Stormwater Management Report

GTI at 169 Meadow Street
Offsite Medical Marijuana Dispensary
Map 219 Parcel 16

Prepared for:
GTI Massachusetts NP
169 Meadow Street
Amherst, MA 01002

April 15, 2016

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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

Kevin A. McCaffery 04-15-2016

Signature and Date

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): POST REDEVELOPMENT FLOWS ARE PREDICTED TO BE LESS THAN EXISTING PRIOR TO DETENTION ROUTING (IMPERVIOUS REDUCTION)

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.

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Attachment D Flood Insurance Profiles and Cut/Fill Calculation
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PROJECT DRAWINGS

Sheet 1.0 Cover Sheet
Sheet 2.0 Existing Conditions Plan
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Sheet 5.0 Proposed Landscape Plan
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INTRODUCTION

The following narrative describes the stormwater management system for the marijuana dispensary proposed at 169 Meadow Street in North Amherst, MA.

This application seeks authorization to discharge under the jurisdiction of the Amherst Zoning Board of Appeals and the MADEP Stormwater Standards. After the project is operational, the impervious cover onsite will include the building, an asphalt covered parking area, and the associated travel lanes. The site is currently used for commercial purposes and has a significant gravel covered parking area. The total impervious cover after the project is constructed will be less than what currently exists (i.e. a portion of the gravel area will be converted to pervious vegetated area).

PROJECT DESCRIPTION

The proposed project is an offsite medical marijuana dispensary to be established within the existing building at the property. The site will be improved by formalizing the parking area on site to include curbing, paving, and drainage measures. Site lighting will be added along with new signage and landscaping.

RECEIVING WATERS

The project area is entirely within the regulatory floodplain of the Mill River and Swamp Brook. The Mill River is directly to the east of the site dividing the property from State Route 116. Swamp Brook runs along the western side of the site. Both channels have culverts under Meadow Street adjacent to the southern corners of the parcel. The existing drainage system, described further below, outlets to Swamp Brook and is the proposed outlet location for the new stormwater management system.

EXISTING CONDITIONS

The site is currently used as an auction facility. The building is surrounded by gravel parking with lawn and treeline at the perimeter. To the rear of the site is an open vegetated area with a small area of trees, further to the north are agricultural fields on the adjacent parcel. There is an existing farm road access that will be retained for future use. The site is essentially flat with no dominant slope in any direction. Existing conditions are illustrated on Sheet 2.0.

Soils under the parcel are mapped by the NRCS as Raynham Silt Loam, Map Unit 30A. The Hydrologic Soil Group is listed as C/D for drained/undrained conditions. For the hydrology analysis all soil types were considered to be HSG D. A series of four test pits were excavated to determine the soil characteristics and depth to groundwater or bedrock, if present. Their locations are shown on the site plans. Groundwater was consistently encountered at approximately 5-ft below grade in all test pits, estimated as El. 145.5'. The groundwater was in a pronounced sandier layer and appeared to be close to the elevation of the base flow in the Mill River and Swamp Brook. The only difference in soil profiles was that Test Pit #3 (to the north outside the gravel parking) had topsoil present. The typical NRCS profile generally agreed with the test pit observations, which is below. A few photos from the investigation are also included.

30A Raynham Silt Loam Map Unit Typical Profile, with field observations

Horizon	Description	Color	Munsell	Normal Depth (in)
Ap	silt loam, with gravel	dark grayish brown	10YR 4/2	0 - 6
Bw	silt loam, with gravel	light olive brown	2.5Y 5/4	6 - 10
Bg	silt loam	olive gray	5Y 5/2	10 - 17
B'w	silt loam	olive brown	2.5Y 4/4	17 - 22
C1	silt loam	olive gray	5Y 5/2	22 - 48
C2	sandy silt loam	olive, water table present	5Y 4/3	48 - 72

Photos from Test Pit Investigation, note groundwater at 5-ft below grade. Test Pit excavated in gravel parking area note lack of topsoil.

EXISTING STORMWATER SYSTEM

Runoff on the existing site is managed by a closed drainage system that outlets to a small headwall in Swamp Brook, just upstream of Meadow Street. There is an existing catch basin in the center of the gravel parking area, and another to the north in the existing tree island. The upstream catch basin flows through an 8-in diameter pipe to the parking area catch basin, from this structure to the outfall the culvert is 12-in diameter. As noted the property is within floodplain and has no major slope to provide drainage.

This existing culvert system is necessary to dewater the site after rain events and/or high stage events in the rivers.

The existing project area was divided into two major subcatchments for modeling of the site hydrology. One smaller catchment from the street to the roofline of the building, a second larger catchment encompassing the north half of the roofline, the gravel parking, and the open space to the north. The existing subwatershed drainage boundaries, time of concentration flow paths, soil types, and land use are shown in the summary table on Sheet 7.0.

Predicted flows from the existing 2.9 acre analysis area were calculated for the 2, 10, and 100 year design events, using NOAA Atlas 14 rainfall data for this location (3.02", 4.80", and 7.63" respectively). The precipitation reference is included as Attachment B. The surface area takeoffs and other modeling inputs are included as Attachment C.

At this site the effective floodplain stages are El. 152' for the 10-year event and El. 154' for the 100-year recurrence interval. The finish floor in the building is nominally El. 152.75', existing grade in the parking area is generally El. 150.5'. This indicates that during the 10-year event the site would be flooded but the finish floor would be just above flood stage. During the 100-year event the flood study predicts that the site and finish floor would be inundated, the depth over the finish floor would be at least 1-ft. The Flood Insurance Study profiles are included in Appendix D for reference, the site locations are annotated.

It should be noted that a 10- or 100-year recurrence interval precipitation event could occur without there simultaneously being a similar flow event in the rivers. The two will not necessarily occur at the same time.

Existing flows for each subcatchment and the entire site are shown below. For the modeled return events, the "Site Total" value for both pre- and post-construction is the arithmetic sum of the peak flows from each subwatershed (the timing of peaks is not considered). The HydroCAD modeling output for existing conditions is included as Attachment E.

TABLE 1. MODELED EXISTING CONDITIONS FLOWS BY SUBCATCHMENT

Subcatchment	2 Year Flow (cfs)	10 Year Flow (cfs)	100 Year Flow (cfs)
1	0.9	1.7	3.0
2	5.1	9.2	15.6
Site Total	6.0	10.9	18.6

PROPOSED STORMWATER SYSTEM

DESIGN CONSTRAINTS

As described above, the site lies within a floodplain and has relatively little grade change. The treatment and conveyance system proposed for this site provides for collection of the improved parking area and roof then treatment of the runoff through various rain garden cells. With the relatively shallow groundwater level observed the amended profile beneath the rain gardens will be limited to prevent direct

interaction of runoff and groundwater. A minimum separation of 2-ft is recommended and shown. The majority of the closed drainage system will be left intact with additional structures added to provide outflow points from the rain garden areas. This is considered a redevelopment site according to the Stormwater Standards and the plan proposed will at a minimum improve existing conditions. Although full compliance with the standards is not required for redevelopment projects, the applicant has developed a site plan that will satisfy the stormwater standards in their entirety as described below.

SUMMARY OF IMPERVIOUS ACREAGES

The applicant seeks authorization to construct impervious cover consisting of an asphalt covered parking area and concrete sidewalks. The runoff from the existing roof is also included in the hydrology analysis and accommodated in the site design. The total proposed impervious coverage included in the modeling is approximately 34,000 sq-ft or 0.8-ac.

A significant portion of the existing gravel parking will be reclaimed and converted to vegetated open space, resulting in a net reduction of impervious coverage compared to existing conditions. Sheet 7.0 presents a comparison of existing and proposed conditions and presents the hydrology values for both scenarios.

ROUTING DESCRIPTION

Several small rain garden areas are proposed on the north side of the building and in the center of the proposed parking area. These will have perforated underdrains to assure they do not pond water for extended periods. They will also have overflow outlets connected to the closed piping system. A larger dry retention pond is proposed off the north side of the parking area to accommodate larger storm events.

COMPLIANCE WITH THE STORMWATER STANDARDS

Each of the stormwater standards is summarized below, refer to the completed checklist placed inside the front cover for additional information for each criteria. As shown on the drawings there are no proposed wetland impacts for this project.

Standard 1: No New Untreated Discharges

There will be no new point source discharges from the site. As described previously all runoff collected in the rain garden and basin system will be routed through the existing culverts. This will outflow to the existing headwall on Swamp Brook. As noted below peak flow rates are predicted to decrease after the system is in place.

Standard 2: Peak Rate Attenuation

HydroCAD modeling software was used to determine the predicted peak flow rates for each of the subcatchments. The table below presents the modeled flow rates for each design storm, these values along with the proposed conditions curve numbers, times of concentration, and subwatershed areas are also shown in the summary table on Sheet 7.0. Subwatershed 2 was divided into four smaller catchments to account for the rain garden cells and the primary retention area to the north.

Proposed conditions flows for the project site are predicted to be equal or less than existing conditions for the design storms modeled, as presented below. A percentage comparison of the pre- and post-development flows is also included. The full HydroCAD modeling output for proposed conditions is included as Attachment F.

TABLE 2. MODELED PROPOSED CONDITIONS FLOWS BY SUBCATCHMENT

Subcatchment	2 Year Flow (cfs)	10 Year Flow (cfs)	100 Year Flow (cfs)
1	0.9	1.7	3.0
2A	0.4	0.6	0.8
2B	0.3	0.5	0.8
2C	0.3	2.2	3.7
2D	1.4	3.1	6.0
2 *(total)*	2.1	5.6	10.8
Site Total	3.0	7.3	13.8
Percent Change	-50%	-33%	-26%

To assure flood storage would not be compromised a cut-fill analysis was performed to compare the proposed grading to the existing ground surface. The calculation output is included with the flood profiles in Attachment D. The project is estimated to have a net cut of approximately 750 to 800 cu-yd, which will provide additional floodplain storage compared to existing conditions. The developer will need to make allowances for removal of material from the site. The cut-fill analysis is presented for each contour interval on site.

Standard 3: Recharge

In Attachment C calculations are included to determine the required recharge (and water quality) volume for the proposed layout. The stage-storage tables for the retention areas were checked within HydroCAD to determine that sufficient volume was being retained below the elevation of the surface outlets. The required recharge volume based on the proposed impervious coverage and soil types is 285 cu-ft. Compliance is stated under Standard 4 below.

Standard 4: Water Quality

As explained in Standard 3 the required water quality volume was calculated and is included in Attachment C. The required water quality volume is 2,844 cu-ft. According to HydroCAD the volume provided in the rain gardens and the retention areas (at the elevation of the surface outlets) is 3,478 cu-ft. This provides sufficient retention for both the recharge and water quality volumes with an excess of 349 cu-ft. Additional water quality and recharge will be realized as runoff flows over vegetated areas on site.

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

This project is not considered an industrial discharge associated with the Multi-Sector General Permit and its relevant Standard Industrial Classification (SIC) codes. There are no LUHPPLs proposed as part of this project.

Standard 6: Critical Areas

This parcel is not located in a Zone II or Interim Wellhead Protection Area. The project is not proposing to discharge to or in close proximity to a critical area.

Standard 7: Redevelopment

This project is considered a redevelopment project with respect to the State stormwater definition of property "redevelopment". As described previously the project has attempted to maintain full compliance with the stormwater standards although it is not required. Flows are predicted to decrease, total impervious cover will be reduced, and water quality and recharge are expected to improve.

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

Management of runoff from this project will occur during both the construction and operational phases. See Sheet 4.0 for the Erosion Control Plan and Sheet 8.0 for associated details for the construction phase.

Although a Stormwater Pollution Prevention Plan is not included with this submittal, it will be required prior to commencing earth disturbance activities. The plan set does include plan sheets that show the location of proposed erosion prevention and sediment control measures. This is accompanied by a details sheet with construction phase notes. The proposed planting for the project and final stabilization measures are also shown on the Site Plans.

As noted, the SWPPP will be prepared and submitted prior to commencing construction. The SWPPP will have a detailed description of the measures proposed for preventing erosion and controlling sedimentation. The general plan for preventing erosion and controlling sediment will generally proceed as follows.

Erosion control measures shall be installed and operational prior to significant vegetation clearing or earth disturbance. Installed measures shall be inspected weekly and after heavy rains by a qualified professional experienced in erosion and sedimentation control techniques until the site is completely stabilized.

It is the Contractor's responsibility not to undertake more than that magnitude of work that can be safely and adequately controlled by the methods at their disposal. The Contractor's approach must emphasize preventing erosion before it occurs as opposed to treating sediment-laden stormwater runoff.

The Contractor shall immediately correct all deficiencies, including, but not limited, to washout, overtopping, clogging due to sediment, and erosion. The contractor shall review the location of erosion control barriers in areas where construction activity causes drainage runoff to ensure that they are properly located for effectiveness. Where deficiencies exist, such as overtopping or washout, additional staking or compost material shall be installed. Contractor shall remove sediment deposits when they reach 50% capacity/depth.

Any exposed soils shall be stabilized with a covering of straw mulch, or a temporary cover of rye or other grass to prevent erosion and sedimentation. Drainage ditches, if applicable, shall be hydro-seeded with a perennial grass mixture. Any stabilization materials such as jute netting shall be firmly anchored to prevent them from being washed from slopes by rain or flooding. Preference should be given to biodegradable materials.

Typical stabilization practices that may be implemented at the site include the following:

- Temporary Stabilization:
    - temporary or permanent seeding
    - straw mulching
    - hydroseeding w/tackifier
    - erosion control blankets
    - soil roughening

- Perimeter Controls:
    - silt fence
    - straw bales
    - wattles

- Stabilized Construction Entrance (anti-tracking pad)
- Dust Control
- Catch Basin Inlet Protection
- Sediment Basin

Standard 9: Operation and Maintenance Plan

A plan for operation and maintenance of the proposed facility and an inspection log is included in Attachment G. The Long Term Pollution Prevention Plan is also included in this Attachment.

Standard 10: Prohibition of Illicit Discharges

There shall be no illicit discharges to the stormwater management system, which could include but is not limited to wastewater discharges, discharge of stormwater contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, oil, or grease. This is also stated in the Operation and Maintenance Plan. A sample Illicit Discharge Statement is included with Attachment G for review and execution by the applicant.

ATTACHMENT A

NRCS SOILS MAPPING

Hydrologic Soil Group—Hampshire County, Massachusetts, Central Part

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 1:15,800.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Hampshire County, Massachusetts, Central Part
Survey Area Data: Version 10, Sep 28, 2015

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

Date(s) aerial images were photographed: Apr 9, 2011—May 12, 2011

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.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Hampshire County, Massachusetts, Central Part (MA609)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
30A	Raynham silt loam, 0 to 3 percent slopes	C/D	4.3	100.0%
Totals for Area of Interest			**4.3**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

ATTACHMENT B

NOAA ATLAS 14 PRECIPITATION VALUES

NOAA Atlas 14, Volume 10, Version 2
Location name: Amherst, Massachusetts, US*
Latitude: 42.4080°, Longitude: -72.5394°
Elevation: 151 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.323 (0.247–0.418)	0.383 (0.293–0.496)	0.481 (0.366–0.625)	0.562 (0.426–0.735)	0.674 (0.496–0.921)	0.760 (0.549–1.06)	0.846 (0.595–1.23)	0.952 (0.638–1.42)	1.09 (0.706–1.69)	1.20 (0.758–1.89)
10-min	0.458 (0.350–0.592)	0.543 (0.415–0.703)	0.681 (0.519–0.885)	0.796 (0.603–1.04)	0.954 (0.702–1.31)	1.08 (0.777–1.51)	1.20 (0.843–1.74)	1.35 (0.903–2.01)	1.55 (1.00–2.39)	1.70 (1.07–2.68)
15-min	0.539 (0.412–0.697)	0.639 (0.488–0.827)	0.802 (0.610–1.04)	0.937 (0.709–1.23)	1.12 (0.826–1.54)	1.27 (0.915–1.77)	1.41 (0.992–2.05)	1.59 (1.06–2.36)	1.82 (1.18–2.81)	2.00 (1.26–3.15)
30-min	0.741 (0.567–0.959)	0.879 (0.671–1.14)	1.10 (0.840–1.43)	1.29 (0.977–1.69)	1.55 (1.14–2.11)	1.74 (1.26–2.44)	1.94 (1.37–2.82)	2.18 (1.46–3.26)	2.50 (1.62–3.87)	2.75 (1.74–4.34)
60-min	0.944 (0.721–1.22)	1.12 (0.854–1.45)	1.41 (1.07–1.83)	1.64 (1.24–2.15)	1.97 (1.45–2.69)	2.22 (1.60–3.11)	2.47 (1.74–3.59)	2.78 (1.86–4.15)	3.19 (2.06–4.93)	3.50 (2.21–5.53)
2-hr	1.19 (0.913–1.52)	1.41 (1.08–1.81)	1.78 (1.36–2.29)	2.08 (1.58–2.70)	2.49 (1.85–3.40)	2.82 (2.05–3.92)	3.14 (2.22–4.55)	3.55 (2.39–5.27)	4.10 (2.66–6.30)	4.51 (2.86–7.09)
3-hr	1.35 (1.04–1.73)	1.61 (1.24–2.06)	2.04 (1.57–2.62)	2.39 (1.83–3.10)	2.88 (2.14–3.91)	3.26 (2.38–4.53)	3.63 (2.59–5.27)	4.14 (2.79–6.12)	4.81 (3.12–7.38)	5.31 (3.38–8.33)
6-hr	1.68 (1.30–2.13)	2.03 (1.58–2.58)	2.60 (2.01–3.32)	3.07 (2.37–3.95)	3.73 (2.80–5.05)	4.23 (3.12–5.88)	4.74 (3.42–6.89)	5.48 (3.71–8.08)	6.47 (4.22–9.89)	7.21 (4.60–11.3)
12-hr	2.06 (1.61–2.60)	2.53 (1.98–3.20)	3.30 (2.58–4.19)	3.94 (3.06–5.04)	4.82 (3.65–6.52)	5.50 (4.10–7.65)	6.18 (4.51–9.02)	7.27 (4.93–10.7)	8.71 (5.69–13.3)	9.80 (6.27–15.2)
24-hr	2.42 (1.92–3.04)	3.02 (2.38–3.80)	3.99 (3.14–5.04)	4.80 (3.76–6.10)	5.92 (4.51–7.97)	6.77 (5.08–9.39)	7.63 (5.62–11.1)	9.07 (6.18–13.2)	11.0 (7.19–16.6)	12.4 (7.96–19.2)
2-day	2.75 (2.19–3.43)	3.45 (2.74–4.31)	4.59 (3.63–5.75)	5.53 (4.36–6.98)	6.83 (5.25–9.16)	7.84 (5.92–10.8)	8.84 (6.55–12.8)	10.6 (7.21–15.3)	12.8 (8.44–19.3)	14.5 (9.36–22.4)
3-day	3.00 (2.40–3.72)	3.75 (3.00–4.67)	4.99 (3.97–6.23)	6.02 (4.76–7.56)	7.43 (5.73–9.93)	8.52 (6.46–11.7)	9.61 (7.15–13.9)	11.5 (7.87–16.6)	14.0 (9.21–21.0)	15.9 (10.2–24.3)
4-day	3.22 (2.58–3.99)	4.02 (3.22–4.99)	5.33 (4.25–6.64)	6.42 (5.09–8.04)	7.91 (6.12–10.5)	9.06 (6.89–12.4)	10.2 (7.62–14.8)	12.2 (8.38–17.6)	14.8 (9.79–22.3)	16.8 (10.9–25.8)
7-day	3.86 (3.11–4.75)	4.74 (3.82–5.85)	6.19 (4.97–7.66)	7.39 (5.90–9.21)	9.04 (7.02–12.0)	10.3 (7.87–14.0)	11.6 (8.65–16.6)	13.7 (9.45–19.7)	16.5 (10.9–24.7)	18.6 (12.1–28.4)
10-day	4.51 (3.65–5.54)	5.44 (4.40–6.68)	6.96 (5.61–8.59)	8.22 (6.58–10.2)	9.95 (7.74–13.1)	11.3 (8.62–15.3)	12.6 (9.41–17.9)	14.7 (10.2–21.1)	17.6 (11.7–26.1)	19.7 (12.8–29.9)
20-day	6.56 (5.35–8.00)	7.55 (6.15–9.22)	9.17 (7.45–11.2)	10.5 (8.48–13.0)	12.4 (9.64–16.0)	13.8 (10.5–18.3)	15.2 (11.2–21.1)	17.1 (11.9–24.3)	19.6 (13.1–28.9)	21.4 (13.9–32.4)
30-day	8.26 (6.77–10.0)	9.29 (7.60–11.3)	11.0 (8.95–13.4)	12.4 (10.0–15.2)	14.3 (11.2–18.4)	15.8 (12.0–20.7)	17.3 (12.7–23.6)	18.9 (13.2–26.8)	21.2 (14.2–31.2)	22.8 (14.9–34.5)
45-day	10.3 (8.50–12.5)	11.4 (9.39–13.8)	13.2 (10.8–16.0)	14.7 (11.9–18.0)	16.7 (13.1–21.3)	18.3 (14.0–23.8)	19.8 (14.6–26.8)	21.4 (15.0–30.1)	23.4 (15.7–34.4)	24.9 (16.3–37.5)
60-day	12.0 (9.93–14.5)	13.2 (10.9–15.9)	15.1 (12.4–18.3)	16.6 (13.6–20.3)	18.8 (14.7–23.8)	20.4 (15.6–26.5)	22.1 (16.2–29.7)	23.6 (16.6–33.1)	25.6 (17.2–37.4)	27.1 (17.7–40.7)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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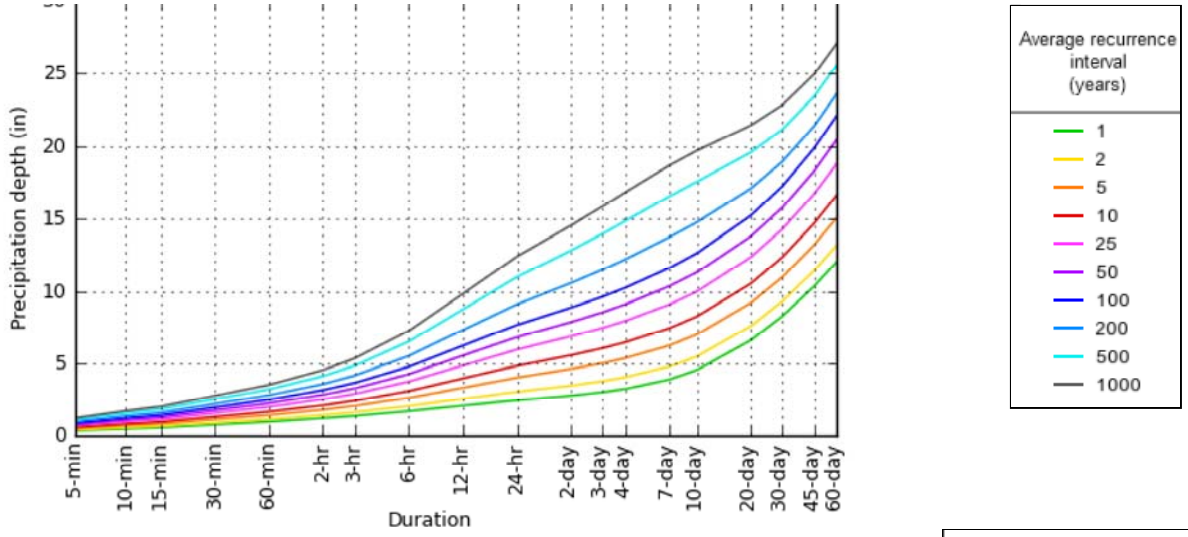
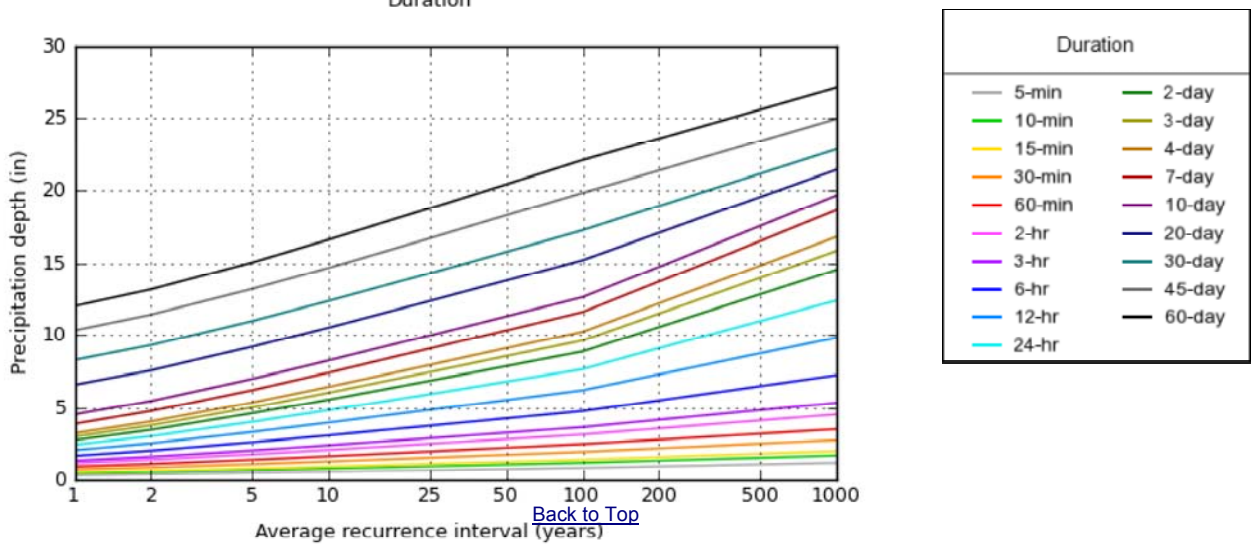
PF graphical





