Storm Water Pollution Prevention Plan
for

Proposed Duthie Building

Town of Lansing
Lansing, New York

September 2023

Prepared by:

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NYSPE#: 053134

For:

Bill Duthie
484 Ridge Road
Lansing, NY 14882

TABLE OF CONTENTS

ATTACHMENTS

Attachment J: **NYSDEC Controls Operation & Maintenance Check List**

Attachment K: **Stormwater Management Summary**

Attachment L: **SWPPP Design Drawings**

1.0 EXECUTIVE SUMMARY

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 New York State Department of Environmental Conservations SPDES General Permit from Construction Activity Permit No. GP-0-20-001 and any local and/or state governing agencies having jurisdiction with regards to erosion and sediment control. The requirements of the SPDES Permit are as follows:

A. **Owner:**

Bill Duthie (United Storage Systems)
484 Ridge Road
Lansing, NY 14882
(607) 280-3872

Project Site:

Tax Parcel #30.-1-16.32
Verizon Lane
Lansing, NY 14882

This project is subject to the requirements of a regulated, traditional land use control MS4. Therefore, the following requirements must be met before a construction activity is authorized to discharge stormwater.

1. An owner or operator that is subject to the requirements of a regulated, traditional land use control MS4, must have its SWPPP reviewed and accepted by the regulated MS4 prior to submitting the NOI to the Department. The owner or operator shall then have the "MS4 SWPPP Acceptance Form," as provided in Attachment A, authorized by the MS4 and submitted to the Department along with the NOI for approval.

2. Complete the Notice of Intent (NOI) provided in Attachment A and forward to the recipients following this section. Five (5) business days from the date the Department receives a complete electronic version of the NOI (eNOI) for construction activities with a SWPPP that has been preopared in conformance with the design criteria in the technical standard referenced in Part III.B.1. of the SPDES General Permit and the performance cirteria in the technical standard referenced in Parts III.B., 2 or 3 of the SPDES general permit, for construction activities that require post-construction stormwater management practices pursuant to Part III.C. of the SPDES General Permit; or

3. Sixty (60) business days from the date the Department receives a complete NOI (electronic or paper version) for construction activities with a SWPPP that has not been prepared in conformance with the design criteria in technical standard referenced in Part III.B.1. or, for construction activities that require post-construction stormwater management practices pursuant to Part III.C., the performance criteria in the technical standard referenced in Parts III.B., 2 or 3, or;

4. Ten (10) business days from the date the Department receives a complete paper version of the NOI for construction activities with a SWPPP that has not been prepared in conformance with the design criteria in technical standard referenced in Part III.B.1. or, for construction activities that require post-construction stormwater.

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

Town of Lansing Town Hall
29 Auburn Road
Lansing, New York 14882
(607) 533-4142

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-0-20-001), 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, NOI, NOI Acknowledgement letter, MS4 Acceptance form (if applicable), 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 five (5) 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 daily 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 I.B.1.d of the SPDES General Permit for additional information. Copies of the SPDES General Permit and the Notice of Intent Forms may be found on-line.

I. **Notice of Termination (NOT)** - Once each lot reaches final stabilization upon completion of the project, Bill Duthie (United Storage Systems), as Owner, may terminate coverage of SPDES permit coverage by submitting a Notice of Termination, Form (included in Attachment B). The Town of Lansing will use this original SWPPP and stormwater practice design as reference when individual lots are sold for development. The lot owner will then be responsible for obtaining all stormwater permit approvals through

the Town of Lansing at that time. An NOT for this SWPPP may be filed by Bill Duthie when one or more of the following conditions are met:

1. Total Project Completion - All construction activity identified in the SWPPP has been completed; and all disturbance have achieved final stabilization and all temporary, structural erosion and sediment control measures have been removed, and all post-construction stormwater management practices have been constructed in conformance with the SWPPP and are operational.

2. Planned shutdown with partial project completion – All soil disturbance activities have ceased; and all areas disturbed as of the project shut down date have achieved final stabilization, and all temporary, structural erosion and sediment control measures have been removed, and all post-construction stormwater management practices have been constructed in conformance with the SWPPP and are operational.

3. A new owner or operator has obtained coverage under the General SPDES Permit in accordance with Part II.E.

4. The owner or operator obtains coverage under an alternative SPDES General Permit or individual SPDES permit.

For construction activities meeting 1.0.I above, the owner or operator shall have a qualified inspector perform a final site inspection prior to submitting the NOT. The qualified inspector shall, by signing the "final stabilization" and "Post-Construction Stormwater Management Practice certification statements on the NOT, certify that all requirements of the SPDES General Permit have been met. Further, construction activities subject to the requirements of a regulated, transitional land use control MS4, must have the MS4 sign the "MS4 acceptance" statement on the NOT, indicating that the project has been constructed in accordance SPDES General Permit requirements.

Lastly, for construction activities that require post-construction stormwater management practices, the owner or operator must, prior to submitting the NOT, ensure one of the following:

1. The post-construction stormwater management practices and any right of ways needed to maintain such practices have been deeded to the municipality in which the practice is located.

2. An executed maintenance agreement is in place with the municipality that will maintain the post-construction stormwater management practices.

3. If the post-constructed management practices are privately owned, the owner or operator must have a mechanism in place that requires operation and maintenance of the practices in accordance with the operation and maintenance plan, such as a deed covenant in the owner or operator's deed of record.

4. If the post-constructed practices are owned by a public or private institution, government agency or authority, or public utility, the owner or operator has policy and procedure in place that ensures operation and maintenance of the practices in accordance with the operation and maintenance plan.

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 Attachment G. 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 activities associated with the construction of a single 9,600-SF storage in the Town of Lansing, NY on an existing gravel and dirt commercial lot. Site stormwater practice design also includes runoff from the potential construction of a second building and 10 additional parking spaces.

Access to the site is through Verizon Lane by a shared gravel driveway. Because this project will disturb over 1-AC at full build out, a Full SWPPP has been prepared for review by the Town of Lansing along with an eventual submission to New York State for SPDES permit coverage.

The Duthie Building is located off of Verizon Lane which is approximately 550 feet north of the intersection of Verizon Lane and Town Barn Road. The entrance to Verizon Lane is approximately 650 feet east of the intersection of State Highway 34 and Town Barn Road. The property sits within a drainage area of approximately 3.10-AC of which, the cumulative land disturbance will be approximately 2.1 acres. There will be a 4% reduction in impervious cover across the site by removing some of the existing hardpacked dirt that has historically served as a stockpile and work site to the development's northern side. Reference the Project Plans for the permanent stormwater management facilities planned.

This SWPPP includes the elements necessary to comply with the SPDES General Permit for Stormwater Discharges GP-0-20-001 administered by the New York State Department of Environmental Protection, 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.

Aside from the residential construction, the project includes landscaping, public water and private sewer, as well as connections to other service utilities ie. (electric, phone). Permanent stormwater management facilities are proposed including one (1) bioretention area to address runoff reduction volume concerns. Remaining water quality volume and quantity attenuation will be controlled by one (1) dry pond and one (1) attenuation basin. Please see Attachment K for this information.

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. See Section 1.0.I for specific NOT eligibility requirements.

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

The SPDES 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. Waters to which cleansers or other components have not been added that are used to wash vehicles or control dust;

4. Routine external building washdown which does not use detergents;

5. Irrigation drainage;

6. Uncontaminated discharges from construction site de-watering operations;

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

8. 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;

9. Air conditioning condensate;

10. Springs and uncontaminated groundwater; and

11. 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 Bill Duthie (United Storage Systems), who will be responsible for the preparation of each lot for sale. Once the cumulative land has been readied, the Mr. Duthie will file a Notice of Termination.

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 PHASE 1

A. Install a standard stabilized construction entrance(s);

B. Placement of silt fence;

C. Construction activities for the development of building and associated driveway:

   a. Construct temporary access leading into the parcel to allow the construction of the large stormwater management systems including the dry pond, bioretention area, and quantity attenuation basin.

   b. Upgrade the existing 6” site culvert to a 12” culvert.

   c. Install the grassed swale leading from the Quantity Attenuation Basin to the new 12” culvert.

   d. Install the grassed swale leading to the Dry Pond Forebay.

   e. Construct general utility services (ie. water infrastructure, septic, storm piping, etc.)

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

g. Complete final grading.

Note: For all Underground Utilities – Sediment barriers such as silt fencing, proper seeding and mulching will be utilized as required to bind the down slope side of utility construction and soil stockpiles;

h. Remove any accumulated sedimentation from the bioretention practice, dry pond, attenuation basin, and associated swales. Return property to permanent lines and grades;

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

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

Step 1 – Protect natural resources and utilize site hydrology

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 a bioretention area.

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 – Site runoff will be collected and directed to specific treatment practices by way of direct sheet flow.

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

- Disconnection of rooftop runoff – Roof downspouts and driveways will be sheet flowed across grassed surfaces and into a bioretention area and quantity attenuation practice (sump).

- Stream daylighting for redevelopment projects – None on site.

- Bioswale – a bioretention area, dry pond, and attenuation basin, will be used for water 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 – A bioretention area and quantity basin will control runoff from rooftop 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 using a bioretention area and quantity controls were considered instead.

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

Step 2 – Determine Overall Water Quality Treatment Volume (WQv)

See Attachment K for the calculation summary.

Step 3 – Runoff reduction by applying green infrastructure technology and standard SMPs.

Green infrastructure techniques were evaluated to potentially reduce the overall water quality volume. Practices used for this project were identified in Steps 1 and 2. The minimum runoff reduction volume was met using a single bioretention practice. Reference Attachment K for details.

Step 4 – Provide standard practices to address remaining water quality volume

Minimum requirements for water quality volume could not be met using green infrastructure alone due to site groundwater table and existing topography restrictions. Instead, a forebay, dry pond, and quantity attenuation basin were sized to meet remaining Water Quality Volume needs.

Reference Attachment K for the overall treatment calculations.

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

Peak rate control is provided by a dry pond and quantity attenuation basin which helps to reduce post construction runoff to predeveloped conditions. See modeling report output for further information.

5.0 STORM WATER POLLUTION PREVENTION MEASURES AND CONTROLS

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*, 2015, NYSDEC and *New York Standards & Specifications for Erosion and Sedimentation Control*, November 2016. Reference Attachment H for copy of *Vegetative and Structural, Measures for Erosion and Sediment Control, New York State Standards & Specifications for Erosion and Sedimentation Control*. (Vegetative; November 2016, Structural; August 2005)

A variety of storm water pollutant controls are recommended for this project. Some controls are intended to function temporarily, such as silt fencing, check dams, and stabilized construction entrances. These will be used as needed for pollutant control during the construction period. (Reference Stormwater, Sediment and Erosion Control Plans accompanying this SWPPP). Post developed controls for quality treatment and quantity reduction remaining after construction include a

bioretention area, dry pond, quantity attenuation basin, and associated grassed swales leading to each practice.

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 under 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 site utilizing proposed site grading, a bioretention area, dry pond, attenuation basin, and associated 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 one (1) bioretention area, one (1) dry pond and one (1) quantity attenuation basin. Those sediment barriers, such as check dams, that do not interfere with normal operations and appear to provide long-term benefits can be left in place after construction is completed. All silt fencing must be removed once the site has received proper stabilization.

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 NYSHPO

A search was conducted on the New York State Parks, Recreation and Historic Preservation Office 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. The project received a no-impact statement from SHPO.

8.0 ENVIRONMENTAL MAPPING

A search was conducted on the Tompkins County, New York State, and Federal Inventory websites to identify any areas with known wetlands, protected plants or animal species, or any significant environmental concerns that could be impacted by this project. There are no impacts or concerns noted. Please see Attachment E for screen prints of this review.

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 or Qualified Inspector, as identified by the SPDES General Permit. The purpose of site inspections is to assess performance of pollutant controls. The inspections will be conducted by an independent third party Qualified Inspector to be provided by the Owner using a form similar to the example provided in Attachment F. The Owner/Operator will also be required to arrange for a designated Trained Contractor (as defined by the SPDES General Permit) to be responsible for the management of this SWPPP during construction, while on-site. Based on these inspections, the Trained 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 Trained 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 I 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 SWPPP at the time of inspection and specifically identify all incidents of non-compliance.

Inspection reports must be kept on file by the Trained Contractor as an integral part of this SWPPP for at least five years from the date of completion and filing of NOT for the project.

Ultimately, it is the responsibility of the site Trained 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 area, dry pond, attenuation basin, grassed swales, and associated drainage infrastructure will lie with the Bill Duthie (United Storage Systems).

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 bioretention area, dry pond, attenuation basin, and associated 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, dry swale, attenuation basin, and grassed swale(s)],
   (insert structure description as appropriate)
   Must be maintained in Accordance with O&M Plan

2. 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

For the bioretention area, dry pond, and attenuation basin, sediment shall be cleaned out at the base of the structure when it accumulates to a depth of more than three inches. Trash and debris shall be removed as necessary.

A stone drop (pea gravel diaphragm) of at least six inches shall be provided at the edge of all driveways leading directly to the grassed surfaces and bioretention areas (if applicable).

C. Inspection & Periodic Maintenance

To ensure the continued operation and long term performance of the proposed stormwater management system(s), 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 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 structure 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 (if applicable)

NOI for coverage under Stormwater General Permit for Construction Activity

version 1.35

(Submission #: HPX-N4FP-GRQC2, version 1)

Details

Originally Started By	Scott Gibson
Alternate Identifier	Duthie Building
Submission ID	HPX-N4FP-GRQC2
Submission Reason	New
Status	Draft

Form Input

Owner/Operator Information

Owner/Operator Name (Company/Private Owner/Municipality/Agency/Institution, etc.)
United Storage Systems

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

Owner/Operator Contact Person First Name
Bill

Owner/Operator Mailing Address
484 Ridge Road

City
Lansing

State
NY

Zip
14882

Phone
607-280-3872

Email
duthp@aol.com

Federal Tax ID
NONE PROVIDED

Project Location

Project/Site Name
Duthie Building

Street Address (Not P.O. Box)
8-18 Verizon Lane

Side of Street
East

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

State
NY

Zip
14880

DEC Region
7

County
TOMPKINS

Name of Nearest Cross Street
Town Barn Road

Distance to Nearest Cross Street (Feet)
550

Project In Relation to Cross Street
North

Tax Map Numbers Section-Block-Parcel
30.-1-16.32

Tax Map Numbers
NONE PROVIDED

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
42.54237498756704,-76.48843203253831

Project Details

2. What is the nature of this project?
Redevelopment with no increase in impervious area

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

Pre-Development Existing Landuse
Commercial

Post-Development Future Land Use
Commercial

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

---

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)
3.1

Total Area to be Disturbed (acres)
2.1

Existing Impervious Area to be Disturbed (acres)
0.78

Future Impervious Area Within Disturbed Area (acres)
0.76

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 (%)
0

B (%)
20

C (%)
80

D (%)
0

7. Is this a phased project?
No

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

Start Date
10/01/2023

End Date
10/01/2024

9. Identify the nearest surface waterbody(ies) to which construction site runoff will discharge.
Town of Lansing Swale Along Town Barn Road and Ste Hwy 34

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

Other Waterbody Type Off Site Description
NONE PROVIDED

9b. If "wetland" was selected in 9A, how was the wetland identified?
NONE PROVIDED

10. Has the surface waterbody(ies in question 9 been identified as a 303(d) segment in Appendix E of GP-0-20-001?
No

11. Is this project located in one of the Watersheds identified in Appendix C of GP-0-20-001?
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 D (provided the map unit name is inclusive of slopes greater than 25%), E or F on the USDA Soil Survey?
No

If Yes, what is the acreage to be disturbed?
NONE PROVIDED

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?
(T) 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, PE

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

Mailing Address
5 Orchard Ave

City
Watkins Glen

State
NY

Zip
14891

Phone
6072280662

Email
scottgibson198@gmail.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
NONE PROVIDED
Comment
NONE PROVIDED

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
Silt Fence
Stabilized Construction Entrance

Biotechnical
None

Vegetative Measures
Seeding
Mulching
Topsoiling

Permanent Structural
Diversion

Other
NONE PROVIDED

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.
Building Footprint Reduction
Parking 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)
0.061

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)
0.024

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)
0.017

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)
0.036

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).
0.061

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)
0.087

CPv Provided (acre-feet)
0.176

36a. The need to provide channel protection has been waived because:
NONE PROVIDED

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)
3.12

Post-Development (CFS)
0.48

Total Extreme Flood Control Criteria (Qf)

Pre-Development (CFS)
8.68

Post-Development (CFS)
5.85

37a. The need to meet the Qp and Qf criteria has been waived because:
NONE PROVIDED

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
Bill Duthie (United Storage Systems)

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.
Originally, an additional bioretention area was planned in the stormwater treatment location for subcatchment PSC-3. A test excavation was performed and groundwater was encountered approximately 2' below the bottom of the future practice. As such, an infiltration based approach for RRv was rejected in lieu of a standard attenuation basin (Dry Pond).

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 PROVIDED

Total Contributing Impervious Acres for Conservation of Natural Area (RR-1)
NONE PROVIDED

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

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

Total Contributing Acres for Tree Planting/Tree Pit (RR-3)
NONE PROVIDED

Total Contributing Impervious Acres for Tree Planting/Tree Pit (RR-3)
NONE PROVIDED

Total Contributing Acres for Disconnection of Rooftop Runoff (RR-4)
NONE PROVIDED

RR Techniques (Volume Reduction)

Total Contributing Impervious Acres for Disconnection of Rooftop Runoff (RR-4)
NONE PROVIDED

Total Contributing Impervious Acres for Vegetated Swale (RR-5)
NONE PROVIDED

Total Contributing Impervious Acres for Rain Garden (RR-6)
NONE PROVIDED

Total Contributing Impervious Acres for Stormwater Planter (RR-7)
NONE PROVIDED

Total Contributing Impervious Acres for Rain Barrel/Cistern (RR-8)
NONE PROVIDED

Total Contributing Impervious Acres for Porous Pavement (RR-9)
NONE PROVIDED

Total Contributing Impervious Acres for Green Roof (RR-10)
NONE PROVIDED

Standard SMPs with RRv Capacity

Total Contributing Impervious Acres for Infiltration Trench (I-1)
NONE PROVIDED

Total Contributing Impervious Acres for Infiltration Basin (I-2)
NONE PROVIDED

Total Contributing Impervious Acres for Dry Well (I-3)
NONE PROVIDED

Total Contributing Impervious Acres for Underground Infiltration System (I-4)
NONE PROVIDED

Total Contributing Impervious Acres for Bioretention (F-5)
0.30

Total Contributing Impervious Acres for Dry Swale (O-1)
NONE PROVIDED

Standard SMPs

Total Contributing Impervious Acres for Micropool Extended Detention (P-1)
0.43

Total Contributing Impervious Acres for Wet Pond (P-2)
NONE PROVIDED

Total Contributing Impervious Acres for Wet Extended Detention (P-3)
NONE PROVIDED

Total Contributing Impervious Acres for Multiple Pond System (P-4)
NONE PROVIDED

Total Contributing Impervious Acres for Pocket Pond (P-5)
NONE PROVIDED

Total Contributing Impervious Acres for Surface Sand Filter (F-1)
NONE PROVIDED

Total Contributing Impervious Acres for Underground Sand Filter (F-2)
NONE PROVIDED

Total Contributing Impervious Acres for Perimeter Sand Filter (F-3)
NONE PROVIDED

Total Contributing Impervious Acres for Organic Filter (F-4)
NONE PROVIDED

Total Contributing Impervious Acres for Shallow Wetland (W-1)
NONE PROVIDED

Total Contributing Impervious Acres for Extended Detention Wetland (W-2)
NONE PROVIDED

Total Contributing Impervious Acres for Pond/Wetland System (W-3)
NONE PROVIDED

Total Contributing Impervious Acres for Pocket Wetland (W-4)
NONE PROVIDED

Total Contributing Impervious Acres for Wet Swale (O-2)
NONE PROVIDED

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

Total Contributing Impervious Area for Hydrodynamic
NONE PROVIDED

Total Contributing Impervious Area for Wet Vault
NONE PROVIDED

Total Contributing Impervious Area for Media Filter
NONE PROVIDED

"Other" Alternative SMP?
NONE PROVIDED

Total Contributing Impervious Area for "Other"
NONE PROVIDED

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 PROVIDED

Name of Alternative SMP
NONE PROVIDED

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 PROVIDED

If Other, then identify
NONE PROVIDED

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 PROVIDED

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 PROVIDED

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
NONE PROVIDED
Comment
NONE PROVIDED

Owner/Operator Certification

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
NONE PROVIDED
Comment
NONE PROVIDED

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

SWPPP Preparer Certification Form

SPDES General Permit for Stormwater Discharges From Construction Activity (GP-0-20-001)

Project Site Information

Project/Site Name

Duthie Building

Owner/Operator Information

Owner/Operator (Company Name/Private Owner/Municipality Name)

Bill Duthie (United Storage Systems)

Certification Statement – SWPPP Preparer

I hereby certify that the Stormwater Pollution Prevention Plan (SWPPP) for this project has been prepared in accordance with the terms and conditions of the GP-0-20-001. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of this permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

Timothy	C	Buhl, PE
First name	MI	Last Name

Signature

Date

Revised: January 2020

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

Owner/Operator Certification Form

SPDES General Permit For Stormwater Discharges From Construction Activity (GP-0-20-001)

Project/Site Name: Duthie Buidling

eNOI Submission Number: HPX-N4FP-GRQC2

eNOI Submitted by: ☐ **Owner/Operator** ☑ **SWPPP Preparer** ☐ **Other**

Certification Statement - Owner/Operator

I have read or been advised of the permit conditions and believe that I understand them. I also understand that, under the terms of the permit, there may be reporting requirements. I hereby certify that this document and the corresponding documents were prepared under my direction or supervision. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I further understand that coverage under the general permit will be identified in the acknowledgment that I will receive as a result of submitting this NOI and can be as long as sixty (60) business days as provided for in the general permit. I also understand that, by submitting this NOI, I am acknowledging that the SWPPP has been developed and will be implemented as the first element of construction, and agreeing to comply with all the terms and conditions of the general permit for which this NOI is being submitted.

Owner/Operator First Name William M.I. J Last Name Duthie

William J Duthie

Signature

9/14/23

Date

NYS 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:	Bill Duthie (United Storage Systems)
2. Contact Person:	Bill Duthie
3. Street Address:	484 Ridge Road
4. City/State/Zip:	Lansing, NY 14882
II. Project Site Information	
5. Project/Site Name:	Duthie Building
6. Street Address:	8-18 Verizon Lane
7. City/State/Zip:	Lansing, NY 14882
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:	Town of Lansing
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

(NYS DEC - MS4 SWPPP Acceptance Form - January 2015)

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

9b. ☐ 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. ☐ 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? ☐ yes ☐ no (If no, go to question 10f.)

10b. Have all post-construction stormwater management practices included in the final SWPPP been constructed? ☐ yes ☐ 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? ☐ yes ☐ no

10e. Indicate the method used to ensure long-term operation and maintenance of the post-construction stormwater management practice(s):

- ☐ Post-construction stormwater management practice(s) and any right-of-way(s) needed to maintain practice(s) have been deeded to the municipality.
- ☐ Executed maintenance agreement is in place with the municipality that will maintain the post-construction stormwater management practice(s).
- ☐ 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.
- ☐ 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? ☐ yes ☐ 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:

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

(NYS DEC Notice of Termination - January 2010)

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-0-20-001)

As per *Part III.A.6* on page 13 of *GP-0-20-001* (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 <u>any</u> *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:
State Historic Preservation Mapping

New York State
Parks, Recreation and
Historic Preservation

KATHY HOCHUL
Governor

ERIK KULLESEID
Commissioner

June 22, 2023

Scott Gibson
Scott Gibson
5 Orchard Ave
Watkins Glen, NY 14891

Re: DEC
Duthie Storage Building
23PR04385

Dear Scott 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 opinion of OPRHP that no properties, including archaeological and/or historic resources, listed in or eligible for the New York State and National Registers of Historic Places will be impacted by this project.

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

Sincerely,

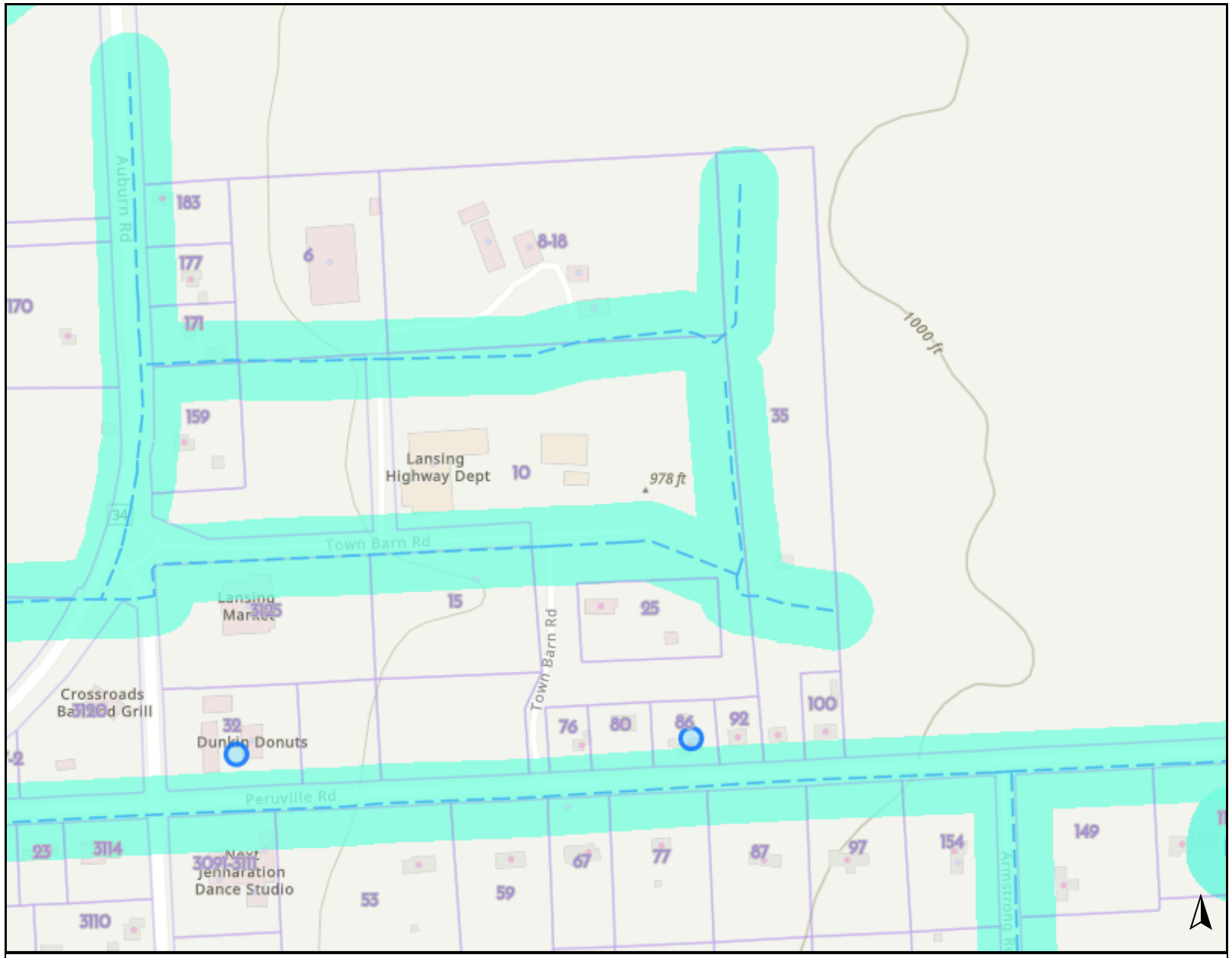
R. Daniel Mackay

Deputy Commissioner for Historic Preservation
Division for Historic Preservation

rev: D. Boggs

Attachment E:
Environmental Mapping

Map Title



Legend

Private Wells

Hydrology
- Intermittent Streams
- Perennial Streams

Addresses
- Res
- Nonres
- Unclassified

Parcels

DraftFlood
- 500 Year
- AREA OF MINIMAL FLOOD HAZARD
- FLOODWAY
- 100 Year

Protected Streams
- AA- Drinking water source
- A- Drinking water source

Notes

0 500 1000 ft

1: 6006

Environmental Resource Mapper

Base Map: Topographical Using this map

- Search
- Tools
- Layers and Legend
- **Other Wetland Layers**
  - National Wetands Inventory
    - Estuarine and Marine Deepwater
    - Estuarine and Marine Wetland
    - Freshwater Emergent Wetland
    - Freshwater Forested/Shrub Wetland
    - Freshwater Pond
- Reference Layers
- Tell Me More...
- Need A Permit?
- Contacts

Attachment F:
Inspection Report (Sample Form)

TOWN OF

Construction Stormwater Inspection Report for SPDES General Permit GP-0- 15-002

Project Name and Location:		Date:	Weather:
		Permit # (if any): **NYR10**	
Municipality:	County:	Entry Time:	Exit Time:
Name of SPDES Permittee:	Contacted: Yes ☐ No ☐	Inspection Type:	
Phone Number:		☐ Compliance ☐ Referral ☐ Complaint ☐ NOT	
On-site Representative(s) and Company(s):			
Phone Number(s):			

SPDES Authority

	Yes	No	N/A	
1.	☐	☐	☐	Does the project have permit coverage?
2.	☐	☐	☐	Is a copy of the NOI and Acknowledgment Letter available on site and accessible for viewing?
3.	☐	☐	☐	Is a copy of the MS4 SWPPP Acceptance Form available on site and accessible for viewing?
4.	☐	☐	☐	Is an up-to-date copy of the signed SWPPP retained at the construction site?
5.	☐	☐	☐	Is a copy of the SPDES General Permit retained at the construction site?
6.	☐	☐	☐	Does the NOI accurately report the number of acres to be disturbed?

SWPPP Content

	Yes	No	N/A	
7.	☐	☐	☐	Does the SWPPP describe and identify the erosion and sediment control measures to be employed?
8.	☐	☐	☐	Does the SWPPP provide an inspection schedule and maintenance requirements for the E&SC measures?
9.	☐	☐	☐	Does the SWPPP describe and identify the stormwater management practices to be employed?
10.	☐	☐	☐	Does the SWPPP identify the contractor(s) and subcontractor(s) responsible for each measure?
11.	☐	☐	☐	Does the SWPPP identify at least one trained individual from each contractor(s) and subcontractor(s) companies
12.	☐	☐	☐	Does the SWPPP include all the necessary Contractor Certification Statements and signatures?
13.	☐	☐	☐	Is the SWPPP signed by the permittee?
14.	☐	☐	☐	Is the SWPPP prepared by a qualified professional (if post-construction stormwater management required)?
15.	☐	☐	☐	Do the SMPs conform to the Enhanced Phosphorus Removal Standards (projects in TMDL watersheds)?

Recordkeeping

	Yes	No	N/A	
16.	☐	☐	☐	Are self-inspections performed as required by the permit (weekly, or twice weekly for >5 acres disturbed)?
17.	☐	☐	☐	Are the self-inspections performed by and signed by a qualified inspector and retained on site?
18.	☐	☐	☐	Do the qualified inspector's reports include the minimum reporting requirements?
19.	☐	☐	☐	Do inspection reports identify corrective measures that have not been implemented or are recurring?

Visual Observations

	Yes	No	N/A	
20.	☐	☐	☐	Are all erosion and sediment control measures installed properly?
21.	☐	☐	☐	Are all erosion and sediment control measures being maintained properly?
22.	☐	☐	☐	Was written authorization issued for any disturbance greater than 5 acres?
23.	☐	☐	☐	Have stabilization measures been implemented in inactive areas per Permit (>5 acres) and E&SC Standards?
24.	☐	☐	☐	Are post-construction stormwater management practices constructed/installed correctly?
25.	☐	☐	☐	Has final site stabilization been achieved and temporary E&SC measures removed prior to NOT submittal?
26.	☐	☐	☐	Was there a discharge from the site on the day of inspection?
27.	☐	☐	☐	Is there evidence that a discharge caused or contributed to a violation of water quality standards?

Water Quality Observations

Describe the discharge(s): location, source(s), impact on receiving water(s), etc.

Describe the quality of the receiving water(s) both upstream and downstream of the discharge

Describe any other water quality standards or permit violations

Additional Comments

☐ Photographs attached

Overall Inspection Rating: ☐ Satisfactory ☐ Marginal ☐ Unsatisfactory	
Name/Agency of Lead Inspector:	**Signature of Lead Inspector:**
Names/Agencies of Other Inspectors:	

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

(NYS Standards & Specifications for Erosion & Sediment Control)

(Reference)

STANDARD AND SPECIFICATIONS FOR MULCHING

Definition and Scope

Applying coarse plant residue or chips, or other suitable materials, to cover the soil surface to provide initial erosion control while a seeding or shrub planting is establishing. Mulch will conserve moisture and modify the surface soil temperature and reduce fluctuation of both. Mulch will prevent soil surface crusting and aid in weed control. Mulch can also be used alone for temporary stabilization in non-growing months. Use of stone as a mulch could be more permanent and should not be limited to non-growing months.

Conditions Where Practice Applies

On soils subject to erosion and on new seedings and shrub plantings. Mulch is useful on soils with low infiltration rates by retarding runoff.

Criteria

Site preparation prior to mulching requires the installation of necessary erosion control or water management practices and drainage systems.

Slope, grade and smooth the site to fit needs of selected mulch products.

Remove all undesirable stones and other debris to meet the needs of the anticipated land use and maintenance required.

Apply mulch after soil amendments and planting is accomplished or simultaneously if hydroseeding is used.

Select appropriate mulch material and application rate or material needs. Hay mulch shall not be used in wetlands or in areas of permanent seeding. Clean straw mulch is preferred alternative in wetland application. Determine local availability.

Select appropriate mulch anchoring material.

NOTE: The best combination for grass/legume establishment is straw (cereal grain) mulch applied at 2 ton/ acre (90 lbs./1000sq.ft.) and anchored with wood fiber mulch (hydromulch) at 500 – 750 lbs./acre (11 – 17 lbs./1000 sq. ft.). The wood fiber mulch must be applied through a hydroseeder immediately after mulching.

Table 4.2
Guide to Mulch Materials, Rates, and Uses

Mulch Material	Quality Standards	per 1000 Sq. Ft.	per Acre	Depth of Application	Remarks
Wood chips or shavings	Air-dried. Free of objectionable coarse material	500-900 lbs.	10-20 tons	2-7”	Used primarily around shrub and tree plantings and recreation trails to inhibit weed competition. Resistant to wind blowing. Decomposes slowly.
Wood fiber cellulose (partly digested wood fibers)	Made from natural wood usually with green dye and dispersing agent	50 lbs.	2,000 lbs.	—	Apply with hydromulcher. No tie down required. Less erosion control provided than 2 tons of hay or straw.
Gravel, Crushed Stone or Slag	Washed; Size 2B or 3A—1 1/2”	9 cu. yds.	405 cu. yds.	3”	Excellent mulch for short slopes and around plants and ornamentals. Use 2B where subject to traffic. (Approximately 2,000 lbs./cu. yd.). Frequently used over filter fabric for better weed control.
Hay or Straw	Air-dried; free of undesirable seeds & coarse materials	90-100 lbs. 2-3 bales	2 tons (100-120 bales)	cover about 90% surface	Use small grain straw where mulch is maintained for more than three months. Subject to wind blowing unless anchored. Most commonly used mulching material. Provides the best micro-environment for germinating seeds.
Jute twisted yarn	Undyed, unbleached plain weave. Warp 78 ends/yd., Weft 41 ends/yd. 60-90 lbs./roll	48” x 50 yds. or 48” x 75 yds.	—	—	Use without additional mulch. Tie down as per manufacturers specifications. Good for center line of concentrated water flow.
Excelsior wood fiber mats	Interlocking web of excelsior fibers with photodegradable plastic netting	4’ x 112.5’ or 8’ x 112.5’.	—	—	Use without additional mulch. Excellent for seeding establishment. Anchor as per manufacturers specifications. Approximately 72 lbs./roll for excelsior with plastic on both sides. Use two sided plastic for centerline of waterways.
Straw or coconut fiber, or combination	Photodegradable plastic net on one or two sides	Most are 6.5 ft. x 3.5 ft.	81 rolls	—	Designed to tolerate higher velocity water flow, centerlines of waterways, 60 sq. yds. per roll.

Table 4.3
Mulch Anchoring Guide

Anchoring Method or Material	Kind of Mulch to be Anchored	How to Apply
1. Peg and Twine	Hay or straw	After mulching, divide areas into blocks approximately 1 sq. yd. in size. Drive 4-6 pegs per block to within 2" to 3" of soil surface. Secure mulch to surface by stretching twine between pegs in criss-cross pattern on each block. Secure twine around each peg with 2 or more tight turns. Drive pegs flush with soil. Driving stakes into ground tightens the twine.
2. Mulch netting	Hay or straw	Staple the light-weight paper, jute, wood fiber, or plastic nettings to soil surface according to manufacturer's recommendations. Should be biodegradable. Most products are not suitable for foot traffic.
3. Wood cellulose fiber	Hay or straw	Apply with hydroseeder immediately after mulching. Use 500 lbs. wood fiber per acre. Some products contain an adhesive material ("tackifier"), possibly advantageous.
4. Mulch anchoring tool	Hay or straw	Apply mulch and pull a mulch anchoring tool (blunt, straight discs) over mulch as near to the contour as possible. Mulch material should be "tucked" into soil surface about 3".
5. Tackifier	Hay or straw	Mix and apply polymeric and gum tackifiers according to manufacturer's instructions. Avoid application during rain. A 24-hour curing period and a soil temperature higher than 45^0 Fahrenheit are required.

STANDARD AND SPECIFICATIONS FOR PERMANENT CONSTRUCTION AREA PLANTING

Definition & Scope

Establishing **permanent** grasses with other forbs and/or shrubs to provide a minimum 80% perennial vegetative cover on areas disturbed by construction and critical areas to reduce erosion and sediment transport. Critical areas may include but are not limited to steep excavated cut or fill slopes as well as eroding or denuded natural slopes and areas subject to erosion.

Conditions Where Practice Applies

This practice applies to all disturbed areas void of, or having insufficient, cover to prevent erosion and sediment transport. See additional standards for special situations such as sand dunes and sand and gravel pits.

Criteria

All water control measures will be installed as needed prior to final grading and seedbed preparation. Any severely compacted sections will require chiseling or disking to provide an adequate rooting zone, to a minimum depth of 12", see Soil Restoration Standard. The seedbed must be prepared to allow good soil to seed contact, with the soil not too soft and not too compact. Adequate soil moisture must be present to accomplish this. If surface is powder dry or sticky wet, postpone operations until moisture changes to a favorable condition. If seeding is accomplished within 24 hours of final grading, additional scarification is generally not needed, especially on ditch or stream banks. Remove all stones and other debris from the surface that are greater than 4 inches, or that will interfere with future mowing or maintenance.

Soil amendments should be incorporated into the upper 2 inches of soil when feasible. **The soil should be tested to determine the amounts of amendments needed.** Apply ground agricultural limestone to attain a pH of 6.0 in the upper 2 inches of soil. If soil must be fertilized before results of a soil test can be obtained to determine fertilizer needs, apply commercial fertilizer at 600 lbs. per acre of 5-5 -10 or equivalent. If manure is used, apply a quantity to meet the nutrients of the above fertilizer. This requires an appropriate manure analysis prior to applying to the site. Do not use manure on sites to be planted with birdsfoot trefoil or in the path of concentrated water flow.

Seed mixtures may vary depending on location within the state and time of seeding. Generally, warm season grasses should only be seeded during early spring, April to May. These grasses are primarily used for vegetating excessively drained sands and gravels. See Standard and Specification for Sand and Gravel Mine Reclamation. Other grasses may be seeded any time of the year when the soil is not frozen and is workable. When legumes such as birdsfoot trefoil are included, spring seeding is preferred. See Table 4.4, "Permanent Construction Area Planting Mixture Recommendations" for additional seed mixtures.

General Seed Mix:	**Variety**	**lbs./ acre**	**lbs/1000 sq. ft.**
Red Clover[1] OR	Acclaim, Rally, Red Head II, Renegade	8[2]	0.20
Common white clover[1]	Common	8	0.20
PLUS			
Creeping Red Fescue	Common	20	0.45
PLUS			
Smooth Bromegrass OR	Common	2	0.05
Ryegrass (perennial)	Pennfine/Linn	5	0.10

[1] add inoculant immediately prior to seeding
[2] Mix 4 lbs each of Empire and Pardee OR 4 lbs of Birdsfoot and 4 lbs white clover per acre. All seeding rates are given for Pure Live Seed (PLS)

Pure Live Seed, or (PLS) refers to the amount of live seed in a lot of bulk seed. Information on the seed bag label includes the type of seed, supplier, test date, source of seed, purity, and germination. Purity is the percentage of pure seed. Germination is the percentage of pure seed that will produce normal plants when planted under favorable conditions.

To compute Pure Live Seed multiply the "germination percent" times the "purity" and divide that by 100 to get Pure Live Seed.

$$\text{Pure Live Seed (PLS)} = \frac{\%\,\text{Germination} \times \%\,\text{Purity}}{100}$$

For example, the PLS for a lot of Kentucky Blue grass with 75% purity and 96% germination would be calculated as follows:

$$\frac{(96) \times (75)}{100} = 72\%\ \text{Pure Live Seed}$$

For 10lbs of PLS from this lot =

$$\frac{10}{0.72} = 13.9\ \text{lbs}$$

Therefore, 13.9 lbs of seed is the actual weight needed to meet 10lbs PSL from this specific seed lot.

Time of Seeding: The optimum timing for the general seed mixture is early spring. Permanent seedings may be made any time of year if properly mulched and adequate moisture is provided. Late June through early August is not a good time to seed, but may facilitate covering the land without additional disturbance if construction is completed. Portions of the seeding may fail due to drought and heat. These areas may need reseeding in late summer/fall or the following spring.

Method of seeding: Broadcasting, drilling, cultipack type seeding, or hydroseeding are acceptable methods. Proper soil to seed contact is key to successful seedings.

Mulching: Mulching is essential to obtain a uniform stand of seeded plants. Optimum benefits of mulching new seedings are obtained with the use of small grain straw applied at a rate of 2 tons per acre, and anchored with a netting or tackifier. See the Standard and Specifications for Mulching for choices and requirements.

Irrigation: Watering may be essential to establish a new seeding when a drought condition occurs shortly after a new seeding emerges. Irrigation is a specialized practice and care must be taken not to exceed the application rate for the soil or subsoil. When disconnecting irrigation pipe, be sure pipes are drained in a safe manor, not creating an erosion concern.

80% Perennial Vegetative Cover

50% Perennial Vegetative Cover

Table 4.4
Permanent Construction Area Planting Mixture Recommendations

Seed Mixture	Variety	Rate in lbs./acre (PLS)	Rate in lbs./ 1, 000 ft^2
Mix #1			
Creeping red fescue	Ensylva, Pennlawn, Boreal	10	.25
Perennial ryegrass	Pennfine, Linn	10	.25
*This mix is used extensively for shaded areas.			
Mix #2			
Switchgrass	Shelter, Pathfinder, Trailblazer, or Blackwell	20	.50
*This rate is in pure live seed, this would be an excellent choice along the upland edge of a wetland to filter runoff and provide wildlife benefits. In areas where erosion may be a problem, a companion seeding of sand lovegrass should be added to provide quick cover at a rate of 2 lbs. per acre (0.05 lbs. per 1000 sq. ft.).			
Mix #3			
Switchgrass	Shelter, Pathfinder, Trailblazer, or Blackwell	4	.10
Big bluestem	Niagara	4	.10
Little bluestem	Aldous or Camper	2	.05
Indiangrass	Rumsey	4	.10
Coastal panicgrass	Atlantic	2	.05
Sideoats grama	El Reno or Trailway	2	.05
Wildflower mix		.50	.01
*This mix has been successful on sand and gravel plantings. It is very difficult to seed without a warm season grass seeder such as a Truax seed drill. Broadcasting this seed is very difficult due to the fluffy nature of some of the seed, such as bluestems and indiangrass.			
Mix #4			
Switchgrass	Shelter, Pathfinder, Trailblazer, or Blackwell	10	.25
Coastal panicgrass	Atlantic	10	.25
*This mix is salt tolerant, a good choice along the upland edge of tidal areas and roadsides.			
Mix #5			
Saltmeadow cordgrass (Spartina patens)—This grass is used for tidal shoreline protection and tidal marsh restoration. It is planted by vegetative stem divisions. 'Cape' American beachgrass can be planted for sand dune stabilization above the saltmeadow cordgrass zone.			
Mix #6			
Creeping red fescue	Ensylva, Pennlawn, Boreal	20	.45
Chewings Fescue	Common	20	.45
Perennial ryegrass	Pennfine, Linn	5	.10
Red Clover	Common	10	.45
*General purpose erosion control mix. Not to be used for a turf planting or play grounds.			

STANDARD AND SPECIFICATIONS FOR TEMPORARY CONSTRUCTION AREA SEEDING

Definition & Scope

Providing temporary erosion control protection to disturbed areas and/or localized critical areas for an interim period by covering all bare ground that exists as a result of construction activities or a natural event. Critical areas may include but are not limited to steep excavated cut or fill slopes and any disturbed, denuded natural slopes subject to erosion.

Conditions Where Practice Applies

Temporary seedings may be necessary on construction sites to protect an area, or section, where final grading is complete, when preparing for winter work shutdown, or to provide cover when permanent seedings are likely to fail due to mid-summer heat and drought. The intent is to provide temporary protective cover during temporary shutdown of construction and/or while waiting for optimal planting time.

Criteria

Water management practices must be installed as appropriate for site conditions. The area must be rough graded and slopes physically stable. Large debris and rocks are usually removed. Seedbed must be seeded within 24 hours of disturbance or scarification of the soil surface will be necessary prior to seeding.

Fertilizer or lime are not typically used for temporary seedings.

IF: Spring or summer or early fall, then seed the area with ryegrass (annual or perennial) at 30 lbs. per acre (Approximately 0.7 lb./1000 sq. ft. or use 1 lb./1000 sq. ft.).

IF: Late fall or early winter, then seed Certified 'Aroostook' winter rye (cereal rye) at 100 lbs. per acre (2.5 lbs./1000 sq. ft.).

