D&L Design Group, Inc.

HYDRAULIC / HYDROLOGIC CALCULATIONS

Residential Subdivision
at
153 Paxton Road
Leicester, Massachusetts

Prepared For:

Schold Development

Prepared By:

D & L Design Group, Inc.
115 Water Street
Milford, Ma 01757

August 29, 2022

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DRAINAGE SUMMARY

D & L Design Group Inc. is pleased to provide the following Hydraulic / Hydrologic analysis for 153 Paxton Street in the town of Leicester Massachusetts. The existing site consists of 60 acres of un-developed land adjacent to Sargent Pond. The hydrologic conditions were analyzed using TR-55 and HydroCAD® for the 2, 10, 50 and 100 year storm events utilizing NOAA Atlas 14+, 24 hour Rainfall events.

The project will also consist of the construction a Open Space Development that will consist of 10 Lots. The development will consist of the construction of a 1,700 linear foot roadway that is 26 feet of pavement and sidewalk on one side of the roadway. The development will also consist of the construction of a proposed drainage system that will consist of drain manhole to catch basin design that will collect and direct runoff generated to two infiltration basins. The proposed single family houses will be serviced by town water and all house will be on sewer. The proposed sewer system will consist of individual pump stations that will be connected into a 2 inch low pressure line within the new roadway that will connect to existing sewer in Paxton Street. The proposed project will also proposed to fill 3,600 s.f. of bordering vegetated wetlands and the project will proposed to replicate 4,500 s.f. of wetlands.

EXISTING CONDITIONS:

The site is abutted by Paxton Street. The existing site consists of 60 acres of un-developed land that abuts Sargent Pond. The topography slopes from North to South at elevations 1015 to 914. There are wetlands located on the lot the first wetland is located in the middle of the project that flows from North to South. The second wetland is located along the west property line.

For the purpose of the analysis of the effect on site development, the site was analyzed as two independent watersheds. In the Pre-Development Condition, Subcatchment 1 & 2 represent the tributary areas of the property that flows to the Sargent Pond and Subcatchment 3 & 4 flow to the wetlands that is located in the middle of the parcel that flows toward Sargent Pond.

According to the online USGS soil survey, the analyzed area consists of soils with "C" hydrologic ratings. On site soil testing confirms. The cover consists of grass area and paved areas.

PROPOSED CONDITIONS:

The project will also consist of the construction a Open Space Development that will consist of 10 Lots. The development will consist of the construction of a 1,700 linear foot roadway that is 26 feet of pavement and sidewalk on one side of the roadway.

The site will be designed to support the project and control stormwater in accordance with the Massachusetts Stormwater Management Policy. The development includes the construction of two drainage open basin with catch basins and drain manholes to provide stormwater treatment and attenuation to reduce the impact of surface alterations.

STORMWATER MANAGEMENT CHECKLIST

D&L Design Group, Inc.
115 Water Street, Milford Ma 01757 (P) 508-408-2577

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

COMMONWEALTH OF MASSACHUSETTS
MICHAEL
DEAN
CIVIL
No. 46255
REGISTERED PROFESSIONAL ENGINEER
9-1-22

Signature and Date 9-1-22

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

Redevelopment

☒ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

☒ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☐ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

Use of "country drainage" versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

Water Quality Swale

Grass Channel

☐ Green Roof

☐ Other (describe): _____

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☒ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the Infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☒ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☒ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☒ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☒ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path

Redevelopment Project

- ☒ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

In order to analyze the surface water flows, the site was divided into multiple Subcatchents, Ponds and a Reaches. The Post-Development are then compared to the Pre-Development Conditions.

In summary, the peak rates of runoff were compared under pre-development and post-development conditions for analysis of the 2 year, 10 year, 50 year and 100 year storm events. The following is a **Peak Discharge Summary Table:**

Design Point Analysis:

Watershed		Design Event			
		2 Year	10 Year	50 Year	100 Year
Pre-Development	IP-E1	35.73	73.94	107.63	130.83
	IP-E2	11.78	24.42	35.51	43.18
Post Development	IP-1P	35.18	73.26	107.17	130.25
	IP-2P	11.49	23.87	35.17	42.58

DEP Stormwater Management Standards:

Standard #1: The proposed changes will not cause erosion in adjacent water of the Commonwealth, as BMP measures are proposed in accordance with the design requirements of the Stormwater Management handbook. The Erosion & Sedimentation Control Plan provides for the installation of siltation barriers, temporary basins, temporary construction entrances and outlines intermediary measures to control runoff during construction and after construction.

Standard #2: The proposed development peak discharge rates for the total off-site flow are less than or equal to pre-development discharge rates for the 2 year, 10 year, 50 year and 100 year storm events for the design points analyzed. Attached calculations show how the site mitigates the increased flow rates due to surface changes from the site development.

Standard #3: The roof drain runoff is directed to two direct infilfration basins that meets the recharge requirement for Class C Soils. Basins 1 &2 designed to infiltrate runoff from the roadway and driveway areas after pre-treatment. Infiltration depths are designed to drain in under 72 hours as required by the Policy.

Standard #4: Over 80% TSS shall occur based on the BMP measurements provided. The treatment train varies for each section. TSS worksheets are provided in the report for each treatment train in the site. The water quality volume was determined using 0.5" of runoff over the proposed impervious area.

Standard #5: The proposed development will not generate higher potential pollutant loads and therefore will not require additional BMP practices.

Standard #6: The proposed project is not near a critical area.

Standard #7: The proposed project is not a redevelopment project.

Standard #8: Erosion and sediment control measures are proposed as part of the proposed project.

Standard #9: An Operation & Maintenance plan is provided within this document

Standard #10: This project does not propose any illicit discharges.

STANDARD #2- PEAK DISCHARGE RATES

STANDARD #3 –LOSS OF ANNUAL RECHARGE

The site is developed along roadway and un-developed in the area along Route 146. The site design incorporates direct recharge of roof drains to infiltration basin. Basins 1 designed to infiltrate retained runoff after pre-treatment. Soils were found to be Class C permeability.

The table below shows the required and provided recharge volumes for the project. As shown, the proposed condition exceeds the minimum requirement for the additional impervious areas.

Recharge Volume Summary

Soil Type	Recharge Factor (in. runoff)	Existing Impervious Area (sf)	Additional Impervious Area (sf)	Min. Req. Recharge Volume (cf)
A	0.60	0	0	0
B	0.35	0	0	0
C	0.25	0	121,224	2,525
D	0.10	0	0	0
Total Required				**2,525**

Standard #3 Only Applies to Additional Impervious

Provided Recharge Volume (cf)		
Basin 1		1,185
Basin 2		2,129
Total Provided		**3,214**

Rechage Volume Calculation:

Rv = F x I
Rv = Required Rechareg Volume
F = Recharge Factor
I = Total Impervious Area
Rv = (0.25")/(1'/12") x 121,224 s.f. = 2,525.4 cf (Required)

Provided Infiltration is3,214 cf taken from Stage Storage Worksheet

Drawdown Calculation:

$$Time_{drawdown} = \frac{Rv}{(K)(Bottom\ Area)}$$

Basin#1:

Where:

Rv = Storage Volume (1,185 c.f.)

K = Saturated Hydraulic Conductivity For "Static" and "Simple Dynamic" Methods, use Rawls Rate (see Table 2.3.3). For "Dynamic Field" Method, use 50% of the in-situ saturated hydraulic conductivity. 1.02 in/hour)

Bottom Area = Bottom Area of Recharge Structure (2,221 s.f.)

Time = 1,185 c.f./ (1.02 in/hour)(1inch/12foot)(2,221 s.f.) = 6 hours

Basin#2:

Where:

Rv = Storage Volume (2,129 c.f.)

K = Saturated Hydraulic Conductivity For "Static" and "Simple Dynamic" Methods, use Rawls Rate (see Table 2.3.3). For "Dynamic Field" Method, use 50% of the in-situ saturated hydraulic conductivity. 1.02 in/hour)

Bottom Area = Bottom Area of Recharge Structure (3,726 s.f.)

Time = 2,129 c.f./ (1.02 in/hour)(1inch/12foot)(3,726 s.f.) = 7 hours

STANDARD #4- 80% TSS REMOVAL

ESTIMATED PROPOSED NEW PAVED COVER= 93,424 S.F.
Driveway & Roadway Areas

REQUIRED WATER QUALITY VOLUME:

Water Quality Volume		
Required Treatment Volume	1.0	Inches Over Impervious Areas
Watershed Series	Paved Area	Water Quality Volume
BASIN 1	19,500	1,618
BASIN 2	54,525	3,894

Provided Water Quality Volume from Stage Storage Worksheet= 7,244 cf

The design of the drainage system is such that the site is routed through a series of treatment BMP's meeting the Standard.

Impervious Area Basin1 is 19,500 s.f. (1in/1'/12In) = 1,618 c.f. (3,350 c.f. Provided)
Impervious Area Basin2 is 54,525 s.f. (1in/1'/12in) = 4,525 c.f. (3,894 c.f. Provided)

****PLEASE SEE THE FOLLOWING PAGES FOR TSS REMOVAL CALCULATIONS.**

STANDARD #9- OPERATION & MAINTENANCE

OPERATION & MAINTENANCE PLAN:

CURRENT OWNER & RESPONSIBLE PARTY:

Central Land Development

(Contractor shall be responsible during construction)

FUTURE OWNER & RESPONSIBLE PARTY:

Central Land Development

DURING CONSTRUCTION:

***SILT FENCE BARRIER*:**

The silt fence barrier shall be installed prior to construction.

During construction the contractor shall inspect the silt fence barrier on a weekly basis and after any significant rainstorm resulting in greater than 0.5" of rainfall. The barrier shall be inspected for any breaches or disturbed silt fence and repaired immediately.

After construction the barrier shall be maintained as stated above until all new areas are vegetated.

After construction these duties shall transfer to the property owner.

***CONSTRUCTION ENTRANCE APRONS*:**

Construction aprons shall be installed to protect Paxton Street. The construction entrance apron shall be installed prior to commencement of construction and shall be inspected weekly. The construction entrance apron shall be replaced when debris becomes noticeable on the existing pavement surfaces leading to and from the construction site.

***SLOPE STABILIZATION*:**

The slope stabilization controls shall be installed immediately upon obtaining final grades as shown on the project plans. Slopes in the swale area shall be stabilized according to the details provided. All 3:1 slopes established on-site shall be loamed and seeded as soon as weather permits. Any 2:1 slopes established shall be covered with slope stabilization fabric, then loamed

and seeded as soon as weather permits. Areas in failure shall be re-graded to final grade and stabilized as necessary.

***TEMPORARY BASINS*:**

The temporary basins shall be inspected immediately after storm events and cleaned to remove sediment build-up. Outfalls shall be inspected for erosion or scouring. Additional rip rap shall be added as required to minimize erosion.

***CATCH BASINS*:**

Catch basins shall entrances shall have temporary stone or other filtration device installed around inlet to prevent sediment deposits. Sediment shall be removed when accumulation exceeds 1" depth on paved surfaces.

***CHECK DAMS*:**

Check Dams shall be inspected weekly and after rainfall in excess of 0.5". Accumulated sediment shall be removed when depth exceeds 3" on the upstream sided of the dam. Stone or fabric shall be replaced when evidence of clogging is present.

***CONSTRUCTION COMPLETION*:**

The entire stormwater management system shall be inspected upon completion of construction. Portions of the system containing sediment shall be cleaned and all sediment properly removed.

AFTER CONSTRUCTION:

***CATCH BASINS*:**

At a minimum, the catch basins shall be inspected and cleaned on a quarterly basis. It is preferred that collection of accumulated sediment shall be accomplished by means of vacuum pumping and not by means of a clamshell bucket. Disposal of accumulated sediment shall be performed in accordance with applicable local, state, and federal guidelines and regulations.

SEDIMENT FORBAYS

Sediment forebays shall be visually inspected monthly for accumulation of debris, slope failure, or stone displacement. Slopes shall be mowed quarterly. Bottom shall be swept, vacuumed of accumulated debris semi-annually.

OPEN INFILTRATION BASIN

The following guidelines shall be adhered to for the operation and maintenance stormwater management system:
A. The owner shall keep a maintenance log which shall include details of any events which would have an effect on the system's operational capacity.
B. The operation and maintenance procedure shall be reviewed periodically and changed to meet site conditions.
C. Maintenance of the stormwater management system shall be performed by qualified workers and shall follow applicable occupational health and safety requirements.
D. Debris removed from the stormwater management system shall be disposed of in accordance with applicable laws and regulations.

- Monthly in first year - Check inlets and outlets for clogging and remove any debris, as required. Spring and Fall Check inlets and outlets for clogging and remove any debris, as required.

One year after commissioning and every third year following Check inlets and outlets for clogging and remove any debris, as required

LONG TERM POLLUTION PREVENTION PLAN

The following are the material management practices that shall be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff.

Good Housekeeping: The following good housekeeping practices will be followed on site during the construction project and continued upon completion of the construction activities.

1. A concerted effort shall be made to store only enough product required to complete a particular task.
2. All materials stored on site shall be stored in a neat and orderly fashion in their appropriate containers and, if possible, under a roof or other secure enclosure.
3. Products shall be kept in their original containers with the original manufacture's label.
4. Substances shall not be mixed with one another unless recommended by the manufacturer.
5. Whenever possible, all of a product shall be used up before disposing of the container.
6. Manufacture's recommendations for proper use and disposal shall be followed.
7. The site superintendent shall inspect daily to ensure proper use and disposal of materials on site.

Hazardous Products: The following practices are intended to reduce the risks associated with hazardous materials.

1. Products shall be kept in original containers unless they are not re-sealable.
2. Where feasible, the original label and material safety data shall be retained, whereas they contain important product information.
3. If surplus product must be disposed of, follow manufacturers or local and State recommended methods for proper disposal.

Product Specific Practices: The following product-specific practices shall be followed on site:
Petroleum Products:

1. All on site vehicles shall be monitored for leaks and receive regular preventative maintenance to reduce the risk of leakage.
2. Petroleum products shall be stored in tightly sealed containers which are clearly labeled.
3. Petroleum Products shall be stored in compliance with Fire Marshall regulations.

Bituminous Concrete:
Any bituminous concrete or asphalt substances used on site shall be applied according to the manufacturer's recommendations.

Fertilizers:
Fertilizers shall be applied in the minimum amounts recommended by the manufacturer. Once applied, fertilizers shall be worked into the soil to limit exposure to stormwater. Storage shall be in a covered shed or trailer. The contents of any partially-used bags of fertilizer shall be transferred to a sealable plastic bag or bin to avoid spills

Paints:

1. All containers shall be tightly sealed and stored when not required for use.
2. Excess paint shall not be discharged into any catch basin, drain manhole or any portion of the stormwater management system.
3. Excess paint shall be properly disposed of according to manufacturer's recommendations or State and local regulations.

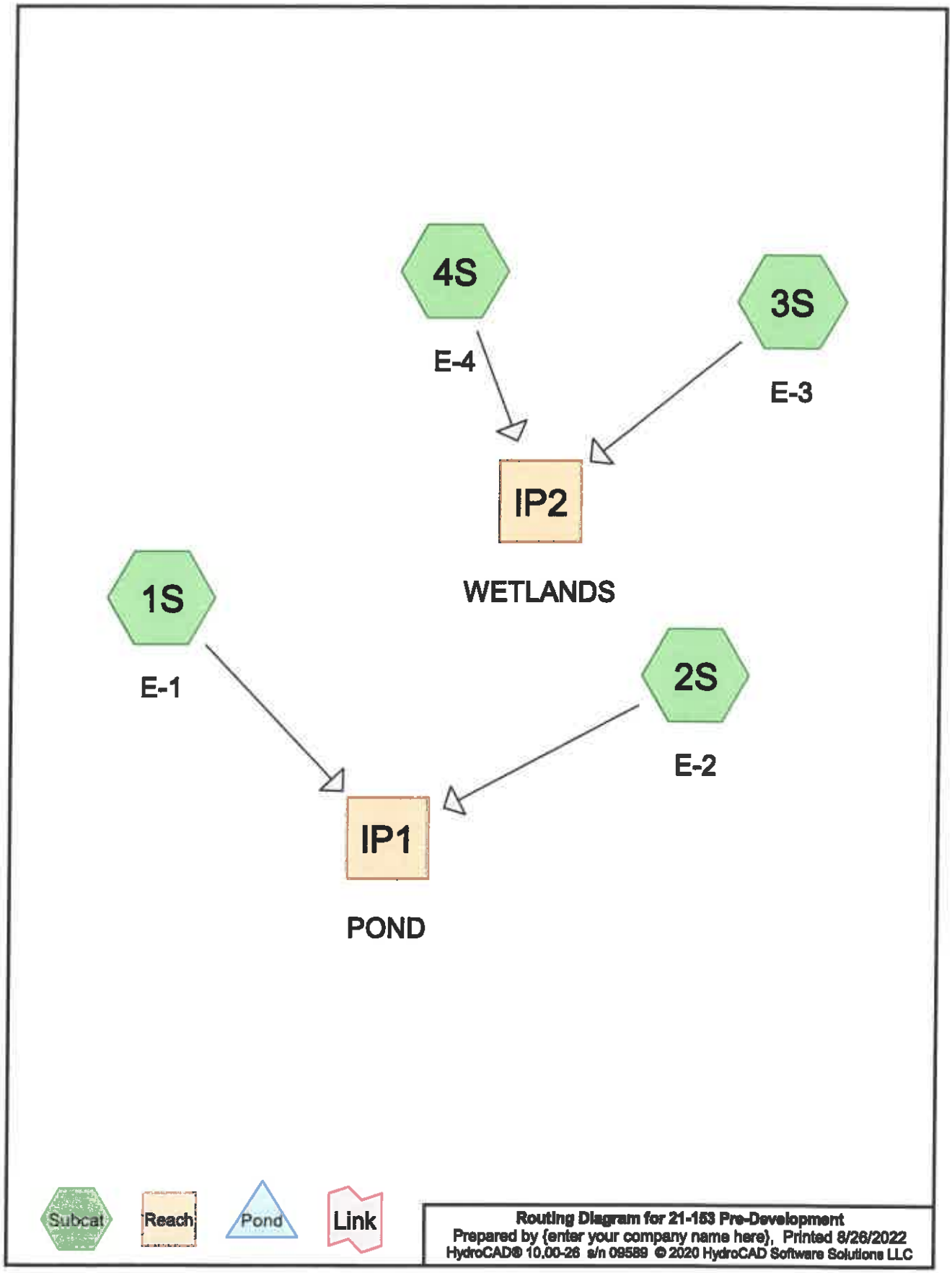
Concrete Trucks:
Concrete trucks shall not be allowed to wash out or discharge surplus concrete or drum wash water on site.

SPILL CONTROL PRACTICES
In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices shall be followed for spill prevention and cleanup:

1. Manufacturer's recommended methods for cleanup shall be readily available at the onsite trailer, and site personnel shall be made aware of the procedures and the location of the information.
2. Materials and equipment necessary for spill clean up shall be kept in the material storage area on site. Equipment and materials shall include, but not be limited to, brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust and plastic and metal trash containers specifically for this purpose.
3. All spills shall be cleaned up immediately after discovery.
4. The spill area shall be kept well ventilated, and personnel shall wear appropriate protective clothing to prevent injury from contact with hazardous substance.
5. Spills of toxic or hazardous material shall be reported to the appropriate State and/or local authority in accordance with local and/or State regulations.
6. The spill prevention plan shall be adjusted to include measures to prevent a particular type of spill from reoccurring and instructions on how to clean up the spill if there is

another occurrence. A description of the spill, what caused it, and the clean up measures shall also be included.

7. The "Manager" shall be the spill prevention and cleanup coordinator. The "Manager" shall designate at least three other site personnel who will be trained in the spill control practices identified above.


4S
3S
E-4
E-3
IP2
WETLANDS
1S
2S
E-1
E-2
IP1
POND
Subcat
Reach
Pond
Link
Routing Diagram for 21-153 Pre-Development
Prepared by {enter your company name here}, Printed 8/26/2022
HydroCAD® 10.00-26 s/n 09589 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
64.727	73	Woods, Fair, HSG C (1S, 2S, 3S, 4S)
64.727	**73**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
64.727	HSG C	1S, 2S, 3S, 4S
0.000	HSG D	
0.000	Other	
64.727		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	64.727	0.000	0.000	64.727	Woods, Fair	1S, 2S, 3S, 4S
0.000	**0.000**	**64.727**	**0.000**	**0.000**	**64.727**	**TOTAL AREA**	

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

Subcatchment 1S: E-1 Runoff Area=1,556,029 sf 0.00% Impervious Runoff Depth>1.01"
Flow Length=1,100' Tc=27.3 min CN=73 Runoff=25.96 cfs 2.994 af

Subcatchment 2S: E-2 Runoff Area=564,741 sf 0.00% Impervious Runoff Depth>1.01"
Flow Length=1,216' Tc=24.2 min CN=73 Runoff=9.92 cfs 1.088 af

Subcatchment 3S: E-3 Runoff Area=562,601 sf 0.00% Impervious Runoff Depth>1.01"
Flow Length=1,000' Tc=26.9 min CN=73 Runoff=9.44 cfs 1.083 af

Subcatchment 4S: E-4 Runoff Area=136,140 sf 0.00% Impervious Runoff Depth>1.01"
Flow Length=386' Tc=18.9 min CN=73 Runoff=2.64 cfs 0.263 af

Reach IP1: POND Inflow=35.73 cfs 4.082 af
Outflow=35.73 cfs 4.082 af

Reach IP2: WETLANDS Inflow=11.78 cfs 1.346 af
Outflow=11.78 cfs 1.346 af

Total Runoff Area = 64.727 ac Runoff Volume = 5.428 af Average Runoff Depth = 1.01"
100.00% Pervious = 64.727 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: E-1

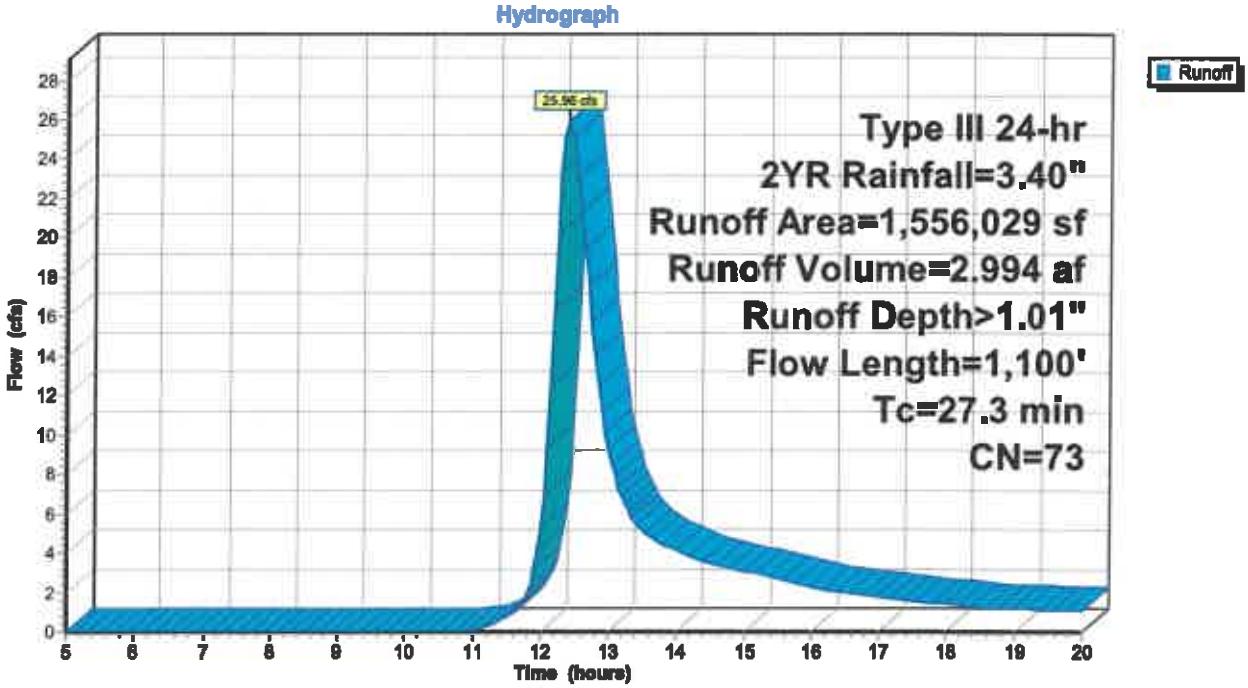
Runoff = 25.96 cfs @ 12.41 hrs, Volume= 2.994 af, Depth> 1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.40"

Area (sf)	CN	Description
1,556,029	73	Woods, Fair, HSG C
1,556,029		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	50	0.0500	0.06		**Sheet Flow, TRAVEL PATH A TO B** Woods: Dense underbrush n= 0.800 P2= 3.20"
12.4	1,050	0.0800	1.41		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Woodland Kv= 5.0 fps
27.3	1,100	Total			

Subcatchment 1S: E-1



Summary for Subcatchment 2S: E-2

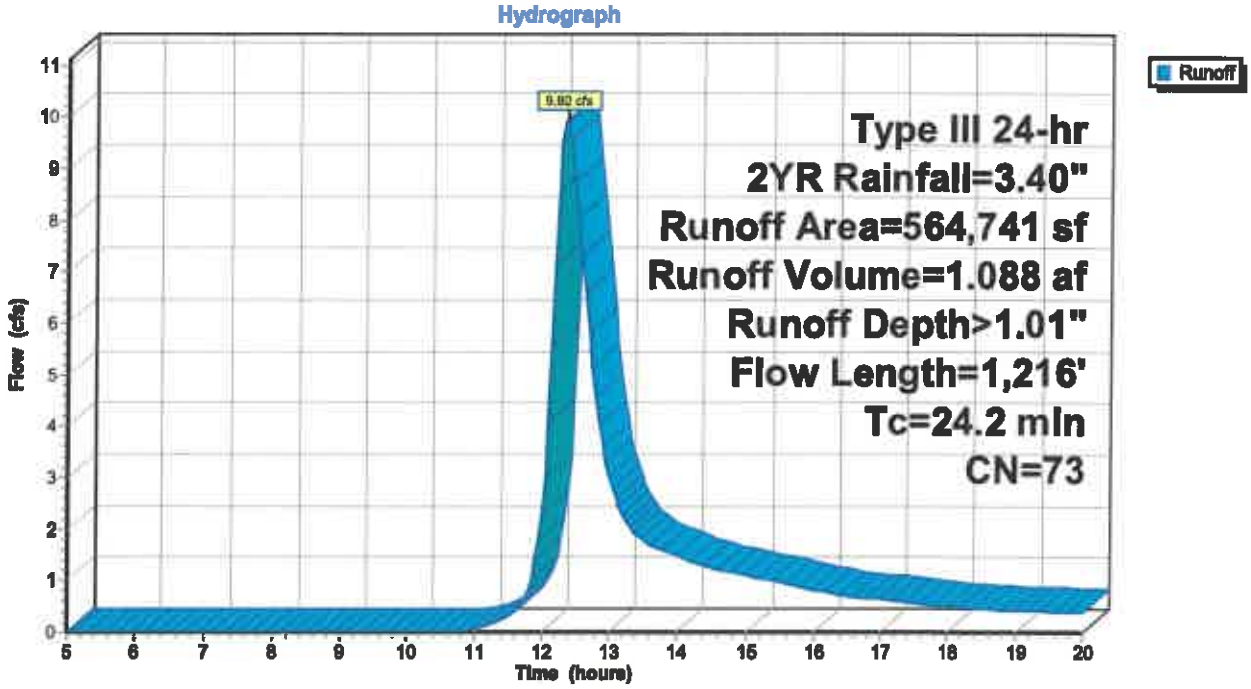
Runoff = 9.92 cfs @ 12.37 hrs, Volume= 1.088 af, Depth> 1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.40"

Area (sf)	CN	Description
564,741	73	Woods, Fair, HSG C
564,741		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	50	0.0500	0.06		**Sheet Flow, TRAVEL PATH A TO B** Woods: Dense underbrush n= 0.800 P2= 3.20"
9.3	1,166	0.0900	2.10		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Short Grass Pasture Kv= 7.0 fps
24.2	1,216	Total			

Subcatchment 2S: E-2



Summary for Subcatchment 3S: E-3

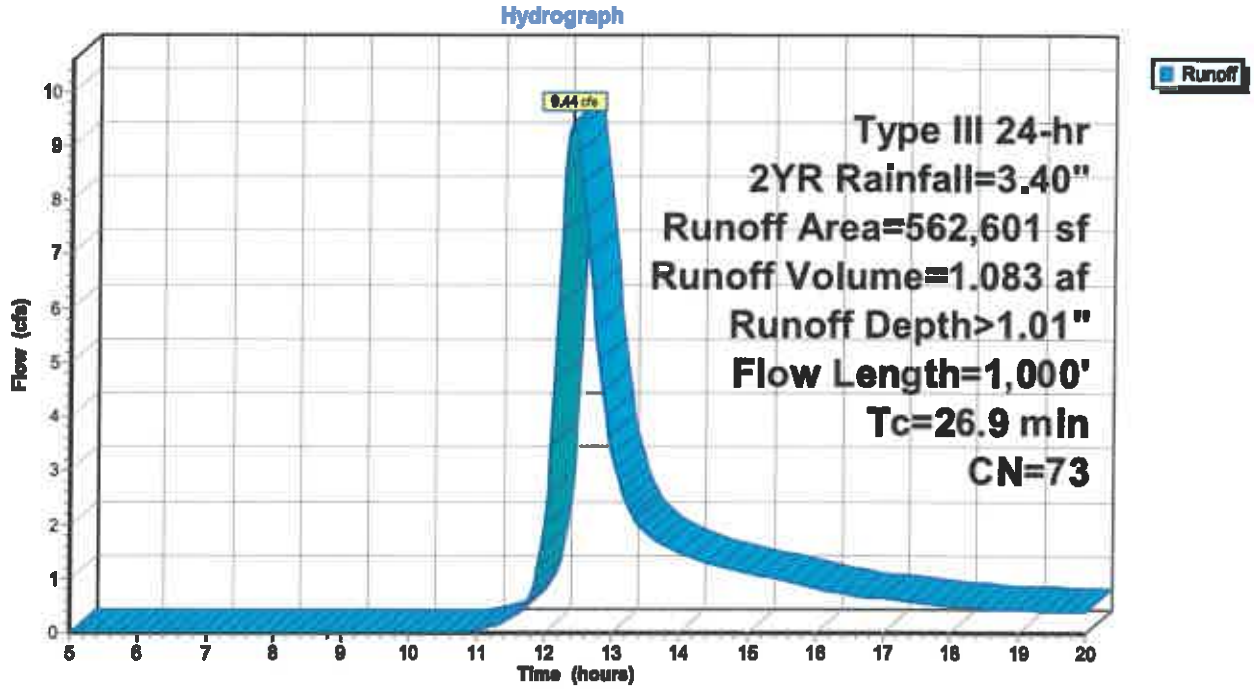
Runoff = 9.44 cfs @ 12.41 hrs, Volume= 1.083 af, Depth> 1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.40"

Area (sf)	CN	Description
562,601	73	Woods, Fair, HSG C
562,601		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0400	0.05		**Sheet Flow, TRAVEL PATH A TO B** Woods: Dense underbrush n= 0.800 P2= 3.20"
10.6	950	0.0900	1.50		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Woodland Kv= 5.0 fps
26.9	1,000	Total			

Subcatchment 3S: E-3



Summary for Subcatchment 4S: E-4

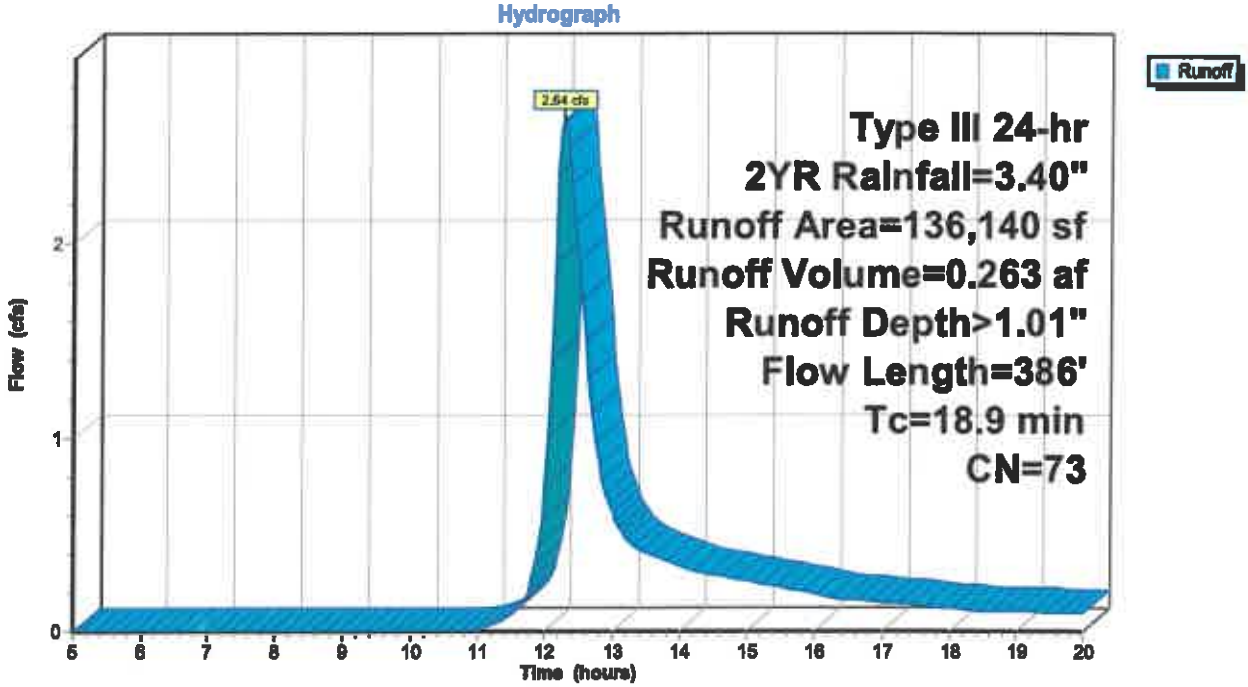
Runoff = 2.64 cfs @ 12.28 hrs, Volume= 0.263 af, Depth> 1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.40"

Area (sf)	CN	Description
136,140	73	Woods, Fair, HSG C
136,140		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	50	0.0500	0.06		**Sheet Flow, TRAVEL PATH A TO B** Woods: Dense underbrush n= 0.800 P2= 3.20"
4.0	336	0.0800	1.41		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Woodland Kv= 5.0 fps
18.9	386	Total			

Subcatchment 4S: E-4



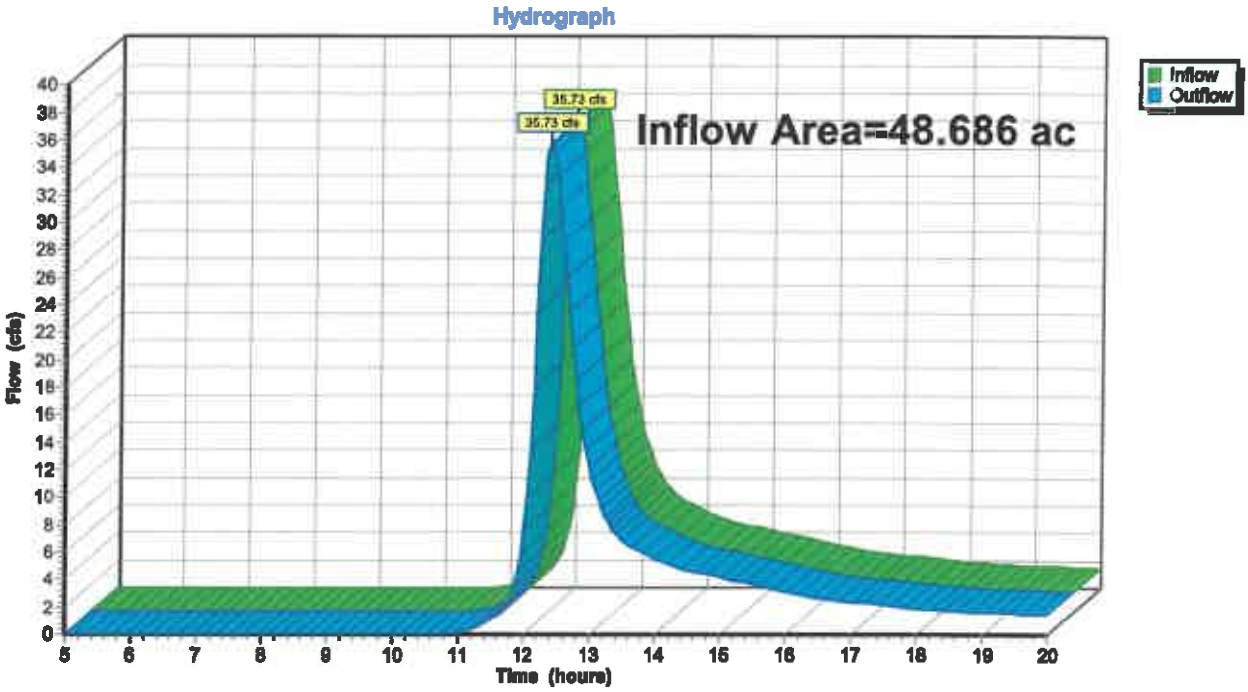
Summary for Reach IP1: POND

Inflow Area = 48.686 ac, 0.00% Impervious, Inflow Depth > 1.01" for 2YR event
Inflow = 35.73 cfs @ 12.40 hrs, Volume= 4.082 af
Outflow = 35.73 cfs @ 12.40 hrs, Volume= 4.082 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 IP1: POND

Hydrograph

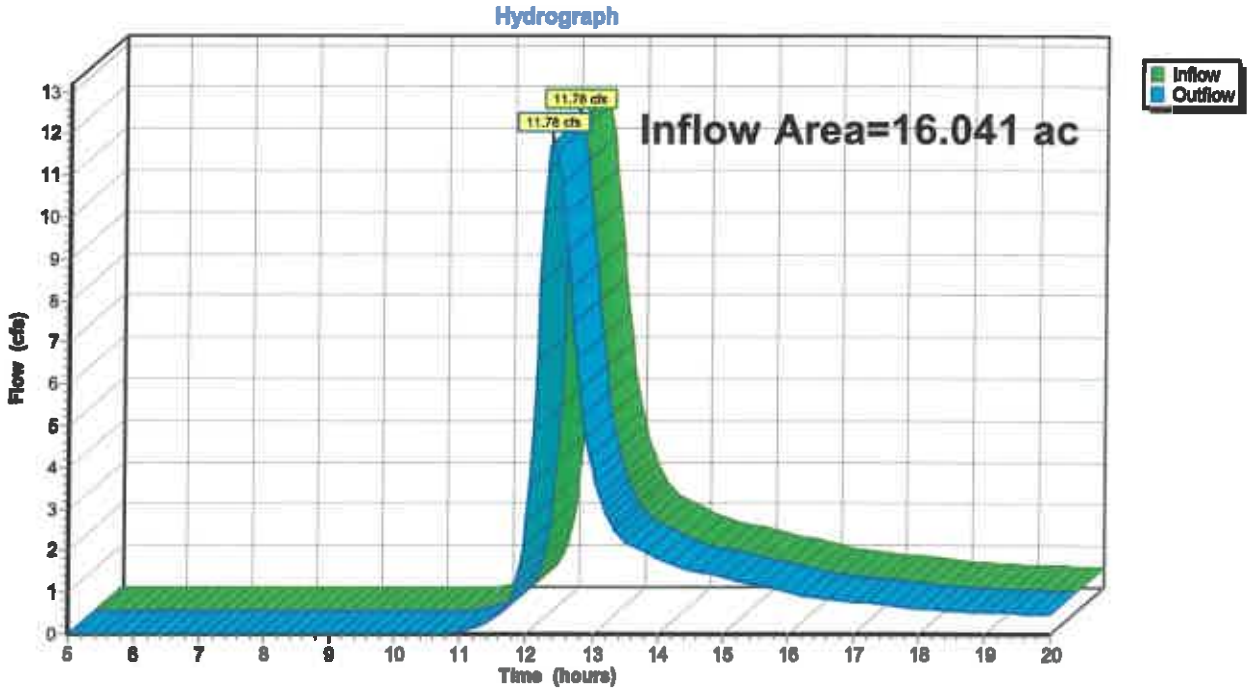


Summary for Reach IP2: WETLANDS

Inflow Area = 16.041 ac, 0.00% Impervious, Inflow Depth > 1.01" for 2YR event
Inflow = 11.78 cfs @ 12.38 hrs, Volume= 1.346 af
Outflow = 11.78 cfs @ 12.38 hrs, Volume= 1.346 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 IP2: WETLANDS



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

Subcatchment 1S: E-1 Runoff Area=1,556,029 sf 0.00% Impervious Runoff Depth>2.02"
Flow Length=1,100' Tc=27.3 min CN=73 Runoff=53.69 cfs 6.012 af