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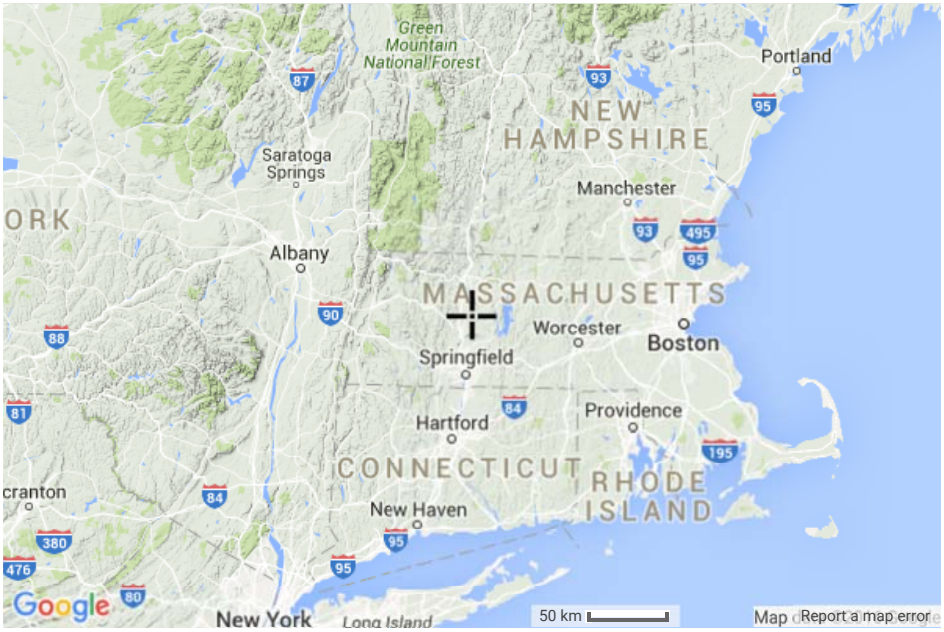
Maps & aerials

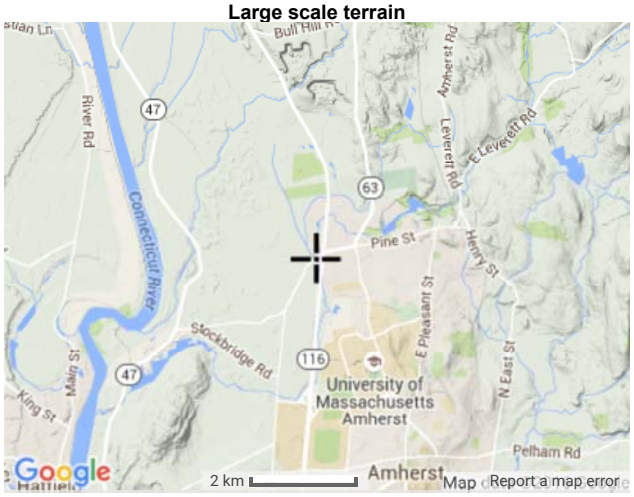
NOAA Atlas 14, Volume 10, Version 2

Created (GMT): Wed Mar 30 12:27:28 2016

Small scale terrain



Large scale terrain



Large scale map

Large scale aerial

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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910

Questions?: HDSC.Questions@noaa.gov

Disclaimer

ATTACHMENT C

MODELING TAKEOFFS *(from AutoCAD)*

- LAND USE & SOIL OVERLAY AREAS
- Tc FLOW PATH LENGTHS
- STAGE -STORAGE RATINGS
- RECHARGE & WATER QUALITY VOLUMES

AUCTION BARN
HYDROLOGY ANALYSIS

3/30/16

(#) = CATCHMENT
△A = POND

PRECIP (NOAA, NWS)
2 YEAR - 3.02 - IN
10 YEAR - 4.80 - IN
100 YEAR - 7.63 - IN

SOILS
ENTIRE SITE IS: RAYNHAM SILT LOAM, 0-3%
MAP UNIT 30A HSG C/D
DRAINED/UNDRAINED

2 MAJOR CATCHMENTS - ALL ULTIMATELY DISCHARGE WEST TO SWAMP BROOK

(1) SOUTHERN AREA, ROADSIDE OF BLDG DRAINS TO GRASSED AREA THEN WEST OVER SECONDARY DRIVEWAY

(2) NORTHERN CATCHMENT, INCLUDES NORTH HALF OF BLDG AND MOST OF EXISTING GRAVEL PARKING. DRAINS INTERNALLY TO EXISTING CATCH BASINS

EXISTING AREAS:

(1) TOTAL AREA = 21,464 SF
ROOF = 3,304 SF
ASPHALT = 668 SF
GRAVEL = 2,066 SF
WOODS = 1,810 SF
LAWN = 13,616 SF
(GOOD)

FLOW LENGTH = 175-FT
50-FT @ 5% LAWN
125-FT @ 1.5% LAWN

(2) TOTAL AREA = 106,708 SF
ROOF = 3,328 SF 678
ASPHALT = 3,304 SF
GRAVEL = 46,231 SF
WOODS = 8,561 SF
LAWN = 45,284 SF
(FAIR)

FLOW LENGTH = 270-FT
50-FT @ 4% LAWN
220-FT @ 1% GRAVEL

AUCTION BARN
HYDROLOGY ANALYSIS

4/1/16

PROPOSED AREAS:

21,666 SF TOTAL

(1) ASPHALT = 2,797
REMOVE GRAVEL
LAWN = 13,755

TC UNCHANGED

TOTAL SITE:
128,172 SF

(2) ASPHALT (PLUS OTHER IMP) = 24,709
→ DOES NOT INCLUDE ROOF
GRAVEL = Ø
LAWN = 70,244
(PLUS OTHER PLANTED SPACE)
("GOOD")

SEE PAGES 3 & 4, CATCHMENT 2
SPLIT INTO SUBWATERSHEDS

RECHARGE VOLUME (2) SUBCATCHMENT (1) ALL TO "QUALIFIED PERVIOUS AREAS"

$$R_V = F \times \text{IMP. AREA}$$

$F = 0.25$ FOR HSG C (INCHES)
$= 0.1$ FOR HSG D

$$R_V = \frac{0.25 \text{ IN}}{12 \frac{\text{IN}}{\text{FT}}} \times 28{,}037 \text{ SF}$$

$$R_{V_C} = 584 \text{ CF}$$

$$R_{V_D} = 234 \text{ CF}$$

AUCTION BARN

HYDROLOGY ANALYSIS

4/1/16
4/5/16
3/4

WATER QUALITY VOLUME

$$WQV = \frac{1\text{-IN}}{\frac{12\text{ IN}}{1\text{ FT}}} \times 28{,}037\text{ SF}$$

$$WQV = 2{,}336\text{ CF}$$

TOTAL VOLUME FOR (2) =

2,570 CF NEEDED

3,478 CF PROVIDED

SPLIT CATCHMENT (2) INTO SUBWATERSHEDS

(2A) 8,903 SF TOTAL

TC = 5 MIN

ROOF = 3,328 SF

ASPHALT = 2,850

(PLUS OTHER PAVED)

LAWN = 2,725

2A

EL	SA
149.5	0
150	400
151	1,300

6-IN RISER GRATE @ EL 150.2 ← CONFIRM

(198 CF STORAGE)

(2B) 4,580 SF TOTAL

TC = 5 MIN

ASPHALT = 3,418

LAWN = 1,162

2B

EL	SA
149.5	0
150.0	1,065

24-IN CB GRATE @ EL 149.75

(67 CF STORAGE)

(2C) 45,561 SF TOTAL

TC = 8 MIN

ASPHALT = 18,441 SF

LAWN = 27,120 SF

2C

EL	SA
147.5	0
148	2,200
149	5,800
150	13,200

GRATE @ EL 148.75 ← CONFIRM

(3,213 CF STORAGE)

CATCHMENTS FOR (2) (CONT)

4/5/16

4/4

(2D) TOTAL = 47,462 SF TC = 8 MIN NO RETN
WOODS = 8,561 SF
LAWN = 38,901 SF

PER EFFECTIVE FEMA FLOOD INSURANCE STUDY (1983):

10-YEAR WSEL = 152.0' ± ≈ 6-IN BELOW FINISH FLOOR
≈ 6-12-IN ABOVE FINAL GRADE

100-YEAR WSEL = 154.0' ± ≈ 2-FT + ABOVE FF

FLOWS FROM HYDROCAD

	2	10	100	CN	TC
EX					
(1)	0.9	1.7	3.0	85	8.2
(2)	5.1	9.2	15.6	90	8.7
TOTAL	6.0	10.9	18.6	89	NA
PROP					
(1)	0.9	1.7	3.0	85	8.2
2A	0.4	0.6	0.8	92	5
2B	0.3	0.5	0.8	93	5
2C	0.3	2.2	3.7	87	8
2D	1.4	3.1	6.0	79	8
(2)	2.1	5.6	10.8	NA	NA
TOTAL	3.0	7.3	13.8	85	
% CHANGE	-50%	-33%	-26%	-5%	NA

4/11/16 4946

WATER QUALITY & RECHARGE VOLUMES

SUBBASIN (1) 2,797 SF ASPHALT
3,304 SF ROOF

6,101 SF TOTAL

$$REV = \frac{0.1}{12} \times 6,101 = 51 \text{ CF}$$

$$WQV = \frac{1-I\phi}{\frac{12 \text{ IN}}{\text{FT}}} \times 6,101 = 508 \text{ CF}$$

TOTAL VOLUME = 559 CF

∴ PROVIDED IN RAIN GARDEN/RET'N SYSTEM

3,478 CF PROVIDED

2,570 CF NEEDED FOR (2)

∴ 908 CF AVAILABLE

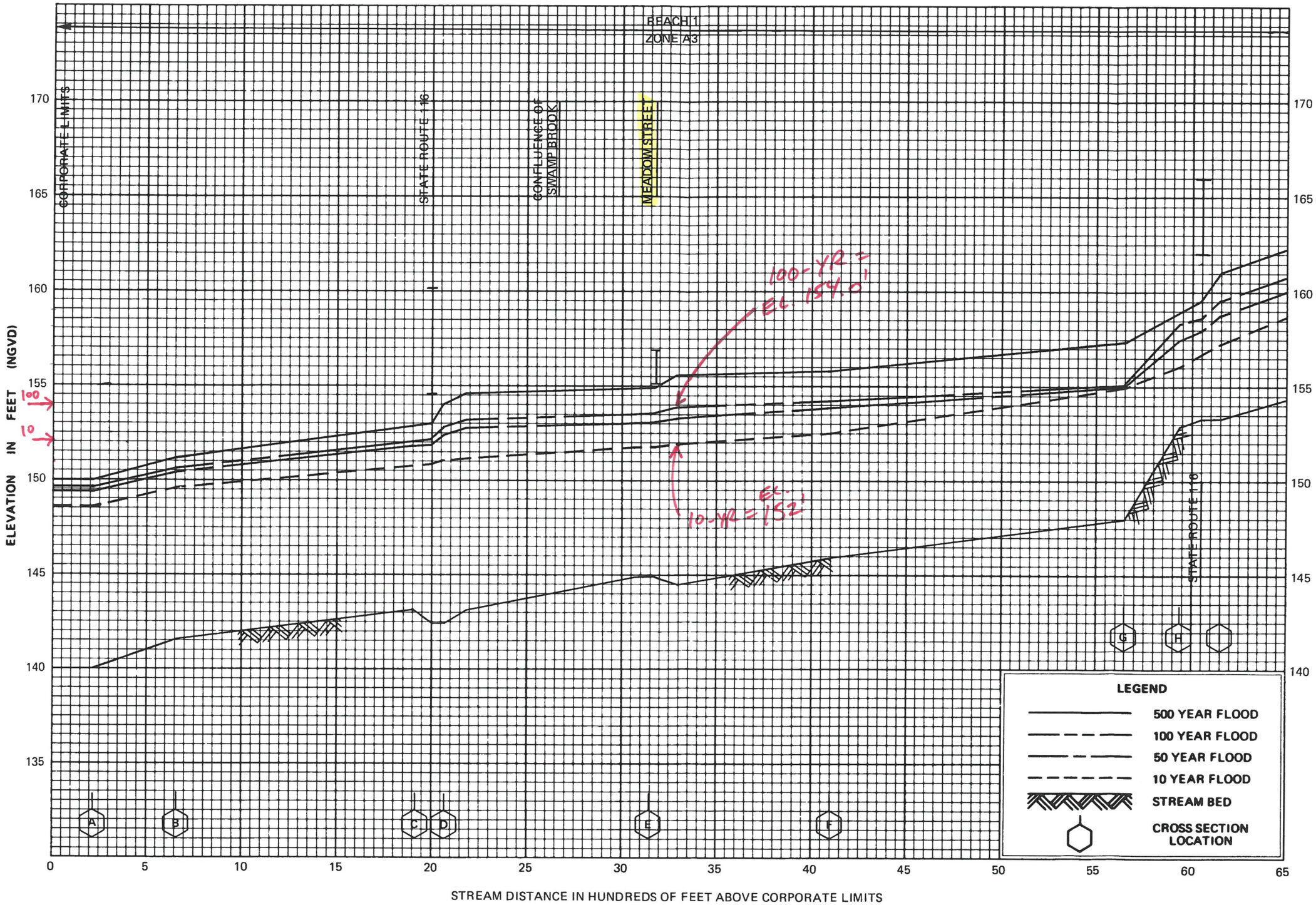
349 CF EXCESS

ATTACHMENT D

FLOOD INSURANCE STUDY PROFILES

- MILL RIVER
- SWAMP BROOK

CUT-FILL CALCULATION



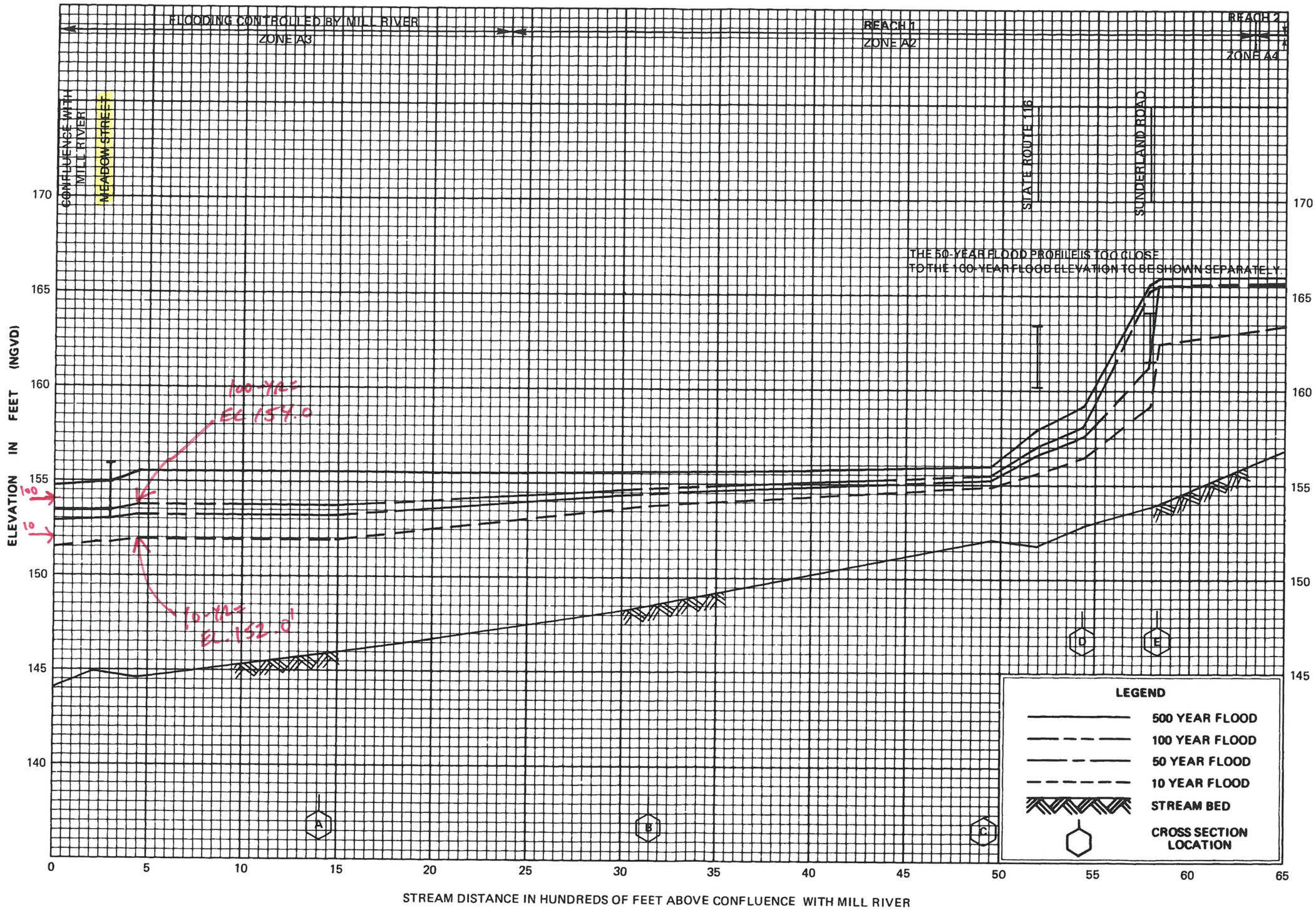
FLOOD PROFILES

MILL RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF AMHERST, MA
(HAMPSHIRE CO.)

01P



FLOOD PROFILES

SWAMP BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF AMHERST, MA
(HAMPSHIRE CO.)

CALCS

Contour Interval (ft)	Existing Surface Area (SF)	Existing Volume, Incremental (CF)	Proposed Surface Area (SF)	Proposed Volume, Incremental (CF)	FROM HYDROCAD	
					EX	PROP
147-148	0	0	2,191	0	0	0
148-149	557	279	7,258	4,725	279	4,725
149-150	6,851	3,704	18,201	12,729	3,983	17,454
150-151	62,085	34,468	63,241	40,721	38,451	58,175
151-152	106,289	84,187	106,855	85,048	122,638	143,223
152-153	118,565	112,427	118,529	112,692	235,065	255,915
153-154	133,119	125,842	133,393	125,961	360,907	381,876

SUMMARY

Contour Interval (ft)	Existing Storage Volume (CUBIC YARDS)	Proposed Storage Volume (CUBIC YARDS)	DIFFERENCE (NEG = CUT)
148-149	10	175	-165
149-150	137	471	-334
150-151	1,277	1,508	-232
151-152	3,118	3,150	-32
152-153	4,164	4,174	-10
153-154	4,661	4,665	-4
SITE TOTAL	13,367	14,144	-777
NET CHANGE = 777 CY OF CUT REMOVED FROM SITE			

Stage-Area-Storage for Pond 1P: exist

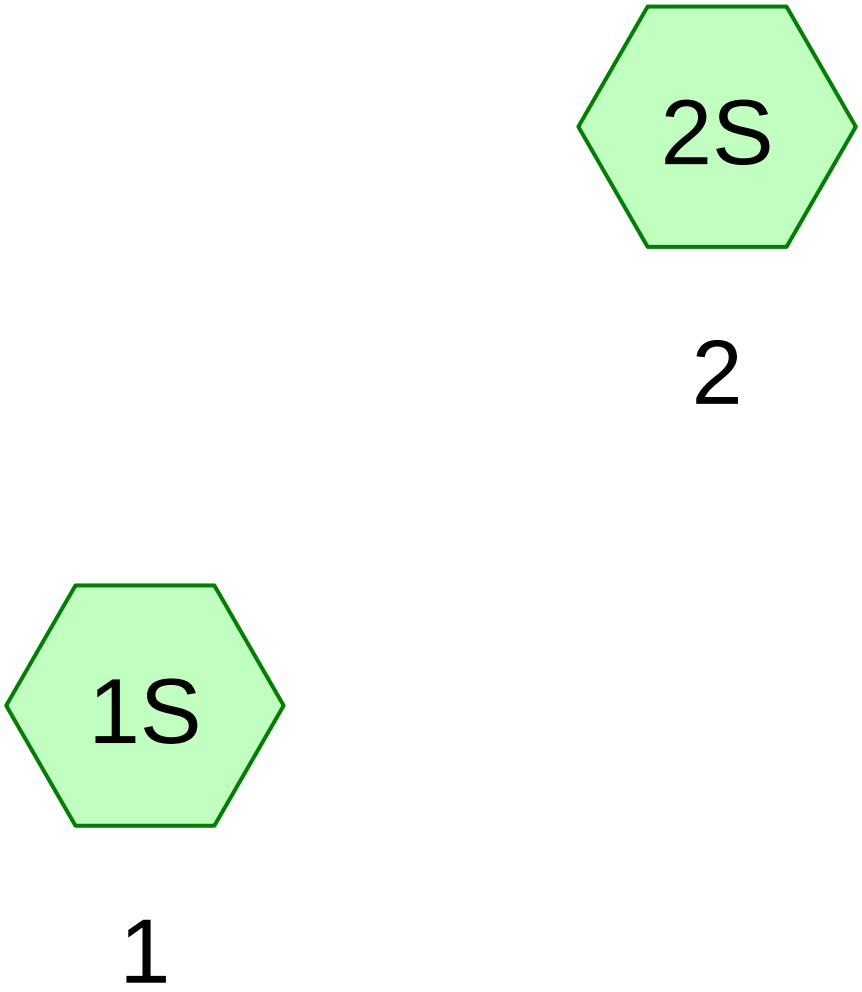
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
148.00	0	0
148.10	56	3
148.20	111	11
148.30	167	25
148.40	223	45
148.50	279	70
148.60	334	100
148.70	390	136
148.80	446	178
148.90	501	226
149.00	557	279
149.10	1,186	366
149.20	1,816	516
149.30	2,445	729
149.40	3,075	1,005
149.50	3,704	1,344
149.60	4,333	1,746
149.70	4,963	2,210
149.80	5,592	2,738
149.90	6,222	3,329
150.00	6,851	3,983
150.10	12,374	4,944
150.20	17,898	6,457
150.30	23,421	8,523
150.40	28,945	11,142
150.50	34,468	14,312
150.60	39,991	18,035
150.70	45,515	22,311
150.80	51,038	27,138
150.90	56,562	32,518
151.00	62,085	38,451
151.10	66,505	44,880
151.20	70,926	51,752
151.30	75,346	59,065
151.40	79,767	66,821
151.50	84,187	75,019
151.60	88,607	83,658
151.70	93,028	92,740
151.80	97,448	102,264
151.90	101,869	112,230
152.00	106,289	122,638
152.10	107,517	133,328
152.20	108,744	144,141
152.30	109,972	155,077
152.40	111,199	166,135
152.50	112,427	177,317
152.60	113,655	188,621
152.70	114,882	200,047
152.80	116,110	211,597
152.90	117,337	223,269
153.00	118,565	235,065
153.10	120,020	246,994
153.20	121,476	259,069
153.30	122,931	271,289
153.40	124,387	283,655
153.50	125,842	296,166
153.60	127,297	308,823
153.70	128,753	321,626
153.80	130,208	334,574
153.90	131,664	347,667
154.00	**133,119**	**360,907**

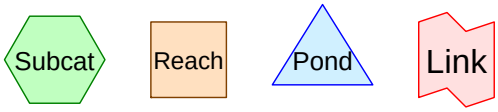
Stage-Area-Storage for Pond 2P: prop

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
148.00	2,191	0
148.10	2,698	244
148.20	3,204	540
148.30	3,711	885
148.40	4,218	1,282
148.50	4,725	1,729
148.60	5,231	2,227
148.70	5,738	2,775
148.80	6,245	3,374
148.90	6,751	4,024
149.00	7,258	4,725
149.10	8,352	5,505
149.20	9,447	6,395
149.30	10,541	7,394
149.40	11,635	8,503
149.50	12,730	9,721
149.60	13,824	11,049
149.70	14,918	12,486
149.80	16,012	14,033
149.90	17,107	15,689
150.00	18,201	17,454
150.10	22,705	19,499
150.20	27,209	21,995
150.30	31,713	24,941
150.40	36,217	28,338
150.50	40,721	32,185
150.60	45,225	36,482
150.70	49,729	41,229
150.80	54,233	46,428
150.90	58,737	52,076
151.00	63,241	58,175
151.10	67,602	64,717
151.20	71,964	71,695
151.30	76,325	79,110
151.40	80,687	86,961
151.50	85,048	95,247
151.60	89,409	103,970
151.70	93,771	113,129
151.80	98,132	122,724
151.90	102,494	132,756
152.00	106,855	143,223
152.10	108,022	153,967
152.20	109,190	164,827
152.30	110,357	175,805
152.40	111,525	186,899
152.50	112,692	198,110
152.60	113,859	209,437
152.70	115,027	220,882
152.80	116,194	232,443
152.90	117,362	244,120
153.00	118,529	255,915
153.10	120,015	267,842
153.20	121,502	279,918
153.30	122,988	292,143
153.40	124,475	304,516
153.50	125,961	317,038
153.60	127,447	329,708
153.70	128,934	342,527
153.80	130,420	355,495
153.90	131,907	368,611
154.00	**133,393**	**381,876**

ATTACHMENT E

EXISTING CONDITIONS MODELING OUTPUT





Routing Diagram for 4946-EXISTING
Prepared by New England Environmental, Printed 4/5/2016
HydroCAD® 10.00-15 s/n 08712 © 2015 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
45,284	84	50-75% Grass cover, Fair, HSG D (2S)
13,616	80	>75% Grass cover, Good, HSG D (1S)
48,297	96	Gravel surface, HSG D (1S, 2S)
3,972	98	Paved parking, HSG D (1S, 2S)
6,632	98	Roofs, HSG D (1S, 2S)
10,371	77	Woods, Good, HSG D (1S, 2S)
128,172	**89**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
0	HSG C	
128,172	HSG D	1S, 2S
0	Other	
128,172		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Sub Num
0	0	0	45,284	0	45,284	50-75% Grass cover, Fair	
0	0	0	13,616	0	13,616	>75% Grass cover, Good	
0	0	0	48,297	0	48,297	Gravel surface	
0	0	0	3,972	0	3,972	Paved parking	
0	0	0	6,632	0	6,632	Roofs	
0	0	0	10,371	0	10,371	Woods, Good	
0	**0**	**0**	**128,172**	**0**	**128,172**	**TOTAL AREA**	