Any seeding method may be used that will provide uniform application of seed to the area and result in relatively good soil to seed contact.

Mulch the area with hay or straw at 2 tons/acre (approx. 90 lbs./1000 sq. ft. or 2 bales). Quality of hay or straw mulch allowable will be determined based on long term use and visual concerns. Mulch anchoring will be required where wind or areas of concentrated water are of concern. Wood fiber hydromulch or other sprayable products approved for erosion control (nylon web or mesh) may be used if applied according to manufacturers' specification. Caution is advised when using nylon or other synthetic products. They may be difficult to remove prior to final seeding and can be a hazard to young wildlife species.

STANDARD AND SPECIFICATIONS FOR TOPSOILING

Definition & Scope

Spreading a specified quality and quantity of topsoil materials on graded or constructed subsoil areas to provide acceptable plant cover growing conditions, thereby reducing erosion; to reduce irrigation water needs; and to reduce the need for nitrogen fertilizer application.

Conditions Where Practice Applies

Topsoil is applied to subsoils that are droughty (low available moisture for plants), stony, slowly permeable, salty or extremely acid. It is also used to backfill around shrub and tree transplants. This standard does not apply to wetland soils.

Design Criteria

1. Preserve existing topsoil in place where possible, thereby reducing the need for added topsoil.

2. Conserve by stockpiling topsoil and friable fine textured subsoils that must be stripped from the excavated site and applied after final grading where vegetation will be established. Topsoil stockpiles must be stabilized. Stockpile surfaces can be stabilized by vegetation, geotextile or plastic covers. This can be aided by orientating the stockpile lengthwise into prevailing winds.

3. Refer to USDA Natural Resource Conservation Service soil surveys or soil interpretation record sheets for further soil texture information for selecting appropriate design topsoil depths.

Site Preparation

1. As needed, install erosion and sediment control practices such as diversions, channels, sediment traps, and stabilizing measures, or maintain if already installed.

2. Complete rough grading and final grade, allowing for depth of topsoil to be added.

3. Scarify all compact, slowly permeable, medium and fine textured subsoil areas. Scarify at approximately right angles to the slope direction in soil areas that are steeper than 5 percent. Areas that have been overly compacted shall be decompacted in accordance with the Soil Restoration Standard.

4. Remove refuse, woody plant parts, stones over 3 inches in diameter, and other litter.

Topsoil Materials

1. Topsoil shall have at least 6 percent by weight of fine textured stable organic material, and no greater than 20 percent. Muck soil shall not be considered topsoil.

2. Topsoil shall have not less than 20 percent fine textured material (passing the NO. 200 sieve) and not more than 15 percent clay.

3. Topsoil treated with soil sterilants or herbicides shall be so identified to the purchaser.

4. Topsoil shall be relatively free of stones over 1 1/2 inches in diameter, trash, noxious weeds such as nut sedge and quackgrass, and will have less than 10 percent gravel.

5. Topsoil containing soluble salts greater than 500 parts per million shall not be used.

6. Topsoil may be manufactured as a mixture of a mineral component and organic material such as compost.

Application and Grading

1. Topsoil shall be distributed to a uniform depth over the area. It shall not be placed when it is partly frozen, muddy, or on frozen slopes or over ice, snow, or standing water puddles.

2. Topsoil placed and graded on slopes steeper than 5 percent shall be promptly fertilized, seeded, mulched, and stabilized by “tracking” with suitable equipment.

3. Apply topsoil in the amounts shown in Table 4.7 below:

Table 4.7 - Topsoil Application Depth		
Site Conditions	**Intended Use**	**Minimum Topsoil Depth**
1. Deep sand or loamy sand	Mowed lawn	6 in.
	Tall legumes, unmowed	2 in.
	Tall grass, unmowed	1 in.
2. Deep sandy loam	Mowed lawn	5 in.
	Tall legumes, unmowed	2 in.
	Tall grass, unmowed	none
3. Six inches or more: silt loam, clay loam, loam, or silt	Mowed lawn	4 in.
	Tall legumes, unmowed	1 in.
	Tall grass, unmowed	1 in.

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.

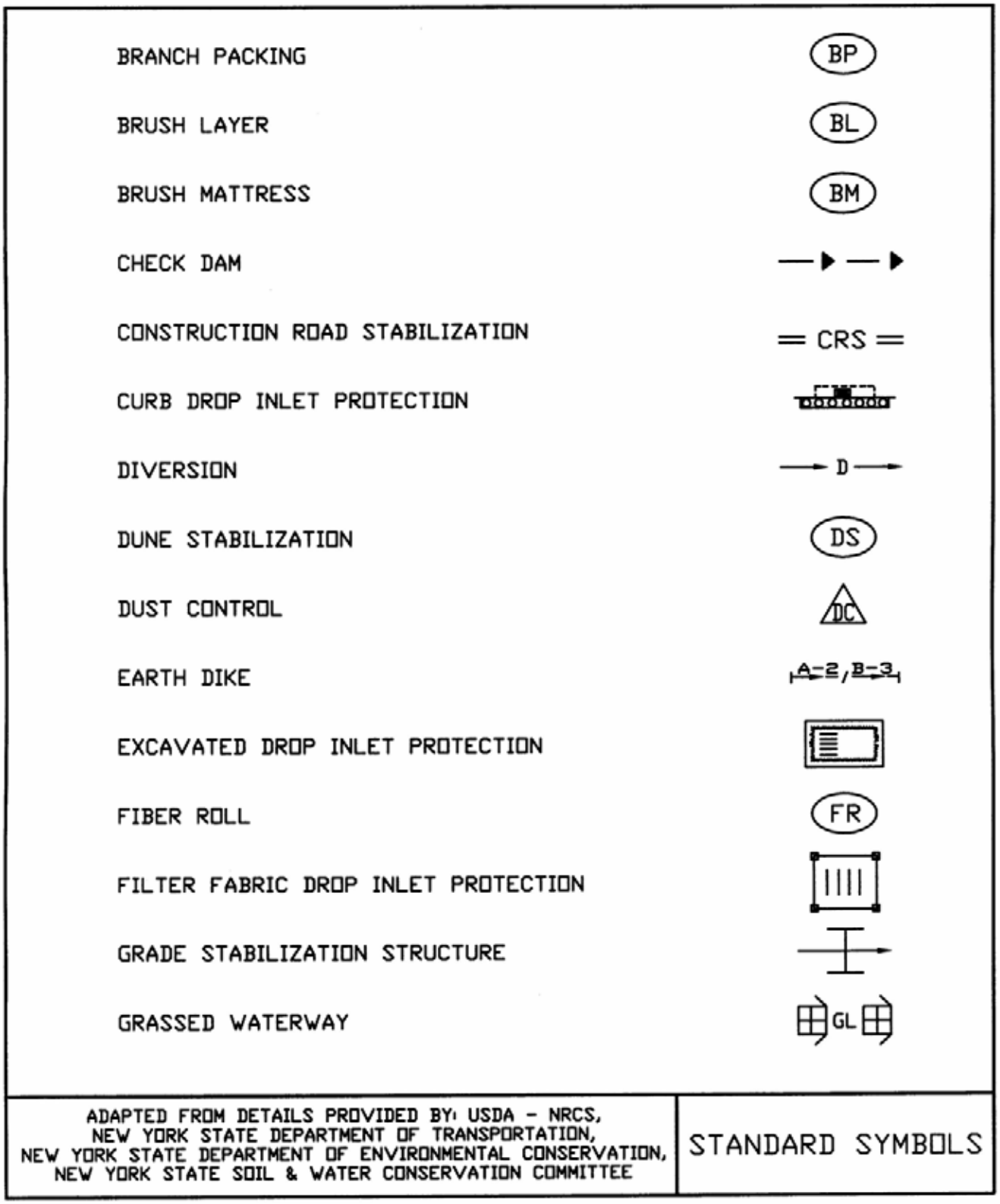
3. Protect streams from chemicals, fuel, lubricants, sewage, or other pollutants.

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

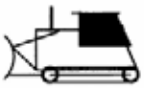
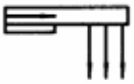
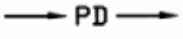
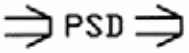
5. Do not locate sanitary facilities over, or adjacent to, waterways, wells, or springs.

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

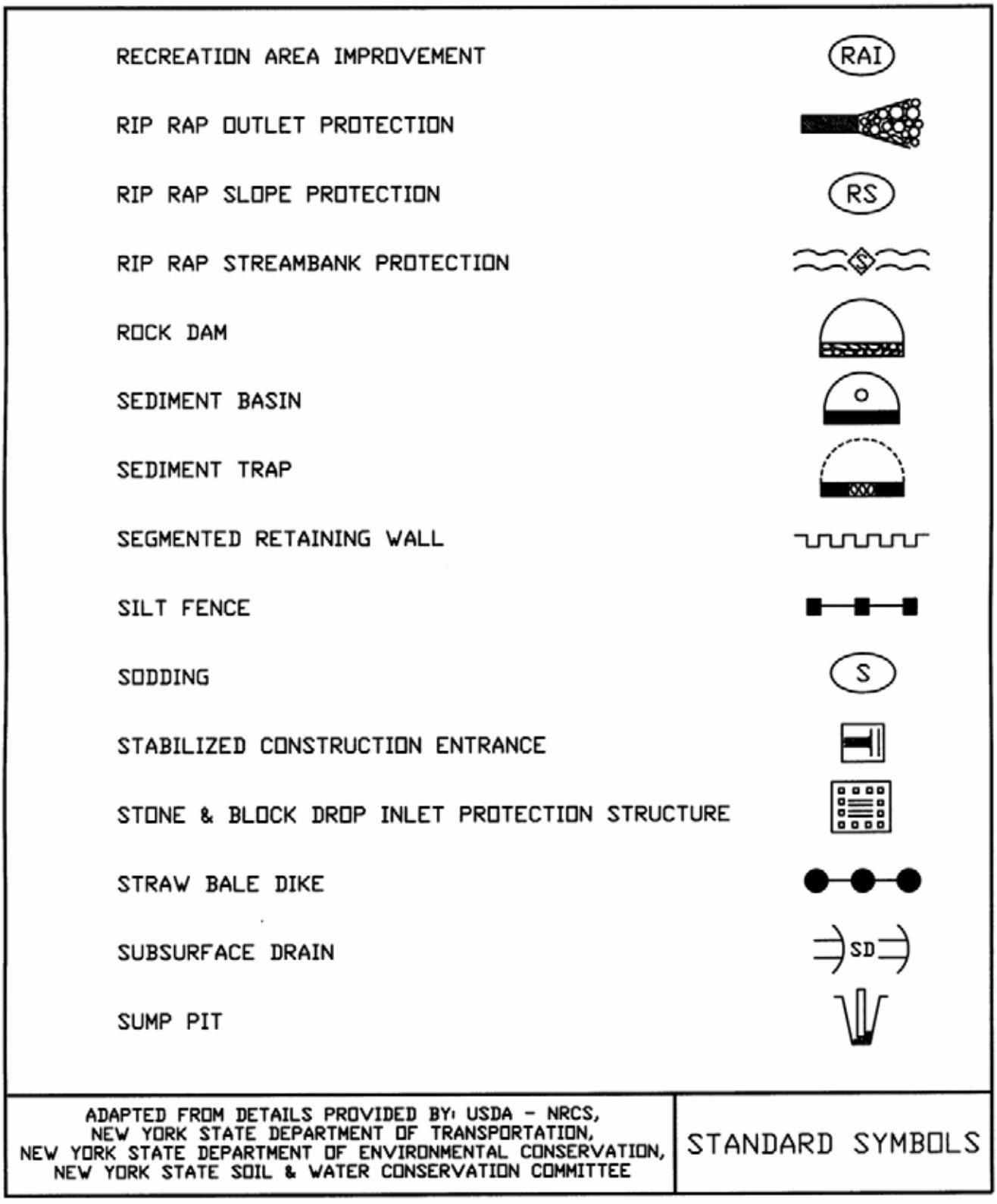


STANDARD SYMBOLS (cont'd)

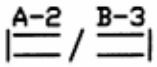
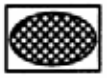
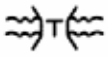
LAND GRADING	
LEVEL SPREADER	
LINED WATERWAY	
LIVE CRIBWALL	
LIVE CUTTINGS/LIVE STAKES PLANTING	
LIVE FASCINE	
MULCHING	
OPTIONAL SEDIMENT TRAP DEWATERING DEVICE	
PAVED FLUME	
PERIMETER DIKE OR SWALE	
PERMANENT SEEDING	
PIPE OUTLET SEDIMENT TRAP	
PIPE SLOPE DRAIN FLEXIBLE	
PORTABLE SEDIMENT TANK	
PROTECTING 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)



STANDARD SYMBOLS (cont'd)

SURFACE ROUGHENING	
TEMPORARY SEEDING	
TEMPORARY SWALE	
TOPSOILING	
TREE REVETMENT	
TURBIDITY CURTAIN	
VEGETATED ROCK GABIONS	
WATER BAR	
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

INDEX

Stormwater Management Summary

STORMWATER MANAGEMENT SUMMARY

SITE DATA - GENERAL

Stormwater

A Full Stormwater Pollution Prevention Plan (SWPPP) has been prepared for the proposed construction of a 9600-SF storage building, associated gravel drive, parking surfaces, and landscaping. The corresponding stormwater plan also incorporates an area for a potential additional building space to the development's west side and the possibly for 10 additional parking spaces to the north. As the existing and potential land use is impervious in these locations, this will have little impact on storm control sizing if and when the building is constructed.

This project will be an extension of an existing impervious commercial area. The site will be privately sewered and will have a series of general stormwater practices for site quality and quantity control. A diversion swale will collect runoff from off-site influences from the east and channel it around the development toward the south and into an existing site drainage collection system. This is modification of existing runoff conditions as the watershed currently drains to the northwest. As such, a quantity attenuation basin/swale will intercept upland runoff before it is sent to the southern collection system. This structure will reduce runoff to existing conditions.

Development site runoff impacted by construction will be directed into a bioretention area and dry pond.

The lot at build out will disturb approximately 91,763-SF (2.1-AC) of existing gravel and dirt surfaces, woods and grass, and meadow reducing the total impervious cover by 1,389-SF (0.03-AC). This amounts to an approximate reduction of 4% as a ratio of existing impervious to proposed.

Subcatchment Evaluation: There are two (2) pre-developed (existing) watershed subcatchments (ESC-1 and ESC-2) for this site totaling 135,161-SF (3.10-AC). Site topography generally runs in an east to west direction over gentle slopes of 1-3%.

The ESC-1 drainage area is a 2.61-AC parcel that begins over a former agricultural area (meadow) running through a light brushy wood and into an existing commercial site with hard packed dirt and gravel surfaces. Runoff eventually finds its way down to the Auburn Road swale system, which then runs to the north. The site analysis point for this area is Design Point Existing 1.

ESC-2 is a smaller 0.49-AC lot that flows to the south and into an on-site ditchline. Runoff moves through a series of existing culverts before it finds its way off-site along Town Barn road and into

an established ditch system. This then runs to the west and into Auburn Road where it flows to the south. The analysis point for this area of the project is Design Point Existing 2.

The project intends to intercept and cut off runoff from the upper portion of ESC-1 (later referred to as PSC-1 in the proposed subcatchment analysis) by channeling it into an attenuation basin and sending it to the south into the ESC-2 culvert system. As such, a runoff model showing existing impacts on the 6"culvert from the 0.77-AC area called CULV. Please see project drawing C-109 for more information.

The proposed development has been divided into three subcatchments, PSC-1 through PSC-3 which mirror the shape and size of ESC-1 and ESC-2. Changes in landcover during construction, minor grading modifications, and the introduction of impervious hardscape surfaces can negatively affect runoff rates and volumes and introduce pollutants to the environment as compared to previously existing conditions. As such, a plan to provide water quality volume treatment and quantity attenuation in accordance with NYSDEC standards is necessary.

PSC-1 represents a 1.81-AC area of off-site upland watershed that includes the former agricultural and wooded property from the east. This flow will be intercepted and diverted around the proposed construction project to the south through an engineered 3' deep attenuation basin. This structure which will reduce runoff rates and volumes to existing conditions to ensure that the downstream swale and collection system will be unimpacted by the change. Modeling of the network indicates that the 6" pipe will handle PSC-1 without incident. However, it is recommended that it be upgraded to a 12" to provide for better maintenance and ensure that the pipe as the capacity for storms larger than the 100 yr . In addition, because half of the proposed building rooftop will be drained to the east, downspouts will be directed into the basin for quality treatment.

PSC-2 includes 0.44-AC of impervious surfaces from the half of the new building as well as the associated parking area. This runoff will be sent into an engineered bioretention system located in the center of the parking lot turnaround. Drainage from the practice will be directed into a new dry attenuation basin (pond) located just downslope within subcatchment PSC-3.

PSC-3 includes 0.85-AC of remaining gravel surfaces and surrounding disturbed areas of the lower site. This runoff including drainage from the bioretenation area in PSC-2 will be collected by an engineered dry pond attenuation basin. Outflow from the basin will be directed into an existing ditch that runs along the northern parcel boundary line to the west and into the Auburn Road swale system.

Treatment Flowpath: The proposed subcatchments have been identified as areas in need of water quality treatment due to impacts from construction and added impervious surfaces. Overall, there are three (3) stormwater practices that have been designed to address runoff reduction volume concerns and to treat 100% of the site water quality volume.

Site Soils: Using the USDA Web Soil Survey, two soil types have been identified within the watershed of the existing site. Kendaia, (KaB) is a gravely silt loam with very low to moderately high drainage characteristics (0.00 – 1.42 in/hr) in the hydrologic soil group B. Ovid (OaA) is a

silt loam with moderately low to moderately high drainage characteristics 0.06 – 0.20 in/hr in the hydrologic soil group C. Overall, Kendaia makes up roughly 13% and Ovid 87% of site soils.

Soils data was obtained from the on-line USDA Soil Conservation Service Web Soil Survey.

Site Topography: The site as a whole has a varied slope of between 1 – 3% primarily moving downhill from east to west.

Site Watershed: Of the 3.10-acre watershed, the cumulative area of disturbance at full buildout will be approximately 2.1-acres. Under no circumstances will more than 5.0-AC be opened at any one time.

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 (Appendix 4). Rainfall data specific to Tompkins County under consideration, for various 24-hour storm events tabled below:

RAINFALL DATA

STORM	24-HOUR RAINFALL
1-year	1.99 inches
10-year	3.39 inches
100-year	5.82 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 is:

WQv = 2,637 cu-ft (0.060af)

Of this amount, there were no opportunities for water quality volume credits.

WQv credit = 0 *cuft (0.00 af)*

Adjusted WQv = 2,637 cuft (0.060 af)

The minimum RRv was based on the following calculation:

Soil group for site:

C – 1.47-AC S = 30%

Minimum RRv:

S = 0.30
Impervious Area = 0.73-AC
Precipitation = 1.0 in
Rv = 0.95

Minimum Rv = [(P)(Rv)(A)] /12 = ((1.0 * ***0.95"/AC * 0.73AC****)/12)0.30* =

755 cuft or, 0.0173-acft

2. **Water Quality Volume Treatment Practices**

A single bioretention area has 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 Adjust. (Cuft)	Adjusted RRv
PSC-1	379	0	Attenuation Basin
PSC-2	1,060	1,060	BR
PSC-3	1,198	0	Dry Pond
	2,637	1,060	

3. Total of RRv

Total RRv required by practices 2,637 cuft (0.060-AF)
Total Remaining Storage Volume for practices (after RRv) 2,637 cuft - 1,060 cuft = 1,577 cuft (0.036AF)

Is provided RRv > adjusted WQv from #1? 0.024 acft > 0.060 AF **NO**
Is provided RRv > minimum RRv for C soils from #1? 0.024 AF > 0.0173 AF **YES**

Originally, an additional bioretention area was planned in the stormwater treatment location for subcatchment PSC-3. A test excavation was performed and groundwater was encountered approximately 2' below the bottom of the future practice. As such, an infiltration based approach for RRv was rejected in lieu of a standard attenuation basin (Dry Pond).

Remaining WQv required for treatment
0.060-AF – 0.024AF = **0.036-AF**

Is volume available within standard practices for remaining untreated WQv?

PSC-1 Attenuation Basin Volume = 6,865-CF (0.157-AF)
PSC-3 Dry Pond Forebay Volume = 2,100-CF (0.048-AF)

YES

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

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

Minimum runoff reduction requirements are met for this project.

DESIGN POINT 1 SUMMARY (DPP-1)

PSC-2 and PSC-3, Cpv = 24 hour extended detention of post-developed 1-year, 24-hour Storm event (**1.99-inch rainfall Tompkins County**) - **1 yr Cpv 0.084-AF (3,659-CF) less the volume captured in runoff reduction practices. 3,659-CF – 1,060-CF = 2,599-CF** The remaining Cpv is captured within the storage volume provided by the free board within the bioretention area, forebay and Dry Pond as shown below.

PSC-2

1. The CPv for PSC-2 is 0.037-AF (1,611-CF) – Runoff Reduction (1060-CF) = 551-CF
2. The bioretention area stage area storage table shows that the entire runoff reduction volume is retained within the practice at elevation 974.82'.
3. The stage area storage table also shows that the remaining volume between 974.82 and the Primary Outlet at 977.00 is 2,227-CF
4. CPv conditions are met for PSC-2

PSC-3

1. The CPv for PSC-3 is 0.047-AF (2,047-CF), there is no runoff reduction credit.
2. The Dry Pond forebay stage area storage table shows that 975-CF is retained below the broadcrested weir at 974.50'
3. The Dry Pond stage area storage table shows that 1,895-CF is retained below the 8" primary outlet at 973.50'.
4. CPv conditions are met for PSC-3

CPv conditions are met.

Dry Pond CPv orifice (Perf Drain)

1. Determine H – Avg head above centerline of proposed orifice invert for 1 yr storm. H between 972.50 and 973.29 = 0.79/2 = 0.40'

2. Determine Q – Flow over 24 hr period.

   Stage storage table volume between 973.29' and 972.50' = 1,100 cuft

   1,100 cuft/day x 1d/24hrs x 1hr/60min x 1 min/60sec = 0.0127cfs

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

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

   $$A = 0.0127 \text{ cfs}/ [0.6(\text{Sqrt}(2*32.2 \text{ ft/s}^2*0.40 \text{ ft})] = 0.004 \text{ ft}^2$$

4. $A = \pi r^2$

$r^2 = Sqrt(0.004\ ft^2 / 3.14) * 2 = 0.071$ ft or **1.0"**

Orifice can adequately outlet the 1 yr 24 hour storm

Overbank Flood (Qp) – DPP-1

Qp = Controls the peak discharge from the 10-year storm **(3.39-inch rainfall Tompkins County)** to 10-year predevelopment rates.

Pre-developed max rate = **2.07-CFS**, Total Volume = 0.203AF (8,843-CF).
The maximum post-developed run-off rate is 0.33-CFS, and the total run-off volume is 0.110-AF (4,791-CF).

The **Qp** Overbank Flood control criterion is met.

Extreme Storm (Qf) – DPP-1

Control the peak discharge from the 100-year storm **(5.82-inch rainfall Tompkins County)** to 100-year predevelopment rates. Safely pass the 100-year storm event.

Pre-developed max run-off rate = **6.08-CFS**, Total Volume = 0.563-AF (24,524-CF).
The maximum post-developed run-off rate is 3.29-CFS, and the total run-off volume is 0.316-AF (13,765-CF).

The **Qf** Overbank Flood control criterion is met.

DESIGN POINT 2 SUMMARY (DPP-2)

PSC-1; Cpv = 24 hour extended detention of post-developed 1-year, 24-hour Storm event for half of the building rooftop (**1.99-inch rainfall Tompkins County**) - **1 yr Cpv 0.027-AF (653-CF).**

There is 5,483-CF of storage between the floor of the attenuation basin and the primary outlet of the practice.

CPv conditions are met.

Overbank Flood (Qp) – DPP-2

Qp = Controls the peak discharge from the 10-year storm **(3.39-inch rainfall Tompkins County)** to 10-year predevelopment rates.

Pre-developed max rate = **1.05-CFS**, Total Volume = 0.101AF (4,400-CF).
The maximum post-developed run-off rate is 0.15-CFS, and the total run-off volume is 0.022-AF (958-CF).

The **Qp** Overbank Flood control criterion is met.

Extreme Storm (Qf) – DPP-2

Control the peak discharge from the 100-year storm **(5.82-inch rainfall Tompkins County)** to 100-year predevelopment rates. Safely pass the 100-year storm event.

Pre-developed max run-off rate = **2.60-CFS**, Total Volume = 0.260-AF (11,326-CF).
The maximum post-developed run-off rate is 2.56-CFS, and the total run-off volume is 0.314-AF (13,678-CF).

The **Qf** Overbank Flood control criterion is met.

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)

DPP-1

EXISTING

EXISTING FLOW CONDITIONS AT DESIGN POINT (DP P1)

STORM EVENT	*PEAK FLOW (CFS)*	*TOTAL VOLUME (AF)*
1-year	*0.40*	*0.053*
10-year	*2.07*	*0.203*
100-year	*6.08*	*0.563*

PROPOSED

PROPOSED FLOW CONDITIONS AT DESIGN POINT (DP P1)

STORM EVENT	*PEAK FLOW (CFS)*	*TOTAL VOLUME (AF)*
1-year	*0.04*	*0.020*
10-year	*0.33*	*0.110*
100-year	*3.29*	*0.316*

DPP-2

EXISTING

EXISTING FLOW CONDITIONS AT DESIGN POINT (DP P2)

STORM EVENT	*PEAK FLOW (CFS)*	*TOTAL VOLUME (AF)*
1-year	*0.40*	*0.035*
10-year	*1.05*	*0.101*
100-year	*2.60*	*0.260*

PROPOSED

PROPOSED FLOW CONDITIONS AT DESIGN POINT (DP P2)

STORM EVENT	*PEAK FLOW (CFS)*	*TOTAL VOLUME (AF)*
1-year	*0.00*	*0.002*
10-year	*0.15*	*0.022*
100-year	*2.56*	*0.314*

STAGE STORAGE TABLES

Dry Pond Basin STAGE-STORAGE TABLE DP-1

STORM EVENT	*PEAK STORAGE (CF)*	*PEAK DEPTH (FT)*
WQv	*1,198*	*0.33'*
*1 year (***Cpv***)*	*1,093*	*0.30'*
10 year	*2,917*	*0.75'*
100 year	*4,965*	*1.20'*

Notes:
Invert Bottom of Practice = 0'
Invert of 8" Attenuation Outlet = 0.50'
10' x 4'-Broad Crested Weir Outlet inv. = 1.00'
Top of Basin Embankment Elev. = 2.00'

Bioretention Area STAGE-STORAGE TABLE BR-1

STORM EVENT	*PEAK STORAGE (CF)*	*PEAK DEPTH (FT)*
WQv	*1,060*	*1.38'*
*1 year (***Cpv***)*	*678*	*0.76'*
10 year	*1,537*	*2.45*
100 year	*3,208*	*3.98'*

Notes:
Invert Washed Stone Drainage Layer 0'
Invert 4" Perforated Piped Outlet = 0'
Invert of Soil Drainage Layer = 1.0'
Bottom of Swale El. = 3.50'
10' x 4' - Broad Crested Weir Outlet inv. = 4.00'
Top of Swale Embankment Elev. = 4.50'

Attenuation Basin STAGE-STORAGE TABLE AB-1

STORM EVENT	*PEAK STORAGE (CF)*	*PEAK DEPTH (FT)*
WQv	*379*	*0.08'*
*1 year (***Cpv***)*	*1,166*	*0.24'*
10 year	*5,164*	*0.95'*
100 year	*6,865*	*1.34'*

Invert Bottom of Practice = 0'
4' x 4'-Broad Crested Weir Outlet inv. = 1.00'
Top of Basin Embankment Elev. = 1.50'

APPENDIX 1

WATER QUALITY VOLUME/RUNOFF REDUCTION WORKSHEETS

Version 1.8
Last Updated: 11/09/2015

Total Water Quality Volume Calculation
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	0.44	0.30	68%	0.66	1,060	PSC-2, BR 1
2	0.84	0.32	38%	0.39	1,198	PSC-3, DRY POND
3	0.11	0.11	100%	0.95	379	PSC-1, Attenuation Basin
4						
5						
6						
7						
8						
9						
10						
Subtotal (1-30)	1.39	0.73	53%	0.52	**2,637**	**Subtotal 1**
Total	1.39	0.73	53%	0.52	**2,637**	**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"	1.39	0.73	53%	0.52	2,637
Subtract Area	0.00	0.00			
WQv adjusted after Area Reductions	**1.39**	**0.73**	53%	0.52	2,637
Disconnection of Rooftops		0.00			
Adjusted WQv after Area Reduction and Rooftop Disconnect	1.39	0.73	53%	0.52	**2,637**

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	0.44	0.30	0.68	0.66	1059.96	PSC-2, BR 1
2	0.84	0.32	0.38	0.39	1,198	PSC-3, DRY
3	0.11	0.11	1.00	0.95	379.34	PSC-1,
4						
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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				
	Bioretention & Infiltration Bioretention	F-5	0.44	0.30	1060	0
	Dry swale	O-1	0.00	0.00	0	0
Standard SMPs	Micropool Extended Detention (P-1)	P-1	0.95	0.43		1577.000
	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 →			0.44	0.30	1060	0
Totals by Standard SMP →			0.95	0.43		1577

Totals (Area + Volume + all SMPs)		→	1.39	0.73	1,060	1,577
	Impervious Cover √	okay				
	Total Area √	okay				

Minimum RRv

Enter the Soils Data for the site		
Soil Group	Acres	S
A		55%
B		40%
C	1.39	30%
D		20%
Total Area	1.39	
Calculate the Minimum RRv		
S =	**0.30**	
Impervious =	0.73	*acre*
Precipitation	1	*in*
Rv	0.95	
Minimum RRv	**755**	***ft3***
	0.02	af

NOI QUESTIONS

#	NOI Question	Reported Value	
		cf	af
28	Total Water Quality Volume (WQv) Required	2637	*0.061*
30	Total RRV Provided	1060	*0.024*
31	Is RRv Provided ≥WQv Required?	No	
32	Minimum RRv	755	*0.017*
32a	Is RRv Provided ≥ Minimum RRv Required?	Yes	
33a	Total WQv Treated	1577	*0.036*
34	Sum of Volume Reduced & Treated	2637	*0.061*
34	Sum of Volume Reduced and Treated	2637	*0.061*
35	Is Sum RRv Provided and WQv Provided ≥WQv Required?	Yes	

Apply Peak Flow Attenuation			
36	Channel Protection	*Cpv*	
37	Overbank	*Qp*	
37	Extreme Flood Control	*Qf*	
	Are Quantity Control requirements met?		

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	0.44	0.30	0.68	0.66	1059.96	1.00	PSC-2, BR 1
Enter Impervious Area Reduced by Disconnection of Rooftops			68%	0.66	1,060	<<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*	

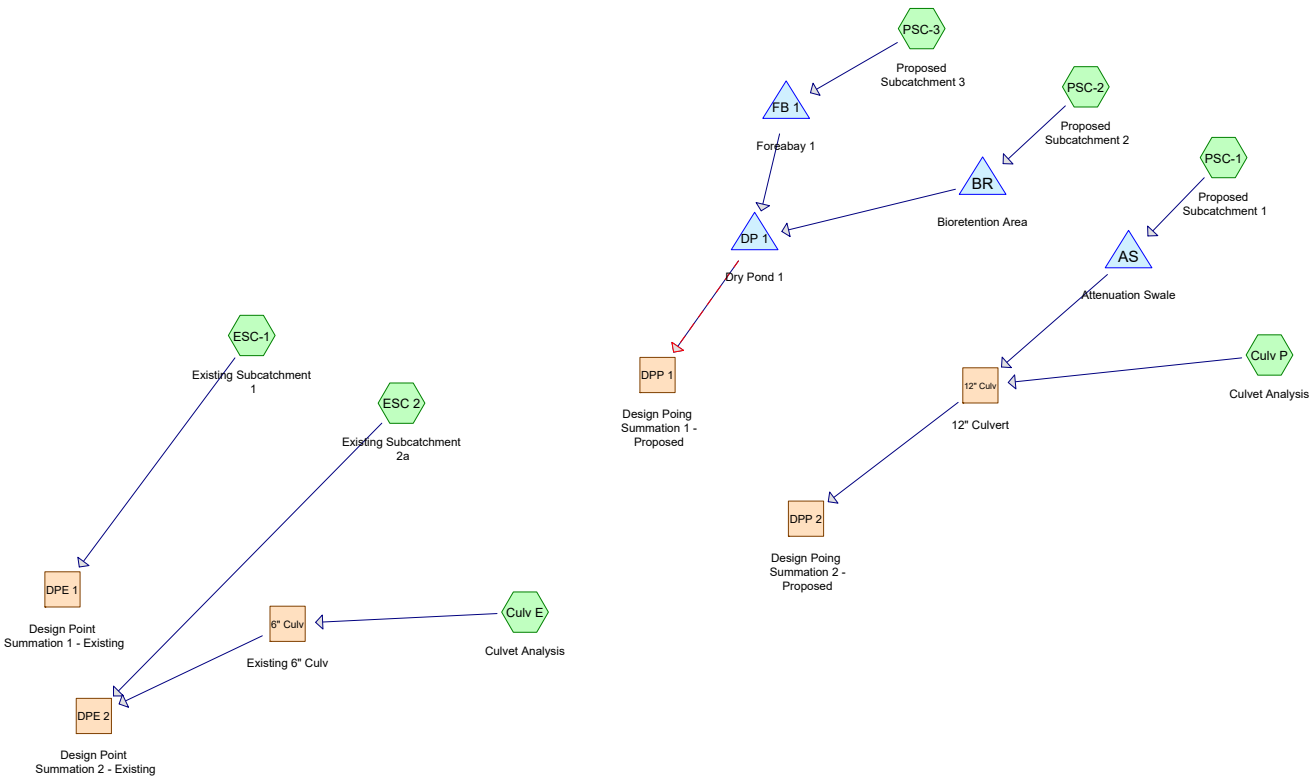
Calculate the Minimum Filter Area				
		Value	Units	Notes
WQv		1,060	*ft^3*	
Enter Depth of Soil Media	*df*	2	*ft*	*2.5-4 ft*
Enter Hydraulic Conductivity	*k*	0.5	*ft/day*	
Enter Average Height of Ponding	*hf*	0.5	*ft*	*6 inches max.*
Enter Filter Time	*tf*	2	*days*	
Required Filter Area	***Af***	**848**	***ft^2***	

Determine Actual Bio-Retention Area			
Filter Width	28	*ft*	
Filter Length	90	*ft*	
Filter Area	2520	*ft^2*	
Actual Volume Provided	3150	*ft^3*	

Determine Runoff Reduction				
Is the Bioretention contributing flow to another practice?		Yes	Select Practice	Other/Standard SMP
RRv	1,260			
RRv applied	**1,060**	***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	

APPENDIX 2

HYDRAULIC MODELING DATA



Subcat Reach Pond Link

Routing Diagram for Duthie2

Prepared by {enter your company name here}, Printed 9/15/2023

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.643	74	>75% Grass cover, Good, HSG C (PSC-2, PSC-3)
0.498	87	Compacted Dirt, HSG C (ESC-1)
0.028	98	Future Parking, HSG C (PSC-3)
0.616	58	Meadow, non-grazed, HSG B (ESC-1, PSC-1)
0.617	98	Paved parking, HSG C (PSC-2, PSC-3)
0.111	98	Roofs, HSG C (PSC-1)
0.288	98	Rooftops, Gravel, Packed Earth, Good, HSG C (ESC 2)
2.038	58	Woods/grass comb., Good, HSG B (Culv E, Culv P, ESC-1, PSC-1)
2.911	72	Woods/grass comb., Good, HSG C (ESC 2, ESC-1, PSC-1)
7.751	**72**	**TOTAL AREA**

Duthie2

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchr Numbers
0.000	0.000	0.643	0.000	0.000	0.643	>75% Grass cover, Good	
0.000	0.000	0.498	0.000	0.000	0.498	Compacted Dirt	
0.000	0.000	0.028	0.000	0.000	0.028	Future Parking	
0.000	0.616	0.000	0.000	0.000	0.616	Meadow, non-grazed	
0.000	0.000	0.617	0.000	0.000	0.617	Paved parking	
0.000	0.000	0.111	0.000	0.000	0.111	Roofs	
0.000	0.000	0.288	0.000	0.000	0.288	Rooftops, Gravel, Packed Earth, Good	
0.000	2.038	2.911	0.000	0.000	4.949	Woods/grass comb., Good	
0.000	**2.654**	**5.097**	**0.000**	**0.000**	**7.751**	**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	Culv E	0.00	0.00	14.0	0.0150	0.013	6.0	0.0	0.0
2	Culv E	0.00	0.00	57.0	0.0230	0.013	12.0	0.0	0.0
3	Culv P	0.00	0.00	14.0	0.0150	0.013	12.0	0.0	0.0
4	Culv P	0.00	0.00	57.0	0.0230	0.013	12.0	0.0	0.0
5	PSC-1	0.00	0.00	14.0	0.0150	0.013	6.0	0.0	0.0
6	PSC-1	0.00	0.00	57.0	0.0230	0.013	12.0	0.0	0.0
7	6" Culv	975.20	975.00	14.0	0.0143	0.013	6.0	0.0	0.0
8	12" Culv	975.20	975.00	14.0	0.0143	0.013	12.0	0.0	0.0
9	BR	973.50	973.00	111.0	0.0045	0.013	12.0	0.0	0.0
10	BR	973.50	973.40	77.0	0.0013	0.013	4.0	0.0	0.0
11	DP 1	972.50	971.60	197.0	0.0046	0.013	12.0	0.0	0.0
12	DP 1	973.00	973.00	71.0	0.0000	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 Culv E: Culvet Analysis Runoff Area=33,656 sf 0.00% Impervious Runoff Depth>0.02"
Flow Length=653' Tc=32.7 min CN=58 Runoff=0.00 cfs 0.002 af

Subcatchment Culv P: Culvet Analysis Runoff Area=33,656 sf 0.00% Impervious Runoff Depth>0.02"
Flow Length=653' Tc=32.6 min CN=58 Runoff=0.00 cfs 0.002 af

Subcatchment ESC 2: Existing Runoff Area=21,518 sf 58.38% Impervious Runoff Depth>0.82"
Flow Length=374' Tc=27.6 min CN=87 Runoff=0.40 cfs 0.034 af

Subcatchment ESC-1: Existing Runoff Area=113,643 sf 0.00% Impervious Runoff Depth>0.24"
Flow Length=1,101' Tc=32.3 min CN=72 Runoff=0.40 cfs 0.053 af

Subcatchment PSC-1: Proposed Runoff Area=79,048 sf 6.12% Impervious Runoff Depth>0.18"
Flow Length=1,043' Tc=27.3 min CN=69 Runoff=0.19 cfs 0.027 af

Subcatchment PSC-2: Proposed Runoff Area=19,189 sf 67.12% Impervious Runoff Depth>1.00"
Tc=6.0 min CN=90 Runoff=0.82 cfs 0.037 af

Subcatchment PSC-3: Proposed Runoff Area=36,924 sf 41.29% Impervious Runoff Depth>0.67"
Tc=6.0 min CN=84 Runoff=1.09 cfs 0.047 af

Reach 6" Culv: Existing 6" Culv Avg. Flow Depth=0.02' Max Vel=0.86 fps Inflow=0.00 cfs 0.002 af
6.0" Round Pipe n=0.013 L=14.0' S=0.0143 '/' Capacity=0.67 cfs Outflow=0.00 cfs 0.002 af

Reach 12" Culv: 12" Culvert Avg. Flow Depth=0.02' Max Vel=0.78 fps Inflow=0.00 cfs 0.002 af
12.0" Round Pipe n=0.013 L=14.0' S=0.0143 '/' Capacity=4.26 cfs Outflow=0.00 cfs 0.002 af

Reach DPE 1: Design Point Summation 1 - Existing Inflow=0.40 cfs 0.053 af
Outflow=0.40 cfs 0.053 af

Reach DPE 2: Design Point Summation 2 - Existing Inflow=0.40 cfs 0.035 af
Outflow=0.40 cfs 0.035 af

Reach DPP 1: Design Poing Summation 1 - Proposed Inflow=0.04 cfs 0.020 af
Outflow=0.04 cfs 0.020 af

Reach DPP 2: Design Poing Summation 2 - Proposed Inflow=0.00 cfs 0.002 af
Outflow=0.00 cfs 0.002 af

Pond AS: Attenuation Swale Peak Elev=976.74' Storage=1,166 cf Inflow=0.19 cfs 0.027 af
Outflow=0.00 cfs 0.000 af

Pond BR: Bioretention Area Peak Elev=974.26' Storage=678 cf Inflow=0.82 cfs 0.037 af
Discarded=0.01 cfs 0.008 af Primary=0.14 cfs 0.027 af Outflow=0.15 cfs 0.035 af

Pond DP 1: Dry Pond 1 Peak Elev=973.30' Storage=1,093 cf Inflow=0.27 cfs 0.048 af
Discarded=0.02 cfs 0.012 af Primary=0.04 cfs 0.020 af Secondary=0.00 cfs 0.000 af Outflow=0.06 cfs 0.031 af

Pond FB 1: Foreabay 1 Peak Elev=974.54' Storage=1,040 cf Inflow=1.09 cfs 0.047 af
Discarded=0.01 cfs 0.004 af Primary=0.13 cfs 0.020 af Outflow=0.14 cfs 0.024 af

Total Runoff Area = 7.751 ac Runoff Volume = 0.201 af Average Runoff Depth = 0.31"
86.52% Pervious = 6.706 ac 13.48% Impervious = 1.045 ac

Summary for Subcatchment Culv E: Culvet Analysis

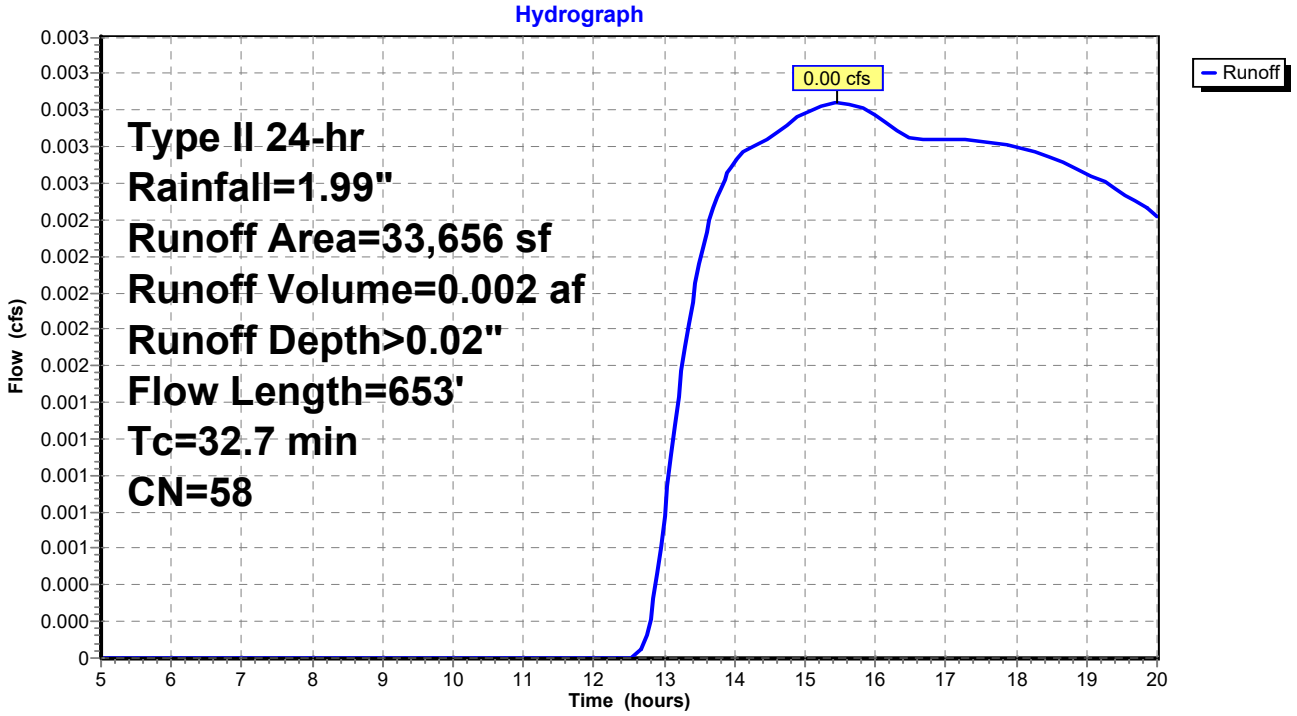
Runoff = 0.00 cfs @ 15.47 hrs, Volume= 0.002 af, Depth> 0.02"

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=1.99"

Area (sf)	CN	Description
33,656	58	Woods/grass comb., Good, HSG B
33,656		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.4	100	0.0200	0.07		**Sheet Flow, First 100' Flowpath** Woods: Light underbrush n= 0.400 P2= 2.70"
8.8	410	0.0240	0.77		**Shallow Concentrated Flow, Balance of Flow to Culvert** Woodland Kv= 5.0 fps
0.1	14	0.0150	3.50	0.69	**Pipe Channel, 6" Culvert** 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.013
0.3	72	0.0080	4.70	75.18	**Trap/Vee/Rect Channel Flow, Channel to 12" Culvert** Bot.W=2.00' D=2.00' Z= 3.0 '/' Top.W=14.00' n= 0.030
0.1	57	0.0230	6.88	5.40	**Pipe Channel, CMP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
32.7	653	Total			