Subcatchment 2S: E-2 Runoff Area=564,741 sf 0.00% Impervious Runoff Depth>2.02"
Flow Length=1,216' Tc=24.2 min CN=73 Runoff=20.54 cfs 2.185 af

Subcatchment 3S: E-3 Runoff Area=562,601 sf 0.00% Impervious Runoff Depth>2.02"
Flow Length=1,000' Tc=26.9 min CN=73 Runoff=19.54 cfs 2.174 af

Subcatchment 4S: E-4 Runoff Area=136,140 sf 0.00% Impervious Runoff Depth>2.03"
Flow Length=386' Tc=18.9 min CN=73 Runoff=5.49 cfs 0.528 af

Reach IP1: POND Inflow=73.94 cfs 8.197 af
Outflow=73.94 cfs 8.197 af

Reach IP2: WETLANDS Inflow=24.42 cfs 2.702 af
Outflow=24.42 cfs 2.702 af

Total Runoff Area = 64.727 ac Runoff Volume = 10.899 af Average Runoff Depth = 2.02"
100.00% Pervious = 64.727 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: E-1

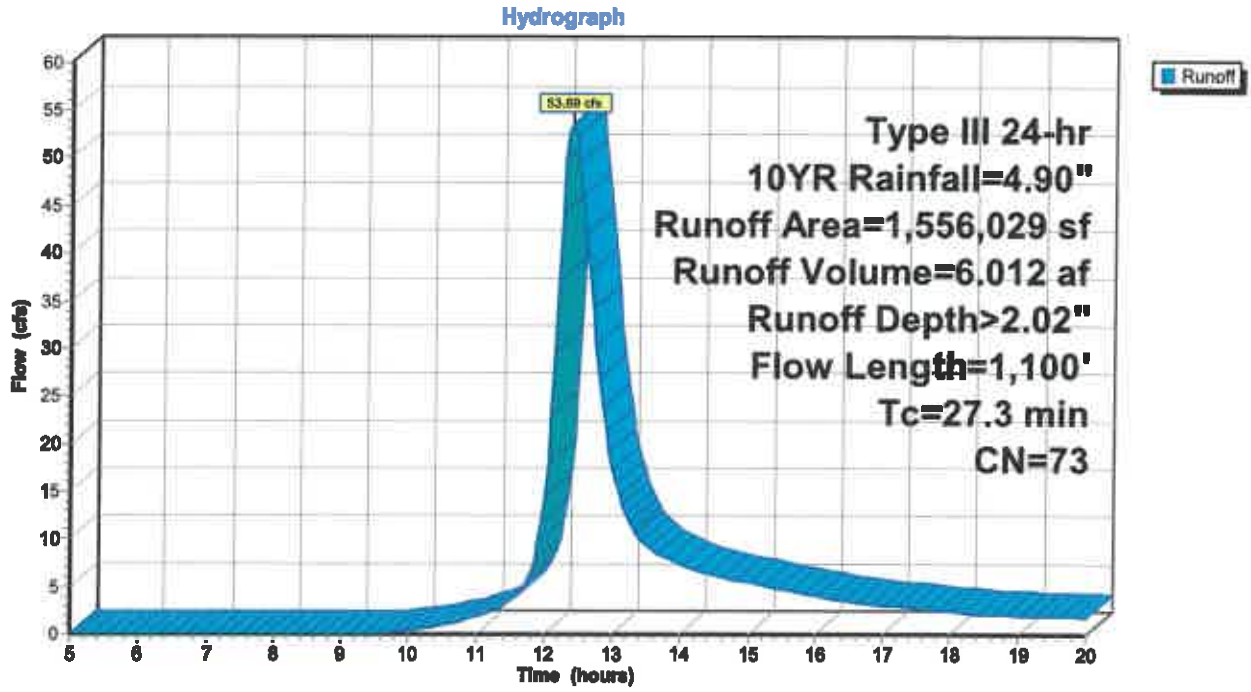
Runoff = 53.69 cfs @ 12.39 hrs, Volume= 6.012 af, Depth> 2.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.90"

Area (sf)	CN	Description
1,556,029	73	Woods, Fair, HSG C
1,556,029		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	50	0.0500	0.06		**Sheet Flow, TRAVEL PATH A TO B** Woods: Dense underbrush n= 0.800 P2= 3.20"
12.4	1,050	0.0800	1.41		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Woodland Kv= 5.0 fps
27.3	1,100	Total			

Subcatchment 1S: E-1



Summary for Subcatchment 2S: E-2

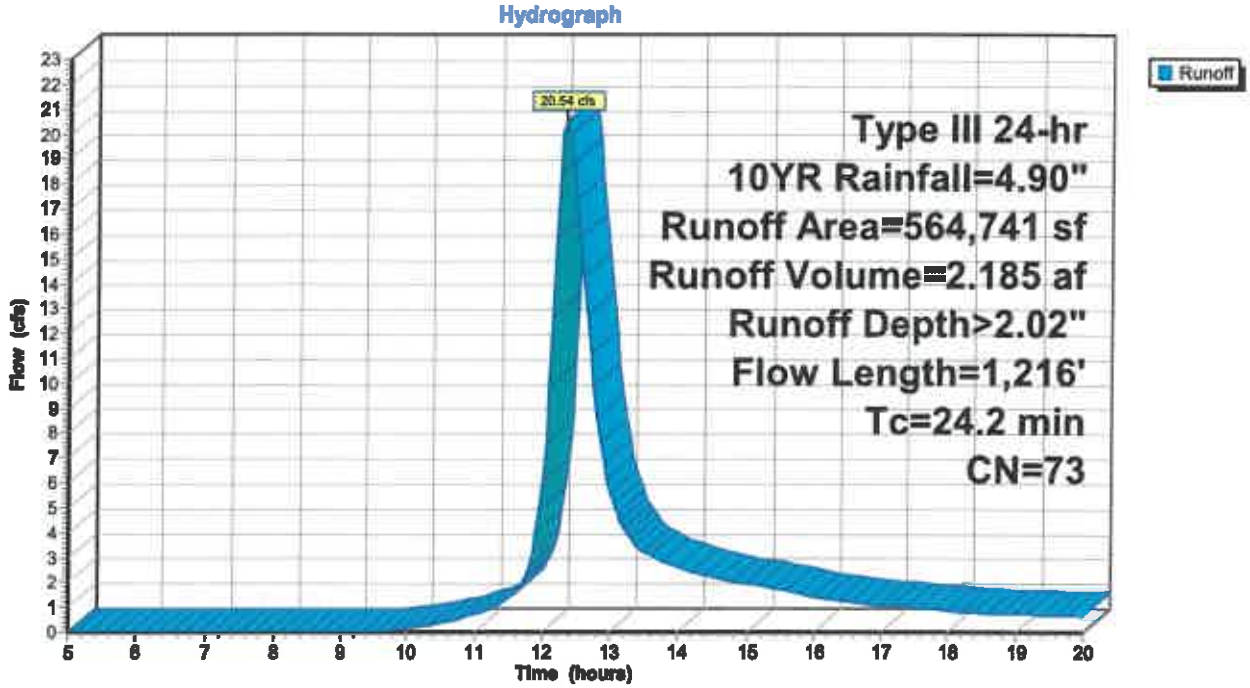
Runoff = 20.54 cfs @ 12.35 hrs, Volume= 2.185 af, Depth> 2.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.90"

Area (sf)	CN	Description
564,741	73	Woods, Fair, HSG C
564,741		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	50	0.0500	0.06		**Sheet Flow, TRAVEL PATH A TO B** Woods: Dense underbrush n= 0.800 P2= 3.20"
9.3	1,166	0.0900	2.10		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Short Grass Pasture Kv= 7.0 fps
24.2	1,216	Total			

Subcatchment 2S: E-2



Summary for Subcatchment 3S: E-3

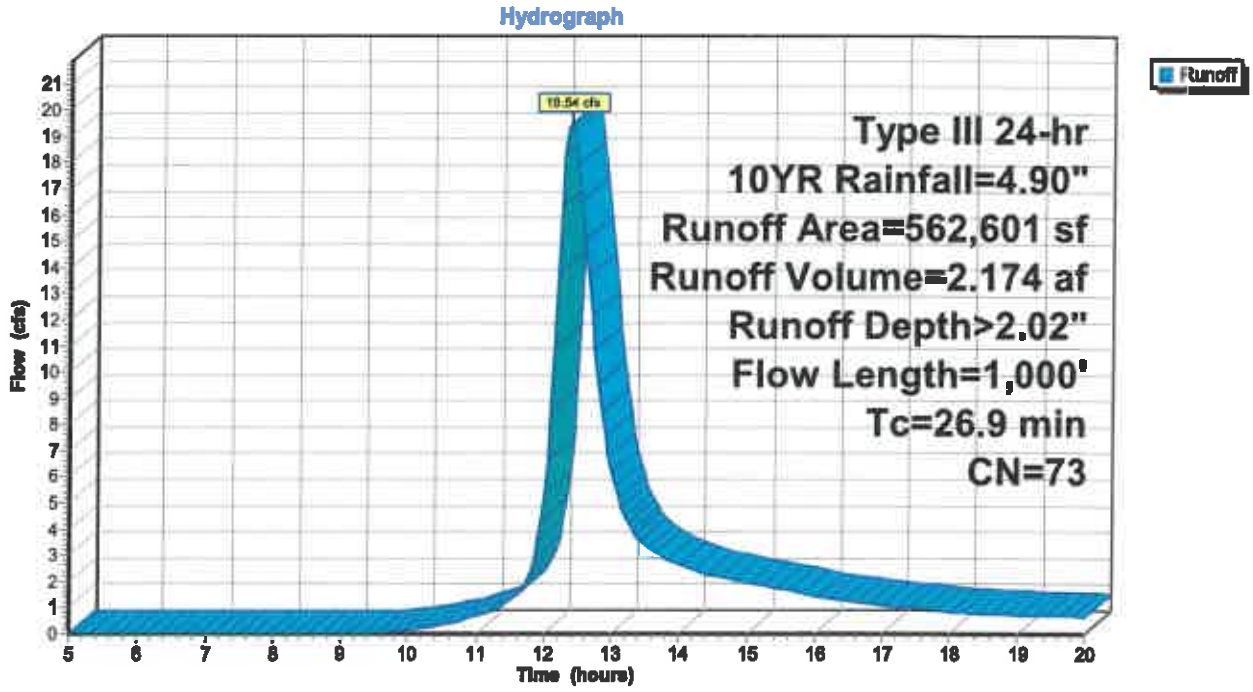
Runoff = 19.54 cfs @ 12.39 hrs, Volume= 2.174 af, Depth> 2.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.90"

Area (sf)	CN	Description
562,601	73	Woods, Fair, HSG C
562,601		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0400	0.05		**Sheet Flow, TRAVEL PATH A TO B** Woods: Dense underbrush n= 0.800 P2= 3.20"
10.6	950	0.0900	1.50		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Woodland Kv= 5.0 fps
26.9	1,000	Total			

Subcatchment 3S: E-3



Summary for Subcatchment 4S: E-4

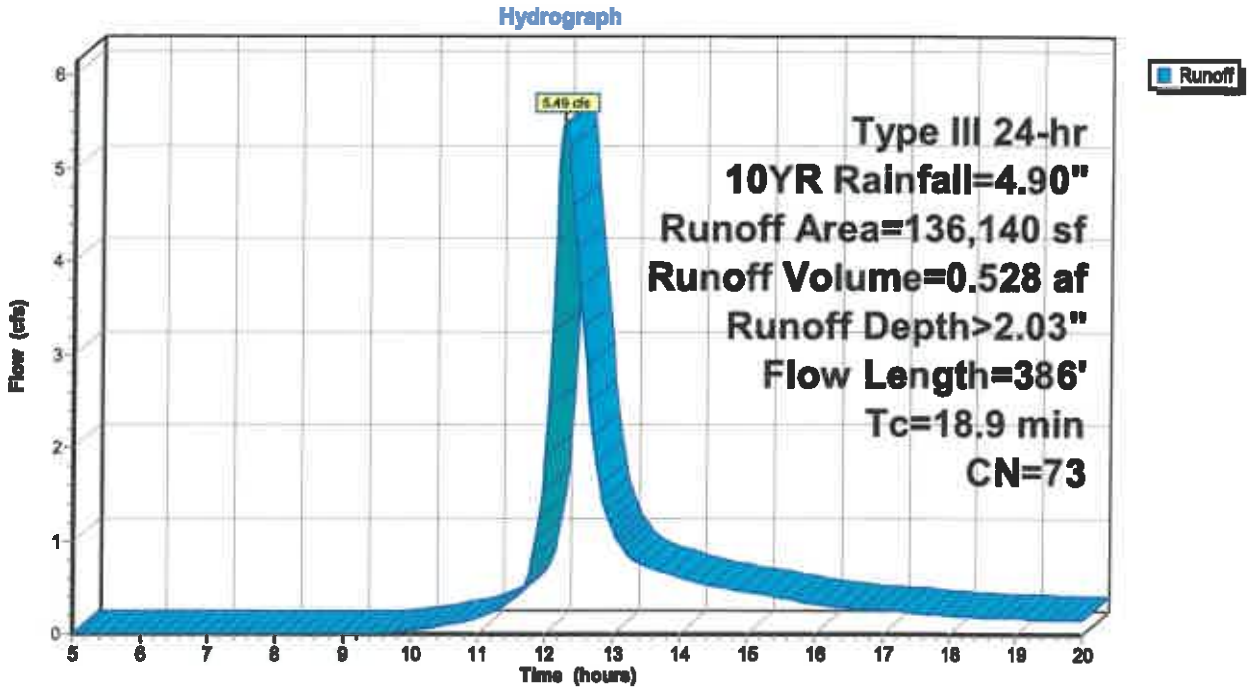
Runoff = 5.49 cfs @ 12.27 hrs, Volume= 0.528 af, Depth> 2.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.90"

Area (sf)	CN	Description
136,140	73	Woods, Fair, HSG C
136,140		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	50	0.0500	0.06		**Sheet Flow, TRAVEL PATH A TO B** Woods: Dense underbrush n= 0.800 P2= 3.20"
4.0	336	0.0800	1.41		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Woodland Kv= 5.0 fps
18.9	386	Total			

Subcatchment 4S: E-4

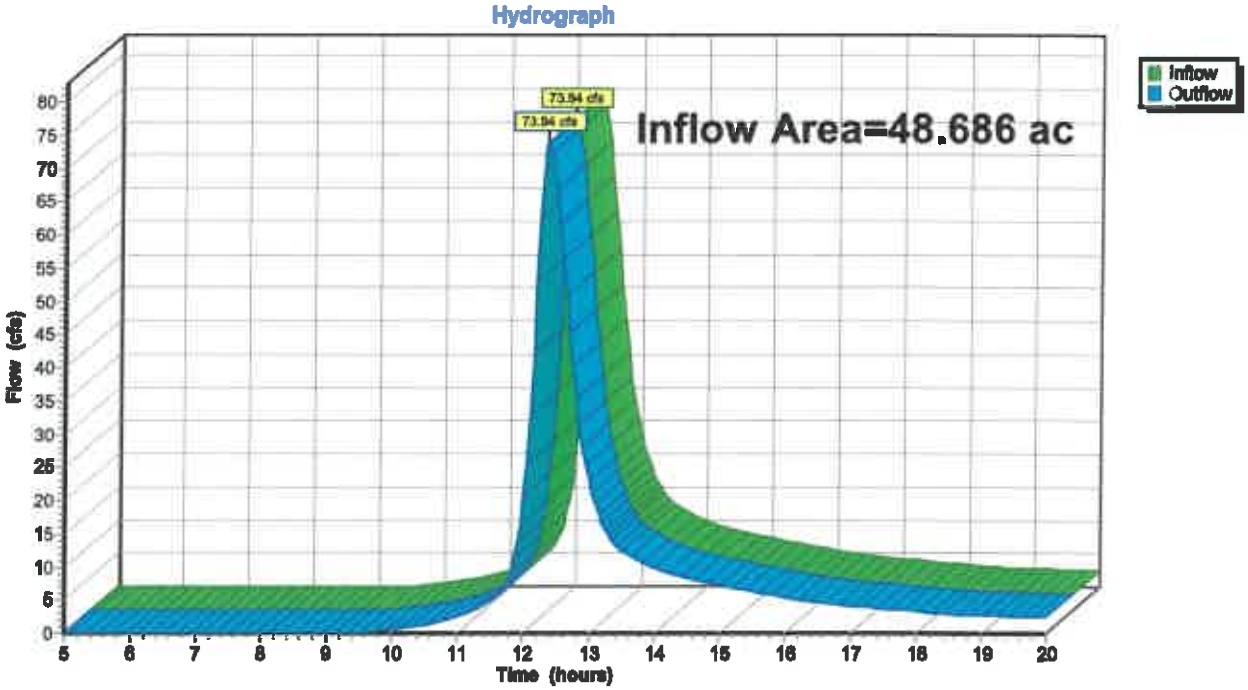


Summary for Reach IP1: POND

Inflow Area = 48.686 ac, 0.00% Impervious, Inflow Depth > 2.02" for 10YR event
Inflow = 73.94 cfs @ 12.38 hrs, Volume= 8.197 af
Outflow = 73.94 cfs @ 12.38 hrs, Volume= 8.197 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 IP1: POND

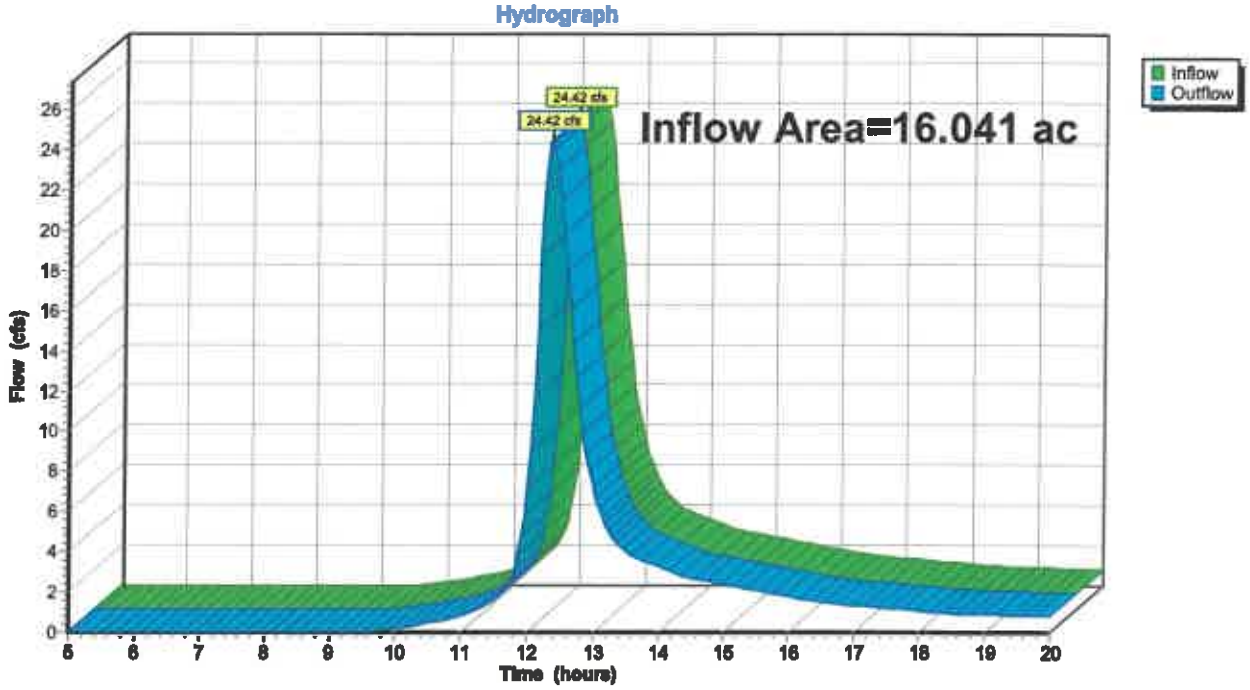


Summary for Reach IP2: WETLANDS

Inflow Area = 16.041 ac, 0.00% Impervious, Inflow Depth > 2.02" for 10YR event
Inflow = 24.42 cfs @ 12.36 hrs, Volume= 2.702 af
Outflow = 24.42 cfs @ 12.36 hrs, Volume= 2.702 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 IP2: WETLANDS



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

Subcatchment 1S: E-1 Runoff Area=1,556,029 sf 0.00% Impervious Runoff Depth>2.93"
Flow Length=1,100' Tc=27.3 min CN=73 Runoff=78.04 cfs 8.716 af

Subcatchment 2S: E-2 Runoff Area=564,741 sf 0.00% Impervious Runoff Depth>2.93"
Flow Length=1,216' Tc=24.2 min CN=73 Runoff=29.86 cfs 3.167 af

Subcatchment 3S: E-3 Runoff Area=562,601 sf 0.00% Impervious Runoff Depth>2.93"
Flow Length=1,000' Tc=26.9 min CN=73 Runoff=28.40 cfs 3.152 af

Subcatchment 4S: E-4 Runoff Area=136,140 sf 0.00% Impervious Runoff Depth>2.94"
Flow Length=386' Tc=18.9 min CN=73 Runoff=7.99 cfs 0.765 af

Reach IP1: POND Inflow=107.63 cfs 11.882 af
Outflow=107.63 cfs 11.882 af

Reach IP2: WETLANDS Inflow=35.51 cfs 3.917 af
Outflow=35.51 cfs 3.917 af

Total Runoff Area = 64.727 ac Runoff Volume = 15.799 af Average Runoff Depth = 2.93"
100.00% Pervious = 64.727 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: E-1

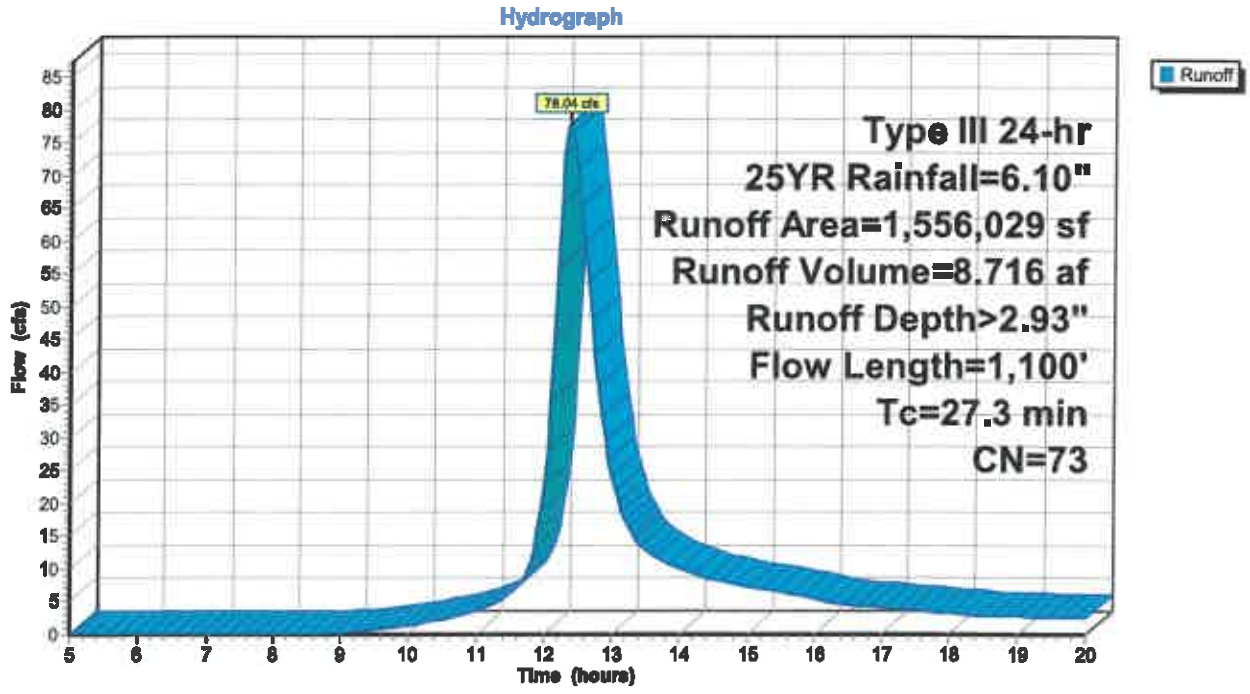
Runoff = 78.04 cfs @ 12.38 hrs, Volume= 8.716 af, Depth> 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.10"

Area (sf)	CN	Description
1,556,029	73	Woods, Fair, HSG C
1,556,029		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	50	0.0500	0.06		**Sheet Flow, TRAVEL PATH A TO B** Woods: Dense underbrush n= 0.800 P2= 3.20"
12.4	1,050	0.0800	1.41		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Woodland Kv= 5.0 fps
27.3	1,100	Total			

Subcatchment 1S: E-1



Summary for Subcatchment 2S: E-2

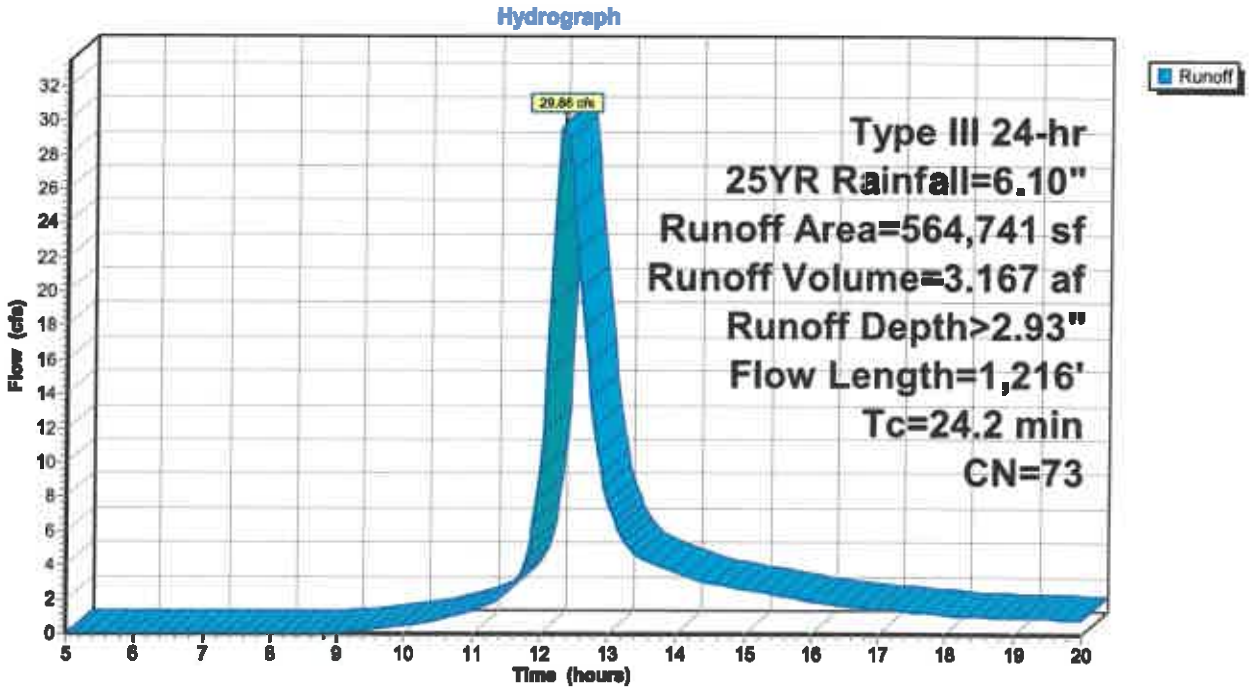
Runoff = 29.86 cfs @ 12.34 hrs, Volume= 3.167 af, Depth> 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.10"

Area (sf)	CN	Description
564,741	73	Woods, Fair, HSG C
564,741		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	50	0.0500	0.06		**Sheet Flow, TRAVEL PATH A TO B** Woods: Dense underbrush n= 0.800 P2= 3.20"
9.3	1,166	0.0900	2.10		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Short Grass Pasture Kv= 7.0 fps
24.2	1,216	Total			

Subcatchment 2S: E-2



Summary for Subcatchment 3S: E-3

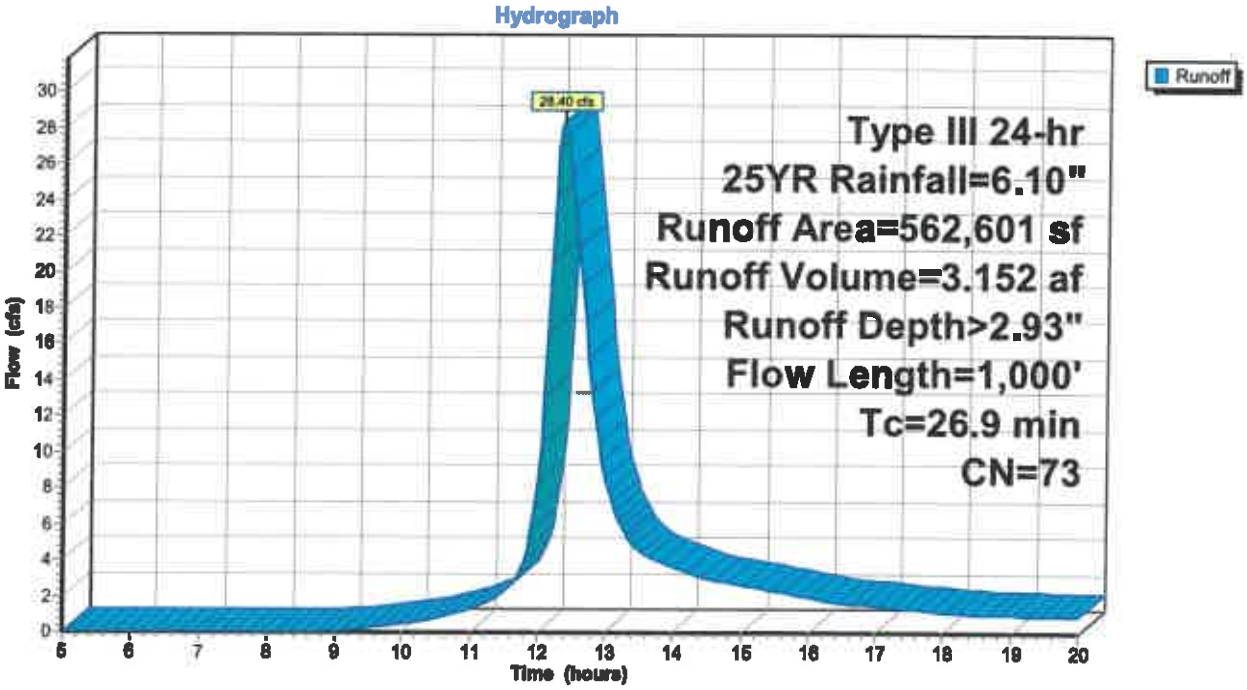
Runoff = 28.40 cfs @ 12.38 hrs, Volume= 3.152 af, Depth> 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.10"

Area (sf)	CN	Description
562,601	73	Woods, Fair, HSG C
562,601		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0400	0.05		**Sheet Flow, TRAVEL PATH A TO B** Woods: Dense underbrush n= 0.800 P2= 3.20"
10.6	950	0.0900	1.50		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Woodland Kv= 5.0 fps
26.9	1,000	Total			

Subcatchment 3S: E-3



Summary for Subcatchment 4S: E-4

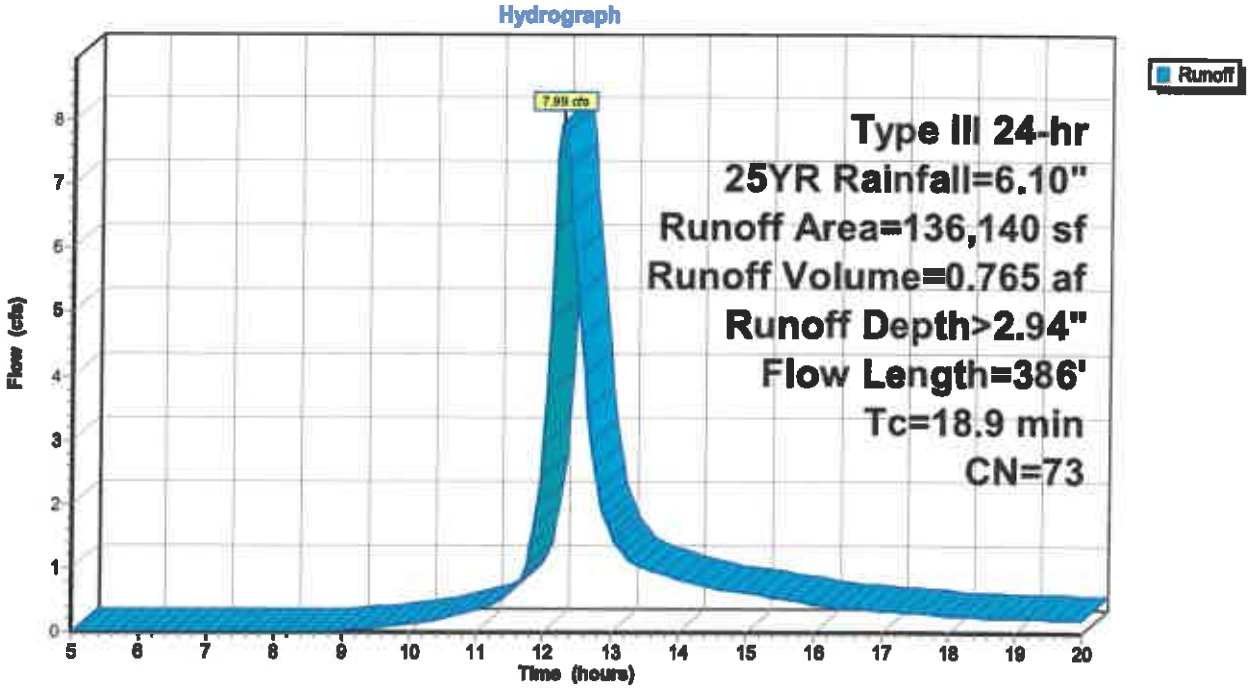
Runoff = 7.99 cfs @ 12.26 hrs, Volume= 0.765 af, Depth> 2.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.10"

Area (sf)	CN	Description
136,140	73	Woods, Fair, HSG C
136,140		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	50	0.0500	0.06		**Sheet Flow, TRAVEL PATH A TO B** Woods: Dense underbrush n= 0.800 P2= 3.20"
4.0	336	0.0800	1.41		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Woodland Kv= 5.0 fps
18.9	386	Total			

Subcatchment 4S: E-4

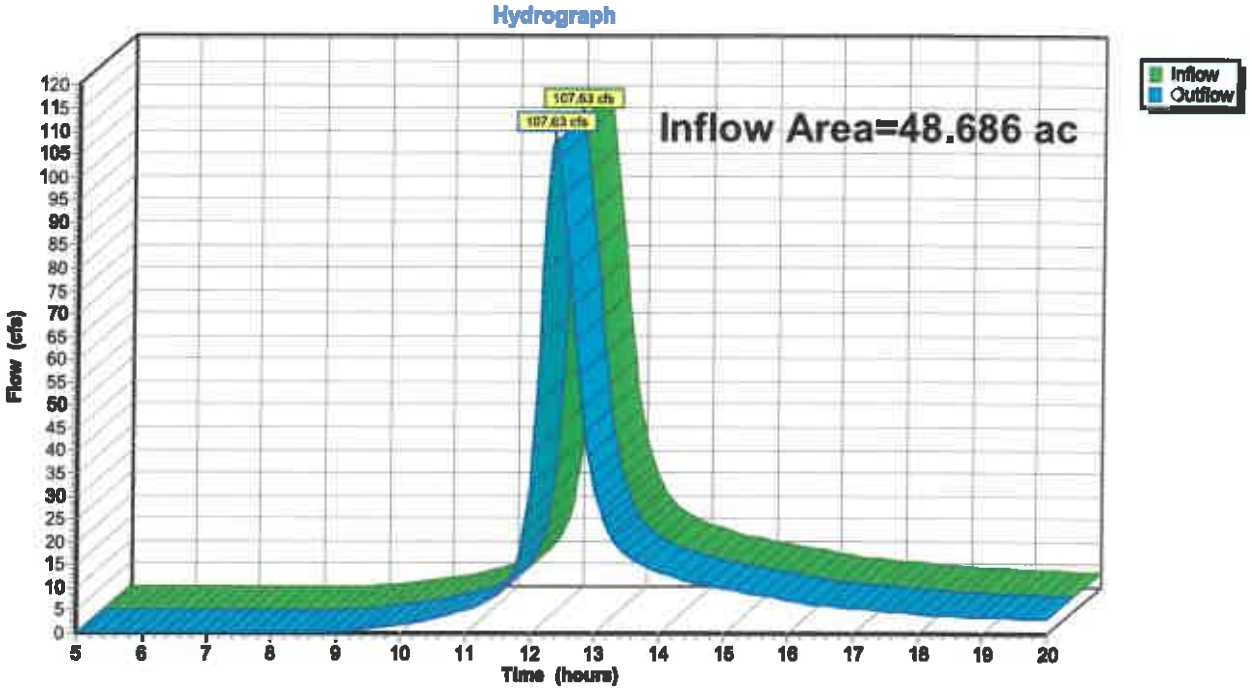


Summary for Reach IP1: POND

Inflow Area = 48.686 ac, 0.00% Impervious, Inflow Depth > 2.93" for 25YR event
Inflow = 107.63 cfs @ 12.37 hrs, Volume= 11.882 af
Outflow = 107.63 cfs @ 12.37 hrs, Volume= 11.882 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 IP1: POND

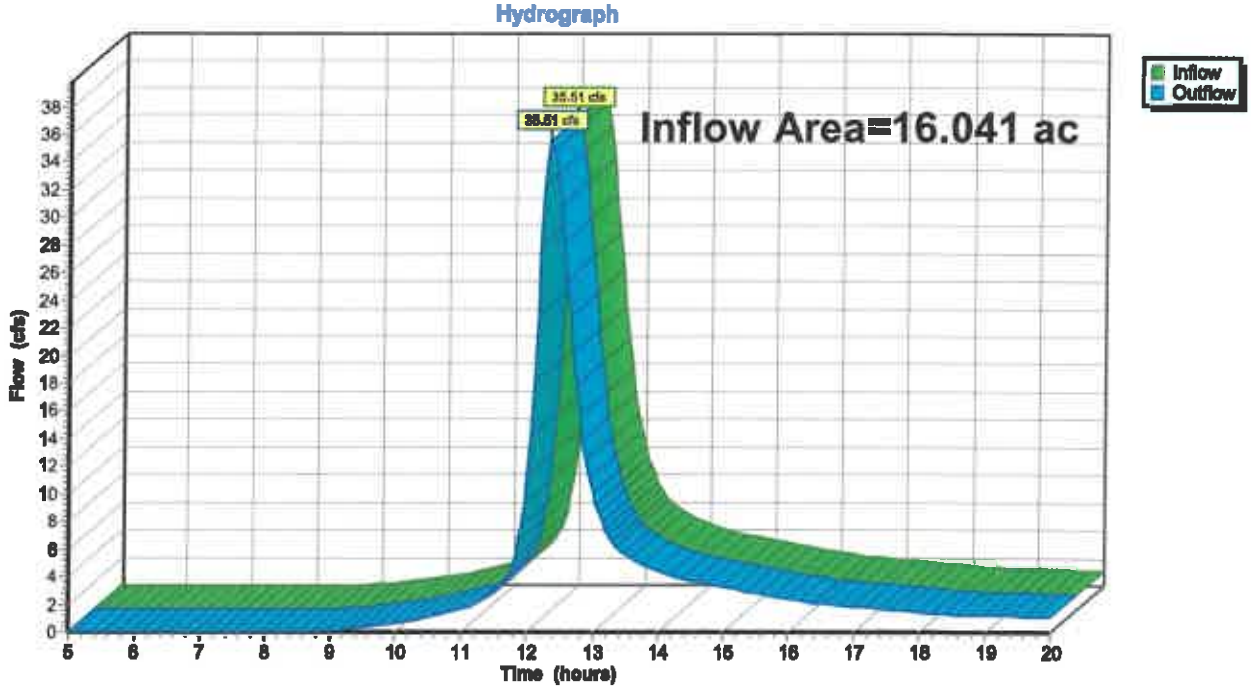


Summary for Reach IP2: WETLANDS

Inflow Area = 16.041 ac, 0.00% Impervious, Inflow Depth > 2.93" for 25YR event
Inflow = 35.51 cfs @ 12.35 hrs, Volume= 3.917 af
Outflow = 35.51 cfs @ 12.35 hrs, Volume= 3.917 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 IP2: WETLANDS



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

Subcatchment 1S: E-1 Runoff Area=1,556,029 sf 0.00% Impervious Runoff Depth>3.56"
Flow Length=1,100' Tc=27.3 min CN=73 Runoff=94.87 cfs 10.611 af

Subcatchment 2S: E-2 Runoff Area=564,741 sf 0.00% Impervious Runoff Depth>3.57"
Flow Length=1,216' Tc=24.2 min CN=73 Runoff=36.30 cfs 3.855 af

Subcatchment 3S: E-3 Runoff Area=562,601 sf 0.00% Impervious Runoff Depth>3.56"
Flow Length=1,000' Tc=26.9 min CN=73 Runoff=34.56 cfs 3.837 af

