NOTICE OF INTENT

for

Veterans Field Parking Lot Rehabilitation & Restroom Facility

April 2024

PREPARED BY:

WAKEFIELD DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION
1 LAFAYETTE STREET, WAKEFIELD, MA 01880

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WPA Form 3
Notice of Intent Application

Massachusetts Department of Environmental Protection

eDEP Transaction Copy

Here is the file you requested for your records.

To retain a copy of this file you must save and/or print.

Username:	**NCHIN**
Transaction ID:	**1669334**
Document:	**WPA Form 3 - NOI**
Size of File:	**273.52K**
Status of Transaction:	**Submitted**
Date and Time Created:	**4/5/2024:10:12:37 AM**

Note: This file only includes forms that were part of your transaction as of the date and time indicated above. If you need a more current copy of your transaction, return to eDEP and select to “Download a Copy” from the Current Submittals page.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 3 - Notice of Intent
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
MassDEP File #:
eDEP Transaction #:1669334
City/Town:WAKEFIELD

A.General Information

1. Project Location:

a. Street Address	468 NOTH AVENUE		
b. City/Town	WAKEFIELD	c. Zip Code	01880
d. Latitude	42.50670N	e. Longitude	71.07857W
f. Map/Plat #	11-046-011	g.Parcel/Lot #	11-045-010

2. Applicant:

☐ Individual ☑ Organization

a. First Name	STEPHEN		b.Last Name	MAIO	
c. Organization	TOWN OF WAKEFIELD				
d. Mailing Address	1 LAFAYETTE STREET				
e. City/Town	WAKEFIELD	f. State	MA	g. Zip Code	01880
h. Phone Number	781-246-6308	i. Fax		j. Email	

3.Property Owner:

☐ more than one owner

a. First Name			b. Last Name		
c. Organization	TOWN OF WAKEFIELD				
d. Mailing Address	1 LAFAYETTE STREET				
e. City/Town	WAKEFIELD	f.State	MA	g. Zip Code	01880
h. Phone Number	781-246-6308	i. Fax		j.Email	wrenault@wakefield.ma.us

4.Representative:

a. First Name	WILLIAM		b. Last Name	RENAULT	
c. Organization	WAKEFIELD DPW - ENGINEERING				
d. Mailing Address	1 LAFAYETTE STREET				
e. City/Town	WAKEFIELD	f. State	MA	g. Zip Code	01880
h.Phone Number	781-246-6308	i.Fax		j.Email	wrenault@wakefield.ma.us

5.Total WPA Fee Paid (Automatically inserted from NOI Wetland Fee Transmittal Form):

a.Total Fee Paid	0.00	b.State Fee Paid	0.00	c.City/Town Fee Paid	0.00

6.General Project Description:

7a.Project Type:

1.☐ Single Family Home	2. ☐ Residential Subdivision
3.☐ Limited Project Driveway Crossing	4. ☐ Commercial/Industrial
5.☐ Dock/Pier	6. ☐ Utilities
7.☐ Coastal Engineering Structure	8. ☐ Agriculture (eg., cranberries, forestry)
9.☑ Transportation	10. ☐ Other

7b.Is any portion of the proposed activity eligible to be treated as a limited project subject to 310 CMR 10.24 (coastal) or 310 CMR 10.53 (inland)?

1. ☐ Yes ☑ No If yes, describe which limited project applies to this project:

2. Limited Project

8.Property recorded at the Registry of Deeds for:

a.County:	b.Certificate:	c.Book:	d.Page:
SOUTHERN MIDDLESEX		5412	154

B. Buffer Zone & Resource Area Impacts (temporary & permanent)

1.Buffer Zone & Resource Area Impacts (temporary & permanent):

☐ This is a Buffer Zone only project - Check if the project is located only in the Buffer Zone of a Bordering Vegetated Wetland, Inland Bank, or Coastal Resource Area.

2.Inland Resource Areas: (See 310 CMR 10.54 - 10.58, if not applicable, go to Section B.3. Coastal Resource Areas)

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☑ Bank	10 1. linear feet	10 2. linear feet
b. ☐ Bordering Vegetated Wetland	1. square feet	2. square feet
c. ☑ Land under Waterbodies and Waterways	774 1. Square feet	774 2. square feet
	3. cubic yards dredged	
d. ☑ Bordering Land Subject to Flooding	5082 1. square feet	5082 2. square feet
	3. cubic feet of flood storage lost	4. cubic feet replaced
e. ☐ Isolated Land Subject to Flooding	1. square feet	
	2. cubic feet of flood storage lost	3. cubic feet replaced

f. ☐ Riverfront Area

1. Name of Waterway (if any)

2. Width of Riverfront Area (check one)
☐ 25 ft. - Designated Densely Developed Areas only
☐ 100 ft. - New agricultural projects only
☐ 200 ft. - All other projects

3. Total area of Riverfront Area on the site of the proposed project

square feet

4. Proposed Alteration of the Riverfront Area:

a. total square feet | b. square feet within 100 ft. | c. square feet between 100 ft. and 200 ft.

5. Has an alternatives analysis been done and is it attached to this NOI? ☐ Yes ☐ No

6. Was the lot where the activity is proposed created prior to August 1, 1996? ☐ Yes ☐ No

3.Coastal Resource Areas: (See 310 CMR 10.25 - 10.35)

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. ☐ Designated Port Areas	Indicate size under	Land under the ocean below,
b. ☐ Land Under the Ocean	1. square feet 2. cubic yards dredged	
c. ☐ Barrier Beaches	Indicate size under Coastal Beaches and/or Coatstal Dunes, below	
d. ☐ Coastal Beaches	1. square feet	2. cubic yards beach nourishment
e. ☐ Coastal Dunes	1. square feet	2. cubic yards dune nourishment
f. ☐ Coastal Banks	1. linear feet	
g. ☐ Rocky Intertidal Shores	1. square feet	
h. ☐ Salt Marshes	1. square feet	2. sq ft restoration, rehab, crea.
i. ☐ Land Under Salt Ponds	1. square feet	
	2. cubic yards dredged	
j. ☐ Land Containing Shellfish	1. square feet	
k. ☐ Fish Runs	Indicate size under Coastal Banks, Inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above	
	1. cubic yards dredged	
l. ☐ Land Subject to Coastal Storm Flowage	1. square feet	

4.Restoration/Enhancement

☐ Restoration/Replacement

If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.2.b or B.3.h above, please entered the additional amount here.

a. square feet of BVW b. square feet of Salt Marsh

5.Projects Involves Stream Crossings

☐ Project Involves Streams Crossings

If the project involves Stream Crossings, please enter the number of new stream crossings/number of replacement stream crossings.

a. number of new stream crossings b. number of replacement stream crossings

C. Other Applicable Standards and Requirements

Streamlined Massachusetts Endangered Species Act/Wetlands Protection Act Review

1. Is any portion of the proposed project located in **Estimated Habitat of Rare Wildlife** as indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage of Endangered Species program (NHESP)?

a. ☐ Yes ☑ No

If yes, include proof of mailing or hand delivery of NOI to:
Natural Heritage and Endangered Species
Program
Division of Fisheries and Wildlife
1 Rabbit Hill Road
Westborough, MA 01581

b. Date of map:FROM MAP VIEWER

If yes, the project is also subject to Massachusetts Endangered Species Act (MESA) review (321 CMR 10.18)....

c. Submit Supplemental Information for Endangered Species Review * (Check boxes as they apply)

1.☐ Percentage/acreage of property to be altered:

(a) within Wetland Resource Area percentage/acreage

(b) outside Resource Area percentage/acreage

2.☐ Assessor's Map or right-of-way plan of site

3.☐ Project plans for entire project site, including wetland resource areas and areas outside of wetland jurisdiction, showing existing and proposed conditions, existing and proposed tree/vegetation clearing line, and clearly demarcated limits of work **

a.☐ Project description (including description of impacts outside of wetland resource area & buffer zone)

b.☐ Photographs representative of the site

c.☐ MESA filing fee (fee information available at: http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/regulatory-review/mass-endangered-species-act-mesa/mesa-fee-schedule.html)
Make check payable to "Natural Heritage & Endangered Species Fund" and **mail to NHESP** at above address

*Projects altering **10 or more acres** of land, also submit:*

d.☐ Vegetation cover type map of site

e.☐ Project plans showing Priority & Estimated Habitat boundaries

d. OR Check One of the following

1.☐ Project is exempt from MESA review. Attach applicant letter indicating which MESA exemption applies. (See 321 CMR 10.14, http://www.mass.gov/eea/agencies/dfg/dfw/laws-regulations/cmr/321-cmr-1000-massachusetts-endangered-species-act.html#10.14; the NOI must still be sent to NHESP if the project is within estimated habitat pursuant to 310 CMR 10.37 and 10.59.)

2.☐ Separate MESA review ongoing.

a. NHESP Tracking Number

b. Date submitted to NHESP

3.☐ Separate MESA review completed.
Include copy of NHESP "no Take" determination or valid Conservation & Management Permit with approved plan.

* Some projects **not** in Estimated Habitat may be located in Priority Habitat, and require NHESP review...

2. For coastal projects only, is any portion of the proposed project located below the mean high waterline or in a fish run?
   a. ☑ Not applicable - project is in inland resource area only
   b. ☐ Yes ☐ No

   If yes, include proof of mailing or hand delivery of NOI to either:

   South Shore - Cohasset to Rhode Island, and the Cape & Islands:

   Division of Marine Fisheries -
   Southeast Marine Fisheries Station
   Attn: Environmental Reviewer
   836 S. Rodney French Blvd
   New Bedford, MA 02744

   North Shore - Hull to New Hampshire:

   Division of Marine Fisheries -
   North Shore Office
   Attn: Environmental Reviewer
   30 Emerson Avenue
   Gloucester, MA 01930

   If yes, it may require a Chapter 91 license. For coastal towns in the Northeast Region, please contact MassDEP's Boston Office. For coastal towns in the Southeast Region, please contact MassDEP's Southeast Regional office.

3. Is any portion of the proposed project within an Area of Critical Environmental Concern (ACEC)?

   a. ☐ Yes ☑ No

   If yes, provide name of ACEC (see instructions to WPA Form 3 or DEP Website for ACEC locations). **Note:** electronic filers click on Website.

   b. ACEC Name

4. Is any portion of the proposed project within an area designated as an Outstanding Resource Water (ORW) as designated in the Massachusetts Surface Water Quality Standards, 314 CMR 4.00?
   a. ☐ Yes ☑ No

5. Is any portion of the site subject to a Wetlands Restriction Order under the Inland Wetlands Restriction Act (M.G.L.c. 131, § 40A) or the Coastal Wetlands Restriction Act (M.G.L.c. 130, § 105)?
   a. ☐ Yes ☑ No

6. Is this project subject to provisions of the MassDEP Stormwater Management Standards?
   a. ☑ Yes, Attach a copy of the Stormwater Report as required by the Stormwater Management Standards per 310 CMR 10.05(6)(k)-(q) and check if:
      1. ☐ Applying for Low Impact Development (LID) site design credits (as described in Stormwater Management Handbook Vol.2, Chapter 3)
      2. ☑ A portion of the site constitutes redevelopment
      3. ☐ Proprietary BMPs are included in the Stormwater Management System

   b. ☐ No, Explain why the project is exempt:
      1. ☐ Single Family Home
      2. ☐ Emergency Road Repair
      3. ☐ Small Residential Subdivision (less than or equal to 4 single-family houses or less than or equal to 4 units in multi-family housing project) with no discharge to Critical Areas.

D. Additional Information

Applicants must include the following with this Notice of Intent (NOI). See instructions for details.

Online Users: Attach the document transaction number (provided on your receipt page) for any of the following information you submit to the Department by regular mail delivery.

1. USGS or other map of the area (along with a narrative description, if necessary) containing sufficient information for the
☑ Conservation Commission and the Department to locate the site. (Electronic filers may omit this item.)
2. Plans identifying the location of proposed activities (including activities proposed to serve as a Bordering Vegetated Wetland
☑ [BVW] replication area or other mitigating measure) relative to the boundaries of each affected resource area.
3. Identify the method for BVW and other resource area boundary delineations (MassDEP BVW Field Data Form(s).
☑ Determination of Applicability, Order of Resource Area Delineation, etc.), and attach documentation of the methodology.
4. List the titles and dates for all plans and other materials submitted with this NOI.
☑

a. Plan Title:	b. Plan Prepared By:	c. Plan Signed/Stamped By:	c. Revised Final Date:	e. Scale:

5. If there is more than one property owner, please attach a list of these property owners not listed on this form.
☐
6. Attach proof of mailing for Natural Heritage and Endangered Species Program, if needed.
☐
7. Attach proof of mailing for Massachusetts Division of Marine Fisheries, if needed.
☐
8. Attach NOI Wetland Fee Transmittal Form.
☑
9. Attach Stormwater Report, if needed.
☑

E. Fees

1. Fee Exempt: No filing fee shall be assessed for projects of any city, town, county, or district of the Commonwealth, federally recognized Indian tribe housing authority, municipal housing authority, or the Massachusetts Bay Transportation Authority.

Applicants must submit the following information (in addition to pages 1 and 2 of the NOI Wetland Fee Transmittal Form) to confirm fee payment:

2. Municipal Check Number	3. Check date
4. State Check Number	5. Check date
6. Payer name on check: First Name	7. Payer name on check: Last Name

F. Signatures and Submittal Requirements

I hereby certify under the penalties of perjury that the foregoing Notice of Intent and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge. I understand that the Conservation Commission will place notification of this Notice in a local newspaper at the expense of the applicant in accordance with the wetlands regulations, 310 CMR 10.05(5)(a).

I further certify under penalties of perjury that all abutters were notified of this application, pursuant to the requirements of M.G.L. c. 131, § 40. Notice must be made by Certificate of Mailing or in writing by hand delivery or certified mail (return receipt requested) to all abutters within 100 feet of the property line of the project location.

Town of Wakefield	4/4/2024
1. Signature of Applicant	2. Date
Town of Wakefield	4/4/2024
3. Signature of Property Owner(if different)	4. Date
Nathan Chin	4/4/2024
5. Signature of Representative (if any)	6. Date

For Conservation Commission:

Two copies of the completed Notice of Intent (Form 3), including supporting plans and documents, two copies of the NOI Wetland Fee Transmittal Form, and the city/town fee payment, to the Conservation Commission by certified mail or hand delivery.

For MassDEP:

One copy of the completed Notice of Intent (Form 3), including supporting plans and documents, one copy of the NOI Wetland Fee Transmittal Form, and a **copy** of the state fee payment to the MassDEP Regional Office (see Instructions) by certified mail or hand delivery.

Other:

If the applicant has checked the "yes" box in Section C, Items 1-3, above, refer to that section and the Instructions for additional submittal requirements.

The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 - Notice of Wetland FeeTransmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
MassDEP File #:
eDEP Transaction #:1669334
City/Town:WAKEFIELD

A. Applicant Information

1. Applicant:

a. First Name	STEPHEN		b.Last Name	MAIO	
c. Organization	TOWN OF WAKEFIELD				
d. Mailing Address	1 LAFAYETTE STREET				
e. City/Town	WAKEFIELD	f. State	MA	g. Zip Code	01880
h. Phone Number	7812466308	i. Fax		j. Email	

2.Property Owner:(if different)

a. First Name			b. Last Name		
c. Organization	TOWN OF WAKEFIELD				
d. Mailing Address	1 LAFAYETTE STREET				
e. City/Town	WAKEFIELD	f.State	MA	g. Zip Code	01880
h. Phone Number	7812466308	i. Fax		j.Email	wrenault@wakefield.ma.us

3. Project Location:

a. Street Address	468 NOTH AVENUE	b. City/Town	WAKEFIELD

Are you exempted from Fee? ☐ (YOU HAVE SELECTED 'YES')

Note: Fee will be exempted if you are one of the following:

- City/Town/County/District
- Municipal Housing Authority
- Indian Tribe Housing Authority
- MBTA

State agencies are only exempt if the fee is less than $100

B. Fees

Activity Type	Activity Number	Activity Fee	RF Multiplier	Sub Total

City/Town share of filling fee	State share of filing fee	Total Project Fee
$0.00	$0.00	$0.00

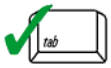
Checklist for Stormwater Report

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

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

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.

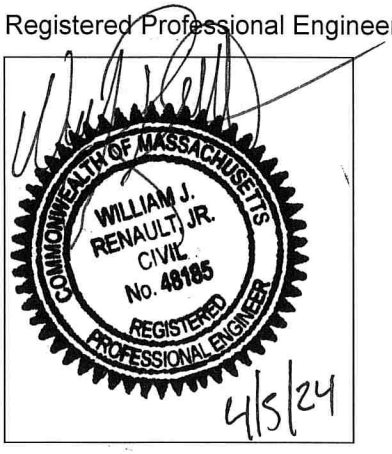
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



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): Pervious paver areas in lieu of asphalt pavement

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

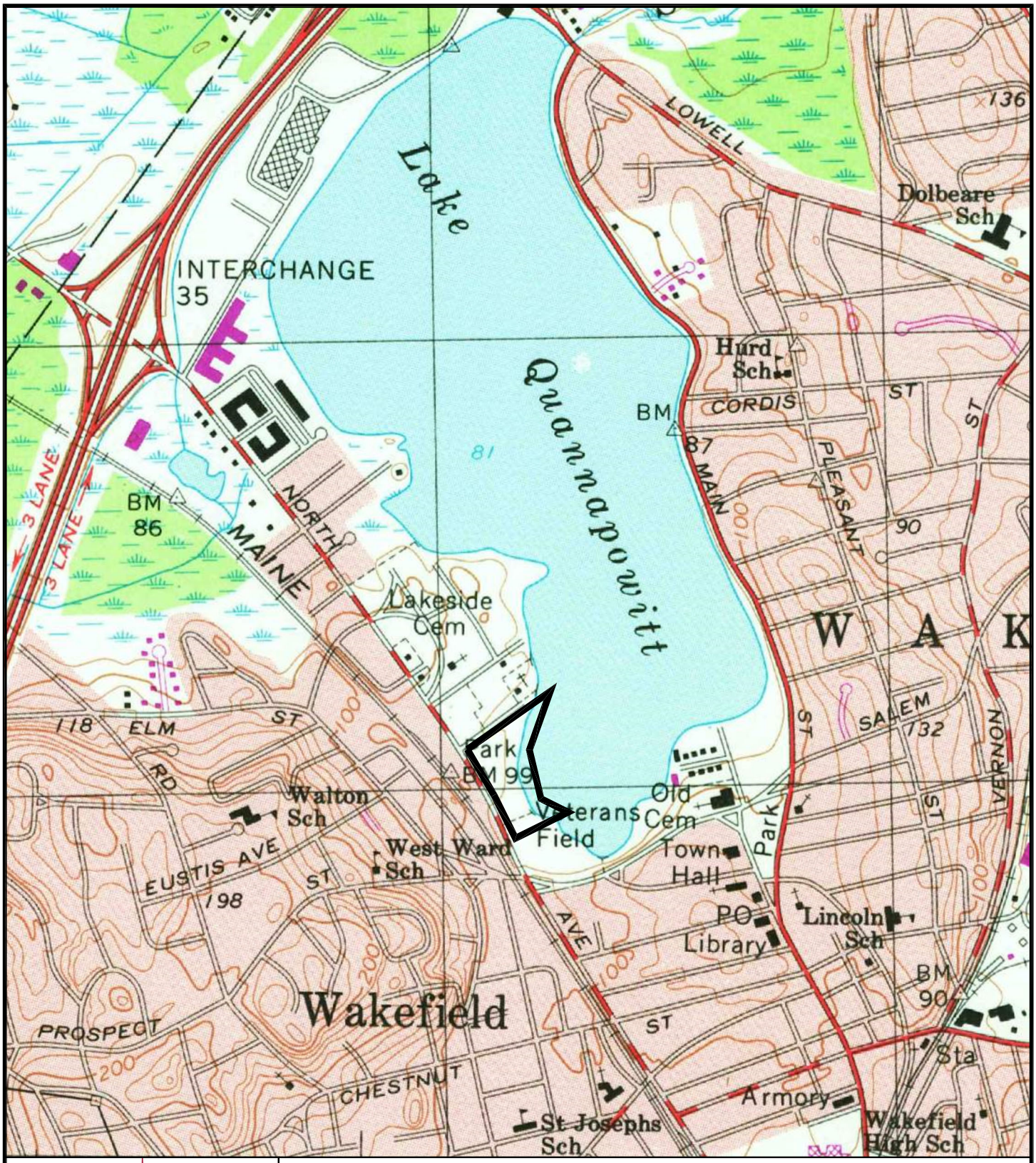
☐ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ 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.

Attachment 1:

USGS Map



TOWN OF WAKEFIELD

ENGINEERING DIVISION - WAKEFIELD PUBLIC WORKS

USGS LOCUS MAP
VETERAN'S FIELD PARKING LOT REHABILITATION

SCALE: N.T.S. DATE: FEB. 2024

Attachment 2:

Project Narrative

Project Narrative

Background

This Notice of Intent (NOI) application is for the Veteran's Park Restroom and Parking Rehabilitation project which proposes the installation of a new restroom facility, reconstruction of the existing parking lot and reconstruction of the pedestrian pathways in Veteran's Field and Hall Park, located at 468 North Avenue in Wakefield, Massachusetts. The project is intended to enhance recreation activities at the park and athletic field while also supporting Wakefield's weekly farmer's market. The project is a mix of new development and redevelopment.

The project's scope proposes to install a new 525 square foot restroom building located 55 feet from the bank of the Lake Quannapowitt. It will be located where farmer's market's shipping container and an overgrown bush are currently located. The restroom work will include associated water, sewer and electric utility connections. Storage for the farmer's market will be provided within the new structure.

The project also proposes the rehabilitation of the parking lot to improve stormwater treatment, ADA access and lighting. Portions of the parking lot are proposed to be regraded toward the existing center island, where a new bioretention area will be installed. The bioretention area will provide a new enhanced water quality and rate attenuation. To meet current ADA requirements for number of handicap spaces and size, a 680 square feet of parking lot pavement expansion is necessary. The footprint of the parking lot will remain 15 feet from the bank Lake Quannapowitt at its closes point.

Lastly, the project proposes to reconstruct portions of pedestrian pathways throughout Hall Park.

Portions of the walkways and parking lot are within the flood plan and as shown on the plans. The areas being reconstructed within the flood plain will be constructed at the existing grades as shown on the plans.

Stormwater Design

The general topography of the site has a very gradual slope from North Avenue to Lake Quannapowitt. Currently, stormwater runoff from the existing parking lot is collected by three existing catch basins and discharged with minimal treatment to Lake Quannapowitt. The proposed reconstruction will redirect a portion of the parking lot's runoff to the new 15-foot-wide, 140-foot-long bio-retention area located within the existing center island. Due to the shallow depth to groundwater, (0.54 feet separation from the bottom) the bioretention area is proposed to be used for stormwater attenuation and water quality treatment only. The bioretention area will be lined and include an underdrain and overflow structure to ensure the basin drains within the 72 hour requirement.