Subcatchment Culv E: Culvet Analysis



Summary for Subcatchment Culv P: Culvet Analysis

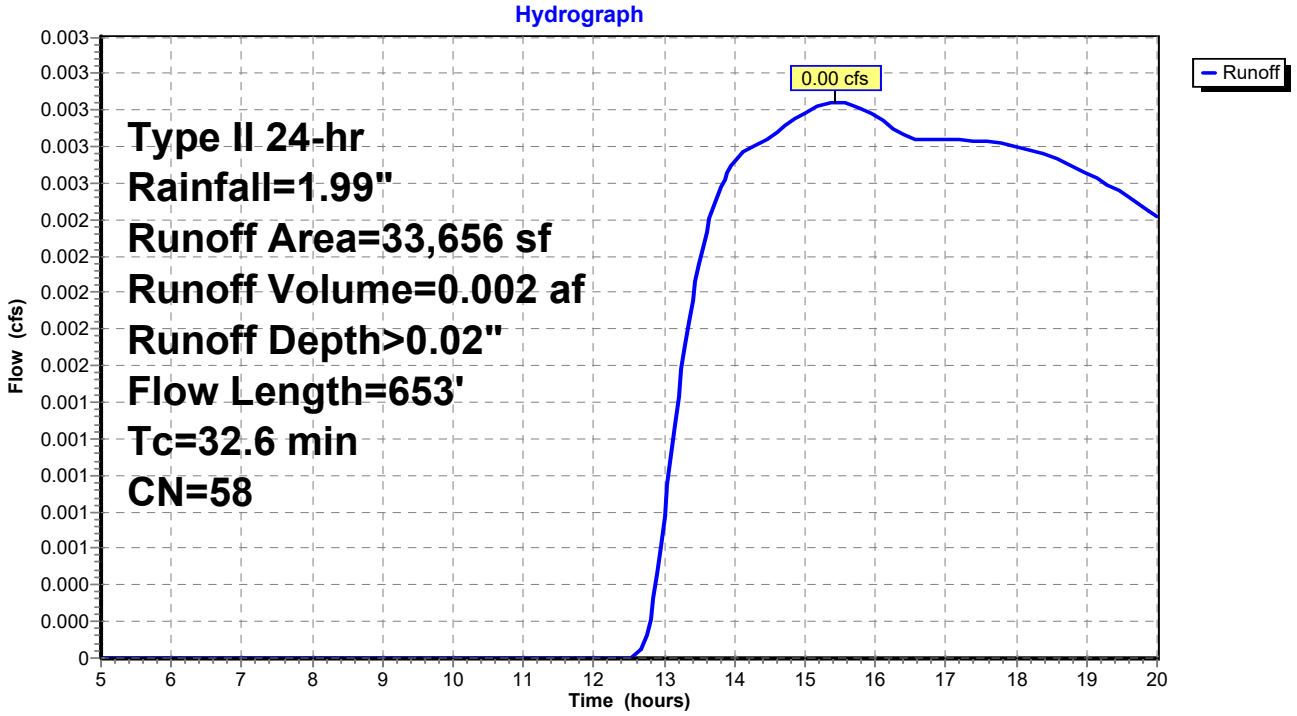
Runoff = 0.00 cfs @ 15.44 hrs, Volume= 0.002 af, Depth> 0.02"

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=1.99"

Area (sf)	CN	Description
33,656	58	Woods/grass comb., Good, HSG B
33,656		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.4	100	0.0200	0.07		**Sheet Flow, First 100' Flowpath** Woods: Light underbrush n= 0.400 P2= 2.70"
8.8	410	0.0240	0.77		**Shallow Concentrated Flow, Balance of Flow to Culvert** Woodland Kv= 5.0 fps
0.0	14	0.0150	5.56	4.36	**Pipe Channel, 12" Culvert** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
0.3	72	0.0080	4.70	75.18	**Trap/Vee/Rect Channel Flow, Channel to 12" Culvert** Bot.W=2.00' D=2.00' Z= 3.0 '/' Top.W=14.00' n= 0.030
0.1	57	0.0230	6.88	5.40	**Pipe Channel, CMP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
32.6	653	Total			

Subcatchment Culv P: Culvet Analysis



Summary for Subcatchment ESC 2: Existing Subcatchment 2a

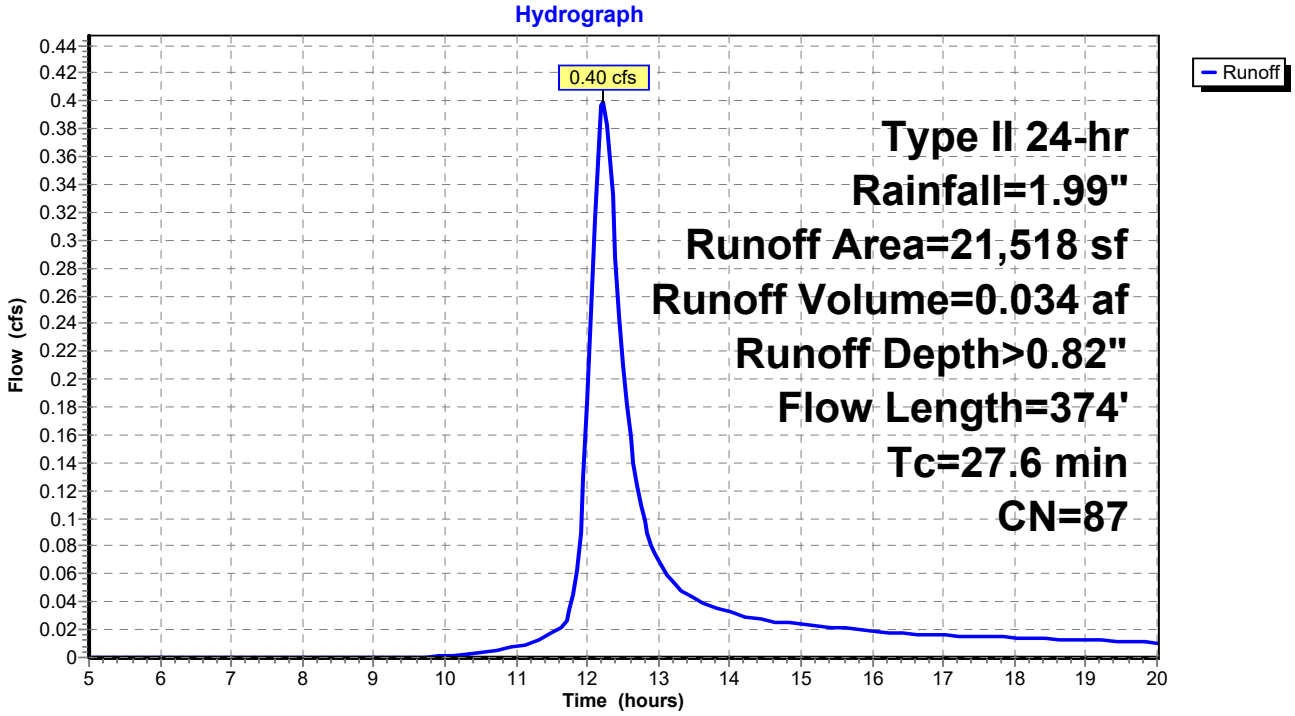
Runoff = 0.40 cfs @ 12.22 hrs, Volume= 0.034 af, Depth> 0.82"

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=1.99"

	Area (sf)	CN	Description
*	12,562	98	Rooftops, Gravel, Packed Earth, Good, HSG C
	8,956	72	Woods/grass comb., Good, HSG C
	21,518	87	Weighted Average
	8,956		41.62% Pervious Area
	12,562		58.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.9	100	0.0210	0.07		**Sheet Flow, First 100' Flowpath** Woods: Light underbrush n= 0.400 P2= 2.70"
3.7	137	0.0150	0.61		**Shallow Concentrated Flow, Balance of Woodland** Woodland Kv= 5.0 fps
1.0	137	0.0220	2.39		**Shallow Concentrated Flow, Balance of Longest Flowpath** Unpaved Kv= 16.1 fps
27.6	374	Total			

Subcatchment ESC 2: Existing Subcatchment 2a



Summary for Subcatchment ESC-1: Existing Subcatchment 1

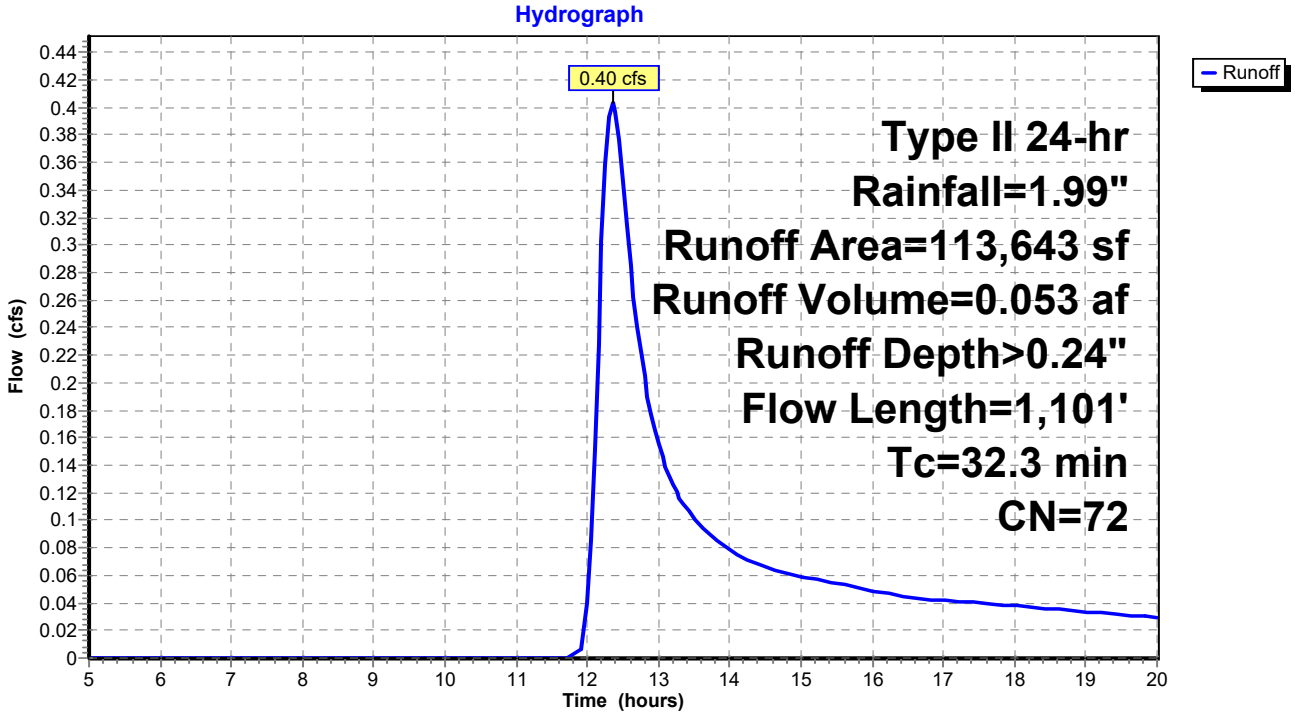
Runoff = 0.40 cfs @ 12.36 hrs, Volume= 0.053 af, Depth> 0.24"

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=1.99"

	Area (sf)	CN	Description
	11,110	58	Meadow, non-grazed, HSG B
	10,739	58	Woods/grass comb., Good, HSG B
	70,087	72	Woods/grass comb., Good, HSG C
*	21,707	87	Compacted Dirt, HSG C
	113,643	72	Weighted Average
	113,643		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	100	0.0180	0.10		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
3.6	250	0.0280	1.17		**Shallow Concentrated Flow, Balance of Meadow** Short Grass Pasture Kv= 7.0 fps
11.4	583	0.0291	0.85		**Shallow Concentrated Flow, Balance of Woods** Woodland Kv= 5.0 fps
1.1	168	0.0240	2.49		**Shallow Concentrated Flow, Balance of Longest Flowpath** Unpaved Kv= 16.1 fps
32.3	1,101	Total			

Subcatchment ESC-1: Existing Subcatchment 1



Summary for Subcatchment PSC-1: Proposed Subcatchment 1

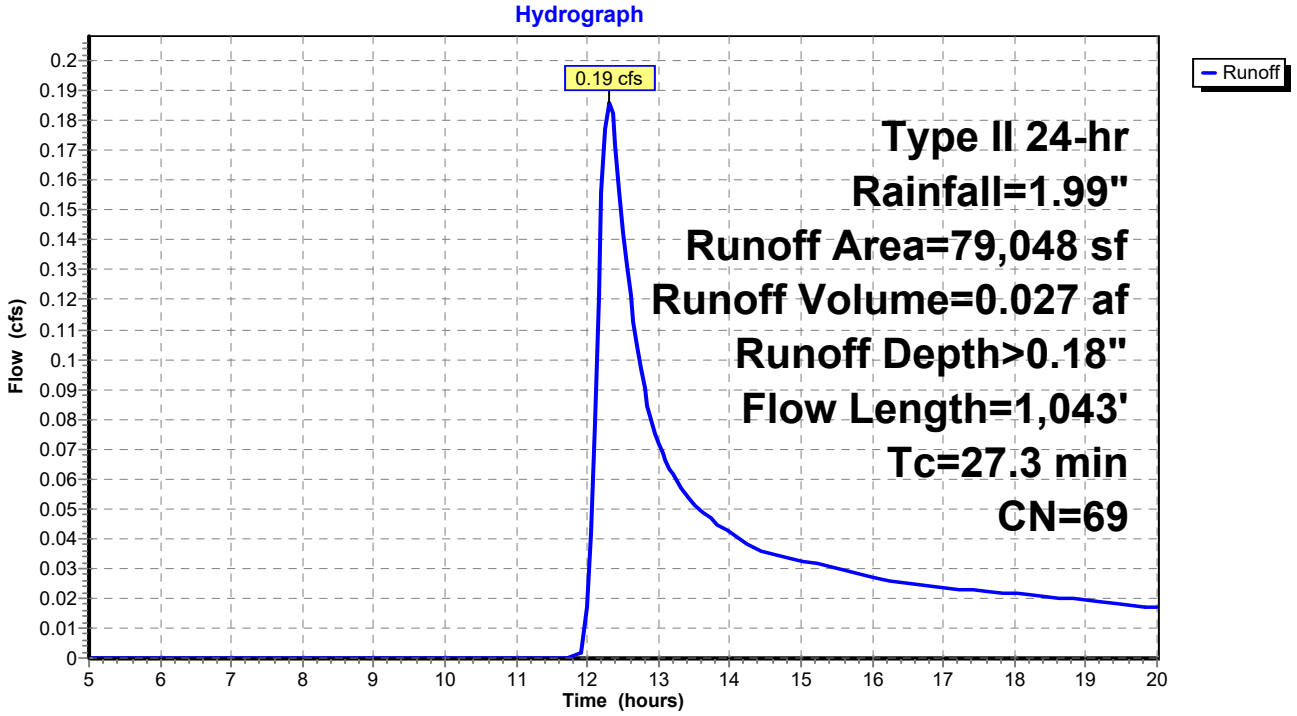
Runoff = 0.19 cfs @ 12.31 hrs, Volume= 0.027 af, Depth> 0.18"

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=1.99"

Area (sf)	CN	Description
15,730	58	Meadow, non-grazed, HSG B
10,739	58	Woods/grass comb., Good, HSG B
47,741	72	Woods/grass comb., Good, HSG C
4,838	98	Roofs, HSG C
79,048	69	Weighted Average
74,210		93.88% Pervious Area
4,838		6.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	100	0.0180	0.10		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
3.6	250	0.0280	1.17		**Shallow Concentrated Flow, Balance of Meadow** Short Grass Pasture Kv= 7.0 fps
6.6	379	0.0370	0.96		**Shallow Concentrated Flow, Woodland to Trap** Woodland Kv= 5.0 fps
0.4	171	0.0175	6.95	111.19	**Trap/Vee/Rect Channel Flow, Trap to 6" Culvert** Bot.W=2.00' D=2.00' Z= 3.0 '/' Top.W=14.00' n= 0.030
0.1	14	0.0150	3.50	0.69	**Pipe Channel, 6" Culvert** 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.013
0.3	72	0.0080	4.70	75.18	**Trap/Vee/Rect Channel Flow, Channel to 12" Culvert** Bot.W=2.00' D=2.00' Z= 3.0 '/' Top.W=14.00' n= 0.030
0.1	57	0.0230	6.88	5.40	**Pipe Channel, CMP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
27.3	1,043	Total			

Subcatchment PSC-1: Proposed Subcatchment 1



Summary for Subcatchment PSC-2: Proposed Subcatchment 2

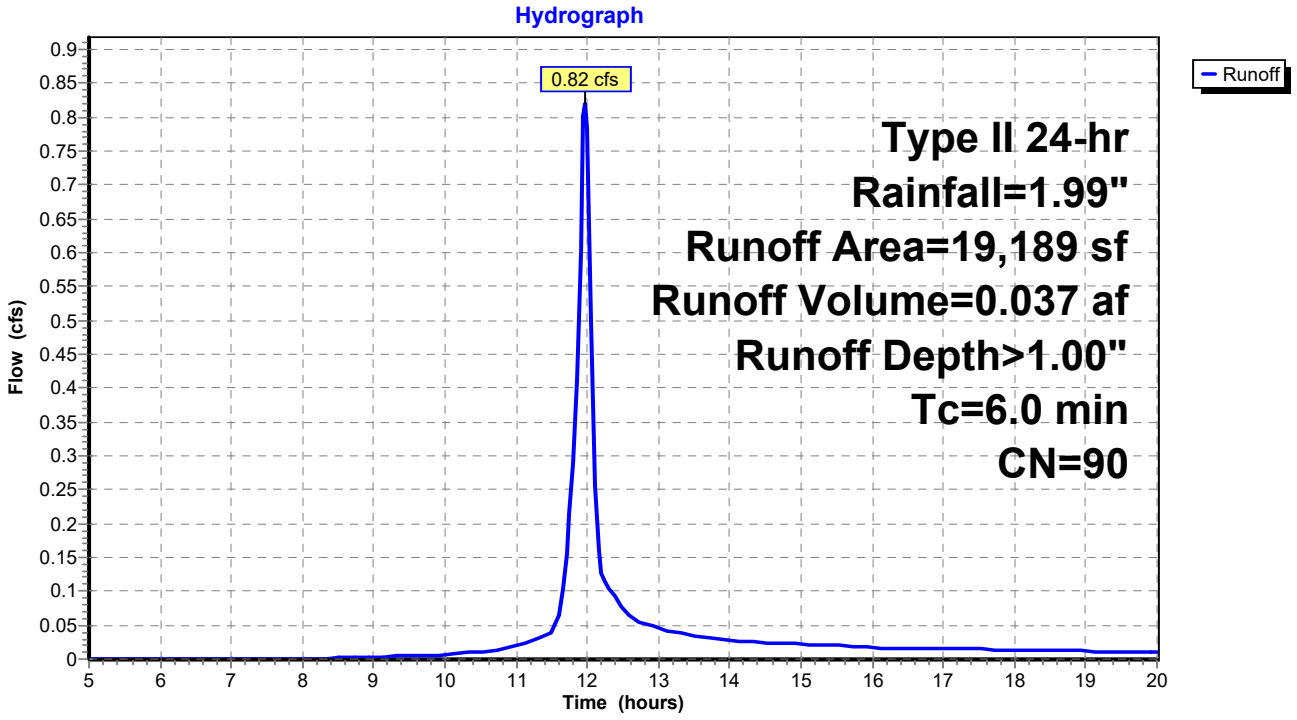
Runoff = 0.82 cfs @ 11.97 hrs, Volume= 0.037 af, Depth> 1.00"

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=1.99"

Area (sf)	CN	Description
12,879	98	Paved parking, HSG C
6,310	74	>75% Grass cover, Good, HSG C
19,189	90	Weighted Average
6,310		32.88% Pervious Area
12,879		67.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum 6 min Tc**

Subcatchment PSC-2: Proposed Subcatchment 2



Summary for Subcatchment PSC-3: Proposed Subcatchment 3

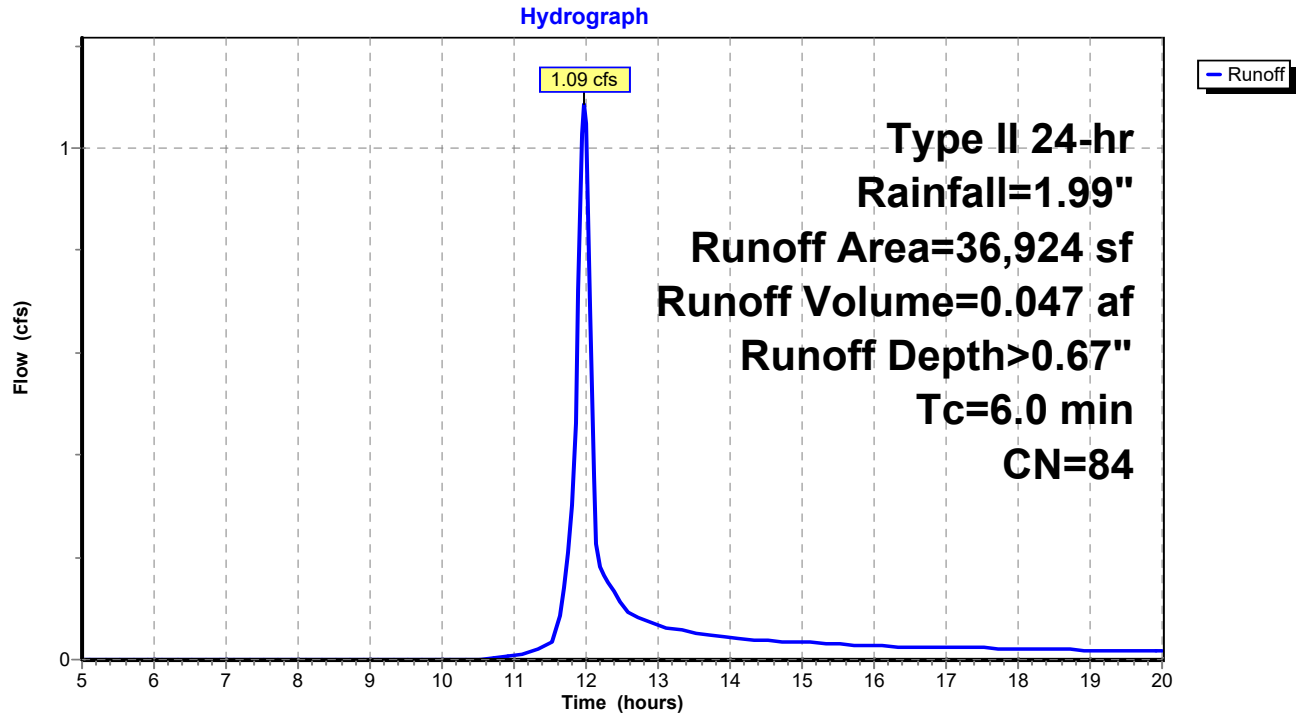
Runoff = 1.09 cfs @ 11.98 hrs, Volume= 0.047 af, Depth> 0.67"

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=1.99"

	Area (sf)	CN	Description
	14,008	98	Paved parking, HSG C
	21,678	74	>75% Grass cover, Good, HSG C
*	1,238	98	Future Parking, HSG C
	36,924	84	Weighted Average
	21,678		58.71% Pervious Area
	15,246		41.29% Impervious Area

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

Subcatchment PSC-3: Proposed Subcatchment 3



Summary for Reach 6" Culv: Existing 6" Culv

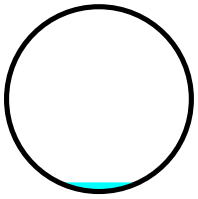
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.773 ac, 0.00% Impervious, Inflow Depth > 0.02"
Inflow = 0.00 cfs @ 15.47 hrs, Volume= 0.002 af
Outflow = 0.00 cfs @ 15.48 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.6 min

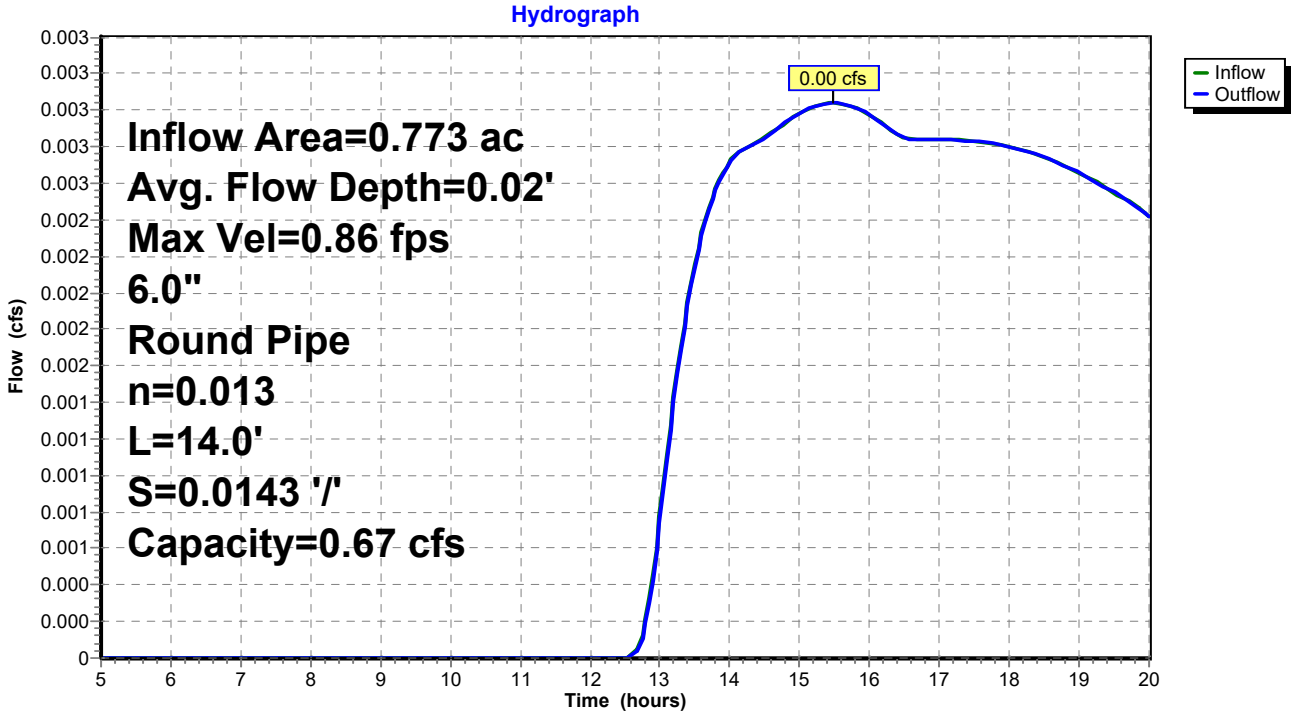
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.86 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 0.81 fps, Avg. Travel Time= 0.3 min

Peak Storage= 0 cf @ 15.47 hrs
Average Depth at Peak Storage= 0.02'
Bank-Full Depth= 0.50' Flow Area= 0.2 sf, Capacity= 0.67 cfs

6.0" Round Pipe
n= 0.013
Length= 14.0' Slope= 0.0143 '/'
Inlet Invert= 975.20', Outlet Invert= 975.00'



Reach 6" Culv: Existing 6" Culv



Summary for Reach 12" Culv: 12" Culvert

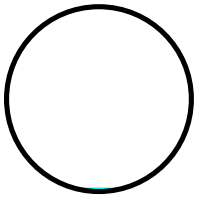
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 2.587 ac, 4.29% Impervious, Inflow Depth > 0.01"
Inflow = 0.00 cfs @ 15.44 hrs, Volume= 0.002 af
Outflow = 0.00 cfs @ 15.45 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.7 min

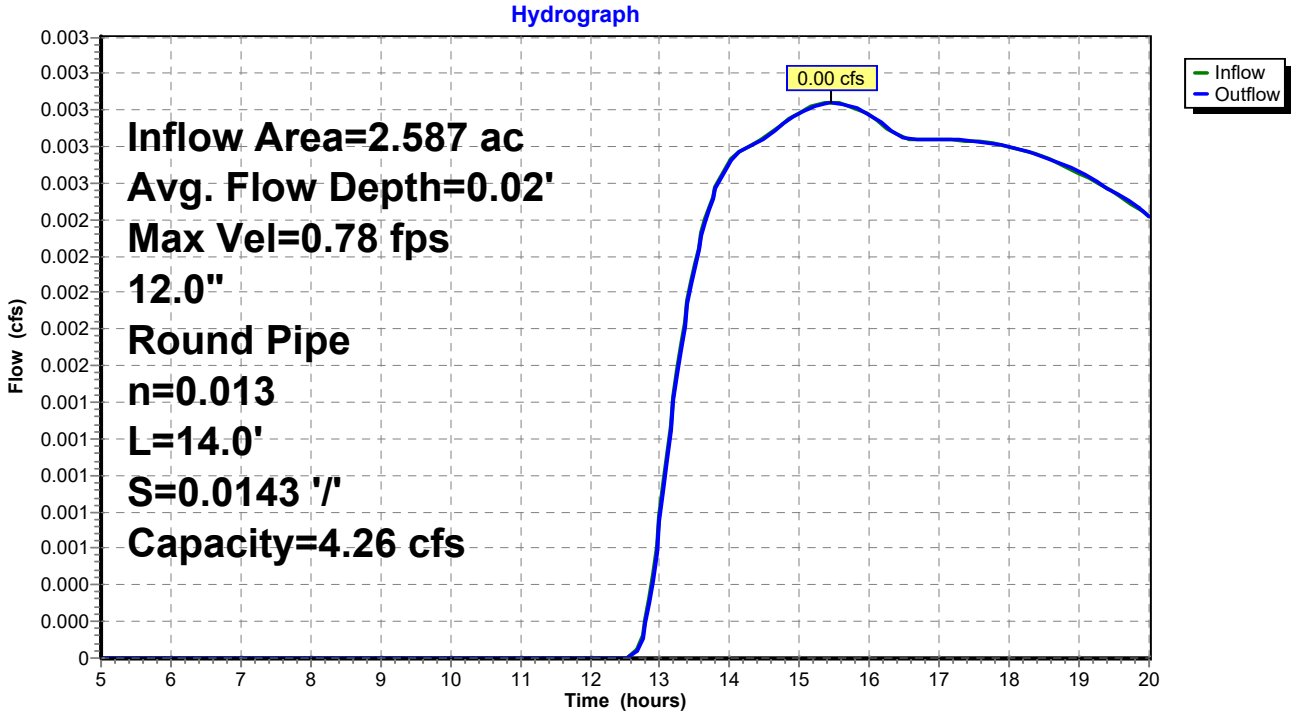
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.78 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 0.74 fps, Avg. Travel Time= 0.3 min

Peak Storage= 0 cf @ 15.44 hrs
Average Depth at Peak Storage= 0.02'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.26 cfs

12.0" Round Pipe
n= 0.013
Length= 14.0' Slope= 0.0143 '/'
Inlet Invert= 975.20', Outlet Invert= 975.00'



Reach 12" Culv: 12" Culvert



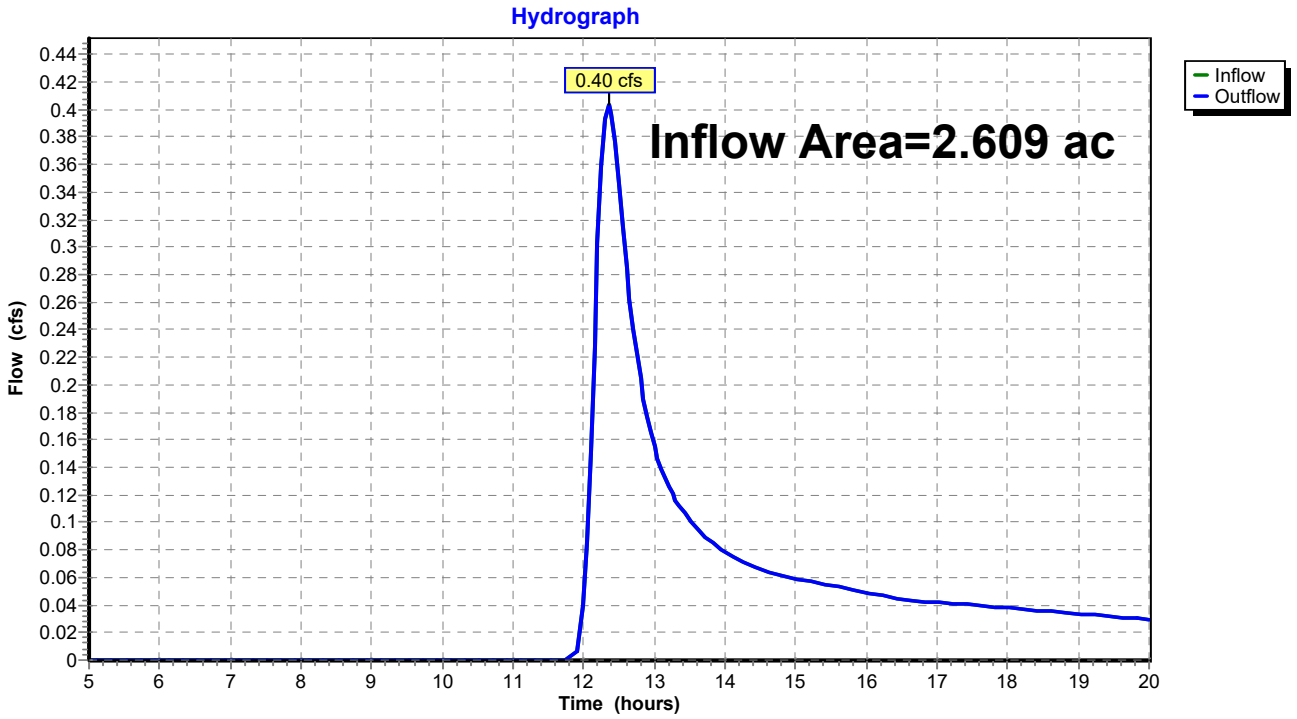
Summary for Reach DPE 1: Design Point Summation 1 - Existing

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.609 ac, 0.00% Impervious, Inflow Depth > 0.24"
Inflow = 0.40 cfs @ 12.36 hrs, Volume= 0.053 af
Outflow = 0.40 cfs @ 12.36 hrs, Volume= 0.053 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 DPE 1: Design Point Summation 1 - Existing



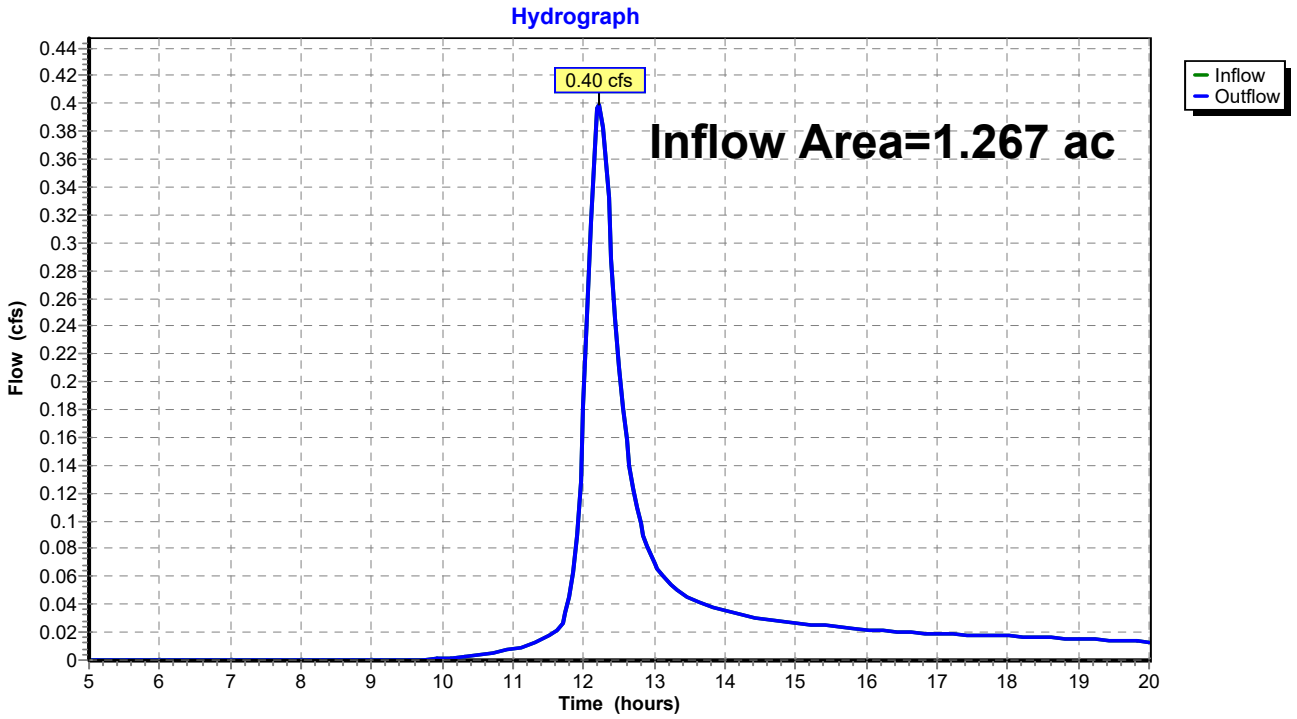
Summary for Reach DPE 2: Design Point Summation 2 - Existing

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.267 ac, 22.77% Impervious, Inflow Depth > 0.33"
Inflow = 0.40 cfs @ 12.22 hrs, Volume= 0.035 af
Outflow = 0.40 cfs @ 12.22 hrs, Volume= 0.035 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 DPE 2: Design Point Summation 2 - Existing



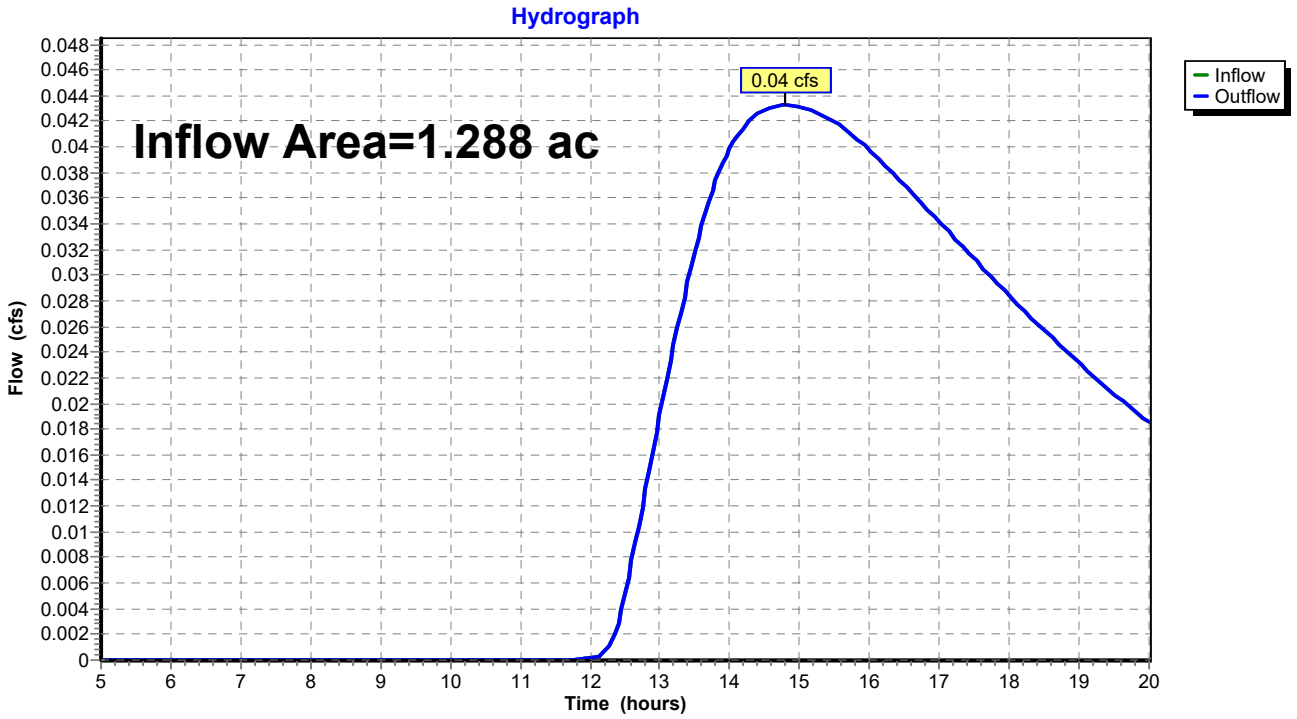
Summary for Reach DPP 1: Design Poing Summation 1 - Proposed

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.288 ac, 50.12% Impervious, Inflow Depth > 0.18"
Inflow = 0.04 cfs @ 14.80 hrs, Volume= 0.020 af
Outflow = 0.04 cfs @ 14.80 hrs, Volume= 0.020 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 DPP 1: Design Poing Summation 1 - Proposed



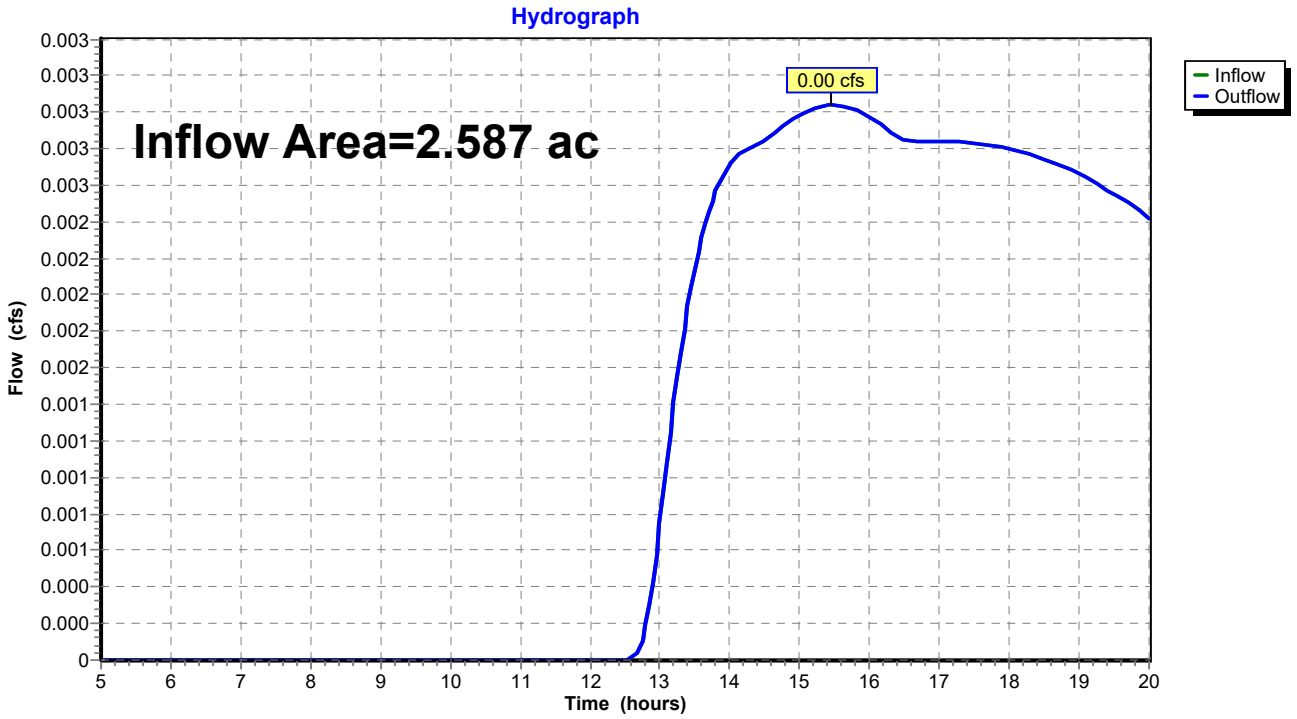
Summary for Reach DPP 2: Design Poing Summation 2 - Proposed

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.587 ac, 4.29% Impervious, Inflow Depth > 0.01"
Inflow = 0.00 cfs @ 15.45 hrs, Volume= 0.002 af
Outflow = 0.00 cfs @ 15.45 hrs, Volume= 0.002 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 DPP 2: Design Poing Summation 2 - Proposed



Summary for Pond AS: Attenuation Swale

Inflow Area = 1.815 ac, 6.12% Impervious, Inflow Depth > 0.18"
Inflow = 0.19 cfs @ 12.31 hrs, Volume= 0.027 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

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 976.74' @ 20.00 hrs Surf.Area= 5,104 sf Storage= 1,166 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

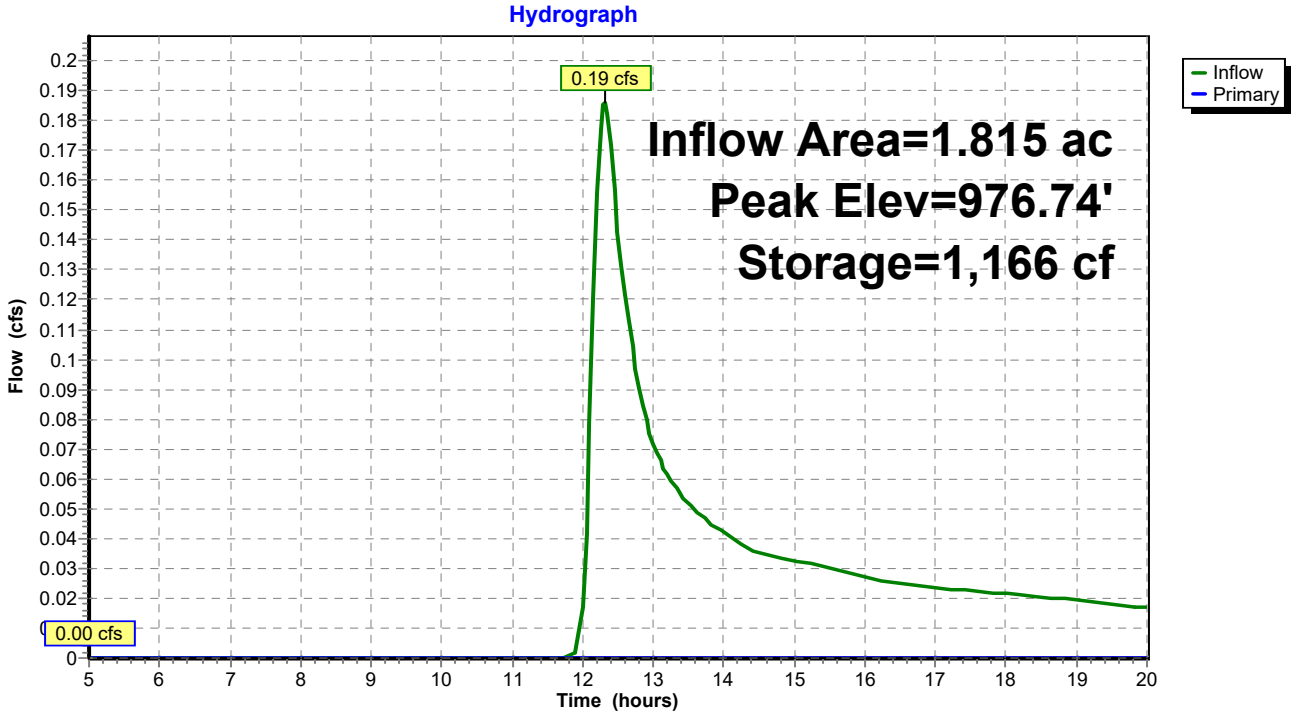
Volume	Invert	Avail.Storage	Storage Description
#1	976.50'	7,034 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
976.50	4,771	0	0
977.00	5,476	2,562	2,562
977.50	6,207	2,921	5,483
978.00	0	1,552	7,034

