Storm Water Pollution Prevention Plan
for

Proposed SDM Rentals Duplex Apartments

Town of Lansing
Lansing, New York

Revised January 2020

Prepared by:

Timothy C. Buhl, PE
NYSPE#: 053134

For:

Scott Morgan
(T) Lansing, Lansing, NY

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1.0 EXECUTIVE SUMMARY

<u>Notes on Change of Ownership</u>

This SWPPP, including stormwater design, modeling, and accompanying documentation were originally approved by the Town of Lansing on November 28, 2016 under the previous site owner, Scott Pinney. Mr. Pinney subsequently filed for Notice of Intent with the New York State Department of Conservation, and received permit acknowledgement and approval. Construction was never begun and the property since changed ownership to Mr. Scott Morgan of SDM Rentals, LLC. Mr. Morgan intends to complete the original project under the same stormwater pollution prevention plan design, using the same approach for quality treatment and quantity attenuation. As such, this plan is being re-submitted to the Town of Lansing under new ownership only. No changes were made to the original document or design.

<u>Summary</u>

The engineer, owner and all contractors involved with construction activity that disturb site soil or who implement pollutant control measures identified in the Storm Water Pollution Prevention Plan (SWPPP) are responsible for complying with the requirements set forth in the National Discharge Elimination System (NPDES) General Permit and any local and/or state governing agencies having jurisdiction with regards to erosion and sediment control. The requirements of the NPDES are as follows:

A. The owner (Scott Morgan) must complete the Notice of Intent (NOI) provided in Attachment A and forward this document to the following agencies at least 5 days prior to starting any construction activity. If the construction activity is located within a permitted municipal separate storm sewer system (MS4), the local municipality must complete and authorize the attached MS4 Acceptance Form and provide that along with the NOI.

   NYS Department of Environmental Conservation (DEC)
   Division of Water
   625 Broadway, 4th Floor
   Albany, New York 12233-3505

   Town of Lansing – Lansing Town Hall
   29 Auburn Road
   Lansing, New York 14882
   (607) 433-4142

All notifications shall be sent via certified mail with return receipt. Copies of mailing receipts shall be kept on record at the project site with the SWPPP and shall be considered part of the contract documents.

The Town's representative shall be included in the pre-construction meeting. Copies of the SWPPP must be provided to the Town of Lansing once all signatures and attachments are complete.

B. A copy of the General Construction Permit (GP-0-15-002), Notice of Intent (NOI), NOI acknowledgement letter received by the DEC, and MS4 Acceptance Form (if applicable), shall be posted in a prominent place for public viewing at the project site.

C. A complete copy of the SWPPP, including copies of all inspection reports, plan revisions, etc., must be retained at the project site at all times during working hours and kept as part of the permanent project records for a duration of no less than three years following submission of the Notice of Termination (NOT).

D. The site development contractors must provide names and addresses of all subcontractors working on the project who will be involved with the major construction activities that will result in soil disturbance. The Owner shall ensure that each contracting firm identifies one trained individual who will be responsible for implementation of the SWPPP. The owner shall also ensure that at least one trained individual is on site on a daily basis when soil disturbance activities are being performed. This information must be retained as part of the SWPPP.

E. The site development contractor and all subcontractors involved with the major construction activities that disturb site soil must sign a copy of the appropriate certification statement included in Attachment C along with the identity of the appropriate trained individual as described in paragraph D of this section.

F. Regular inspections must be made to determine effectiveness of the SWPPP. It would be modified as needed to prevent pollutants from discharging from the site. The inspector must be a person familiar with the site, the nature of the major construction activities, and qualified to evaluate both overall system performance and individual component performance. Additionally, the inspector must either be someone empowered to implement modifications to the SWPPP and the pollutant control devices, if needed, in order to increase effectiveness to an acceptable level, or someone with the authority to cause such events to happen.

G. This SWPPP must be updated each time there is a significant modification to the pollutant prevention system or a change of contractors working on the project who may disturb site soil. The site development contractor must notify the governing agency(s) as soon as these modifications are implemented.

H. Discharge of oil or other hazardous substances into the storm water is subject to reporting and cleanup requirements. Refer to Part III.B of the NPDES General Permit for additional information. Copies of the NPDES General Permit and the Notice of Intent Forms are available by calling 1-703-821-4823.

I. Once the site reaches final stabilization upon completion of the project, Scott Morgan, as Owner, must complete and submit a Notice of Termination (NOT), Form Included in Attachment B.

J. This SWPPP intends to control water-borne and liquid pollutant discharges by some combination of interception, filtration, and containment. The general contractor and subcontractors implementing this SWPPP must remain alert to the need to periodically refine and update the SWPPP in order to accomplish the intended goals.

K. This SWPPP must be amended as necessary during the course of construction in order to keep it current with the pollutant control measures utilized at the site. Amending the SWPPP does not mean that it has to be reprinted. It is acceptable to add addenda, sketches, new sections, and/or revised drawings.

L. A record of the dates when major grading activities occur, when construction activities temporarily or permanently cease on a portion of the site, and when stabilization measures are initiated must be maintained until the NOT is filed. A log for keeping such records is included in the Attachments. A different form for the log may be substituted if it is found to be more useful.

2.0 INTRODUCTION

This SWPPP has been prepared for major activities associated with the construction of a 15 building duplex apartment subdivision on 35.74-AC of land. The property will include associated asphalt driveways, roads, associated landscaping and public and private utilities. The SDM Rentals Duplex Apartment complex is located in the Town of Lansing, Lansing, New York approximately 8,000 feet east of the intersection of Van Ostrand Road and State Hwy 34b and 1,000 feet west of the intersection of Walden Lane and State Hwy 34b. The property sits on 35.74-acres in area of which, the total land disturbance will be approximately 14.9 acres over a multiple construction phase. The additional total impervious area added to the site will be 6.4% based on the calculated ratio of proposed new impervious surface to existing cover. Reference the Project Plans for the permanent stormwater management facilities planned. This SWPPP includes the elements necessary to comply with the national baseline general permit for construction activities administered by the U.S. Environmental Protection Agency (EPA) under the National Pollutant Discharge Elimination System (NPDES) program and all local governing agency requirements. This SWPPP must be implemented at the start of construction.

Construction phase pollutant sources anticipated at the site are disturbed (bare) soil, vehicle fuels and lubricants, chemicals associated with building construction, and building materials. Without adequate control there is the potential for each type of pollutant to be transported by storm water.

The project will consist of the construction of 15 duplex apartment buildings consisting of 2,000-SF structures, asphalt driveways, roads, and landscaping. There will be public water, private sewer, as well as connections to other service utilities ie. (gas, electric, phone). Permanent stormwater management facilities are proposed including seven (7) bioretention areas, one (1) dry swale, one (1) pond, and diversion and interceptor swales to improve water quality from proposed impervious areas and provide water quality attenuation to that of pre-developed conditions.

A. Purpose

The major goal of pollution prevention efforts during project construction is to control the migration of soil and pollutants that originate on-site and prevent them from impacting surface waters and the environment. The purpose of this SWPPP is to provide guidelines for achieving that goal. A successful pollution prevention program also relies upon careful inspection and adjustments during the construction process in order to enhance its effectiveness.

B. Scope

This SWPPP must be implemented before construction begins on the site. It primarily addresses the impact of storm rainfall and runoff in areas of the ground surface disturbed during the construction process. In addition, there are recommendations for controlling other sources of pollution that could accompany the major construction activities. This SWPPP will terminate when disturbed areas are stabilized, construction activities covered herein have ceased, and a completed Notice of Termination (NOT) is mailed to the governing agency requiring the NOT.

Particular forms are included which are necessary for implementing the SWPPP.

The national baseline General Permit for Storm Water Discharges from Construction Activities prohibits most non-storm water discharges during the construction phase. Allowable non-storm water discharges that could occur during construction on this project, which would therefore be covered by the General Permit, include:

1. Discharges from fire fighting activities;

2. Fire hydrant flushing;

3. Water used to wash vehicles or control dust;

4. Water flowing from potable sources and water line flushing:

5. Irrigation drainage;

6. External building wash down which does not use detergents;

7. Runoff from pavement wash down where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents have not been used;

8. Air conditioning condensate;

9. Springs and uncontaminated groundwater; and

10. Foundation or footing drains where flows are not contaminated with process materials such as solvents.

The techniques described in this SWPPP focus on providing control of pollutant discharges with practical approaches that utilize readily available expertise, materials, and equipment.

The Owner/Developer referred to in this SWPPP is Scott Morgan who will be responsible for full development and build-out of the subject parcel.

3.0 PROJECT DESCRIPTION

Described below are the major construction activities that are subject to this SWPPP. The Owner shall not disturb greater than five (5) acres of soil at any one time without prior written authorization from the DEC, or, in areas under the jurisdiction of a regulated MS4, authorization by that municipality. They are presented in the order (or sequence) they are expected to begin, but each activity will not necessarily be completed before the next begins. Install erosion and sediment control measures as shown on Drainage, Sediment and Erosion Control

Plans, down slope from construction activities that disturb site soil before disturbance of soil;

CONSTRUCTION – EACH PHASE

A. Construction of stabilized construction entrance(s);

B. Placement of silt fence;

C. Construction of grassed diversion swales along the northern property boundary, and at the west end of subcatchment OSC-4 as shown on plans. These will be used as necessary, to channel upstream flow into areas directed by the Erosion and Sediment Control Plan;

D. Downstream stormwater controls must be installed before development takes place within each subcatchment. Individual stormwater practices shall correspond to the localized disturbance area as shown on construction drawings. For example, in anticipation of work planned within subcatchment PSC-2, the Owner shall first complete the installation of the bioretention area, BR-2, and all of its associated interceptor swales. Similarly, the Pond shall be constructed prior to any soil disturbance planned in PSC-7.

E. Construction of development roadway to gain access to each individual construction area.

F. Construction activities for the development of building and associated driveway/parking area:

    a. Install bioretention areas in locations shown on plans ***before*** major construction activities associated with lot development occur.

    b. Construct drainage swales/plumbing to bring local runoff into retention areas.

    c. Ensure that site is graded toward local retention areas;

    d. Construct driveways and individual lot temporary parking;

    e. Construct general utility services (ie. water and sewer piping, storm piping, etc.)

    f. Construct buildings;

    g. Construct other utility service connections (gas, electric, phone);

Note: For all Underground Utilities– Sediment barriers will be utilized as required to bind the down slope side of utility construction and soil stockpiles;

G. Remove any accumulated sedimentation from bioretention swales, dry swale, diversion swales, and pond. Return property to permanent lines and grades;

H. Final Grading Mulching & Seeding – Sediment barriers will be maintained down slope from disturbed soil during these operations;

I. Completion of site stabilization, ie. Vegetative cover, driveway surface. Sediment & Erosion Controls to remain in place until vegetative cover reaches 80% density.

4.0 RUNOFF REDUCTION VOLUME

This project follows the newer guidelines set forth by the DEC for runoff reduction. Chapter 3 or the New York State Stormwater Management Design Manual requires a five step planning process to document compliance with required processes.

<u>Step 1 – Protect natural resources and utilize site hydrology</u>

This planning step is designed to preserve area natural resources by protecting areas, avoiding sensitive locations, and minimizing grading and soil disturbances. There were no erodible soils, critical areas, wetlands, riparian buffer areas, or locally listed protected areas.

Another component of the planning process is an evaluation of all green infrastructure practices that might be acceptable for runoff reduction on site. This project will utilize bioretention areas and a dry swale.

The selection process is described as follows:

- Conservation of natural areas – Pre-development hydrology and water quality characteristics of undisturbed natural areas remains unaltered.

- Sheetflow to riparian buffers – None were available on-site.

- Vegetated open swales – Interceptor/Diversion swales will be used to direct on-site runoff into appropriate treatment practices.

- Tree planting/tree box – This was not a specific reduction practice considered for this project.

- Disconnection of rooftop runoff – There were no low lying natural areas that runoff could be directed to that could be disconnected from the design point. As such, rooftop runoff will be channeled to associated site bioretention areas.

- Stream daylighting for redevelopment projects – None on site.

- Bioswale – Bioretention areas will be utilized to control building and driveway runoff. The basins are designed for quality treatment.

- Green roof – This practice was cost prohibitive to the project and is impractical for individual homes. As such, this option was not considered.

- Stormwater planters – Bioretention areas were utilized to control runoff from rooftop, parking, and driveway areas due to the large surface areas involved.

- Rain cistern – This practice was considered impractical for the overall usage and square footage of the developed parcels. Source control measures like bioretention areas were considered instead.

- Porous pavement - This practice was cost prohibitive to the project and as such, this was not considered.

<u>Step 2 – Determine Overall Water Quality Treatment Volume (WQv)</u>

As required, the project originally planned to meet 100% of the WQv using green infrastructure practices and an infiltration basin was designed to capture and treat approximately 6,900 CF of runoff volume. An infiltration test was conducted at the proposed location of the basin on May 14, 2016 in accordance with Appendix D of the NYSDEC Stormwater Management Design Manual. The soil did not meet the necessary minimum percolation rate (0.5"/hr) and a standard practice to meet the remaining WQv after runoff reduction volume was implemented. See Attachment K for the calculation summary.

<u>Step 3 – Runoff reduction by applying green infrastructure technology and standard SMPs.</u>

Green infrastructure techniques were evaluated to potentially reduce the overall water quality volume. Green infrastructure practices used for this project were identified in Steps 1 and 2. The majority of site controls was through the use of standard infiltration practices including bioretention areas and a dry swale. As shown in Attachment K, minimum requirements for runoff reduction volume were met.

<u>Step 4 – Provide standard practices to address remaining water quality volume</u>

A pond was designed to provide treatment to address the remaining water quality volume after runoff reduction. See Step 2 above for an explanation as to why green infrastructure practices were impractical for this step. Reference Attachment K for the overall treatment calculations.

Step 5 – Apply volume and peak rate control practices if still required

A pond was added to the design to provide quantity attenuation to that of pre-developed conditions.

5.0 STORM WATER POLLUTION PREVENTION MEASURES AND CONTROLS

Various erosion and sediment control measures have been incorporated into the design of the project, Reference Stormwater, Sediment and Erosion Control Plans accompanying this SWPPP. These measures will be implemented during construction to minimize soil erosion and to protect the character and integrity of downstream receiving waters. The bioretention areas, dry swale, pond, and interceptor/diversion swales, will remain upon completion of the project to control the quality and quantity of storm water runoff from the developed site.

The site development contractor shall take all appropriate precautions to prevent soil erosion and discharge of sediment and other pollutants to receiving water bodies and wetlands. Specific measures are outlined in this plan. In general, disturbance areas shall be limited to the smallest practical areas at any given time, and the areas are to be reseeded as soon as possible. During construction the measures outlined in this document and shown on the plans are to be installed as described. Additional measures may be warranted or required by site and climatic conditions.

Specific erosion control measures, designed to minimize soil loss, and sediment control measures devised to retain eroded soil and prevent it from reaching water bodies or adjoining properties have been developed in accordance with the New *York State Stormwater Management Design Manual*, 2010, NYSDEC and *New York Standards & Specifications for Erosion and Sedimentation Control*, August 2005. Reference Attachment H for copy of *Vegetative and Structural, Measures for Erosion and Sediment Control, Sections 3 and 5 of the New York Standards & Specifications for Erosion and Sedimentation Control,* August 2005.

A variety of storm water pollutant controls are recommended for this project. Some controls are intended to function temporarily and will be used as needed for pollutant control during the construction period. These include temporary sediment and erosion control measures as shown on the plans and permanent stormwater facilities including, seven bioretention areas, a dry swale, a pond, and interceptor/diversion swales. For all disturbed areas, permanent stabilization will be accomplished by covering the disturbed soil with vegetation, pavement, or commercial structures.

A. Erosion and Sediment Controls

1. Soil Stabilization – The purpose of soil stabilization is to prevent soil from leaving the site. In the natural condition, soil is stabilized by native vegetation. The primary technique to be used at this project for stabilizing site soil will be to provide a protective cover of turf grass, pavement, or building structure.

a. Temporary Seeding - Where land disturbance is necessary, temporary seeding with fast-germinating temporary seed and a protection of mulch must be used on areas which will be exposed for more than 14 days.

b. Permanent Seeding – All areas at final grade must be seeded and mulched within 7 days after completion of the major activity.

c. Structural Controls – The storm water will be managed on the site utilizing proposed site grading, bioretention areas, dry swale, pond, and associated swale based drainage systems. Their design is shown on the Project Site Stormwater Plans.

Final site stabilization is achieved when there is a uniform 80 percent density of permanent vegetation on all previously disturbed soil surfaces, exclusive of areas that have been paved.

B. Other Pollutant Controls

Control of sediments has been described previously. Other aspects of this SWPPP are listed below:

1. Dust Control – Construction traffic must enter and exit the site at the stabilized construction/driveway entrance. The purpose is to trap dust and mud that would otherwise be carried off-site by construction traffic.

Dust control must be provided by the general contractor to a degree that is acceptable to the Owner, and in compliance with applicable local and state dust control regulations. After construction, the site will be stabilized (as described elsewhere), which will reduce the potential for dust generation.

2. Solid Waste Disposal – No solid materials, including building materials, are allowed to be discharged from the site with storm water.

All solid waste, including disposable materials incidental to the major construction activities, must be collected and placed in containers. The containers will be emptied periodically by a contract trash disposal service and hauled away from the site.

Substances that have the potential for polluting surface and/or groundwater must be controlled by whatever means necessary in order to ensure that they do not discharge from the site. As an example, special care must be exercised during equipment fueling and servicing operations. If a spill occurs, it must be contained and disposed so that it will not flow from the site or enter groundwater, even if this requires removal, treatment, and disposal of soil. In this regard, potentially polluting substances should be handled in a manner consistent with the impact they represent.

3. Sanitary Facilities – All personnel involved with construction activities must comply with state and local sanitary or septic system regulations. Temporary sanitary facilities will be provided at the site throughout the construction phase. They must be utilized by all construction personnel and will be serviced by a commercial contractor.

4. Water Source – Non-storm water components of site discharge must be clean water. Water used for construction, which discharges from the site, must originate from a public water supply or private well approved by the State Health Department. Water used for construction that does not originate from an approved public supply must not discharge from the site. It can be retained in temporary ponds until it infiltrates and evaporates.

5. Long-Term Pollutant Controls – Storm water pollutant control measures installed during construction that will also provide benefits after construction, include seven (7) bioretention areas, one (1) dry swale, one (1) pond, and interceptor/diversion swales. Those sediment barriers that do not interfere with normal operations and appear to provide long-term benefits can be left in place after construction is completed.

C. Construction Phase “Best Management Practices”

During the construction phase, the general contractor will implement the following measures:

1. Permanent traffic corridors shall be established and “routes of convenience” shall be avoided;

2. Preservation of existing vegetation as much as possible. Following the completion of construction activities in any portion of the site permanent vegetation shall be established an all exposed soils;

3. Site preparation activities shall be planned to minimize the area and duration of soil disruption;

4. Minimizing soil erosion and sedimentation by stabilization of disturbed areas and by removing sediment from construction site discharges;

5. Material resulting from the clearing and grubbing operation will be stockpiled up slope from adequate sedimentation controls.

6. The general contractor will designate areas for equipment cleaning, maintenance, and repair. The general contractor and subcontractors will utilize those areas. The areas will be protected by a temporary perimeter berm.

7. Use of detergents for large scale washing is prohibited (i.e., vehicles, buildings, pavement surfaces, etc.)

8. Chemicals, paints, solvents, fertilizers, and other toxic material must be stored in waterproof containers. Except during application, the contents must be kept in trucks or within storage facilities. Runoff containing such material must be collected, removed from the site, treated and disposed at an approved solid waste or chemical disposal facility.

6.0 LOCAL PLANS

In addition to this SWPPP, construction activities associated with this project must comply with any guidelines set forth by local and state regulatory agencies. Reference Project Plans and the Stormwater Management Design Summary (Attachment K) prepared to meet Local and State requirements for post-development stormwater quantity & quality.

7.0 WETLANDS, FLOODPLAINS, AND FLOOD LIMITS

A search was made on the State DEC Environmental Mapper web site to identify any state regulated wetlands in the project vicinity. In addition, a review from the Tompkins County Natural Resources Mapper web site was conducted to evaluate flood plain zones in the area. On both accounts, it appears that the project is well outside of any known target zones, respectively. Please see Attachment D for area mapping.

8.0 NYSHPO

A search was conducted on the New York State Parks, Recreation and Historic Preservation Office (SHPO) website to identify whether the subject parcel is listed under natural or historic places registration, or if the area resides within an archaeologically sensitive location. Attachment E, includes a "circles and squares map" indicating that the property is not found to be within this type of area designation. An application was made to the SHPO office and the project received confirmation on October 15, 2015 regarding the same.

9.0 INSPECTIONS AND SYSTEM MAINTENANCE

Between the time this SWPPP is implemented and final site stabilization is achieved, all disturbed areas and pollutant controls must be inspected at least once every seven calendar days by a licensed professional. The purpose of site inspections is to assess performance of pollutant controls. The inspections will be conducted by a third party professional provided by the Owner. The development contractor will also be required to arrange for a designated trained representative to be responsible for the management of this SWPPP. Based on these inspections, the contractor will decide whether it is necessary to modify this SWPPP, add or relocate sediment barriers, or whatever else may be needed in order to prevent pollutants from leaving the site via storm water runoff. The general contractor has the duty to cause pollutant control measures to be repaired, modified, maintained, supplemented, or whatever else is necessary in order to achieve effective pollutant control.

Examples of particular items to evaluate during site inspections are listed below. This list is not intended to be comprehensive. During each inspection the inspector must evaluate overall pollutant control system performance as well as particular details of individual system components. Additional factors should be considered as appropriate to the circumstances.

A. Construction of stormwater facilities. Insure facilities are constructed substantially in accordance with the plans. (Also, Reference Attachment F for sample inspection checklist - NYSDEC Stormwater Construction Checklist):

B. Locations where vehicles enter and exit the site must be inspected for evidence of off-site sediment tracking. A stabilized construction entrance will be constructed where vehicles enter and exit. This entrance will be maintained or supplemented as necessary to prevent sediment from leaving the site on vehicles.

C. Sediment barriers must be inspected and, if necessary, they must be enlarged or cleaned in order to provide additional capacity. All material from behind sediment barriers will be stockpiled on the up slope side. Additional sediment barriers must be constructed as needed.

D. Inspections will evaluate disturbed areas and areas used for storing materials that are exposed to rainfall for evidence of, or the potential for, pollutants entering the drainage system. If necessary, the materials must be covered or original covers must be repaired or supplemented. Also, protective berms must be constructed, if needed, in order to contain runoff from material storage areas.

E. Grassed areas will be inspected to confirm that a healthy stand of grass is maintained. The site has achieved final stabilization once all areas are covered with building foundation or pavement, or have a stand of grass with at least 80 percent density. The density of 80 percent or greater must be maintained to be considered as stabilized. Areas must be watered, fertilized, and reseeded as needed to achieve this goal.

F. All discharge points must be inspected to determine whether erosion control measures are effective in preventing significant impacts to receiving waters.

Based on inspection results, any modification necessary to increase effectiveness of this SWPPP to an acceptable level must be made within seven calendar days of the inspection. The inspection reports must be completed entirely and additional remarks should be included if needed to fully describe a situation. An important aspect of the inspection report is the description of additional measures that need to be taken to enhance plan effectiveness. The inspection report must identify whether the site was in compliance with the SWPP at the time of inspection and specifically identify all incidents of non-compliance.

Inspection reports must be kept on file by the general contractor as an integral part of this SWPPP for at least three years from the date of completion of the project.

Ultimately, it is the responsibility of the site development contractor to assure the adequacy of site pollutant discharge controls. Actual physical site conditions or contractor practices could make it necessary to install more structural controls than are shown on the plans. (For example, localized concentrations of runoff could make it necessary to install additional sediment barriers.) Assessing the need for additional controls and implementing them or adjusting existing controls will be a continuing aspect of this SWPPP until the site achieves final stabilization.

10.0 POST CONSTRUCTION INSPECTION, OPERATION AND MAINTENANCE PLAN

A. Maintenance Responsibility

Short and long term maintenance responsibilities for the bioretention areas, dry swale, pond, and associated swales and culvert drainage systems will lay with Scott Morgan.

Specifically, Scott Morgan is aware that the following shall be incorporated into the project as part of an O&M post construction management plan:

1. A sign shall be erected in a conspicuous area (ie. close proximity to each developed practice) to identify each stormwater management practice including: the six bioretention areas, dry swale, pond, and diversion swales. The sign shall be of a size not less than 18” x 24” (or 10” x 12” for footprints smaller than 400 SF) bearing the following information:

   STORMWATER MANAGEMENT PRACTICE
   Project Identification (*SPDES Permit #*)
   Bioretention area, pond, dry swale, diversion swales
   Must be maintained in Accordance with O&M Plan

2. A legally binding mechanism shall be used to ensure long term operation and maintenance and protection of the bioretention areas, dry swale, pond, and general diversion swales. This mechanism shall be through execution of an agreement with the Town of Lansing, carried by deed which shall be transferred upon full build-out between Scott Morgan and the Town of Lansing.

3. Copies of the practice designs and details shall be kept on record and be made available at all times. Copies shall also be forwarded to the Town of Lansing for archival purposes.

B. Sediment & Debris Removal

Sediment removal in the retention areas shall occur every five to six years or after 50% of total capacity has been lost. Inspection of the infiltration practices shall take place annually after the spring melt to determine if maintenance is necessary. Sediments excavated from the stormwater controls that have not received runoff from designated hotspots and are generally not considered toxic or hazardous may be safely excavated, transported and used as fill.

C. Inspection & Periodic Maintenance

To ensure the continued operation and long term performance of the proposed stormwater management system, inspections shall be conducted periodically for the first few months following construction and then on an annual basis. Site inspection should also be performed following major storm events (i.e., intense storms, thunder storms, cloud bursts, etc.). Items to check for include, but are not limited to the following: (Reference Attachment I and Attachment J for complete inspection checklist - NYSDEC Stormwater Operation, Maintenance and Management Inspection Checklists):

i) Embankment & Structural;

- Check basin embankments, outlets and spillways note cracks, bulges, animal burrows, differential settlement, damage to or fatigue of stormwater pipe, structures and permanent erosion control. Components of the system that require repair or replacement should be addressed immediately following identification. Check pipes, channels, grates, inlet structures and spillways to insure design capacity. Look for objects or accumulations of sediments and debris obstructing flow path.

ii) Vegetation;

- Preclude deep rooted woody plant growth on pond embankment by mowing at least once annually.

- Maintain a dense vigorous growth of grass cover. Spot seed, mulch and fertilize where necessary.

Attachment A:
Notice of Intent, (NOI) and MS4 Acceptance Form

NOI for coverage under Stormwater General Permit for Construction Activity

Alternate ID SDM Rentals Duplex Apartments **Submission** HNX-1S7Z-B2SNG **Revision** 1 **Form Version** 1.20

Review

This step allows you to review the form to confirm the form is populated completely and accurately, prior to certification and submission.

Please note: Any work you perform filling out a form will not be accessible by NYSDEC staff or the public until you actually submit the form in the 'Certify & Submit' step.

OWNER/OPERATOR INFORMATION

Owner/Operator Name (Company/Private Owner/Municipality/Agency/Institution, etc.)
SDM Rentals, LLC

Owner/Operator Contact Person Last Name (NOT CONSULTANT)
Morgan

Owner/Operator Contact Person First Name
Scott

Owner/Operator Mailing Address
P.O. Box 4925

City
Ithaca

State
NY

Zip
14852

Phone
6072795609

Email
sdmlandscaping@hotmail.com

Federal Tax ID
None Specified

PROJECT LOCATION

Project/Site Name
SDM Rentals Duplex Apartments

Street Address (Not P.O. Box)
Peruville Road

Side of Street
North

City/Town/Village (THAT ISSUES BUILDING PERMIT)
(T) Lansing

State
NY

Zip
14882

County
TOMPKINS

DEC Region
7

Name of Nearest Cross Street
Walton Lane

Distance to Nearest Cross Street (Feet)
1000

Project In Relation to Cross Street
West

Tax Map Numbers Section-Block-Parcel
None Specified

Tax Map Numbers
None Specified

1. Coordinates

Provide the Geographic Coordinates for the project site. The two methods are:
- Navigate to the project location on the map (below) and click to place a marker and obtain the XY coordinates.
- The "Find Me" button will provide the lat/long for the person filling out this form. Then pan the map to the correct location and click the map to place a marker and obtain the XY coordinates.

Navigate to your location and click on the map to get the X,Y coordinates

Latitude	Longitude
42.53999034775728	-76.45904901880583

PROJECT DETAILS

2. What is the nature of this project?
New Construction

3. Select the predominant land use for both pre and post development conditions.

Pre-Development Existing Landuse
Pasture/Open Land

Post-Development Future Land Use
Multifamily Residential

3a. If Single Family Subdivision was selected in question 3, enter the number of subdivision lots.
None Specified

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4. In accordance with the larger common plan of development or sale, enter the total project site acreage, the acreage to be disturbed and the future impervious area (acreage)within the disturbed area.

*** ROUND TO THE NEAREST TENTH OF AN ACRE. ***

Total Site Area (acres)
35.74

Total Area to be Disturbed (acres)
14.9

Existing Impervious Area to be Disturbed (acres)
0

Future Impervious Area Within Disturbed Area (acres)
2.28

5. Do you plan to disturb more than 5 acres of soil at any one time?
No

6. Indicate the percentage (%) of each Hydrologic Soil Group(HSG) at the site.

A (%)
16

B (%)
3

C (%)
81

D (%)
0

7. Is this a phased project?
Yes

8. Enter the planned start and end dates of the disturbance activities.

Start Date
06/01/2020

End Date
06/01/2022

9. Identify the nearest surface waterbody(ies) to which construction site runoff will discharge.
Class B Stream - #898-238

9a. Type of waterbody identified in question 9?
Stream/Creek Off Site

Other Waterbody Type Off Site Description
None Specified

9b. If "wetland" was selected in 9A, how was the wetland identified?
None Specified

10. Has the surface waterbody(ies in question 9 been identified as a 303(d) segment in Appendix E of GP-0-15-002?
No

11. Is this project located in one of the Watersheds identified in Appendix C of GP-0-15-002?
No

12. Is the project located in one of the watershed areas associated with AA and AA-S classified waters?
Yes

If No, skip question 13.

13. Does this construction activity disturb land with no existing impervious cover and where the Soil Slope Phase is identified as an E or F on the USDA Soil Survey?
No

If Yes, what is the acreage to be disturbed?
None Specified

14. Will the project disturb soils within a State regulated wetland or the protected 100 foot adjacent area?
No

15. Does the site runoff enter a separate storm sewer system (including roadside drains, swales, ditches, culverts, etc)?
Yes

16. What is the name of the municipality/entity that owns the separate storm sewer system?
Town of Lansing

17. Does any runoff from the site enter a sewer classified as a Combined Sewer?
No

18. Will future use of this site be an agricultural property as defined by the NYS Agriculture and Markets Law?
No

19. Is this property owned by a state authority, state agency, federal government or local government?
No

20. Is this a remediation project being done under a Department approved work plan? (i.e. CERCLA, RCRA, Voluntary Cleanup Agreement, etc.)
No

REQUIRED SWPPP COMPONENTS

21. Has the required Erosion and Sediment Control component of the SWPPP been developed in conformance with the current NYS Standards and Specifications for Erosion and Sediment Control (aka Blue Book)?
Yes

22. Does this construction activity require the development of a SWPPP that includes the post-construction stormwater management practice component (i.e. Runoff Reduction, Water Quality and Quantity Control practices/techniques)?
Yes

If you answered No in question 22, skip question 23 and the Post-construction Criteria and Post-construction SMP Identification sections.

23. Has the post-construction stormwater management practice component of the SWPPP been developed in conformance with the current NYS Stormwater Management Design Manual?
Yes

24. The Stormwater Pollution Prevention Plan (SWPPP) was prepared by:
Professional Engineer (P.E.)

SWPPP Preparer
Timothy C. Buhl

Contact Name (Last, Space, First)
Gibson, Scott

Mailing Address
5 Orchard Avenue

City
Watkins Glen

State
New York

Zip
14891

Phone
6072280662

Email
scottg@stny.rr.com

Download SWPPP Preparer Certification Form

Please take the following steps to prepare and upload your preparer certification form:

1) Click on the link below to download a blank certification form
2) The certified SWPPP preparer should sign this form
3) Scan the signed form
4) Upload the scanned document

Download SWPPP Preparer Certification Form

Please upload the SWPPP Preparer Certification

No files uploaded

Comment
None Specified

At least one file is required.

EROSION & SEDIMENT CONTROL CRITERIA

25. Has a construction sequence schedule for the planned management practices been prepared?
Yes

26. Select all of the erosion and sediment control practices that will be employed on the project site:

Temporary Structural

Check Dams
Perimeter Dike/Swale
Sediment Traps
Stabilized Construction Entrance
Silt Fence
Construction Road Stabilization

Biotechnical
None

Vegetative Measures
Grassed Waterway
Mulching
Seeding
Sodding
Topsoiling

Permanent Structural
Diversion

Other
None Specified

POST-CONSTRUCTION CRITERIA

*** IMPORTANT: Completion of Questions 27-39 is not required if response to Question 22 is No.**

27. Identify all site planning practices that were used to prepare the final site plan/layout for the project.
Reduction of Clearing and Grading
Roadway Reduction

27a. Indicate which of the following soil restoration criteria was used to address the requirements in Section 5.1.6("Soil Restoration") of the Design Manual (2010 version).

All disturbed areas will be restored in accordance with the Soil Restoration requirements in Table 5.3 of the Design Manual (see page 5-22).

28. Provide the total Water Quality Volume (WQv) required for this project (based on final site plan/layout). (Acre-feet)

0.232

29. Post-construction SMP Identification

Use the Post-construction SMP Identification section to identify the RR techniques (Area Reduction), RR techniques(Volume Reduction) and Standard SMPs with RRv Capacity that were used to reduce the Total WQv Required (#28).

Identify the SMPs to be used by providing the total impervious area that contributes runoff to each technique/practice selected. For the Area Reduction Techniques, provide the total contributing area (includes pervious area) and, if applicable, the total impervious area that contributes runoff to the technique/practice.

Note: Redevelopment projects shall use the Post-Construction SMP Identification section to identify the SMPs used to treat and/or reduce the WQv required. If runoff reduction techniques will not be used to reduce the required WQv, skip to question 33a after identifying the SMPs.

30. Indicate the Total RRv provided by the RR techniques (Area/Volume Reduction) and Standard SMPs with RRv capacity identified in question 29. (acre-feet)

0.068

31. Is the Total RRv provided (#30) greater than or equal to the total WQv required (#28)?

No

If Yes, go to question 36. If No, go to question 32.

32. Provide the Minimum RRv required based on HSG. [Minimum RRv Required = (P) (0.95) (Ai) / 12, Ai=(s) (Aic)] (acre-feet)

0.064

32a. Is the Total RRv provided (#30) greater than or equal to the Minimum RRv Required (#32)?

Yes

If Yes, go to question 33.

Note: Use the space provided in question #39 to summarize the specific site limitations and justification for not reducing 100% of WQv required (#28). A detailed evaluation of the specific site limitations and justification for not reducing 100% of the WQv required (#28) must also be included in the SWPPP.

If No, sizing criteria has not been met; therefore, NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

33. SMPs

Use the Post-construction SMP Identification section to identify the Standard SMPs and, if applicable, the Alternative SMPs to be used to treat the remaining total WQv (=Total WQv Required in #28 - Total RRv Provided in #30).

Also, provide the total impervious area that contributes runoff to each practice selected.

NOTE: Use the Post-construction SMP Identification section to identify the SMPs used on Redevelopment projects.

33a. Indicate the Total WQv provided (i.e. WQv treated) by the SMPs identified in question #33 and Standard SMPs with RRv Capacity identified in question #29. (acre-feet)

0.164

Note: For the standard SMPs with RRv capacity, the WQv provided by each practice = the WQv calculated using the contributing drainage area to the practice - provided by the practice. (See Table 3.5 in Design Manual)

34. Provide the sum of the Total RRv provided (#30) and the WQv provided (#33a).

0.232

35. Is the sum of the RRv provided (#30) and the WQv provided (#33a) greater than or equal to the total WQv required (#28)?

Yes

If Yes, go to question 36.

If No, sizing criteria has not been met; therefore, NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

36. Provide the total Channel Protection Storage Volume (CPv required and provided or select waiver (#36a), if applicable.

CPv Required (acre-feet)
0.235

CPv Provided (acre-feet)
0.434

36a. The need to provide channel protection has been waived because:
None Specified

37. Provide the Overbank Flood (Qp) and Extreme Flood (Qf) control criteria or select waiver (#37a), if applicable.

Overbank Flood Control Criteria (Qp)

Pre-Development (CFS)
12.35

Post-Development (CFS)
9.43

Total Extreme Flood Control Criteria (Qf)

Pre-Development (CFS)
64.97

Post-Development (CFS)
54.21

37a. The need to meet the Qp and Qf criteria has been waived because:

None Specified

38. Has a long term Operation and Maintenance Plan for the post-construction stormwater management practice(s) been developed?
Yes

If Yes, Identify the entity responsible for the long term Operation and Maintenance
Scott Morgan

39. Use this space to summarize the specific site limitations and justification for not reducing 100% of WQv required (#28). (See question #32a) This space can also be used for other pertinent project information.
As required, the project originally planned to meet 100% of the WQv using green infiltration practices and an infiltration basin was designed to capture and treat approximately 6,900-CF of runoff volume. A centralized basin was chosen due to site limitations in slope and contour. An infiltration test was conducted at the proposed basin location on May 14, 2016 with testing in accordance with Appendix D of the NYSDEC Stormwater Management Design Manual. The soil did not meet the minimum percolation rate of 0.5"/hr and a standard practice to meet the remaining WQv after minimum RRv was implemented instead.

POST-CONSTRUCTION SMP IDENTIFICATION

Runoff Reduction (RR) Techniques, Standard Stormwater Management Practices (SMPs) and Alternative SMPs

Identify the Post-construction SMPs to be used by providing the total impervious area that contributes runoff to each technique/practice selected. For the Area Reduction Techniques, provide the total contributing area (includes pervious area) and, if applicable, the total impervious area that contributes runoff to the technique/practice.

RR Techniques (Area Reduction)

Round to the nearest tenth

Total Contributing Acres for Conservation of Natural Area (RR-1)
None Specified

Total Contributing Impervious Acres for Conservation of Natural Area (RR-1)
None Specified

Total Contributing Acres for Sheetflow to Riparian Buffers/Filter Strips (RR-2)
None Specified

Total Contributing Impervious Acres for Sheetflow to Riparian Buffers/Filter Strips (RR-2)
None Specified

Total Contributing Acres for Tree Planting/Tree Pit (RR-3)
None Specified

Total Contributing Impervious Acres for Tree Planting/Tree Pit (RR-3)
None Specified

Total Contributing Acres for Disconnection of Rooftop Runoff (RR-4)
None Specified

RR Techniques (Volume Reduction)

Total Contributing Impervious Acres for Disconnection of Rooftop Runoff (RR-4)
None Specified

Total Contributing Impervious Acres for Vegetated Swale (RR-5)
None Specified

Total Contributing Impervious Acres for Rain Garden (RR-6)
None Specified

Total Contributing Impervious Acres for Stormwater Planter (RR-7)
None Specified

Total Contributing Impervious Acres for Rain Barrel/Cistern (RR-8)
None Specified

Total Contributing Impervious Acres for Porous Pavement (RR-9)
None Specified

Total Contributing Impervious Acres for Green Roof (RR-10)
None Specified

Standard SMPs with RRv Capacity

Total Contributing Impervious Acres for Infiltration Trench (I-1)
None Specified

Total Contributing Impervious Acres for Infiltration Basin (I-2)
None Specified

Total Contributing Impervious Acres for Dry Well (I-3)
None Specified

Total Contributing Impervious Acres for Underground Infiltration System (I-4)
None Specified

Total Contributing Impervious Acres for Bioretention (F-5)
0.69

Total Contributing Impervious Acres for Dry Swale (O-1)
0.07

Standard SMPs

Total Contributing Impervious Acres for Micropool Extended Detention (P-1)
None Specified

Total Contributing Impervious Acres for Wet Pond (P-2)
1.72

Total Contributing Impervious Acres for Wet Extended Detention (P-3)
None Specified

Total Contributing Impervious Acres for Multiple Pond System (P-4)
None Specified

Total Contributing Impervious Acres for Pocket Pond (P-5)
None Specified

Total Contributing Impervious Acres for Surface Sand Filter (F-1)
None Specified

Total Contributing Impervious Acres for Underground Sand Filter (F-2)
None Specified

Total Contributing Impervious Acres for Perimeter Sand Filter (F-3)
None Specified

Total Contributing Impervious Acres for Organic Filter (F-4)
None Specified

Total Contributing Impervious Acres for Shallow Wetland (W-1)
None Specified

Total Contributing Impervious Acres for Extended Detention Wetland (W-2)
None Specified

Total Contributing Impervious Acres for Pond/Wetland System (W-3)
None Specified

Total Contributing Impervious Acres for Pocket Wetland (W-4)
None Specified

Total Contributing Impervious Acres for Wet Swale (O-2)
None Specified

Alternative SMPs (DO NOT INCLUDE PRACTICES BEING USED FOR PRETREATMENT ONLY)

Total Contributing Impervious Area for Hydrodynamic
None Specified

Total Contributing Impervious Area for Wet Vault
None Specified

Total Contributing Impervious Area for Media Filter
None Specified

"Other" Alternative SMP?
None Specified

Total Contributing Impervious Area for "Other"
None Specified

Provide the name and manufaturer of the alternative SMPs (i.e. proprietary practice(s)) being used for WQv treatment.

Note: Redevelopment projects which do not use RR techniques, shall use questions 28, 29, 33 and 33a to provide SMPs used, total WQv required and total WQv provided for the project.

Manufacturer of Alternative SMP
None Specified

Name of Alternative SMP
None Specified

OTHER PERMITS

40. Identify other DEC permits, existing and new, that are required for this project/facility.
None

If SPDES Multi-Sector GP, then give permit ID
None Specified

If Other, then identify
None Specified

41. Does this project require a US Army Corps of Engineers Wetland Permit?
No

If "Yes," then indicate Size of Impact, in acres, to the nearest tenth
None Specified

42. If this NOI is being submitted for the purpose of continuing or transferring coverage under a general permit for stormwater runoff from construction activities, please indicate the former SPDES number assigned.
None Specified

MS4 SWPPP ACCEPTANCE

43. Is this project subject to the requirements of a regulated, traditional land use control MS4?
Yes - Please attach the MS4 Acceptance form below

If No, skip question 44

44. Has the "MS4 SWPPP Acceptance" form been signed by the principal executive officer or ranking elected official and submitted along with this NOI?
Yes

MS4 SWPPP Acceptance Form Download

Download form from the link below. Complete, sign, and upload.

MS4 SWPPP Acceptance Form

MS4 Acceptance Form Upload

No files uploaded

Comment

None Specified

OWNER/OPERATOR CERTIFICATION

The owner/operator must download, sign, and upload the certification form in order to complete this application.

Owner/Operator Certification Form Download

Download the certification form by clicking the link below. Complete, sign, scan, and upload the form.

Owner/Operator Certification Form (PDF, 45KB)

Upload Owner/Operator Certification Form

No files uploaded

Comment

None Specified

At least one file is required.

New York State Department of Environmental Conservation Division of Water 625 Broadway, 4th Floor Albany, New York 12233-3505 MS4 Stormwater Pollution Prevention Plan (SWPPP) Acceptance Form for Construction Activities Seeking Authorization Under SPDES General Permit *(NOTE: Attach Completed Form to Notice Of Intent and Submit to Address Above)
I. Project Owner/Operator Information
1. Owner/Operator Name:
2. Contact Person:
3. Street Address:
4. City/State/Zip:
II. Project Site Information
5. Project/Site Name:
6. Street Address:
7. City/State/Zip:
III. Stormwater Pollution Prevention Plan (SWPPP) Review and Acceptance Information
8. SWPPP Reviewed by:
9. Title/Position:
10. Date Final SWPPP Reviewed and Accepted:
IV. Regulated MS4 Information
11. Name of MS4:
12. MS4 SPDES Permit Identification Number: NYR20A
13. Contact Person:
14. Street Address:
15. City/State/Zip:
16. Telephone Number:

MS4 SWPPP Acceptance Form -continued
V. Certification Statement - MS4 Official (principal executive officer or ranking elected official) or Duly Authorized Representative
I hereby certify that the final Stormwater Pollution Prevention Plan (SWPPP) for the construction project identified in question 5 has been reviewed and meets the substantive requirements in the SPDES General Permit For Stormwater Discharges from Municipal Separate Storm Sewer Systems (MS4s). Note: The MS4, through the acceptance of the SWPPP, assumes no responsibility for the accuracy and adequacy of the design included in the SWPPP. In addition, review and acceptance of the SWPPP by the MS4 does not relieve the owner/operator or their SWPPP preparer of responsibility or liability for errors or omissions in the plan.
Printed Name:
Title/Position:
Signature:
Date:
VI. Additional Information

Attachment B:
Notice of Termination, (NOT)

New York State Department of Environmental Conservation Division of Water 625 Broadway, 4th Floor Albany, New York 12233-3505 ***(NOTE: Submit completed form to address above)*** **NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity**

Please indicate your permit identification number: NYR ___ ___ ___ ___ ___ ___

I. Owner or Operator Information

1. Owner/Operator Name:

2. Street Address:

3. City/State/Zip:

4. Contact Person:	4a.Telephone:

5. Contact Person E-Mail:

II. Project Site Information

5. Project/Site Name:

6. Street Address:

7. City/Zip:

8. County:

III. Reason for Termination

9a. G All disturbed areas have achieved final stabilization in accordance with the general permit and SWPPP.
***Date final stabilization completed** (month/year):

9b. G Permit coverage has been transferred to new owner/operator. Indicate new owner/operator's permit identification number: NYR ___ ___ ___ ___ ___ ___ (Note: Permit coverage can not be terminated by owner identified in I.1. above until new owner/operator obtains coverage under the general permit)

9c. G Other (Explain on Page 2)

IV. Final Site Information:

10a. Did this construction activity require the development of a SWPPP that includes post-construction stormwater management practices? G yes G no (If no, go to question 10f.)

10b. Have all post-construction stormwater management practices included in the final SWPPP been constructed? G yes G no (If no, explain on Page 2)

10c. Identify the entity responsible for long-term operation and maintenance of practice(s)?

NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity - continued

10d. Has the entity responsible for long-term operation and maintenance been given a copy of the operation and maintenance plan required by the general permit? G yes G no

10e. Indicate the method used to ensure long-term operation and maintenance of the post-construction stormwater management practice(s): G Post-construction stormwater management practice(s) and any right-of-way(s) needed to maintain practice(s) have been deeded to the municipality. G Executed maintenance agreement is in place with the municipality that will maintain the post-construction stormwater management practice(s). G For post-construction stormwater management practices that are privately owned, the deed of record has been modified to include a deed covenant that requires operation and maintenance of the practice(s) in accordance with the operation and maintenance plan. G For post-construction stormwater management practices that are owned by a public or private institution (e.g. school, college, university), or government agency or authority, policy and procedures are in place that ensures operation and maintenance of the practice(s) in accordance with the operation and maintenance plan.

10f. Provide the total area of impervious surface (i.e. roof, pavement, concrete, gravel, etc.) constructed within the disturbance area? (acres)

11. Is this project subject to the requirements of a regulated, traditional land use control MS4? G yes G no (If Yes, complete section VI - "MS4 Acceptance" statement

V. Additional Information/Explanation: (Use this section to answer questions 9c. and 10b., if applicable)

VI. MS4 Acceptance - MS4 Official (principal executive officer or ranking elected official) or Duly Authorized Representative (Note: Not required when 9b. is checked -transfer of coverage)

I have determined that it is acceptable for the owner or operator of the construction project identified in question 5 to submit the Notice of Termination at this time.

Printed Name:

Title/Position:

Signature:	Date:

VII. Qualified Inspector Certification - Final Stabilization:

I hereby certify that all disturbed areas have achieved final stabilization as defined in the current version of the general permit, and that all temporary, structural erosion and sediment control measures have been removed. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.	
Printed Name:	
Title/Position:	
Signature:	Date:
VIII. Qualified Inspector Certification - Post-construction Stormwater Management Practice(s):	
I hereby certify that all post-construction stormwater management practices have been constructed in conformance with the SWPPP. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.	
Printed Name:	
Title/Position:	
Signature:	Date:
IX. Owner or Operator Certification	
I hereby certify that this document was prepared by me or under my direction or supervision. My determination, based upon my inquiry of the person(s) who managed the construction activity, or those persons directly responsible for gathering the information, is that the information provided in this document is true, accurate and complete. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.	
Printed Name:	
Title/Position:	
Signature:	Date:

Attachment C:
Certification Forms

CONTRACTOR and SUBCONTRACTOR CERTIFICATION STATEMENT

for the New York State Department of Environmental Conservation (DEC) State Pollutant Discharge Elimination System Permit for Stormwater Discharges from Construction Activity (GP-0-10-001)

As per *Part III.A.6* on page 13 of *GP-0-10-001* (effective January 29, 2010):

'Prior to the *commencement of construction activity*, the *owner or operator* must identify the contractor(s) and subcontractor(s) that will be responsible for installing, constructing, repairing, replacing, inspecting and maintaining the erosion and sediment control practices included in the SWPPP; and the contractor(s) and subcontractor(s) that will be responsible for constructing the post-construction stormwater management practices included in the SWPPP. The *owner or operator* shall have each of the contractors and sub-contractors identify at least one person from their company that will be responsible for implementation of the SWPPP. This person shall be known as the *trained contractor*. The *owner or operator* shall ensure that at least one *trained contractor* is on site on a daily basis when soil disturbance activities are being performed.'

The *owner or operator* shall have each contractor and subcontractor involved in soil disturbance sign a copy of the following certification statement before they commence any *construction activity*:

____________________	NYR __________	____________________
Name of Construction Site	*DEC Permit ID*	*Municipality (MS4)*

"I hereby certify that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the qualified inspector during a site inspection. I also understand that the owner or operator must comply with the terms and conditions of the most current version of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

______________________________	______________________________
Responsible Corporate Officer/Partner Signature	Date
______________________________	______________________________
Name of above Signatory	Name of Company
______________________________	______________________________
Title of above Signatory	Mailing Address
______________________________	______________________________
Telephone of Company	City, State and Zip

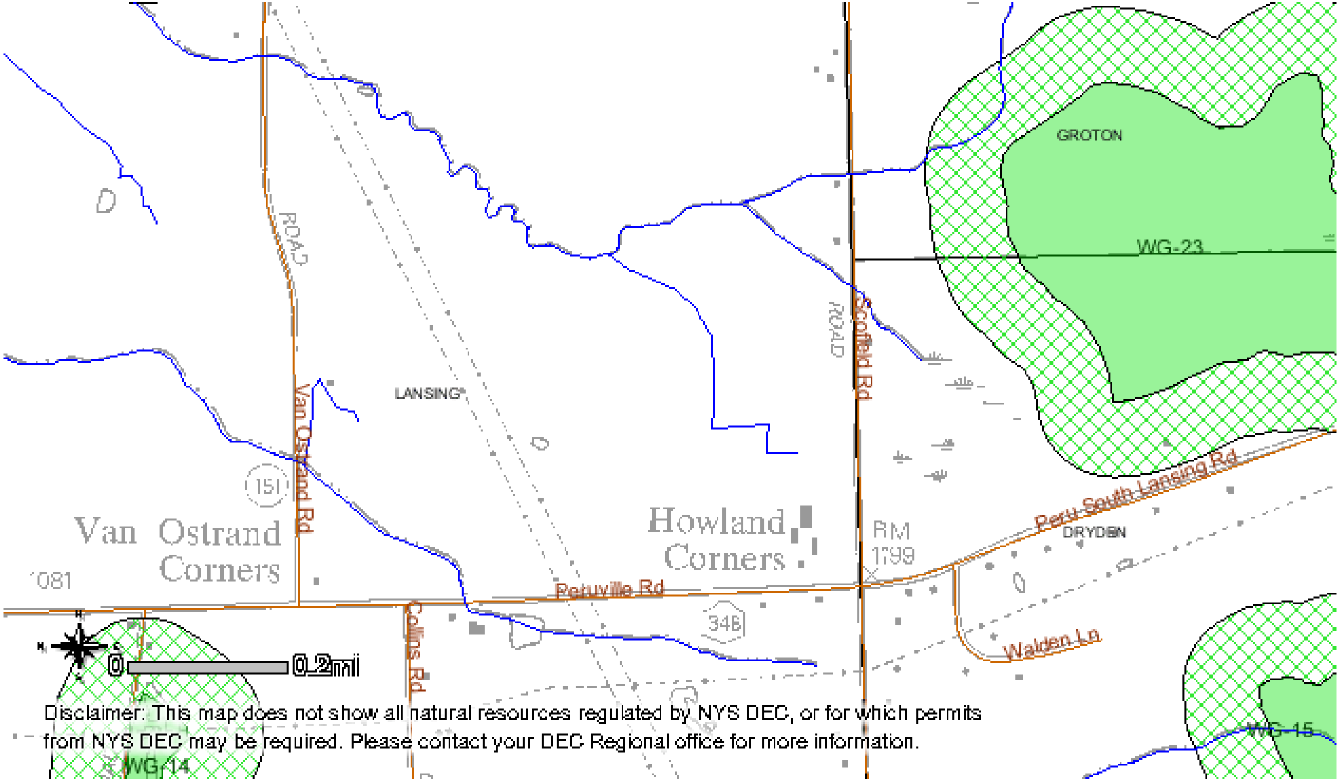
Identify the specific elements of the SWPPP the contractor or subcontractor is responsible for:

'*TRAINED CONTRACTOR*' FOR THE CERTIFIED CONTRACTOR OR SUBCONTRACTOR

____________________	____________________	____________________
Name of Trained Employee	*Title of Trained Employee*	*NYSDEC SWT #*

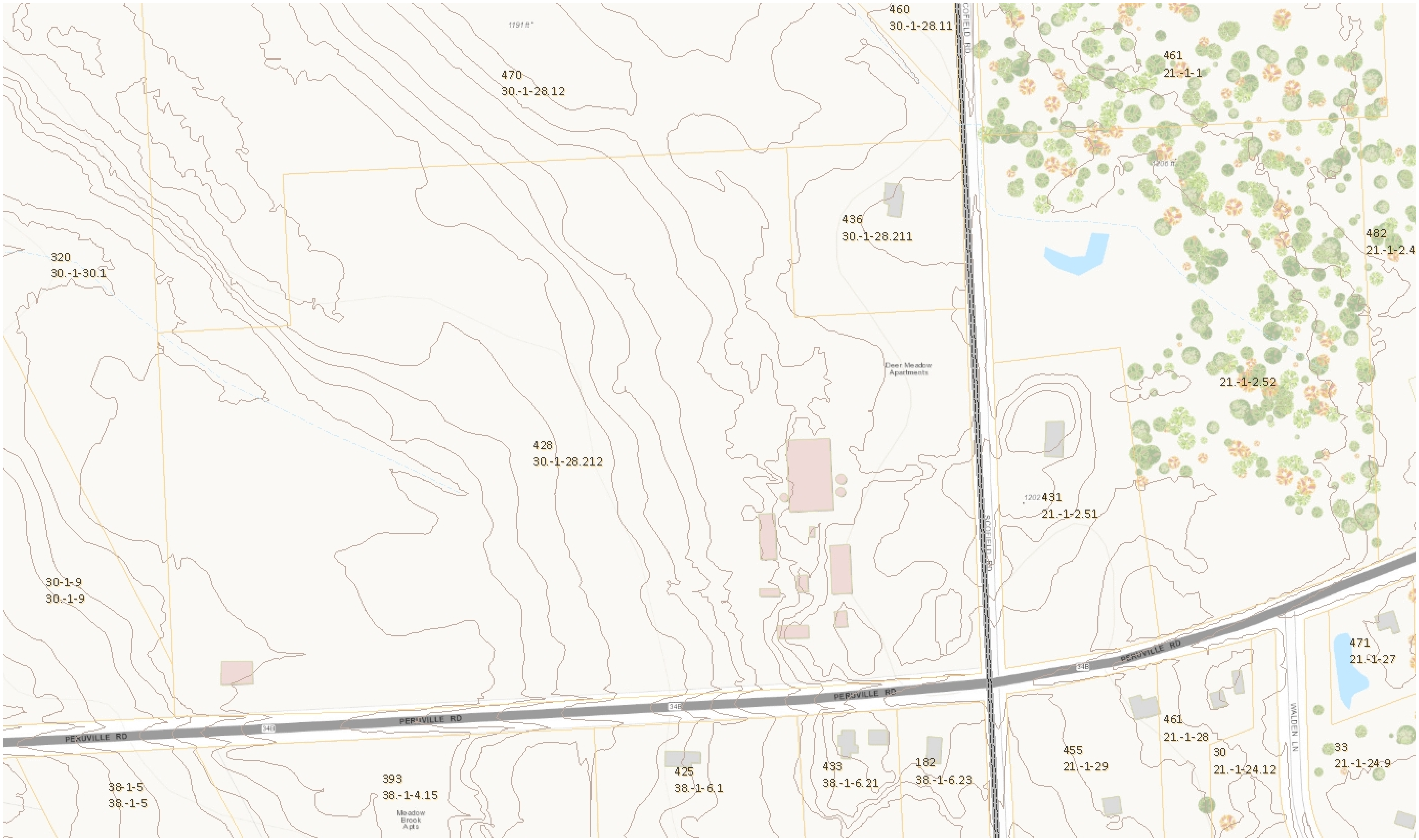
A copy of this signed contractor certification statement must be maintained at the SWPPP on site

Attachment D:
Wetlands and Floodplain Mapping



Pinney - Wetlands Map

Pinney Duplex Project Flood Zone Map



Legend

- Address
- Open Water
- Streams
  - Intermittent Streams
  - Perennial Streams
- PARCELS
- Flood Zones
  - 100 Year
  - 500 Year
  - Not Included in Flood Map
- Building
- Municipalities
- ULY-SE
- ULY-SW
- ULY-NW
- ULY-tNE
- NEW-SW
- NEW-SE
- NEW-NE
- NEW-NW
- LAN2ftSouth
- LAN-NE
- LAN-NW
- LAN2ftMiddle
- GRO-SE
- GRO-SW
- GRO-NE
- GRO-NW
- ENF-SE
- ENF-SW
- ENF-NE
- ENF-NW
- DRY-SE
- DRY-SW
- DRY-NE
- DRY-tNW
- DAN2ftSW
- DAN2ftSE
- DAN2ftNW
- DAN2ftNE
- CAR-SW
- CAR-SE

1: 3,287

547.9 0 273.93 547.9 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

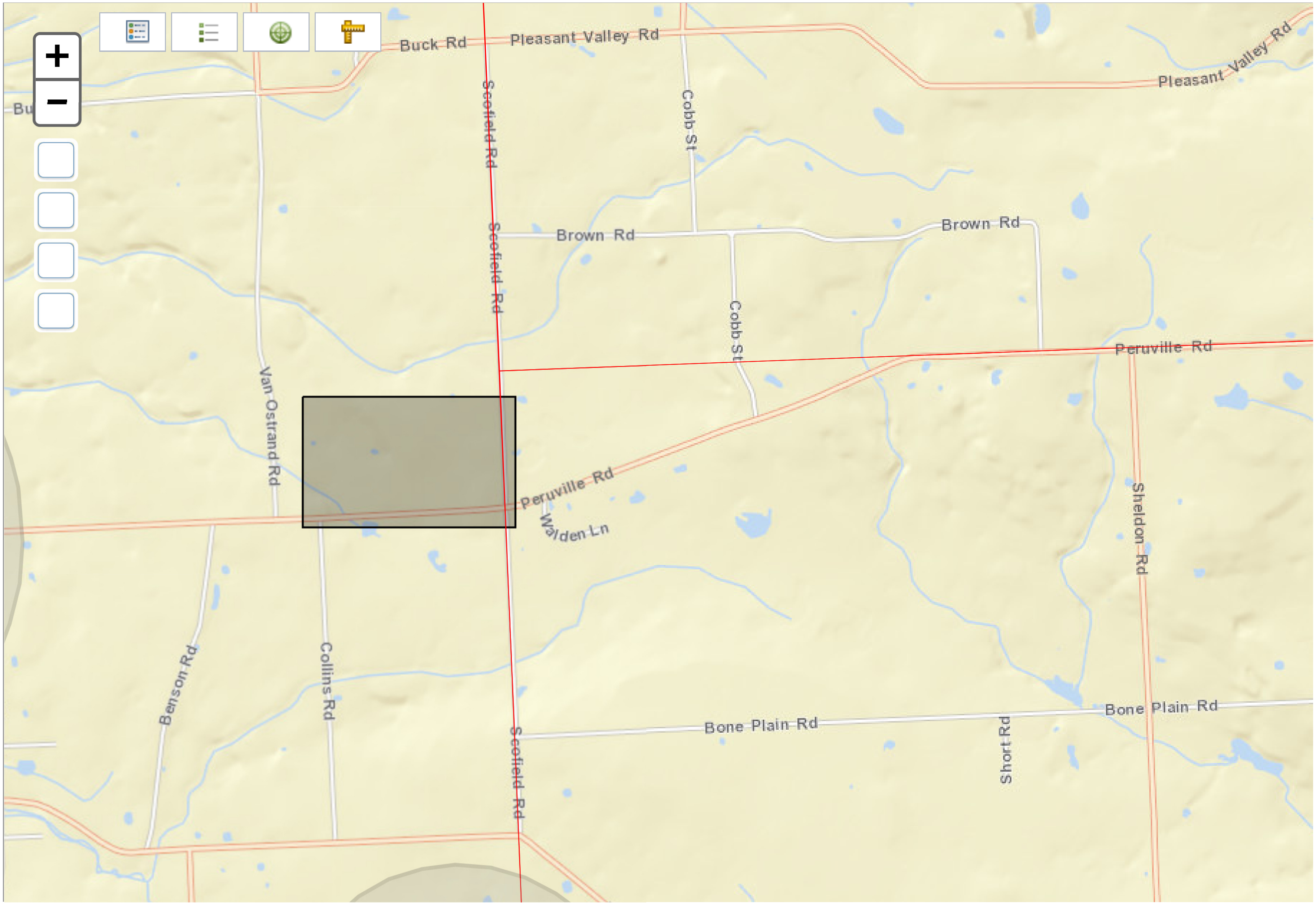
Notes

This map was automatically generated using Geocortex Essentials. Your tax dollars at work!

Attachment E:
NYSHPO – Circles and Squares Map

CRIS
Cultural Resource Information System

HOME SUBMIT SEARCH COMMUNICATE



October 15, 2015

Mr. Scott Gibson
5 Orchard Avenue
Watkins Glen, NY 14891

Re: DEC
Pinney Duplex Apartments
Town of Lansing, Tompkins County
15PR05870

Dear Mr. Gibson:

Thank you for requesting the comments of the Office of Parks, Recreation and Historic Preservation (OPRHP). We have reviewed the project in accordance with the New York State Historic Preservation Act of 1980 (Section 14.09 of the New York Parks, Recreation and Historic Preservation Law). These comments are those of the OPRHP and relate only to Historic/Cultural resources. They do not include potential environmental impacts to New York State Parkland that may be involved in or near your project. Such impacts must be considered as part of the environmental review of the project pursuant to the State Environmental Quality Review Act (New York Environmental Conservation Law Article 8) and its implementing regulations (6 NYCRR Part 617).

Based upon this review, it is the New York State Office of Parks, Recreation and Historic Preservation's opinion that your project will have no impact on archaeological and/or historic resources listed in or eligible for the New York State and National Registers of Historic Places.

If further correspondence is required regarding this project, please be sure to refer to the OPRHP Project Review (PR) number noted above.

Sincerely,

Ruth L. Pierpont

Ruth L. Pierpont
Deputy Commissioner for Historic Preservation

Attachment F:
Inspection Report (Sample Form)

INSPECTION REPORT
for
STORM WATER POLLUTION PREVENTION PLAN

PROJECT TITLE: ____
____

PROJECT LOCATION: ____
____

INSPECTOR: ____
DATE: ____

SITE CONDITIONS:

POLLUTANT CONTROL	IN CONFORMANCE	EFFECTIVE
Stabilized Construction Entrance	YES/NO (See Below)	YES/NO (See Below)
Silt Fence	YES/NO (See Below)	YES/NO (See Below)
Temporary Seeding & Mulching	YES/NO (See Below)	YES/NO (See Below)
Swales, Ditches, Channels	YES/NO (See Below)	YES/NO (See Below)
Rock Check Dams	YES/NO (See Below)	YES/NO (See Below)
Wet Pond & Forebays	YES/NO (See Below)	YES/NO (See Below)
Material Storage	YES/NO (See Below)	YES/NO (See Below)
Other: ____________________	YES/NO (See Below)	YES/NO (See Below)

VIOLATION NOTED: (Explain each "NO" circled above) ____
____
____
____
____

RECOMMENDED REMEDIAL ACTION(S): ____
____
____
____
____

COMMENTS: ____
____

Based on the results of the inspection, necessary control modifications shall be implemented within 7 calendar days. These reports shall be kept on file as part of the Storm Water Pollution Prevention Plan for at least three years from the date of completion and submission of the Notice of Termination. A copy of the SWPPP shall be kept at the site at all times during construction.

CERTIFICATION STATEMENT

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person(s) who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonments for knowing violations.

____ Signature

____________________________ Date

____ Printed Name

Attachment G: Record of Stabilization and Construction Activity Dates (Sample Form)

SITE STABILIZATION
and
CONSTRUCTION ACTIVITY DATES

A record of dates when major grading activities occur, when construction activities temporarily or permanently cease on a portion of the site, and when stabilization measures are initiated shall be maintained until final site stabilization is achieved and the Notice of Termination is filed. The dates can be entered in the following form, or on a different form.

MAJOR GRADING ACTIVITIES:

Description of Activity: ______________________________
Begin (date): ____________ Site Contractor: ______________________
Location: ______________________________
End (date): ____________

Description of Activity: ______________________________
Begin (date): ____________ Site Contractor: ______________________
Location: ______________________________
End (date): ____________

Description of Activity: ______________________________
Begin (date): ____________ Site Contractor: ______________________
Location: ______________________________
End (date): ____________

Description of Activity: ______________________________
Begin (date): ____________ Site Contractor: ______________________
Location: ______________________________
End (date): ____________

Description of Activity: ______________________________
Begin (date): ____________ Site Contractor: ______________________
Location: ______________________________
End (date): ____________

Description of Activity: ______________________________
Begin (date): ____________ Site Contractor: ______________________
Location: ______________________________
End (date): ____________

Description of Activity: ______________________________
Begin (date): ____________ Site Contractor: ______________________
Location: ______________________________
End (date): ____________

Attachment H:
Vegetative and Structural Measures
For Erosion and Sediment Control

(*Sections 3 and 5 NY Standards & Specifications for Erosion & Sediment Control*)

(Reference)

VEGETATIVE MEASURES FOR EROSION AND SEDIMENT CONTROL

Erosion is the gradual wearing away of the land surface as a result of uncontrolled wind and water energy. Sedimentation is the result of transport and delivery of eroded soil particles, deposited at some point. Erosion and sediment control is a complex interaction of soils, engineering water management, agronomic and horticultural practices. Decisions for resolving erosion conditions, both on site and within the upper watershed, are formulated based on surface and subsurface water, soil material, climatic conditions, and anticipated land use. Creating a stable slope is necessary prior to vegetating. Sloughing and slumping are not helpful in establishing a uniform protective cover.

General planning considerations for vegetating a steep slope will include evaluating the soil. Factors such as soil texture and steepness affect the stability of the slope. Texture also influences the permeability and water holding capacity of the soil. Many slopes are stripped of topsoil during the construction phase, leaving an infertile, compacted soil surface, void of valuable organic matter. Topsoil must be reapplied. Overly compacted slopes should be decompacted with appropriate equipment. Soil pH and nutrient level are determined by obtaining a representative soil sample for analysis from an accredited lab. Appropriate plants are selected to meet the final slope and soil conditions for the site.

Liming material sold in New York varies considerably in several ways. The mineral content (calcium and magnesium) of the limestone may be high or low, the fineness or particle sizes vary between suppliers, and the cost varies greatly. Two types of limestone are sold. The most common is limestone high in calcium. Dolomitic limestone contains magnesium (Mg) and calcium (Ca). Limestone sold in NY varies from 0 to 20% Mg while the calcium content of lime varies from 14.7% to 51.5%. Particle size determines how rapidly the calcium and magnesium will react with the acid in the soil. The finer the particle sizes, the quicker the reaction.

When purchasing agricultural limestone, one should state on the order that the amount should be adjusted to 100% effective neutralizing value (ENV). This is the way to compare materials as it adjusts for the reactive Ca and Mg and the particle size. The ENV is stated as the ratio needed to convert a limestone recommendation to 100% ENV. Thus, if the recommendation is 4 tons/acre of 100% ENV lime and the lime being used had an 80% ENV (1/ENV = 1.25), 4 times 1.25 or 5 tons/acre would be required.

The amount of limestone needed can be estimated by using the table below. A soil test is the only way to determine the soil pH. This table is very general, but it is useful for planning.

General lime guidelines (at 100% ENV)

Initial Soil pH	*Sands*	*Sandy Loams*	*Loams and Silt Loams*	*Silty Clay Loams*
		T/A of lime[1]		
4.5	2.5	6.0	9.5	13.0
4.6-4.7	2.5	6.0	9.0	12.5
4.8-4.9	2.5	5.5	8.5	12.0
5.0-5.1	2.0	5.0	7.5	10.5
5.2-5.3	1.5	4.0	6.5	8.5
5.4-5.5	1.0	3.0	4.0	6.0
5.6-5.7	1.0	2.0	3.0	4.5
5.8-5.9	0.7	1.5	2.5	3.5
6.0-6.1	0.6	1.5	2.0	3.0
6.2-6.3	0.4	1.0	1.5	2.0
6.~6.5	0.3	0.7	1.0	1.5
6.6-6.7	0.2	0.5	0.7	1.0

Lime guidelines are in tons per acre and are based on a plow depth of 8.0 inches. Correct rate if plowing to a different depth.

REFERENCE: Cornell Cooperative Extension. 2003 Cornell Guide for Integrated Field Crop Management, Pg. 32.

Fertilizer is sold with an analysis printed on the tag or bag. The first number is the percent of nitrogen (N), the second is phosphorus (P), and the third is potassium (K). Other elements are sometimes included and are listed with these basic three components. For example, a forty pound bag of 5-10-5 contains 2 lbs. N, 4 lbs. P (as P_2O_5), and 2 lbs. of K (as K_20). Select an appropriate analysis to meet the nutrients required for the specific site. Always apply as closely as possible the required amount of fertilizer to meet the requirements of the site. Adding surplus nitrogen may cause pollution of drinking water and saltwater ecosystems. Excessive phosphorus may accelerate the aging process of freshwater ecosystems. Excessive amounts of N and K2O may result in 'burning' the grass and killing it.

Water management on and above potentially eroding sites is extremely important. Large watersheds above a site may require extensive water control measures. Water flow paths must be controlled to allow the safe delivery of the water to an outlet to the side or bottom of the slope. Shallow ditches or diversions across the slope and above the area to be seeded is an effective method of avoiding wash-out of the seed and soil. Diversions may be constructed at a point where surface runoff water is intercepted and carried away from the slope and to a safe outlet. On large slopes, benching may be necessary for bench drains or future maintenance (see standard for Land Grading). Subsurface drainage is frequently included to prevent long term saturated soil conditions and sloughing.

Conservation plantings need to effectively hold soil and control erosion, and they should enhance and blend with their surroundings. Mature plant size, form, and appearance must be considered along with their functionality to match the anticipated land use. Basic erosion control is accomplished by providing cover to the soil surface utilizing plants and/or mulch. It is the system of seedbed preparation, soil amendments, plant selection, proper timing of planting, and mulching that will optimize the chances of success. Characteristics of grasses such as low growth, horizontal above and below ground stems, leafy growth, and many fine roots for binding soil particles, make them the primary choice for vegetating slopes. Once the grass type is selected, then appropriate forbs, shrubs, or trees may be added to meet site conditions. The use of appropriate mulches will depend on site criteria and should be carefully evaluated. Although some materials are costly, they may prevent the need for more costly reshaping and reseeding.

Selection of proper vegetative materials for site stabilization is critical for environmental success. Species should be selected that are not considered "invasive." A primary list of invasive plants can be found at the website of the Invasive Plant Council of New York State (http://www.ipcnys.org). Any species not on this list but considered suspect should be verified at the appropriate regional or local level for acceptance.

STRUCTURAL MEASURES FOR EROSION AND SEDIMENT CONTROL

General

Uncontrolled runoff and excess erosion often occurs in urban developments, particularly during the construction stage. This erosion forms rills and gullies; washes out roads; scours cut and fill areas; fills road ditches, storm drains, and streams; and does other damage that is costly to the developers and damaging to land and water users below. Careful inclusion of proven conservation practices in the development plan can prevent or alleviate much of this damage and should be a part of every development plan.

These practices will usually be a combination of vegetative and structural measures. They may be temporary and serve only during the construction stage or they may be permanent in nature and become a part of the completed development. Permanent structural practices should be installed as early as possible in the construction stage. This section deals with the more common structural measures that may be used. Adequate designs, plans, and specification should be prepared for the measures to be used. A number of measures and specifications are included throughout this section. The designer shall determine those elements to be installed to control erosion (Section 2) and follow the criteria included in these standards and specifications.

Introduction

Structural erosion and sediment control practices have been classified as either temporary or permanent, according to how they are used. Temporary structural practices are used during construction to prevent offsite sedimentation. The length of time that temporary practices are functional varies from project to project, since the sediment control strategy may change as construction activity progresses. Permanent structural practices are used to convey surface water runoff to a safe outlet. Permanent structural practices will remain in place and continue to function after the completion of construction.

Regardless of whether the practices are temporary or permanent, runoff control measures should be the first items constructed when grading begins, and be completely functional before downslope land disturbance takes place. Earthen structures such as diversions, dikes, and swales should be stabilized before being considered functional. Only after the runoff control structures are operational and sediment control measures are in place, should clearing and grading on the rest of the construction site begin.

While clearing and grading the site, it is important to minimize the amount of sediment that is produced. In general, it is advantageous to clear only as much area as is necessary to accommodate construction needs. Grade and stabilize large sites in stages whenever possible. Limiting the amount of disturbed area limits the amount of sediment that is generated, thus decreasing the amount of maintenance required on sediment control measures.

Sediment generated during the construction of cut and fill slopes can also be minimized through design and grading techniques. When designing either a cut or fill slope, factors to consider include slope length and steepness, soil type, and upslope drainage area. In general, it is important to leave soil surfaces on disturbed slopes in a roughened condition and to construct a water diversion practice at the top of slopes. Rough soil surfaces do not erode as readily as smooth soil surfaces.

Although design and grading techniques can reduce soil erosion, they cannot eliminate it entirely. Therefore, practices must be installed to prevent offsite sedimentation.

Even though the specific conditions of each site determine what measures are necessary to control erosion and sedimentation, some general principles apply to the selection and placement of sediment control measures.

1. Prevent clean water from becoming turbid, by diverting runoff from upslope areas away from disturbed areas. Earth dikes, temporary swales, perimeter dike/swales, or diversions that outlet in stable areas can be used in this capacity.

2. Remove sediment from turbid water before the water leaves the site. The method of sediment removal depends upon how the water drains from the site. Concentrated flow must be diverted to a trapping device so that suspended sediment can be deposited. Dikes or swales that outlet into traps or basins can accomplish this. A storm drain system may be used to convey concentrated sediment laden water only if the system empties into a trap or basin. Otherwise, all storm drain inlets must be protected so that sediment laden water cannot enter the drainage system before being treated to remove the sediment.

3. Surface runoff draining in sheet flow must be controlled and treated before the water leaves the site. Straw bale dikes, silt fences, or vegetative buffer strips can be used to treat sheet flow.

All practices designed and implemented must be properly maintained in order to remain functional. Sediment accumulated in basins and traps must be removed and disposed of in a manner that stabilizes them on the construction site.

Other factors should be observed during construction in order to make erosion and sediment control measures more effective in pollution control.

These are:

1. Sprinkle or apply dust suppressors. Keep dust down to a tolerable limit on construction sites and haul roads.

2. Use temporary bridges or culverts where fording of streams is objectionable. Avoid borrow areas where pollution from this operation is inevitable.

3. Protect streams from chemicals, fuel, lubricants, sewage, or other pollutants.

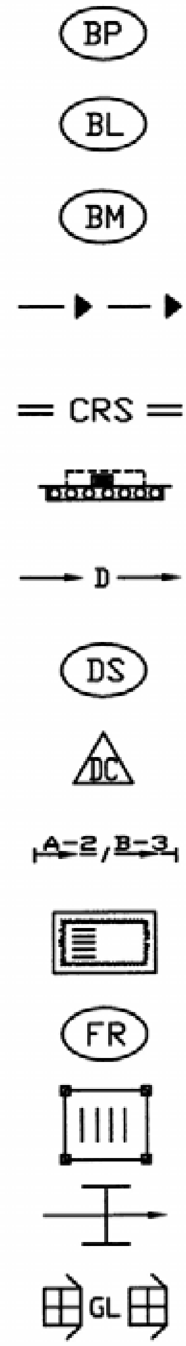
4. Avoid disposal of fill in floodplains or drainage ways. This reduces the capacity of these areas to pass flood flows.

5. Do not locate sanitary facilities over, or adjacent to, waterways, wells, or springs.

6. Locate storage yards and stockpiles where erosion and sediment hazards are slight. Where this is not possible, apply necessary erosion control practices.