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: 1 Runoff Area=21,464 sf 18.51% Impervious Runoff Depth=1.61"
Flow Length=175' Tc=8.2 min CN=85 Runoff=0.85 cfs 2,871 cf

Subcatchment2S: 2 Runoff Area=106,708 sf 6.22% Impervious Runoff Depth=2.00"
Flow Length=270' Tc=8.7 min CN=90 Runoff=5.13 cfs 17,807 cf

Total Runoff Area = 128,172 sf Runoff Volume = 20,678 cf Average Runoff Depth = 1.94"
91.73% Pervious = 117,568 sf 8.27% Impervious = 10,604 sf

Summary for Subcatchment 1S: 1

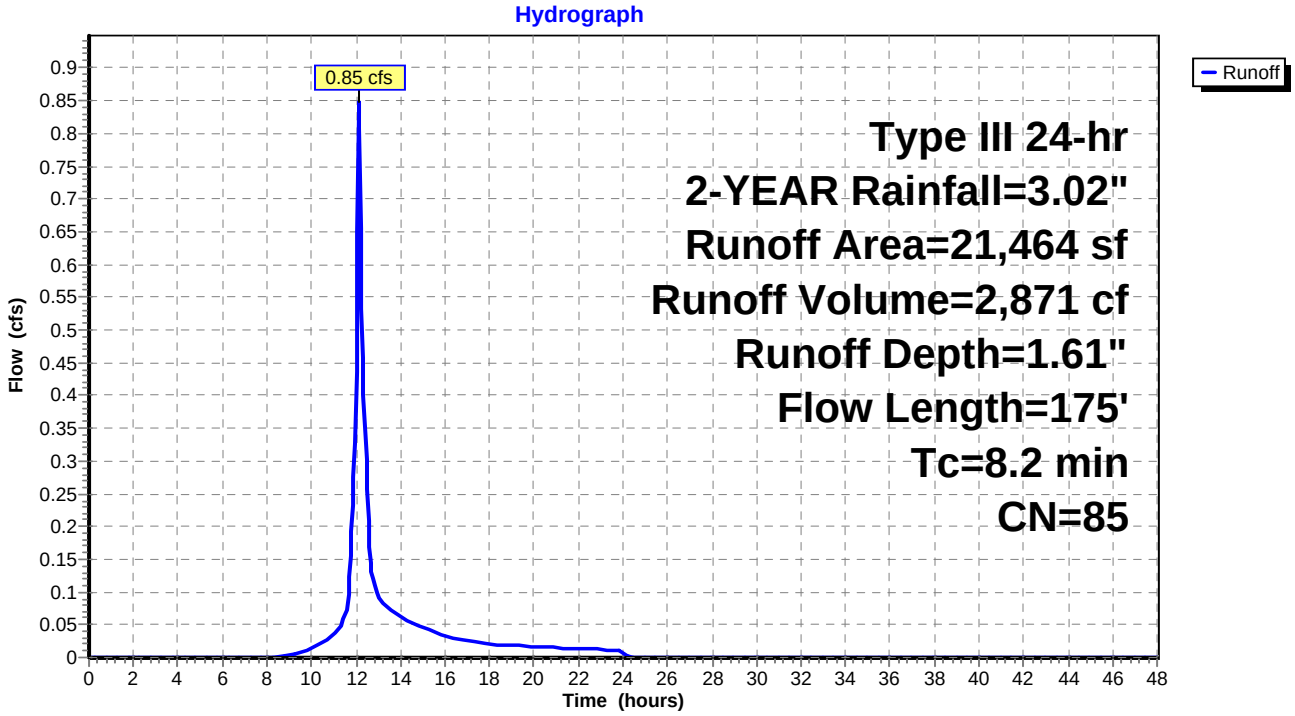
Runoff = 0.85 cfs @ 12.12 hrs, Volume= 2,871 cf, Depth= 1.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR Rainfall=3.02"

Area (sf)	CN	Description
3,304	98	Roofs, HSG D
668	98	Paved parking, HSG D
2,066	96	Gravel surface, HSG D
1,810	77	Woods, Good, HSG D
13,616	80	>75% Grass cover, Good, HSG D
21,464	85	Weighted Average
17,492		81.49% Pervious Area
3,972		18.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.0500	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.02"
2.4	125	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.2	175	Total			

Subcatchment 1S: 1



Summary for Subcatchment 2S: 2

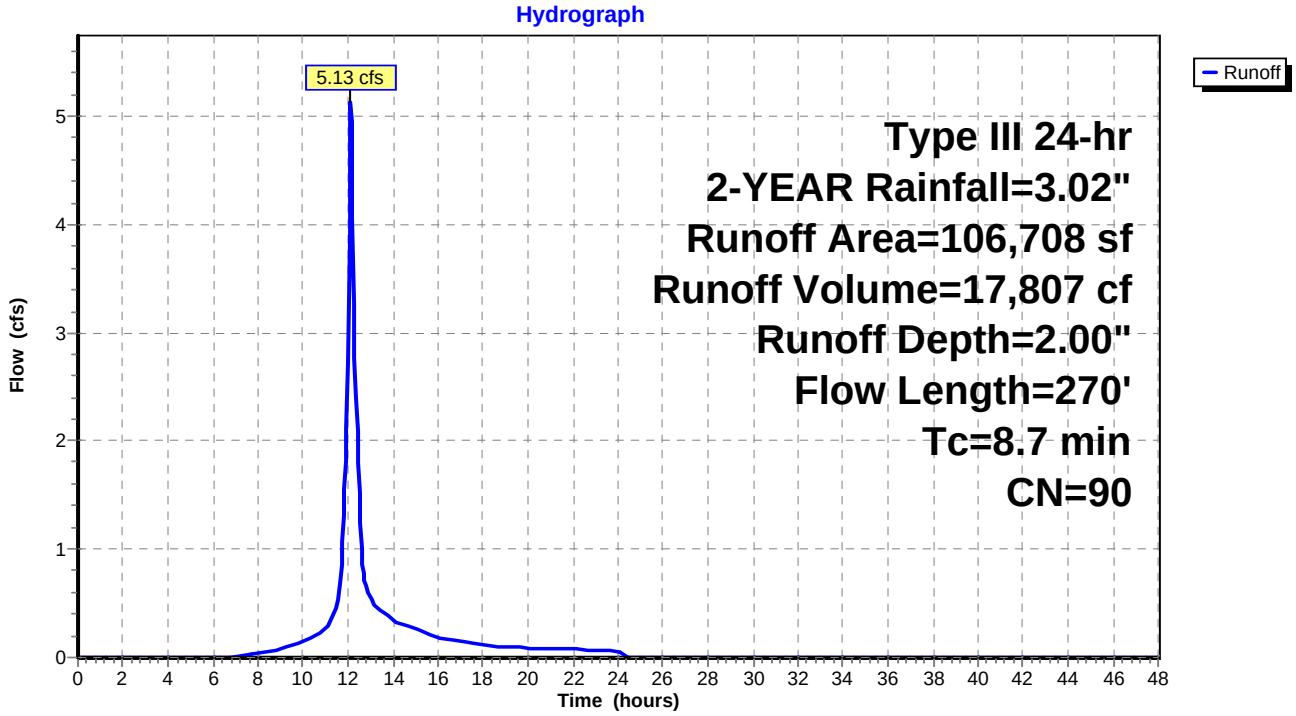
Runoff = 5.13 cfs @ 12.12 hrs, Volume= 17,807 cf, Depth= 2.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR Rainfall=3.02"

Area (sf)	CN	Description
3,328	98	Roofs, HSG D
3,304	98	Paved parking, HSG D
46,231	96	Gravel surface, HSG D
8,561	77	Woods, Good, HSG D
45,284	84	50-75% Grass cover, Fair, HSG D
106,708	90	Weighted Average
100,076		93.78% Pervious Area
6,632		6.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.02"
2.3	220	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
8.7	270	Total			

Subcatchment 2S: 2



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: 1 Runoff Area=21,464 sf 18.51% Impervious Runoff Depth=3.18"
Flow Length=175' Tc=8.2 min CN=85 Runoff=1.67 cfs 5,695 cf

Subcatchment2S: 2 Runoff Area=106,708 sf 6.22% Impervious Runoff Depth=3.68"
Flow Length=270' Tc=8.7 min CN=90 Runoff=9.22 cfs 32,757 cf

Total Runoff Area = 128,172 sf Runoff Volume = 38,451 cf Average Runoff Depth = 3.60"
91.73% Pervious = 117,568 sf 8.27% Impervious = 10,604 sf

Summary for Subcatchment 1S: 1

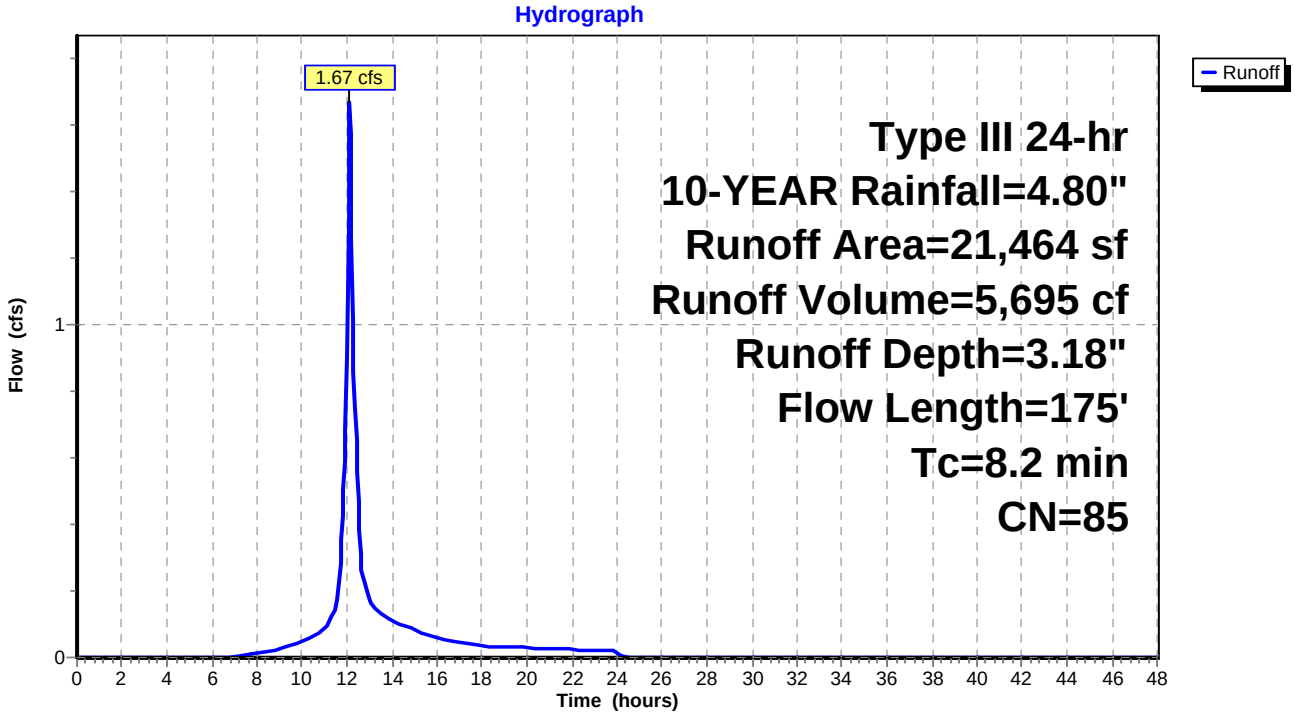
Runoff = 1.67 cfs @ 12.12 hrs, Volume= 5,695 cf, Depth= 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR Rainfall=4.80"

Area (sf)	CN	Description
3,304	98	Roofs, HSG D
668	98	Paved parking, HSG D
2,066	96	Gravel surface, HSG D
1,810	77	Woods, Good, HSG D
13,616	80	>75% Grass cover, Good, HSG D
21,464	85	Weighted Average
17,492		81.49% Pervious Area
3,972		18.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.0500	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.02"
2.4	125	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.2	175	Total			

Subcatchment 1S: 1



Summary for Subcatchment 2S: 2

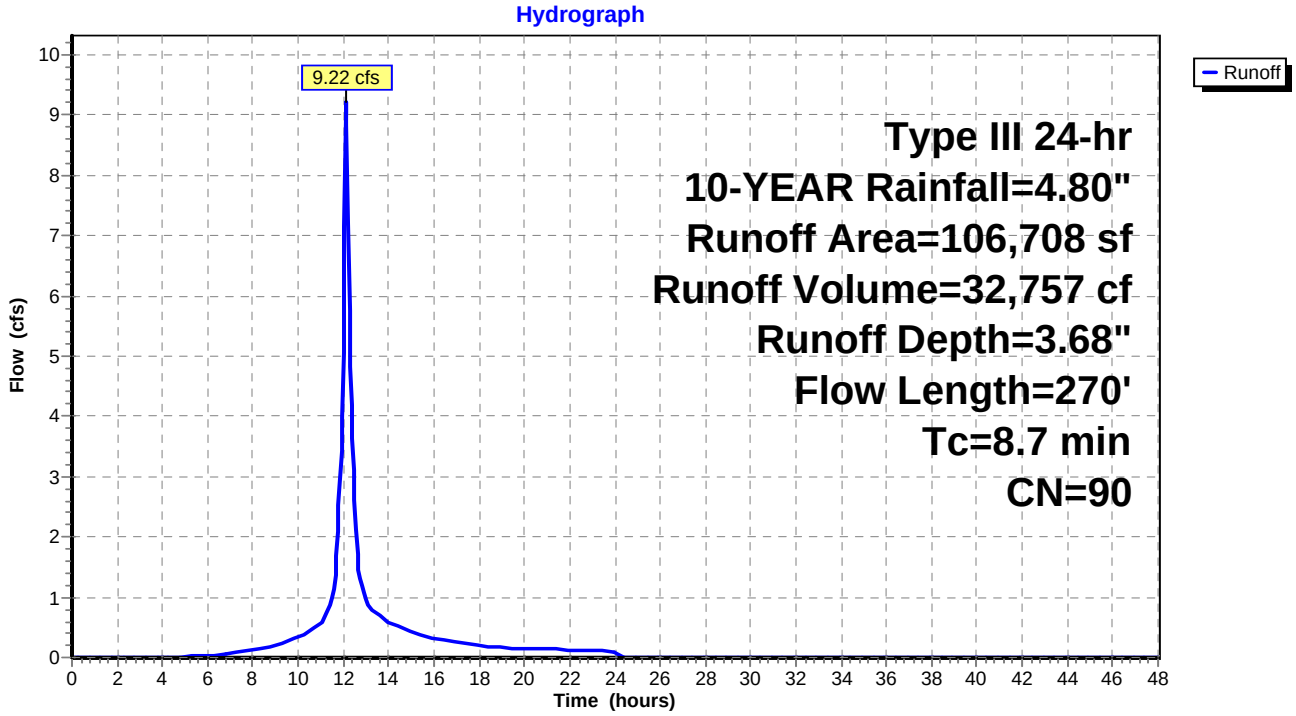
Runoff = 9.22 cfs @ 12.12 hrs, Volume= 32,757 cf, Depth= 3.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR Rainfall=4.80"

Area (sf)	CN	Description
3,328	98	Roofs, HSG D
3,304	98	Paved parking, HSG D
46,231	96	Gravel surface, HSG D
8,561	77	Woods, Good, HSG D
45,284	84	50-75% Grass cover, Fair, HSG D
106,708	90	Weighted Average
100,076		93.78% Pervious Area
6,632		6.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.02"
2.3	220	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
8.7	270	Total			

Subcatchment 2S: 2



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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: 1 Runoff Area=21,464 sf 18.51% Impervious Runoff Depth=5.86"
Flow Length=175' Tc=8.2 min CN=85 Runoff=3.00 cfs 10,476 cf

Subcatchment 2S: 2 Runoff Area=106,708 sf 6.22% Impervious Runoff Depth=6.44"
Flow Length=270' Tc=8.7 min CN=90 Runoff=15.64 cfs 57,281 cf

Total Runoff Area = 128,172 sf Runoff Volume = 67,757 cf Average Runoff Depth = 6.34"
91.73% Pervious = 117,568 sf 8.27% Impervious = 10,604 sf

Summary for Subcatchment 1S: 1

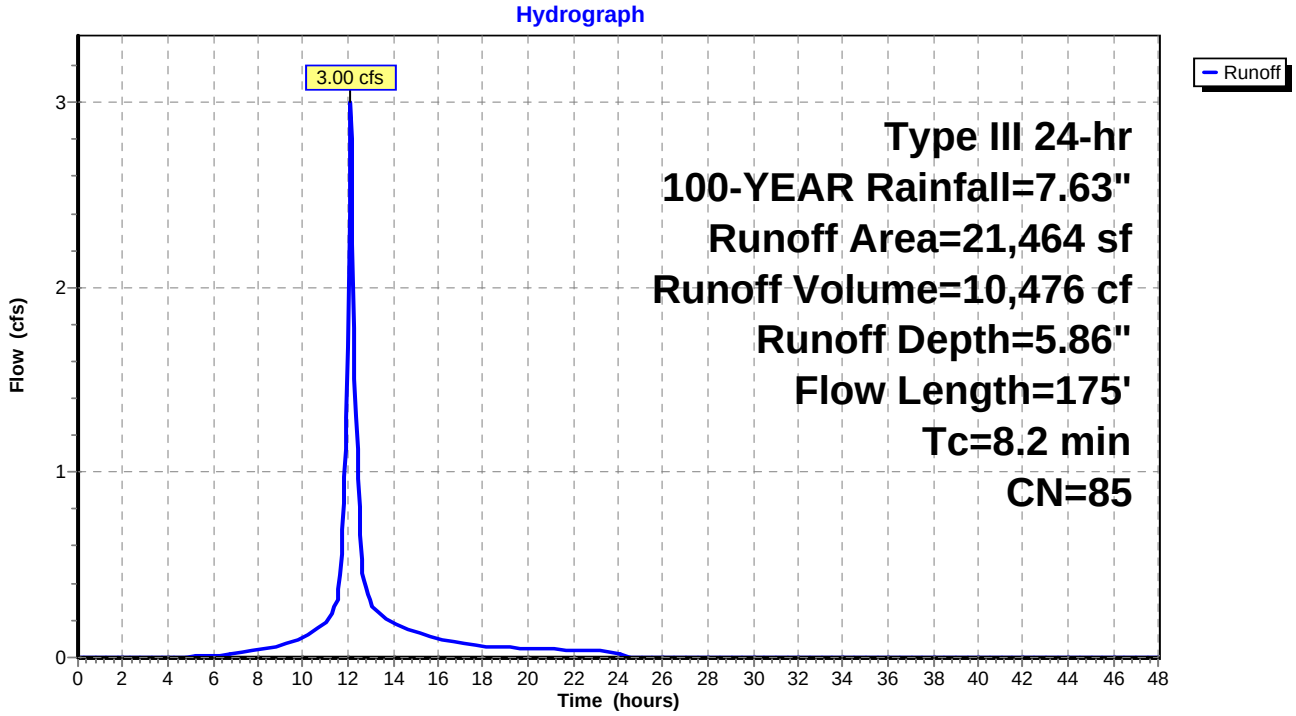
Runoff = 3.00 cfs @ 12.11 hrs, Volume= 10,476 cf, Depth= 5.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YEAR Rainfall=7.63"

Area (sf)	CN	Description
3,304	98	Roofs, HSG D
668	98	Paved parking, HSG D
2,066	96	Gravel surface, HSG D
1,810	77	Woods, Good, HSG D
13,616	80	>75% Grass cover, Good, HSG D
21,464	85	Weighted Average
17,492		81.49% Pervious Area
3,972		18.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.0500	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.02"
2.4	125	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.2	175	Total			

Subcatchment 1S: 1



Summary for Subcatchment 2S: 2

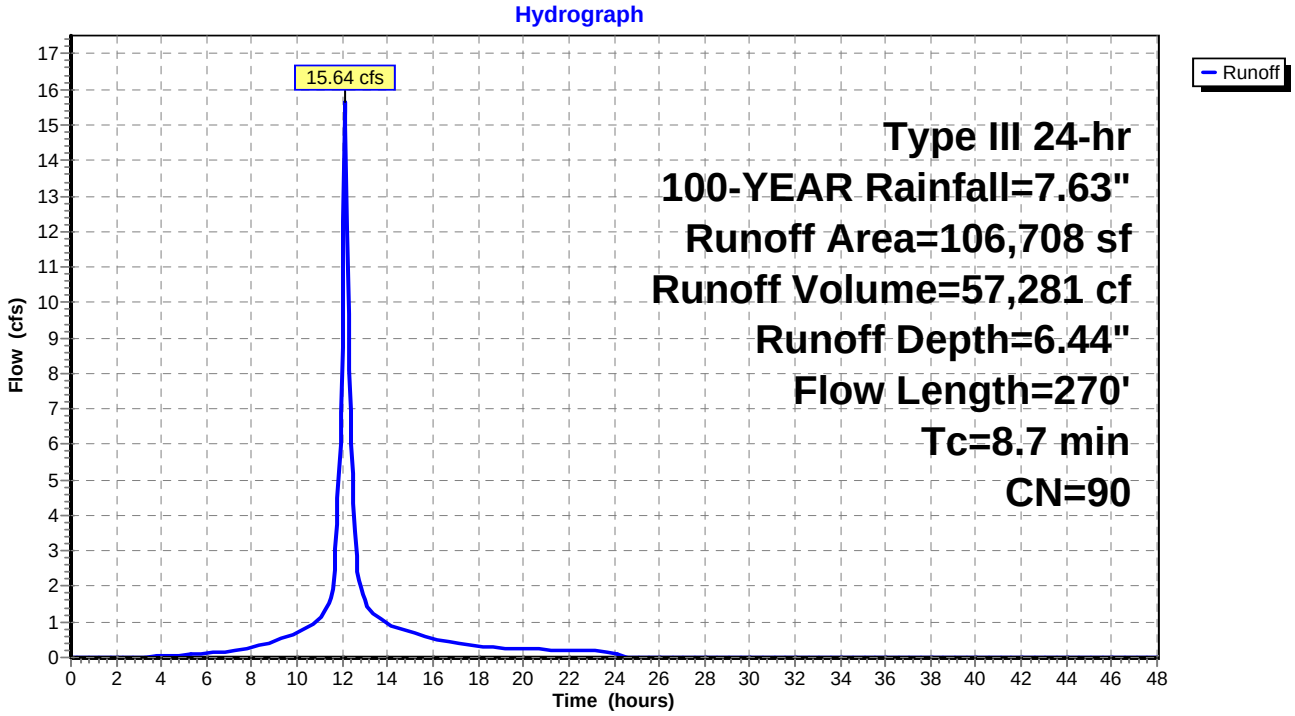
Runoff = 15.64 cfs @ 12.12 hrs, Volume= 57,281 cf, Depth= 6.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YEAR Rainfall=7.63"

Area (sf)	CN	Description
3,328	98	Roofs, HSG D
3,304	98	Paved parking, HSG D
46,231	96	Gravel surface, HSG D
8,561	77	Woods, Good, HSG D
45,284	84	50-75% Grass cover, Fair, HSG D
106,708	90	Weighted Average
100,076		93.78% Pervious Area
6,632		6.22% Impervious Area

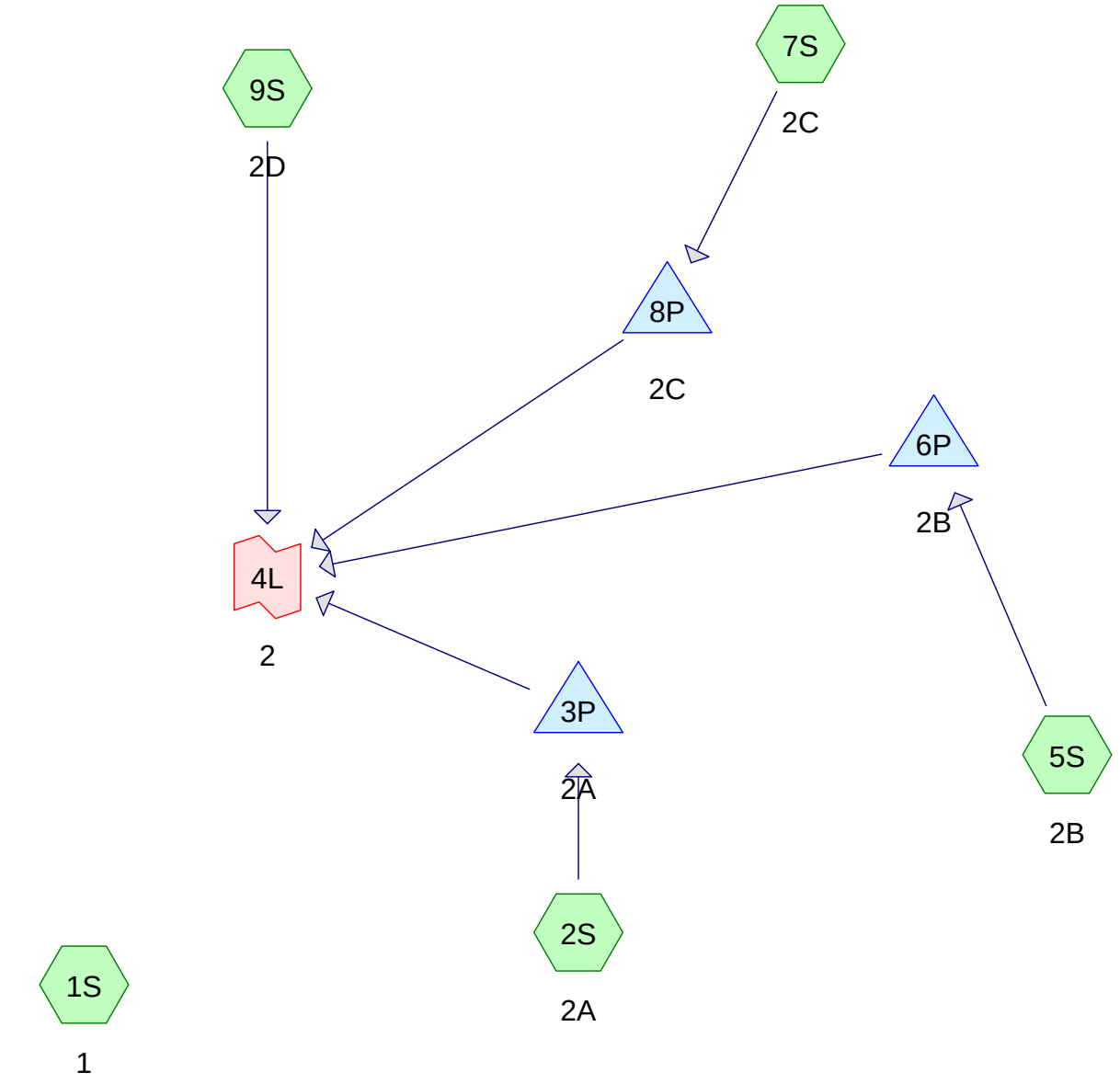
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.0400	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.02"
2.3	220	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
8.7	270	Total			