Device	Routing	Invert	Outlet Devices
#1	Primary	977.50'	**4.0' 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=976.50' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond AS: Attenuation Swale



Summary for Pond BR: Bioretention Area

Inflow Area = 0.441 ac, 67.12% Impervious, Inflow Depth > 1.00"
Inflow = 0.82 cfs @ 11.97 hrs, Volume= 0.037 af
Outflow = 0.15 cfs @ 12.17 hrs, Volume= 0.035 af, Atten= 81%, Lag= 11.8 min
Discarded = 0.01 cfs @ 11.25 hrs, Volume= 0.008 af
Primary = 0.14 cfs @ 12.17 hrs, Volume= 0.027 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 974.26' @ 12.17 hrs Surf.Area= 2,229 sf Storage= 678 cf
Flood Elev= 978.50' Surf.Area= 0 sf Storage= 5,923 cf

Plug-Flow detention time= 67.6 min calculated for 0.035 af (96% of inflow)
Center-of-Mass det. time= 53.7 min (836.5 - 782.8)

Volume	Invert	Avail.Storage	Storage Description
#1	973.50'	5,923 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

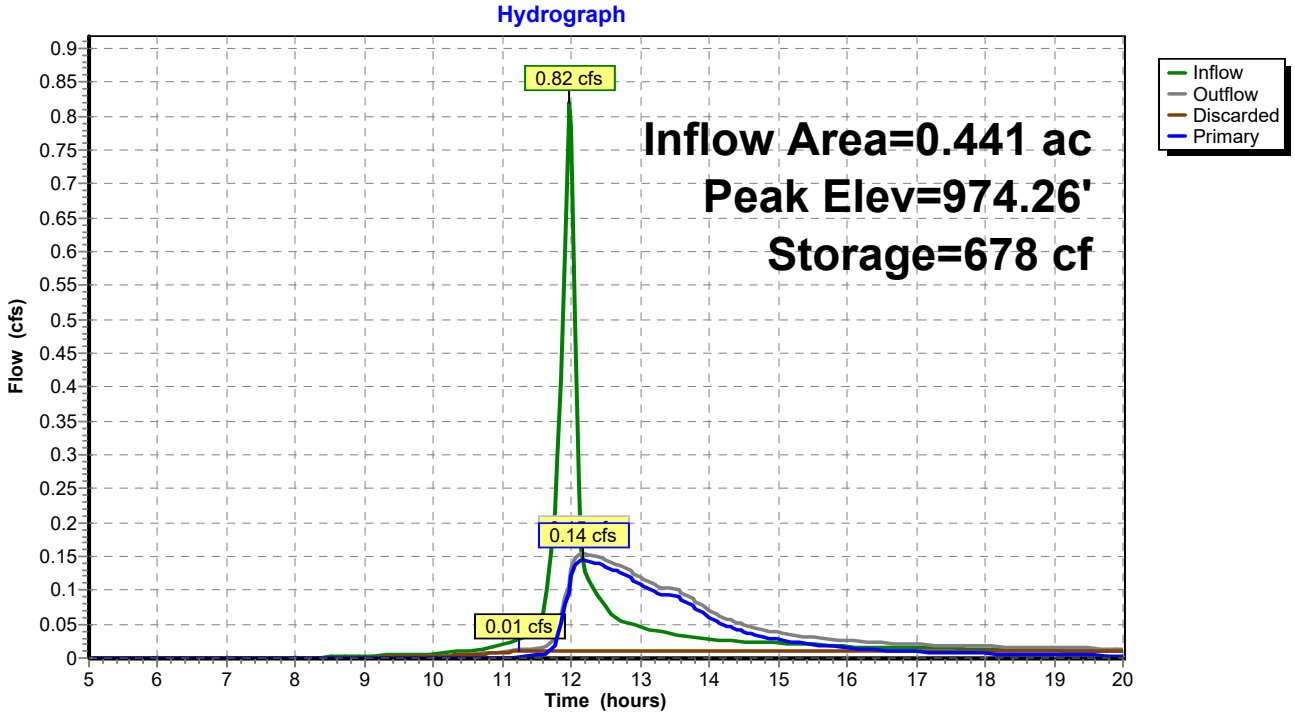
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
973.50	2,229	0.0	0	0
974.50	2,229	40.0	892	892
974.51	2,229	20.0	4	896
977.00	2,229	20.0	1,110	2,006
977.10	2,229	100.0	223	2,229
978.00	3,844	100.0	2,733	4,962
978.50	0	100.0	961	5,923

Device	Routing	Invert	Outlet Devices
#1	Discarded	973.50'	**0.200 in/hr Exfiltration over Surface area**
#2	Primary	973.50'	**12.0" Round Culvert** L= 111.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 973.50' / 973.00' S= 0.0045 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	977.50'	**12.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	973.50'	**4.0" Round Culvert** L= 77.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 973.50' / 973.40' S= 0.0013 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Discarded OutFlow Max=0.01 cfs @ 11.25 hrs HW=973.55' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.14 cfs @ 12.17 hrs HW=974.26' (Free Discharge)
└**2=Culvert** (Passes 0.14 cfs of 1.37 cfs potential flow)
  ├**3=Orifice/Grate** (Controls 0.00 cfs)
  └**4=Culvert** (Barrel Controls 0.14 cfs @ 1.65 fps)

Pond BR: Bioretention Area



Summary for Pond DP 1: Dry Pond 1

[79] Warning: Submerged Pond BR Primary device # 2 OUTLET by 0.30'

Inflow Area = 1.288 ac, 50.12% Impervious, Inflow Depth > 0.44"
Inflow = 0.27 cfs @ 12.36 hrs, Volume= 0.048 af
Outflow = 0.06 cfs @ 14.80 hrs, Volume= 0.031 af, Atten= 78%, Lag= 146.3 min
Discarded = 0.02 cfs @ 14.80 hrs, Volume= 0.012 af
Primary = 0.04 cfs @ 14.80 hrs, Volume= 0.020 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= 973.30' @ 14.80 hrs Surf.Area= 3,837 sf Storage= 1,093 cf
Flood Elev= 976.00' Surf.Area= 0 sf Storage= 12,005 cf

Plug-Flow detention time= 189.6 min calculated for 0.031 af (66% of inflow)
Center-of-Mass det. time= 120.6 min (962.4 - 841.8)

Volume	Invert	Avail.Storage	Storage Description
#1	973.00'	12,005 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
973.00	3,533	0	0
974.00	4,557	4,045	4,045
975.00	5,681	5,119	9,164
976.00	0	2,841	12,005

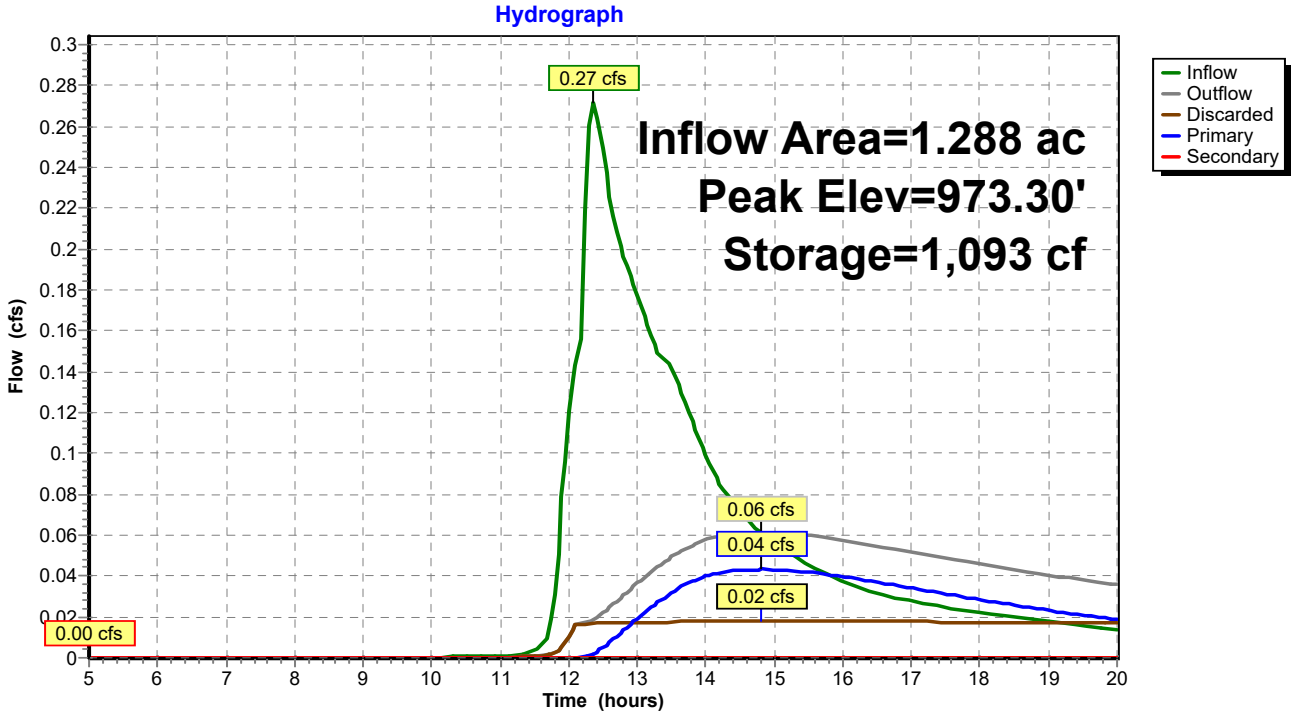
Device	Routing	Invert	Outlet Devices
#1	Secondary	974.00'	**10.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#2	Discarded	973.00'	**0.200 in/hr Exfiltration over Surface area**
#3	Primary	972.50'	**12.0" Round Culvert** L= 197.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 972.50' / 971.60' S= 0.0046 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#4	Device 3	973.00'	**4.0" Round Culvert** L= 71.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 973.00' / 973.00' S= 0.0000 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf
#5	Device 3	973.50'	**8.0" Vert. Orifice/Grate - 10 Yr Overflow** C= 0.600

Discarded OutFlow Max=0.02 cfs @ 14.80 hrs HW=973.30' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.04 cfs @ 14.80 hrs HW=973.30' (Free Discharge)
└**3=Culvert** (Passes 0.04 cfs of 1.53 cfs potential flow)
└**4=Culvert** (Barrel Controls 0.04 cfs @ 0.70 fps)
└**5=Orifice/Grate - 10 Yr Overflow** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=973.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DP 1: Dry Pond 1



Summary for Pond FB 1: Foreabay 1

Inflow Area = 0.848 ac, 41.29% Impervious, Inflow Depth > 0.67"
Inflow = 1.09 cfs @ 11.98 hrs, Volume= 0.047 af
Outflow = 0.14 cfs @ 12.37 hrs, Volume= 0.024 af, Atten= 87%, Lag= 23.6 min
Discarded = 0.01 cfs @ 12.37 hrs, Volume= 0.004 af
Primary = 0.13 cfs @ 12.37 hrs, Volume= 0.020 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 974.54' @ 12.37 hrs Surf.Area= 1,230 sf Storage= 1,040 cf
Flood Elev= 975.50' Surf.Area= 0 sf Storage= 2,101 cf

Plug-Flow detention time= 173.8 min calculated for 0.024 af (51% of inflow)
Center-of-Mass det. time= 86.8 min (889.5 - 802.7)

Volume	Invert	Avail.Storage	Storage Description
#1	973.00'	2,101 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

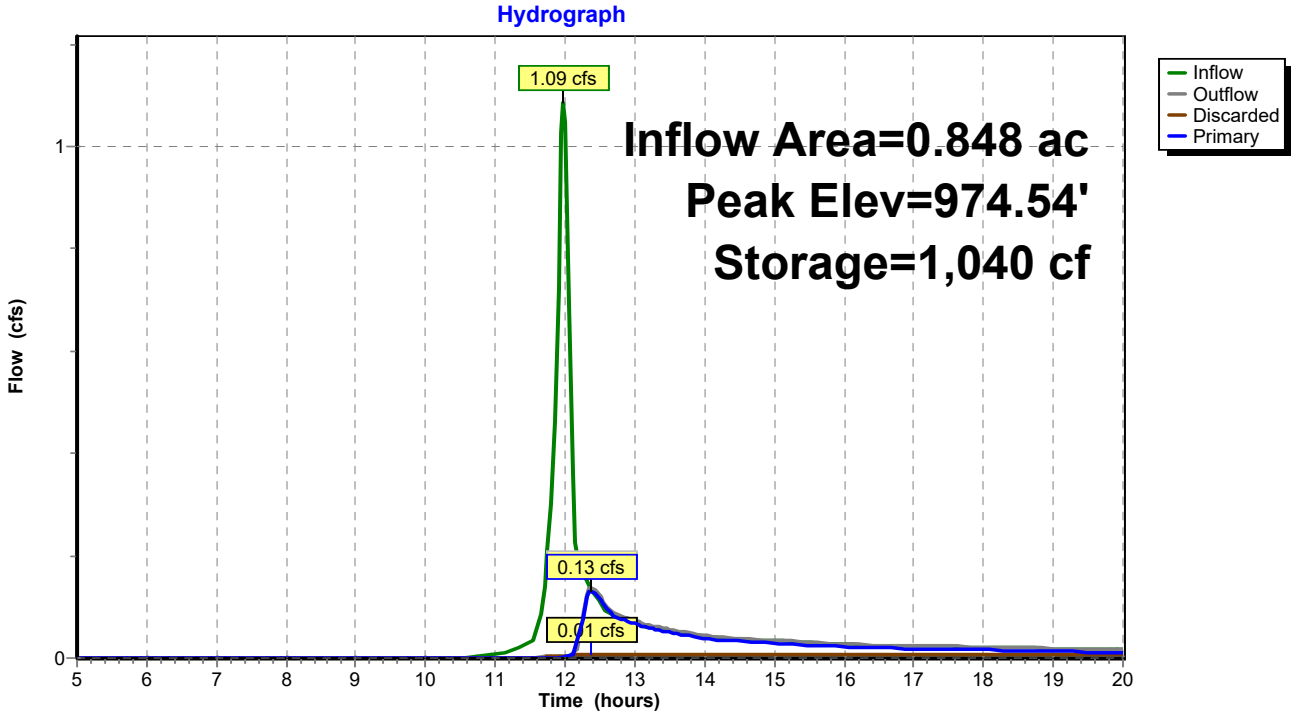
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
973.00	200	0	0
974.00	796	498	498
975.00	1,607	1,202	1,700
975.50	0	402	2,101

Device	Routing	Invert	Outlet Devices
#1	Primary	974.50'	**8.0' 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
#2	Discarded	973.00'	**0.200 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.37 hrs HW=974.53' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.12 cfs @ 12.37 hrs HW=974.53' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.12 cfs @ 0.45 fps)

Pond FB 1: Foreabay 1



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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.643	74	>75% Grass cover, Good, HSG C (PSC-2, PSC-3)
0.498	87	Compacted Dirt, HSG C (ESC-1)
0.028	98	Future Parking, HSG C (PSC-3)
0.616	58	Meadow, non-grazed, HSG B (ESC-1, PSC-1)
0.617	98	Paved parking, HSG C (PSC-2, PSC-3)
0.111	98	Roofs, HSG C (PSC-1)
0.288	98	Rooftops, Gravel, Packed Earth, Good, HSG C (ESC 2)
2.038	58	Woods/grass comb., Good, HSG B (Culv E, Culv P, ESC-1, PSC-1)
2.911	72	Woods/grass comb., Good, HSG C (ESC 2, ESC-1, PSC-1)
7.751	**72**	**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchr Numbers
0.000	0.000	0.643	0.000	0.000	0.643	>75% Grass cover, Good	
0.000	0.000	0.498	0.000	0.000	0.498	Compacted Dirt	
0.000	0.000	0.028	0.000	0.000	0.028	Future Parking	
0.000	0.616	0.000	0.000	0.000	0.616	Meadow, non-grazed	
0.000	0.000	0.617	0.000	0.000	0.617	Paved parking	
0.000	0.000	0.111	0.000	0.000	0.111	Roofs	
0.000	0.000	0.288	0.000	0.000	0.288	Rooftops, Gravel, Packed Earth, Good	
0.000	2.038	2.911	0.000	0.000	4.949	Woods/grass comb., Good	
0.000	**2.654**	**5.097**	**0.000**	**0.000**	**7.751**	**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	Culv E	0.00	0.00	14.0	0.0150	0.013	6.0	0.0	0.0
2	Culv E	0.00	0.00	57.0	0.0230	0.013	12.0	0.0	0.0
3	Culv P	0.00	0.00	14.0	0.0150	0.013	12.0	0.0	0.0
4	Culv P	0.00	0.00	57.0	0.0230	0.013	12.0	0.0	0.0
5	PSC-1	0.00	0.00	14.0	0.0150	0.013	6.0	0.0	0.0
6	PSC-1	0.00	0.00	57.0	0.0230	0.013	12.0	0.0	0.0
7	6" Culv	975.20	975.00	14.0	0.0143	0.013	6.0	0.0	0.0
8	12" Culv	975.20	975.00	14.0	0.0143	0.013	12.0	0.0	0.0
9	BR	973.50	973.00	111.0	0.0045	0.013	12.0	0.0	0.0
10	BR	973.50	973.40	77.0	0.0013	0.013	4.0	0.0	0.0
11	DP 1	972.50	971.60	197.0	0.0046	0.013	12.0	0.0	0.0
12	DP 1	973.00	973.00	71.0	0.0000	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 Culv E: Culvet Analysis Runoff Area=33,656 sf 0.00% Impervious Runoff Depth>0.34"
Flow Length=653' Tc=32.7 min CN=58 Runoff=0.15 cfs 0.022 af

Subcatchment Culv P: Culvet Analysis Runoff Area=33,656 sf 0.00% Impervious Runoff Depth>0.34"
Flow Length=653' Tc=32.6 min CN=58 Runoff=0.15 cfs 0.022 af

Subcatchment ESC 2: Existing Runoff Area=21,518 sf 58.38% Impervious Runoff Depth>1.92"
Flow Length=374' Tc=27.6 min CN=87 Runoff=0.94 cfs 0.079 af

Subcatchment ESC-1: Existing Runoff Area=113,643 sf 0.00% Impervious Runoff Depth>0.93"
Flow Length=1,101' Tc=32.3 min CN=72 Runoff=2.07 cfs 0.203 af

Subcatchment PSC-1: Proposed Runoff Area=79,048 sf 6.12% Impervious Runoff Depth>0.78"
Flow Length=1,043' Tc=27.3 min CN=69 Runoff=1.30 cfs 0.119 af

Subcatchment PSC-2: Proposed Runoff Area=19,189 sf 67.12% Impervious Runoff Depth>2.19"
Tc=6.0 min CN=90 Runoff=1.72 cfs 0.080 af

Subcatchment PSC-3: Proposed Runoff Area=36,924 sf 41.29% Impervious Runoff Depth>1.70"
Tc=6.0 min CN=84 Runoff=2.68 cfs 0.120 af

Reach 6" Culv: Existing 6" Culv Avg. Flow Depth=0.16' Max Vel=2.75 fps Inflow=0.15 cfs 0.022 af
6.0" Round Pipe n=0.013 L=14.0' S=0.0143 '/' Capacity=0.67 cfs Outflow=0.15 cfs 0.022 af

Reach 12" Culv: 12" Culvert Avg. Flow Depth=0.13' Max Vel=2.54 fps Inflow=0.15 cfs 0.022 af
12.0" Round Pipe n=0.013 L=14.0' S=0.0143 '/' Capacity=4.26 cfs Outflow=0.15 cfs 0.022 af

Reach DPE 1: Design Point Summation 1 - Existing Inflow=2.07 cfs 0.203 af
Outflow=2.07 cfs 0.203 af

Reach DPE 2: Design Point Summation 2 - Existing Inflow=1.05 cfs 0.101 af
Outflow=1.05 cfs 0.101 af

Reach DPP 1: Design Poing Summation 1 - Proposed Inflow=0.33 cfs 0.110 af
Outflow=0.33 cfs 0.110 af

Reach DPP 2: Design Poing Summation 2 - Proposed Inflow=0.15 cfs 0.022 af
Outflow=0.15 cfs 0.022 af

Pond AS: Attenuation Swale Peak Elev=977.45' Storage=5,164 cf Inflow=1.30 cfs 0.119 af
Outflow=0.00 cfs 0.000 af

Pond BR: Bioretention Area Peak Elev=975.95' Storage=1,537 cf Inflow=1.72 cfs 0.080 af
Discarded=0.01 cfs 0.010 af Primary=0.30 cfs 0.068 af Outflow=0.31 cfs 0.078 af

Pond DP 1: Dry Pond 1 Peak Elev=973.75' Storage=2,917 cf Inflow=2.82 cfs 0.160 af
Discarded=0.02 cfs 0.014 af Primary=0.33 cfs 0.110 af Secondary=0.00 cfs 0.000 af Outflow=0.35 cfs 0.124 af

Pond FB 1: Foreabay 1 Peak Elev=974.76' Storage=1,337 cf Inflow=2.68 cfs 0.120 af
Discarded=0.01 cfs 0.004 af Primary=2.58 cfs 0.093 af Outflow=2.58 cfs 0.097 af

Total Runoff Area = 7.751 ac Runoff Volume = 0.645 af Average Runoff Depth = 1.00"
86.52% Pervious = 6.706 ac 13.48% Impervious = 1.045 ac

Summary for Subcatchment Culv E: Culvet Analysis

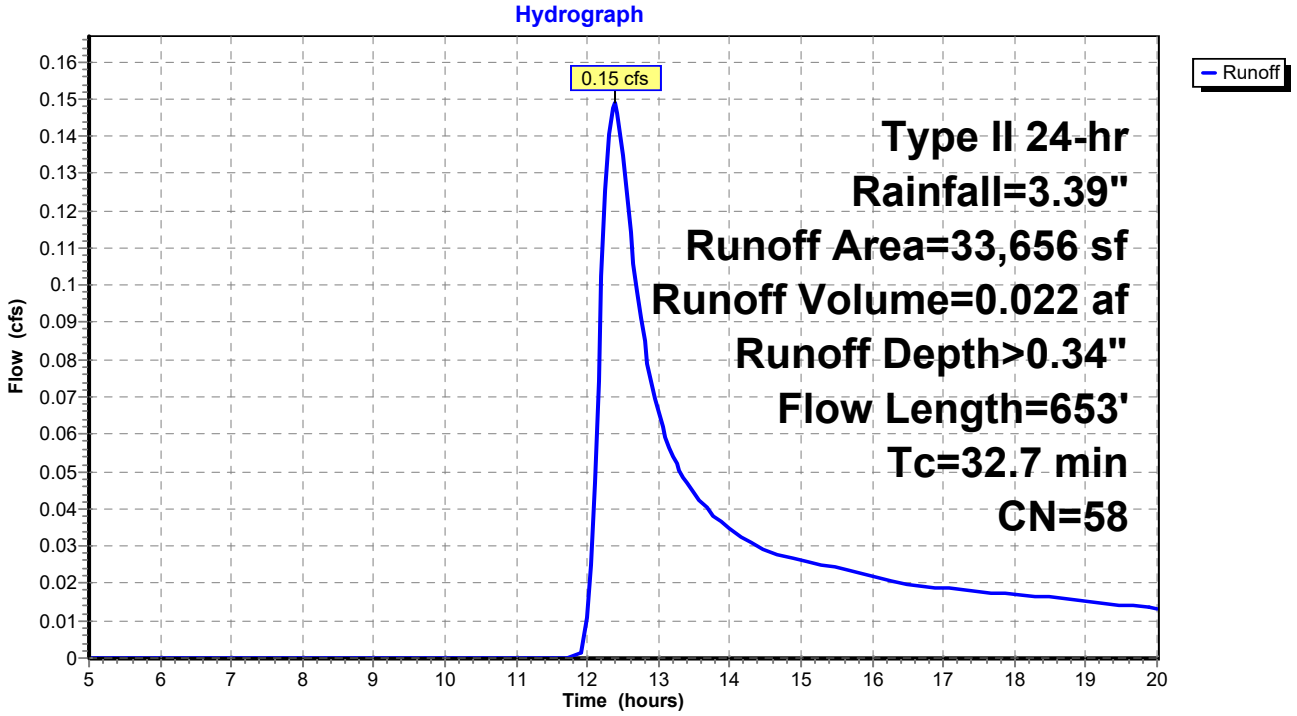
Runoff = 0.15 cfs @ 12.38 hrs, Volume= 0.022 af, Depth> 0.34"

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=3.39"

Area (sf)	CN	Description
33,656	58	Woods/grass comb., Good, HSG B
33,656		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.4	100	0.0200	0.07		**Sheet Flow, First 100' Flowpath** Woods: Light underbrush n= 0.400 P2= 2.70"
8.8	410	0.0240	0.77		**Shallow Concentrated Flow, Balance of Flow to Culvert** Woodland Kv= 5.0 fps
0.1	14	0.0150	3.50	0.69	**Pipe Channel, 6" Culvert** 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.013
0.3	72	0.0080	4.70	75.18	**Trap/Vee/Rect Channel Flow, Channel to 12" Culvert** Bot.W=2.00' D=2.00' Z= 3.0 '/' Top.W=14.00' n= 0.030
0.1	57	0.0230	6.88	5.40	**Pipe Channel, CMP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
32.7	653	Total			

Subcatchment Culv E: Culvet Analysis



Summary for Subcatchment Culv P: Culvet Analysis

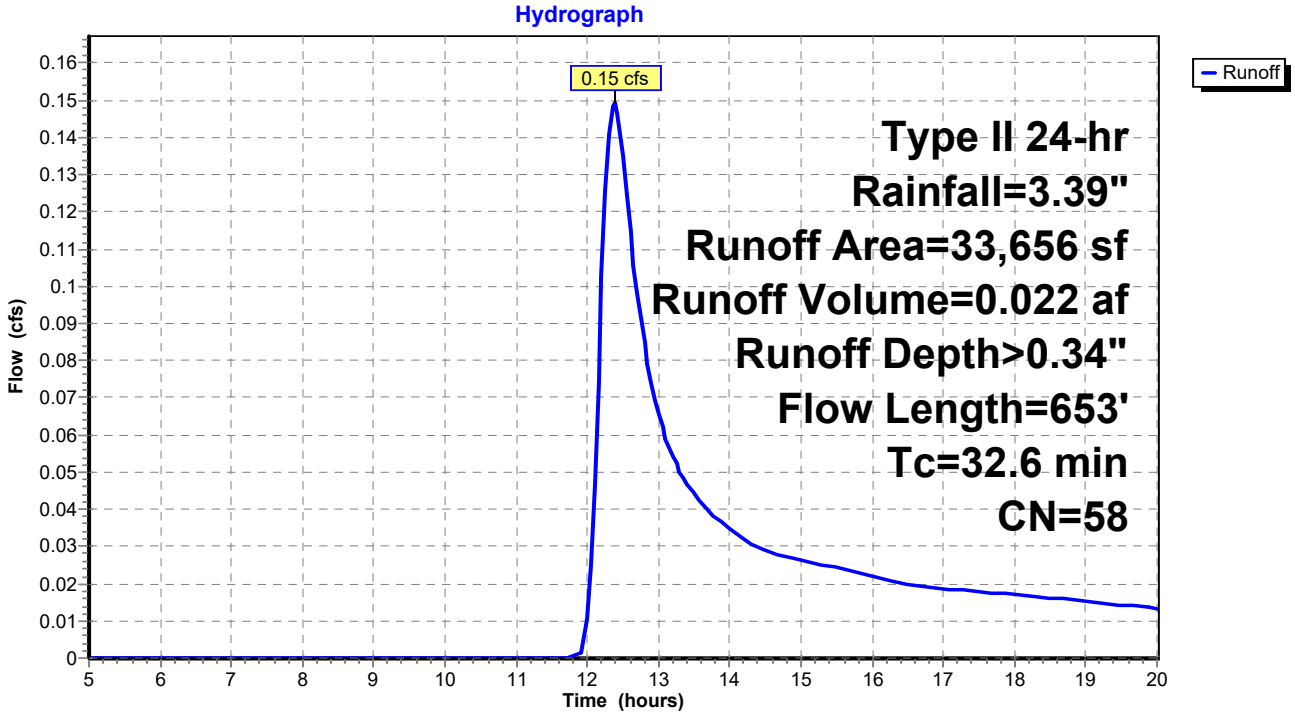
Runoff = 0.15 cfs @ 12.38 hrs, Volume= 0.022 af, Depth> 0.34"

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=3.39"

Area (sf)	CN	Description
33,656	58	Woods/grass comb., Good, HSG B
33,656		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.4	100	0.0200	0.07		**Sheet Flow, First 100' Flowpath** Woods: Light underbrush n= 0.400 P2= 2.70"
8.8	410	0.0240	0.77		**Shallow Concentrated Flow, Balance of Flow to Culvert** Woodland Kv= 5.0 fps
0.0	14	0.0150	5.56	4.36	**Pipe Channel, 12" Culvert** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
0.3	72	0.0080	4.70	75.18	**Trap/Vee/Rect Channel Flow, Channel to 12" Culvert** Bot.W=2.00' D=2.00' Z= 3.0 '/' Top.W=14.00' n= 0.030
0.1	57	0.0230	6.88	5.40	**Pipe Channel, CMP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
32.6	653	Total			

Subcatchment Culv P: Culvet Analysis



Summary for Subcatchment ESC 2: Existing Subcatchment 2a

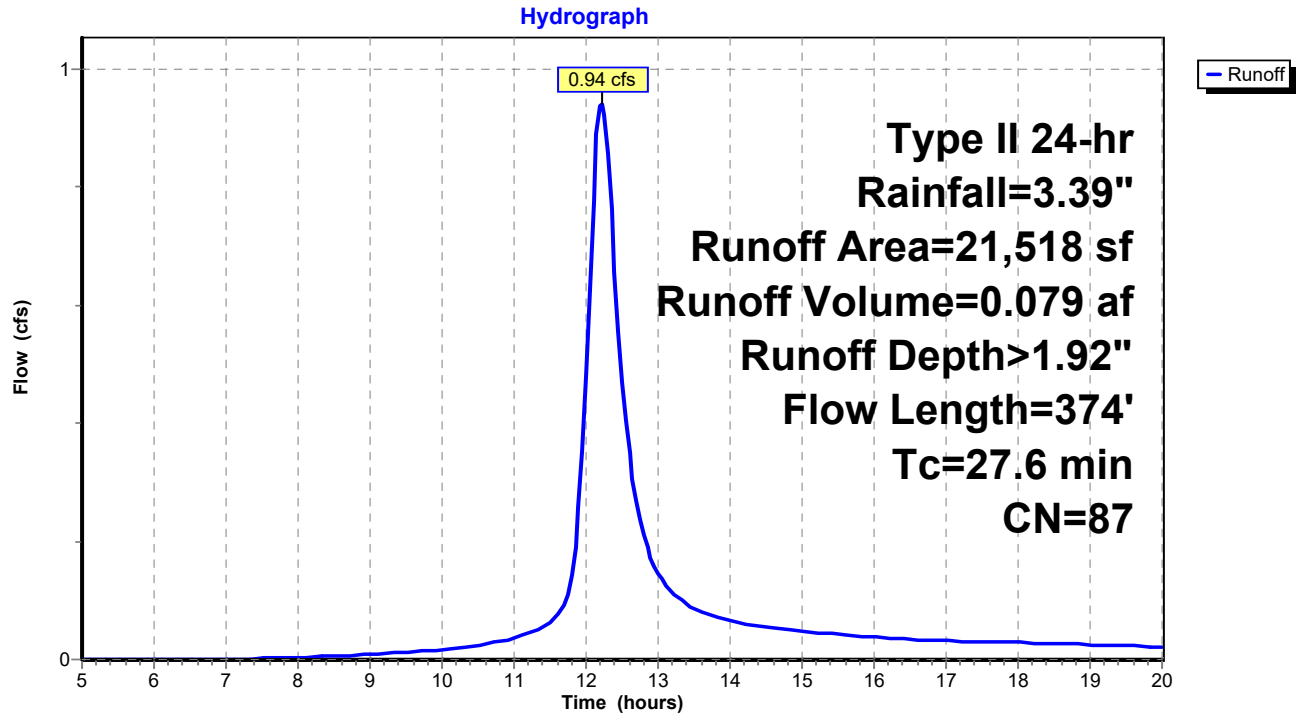
Runoff = 0.94 cfs @ 12.21 hrs, Volume= 0.079 af, Depth> 1.92"

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=3.39"

	Area (sf)	CN	Description
*	12,562	98	Rooftops, Gravel, Packed Earth, Good, HSG C
	8,956	72	Woods/grass comb., Good, HSG C
	21,518	87	Weighted Average
	8,956		41.62% Pervious Area
	12,562		58.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.9	100	0.0210	0.07		**Sheet Flow, First 100' Flowpath** Woods: Light underbrush n= 0.400 P2= 2.70"
3.7	137	0.0150	0.61		**Shallow Concentrated Flow, Balance of Woodland** Woodland Kv= 5.0 fps
1.0	137	0.0220	2.39		**Shallow Concentrated Flow, Balance of Longest Flowpath** Unpaved Kv= 16.1 fps
27.6	374	Total			

Subcatchment ESC 2: Existing Subcatchment 2a



Summary for Subcatchment ESC-1: Existing Subcatchment 1

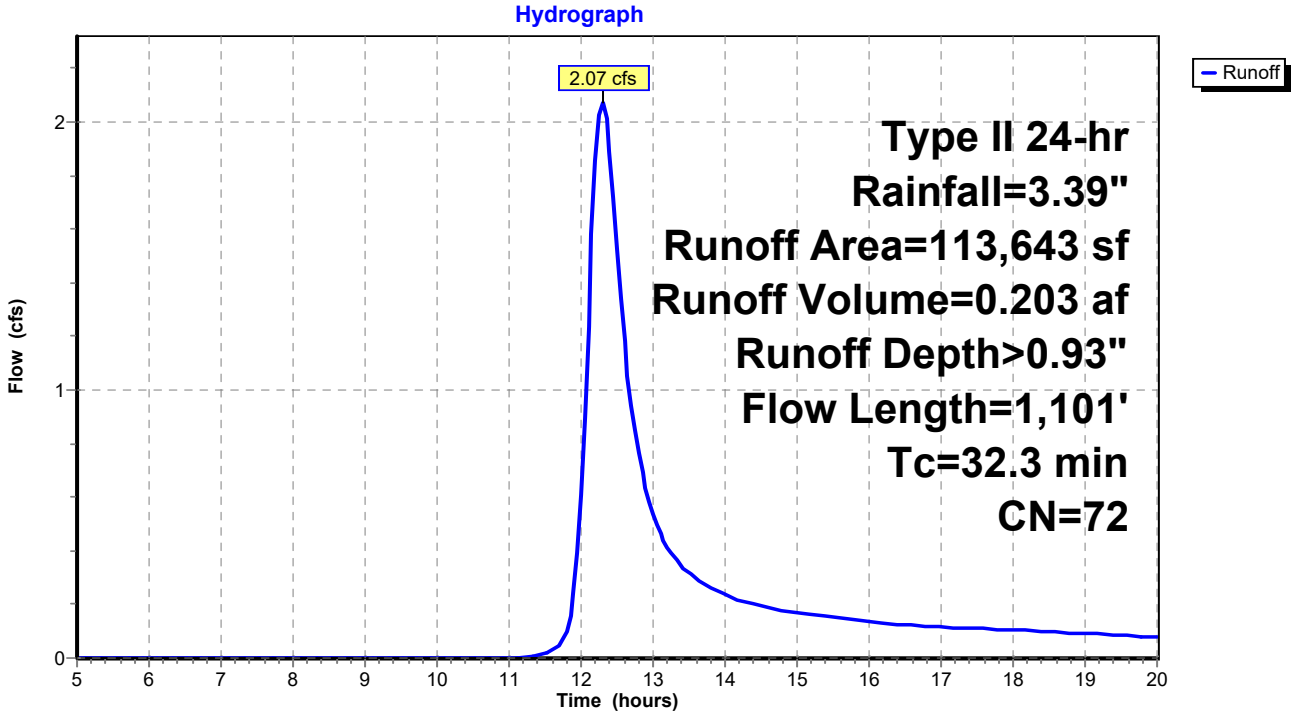
Runoff = 2.07 cfs @ 12.30 hrs, Volume= 0.203 af, Depth> 0.93"

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=3.39"

	Area (sf)	CN	Description
	11,110	58	Meadow, non-grazed, HSG B
	10,739	58	Woods/grass comb., Good, HSG B
	70,087	72	Woods/grass comb., Good, HSG C
*	21,707	87	Compacted Dirt, HSG C
	113,643	72	Weighted Average
	113,643		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	100	0.0180	0.10		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
3.6	250	0.0280	1.17		**Shallow Concentrated Flow, Balance of Meadow** Short Grass Pasture Kv= 7.0 fps
11.4	583	0.0291	0.85		**Shallow Concentrated Flow, Balance of Woods** Woodland Kv= 5.0 fps
1.1	168	0.0240	2.49		**Shallow Concentrated Flow, Balance of Longest Flowpath** Unpaved Kv= 16.1 fps
32.3	1,101	Total			

Subcatchment ESC-1: Existing Subcatchment 1



Summary for Subcatchment PSC-1: Proposed Subcatchment 1

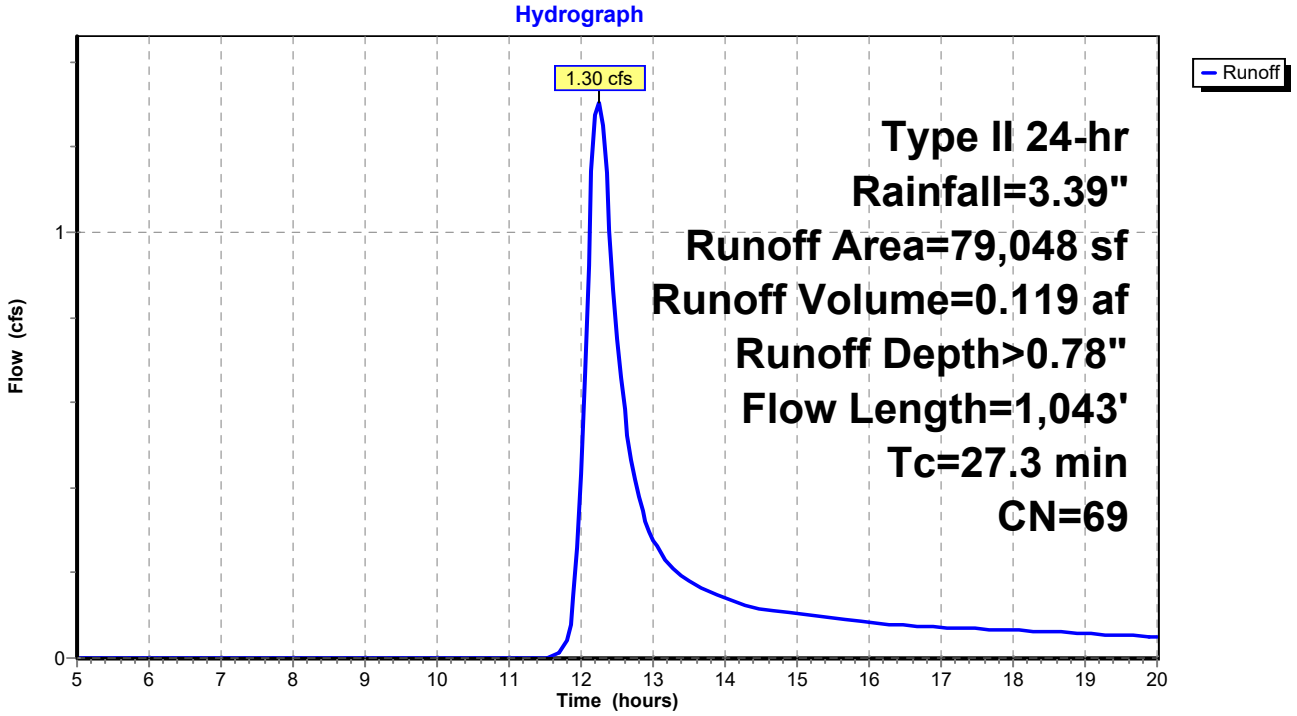
Runoff = 1.30 cfs @ 12.24 hrs, Volume= 0.119 af, Depth> 0.78"

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=3.39"

Area (sf)	CN	Description
15,730	58	Meadow, non-grazed, HSG B
10,739	58	Woods/grass comb., Good, HSG B
47,741	72	Woods/grass comb., Good, HSG C
4,838	98	Roofs, HSG C
79,048	69	Weighted Average
74,210		93.88% Pervious Area
4,838		6.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	100	0.0180	0.10		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
3.6	250	0.0280	1.17		**Shallow Concentrated Flow, Balance of Meadow** Short Grass Pasture Kv= 7.0 fps
6.6	379	0.0370	0.96		**Shallow Concentrated Flow, Woodland to Trap** Woodland Kv= 5.0 fps
0.4	171	0.0175	6.95	111.19	**Trap/Vee/Rect Channel Flow, Trap to 6" Culvert** Bot.W=2.00' D=2.00' Z= 3.0 '/' Top.W=14.00' n= 0.030
0.1	14	0.0150	3.50	0.69	**Pipe Channel, 6" Culvert** 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.013
0.3	72	0.0080	4.70	75.18	**Trap/Vee/Rect Channel Flow, Channel to 12" Culvert** Bot.W=2.00' D=2.00' Z= 3.0 '/' Top.W=14.00' n= 0.030
0.1	57	0.0230	6.88	5.40	**Pipe Channel, CMP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
27.3	1,043	Total			

Subcatchment PSC-1: Proposed Subcatchment 1



Summary for Subcatchment PSC-2: Proposed Subcatchment 2

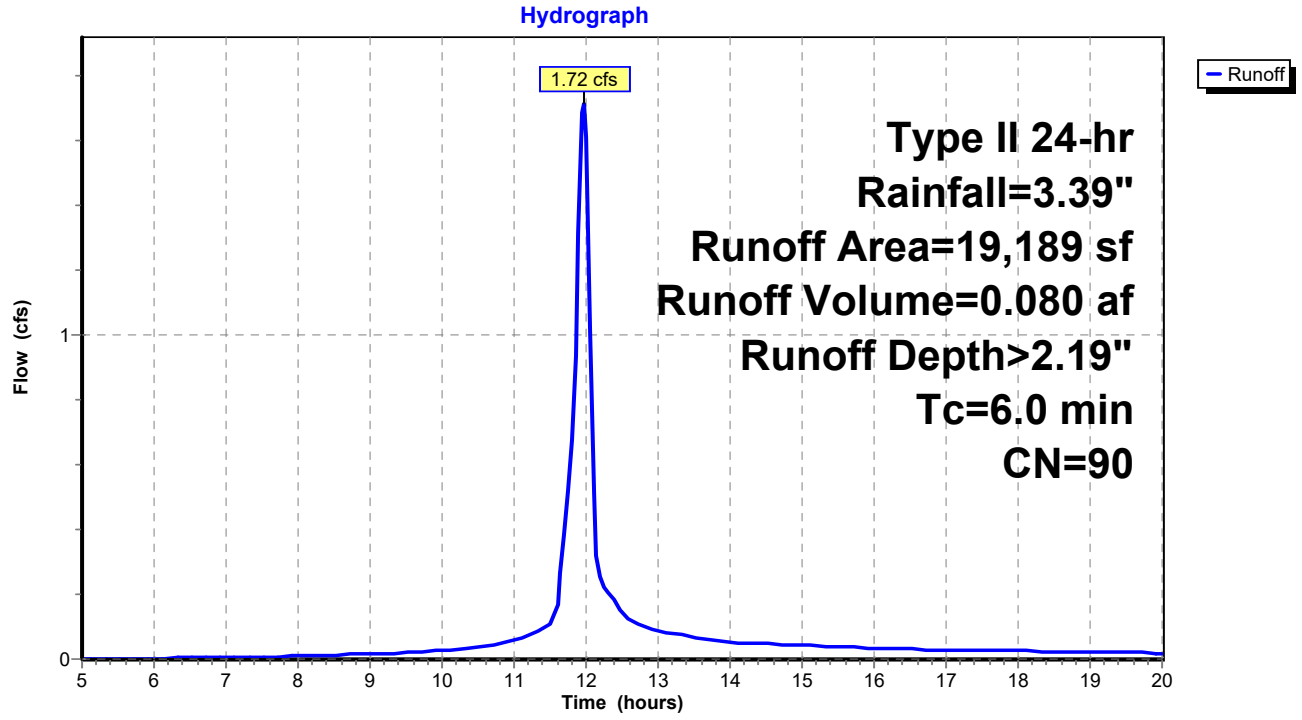
Runoff = 1.72 cfs @ 11.97 hrs, Volume= 0.080 af, Depth> 2.19"

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=3.39"

Area (sf)	CN	Description
12,879	98	Paved parking, HSG C
6,310	74	>75% Grass cover, Good, HSG C
19,189	90	Weighted Average
6,310		32.88% Pervious Area
12,879		67.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum 6 min Tc**