<u>Responses to the Stormwater Management Standards</u>

1. *"No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth."*

   No new stormwater conveyances have been created with existing conveyances being replaced with stormwater BMP to increase stormwater treatment prior to discharge to Lake Quannapowitt.

2. *"Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04."*

   Standard met. The project proposes a marginal increase in impervious area created by the addition of the restroom building and alternations to the parking lot footprint (147 sf) which will be offset with the addition of stormwater BMP in the form of a lined bio-retention area. As demonstrated in the attached HydroCAD report, the post-development peak discharge rates do not exceed pre-development.

Peak Discharge Rates		
Storm Event	**Pre-development**	**Post-development**
2 Year	0.83 cfs	0.57 cfs
10 Year	2.69 cfs	2.69 cfs
25 Year	4.45 cfs	4.28 cfs
100 Year	8.48 cfs	7.93 cfs

3. *"Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook."*

   This standard cannot be met due to site and scope constraints. The groundwater is 0.54 feet from the bottom of the bio-retention area and, as such, is proposed to be lined with an impervious membrane with an underdrain system.

4. *"Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This Standard is met when:*

   a. *Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;*

   b. *Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and*

   c. *Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook."*

   Standard Met. Due to site constraints, the Bio-Retention Area BMP cannot be sized with adequate pre-treatment to obtain the full 90% TSS removal credit that is normally allotted to Bio-retention area BMPs. As such, a TSS removal rate of 87% was calculated for this BMP without pre-treatment by deducting the 25% TSS removal credit for sediment forebays that normally provide pre-treatment (Mass. Stormwater Handbook, Vol 2, Ch. 2, page 13).

The 87% removal has been determined utilizing the TSS Removal Calculation Worksheet in reverse order to determine how much TSS a Bio-Retention BMP without a sediment forebay pre-treatment reduction of 25% removes.

TSS Removal Calculation Worksheet

B BMP	C TSS Removal	D Starting TSS Load	E Amt Removed (C*D)	F Remain Load (D-E)
Sediment Forebay Pretreat	0.25	1.00	0.25	0.75
Bio Area BMP w/out Pretreat	"BMP Removal"	0.75	"BMP Amt Rem."	0.10
Bio Area BMP w/ Pretreat	0.90	n/a	n/a	0.10

0.75 – "BMP Amt Rem" = 0.10
"BMP Amt Rem" = 0.65

"BMP Removal" * 0.75 = "BMP Amt Rem"
"BMP Removal" * 0.75 = 0.65
"BMP Removal" = 0.65 / 0.75
"BMP Removal" = 0.87

5. *"For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable…"*

   Non-applicable

6. *"Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices…"*

   Portions of the site are located within the Zone A for the Lynn Water/Sewer's water supply. The proposed project incorporates a new bioretention BMP located within the confides of Zone A. It should be noted that this BMP is non-infiltrating (site constrained since there's minimal separation from groundwater), and is a redevelopment of an existing drainage outfall which will provide attenuation and treatment that otherwise did not exist.

7. *"A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions."*

The project proposes a marginal increase in impervious area created by the addition of the restroom building and alternations to the parking lot footprint (147 sf) which will be offset with the addition of a stormwater BMP in the form of a lined bio-retention area. The remaining site is considered redevelopment. A bioretention area provides flow mitigation and improved water quality treatment in the form of TSS reduction when compared to the existing condition.

The bioretention area will not be used for infiltration as the groundwater separation is only 0.54 feet. 87% TSS removal is credited to this project as explained above.

8. *"A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented."*

   Erosion Control Section below outlines the proposed measures. Additionally, plans and details are included with the project site plans attached.

9. *A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.*

   An operations and maintenance plan have been included with this submittal.

10. *All illicit discharges to the stormwater management system are prohibited.*

    No illicit connections will be made to this drainage system.

EROSION CONTROL

Proposed erosion control measures will include the deployment of straw wattles (as shown on the attached plans). A floating turbidity curtain will be deployed during the replacement of the existing stormwater outfall. at the inlet of the existing boat ramp with straw wattles laid across the entrance of the ramp for additional protection.

DEWATERING

During the proposed replacement of the existing 18" cast iron pipe outfall, a cofferdam made of bulk sand bags will be constructed to provide dry access to the outlet end of the pipe.

Any de-watering required of the project will utilize large capacity dewatering sediment bags or a dewatering basin deployed near the embankment/boat ramp of Lake Quannapowitt with plastic sheeting or tarpaulins placed underneath the bags to prevent erosion of the embankment during use.

WATER QUALITY CALCULATIONS

The proposed infiltration basin was sized to the maximum extent practical given the shallow depth to groundwater, general flat topography, and close proximity to Lake Quannapowitt. As such, the length of the bio-retention BMP was limited to prevent it encroaching within 100 feet of Lake Quannapowitt. In addition, approximately 65% of the higher slope parking lot could sheet flow into the bio-retention BMP. Therefore, a volume of 2,589 cubic feet was calculated with a proposed 9" deep basin. Runoff generated via three sub catchment areas (5S) has been included in the evaluation of the infiltration basin (see attached sub catchment map, subcat 5S).

<u>Water Quality Volume</u>

$$WQV = D_{WQ} \times A_{imp}$$

WQV = Required Water Quality Volume
D_{WQ} = Water Quality Depth (1" Based on HSG B Infiltration Rate)
A_{imp} = Contributing impervious area (17,179 sqft)

$$WQV = 1'' / (12 \text{ in/ft}) \times 17{,}179 \text{ sqft} = \underline{1{,}431.6 \text{ cu-ft}}$$

The bio-retention area provides <u>almost twice</u> of required stormwater storage volume, this requirement has been deemed satisfied.

Attachment 3:

Notification of Abutters

WAKEFIELD
Abutters List

Subject Parcel ID: ***SEE NOTES***

Subject Property Location: ***SEE NOTES***

ParcelID	Location	Owner	Co-Owner	Mailing Address	City	State	Zip
05-133-056	BEACON ST	CONGREGATION, ADATH ISRAEL		BEACON ST	WAKEFIELD	MA	01880
05-134-062	LAKESIDE AVE	LYNN HEBREW, BENEVOLENT		LAKESIDE AVE	WAKEFIELD	MA	01880
11-041-111	NORTH AVE	MASS BAY TRANS, AUTHORITY	DIRECTOR OF REAL ESTAT	10 PARK PLAZA	BOSTON	MA	02116
11-042-85	480 NORTH AVE	TOWN OF WAKEFIELD LIGHT + G		9 ALBION ST	WAKEFIELD	MA	01880
11-044-009	LAKESIDE AVE	TOWN OF WAKEFIELD DPW	PARK DEPT	1 LAFAYETTE ST	WAKEFIELD	MA	01880
11-045-010	NORTH AVE	TOWN OF WAKEFIELD DPW	PARK DEPT HALL PARK	1 LAFAYETTE ST	WAKEFIELD	MA	01880
11-046-011	41 CHURCH ST	TOWN OF WAKEFIELD DPW	PARK DEPT HARTSHORNE I	1 LAFAYETTE ST	WAKEFIELD	MA	01880
11-047-012	CHURCH ST	TOWN OF WAKEFIELD DPW	PARK DEPT CEMETARY	1 LAFAYETTE ST	WAKEFIELD	MA	01880
11-097-70A	36 LAFAYETTE ST	WEISSE SUZANNE M TR	COMEAU JEANNE TR	36 LAFAYETTE ST	WAKEFIELD	MA	01880
11-098-068	34 CHURCH ST	CAMIER, PETER J	LINDA M CAMIER	34 CHURCH ST	WAKEFIELD	MA	01880
11-099-0671	36 CHURCH ST 1	STANTON DENYCE		36 CHURCH ST #1	WAKEFIELD	MA	01880
11-099-0672	36 CHURCH ST 2	KIRK EILEEN	GILLAN JAMES	36 CHURCH ST #2	WAKEFIELD	MA	01880
11-100-066	38 CHURCH ST	HIGGINS BRENDAN T	HIGGINS MOLLY DINSMOR	38 CHURCH ST	WAKEFIELD	MA	01880
11-101-063	40 CHURCH ST	CONTI PETER L	CAMP SEAN	40 CHURCH ST	WAKEFIELD	MA	01880
11-102-062	42 CHURCH ST	EVARTS EDWARD B	EVARTS KATHLEEN C	42 CHURCH ST	WAKEFIELD	MA	01880
11-103-61A	44 CHURCH ST	THOMAS JOHN F	THOMAS MADELINE A	44 CHURCH ST	WAKEFIELD	MA	01880
11-104-060	363 -369 NORTH AVE	MCC REALTY TRUST		369 NORTH AVE	WAKEFIELD	MA	01880
11-1042-60B2	46 CHURCH ST 2	FUREY JOHN COTTON POTTER	STOREY JACQUELINE KAT	46 CHURCH ST #2	WAKEFIELD	MA	01880
11-104A-60B	46 CHURCH ST 1	GREEN PAMELA M		46 CHURCH ST #1	WAKEFIELD	MA	01880
11-105-112	NORTH AVE	MASS BAY TRANS, AUTHORITY	DIRECTOR OF REAL ESTAT	10 PARK PLAZA	BOSTON	MA	02116
11-42A-007	NORTH AVE	MASS BAY TRANS,AUTHORITY	DIRECTOR OF REAL ESTAT	10 PARK PLAZA	BOSTON	MA	02116

Parcel Count: **21**

100ft Abutters List of the Subject Parcel IDs
Requested by: Nathan Chin, P.E.
Wakefield Public Works – Engineering Division
1 Lafayette Street
Wakefield, MA 01880
Ph: 781-246-6308

Parcel ID: 11-044-009
Location: Lakeside Ave

Parcel ID: 11-045-010
Location: North Ave

Parcel ID: 11-046-011
Location: 41 Church St

Scott W. Morrison

BOARD OF ASSESSORS

AFFIDAVIT OF SERVICE

Under the Massachusetts Wetlands Protection Act

I, NATHAN CHIN hereby certify under the pains and penalties of perjury that on 4/4/24 (date) I gave notification to abutters in compliance with the second paragraph of the Massachusetts General Laws, Chapter 131, Section 40 and the DEP Guide to Abutter Notification in connection with the following matter:

A(n) NOTICE OF INTENT application was filed under the Massachusetts Wetlands Protection Act by

TOWN OF WAKEFIELD (name) with the Wakefield Conservation Commission on

4/4/24 (date) for a property located at

468 NORTH AVE., WAKEFIELD, MA.

The form of notification and the list of abutters to whom it was given and their addresses are attached to this Affidavit of Service.

signature

4/4/24
date

TOWN OF WAKEFIELD

CONSERVATION COMMISSION

Notification to Abutters: Under the Massachusetts Wetlands Protection Act

In accordance with the second paragraph of Massachusetts General Laws, Chapter 131, Section 40, you are hereby notified of the following:

The name of the applicant is Town of Wakefield, MA (Agent: William J. Renault, Jr., PE, Town Engineer)

The applicant has filed with the Wakefield Conservation Commission for a (please check applicable filing):

- [x] Notice of Intent, seeking permission to alter an Area Subject to Protection
- [ ] Request to amend an existing Order of Conditions
- [ ] Notice of Resource Area Delineation, seeking to determine the extent of Areas Subject to Protection

The proposed work includes:

The reconstruction of the existing Veteran's Field Parking Lot with drainage, lighting, and electrical infrastructure improvements and the addition of a public restroom facility.

Site location: 468 North Avenue, Wakefield, MA 01880

Copies may be examined or obtained (for a fee) from:

(Check all that apply)

- [x] Applicant at Wakefield Town Hall, 1 Lafayette Street, Wakefield, MA 01880
- [x] Representative at DPW-Engineering Division, Wakefield Town Hall, 1 Lafayette Street, Wakefield, MA between the hours of 8:30am and 4:30pm on the following days: Mon - Thursday, Friday half-days.
- [x] Conservation Department in Wakefield Town Hall, 1 Lafayette Street, 2nd floor, Wakefield, MA on Tuesdays and Thursdays between 10:00 a.m. and 2:00 p.m. Please call the Conservation office at 781-224-5015 to verify arrangements prior to visiting.

Electronic copies of these filings may also be available through the Conservation Department. To request an e-copy, please email concom@wakefield.ma.us or call the Conservation Office directly at 781-224-5015. Copies may also be examined at www.wakefield.ma.us/conservation-commission/pages/current-projects.

Information regarding the date, time, and place of the public hearing may be obtained on the Wakefield Conservation Commission website at www.wakefield.ma.us/calendar.

Notice of the public hearing, including its date, time, and place will be published in the Wakefield Daily Item at least five business days prior to the public hearing date.

Notice of the public hearing, including its date, time, and place will be posted in Wakefield Town Hall at least 48 hours prior to the public hearing date. This information will be listed at www.wakefield.ma.us on the public meeting calendar.

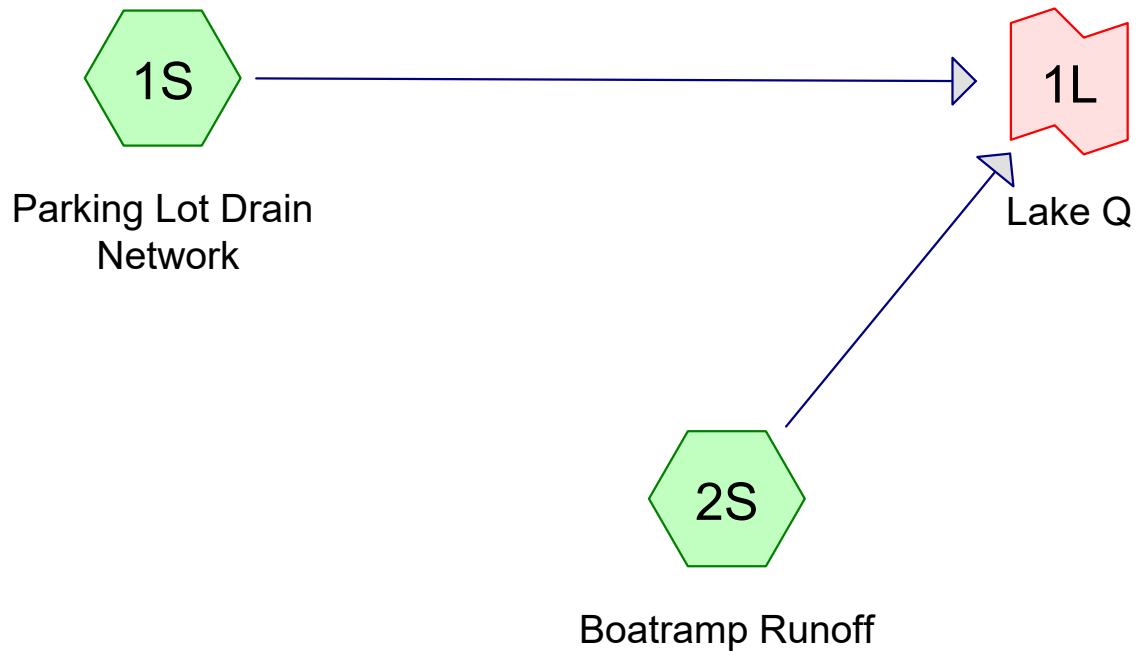
You may contact the Department of Environmental Protection (DEP) Regional Office for more information about this application or the Wetlands Protection Act. To contact the DEP, Northeast Region, call (978) 694-3200.

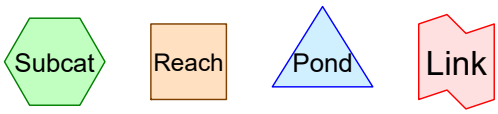
Attachment 4:

Stormwater Calculations

Attachment 4a:

Pre-development HydroCAD Report





Routing Diagram for pre_parking lot 03 28 24
Prepared by {enter your company name here}, Printed 4/5/2024
HydroCAD® 10.10-6a s/n 11989 © 2020 HydroCAD Software Solutions LLC

Project Notes

Rainfall events imported from "Atlas-14-Rain.txt" for 6679 MA Middlesex North
Rainfall events imported from "Atlas-14-Rain.txt" for 6680 MA Middlesex South

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.16	2
2	10-Year	Type III 24-hr		Default	24.00	1	4.77	2
3	25-Year	Type III 24-hr		Default	24.00	1	6.03	2
4	100-Year	Type III 24-hr		Default	24.00	1	8.62	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.977	39	>75% Grass cover, Good, HSG A (1S, 2S)
0.733	98	Paved parking, HSG A (1S, 2S)
1.710	**64**	**TOTAL AREA**

Soil Listing (all nodes)

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

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.977	0.000	0.000	0.000	0.000	0.977	>75% Grass cover, Good	1S, 2S
0.733	0.000	0.000	0.000	0.000	0.733	Paved parking	1S, 2S
1.710	**0.000**	**0.000**	**0.000**	**0.000**	**1.710**	**TOTAL AREA**	

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Parking Lot Drain Runoff Area=43,756 sf 45.78% Impervious Runoff Depth>0.62"
Tc=6.0 min CN=66 Runoff=0.58 cfs 0.052 af

Subcatchment 2S: Boatramp Runoff Runoff Area=30,719 sf 38.69% Impervious Runoff Depth>0.46"
Tc=6.0 min CN=62 Runoff=0.25 cfs 0.027 af

Link 1L: Lake Q Inflow=0.83 cfs 0.079 af
Primary=0.83 cfs 0.079 af

Total Runoff Area = 1.710 ac Runoff Volume = 0.079 af Average Runoff Depth = 0.56"
57.14% Pervious = 0.977 ac 42.86% Impervious = 0.733 ac

Summary for Subcatchment 1S: Parking Lot Drain Network

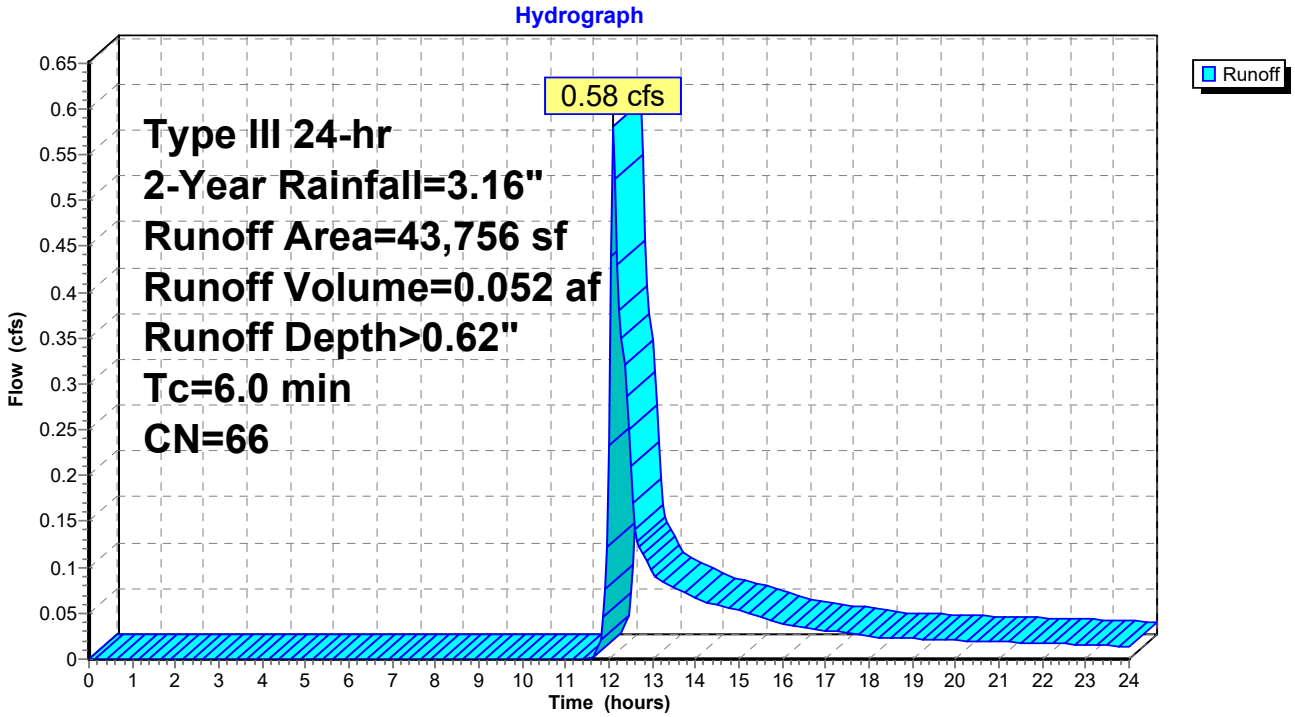
Runoff = 0.58 cfs @ 12.11 hrs, Volume= 0.052 af, Depth> 0.62"
Routed to Link 1L : Lake Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
20,033	98	Paved parking, HSG A
23,723	39	>75% Grass cover, Good, HSG A
43,756	66	Weighted Average
23,723		54.22% Pervious Area
20,033		45.78% Impervious Area