Subcatchment 2S: 2



ATTACHMENT F

PROPOSED CONDITIONS MODELING OUTPUT



Subcat Reach Pond Link

Routing Diagram for 4946-PROPOSED
Prepared by New England Environmental, Printed 4/5/2016
HydroCAD® 10.00-15 s/n 08712 © 2015 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
83,663	80	>75% Grass cover, Good, HSG D (1S, 2S, 5S, 7S, 9S)
27,506	98	Paved parking, HSG D (1S, 2S, 5S, 7S)
6,632	98	Roofs, HSG D (1S, 2S)
10,371	77	Woods, Good, HSG D (1S, 9S)
128,172	**85**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
0	HSG C	
128,172	HSG D	1S, 2S, 5S, 7S, 9S
0	Other	
128,172		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Sub Num
0	0	0	83,663	0	83,663	>75% Grass cover, Good	
0	0	0	27,506	0	27,506	Paved parking	
0	0	0	6,632	0	6,632	Roofs	
0	0	0	10,371	0	10,371	Woods, Good	
0	**0**	**0**	**128,172**	**0**	**128,172**	**TOTAL AREA**	

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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: 1 Runoff Area=21,666 sf 28.16% Impervious Runoff Depth=1.61"
Flow Length=175' Tc=8.2 min CN=85 Runoff=0.86 cfs 2,898 cf

Subcatchment 2S: 2A Runoff Area=8,903 sf 69.39% Impervious Runoff Depth=2.18"
Tc=5.0 min CN=92 Runoff=0.51 cfs 1,617 cf

Subcatchment 5S: 2B Runoff Area=4,580 sf 74.63% Impervious Runoff Depth=2.27"
Tc=5.0 min CN=93 Runoff=0.27 cfs 868 cf

Subcatchment 7S: 2C Runoff Area=45,561 sf 40.48% Impervious Runoff Depth=1.76"
Tc=8.0 min CN=87 Runoff=1.98 cfs 6,669 cf

Subcatchment 9S: 2D Runoff Area=47,462 sf 0.00% Impervious Runoff Depth=1.20"
Tc=8.0 min CN=79 Runoff=1.38 cfs 4,759 cf

Pond 3P: 2A Peak Elev=150.40' Storage=330 cf Inflow=0.51 cfs 1,617 cf
Outflow=0.42 cfs 1,419 cf

Pond 6P: 2B Peak Elev=149.80' Storage=94 cf Inflow=0.27 cfs 868 cf
Outflow=0.27 cfs 801 cf

Pond 8P: 2C Peak Elev=148.83' Storage=3,621 cf Inflow=1.98 cfs 6,669 cf
Outflow=0.30 cfs 3,457 cf

Link 4L: 2 Inflow=2.07 cfs 10,436 cf
Primary=2.07 cfs 10,436 cf

Total Runoff Area = 128,172 sf Runoff Volume = 16,811 cf Average Runoff Depth = 1.57"
73.37% Pervious = 94,034 sf 26.63% Impervious = 34,138 sf

Summary for Subcatchment 1S: 1

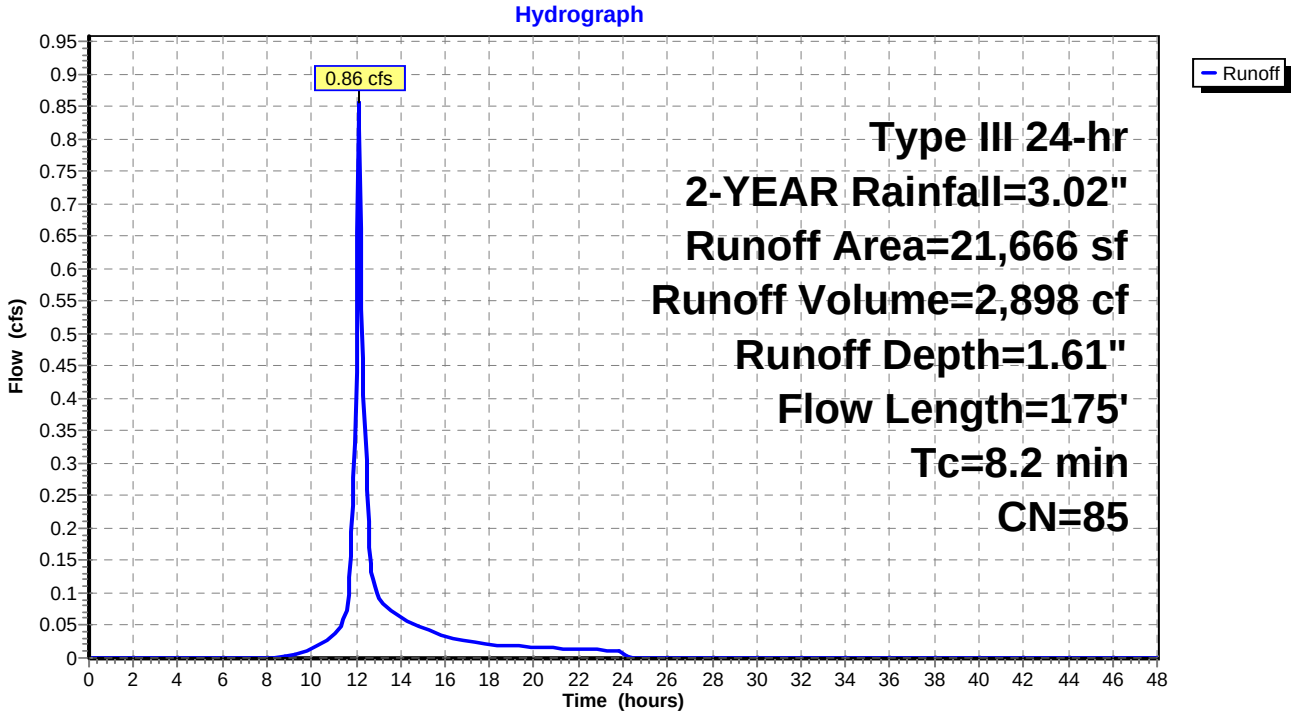
Runoff = 0.86 cfs @ 12.12 hrs, Volume= 2,898 cf, Depth= 1.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR Rainfall=3.02"

Area (sf)	CN	Description
3,304	98	Roofs, HSG D
2,797	98	Paved parking, HSG D
1,810	77	Woods, Good, HSG D
13,755	80	>75% Grass cover, Good, HSG D
21,666	85	Weighted Average
15,565		71.84% Pervious Area
6,101		28.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.0500	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.02"
2.4	125	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.2	175	Total			

Subcatchment 1S: 1



Summary for Subcatchment 2S: 2A

[49] Hint: Tc<2dt may require smaller dt

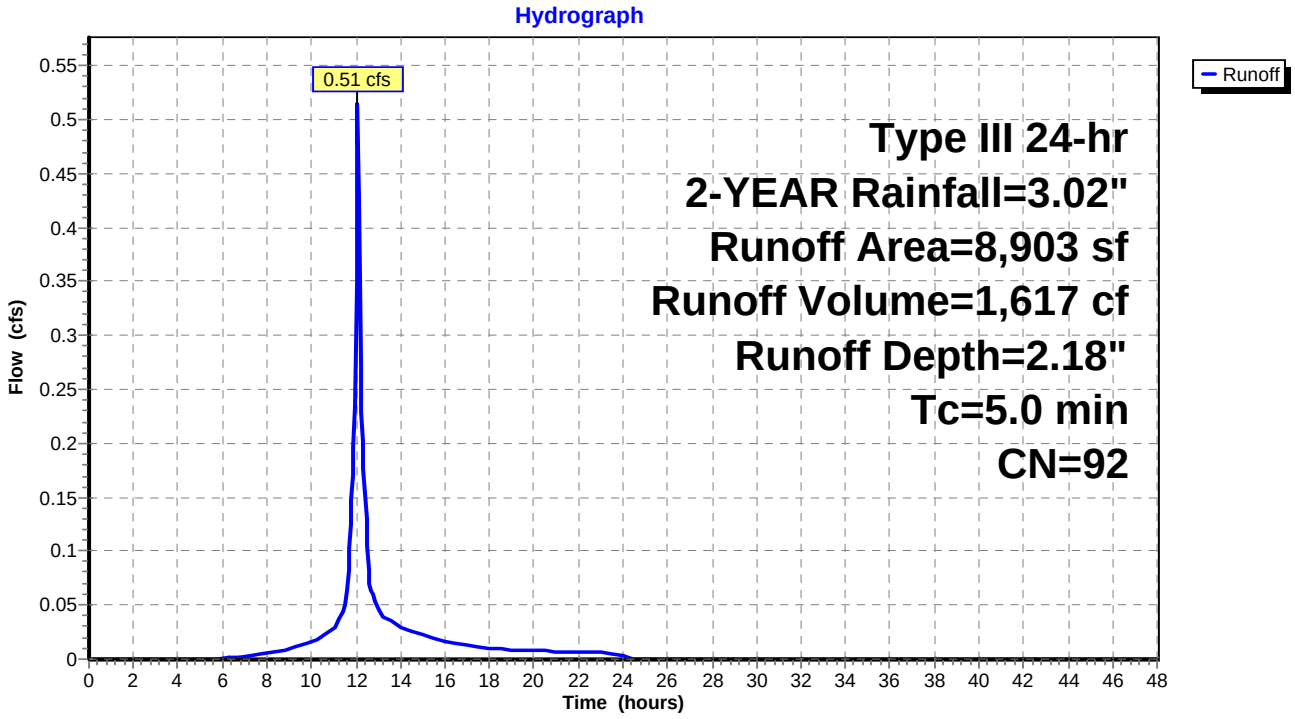
Runoff = 0.51 cfs @ 12.07 hrs, Volume= 1,617 cf, Depth= 2.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR Rainfall=3.02"

Area (sf)	CN	Description
3,328	98	Roofs, HSG D
2,850	98	Paved parking, HSG D
2,725	80	>75% Grass cover, Good, HSG D
8,903	92	Weighted Average
2,725		30.61% Pervious Area
6,178		69.39% Impervious Area

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

Subcatchment 2S: 2A



Summary for Subcatchment 5S: 2B

[49] Hint: Tc<2dt may require smaller dt

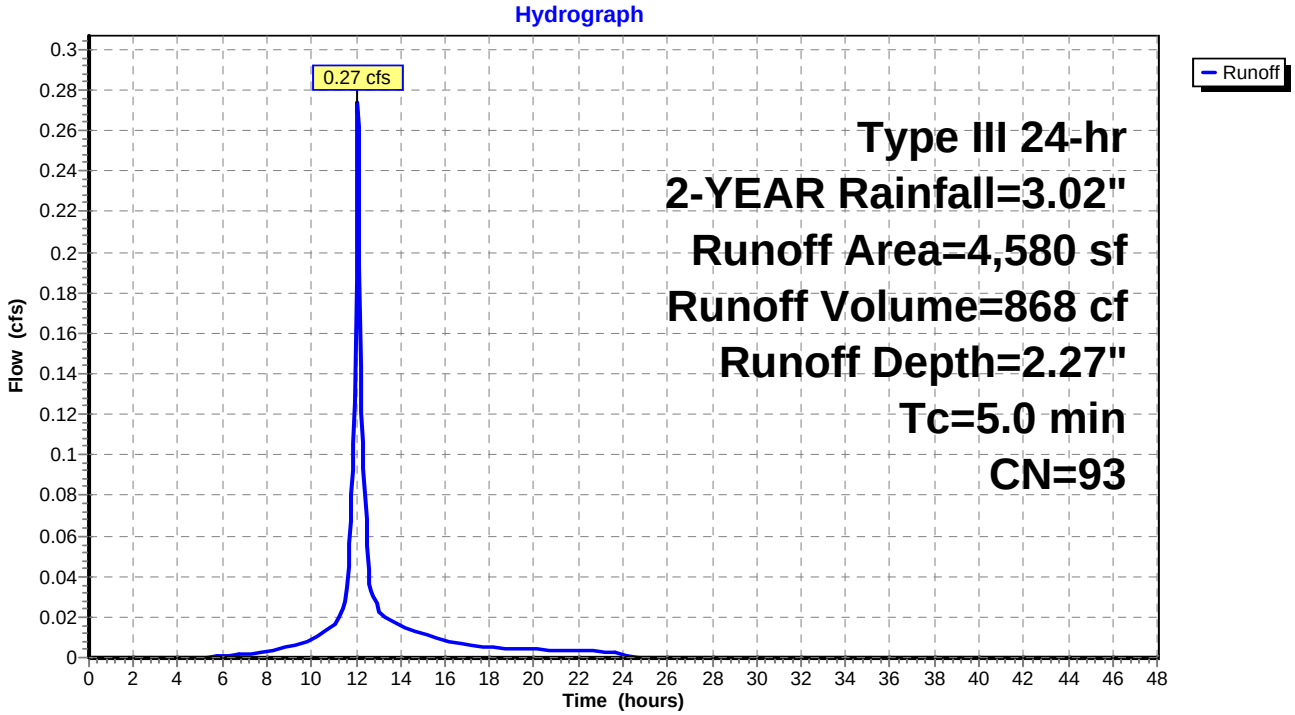
Runoff = 0.27 cfs @ 12.07 hrs, Volume= 868 cf, Depth= 2.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR Rainfall=3.02"

Area (sf)	CN	Description
3,418	98	Paved parking, HSG D
1,162	80	>75% Grass cover, Good, HSG D
4,580	93	Weighted Average
1,162		25.37% Pervious Area
3,418		74.63% Impervious Area

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

Subcatchment 5S: 2B



Summary for Subcatchment 7S: 2C

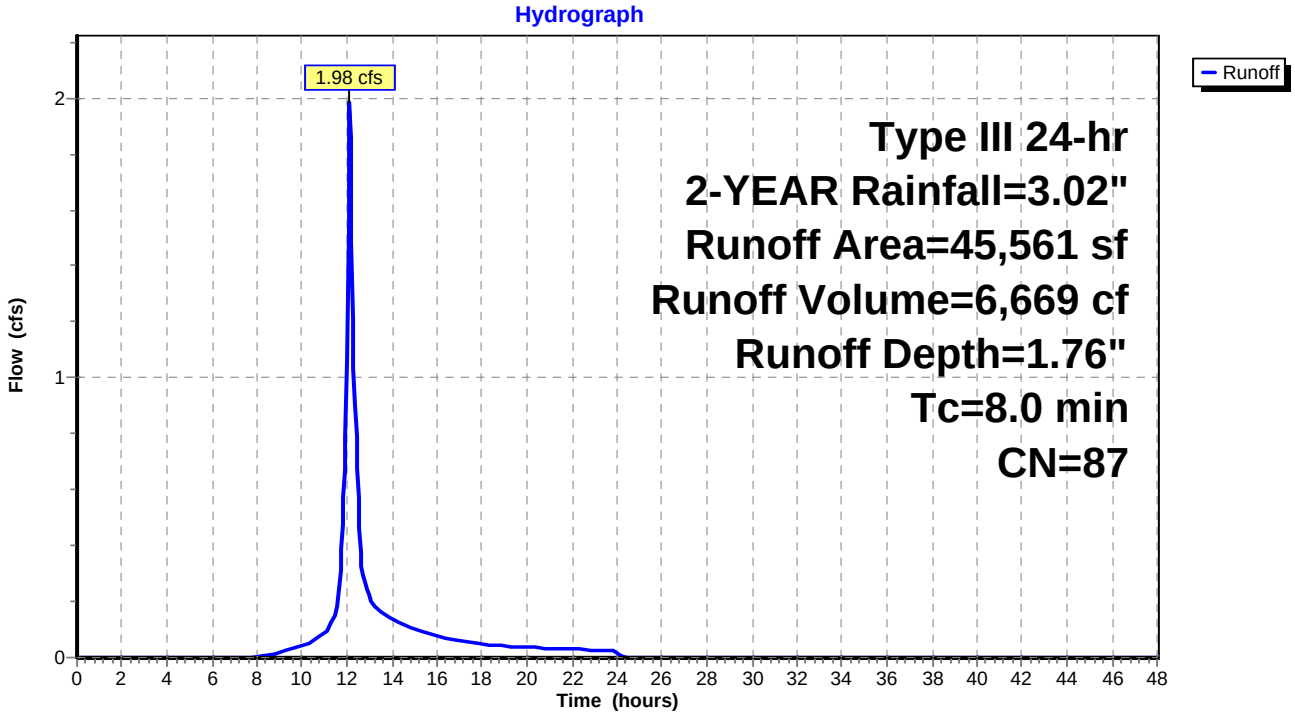
Runoff = 1.98 cfs @ 12.12 hrs, Volume= 6,669 cf, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR Rainfall=3.02"

Area (sf)	CN	Description
18,441	98	Paved parking, HSG D
27,120	80	>75% Grass cover, Good, HSG D
45,561	87	Weighted Average
27,120		59.52% Pervious Area
18,441		40.48% Impervious Area

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

Subcatchment 7S: 2C



Summary for Subcatchment 9S: 2D

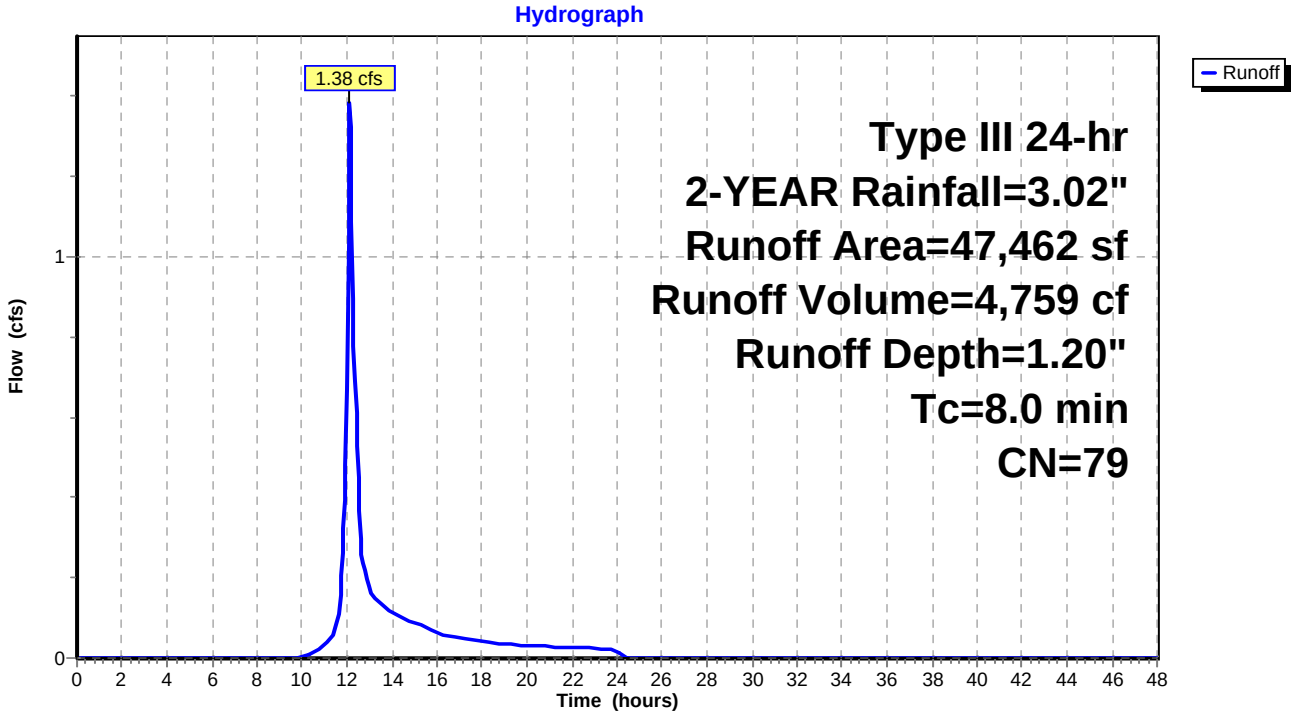
Runoff = 1.38 cfs @ 12.12 hrs, Volume= 4,759 cf, Depth= 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-YEAR Rainfall=3.02"

Area (sf)	CN	Description
8,561	77	Woods, Good, HSG D
38,901	80	>75% Grass cover, Good, HSG D
47,462	79	Weighted Average
47,462		100.00% Pervious Area

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

Subcatchment 9S: 2D



Summary for Pond 3P: 2A

Inflow Area = 8,903 sf, 69.39% Impervious, Inflow Depth = 2.18" for 2-YEAR event
Inflow = 0.51 cfs @ 12.07 hrs, Volume= 1,617 cf
Outflow = 0.42 cfs @ 12.13 hrs, Volume= 1,419 cf, Atten= 18%, Lag= 3.3 min
Primary = 0.42 cfs @ 12.13 hrs, Volume= 1,419 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 150.40' @ 12.13 hrs Surf.Area= 757 sf Storage= 330 cf

Plug-Flow detention time= 93.3 min calculated for 1,418 cf (88% of inflow)
Center-of-Mass det. time= 37.8 min (836.8 - 798.9)

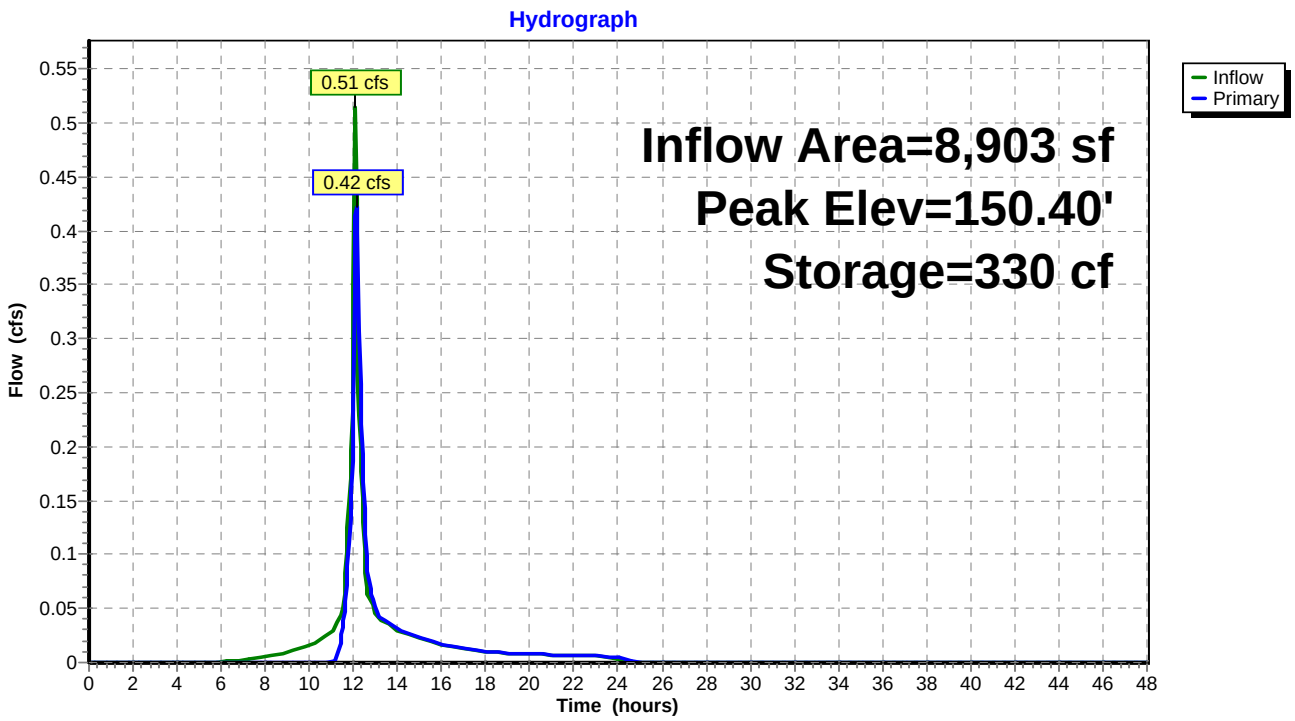
Volume	Invert	Avail.Storage	Storage Description
#1	149.50'	950 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
149.50	0	0	0
150.00	400	100	100
151.00	1,300	850	950

Device	Routing	Invert	Outlet Devices
#1	Primary	150.20'	**6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.42 cfs @ 12.13 hrs HW=150.39' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.42 cfs @ 2.12 fps)

Pond 3P: 2A


Hydrograph
0.51 cfs
0.42 cfs
Inflow Area=8,903 sf
Peak Elev=150.40'
Storage=330 cf
Inflow
Primary
Flow (cfs)
Time (hours)
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
0.55
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48