STANDARD SYMBOLS

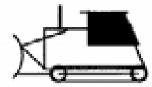
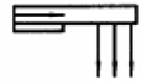
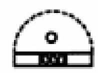
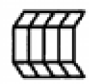
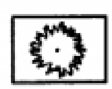
BRANCH PACKING	BP
BRUSH LAYER	BL
BRUSH MATTRESS	BM
CHECK DAM	
CONSTRUCTION ROAD STABILIZATION	CRS
CURB DROP INLET PROTECTION	
DIVERSION	D
DUNE STABILIZATION	DS
DUST CONTROL	DC
EARTH DIKE	A-2, B-3
EXCAVATED DROP INLET PROTECTION	
FIBER ROLL	FR
FILTER FABRIC DROP INLET PROTECTION	
GRADE STABILIZATION STRUCTURE	
GRASSED WATERWAY	GL



ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS,
NEW YORK STATE DEPARTMENT OF TRANSPORTATION,
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION,
NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE

STANDARD SYMBOLS

STANDARD SYMBOLS (cont'd)

LAND GRADING	
LEVEL SPREADER	
LINED WATERWAY	
LIVE CRIBWALL	(LCW)
LIVE CUTTINGS/LIVE STAKES PLANTING	(LC/LS)
LIVE FASCINE	(LF)
MULCHING	(M)
OPTIONAL SEDIMENT TRAP DEWATERING DEVICE	
PAVED FLUME	
PERIMETER DIKE OR SWALE	→ PD →
PERMANENT SEEDING	(PS)
PIPE OUTLET SEDIMENT TRAP	
PIPE SLOPE DRAIN FLEXIBLE	⇒ PSD ⇒
PORTABLE SEDIMENT TANK	
PROTECTING VEGETATION	

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	STANDARD SYMBOLS

STANDARD SYMBOLS (cont'd)

RECREATION AREA IMPROVEMENT

RIP RAP OUTLET PROTECTION

RIP RAP SLOPE PROTECTION

RIP RAP STREAMBANK PROTECTION

ROCK DAM

SEDIMENT BASIN

SEDIMENT TRAP

SEGMENTED RETAINING WALL

SILT FENCE

SODDING

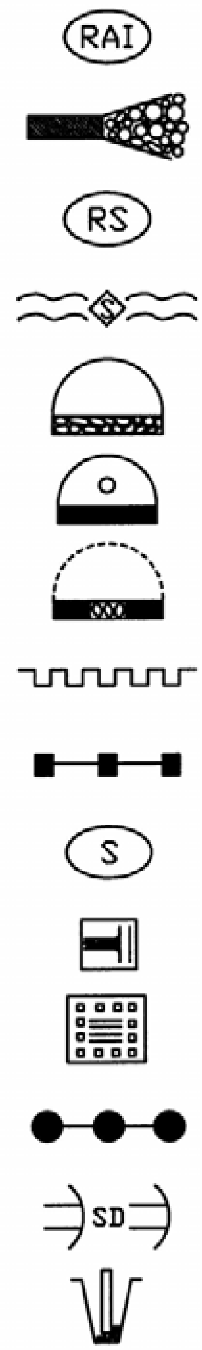
STABILIZED CONSTRUCTION ENTRANCE

STONE & BLOCK DROP INLET PROTECTION STRUCTURE

STRAW BALE DIKE

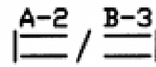
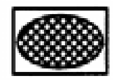
SUBSURFACE DRAIN

SUMP PIT



ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	STANDARD SYMBOLS

STANDARD SYMBOLS (cont'd)

SURFACE ROUGHENING	
TEMPORARY SEEDING	TS
TEMPORARY SWALE	 A-2 / B-3
TOPSOILING	
TREE REVETMENT	TR
TURBIDITY CURTAIN	
VEGETATED ROCK GABIONS	VRG
WATER BAR	—WB—
WATERWAY CROSSING	

ADAPTED FROM DETAILS PROVIDED BY: USDA - NRCS, NEW YORK STATE DEPARTMENT OF TRANSPORTATION, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE	STANDARD SYMBOLS

Attachment I: NYSDEC Stormwater Construction Checklists (Sample Form)

Stormwater/Wetland Pond Construction Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
Pre-Construction/Materials and Equipment		
Pre-construction meeting		
Pipe and appurtenances on-site prior to construction and dimensions checked		
1. Material (including protective coating, if specified)		
2. Diameter		
3. Dimensions of metal riser or pre-cast concrete outlet structure		
4. Required dimensions between water control structures (orifices, weirs, etc.) are in accordance with approved plans		
5. Barrel stub for prefabricated pipe structures at proper angle for design barrel slope		
6. Number and dimensions of prefabricated anti-seep collars		
7. Watertight connectors and gaskets		
8. Outlet drain valve		
Project benchmark near pond site		
Equipment for temporary de-watering		

Construction Sequence	Satisfactory/ Unsatisfactory	Comments
2. Subgrade Preparation		
Area beneath embankment stripped of all vegetation, topsoil, and organic matter		
3. Pipe Spillway Installation		
Method of installation detailed on plans		
A. Bed preparation		
Installation trench excavated with specified side slopes		
Stable, uniform, dry subgrade of relatively impervious material (If subgrade is wet, contractor shall have defined steps before proceeding with installation)		
Invert at proper elevation and grade		
B. Pipe placement		
Metal / plastic pipe		
1. Watertight connectors and gaskets properly installed		
2. Anti-seep collars properly spaced and having watertight connections to pipe		
3. Backfill placed and tamped by hand under “haunches” of pipe		
4. Remaining backfill placed in max. 8 inch lifts using small power tamping equipment until 2 feet cover over pipe is reached		

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
3. Pipe Spillway Installation		
Concrete pipe		
1. Pipe set on blocks or concrete slab for pouring of low cradle		
2. Pipe installed with rubber gasket joints with no spalling in gasket interface area		
3. Excavation for lower half of anti-seep collar(s) with reinforcing steel set		
4. Entire area where anti-seep collar(s) will come in contact with pipe coated with mastic or other approved waterproof sealant		
5. Low cradle and bottom half of anti-seep collar installed as monolithic pour and of an approved mix		
6. Upper half of anti-seep collar(s) formed with reinforcing steel set		
7. Concrete for collar of an approved mix and vibrated into place (protected from freezing while curing, if necessary)		
8. Forms stripped and collar inspected for honeycomb prior to backfilling. Parge if necessary.		
C. Backfilling		
Fill placed in maximum 8 inch lifts		
Backfill taken minimum 2 feet above top of anti-seep collar elevation before traversing with heavy equipment		

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
4. Riser / Outlet Structure Installation		
Riser located within embankment		
A. Metal riser		
Riser base excavated or formed on stable subgrade to design dimensions		
Set on blocks to design elevations and plumbed		
Reinforcing bars placed at right angles and projecting into sides of riser		
Concrete poured so as to fill inside of riser to invert of barrel		
B. Pre-cast concrete structure		
Dry and stable subgrade		
Riser base set to design elevation		
If more than one section, no spalling in gasket interface area; gasket or approved caulking material placed securely		
Watertight and structurally sound collar or gasket joint where structure connects to pipe spillway		
C. Poured concrete structure		
Footing excavated or formed on stable subgrade, to design dimensions with reinforcing steel set		
Structure formed to design dimensions, with reinforcing steel set as per plan		
Concrete of an approved mix and vibrated into place (protected from freezing while curing, if necessary)		
Forms stripped & inspected for “honeycomb” prior to backfilling; parge if necessary		

Construction Sequence	Satisfactory/ Unsatisfactory	Comments
5. Embankment Construction		
Fill material		
Compaction		
Embankment		
1. Fill placed in specified lifts and compacted with appropriate equipment		
2. Constructed to design cross-section, side slopes and top width		
3. Constructed to design elevation plus allowance for settlement		
6. Impounded Area Construction		
Excavated / graded to design contours and side slopes		
Inlet pipes have adequate outfall protection		
Forebay(s)		
Pond benches		
7. Earth Emergency Spillway Construction		
Spillway located in cut or structurally stabilized with riprap, gabions, concrete, etc.		
Excavated to proper cross-section, side slopes and bottom width		
Entrance channel, crest, and exit channel constructed to design grades and elevations		

CONSTRUCTION SEQUENCE	SATISFACTORY / UNSATISFACTORY	COMMENTS
8. Outlet Protection		
A. End section		
Securely in place and properly backfilled		
B. Endwall		
Footing excavated or formed on stable subgrade, to design dimensions and reinforcing steel set, if specified		
Endwall formed to design dimensions with reinforcing steel set as per plan		
Concrete of an approved mix and vibrated into place (protected from freezing, if necessary)		
Forms stripped and structure inspected for “honeycomb” prior to backfilling; parge if necessary		
C. Riprap apron / channel		
Apron / channel excavated to design cross-section with proper transition to existing ground		
Filter fabric in place		
Stone sized as per plan and uniformly place at the thickness specified		
9. Vegetative Stabilization		
Approved seed mixture or sod		
Proper surface preparation and required soil amendments		
Excelsior mat or other stabilization, as per plan		

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
10. Miscellaneous		
Drain for ponds having a permanent pool		
Trash rack / anti-vortex device secured to outlet structure		
Trash protection for low flow pipes, orifices, etc.		
Fencing (when required)		
Access road		
Set aside for clean-out maintenance		
11. Stormwater Wetlands		
Adequate water balance		
Variety of depth zones present		
Approved pondscaping plan in place Reinforcement budget for additional plantings		
Plants and materials ordered 6 months prior to construction		
Construction planned to allow for adequate planting and establishment of plant community (April-June planting window)		
Wetland buffer area preserved to maximum extent possible		

Comments:

Actions to be Taken:

Bioretention Construction Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
1. Pre-Construction		
Pre-construction meeting		
Runoff diverted		
Facility area cleared		
If designed as exfilter, soil testing for permeability		
Facility location staked out		
2. Excavation		
Size and location		
Lateral slopes completely level		
If designed as exfilter, ensure that excavation does not compact susoils.		
Longitudinal slopes within design range		

CONSTRUCTION SEQUENCE	SATISFACTORY / UNSATISFACTORY	COMMENTS
3. Structural Components		
Stone diaphragm installed correctly		
Outlets installed correctly		
Underdrain		
Pretreatment devices installed		
Soil bed composition and texture		
4. Vegetation		
Complies with planting specs		
Topsoil adequate in composition and placement		
Adequate erosion control measures in place		
5. Final Inspection		
Dimensions		
Proper stone diaphragm		
Proper outlet		
Soil/ filter bed permeability testing		
Effective stand of vegetation and stabilization		
Construction generated sediments removed		
Contributing watershed stabilized before flow is diverted to the practice		

Comments:

Actions to be Taken:

Open Channel System Construction Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

CONSTRUCTION SEQUENCE	SATISFACTORY / UNSATISFACTORY	COMMENTS
1. Pre-Construction		
Pre-construction meeting		
Runoff diverted		
Facility location staked out		
2. Excavation		
Size and location		
Side slope stable		
Soil permeability		
Groundwater / bedrock		
Lateral slopes completely level		
Longitudinal slopes within design range		
Excavation does not compact subsoils		
3. Check dams		
Dimensions		
Spacing		
Materials		

CONSTRUCTION SEQUENCE	SATISFACTORY / UNSATISFACTORY	COMMENTS
4. Structural Components		
Underdrain installed correctly		
Inflow installed correctly		
Pretreatment devices installed		
5. Vegetation		
Complies with planting specifications		
Topsoil adequate in composition and placement		
Adequate erosion control measures in place		
6. Final inspection		
Dimensions		
Check dams		
Proper outlet		
Effective stand of vegetation and stabilization		
Contributing watershed stabilized before flow is routed to the factility		

Comments:

Actions to be Taken:

Attachment J:
NYSDEC
Operation & Maintenance
Checklist
(Sample Form)

Stormwater Pond/Wetland Operation, Maintenance and Management Inspection Checklist

Project ____________________

Location: ____________________

Site Status: ____________________

Date: ____________________

Time: ____________________

Inspector: ____________________

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

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

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

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

Comments:

Actions to be Taken:

Bioretention Operation, Maintenance and Management Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
1. Debris Cleanout (Monthly)		
Bioretention and contributing areas clean of debris		
No dumping of yard wastes into practice		
Litter (branches, etc.) have been removed		
2. Vegetation (Monthly)		
Plant height not less than design water depth		
Fertilized per specifications		
Plant composition according to approved plans		
No placement of inappropriate plants		
Grass height not greater than 6 inches		
No evidence of erosion		
3. Check Dams/Energy Dissipaters/Sumps (Annual, After Major Storms)		
No evidence of sediment buildup		

MAINTENANCE ITEM	**SATISFACTORY / UNSATISFACTORY**	**COMMENTS**
Sumps should not be more than 50% full of sediment		
No evidence of erosion at downstream toe of drop structure		
4. Dewatering (Monthly)		
Dewaters between storms		
No evidence of standing water		
5. Sediment Deposition (Annual)		
Swale clean of sediments		
Sediments should not be > 20% of swale design depth		
6. Outlet/Overflow Spillway (Annual, After Major Storms)		
Good condition, no need for repair		
No evidence of erosion		
No evidence of any blockages		
7. Integrity of Filter Bed (Annual)		
Filter bed has not been blocked or filled inappropriately		

Comments:

Actions to be Taken:

Open Channel Operation, Maintenance, and Management Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

MAINTENANCE ITEM	SATISFACTORY/ UNSATISFACTORY	COMMENTS
1. Debris Cleanout (Monthly)		
Contributing areas clean of debris		
2. Check Dams or Energy Dissipators (Annual, After Major Storms)		
No evidence of flow going around structures		
No evidence of erosion at downstream toe		
Soil permeability		
Groundwater / bedrock		
3. Vegetation (Monthly)		
Mowing done when needed		
Minimum mowing depth not exceeded		
No evidence of erosion		
Fertilized per specification		
4. Dewatering (Monthly)		
Dewaters between storms		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
5. Sediment deposition (Annual)		
Clean of sediment		
6. Outlet/Overflow Spillway (Annual)		
Good condition, no need for repairs		
No evidence of erosion		

Comments:

Actions to be Taken:

Attachment K:
Stormwater Management Summary and Hydraulic Modeling Results

INDEX

Stormwater Management Summary

STORMWATER MANAGEMENT SUMMARY

SITE DATA - GENERAL

Site Notes: This summary is for a proposed duplex apartment development consisting of fifteen (15), 2,000-SF buildings, associated asphalt roadway and parking areas, public water and private sewer, sidewalks, and landscaping on a 1,556,932-SF (35.74-AC) parcel in the Town of Lansing, NY. The project will disturb roughly 650,000-SF (14.9-AC) of former brush, weeds, and grassed locations. Of this, there will be 107,584-SF (2.47-AC) of new impervious surfaces which will increase the site total by 7.0%.

Subcatchment Evaluation: There are two (2) pre-developed (existing) watershed subcatchments (ESC-1 through ESC-2) for this site totaling 1,571,206-SF (36.07-AC). These areas are isolated from upland watershed runoff from the east by a road R.O.W. drainage ditch that splits flow to the north and south along the western edge of Scofield Road. To the north, a low lying drainage channel follows the project property line capturing flow from the northeast and diverting it due west preventing it from entering the property. Along the southern line, flow is captured in a R.O.W ditchline along the northern edge of Peruville Road where it is channeled to the west. Finally, a berm prevents site runoff from leaving the property along the western boundary. Flow is directed to the south into the Peruville Road ditch from ESC-1 (DP-1) and to the north into an existing central channel that flows east to west through much of ESC-2 (DP-2).

Approximately 1,093,226-SF (25.10-AC) are areas that are largely outside of the major activities of development and any surfaces that see any temporary soil disturbance during construction will be restored to original condition upon completion of the project. These parcels have been identified as off-site subcatchments OSC-1 through OSC-4 on Proposed Conditions runoff analyses worksheets that have been provided in the stormwater drawings attached to this report.

Generally, the existing topography moves in an east to west direction over gentle slopes (<1% - 5% avg.) where flow eventually finds its way off-site through two distinct design points. The site is located across all soil class types with the majority being hydrologic soil class C.

The proposed development will disturb approximately 650,000-SF (14.9-AC) of land. Drainage areas impacted by construction have been divided into 8 separate subcatchments (PSC 1 – PSC 8) to identify how runoff will be affected by the project. Two diversion swales will be installed to prevent upland neighboring runoff from impacting the future development and the final design volume characteristics of any water quality or quantity treatment practices planned for the site. The property's northern border will capture limited off-site flow from the northeast which would normally flow across PSC-7 and into an existing low lying drainage ditch that runs southeast-northwest through OSC-3 where it continues off site to eventually join the Salmon Creek tributary system. Flow from the new diversion swale will be diverted around the parcel boundary where it will terminate into the same drainage channel further downstream. Similarly, another swale will be installed on the western edge of OSC-4 to capture flow from the east. Originally, flow would continue westward and terminate in a north south ditch that runs into the Peruville Road R.O.W. ditchline just to the west of the Pinney parcel. The new swale would cut off this runoff approximately 300-lf further east by diverting it due south where it will find its way into the same ditchline slightly upstream. The Pervuville Road ditchline currently runs to the west where it eventually winds its way to the northwest becoming part of the Salmon Creek tributary system.

All proposed subcatchment delineations have been identified as areas in need of water quality and quantity treatment due to impacts from construction and added impervious surfaces. Overall, there are seven (7) bioretention practices, one (1) dry swale, and one (1) pond that have been planned to address runoff reduction volume, remaining water quality volume (after RRv) and attenuation concerns.

Flow to each treatment practice will be directed by a series of new road and local site swales to ensure that runoff will be confined to the subcatchment boundary for which it is intended. As these are infiltration based practices, percolation tests will need to be performed to ensure that they will meet design requirements. All practices will contain a piped underdrain system to ensure that they will not have any prolonged periods of standing water.

Site Control Methods: This project follows the newer DEC design standards on runoff reduction by applying green infrastructure techniques and standard stormwater management practices to provide source control for impervious surfaces. The site incorporates several engineered infiltration structures to meet water quality and quantity needs. Seven bioretention areas and a dry swale basin have been chosen to meet NYSDEC guidance requirements. Although an infiltration basin was originally considered to meet quality, RRv and quantity requirements for PSC-7, the area did not meet the required minimum infiltration testing parameters and a standard practice pond was designed instead.

Site Soils: There are a total of four soil types in hydrologic soil groups A through C located throughout the site. Palmyra gravelly loam (PaC) belongs to the hydrologic soil group A with a well drained permeability range of 0.63 – 6.3 inches per hour. Phelps (PhB), is a gravelly silt loam in the hydrologic soil group B with a moderately well drained permeability of 0.63 – 2.0 inches per hour. Finally, Conesus (CfB) (0.63 – 2.0 in/hr), is a gravelly silt loam with moderately well drained soil and Kendaia (KnA), a somewhat poorly drained soil (0.20 – 2.0 in/hr, make up the hydrologic soil group C has a slow permeability of 0.20 inches per hour. See Appendix 3 for more information.

Soils data was obtained from the Tompkins County Soil Survey conducted by the USDA Soil Conservation Service and the on-line Web Soil Survey.

Site Topography: The site as a whole has a varied slope of <1% - 5% primarily moving downhill from east to west.

Site Watershed: Of the 35.74-acre watershed, the area of disturbance will be approximately 14.9-acres. Diversion swales located along the site's northern property line and lower mid-section have been designed to channel off-site runoff away from the development. Interceptor swales are used throughout the site to channel on-site runoff from to effectively contain flow to the site proper to designated treatment and attenuation systems for water quality and quantity controls.

Rainfall: Rainfall data used in the modeling and analysis was taken from www.precipt.net, from the Northeast Regional Climate Center which is an accepted NYSDEC reference. Rainfall data specific to Tompkins County under consideration, for various 24-hour storm events tabled below:

RAINFALL DATA

STORM	24-HOUR RAINFALL
1-year	2.0 inches
10-year	3.4 inches
100-year	5.85 inches

These values were used in modeling for the evaluation of existing and proposed stormwater run-off conditions.

RUNOFF REDUCTION VOLUME MANAGEMENT STRATEGY

(See Appendix 1 for Worksheet Analyses)

1. **Water Quality Volume and Runoff Reduction Stormwater Management Strategy** - *Reference modeling results and WQv/RRv worksheets which follow this summary:*

The total site water quality volume for DP-1 and DP-2 is

DP-1 WQv = 1,481 cu-ft (0.034af)
DP-2 WQv = 8,629 cu-ft (0.198af)

Total: 10,110 cu-ft (0.232af)

Of this amount, there was no potential for the conservation of natural areas, protection of riparian areas, tree planting, rooftop disconnection, etc. that would lend to a reduction in total WQv.

WQv credit = 0 *cuft (0.00 af)*

The minimum RRv was based on the following calculation:

Soil group for site:

A – 0.80-AC S = 55%
B – 0.82-AC S = 40%
C – 9.51-AC S = 30%

Minimum RRv:

S = 0.32
Impervious Area = 2.47-AC
Precipitation = 1.0 in
Rv = 0.95

Minimum Rv = [(P)(Rv)(A)] /12 = ((1.0 * ***0.95"/AC * 2.47AC**)/12)0.32 =*

2,780 cuft or, 0.064-acft

2. **Water Quality Volume Treatment Practices**

Seven bioretention (BR) practices, and a dry swale (DS) have been designed to the minimum total volume specifications as calculated in the attached practice worksheets. A summary of total runoff reduction volumes is provided in the table below:

Subcatchment	Required RRv (cuft)	RRv Applied (Cuft)	Practice
PSC-1	612	612	BR-1
PSC-4	466	466	BR-4
PSC-5	403	403	BR-5
PSC-2	495	495	BR-2
PSC-3	198	198	BR-3
PSC-6	345	345	BR-6
PSC-7	7,149	0	None
PSC-7A	187	187	BR-7
PSC-8	254	254	DS
	10,110	2,960	

3. Total of RRv

Total RRv provided by practices 2,960 cuft (0.068-AF)
Total Remaining Storage Volume for practices (after RRv) 10,110 cuft - 2,960 cuft = 7,150 cuft (0.164af)

Is provided RRv > minimum RRv for all soils from #1? 0.068 acft > 0.064 acft **YES**
Is provided RRv > adjusted WQv from #1? 0.068 acft > 0.232 acft **NO**

Is volume available within standard practices for remaining untreated WQv?

Total WQv 0.232AF
RRv 0.068 AF
Remaining WQv 0.164AF (7,144-CF)

Additional volume is available in the pond forebay and in the pond permanent pool. The pond forebay has 1,400-CF of storage volume which is at least 10% of the WQv as required. In addition, the storage volume of the pond permanent pool at 4.00' is 5,821-CF, the total of which is more than 100% of the required Water Quality Volume. **YES**

Is all of the watershed drainage area treated by either area reduction or source control practices? **YES**

Is all of the watershed impervious area treated with either reduction or source control practices? **YES**

Minimum runoff reduction requirements are met for this project.

DP-1

Design Point 1 Summary (DP-1)

CONTROL SIZING

Bioretention Areas

Please see the attached worksheets to determine bioretention area sizing.

Cpv = 24 hour extended detention of post-developed 1-year, 24-hour Storm event. The required CPv is a summation of the modeled 1 yr runoff output from each untreated subcatchment (**2.0-inch rainfall Tompkins County**) after runoff reduction (RRv). **1 yr Cpv 0.057-AF – RRV 0.034-AF = 0.023-AF (1,002)-CF**

The **Cpv** Channel Protection Volume is provided by the basin practices as determined by measuring the storage volume allowed through extended detention between the elevation at the bottom of each structure (0.0') and the primary outlet (4.0'), less the amount required for RRV.

BR 1 for PSC-1 = 1,680 – 612 = 1,068-CF of storage
BR 4 for PSC-4 = 1,346 – 466 = 880 CF of storage
BR 5 for PSC-5 = 1,226 – 403 = 823 CF of storage

Total – 2,771 CF

The combined available storage volume between the bioretention areas is 0.064-AF which exceeds the minimum requirement of 0.023. Flow is captured and exfiltrated into the surrounding soil structure and outlet through the underdrain system.

CPv conditions are met.

Overbank Flood (Qp) – DP1

Qp = Controls the peak discharge from the 10-year storm **(3.4-inch rainfall Tompkins County)** to 10-year predevelopment rates.

Pre-developed max rate = **1.86-CFS**, Total Volume = 0.291AF (12,676-CF). Post-developed w/o controls max rate = 3.32-CFS, Total Volume = 0.380-AF (16,553-CF).

The maximum post-developed run-off rate with the bioretention areas in-line is 1.64-CFS, and the total run-off volume is 0.343-AF (14,941-CF).

The **Qp** Overbank Flood control criterion is met with the bioretention areas in-line.

Extreme Storm (Qf) – DP1

Control the peak discharge from the 100-year storm **(5.85-inch rainfall Tompkins County)** to 100-year predevelopment rates. Safely pass the 100-year storm event.

Pre-developed max run-off rate = **12.78-CFS**, Total Volume = 1.294-AF (56,367-CF).
Post-developed w/o controls max rate = 10.92-CFS, Total Volume = 1.429 -AF (62,247-CF).

The maximum post-developed run-off rate with the structures inline is 10.79-CFS, and the total run-off volume is 1.389-AF (60,505-CF).

The **Qf** Extreme Storm control criterion is met with the bioretention areas in-line.

DP-2

Design Point 2 Summary (DP-2)

CONTROL SIZING

Bioretention Areas

Please see the attached worksheets to determine bioretention area sizing.

Cpv = 24 hour extended detention of post-developed 1-year, 24-hour Storm event. The required CPv is a summation of the modeled 1 yr runoff output from each untreated subcatchment (**2.0-inch rainfall Tompkins County**) after runoff reduction (RRv). **1 yr Cpv 0.246-AF – RRV 0.034-AF = 0.212-AF (9,235)-CF**

The **Cpv** Channel Protection Volume is provided by the basin practices as determined by measuring the storage volume allowed through extended detention between the elevation at the bottom of each structure (0.0') and the primary outlet (4.0'), less the amount required for RRV.

BR 2 for PSC-2 = 1,680 – 495 = 1,185-CF of storage
BR 3 for PSC-3 = 795 – 198 = 597 CF of storage
BR 6 for PSC-6 = 843 – 345 = 498 CF of storage
BR 7 for PSC-7A = 795 – 187 = 608 CF of storage
DS for PSC-8 = 698 – 254 = 444 CF of storage

Total – 3,332 CF

In addition, the pond provides 12,771-CF between the primary outlet at 5.25' and the 1 yr CPv orifice at 4.0'.

The combined available storage volume between the bioretention areas and pond is **16,103-CF (0.370-AF)** of storage which exceeds the minimum requirement of 0.212. Flow is captured and exfiltrated into the surrounding soil structure and outlet through the underdrain systems.

CPv conditions are met.

Pond 1 CPv orifice

1. Determine H – Avg head above centerline of proposed orifice invert for 1 yr storm. H between 4.55 and 4.00 = 0.55/2 = 0.28'

2. Determine Q – Flow over 24 hr period.

   Stage storage table volume between 4.28' and 4.00' = 2,719 cuft

2,719 cuft/day x 1d/24hrs x 1hr/60min x 1 min/60sec = 0.032cfs

3. $A = Q/C_\delta * \text{Sqrt}(2gH)$

   Where, $C_\delta = 0.6$ and $g = 32.2\ ft/s^2$

   $A = 0.032\ cfs/0.6*(\text{Sqrt}(2(32.2\ ft/s^2) \times 0.28\ ft) = 0.0125\ ft^2$

4. $A = \pi r^2$

   $r^2 = \text{Sqrt}(0.0125\ ft^2 / 3.14) * 2 = 0.126$ ft or **1.5"**

Orifice can adequately outlet the 1 yr 24 hour storm

<u>Overbank Flood (Qp) – DP2</u>

Qp = Controls the peak discharge from the 10-year storm **(3.4-inch rainfall Tompkins County)** to 10-year predevelopment rates.

Pre-developed max rate = **10.49-CFS**, Total Volume = 1.169AF (50,922-CF). Post-developed w/o controls max rate = 17.13-CFS, Total Volume = 1.668-AF (72,658-CF).

The maximum post-developed run-off rate with the bioretention areas and pond in-line is 7.79-CFS, and the total run-off volume is 1.225-AF (53,361-CF).

The **Qp** Overbank Flood control criterion is met with the bioretention areas and pond in-line.

<u>Extreme Storm (Qf) – DP2</u>

Control the peak discharge from the 100-year storm **(5.85-inch rainfall Tompkins County)** to 100-year predevelopment rates. Safely pass the 100-year storm event.

Pre-developed max run-off rate = **52.19-CFS**, Total Volume = 4.392-AF (191,316-CF). Post-developed w/o controls max rate = 63.29-CFS, Total Volume = 5.297 -AF (230,737-CF). The bioretention areas and pond attenuate the post-developed 100-year storm event less than or equal to pre-developed 100 year storm event. **The maximum post-developed run-off rate with the structures inline is 43.42-CFS, and the total run-off volume is 4.821-AF (210,003-CF).**

The **Qf** Extreme Storm control criterion is met with the bioretention areas and pond in-line.

METHODOLOGY

The methodology used for the hydrologic and hydraulic analysis was obtained from the United States Department of Agriculture (USDA) Soil Conservation Service's (SCS) Technical Release No. 20, as implemented by the application program HydroCAD. HydroCAD, developed by Applied Microcomputer Systems of Chocorua, New Hampshire, is a Computer-Aided-Design (CAD) program for analyzing the hydrologic and hydraulic characteristics of a given watershed and associated stormwater management facilities. It utilizes the latest modeling techniques to predict the consequences of any given storm.

HydroCAD has the capability of computing hydrographs and routing flows through pipes, streams and ponds. Hydrographs represent discharge rates characteristic of specified watershed conditions, precipitation and geologic factors.

For this analysis, the watershed and drainage system was broken down into a network consisting of three types of components described below:

Subcatchment: A relatively homogeneous area of land, which produces a volume and rate of surface run-off unique to that area.

Reach: Uniform streams, channels or pipes which convey stormwater from one distinct point to another reach or pond.

Pond: Natural or man-made impoundment (ie. pond), which temporarily stores stormwater run-off and empties in a manner determined by its geometry and the hydraulic structure located at its outlet(s).

Subcatchments, reaches and ponds are represented by hexagons, squares and triangles, respectively, on the watershed routing diagrams provided with the computations reference modeling results attached.

Modeling Results Tabled:

(See Appendix 2 for actual modeling data)

DP1

EXISTING

EXISTING FLOW CONDITIONS AT DESIGN POINT (DP1)

STORM EVENT	*PEAK FLOW (CFS)*	*TOTAL VOLUME (AF)*
1-year	*0.03*	*0.017*
10-year	*1.86*	*0.291*
100-year	*12.78*	*1.294*

PROPOSED

WITHOUT STORMWATER MANAGEMENT

FLOW CONDITIONS AT DESIGN POINT (DP1)

STORM EVENT	*PEAK FLOW (CFS)*	*TOTAL VOLUME (AF)*
1-year	*0.95*	*0.066*
10-year	*3.32*	*0.380*
100-year	*10.92*	*1.429*

PROPOSED

WITH BIORETENTION AREAS IN-LINE

PROPOSED FLOW CONDITIONS AT DESIGN POINT (DP1)

STORM EVENT	*PEAK FLOW (CFS)*	*TOTAL VOLUME (AF)*
1-year	*0.07*	*0.031*
10-year	*1.64*	*0.343*
100-year	*10.79*	*1.389*

The run-off rates decrease for the 10 and 100 yr storm events as modeled.

DP2

EXISTING
EXISTING FLOW CONDITIONS AT DESIGN POINT (DP2)

STORM EVENT	*PEAK FLOW (CFS)*	*TOTAL VOLUME (AF)*
1-year	*0.32*	*0.144*
10-year	*10.49*	*1.169*
100-year	*52.19*	*4.392*

PROPOSED
WITHOUT STORMWATER MANAGEMENT
FLOW CONDITIONS AT DESIGN POINT (DP2)

STORM EVENT	*PEAK FLOW (CFS)*	*TOTAL VOLUME (AF)*
1-year	*2.52*	*0.356*
10-year	*17.13*	*1.668*
100-year	*63.29*	*5.297*

PROPOSED
WITH BIORETENTION AREAS AND PONDS IN-LINE
PROPOSED FLOW CONDITIONS AT DESIGN POINT (DP2)

STORM EVENT	*PEAK FLOW (CFS)*	*TOTAL VOLUME (AF)*
1-year	*0.32*	*0.136*
10-year	*7.79*	*1.225*
100-year	*43.42*	*4.821*

The run-off rates decrease for the 10 and 100 yr storm events as modeled.

Stage Storage Tables:

BIORETENTION 1 STAGE-STORAGE TABLE BR-1

STORM EVENT	*PEAK STORAGE (CF)*	*PEAK DEPTH (FT)*
WQv	*612*	*1.75'*
1 year (**Cpv**)	*494*	*1.21'*
10 year	*1,481*	*3.86'*
100 year	*2,203*	*4.38'*

Notes:
Invert Washed Stone Drainage Layer 0'
Invert of Drainage Pipe 0.5'
Invert of Soil Drainage Layer 1.0'
Bottom of Swale El. = 3.50'
6'-Broad Crested Weir Outlet inv. = 4.00'
Top of Swale Embankment Elev. = 5.00'

BIORETENTION 2 STAGE-STORAGE TABLE BR-2

STORM EVENT	*PEAK STORAGE (CF)*	*PEAK DEPTH (FT)*
WQv	*495*	*1.21'*
1 year (**Cpv**)	*688*	*2.09'*
10 year	*1,050*	*3.54'*
100 year	*1,946*	*4.19'*

Notes:
Invert Washed Stone Drainage Layer 0'
Invert of Drainage Pipe 0.5'
Invert of Soil Drainage Layer 1.0'
Bottom of Swale El. = 3.50'
6'-Broad Crested Weir Outlet inv. = 4.00'
Top of Swale Embankment Elev. = 5.00'

BIORETENTION 3 STAGE-STORAGE TABLE BR-3

STORM EVENT	*PEAK STORAGE (CF)*	*PEAK DEPTH (FT)*
WQv	*198*	*1.00'*
1 year (**Cpv**)	*306*	*2.04'*
10 year	*391*	*2.90'*
100 year	*845*	*4.07'*

Notes:
Invert Washed Stone Drainage Layer 0'
Invert of Drainage Pipe 0.5'
Invert of Soil Drainage Layer 1.0'
Bottom of Swale El. = 3.50'
6'-Broad Crested Weir Outlet inv. = 4.00'
Top of Swale Embankment Elev. = 5.00'

BIORETENTION 4 STAGE-STORAGE TABLE BR-4

STORM EVENT	*PEAK STORAGE (CF)*	*PEAK DEPTH (FT)*
WQv	*466*	*1.60'*
1 year (**Cpv**)	*688*	*2.86'*
10 year	*1,113*	*3.79'*
100 year	*1,631*	*4.26'*

Notes:
Invert Washed Stone Drainage Layer 0'
Invert of Drainage Pipe 0.5'
Invert of Soil Drainage Layer 1.0'
Bottom of Swale El. = 3.50'
6'-Broad Crested Weir Outlet inv. = 4.00'
Top of Swale Embankment Elev. = 5.00'

BIORETENTION 5 STAGE-STORAGE TABLE BR-5

STORM EVENT	*PEAK STORAGE (CF)*	*PEAK DEPTH (FT)*
WQv	*403*	*1.52'*
1 year (**Cpv**)	*348*	*1.17'*
10 year	*719*	*3.51'*
100 year	*1,390*	*4.16'*

Notes:
Invert Washed Stone Drainage Layer 0'
Invert of Drainage Pipe 0.5'
Invert of Soil Drainage Layer 1.0'

Bottom of Swale El. = 3.50'
6'-Broad Crested Weir Outlet inv. = 4.00'
Top of Swale Embankment Elev. = 5.00'

BIORETENTION 6 STAGE-STORAGE TABLE BR-6

STORM EVENT	*PEAK STORAGE (CF)*	*PEAK DEPTH (FT)*
WQv	*345*	*2.78'*
*1 year (***Cpv***)*	*330*	*2.62'*
10 year	*659*	*3.79'*
100 year	*1,034*	*4.22'*

Notes:
Invert Washed Stone Drainage Layer 0'
Invert of Drainage Pipe 0.5'
Invert of Soil Drainage Layer 1.0'
Bottom of Swale El. = 3.50'
6'-Broad Crested Weir Outlet inv. = 4.00'
Top of Swale Embankment Elev. = 5.00'

BIORETENTION 7 STAGE-STORAGE TABLE BR-7A

STORM EVENT	*PEAK STORAGE (CF)*	*PEAK DEPTH (FT)*
WQv	*187*	*0.95'*
*1 year (***Cpv***)*	*294*	*1.92'*
10 year	*354*	*2.52'*
100 year	*708*	*3.87'*

Notes:
Invert Washed Stone Drainage Layer 0'
Invert of Drainage Pipe 0.5'
Invert of Soil Drainage Layer 1.0'
Bottom of Swale El. = 3.50'
6'-Broad Crested Weir Outlet inv. = 4.00'
Top of Swale Embankment Elev. = 5.00'

POND STAGE-STORAGE TABLE P

STORM EVENT	*PEAK STORAGE (CF)*	*PEAK DEPTH (FT)*
WQv	*7,149*	*4.12'*
*1 year (***Cpv***)*	*10,418*	*4.47'*
10 year	*20,998*	*5.43'*
100 year	*38,587*	*6.70'*

Notes:
Notes:
Bottom of Basin El. = 0.00'
1.5" Permanent Pool Orifice = 4.00'
12" 10 Yr Overflow Horizontal Orifice = 5.25'
25' x 6' *100 Yr* Broadcrested Weir = 6.50'
Top of Basin Embankment Elev. = 7.50'

APPENDIX 1

WATER QUALITY VOLUME/RUNOFF REDUCTION WORKSHEETS

Version 1.6 Total Water Quality Volume Calculation
Last Updated: 03/28/2014 WQv(acre-feet) = [(P)(Rv)(A)] /12

Is this project subject to Chapter 10 of the NYS Design Manual (i.e. WQv is equal to post-development 1 year runoff volume)?...	No

Design Point:	1	
P=	1.00	inch

Manually enter P, Total Area and Impervious Cover.

Breakdown of Subcatchments

Catchment Number	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious *%*	Rv	WQv *(ft^3)*	Description
1	0.85	0.14	16%	0.20	612	PSC 1 - Bioretention, BR 1
2	0.41	0.12	29%	0.31	466	PSC 4 - Bioretention, BR 4
3	0.24	0.11	46%	0.46	403	PSC 5 - Bioretention, BR 5
4						
5						
6						
7						
8						
9						
10						
Subtotal (1-30)	1.50	0.37	25%	0.27	**1,481**	**Subtotal 1**
Total	1.50	0.37	25%	0.27	**1,481**	**Initial WQv**

Identify Runoff Reduction Techniques By Area

Technique	Total Contributing Area *(Acre)*	Contributing Impervious Area *(Acre)*	Notes
Conservation of Natural Areas	0.00	0.00	*minimum 10,000 sf*
Riparian Buffers	0.00	0.00	*maximum contributing length 75 feet to 150 feet*
Filter Strips	0.00	0.00	
Tree Planting	0.00	0.00	*Up to 100 sf directly connected impervious area may be subtracted per tree*
Total	**0.00**	**0.00**	

Recalculate WQv after application of Area Reduction Techniques

	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious *%*	Runoff Coefficient Rv	WQv *(ft^3)*
"<<Initial WQv"	1.50	0.37	25%	0.27	1,481
Subtract Area	0.00	0.00			
WQv adjusted after Area Reductions	**1.50**	**0.37**	25%	0.27	1,481
Disconnection of Rooftops		0.00			

Total Water Quality Volume Calculation
WQv(acre-feet) = [(P)(Rv)(A)] /12

Adjusted WQv after Area Reduction and Rooftop Disconnect	1.50	0.37	25%	0.27	**1,481**
WQv reduced by Area Reduction techniques					0

Total Water Quality Volume Calculation

WQv(acre-feet) = [(P)(Rv)(A)] /12

All Subcatchments						
Catchment	**Total Area** *(Acres)*	**Impervious Cover** *(Acres)*	**Percent Impervious** *%*	**Runoff Coefficient** *Rv*	**WQv** *(ft^3)*	**Description**
1	0.85	0.14	0.16	0.20	611.66	PSC 1 - Bioretention,
2	0.41	0.12	0.29	0.31	466	PSC 4 - Bioretention,
3	0.24	0.11	0.46	0.46	402.93	PSC 5 - Bioretention,
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Runoff Reduction Volume and Treated volumes						
	Runoff Reduction Techiques/Standard SMPs		**Total Contributing Area**	**Total Contributing Impervious Area**	**WQv Reduced (RRv)**	**WQv Treated**
			(acres)	**(acres)**	**cf**	**cf**
Area/Volume Reduction	Conservation of Natural Areas	RR-1	0.00	0.00		
	Sheetflow to Riparian Buffers/Filter Strips	RR-2	0.00	0.00		
	Tree Planting/Tree Pit	RR-3	0.00	0.00		
	Disconnection of Rooftop Runoff	RR-4		0.00		
	Vegetated Swale	RR-5	0.00	0.00	0	
	Rain Garden	RR-6	0.00	0.00	0	
	Stormwater Planter	RR-7	0.00	0.00	0	
	Rain Barrel/Cistern	RR-8	0.00	0.00	0	
	Porous Pavement	RR-9	0.00	0.00	0	
	Green Roof (Intensive & Extensive)	RR-10	0.00	0.00	0	
Standard SMPs w/RRv Capacity	Infiltration Trench	I-1	0.00	0.00	0	0
	Infiltration Basin	I-2	0.00	0.00	0	0
	Dry Well	I-3	0.00	0.00	0	0
	Underground Infiltration System	I-4	0.00			
	Bioretention & Infiltration Bioretention	F-5	1.50	0.37	1481	0
	Dry swale	O-1	0.00	0.00	0	0
Standard SMPs	Micropool Extended Detention (P-1)	P-1				
	Wet Pond (P-2)	P-2				
	Wet Extended Detention (P-3)	P-3				
	Multiple Pond system (P-4)	P-4				
	Pocket Pond (p-5)	P-5				
	Surface Sand filter (F-1)	F-1				
	Underground Sand filter (F-2)	F-2				
	Perimeter Sand Filter (F-3)	F-3				
	Organic Filter (F-4	F-4				
	Shallow Wetland (W-1)	W-1				
	Extended Detention Wetland (W-2	W-2				
	Pond/Wetland System (W-3)	W-3				
	Pocket Wetland (W-4)	W-4				
	Wet Swale (O-2)	O-2				
	Totals by Area Reduction	→	0.00	0.00	0	
	Totals by Volume Reduction	→	0.00	0.00	0	
	Totals by Standard SMP w/RRV	→	1.50	0.37	1481	0
	Totals by Standard SMP	→	0.00	0.00		0
	Totals (Area + Volume + all SMPs)	→	1.50	0.37	1,481	0
	Impervious Cover √	okay				

Minimum RRv

Enter the Soils Data for the site		
Soil Group	Acres	S
A		55%
B		40%
C	1.50	30%
D		20%
Total Area	1.5	
Calculate the Minimum RRv		
S =	**0.30**	
Impervious =	0.37	*acre*
Precipitation	1	*in*
Rv	0.95	
Minimum RRv	**383**	***ft3***
	0.01	af

Bioretention Worksheet

(For use on HSG C or D Soils with underdrains)

Af=WQv*(df)/[k*(hf+df)(tf)]

Af	Required Surface Area (ft2)
WQv	Water Quality Volume (ft3)
df	Depth of the Soil Medium (feet)
hf	Average height of water above the planter bed
tf	Volume Through the Filter Media (days)

k The hydraulic conductivity [ft/day], can be varied depending on the properties of the soil media. Some reported conductivity values are: ***Sand*** - 3.5 ft/day (City of Austin 1988); ***Peat*** - 2.0 ft/day (Galli 1990); ***Leaf Compost*** - 8.7 ft/day (Claytor and Schueler, 1996); ***Bioretention Soil*** (0.5 ft/day (Claytor &

Design Point:	**1**						
Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
1	0.85	0.14	0.16	0.20	611.66	1.00	PSC 1 - Bioretention, BR 1
Enter Impervious Area Reduced by Disconnection of Rooftops			16%	0.20	612	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.						*ft^3*	
Soil Information							
Soil Group		C					
Soil Infiltration Rate		0.20	*in/hour*	*Okay*			
Using Underdrains?		Yes	*Okay*				
Calculate the Minimum Filter Area							
				Value		Units	Notes
WQv				612		*ft^3*	
Enter Depth of Soil Media			*df*	2.5		*ft*	*2.5-4 ft*
Enter Hydraulic Conductivity			*k*	0.5		*ft/day*	
Enter Average Height of Ponding			*hf*	0.5		*ft*	*6 inches max.*
Enter Filter Time			*tf*	2		*days*	
Required Filter Area			***Af***	**510**		***ft^2***	
Determine Actual Bio-Retention Area							
Filter Width		24	*ft*				
Filter Length		55	*ft*				
Filter Area		1320	*ft^2*				
Actual Volume Provided		1584	*ft^3*				
Determine Runoff Reduction							
Is the Bioretention contributing flow to another practice?				Select Practice			
RRv		634					
RRv applied		**612**	***ft^3***	***This is 40% of the storage provided or WQv whichever is less.***			
Volume Treated		0	*ft^3*	*This is the portion of the WQv that is not reduced in the practice.*			
Volume Directed		0	*ft^3*	This volume is directed another practice			
Sizing √		OK		*Check to be sure Area provided ≥ Af*			

Bioretention Worksheet

(For use on HSG C or D Soils with underdrains)

Af=WQv*(df)/[k*(hf+df)(tf)]

Af	Required Surface Area (ft2)
WQv	Water Quality Volume (ft3)
df	Depth of the Soil Medium (feet)
hf	Average height of water above the planter bed
tf	Volume Through the Filter Media (days)

k — The hydraulic conductivity [ft/day], can be varied depending on the properties of the soil media. Some reported conductivity values are: ***Sand*** - 3.5 ft/day (City of Austin 1988); ***Peat*** - 2.0 ft/day (Galli 1990); ***Leaf Compost*** - 8.7 ft/day (Claytor and Schueler, 1996); ***Bioretention Soil*** (0.5 ft/day (Claytor & Schueler, 1996)

Design Point:	**1**						
Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
2	0.41	0.12	0.29	0.31	466.46	1.00	PSC 4 - Bioretention, BR 4
Enter Impervious Area Reduced by Disconnection of Rooftops			29%	0.31	466	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.						*ft^3*	
Soil Information							
Soil Group	C						
Soil Infiltration Rate	0.20	*in/hour*	*Okay*				
Using Underdrains?	Yes	*Okay*					
Calculate the Minimum Filter Area							
			Value			Units	Notes
WQv			466			*ft^3*	
Enter Depth of Soil Media		*df*	2.5			*ft*	*2.5-4 ft*
Enter Hydraulic Conductivity		*k*	0.5			*ft/day*	
Enter Average Height of Ponding		*hf*	0.5			*ft*	*6 inches max.*
Enter Filter Time		*tf*	2			*days*	
Required Filter Area		***Af***	**389**			***ft^2***	
Determine Actual Bio-Retention Area							
Filter Width	22	*ft*					
Filter Length	45	*ft*					
Filter Area	990	*ft^2*					
Actual Volume Provided	1188	*ft^3*					
Determine Runoff Reduction							
Is the Bioretention contributing flow to another practice?			Select Practice				
RRv	475						
RRv applied	**466**	***ft^3***	***This is 40% of the storage provided or WQv whichever is less.***				
Volume Treated	0	*ft^3*	*This is the portion of the WQv that is not reduced in the practice.*				
Volume Directed	0	*ft^3*	This volume is directed another practice				
Sizing √	OK		*Check to be sure Area provided ≥ Af*				

Bioretention Worksheet

(For use on HSG C or D Soils with underdrains)

Af=WQv*(df)/[k*(hf+df)(tf)]

Af	Required Surface Area (ft2)
WQv	Water Quality Volume (ft3)
df	Depth of the Soil Medium (feet)
hf	Average height of water above the planter bed
tf	Volume Through the Filter Media (days)
k	The hydraulic conductivity [ft/day], can be varied depending on the properties of the soil media. Some reported conductivity values are: ***Sand*** - 3.5 ft/day (City of Austin 1988); ***Peat*** - 2.0 ft/day (Galli 1990); ***Leaf Compost*** - 8.7 ft/day (Claytor and Schueler, 1996); ***Bioretention Soil*** (0.5 ft/day (Claytor &

Design Point:	**1**						
Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
3	0.24	0.11	0.46	0.46	402.93	1.00	PSC 5 - Bioretention, BR 5
Enter Impervious Area Reduced by Disconnection of Rooftops			46%	0.46	403	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.						*ft^3*	
Soil Information							
Soil Group	C						
Soil Infiltration Rate	0.20	*in/hour*	*Okay*				
Using Underdrains?	Yes	*Okay*					
Calculate the Minimum Filter Area							
			Value		Units	Notes	
WQv			403		*ft^3*		
Enter Depth of Soil Media		*df*	2.5		*ft*	*2.5-4 ft*	
Enter Hydraulic Conductivity		*k*	0.5		*ft/day*		
Enter Average Height of Ponding		*hf*	0.5		*ft*	*6 inches max.*	
Enter Filter Time		*tf*	2		*days*		
Required Filter Area		***Af***	**336**		***ft^2***		
Determine Actual Bio-Retention Area							
Filter Width	20	*ft*					
Filter Length	42	*ft*					
Filter Area	840	*ft^2*					
Actual Volume Provided	1008	*ft^3*					
Determine Runoff Reduction							
Is the Bioretention contributing flow to another practice?			Select Practice				
RRv	403						
RRv applied	**403**	***ft^3***	***This is 40% of the storage provided or WQv whichever is less.***				
Volume Treated	0	*ft^3*	*This is the portion of the WQv that is not reduced in the practice.*				
Volume Directed	0	*ft^3*	This volume is directed another practice				
Sizing √	OK		*Check to be sure Area provided ≥ Af*				

Version 1.6 Total Water Quality Volume Calculation
Last Updated: 03/28/2014 WQv(acre-feet) = [(P)(Rv)(A)] /12

Is this project subject to Chapter 10 of the NYS Design Manual (i.e. WQv is equal to post-development 1 year runoff volume)?...						No
Design Point:	2		*Manually enter P, Total Area and Impervious Cover.*			
P=	1.00	*inch*				
Breakdown of Subcatchments						
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Description**
1	0.39	0.13	33%	0.35	495	PSC 2 - Bioretention, BR 2
2	0.19	0.05	26%	0.29	198	PSC 3 - Bioretention, BR 3
3	0.28	0.09	32%	0.34	345	PSC 6 - Bioretention, BR 6
4	8.43	1.72	20%	0.23	7,149	PSC 7 - Standard Practice; Pond
5	0.14	0.07	50%	0.50	254	PSC 8 - DrySwale
6	0.13	0.05	38%	0.40	187	PSC 7A - Bioretention, BR 7
7						
8						
9						
10						
Subtotal (1-30)	9.56	2.11	22%	0.25	**8,629**	**Subtotal 1**
Total	9.56	2.11	22%	0.25	**8,629**	**Initial WQv**

Identify Runoff Reduction Techniques By Area			
Technique	**Total Contributing Area** *(Acre)*	**Contributing Impervious Area** *(Acre)*	**Notes**
Conservation of Natural Areas	0.00	0.00	*minimum 10,000 sf*
Riparian Buffers	0.00	0.00	*maximum contributing length 75 feet to 150 feet*
Filter Strips	0.00	0.00	
Tree Planting	0.00	0.00	*Up to 100 sf directly connected impervious area may be subtracted per tree*
Total	**0.00**	**0.00**	

Recalculate WQv after application of Area Reduction Techniques					
	Total Area *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Runoff Coefficient Rv**	**WQv** *(ft^3)*
"<<Initial WQv"	9.56	2.11	22%	0.25	8,629
Subtract Area	0.00	0.00			

Total Water Quality Volume Calculation
WQv(acre-feet) = [(P)(Rv)(A)] /12

WQv adjusted after Area Reductions	**9.56**	**2.11**	22%	0.25	8,629
Disconnection of Rooftops		0.00			
Adjusted WQv after Area Reduction and Rooftop Disconnect	9.56	2.11	22%	0.25	**8,629**
WQv reduced by Area Reduction techniques					0

Total Water Quality Volume Calculation

WQv(acre-feet) = [(P)(Rv)(A)] /12

All Subcatchments						
Catchment	**Total Area** *(Acres)*	**Impervious Cover** *(Acres)*	**Percent Impervious** *%*	**Runoff Coefficient** *Rv*	**WQv** *(ft^3)*	**Description**
1	0.39	0.13	0.33	0.35	495.50	PSC 2 - Bioretention,
2	0.19	0.05	0.26	0.29	198	PSC 3 - Bioretention,
3	0.28	0.09	0.32	0.34	344.85	PSC 6 - Bioretention,
4	8.43	1.72	0.20	0.23	7149.29	PSC 7 -
5	0.14	0.07	0.50	0.50	254.10	PSC 8 - DrySwale
6	0.13	0.05	0.38	0.40	186.95	PSC 7A -
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

Runoff Reduction Volume and Treated volumes						
	Runoff Reduction Techiques/Standard SMPs		Total Contributing Area	Total Contributing Impervious Area	WQv Reduced (RRv)	WQv Treated
			(acres)	(acres)	cf	cf
Area/Volume Reduction	Conservation of Natural Areas	RR-1	0.00	0.00		
	Sheetflow to Riparian Buffers/Filter Strips	RR-2	0.00	0.00		
	Tree Planting/Tree Pit	RR-3	0.00	0.00		
	Disconnection of Rooftop Runoff	RR-4		0.00		
	Vegetated Swale	RR-5	0.00	0.00	0	
	Rain Garden	RR-6	0.00	0.00	0	
	Stormwater Planter	RR-7	0.00	0.00	0	
	Rain Barrel/Cistern	RR-8	0.00	0.00	0	
	Porous Pavement	RR-9	0.00	0.00	0	
	Green Roof (Intensive & Extensive)	RR-10	0.00	0.00	0	
Standard SMPs w/RRv Capacity	Infiltration Trench	I-1	0.00	0.00	0	0
	Infiltration Basin	I-2	0.00	0.00	0	0
	Dry Well	I-3	0.00	0.00	0	0
	Underground Infiltration System	I-4	0.00			
	Bioretention & Infiltration Bioretention	F-5	0.99	0.32	1225	0
	Dry swale	O-1	0.14	0.07	254	0
Standard SMPs	Micropool Extended Detention (P-1)	P-1				
	Wet Pond (P-2)	P-2	8.46	1.66		7149.000
	Wet Extended Detention (P-3)	P-3				
	Multiple Pond system (P-4)	P-4				
	Pocket Pond (p-5)	P-5				
	Surface Sand filter (F-1)	F-1				
	Underground Sand filter (F-2)	F-2				
	Perimeter Sand Filter (F-3)	F-3				
	Organic Filter (F-4	F-4				
	Shallow Wetland (W-1)	W-1				
	Extended Detention Wetland (W-2	W-2				
	Pond/Wetland System (W-3)	W-3				
	Pocket Wetland (W-4)	W-4				
	Wet Swale (O-2)	O-2				
Totals by Area Reduction		→	0.00	0.00	0	
Totals by Volume Reduction		→	0.00	0.00	0	
Totals by Standard SMP w/RRV		→	1.13	0.39	1479	0
Totals by Standard SMP		→	8.46	1.66		7149
Totals (Area + Volume + all SMPs)		→	9.59	2.05	1,479	7,149
	Impervious Cover √	error				

Minimum RRv

Enter the Soils Data for the site		
Soil Group	Acres	S
A	0.80	55%
B	0.82	40%
C	7.95	30%
D		20%
Total Area	9.57	
Calculate the Minimum RRv		
S =	**0.33**	
Impervious =	2.11	*acre*
Precipitation	1	*in*
Rv	0.95	
Minimum RRv	**2,397**	***ft3***
	0.06	af

Bioretention Worksheet

(For use on HSG C or D Soils with underdrains)

Af=WQv*(df)/[k*(hf+df)(tf)]

Af	Required Surface Area (ft2)
WQv	Water Quality Volume (ft3)
df	Depth of the Soil Medium (feet)
hf	Average height of water above the planter bed
tf	Volume Through the Filter Media (days)

k The hydraulic conductivity [ft/day], can be varied depending on the properties of the soil media. Some reported conductivity values are: ***Sand*** - 3.5 ft/day (City of Austin 1988); ***Peat*** - 2.0 ft/day (Galli 1990); ***Leaf Compost*** - 8.7 ft/day (Claytor and Schueler, 1996); ***Bioretention Soil*** (0.5 ft/day (Claytor &

Design Point:	**2**						
Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
1	0.39	0.13	0.33	0.35	495.50	1.00	PSC 2 - Bioretention, BR 2
Enter Impervious Area Reduced by Disconnection of Rooftops			33%	0.35	495	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.						*ft^3*	
Soil Information							
Soil Group		C					
Soil Infiltration Rate		0.20	*in/hour*	*Okay*			
Using Underdrains?		Yes	*Okay*				
Calculate the Minimum Filter Area							
				Value		Units	Notes
WQv				495		*ft^3*	
Enter Depth of Soil Media			*df*	2.5		*ft*	*2.5-4 ft*
Enter Hydraulic Conductivity			*k*	0.5		*ft/day*	
Enter Average Height of Ponding			*hf*	0.5		*ft*	*6 inches max.*
Enter Filter Time			*tf*	2		*days*	
Required Filter Area			***Af***	**413**		***ft^2***	
Determine Actual Bio-Retention Area							
Filter Width		26	*ft*				
Filter Length		40	*ft*				
Filter Area		1040	*ft^2*				
Actual Volume Provided		1248	*ft^3*				
Determine Runoff Reduction							
Is the Bioretention contributing flow to another practice?				Select Practice			
RRv		499					
RRv applied		**495**	***ft^3***	***This is 40% of the storage provided or WQv whichever is less.***			
Volume Treated		0	*ft^3*	*This is the portion of the WQv that is not reduced in the practice.*			
Volume Directed		0	*ft^3*	This volume is directed another practice			
Sizing √		OK		*Check to be sure Area provided ≥ Af*			

Bioretention Worksheet

(For use on HSG C or D Soils with underdrains)

Af=WQv*(df)/[k*(hf+df)(tf)]

Af	Required Surface Area (ft2)
WQv	Water Quality Volume (ft3)
df	Depth of the Soil Medium (feet)
hf	Average height of water above the planter bed
tf	Volume Through the Filter Media (days)

k The hydraulic conductivity [ft/day], can be varied depending on the properties of the soil media. Some reported conductivity values are: ***Sand*** - 3.5 ft/day (City of Austin 1988); ***Peat*** - 2.0 ft/day (Galli 1990); ***Leaf Compost*** - 8.7 ft/day (Claytor and Schueler, 1996); ***Bioretention Soil*** (0.5 ft/day (Claytor & Schueler, 1996)

Design Point:	**2**						
Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
2	0.19	0.05	0.26	0.29	197.84	1.00	PSC 3 - Bioretention, BR 3
Enter Impervious Area Reduced by Disconnection of Rooftops			26%	0.29	198	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.						*ft^3*	
Soil Information							
Soil Group		C					
Soil Infiltration Rate		0.20	*in/hour*	*Okay*			
Using Underdrains?		Yes	*Okay*				
Calculate the Minimum Filter Area							
				Value		Units	Notes
WQv				198		*ft^3*	
Enter Depth of Soil Media			*df*	2.5		*ft*	*2.5-4 ft*
Enter Hydraulic Conductivity			*k*	0.5		*ft/day*	
Enter Average Height of Ponding			*hf*	0.5		*ft*	*6 inches max.*
Enter Filter Time			*tf*	2		*days*	
Required Filter Area			***Af***	**165**		***ft^2***	
Determine Actual Bio-Retention Area							
Filter Width		15	*ft*				
Filter Length		30	*ft*				
Filter Area		450	*ft^2*				
Actual Volume Provided		540	*ft^3*				
Determine Runoff Reduction							
Is the Bioretention contributing flow to another practice?				Select Practice			
RRv		216					
RRv applied		**198**	***ft^3***	***This is 40% of the storage provided or WQv whichever is less.***			
Volume Treated		0	*ft^3*	*This is the portion of the WQv that is not reduced in the practice.*			
Volume Directed		0	*ft^3*	This volume is directed another practice			
Sizing √		OK		*Check to be sure Area provided ≥ Af*			

Bioretention Worksheet

(For use on HSG C or D Soils with underdrains)

Af=WQv*(df)/[k*(hf+df)(tf)]

Af	Required Surface Area (ft2)
WQv	Water Quality Volume (ft3)
df	Depth of the Soil Medium (feet)
hf	Average height of water above the planter bed
tf	Volume Through the Filter Media (days)
k	The hydraulic conductivity [ft/day], can be varied depending on the properties of the soil media. Some reported conductivity values are: ***Sand*** - 3.5 ft/day (City of Austin 1988); ***Peat*** - 2.0 ft/day (Galli 1990); ***Leaf Compost*** - 8.7 ft/day (Claytor and Schueler, 1996); ***Bioretention Soil*** (0.5 ft/day (Claytor &

Design Point:	**2**

Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
3	0.28	0.09	0.32	0.34	344.85	1.00	PSC 6 - Bioretention, BR 6
Enter Impervious Area Reduced by Disconnection of Rooftops			32%	0.34	345	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.						*ft^3*	
Soil Information							
Soil Group		C					
Soil Infiltration Rate		0.20	*in/hour*	*Okay*			
Using Underdrains?		Yes	*Okay*				

Calculate the Minimum Filter Area					
			Value	Units	Notes
WQv			345	*ft^3*	
Enter Depth of Soil Media		*df*	2.5	*ft*	*2.5-4 ft*
Enter Hydraulic Conductivity		*k*	0.5	*ft/day*	
Enter Average Height of Ponding		*hf*	0.5	*ft*	*6 inches max.*
Enter Filter Time		*tf*	2	*days*	
Required Filter Area		***Af***	**287**	***ft^2***	

Determine Actual Bio-Retention Area			
Filter Width	9	*ft*	
Filter Length	80	*ft*	
Filter Area	720	*ft^2*	
Actual Volume Provided	864	*ft^3*	
Determine Runoff Reduction			
Is the Bioretention contributing flow to another practice?			Select Practice
RRv	346		
RRv applied	**345**	***ft^3***	***This is 40% of the storage provided or WQv whichever is less.***
Volume Treated	0	*ft^3*	*This is the portion of the WQv that is not reduced in the practice.*
Volume Directed	0	*ft^3*	This volume is directed another practice
Sizing √	OK		*Check to be sure Area provided ≥ Af*

Bioretention Worksheet

(For use on HSG C or D Soils with underdrains)

Af=WQv*(df)/[k*(hf+df)(tf)]

Af	Required Surface Area (ft2)	*k*	The hydraulic conductivity [ft/day], can be varied depending on the properties of the soil media. Some reported conductivity values are: ***Sand*** - 3.5 ft/day (City of Austin 1988); ***Peat*** - 2.0 ft/day (Galli 1990); ***Leaf Compost*** - 8.7 ft/day (Claytor and Schueler, 1996); ***Bioretention Soil*** (0.5 ft/day (Claytor &
WQv	Water Quality Volume (ft3)		
df	Depth of the Soil Medium (feet)		
hf	Average height of water above the planter bed		
tf	Volume Through the Filter Media (days)		

Design Point:	**2**						
Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
6	0.13	0.05	0.38	0.40	186.95	1.00	PSC 7A - Bioretention, BR 7
Enter Impervious Area Reduced by Disconnection of Rooftops			38%	0.40	187	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.						*ft^3*	
Soil Information							
Soil Group		C					
Soil Infiltration Rate		0.20	*in/hour*	*Okay*			
Using Underdrains?		Yes	*Okay*				
Calculate the Minimum Filter Area							
				Value		Units	Notes
WQv				187		*ft^3*	
Enter Depth of Soil Media			*df*	2.5		*ft*	*2.5-4 ft*
Enter Hydraulic Conductivity			*k*	0.5		*ft/day*	
Enter Average Height of Ponding			*hf*	0.5		*ft*	*6 inches max.*
Enter Filter Time			*tf*	2		*days*	
Required Filter Area			***Af***	**156**		***ft^2***	
Determine Actual Bio-Retention Area							
Filter Width		15	*ft*				
Filter Length		30	*ft*				
Filter Area		450	*ft^2*				
Actual Volume Provided		540	*ft^3*				
Determine Runoff Reduction							
Is the Bioretention contributing flow to another practice?				Select Practice			
RRv		216					
RRv applied		**187**	***ft^3***	***This is 40% of the storage provided or WQv whichever is less.***			
Volume Treated		0	*ft^3*	*This is the portion of the WQv that is not reduced in the practice.*			
Volume Directed		0	*ft^3*	This volume is directed another practice			
Sizing √		OK		*Check to be sure Area provided ≥ Af*			

Dry Swale Worksheet

Design Point:	**2**

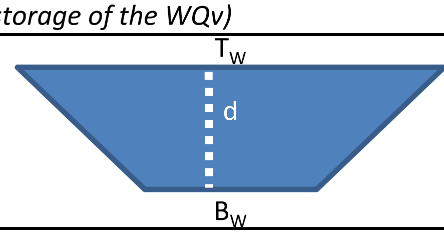
Enter Site Data For Drainage Area to be Treated by Practice

Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft ^{3})*	**Precipitation** *(in)*	**Description**
5	0.14	0.07	0.50	0.50	254.10	1.00	PSC 8 - DrySwale
Enter Impervious Area Reduced by Disconnection of Rooftops			50%	0.50	254	<<WQv after adjusting for Disconnected Rooftops	

Pretreatment Provided			**Pretreatment Technique**
Pretreatment (10% of WQv)	25	*ft ^{3}*	

Calculate Available Storage Capacity

Bottom Width	4	*ft*	Design with a bottom width no greater than eight feet to avoid potential gullying and channel braiding, but no less than two feet
Side Slope (X:1)	4	*Okay*	Channels shall be designed with moderate side slopes (flatter than 3:1) for most conditions. 2:1 is the absolute maximum side slope
Longitudinal Slope	2%	*Okay*	*Maximum longitudinal slope shall be 4%*
Flow Depth	1	*ft*	*Maximum ponding depth of one foot at the mid-point of the channel, and a maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Top Width	12	*ft*	
Area	8.00	*sf*	
Minimum Length	29	*ft*	
Actual Length	156	*ft*	
End Point Depth check	0.50	*Okay*	*A maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Storage Capacity	1,273	*ft ^{3}*	
Soil Group (HSG)		C	

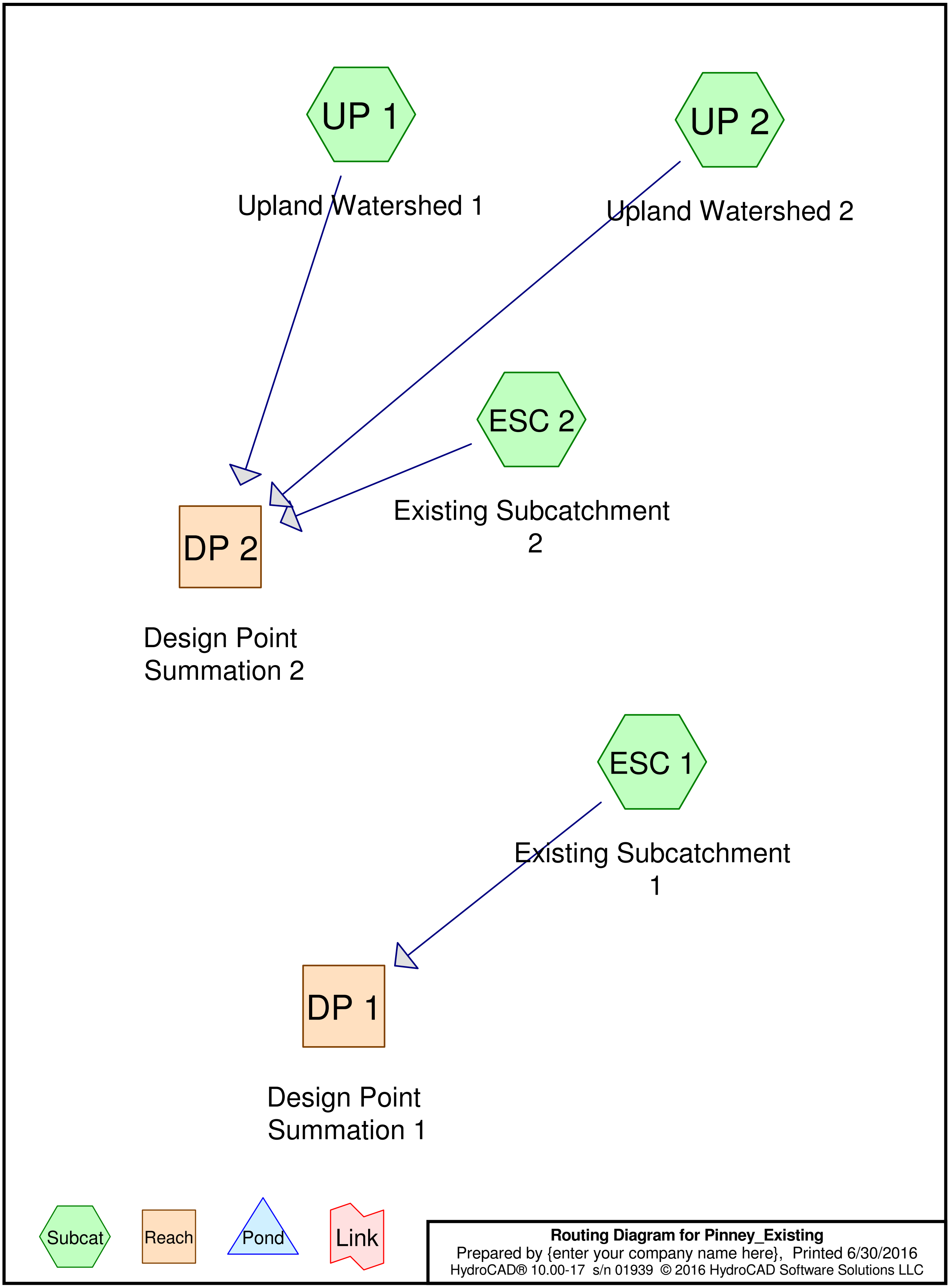


Runoff Reduction

Is the Dry Swale contributing flow to another practice?	No	Select Practice	
RRv	**254**	***ft ^{3}***	**Runnoff Reduction equals 40% in HSG A and B and 20% in HSG C and D up to the WQv**
Volume Treated	0	*ft ^{3}*	This is the difference between the WQv calculated and the runoff reduction achieved in the swale
Volume Directed	0	*ft ^{3}*	This volume is directed another practice
Volume √	*Okay*		Check to be sure that channel is long enough to store WQv

APPENDIX 2

HYDRAULIC MODELING DATA



Routing Diagram for Pinney_Existing
Prepared by {enter your company name here}, Printed 6/30/2016
HydroCAD® 10.00-17 s/n 01939 © 2016 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
5.827	30	Brush, Good, HSG A (ESC 1, ESC 2)
1.271	48	Brush, Good, HSG B (ESC 2)
34.825	65	Brush, Good, HSG C (ESC 1, ESC 2, UP 1, UP 2)
0.082	98	Paved parking & roofs (ESC 1, ESC 2)
42.006	**60**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
5.827	HSG A	ESC 1, ESC 2
1.271	HSG B	ESC 2
34.825	HSG C	ESC 1, ESC 2, UP 1, UP 2
0.000	HSG D	
0.082	Other	ESC 1, ESC 2
42.006		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
5.827	1.271	34.825	0.000	0.000	41.924	Brush, Good	ESC 1, ESC 2, UP 1, UP 2
0.000	0.000	0.000	0.000	0.082	0.082	Paved parking & roofs	ESC 1, ESC 2
5.827	**1.271**	**34.825**	**0.000**	**0.082**	**42.006**	**TOTAL AREA**	

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 ESC 1: Existing Runoff Area=483,408 sf 0.43% Impervious Runoff Depth>0.02"
Flow Length=1,275' Tc=32.4 min CN=57 Runoff=0.03 cfs 0.017 af

Subcatchment ESC 2: Existing Runoff Area=1,087,798 sf 0.14% Impervious Runoff Depth>0.04"
Flow Length=1,657' Tc=25.6 min CN=60 Runoff=0.19 cfs 0.090 af

Subcatchment UP 1: Upland Watershed 1 Runoff Area=187,023 sf 0.00% Impervious Runoff Depth>0.11"
Flow Length=557' Tc=15.0 min CN=65 Runoff=0.23 cfs 0.039 af

Subcatchment UP 2: Upland Watershed 2 Runoff Area=71,533 sf 0.00% Impervious Runoff Depth>0.11"
Flow Length=410' Slope=0.0300 '/' Tc=14.5 min CN=65 Runoff=0.09 cfs 0.015 af

Reach DP 1: Design Point Summation 1 Inflow=0.03 cfs 0.017 af
Outflow=0.03 cfs 0.017 af

Reach DP 2: Design Point Summation 2 Inflow=0.32 cfs 0.144 af
Outflow=0.32 cfs 0.144 af

Total Runoff Area = 42.006 ac Runoff Volume = 0.161 af Average Runoff Depth = 0.05"
99.80% Pervious = 41.924 ac 0.20% Impervious = 0.082 ac

Summary for Subcatchment ESC 1: Existing Subcatchment 1

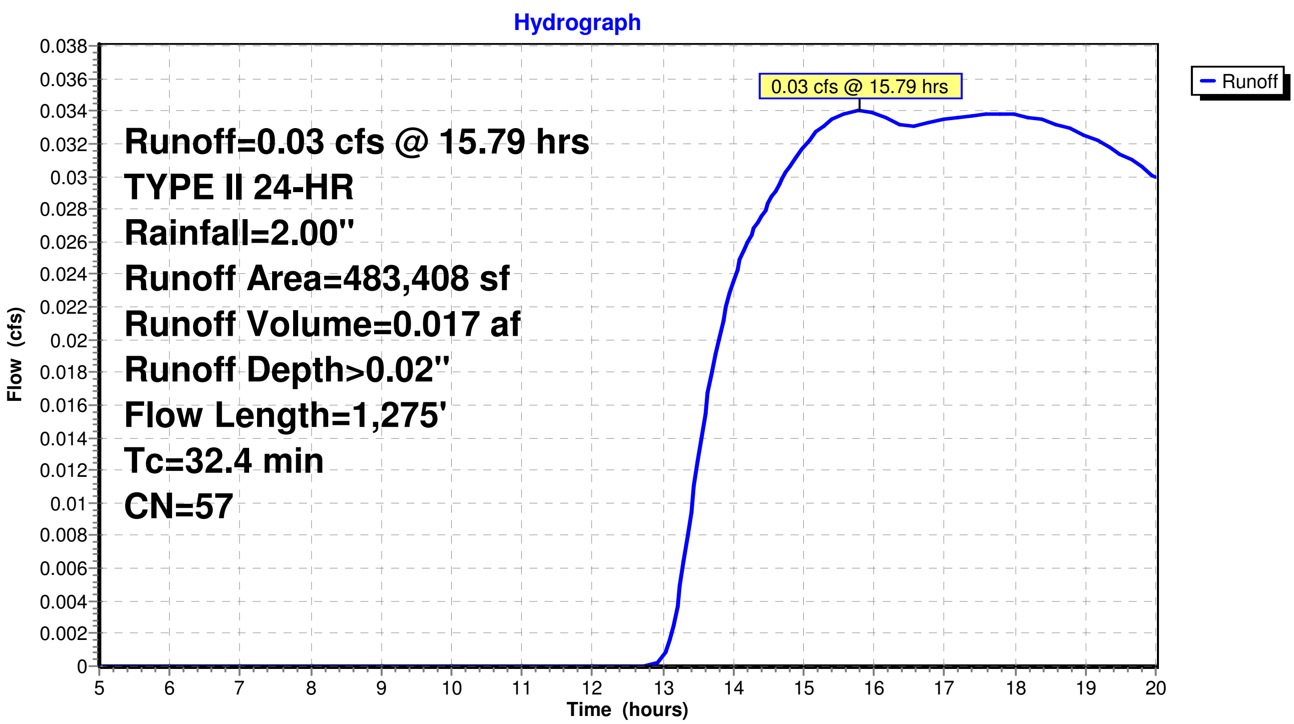
Runoff = 0.03 cfs @ 15.79 hrs, Volume= 0.017 af, Depth> 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=2.00"

Area (sf)	CN	Description
112,111	30	Brush, Good, HSG A
369,232	65	Brush, Good, HSG C
2,065	98	Paved parking & roofs
483,408	57	Weighted Average
481,343		99.57% Pervious Area
2,065		0.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0100	0.08		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
11.9	1,175	0.0120	1.64		**Shallow Concentrated Flow, Balance of Flow to Channel** Grassed Waterway Kv= 15.0 fps
32.4	1,275	Total			

Subcatchment ESC 1: Existing Subcatchment 1



Summary for Subcatchment ESC 2: Existing Subcatchment 2

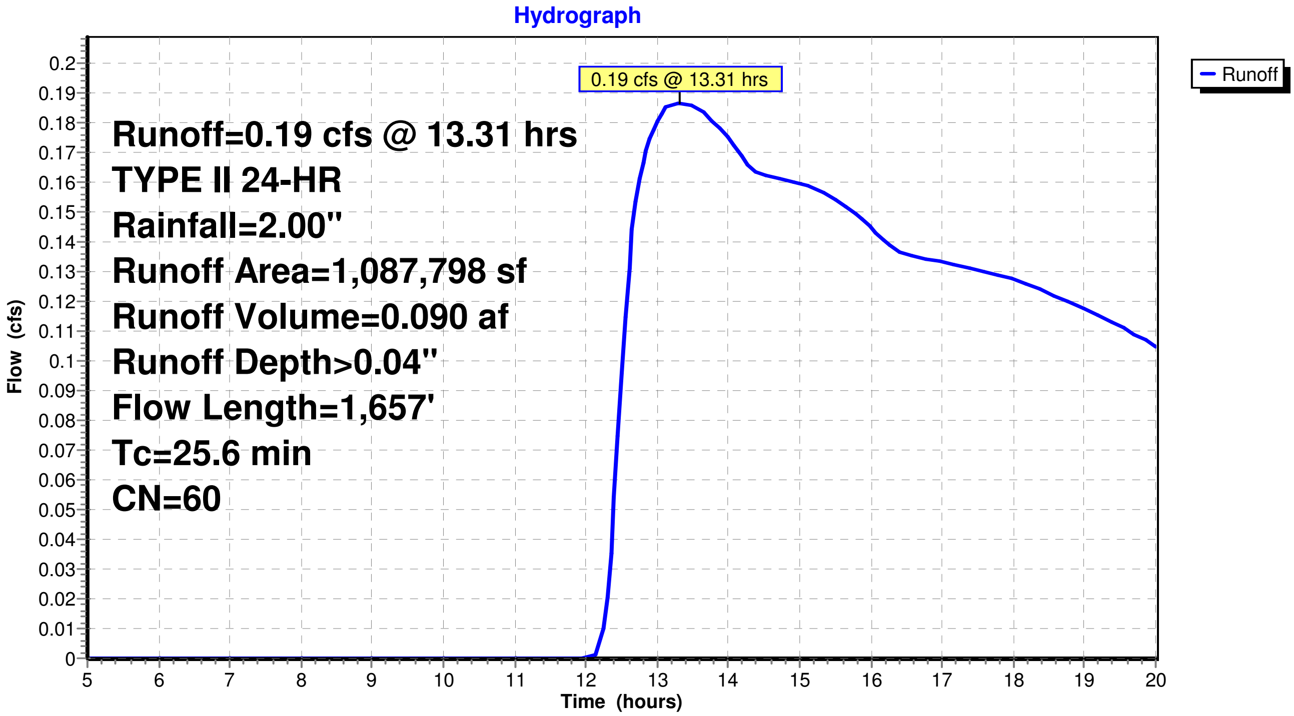
Runoff = 0.19 cfs @ 13.31 hrs, Volume= 0.090 af, Depth> 0.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=2.00"

Area (sf)	CN	Description
141,720	30	Brush, Good, HSG A
55,371	48	Brush, Good, HSG B
889,202	65	Brush, Good, HSG C
1,505	98	Paved parking & roofs
1,087,798	60	Weighted Average
1,086,293		99.86% Pervious Area
1,505		0.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.4	100	0.0150	0.10		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
6.6	957	0.0260	2.42		**Shallow Concentrated Flow, Balance of Flow to Channel** Grassed Waterway Kv= 15.0 fps
1.6	600	0.0100	6.22	124.39	**Trap/Vee/Rect Channel Flow, Balance of Longest Flowpath** Bot.W=4.00' D=2.00' Z= 3.0 '/' Top.W=16.00' n= 0.027
25.6	1,657	Total			

Subcatchment ESC 2: Existing Subcatchment 2



Summary for Subcatchment UP 1: Upland Watershed 1

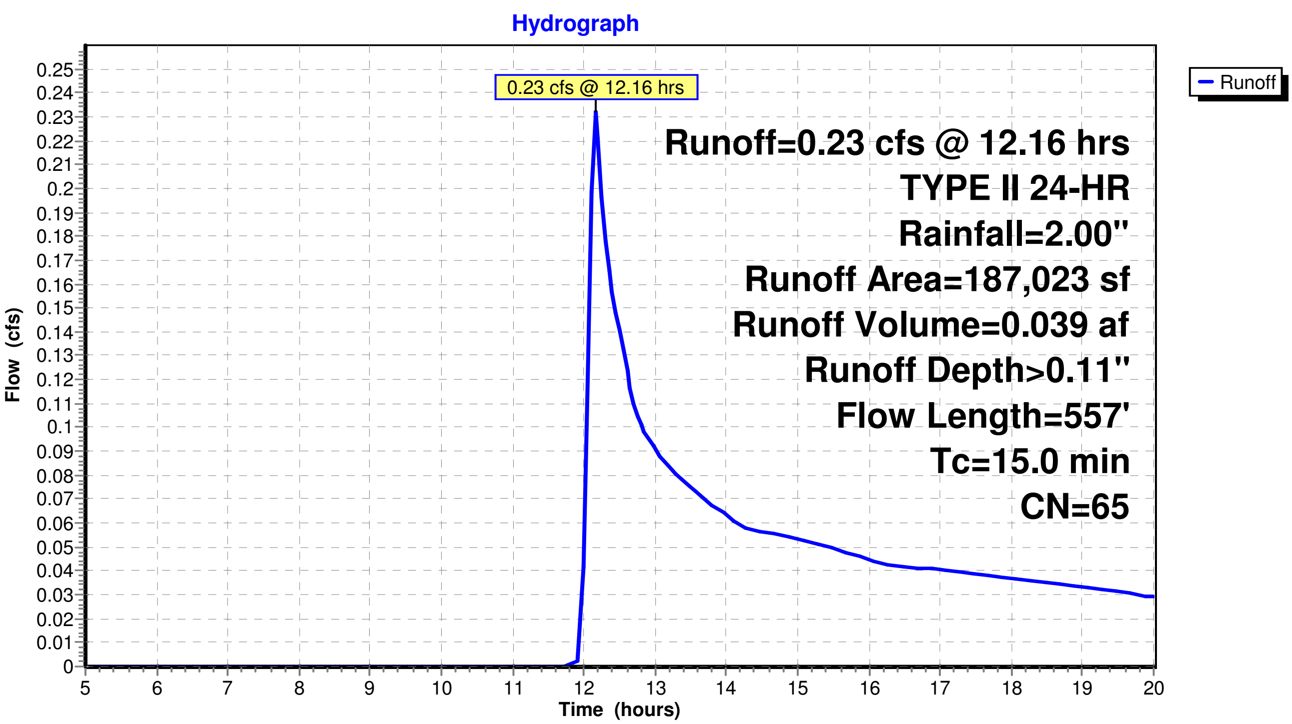
Runoff = 0.23 cfs @ 12.16 hrs, Volume= 0.039 af, Depth> 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=2.00"

Area (sf)	CN	Description
187,023	65	Brush, Good, HSG C
187,023		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	100	0.0360	0.14		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
2.7	457	0.0350	2.81		**Shallow Concentrated Flow, Balance of Longest Flowpath** Grassed Waterway Kv= 15.0 fps
15.0	557	Total			