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

Subcatchment 1S: Parking Lot Drain Network



Summary for Subcatchment 2S: Boatramp Runoff

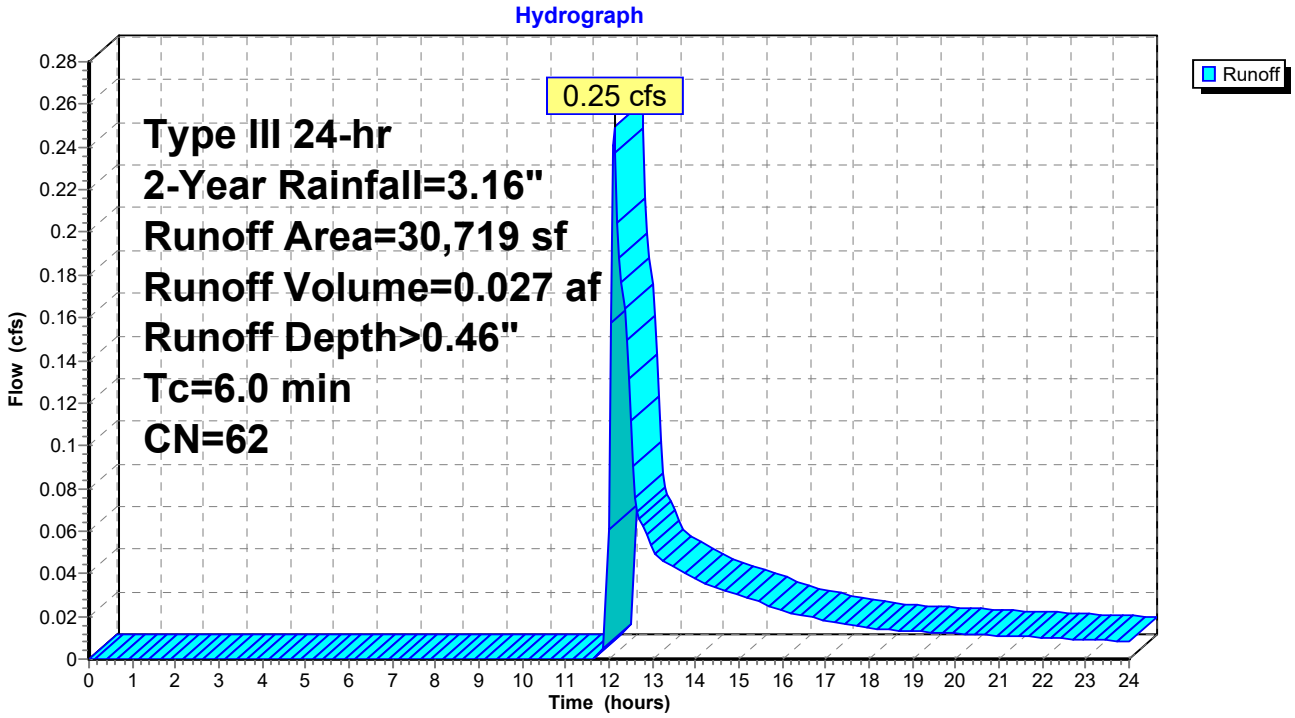
Runoff = 0.25 cfs @ 12.12 hrs, Volume= 0.027 af, Depth> 0.46"
Routed to Link 1L : Lake Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
11,885	98	Paved parking, HSG A
18,834	39	>75% Grass cover, Good, HSG A
30,719	62	Weighted Average
18,834		61.31% Pervious Area
11,885		38.69% Impervious Area

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

Subcatchment 2S: Boatramp Runoff

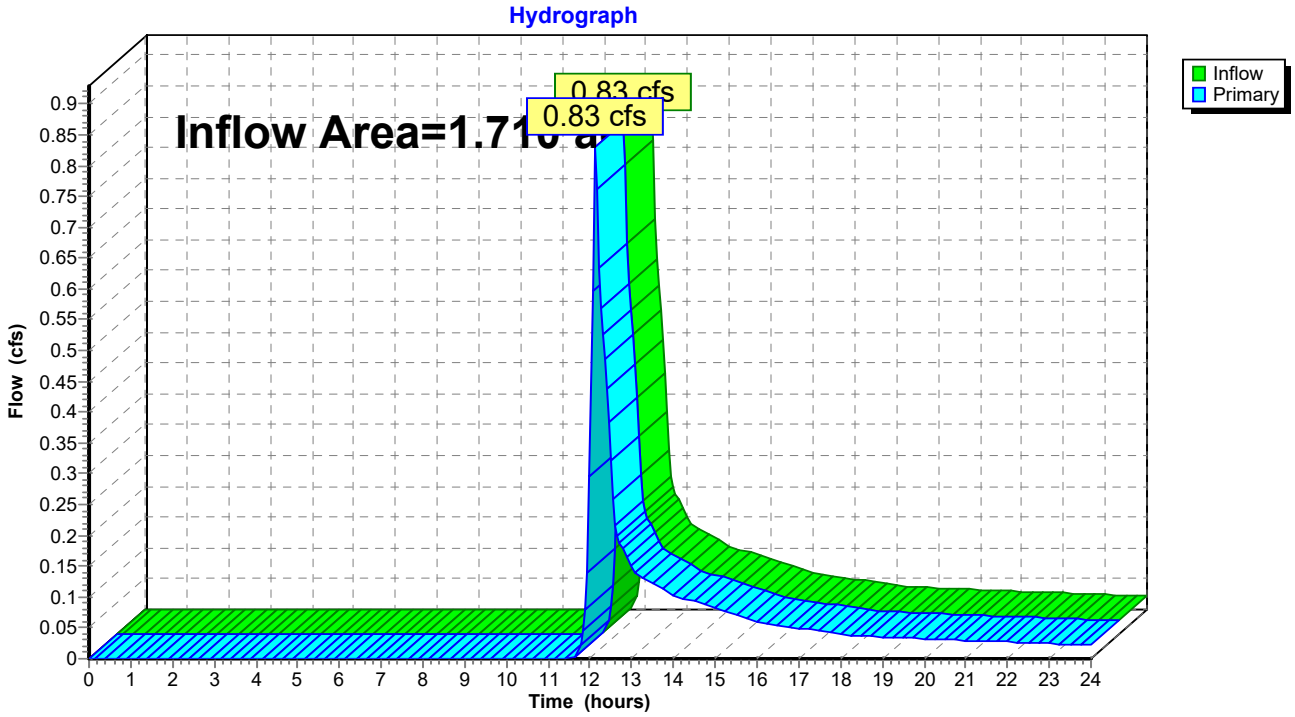


Summary for Link 1L: Lake Q

Inflow Area = 1.710 ac, 42.86% Impervious, Inflow Depth > 0.56" for 2-Year event
Inflow = 0.83 cfs @ 12.11 hrs, Volume= 0.079 af
Primary = 0.83 cfs @ 12.11 hrs, Volume= 0.079 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: Lake Q



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Parking Lot Drain Runoff Area=43,756 sf 45.78% Impervious Runoff Depth>1.57"
Tc=6.0 min CN=66 Runoff=1.73 cfs 0.132 af

Subcatchment 2S: Boatramp Runoff Runoff Area=30,719 sf 38.69% Impervious Runoff Depth>1.30"
Tc=6.0 min CN=62 Runoff=0.96 cfs 0.076 af

Link 1L: Lake Q Inflow=2.69 cfs 0.208 af
Primary=2.69 cfs 0.208 af

Total Runoff Area = 1.710 ac Runoff Volume = 0.208 af Average Runoff Depth = 1.46"
57.14% Pervious = 0.977 ac 42.86% Impervious = 0.733 ac

Summary for Subcatchment 1S: Parking Lot Drain Network

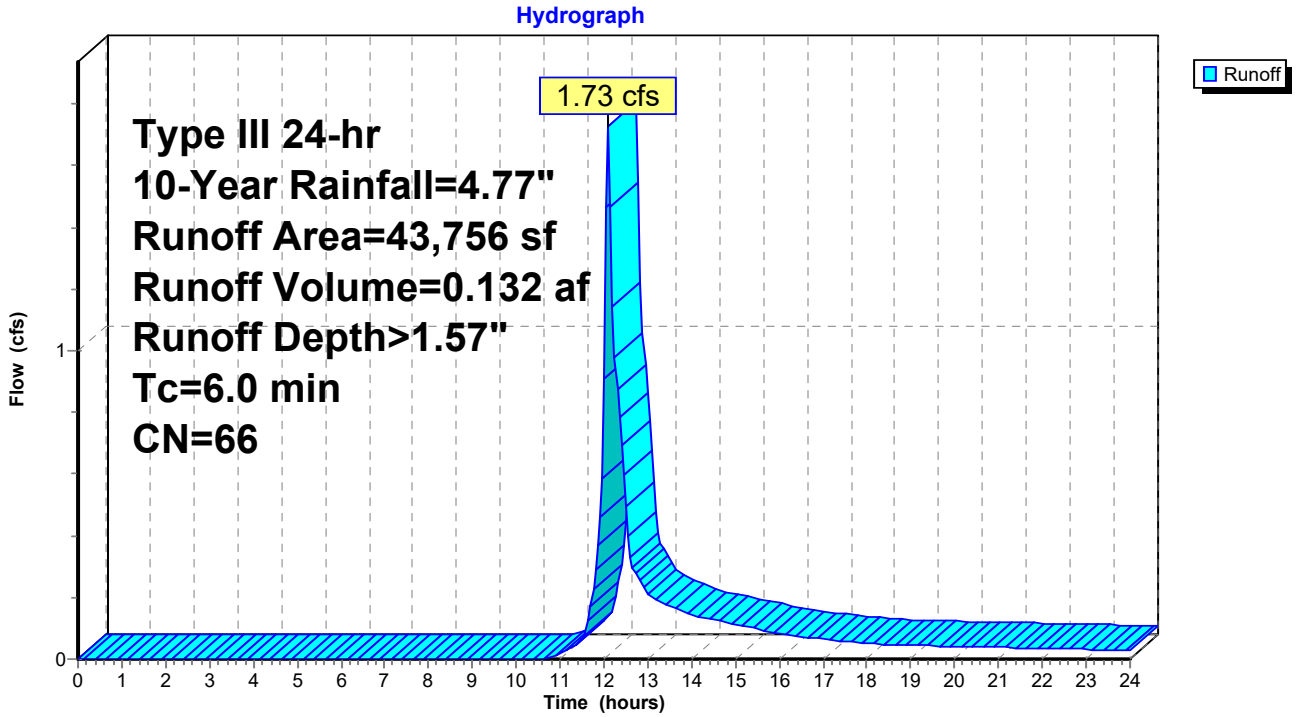
Runoff = 1.73 cfs @ 12.10 hrs, Volume= 0.132 af, Depth> 1.57"
Routed to Link 1L : Lake Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.77"

Area (sf)	CN	Description
20,033	98	Paved parking, HSG A
23,723	39	>75% Grass cover, Good, HSG A
43,756	66	Weighted Average
23,723		54.22% Pervious Area
20,033		45.78% Impervious Area

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

Subcatchment 1S: Parking Lot Drain Network



Summary for Subcatchment 2S: Boatramp Runoff

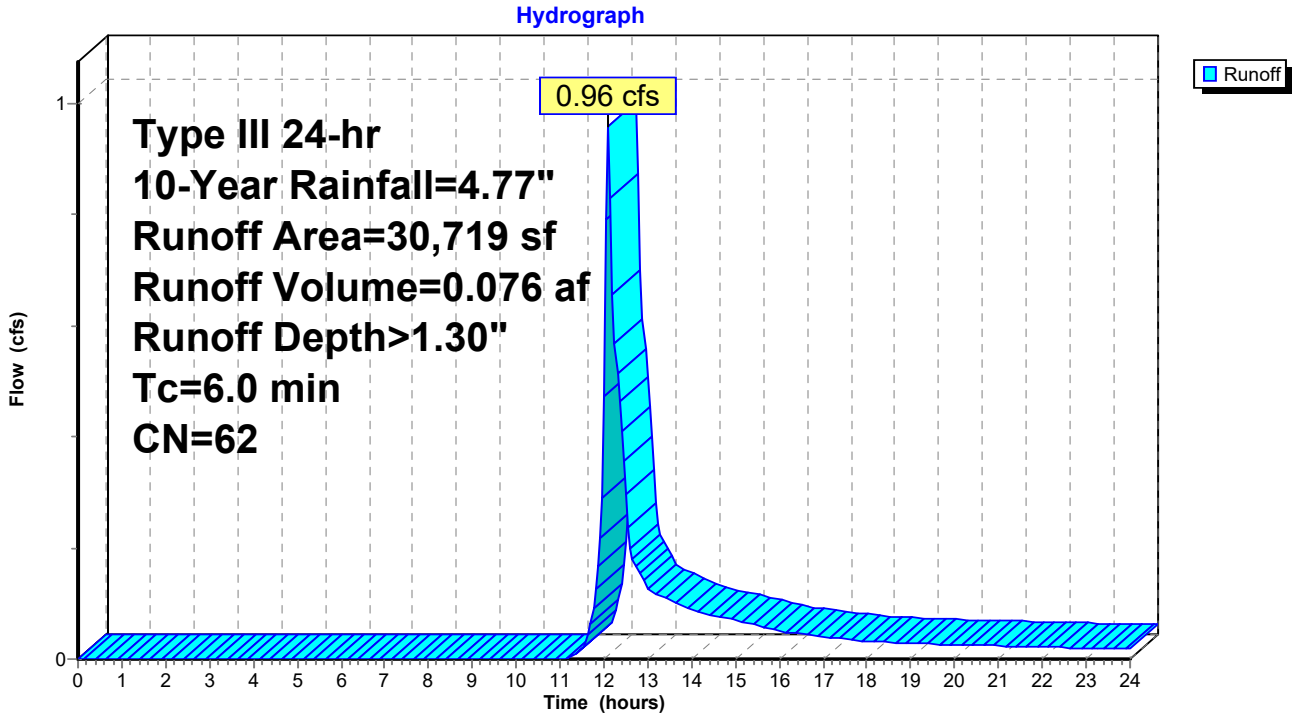
Runoff = 0.96 cfs @ 12.10 hrs, Volume= 0.076 af, Depth> 1.30"
Routed to Link 1L : Lake Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.77"

Area (sf)	CN	Description
11,885	98	Paved parking, HSG A
18,834	39	>75% Grass cover, Good, HSG A
30,719	62	Weighted Average
18,834		61.31% Pervious Area
11,885		38.69% Impervious Area

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

Subcatchment 2S: Boatramp Runoff

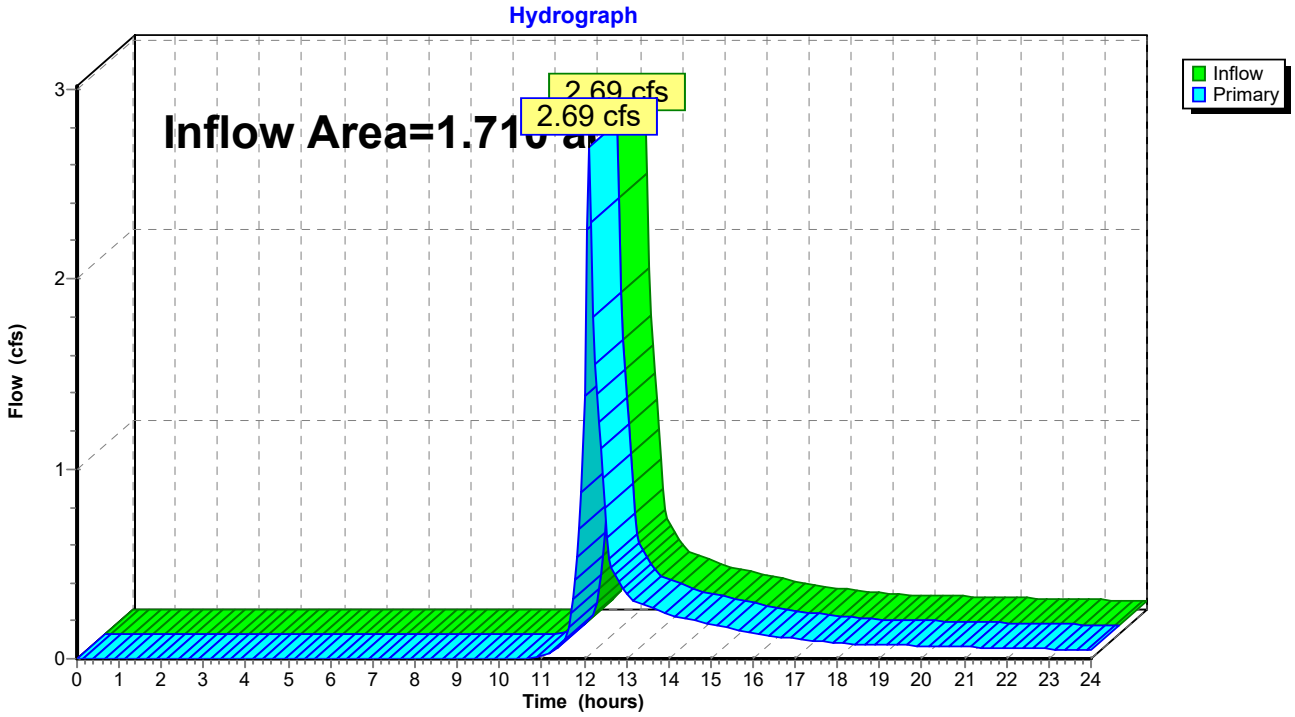


Summary for Link 1L: Lake Q

Inflow Area = 1.710 ac, 42.86% Impervious, Inflow Depth > 1.46" for 10-Year event
Inflow = 2.69 cfs @ 12.10 hrs, Volume= 0.208 af
Primary = 2.69 cfs @ 12.10 hrs, Volume= 0.208 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: Lake Q



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Parking Lot Drain Runoff Area=43,756 sf 45.78% Impervious Runoff Depth>2.46"
Tc=6.0 min CN=66 Runoff=2.80 cfs 0.206 af

Subcatchment 2S: Boatramp Runoff Runoff Area=30,719 sf 38.69% Impervious Runoff Depth>2.11"
Tc=6.0 min CN=62 Runoff=1.65 cfs 0.124 af

Link 1L: Lake Q Inflow=4.45 cfs 0.330 af
Primary=4.45 cfs 0.330 af

Total Runoff Area = 1.710 ac Runoff Volume = 0.330 af Average Runoff Depth = 2.31"
57.14% Pervious = 0.977 ac 42.86% Impervious = 0.733 ac

Summary for Subcatchment 1S: Parking Lot Drain Network

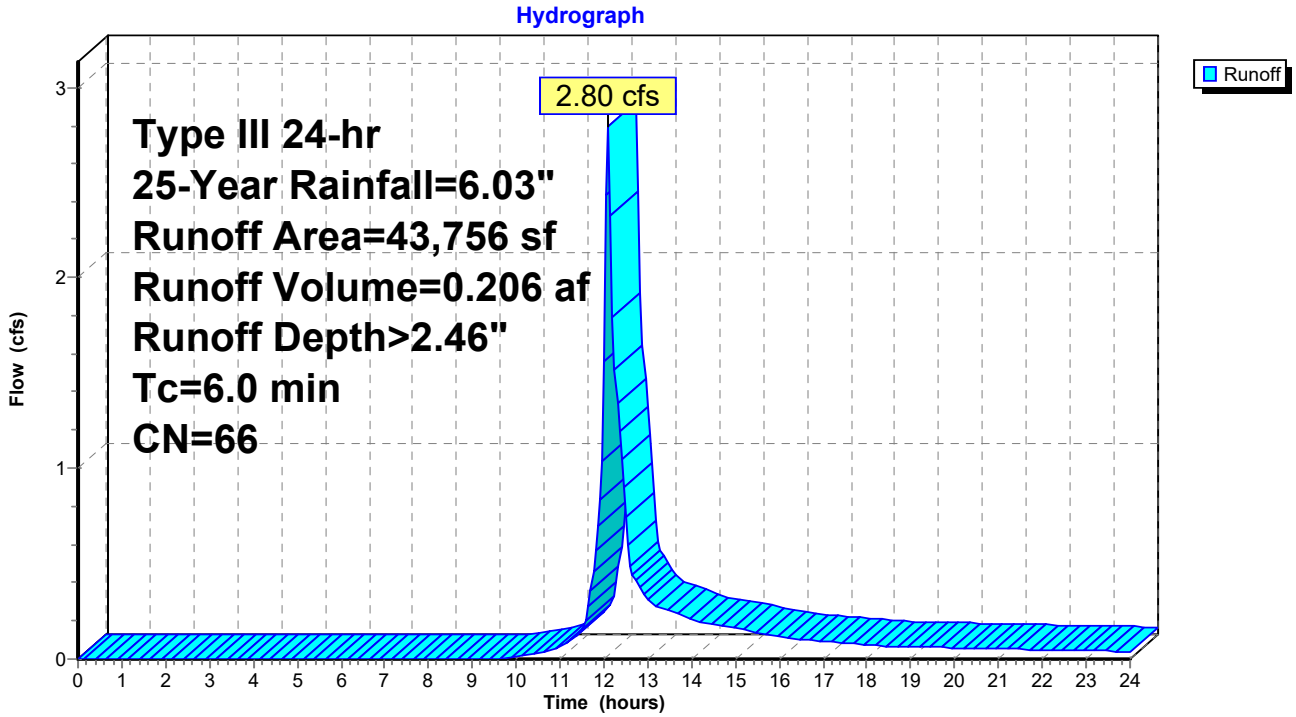
Runoff = 2.80 cfs @ 12.10 hrs, Volume= 0.206 af, Depth> 2.46"
Routed to Link 1L : Lake Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.03"

Area (sf)	CN	Description
20,033	98	Paved parking, HSG A
23,723	39	>75% Grass cover, Good, HSG A
43,756	66	Weighted Average
23,723		54.22% Pervious Area
20,033		45.78% Impervious Area

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

Subcatchment 1S: Parking Lot Drain Network



Summary for Subcatchment 2S: Boatramp Runoff

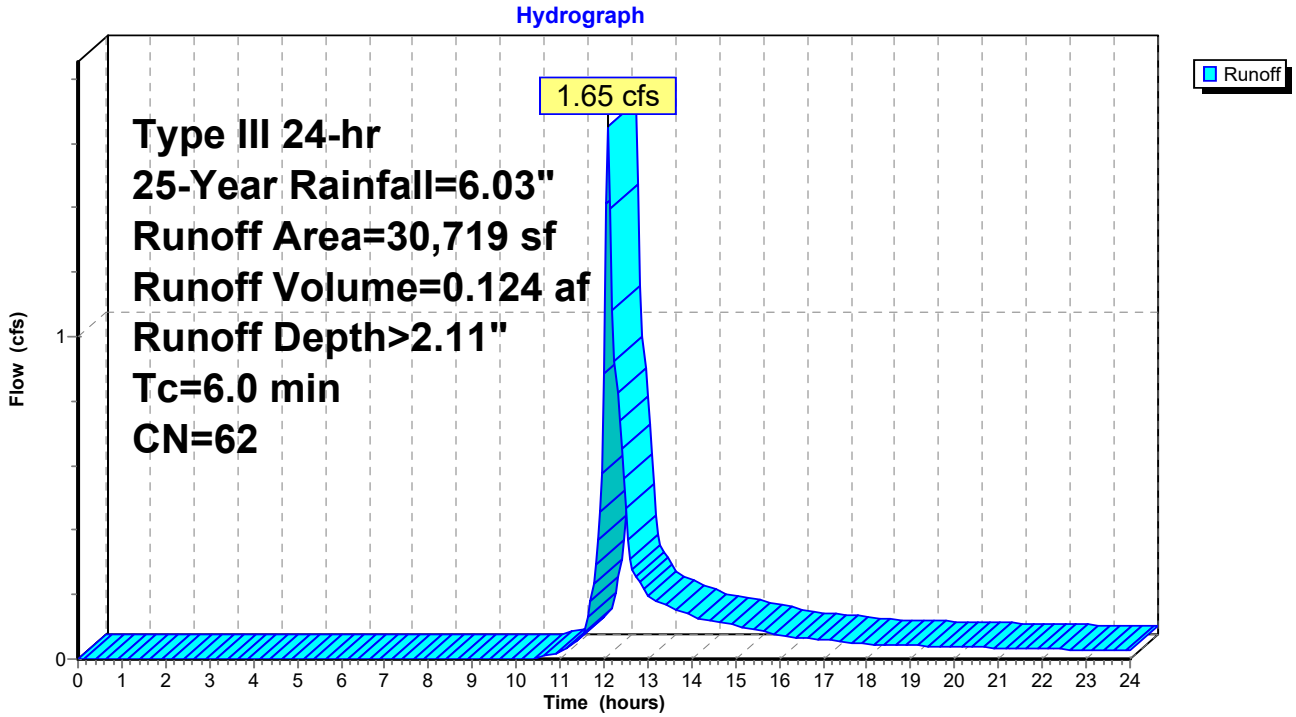
Runoff = 1.65 cfs @ 12.10 hrs, Volume= 0.124 af, Depth> 2.11"
Routed to Link 1L : Lake Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.03"

