## **Stormwater Management Report**

For

The Cottages at Wandering Pond Athens Street Stow, MA 01775

June 29, 2022

**Rev: October 27, 2022** 

July 6, 2023

**February 16, 2024** 

Applicant:

The Cottages at Wandering Pond Realty Trust 148 Park Street

North Reading, MA 01864

Stamski And McNary, Inc. Engineering - Planning – Surveying 1000 Main Street; Acton, MA 01720 (978) 263-8585

SM-3719C

## **Table of Contents**

Routing Map

Stormwater Checklist

Pre-Development Hydrology

Post-Development Hydrology

Recharge Volume Calculations

Water Quality Volume Calculations

Groundwater Mounding Calculations

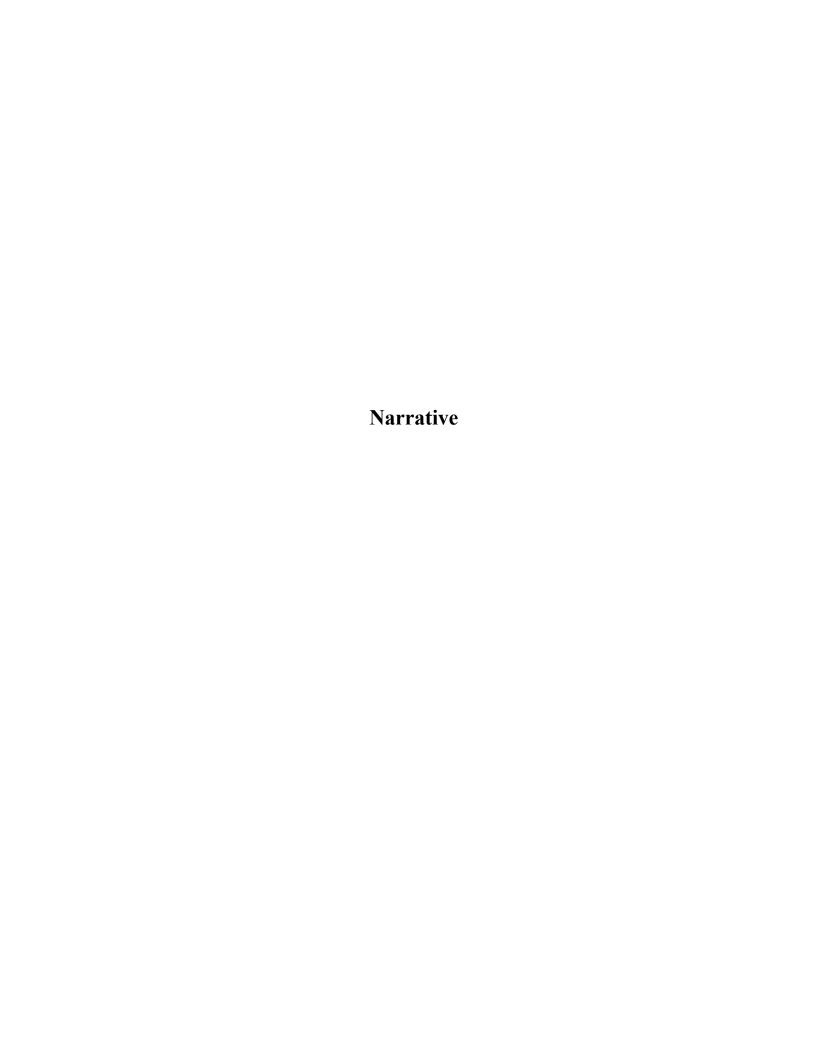
Pipe Sizing Calculations

TSS Removal Calculations

Soil Evaluation

Stormwater Operation and Maintenance Manual

Drainage Maps



### STORMWATER MANAGEMENT

The project site is located off Hudson Road and consists of seven (7) parcels totaling approximately 110 acres. Two parcels contain several existing buildings and the other parcels are vacant. Vegetation varies across the site and consists of open space, wooded area, and wetland vegetation. A series of gravel roads and gravel cart paths are located within the site to provide means of access to portions of the site. There is Bordering Vegetated Wetland (BVW) located in the central portion of the site that is associated with the Mean Annual High Water Line (MAHWL) of an unnamed river that runs through the site. There are additional pockets of BVW throughout the site to the south, east, west, and north. The Natural Resource Conservation Service (N.R.C.S) soil survey report for Middlesex County indicates the presence of Scarboro Mucky Fine Sandy Loam, Swansea Muck, Freetown Muck, all of hydrologic soil group D; Paxton Fine Sandy Loam, Woodbridge Fine Sandy Loam, both of hydrologic soil group C; and Hinckley Loamy Sand, Merrimac Fine Sandy Loam, Windsor Loamy Sand, all of hydrologic soil group A.

### Pre-Development

The existing site is comprised of thirteen (13) subcatchments. Subcatchment E-1 contains wooded area and drains to a BVW located in the northern corner of the site.

Subcatchment E-2A contains wooded area, open space, gravel roads, and BVW. This subcatchment drains to a BVW located along the northern portion of the site.

Subcatchment E-2B contains wooded area, open space, gravel roads, most of the existing buildings, BVW, and some offsite runoff. Runoff from this subcatchment drains to the BVW and river located centrally onsite.

Subcatchment E-3 contains mostly wooded area and a portion of the existing gravel cart path, this subcatchment drains to the northeastern property line and eventually to a BVW offsite.

Subcatchment E-4 contains mainly wooded area and a portion of the existing gravel cart path, and it drains to the BVW located onsite to the east.

Subcatchment E-5 contains wooded area, open space, gravel road/cart paths, the existing dwelling at 217 Hudson Road, and BVW. Runoff from this subcatchment drains to the BVW located on the southeastern portion of the site.

Subcatchment E-6 contains wooded area and portions of gravel roads, all of which drain to the BVW located onsite to the south.

Subcatchment E-7 contains mainly wooded area and a portion of a gravel road and parking area. Runoff from this subcatchment drains to a low spot onsite.

Subcatchment E-8 contains wooded area and drains to a low spot centrally located on site.

Subcatchment E-9A contains wooded area, open space, some runoff from the adjacent property, an existing building, and gravel roads and parking areas. This subcatchment drains to a low spot centrally located on site.

Subcatchment E-9B contains some onsite wooded area, and a residential development located on the abutting property to the north, which consists of wooded area, open space, several dwellings and driveways, and a portion of a road. Runoff from this subcatchment is directed to a detention basin located offsite to the north of the subject property. The basin and its outflows have been modeled in this stormwater analysis.

Subcatchment E-10 contains mainly wooded area and a portion of a gravel cart path offsite as well as a portion of offsite runoff, all of which drain to the BVW located on the central southern portion of the site.

Subcatchment E-11 contains wooded area and drains to the BVW located offsite to the west.

Subcatchment E-12 contains wooded area and drains to a BVW located offsite to the northwest.

### Post-Development

The purpose of the proposed project is to develop an Active Adult Neighborhood (AAN). A series of ten (10) roadways are proposed to serve 140 units spread across the majority of the site. The main road comes in off Hudson Road which travels through the site to the northeast and branches off mid-site to the second main road which travels west through the site. There are a series of dead end and looped roadways which branch off the two main roadways. The post-developed site it broken up into the 26 subcatchments shown on the Post-Development Drainage Map and described below.

Subcatchment P-1 compares to subcatchment E-1 and drains to a BVW located in the northern corner of the site. This subcatchment remains unchanged.

Subcatchments P-2A1, P-2A2, and P-2A3 compare to subcatchment E-2A. Subcatchment P-2A1 contains a portion of Wandering Pond Circle, some dwellings, and the surrounding open space. Roadway runoff from this subcatchment is captured in a series of catch basins located along the roadway and discharges to IB-2A1 to be treated and infiltrated. Subcatchment P-2A2 similarly contains a portion of Wandering Pond Circle, some dwellings, and surrounding open space. Runoff from this subcatchment is captured in a series of catch basins located along the roadway and discharges to IB-2A2, where it is treated and infiltrated. Subcatchment P-2A3 remains mostly unchanged with the exception of a proposed pump house building and holding tank for the proposed water supply system, and it contains the remaining open space, wooded area, gravel road, and BVW to the west of Wandering Pond Circle. This subcatchment, along with the outflows of IB-2A1 and IB-2A2, continues to drain to the BVW located along the northern portion of the site.

Subcatchments P-2B-A, P-2B-B, and P-5D compare to subcatchment E-2B. Subcatchment P-2B-A contains the entirety of Stepping Stone Lane and the dwellings proposed along the road, a proposed portion of a gravel drive to provide access to the pump house and wells, as well as open space and wooded area, some of which remains undisturbed. Runoff from the roadway, dwelling roof areas, and surrounding open space is captured in a series of catch basins located along Stepping Stone Lane before discharging to IB-2B-A, where it is treated and infiltrated. Roadway runoff is treated through a combination of deep sump hooded catch basins and a sediment forebay prior to infiltration. Subcatchment P-5D contains a portion of Wandering Pond Way, all of Daffodil Drive, the dwellings located along Daffodil Drive, and surrounding open space. Runoff from this subcatchment is captured in a series of catch basins along the roadway before discharging to IB-5D, where it is treated and infiltrated. Prior to infiltration, the roadway runoff in this subcatchment is treated through a combination of deep sump hooded catch basins and a sediment forebay. Subcatchment P-2B-B contains a portion of the proposed and existing gravel access road and mainly undisturbed open space and wooded area. Runoff from this subcatchment, along with the outflow of IB-2B-A and IB-5D, continues to flow to the BVW and river located centrally onsite.

Subcatchments P-3A and P-3B compare to Subcatchment E-3. Subcatchment P-3A contains a portion of Wandering Pond Circle and some adjacent dwellings. Runoff from this subcatchment is captured through a series of catch basins located along the roadway and discharges to IB-3A to be treated and infiltrated. Subcatchment P-3B contains mostly wooded area, a portion of the existing gravel cart path, and a portion of open space surrounding the proposed dwellings. This subcatchment, combined with the outflow of IB-3A, drains to the northeastern property line and eventually to a BVW offsite.

Subcatchments P-4A and P-4B compare to Subcatchment E-4. Subcatchment P-4A contains a portion of Wandering Pond Circle and some open space. Runoff is captured through a series of catch basins located along the roadway and discharges to IB-4A. Subcatchment P-4B contains mostly undisturbed wooded area, a portion of the existing gravel cart path, and some open space surrounding the dwellings. Runoff from this subcatchment and the outflow of IB-4A continue to drain to the BVW located onsite to the east.

A total of 19 dwellings located along the outside of Wandering Pond Circle will be provided with individual roof drywell designed to fully infiltrate roof runoff up to the 100-year design storm.

Subcatchments P-5B, P-5C, and P-5E compare to Subcatchment E-5. Subcatchment P-5B contains a portion of Wandering Pond Circle, some open space surrounding the roadway, and much of the undisturbed area in the center of Wandering Pond Circle. Runoff from this subcatchment is captured in a series of catch basins located along the roadway before discharging to IB-5B, where it is treated and infiltrated. Subcatchment P-5C contains a portion of Wandering Pond Way, all of the dwellings located along said road, and surrounding open space. Roadway runoff is captured in a series of catch basins before discharging to IB-5C. Roadway runoff is treated with a combination of deep sump hooded catch basins and a sediment forebay prior to infiltration. Roof runoff from the dwellings is captured in gutters and directed via a roof drain to IB-5C. IB-5B and IB-5C are designed to overflow; excess runoff is piped under the road network and daylights directly into Subcatchment P-5E. Subcatchment P-5E contains Athens Street, the majority of Wandering Pond Way, the existing dwelling at 217 Hudson Road, open space, and wooded area, all of which drains to the BVW located on the southeastern portion f the site. Roadway runoff from this subcatchment is treated via Contech units within the catch basins prior to discharge.

Subcatchment P-6A and P-6B compare to subcatchment E-6. Subcatchment P-6A contains mainly wooded area and some open space. Runoff from this subcatchment drains to the BVW located onsite to the south. Subcatchment P-6B contains the driveway and parking area for the Wastewater Treatment Facility Building, the building itself, some open space, and wooded area. Runoff from this subcatchment is captured with a grass swale running along the side of the pavement and drains to IB-6B to be infiltrated and recharged. Roadway runoff is treated through a pea gravel diaphragm, grass filter strip, and sediment forebay prior to infiltration.

Subcatchment P-7A and P-7B compare to Subcatchment E-7. Subcatchment P-7A contains the entirety of Buttercup Lane and Daisy Lane, adjacent dwellings, and associated open space. Runoff from this subcatchment discharges to IB-7A to be treated, infiltrated, and recharged. Subcatchment P-7B contains a portion of Wildflower Lane, the entirety of Cottagehouse Lane, the Cottagehouse, some associated parking, pool and associated patio/pool coping, walkways, and paved sports court. Runoff from this subcatchment drains to IB-7B to be treated, infiltrated, and recharged.

Subcatchment P-8 compares to Subcatchment E-8. Subcatchment P-8 contains a portion of Wildflower Lane, the entirety of Lily Pad Lane, adjacent dwellings, a portion of the Cottagehouse area and parking, and open space. Runoff from this subcatchment discharges to IB-P8 to be treated, infiltrated, and recharged.

Subcatchments P-9A, P-9B, P-10A, P-10B, and P-10C compare to subcatchment E-10. Subcatchment P-9A contains open space and wooded area along the northern property lines behind the dwellings along Wildflower Way along with a portion of Sweet Pea Path. Runoff from this subcatchment drains directly to IB-10C. Roadway runoff from Sweet Pea Path is treated via a treatment trench adjacent to the roadway prior to infiltration. Subcatchment P-9B contains mostly the abutting development and the runoff from the outflow of its associated detention basin. Runoff from this detention basin drains onto the subject property and eventually discharges to IB-10C. Subcatchment P-10A contains mainly wooded area and some open space around the dwellings. Runoff from this subcatchment continues to flow towards the BVW located on the central southern portion of the site. Subcatchment P-10B contains a portion of Wildflower Way, several dwellings, and surrounding open space. Roadway and open space runoff are captured in a series of catch basins located along

Wildflower Way before discharging to IB-10B. Roadway runoff is treated through a combination of deep sump hooded catch basins and a sediment forebay prior to infiltration. Roof runoff from the dwellings is captured in gutters and directed via a roof drain to IB-10B. Subcatchment P-10C contains the remainder of Wildflower Way and the adjacent dwellings, surrounding open space, and undisturbed area in the center of the Wildflower Way loop. Runoff from this subcatchment is captured in a series of catch basins located along the roadway and discharged to IB-10C. Roadway runoff is treated through a combination of deep sump hooded catch basins and a sediment forebay prior to infiltration. IB-10B and IB-10C are designed to overflow, with excess runoff being piped to daylight and discharging to the BVW. Post development peak discharge rate and volume is increased from existing conditions during the 100-year design storm only, but it will not result in an increase in offsite flooding during the 100-year 24-hour storm.

Subcatchment P-11 compares to subcatchment E-11. Subcatchment P-11 remains mostly unchanged from E-11 with the exception of a small portion due to the proposed grading associated with the proposed dwellings. Runoff from this subcatchment drains to the offsite BVW to the west.

Subcatchment P-12 compares to subcatchment E-12 and remains unchanged, draining to a BVW located offsite to the northwest.

Road runoff that is directed into any infiltration structure is being treated through a combination of deep sump hooded catch basins and sediment forebay to provide sufficient pre-treatment.

### **Compliance with MA DEP Stormwater Management Standards**

Compliance with the Stormwater Management Standards is as follows:

### **Standard #1 No Untreated Discharges:**

No new untreated discharges are proposed. Any additional runoff will be treated and infiltrated.

### **Standard #2 Peak Rate Attenuation:**

The Post-Development peak flow rates must not be increased from pre-development rates for the 2-year, 10-year, 25-year, and 100-year storm events. Also, offsite flood impact from the 100-year storm must not be increased. With a combination of infiltration and detention, the peak runoff rates and volumes have been decreased. The peak runoff rates have been summarized in the following tables.

# Discharge Summary Tables E-1 Compared to P-1

	2-year Storm		10-year	r Storm	25-year	r Storm	100-year Storm	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Peak Flow (cfs)	0	0	0	0	0.002	0.002	0.015	0.015
Total Volume (cf)	0	0	3.52	3.52	52.4	52.4	228	228

E-2A Compared to P-2A

	2-year Storm		10-year Storm		25-yea	r Storm	100-year Storm		
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	
Peak Flow (cfs)	6.063	5.436	20.82	20.40	32.08	31.74	51.14	50.99	
Total Volume (cf)	35,403	29,551	98,578	84,566	146,158	129,925	227,661	214,445	

E-2B Compared to P-2B

	2-year Storm		10-year Storm		25-year Storm		100-year Storm				
	Pre	Post	Pre	Post	Pre	Post	Pre	Post			
Peak Flow (cfs)	1.662	0.158	13.40	6.856	24.82	16.79	45.93	35.76			
Total Volume (cf)	18,921	4,328	77,016	50,559	126,186	95,281	215,845	178,854			

E-3 Compared to P-3

	2-year Storm		10-year Storm		25-year Storm		100-year Storm	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Peak Flow (cfs)	6.809	6.651	17.08	17.04	24.26	24.13	35.91	35.67
Total Volume (cf)	35,200	31,428	82,096	74,005	115,182	103,869	169,813	153,009

E-4 Compared to P-4

	2-year Storm		10-year Storm		25-year Storm		100-year Storm	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Peak Flow (cfs)	6.300	5.817	16.28	15.63	23.33	22.81	34.82	34.67
Total Volume (cf)	33,076	26,742	78,626	67,232	111,000	96,277	164,675	144,724

E-5 Compared to P-5

	2-year Storm		10-year	10-year Storm		25-year Storm		r Storm
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Peak Flow (cfs)	2.571	1.549	11.19	9.173	18.21	16.83	30.49	30.35
Total Volume (cf)	19,062	14,387	59,868	51,772	91,855	81,739	147,879	138,839

E-6 Compared to P-6

	2-year Storm Pre Post		10-year	10-year Storm		25-year Storm		100-year Storm	
			Pre	Post	Pre	Post	Pre	Post	
Peak Flow (cfs)	0	0	0.056	0.027	0.315	0.146	1.157	0.702	
Total Volume (cf)	0.024	0	1,451	743	3,584	2,131	8,335	5,404	

E-7 Compared to P-7

	2-year Storm		10-year Storm		25-year Storm		100-year Storm	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Peak Flow (cfs)	0	0	0.023	0	0.135	0	1.078	0
Total Volume (cf)	0	0	669	0	3,648	0	12,259	0

E-8 Compared to P-8

	2-year Storm		10-year	10-year Storm		25-year Storm		r Storm
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Peak Flow (cfs)	0	0	0.001	0	0.008	0	0.056	0
Total Volume (cf)	0	0	14.5	0	216	0	938	0

E-10 Compared to P-10

	2-year Storm		10-year Storm		25-year	Storm	100-year Storm	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Peak Flow (cfs)	3.993	2.097	18.72	8.492	30.87	13.98	52.40	50.76
Total Volume (cf)	34,460	16,218	112,089	49,369	173,628	94,526	282,066	227,623

E-11 Compared to P-11

	2-year Storm		10-year Storm		25-year Storm		100-year Storm	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Peak Flow (cfs)	4.684	4.637	13.35	13.21	19.61	19.41	30.10	29.80
Total Volume (cf)	28,624	28,334	72,378	71,647	104,209	103,157	157,683	156,090

E-12 Compared to P-12

	2-year Storm		10-year	r Storm	25-year	r Storm	100-year Storm		
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	
Peak Flow (cfs)	0	0	0	0	0.002	0.002	0.021	0.021	
Total Volume (cf)	0	0	4.70	4.70	69.9	69.9	303	303	

### **Standard #3 Stormwater Recharge:**

This standard prescribes the stormwater volume that must be recharged to groundwater based on the existing site soil conditions. The Natural Resources Conservation Service (N.R.C.S.) Middlesex Soil Survey map indicates that the site contains soil in Hydrologic Group A, C, and D. The Stormwater Management Policy requires 0.6 inches of runoff over the total impervious area to be recharged in areas with Hydrologic Group A soils, 0.25 inches in areas with hydrologic group C, and 0.10 inches in areas with hydrologic group D. Detailed "Recharge Volume Calculations" showing compliance with this standard are attached. Additionally, runoff from non-metal roofs may be discharged to a drywell without any pretreatment.

### **Standard #4 Water Quality:**

According to the guidelines provided in the Stormwater Management Standards 80% Total Suspended Solids (TSS) removal is required for the total increase in impervious area associated with the project. This standard requires 1 inch of water over the impervious area in areas of rapid infiltration and 0.5 inches in all other areas. Calculations are provided. The combination of deep sump hooded catch basins and a sediment forebay will be utilized to achieve the required treatment levels.

### Standard #5 Land Uses with Higher Potential Pollutant Loads:

The site will not contain "land uses with higher potential pollutant loads."

### **Standard #6 Critical Areas:**

This site does not discharge runoff to critical areas.

## **Standard #7 Redevelopment:**

This project is not for redevelopment. This standard would require that the Stormwater Management Standards be met to the extent practicable. The project has been designed to meet all of the standards.

### **Standard #8 Erosion/Sediment Control:**

Erosion and sediment controls are incorporated into the project design to prevent erosion, control sediment movement, and stabilize exposed and disturbed soils during construction. Temporary erosion and sedimentation controls during construction include minimizing areas of exposed soil, directing and controlling runoff, and rapidly stabilizing exposed areas. Soils left exposed for extended periods will be mulched and seeded for temporary vegetative cover. Following construction, exposed areas will be permanently vegetated with appropriate ground cover. Erosion and sedimentation control measures will be maintained throughout all phases of construction. Inspections will be made regularly and after rainfalls exceeding 0.5 inches in a 24-hour period during construction. The contractor will be required to inspect erosion and sedimentation control measures at the end of each workday, when precipitation is forecasted, and after each rainfall. All measures

will be inspected prior to each weekend. The contractor will replace and repair any malfunctioning or damaged control measures including vegetative stabilization. Long term erosion and sedimentation control will be realized using the Best Management Practices described previously. Areas where soils have been disturbed will be loamed and vegetated.

## **Standard #9 Operation and Maintenance Plan:**

An Operation and Maintenance Plan has been prepared and is included in this report as well as shown on the plan set.

### Standard #10 Illicit Discharges to Drainage System:

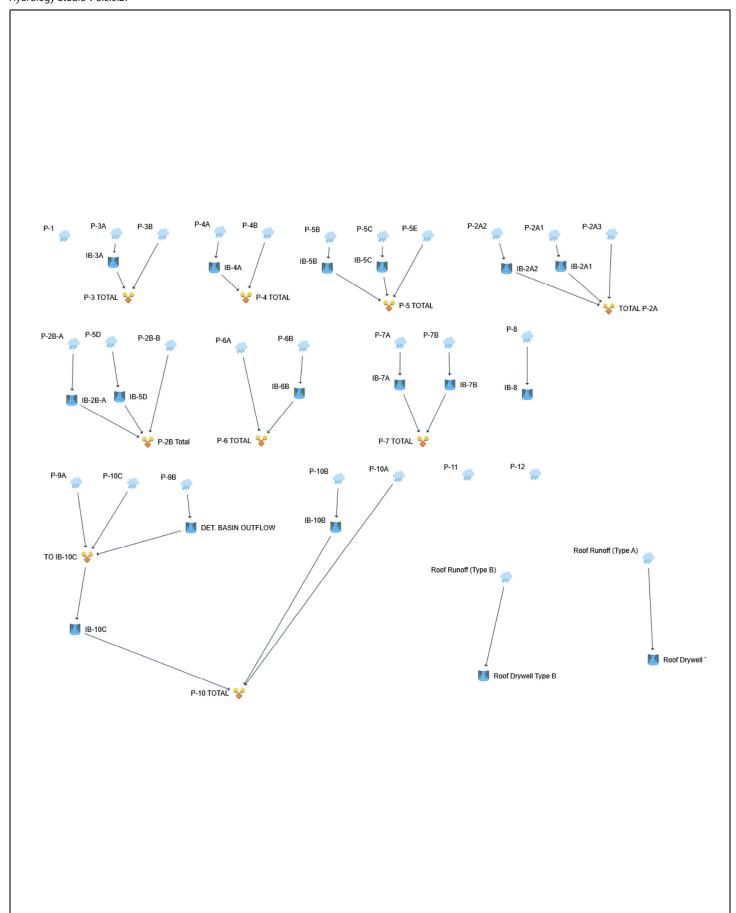
No known illicit discharges exist nor are any proposed.

#### **Design Basis**

- 1. The United States Department of Agriculture Natural Resource Conservation Service (N.R.C.S.) TR55 methodology was used to determine offsite rates of runoff.
- 2. The twenty-four hour rainfall, taken from the NOAA Atlas, is 7.84 inches for the 100-year storm, 6.14 inches for the 25-year storm, 5.04 inches for the 10-year storm, and 3.27 inches for the 2-year storm event.
- 3. The hydrologic calculations were performed using the computer program: "Hydrology Studio" by Hydrology Studio.
- 4. The soil types of the site were taken from the N.R.C.S. Soil Survey Map for Middlesex County.
- 5. Soil conditions and estimated seasonal high groundwater table were based on on-site soil evaluations.
- 6. The Natural Resource Conservation Service (N.R.C.S) soil survey report for Middlesex County indicates the presence of Scarboro Mucky Fine Sandy Loam, Swansea Muck, Freetown Muck, all of hydrologic soil group D; Paxton Fine Sandy Loam, Woodbridge Fine Sandy Loam, both of hydrologic soil group C; and Hinckley Loamy Sand, Merrimac Fine Sandy Loam, Windsor Loamy Sand, all of hydrologic soil group A.
- 7. The rational method (Q=CIA) was used as a basis for sizing pipes. Runoff Coefficients: C=0.15 for woods, 0.20 for grass/landscaped areas, and 0.90 for impervious surfaces.
- 8. The Hantush Method was used for Mounding analysis.

Basin Model

Hydrology Studio v 3.0.0.27 07-10-2023







## **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. 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<sup>2</sup>
- 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.

<sup>&</sup>lt;sup>1</sup> 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.

<sup>&</sup>lt;sup>2</sup> 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.

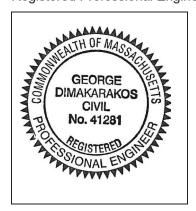
*Note:* Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that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



Redevelopment

Lego ) M 2/21/2024

Signature and Date

### Checklist

<b>Project Type:</b> Is the application for new development	nent, redevelopment, or a mix of new and
redevelopment?	
New development	

☐ Mix of New Development and Redevelopment



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

# **Checklist for Stormwater Report**

## Checklist (continued)

env	<b>Measures:</b> Stormwater Standards require LID measures to be considered. Document what ironmentally sensitive design and LID Techniques were considered during the planning and design of 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):  Infiltration Basin, Treatment Trench, Contech Units
Sta	ndard 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



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

# **Checklist for Stormwater Report**

Cł	necklist (continued)						
Sta	ndard 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.						
Sta	ndard 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 <sup>1</sup>						
	Runoff from all impervious areas at the site discharging to the infiltration BMP.						
	Runoff from all impervious areas at the site is <i>not</i> 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 <i>only</i> 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.						

<sup>&</sup>lt;sup>1</sup> 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.



### **Massachusetts Department of Environmental Protection**

Bureau of Resource Protection - Wetlands Program

# 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 10year 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:

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.



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

# **Checklist for Stormwater Report**

Cł	necklist (continued)
Sta	ndard 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.
Sta	ndard 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 <i>prior to</i> the discharge of stormwater to the post-construction stormwater BMPs.
	The NPDES Multi-Sector General Permit does <i>not</i> 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 <i>not</i> 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.
Sta	ndard 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.



### **Massachusetts Department of Environmental Protection**

Bureau of Resource Protection - Wetlands Program

# **Checklist for Stormwater Report**

## Checklist (continued)

	rd 7: Redevelopments and Other Projects Subject to the Standards only to the maximum practicable
The	e project is subject to the Stormwater Management Standards only to the maximum Extent acticable 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.
	rtain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an planation of why these standards are not met is contained in the Stormwater Report.
imp in \ the and	e project involves redevelopment and a description of all measures that have been taken to prove existing conditions is provided in the Stormwater Report. The redevelopment checklist found folume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment a structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) proves 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.



## **Massachusetts Department of Environmental Protection**

Bureau of Resource Protection - Wetlands Program

# **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.



Project:	Athens Street	Ву МКО	Date 6/1/22 Rev Date 9/27/2022
Location:	Stow, MA	Checked	Date
Circle one:	Present Developed	Subcatchment E-1	

1. Runoff curve number (CN)

Soil name and hydrologic	Cover description (cover type, treatment, and		CN 1/			Product of CN x Area
group (appendix A)	hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious	98			0.00	0.00
Α	Woods Good Condition	30			0.16	4.80
А	Open Space Good Condition	39			0.00	0.00
Α	Brush Fair	35			0.00	0.00
Α	Gravel	76			0.00	0.00
В	Woods Good Condition	55			0.00	0.00
В	Open Space Good Condition	61			0.00	0.00
В	Gravel	85			0.00	0.00
С	Woods Good Condition	70			0.00	0.00
С	Open Space Fair Condition	74			0.00	0.00
С	Gravel	89			0.00	0.00
1/ Use only one CN source per line. Totals =						4.80

						_
CN (weighted) =	total product	=	4.80 =	30.00 ;	Use CN =	30
•	total area		0.16			

2. Runoff	
-----------	--

Frequency	yr
Rainfall, P (24-hour)	in
Runoff, Q(Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in

Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.09	0.09	0.38

Project:	Athens Street	-	Ву	MKO	Date Rev Date	6/1/2022 9/27/2022	-
Location:	Stow, MA	_	Checked		Date		-
Circle one:	Present Developed	through	Subcatchi	ment E-1	-		
		subarea					
Sheet flow	(Applicable to Tc only)		Segment ID	A-B			I
1. Surface	Description (table 3-1)			WOODS			
2. Manning	s roughness coeff., n (table 3-1)			0.6			
3. Flow len	gth, L (total L <= 300 ft)		ft	50			
4. Two-yr 2	4-hr rainfall, P2		in	3.1			
5. Land Slo	ppe, s		ft/ft	0.082			
6. Tt = 0.00	07 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Ti	hr	0.16			0.16
Shallow co	ncentrated Flow		Segment ID	B-C			
7. Surface	Description (paved or unpaved)			UNPAVED			
8. Flow Ler	ngth, L		ft	32			
9. Waterco	urse slope, s		ft/ft	0.047			
10. Average	e Velocity, V (figure 3-1)		ft/s	3.50			
11. Tt = L /	3600V	Compute Ti	hr	0.00			0.00
Channel flo	ow		Segment ID				
	sectional flow area, a		sf				
	perimeter, pw	0	ft				
	lic radius, r=a/wp	Compute r					4
15. Channe	-		ft/ft				
	g's roughness coeff., n	Comments	ft/a				4
	9 r^2/3 s^1/2 / n	Compute V					
18. Flow let 19. Tt = L /		Compute Ti	ft hr				0
20. Waters	hed or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	i 19)			hr min	0.17 10.0
	(210-VI-TR-55, Second	Ed., June 19	86)				D-3

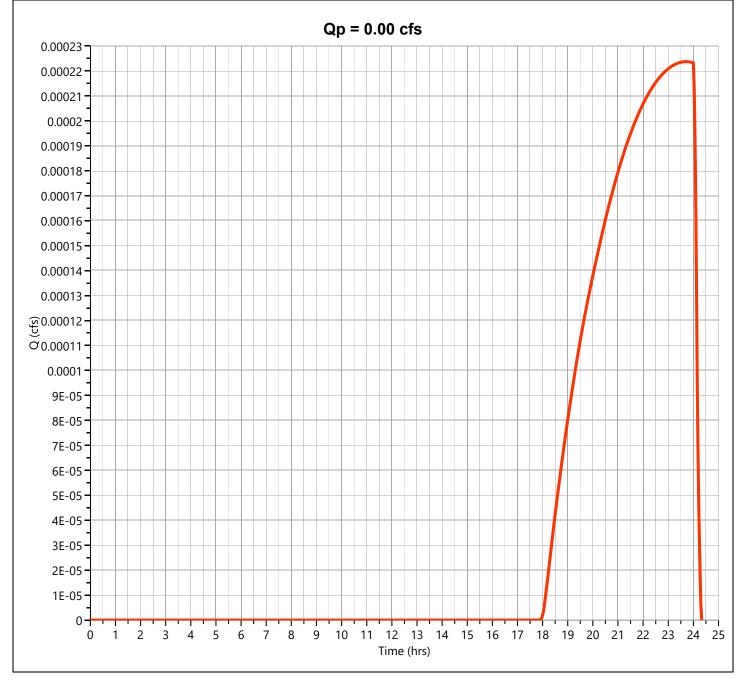
## E-1 Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.00 hrs
Time Interval	= 2 min	Runoff Volume	= 0.000 cuft
Drainage Area	= 0.16 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 0.00 cfs

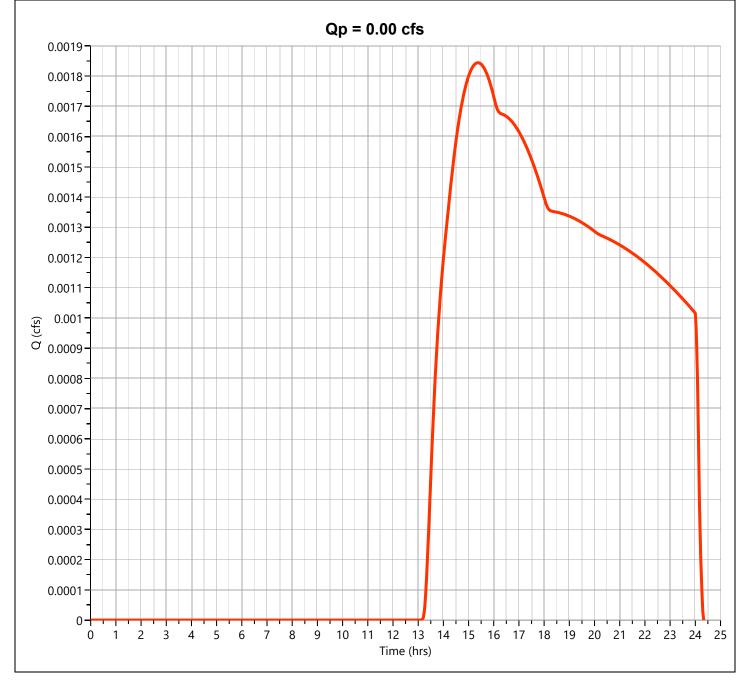
## E-1 Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.000 cfs
Storm Frequency	= 10-yr	Time to Peak	= 23.73 hrs
Time Interval	= 2 min	Runoff Volume	= 3.52 cuft
Drainage Area	= 0.16 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



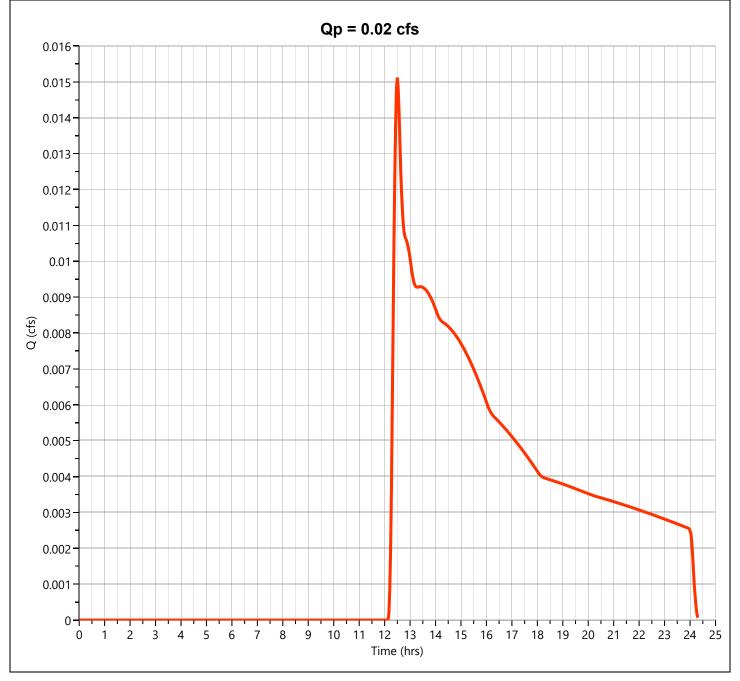
## E-1 Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.002 cfs
Storm Frequency	= 25-yr	Time to Peak	= 15.37 hrs
Time Interval	= 2 min	Runoff Volume	= 52.4 cuft
Drainage Area	= 0.16 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



## E-1 Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.015 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.50 hrs
Time Interval	= 2 min	Runoff Volume	= 228 cuft
Drainage Area	= 0.16 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



#### Worksheet 2: Runoff curve number and runoff

SM-3719C

Project:	Athens Street	By MKO	Date 6/1/22
Location:	Stow, MA	Checked	Rev Date 9/27/2022  Date
Circle one:	Present Developed	Subcatchment E-2A	_

1. Runoff curve number (CN)

Soil name and hydrologic	Cover description (cover type, treatment, and		CN 1/		Area	Product of CN x Area
group (appendix A)	hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious	98			0.00	0.00
А	Woods Good Condition	30			3.28	98.39
А	Open Space Good Condition	39			1.17	45.45
А	Open Space Fair Condition	49			0.06	3.13
А	Woods-Grass Combination Good Condition	32			0.00	0.00
А	Gravel	76			0.22	16.34
В	Woods Good Condition	55			0.00	0.00
В	Open Space Good Condition	61			0.00	0.00
В	Gravel	85			0.00	0.00
С	Woods Good Condition	70			8.00	559.75
С	Open Space Fair Condition	79			0.09	7.14
С	Gravel	89			0.11	10.19
D	BVW	77			4.78	367.78
1/ Use only one	CN source per line.			Totals =	17.70	1108.18

CN (weighted) =	total product	_=	1108.18 =	62.60	;	Use CN =	63
	total area		17.70				

2. Runoff

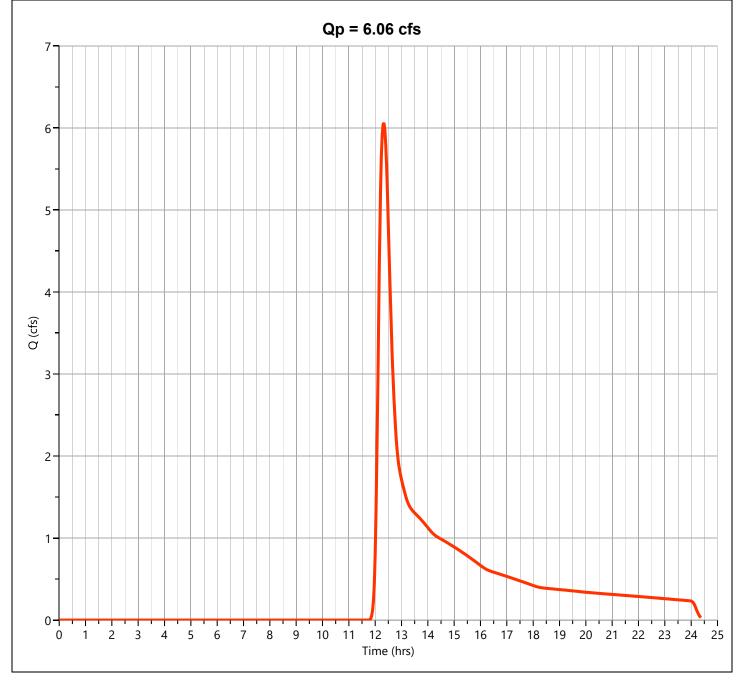
Frequency..... Rainfall, P (24-hour)....

	Storm #1	Storm #2	Storm #3
/r	2	25	100
n	3.27	6.14	7.84
n	0.54	2.24	3.50

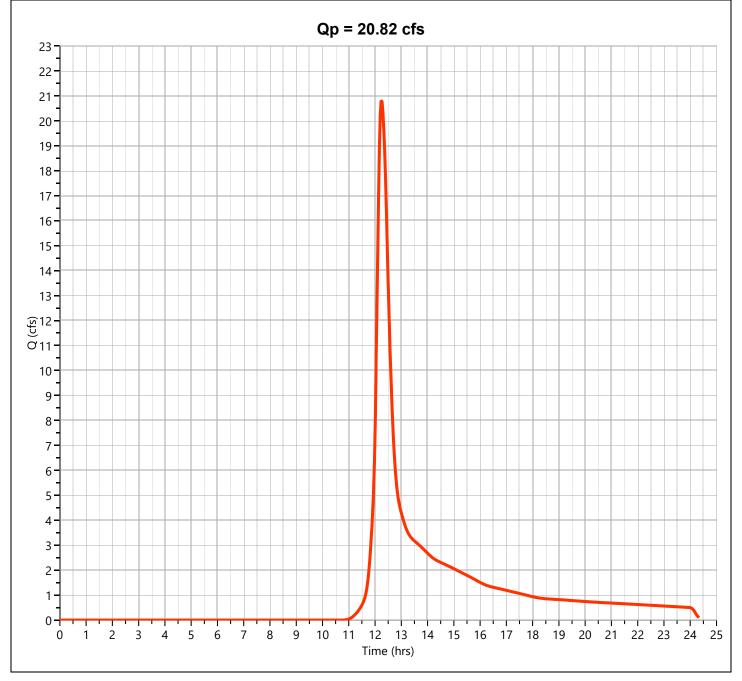
Runoff, Q......(Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)

Project:	Athens Street	-	Ву	MKO	Date Rev Date	6/1/2022 9/27/2022	
Location:	Stow, MA	_	Checked		Date		
Circle one: Circle one:	Present Developed Tc Tt	through subarea	Subcatchn	nent E-2A			
Sheet flow	(Applicable to Tc only)		Segment ID	A-B			
1. Surface	Description (table 3-1)			WOODS			
2. Manning	s roughness coeff., n (table 3-1)			0.6			
3. Flow leng	gth, L (total L <= 300 ft)		ft	50			
4. Two-yr 2	4-hr rainfall, P2		in	3.1			
5. Land Slo	pe, s		ft/ft	0.028			
6. Tt = 0.00	7 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	: hr	0.25			0.25
Shallow co	ncentrated Flow		Segment ID	B-C			
7. Surface	Description (paved or unpaved)			UNPAVED			
8. Flow Ler	gth, L		ft	694			
9. Waterco	urse slope, s		ft/ft	0.128			
10. Average	e Velocity, V (figure 3-1)		ft/s	5.77			
11. Tt = L /	3600V	Compute Tt	hr	0.03			0.03
Channel flo	w		Segment ID				
<ul><li>13. Wetted</li><li>14. Hydrau</li><li>15. Channe</li><li>16. Mannin</li></ul>	ectional flow area, a perimeter, pw lic radius, r=a/wp el Slope, s g's roughness coeff., n 9 r^2/3 s^1/2 / n	Compute r	ft/ft				
18. Flow leading 19. Tt = L /		Compute Tt	ft : hr				0
	ned or subarea Tc or Tt (add Tt in ste	•	!			hr min	0.29 17.2

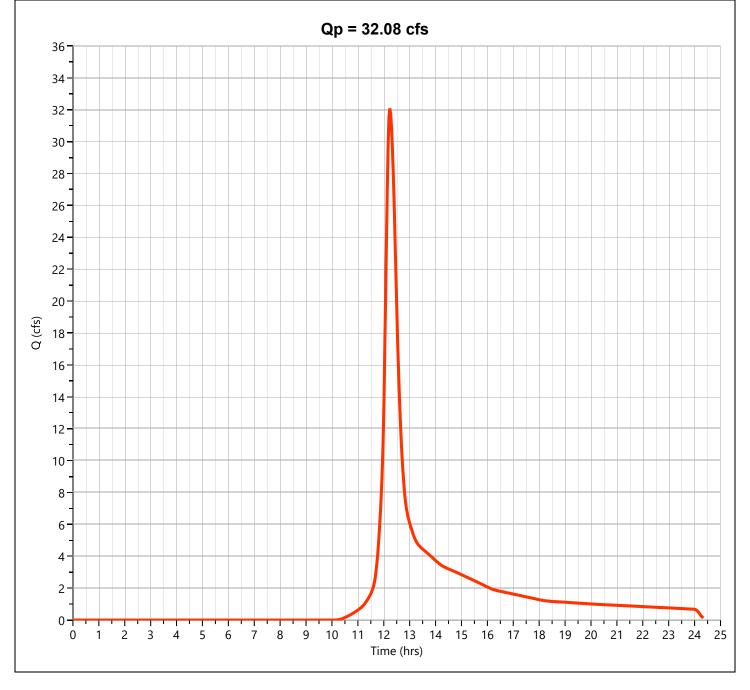
Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.063 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Runoff Volume	= 35,403 cuft
Drainage Area	= 17.7 ac	Curve Number	= 63
Tc Method	= User	Time of Conc. (Tc)	= 17.2 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



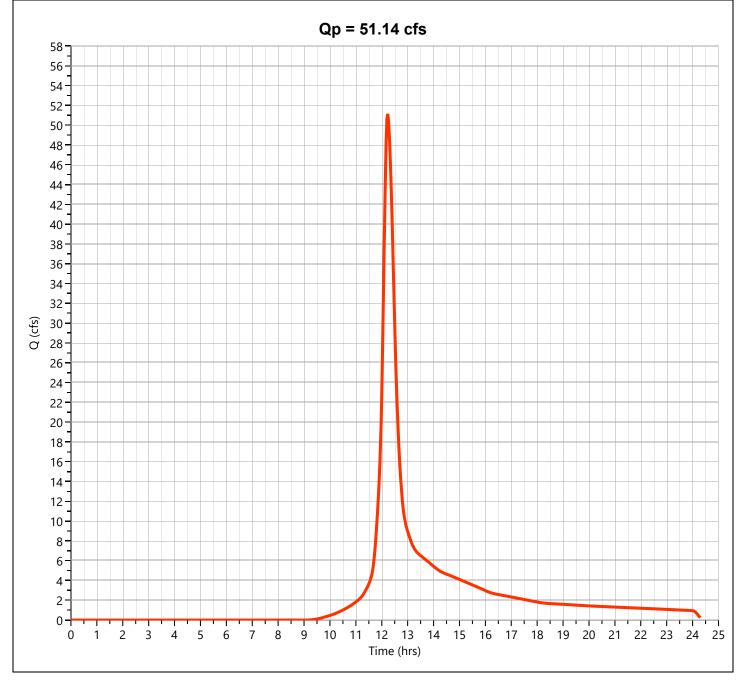
Hydrograph Type	= NRCS Runoff	Peak Flow	= 20.82 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 98,578 cuft
Drainage Area	= 17.7 ac	Curve Number	= 63
Tc Method	= User	Time of Conc. (Tc)	= 17.2 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 32.08 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 146,158 cuft
Drainage Area	= 17.7 ac	Curve Number	= 63
Tc Method	= User	Time of Conc. (Tc)	= 17.2 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 51.14 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 227,661 cuft
Drainage Area	= 17.7 ac	Curve Number	= 63
Tc Method	= User	Time of Conc. (Tc)	= 17.2 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



#### Worksheet 2: Runoff curve number and runoff

SM-3719C

Project:	Athens Stre	et		Ву	MKO	Date	6/1/22	
				_			9/27/2022	
Location:	Stow, MA			 Checked		Date		
Circle one:		Present	Developed	Subcatchm	ent E-2B			

1. Runoff curve number (CN)

Soil name and hydrologic	Cover description CN 1/ (cover type, treatment, and				Area	Product of CN x Area
group (appendix A)	hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious	98			0.34	33.25
Α	Woods Good Condition	30			5.85	175.41
Α	Open Space Good Condition	39			2.78	108.36
Α	Open Space Fair Condition	49			1.89	92.39
Α	Woods-Grass Combination Good Condition	32			2.92	93.30
Α	Gravel	76			0.84	63.70
В	Woods Good Condition	55			0.00	0.00
В	Open Space Good Condition	61			0.00	0.00
В	Gravel	85			0.00	0.00
С	Woods Good Condition	70			3.65	255.18
С	Open Space Fair Condition	79			1.74	137.62
С	Gravel	89			0.00	0.00
D	BVW	77			4.14	318.86
1/ Use only one	CN source per line.			Totals =	24.13	1278.07

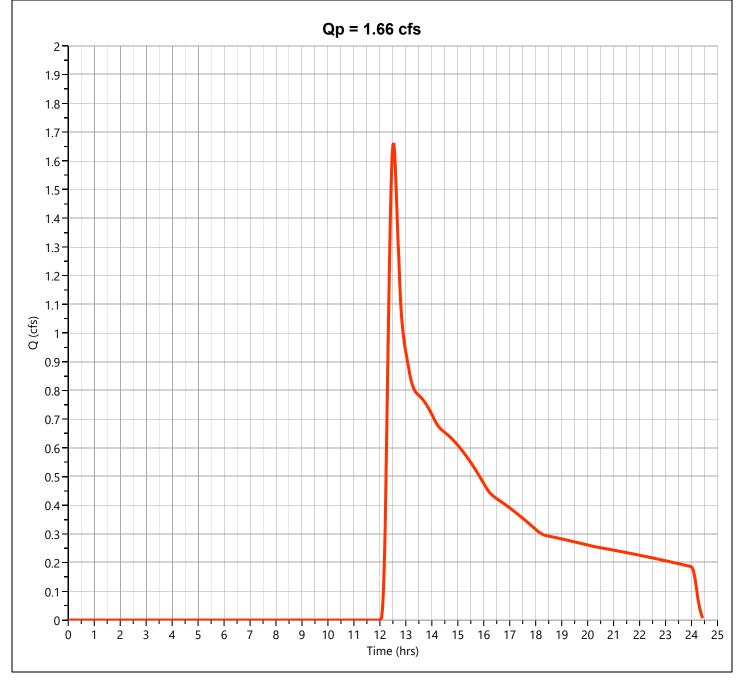
CN (weighted) =	total product	=	1278.07=	52.96	Use CN =	53
•	total area		24.13			

2. Runoff

Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.22	1.44	2.46

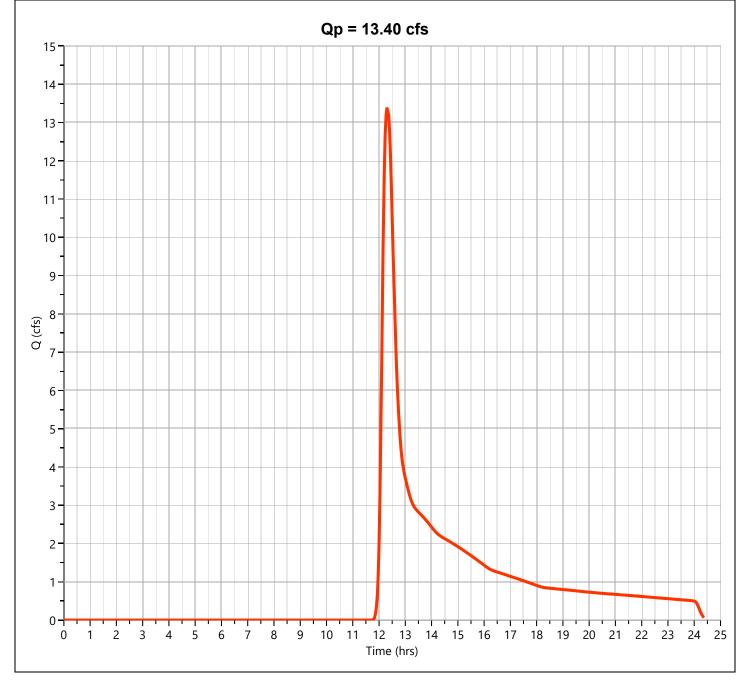
Project:	Athens Street	<del>-</del>	Ву	MKO	Date Rev Date	6/1/2022 9/27/2022	
Location:	Stow, MA	_	Checked		Date		
Circle one: Circle one:	Present Developed Tc Tt	through subarea	Subcatchn	nent E-2B			
Sheet flow	(Applicable to Tc only)		Segment ID	А-В			
1. Surface	Description (table 3-1)			WOODS			
2. Manning	s roughness coeff., n (table 3-1)			0.6			
3. Flow len	gth, L (total L <= 300 ft)		ft	50			
4. Two-yr 2	4-hr rainfall, P2		in	3.1			
5. Land Slo	pe, s		ft/ft	0.042			
6. Tt = 0.00	7 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.21			0.21
Shallow co	ncentrated Flow		Segment ID	B-C			
7. Surface	Description (paved or unpaved)			UNPAVED			
8. Flow Ler	ngth, L		ft	1267			
9. Waterco	urse slope, s		ft/ft	0.088			
10. Average	e Velocity, V (figure 3-1)		ft/s	4.77			
11. Tt = L /	3600V	Compute Tt	hr	0.07			0.07
Channel flo	w		Segment ID				
<ul><li>13. Wetted</li><li>14. Hydrau</li><li>15. Channe</li><li>16. Mannin</li></ul>	ectional flow area, a perimeter, pw lic radius, r=a/wp el Slope, s g's roughness coeff., n 9 r^2/3 s^1/2 / n	Compute r	ft/ft				
18. Flow leading 19. Tt = L /		Compute Tt	ft hr				0
20. Waters	ned or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	l 19)			hr min	0.29 17.3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.662 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.53 hrs
Time Interval	= 2 min	Runoff Volume	= 18,921 cuft
Drainage Area	= 24.13 ac	Curve Number	= 53
Tc Method	= User	Time of Conc. (Tc)	= 17.3 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



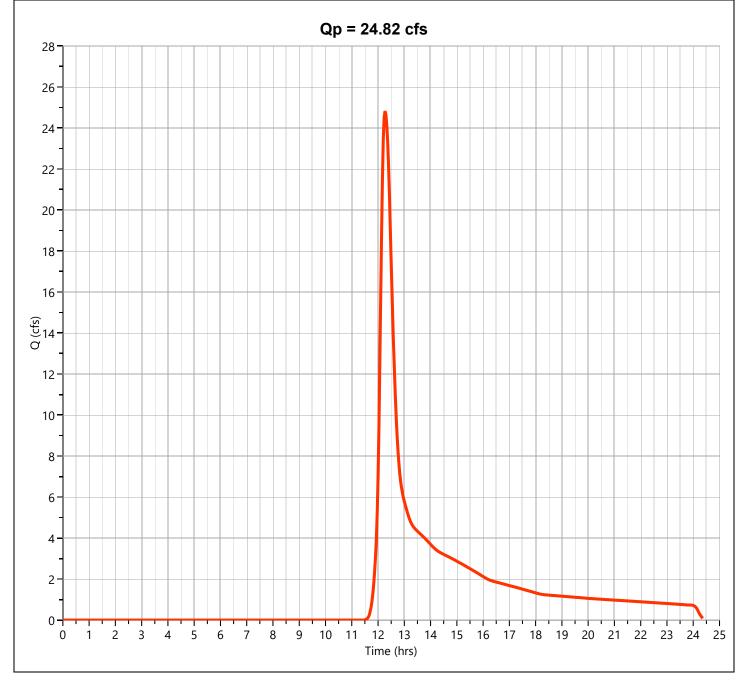
#### E-2B Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 13.40 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Runoff Volume	= 77,016 cuft
Drainage Area	= 24.13 ac	Curve Number	= 53
Tc Method	= User	Time of Conc. (Tc)	= 17.3 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



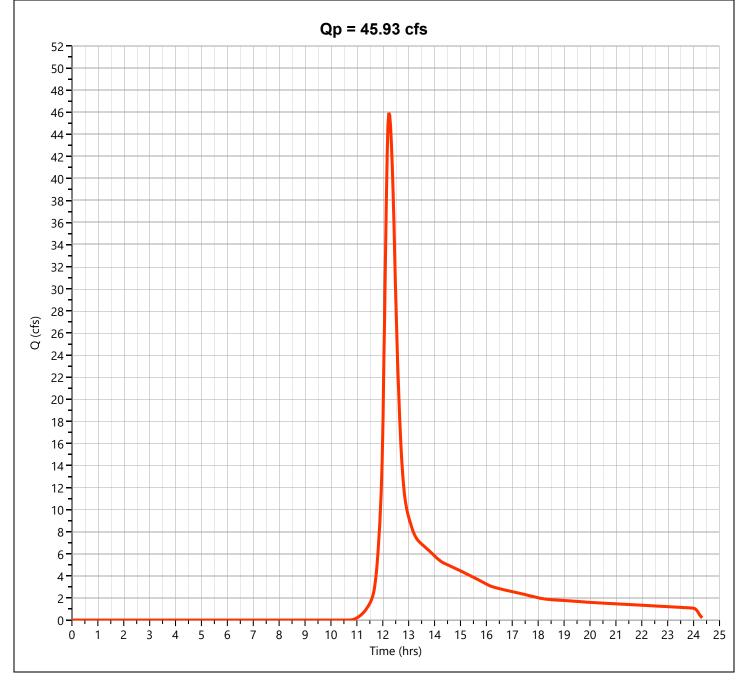
#### E-2B Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 24.82 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Runoff Volume	= 126,186 cuft
Drainage Area	= 24.13 ac	Curve Number	= 53
Tc Method	= User	Time of Conc. (Tc)	= 17.3 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



### E-2B Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 45.93 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 215,845 cuft
Drainage Area	= 24.13 ac	Curve Number	= 53
Tc Method	= User	Time of Conc. (Tc)	= 17.3 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Project:	Athens Street	By MKO	Date 6/1/22
			Rev Date 9/27/2022
Location:	Stow, MA	Checked	Date
Circle one:	Present Developed	Subcatchment E-3	

#### 1. Runoff curve number (CN)

Soil name and hydrologic	Cover description CN 1/ (cover type, treatment, and				Area	Product of CN x Area
group (appendix A)	hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious	98			0.00	0.00
Α	Woods Good Condition	30			0.00	0.00
Α	Open Space Good Condition	39			0.00	0.00
Α	Brush Fair	35			0.00	0.00
Α	Gravel	76			0.00	0.00
В	Woods Good Condition	55			0.00	0.00
В	Open Space Good Condition	61			0.00	0.00
В	Gravel	85			0.00	0.00
С	Woods Good Condition	70			10.00	699.99
С	Open Space Good Condition	74			0.00	0.00
С	Gravel	89			0.35	30.80
1/ Use only one	CN source per line.	-		Totals =	10.35	730.79

CN (weighted) =	total product	=	730.79 =	70.64 ;	Use CN =	71
	total area		10.35			

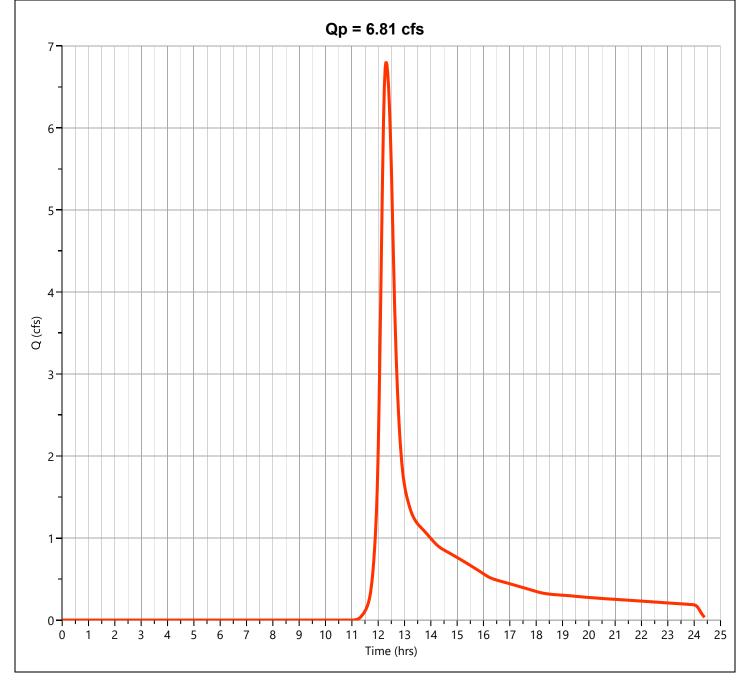
#### 2. Runoff

Frequency	yr
Rainfall, P (24-hour)	in
Naiiliaii, F (24-110ui )	111
Runoff, Q	in
(Use P and CN with table 2-1, fig. 2-1,)	
or eqs. 2-3 and 2-4.)	