Subcatchment 4S: E-4 Runoff Area=136,140 sf 0.00% Impervious Runoff Depth>3.57"
Flow Length=386' Tc=18.9 min CN=73 Runoff=9.71 cfs 0.931 af

Reach IP1: POND Inflow=130.86 cfs 14.466 af
Outflow=130.86 cfs 14.466 af

Reach IP2: WETLANDS Inflow=43.18 cfs 4.768 af
Outflow=43.18 cfs 4.768 af

Total Runoff Area = 64.727 ac Runoff Volume = 19.234 af Average Runoff Depth = 3.57"
100.00% Pervious = 64.727 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: E-1

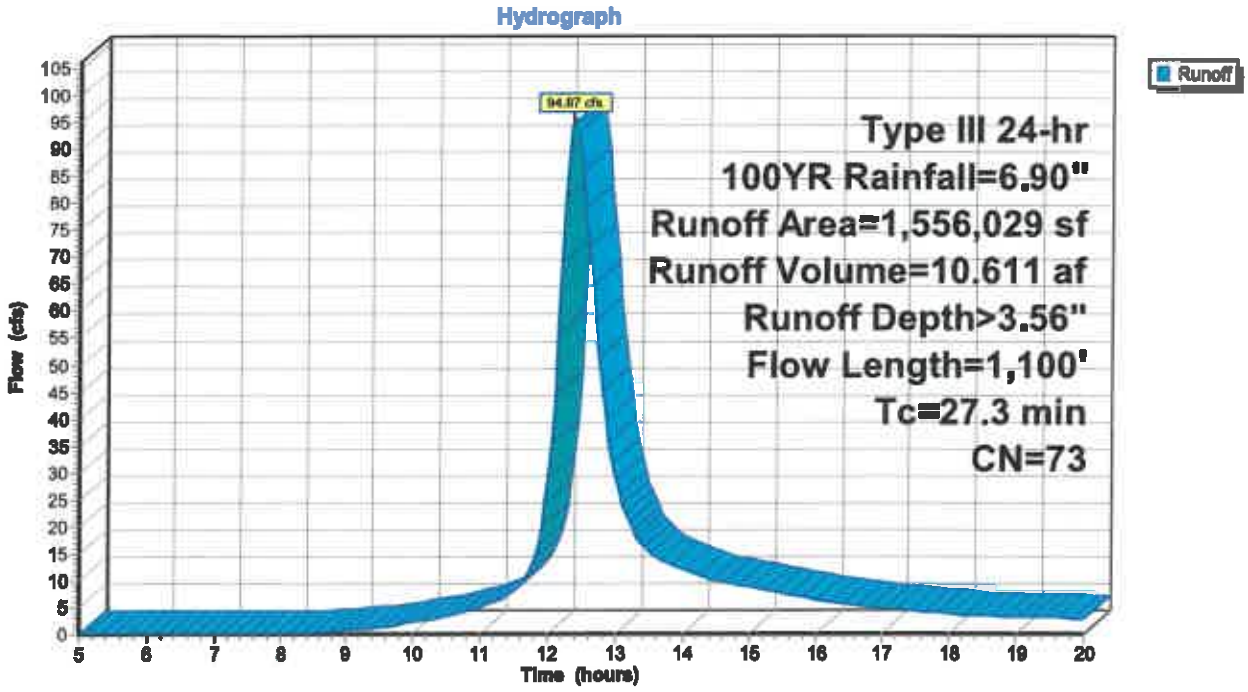
Runoff = 94.87 cfs @ 12.38 hrs, Volume= 10.611 af, Depth> 3.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.90"

Area (sf)	CN	Description
1,556,029	73	Woods, Fair, HSG C
1,556,029		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	50	0.0500	0.06		**Sheet Flow, TRAVEL PATH A TO B** Woods: Dense underbrush n= 0.800 P2= 3.20"
12.4	1,050	0.0800	1.41		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Woodland Kv= 5.0 fps
27.3	1,100	Total			

Subcatchment 1S: E-1



Summary for Subcatchment 2S: E-2

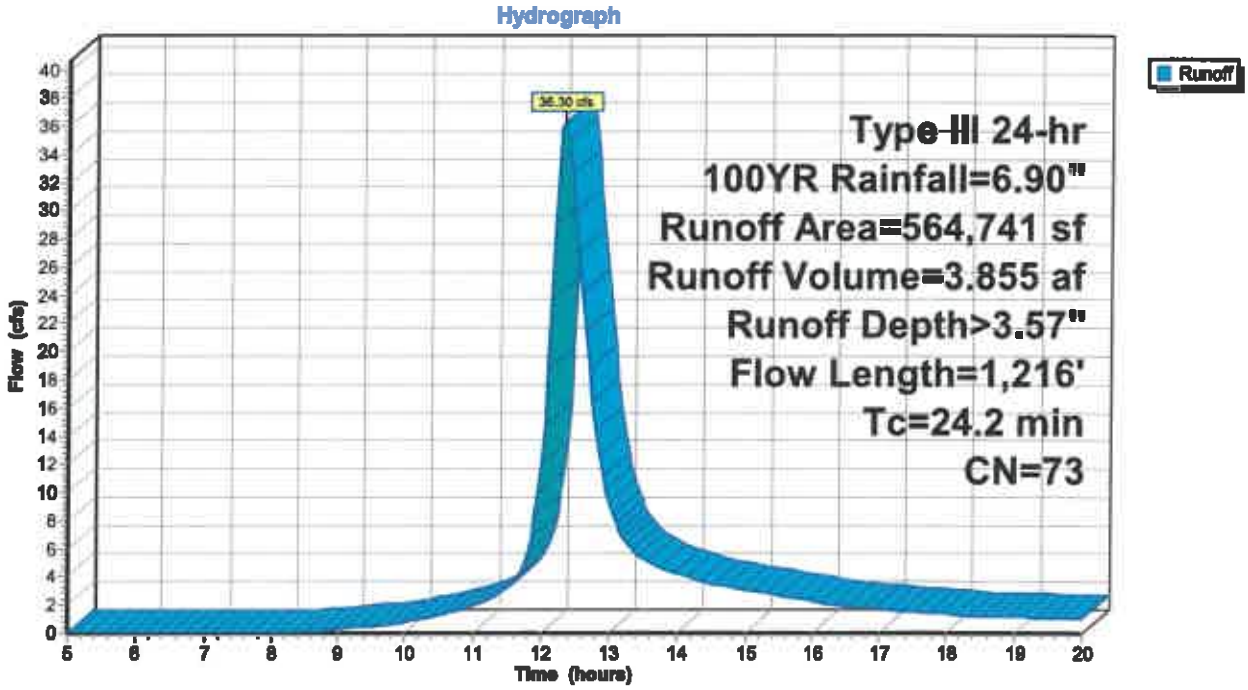
Runoff = 36.30 cfs @ 12.34 hrs, Volume= 3.855 af, Depth> 3.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.90"

Area (sf)	CN	Description
564,741	73	Woods, Fair, HSG C
564,741		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	50	0.0500	0.06		**Sheet Flow, TRAVEL PATH A TO B** Woods: Dense underbrush n= 0.800 P2= 3.20"
9.3	1,166	0.0900	2.10		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Short Grass Pasture Kv= 7.0 fps
24.2	1,216	Total			

Subcatchment 2S: E-2



Summary for Subcatchment 3S: E-3

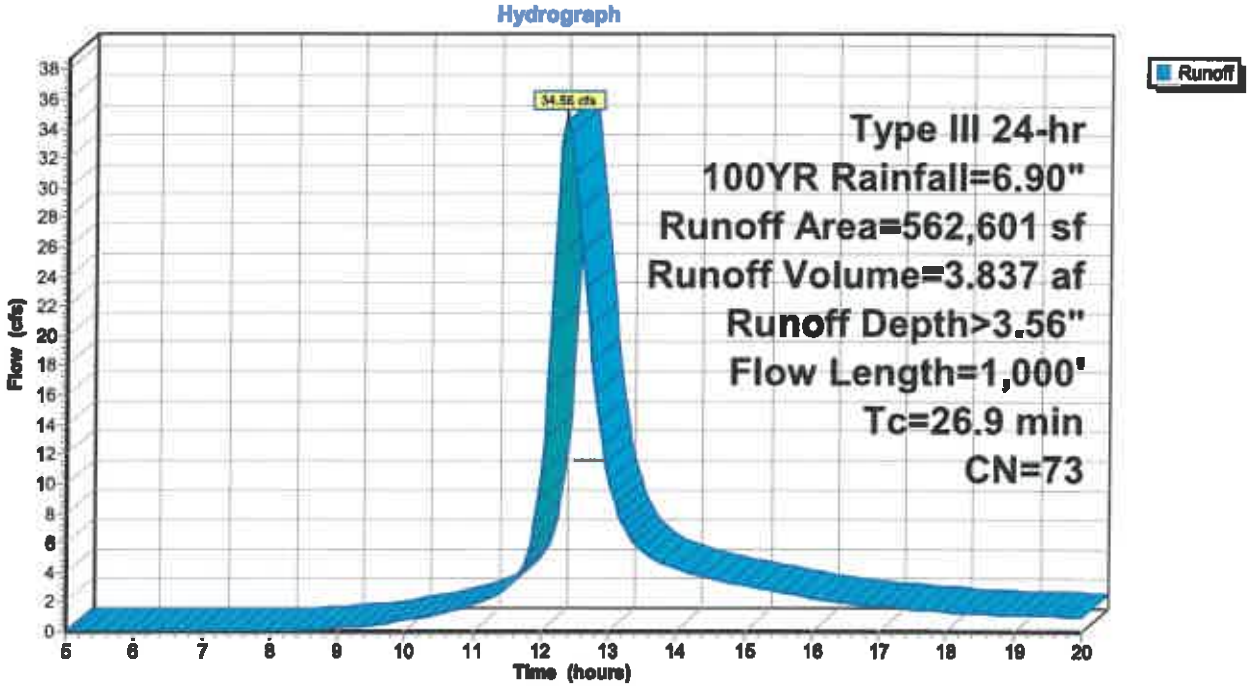
Runoff = 34.56 cfs @ 12.37 hrs, Volume= 3.837 af, Depth> 3.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.90"

Area (sf)	CN	Description
562,601	73	Woods, Fair, HSG C
562,601		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0400	0.05		**Sheet Flow, TRAVEL PATH A TO B** Woods: Dense underbrush n= 0.800 P2= 3.20"
10.6	950	0.0900	1.50		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Woodland Kv= 5.0 fps
26.9	1,000	Total			

Subcatchment 3S: E-3



Summary for Subcatchment 4S: E-4

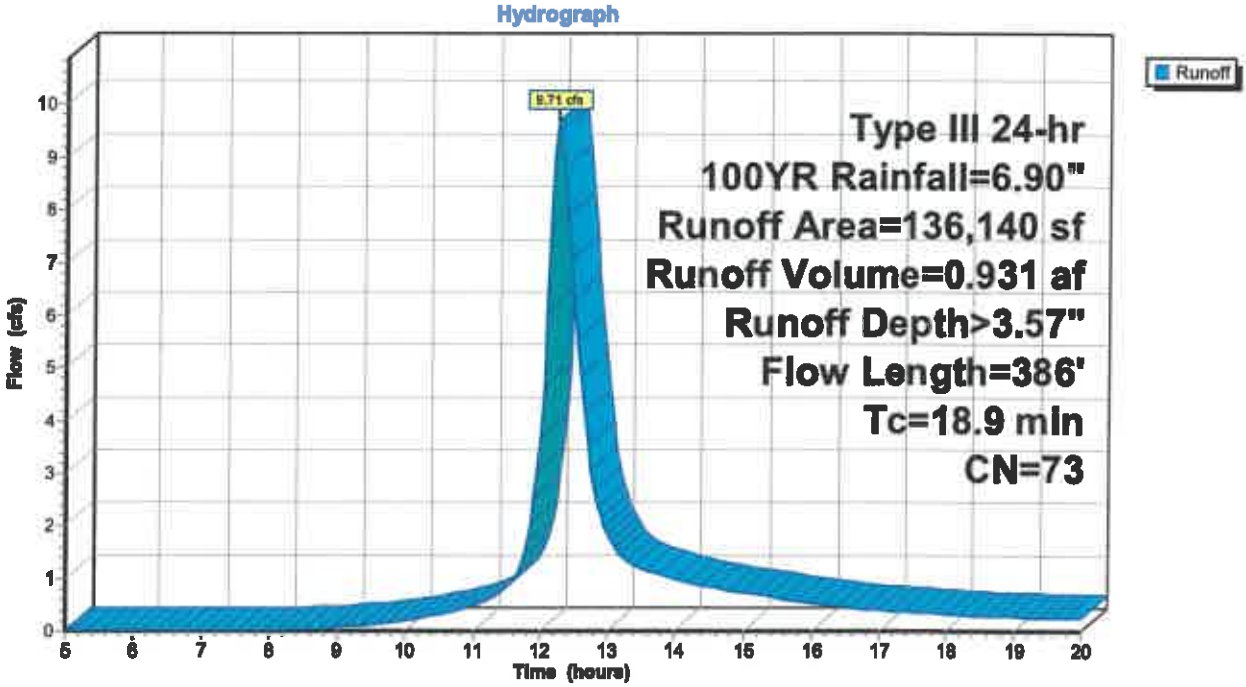
Runoff = 9.71 cfs @ 12.26 hrs, Volume= 0.931 af, Depth> 3.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.90"

Area (sf)	CN	Description
136,140	73	Woods, Fair, HSG C
136,140		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	50	0.0500	0.06		**Sheet Flow, TRAVEL PATH A TO B** Woods: Dense underbrush n= 0.800 P2= 3.20"
4.0	336	0.0800	1.41		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Woodland Kv= 5.0 fps
18.9	386	Total			

Subcatchment 4S: E-4

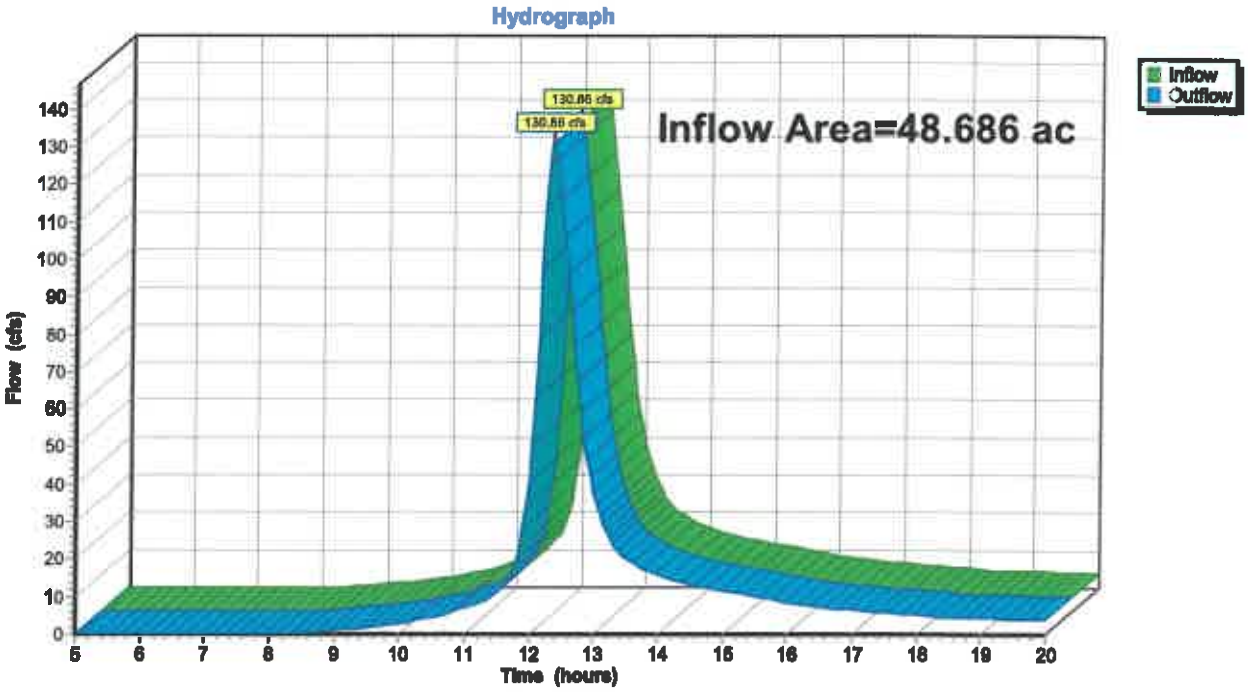


Summary for Reach IP1: POND

Inflow Area = 48.686 ac, 0.00% Impervious, Inflow Depth > 3.57" for 100YR event
Inflow = 130.86 cfs @ 12.37 hrs, Volume= 14.466 af
Outflow = 130.86 cfs @ 12.37 hrs, Volume= 14.466 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 IP1: POND

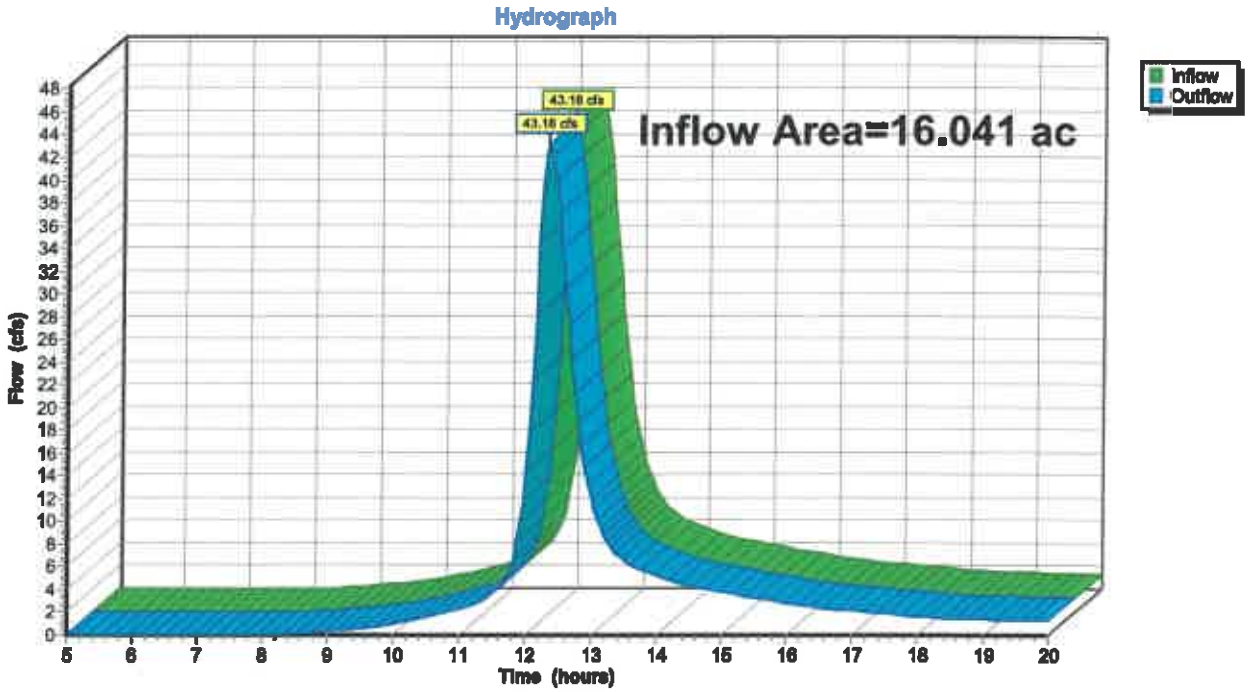


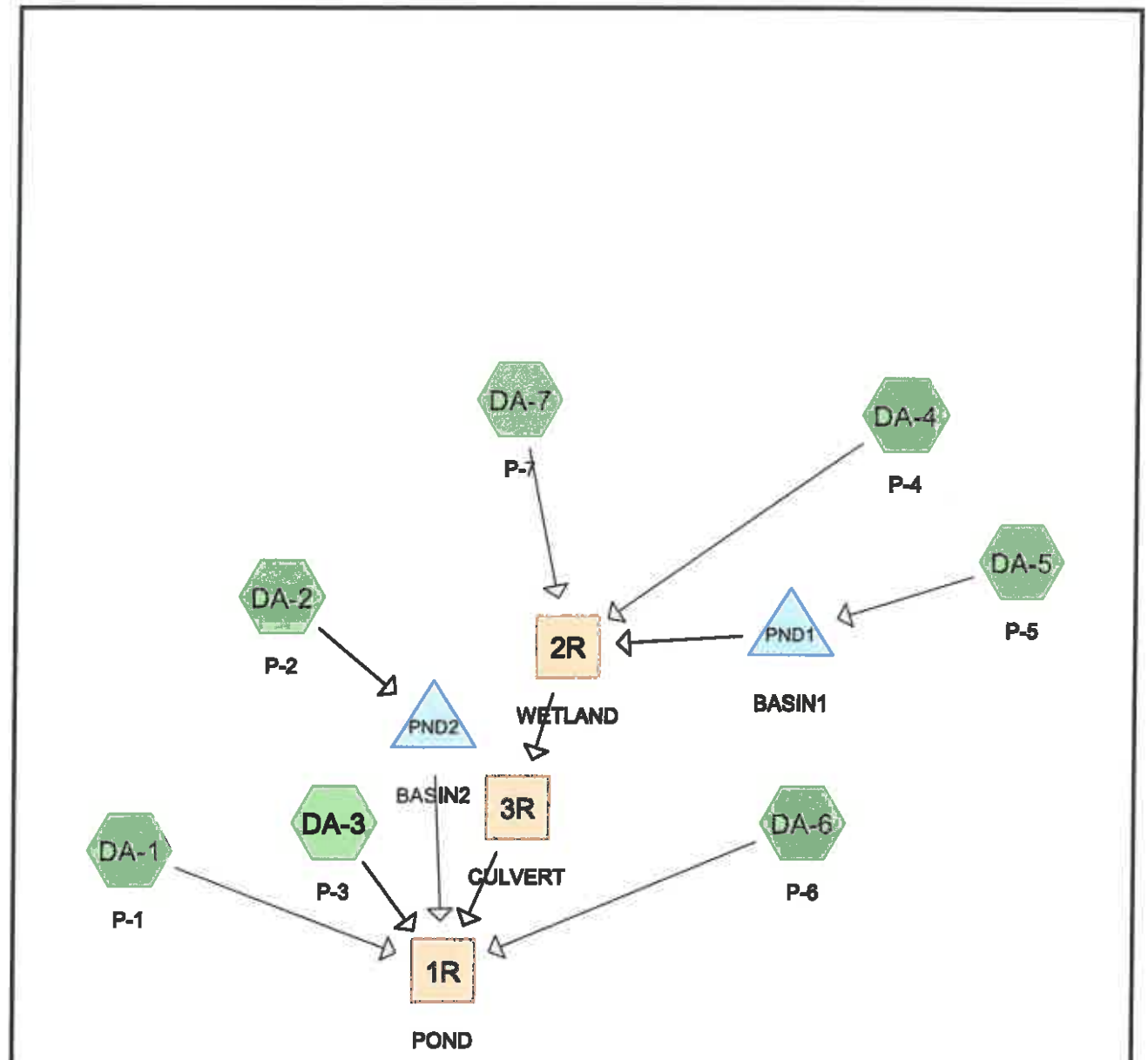
Summary for Reach IP2: WETLANDS

Inflow Area = 16.041 ac, 0.00% Impervious, Inflow Depth > 3.57" for 100YR event
Inflow = 43.18 cfs @ 12.35 hrs, Volume= 4.768 af
Outflow = 43.18 cfs @ 12.35 hrs, Volume= 4.768 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 IP2: WETLANDS




DA-7
P-7
DA-4
P-4
DA-5
P-5
DA-2
P-2
2R
PND1
BASIN1
PND2
WETLAND
BASIN2
3R
DA-3
P-3
DA-1
P-1
CULVERT
DA-6
P-6
1R
POND
Subcat
Reach
Pond
Link

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.989	74	>75% Grass cover, Good, HSG C (DA-1, DA-2, DA-3, DA-5, DA-6)
2.783	98	Paved parking, HSG C (DA-1, DA-2, DA-3, DA-5, DA-6)
56.981	73	Woods, Fair, HSG C (DA-1, DA-2, DA-3, DA-4, DA-5, DA-6, DA-7)
62.753	**74**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
62.753	HSG C	DA-1, DA-2, DA-3, DA-4, DA-5, DA-6, DA-7
0.000	HSG D	
0.000	Other	
62.753		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	2.989	0.000	0.000	2.989	>75% Grass cover, Good	DA-1, DA-2, DA-3, DA-5, DA-6
0.000	0.000	2.783	0.000	0.000	2.783	Paved parking	DA-1, DA-2, DA-3, DA-5, DA-6
0.000	0.000	56.981	0.000	0.000	56.981	Woods, Fair	DA-1, DA-2, DA-3, DA-4, DA-5, DA-6, DA-7
0.000	**0.000**	**62.753**	**0.000**	**0.000**	**62.753**	**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	DA-2	0.00	0.00	350.0	0.0100	0.010	18.0	0.0	0.0
2	DA-5	0.00	0.00	120.0	0.0200	0.010	15.0	0.0	0.0
3	3R	924.00	920.00	55.0	0.0727	0.010	36.0	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 DA-1: P-1 Runoff Area=911,170 sf 2.34% Impervious Runoff Depth>1.06"
Flow Length=1,280' Tc=32.1 min CN=74 Runoff=15.03 cfs 1.846 af

Subcatchment DA-2: P-2 Runoff Area=335,021 sf 16.28% Impervious Runoff Depth>1.24"
Flow Length=1,280' Tc=21.2 min CN=77 Runoff=7.83 cfs 0.795 af

Subcatchment DA-3: P-3 Runoff Area=325,676 sf 5.79% Impervious Runoff Depth>1.07"
Flow Length=524' Slope=0.0300 '/' Tc=17.6 min CN=74 Runoff=6.92 cfs 0.664 af

Subcatchment DA-4: P-4 Runoff Area=521,761 sf 0.00% Impervious Runoff Depth>1.00"
Flow Length=1,071' Tc=30.3 min CN=73 Runoff=8.32 cfs 1.002 af

Subcatchment DA-5: P-5 Runoff Area=318,322 sf 6.13% Impervious Runoff Depth>1.12"
Flow Length=1,184' Tc=17.5 min CN=75 Runoff=7.20 cfs 0.684 af

Subcatchment DA-6: P-6 Runoff Area=196,038 sf 3.57% Impervious Runoff Depth>1.07"
Tc=6.0 min CN=74 Runoff=5.83 cfs 0.402 af

Subcatchment DA-7: P-7 Runoff Area=125,523 sf 0.00% Impervious Runoff Depth>1.02"
Tc=6.0 min CN=73 Runoff=3.51 cfs 0.244 af

Reach 1R: POND Inflow=35.18 cfs 5.285 af
Outflow=35.18 cfs 5.285 af

Reach 2R: WETLAND Inflow=11.49 cfs 1.813 af
Outflow=11.49 cfs 1.813 af

Reach 3R: CULVERT Avg. Flow Depth=0.45' Max Vel=17.15 fps Inflow=11.49 cfs 1.813 af
36.0" Round Pipe n=0.010 L=55.0' S=0.0727 '/' Capacity=233.83 cfs Outflow=11.49 cfs 1.812 af

Pond PND1: BASIN1 Peak Elev=934.47' Storage=10,348 cf Inflow=7.20 cfs 0.684 af
Discarded=0.14 cfs 0.071 af Primary=2.15 cfs 0.566 af Outflow=2.29 cfs 0.637 af

Pond PND2: BASIN2 Peak Elev=924.59' Storage=14,403 cf Inflow=7.83 cfs 0.795 af
Discarded=0.17 cfs 0.105 af Primary=1.88 cfs 0.561 af Outflow=2.06 cfs 0.666 af

Total Runoff Area = 62.753 ac Runoff Volume = 5.637 af Average Runoff Depth = 1.08"
95.57% Pervious = 59.970 ac 4.43% Impervious = 2.783 ac

Summary for Subcatchment DA-1: P-1

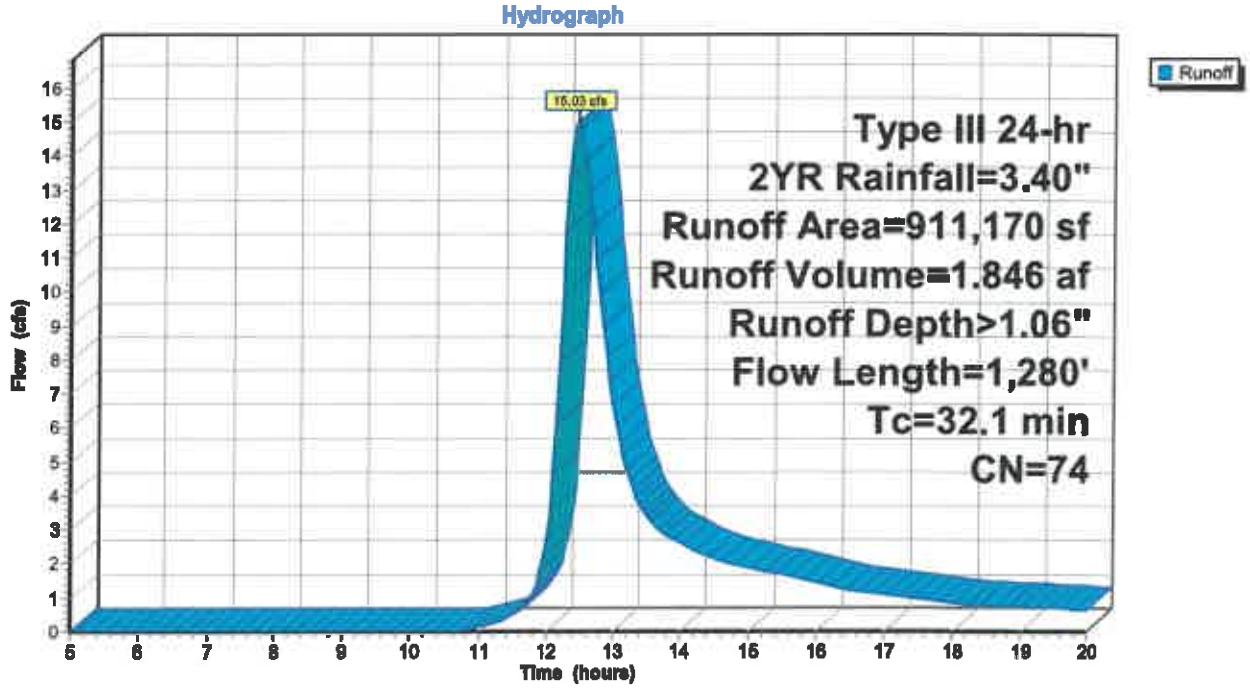
Runoff = 15.03 cfs @ 12.48 hrs, Volume= 1.846 af, Depth> 1.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.40"

Area (sf)	CN	Description
878,323	73	Woods, Fair, HSG C
21,347	98	Paved parking, HSG C
11,500	74	>75% Grass cover, Good, HSG C
911,170	74	Weighted Average
889,823		97.66% Pervious Area
21,347		2.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, TRAVEL PATH A TO B** Woods: Light underbrush n= 0.400 P2= 3.20"
11.9	620	0.0300	0.87		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Woodland Kv= 5.0 fps
2.3	225	0.0100	1.61		**Shallow Concentrated Flow, Travel Path C TO D** Unpaved Kv= 16.1 fps
7.4	385	0.0300	0.87		**Shallow Concentrated Flow, TRAVEL PATH D TO E** Woodland Kv= 5.0 fps
32.1	1,280	Total			

Subcatchment DA-1: P-1



Summary for Subcatchment DA-2: P-2

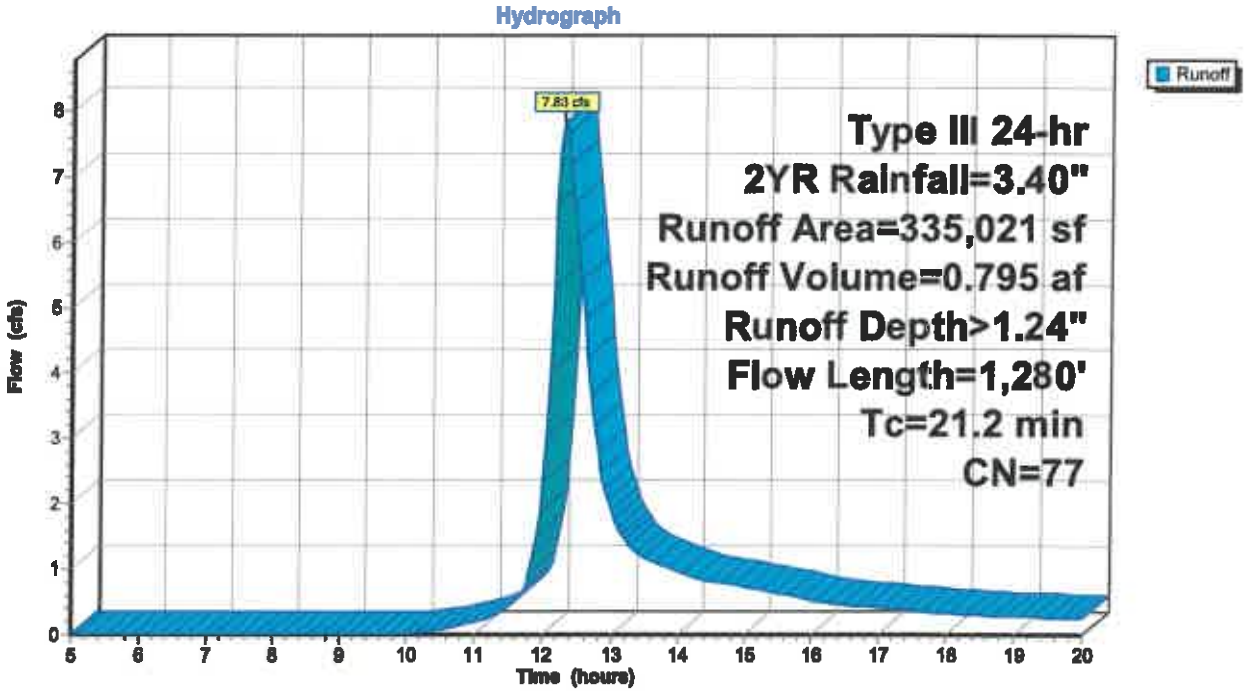
Runoff = 7.83 cfs @ 12.31 hrs, Volume= 0.795 af, Depth> 1.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.40"

Area (sf)	CN	Description
273,495	73	Woods, Fair, HSG C
54,526	98	Paved parking, HSG C
7,000	74	>75% Grass cover, Good, HSG C
335,021	77	Weighted Average
280,495		83.72% Pervious Area
54,526		16.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, TRAVEL PATH A TO B** Woods: Light underbrush n= 0.400 P2= 3.20"
7.9	530	0.0500	1.12		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Woodland Kv= 5.0 fps
2.0	350	0.0200	2.87		**Shallow Concentrated Flow, TRAVEL PATH C TO D** Paved Kv= 20.3 fps
0.8	350	0.0100	7.73	13.66	**Pipe Channel, TRAVEL PATH D TO E** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.010 PVC, smooth interior
21.2	1,280	Total			

Subcatchment DA-2: P-2



Summary for Subcatchment DA-3: P-3

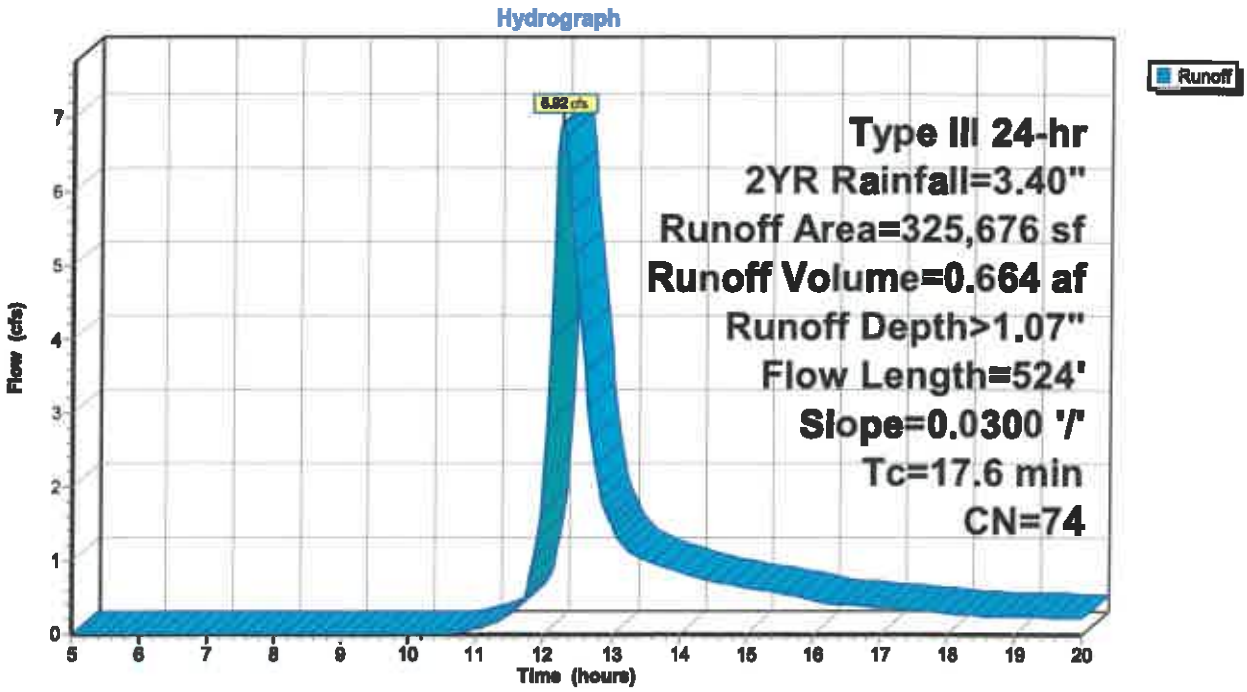
Runoff = 6.92 cfs @ 12.26 hrs, Volume= 0.664 af, Depth> 1.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.40"

Area (sf)	CN	Description
296,825	73	Woods, Fair, HSG C
18,851	98	Paved parking, HSG C
10,000	74	>75% Grass cover, Good, HSG C
325,676	74	Weighted Average
306,825		94.21% Pervious Area
18,851		5.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, TRAVEL PATH A TO B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.9	150	0.0300	2.79		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Unpaved Kv= 16.1 fps
6.2	324	0.0300	0.87		**Shallow Concentrated Flow, TRAVEL PATH C TO D** Woodland Kv= 5.0 fps
17.6	524	Total			

Subcatchment DA-3: P-3



Summary for Subcatchment DA-4: P-4

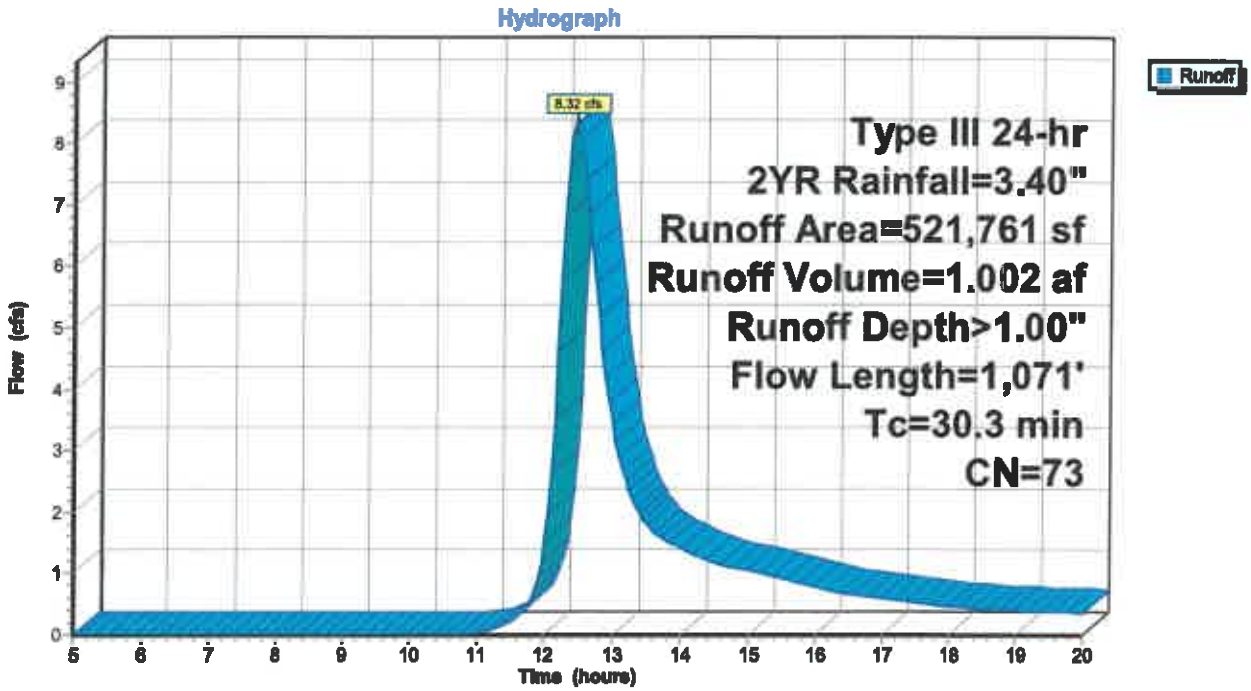
Runoff = 8.32 cfs @ 12.46 hrs, Volume= 1.002 af, Depth> 1.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.40"