Subcatchment UP 1: Upland Watershed 1



Summary for Subcatchment UP 2: Upland Watershed 2

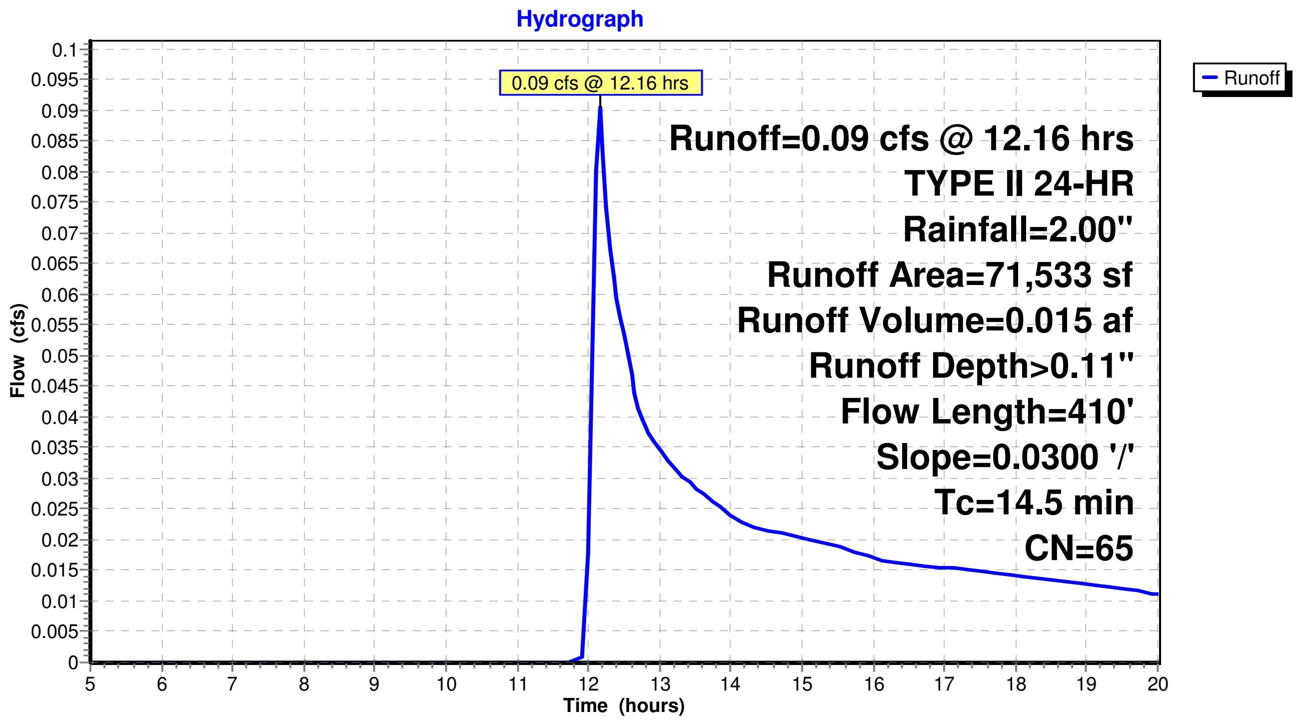
Runoff = 0.09 cfs @ 12.16 hrs, Volume= 0.015 af, Depth> 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=2.00"

Area (sf)	CN	Description
71,533	65	Brush, Good, HSG C
71,533		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	155	0.0300	0.20		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
1.6	255	0.0300	2.60		**Shallow Concentrated Flow, Balance of Longest Flowpath** Grassed Waterway Kv= 15.0 fps
14.5	410	Total			

Subcatchment UP 2: Upland Watershed 2

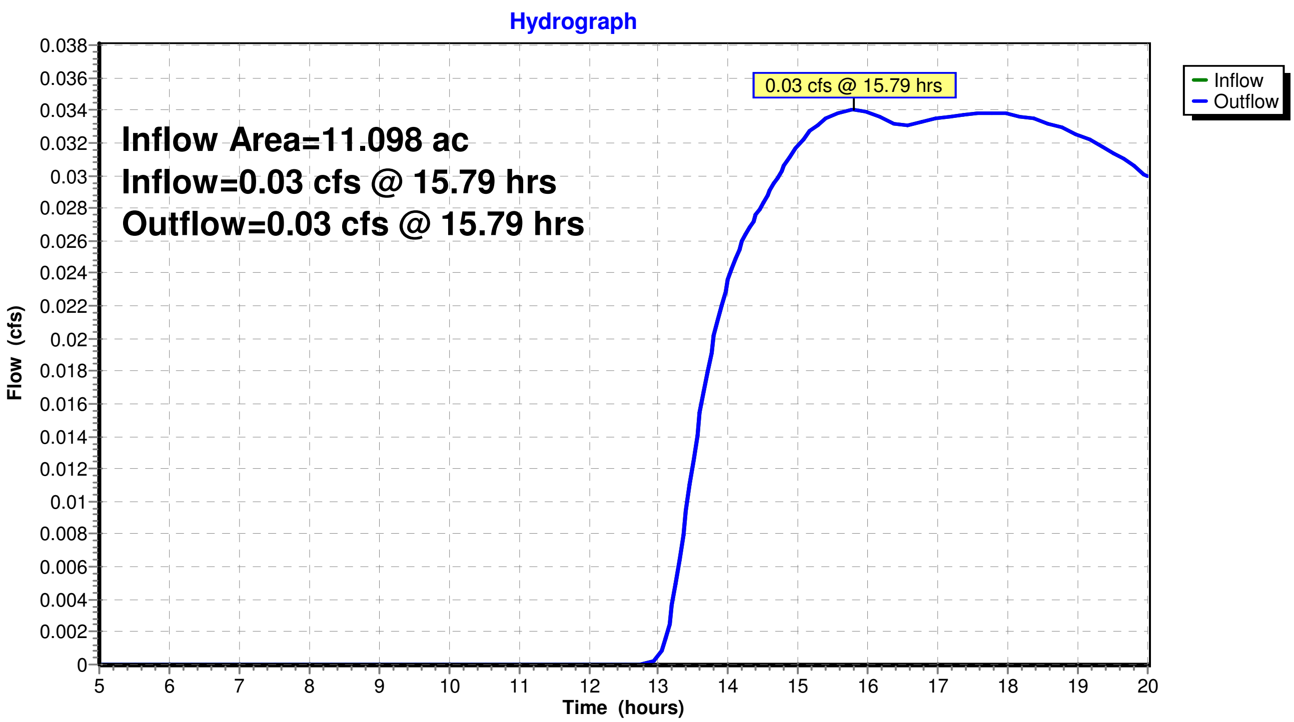


Summary for Reach DP 1: Design Point Summation 1

Inflow Area =	11.098 ac,	0.43% Impervious,	Inflow Depth >	0.02"	
Inflow =	0.03 cfs @	15.79 hrs,	Volume=	0.017 af	
Outflow =	0.03 cfs @	15.79 hrs,	Volume=	0.017 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 DP 1: Design Point Summation 1

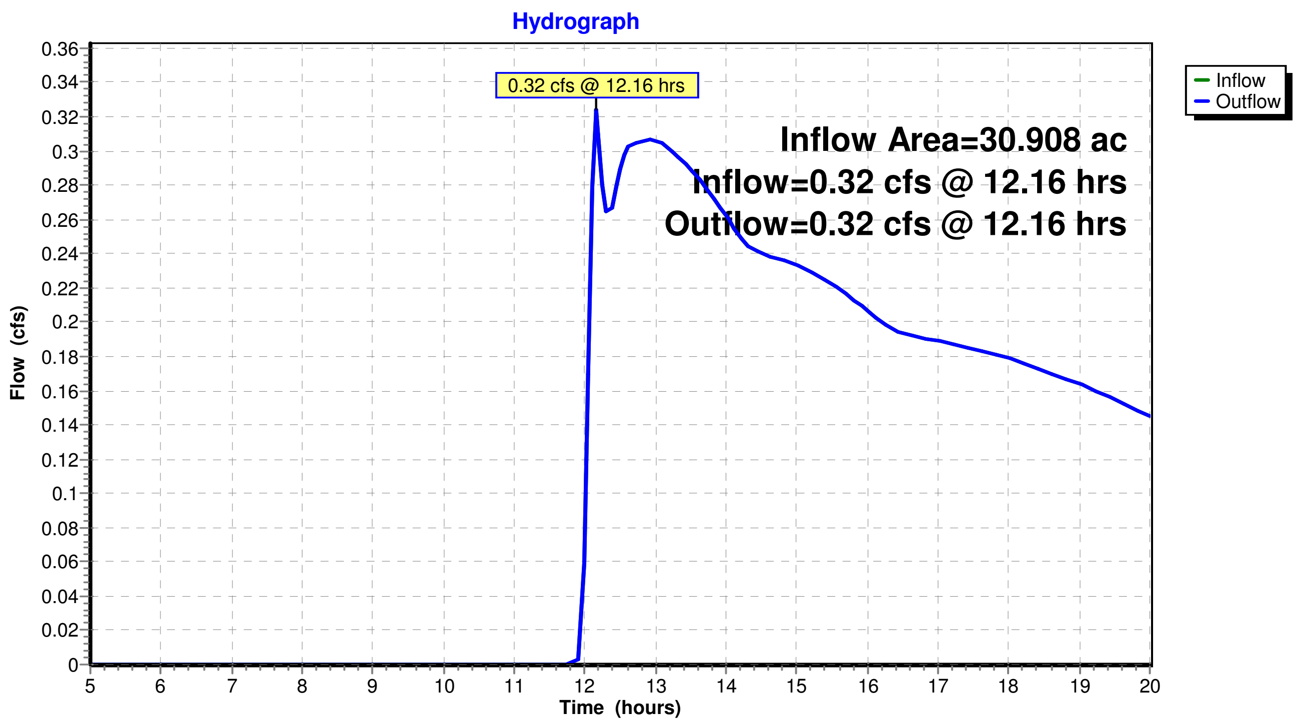


Summary for Reach DP 2: Design Point Summation 2

Inflow Area =	30.908 ac,	0.11% Impervious,	Inflow Depth >	0.06"
Inflow =	0.32 cfs @	12.16 hrs,	Volume=	0.144 af
Outflow =	0.32 cfs @	12.16 hrs,	Volume=	0.144 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 DP 2: Design Point Summation 2



Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
5.827	30	Brush, Good, HSG A (ESC 1, ESC 2)
1.271	48	Brush, Good, HSG B (ESC 2)
34.825	65	Brush, Good, HSG C (ESC 1, ESC 2, UP 1, UP 2)
0.082	98	Paved parking & roofs (ESC 1, ESC 2)
42.006	**60**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
5.827	HSG A	ESC 1, ESC 2
1.271	HSG B	ESC 2
34.825	HSG C	ESC 1, ESC 2, UP 1, UP 2
0.000	HSG D	
0.082	Other	ESC 1, ESC 2
42.006		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
5.827	1.271	34.825	0.000	0.000	41.924	Brush, Good	ESC 1, ESC 2, UP 1, UP 2
0.000	0.000	0.000	0.000	0.082	0.082	Paved parking & roofs	ESC 1, ESC 2
5.827	**1.271**	**34.825**	**0.000**	**0.082**	**42.006**	**TOTAL AREA**	

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 ESC 1: Existing Runoff Area=483,408 sf 0.43% Impervious Runoff Depth>0.31"
Flow Length=1,275' Tc=32.4 min CN=57 Runoff=1.86 cfs 0.291 af

Subcatchment ESC 2: Existing Runoff Area=1,087,798 sf 0.14% Impervious Runoff Depth>0.42"
Flow Length=1,657' Tc=25.6 min CN=60 Runoff=7.70 cfs 0.866 af

Subcatchment UP 1: Upland Watershed 1 Runoff Area=187,023 sf 0.00% Impervious Runoff Depth>0.61"
Flow Length=557' Tc=15.0 min CN=65 Runoff=3.29 cfs 0.220 af

Subcatchment UP 2: Upland Watershed 2 Runoff Area=71,533 sf 0.00% Impervious Runoff Depth>0.61"
Flow Length=410' Slope=0.0300 '/' Tc=14.5 min CN=65 Runoff=1.28 cfs 0.084 af

Reach DP 1: Design Point Summation 1 Inflow=1.86 cfs 0.291 af
Outflow=1.86 cfs 0.291 af

Reach DP 2: Design Point Summation 2 Inflow=10.49 cfs 1.169 af
Outflow=10.49 cfs 1.169 af

Total Runoff Area = 42.006 ac Runoff Volume = 1.460 af Average Runoff Depth = 0.42"
99.80% Pervious = 41.924 ac 0.20% Impervious = 0.082 ac

Summary for Subcatchment ESC 1: Existing Subcatchment 1

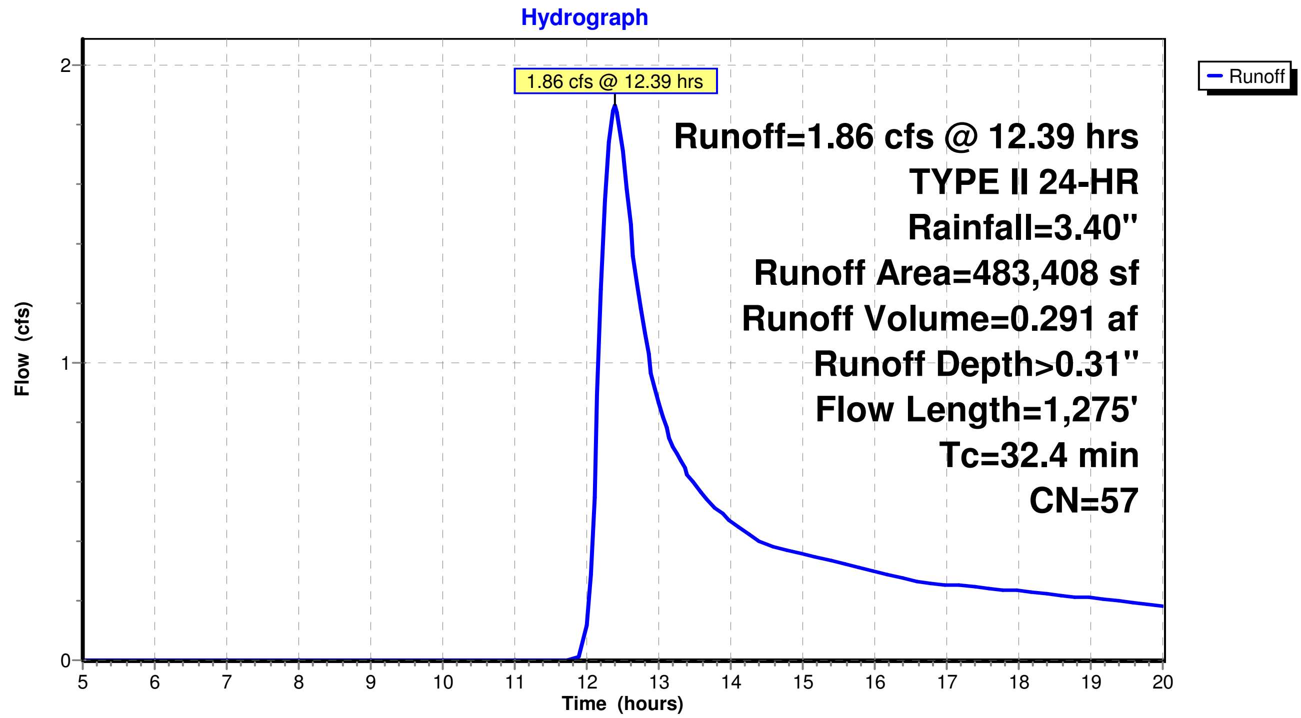
Runoff = 1.86 cfs @ 12.39 hrs, Volume= 0.291 af, Depth> 0.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=3.40"

Area (sf)	CN	Description
112,111	30	Brush, Good, HSG A
369,232	65	Brush, Good, HSG C
2,065	98	Paved parking & roofs
483,408	57	Weighted Average
481,343		99.57% Pervious Area
2,065		0.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0100	0.08		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
11.9	1,175	0.0120	1.64		**Shallow Concentrated Flow, Balance of Flow to Channel** Grassed Waterway Kv= 15.0 fps
32.4	1,275	Total			

Subcatchment ESC 1: Existing Subcatchment 1



Summary for Subcatchment ESC 2: Existing Subcatchment 2

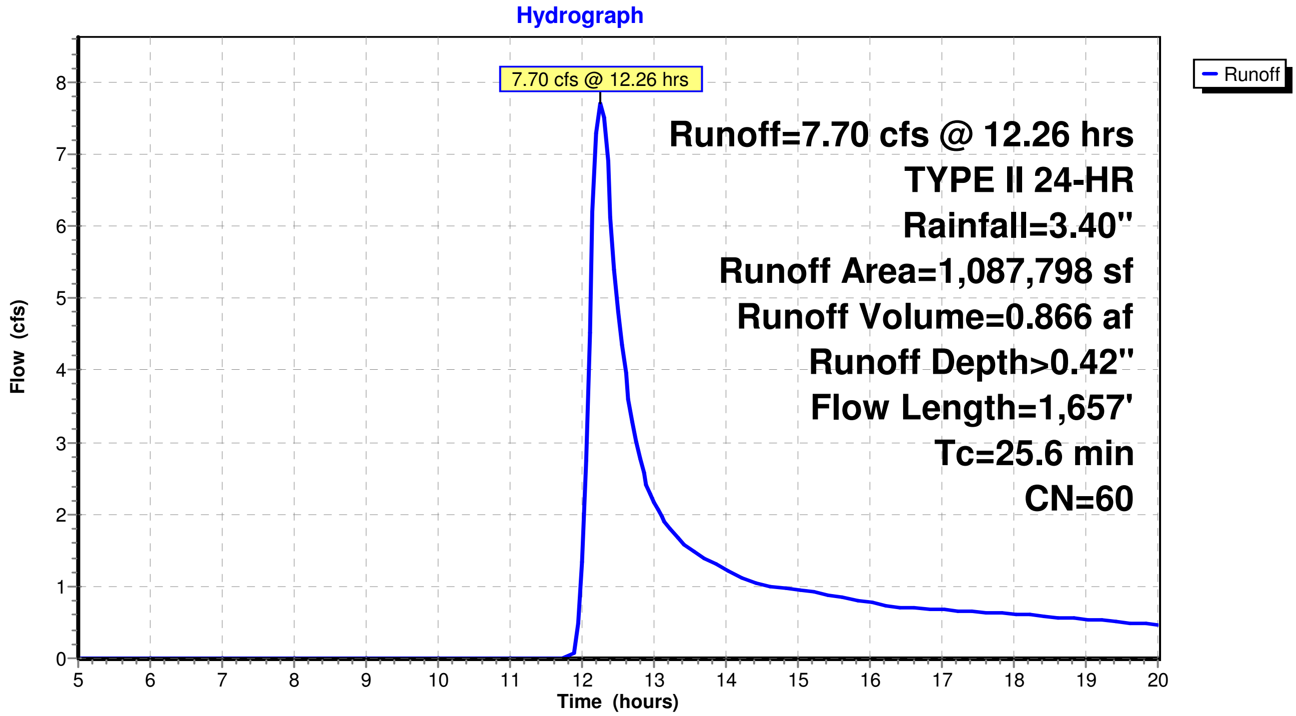
Runoff = 7.70 cfs @ 12.26 hrs, Volume= 0.866 af, Depth> 0.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=3.40"

Area (sf)	CN	Description
141,720	30	Brush, Good, HSG A
55,371	48	Brush, Good, HSG B
889,202	65	Brush, Good, HSG C
1,505	98	Paved parking & roofs
1,087,798	60	Weighted Average
1,086,293		99.86% Pervious Area
1,505		0.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.4	100	0.0150	0.10		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
6.6	957	0.0260	2.42		**Shallow Concentrated Flow, Balance of Flow to Channel** Grassed Waterway Kv= 15.0 fps
1.6	600	0.0100	6.22	124.39	**Trap/Vee/Rect Channel Flow, Balance of Longest Flowpath** Bot.W=4.00' D=2.00' Z= 3.0 '/' Top.W=16.00' n= 0.027
25.6	1,657	Total			

Subcatchment ESC 2: Existing Subcatchment 2



Summary for Subcatchment UP 1: Upland Watershed 1

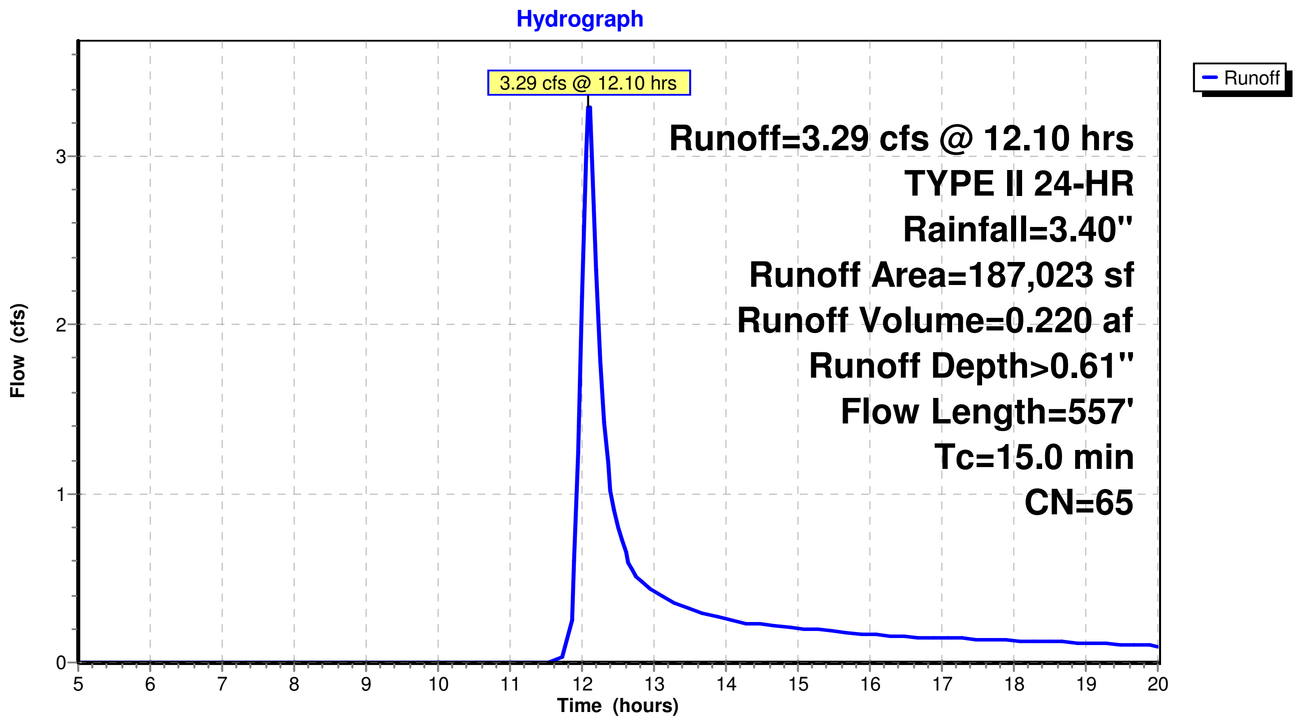
Runoff = 3.29 cfs @ 12.10 hrs, Volume= 0.220 af, Depth> 0.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=3.40"

Area (sf)	CN	Description
187,023	65	Brush, Good, HSG C
187,023		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	100	0.0360	0.14		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
2.7	457	0.0350	2.81		**Shallow Concentrated Flow, Balance of Longest Flowpath** Grassed Waterway Kv= 15.0 fps
15.0	557	Total			

Subcatchment UP 1: Upland Watershed 1



Summary for Subcatchment UP 2: Upland Watershed 2

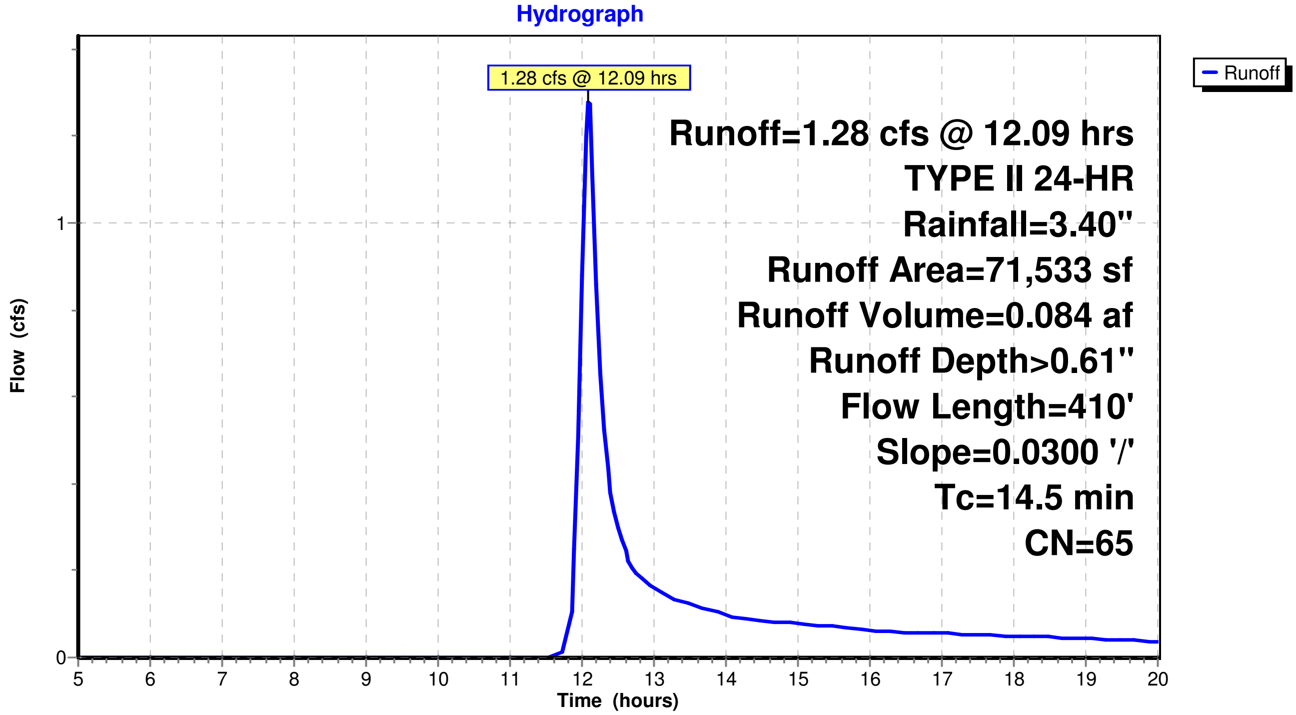
Runoff = 1.28 cfs @ 12.09 hrs, Volume= 0.084 af, Depth> 0.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=3.40"

Area (sf)	CN	Description
71,533	65	Brush, Good, HSG C
71,533		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	155	0.0300	0.20		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
1.6	255	0.0300	2.60		**Shallow Concentrated Flow, Balance of Longest Flowpath** Grassed Waterway Kv= 15.0 fps
14.5	410	Total			

Subcatchment UP 2: Upland Watershed 2

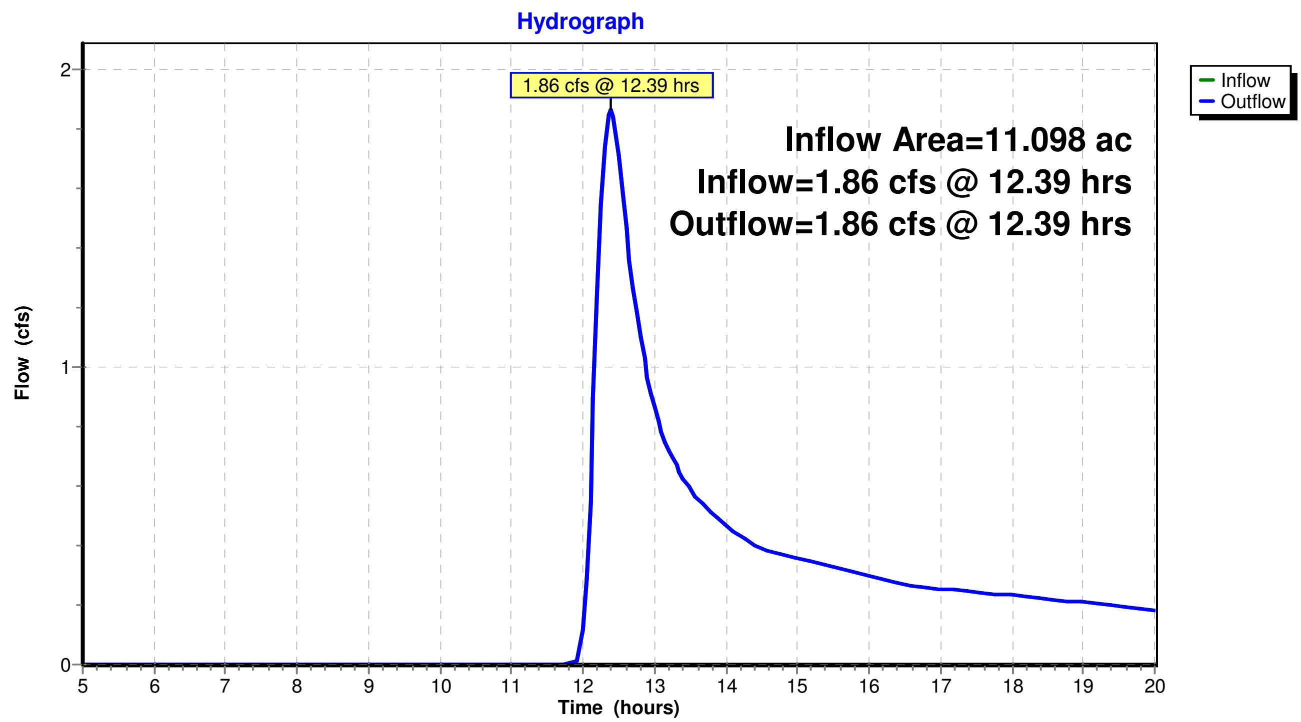


Summary for Reach DP 1: Design Point Summation 1

Inflow Area =	11.098 ac,	0.43% Impervious,	Inflow Depth >	0.31"
Inflow =	1.86 cfs @	12.39 hrs,	Volume=	0.291 af
Outflow =	1.86 cfs @	12.39 hrs,	Volume=	0.291 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 DP 1: Design Point Summation 1

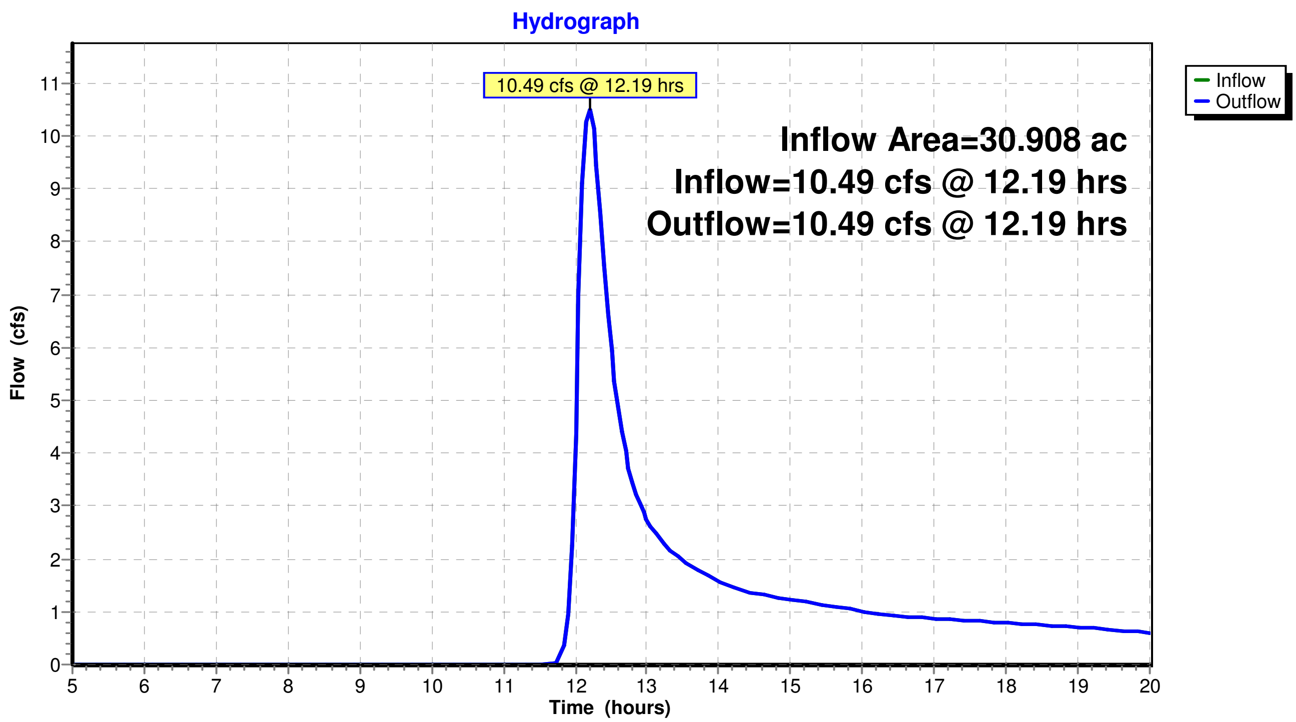


Summary for Reach DP 2: Design Point Summation 2

Inflow Area =	30.908 ac,	0.11% Impervious,	Inflow Depth >	0.45"
Inflow =	10.49 cfs @	12.19 hrs,	Volume=	1.169 af
Outflow =	10.49 cfs @	12.19 hrs,	Volume=	1.169 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 DP 2: Design Point Summation 2



Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
5.827	30	Brush, Good, HSG A (ESC 1, ESC 2)
1.271	48	Brush, Good, HSG B (ESC 2)
34.825	65	Brush, Good, HSG C (ESC 1, ESC 2, UP 1, UP 2)
0.082	98	Paved parking & roofs (ESC 1, ESC 2)
42.006	**60**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
5.827	HSG A	ESC 1, ESC 2
1.271	HSG B	ESC 2
34.825	HSG C	ESC 1, ESC 2, UP 1, UP 2
0.000	HSG D	
0.082	Other	ESC 1, ESC 2
42.006		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
5.827	1.271	34.825	0.000	0.000	41.924	Brush, Good	ESC 1, ESC 2, UP 1, UP 2
0.000	0.000	0.000	0.000	0.082	0.082	Paved parking & roofs	ESC 1, ESC 2
5.827	**1.271**	**34.825**	**0.000**	**0.082**	**42.006**	**TOTAL AREA**	

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 ESC 1: Existing Runoff Area=483,408 sf 0.43% Impervious Runoff Depth>1.40"
Flow Length=1,275' Tc=32.4 min CN=57 Runoff=12.78 cfs 1.294 af

Subcatchment ESC 2: Existing Runoff Area=1,087,798 sf 0.14% Impervious Runoff Depth>1.63"
Flow Length=1,657' Tc=25.6 min CN=60 Runoff=40.52 cfs 3.387 af

Subcatchment UP 1: Upland Watershed 1 Runoff Area=187,023 sf 0.00% Impervious Runoff Depth>2.03"
Flow Length=557' Tc=15.0 min CN=65 Runoff=12.13 cfs 0.727 af

Subcatchment UP 2: Upland Watershed 2 Runoff Area=71,533 sf 0.00% Impervious Runoff Depth>2.03"
Flow Length=410' Slope=0.0300 '/' Tc=14.5 min CN=65 Runoff=4.73 cfs 0.278 af

Reach DP 1: Design Point Summation 1 Inflow=12.78 cfs 1.294 af
Outflow=12.78 cfs 1.294 af

Reach DP 2: Design Point Summation 2 Inflow=52.19 cfs 4.392 af
Outflow=52.19 cfs 4.392 af

Total Runoff Area = 42.006 ac Runoff Volume = 5.685 af Average Runoff Depth = 1.62"
99.80% Pervious = 41.924 ac 0.20% Impervious = 0.082 ac

Summary for Subcatchment ESC 1: Existing Subcatchment 1

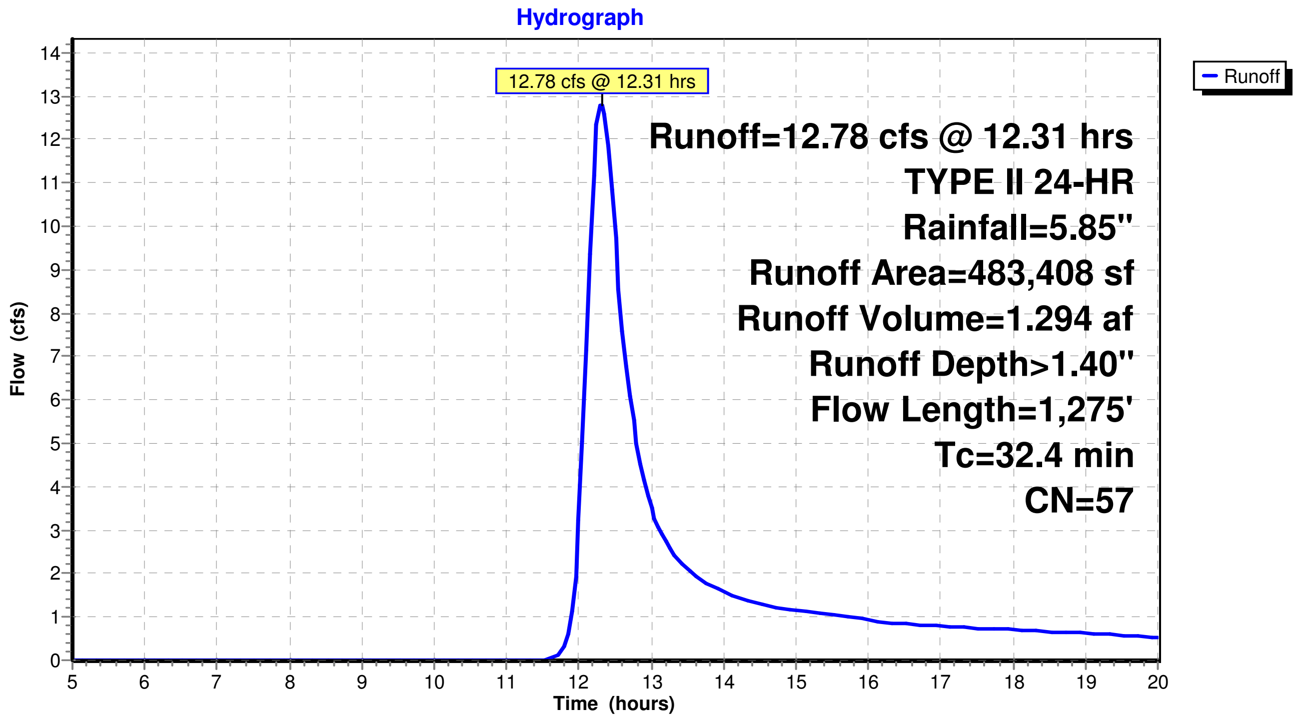
Runoff = 12.78 cfs @ 12.31 hrs, Volume= 1.294 af, Depth> 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=5.85"

Area (sf)	CN	Description
112,111	30	Brush, Good, HSG A
369,232	65	Brush, Good, HSG C
2,065	98	Paved parking & roofs
483,408	57	Weighted Average
481,343		99.57% Pervious Area
2,065		0.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0100	0.08		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
11.9	1,175	0.0120	1.64		**Shallow Concentrated Flow, Balance of Flow to Channel** Grassed Waterway Kv= 15.0 fps
32.4	1,275	Total			

Subcatchment ESC 1: Existing Subcatchment 1



Summary for Subcatchment ESC 2: Existing Subcatchment 2

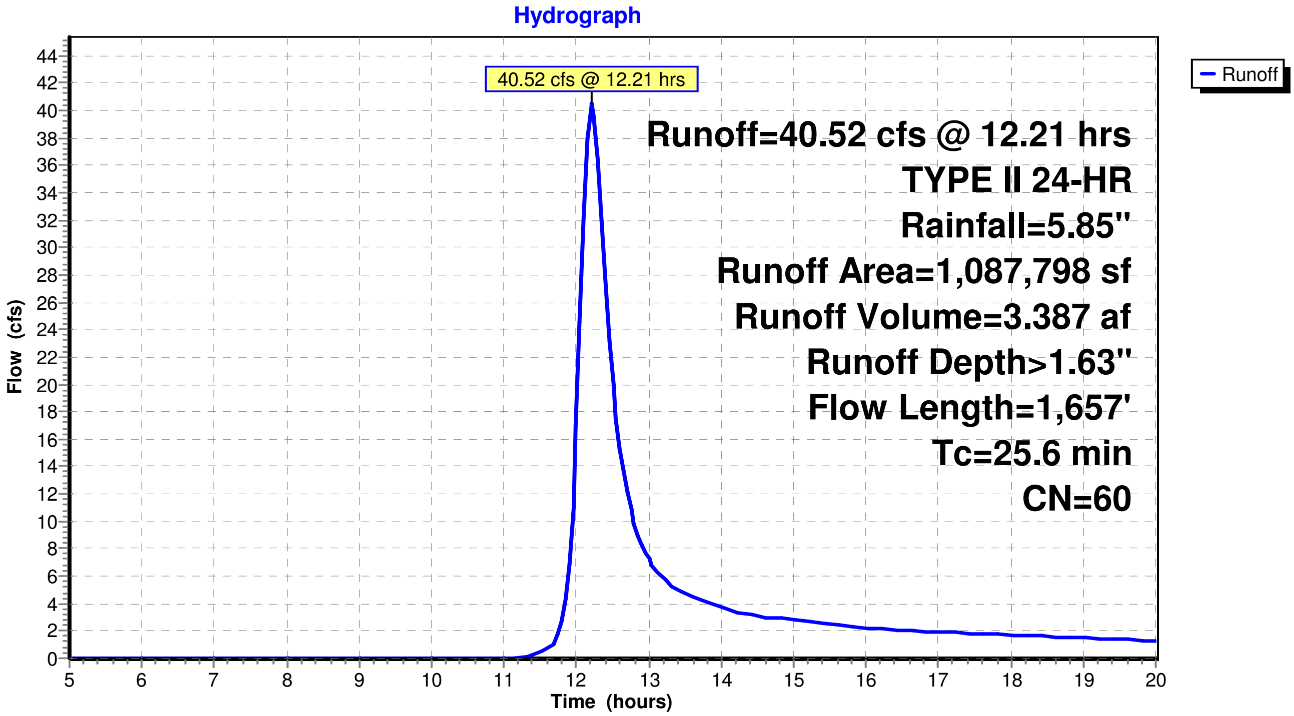
Runoff = 40.52 cfs @ 12.21 hrs, Volume= 3.387 af, Depth> 1.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=5.85"

Area (sf)	CN	Description
141,720	30	Brush, Good, HSG A
55,371	48	Brush, Good, HSG B
889,202	65	Brush, Good, HSG C
1,505	98	Paved parking & roofs
1,087,798	60	Weighted Average
1,086,293		99.86% Pervious Area
1,505		0.14% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.4	100	0.0150	0.10		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
6.6	957	0.0260	2.42		**Shallow Concentrated Flow, Balance of Flow to Channel** Grassed Waterway Kv= 15.0 fps
1.6	600	0.0100	6.22	124.39	**Trap/Vee/Rect Channel Flow, Balance of Longest Flowpath** Bot.W=4.00' D=2.00' Z= 3.0 '/' Top.W=16.00' n= 0.027
25.6	1,657	Total			

Subcatchment ESC 2: Existing Subcatchment 2



Summary for Subcatchment UP 1: Upland Watershed 1

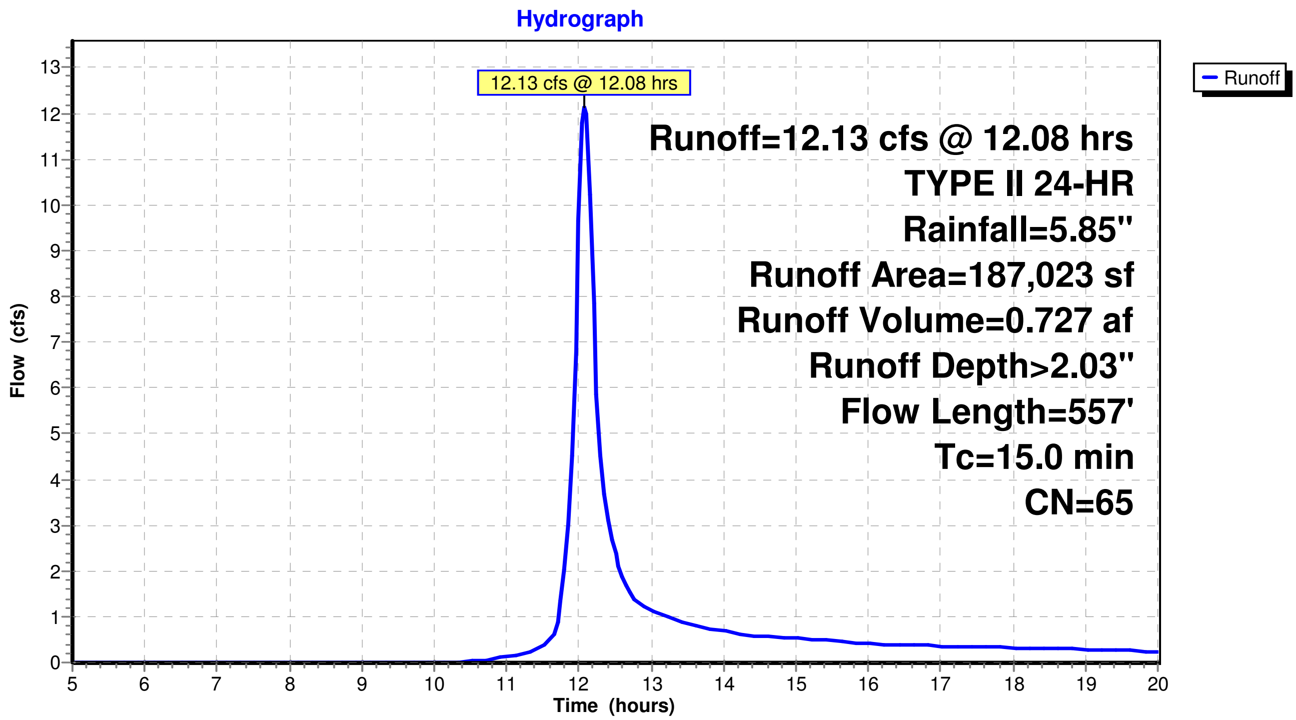
Runoff = 12.13 cfs @ 12.08 hrs, Volume= 0.727 af, Depth> 2.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=5.85"

Area (sf)	CN	Description
187,023	65	Brush, Good, HSG C
187,023		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	100	0.0360	0.14		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
2.7	457	0.0350	2.81		**Shallow Concentrated Flow, Balance of Longest Flowpath** Grassed Waterway Kv= 15.0 fps
15.0	557	Total			

Subcatchment UP 1: Upland Watershed 1



Summary for Subcatchment UP 2: Upland Watershed 2

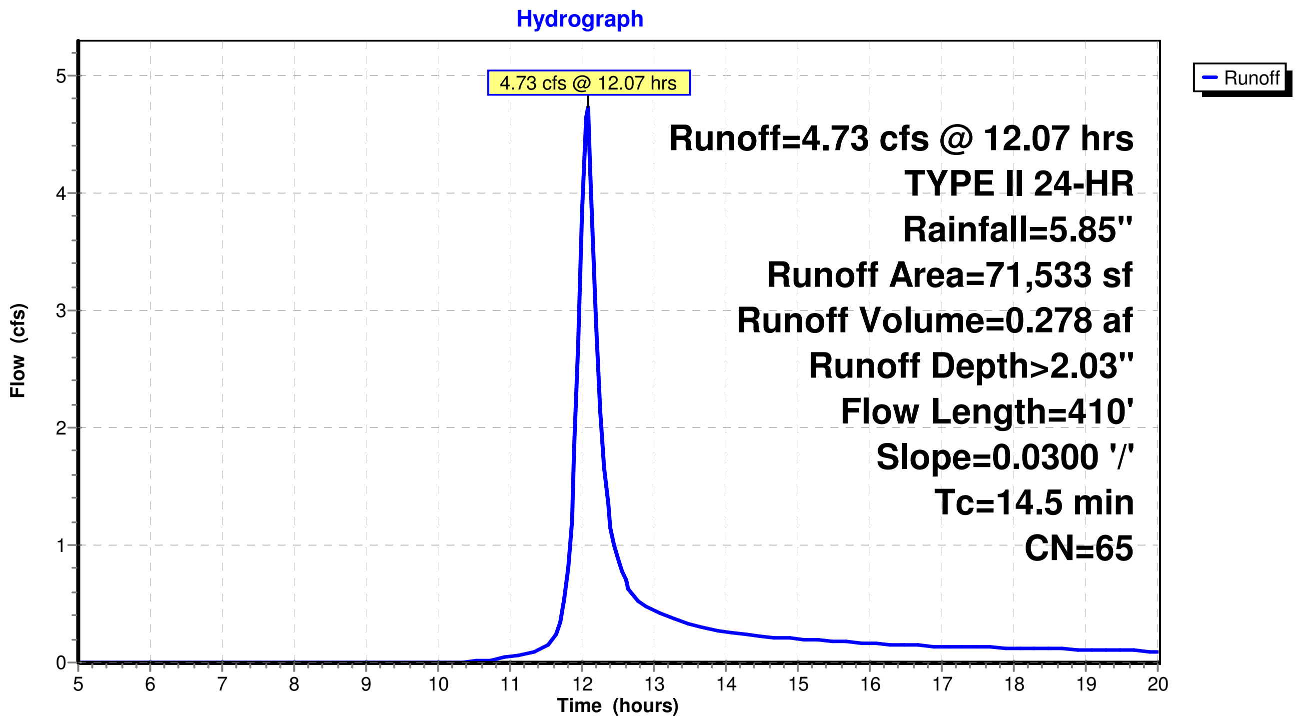
Runoff = 4.73 cfs @ 12.07 hrs, Volume= 0.278 af, Depth> 2.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=5.85"

Area (sf)	CN	Description
71,533	65	Brush, Good, HSG C
71,533		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	155	0.0300	0.20		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
1.6	255	0.0300	2.60		**Shallow Concentrated Flow, Balance of Longest Flowpath** Grassed Waterway Kv= 15.0 fps
14.5	410	Total			

Subcatchment UP 2: Upland Watershed 2

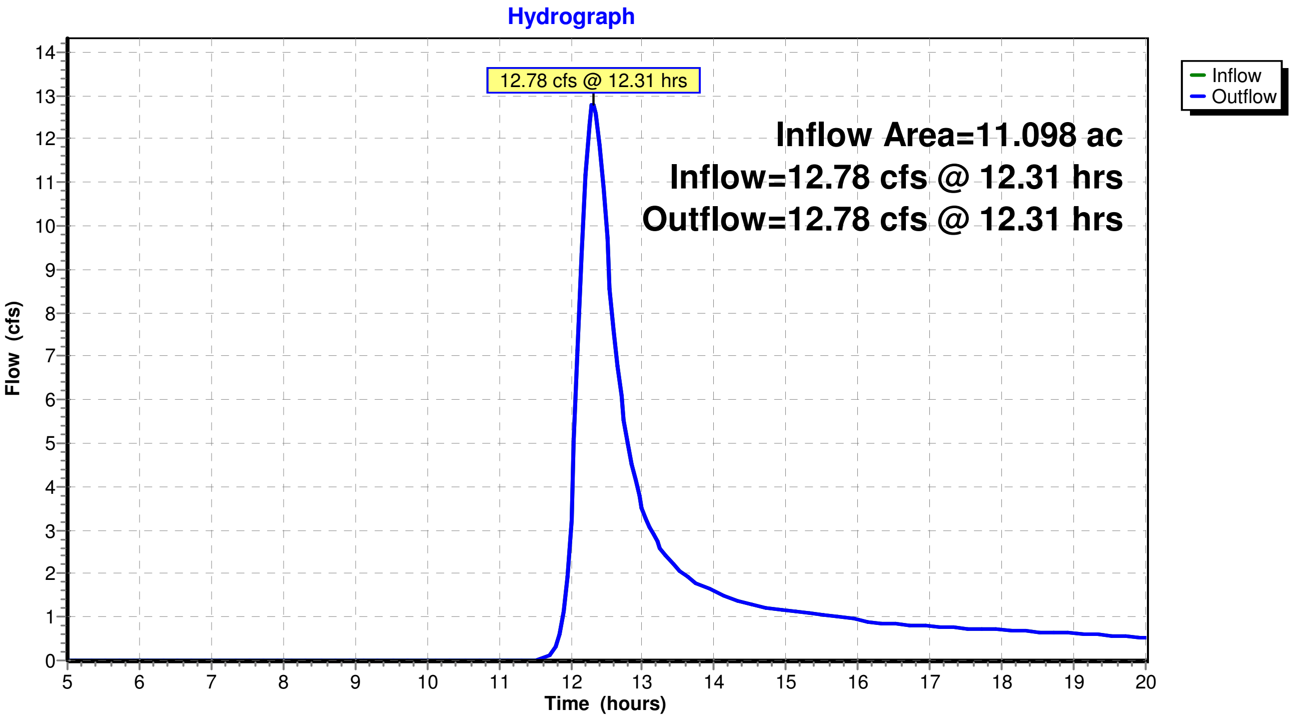


Summary for Reach DP 1: Design Point Summation 1

Inflow Area = 11.098 ac, 0.43% Impervious, Inflow Depth > 1.40"
Inflow = 12.78 cfs @ 12.31 hrs, Volume= 1.294 af
Outflow = 12.78 cfs @ 12.31 hrs, Volume= 1.294 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 DP 1: Design Point Summation 1

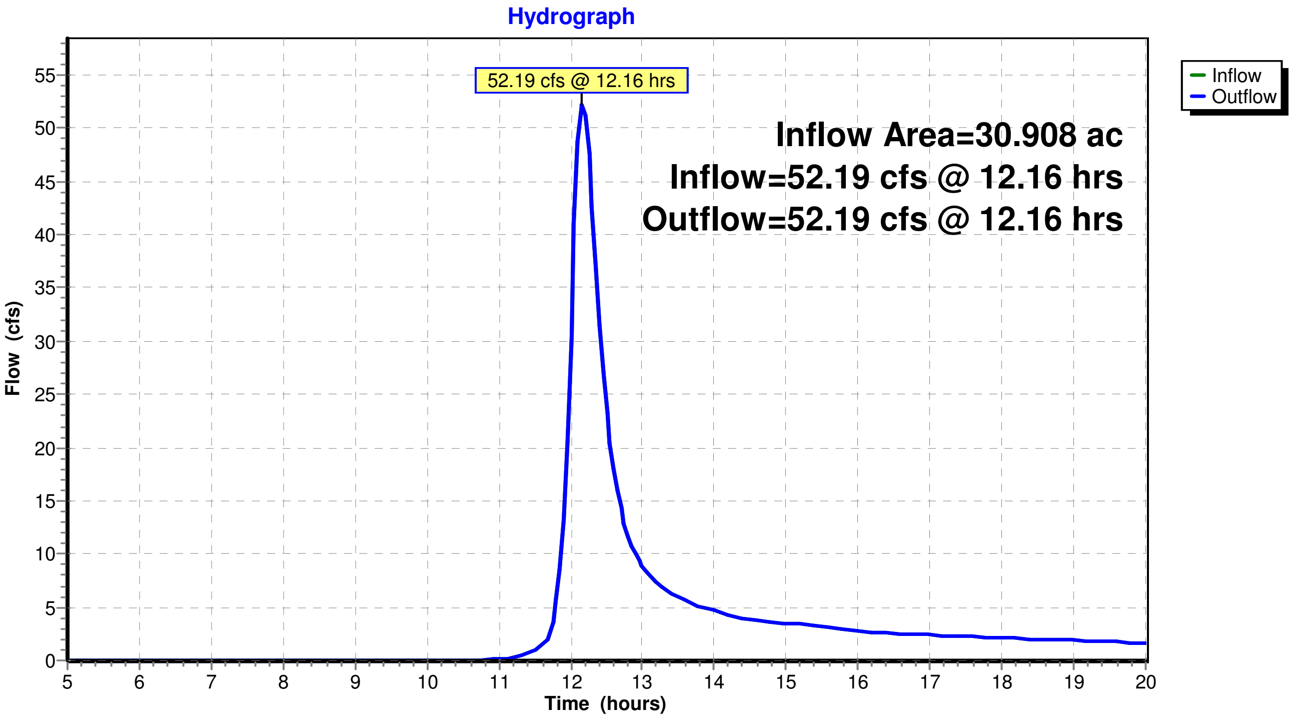


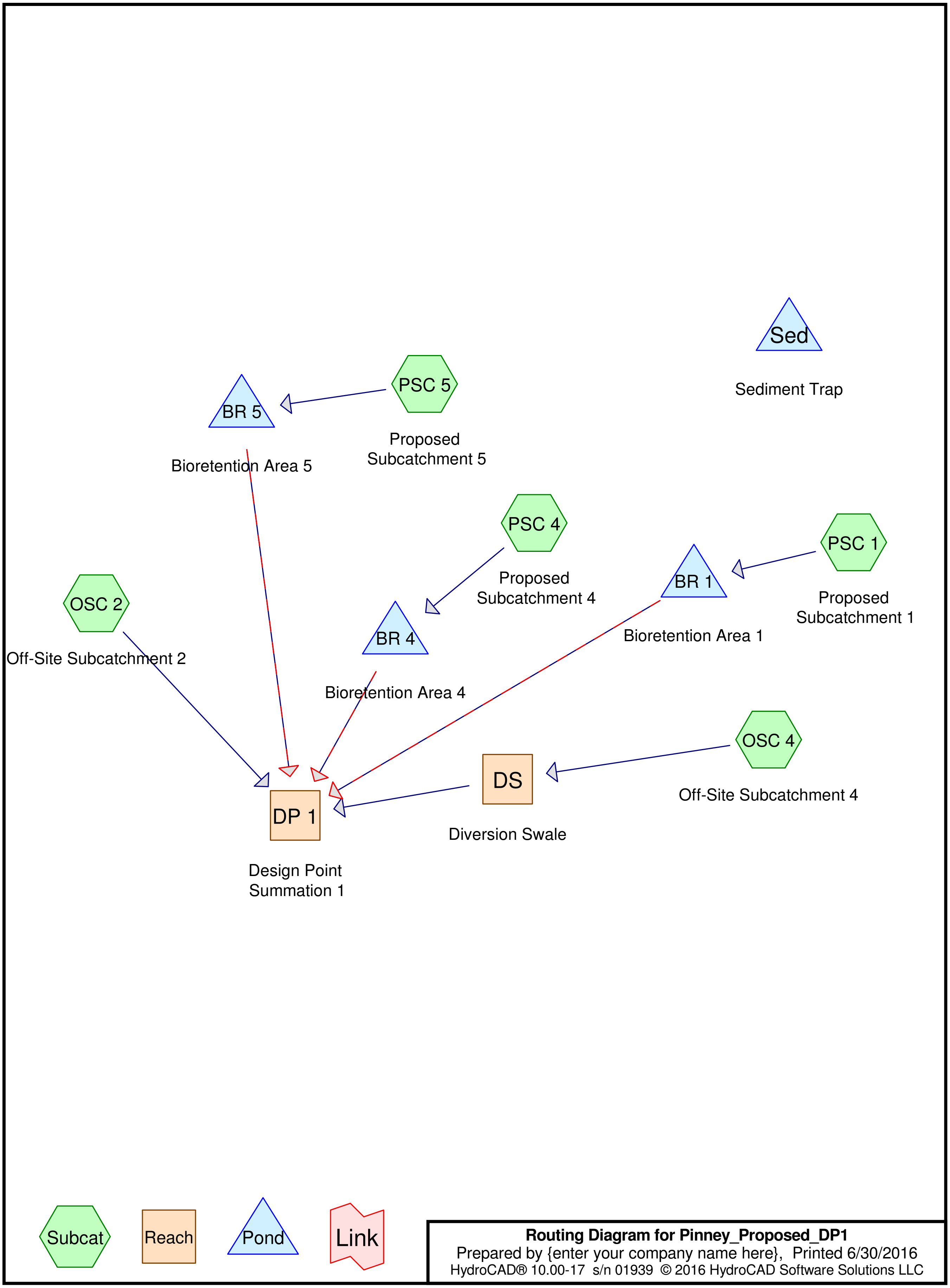
Summary for Reach DP 2: Design Point Summation 2

Inflow Area = 30.908 ac, 0.11% Impervious, Inflow Depth > 1.71"
Inflow = 52.19 cfs @ 12.16 hrs, Volume= 4.392 af
Outflow = 52.19 cfs @ 12.16 hrs, Volume= 4.392 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 DP 2: Design Point Summation 2





Routing Diagram for Pinney_Proposed_DP1

Prepared by {enter your company name here}, Printed 6/30/2016

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.856	74	>75% Grass cover, Good, HSG C (PSC 1, PSC 4, PSC 5)
2.633	30	Brush, Good, HSG A (OSC 4)
7.201	65	Brush, Good, HSG C (OSC 2, OSC 4, PSC 1)
0.364	98	Paved parking & roofs (PSC 1, PSC 4, PSC 5)
0.047	98	Unconnected roofs, HSG A (OSC 4)
11.101	**59**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.681	HSG A	OSC 4
0.000	HSG B	
8.056	HSG C	OSC 2, OSC 4, PSC 1, PSC 4, PSC 5
0.000	HSG D	
0.364	Other	PSC 1, PSC 4, PSC 5
11.101		**TOTAL AREA**

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	0.856	0.000	0.000	0.856	>75% Grass cover, Good	PSC 1, PSC 4, PSC 5
2.633	0.000	7.201	0.000	0.000	9.834	Brush, Good	OSC 2, OSC 4, PSC 1
0.000	0.000	0.000	0.000	0.364	0.364	Paved parking & roofs	PSC 1, PSC 4, PSC 5
0.047	0.000	0.000	0.000	0.000	0.047	Unconnected roofs	OSC 4
2.681	**0.000**	**8.056**	**0.000**	**0.364**	**11.101**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	BR 1	1.00	0.50	197.0	0.0025	0.013	4.0	0.0	0.0
2	BR 4	2.75	2.50	157.0	0.0016	0.013	4.0	0.0	0.0
3	BR 5	1.00	0.50	219.0	0.0023	0.013	4.0	0.0	0.0

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 OSC 2: Off-Site Runoff Area=14,274 sf 0.00% Impervious Runoff Depth>0.11"
Flow Length=220' Tc=10.4 min CN=65 Runoff=0.02 cfs 0.003 af

Subcatchment OSC 4: Off-Site Runoff Area=403,901 sf 0.51% Impervious Runoff Depth>0.01"
Flow Length=1,275' Tc=32.4 min CN=55 Runoff=0.02 cfs 0.006 af

Subcatchment PSC 1: Proposed Runoff Area=37,170 sf 16.23% Impervious Runoff Depth>0.33"
Flow Length=327' Tc=10.3 min CN=75 Runoff=0.42 cfs 0.024 af

Subcatchment PSC 4: Proposed Runoff Area=17,938 sf 29.06% Impervious Runoff Depth>0.54"
Flow Length=327' Tc=10.3 min CN=81 Runoff=0.36 cfs 0.019 af

Subcatchment PSC 5: Proposed Runoff Area=10,292 sf 44.84% Impervious Runoff Depth>0.73"
Flow Length=83' Tc=2.8 min CN=85 Runoff=0.37 cfs 0.014 af

Reach DP 1: Design Point Summation 1 Inflow=0.07 cfs 0.031 af
Outflow=0.07 cfs 0.031 af

Reach DS: Diversion Swale Avg. Flow Depth=0.04' Max Vel=0.36 fps Inflow=0.02 cfs 0.006 af
n=0.030 L=318.0' S=0.0063 '/' Capacity=15.57 cfs Outflow=0.02 cfs 0.005 af

Pond BR 1: Bioretention Area 1 Peak Elev=1.21' Storage=494 cf Inflow=0.42 cfs 0.024 af
Primary=0.04 cfs 0.013 af Secondary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.013 af

Pond BR 4: Bioretention Area 4 Peak Elev=2.86' Storage=688 cf Inflow=0.36 cfs 0.019 af
Primary=0.01 cfs 0.003 af Secondary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.003 af

Pond BR 5: Bioretention Area 5 Peak Elev=1.17' Storage=348 cf Inflow=0.37 cfs 0.014 af
Primary=0.03 cfs 0.007 af Secondary=0.00 cfs 0.000 af Outflow=0.03 cfs 0.007 af

Pond Sed: Sediment Trap Peak Elev=0.00' Storage=0 cf
Primary=0.00 cfs 0.000 af

Total Runoff Area = 11.101 ac Runoff Volume = 0.066 af Average Runoff Depth = 0.07"
96.29% Pervious = 10.690 ac 3.71% Impervious = 0.411 ac

Summary for Subcatchment OSC 2: Off-Site Subcatchment 2

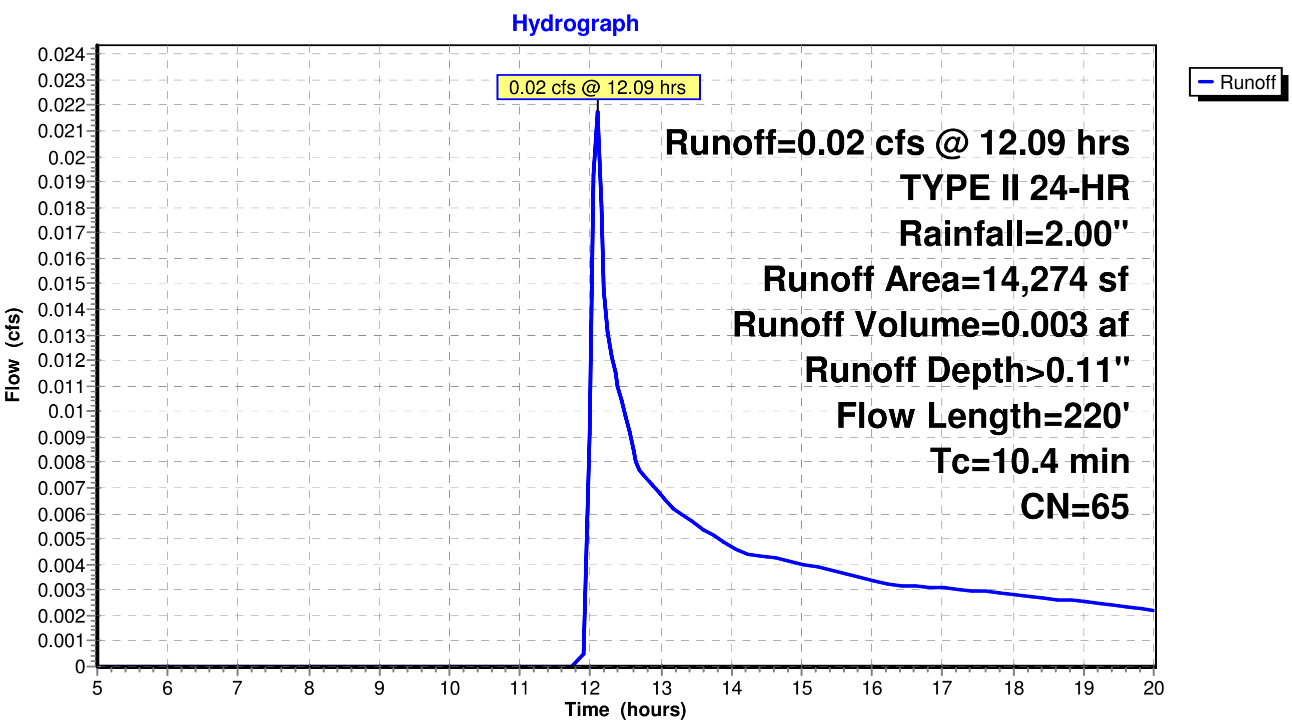
Runoff = 0.02 cfs @ 12.09 hrs, Volume= 0.003 af, Depth> 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=2.00"

Area (sf)	CN	Description
14,274	65	Brush, Good, HSG C
14,274		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0350	0.20		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
1.9	120	0.0050	1.06		**Shallow Concentrated Flow, Balance of Flow to Channel** Grassed Waterway Kv= 15.0 fps
10.4	220	Total			

Subcatchment OSC 2: Off-Site Subcatchment 2



Summary for Subcatchment OSC 4: Off-Site Subcatchment 4

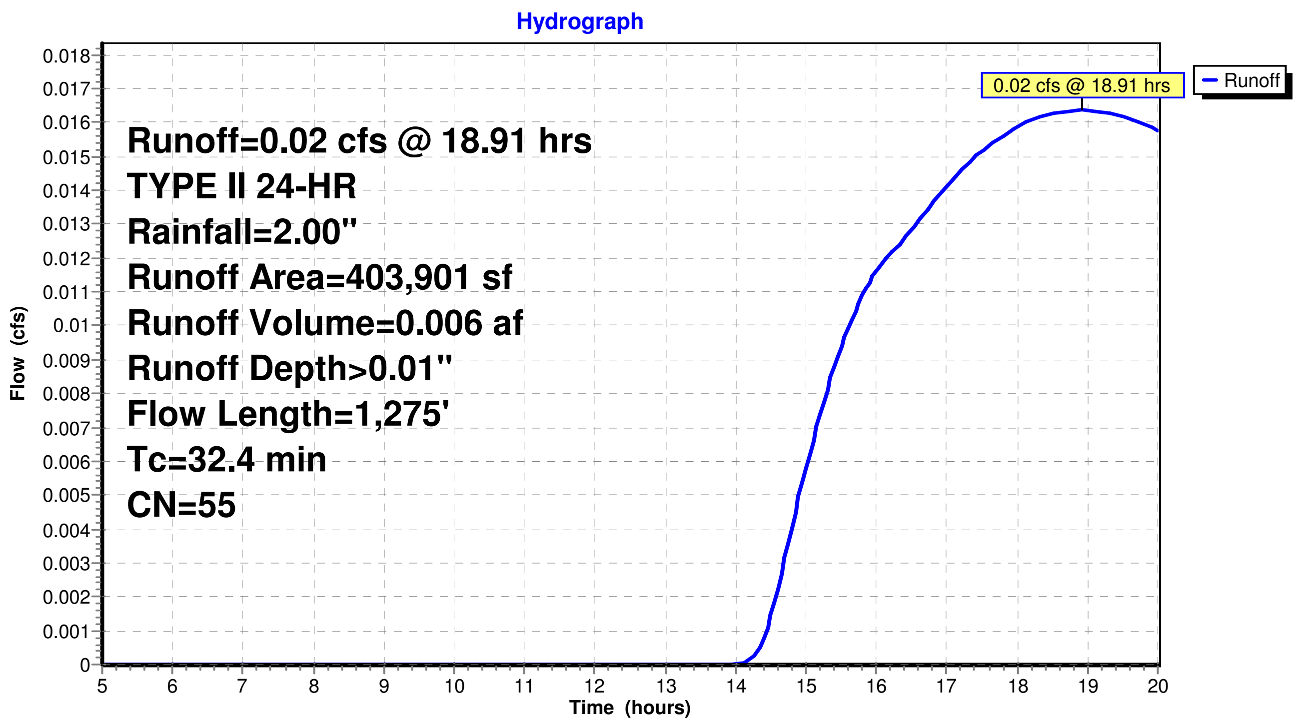
Runoff = 0.02 cfs @ 18.91 hrs, Volume= 0.006 af, Depth> 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=2.00"

Area (sf)	CN	Description
114,714	30	Brush, Good, HSG A
287,122	65	Brush, Good, HSG C
2,065	98	Unconnected roofs, HSG A
403,901	55	Weighted Average
401,836		99.49% Pervious Area
2,065		0.51% Impervious Area
2,065		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0100	0.08		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
11.9	1,175	0.0120	1.64		**Shallow Concentrated Flow, Balance of Flow** Grassed Waterway Kv= 15.0 fps
32.4	1,275	Total			

Subcatchment OSC 4: Off-Site Subcatchment 4



Summary for Subcatchment PSC 1: Proposed Subcatchment 1

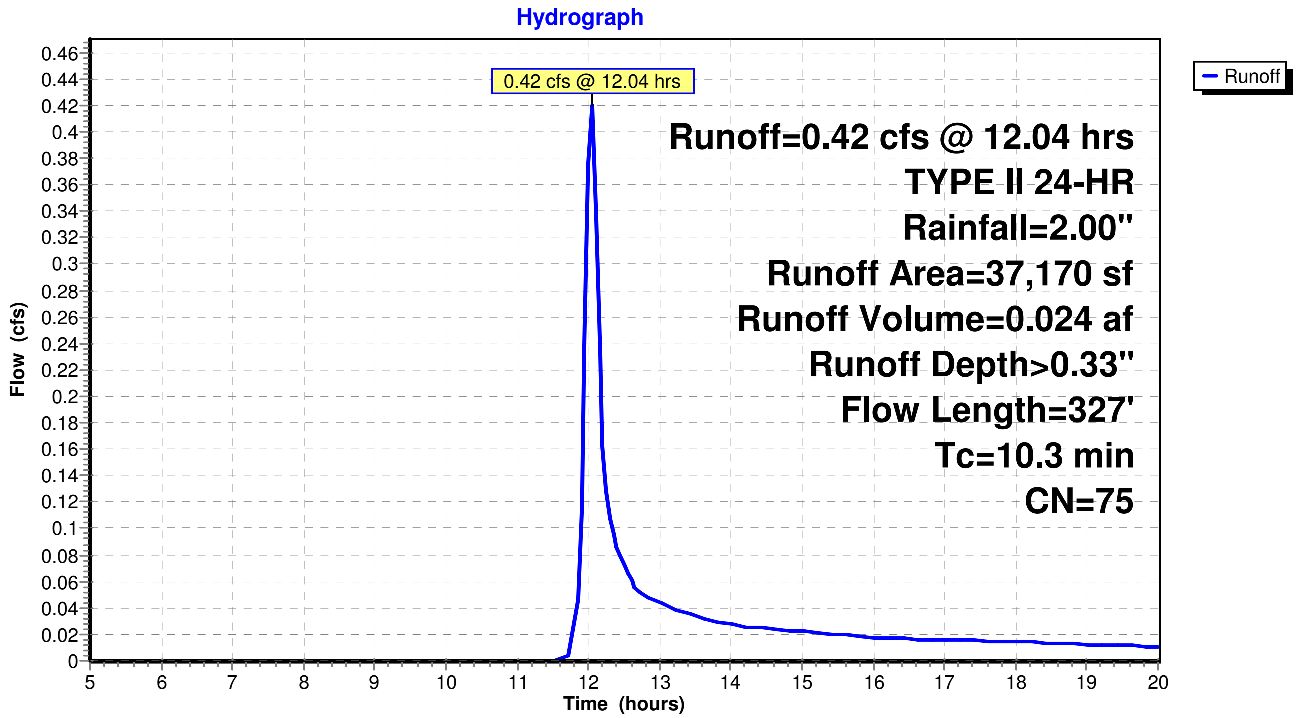
Runoff = 0.42 cfs @ 12.04 hrs, Volume= 0.024 af, Depth> 0.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=2.00"

Area (sf)	CN	Description
6,031	98	Paved parking & roofs
18,864	74	>75% Grass cover, Good, HSG C
12,275	65	Brush, Good, HSG C
37,170	75	Weighted Average
31,139		83.77% Pervious Area
6,031		16.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	100	0.0300	0.18		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
0.7	70	0.0140	1.77		**Shallow Concentrated Flow, Balance of Flow to Channel** Grassed Waterway Kv= 15.0 fps
0.5	157	0.0190	5.40	27.00	**Trap/Vee/Rect Channel Flow, Balance of Longest Flowpath** Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.027
10.3	327	Total			

Subcatchment PSC 1: Proposed Subcatchment 1



Summary for Subcatchment PSC 4: Proposed Subcatchment 4

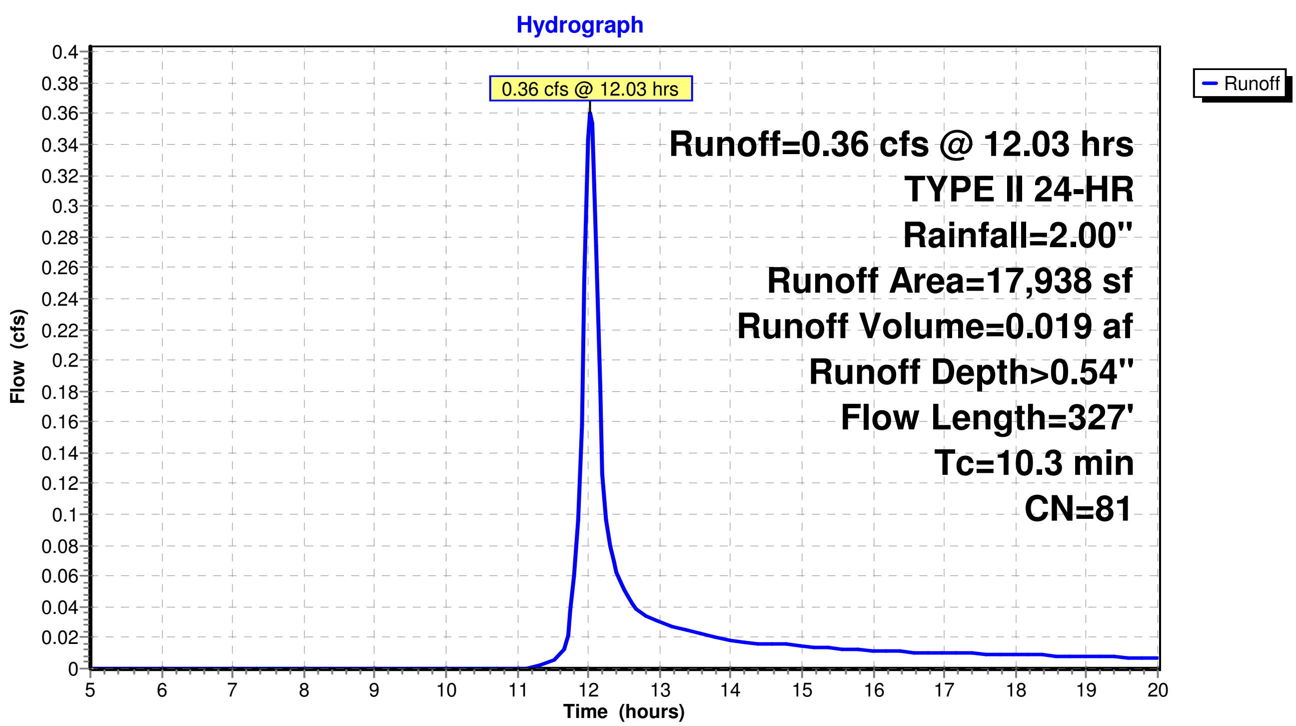
Runoff = 0.36 cfs @ 12.03 hrs, Volume= 0.019 af, Depth> 0.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=2.00"

Area (sf)	CN	Description
5,212	98	Paved parking & roofs
12,726	74	>75% Grass cover, Good, HSG C
17,938	81	Weighted Average
12,726		70.94% Pervious Area
5,212		29.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	100	0.0300	0.18		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
0.7	70	0.0140	1.77		**Shallow Concentrated Flow, Balance of Flow to Channel** Grassed Waterway Kv= 15.0 fps
0.5	157	0.0190	5.40	27.00	**Trap/Vee/Rect Channel Flow, Balance of Longest Flowpath** Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.027
10.3	327	Total			

Subcatchment PSC 4: Proposed Subcatchment 4



Summary for Subcatchment PSC 5: Proposed Subcatchment 5

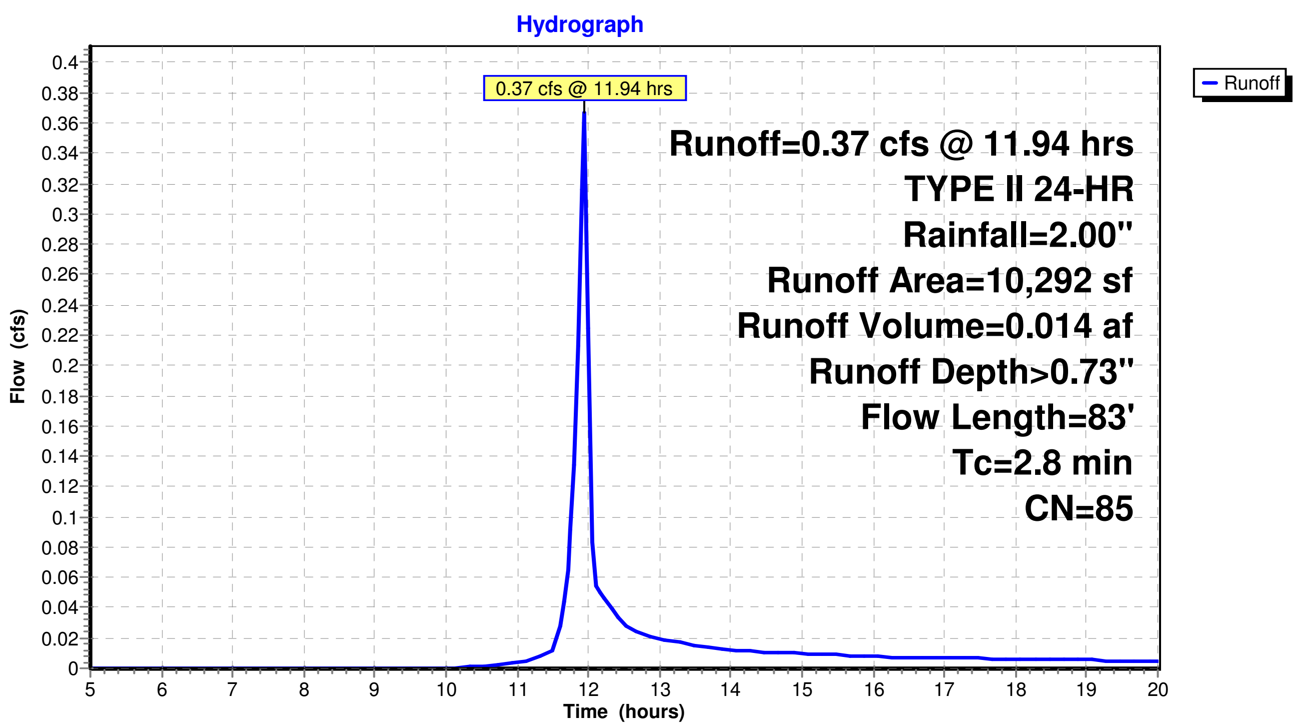
Runoff = 0.37 cfs @ 11.94 hrs, Volume= 0.014 af, Depth> 0.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=2.00"