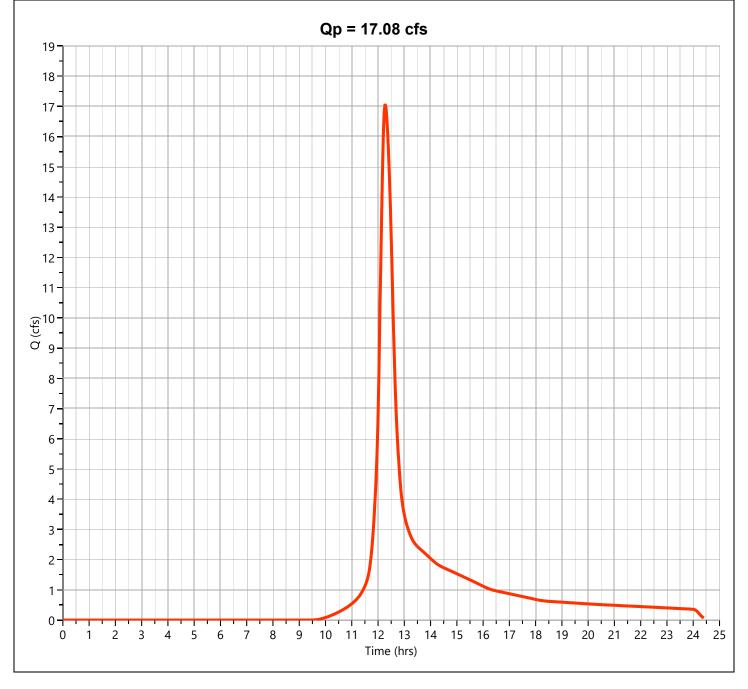
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.90	2.98	4.40

Project: Athens Street	_	Ву	MKO	Date	6/1/2022	•
				Rev Date	9/27/2022	-
Location: Stow, MA	=	Checked		Date		-
Circle one: Present Developed		Subcatchr	ment E-3			
Circle one: Tc Tt	through			•		
	subarea					
Sheet flow (Applicable to Tc only)		Segment ID	A-B			1
1. Surface Description (table 3-1)			WOODS			1
		ļ				
2. Mannings roughness coeff., n (table 3-1)			0.6			
3. Flow length, L (total L <= 300 ft)		ft	50			
o. Flow longin, E (total E 4- 000 ft)			30			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.012			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tr	t br	0.35			0.35
0. 11 - 0.007 (IIL) 0.87 (F2 0.3 \$ 0.4)	Compute 1	. !!!	0.33			0.33
Shallow concentrated Flow		Segment ID	B-C			Ī
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	457			
o. Flow Length, L		IL	457			
9. Watercourse slope, s		ft/ft	0.168			
10. Average Velocity, V (figure 3-1)		ft/s	6.61			
11. Tt = L / 3600V	Compute T	t br	0.02			0.02
11. It – L7 3000V	Compute 1	. !!!	0.02			0.02
Channel flow		Segment ID				Ī
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r					
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n	_	<u>.</u>				I
17. V = 1.49 r^2/3 s^1/2 / n	Compute V					
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute T	t hr				0
20. Watershed or subarea Tc or Tt (add Tt in ste	ns 6 11 and	1 10)			hr	0.37
20. Watershed or Subarea 10 or 11 (aud 11 III Ste	ρο υ, τι, απι	a 1 <i>3)</i>			min	22.4
(210-VI-TR-55, Second	Ed., June 19	986)				D-3

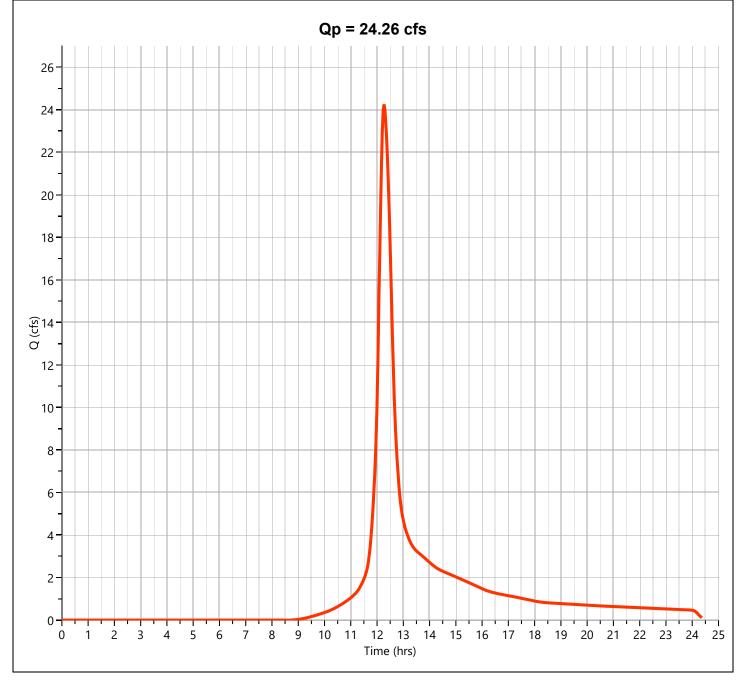
Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.809 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.30 hrs
Time Interval	= 2 min	Runoff Volume	= 35,200 cuft
Drainage Area	= 10.35 ac	Curve Number	= 71
Tc Method	= User	Time of Conc. (Tc)	= 22.4 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



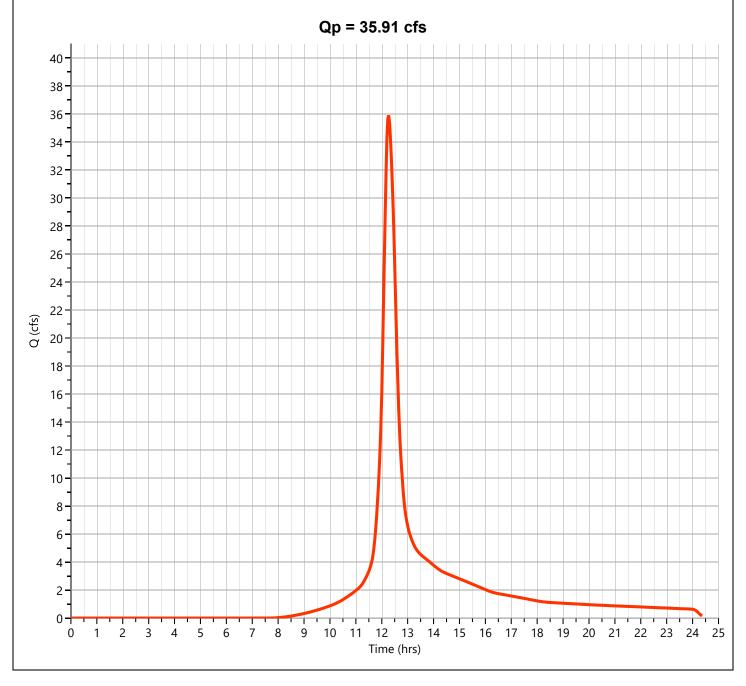
Hydrograph Type	= NRCS Runoff	Peak Flow	= 17.08 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Runoff Volume	= 82,096 cuft
Drainage Area	= 10.35 ac	Curve Number	= 71
Tc Method	= User	Time of Conc. (Tc)	= 22.4 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 24.26 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Runoff Volume	= 115,182 cuft
Drainage Area	= 10.35 ac	Curve Number	= 71
Tc Method	= User	Time of Conc. (Tc)	= 22.4 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 35.91 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Runoff Volume	= 169,813 cuft
Drainage Area	= 10.35 ac	Curve Number	= 71
Tc Method	= User	Time of Conc. (Tc)	= 22.4 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Project:	Athens Street	By MKO	Date	6/1/22
Location:	Stow, MA	Checked	Rev Date Date	9/27/2022
Circle one:	Present Developed	Subcatchment E-4	•	

1. Runoff curve number (CN)

Soil name and hydrologic	Cover description (cover type, treatment, and		CN 1/		Area	Product of CN x Area
group (appendix A)	hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious	98			0.00	0.00
А	Woods Good Condition	30			0.18	5.55
Α	Open Space Good Condition	39			0.00	0.00
Α	Brush Fair	35			0.00	0.00
Α	Gravel	76			0.05	3.63
В	Woods Good Condition	55			0.00	0.00
В	Open Space Good Condition	61			0.00	0.00
В	Gravel	85			0.00	0.00
С	Woods Good Condition	70			9.72	680.19
С	Open Space Good Condition	74			0.00	0.00
С	Gravel	89			0.31	28.03
D	BVW	77			0.03	2.51
1/ Use only one	1/ Use only one CN source per line.					719.91

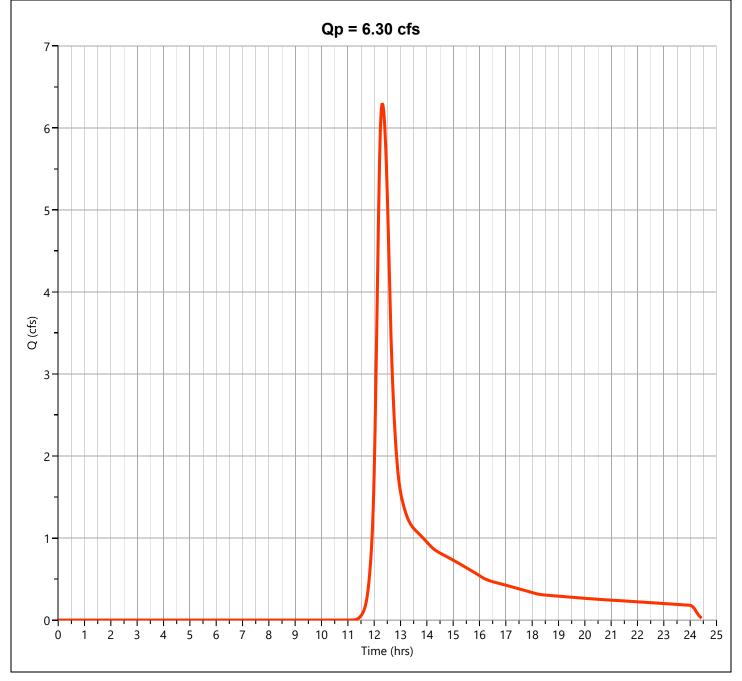
						_
CN (weighted) =	total product	=	719.91 =	69.91 ;	Use CN =	70
	total area		10.30			

2. Runoff

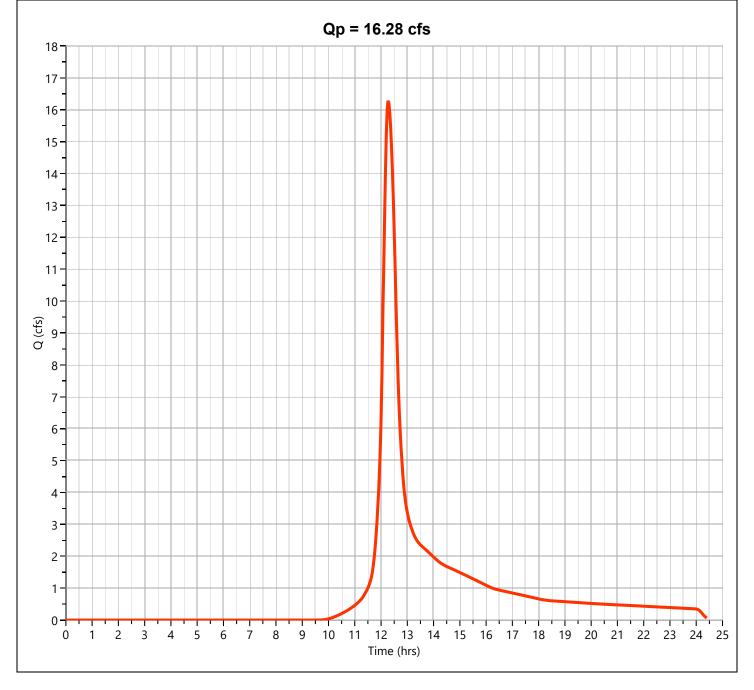
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.86	2.91	4.32

Project:	Athens Stre	et	_	Ву	MKO	Date	6/1/2022	
						Rev Date	9/27/2022	
Location:	Stow, MA		=	Checked		Date		
Cirolo ono		Dragent Davidened		Cubaatab				
Circle one:		Present Developed Tc Tt		Subcatchi	ment E-4	•		
Circle one.		10 11	through subarea			•		
			Subarea					
Sheet flow	(Applicable to	o Tc only)		Segment ID	A-B			
	_\	,,		3				
1. Surface	Description (1	table 3-1)			WOODS			
		·						
2. Manning	s roughness	coeff., n (table 3-1)			0.6			
3. Flow len	gth, L (total L	. <= 300 ft)		ft	50			
4. Two-yr 2	24-hr rainfall,	P2		in	3.1			
5. Land Slo	ppe, s			ft/ft	0.016			
. =	- / / .	(DOLO = 10.4)			2.22			
6. It = 0.00	)/ (nL)^0.8/(	(P2^0.5 s^0.4)	Compute T	t hr	0.32			0.32
01-11-11				0	D 0			
Shallow co	ncentrated Fl	OW		Segment ID	B-C			
7 Surface	Description (	paved or unpaved)			UNPAVED			
7. Surface	Description (	paved of unpaved)			UNFAVED			
8. Flow Ler	nath I			ft	735			
O. I low Loi	igui, L			10	700			
9. Waterco	urse slope, s			ft/ft	0.103			
0	шоо окоро, о				01.100			
10. Averag	e Velocity, V	(figure 3-1)		ft/s	5.18			
J	•	,						
11. Tt = L /	3600V		Compute T	t hr	0.04			0.04
Channel flo	)W			Segment ID				
	sectional flow			sf				
	perimeter, p			ft				
	lic radius, r=a	a/wp	Compute r					
15. Channe				ft/ft				
	g's roughnes			<b>5.</b> /				
	9 r^2/3 s^1/2	/ n	Compute V					
18. Flow le			O	ft				0
19. Tt = L /	30UUV		Compute T	ו חר				0
20 Mata	had ar aubar	oo To or Tt (add Tt in ata	no 6 11 and	4 10)			hr	0.36
ZU. Waters	neu or subar	ea Tc or Tt (add Tt in ste	ρου, π, and	. 1 <i>9)</i>			hr min	0.36 21.3
							111111	۷۱.۵

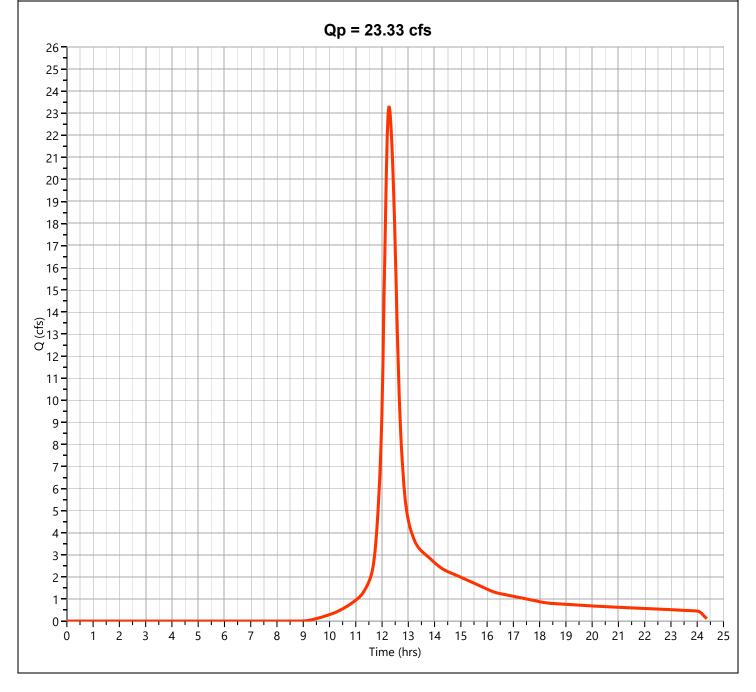
Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.300 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.30 hrs
Time Interval	= 2 min	Runoff Volume	= 33,076 cuft
Drainage Area	= 10.3 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 21.3 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



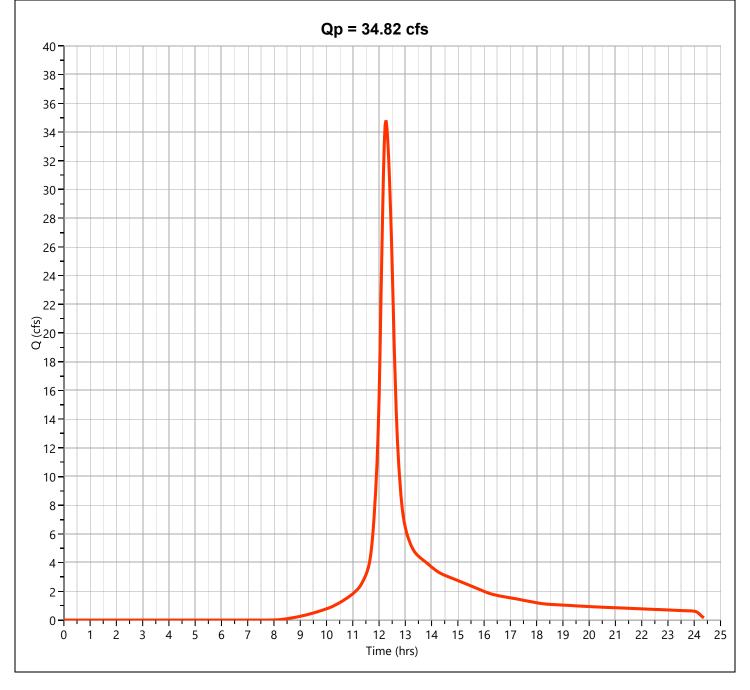
Hydrograph Type	= NRCS Runoff	Peak Flow	= 16.28 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Runoff Volume	= 78,626 cuft
Drainage Area	= 10.3 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 21.3 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 23.33 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Runoff Volume	= 111,000 cuft
Drainage Area	= 10.3 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 21.3 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 34.82 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Runoff Volume	= 164,675 cuft
Drainage Area	= 10.3 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 21.3 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Project:	Athens Street	Ву МКО	Date 6/1/22 Rev Date 9/27/2022
Location:	Stow, MA	Checked	Date
Circle one:	Present Developed	Subcatchment E-5	

1. Runoff curve number (CN)

Soil name and hydrologic	Cover description (cover type, treatment, and		CN 1/		Area	Product of CN x Area
group (appendix A)	hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious	98			0.04	3.50
Α	Woods Good Condition	30			3.05	91.50
Α	Open Space Good Condition	39			0.00	0.00
А	Open Space Fair Condition	49			1.97	96.49
А	Gravel	76			0.24	17.90
В	Woods Good Condition	55			0.00	0.00
В	Open Space Good Condition	61			0.00	0.00
В	Gravel	85			0.00	0.00
С	Woods Good Condition	70			4.91	343.56
С	Open Space Fair Condition	79			0.49	38.52
С	Gravel	89			0.00	0.00
D	BVW	77			2.21	170.08
1/ Use only one	CN source per line.			Totals =	12.89	761.55

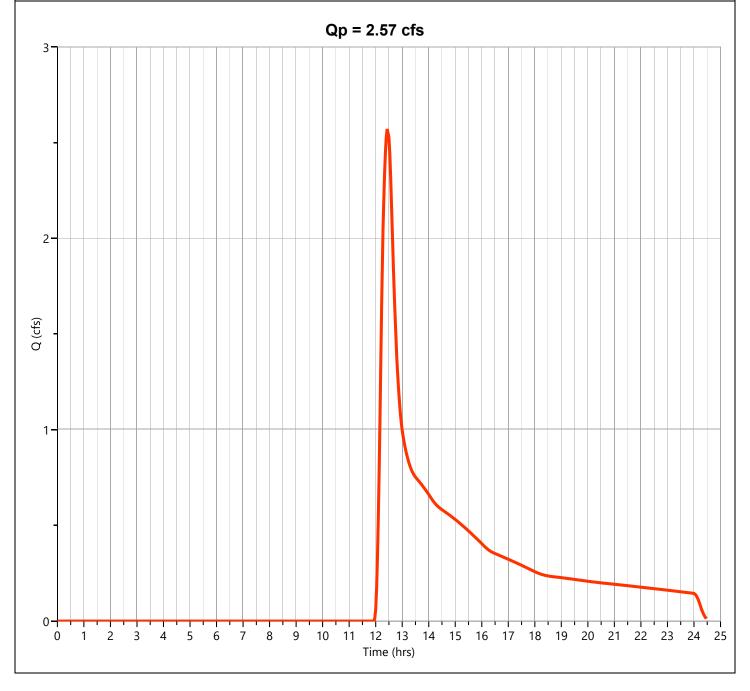
CN (weighted) =	total pr	roduct	=	761.55	=	59.06	;	Use CN =	59	1
!	total ar	ea		12.89	_					

2.	Runoff
----	--------

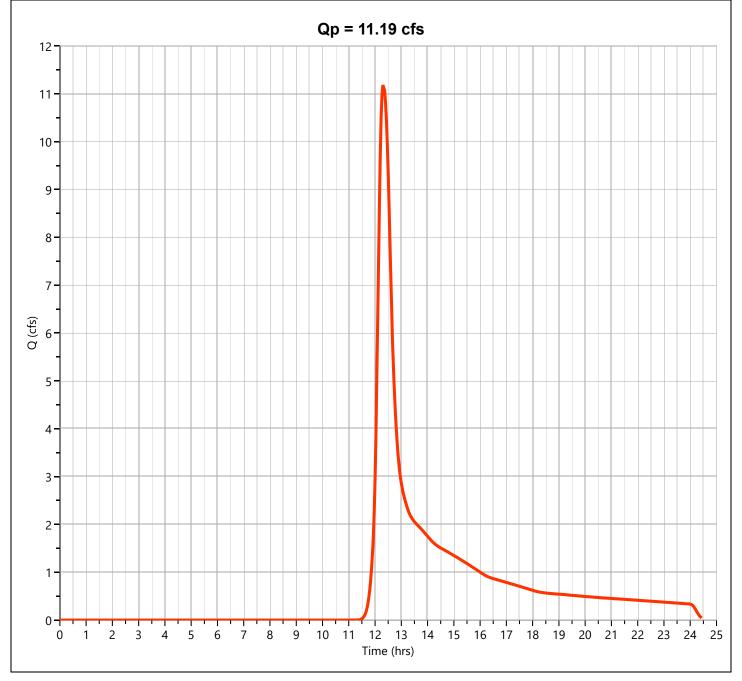
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.40	1.93	3.11

Project:	Athens Street	_	Ву	MKO	Date Rev Date	6/1/2022 9/27/2022	-
Location:	Stow, MA	_	Checked		Date	0/21/2022	-
Circle one: Circle one:	Present Developed Tc Tt	through	Subcatchi	ment E-5			
		subarea					
Sheet flow	(Applicable to Tc only)		Segment ID	A-B			1
1. Surface	Description (table 3-1)			WOODS			1
2. Manning	s roughness coeff., n (table 3-1)			0.6			
3. Flow leng	gth, L (total L <= 300 ft)		ft	50			
4. Two-yr 2	4-hr rainfall, P2		in	3.1			İ
5. Land Slo	ppe, s		ft/ft	0.026			1
6. Tt = 0.00	07 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Ti	hr	0.26			0.26
Shallow co	ncentrated Flow		Segment ID	B-C			
7. Surface	Description (paved or unpaved)			UNPAVED			
8. Flow Ler	ngth, L		ft	1260			
9. Waterco	urse slope, s		ft/ft	0.076			
10. Average	e Velocity, V (figure 3-1)		ft/s	4.45			
11. Tt = L /	3600V	Compute Tr	hr	0.08			0.08
Channel flo	ow		Segment ID				
	sectional flow area, a		sf				
	perimeter, pw		ft				
	lic radius, r=a/wp	Compute r					
15. Channe			ft/ft				
	g's roughness coeff., n 9 r^2/3 s^1/2 / n	Compute V	ft/c				
18. Flow le		Compute v	ft				
19. Tt = L /		Compute Ti					0
20. Waters	hed or subarea Tc or Tt (add Tt in ste	eps 6, 11, and	l 19)			hr min	0.34 20.3
	(210-VI-TR-55, Second	Ed., June 19	86)				D-3

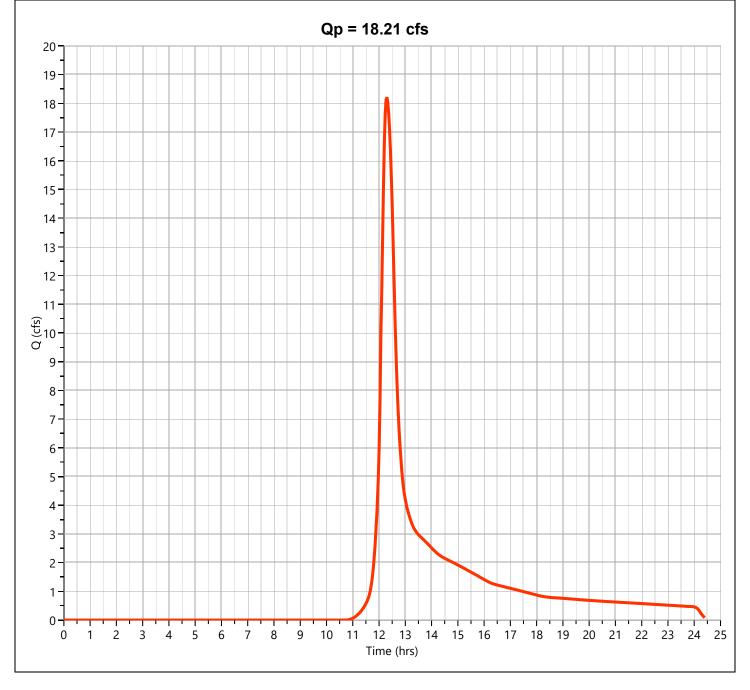
Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.571 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.47 hrs
Time Interval	= 2 min	Runoff Volume	= 19,062 cuft
Drainage Area	= 12.89 ac	Curve Number	= 59
Tc Method	= User	Time of Conc. (Tc)	= 20.3 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



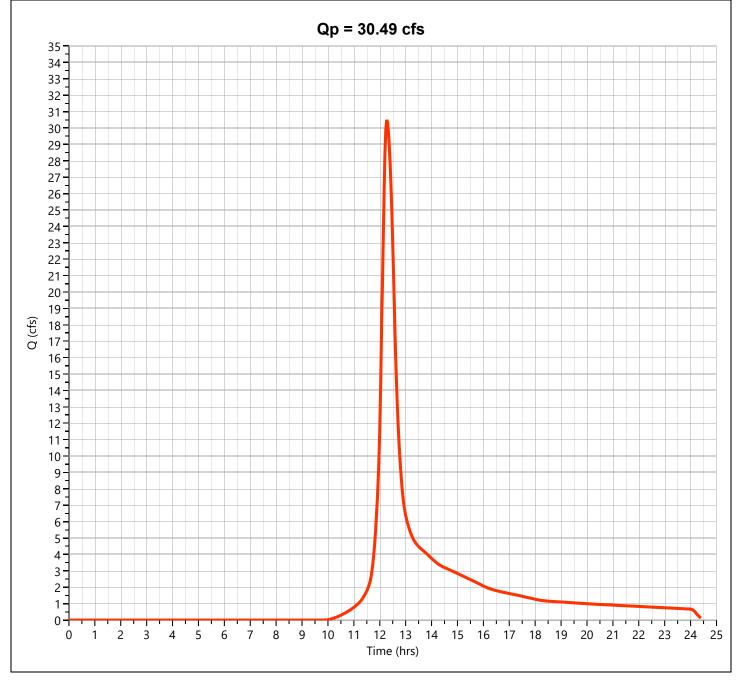
Hydrograph Type	= NRCS Runoff	Peak Flow	= 11.19 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Runoff Volume	= 59,868 cuft
Drainage Area	= 12.89 ac	Curve Number	= 59
Tc Method	= User	Time of Conc. (Tc)	= 20.3 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 18.21 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.30 hrs
Time Interval	= 2 min	Runoff Volume	= 91,855 cuft
Drainage Area	= 12.89 ac	Curve Number	= 59
Tc Method	= User	Time of Conc. (Tc)	= 20.3 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 30.49 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Runoff Volume	= 147,879 cuft
Drainage Area	= 12.89 ac	Curve Number	= 59
Tc Method	= User	Time of Conc. (Tc)	= 20.3 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Project:	Athens Street	Ву МКО	Date 6/1/22 Rev Date 9/27/2022
Location:	Stow, MA	Checked	Date
Circle one:	Present Developed	Subcatchment E-6	

1. Runoff curve number (CN)

Soil name and hydrologic	Cover description (cover type, treatment, and		CN 1/		Area	Product of CN x Area
group (appendix A)	hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious	98			0.00	0.00
А	Woods Good Condition	30			1.87	56.21
А	Open Space Good Condition	39			0.00	0.00
А	Open Space Fair Condition	49			0.00	0.00
А	Gravel	76			0.30	22.79
В	Woods Good Condition	55			0.00	0.00
В	Open Space Good Condition	61			0.00	0.00
В	Gravel	85			0.00	0.00
С	Woods Good Condition	70			0.00	0.00
С	Open Space Good Condition	74			0.00	0.00
С	Gravel	89			0.00	0.00
D	BVW	77			0.08	6.03
1/ Use only one	CN source per line.	-	Totals =	2.25	85.03	

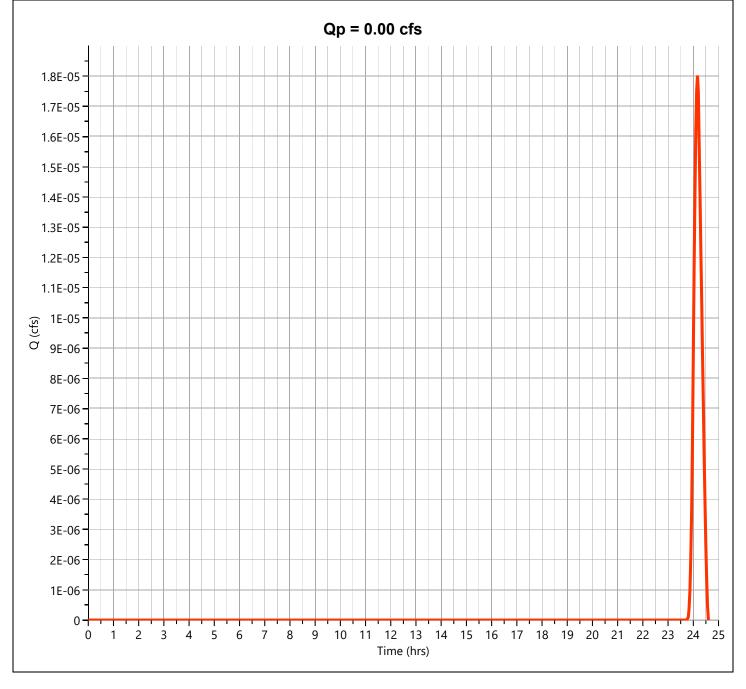
						_
CN (weighted) =	total product	=	85.03 =	37.76 ;	Use CN =	38
	total area		2.25			

2. Runoff

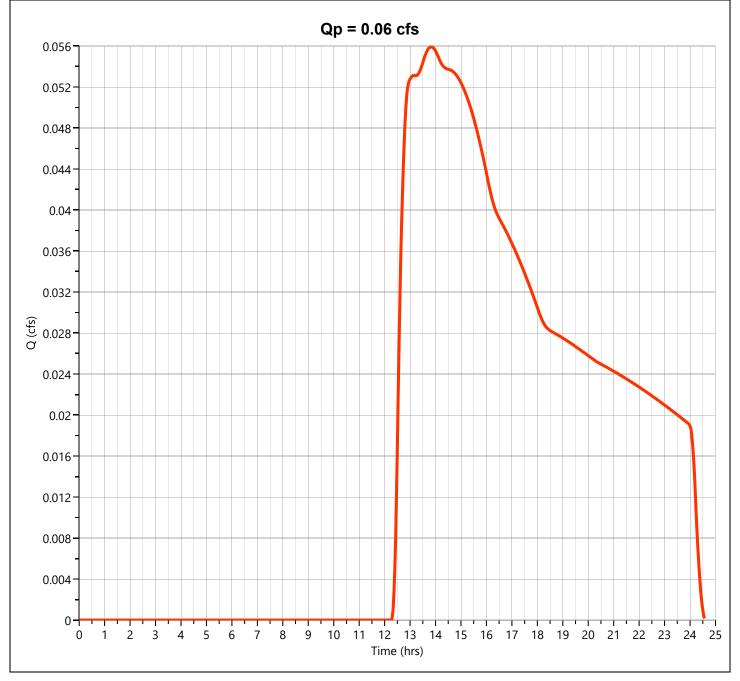
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.00	0.42	0.98

Project:	Athens Street	-	Ву	MKO	Date Rev Date	6/1/2022 9/27/2022	
Location:	Stow, MA	_	Checked		Date		
Circle one: Circle one:	Present Developed Tc Tt	through subarea	Subcatchi	ment E-6			
Sheet flow	(Applicable to Tc only)		Segment ID	A-B			
1. Surface l	Description (table 3-1)			WOODS			
2. Manning	s roughness coeff., n (table 3-1)			0.6			
3. Flow leng	gth, L (total L <= 300 ft)		ft	50			
4. Two-yr 2	4-hr rainfall, P2		in	3.1			
5. Land Slo	pe, s		ft/ft	0.014			
6. Tt = 0.00	7 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.33			0.33
Shallow cor	ncentrated Flow		Segment ID	B-C			
7. Surface l	Description (paved or unpaved)			UNPAVED			
8. Flow Ler	ngth, L		ft	297			
9. Waterco	urse slope, s		ft/ft	0.050			
10. Average	e Velocity, V (figure 3-1)		ft/s	3.61			
11. Tt = L /	3600V	Compute Tt	hr	0.02			0.02
Channel flo	w		Segment ID				
<ul><li>13. Wetted</li><li>14. Hydraul</li><li>15. Channe</li><li>16. Mannin</li><li>17. V = 1.49</li></ul>	g's roughness coeff., n 9 r^2/3 s^1/2 / n	Compute r	ft/ft ft/s				
18. Flow ler 19. Tt = L /	•	Compute Tt	ft hr				0
20. Watersl	ned or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	i 19)			hr min	0.36 21.4

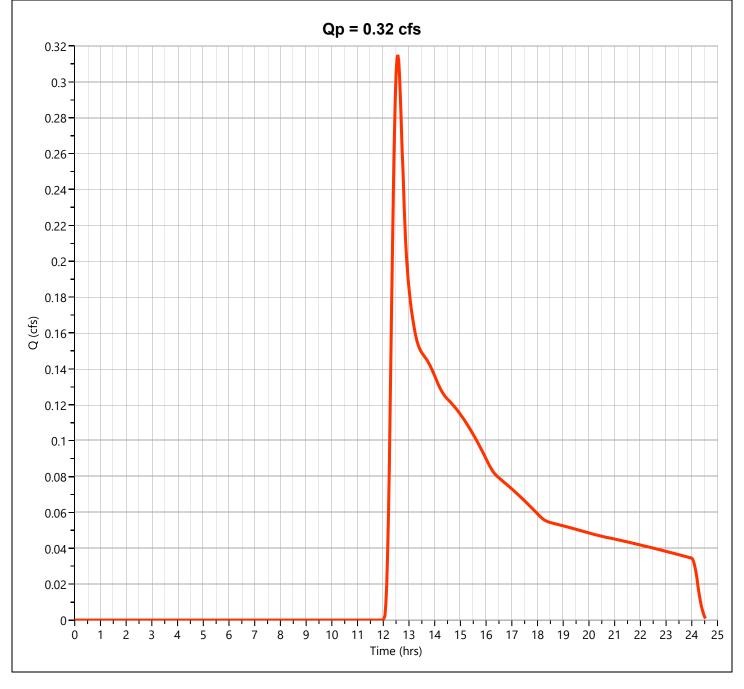
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 24.17 hrs
Time Interval	= 2 min	Runoff Volume	= 0.024 cuft
Drainage Area	= 2.25 ac	Curve Number	= 38
Tc Method	= User	Time of Conc. (Tc)	= 21.4 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



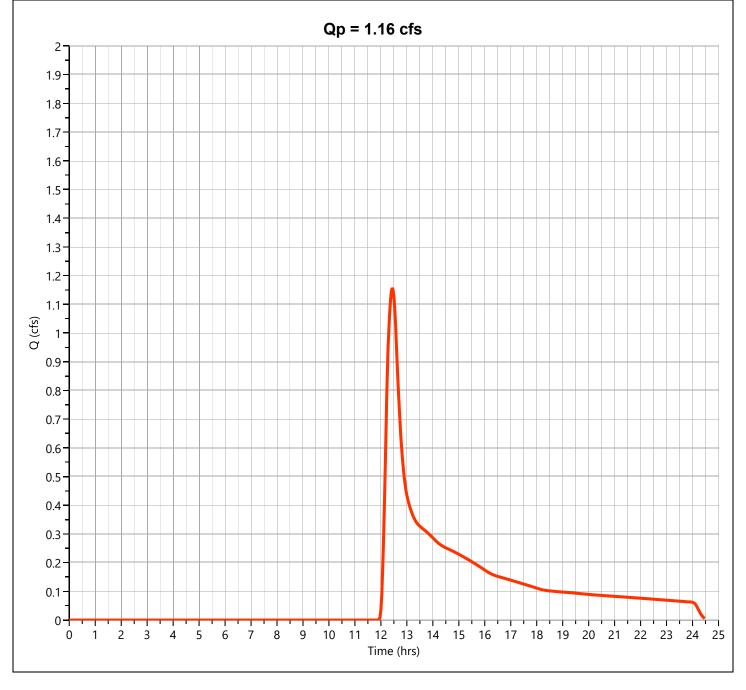
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.056 cfs
Storm Frequency	= 10-yr	Time to Peak	= 13.83 hrs
Time Interval	= 2 min	Runoff Volume	= 1,451 cuft
Drainage Area	= 2.25 ac	Curve Number	= 38
Tc Method	= User	Time of Conc. (Tc)	= 21.4 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.315 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.57 hrs
Time Interval	= 2 min	Runoff Volume	= 3,584 cuft
Drainage Area	= 2.25 ac	Curve Number	= 38
Tc Method	= User	Time of Conc. (Tc)	= 21.4 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.157 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.43 hrs
Time Interval	= 2 min	Runoff Volume	= 8,335 cuft
Drainage Area	= 2.25 ac	Curve Number	= 38
Tc Method	= User	Time of Conc. (Tc)	= 21.4 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Project:	Athens Street	Ву МКО	Date 6/1/22 Rev Date 9/27/2022
Location:	Stow, MA	Checked	Date
Circle one:	Present Developed	Subcatchment E-7	

1. Runoff curve number (CN)

Soil name and hydrologic	c (cover type, treatment, and		CN 1/		Area	Product of CN x Area
group (appendix A)	hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious	98			0.00	0.00
Α	Woods Good Condition	30			6.24	187.15
Α	Open Space Good Condition	39			0.00	0.00
Α	Open Space Fair Condition	49			0.00	0.00
Α	Gravel	76			0.27	20.52
В	Woods Good Condition	55			0.00	0.00
В	Open Space Good Condition	61			0.00	0.00
В	Gravel	85			0.00	0.00
С	Woods Good Condition	70			0.00	0.00
С	Open Space Good Condition	74			0.00	0.00
С	Gravel	89			0.00	0.00
1/ Use only one	CN source per line.			Totals =	6.51	207.68

CN (weighted) =	total product	=	207.68 =	31.91 ;	Use CN =	32
, , ,	total area	_	6.51			-

2. Runoff	
-----------	--

Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.05	0.15	0.51

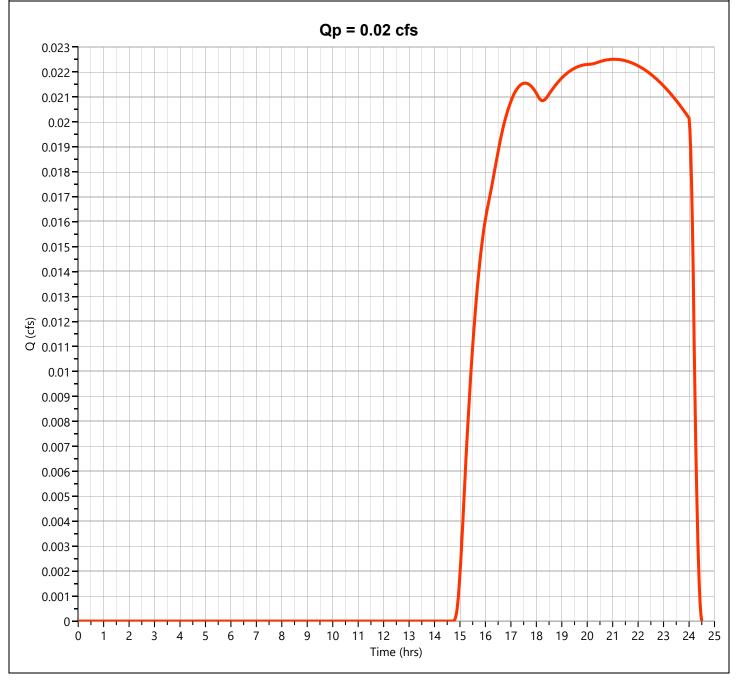
Project:	Athens Street	-	Ву	MKO	Date Rev Date	6/1/2022 9/27/2022	
Location:	Stow, MA	-	Checked		Date		
Circle one: Circle one:	Present Developed Tt	through subarea	Subcatchr	ment E-7			
Sheet flow	(Applicable to Tc only)		Segment ID	A-B			
1. Surface	Description (table 3-1)			WOODS			
2. Manning	s roughness coeff., n (table 3-1)			0.6			
3. Flow leng	gth, L (total L <= 300 ft)		ft	50			
4. Two-yr 2	4-hr rainfall, P2		in	3.1			
5. Land Slo	pe, s		ft/ft	0.036			
6. Tt = 0.00	7 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Ti	t hr	0.23			0.23
Shallow co	ncentrated Flow		Segment ID	B-C			
7. Surface	Description (paved or unpaved)			UNPAVED			
8. Flow Ler	ngth, L		ft	533			
9. Waterco	urse slope, s		ft/ft	0.011			
10. Average	e Velocity, V (figure 3-1)		ft/s	1.69			
11. Tt = L /	3600V	Compute Ti	t hr	0.09			0.09
Channel flo	w		Segment ID				
<ul><li>13. Wetted</li><li>14. Hydrau</li><li>15. Channe</li><li>16. Mannin</li><li>17. V = 1.4</li></ul>	g's roughness coeff., n 9 r^2/3 s^1/2 / n	Compute r	ft/ft ft/s				
18. Flow let 19. Tt = L /		Compute Ti	ft t hr				0
20. Waters	hed or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	d 19)			hr min	0.32 19.0

# E-7 Hyd. No. 8

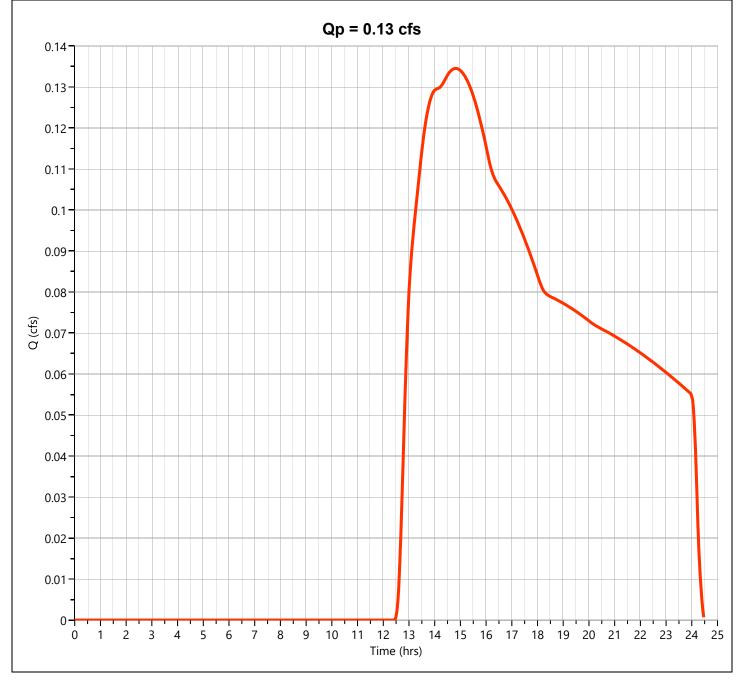
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.00 hrs
Time Interval	= 2 min	Runoff Volume	= 0.000 cuft
Drainage Area	= 6.51 ac	Curve Number	= 32
Tc Method	= User	Time of Conc. (Tc)	= 19.0 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 0.00 cfs

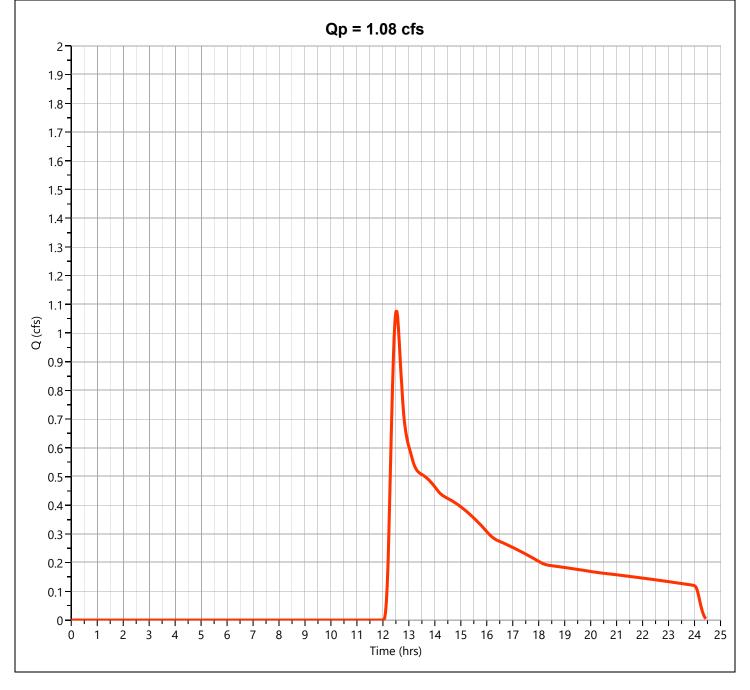
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.023 cfs
Storm Frequency	= 10-yr	Time to Peak	= 21.03 hrs
Time Interval	= 2 min	Runoff Volume	= 669 cuft
Drainage Area	= 6.51 ac	Curve Number	= 32
Tc Method	= User	Time of Conc. (Tc)	= 19.0 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.135 cfs
Storm Frequency	= 25-yr	Time to Peak	= 14.83 hrs
Time Interval	= 2 min	Runoff Volume	= 3,648 cuft
Drainage Area	= 6.51 ac	Curve Number	= 32
Tc Method	= User	Time of Conc. (Tc)	= 19.0 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.078 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.53 hrs
Time Interval	= 2 min	Runoff Volume	= 12,259 cuft
Drainage Area	= 6.51 ac	Curve Number	= 32
Tc Method	= User	Time of Conc. (Tc)	= 19.0 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Project:	Athens Street	By MKO	Date 6/1/22  Rev Date 9/27/2022
Location:	Stow, MA	Checked	Date Date
Circle one:	Present Developed	Subcatchment E-8	

#### 1. Runoff curve number (CN)

Soil name and hydrologic	(cover type, treatment, and		CN 1/		Area	Product of CN x Area
group (appendix A)	hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious	98			0.00	0.00
А	Woods Good Condition	30			0.68	20.49
Α	Open Space Good Condition	39			0.00	0.00
А	Open Space Fair Condition	49			0.00	0.00
Α	Gravel	76			0.00	0.00
В	Woods Good Condition	55			0.00	0.00
В	Open Space Good Condition	61			0.00	0.00
В	Gravel	85			0.00	0.00
С	Woods Good Condition	70			0.00	0.00
С	Open Space Poor Condition	86			0.00	0.00
С	Gravel	89			0.00	0.00
1/ Use only one	CN source per line.			Totals =	0.68	20.49

						_
CN (weighted) =	total product	=	20.49=	30.00 ;	Use CN =	30
	total area		0.68			

#### 2. Runoff

Frequency	yr	
Rainfall, P (24-hour)	in	
Runoff, Q(Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	Ė

Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.09	0.09	0.38

Project:	Athens Stre	et	_	Ву	MKO	Date	6/1/2022	
						Rev Date	9/27/2022	
Location:	Stow, MA		-	Checked		Date		
Cirolo ano	ı	Dragent Davidened		Cubaatab				
Circle one:		Present Developed Tc Tt		Subcatchr	ment E-8			
Circle one.		10 11	through subarea			•		
			Subarea					
Sheet flow	(Applicable to	o Tc only)		Segment ID	A-B			
		,,		o .				
1. Surface	Description (t	table 3-1)			WOODS			
2. Manning	s roughness	coeff., n (table 3-1)			0.6			
3. Flow len	gth, L (total L	. <= 300 ft)		ft	50			
4. Two-yr 2	24-hr rainfall,	P2		in	3.1			
5 L				6.16	0.040			
5. Land Slo	ope, s			ft/ft	0.016			
6 Tt = 0.00	17 (nl \^0 8 / /	(P2^0.5 s^0.4)	Compute Ti	t hr	0.32			0.32
0. 11 – 0.00	)/ (IIL) 0.6/ (	(F2*0.5 \$*0.4)	Compute 11	· '''	0.32			0.32
Shallow co	ncentrated FI	OW		Segment ID	B-C			
Challow 66	noontiatoa i i			Cogmont ID	ВО			
7. Surface	Description (	paved or unpaved)			UNPAVED			
	(1							
8. Flow Ler	ngth, L			ft	116			
9. Waterco	urse slope, s			ft/ft	0.038			
10. Averag	e Velocity, V	(figure 3-1)		ft/s	3.15			
			_					
11. Tt = L /	3600V		Compute Ti	t hr	0.01			0.01
01				0				
Channel flo	DW			Segment ID				
12 Cross s	sectional flow	area a		sf				
	perimeter, p			ft				
	lic radius, r=a		Compute r					
15. Channe		P	Computer	ft/ft				
	ig's roughnes	s coeffn		.4				
	.9 r^2/3 s^1/2		Compute V	ft/s				
18. Flow le			'	ft				
19. Tt = L /			Compute Ti					0
			•					
20. Waters	hed or subare	ea Tc or Tt (add Tt in ste	ps 6, 11, and	d 19)			hr	0.33
							min	19.6

# Hydrograph Report

Hydrology Studio v 3.0.0.21 10-27-2022

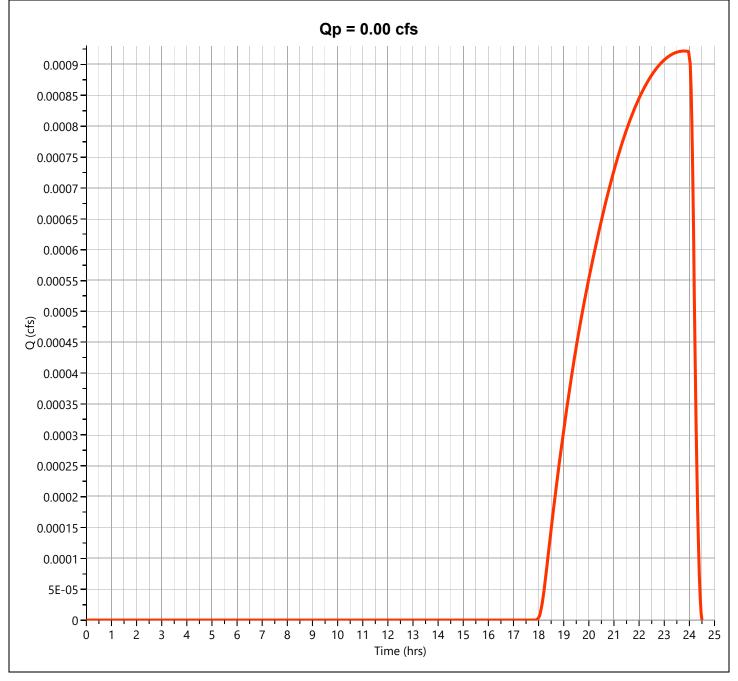
# E-8 Hyd. No. 9

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.00 hrs
Time Interval	= 2 min	Runoff Volume	= 0.000 cuft
Drainage Area	= 0.68 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 19.6 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 0.00 cfs

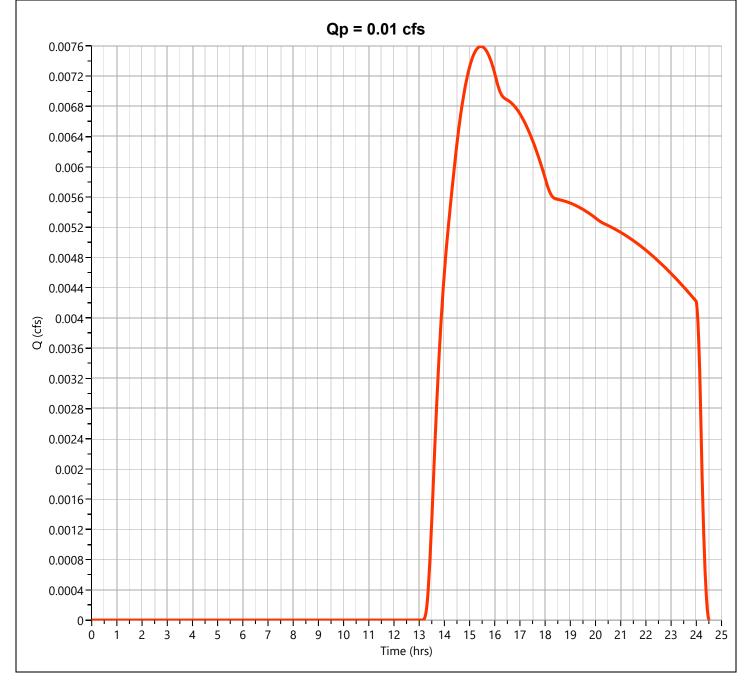
## E-8 Hyd. No. 9

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.001 cfs
Storm Frequency	= 10-yr	Time to Peak	= 23.80 hrs
Time Interval	= 2 min	Runoff Volume	= 14.5 cuft
Drainage Area	= 0.68 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 19.6 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



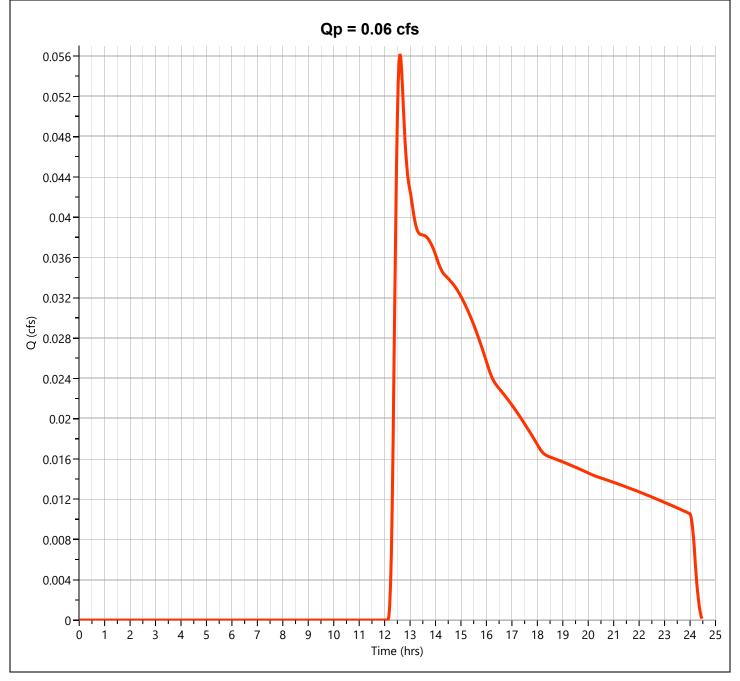
# E-8 Hyd. No. 9

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.008 cfs
Storm Frequency	= 25-yr	Time to Peak	= 15.47 hrs
Time Interval	= 2 min	Runoff Volume	= 216 cuft
Drainage Area	= 0.68 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 19.6 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



## E-8 Hyd. No. 9

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.056 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.60 hrs
Time Interval	= 2 min	Runoff Volume	= 938 cuft
Drainage Area	= 0.68 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 19.6 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Project:	Athens Street	Ву МКО	Date 6/1/22 Rev Date 9/27/2022
Location:	Stow, MA	Checked	Date
Circle one:	Present Developed	Subcatchment E-9A	