Area (sf)	CN	Description
11,885	98	Paved parking, HSG A
18,834	39	>75% Grass cover, Good, HSG A
30,719	62	Weighted Average
18,834		61.31% Pervious Area
11,885		38.69% Impervious Area

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

Subcatchment 2S: Boatramp Runoff

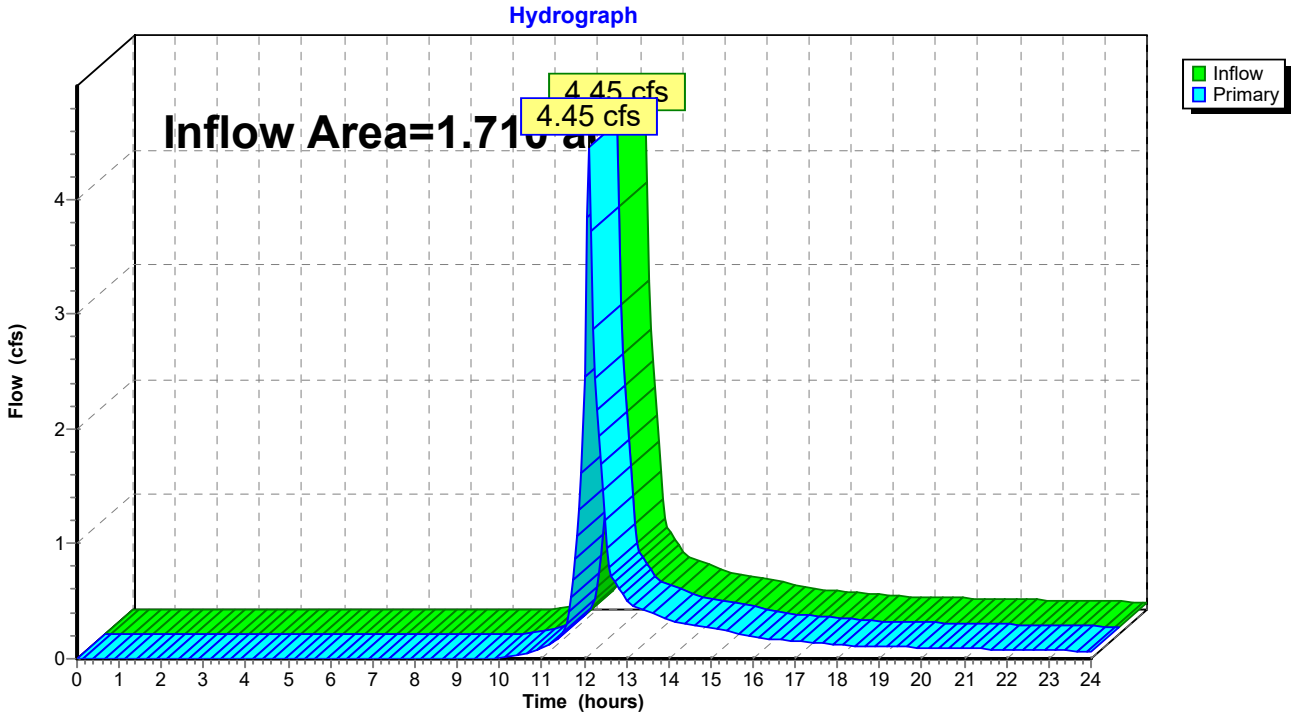


Summary for Link 1L: Lake Q

Inflow Area = 1.710 ac, 42.86% Impervious, Inflow Depth > 2.31" for 25-Year event
Inflow = 4.45 cfs @ 12.10 hrs, Volume= 0.330 af
Primary = 4.45 cfs @ 12.10 hrs, Volume= 0.330 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: Lake Q



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: Parking Lot Drain Runoff Area=43,756 sf 45.78% Impervious Runoff Depth>4.52"
Tc=6.0 min CN=66 Runoff=5.22 cfs 0.378 af

Subcatchment 2S: Boatramp Runoff Runoff Area=30,719 sf 38.69% Impervious Runoff Depth>4.04"
Tc=6.0 min CN=62 Runoff=3.26 cfs 0.237 af

Link 1L: Lake Q Inflow=8.48 cfs 0.615 af
Primary=8.48 cfs 0.615 af

Total Runoff Area = 1.710 ac Runoff Volume = 0.615 af Average Runoff Depth = 4.32"
57.14% Pervious = 0.977 ac 42.86% Impervious = 0.733 ac

Summary for Subcatchment 1S: Parking Lot Drain Network

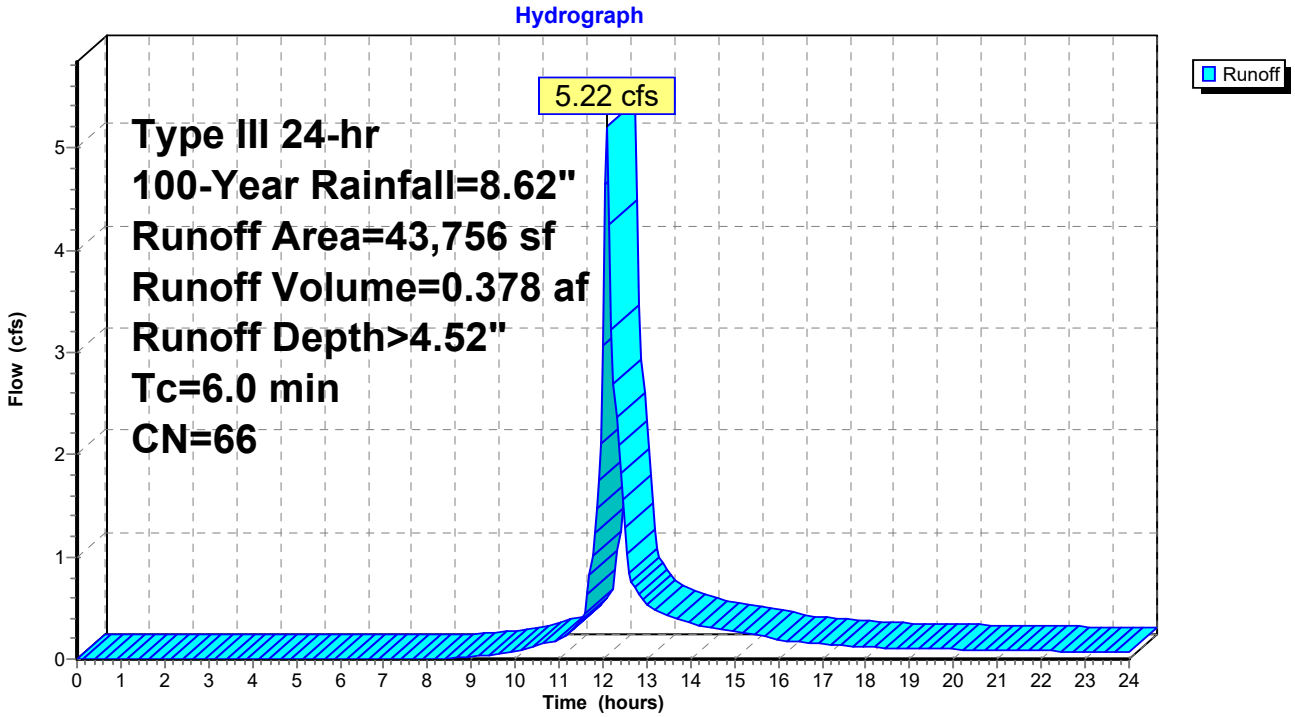
Runoff = 5.22 cfs @ 12.09 hrs, Volume= 0.378 af, Depth> 4.52"
Routed to Link 1L : Lake Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.62"

Area (sf)	CN	Description
20,033	98	Paved parking, HSG A
23,723	39	>75% Grass cover, Good, HSG A
43,756	66	Weighted Average
23,723		54.22% Pervious Area
20,033		45.78% Impervious Area

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

Subcatchment 1S: Parking Lot Drain Network



Summary for Subcatchment 2S: Boatramp Runoff

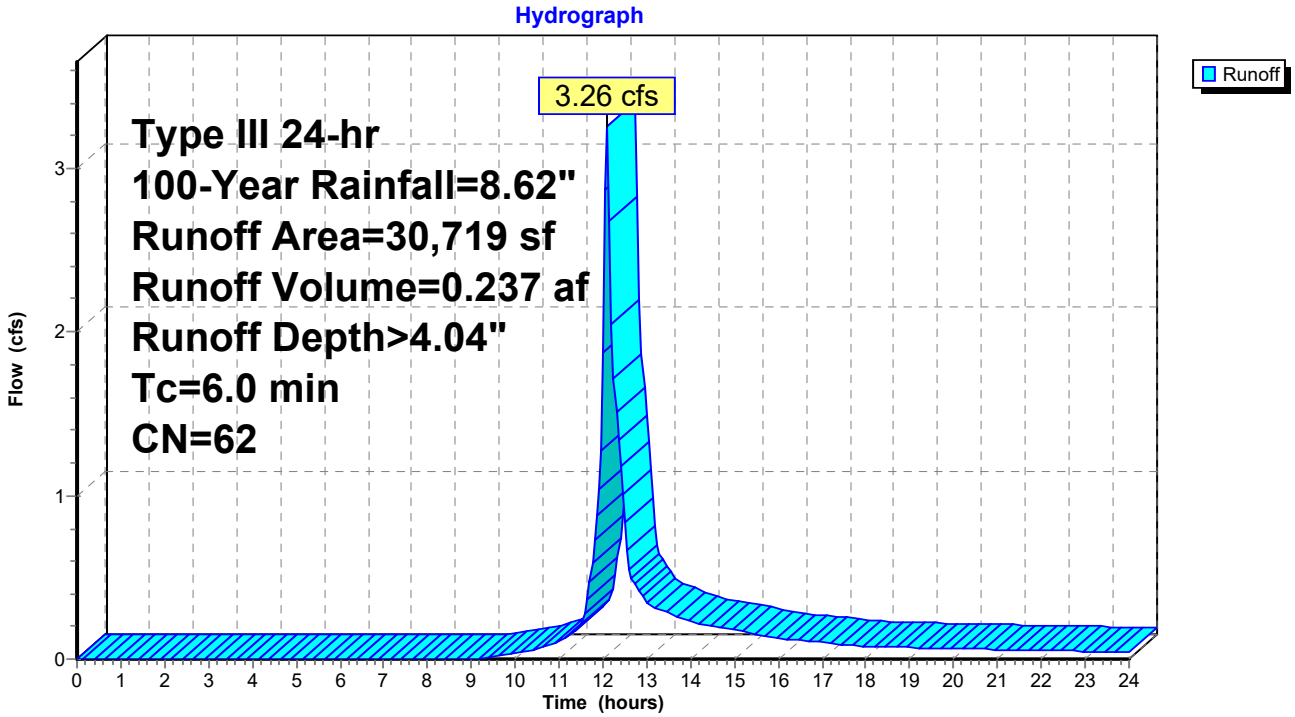
Runoff = 3.26 cfs @ 12.09 hrs, Volume= 0.237 af, Depth> 4.04"
Routed to Link 1L : Lake Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.62"

Area (sf)	CN	Description
11,885	98	Paved parking, HSG A
18,834	39	>75% Grass cover, Good, HSG A
30,719	62	Weighted Average
18,834		61.31% Pervious Area
11,885		38.69% Impervious Area

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

Subcatchment 2S: Boatramp Runoff

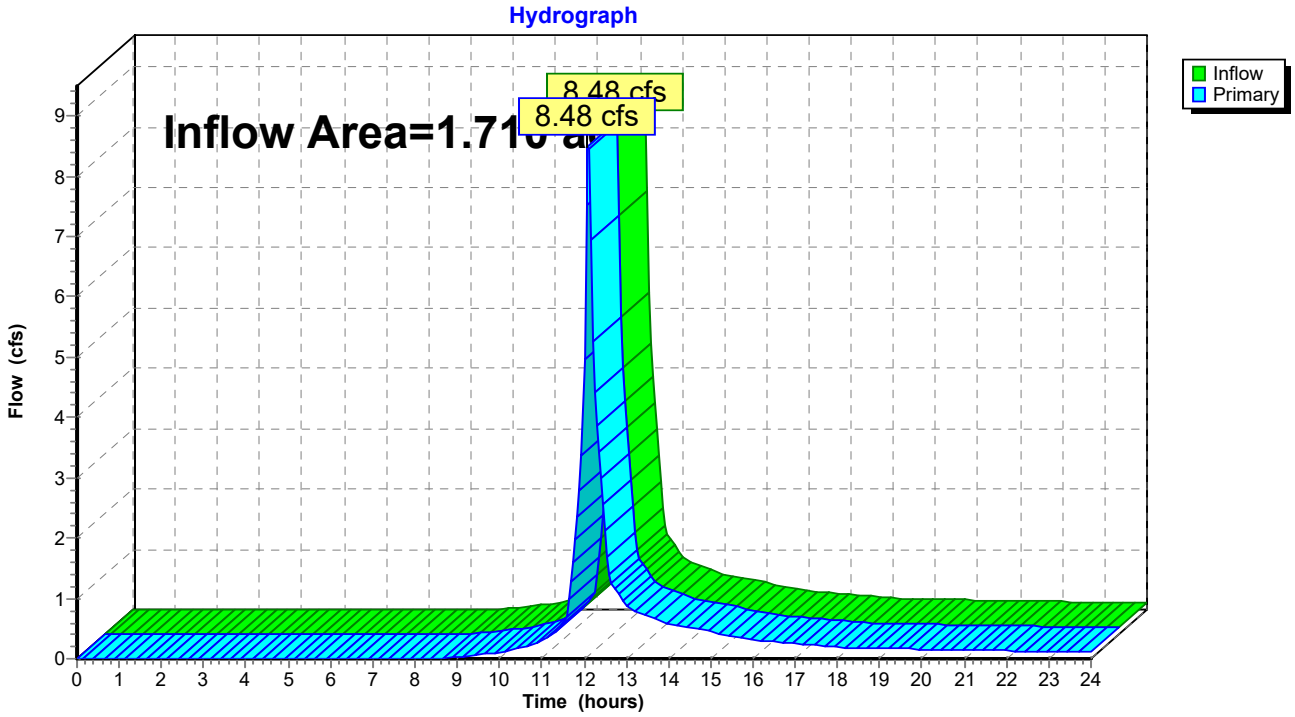


Summary for Link 1L: Lake Q

Inflow Area = 1.710 ac, 42.86% Impervious, Inflow Depth > 4.32" for 100-Year event
Inflow = 8.48 cfs @ 12.09 hrs, Volume= 0.615 af
Primary = 8.48 cfs @ 12.09 hrs, Volume= 0.615 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 1L: Lake Q



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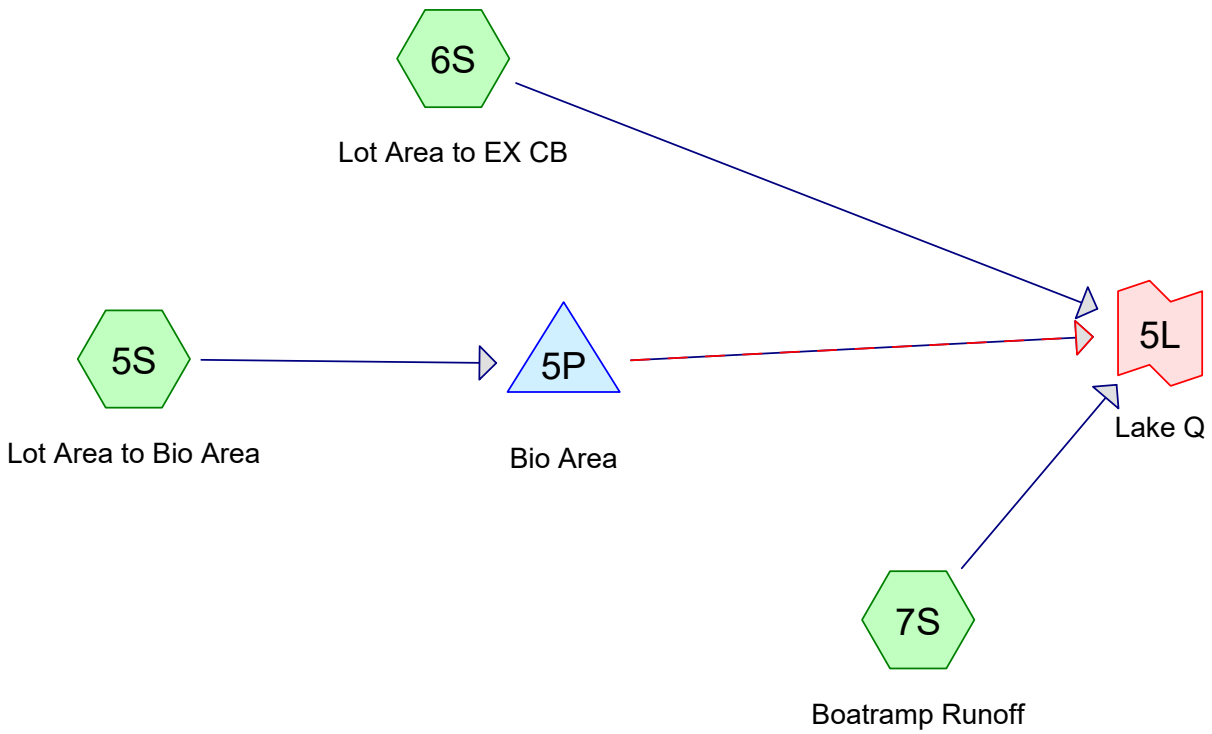
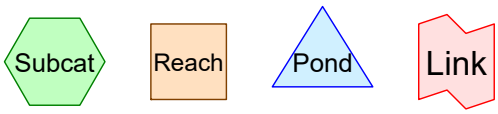
Attachment 4b:

Post-development HydroCAD Report





Routing Diagram for post_parking lot 03 29 24
Prepared by {enter your company name here}, Printed 4/5/2024
HydroCAD® 10.10-6a s/n 11989 © 2020 HydroCAD Software Solutions LLC

Project Notes

Rainfall events imported from "Atlas-14-Rain.txt" for 6679 MA Middlesex North
Rainfall events imported from "Atlas-14-Rain.txt" for 6680 MA Middlesex South

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.16	2
2	10-Year	Type III 24-hr		Default	24.00	1	4.77	2
3	25-Year	Type III 24-hr		Default	24.00	1	6.03	2
4	100-Year	Type III 24-hr		Default	24.00	1	8.62	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.974	39	>75% Grass cover, Good, HSG A (5S, 6S, 7S)
0.736	98	Paved parking, HSG A (5S, 6S, 7S)
1.710	**64**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
1.710	HSG A	5S, 6S, 7S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
1.710		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.974	0.000	0.000	0.000	0.000	0.974	>75% Grass cover, Good	5S, 6S, 7S
0.736	0.000	0.000	0.000	0.000	0.736	Paved parking	5S, 6S, 7S
1.710	**0.000**	**0.000**	**0.000**	**0.000**	**1.710**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	5P	81.25	81.25	60.0	0.0000	0.012	0.0	4.0	0.0

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 5S: Lot Area to Bio Area Runoff Area=22,579 sf 75.98% Impervious Runoff Depth>1.65"
Tc=6.0 min CN=84 Runoff=0.98 cfs 0.071 af

Subcatchment 6S: Lot Area to EX CB Runoff Area=22,015 sf 29.18% Impervious Runoff Depth>0.27"
Tc=6.0 min CN=56 Runoff=0.06 cfs 0.011 af

Subcatchment 7S: Boatramp Runoff Runoff Area=29,886 sf 28.39% Impervious Runoff Depth>0.27"
Tc=6.0 min CN=56 Runoff=0.08 cfs 0.015 af

Pond 5P: Bio Area Peak Elev=82.75' Storage=1,343 cf Inflow=0.98 cfs 0.071 af
Primary=0.00 cfs 0.000 af Secondary=0.43 cfs 0.041 af Outflow=0.43 cfs 0.041 af

Link 5L: Lake Q Inflow=0.57 cfs 0.067 af
Primary=0.57 cfs 0.067 af

Total Runoff Area = 1.710 ac Runoff Volume = 0.098 af Average Runoff Depth = 0.69"
56.95% Pervious = 0.974 ac 43.05% Impervious = 0.736 ac