Subcatchment PSC-2: Proposed Subcatchment 2



Summary for Subcatchment PSC-3: Proposed Subcatchment 3

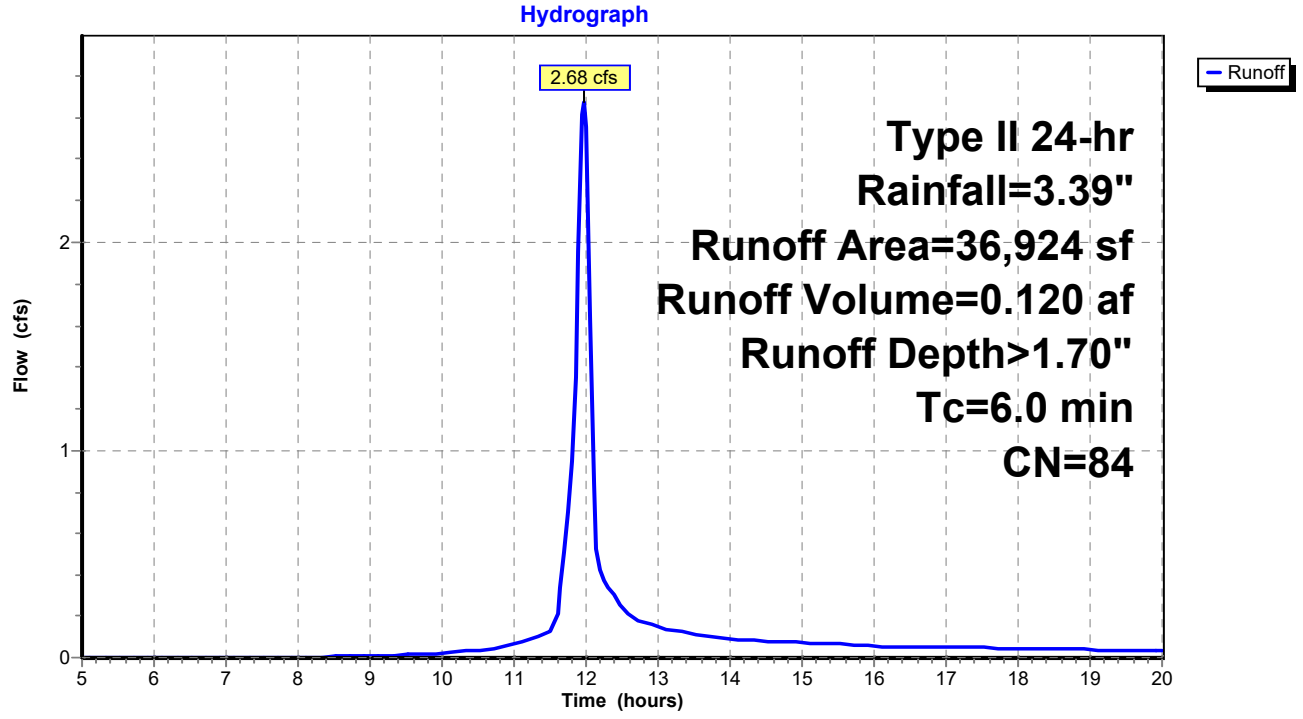
Runoff = 2.68 cfs @ 11.97 hrs, Volume= 0.120 af, Depth> 1.70"

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=3.39"

	Area (sf)	CN	Description
	14,008	98	Paved parking, HSG C
	21,678	74	>75% Grass cover, Good, HSG C
*	1,238	98	Future Parking, HSG C
	36,924	84	Weighted Average
	21,678		58.71% Pervious Area
	15,246		41.29% Impervious Area

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

Subcatchment PSC-3: Proposed Subcatchment 3



Summary for Reach 6" Culv: Existing 6" Culv

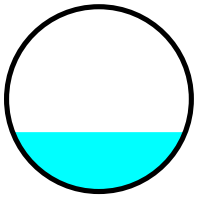
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 0.773 ac, 0.00% Impervious, Inflow Depth > 0.34"
Inflow = 0.15 cfs @ 12.38 hrs, Volume= 0.022 af
Outflow = 0.15 cfs @ 12.39 hrs, Volume= 0.022 af, Atten= 0%, Lag= 0.1 min

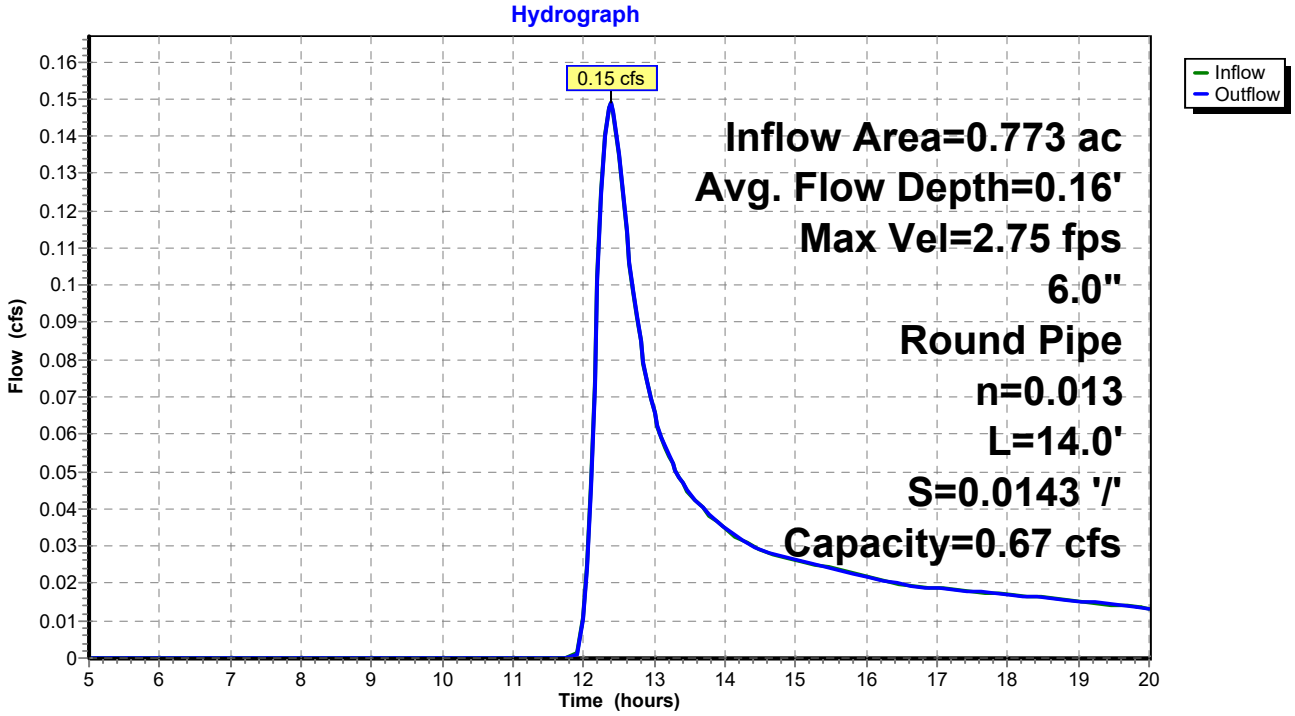
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.75 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.66 fps, Avg. Travel Time= 0.1 min

Peak Storage= 1 cf @ 12.38 hrs
Average Depth at Peak Storage= 0.16'
Bank-Full Depth= 0.50' Flow Area= 0.2 sf, Capacity= 0.67 cfs

6.0" Round Pipe
n= 0.013
Length= 14.0' Slope= 0.0143 '/'
Inlet Invert= 975.20', Outlet Invert= 975.00'



Reach 6" Culv: Existing 6" Culv



Summary for Reach 12" Culv: 12" Culvert

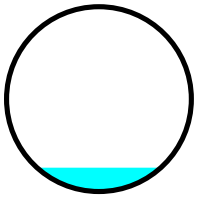
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 2.587 ac, 4.29% Impervious, Inflow Depth > 0.10"
Inflow = 0.15 cfs @ 12.38 hrs, Volume= 0.022 af
Outflow = 0.15 cfs @ 12.38 hrs, Volume= 0.022 af, Atten= 0%, Lag= 0.2 min

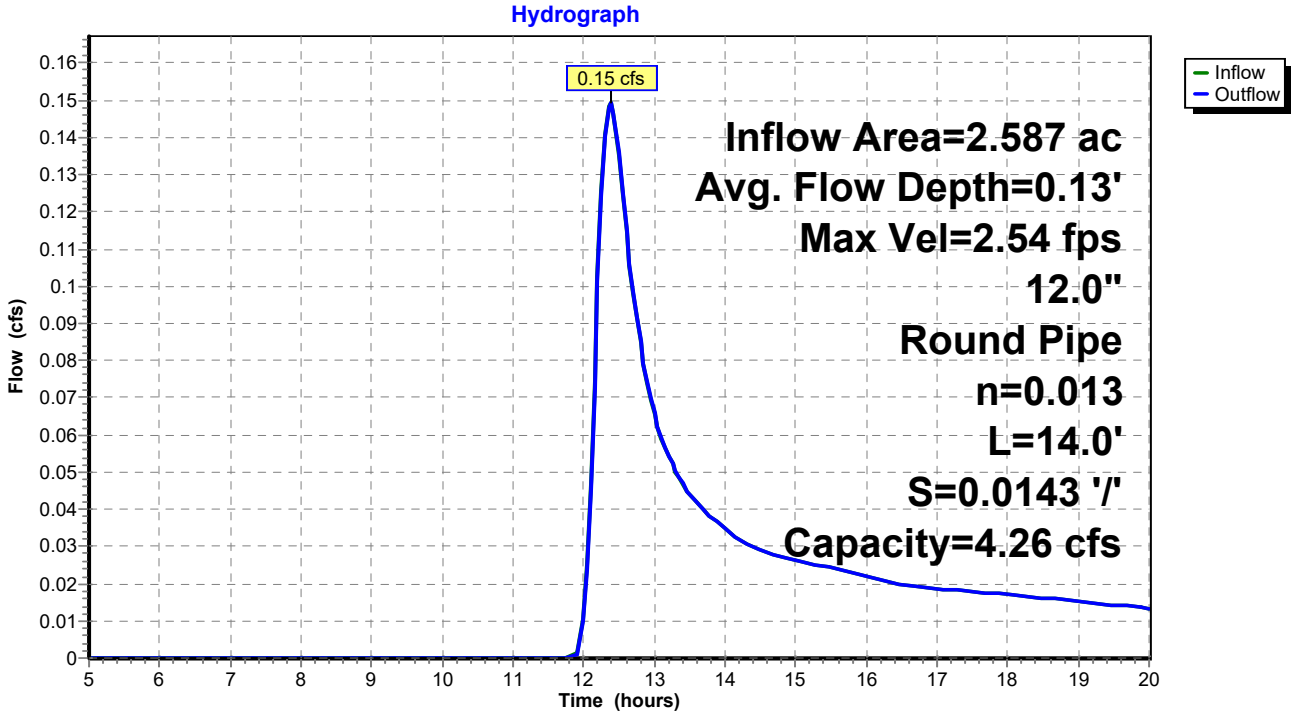
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.54 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 1.52 fps, Avg. Travel Time= 0.2 min

Peak Storage= 1 cf @ 12.38 hrs
Average Depth at Peak Storage= 0.13'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.26 cfs

12.0" Round Pipe
n= 0.013
Length= 14.0' Slope= 0.0143 '/'
Inlet Invert= 975.20', Outlet Invert= 975.00'



Reach 12" Culv: 12" Culvert



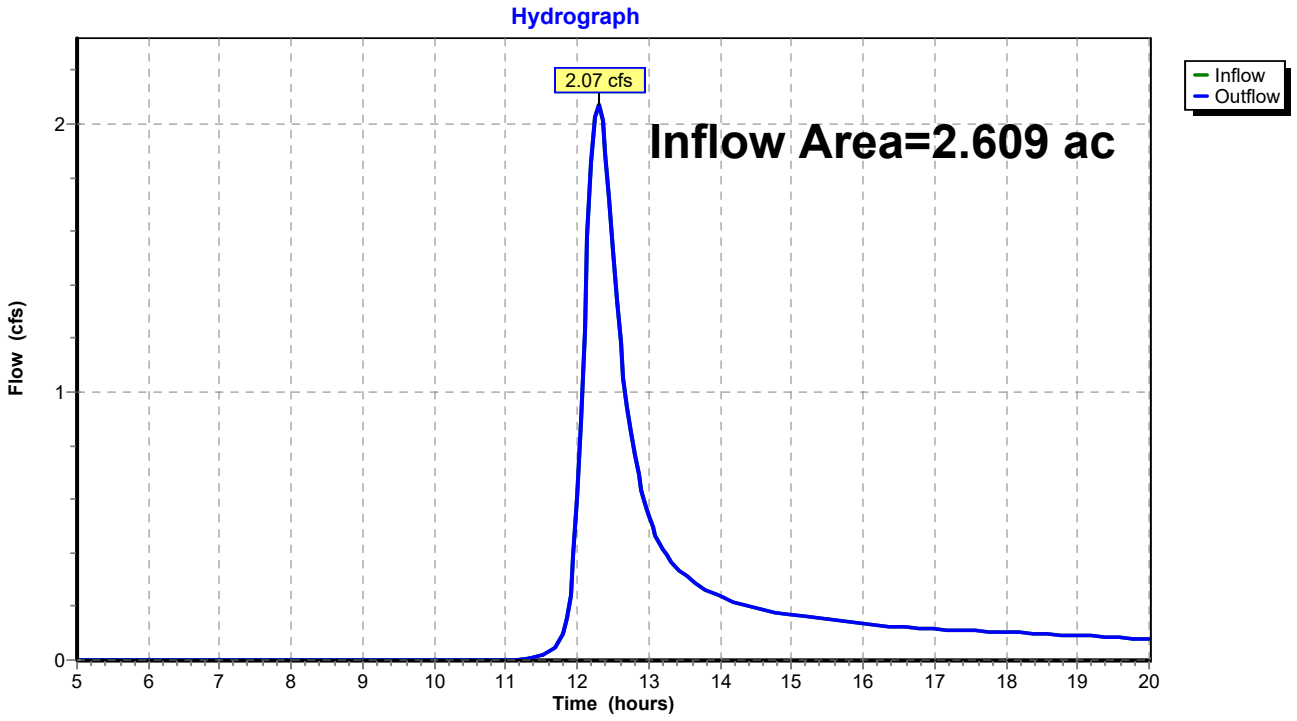
Summary for Reach DPE 1: Design Point Summation 1 - Existing

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.609 ac, 0.00% Impervious, Inflow Depth > 0.93"
Inflow = 2.07 cfs @ 12.30 hrs, Volume= 0.203 af
Outflow = 2.07 cfs @ 12.30 hrs, Volume= 0.203 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 DPE 1: Design Point Summation 1 - Existing



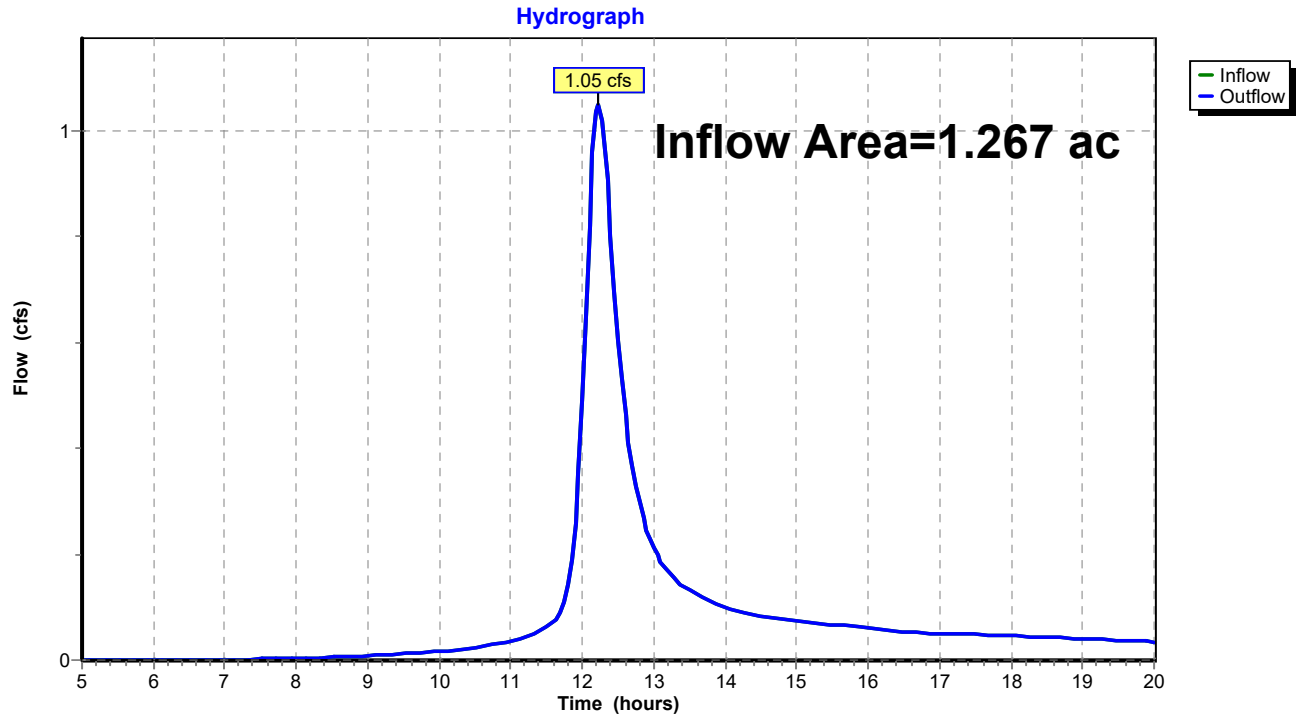
Summary for Reach DPE 2: Design Point Summation 2 - Existing

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.267 ac, 22.77% Impervious, Inflow Depth > 0.96"
Inflow = 1.05 cfs @ 12.23 hrs, Volume= 0.101 af
Outflow = 1.05 cfs @ 12.23 hrs, Volume= 0.101 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 DPE 2: Design Point Summation 2 - Existing



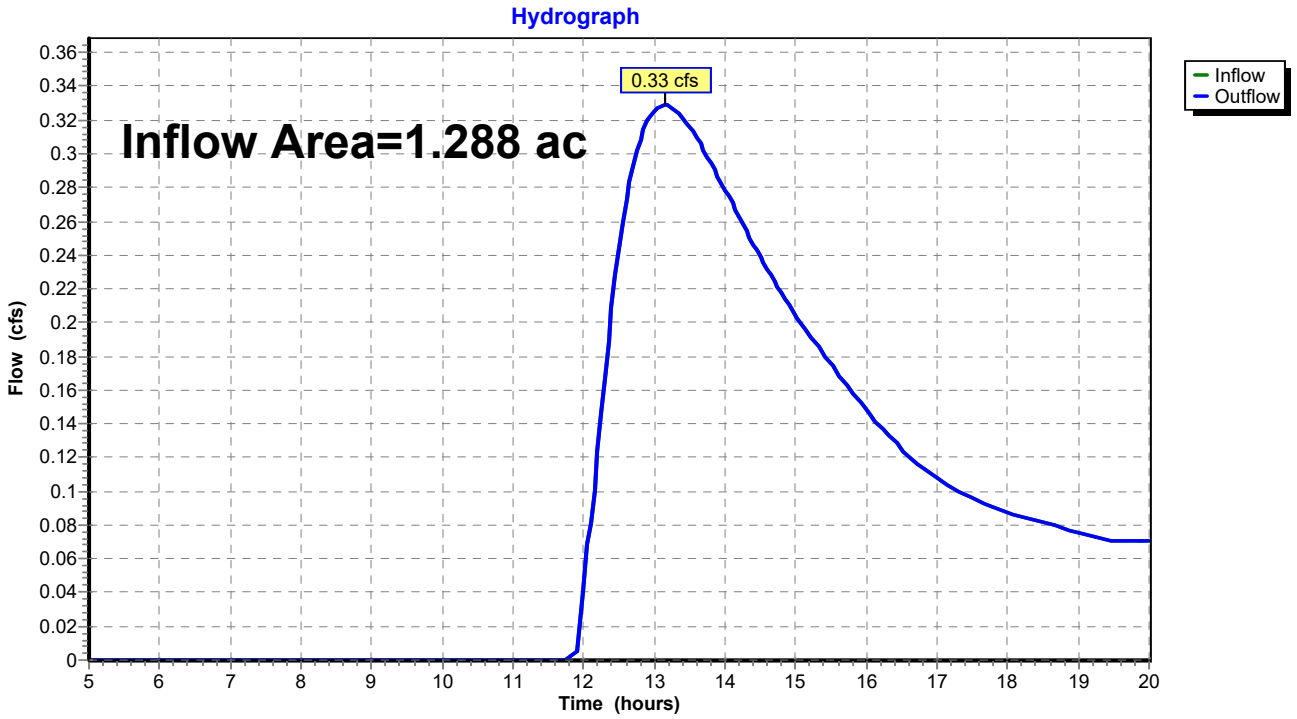
Summary for Reach DPP 1: Design Poing Summation 1 - Proposed

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.288 ac, 50.12% Impervious, Inflow Depth > 1.02"
Inflow = 0.33 cfs @ 13.15 hrs, Volume= 0.110 af
Outflow = 0.33 cfs @ 13.15 hrs, Volume= 0.110 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 DPP 1: Design Poing Summation 1 - Proposed



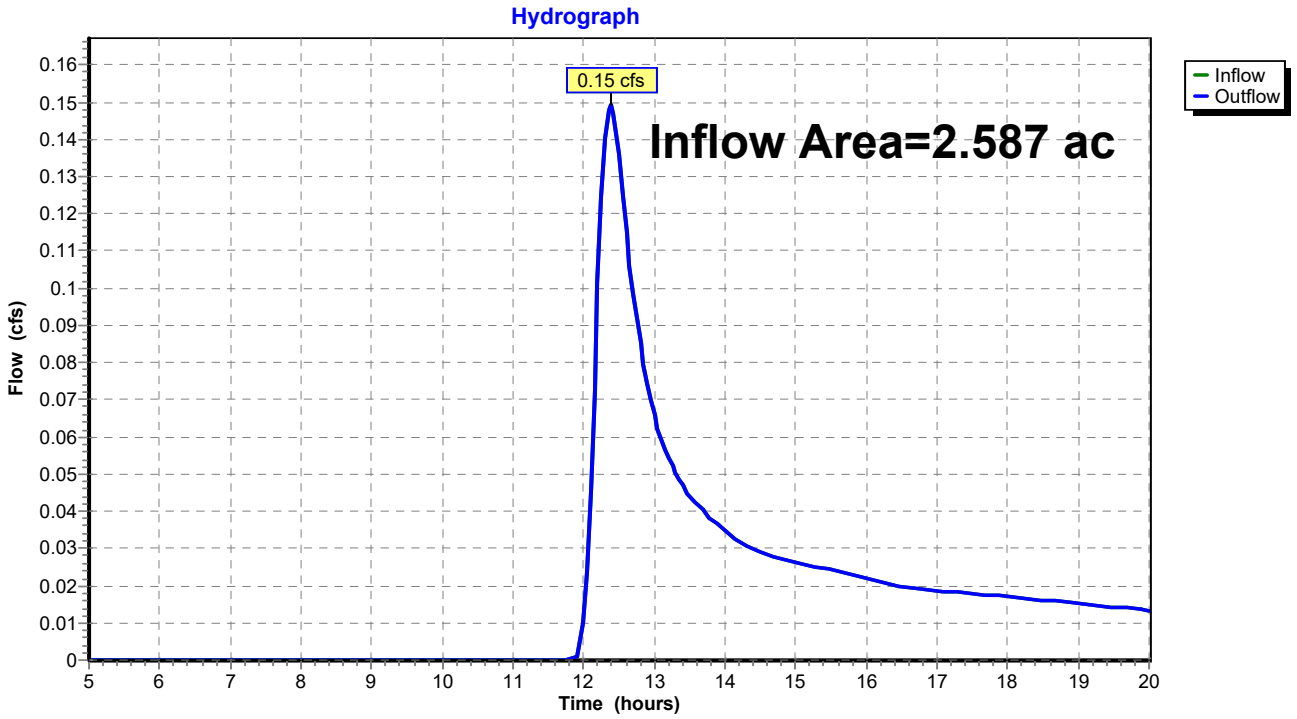
Summary for Reach DPP 2: Design Poing Summation 2 - Proposed

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.587 ac, 4.29% Impervious, Inflow Depth > 0.10"
Inflow = 0.15 cfs @ 12.38 hrs, Volume= 0.022 af
Outflow = 0.15 cfs @ 12.38 hrs, Volume= 0.022 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 DPP 2: Design Poing Summation 2 - Proposed



Summary for Pond AS: Attenuation Swale

Inflow Area = 1.815 ac, 6.12% Impervious, Inflow Depth > 0.78"
Inflow = 1.30 cfs @ 12.24 hrs, Volume= 0.119 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

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 977.45' @ 20.00 hrs Surf.Area= 6,132 sf Storage= 5,164 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

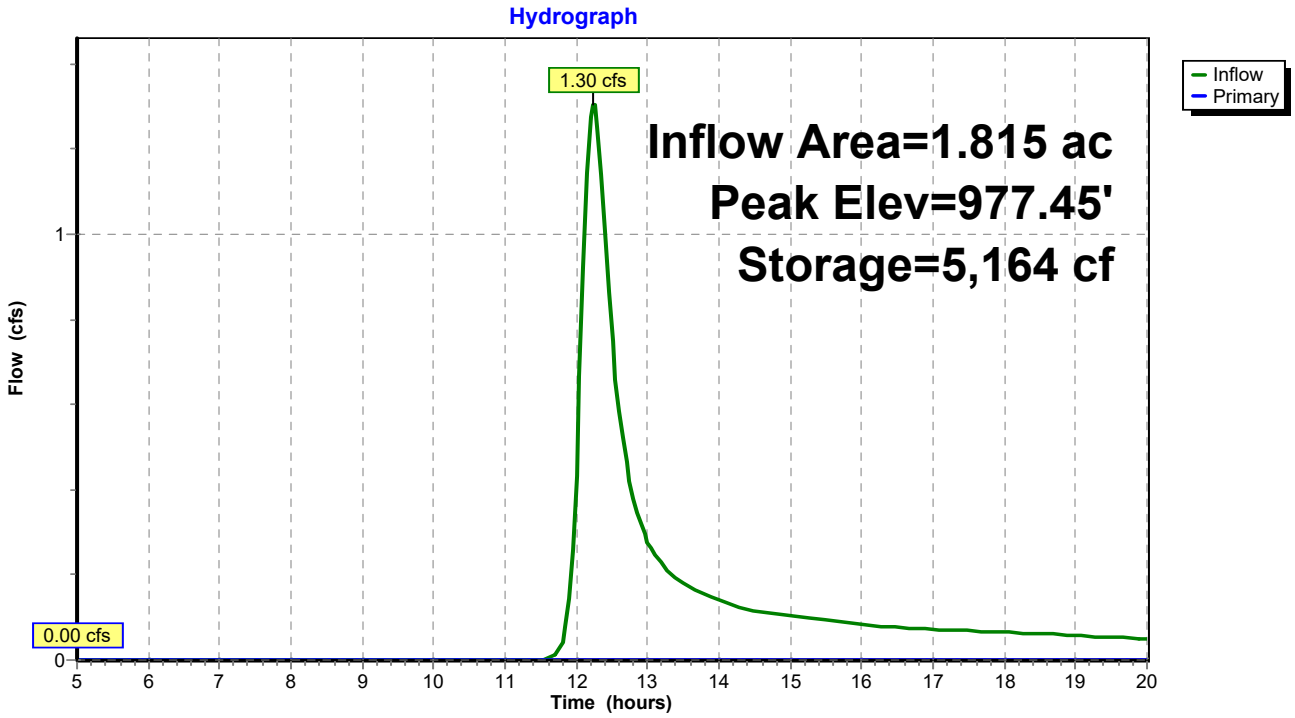
Volume	Invert	Avail.Storage	Storage Description
#1	976.50'	7,034 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
976.50	4,771	0	0
977.00	5,476	2,562	2,562
977.50	6,207	2,921	5,483
978.00	0	1,552	7,034

Device	Routing	Invert	Outlet Devices
#1	Primary	977.50'	**4.0' 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=976.50' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond AS: Attenuation Swale



Summary for Pond BR: Bioretention Area

Inflow Area = 0.441 ac, 67.12% Impervious, Inflow Depth > 2.19"
Inflow = 1.72 cfs @ 11.97 hrs, Volume= 0.080 af
Outflow = 0.31 cfs @ 12.17 hrs, Volume= 0.078 af, Atten= 82%, Lag= 12.1 min
Discarded = 0.01 cfs @ 9.30 hrs, Volume= 0.010 af
Primary = 0.30 cfs @ 12.17 hrs, Volume= 0.068 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 975.95' @ 12.17 hrs Surf.Area= 2,229 sf Storage= 1,537 cf
Flood Elev= 978.50' Surf.Area= 0 sf Storage= 5,923 cf

Plug-Flow detention time= 73.1 min calculated for 0.078 af (97% of inflow)
Center-of-Mass det. time= 60.7 min (825.8 - 765.1)

Volume	Invert	Avail.Storage	Storage Description
#1	973.50'	5,923 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

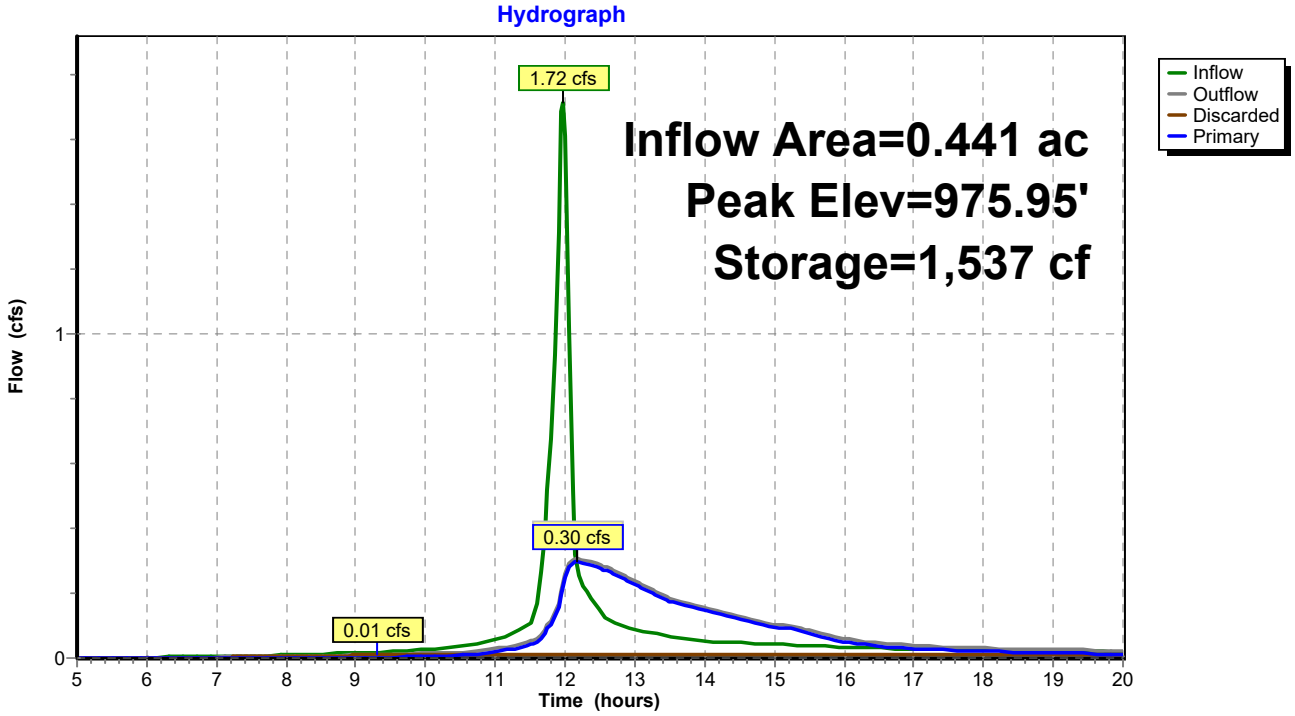
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
973.50	2,229	0.0	0	0
974.50	2,229	40.0	892	892
974.51	2,229	20.0	4	896
977.00	2,229	20.0	1,110	2,006
977.10	2,229	100.0	223	2,229
978.00	3,844	100.0	2,733	4,962
978.50	0	100.0	961	5,923

Device	Routing	Invert	Outlet Devices
#1	Discarded	973.50'	**0.200 in/hr Exfiltration over Surface area**
#2	Primary	973.50'	**12.0" Round Culvert** L= 111.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 973.50' / 973.00' S= 0.0045 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	977.50'	**12.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	973.50'	**4.0" Round Culvert** L= 77.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 973.50' / 973.40' S= 0.0013 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Discarded OutFlow Max=0.01 cfs @ 9.30 hrs HW=973.55' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.30 cfs @ 12.17 hrs HW=975.94' (Free Discharge)
└**2=Culvert** (Passes 0.30 cfs of 3.78 cfs potential flow)
  ├**3=Orifice/Grate** (Controls 0.00 cfs)
  └**4=Culvert** (Barrel Controls 0.30 cfs @ 3.39 fps)

Pond BR: Bioretention Area



Summary for Pond DP 1: Dry Pond 1

[79] Warning: Submerged Pond BR Primary device # 2 INLET by 0.25'

Inflow Area = 1.288 ac, 50.12% Impervious, Inflow Depth > 1.49"
Inflow = 2.82 cfs @ 12.00 hrs, Volume= 0.160 af
Outflow = 0.35 cfs @ 13.15 hrs, Volume= 0.124 af, Atten= 88%, Lag= 69.0 min
Discarded = 0.02 cfs @ 13.15 hrs, Volume= 0.014 af
Primary = 0.33 cfs @ 13.15 hrs, Volume= 0.110 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= 973.75' @ 13.15 hrs Surf.Area= 4,296 sf Storage= 2,917 cf
Flood Elev= 976.00' Surf.Area= 0 sf Storage= 12,005 cf

Plug-Flow detention time= 145.3 min calculated for 0.124 af (77% of inflow)
Center-of-Mass det. time= 90.3 min (903.3 - 813.0)

Volume	Invert	Avail.Storage	Storage Description
#1	973.00'	12,005 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
973.00	3,533	0	0
974.00	4,557	4,045	4,045
975.00	5,681	5,119	9,164
976.00	0	2,841	12,005

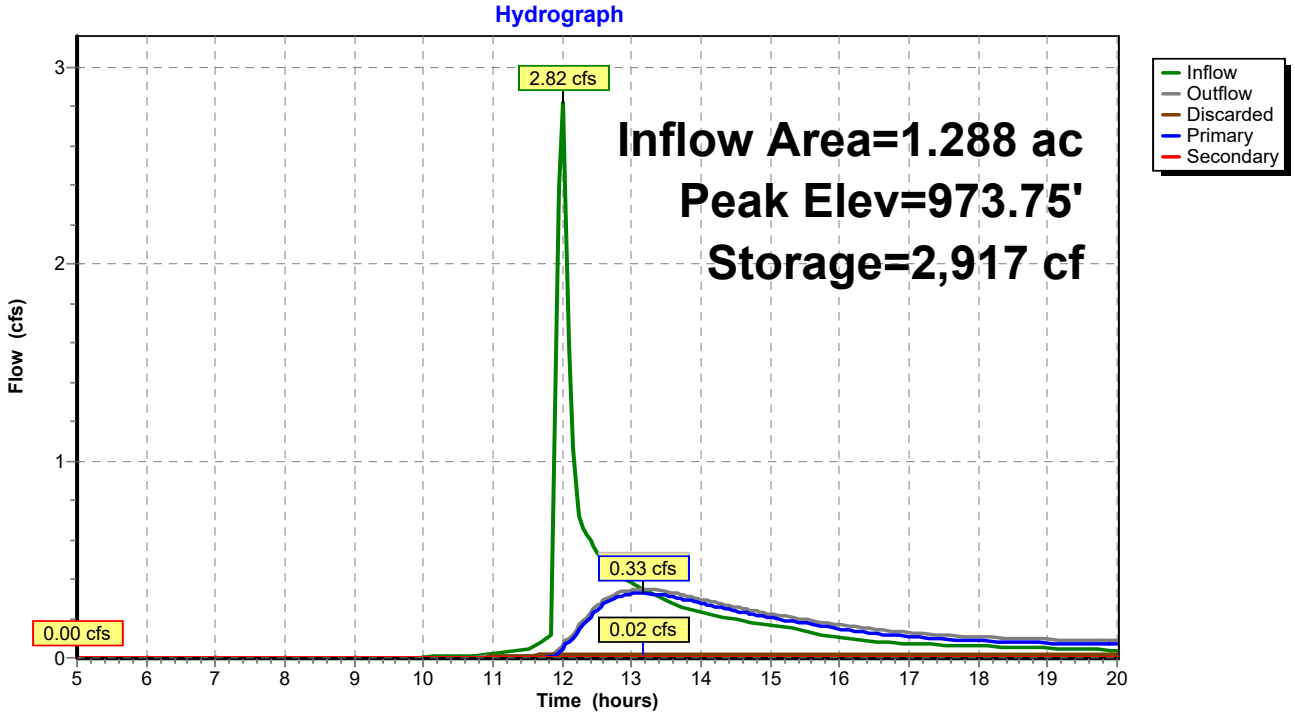
Device	Routing	Invert	Outlet Devices
#1	Secondary	974.00'	**10.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#2	Discarded	973.00'	**0.200 in/hr Exfiltration over Surface area**
#3	Primary	972.50'	**12.0" Round Culvert** L= 197.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 972.50' / 971.60' S= 0.0046 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#4	Device 3	973.00'	**4.0" Round Culvert** L= 71.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 973.00' / 973.00' S= 0.0000 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf
#5	Device 3	973.50'	**8.0" Vert. Orifice/Grate - 10 Yr Overflow** C= 0.600

Discarded OutFlow Max=0.02 cfs @ 13.15 hrs HW=973.75' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.33 cfs @ 13.15 hrs HW=973.75' (Free Discharge)
└**3=Culvert** (Passes 0.33 cfs of 2.56 cfs potential flow)
└**4=Culvert** (Barrel Controls 0.13 cfs @ 1.52 fps)
└**5=Orifice/Grate - 10 Yr Overflow** (Orifice Controls 0.20 cfs @ 1.69 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=973.00' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DP 1: Dry Pond 1



Summary for Pond FB 1: Foreabay 1

Inflow Area = 0.848 ac, 41.29% Impervious, Inflow Depth > 1.70"
Inflow = 2.68 cfs @ 11.97 hrs, Volume= 0.120 af
Outflow = 2.58 cfs @ 12.00 hrs, Volume= 0.097 af, Atten= 4%, Lag= 1.6 min
Discarded = 0.01 cfs @ 12.00 hrs, Volume= 0.004 af
Primary = 2.58 cfs @ 12.00 hrs, Volume= 0.093 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 974.76' @ 12.00 hrs Surf.Area= 1,412 sf Storage= 1,337 cf
Flood Elev= 975.50' Surf.Area= 0 sf Storage= 2,101 cf

Plug-Flow detention time= 80.3 min calculated for 0.097 af (80% of inflow)
Center-of-Mass det. time= 26.8 min (809.8 - 783.0)

Volume	Invert	Avail.Storage	Storage Description
#1	973.00'	2,101 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

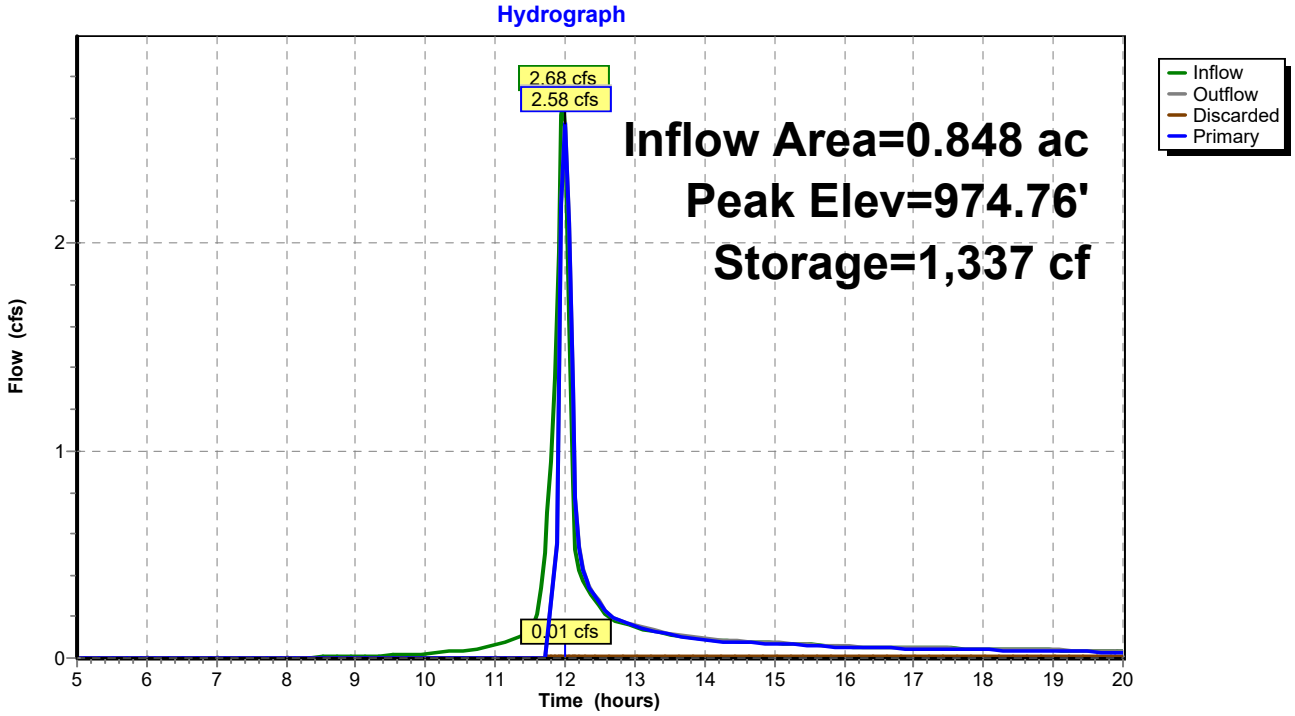
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
973.00	200	0	0
974.00	796	498	498
975.00	1,607	1,202	1,700
975.50	0	402	2,101

Device	Routing	Invert	Outlet Devices
#1	Primary	974.50'	**8.0' 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
#2	Discarded	973.00'	**0.200 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.00 hrs HW=974.76' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=2.55 cfs @ 12.00 hrs HW=974.76' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 2.55 cfs @ 1.23 fps)

Pond FB 1: Foreabay 1



Duthie2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.643	74	>75% Grass cover, Good, HSG C (PSC-2, PSC-3)
0.498	87	Compacted Dirt, HSG C (ESC-1)
0.028	98	Future Parking, HSG C (PSC-3)
0.616	58	Meadow, non-grazed, HSG B (ESC-1, PSC-1)
0.617	98	Paved parking, HSG C (PSC-2, PSC-3)
0.111	98	Roofs, HSG C (PSC-1)
0.288	98	Rooftops, Gravel, Packed Earth, Good, HSG C (ESC 2)
2.038	58	Woods/grass comb., Good, HSG B (Culv E, Culv P, ESC-1, PSC-1)
2.911	72	Woods/grass comb., Good, HSG C (ESC 2, ESC-1, PSC-1)
7.751	**72**	**TOTAL AREA**

Duthie2

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchr Numbers
0.000	0.000	0.643	0.000	0.000	0.643	>75% Grass cover, Good	
0.000	0.000	0.498	0.000	0.000	0.498	Compacted Dirt	
0.000	0.000	0.028	0.000	0.000	0.028	Future Parking	
0.000	0.616	0.000	0.000	0.000	0.616	Meadow, non-grazed	
0.000	0.000	0.617	0.000	0.000	0.617	Paved parking	
0.000	0.000	0.111	0.000	0.000	0.111	Roofs	
0.000	0.000	0.288	0.000	0.000	0.288	Rooftops, Gravel, Packed Earth, Good	
0.000	2.038	2.911	0.000	0.000	4.949	Woods/grass comb., Good	
0.000	**2.654**	**5.097**	**0.000**	**0.000**	**7.751**	**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	Culv E	0.00	0.00	14.0	0.0150	0.013	6.0	0.0	0.0
2	Culv E	0.00	0.00	57.0	0.0230	0.013	12.0	0.0	0.0
3	Culv P	0.00	0.00	14.0	0.0150	0.013	12.0	0.0	0.0
4	Culv P	0.00	0.00	57.0	0.0230	0.013	12.0	0.0	0.0
5	PSC-1	0.00	0.00	14.0	0.0150	0.013	6.0	0.0	0.0
6	PSC-1	0.00	0.00	57.0	0.0230	0.013	12.0	0.0	0.0
7	6" Culv	975.20	975.00	14.0	0.0143	0.013	6.0	0.0	0.0
8	12" Culv	975.20	975.00	14.0	0.0143	0.013	12.0	0.0	0.0
9	BR	973.50	973.00	111.0	0.0045	0.013	12.0	0.0	0.0
10	BR	973.50	973.40	77.0	0.0013	0.013	4.0	0.0	0.0
11	DP 1	972.50	971.60	197.0	0.0046	0.013	12.0	0.0	0.0
12	DP 1	973.00	973.00	71.0	0.0000	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 Culv E: Culvet Analysis Runoff Area=33,656 sf 0.00% Impervious Runoff Depth>1.45"
Flow Length=653' Tc=32.7 min CN=58 Runoff=0.93 cfs 0.094 af

Subcatchment Culv P: Culvet Analysis Runoff Area=33,656 sf 0.00% Impervious Runoff Depth>1.46"
Flow Length=653' Tc=32.6 min CN=58 Runoff=0.93 cfs 0.094 af

Subcatchment ESC 2: Existing Runoff Area=21,518 sf 58.38% Impervious Runoff Depth>4.05"
Flow Length=374' Tc=27.6 min CN=87 Runoff=1.93 cfs 0.167 af

Subcatchment ESC-1: Existing Runoff Area=113,643 sf 0.00% Impervious Runoff Depth>2.59"
Flow Length=1,101' Tc=32.3 min CN=72 Runoff=6.08 cfs 0.563 af

Subcatchment PSC-1: Proposed Runoff Area=79,048 sf 6.12% Impervious Runoff Depth>2.34"
Flow Length=1,043' Tc=27.3 min CN=69 Runoff=4.22 cfs 0.353 af