1. Runoff curve number (CN)

Soil name and hydrologic	Cover description CN 1/ (cover type, treatment, and			Area	Product of CN x Area		
group (appendix A)		hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious		98			0.03	2.67
Α	Woods	Good Condition	30			1.57	47.09
Α	Open Space	Good Condition	39			0.00	0.00
А	Open Space	Fair Condition	49			0.44	21.74
А	Gravel		76			0.50	38.18
В	Woods	Good Condition	55			0.00	0.00
В	Open Space	Good Condition	61			0.00	0.00
В	Gravel		85			0.00	0.00
С	Woods	Good Condition	70			0.05	3.27
С	Open Space	Good Condition	74			0.00	0.00
D	Open Space	Good Condition	80			0.00	0.00
D	Open Space	Fair Condition	84			0.00	0.00
D	Woods	Good Condition	77			0.00	0.00
1/ Use only one CN source per line.			Totals =	2.59	112.94		

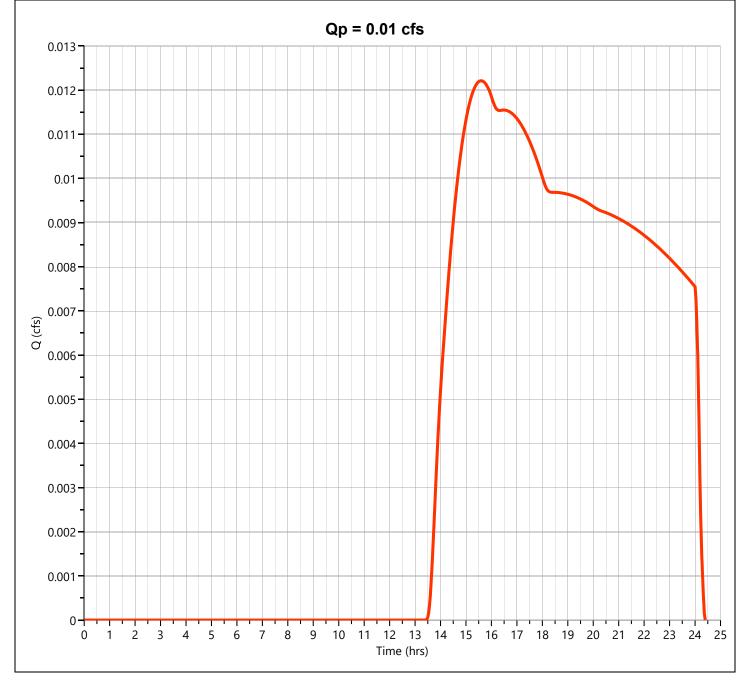
CN (weighted) = total product = 112.94 = 43.62 ; Use CN = 44 total area 2.59

2. Runoff

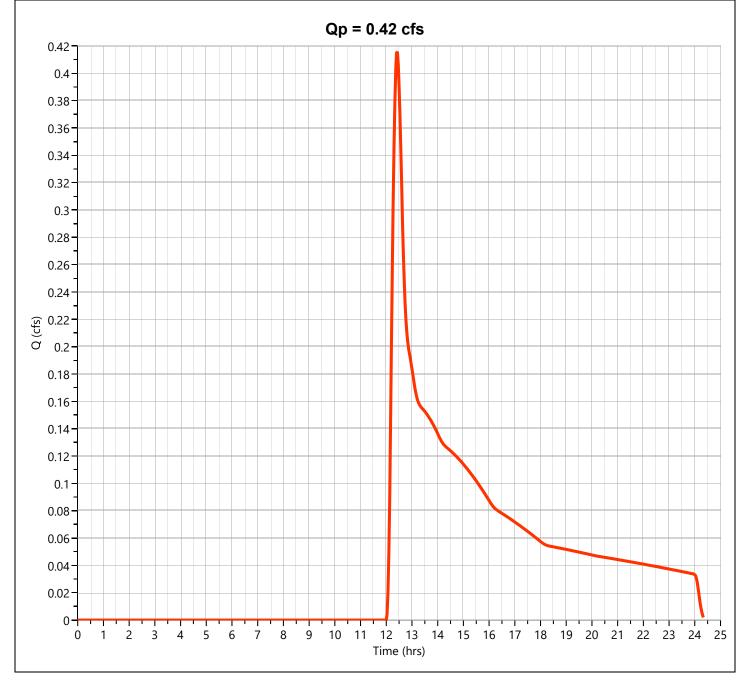
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.03	0.77	1.52

Project:	Athens Street	<u>-</u>	Ву	MKO	Date Rev Date		
Location:	Stow, MA	_	Checked		Date		
Circle one: Circle one:	Present Developed Tc Tt	through subarea	Subcatchn	nent E-9A			
Sheet flow	(Applicable to Tc only)		Segment ID	А-В			
1. Surface l	Description (table 3-1)			WOODS			
2. Manning	s roughness coeff., n (table 3-1)			0.6			
3. Flow leng	gth, L (total L <= 300 ft)		ft	50			
4. Two-yr 2	4-hr rainfall, P2		in	3.1			
5. Land Slo	pe, s		ft/ft	0.043			
6. Tt = 0.00	7 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Ti	t hr	0.21			0.21
Shallow cor	ncentrated Flow		Segment ID	B-C			
7. Surface l	Description (paved or unpaved)			UNPAVED			
8. Flow Ler	gth, L		ft	449			
9. Waterco	urse slope, s		ft/ft	0.017			
10. Average	e Velocity, V (figure 3-1)		ft/s	2.10			
11. Tt = L /	3600V	Compute Ti	t hr	0.06			0.06
Channel flo	w		Segment ID				
<ul><li>13. Wetted</li><li>14. Hydraul</li><li>15. Channe</li><li>16. Mannin</li><li>17. V = 1.49</li></ul>	g's roughness coeff., n 9 r^2/3 s^1/2 / n	Compute r	ft/ft ft/s				
18. Flow lei 19. Tt = L /	•	Compute Tr	ft hr				0
20. Watersl	ned or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	1 19)			hr min	0.27 16.3

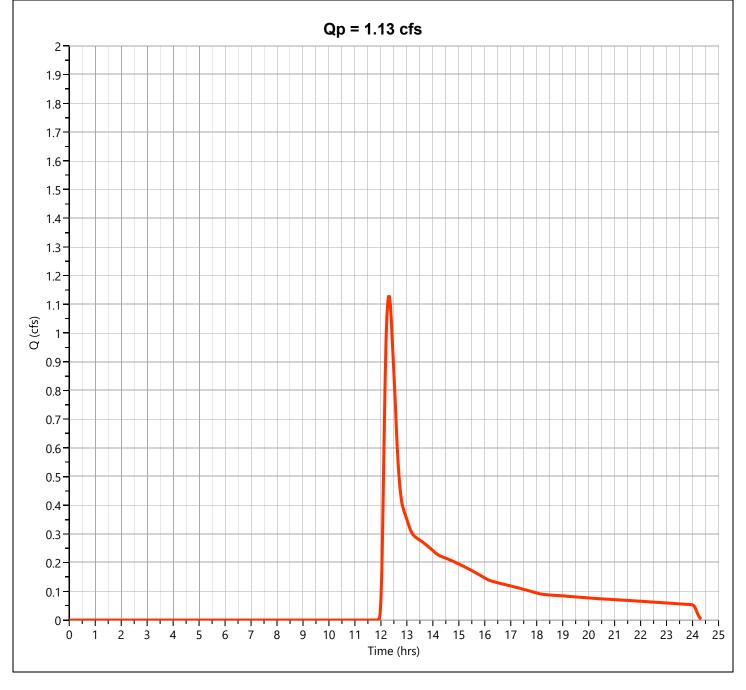
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.012 cfs
Storm Frequency	= 2-yr	Time to Peak	= 15.60 hrs
Time Interval	= 2 min	Runoff Volume	= 358 cuft
Drainage Area	= 2.59 ac	Curve Number	= 44
Tc Method	= User	Time of Conc. (Tc)	= 16.3 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



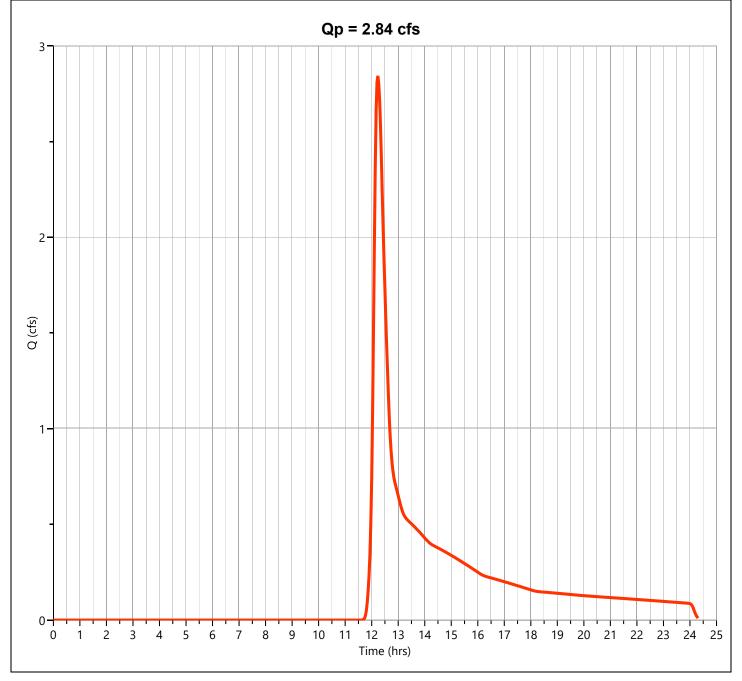
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.416 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.43 hrs
Time Interval	= 2 min	Runoff Volume	= 3,747 cuft
Drainage Area	= 2.59 ac	Curve Number	= 44
Tc Method	= User	Time of Conc. (Tc)	= 16.3 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.130 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.30 hrs
Time Interval	= 2 min	Runoff Volume	= 7,257 cuft
Drainage Area	= 2.59 ac	Curve Number	= 44
Tc Method	= User	Time of Conc. (Tc)	= 16.3 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.844 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 14,258 cuft
Drainage Area	= 2.59 ac	Curve Number	= 44
Tc Method	= User	Time of Conc. (Tc)	= 16.3 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Project:	Athens Street	By MKO	Date	6/1/22
			Rev Date	9/27/2022
Location:	Stow, MA	Checked	Date	
Circle one:	Present Developed	Subcatchment E-9B		

1. Runoff curve number (CN)

Soil name and hydrologic	(cover	Cover description type, treatment, and		CN 1/			Product of CN x Area
group (appendix A)	,	hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious		98			1.01	98.85
А	Woods	Good Condition	30			1.54	46.08
А	Open Space	Good Condition	39			1.06	41.53
Α	Open Space	Fair Condition	49			0.00	0.00
Α	Gravel		76			0.00	0.00
В	Woods	Good Condition	55			0.00	0.00
В	Open Space	Good Condition	61			0.00	0.00
В	Gravel		85			0.00	0.00
С	Woods	Good Condition	70			4.90	343.20
С	Open Space	Good Condition	74			3.41	252.00
D	Open Space	Good Condition	80			0.00	0.00
D	Open Space	Fair Condition	84			0.00	0.00
D	Woods	Good Condition	77			0.00	0.00
/ Use only one	CN source per line.		-		Totals =	11.92	781.65

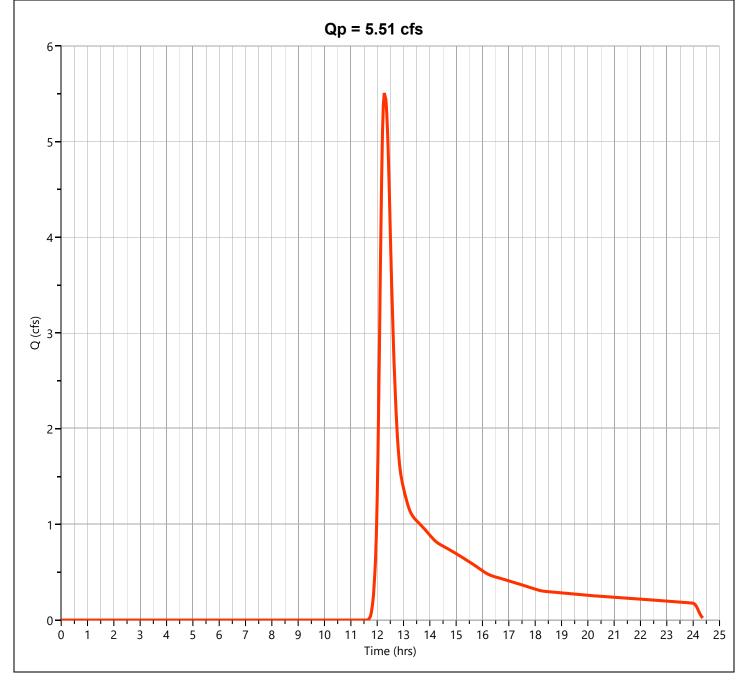
CN (weighted) =	total product	=	781.65 =	65.59	;	Use CN =	66
•	total area		11.92			'	

Frequency	yr
Rainfall, P (24-hour)	in
Runoff, Q(Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in

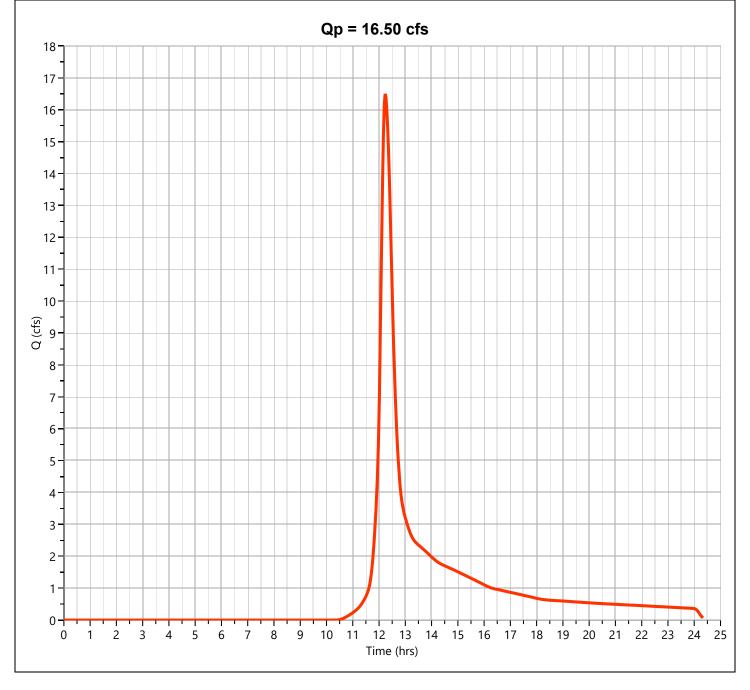
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.66	2.51	3.83

Project:	Athens Street	_	Ву	MKO	Date	6/1/2022	
Location:	Stow, MA	_	Checked		Rev Date Date	9/27/2022	
Circle one: Circle one:	Present Developed Tc Tt	through subarea	Subcatchm	nent E-9B			
Sheet flow	(Applicable to Tc only)		Segment ID	A-B			
1. Surface	Description (table 3-1)			WOODS			
2. Manning	s roughness coeff., n (table 3-1)			0.6			
3. Flow len	gth, L (total L <= 300 ft)		ft	50			
4. Two-yr 2	4-hr rainfall, P2		in	3.1			
5. Land Slo	ppe, s		ft/ft	0.026			
6. Tt = 0.00	07 (nL)^0.8 / (P2^0.5 s^0.4)	Compute T	t hr	0.26			0.26
Shallow co	ncentrated Flow		Segment ID	B-C			
7. Surface	Description (paved or unpaved)			UNPAVED			
8. Flow Ler	ngth, L		ft	629			
9. Waterco	urse slope, s		ft/ft	0.080			
10. Averag	e Velocity, V (figure 3-1)		ft/s	4.56			
11. Tt = L /	3600V	Compute T	t hr	0.04			0.04
Channel flo	ow		Segment ID				
<ul><li>13. Wetted</li><li>14. Hydrau</li><li>15. Channe</li><li>16. Mannin</li></ul>	g's roughness coeff., n 9 r^2/3 s^1/2 / n	Compute r	ft/ft				
19. Tt = L /	=	Compute T					0
20. Waters	hed or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	d 19)			hr min	0.30 17.9
	(210 VI TD 55 Second	Ed lung 10	196)				D 3

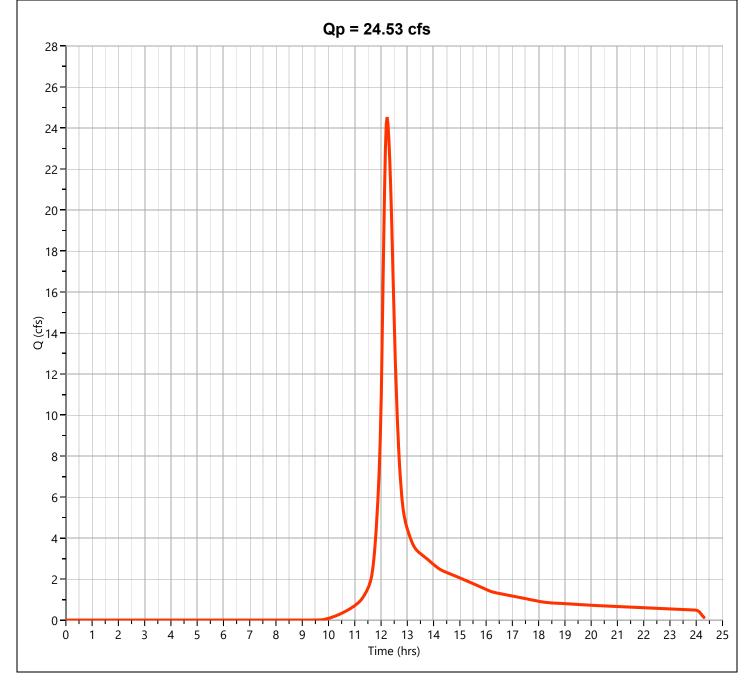
Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.513 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.30 hrs
Time Interval	= 2 min	Runoff Volume	= 29,366 cuft
Drainage Area	= 11.92 ac	Curve Number	= 66
Tc Method	= User	Time of Conc. (Tc)	= 17.9 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



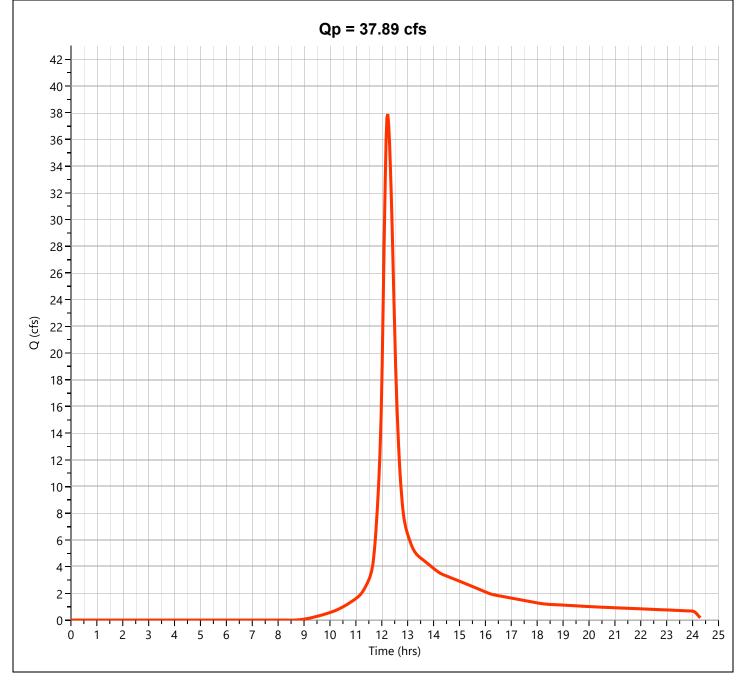
Hydrograph Type	= NRCS Runoff	Peak Flow	= 16.50 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 75,937 cuft
Drainage Area	= 11.92 ac	Curve Number	= 66
Tc Method	= User	Time of Conc. (Tc)	= 17.9 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 24.53 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 110,097 cuft
Drainage Area	= 11.92 ac	Curve Number	= 66
Tc Method	= User	Time of Conc. (Tc)	= 17.9 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 37.89 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 167,750 cuft
Drainage Area	= 11.92 ac	Curve Number	= 66
Tc Method	= User	Time of Conc. (Tc)	= 17.9 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



#### **DETENTION BASIN**

## Hyd. No. 12

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.00 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 11 - E-9B	Max. Elevation	= 236.72 ft
Pond Name	= EXIST DETENTION	Max. Storage	= 29,366 cuft

Pond Routing by Storage Indication Method

Qp = 0.00 cfs

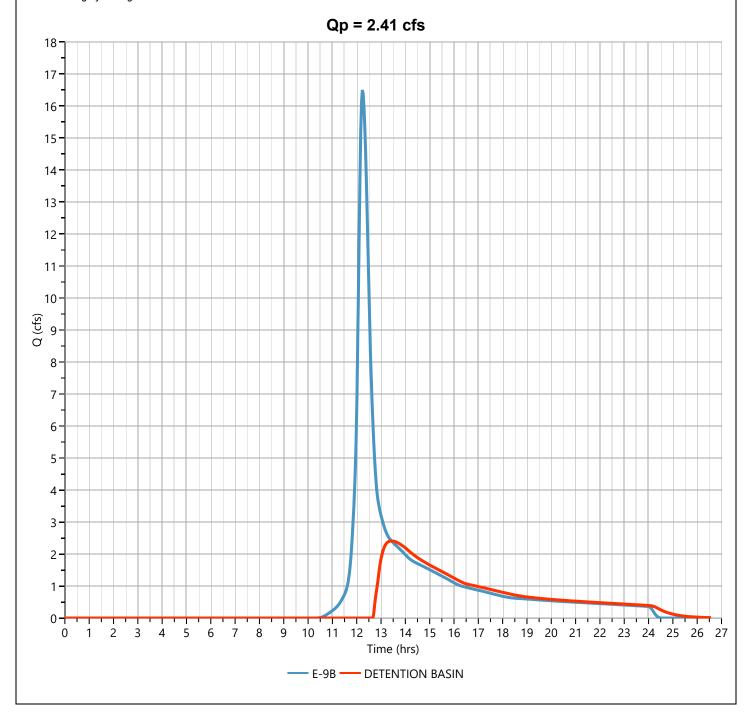
#### **DETENTION BASIN**

#### Hyd. No. 12

Hydrograph Type	= Pond Route	Peak Flow	= 2.408 cfs
Storm Frequency	= 10-yr	Time to Peak	= 13.43 hrs
Time Interval	= 2 min	Hydrograph Volume	= 41,634 cuft
Inflow Hydrograph	= 11 - E-9B	Max. Elevation	= 237.17 ft
Pond Name	= EXIST DETENTION	Max. Storage	= 38,554 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.41 hrs



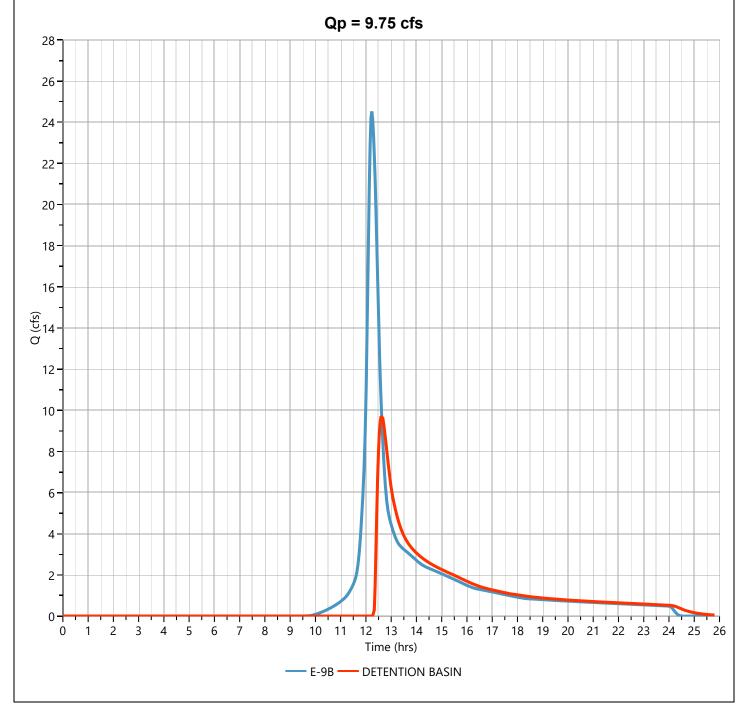
#### **DETENTION BASIN**

## Hyd. No. 12

Hydrograph Type	= Pond Route	Peak Flow	= 9.751 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.63 hrs
Time Interval	= 2 min	Hydrograph Volume	= 75,794 cuft
Inflow Hydrograph	= 11 - E-9B	Max. Elevation	= 237.42 ft
Pond Name	= EXIST DETENTION	Max. Storage	= 44,933 cuft
Band Bauting by Starge at Inc	diantina Matteral	Contag of man	detention time = 1.40 hrs

Pond Routing by Storage Indication Method

Center of mass detention time = 1.49 hrs



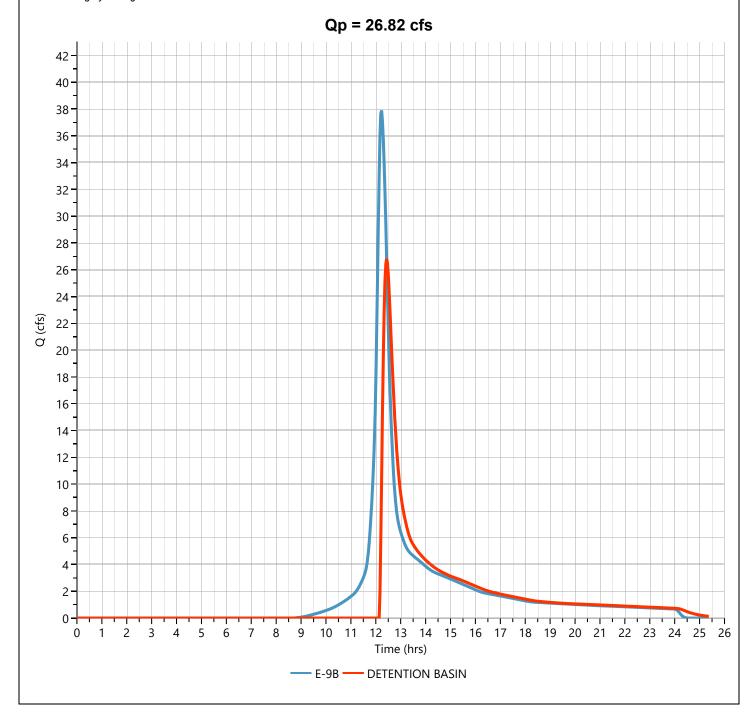
#### **DETENTION BASIN**

#### Hyd. No. 12

Hydrograph Type	= Pond Route	Peak Flow	= 26.82 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.43 hrs
Time Interval	= 2 min	Hydrograph Volume	= 133,448 cuft
Inflow Hydrograph	= 11 - E-9B	Max. Elevation	= 237.78 ft
Pond Name	= EXIST DETENTION	Max. Storage	= 54,171 cuft

Pond Routing by Storage Indication Method

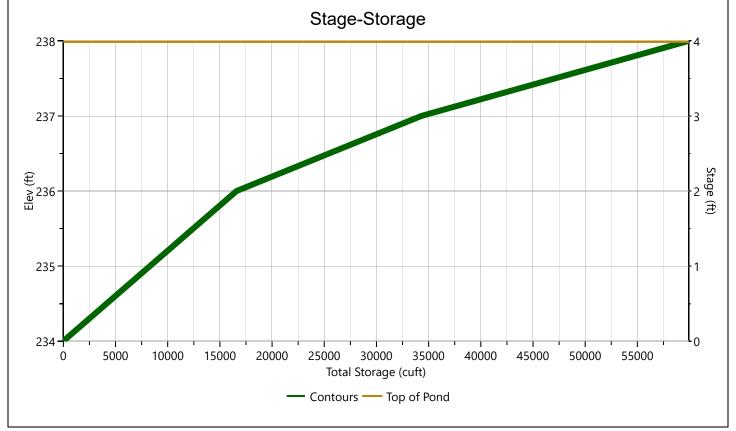
Center of mass detention time = 58 min



#### **EXIST DETENTION**

## Stage-Storage

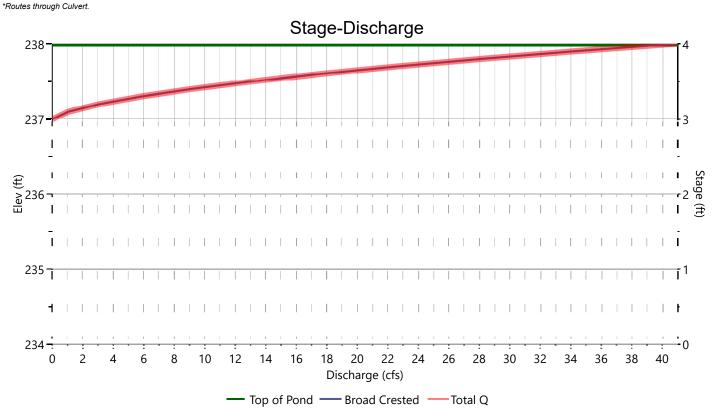
User Defined Contou		Stage / Storage Table					
Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)	
Bottom Elevation, ft	234.00						
Voids (%)	100.00	0.00	234.00	2,400	0.000	0.000	
		2.00	236.00	14,200	16,600	16,600	
Volume Calc	Rectangular	3.00	237.00	21,200	17,700	34,300	
		4.00	238.00	30,000	25,600	59,900	



#### **EXIST DETENTION**

#### Stage-Discharge

Cubrant / Onitions	Culusant		Orifices		De Granta I Dina	
Culvert / Orifices	Culvert	1 2		3	Perforated Riser	
Rise, in					Hole Diameter, in	
Span, in					No. holes	
No. Barrels					Invert Elevation, ft	
Invert Elevation, ft					Height, ft	
Orifice Coefficient, Co					Orifice Coefficient, Co	
Length, ft						
Barrel Slope, %						
N-Value, n						
Weirs	Dioor*	Weirs			Ancilland	
vveirs	Riser*	1	2	3	Ancillary	
Shape / Type		Broad Crested			Exfiltration, in/hr	
Crest Elevation, ft		237				
Crest Length, ft		10				
Angle, deg		18.4 (3:1)				
Weir Coefficient, Cw		3.3				



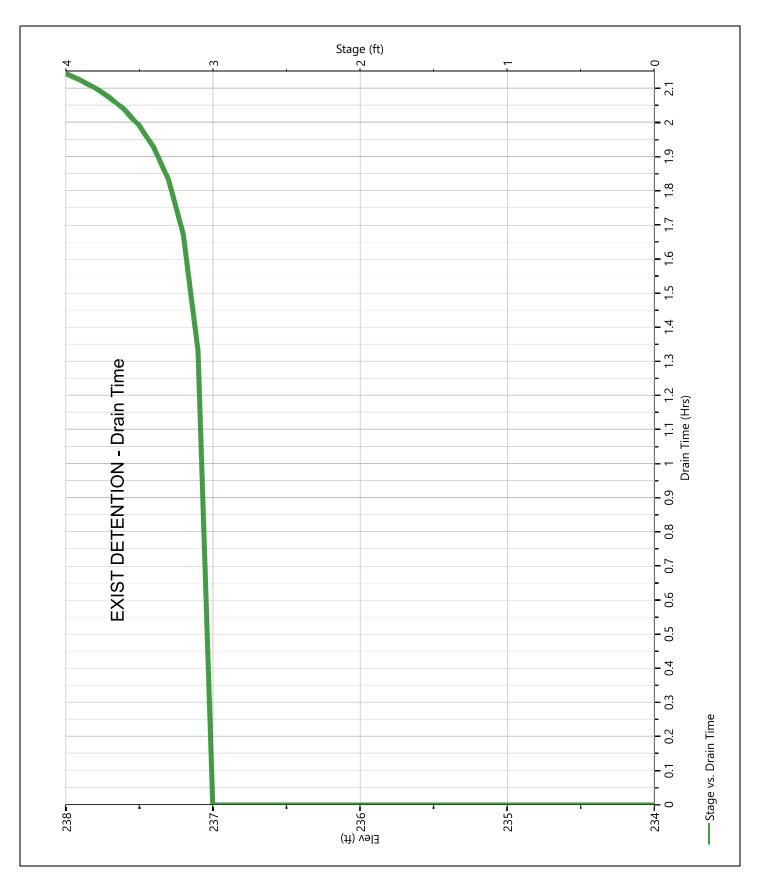
#### **EXIST DETENTION**

## **Stage-Storage-Discharge Summary**

Stage	Elev.	Storage	Culvert	(	Orifices, cf	s	Riser		Weirs, cfs		Pf Riser	Exfil	User	Total
(ft)	(ft)	(cuft)	(cfs)	1	2	3	(cfs)	1	2	3	(cfs)	(cfs)	(cfs)	(cfs)
0.00	234.00	0.000						0.000						0.000
2.00	236.00	16,600						0.000						0.000
3.00	237.00	34,300						0.000						0.000
4.00	238.00	59,900						40.92						40.92

#### **EXIST DETENTION**

#### **Pond Drawdown**



Project:	Athens Street	By MKO	Date 6/1/22
			Rev Date 9/27/2022
Location:	Stow, MA	Checked	Date
Circle one:	Present Developed	Subcatchment E-10	

1. Runoff curve number (CN)

Soil name and hydrologic	(cover	Cover description type, treatment, and		CN 1/		Area	Product of CN x Area
group (appendix A)		hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious		98			0.00	0.00
А	Woods	Good Condition	30			7.61	228.33
А	Open Space	Good Condition	39			0.00	0.00
А	Open Space	Fair Condition	49			0.00	0.00
А	Gravel		76			0.14	10.92
В	Woods	Good Condition	55			0.00	0.00
В	Open Space	Good Condition	61			0.00	0.00
С	Woods	Good Condition	70			17.70	1239.05
С	Open Space	Fair Condition	79			0.00	0.00
С	Gravel		89			0.12	11.00
D	Woods	Good Condition	77			0.00	0.00
D	Gravel		91			0.00	0.00
D	BVW		77			0.35	26.97
1/ Use only one	CN source per line.				Totals =	25.93	1516.27

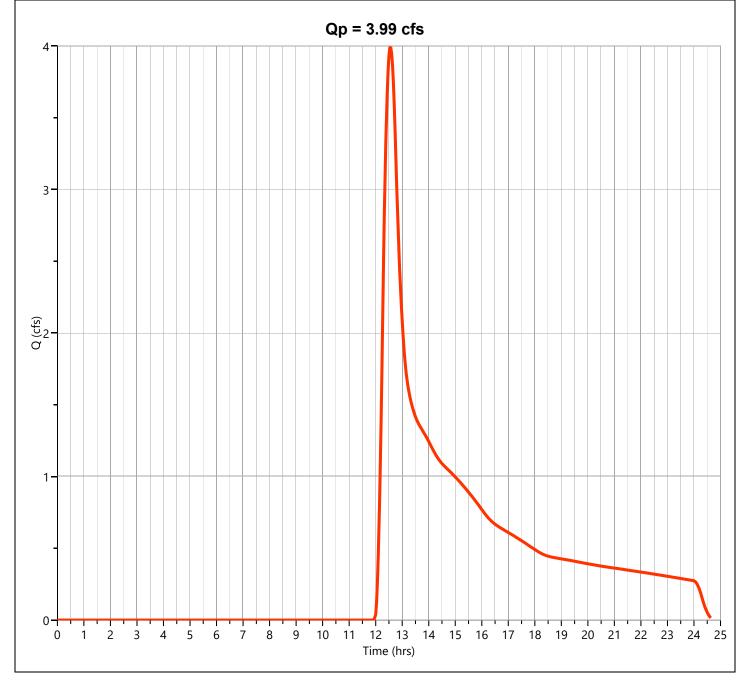
						_
CN (weighted) =	total product	=	1516.27 =	58.48 ;	Use CN =	58
	total area		25.93			

2. Runoff

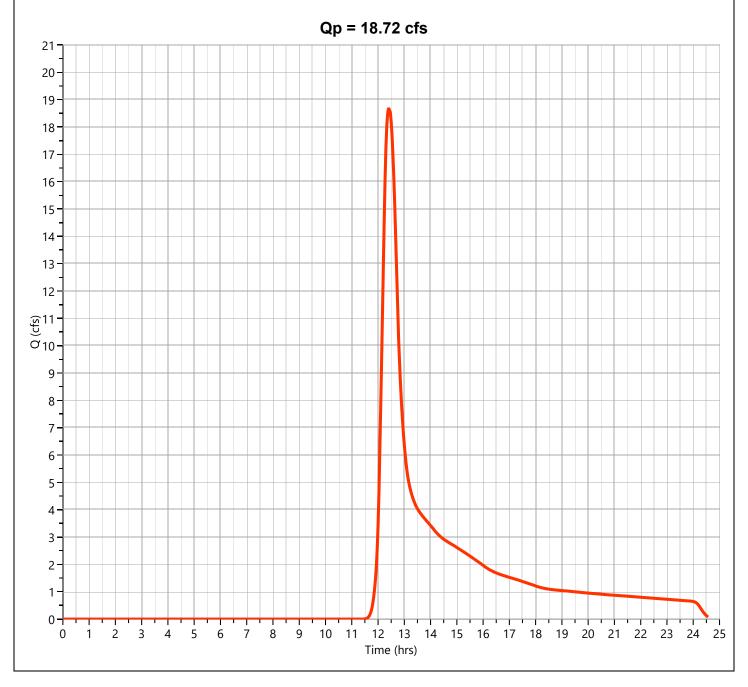
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.38	1.88	3.05

Project:	Athens Street	<u>-</u>	Ву	MKO	Date Rev Date	6/1/2022 9/27/2022	
Location:	Stow, MA	_	Checked		Date		
Circle one:	Present Developed Tc Tt	through subarea	Subcatchn	nent E-10			
	(Applicable to Tc only)  Description (table 3-1)		Segment ID	A-B WOODS			
2. Manning	s roughness coeff., n (table 3-1)			0.6			
3. Flow leng	gth, L (total L <= 300 ft)		ft	50			
4. Two-yr 2	4-hr rainfall, P2		in	3.1			
5. Land Slo	pe, s		ft/ft	0.008			
6. Tt = 0.00	77 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Ti	hr	0.42			0.42
Shallow co	ncentrated Flow		Segment ID	B-C			
7. Surface	Description (paved or unpaved)			UNPAVED			
8. Flow Ler	ngth, L		ft	1082			
9. Waterco	urse slope, s		ft/ft	0.055			
10. Average	e Velocity, V (figure 3-1)		ft/s	3.78			
11. Tt = L /	3600V	Compute Ti	hr	0.08			0.08
Channel flo	w		Segment ID				
<ul><li>13. Wetted</li><li>14. Hydrau</li><li>15. Channe</li><li>16. Mannin</li><li>17. V = 1.4</li></ul>	g's roughness coeff., n 9 r^2/3 s^1/2 / n	Compute r	ft/ft ft/s				
18. Flow let 19. Tt = L /		Compute To	ft hr				0
20. Waters	hed or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	i 19)			hr min	0.50 29.8

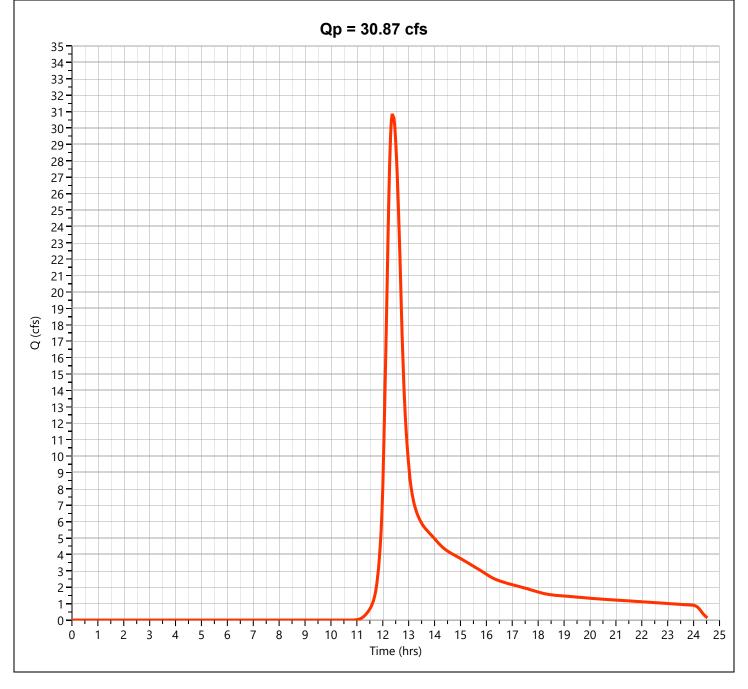
Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.993 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.57 hrs
Time Interval	= 2 min	Runoff Volume	= 34,460 cuft
Drainage Area	= 25.93 ac	Curve Number	= 58
Tc Method	= User	Time of Conc. (Tc)	= 29.8 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



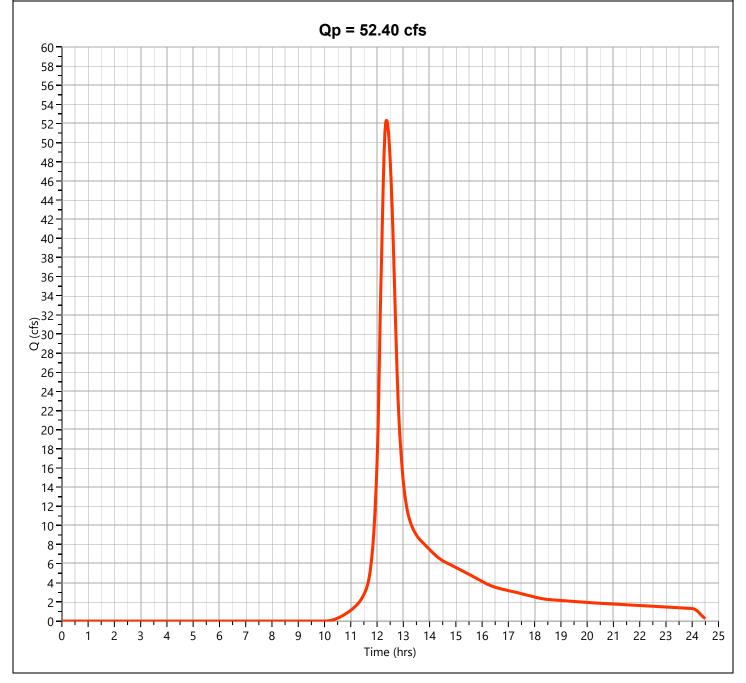
Hydrograph Type	= NRCS Runoff	Peak Flow	= 18.72 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.43 hrs
Time Interval	= 2 min	Runoff Volume	= 112,089 cuft
Drainage Area	= 25.93 ac	Curve Number	= 58
Tc Method	= User	Time of Conc. (Tc)	= 29.8 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 30.87 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.40 hrs
Time Interval	= 2 min	Runoff Volume	= 173,628 cuft
Drainage Area	= 25.93 ac	Curve Number	= 58
Tc Method	= User	Time of Conc. (Tc)	= 29.8 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 52.40 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.37 hrs
Time Interval	= 2 min	Runoff Volume	= 282,066 cuft
Drainage Area	= 25.93 ac	Curve Number	= 58
Tc Method	= User	Time of Conc. (Tc)	= 29.8 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Project:	Athens Street	Ву МКО	Date	6/1/22	
Location:	Stow, MA	Checked	Rev Date Date	9/27/2022	
Circle one:	Present Developed	Subcatchment E-11			

#### 1. Runoff curve number (CN)

Soil name and hydrologic	Cover desc	CN 1/		CN 1/		Area	Product of CN x Area
group (appendix A)	hydrologic co percent impe unconnected/connec area rat	ervious: eted impervious	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious		98			0.00	0.00
Α	Woods Good Condition		30			0.80	24.00
А	Open Space Good Condition		39			0.00	0.00
А	Open Space Fair Condition		49			0.00	0.00
Α	Gravel		76			0.00	0.00
В	Woods Good Condition		55			0.00	0.00
В	Open Space Good Condition		61			0.00	0.00
В	Gravel		85			0.00	0.00
С	Woods Good Condition		70			10.09	706.53
С	Open Space Poor Condition		86			0.00	0.00
С	Gravel		89			0.00	0.00
D	BVW	,	77			0.00	0.00
1/ Use only one	CN source per line.				Totals =	10.89	730.54

I/ Use only one CN source per line.	Totals =	10.89	730.5
	•		

67.06 ;

Use CN =

67

730.54 =

10.89

#### 2. Runoff

CN (weighted) = total product

total area

Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.73	2.64	4.00

Project:

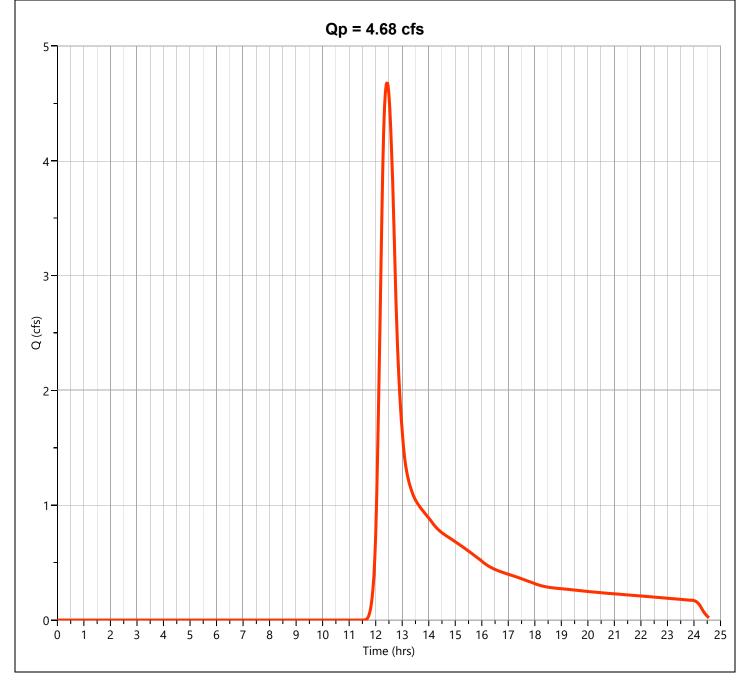
Athens Street

Date 6/1/2022

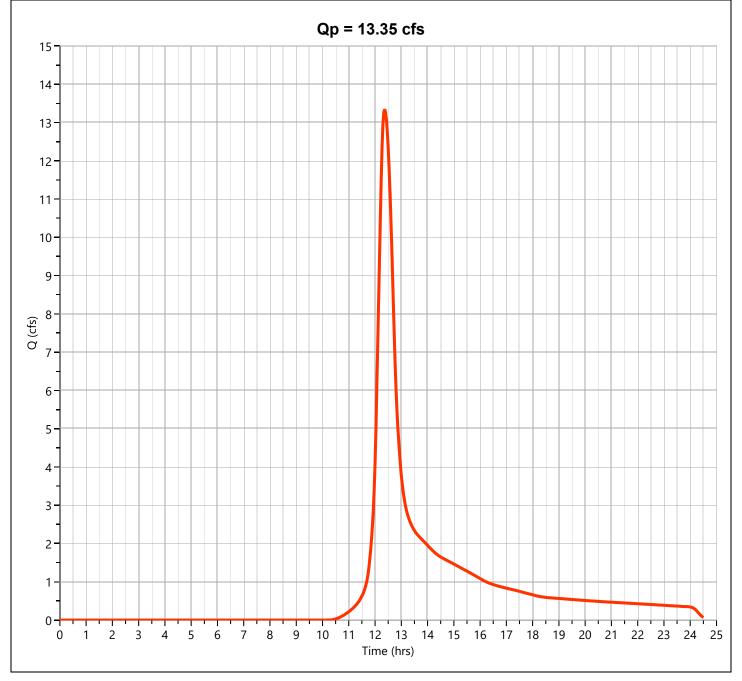
By MKO

Location: Stow, I	МА		_	Checked		Rev Date Date	9/27/2022	- -
Circle one: Circle one:	Present Tc	Developed Tt	through subarea	Subcatchn	nent E-11			
Sheet flow (Applica	able to Tc only)			Segment ID	А-В			1
1. Surface Descrip	tion (table 3-1)				WOODS			
2. Mannings rough	ness coeff., n (tab	ole 3-1)			0.6			
3. Flow length, L (t	otal L <= 300 ft)			ft	50			
4. Two-yr 24-hr rai	nfall, P2			in	3.1			
5. Land Slope, s				ft/ft	0.006			
6. Tt = 0.007 (nL)^	0.8 / (P2^0.5 s^0.4	4)	Compute Ti	hr	0.47			0.47
Shallow concentra	ted Flow			Segment ID	B-C			]
7. Surface Descrip	tion (paved or unp	paved)			UNPAVED			
8. Flow Length, L				ft	411			
9. Watercourse slo	pe, s			ft/ft	0.047			
10. Average Veloc	ty, V (figure 3-1)			ft/s	3.50			
11. Tt = L / 3600V			Compute Ti	hr	0.03			0.03
Channel flow				Segment ID				1
12. Cross sectiona 13. Wetted perime 14. Hydraulic radiu 15. Channel Slope 16. Manning's roug 17. V = 1.49 r^2/3	er, pw s, r=a/wp , s hness coeff., n		Compute r	ft/ft				
18. Flow length, L 19. Tt = L / 3600V			Compute Ti	ft hr				0
20. Watershed or s	subarea Tc or Tt (a	add Tt in ste	ps 6, 11, and	i 19)			hr min	0.50 30.0
	(210-VI-TR-	55, Second	Ed., June 19	86)				D-3

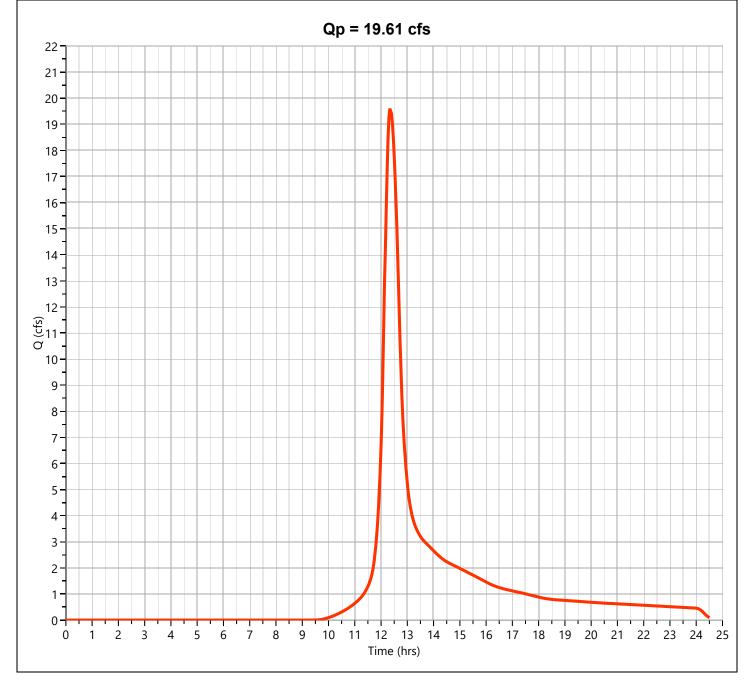
Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.684 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.43 hrs
Time Interval	= 2 min	Runoff Volume	= 28,624 cuft
Drainage Area	= 10.89 ac	Curve Number	= 67
Tc Method	= User	Time of Conc. (Tc)	= 30.0 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



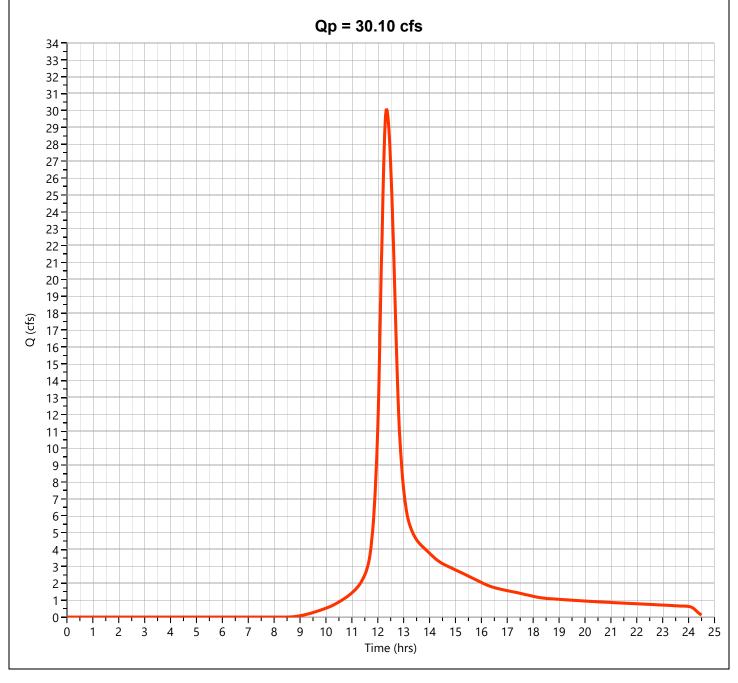
Hydrograph Type	= NRCS Runoff	Peak Flow	= 13.35 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.37 hrs
Time Interval	= 2 min	Runoff Volume	= 72,378 cuft
Drainage Area	= 10.89 ac	Curve Number	= 67
Tc Method	= User	Time of Conc. (Tc)	= 30.0 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 19.61 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.37 hrs
Time Interval	= 2 min	Runoff Volume	= 104,209 cuft
Drainage Area	= 10.89 ac	Curve Number	= 67
Tc Method	= User	Time of Conc. (Tc)	= 30.0 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 30.10 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Runoff Volume	= 157,683 cuft
Drainage Area	= 10.89 ac	Curve Number	= 67
Tc Method	= User	Time of Conc. (Tc)	= 30.0 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Project:	Athens Street	Ву	MKO	Date	6/1/22	
Location:	Stow, MA	Checked		Rev Date Date	9/2//2022	
Circle one:	Present Developed	Subcatchme	ent E-12			

#### 1. Runoff curve number (CN)

Soil name and hydrologic	Cover description (cover type, treatment, and		CN 1/			Product of CN x Area
group (appendix A)	hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious	98			0.00	0.00
Α	Woods Good Condition	30			0.22	6.53
Α	Open Space Good Condition	39			0.00	0.00
Α	Open Space Fair Condition	49			0.00	0.00
А	Gravel	76			0.00	0.00
В	Woods Good Condition	55			0.00	0.00
В	Open Space Good Condition	61			0.00	0.00
В	Gravel	85			0.00	0.00
С	Woods Good Condition	70			0.00	0.00
С	Open Space Poor Condition	86			0.00	0.00
С	Gravel	89			0.00	0.00
D	BVW	77			0.00	0.00
1/ Use only one	CN source per line.	-		Totals =	0.22	6.53

							•
CN (weighted) =	total product	_=	6.53 =	30.00 ;	Use CN =	30	

2.	Runoff
----	--------

Frequency	yr
Rainfall, P (24-hour)	in
Runoff, Q(Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in

Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.09	0.09	0.38

Project:	Athens Stree	et			Ву	MKO	Date	6/1/2022	-
							Rev Date	9/27/2022	-
Location:	Stow, MA				Checked		Date		-
Circle one:		Present	Developed		Subcatchm	nent F-12			
Circle one:		Tc	Tt	through	Cuboutoniii	HOIR E 12	•		
				subarea			•		
Chaot flow	(Annliaghla te	o To only)			Segment ID	A-B			1
Sheet now	(Applicable to	o icomy)			Segment iD	A-D			
1. Surface	Description (t	table 3-1)				WOODS			1
	, ,	,							
2. Manning	s roughness	coeff., n (tab	le 3-1)			0.6			1
3. Flow len	gth, L (total L	. <= 300 ft)			ft	50			
1 Two-vr 2	4-hr rainfall,	D2			in	3.1			ł
4. 1WO-yi Z	. <del>T</del> -III Tallilali, I	1 2				0.1			
5. Land Slo	pe, s				ft/ft	0.122			1
6. Tt = 0.00	)7 (nL)^0.8 / (	(P2^0.5 s^0.4	4)	Compute Tt	hr	0.14			0.14
Challauras	maantratad Fl				Commont ID	B-C			1
Shallow Co.	ncentrated FI	OW			Segment ID	D-C			
7. Surface	Description (p	paved or unp	aved)			UNPAVED			1
		•	,						
8. Flow Ler	ngth, L				ft	57			
0.147.1					0.40	0.440			
9. Waterco	urse slope, s				ft/ft	0.112			
10 Average	e Velocity, V	(figure 3-1)			ft/s	5.40			i
		(ga 0 . )			.,,	00			
11. Tt = L /	3600V			Compute Tt	hr	0.00			0.00
									-
Channel flo	)W	•			Segment ID				
12 Cross s	sectional flow	area a			sf				ł
	perimeter, p				ft				ł
	lic radius, r=a			Compute r					ł
15. Channe		2/ <b>V</b> P		Compater	ft/ft				ł
	g's roughnes	s sooff n			TUTE				ł
	g s roughnes 9 r^2/3 s^1/2			Compute V	ft/s				ł
		/ 11		Compute V					1
18. Flow le				Camerita T	ft				_
19. Tt = L /	30UUV			Compute Tt	. NE				0
20. Waters	hed or subare	ea Tc or Tt (a	add Tt in stei	os 6, 11, and	l 19)			hr	0.14
		(	19	-, -,	- /			min	8.6
		(210-VI-TR-	55, Second	Ed., June 19	86)				D-3