Summary for Subcatchment 5S: Lot Area to Bio Area

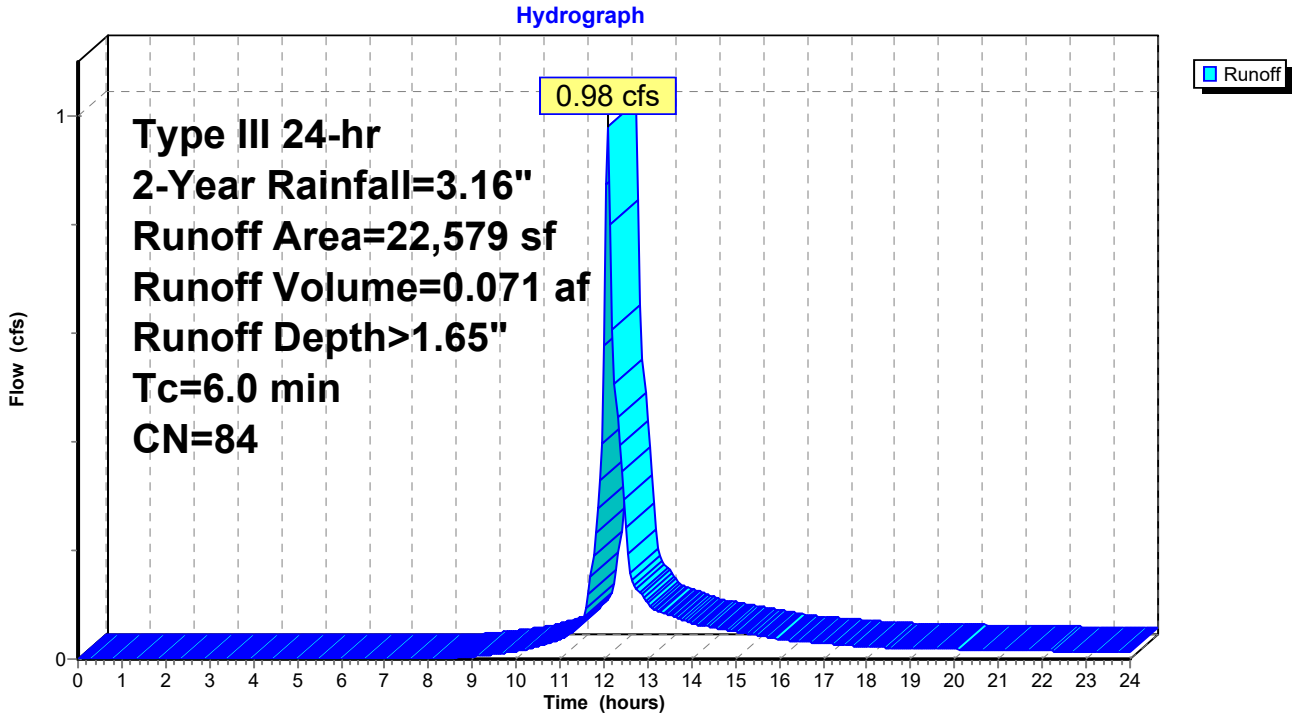
Runoff = 0.98 cfs @ 12.09 hrs, Volume= 0.071 af, Depth> 1.65"
Routed to Pond 5P : Bio Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
17,156	98	Paved parking, HSG A
5,423	39	>75% Grass cover, Good, HSG A
22,579	84	Weighted Average
5,423		24.02% Pervious Area
17,156		75.98% Impervious Area

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

Subcatchment 5S: Lot Area to Bio Area



Summary for Subcatchment 6S: Lot Area to EX CB

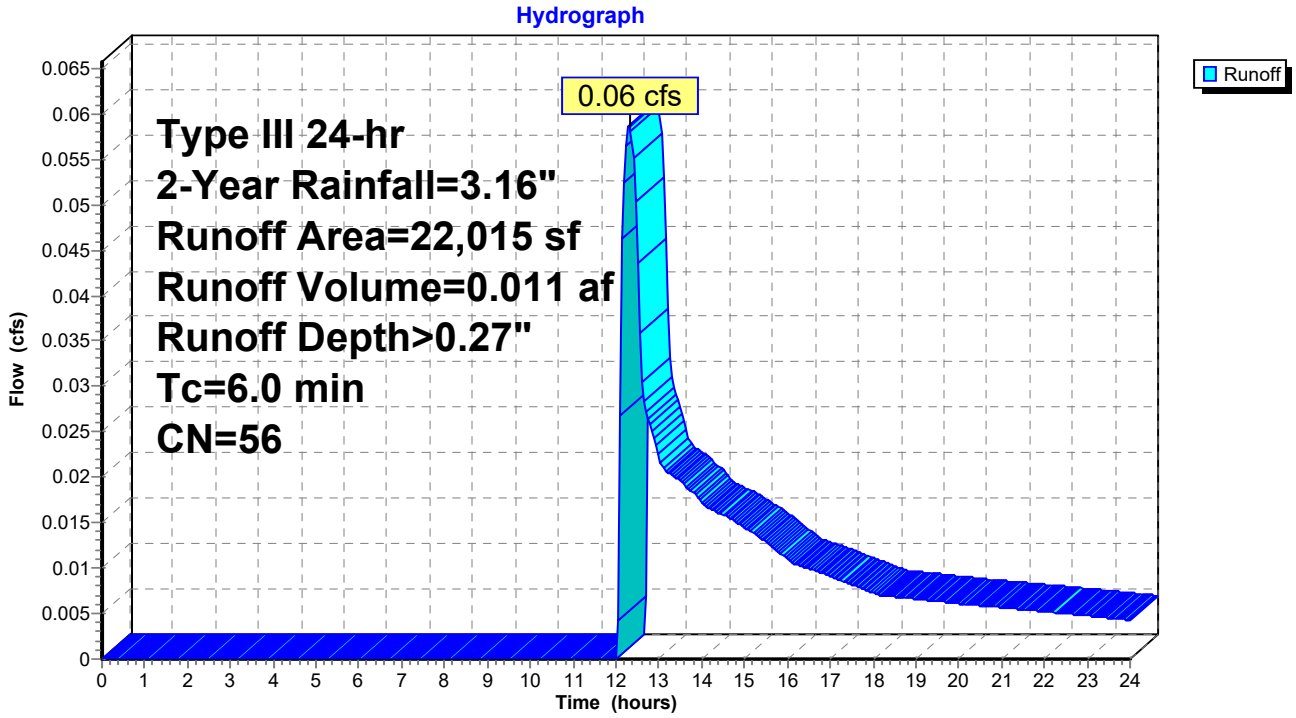
Runoff = 0.06 cfs @ 12.32 hrs, Volume= 0.011 af, Depth> 0.27"
Routed to Link 5L : Lake Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
6,423	98	Paved parking, HSG A
15,592	39	>75% Grass cover, Good, HSG A
22,015	56	Weighted Average
15,592		70.82% Pervious Area
6,423		29.18% Impervious Area

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

Subcatchment 6S: Lot Area to EX CB



Summary for Subcatchment 7S: Boatramp Runoff

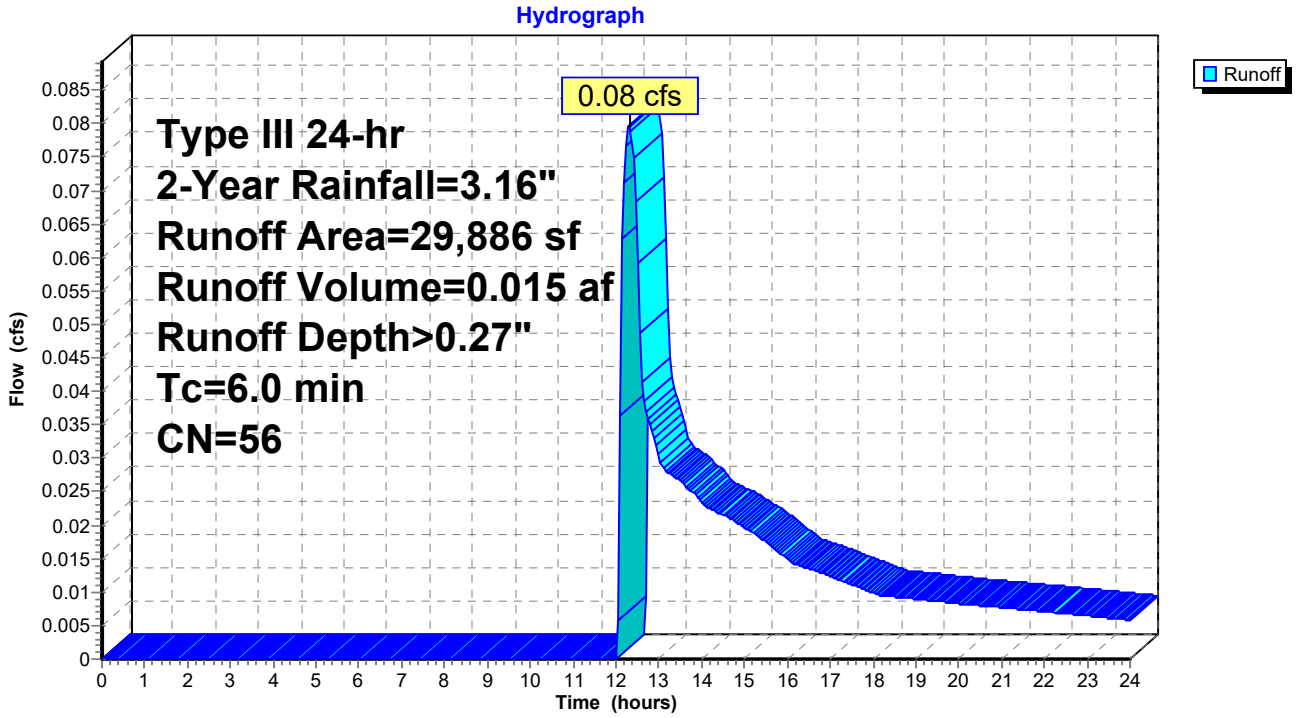
Runoff = 0.08 cfs @ 12.32 hrs, Volume= 0.015 af, Depth> 0.27"
Routed to Link 5L : Lake Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.16"

Area (sf)	CN	Description
8,486	98	Paved parking, HSG A
21,400	39	>75% Grass cover, Good, HSG A
29,886	56	Weighted Average
21,400		71.61% Pervious Area
8,486		28.39% Impervious Area

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

Subcatchment 7S: Boatramp Runoff



Summary for Pond 5P: Bio Area

Inflow Area = 0.518 ac, 75.98% Impervious, Inflow Depth > 1.65" for 2-Year event
Inflow = 0.98 cfs @ 12.09 hrs, Volume= 0.071 af
Outflow = 0.43 cfs @ 12.33 hrs, Volume= 0.041 af, Atten= 56%, Lag= 14.1 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link 5L : Lake Q
Secondary = 0.43 cfs @ 12.33 hrs, Volume= 0.041 af
Routed to Link 5L : Lake Q

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 82.75' @ 12.33 hrs Surf.Area= 1,802 sf Storage= 1,343 cf

Plug-Flow detention time= 202.3 min calculated for 0.040 af (57% of inflow)
Center-of-Mass det. time= 91.7 min (921.3 - 829.6)

Volume	Invert	Avail.Storage	Storage Description
#1	81.25'	524 cf	**Custom Stage Data (Irregular)**Listed below (Recalc) -Impervious 1,311 cf Overall x 40.0% Voids
#2	82.25'	810 cf	**Custom Stage Data (Irregular)**Listed below (Recalc) -Impervious
#3	82.75'	468 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)
		1,803 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
81.25	1,311	286.0	0	0	1,311
82.25	1,311	286.0	1,311	1,311	1,597

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
82.25	1,312	286.0	0.0	0	0	1,312
82.75	1,951	305.3	100.0	810	810	2,232

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
82.75	1,799	301.0	0	0	1,799
83.00	1,950	305.0	468	468	2,006

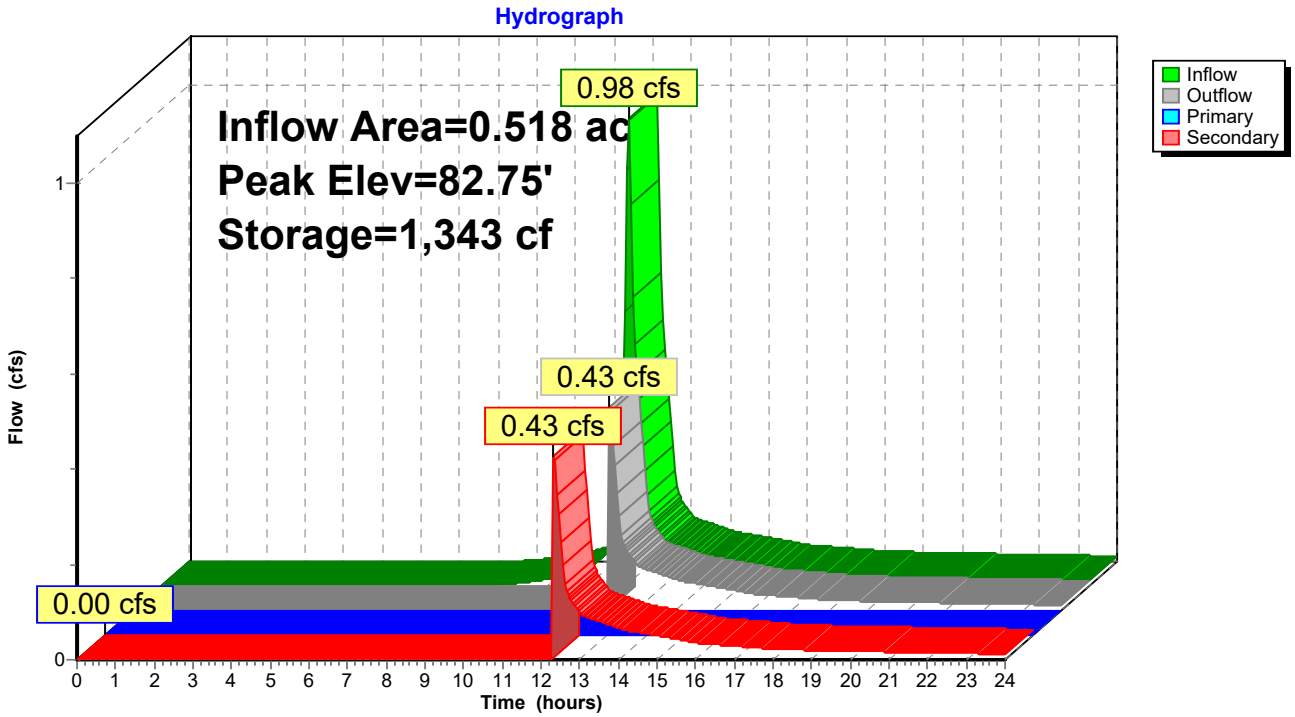
Device	Routing	Invert	Outlet Devices
#1	Secondary	83.45'	**20.0' long + 1.0 '/' SideZ x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Secondary	82.85'	**12.0" Horiz. Orifice/Grate** C= 1.000 Limited to weir flow at low heads
#3	Secondary	82.75'	**12.0" Horiz. Orifice/Grate** C= 1.000
#4	Device 5	82.75'	**99.000 in/hr Exfiltration over Surface area from 81.25' - 82.25'** Conductivity to Groundwater Elevation = 70.00' Excluded Surface area = 0 sf
#5	Primary	81.25'	**4.0" Round Culvert X 4.00** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 81.25' / 81.25' S= 0.0000 '/' Cc= 0.900

n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=81.25' TW=0.00' (Dynamic Tailwater)
└─**5=Culvert** (Controls 0.00 cfs)
  └─**4=Exfiltration** (Controls 0.00 cfs)

Secondary OutFlow Max=0.42 cfs @ 12.33 hrs HW=82.75' TW=0.00' (Dynamic Tailwater)
├─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
├─**2=Orifice/Grate** (Controls 0.00 cfs)
└─**3=Orifice/Grate** (Orifice Controls 0.42 cfs @ 0.53 fps)

Pond 5P: Bio Area

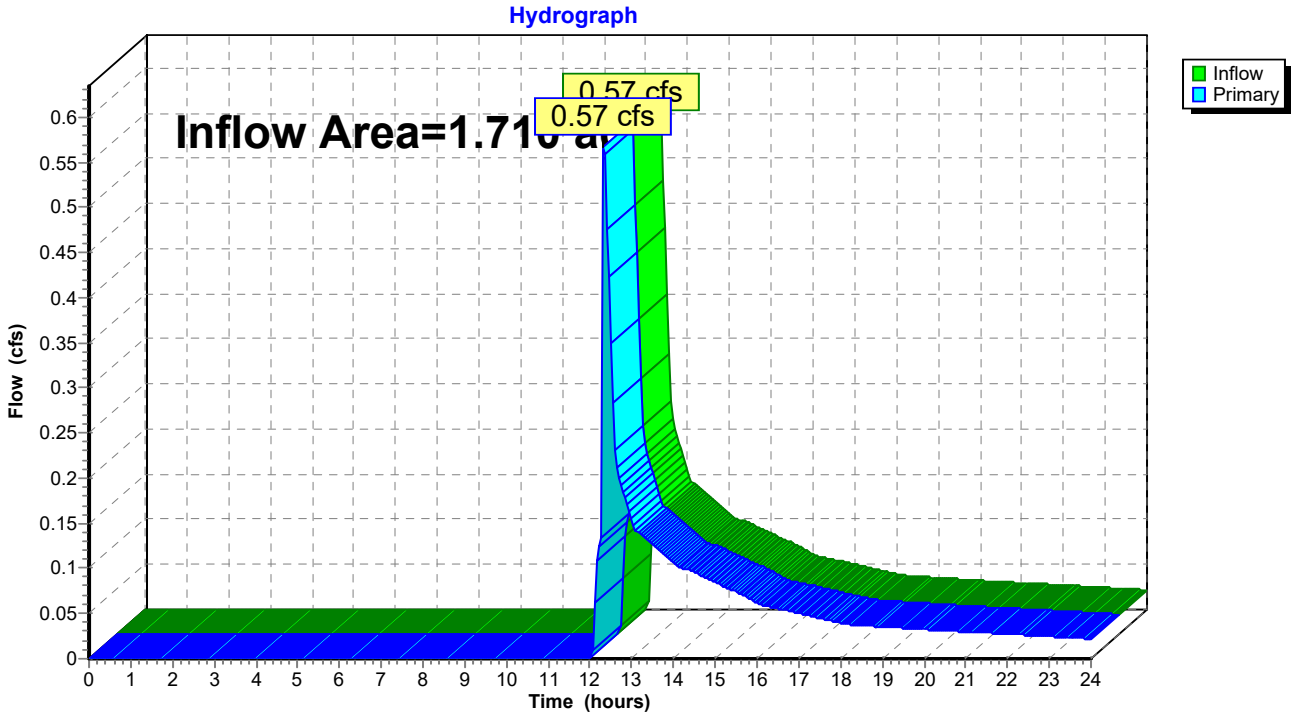


Summary for Link 5L: Lake Q

Inflow Area = 1.710 ac, 43.05% Impervious, Inflow Depth > 0.47" for 2-Year event
Inflow = 0.57 cfs @ 12.33 hrs, Volume= 0.067 af
Primary = 0.57 cfs @ 12.33 hrs, Volume= 0.067 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 5L: Lake Q



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 5S: Lot Area to Bio Area Runoff Area=22,579 sf 75.98% Impervious Runoff Depth>3.06"
Tc=6.0 min CN=84 Runoff=1.81 cfs 0.132 af

Subcatchment 6S: Lot Area to EX CB Runoff Area=22,015 sf 29.18% Impervious Runoff Depth>0.92"
Tc=6.0 min CN=56 Runoff=0.43 cfs 0.039 af

Subcatchment 7S: Boatramp Runoff Runoff Area=29,886 sf 28.39% Impervious Runoff Depth>0.92"
Tc=6.0 min CN=56 Runoff=0.59 cfs 0.053 af

Pond 5P: Bio Area Peak Elev=82.82' Storage=1,463 cf Inflow=1.81 cfs 0.132 af
Primary=0.00 cfs 0.000 af Secondary=1.68 cfs 0.101 af Outflow=1.68 cfs 0.101 af

Link 5L: Lake Q Inflow=2.69 cfs 0.193 af
Primary=2.69 cfs 0.193 af

Total Runoff Area = 1.710 ac Runoff Volume = 0.224 af Average Runoff Depth = 1.57"
56.95% Pervious = 0.974 ac 43.05% Impervious = 0.736 ac

Summary for Subcatchment 5S: Lot Area to Bio Area

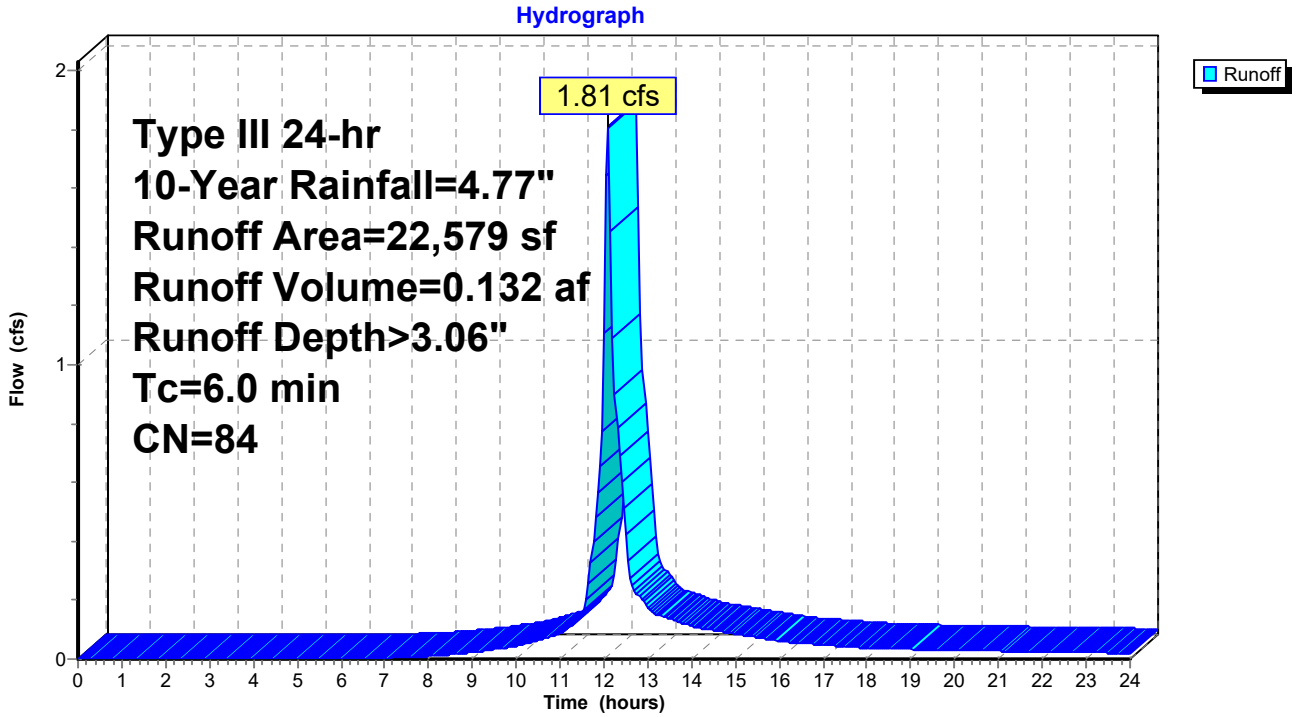
Runoff = 1.81 cfs @ 12.09 hrs, Volume= 0.132 af, Depth> 3.06"
Routed to Pond 5P : Bio Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.77"

Area (sf)	CN	Description
17,156	98	Paved parking, HSG A
5,423	39	>75% Grass cover, Good, HSG A
22,579	84	Weighted Average
5,423		24.02% Pervious Area
17,156		75.98% Impervious Area