Area (sf)	CN	Description
4,615	98	Paved parking & roofs
5,677	74	>75% Grass cover, Good, HSG C
10,292	85	Weighted Average
5,677		55.16% Pervious Area
4,615		44.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	23	0.0860	0.21		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
1.0	60	0.0140	0.99		**Sheet Flow, First 100' Flowpath** Smooth surfaces n= 0.011 P2= 2.70"
2.8	83	Total			

Subcatchment PSC 5: Proposed Subcatchment 5

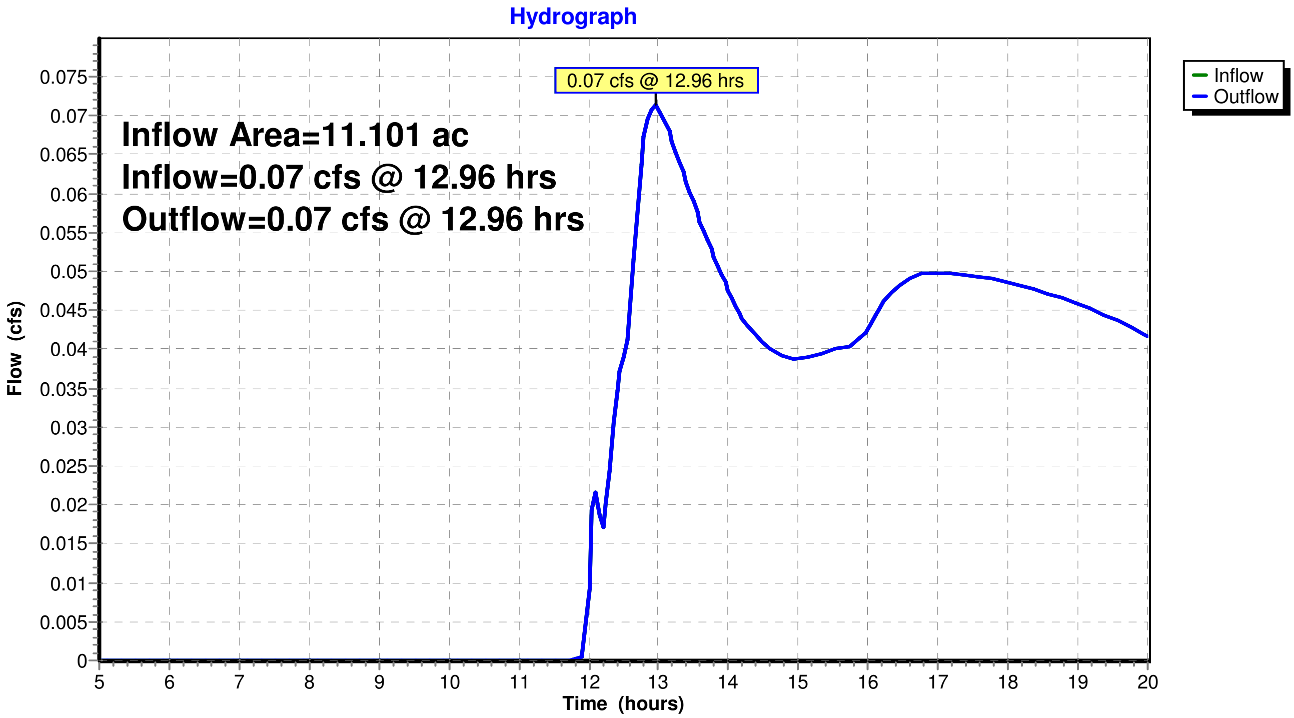


Summary for Reach DP 1: Design Point Summation 1

Inflow Area =	11.101 ac,	3.71% Impervious,	Inflow Depth > 0.03"	
Inflow =	0.07 cfs @	12.96 hrs, Volume=	0.031 af	
Outflow =	0.07 cfs @	12.96 hrs, Volume=	0.031 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 DP 1: Design Point Summation 1



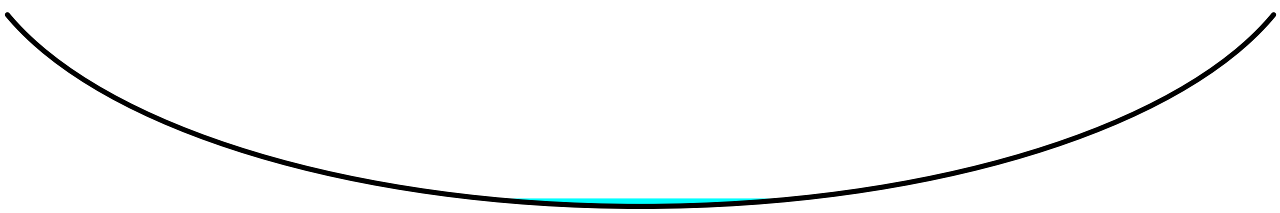
Summary for Reach DS: Diversion Swale

Inflow Area = 9.272 ac, 0.51% Impervious, Inflow Depth > 0.01"
Inflow = 0.02 cfs @ 18.91 hrs, Volume= 0.006 af
Outflow = 0.02 cfs @ 19.34 hrs, Volume= 0.005 af, Atten= 0%, Lag= 26.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.36 fps, Min. Travel Time= 14.7 min
Avg. Velocity = 0.31 fps, Avg. Travel Time= 16.9 min

Peak Storage= 14 cf @ 19.10 hrs
Average Depth at Peak Storage= 0.04'
Bank-Full Depth= 1.00' Flow Area= 5.3 sf, Capacity= 15.57 cfs

8.00' x 1.00' deep Parabolic Channel, n= 0.030
Length= 318.0' Slope= 0.0063 '/'
Inlet Invert= 0.00', Outlet Invert= -2.00'



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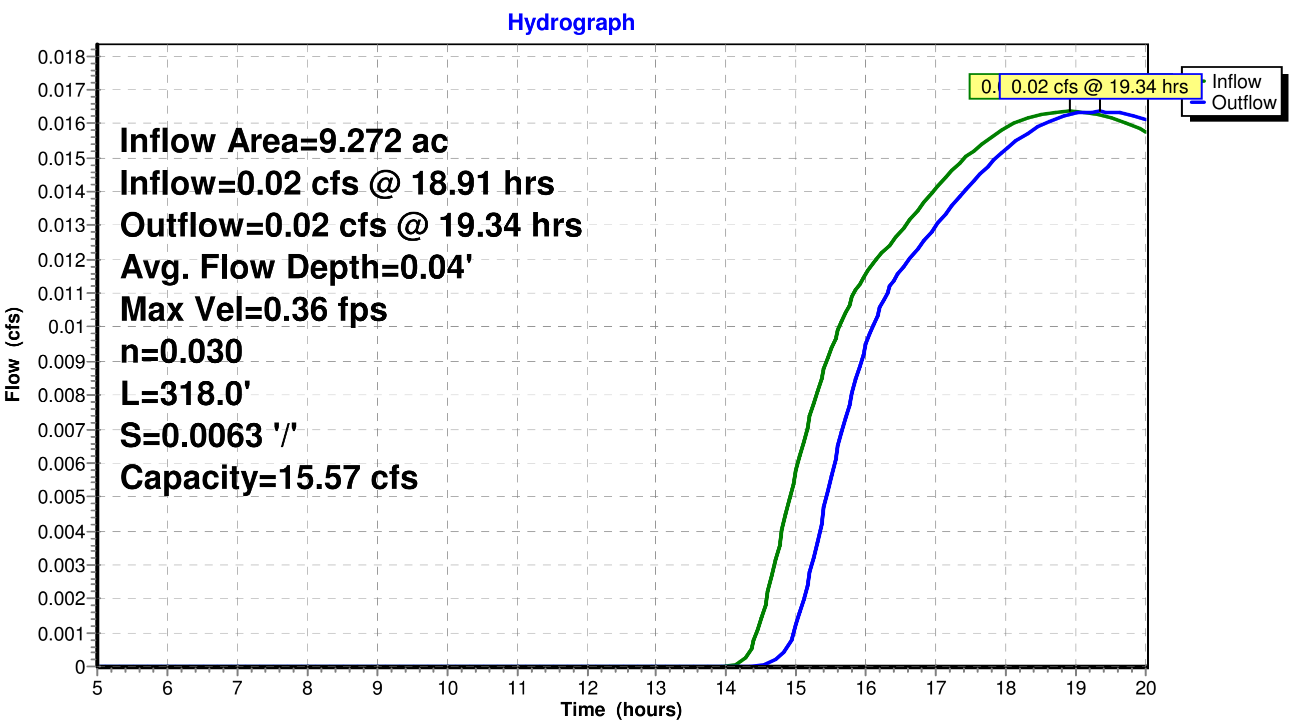
Reach DS: Diversion Swale



Summary for Pond BR 1: Bioretention Area 1

Inflow Area = 0.853 ac, 16.23% Impervious, Inflow Depth > 0.33"
Inflow = 0.42 cfs @ 12.04 hrs, Volume= 0.024 af
Outflow = 0.04 cfs @ 13.03 hrs, Volume= 0.013 af, Atten= 90%, Lag= 59.3 min
Primary = 0.04 cfs @ 13.03 hrs, Volume= 0.013 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= 1.21' @ 13.03 hrs Surf.Area= 219 sf Storage= 494 cf
Flood Elev= 5.00' Surf.Area= 0 sf Storage= 2,454 cf

Plug-Flow detention time= 195.8 min calculated for 0.013 af (54% of inflow)
Center-of-Mass det. time= 95.9 min (930.8 - 834.9)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2,454 cf	**Custom Stage Data (Prismatic)** Listed below

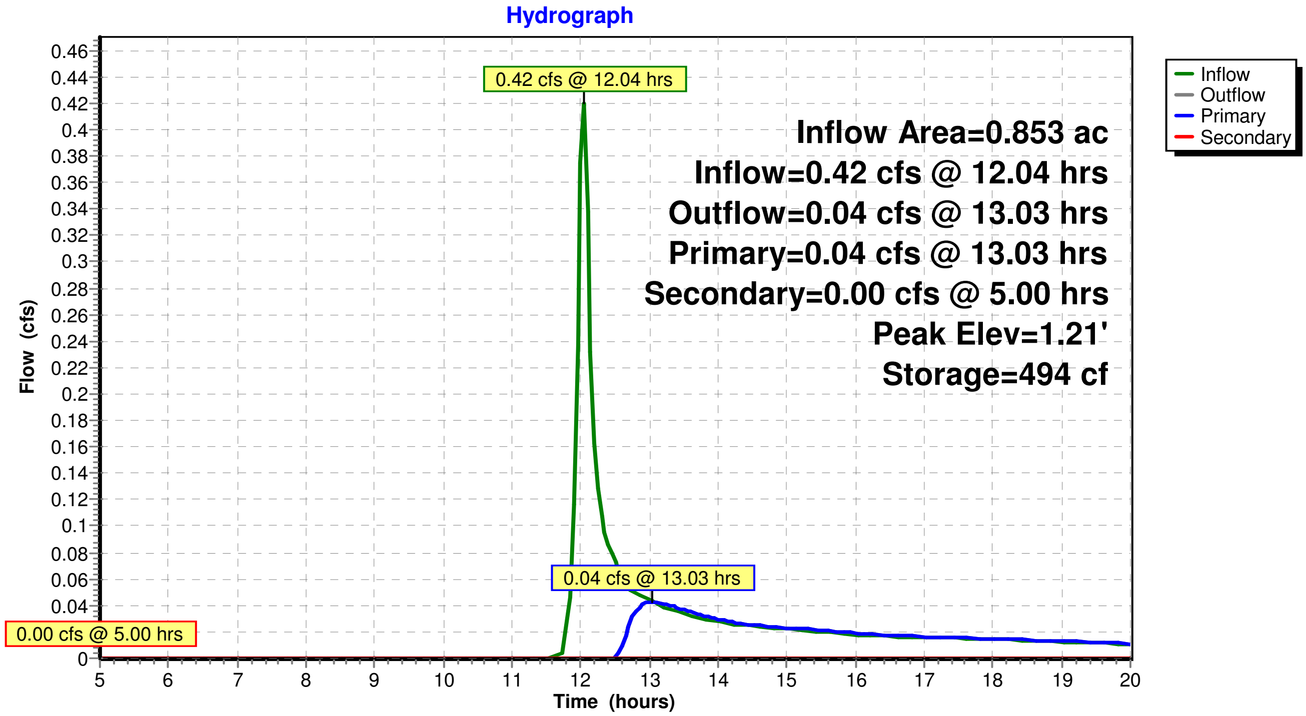
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	438	0	0
1.00	438	438	438
1.10	219	33	471
3.50	219	526	996
3.51	1,094	7	1,003
4.50	1,669	1,368	2,371
4.60	0	83	2,454

Device	Routing	Invert	Outlet Devices
#1	Secondary	4.00'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	1.00'	**4.0" Round Culvert** L= 197.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 1.00' / 0.50' S= 0.0025 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.04 cfs @ 13.03 hrs HW=1.21' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.04 cfs @ 1.08 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=0.00' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BR 1: Bioretention Area 1



Summary for Pond BR 4: Bioretention Area 4

Inflow Area = 0.412 ac, 29.06% Impervious, Inflow Depth > 0.54"
Inflow = 0.36 cfs @ 12.03 hrs, Volume= 0.019 af
Outflow = 0.01 cfs @ 17.02 hrs, Volume= 0.003 af, Atten= 97%, Lag= 299.1 min
Primary = 0.01 cfs @ 17.02 hrs, Volume= 0.003 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= 2.86' @ 17.02 hrs Surf.Area= 176 sf Storage= 688 cf
Flood Elev= 5.00' Surf.Area= 0 sf Storage= 1,963 cf

Plug-Flow detention time= 366.5 min calculated for 0.003 af (16% of inflow)
Center-of-Mass det. time= 264.3 min (1,079.1 - 814.8)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	1,963 cf	**Custom Stage Data (Prismatic)** Listed below

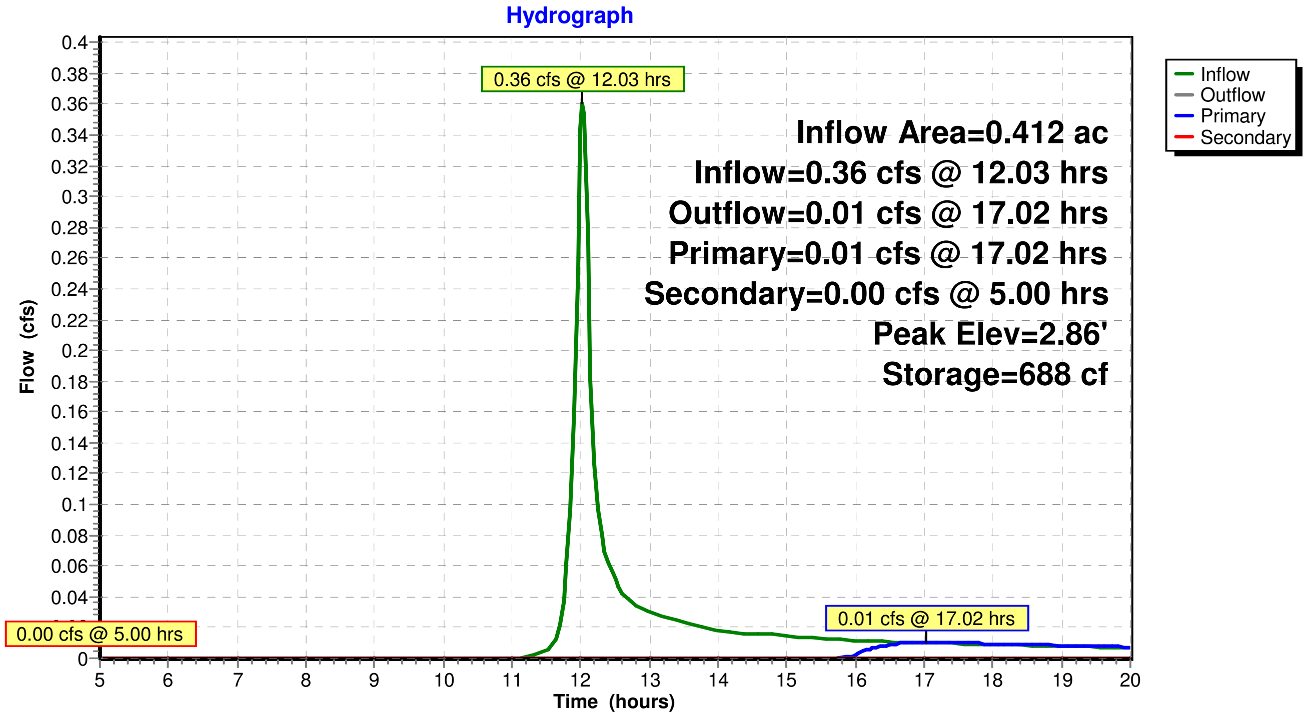
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	352	0	0
1.00	352	352	352
1.10	176	26	378
3.50	176	422	801
3.51	880	5	806
4.50	1,324	1,091	1,897
4.60	0	66	1,963

Device	Routing	Invert	Outlet Devices
#1	Secondary	4.00'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	2.75'	**4.0" Round Culvert** L= 157.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2.75' / 2.50' S= 0.0016 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.01 cfs @ 17.02 hrs HW=2.86' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.01 cfs @ 0.62 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=0.00' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BR 4: Bioretention Area 4



Summary for Pond BR 5: Bioretention Area 5

Inflow Area = 0.236 ac, 44.84% Impervious, Inflow Depth > 0.73"
Inflow = 0.37 cfs @ 11.94 hrs, Volume= 0.014 af
Outflow = 0.03 cfs @ 12.52 hrs, Volume= 0.007 af, Atten= 92%, Lag= 35.0 min
Primary = 0.03 cfs @ 12.52 hrs, Volume= 0.007 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= 1.17' @ 12.52 hrs Surf.Area= 157 sf Storage= 348 cf
Flood Elev= 5.00' Surf.Area= 0 sf Storage= 1,807 cf

Plug-Flow detention time= 193.2 min calculated for 0.007 af (47% of inflow)
Center-of-Mass det. time= 106.3 min (903.3 - 797.0)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	1,807 cf	**Custom Stage Data (Prismatic)** Listed below

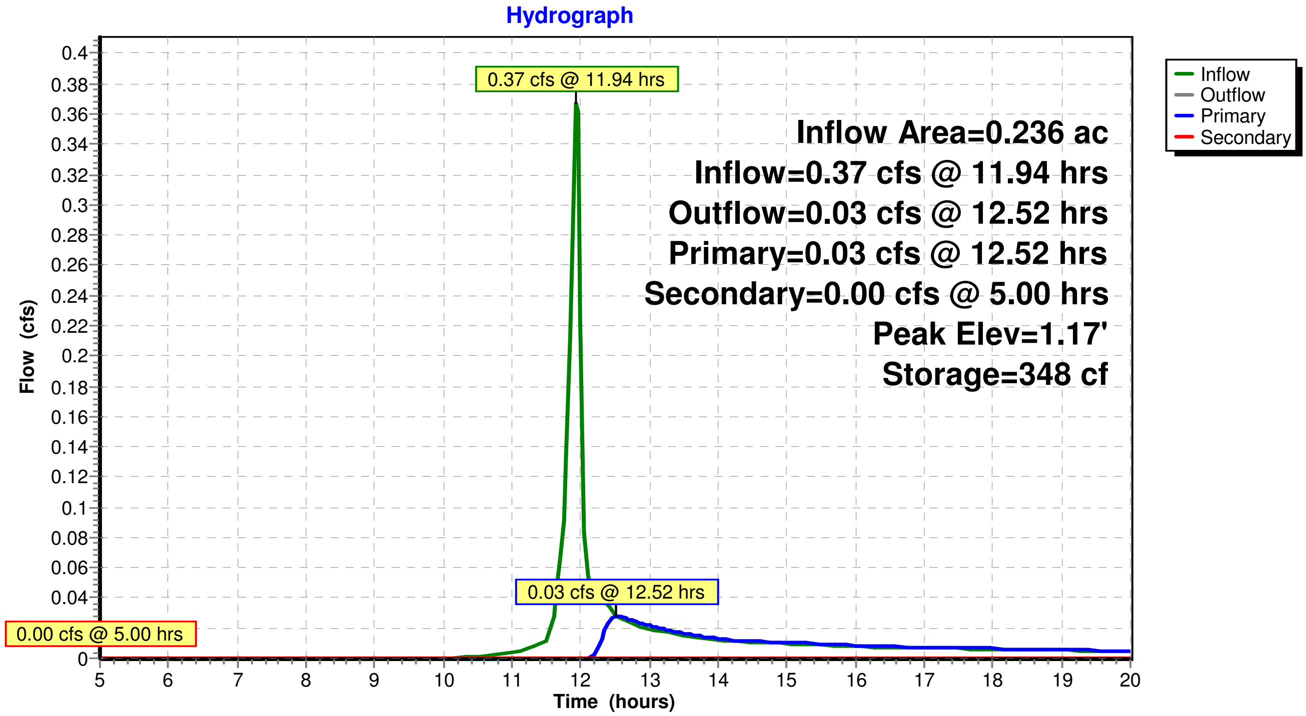
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	314	0	0
1.00	314	314	314
1.10	157	24	338
3.50	157	377	714
3.51	786	5	719
4.50	1,282	1,024	1,743
4.60	0	64	1,807

Device	Routing	Invert	Outlet Devices
#1	Secondary	4.00'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	1.00'	**4.0" Round Culvert** L= 219.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 1.00' / 0.50' S= 0.0023 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.03 cfs @ 12.52 hrs HW=1.17' (Free Discharge)
2=Culvert (Barrel Controls 0.03 cfs @ 0.92 fps)

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

Pond BR 5: Bioretention Area 5



Summary for Pond Sed: Sediment Trap

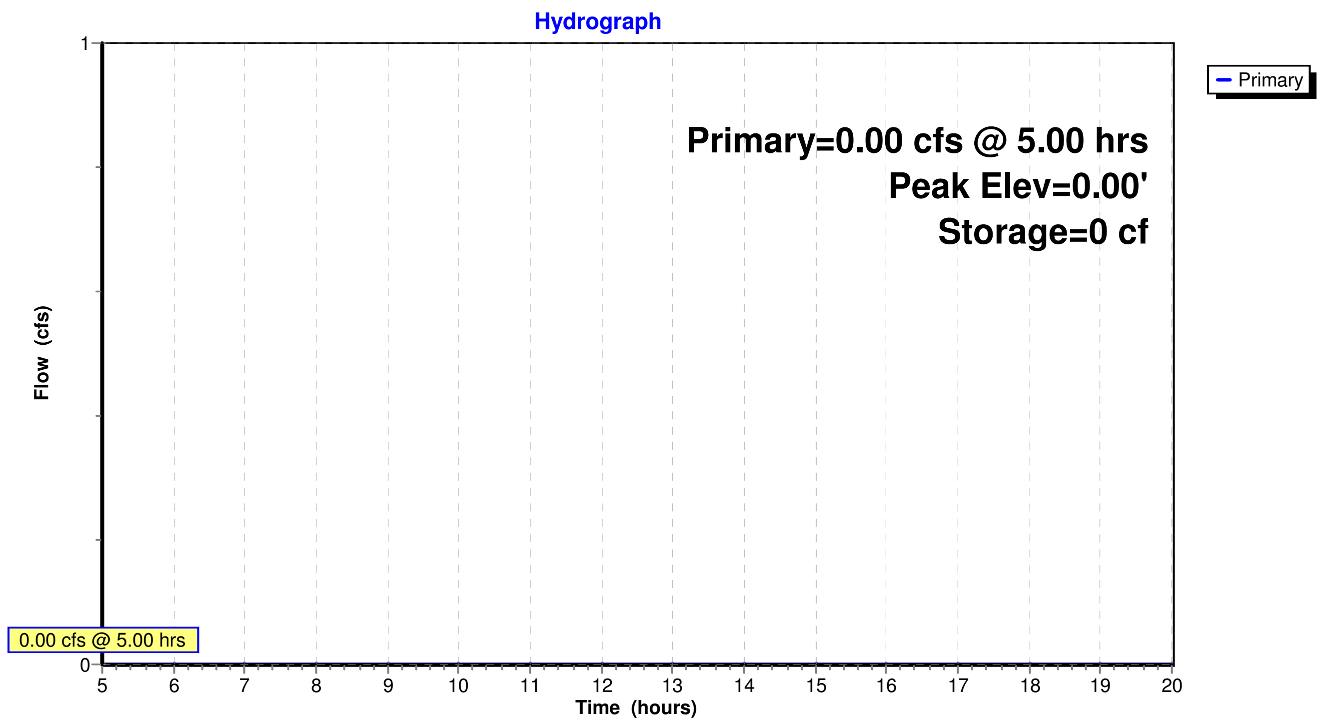
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	22,831 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	3,425	0	0
1.00	5,874	4,650	4,650
2.00	8,774	7,324	11,974
3.00	11,765	10,270	22,243
3.10	0	588	22,831

Device	Routing	Invert	Outlet Devices
#1	Primary	2.00'	**6.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=0.00' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Sed: Sediment Trap



Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.856	74	>75% Grass cover, Good, HSG C (PSC 1, PSC 4, PSC 5)
2.633	30	Brush, Good, HSG A (OSC 4)
7.201	65	Brush, Good, HSG C (OSC 2, OSC 4, PSC 1)
0.364	98	Paved parking & roofs (PSC 1, PSC 4, PSC 5)
0.047	98	Unconnected roofs, HSG A (OSC 4)
11.101	**59**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.681	HSG A	OSC 4
0.000	HSG B	
8.056	HSG C	OSC 2, OSC 4, PSC 1, PSC 4, PSC 5
0.000	HSG D	
0.364	Other	PSC 1, PSC 4, PSC 5
11.101		**TOTAL AREA**

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	0.856	0.000	0.000	0.856	>75% Grass cover, Good	PSC 1, PSC 4, PSC 5
2.633	0.000	7.201	0.000	0.000	9.834	Brush, Good	OSC 2, OSC 4, PSC 1
0.000	0.000	0.000	0.000	0.364	0.364	Paved parking & roofs	PSC 1, PSC 4, PSC 5
0.047	0.000	0.000	0.000	0.000	0.047	Unconnected roofs	OSC 4
2.681	**0.000**	**8.056**	**0.000**	**0.364**	**11.101**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	BR 1	1.00	0.50	197.0	0.0025	0.013	4.0	0.0	0.0
2	BR 4	2.75	2.50	157.0	0.0016	0.013	4.0	0.0	0.0
3	BR 5	1.00	0.50	219.0	0.0023	0.013	4.0	0.0	0.0

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 OSC 2: Off-Site Runoff Area=14,274 sf 0.00% Impervious Runoff Depth>0.62"
Flow Length=220' Tc=10.4 min CN=65 Runoff=0.30 cfs 0.017 af

Subcatchment OSC 4: Off-Site Runoff Area=403,901 sf 0.51% Impervious Runoff Depth>0.26"
Flow Length=1,275' Tc=32.4 min CN=55 Runoff=1.09 cfs 0.197 af

Subcatchment PSC 1: Proposed Runoff Area=37,170 sf 16.23% Impervious Runoff Depth>1.11"
Flow Length=327' Tc=10.3 min CN=75 Runoff=1.55 cfs 0.079 af

Subcatchment PSC 4: Proposed Runoff Area=17,938 sf 29.06% Impervious Runoff Depth>1.49"
Flow Length=327' Tc=10.3 min CN=81 Runoff=1.00 cfs 0.051 af

Subcatchment PSC 5: Proposed Runoff Area=10,292 sf 44.84% Impervious Runoff Depth>1.79"
Flow Length=83' Tc=2.8 min CN=85 Runoff=0.87 cfs 0.035 af

Reach DP 1: Design Point Summation 1 Inflow=1.64 cfs 0.343 af
Outflow=1.64 cfs 0.343 af

Reach DS: Diversion Swale Avg. Flow Depth=0.29' Max Vel=1.30 fps Inflow=1.09 cfs 0.197 af
n=0.030 L=318.0' S=0.0063 '/' Capacity=15.57 cfs Outflow=1.06 cfs 0.195 af

Pond BR 1: Bioretention Area 1 Peak Elev=3.86' Storage=1,481 cf Inflow=1.55 cfs 0.079 af
Primary=0.23 cfs 0.068 af Secondary=0.00 cfs 0.000 af Outflow=0.23 cfs 0.068 af

Pond BR 4: Bioretention Area 4 Peak Elev=3.79' Storage=1,113 cf Inflow=1.00 cfs 0.051 af
Primary=0.14 cfs 0.035 af Secondary=0.00 cfs 0.000 af Outflow=0.14 cfs 0.035 af

Pond BR 5: Bioretention Area 5 Peak Elev=3.51' Storage=719 cf Inflow=0.87 cfs 0.035 af
Primary=0.20 cfs 0.027 af Secondary=0.00 cfs 0.000 af Outflow=0.20 cfs 0.027 af

Pond Sed: Sediment Trap Peak Elev=0.00' Storage=0 cf
Primary=0.00 cfs 0.000 af

Total Runoff Area = 11.101 ac Runoff Volume = 0.380 af Average Runoff Depth = 0.41"
96.29% Pervious = 10.690 ac 3.71% Impervious = 0.411 ac

Summary for Subcatchment OSC 2: Off-Site Subcatchment 2

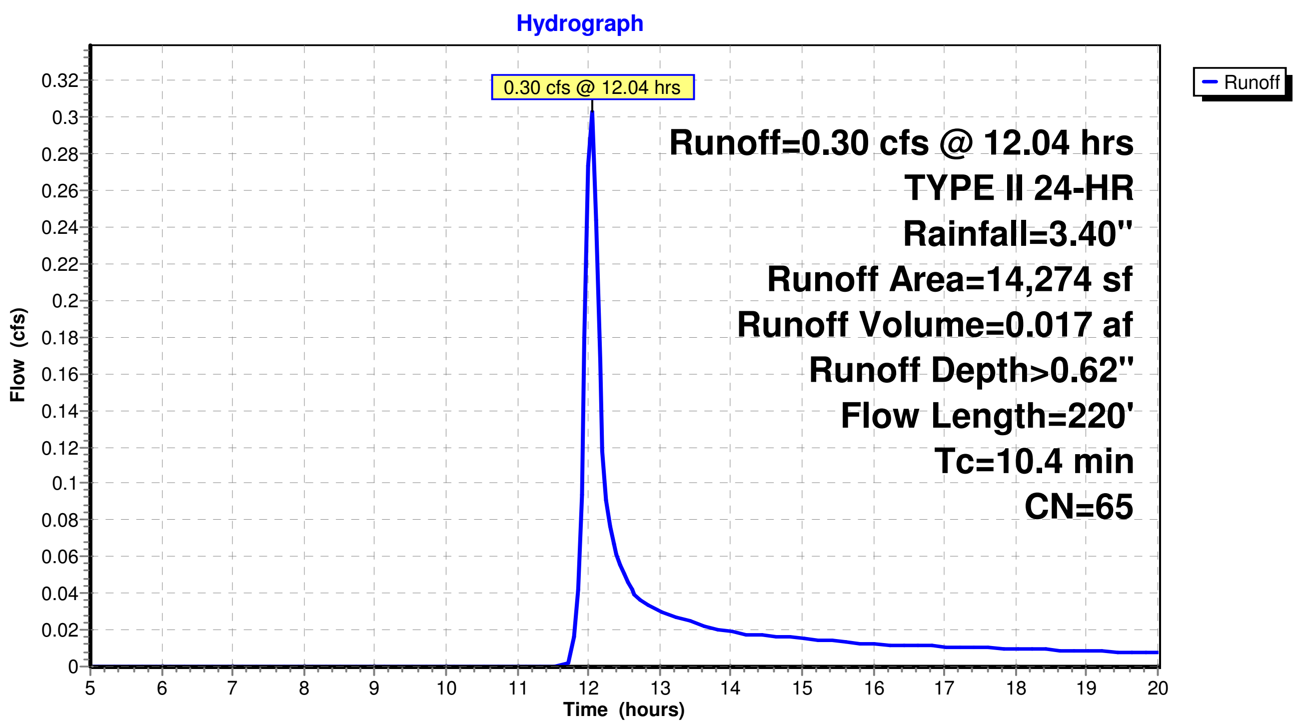
Runoff = 0.30 cfs @ 12.04 hrs, Volume= 0.017 af, Depth> 0.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=3.40"

Area (sf)	CN	Description
14,274	65	Brush, Good, HSG C
14,274		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0350	0.20		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
1.9	120	0.0050	1.06		**Shallow Concentrated Flow, Balance of Flow to Channel** Grassed Waterway Kv= 15.0 fps
10.4	220	Total			

Subcatchment OSC 2: Off-Site Subcatchment 2



Summary for Subcatchment OSC 4: Off-Site Subcatchment 4

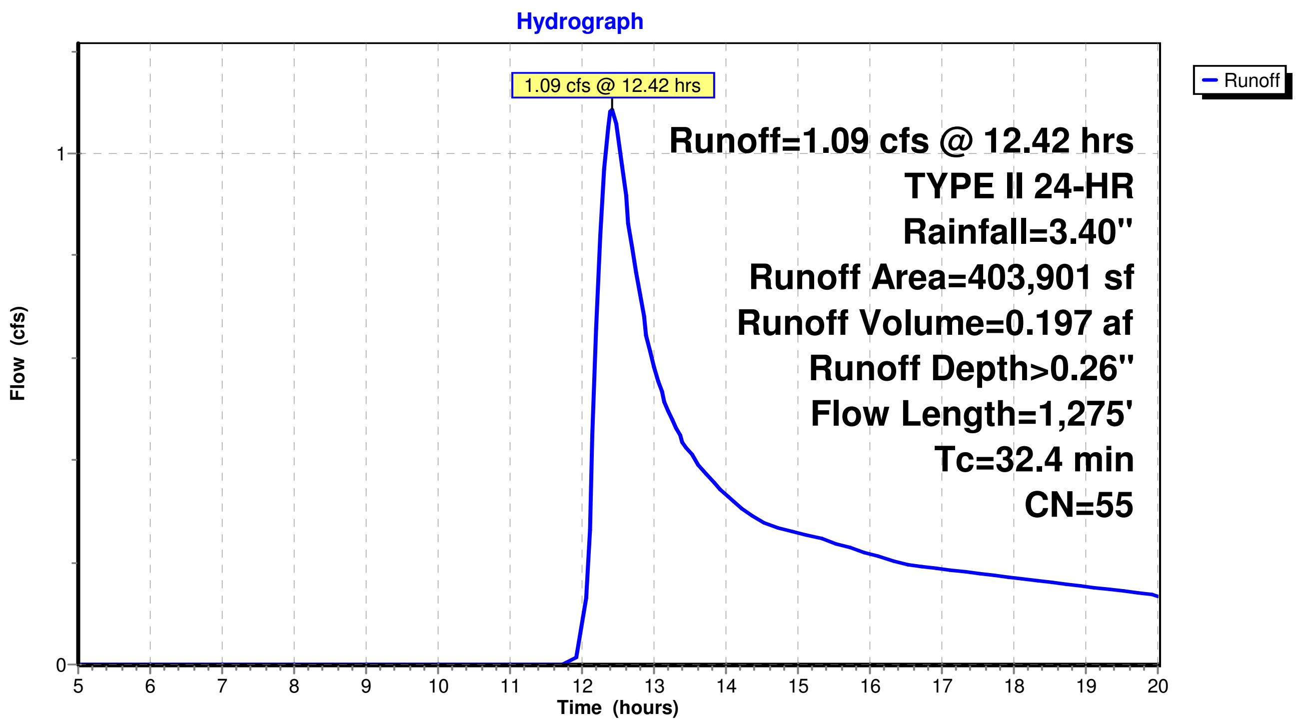
Runoff = 1.09 cfs @ 12.42 hrs, Volume= 0.197 af, Depth> 0.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=3.40"

Area (sf)	CN	Description
114,714	30	Brush, Good, HSG A
287,122	65	Brush, Good, HSG C
2,065	98	Unconnected roofs, HSG A
403,901	55	Weighted Average
401,836		99.49% Pervious Area
2,065		0.51% Impervious Area
2,065		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0100	0.08		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
11.9	1,175	0.0120	1.64		**Shallow Concentrated Flow, Balance of Flow** Grassed Waterway Kv= 15.0 fps
32.4	1,275	Total			

Subcatchment OSC 4: Off-Site Subcatchment 4



Summary for Subcatchment PSC 1: Proposed Subcatchment 1

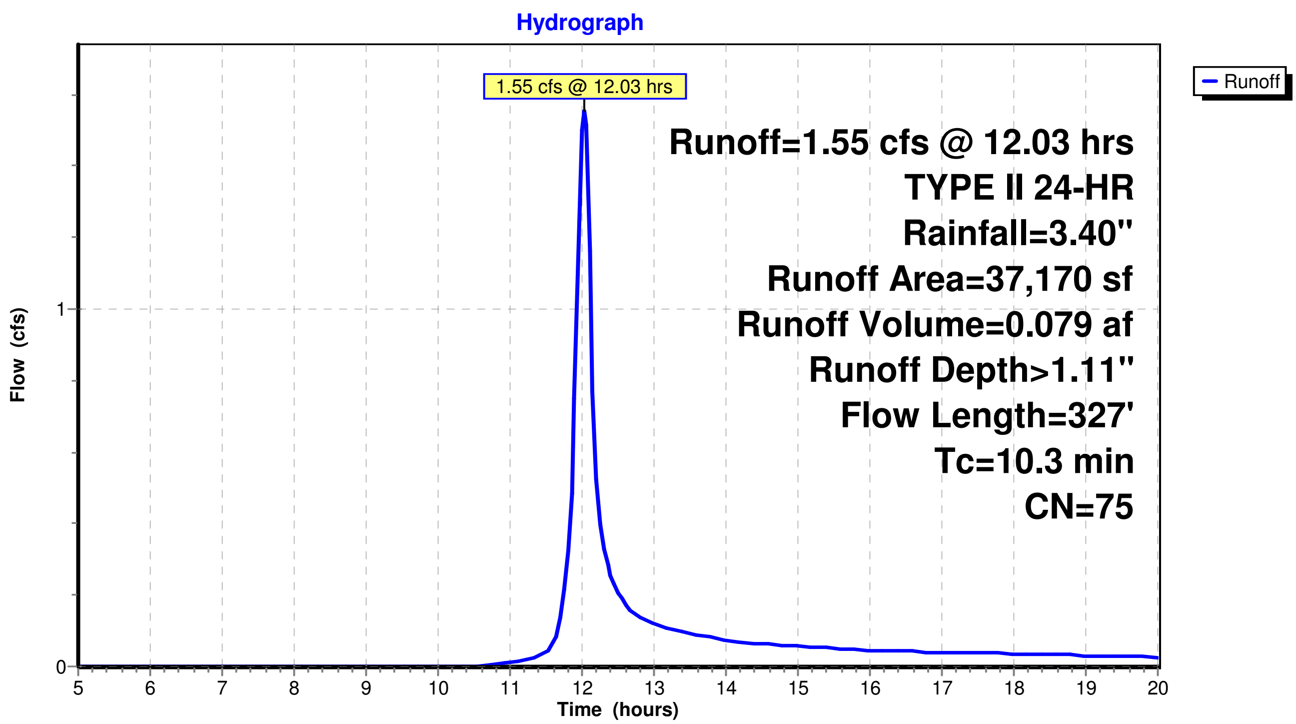
Runoff = 1.55 cfs @ 12.03 hrs, Volume= 0.079 af, Depth> 1.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=3.40"

Area (sf)	CN	Description
6,031	98	Paved parking & roofs
18,864	74	>75% Grass cover, Good, HSG C
12,275	65	Brush, Good, HSG C
37,170	75	Weighted Average
31,139		83.77% Pervious Area
6,031		16.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	100	0.0300	0.18		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
0.7	70	0.0140	1.77		**Shallow Concentrated Flow, Balance of Flow to Channel** Grassed Waterway Kv= 15.0 fps
0.5	157	0.0190	5.40	27.00	**Trap/Vee/Rect Channel Flow, Balance of Longest Flowpath** Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.027
10.3	327	Total			

Subcatchment PSC 1: Proposed Subcatchment 1



Summary for Subcatchment PSC 4: Proposed Subcatchment 4

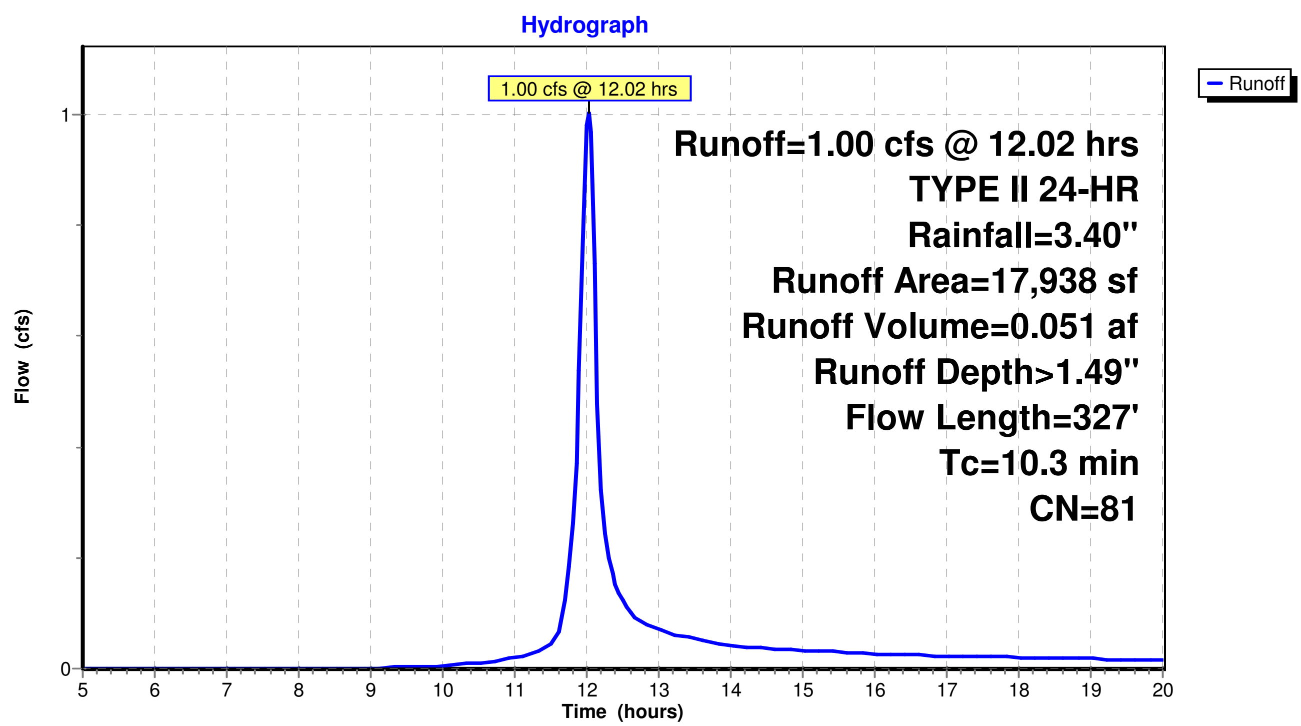
Runoff = 1.00 cfs @ 12.02 hrs, Volume= 0.051 af, Depth> 1.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=3.40"

Area (sf)	CN	Description
5,212	98	Paved parking & roofs
12,726	74	>75% Grass cover, Good, HSG C
17,938	81	Weighted Average
12,726		70.94% Pervious Area
5,212		29.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	100	0.0300	0.18		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
0.7	70	0.0140	1.77		**Shallow Concentrated Flow, Balance of Flow to Channel** Grassed Waterway Kv= 15.0 fps
0.5	157	0.0190	5.40	27.00	**Trap/Vee/Rect Channel Flow, Balance of Longest Flowpath** Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.027
10.3	327	Total			

Subcatchment PSC 4: Proposed Subcatchment 4



Summary for Subcatchment PSC 5: Proposed Subcatchment 5

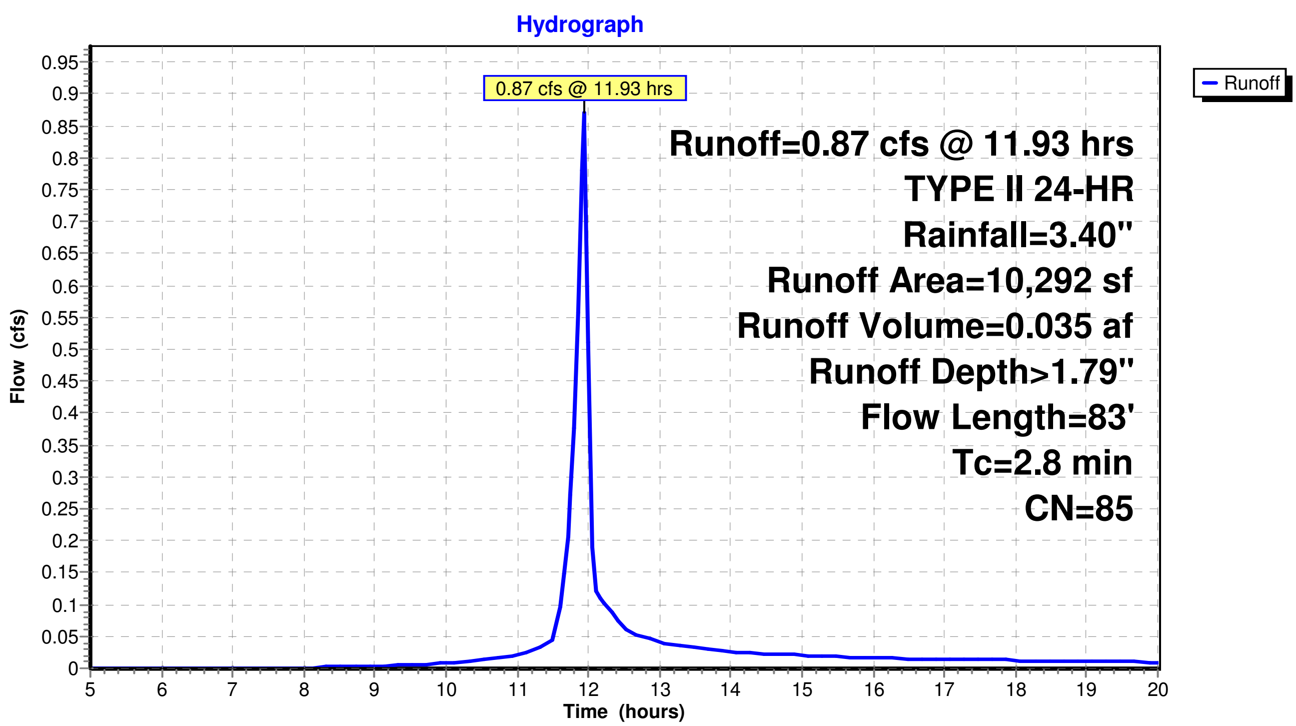
Runoff = 0.87 cfs @ 11.93 hrs, Volume= 0.035 af, Depth> 1.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=3.40"

Area (sf)	CN	Description
4,615	98	Paved parking & roofs
5,677	74	>75% Grass cover, Good, HSG C
10,292	85	Weighted Average
5,677		55.16% Pervious Area
4,615		44.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	23	0.0860	0.21		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
1.0	60	0.0140	0.99		**Sheet Flow, First 100' Flowpath** Smooth surfaces n= 0.011 P2= 2.70"
2.8	83	Total			

Subcatchment PSC 5: Proposed Subcatchment 5

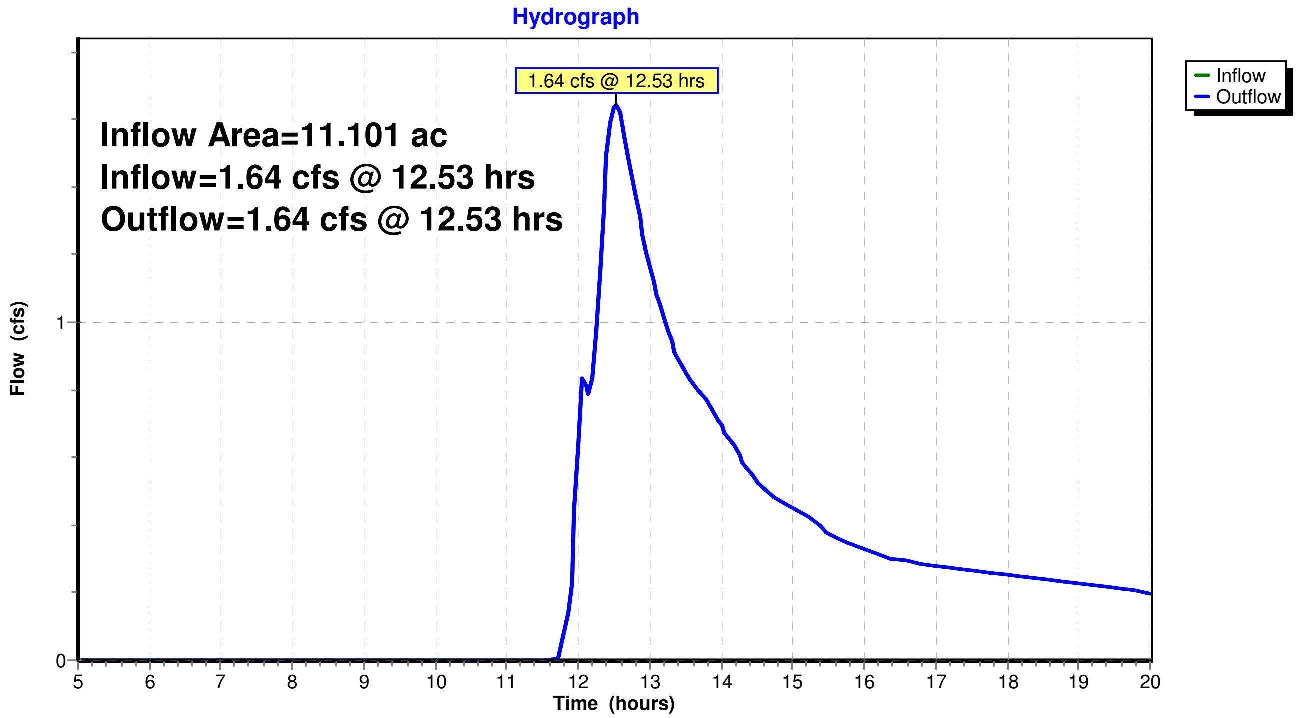


Summary for Reach DP 1: Design Point Summation 1

Inflow Area = 11.101 ac, 3.71% Impervious, Inflow Depth > 0.37"
Inflow = 1.64 cfs @ 12.53 hrs, Volume= 0.343 af
Outflow = 1.64 cfs @ 12.53 hrs, Volume= 0.343 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 DP 1: Design Point Summation 1



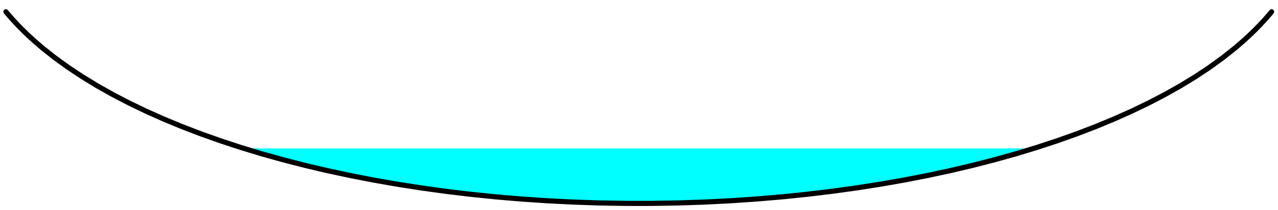
Summary for Reach DS: Diversion Swale

Inflow Area = 9.272 ac, 0.51% Impervious, Inflow Depth > 0.26"
Inflow = 1.09 cfs @ 12.42 hrs, Volume= 0.197 af
Outflow = 1.06 cfs @ 12.54 hrs, Volume= 0.195 af, Atten= 2%, Lag= 7.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.30 fps, Min. Travel Time= 4.1 min
Avg. Velocity = 0.83 fps, Avg. Travel Time= 6.4 min

Peak Storage= 262 cf @ 12.47 hrs
Average Depth at Peak Storage= 0.29'
Bank-Full Depth= 1.00' Flow Area= 5.3 sf, Capacity= 15.57 cfs

8.00' x 1.00' deep Parabolic Channel, n= 0.030
Length= 318.0' Slope= 0.0063 '/'
Inlet Invert= 0.00', Outlet Invert= -2.00'



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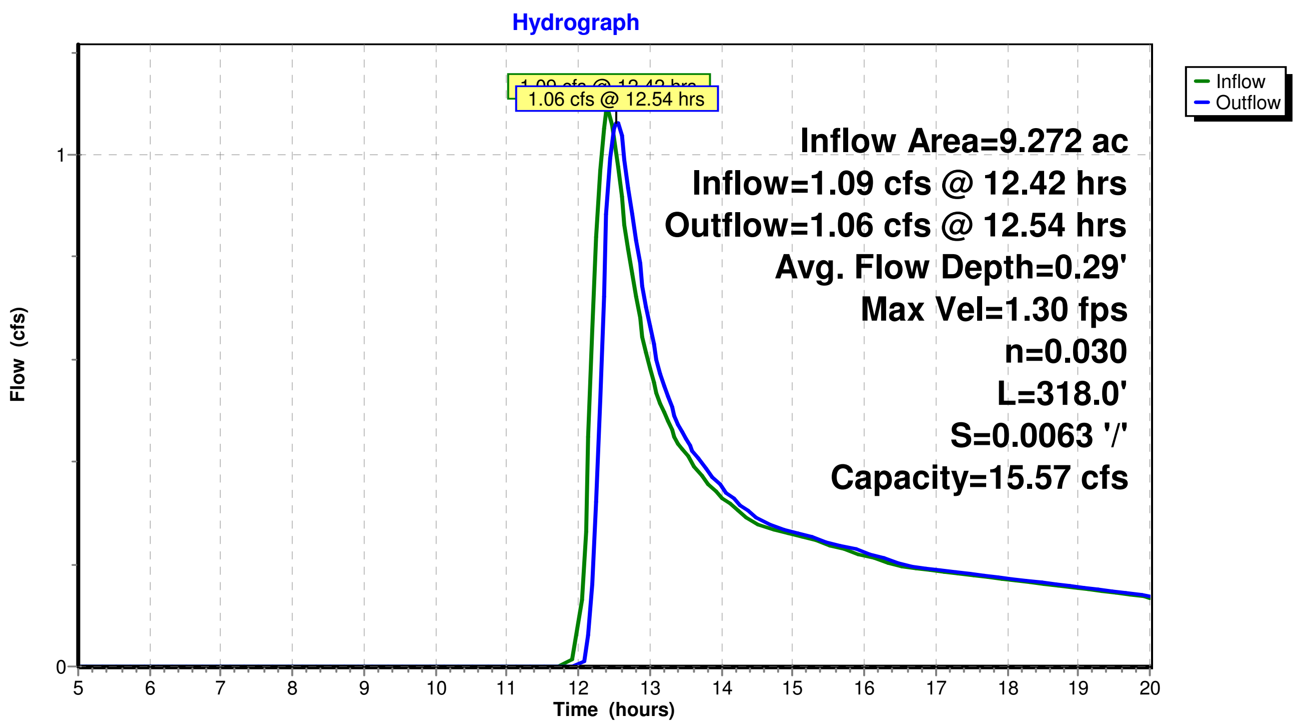
Reach DS: Diversion Swale



Summary for Pond BR 1: Bioretention Area 1

Inflow Area = 0.853 ac, 16.23% Impervious, Inflow Depth > 1.11"
Inflow = 1.55 cfs @ 12.03 hrs, Volume= 0.079 af
Outflow = 0.23 cfs @ 12.46 hrs, Volume= 0.068 af, Atten= 85%, Lag= 25.7 min
Primary = 0.23 cfs @ 12.46 hrs, Volume= 0.068 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= 3.86' @ 12.46 hrs Surf.Area= 1,295 sf Storage= 1,481 cf
Flood Elev= 5.00' Surf.Area= 0 sf Storage= 2,454 cf

Plug-Flow detention time= 97.3 min calculated for 0.068 af (86% of inflow)
Center-of-Mass det. time= 53.7 min (860.7 - 807.0)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2,454 cf	**Custom Stage Data (Prismatic)** Listed below

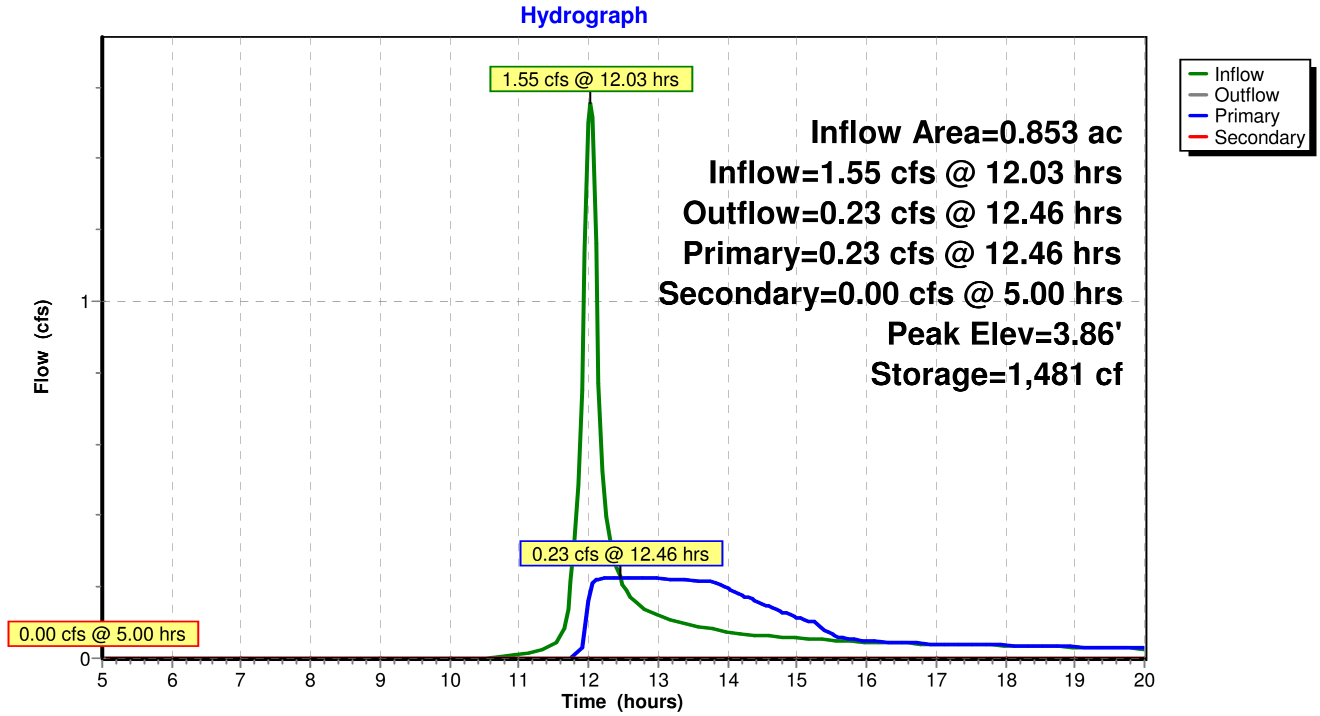
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	438	0	0
1.00	438	438	438
1.10	219	33	471
3.50	219	526	996
3.51	1,094	7	1,003
4.50	1,669	1,368	2,371
4.60	0	83	2,454

Device	Routing	Invert	Outlet Devices
#1	Secondary	4.00'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	1.00'	**4.0" Round Culvert** L= 197.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 1.00' / 0.50' S= 0.0025 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.23 cfs @ 12.46 hrs HW=3.86' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.23 cfs @ 2.61 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=0.00' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BR 1: Bioretention Area 1



Summary for Pond BR 4: Bioretention Area 4

Inflow Area = 0.412 ac, 29.06% Impervious, Inflow Depth > 1.49"
Inflow = 1.00 cfs @ 12.02 hrs, Volume= 0.051 af
Outflow = 0.14 cfs @ 12.43 hrs, Volume= 0.035 af, Atten= 86%, Lag= 24.6 min
Primary = 0.14 cfs @ 12.43 hrs, Volume= 0.035 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= 3.79' @ 12.43 hrs Surf.Area= 1,005 sf Storage= 1,113 cf
Flood Elev= 5.00' Surf.Area= 0 sf Storage= 1,963 cf

Plug-Flow detention time= 133.1 min calculated for 0.035 af (69% of inflow)
Center-of-Mass det. time= 63.8 min (857.4 - 793.6)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	1,963 cf	**Custom Stage Data (Prismatic)** Listed below

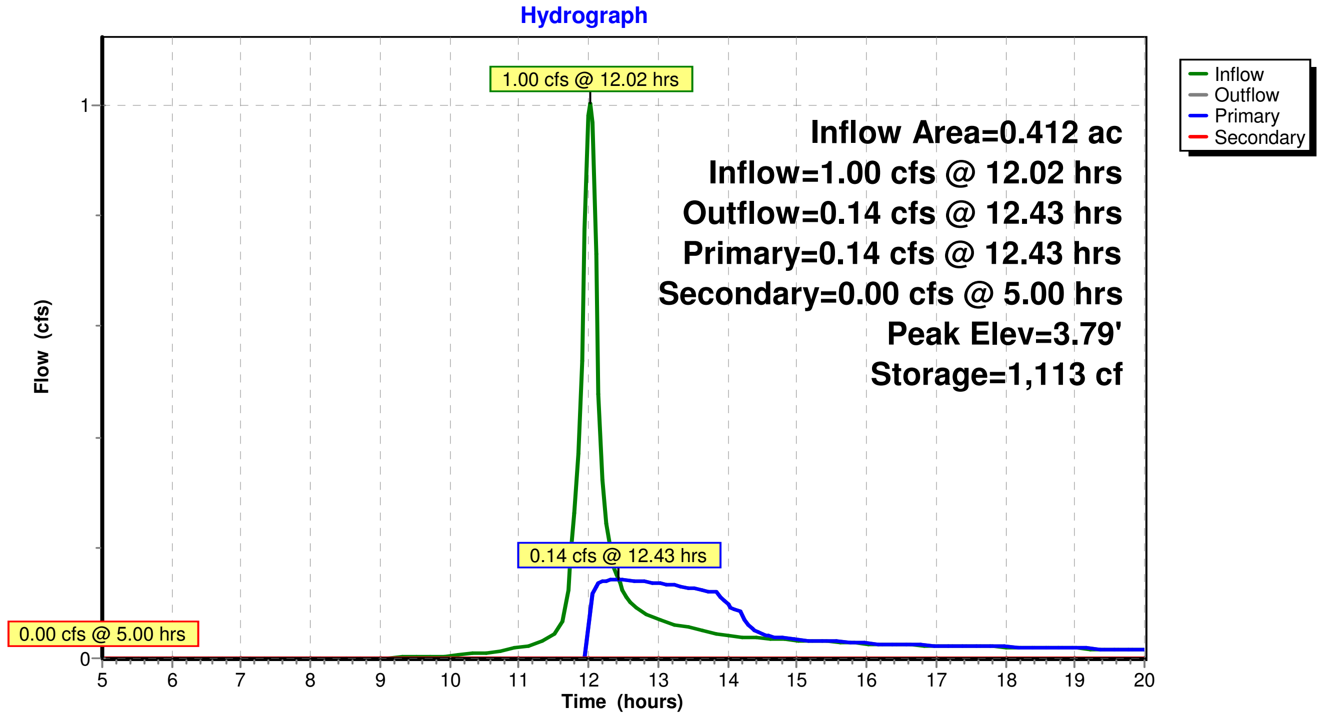
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	352	0	0
1.00	352	352	352
1.10	176	26	378
3.50	176	422	801
3.51	880	5	806
4.50	1,324	1,091	1,897
4.60	0	66	1,963

Device	Routing	Invert	Outlet Devices
#1	Secondary	4.00'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	2.75'	**4.0" Round Culvert** L= 157.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2.75' / 2.50' S= 0.0016 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.14 cfs @ 12.43 hrs HW=3.79' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.14 cfs @ 1.63 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=0.00' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BR 4: Bioretention Area 4



Summary for Pond BR 5: Bioretention Area 5

Inflow Area = 0.236 ac, 44.84% Impervious, Inflow Depth > 1.79"
Inflow = 0.87 cfs @ 11.93 hrs, Volume= 0.035 af
Outflow = 0.20 cfs @ 12.06 hrs, Volume= 0.027 af, Atten= 77%, Lag= 7.8 min
Primary = 0.20 cfs @ 12.06 hrs, Volume= 0.027 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= 3.51' @ 12.06 hrs Surf.Area= 786 sf Storage= 719 cf
Flood Elev= 5.00' Surf.Area= 0 sf Storage= 1,807 cf

Plug-Flow detention time= 101.7 min calculated for 0.027 af (78% of inflow)
Center-of-Mass det. time= 44.1 min (821.9 - 777.8)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	1,807 cf	**Custom Stage Data (Prismatic)** Listed below

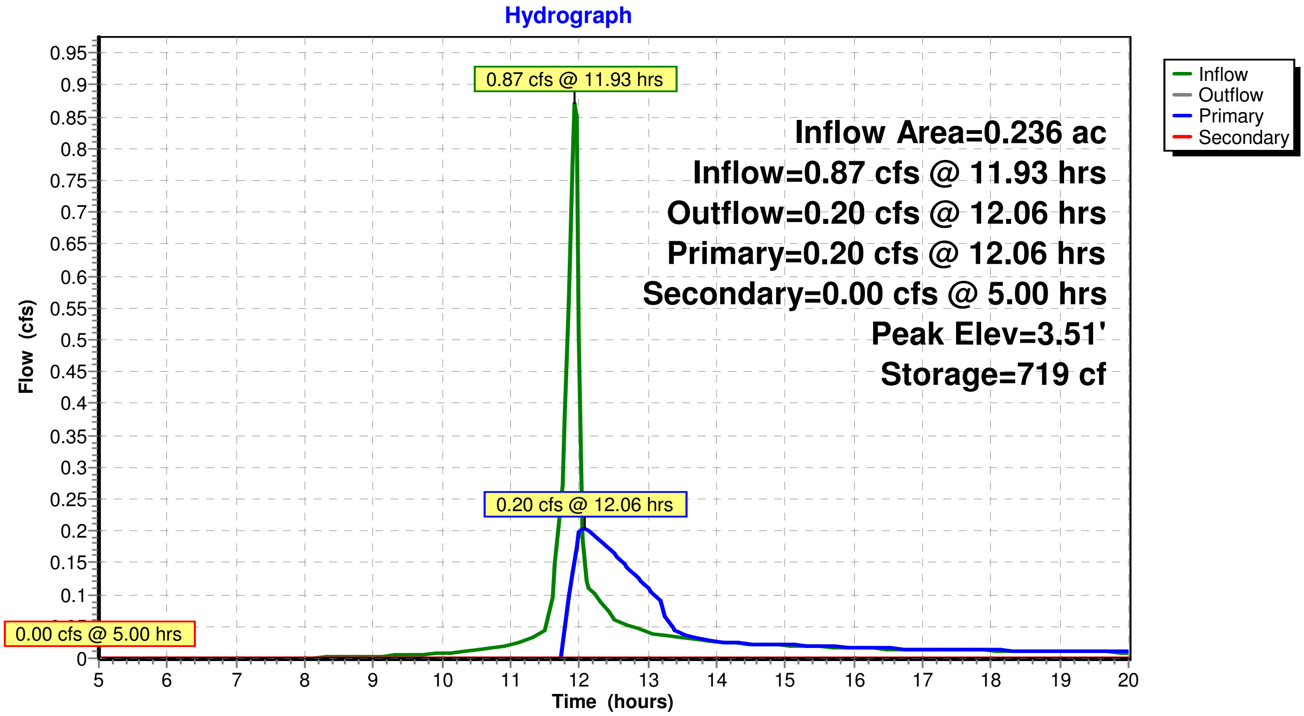
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	314	0	0
1.00	314	314	314
1.10	157	24	338
3.50	157	377	714
3.51	786	5	719
4.50	1,282	1,024	1,743
4.60	0	64	1,807

Device	Routing	Invert	Outlet Devices
#1	Secondary	4.00'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	1.00'	**4.0" Round Culvert** L= 219.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 1.00' / 0.50' S= 0.0023 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.20 cfs @ 12.06 hrs HW=3.49' (Free Discharge)
↑—**2=Culvert** (Barrel Controls 0.20 cfs @ 2.32 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=0.00' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BR 5: Bioretention Area 5



Summary for Pond Sed: Sediment Trap

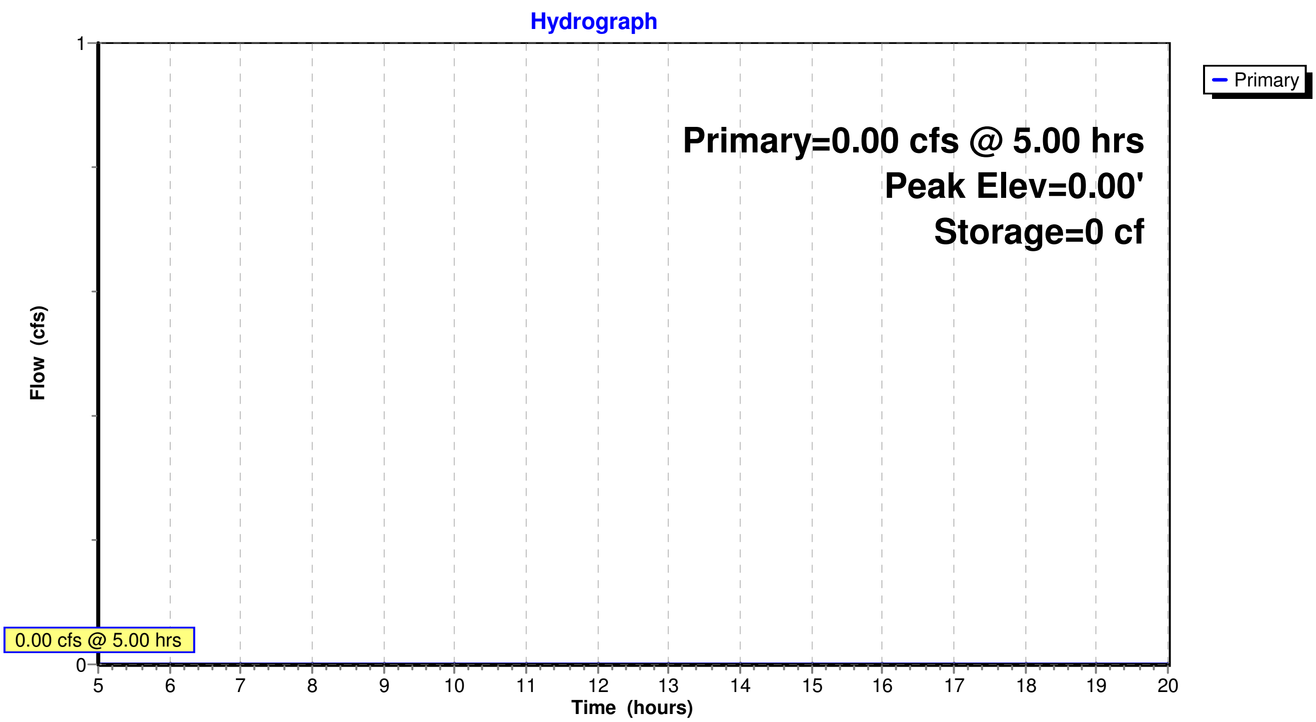
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	22,831 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	3,425	0	0
1.00	5,874	4,650	4,650
2.00	8,774	7,324	11,974
3.00	11,765	10,270	22,243
3.10	0	588	22,831

Device	Routing	Invert	Outlet Devices
#1	Primary	2.00'	**6.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=0.00' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Sed: Sediment Trap



Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.856	74	>75% Grass cover, Good, HSG C (PSC 1, PSC 4, PSC 5)
2.633	30	Brush, Good, HSG A (OSC 4)
7.201	65	Brush, Good, HSG C (OSC 2, OSC 4, PSC 1)
0.364	98	Paved parking & roofs (PSC 1, PSC 4, PSC 5)
0.047	98	Unconnected roofs, HSG A (OSC 4)
11.101	**59**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.681	HSG A	OSC 4
0.000	HSG B	
8.056	HSG C	OSC 2, OSC 4, PSC 1, PSC 4, PSC 5
0.000	HSG D	
0.364	Other	PSC 1, PSC 4, PSC 5
11.101		**TOTAL AREA**

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	0.856	0.000	0.000	0.856	>75% Grass cover, Good	PSC 1, PSC 4, PSC 5
2.633	0.000	7.201	0.000	0.000	9.834	Brush, Good	OSC 2, OSC 4, PSC 1
0.000	0.000	0.000	0.000	0.364	0.364	Paved parking & roofs	PSC 1, PSC 4, PSC 5
0.047	0.000	0.000	0.000	0.000	0.047	Unconnected roofs	OSC 4
2.681	**0.000**	**8.056**	**0.000**	**0.364**	**11.101**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	BR 1	1.00	0.50	197.0	0.0025	0.013	4.0	0.0	0.0
2	BR 4	2.75	2.50	157.0	0.0016	0.013	4.0	0.0	0.0
3	BR 5	1.00	0.50	219.0	0.0023	0.013	4.0	0.0	0.0

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 OSC 2: Off-Site Runoff Area=14,274 sf 0.00% Impervious Runoff Depth>2.04"
Flow Length=220' Tc=10.4 min CN=65 Runoff=1.09 cfs 0.056 af

Subcatchment OSC 4: Off-Site Runoff Area=403,901 sf 0.51% Impervious Runoff Depth>1.26"
Flow Length=1,275' Tc=32.4 min CN=55 Runoff=9.31 cfs 0.970 af

Subcatchment PSC 1: Proposed Runoff Area=37,170 sf 16.23% Impervious Runoff Depth>2.91"
Flow Length=327' Tc=10.3 min CN=75 Runoff=4.03 cfs 0.207 af

Subcatchment PSC 4: Proposed Runoff Area=17,938 sf 29.06% Impervious Runoff Depth>3.48"
Flow Length=327' Tc=10.3 min CN=81 Runoff=2.28 cfs 0.120 af

Subcatchment PSC 5: Proposed Runoff Area=10,292 sf 44.84% Impervious Runoff Depth>3.90"
Flow Length=83' Tc=2.8 min CN=85 Runoff=1.80 cfs 0.077 af

Reach DP 1: Design Point Summation 1 Inflow=10.79 cfs 1.389 af
Outflow=10.79 cfs 1.389 af

Reach DS: Diversion Swale Avg. Flow Depth=0.78' Max Vel=2.50 fps Inflow=9.31 cfs 0.970 af
n=0.030 L=318.0' S=0.0063 '/' Capacity=15.57 cfs Outflow=9.20 cfs 0.966 af

Pond BR 1: Bioretention Area 1 Peak Elev=4.38' Storage=2,203 cf Inflow=4.03 cfs 0.207 af
Primary=0.25 cfs 0.118 af Secondary=3.64 cfs 0.077 af Outflow=3.89 cfs 0.195 af

Pond BR 4: Bioretention Area 4 Peak Elev=4.26' Storage=1,631 cf Inflow=2.28 cfs 0.120 af
Primary=0.17 cfs 0.065 af Secondary=2.02 cfs 0.039 af Outflow=2.20 cfs 0.103 af

Pond BR 5: Bioretention Area 5 Peak Elev=4.16' Storage=1,390 cf Inflow=1.80 cfs 0.077 af
Primary=0.23 cfs 0.060 af Secondary=0.96 cfs 0.009 af Outflow=1.19 cfs 0.069 af

Pond Sed: Sediment Trap Peak Elev=0.00' Storage=0 cf
Primary=0.00 cfs 0.000 af

Total Runoff Area = 11.101 ac Runoff Volume = 1.429 af Average Runoff Depth = 1.54"
96.29% Pervious = 10.690 ac 3.71% Impervious = 0.411 ac

Summary for Subcatchment OSC 2: Off-Site Subcatchment 2

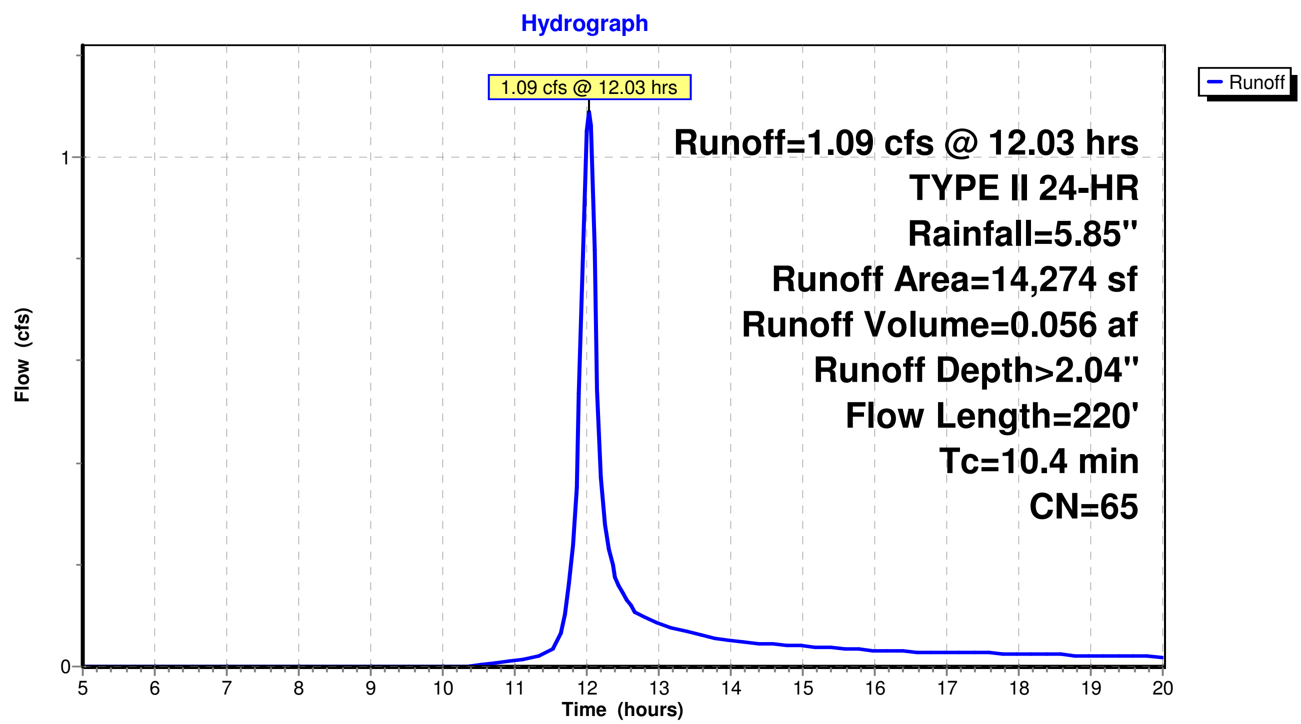
Runoff = 1.09 cfs @ 12.03 hrs, Volume= 0.056 af, Depth> 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=5.85"

Area (sf)	CN	Description
14,274	65	Brush, Good, HSG C
14,274		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0350	0.20		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
1.9	120	0.0050	1.06		**Shallow Concentrated Flow, Balance of Flow to Channel** Grassed Waterway Kv= 15.0 fps
10.4	220	Total			