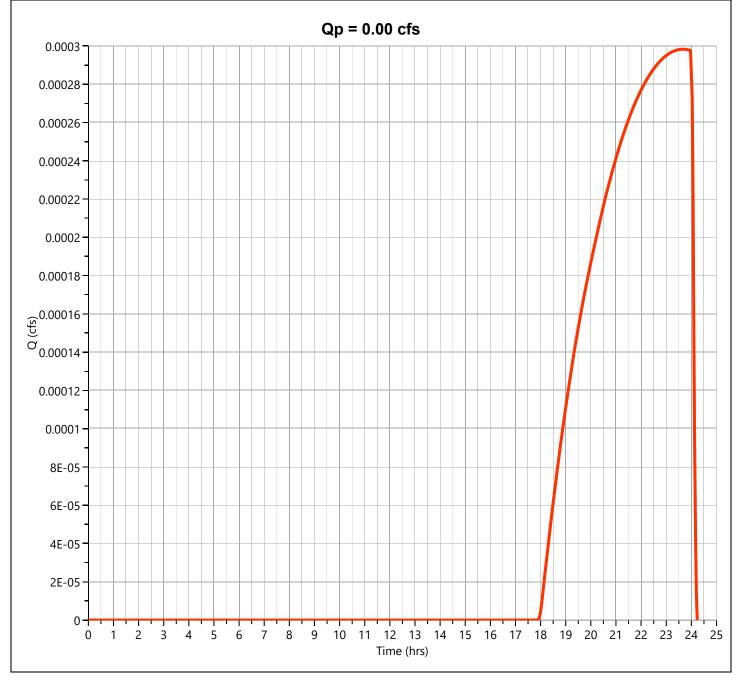
## E-12 Hyd. No. 16

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.00 hrs
Time Interval	= 2 min	Runoff Volume	= 0.000 cuft
Drainage Area	= 0.22 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 8.6 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 0.00 cfs

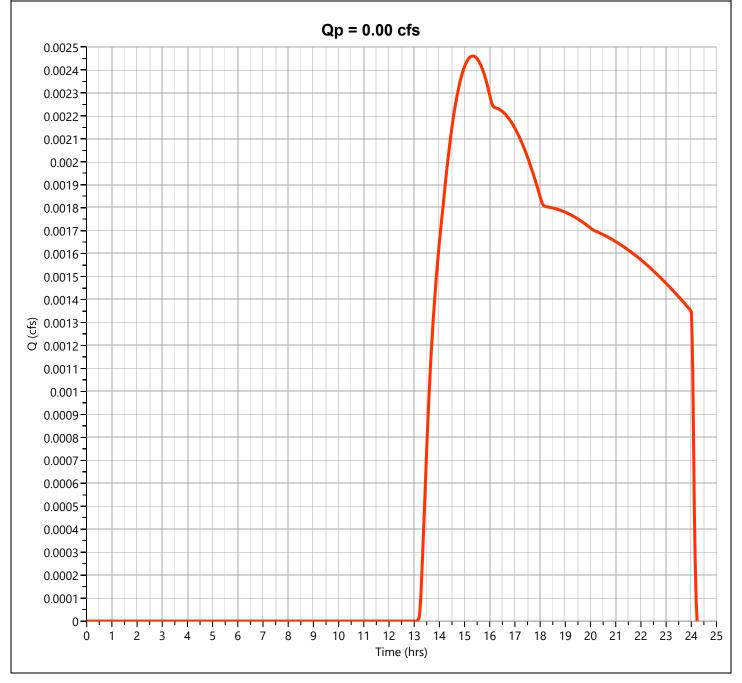
## E-12 Hyd. No. 16

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.000 cfs
Storm Frequency	= 10-yr	Time to Peak	= 23.70 hrs
Time Interval	= 2 min	Runoff Volume	= 4.70 cuft
Drainage Area	= 0.22 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 8.6 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



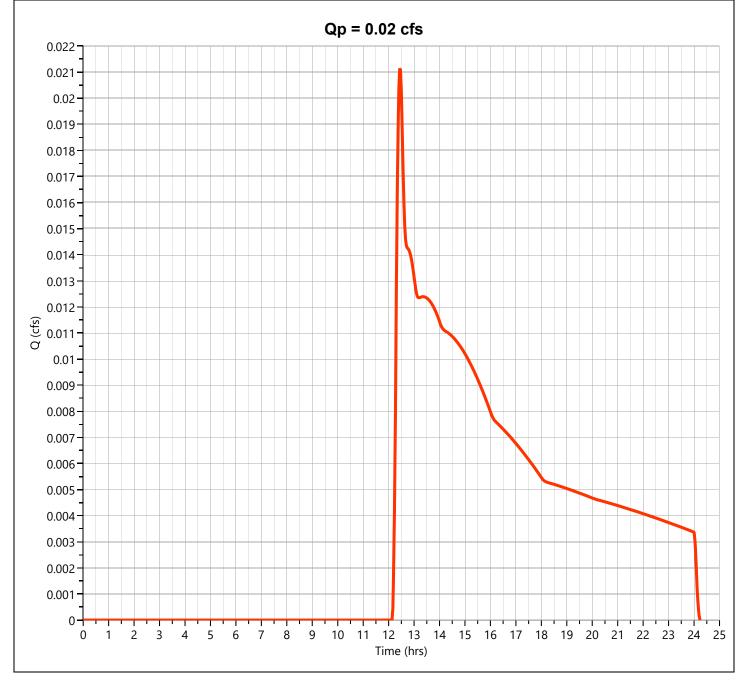
#### E-12 Hyd. No. 16

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.002 cfs
Storm Frequency	= 25-yr	Time to Peak	= 15.33 hrs
Time Interval	= 2 min	Runoff Volume	= 69.9 cuft
Drainage Area	= 0.22 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 8.6 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



## E-12 Hyd. No. 16

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.021 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.43 hrs
Time Interval	= 2 min	Runoff Volume	= 303 cuft
Drainage Area	= 0.22 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 8.6 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484





SUMMARY TABLE SM-3719C

 Project:
 Athens Street
 By PFK
 Date 6/26/22 Rev Date 6/17/2023

 Location:
 Stow, MA
 Checked
 Date

EXISTING	AREA	CN	TIME OF CONCENTRATION
E-1	0.16	30	10.0
E-2A	17.70	63	17.2
E-2B	24.13	53	17.3
E-3	10.35	71	22.4
E-4	10.30	70	21.3
E-5	12.89	59	20.3
E-6	2.25	38	21.4
E-7	6.51	32	19.0
E-8	0.68	30	19.6
E-9A	2.59	44	16.3
E-9B	11.92	66	17.9
E-10	25.93	58	8.5
E-11	10.89	67	30.0
E-12	0.22	30	8.6

Total 136.52

PROPOSED	AREA	CN	TIME OF CONCENTRATION
P-1	0.16	30	10.0
P-2A1	1.49	84	9.6
P-2A2	1.40	81	14.2
P-2A3	15.44	62	11.5
P-2B-A	4.62	68	13.3
P-2B-B	17.11	46	11.4
P-3A	1.09	83	8.2
P-3B	8.52	71	13.4
P-4A	1.71	76	13.2
P-4B	7.57	70	10.5
P-5B	2.75	76	17.6
P-5C	1.22	84	10.9
P-5D	2.20	79	6.7
P-5E	8.97	57	12.8
P-6A	1.65	34	19.6
P-6B	0.90	47	10.9
P-7A	3.97	61	6.9
P-7B	1.70	56	25.7
P-8	4.55	65	10.5
P-9A	4.77	55	14.0
P-9B	11.92	66	17.9
P-10A	10.25	60	28.6
P-10B	2.90	82	10.0
P-10C	7.67	85	8.5
P-11	10.78	67	30.0
P-12	0.22	30	8.6
Roof Runoff (x19)	0.99	98	6.0

Total 136.52

# Hydrograph 2-yr Summary Hydrology Studio v 3.0.0.31

lydrology St	udio v 3.0.0.31							02-15-202
Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	P-1	0.000	0.00	0.000			
3	NRCS Runoff	P-3A	1.928	12.10	6,595			
4	Pond Route	IB-3A	0.554	12.47	3,671	3	290.27	2,406
5	NRCS Runoff	P-3B	6.260	12.20	27,756			
6	Junction	P-3 TOTAL	6.651	12.20	31,428	4, 5		
8	NRCS Runoff	P-4A	1.939	12.17	7,688			
9	Pond Route	IB-4A	0.331	12.63	2,113	8	282.04	2,679
10	NRCS Runoff	P-4B	5.803	12.17	24,629			
11	Junction	P-4 TOTAL	5.817	12.17	26,742	9, 10		
13	NRCS Runoff	P-5B	2.628	12.23	11,989			
14	Pond Route	IB-5B	0.352	12.90	3,194	13	284.57	4,674
15	NRCS Runoff	P-5C	2.072	12.13	7,952			
16	Pond Route	IB-5C	0.000	12.87	0.002	15	259.12	3,568
17	NRCS Runoff	P-5E	1.511	12.30	11,193			
18	Junction	P-5 TOTAL	1.549	12.33	14,387	14, 16, 17		
20	NRCS Runoff	P-2A2	1.838	12.20	7,553			
21	Pond Route	IB-2A2	0.000	17.20	0.000	20	302.21	3,454
22	NRCS Runoff	P-2A1	2.879	12.10	9,830			
23	Pond Route	IB-2A1	0.000	16.63	0.000	22	307.05	4,358
24	NRCS Runoff	P-2A3	5.436	12.20	29,551			
25	Junction	TOTAL P-2A	5.436	12.20	29,551	21, 23, 24		
27	NRCS Runoff	P-2B-A	3.019	12.17	13,333			
28	NRCS Runoff	P-5D	3.197	12.10	11,097			
29	Pond Route	IB-5D	0.000	16.13	0.002	28	231.73	7,020
30	Pond Route	IB-2B-A	0.001	13.03	0.568	27	232.10	3,912
31	NRCS Runoff	P-2B-B	0.158	14.97	4,327			
32	Junction	P-2B Total	0.158	14.97	4,328	29, 30, 31		
34	NRCS Runoff	P-6A	0.000	0.00	0.000			
35	NRCS Runoff	P-6B	0.082	12.40	773			
36	Pond Route	IB-6B	0.000	12.33	0.000	35	221.06	41.5

# Hydrograph 2-yr Summary

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
37	Junction	P-6 TOTAL	0.000	12.33	0.000	34, 36		
39	NRCS Runoff	P-7A	1.309	12.17	6,815			
40	Pond Route	IB-7A	0.000	16.33	0.000	39	219.17	704
41	NRCS Runoff	P-7B	0.889	12.17	3,774			
42	Pond Route	IB-7B	0.000	13.10	0.000	41	224.17	485
43	Junction	P-7 TOTAL	0.000	13.10	0.000	40, 42		
44	NRCS Runoff	P-8	2.005	12.20	10,375			
45	Pond Route	IB-8	0.000	12.17	0.000	44	222.45	1,039
47	NRCS Runoff	P-10A	2.091	12.53	16,170			
48	NRCS Runoff	P-10B	4.488	12.13	17,311			
49	Pond Route	IB-10B	0.000	12.10	0.000	48	225.90	4,886
50	NRCS Runoff	P-9B	5.513	12.30	29,366			
51	Pond Route	DET. BASIN OUTFLOW	0.000	0.00	0.000	50	236.72	29,366
52	NRCS Runoff	P-9A	0.518	12.40	4,571			
53	NRCS Runoff	P-10C	14.82	12.10	50,604			
54	Junction	TO IB-10C	14.89	12.10	55,175	51, 52, 53		
55	Pond Route	IB-10C	0.000	12.13	0.005	54	225.77	14,103
56	Junction	P-10 TOTAL	2.091	12.53	16,170	47, 49, 55		
58	NRCS Runoff	P-11	4.637	12.43	28,334			
60	NRCS Runoff	P-12	0.000	0.00	0.000			
62	NRCS Runoff	Roof Runoff (Type A)	0.153	12.07	517			
63	Pond Route	Roof Drywell Type A	0.000	9.83	0.000	62	101.06	161
65	NRCS Runoff	Roof Runoff (Type B)	0.153	12.07	517			
66	Pond Route	Roof Drywell Type B	0.000	7.77	0.000	65	101.15	206

# Hydrograph 10-yr Summary Hydrology Studio v 3.0.0.31

lydrology St	udio v 3.0.0.31						_	02-15-202
Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	P-1	0.000	23.73	3.52			
3	NRCS Runoff	P-3A	3.704	12.10	12,702			
4	Pond Route	IB-3A	1.538	12.33	9,270	3	291.01	4,154
5	NRCS Runoff	P-3B	15.66	12.20	64,735			
6	Junction	P-3 TOTAL	17.04	12.20	74,005	4, 5		
8	NRCS Runoff	P-4A	4.275	12.13	16,442			
9	Pond Route	IB-4A	1.501	12.47	8,685	8	282.87	5,370
10	NRCS Runoff	P-4B	14.96	12.17	58,547			
11	Junction	P-4 TOTAL	15.63	12.17	67,232	9, 10		
13	NRCS Runoff	P-5B	5.798	12.23	25,640			
14	Pond Route	IB-5B	3.250	12.47	13,966	13	285.30	7,820
15	NRCS Runoff	P-5C	3.921	12.13	15,103			
16	Pond Route	IB-5C	0.000	12.13	0.001	15	260.17	7,907
17	NRCS Runoff	P-5E	8.379	12.17	37,806			
18	Junction	P-5 TOTAL	9.173	12.27	51,772	14, 16, 17		
20	NRCS Runoff	P-2A2	3.676	12.17	14,967			
21	Pond Route	IB-2A2	0.000	12.97	0.002	20	303.48	8,168
22	NRCS Runoff	P-2A1	5.341	12.10	18,417			
23	Pond Route	IB-2A1	0.000	12.90	0.001	22	308.11	9,626
24	NRCS Runoff	P-2A3	20.40	12.17	84,566			
25	Junction	TOTAL P-2A	20.40	12.17	84,566	21, 23, 24		
27	NRCS Runoff	P-2B-A	8.357	12.17	33,000			
28	NRCS Runoff	P-5D	6.634	12.10	22,649			
29	Pond Route	IB-5D	1.926	12.47	8,511	28	232.28	9,862
30	Pond Route	IB-2B-A	1.320	12.67	9,693	27	232.80	11,480
31	NRCS Runoff	P-2B-B	4.292	12.33	32,355			
32	Junction	P-2B Total	6.856	12.43	50,559	29, 30, 31		
34	NRCS Runoff	P-6A	0.027	14.93	743			
35	NRCS Runoff	P-6B	0.610	12.20	2,988			
36	Pond Route	IB-6B	0.000	16.63	0.000	35	221.94	689

# Hydrograph 10-yr Summary Hydrology Studio v 3.0.0.31

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
37	Junction	P-6 TOTAL	0.027	14.93	743	34, 36		
39	NRCS Runoff	P-7A	5.329	12.13	20,077			
40	Pond Route	IB-7A	0.000	22.73	0.000	39	220.34	5,971
41	NRCS Runoff	P-7B	2.292	12.17	8,971			
42	Pond Route	IB-7B	0.000	11.93	0.000	41	224.83	2,428
43	Junction	P-7 TOTAL	0.000	11.93	0.000	40, 42		
44	NRCS Runoff	P-8	7.047	12.17	28,889			
45	Pond Route	IB-8	0.000	16.17	0.000	44	223.18	8,430
47	NRCS Runoff	P-10A	8.465	12.40	49,137			
48	NRCS Runoff	P-10B	8.811	12.13	33,815			
49	Pond Route	IB-10B	0.053	12.67	88.3	48	226.88	11,821
50	NRCS Runoff	P-9B	16.50	12.23	75,937			
51	Pond Route	DET. BASIN OUTFLOW	2.408	13.43	41,634	50	237.17	38,554
52	NRCS Runoff	P-9A	3.353	12.23	16,810			
53	NRCS Runoff	P-10C	27.49	12.10	94,804			
54	Junction	TO IB-10C	29.80	12.10	153,248	51, 52, 53		
55	Pond Route	IB-10C	0.000	12.27	0.006	54	226.98	39,975
56	Junction	P-10 TOTAL	8.467	12.40	49,225	47, 49, 55		
58	NRCS Runoff	P-11	13.21	12.37	71,647			
60	NRCS Runoff	P-12	0.000	23.70	4.70			
62	NRCS Runoff	Roof Runoff (Type A)	0.238	12.07	817			
63	Pond Route	Roof Drywell Type A	0.000	10.43	0.000	62	101.75	291
65	NRCS Runoff	Roof Runoff (Type B)	0.238	12.07	817			
66	Pond Route	Roof Drywell Type B	0.000	5.87	0.000	65	101.88	364

# Hydrograph 25-yr Summary

lydrology St	udio v 3.0.0.31							02-15-202
Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	P-1	0.002	15.37	52.4			
3	NRCS Runoff	P-3A	4.833	12.10	16,703			
4	Pond Route	IB-3A	2.111	12.33	13,045	3	291.37	5,194
5	NRCS Runoff	P-3B	22.18	12.17	90,824			
6	Junction	P-3 TOTAL	24.13	12.20	103,869	4, 5		
8	NRCS Runoff	P-4A	5.848	12.13	22,412			
9	Pond Route	IB-4A	2.490	12.43	13,624	8	283.28	6,941
10	NRCS Runoff	P-4B	21.38	12.13	82,653			
11	Junction	P-4 TOTAL	22.81	12.17	96,277	9, 10		
13	NRCS Runoff	P-5B	7.910	12.23	34,951			
14	Pond Route	IB-5B	5.512	12.40	22,102	13	285.60	9,306
15	NRCS Runoff	P-5C	5.092	12.13	19,765			
16	Pond Route	IB-5C	0.135	13.73	483	15	260.72	10,635
17	NRCS Runoff	P-5E	14.23	12.17	59,154			
18	Junction	P-5 TOTAL	16.83	12.20	81,739	14, 16, 17		
20	NRCS Runoff	P-2A2	4.862	12.17	19,877			
21	Pond Route	IB-2A2	1.062	12.63	3,531	20	303.68	9,016
22	NRCS Runoff	P-2A1	6.889	12.10	23,986			
23	Pond Route	IB-2A1	0.000	12.70	0.001	22	308.76	13,345
24	NRCS Runoff	P-2A3	31.74	12.17	126,394			
25	Junction	TOTAL P-2A	31.74	12.17	129,925	21, 23, 24		
27	NRCS Runoff	P-2B-A	12.14	12.17	47,193			
28	NRCS Runoff	P-5D	8.876	12.10	30,386			
29	Pond Route	IB-5D	4.544	12.27	15,726	28	232.49	11,090
30	Pond Route	IB-2B-A	2.737	12.60	19,907	27	233.19	16,227
31	NRCS Runoff	P-2B-B	10.72	12.23	59,648			
32	Junction	P-2B Total	16.79	12.27	95,281	29, 30, 31		
34	NRCS Runoff	P-6A	0.146	12.57	2,131			
35	NRCS Runoff	P-6B	1.113	12.17	4,834			
36	Pond Route	IB-6B	0.000	12.47	0.000	35	222.35	1,356

# Hydrograph 25-yr Summary

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
37	Junction	P-6 TOTAL	0.146	12.57	2,131	34, 36		
39	NRCS Runoff	P-7A	8.421	12.10	30,260			
40	Pond Route	IB-7A	0.000	19.53	0.000	39	221.14	10,526
41	NRCS Runoff	P-7B	3.277	12.13	12,665			
42	Pond Route	IB-7B	0.000	16.33	0.000	41	225.27	3,993
43	Junction	P-7 TOTAL	0.000	16.33	0.000	40, 42		
44	NRCS Runoff	P-8	10.82	12.17	42,833			
45	Pond Route	IB-8	0.000	11.77	0.000	44	223.96	14,896
47	NRCS Runoff	P-10A	13.53	12.37	74,706			
48	NRCS Runoff	P-10B	11.58	12.13	44,684			
49	Pond Route	IB-10B	0.563	12.67	2,416	48	227.36	16,025
50	NRCS Runoff	P-9B	24.53	12.23	110,097			
51	Pond Route	DET. BASIN OUTFLOW	9.751	12.63	75,794	50	237.42	44,933
52	NRCS Runoff	P-9A	5.929	12.20	26,880			
53	NRCS Runoff	P-10C	35.46	12.10	123,472			
54	Junction	TO IB-10C	40.00	12.10	226,146	51, 52, 53		
55	Pond Route	IB-10C	4.215	13.10	17,119	54	228.12	70,778
56	Junction	P-10 TOTAL	13.94	12.40	94,241	47, 49, 55		
58	NRCS Runoff	P-11	19.41	12.37	103,157			
60	NRCS Runoff	P-12	0.002	15.33	69.9			
62	NRCS Runoff	Roof Runoff (Type A)	0.290	12.07	1,004			
63	Pond Route	Roof Drywell Type A	0.000	9.77	0.000	62	102.24	379
65	NRCS Runoff	Roof Runoff (Type B)	0.290	12.07	1,004			
66	Pond Route	Roof Drywell Type B	0.000	7.77	0.000	65	102.39	466

# Hydrograph 100-yr Summary Hydrology Studio v 3.0.0.31

lydrology St	udio v 3.0.0.31							02-15-202
Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	P-1	0.015	12.50	228			
3	NRCS Runoff	P-3A	6.583	12.10	23,047			
4	Pond Route	IB-3A	3.175	12.27	19,107	3	291.86	6,627
5	NRCS Runoff	P-3B	32.90	12.17	133,902			
6	Junction	P-3 TOTAL	35.67	12.20	153,009	4, 5		
8	NRCS Runoff	P-4A	8.346	12.13	32,087			
9	Pond Route	IB-4A	4.180	12.37	22,104	8	283.87	9,308
10	NRCS Runoff	P-4B	31.98	12.13	122,621			
11	Junction	P-4 TOTAL	34.67	12.17	144,724	9, 10		
13	NRCS Runoff	P-5B	11.28	12.20	50,037			
14	Pond Route	IB-5B	9.834	12.33	35,778	13	285.88	10,765
15	NRCS Runoff	P-5C	6.902	12.13	27,136			
16	Pond Route	IB-5C	2.414	12.43	6,054	15	260.94	11,696
17	NRCS Runoff	P-5E	24.48	12.17	97,007			
18	Junction	P-5 TOTAL	30.35	12.20	138,839	14, 16, 17		
20	NRCS Runoff	P-2A2	6.710	12.17	27,705			
21	Pond Route	IB-2A2	3.959	12.37	9,757	20	303.95	10,112
22	NRCS Runoff	P-2A1	9.275	12.10	32,771			
23	Pond Route	IB-2A1	2.462	12.43	6,265	22	309.00	14,786
24	NRCS Runoff	P-2A3	50.99	12.17	198,423			
25	Junction	TOTAL P-2A	50.99	12.17	214,445	21, 23, 24		
27	NRCS Runoff	P-2B-A	18.47	12.13	70,930			
28	NRCS Runoff	P-5D	12.39	12.10	42,798			
29	Pond Route	IB-5D	7.861	12.23	27,675	28	232.88	13,292
30	Pond Route	IB-2B-A	4.891	12.57	38,402	27	233.83	24,838
31	NRCS Runoff	P-2B-B	24.99	12.17	112,777			
32	Junction	P-2B Total	35.76	12.20	178,854	29, 30, 31		
34	NRCS Runoff	P-6A	0.702	12.43	5,404			
35	NRCS Runoff	P-6B	2.024	12.17	8,176			
36	Pond Route	IB-6B	0.000	12.30	0.000	35	223.03	2,580

# Hydrograph 100-yr Summary Hydrology Studio v 3.0.0.31

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
37	Junction	P-6 TOTAL	0.702	12.43	5,404	34, 36		
39	NRCS Runoff	P-7A	13.79	12.10	47,890			
40	Pond Route	IB-7A	0.000	11.27	0.000	39	222.39	19,475
41	NRCS Runoff	P-7B	4.901	12.13	18,790			
42	Pond Route	IB-7B	0.000	10.77	0.000	41	225.94	6,644
43	Junction	P-7 TOTAL	0.000	10.77	0.000	40, 42		
44	NRCS Runoff	P-8	17.18	12.17	66,719			
45	Pond Route	IB-8	0.000	10.93	0.000	44	225.06	26,369
47	NRCS Runoff	P-10A	22.34	12.37	119,228			
48	NRCS Runoff	P-10B	15.88	12.13	61,966			
49	Pond Route	IB-10B	1.619	12.60	8,312	48	228.10	23,009
50	NRCS Runoff	P-9B	37.89	12.23	167,750			
51	Pond Route	DET. BASIN OUTFLOW	26.82	12.43	133,448	50	237.78	54,171
52	NRCS Runoff	P-9A	10.57	12.20	44,975			
53	NRCS Runoff	P-10C	47.75	12.10	168,694			
54	Junction	TO IB-10C	56.33	12.10	347,117	51, 52, 53		
55	Pond Route	IB-10C	29.98	12.57	99,598	54	228.73	90,503
56	Junction	P-10 TOTAL	50.66	12.53	227,139	47, 49, 55		
58	NRCS Runoff	P-11	29.80	12.33	156,090			
60	NRCS Runoff	P-12	0.021	12.43	303			
62	NRCS Runoff	Roof Runoff (Type A)	0.371	12.07	1,293			
63	Pond Route	Roof Drywell Type A	0.000	8.90	0.000	62	103.25	521
65	NRCS Runoff	Roof Runoff (Type B)	0.371	12.07	1,293			
66	Pond Route	Roof Drywell Type B	0.000	6.63	0.000	65	103.45	624

SM-3719C	
----------	--

Project:	Athens Street	By NC	Date 6/24/22
Location:	Stow, MA	Checked	Rev Date 10/27/2022 Date 6/17/2023
Circle one:	Present Developed	Subcatchment P-1	1

#### 1. Runoff curve number (CN)

Soil name and hydrologic	Cover description (cover type, treatment, and	T	CN 1/		Area	Product of CN x Area
group (appendix A)	hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious	98			0.00	0.00
Α	Woods Good Condition	30			0.16	4.80
А	Open Space Good Condition	39			0.00	0.00
А	Brush Fair	35			0.00	0.00
А	Gravel	76			0.00	0.00
В	Woods Good Condition	55			0.00	0.00
В	Open Space Good Condition	61			0.00	0.00
В	Gravel	85			0.00	0.00
С	Woods Good Condition	70			0.00	0.00
С	Open Space Fair Condition	74			0.00	0.00
С	Gravel	89			0.00	0.00
1/ Use only one	CN source per line.			Totals =	0.16	4.80

CN (weighted) =	total product	=	4.80 =	30.00 ;	Use CN =	30

#### 2. Runoff

or eqs. 2-3 and 2-4.)

		Storm #1	Storm #2	Storm #3
Frequency	yr	2	25	100
Rainfall, P (24-hour)	in	3.27	6.14	7.84
Runoff, Q(Use P and CN with table 2-1, fig. 2-1,)	in	0.09	0.09	0.38

Project:	Athens Street	_	Ву	/ NC	Date		
Location:	Stow, MA		Checked	1	Rev Date Date	10/27/2022 6/17/2023	
Location.	Otow, IVI/Y	<u> </u>	Oncorco	'	Date	0/11/2020	
Circle one:	•		Subcatch	ment P-1			
Circle one:	Tc <u>Tt</u>	through subarea					
		Subarca					
Sheet flow	(Applicable to Tc only)		Segment ID	A-B			
1. Surface	Description (table 3-1)			WOODS			
2. Manning	gs roughness coeff., n (table 3-1)			0.6			
3. Flow len	ngth, L (total L <= 300 ft)		ft	50			
4. Two-yr 2	24-hr rainfall, P2		in	3.1			
5. Land Slo	ppe, s		ft/ft	0.082			
6. Tt = 0.00	07 (nL)^0.8 / (P2^0.5 s^0.4)	Compute T	t hr	0.16			0.16
Shallow co	oncentrated Flow		Segment ID	B-C			
7. Surface	Description (paved or unpaved)			UNPAVED			
8. Flow Le	ngth, L		ft	32			
9. Waterco	ourse slope, s		ft/ft	0.047			
10. Averag	ge Velocity, V (figure 3-1)		ft/s	3.50			
11. Tt = L /	/ 3600V	Compute T	t hr	0.00			0.00
Channel flo	ow		Segment ID				
12. Cross	sectional flow area, a		sf				
13. Wetted	l perimeter, pw		ft				
	ılic radius, r=a/wp	Compute r	ft				
15. Channe		•	ft/ft				
	ng's roughness coeff., n						
	l9 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow le		<b>P</b>	ft				
19. Tt = L /		Compute T					0
20. Waters	shed or subarea Tc or Tt (add Tt in st	eps 6, 11, and	d 19)			hr	0.1
						min	10.

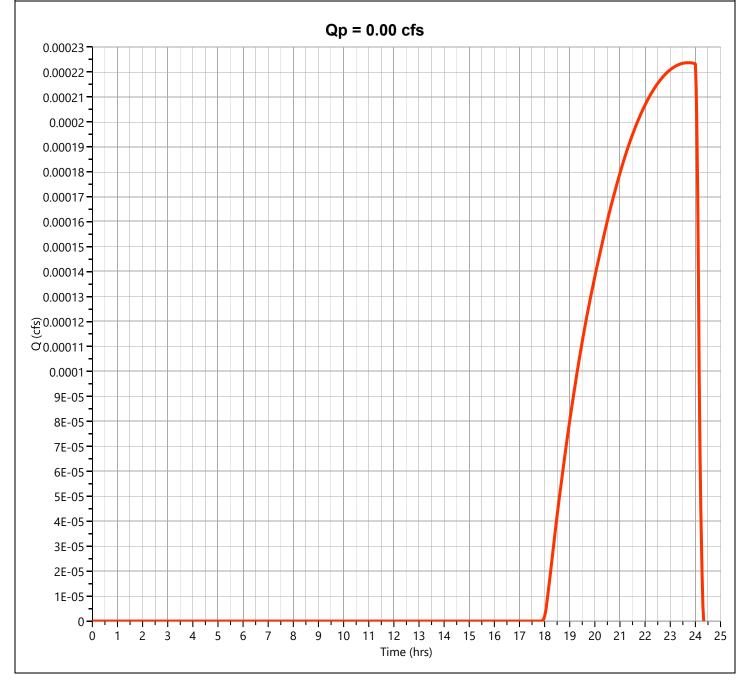
## P-1 Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.00 hrs
Time Interval	= 2 min	Runoff Volume	= 0.000 cuft
Drainage Area	= 0.16 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 0.00 cfs

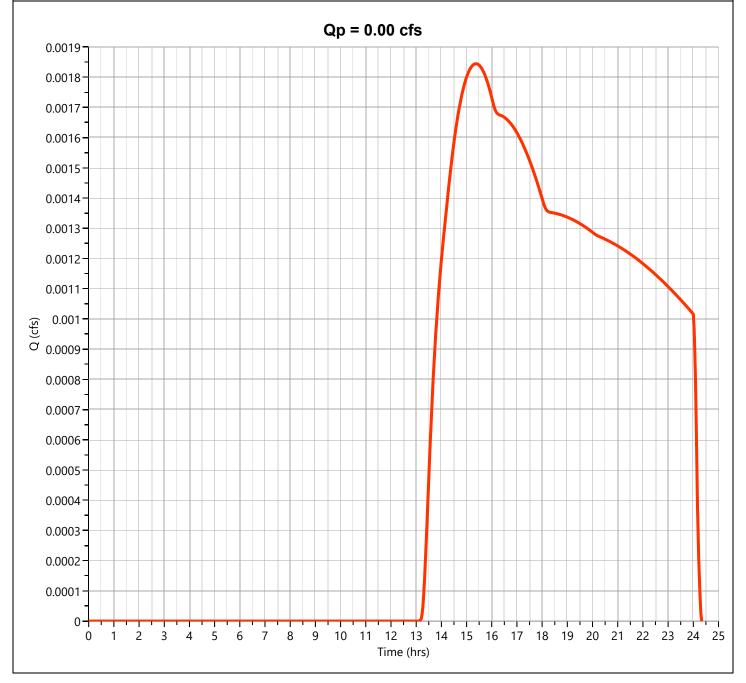
## P-1 Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.000 cfs
Storm Frequency	= 10-yr	Time to Peak	= 23.73 hrs
Time Interval	= 2 min	Runoff Volume	= 3.52 cuft
Drainage Area	= 0.16 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



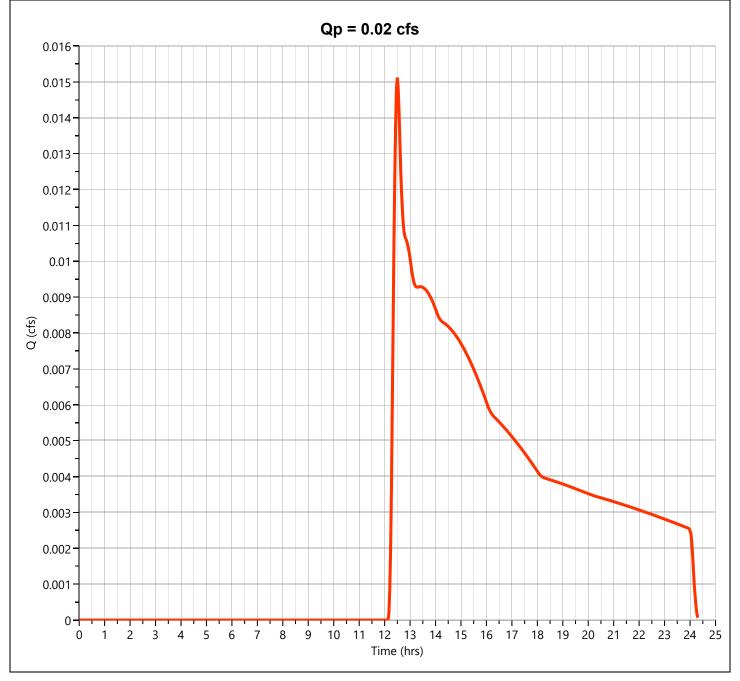
## P-1 Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.002 cfs
Storm Frequency	= 25-yr	Time to Peak	= 15.37 hrs
Time Interval	= 2 min	Runoff Volume	= 52.4 cuft
Drainage Area	= 0.16 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



## P-1 Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.015 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.50 hrs
Time Interval	= 2 min	Runoff Volume	= 228 cuft
Drainage Area	= 0.16 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Project:	Athens Street	ByPFK	Date 10/13/22
Location:	Stow, MA	Checked	Rev Date 6/17/2023  Date
Circle one:	Present Developed	Subcatchment P-2A2	

1. Runoff curve number (CN)

Soil name and hydrologic	Cover description (cover type, treatment, and		CN 1/		Area	
group (appendix A)	hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious	98			0.47	45.81
А	Woods Good Condition	30			0.00	0.00
Α	Open Space Good Condition	39			0.00	0.00
Α	Gravel	76			0.00	0.00
С	Woods Good Condition	70			0.25	17.38
С	Open Space Good Condition	74			0.69	50.88
С	Gravel	89			0.00	0.00
1/ Use only one	e CN source per line. 6112	6		Totals =	1.40	114.07

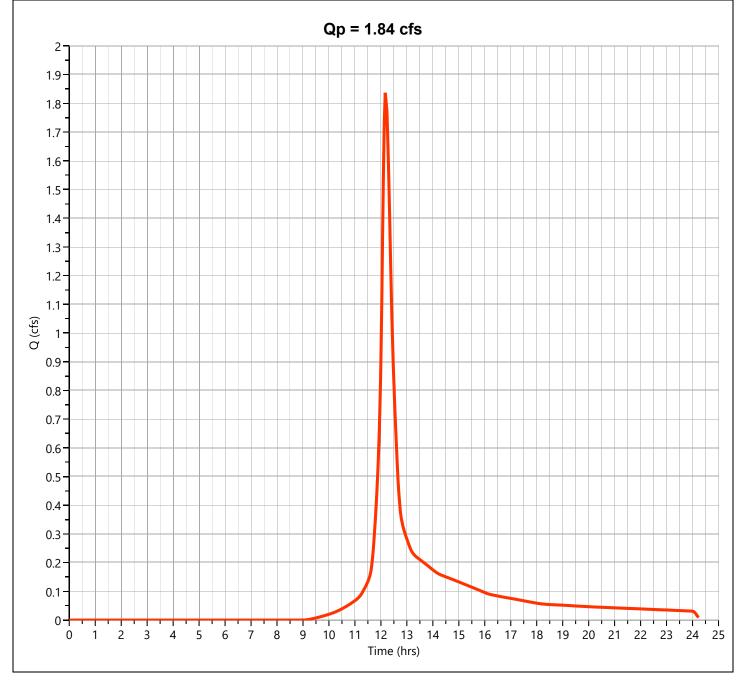
CN (weighted) =	total product	_=	114.07 =	81.29	;	Use CN =	81
	total area		1.40		_		

2. Runoff

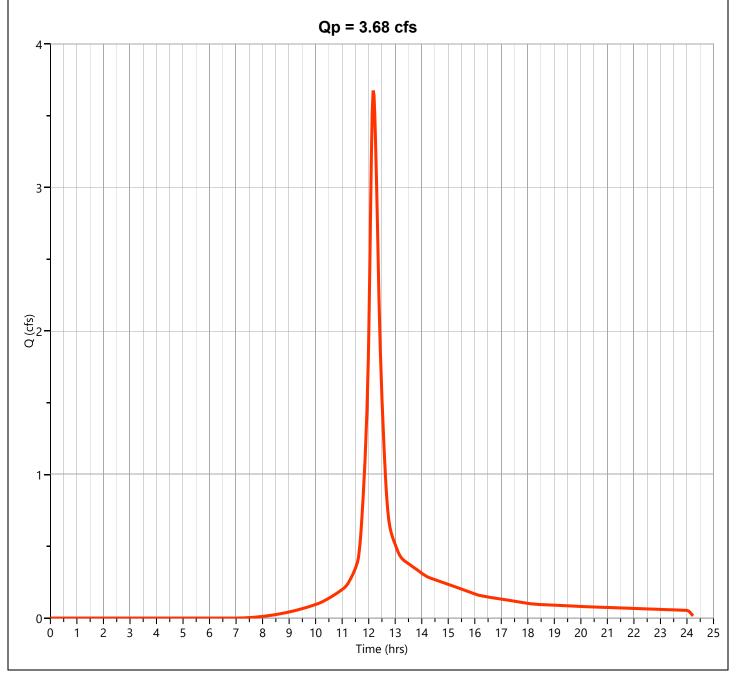
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
1.54	4.04	5.62

Project: Athens Street	=	Ву	PFK		10/13/2022	
					6/17/2023	
Location: Stow, MA	-	Checked		Date		
Circle one: Present Developed	1	Subcatchm	ont D 2A2			
Circle one: Tc Tt	<b>I</b> through	Subcatchini	EIIL F-ZAZ			
10	subarea			i		
Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			WOODS			
2 Manufact revelopment and the control of the contr			0.0			
2. Mannings roughness coeff., n (table 3-1)			0.6			
3. Flow length, L (total L <= 300 ft)		ft	50			
3. Flow length, E (total E 1 = 300 ft)		TC .	30			
4. Two-yr 24-hr rainfall, P2		in	3.1			
, , , , , , , , , , , , , , , , , , ,						
5. Land Slope, s		ft/ft	0.040			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Ti	hr	0.22			0.22
Shallow concentrated Flow		Segment ID	B-C	C-D	D-E	
7. Surface Description (paved or unpaved)			UNPAVED	UNPAVED	PAVED	
9 Flow Longth I		ft	102	100	15	
8. Flow Length, L		π	102	109	15	
9. Watercourse slope, s		ft/ft	0.040	0.065	0.07	
o. Waterboards dispo, o		1012	0.010	0.000	0.01	
10. Average Velocity, V (figure 3-1)		ft/s	3.23	4.11	5.38	
, ,						
11. Tt = L / 3600V	Compute Ti	hr	0.01	0.01	0.00	0.02
Channel flow		Segment ID				
		_				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw	C	ft				
14. Hydraulic radius, r=a/wp	Compute r					
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V					
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Ti	hr				0
20. Watershed or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	d 19)			hr	0.24
					min	14.2

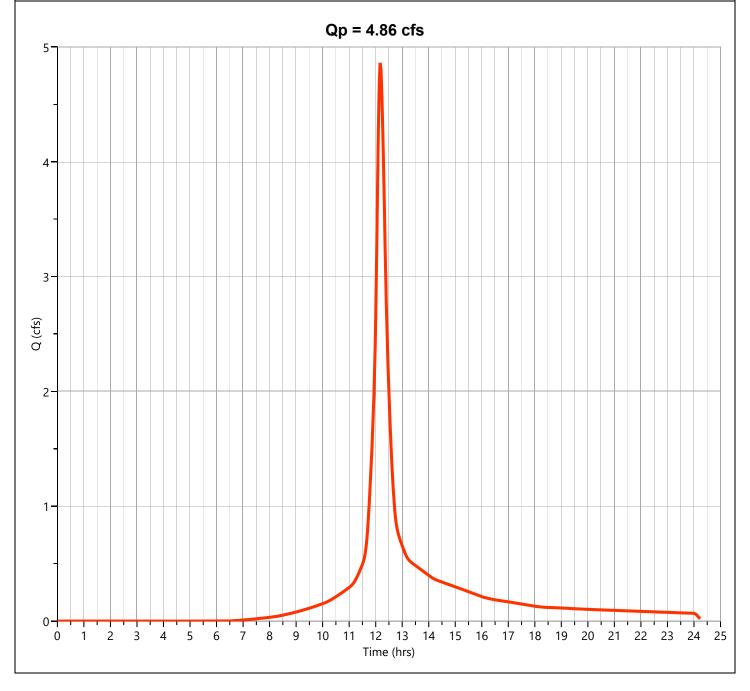
Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.838 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 7,553 cuft
Drainage Area	= 1.4 ac	Curve Number	= 81
Tc Method	= User	Time of Conc. (Tc)	= 14.2 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



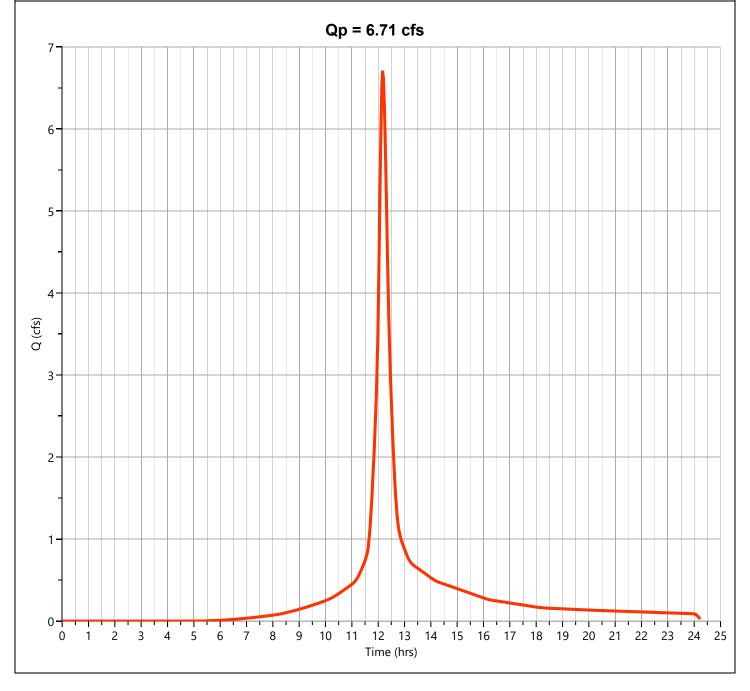
	ND00 D	5 . 5	0.070 (
Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.676 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 14,967 cuft
Drainage Area	= 1.4 ac	Curve Number	= 81
Tc Method	= User	Time of Conc. (Tc)	= 14.2 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.862 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 19,877 cuft
Drainage Area	= 1.4 ac	Curve Number	= 81
Tc Method	= User	Time of Conc. (Tc)	= 14.2 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



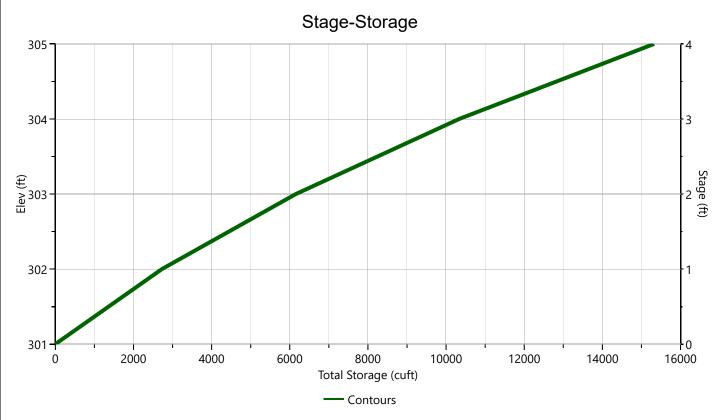
Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.710 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 27,705 cuft
Drainage Area	= 1.4 ac	Curve Number	= 81
Tc Method	= User	Time of Conc. (Tc)	= 14.2 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



#### IB-2A2

## Stage-Storage

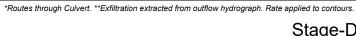
User Defined Contours			Stage / Storage Table					
Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)		
Bottom Elevation, ft	301.00							
Voids (%)	100.00	0.00	301.00	2,397	0.000	0.000		
		1.00	302.00	3,064	2,731	2,731		
Volume Calc	Ave End Area	2.00 3.00	303.00 304.00	3,788	3,426	6,157		
		4.00	304.00	4,569 5,407	4,179	10,335 15,323		
		4.00	303.00	5,407	4,988	10,323		

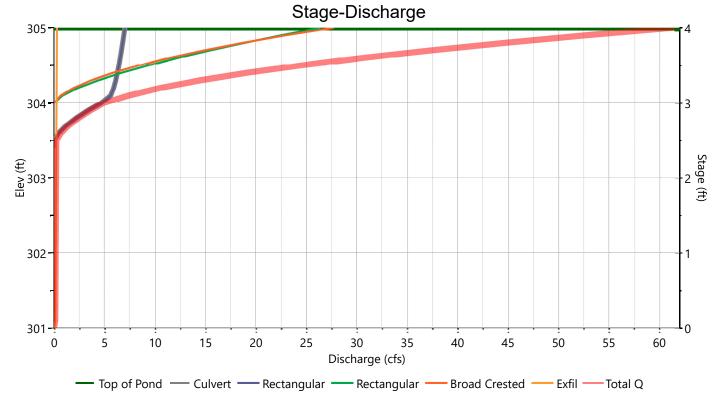


#### IB-2A2

## Stage-Discharge

Culvert / Ouifices	Cultivant		Orifices		Doufounted Discu	
Culvert / Orifices	Culvert	1	2	3	Perforated Ris	er
Rise, in	12				Hole Diameter, in	
Span, in	12				No. holes	
No. Barrels	1				Invert Elevation, ft	
Invert Elevation, ft	301.00				Height, ft	
Orifice Coefficient, Co	0.60				Orifice Coefficient, Co	
Length, ft	34					
Barrel Slope, %	8.8					
N-Value, n	0.013					
Maine	Riser*	Weirs			Anaillana	
Weirs	Riser	1*	2	3	Ancillary	
Shape / Type	Circular	Rectangular	Rectangular	Broad Crested	Exfiltration, in/hr	2.41**
Crest Elevation, ft		303.5	304	304		
Crest Length, ft		4	8	6		
Angle, deg				18.4 (3:1)		
Weir Coefficient, Cw		3.3	3.3	3.3		





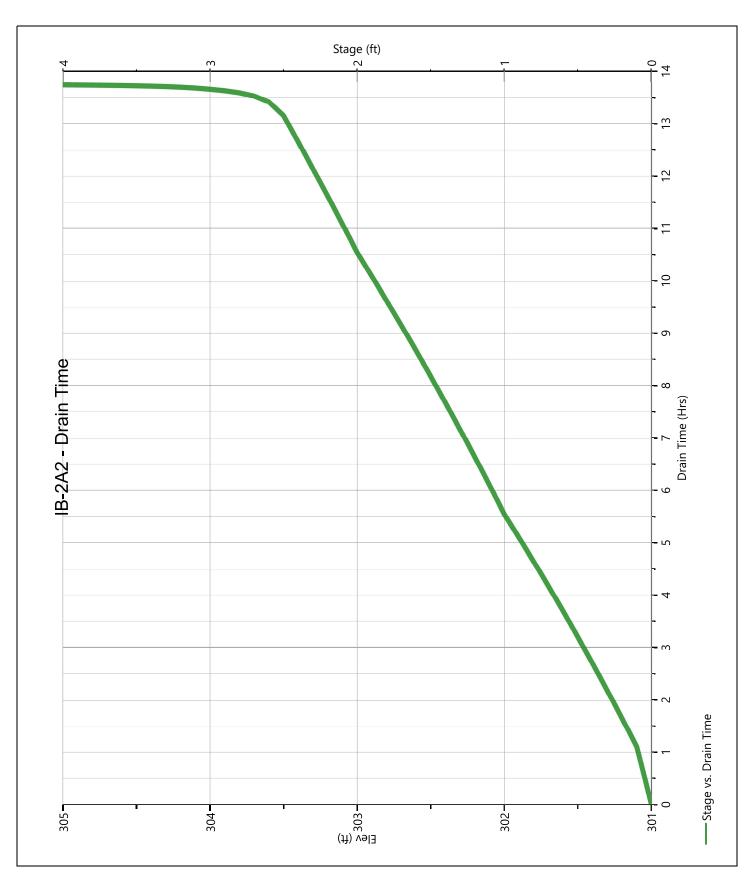
#### IB-2A2

## **Stage-Storage-Discharge Summary**

Stage	Elev.	Storage	Culvert	(	Orifices, cf	's	Riser		Weirs, cfs	;	Pf Riser	Exfil	User	Total
(ft)	(ft)	(cuft)	(cfs)	1	2	3	(cfs)	1	2	3	(cfs)	(cfs)	(cfs)	(cfs)
0.00	301.00	0.000	0.000					0.000	0.000	0.000		0.000		0.000
1.00	302.00	2,731	0.000					0.000	0.000	0.000		0.171		0.171
2.00	303.00	6,157	0.000					0.000	0.000	0.000		0.211		0.211
3.00	304.00	10,335	4.667 ic					4.667	0.000	0.000		0.255		4.922
4.00	305.00	15,323	7.030 ic					7.030 s	26.40	27.72		0.302		61.45

#### IB-2A2

#### **Pond Drawdown**



#### IR-2A2

3-2A2				Hyd. No. 2	
Hydrograph Type	= Pond Route		Peak Flow	= 0.000 cfs	
Storm Frequency	= 2-yr		Time to Peak	= 17.20 hrs	
Time Interval	= 2 min		Hydrograph Volume	= 0.000 cuft	
Inflow Hydrograph	= 20 - P-2A2		Max. Elevation	= 302.21 ft	
Pond Name	= IB-2A2		Max. Storage = 3,454 cuft		
Pond Routing by Storage In	dication Method		Center of mass	detention time = 19.24 h	
		Qp = 0.00 cfs			
2		-			
1.9					
1.8					
1.7					
1.6					
4					
1.5 -					
1.4					
1.3					
1.2					
1.1					
(S <sub>2</sub> ) 0 1					
0.9					
0.8					
0.7					
0.6					
0.5					
0.4					
0.3					
0.2					
-					
0.1					
0-					

Time (hrs)

– P-2A2 –– IB-2A2

9 10 11 12 13 14 15 16 17 18 19 20 21

## IB-2A2 Hyd. No. 21

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 10-yr	Time to Peak	= 15.00 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.016 cuft
Inflow Hydrograph	= 20 - P-2A2	Max. Elevation	= 303.48 ft
Pond Name	= IB-2A2	Max. Storage	= 8,168 cuft
Pond Routing by Storage Inc			s detention time = 1.45 hrs
	Qp = 0.00 cfs	<b>.</b>	
4			
3-			
2 <del>-</del>			
1-			
0			
-1 <del>                                     </del>		11 12 13 14 15 A2	

## IB-2A2 Hyd. No. 21

									- P-2 <i>F</i>	Time	(rirs)								
-1-	0	1	2	3	4	5	1	6	7		(brs)	9	10	11	12	13	14	15	
•	-																		
0-																			
0	-																		
1-																$\Lambda$			
	-																		
(cls) 2-																			
3-																			
,	-																		
4-																			
-																			
5 <b>-</b>								C	)p =	1.0	6 cf	S							
	Nam	ne by Storage		= IB-2 tion Me									Ma	x. Sto	rage		= 9,0	)16 cuft	
		drograph		= 20 -		\2							Ма	x. Ele	vation		= 30	3.69 ft	
	Inter			- 23-y = 2 m												lume		.03 ms 531 cuft	
		oh Type quency		= Pon = 25-y										ak Flo ne to F				062 cfs .63 hrs	

## IB-2A2 Hyd. No. 21

lydrograph Type torm Frequency	= Pond Route = 100-yr	Peak Flow Time to Peak	= 3.959 cfs = 12.37 hrs
ime Interval	= 2 min	Hydrograph Volume	= 9,757 cuft
nflow Hydrograph	= 20 - P-2A2	Max. Elevation	= 303.95 ft
ond Name	= IB-2A2	Max. Storage	= 10,112 cuft
ond Routing by Storage Ind		Max. Otorage	- 10,112 out
one reading by elerage ma			
7-	Qp = 3.96 cfs		
1			
6			
5	+++++++++++++++++++++++++++++++++++++++		
4			
1			
(SI:			
3			
1			
2			
1			
1			
1			
0			
1			
-1			
0 1 2	3 4 5 6 7 8 9 1 Time (hrs)	0 11 12 13 14	4 15 16

Project:	Athens Street	By PFK	Date 10/13/22
Location:	Stow, MA	Checked	Rev Date 6/17/2023 Date
Circle one:	Present Developed	Subcatchment P-2A1	

1. Runoff curve number (CN)

Soil name and hydrologic	Cover description (cover type, treatment, and		CN 1/		Area	Product of CN x Area
group (appendix A)	hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious	98			0.66	64.20
А	Woods Good Condition	30			0.00	0.00
А	Open Space Good Condition	39			0.00	0.00
А	Gravel	76			0.00	0.00
С	Woods Good Condition	70			0.00	0.00
С	Open Space Good Condition	74			0.84	62.01
С	Gravel	89			0.00	0.00
1/ Use only one	e CN source per line. 6504	0		Totals =	1.49	126.21

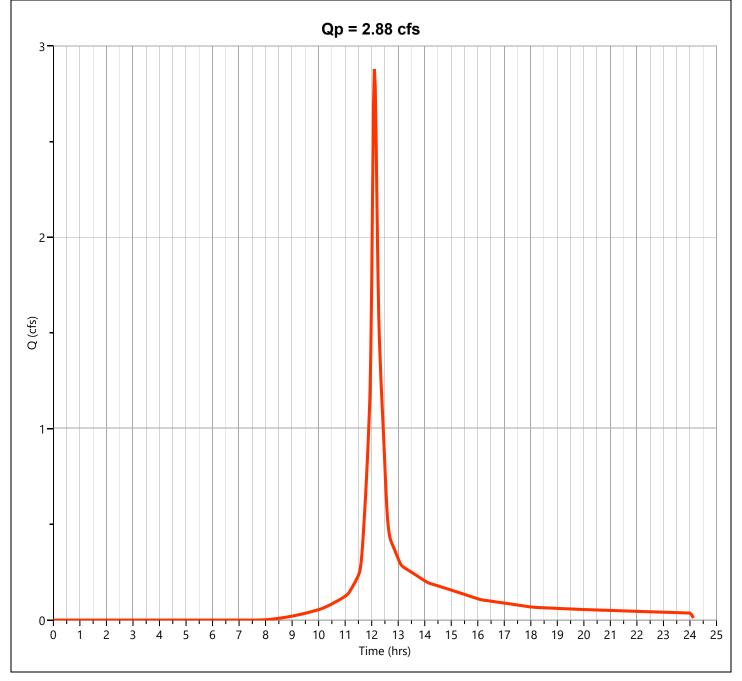
CN (weighted) =	total product	_=	126.21 =	84.53	;	Use CN =	85
•	total area		1.49				

2	Runoff
۷.	Rulloll

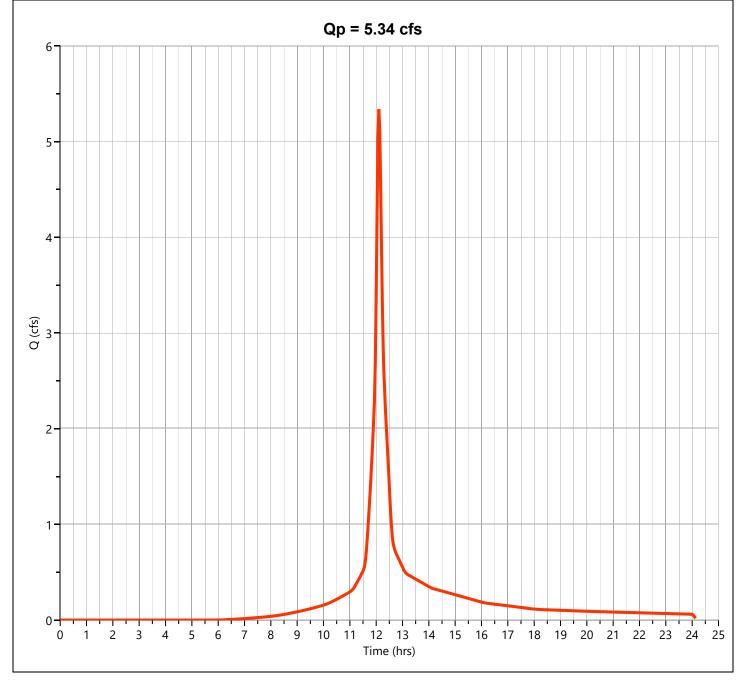
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
1.78	4.38	6.00

Project: Athens Street		Ву	<u>PFK</u>		e 10/13/2022	
Locations Chaus MA		Ch a also d		Rev Date		
Location: Stow, MA	_	Checked		Date	<u> </u>	
Circle one: Present Develope	ed	Subcatchm	ent P-2A1			
Circle one: Tc Tt	through					
	subarea					
Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			GRASS			
2. Mannings roughness coeff., n (table 3-1)			0.24			
2. Mailings roughness coeff., if (table 3-1)			0.24			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.020		+	
5. Land Slope, S		1011	0.020			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute T	t hr	0.14		<del>                                     </del>	
Shallow concentrated Flow		Segment ID	B-C	C-D		
7. Surface Description (paved or unpaved)			UNPAVED	PAVED	+	
7. Surface Description (paved or unpaved)			ON AVED	IAVED		
8. Flow Length, L		ft	153	21		
9. Watercourse slope, s		ft/ft	0.020	0.010		
10. Average Velocity, V (figure 3-1)		ft/s	2.28	2.03	-	
10. Average velocity, v (ligure 3-1)		105	2.20	2.03		
11. Tt = L / 3600V	Compute T	t hr	0.02	0.00	<del>                                     </del>	
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf			+	
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r					
15. Channel Slope, s	·	ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	/ ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute T	t hr				
20. Watershed or subarea Tc or Tt (add Tt in s	steps 6, 11, an	ıd 19)			hr	
					min	