Stage-Area-Storage for Pond 3P: 2A

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
149.50	0	0
149.52	16	0
149.54	32	1
149.56	48	1
149.58	64	3
149.60	80	4
149.62	96	6
149.64	112	8
149.66	128	10
149.68	144	13
149.70	160	16
149.72	176	19
149.74	192	23
149.76	208	27
149.78	224	31
149.80	240	36
149.82	256	41
149.84	272	46
149.86	288	52
149.88	304	58
149.90	320	64
149.92	336	71
149.94	352	77
149.96	368	85
149.98	384	92
150.00	400	100
150.02	418	108
150.04	436	117
150.06	454	126
150.08	472	135
150.10	490	144
150.12	508	154
150.14	526	165
150.16	544	176
150.18	562	187
150.20	580	198
150.22	598	210
150.24	616	222
150.26	634	234
150.28	652	247
150.30	670	261
150.32	688	274
150.34	706	288
150.36	724	302
150.38	742	317
150.40	760	332
150.42	778	347
150.44	796	363
150.46	814	379
150.48	832	396
150.50	850	413
150.52	868	430
150.54	886	447
150.56	904	465
150.58	922	483
150.60	940	502
150.62	958	521
150.64	976	540
150.66	994	560
150.68	1,012	580
150.70	1,030	600
150.72	1,048	621
150.74	1,066	642
150.76	1,084	664
150.78	1,102	686
150.80	1,120	708
150.82	1,138	731
150.84	1,156	754
150.86	1,174	777
150.88	1,192	800
150.90	1,210	825
150.92	1,228	849
150.94	1,246	874
150.96	1,264	899
150.98	1,282	924
151.00	**1,300**	**950**

Summary for Pond 6P: 2B

Inflow Area = 4,580 sf, 74.63% Impervious, Inflow Depth = 2.27" for 2-YEAR event
Inflow = 0.27 cfs @ 12.07 hrs, Volume= 868 cf
Outflow = 0.27 cfs @ 12.10 hrs, Volume= 801 cf, Atten= 3%, Lag= 1.5 min
Primary = 0.27 cfs @ 12.10 hrs, Volume= 801 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 149.80' @ 12.10 hrs Surf.Area= 633 sf Storage= 94 cf

Plug-Flow detention time= 64.6 min calculated for 801 cf (92% of inflow)
Center-of-Mass det. time= 24.8 min (818.6 - 793.8)

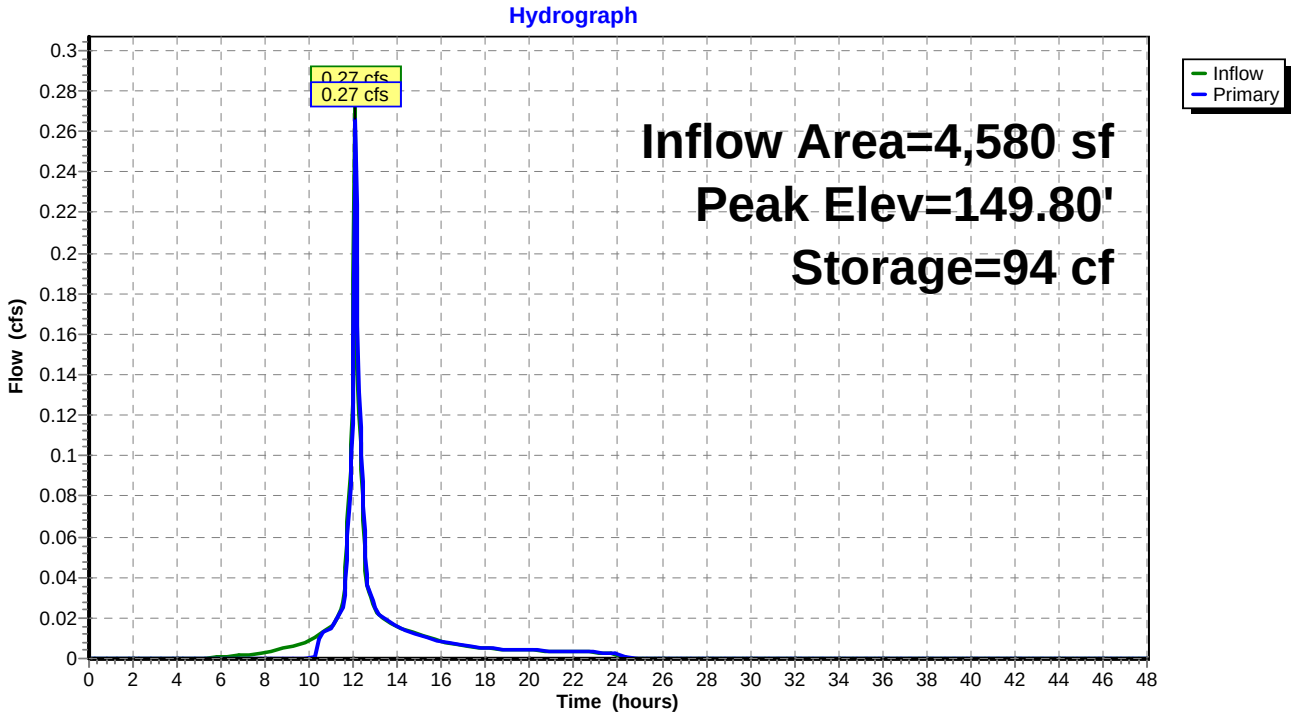
Volume	Invert	Avail.Storage	Storage Description
#1	149.50'	266 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
149.50	0	0	0
150.00	1,065	266	266

Device	Routing	Invert	Outlet Devices
#1	Primary	149.75'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.26 cfs @ 12.10 hrs HW=149.80' (Free Discharge)
└─**1=Orifice/Grate** (Weir Controls 0.26 cfs @ 0.71 fps)

Pond 6P: 2B


Hydrograph
0.27 cfs
0.27 cfs
Inflow Area=4,580 sf
Peak Elev=149.80'
Storage=94 cf
Inflow
Primary
Flow (cfs)
Time (hours)
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
0.16
0.18
0.2
0.22
0.24
0.26
0.28
0.3
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48

Stage-Area-Storage for Pond 6P: 2B

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
149.50	0	0
149.51	21	0
149.52	43	0
149.53	64	1
149.54	85	2
149.55	107	3
149.56	128	4
149.57	149	5
149.58	170	7
149.59	192	9
149.60	213	11
149.61	234	13
149.62	256	15
149.63	277	18
149.64	298	21
149.65	320	24
149.66	341	27
149.67	362	31
149.68	383	35
149.69	405	38
149.70	426	43
149.71	447	47
149.72	469	52
149.73	490	56
149.74	511	61
149.75	533	67
149.76	554	72
149.77	575	78
149.78	596	83
149.79	618	90
149.80	639	96
149.81	660	102
149.82	682	109
149.83	703	116
149.84	724	123
149.85	745	130
149.86	767	138
149.87	788	146
149.88	809	154
149.89	831	162
149.90	852	170
149.91	873	179
149.92	895	188
149.93	916	197
149.94	937	206
149.95	958	216
149.96	980	225
149.97	1,001	235
149.98	1,022	245
149.99	1,044	256
150.00	**1,065**	**266**

Summary for Pond 8P: 2C

Inflow Area = 45,561 sf, 40.48% Impervious, Inflow Depth = 1.76" for 2-YEAR event
Inflow = 1.98 cfs @ 12.12 hrs, Volume= 6,669 cf
Outflow = 0.30 cfs @ 12.69 hrs, Volume= 3,457 cf, Atten= 85%, Lag= 34.7 min
Primary = 0.30 cfs @ 12.69 hrs, Volume= 3,457 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 148.83' @ 12.69 hrs Surf.Area= 5,191 sf Storage= 3,621 cf

Plug-Flow detention time= 253.3 min calculated for 3,457 cf (52% of inflow)
Center-of-Mass det. time= 139.3 min (962.4 - 823.2)

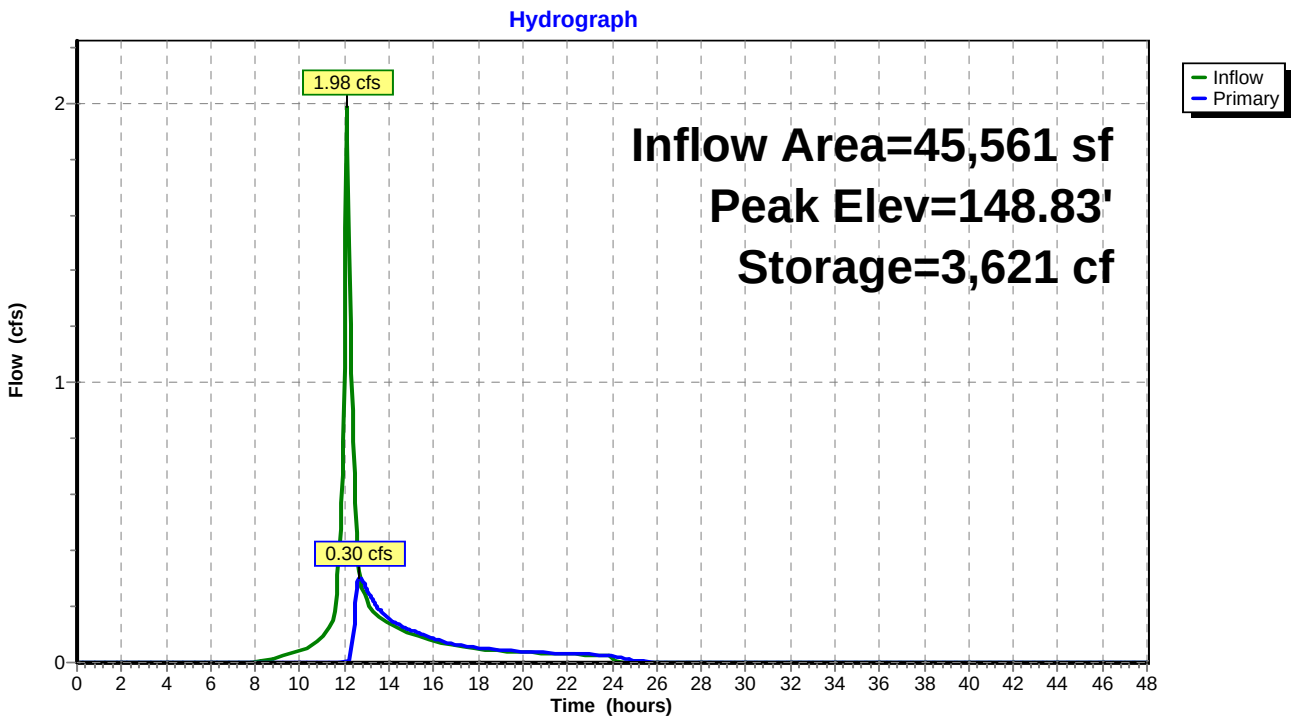
Volume	Invert	Avail.Storage	Storage Description
#1	147.50'	14,050 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
147.50	0	0	0
148.00	2,200	550	550
149.00	5,800	4,000	4,550
150.00	13,200	9,500	14,050

Device	Routing	Invert	Outlet Devices
#1	Primary	148.75'	**12.0" x 12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.30 cfs @ 12.69 hrs HW=148.83' (Free Discharge)
└─**1=Orifice/Grate** (Weir Controls 0.30 cfs @ 0.93 fps)

Pond 8P: 2C


Hydrograph
1.98 cfs
0.30 cfs
Inflow Area=45,561 sf
Peak Elev=148.83'
Storage=3,621 cf
Inflow
Primary
Flow (cfs)
Time (hours)
0
1
2
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48

Stage-Area-Storage for Pond 8P: 2C

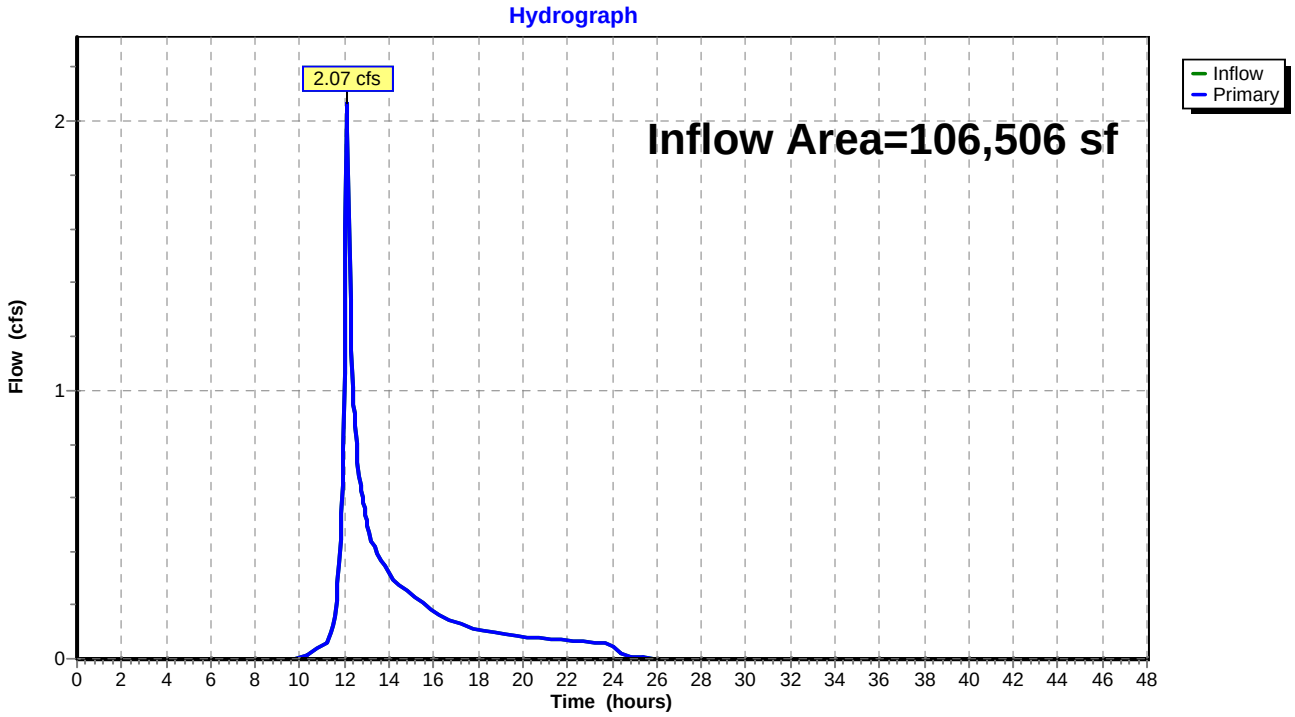
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
147.50	0	0
147.55	220	6
147.60	440	22
147.65	660	50
147.70	880	88
147.75	1,100	138
147.80	1,320	198
147.85	1,540	269
147.90	1,760	352
147.95	1,980	445
148.00	2,200	550
148.05	2,380	665
148.10	2,560	788
148.15	2,740	921
148.20	2,920	1,062
148.25	3,100	1,213
148.30	3,280	1,372
148.35	3,460	1,540
148.40	3,640	1,718
148.45	3,820	1,904
148.50	4,000	2,100
148.55	4,180	2,305
148.60	4,360	2,518
148.65	4,540	2,741
148.70	4,720	2,972
148.75	4,900	3,213
148.80	5,080	3,462
148.85	5,260	3,720
148.90	5,440	3,988
148.95	5,620	4,264
149.00	5,800	4,550
149.05	6,170	4,849
149.10	6,540	5,167
149.15	6,910	5,503
149.20	7,280	5,858
149.25	7,650	6,231
149.30	8,020	6,623
149.35	8,390	7,033
149.40	8,760	7,462
149.45	9,130	7,909
149.50	9,500	8,375
149.55	9,870	8,859
149.60	10,240	9,362
149.65	10,610	9,883
149.70	10,980	10,423
149.75	11,350	10,981
149.80	11,720	11,558
149.85	12,090	12,153
149.90	12,460	12,767
149.95	12,830	13,399
150.00	**13,200**	**14,050**

Summary for Link 4L: 2

Inflow Area = 106,506 sf, 26.32% Impervious, Inflow Depth = 1.18" for 2-YEAR event
Inflow = 2.07 cfs @ 12.12 hrs, Volume= 10,436 cf
Primary = 2.07 cfs @ 12.12 hrs, Volume= 10,436 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 4L: 2



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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: 1 Runoff Area=21,666 sf 28.16% Impervious Runoff Depth=3.18"
Flow Length=175' Tc=8.2 min CN=85 Runoff=1.69 cfs 5,748 cf

Subcatchment 2S: 2A Runoff Area=8,903 sf 69.39% Impervious Runoff Depth=3.89"
Tc=5.0 min CN=92 Runoff=0.89 cfs 2,889 cf

Subcatchment 5S: 2B Runoff Area=4,580 sf 74.63% Impervious Runoff Depth=4.00"
Tc=5.0 min CN=93 Runoff=0.47 cfs 1,527 cf

Subcatchment 7S: 2C Runoff Area=45,561 sf 40.48% Impervious Runoff Depth=3.38"
Tc=8.0 min CN=87 Runoff=3.76 cfs 12,830 cf

Subcatchment 9S: 2D Runoff Area=47,462 sf 0.00% Impervious Runoff Depth=2.63"
Tc=8.0 min CN=79 Runoff=3.10 cfs 10,403 cf

Pond 3P: 2A Peak Elev=150.57' Storage=478 cf Inflow=0.89 cfs 2,889 cf
Outflow=0.58 cfs 2,691 cf

Pond 6P: 2B Peak Elev=149.82' Storage=107 cf Inflow=0.47 cfs 1,527 cf
Outflow=0.46 cfs 1,461 cf

Pond 8P: 2C Peak Elev=149.06' Storage=4,888 cf Inflow=3.76 cfs 12,830 cf
Outflow=2.22 cfs 9,618 cf

Link 4L: 2 Inflow=5.60 cfs 24,173 cf
Primary=5.60 cfs 24,173 cf

Total Runoff Area = 128,172 sf Runoff Volume = 33,398 cf Average Runoff Depth = 3.13"
73.37% Pervious = 94,034 sf 26.63% Impervious = 34,138 sf

Summary for Subcatchment 1S: 1

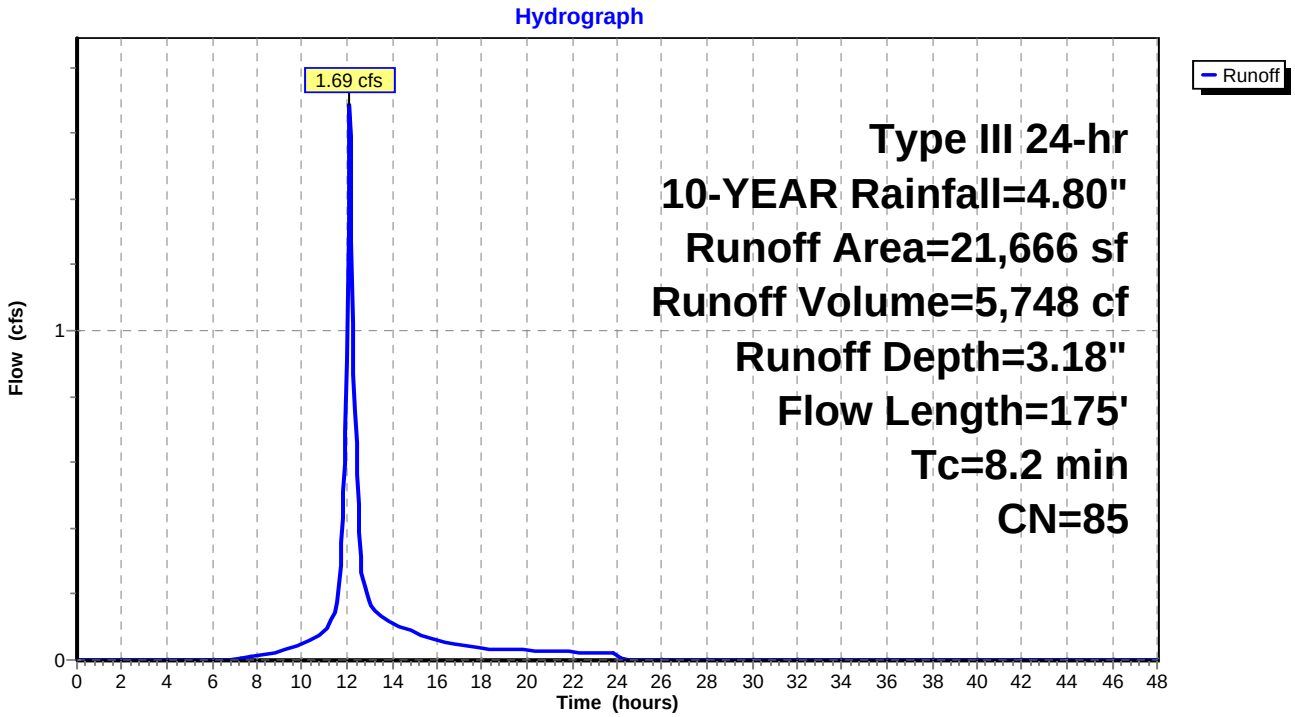
Runoff = 1.69 cfs @ 12.12 hrs, Volume= 5,748 cf, Depth= 3.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR Rainfall=4.80"

Area (sf)	CN	Description
3,304	98	Roofs, HSG D
2,797	98	Paved parking, HSG D
1,810	77	Woods, Good, HSG D
13,755	80	>75% Grass cover, Good, HSG D
21,666	85	Weighted Average
15,565		71.84% Pervious Area
6,101		28.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.0500	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.02"
2.4	125	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.2	175	Total			

Subcatchment 1S: 1



Summary for Subcatchment 2S: 2A

[49] Hint: Tc<2dt may require smaller dt

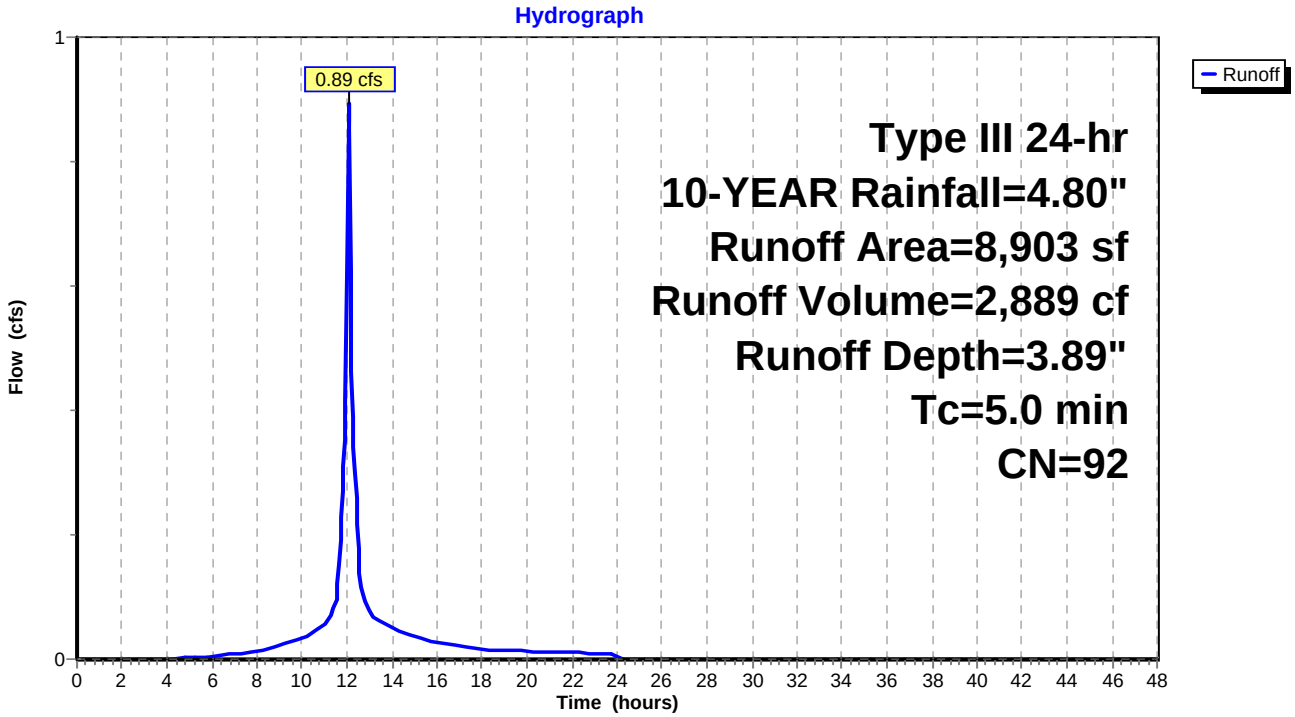
Runoff = 0.89 cfs @ 12.07 hrs, Volume= 2,889 cf, Depth= 3.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR Rainfall=4.80"

Area (sf)	CN	Description
3,328	98	Roofs, HSG D
2,850	98	Paved parking, HSG D
2,725	80	>75% Grass cover, Good, HSG D
8,903	92	Weighted Average
2,725		30.61% Pervious Area
6,178		69.39% Impervious Area