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

Subcatchment 5S: Lot Area to Bio Area



Summary for Subcatchment 6S: Lot Area to EX CB

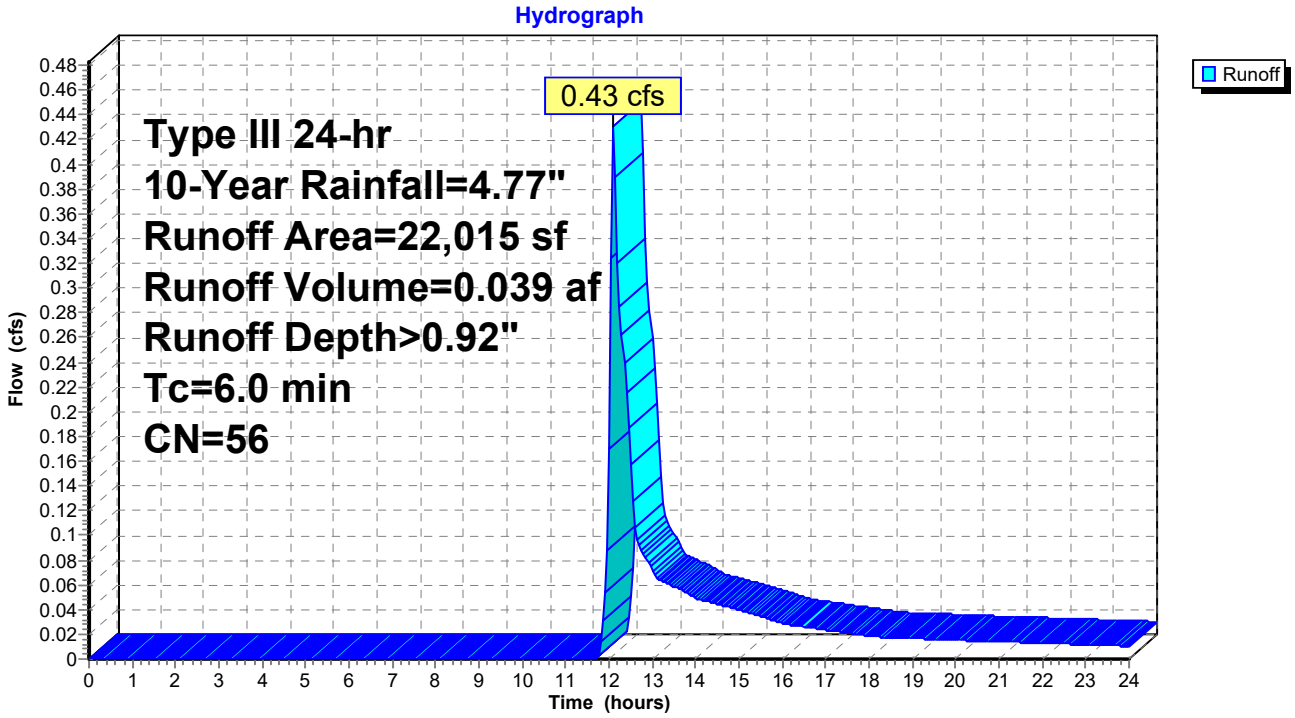
Runoff = 0.43 cfs @ 12.11 hrs, Volume= 0.039 af, Depth> 0.92"
Routed to Link 5L : Lake Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.77"

Area (sf)	CN	Description
6,423	98	Paved parking, HSG A
15,592	39	>75% Grass cover, Good, HSG A
22,015	56	Weighted Average
15,592		70.82% Pervious Area
6,423		29.18% Impervious Area

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

Subcatchment 6S: Lot Area to EX CB



Summary for Subcatchment 7S: Boatramp Runoff

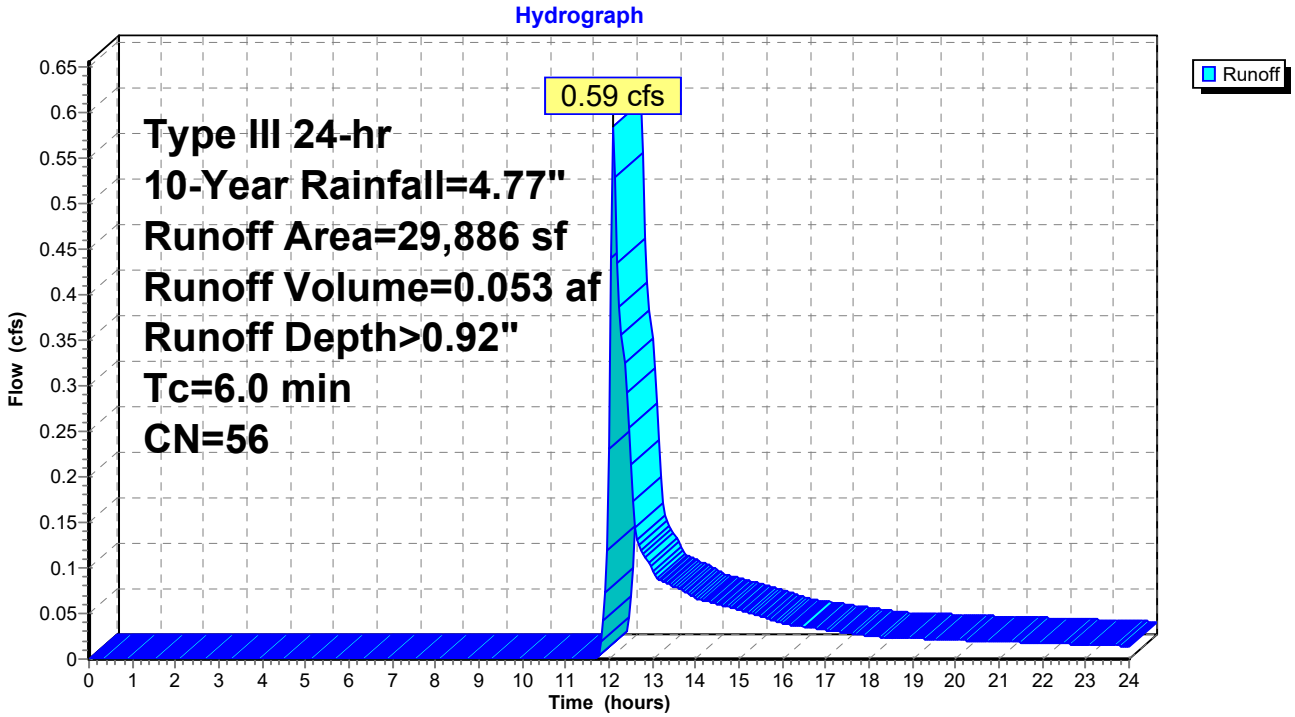
Runoff = 0.59 cfs @ 12.11 hrs, Volume= 0.053 af, Depth> 0.92"
Routed to Link 5L : Lake Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.77"

Area (sf)	CN	Description
8,486	98	Paved parking, HSG A
21,400	39	>75% Grass cover, Good, HSG A
29,886	56	Weighted Average
21,400		71.61% Pervious Area
8,486		28.39% Impervious Area

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

Subcatchment 7S: Boatramp Runoff



Summary for Pond 5P: Bio Area

Inflow Area = 0.518 ac, 75.98% Impervious, Inflow Depth > 3.06" for 10-Year event
Inflow = 1.81 cfs @ 12.09 hrs, Volume= 0.132 af
Outflow = 1.68 cfs @ 12.12 hrs, Volume= 0.101 af, Atten= 8%, Lag= 1.9 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link 5L : Lake Q
Secondary = 1.68 cfs @ 12.12 hrs, Volume= 0.101 af
Routed to Link 5L : Lake Q

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 82.82' @ 12.12 hrs Surf.Area= 1,841 sf Storage= 1,463 cf

Plug-Flow detention time= 126.8 min calculated for 0.101 af (77% of inflow)
Center-of-Mass det. time= 44.5 min (856.3 - 811.9)

Volume	Invert	Avail.Storage	Storage Description
#1	81.25'	524 cf	**Custom Stage Data (Irregular)**Listed below (Recalc) -Impervious 1,311 cf Overall x 40.0% Voids
#2	82.25'	810 cf	**Custom Stage Data (Irregular)**Listed below (Recalc) -Impervious
#3	82.75'	468 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)
		1,803 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
81.25	1,311	286.0	0	0	1,311
82.25	1,311	286.0	1,311	1,311	1,597

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
82.25	1,312	286.0	0.0	0	0	1,312
82.75	1,951	305.3	100.0	810	810	2,232

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
82.75	1,799	301.0	0	0	1,799
83.00	1,950	305.0	468	468	2,006

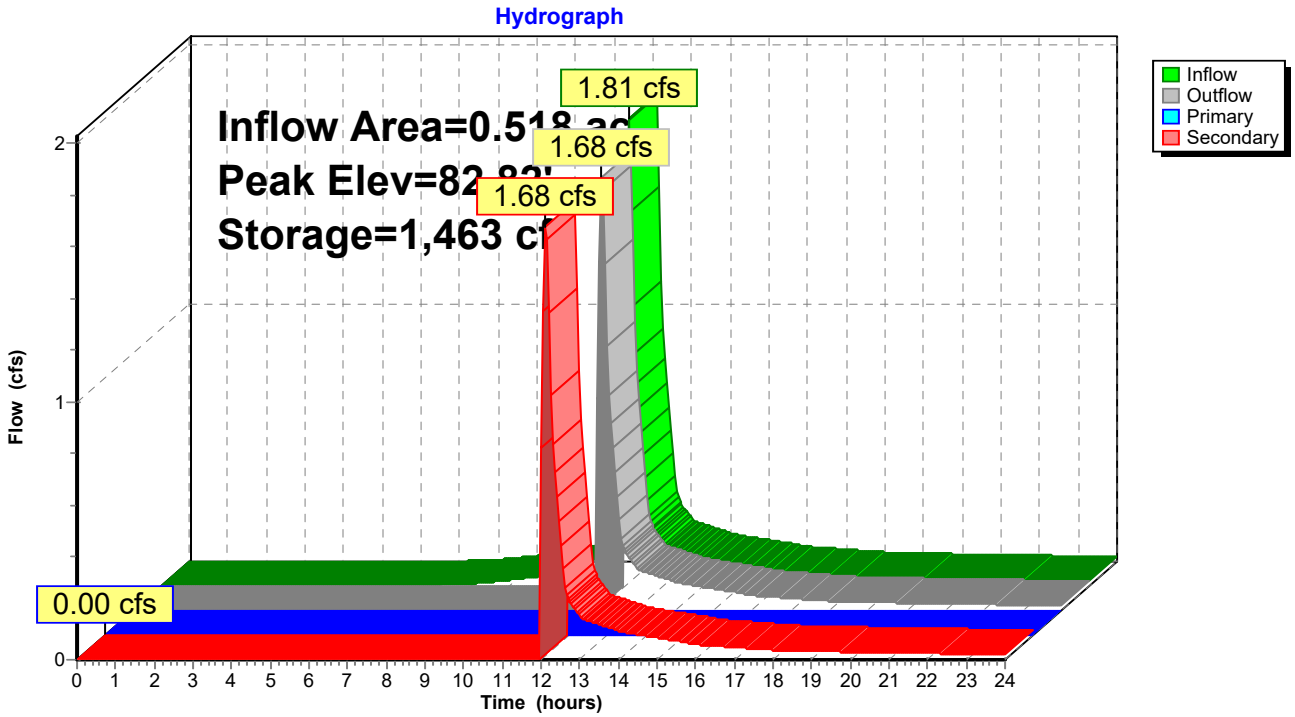
Device	Routing	Invert	Outlet Devices
#1	Secondary	83.45'	**20.0' long + 1.0 '/' SideZ x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Secondary	82.85'	**12.0" Horiz. Orifice/Grate** C= 1.000 Limited to weir flow at low heads
#3	Secondary	82.75'	**12.0" Horiz. Orifice/Grate** C= 1.000
#4	Device 5	82.75'	**99.000 in/hr Exfiltration over Surface area from 81.25' - 82.25'** Conductivity to Groundwater Elevation = 70.00' Excluded Surface area = 0 sf
#5	Primary	81.25'	**4.0" Round Culvert X 4.00** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 81.25' / 81.25' S= 0.0000 '/' Cc= 0.900

n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=81.25' TW=0.00' (Dynamic Tailwater)
└─**5=Culvert** (Controls 0.00 cfs)
  └─**4=Exfiltration** (Controls 0.00 cfs)

Secondary OutFlow Max=1.64 cfs @ 12.12 hrs HW=82.82' TW=0.00' (Dynamic Tailwater)
├─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
├─**2=Orifice/Grate** (Controls 0.00 cfs)
└─**3=Orifice/Grate** (Orifice Controls 1.64 cfs @ 2.08 fps)

Pond 5P: Bio Area

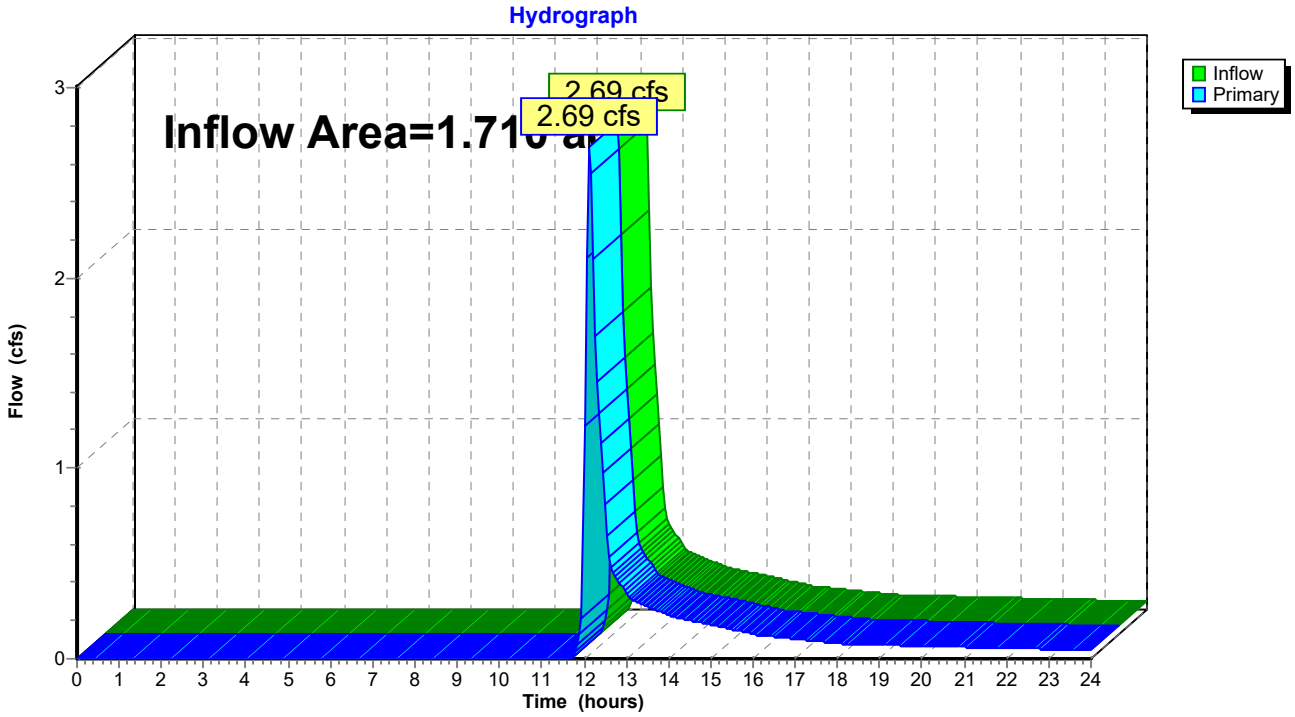


Summary for Link 5L: Lake Q

Inflow Area = 1.710 ac, 43.05% Impervious, Inflow Depth > 1.36" for 10-Year event
Inflow = 2.69 cfs @ 12.12 hrs, Volume= 0.193 af
Primary = 2.69 cfs @ 12.12 hrs, Volume= 0.193 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 5L: Lake Q



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 5S: Lot Area to Bio Area Runoff Area=22,579 sf 75.98% Impervious Runoff Depth>4.22"
Tc=6.0 min CN=84 Runoff=2.47 cfs 0.182 af

Subcatchment 6S: Lot Area to EX CB Runoff Area=22,015 sf 29.18% Impervious Runoff Depth>1.61"
Tc=6.0 min CN=56 Runoff=0.85 cfs 0.068 af

Subcatchment 7S: Boatramp Runoff Runoff Area=29,886 sf 28.39% Impervious Runoff Depth>1.61"
Tc=6.0 min CN=56 Runoff=1.16 cfs 0.092 af

Pond 5P: Bio Area Peak Elev=82.87' Storage=1,558 cf Inflow=2.47 cfs 0.182 af
Primary=0.00 cfs 0.000 af Secondary=2.23 cfs 0.152 af Outflow=2.23 cfs 0.152 af

Link 5L: Lake Q Inflow=4.21 cfs 0.312 af
Primary=4.21 cfs 0.312 af

Total Runoff Area = 1.710 ac Runoff Volume = 0.342 af Average Runoff Depth = 2.40"
56.95% Pervious = 0.974 ac 43.05% Impervious = 0.736 ac

Summary for Subcatchment 5S: Lot Area to Bio Area

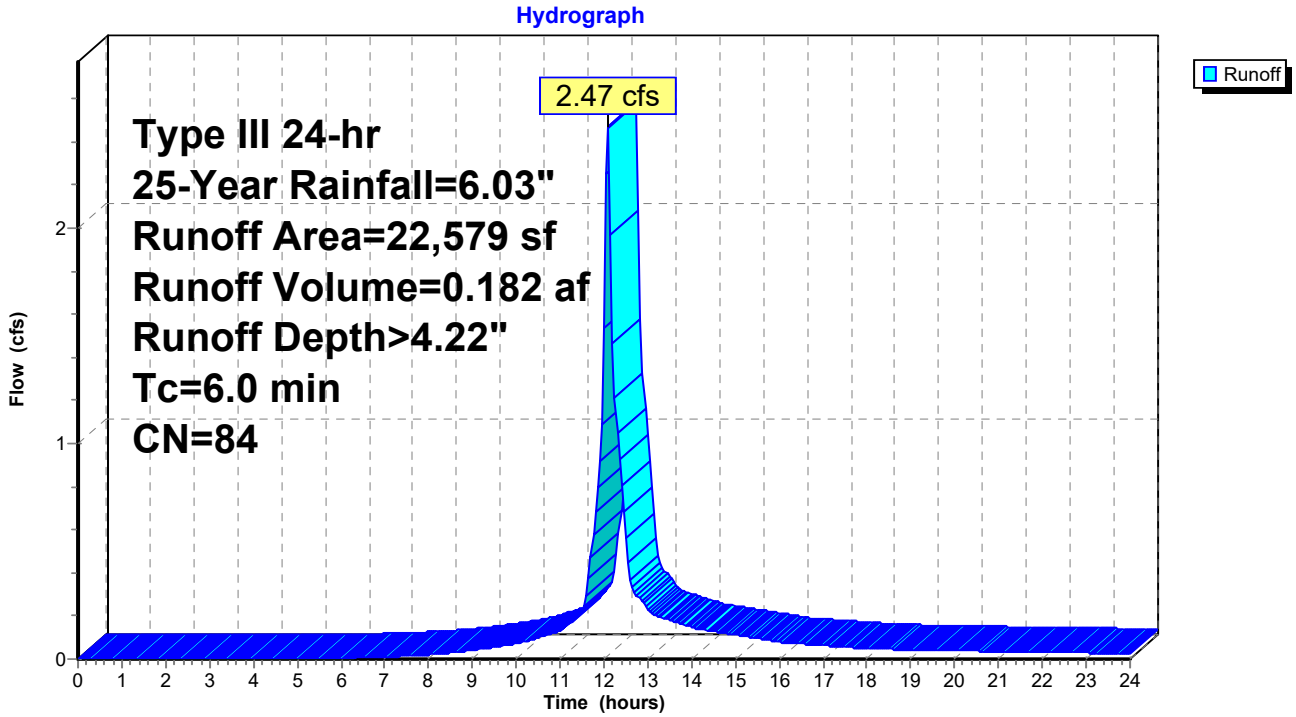
Runoff = 2.47 cfs @ 12.09 hrs, Volume= 0.182 af, Depth> 4.22"
Routed to Pond 5P : Bio Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.03"

Area (sf)	CN	Description
17,156	98	Paved parking, HSG A
5,423	39	>75% Grass cover, Good, HSG A
22,579	84	Weighted Average
5,423		24.02% Pervious Area
17,156		75.98% Impervious Area

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

Subcatchment 5S: Lot Area to Bio Area



Summary for Subcatchment 6S: Lot Area to EX CB

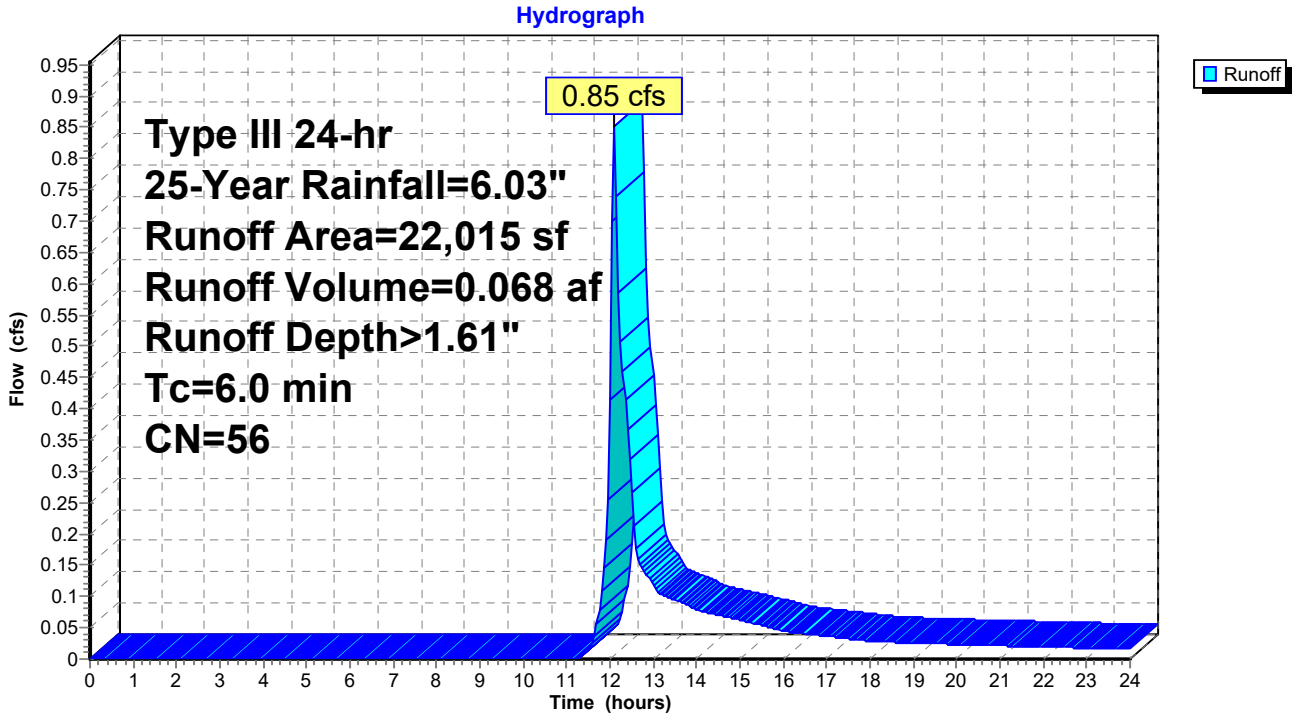
Runoff = 0.85 cfs @ 12.10 hrs, Volume= 0.068 af, Depth> 1.61"
Routed to Link 5L : Lake Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.03"