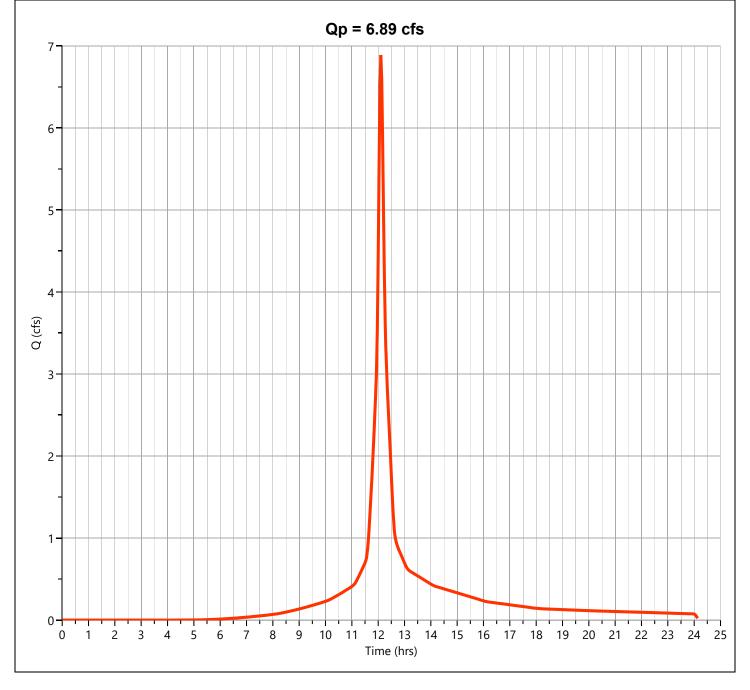
Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.879 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 9,830 cuft
Drainage Area	= 1.49 ac	Curve Number	= 85
Tc Method	= User	Time of Conc. (Tc)	= 9.6 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



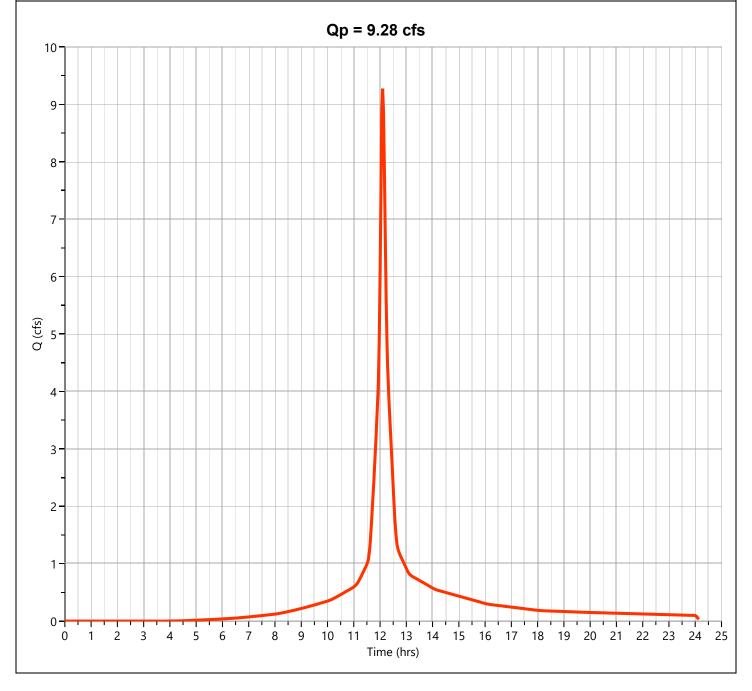
Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.341 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 18,417 cuft
Drainage Area	= 1.49 ac	Curve Number	= 85
Tc Method	= User	Time of Conc. (Tc)	= 9.6 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.889 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 23,986 cuft
Drainage Area	= 1.49 ac	Curve Number	= 85
Tc Method	= User	Time of Conc. (Tc)	= 9.6 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 9.275 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 32,771 cuft
Drainage Area	= 1.49 ac	Curve Number	= 85
Tc Method	= User	Time of Conc. (Tc)	= 9.6 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs			
Storm Frequency	= 2-yr	Time to Peak	= 16.63 hrs			
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft			
Inflow Hydrograph	= 22 - P-2A1	Max. Elevation	= 307.05 ft			
Pond Name	= IB-2A1	Max. Storage	= 4,358 cuft			
Pond Routing by Storage In	dication Method	Center of mas	s detention time = 5.94 hrs			
	Qp = 0.00 cfs					
2 - (\$t)						
( <del>S</del> ) 1						
_						
-1 <del>1                                   </del>	3 4 5 6 7 8 9 10	11 12 13 14	15 16 17 18			
	Time (hrs)					
	— P-2A1 — IB-2A1					

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.90 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.001 cuft
nflow Hydrograph	= 22 - P-2A1	Max. Elevation	= 308.11 ft
ond Name	= IB-2A1	Max. Storage	= 9,626 cuft
ond Routing by Storage In	dication Method	Center of mas	ss detention time = 1.42 l
	Qp = 0.0	0 cfs	
6			
_			
5			
1			
4			
-			
3			
(615)			
g			
2-			
-			
1-			
'			
-			
0			
-1			
0 1 2		9 10 11 12 13 14 e (hrs)	15 16 17
		─ IB-2A1	

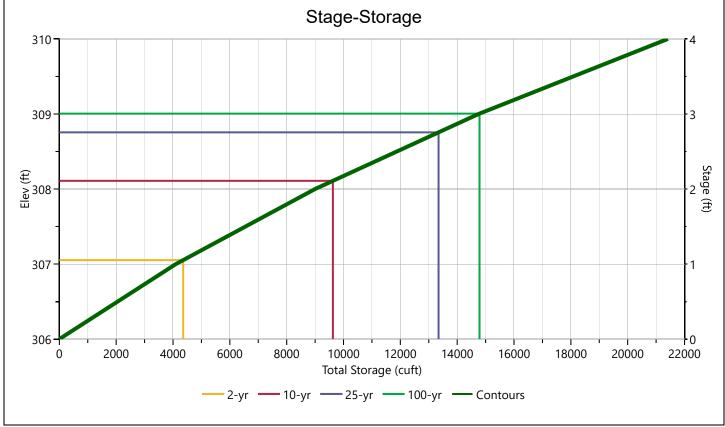
torn	n Fre	quenc	y	= 2	25-y	r									Ti	me t	ю Ре	eak			= 13	2.70	hrs
	Inter				2 mi										Н	ydro	grap	h Vo	olum	е	= 0	.001	cuft
flow	v Hyc	drograp	oh	= 2	22 -	P-2	<b>A</b> 1											ation			= 3	08.76	ft
ond	Nan	ne		=	B-2	<b>A</b> 1									M	ax. S	Stora	age			= 1	3,345	cuft
nd R	Routing	by Stora	ge Ind	ication	n Met	hod																	
										Qp	) =	0.00	) cf	S									
7-																							
•	-																						
_																							
6 <del>-</del>																							
•	1																						
5-																					$\coprod$		
•	1																						
4-																					H		
	]																						
<u>6</u>																							
) 3-																							
-																							
2-																						1	
-																							
1-																				+			
	-																						
0-																							
J																							
•	1																						
-1 <b>-</b>						ı				ı	ı	1								-			
	0	1	á	2	3	3	4	5	5	(	6 .	7	, (hrs)	8	9		10		11		12	1	3

lydrograph Type	= Pond Route	Peak Flow	= 2.462 cfs		
torm Frequency	= 100-yr	Time to Peak	= 12.43 hrs		
ime Interval	= 2 min	Hydrograph Volume	= 6,265 cuft		
nflow Hydrograph	= 22 - P-2A1	Max. Elevation	= 309.00 ft		
ond Name	= IB-2A1	Max. Storage	= 14,786 cuft		
ond Routing by Storage Ind	dication Method				
10	Qp = 2.46 c	fs			
10 7					
9					
1					
8					
-					
7 -					
-					
6					
-					
5					
(613)					
4					
-					
3					
-					
2					
1 -					
<u> </u>					
0					
-1 1 2			4 15 16		
	Time (hrs	5)			

#### IB-2A1

# Stage-Storage

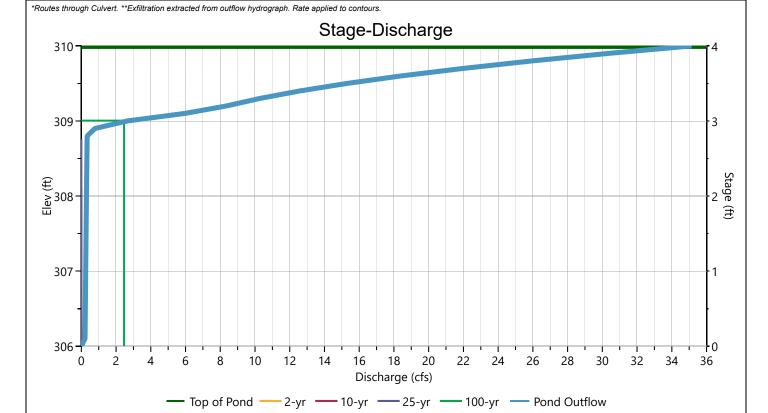
User Defined Conto	ırs			Stage / Stora	ge Table	
Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
Bottom Elevation, ft	306.00					
Voids (%)	100.00	0.00 1.00	306.00 307.00	3,719	0.000	0.000
		2.00	308.00	4,487 5,311	4,103 4,899	4,103 9,002
Volume Calc	Ave End Area	3.00	309.00	6,192	5,752	14,754
		4.00	310.00	7,130	6,661	21,415
		4.00	310.00	7,130	0,001	21,410
						J



#### **IB-2A1**

# Stage-Discharge

Outroot / Outfloor	Ocalescent		Orifices		Perforated Riser			
Culvert / Orifices	Culvert	1	2	3	Perforated Ris	er		
Rise, in	12				Hole Diameter, in			
Span, in	12				No. holes			
No. Barrels	1				Invert Elevation, ft			
Invert Elevation, ft	306.00				Height, ft			
Orifice Coefficient, Co	0.60				Orifice Coefficient, Co			
Length, ft	28							
Barrel Slope, %	3.6							
N-Value, n	0.012							
Maine	Diagr*		Weirs		Anailland			
Weirs	Riser*	1*	2	3	Ancillary			
Shape / Type	Circular	Rectangular		Broad Crested	Exfiltration, in/hr	2.41**		
Crest Elevation, ft		308.85		309				
Crest Length, ft		12		6				
Angle, deg				18.4 (3:1)				
Weir Coefficient, Cw		3.3		3.3				



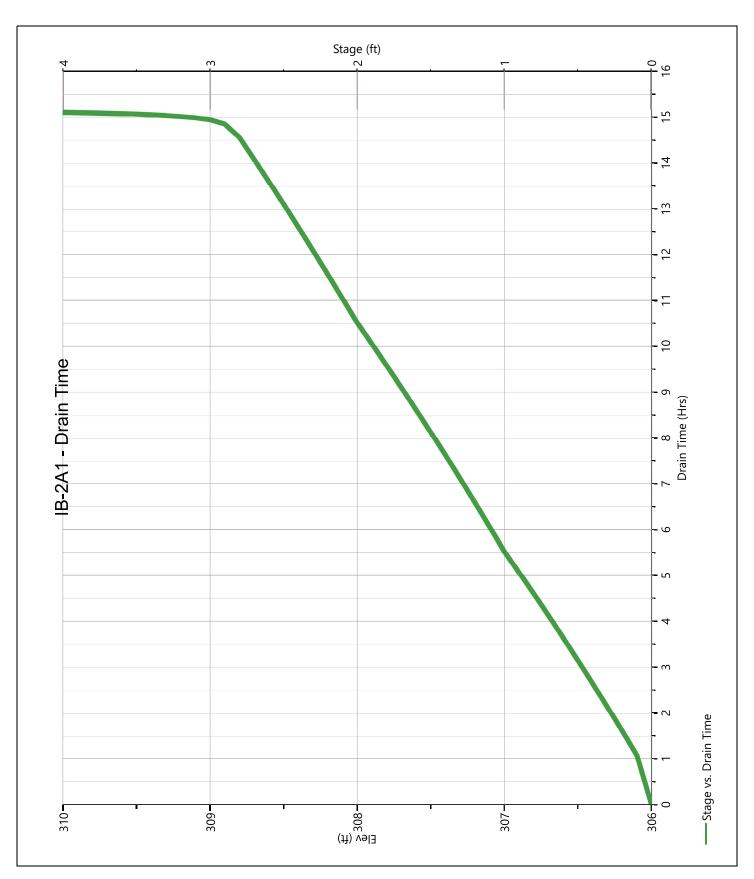
#### **IB-2A1**

# **Stage-Storage-Discharge Summary**

Stage	tage Elev. Stor		Culvert	(	Orifices, cf	s	Riser		Weirs, cfs	i	Pf Riser	Exfil	User	Total
Stage (ft)	(ft)	(cuft)	(cfs)	1	2	3	(cfs)	1	2	3	(cfs)	(cfs)	(cfs)	(cfs)
0.00	306.00	0.000	0.000					0.000		0.000		0.000		0.000
1.00	307.00	4,103	0.000					0.000		0.000		0.250		0.250
2.00	308.00	9,002	0.000					0.000		0.000		0.296		0.296
3.00	309.00	14,754	2.300 ic					2.300		0.000		0.345		2.646
4.00	310.00	21,415	7.022 ic					7.022 s		27.72		0.398		35.14

#### IB-2A1

#### **Pond Drawdown**



#### Worksheet 2: Runoff curve number and runoff

SM-3719C

Project:	Athens Street	By PFK	Date 10/13/22
			Rev Date 6/17/2023
Location:	Stow, MA	Checked	Date
Circle one:	Present Developed	Subcatchment P-2A3	

1. Runoff curve number (CN)

Soil name and hydrologic	Cover description (cover type, treatment, and		CN 1/		Area	Product of CN x Area
group (appendix A)	hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious	98			0.00	0.00
А	Woods Good Condition	30			3.35	100.50
А	Open Space Good Condition	39			1.16	45.15
А	Open Space Fair Condition	49			0.00	0.00
А	Woods-Grass Combination Good Condition	32			0.00	0.00
А	Gravel	76			0.22	16.35
В	Woods Good Condition	55			0.00	0.00
В	Open Space Good Condition	61			0.00	0.00
С	Open Space Good Condition	77			0.62	47.91
С	Woods Good Condition	70			5.20	364.14
С	Open Space Fair Condition	79			0.00	0.00
С	Gravel	89			0.12	10.26
D	BVW	77			4.78	367.78
1/ Use only one	CN source per line. 464	1455	-	Totals =	15.44	952.10

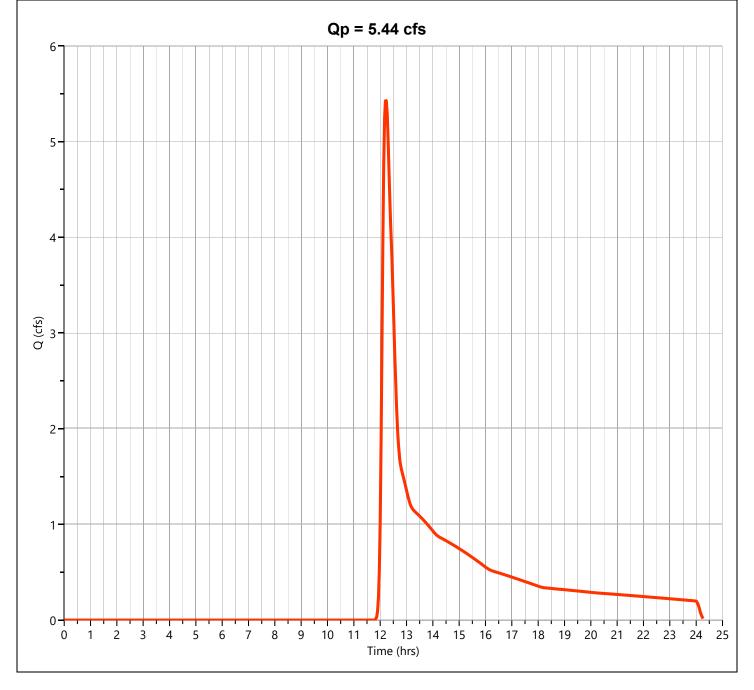
CN (weighted) =	total product	_=	952.10 =	61.67	_;	Use CN =	62
•	total area		15.44				

2. Runoff

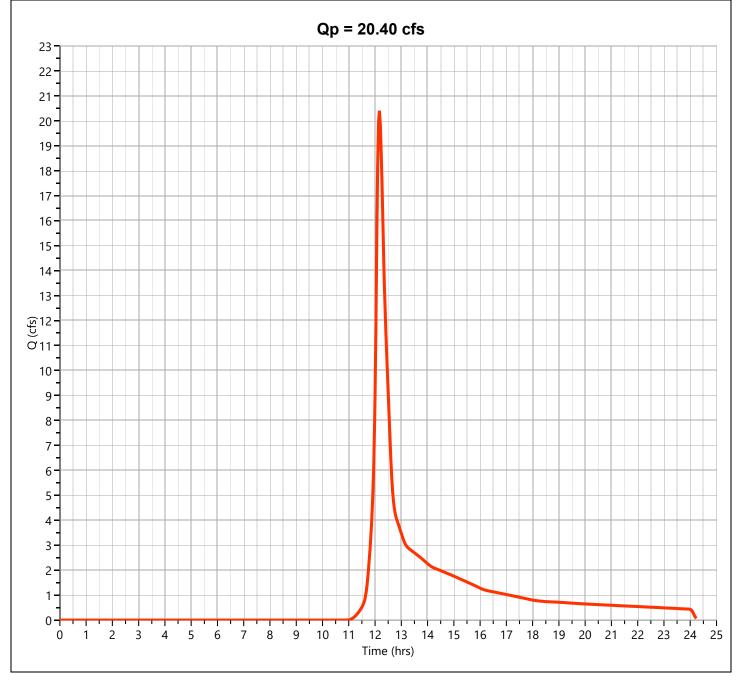
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.50	2.16	3.40

Project: Athens Street		Ву	PFK P		10/13/2022	
				Rev Date	6/17/2023	
Location: Stow, MA		Checked		Date		
Circle one: Present Develo	ned	Subcatchm	ent D-2A3			
Circle one: Tc Tt	through	Gubcateriii	ICHT -ZAS	•		
	subarea			•		
Shoot flow (Applicable to To only)		Commont ID	A D			
Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			WOODS			
, , ,						
2. Mannings roughness coeff., n (table 3-1)			0.6			
		_				
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
4. 1W0-yi 24-iii falifiali, i 2			0.1			
5. Land Slope, s		ft/ft	0.080			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute 7	Γt hr	0.17			0.1
Shallow concentrated Flow		Segment ID	B-C	C-D	D-E	
Shallow concentrated Flow		Segmentib	D-C	C-D	D-E	
7. Surface Description (paved or unpaved)			UNPAVED	UNPAVED	UNPAVED	
8. Flow Length, L		ft	213	146	162	
0. Watanaan alama		£. /£.	0.440	0.000	0.00	
9. Watercourse slope, s		ft/ft	0.110	0.230	0.08	
10. Average Velocity, V (figure 3-1)		ft/s	5.35	7.74	4.56	
3 3, (3 1)						
11. Tt = L / 3600V	Compute 7	Γt hr	0.01	0.01	0.01	0.0
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r					
15. Channel Slope, s	•	ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute \	/ ft/s				
18. Flow length, L	,	ft				
19. Tt = L / 3600V	Compute 7					C
	·					
20. Watershed or subarea Tc or Tt (add Tt ir	n steps 6, 11, ar	nd 19)			hr	
					min	

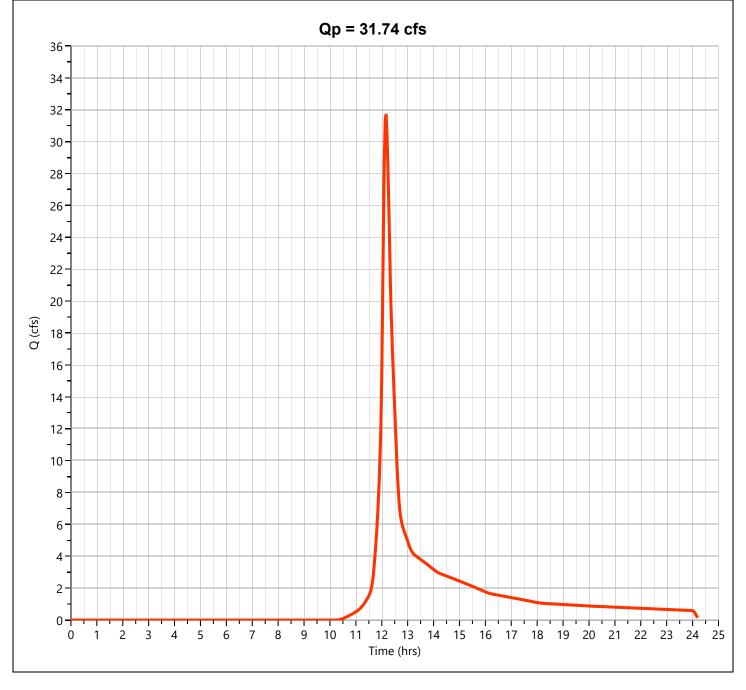
Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.436 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 29,551 cuft
Drainage Area	= 15.44 ac	Curve Number	= 62
Tc Method	= User	Time of Conc. (Tc)	= 11.5 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



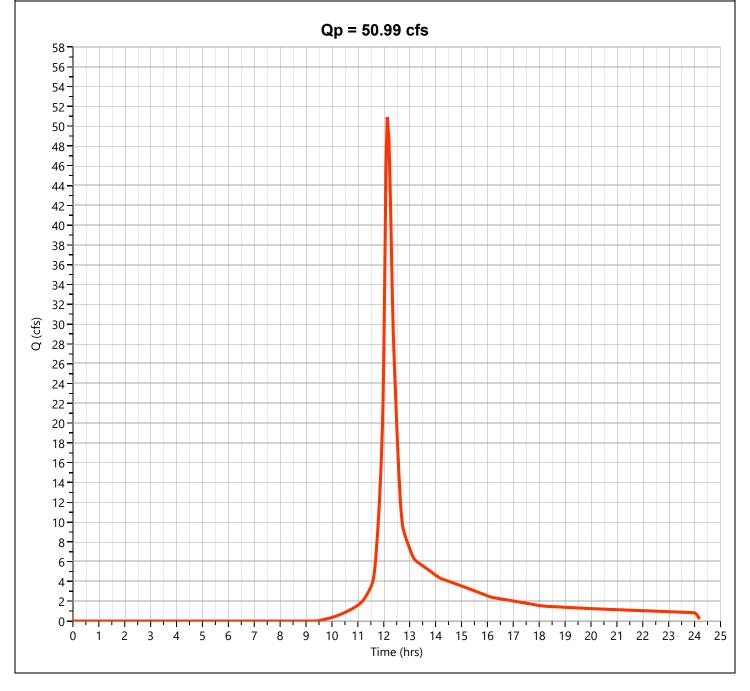
Hydrograph Type	= NRCS Runoff	Peak Flow	= 20.40 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 84,566 cuft
Drainage Area	= 15.44 ac	Curve Number	= 62
Tc Method	= User	Time of Conc. (Tc)	= 11.5 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 31.74 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 126,394 cuft
Drainage Area	= 15.44 ac	Curve Number	= 62
Tc Method	= User	Time of Conc. (Tc)	= 11.5 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 50.99 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 198,423 cuft
Drainage Area	= 15.44 ac	Curve Number	= 62
Tc Method	= User	Time of Conc. (Tc)	= 11.5 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

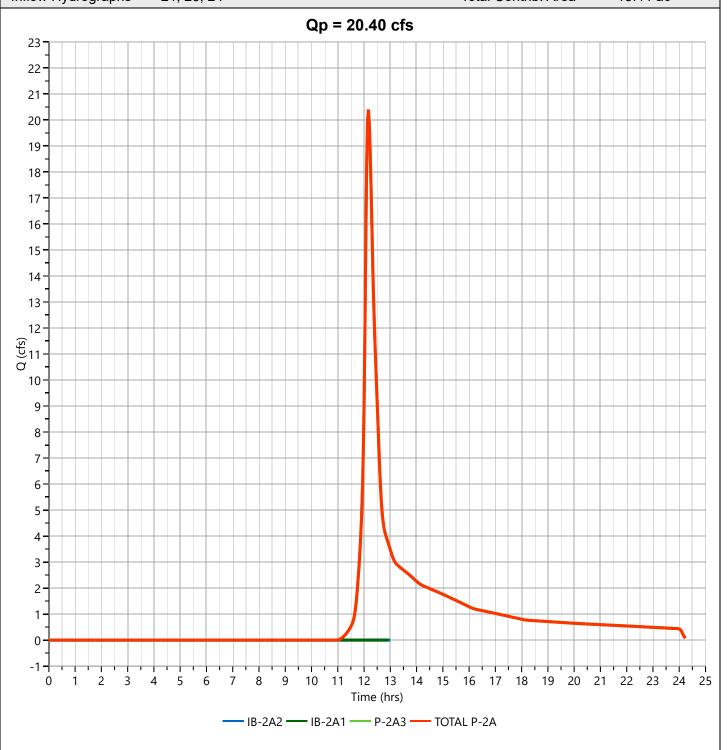


# TOTAL P-2A Hyd. No. 25

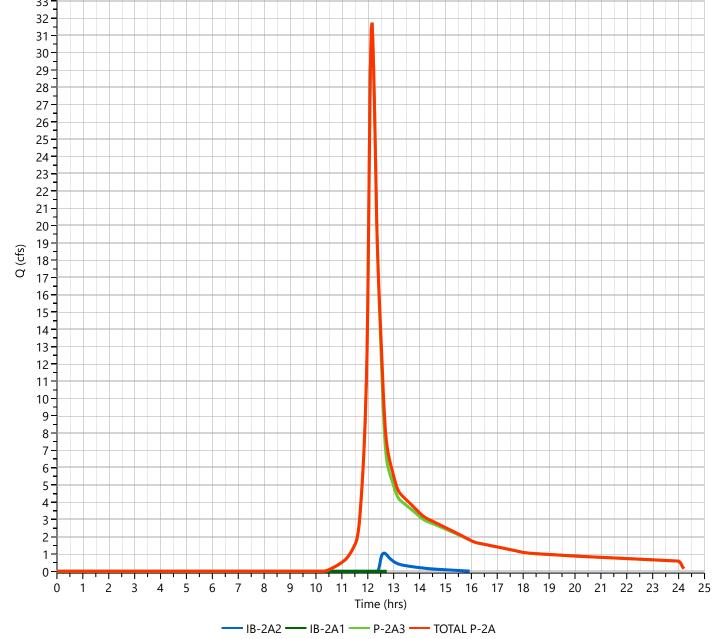
Hydrograph Type	= Junction	Peak Flow	= 5.436 cfs				
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs				
Time Interval	= 2 min	Hydrograph Volume	= 29,551 cuft				
Inflow Hydrographs	= 21, 23, 24	Total Contrib. Area	= 15.44 ac				
	Qp = 5.44 cfs						
6	·						
1							
5							
4							
1							
2							
3-							
Q (cfs)							
σ							
2-							
-							
1 -							
<u> </u>							
0-							
-1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -	4 5 6 7 8 9 10 11 12 13 14	15 16 17 18 19 20	21 22 23 24 25				
	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 Time (hrs)						
	—— IB-2A2 —— IB-2A1 —— P-2A3 —— TOTAL P-2A						

#### TOTAL P-2A Hyd. No. 25

Hydrograph Type	= Junction	Peak Flow	= 20.40 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 84,566 cuft
Inflow Hydrographs	= 21, 23, 24	Total Contrib. Area	= 15.44 ac



TOTAL P-2A				Hyd. No. 25
Hydrograph Type	= Junction		Peak Flow	= 31.74 cfs
Storm Frequency	= 25-yr		Time to Peak	= 12.17 hrs
Time Interval	= 2 min		Hydrograph Volume	= 129,925 cuft
Inflow Hydrographs	= 21, 23, 24		Total Contrib. Area	= 15.44 ac
		Qp = 31.74 cfs		
36				
26				



#### TOTAL P-2A Hyd. No. 25

Hydrograph Type	= Junction	Peak Flow		= 50.99  cfs		
Storm Frequency	= 100-yr	Time to Pea	k	= 12.17 hrs = 214,445 cuft		
Time Interval	= 2 min	Hydrograph	Volume			
nflow Hydrographs	= 21, 23, 24	Total Contrib	o. Area	= 15.44 ac		
	<b>Qp = 50.99</b> c	fs				
58 -						
56						
54 -						
52						
50						
48						
46						
44						
42 -						
40						
38 - 36 -						
34						
32 -						
4						
ŷ 30 <del> </del>						
26						
24 -						
22						
20	<mark>_</mark>					
18						
16						
14 -						
12						
10	<del></del>					
8 -						
6 -						
4	/ / / / / / / / / / / / / / / / / / /					
2 =						
0 1 2 3	4 5 6 7 9 0 10 11 12 13	14 1E 16 17 10	10 20		24	
0 1 2 3	4 5 6 7 8 9 10 11 12 13 Time (hrs	14 15 16 17 18	19 20	L1	<del>-4</del>	

#### Worksheet 2: Runoff curve number and runoff

SM-3719C

Project:	Athens Street	By NC	Date 10/13/22 Rev Date 6/17/2023
Location:	Stow, MA	Checked	Date
Circle one:	Present Developed	Subcatchment P-2B-A	•

#### 1. Runoff curve number (CN)

Soil name and hydrologic	Cover description (cover type, treatment, and		CN 1/		Area	Product of CN x Area
group (appendix A)	hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious	98			0.81	79.21
А	Woods Good Condition	30			0.02	0.52
А	Open Space Good Condition	39			1.25	48.94
А	Open Space Fair Condition	49			0.00	0.00
С	Gravel	89			0.07	5.95
С	Woods Good Condition	70			0.79	55.42
С	Open Space Poor Condition	86			0.00	0.00
С	Open Space Good Condition	74			1.68	124.49
1/ Use only one	CN source per line. 2013	608		Totals =	4.62	314.54

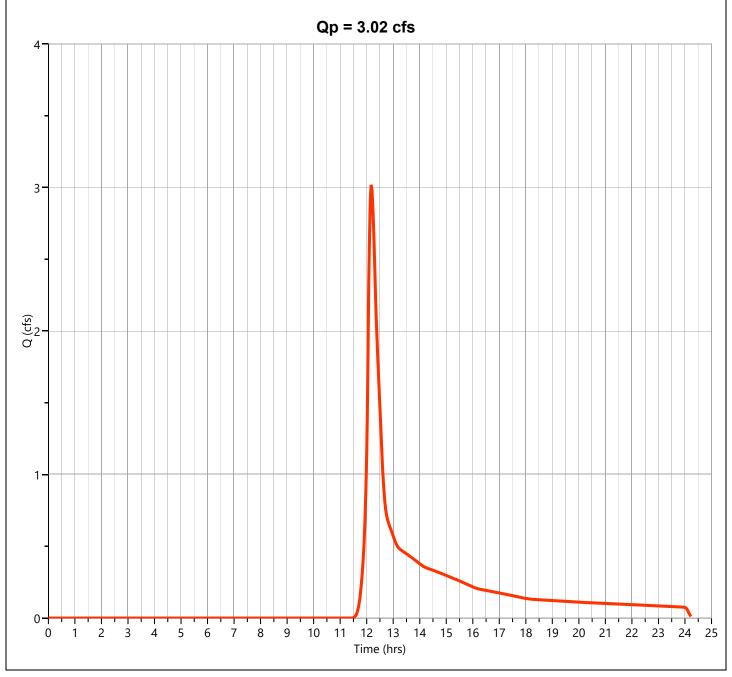
CN (weighted) =	total product	_=	314.54 =	68.06;	Use CN =	68
	total area		4.62			

2. Runoff

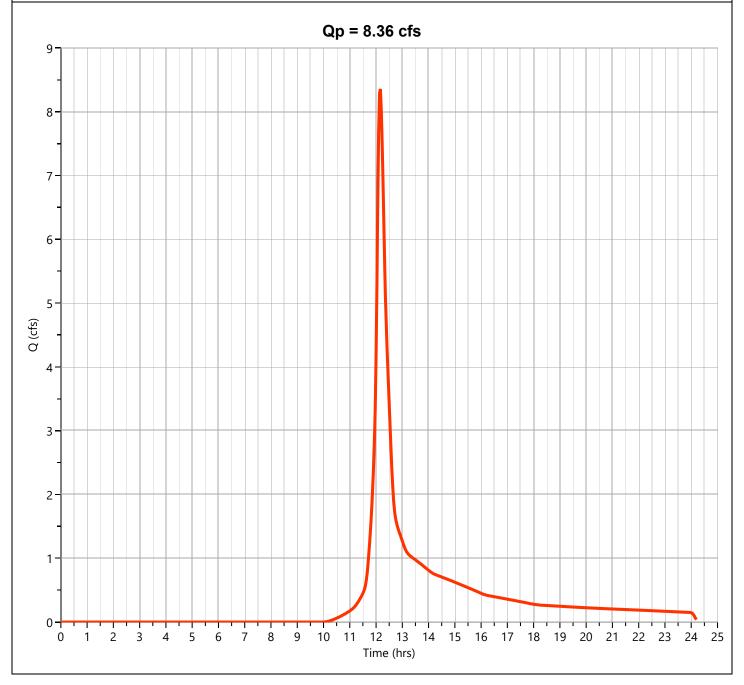
Storm #1 Storm #2 Storm #3

Project: Athens Street	-	Ву	NC NC		10/13/2022	
Location: Stow, MA		Checked		Rev Date Date	6/17/2023	
Circle one: Present Developed  Circle one: Tc Tt	through subarea	Subcatchmo	ent P-2B-A			
Sheet flow (Applicable to Tc only)		Segment ID	А-В			
1. Surface Description (table 3-1)			GRASS			
2. Mannings roughness coeff., n (table 3-1)			0.24			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.010			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute T	t hr	0.18			0.1
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
3. Flow Length, L		ft	275			
9. Watercourse slope, s		ft/ft	0.015			
10. Average Velocity, V (figure 3-1)		ft/s	1.98			
11. Tt = L / 3600V	Compute T	t hr	0.04			0.0
Channel flow		Segment ID				
12. Cross sectional flow area, a 13. Wetted perimeter, pw 14. Hydraulic radius, r=a/wp 15. Channel Slope, s	Compute r	sf ft ft ft/ft				
16. Manning's roughness coeff., n 17. V = 1.49 r^2/3 s^1/2 / n 18. Flow length, L	Compute V	ft				
<ul><li>19. Tt = L / 3600V</li><li>20. Watershed or subarea Tc or Tt (add Tt in ste</li></ul>	Compute T				hr min	0

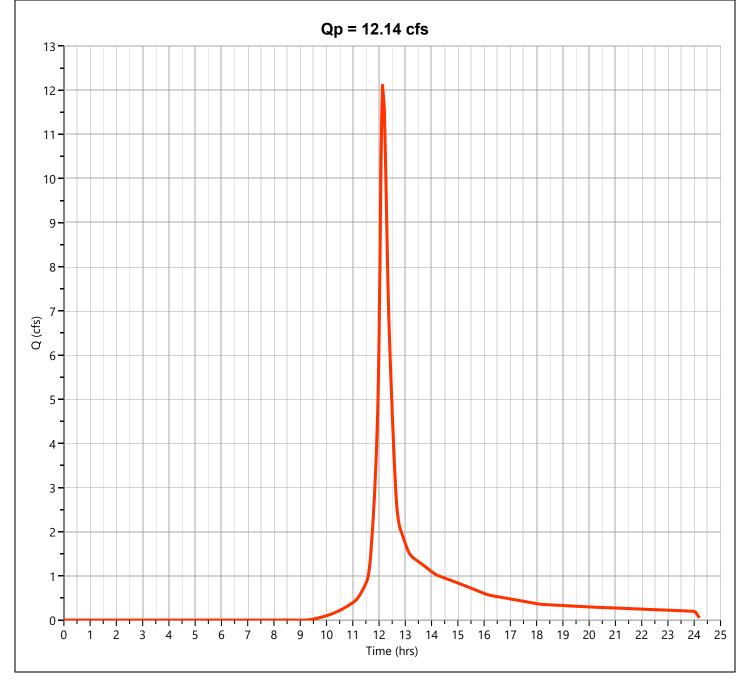
Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.019 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 13,333 cuft
Drainage Area	= 4.62 ac	Curve Number	= 68
Tc Method	= User	Time of Conc. (Tc)	= 13.3 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



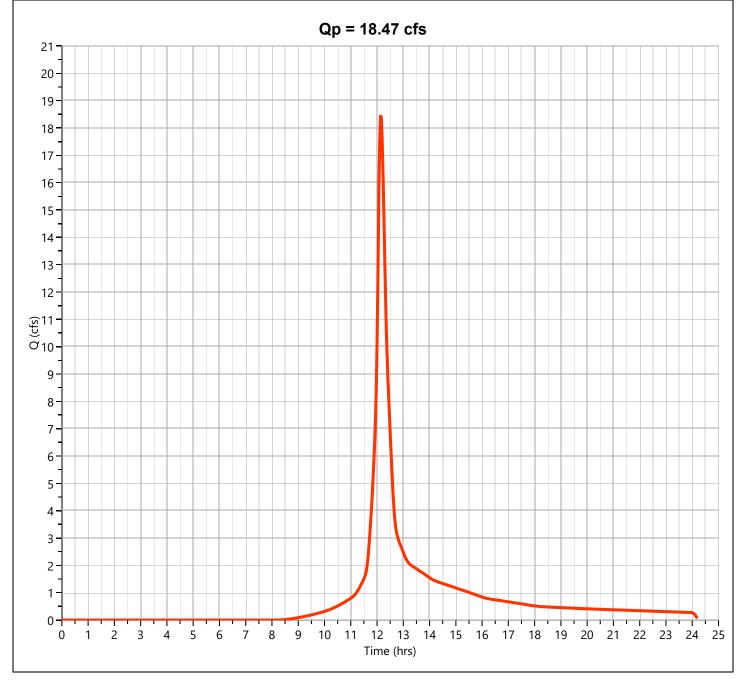
Hydrograph Type	= NRCS Runoff	Peak Flow	= 8.357 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 33,000 cuft
Drainage Area	= 4.62 ac	Curve Number	= 68
Tc Method	= User	Time of Conc. (Tc)	= 13.3 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 12.14 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 47,193 cuft
Drainage Area	= 4.62 ac	Curve Number	= 68
Tc Method	= User	Time of Conc. (Tc)	= 13.3 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



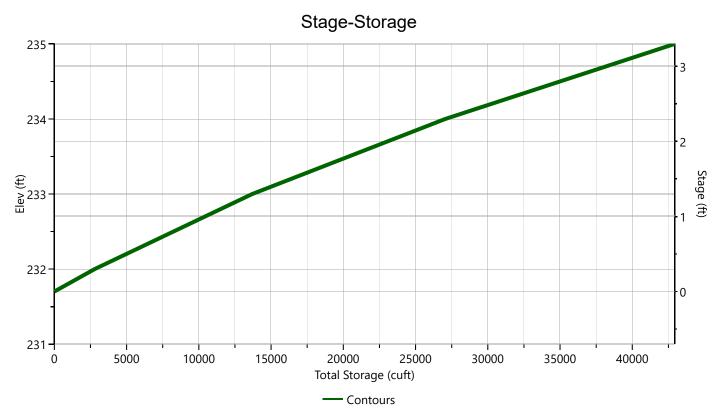
Hydrograph Type	= NRCS Runoff	Peak Flow	= 18.47 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 70,930 cuft
Drainage Area	= 4.62 ac	Curve Number	= 68
Tc Method	= User	Time of Conc. (Tc)	= 13.3 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



#### IB-2B-A

# Stage-Storage

User Defined Contou	rs			Stage / Stora	ge Table	
Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
Bottom Elevation, ft	231.70					
Voids (%)	100.00	0.00	231.70 232.00	8,967 9,686	0.000	0.000 2,798
		1.30	232.00	12,116	2,798 10,901	13,699
Volume Calc	Circular	2.30	234.00	14,605	13,361	27,059
		3.30	235.00	17,149	15,877	42,936
		0.00	200.00	17,110	10,011	12,000

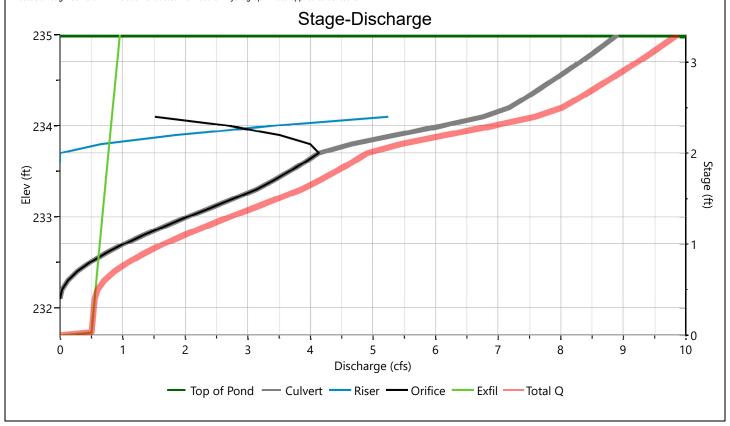


#### IB-2B-A

# Stage-Discharge

Cultivant / Onificas	Cultivant		Orifices		Oution Plate	
Culvert / Orifices	Culvert	1*	2	3	Orifice Plate	
Rise, in	15	15			Orifice Dia, in	
Span, in	15	15			No. Orifices	
No. Barrels	1	1			Invert Elevation, ft	
Invert Elevation, ft	232.10	232.10			Height, ft	
Orifice Coefficient, Co	0.60	0.60			Orifice Coefficient, Co	
Length, ft	60					
Barrel Slope, %	1					
N-Value, n	0.012					
Weirs	Riser*		Weirs		A waillow.	
weirs	Riser	1	2	3	Ancillary	
Shape / Type	Circular				Exfiltration, in/hr	2.41**
Crest Elevation, ft	233.7					
Crest Length, ft	6.28					
Angle, deg						
Weir Coefficient, Cw	3.3					

\*Routes through Culvert. \*\*Exfiltration extracted from outflow hydrograph. Rate applied to contours.

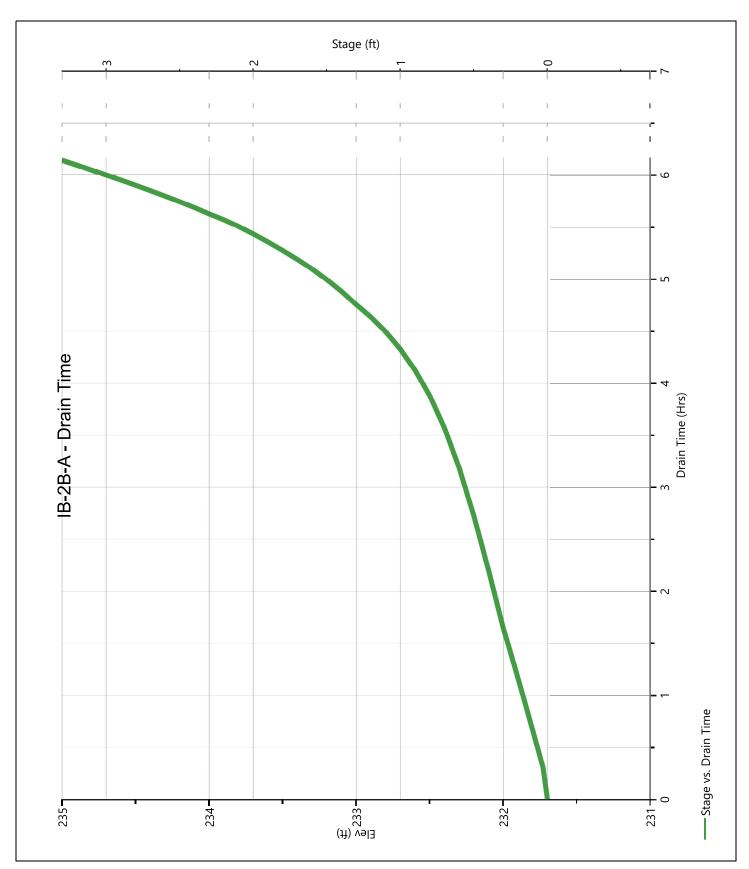


#### IB-2B-A

# **Stage-Storage-Discharge Summary**

Stage	Elev.	Storage	Culvert	(	Orifices, cf	s	Riser		Weirs, cfs	i	Pf Riser	Exfil	User	Total
Stage (ft)	(ft)	(cuft)	(cfs)	1	2	3	(cfs)	1	2	3	(cfs)	(cfs)	(cfs)	(cfs)
0.00	231.70	0.000	0.000	0.000			0.000					0.000		0.000
0.30	232.00	2,798	0.000	0.000			0.000					0.540		0.540
1.30	233.00	13,699	2.041 ic	2.041			0.000					0.676		2.716
2.30	234.00	27,059	6.101 ic	2.696			3.405					0.815		6.916
2.30 3.30	234.00	27,059 42,936	6.101 ic 8.911 ic	2.696			3.405					0.815		6.916 9.868

#### IB-2B-A Pond Drawdown



ydrograph Type	= Pond Route		Peak Flow	= 0.001 cfs
torm Frequency	= 2-yr		Time to Peak	= 13.03 hrs
ime Interval	= 2 min		Hydrograph Volume	= 0.569 cuft
nflow Hydrograph			Max. Elevation	= 232.10 ft
ond Name	= IB-2B-A		Max. Storage	= 3,912 cuft
ond Routing by Storage	Indication Method			
		Qp = 0.00 cfs		
4				
3				
3				
				$ \Lambda $
2				
_				
1				
-				
				<i>]</i>
0				
0 1	2 3 4 5	6 7 8 Time (hrs)	9 10 11	12 13
		— P-2B-A — IB-2B-A		

lydrograph Type	= Pond Route	Peak Flow	= 1.320 cfs
torm Frequency	= 10-yr	Time to Peak	= 12.67 hrs
ime Interval	= 2 min	Hydrograph Volume	= 9,693 cuft
nflow Hydrograph	= 27 - P-2B-A	Max. Elevation	= 232.80 ft
ond Name	= IB-2B-A	Max. Storage	= 11,480 cuft
ond Routing by Storage In	dication Method		
	Qp = 1.32 cfs		
9	-		
-			
8			
_			
7 -			
/ ]			
1			
6			
5			
g 4-			
-			
3			
-			
2			
1 -			
1			
0			
-			
-1-			
0 1 2	3 4 5 6 7 8 9 10	11 12 13 14 15	16 17 18
	Time (hrs)		

Hydrograph Type	= Pond Route	Peak Flow	= 2.737 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.60 hrs
īme Interval	= 2 min	Hydrograph Volume	= 19,907 cuft
nflow Hydrograph	= 27 - P-2B-A	Max. Elevation	= 233.19 ft
Pond Name	= IB-2B-A	Max. Storage	= 16,227 cuft
Pond Routing by Storage Ind	dication Method		
		Qp = 2.74 cfs	
13			
12 -			
-			
11			
10			
10			
9			
-			
8			
7			
(G) 6 d			
1			
5			
4			
-			
3			
2			
_			
1			
0			
-1			
0 1 2	3 4 5 6 7 8	3 9 10 11 12 13 14 15 16 Time (hrs)	17 18 19
		- P-2B-A IB-2B-A	

#### IB-2B-A Hyd. No. 30

lydrograph Type	= Pond Route	Peak Flow	= 4.891 cfs
orm Frequency	= 100-yr	Time to Peak	= 12.57 hrs
me Interval	= 2 min	Hydrograph Volume	= 38,402 cuft
flow Hydrograph	= 27 - P-2B-A	Max. Elevation	= 233.84 ft
ond Name	= IB-2B-A	Max. Storage	= 24,838 cuft
and Routing by Storage Ind	dication Method		
	Q	ρ = 4.89 cfs	
21		•	
20			
19			
18			
17			
16			
-			
15			
14 -			
13 -			
12			
<u> </u>			
211- 210-			
9 -			
8			
7			
6			
+			
5 -			
4			
3			
2 -			
1 -			
0 1 2	3 4 5 6 7 8	9 10 11 12 13 14 15 16 17	

— P-2B-A — IB-2B-A

Project:	Athens Street	ByPFK	Date 6/21/22
			Rev Date 10/13/2022
Location:	Stow, MA	Checked	Date 6/17/2023
Circle one:	Present Developed	Subcatchment P-5D	

1. Runoff curve number (CN)

Soil name and hydrologic	Cover description (cover type, treatment, and		CN 1/		Area	Product of CN x Area
group (appendix A)	hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious	98			1.05	103.12
Α	Woods Good Condition	30			0.00	0.00
Α	Open Space Good Condition	39			0.28	10.87
Α	Open Space Fair Condition	49			0.00	0.00
Α	Gravel	76			0.00	0.00
С	Woods Good Condition	70			0.00	0.00
С	Open Space Poor Condition	86			0.00	0.00
С	Open Space Good Condition	70			0.87	61.06
D	Open Space Good Condition	80			0.00	0.00
1/ Use only one	CN source per line. 95975	5		Totals =	2.20	175.05

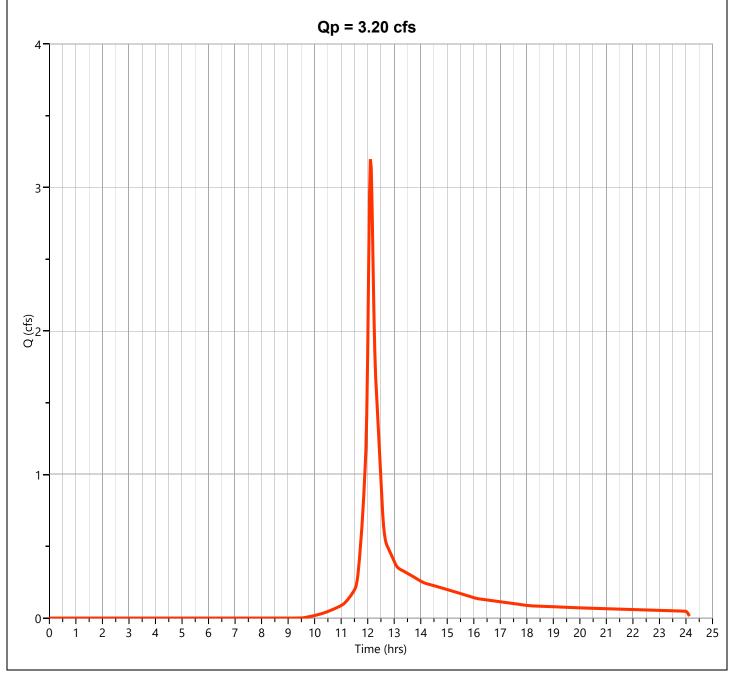
CN (weighted) =	total product	_=	175.05	=	; Use CN =	79
	total area	_	2.20			

2. Runoff

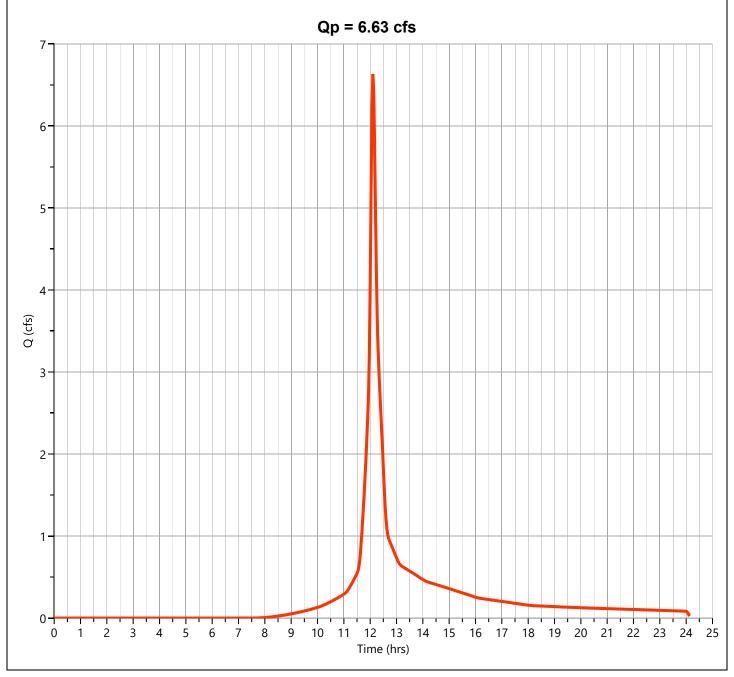
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
1.42	3.85	5.41

Project: Athens Street		Ву	<u>PFK</u>	Date	
Lagations Story MA		Ch a also d			10/13/2022
Location: Stow, MA		Checked		Date	e 6/17/2023
Circle one: Present Develop	ed	Subcatchn	nent P-5D		
Circle one: Tc Tt	through				
	subarea				
Sheet flow (Applicable to Tc only)		Segment ID	A-B		
Surface Description (table 3-1)			WOODS		
2. Mannings roughness coeff., n (table 3-1)			0.6		
z. manninge reagrinese eeem, ii (table e 1)			0.0		
3. Flow length, L (total L <= 300 ft)		ft	20		
			0.1		
4. Two-yr 24-hr rainfall, P2		in	3.1		
5. Land Slope, s		ft/ft	0.070		
		. 4. 1	0.010		
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute 7	Tt hr	0.08		
0		0 410	D 0	0.0	_
Shallow concentrated Flow		Segment ID	B-C	C-D	
7. Surface Description (paved or unpaved)			UNPAVED	PAVED	
8. Flow Length, L		ft	47	489	
O Watereauree alone a		ft/ft	0.150	0.07	
9. Watercourse slope, s		II/II	0.150	0.07	
10. Average Velocity, V (figure 3-1)		ft/s	6.25	5.38	
11. Tt = L / 3600V	Compute 7	Tt hr	0.00	0.03	
Channal flow		Commont ID			
Channel flow		Segment ID			
12. Cross sectional flow area, a		sf			
13. Wetted perimeter, pw		ft			
14. Hydraulic radius, r=a/wp	Compute r	ft			
15. Channel Slope, s		ft/ft			
16. Manning's roughness coeff., n		/ #/o			
	Compute \	/ 11/5			
16. Manning's roughness coeff., n 17. V = 1.49 r^2/3 s^1/2 / n 18. Flow length, L	Compute \	ft			

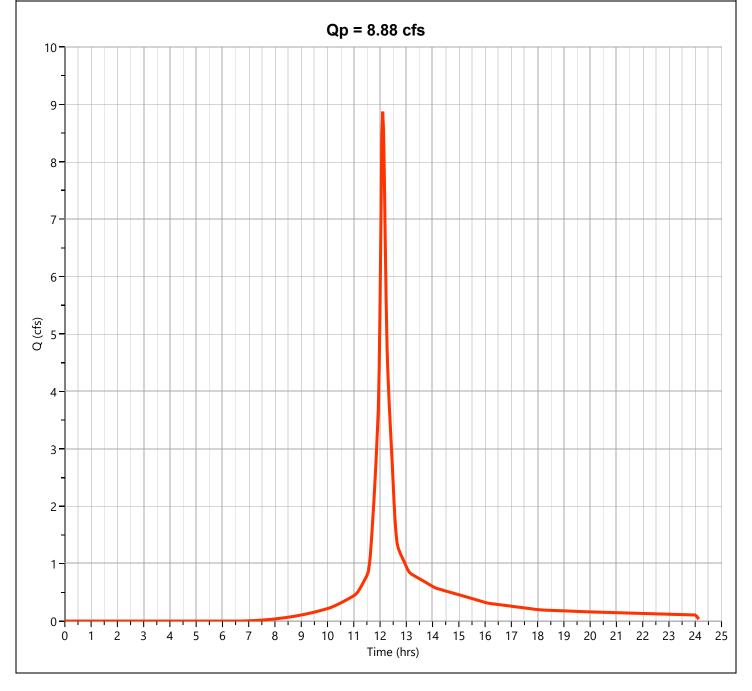
Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.197 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 11,097 cuft
Drainage Area	= 2.2 ac	Curve Number	= 79
Tc Method	= User	Time of Conc. (Tc)	= 6.7 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



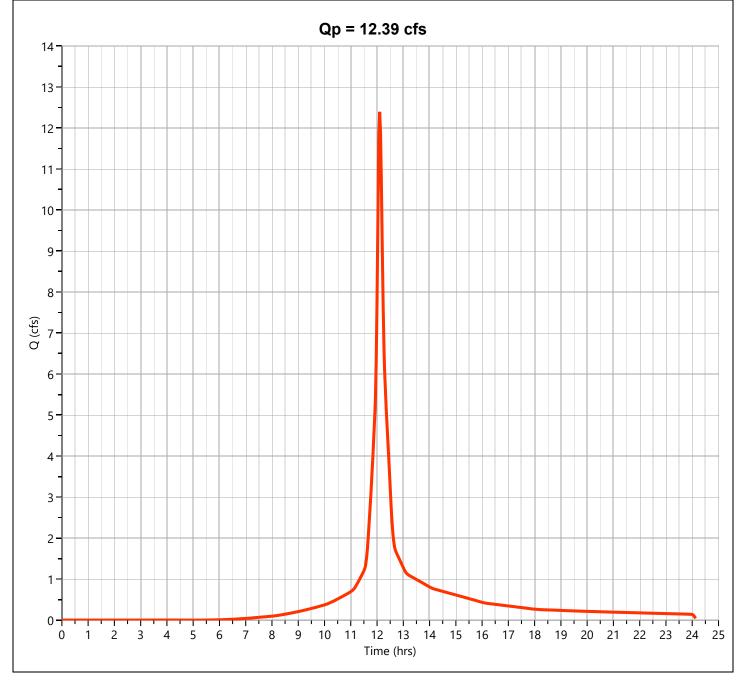
Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.634 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 22,649 cuft
Drainage Area	= 2.2 ac	Curve Number	= 79
Tc Method	= User	Time of Conc. (Tc)	= 6.7 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