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

Subcatchment 2S: 2A



Summary for Subcatchment 5S: 2B

[49] Hint: Tc<2dt may require smaller dt

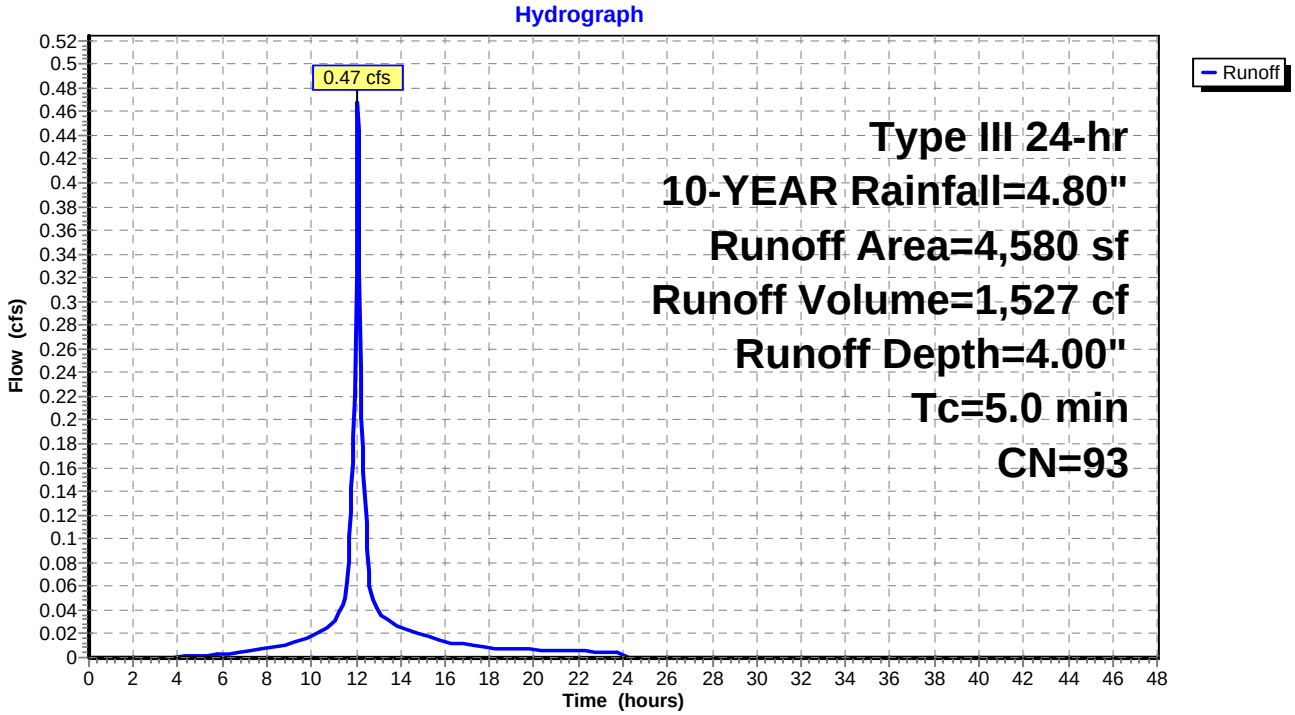
Runoff = 0.47 cfs @ 12.07 hrs, Volume= 1,527 cf, Depth= 4.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR Rainfall=4.80"

Area (sf)	CN	Description
3,418	98	Paved parking, HSG D
1,162	80	>75% Grass cover, Good, HSG D
4,580	93	Weighted Average
1,162		25.37% Pervious Area
3,418		74.63% Impervious Area

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

Subcatchment 5S: 2B



Summary for Subcatchment 7S: 2C

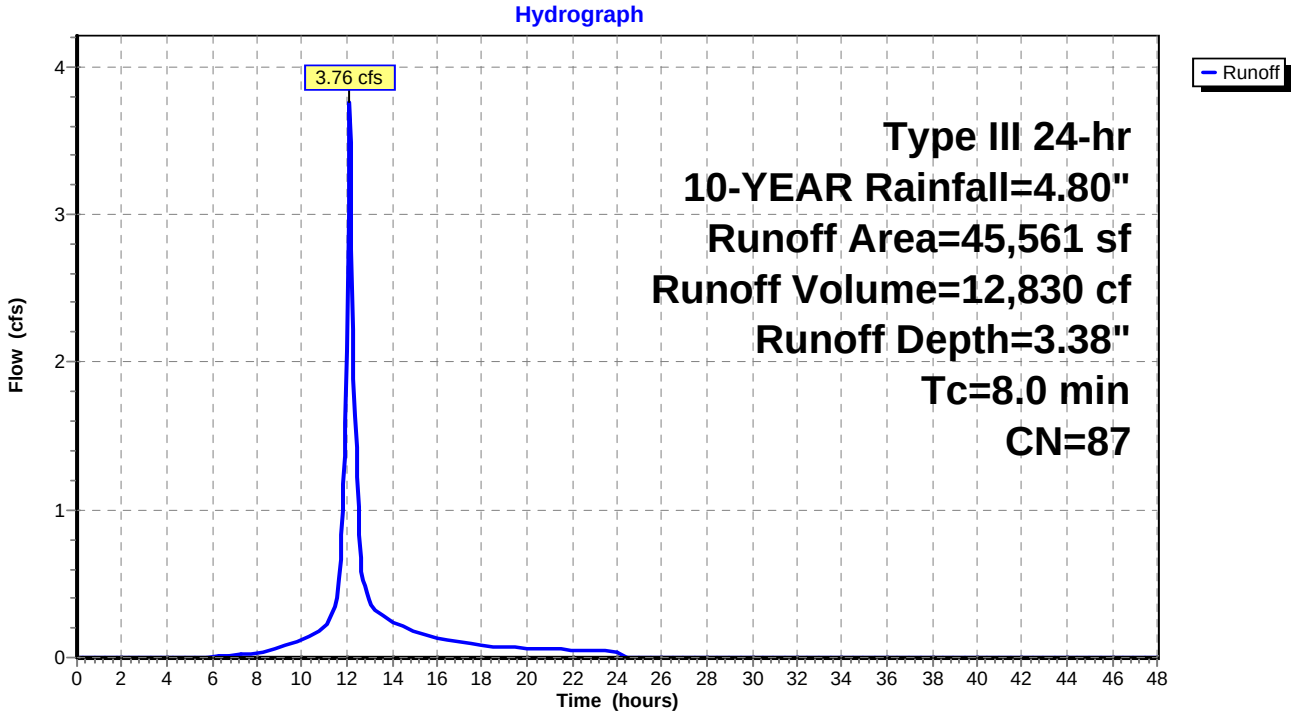
Runoff = 3.76 cfs @ 12.11 hrs, Volume= 12,830 cf, Depth= 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR Rainfall=4.80"

Area (sf)	CN	Description
18,441	98	Paved parking, HSG D
27,120	80	>75% Grass cover, Good, HSG D
45,561	87	Weighted Average
27,120		59.52% Pervious Area
18,441		40.48% Impervious Area

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

Subcatchment 7S: 2C



Summary for Subcatchment 9S: 2D

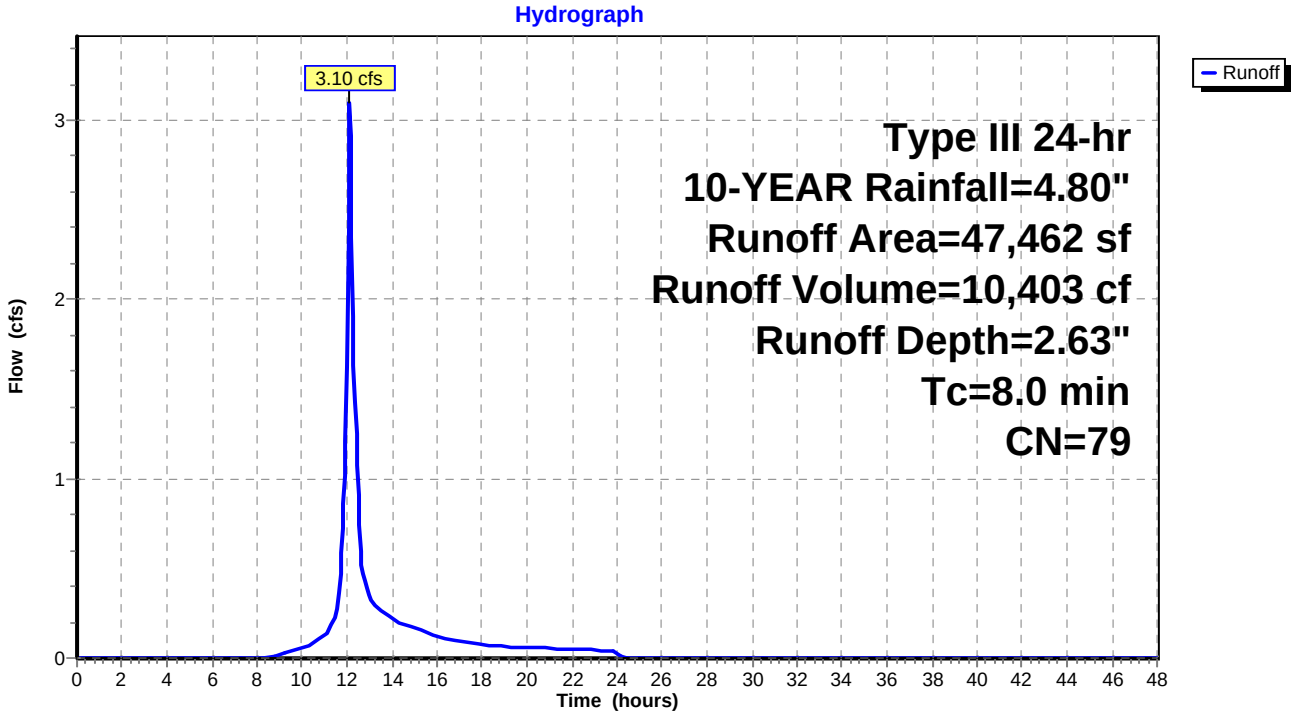
Runoff = 3.10 cfs @ 12.12 hrs, Volume= 10,403 cf, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-YEAR Rainfall=4.80"

Area (sf)	CN	Description
8,561	77	Woods, Good, HSG D
38,901	80	>75% Grass cover, Good, HSG D
47,462	79	Weighted Average
47,462		100.00% Pervious Area

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

Subcatchment 9S: 2D



Summary for Pond 3P: 2A

Inflow Area = 8,903 sf, 69.39% Impervious, Inflow Depth = 3.89" for 10-YEAR event
Inflow = 0.89 cfs @ 12.07 hrs, Volume= 2,889 cf
Outflow = 0.58 cfs @ 12.17 hrs, Volume= 2,691 cf, Atten= 35%, Lag= 5.7 min
Primary = 0.58 cfs @ 12.17 hrs, Volume= 2,691 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 150.57' @ 12.17 hrs Surf.Area= 916 sf Storage= 478 cf

Plug-Flow detention time= 66.8 min calculated for 2,688 cf (93% of inflow)
Center-of-Mass det. time= 30.6 min (813.7 - 783.1)

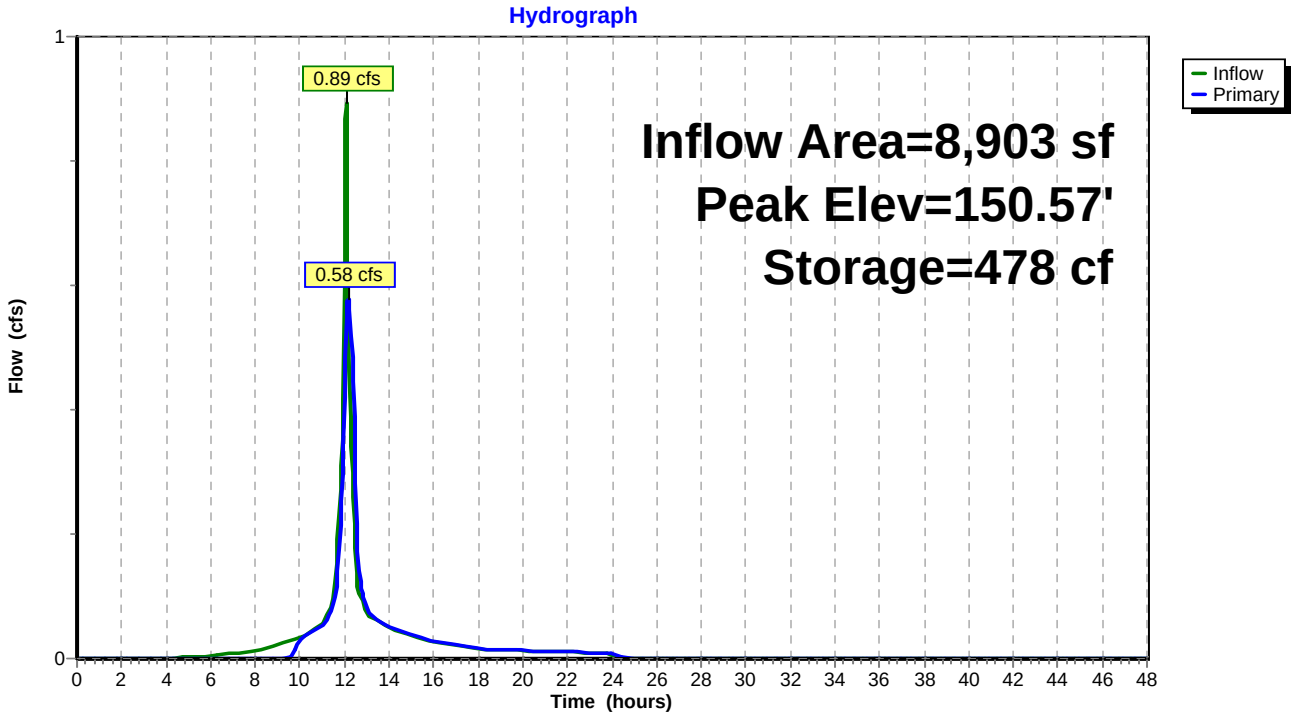
Volume	Invert	Avail.Storage	Storage Description
#1	149.50'	950 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
149.50	0	0	0
150.00	400	100	100
151.00	1,300	850	950

Device	Routing	Invert	Outlet Devices
#1	Primary	150.20'	**6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.57 cfs @ 12.17 hrs HW=150.57' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 0.57 cfs @ 2.92 fps)

Pond 3P: 2A


Hydrograph
Inflow
Primary
0.89 cfs
0.58 cfs
Inflow Area=8,903 sf
Peak Elev=150.57'
Storage=478 cf
Flow (cfs)
Time (hours)
1
0
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48

Stage-Area-Storage for Pond 3P: 2A

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
149.50	0	0
149.52	16	0
149.54	32	1
149.56	48	1
149.58	64	3
149.60	80	4
149.62	96	6
149.64	112	8
149.66	128	10
149.68	144	13
149.70	160	16
149.72	176	19
149.74	192	23
149.76	208	27
149.78	224	31
149.80	240	36
149.82	256	41
149.84	272	46
149.86	288	52
149.88	304	58
149.90	320	64
149.92	336	71
149.94	352	77
149.96	368	85
149.98	384	92
150.00	400	100
150.02	418	108
150.04	436	117
150.06	454	126
150.08	472	135
150.10	490	144
150.12	508	154
150.14	526	165
150.16	544	176
150.18	562	187
150.20	580	198
150.22	598	210
150.24	616	222
150.26	634	234
150.28	652	247
150.30	670	261
150.32	688	274
150.34	706	288
150.36	724	302
150.38	742	317
150.40	760	332
150.42	778	347
150.44	796	363
150.46	814	379
150.48	832	396
150.50	850	413
150.52	868	430
150.54	886	447
150.56	904	465
150.58	922	483
150.60	940	502
150.62	958	521
150.64	976	540
150.66	994	560
150.68	1,012	580
150.70	1,030	600
150.72	1,048	621
150.74	1,066	642
150.76	1,084	664
150.78	1,102	686
150.80	1,120	708
150.82	1,138	731
150.84	1,156	754
150.86	1,174	777
150.88	1,192	800
150.90	1,210	825
150.92	1,228	849
150.94	1,246	874
150.96	1,264	899
150.98	1,282	924
151.00	**1,300**	**950**

Summary for Pond 6P: 2B

Inflow Area = 4,580 sf, 74.63% Impervious, Inflow Depth = 4.00" for 10-YEAR event
Inflow = 0.47 cfs @ 12.07 hrs, Volume= 1,527 cf
Outflow = 0.46 cfs @ 12.09 hrs, Volume= 1,461 cf, Atten= 2%, Lag= 1.4 min
Primary = 0.46 cfs @ 12.09 hrs, Volume= 1,461 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 149.82' @ 12.09 hrs Surf.Area= 676 sf Storage= 107 cf

Plug-Flow detention time= 44.4 min calculated for 1,461 cf (96% of inflow)
Center-of-Mass det. time= 19.3 min (797.9 - 778.6)

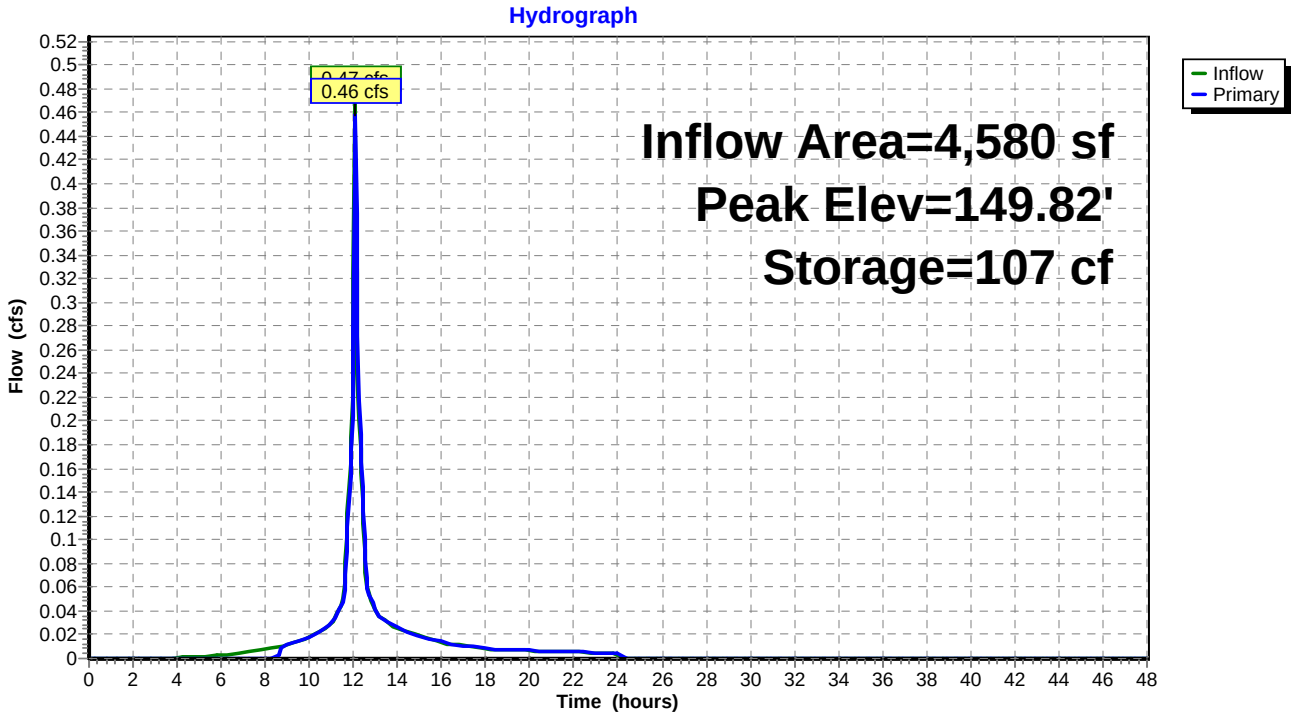
Volume	Invert	Avail.Storage	Storage Description
#1	149.50'	266 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
149.50	0	0	0
150.00	1,065	266	266

Device	Routing	Invert	Outlet Devices
#1	Primary	149.75'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.45 cfs @ 12.09 hrs HW=149.82' (Free Discharge)
└─**1=Orifice/Grate** (Weir Controls 0.45 cfs @ 0.84 fps)

Pond 6P: 2B


Hydrograph
0.46 cfs
Inflow Area=4,580 sf
Peak Elev=149.82'
Storage=107 cf
Inflow
Primary
Flow (cfs)
Time (hours)

Stage-Area-Storage for Pond 6P: 2B

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
149.50	0	0
149.51	21	0
149.52	43	0
149.53	64	1
149.54	85	2
149.55	107	3
149.56	128	4
149.57	149	5
149.58	170	7
149.59	192	9
149.60	213	11
149.61	234	13
149.62	256	15
149.63	277	18
149.64	298	21
149.65	320	24
149.66	341	27
149.67	362	31
149.68	383	35
149.69	405	38
149.70	426	43
149.71	447	47
149.72	469	52
149.73	490	56
149.74	511	61
149.75	533	67
149.76	554	72
149.77	575	78
149.78	596	83
149.79	618	90
149.80	639	96
149.81	660	102
149.82	682	109
149.83	703	116
149.84	724	123
149.85	745	130
149.86	767	138
149.87	788	146
149.88	809	154
149.89	831	162
149.90	852	170
149.91	873	179
149.92	895	188
149.93	916	197
149.94	937	206
149.95	958	216
149.96	980	225
149.97	1,001	235
149.98	1,022	245
149.99	1,044	256
150.00	**1,065**	**266**

Summary for Pond 8P: 2C

Inflow Area = 45,561 sf, 40.48% Impervious, Inflow Depth = 3.38" for 10-YEAR event
Inflow = 3.76 cfs @ 12.11 hrs, Volume= 12,830 cf
Outflow = 2.22 cfs @ 12.26 hrs, Volume= 9,618 cf, Atten= 41%, Lag= 8.8 min
Primary = 2.22 cfs @ 12.26 hrs, Volume= 9,618 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 149.06' @ 12.26 hrs Surf.Area= 6,216 sf Storage= 4,888 cf

Plug-Flow detention time= 156.1 min calculated for 9,608 cf (75% of inflow)
Center-of-Mass det. time= 71.4 min (876.0 - 804.6)

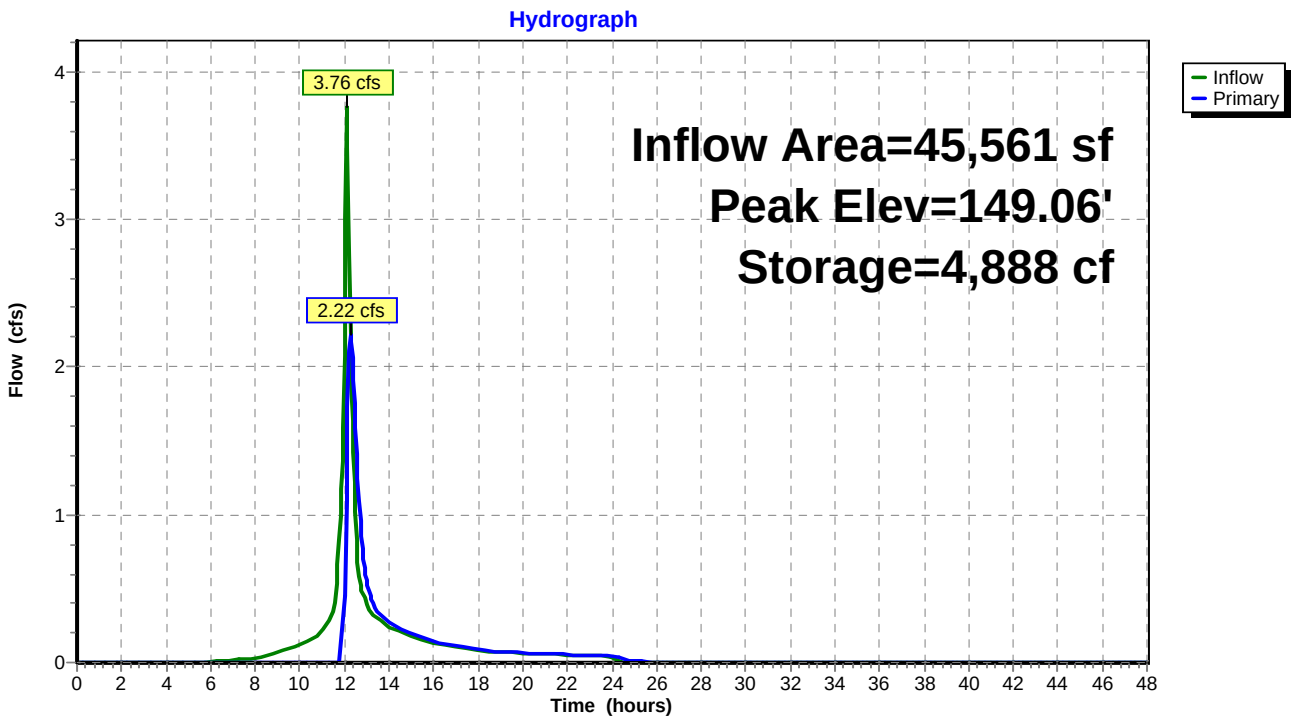
Volume	Invert	Avail.Storage	Storage Description
#1	147.50'	14,050 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
147.50	0	0	0
148.00	2,200	550	550
149.00	5,800	4,000	4,550
150.00	13,200	9,500	14,050

Device	Routing	Invert	Outlet Devices
#1	Primary	148.75'	**12.0" x 12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.20 cfs @ 12.26 hrs HW=149.06' (Free Discharge)
└─**1=Orifice/Grate** (Weir Controls 2.20 cfs @ 1.81 fps)

Pond 8P: 2C


Hydrograph
3.76 cfs
2.22 cfs
Inflow Area=45,561 sf
Peak Elev=149.06'
Storage=4,888 cf
Inflow
Primary
Flow (cfs)
Time (hours)
0
1
2
3
4
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48