Subcatchment PSC-2: Proposed Runoff Area=19,189 sf 67.12% Impervious Runoff Depth>4.38"
Tc=6.0 min CN=90 Runoff=3.28 cfs 0.161 af

Subcatchment PSC-3: Proposed Runoff Area=36,924 sf 41.29% Impervious Runoff Depth>3.76"
Tc=6.0 min CN=84 Runoff=5.68 cfs 0.266 af

Reach 6" Culv: Existing 6" Culv Avg. Flow Depth=0.50' Max Vel=3.89 fps Inflow=0.93 cfs 0.094 af
6.0" Round Pipe n=0.013 L=14.0' S=0.0143 '/' Capacity=0.67 cfs Outflow=0.68 cfs 0.094 af

Reach 12" Culv: 12" Culvert Avg. Flow Depth=0.56' Max Vel=5.67 fps Inflow=2.56 cfs 0.314 af
12.0" Round Pipe n=0.013 L=14.0' S=0.0143 '/' Capacity=4.26 cfs Outflow=2.56 cfs 0.314 af

Reach DPE 1: Design Point Summation 1 - Existing Inflow=6.08 cfs 0.563 af
Outflow=6.08 cfs 0.563 af

Reach DPE 2: Design Point Summation 2 - Existing Inflow=2.60 cfs 0.260 af
Outflow=2.60 cfs 0.260 af

Reach DPP 1: Design Poing Summation 1 - Proposed Inflow=3.29 cfs 0.316 af
Outflow=3.29 cfs 0.316 af

Reach DPP 2: Design Poing Summation 2 - Proposed Inflow=2.56 cfs 0.314 af
Outflow=2.56 cfs 0.314 af

Pond AS: Attenuation Swale Peak Elev=977.84' Storage=6,865 cf Inflow=4.22 cfs 0.353 af
Outflow=1.93 cfs 0.220 af

Pond BR: Bioretention Area Peak Elev=977.48' Storage=3,208 cf Inflow=3.28 cfs 0.161 af
Discarded=0.01 cfs 0.012 af Primary=0.39 cfs 0.144 af Outflow=0.40 cfs 0.157 af

Pond DP 1: Dry Pond 1 Peak Elev=974.20' Storage=4,965 cf Inflow=5.92 cfs 0.382 af
Discarded=0.02 cfs 0.018 af Primary=1.21 cfs 0.276 af Secondary=2.08 cfs 0.040 af Outflow=3.31 cfs 0.333 af

Pond FB 1: Foreabay 1 Peak Elev=974.92' Storage=1,573 cf Inflow=5.68 cfs 0.266 af
Discarded=0.01 cfs 0.005 af Primary=5.55 cfs 0.237 af Outflow=5.56 cfs 0.242 af

Total Runoff Area = 7.751 ac Runoff Volume = 1.697 af Average Runoff Depth = 2.63"
86.52% Pervious = 6.706 ac 13.48% Impervious = 1.045 ac

Summary for Subcatchment Culv E: Culvet Analysis

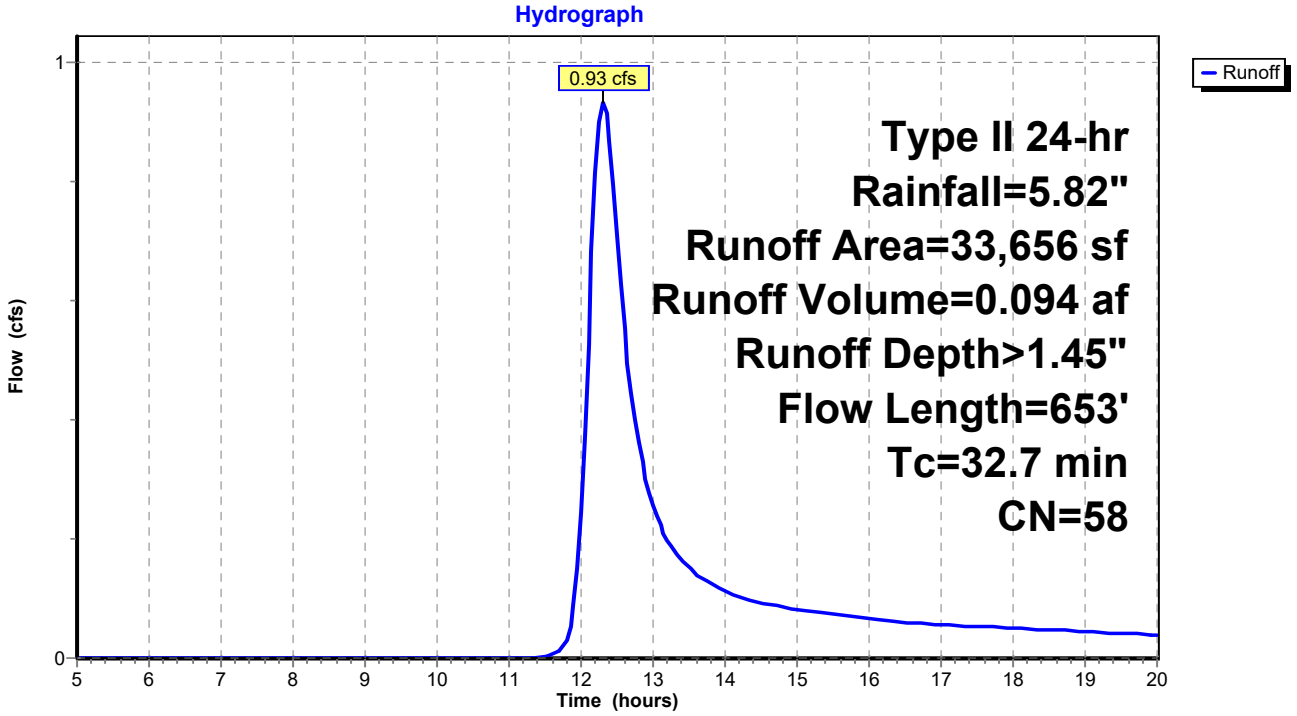
Runoff = 0.93 cfs @ 12.31 hrs, Volume= 0.094 af, Depth> 1.45"

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=5.82"

Area (sf)	CN	Description
33,656	58	Woods/grass comb., Good, HSG B
33,656		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.4	100	0.0200	0.07		**Sheet Flow, First 100' Flowpath** Woods: Light underbrush n= 0.400 P2= 2.70"
8.8	410	0.0240	0.77		**Shallow Concentrated Flow, Balance of Flow to Culvert** Woodland Kv= 5.0 fps
0.1	14	0.0150	3.50	0.69	**Pipe Channel, 6" Culvert** 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.013
0.3	72	0.0080	4.70	75.18	**Trap/Vee/Rect Channel Flow, Channel to 12" Culvert** Bot.W=2.00' D=2.00' Z= 3.0 '/' Top.W=14.00' n= 0.030
0.1	57	0.0230	6.88	5.40	**Pipe Channel, CMP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
32.7	653	Total			

Subcatchment Culv E: Culvet Analysis



Summary for Subcatchment Culv P: Culvet Analysis

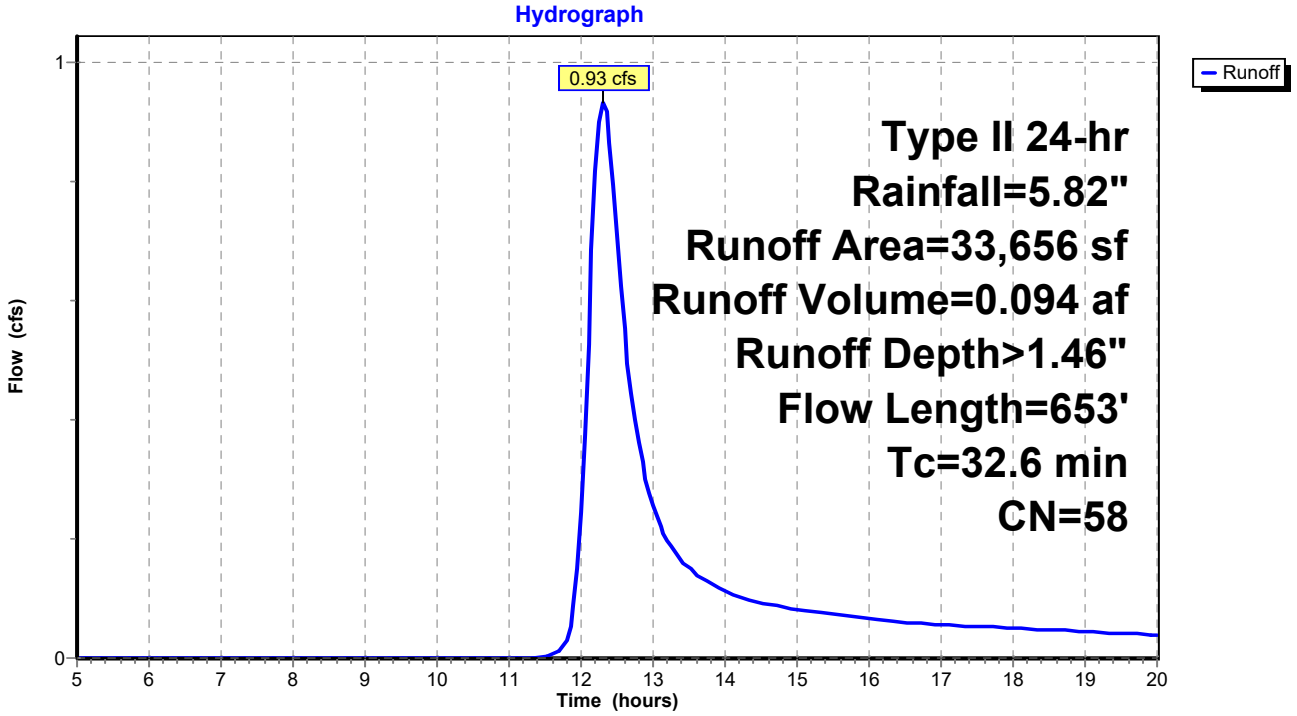
Runoff = 0.93 cfs @ 12.31 hrs, Volume= 0.094 af, Depth> 1.46"

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=5.82"

Area (sf)	CN	Description
33,656	58	Woods/grass comb., Good, HSG B
33,656		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.4	100	0.0200	0.07		**Sheet Flow, First 100' Flowpath** Woods: Light underbrush n= 0.400 P2= 2.70"
8.8	410	0.0240	0.77		**Shallow Concentrated Flow, Balance of Flow to Culvert** Woodland Kv= 5.0 fps
0.0	14	0.0150	5.56	4.36	**Pipe Channel, 12" Culvert** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
0.3	72	0.0080	4.70	75.18	**Trap/Vee/Rect Channel Flow, Channel to 12" Culvert** Bot.W=2.00' D=2.00' Z= 3.0 '/' Top.W=14.00' n= 0.030
0.1	57	0.0230	6.88	5.40	**Pipe Channel, CMP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
32.6	653	Total			

Subcatchment Culv P: Culvet Analysis



Summary for Subcatchment ESC 2: Existing Subcatchment 2a

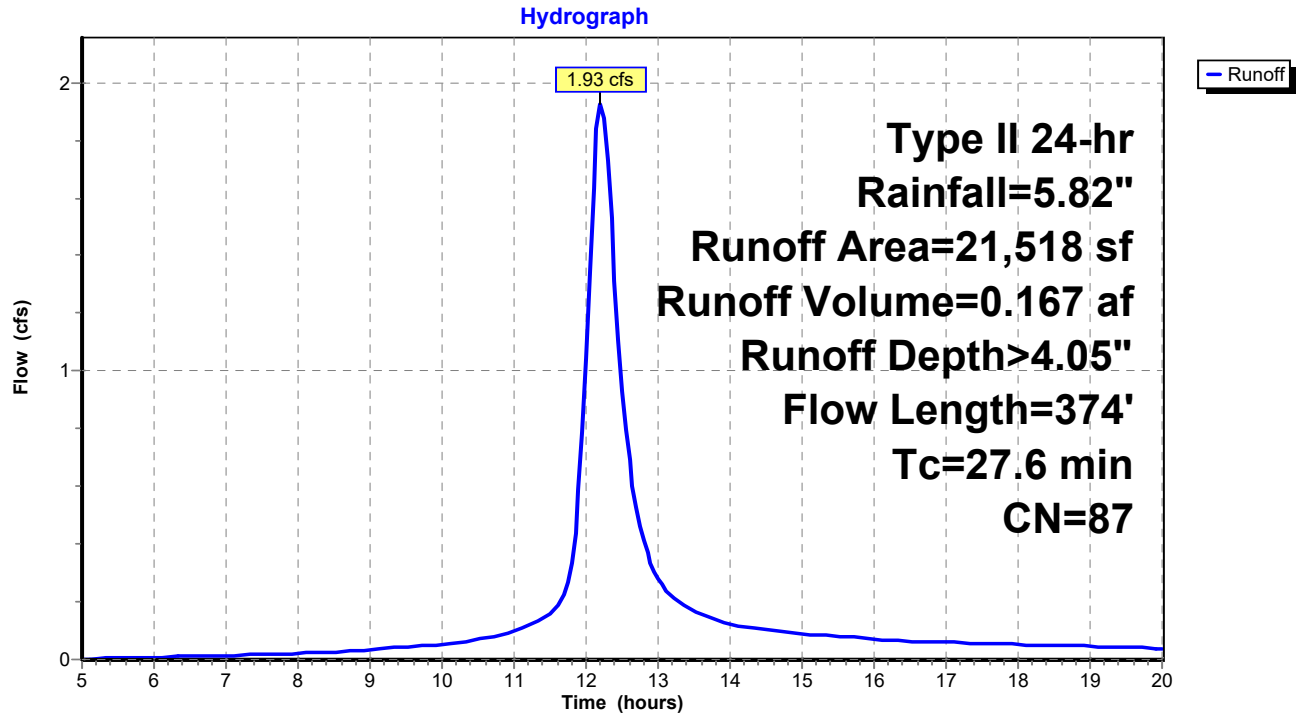
Runoff = 1.93 cfs @ 12.21 hrs, Volume= 0.167 af, Depth> 4.05"

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=5.82"

	Area (sf)	CN	Description
*	12,562	98	Rooftops, Gravel, Packed Earth, Good, HSG C
	8,956	72	Woods/grass comb., Good, HSG C
	21,518	87	Weighted Average
	8,956		41.62% Pervious Area
	12,562		58.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.9	100	0.0210	0.07		**Sheet Flow, First 100' Flowpath** Woods: Light underbrush n= 0.400 P2= 2.70"
3.7	137	0.0150	0.61		**Shallow Concentrated Flow, Balance of Woodland** Woodland Kv= 5.0 fps
1.0	137	0.0220	2.39		**Shallow Concentrated Flow, Balance of Longest Flowpath** Unpaved Kv= 16.1 fps
27.6	374	Total			

Subcatchment ESC 2: Existing Subcatchment 2a



Summary for Subcatchment ESC-1: Existing Subcatchment 1

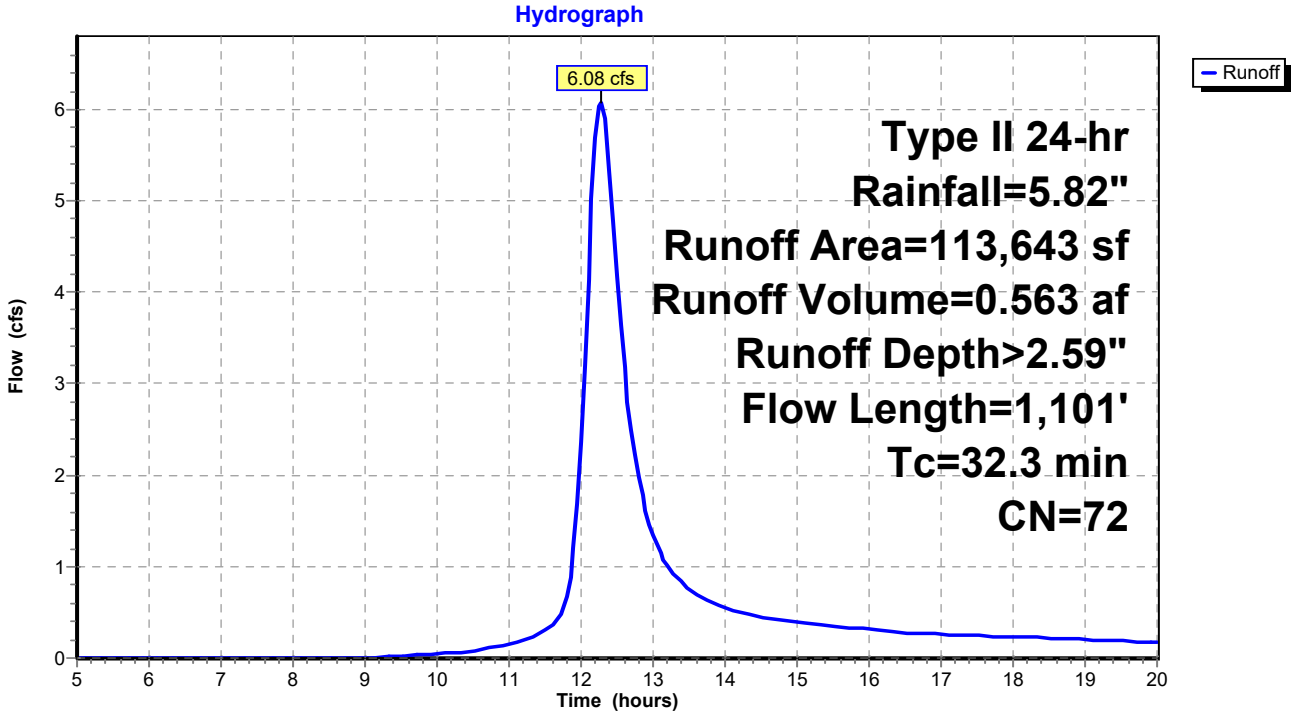
Runoff = 6.08 cfs @ 12.28 hrs, Volume= 0.563 af, Depth> 2.59"

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=5.82"

	Area (sf)	CN	Description
	11,110	58	Meadow, non-grazed, HSG B
	10,739	58	Woods/grass comb., Good, HSG B
	70,087	72	Woods/grass comb., Good, HSG C
*	21,707	87	Compacted Dirt, HSG C
	113,643	72	Weighted Average
	113,643		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	100	0.0180	0.10		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
3.6	250	0.0280	1.17		**Shallow Concentrated Flow, Balance of Meadow** Short Grass Pasture Kv= 7.0 fps
11.4	583	0.0291	0.85		**Shallow Concentrated Flow, Balance of Woods** Woodland Kv= 5.0 fps
1.1	168	0.0240	2.49		**Shallow Concentrated Flow, Balance of Longest Flowpath** Unpaved Kv= 16.1 fps
32.3	1,101	Total			

Subcatchment ESC-1: Existing Subcatchment 1



Summary for Subcatchment PSC-1: Proposed Subcatchment 1

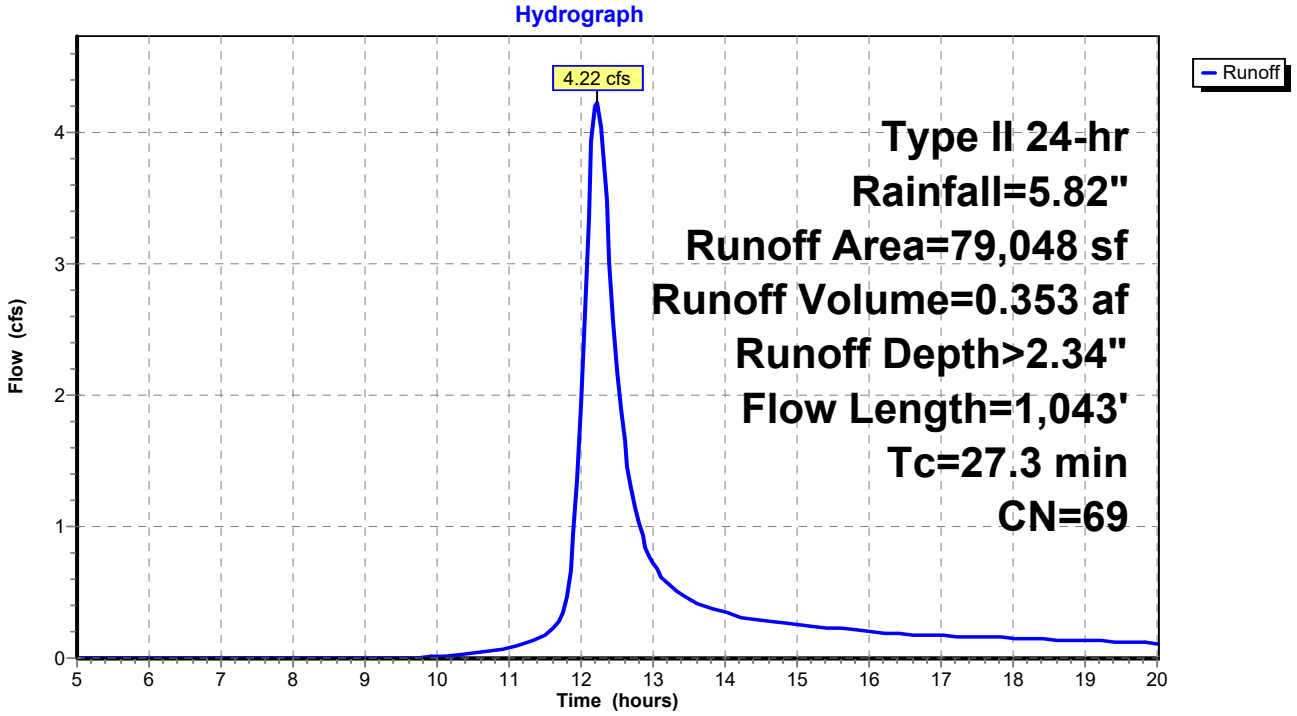
Runoff = 4.22 cfs @ 12.22 hrs, Volume= 0.353 af, Depth> 2.34"

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=5.82"

Area (sf)	CN	Description
15,730	58	Meadow, non-grazed, HSG B
10,739	58	Woods/grass comb., Good, HSG B
47,741	72	Woods/grass comb., Good, HSG C
4,838	98	Roofs, HSG C
79,048	69	Weighted Average
74,210		93.88% Pervious Area
4,838		6.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.2	100	0.0180	0.10		**Sheet Flow, First 100' Flowpath** Grass: Dense n= 0.240 P2= 2.70"
3.6	250	0.0280	1.17		**Shallow Concentrated Flow, Balance of Meadow** Short Grass Pasture Kv= 7.0 fps
6.6	379	0.0370	0.96		**Shallow Concentrated Flow, Woodland to Trap** Woodland Kv= 5.0 fps
0.4	171	0.0175	6.95	111.19	**Trap/Vee/Rect Channel Flow, Trap to 6" Culvert** Bot.W=2.00' D=2.00' Z= 3.0 '/' Top.W=14.00' n= 0.030
0.1	14	0.0150	3.50	0.69	**Pipe Channel, 6" Culvert** 6.0" Round Area= 0.2 sf Perim= 1.6' r= 0.13' n= 0.013
0.3	72	0.0080	4.70	75.18	**Trap/Vee/Rect Channel Flow, Channel to 12" Culvert** Bot.W=2.00' D=2.00' Z= 3.0 '/' Top.W=14.00' n= 0.030
0.1	57	0.0230	6.88	5.40	**Pipe Channel, CMP_Round 12"** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
27.3	1,043	Total			

Subcatchment PSC-1: Proposed Subcatchment 1



Summary for Subcatchment PSC-2: Proposed Subcatchment 2

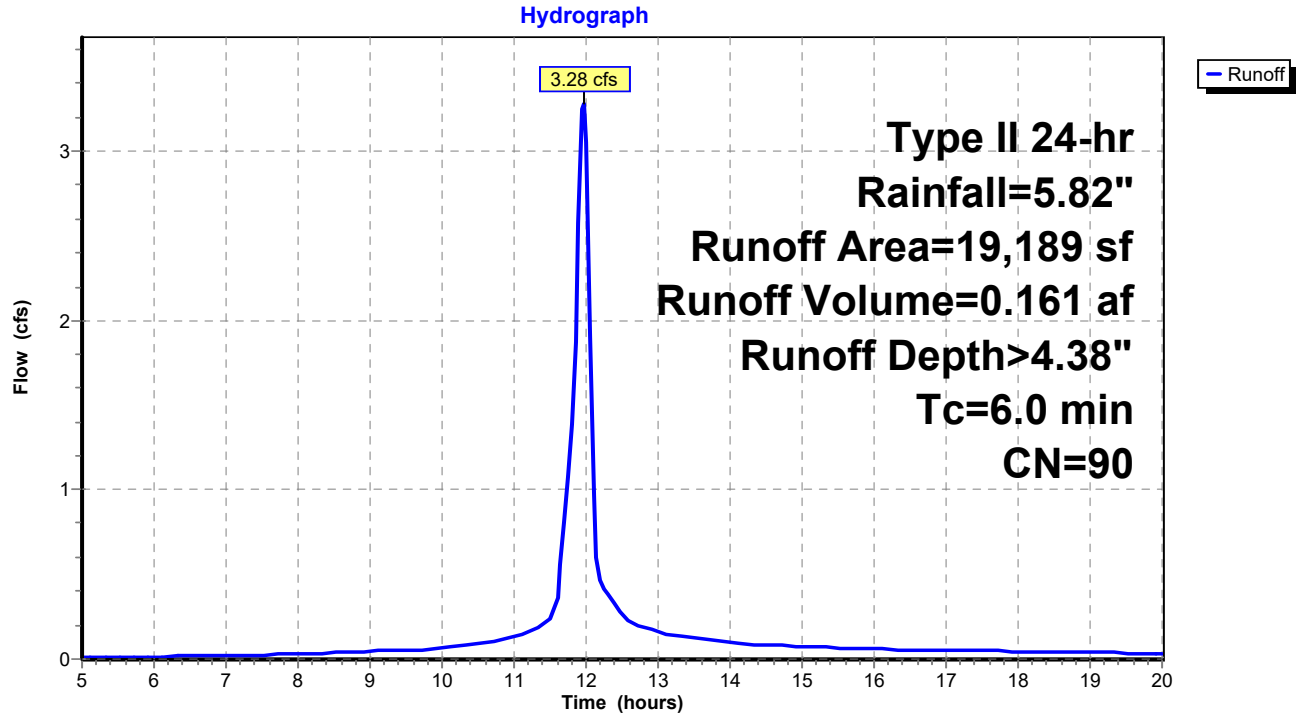
Runoff = 3.28 cfs @ 11.96 hrs, Volume= 0.161 af, Depth> 4.38"

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=5.82"

Area (sf)	CN	Description
12,879	98	Paved parking, HSG C
6,310	74	>75% Grass cover, Good, HSG C
19,189	90	Weighted Average
6,310		32.88% Pervious Area
12,879		67.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Minimum 6 min Tc**

Subcatchment PSC-2: Proposed Subcatchment 2



Summary for Subcatchment PSC-3: Proposed Subcatchment 3

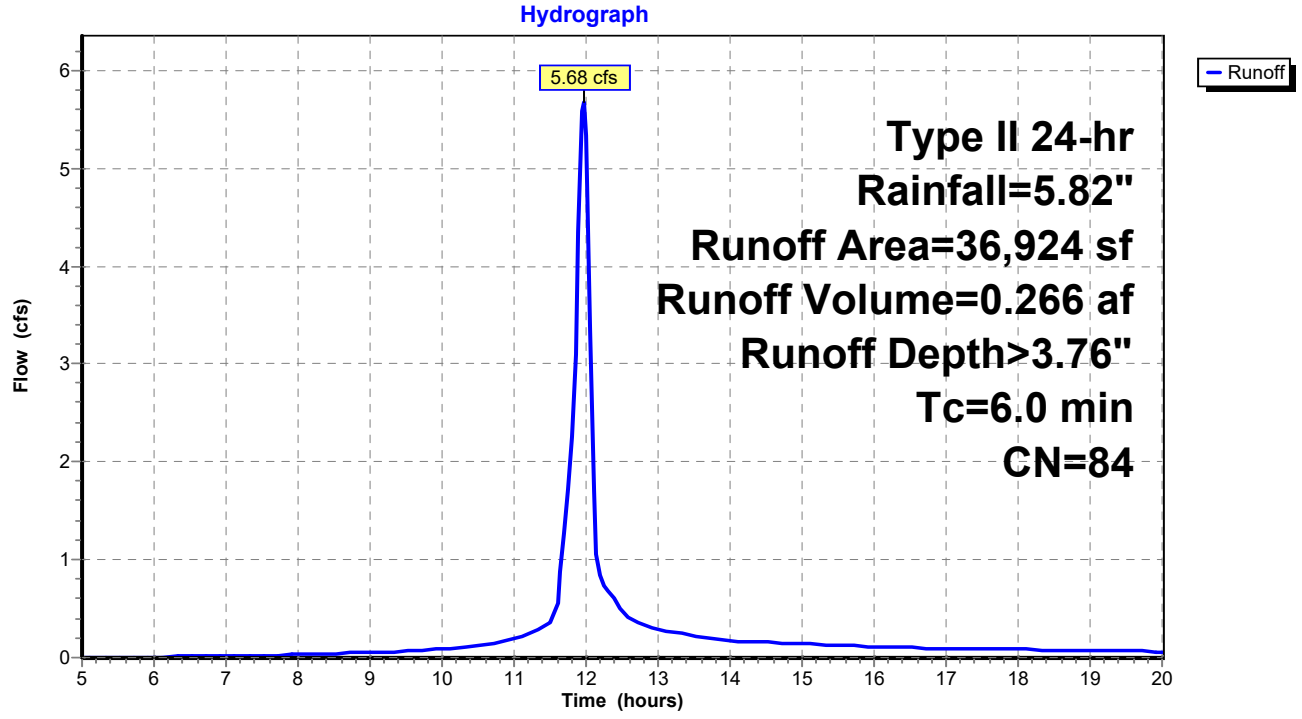
Runoff = 5.68 cfs @ 11.97 hrs, Volume= 0.266 af, Depth> 3.76"

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=5.82"

	Area (sf)	CN	Description
	14,008	98	Paved parking, HSG C
	21,678	74	>75% Grass cover, Good, HSG C
*	1,238	98	Future Parking, HSG C
	36,924	84	Weighted Average
	21,678		58.71% Pervious Area
	15,246		41.29% Impervious Area

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

Subcatchment PSC-3: Proposed Subcatchment 3



Summary for Reach 6" Culv: Existing 6" Culv

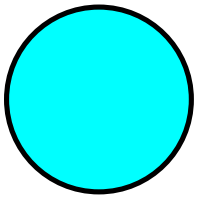
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 139% of Manning's capacity
[76] Warning: Detained 0.005 af (Pond w/culvert advised)

Inflow Area = 0.773 ac, 0.00% Impervious, Inflow Depth > 1.45"
Inflow = 0.93 cfs @ 12.31 hrs, Volume= 0.094 af
Outflow = 0.68 cfs @ 12.15 hrs, Volume= 0.094 af, Atten= 27%, Lag= 0.0 min

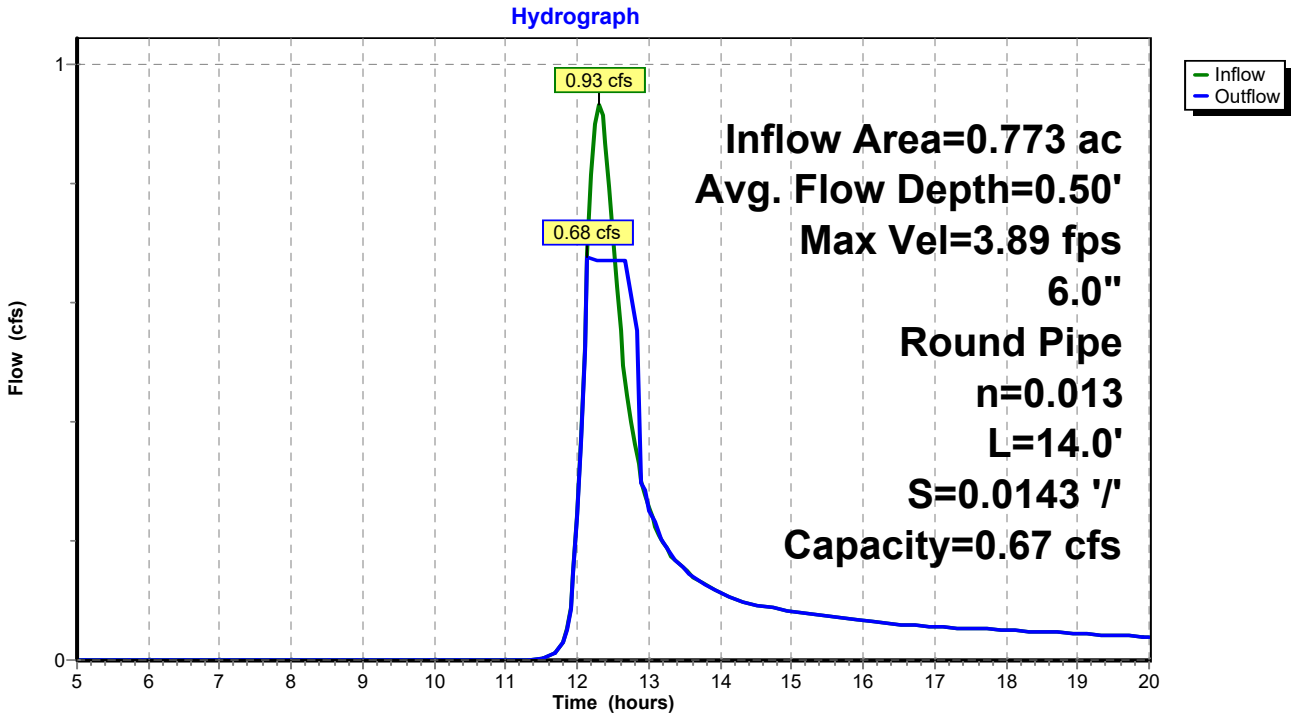
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.89 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 2.28 fps, Avg. Travel Time= 0.1 min

Peak Storage= 3 cf @ 12.20 hrs
Average Depth at Peak Storage= 0.50'
Bank-Full Depth= 0.50' Flow Area= 0.2 sf, Capacity= 0.67 cfs

6.0" Round Pipe
n= 0.013
Length= 14.0' Slope= 0.0143 '/'
Inlet Invert= 975.20', Outlet Invert= 975.00'



Reach 6" Culv: Existing 6" Culv



Summary for Reach 12" Culv: 12" Culvert

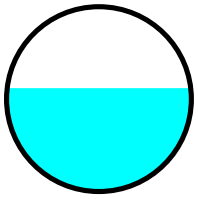
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 2.587 ac, 4.29% Impervious, Inflow Depth > 1.45"
Inflow = 2.56 cfs @ 12.54 hrs, Volume= 0.314 af
Outflow = 2.56 cfs @ 12.54 hrs, Volume= 0.314 af, Atten= 0%, Lag= 0.1 min

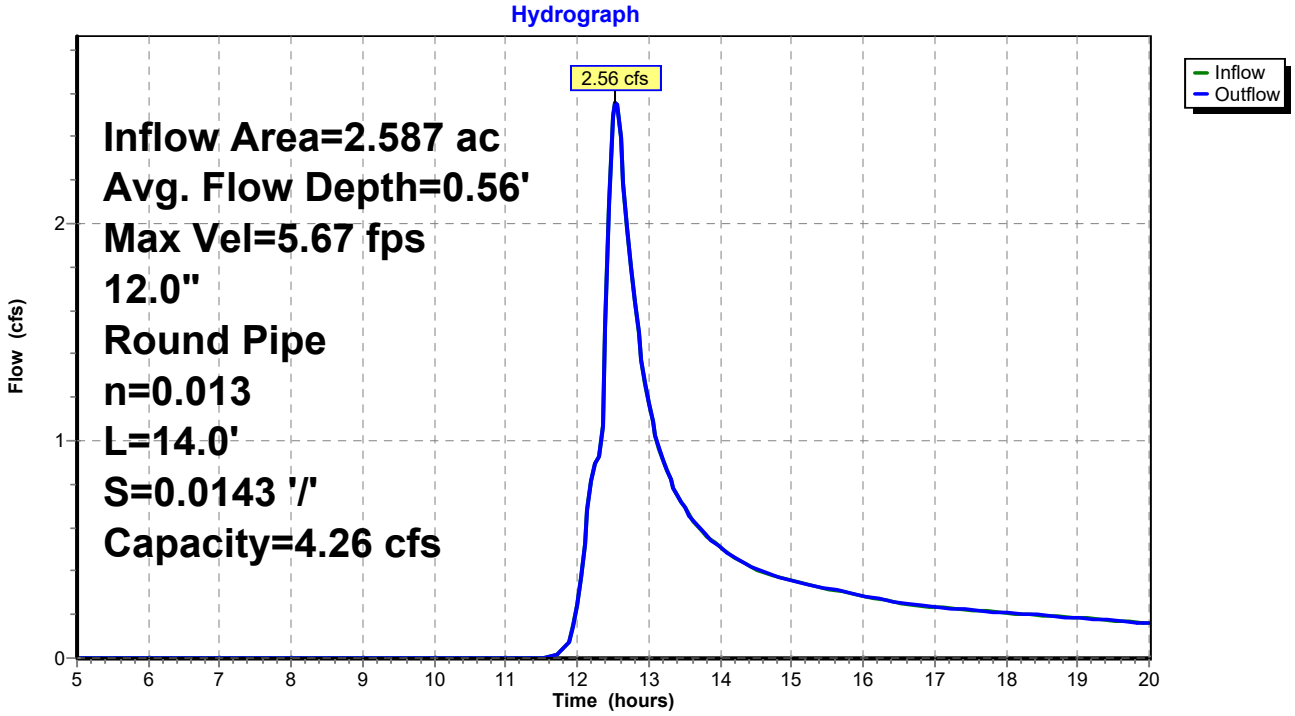
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.67 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 3.17 fps, Avg. Travel Time= 0.1 min

Peak Storage= 6 cf @ 12.54 hrs
Average Depth at Peak Storage= 0.56'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.26 cfs

12.0" Round Pipe
n= 0.013
Length= 14.0' Slope= 0.0143 '/'
Inlet Invert= 975.20', Outlet Invert= 975.00'



Reach 12" Culv: 12" Culvert



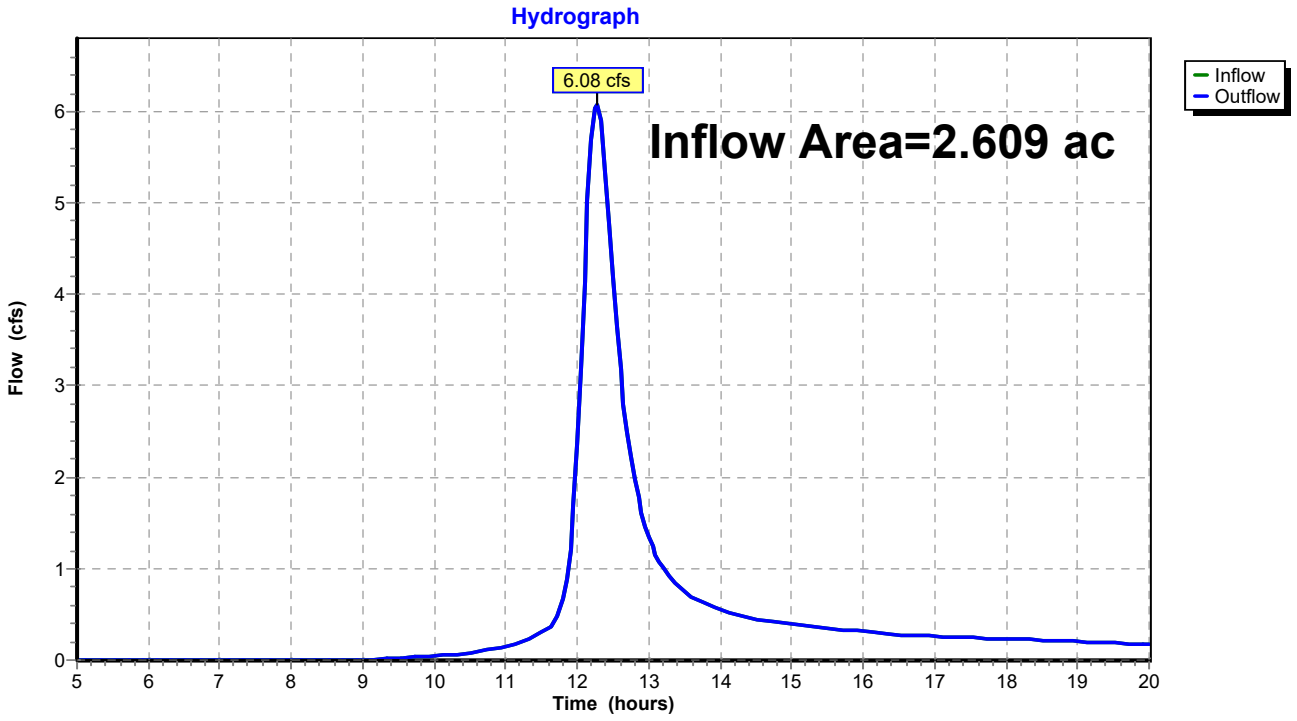
Summary for Reach DPE 1: Design Point Summation 1 - Existing

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.609 ac, 0.00% Impervious, Inflow Depth > 2.59"
Inflow = 6.08 cfs @ 12.28 hrs, Volume= 0.563 af
Outflow = 6.08 cfs @ 12.28 hrs, Volume= 0.563 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 DPE 1: Design Point Summation 1 - Existing



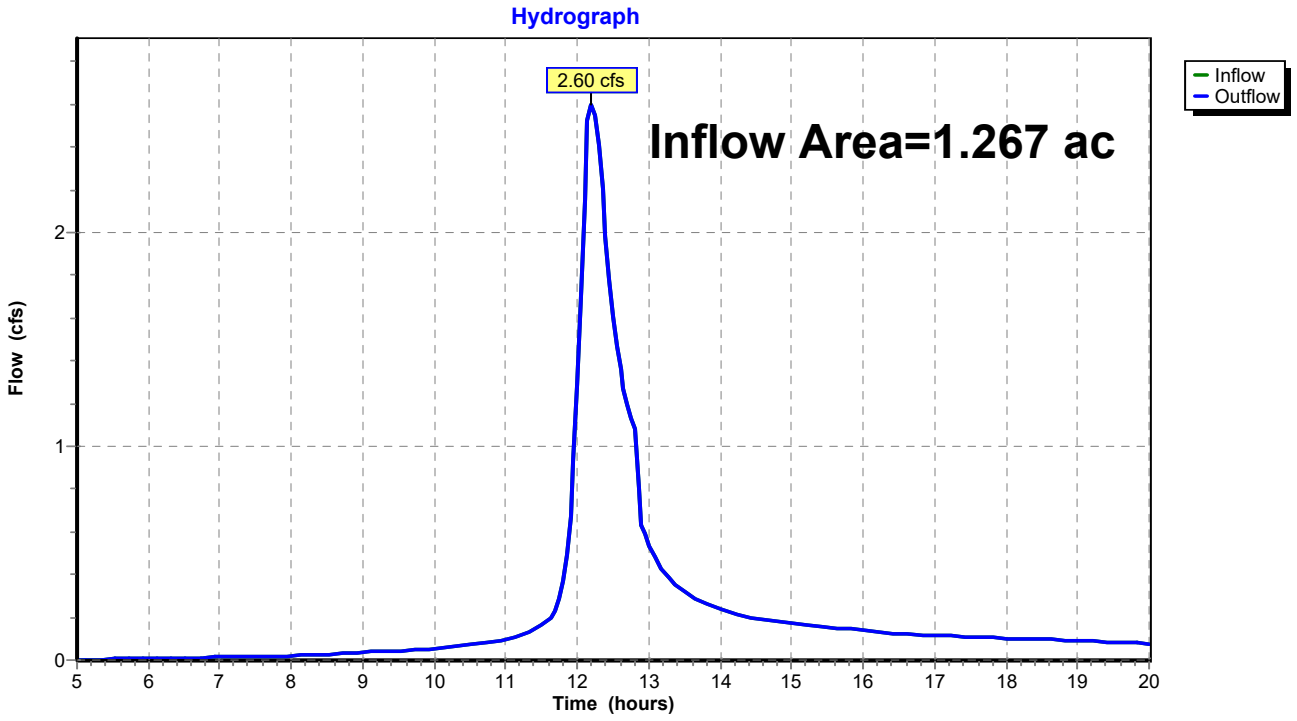
Summary for Reach DPE 2: Design Point Summation 2 - Existing

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.267 ac, 22.77% Impervious, Inflow Depth > 2.47"
Inflow = 2.60 cfs @ 12.21 hrs, Volume= 0.260 af
Outflow = 2.60 cfs @ 12.21 hrs, Volume= 0.260 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 DPE 2: Design Point Summation 2 - Existing