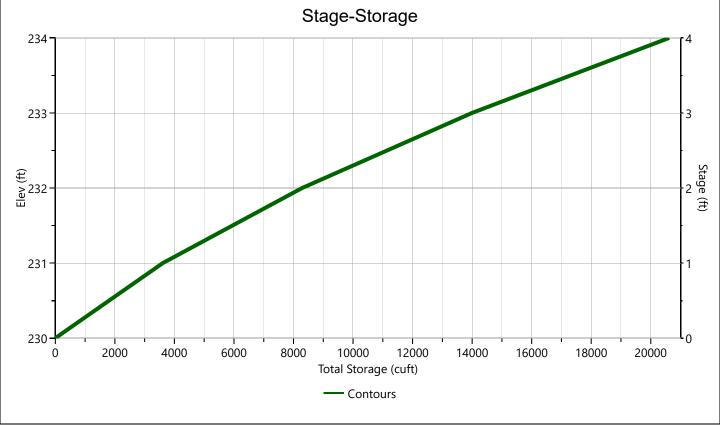
Hydrograph Type	= NRCS Runoff	Peak Flow	= 8.876 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 30,386 cuft
Drainage Area	= 2.2 ac	Curve Number	= 79
Tc Method	= User	Time of Conc. (Tc)	= 6.7 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 12.39 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 42,798 cuft
Drainage Area	= 2.2 ac	Curve Number	= 79
Tc Method	= User	Time of Conc. (Tc)	= 6.7 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



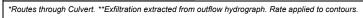
User Defined Contours			Stage / Storage Table					
Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)		
Bottom Elevation, ft	230.00							
Voids (%)	100.00	0.00 1.00	230.00 231.00	3,129 4,097	0.000 3,613	0.000 3,613		
Volume Calc	Ave End Area	2.00	231.00	5,259	4,678	8,291		
volume Calc	Ave End Area	3.00	233.00	6,149	5,704	13,995		
		4.00	234.00	7,097	6,623	20,618		
		-						
			_		I	•		
	5	Stage-S	Storage					
34 7						4		

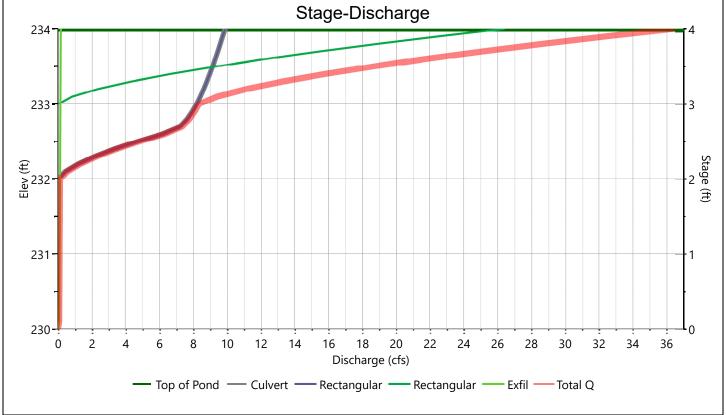


#### IB-5D

# Stage-Discharge

Culvert / Orifices	Culvent		Orifices		Doufounted Die			
Culvert / Orifices	Culvert	1	2	3	Perforated Ris	er		
Rise, in	15				Hole Diameter, in			
Span, in	15				No. holes			
No. Barrels	1				Invert Elevation, ft			
Invert Elevation, ft	230.00				Height, ft			
Orifice Coefficient, Co	0.60				Orifice Coefficient, Co			
Length, ft	111							
Barrel Slope, %	.9							
N-Value, n	0.012							
Maine	Riser*	Weirs		Weirs			Amaillam	
Weirs	KISEI"	1*	2	3	Ancillary			
Shape / Type	Circular	Rectangular	Rectangular		Exfiltration, in/hr	1.02**		
Crest Elevation, ft		232	233					
Crest Length, ft		4	8					
Angle, deg								
Weir Coefficient, Cw		3.3	3.3					





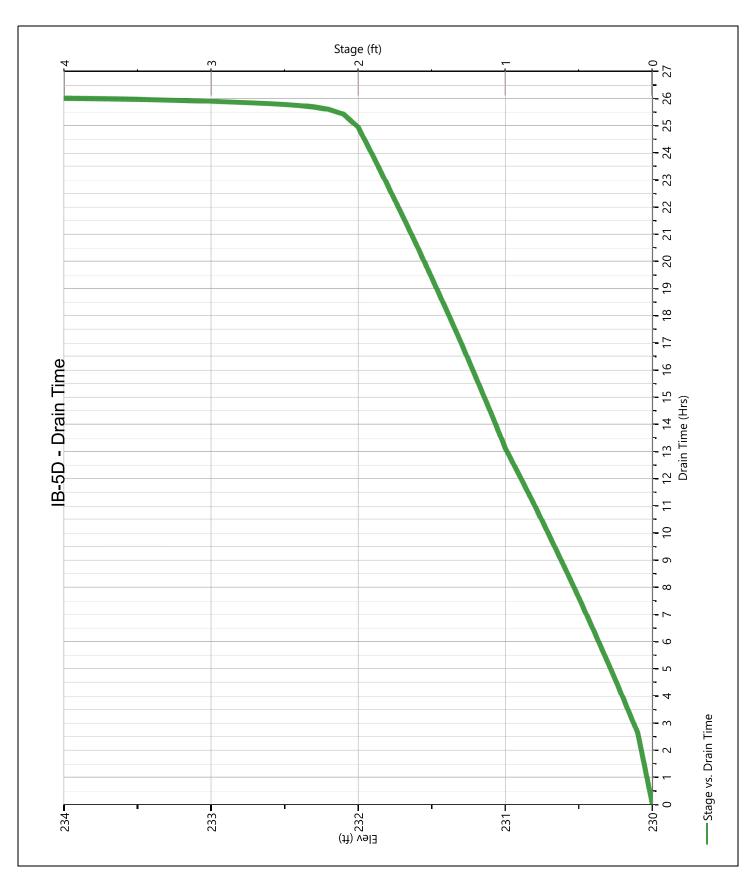
#### IB-5D

# **Stage-Storage-Discharge Summary**

Stage	Elev.	Storage	Culvert	C	Orifices, cf	s	Riser		Weirs, cfs	1	Pf Riser	Exfil	User	Total
(ft)	(ft)	(cuft)	(cfs)	1	2	3	(cfs)	1	2	3	(cfs)	(cfs)	(cfs)	(cfs)
0.00	230.00	0.000	0.000					0.000	0.000			0.000		0.000
1.00	231.00	3,613	0.000					0.000	0.000			0.097		0.097
2.00	232.00	8,291	0.000					0.000	0.000			0.124		0.124
3.00	233.00	13,995	8.191 oc					8.191 s	0.000			0.145		8.336
3.00	233.00	13,995 20,618	8.191 oc 9.884 oc					8.191 s 9.884 s	0.000			0.145		8.336

#### IB-5D

#### **Pond Drawdown**



Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 16.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.002 cuft
Inflow Hydrograph	= 28 - P-5D	Max. Elevation	= 231.73 ft
Pond Name	= IB-5D	Max. Storage	= 7,020 cuft
Pond Routing by Storage Inc	ication Method	Center of mas.	s detention time = 4.16 hrs
	Qp = 0.00 cfs		
4			
4			
3-			
3			
1			
2			
Q (cfs)			
ă ]			
1			
-			
0			
U I			
†			
-1 -1 -1 -1 -1	4 5 6 7 8 9 10 11 12 13	14 15 16 17 19	19 20 21 3
0 1 2 3	Time (hrs)	1 1 U U I/ 10	19 20 21 2
	— P-5D — IB-5D		

ydrograph Type	= Pond Route	Peak Flow	= 1.926 cfs
torm Frequency	= 10-yr	Time to Peak	= 12.47 hrs
me Interval	= 2 min	Hydrograph Volume	= 8,511 cuft
flow Hydrograpl	= 28 - P-5D	Max. Elevation	= 232.28 ft
ond Name	= IB-5D	Max. Storage	= 9,862 cuft
nd Routing by Storage	Indication Method	Center of m	nass detention time = 2 n
	Qp = 1.93 cfs		
7			
-			
6			
5			
4			
4			
4			
-			
3			
ý 3			
-			
2			
-			
1 -			
-			
0			
1			
-1			
0 1 2	3 4 5 6 7 8 9 10 11	12 13 14 15 16	17 18 19
	Time (hrs) —— P-5D —— IB-5D		

	Peak Flow	= 4.544 cfs
= 25-yr	Time to Peak	= 12.27 hrs
= 2 min	Hydrograph Volume	= 15,726 cuft
= 28 - P-5D	Max. Elevation	= 232.49 ft
= IB-5D	Max. Storage	= 11,090 cuft
dication Method		
Qp = 4.54 cfs		
<del></del>		
<del></del>		
3 4 5 6 7 8 9 10 11 12 Time (hrs)	13 14 15 16 17 18	19 20 21
	= 2 min = 28 - P-5D = IB-5D dication Method  Qp = 4.54 cfs	= 2 min

lydrograph Type	= Pond Route	Peak Flow	= 7.861 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
īme Interval	= 2 min	Hydrograph Volume	= 27,675 cuft
nflow Hydrograph	= 28 - P-5D	Max. Elevation	= 232.88 ft
ond Name	= IB-5D	Max. Storage	= 13,291 cuft
ond Routing by Storage Ind	dication Method	Center of m	nass detention time = 2 m
	Qp = 7.86 cfs		
14			
13			
12			
11-			
'' -			
10			
-			
9			
8			
-			
7-			
6			
-			
5			
4			
-			
3			
2			
-			
1 -			
-			
0-			
-1-			
0 1 2 3	4 5 6 7 8 9 10 11 12 13 Time (hrs)	14 15 16 17 18 19 2	20 21 22 23
	— P-5D — IB-5D		

#### Worksheet 2: Runoff curve number and runoff

SM-3719C

Project:	Athens Street		Ву	NC	Date	10/13/22
					Rev Date	6/17/2023
Location:	Stow, MA		Checked		Date	
Circle one:	Present	Developed	Subcatchme	nt P-2B-B	•	

1. Runoff curve number (CN)

Soil name and hydrologic	Cov (cover type, treatmen	er description nt, and	CN 1/			Area	Product of CN x Area
group (appendix A)	perco unconnected	ologic condition: ent impervious: //connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious		98			0.00	0.00
Α	Woods Good Co	ndition	30			8.99	269.58
Α	Open Space Good Co	ndition	39			2.67	104.19
Α	Open Space Fair Cor	ndition	49			0.00	0.00
Α	Woods-Grass Combination Good Co	ndition	32			0.00	0.00
Α	Gravel		76			0.03	2.16
В	Woods Good Co	ndition	55			0.00	0.00
В	Open Space Good Co	ndition	61			0.00	0.00
С	Gravel		89			0.01	1.32
С	Woods Good Co	ndition	70			0.85	59.22
С	Open Space Fair Cor	ndition	79			0.00	0.00
С	Open Space Good Co	ndition	74			0.52	38.84
С	Gravel		89			0.00	0.00
D	BVW		77			4.14	318.78
1/ Use only one	: CN source per line.	930080			Totals =	17.21	794.09

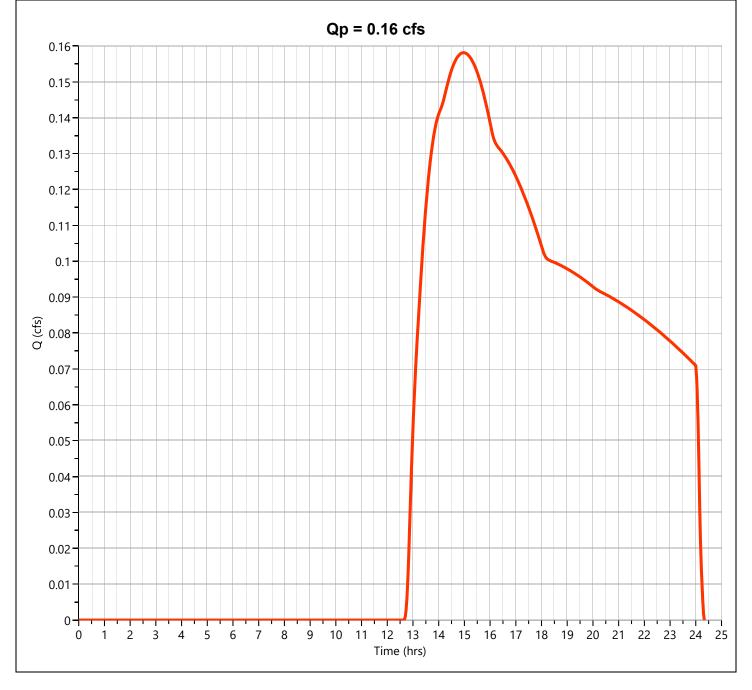
CN (weighted) =	total product	=	794.09 =	46.14	;	Use CN =	46
	total area		17.21		-		

2. Runoff

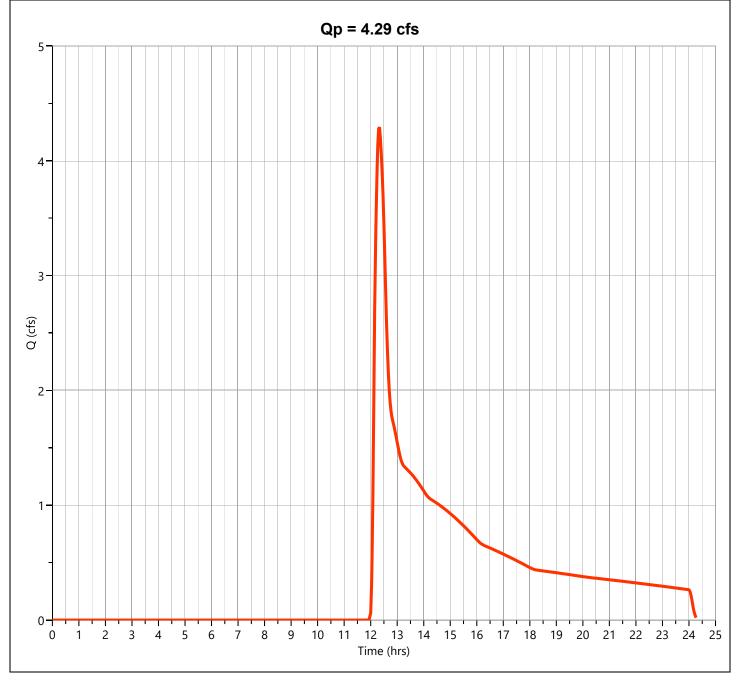
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84

Project: Athens Street	_	Ву	NC NC		10/13/2022	
Location: Stow, MA		Checked		Rev Date Date		
Circle one: Present Developed		Subcatchme				
Circle one: Tc Tt	through subarea					
Sheet flow (Applicable to Tc only)		Segment ID	А-В			
1. Surface Description (table 3-1)			WOODS			
2. Mannings roughness coeff., n (table 3-1)			0.6			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.094			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute T	t hr	0.16			0.
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
3. Flow Length, L		ft	653			
9. Watercourse slope, s		ft/ft	0.110			
10. Average Velocity, V (figure 3-1)		ft/s	5.35			
11. Tt = L / 3600V	Compute T	t hr	0.03			0.
Channel flow		Segment ID				
12. Cross sectional flow area, a 13. Wetted perimeter, pw		sf ft				
<ul><li>14. Hydraulic radius, r=a/wp</li><li>15. Channel Slope, s</li><li>16. Manning's roughness coeff., n</li></ul>	Compute r	ft ft/ft				
17. V = 1.49 r^2/3 s^1/2 / n	Compute V					
18. Flow length, L 19. Tt = L / 3600V	Compute T	ft t hr				
20. Watershed or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	d 19)			hr min	

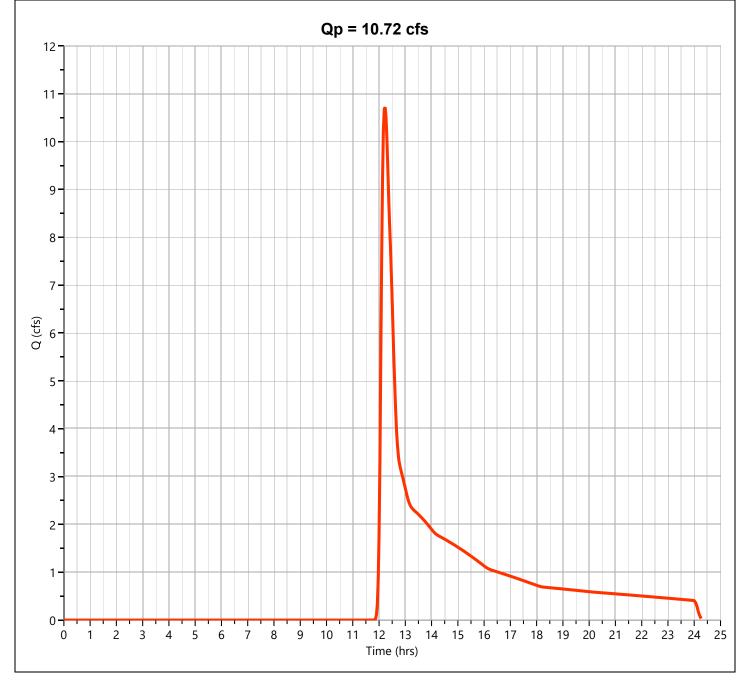
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.158 cfs
Storm Frequency	= 2-yr	Time to Peak	= 14.97 hrs
Time Interval	= 2 min	Runoff Volume	= 4,327 cuft
Drainage Area	= 17.21 ac	Curve Number	= 46
Tc Method	= User	Time of Conc. (Tc)	= 11.4 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



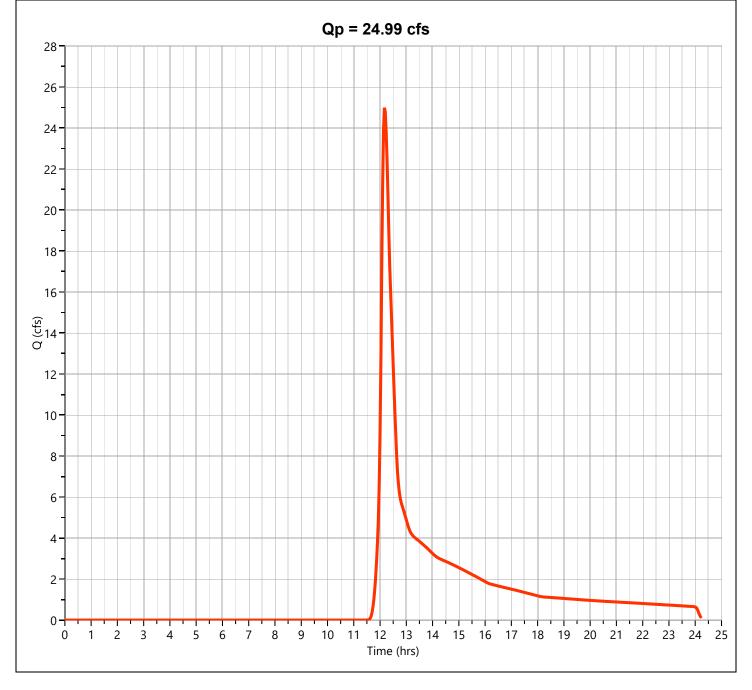
Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.292 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Runoff Volume	= 32,355 cuft
Drainage Area	= 17.21 ac	Curve Number	= 46
Tc Method	= User	Time of Conc. (Tc)	= 11.4 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 10.72 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 59,648 cuft
Drainage Area	= 17.21 ac	Curve Number	= 46
Tc Method	= User	Time of Conc. (Tc)	= 11.4 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 24.99 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 112,777 cuft
Drainage Area	= 17.21 ac	Curve Number	= 46
Tc Method	= User	Time of Conc. (Tc)	= 11.4 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Inflow Hydrographs	= 29, 30, 31	Total Contrib. Ar <b>Qp = 0.16 cfs</b>	rea = 17.21 ac
Time Interval	= 2 min	Hydrograph Vol	ume = 4,328 cuft
Storm Frequency	= 2-yr	Time to Peak	= 14.97 hrs
Hydrograph Type	= Junction	Peak Flow	= 0.158 cfs



Hydrograph Type	= Junction	Peak Flow	= 6.856 cfs	
Storm Frequency	= 10-yr	Time to Peak	= 12.43 hrs	
Time Interval	= 2 min	Hydrograph Volume	= 50,559 cuft	
Inflow Hydrographs	= 29, 30, 31	Total Contrib. Area	= 17.21 ac	
	Qp = 6.86 cfs			
7 7				
7				
6-	<b>_</b>			
-				
5				
-	<b></b>			
	-			
4				
-				
[s]				
0 (cfs) 3				
_				
2				
_				
1 -				
0-	<del></del>		<u> </u>	
-1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -				
0 1 2 3	4 5 6 7 8 9 10 11 12 13 14 15	16 17 18 19 20	21 22 23 24 25	
	Time (hrs)	2P Total		
	—— IB-5D —— IB-2B-A —— P-2B-B —— P-	-ZD IOldi		

lydrograph Type	= Junction	Peak Flow	= 16.79 cfs	
Storm Frequency	= 25-yr	Time to Peak	= 12.27 hrs	
ïme Interval	= 2 min	Hydrograph Volume	= 95,281 cuft	
nflow Hydrographs	= 29, 30, 31	Total Contrib. Area	= 17.21 ac	
10	Qp = 16.79 cfs			
19 -				
18				
17				
16				
15 -				
-				
14 -	<u> </u>			
13				
12				
11 -				
10				
9 1				
8-				
7				
6				
-				
5 -				
4 -	The state of the s			
3				
2				
1 -				
-				
0				
	4 5 6 7 8 9 10 11 12 13 14			

Hydrograph Type	= Junction	Peak Flow	= 35.76 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Γime Interval	= 2 min	Hydrograph Volume	= 178,854 cuft
nflow Hydrographs	= 29, 30, 31	Total Contrib. Area	= 17.21 ac
	Qp = 35.76 cfs		
40			
38 -			
36			
-			
34			
32 -			
30			
28			
26	<del></del>		
24	<u> </u>		
22	<mark> </mark>		
<del>(§</del> 20 − − − − − − − − − − − − − − − − − −			
18			
-			
16 -			
14 -			
12			
10			
8			
6			
4 -			
2			
0			
0 1 2 3	4 5 6 7 8 9 10 11 12 13 1. Time (hrs)	4 15 16 17 18 19 20	21 22 23 24
	—— IB-5D —— IB-2B-A —— P-2B-B —	D 2P Total	

SM-3719C
----------

Project:	Athens Street	By PFK	Date	6/21/22
			Rev Date	10/13/2022
Location:	Stow, MA	Checked	Date	6/17/2023
Circle one:	Present Developed	Subcatchment P-3	BA_	

1. Runoff curve number (CN)

Soil name and hydrologic	Cover description  (cover type, treatment, and	CN 1/			Area	Product of CN x Area
group (appendix A)	hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious	98			0.42	41.12
Α	Woods Good Condition	30			0.00	0.00
Α	Open Space Good Condition	39			0.00	0.00
Α	Brush Fair	35			0.00	0.00
Α	Gravel	76			0.00	0.00
С	Woods Good Condition	70			0.00	0.00
С	Open Space Good Condition	74			0.67	49.33
С	Gravel	89			0.00	0.00
1/ Use only one	e CN source per line. 473	17		Totals =	1.09	90.45

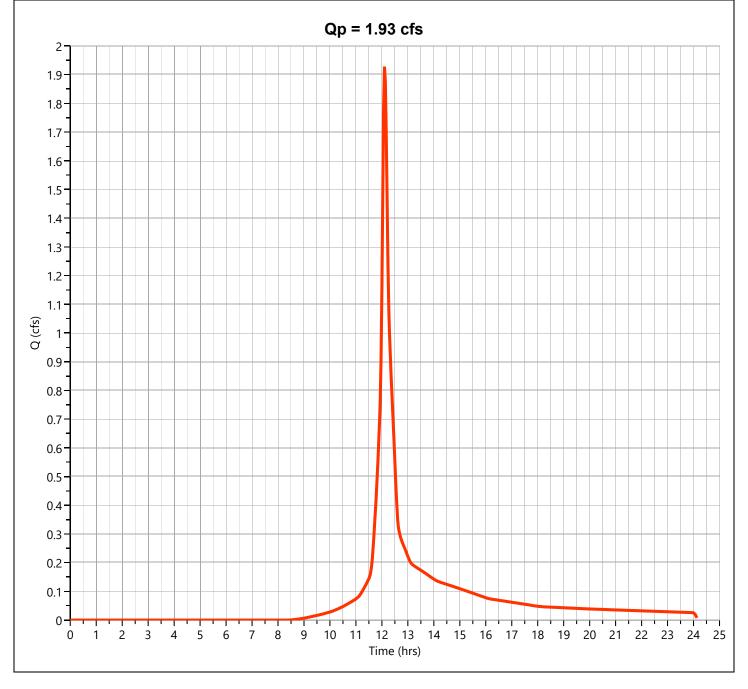
CN (weighted) =	total product	=	90.45 =	83.27	;	Use CN =	83
	total area		1.09				

2	Runoff
۷.	Rulloll

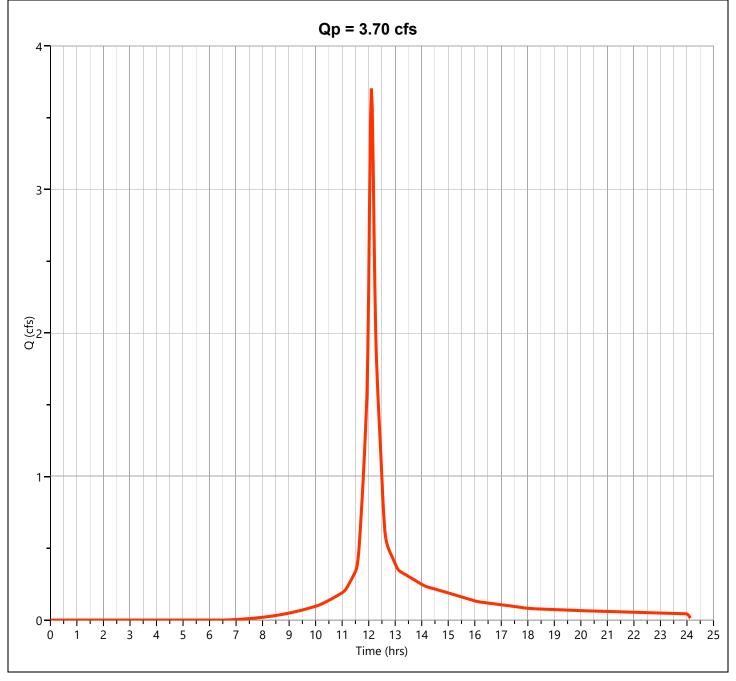
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
1.69	4.25	5.86

Project: Athens Street	_	Ву	PFK		6/21/2022	
					10/13/2022	
Location: Stow, MA	-	Checked		Date	6/17/2023	
Circle one: Present Developed	1	Subcatchm	nent P-3A			
Circle one: Tc Tt	through	Cubcutoriii	IOTICT OF			
	subarea					
O						
Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			GRASS			
1. Surface Description (table 3-1)			GIVAGG			
2. Mannings roughness coeff., n (table 3-1)			0.24			
a			V			
3. Flow length, L (total L <= 300 ft)		ft	50			
,						
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.030			
0.7: 0.007 ( 1.)40.0 ( (7.040.7 40.4)			0.40			0.40
6. Tt = $0.007 (nL)^0.8 / (P2^0.5 s^0.4)$	Compute T	t hr	0.12			0.12
Challey, and contrated Flave		Commont ID	D.C	C D		
Shallow concentrated Flow		Segment ID	B-C	C-D		
7. Surface Description (paved or unpaved)			UNPAVED	PAVED		
7. Gariage Description (paved of anpaved)			ON AVED	TAVED		
8. Flow Length, L		ft	78	259		
••••••••••••••••••••••••••••••••••••••						
9. Watercourse slope, s		ft/ft	0.050	0.070		
10. Average Velocity, V (figure 3-1)		ft/s	3.61	5.38		
11. Tt = L / 3600V	Compute T	t hr	0.01	0.01		0.02
Charact flavo		Cammant ID				
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	- <del>-</del>				
15. Channel Slope, s	Computer	ft/ft				
16. Manning's roughness coeff., n		1011				
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/e				
18. Flow length, L	Joinpule V	ft				
19. Tt = L / 3600V	Compute T					0
13. II - L / 3000 V	Compute 1	LIII				U
20. Watershed or subarea Tc or Tt (add Tt in ste	ns 6 11 an	1 19)			hr	0.14
20. Watershed or subarea 10 or 11 (add 11 III Ste	ρο υ, τι, απ	4 1 <i>3)</i>			min	8.2
						0.2

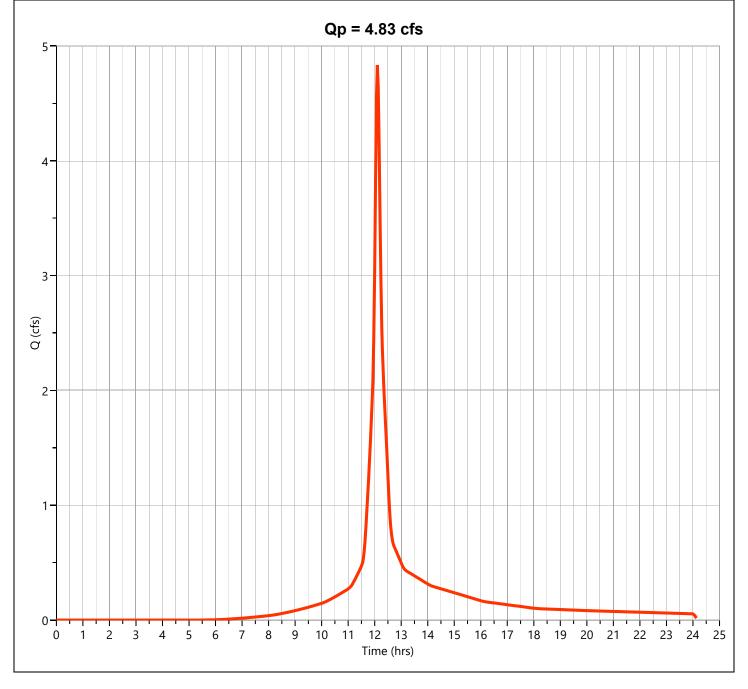
Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.928 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 6,595 cuft
Drainage Area	= 1.09 ac	Curve Number	= 83
Tc Method	= User	Time of Conc. (Tc)	= 8.2 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



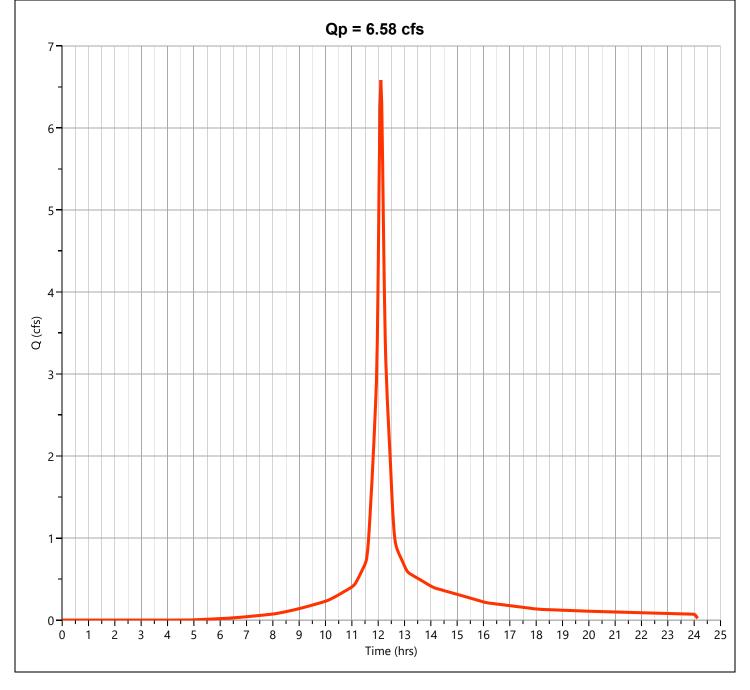
Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.704 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 12,702 cuft
Drainage Area	= 1.09 ac	Curve Number	= 83
Tc Method	= User	Time of Conc. (Tc)	= 8.2 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.833 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 16,703 cuft
Drainage Area	= 1.09 ac	Curve Number	= 83
Tc Method	= User	Time of Conc. (Tc)	= 8.2 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

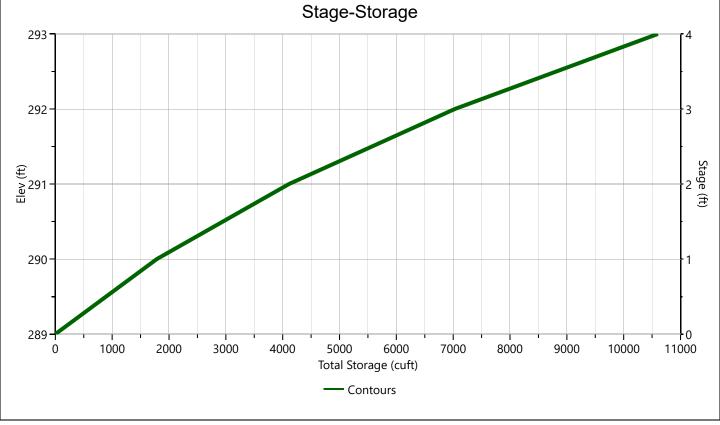


Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.583 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 23,047 cuft
Drainage Area	= 1.09 ac	Curve Number	= 83
Tc Method	= User	Time of Conc. (Tc)	= 8.2 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



#### IB-3A Stage-Storage

User Defined Conto	urs	Stage / Storage Table							
Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)			
Bottom Elevation, ft	289.00								
Voids (%)	100.00	0.00 1.00	289.00 290.00	1,532 2,042	0.000 1,787	0.000 1,787			
		2.00	290.00	2,608	2,325	4,112			
Volume Calc	Ave End Area	3.00	292.00	3,231	2,920	7,032			
		4.00	293.00	3,910	3,571	10,602			
	S	Stage-S	Storage						
93 <del>7</del>		3				1			
						[4			

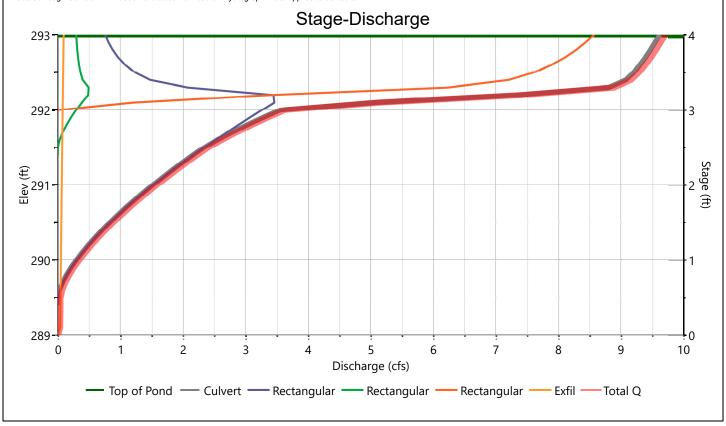


#### IB-3A

# Stage-Discharge

Outrout / Outlines	Orderant		Orifices		Doufouete d Die	
Culvert / Orifices	Culvert	1	2	3	Perforated Ris	er
Rise, in	12				Hole Diameter, in	
Span, in	12				No. holes	
No. Barrels	1				Invert Elevation, ft	
Invert Elevation, ft	286.00				Height, ft	
Orifice Coefficient, Co	0.60				Orifice Coefficient, Co	
Length, ft	37					
Barrel Slope, %	2.7					
N-Value, n	0.012					
Weirs	Riser*		Weirs		Ancillone	
weirs	Riser	1*	2*	3*	Ancillary	
Shape / Type	Circular	Rectangular	Rectangular	Rectangular	Exfiltration, in/hr	1.02**
Crest Elevation, ft		289.5	291.5	292		
Crest Length, ft		.25	.25	11.5		
Angle, deg						
Weir Coefficient, Cw		3.3	3.3	3.3		

\*Routes through Culvert. \*\*Exfiltration extracted from outflow hydrograph. Rate applied to contours.

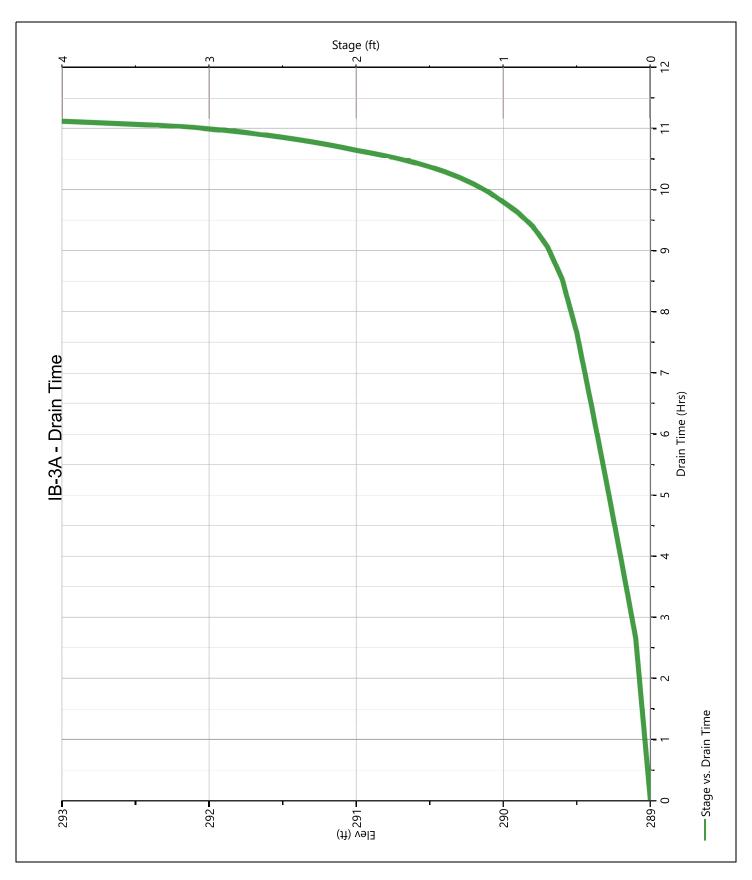


#### IB-3A

# **Stage-Storage-Discharge Summary**

Stage	Elev.	Storage	Culvert	(	Orifices, cf	s	Riser		Weirs, cfs		Pf Riser	Exfil	User	Total
(ft)	(ft)	(cuft)	(cfs)	1	2	3	(cfs)	1	2	3	(cfs)	(cfs)	(cfs)	(cfs)
0.00	289.00	0.000	0.000					0.000	0.000	0.000		0.000		0.000
1.00	290.00	1,787	0.292 ic					0.292	0.000	0.000		0.048		0.340
2.00	291.00	4,112	1.516 ic					1.516	0.000	0.000		0.062		1.577
3.00	292.00	7,032	3.553 ic					3.261	0.292	0.000		0.076		3.629
4.00	293.00	10,602	9.614 ic					0.754 s	0.293 s	8.567 s		0.092		9.706

#### IB-3A Pond Drawdown



# IB-3A Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 0.554 cfs	
Storm Frequency	= 2-yr	Time to Peak	= 12.47 hrs	
Time Interval	= 2 min	Hydrograph Volume	= 3,671 cuft	
nflow Hydrograph	= 3 - P-3A	Max. Elevation	= 290.27 ft	
Pond Name	= IB-3A	= 2,406 cuft		
Pond Routing by Storage Ind	dication Method			
	Qp = 0.55	cfs		
2 ]				
1.9				
1.8				
1.7				
1.6				
1.5				
-				
1.4				
1.3				
1.2				
1.1				
(§b) 1				
0.9				
0.8				
4				
0.7				
0.6				
0.5				
0.4				
0.3				
0.2				
0.1				
-				
0 1 2	3 4 5 6 7 8 9 10	11 12 13 14 15 16 17	18 19 20 2	

— P-3A —— IB-3A

ydrograph Type	= Pond Route	Peak Flow	= 1.538 cfs
torm Frequency	= 10-yr	Time to Peak	= 12.33 hrs
me Interval	= 2 min	Hydrograph Volume	= 9,270 cuft
flow Hydrograph		Max. Elevation	= 291.01 ft
ond Name	= IB-3A	Max. Storage	= 4,154 cuft
ond Routing by Storage		Center of ma	ass detention time = 16 m
4-	Qp = 1.54 cfs		
4			
-			
3-			
1			
2			
1			
_			
0			
-			
-1			
0 1 2 3	4 5 6 7 8 9 10 11 12 13 14 19	5 16 17 18 19 20	
	Time (hrs)		

ydrograph Type	= Pond Route	Peak Flow	= 2.111 cfs
torm Frequency	= 25-yr	Time to Peak	= 12.33 hrs
me Interval	= 2 min	Hydrograph Volume	= 13,045 cuft
flow Hydrograph	= 3 - P-3A	Max. Elevation	= 291.37 ft
ond Name	= IB-3A	Max. Storage	= 5,194 cuft
and Routing by Storage Inc	dication Method	Center of mas	ss detention time = 24 m
	Qp = 2.11 cfs		
5			
1			
4			
1			
3			
-			
2			
1			
1 + + + + + + + + + + + + + + + + + + +			
1			
0-			
1			
0 1 2 3	4 5 6 7 8 9 10 11 12 13 14 15	5 16 17 18 19 20	21 22 23 24
	Time (hrs)		

ydrograph Type	= Pond Route	Peak Flow	= 3.175 cfs
torm Frequency	= 100-yr	Time to Peak	= 12.27 hrs
me Interval	= 2 min	Hydrograph Volume	= 19,107 cuft
flow Hydrograph	n = 3 - P-3A	Max. Elevation	= 291.87 ft
ond Name	= IB-3A	Max. Storage	= 6,627 cuft
and Routing by Storage	Indication Method	Center of ma	ss detention time = 30 n
	Qp = 3.18 cfs		
7			
_			
6			
_			
5			
_			
4			
1			
3	<del>                                     </del>		
_			
2			
-			
1			
4			
0			
-			
-1 <del>- </del>			
	Time (hrs)		

	-3:		

	Worksheet Z. Ranon curve number and run	OII		OM-07 130
Project:	Athens Street	By PFK	Date 6/21/22 Rev Date 10/13/2022	
Location:	Stow, MA	Checked	Date 6/17/2023	
Circle one:	Present Developed	Subcatchment P-3B		
1. Runoff cur	ve number (CN)			
Soil name	Cover descrip	tion	CN 1/	Area F
hydrologic	(cover type, treatment, and	Nition:	1	<b>—</b>
aroup	hydrologic cond	dition:		-

Soil name and hydrologic	(cover type, to	Cover description reatment, and		CN 1/		Area	Product of CN x Area
group (appendix A)		hydrologic condition: percent impervious: nected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious		98			0.00	0.00
А	Woods G	ood Condition	30			0.00	0.00
А	Open Space G	ood Condition	39			0.00	0.00
А	Brush	Fair	35			0.00	0.00
А	Gravel		76			0.00	0.00
С	Woods G	ood Condition	70			7.27	509.21
С	Open Space G	ood Condition	74			0.90	66.31
С	Gravel		89			0.35	30.80
1/ Use only one	CN source per line.	3709	86		Totals =	8.52	606.33

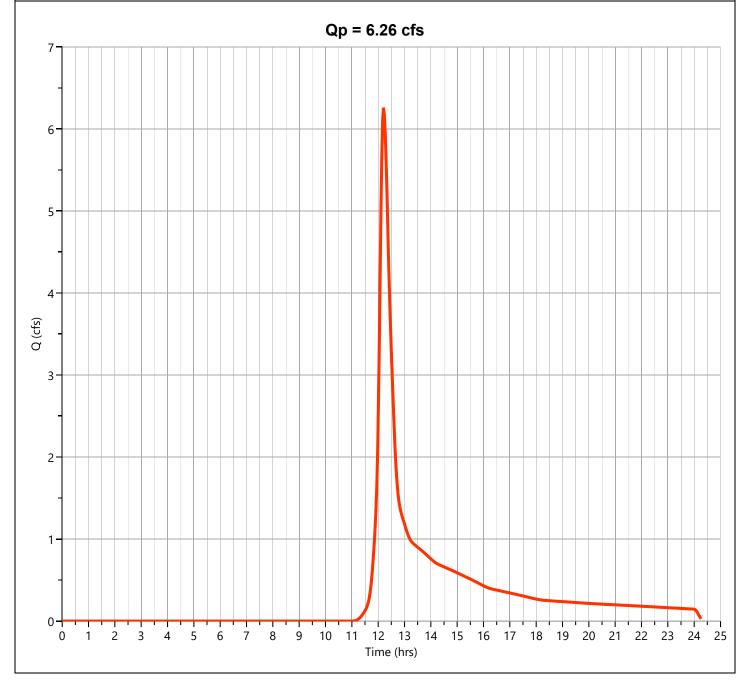
CN (weighted) =	total product	=	606.33=	71.19;	Use CN =	71
-	total area		8.52			

2. Runoπ
----------

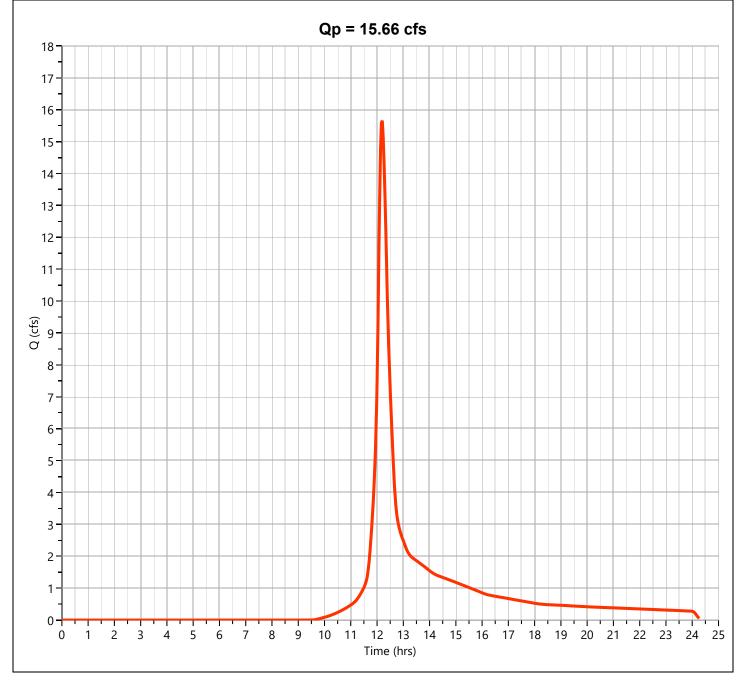
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.93	3.03	4.46

Project: <u>/</u>	Athens Street	_	Ву	<u>PFK</u>	Date		
Location	Store MA		Charlend	Ī		10/13/2022	
Location:	Stow, MA	_	Checked	-	Date	6/17/2023	
Circle one:	Present Developed	i	Subcatchn	nent P-3B			
Circle one:	Tc Tt	through					
		subarea					
Sheet flow (A	Applicable to Tc only)		Segment ID	A-B			
1. Surface D	escription (table 3-1)			WOODS			
2 Mannings	roughness coeff., n (table 3-1)			0.6			
2. Mailings	Tougriness coem., if (table 3-1)			0.0			
3. Flow leng	th, L (total L <= 300 ft)		ft	50			
	,						
4. Two-yr 24	-hr rainfall, P2		in	3.1			
			EL/EL	0.040			
5. Land Slop	e, s		ft/ft	0.049			
6. Tt = 0.007	' (nL)^0.8 / (P2^0.5 s^0.4)	Compute T	t hr	0.20			0.20
		•				<u> </u>	
Shallow con	centrated Flow		Segment ID	B-C			
7. Surface D	escription (paved or unpaved)			UNPAVED			
8. Flow Leng	ath. L		ft	400			
	,, <u> </u>						
9. Watercou	rse slope, s		ft/ft	0.110			
10. Average	Velocity, V (figure 3-1)		ft/s	5.35			
11. Tt = L / 3	8600V	Compute T	't hr	0.02			0.0
270	.0001	Compute 1	****	0.02			0.0
Channel flov	V		Segment ID				
	ectional flow area, a		sf				
	perimeter, pw		ft				
	c radius, r=a/wp	Compute r					
15. Channel			ft/ft				
	's roughness coeff., n						
	r^2/3 s^1/2 / n	Compute V					
18. Flow len			ft				
19. Tt = L / 3	600V	Compute T	t hr				0
20. Watersh	ed or subarea Tc or Tt (add Tt in ste	eps 6, 11, an	d 19)			hr	
						min	

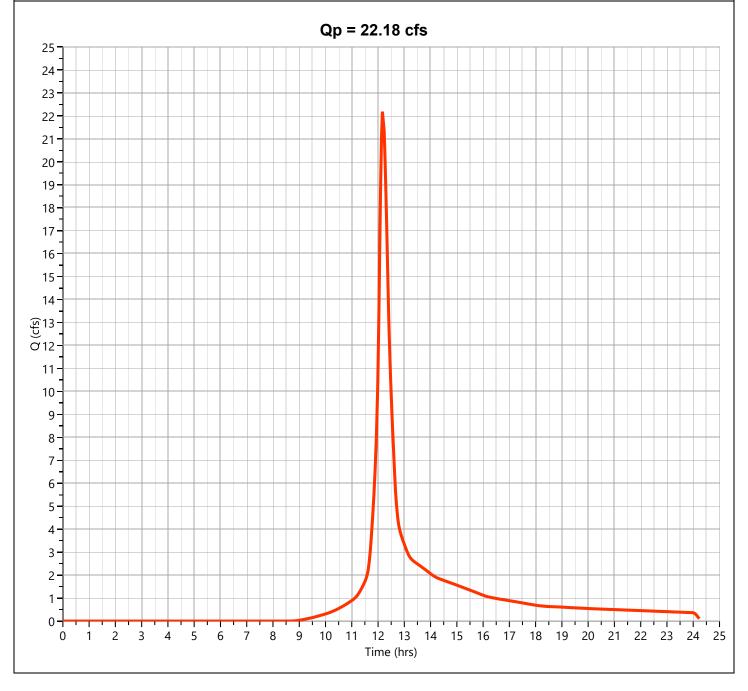
Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.260 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 27,756 cuft
Drainage Area	= 8.52 ac	Curve Number	= 71
Tc Method	= User	Time of Conc. (Tc)	= 13.4 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



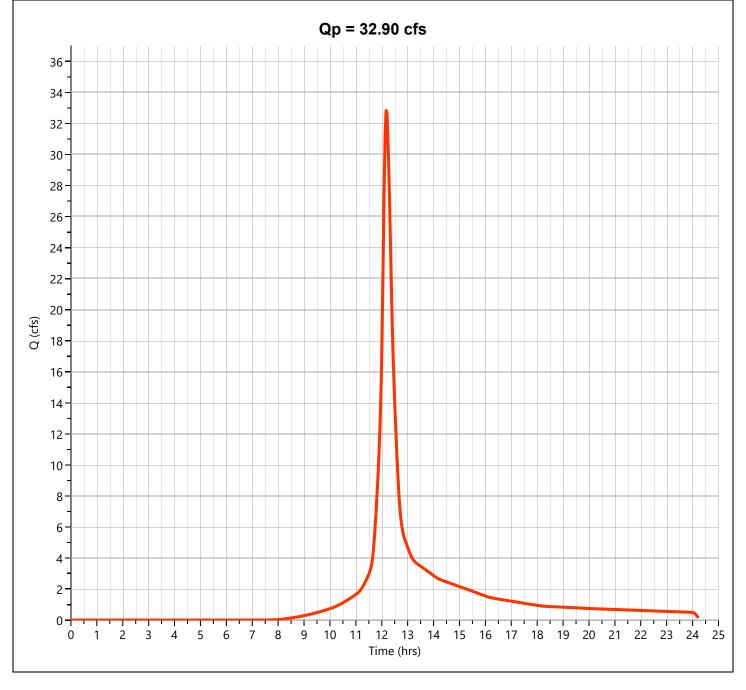
Hydrograph Type	= NRCS Runoff	Peak Flow	= 15.66 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 64,735 cuft
Drainage Area	= 8.52 ac	Curve Number	= 71
Tc Method	= User	Time of Conc. (Tc)	= 13.4 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 22.18 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 90,824 cuft
Drainage Area	= 8.52 ac	Curve Number	= 71
Tc Method	= User	Time of Conc. (Tc)	= 13.4 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 32.90 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 133,902 cuft
Drainage Area	= 8.52 ac	Curve Number	= 71
Tc Method	= User	Time of Conc. (Tc)	= 13.4 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



## P-3 TOTAL Hyd. No. 6

Hydrograph Type	= Junction	Peak Flow	= 6.651 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 31,428 cuft
Inflow Hydrographs	= 4, 5	Total Contrib. Area	= 8.52 ac
	Qp = 6.65 cfs		
7 7			
6	<del></del>		
5-			
-			
4			
4			
fs)			
Q (cfs) 3			
4			
2			
1 +			
-			
0			
-			
_1			
-1 <del>1                                   </del>	4 5 6 7 8 9 10 11 12 13 14 15		
	Time (hrs)		
	—— IB-3A —— P-3B —— P-3 TOTAL	-	
L			

#### P-3 TOTAL Hyd. No. 6

Hydrograph Type	= Junction	Peak Flow	= 17.04 cfs	
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs	
Time Interval	= 2 min Hydrograph Volume		= 74,005 cuft	
nflow Hydrographs	= 4, 5	Total Contrib. Area	= 8.52 ac	
	Qp = 17.04 cfs			
19				
18-				
17				
16-				
4				
15 -				
14				
13				
12				
11 -				
10				
β - (Gg) 9				
8 -				
7	<del></del>			
6				
5				
-				
4 -				
3 -				
2				
1-				
0				
-1 -1 -1 -1 -1				
0 1 2 3	4 5 6 7 8 9 10 11 12 13 14 Time (hrs)	15 16 17 18 19 20	21 22 23 24	
	—— IB-3A —— P-3B —— P-3 TC	<b>)ΤΔΙ</b>		

# P-3 TOTAL Hyd. No. 6

Hydrograph Type	= Junction	Peak Flow	= 24.13 cfs	
Storm Frequency	= 25-yr	Time to Peak	= 12.20 hrs = 103,869 cuft = 8.52 ac	
ime Interval	= 2 min	Hydrograph Volume		
nflow Hydrographs	= 4, 5	Total Contrib. Area		
	Qp = 24.13 cfs			
27				
26				
25				
24				
23				
22				
21	<u> </u>			
20				
19				
18				
17				
16				
15 =				
Ω 14 <del>-</del>				
14 - (S) 13 - (O) 0 - (O)				
12 -				
11				
10				
9 =				
8 -				
7				
6 🖠				
5 -	<del>                                     </del>			
4 -				
3 -				
2 -				
1 -				
0				

Time (hrs)

—— IB-3A —— P-3B —— P-3 TOTAL

#### P-3 TOTAL Hyd. No. 6

Hydrograph Type	= Junction	Peak Flow	= 35.67 cfs	
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs	
Time Interval	= 2 min	Hydrograph Volume	= 153,009 cuft	
Inflow Hydrographs	= 4, 5	Total Contrib. Area	= 8.52 ac	
	Qp = 35.67 cfs			
40				
38 -				
36				
34				
32				
30				
28				
26				
24				
22				
(5) O 20				
18				
16				
14				
12				
10				
8				
6	<del></del>			
4 🖠				
2				
0 1 2 3	4 5 6 7 8 9 10 11 12 13 14 1	5 16 17 18 19 20	21 22 23 24 25	
V 1 2 3	Time (hrs)	5 10 17 10 15 20	L. LL LJ L4 LJ	
	—— IB-3A —— P-3B —— P-3 TOTA	NL .		