Subcatchment OSC 2: Off-Site Subcatchment 2



Summary for Subcatchment OSC 4: Off-Site Subcatchment 4

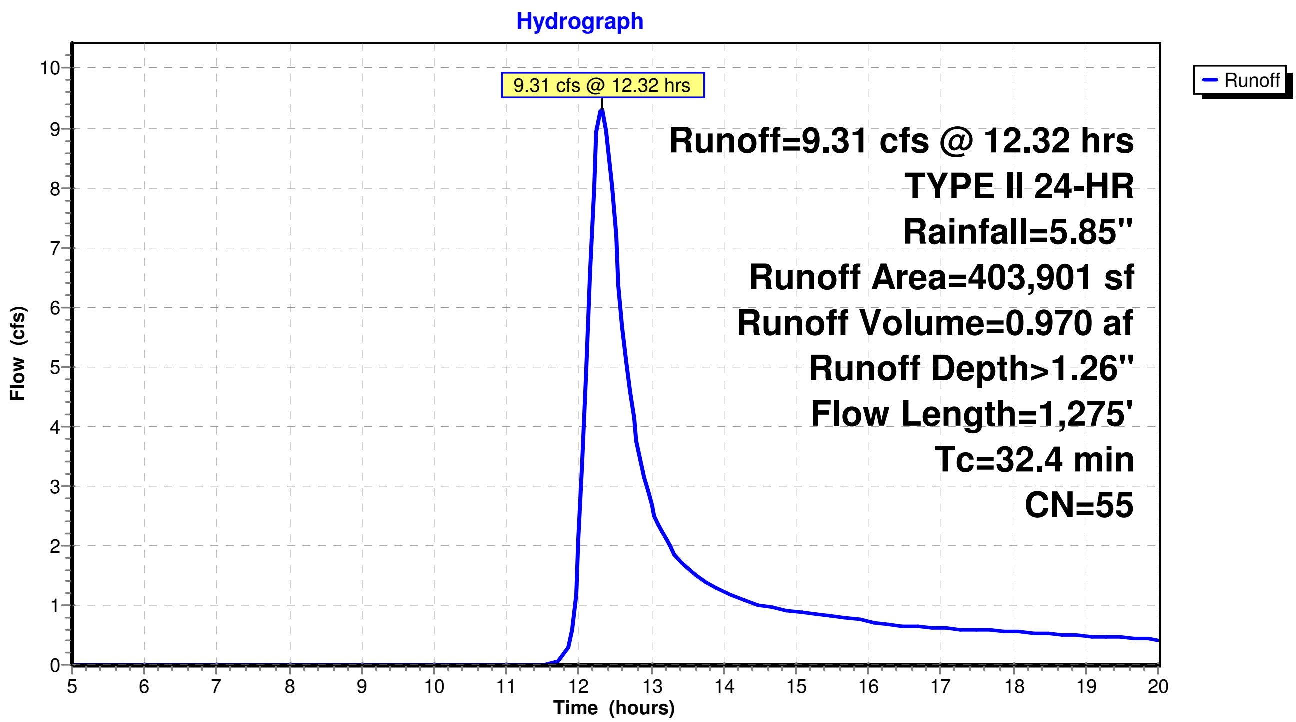
Runoff = 9.31 cfs @ 12.32 hrs, Volume= 0.970 af, Depth> 1.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=5.85"

Area (sf)	CN	Description
114,714	30	Brush, Good, HSG A
287,122	65	Brush, Good, HSG C
2,065	98	Unconnected roofs, HSG A
403,901	55	Weighted Average
401,836		99.49% Pervious Area
2,065		0.51% Impervious Area
2,065		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0100	0.08		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
11.9	1,175	0.0120	1.64		**Shallow Concentrated Flow, Balance of Flow** Grassed Waterway Kv= 15.0 fps
32.4	1,275	Total			

Subcatchment OSC 4: Off-Site Subcatchment 4



Summary for Subcatchment PSC 1: Proposed Subcatchment 1

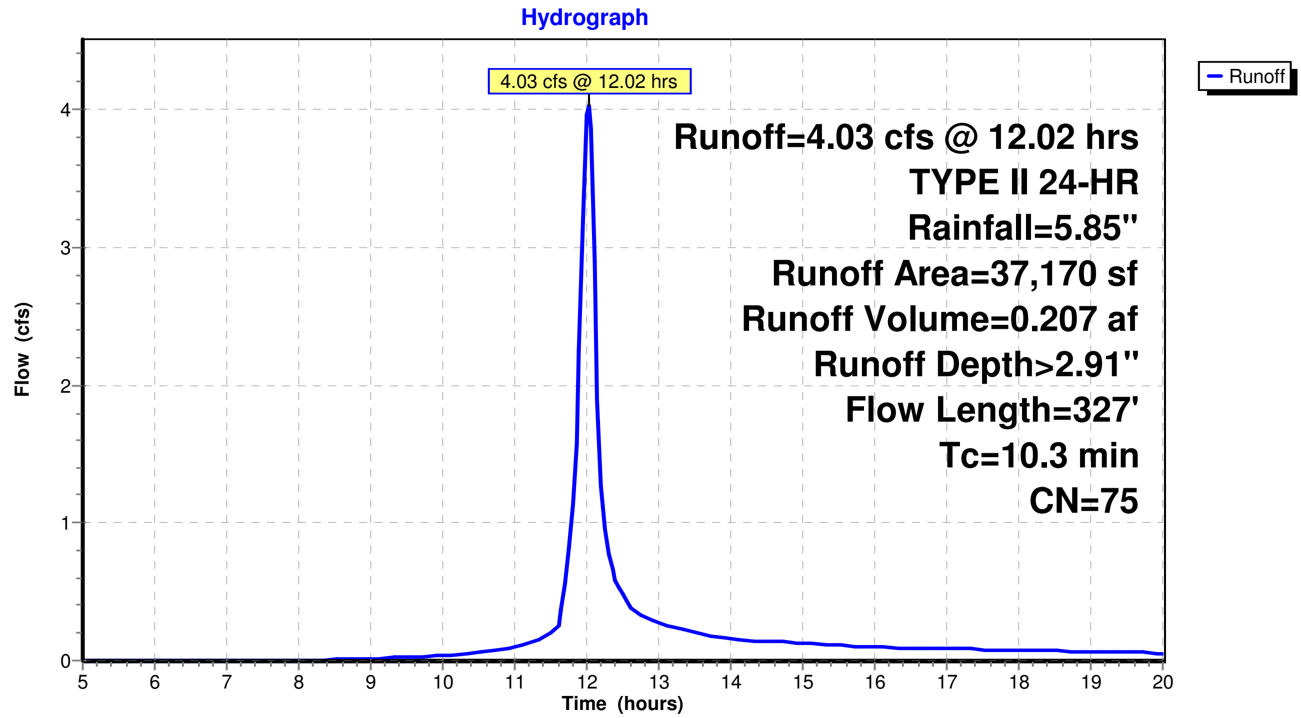
Runoff = 4.03 cfs @ 12.02 hrs, Volume= 0.207 af, Depth> 2.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=5.85"

Area (sf)	CN	Description
6,031	98	Paved parking & roofs
18,864	74	>75% Grass cover, Good, HSG C
12,275	65	Brush, Good, HSG C
37,170	75	Weighted Average
31,139		83.77% Pervious Area
6,031		16.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	100	0.0300	0.18		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
0.7	70	0.0140	1.77		**Shallow Concentrated Flow, Balance of Flow to Channel** Grassed Waterway Kv= 15.0 fps
0.5	157	0.0190	5.40	27.00	**Trap/Vee/Rect Channel Flow, Balance of Longest Flowpath** Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.027
10.3	327	Total			

Subcatchment PSC 1: Proposed Subcatchment 1



Summary for Subcatchment PSC 4: Proposed Subcatchment 4

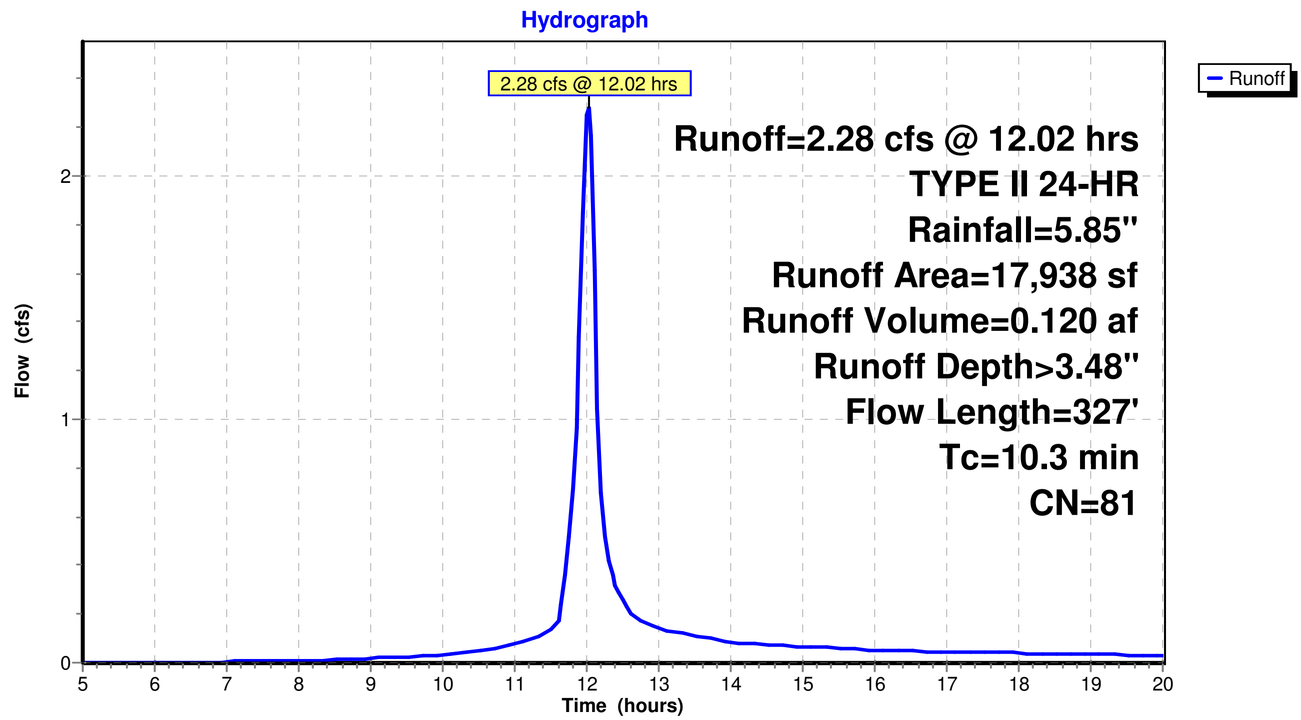
Runoff = 2.28 cfs @ 12.02 hrs, Volume= 0.120 af, Depth> 3.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=5.85"

Area (sf)	CN	Description
5,212	98	Paved parking & roofs
12,726	74	>75% Grass cover, Good, HSG C
17,938	81	Weighted Average
12,726		70.94% Pervious Area
5,212		29.06% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	100	0.0300	0.18		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
0.7	70	0.0140	1.77		**Shallow Concentrated Flow, Balance of Flow to Channel** Grassed Waterway Kv= 15.0 fps
0.5	157	0.0190	5.40	27.00	**Trap/Vee/Rect Channel Flow, Balance of Longest Flowpath** Bot.W=2.00' D=1.00' Z= 3.0 '/' Top.W=8.00' n= 0.027
10.3	327	Total			

Subcatchment PSC 4: Proposed Subcatchment 4



Summary for Subcatchment PSC 5: Proposed Subcatchment 5

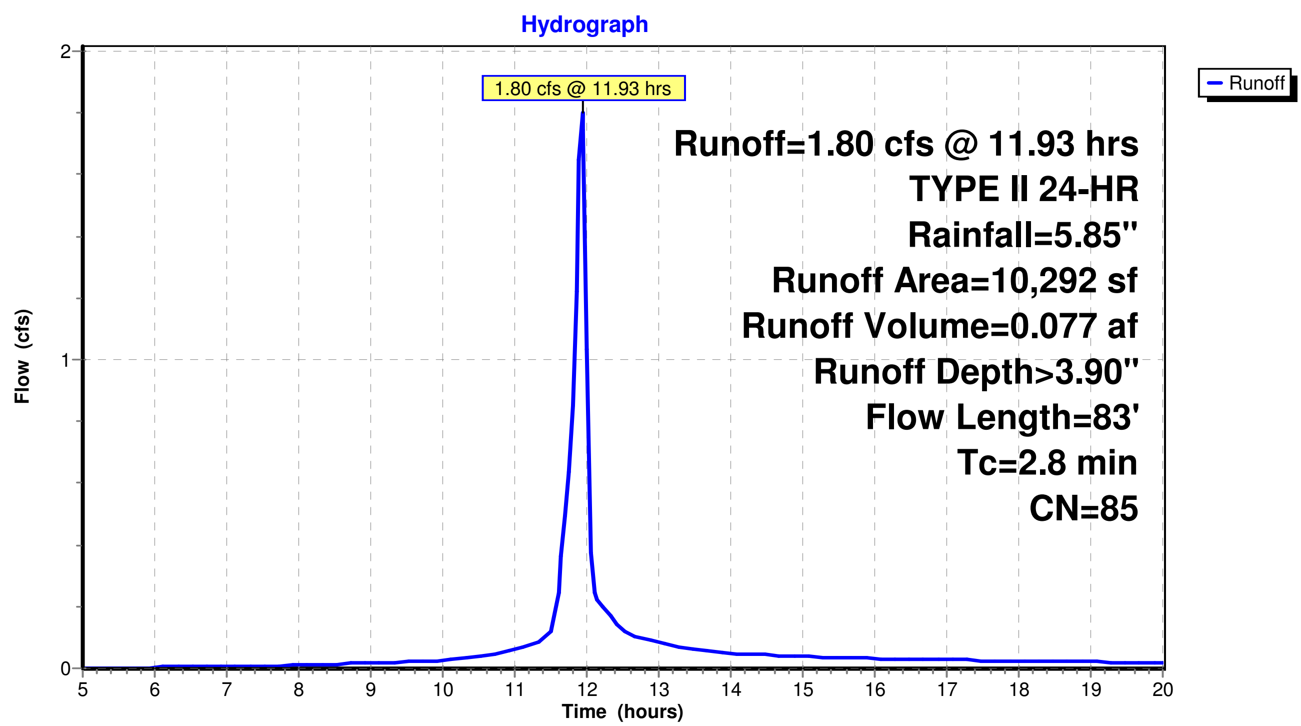
Runoff = 1.80 cfs @ 11.93 hrs, Volume= 0.077 af, Depth> 3.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=5.85"

Area (sf)	CN	Description
4,615	98	Paved parking & roofs
5,677	74	>75% Grass cover, Good, HSG C
10,292	85	Weighted Average
5,677		55.16% Pervious Area
4,615		44.84% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	23	0.0860	0.21		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
1.0	60	0.0140	0.99		**Sheet Flow, First 100' Flowpath** Smooth surfaces n= 0.011 P2= 2.70"
2.8	83	Total			

Subcatchment PSC 5: Proposed Subcatchment 5

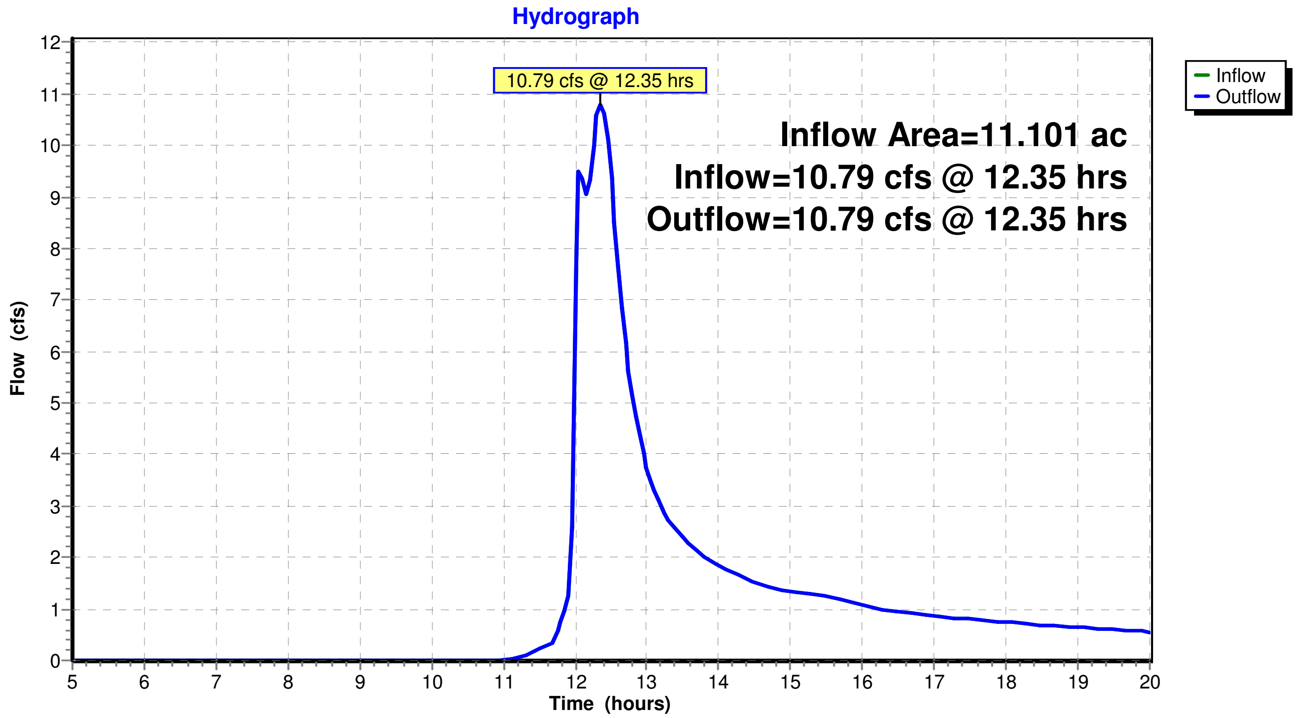


Summary for Reach DP 1: Design Point Summation 1

Inflow Area = 11.101 ac, 3.71% Impervious, Inflow Depth > 1.50"
Inflow = 10.79 cfs @ 12.35 hrs, Volume= 1.389 af
Outflow = 10.79 cfs @ 12.35 hrs, Volume= 1.389 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 DP 1: Design Point Summation 1



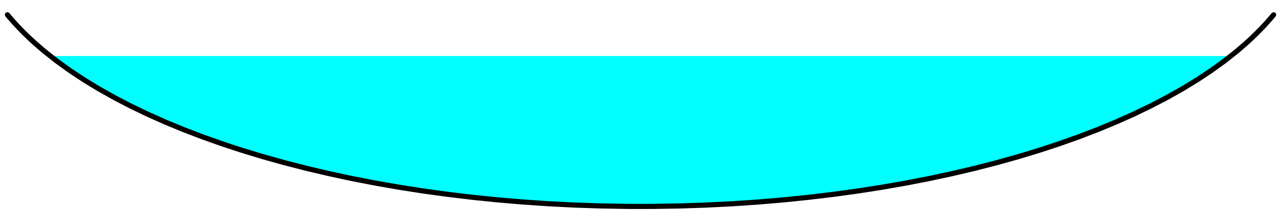
Summary for Reach DS: Diversion Swale

Inflow Area = 9.272 ac, 0.51% Impervious, Inflow Depth > 1.26"
Inflow = 9.31 cfs @ 12.32 hrs, Volume= 0.970 af
Outflow = 9.20 cfs @ 12.38 hrs, Volume= 0.966 af, Atten= 1%, Lag= 3.7 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.50 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 1.25 fps, Avg. Travel Time= 4.2 min

Peak Storage= 1,178 cf @ 12.34 hrs
Average Depth at Peak Storage= 0.78'
Bank-Full Depth= 1.00' Flow Area= 5.3 sf, Capacity= 15.57 cfs

8.00' x 1.00' deep Parabolic Channel, n= 0.030
Length= 318.0' Slope= 0.0063 '/'
Inlet Invert= 0.00', Outlet Invert= -2.00'



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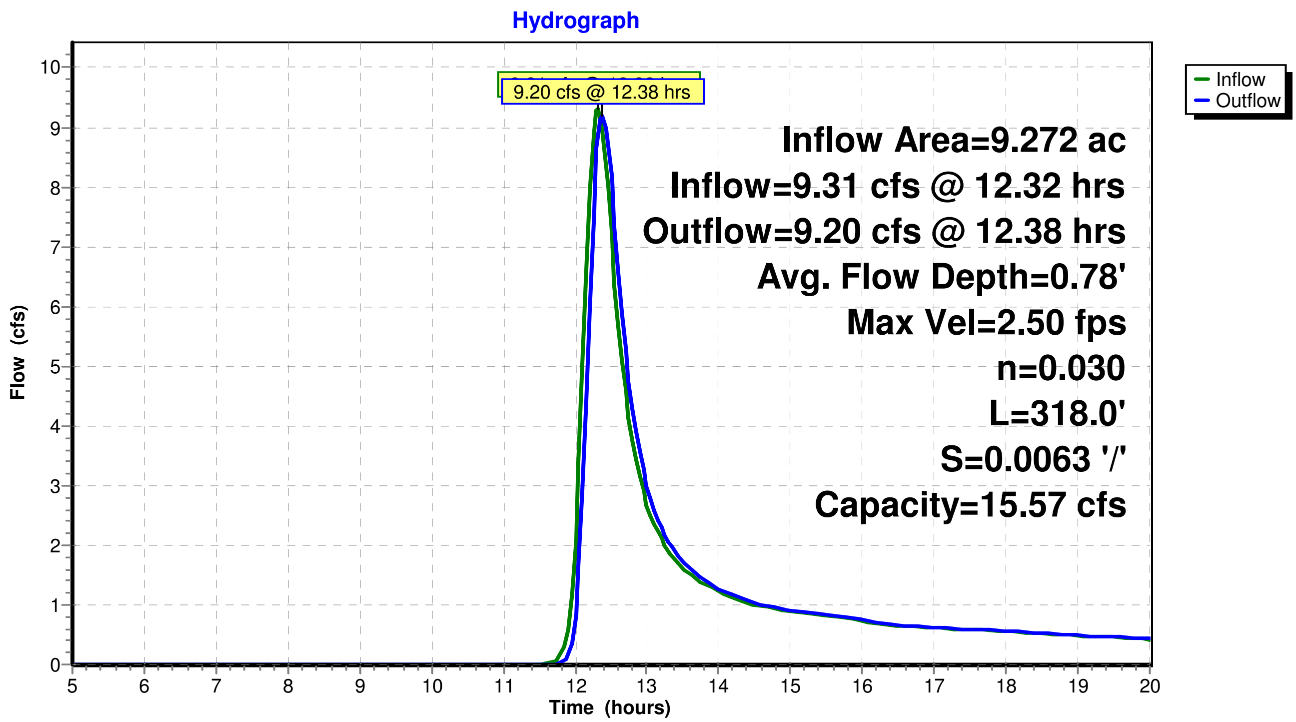
Reach DS: Diversion Swale



Summary for Pond BR 1: Bioretention Area 1

Inflow Area = 0.853 ac, 16.23% Impervious, Inflow Depth > 2.91"
Inflow = 4.03 cfs @ 12.02 hrs, Volume= 0.207 af
Outflow = 3.89 cfs @ 12.06 hrs, Volume= 0.195 af, Atten= 3%, Lag= 2.2 min
Primary = 0.25 cfs @ 12.06 hrs, Volume= 0.118 af
Secondary = 3.64 cfs @ 12.06 hrs, Volume= 0.077 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 4.38' @ 12.06 hrs Surf.Area= 1,598 sf Storage= 2,203 cf
Flood Elev= 5.00' Surf.Area= 0 sf Storage= 2,454 cf

Plug-Flow detention time= 61.9 min calculated for 0.195 af (94% of inflow)
Center-of-Mass det. time= 41.6 min (828.4 - 786.8)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2,454 cf	**Custom Stage Data (Prismatic)** Listed below

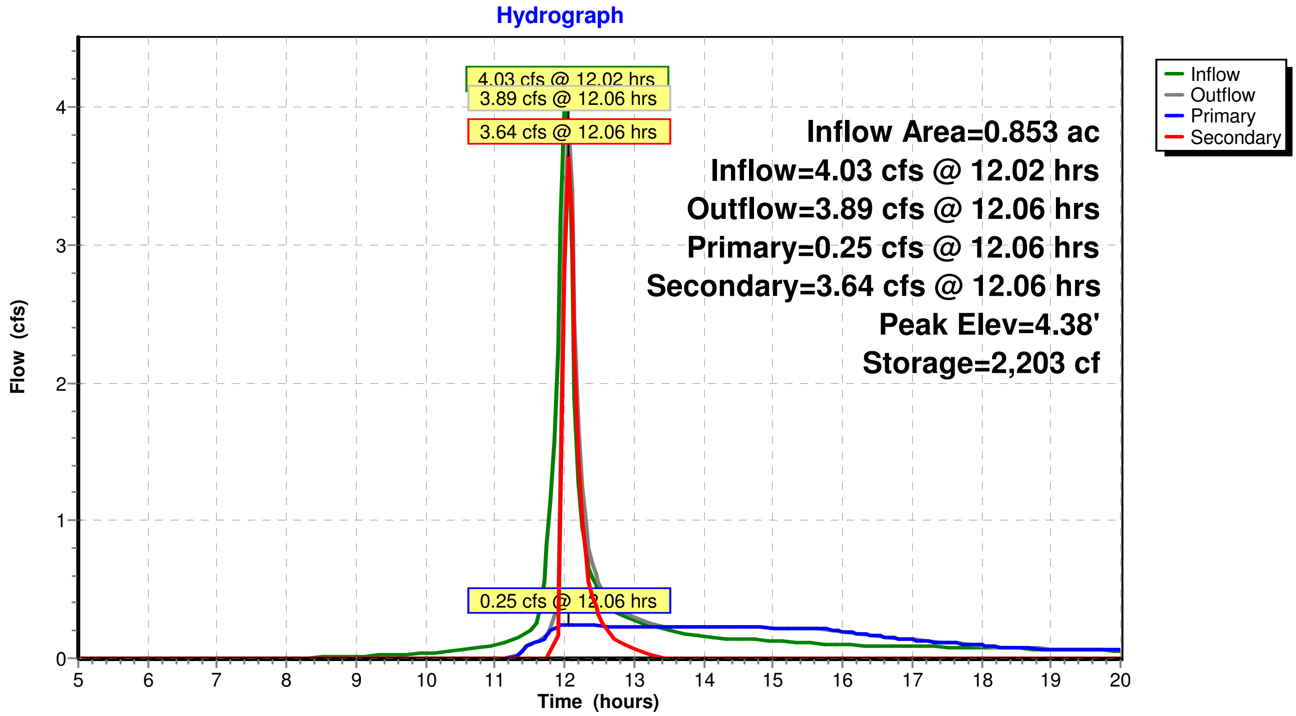
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	438	0	0
1.00	438	438	438
1.10	219	33	471
3.50	219	526	996
3.51	1,094	7	1,003
4.50	1,669	1,368	2,371
4.60	0	83	2,454

Device	Routing	Invert	Outlet Devices
#1	Secondary	4.00'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	1.00'	**4.0" Round Culvert** L= 197.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 1.00' / 0.50' S= 0.0025 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.25 cfs @ 12.06 hrs HW=4.37' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.25 cfs @ 2.82 fps)

Secondary OutFlow Max=3.56 cfs @ 12.06 hrs HW=4.37' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 3.56 cfs @ 1.59 fps)

Pond BR 1: Bioretention Area 1



Summary for Pond BR 4: Bioretention Area 4

Inflow Area = 0.412 ac, 29.06% Impervious, Inflow Depth > 3.48"
Inflow = 2.28 cfs @ 12.02 hrs, Volume= 0.120 af
Outflow = 2.20 cfs @ 12.06 hrs, Volume= 0.103 af, Atten= 4%, Lag= 2.5 min
Primary = 0.17 cfs @ 12.06 hrs, Volume= 0.065 af
Secondary = 2.02 cfs @ 12.06 hrs, Volume= 0.039 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 4.26' @ 12.06 hrs Surf.Area= 1,216 sf Storage= 1,631 cf
Flood Elev= 5.00' Surf.Area= 0 sf Storage= 1,963 cf

Plug-Flow detention time= 88.3 min calculated for 0.103 af (86% of inflow)
Center-of-Mass det. time= 47.0 min (822.1 - 775.1)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	1,963 cf	**Custom Stage Data (Prismatic)** Listed below

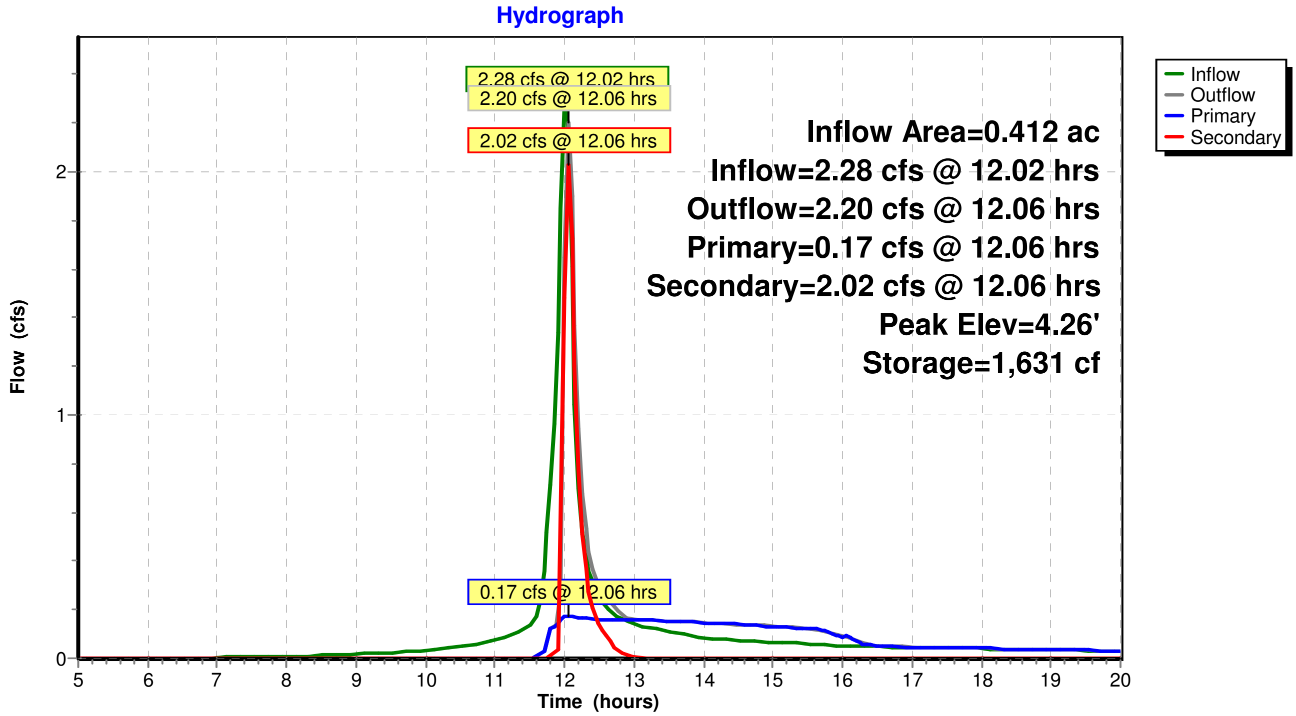
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	352	0	0
1.00	352	352	352
1.10	176	26	378
3.50	176	422	801
3.51	880	5	806
4.50	1,324	1,091	1,897
4.60	0	66	1,963

Device	Routing	Invert	Outlet Devices
#1	Secondary	4.00'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	2.75'	**4.0" Round Culvert** L= 157.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2.75' / 2.50' S= 0.0016 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.17 cfs @ 12.06 hrs HW=4.25' (Free Discharge)
↑**2=Culvert** (Barrel Controls 0.17 cfs @ 1.98 fps)

Secondary OutFlow Max=1.97 cfs @ 12.06 hrs HW=4.25' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 1.97 cfs @ 1.29 fps)

Pond BR 4: Bioretention Area 4



Summary for Pond BR 5: Bioretention Area 5

Inflow Area = 0.236 ac, 44.84% Impervious, Inflow Depth > 3.90"
Inflow = 1.80 cfs @ 11.93 hrs, Volume= 0.077 af
Outflow = 1.19 cfs @ 12.01 hrs, Volume= 0.069 af, Atten= 34%, Lag= 4.6 min
Primary = 0.23 cfs @ 12.01 hrs, Volume= 0.060 af
Secondary = 0.96 cfs @ 12.01 hrs, Volume= 0.009 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 4.16' @ 12.01 hrs Surf.Area= 1,111 sf Storage= 1,390 cf
Flood Elev= 5.00' Surf.Area= 0 sf Storage= 1,807 cf

Plug-Flow detention time= 85.2 min calculated for 0.069 af (90% of inflow)
Center-of-Mass det. time= 49.9 min (809.8 - 759.9)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	1,807 cf	**Custom Stage Data (Prismatic)** Listed below

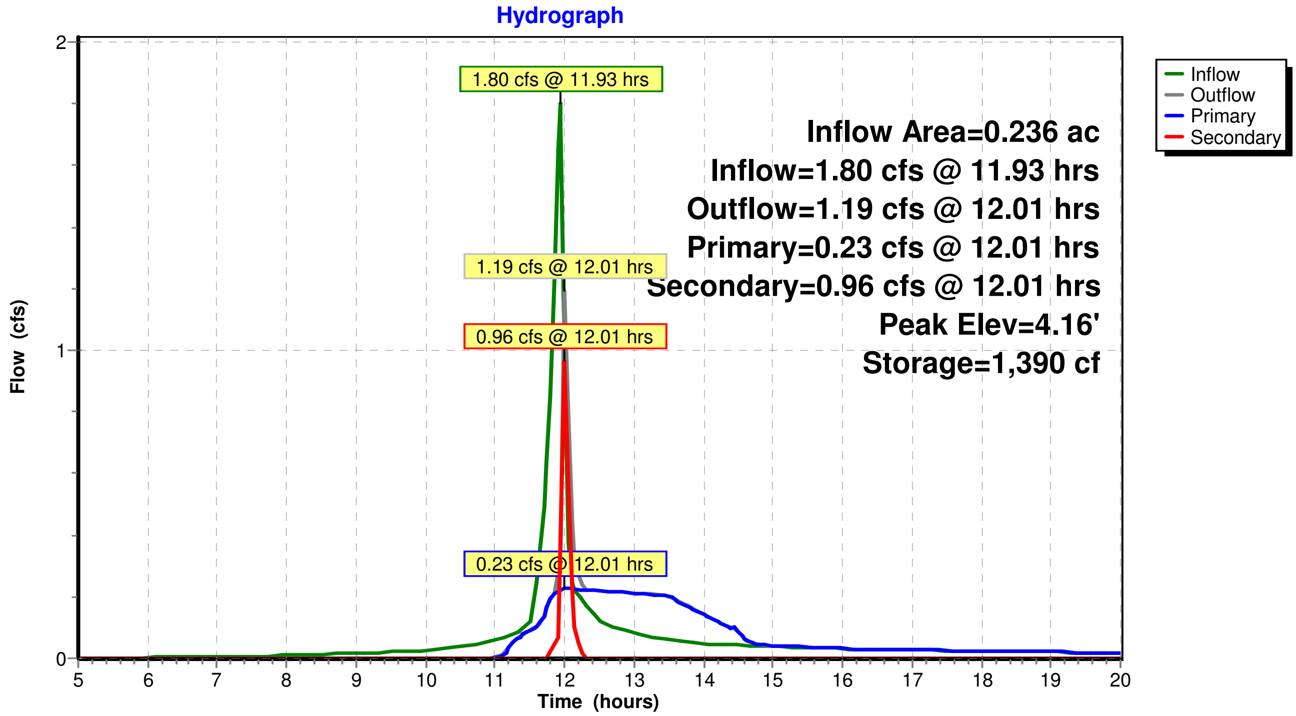
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	314	0	0
1.00	314	314	314
1.10	157	24	338
3.50	157	377	714
3.51	786	5	719
4.50	1,282	1,024	1,743
4.60	0	64	1,807

Device	Routing	Invert	Outlet Devices
#1	Secondary	4.00'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	1.00'	**4.0" Round Culvert** L= 219.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 1.00' / 0.50' S= 0.0023 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.23 cfs @ 12.01 hrs HW=4.15' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.23 cfs @ 2.60 fps)

Secondary OutFlow Max=0.88 cfs @ 12.01 hrs HW=4.15' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 0.88 cfs @ 0.98 fps)

Pond BR 5: Bioretention Area 5



Summary for Pond Sed: Sediment Trap

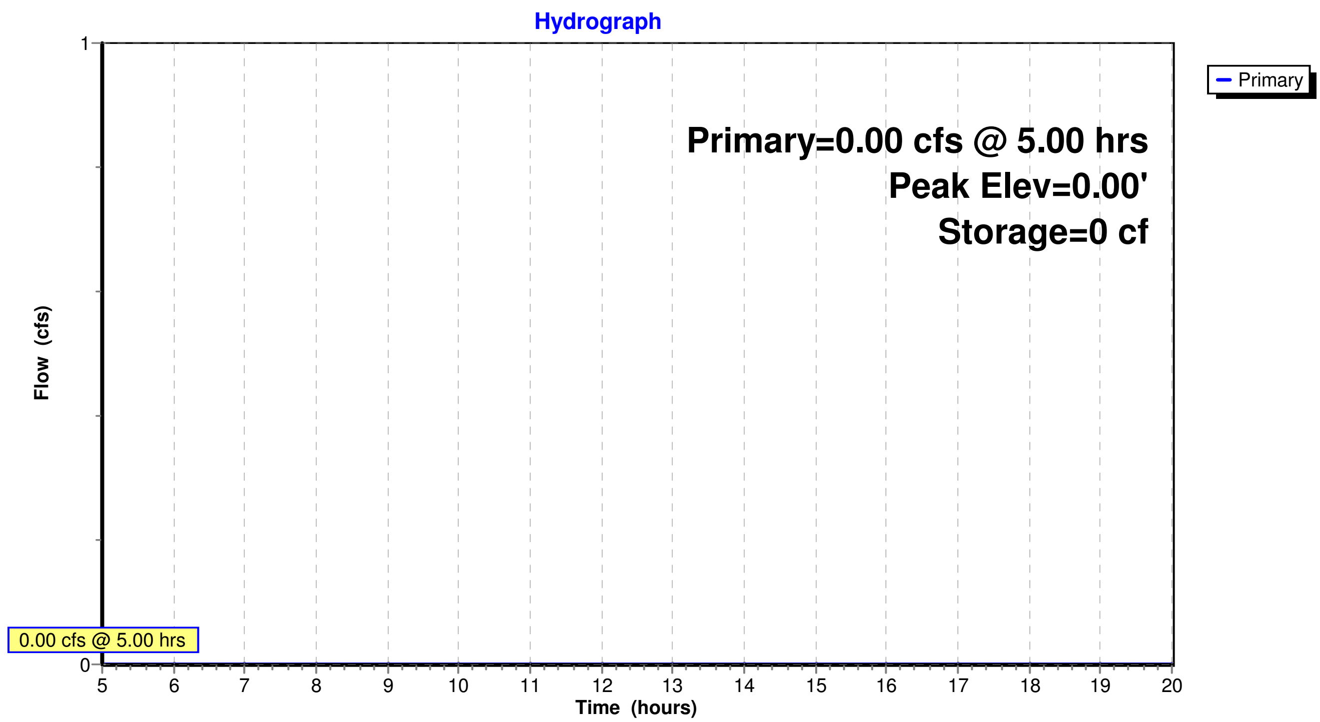
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	22,831 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

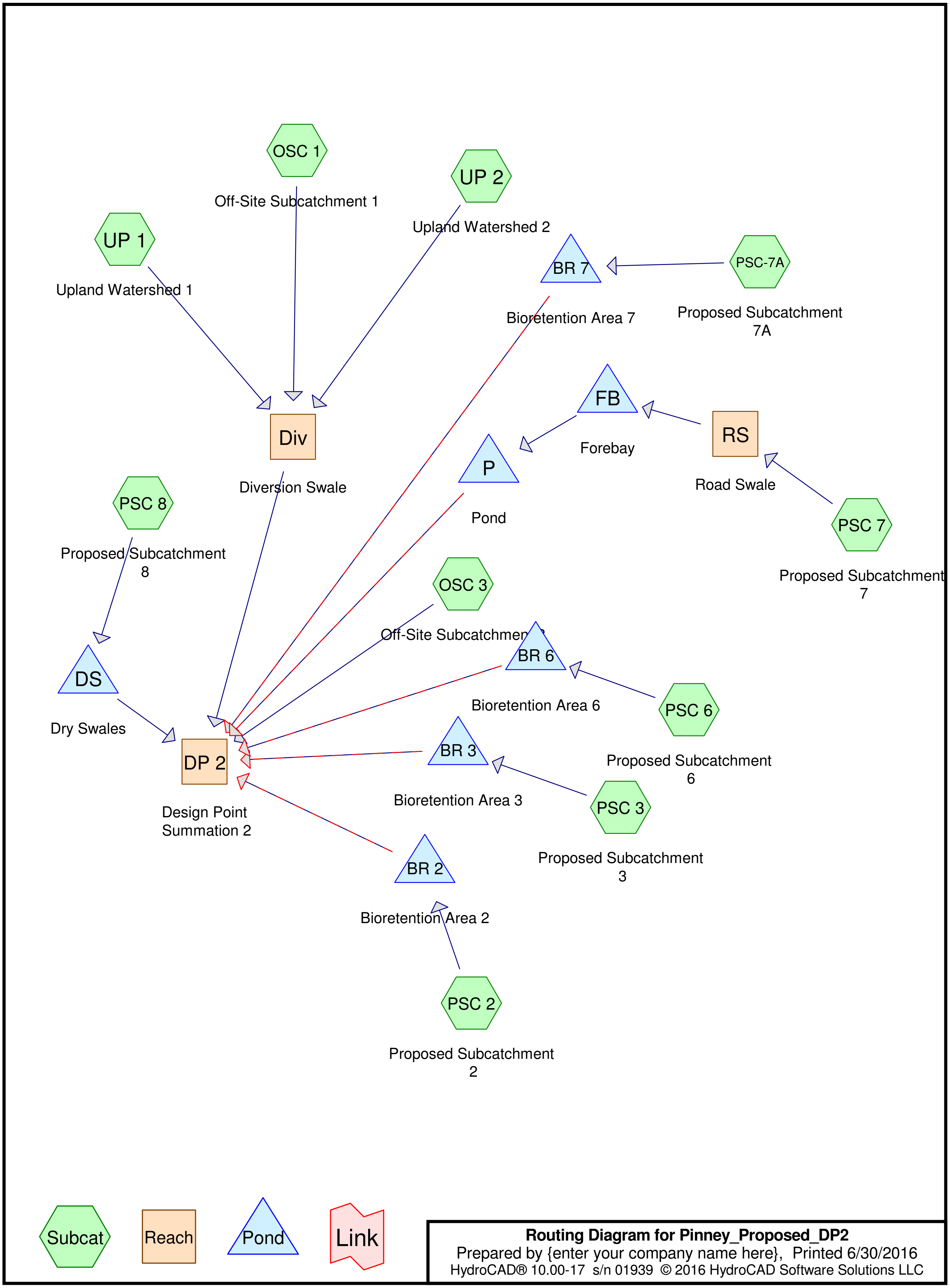
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	3,425	0	0
1.00	5,874	4,650	4,650
2.00	8,774	7,324	11,974
3.00	11,765	10,270	22,243
3.10	0	588	22,831

Device	Routing	Invert	Outlet Devices
#1	Primary	2.00'	**6.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=0.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Sed: Sediment Trap





Routing Diagram for Pinney_Proposed_DP2
Prepared by {enter your company name here}, Printed 6/30/2016
HydroCAD® 10.00-17 s/n 01939 © 2016 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.519	39	>75% Grass cover, Good, HSG A (PSC 7)
0.491	61	>75% Grass cover, Good, HSG B (PSC 7)
3.449	74	>75% Grass cover, Good, HSG C (PSC 2, PSC 3, PSC 6, PSC 7, PSC-7A)
2.435	30	Brush, Good, HSG A (OSC 3)
0.360	48	Brush, Good, HSG B (OSC 3)
21.522	65	Brush, Good, HSG C (OSC 1, OSC 3, PSC 7, PSC 8, UP 1, UP 2)
2.059	98	Paved parking & roofs (PSC 2, PSC 3, PSC 6, PSC 7, PSC 8)
0.046	98	Roofs, HSG C (PSC-7A)
0.035	98	Unconnected roofs, HSG A (OSC 3)
30.917	**65**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.989	HSG A	OSC 3, PSC 7
0.851	HSG B	OSC 3, PSC 7
25.018	HSG C	OSC 1, OSC 3, PSC 2, PSC 3, PSC 6, PSC 7, PSC 8, PSC-7A, UP 1, UP 2
0.000	HSG D	
2.059	Other	PSC 2, PSC 3, PSC 6, PSC 7, PSC 8
30.917		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.519	0.491	3.449	0.000	0.000	4.460	>75% Grass cover, Good	PSC 2, PSC 3, PSC 6, PSC 7, PSC-7A
2.435	0.360	21.522	0.000	0.000	24.317	Brush, Good	OSC 1, OSC 3, PSC 7, PSC 8, UP 1, UP 2
0.000	0.000	0.000	0.000	2.059	2.059	Paved parking & roofs	PSC 2, PSC 3, PSC 6, PSC 7, PSC 8
0.000	0.000	0.046	0.000	0.000	0.046	Roofs	PSC-7A
0.035	0.000	0.000	0.000	0.000	0.035	Unconnected roofs	OSC 3
2.989	**0.851**	**25.018**	**0.000**	**2.059**	**30.917**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	BR 2	2.00	1.50	177.0	0.0028	0.013	4.0	0.0	0.0
2	BR 3	2.00	1.50	57.0	0.0088	0.013	4.0	0.0	0.0
3	BR 6	2.50	2.00	132.0	0.0038	0.013	4.0	0.0	0.0
4	BR 7	2.00	1.50	57.0	0.0088	0.013	4.0	0.0	0.0
5	DS	0.00	-0.50	127.0	0.0039	0.013	4.0	0.0	0.0
6	P	0.00	-1.00	104.0	0.0096	0.013	12.0	0.0	0.0

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 OSC 1: Off-Site Runoff Area=143,197 sf 0.00% Impervious Runoff Depth>0.11"
Flow Length=2,079' Slope=0.0170 '/' Tc=4.6 min CN=65 Runoff=0.33 cfs 0.030 af

Subcatchment OSC 3: Off-Site Runoff Area=529,093 sf 0.28% Impervious Runoff Depth>0.03"
Flow Length=1,570' Tc=19.6 min CN=58 Runoff=0.05 cfs 0.026 af

Subcatchment PSC 2: Proposed Runoff Area=16,829 sf 34.86% Impervious Runoff Depth>0.58"
Flow Length=170' Tc=14.8 min CN=82 Runoff=0.31 cfs 0.019 af

Subcatchment PSC 3: Proposed Runoff Area=8,226 sf 24.51% Impervious Runoff Depth>0.50"
Flow Length=146' Tc=8.0 min CN=80 Runoff=0.17 cfs 0.008 af

Subcatchment PSC 6: Proposed Runoff Area=12,258 sf 31.15% Impervious Runoff Depth>0.54"
Flow Length=49' Tc=4.1 min CN=81 Runoff=0.31 cfs 0.013 af

Subcatchment PSC 7: Proposed Runoff Area=366,995 sf 20.46% Impervious Runoff Depth>0.27"
Flow Length=1,566' Tc=25.5 min CN=73 Runoff=1.83 cfs 0.193 af

Subcatchment PSC 8: Proposed Runoff Area=5,995 sf 48.99% Impervious Runoff Depth>0.54"
Flow Length=148' Slope=0.0500 '/' Tc=1.1 min CN=81 Runoff=0.16 cfs 0.006 af

Subcatchment PSC-7A: Proposed Runoff Area=5,604 sf 35.97% Impervious Runoff Depth>0.63"
Flow Length=35' Slope=0.0100 '/' Tc=0.8 min CN=83 Runoff=0.18 cfs 0.007 af

Subcatchment UP 1: Upland Watershed 1 Runoff Area=187,023 sf 0.00% Impervious Runoff Depth>0.11"
Flow Length=557' Tc=15.0 min CN=65 Runoff=0.23 cfs 0.039 af

Subcatchment UP 2: Upland Watershed 2 Runoff Area=71,533 sf 0.00% Impervious Runoff Depth>0.11"
Flow Length=410' Slope=0.0300 '/' Tc=14.5 min CN=65 Runoff=0.09 cfs 0.015 af

Reach Div: Diversion Swale Avg. Flow Depth=0.14' Max Vel=1.32 fps Inflow=0.44 cfs 0.084 af
n=0.030 L=2,079.0' S=0.0168 '/' Capacity=75.76 cfs Outflow=0.27 cfs 0.078 af

Reach DP 2: Design Point Summation 2 Inflow=0.32 cfs 0.136 af
Outflow=0.32 cfs 0.136 af

Reach RS: Road Swale Avg. Flow Depth=0.28' Max Vel=2.43 fps Inflow=1.83 cfs 0.193 af
n=0.027 L=1,232.0' S=0.0187 '/' Capacity=56.90 cfs Outflow=1.56 cfs 0.189 af

Pond BR 2: Bioretention Area 2 Peak Elev=2.09' Storage=688 cf Inflow=0.31 cfs 0.019 af
Primary=0.01 cfs 0.003 af Secondary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.003 af

Pond BR 3: Bioretention Area 3 Peak Elev=2.04' Storage=306 cf Inflow=0.17 cfs 0.008 af
Primary=0.00 cfs 0.001 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.001 af

Pond BR 6: Bioretention Area 6 Peak Elev=2.62' Storage=330 cf Inflow=0.31 cfs 0.013 af
Primary=0.02 cfs 0.005 af Secondary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.005 af

Pond BR 7: Bioretention Area 7 Peak Elev=1.92' Storage=294 cf Inflow=0.18 cfs 0.007 af
Primary=0.00 cfs 0.000 af Secondary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond DS: Dry Swales Peak Elev=0.35' Storage=49 cf Inflow=0.16 cfs 0.006 af
Outflow=0.12 cfs 0.006 af

Pond FB: Forebay Peak Elev=4.17' Storage=2,928 cf Inflow=1.56 cfs 0.189 af
Outflow=1.03 cfs 0.122 af

Pond P: Pond Peak Elev=4.47' Storage=10,418 cf Inflow=1.03 cfs 0.122 af
Primary=0.04 cfs 0.017 af Secondary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.017 af

Total Runoff Area = 30.917 ac Runoff Volume = 0.356 af Average Runoff Depth = 0.14"
93.08% Pervious = 28.777 ac 6.92% Impervious = 2.140 ac

Summary for Subcatchment OSC 1: Off-Site Subcatchment 1

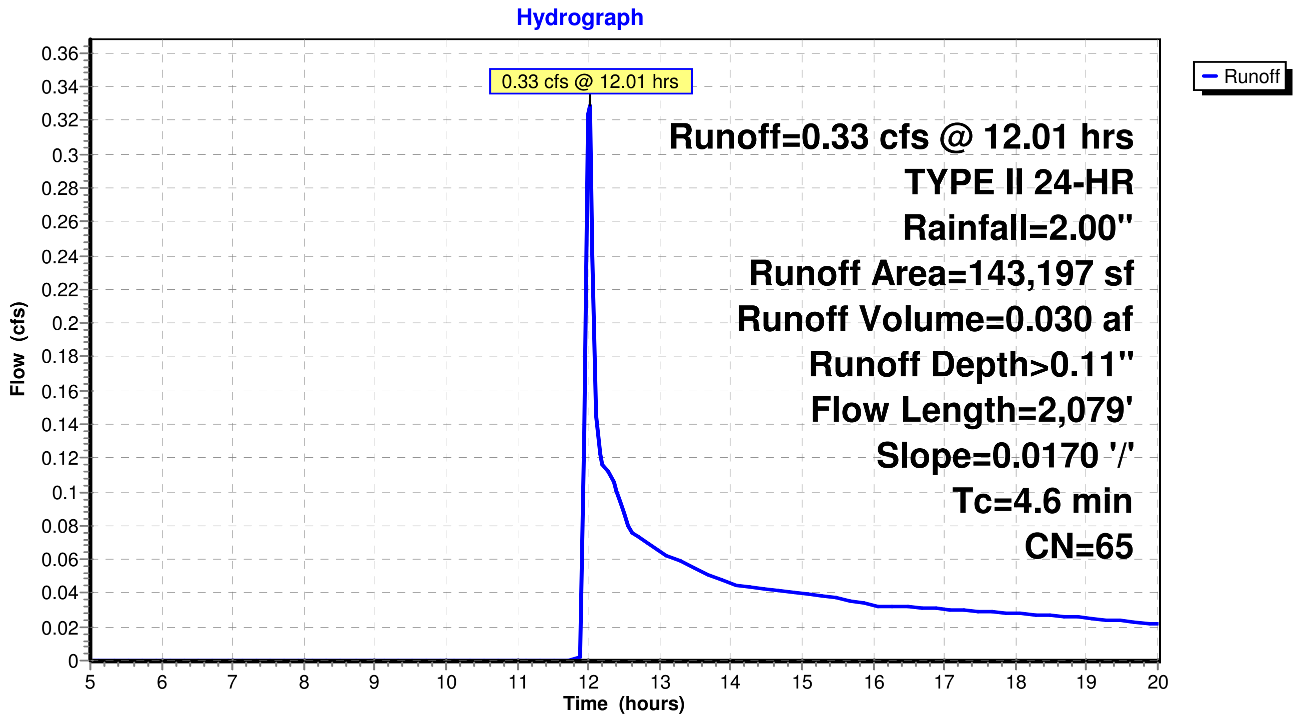
Runoff = 0.33 cfs @ 12.01 hrs, Volume= 0.030 af, Depth> 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=2.00"

Area (sf)	CN	Description
143,197	65	Brush, Good, HSG C
143,197		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	2,079	0.0170	7.61	121.77	**Trap/Vee/Rect Channel Flow, Balance of Longest Flowpath** Bot.W=2.00' D=2.00' Z= 3.0 '/' Top.W=14.00' n= 0.027

Subcatchment OSC 1: Off-Site Subcatchment 1



Summary for Subcatchment OSC 3: Off-Site Subcatchment 3

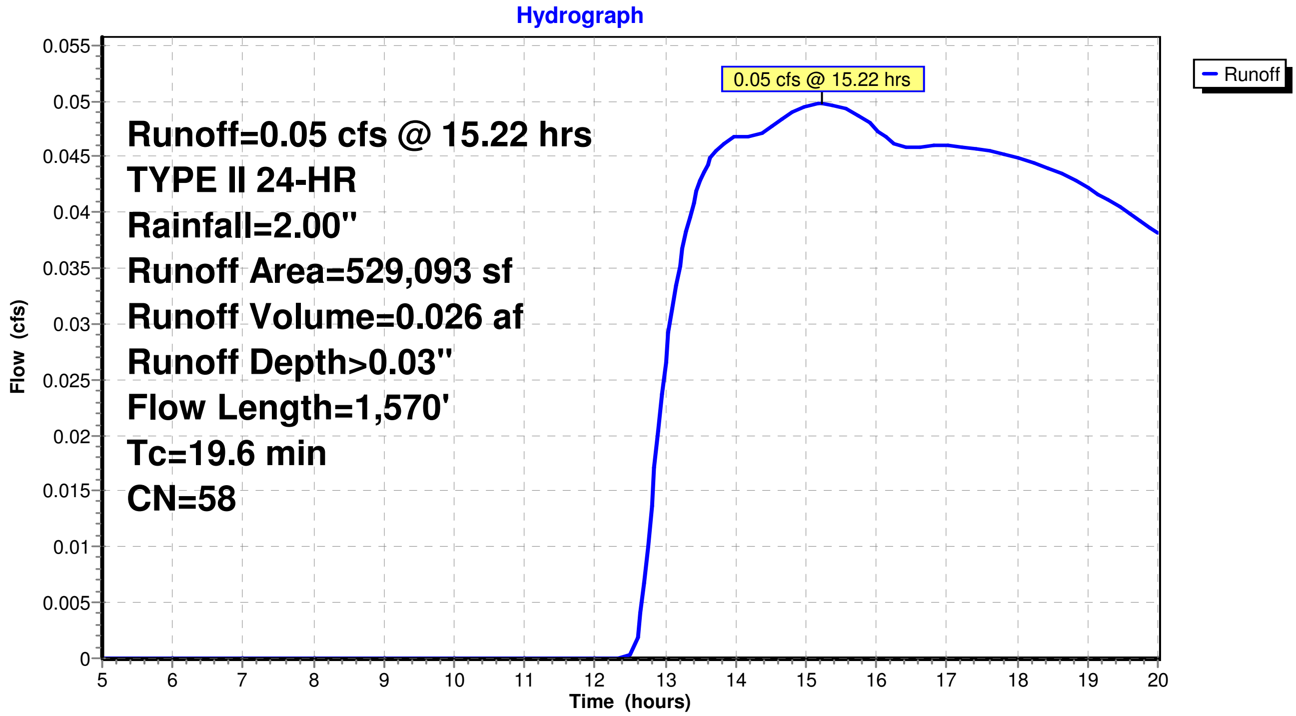
Runoff = 0.05 cfs @ 15.22 hrs, Volume= 0.026 af, Depth> 0.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=2.00"

Area (sf)	CN	Description
106,079	30	Brush, Good, HSG A
15,682	48	Brush, Good, HSG B
405,827	65	Brush, Good, HSG C
1,505	98	Unconnected roofs, HSG A
529,093	58	Weighted Average
527,588		99.72% Pervious Area
1,505		0.28% Impervious Area
1,505		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	100	0.0400	0.14		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
6.8	1,064	0.0300	2.60		**Shallow Concentrated Flow, Balance of Flow to Channel** Grassed Waterway Kv= 15.0 fps
1.0	406	0.0110	6.52	130.46	**Trap/Vee/Rect Channel Flow, Balance of Flowpath** Bot.W=4.00' D=2.00' Z= 3.0 '/' Top.W=16.00' n= 0.027
19.6	1,570	Total			

Subcatchment OSC 3: Off-Site Subcatchment 3



Summary for Subcatchment PSC 2: Proposed Subcatchment 2

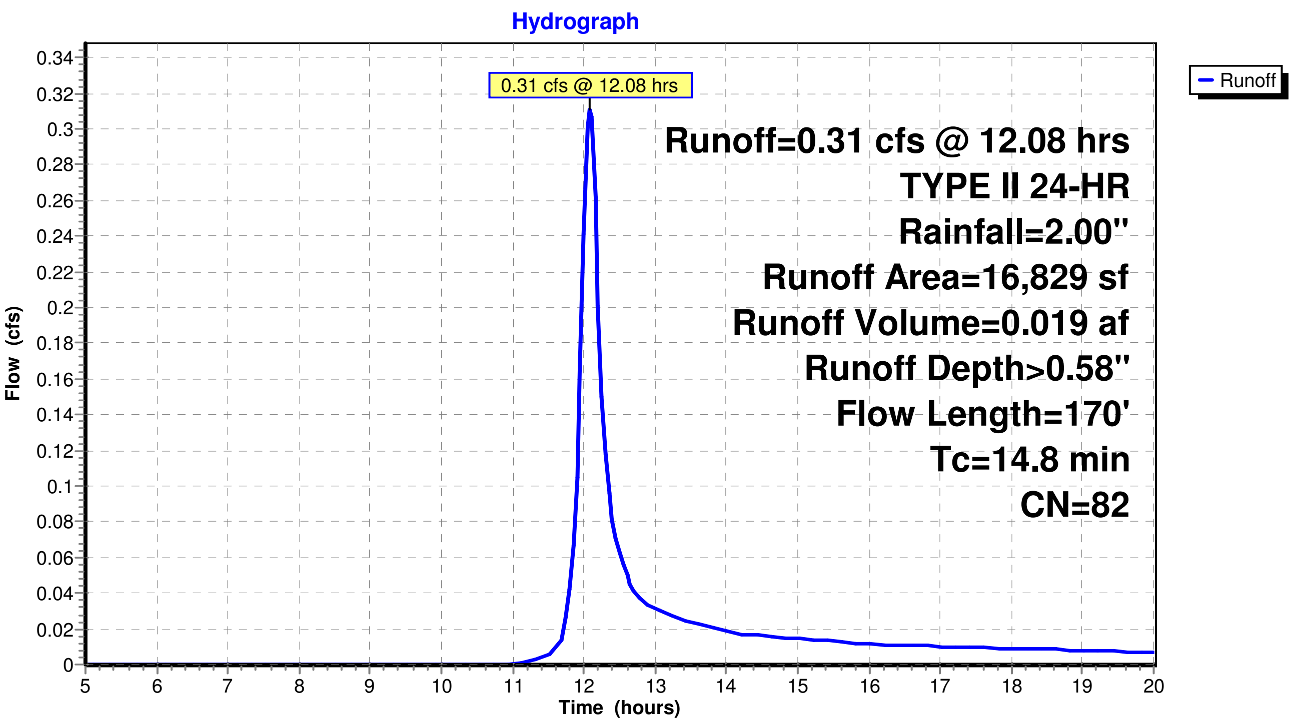
Runoff = 0.31 cfs @ 12.08 hrs, Volume= 0.019 af, Depth> 0.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=2.00"

Area (sf)	CN	Description
5,866	98	Paved parking & roofs
10,963	74	>75% Grass cover, Good, HSG C
16,829	82	Weighted Average
10,963		65.14% Pervious Area
5,866		34.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0100	0.12		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
0.6	65	0.0070	1.70		**Shallow Concentrated Flow, Balance of Flow to Channel** Paved Kv= 20.3 fps
0.1	5	0.0070	1.25		**Shallow Concentrated Flow, Balance of Longest Flowpath** Grassed Waterway Kv= 15.0 fps
14.8	170	Total			

Subcatchment PSC 2: Proposed Subcatchment 2



Summary for Subcatchment PSC 3: Proposed Subcatchment 3

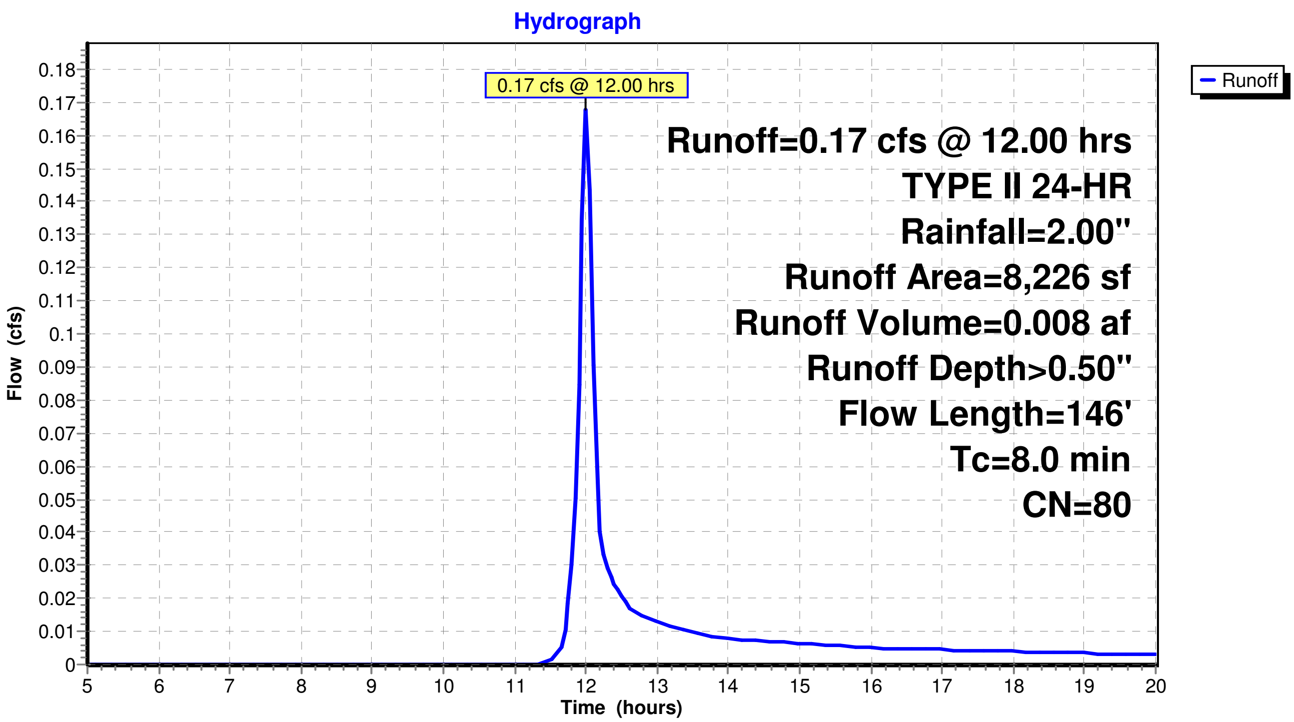
Runoff = 0.17 cfs @ 12.00 hrs, Volume= 0.008 af, Depth> 0.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=2.00"

Area (sf)	CN	Description
2,016	98	Paved parking & roofs
6,210	74	>75% Grass cover, Good, HSG C
8,226	80	Weighted Average
6,210		75.49% Pervious Area
2,016		24.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	76	0.0300	0.17		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
0.6	65	0.0070	1.70		**Shallow Concentrated Flow, Balance of Flow to Channel** Paved Kv= 20.3 fps
0.1	5	0.0070	1.25		**Shallow Concentrated Flow, Balance of Longest Flowpath** Grassed Waterway Kv= 15.0 fps
8.0	146	Total			

Subcatchment PSC 3: Proposed Subcatchment 3



Summary for Subcatchment PSC 6: Proposed Subcatchment 6

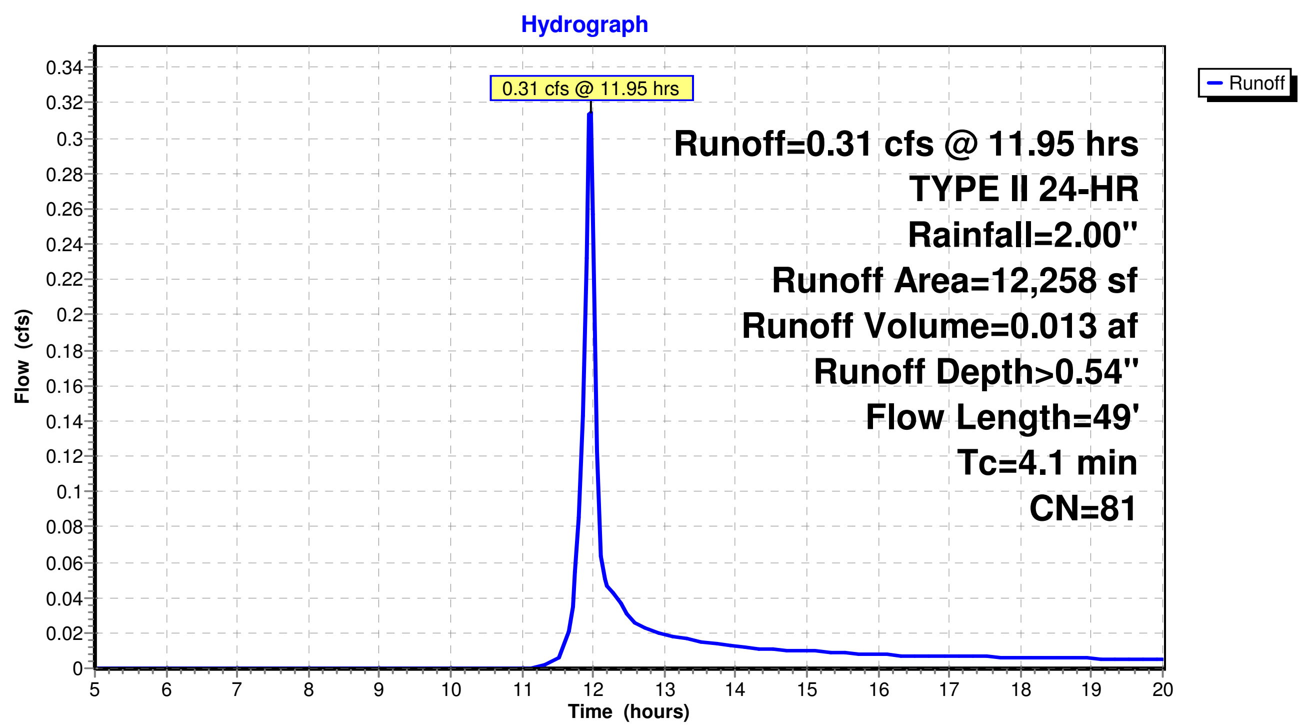
Runoff = 0.31 cfs @ 11.95 hrs, Volume= 0.013 af, Depth> 0.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=2.00"

Area (sf)	CN	Description
3,818	98	Paved parking & roofs
8,440	74	>75% Grass cover, Good, HSG C
12,258	81	Weighted Average
8,440		68.85% Pervious Area
3,818		31.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	23	0.0200	0.12		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
0.8	26	0.0050	0.55		**Sheet Flow, Balance of Longest Flowpath** Smooth surfaces n= 0.011 P2= 2.70"
4.1	49	Total			

Subcatchment PSC 6: Proposed Subcatchment 6



Summary for Subcatchment PSC 7: Proposed Subcatchment 7

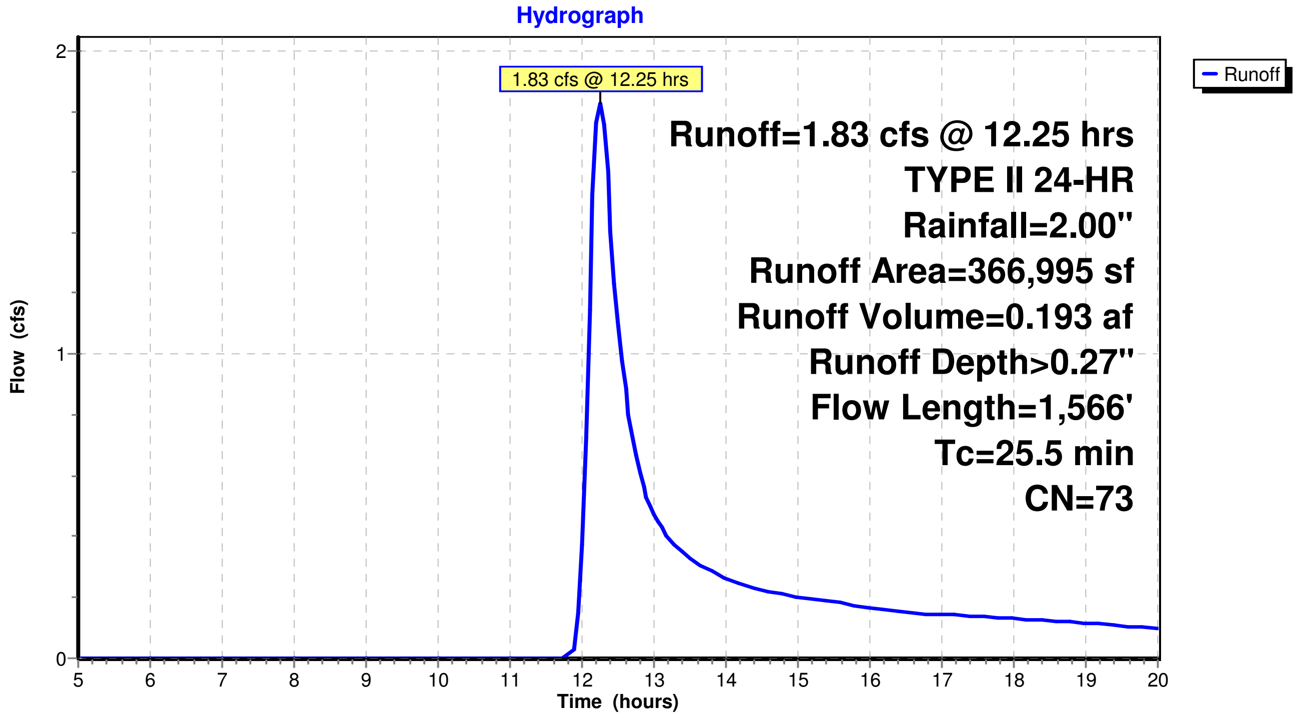
Runoff = 1.83 cfs @ 12.25 hrs, Volume= 0.193 af, Depth> 0.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=2.00"

Area (sf)	CN	Description
10,696	98	Paved parking & roofs
22,613	39	>75% Grass cover, Good, HSG A
14,492	98	Paved parking & roofs
21,401	61	>75% Grass cover, Good, HSG B
31,721	98	Paved parking & roofs
18,164	98	Paved parking & roofs
121,053	74	>75% Grass cover, Good, HSG C
126,855	65	Brush, Good, HSG C
366,995	73	Weighted Average
291,922		79.54% Pervious Area
75,073		20.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0100	0.08		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
2.5	350	0.0240	2.32		**Shallow Concentrated Flow, Balance of Flow to Road** Grassed Waterway Kv= 15.0 fps
0.1	16	0.0100	2.03		**Shallow Concentrated Flow, Balance of Flow to Swale** Paved Kv= 20.3 fps
2.4	1,100	0.0170	7.61	121.77	**Trap/Vee/Rect Channel Flow, Balance of Longest Flowpath** Bot.W=2.00' D=2.00' Z= 3.0 '/' Top.W=14.00' n= 0.027
25.5	1,566	Total			

Subcatchment PSC 7: Proposed Subcatchment 7



Summary for Subcatchment PSC 8: Proposed Subcatchment 8

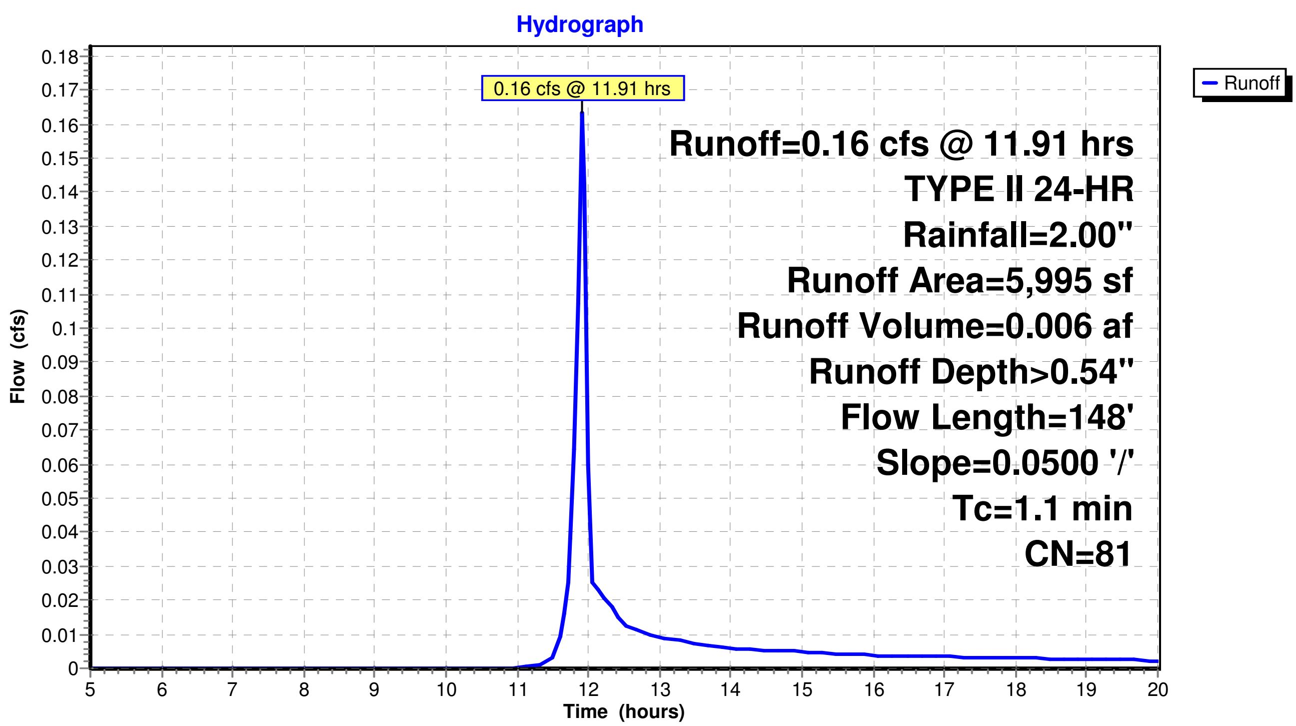
Runoff = 0.16 cfs @ 11.91 hrs, Volume= 0.006 af, Depth> 0.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=2.00"

Area (sf)	CN	Description
2,937	98	Paved parking & roofs
3,058	65	Brush, Good, HSG C
5,995	81	Weighted Average
3,058		51.01% Pervious Area
2,937		48.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	100	0.0500	1.82		**Sheet Flow, First 100' Flowpath** Smooth surfaces n= 0.011 P2= 2.70"
0.2	48	0.0500	4.54		**Shallow Concentrated Flow, Balance of Flow to Channel** Paved Kv= 20.3 fps
1.1	148	Total			

Subcatchment PSC 8: Proposed Subcatchment 8



Summary for Subcatchment PSC-7A: Proposed Subcatchment 7A

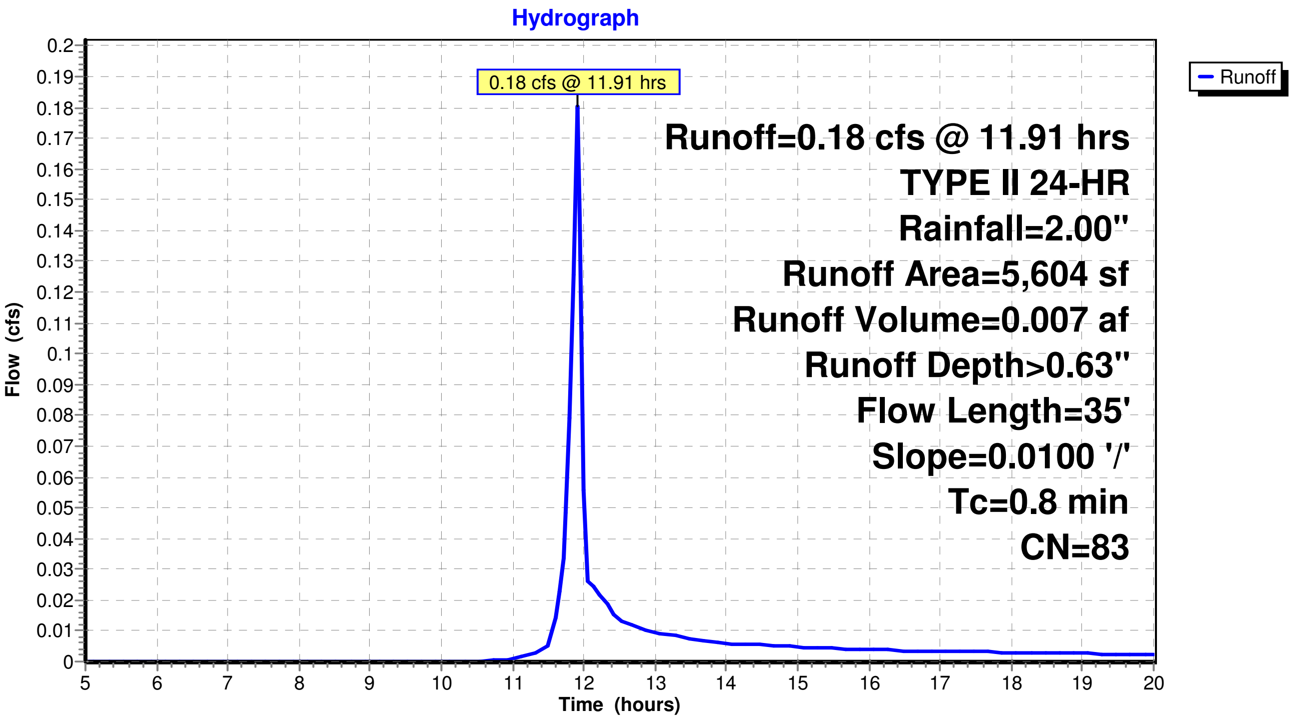
Runoff = 0.18 cfs @ 11.91 hrs, Volume= 0.007 af, Depth> 0.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=2.00"

Area (sf)	CN	Description
3,588	74	>75% Grass cover, Good, HSG C
2,016	98	Roofs, HSG C
5,604	83	Weighted Average
3,588		64.03% Pervious Area
2,016		35.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	35	0.0100	0.78		**Sheet Flow, Balance of Longest Flowpath** Smooth surfaces n= 0.011 P2= 2.70"