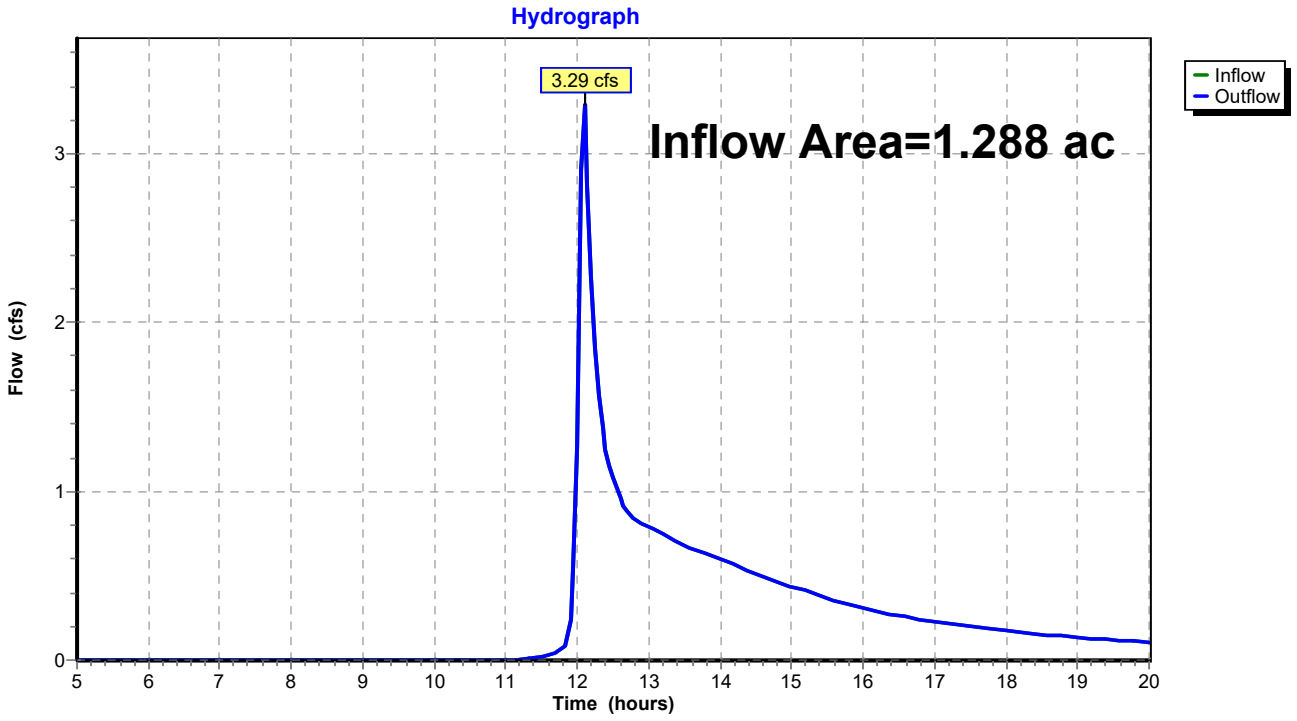
Summary for Reach DPP 1: Design Poing Summation 1 - Proposed

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.288 ac, 50.12% Impervious, Inflow Depth > 2.94"
Inflow = 3.29 cfs @ 12.10 hrs, Volume= 0.316 af
Outflow = 3.29 cfs @ 12.10 hrs, Volume= 0.316 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 DPP 1: Design Poing Summation 1 - Proposed



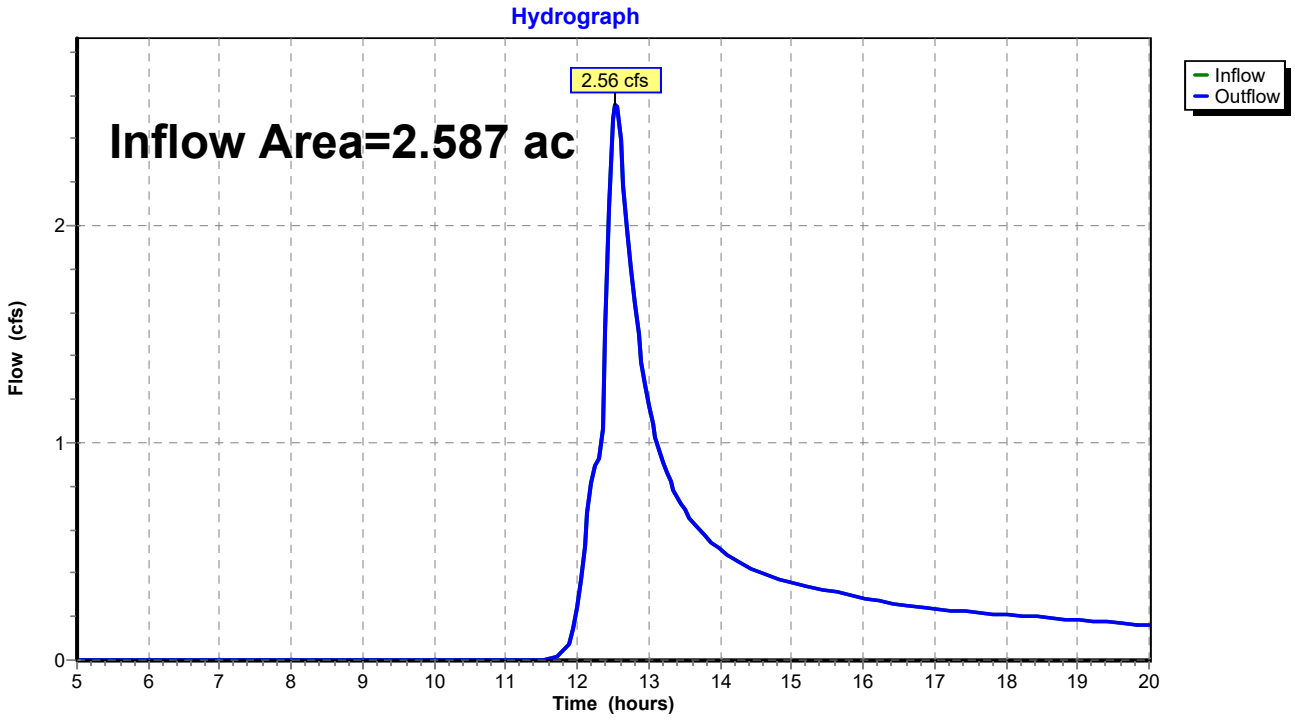
Summary for Reach DPP 2: Design Poing Summation 2 - Proposed

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2.587 ac, 4.29% Impervious, Inflow Depth > 1.45"
Inflow = 2.56 cfs @ 12.54 hrs, Volume= 0.314 af
Outflow = 2.56 cfs @ 12.54 hrs, Volume= 0.314 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 DPP 2: Design Poing Summation 2 - Proposed



Summary for Pond AS: Attenuation Swale

Inflow Area = 1.815 ac, 6.12% Impervious, Inflow Depth > 2.34"
Inflow = 4.22 cfs @ 12.22 hrs, Volume= 0.353 af
Outflow = 1.93 cfs @ 12.56 hrs, Volume= 0.220 af, Atten= 54%, Lag= 20.1 min
Primary = 1.93 cfs @ 12.56 hrs, Volume= 0.220 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 977.84' @ 12.56 hrs Surf.Area= 2,048 sf Storage= 6,865 cf

Plug-Flow detention time= 138.4 min calculated for 0.220 af (62% of inflow)
Center-of-Mass det. time= 63.7 min (874.4 - 810.7)

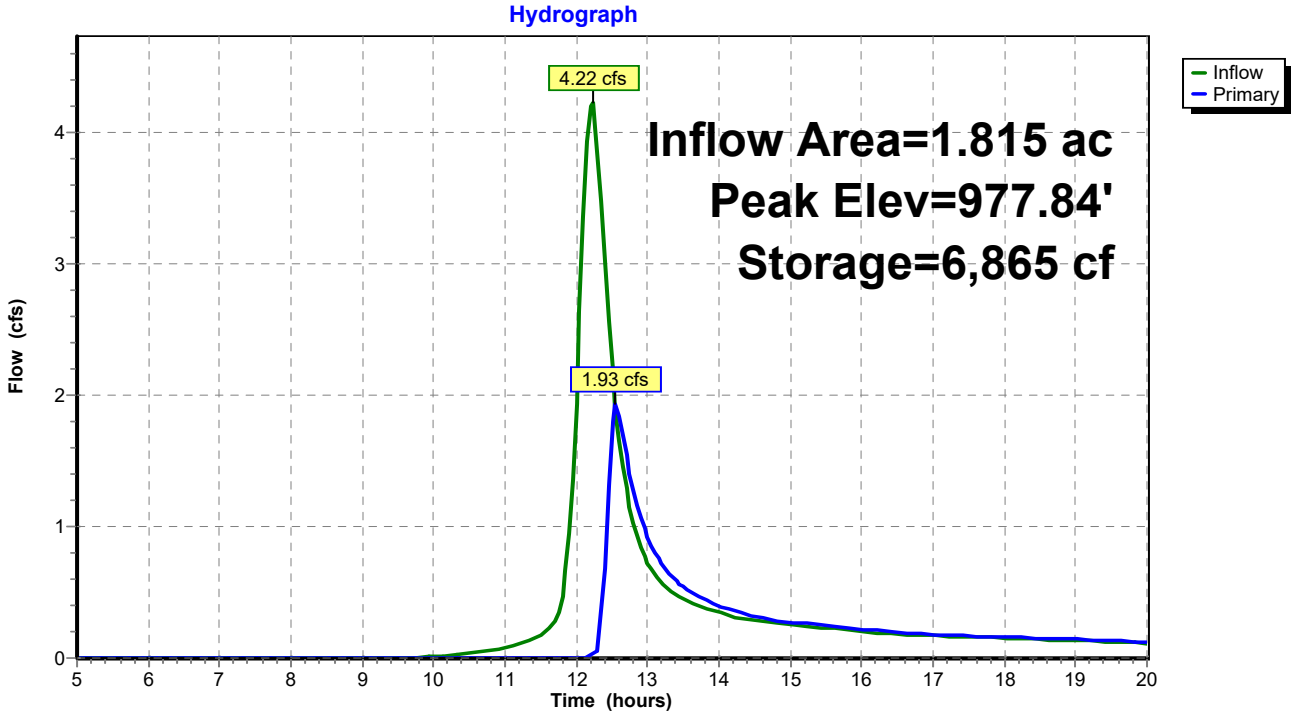
Volume	Invert	Avail.Storage	Storage Description
#1	976.50'	7,034 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
976.50	4,771	0	0
977.00	5,476	2,562	2,562
977.50	6,207	2,921	5,483
978.00	0	1,552	7,034

Device	Routing	Invert	Outlet Devices
#1	Primary	977.50'	**4.0' 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=1.92 cfs @ 12.56 hrs HW=977.83' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 1.92 cfs @ 1.44 fps)

Pond AS: Attenuation Swale



Summary for Pond BR: Bioretention Area

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.441 ac, 67.12% Impervious, Inflow Depth > 4.38"
Inflow = 3.28 cfs @ 11.96 hrs, Volume= 0.161 af
Outflow = 0.40 cfs @ 12.27 hrs, Volume= 0.157 af, Atten= 88%, Lag= 18.5 min
Discarded = 0.01 cfs @ 12.27 hrs, Volume= 0.012 af
Primary = 0.39 cfs @ 12.27 hrs, Volume= 0.144 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 977.48' @ 12.27 hrs Surf.Area= 2,912 sf Storage= 3,208 cf
Flood Elev= 978.50' Surf.Area= 0 sf Storage= 5,923 cf

Plug-Flow detention time= 90.4 min calculated for 0.156 af (97% of inflow)
Center-of-Mass det. time= 80.1 min (830.2 - 750.1)

Volume	Invert	Avail.Storage	Storage Description
#1	973.50'	5,923 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

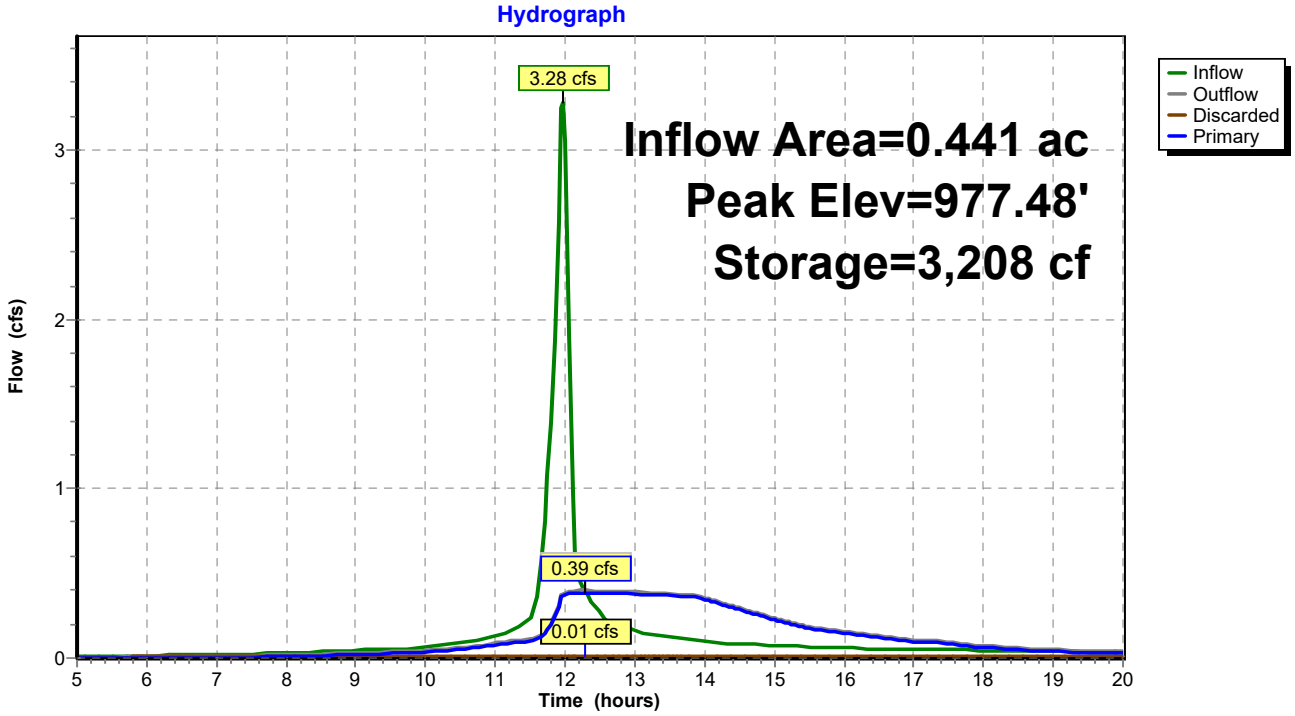
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
973.50	2,229	0.0	0	0
974.50	2,229	40.0	892	892
974.51	2,229	20.0	4	896
977.00	2,229	20.0	1,110	2,006
977.10	2,229	100.0	223	2,229
978.00	3,844	100.0	2,733	4,962
978.50	0	100.0	961	5,923

Device	Routing	Invert	Outlet Devices
#1	Discarded	973.50'	**0.200 in/hr Exfiltration over Surface area**
#2	Primary	973.50'	**12.0" Round Culvert** L= 111.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 973.50' / 973.00' S= 0.0045 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	977.50'	**12.0" Vert. Orifice/Grate** C= 0.600
#4	Device 2	973.50'	**4.0" Round Culvert** L= 77.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 973.50' / 973.40' S= 0.0013 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf

Discarded OutFlow Max=0.01 cfs @ 12.27 hrs HW=977.48' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.39 cfs @ 12.27 hrs HW=977.48' (Free Discharge)
└**2=Culvert** (Passes 0.39 cfs of 5.07 cfs potential flow)
  ├**3=Orifice/Grate** (Controls 0.00 cfs)
  └**4=Culvert** (Barrel Controls 0.39 cfs @ 4.42 fps)

Pond BR: Bioretention Area



Summary for Pond DP 1: Dry Pond 1

[79] Warning: Submerged Pond BR Primary device # 2 INLET by 0.70'

Inflow Area = 1.288 ac, 50.12% Impervious, Inflow Depth > 3.55"
Inflow = 5.92 cfs @ 11.99 hrs, Volume= 0.382 af
Outflow = 3.31 cfs @ 12.10 hrs, Volume= 0.333 af, Atten= 44%, Lag= 6.6 min
Discarded = 0.02 cfs @ 12.10 hrs, Volume= 0.018 af
Primary = 1.21 cfs @ 12.10 hrs, Volume= 0.276 af
Secondary = 2.08 cfs @ 12.10 hrs, Volume= 0.040 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 974.20' @ 12.10 hrs Surf.Area= 4,778 sf Storage= 4,965 cf
Flood Elev= 976.00' Surf.Area= 0 sf Storage= 12,005 cf

Plug-Flow detention time= 84.9 min calculated for 0.332 af (87% of inflow)
Center-of-Mass det. time= 47.8 min (850.8 - 802.9)

Volume	Invert	Avail.Storage	Storage Description
#1	973.00'	12,005 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
973.00	3,533	0	0
974.00	4,557	4,045	4,045
975.00	5,681	5,119	9,164
976.00	0	2,841	12,005

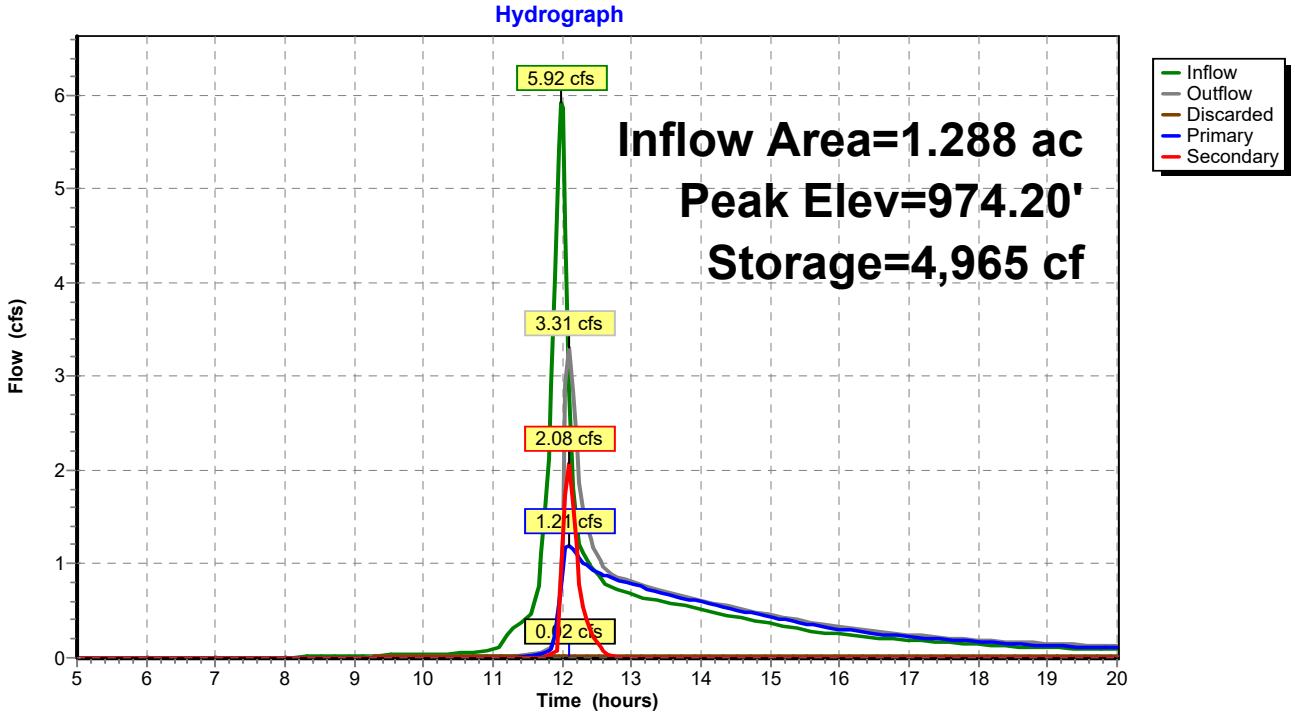
Device	Routing	Invert	Outlet Devices
#1	Secondary	974.00'	**10.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#2	Discarded	973.00'	**0.200 in/hr Exfiltration over Surface area**
#3	Primary	972.50'	**12.0" Round Culvert** L= 197.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 972.50' / 971.60' S= 0.0046 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#4	Device 3	973.00'	**4.0" Round Culvert** L= 71.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 973.00' / 973.00' S= 0.0000 '/' Cc= 0.900 n= 0.013, Flow Area= 0.09 sf
#5	Device 3	973.50'	**8.0" Vert. Orifice/Grate - 10 Yr Overflow** C= 0.600

Discarded OutFlow Max=0.02 cfs @ 12.10 hrs HW=974.20' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=1.20 cfs @ 12.10 hrs HW=974.20' (Free Discharge)
└**3=Culvert** (Passes 1.20 cfs of 2.80 cfs potential flow)
  └**4=Culvert** (Barrel Controls 0.19 cfs @ 2.19 fps)
  └**5=Orifice/Grate - 10 Yr Overflow** (Orifice Controls 1.01 cfs @ 2.90 fps)

Secondary OutFlow Max=2.06 cfs @ 12.10 hrs HW=974.20' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 2.06 cfs @ 1.05 fps)

Pond DP 1: Dry Pond 1



Summary for Pond FB 1: Foreabay 1

Inflow Area = 0.848 ac, 41.29% Impervious, Inflow Depth > 3.76"
Inflow = 5.68 cfs @ 11.97 hrs, Volume= 0.266 af
Outflow = 5.56 cfs @ 11.99 hrs, Volume= 0.242 af, Atten= 2%, Lag= 1.3 min
Discarded = 0.01 cfs @ 11.99 hrs, Volume= 0.005 af
Primary = 5.55 cfs @ 11.99 hrs, Volume= 0.237 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 974.92' @ 11.99 hrs Surf.Area= 1,542 sf Storage= 1,573 cf
Flood Elev= 975.50' Surf.Area= 0 sf Storage= 2,101 cf

Plug-Flow detention time= 50.7 min calculated for 0.242 af (91% of inflow)
Center-of-Mass det. time= 19.7 min (784.8 - 765.1)

Volume	Invert	Avail.Storage	Storage Description
#1	973.00'	2,101 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

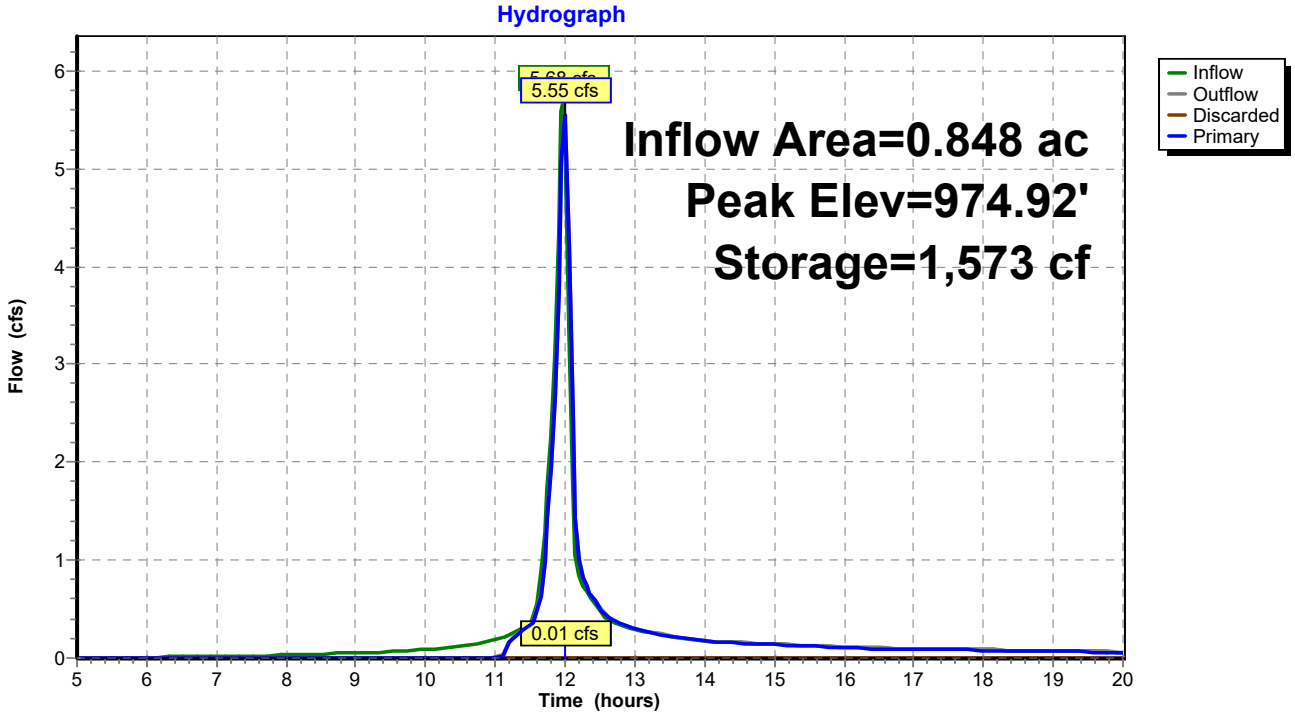
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
973.00	200	0	0
974.00	796	498	498
975.00	1,607	1,202	1,700
975.50	0	402	2,101

Device	Routing	Invert	Outlet Devices
#1	Primary	974.50'	**8.0' 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
#2	Discarded	973.00'	**0.200 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 11.99 hrs HW=974.91' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=5.39 cfs @ 11.99 hrs HW=974.91' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 5.39 cfs @ 1.64 fps)

Pond FB 1: Foreabay 1



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

July 3, 2023

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 (https://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.

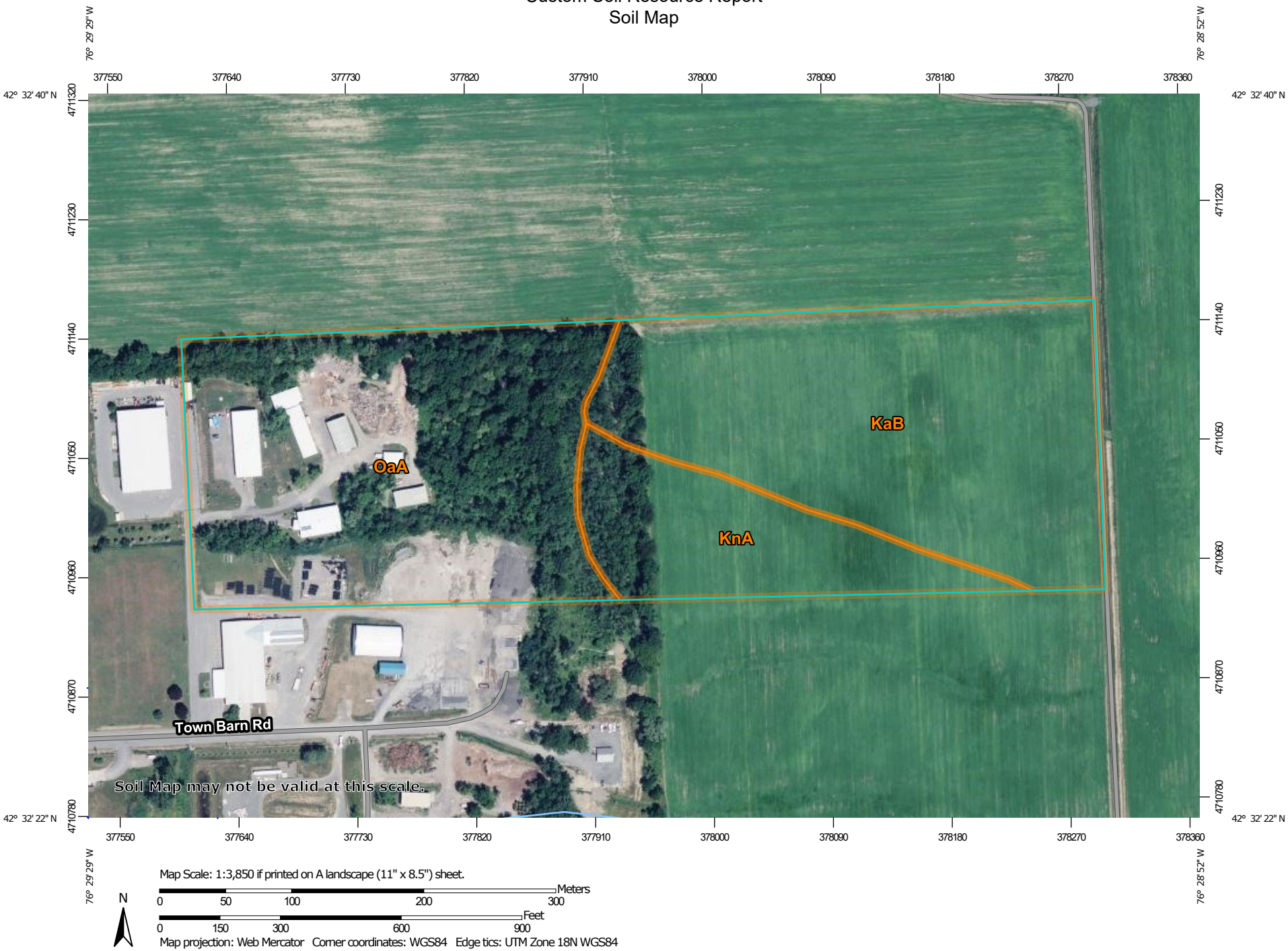
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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.

Custom Soil Resource Report
Soil Map



Map Scale: 1:3,850 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 150 300 600 900

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:
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 18, Sep 10, 2022

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

Date(s) aerial images were photographed: Apr 1, 2020—Oct 1, 2020

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

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
KaB	Kendaia silt loam, 3 to 8 percent slopes	15.0	41.4%
KnA	Kendaia and Lyons soils, 0 to 3 percent slopes	5.5	15.1%
OaA	Ovid silt loam, 0 to 6 percent slopes	15.7	43.5%
Totals for Area of Interest		**36.2**	**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

KaB—Kendaia silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2w5j4
Elevation: 430 to 1,610 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: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kendaia

Setting

Landform: Till plains, ridges, drumlins
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: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
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 content: 40 percent
Available water supply, 0 to 60 inches: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Ecological site: F101XY013NY - Moist Till
Hydric soil rating: No

Minor Components

Lima

Percent of map unit: 7 percent
Landform: Till plains, drumlins
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Lyons

Percent of map unit: 4 percent
Landform: Drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Churchville

Percent of map unit: 2 percent
Landform: Till plains, lake plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope, rise, talf
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ovid

Percent of map unit: 2 percent
Landform: Till plains, reworked lake plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

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: Till plains, ridges, drumlins
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
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 content: 40 percent
Available water supply, 0 to 60 inches: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Ecological site: F101XY013NY - Moist Till
Hydric soil rating: No

Description of Lyons

Setting

Landform: Drainageways, depressions
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
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 content: 40 percent
Available water supply, 0 to 60 inches: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Ecological site: F101XY014NY - Wet Till Depression
Hydric soil rating: Yes

Description of Lyons, Frequently Ponded

Setting

Landform: Drainageways, depressions
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
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 content: 40 percent
Available water supply, 0 to 60 inches: High (about 9.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D

Ecological site: F101XY014NY - Wet Till Depression
Hydric soil rating: Yes

Minor Components

Conesus
Percent of map unit: 3 percent
Landform: Till plains, hills, drumlinoid ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Concave
Across-slope shape: Convex
Hydric soil rating: No

Lima
Percent of map unit: 3 percent
Landform: Till plains, drumlins
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Concave
Across-slope shape: Convex
Hydric soil rating: No

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
Hydric soil rating: Yes

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
Hydric soil rating: Yes

OaA—Ovid silt loam, 0 to 6 percent slopes

Map Unit Setting
National map unit symbol: 9xnm
Elevation: 250 to 1,000 feet
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: Prime farmland if drained

Map Unit Composition

Ovid and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ovid

Setting

Landform: Till plains, reworked lake plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy till with a significant component of reddish shale or reddish glaciolacustrine clays, mixed with limestone and some sandstone

Typical profile

H1 - 0 to 14 inches: silt loam
H2 - 14 to 24 inches: silty clay loam
H3 - 24 to 60 inches: gravelly loam

Properties and qualities

Slope: 0 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly 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 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F101XY013NY - Moist Till
Hydric soil rating: No

Minor Components

Lyons

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Rhinebeck

Percent of map unit: 5 percent
Hydric soil rating: No

Kendaia

Percent of map unit: 5 percent
Hydric soil rating: No

Cayuga

Percent of map unit: 5 percent
Hydric soil rating: No

Ilion

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

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.

Metadata for Point	
Smoothing	Yes
State	New York
Location	New York, United States
Latitude	42.542 degrees North
Longitude	76.489 degrees West
Elevation	290 feet
Date/Time	Mon Jul 03 2023 13:00:21 GMT-0400 (Eastern Daylight Time)

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	0.69	0.87	1.06	**1yr**	0.75	0.94	1.20	1.44	1.70	1.99	2.25	**1yr**	1.76	2.16	2.56	3.09	3.56
2yr	0.32	0.49	0.62	0.81	1.02	1.25	**2yr**	0.88	1.12	1.42	1.69	2.00	2.33	2.61	**2yr**	2.07	2.51	2.94	3.49	4.00
5yr	0.38	0.59	0.74	0.99	1.26	1.56	**5yr**	1.09	1.39	1.77	2.11	2.48	2.89	3.23	**5yr**	2.56	3.10	3.61	4.20	4.80
10yr	0.42	0.66	0.84	1.14	1.48	1.85	**10yr**	1.28	1.63	2.10	2.51	2.93	3.39	3.80	**10yr**	3.00	3.65	4.22	4.84	5.52
25yr	0.50	0.79	1.00	1.38	1.84	2.31	**25yr**	1.58	2.02	2.63	3.13	3.66	4.21	4.71	**25yr**	3.72	4.53	5.20	5.83	6.63
50yr	0.56	0.90	1.15	1.60	2.16	2.72	**50yr**	1.86	2.38	3.11	3.70	4.32	4.95	5.54	**50yr**	4.38	5.33	6.08	6.71	7.63
100yr	0.63	1.02	1.31	1.86	2.54	3.23	**100yr**	2.19	2.80	3.69	4.39	5.10	5.82	6.53	**100yr**	5.15	6.28	7.12	7.73	8.78
200yr	0.72	1.17	1.52	2.17	2.99	3.82	**200yr**	2.58	3.30	4.37	5.19	6.02	6.85	7.69	**200yr**	6.06	7.39	8.34	8.91	10.10
500yr	0.85	1.40	1.83	2.65	3.72	4.77	**500yr**	3.21	4.11	5.46	6.49	7.50	8.50	9.56	**500yr**	7.53	9.19	10.28	10.75	12.17

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day
1yr	0.25	0.38	0.47	0.63	0.77	0.81	**1yr**	0.67	0.80	0.93	1.05	1.49	1.85	2.09	**1yr**	1.64	2.01	2.43	2.95	3.32
2yr	0.32	0.49	0.60	0.82	1.01	1.11	**2yr**	0.87	1.09	1.23	1.52	1.85	2.27	2.54	**2yr**	2.01	2.45	2.86	3.41	3.92
5yr	0.36	0.55	0.69	0.94	1.20	1.32	**5yr**	1.03	1.29	1.44	1.77	2.17	2.70	3.02	**5yr**	2.39	2.90	3.39	3.97	4.56
10yr	0.40	0.61	0.76	1.06	1.36	1.50	**10yr**	1.18	1.47	1.63	1.99	2.45	3.09	3.43	**10yr**	2.73	3.30	3.85	4.45	5.12
25yr	0.45	0.69	0.86	1.23	1.62	1.79	**25yr**	1.40	1.75	1.92	2.29	2.85	3.66	4.04	**25yr**	3.24	3.89	4.53	5.18	5.97
50yr	0.50	0.76	0.95	1.36	1.83	2.04	**50yr**	1.58	1.99	2.17	2.56	3.21	4.17	4.58	**50yr**	3.69	4.40	5.13	5.80	6.71
100yr	0.55	0.84	1.05	1.51	2.08	2.33	**100yr**	1.79	2.28	2.46	2.86	3.61	4.75	5.18	**100yr**	4.20	4.99	5.80	6.51	7.55
200yr	0.62	0.93	1.17	1.70	2.37	2.67	**200yr**	2.05	2.61	2.80	3.19	4.06	5.40	5.88	**200yr**	4.78	5.65	6.56	7.28	8.48
500yr	0.72	1.07	1.38	2.00	2.85	3.22	**500yr**	2.46	3.15	3.32	3.70	4.74	6.42	6.92	**500yr**	5.68	6.65	7.72	8.46	9.91

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	1.43	1.77	2.12	2.38	**1yr**	1.88	2.29	2.71	3.24	3.73
2yr	0.34	0.52	0.64	0.87	1.07	1.18	**2yr**	0.92	1.15	1.31	1.62	1.98	2.40	2.70	**2yr**	2.13	2.60	3.03	3.58	4.10
5yr	0.40	0.62	0.76	1.05	1.33	1.52	**5yr**	1.15	1.49	1.68	2.06	2.52	3.07	3.44	**5yr**	2.72	3.31	3.84	4.44	5.07
10yr	0.46	0.71	0.88	1.23	1.59	1.85	**10yr**	1.37	1.81	2.03	2.47	3.05	3.71	4.15	**10yr**	3.29	3.99	4.61	5.24	5.97
25yr	0.57	0.86	1.07	1.53	2.02	2.41	**25yr**	1.74	2.36	2.62	3.16	3.93	4.77	5.33	**25yr**	4.22	5.13	5.89	6.51	7.40
50yr	0.66	1.01	1.25	1.80	2.42	2.93	**50yr**	2.09	2.86	3.18	3.81	4.77	5.77	6.45	**50yr**	5.10	6.20	7.09	7.69	8.71
100yr	0.77	1.17	1.46	2.12	2.90	3.56	**100yr**	2.50	3.48	3.85	4.61	5.76	6.97	7.80	**100yr**	6.17	7.50	8.55	9.09	10.26
200yr	0.90	1.36	1.72	2.49	3.47	4.34	**200yr**	3.00	4.24	4.68	5.56	6.99	8.44	9.45	**200yr**	7.47	9.09	10.30	10.73	12.09
500yr	1.12	1.66	2.14	3.11	4.42	5.62	**500yr**	3.81	5.49	6.03	7.11	9.03	10.87	12.18	**500yr**	9.62	11.71	13.21	13.39	15.00

Powered by ACIS Northeast Regional Climate Center

Attachment L:
SWPPP Design Drawings

GENERAL NOTES

NYS STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL, NOVEMBER 2016

1. PHYSICALLY MARK LIMITS OF LAND DISTURBANCE ON THE SITE WITH TAPE, SIGNS, OR ORANGE CONSTRUCTION FENCE, SO THAT WORKERS CAN SEE THE AREAS TO BE PROTECTED.

2. DIVERT OFF-SITE RUNOFF FROM HIGHLY ERODIBLE SOILS AND STEEP SLOPES TO STABLE AREAS.

3. CLEAR ONLY WHAT IS REQUIRED FOR IMMEDIATE CONSTRUCTION ACTIVITY. LARGE PROJECTS SHOULD BE CLEARED AND GRADED AS CONSTRUCTION PROGRESSES. AREAS EXCEEDING TWO ACRES IN SIZE SHOULD NOT BE DISTURBED WITHOUT A SEQUENCING PLAN THAT REQUIRES PRACTICES TO BE INSTALLED AND THE SOIL STABILIZED, AS DISTURBANCE BEYOND THE TWO ACRES CONTINUES. MASS CLEARINGS AND GRADING OF ENTIRE SITE SHOULD BE AVOIDED.

4. RESTABILIZE DISTURBED AREAS AS SOON AS POSSIBLE AFTER CONSTRUCTION IS COMPLETED. ON SITES GREATER THAN TWO ACRES IN SIZE, WAITING UNTIL ALL DISTURBED AREAS ARE READY FOR SEEDING IS UNACCEPTABLE. FOURTEEN DAYS SHALL BE THE MAXIMUM EXPOSURE PERIOD. MAINTENANCE MUST BE PERFORMED AS NECESSARY TO ENSURE CONTINUED STABILIZATION. EXCEPT AS NOTED BELOW, ALL SITES SHALL BE SEEDED AND STABILIZED WITH EROSION CONTROL MATERIALS, SUCH AS STRAW MULCH, JUTE MESH, OR EXCELSIOR, INCLUDING AREAS WHERE CONSTRUCTION HAS BEEN SUSPENDED OR SECTIONS COMPLETED:

A. FOR ACTIVE CONSTRUCTION AREAS SUCH AS BORROW OR STOCKPILE AREAS, ROADWAY IMPROVEMENTS AND AREAS WITHIN 50 FT. OF A BUILDING UNDER CONSTRUCTION, A PERIMETER SEDIMENT CONTROL SYSTEM CONSISTING, FOR EXAMPLE, SILT FENCING, SHALL BE INSTALLED AND MAINTAINED TO CONTAIN SOIL. EXPOSED DISTURBED AREAS ADJACENT TO A CONVEYANCE THAT PROVIDES RAPID OFF-SITE DISCHARGE OF SEDIMENT, SUCH AS A CUT SLOPE AT AN ENTRANCE, SHALL BE COVERED WITH PLASTIC OR, GEOTEXTILE FABRIC TO PREVENT SOIL LOSS UNTIL IT CAN BE STABILIZED. STABILIZED CONSTRUCTION ENTRANCES WILL BE MAINTAINED TO CONTROL VEHICLE TRACKING MATERIAL OFF-SITE.

B. ON THE CUT SIDE OF ROADS, DITCHES SHALL BE STABILIZED IMMEDIATELY WITH ROCK RIP-RAP OR OTHER NON-ERODIBLE LINERS (EG. ROLLED EROSION PRODUCTS), OR WHERE APPROPRIATE, VEGETATIVE MEASURES SUCH AS SOD.

C. PERMANENT SEEDING SHOULD OPTIMALLY BE UNDERTAKEN IN THE SPRING FROM MARCH THROUGH MAY, AND IN LATE SUMMER AND EARLY FALL FROM SEPTEMBER TO OCTOBER 15. DURING THE PEAK SUMMER MONTHS AND IN THE FALL AFTER OCTOBER 15, WHEN SEEDING IS FOUND TO BE IMPRACTICABLE, AN APPROPRIATE TEMPORARY MULCH SHALL BE APPLIED. PERMANENT SEEDING MAY BE UNDERTAKEN DURING THE SUMMER IF PLANS PROVIDE FOR ADEQUATE WATERING. TEMPORARY SEEDING WITH RYE CAN BE UTILIZED THROUGH NOVEMBER.

D. ALL SLOPES STEEPER THAN 3:1 (H:V), OR 33.3%, AS WELL AS PERIMETER DIKES, SEDIMENT BASINS AND TRAPS, AND EMBANKMENTS SHALL, UPON COMPLETION, BE IMMEDIATELY STABILIZED WITH SOD, SEED AND ANCHORED STRAW MULCH, OR OTHER APPROVED STABILIZATION MEASURES. AREAS OUTSIDE OF THE PERIMETER SEDIMENT CONTROL SYSTEM SHALL NOT BE DISTURBED. MAINTENANCE SHALL BE PERFORMED AS NECESSARY TO ENSURE CONTINUED STABILIZATION.

E. TEMPORARY SEDIMENT TRAPPING DEVICES SHALL NOT BE REMOVED UNTIL PERMANENT STABILIZATION IS ESTABLISHED IN ALL CONTIRBUTORY DRAINAGE AREAS. SIMILARLY, STABILIZATION SHALL BE ESTABLISHED PRIOR TO CONVERTING SEDIMENT TRAPS/BASINS INTO PERMANENT (POST-CONSTRUCTION) STORMWATER MANAGEMENT PRACTICES.

5. IF TEMPORARY WORK ROADS OR HAUL ROADS CROSS STREAM CHANNELS, ADEQUATE WATERWAY OPENINGS SHALL BE CONSTRUCTED USING SPANS, CULVERTS, WASHED ROCK BACKFILL, OR OTHER ACCEPTABLE, CLEAN METHODS THAT WILL ENSURE THAT ROAD CONSTRUCTION AND THEIR USE DO NOT RESULT IN TURBIDITY AND SEDIMENT DOWNSTREAM. ALL CROSSING ACTIVITIES AND APPURTENANCES ON STREAMS REGULATED BY ARTICLE 15 OF THE ENVIRONMENTAL CONSERVATION LAW SHALL BE IN COMPLIANCE WITH A PERMIT ISSUED PURSUANT TO ARTICLE 15 OF THE ECL.

6. MAKE SURE THAT ALL CONTRACTORS AND SUB-CONTRACTORS UNDERSTAND THE ESC PLAN AND SIGN THE CERTIFICATION STATEMENT REQUIRED BY NYSDEC GP.

7. DESIGNATE RESPONSIBLITY FOR THE ESC PLAN TO ONE INDIVIDUAL. THIS PERSON SHALL BE NAMED IN THE NOTICE OF INTENT.

8. AN ESC PLAN INSPECTION PROGRAM MEETING THE REQUIREMENTS OF THE NYSDEC GP, IS NECESSARY TO DETERMINE WHEN ESC MEASURES NEED MAINTENANCE OR REPAIR. PAY PARTICULAR ATTENTION TO INSPECTIONS REQUIRED AFTER RAINFALL. THE INSPECTION PROGRAM SHALL ALSO STATE THE COMPLETION OF IDENTIFIED REPAIR AND MAINTENANCE ITEMS.

9. IF CONSTRUCTION ACTIVITIES CONTINUE DURING WINTER, ACCESS POINTS SHOULD BE ENLARGED AND STABILIZED TO PROVIDE FOR SNOW STOCKPILING. IN ADDITION SNOW MANAGEMENT PLAN SHOULD BE PREPARED WITH ADEQUATE STORAGE AND CONTROL OF MELTWATER. A MINIMUM 25 FOOT BUFFER SHALL BE MAINTAINED FROM PERIMETER CONTROLS SUCH AS SILT FENCING. KEEP DRAINAGE STRUCTURES OPEN AND FREE OF SNOW AND ICE DAMS. INSPECTION AND MAINTENANCE ARE NECESSARY TO ENSURE THE FUNCTION OF THESE PRACTICES DURING RUNOFF EVENTS.

LAND GRADING SPECIFICATIONS

1. ALL FILLS SHALL BE COMPACTED AS REQUIRED TO REDUCE EROSION, SLIPPAGE, SETTLEMENT, SUBSIDENCE OR OTHER RELATED PROBLEMS. FILL INTENDED TO SUPPORT BUILDINGS, STRUCTURES AND CONDUITS, ETC. SHALL BE COMPACTED IN ACCORDANCE WITH LOCAL REQUIREMENTS OR CODES.

2. ALL FILL TO BE PLACED AND COMPACTED IN LAYERS NOT TO EXCEED 9 INCHES IN THICKNESS.

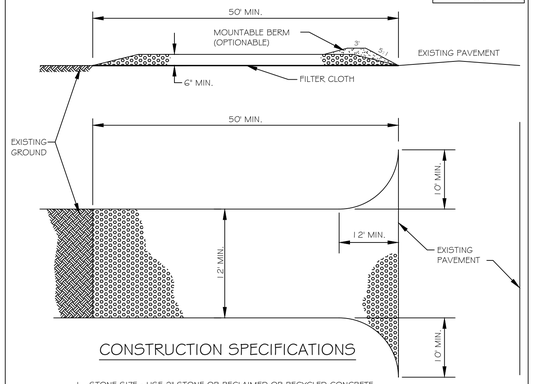
3. FILL MATERIAL SHALL BE FREE OF FROZEN PARTICLES, BRUSH, ROOTS, SOD, OR OTHER FOREIGN OR OTHER OBJECTIONABLE MATERIALS THAT WOULD INTERFERE WITH OR PREVENT CONSTRUCTION OF SATISFACTORY FILLS.