Area (sf)	CN	Description
521,761	73	Woods, Fair, HSG C
521,761		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow, TRAVEL PATH A TO B** Woods: Light underbrush n= 0.400 P2= 3.20"
7.6	321	0.0200	0.71		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Woodland Kv= 5.0 fps
10.4	700	0.0500	1.12		**Shallow Concentrated Flow, TRAVEL PATH C TO D** Woodland Kv= 5.0 fps
30.3	1,071	Total			

Subcatchment DA-4: P-4



Summary for Subcatchment DA-5: P-5

Runoff = 7.20 cfs @ 12.26 hrs, Volume= 0.684 af, Depth> 1.12"

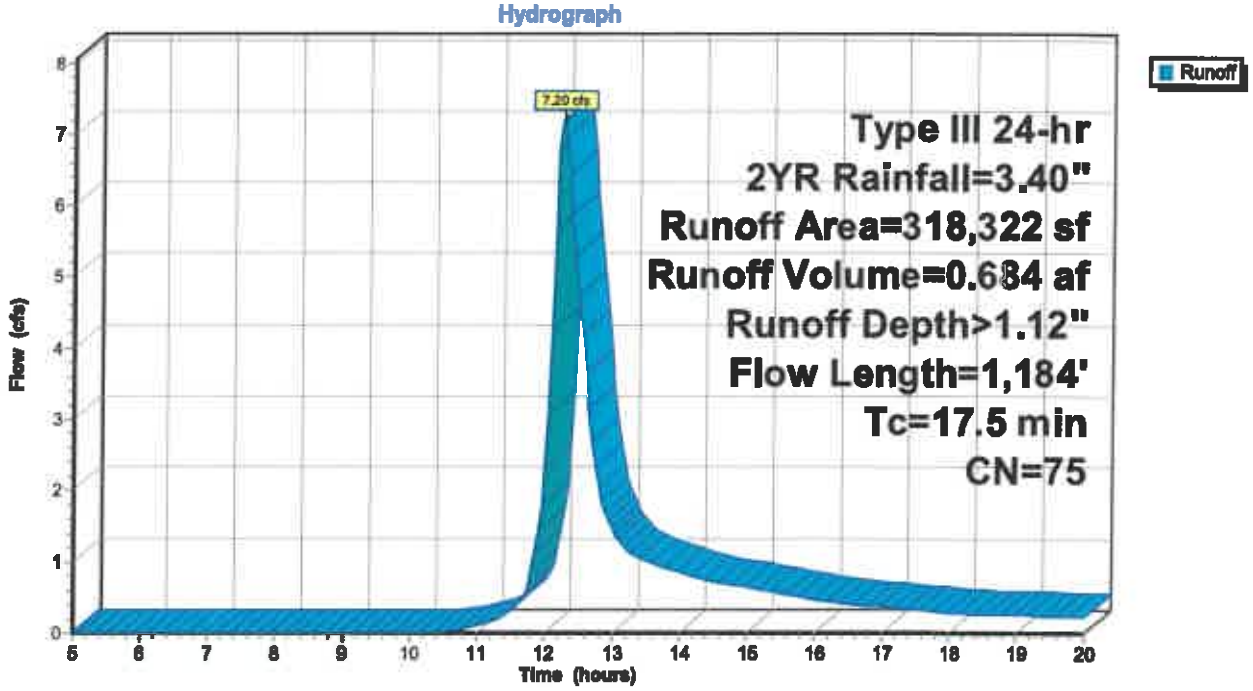
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.40"

Area (sf)	CN	Description
266,167	73	Woods, Fair, HSG C
19,500	98	Paved parking, HSG C
32,655	74	>75% Grass cover, Good, HSG C
318,322	75	Weighted Average
298,822		93.87% Pervious Area
19,500		6.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, TRAVEL PATH A TO B** Grass: Short n= 0.150 P2= 3.20"
3.4	200	0.0200	0.99		**Shallow Concentrated Flow, TRAVELPATH B TO C** Short Grass Pasture Kv= 7.0 fps
7.6	643	0.0800	1.41		**Shallow Concentrated Flow, TRAVEL PATH C TO D** Woodland Kv= 5.0 fps
0.7	171	0.0400	4.06		**Shallow Concentrated Flow, TRAVEL PATH D TO E** Paved Kv= 20.3 fps
0.2	120	0.0200	9.68	11.88	**Pipe Channel, TRAVEL PATH E TO F** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.010 PVC, smooth interior
17.5	1,184	Total			

Subcatchment DA-5: P-5

Hydrograph



Summary for Subcatchment DA-6: P-6

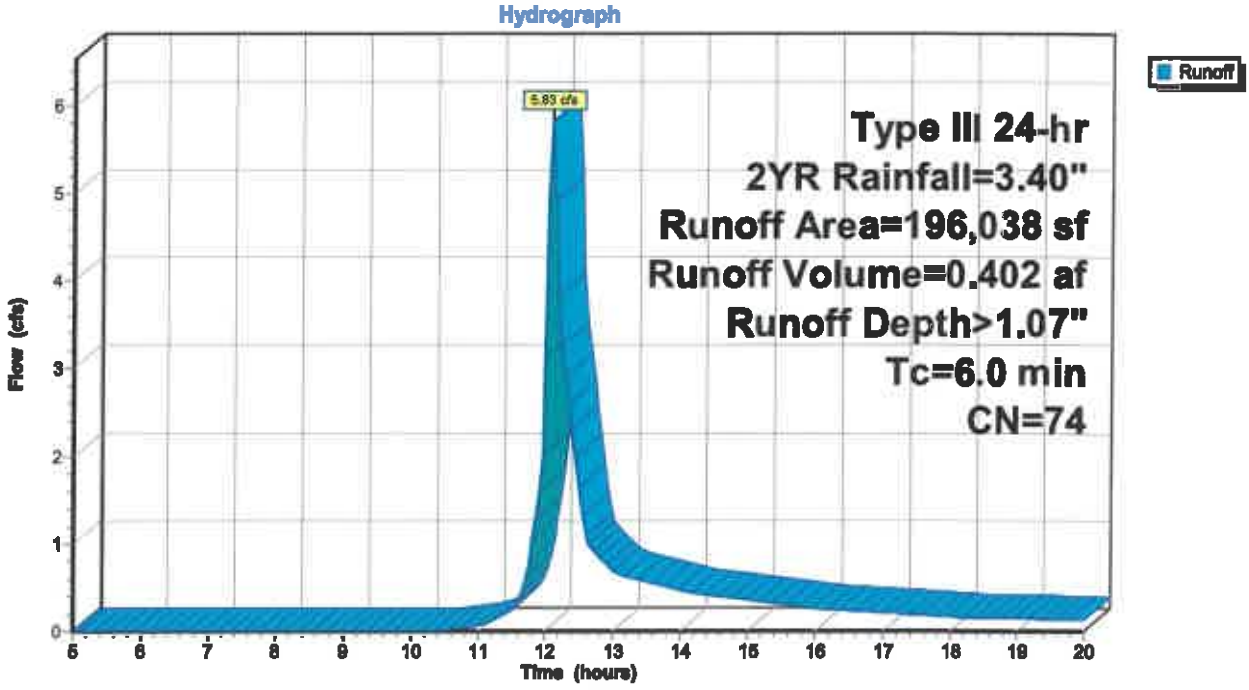
Runoff = 5.83 cfs @ 12.10 hrs, Volume= 0.402 af, Depth> 1.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.40"

Area (sf)	CN	Description
119,978	73	Woods, Fair, HSG C
69,060	74	>75% Grass cover, Good, HSG C
7,000	98	Paved parking, HSG C
196,038	74	Weighted Average
189,038		96.43% Pervious Area
7,000		3.57% Impervious Area

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

Subcatchment DA-6: P-6



Summary for Subcatchment DA-7: P-7

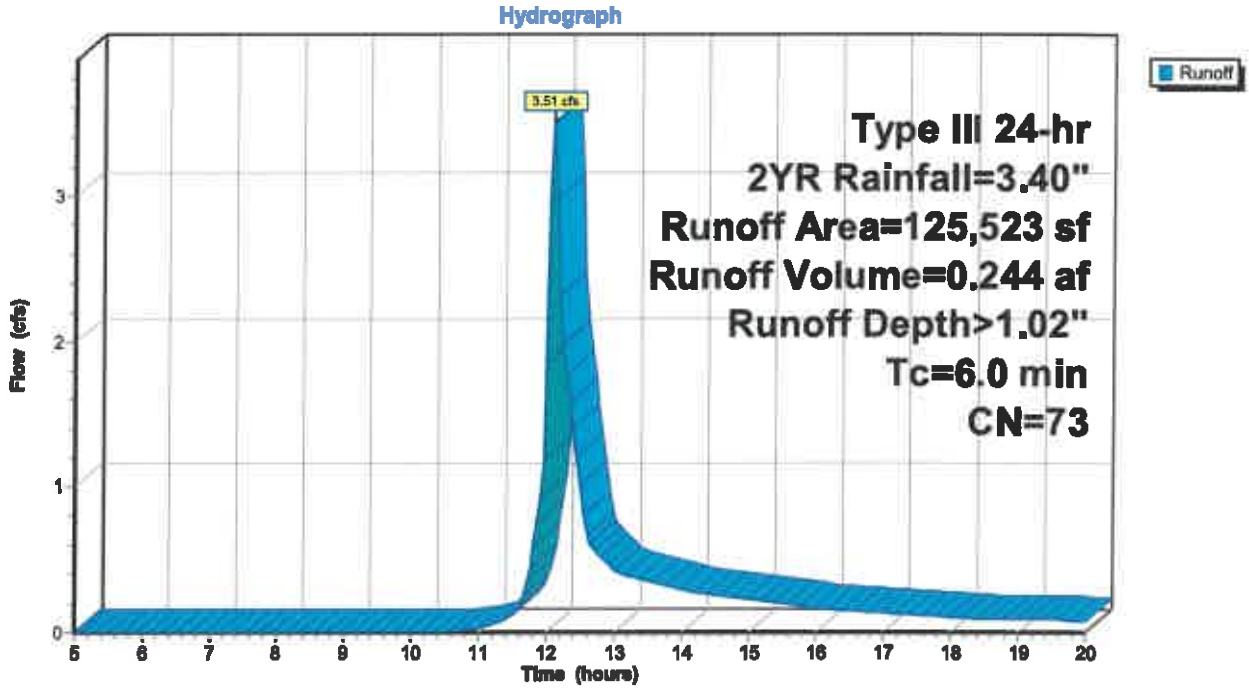
Runoff = 3.51 cfs @ 12.10 hrs, Volume= 0.244 af, Depth> 1.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2YR Rainfall=3.40"

Area (sf)	CN	Description
125,523	73	Woods, Fair, HSG C
125,523		100.00% Pervious Area

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

Subcatchment DA-7: P-7

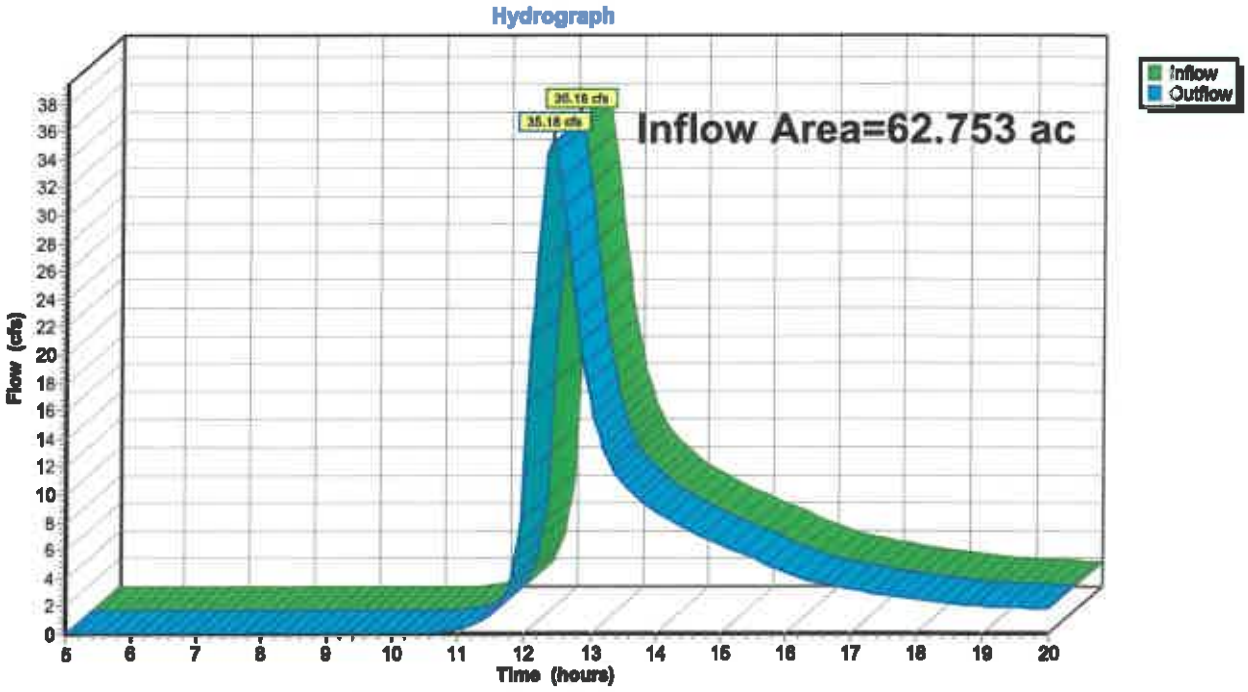


Summary for Reach 1R: POND

Inflow Area = 62.753 ac, 4.43% Impervious, Inflow Depth > 1.01" for 2YR event
Inflow = 35.18 cfs @ 12.42 hrs, Volume= 5.285 af
Outflow = 35.18 cfs @ 12.42 hrs, Volume= 5.285 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 1R: POND

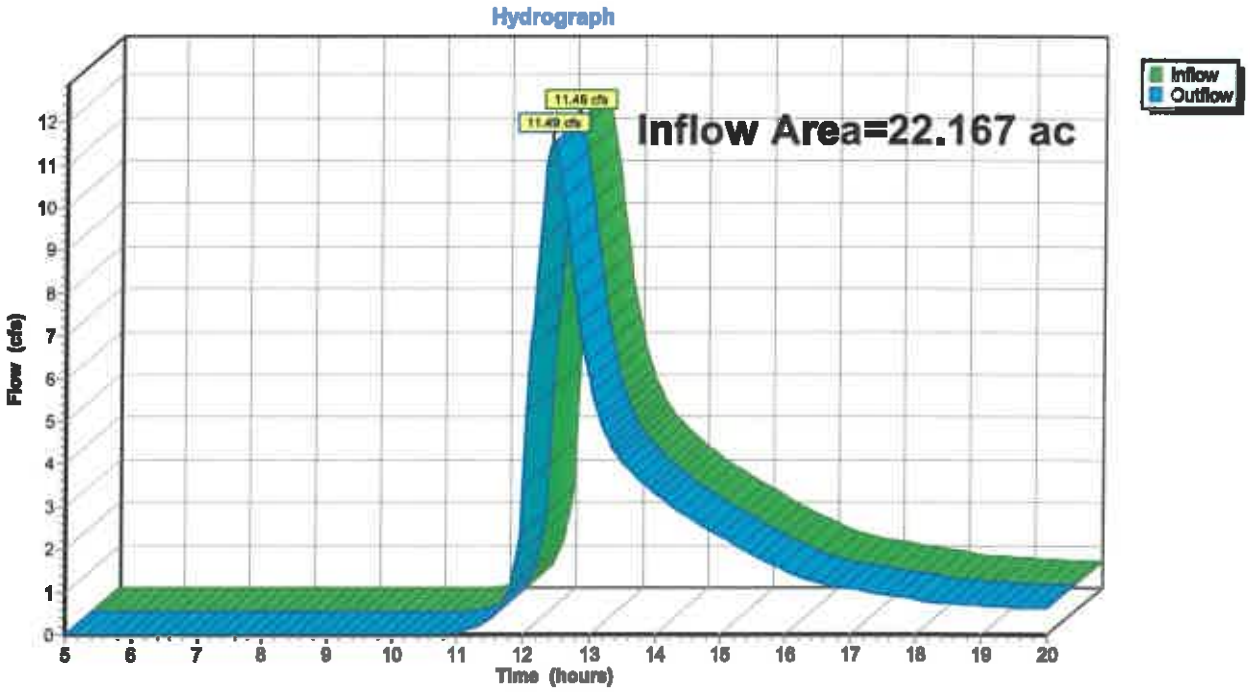


Summary for Reach 2R: WETLAND

Inflow Area = 22.167 ac, 2.02% Impervious, Inflow Depth > 0.98" for 2YR event
Inflow = 11.49 cfs @ 12.44 hrs, Volume= 1.813 af
Outflow = 11.49 cfs @ 12.44 hrs, Volume= 1.813 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 2R: WETLAND



Summary for Reach 3R: CULVERT

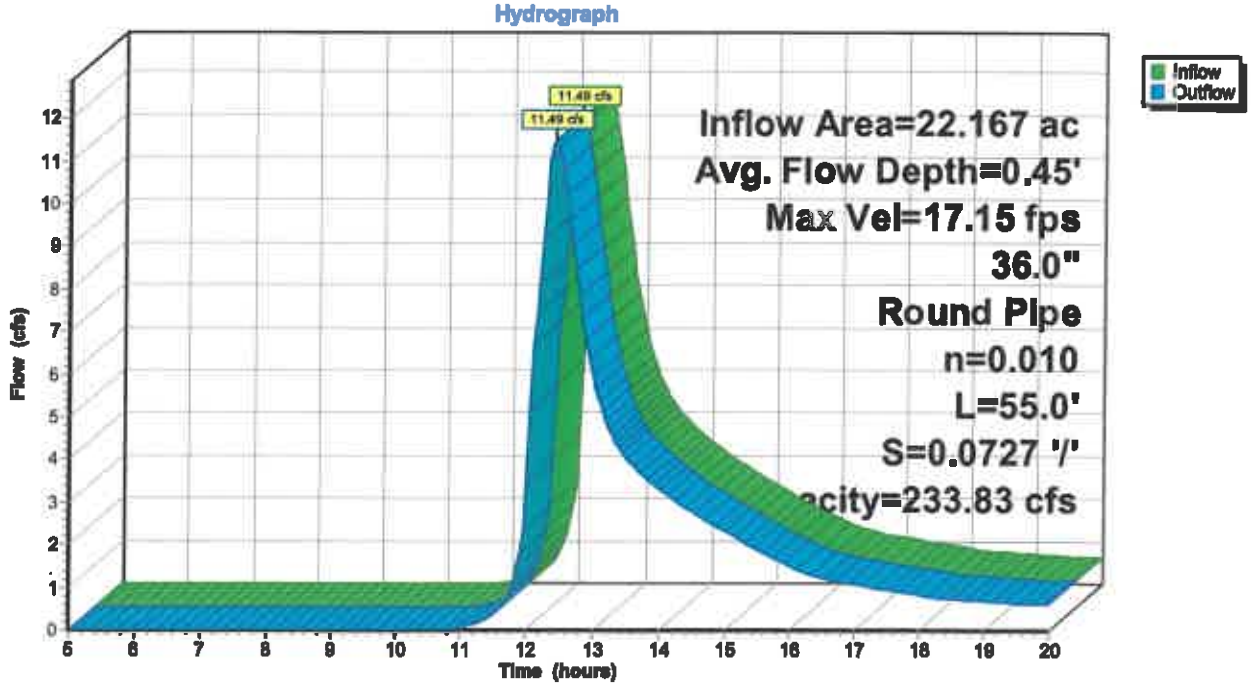
Inflow Area = 22.167 ac, 2.02% Impervious, Inflow Depth > 0.98" for 2YR event
Inflow = 11.49 cfs @ 12.44 hrs, Volume= 1.813 af
Outflow = 11.49 cfs @ 12.44 hrs, Volume= 1.812 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 17.15 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 9.45 fps, Avg. Travel Time= 0.1 min

Peak Storage= 37 cf @ 12.44 hrs
Average Depth at Peak Storage= 0.45'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 233.83 cfs

36.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 55.0' Slope= 0.0727 '/'
Inlet Invert= 924.00', Outlet Invert= 920.00'

Reach 3R: CULVERT



Summary for Pond PND1: BASIN1

Inflow Area = 7.308 ac, 6.13% Impervious, Inflow Depth > 1.12" for 2YR event
Inflow = 7.20 cfs @ 12.26 hrs, Volume= 0.684 af
Outflow = 2.29 cfs @ 12.76 hrs, Volume= 0.637 af, Atten= 68%, Lag= 30.1 min
Discarded = 0.14 cfs @ 12.76 hrs, Volume= 0.071 af
Primary = 2.15 cfs @ 12.76 hrs, Volume= 0.566 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 934.47' @ 12.76 hrs Surf.Area= 5,968 sf Storage= 10,348 cf

Plug-Flow detention time= 68.8 min calculated for 0.637 af (93% of inflow)
Center-of-Mass det. time= 46.0 min (868.0 - 822.0)

Volume	Invert	Avail.Storage	Storage Description
#1	932.00'	38,575 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
932.00	2,235	0	0
934.00	5,450	7,685	7,685
936.00	7,670	13,120	20,805
938.00	10,100	17,770	38,575

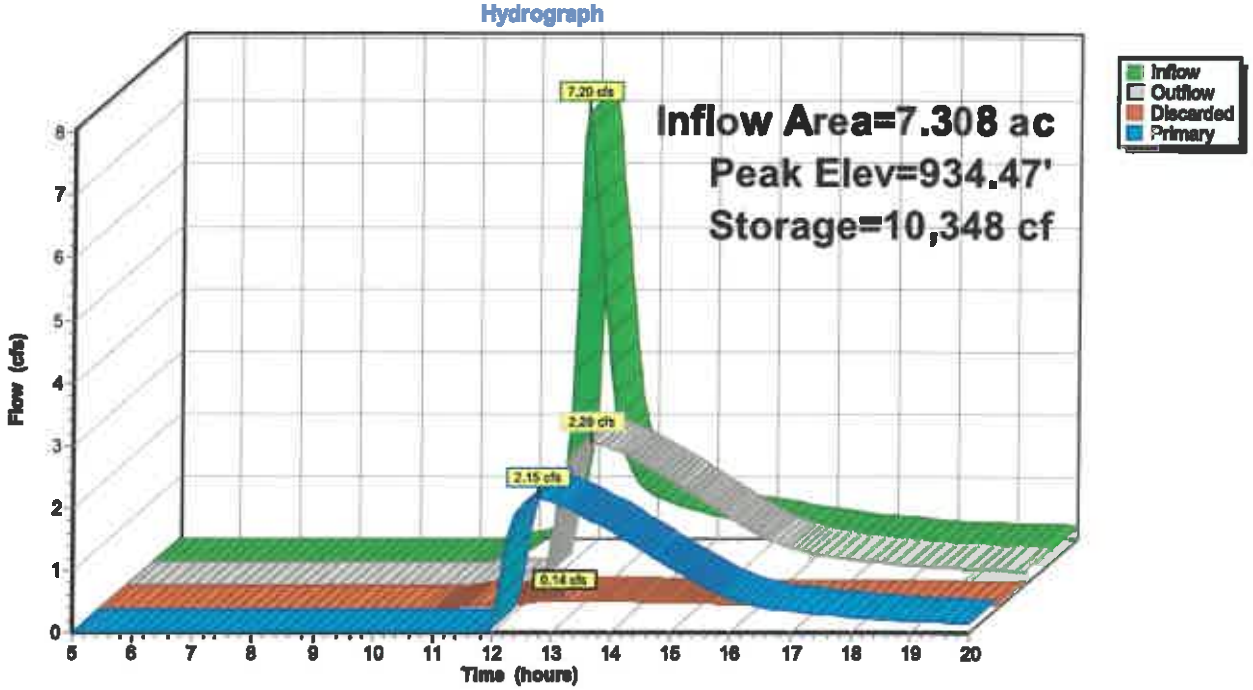
Device	Routing	Invert	Outlet Devices
#1	Primary	932.50'	**8.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	932.00'	**1.020 in/hr Exfiltration over Surface area**
#3	Primary	934.60'	**8.0" Vert. Orifice/Grate** C= 0.600
#4	Primary	936.00'	**6.0" Vert. Orifice/Grate X 2.00** C= 0.600
#5	Primary	937.75'	**20.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.14 cfs @ 12.76 hrs HW=934.47' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=2.15 cfs @ 12.76 hrs HW=934.47' (Free Discharge)
├**1=Orifice/Grate** (Orifice Controls 2.15 cfs @ 6.15 fps)
├**3=Orifice/Grate** (Controls 0.00 cfs)
├**4=Orifice/Grate** (Controls 0.00 cfs)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond PND1: BASIN1

Hydrograph



Summary for Pond PND2: BASIN2

Inflow Area = 7.691 ac, 16.28% Impervious, Inflow Depth > 1.24" for 2YR event
Inflow = 7.83 cfs @ 12.31 hrs, Volume= 0.795 af
Outflow = 2.06 cfs @ 12.95 hrs, Volume= 0.666 af, Atten= 74%, Lag= 38.5 min
Discarded = 0.17 cfs @ 12.95 hrs, Volume= 0.105 af
Primary = 1.88 cfs @ 12.95 hrs, Volume= 0.561 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 924.59' @ 12.95 hrs Surf.Area= 7,352 sf Storage= 14,403 cf

Plug-Flow detention time= 112.1 min calculated for 0.664 af (83% of inflow)
Center-of-Mass det. time= 67.2 min (887.3 - 820.2)

Volume	Invert	Avail.Storage	Storage Description
#1	922.00'	47,450 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
922.00	3,730	0	0
924.00	6,565	10,295	10,295
926.00	9,230	15,795	26,090
928.00	12,130	21,360	47,450

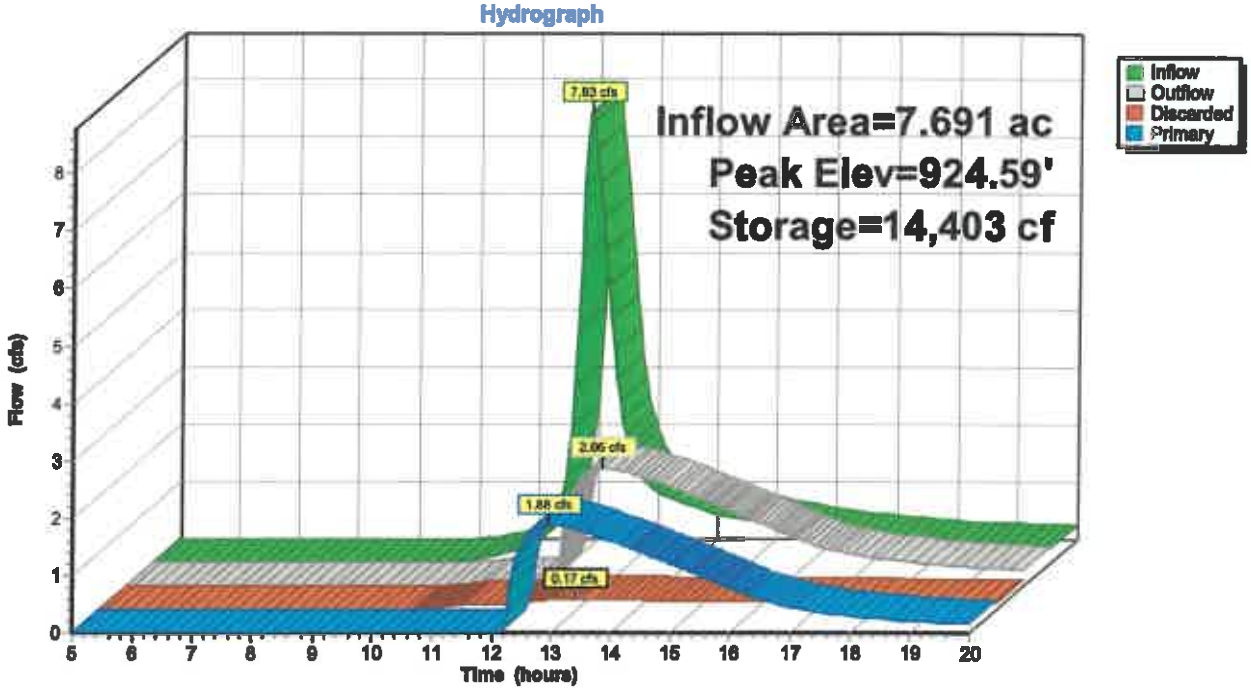
Device	Routing	Invert	Outlet Devices
#1	Discarded	922.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	923.00'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	924.60'	**12.0" Vert. Orifice/Grate** C= 0.600
#4	Primary	926.00'	**6.0" Vert. Orifice/Grate X 2.00** C= 0.600
#5	Primary	927.40'	**20.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.17 cfs @ 12.95 hrs HW=924.59' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.17 cfs)

Primary OutFlow Max=1.88 cfs @ 12.95 hrs HW=924.59' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 1.88 cfs @ 5.40 fps)
├**3=Orifice/Grate** (Controls 0.00 cfs)
├**4=Orifice/Grate** (Controls 0.00 cfs)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond PND2: BASIN2

Hydrograph



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 DA-1: P-1 Runoff Area=911,170 sf 2.34% Impervious Runoff Depth>2.09"
Flow Length=1,280' Tc=32.1 min CN=74 Runoff=30.45 cfs 3.652 af

Subcatchment DA-2: P-2 Runoff Area=335,021 sf 16.28% Impervious Runoff Depth>2.35"
Flow Length=1,280' Tc=21.2 min CN=77 Runoff=14.99 cfs 1.506 af

Subcatchment DA-3: P-3 Runoff Area=325,676 sf 5.79% Impervious Runoff Depth>2.11"
Flow Length=524' Slope=0.0300 '/' Tc=17.6 min CN=74 Runoff=14.05 cfs 1.312 af

Subcatchment DA-4: P-4 Runoff Area=521,761 sf 0.00% Impervious Runoff Depth>2.02"
Flow Length=1,071' Tc=30.3 min CN=73 Runoff=17.19 cfs 2.014 af

Subcatchment DA-5: P-5 Runoff Area=318,322 sf 6.13% Impervious Runoff Depth>2.19"
Flow Length=1,184' Tc=17.5 min CN=75 Runoff=14.31 cfs 1.332 af

Subcatchment DA-6: P-6 Runoff Area=196,038 sf 3.57% Impervious Runoff Depth>2.12"
Tc=6.0 min CN=74 Runoff=11.77 cfs 0.793 af

Subcatchment DA-7: P-7 Runoff Area=125,523 sf 0.00% Impervious Runoff Depth>2.04"
Tc=6.0 min CN=73 Runoff=7.24 cfs 0.489 af

Reach 1R: POND Inflow=73.26 cfs 10.676 af
Outflow=73.26 cfs 10.676 af

Reach 2R: WETLAND Inflow=23.87 cfs 3.686 af
Outflow=23.87 cfs 3.686 af

Reach 3R: CULVERT Avg. Flow Depth=0.65' Max Vel=21.26 fps Inflow=23.87 cfs 3.686 af
36.0" Round Pipe n=0.010 L=55.0' S=0.0727 '/' Capacity=233.83 cfs Outflow=23.86 cfs 3.686 af

Pond PND1: BASIN1 Peak Elev=936.02' Storage=20,921 cf Inflow=14.31 cfs 1.332 af
Discarded=0.18 cfs 0.094 af Primary=4.75 cfs 1.184 af Outflow=4.93 cfs 1.277 af

Pond PND2: BASIN2 Peak Elev=925.89' Storage=25,087 cf Inflow=14.99 cfs 1.506 af
Discarded=0.21 cfs 0.129 af Primary=6.05 cfs 1.233 af Outflow=6.26 cfs 1.362 af

Total Runoff Area = 62.753 ac Runoff Volume = 11.098 af Average Runoff Depth = 2.12"
95.57% Pervious = 59.970 ac 4.43% Impervious = 2.783 ac

Summary for Subcatchment DA-1: P-1

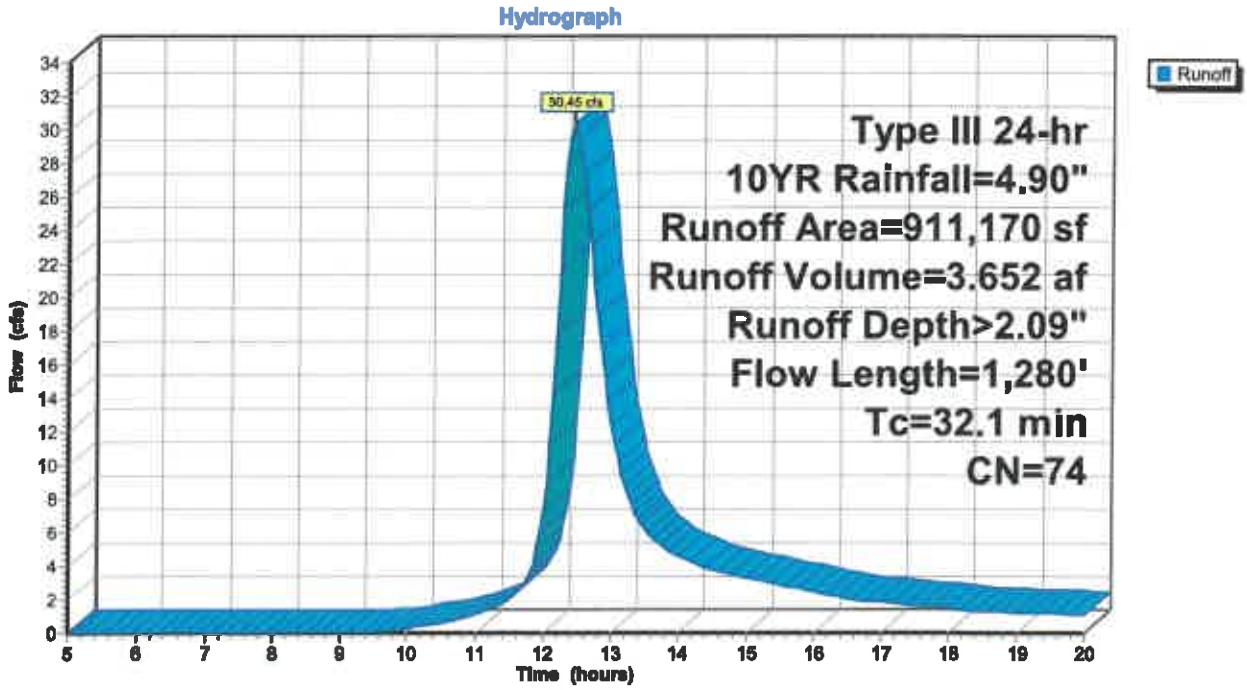
Runoff = 30.45 cfs @ 12.46 hrs, Volume= 3.652 af, Depth> 2.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.90"

Area (sf)	CN	Description
878,323	73	Woods, Fair, HSG C
21,347	98	Paved parking, HSG C
11,500	74	>75% Grass cover, Good, HSG C
911,170	74	Weighted Average
889,823		97.66% Pervious Area
21,347		2.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, TRAVEL PATH A TO B** Woods: Light underbrush n= 0.400 P2= 3.20"
11.9	620	0.0300	0.87		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Woodland Kv= 5.0 fps
2.3	225	0.0100	1.61		**Shallow Concentrated Flow, Travel Path C TO D** Unpaved Kv= 16.1 fps
7.4	385	0.0300	0.87		**Shallow Concentrated Flow, TRAVEL PATH D TO E** Woodland Kv= 5.0 fps
32.1	1,280	Total			

Subcatchment DA-1: P-1



Summary for Subcatchment DA-2: P-2

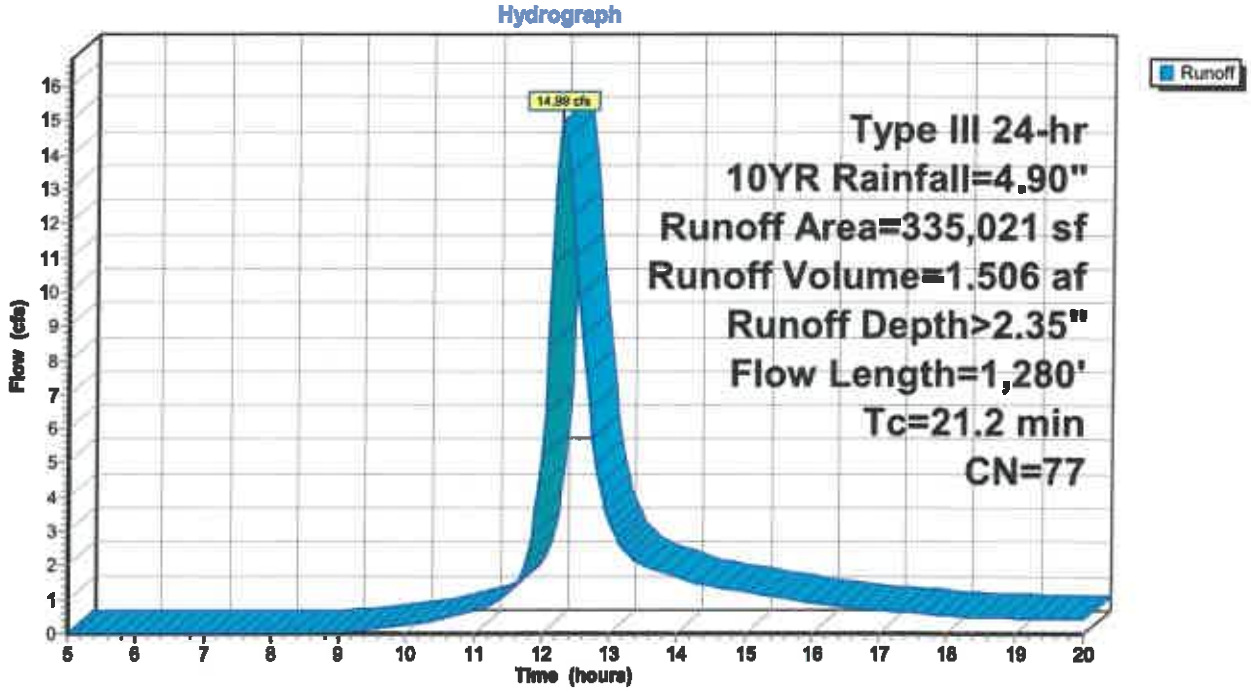
Runoff = 14.99 cfs @ 12.30 hrs, Volume= 1.506 af, Depth> 2.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.90"

Area (sf)	CN	Description
273,495	73	Woods, Fair, HSG C
54,526	98	Paved parking, HSG C
7,000	74	>75% Grass cover, Good, HSG C
335,021	77	Weighted Average
280,495		83.72% Pervious Area
54,526		16.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, TRAVEL PATH A TO B** Woods: Light underbrush n= 0.400 P2= 3.20"
7.9	530	0.0500	1.12		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Woodland Kv= 5.0 fps
2.0	350	0.0200	2.87		**Shallow Concentrated Flow, TRAVEL PATH C TO D** Paved Kv= 20.3 fps
0.8	350	0.0100	7.73	13.66	**Pipe Channel, TRAVEL PATH D TO E** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.010 PVC, smooth interior
21.2	1,280	Total			