Project:	Athens Street	ByPFK	Date	6/21/22
			Rev Date	10/13/2022
Location:	Stow, MA	Checked	Date	6/17/2023
Circle one:	Present Developed	Subcatchment P-4A		

1. Runoff curve number (CN)

Soil name and hydrologic	Cover description (cover type, treatment, and	CN 1/		Area		Product of CN x Area
group (appendix A)	hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious	98			0.27	26.69
А	Woods Good Condition	30			0.00	0.00
А	Open Space Good Condition	39			0.00	0.00
А	Gravel	76			0.00	0.00
С	Woods Good Condition	70			0.57	40.17
С	Open Space Good Condition	74			0.86	63.71
С	Gravel	89			0.00	0.00
D	BVW	77			0.00	0.00
1/ Use only one	e CN source per line. 7436	2		Totals =	1.71	130.57

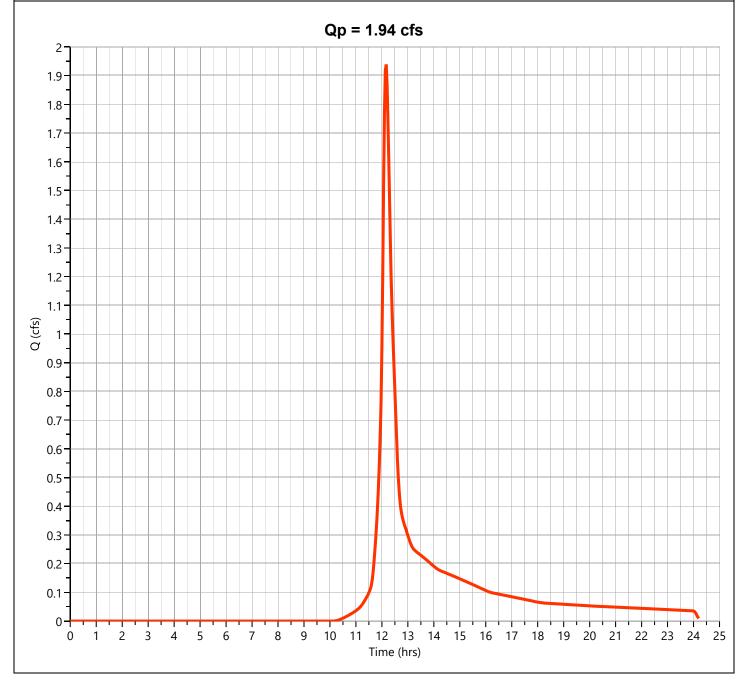
CN (weighted) =	total product	_=	130.57 =	76.48 ;	Use CN =	76
	total area		1.71			

2	Runoff
۷.	Rulloll

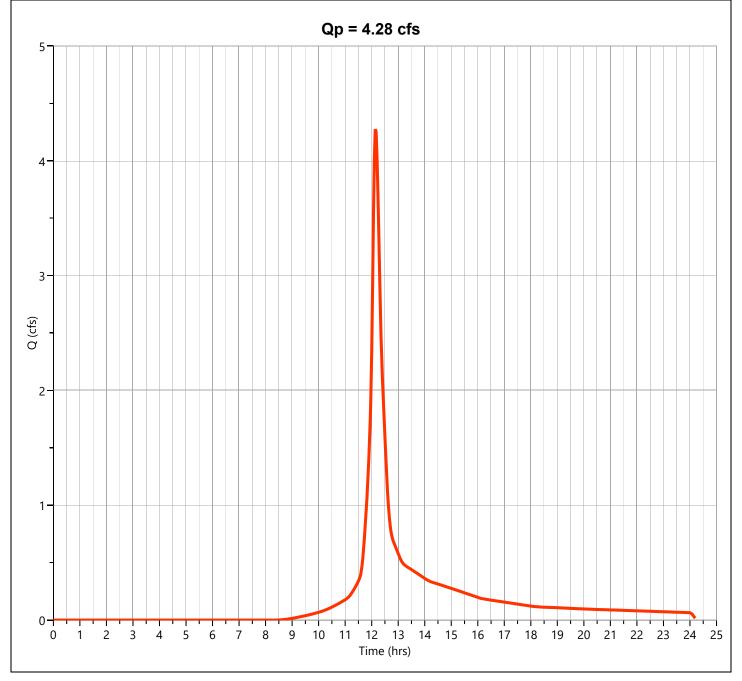
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
1.23	3.55	5.07

Location: Stow, MA  Circle one: Present Developed  Circle one: Tc Tt throu subar  Sheet flow (Applicable to Tc only)	· —			10/13/2022 6/17/2023	
Circle one:  Present Developed  Circle one:  Tc Tt throu subar	Subcatchr gh		Date	6/17/2023	
Circle one: Tc Tt throu suba	gh	ment P-4A			
Circle one: Tc Tt throu suba	gh		•		
suba	· —		1		
Sheet flow (Applicable to Tc only)					
Sheet flow (Applicable to Tc only)					
Sheet flow (Applicable to Tc only)					
Sheet now (Applicable to 10 only)	Segment ID	A-B			
	ocginent ib	Λ-Β			
1. Surface Description (table 3-1)		WOODS			
, ,					
2. Mannings roughness coeff., n (table 3-1)		0.6			
3. Flow length, L (total L <= 300 ft)	ft	50			
4. Two vr 24 hr rainfall D2	in	2.1			
4. Two-yr 24-hr rainfall, P2	in	3.1			
5. Land Slope, s	ft/ft	0.050			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4) Com	oute Tt hr	0.20			0
Shallow concentrated Flow	Segment ID	B-C	C-D	D-E	
7 Surface Description (neved or unneved)		UNPAVED	UNPAVED	PAVED	
7. Surface Description (paved or unpaved)		UNPAVED	UNPAVED	PAVED	
8. Flow Length, L	ft	192	12	69	
9. Watercourse slope, s	ft/ft	0.100	0.33	0.01	
10. Average Velocity, V (figure 3-1)	ft/s	5.10	9.27	2.03	
11 Tt = 1 / 2600V	outo It br	0.01	0.00	0.01	0
11. Tt = L / 3600V Comp	pute Tt hr	0.01	0.00	0.01	0
Channel flow	Segment ID				
	9				
12. Cross sectional flow area, a	sf				
13. Wetted perimeter, pw	ft				
	oute r ft				
15. Channel Slope, s	ft/ft				
16. Manning's roughness coeff., n					
17. V = 1.49 r^2/3 s^1/2 / n Com	oute V ft/s				
18. Flow length, L	ft				
	oute Tt hr				

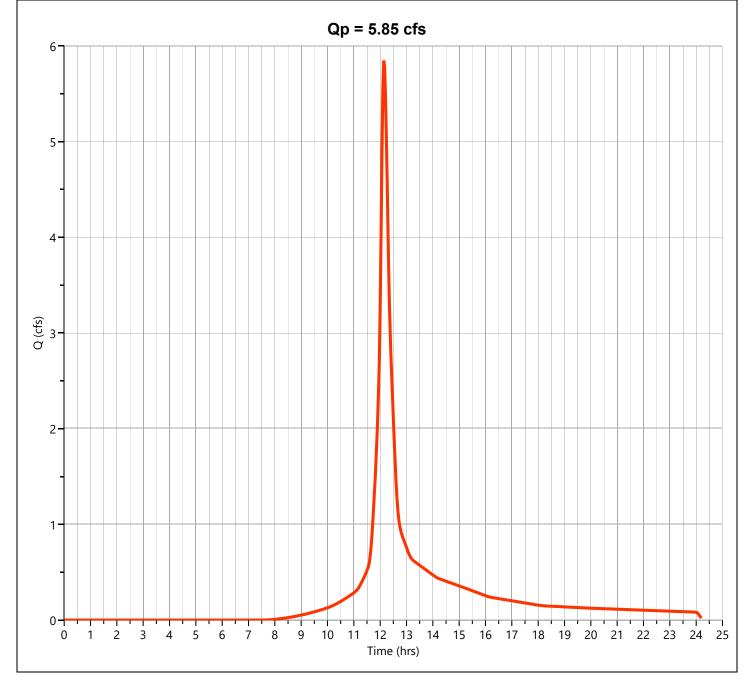
Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.939 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 7,688 cuft
Drainage Area	= 1.71 ac	Curve Number	= 76
Tc Method	= User	Time of Conc. (Tc)	= 13.2 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



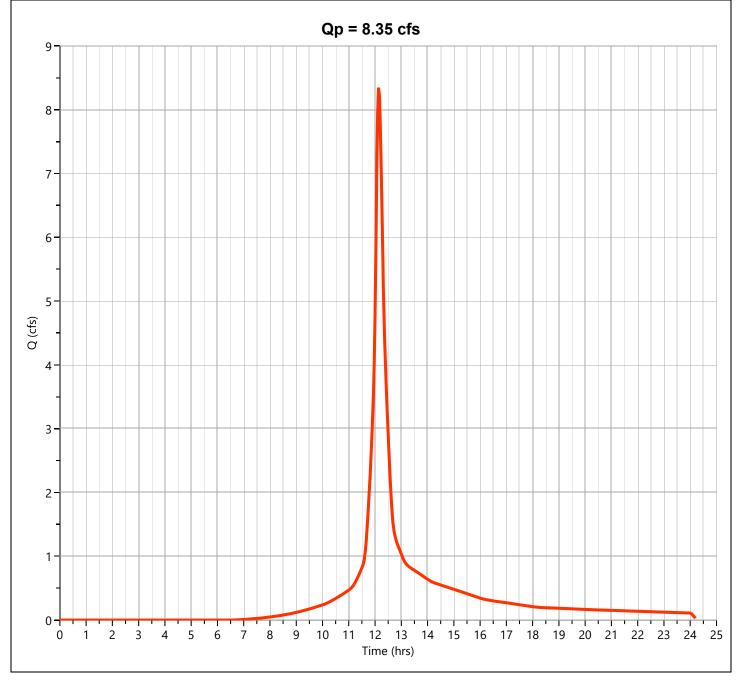
Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.275 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 16,442 cuft
Drainage Area	= 1.71 ac	Curve Number	= 76
Tc Method	= User	Time of Conc. (Tc)	= 13.2 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.848 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 22,412 cuft
Drainage Area	= 1.71 ac	Curve Number	= 76
Tc Method	= User	Time of Conc. (Tc)	= 13.2 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 8.346 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 32,087 cuft
Drainage Area	= 1.71 ac	Curve Number	= 76
Tc Method	= User	Time of Conc. (Tc)	= 13.2 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



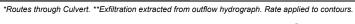
#### IB-4A Stage-Storage

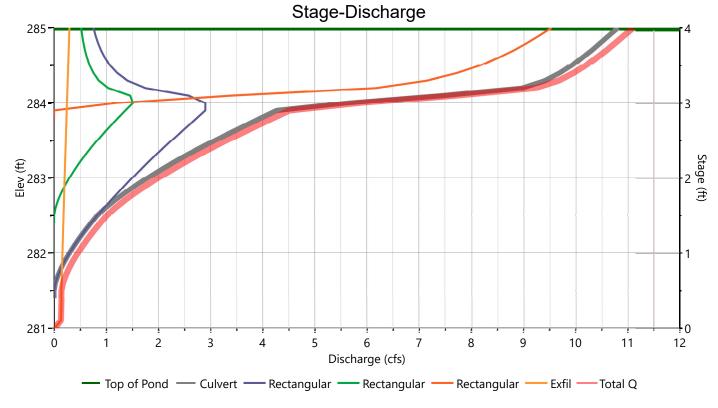
Us	ser Defined Conto	urs			Stage / Stora	ige Table	
	Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
	Bottom Elevation, ft	281.00					
	Voids (%)	100.00	0.00 1.00	281.00 282.00	2,195 2,883	0.000 2,539	0.000 2,539
	Volume Calc	Ave End Area	2.00	283.00	3,628	3,256	5,795
	volume Calc	Ave End Area	3.00	284.00	4,429	4,029	9,823
			4.00	285.00	5,286	4,858	14,681
		S	Stage-S	Storage			
285							4
-							
284							3
1							
£ ≥ 283 -							Stage (ft)
≥ 283							2 e (f
							t t
1							
202							
282							1
J							
1 /							
281							$ \downarrow$ <sub>0</sub>
0	2000 4	1000 600		8000	10000	12000	14000
				orage (cuft)			
			— co	ontours			

#### IB-4A

#### Stage-Discharge

Cultivant / Onificas	Culvent		Orifices		Dowforeted Die	
Culvert / Orifices	Culvert	1	2	3	Perforated Ris	er
Rise, in	15				Hole Diameter, in	
Span, in	15				No. holes	
No. Barrels	1				Invert Elevation, ft	
Invert Elevation, ft	281.00				Height, ft	
Orifice Coefficient, Co	0.60				Orifice Coefficient, Co	
Length, ft	43					
Barrel Slope, %	14					
N-Value, n	0.012					
Waira	Pioor*		Weirs		Ancillant	
Weirs	Riser*	1*	2*	3*	Ancillary	
Shape / Type		Rectangular	Rectangular	Rectangular	Exfiltration, in/hr	2.41**
Crest Elevation, ft		281.5	282.5	283.9		
Crest Length, ft		.25	.25	11.5		
Angle, deg						
Weir Coefficient, Cw		3.3	3.3	3.3		



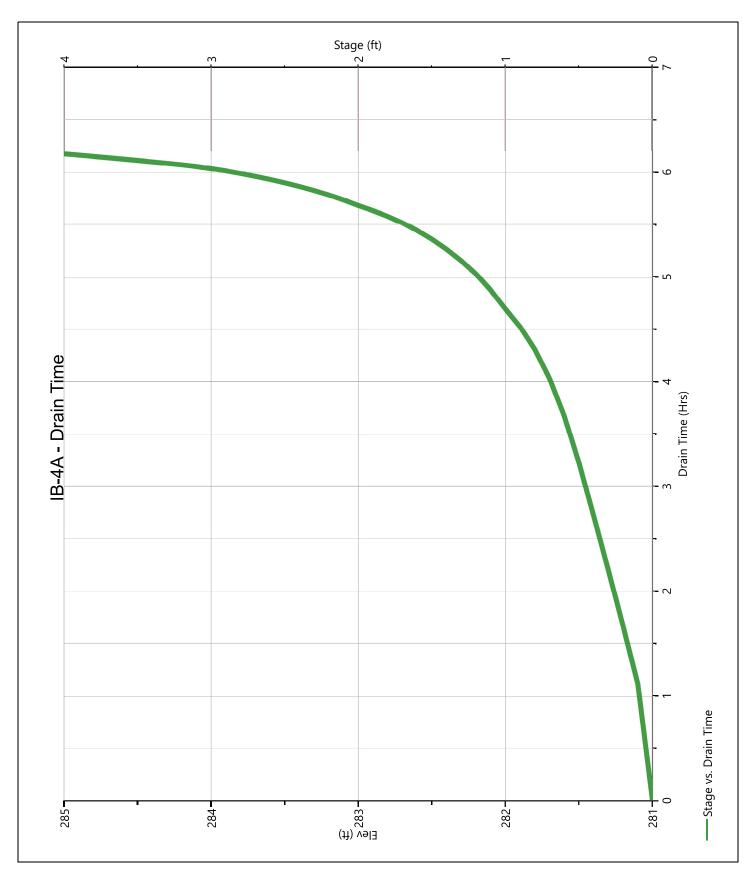


#### IB-4A

#### **Stage-Storage-Discharge Summary**

Stage	Elev.	Storage	Culvert	(	Orifices, cf	's	Riser		Weirs, cfs	i	Pf Riser	Exfil	User	Total
(ft)	(ft)	(cuft)	(cfs)	1	2	3	(cfs)	1	2	3	(cfs)	(cfs)	(cfs)	(cfs)
0.00	281.00	0.000	0.000					0.000	0.000	0.000		0.000		0.000
1.00	282.00	2,539	0.292 ic					0.292	0.000	0.000		0.161		0.453
2.00	283.00	5,795	1.788 ic					1.497 s	0.292	0.000		0.202		1.991
3.00	284.00	9,823	5.613 ic					2.899 s	1.514 s	1.200		0.247		5.860
4.00	285.00	14,681	10.81 ic					0.754 s	0.518 s	9.539 s		0.295		11.11

#### IB-4A Pond Drawdown



Hydrograph Type	= Pond Route	Peak Flow	= 0.331 cfs		
Storm Frequency	= 2-yr	Time to Peak	= 12.63 hrs		
Time Interval	= 2 min	Hydrograph Volume	= 2,114 cuft		
nflow Hydrograph	= 8 - P-4A	Max. Elevation	= 282.04 ft		
Pond Name	= IB-4A	Max. Storage	= 2,679 cuft		
Pond Routing by Storage Ind	dication Method				
	Qp = 0.33 cfs	<b>;</b>			
2					
1.9					
1.8					
1.7					
1.6					
1.5					
1.4					
1.3					
+					
1.2 -					
1.1 <del> </del>					
(\$\frac{1}{5}\) O  1					
0.9					
0.8					
0.7					
0.6					
0.5					
0.4					
0.3					
0.2					
-					
0.1					
0 1	2 3 4 5 6 7 8 9	10 11 12 13 1	4 15 16		

ydrograph Ty				id Ro	oute										k Flov				1.501		
torm Frequer	су		10-y												e to P		l		12.47		
me Interval	a m b		2 m													ph Vo	iume				
flow Hydrogr ond Name	apn			P-4A	١											ation		= 282.87 ft = 5,370 cuft			
ond Name	rogo In		IB-4											IVIAX	. Stor	age		= ;	0,370	Cuit	
ina Routing by Sto	rage in	uicalio	ni ivie	unoa				_													
5 7								Ųр	= 1	.50	cfs	•									
4																					
4																					
-																					
													Ш								
3													+								
-																					
2																					
-																					
													Ш	N							
1													П	11							
													Ш								
													'								
0																					
1																					
-1				-						-	-			1	1	1		1			-
0 1	2	3	4	!	5	6	7	8		10 ime		11	12	13	14	15	16	17	18	19	
											· IB-4										

Hydrograph Type	= Pond Route		Peak Flow	= 2.490 cfs		
Storm Frequency	= 25-yr		Time to Peak	= 12.43 hrs		
Γime Interval	= 2 min		Hydrograph Volume	= 13,624 cuft		
nflow Hydrograph	= 8 - P-4A		Max. Elevation	= 283.29 ft		
Pond Name	= IB-4A		Max. Storage	= 6,941 cuft		
Pond Routing by Storage In	dication Method					
		Qp = 2.49 cfs				
6						
]						
5						
1						
4						
7						
-						
3						
Q (cfs)						
o						
2-						
1						
1-						
-						
0-						
-1-						
0 1 2	3 4 5 6 7	8 9 10 11 12 Time (hrs)	13 14 15 16 17	18 19 20 2		
		— P-4A — IB-4A				

Hydrograph Type	= Pond Route		Peak Flow	= 4.180 cfs		
Storm Frequency	= 100-yr		Time to Peak	= 12.37 hrs		
Time Interval	= 2 min		Hydrograph Volume	= 22,104 cuft		
nflow Hydrograph	= 8 - P-4A		Max. Elevation	= 283.87 ft		
Pond Name	= IB-4A		Max. Storage	= 9,308 cuft		
Pond Routing by Storage Ir	dication Method					
		Qp = 4.18 cfs				
9 -						
1						
8 -						
-						
7						
6						
1						
5						
_						
(\$\frac{\firec{\frac{\fin}}}}}}{\frac{\fint}}}}{\frac{\fir}}}}}}{\firac{\frac{\frac{\frac{\frac{\frac{\frac}{\frac{\frac}}}}{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\fir}}}}}{\firac{\fi}}}}}{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac		<del>                                     </del>				
3						
2						
1						
1 -						
-						
0						
_						
-1-						
0 1 2	3 4 5 6 7 8	9 10 11 12 13 Time (hrs)	14 15 16 17 18	19 20 21 2		
		— P-4A — IB-4A				

Project:	Athens Street	By PFK	Date 6/21/22
		<u></u>	Rev Date 10/13/2022
Location:	Stow, MA	Checked	Date 6/17/2023
Circle one:	Present Developed	Subcatchment P-4B	

1. Runoff curve number (CN)

Soil name and hydrologic	Cover description (cover type, treatment, and		CN 1/			Product of CN x Area
group (appendix A)	hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious	98			0.00	0.00
Α	Woods Good Condition	30			0.18	5.55
А	Open Space Good Condition	39			0.00	0.00
А	Gravel	76			0.05	3.63
С	Woods Good Condition	70			5.99	418.99
С	Open Space Good Condition	74			1.00	74.21
С	Gravel	89			0.31	28.03
D	BVW	77			0.03	2.55
1/ Use only one	CN source per line. 32970	8		Totals =	7.57	532.95

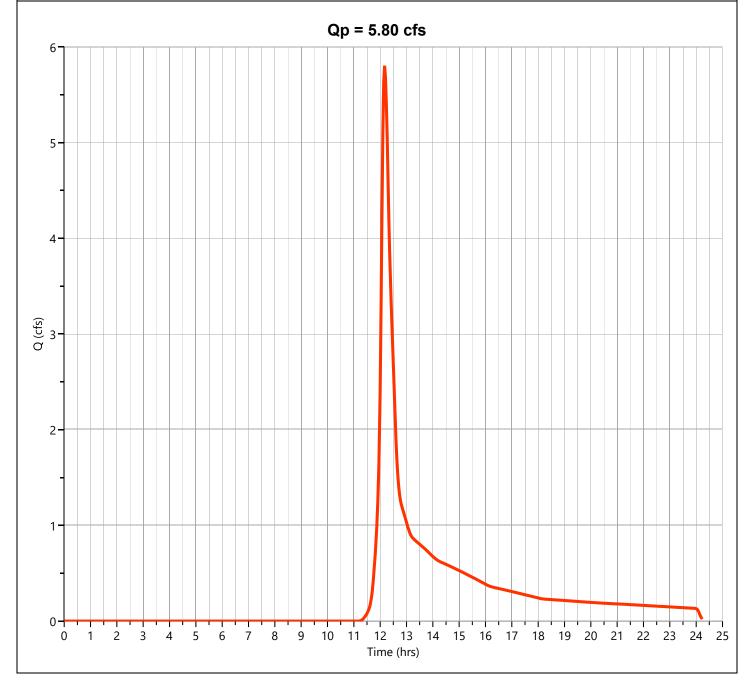
CN (weighted) =	total product	_=	532.95 =	70.41 ;	Use CN =	70
	total area	_	7.57			

2	Runoff
۷.	Rulloll

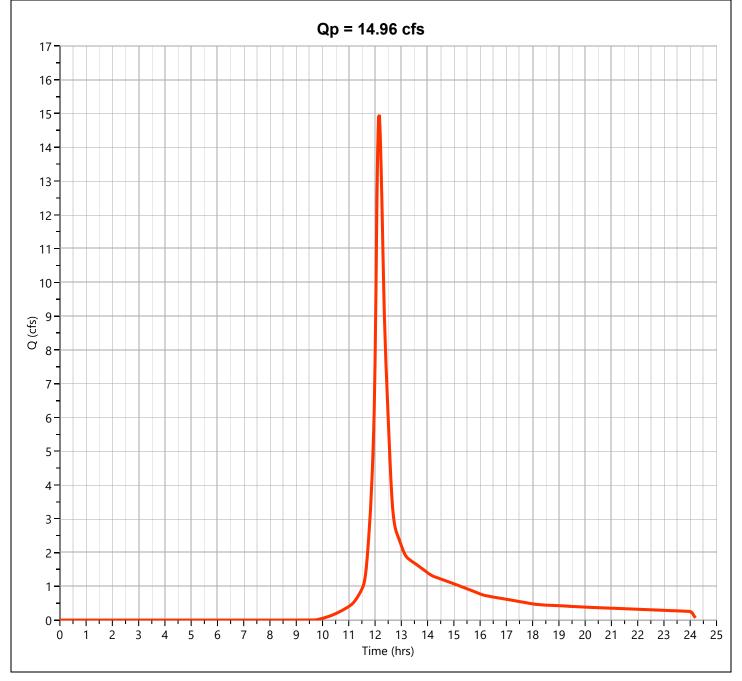
Storm #1	orm #1 Storm #2	
2	25	100
3.27	6.14	7.84
0.89	2.96	4.37

Project: A	Athens Street	_	Ву	PFK		6/21/2022	
			<u> </u>			10/13/2022	
Location: S	Stow, MA	•	Checked		Date	6/17/2023	
Circle one:	Present Developed	1	Subcatchm	nent P-4R			
Circle one:	Tc Tt	through	Cubcateriii	ICITI -4D			
		subarea					
01 1 1 1 1	· · · · · · · ·		0 115	4 B			
Sheet flow (A	Applicable to Tc only)		Segment ID	A-B			
1 Surface De	escription (table 3-1)			WOODS			
i. Suilace De	escription (table 3-1)			WOODS			
2. Mannings	roughness coeff., n (table 3-1)			0.6			
				0.0			
3. Flow lengtl	h, L (total L <= 300 ft)		ft	50			
· ·	,						
4. Two-yr 24-	-hr rainfall, P2		in	3.1			
5. Land Slope	e, s		ft/ft	0.080			
	/ LNAS S / / TOAS 5 . AS 4)			0.47			0.47
6. Tt = 0.007	(nL)^0.8 / (P2^0.5 s^0.4)	Compute T	hr	0.17			0.17
Shallow cons	centrated Flow		Segment ID	B-C			
Strailow Corre	zentrated Flow		Segment iD	D-C			
7. Surface De	escription (paved or unpaved)			UNPAVED			
	ээсирион (ратоа от апратоа)			011171122			
8. Flow Leng	th, L		ft	189			
9. Watercour	se slope, s		ft/ft	0.126			
10. Average	Velocity, V (figure 3-1)		ft/s	5.73			
44 Tt - 1 / 2/	0001/	Community T	. h	0.04			0.04
11. Tt = L / 36	600 V	Compute T	LTII	0.01			0.01
Channel flow			Segment ID				
Orialino now			Cogmontib				
12. Cross sec	ctional flow area, a		sf				
13. Wetted po			ft				
	c radius, r=a/wp	Compute r	ft				
15. Channel			ft/ft				
16. Manning's	s roughness coeff., n						
_	r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow leng		•	ft				
19. Tt = L / 30		Compute T					0
		•					
20. Watershe	ed or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	d 19)			hr	0.18
						min	10.5

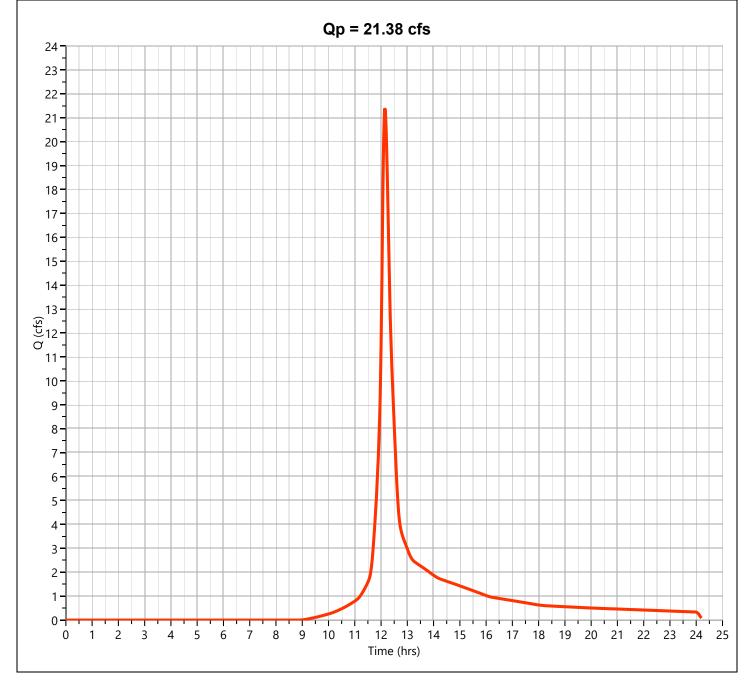
Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.803 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 24,629 cuft
Drainage Area	= 7.57 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 10.5 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



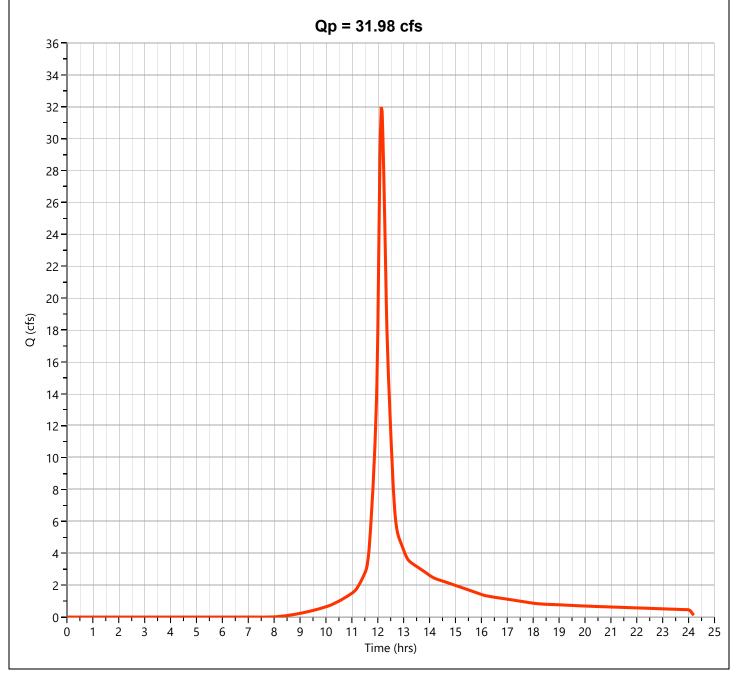
Hydrograph Type	= NRCS Runoff	Peak Flow	= 14.96 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 58,547 cuft
Drainage Area	= 7.57 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 10.5 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 21.38 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 82,653 cuft
Drainage Area	= 7.57 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 10.5 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 31.98 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 122,621 cuft
Drainage Area	= 7.57 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 10.5 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



## P-4 TOTAL Hyd. No. 11

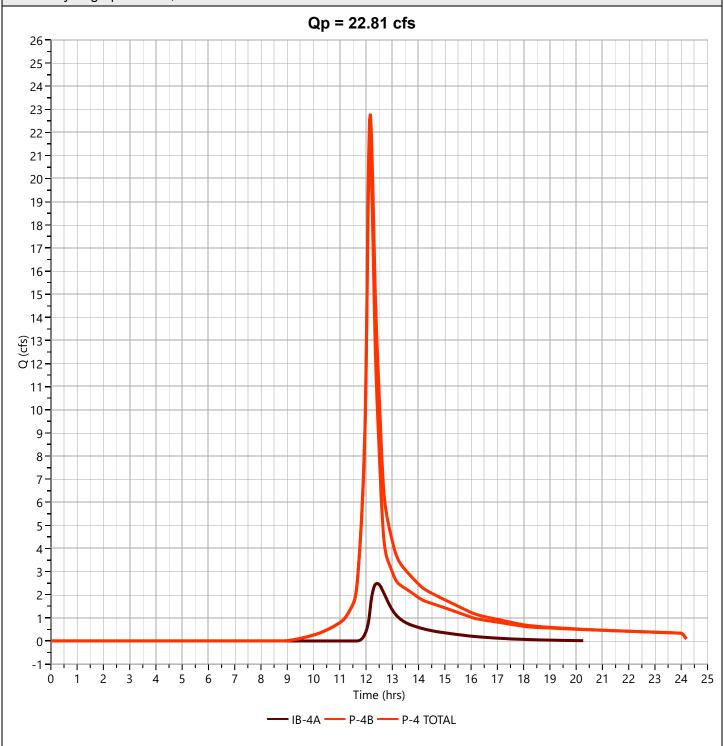
Hydrograph Type	= Junction	Peak Flow	= 5.817 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 26,743 cuft
nflow Hydrographs	= 9, 10	Total Contrib. Area	= 7.57 ac
67	Qp = 5.82	2 cfs	
5 - 4			
2- - 1- 0-			
-1	4 5 6 7 8 9 10 11 12	13 14 15 16 17 18 19 20 e (hrs)	21 22 23 24 2

#### P-4 TOTAL Hyd. No. 11

Hydrograph Type	= Junction	Peak Flow	= 15.63 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs = 67,232 cuft = 7.57 ac
īme Interval	= 2 min	Hydrograph Volume	
nflow Hydrographs	= 9, 10	Total Contrib. Area	
	Qp = 15.63 cfs	S	
17 -			
16	<u> </u>		
15			
14 -			
-			
13			
12 -			
11 -			
10			
-			
9-			
Q ( <del>d</del> s)			
7-			
-			
6			
5			
4			
3-	1		
-			
2			
1 -			
0			
1			
0 1 2 3	4 5 6 7 8 9 10 11 12 13	14 15 16 17 18 19 20	21 22 23 24
	Time (hrs) —— IB-4A —— P-4B —— P		

#### P-4 TOTAL Hyd. No. 11

On = 22.81 cfs					
Inflow Hydrographs	= 9, 10	Total Contrib. Area	= 7.57 ac		
Time Interval	= 2 min	Hydrograph Volume	= 96,277 cuft		
Storm Frequency	= 25-yr	Time to Peak	= 12.17 hrs		
Hydrograph Type	= Junction	Peak Flow	= 22.81 cfs		



## P-4 TOTAL Hyd. No. 11

Firme Interval = 2 min Hydrograph Volume = 144,724 cut Inflow Hydrographs = 9, 10 Total Contrib. Area = 7.57 ac   Qp = 34.67 cfs   Qp = 34.67 cfs  38	Hydrograph Type	= Junction	Peak Flow	= 34.67 cfs
### Company of the image of the	Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Qp = 34.67 cfs  38				
38- 36- 34- 32- 30- 28- 24- 22- 22- 18- 16- 14- 12- 10- 8- 6- 4- 2- 2- 2- 2- 2- 2- 2- 2- 2- 2	Inflow Hydrographs	= 9, 10	Total Contrib. Area	= 7.57 ac
36- 34- 32- 30- 28- 26- 24- 22- 20- 0 18- 16- 14- 12- 10- 8- 6- 4- 2-		Qp = 34.67 cfs		
34 32 30 28 26 26 24 22 22 30 18 16 14 12 12 10 8 6 6 4 4 2 2 2	38			
32 - 30 - 28 - 26 - 24 - 22 - 20 - 18 - 16 - 14 - 12 - 10 - 8 - 6 - 4 - 2 - 2 - 20 - 20 - 20 - 20 - 20 -	36			
30 28 26 26 24 22 22 20 3	34	<u> </u>		
28   26   24   22   22   20   27   20   20   20   20	32 -			
26 - 24 - 22 - 20 - 20 - 20 - 20 - 20 - 20	30			
24 - 22 - 20 - 20 - 20 - 20 - 20 - 20 -	28			
22- 20- 18- 16- 14- 12- 10- 8- 6- 4- 2-	26			
© 20- 18- 16- 14- 12- 10- 8- 6- 4- 2-	24			
18- 16- 14- 12- 10- 8- 6- 4- 2-	22			
18- 16- 14- 12- 10- 8- 6- 4- 2-	(g) 20 ]			
14- 12- 10- 8- 6- 4- 2- 2-	7 18			
12 - 10 - 8 - 6 - 4 - 2 - 1 - 10 - 10 - 10 - 10 - 10 - 10 -	16			
10 - 8 - 6 - 4 - 2 - 2 - 2	14 -			
8	12			
	10			
4 - 2 -	8 -			
2	6			
	4 -			
	2			
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	0			

Project:	Athens Street	By PFK	Date 6/21/22
			Rev Date 10/13/2022
Location:	Stow, MA	Checked	Date 6/17/2023
Circle one:	Present Developed	Subcatchment P-5B	

1. Runoff curve number (CN)

Soil name and hydrologic	Cover description (cover type, treatment, and		CN 1/		Area	Product of CN x Area
group (appendix A)	hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious	98			0.50	49.43
А	Woods Good Condition	30			0.00	0.00
А	Open Space Good Condition	39			0.00	0.00
А	Gravel	76			0.00	0.00
С	Woods Good Condition	70			1.37	95.58
С	Open Space Good Condition	74			0.88	65.29
С	Gravel	89			0.00	0.00
1/ Use only one	CN source per line. 1198	79		Totals =	2.75	210.29

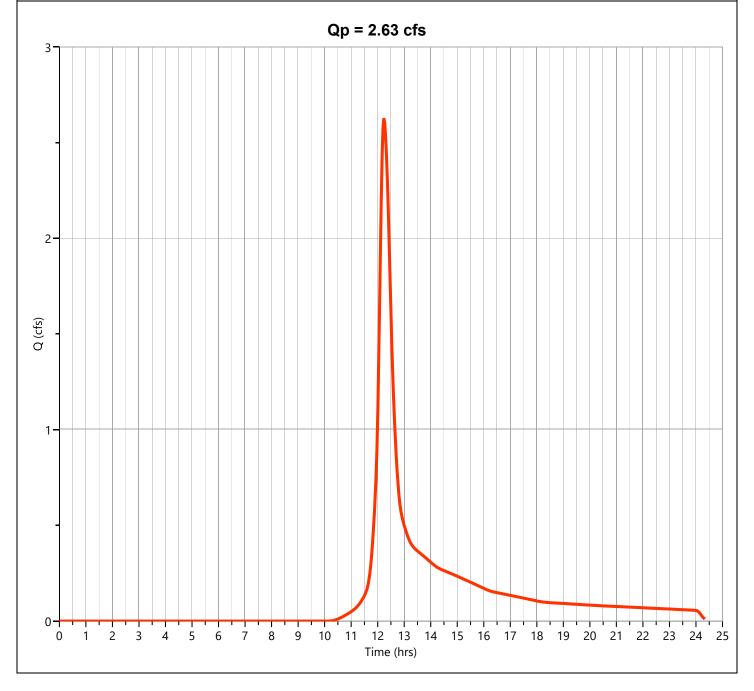
CN (weighted) =	total product	_=	210.29 =	76.41	;	Use CN =	76
	total area		2.75		-		

2	Runoff
۷.	Rulloll

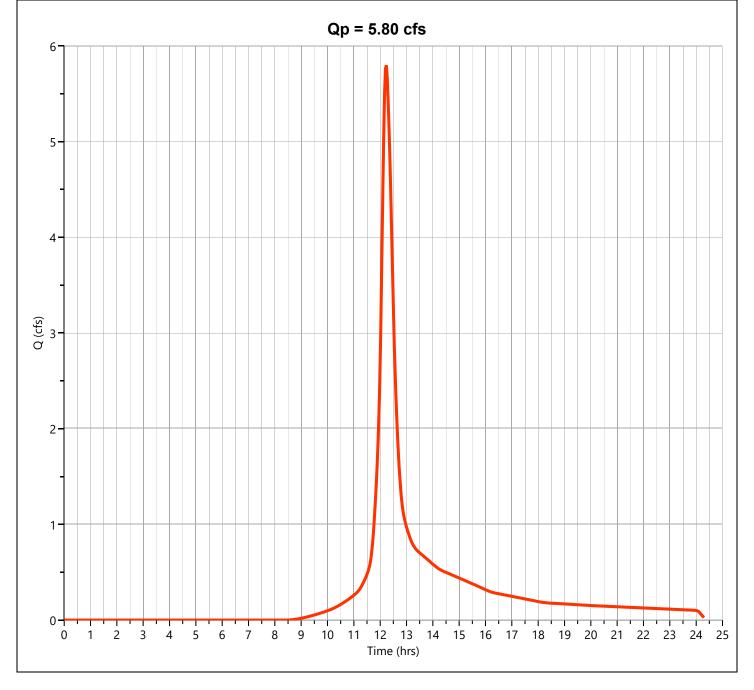
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
1.23	3.54	5.06

Project:	Athens Street	_	Ву	PFK		6/21/2022	
			<u> </u>		1	10/13/2022	
Location:	Stow, MA	-	Checked		Date	6/17/2023	
Circle one:	Present Developed	1	Subcatchm	ont D 5B			
Circle one:	Tc Tt	<b>I</b> through	Subcatchin	IEIIL F-3D	•		
Olloid dile.	10 11	subarea			•		
Sheet flow	(Applicable to Tc only)		Segment ID	A-B			
1. Surface	Description (table 3-1)			WOODS			
2. Manning	s roughness coeff., n (table 3-1)			0.6			
3. Flow len	gth, L (total L <= 300 ft)		ft	50			
4. Two vr 0	M. br rainfall D2		in	3.1			
4. TWO-yi 2	4-hr rainfall, P2		in	3.1			
5. Land Slo	nne s		ft/ft	0.025			
J. Land Oic	,pc, 3		1010	0.020			
6. Tt = 0.00	07 (nL)^0.8 / (P2^0.5 s^0.4)	Compute T	t hr	0.26			0.26
Shallow co	ncentrated Flow		Segment ID	B-C	C-D	D-E	
7. Surface	Description (paved or unpaved)			UNPAVED	UNPAVED	PAVED	
8. Flow Ler	ngth, L		ft	204	22	120	
			0.10	2 222	2 222	0.04	
9. Waterco	urse slope, s		ft/ft	0.090	0.330	0.01	
10 Averes	o Vologity V (figure 2.4)		ft/s	4.04	0.27	2.02	
iu. Averag	e Velocity, V (figure 3-1)		10'5	4.84	9.27	2.03	
11. Tt = L /	3600V	Compute T	t hr	0.01	0.00	0.02	0.03
		oopato .		0.0.	0.00	0.02	0.00
Channel flo	ow .		Segment ID				
			J				
12. Cross s	sectional flow area, a		sf				
13. Wetted	perimeter, pw		ft				
14. Hydrau	lic radius, r=a/wp	Compute r	ft				
15. Channe	el Slope, s		ft/ft				
16. Mannin	g's roughness coeff., n						
	9 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow le			ft				
19. Tt = L /	<u> </u>	Compute T					0
		•					
20. Waters	hed or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	d 19)			hr	0.29
			•			min	17.6

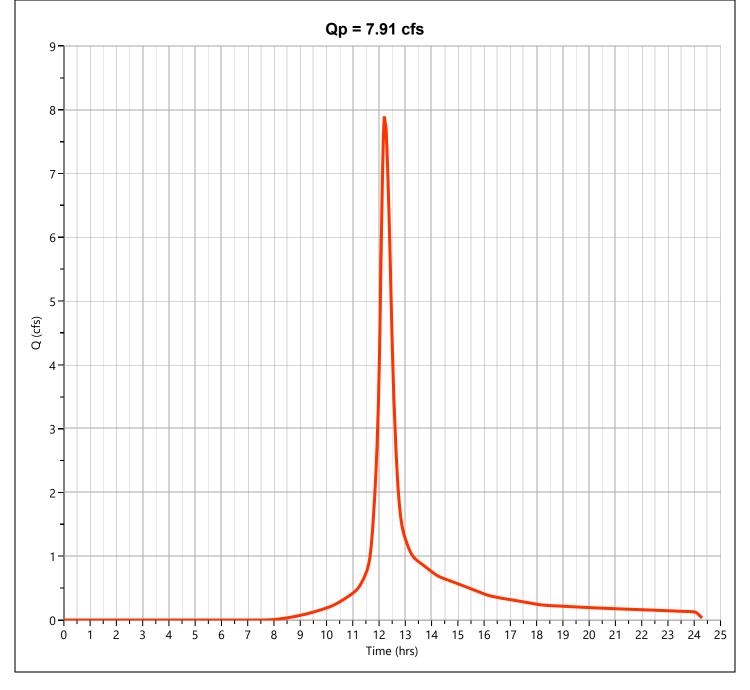
Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.628 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 11,989 cuft
Drainage Area	= 2.75 ac	Curve Number	= 76
Tc Method	= User	Time of Conc. (Tc)	= 17.6 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



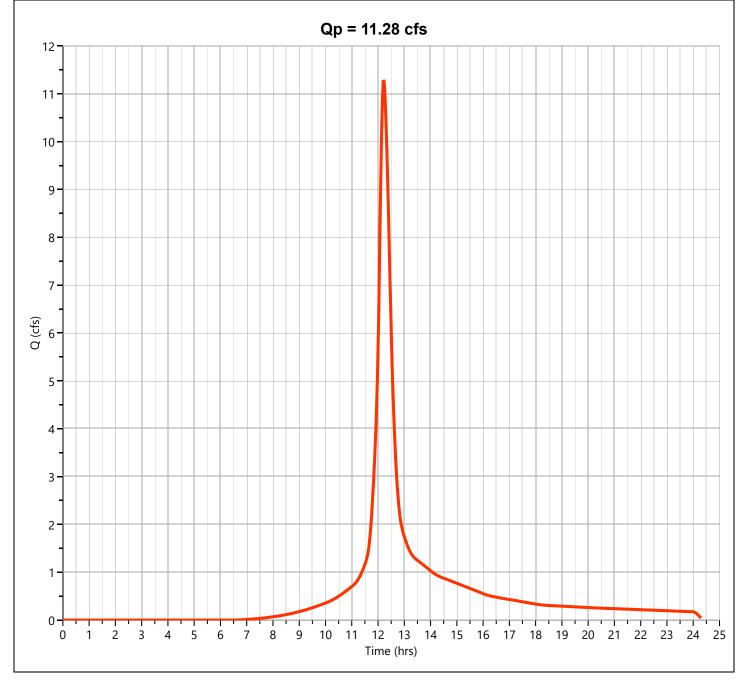
Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.798 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 25,640 cuft
Drainage Area	= 2.75 ac	Curve Number	= 76
Tc Method	= User	Time of Conc. (Tc)	= 17.6 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 7.910 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 34,951 cuft
Drainage Area	= 2.75 ac	Curve Number	= 76
Tc Method	= User	Time of Conc. (Tc)	= 17.6 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 11.28 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 50,037 cuft
Drainage Area	= 2.75 ac	Curve Number	= 76
Tc Method	= User	Time of Conc. (Tc)	= 17.6 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



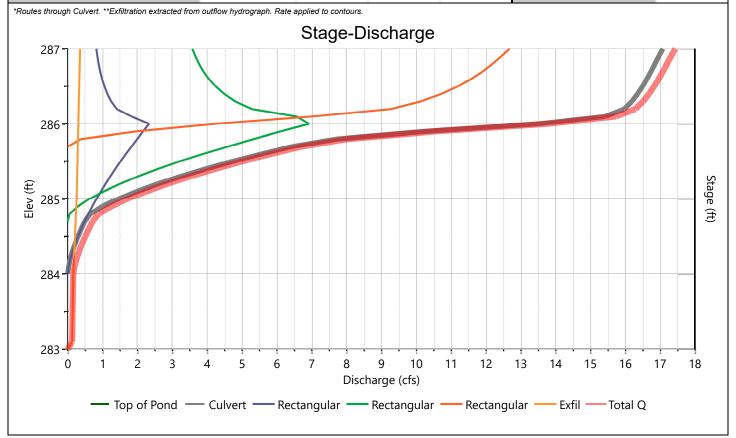
# IB-5B Stage-Storage

ι	Jser Defined Conto	urs			Stage / Stora	ige Table	
	Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
	Bottom Elevation, ft	283.00					
	Voids (%)	100.00	0.00 1.00	283.00 284.00	2,245 2,866	0.000 2,556	0.000 2,556
			2.00	285.00	4,622	3,744	6,300
	Volume Calc	Ave End Area	3.00	286.00	5,477	5,050	11,349
			4.00	287.00	6,388	5,933	17,282
			1				
		S	Stage-S	Storage			
287 –							<b>-</b> 4
4							
286							-3
_							
							<u> </u>
± > 285							2 iai 2 e
£) ≥285 -							Stage (ft)
1							
284							1
204							
J							
] /							
393							
283 <del> </del> 0	2000 4000	6000	8000	10000	12000	14000 1600	0 18000
•	2000 -1000	2300		orage (cuft)	.2000		
			— <u> </u>	ontours			

#### IB-5B

## Stage-Discharge

Cultivant / Onificas	Culvent		Orifices		Dowforeted Die	
Culvert / Orifices	Culvert	1	2	3	Perforated Ris	er
Rise, in	15				Hole Diameter, in	
Span, in	15				No. holes	
No. Barrels	1				Invert Elevation, ft	
Invert Elevation, ft	278.00				Height, ft	
Orifice Coefficient, Co	0.60				Orifice Coefficient, Co	
Length, ft	52					
Barrel Slope, %	11.5					
N-Value, n	0.012					
Maine	Diggs*		Weirs		Anailland	
Weirs	Riser*	1*	2*	3*	Ancillary	
Shape / Type	Circular	Rectangular	Rectangular	Rectangular	Exfiltration, in/hr	2.41**
Crest Elevation, ft		284	284.75	285.75		
Crest Length, ft		.25	1.5	10.25		
Angle, deg						
Weir Coefficient, Cw		3.3	3.3	3.3		

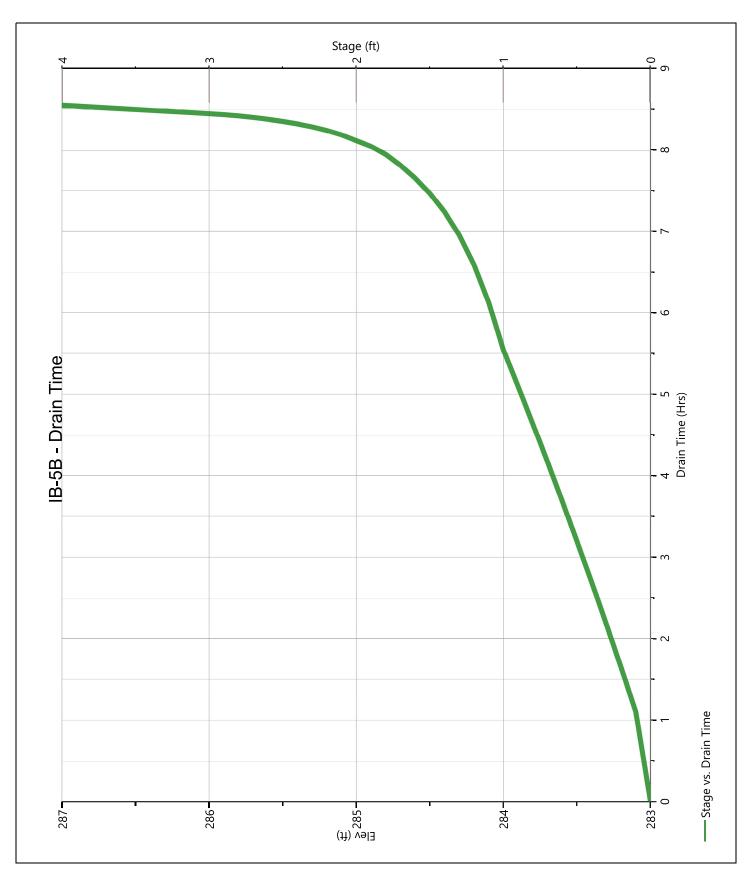


#### IB-5B

## **Stage-Storage-Discharge Summary**

Stage	Elev.	Storage	Culvert	(	Orifices, cf	's	Riser		Weirs, cfs		Pf Riser	Exfil	User	Total
(ft)	(ft)	(cuft)	(cfs)	1	2	3	(cfs)	1	2	3	(cfs)	(cfs)	(cfs)	(cfs)
0.00	283.00	0.000	0.000					0.000	0.000	0.000		0.000		0.000
1.00	284.00	2,556	0.000 ic					0.000	0.000	0.000		0.160		0.160
2.00	285.00	6,300	1.444 ic					0.825	0.619	0.000		0.258		1.702
3.00	286.00	11,349	13.48 ic					2.333	6.918	4.228		0.306		13.78
4.00	287.00	17,282	17.07 ic					0.821 s	3.574 s	12.67 s		0.356		17.42

#### IB-5B Pond Drawdown



	ngraph Type n Frequency	= Pond Route = 2-yr	Peak Flow Time to Peak	= 0.352 cfs = 12.90 hrs
	Interval	= 2 min	Hydrograph Volume	= 3,194 cuft
	/ Hydrograph	= 13 - P-5B	Max. Elevation	= 284.57 ft
	Name	= IB-5B	Max. Storage	= 4,674 cuft
ond R	outing by Storage In	ndication Method		
		Qp = 0.35	5 cfs	
3 –		·		
-	-			
2-				
-	-			
(c				
(s) 1-				
-	-			
0-				
-	1			
-1 <del>-</del>	0 1 2	3 4 5 6 7 8 9	10 11 12 13 14 15	16 17 18
,	0 1 2	Time		10 17 10

ydrograph Type torm Frequency	= Pond Route = 10-yr	Peak Flow Time to Peak	= 3.250 cfs = 12.47 hrs
ime Interval	= 2 min	Hydrograph Volume	= 12.47 fils = 13,966 cuft
nflow Hydrograph	= 13 - P-5B	Max. Elevation	= 285.30 ft
ond Name	= IB-5B	Max. Storage	= 7,820 cuft
ond Name		Max. Otorage	7,020 ouit
one realing by elerage i		a.f.a	
67	Qp = 3.25	CIS	
5			
4			
-			
3 -			
(CIS) -			
g			
2 -			
-			
1			
1			
0			
1			
0 1 2	3 4 5 6 7 8 9 10 11	12 13 14 15 16 17 18	3 19 20 21
	Time (I	hrs)	

lydrograph Type	= Pond Route	Peak Flow	= 5.512 cfs
torm Frequency	= 25-yr	Time to Peak	= 12.40 hrs
ime Interval	= 2 min	Hydrograph Volume	= 22,102 cuft
nflow Hydrograph	= 13 - P-5B	Max. Elevation	= 285.60 ft
ond Name	= IB-5B	Max. Storage	= 9,306 cuft
ond Routing by Storage In			
	Qp = 5.51 c	fs	
9 -			
8			
-			
7 -			
1			
6			
-			
5			
4			
-			
3			
_			
2			
	<b> </b>		
1			
1			
-			
0			
0 1 2 3	3 4 5 6 7 8 9 10 11 12	13 14 15 16 17 18 1	9 20 21 22
	Time (hrs		

lydrograph Type	= Pond Route	Peak Flo		= 9.833 cfs
torm Frequency	= 100-yr	Time to F		= 12.33 hrs
ime Interval	= 2 min		ph Volume	= 35,778 cuft
nflow Hydrograph	= 13 - P-5B	Max. Ele		= 285.89 ft
ond Name	= IB-5B	Max. Sto	rage	= 10,765 cuft
ond Routing by Storage				
12 –	Qp = 9.8	33 cfs		
-				
11				
-				
10				
-				
9				
8-				
_				
7				
-				
<u>§</u> 6				
C (CES)				
5				
4				
-				
3		H		
-				
2				
1-	<i></i>			
· <u> </u>				
0				
-				
-1 <del>                                    </del>		12 13 14 15 16 1		
· . L		ne (hrs)	10 15 2	

Project:	Athens Street		Ву	PFK	Date	6/21/22
					Rev Date	10/13/2022
Location:	Stow, MA		Checked		Date	6/17/2023
Circle one:	Present	Developed	Subcatchme	nt P-5C		

1. Runoff curve number (CN)

Soil name and hydrologic	Cover description (cover type, treatment, and		CN 1/		Area	Product of CN x Area
group (appendix A)	hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious	98			0.61	60.01
А	Woods Good Condition	30			0.00	0.00
А	Open Space Good Condition	39			0.00	0.00
А	Open Space Fair Condition	49			0.00	0.00
А	Gravel	76			0.00	0.00
С	Woods Good Condition	70			0.00	0.00
С	Open Space Poor Condition	86			0.00	0.00
С	Open Space Good Condition	70			0.60	42.22
D	Open Space Good Condition	80			0.00	0.00
1/ Use only one	CN source per line.	2946		Totals =	1.22	102.23

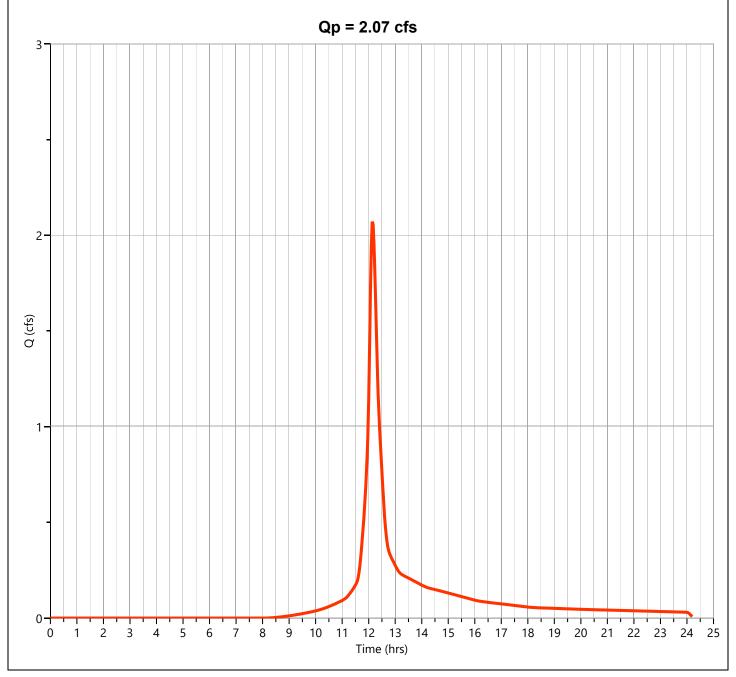
CN (weighted) =	total product	_=	102.23 =	84.11	;	Use CN =	84
	total area		1.22		•		

2	Runoff
۷.	Rulloll

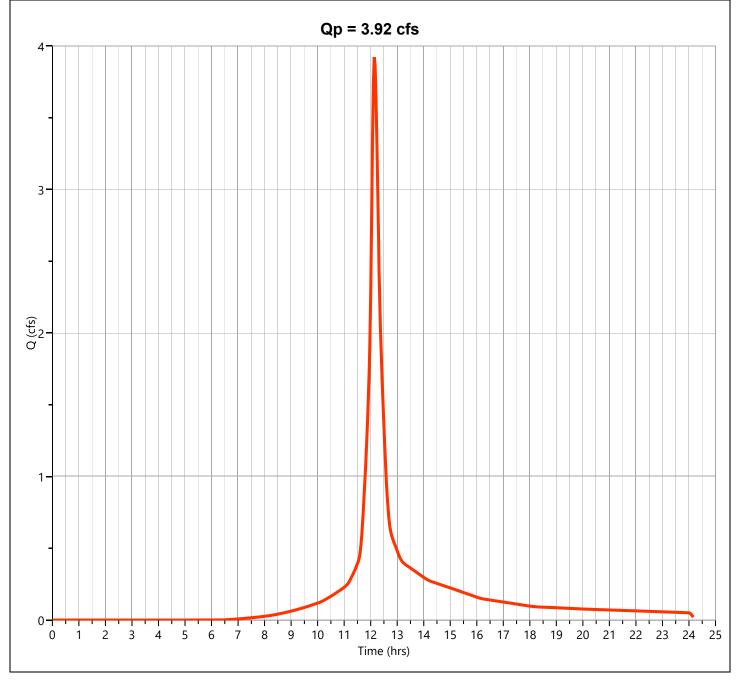
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
1.75	4.34	5.95

Project:	Athens Street	_	Ву	PFK		6/21/2022	
			<u> </u>			10/13/2022	
Location:	Stow, MA	-	Checked		Date	6/17/2023	
Circle one:	Present Developed	1	Subcatchm	nent P-5C			
Circle one:		through	Cubcatoriii	ICHT -OO			
		subarea					
01 1 4	(A		0 115	4.5			
Sheet flow	(Applicable to Tc only)		Segment ID	A-B			
1 Surface	Description (table 3-1)			WOODS			
i. Suriace	Description (table 3-1)			WOODS			
2. Manning	s roughness coeff., n (table 3-1)			0.6			
	, c c g			0.0			
3. Flow len	gth, L (total L <= 300 ft)		ft	50			
	,						
4. Two-yr 2	24-hr rainfall, P2		in	3.1			
5. Land Slo	ope, s		ft/ft	0.065			
. =:				0.40			0.40
6. It = 0.00	07 (nL)^0.8 / (P2^0.5 s^0.4)	Compute T	i hr	0.18			0.18
Shallow oo	ncentrated Flow		Segment ID	C-D			
Sitallow Co	incentifated Flow		Segment ib	C-D			
7. Surface	Description (paved or unpaved)			UNPAVED			
r. Gariago	Description (parea of anjeavea)			OI II / II LD			
8. Flow Ler	ngth, L		ft	35			
9. Waterco	urse slope, s		ft/ft	0.200			
10. Averag	e Velocity, V (figure 3-1)		ft/s	7.22			
44 74 1 /	20001/	O	. In	0.00			0.00
11. Tt = L /	36007	Compute T	nr	0.00			0.00
Channel flo	2)4/		Segment ID				
Chamileine			Segment ib				
12. Cross s	sectional flow area, a		sf				
	perimeter, pw		ft				
	lic radius, r=a/wp	Compute r	ft				
15. Channe			ft/ft				
	ig's roughness coeff., n						
	9 r^2/3 s^1/2 / n	Compute V	ft/s				
		Jonnpule V	ft				
18. Flow le 19. Tt = L /	=	Compute T					0
ı⊎. Il – L /	3000 V	Compute 1	. 111				U
20 Waters	hed or subarea Tc or Tt (add Tt in ste	ns 6 11 an	1 10)			hr	0.18
LU. WAICIS	iled of Subarea 10 of 11 (add 11 III Ste	ρο υ, τι, απ	. 1 <i>3)</i>			min	10.9
							10.5

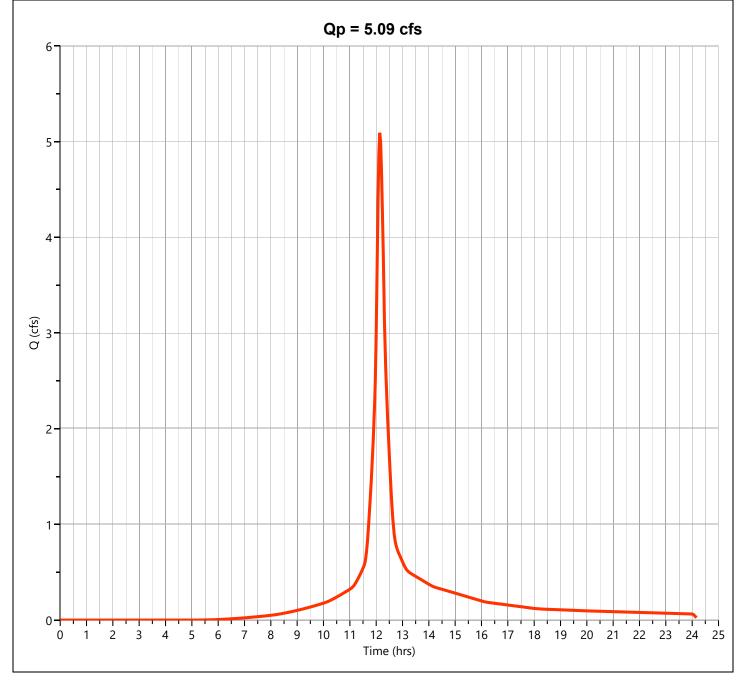
Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.072 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 7,952 cuft
Drainage Area	= 1.22 ac	Curve Number	= 84
Tc Method	= User	Time of Conc. (Tc)	= 10.9 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



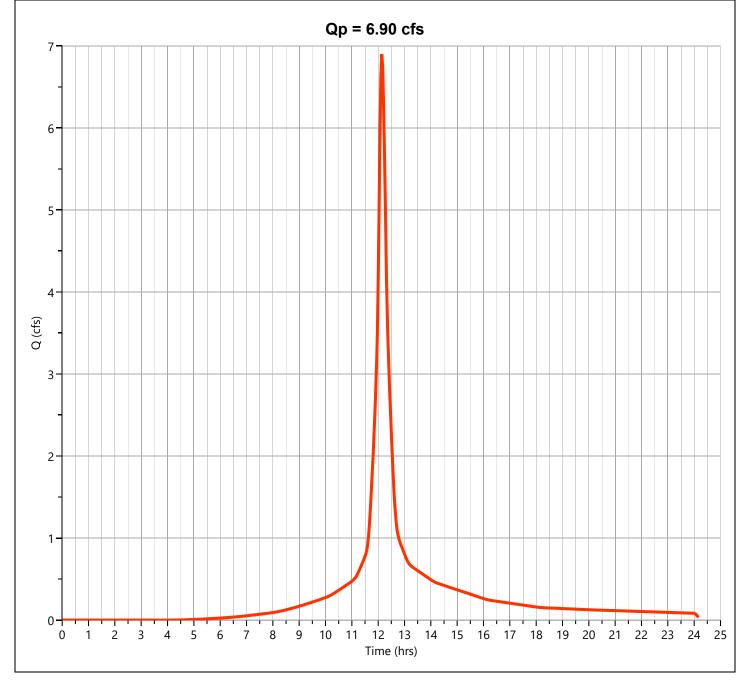
Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.921 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 15,103 cuft
Drainage Area	= 1.22 ac	Curve Number	= 84
Tc Method	= User	Time of Conc. (Tc)	= 10.9 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



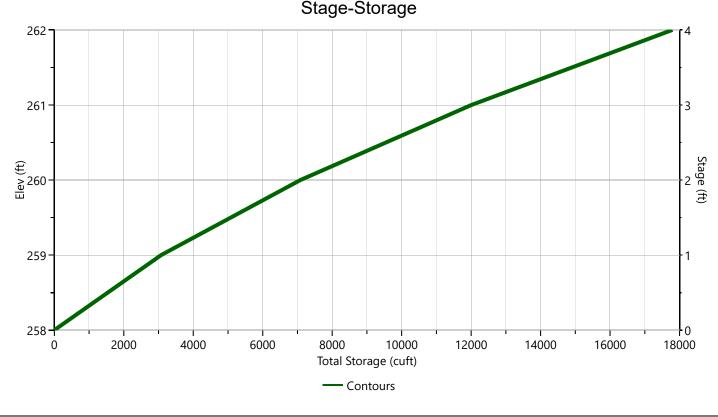
Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.092 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 19,765 cuft
Drainage Area	= 1.22 ac	Curve Number	= 84
Tc Method	= User	Time of Conc. (Tc)	= 10.9 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.902 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 27,136 cuft
Drainage Area	= 1.22 ac	Curve Number	= 84
Tc Method	= User	Time of Conc. (Tc)	= 10.9 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



User Defined Contour	S	Stage / Storage Table						
Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)		
Bottom Elevation, ft	258.00							
Voids (%)	100.00	0.00 1.00	258.00 259.00	2,638 3,517	0.000 3,078	0.000 3,078		
Volume Calc		2.00	260.00	4,505	4,011	7,089		
volume Calc	None	3.00	261.00	5,340	4,923	12,011		
		4.00	262.00	6,231	5,786	17,797		
		0.						
		Stage-S	Storage					
262						4		
1								

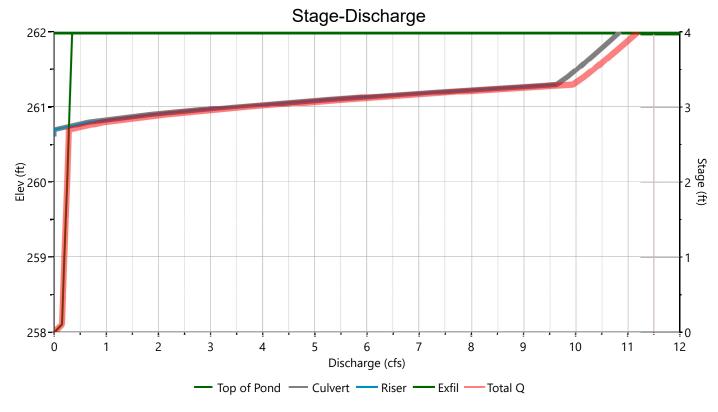


#### IB-5C

## Stage-Discharge

Cultivant / Onificas	Cultivant		Orifices		Orifice Plate		
Culvert / Orifices	Culvert	1	2	3	Orifice Plate		
Rise, in	15				Orifice Dia, in		
Span, in	15				No. Orifices		
No. Barrels	1				Invert Elevation, ft		
Invert Elevation, ft	258.00				Height, ft		
Orifice Coefficient, Co	0.60				Orifice Coefficient, Co		
Length, ft	88						
Barrel Slope, %	2.12						
N-Value, n	0.012						
Weirs	Riser*	Weirs			Anaillam		
vveirs	Kisei	1	2	3	Ancillary		
Shape / Type	Circular				Exfiltration, in/hr	2.41**	
Crest Elevation, ft	260.7						
Crest Length, ft	6.28						
Angle, deg							
Weir Coefficient, Cw	3.3						

\*Routes through Culvert. \*\*Exfiltration extracted from outflow hydrograph. Rate applied to contours.