Area (sf)	CN	Description
6,423	98	Paved parking, HSG A
15,592	39	>75% Grass cover, Good, HSG A
22,015	56	Weighted Average
15,592		70.82% Pervious Area
6,423		29.18% Impervious Area

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

Subcatchment 6S: Lot Area to EX CB



Summary for Subcatchment 7S: Boatramp Runoff

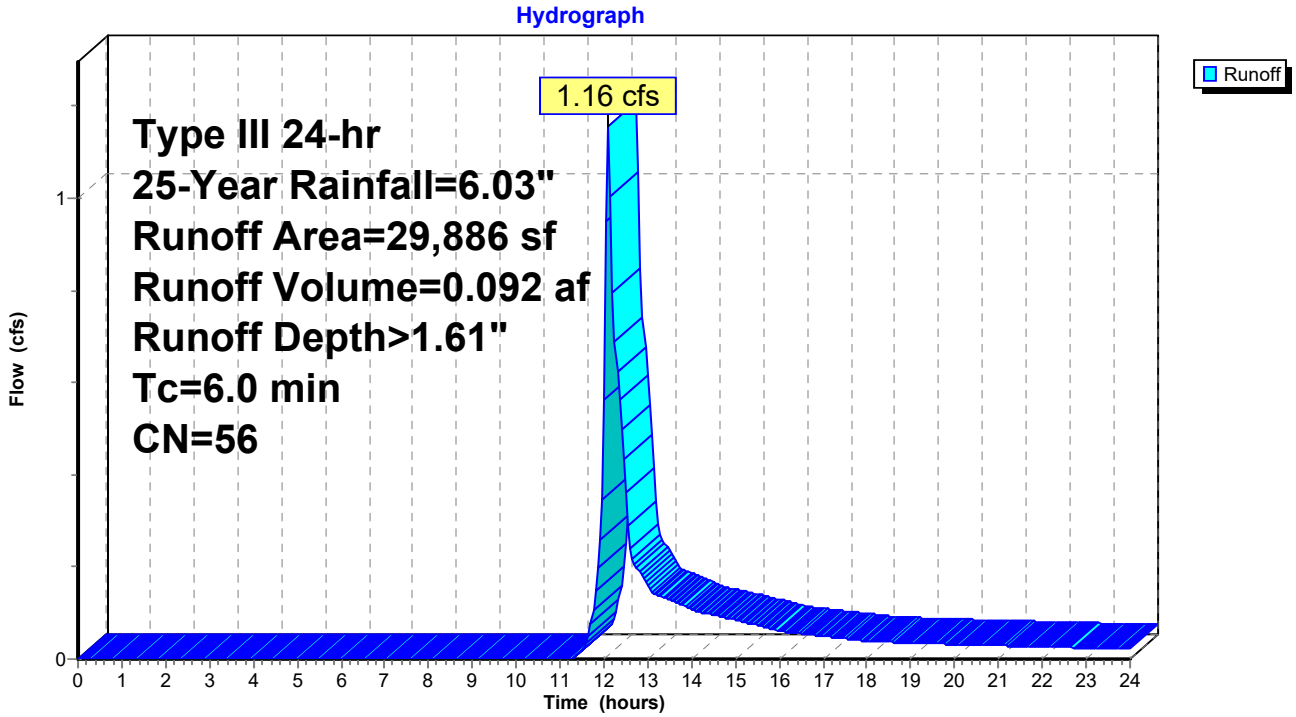
Runoff = 1.16 cfs @ 12.10 hrs, Volume= 0.092 af, Depth> 1.61"
Routed to Link 5L : Lake Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.03"

Area (sf)	CN	Description
8,486	98	Paved parking, HSG A
21,400	39	>75% Grass cover, Good, HSG A
29,886	56	Weighted Average
21,400		71.61% Pervious Area
8,486		28.39% Impervious Area

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

Subcatchment 7S: Boatramp Runoff



Summary for Pond 5P: Bio Area

Inflow Area = 0.518 ac, 75.98% Impervious, Inflow Depth > 4.22" for 25-Year event
Inflow = 2.47 cfs @ 12.09 hrs, Volume= 0.182 af
Outflow = 2.23 cfs @ 12.13 hrs, Volume= 0.152 af, Atten= 10%, Lag= 2.4 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link 5L : Lake Q
Secondary = 2.23 cfs @ 12.13 hrs, Volume= 0.152 af
Routed to Link 5L : Lake Q

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 82.87' @ 12.13 hrs Surf.Area= 1,872 sf Storage= 1,558 cf

Plug-Flow detention time= 104.0 min calculated for 0.152 af (83% of inflow)
Center-of-Mass det. time= 36.1 min (838.9 - 802.8)

Volume	Invert	Avail.Storage	Storage Description
#1	81.25'	524 cf	**Custom Stage Data (Irregular)**Listed below (Recalc) -Impervious 1,311 cf Overall x 40.0% Voids
#2	82.25'	810 cf	**Custom Stage Data (Irregular)**Listed below (Recalc) -Impervious
#3	82.75'	468 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)
		1,803 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
81.25	1,311	286.0	0	0	1,311
82.25	1,311	286.0	1,311	1,311	1,597

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
82.25	1,312	286.0	0.0	0	0	1,312
82.75	1,951	305.3	100.0	810	810	2,232

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
82.75	1,799	301.0	0	0	1,799
83.00	1,950	305.0	468	468	2,006

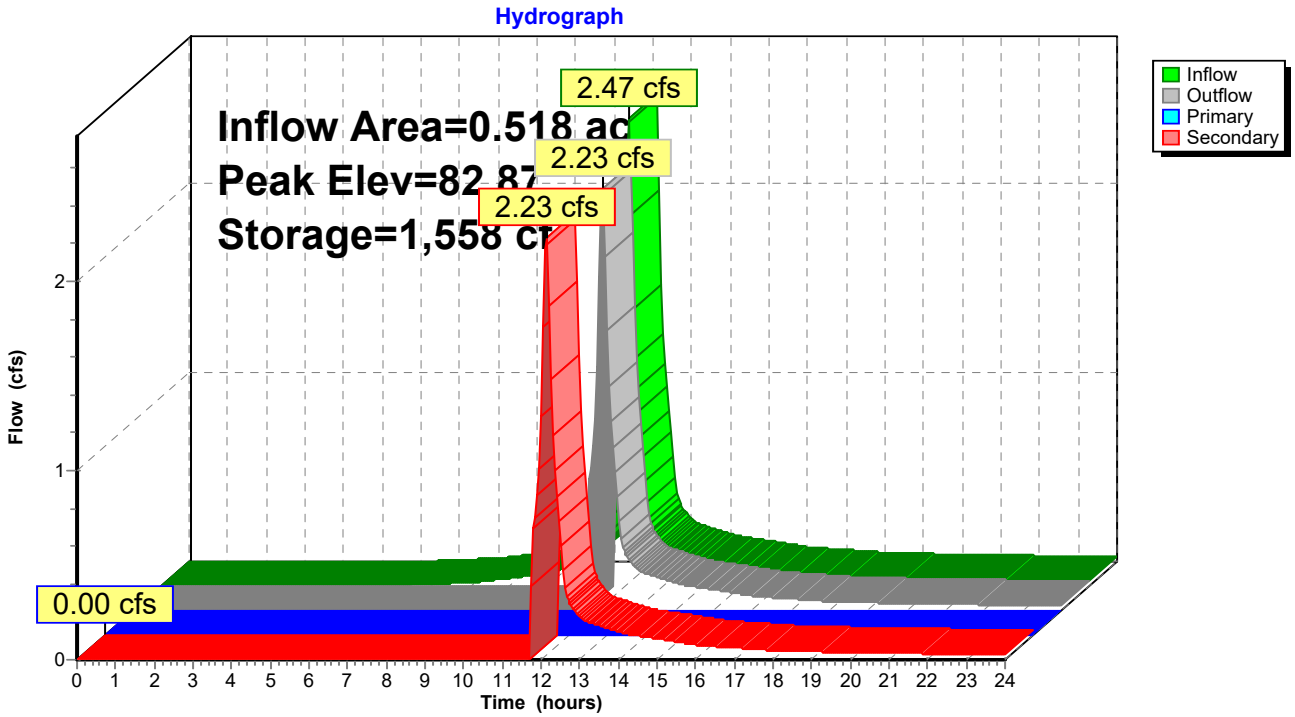
Device	Routing	Invert	Outlet Devices
#1	Secondary	83.45'	**20.0' long + 1.0 '/' SideZ x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Secondary	82.85'	**12.0" Horiz. Orifice/Grate** C= 1.000 Limited to weir flow at low heads
#3	Secondary	82.75'	**12.0" Horiz. Orifice/Grate** C= 1.000
#4	Device 5	82.75'	**99.000 in/hr Exfiltration over Surface area from 81.25' - 82.25'** Conductivity to Groundwater Elevation = 70.00' Excluded Surface area = 0 sf
#5	Primary	81.25'	**4.0" Round Culvert X 4.00** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 81.25' / 81.25' S= 0.0000 '/' Cc= 0.900

n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=81.25' TW=0.00' (Dynamic Tailwater)
└─**5=Culvert** (Controls 0.00 cfs)
  └─**4=Exfiltration** (Controls 0.00 cfs)

Secondary OutFlow Max=2.19 cfs @ 12.13 hrs HW=82.87' TW=0.00' (Dynamic Tailwater)
├─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
├─**2=Orifice/Grate** (Weir Controls 0.02 cfs @ 0.43 fps)
└─**3=Orifice/Grate** (Orifice Controls 2.16 cfs @ 2.75 fps)

Pond 5P: Bio Area

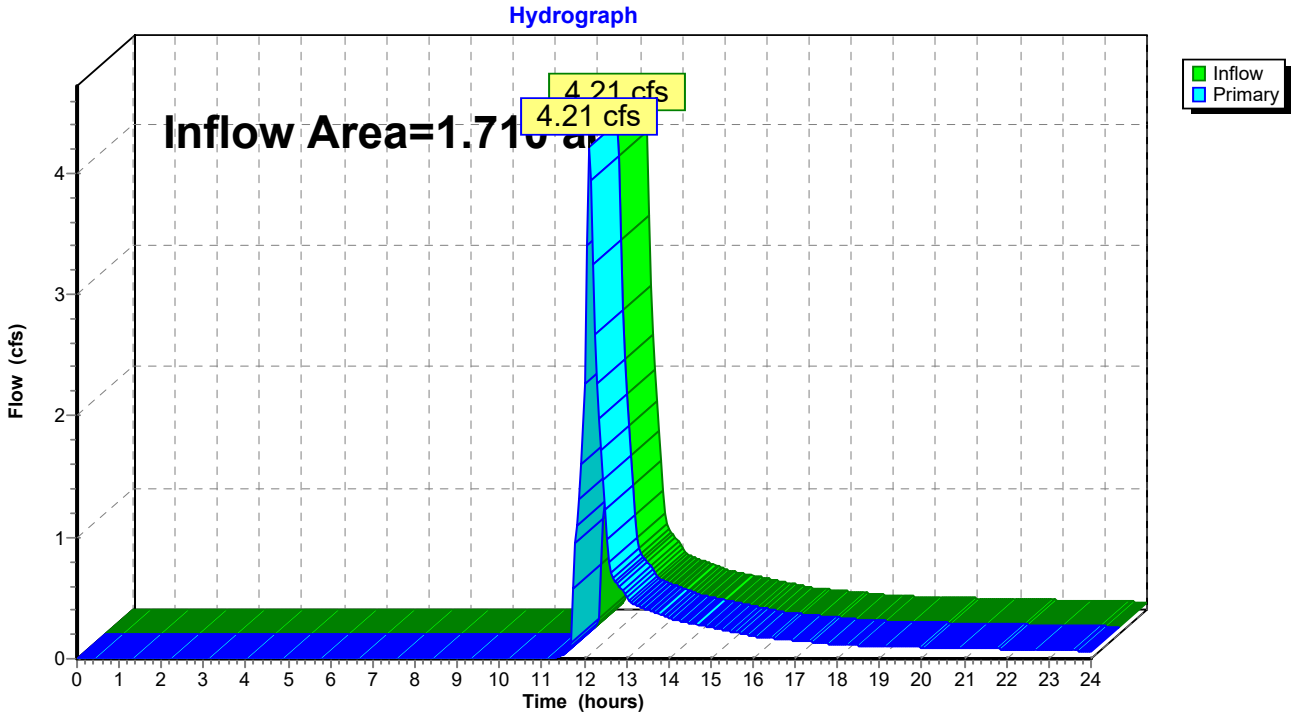


Summary for Link 5L: Lake Q

Inflow Area = 1.710 ac, 43.05% Impervious, Inflow Depth > 2.19" for 25-Year event
Inflow = 4.21 cfs @ 12.11 hrs, Volume= 0.312 af
Primary = 4.21 cfs @ 12.11 hrs, Volume= 0.312 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 5L: Lake Q



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points x 3
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 5S: Lot Area to Bio Area Runoff Area=22,579 sf 75.98% Impervious Runoff Depth>6.69"
Tc=6.0 min CN=84 Runoff=3.83 cfs 0.289 af

Subcatchment 6S: Lot Area to EX CB Runoff Area=22,015 sf 29.18% Impervious Runoff Depth>3.33"
Tc=6.0 min CN=56 Runoff=1.89 cfs 0.140 af

Subcatchment 7S: Boatramp Runoff Runoff Area=29,886 sf 28.39% Impervious Runoff Depth>3.33"
Tc=6.0 min CN=56 Runoff=2.57 cfs 0.190 af

Pond 5P: Bio Area Peak Elev=82.98' Storage=1,758 cf Inflow=3.83 cfs 0.289 af
Primary=0.00 cfs 0.000 af Secondary=3.46 cfs 0.258 af Outflow=3.46 cfs 0.258 af

Link 5L: Lake Q Inflow=7.86 cfs 0.589 af
Primary=7.86 cfs 0.589 af

Total Runoff Area = 1.710 ac Runoff Volume = 0.619 af Average Runoff Depth = 4.35"
56.95% Pervious = 0.974 ac 43.05% Impervious = 0.736 ac

Summary for Subcatchment 5S: Lot Area to Bio Area

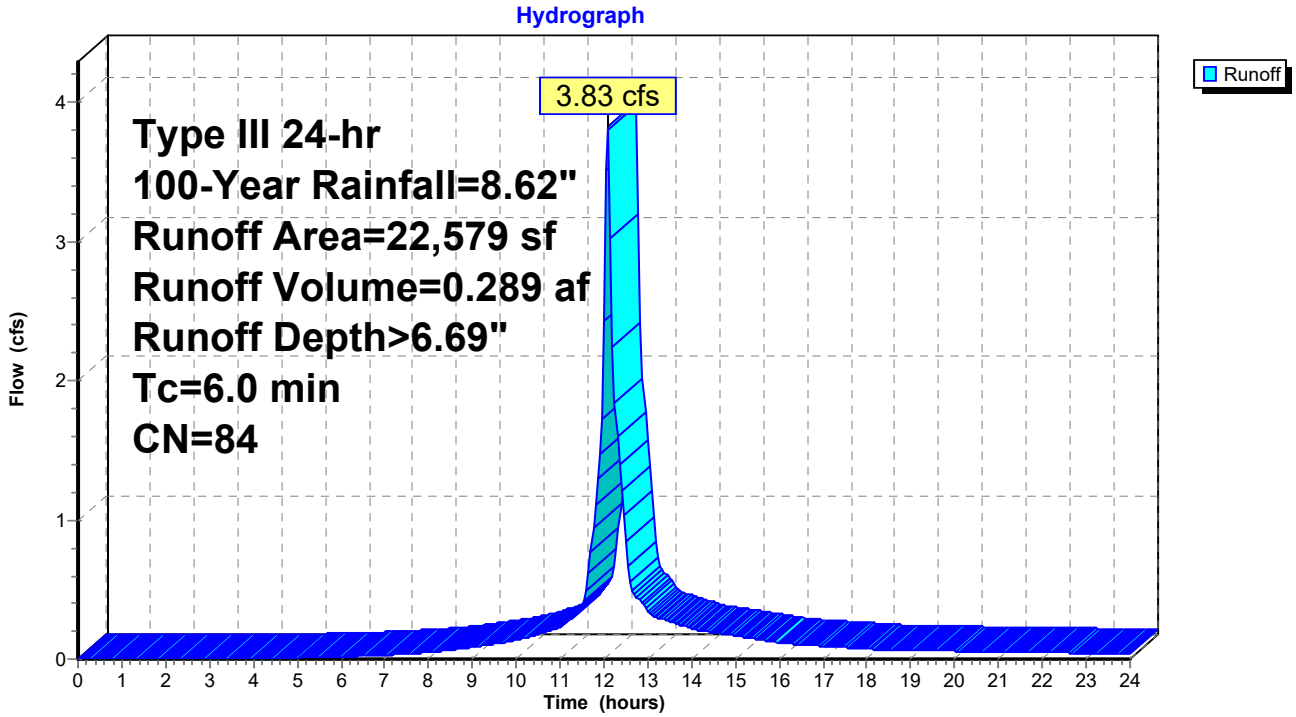
Runoff = 3.83 cfs @ 12.09 hrs, Volume= 0.289 af, Depth> 6.69"
Routed to Pond 5P : Bio Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.62"

Area (sf)	CN	Description
17,156	98	Paved parking, HSG A
5,423	39	>75% Grass cover, Good, HSG A
22,579	84	Weighted Average
5,423		24.02% Pervious Area
17,156		75.98% Impervious Area

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

Subcatchment 5S: Lot Area to Bio Area



Summary for Subcatchment 6S: Lot Area to EX CB

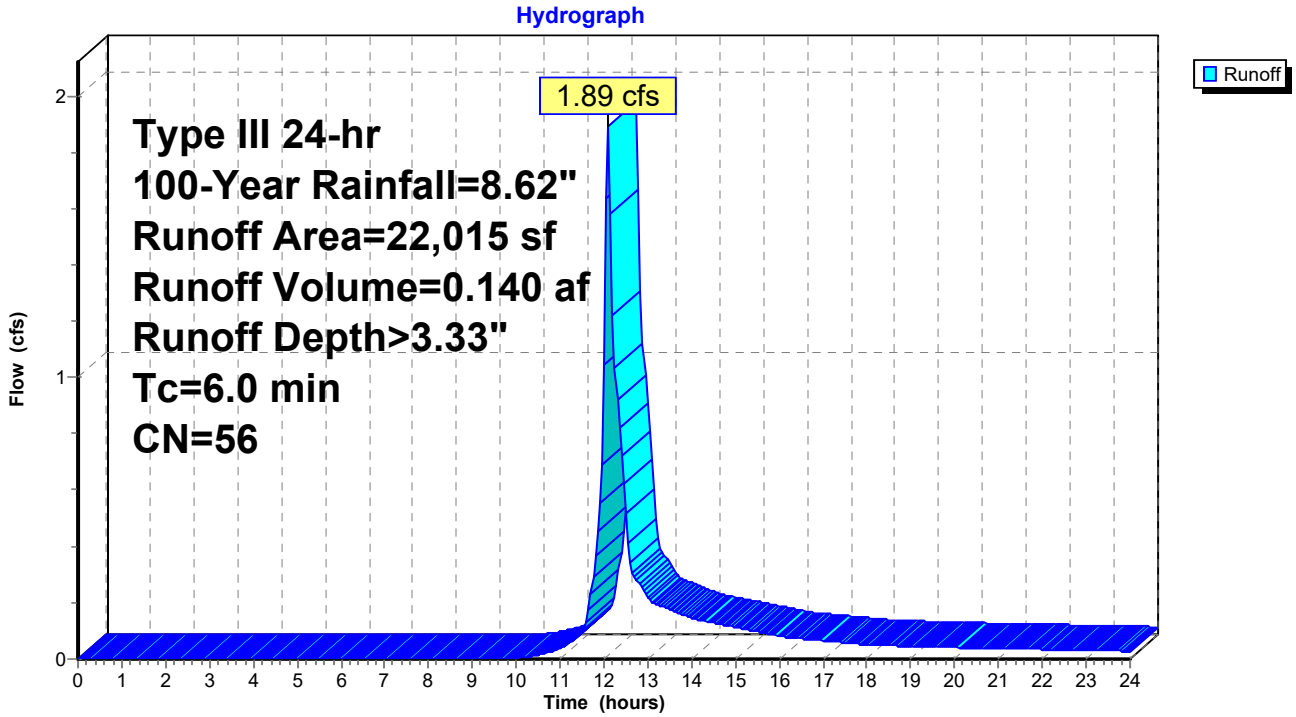
Runoff = 1.89 cfs @ 12.10 hrs, Volume= 0.140 af, Depth> 3.33"
Routed to Link 5L : Lake Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.62"

Area (sf)	CN	Description
6,423	98	Paved parking, HSG A
15,592	39	>75% Grass cover, Good, HSG A
22,015	56	Weighted Average
15,592		70.82% Pervious Area
6,423		29.18% Impervious Area