Subcatchment DA-2: P-2



Summary for Subcatchment DA-3: P-3

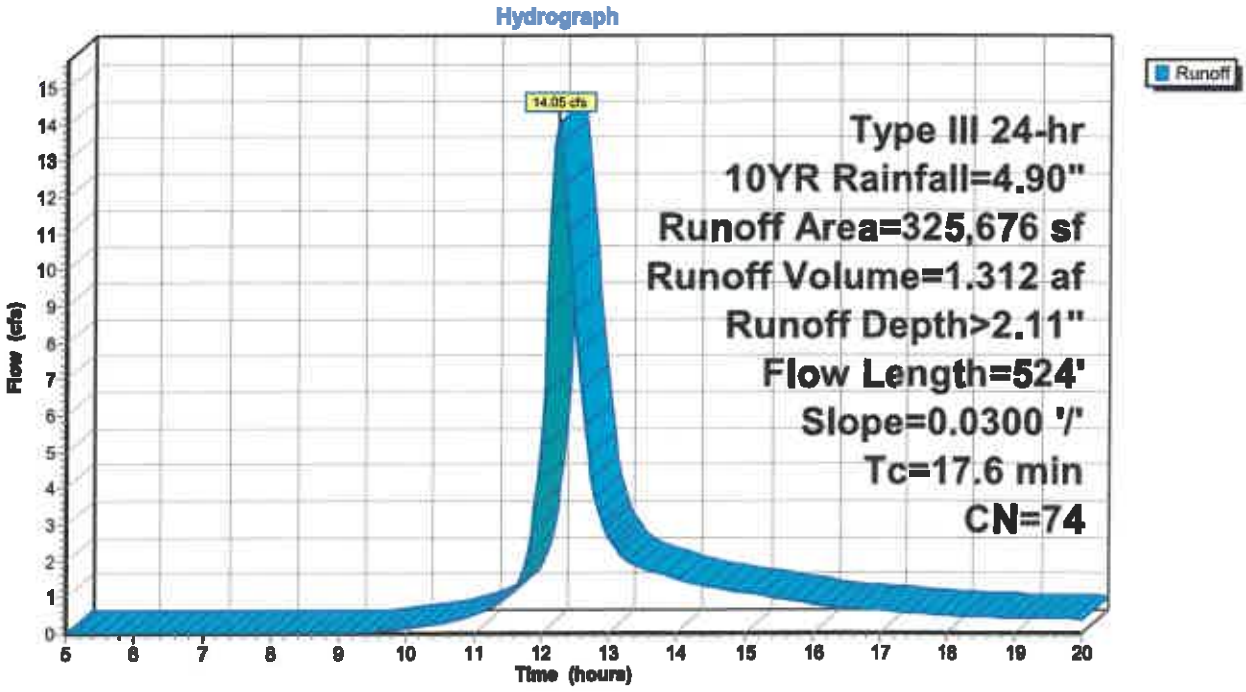
Runoff = 14.05 cfs @ 12.25 hrs, Volume= 1.312 af, Depth> 2.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.90"

Area (sf)	CN	Description
296,825	73	Woods, Fair, HSG C
18,851	98	Paved parking, HSG C
10,000	74	>75% Grass cover, Good, HSG C
325,676	74	Weighted Average
306,825		94.21% Pervious Area
18,851		5.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, TRAVEL PATH A TO B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.9	150	0.0300	2.79		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Unpaved Kv= 16.1 fps
6.2	324	0.0300	0.87		**Shallow Concentrated Flow, TRAVEL PATH C TO D** Woodland Kv= 5.0 fps
17.6	524	Total			

Subcatchment DA-3: P-3



Summary for Subcatchment DA-4: P-4

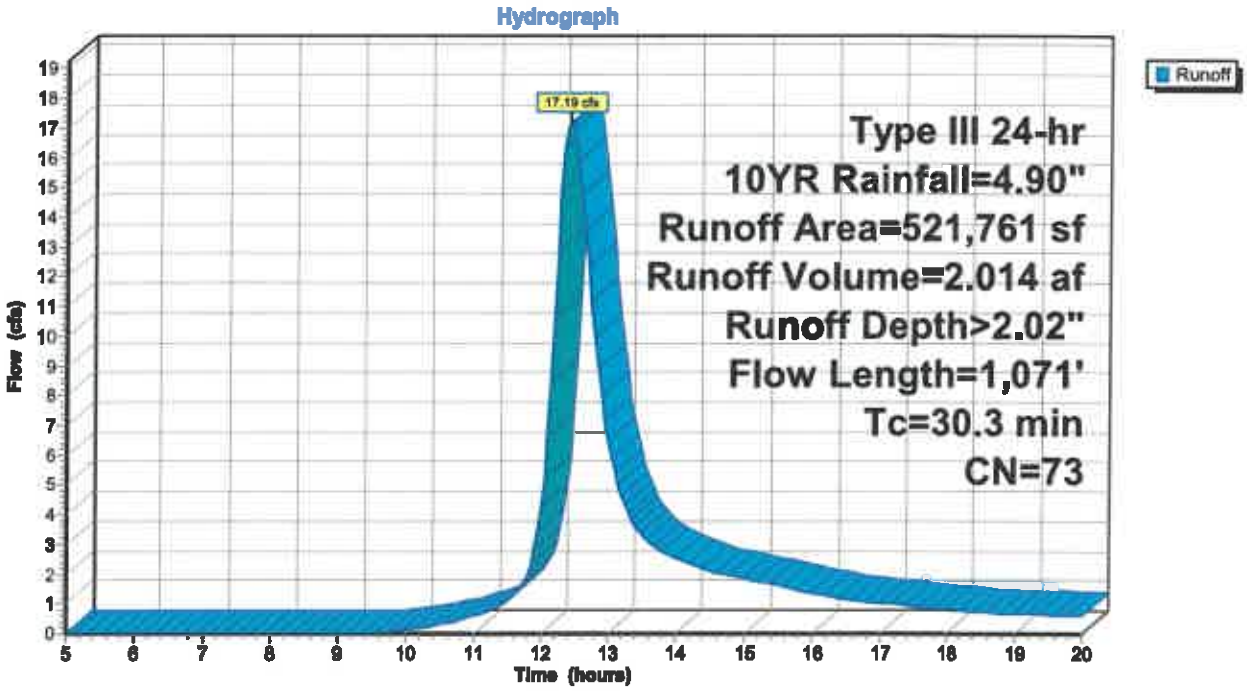
Runoff = 17.19 cfs @ 12.44 hrs, Volume= 2.014 af, Depth> 2.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.90"

Area (sf)	CN	Description
521,761	73	Woods, Fair, HSG C
521,761		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow, TRAVEL PATH A TO B** Woods: Light underbrush n= 0.400 P2= 3.20"
7.6	321	0.0200	0.71		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Woodland Kv= 5.0 fps
10.4	700	0.0500	1.12		**Shallow Concentrated Flow, TRAVEL PATH C TO D** Woodland Kv= 5.0 fps
30.3	1,071	Total			

Subcatchment DA-4: P-4



Summary for Subcatchment DA-5: P-5

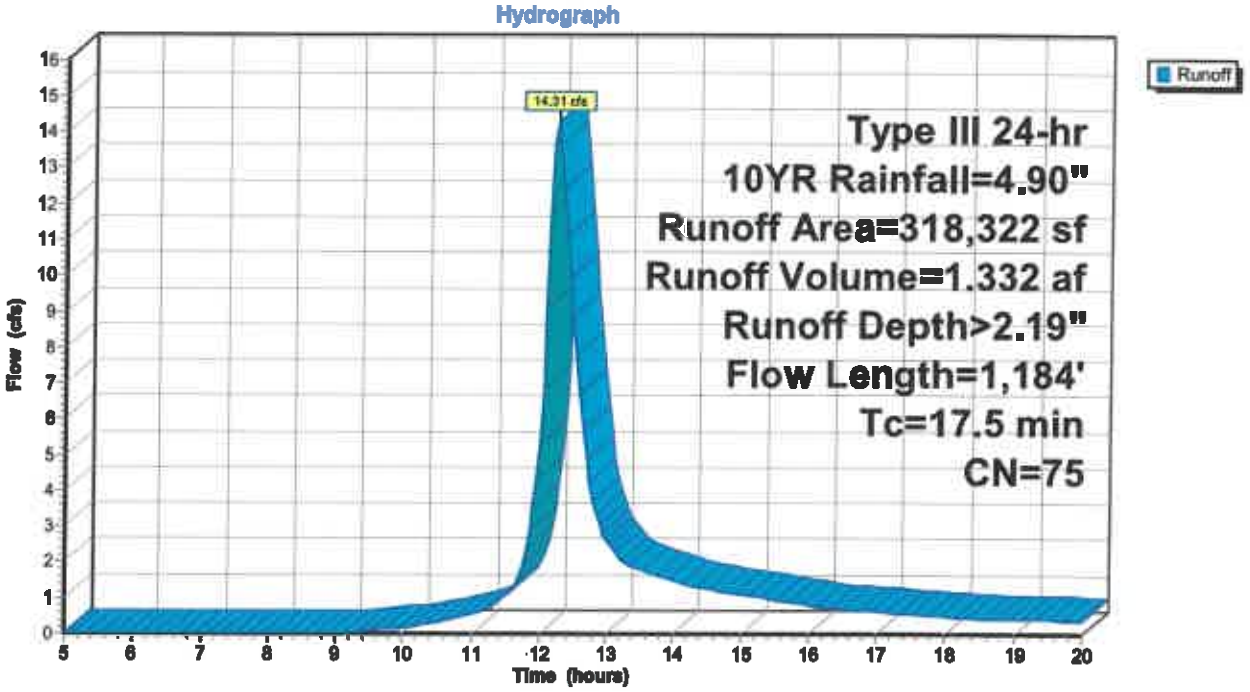
Runoff = 14.31 cfs @ 12.25 hrs, Volume= 1.332 af, Depth> 2.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.90"

Area (sf)	CN	Description
266,167	73	Woods, Fair, HSG C
19,500	98	Paved parking, HSG C
32,655	74	>75% Grass cover, Good, HSG C
318,322	75	Weighted Average
298,822		93.87% Pervious Area
19,500		6.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, TRAVEL PATH A TO B** Grass: Short n= 0.150 P2= 3.20"
3.4	200	0.0200	0.99		**Shallow Concentrated Flow, TRAVELPATH B TO C** Short Grass Pasture Kv= 7.0 fps
7.6	643	0.0800	1.41		**Shallow Concentrated Flow, TRAVEL PATH C TO D** Woodland Kv= 5.0 fps
0.7	171	0.0400	4.06		**Shallow Concentrated Flow, TRAVEL PATH D TO E** Paved Kv= 20.3 fps
0.2	120	0.0200	9.68	11.88	**Pipe Channel, TRAVEL PATH E TO F** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.010 PVC, smooth interior
17.5	1,184	Total			

Subcatchment DA-5: P-5



Summary for Subcatchment DA-6: P-6

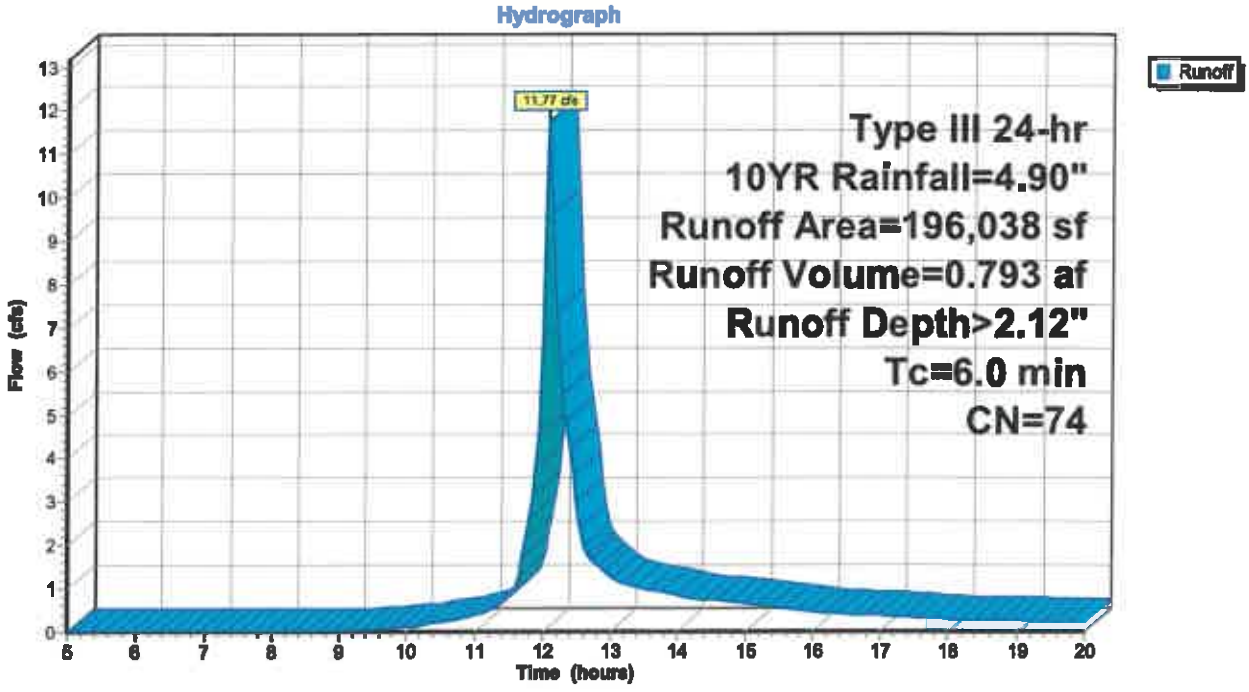
Runoff = 11.77 cfs @ 12.10 hrs, Volume= 0.793 af, Depth> 2.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.90"

Area (sf)	CN	Description
119,978	73	Woods, Fair, HSG C
69,060	74	>75% Grass cover, Good, HSG C
7,000	98	Paved parking, HSG C
196,038	74	Weighted Average
189,038		96.43% Pervious Area
7,000		3.57% Impervious Area

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

Subcatchment DA-6: P-6



Summary for Subcatchment DA-7: P-7

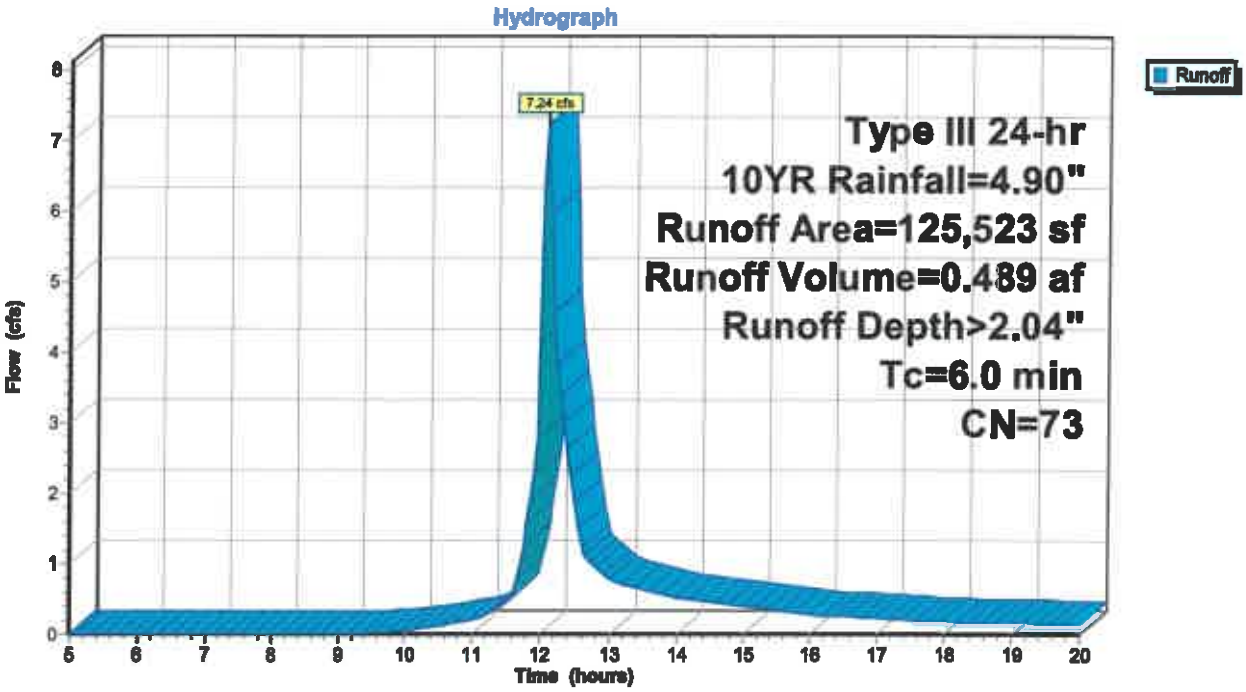
Runoff = 7.24 cfs @ 12.10 hrs, Volume= 0.489 af, Depth> 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10YR Rainfall=4.90"

Area (sf)	CN	Description
125,523	73	Woods, Fair, HSG C
125,523		100.00% Pervious Area

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

Subcatchment DA-7: P-7

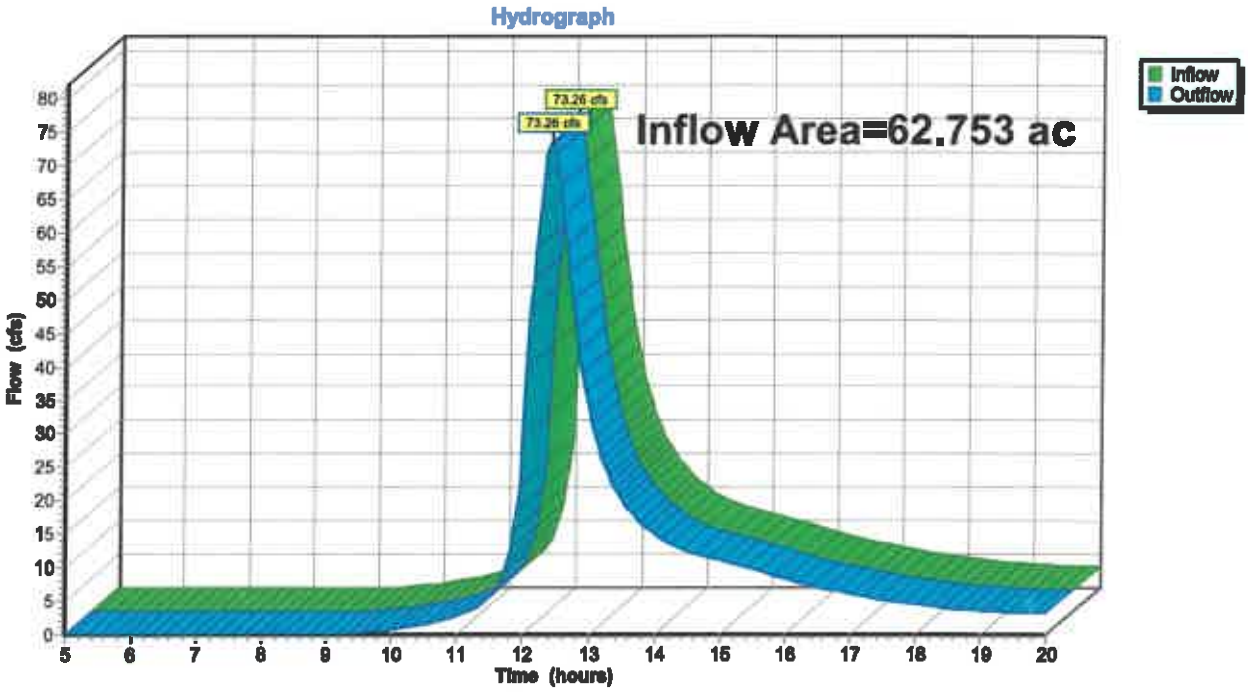


Summary for Reach 1R: POND

Inflow Area = 62.753 ac, 4.43% Impervious, Inflow Depth > 2.04" for 10YR event
Inflow = 73.26 cfs @ 12.41 hrs, Volume= 10.676 af
Outflow = 73.26 cfs @ 12.41 hrs, Volume= 10.676 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 1R: POND

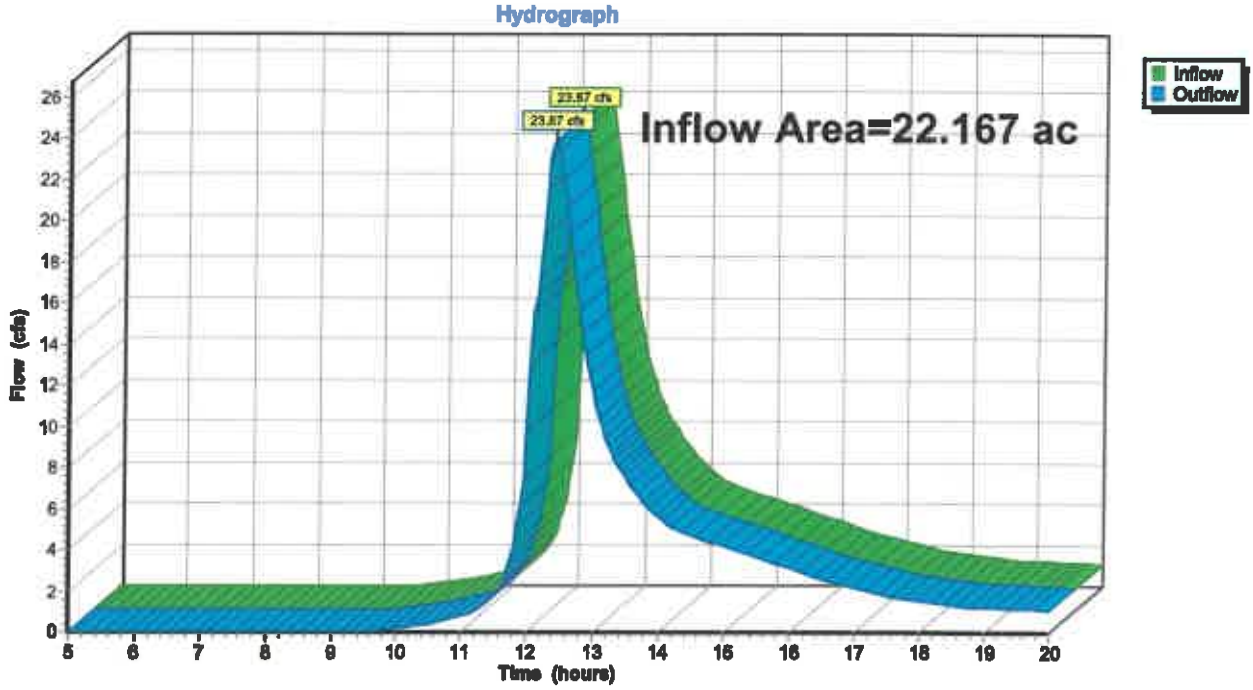


Summary for Reach 2R: WETLAND

Inflow Area = 22.167 ac, 2.02% Impervious, Inflow Depth > 2.00" for 10YR event
Inflow = 23.87 cfs @ 12.42 hrs, Volume= 3.686 af
Outflow = 23.87 cfs @ 12.42 hrs, Volume= 3.686 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 2R: WETLAND



Summary for Reach 3R: CULVERT

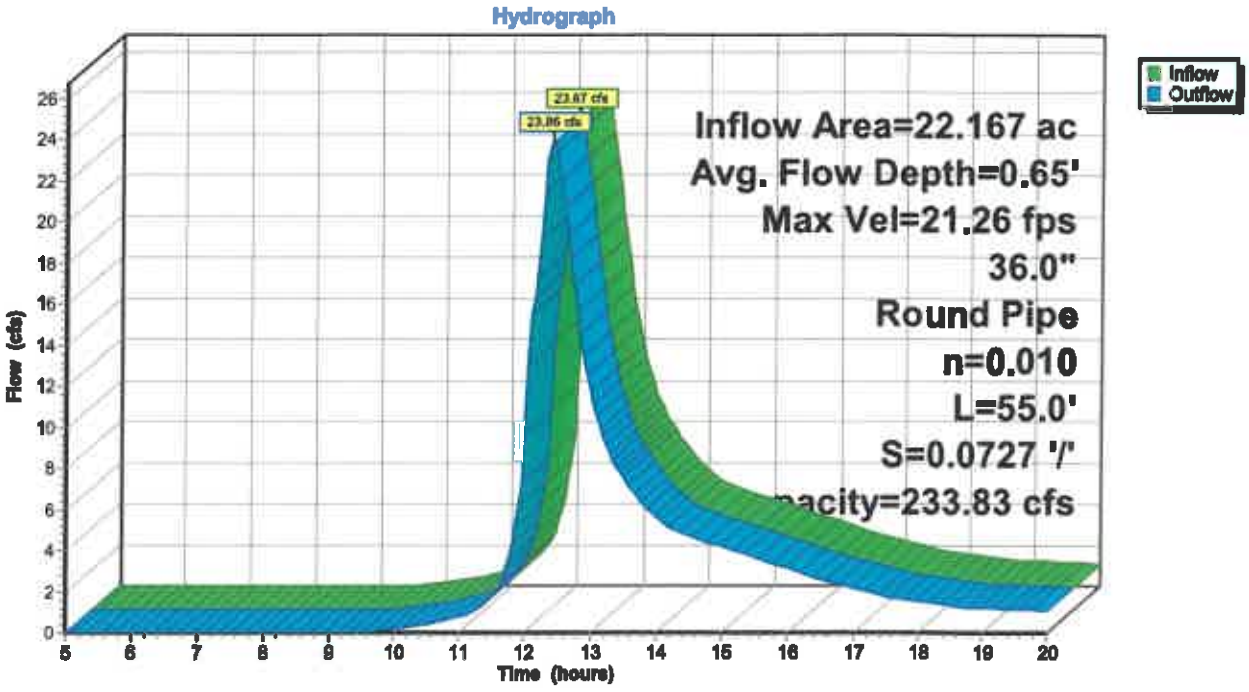
Inflow Area = 22.167 ac, 2.02% Impervious, Inflow Depth > 2.00" for 10YR event
Inflow = 23.87 cfs @ 12.42 hrs, Volume= 3.686 af
Outflow = 23.86 cfs @ 12.43 hrs, Volume= 3.686 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 21.26 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 10.96 fps, Avg. Travel Time= 0.1 min

Peak Storage= 62 cf @ 12.42 hrs
Average Depth at Peak Storage= 0.65'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 233.83 cfs

36.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 55.0' Slope= 0.0727 '/'
Inlet Invert= 924.00', Outlet Invert= 920.00'

Reach 3R: CULVERT



Summary for Pond PND1: BASIN1

Inflow Area = 7.308 ac, 6.13% Impervious, Inflow Depth > 2.19" for 10YR event
Inflow = 14.31 cfs @ 12.25 hrs, Volume= 1.332 af
Outflow = 4.93 cfs @ 12.70 hrs, Volume= 1.277 af, Atten= 66%, Lag= 27.1 min
Discarded = 0.18 cfs @ 12.70 hrs, Volume= 0.094 af
Primary = 4.75 cfs @ 12.70 hrs, Volume= 1.184 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 936.02' @ 12.70 hrs Surf.Area= 7,688 sf Storage= 20,921 cf

Plug-Flow detention time= 68.8 min calculated for 1.277 af (96% of inflow)
Center-of-Mass det. time= 54.1 min (861.3 - 807.3)

Volume	Invert	Avail.Storage	Storage Description
#1	932.00'	38,575 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
932.00	2,235	0	0
934.00	5,450	7,685	7,685
936.00	7,670	13,120	20,805
938.00	10,100	17,770	38,575

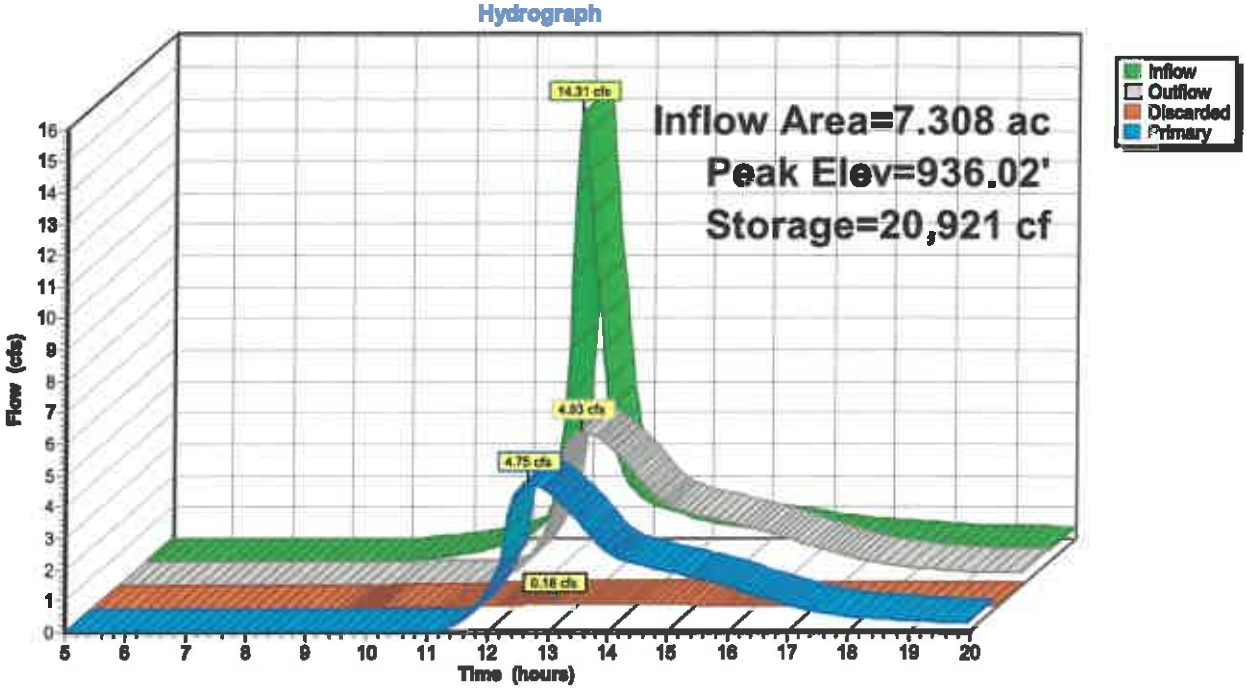
Device	Routing	Invert	Outlet Devices
#1	Primary	932.50'	**8.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	932.00'	**1.020 in/hr Exfiltration over Surface area**
#3	Primary	934.60'	**8.0" Vert. Orifice/Grate** C= 0.600
#4	Primary	936.00'	**6.0" Vert. Orifice/Grate X 2.00** C= 0.600
#5	Primary	937.75'	**20.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.18 cfs @ 12.70 hrs HW=936.01' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.18 cfs)

Primary OutFlow Max=4.75 cfs @ 12.70 hrs HW=936.01' (Free Discharge)
├**1=Orifice/Grate** (Orifice Controls 3.00 cfs @ 8.59 fps)
├**3=Orifice/Grate** (Orifice Controls 1.75 cfs @ 5.01 fps)
├**4=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.42 fps)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond PND1: BASIN1

Hydrograph



Summary for Pond PND2: BASIN2

Inflow Area = 7.691 ac, 16.28% Impervious, Inflow Depth > 2.35" for 10YR event
Inflow = 14.99 cfs @ 12.30 hrs, Volume= 1.506 af
Outflow = 6.26 cfs @ 12.72 hrs, Volume= 1.362 af, Atten= 58%, Lag= 25.2 min
Discarded = 0.21 cfs @ 12.72 hrs, Volume= 0.129 af
Primary = 6.05 cfs @ 12.72 hrs, Volume= 1.233 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 925.89' @ 12.72 hrs Surf.Area= 9,084 sf Storage= 25,087 cf

Plug-Flow detention time= 91.9 min calculated for 1.358 af (90% of inflow)
Center-of-Mass det. time= 62.0 min (868.1 - 806.1)

Volume	Invert	Avail.Storage	Storage Description
#1	922.00'	47,450 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
922.00	3,730	0	0
924.00	6,565	10,295	10,295
926.00	9,230	15,795	26,090
928.00	12,130	21,360	47,450

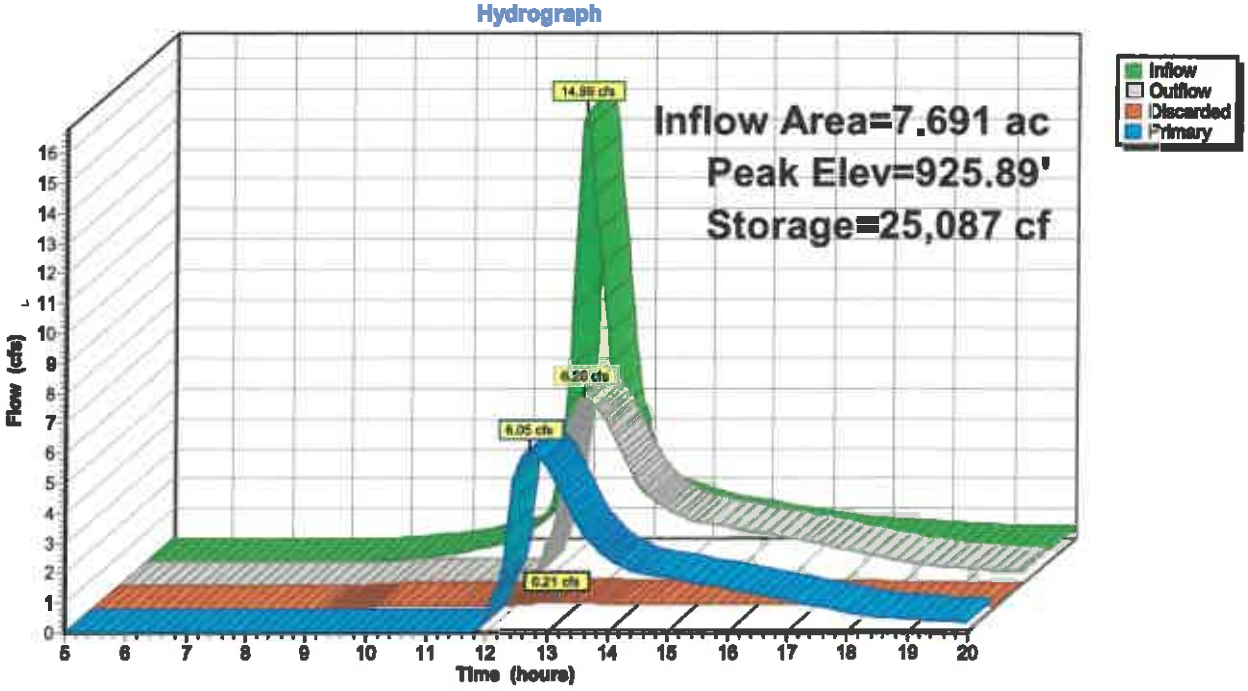
Device	Routing	Invert	Outlet Devices
#1	Discarded	922.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	923.00'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	924.60'	**12.0" Vert. Orifice/Grate** C= 0.600
#4	Primary	926.00'	**6.0" Vert. Orifice/Grate X 2.00** C= 0.600
#5	Primary	927.40'	**20.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.21 cfs @ 12.72 hrs HW=925.89' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.21 cfs)

Primary OutFlow Max=6.04 cfs @ 12.72 hrs HW=925.89' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 2.69 cfs @ 7.70 fps)
├**3=Orifice/Grate** (Orifice Controls 3.36 cfs @ 4.27 fps)
├**4=Orifice/Grate** (Controls 0.00 cfs)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond PND2: BASIN2

Hydrograph



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 DA-1: P-1 Runoff Area=911,170 sf 2.34% Impervious Runoff Depth>3.02"
Flow Length=1,280' Tc=32.1 min CN=74 Runoff=43.88 cfs 5.258 af

Subcatchment DA-2: P-2 Runoff Area=335,021 sf 16.28% Impervious Runoff Depth>3.32"
Flow Length=1,280' Tc=21.2 min CN=77 Runoff=21.10 cfs 2.126 af

Subcatchment DA-3: P-3 Runoff Area=325,676 sf 5.79% Impervious Runoff Depth>3.03"
Flow Length=524' Slope=0.0300 '/' Tc=17.6 min CN=74 Runoff=20.26 cfs 1.889 af

Subcatchment DA-4: P-4 Runoff Area=521,761 sf 0.00% Impervious Runoff Depth>2.92"
Flow Length=1,071' Tc=30.3 min CN=73 Runoff=24.98 cfs 2.919 af

Subcatchment DA-5: P-5 Runoff Area=318,322 sf 6.13% Impervious Runoff Depth>3.13"
Flow Length=1,184' Tc=17.5 min CN=75 Runoff=20.46 cfs 1.905 af

Subcatchment DA-6: P-6 Runoff Area=196,038 sf 3.57% Impervious Runoff Depth>3.04"
Tc=6.0 min CN=74 Runoff=16.91 cfs 1.142 af

Subcatchment DA-7: P-7 Runoff Area=125,523 sf 0.00% Impervious Runoff Depth>2.95"
Tc=6.0 min CN=73 Runoff=10.50 cfs 0.708 af

Reach 1R: POND Inflow=107.17 cfs 15.477 af
Outflow=107.17 cfs 15.477 af

Reach 2R: WETLAND Inflow=35.17 cfs 5.362 af
Outflow=35.17 cfs 5.362 af

Reach 3R: CULVERT Avg. Flow Depth=0.79' Max Vel=23.79 fps Inflow=35.17 cfs 5.362 af
36.0" Round Pipe n=0.010 L=55.0' S=0.0727 '/' Capacity=233.83 cfs Outflow=35.17 cfs 5.362 af

Pond PND1: BASIN1 Peak Elev=937.02' Storage=29,298 cf Inflow=20.46 cfs 1.905 af
Discarded=0.21 cfs 0.109 af Primary=7.53 cfs 1.735 af Outflow=7.75 cfs 1.844 af

Pond PND2: BASIN2 Peak Elev=926.79' Storage=33,782 cf Inflow=21.10 cfs 2.126 af
Discarded=0.24 cfs 0.146 af Primary=9.41 cfs 1.825 af Outflow=9.66 cfs 1.971 af

Total Runoff Area = 62.753 ac Runoff Volume = 15.947 af Average Runoff Depth = 3.05"
95.57% Pervious = 59.970 ac 4.43% Impervious = 2.783 ac

Summary for Subcatchment DA-1: P-1

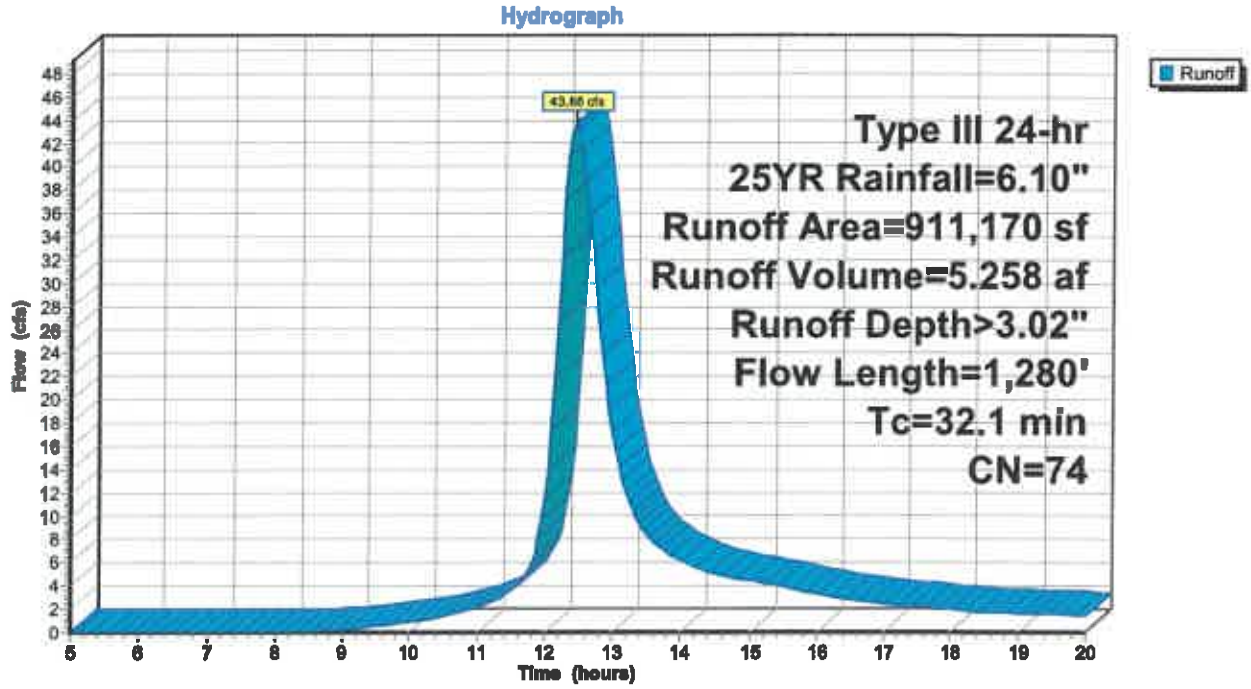
Runoff = 43.88 cfs @ 12.45 hrs, Volume= 5.258 af, Depth> 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.10"

Area (sf)	CN	Description
878,323	73	Woods, Fair, HSG C
21,347	98	Paved parking, HSG C
11,500	74	>75% Grass cover, Good, HSG C
911,170	74	Weighted Average
889,823		97.66% Pervious Area
21,347		2.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, TRAVEL PATH A TO B** Woods: Light underbrush n= 0.400 P2= 3.20"
11.9	620	0.0300	0.87		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Woodland Kv= 5.0 fps
2.3	225	0.0100	1.61		**Shallow Concentrated Flow, Travel Path C TO D** Unpaved Kv= 16.1 fps
7.4	385	0.0300	0.87		**Shallow Concentrated Flow, TRAVEL PATH D TO E** Woodland Kv= 5.0 fps
32.1	1,280	Total			