Subcatchment PSC-7A: Proposed Subcatchment 7A



Summary for Subcatchment UP 1: Upland Watershed 1

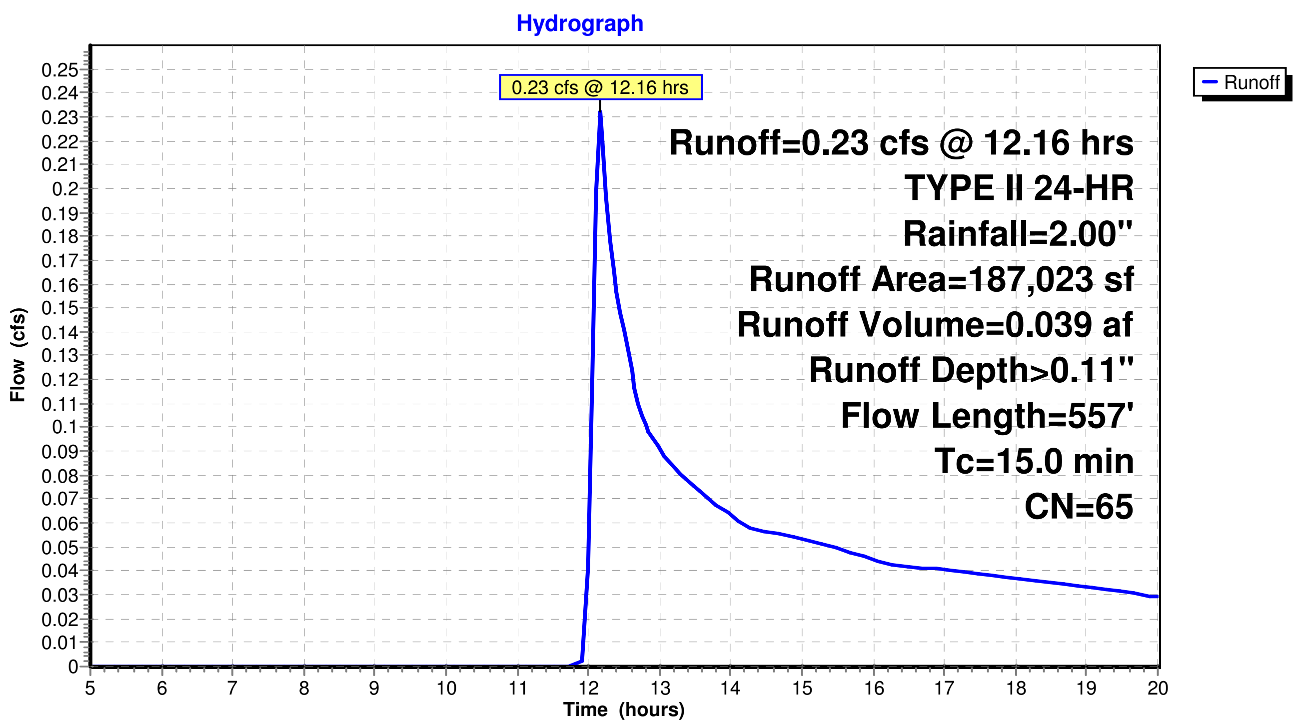
Runoff = 0.23 cfs @ 12.16 hrs, Volume= 0.039 af, Depth> 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=2.00"

Area (sf)	CN	Description
187,023	65	Brush, Good, HSG C
187,023		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	100	0.0360	0.14		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
2.7	457	0.0350	2.81		**Shallow Concentrated Flow, Balance of Longest Flowpath** Grassed Waterway Kv= 15.0 fps
15.0	557	Total			

Subcatchment UP 1: Upland Watershed 1



Summary for Subcatchment UP 2: Upland Watershed 2

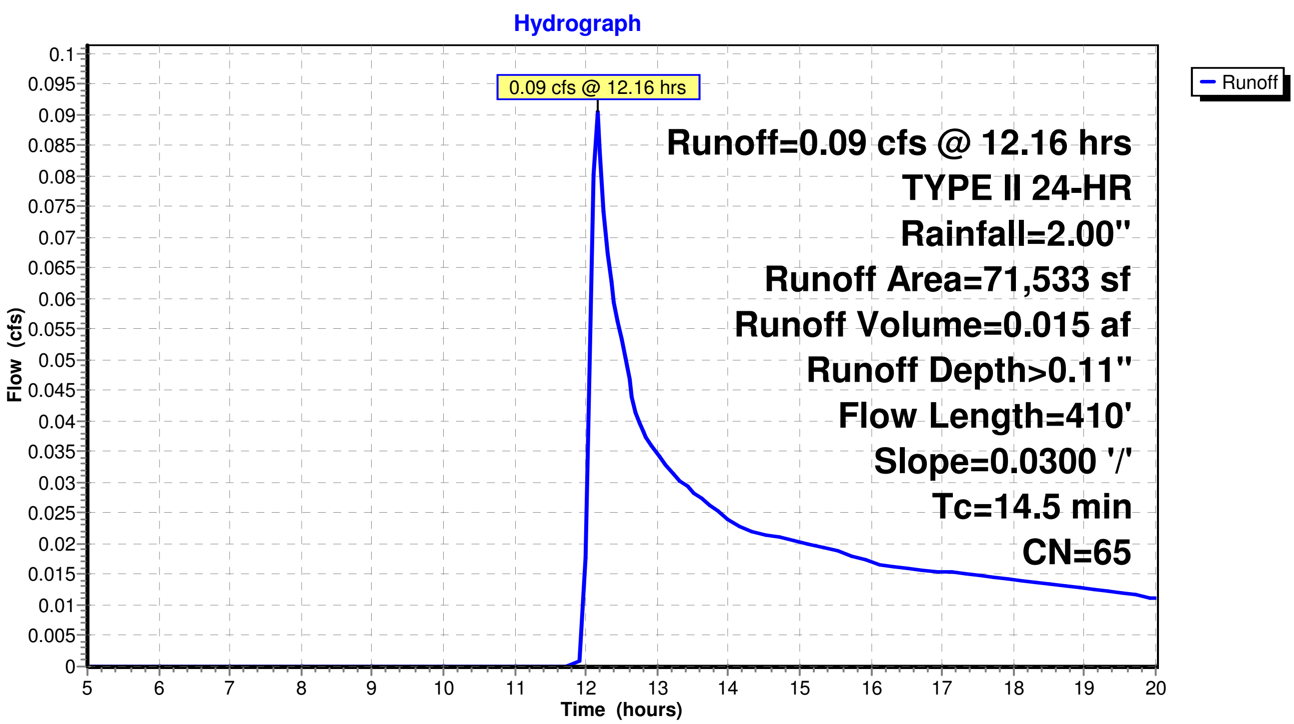
Runoff = 0.09 cfs @ 12.16 hrs, Volume= 0.015 af, Depth> 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=2.00"

Area (sf)	CN	Description
71,533	65	Brush, Good, HSG C
71,533		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	155	0.0300	0.20		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
1.6	255	0.0300	2.60		**Shallow Concentrated Flow, Balance of Longest Flowpath** Grassed Waterway Kv= 15.0 fps
14.5	410	Total			

Subcatchment UP 2: Upland Watershed 2



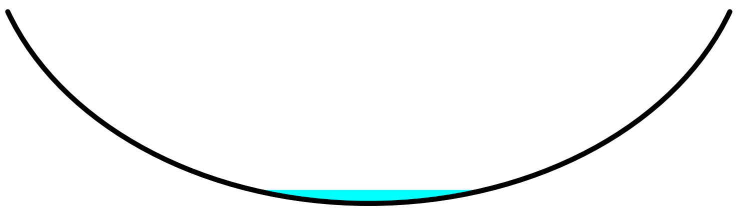
Summary for Reach Div: Diversion Swale

Inflow Area = 9.223 ac, 0.00% Impervious, Inflow Depth > 0.11"
Inflow = 0.44 cfs @ 12.15 hrs, Volume= 0.084 af
Outflow = 0.27 cfs @ 12.98 hrs, Volume= 0.078 af, Atten= 40%, Lag= 49.9 min

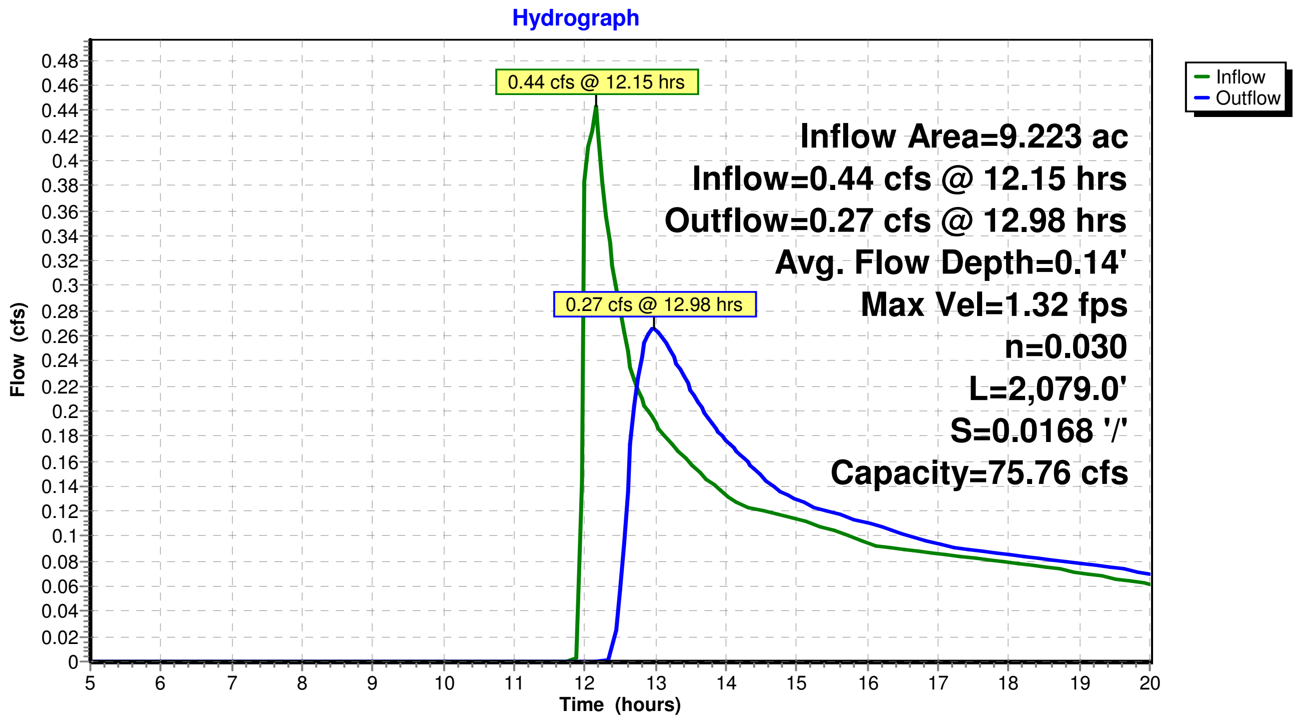
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.32 fps, Min. Travel Time= 26.2 min
Avg. Velocity = 1.01 fps, Avg. Travel Time= 34.2 min

Peak Storage= 418 cf @ 12.54 hrs
Average Depth at Peak Storage= 0.14'
Bank-Full Depth= 2.00' Flow Area= 10.7 sf, Capacity= 75.76 cfs

8.00' x 2.00' deep Parabolic Channel, n= 0.030
Length= 2,079.0' Slope= 0.0168 '/'
Inlet Invert= 0.00', Outlet Invert= -35.00'



Reach Div: Diversion Swale

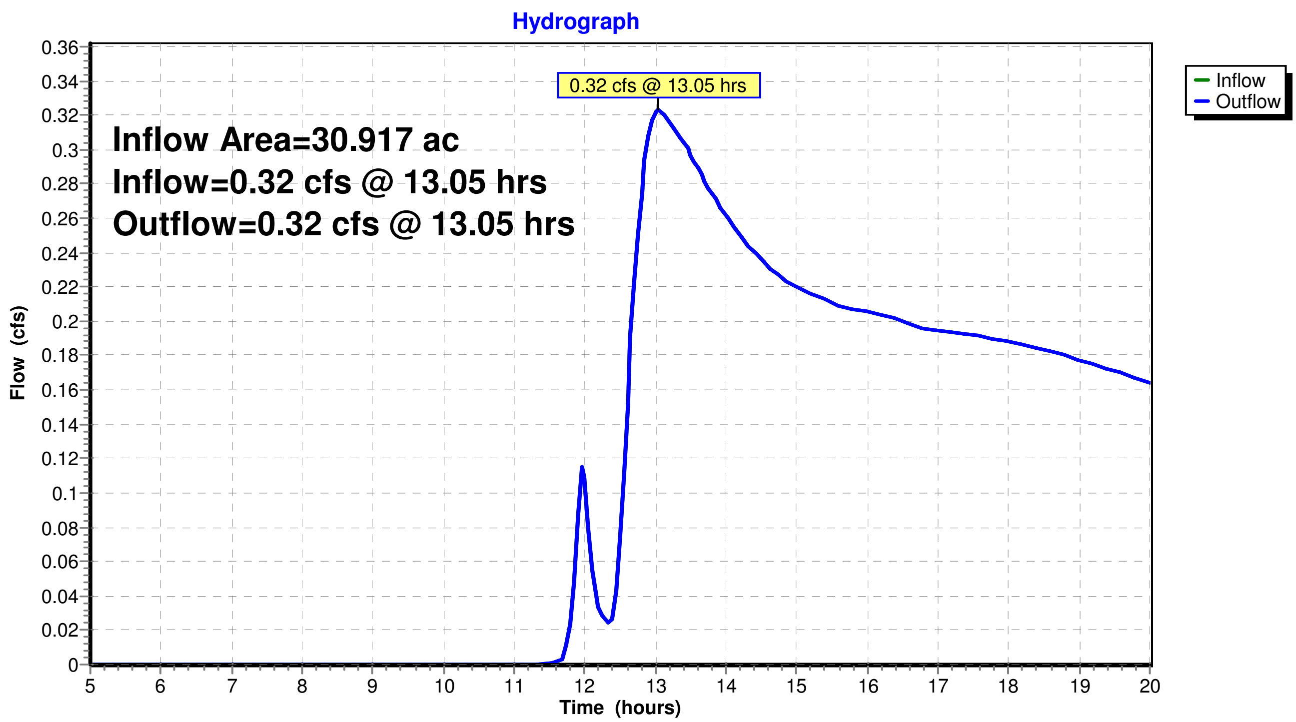


Summary for Reach DP 2: Design Point Summation 2

Inflow Area =	30.917 ac,	6.92% Impervious, Inflow Depth > 0.05"	
Inflow =	0.32 cfs @	13.05 hrs, Volume=	0.136 af
Outflow =	0.32 cfs @	13.05 hrs, Volume=	0.136 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 DP 2: Design Point Summation 2



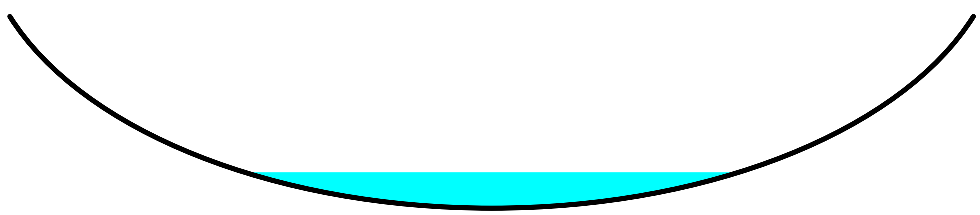
Summary for Reach RS: Road Swale

Inflow Area = 8.425 ac, 20.46% Impervious, Inflow Depth > 0.27"
Inflow = 1.83 cfs @ 12.25 hrs, Volume= 0.193 af
Outflow = 1.56 cfs @ 12.51 hrs, Volume= 0.189 af, Atten= 15%, Lag= 15.4 min

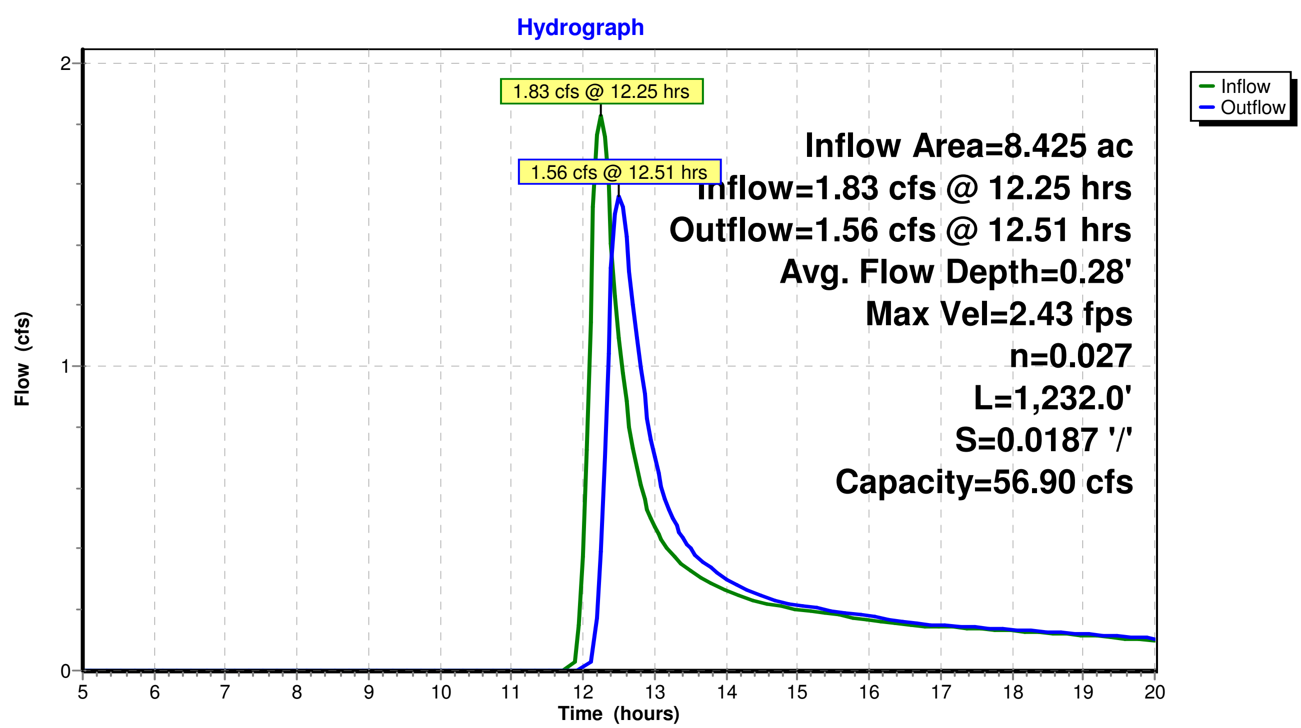
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.43 fps, Min. Travel Time= 8.5 min
Avg. Velocity = 1.33 fps, Avg. Travel Time= 15.4 min

Peak Storage= 795 cf @ 12.36 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 1.50' Flow Area= 8.0 sf, Capacity= 56.90 cfs

8.00' x 1.50' deep Parabolic Channel, n= 0.027
Length= 1,232.0' Slope= 0.0187 '/'
Inlet Invert= 0.00', Outlet Invert= -23.00'



Reach RS: Road Swale



Summary for Pond BR 2: Bioretention Area 2

Inflow Area = 0.386 ac, 34.86% Impervious, Inflow Depth > 0.58"
Inflow = 0.31 cfs @ 12.08 hrs, Volume= 0.019 af
Outflow = 0.01 cfs @ 16.95 hrs, Volume= 0.003 af, Atten= 97%, Lag= 292.4 min
Primary = 0.01 cfs @ 16.95 hrs, Volume= 0.003 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= 2.09' @ 16.95 hrs Surf.Area= 219 sf Storage= 688 cf
Flood Elev= 5.00' Surf.Area= 0 sf Storage= 2,454 cf

Plug-Flow detention time= 357.9 min calculated for 0.003 af (16% of inflow)
Center-of-Mass det. time= 257.6 min (1,072.8 - 815.2)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2,454 cf	**Custom Stage Data (Prismatic)** Listed below

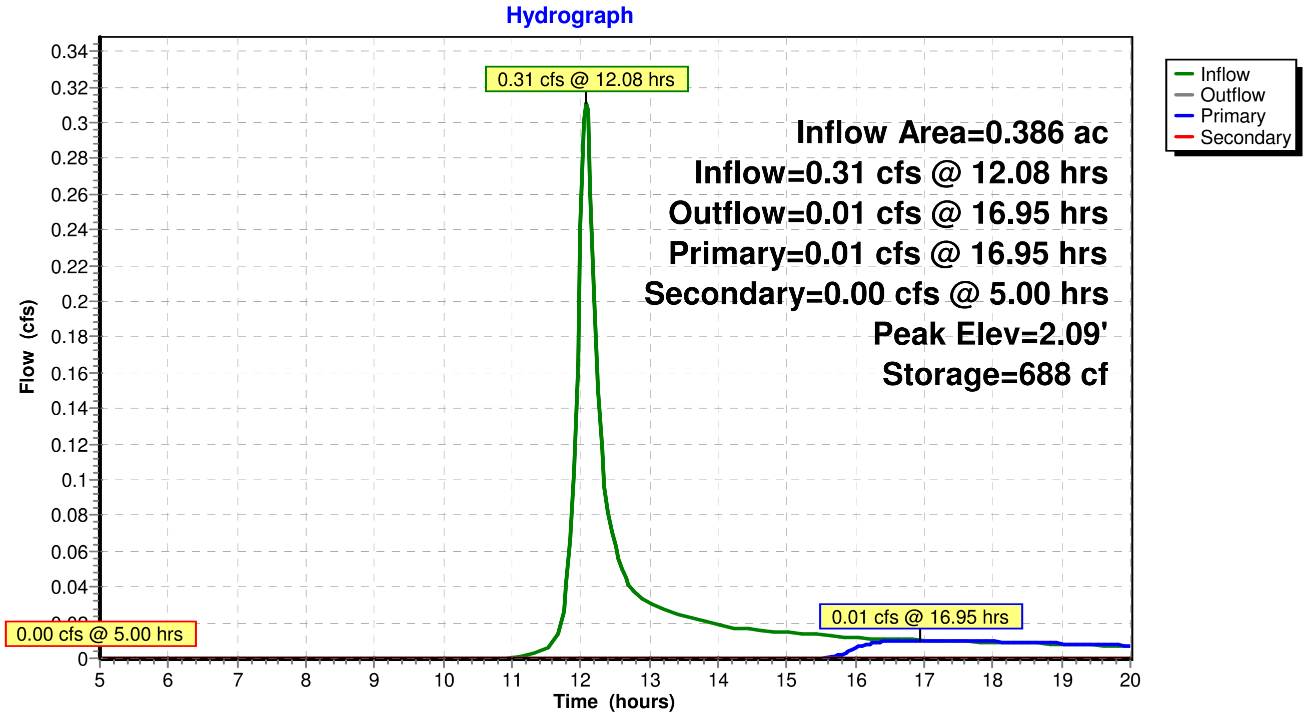
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	438	0	0
1.00	438	438	438
1.10	219	33	471
3.50	219	526	996
3.51	1,094	7	1,003
4.50	1,669	1,368	2,371
4.60	0	83	2,454

Device	Routing	Invert	Outlet Devices
#1	Secondary	4.00'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	2.00'	**4.0" Round Culvert** L= 177.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2.00' / 1.50' S= 0.0028 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.01 cfs @ 16.95 hrs HW=2.09' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.01 cfs @ 0.74 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=0.00' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BR 2: Bioretention Area 2



Summary for Pond BR 3: Bioretention Area 3

Inflow Area = 0.189 ac, 24.51% Impervious, Inflow Depth > 0.50"
Inflow = 0.17 cfs @ 12.00 hrs, Volume= 0.008 af
Outflow = 0.00 cfs @ 17.88 hrs, Volume= 0.001 af, Atten= 98%, Lag= 352.8 min
Primary = 0.00 cfs @ 17.88 hrs, Volume= 0.001 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= 2.04' @ 17.88 hrs Surf.Area= 99 sf Storage= 306 cf
Flood Elev= 5.00' Surf.Area= 0 sf Storage= 1,189 cf

Plug-Flow detention time= 398.0 min calculated for 0.001 af (12% of inflow)
Center-of-Mass det. time= 292.8 min (1,109.0 - 816.2)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	1,189 cf	**Custom Stage Data (Prismatic)** Listed below

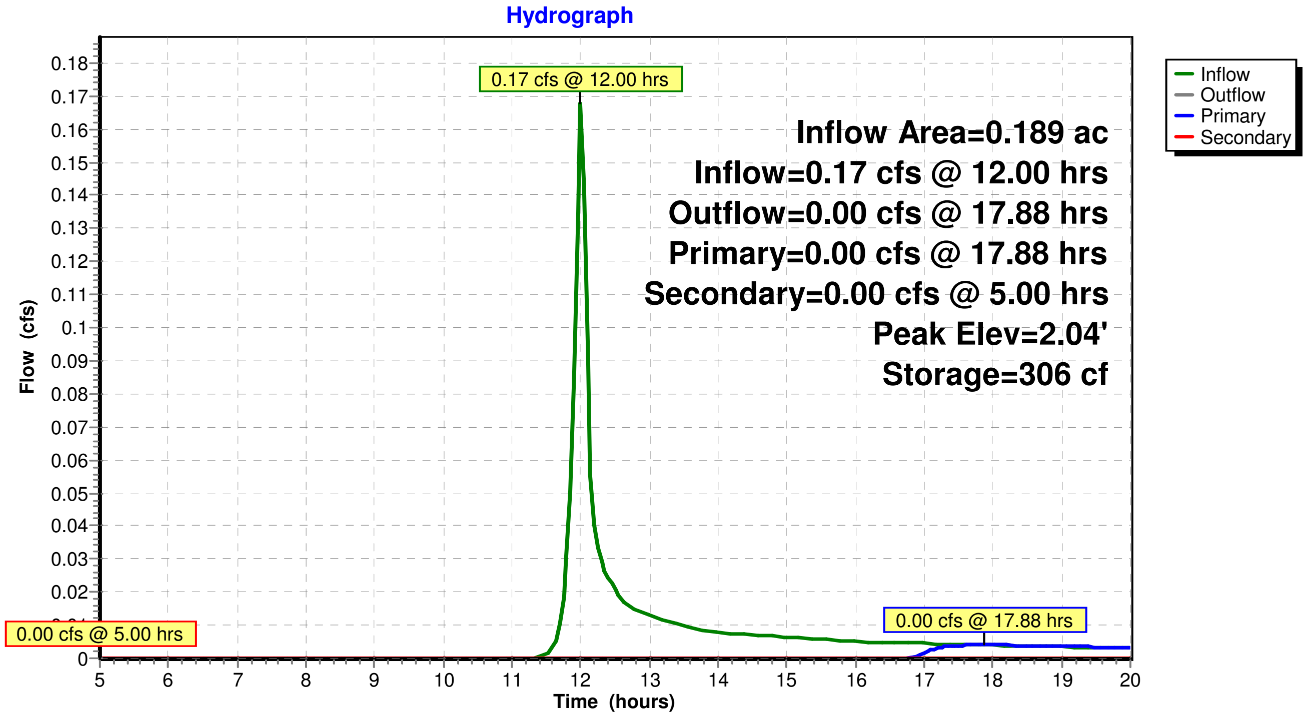
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	198	0	0
1.00	198	198	198
1.10	99	15	213
3.50	99	238	450
3.51	495	3	453
4.50	901	691	1,144
4.60	0	45	1,189

Device	Routing	Invert	Outlet Devices
#1	Secondary	4.00'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	2.00'	**4.0" Round Culvert** L= 57.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2.00' / 1.50' S= 0.0088 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.00 cfs @ 17.88 hrs HW=2.04' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.00 cfs @ 0.80 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=0.00' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BR 3: Bioretention Area 3



Summary for Pond BR 6: Bioretention Area 6

Inflow Area = 0.281 ac, 31.15% Impervious, Inflow Depth > 0.54"
Inflow = 0.31 cfs @ 11.95 hrs, Volume= 0.013 af
Outflow = 0.02 cfs @ 13.05 hrs, Volume= 0.005 af, Atten= 94%, Lag= 66.0 min
Primary = 0.02 cfs @ 13.05 hrs, Volume= 0.005 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= 2.62' @ 13.05 hrs Surf.Area= 90 sf Storage= 330 cf
Flood Elev= 5.00' Surf.Area= 0 sf Storage= 1,348 cf

Plug-Flow detention time= 222.2 min calculated for 0.005 af (41% of inflow)
Center-of-Mass det. time= 127.3 min (937.5 - 810.2)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	1,348 cf	**Custom Stage Data (Prismatic)** Listed below

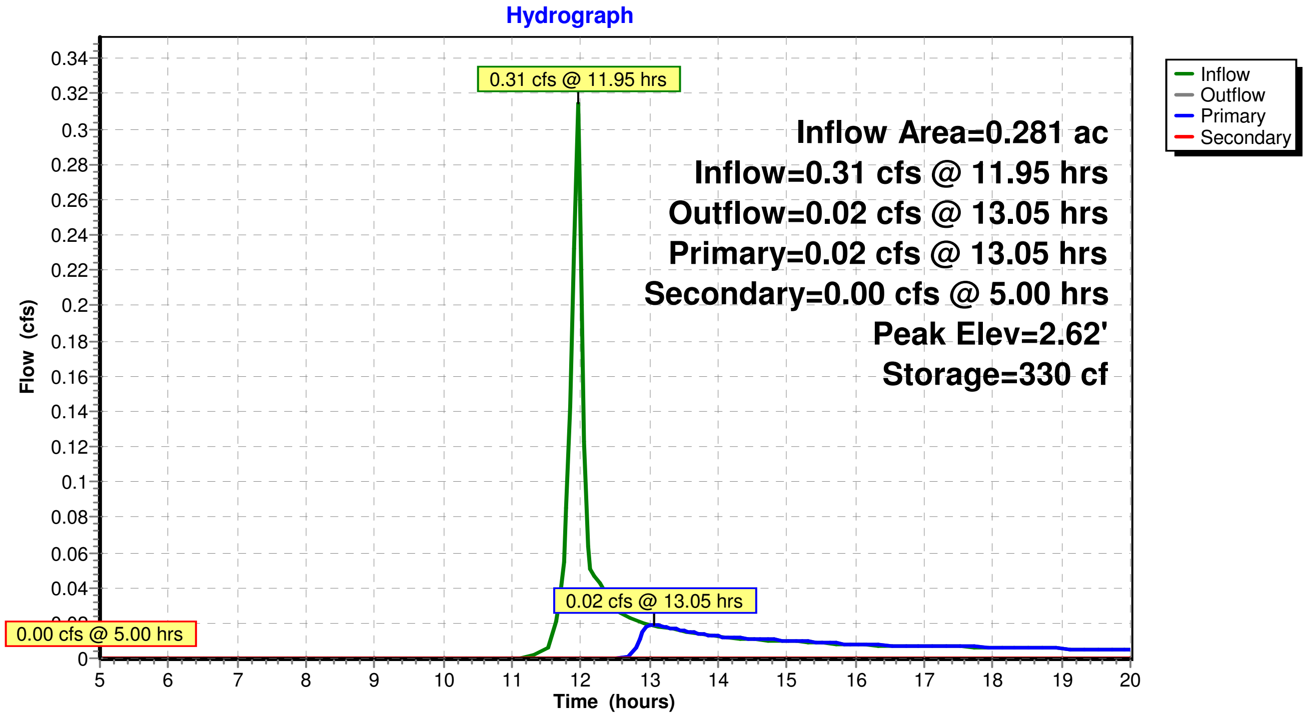
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	180	0	0
1.00	180	180	180
1.10	90	14	194
3.50	90	216	410
3.51	451	3	412
4.50	1,307	870	1,282
4.60	0	65	1,348

Device	Routing	Invert	Outlet Devices
#1	Secondary	4.00'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	2.50'	**4.0" Round Culvert** L= 132.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2.50' / 2.00' S= 0.0038 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.02 cfs @ 13.05 hrs HW=2.62' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.02 cfs @ 0.97 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=0.00' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BR 6: Bioretention Area 6



Summary for Pond BR 7: Bioretention Area 7

Inflow Area = 0.129 ac, 35.97% Impervious, Inflow Depth > 0.63"
Inflow = 0.18 cfs @ 11.91 hrs, Volume= 0.007 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 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= 1.92' @ 20.00 hrs Surf.Area= 99 sf Storage= 294 cf
Flood Elev= 5.00' Surf.Area= 0 sf Storage= 1,189 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	1,189 cf	**Custom Stage Data (Prismatic)** Listed below

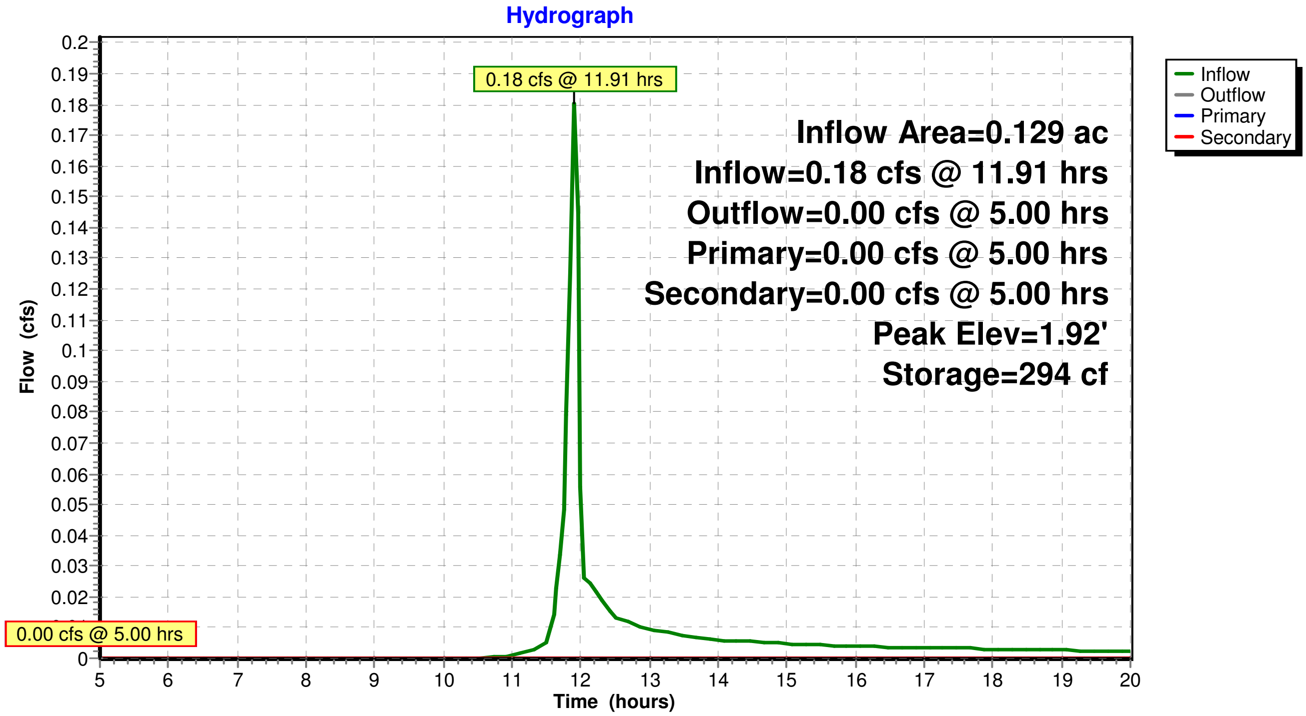
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	198	0	0
1.00	198	198	198
1.10	99	15	213
3.50	99	238	450
3.51	495	3	453
4.50	901	691	1,144
4.60	0	45	1,189

Device	Routing	Invert	Outlet Devices
#1	Secondary	4.00'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	2.00'	**4.0" Round Culvert** L= 57.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2.00' / 1.50' S= 0.0088 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=0.00' (Free Discharge)
↑**2=Culvert** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=0.00' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BR 7: Bioretention Area 7



Summary for Pond DS: Dry Swales

Inflow Area = 0.138 ac, 48.99% Impervious, Inflow Depth > 0.54"
Inflow = 0.16 cfs @ 11.91 hrs, Volume= 0.006 af
Outflow = 0.12 cfs @ 11.97 hrs, Volume= 0.006 af, Atten= 28%, Lag= 3.3 min
Primary = 0.12 cfs @ 11.97 hrs, Volume= 0.006 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 0.35' @ 11.97 hrs Surf.Area= 350 sf Storage= 49 cf
Flood Elev= 5.00' Surf.Area= 0 sf Storage= 1,146 cf

Plug-Flow detention time= 18.0 min calculated for 0.006 af (98% of inflow)
Center-of-Mass det. time= 10.5 min (818.5 - 808.0)

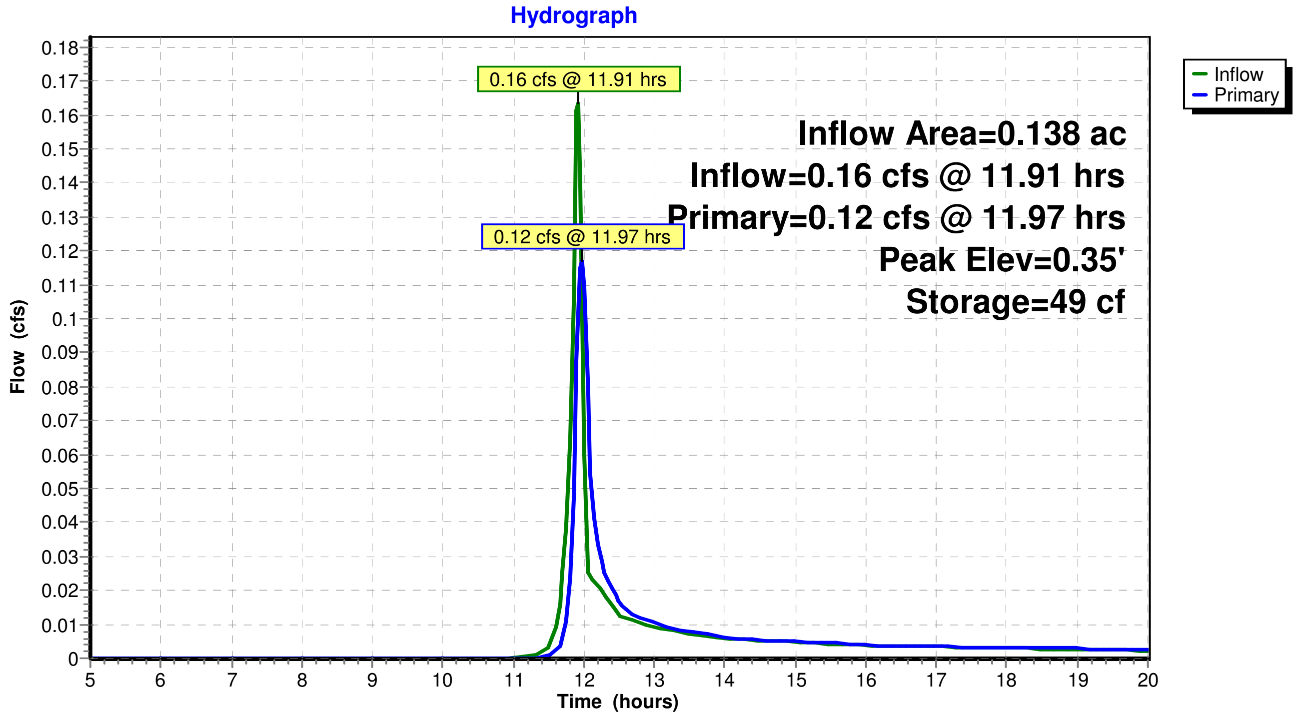
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	573 cf	**Custom Stage Data (Prismatic)** Listed below
		573 cf	x 2.00 = 1,146 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	175	0.0	0	0
1.00	175	40.0	70	70
1.10	175	20.0	4	74
3.50	175	20.0	84	158
3.51	175	100.0	2	159
4.50	600	100.0	384	543
4.60	0	100.0	30	573

Device	Routing	Invert	Outlet Devices
#1	Primary	4.00'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	0.00'	**4.0" Round Culvert** L= 127.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 0.00' / -0.50' S= 0.0039 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.11 cfs @ 11.97 hrs HW=0.34' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
2=Culvert (Barrel Controls 0.11 cfs @ 1.57 fps)

Pond DS: Dry Swales



Summary for Pond FB: Forebay

Inflow Area = 8.425 ac, 20.46% Impervious, Inflow Depth > 0.27"
Inflow = 1.56 cfs @ 12.51 hrs, Volume= 0.189 af
Outflow = 1.03 cfs @ 13.00 hrs, Volume= 0.122 af, Atten= 34%, Lag= 29.6 min
Primary = 1.03 cfs @ 13.00 hrs, Volume= 0.122 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 4.17' @ 13.00 hrs Surf.Area= 0 sf Storage= 2,928 cf
Flood Elev= 4.00' Surf.Area= 1,536 sf Storage= 2,852 cf

Plug-Flow detention time= 146.8 min calculated for 0.122 af (65% of inflow)
Center-of-Mass det. time= 62.8 min (930.8 - 868.0)

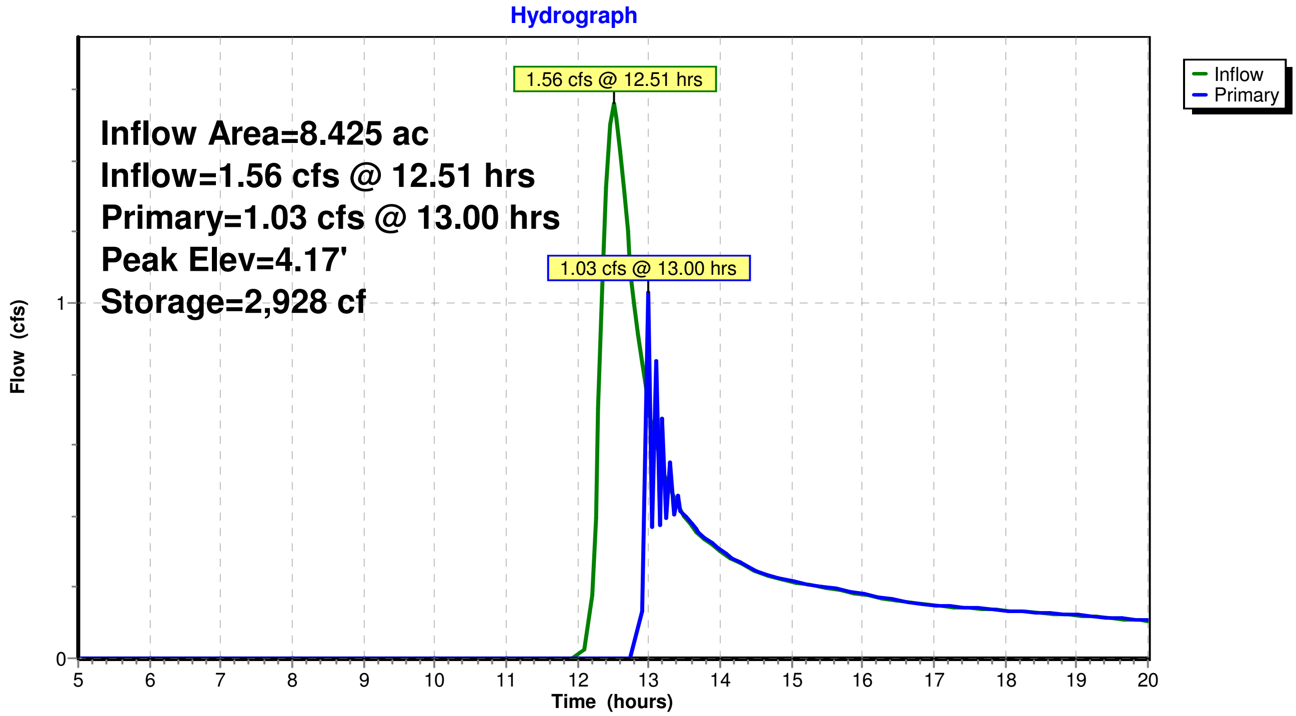
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2,928 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	113	0	0
1.00	345	229	229
2.00	633	489	718
3.00	1,049	841	1,559
4.00	1,536	1,293	2,852
4.10	0	77	2,928

Device	Routing	Invert	Outlet Devices
#1	Primary	4.00'	**6.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=1.02 cfs @ 13.00 hrs HW=4.17' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 1.02 cfs @ 0.99 fps)

Pond FB: Forebay



Summary for Pond P: Pond

Inflow Area = 8.425 ac, 20.46% Impervious, Inflow Depth > 0.17"
Inflow = 1.03 cfs @ 13.00 hrs, Volume= 0.122 af
Outflow = 0.04 cfs @ 20.00 hrs, Volume= 0.017 af, Atten= 96%, Lag= 420.0 min
Primary = 0.04 cfs @ 20.00 hrs, Volume= 0.017 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
Starting Elev= 4.00' Surf.Area= 7,635 sf Storage= 5,821 cf
Peak Elev= 4.47' @ 20.00 hrs Surf.Area= 9,601 sf Storage= 10,418 cf (4,597 cf above start)
Flood Elev= 7.50' Surf.Area= 0 sf Storage= 46,941 cf (41,120 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 92.9 min (1,023.8 - 930.8)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	46,941 cf	**Custom Stage Data (Prismatic)** Listed below

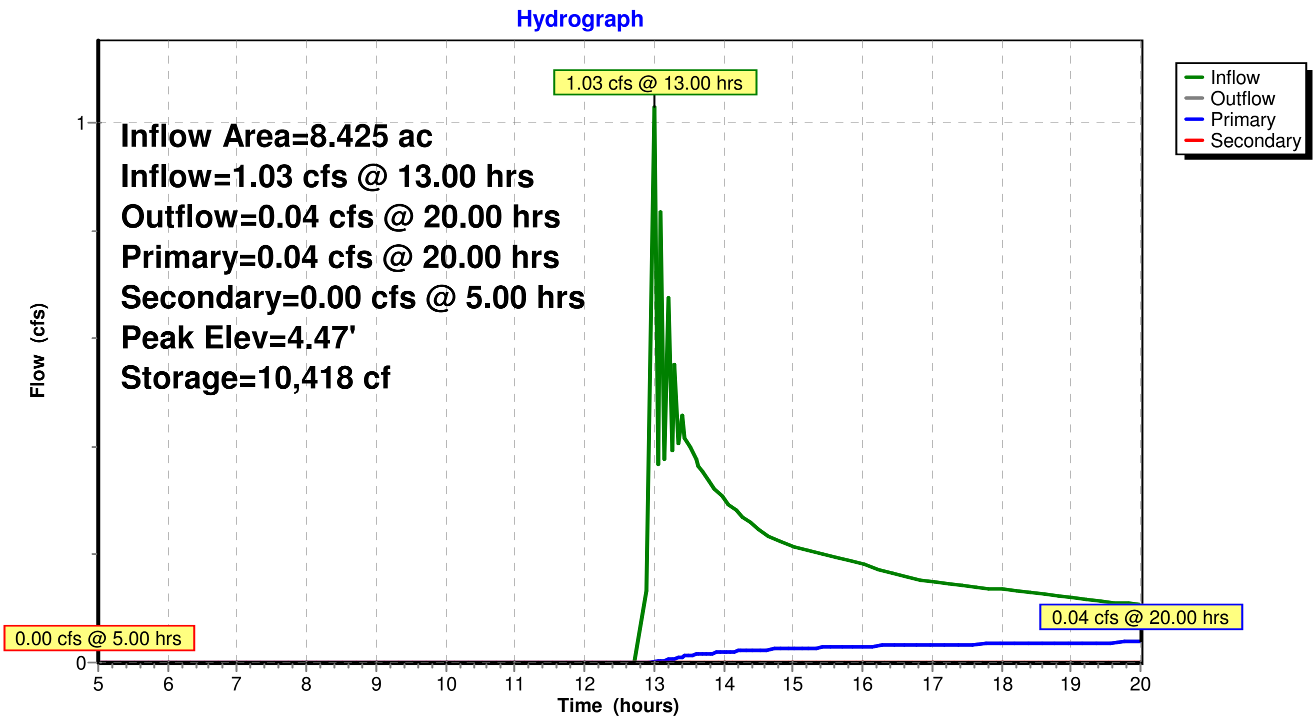
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	113	0	0
1.00	314	214	214
2.00	616	465	679
3.00	1,017	817	1,495
4.00	7,635	4,326	5,821
5.00	11,788	9,712	15,533
6.00	13,709	12,749	28,281
7.00	15,740	14,725	43,006
7.50	0	3,935	46,941

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**12.0" Round Culvert** L= 104.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 0.00' / -1.00' S= 0.0096 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	4.00'	**1.5" Vert. Orifice/Grate** C= 0.600
#3	Device 1	5.25'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	6.50'	**25.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=0.04 cfs @ 20.00 hrs HW=4.47' (Free Discharge)
└─**1=Culvert** (Passes 0.04 cfs of 5.87 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.04 cfs @ 3.09 fps)
  └─**3=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=4.00' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P: Pond



Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.519	39	>75% Grass cover, Good, HSG A (PSC 7)
0.491	61	>75% Grass cover, Good, HSG B (PSC 7)
3.449	74	>75% Grass cover, Good, HSG C (PSC 2, PSC 3, PSC 6, PSC 7, PSC-7A)
2.435	30	Brush, Good, HSG A (OSC 3)
0.360	48	Brush, Good, HSG B (OSC 3)
21.522	65	Brush, Good, HSG C (OSC 1, OSC 3, PSC 7, PSC 8, UP 1, UP 2)
2.059	98	Paved parking & roofs (PSC 2, PSC 3, PSC 6, PSC 7, PSC 8)
0.046	98	Roofs, HSG C (PSC-7A)
0.035	98	Unconnected roofs, HSG A (OSC 3)
30.917	**65**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.989	HSG A	OSC 3, PSC 7
0.851	HSG B	OSC 3, PSC 7
25.018	HSG C	OSC 1, OSC 3, PSC 2, PSC 3, PSC 6, PSC 7, PSC 8, PSC-7A, UP 1, UP 2
0.000	HSG D	
2.059	Other	PSC 2, PSC 3, PSC 6, PSC 7, PSC 8
30.917		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.519	0.491	3.449	0.000	0.000	4.460	>75% Grass cover, Good	PSC 2, PSC 3, PSC 6, PSC 7, PSC-7A
2.435	0.360	21.522	0.000	0.000	24.317	Brush, Good	OSC 1, OSC 3, PSC 7, PSC 8, UP 1, UP 2
0.000	0.000	0.000	0.000	2.059	2.059	Paved parking & roofs	PSC 2, PSC 3, PSC 6, PSC 7, PSC 8
0.000	0.000	0.046	0.000	0.000	0.046	Roofs	PSC-7A
0.035	0.000	0.000	0.000	0.000	0.035	Unconnected roofs	OSC 3
2.989	**0.851**	**25.018**	**0.000**	**2.059**	**30.917**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	BR 2	2.00	1.50	177.0	0.0028	0.013	4.0	0.0	0.0
2	BR 3	2.00	1.50	57.0	0.0088	0.013	4.0	0.0	0.0
3	BR 6	2.50	2.00	132.0	0.0038	0.013	4.0	0.0	0.0
4	BR 7	2.00	1.50	57.0	0.0088	0.013	4.0	0.0	0.0
5	DS	0.00	-0.50	127.0	0.0039	0.013	4.0	0.0	0.0
6	P	0.00	-1.00	104.0	0.0096	0.013	12.0	0.0	0.0

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 OSC 1: Off-Site Runoff Area=143,197 sf 0.00% Impervious Runoff Depth>0.62"
Flow Length=2,079' Slope=0.0170 '/' Tc=4.6 min CN=65 Runoff=3.87 cfs 0.169 af

Subcatchment OSC 3: Off-Site Runoff Area=529,093 sf 0.28% Impervious Runoff Depth>0.35"
Flow Length=1,570' Tc=19.6 min CN=58 Runoff=3.37 cfs 0.354 af

Subcatchment PSC 2: Proposed Runoff Area=16,829 sf 34.86% Impervious Runoff Depth>1.56"
Flow Length=170' Tc=14.8 min CN=82 Runoff=0.85 cfs 0.050 af

Subcatchment PSC 3: Proposed Runoff Area=8,226 sf 24.51% Impervious Runoff Depth>1.43"
Flow Length=146' Tc=8.0 min CN=80 Runoff=0.48 cfs 0.022 af

Subcatchment PSC 6: Proposed Runoff Area=12,258 sf 31.15% Impervious Runoff Depth>1.50"
Flow Length=49' Tc=4.1 min CN=81 Runoff=0.86 cfs 0.035 af

Subcatchment PSC 7: Proposed Runoff Area=366,995 sf 20.46% Impervious Runoff Depth>1.00"
Flow Length=1,566' Tc=25.5 min CN=73 Runoff=8.45 cfs 0.699 af

Subcatchment PSC 8: Proposed Runoff Area=5,995 sf 48.99% Impervious Runoff Depth>1.50"
Flow Length=148' Slope=0.0500 '/' Tc=1.1 min CN=81 Runoff=0.45 cfs 0.017 af

Subcatchment PSC-7A: Proposed Runoff Area=5,604 sf 35.97% Impervious Runoff Depth>1.64"
Flow Length=35' Slope=0.0100 '/' Tc=0.8 min CN=83 Runoff=0.46 cfs 0.018 af

Subcatchment UP 1: Upland Watershed 1 Runoff Area=187,023 sf 0.00% Impervious Runoff Depth>0.61"
Flow Length=557' Tc=15.0 min CN=65 Runoff=3.29 cfs 0.220 af

Subcatchment UP 2: Upland Watershed 2 Runoff Area=71,533 sf 0.00% Impervious Runoff Depth>0.61"
Flow Length=410' Slope=0.0300 '/' Tc=14.5 min CN=65 Runoff=1.28 cfs 0.084 af

Reach Div: Diversion Swale Avg. Flow Depth=0.53' Max Vel=3.14 fps Inflow=6.63 cfs 0.473 af
n=0.030 L=2,079.0' S=0.0168 '/' Capacity=75.76 cfs Outflow=4.59 cfs 0.461 af

Reach DP 2: Design Point Summation 2 Inflow=7.79 cfs 1.225 af
Outflow=7.79 cfs 1.225 af

Reach RS: Road Swale Avg. Flow Depth=0.60' Max Vel=3.96 fps Inflow=8.45 cfs 0.699 af
n=0.027 L=1,232.0' S=0.0187 '/' Capacity=56.90 cfs Outflow=7.91 cfs 0.692 af

Pond BR 2: Bioretention Area 2 Peak Elev=3.54' Storage=1,050 cf Inflow=0.85 cfs 0.050 af
Primary=0.18 cfs 0.034 af Secondary=0.00 cfs 0.000 af Outflow=0.18 cfs 0.034 af

Pond BR 3: Bioretention Area 3 Peak Elev=2.90' Storage=391 cf Inflow=0.48 cfs 0.022 af
Primary=0.23 cfs 0.015 af Secondary=0.00 cfs 0.000 af Outflow=0.23 cfs 0.015 af

Pond BR 6: Bioretention Area 6 Peak Elev=3.79' Storage=659 cf Inflow=0.86 cfs 0.035 af
Primary=0.19 cfs 0.028 af Secondary=0.00 cfs 0.000 af Outflow=0.19 cfs 0.028 af

Pond BR 7: Bioretention Area 7 Peak Elev=2.52' Storage=354 cf Inflow=0.46 cfs 0.018 af
Primary=0.19 cfs 0.011 af Secondary=0.00 cfs 0.000 af Outflow=0.19 cfs 0.011 af

Pond DS: Dry Swales Peak Elev=1.46' Storage=172 cf Inflow=0.45 cfs 0.017 af
Outflow=0.20 cfs 0.017 af

Pond FB: Forebay Peak Elev=4.80' Storage=2,928 cf Inflow=7.91 cfs 0.692 af
Outflow=11.55 cfs 0.625 af

Pond P: Pond Peak Elev=5.43' Storage=20,998 cf Inflow=11.55 cfs 0.625 af
Primary=0.86 cfs 0.305 af Secondary=0.00 cfs 0.000 af Outflow=0.86 cfs 0.305 af

Total Runoff Area = 30.917 ac Runoff Volume = 1.668 af Average Runoff Depth = 0.65"
93.08% Pervious = 28.777 ac 6.92% Impervious = 2.140 ac

Summary for Subcatchment OSC 1: Off-Site Subcatchment 1

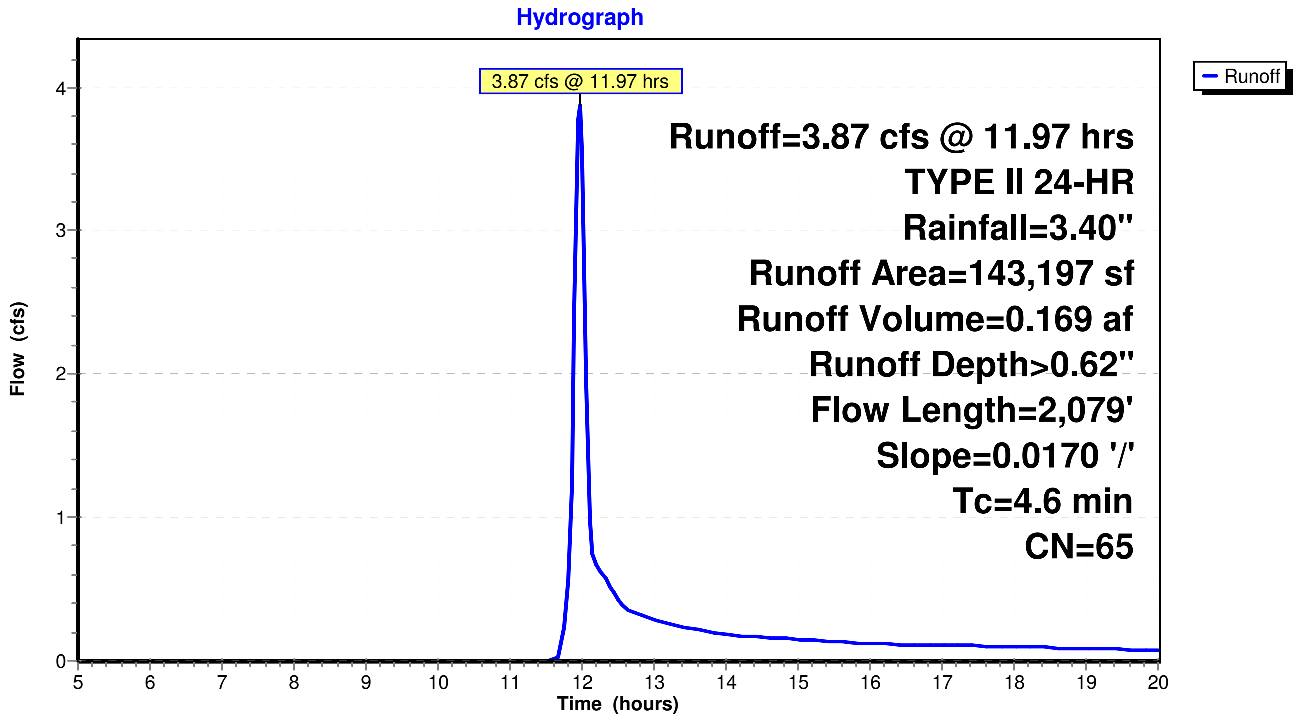
Runoff = 3.87 cfs @ 11.97 hrs, Volume= 0.169 af, Depth> 0.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=3.40"

Area (sf)	CN	Description
143,197	65	Brush, Good, HSG C
143,197		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	2,079	0.0170	7.61	121.77	**Trap/Vee/Rect Channel Flow, Balance of Longest Flowpath** Bot.W=2.00' D=2.00' Z= 3.0 '/' Top.W=14.00' n= 0.027

Subcatchment OSC 1: Off-Site Subcatchment 1



Summary for Subcatchment OSC 3: Off-Site Subcatchment 3

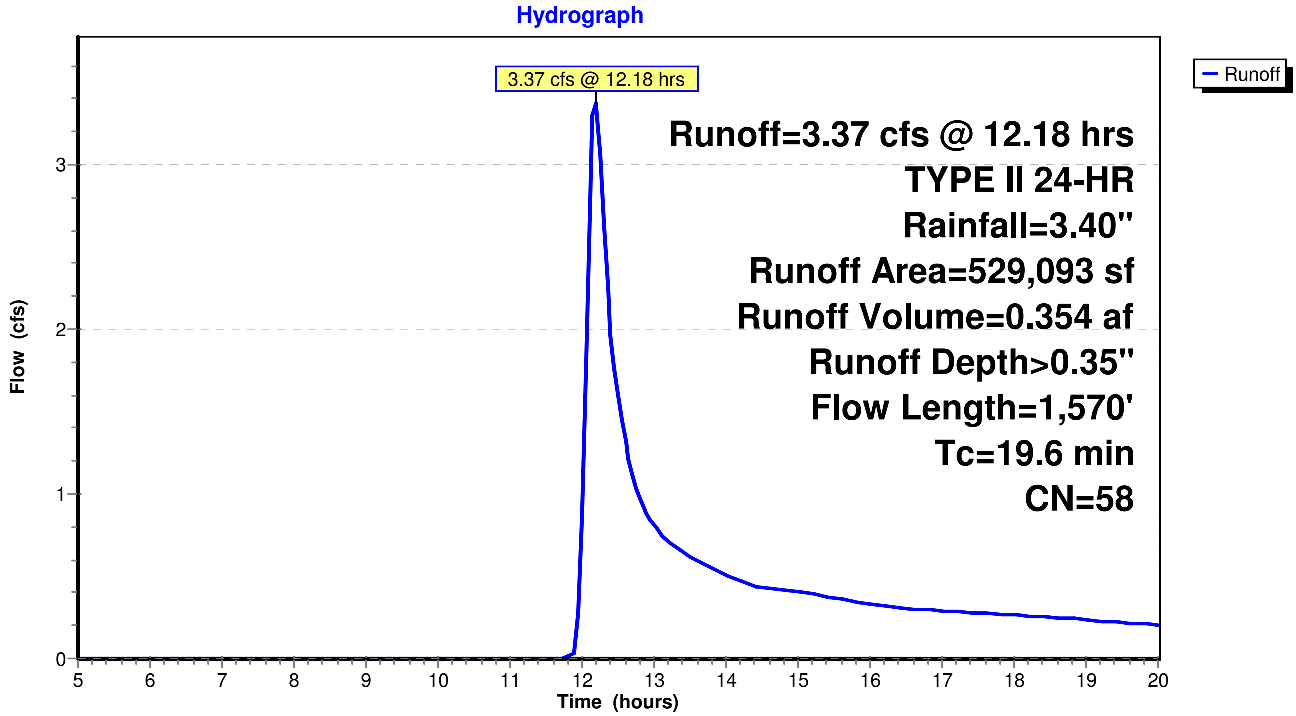
Runoff = 3.37 cfs @ 12.18 hrs, Volume= 0.354 af, Depth> 0.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=3.40"

Area (sf)	CN	Description
106,079	30	Brush, Good, HSG A
15,682	48	Brush, Good, HSG B
405,827	65	Brush, Good, HSG C
1,505	98	Unconnected roofs, HSG A
529,093	58	Weighted Average
527,588		99.72% Pervious Area
1,505		0.28% Impervious Area
1,505		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	100	0.0400	0.14		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
6.8	1,064	0.0300	2.60		**Shallow Concentrated Flow, Balance of Flow to Channel** Grassed Waterway Kv= 15.0 fps
1.0	406	0.0110	6.52	130.46	**Trap/Vee/Rect Channel Flow, Balance of Flowpath** Bot.W=4.00' D=2.00' Z= 3.0 '/' Top.W=16.00' n= 0.027
19.6	1,570	Total			

Subcatchment OSC 3: Off-Site Subcatchment 3



Summary for Subcatchment PSC 2: Proposed Subcatchment 2

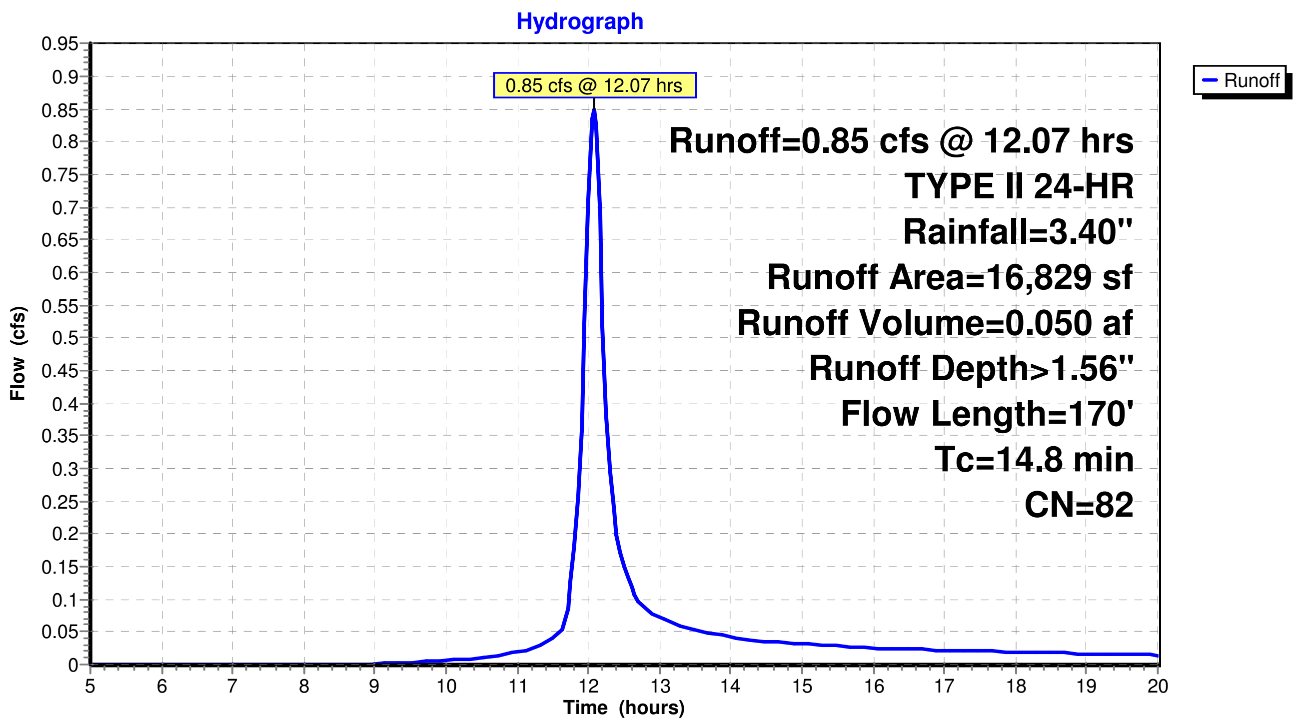
Runoff = 0.85 cfs @ 12.07 hrs, Volume= 0.050 af, Depth> 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=3.40"

Area (sf)	CN	Description
5,866	98	Paved parking & roofs
10,963	74	>75% Grass cover, Good, HSG C
16,829	82	Weighted Average
10,963		65.14% Pervious Area
5,866		34.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0100	0.12		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
0.6	65	0.0070	1.70		**Shallow Concentrated Flow, Balance of Flow to Channel** Paved Kv= 20.3 fps
0.1	5	0.0070	1.25		**Shallow Concentrated Flow, Balance of Longest Flowpath** Grassed Waterway Kv= 15.0 fps
14.8	170	Total			

Subcatchment PSC 2: Proposed Subcatchment 2



Summary for Subcatchment PSC 3: Proposed Subcatchment 3

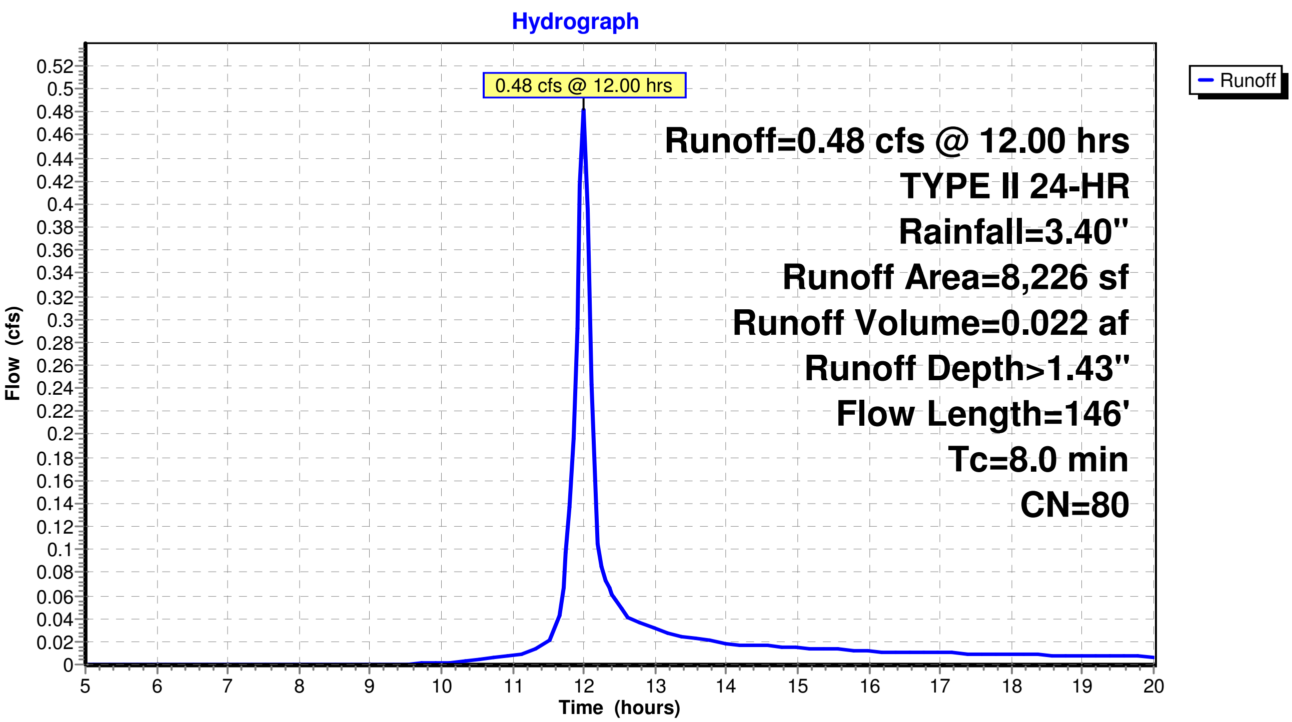
Runoff = 0.48 cfs @ 12.00 hrs, Volume= 0.022 af, Depth> 1.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=3.40"

Area (sf)	CN	Description
2,016	98	Paved parking & roofs
6,210	74	>75% Grass cover, Good, HSG C
8,226	80	Weighted Average
6,210		75.49% Pervious Area
2,016		24.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	76	0.0300	0.17		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
0.6	65	0.0070	1.70		**Shallow Concentrated Flow, Balance of Flow to Channel** Paved Kv= 20.3 fps
0.1	5	0.0070	1.25		**Shallow Concentrated Flow, Balance of Longest Flowpath** Grassed Waterway Kv= 15.0 fps
8.0	146	Total			

Subcatchment PSC 3: Proposed Subcatchment 3



Summary for Subcatchment PSC 6: Proposed Subcatchment 6

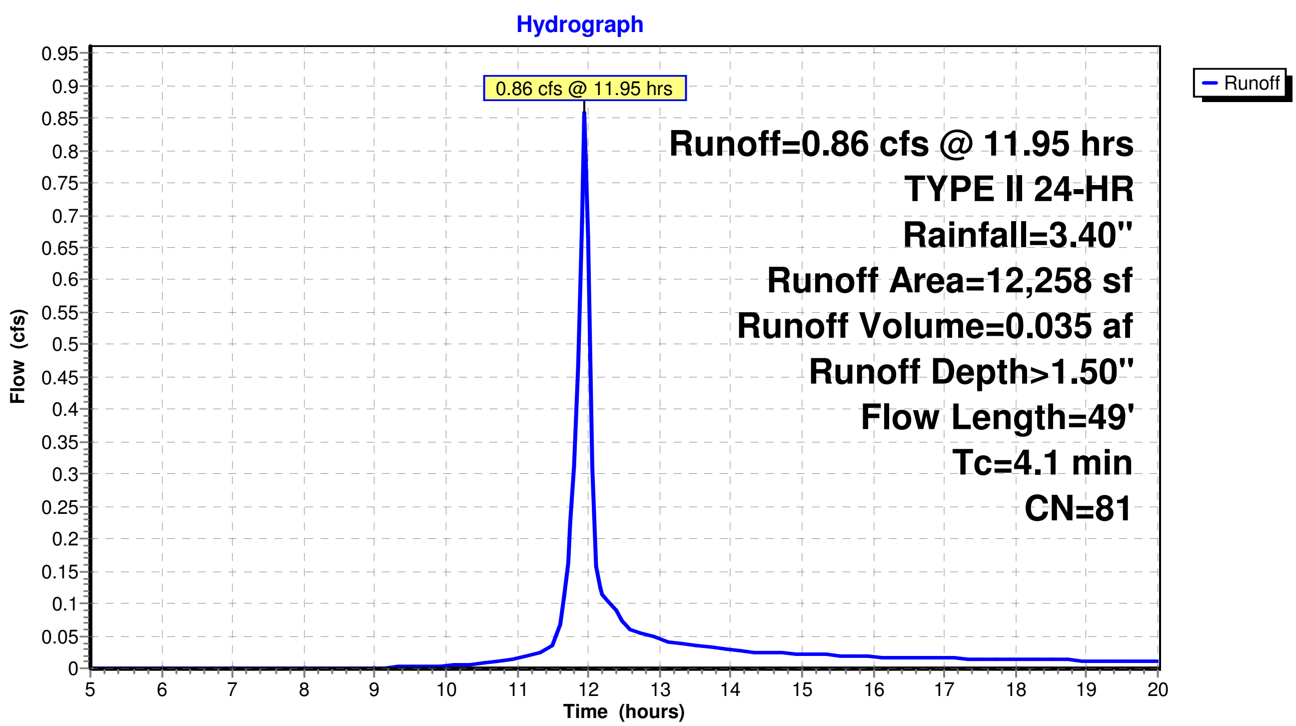
Runoff = 0.86 cfs @ 11.95 hrs, Volume= 0.035 af, Depth> 1.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=3.40"

Area (sf)	CN	Description
3,818	98	Paved parking & roofs
8,440	74	>75% Grass cover, Good, HSG C
12,258	81	Weighted Average
8,440		68.85% Pervious Area
3,818		31.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	23	0.0200	0.12		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
0.8	26	0.0050	0.55		**Sheet Flow, Balance of Longest Flowpath** Smooth surfaces n= 0.011 P2= 2.70"
4.1	49	Total			

Subcatchment PSC 6: Proposed Subcatchment 6



Summary for Subcatchment PSC 7: Proposed Subcatchment 7

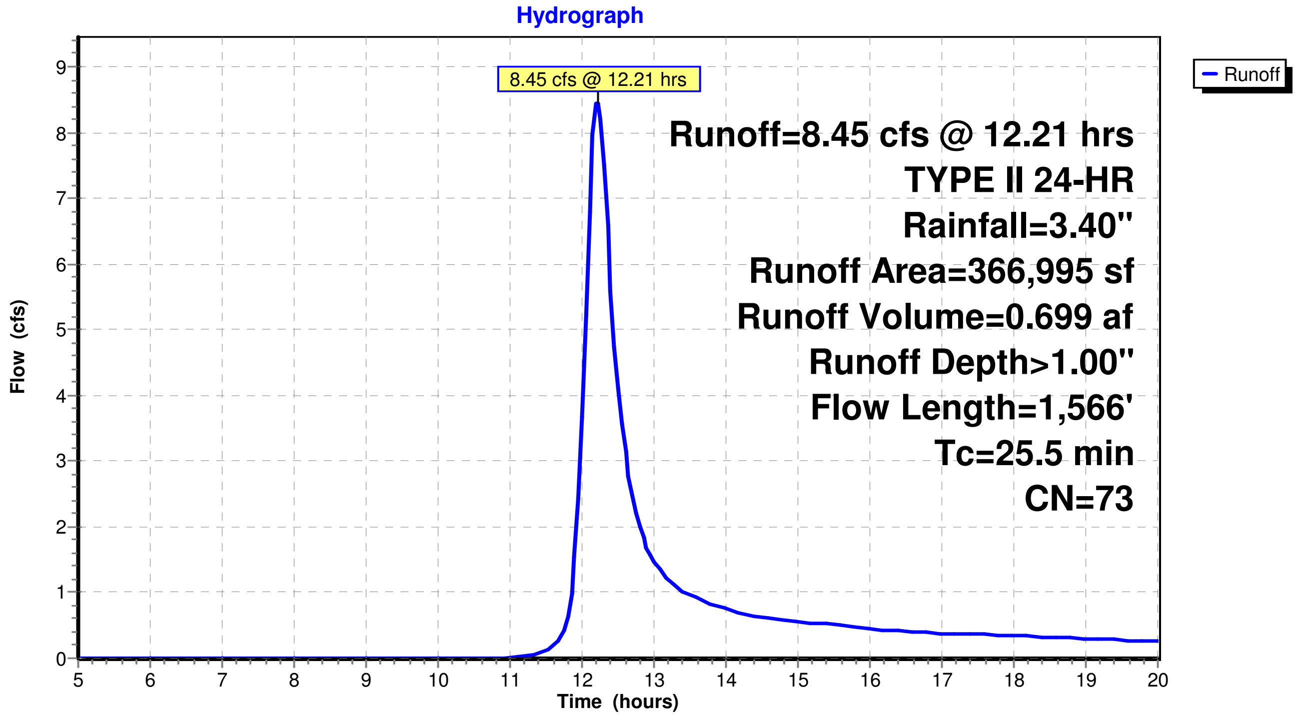
Runoff = 8.45 cfs @ 12.21 hrs, Volume= 0.699 af, Depth> 1.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=3.40"

Area (sf)	CN	Description
10,696	98	Paved parking & roofs
22,613	39	>75% Grass cover, Good, HSG A
14,492	98	Paved parking & roofs
21,401	61	>75% Grass cover, Good, HSG B
31,721	98	Paved parking & roofs
18,164	98	Paved parking & roofs
121,053	74	>75% Grass cover, Good, HSG C
126,855	65	Brush, Good, HSG C
366,995	73	Weighted Average
291,922		79.54% Pervious Area
75,073		20.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0100	0.08		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
2.5	350	0.0240	2.32		**Shallow Concentrated Flow, Balance of Flow to Road** Grassed Waterway Kv= 15.0 fps
0.1	16	0.0100	2.03		**Shallow Concentrated Flow, Balance of Flow to Swale** Paved Kv= 20.3 fps
2.4	1,100	0.0170	7.61	121.77	**Trap/Vee/Rect Channel Flow, Balance of Longest Flowpath** Bot.W=2.00' D=2.00' Z= 3.0 '/' Top.W=14.00' n= 0.027
25.5	1,566	Total			

Subcatchment PSC 7: Proposed Subcatchment 7



Summary for Subcatchment PSC 8: Proposed Subcatchment 8

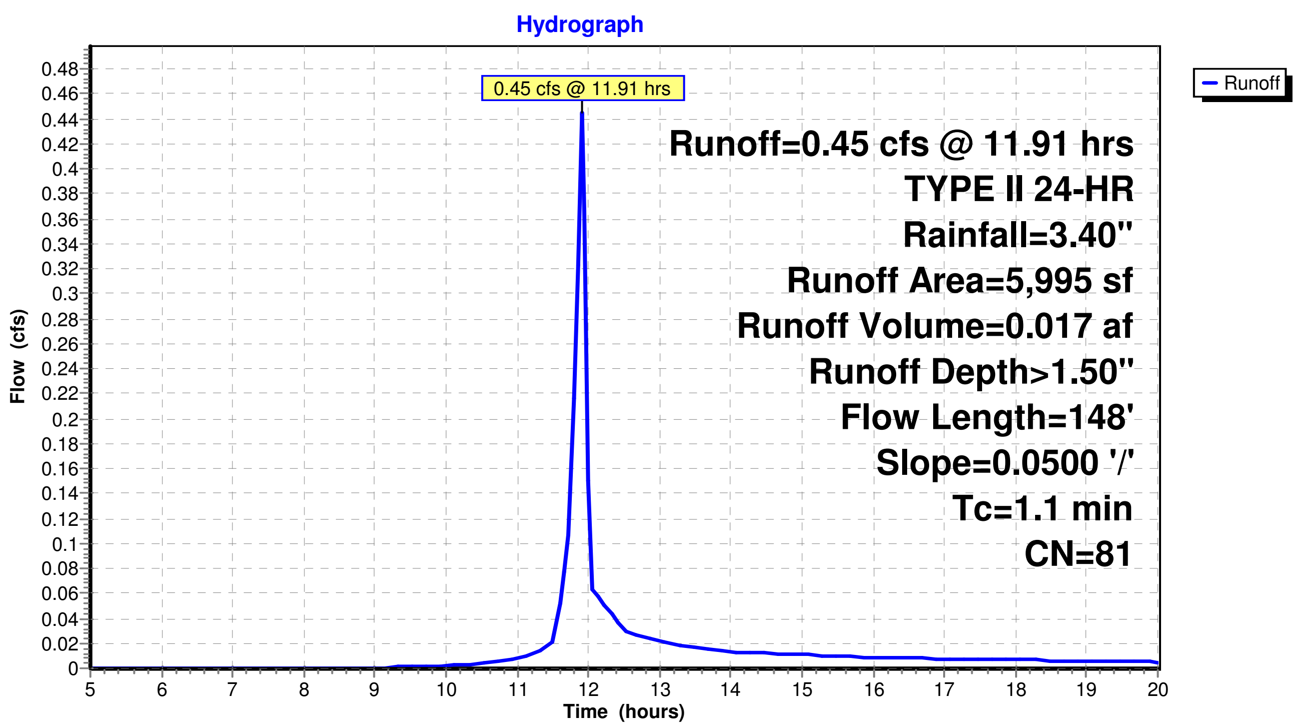
Runoff = 0.45 cfs @ 11.91 hrs, Volume= 0.017 af, Depth> 1.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=3.40"