4. SEEPS OR SPRINGS ENCOUNTERED DURING CONSTRUCTION SHALL BE HANDLED IN ACCORDANCE WITH THE STANDARD AND SPECIFICATION FOR SUBSURFACE DRAIN OR OTHER APPROVED METHOD.

5. STOCKPILES, BORROW AREAS AND SPOIL AREAS SHALL BE SHOWN ON THE PLANS AND SHALL BE SUBJECT TO THE PROVISIONS OF THIS STANDARD AND SPECIFICATION.

STABILIZED CONSTRUCTION ENTRANCE

SYMBOL: SCE

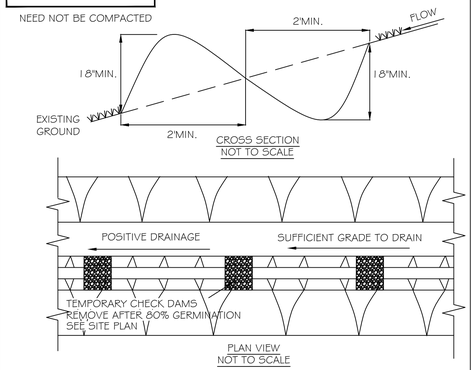


CONSTRUCTION SPECIFICATIONS

1. STONE SIZE - USE 2" STONE OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH - NOT LESS THAN 50 FEET (EXCEPT ON A SINGLE RESIDENCE LOT WHERE A 30 FOOT MIN. LENGTH WOULD APPLY).
3. THICKNESS - NOT LESS THAN SIX (6) INCHES.
4. WIDTH - TWELVE (12) FOOT MIN. BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY-FOUR (24) FOOT IF SINGLE ENTRANCE TO SITE.
5. FILTER CLOTH - WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACTED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPINGS DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.
10. TEMPORARY CONSTRUCTION ENTRANCES, EXITS AND TEMPORARY ACCESS SHALL BE SUBJECT TO THE APPROVAL OF THE APPROPRIATE AUTHORITIES.

GRASSED/VEGETATED SWALE

SYMBOL: G

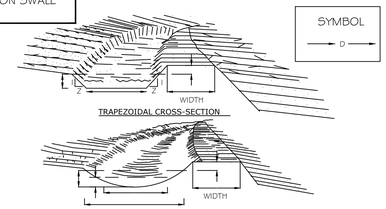


CONSTRUCTION SPECIFICATIONS

1. DRAINAGE AREA SHALL BE LESS THAN 5 ACRES.
2. HEIGHT SHALL BE NO LESS THAN 18-INCHES FROM BOTTOM OF SWALE TO TOP OF DIKE EVENLY DIVIDED BETWEEN DIKE HEIGHT AND SWALE DEPTH.
3. BOTTOM WIDTH OF DIKE SHALL BE NO LESS THAN 2-FEET.
4. WIDTH OF SWALE SHALL BE NO LESS THAN 2-FEET.
5. SWALE SHALL HAVE POSITIVE DRAINAGE TO AN ADEQUATELY STABILIZED OUTLET TO AN UNDISTURBED AREA. MAXIMUM ALLOWABLE GRADE NOT TO EXCEED 6%.
6. THE DISTURBED AREA OF THE DIKE AND SWALE SHALL BE STABILIZED WITHIN 7 DAYS OF INSTALLATION, IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR TEMPORARY SWALES.
7. DIVERTED RUNOFF FROM A DISTURBED OR EXPOSED UPLAND AREA SHALL BE CONVEYED TO A SEDIMENT TRAPPING DEVICE SUCH AS A TRAP, BASIN, OR TO AN AREA PROTECTED BY ANY OF THESE PRACTICES
8. PERIODIC INSPECTION AND REQUIRED MAINTENANCE MUST BE PROVIDED AFTER EACH RAIN EVENT.

DIVERSION SWALE

SYMBOL: D

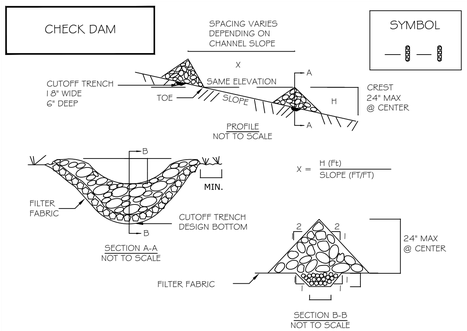


CONSTRUCTION SPECIFICATIONS

1. ALL TREES, BRUSH, STUMPS, OBSTRUCTIONS, AND OTHER OBJECTIONABLE MATERIAL SHALL BE REMOVED AND DISPOSED OF SO AS NOT TO INTERFERE WITH THE PROPER FUNCTIONING OF THE DIVERSION.
2. THE DIVERSION SHALL BE EXCAVATED OR SHAPED TO LINE, GRADE, AND CROSS SECTION AS REQUIRED TO MEET THE CRITERIA SPECIFIED HEREIN, AND BE FREE OF BANK PROJECTIONS OR OTHER IRREGULARITIES WHICH WILL IMPEDE NORMAL FLOW.
3. FILLS SHALL BE COMPACTED AS NEEDED TO PREVENT UNEQUAL SETTLEMENT THAT WOULD CAUSE DAMAGE IN THE COMPLETE DIVERSION.
4. ALL EARTH REMOVED AND NOT NEEDED IN CONSTRUCTION SHALL BE SPREAD OR DISPOSED OF SO THAT IT WILL NOT INTERFERE WITH THE FUNCTIONING OF THE DIVERSION.
5. STABILIZATION SHALL BE DONE ACCORDING TO THE APPROPRIATE STANDARD AND SPECIFICATIONS FOR VEGETATIVE PRACTICES.
   A. FOR DESIGN VELOCITIES OF LESS THAN 3.5 FT. PER. SEC., SEEDING AND MULCHING MAY BE USED FOR THE ESTABLISHMENT OF THE VEGETATION. IT IS RECOMMENDED THAT, WHEN CONDITIONS PERMIT, TEMPORARY DIVERSIONS OR OTHER MEANS SHOULD BE USED TO PREVENT WATER FROM ENTERING THE DIVERSION DURING THE ESTABLISHMENT OF THE VEGETATION.
   B. FOR DESIGN VELOCITIES OF MORE THAN 3.5 FT. PER. SEC., THE DIVERSION SHALL BE STABILIZED WITH SOD, WITH SEEDING PROTECTED BY JUTE OR EXCELSIOR MATTING OR WITH SEEDING AND MULCHING INCLUDING TEMPORARY DIVERSION OF THE WATER UNTIL THE VEGETATION IS ESTABLISHED.

CHECK DAM

SYMBOL



CONSTRUCTION SPECIFICATIONS

1. STONE WILL BE PLACED ON A FILTER FABRIC FOUNDATION TO THE LINES, GRADES AND LOCATIONS SHOWN IN THE PLAN.
2. SET SPACING OF CHECK DAMS TO ASSUME THAT THE ELEVATIONS OF THE CREST OF THE DOWNSTREAM DAM IS AT THE SAME ELEVATION OF THE TOE OF THE UPSTREAM DAM.
3. EXTEND THE STONE A MINIMUM OF 1.5 FEET BEYOND THE DITCH BANKS TO PREVENT CUTTING AROUND THE DAM.
4. PROTECT THE CHANNEL DOWNSTREAM OF THE LOWEST CHECK DAM FROM SCOUR AND EROSION WITH STONE OR LINER AS APPROPRIATE.
5. ENSURE THAT CHANNEL APPURTENANCES SUCH AS CULVERT ENTRANCES BELOW CHECK DAMS ARE NOT SUBJECT TO DAMAGE OR BLOCKAGE FROM DISPLACED STONE.

MAXIMUM DRAINAGE AREA 2 ACRES.

CONCRETE WASHOUT

CONSTRUCTION SPECIFICATIONS

DESIGN CRITERIA

1. THE WASHOUT FACILITY SHOULD BE SIZED TO CONTAIN SOLIDS, WASHWATER AND RAINFALL AND SIZED TO ALLOW FOR THE EVAPORATION OF THE WASHWATER AND RAINFALL.
2. WASHWATER SHALL BE ESTIMATED AT 7 GALLONS PER CHUTE AND 50 GALLONS PER HOPPER OF CONCRETE PUMP TRUCK AND/OR DISCHARGING DRUM.
3. THE MINIMUM SIZE SHALL BE 8' X 8' AT THE BOTTOM AND 2' DEEP. IF EXCAVATED, THE SIDE SLOPES SHALL BNE 2 HORIZONTAL : 1 VERTICAL.
4. LOCATE THE FACILITY A MINIMUM OF 100' FROM DRAINAGE SWALES, STORM DRAIN INLETS, WETALANDS, STREAMS AND OTHER SURFACE WATERS. PREVENT SURFACE WATER FROM ENTERING THE STRUCTURE EXCEPT FOR THE ACCESS ROAD.
5. PROVIDE APPROPRIATE ACCESS WITH A GRAVEL ACCESS ROAD SLOPED DOWN TO STRUCTURE.
6. SIGNS SHALL BE PLACED TO DIRECT DRIVERS TO THE FACILITY AFTER THEIR LOAD IS DISCHARGED.

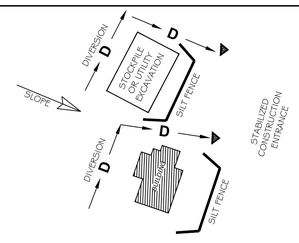
THE LINER SHALL BE PLASTIC SHEETING WITH A MIN. THICKNESS OF 10 MILS WITH NO HOLES OR TEARS. ANCHOR THE LINER TO THE TOP OF THE PIT WITH AN EARTHEN BERM, SAND BAGS, STONE, ETC.

MAINTENANCE

1. INSPECT ALL FACILITIES DAILY. REPAIR ALL DAMAGED OR LEAKING WASHOUT STATIONS IMMEDIATELY.
2. PUMP OUT ANY ACCUMULATED RAINWATER OVER HARDENED CONCRETE.
3. ACCUMULATED HARDENED MATERIAL SHALL BE REMOVED WHEN 75% OF THE STORAGE CAPACITY OF THE STRUCTURE IS FILLED.
4. DISPOSE OF HARDENED MATERIAL OFF-SITE IN A C/D LANDFILL. ON-SITE DISPOSAL IS ACCEPTABLE IF IT HAS BEEN APPORVED AND ACCEPTED AS PART OF THE SWPPP.
5. REPLACE THE PLASTIC LINER WITH EACH CLEANING OF WASHOUT FACILITY.
6. INSPECT THE PROJECT SITE FREQUENTLY TO ENSURE THAT NO CONCRETE DISCHARGES ARE TAKING PLACE IN NON-DESIGNATED AREAS.

TOP SOILING SPECIFICATIONS

1. PRESERVE EXISTING TOPSOIL IN PLACE WHERE POSSIBLE, THEREBY REDUCING THE NEED FOR ADDED TOPSOIL.
2. AS NEEDED, INSTALL EROSION CONTROL PRACTICES SUCH AS DIVERSIONS, CHANNELS, SEDIMENT TRAPS, AND STABILIZING MEASURES, OR MAINTAIN IF ALREADY INSTALLED.
3. COMPLETE ROUGH GRADING AND FINAL GRADE, ALLOWING FOR DEPTH OF TOPSOIL TO BE ADDED.
4. SCARIFY ALL COMPACT, SLOWLY PERMEABLE, MEDIUM AND FINE TEXTURED SUBSOIL AREAS. SCARIFY AT APPROXIMATELY RIGHT ANGLES TO THE SLOPE DIRECTION IN SOIL AREAS THAT ARE STEEPER THAN 5%. AREAS THAT HAVE BEEN OVERLY COMPACTED SHALL BE DECOMPACTED TO A MINIMUM DEPTH OF 12-INCHES WITH A DEEP RIPPER OR CHISEL PLOW PRIOR TO TOPSOILING.
5. REMOVE REFUSE, WOODY PLANT PARTS, STONES OVER 3-INCHES IN DIAMETER, AND OTHER LITTER.
6. TOPSOIL SHALL HAVE AT LEAST 6% BY WEIGHT OF FINE TEXTURED STABLE ORGANIC MATERIAL, AND NO GREATER THAN 20%. MUCK SOIL SHALL NOT BE CONSIDERED TOPSOIL.
7. TOPSOIL SHALL HAVE NOT LESS THAN 20% FINE TEXTURED MATERIAL (PASSING THE NO. 200 SIEVE) AND NOT MORE THAN 15% CLAY.
8. TOPSOIL TREATED WITH SOIL STERILANTS OR HERBICIDES SHALL BE SO IDENTIFIED TO THE PURCHASER.
9. TOPSOIL SHALL BE RELATIVELY FREE OF STONES OVER 1 1/2-INCHES IN DIAMETER, TRASH, NOXIOUS WEEDS SUCH AS NUT SEDGE AND QUACKGRASS, AND WILL HAVE LESS THAN 10% GRAVEL.
10. TOPSOIL CONTAINING SOLUBLE SALTS GREATER THAN 500 PARTS PER MILLION SHALL NOT BE USED.
11. TOPSOIL SHALL BE DISTRIBUTED TO A UNIFORM DEPTH OVER THE AREA. IT SHALL NOT BE PLACED WHEN IT IS PARTIALLY FROZEN, MUDDY, OR ON FROZEN SLOPES OR OVER ICE, SNOW, OR STANDING WATER PUDDLES.
12. TOPSOIL PLACED AND GRADED ON SLOPES STEEPER THAN 5% SHALL BE PROMPTLY FERTILIZED, SEEDED, MULCHED, AND STABILIZED BY "TRACKING" WITH SUITABLE EQUIPMENT.



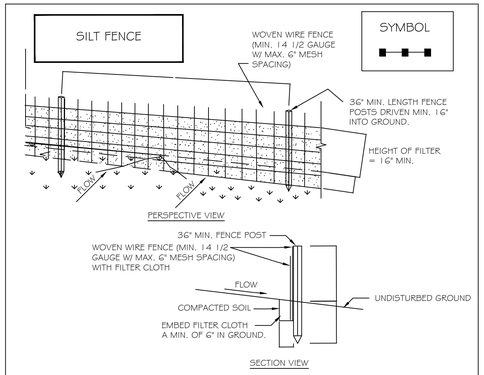
SEDIMENT & EROSION CONTROL MEASURES
TYPICAL
N.T.S.

MATERIAL STOCKPILING

1. FOR RESIDENTIAL CONSTRUCTION, ONE SPECIFIC AREA ON EACH LOT SHALL BE DESIGNATED FOR TEMPORARY STOCKPILING OF TOPSOIL AND ALL OTHER CONSTRUCTION MATERIALS CONTAINING FINES THAT CAN BE MOVED BY RUNOFF. THIS AREA SHALL BE AS SMALL AS PRACTICABLE
2. STOCK PILES WILL HAVE DOWN HILL SIDE PERIMETER SILT FENCING PROTECTION. REFERENCE SILT FENCE DETAILS THESE PLANS.
3. STOCK PILES WILL BE SEEDED AND MULCHED IF ANTICPATED TO BE LEFT IN PLACE 14-DAYS OR MORE. REFERENCE DETAIL SHEET NOTES AND SPECIFICATIONS THIS PLANT SET AND STORMWATER POLLUTION PREVENTION PLAN (SWPPP) ACCOMPANYING THIS PLAN SET.
4. SILT FENCE AND OTHER TEMPORARY CONTROL MEASURES SHALL BE IN PLACE BEFORE STOCKPILING OF MATERIALS.

SILT FENCE

SYMBOL



CONSTRUCTION SPECIFICATIONS

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24' AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 12 1/2 GAUGE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

EXCERPTS FROM NYS STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL
NOVEMBER 2016

REVISIONS

No.	Date	SYM.	Description

EROSION AND SEDIMENT CONTROL PLAN DETAILS

BILL DUTHIE
484 RIDGE ROAD
LANSING (T) TOMPKINS CO. N.Y.

NEW BUILDING
8-18 VERIZON LANE
LANSING, NY 14882

STATE OF NEW YORK — TIMOTHY C. BUHL — LICENSED PROFESSIONAL ENGINEER

TIMOTHY C. BUHL, P.E.
35 FIRE LANE 24, AUBURN, NY 13021

DATE: Sept 15, 2023
SCALE: N.T.S.
DRAWN: SDG
JOB:
SHEET: C-106

STABILIZED CONSTRUCTION ENTRANCE

PROPERTY LINE

10 FUTURE PARKING SPACES

Stone Splash Protection

ASPHALT PAVING

DRY POND

CROSSED SWALE

Bioretention Area

Attenuation Basin

BRUSH & TREES

FFE = 979.00'

NEW BUILDING

10 PARKING SPACES

AREA OF DISTURBANCE
93,492-SF (2.1-AC)

SILT FENCING

FOREBAY

6" Downspout

CONCRETE WASHOUT

EDGE OF GRAVEL

FLOW

POSSIBLE FUTURE BUILDING

GRAVEL SURFACE

GRAVEL PAVING

STOCKPILE MANAGEMENT AND LAYDOWN AREA

Grassed Diversion Swale

CHECK DAMS

Floor of Basin 4,771-SF, 145' L x 33'W
Broadcrested Weir Outlet, 4' x 4'
Inv. El. 977.50'
See Weir Detail, Sheet C-109

1 STORY BUILDING

CONDUIT

GAS METER

SMALL DRAIN
RIM=972.7

FFE=973.1

CONC.

ASPHALT PARKING

1 STORY
FFE=974.4 BUILDING

BOLLARD

DRIVE

ELECTRIC METER

12" HDPE

INV=973.5

INV=972.2

INV=970.2

INV=975.0

DISTRIBUTION BOX

APPROXIMATE LOCATION

UPGRADE CULVERT TO 12" HDPE

6" PVC

O.H.

971.60

971.5'

REVISIONS

No.	Date	SYM.	Description

EROSION, SEDIMENT AND GRADING PLAN

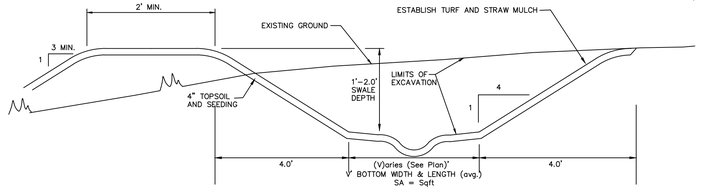
BILL DUTHIE
484 RIDGE ROAD
LANSING (T) TOMPKINS CO. N.Y.

NEW BUILDING
8-18 VERIZON LANE
LANSING, NY 14882

STATE OF NEW YORK — TIMOTHY C. BUHL — LICENSED PROFESSIONAL ENGINEER

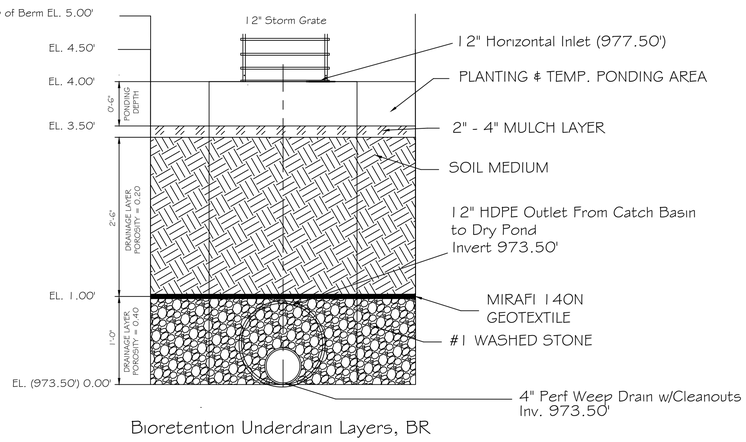
TIMOTHY C. BUHL,P.E.
35 FIRE LANE 24, AUBURN, NY 13021

DATE: Sept 15, 2023
SCALE: 1" = 20'
DRAWN: SDG
JOB:
SHEET: C-107

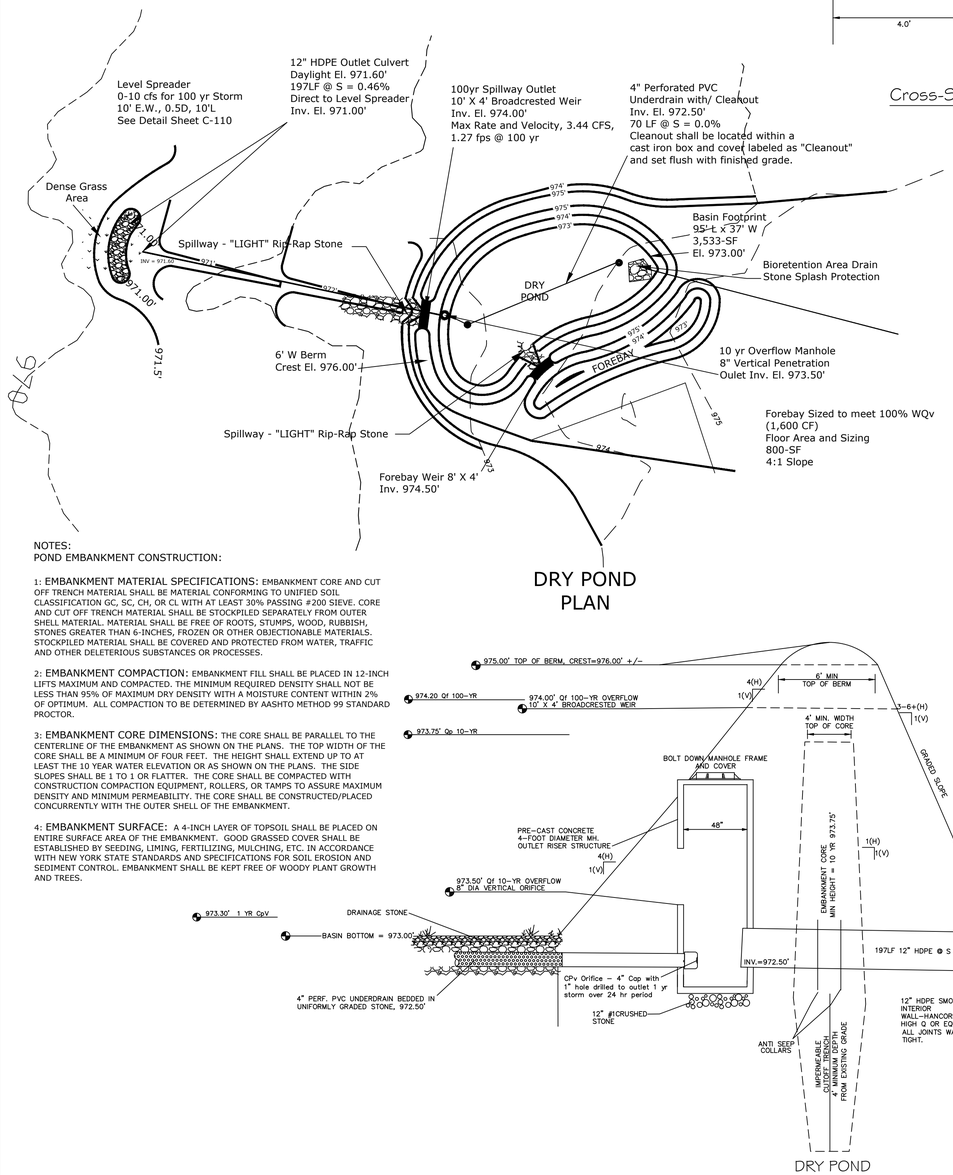


Cross-Section Bioretention Area

DIMENSIONS VARY AS PER PLAN



Bioretention Underdrain Layers, BR



DRY POND PLAN

NOTES:
POND EMBANKMENT CONSTRUCTION:

1: EMBANKMENT MATERIAL SPECIFICATIONS: EMBANKMENT CORE AND CUT OFF TRENCH MATERIAL SHALL BE MATERIAL CONFORMING TO UNIFIED SOIL CLASSIFICATION GC, SC, CH, OR CL WITH AT LEAST 30% PASSING #200 SIEVE. CORE AND CUT OFF TRENCH MATERIAL SHALL BE STOCKPILED SEPARATELY FROM OUTER SHELL MATERIAL. MATERIAL SHALL BE FREE OF ROOTS, STUMPS, WOOD, RUBBISH, STONES GREATER THAN 6-INCHES, FROZEN OR OTHER OBJECTIONABLE MATERIALS. STOCKPILED MATERIAL SHALL BE COVERED AND PROTECTED FROM WATER, TRAFFIC AND OTHER DELETERIOUS SUBSTANCES OR PROCESSES.

2: EMBANKMENT COMPACTION: EMBANKMENT FILL SHALL BE PLACED IN 12-INCH LIFTS MAXIMUM AND COMPACTED. THE MINIMUM REQUIRED DENSITY SHALL NOT BE LESS THAN 95% OF MAXIMUM DRY DENSITY WITH A MOISTURE CONTENT WITHIN 2% OF OPTIMUM. ALL COMPACTION TO BE DETERMINED BY AASHTO METHOD 99 STANDARD PROCTOR.

3: EMBANKMENT CORE DIMENSIONS: THE CORE SHALL BE PARALLEL TO THE CENTERLINE OF THE EMBANKMENT AS SHOWN ON THE PLANS. THE TOP WIDTH OF THE CORE SHALL BE A MINIMUM OF FOUR FEET. THE HEIGHT SHALL EXTEND UP TO AT LEAST THE 10 YEAR WATER ELEVATION OR AS SHOWN ON THE PLANS. THE SIDE SLOPES SHALL BE 1 TO 1 OR FLATTER. THE CORE SHALL BE COMPACTED WITH CONSTRUCTION COMPACTION EQUIPMENT, ROLLERS, OR TAMPS TO ASSURE MAXIMUM DENSITY AND MINIMUM PERMEABILITY. THE CORE SHALL BE CONSTRUCTED/PLACED CONCURRENTLY WITH THE OUTER SHELL OF THE EMBANKMENT.

4: EMBANKMENT SURFACE: A 4-INCH LAYER OF TOPSOIL SHALL BE PLACED ON ENTIRE SURFACE AREA OF THE EMBANKMENT. GOOD GRASSED COVER SHALL BE ESTABLISHED BY SEEDING, LIMING, FERTILIZING, MULCHING, ETC. IN ACCORDANCE WITH NEW YORK STATE STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL. EMBANKMENT SHALL BE KEPT FREE OF WOODY PLANT GROWTH AND TREES.

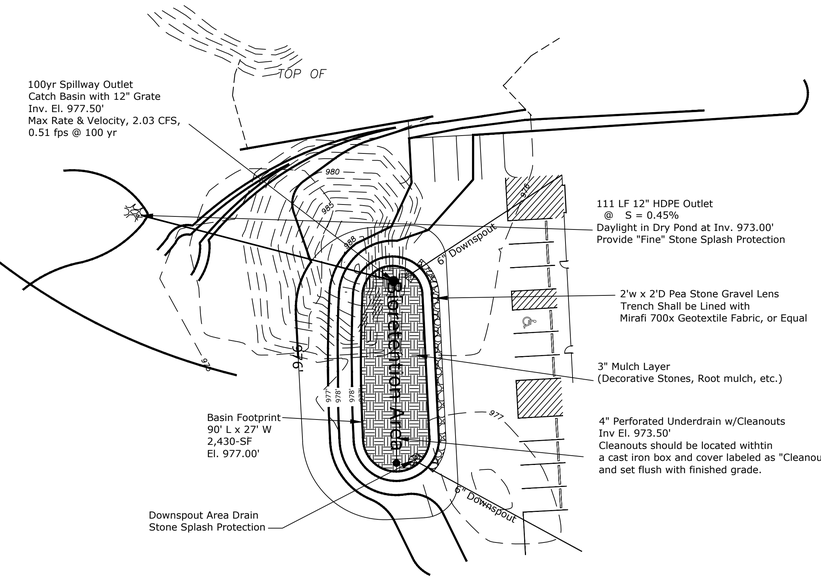
BASIN VOLUME AND AS-BUILT CERTIFICATION:
Upon completion of construction, a basin volume certification and as-built must be certified by a licensed professional engineer or land surveyor to ensure that each structure meets the conditions and requirements with the details of this sheet. Provide location and elevation of all pipes, structures, and impoundments with respect to property lines. Certification shall be submitted to the local reviewing jurisdiction for approval.

SPECIFICATIONS FOR BIORETENTION SYSTEMS

Planting Soil
The soil shall be a uniform mix, free of stones, stumps, roots or other similar objects larger than two inches. No other materials or substances shall be mixed or dumped within the bioretention area that may be harmful to plant growth, or prove a hindrance to the planting or maintenance operations. The planting soil shall be free of noxious weeds.

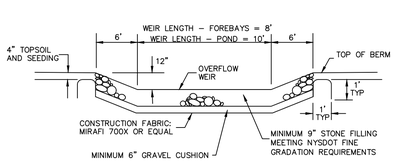
Planting soil shall be of a sandy loam consistency containing approximately 75% concrete sand, 25% top soil and organics.

Compaction
Minimize compaction of both the base of the bioretention area and the required backfill. Place soil in lifts 12" or great. Do not use heavy equipment within the bioretention area basin.

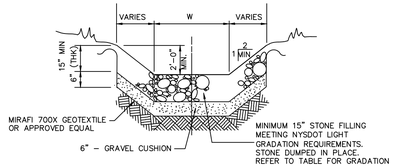


BIORETENTION AREA PLAN

DRY POND SECTION

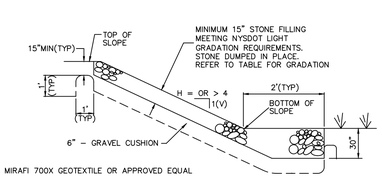


FOREBAY, & POND OUTLET WEIRS



L= SEE PLAN FOR LINED CHANNEL LENGTH

STONE LINED CHANNELS



SPILLWAY SLOPES FOREBAY & POND

STONE LINING FOR STORMWATER CONVEYANCE SECTIONS

MIN THICKNESS (THK)	STONE FILLING ITEM	V MAX*2 2' DEPTH	SEE NOTES	STONE SIZE*1	PERCENT OF TOTAL BY WEIGHT	MANNING'S ROUGHNESS COEFF "N"
9"	FINE	11.0 FPS	2,3,4	SMALLER THAN 8" LARGER THAN 3" SMALLER THAN NO. 10 SIEVE	90–100 50–100 0–10	0.0314
15"	LIGHT	13.0 FPS	2,3,4	LIGHTER THAN 100 LBS LARGER THAN 6" SMALLER THAN 1/2"	90–100 50–100 0–10	0.0352
18"	MEDIUM	15.5 FPS	2,3,4	HEAVIER THAN 100 LBS SMALLER THAN 4"	50–100 0–10	0.0395
30"	HEAVY	17.0 FPS	2,3,4	HEAVIER THAN 100 LBS SMALLER THAN 6"	50–100 0–10	0.0423

*1 SOURCE: HYDRAULIC ENGINEERING CIRCULAR NO. 15 DESIGN OF STABLE CHANNELS WITH FLEXIBLE LININGS
*2 SOURCE: SOILS DESIGN PROCEDURE SDP2, BANK AND CHANNEL PROTECTIVE LINING DESIGN PROCEDURES

NOTES:

1. STONE SIZES, OTHER THAN WEIGHTS, REFER TO THE AVERAGE OF THE MAXIMUM AND MINIMUM DIMENSIONS OF A STONE PARTICLE AS ESTIMATED BY THE ENGINEER.

2. MATERIALS SHALL CONTAIN LESS THAN 20 PERCENT OF STONES WITH A RATIO OF MAXIMUM TO MINIMUM DIMENSIONS GREATER THAN THREE.

3. AIR–COOLED BLAST FURNACE SLAG, COBBLES OR GRAVEL HAVING AT LEAST ONE FRACTURED FACE PER ACCEPTABLE SUBSTITUTES FOR STONE UNDER THESE ITEMS, PROVIDED THAT SOUNDNESS AND GRADATION REQUIREMENTS ARE MET.

4. MATERIALS SHALL CONTAIN A SUFFICIENT AMOUNT OF STONES SMALLER THAN THE AVERAGE STONE SIZE TO FILL THE SPACES BETWEEN THE STONES.

REVISIONS

No.	Date	SYM.	Description

STORMWATER PRACTICE DETAILS

NEW BUILDING
8-18 VERIZON LANE
LANSING, NY 14882

BILL DUTHIE
484 RIDGE ROAD
LANSING (T) TOMPKINS CO. N.Y.

TIMOTHY C. BUHL, P.E.
35 FIRE LANE 24, AUBURN, NY 13021

DATE: Sept 15, 2023
SCALE: 1"=50'
DRAWN: SDG
JOB:
SHEET: C-108

Existing Subcatchment 2 - ESC-2
Existing Site Conditions - Area = 21,518 SF (0.49-AC)

Surface Conditions & Soils:
100% Ovid, OaA - Hydrologic Soil Group (HSG) C

Runoff Curve Number = 72, Woods and Brush, Good HSG C Soils
Runoff Curve Number = 98, Impervious/Gravel, Good HSG C Soils

Overland Stormwater Runoff - Longest Flowpath = 374 lf +/-
Sheet Flow, Woods, Lt. Under - 100 lf @ S = 2.1% avg.
Shallow Conc. Flow - Woodland - 137 lf @ S = 1.5% avg.
Shallow Conc. Flow - Unpaved - 137 lf @ S = 2.2% avg.

To Design Point 2 - (DPE 2)

Existing Subcatchment 1 - ESC-1
Existing Site Conditions - Area = 113,643 SF (2.61-AC)

Surface Conditions & Soils:
20% Kendaia, KaB - Hydrologic Soil Group (HSG) B
80% Ovid, OaA - Hydrologic Soil Group (HSG) C

Runoff Curve Number = 58, Meadow, Good HSG B Soils
Runoff Curve Number = 58, Woods and Brush, Good HSG B Soils
Runoff Curve Number = 72, Woods and Brush, Good HSG C Soils
Runoff Curve Number = 87, Compacted Dirt, Good HSG C Soils

Overland Stormwater Runoff - Longest Flowpath = 1,101 lf +/-
Sheet Flow, Dense Grass - 100 lf @ S = 1.8% avg.
Shallow Conc. Flow - Short Grassed Pasture - 250 lf @ S = 2.8% avg.
Shallow Conc. Flow - Woodland - 583 lf @ S = 2.91% avg.
Shallow Conc. Flow - Unpaved - 168 lf @ S = 2.4% avg.

To Design Point 1 - (DPE 1)

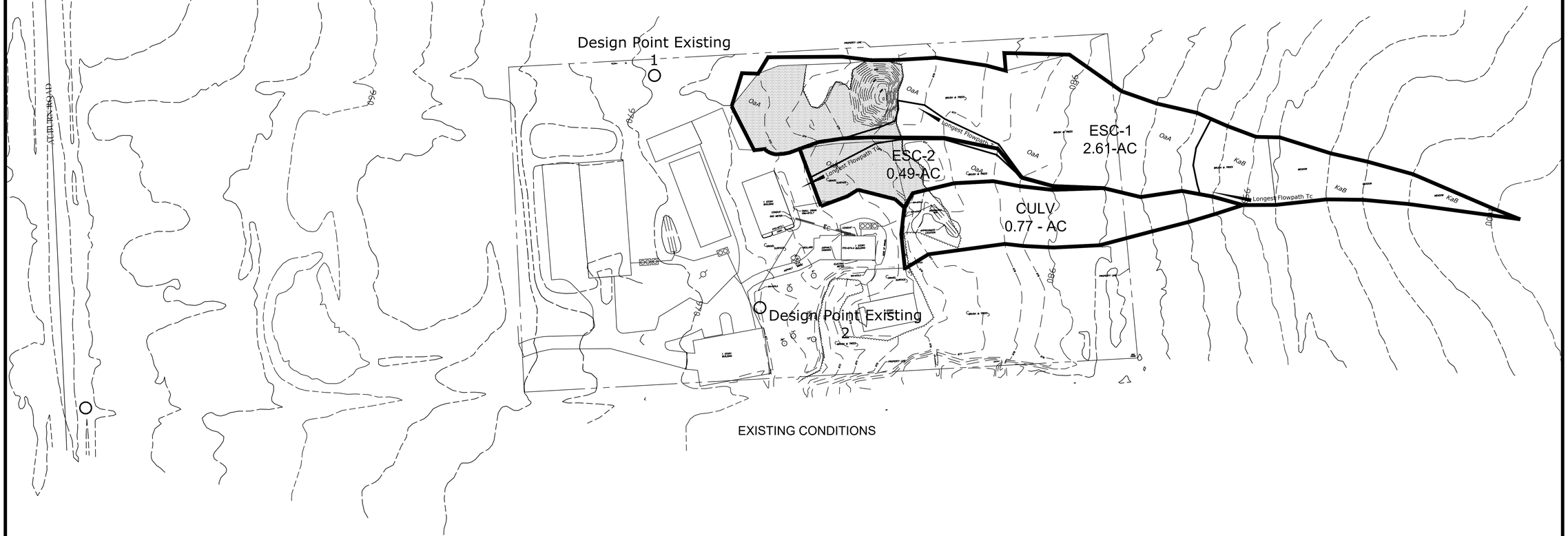
Proposed Culvert Analysis
Proposed Site Conditions - PSC-1 Area = 61,729 SF (1.42-AC)
Culvert Drainage Area = 33,656 SF (0.77-AC)

Surface Conditions & Soils:
100% Ovid, OaA - Hydrologic Soil Group (HSG) C

Runoff Curve Number = 58, Woods and Brush, Good HSG B Soils

Overland Stormwater Runoff - Longest Flowpath = 1,043 lf +/-
Sheet Flow, Woods, Lt. Underbrush - 100 lf @ S = 2.0% avg.
Shallow Conc. Flow - Woodland - 410 lf @ S = 2.4% avg.
6" Culvert - 14 lf @ S = 1.5% avg.
Trap/Vee Channel Flow - 72 lf @ S = 0.8% avg.
12" Culvert - 57 lf @ S = 2.3% avg.

100 Yr Storm
0.93 cfs, Max Vel 3.89 fps
Avg. Depth at Peak, 0.50"



EXISTING CONDITIONS

REFERENCE HYDROCAD (HYDRAULIC & HYDROLOGIC) MODELING RESULTS PRESENTED WITH THESE PLANS

REVISIONS

No.	Date	SYM.	Description

HYDRAULIC AND HYDROLOGIC
RUNOFF ANALYSIS WORKSHEET
EXISTING CONDITIONS

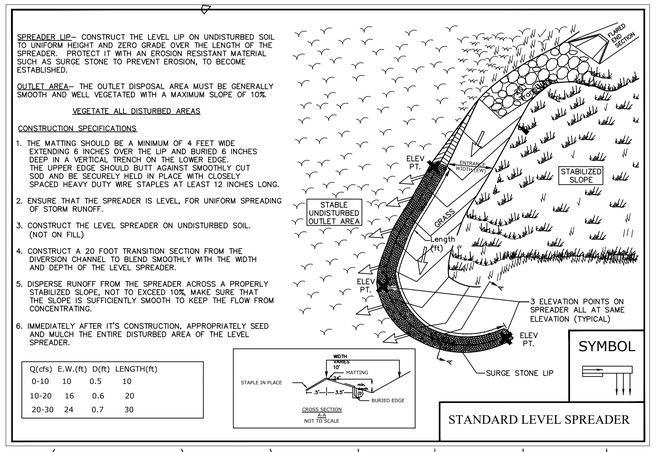
BILL DUTHIE
484 RIDGE ROAD
LANSING (T) TOMPKINS CO. N.Y.

NEW BUILDING
8-18 VERIZON LANE
LANSING, NY 14882

STATE OF NEW YORK — TIMOTHY C. BUHL — LICENSED PROFESSIONAL ENGINEER

TIMOTHY C. BUHL, P.E.
35 FIRE LANE 24, AUBURN, NY 13021

DATE: Sept 15, 2023
SCALE: 1"=70'
DRAWN: SDG
JOB:
SHEET: C-109



Proposed Subcatchment 1 - PSC-1
Proposed Site Conditions - Area = 79,048 SF (1.81-AC)

Surface Conditions & Soils:
44% Kendaia, KaB - Hydrologic Soil Group (HSG) B
56% Ovid, OaA - Hydrologic Soil Group (HSG) C

Runoff Curve Number = 58, Meadow, Good HSG B Soils
Runoff Curve Number = 58, Woods and Brush, Good HSG B Soils
Runoff Curve Number = 72, Woods and Brush, Good HSG C Soils

Overland Stormwater Runoff - Longest Flowpath = 1,043 lf +/-
Sheet Flow, Dense Grass - 100 lf @ S = 1.8% avg.
Shallow Conc. Flow - Short Grassed Pasture - 250 lf @ S = 2.8% avg.
Shallow Conc. Flow - Woodland - 379 lf @ S = 3.3% avg.
Trap/Vee Channel Flow - 171 lf @ S = 1.75% avg.
6" Culvert - 14 lf @ S = 1.5% avg.
Trap/Vee Channel Flow - 72 lf @ S = 0.8% avg.
12" Culvert - 57 lf @ S = 2.3% avg.

To Design Point 1 - (DPP 1)

Proposed Culvert Analysis
Proposed Site Conditions - PSC-1 Area = 61,729 SF (1.42-AC)
Culvert Drainage Area = 33,656 SF (0.77-AC)

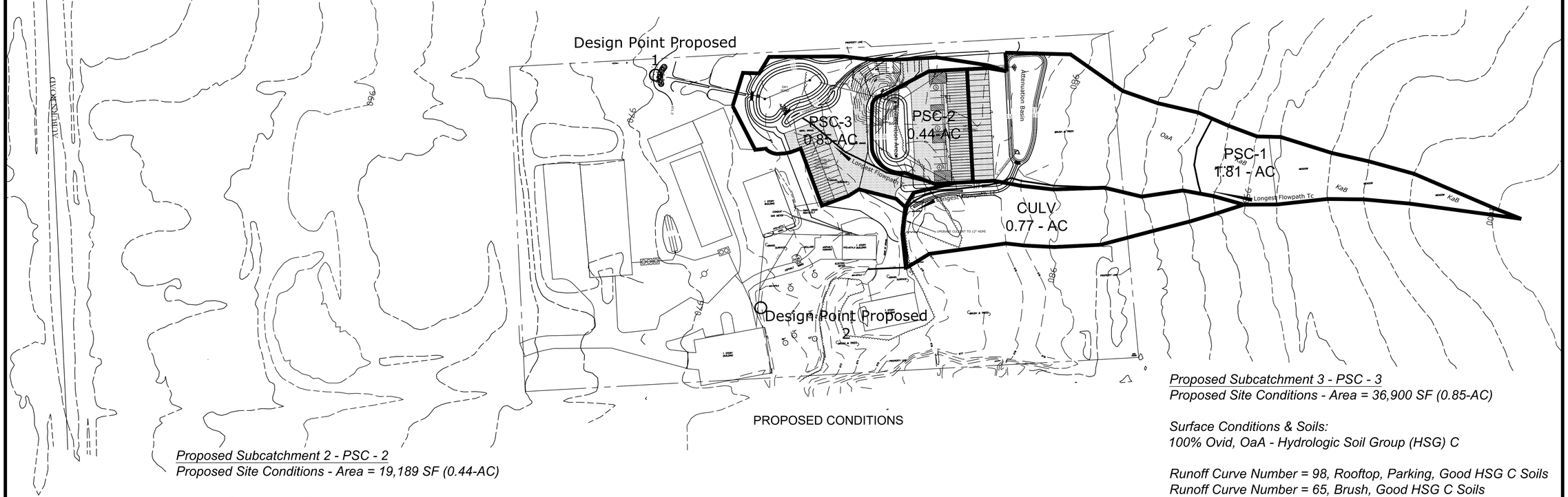
Surface Conditions & Soils:
100% Ovid, OaA - Hydrologic Soil Group (HSG) C

Runoff Curve Number = 58, Woods and Brush, Good HSG B Soils

Overland Stormwater Runoff - Longest Flowpath = 1,043 lf +/-
Sheet Flow, Woods, Lt. Underbrush - 100 lf @ S = 2.0% avg.
Shallow Conc. Flow - Woodland - 410 lf @ S = 2.4% avg.
12" Culvert - 14 lf @ S = 1.5% avg.
Trap/Vee Channel Flow - 72 lf @ S = 0.8% avg.
12" Culvert - 57 lf @ S = 2.3% avg.

100 Yr Storm
3.79 cfs, Max Vel 6.13 fps
Avg. Depth at Peak, 0.73"

TRUE NORTH



PROPOSED CONDITIONS

Proposed Subcatchment 2 - PSC - 2
Proposed Site Conditions - Area = 19,189 SF (0.44-AC)

Surface Conditions & Soils:
100% Ovid, OaA - Hydrologic Soil Group (HSG) C

Runoff Curve Number = 98, Rooftop, Parking, Good HSG C Soils
Runoff Curve Number = 74, >75% Grass, Good HSG C Soils

Overland Stormwater Runoff - Minimum 6 minutes

To Design Point 1 - (DPP 1)

Proposed Subcatchment 3 - PSC - 3
Proposed Site Conditions - Area = 36,900 SF (0.85-AC)

Surface Conditions & Soils:
100% Ovid, OaA - Hydrologic Soil Group (HSG) C

Runoff Curve Number = 98, Rooftop, Parking, Good HSG C Soils
Runoff Curve Number = 65, Brush, Good HSG C Soils

Overland Stormwater Runoff - Minimum 6 minutes

To Design Point 1 - (DPP 1)

REFERENCE HYDROCAD (HYDRAULIC & HYDROLOGIC) MODELING RESULTS PRESENTED WITH THESE PLANS

REVISIONS
No. | Date | SYM. | Description

HYDRAULIC AND HYDROLOGIC RUNOFF ANALYSIS WORKSHEET
PROPOSED CONDITIONS

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35 FIRE LANE 24, AUBURN, NY 13021

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SCALE: 1"=70'
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SHEET: C-110