Subcatchment DA-1: P-1



Summary for Subcatchment DA-2: P-2

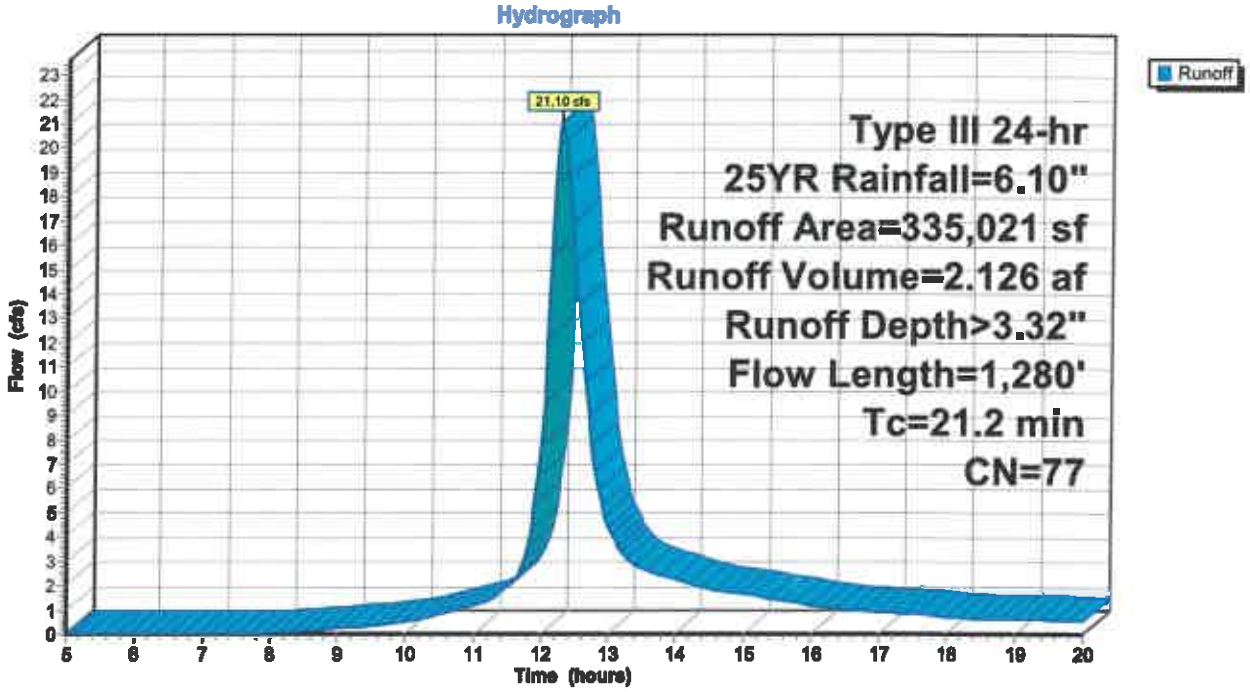
Runoff = 21.10 cfs @ 12.29 hrs, Volume= 2.126 af, Depth> 3.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.10"

Area (sf)	CN	Description
273,495	73	Woods, Fair, HSG C
54,526	98	Paved parking, HSG C
7,000	74	>75% Grass cover, Good, HSG C
335,021	77	Weighted Average
280,495		83.72% Pervious Area
54,526		16.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, TRAVEL PATH A TO B** Woods: Light underbrush n= 0.400 P2= 3.20"
7.9	530	0.0500	1.12		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Woodland Kv= 5.0 fps
2.0	350	0.0200	2.87		**Shallow Concentrated Flow, TRAVEL PATH C TO D** Paved Kv= 20.3 fps
0.8	350	0.0100	7.73	13.66	**Pipe Channel, TRAVEL PATH D TO E** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.010 PVC, smooth interior
21.2	1,280	Total			

Subcatchment DA-2: P-2



Summary for Subcatchment DA-3: P-3

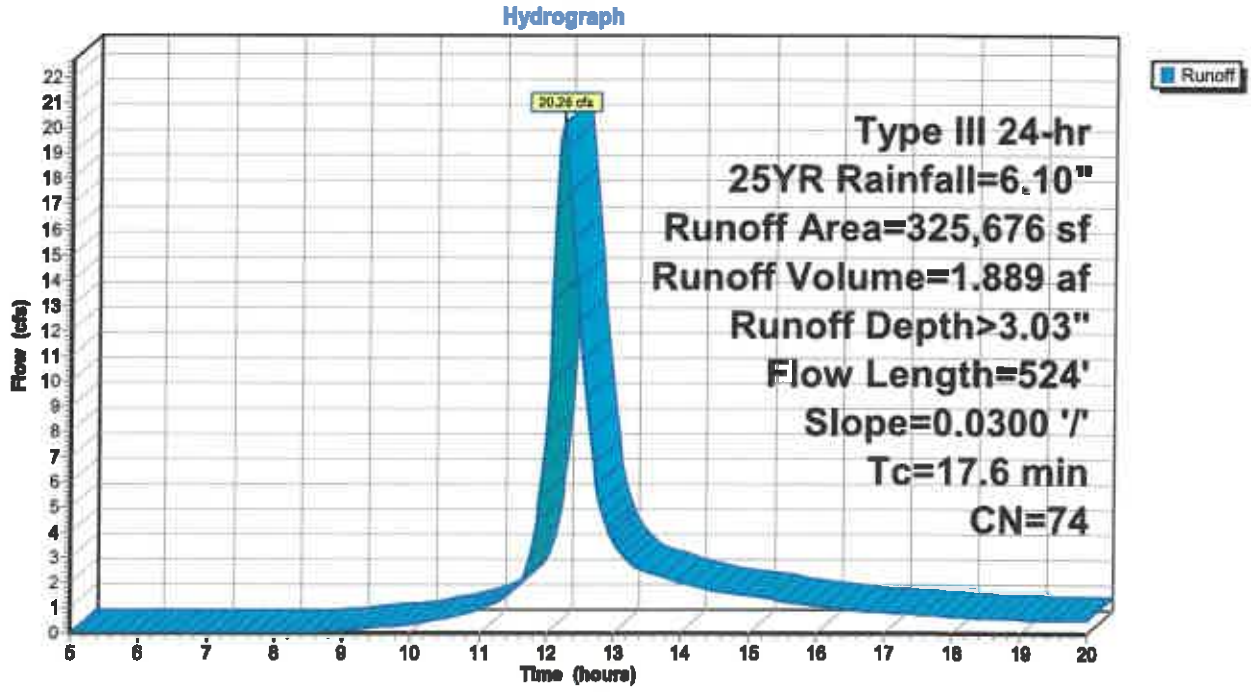
Runoff = 20.26 cfs @ 12.25 hrs, Volume= 1.889 af, Depth> 3.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.10"

Area (sf)	CN	Description
296,825	73	Woods, Fair, HSG C
18,851	98	Paved parking, HSG C
10,000	74	>75% Grass cover, Good, HSG C
325,676	74	Weighted Average
306,825		94.21% Pervious Area
18,851		5.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, TRAVEL PATH A TO B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.9	150	0.0300	2.79		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Unpaved Kv= 16.1 fps
6.2	324	0.0300	0.87		**Shallow Concentrated Flow, TRAVEL PATH C TO D** Woodland Kv= 5.0 fps
17.6	524	Total			

Subcatchment DA-3: P-3



Summary for Subcatchment DA-4: P-4

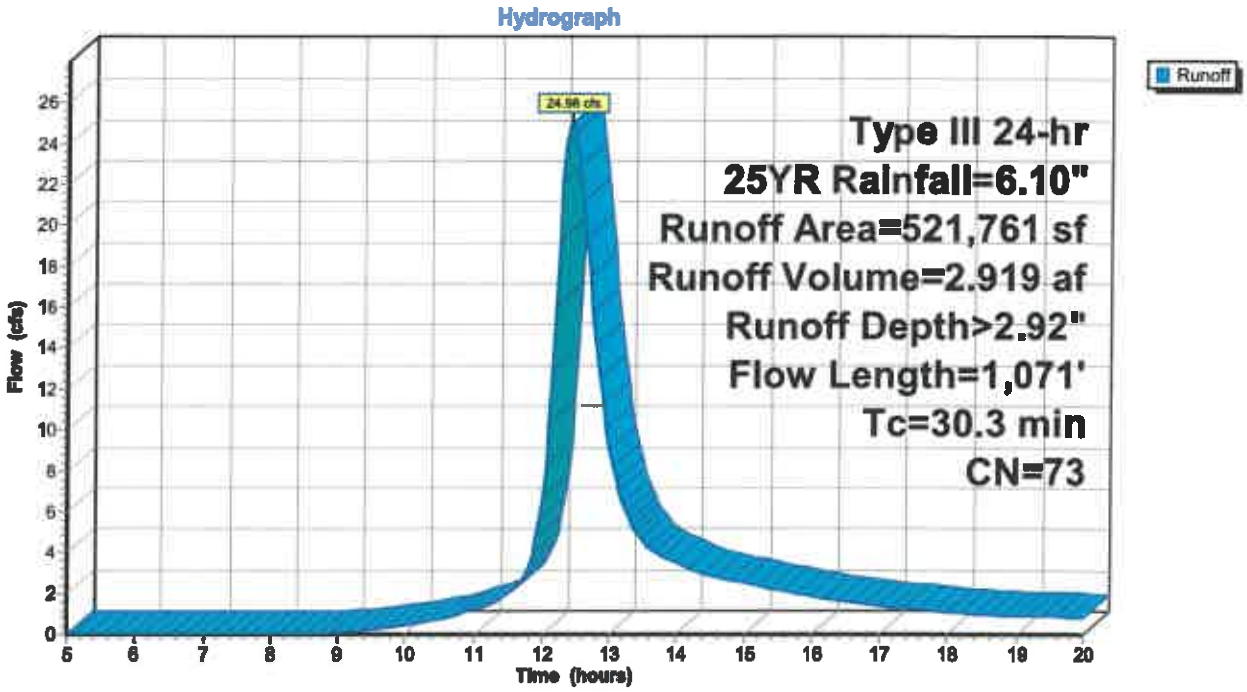
Runoff = 24.98 cfs @ 12.43 hrs, Volume= 2.919 af, Depth> 2.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.10"

Area (sf)	CN	Description
521,761	73	Woods, Fair, HSG C
521,761		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow, TRAVEL PATH A TO B** Woods: Light underbrush n= 0.400 P2= 3.20"
7.6	321	0.0200	0.71		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Woodland Kv= 5.0 fps
10.4	700	0.0500	1.12		**Shallow Concentrated Flow, TRAVEL PATH C TO D** Woodland Kv= 5.0 fps
30.3	1,071	Total			

Subcatchment DA-4: P-4



Summary for Subcatchment DA-5: P-5

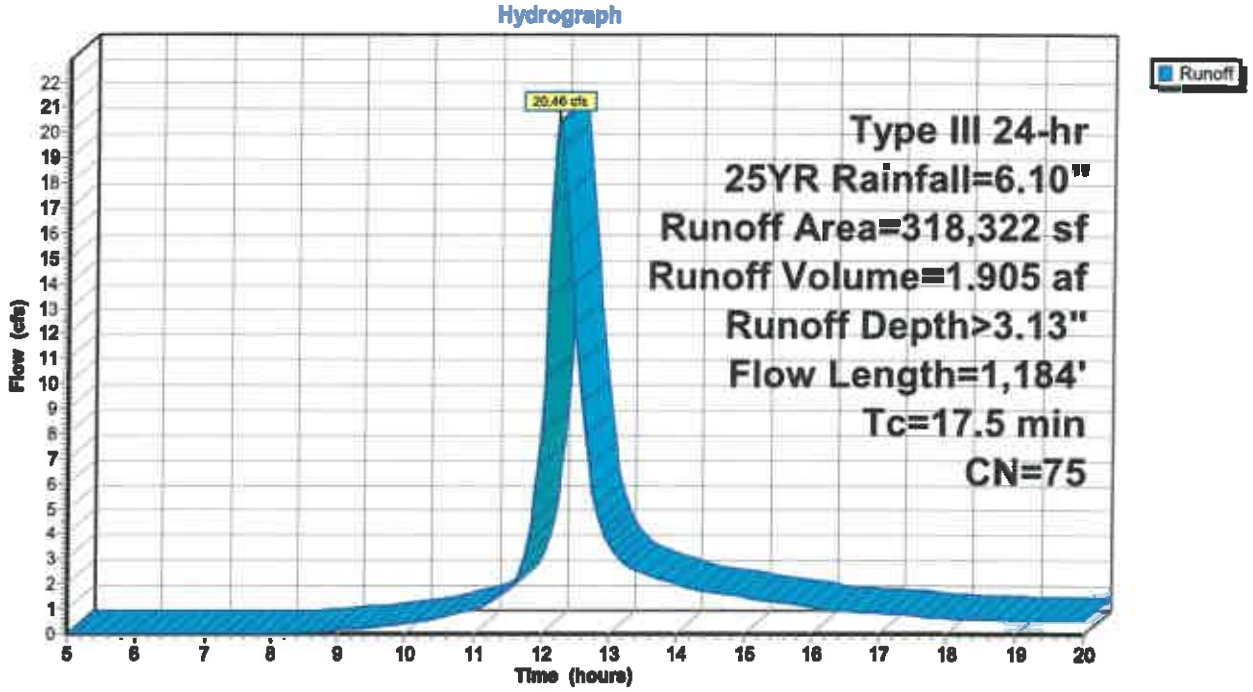
Runoff = 20.46 cfs @ 12.24 hrs, Volume= 1.905 af, Depth> 3.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.10"

Area (sf)	CN	Description
266,167	73	Woods, Fair, HSG C
19,500	98	Paved parking, HSG C
32,655	74	>75% Grass cover, Good, HSG C
318,322	75	Weighted Average
298,822		93.87% Pervious Area
19,500		6.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, TRAVEL PATH A TO B** Grass: Short n= 0.150 P2= 3.20"
3.4	200	0.0200	0.99		**Shallow Concentrated Flow, TRAVELPATH B TO C** Short Grass Pasture Kv= 7.0 fps
7.6	643	0.0800	1.41		**Shallow Concentrated Flow, TRAVEL PATH C TO D** Woodland Kv= 5.0 fps
0.7	171	0.0400	4.06		**Shallow Concentrated Flow, TRAVEL PATH D TO E** Paved Kv= 20.3 fps
0.2	120	0.0200	9.68	11.88	**Pipe Channel, TRAVEL PATH E TO F** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.010 PVC, smooth interior
17.5	1,184	Total			

Subcatchment DA-5: P-5



Summary for Subcatchment DA-6: P-6

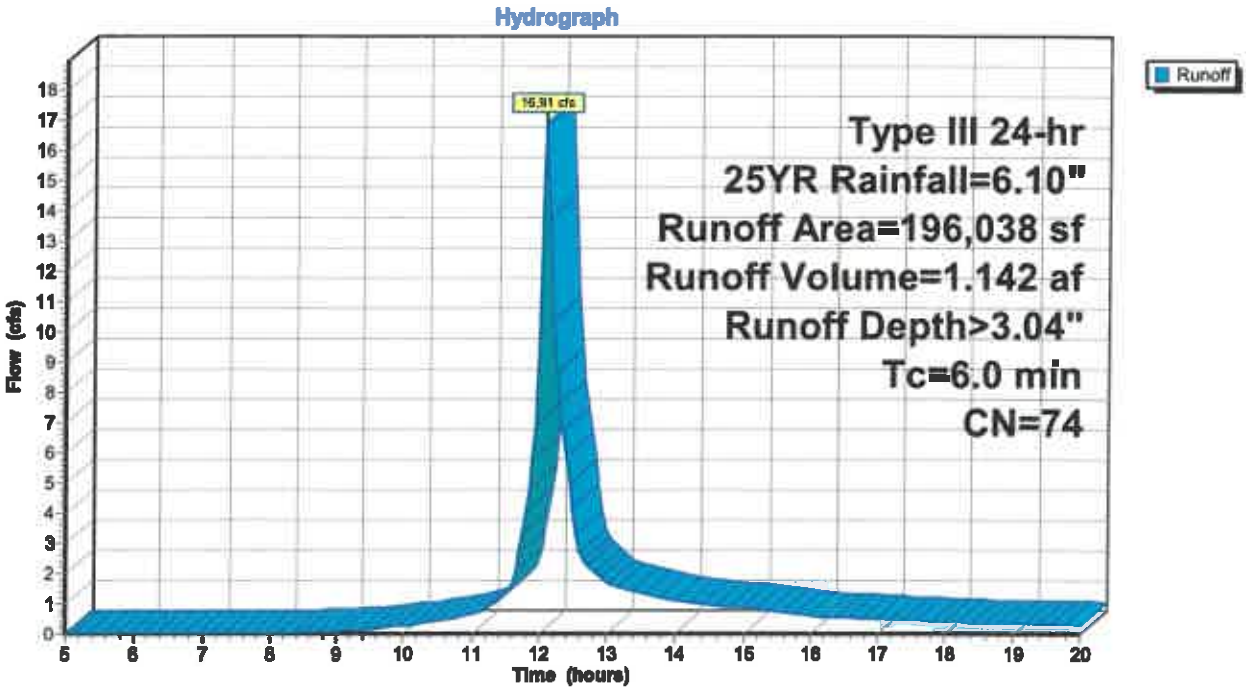
Runoff = 16.91 cfs @ 12.09 hrs, Volume= 1.142 af, Depth> 3.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.10"

Area (sf)	CN	Description
119,978	73	Woods, Fair, HSG C
69,060	74	>75% Grass cover, Good, HSG C
7,000	98	Paved parking, HSG C
196,038	74	Weighted Average
189,038		96.43% Pervious Area
7,000		3.57% Impervious Area

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

Subcatchment DA-6: P-6



Summary for Subcatchment DA-7: P-7

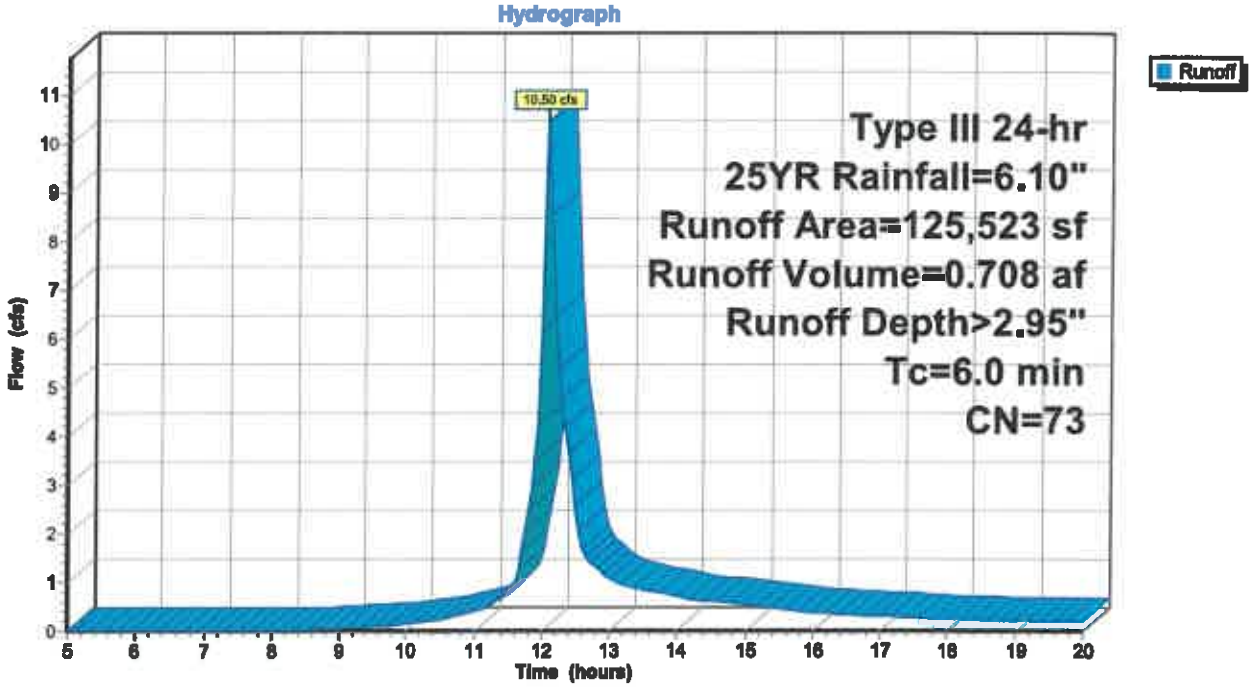
Runoff = 10.50 cfs @ 12.09 hrs, Volume= 0.708 af, Depth> 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25YR Rainfall=6.10"

Area (sf)	CN	Description
125,523	73	Woods, Fair, HSG C
125,523		100.00% Pervious Area

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

Subcatchment DA-7: P-7

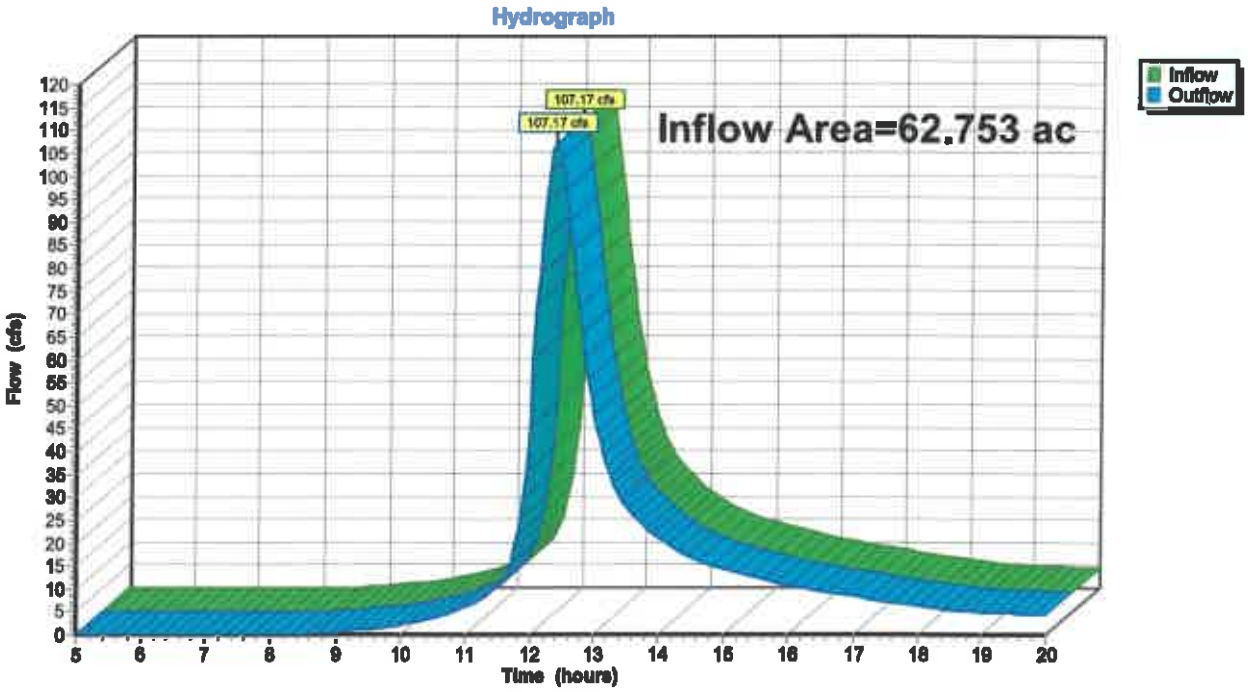


Summary for Reach 1R: POND

Inflow Area = 62.753 ac, 4.43% Impervious, Inflow Depth > 2.96" for 25YR event
Inflow = 107.17 cfs @ 12.41 hrs, Volume= 15.477 af
Outflow = 107.17 cfs @ 12.41 hrs, Volume= 15.477 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 1R: POND

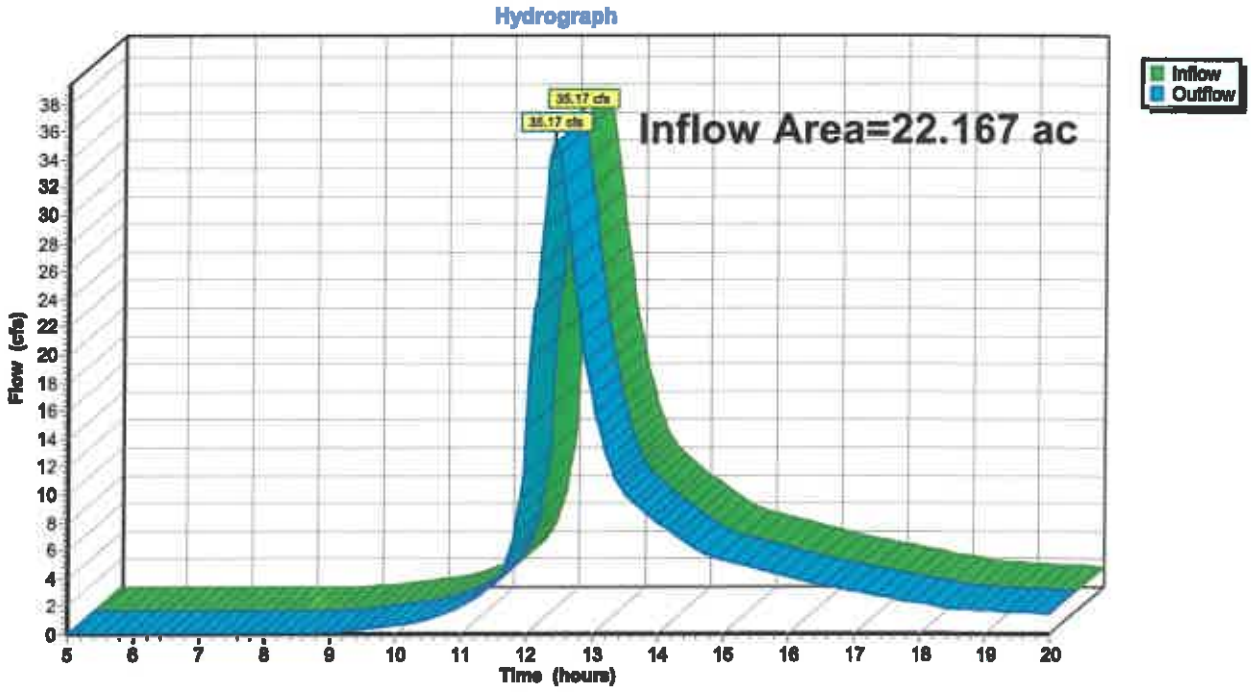


Summary for Reach 2R: WETLAND

Inflow Area = 22.167 ac, 2.02% Impervious, Inflow Depth > 2.90" for 25YR event
Inflow = 35.17 cfs @ 12.42 hrs, Volume= 5.362 af
Outflow = 35.17 cfs @ 12.42 hrs, Volume= 5.362 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 2R: WETLAND



Summary for Reach 3R: CULVERT

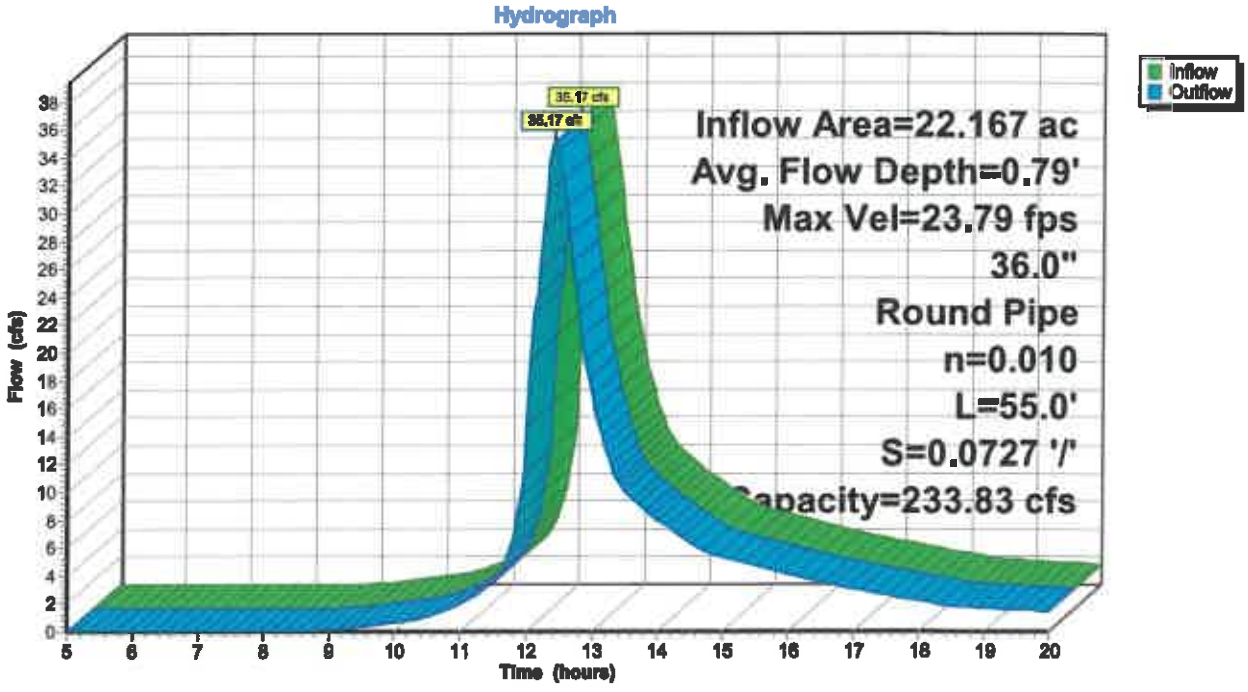
Inflow Area = 22.167 ac, 2.02% Impervious, Inflow Depth > 2.90" for 25YR event
Inflow = 35.17 cfs @ 12.42 hrs, Volume= 5.362 af
Outflow = 35.17 cfs @ 12.42 hrs, Volume= 5.362 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 23.79 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 11.82 fps, Avg. Travel Time= 0.1 min

Peak Storage= 81 cf @ 12.42 hrs
Average Depth at Peak Storage= 0.79'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 233.83 cfs

36.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 55.0' Slope= 0.0727 '/'
Inlet Invert= 924.00', Outlet Invert= 920.00'

Reach 3R: CULVERT



Summary for Pond PND1: BASIN1

Inflow Area = 7.308 ac, 6.13% Impervious, Inflow Depth > 3.13" for 25YR event
Inflow = 20.46 cfs @ 12.24 hrs, Volume= 1.905 af
Outflow = 7.75 cfs @ 12.66 hrs, Volume= 1.844 af, Atten= 62%, Lag= 24.9 min
Discarded = 0.21 cfs @ 12.66 hrs, Volume= 0.109 af
Primary = 7.53 cfs @ 12.66 hrs, Volume= 1.735 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 937.02' @ 12.66 hrs Surf.Area= 8,914 sf Storage= 29,298 cf

Plug-Flow detention time= 66.5 min calculated for 1.838 af (97% of inflow)
Center-of-Mass det. time= 54.8 min (854.0 - 799.2)

Volume	Invert	Avail.Storage	Storage Description
#1	932.00'	38,575 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
932.00	2,235	0	0
934.00	5,450	7,685	7,685
936.00	7,670	13,120	20,805
938.00	10,100	17,770	38,575

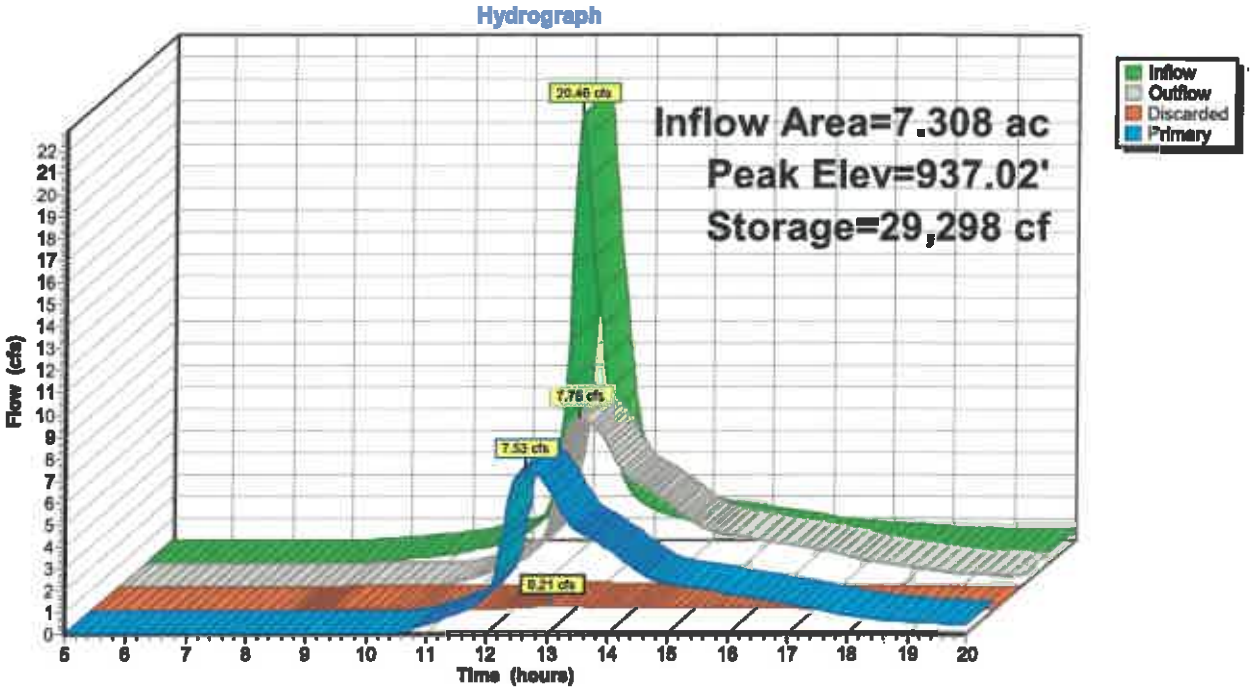
Device	Routing	Invert	Outlet Devices
#1	Primary	932.50'	**8.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	932.00'	**1.020 in/hr Exfiltration over Surface area**
#3	Primary	934.60'	**8.0" Vert. Orifice/Grate** C= 0.600
#4	Primary	936.00'	**6.0" Vert. Orifice/Grate X 2.00** C= 0.600
#5	Primary	937.75'	**20.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.21 cfs @ 12.66 hrs HW=937.02' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.21 cfs)

Primary OutFlow Max=7.53 cfs @ 12.66 hrs HW=937.02' (Free Discharge)
├─1=**Orifice/Grate** (Orifice Controls 3.44 cfs @ 9.85 fps)
├─3=**Orifice/Grate** (Orifice Controls 2.43 cfs @ 6.96 fps)
├─4=**Orifice/Grate** (Orifice Controls 1.66 cfs @ 4.23 fps)
└─5=**Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond PND1: BASIN1

Hydrograph



Summary for Pond PND2: BASIN2

Inflow Area = 7.691 ac, 16.28% Impervious, Inflow Depth > 3.32" for 25YR event
Inflow = 21.10 cfs @ 12.29 hrs, Volume= 2.126 af
Outflow = 9.66 cfs @ 12.68 hrs, Volume= 1.971 af, Atten= 54%, Lag= 23.0 min
Discarded = 0.24 cfs @ 12.68 hrs, Volume= 0.146 af
Primary = 9.41 cfs @ 12.68 hrs, Volume= 1.825 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 926.79' @ 12.68 hrs Surf.Area= 10,368 sf Storage= 33,782 cf

Plug-Flow detention time= 82.8 min calculated for 1.965 af (92% of inflow)
Center-of-Mass det. time= 58.7 min (857.0 - 798.3)

Volume	Invert	Avail.Storage	Storage Description
#1	922.00'	47,450 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
922.00	3,730	0	0
924.00	6,565	10,295	10,295
926.00	9,230	15,795	26,090
928.00	12,130	21,360	47,450

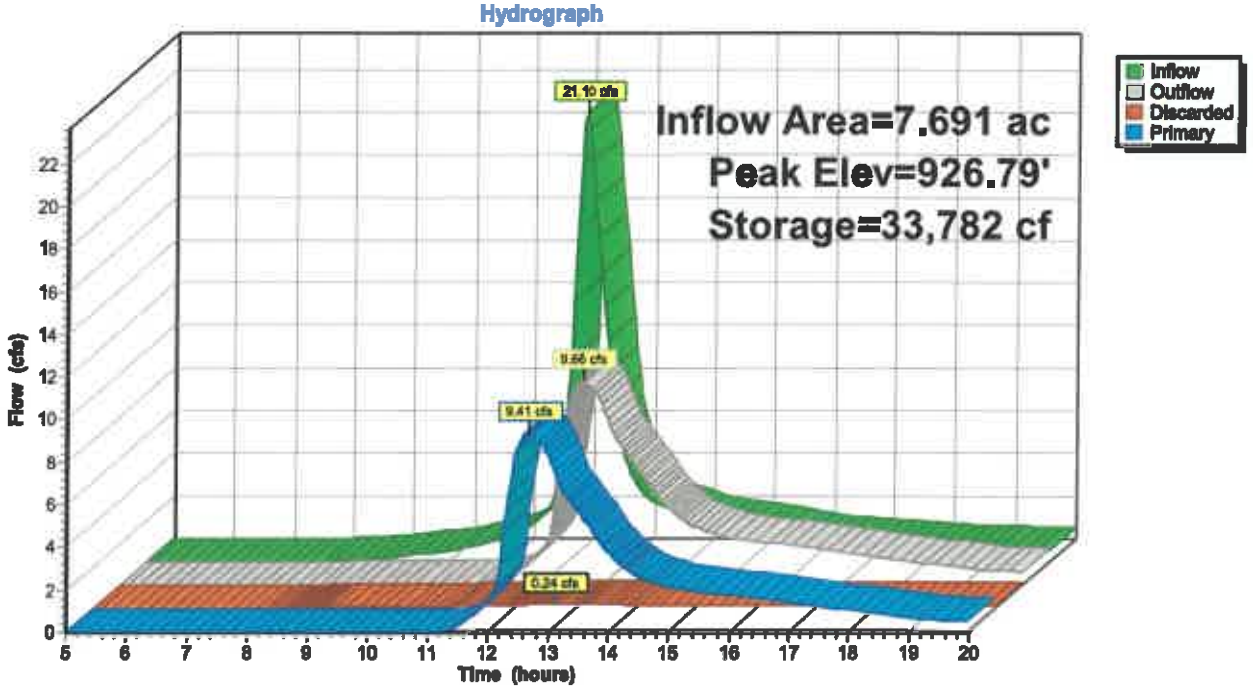
Device	Routing	Invert	Outlet Devices
#1	Discarded	922.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	923.00'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	924.60'	**12.0" Vert. Orifice/Grate** C= 0.600
#4	Primary	926.00'	**6.0" Vert. Orifice/Grate X 2.00** C= 0.600
#5	Primary	927.40'	**20.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.24 cfs @ 12.68 hrs HW=926.78' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.24 cfs)

Primary OutFlow Max=9.41 cfs @ 12.68 hrs HW=926.78' (Free Discharge)
↑**2=Orifice/Grate** (Orifice Controls 3.12 cfs @ 8.94 fps)
3=Orifice/Grate (Orifice Controls 4.90 cfs @ 6.25 fps)
4=Orifice/Grate (Orifice Controls 1.38 cfs @ 3.51 fps)
5=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond PND2: BASIN2

Hydrograph



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 DA-1: P-1 Runoff Area=911,170 sf 2.34% Impervious Runoff Depth>3.66"
Flow Length=1,280' Tc=32.1 min CN=74 Runoff=53.12 cfs 6.381 af

Subcatchment DA-2: P-2 Runoff Area=335,021 sf 16.28% Impervious Runoff Depth>3.99"
Flow Length=1,280' Tc=21.2 min CN=77 Runoff=25.26 cfs 2.555 af

Subcatchment DA-3: P-3 Runoff Area=325,676 sf 5.79% Impervious Runoff Depth>3.68"
Flow Length=524' Slope=0.0300 '/' Tc=17.6 min CN=74 Runoff=24.53 cfs 2.292 af

Subcatchment DA-4: P-4 Runoff Area=521,761 sf 0.00% Impervious Runoff Depth>3.56"
Flow Length=1,071' Tc=30.3 min CN=73 Runoff=30.39 cfs 3.554 af

Subcatchment DA-5: P-5 Runoff Area=318,322 sf 6.13% Impervious Runoff Depth>3.78"
Flow Length=1,184' Tc=17.5 min CN=75 Runoff=24.67 cfs 2.303 af

Subcatchment DA-6: P-6 Runoff Area=196,038 sf 3.57% Impervious Runoff Depth>3.69"
Tc=6.0 min CN=74 Runoff=20.45 cfs 1.385 af

Subcatchment DA-7: P-7 Runoff Area=125,523 sf 0.00% Impervious Runoff Depth>3.59"
Tc=6.0 min CN=73 Runoff=12.75 cfs 0.862 af

Reach 1R: POND Inflow=130.25 cfs 18.829 af
Outflow=130.25 cfs 18.829 af

Reach 2R: WETLAND Inflow=42.58 cfs 6.536 af
Outflow=42.58 cfs 6.536 af

Reach 3R: CULVERT Avg. Flow Depth=0.87' Max Vel=25.15 fps Inflow=42.58 cfs 6.536 af
36.0" Round Pipe n=0.010 L=55.0' S=0.0727 '/' Capacity=233.83 cfs Outflow=42.57 cfs 6.536 af

Pond PND1: BASIN1 Peak Elev=937.70' Storage=35,562 cf Inflow=24.67 cfs 2.303 af
Discarded=0.23 cfs 0.119 af Primary=8.77 cfs 2.119 af Outflow=9.00 cfs 2.239 af