Area (sf)	CN	Description
2,937	98	Paved parking & roofs
3,058	65	Brush, Good, HSG C
5,995	81	Weighted Average
3,058		51.01% Pervious Area
2,937		48.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	100	0.0500	1.82		**Sheet Flow, First 100' Flowpath** Smooth surfaces n= 0.011 P2= 2.70"
0.2	48	0.0500	4.54		**Shallow Concentrated Flow, Balance of Flow to Channel** Paved Kv= 20.3 fps
1.1	148	Total			

Subcatchment PSC 8: Proposed Subcatchment 8



Summary for Subcatchment PSC-7A: Proposed Subcatchment 7A

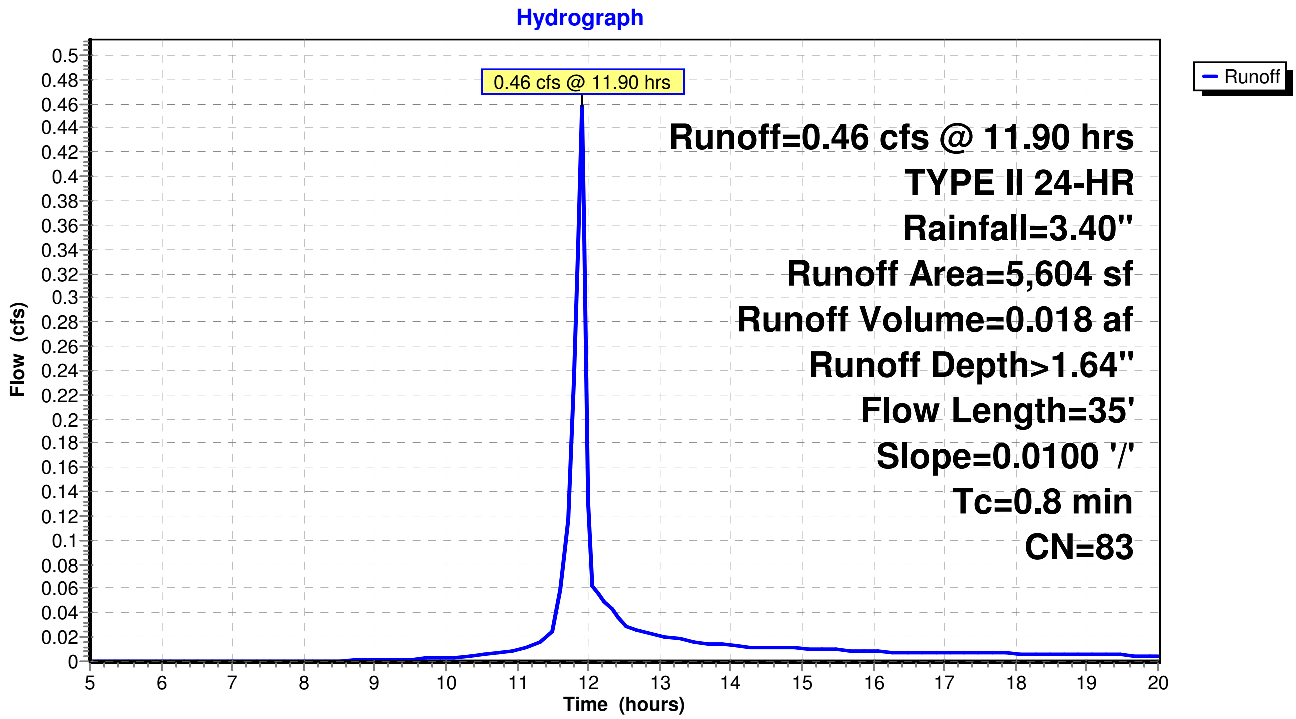
Runoff = 0.46 cfs @ 11.90 hrs, Volume= 0.018 af, Depth> 1.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=3.40"

Area (sf)	CN	Description
3,588	74	>75% Grass cover, Good, HSG C
2,016	98	Roofs, HSG C
5,604	83	Weighted Average
3,588		64.03% Pervious Area
2,016		35.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	35	0.0100	0.78		**Sheet Flow, Balance of Longest Flowpath** Smooth surfaces n= 0.011 P2= 2.70"

Subcatchment PSC-7A: Proposed Subcatchment 7A



Summary for Subcatchment UP 1: Upland Watershed 1

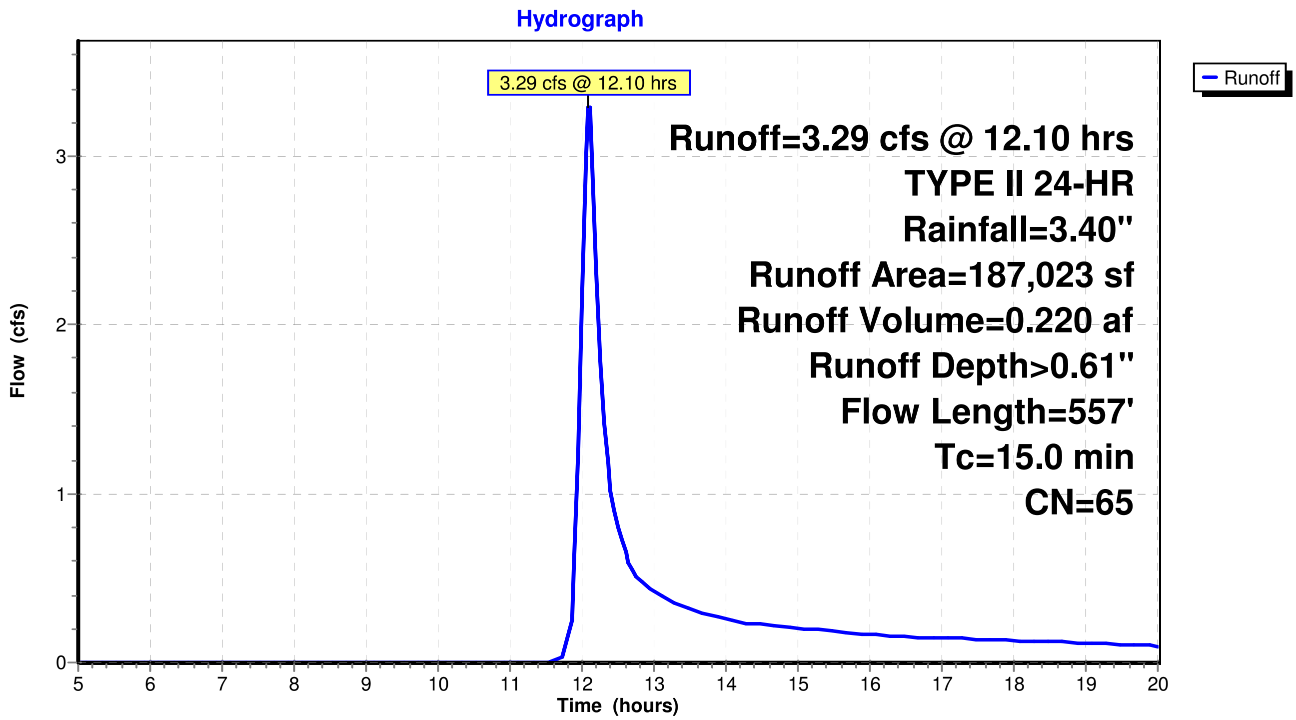
Runoff = 3.29 cfs @ 12.10 hrs, Volume= 0.220 af, Depth> 0.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=3.40"

Area (sf)	CN	Description
187,023	65	Brush, Good, HSG C
187,023		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	100	0.0360	0.14		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
2.7	457	0.0350	2.81		**Shallow Concentrated Flow, Balance of Longest Flowpath** Grassed Waterway Kv= 15.0 fps
15.0	557	Total			

Subcatchment UP 1: Upland Watershed 1



Summary for Subcatchment UP 2: Upland Watershed 2

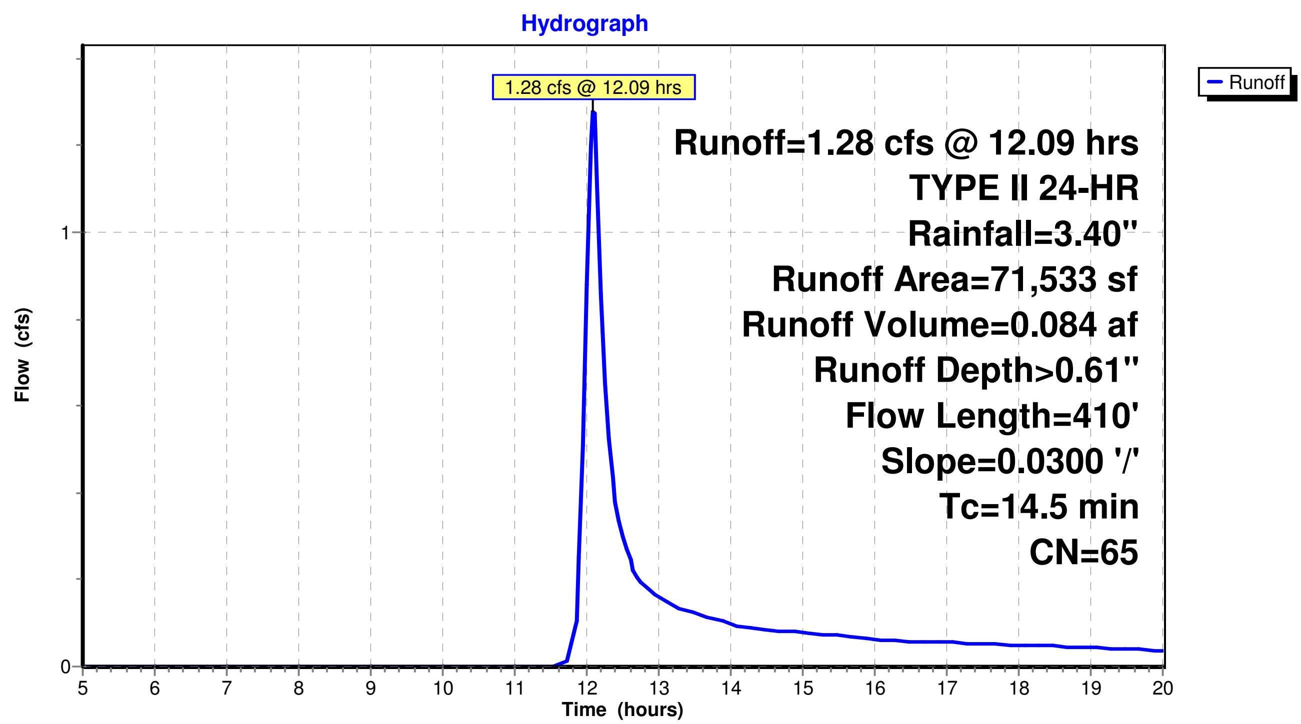
Runoff = 1.28 cfs @ 12.09 hrs, Volume= 0.084 af, Depth> 0.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=3.40"

Area (sf)	CN	Description
71,533	65	Brush, Good, HSG C
71,533		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	155	0.0300	0.20		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
1.6	255	0.0300	2.60		**Shallow Concentrated Flow, Balance of Longest Flowpath** Grassed Waterway Kv= 15.0 fps
14.5	410	Total			

Subcatchment UP 2: Upland Watershed 2



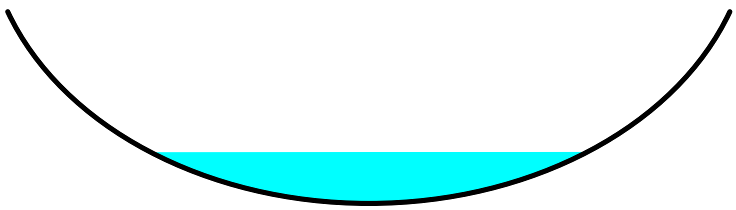
Summary for Reach Div: Diversion Swale

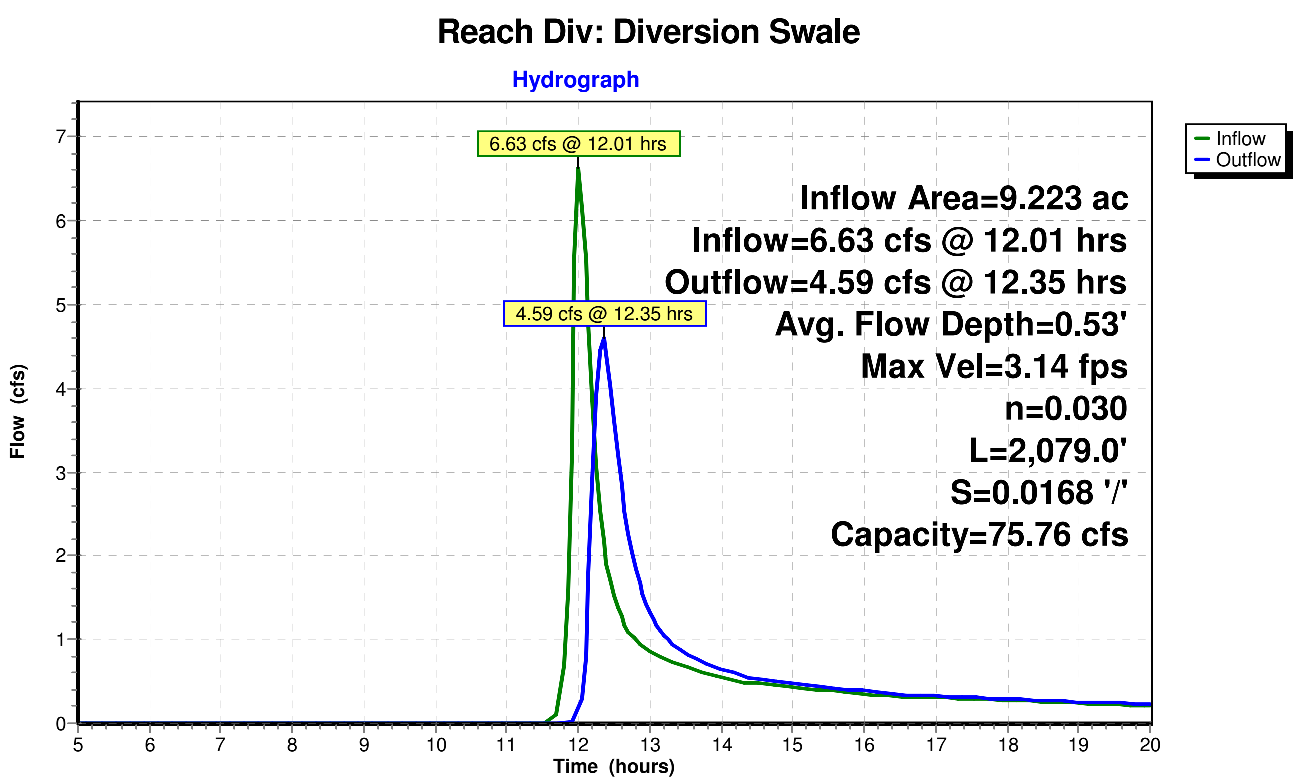
Inflow Area = 9.223 ac, 0.00% Impervious, Inflow Depth > 0.62"
Inflow = 6.63 cfs @ 12.01 hrs, Volume= 0.473 af
Outflow = 4.59 cfs @ 12.35 hrs, Volume= 0.461 af, Atten= 31%, Lag= 20.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.14 fps, Min. Travel Time= 11.0 min
Avg. Velocity = 1.60 fps, Avg. Travel Time= 21.6 min

Peak Storage= 3,066 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.53'
Bank-Full Depth= 2.00' Flow Area= 10.7 sf, Capacity= 75.76 cfs

8.00' x 2.00' deep Parabolic Channel, n= 0.030
Length= 2,079.0' Slope= 0.0168 '/'
Inlet Invert= 0.00', Outlet Invert= -35.00'



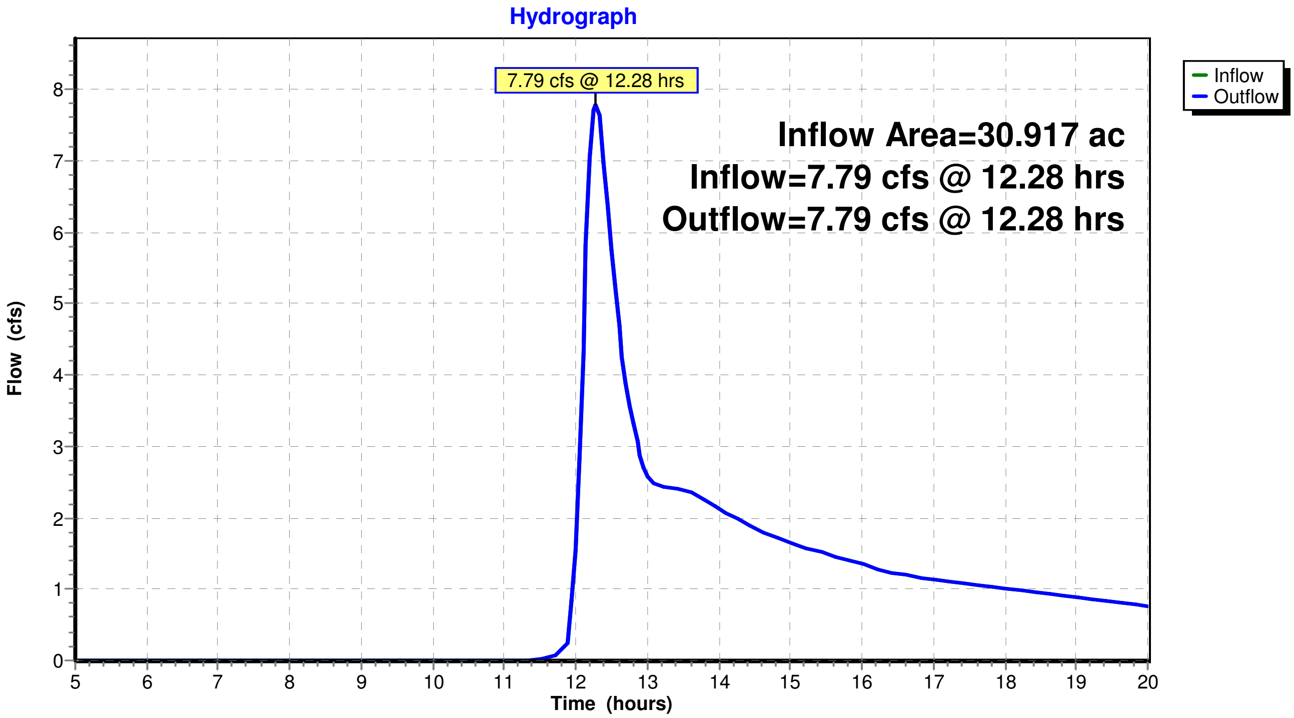


Summary for Reach DP 2: Design Point Summation 2

Inflow Area =	30.917 ac,	6.92% Impervious,	Inflow Depth >	0.48"
Inflow =	7.79 cfs @	12.28 hrs,	Volume=	1.225 af
Outflow =	7.79 cfs @	12.28 hrs,	Volume=	1.225 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 DP 2: Design Point Summation 2



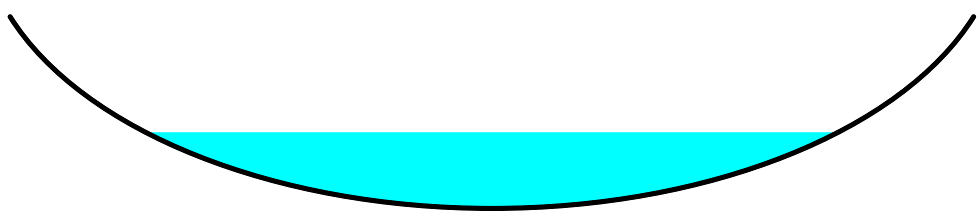
Summary for Reach RS: Road Swale

Inflow Area = 8.425 ac, 20.46% Impervious, Inflow Depth > 1.00"
Inflow = 8.45 cfs @ 12.21 hrs, Volume= 0.699 af
Outflow = 7.91 cfs @ 12.36 hrs, Volume= 0.692 af, Atten= 6%, Lag= 9.3 min

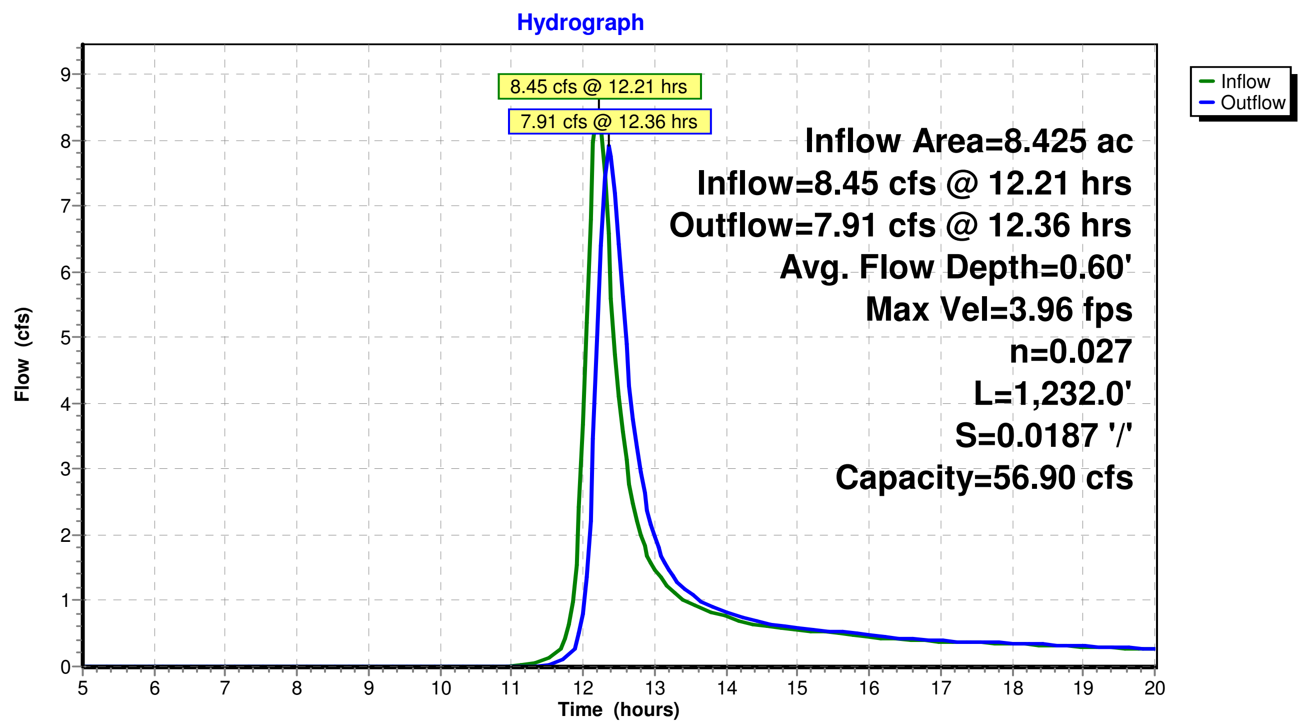
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.96 fps, Min. Travel Time= 5.2 min
Avg. Velocity = 1.78 fps, Avg. Travel Time= 11.5 min

Peak Storage= 2,470 cf @ 12.27 hrs
Average Depth at Peak Storage= 0.60'
Bank-Full Depth= 1.50' Flow Area= 8.0 sf, Capacity= 56.90 cfs

8.00' x 1.50' deep Parabolic Channel, n= 0.027
Length= 1,232.0' Slope= 0.0187 '/'
Inlet Invert= 0.00', Outlet Invert= -23.00'



Reach RS: Road Swale



Summary for Pond BR 2: Bioretention Area 2

Inflow Area = 0.386 ac, 34.86% Impervious, Inflow Depth > 1.56"
Inflow = 0.85 cfs @ 12.07 hrs, Volume= 0.050 af
Outflow = 0.18 cfs @ 12.43 hrs, Volume= 0.034 af, Atten= 79%, Lag= 21.9 min
Primary = 0.18 cfs @ 12.43 hrs, Volume= 0.034 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= 3.54' @ 12.43 hrs Surf.Area= 1,114 sf Storage= 1,050 cf
Flood Elev= 5.00' Surf.Area= 0 sf Storage= 2,454 cf

Plug-Flow detention time= 127.1 min calculated for 0.034 af (68% of inflow)
Center-of-Mass det. time= 57.5 min (852.2 - 794.7)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2,454 cf	**Custom Stage Data (Prismatic)** Listed below

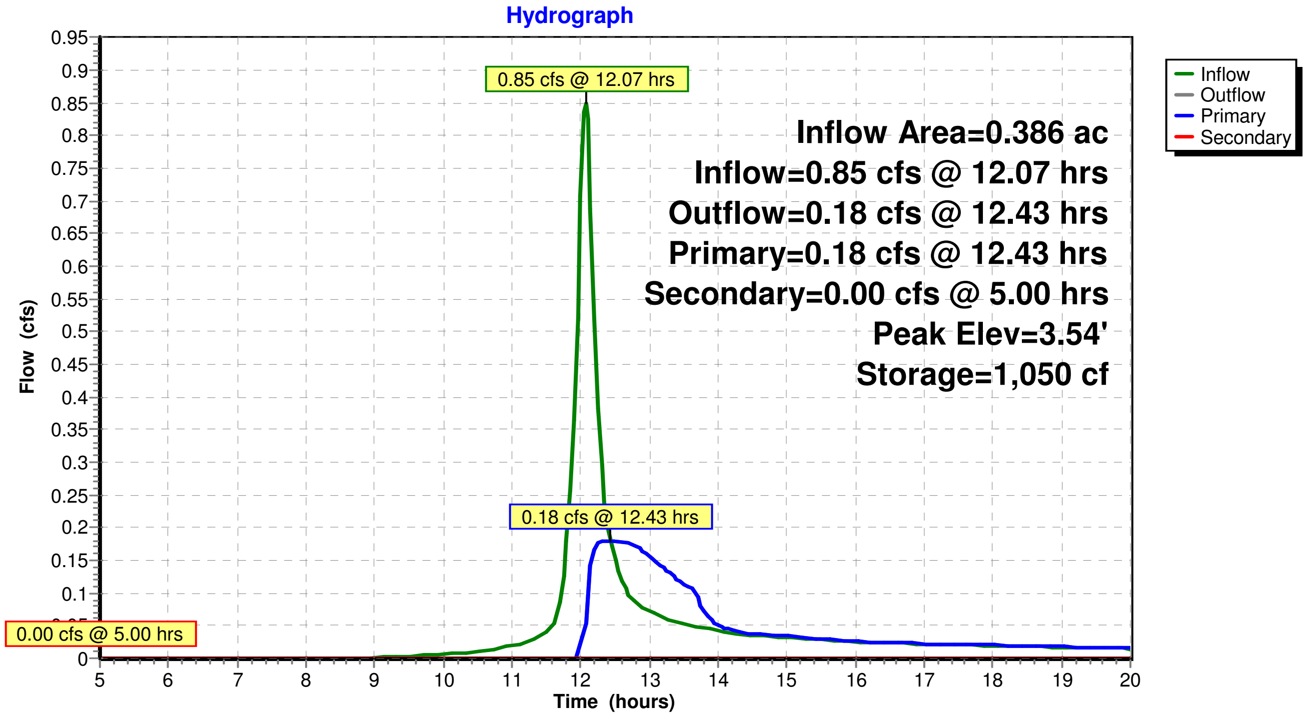
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	438	0	0
1.00	438	438	438
1.10	219	33	471
3.50	219	526	996
3.51	1,094	7	1,003
4.50	1,669	1,368	2,371
4.60	0	83	2,454

Device	Routing	Invert	Outlet Devices
#1	Secondary	4.00'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	2.00'	**4.0" Round Culvert** L= 177.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2.00' / 1.50' S= 0.0028 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.18 cfs @ 12.43 hrs HW=3.54' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.18 cfs @ 2.06 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=0.00' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BR 2: Bioretention Area 2



Summary for Pond BR 3: Bioretention Area 3

Inflow Area = 0.189 ac, 24.51% Impervious, Inflow Depth > 1.43"
Inflow = 0.48 cfs @ 12.00 hrs, Volume= 0.022 af
Outflow = 0.23 cfs @ 12.11 hrs, Volume= 0.015 af, Atten= 52%, Lag= 7.0 min
Primary = 0.23 cfs @ 12.11 hrs, Volume= 0.015 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= 2.90' @ 12.11 hrs Surf.Area= 99 sf Storage= 391 cf
Flood Elev= 5.00' Surf.Area= 0 sf Storage= 1,189 cf

Plug-Flow detention time= 116.1 min calculated for 0.015 af (69% of inflow)
Center-of-Mass det. time= 44.6 min (838.7 - 794.1)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	1,189 cf	**Custom Stage Data (Prismatic)** Listed below

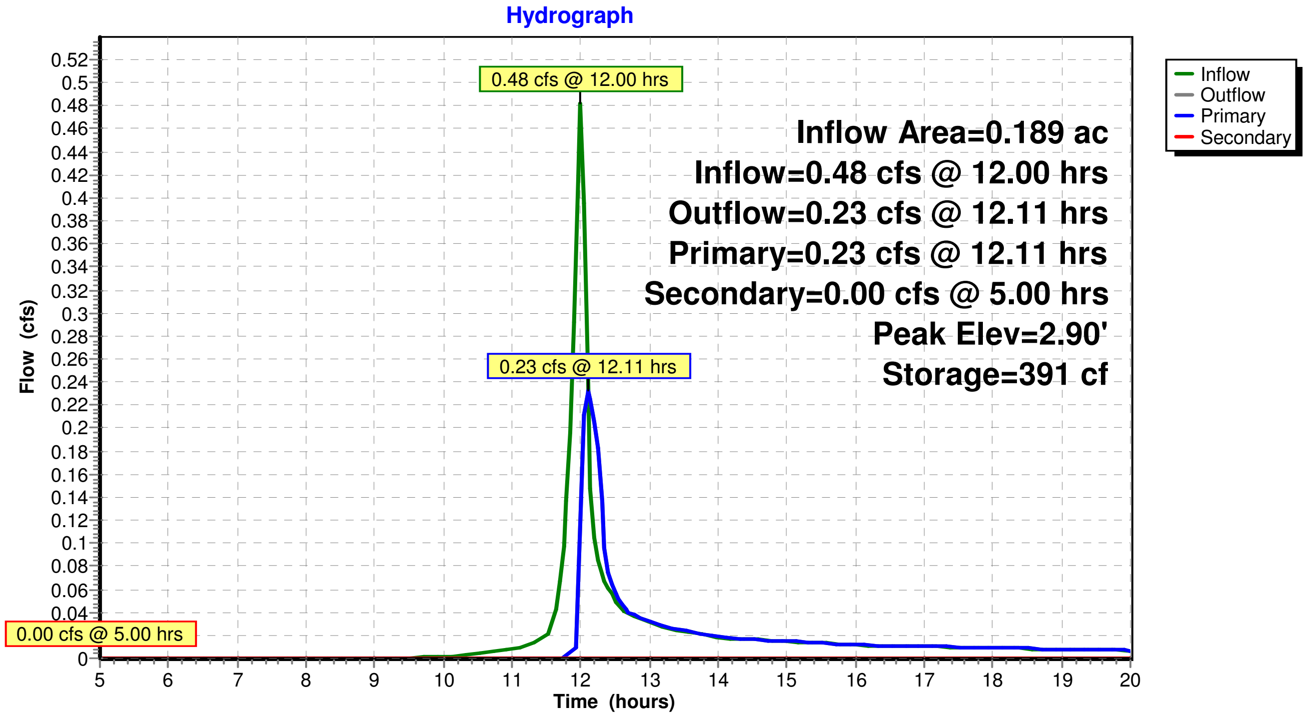
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	198	0	0
1.00	198	198	198
1.10	99	15	213
3.50	99	238	450
3.51	495	3	453
4.50	901	691	1,144
4.60	0	45	1,189

Device	Routing	Invert	Outlet Devices
#1	Secondary	4.00'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	2.00'	**4.0" Round Culvert** L= 57.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2.00' / 1.50' S= 0.0088 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.23 cfs @ 12.11 hrs HW=2.87' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.23 cfs @ 2.64 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=0.00' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BR 3: Bioretention Area 3



Summary for Pond BR 6: Bioretention Area 6

Inflow Area = 0.281 ac, 31.15% Impervious, Inflow Depth > 1.50"
Inflow = 0.86 cfs @ 11.95 hrs, Volume= 0.035 af
Outflow = 0.19 cfs @ 12.10 hrs, Volume= 0.028 af, Atten= 78%, Lag= 9.0 min
Primary = 0.19 cfs @ 12.10 hrs, Volume= 0.028 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= 3.79' @ 12.10 hrs Surf.Area= 693 sf Storage= 659 cf
Flood Elev= 5.00' Surf.Area= 0 sf Storage= 1,348 cf

Plug-Flow detention time= 95.8 min calculated for 0.027 af (78% of inflow)
Center-of-Mass det. time= 37.9 min (826.7 - 788.7)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	1,348 cf	**Custom Stage Data (Prismatic)** Listed below

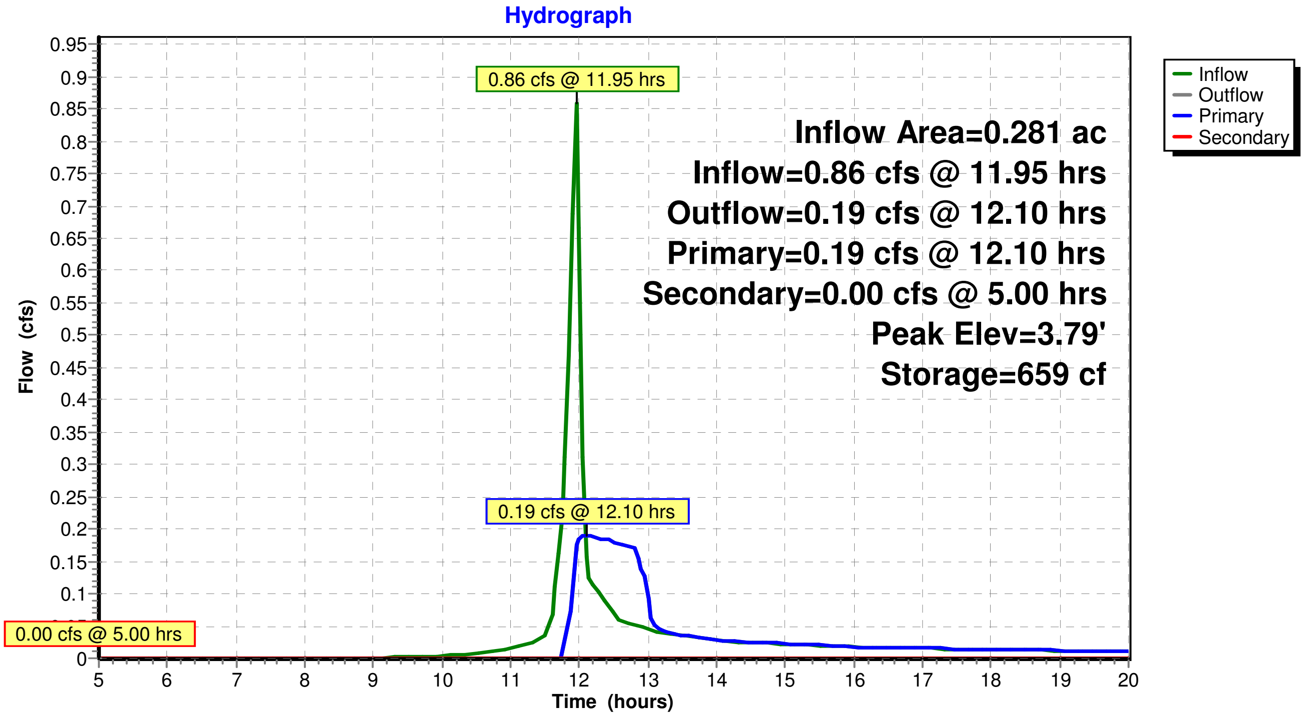
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	180	0	0
1.00	180	180	180
1.10	90	14	194
3.50	90	216	410
3.51	451	3	412
4.50	1,307	870	1,282
4.60	0	65	1,348

Device	Routing	Invert	Outlet Devices
#1	Secondary	4.00'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	2.50'	**4.0" Round Culvert** L= 132.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2.50' / 2.00' S= 0.0038 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.19 cfs @ 12.10 hrs HW=3.79' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.19 cfs @ 2.18 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=0.00' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BR 6: Bioretention Area 6



Summary for Pond BR 7: Bioretention Area 7

Inflow Area = 0.129 ac, 35.97% Impervious, Inflow Depth > 1.64"
Inflow = 0.46 cfs @ 11.90 hrs, Volume= 0.018 af
Outflow = 0.19 cfs @ 12.00 hrs, Volume= 0.011 af, Atten= 59%, Lag= 5.8 min
Primary = 0.19 cfs @ 12.00 hrs, Volume= 0.011 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= 2.52' @ 12.00 hrs Surf.Area= 99 sf Storage= 354 cf
Flood Elev= 5.00' Surf.Area= 0 sf Storage= 1,189 cf

Plug-Flow detention time= 136.6 min calculated for 0.011 af (60% of inflow)
Center-of-Mass det. time= 60.1 min (841.5 - 781.3)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	1,189 cf	**Custom Stage Data (Prismatic)** Listed below

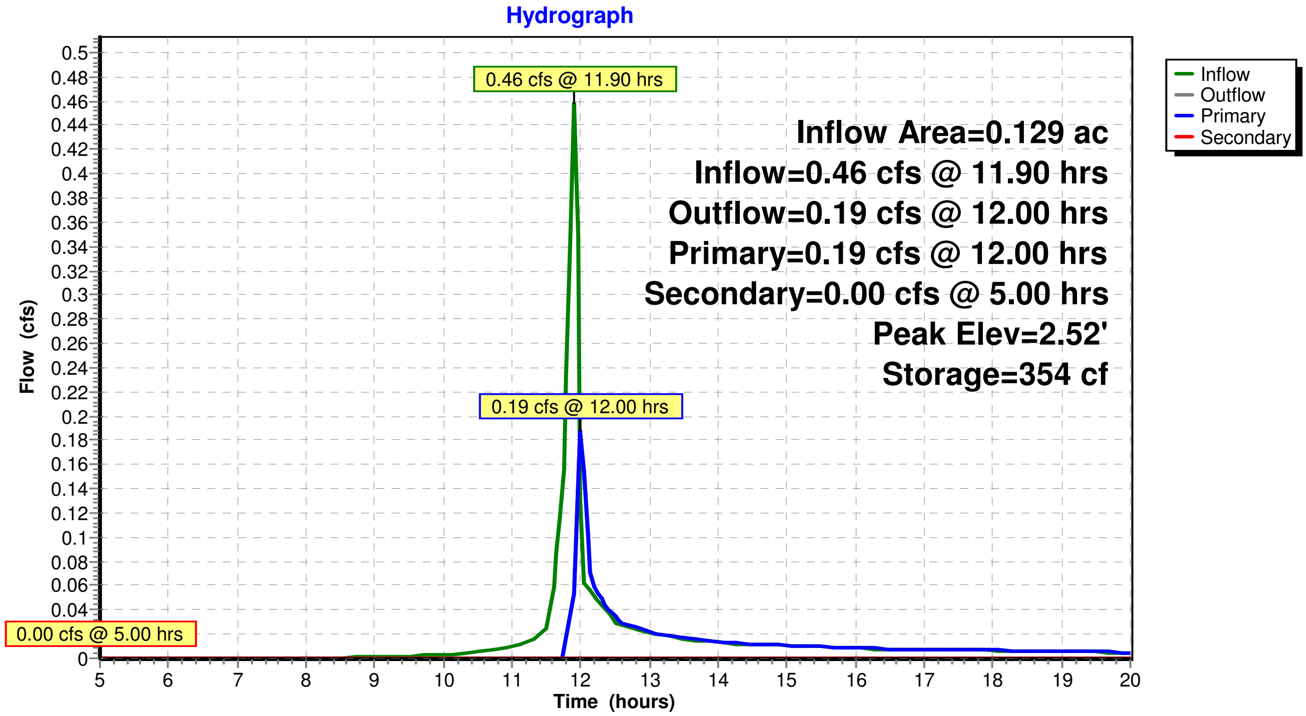
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	198	0	0
1.00	198	198	198
1.10	99	15	213
3.50	99	238	450
3.51	495	3	453
4.50	901	691	1,144
4.60	0	45	1,189

Device	Routing	Invert	Outlet Devices
#1	Secondary	4.00'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	2.00'	**4.0" Round Culvert** L= 57.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2.00' / 1.50' S= 0.0088 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.19 cfs @ 12.00 hrs HW=2.52' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.19 cfs @ 2.14 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=0.00' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BR 7: Bioretention Area 7



Summary for Pond DS: Dry Swales

Inflow Area = 0.138 ac, 48.99% Impervious, Inflow Depth > 1.50"
Inflow = 0.45 cfs @ 11.91 hrs, Volume= 0.017 af
Outflow = 0.20 cfs @ 11.99 hrs, Volume= 0.017 af, Atten= 54%, Lag= 5.3 min
Primary = 0.20 cfs @ 11.99 hrs, Volume= 0.017 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 1.46' @ 11.99 hrs Surf.Area= 350 sf Storage= 172 cf
Flood Elev= 5.00' Surf.Area= 0 sf Storage= 1,146 cf

Plug-Flow detention time= 14.2 min calculated for 0.017 af (99% of inflow)
Center-of-Mass det. time= 9.8 min (796.2 - 786.4)

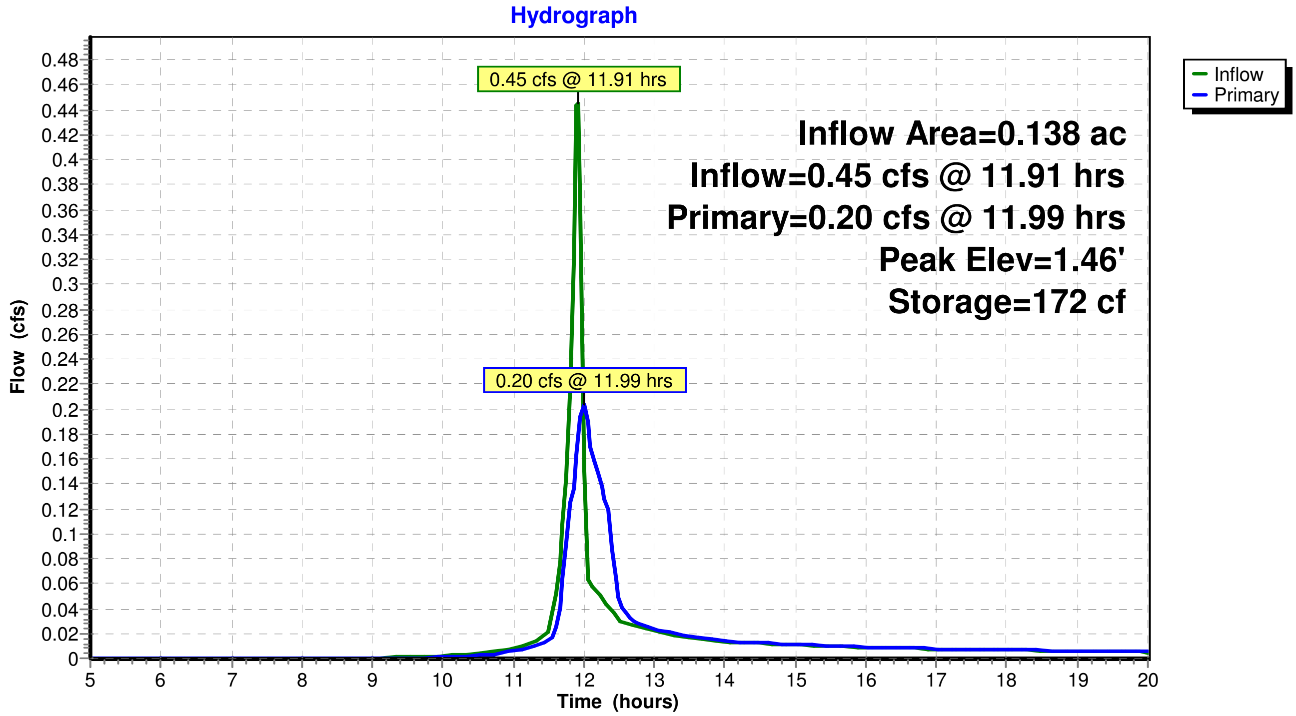
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	573 cf	**Custom Stage Data (Prismatic)** Listed below
		573 cf	x 2.00 = 1,146 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	175	0.0	0	0
1.00	175	40.0	70	70
1.10	175	20.0	4	74
3.50	175	20.0	84	158
3.51	175	100.0	2	159
4.50	600	100.0	384	543
4.60	0	100.0	30	573

Device	Routing	Invert	Outlet Devices
#1	Primary	4.00'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	0.00'	**4.0" Round Culvert** L= 127.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 0.00' / -0.50' S= 0.0039 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.20 cfs @ 11.99 hrs HW=1.44' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└—**2=Culvert** (Barrel Controls 0.20 cfs @ 2.33 fps)

Pond DS: Dry Swales



Summary for Pond FB: Forebay

Inflow Area =	8.425 ac, 20.46% Impervious, Inflow Depth > 0.99"		
Inflow =	7.91 cfs @ 12.36 hrs, Volume=	0.692 af	
Outflow =	11.55 cfs @ 12.40 hrs, Volume=	0.625 af,	Atten= 0%, Lag= 2.1 min
Primary =	11.55 cfs @ 12.40 hrs, Volume=	0.625 af	

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 4.80' @ 12.40 hrs Surf.Area= 0 sf Storage= 2,928 cf
Flood Elev= 4.00' Surf.Area= 1,536 sf Storage= 2,852 cf

Plug-Flow detention time= 42.4 min calculated for 0.625 af (90% of inflow)
Center-of-Mass det. time= 11.4 min (844.0 - 832.6)

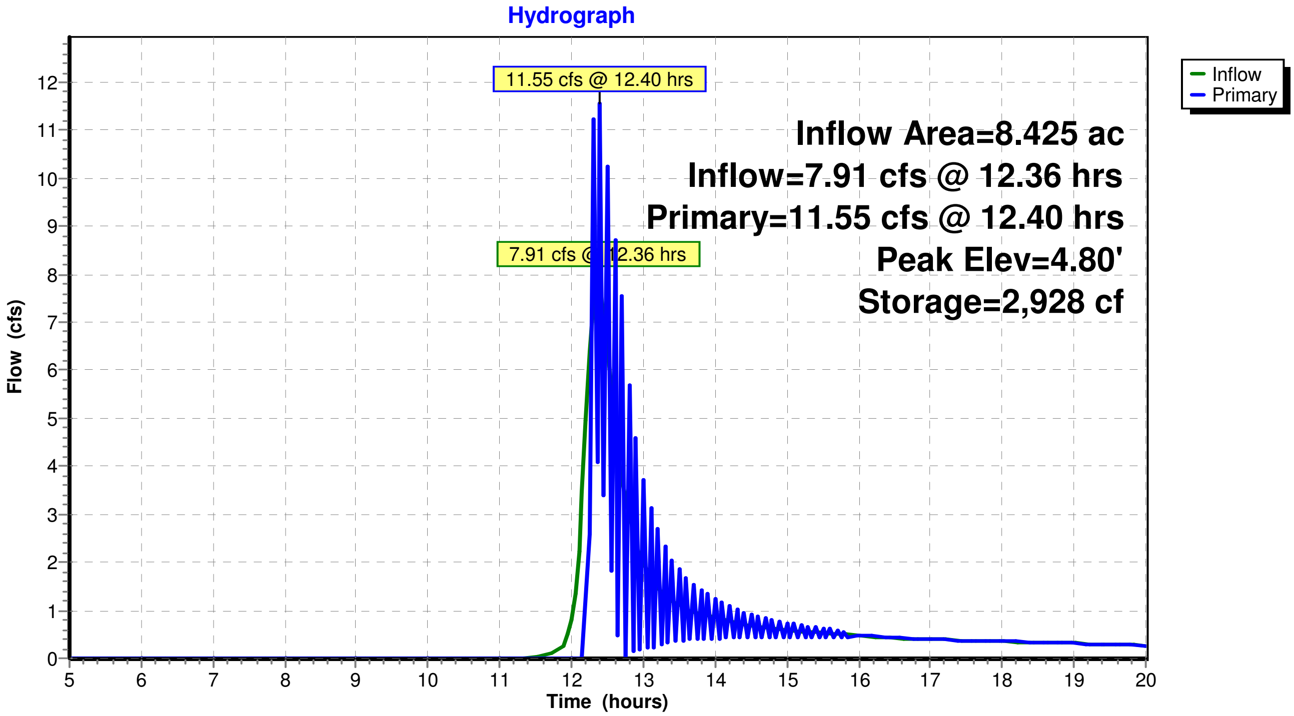
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2,928 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	113	0	0
1.00	345	229	229
2.00	633	489	718
3.00	1,049	841	1,559
4.00	1,536	1,293	2,852
4.10	0	77	2,928

Device	Routing	Invert	Outlet Devices
#1	Primary	4.00'	**6.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=11.37 cfs @ 12.40 hrs HW=4.79' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 11.37 cfs @ 2.39 fps)

Pond FB: Forebay



Summary for Pond P: Pond

Inflow Area = 8.425 ac, 20.46% Impervious, Inflow Depth > 0.89"
Inflow = 11.55 cfs @ 12.40 hrs, Volume= 0.625 af
Outflow = 0.86 cfs @ 13.94 hrs, Volume= 0.305 af, Atten= 93%, Lag= 92.7 min
Primary = 0.86 cfs @ 13.94 hrs, Volume= 0.305 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
Starting Elev= 4.00' Surf.Area= 7,635 sf Storage= 5,821 cf
Peak Elev= 5.43' @ 13.94 hrs Surf.Area= 12,612 sf Storage= 20,998 cf (15,177 cf above start)
Flood Elev= 7.50' Surf.Area= 0 sf Storage= 46,941 cf (41,120 cf above start)

Plug-Flow detention time= 296.5 min calculated for 0.171 af (27% of inflow)
Center-of-Mass det. time= 111.7 min (955.8 - 844.0)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	46,941 cf	**Custom Stage Data (Prismatic)** Listed below

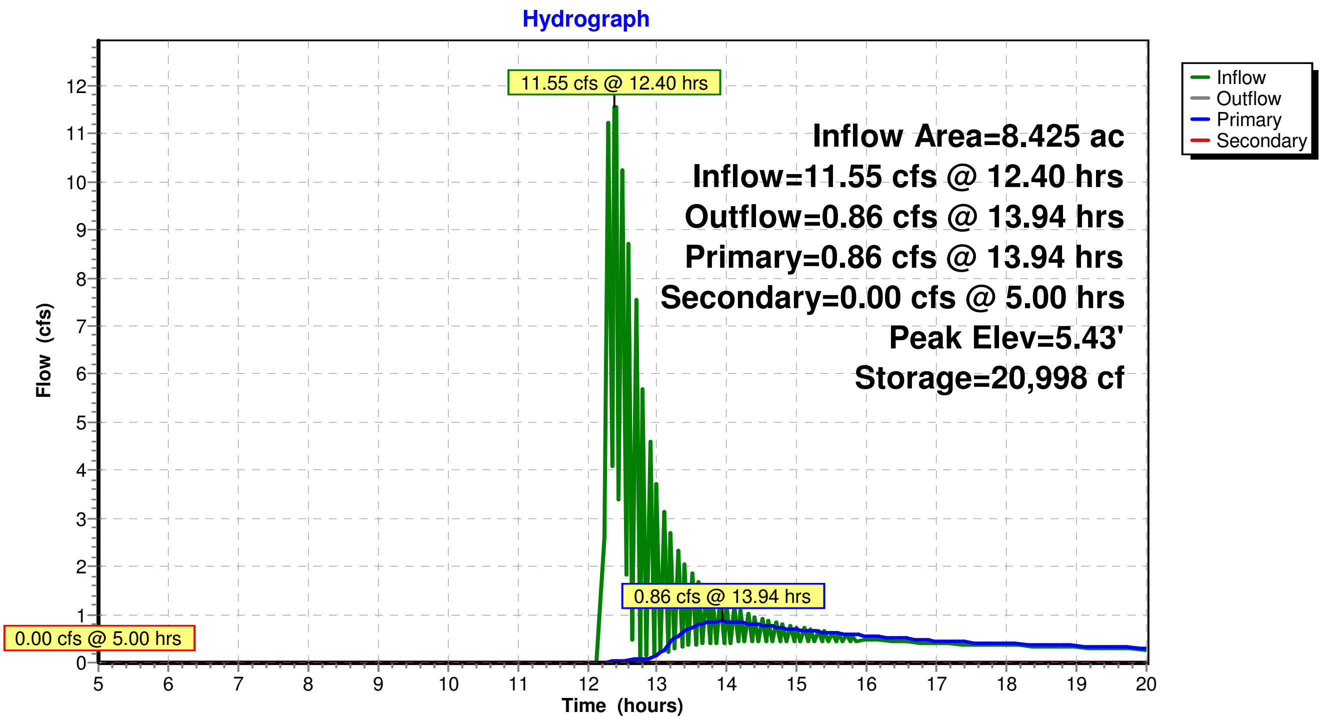
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	113	0	0
1.00	314	214	214
2.00	616	465	679
3.00	1,017	817	1,495
4.00	7,635	4,326	5,821
5.00	11,788	9,712	15,533
6.00	13,709	12,749	28,281
7.00	15,740	14,725	43,006
7.50	0	3,935	46,941

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**12.0" Round Culvert** L= 104.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 0.00' / -1.00' S= 0.0096 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	4.00'	**1.5" Vert. Orifice/Grate** C= 0.600
#3	Device 1	5.25'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	6.50'	**25.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=0.85 cfs @ 13.94 hrs HW=5.43' (Free Discharge)
└**1=Culvert** (Passes 0.85 cfs of 6.46 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.07 cfs @ 5.63 fps)
  └**3=Orifice/Grate** (Weir Controls 0.78 cfs @ 1.38 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=4.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond P: Pond



Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.519	39	>75% Grass cover, Good, HSG A (PSC 7)
0.491	61	>75% Grass cover, Good, HSG B (PSC 7)
3.449	74	>75% Grass cover, Good, HSG C (PSC 2, PSC 3, PSC 6, PSC 7, PSC-7A)
2.435	30	Brush, Good, HSG A (OSC 3)
0.360	48	Brush, Good, HSG B (OSC 3)
21.522	65	Brush, Good, HSG C (OSC 1, OSC 3, PSC 7, PSC 8, UP 1, UP 2)
2.059	98	Paved parking & roofs (PSC 2, PSC 3, PSC 6, PSC 7, PSC 8)
0.046	98	Roofs, HSG C (PSC-7A)
0.035	98	Unconnected roofs, HSG A (OSC 3)
30.917	**65**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.989	HSG A	OSC 3, PSC 7
0.851	HSG B	OSC 3, PSC 7
25.018	HSG C	OSC 1, OSC 3, PSC 2, PSC 3, PSC 6, PSC 7, PSC 8, PSC-7A, UP 1, UP 2
0.000	HSG D	
2.059	Other	PSC 2, PSC 3, PSC 6, PSC 7, PSC 8
30.917		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.519	0.491	3.449	0.000	0.000	4.460	>75% Grass cover, Good	PSC 2, PSC 3, PSC 6, PSC 7, PSC-7A
2.435	0.360	21.522	0.000	0.000	24.317	Brush, Good	OSC 1, OSC 3, PSC 7, PSC 8, UP 1, UP 2
0.000	0.000	0.000	0.000	2.059	2.059	Paved parking & roofs	PSC 2, PSC 3, PSC 6, PSC 7, PSC 8
0.000	0.000	0.046	0.000	0.000	0.046	Roofs	PSC-7A
0.035	0.000	0.000	0.000	0.000	0.035	Unconnected roofs	OSC 3
2.989	**0.851**	**25.018**	**0.000**	**2.059**	**30.917**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	BR 2	2.00	1.50	177.0	0.0028	0.013	4.0	0.0	0.0
2	BR 3	2.00	1.50	57.0	0.0088	0.013	4.0	0.0	0.0
3	BR 6	2.50	2.00	132.0	0.0038	0.013	4.0	0.0	0.0
4	BR 7	2.00	1.50	57.0	0.0088	0.013	4.0	0.0	0.0
5	DS	0.00	-0.50	127.0	0.0039	0.013	4.0	0.0	0.0
6	P	0.00	-1.00	104.0	0.0096	0.013	12.0	0.0	0.0

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 OSC 1: Off-Site Runoff Area=143,197 sf 0.00% Impervious Runoff Depth>2.04"
Flow Length=2,079' Slope=0.0170 '/' Tc=4.6 min CN=65 Runoff=13.52 cfs 0.559 af

Subcatchment OSC 3: Off-Site Runoff Area=529,093 sf 0.28% Impervious Runoff Depth>1.48"
Flow Length=1,570' Tc=19.6 min CN=58 Runoff=20.84 cfs 1.500 af

Subcatchment PSC 2: Proposed Runoff Area=16,829 sf 34.86% Impervious Runoff Depth>3.58"
Flow Length=170' Tc=14.8 min CN=82 Runoff=1.90 cfs 0.115 af

Subcatchment PSC 3: Proposed Runoff Area=8,226 sf 24.51% Impervious Runoff Depth>3.39"
Flow Length=146' Tc=8.0 min CN=80 Runoff=1.11 cfs 0.053 af

Subcatchment PSC 6: Proposed Runoff Area=12,258 sf 31.15% Impervious Runoff Depth>3.49"
Flow Length=49' Tc=4.1 min CN=81 Runoff=1.92 cfs 0.082 af

Subcatchment PSC 7: Proposed Runoff Area=366,995 sf 20.46% Impervious Runoff Depth>2.71"
Flow Length=1,566' Tc=25.5 min CN=73 Runoff=23.85 cfs 1.903 af

Subcatchment PSC 8: Proposed Runoff Area=5,995 sf 48.99% Impervious Runoff Depth>3.49"
Flow Length=148' Slope=0.0500 '/' Tc=1.1 min CN=81 Runoff=1.00 cfs 0.040 af

Subcatchment PSC-7A: Proposed Runoff Area=5,604 sf 35.97% Impervious Runoff Depth>3.69"
Flow Length=35' Slope=0.0100 '/' Tc=0.8 min CN=83 Runoff=0.98 cfs 0.040 af

Subcatchment UP 1: Upland Watershed 1 Runoff Area=187,023 sf 0.00% Impervious Runoff Depth>2.03"
Flow Length=557' Tc=15.0 min CN=65 Runoff=12.13 cfs 0.727 af

Subcatchment UP 2: Upland Watershed 2 Runoff Area=71,533 sf 0.00% Impervious Runoff Depth>2.03"
Flow Length=410' Slope=0.0300 '/' Tc=14.5 min CN=65 Runoff=4.73 cfs 0.278 af

Reach Div: Diversion Swale Avg. Flow Depth=1.08' Max Vel=4.89 fps Inflow=25.04 cfs 1.564 af
n=0.030 L=2,079.0' S=0.0168 '/' Capacity=75.76 cfs Outflow=20.53 cfs 1.543 af

Reach DP 2: Design Point Summation 2 Inflow=43.42 cfs 4.821 af
Outflow=43.42 cfs 4.821 af

Reach RS: Road Swale Avg. Flow Depth=0.98' Max Vel=5.46 fps Inflow=23.85 cfs 1.903 af
n=0.027 L=1,232.0' S=0.0187 '/' Capacity=56.90 cfs Outflow=22.96 cfs 1.891 af

Pond BR 2: Bioretention Area 2 Peak Elev=4.19' Storage=1,945 cf Inflow=1.90 cfs 0.115 af
Primary=0.21 cfs 0.074 af Secondary=1.28 cfs 0.025 af Outflow=1.49 cfs 0.099 af

Pond BR 3: Bioretention Area 3 Peak Elev=4.07' Storage=845 cf Inflow=1.11 cfs 0.053 af
Primary=0.34 cfs 0.044 af Secondary=0.30 cfs 0.002 af Outflow=0.64 cfs 0.046 af

Pond BR 6: Bioretention Area 6 Peak Elev=4.22' Storage=1,034 cf Inflow=1.92 cfs 0.082 af
Primary=0.22 cfs 0.055 af Secondary=1.54 cfs 0.020 af Outflow=1.76 cfs 0.074 af

Pond BR 7: Bioretention Area 7 Peak Elev=3.87' Storage=708 cf Inflow=0.98 cfs 0.040 af
Primary=0.32 cfs 0.033 af Secondary=0.00 cfs 0.000 af Outflow=0.32 cfs 0.033 af

Pond DS: Dry Swales Peak Elev=3.73' Storage=491 cf Inflow=1.00 cfs 0.040 af
Outflow=0.32 cfs 0.040 af

Pond FB: Forebay Peak Elev=5.28' Storage=2,928 cf Inflow=22.96 cfs 1.891 af
Outflow=23.15 cfs 1.824 af

Pond P: Pond Peak Elev=6.70' Storage=38,587 cf Inflow=23.15 cfs 1.824 af
Primary=4.65 cfs 1.325 af Secondary=5.39 cfs 0.160 af Outflow=10.04 cfs 1.486 af

Total Runoff Area = 30.917 ac Runoff Volume = 5.297 af Average Runoff Depth = 2.06"
93.08% Pervious = 28.777 ac 6.92% Impervious = 2.140 ac

Summary for Subcatchment OSC 1: Off-Site Subcatchment 1

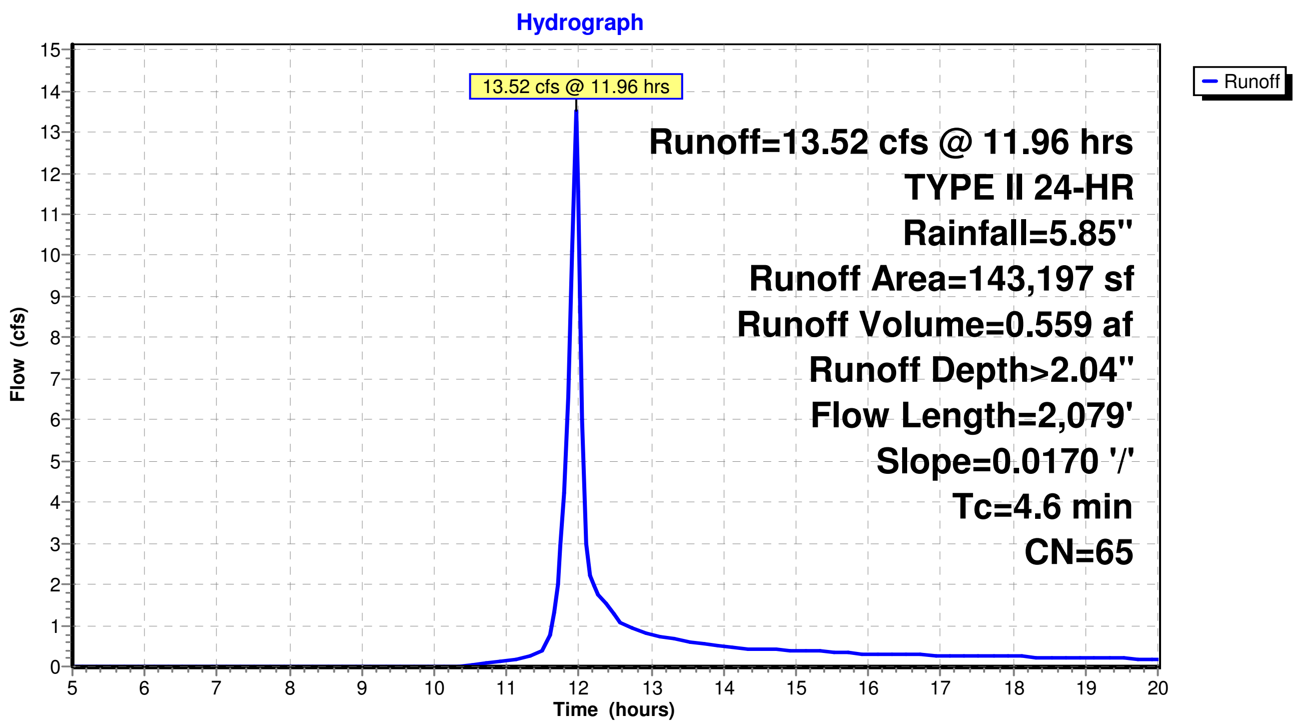
Runoff = 13.52 cfs @ 11.96 hrs, Volume= 0.559 af, Depth> 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=5.85"

Area (sf)	CN	Description
143,197	65	Brush, Good, HSG C
143,197		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	2,079	0.0170	7.61	121.77	**Trap/Vee/Rect Channel Flow, Balance of Longest Flowpath** Bot.W=2.00' D=2.00' Z= 3.0 '/' Top.W=14.00' n= 0.027

Subcatchment OSC 1: Off-Site Subcatchment 1



Summary for Subcatchment OSC 3: Off-Site Subcatchment 3

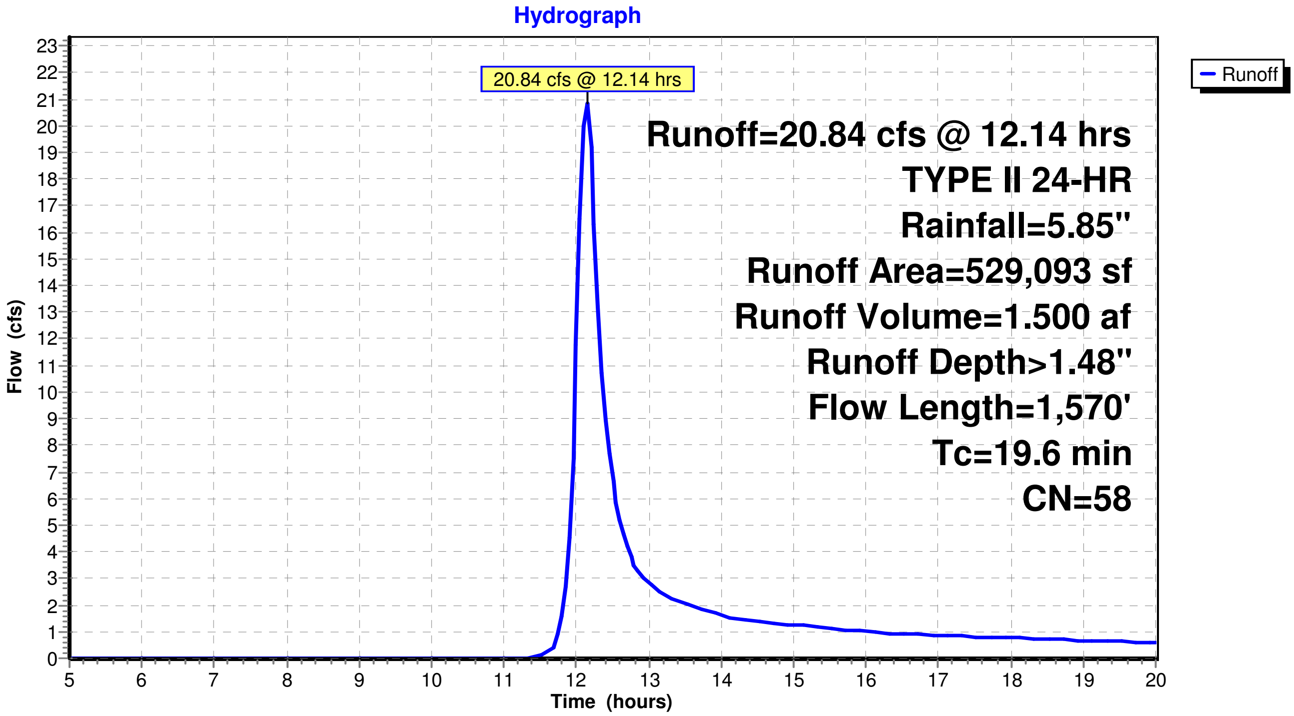
Runoff = 20.84 cfs @ 12.14 hrs, Volume= 1.500 af, Depth> 1.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=5.85"

Area (sf)	CN	Description
106,079	30	Brush, Good, HSG A
15,682	48	Brush, Good, HSG B
405,827	65	Brush, Good, HSG C
1,505	98	Unconnected roofs, HSG A
529,093	58	Weighted Average
527,588		99.72% Pervious Area
1,505		0.28% Impervious Area
1,505		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	100	0.0400	0.14		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
6.8	1,064	0.0300	2.60		**Shallow Concentrated Flow, Balance of Flow to Channel** Grassed Waterway Kv= 15.0 fps
1.0	406	0.0110	6.52	130.46	**Trap/Vee/Rect Channel Flow, Balance of Flowpath** Bot.W=4.00' D=2.00' Z= 3.0 '/' Top.W=16.00' n= 0.027
19.6	1,570	Total			

Subcatchment OSC 3: Off-Site Subcatchment 3



Summary for Subcatchment PSC 2: Proposed Subcatchment 2

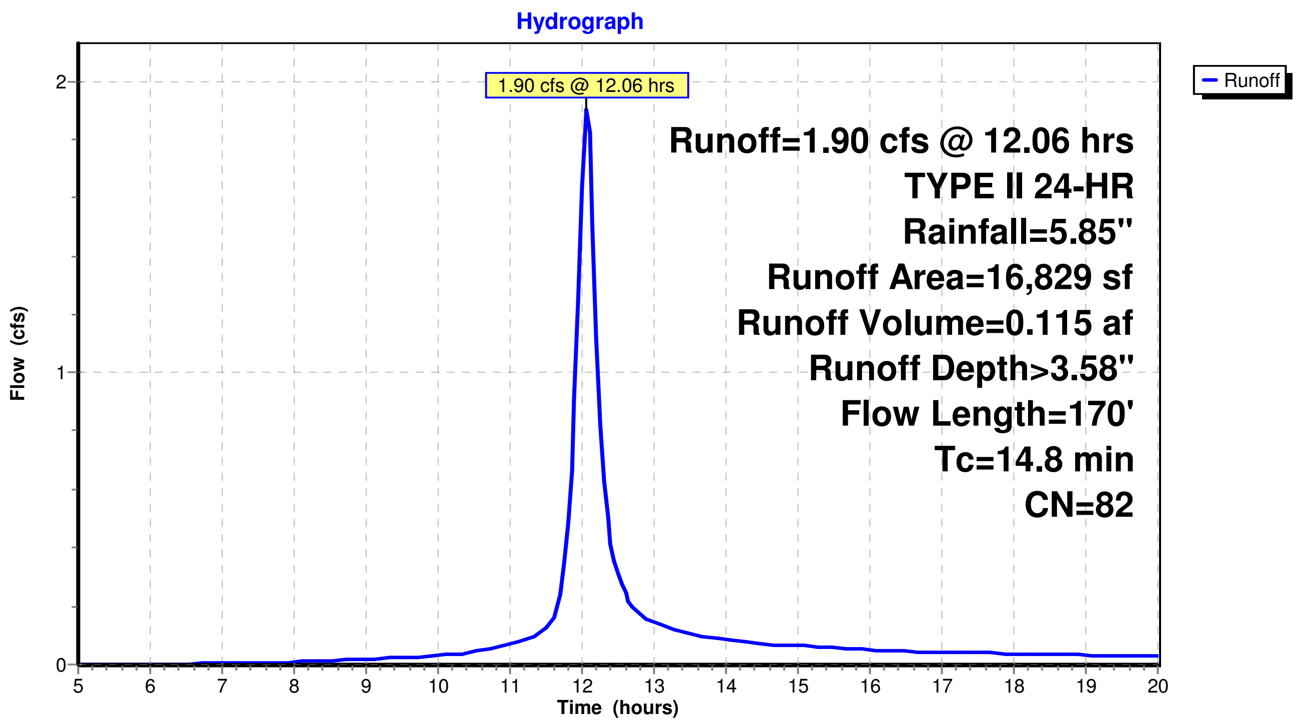
Runoff = 1.90 cfs @ 12.06 hrs, Volume= 0.115 af, Depth> 3.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=5.85"

Area (sf)	CN	Description
5,866	98	Paved parking & roofs
10,963	74	>75% Grass cover, Good, HSG C
16,829	82	Weighted Average
10,963		65.14% Pervious Area
5,866		34.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0100	0.12		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
0.6	65	0.0070	1.70		**Shallow Concentrated Flow, Balance of Flow to Channel** Paved Kv= 20.3 fps
0.1	5	0.0070	1.25		**Shallow Concentrated Flow, Balance of Longest Flowpath** Grassed Waterway Kv= 15.0 fps
14.8	170	Total			

Subcatchment PSC 2: Proposed Subcatchment 2



Summary for Subcatchment PSC 3: Proposed Subcatchment 3

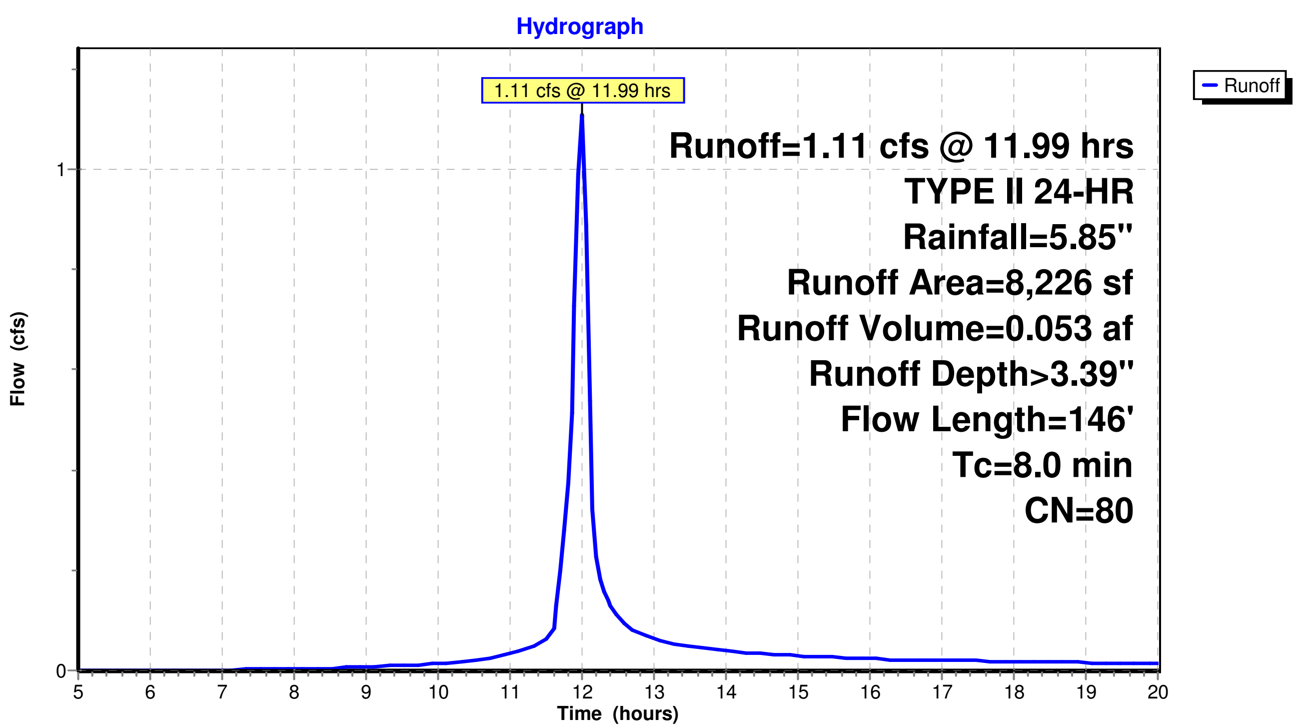
Runoff = 1.11 cfs @ 11.99 hrs, Volume= 0.053 af, Depth> 3.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=5.85"

Area (sf)	CN	Description
2,016	98	Paved parking & roofs
6,210	74	>75% Grass cover, Good, HSG C
8,226	80	Weighted Average
6,210		75.49% Pervious Area
2,016		24.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	76	0.0300	0.17		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
0.6	65	0.0070	1.70		**Shallow Concentrated Flow, Balance of Flow to Channel** Paved Kv= 20.3 fps
0.1	5	0.0070	1.25		**Shallow Concentrated Flow, Balance of Longest Flowpath** Grassed Waterway Kv= 15.0 fps
8.0	146	Total			

Subcatchment PSC 3: Proposed Subcatchment 3



Summary for Subcatchment PSC 6: Proposed Subcatchment 6

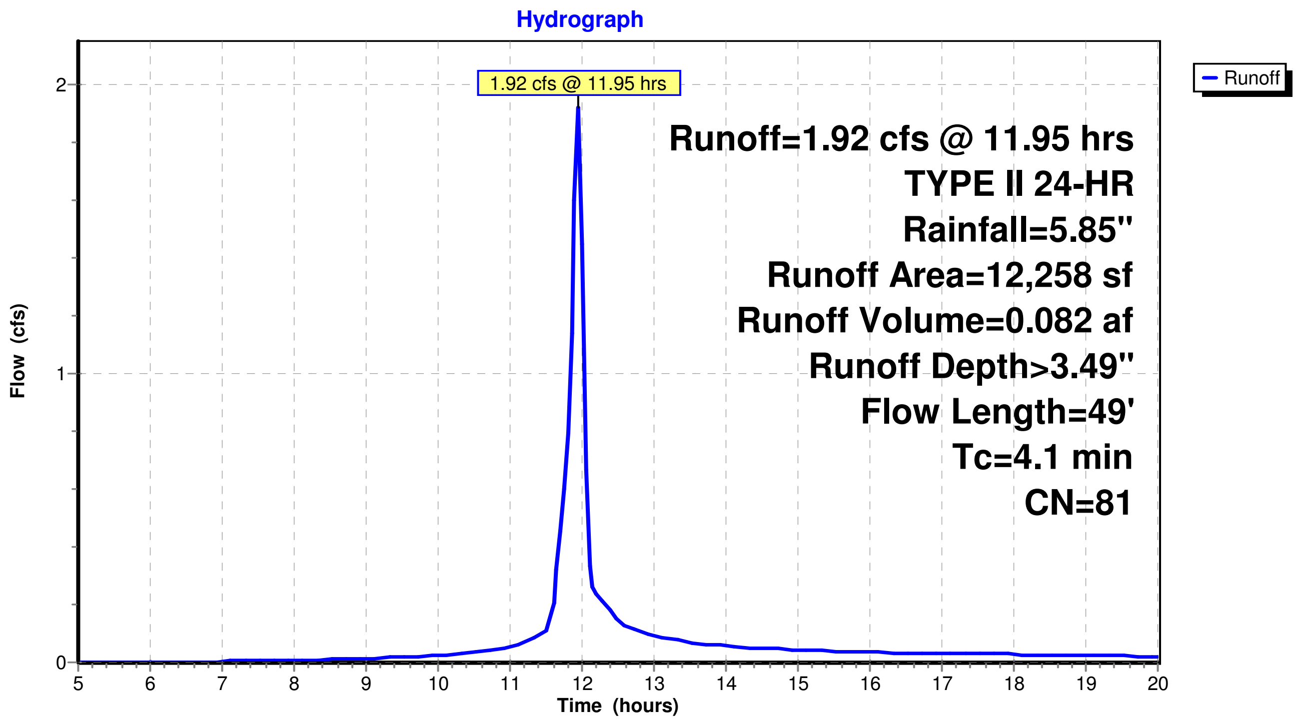
Runoff = 1.92 cfs @ 11.95 hrs, Volume= 0.082 af, Depth> 3.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=5.85"

Area (sf)	CN	Description
3,818	98	Paved parking & roofs
8,440	74	>75% Grass cover, Good, HSG C
12,258	81	Weighted Average
8,440		68.85% Pervious Area
3,818		31.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	23	0.0200	0.12		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
0.8	26	0.0050	0.55		**Sheet Flow, Balance of Longest Flowpath** Smooth surfaces n= 0.011 P2= 2.70"
4.1	49	Total			