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

Subcatchment 6S: Lot Area to EX CB



Summary for Subcatchment 7S: Boatramp Runoff

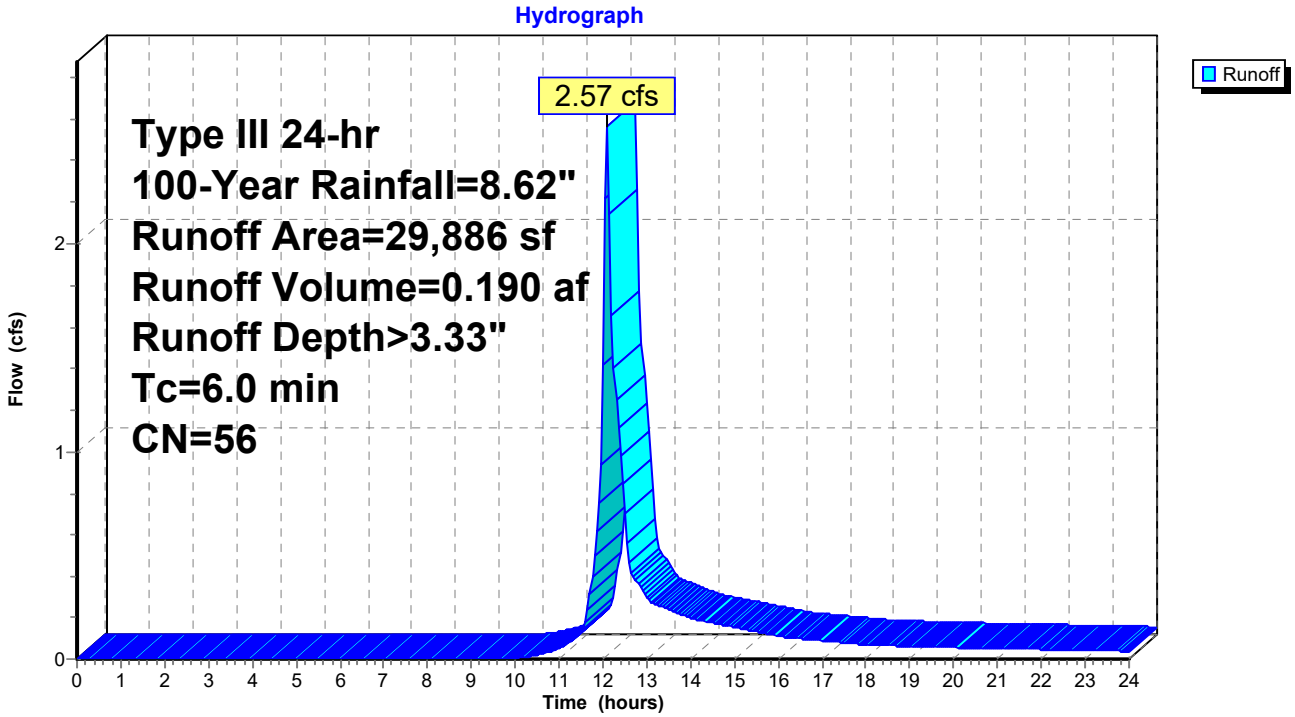
Runoff = 2.57 cfs @ 12.10 hrs, Volume= 0.190 af, Depth> 3.33"
Routed to Link 5L : Lake Q

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.62"

Area (sf)	CN	Description
8,486	98	Paved parking, HSG A
21,400	39	>75% Grass cover, Good, HSG A
29,886	56	Weighted Average
21,400		71.61% Pervious Area
8,486		28.39% Impervious Area

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

Subcatchment 7S: Boatramp Runoff



Summary for Pond 5P: Bio Area

Inflow Area = 0.518 ac, 75.98% Impervious, Inflow Depth > 6.69" for 100-Year event
Inflow = 3.83 cfs @ 12.09 hrs, Volume= 0.289 af
Outflow = 3.46 cfs @ 12.13 hrs, Volume= 0.258 af, Atten= 10%, Lag= 2.3 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link 5L : Lake Q
Secondary = 3.46 cfs @ 12.13 hrs, Volume= 0.258 af
Routed to Link 5L : Lake Q

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 82.98' @ 12.13 hrs Surf.Area= 1,936 sf Storage= 1,758 cf

Plug-Flow detention time= 79.5 min calculated for 0.258 af (89% of inflow)
Center-of-Mass det. time= 29.4 min (819.5 - 790.1)

Volume	Invert	Avail.Storage	Storage Description
#1	81.25'	524 cf	**Custom Stage Data (Irregular)**Listed below (Recalc) -Impervious 1,311 cf Overall x 40.0% Voids
#2	82.25'	810 cf	**Custom Stage Data (Irregular)**Listed below (Recalc) -Impervious
#3	82.75'	468 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)
		1,803 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
81.25	1,311	286.0	0	0	1,311
82.25	1,311	286.0	1,311	1,311	1,597

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
82.25	1,312	286.0	0.0	0	0	1,312
82.75	1,951	305.3	100.0	810	810	2,232

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
82.75	1,799	301.0	0	0	1,799
83.00	1,950	305.0	468	468	2,006

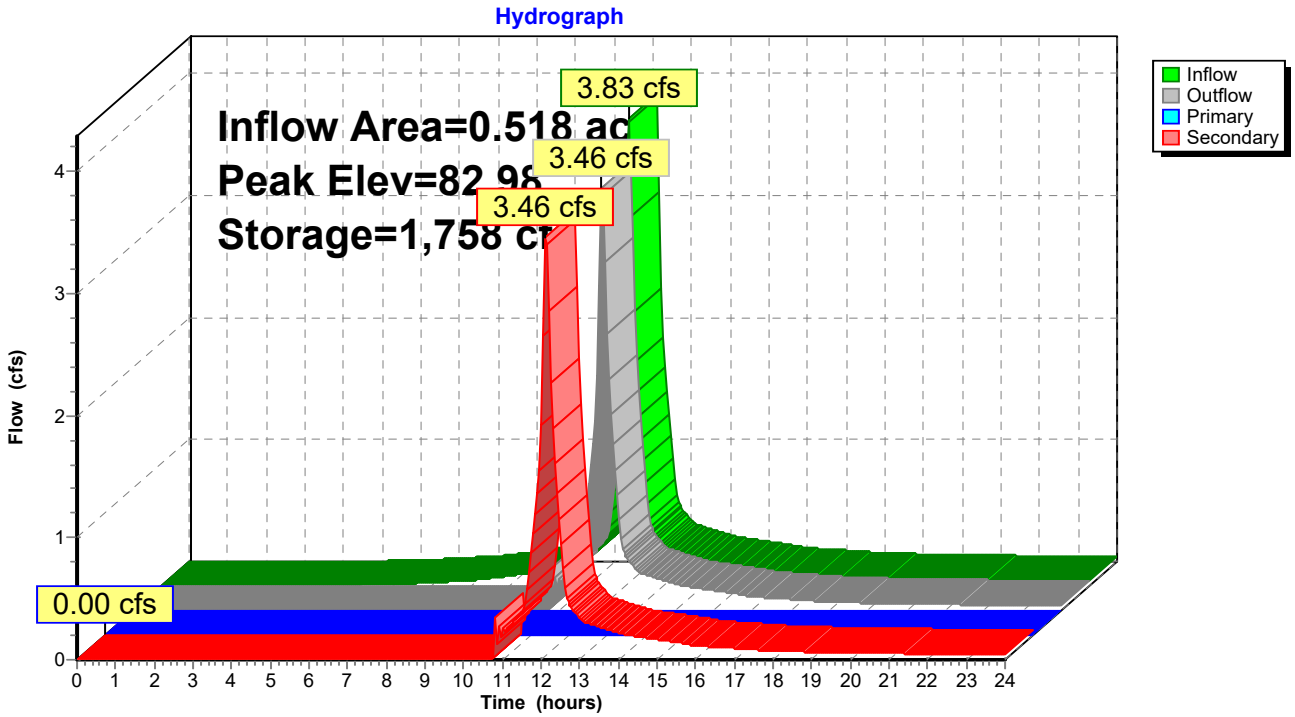
Device	Routing	Invert	Outlet Devices
#1	Secondary	83.45'	**20.0' long + 1.0 '/' SideZ x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#2	Secondary	82.85'	**12.0" Horiz. Orifice/Grate** C= 1.000 Limited to weir flow at low heads
#3	Secondary	82.75'	**12.0" Horiz. Orifice/Grate** C= 1.000
#4	Device 5	82.75'	**99.000 in/hr Exfiltration over Surface area from 81.25' - 82.25'** Conductivity to Groundwater Elevation = 70.00' Excluded Surface area = 0 sf
#5	Primary	81.25'	**4.0" Round Culvert X 4.00** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 81.25' / 81.25' S= 0.0000 '/' Cc= 0.900

n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.09 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=81.25' TW=0.00' (Dynamic Tailwater)
└─**5=Culvert** (Controls 0.00 cfs)
  └─**4=Exfiltration** (Controls 0.00 cfs)

Secondary OutFlow Max=3.39 cfs @ 12.13 hrs HW=82.97' TW=0.00' (Dynamic Tailwater)
├─**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
├─**2=Orifice/Grate** (Weir Controls 0.43 cfs @ 1.14 fps)
└─**3=Orifice/Grate** (Orifice Controls 2.96 cfs @ 3.77 fps)

Pond 5P: Bio Area

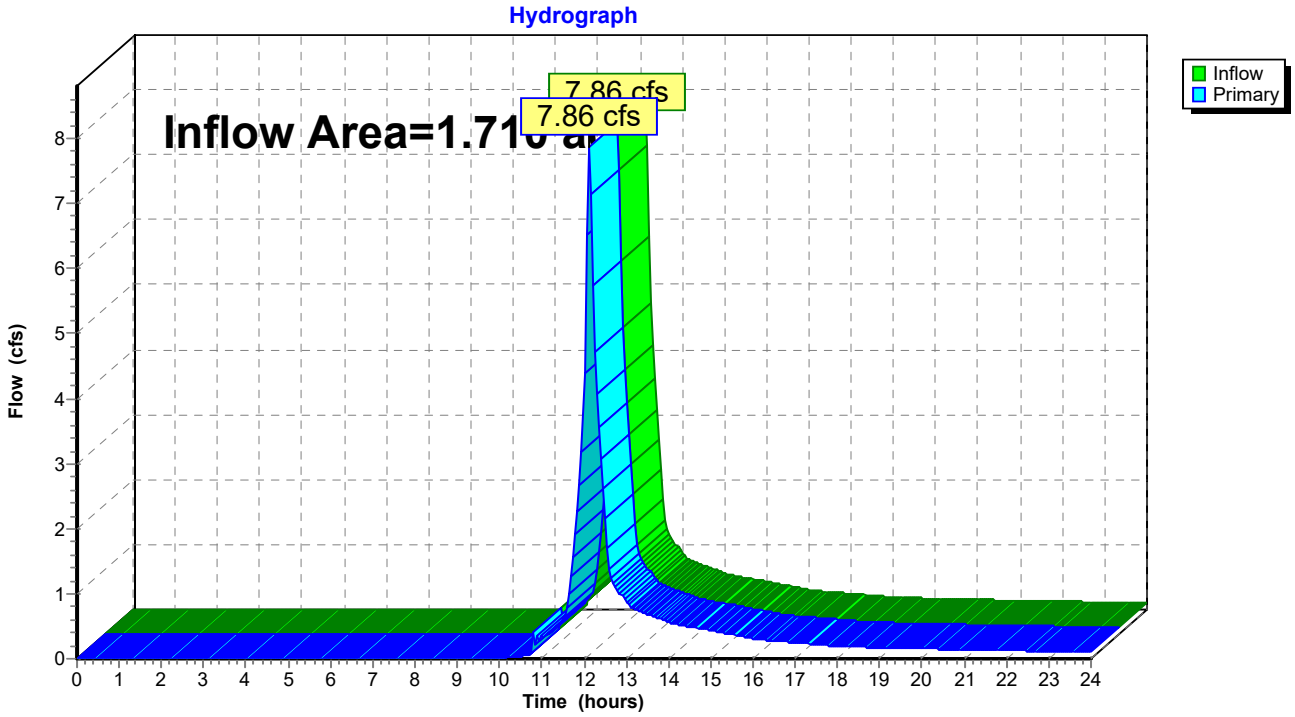


Summary for Link 5L: Lake Q

Inflow Area = 1.710 ac, 43.05% Impervious, Inflow Depth > 4.13" for 100-Year event
Inflow = 7.86 cfs @ 12.11 hrs, Volume= 0.589 af
Primary = 7.86 cfs @ 12.11 hrs, Volume= 0.589 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Link 5L: Lake Q



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Attachment 5:

Sub catchment Map

SC-1

1 OF 2

2024-NOI

PRE-DEVELOPMENT

VETERANS FIELD PARKING LOT REHAB.
468 NORTH AVENUE

NOTICE OF INTENT - APRIL 2024

DESIGNED: NLC
DRAFTED: NLC
APPROVED: WJR

SCALE: AS SHOWN

REVISIONS

TOWN OF WAKEFIELD

Public Works • Engineering Division • 1 Lafayette Street Wakefield, MA 01880

SC-2

2 OF 2

2024-NOI

POST-DEVELOPMENT

VETERANS FIELD PARKING LOT REHAB.
468 NORTH AVENUE

NOTICE OF INTENT - APRIL 2024

DESIGNED: NLC
DRAFTED: NLC
APPROVED: WJR

SCALE: AS SHOWN

REVISIONS

TOWN OF WAKEFIELD

Public Works • Engineering Division • 1 Lafayette Street Wakefield, MA 01880

Attachment 6:

Operations and Maintenance Plan

INSPECTING CONSTRUCTED BEST MANAGEMENT PRACTICES

Best Management Practices (BMPs) are policies, procedures and structures designed to reduce stormwater pollution, prevent contaminant discharges to natural water bodies, and reduce stormwater facility maintenance costs. Constructed BMPs are permanent site features designed to treat stormwater before infiltrating it to the subsurface or discharging it to a surface water body.

This Standard Operating Procedure provides a summary of inspection procedures for the constructed BMPs in the Town of Wakefield:

1. Bioretention Areas and Rain Gardens
2. Deep Sump Catch Basins
3. Sediment Forebay
4. Drain Basin (Yard Drain)
5. Stone Swale (Dry Creek Bed)
6. Vegetated Filter Strips
7. Dry Wells
8. Leaching Catch Basins

This SOP is based on the Massachusetts Stormwater Handbook and is not intended to replace that document. This SOP is also not intended to replace the Stormwater BMP Operation and Maintenance (O&M) Plan required by the Massachusetts Wetlands Protection Act, Order of Conditions.

1. Bioretention Areas and Rain Gardens

Bioretention areas and rain gardens are shallow depressions filled with sandy soil, topped with a thick layer of mulch and planted with dense native vegetation. There are two types of bioretention cells:

1. Filtering bioretention area: Areas that are designed solely as an organic filter; and
2. Exfiltration bioretention area: Areas that are configured to recharge groundwater in addition to acting as a filter.

Inspection & Maintenance

Regular inspection and maintenance are important to prevent against premature failure of bioretention areas or rain gardens. Regular inspection and maintenance of pretreatment devices and bioretention cells for sediment buildup, structural damage and standing water can extend the life of the soil media.

Maintenance Schedule: Bioretention Areas and Rain Gardens

Activity	Frequency
Inspect for soil erosion and repair	Monthly
Inspect for invasive species and remove if present	Monthly

Remove trash	Monthly
Mulch Void Areas	Annually
Remove dead vegetation	Bi-Annually
Replace dead vegetation	Annually
Prune	Annually
Replace all media and vegetation	As Needed

When failure is discovered, excavate the bioretention area, scarify the bottom and sides, replace the filter fabric and soil, replant vegetation and mulch the surface.

Never store snow within a bioretention area or rain garden. This would prevent required water quality treatment and the recharge of groundwater.

2. Deep Sump Catch Basin

Deep sump catch basins, also known as oil and grease or hooded catch basins, are underground retention systems designed to remove trash, debris, and coarse sediment from stormwater runoff, and serve as temporary spill containment devices for floatables such as oils and greases.

Inspection & Maintenance
Regular maintenance is essential. Deep sump catch basins remain effective at removing pollutants only if they are cleaned out frequently. One study found that once 50% of the sump volume is filled, the catch basin is not able to retain additional sediments.

Inspect or clean deep sump basins at least four times per year and at the end of the foliage and snow removal seasons. Sediments must also be removed four times per year or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin. If handling runoff from land uses with higher potential pollutant loads or discharging runoff near or to a critical area, more frequent cleaning may be necessary.

Clamshell buckets are typically used to remove sediment in Massachusetts. However, vacuum trucks are preferable, because they remove more trapped sediment and supernatant than clamshells. Vacuuming is also a speedier process and is less likely to snap the cast iron hood within the deep sump catch basin.

Maintenance Schedule, Deep Sump Catch Basins

Activity	Frequency
Inspect units	Four times per year
Clean units	Four times per year or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin.

3. Sediment Forebay

Sediment Forebays are typically on-line units, designed to slow stormwater runoff and settle out sediment. Sediment forebays pretreat the water quality volume and will withstand anticipated velocities without scouring. It is excavated below grade with earthen sides and a stone check dam.

Inspection & Maintenance

Sediments and associated pollutants are removed only when sediment forebays are actually cleaned out, so regular maintenance is essential, Frequently removing accumulated sediments will make it less likely that sediments will be resuspended. At a minimum, inspect sediment forebays monthly and clean them out at least four times per year. Stabilize the floor and sidewalls of the sediment forebay before making it operational, otherwise the practice will discharge excess amounts of suspended sediments. When mowing grasses, keep height no greater than 6 inches. Set mower blades no lower than 3 to 4 inches. Check for signs of rilling and gullying and repair as needed. After removing the sediment, replace any vegetation damaged during the clean-out by either reseeding or resodding. When reseeding, incorporate practices such as hydroseeding with a tackifier, blanket, or similar practice to ensure that no scour occurs in the forebay, while the seeds germinate and develop roots.

Maintenance Schedule, Sediment Forebay

Activity	Frequency
Inspect sediment forebays	Monthly
Clean sediment forebays	Four times per year and when sediment depth is between 3 to 6 feet.

4. Drain Basin (Yard Drain)

A drain basin (yard drain) collects standing water and/or catches runoff water and channels it to a specified drainage area. It is meant to prevent pooling of water in a grassed area.

Inspection & Maintenance

- Over the span of the first year of a new installation, visually inspect each basin every 2 months or after 2 storm events once the site has stabilized
- Check for obstructions and debris at the openings of the grate and remove as needed.
- After cleaning the surface of the grate, remove the grate from the frame.
- Once the grate is removed from the frame, check for obstructions and debris inside the basin (including the sump and inlet and outlet pipes) and clean out as needed.
- A vacuum truck is best for the removal of debris when necessary. After the collection of the debris, it shall be disposed of according to the local environment requirements.
- After the maintenance or inspection of the structure is completed, set the grate back in the frame si it sits flush and does not rock.

- Once the monitoring period is over, it is best to continually schedule maintenance based on the amount of debris or sediment that accumulates over time.

Maintenance Schedule, Drain Basin (Yard Drain)

Activity	Frequency
First year monitoring period, visually inspect basin	Every 2 months or after 2 storm events
Clean basin, sump and outlet pipe / Vacuum truck is best	As needed

5. Stone Swale (Dry Creek Bed)

Stone-lined swales are shallow trenches in a landscape that capture rainwater runoff from hardened surfaces. They are designed to slow water down, spread it out and allow it to sink into the soil during small to moderate storms. A stone-lined swale uses stones instead of grass or other vegetation to safely infiltrate or direct runoff.

Inspection & Maintenance

Stone swales should be cleaned or stones replaced to prevent and reduce clogging and ensure sediment and debris does not accumulate in the swale. The swale should be tested for adequate infiltration and draining immediately after construction and at the beginning and end of the rainy season each year. If the swale is not infiltrating the intended amount of water or water is standing for more than 24 hours, the swale should be cleaned.

Routine maintenance should include an evaluation of the surrounding trees and shrubs and removal of any dead or diseased vegetation around the swale at least twice a year. This maintenance can be incorporated into regular landscape maintenance. Other potential tasks might include erosion repair at inflow points, surface rock replenishment, and repairing the overflow structure.

Maintenance Schedule, Stone Swale (Dry Creek Bed)

Activity	Frequency
Clean or replace stones	As needed or if not infiltrating as intended
Remove dead or diseased vegetation surrounding swale	Twice a year

6. Vegetated Filter Strips

Vegetated filter strips, also known as filter strips, grass buffer strips and grass filters, are uniformly graded vegetated surfaces (i.e., grass or close-growing native vegetation) that receive runoff from adjacent impervious areas. Vegetated filter strips typically treat sheet flow or small concentrated flows that can be distributed along the width of the strip using a level spreader. Vegetated filter strips are

designed to slow runoff velocities, trap sediment, and promote infiltration, thereby reducing runoff volumes.

Inspection & Maintenance

Regular maintenance is critical for filter strips to be effective and to ensure that flow does not short circuit the system. Conduct semi-annual inspections during the first year (and annually thereafter). Inspect the level spreader for sediment buildup and the vegetation for signs of erosion, bare spots, and overall health. Regular, frequent mowing of the grass is required. Remove sediment from the toe of slope or level spreader, and reseed bare spots as necessary. Periodically, remove sediment that accumulates near the top of the strip to maintain the appropriate slope and prevent formation of a "berm" that could impede the distribution of runoff as sheet flow. When the filter strip is located in the buffer zone to a wetland resource area, the operation and maintenance plan must include strict measures to ensure that maintenance operations do not alter the wetland resource areas. Please note, filter strips are restricted to the outer 50 feet of the buffer zone.

Maintenance Schedule: Vegetated Filter Strips

Activity	Frequency
Inspect the level spreader for sediment buildup and the vegetation for signs of erosion, bare spots, and overall health.	Every six months during the first year. Annually thereafter.
Regularly mow the grass.	As needed
Remove sediment from the toe of slope or level spreader and reseed bare spots.	As needed

7. Dry Wells

Dry wells are small excavated pits, backfilled with aggregate, and used to infiltrate uncontaminated runoff from non-metal roofs or metal roofs located outside the Zone II or Interim Wellhead Protection Area of a public water supply and outside an industrial site. Do not use dry wells to infiltrate any runoff that could be significantly contaminated with sediment and other pollutants. Never use dry wells to infiltrate runoff from land uses with higher potential pollutant loads, including parking lot runoff.

Inspection & Maintenance

Maintenance Schedule: Dry Wells

Activity	Frequency
Inspect dry wells.	After every major storm in the first few months after construction to ensure proper stabilization and function. Thereafter, inspect annually.
Measure the water depth in the observation well at 24- and 48-hour intervals after a storm. Calculate	See activity

clearance rates by dividing the drop in water level (inches) by the time elapsed (hr).	

8. Leaching Catch Basins

A leaching catch basin is pre-cast concrete barrel and riser with an open bottom that permits runoff to infiltrate into the ground. There are two configurations:

1. Stand-alone barrel/riser and
2. Barrel/riser combined with a deep sump catch basins that provides pretreatment.

80% TSS removal is awarded to the deep sump catch basin/leaching catch basin pretreatment combination provided the system is off-line.

Inspection & Maintenance

• Inspect annually or more frequently as indicated by structure performance
• Remove sediment when the basin is 50% filled.
• Rehabilitate the basin if it fails due to clogging

Maintenance Schedule: Leaching Catch Basins

Activity	Frequency
Inspect units and remove debris	Inspect annually or more frequently as indicated by structure performance
Remove sediment	When the basin is 50% filled
Rehabilitate the basin if it fails due to clogging	As needed

REVISION - The procedures contained in the SOP are reviewed as part of the NPDES MS4 Annual Report development and updated as needed.

EFFECTIVE: 6/28/2019

Attachment 7:

Notice of Intent Plans