Pond PND2: BASIN2 Peak Elev=927.36' Storage=39,992 cf Inflow=25.26 cfs 2.555 af
Discarded=0.26 cfs 0.157 af Primary=11.05 cfs 2.235 af Outflow=11.32 cfs 2.392 af

Total Runoff Area = 62.753 ac Runoff Volume = 19.333 af Average Runoff Depth = 3.70"
95.57% Pervious = 59.970 ac 4.43% Impervious = 2.783 ac

Summary for Subcatchment DA-1: P-1

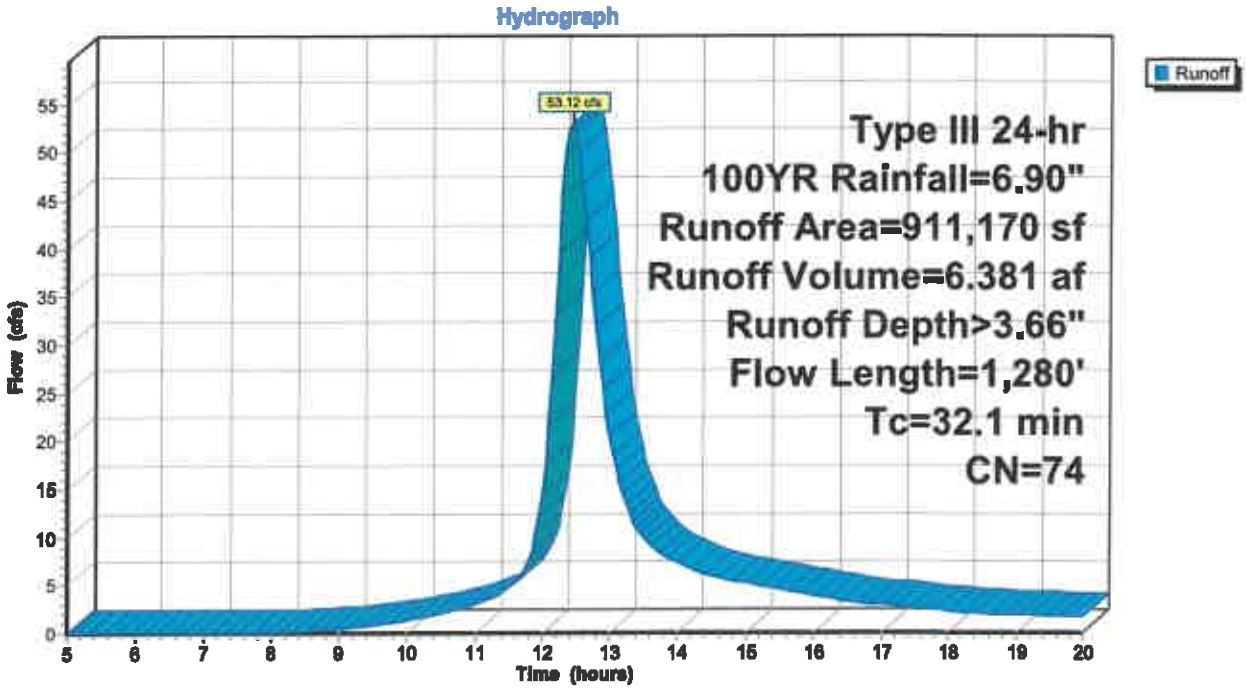
Runoff = 53.12 cfs @ 12.45 hrs, Volume= 6.381 af, Depth> 3.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.90"

Area (sf)	CN	Description
878,323	73	Woods, Fair, HSG C
21,347	98	Paved parking, HSG C
11,500	74	>75% Grass cover, Good, HSG C
911,170	74	Weighted Average
889,823		97.66% Pervious Area
21,347		2.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, TRAVEL PATH A TO B** Woods: Light underbrush n= 0.400 P2= 3.20"
11.9	620	0.0300	0.87		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Woodland Kv= 5.0 fps
2.3	225	0.0100	1.61		**Shallow Concentrated Flow, Travel Path C TO D** Unpaved Kv= 16.1 fps
7.4	385	0.0300	0.87		**Shallow Concentrated Flow, TRAVEL PATH D TO E** Woodland Kv= 5.0 fps
32.1	1,280	Total			

Subcatchment DA-1: P-1



Summary for Subcatchment DA-2: P-2

Runoff = 25.26 cfs @ 12.29 hrs, Volume= 2.555 af, Depth> 3.99"

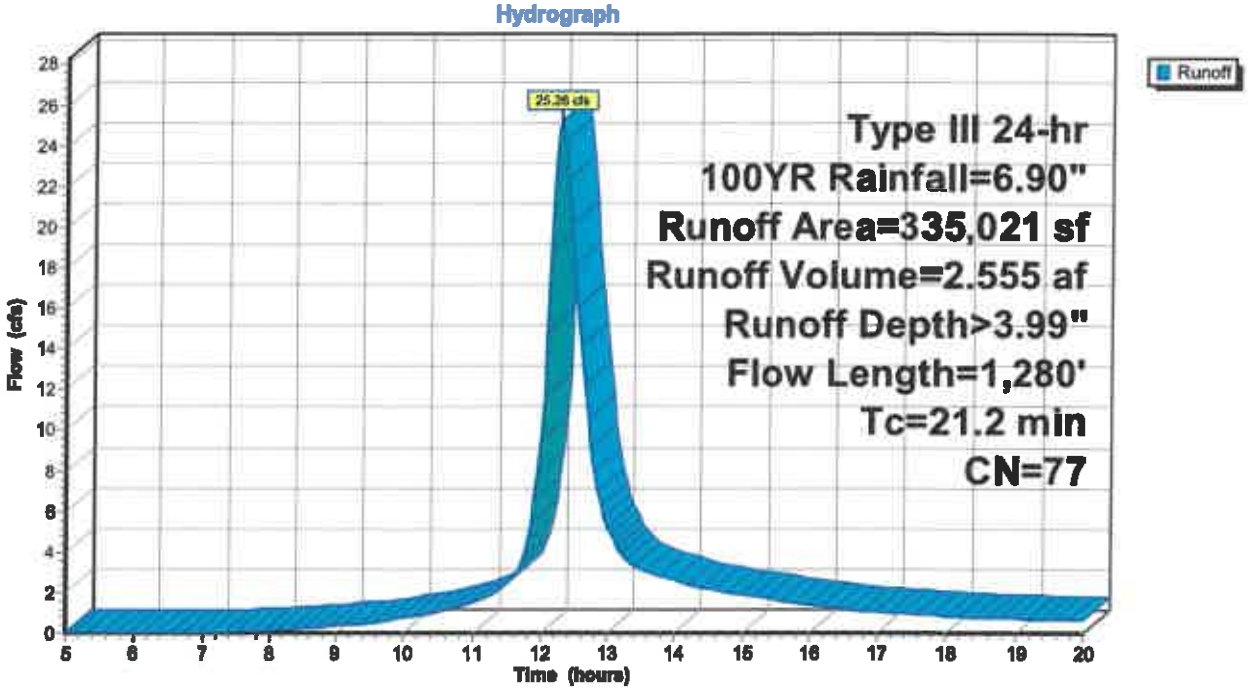
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.90"

Area (sf)	CN	Description
273,495	73	Woods, Fair, HSG C
54,526	98	Paved parking, HSG C
7,000	74	>75% Grass cover, Good, HSG C
335,021	77	Weighted Average
280,495		83.72% Pervious Area
54,526		16.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, TRAVEL PATH A TO B** Woods: Light underbrush n= 0.400 P2= 3.20"
7.9	530	0.0500	1.12		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Woodland Kv= 5.0 fps
2.0	350	0.0200	2.87		**Shallow Concentrated Flow, TRAVEL PATH C TO D** Paved Kv= 20.3 fps
0.8	350	0.0100	7.73	13.66	**Pipe Channel, TRAVEL PATH D TO E** 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.010 PVC, smooth interior
21.2	1,280	Total			

Subcatchment DA-2: P-2

Hydrograph



Summary for Subcatchment DA-3: P-3

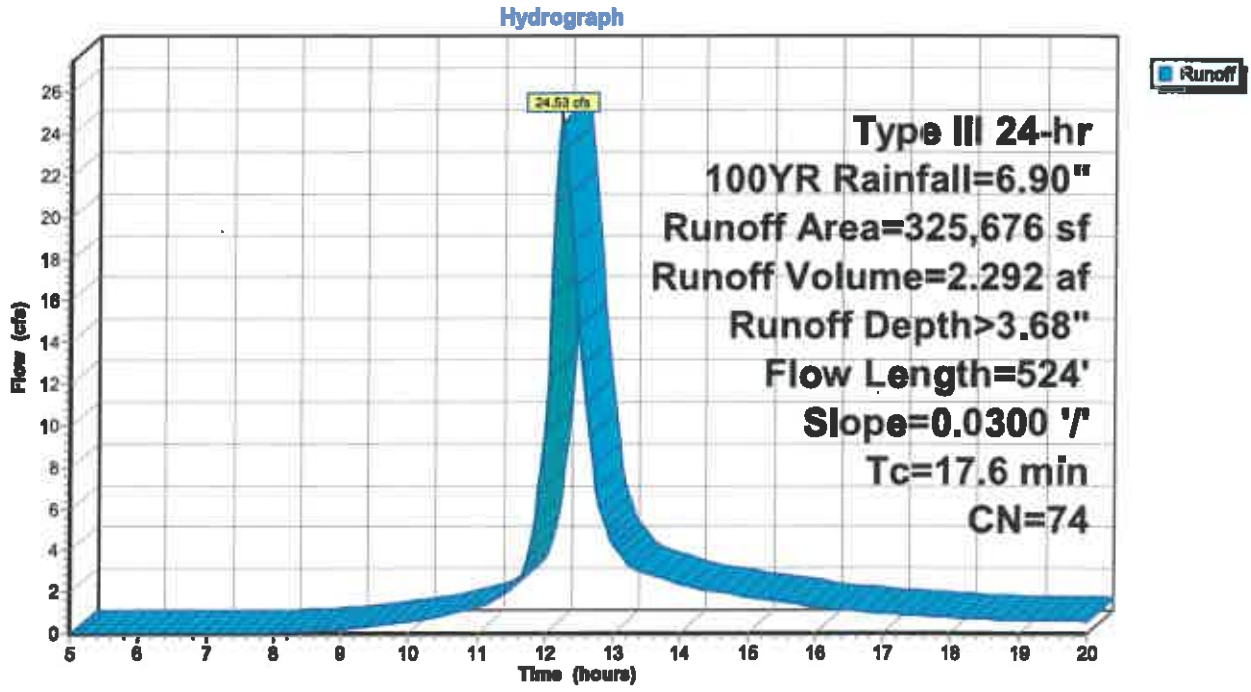
Runoff = 24.53 cfs @ 12.24 hrs, Volume= 2.292 af, Depth> 3.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.90"

Area (sf)	CN	Description
296,825	73	Woods, Fair, HSG C
18,851	98	Paved parking, HSG C
10,000	74	>75% Grass cover, Good, HSG C
325,676	74	Weighted Average
306,825		94.21% Pervious Area
18,851		5.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.0300	0.08		**Sheet Flow, TRAVEL PATH A TO B** Woods: Light underbrush n= 0.400 P2= 3.20"
0.9	150	0.0300	2.79		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Unpaved Kv= 16.1 fps
6.2	324	0.0300	0.87		**Shallow Concentrated Flow, TRAVEL PATH C TO D** Woodland Kv= 5.0 fps
17.6	524	Total			

Subcatchment DA-3: P-3



Summary for Subcatchment DA-4: P-4

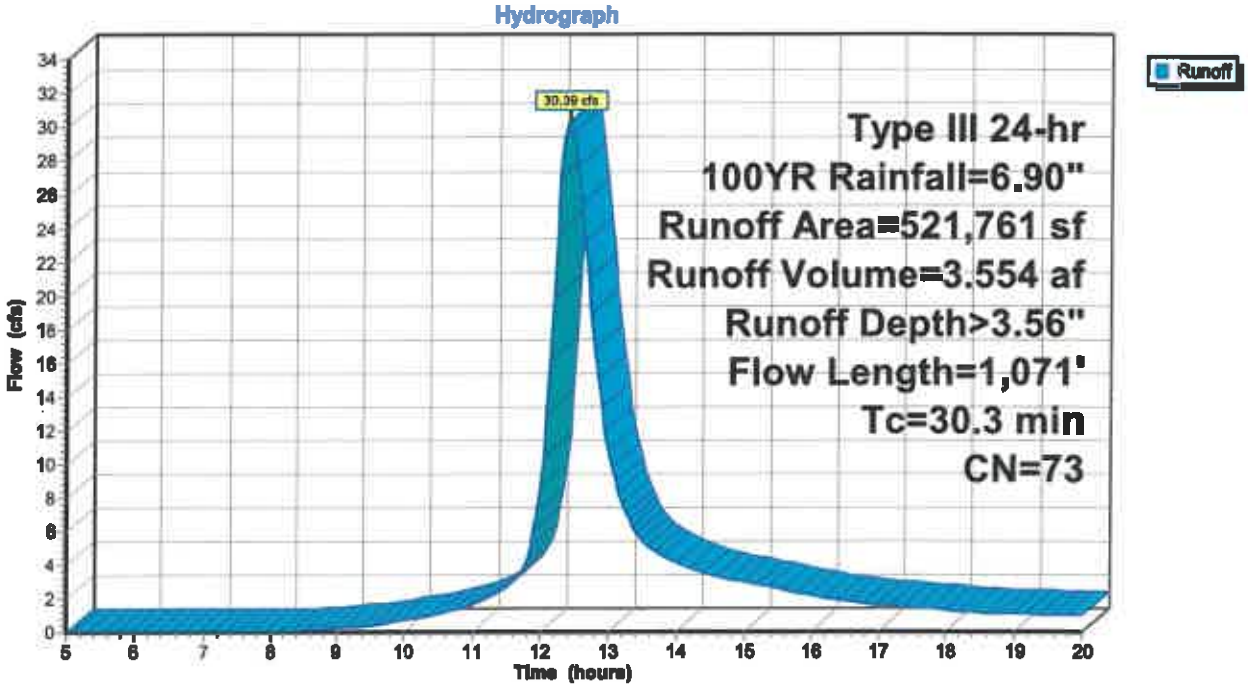
Runoff = 30.39 cfs @ 12.42 hrs, Volume= 3.554 af, Depth> 3.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.90"

Area (sf)	CN	Description
521,761	73	Woods, Fair, HSG C
521,761		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.3	50	0.0200	0.07		**Sheet Flow, TRAVEL PATH A TO B** Woods: Light underbrush n= 0.400 P2= 3.20"
7.6	321	0.0200	0.71		**Shallow Concentrated Flow, TRAVEL PATH B TO C** Woodland Kv= 5.0 fps
10.4	700	0.0500	1.12		**Shallow Concentrated Flow, TRAVEL PATH C TO D** Woodland Kv= 5.0 fps
30.3	1,071	Total			

Subcatchment DA-4: P-4



Summary for Subcatchment DA-5: P-5

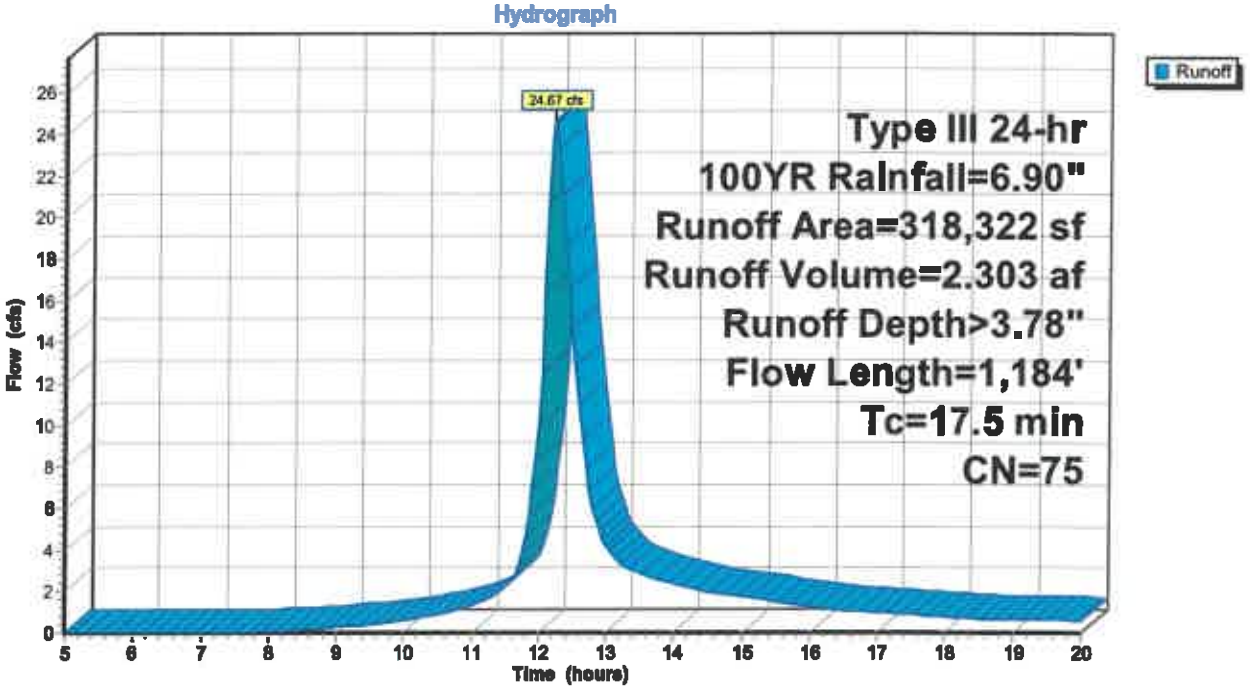
Runoff = 24.67 cfs @ 12.24 hrs, Volume= 2.303 af, Depth> 3.78"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.90"

Area (sf)	CN	Description
266,167	73	Woods, Fair, HSG C
19,500	98	Paved parking, HSG C
32,655	74	>75% Grass cover, Good, HSG C
318,322	75	Weighted Average
298,822		93.87% Pervious Area
19,500		6.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	50	0.0200	0.15		**Sheet Flow, TRAVEL PATH A TO B** Grass: Short n= 0.150 P2= 3.20"
3.4	200	0.0200	0.99		**Shallow Concentrated Flow, TRAVELPATH B TO C** Short Grass Pasture Kv= 7.0 fps
7.6	643	0.0800	1.41		**Shallow Concentrated Flow, TRAVEL PATH C TO D** Woodland Kv= 5.0 fps
0.7	171	0.0400	4.06		**Shallow Concentrated Flow, TRAVEL PATH D TO E** Paved Kv= 20.3 fps
0.2	120	0.0200	9.68	11.88	**Pipe Channel, TRAVEL PATH E TO F** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.010 PVC, smooth interior
17.5	1,184	Total			

Subcatchment DA-5: P-5



Summary for Subcatchment DA-6: P-6

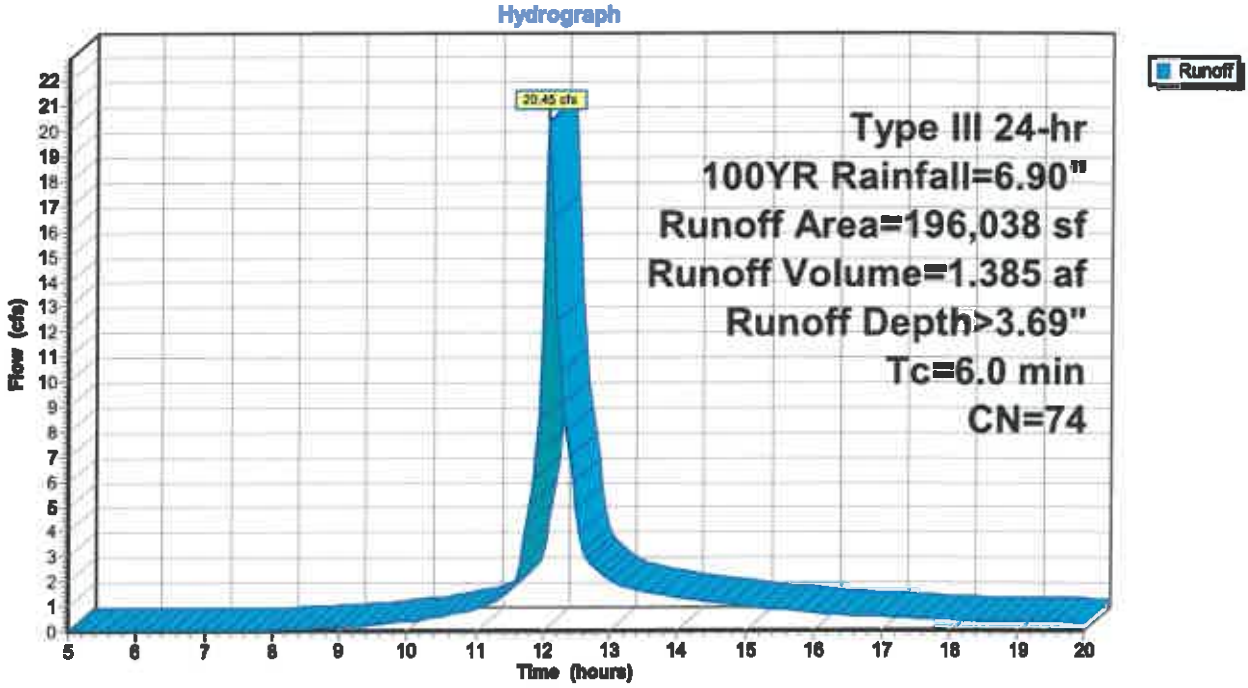
Runoff = 20.45 cfs @ 12.09 hrs, Volume= 1.385 af, Depth> 3.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.90"

Area (sf)	CN	Description
119,978	73	Woods, Fair, HSG C
69,060	74	>75% Grass cover, Good, HSG C
7,000	98	Paved parking, HSG C
196,038	74	Weighted Average
189,038		96.43% Pervious Area
7,000		3.57% Impervious Area

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

Subcatchment DA-6: P-6



Summary for Subcatchment DA-7: P-7

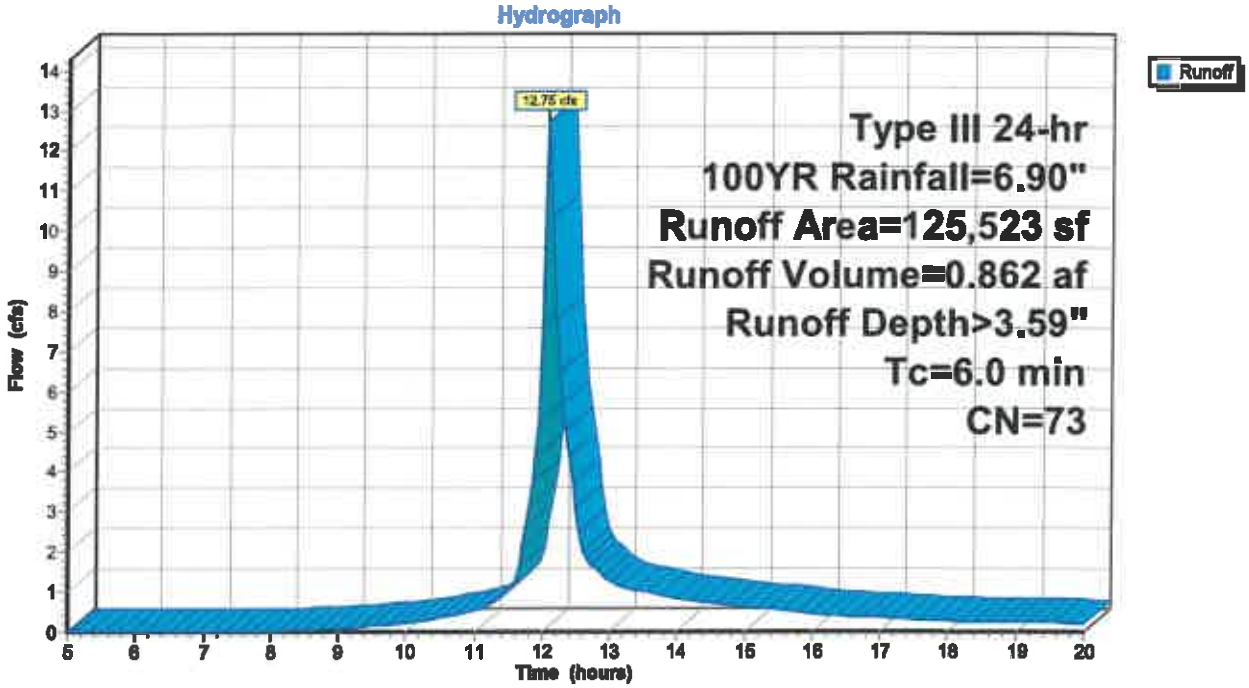
Runoff = 12.75 cfs @ 12.09 hrs, Volume= 0.862 af, Depth> 3.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100YR Rainfall=6.90"

Area (sf)	CN	Description
125,523	73	Woods, Fair, HSG C
125,523		100.00% Pervious Area

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

Subcatchment DA-7: P-7

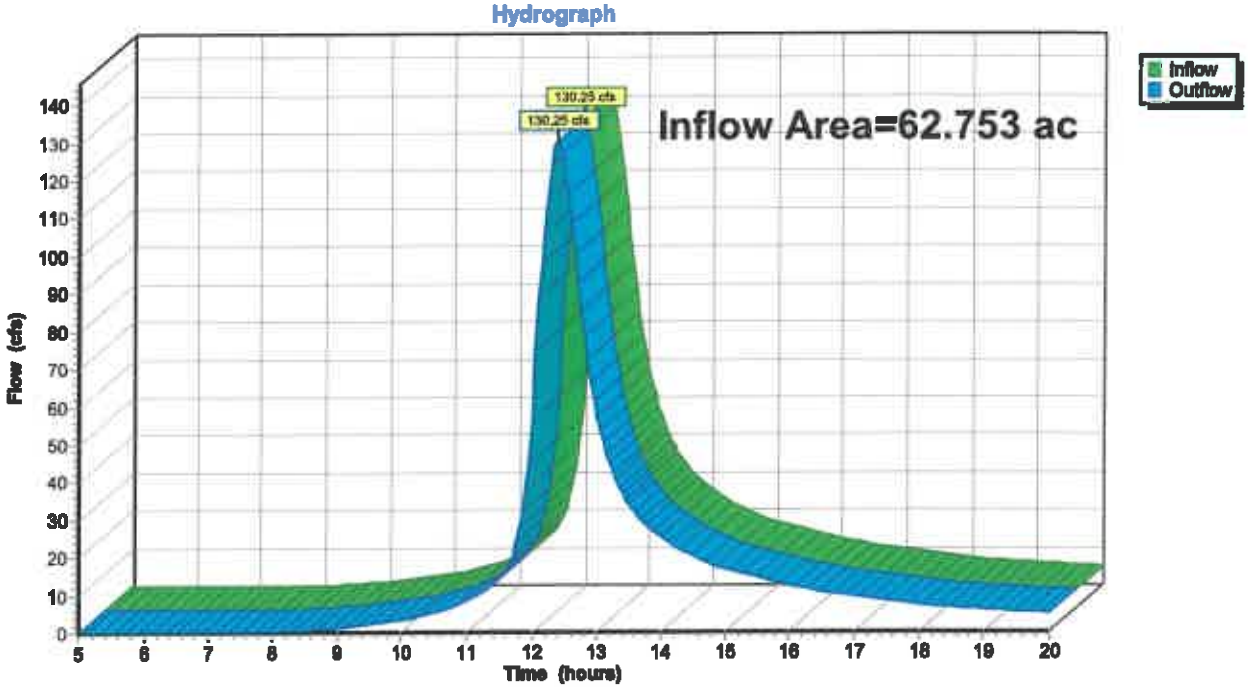


Summary for Reach 1R: POND

Inflow Area = 62.753 ac, 4.43% Impervious, Inflow Depth > 3.60" for 100YR event
Inflow = 130.25 cfs @ 12.39 hrs, Volume= 18.829 af
Outflow = 130.25 cfs @ 12.39 hrs, Volume= 18.829 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 1R: POND

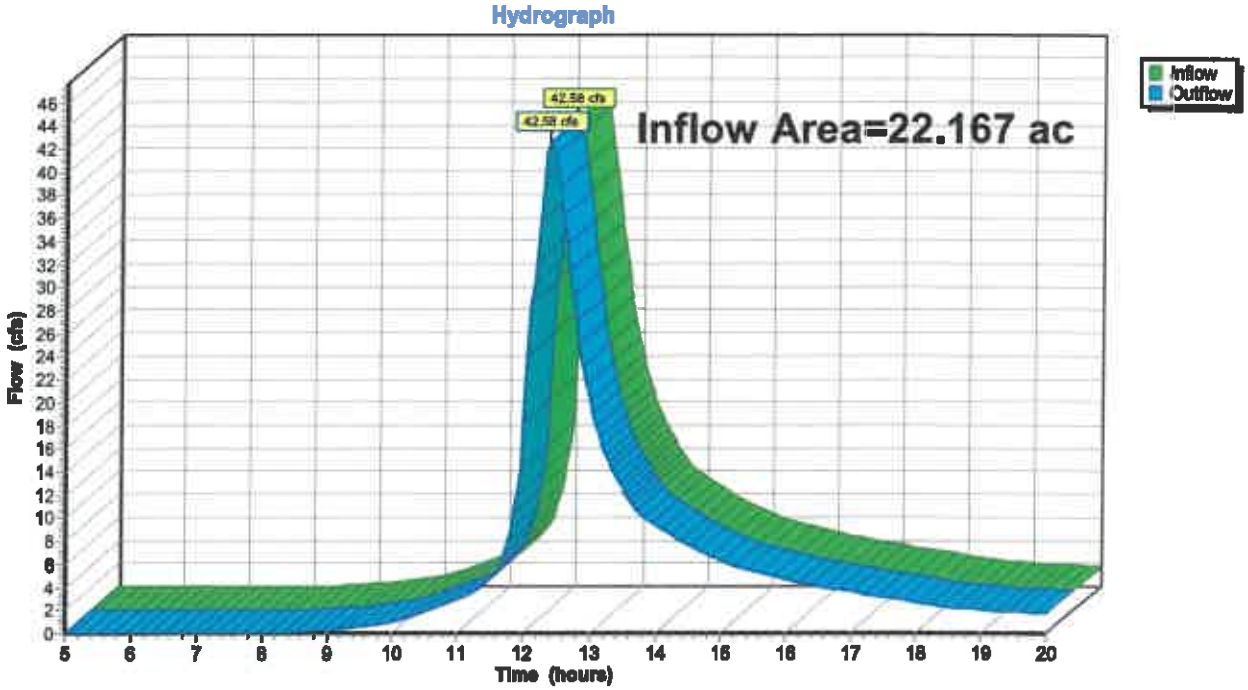


Summary for Reach 2R: WETLAND

Inflow Area = 22.167 ac, 2.02% Impervious, Inflow Depth > 3.54" for 100YR event
Inflow = 42.58 cfs @ 12.41 hrs, Volume= 6.536 af
Outflow = 42.58 cfs @ 12.41 hrs, Volume= 6.536 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 2R: WETLAND



Summary for Reach 3R: CULVERT

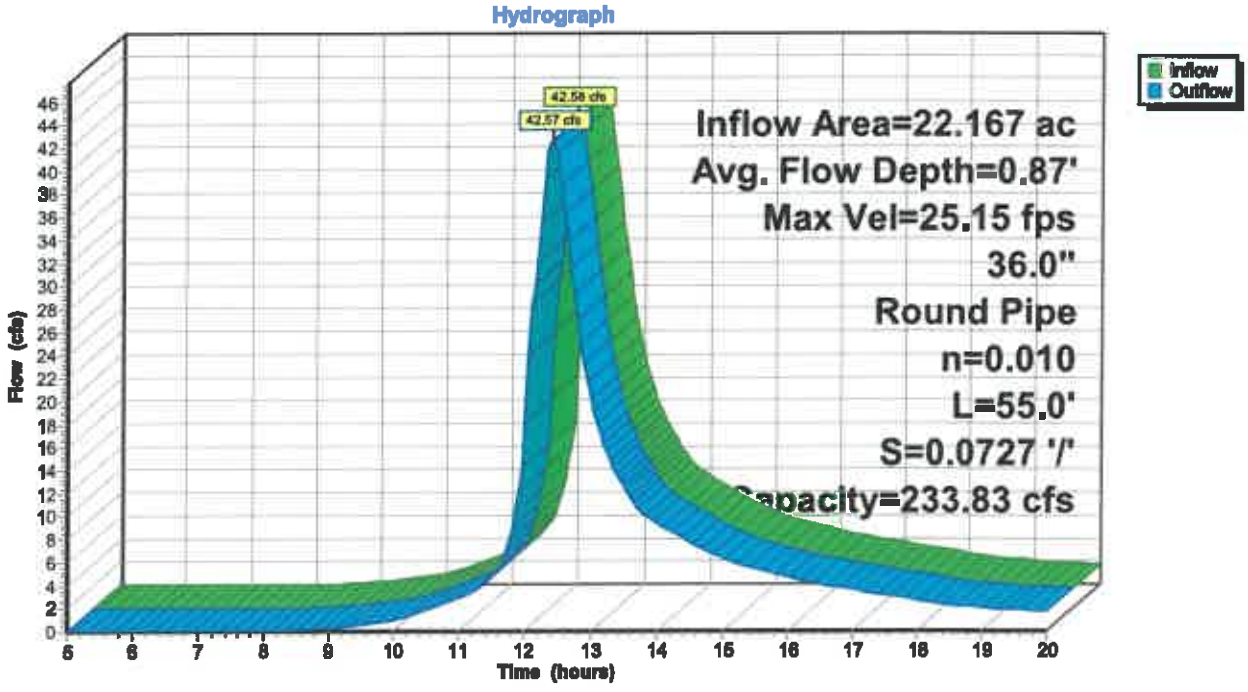
Inflow Area = 22.167 ac, 2.02% Impervious, Inflow Depth > 3.54" for 100YR event
Inflow = 42.58 cfs @ 12.41 hrs, Volume= 6.536 af
Outflow = 42.57 cfs @ 12.41 hrs, Volume= 6.536 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 25.15 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 12.32 fps, Avg. Travel Time= 0.1 min

Peak Storage= 93 cf @ 12.41 hrs
Average Depth at Peak Storage= 0.87'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 233.83 cfs

36.0" Round Pipe
n= 0.010 PVC, smooth interior
Length= 55.0' Slope= 0.0727 '/'
Inlet Invert= 924.00', Outlet Invert= 920.00'

Reach 3R: CULVERT



Summary for Pond PND1: BASIN1

Inflow Area = 7.308 ac, 6.13% Impervious, Inflow Depth > 3.78" for 100YR event
Inflow = 24.67 cfs @ 12.24 hrs, Volume= 2.303 af
Outflow = 9.00 cfs @ 12.66 hrs, Volume= 2.239 af, Atten= 64%, Lag= 25.3 min
Discarded = 0.23 cfs @ 12.66 hrs, Volume= 0.119 af
Primary = 8.77 cfs @ 12.66 hrs, Volume= 2.119 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 937.70' @ 12.66 hrs Surf.Area= 9,731 sf Storage= 35,562 cf

Plug-Flow detention time= 66.2 min calculated for 2.239 af (97% of inflow)
Center-of-Mass det. time= 55.6 min (850.5 - 794.9)

Volume	Invert	Avail.Storage	Storage Description
#1	932.00'	38,575 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
932.00	2,235	0	0
934.00	5,450	7,685	7,685
936.00	7,670	13,120	20,805
938.00	10,100	17,770	38,575

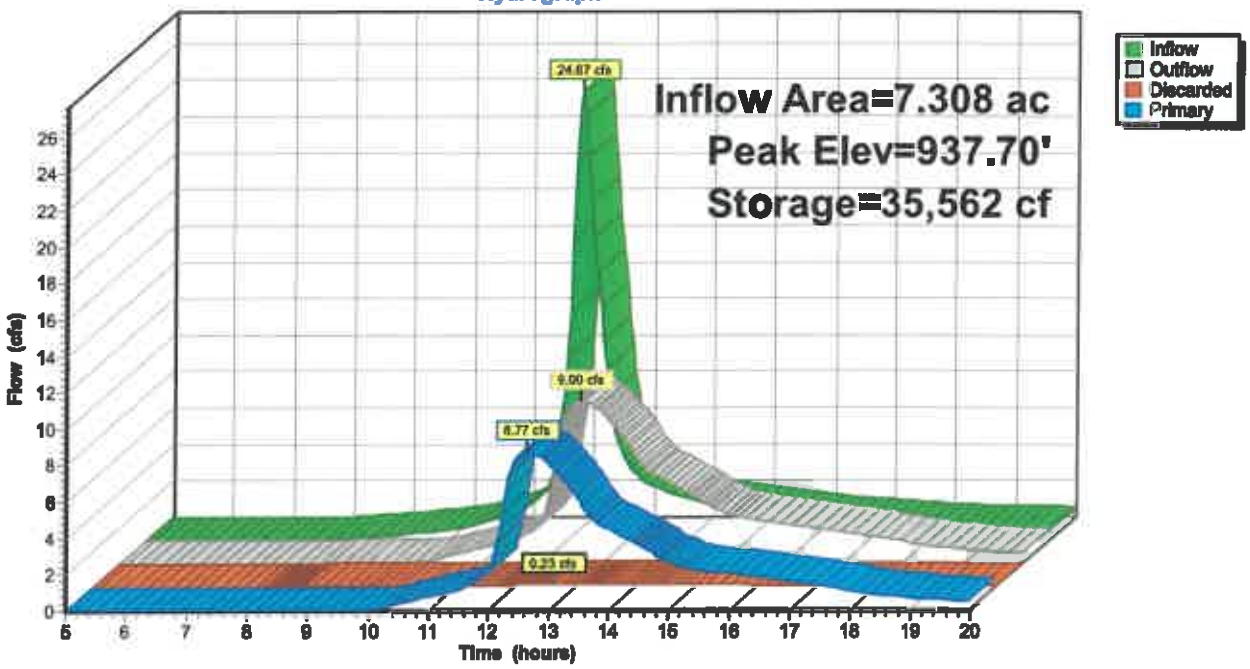
Device	Routing	Invert	Outlet Devices
#1	Primary	932.50'	**8.0" Vert. Orifice/Grate** C= 0.600
#2	Discarded	932.00'	**1.020 in/hr Exfiltration over Surface area**
#3	Primary	934.60'	**8.0" Vert. Orifice/Grate** C= 0.600
#4	Primary	936.00'	**6.0" Vert. Orifice/Grate X 2.00** C= 0.600
#5	Primary	937.75'	**20.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.23 cfs @ 12.66 hrs HW=937.69' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.23 cfs)

Primary OutFlow Max=8.77 cfs @ 12.66 hrs HW=937.69' (Free Discharge)
├**1=Orifice/Grate** (Orifice Controls 3.71 cfs @ 10.61 fps)
├**3=Orifice/Grate** (Orifice Controls 2.79 cfs @ 8.00 fps)
├**4=Orifice/Grate** (Orifice Controls 2.27 cfs @ 5.78 fps)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond PND1: BASIN1

Hydrograph



Summary for Pond PND2: BASIN2

Inflow Area = 7.691 ac, 16.28% Impervious, Inflow Depth > 3.99" for 100YR event
Inflow = 25.26 cfs @ 12.29 hrs, Volume= 2.555 af
Outflow = 11.32 cfs @ 12.68 hrs, Volume= 2.392 af, Atten= 55%, Lag= 23.3 min
Discarded = 0.26 cfs @ 12.68 hrs, Volume= 0.157 af
Primary = 11.05 cfs @ 12.68 hrs, Volume= 2.235 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 927.36' @ 12.68 hrs Surf.Area= 11,203 sf Storage= 39,992 cf

Plug-Flow detention time= 79.5 min calculated for 2.392 af (94% of inflow)
Center-of-Mass det. time= 57.4 min (851.5 - 794.1)

Volume	Invert	Avail.Storage	Storage Description
#1	922.00'	47,450 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
922.00	3,730	0	0
924.00	6,565	10,295	10,295
926.00	9,230	15,795	26,090
928.00	12,130	21,360	47,450