Subcatchment PSC 6: Proposed Subcatchment 6



Summary for Subcatchment PSC 7: Proposed Subcatchment 7

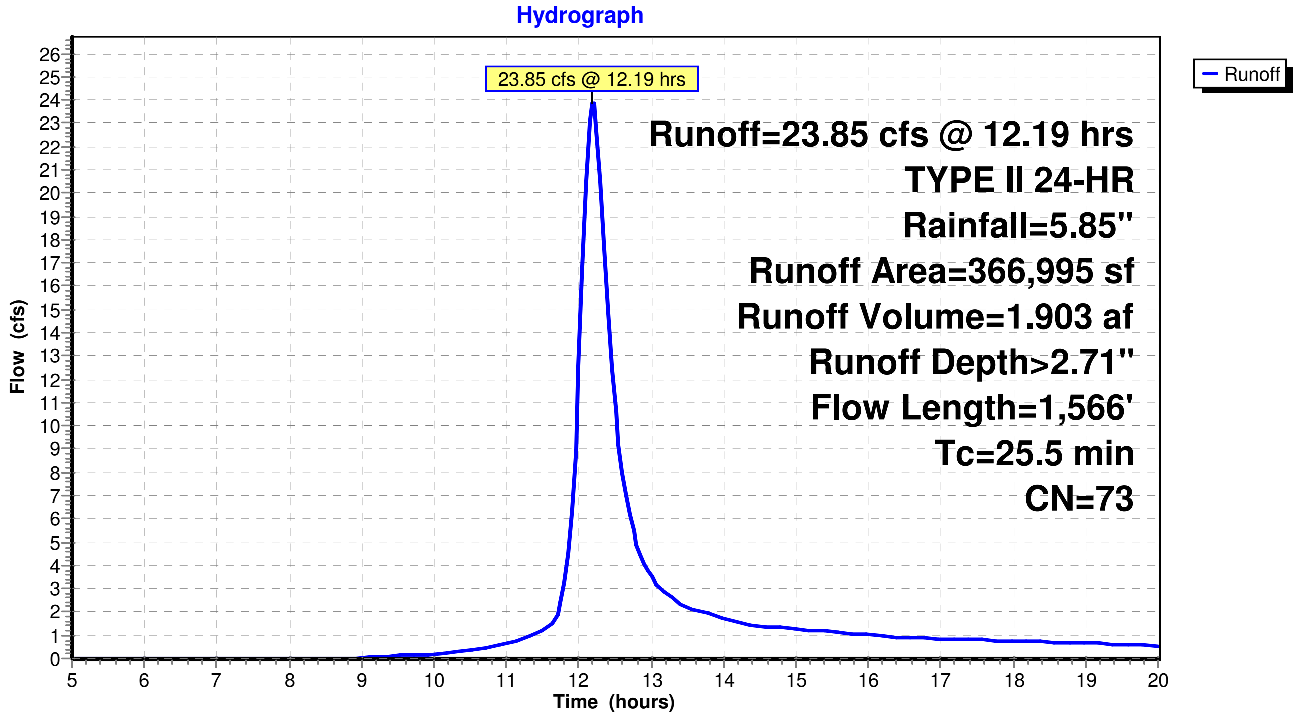
Runoff = 23.85 cfs @ 12.19 hrs, Volume= 1.903 af, Depth> 2.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=5.85"

Area (sf)	CN	Description
10,696	98	Paved parking & roofs
22,613	39	>75% Grass cover, Good, HSG A
14,492	98	Paved parking & roofs
21,401	61	>75% Grass cover, Good, HSG B
31,721	98	Paved parking & roofs
18,164	98	Paved parking & roofs
121,053	74	>75% Grass cover, Good, HSG C
126,855	65	Brush, Good, HSG C
366,995	73	Weighted Average
291,922		79.54% Pervious Area
75,073		20.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0100	0.08		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
2.5	350	0.0240	2.32		**Shallow Concentrated Flow, Balance of Flow to Road** Grassed Waterway Kv= 15.0 fps
0.1	16	0.0100	2.03		**Shallow Concentrated Flow, Balance of Flow to Swale** Paved Kv= 20.3 fps
2.4	1,100	0.0170	7.61	121.77	**Trap/Vee/Rect Channel Flow, Balance of Longest Flowpath** Bot.W=2.00' D=2.00' Z= 3.0 '/' Top.W=14.00' n= 0.027
25.5	1,566	Total			

Subcatchment PSC 7: Proposed Subcatchment 7



Summary for Subcatchment PSC 8: Proposed Subcatchment 8

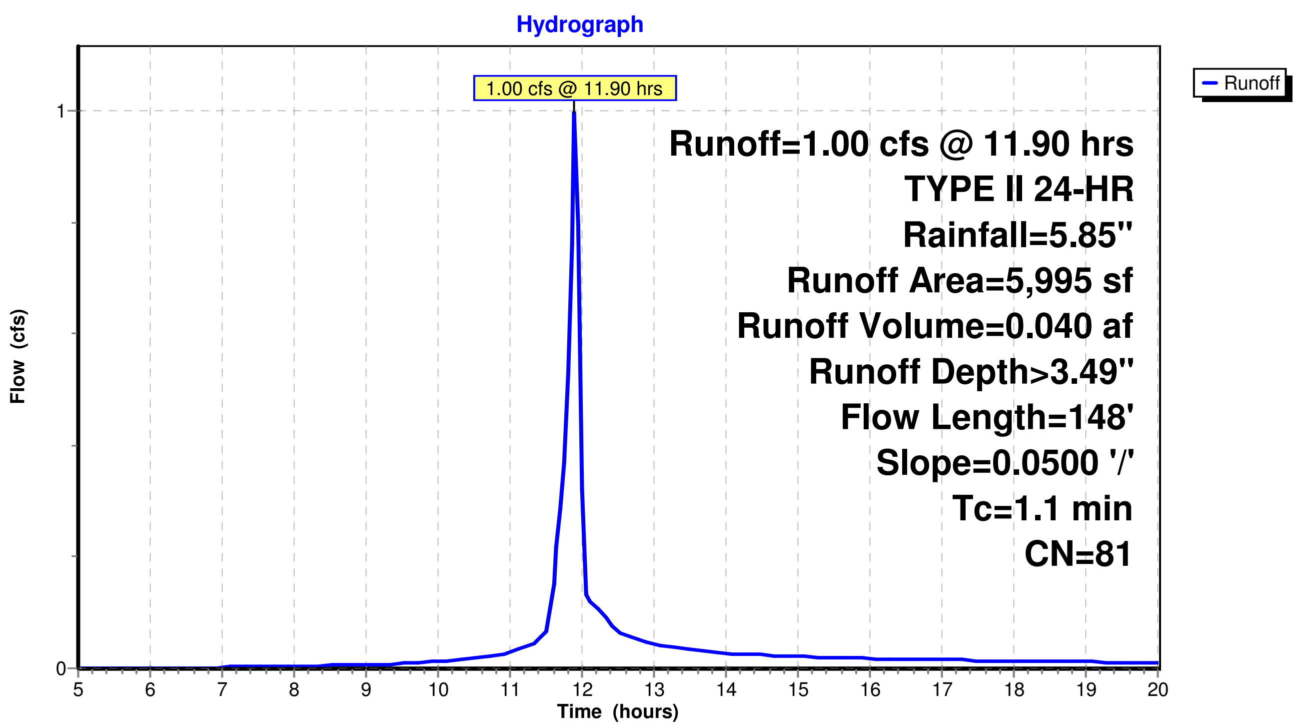
Runoff = 1.00 cfs @ 11.90 hrs, Volume= 0.040 af, Depth> 3.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=5.85"

Area (sf)	CN	Description
2,937	98	Paved parking & roofs
3,058	65	Brush, Good, HSG C
5,995	81	Weighted Average
3,058		51.01% Pervious Area
2,937		48.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	100	0.0500	1.82		**Sheet Flow, First 100' Flowpath** Smooth surfaces n= 0.011 P2= 2.70"
0.2	48	0.0500	4.54		**Shallow Concentrated Flow, Balance of Flow to Channel** Paved Kv= 20.3 fps
1.1	148	Total			

Subcatchment PSC 8: Proposed Subcatchment 8



Summary for Subcatchment PSC-7A: Proposed Subcatchment 7A

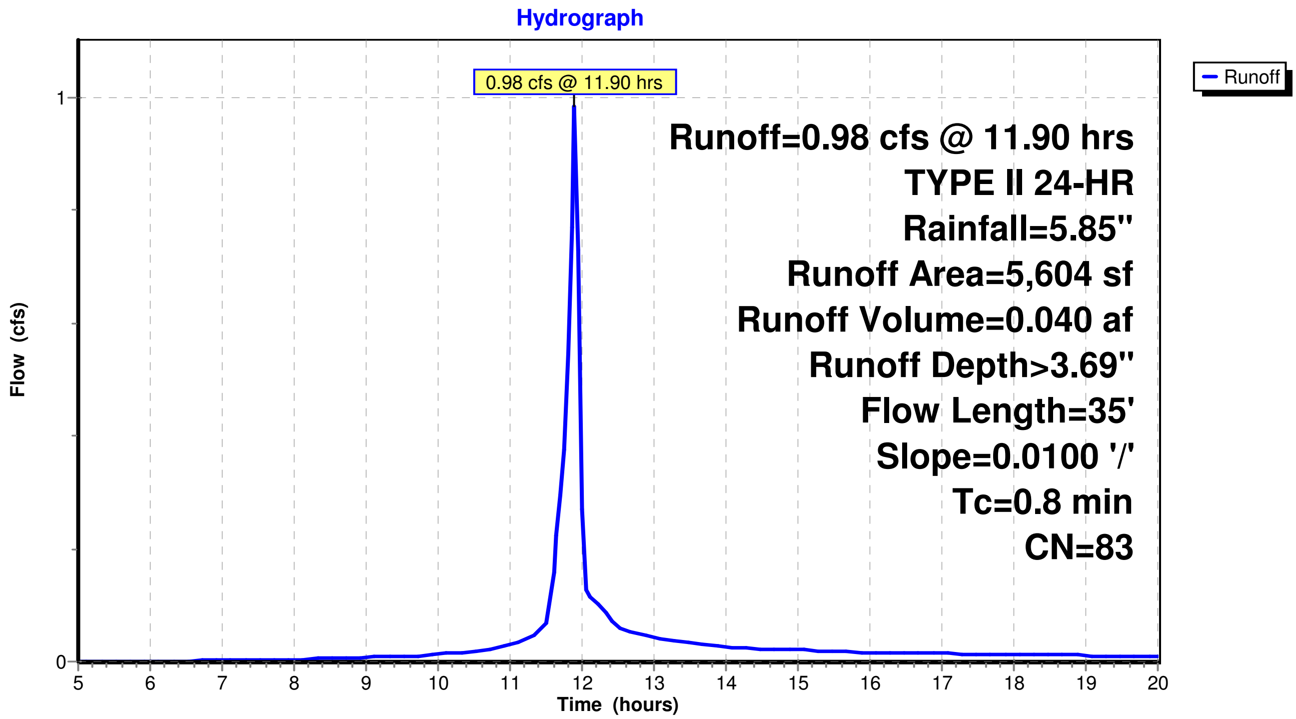
Runoff = 0.98 cfs @ 11.90 hrs, Volume= 0.040 af, Depth> 3.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=5.85"

Area (sf)	CN	Description
3,588	74	>75% Grass cover, Good, HSG C
2,016	98	Roofs, HSG C
5,604	83	Weighted Average
3,588		64.03% Pervious Area
2,016		35.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	35	0.0100	0.78		**Sheet Flow, Balance of Longest Flowpath** Smooth surfaces n= 0.011 P2= 2.70"

Subcatchment PSC-7A: Proposed Subcatchment 7A



Summary for Subcatchment UP 1: Upland Watershed 1

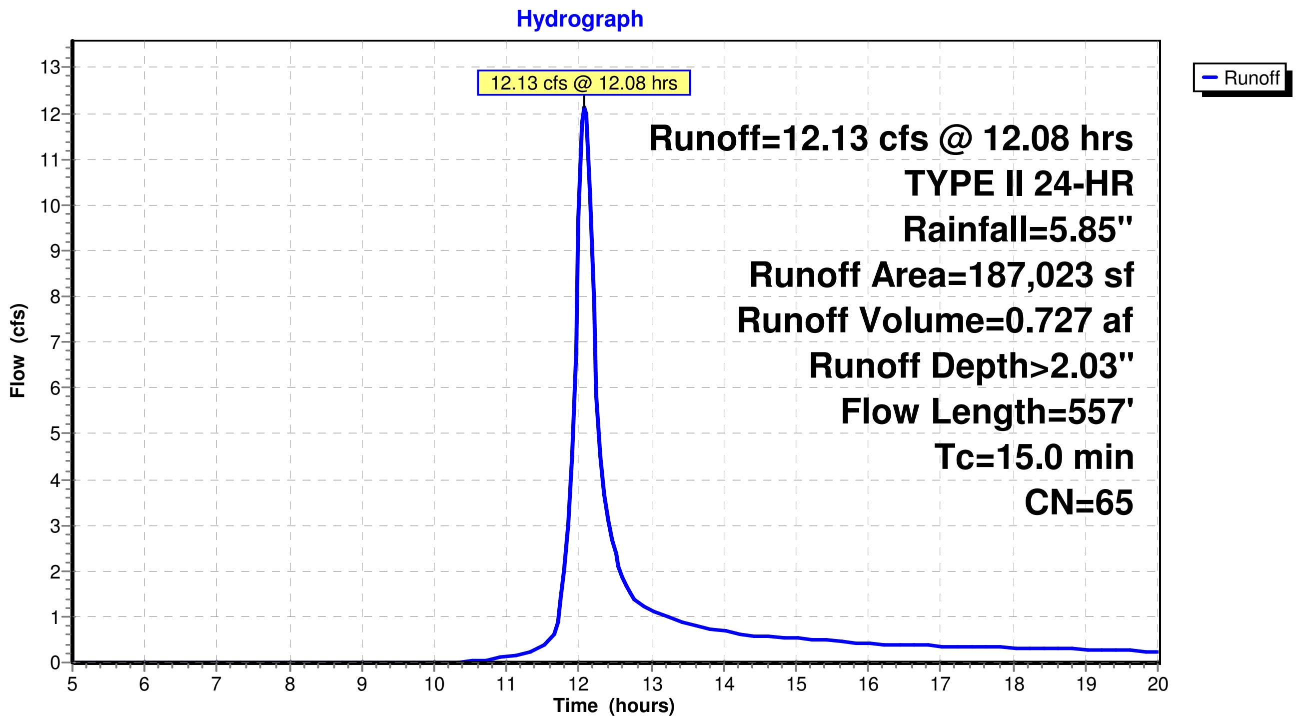
Runoff = 12.13 cfs @ 12.08 hrs, Volume= 0.727 af, Depth> 2.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=5.85"

Area (sf)	CN	Description
187,023	65	Brush, Good, HSG C
187,023		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	100	0.0360	0.14		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
2.7	457	0.0350	2.81		**Shallow Concentrated Flow, Balance of Longest Flowpath** Grassed Waterway Kv= 15.0 fps
15.0	557	Total			

Subcatchment UP 1: Upland Watershed 1



Summary for Subcatchment UP 2: Upland Watershed 2

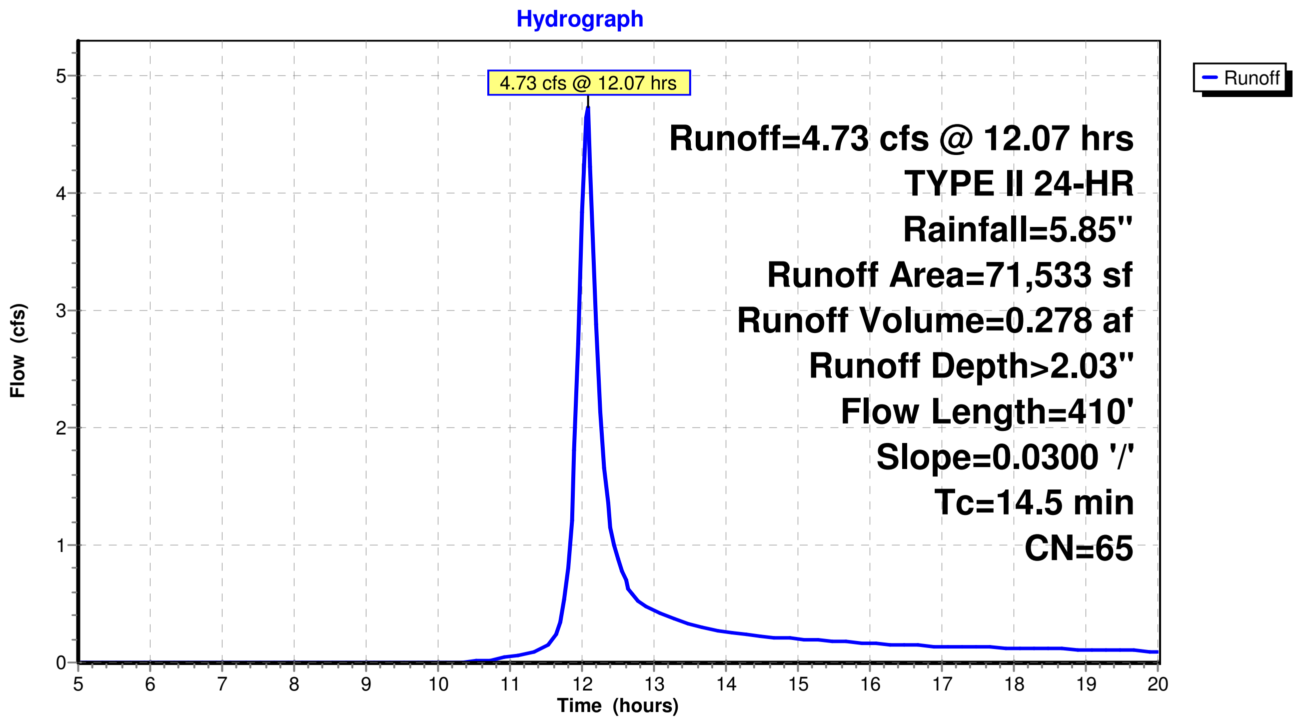
Runoff = 4.73 cfs @ 12.07 hrs, Volume= 0.278 af, Depth> 2.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
TYPE II 24-HR Rainfall=5.85"

Area (sf)	CN	Description
71,533	65	Brush, Good, HSG C
71,533		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.9	155	0.0300	0.20		**Sheet Flow, First 100' Flowpath** Grass: Short n= 0.150 P2= 2.70"
1.6	255	0.0300	2.60		**Shallow Concentrated Flow, Balance of Longest Flowpath** Grassed Waterway Kv= 15.0 fps
14.5	410	Total			

Subcatchment UP 2: Upland Watershed 2



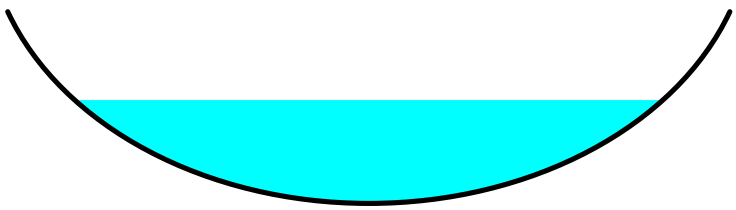
Summary for Reach Div: Diversion Swale

Inflow Area = 9.223 ac, 0.00% Impervious, Inflow Depth > 2.04"
Inflow = 25.04 cfs @ 12.00 hrs, Volume= 1.564 af
Outflow = 20.53 cfs @ 12.21 hrs, Volume= 1.543 af, Atten= 18%, Lag= 12.6 min

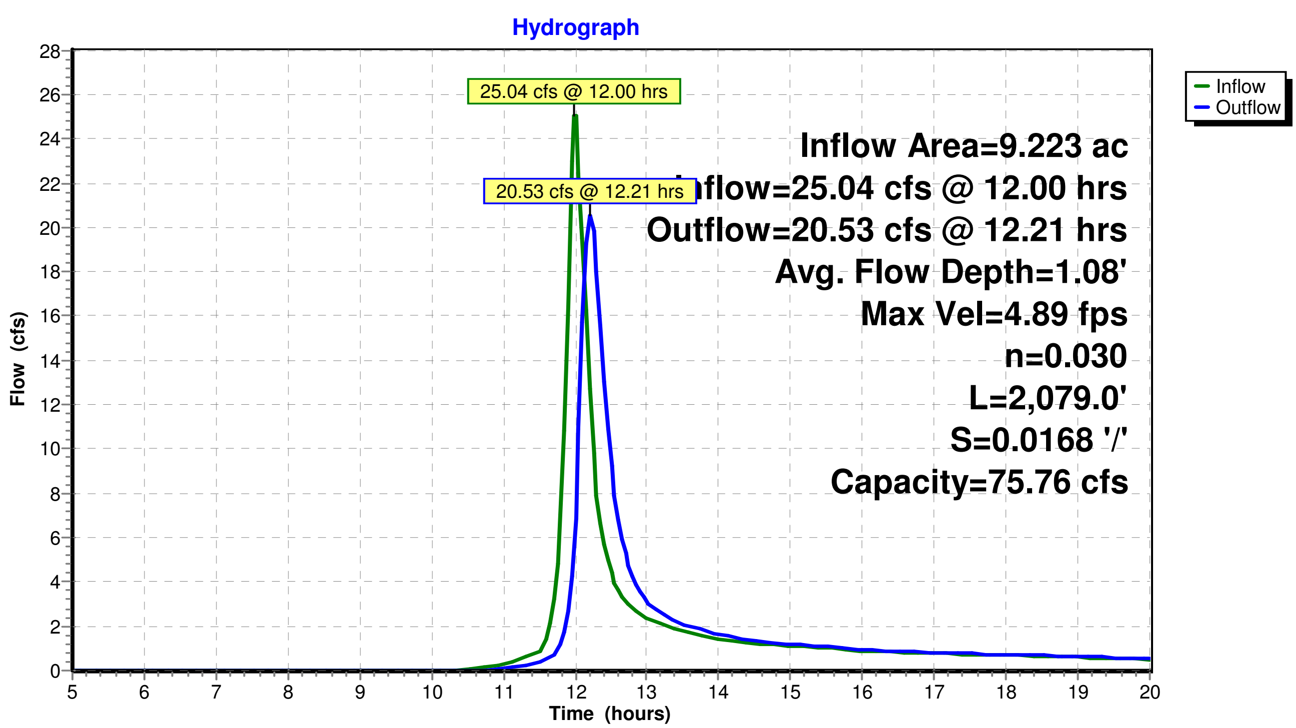
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.89 fps, Min. Travel Time= 7.1 min
Avg. Velocity = 2.03 fps, Avg. Travel Time= 17.1 min

Peak Storage= 8,794 cf @ 12.09 hrs
Average Depth at Peak Storage= 1.08'
Bank-Full Depth= 2.00' Flow Area= 10.7 sf, Capacity= 75.76 cfs

8.00' x 2.00' deep Parabolic Channel, n= 0.030
Length= 2,079.0' Slope= 0.0168 '/'
Inlet Invert= 0.00', Outlet Invert= -35.00'



Reach Div: Diversion Swale

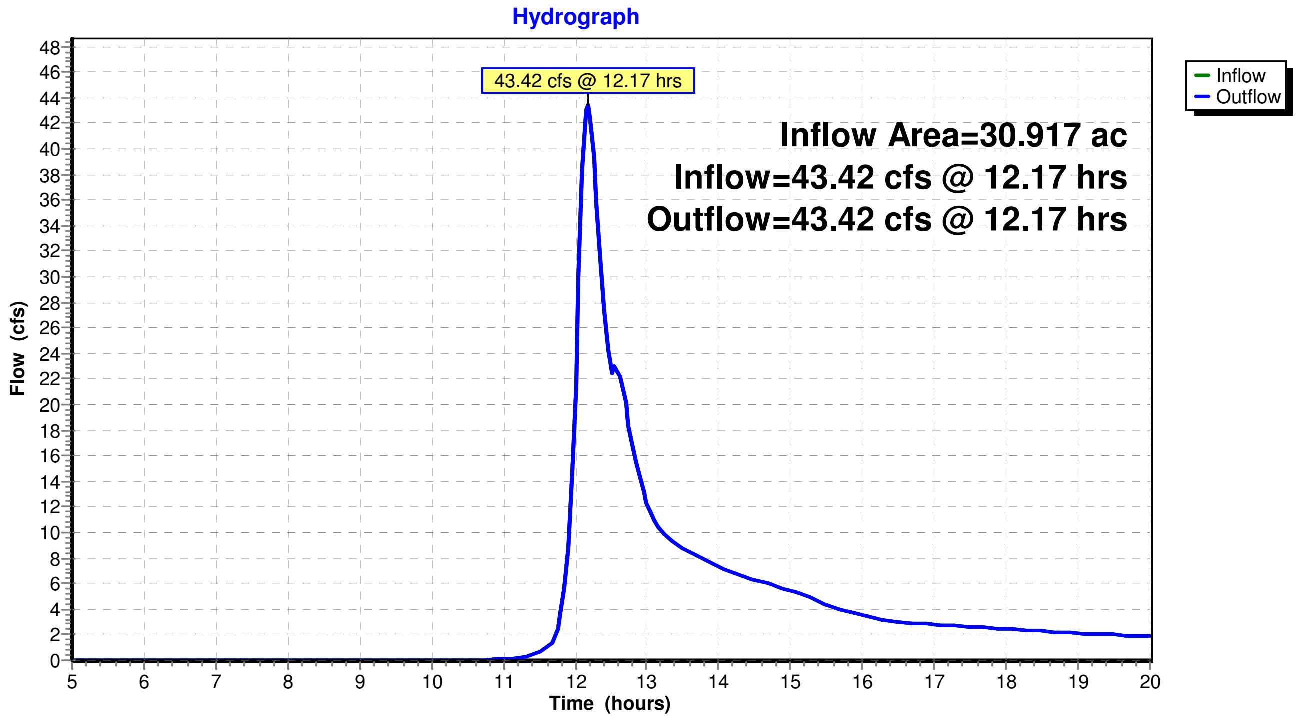


Summary for Reach DP 2: Design Point Summation 2

Inflow Area = 30.917 ac, 6.92% Impervious, Inflow Depth > 1.87"
Inflow = 43.42 cfs @ 12.17 hrs, Volume= 4.821 af
Outflow = 43.42 cfs @ 12.17 hrs, Volume= 4.821 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 DP 2: Design Point Summation 2



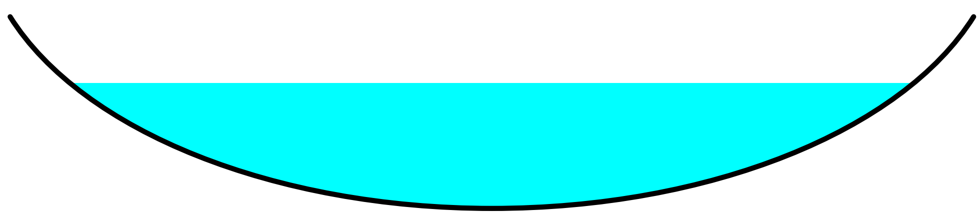
Summary for Reach RS: Road Swale

Inflow Area = 8.425 ac, 20.46% Impervious, Inflow Depth > 2.71"
Inflow = 23.85 cfs @ 12.19 hrs, Volume= 1.903 af
Outflow = 22.96 cfs @ 12.31 hrs, Volume= 1.891 af, Atten= 4%, Lag= 6.7 min

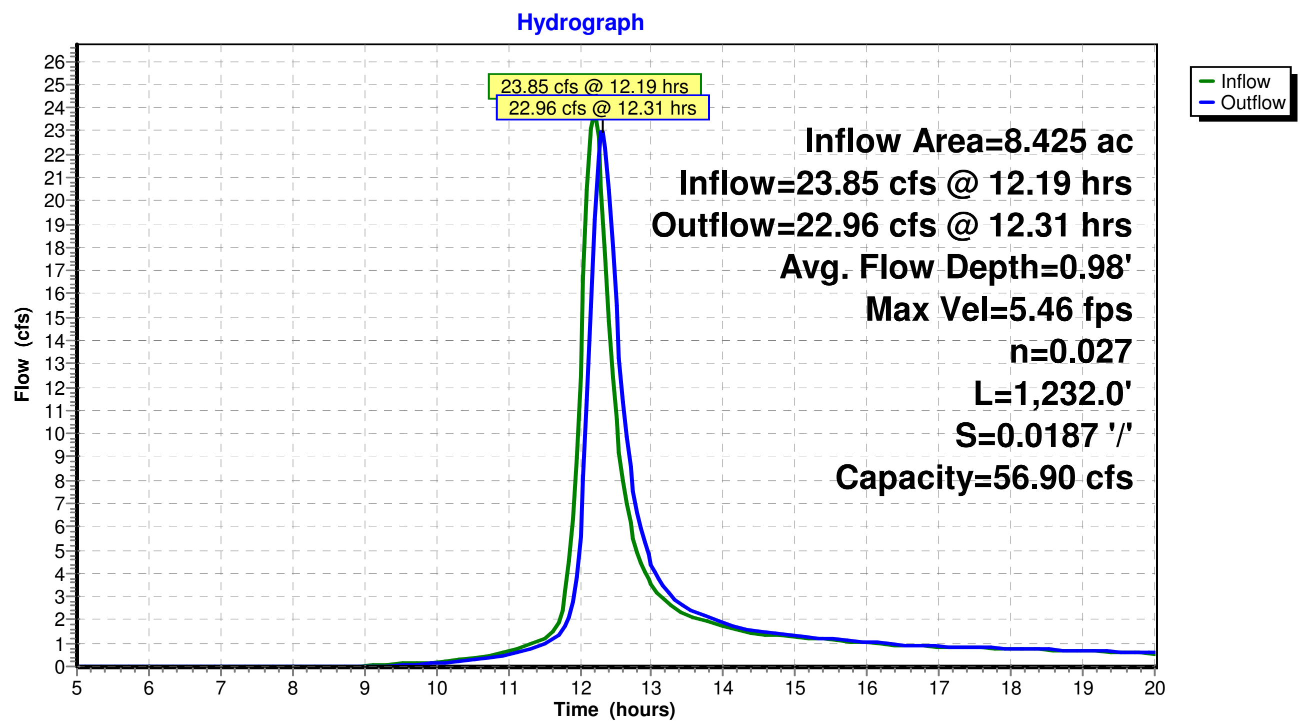
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.46 fps, Min. Travel Time= 3.8 min
Avg. Velocity = 2.13 fps, Avg. Travel Time= 9.6 min

Peak Storage= 5,217 cf @ 12.24 hrs
Average Depth at Peak Storage= 0.98'
Bank-Full Depth= 1.50' Flow Area= 8.0 sf, Capacity= 56.90 cfs

8.00' x 1.50' deep Parabolic Channel, n= 0.027
Length= 1,232.0' Slope= 0.0187 '/'
Inlet Invert= 0.00', Outlet Invert= -23.00'



Reach RS: Road Swale



Summary for Pond BR 2: Bioretention Area 2

Inflow Area = 0.386 ac, 34.86% Impervious, Inflow Depth > 3.58"
Inflow = 1.90 cfs @ 12.06 hrs, Volume= 0.115 af
Outflow = 1.49 cfs @ 12.17 hrs, Volume= 0.099 af, Atten= 21%, Lag= 6.2 min
Primary = 0.21 cfs @ 12.17 hrs, Volume= 0.074 af
Secondary = 1.28 cfs @ 12.17 hrs, Volume= 0.025 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 4.19' @ 12.17 hrs Surf.Area= 1,490 sf Storage= 1,945 cf
Flood Elev= 5.00' Surf.Area= 0 sf Storage= 2,454 cf

Plug-Flow detention time= 98.8 min calculated for 0.099 af (86% of inflow)
Center-of-Mass det. time= 56.7 min (833.1 - 776.5)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2,454 cf	**Custom Stage Data (Prismatic)** Listed below

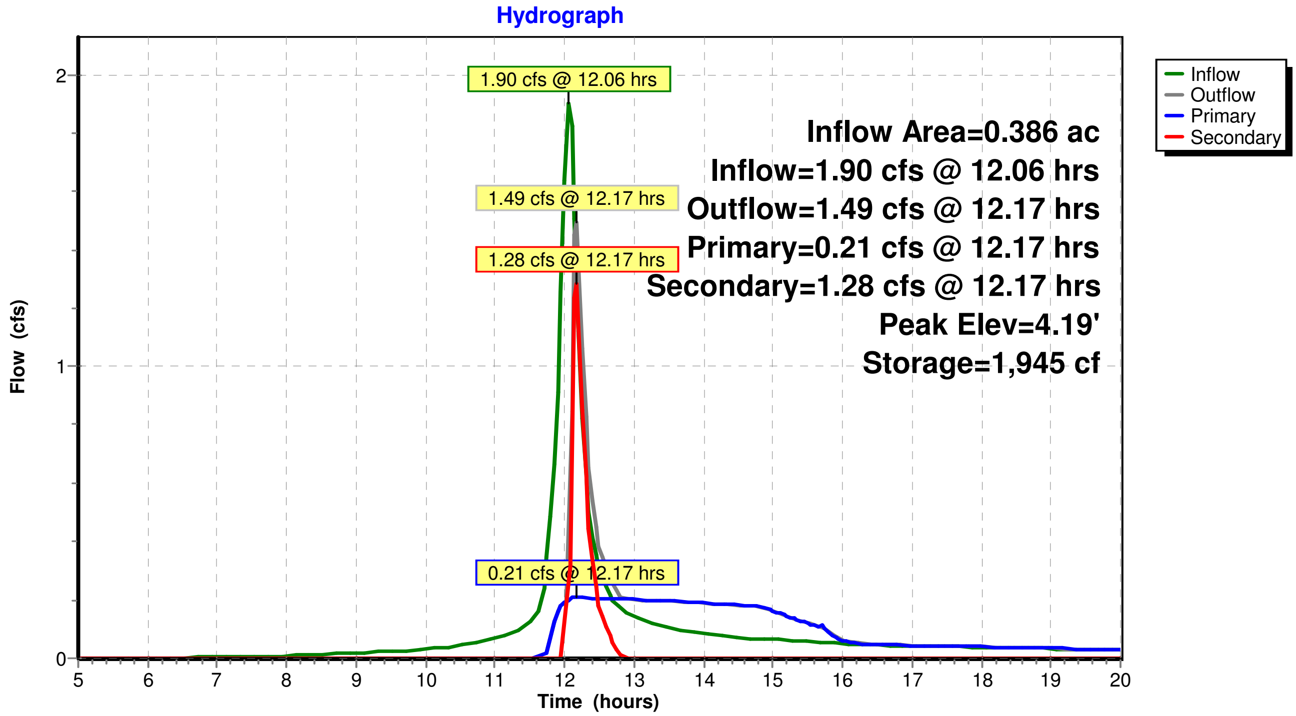
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	438	0	0
1.00	438	438	438
1.10	219	33	471
3.50	219	526	996
3.51	1,094	7	1,003
4.50	1,669	1,368	2,371
4.60	0	83	2,454

Device	Routing	Invert	Outlet Devices
#1	Secondary	4.00'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	2.00'	**4.0" Round Culvert** L= 177.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2.00' / 1.50' S= 0.0028 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.21 cfs @ 12.17 hrs HW=4.18' (Free Discharge)
↑**2=Culvert** (Barrel Controls 0.21 cfs @ 2.42 fps)

Secondary OutFlow Max=1.19 cfs @ 12.17 hrs HW=4.18' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 1.19 cfs @ 1.09 fps)

Pond BR 2: Bioretention Area 2



Summary for Pond BR 3: Bioretention Area 3

Inflow Area = 0.189 ac, 24.51% Impervious, Inflow Depth > 3.39"
Inflow = 1.11 cfs @ 11.99 hrs, Volume= 0.053 af
Outflow = 0.64 cfs @ 12.10 hrs, Volume= 0.046 af, Atten= 42%, Lag= 6.7 min
Primary = 0.34 cfs @ 12.11 hrs, Volume= 0.044 af
Secondary = 0.30 cfs @ 12.10 hrs, Volume= 0.002 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 4.07' @ 12.11 hrs Surf.Area= 725 sf Storage= 845 cf
Flood Elev= 5.00' Surf.Area= 0 sf Storage= 1,189 cf

Plug-Flow detention time= 72.4 min calculated for 0.046 af (87% of inflow)
Center-of-Mass det. time= 30.6 min (805.9 - 775.3)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	1,189 cf	**Custom Stage Data (Prismatic)** Listed below

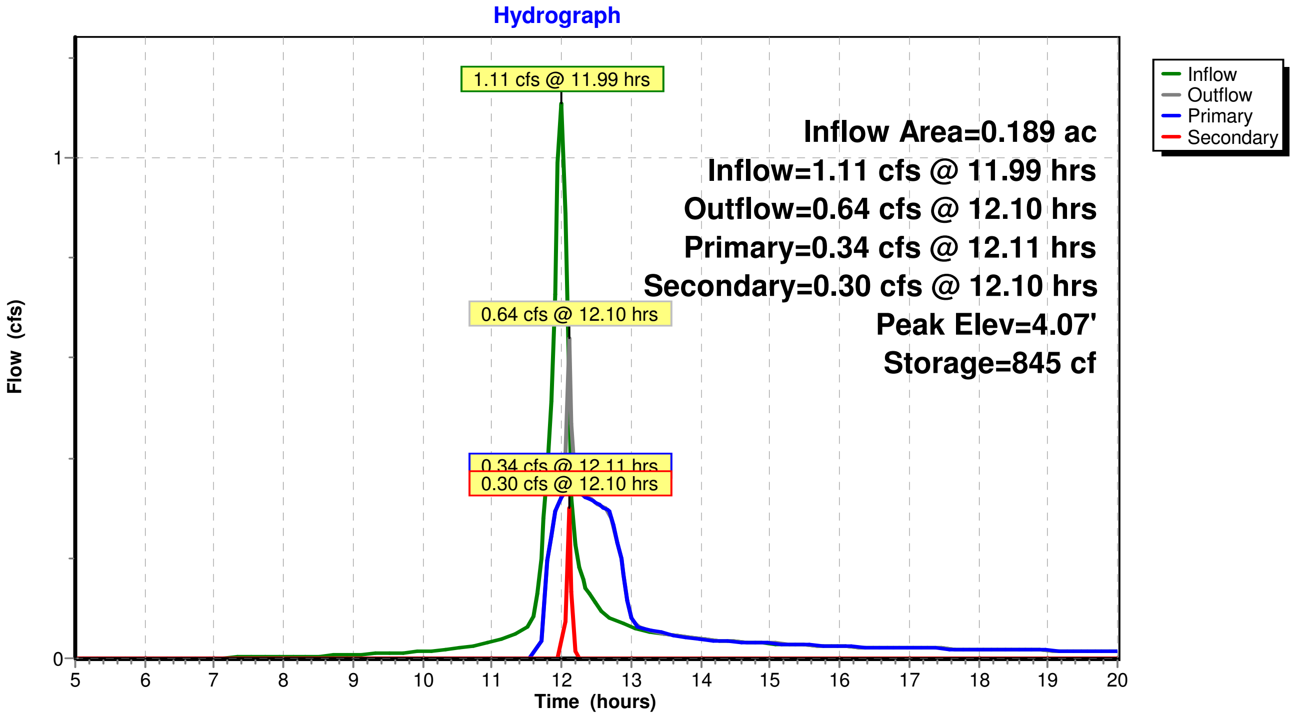
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	198	0	0
1.00	198	198	198
1.10	99	15	213
3.50	99	238	450
3.51	495	3	453
4.50	901	691	1,144
4.60	0	45	1,189

Device	Routing	Invert	Outlet Devices
#1	Secondary	4.00'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	2.00'	**4.0" Round Culvert** L= 57.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2.00' / 1.50' S= 0.0088 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.34 cfs @ 12.11 hrs HW=4.07' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.34 cfs @ 3.86 fps)

Secondary OutFlow Max=0.27 cfs @ 12.10 hrs HW=4.07' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 0.27 cfs @ 0.66 fps)

Pond BR 3: Bioretention Area 3



Summary for Pond BR 6: Bioretention Area 6

Inflow Area = 0.281 ac, 31.15% Impervious, Inflow Depth > 3.49"
Inflow = 1.92 cfs @ 11.95 hrs, Volume= 0.082 af
Outflow = 1.76 cfs @ 11.98 hrs, Volume= 0.074 af, Atten= 9%, Lag= 1.9 min
Primary = 0.22 cfs @ 11.98 hrs, Volume= 0.055 af
Secondary = 1.54 cfs @ 11.98 hrs, Volume= 0.020 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 4.22' @ 11.98 hrs Surf.Area= 1,062 sf Storage= 1,034 cf
Flood Elev= 5.00' Surf.Area= 0 sf Storage= 1,348 cf

Plug-Flow detention time= 63.2 min calculated for 0.074 af (91% of inflow)
Center-of-Mass det. time= 31.3 min (801.5 - 770.1)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	1,348 cf	**Custom Stage Data (Prismatic)** Listed below

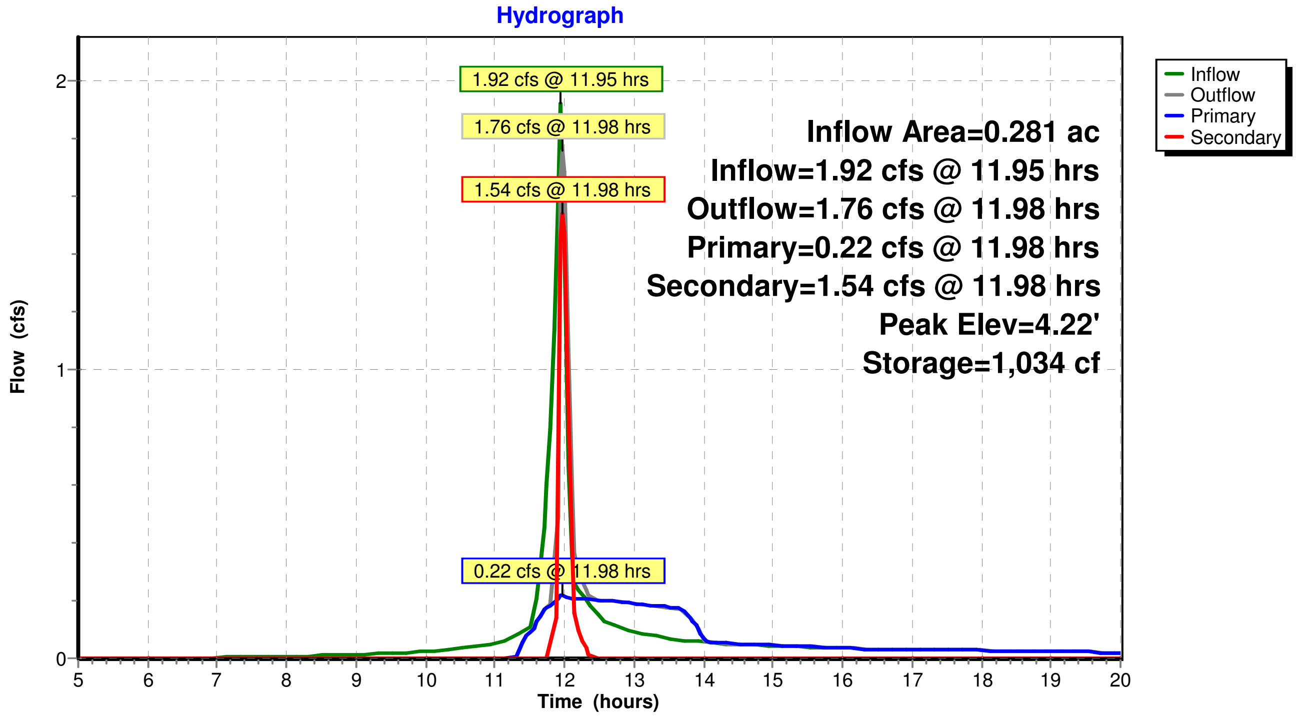
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	180	0	0
1.00	180	180	180
1.10	90	14	194
3.50	90	216	410
3.51	451	3	412
4.50	1,307	870	1,282
4.60	0	65	1,348

Device	Routing	Invert	Outlet Devices
#1	Secondary	4.00'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	2.50'	**4.0" Round Culvert** L= 132.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2.50' / 2.00' S= 0.0038 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.22 cfs @ 11.98 hrs HW=4.21' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.22 cfs @ 2.47 fps)

Secondary OutFlow Max=1.45 cfs @ 11.98 hrs HW=4.21' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 1.45 cfs @ 1.16 fps)

Pond BR 6: Bioretention Area 6



Summary for Pond BR 7: Bioretention Area 7

Inflow Area = 0.129 ac, 35.97% Impervious, Inflow Depth > 3.69"
Inflow = 0.98 cfs @ 11.90 hrs, Volume= 0.040 af
Outflow = 0.32 cfs @ 12.00 hrs, Volume= 0.033 af, Atten= 67%, Lag= 6.4 min
Primary = 0.32 cfs @ 12.00 hrs, Volume= 0.033 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= 3.87' @ 12.00 hrs Surf.Area= 645 sf Storage= 708 cf
Flood Elev= 5.00' Surf.Area= 0 sf Storage= 1,189 cf

Plug-Flow detention time= 86.5 min calculated for 0.032 af (82% of inflow)
Center-of-Mass det. time= 36.1 min (799.2 - 763.1)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	1,189 cf	**Custom Stage Data (Prismatic)** Listed below

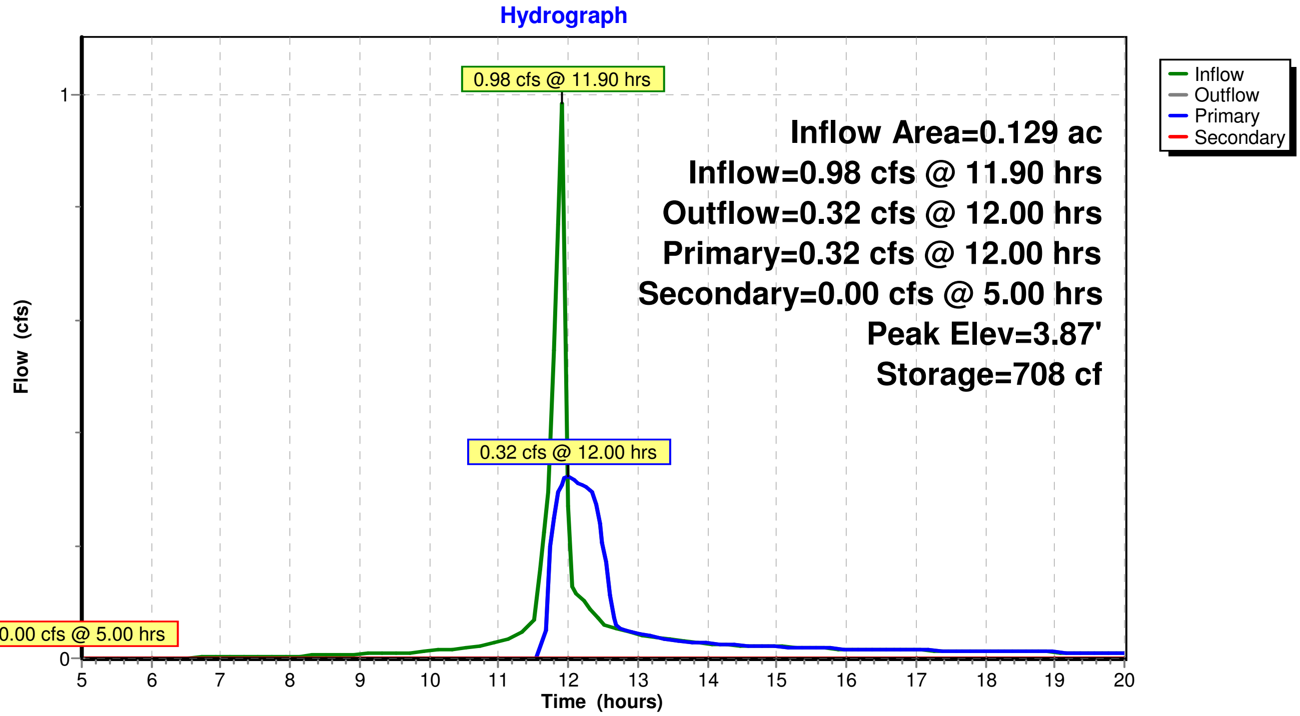
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	198	0	0
1.00	198	198	198
1.10	99	15	213
3.50	99	238	450
3.51	495	3	453
4.50	901	691	1,144
4.60	0	45	1,189

Device	Routing	Invert	Outlet Devices
#1	Secondary	4.00'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	2.00'	**4.0" Round Culvert** L= 57.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2.00' / 1.50' S= 0.0088 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.32 cfs @ 12.00 hrs HW=3.87' (Free Discharge)
└—**2=Culvert** (Barrel Controls 0.32 cfs @ 3.69 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=0.00' (Free Discharge)
└—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond BR 7: Bioretention Area 7



Summary for Pond DS: Dry Swales

Inflow Area = 0.138 ac, 48.99% Impervious, Inflow Depth > 3.49"
Inflow = 1.00 cfs @ 11.90 hrs, Volume= 0.040 af
Outflow = 0.32 cfs @ 12.01 hrs, Volume= 0.040 af, Atten= 68%, Lag= 6.6 min
Primary = 0.32 cfs @ 12.01 hrs, Volume= 0.040 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 3.73' @ 12.01 hrs Surf.Area= 542 sf Storage= 491 cf
Flood Elev= 5.00' Surf.Area= 0 sf Storage= 1,146 cf

Plug-Flow detention time= 15.8 min calculated for 0.040 af (99% of inflow)
Center-of-Mass det. time= 13.0 min (780.7 - 767.7)

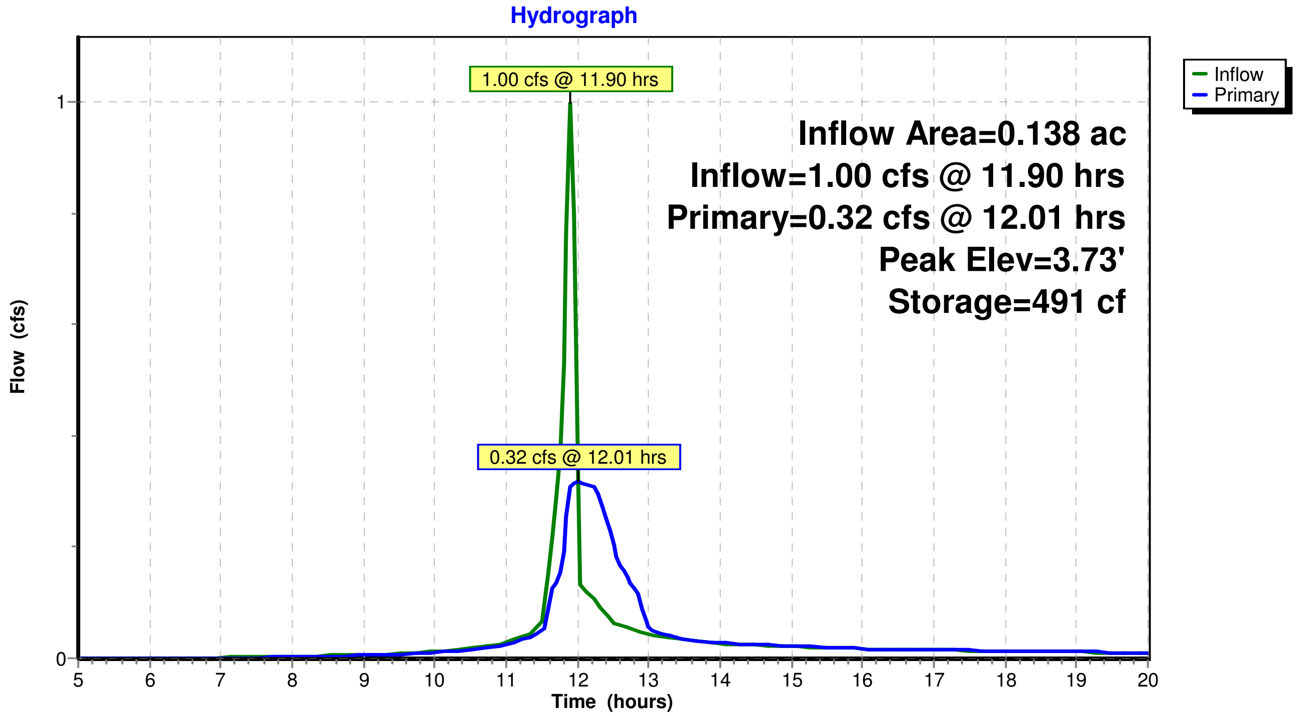
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	573 cf	**Custom Stage Data (Prismatic)** Listed below
		573 cf	x 2.00 = 1,146 cf Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	175	0.0	0	0
1.00	175	40.0	70	70
1.10	175	20.0	4	74
3.50	175	20.0	84	158
3.51	175	100.0	2	159
4.50	600	100.0	384	543
4.60	0	100.0	30	573

Device	Routing	Invert	Outlet Devices
#1	Primary	4.00'	**6.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	0.00'	**4.0" Round Culvert** L= 127.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 0.00' / -0.50' S= 0.0039 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Primary OutFlow Max=0.32 cfs @ 12.01 hrs HW=3.73' (Free Discharge)
├─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**2=Culvert** (Barrel Controls 0.32 cfs @ 3.62 fps)

Pond DS: Dry Swales



Summary for Pond FB: Forebay

Inflow Area = 8.425 ac, 20.46% Impervious, Inflow Depth > 2.69"
Inflow = 22.96 cfs @ 12.31 hrs, Volume= 1.891 af
Outflow = 23.15 cfs @ 12.33 hrs, Volume= 1.824 af, Atten= 0%, Lag= 1.7 min
Primary = 23.15 cfs @ 12.33 hrs, Volume= 1.824 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 5.28' @ 12.33 hrs Surf.Area= 0 sf Storage= 2,928 cf
Flood Elev= 4.00' Surf.Area= 1,536 sf Storage= 2,852 cf

Plug-Flow detention time= 18.2 min calculated for 1.818 af (96% of inflow)
Center-of-Mass det. time= 5.6 min (815.5 - 809.9)

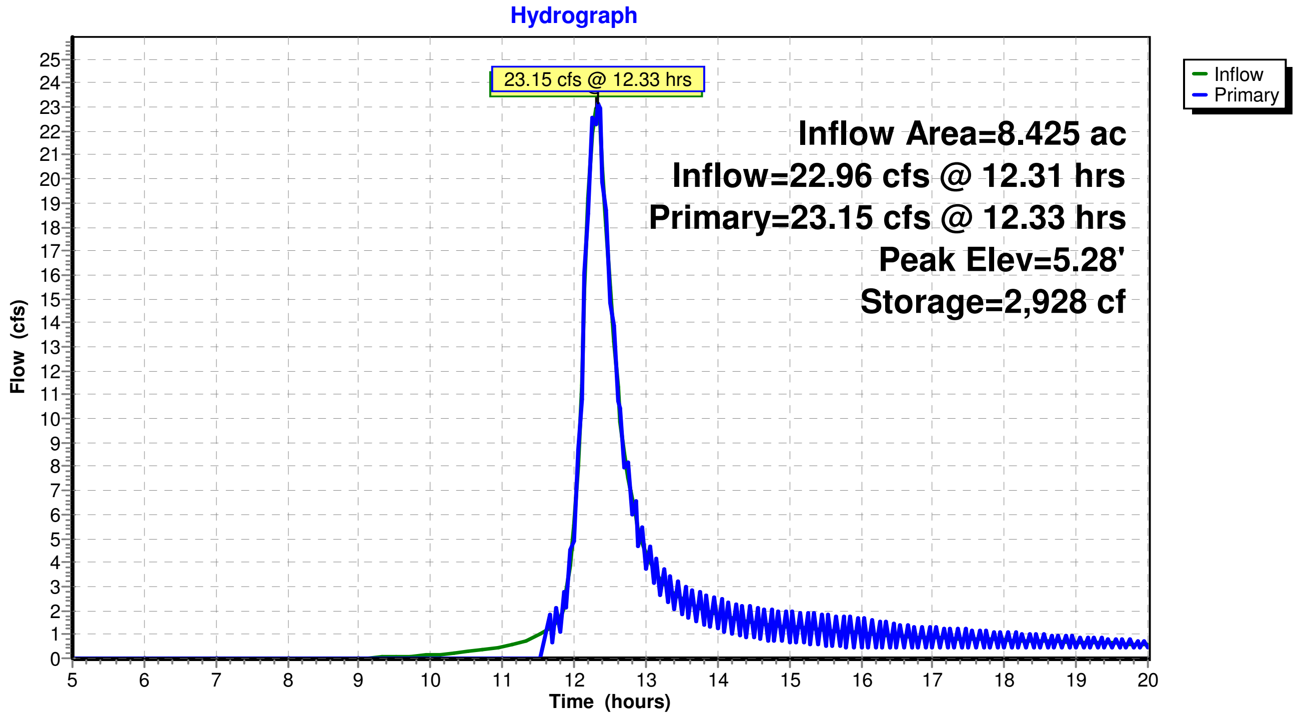
Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	2,928 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	113	0	0
1.00	345	229	229
2.00	633	489	718
3.00	1,049	841	1,559
4.00	1,536	1,293	2,852
4.10	0	77	2,928

Device	Routing	Invert	Outlet Devices
#1	Primary	4.00'	**6.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=22.73 cfs @ 12.33 hrs HW=5.26' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 22.73 cfs @ 3.00 fps)

Pond FB: Forebay



Summary for Pond P: Pond

Inflow Area = 8.425 ac, 20.46% Impervious, Inflow Depth > 2.60"
Inflow = 23.15 cfs @ 12.33 hrs, Volume= 1.824 af
Outflow = 10.04 cfs @ 12.65 hrs, Volume= 1.486 af, Atten= 57%, Lag= 19.1 min
Primary = 4.65 cfs @ 12.65 hrs, Volume= 1.325 af
Secondary = 5.39 cfs @ 12.65 hrs, Volume= 0.160 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Starting Elev= 4.00' Surf.Area= 7,635 sf Storage= 5,821 cf
Peak Elev= 6.70' @ 12.65 hrs Surf.Area= 15,131 sf Storage= 38,587 cf (32,766 cf above start)
Flood Elev= 7.50' Surf.Area= 0 sf Storage= 46,941 cf (41,120 cf above start)

Plug-Flow detention time= 127.6 min calculated for 1.348 af (74% of inflow)
Center-of-Mass det. time= 54.0 min (869.6 - 815.5)

Volume	Invert	Avail.Storage	Storage Description
#1	0.00'	46,941 cf	**Custom Stage Data (Prismatic)** Listed below

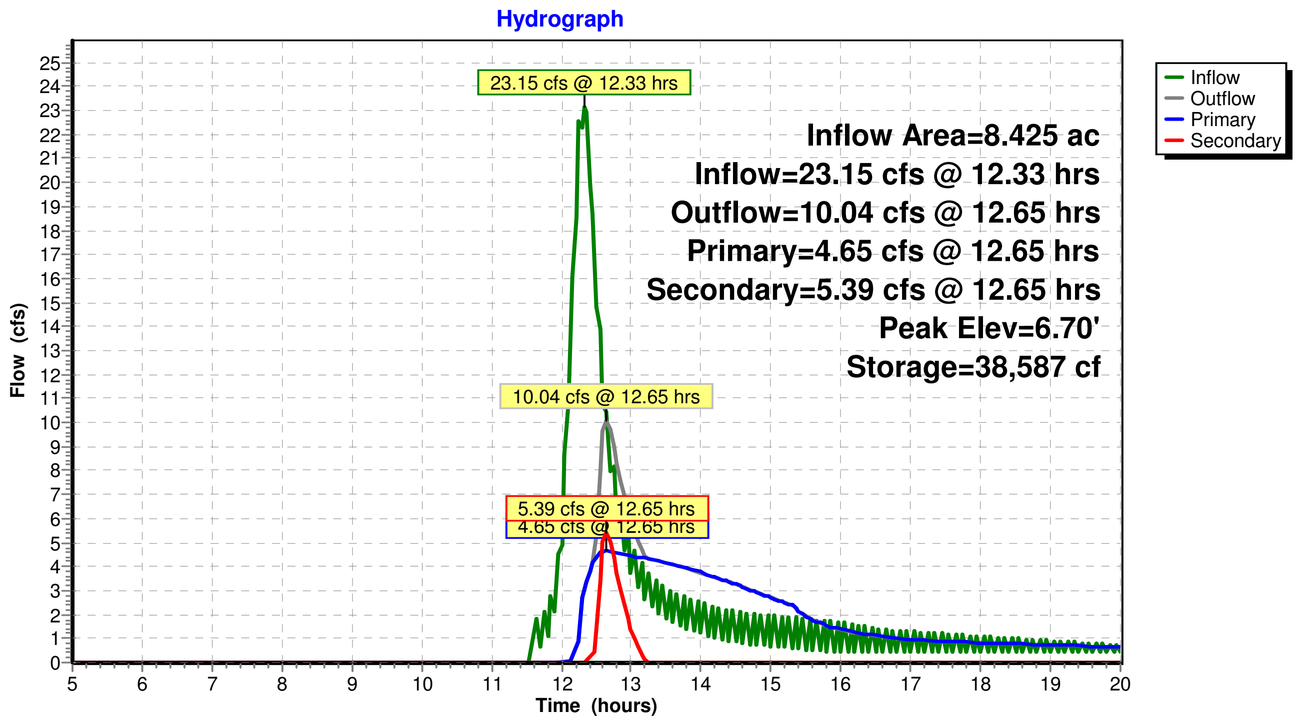
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
0.00	113	0	0
1.00	314	214	214
2.00	616	465	679
3.00	1,017	817	1,495
4.00	7,635	4,326	5,821
5.00	11,788	9,712	15,533
6.00	13,709	12,749	28,281
7.00	15,740	14,725	43,006
7.50	0	3,935	46,941

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	**12.0" Round Culvert** L= 104.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 0.00' / -1.00' S= 0.0096 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	4.00'	**1.5" Vert. Orifice/Grate** C= 0.600
#3	Device 1	5.25'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	6.50'	**25.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=4.65 cfs @ 12.65 hrs HW=6.70' (Free Discharge)
└─**1=Culvert** (Passes 4.65 cfs of 7.18 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.10 cfs @ 7.82 fps)
  └─**3=Orifice/Grate** (Orifice Controls 4.55 cfs @ 5.80 fps)

Secondary OutFlow Max=5.29 cfs @ 12.65 hrs HW=6.70' (Free Discharge)
└─**4=Broad-Crested Rectangular Weir** (Weir Controls 5.29 cfs @ 1.06 fps)

Pond P: Pond



APPENDIX 3

SOILS DATA

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for

Tompkins County, New York

Pinney Duplex Apartments

May 11, 2016

Preface

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

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

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

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

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

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

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Contents

How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

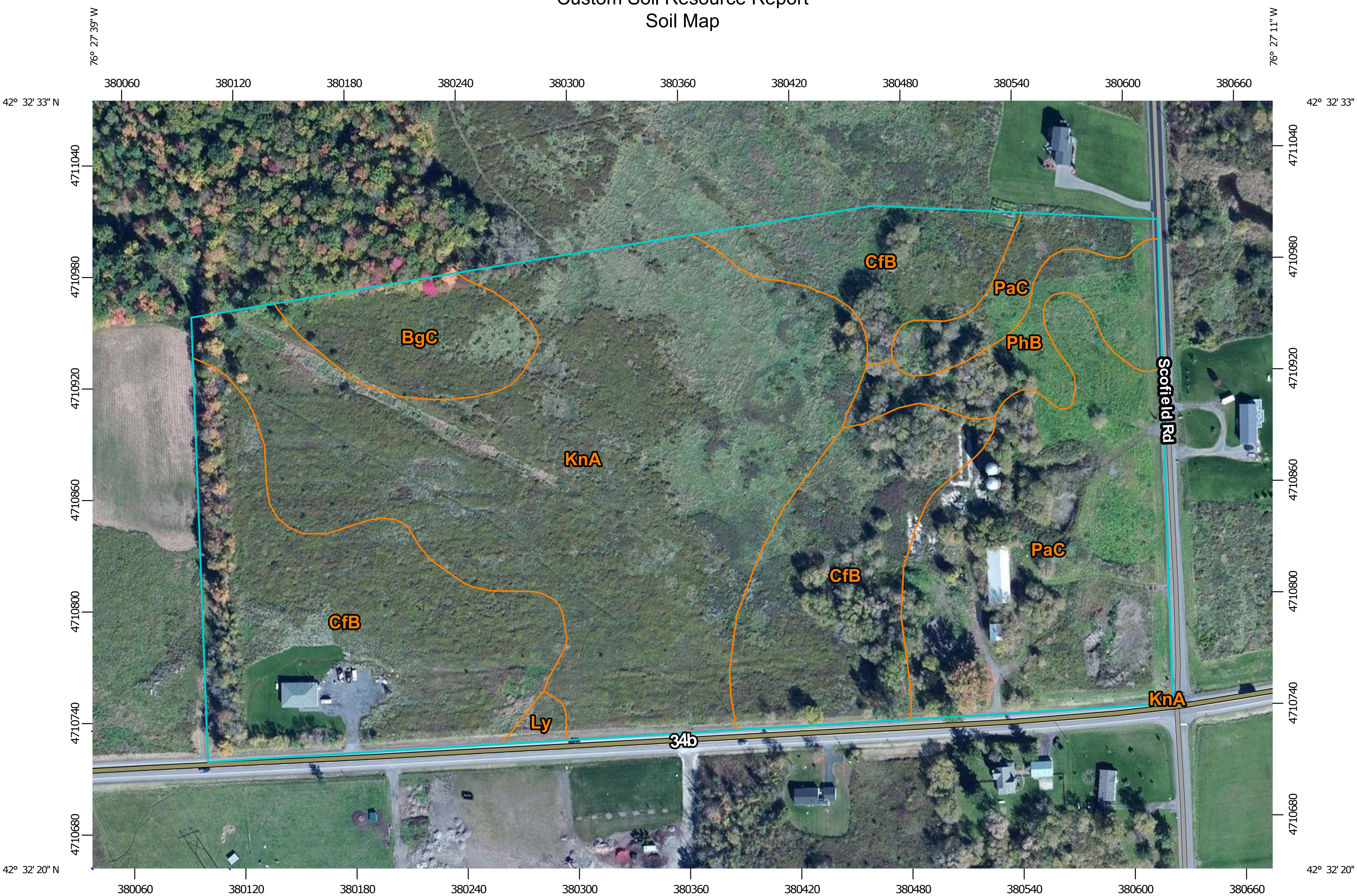
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree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

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

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

Soil Map



Map Scale: 1:2,910 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 40, 80, 160, 240

Feet: 0, 100, 200, 400, 600

N

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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Tompkins County, New York
Survey Area Data: Version 10, Sep 24, 2015

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

Date(s) aerial images were photographed: Jun 2, 2010—Oct 8, 2010

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

Map Unit Legend

Tompkins County, New York (NY109)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
BgC	Bath and Valois soils, 5 to 15 percent slopes	1.6	4.8%
CfB	Conesus gravelly silt loam, 3 to 8 percent slopes	11.2	33.0%
KnA	Kendaia and Lyons soils, 0 to 3 percent slopes	12.6	37.2%
Ly	Lyons soils, 0 to 3 percent slopes	0.1	0.4%
PaC	Palmyra gravelly loam, 5 to 15 percent simple slopes	6.8	20.0%
PhB	Phelps gravelly silt loam, 3 to 8 percent slopes	1.6	4.6%
Totals for Area of Interest		**33.9**	**100.0%**

Map Unit Descriptions

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

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

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

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

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

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

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

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

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

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

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

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

Tompkins County, New York

BgC—Bath and Valois soils, 5 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2v32c
Elevation: 330 to 2,460 feet
Mean annual precipitation: 31 to 70 inches
Mean annual air temperature: 39 to 52 degrees F
Frost-free period: 105 to 180 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Bath and similar soils: 40 percent
Valois and similar soils: 35 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bath

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy till derived mainly from gray and brown siltstone, sandstone, and shale

Typical profile

Ap - 0 to 9 inches: channery silt loam
Bw1 - 9 to 15 inches: channery silt loam
Bw2 - 15 to 25 inches: channery loam
E - 25 to 29 inches: channery loam
Bx - 29 to 52 inches: very channery silt loam
C - 52 to 72 inches: very channery silt loam

Properties and qualities

Slope: 5 to 15 percent
Percent of area covered with surface fragments: 0.0 percent
Depth to restrictive feature: 26 to 38 inches to fragipan
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 24 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C

Description of Valois

Setting

Landform: End moraines, lateral moraines, valley sides
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from sandstone, siltstone, and shale

Typical profile

H1 - 0 to 2 inches: gravelly silt loam
H2 - 2 to 32 inches: gravelly silt loam
H3 - 32 to 49 inches: gravelly silt loam
H4 - 49 to 60 inches: gravelly silt loam

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: 24 to 36 inches to fragipan
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 35 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C

Minor Components

Lordstown

Percent of map unit: 5 percent
Landform: Benches, ridges, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Langford

Percent of map unit: 5 percent
Landform: Hills, till plains, drumlinoid ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex

Volusia

Percent of map unit: 5 percent
Landform: Hills, mountains
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Base slope, interfluve, side slope
Down-slope shape: Concave
Across-slope shape: Linear

Mardin

Percent of map unit: 5 percent
Landform: Hills, mountains
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex

Erie

Percent of map unit: 5 percent
Landform: Hills, till plains, drumlinoid ridges
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Base slope, side slope
Down-slope shape: Concave
Across-slope shape: Linear

CfB—Conesus gravelly silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2w3j3
Elevation: 820 to 1,800 feet
Mean annual precipitation: 31 to 57 inches
Mean annual air temperature: 41 to 50 degrees F
Frost-free period: 100 to 190 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Conesus and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Conesus

Setting

Landform: Drumlins, hills, till plains
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Calcareous loamy lodgment till derived from limestone, sandstone, and shale

Typical profile

Ap - 0 to 9 inches: gravelly silt loam
E/B - 9 to 14 inches: gravelly silt loam
Bt/E - 14 to 19 inches: gravelly silt loam
Bt1 - 19 to 25 inches: gravelly silt loam
Bt2 - 25 to 36 inches: gravelly silt loam
C - 36 to 79 inches: gravelly loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Available water storage in profile: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D

Minor Components

Lansing

Percent of map unit: 7 percent
Landform: Drumlins, hills, till plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex
Across-slope shape: Convex

Kendaia

Percent of map unit: 3 percent
Landform: Drumlins, till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear

Nunda

Percent of map unit: 2 percent
Landform: Hills, drumlinoid ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Concave
Across-slope shape: Convex

Appleton

Percent of map unit: 2 percent
Landform: Drumlins, till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear

Lyons

Percent of map unit: 1 percent
Landform: Depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope

Down-slope shape: Concave
Across-slope shape: Concave

KnA—Kendaia and Lyons soils, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2trwv
Elevation: 430 to 1,510 feet
Mean annual precipitation: 31 to 57 inches
Mean annual air temperature: 41 to 50 degrees F
Frost-free period: 100 to 190 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Kendaia and similar soils: 50 percent
Lyons and similar soils: 25 percent
Lyons, frequently ponded, and similar soils: 15 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kendaia

Setting

Landform: Drumlins, ridges, till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Calcareous loamy lodgment till derived from limestone, sandstone, and shale

Typical profile

Ap - 0 to 8 inches: silt loam
Bw - 8 to 15 inches: silt loam
Bg - 15 to 20 inches: gravelly silt loam
BCg - 20 to 24 inches: gravelly loam
C - 24 to 79 inches: gravelly loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 1.42 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Available water storage in profile: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D

Description of Lyons

Setting

Landform: Depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Calcareous loamy lodgment till derived from limestone and shale

Typical profile

Ap - 0 to 10 inches: silt loam
Bg1 - 10 to 19 inches: silt loam
Bg2 - 19 to 25 inches: silty clay loam
BCg - 25 to 34 inches: gravelly silt loam
C - 34 to 79 inches: gravelly loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 1.42 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Available water storage in profile: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D

Description of Lyons, Frequently Ponded

Setting

Landform: Depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Calcareous loamy lodgment till derived from limestone and shale

Typical profile

Ap - 0 to 10 inches: mucky silt loam
Bg1 - 10 to 19 inches: silt loam
Bg2 - 19 to 25 inches: silty clay loam
BCg - 25 to 34 inches: gravelly silt loam
C - 34 to 79 inches: gravelly loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 1.42 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum in profile: 40 percent
Available water storage in profile: High (about 9.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D

Minor Components

Conesus

Percent of map unit: 3 percent
Landform: Hills, till plains, drumlinoid ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Concave
Across-slope shape: Convex

Lima

Percent of map unit: 3 percent
Landform: Drumlins, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Concave
Across-slope shape: Convex

Palms

Percent of map unit: 2 percent
Landform: Marshes, swamps
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Concave

Ilion

Percent of map unit: 2 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave

Ly—Lyons soils, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2spjy
Elevation: 250 to 1,900 feet
Mean annual precipitation: 31 to 57 inches
Mean annual air temperature: 41 to 50 degrees F
Frost-free period: 100 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Lyons and similar soils: 75 percent
Lyons, frequently ponded, and similar soils: 15 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lyons

Setting

Landform: Depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Calcareous loamy lodgment till derived from limestone and shale

Typical profile

Ap - 0 to 10 inches: silt loam
Bg1 - 10 to 19 inches: silt loam
Bg2 - 19 to 25 inches: silty clay loam
BCg - 25 to 34 inches: gravelly silt loam
C - 34 to 79 inches: gravelly loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 1.42 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Available water storage in profile: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D

Description of Lyons, Frequently Ponded

Setting

Landform: Depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Calcareous loamy lodgment till derived from limestone and shale

Typical profile

Ap - 0 to 10 inches: mucky silt loam
Bg1 - 10 to 19 inches: silt loam
Bg2 - 19 to 25 inches: silty clay loam
BCg - 25 to 34 inches: gravelly silt loam
C - 34 to 79 inches: gravelly loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 1.42 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum in profile: 40 percent
Available water storage in profile: High (about 9.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D

Minor Components

Canandaigua

Percent of map unit: 3 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave

Appleton

Percent of map unit: 3 percent
Landform: Drumlins, till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear

Kendaia

Percent of map unit: 2 percent
Landform: Drumlins, till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear

Ilion

Percent of map unit: 1 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave

Palms

Percent of map unit: 1 percent
Landform: Marshes, swamps
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Concave

PaC—Palmyra gravelly loam, 5 to 15 percent simple slopes

Map Unit Setting

National map unit symbol: 9xnt
Mean annual precipitation: 32 to 42 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 120 to 160 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Palmyra and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Palmyra

Setting

Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy over sandy and gravelly glaciofluvial deposits, derived mainly from limestone and other sedimentary rocks

Typical profile

H1 - 0 to 12 inches: gravelly loam
H2 - 12 to 21 inches: gravelly clay loam
H3 - 21 to 60 inches: stratified extremely gravelly sand

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Available water storage in profile: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A

Minor Components

Fredon

Percent of map unit: 5 percent

Phelps

Percent of map unit: 5 percent

Genesee (hamlin)

Percent of map unit: 5 percent

Howard

Percent of map unit: 5 percent

Honeoye

Percent of map unit: 5 percent

PhB—Phelps gravelly silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9xny
Mean annual precipitation: 32 to 42 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 120 to 160 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Phelps and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Phelps

Setting

Landform: Terraces, valley trains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits over sandy and gravelly glaciofluvial deposits, containing significant amounts of limestone

Typical profile

H1 - 0 to 9 inches: gravelly silt loam
H2 - 9 to 15 inches: gravelly loam
H3 - 15 to 25 inches: silt loam
H4 - 25 to 60 inches: stratified gravelly loam to silt

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 15 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Available water storage in profile: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B/D

Minor Components

Howard

Percent of map unit: 5 percent

Palmyra

Percent of map unit: 5 percent

Fredon

Percent of map unit: 5 percent

Arkport

Percent of map unit: 5 percent

Braceville

Percent of map unit: 5 percent

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

APPENDIX 4

PRECIPITATION DATA

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	New York
Location	
Longitude	76.457 degrees West
Latitude	42.541 degrees North
Elevation	Unknown/Unavailable
Date/Time	Mon, 05 Oct 2015 10:10:17 -0400

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.28	0.43	0.53	0.70	0.87	1.07	**1yr**	0.75	0.95	1.21	1.44	1.70	2.00	2.26	**1yr**	1.77	2.17	2.57	3.10	3.57	**1yr**
2yr	0.32	0.49	0.62	0.81	1.02	1.26	**2yr**	0.88	1.12	1.42	1.70	2.00	2.34	2.61	**2yr**	2.07	2.51	2.95	3.50	4.01	**2yr**
5yr	0.38	0.59	0.74	0.99	1.26	1.56	**5yr**	1.09	1.39	1.77	2.12	2.49	2.90	3.23	**5yr**	2.56	3.11	3.62	4.21	4.81	**5yr**
10yr	0.42	0.66	0.84	1.14	1.48	1.85	**10yr**	1.28	1.63	2.10	2.51	2.94	3.41	3.80	**10yr**	3.01	3.66	4.23	4.84	5.53	**10yr**
25yr	0.50	0.79	1.00	1.38	1.83	2.30	**25yr**	1.58	2.02	2.63	3.13	3.67	4.22	4.72	**25yr**	3.74	4.53	5.21	5.83	6.66	**25yr**
50yr	0.56	0.90	1.15	1.60	2.15	2.72	**50yr**	1.86	2.38	3.11	3.71	4.33	4.97	5.55	**50yr**	4.40	5.34	6.10	6.72	7.66	**50yr**
100yr	0.63	1.01	1.31	1.86	2.53	3.23	**100yr**	2.19	2.80	3.69	4.40	5.12	5.85	6.54	**100yr**	5.18	6.29	7.14	7.74	8.81	**100yr**
200yr	0.72	1.17	1.51	2.16	2.98	3.81	**200yr**	2.58	3.30	4.37	5.20	6.04	6.89	7.70	**200yr**	6.10	7.41	8.36	8.91	10.15	**200yr**
500yr	0.85	1.39	1.82	2.64	3.71	4.76	**500yr**	3.20	4.10	5.46	6.50	7.53	8.56	9.57	**500yr**	7.57	9.20	10.31	10.75	12.22	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.25	0.39	0.47	0.64	0.78	0.82	**1yr**	0.68	0.80	0.94	1.06	1.49	1.86	2.10	**1yr**	1.65	2.02	2.43	2.96	3.33	**1yr**
2yr	0.32	0.49	0.60	0.82	1.01	1.11	**2yr**	0.87	1.09	1.23	1.52	1.85	2.28	2.55	**2yr**	2.02	2.45	2.87	3.42	3.93	**2yr**
5yr	0.36	0.55	0.69	0.94	1.20	1.32	**5yr**	1.03	1.29	1.44	1.78	2.17	2.71	3.03	**5yr**	2.40	2.92	3.41	3.98	4.58	**5yr**
10yr	0.40	0.61	0.76	1.06	1.36	1.50	**10yr**	1.18	1.47	1.63	1.98	2.45	3.09	3.44	**10yr**	2.74	3.31	3.87	4.47	5.14	**10yr**
25yr	0.45	0.69	0.86	1.23	1.61	1.78	**25yr**	1.39	1.74	1.92	2.29	2.85	3.66	4.05	**25yr**	3.24	3.90	4.57	5.20	6.00	**25yr**
50yr	0.50	0.76	0.95	1.36	1.83	2.03	**50yr**	1.58	1.99	2.17	2.56	3.21	4.17	4.59	**50yr**	3.69	4.41	5.18	5.82	6.75	**50yr**
100yr	0.55	0.83	1.04	1.51	2.07	2.33	**100yr**	1.78	2.28	2.46	2.85	3.60	4.74	5.19	**100yr**	4.19	4.99	5.87	6.54	7.59	**100yr**
200yr	0.61	0.92	1.17	1.69	2.36	2.66	**200yr**	2.03	2.60	2.80	3.18	4.05	5.39	5.88	**200yr**	4.77	5.66	6.65	7.32	8.54	**200yr**
500yr	0.72	1.06	1.37	1.99	2.83	3.20	**500yr**	2.44	3.13	3.32	3.67	4.72	6.38	6.92	**500yr**	5.65	6.65	7.85	8.50	9.98	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.30	0.47	0.57	0.77	0.94	1.03	**1yr**	0.81	1.01	1.16	1.44	1.77	2.12	2.38	**1yr**	1.88	2.29	2.72	3.25	3.74	**1yr**
2yr	0.34	0.52	0.64	0.87	1.07	1.18	**2yr**	0.92	1.15	1.31	1.62	1.98	2.41	2.71	**2yr**	2.13	2.60	3.03	3.59	4.11	**2yr**
5yr	0.40	0.62	0.76	1.05	1.33	1.52	**5yr**	1.15	1.49	1.68	2.06	2.53	3.09	3.43	**5yr**	2.73	3.30	3.85	4.44	5.08	**5yr**
10yr	0.46	0.71	0.88	1.23	1.59	1.86	**10yr**	1.37	1.81	2.04	2.48	3.06	3.73	4.14	**10yr**	3.31	3.98	4.62	5.23	5.97	**10yr**
25yr	0.57	0.86	1.07	1.53	2.01	2.41	**25yr**	1.74	2.36	2.63	3.17	3.95	4.81	5.30	**25yr**	4.25	5.10	5.89	6.49	7.42	**25yr**
50yr	0.66	1.00	1.25	1.80	2.42	2.93	**50yr**	2.09	2.87	3.19	3.83	4.79	5.82	6.40	**50yr**	5.15	6.15	7.10	7.65	8.74	**50yr**
100yr	0.77	1.16	1.46	2.11	2.89	3.57	**100yr**	2.49	3.49	3.86	4.64	5.80	7.06	7.72	**100yr**	6.25	7.43	8.56	9.03	10.29	**100yr**
200yr	0.90	1.35	1.71	2.48	3.46	4.35	**200yr**	2.98	4.25	4.69	5.60	7.04	8.56	9.34	**200yr**	7.58	8.98	10.31	10.65	12.13	**200yr**
500yr	1.11	1.65	2.13	3.09	4.40	5.63	**500yr**	3.79	5.51	6.05	7.18	9.12	11.07	12.00	**500yr**	9.79	11.54	13.21	13.25	15.07	**500yr**

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