Stage-Area-Storage for Pond 8P: 2C

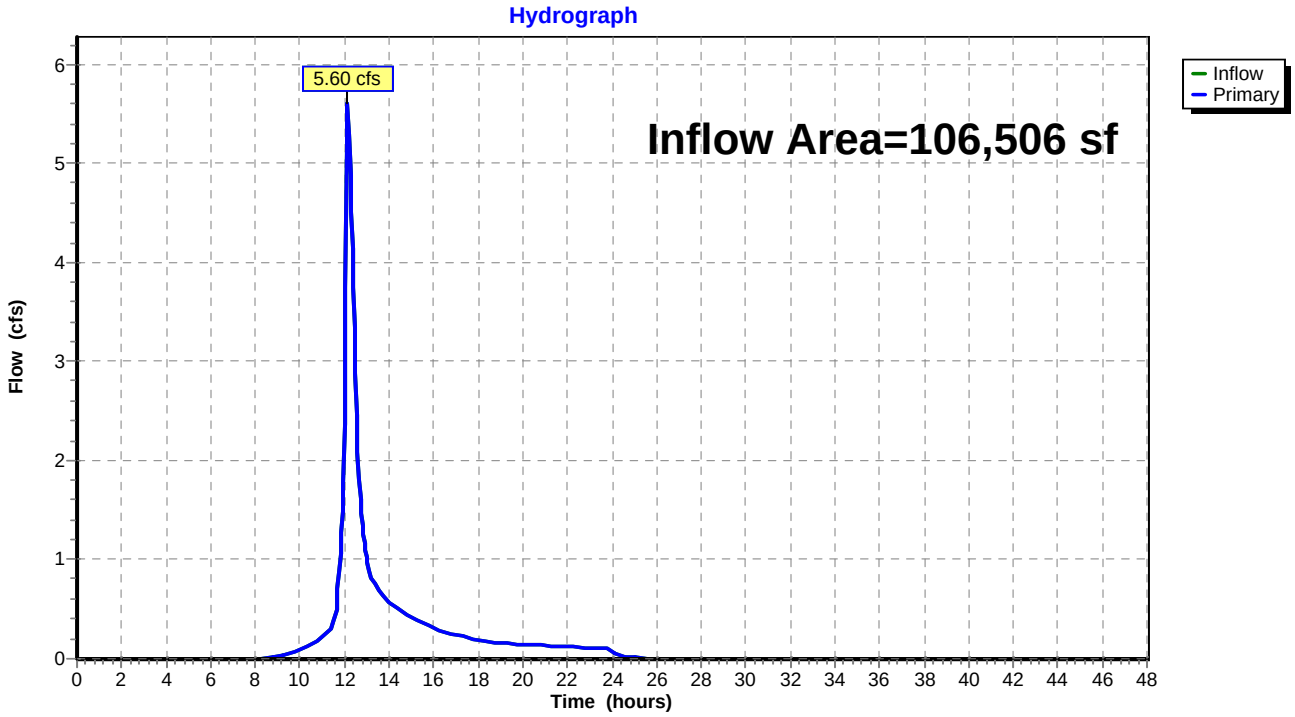
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
147.50	0	0
147.55	220	6
147.60	440	22
147.65	660	50
147.70	880	88
147.75	1,100	138
147.80	1,320	198
147.85	1,540	269
147.90	1,760	352
147.95	1,980	445
148.00	2,200	550
148.05	2,380	665
148.10	2,560	788
148.15	2,740	921
148.20	2,920	1,062
148.25	3,100	1,213
148.30	3,280	1,372
148.35	3,460	1,540
148.40	3,640	1,718
148.45	3,820	1,904
148.50	4,000	2,100
148.55	4,180	2,305
148.60	4,360	2,518
148.65	4,540	2,741
148.70	4,720	2,972
148.75	4,900	3,213
148.80	5,080	3,462
148.85	5,260	3,720
148.90	5,440	3,988
148.95	5,620	4,264
149.00	5,800	4,550
149.05	6,170	4,849
149.10	6,540	5,167
149.15	6,910	5,503
149.20	7,280	5,858
149.25	7,650	6,231
149.30	8,020	6,623
149.35	8,390	7,033
149.40	8,760	7,462
149.45	9,130	7,909
149.50	9,500	8,375
149.55	9,870	8,859
149.60	10,240	9,362
149.65	10,610	9,883
149.70	10,980	10,423
149.75	11,350	10,981
149.80	11,720	11,558
149.85	12,090	12,153
149.90	12,460	12,767
149.95	12,830	13,399
150.00	**13,200**	**14,050**

Summary for Link 4L: 2

Inflow Area = 106,506 sf, 26.32% Impervious, Inflow Depth = 2.72" for 10-YEAR event
Inflow = 5.60 cfs @ 12.15 hrs, Volume= 24,173 cf
Primary = 5.60 cfs @ 12.15 hrs, Volume= 24,173 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 4L: 2



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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: 1 Runoff Area=21,666 sf 28.16% Impervious Runoff Depth=5.86"
Flow Length=175' Tc=8.2 min CN=85 Runoff=3.03 cfs 10,574 cf

Subcatchment 2S: 2A Runoff Area=8,903 sf 69.39% Impervious Runoff Depth=6.68"
Tc=5.0 min CN=92 Runoff=1.49 cfs 4,954 cf

Subcatchment 5S: 2B Runoff Area=4,580 sf 74.63% Impervious Runoff Depth=6.80"
Tc=5.0 min CN=93 Runoff=0.77 cfs 2,594 cf

Subcatchment 7S: 2C Runoff Area=45,561 sf 40.48% Impervious Runoff Depth=6.09"
Tc=8.0 min CN=87 Runoff=6.60 cfs 23,122 cf

Subcatchment 9S: 2D Runoff Area=47,462 sf 0.00% Impervious Runoff Depth=5.16"
Tc=8.0 min CN=79 Runoff=6.02 cfs 20,426 cf

Pond 3P: 2A Peak Elev=150.88' Storage=804 cf Inflow=1.49 cfs 4,954 cf
Outflow=0.78 cfs 4,756 cf

Pond 6P: 2B Peak Elev=149.84' Storage=126 cf Inflow=0.77 cfs 2,594 cf
Outflow=0.76 cfs 2,527 cf

Pond 8P: 2C Peak Elev=149.32' Storage=6,813 cf Inflow=6.60 cfs 23,122 cf
Outflow=3.65 cfs 19,909 cf

Link 4L: 2 Inflow=10.79 cfs 47,618 cf
Primary=10.79 cfs 47,618 cf

Total Runoff Area = 128,172 sf Runoff Volume = 61,670 cf Average Runoff Depth = 5.77"
73.37% Pervious = 94,034 sf 26.63% Impervious = 34,138 sf

Summary for Subcatchment 1S: 1

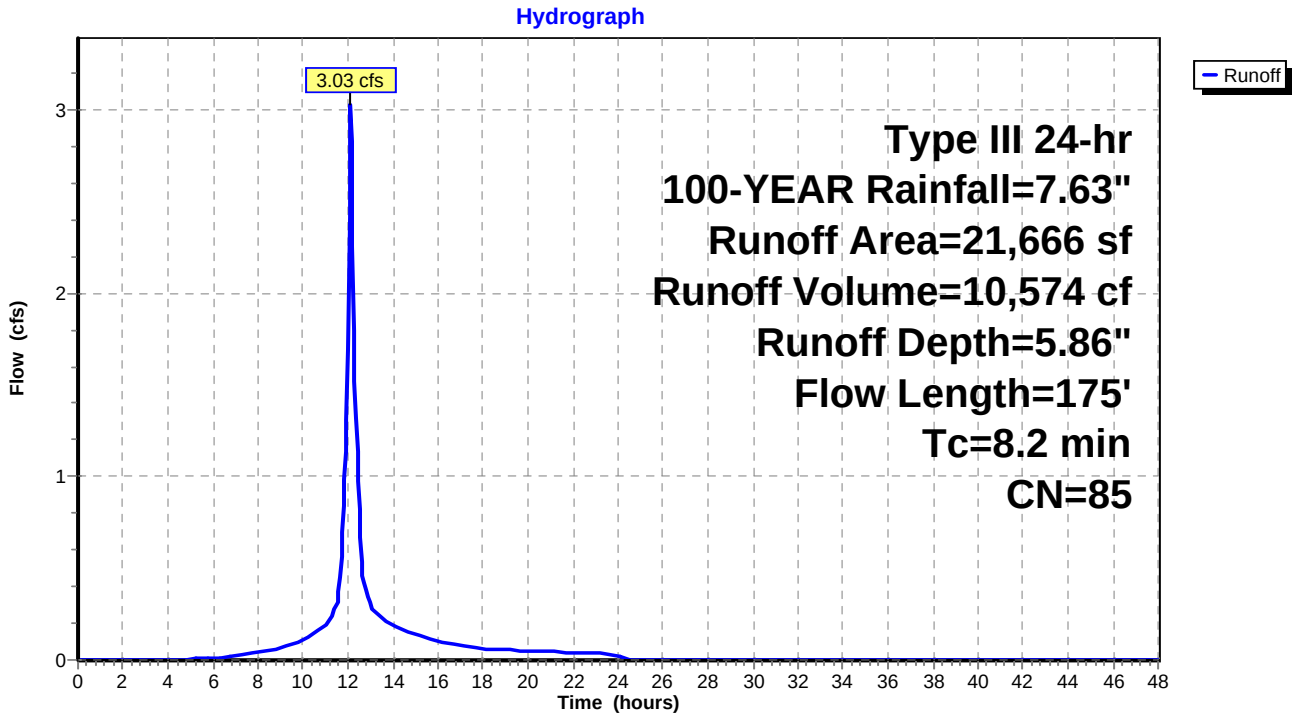
Runoff = 3.03 cfs @ 12.11 hrs, Volume= 10,574 cf, Depth= 5.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YEAR Rainfall=7.63"

Area (sf)	CN	Description
3,304	98	Roofs, HSG D
2,797	98	Paved parking, HSG D
1,810	77	Woods, Good, HSG D
13,755	80	>75% Grass cover, Good, HSG D
21,666	85	Weighted Average
15,565		71.84% Pervious Area
6,101		28.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.0500	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.02"
2.4	125	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
8.2	175	Total			

Subcatchment 1S: 1



Summary for Subcatchment 2S: 2A

[49] Hint: Tc<2dt may require smaller dt

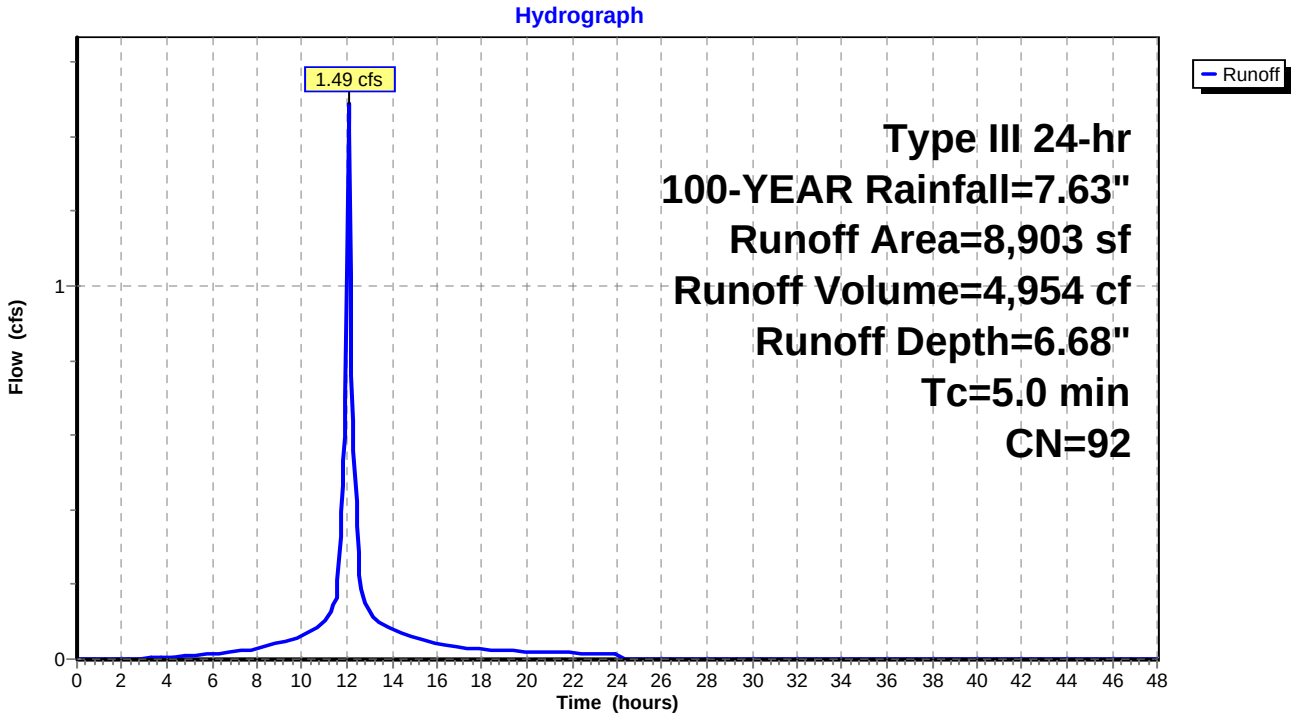
Runoff = 1.49 cfs @ 12.07 hrs, Volume= 4,954 cf, Depth= 6.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YEAR Rainfall=7.63"

Area (sf)	CN	Description
3,328	98	Roofs, HSG D
2,850	98	Paved parking, HSG D
2,725	80	>75% Grass cover, Good, HSG D
8,903	92	Weighted Average
2,725		30.61% Pervious Area
6,178		69.39% Impervious Area

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

Subcatchment 2S: 2A



Summary for Subcatchment 5S: 2B

[49] Hint: Tc<2dt may require smaller dt

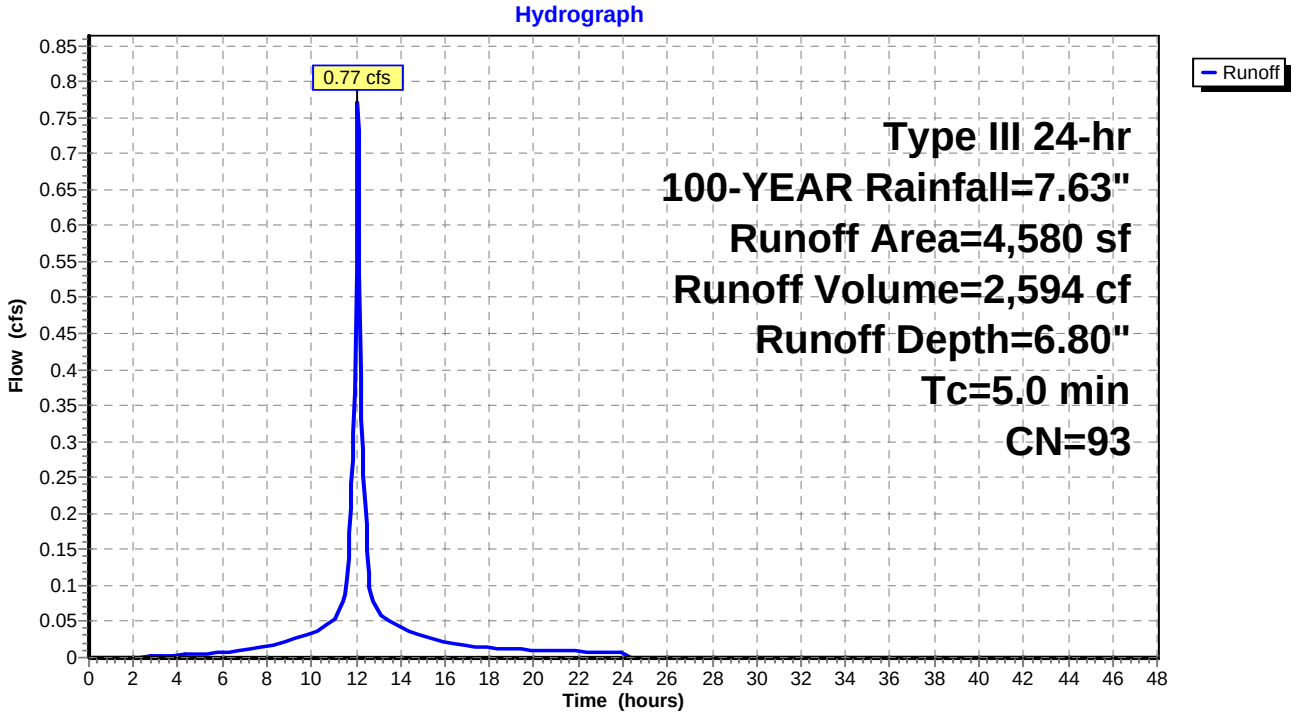
Runoff = 0.77 cfs @ 12.07 hrs, Volume= 2,594 cf, Depth= 6.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YEAR Rainfall=7.63"

Area (sf)	CN	Description
3,418	98	Paved parking, HSG D
1,162	80	>75% Grass cover, Good, HSG D
4,580	93	Weighted Average
1,162		25.37% Pervious Area
3,418		74.63% Impervious Area

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

Subcatchment 5S: 2B



Summary for Subcatchment 7S: 2C

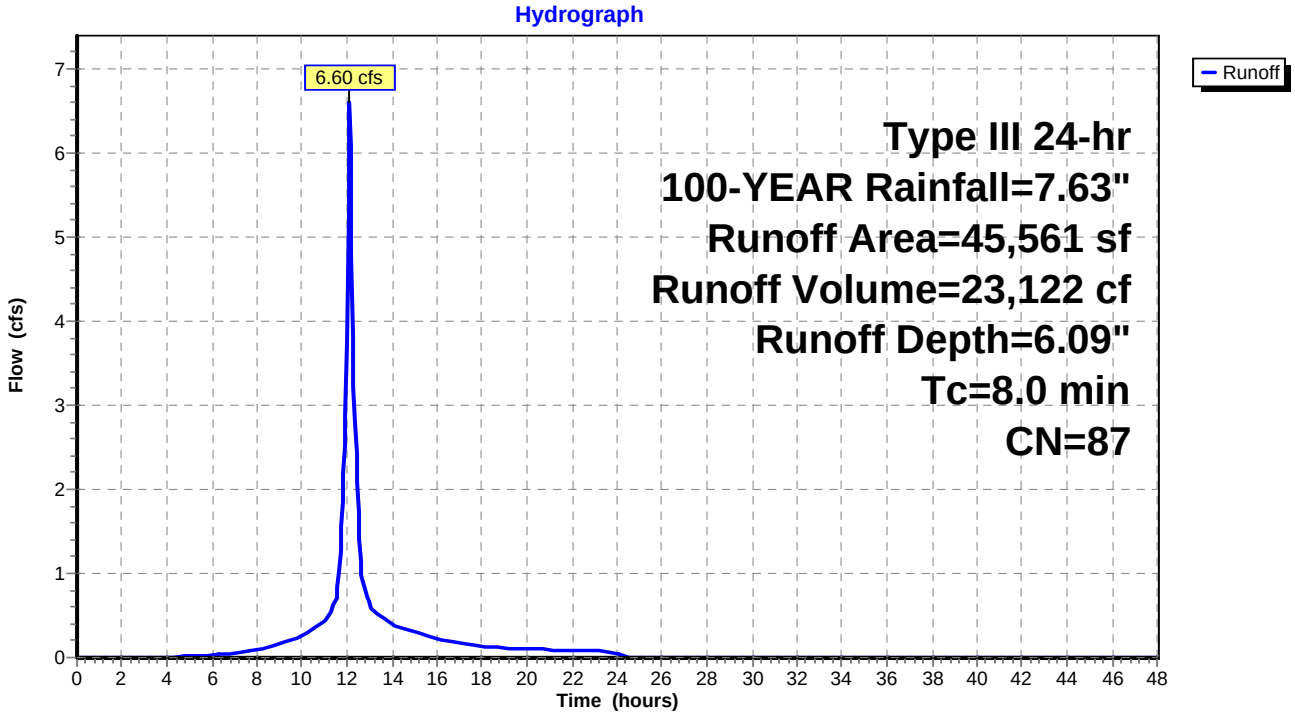
Runoff = 6.60 cfs @ 12.11 hrs, Volume= 23,122 cf, Depth= 6.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YEAR Rainfall=7.63"

Area (sf)	CN	Description
18,441	98	Paved parking, HSG D
27,120	80	>75% Grass cover, Good, HSG D
45,561	87	Weighted Average
27,120		59.52% Pervious Area
18,441		40.48% Impervious Area

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

Subcatchment 7S: 2C



Summary for Subcatchment 9S: 2D

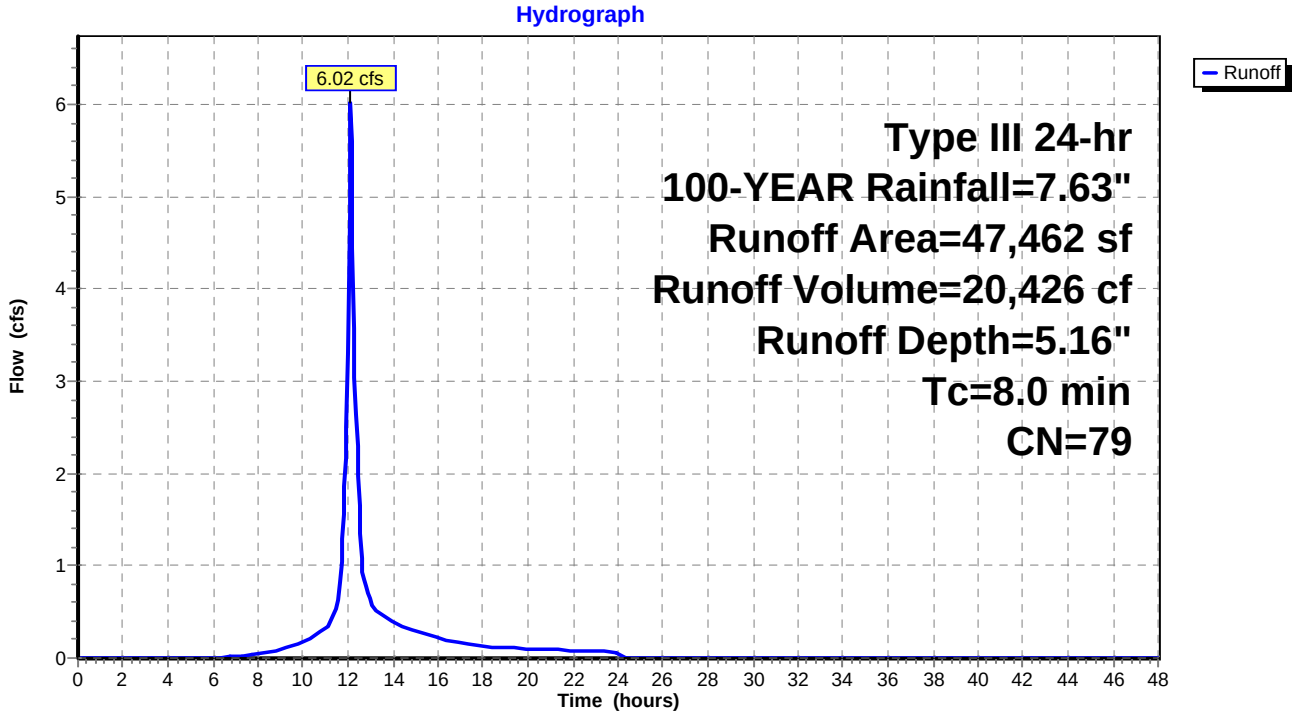
Runoff = 6.02 cfs @ 12.11 hrs, Volume= 20,426 cf, Depth= 5.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-YEAR Rainfall=7.63"

Area (sf)	CN	Description
8,561	77	Woods, Good, HSG D
38,901	80	>75% Grass cover, Good, HSG D
47,462	79	Weighted Average
47,462		100.00% Pervious Area

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

Subcatchment 9S: 2D



Summary for Pond 3P: 2A

Inflow Area = 8,903 sf, 69.39% Impervious, Inflow Depth = 6.68" for 100-YEAR event
Inflow = 1.49 cfs @ 12.07 hrs, Volume= 4,954 cf
Outflow = 0.78 cfs @ 12.20 hrs, Volume= 4,756 cf, Atten= 47%, Lag= 8.0 min
Primary = 0.78 cfs @ 12.20 hrs, Volume= 4,756 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 150.88' @ 12.20 hrs Surf.Area= 1,195 sf Storage= 804 cf

Plug-Flow detention time= 49.2 min calculated for 4,751 cf (96% of inflow)
Center-of-Mass det. time= 25.9 min (795.3 - 769.4)

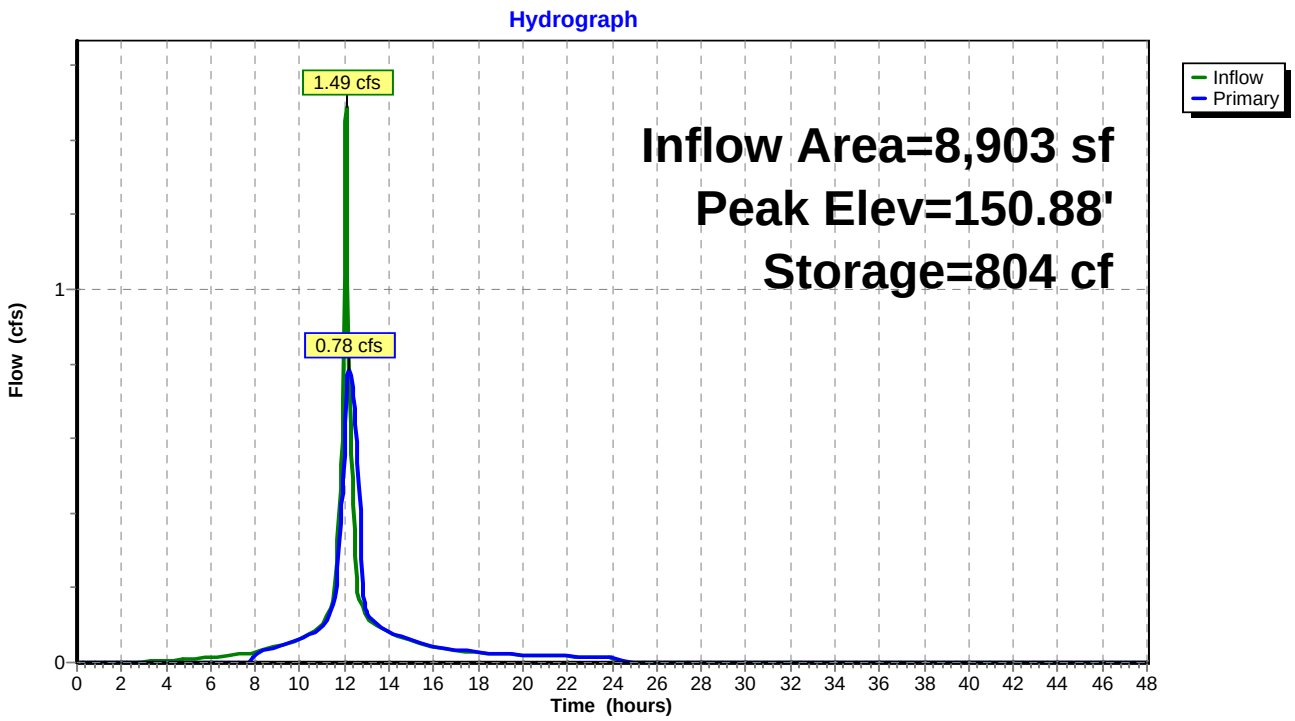
Volume	Invert	Avail.Storage	Storage Description
#1	149.50'	950 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
149.50	0	0	0
150.00	400	100	100
151.00	1,300	850	950