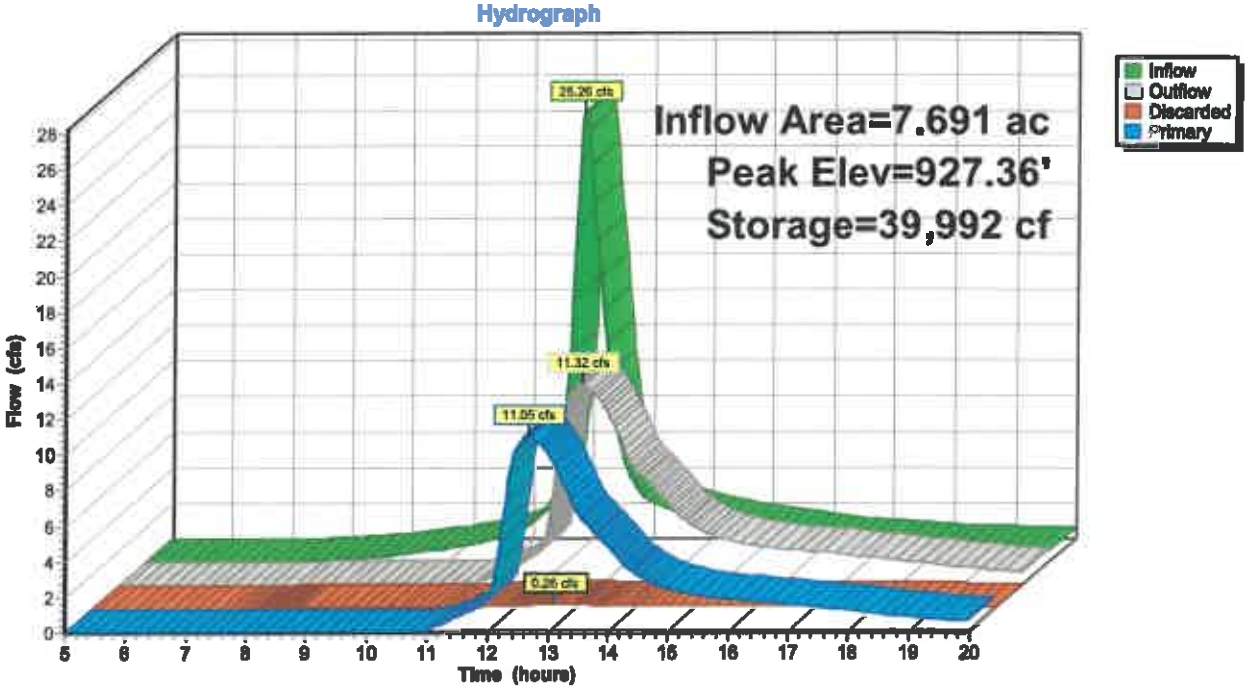
Device	Routing	Invert	Outlet Devices
#1	Discarded	922.00'	**1.020 in/hr Exfiltration over Surface area**
#2	Primary	923.00'	**8.0" Vert. Orifice/Grate** C= 0.600
#3	Primary	924.60'	**12.0" Vert. Orifice/Grate** C= 0.600
#4	Primary	926.00'	**6.0" Vert. Orifice/Grate X 2.00** C= 0.600
#5	Primary	927.40'	**20.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.26 cfs @ 12.68 hrs HW=927.36' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.26 cfs)

Primary OutFlow Max=11.04 cfs @ 12.68 hrs HW=927.36' (Free Discharge)
├**2=Orifice/Grate** (Orifice Controls 3.37 cfs @ 9.66 fps)
├**3=Orifice/Grate** (Orifice Controls 5.68 cfs @ 7.23 fps)
├**4=Orifice/Grate** (Orifice Controls 1.99 cfs @ 5.07 fps)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond PND2: BASIN2

Hydrograph



APPENDICES:

PRE-DEVELOPMENT WATERSHED MAP

POST-DEVELOPMENT WATERSHED MAP

Soil Maps

Operation & Maintenance Plan During Construction

Operation & Maintenance Plan After Construction

J-018 -Pond 1
Smugglers Cover
HANTUSH GROUNDWATER MOUND CALCULATOR

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration

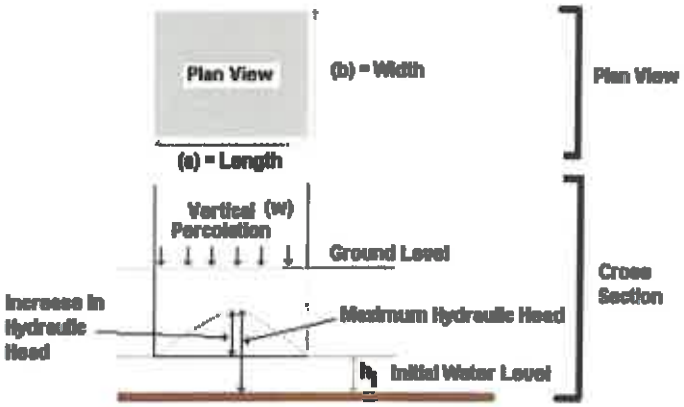
Basin	Length	Width	Volume	Time		Total		w (perc)
	ft	ft	cf	start	end	Hrs	Days	ft/d
1	98	50	1,185	10	40	30	1.25	0.193

dl

K (hyd. Conductivity)*

Texture	m/yr	m/d	ft/d
sand	5.55E+03	15.21	49.89
loamy sand	4.93E+03	13.51	44.31
sandy loam	1.09E+03	2.99	9.80
silty loam	2.27E+02	0.62	2.04
loam	2.19E+02	0.60	1.97
sandy clay loam	1.99E+02	0.55	1.79
silty clay loam	5.36E+01	0.15	0.48
clay loam	7.73E+01	0.21	0.69
sandy clay	6.84E+01	0.19	0.61
silty clay	3.21E+01	0.09	0.29
clay	4.05E+01	0.11	0.36

Source: Clapp and Hornberger (1978)

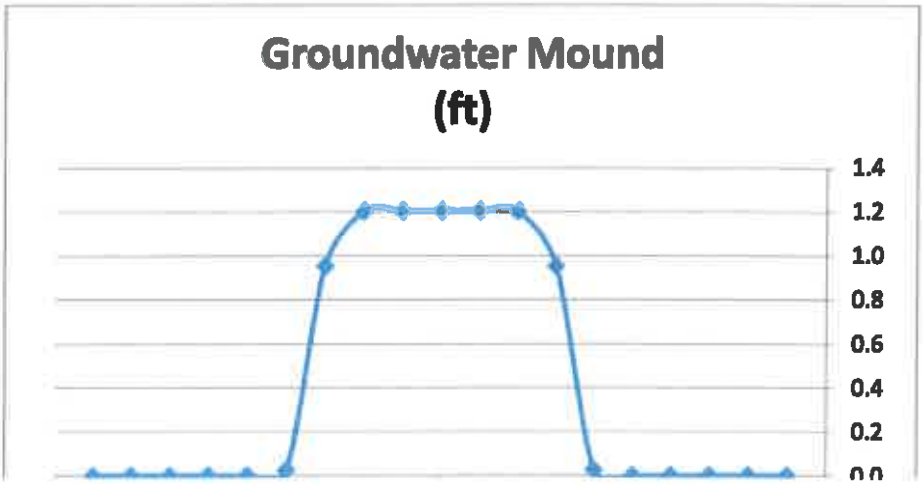


Input Values

2.04	K	Horizontal hydraulic conductivity (feet/day)
0.200	Sy	Specific yield (dimensionless)
2.000	hi	Initial Water Level (feet)
98.000	a	Basin Length (feet)
50.000	b	Basin Width (feet)
0.1930	w	Recharge (infiltration) rate (feet/day)
1.250	t	duration of infiltration period (days)

3.206	h(max)	Maximum Hydraulic Head (feet)
1.206	Δh(max)	Maximum Groundwater Mound (feet)

Ground-water Mound (ft)	Distance from Center (ft)
1.206	0
1.206	15
1.203	30
0.955	45
0.026	60
0.000	75
0.000	90
0.000	105
0.000	120
0.000	135



J-018 -Pond 1
Smugglers Cover
HANTUSH GROUNDWATER MOUND CALCULATOR

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration

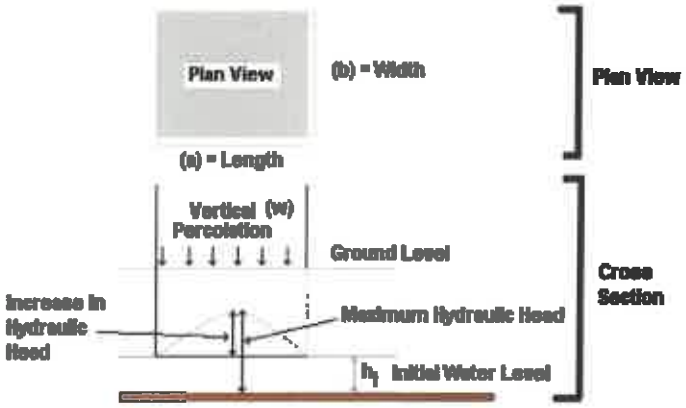
Basin	Length	Width	Volume	Time		Total		w (perc)
	ft	ft	cf	start	end	Hrs	Days	ft/d
1	150	50	1,185	12.5	32.5	20	0.83	0.190

di

K (hyd. Conductivity)*

Texture	m/yr	m/d	ft/d
sand	5.55E+03	15.21	49.89
loamy sand	4.93E+03	13.51	44.31
sandy loam	1.09E+03	2.99	9.80
silty loam	2.27E+02	0.62	2.04
loam	2.19E+02	0.60	1.97
sandy clay loam	1.99E+02	0.55	1.79
silty clay loam	5.36E+01	0.15	0.48
clay loam	7.73E+01	0.21	0.69
sandy clay	6.84E+01	0.19	0.61
silty clay	3.21E+01	0.09	0.29
clay	4.05E+01	0.11	0.36

Source: Clapp and Hornberger (1978)

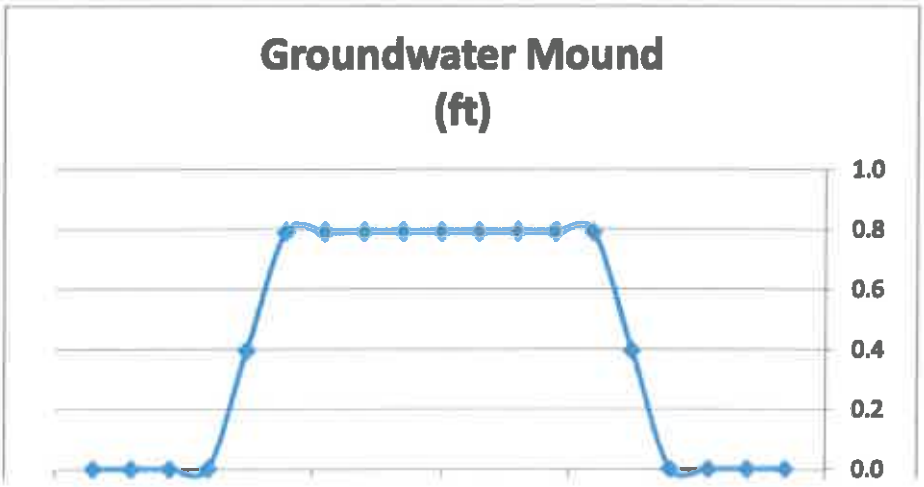


Input Values

2.04	K	Horizontal hydraulic conductivity (feet/day)
0.200	Sy	Specific yield (dimensionless)
2.000	hi	Initial Water Level (feet)
150.000	a	Basin Length (feet)
50.000	b	Basin Width (feet)
0.1900	w	Recharge (infiltration) rate (feet/day)
0.833	t	duration of infiltration period (days)

2.792	h(max)	Maximum Hydraulic Head (feet)
0.792	Δh(max)	Maximum Groundwater Mound (feet)

Ground-water Mound (ft)	Distance from Center (ft)
0.792	0
0.792	15
0.792	30
0.792	45
0.790	60
0.396	75
0.001	90
0.000	105
0.000	120
0.000	135



STAGE-STORAGE WORKSHEET

	DATE:	8/28/2022		CLIENT:	Schold
	PROJECT NUMBER:	J-018		CALCULATED BY:	PML
	BASIN NUMBER:	2		CHECKED BY:	
	LOCATION:	BASIN 2			
		AVERAGE	VERTICAL	VOLUME	VOLUME
ELEVATION	AREA	AREA	INTERVAL	INCREMENTAL	CUMULATIVE
(FEET)	(FT^2)	(FT^2)	(FT)	(FT^3)	(FT^3)
922.0	3726				0
922.5	4788	4257	1	2129	2129

STAGE-STORAGE WORKSHEET

	DATE:	8/28/2022		CLIENT:	Schold
	PROJECT NUMBER:	J-018		CALCULATED BY:	PML
	BASIN NUMBER:	2		CHECKED BY:	
	LOCATION:	BASIN 2			

ELEVATION (FEET)	AREA (FT^2)	AVERAGE AREA (FT^2)	VERTICAL INTERVAL (FT)	VOLUME INCREMENTAL (FT^3)	VOLUME CUMULATIVE (FT^3)
922.0	875				0
924.5	2240	1558	3	3894	3894

STAGE-STORAGE WORKSHEET

	DATE:	8/28/2022		CLIENT:	Schold
	PROJECT NUMBER:	J-018		CALCULATED BY:	PML
	BASIN NUMBER:	2		CHECKED BY:	
	LOCATION:	BASIN 2			
		AVERAGE	VERTICAL	VOLUME	VOLUME
ELEVATION	AREA	AREA	INTERVAL	INCREMENTAL	CUMULATIVE
(FEET)	(FT^2)	(FT^2)	(FT)	(FT^3)	(FT^3)
934.0	875				0
936.5	1805	1340	3	3350	3350

STAGE-STORAGE WORKSHEET

	DATE:	8/28/2022		CLIENT:	Schold
	PROJECT NUMBER:	J-018		CALCULATED BY:	PML
	BASIN NUMBER:	1		CHECKED BY:	
	LOCATION:	BASIN 1			
		AVERAGE	VERTICAL	VOLUME	VOLUME
ELEVATION	AREA	AREA	INTERVAL	INCREMENTAL	CUMULATIVE
(FEET)	(FT^2)	(FT^2)	(FT)	(FT^3)	(FT^3)
932.0	2221				0
932.5	2518	2370	1	1185	1185

Drawdown Calculation:

Pond #1

$$Time_{drawdown} = \frac{Rv}{(K)(Bottom\ Area)}$$

Where:

Rv = Storage Volume (1,185.f.)

K = Saturated 1.02 in/hour)

Bottom Area = Bottom Area of Recharge Structure (2800 s.f.)

1,185 c.f./ (1.02 in/hour)(1inch/12foot)(2800 s.f.) = 5 hours

Pond #2

$$Time_{drawdown} = \frac{Rv}{(K)(Bottom\ Area)}$$

Where:

Rv = Storage Volume (2,129.f.)

K = Saturated 1.02 in/hour)

Bottom Area = Bottom Area of Recharge Structure (2,720 s.f.)

2,129 c.f./ (1.02 in/hour)(1inch/12foot)(2,720 s.f.) = 10 hours

153 Paxton Street, Leicester Ma

Project# J-018

Riprap Stone Sizing – Drainage Outfalls

Method – ARS Rock Chutes (Slopes 2%-40%)
Reference: National Engineering Handbook, TS14C-8

#1–Rock Apron- Basin#1 spillway (HydroCAD)
Slope = 0.024 ft/ft
q (100-yr) = 9.00 cfs

$D_{50} = 12(1.923qS^{1.5})^{0.529}$
$= D_{50} = 12(1.923x9x2.4^{1.5})^{0.529}$
D_{50}=3" required
D_{50}=8" provided

$L= (1.8 (Q-5)/D^{1.5}+10) =$
$=(1.8 (9-5)/1.5^{1.5}+10)$ 14.0 feet
W1=3D = 3(1.5'4.5 feet
W2= 3D+0.7L= 3(1.5)+0.7(14) = 14.5 feet

#2–Rock Apron- Basin#2 spillway (HydroCAD)
Slope = 0.029 ft/ft
q (100-yr) 11.25 cfs

$D_{50} = 12(1.923qS^{1.5})^{0.529}$
$= D_{50} = 12(1.923x11.25x0.029^{1.5})^{0.529}$
D_{50}=4" required
D_{50}=8" provided

$L= (1.8 (Q-5)/D^{1.5}+10) =$
$=(1.8 (11.25-5)/2^{1.5}+10)$ 15.5 feet
W1=3D = 3(2')=6 feet
W2= 3D+0.7L= 3(2)+0.7(15.5) 17.0 feet

8/31/2022

RATIONAL METHOD PIPE DESIGN WORKSHEET

LOCATION	PIPE SEGMENT		INCREMENTAL AREA						FLOW TIME (min.)			100-Yr	100-Yr	DESIGN CONDITIONS					Design (100-Yr)		Inverts		Remarks
	From	To	DESIGNATION	A (Acres)	Total A	C	C*A	Sum (C*A)	To Inlet	In Chan.	Tot.	I (in/hr)	Q (cfs)	Pipe Diam (in.)	Length (ft)	Slope (%)	Q-full (cfs)	V-Full (fps)	Depth Peak (in.)	V-Peak (fps)	Up	Down	
Site To Basin 1																							
	CB-1	DMH-1		0.090		0.90	0.07		5		5	6.0	0.43	12	20	0.020	5.47	6.97	0.9	0.55	963.26	962.86	ch1-dmh1
	CB-2	DMH-1		0.420		0.62	0.26		5		5	6.0	1.56	12	15	0.020	5.47	6.97	3.4	1.99	963.26	962.86	ch2-dmh1
	DMH-1	DMH-2			0.500			0.33	7		7	6.0	1.99	12	200	0.050	8.65	11.02	2.8	2.54	962.76	952.19	dmh1-dmh2
	CB-3	DMH-2		0.350		0.8	0.28		5		5	6.0	1.68	12	20	0.020	5.47	6.97	3.7	2.14	954.13	953.83	ch3-dmh2
	CB-4	DMH-2		0.080		0.9	0.07		5		5	6.0	0.43	12	15	0.020	5.47	6.97	12.8	3.25	954.13	953.83	ch4-dmh2
	DMH-2	DMH-3			0.930			0.35	10		5	6.0	2.11	12	203	0.040	7.74	9.86	3.3	2.69	952.09	943.43	dmh2-dmh3
	CB-5	DMH-3		0.060		0.90	0.05		5		5	6.0	0.32	12	20	0.020	5.47	6.97	0.7	0.41	945.12	944.80	ch5-dmh3
	CB-6	DMH-3		1.800		0.62	1.12		10		10	6.0	6.70	12	15	0.020	5.47	6.97	14.7	8.53	945.12	944.80	ch6-dmh3
	DMH-3	DMH-4			2.110			1.17	10		10	6.0	7.02	15	113	0.025	11.89	9.04	9.5	5.72	945.33	940.50	dmh3-dmh4
	DMH-4	DMH-5			2.110			1.17			10	6.0	7.02	18	77	0.040	22.81	12.91	1.7	1.20	940.40	936.70	dmh4-dmh5
	CB-7	DMH-5		0.11		0.9	0.1		5		5	3	0.59	12	20	0.020	5.47	6.97	1.3	0.76	638.57	638.33	ch7-dmh5
	CB-8	DMH-5		3.040		0.62	1.88		15		15	6.0	11.31	12	15	0.040					638.57	638.33	ch8-dmh5
	DMH5	FES1A			5.15			1.05	15		15			18	100	0.010					936.60	935.60	dmh5-dmh6
POND-1		BASIN	Q Values For Pond Outlet Based on TR-20 100-Year Storm									Q_{25}	7.75	18	100	0.026	26.74	4.93	8.1	3.34	932.40	930.00	18"HPDE -Settling Pond
POND-1		BASIN 1	Q Values For Pond Outlet Based on TR-20 100-Year Storm									Q100	9.00	18	100	0.024	11.86	6.71	13.7	5.10	932.40	930.00	18" HDPE -Settling Pond

Notes:
1) Runoff Coefficient C-Values used; Impervious(Pavement) C=0.90 Grass/OpenSpace C=0.20, Residential Suburban C=.25-.40, Mannings "n" HDPE n=0.012, RCP n=0.013
2) Rainfall Intensity I (in/hr) values taken from Figure 10-4 Intensity-Duration-Frequency Curve for Boston, Massachusetts, Mass Highway Design Manual.
3) Five (5) minute minimum flow time used for minimum time of concentration (Tc) to CB inlet to system
4) Massachusetts Cascade Grate Inlet Capacity = 1.26 cfs @ 100% efficiency, Standard Grate = 0.95 cfs at PL
5) Blue Highlight denotes calculated peak flow (cfs) to CB Inlet

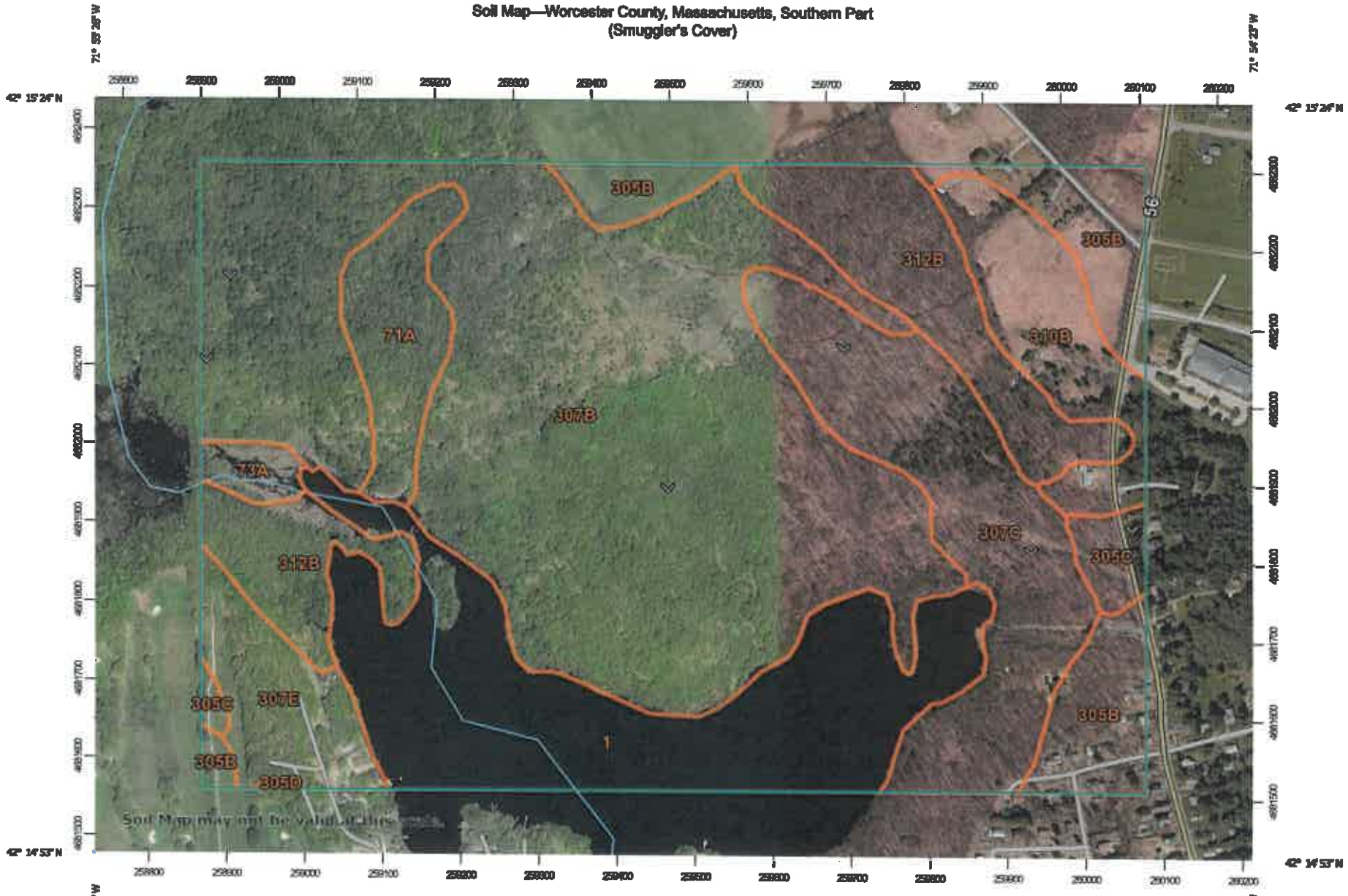
8/31/2022

RATIONAL METHOD PIPE DESIGN WORKSHEET

LOCATION	PIPE SEGMENT From	To	INCREMENTAL AREA DESIGNATION	A (Acres)	Total A	C	C*A	Sum (C*A)	FLOW TIME (min.) To Inlet	In Chan.	Tot.	100-Yr I (in/hr)	100-Yr Q (cfs)	DESIGN CONDITIONS Pipe Diam (in.)	Length (ft)	Slope (%)	Q-full (cfs)	V-Full (fps)	Design (100-Yr) Depth Peak (in.)	V-Peak (fps)	Inverts Up	Down	Remarks
Site To Basin 1																							
	CB-9	DMH-7		0.170		0.80	0.14		5		5	6.0	0.82	12	20	0.020	5.47	6.97	1.8	1.04	929.57	928.33	ch9-dmh7
	CB-10	DMH-7		0.130		0.80	0.10		5		5	6.0	0.62	12	15	0.020	5.47	6.97	1.4	0.79	929.57	928.33	ch10-dmh7
	DMH-7	DMH-8			0.300			0.24	7		7	6.0	1.44	12	114	0.020	5.47	6.97	3.2	1.83	928.23	926.00	dmh7-dmh8
	CB-11	DMH-9		0.810		0.8	0.65		5		5	6.0	3.89	12	20	0.020	5.47	6.97	8.5	4.95	924	923.74	ch11-dmh9
	CB-12	DMH-9		0.190		0.9	0.16		5		5	6.0	0.97	12	15	0.020	8.06	4.57	12.8	3.25	924	923.74	ch12-dmh9
	DMH-8	DMH-9			1.290			1.27	10		5	3.0	3.81	12	125	0.015	4.74	6.04	9.7	4.85	925.9	925	dmh8-dmh9
	CB-13	DMH-10		2.700		0.62	1.67		5		5	3.0	5.02	15	20	0.020	9.92	8.09	7.6	4.00	925.57	925.33	ch13-dmh10
	CB-14	DMH-10		0.270		0.90	0.24		10		10	6.0	1.46	12	15	0.020	5.47	6.97	3.2	1.86	925.57	925.33	ch14-dmh14
	DMH-9	DMH-10			4.260			4.26	10		10	3.0	12.78	24	206	0.005	17.37	5.53	17.7	4.07	923.64	922.74	dmh9-dmh10
	DMH-10	FES-2A			4.260			4.26			10	3.0	12.78	24	83	0.005	17.37	5.53	17.7	4.07	922.64	922.25	dmh10-fes2a
FOND-2		BASIN 2	Q Values For Pond Outlet Based on TR-20 100-Year Storm																				
												Q_{25}	11.32	24	100	0.029	28.07	8.94	3.7	3.61	921.00	920.00	24"HPDE -Setting Pond
FOND-2		BASIN 2	Q Values For Pond Outlet Based on TR-20 100-Year Storm									Q100	11.32	24	100	0.029	28.07	8.94	9.7	3.61	921.00	920.00	24" HDPE -Setting Pond

Notes:
1) Runoff Coefficient C-Values used; Impervious(Pavement) C=0.90 Grass/Openspace C=0.20, Residential Suburban C=.25-.40, Mannings "n" HDPE n=0.012, RCP n=0.013
2) Rainfall Intensity I (in/hr) values taken from Figure 10-4 Intensity-Duration-Frequency Curve for Boston, Massachusetts, Mass Highway Design Manual.
3) Five (5) minute minimum flow time used for minimum time of concentration (Tc) to CB inlet to system
4) Massachusetts Cascade Grate Inlet Capacity = 1.26 cfs @ 100% efficiency, Standard Grate = 0.95 cfs est PI.
5) Blue Highlight denotes calculated peak flow (cfs) to CB Inlet

Soil Map—Worcester County, Massachusetts, Southern Part
(Smuggler's Cover)



Map Scale: 1:6,770 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 300 600 1200 1800

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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Worcester County, Massachusetts, Southern Part
Survey Area Data: Version 14, Sep 3, 2021

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

Date(s) aerial images were photographed: Apr 8, 2011—Jul 9, 2019

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
1	Water	38.4	16.0%
71A	Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony	9.2	3.8%
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	2.1	0.9%
305B	Paxton fine sandy loam, 3 to 8 percent slopes	17.4	7.2%
305C	Paxton fine sandy loam, 8 to 15 percent slopes	3.1	1.3%
305D	Paxton fine sandy loam, 15 to 25 percent slopes	0.2	0.1%
307B	Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony	99.0	41.3%
307C	Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony	26.9	11.2%
307E	Paxton fine sandy loam, 15 to 35 percent slopes, extremely stony	9.4	3.9%
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	12.0	5.0%
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	22.3	9.3%
Totals for Area of Interest		240.0	100.0%

Worcester County, Massachusetts, Southern Part

305B—Paxton fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t2qp
Elevation: 0 to 1,570 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Paxton and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton

Setting

Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 15 inches: fine sandy loam
Bw2 - 15 to 26 inches: fine sandy loam
Cd - 26 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 18 to 39 inches to densic material
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s

Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Woodbridge
Percent of map unit: 9 percent
Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury
Percent of map unit: 6 percent
Landform: Hills, drainageways, depressions, ground moraines
Landform position (two-dimensional): Toeslope, backslope, footslope
Landform position (three-dimensional): Base slope, head slope, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Charlton
Percent of map unit: 5 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Data Source Information

Soil Survey Area: Worcester County, Massachusetts, Southern Part
Survey Area Data: Version 14, Sep 3, 2021

Operation & Maintenance Plan After Construction

D&L Design Group, Inc.
115 Water Street, Milford Ma 01757 (P) 508-408-2577

J-018

Inspection and Maintenance Log FOR: 153 Paxton Street
AFTER CONSTRUCTION & After 3.0" Rain

Components	**Date**
Basin#1 **– twice a year**	
Comments during insp.	
Note corrective measures performed & Date	
Basin#2 **-twice a year**	
Comments during insp.	
Note corrective measures performed & date	
Forebay#1 **-twice a year**	
Comments during insp.	
Note corrective measures performed & date	
Forebay#2 **-twice a year**	
Comments during insp.	
Note corrective measures performed & date	
Catch Basins **– 8 inches of sediment or twice a year**	
Comments during insp.	
Note corrective measures performed & date _____. Inspector Title Date	
_____. Address Tel#	

J-018

Inspection and Maintenance Log FOR: 153 Paxton Street
AFTER CONSTRUCTION & After 3.0" Rain

Components	**Date**
Outlet Oontrol Structure#1 **-8 inches of sediment or twice a year**	
Comments during insp.	
Note corrective measures performed & date	
Outlet Control Structure #2 **Twice a year**	
Comments during insp.	
Note corrective measures performed & date	
Drain Manholes **–four times a year**	
Comments during insp.	
Note corrective measures performed & date	
Level Spreader Basin 1 **-Twice a year**	
Comments during insp.	
Note corrective measures performed & date	
Level Spreader Basin 2 **-Twice a year**	
Comments during insp.	
Note corrective measures performed & date	
All Flared end sections and rip rap aprons **– twice a year**	
Comments during insp.	
Note corrective measures performed & date _____ Inspector Title Date	
Components	Date

Operation & Maintenance Plan During Construction

D&L Design Group, Inc.
115 Water Street, Milford Ma 01757 (P) 508-408-2577

J-018

WEEKLY
Inspection and Maintenance Log FOR: 153 Paxton Street
DURING CONSTRUCTION & After 0.5" Rain

omponents	Date
Erosion Control – Weekly	
Comments during insp.	
Note corrective measures performed & Date	
On Site Pavement Sweeping – as Needed	
Comments during insp.	
Note corrective measures performed & date	
Silt Fence & Composite Sock– Monthly	
Comments during insp.	
Note corrective measures performed & date	
Temporary Basin Area as Needed	
Comments during insp.	
Note corrective measures performed & date	
Construction Entrance as Needed	
Comments during insp.	
Note corrective measures performed & date	
Inspector Title Date	
Address Tel#	

J-018

WEEKLY
Inspection and Maintenance Log FOR: 153 Paxton Street
DURING CONSTRUCTION & After 0.5" Rain

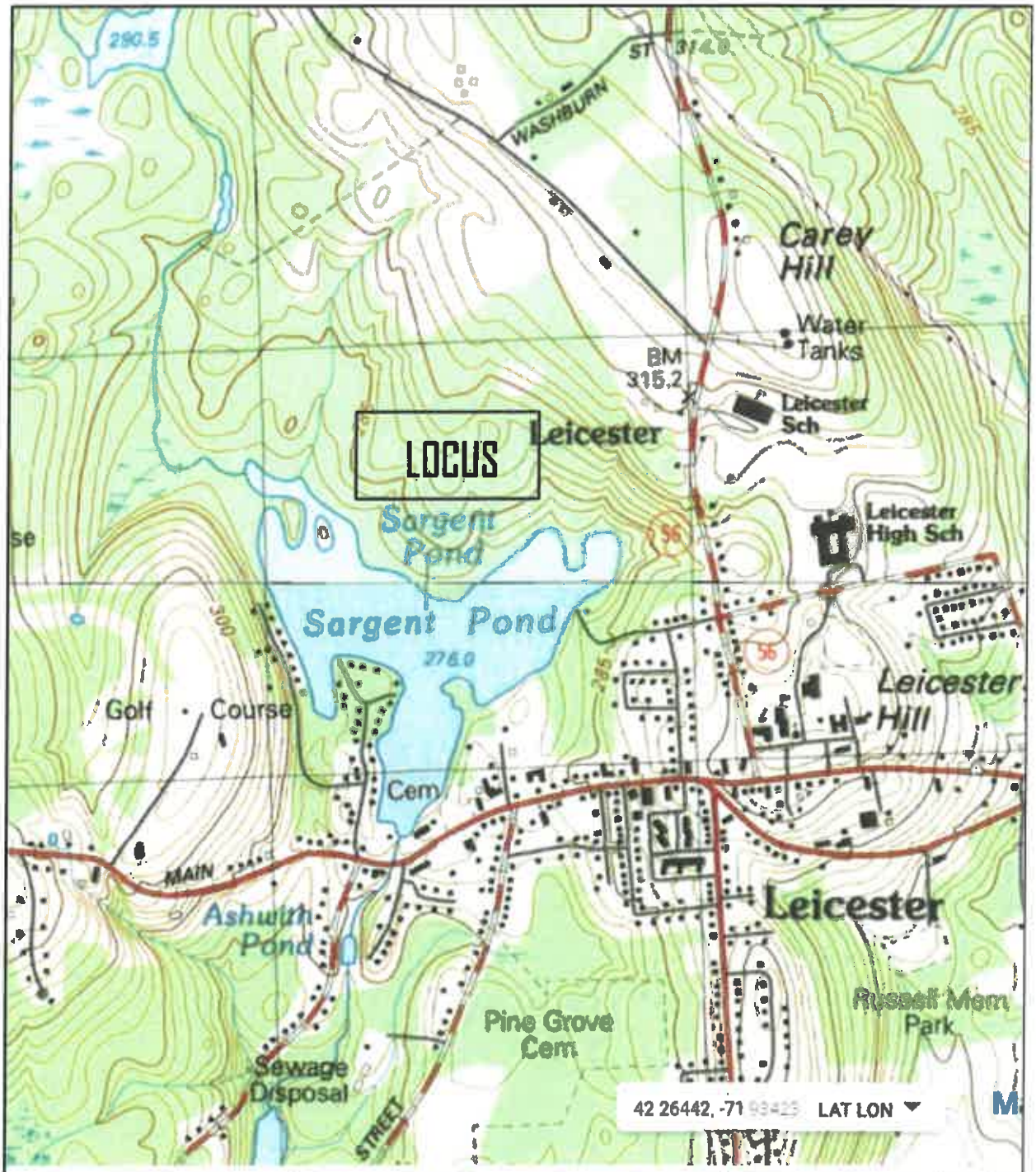
Components	**Date**
Notify Cons. Comm. Issues effecting Resource Areas	
Comments during insp.	
Note corrective measures performed & date	
Silt of Public (Charlton Road) Streets – Daily	
Comments during insp.	
Note corrective measures performed & date	
Stockpile Materials Ring with Composite Sock – Weekly	
Comments during insp.	
Note corrective measures performed & date	
Any Spill Fuel, Chemical- Daily	
Comments during insp.	
Note corrective measures performed & date	
Temporary Ground Cover Area – Weekly	
Comments during insp.	
Note corrective measures performed & date	
Temporary Stone at Access Drive as Needed	
Comments during insp.	
Note corrective measures performed & date _____. Inspector Title Date	
_____. Address Tel#	

J-018

WEEKLY
Inspection and Maintenance Log FOR: 153 Paxton Street
DURING CONSTRUCTION & After 0.5" Rain

Components	**Date**
Lawn Area / Mulch Area **Erosion, Washouts**	
Comments during insp.	
Note corrective measures performed & date	
Stone Aprons at Outfalls Exit **as Needed**	
Comments during insp.	
Note corrective measures performed & date	
Forebay **as Needed**	
Comments during insp.	
Note corrective measures performed & date	
Temporary Basins **as Needed**	
Comments during insp.	
Note corrective measures performed & date	
Illicit Drainage **Discharge**	
Comments during insp.	
Note corrective measures performed & date	
_____. Inspector Title Date	
_____. Address Tel#	

Appendices:



USGS MAP
153 PAXTON STREET
LEICESTER, MA

REF: J-018

D&L Design Group
Civil Engineering & Land Surveying
115 Water Street • Milford, MA 01757
P:(508) 408-2577
www.dandldesigngroup.com

		DATE	REVISIONS
FIELD BY:	-		
DRAFTED BY:	P.M.L.		
REVIEWED BY:	MD		
SCALE:	NTS		
DATE:	9/1/22		
SHEET:	1 OF 1		

NATURAL HERITAGE MAP
153 PAXTON STREET
LEICESTER, MA

REF: J-018

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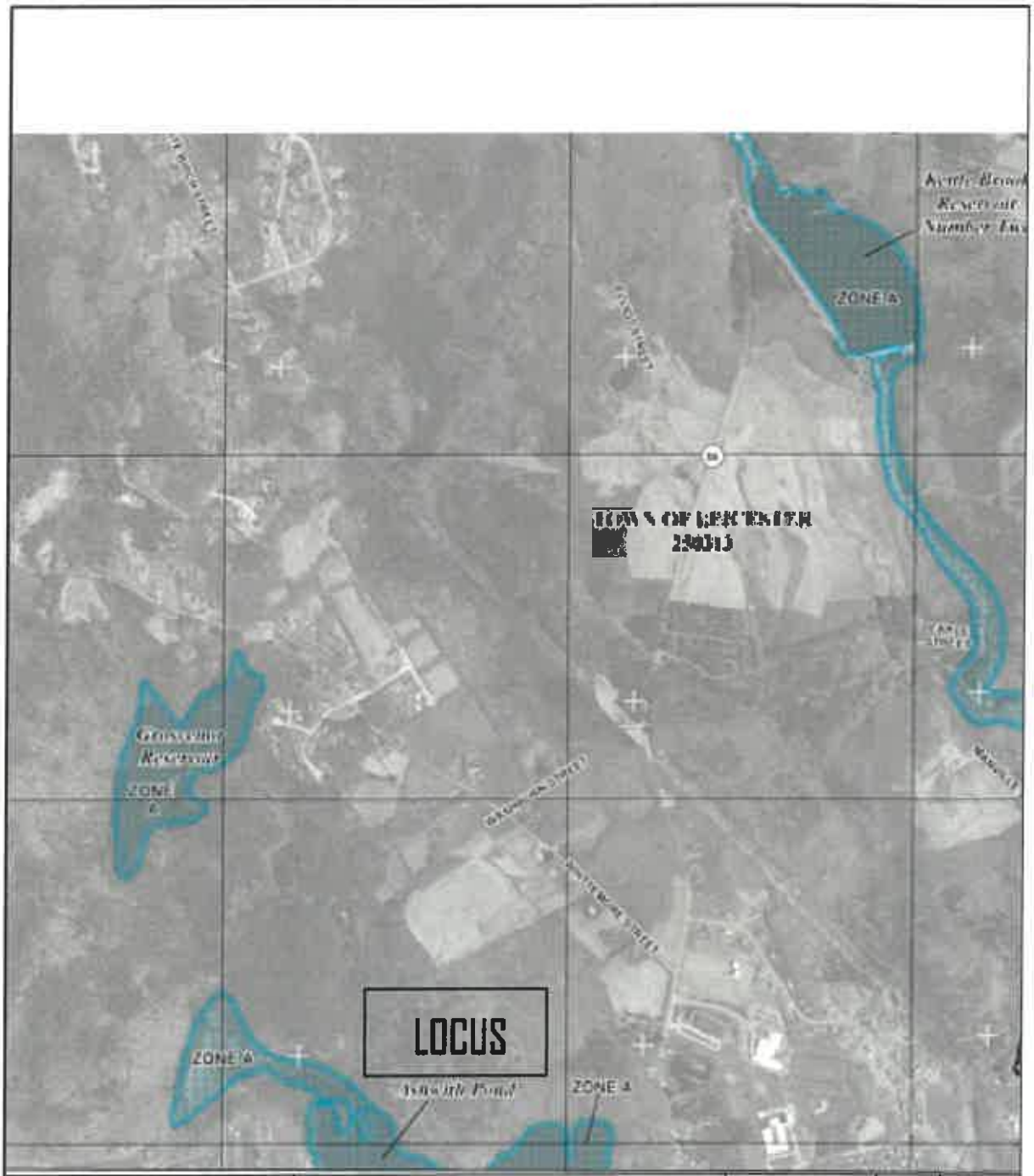

FEMA MAP
153 PAXTON STREET
LEICESTER, MA

REF: J-018

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