Device	Routing	Invert	Outlet Devices
#1	Primary	150.20'	**6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.78 cfs @ 12.20 hrs HW=150.88' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.78 cfs @ 3.98 fps)

Pond 3P: 2A


Hydrograph
1.49 cfs
0.78 cfs
Inflow Area=8,903 sf
Peak Elev=150.88'
Storage=804 cf
Inflow
Primary
Flow (cfs)
Time (hours)
0
1
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48

Stage-Area-Storage for Pond 3P: 2A

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
149.50	0	0
149.52	16	0
149.54	32	1
149.56	48	1
149.58	64	3
149.60	80	4
149.62	96	6
149.64	112	8
149.66	128	10
149.68	144	13
149.70	160	16
149.72	176	19
149.74	192	23
149.76	208	27
149.78	224	31
149.80	240	36
149.82	256	41
149.84	272	46
149.86	288	52
149.88	304	58
149.90	320	64
149.92	336	71
149.94	352	77
149.96	368	85
149.98	384	92
150.00	400	100
150.02	418	108
150.04	436	117
150.06	454	126
150.08	472	135
150.10	490	144
150.12	508	154
150.14	526	165
150.16	544	176
150.18	562	187
150.20	580	198
150.22	598	210
150.24	616	222
150.26	634	234
150.28	652	247
150.30	670	261
150.32	688	274
150.34	706	288
150.36	724	302
150.38	742	317
150.40	760	332
150.42	778	347
150.44	796	363
150.46	814	379
150.48	832	396
150.50	850	413
150.52	868	430
150.54	886	447
150.56	904	465
150.58	922	483
150.60	940	502
150.62	958	521
150.64	976	540
150.66	994	560
150.68	1,012	580
150.70	1,030	600
150.72	1,048	621
150.74	1,066	642
150.76	1,084	664
150.78	1,102	686
150.80	1,120	708
150.82	1,138	731
150.84	1,156	754
150.86	1,174	777
150.88	1,192	800
150.90	1,210	825
150.92	1,228	849
150.94	1,246	874
150.96	1,264	899
150.98	1,282	924
151.00	**1,300**	**950**

Summary for Pond 6P: 2B

Inflow Area = 4,580 sf, 74.63% Impervious, Inflow Depth = 6.80" for 100-YEAR event
Inflow = 0.77 cfs @ 12.07 hrs, Volume= 2,594 cf
Outflow = 0.76 cfs @ 12.09 hrs, Volume= 2,527 cf, Atten= 2%, Lag= 1.3 min
Primary = 0.76 cfs @ 12.09 hrs, Volume= 2,527 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 149.84' @ 12.09 hrs Surf.Area= 733 sf Storage= 126 cf

Plug-Flow detention time= 30.6 min calculated for 2,527 cf (97% of inflow)
Center-of-Mass det. time= 14.7 min (780.3 - 765.6)

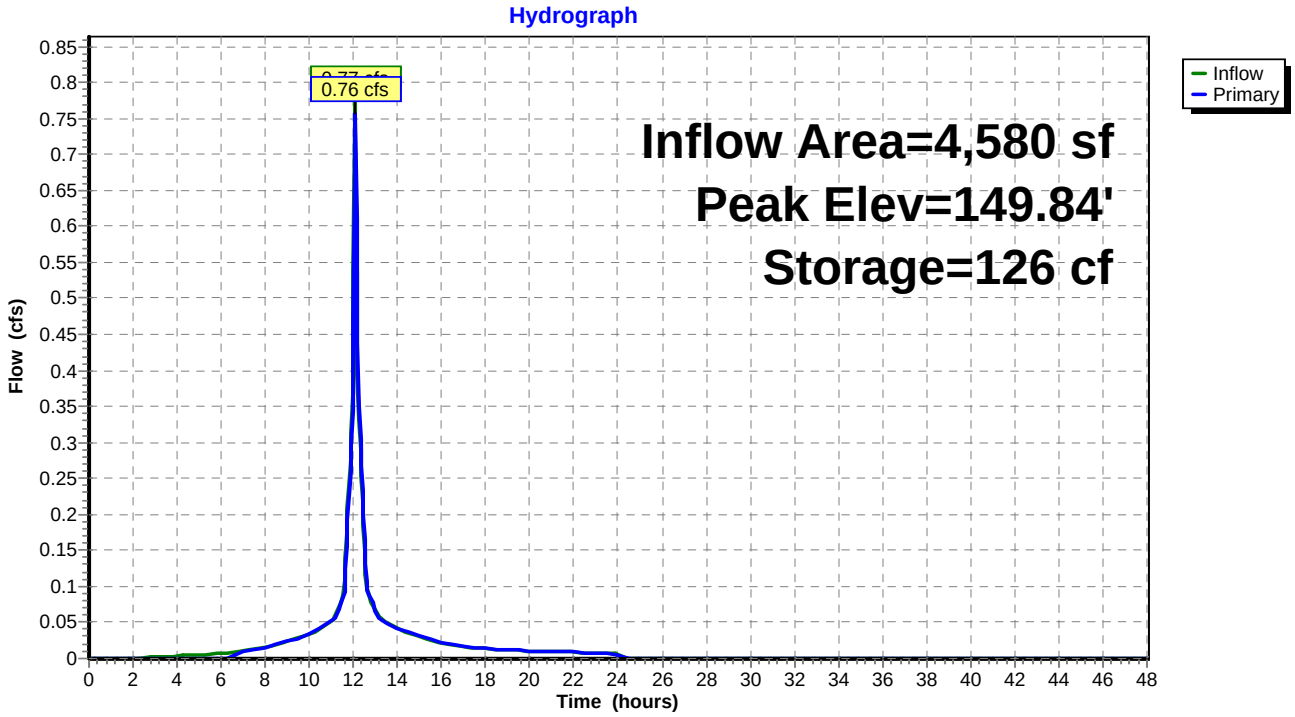
Volume	Invert	Avail.Storage	Storage Description
#1	149.50'	266 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
149.50	0	0	0
150.00	1,065	266	266

Device	Routing	Invert	Outlet Devices
#1	Primary	149.75'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.74 cfs @ 12.09 hrs HW=149.84' (Free Discharge)
↑—**1=Orifice/Grate** (Weir Controls 0.74 cfs @ 1.00 fps)

Pond 6P: 2B


Hydrograph
0.76 cfs
Inflow Area=4,580 sf
Peak Elev=149.84'
Storage=126 cf
Inflow
Primary
Flow (cfs)
Time (hours)

Stage-Area-Storage for Pond 6P: 2B

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
149.50	0	0
149.51	21	0
149.52	43	0
149.53	64	1
149.54	85	2
149.55	107	3
149.56	128	4
149.57	149	5
149.58	170	7
149.59	192	9
149.60	213	11
149.61	234	13
149.62	256	15
149.63	277	18
149.64	298	21
149.65	320	24
149.66	341	27
149.67	362	31
149.68	383	35
149.69	405	38
149.70	426	43
149.71	447	47
149.72	469	52
149.73	490	56
149.74	511	61
149.75	533	67
149.76	554	72
149.77	575	78
149.78	596	83
149.79	618	90
149.80	639	96
149.81	660	102
149.82	682	109
149.83	703	116
149.84	724	123
149.85	745	130
149.86	767	138
149.87	788	146
149.88	809	154
149.89	831	162
149.90	852	170
149.91	873	179
149.92	895	188
149.93	916	197
149.94	937	206
149.95	958	216
149.96	980	225
149.97	1,001	235
149.98	1,022	245
149.99	1,044	256
150.00	**1,065**	**266**

Summary for Pond 8P: 2C

Inflow Area = 45,561 sf, 40.48% Impervious, Inflow Depth = 6.09" for 100-YEAR event
Inflow = 6.60 cfs @ 12.11 hrs, Volume= 23,122 cf
Outflow = 3.65 cfs @ 12.27 hrs, Volume= 19,909 cf, Atten= 45%, Lag= 9.4 min
Primary = 3.65 cfs @ 12.27 hrs, Volume= 19,909 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 149.32' @ 12.27 hrs Surf.Area= 8,193 sf Storage= 6,813 cf

Plug-Flow detention time= 115.9 min calculated for 19,909 cf (86% of inflow)
Center-of-Mass det. time= 54.9 min (843.2 - 788.4)

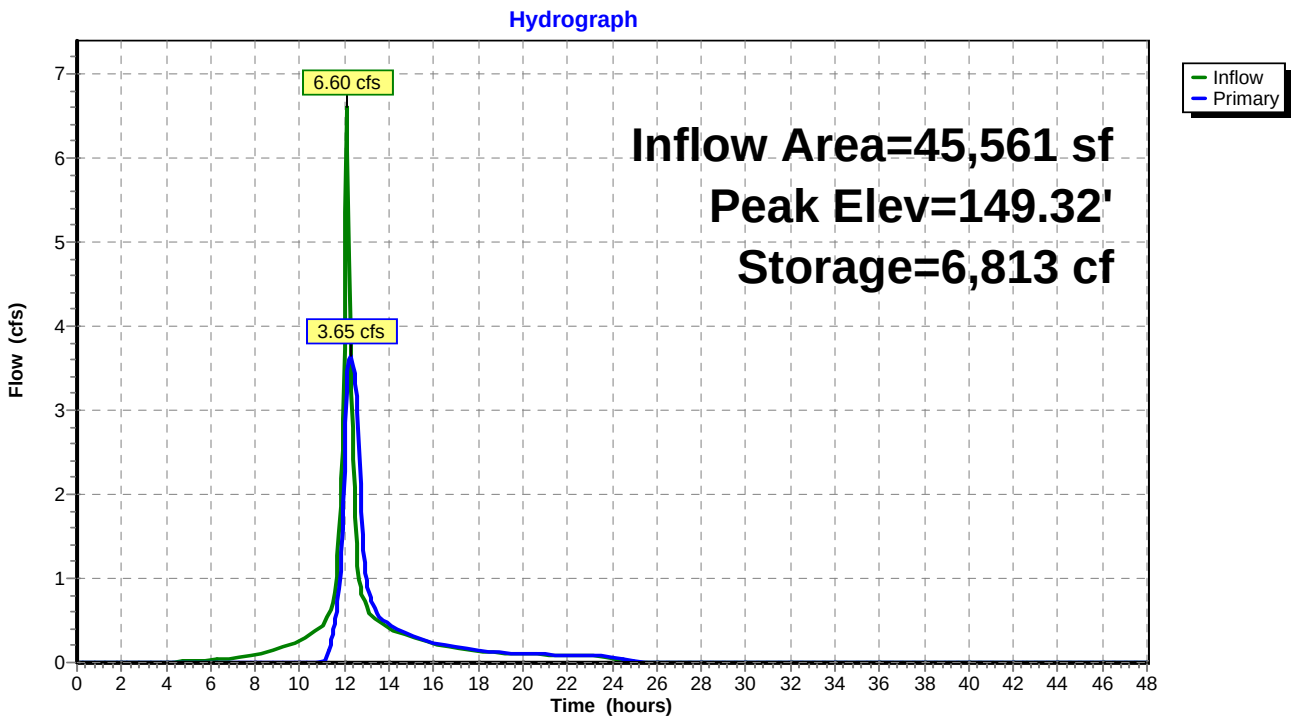
Volume	Invert	Avail.Storage	Storage Description
#1	147.50'	14,050 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
147.50	0	0	0
148.00	2,200	550	550
149.00	5,800	4,000	4,550
150.00	13,200	9,500	14,050

Device	Routing	Invert	Outlet Devices
#1	Primary	148.75'	**12.0" x 12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.64 cfs @ 12.27 hrs HW=149.32' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 3.64 cfs @ 3.64 fps)

Pond 8P: 2C


Hydrograph
6.60 cfs
3.65 cfs
Inflow Area=45,561 sf
Peak Elev=149.32'
Storage=6,813 cf
Inflow
Primary
Flow (cfs)
Time (hours)
0
1
2
3
4
5
6
7
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48

Stage-Area-Storage for Pond 8P: 2C

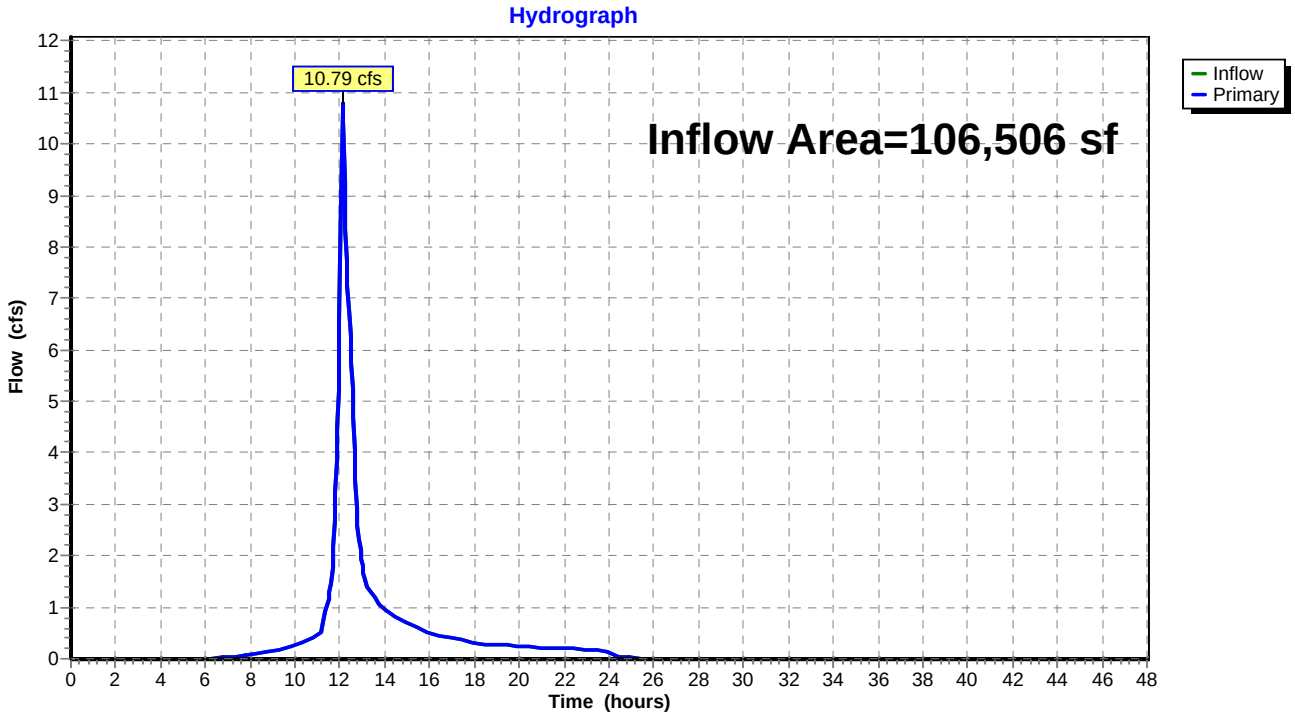
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
147.50	0	0
147.55	220	6
147.60	440	22
147.65	660	50
147.70	880	88
147.75	1,100	138
147.80	1,320	198
147.85	1,540	269
147.90	1,760	352
147.95	1,980	445
148.00	2,200	550
148.05	2,380	665
148.10	2,560	788
148.15	2,740	921
148.20	2,920	1,062
148.25	3,100	1,213
148.30	3,280	1,372
148.35	3,460	1,540
148.40	3,640	1,718
148.45	3,820	1,904
148.50	4,000	2,100
148.55	4,180	2,305
148.60	4,360	2,518
148.65	4,540	2,741
148.70	4,720	2,972
148.75	4,900	3,213
148.80	5,080	3,462
148.85	5,260	3,720
148.90	5,440	3,988
148.95	5,620	4,264
149.00	5,800	4,550
149.05	6,170	4,849
149.10	6,540	5,167
149.15	6,910	5,503
149.20	7,280	5,858
149.25	7,650	6,231
149.30	8,020	6,623
149.35	8,390	7,033
149.40	8,760	7,462
149.45	9,130	7,909
149.50	9,500	8,375
149.55	9,870	8,859
149.60	10,240	9,362
149.65	10,610	9,883
149.70	10,980	10,423
149.75	11,350	10,981
149.80	11,720	11,558
149.85	12,090	12,153
149.90	12,460	12,767
149.95	12,830	13,399
150.00	**13,200**	**14,050**

Summary for Link 4L: 2

Inflow Area = 106,506 sf, 26.32% Impervious, Inflow Depth = 5.37" for 100-YEAR event
Inflow = 10.79 cfs @ 12.12 hrs, Volume= 47,618 cf
Primary = 10.79 cfs @ 12.12 hrs, Volume= 47,618 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 4L: 2



ATTACHMENT G

LONG TERM POLLUTION PREVENTION PLAN (LTPPP)

OPERATION AND MAINTENANCE PLAN (O&M PLAN) WITH INSPECTION LOG

SAMPLE ILLICIT DISCHARGE STATEMENT

Long-Term Pollution Prevention Plan

Project: GTI Facility at 169 Meadow St, Amherst, MA 01002

System Owner, via Lease:
GTI Massachusetts NP
169 Meadow St
Amherst, MA 01002
attn: Pete Kadens

Property Owner:
Joseph J. Czajkowski
86 Comins Rd
Hadley, MA 01035

Party Responsible for O&M of the Stormwater System:
GTI Massachusetts NP
169 Meadow St
Amherst, MA 01002
attn: Pete Kadens

Good Housekeeping:
Good housekeeping practices, outlined below, will be used on site:
An effort will be made to store only enough products that will be needed.
All materials stored on site will be stored neatly, in their appropriate containers, and, if possible, under a roof or other enclosure.
Products will be kept in their original containers with the original manufacturer's label.
Substances will not be mixed with one another unless recommended by the manufacturer.
Whenever possible, all of a product will be used before disposing the container.
Manufacturer's recommendations for proper use and disposal will be followed.

Routine Inspections:
Routine inspections and procedures are outlined in the Stormwater Operation & Maintenance Plan.

Waste Materials:
All waste materials will be collected and stored in a metal dumpster. All trash and debris from the site will be deposited in the dumpsters. Dumpsters will be emptied weekly or more often if necessary, and the trash will be hauled off-site to an approved waste facility. No construction waste materials will be buried on site. All personnel will be instructed regarding the correct procedures for waste disposal. Individual(s) managing daily operations will be responsible for assuring that these procedures are followed.

Hazardous Waste:
All hazardous waste materials will be disposed of in the manner specified by local or state regulation or by the manufacturer. Site personnel will be instructed in these practices and the individual managing day-to-day operations will be responsible for implementing these practices.

Hazardous Materials:

These practices will be used to reduce the risks associated with hazardous materials.
Products will be kept in original containers unless they are not resealable.
Original labels and material safety data sheets (MSDS) will be retained; they contain important product information.
Manufacturers' and local and/or state recommended methods for proper disposal of excess materials will be followed.

Spill Control Practices:

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be used for spill prevention and cleanup:

Manufacturers' recommended methods for spill cleanup will be clearly posted and site personnel will be familiar with the procedures and location of the information and cleanup supplies.

Materials and equipment necessary for spill cleanup will be kept in the material storage area on site. Equipment and materials will 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.

All spills will be cleaned up immediately upon discovery.

Spill areas will be kept well ventilated, and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.

Spills of toxic or hazardous material will be reported to the appropriate state or local government agency, regardless of the size of the spill.

If possible the spill prevention plan will be adjusted to include measures to prevent this type of spill from re-occurring and how to clean up the spill if there is another one. A description of the spill, what caused it, and the cleanup measures will also be included.

Post-Construction Stormwater Operation and Maintenance Plan

Project: GTI Facility at 169 Meadow St, Amherst, MA 01002

System Owner, via Lease:
GTI Massachusetts NP
169 Meadow St
Amherst, MA 01002
attn: Pete Kadens

Property Owner:
Joseph J. Czajkowski
86 Comins Rd
Hadley, MA 01035

Party Responsible for O&M of the Stormwater System:
GTI Massachusetts NP
169 Meadow St
Amherst, MA 01002
attn: Pete Kadens

Estimated Annual Budget: $2,500

The owner shall engage a licensed contractor qualified to perform the necessary maintenance to the stormwater system. The contractor shall perform the necessary maintenance to remove sediment and/or debris from the stormwater system. The sediment and debris shall be properly disposed of. The owner shall inspect the stormwater management components as described below and after major storm events (a major storm event is defined as a storm that is equal to or greater than the 2 year, 24 hour storm event- approximately 3 inches of rain in a 24-hour period).

Drainage System

All components of the drainage system shall be inspected as specified below or immediately after major storm events and upon evidence of malfunction. The owner shall keep the stormwater system in good working condition at all times.

Inspection and maintenance procedures are described below:

Stormwater Basins

All areas in the stormwater basin devoid of vegetation or found to be eroding shall be immediately repaired. Repairs shall include replacement of eroded soils, re-establishment and protection of vegetative cover or stone cover, and immediate stabilization with erosion control measures to control erosion until stabilization occurs.

Items to check during inspection: differential settlement, cracking, erosion, leakage in the embankment, condition of rip-rap, sediment accumulation, and health of the turf.

At least twice per year, mow the side slopes of the basin. When mowing grasses keep the grass height no greater than 6 inches. Set mower blade no lower than 3 to 4 inches. Remove grass clippings and accumulated organic

matter to prevent an impervious organic mat from forming. Use deep tilling to break up clogged surfaces, and revegetate immediately.

Sediment shall be removed from the stormwater basin areas when it reaches a thickness of 4 inches and/or as necessary for the proper functioning of the system. Remove trash and debris. All material removed from stormwater basin shall be disposed in accordance with applicable local, state, and federal guidelines and regulations. Regular maintenance includes mowing, fertilizing, liming, watering, pruning, and weed and pest control. Avoid disposal of snow within basin area.

Outlet Control Structures

The outlet control risers and grates shall be inspected quarterly at a minimum, and shall be cleaned at least four times per year, as needed, or whenever the depth of deposits is greater than half the depth of the basin.

All material removed shall be disposed of in accordance with applicable local, state, and federal guidelines and regulations.

Catch Basins

All catch basins shall be inspected quarterly, at a minimum. They shall be cleaned at least four times per year, as needed, or whenever the depth of deposits is greater than or equal to one half the depth from the sump invert to the lowest culvert invert in the basin. All material removed from catch basins shall be disposed of in accordance with applicable local, state, and federal guidelines and regulations. Avoid disposal of snow on top of catch basins. Clear ice or other debris from the grate immediately following observation.

Sweeping

Paved areas shall be swept at least two times per year, Spring and Fall. If needed an additional sweeping can be performed after fall leaf debris has ceased. Routinely pick up and remove litter from the paved areas and perimeter areas in addition to regular pavement sweeping. All materials swept from paved areas shall be disposed of in accordance with applicable local, state, and federal guidelines and regulations.

Illicit Discharge

There shall be no illicit discharge to the stormwater management systems, on the entire site, including wastewater discharges and discharges of stormwater contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, oil or grease. A sample illicit discharge statement is included to be finalized and executed by the responsible party.

Snow Disposal

Disposal of snow shall comply with Mass DEP Snow Disposal Guidance, Guideline No. BRPGO 1-01. The access road shall be cleared of snow when the depth reaches 4-inches.

Record Keeping and Annual Reports

Records shall be maintained by the owner at their offices as described above and shall document all maintenance to the stormwater management system and shall bear the signature of the individual supervising the work.

OPERATION AND MAINTENANCE LOG

GTI Facility at 169 Meadow St, Amherst, MA 01002

DATES: _____ **NEE PROJECT#: 16-4946**

DATE	TIME(S)	INSP.	REMARKS

ILLICIT DISCHARGE COMPLIANCE STATEMENT

By Project Developer/Contractor/Owner: _____

Project Site: _____
Location: _____
Property ID: _____

Illicit discharges to the stormwater management system are discharges that are not entirely comprised of stormwater. Notwithstanding the foregoing, an illicit discharge does not include discharges from the following activities or facilities: firefighting, water line flushing, landscape irrigation, uncontaminated groundwater, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing and water used to clean residential buildings without detergents.

Proponents of projects within Wetlands jurisdiction must demonstrate compliance with this requirement by submitting to the issuing authority an Illicit Discharge Compliance Statement verifying that no illicit discharges exist on the site and by including in the pollution prevention plan measures to prevent illicit discharges to the stormwater management system, including wastewater discharges and discharges of stormwater contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, oil, or grease.

As Developer, Contractor and/or and Owner of the above referenced site, I state that

1. No illicit discharges to stormwater systems are known to occur on this site.
2. No illicit discharges are proposed nor planned during site development; the Construction Site Waste Management procedures of the Construction Site - Stormwater Pollution Prevention Plan (SWPPP) are intended to prevent illicit discharges.
3. No illicit discharges are proposed nor planned for the developed site; the procedures outlined in the Long Term Pollution Prevention Plan are intended to prevent illicit discharges.

As the Developer, Contractor, and/or Owner of the Site, I hereby acknowledge and state that the procedures set forth above to prevent illicit discharges will be followed and that this site will have no illicit discharges to the stormwater system, surface waters, and wetland resource areas.

Name of Applicant: _____
{provide full name and title: Developer, Contractor, Owner}

Signature of Applicant: _____ Date: _____

Contact Address: _____

_____

Telephone: _____

FORM TO BE FILLED OUT BY ANY FUTURE DEVELOPERS, CONTRACTORS, AND SITE OWNERS FOR SUBMITTAL TO THE CONSERVATION COMMISSION.