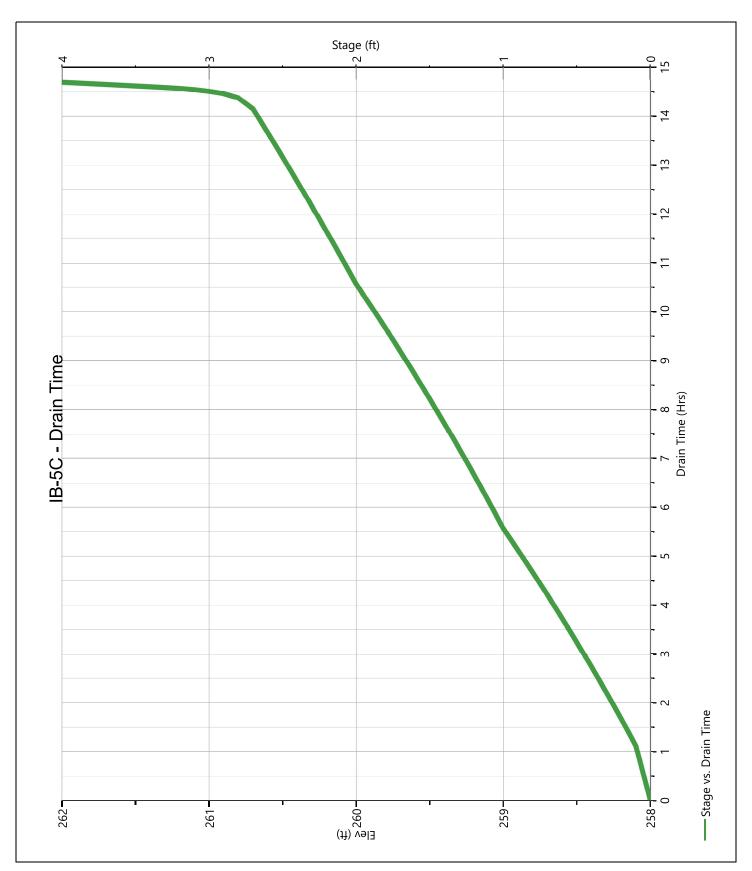


#### IB-5C

## **Stage-Storage-Discharge Summary**

Stage	Elev.	Storage	Culvert	C	Orifices, cf	s	Riser		Weirs, cfs	irs, cfs		Exfil	User	Total
Stage (ft)	(ft)	(cuft)	(cfs)	1	2	3	(cfs)	1	2	3	Pf Riser (cfs)	(cfs)	(cfs)	(cfs)
0.00	258.00	0.000	0.000				0.000					0.000		0.000
1.00	259.00	3,078	0.000				0.000					0.196		0.196
2.00	260.00	7,089	0.000				0.000					0.251		0.251
3.00	261.00	12,011	3.405 ic				3.405					0.298		3.703
4.00	262.00	17,797	10.85 ic				0.000					0.348		11.20

#### IB-5C Pond Drawdown



lydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.87 hrs
ime Interval	= 2 min	Hydrograph Volume	= 0.002 cuft
nflow Hydrograph	= 15 - P-5C	Max. Elevation	= 259.12 ft
Pond Name	= IB-5C	Max. Storage	= 3,568 cuft
ond Routing by Storage Inc	dication Method	Center of ma	ass detention time = 6 mii
	Qp = 0.00 cfs		
3			
2 <del>-</del>			
-			
-1			
0 1 2	3 4 5 6 7 8 9	10 11 12 13	14 15 1
	Time (hrs)		

lydrograph Type Storm Frequency	= Pond Route = 10-yr	Peak Flow Time to Peak	= 0.000 cfs = 12.13 hrs
ime Interval	= 2 min	Hydrograph Volume	= 0.001 cuft
iflow Hydrograph		Max. Elevation	= 0.001 cuit = 260.17 ft
ond Name	= IB-5C	Max. Storage	= 7,907 cuft
ond Routing by Storage		Wax. Otorago	7,007 Gait
3 1, 111	Qp = 0.00 cf	•	
4	<b>ωρ – 0.00 ει</b>	<b>5</b>	
3-			
-			
2			
1-			
0			
-1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -	2 3 4 5 6	7 8 9 10	11 12
	Time (hrs)		

ydrograph Type	= Pond Route	Peak Flow	= 0.135 cfs
torm Frequency	= 25-yr	Time to Peak	= 13.73 hrs
me Interval	= 2 min	Hydrograph Volume	= 483 cuft
flow Hydrograph	= 15 - P-5C	Max. Elevation	= 260.72 ft
ond Name	= IB-5C	Max. Storage	= 10,635 cuft
ond Routing by Storage In	dication Method	Center of ma	ss detention time = 35 n
	Qp = 0.13 cfs		
6			
1			
5			
1			
4			
1			
3			
2			
1			
†			
0-			
0 1 2	3 4 5 6 7 8	9 10 11 12 13	14 15
- · · · -	Time (hrs)		

ydrograph Type	= Pond Route = 100-yr	Peak Flow Time to Peak	= 2.414 cfs = 12.43 hrs
torm Frequency ime Interval	= 100-yi = 2 min	Hydrograph Volume	= 12.43 nrs = 6,054 cuft
	= 15 - P-5C	Max. Elevation	= 0,034 cuit = 260.94 ft
ond Name	= IB-5C		= 11,696 cuft
ond Routing by Storage Ind		Max. Storage	- 11,090 Cuit
ond Routing by Storage Ind.			
7	Qp = 2.41 cfs		
1			
6			
1			
5			
1			
4			
_ 1			
3			
2			
1-			
4			
0			
4			
-1 -1 - 2	3 4 5 6 7 8 9	10 11 12 13	14 15

Project:	Athens Street		Ву	PFK	Date	6/21/22
					Rev Date	10/13/2022
Location:	Stow, MA		Checked		Date	6/17/2023
Circle one:	Present	Developed	Subcatchme	ant P-5E	•	

1. Runoff curve number (CN)

Soil name and hydrologic	Cover description (cover type, treatment, and			CN 1/			Product of CN x Area
group (appendix A)		hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious		98			1.09	106.43
А	Woods	Good Condition	30			2.63	78.99
А	Open Space	Good Condition	39			2.05	80.04
Α	Open Space	Fair Condition	49			0.00	0.00
Α	Gravel		76			0.00	0.00
С	Woods	Good Condition	70			0.54	37.93
С	Open Space	Good Condition	77			0.43	33.48
С	Gravel		89			0.00	0.00
D	Woods	Good Condition	91			0.00	0.00
D	Open Space	Good Condition	80			0.00	0.00
D	Gravel		91			0.00	0.00
D	BVW		77			2.22	170.98
1/ Use only one	CN source per line.	39	0664		Totals =	8.97	507.85

CN (weighted) =	total product	=	507.85 =	56.63	_;	Use CN =	57
'	total area	_	8.97				

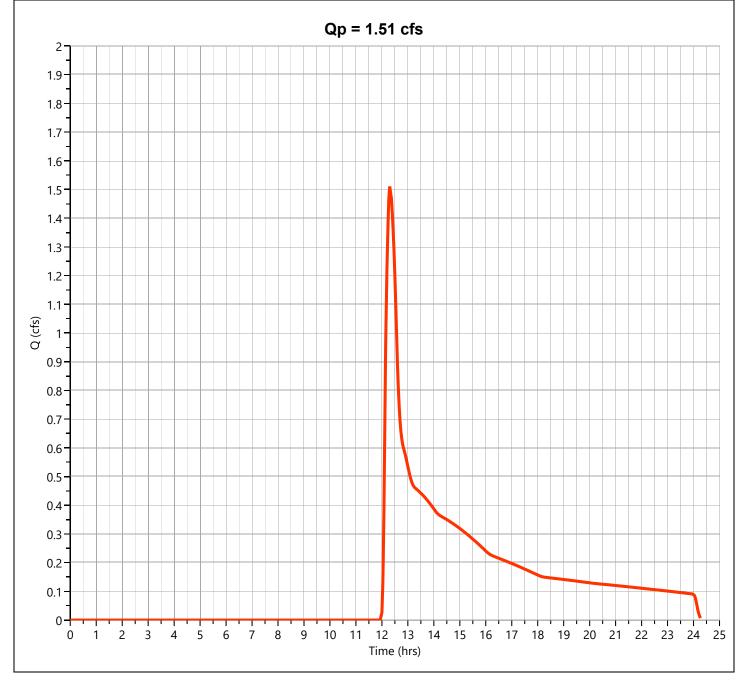
2	Runoff
۷.	Rulloll

Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.32	1.73	2.85

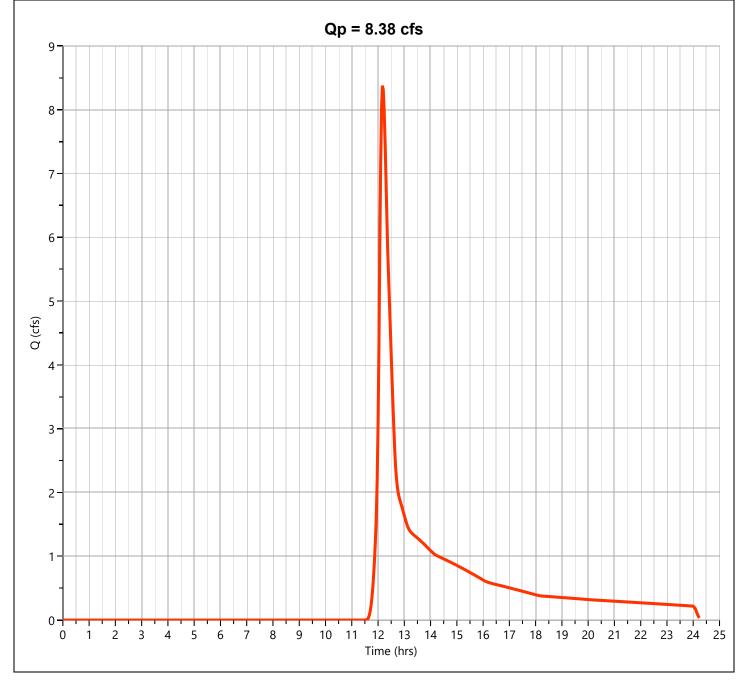
SM-3719C

Project: Athens Street	_	Ву	PFK		6/21/2022	
					10/13/2022	
Location: Stow, MA	-	Checked		Date	6/17/2023	
Circle one: Present Developed	1	Subcatchn	nent P-5F			
Circle one: Tc Tt	through	Cubcutoriii	HOHET OL			
	subarea					
OL 15 (A 15 LL 1 T L)		0 110	4 D			
Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			WOODS			
1. Surface Description (table 3-1)			WOODS			
2. Mannings roughness coeff., n (table 3-1)			0.6			
a			0.0			
3. Flow length, L (total L <= 300 ft)		ft	50			
,						
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.060			
0.7: 0.007 ( 1.)40.0 ( (7.040.7 40.4)			2.42			0.40
6. Tt = $0.007 (nL)^0.8 / (P2^0.5 s^0.4)$	Compute T	t hr	0.19			0.19
Challey, and contrated Flave		Cammant ID	B-C			
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
7. Gariage Description (paved of anpaved)			ON AVED			
8. Flow Length, L		ft	459			
3 /						
9. Watercourse slope, s		ft/ft	0.080			
10. Average Velocity, V (figure 3-1)		ft/s	4.56			
11. Tt = L / 3600V	Compute T	t hr	0.03			0.03
Observed floor		0 1D				
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r					
15. Channel Slope, s	oompato.	ft/ft				
16. Manning's roughness coeff., n		1011				
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L	Joinpute V	ft				
19. Tt = L / 3600V	Compute T					0
19. It = L / 3000 V	Compute 1	. 111				U
20. Watershed or subarea Tc or Tt (add Tt in ste	ns 6 11 an	H 19)			hr	0.21
20. Watershed or Subarea 10 or 11 (add 11 III Ste	po 0, 11, all	,			min	12.8
						12.0

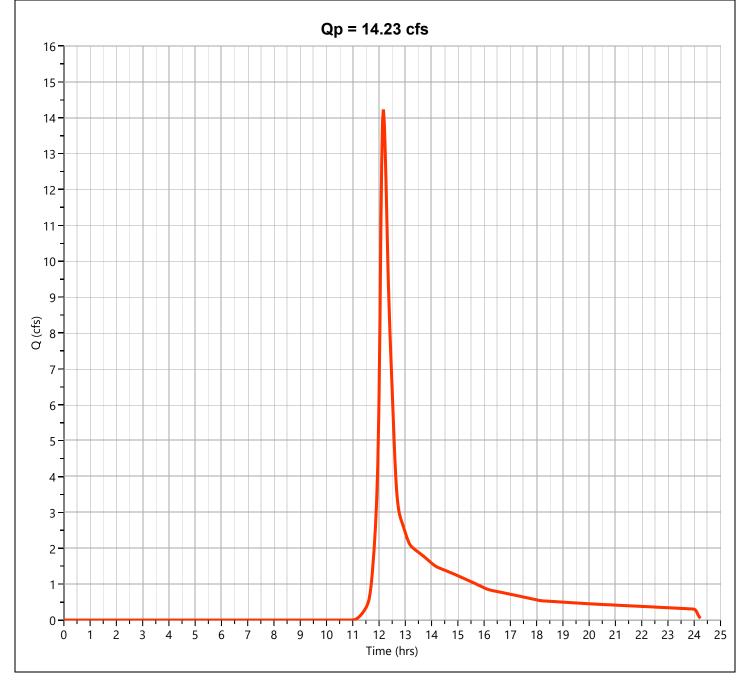
Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.511 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.30 hrs
Time Interval	= 2 min	Runoff Volume	= 11,193 cuft
Drainage Area	= 8.97 ac	Curve Number	= 57
Tc Method	= User	Time of Conc. (Tc)	= 12.8 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



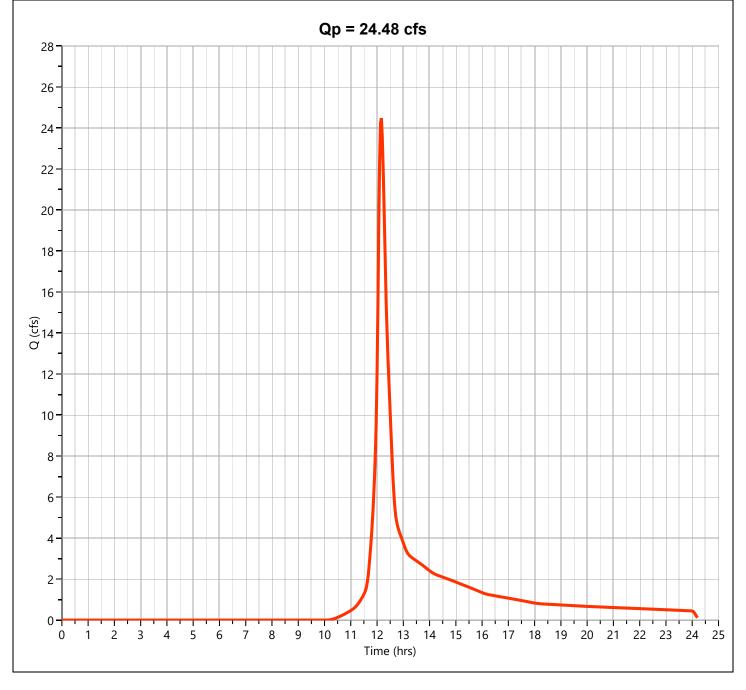
Hydrograph Type	= NRCS Runoff	Peak Flow	= 8.379 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 37,806 cuft
Drainage Area	= 8.97 ac	Curve Number	= 57
Tc Method	= User	Time of Conc. (Tc)	= 12.8 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



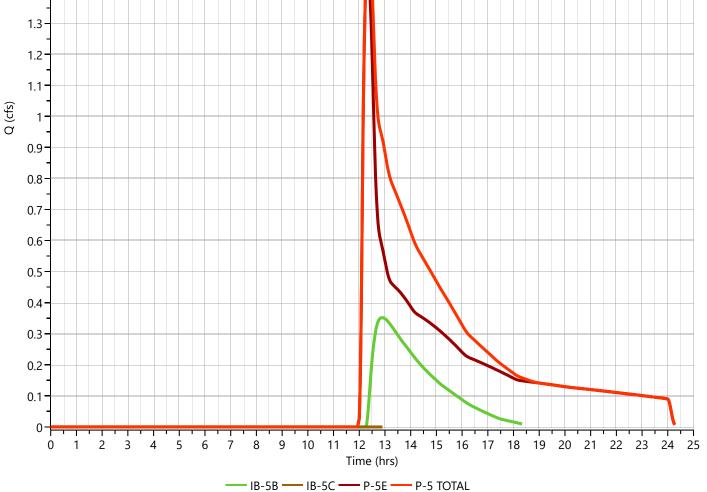
Hydrograph Type	= NRCS Runoff	Peak Flow	= 14.23 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 59,154 cuft
Drainage Area	= 8.97 ac	Curve Number	= 57
Tc Method	= User	Time of Conc. (Tc)	= 12.8 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 24.48 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 97,007 cuft
Drainage Area	= 8.97 ac	Curve Number	= 57
Tc Method	= User	Time of Conc. (Tc)	= 12.8 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

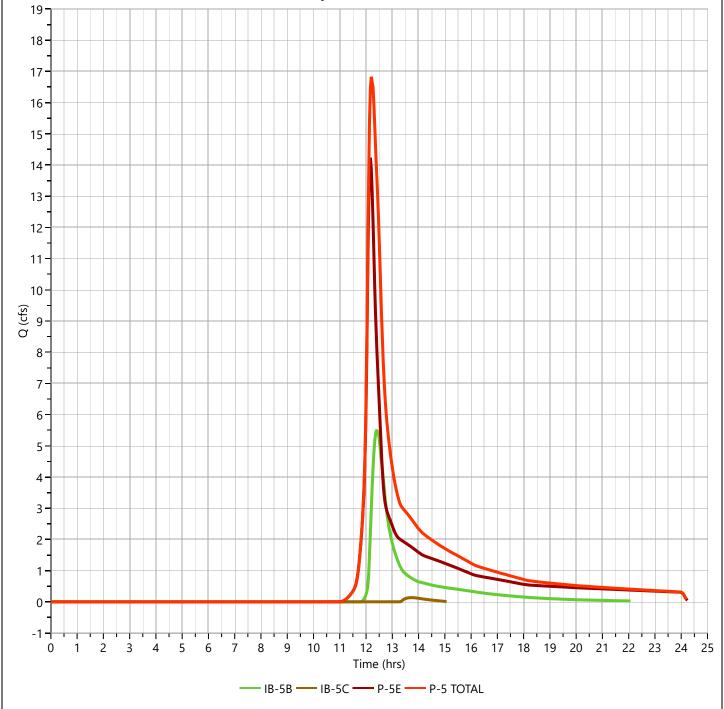


P-5 TOTAL					Hyd. No. 18
Hydrograph Type	= Junction			Peak Flow	= 1.549 cfs
Storm Frequency	= 2-yr			Time to Peak	= 12.33 hrs
Time Interval	= 2 min			Hydrograph Volume	= 14,387 cuft
Inflow Hydrographs	= 14, 16, 17			Total Contrib. Area	= 8.97 ac
		Qp = 1.55	cfs		
1.9 - 1.8 - 1.7 - 1.6 - 1.5 -					
1.4					
1.3					
1.2					
1.1 <del>-</del> (S) 1 <del>-</del> (1.1 + 1.1 +					



lydrograph Type	= Junction	Peak Flow	= 9.173 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.27 hrs
ime Interval	= 2 min	Hydrograph Volume	= 51,772 cuft
nflow Hydrographs	= 14, 16, 17	Total Contrib. Area	= 8.97 ac
4.0	Qp = 9.17 cfs		
10 7			
1			
9			
-			
8	<u> </u>		
1			
7	<del></del>		
4			
6			
4			
5			
4-			
<u>-</u>			
3-			
1			
2			
-			
1			
-			
0			
-1			
0 1 2 3	4 5 6 7 8 9 10 11 12 13 14 15 Time (hrs)	16 17 18 19 20	21 22 23 24 2
	—— IB-5B —— IB-5C —— P-5E —— P-5		

OTOTAL				1194. 110. 10
Hydrograph Type	= Junction		Peak Flow	= 16.83 cfs
Storm Frequency	= 25-yr		Time to Peak	= 12.20 hrs
Time Interval	= 2 min		Hydrograph Volume	= 81,739 cuft
Inflow Hydrographs	= 14, 16, 17		Total Contrib. Area	= 8.97 ac
		Qp = 16.83 cfs		
18 - 17 -				



Hydrograph Type	= Junction	Peak Flow	= 30.35 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Гime Interval	= 2 min	Hydrograph Volume	= 138,839 cuft
nflow Hydrographs	= 14, 16, 17	Total Contrib. Area	= 8.97 ac
	Qp = 30.35 cfs		
34 –	<b>Q</b> ρ – 30.33 Cl3		
33			
32			
31 =			
30 -			
29			
28 -			
27 - 26 -			
25 -			
24	<b>_</b>		
23			
22 =	<del></del>		
21			
20	<del></del>		
19			
<u>9</u> 18 <del>-</del>			
(デート) 17 - 16 - 16 - 16 - 16 - 16 - 16 - 16 -			
15			
14			
13 -			
12 -	<del></del>		
11 -			
10	All		
9 =			
8 -			
7-			
5			
4 -			
3 -			
2 -			
1 -			
0			
0 1 2 3	4 5 6 7 8 9 10 11 12 13 1 Time (hrs)	4 15 16 17 18 19 20	21 22 23 24
	Title (IIIS)		

#### Worksheet 2: Runoff curve number and runoff

SM-3719C

Project:	Athens Street	Ву	NC	Date	6/24/22
				Rev Date	10/13/2022
Location:	Stow, MA	Checked		Date	6/17/2023
Circle one:	Present Developed	Subcatchment	P-6A	•	

1. Runoff curve number (CN)

Soil name and hydrologic	(cover	Cover description  type, treatment, and		CN 1/			Area	Product of CN x Area
group (appendix A)		hydrologic condition: percent impervious: unconnected/connected impervious area ratio)		Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious			98			0.02	1.48
А	Woods	Good Condition		30			0.99	29.65
А	Open Space	Good Condition		39			0.71	27.50
А	Open Space	Fair Condition		49			0.00	0.00
А	Gravel			76			0.00	0.00
В	Woods	Good Condition		55			0.00	0.00
В	Open Space	Good Condition		61			0.00	0.00
В	Gravel			85			0.00	0.00
С	Woods	Good Condition		70			0.00	0.00
С	Open Space	Good Condition		74			0.00	0.00
С	Open Space	Poor Condition		86			0.00	0.00
С	Gravel			89			0.00	0.00
D	BVW			77			0.08	6.03
D	Woods	Good Condition		77			0.00	0.00
D	Open Space	Good Condition		80			0.00	0.00
1/ Use only one	CN source per line.		77823			Totals =	1.79	64.65

CN (weighted) =	total product	_=	64.65 =	36.19;	Use CN =	36
•	total area		1.79		'	

2.	Runoff				
			Storm #1	Storm #2	Storm #3
Fre	allency	Vr	2	25	100

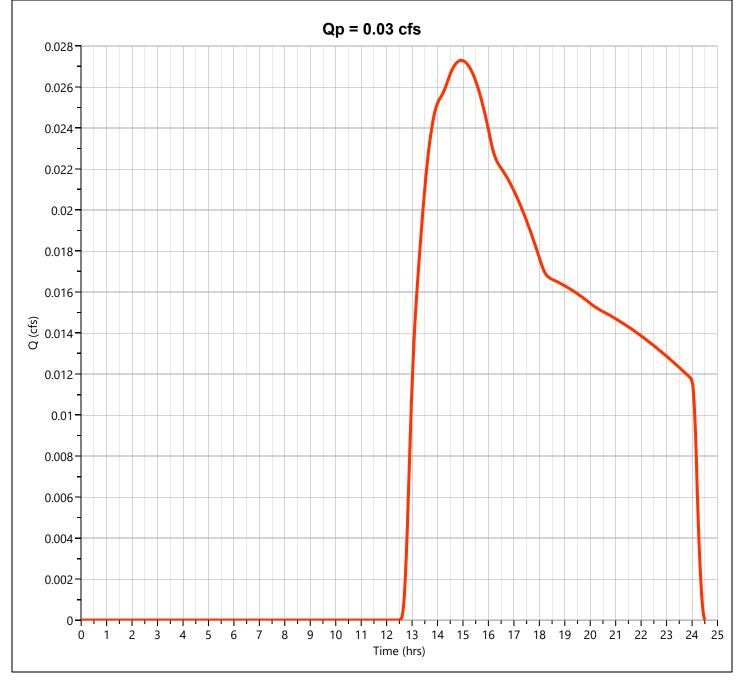
Project:	Athens Street	_	Ву	NC NC		6/24/2022	
			<b>-</b>			10/13/2022	
Location:	Stow, MA	_	Checked		Date	6/17/2023	
Circle one:	Present Developed	1	Subcatchn	nent P-6A			
Circle one:		through	Capcaterin	HOILT -OA			
		subarea	-				
01 1 1	(A		0 415	4 D			
Sheet flow	(Applicable to Tc only)		Segment ID	A-B			
1 Surface	Description (table 3-1)			WOODS			
i. Guilacc	Description (table 0-1)			WOODO			
2. Manning	s roughness coeff., n (table 3-1)			0.6			
J	,						
3. Flow len	gth, L (total L <= 300 ft)		ft	50			
4. Two-yr 2	24-hr rainfall, P2		in	3.1			
			£1./£1	0.000			
5. Land Slo	ope, s		ft/ft	0.020			
6 Tt = 0.00	07 (nL)^0.8 / (P2^0.5 s^0.4)	Compute T	t hr	0.29			0.29
0. 11 0.00	(112) 0.07 (12 0.00 0.1)	Compute 1		0.20			0.20
Shallow co	ncentrated Flow		Segment ID	B-C			
7. Surface	Description (paved or unpaved)			UNPAVED			
8. Flow Ler	ngth, L		ft	381			
0 Wateres	urse slope, s		ft/ft	0.030			
9. Waterco	urse slope, s		11/11	0.030			
10. Average	e Velocity, V (figure 3-1)		ft/s	2.79			
11. Tt = L /	3600V	Compute T	t hr	0.04			0.04
Channel flo	ow		Segment ID				
40. 0			- £				
	sectional flow area, a		sf ft				
	perimeter, pw	Computor					
15. Channe	lic radius, r=a/wp	Compute r					
	•		ft/ft				
	g's roughness coeff., n						
	9 r^2/3 s^1/2 / n	Compute V					
18. Flow le	<del>-</del>	_	ft				
19. Tt = L /	3600V	Compute T	t hr				0
00 14/ /	had an authoria Tall Tri Chita	0 44	-1.40)			la	2.22
20. Waters	hed or subarea Tc or Tt (add Tt in ste	eps 6, 11, an	a 19)			hr	0.33
						min	19.6

# P-6A Hyd. No. 34

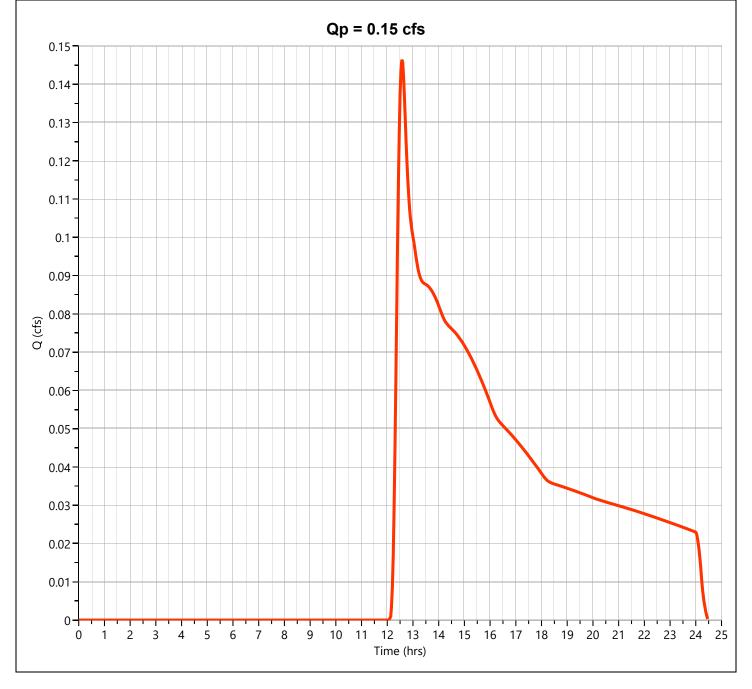
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.00 hrs
Time Interval	= 2 min	Runoff Volume	= 0.000 cuft
Drainage Area	= 1.79 ac	Curve Number	= 36
Tc Method	= User	Time of Conc. (Tc)	= 19.6 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 0.00 cfs

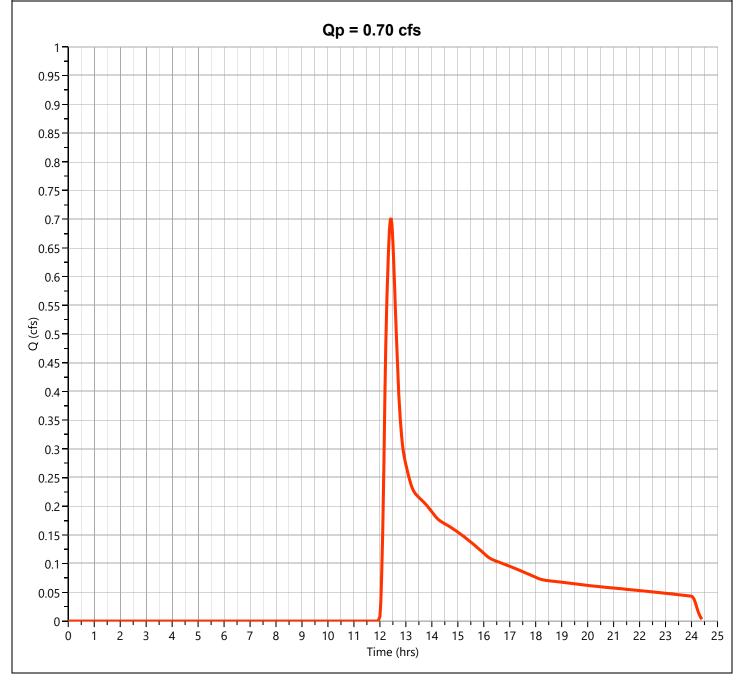
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.027 cfs
Storm Frequency	= 10-yr	Time to Peak	= 14.93 hrs
Time Interval	= 2 min	Runoff Volume	= 743 cuft
Drainage Area	= 1.79 ac	Curve Number	= 36
Tc Method	= User	Time of Conc. (Tc)	= 19.6 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.146 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.57 hrs
Time Interval	= 2 min	Runoff Volume	= 2,131 cuft
Drainage Area	= 1.79 ac	Curve Number	= 36
Tc Method	= User	Time of Conc. (Tc)	= 19.6 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.702 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.43 hrs
Time Interval	= 2 min	Runoff Volume	= 5,404 cuft
Drainage Area	= 1.79 ac	Curve Number	= 36
Tc Method	= User	Time of Conc. (Tc)	= 19.6 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



#### Worksheet 2: Runoff curve number and runoff

SM-3719C

Project:	Athens Street	By NC	Date	6/24/22
			Rev Date	10/13/2022
ocation:	Stow, MA	Checked	Date	6/17/2023
Circle one:	Present Developed	Subcatchment P-6	В	

1. Runoff curve number (CN)

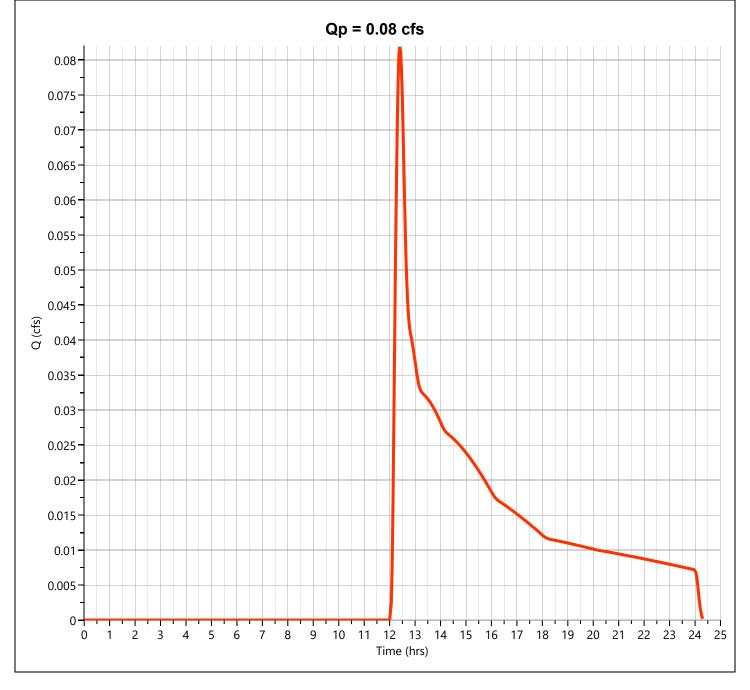
Soil name and hydrologic	(cover	Cover description type, treatment, and		CN 1/			Product of CN x Area
group (appendix A)		hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious		98			0.21	20.72
А	Woods	Good Condition	30			0.00	0.00
А	Open Space	Good Condition	39			0.64	24.86
А	Open Space	Fair Condition	49			0.00	0.00
А	Gravel		76			0.00	0.00
В	Woods	Good Condition	55			0.00	0.00
В	Open Space	Good Condition	61			0.00	0.00
В	Gravel		85			0.00	0.00
С	Woods	Good Condition	70			0.00	0.00
С	Open Space	Good Condition	74			0.00	0.00
С	Open Space	Poor Condition	86			0.00	0.00
С	Gravel		89			0.00	0.00
D	BVW		77			0.00	0.00
D	Woods	Good Condition	77			0.00	0.00
D	Open Space	Good Condition	80			0.00	0.00
1/ Use only one	CN source per line.	3	6974		Totals =	0.85	45.58

CN (weighted) =	total product	_=	45.58 =	53.69	_;	Use CN =	54
•	total area		0.85				_

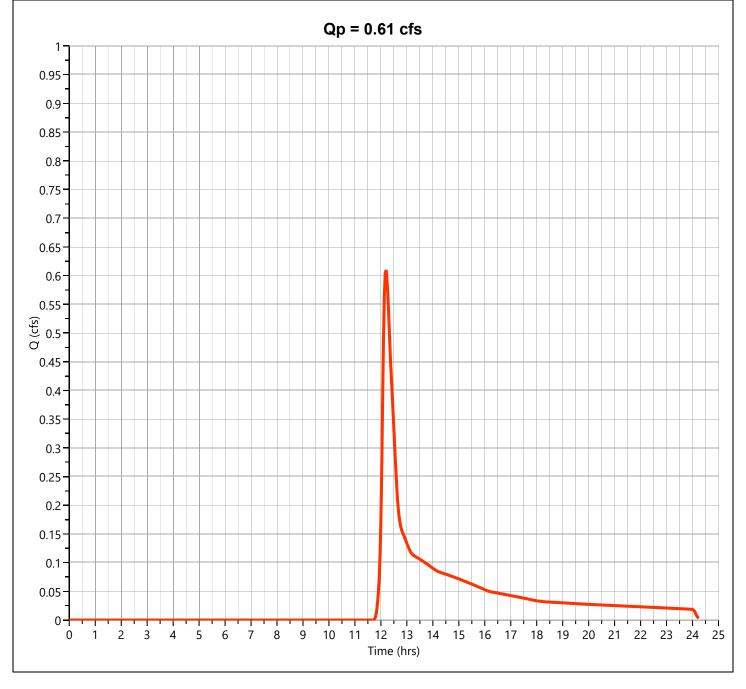
2.	Runoff				
			Storm #1	Storm #2	Storm #3
Free	quency	vr	2	25	100

Project: Athens Street	=	Ву	NC NC		6/24/2022	
		<b>.</b>			10/13/2022	
Location: Stow, MA	-	Checked		Date	6/17/2023	
Circle one: Present Developed	1	Subcatchn	nent P-6R			
Circle one: Tc Tt	through	Cubcaterin	HCHT -OD			
	subarea	•				
OL 15 (A 15 LL 1 T			4 D			
Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			LAWN			
1. Gunade Description (table 6-1)			LAVVIA			
2. Mannings roughness coeff., n (table 3-1)			0.24			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
E Land Clana		ft/ft	0.015			
5. Land Slope, s		IVIL	0.015			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute T	t hr	0.16			0.16
0. 11 0.001 (1.2) 0.07 (1.2 0.0 0 0.1)	oopato		00			00
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
0.51			400			
8. Flow Length, L		ft	198			
9. Watercourse slope, s		ft/ft	0.030			
a. Watercourse slope, s		10/10	0.030			
10. Average Velocity, V (figure 3-1)		ft/s	2.79			
, , , , , , , , , , , , , , , , , , ,						
11. Tt = L / 3600V	Compute T	t hr	0.02			0.02
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r					
15. Channel Slope, s	Computer	ft/ft				
16. Manning's roughness coeff., n		10/10				
	Community V	<b>6</b> 1-				
17. V = 1.49 r^2/3 s^1/2 / n	Compute V					
18. Flow length, L	0	ft				0
19. Tt = L / 3600V	Compute T	l NF				0
20 Watershed or subares To or Tt (add Tt in ste	ne 6 11 and	d 10)			hr	0.18
20. Watershed or subarea Tc or Tt (add Tt in ste	μο υ, τι, απο	u 1 <i>3)</i>			min	10.5
						10.5

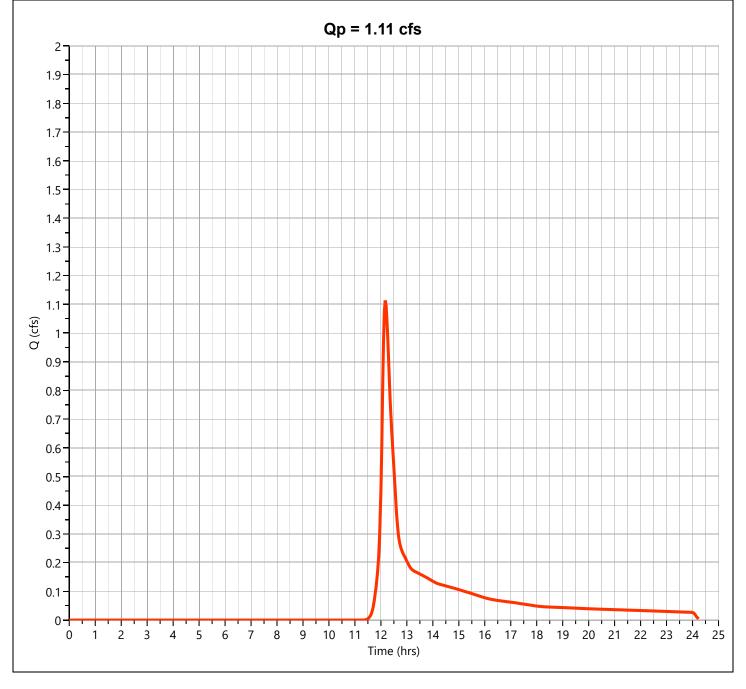
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.082 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.40 hrs
Time Interval	= 2 min	Runoff Volume	= 773 cuft
Drainage Area	= 0.85 ac	Curve Number	= 54
Tc Method	= User	Time of Conc. (Tc)	= 10.5 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



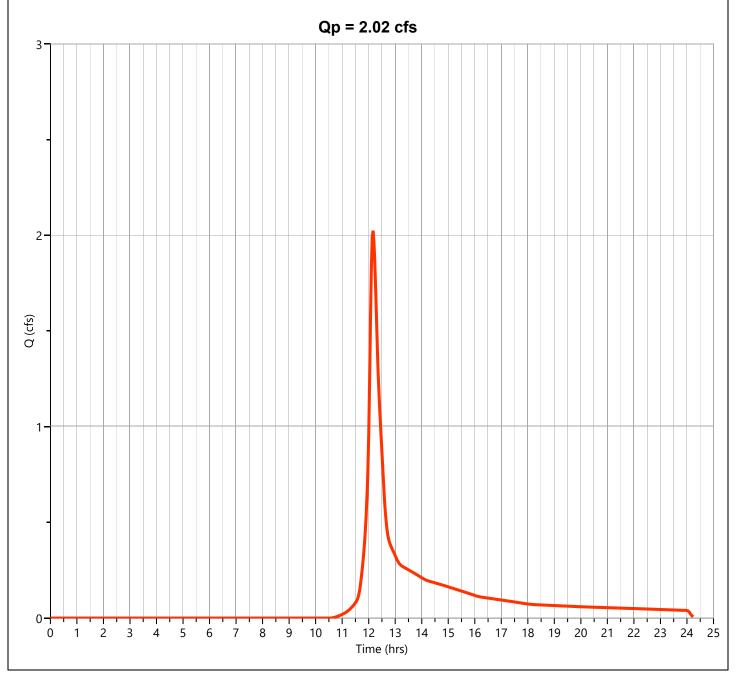
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.610 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 2,988 cuft
Drainage Area	= 0.85 ac	Curve Number	= 54
Tc Method	= User	Time of Conc. (Tc)	= 10.5 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.113 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 4,834 cuft
Drainage Area	= 0.85 ac	Curve Number	= 54
Tc Method	= User	Time of Conc. (Tc)	= 10.5 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.024 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 8,176 cuft
Drainage Area	= 0.85 ac	Curve Number	= 54
Tc Method	= User	Time of Conc. (Tc)	= 10.5 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



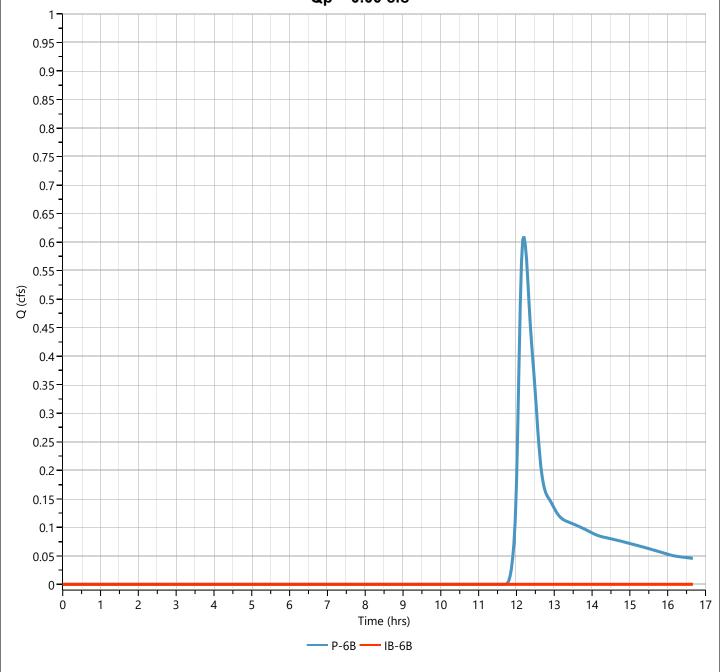
# IB-6B Hyd. No. 36

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
nflow Hydrograph	= 35 - P-6B	Max. Elevation	= 221.06 ft
Pond Name	= IB-6B	Max. Storage	= 41.5 cuft
Pond Routing by Storage Inc	dication Method		
	Qp = 0.00 cfs		
0.08			
0.075			
0.075			
0.07			
0.065			
-			
0.06			
0.055			
0.05			
0.045			
(St) 0.04			
9 0.04			
0.035			
0.03			
0.025			
0.02			
0.015			
0.01			
0.005			
0 1	2 3 4 5 6 7	8 9 10	11 12

— P-6B — IB-6B

# IB-6B Hyd. No. 36

				•
Hydrograph Type	= Pond Route		Peak Flow	= 0.000 cfs
Storm Frequency	= 10-yr		Time to Peak	= 16.63 hrs
Time Interval	= 2 min		Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 35 - P-6B		Max. Elevation	= 221.94 ft
Pond Name	= IB-6B		Max. Storage	= 689 cuft
Pond Routing by Storage Ind	lication Method			
		Qp = 0.00 cfs		
0.95				



# IB-6B Hyd. No. 36

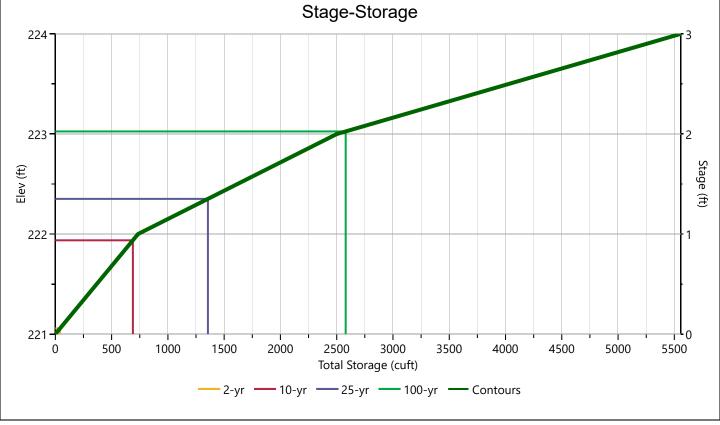
Hydrograph Type Storm Frequency	= Pond Route = 25-yr						k Flow e to Pe			000 cfs 2.50 hrs	
Time Interval	= 2 min							h Volume		000 cuft	
Inflow Hydrograph	= 35 - P-6B						k. Eleva			22.35 ft	
Pond Name	= IB-6B					Max	c. Stora	ige	= 1,	356 cuft	
Pond Routing by Storage Inc	dication Method										
			Qp =	= 0.00	cfs						
2											
1.9											
1.8											
1.7											
1.6											
1.5											
1.4											
1.3											
1.2											
1.1											
(\$\frac{1}{5}\) 1											
0.9											
0.8											
0.7											
0.6											
0.5											
0.4											
0.3											
0.2											
0.1											
0		<del>                                     </del>	1 1 1	1 1 1	<u> </u>	· · · · ·	1 1 1	<del>                                     </del>	1 1		
0 1	2 3	4	5	6 Time	7 (hrs)	8	9	10	11	12	•
			p.	-6B <del></del>							

# IB-6B Hyd. No. 36

		— P-6B — IB-6B		
-1 <del>- </del>	2 3 4	5 6 7 Time (hrs)	8 9 10	11 12 13
0				
σ				
(Si)				
2				1
-				
3		Qp = 0.00 cfs		
ond Routing by Storage Ind			- Max. Storago	2,000 0411
nflow Hydrograph Pond Name	= 35 - P-6B = IB-6B		Max. Elevation  Max. Storage	= 223.03 ft = 2,580 cuft
ime Interval	= 2 min		Hydrograph Volume	= 0.000 cuft
Storm Frequency	= 100-yr		Time to Peak	= 12.33 hrs

## IB-6B Stage-Storage

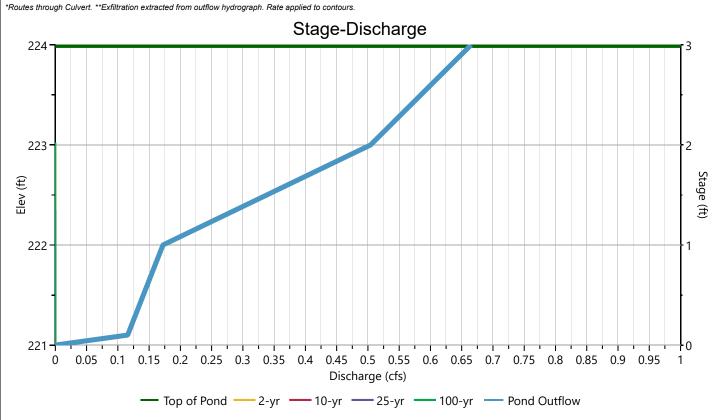
User Defined Conto	urs	Stage / Storage Table							
Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)			
Bottom Elevation, ft	221.00								
Voids (%)	100.00	0.00 1.00	221.00 222.00	572 899	0.000 736	0.000 736			
Volume Calc		2.00	223.00	2,633	1,766	2,502			
volume Calc	Ave End Area	3.00	224.00	3,474	3,054	5,555			
				,	,	,			
	_		_						
	S	Stage-S	Storage						
24 7						2			
24						3			



#### IB-6B

### Stage-Discharge

Outroot / Outlines	Ordbroad		Orifices		Daufaustad Diasu		
Culvert / Orifices	Culvert	1	2	3	Perforated Ris	er	
Rise, in					Hole Diameter, in		
Span, in					No. holes		
No. Barrels					Invert Elevation, ft		
Invert Elevation, ft					Height, ft		
Orifice Coefficient, Co					Orifice Coefficient, Co		
Length, ft							
Barrel Slope, %							
N-Value, n	0.000						
Weirs	Riser*		Weirs		A 711		
weirs	Kiser"	1	2	3	Ancillary		
Shape / Type	Circular				Exfiltration, in/hr	8.27**	
Crest Elevation, ft							
Crest Length, ft							
Angle, deg							
Weir Coefficient, Cw							

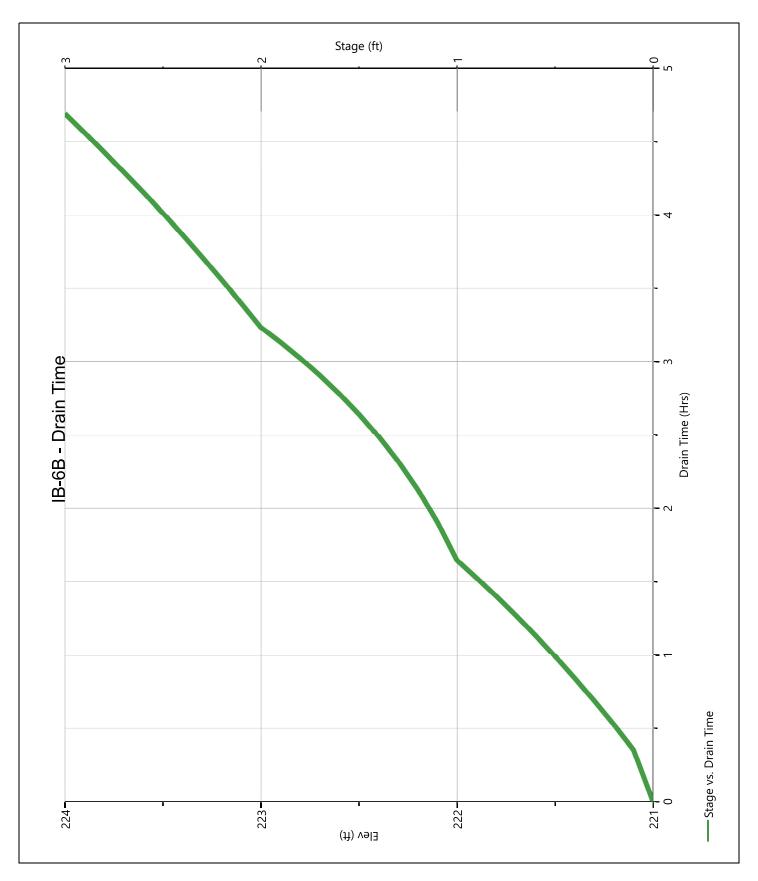


#### IB-6B

# **Stage-Storage-Discharge Summary**

Stage	Elev.	Storage	Culvert	C	Orifices, cf	s	Riser		Weirs, cfs	i	Pf Riser	Exfil	User	Total
Stage (ft)	(ft)	(cuft)	(cfs)	1	2	3	(cfs)	1	2	3	(cfs)	(cfs)	(cfs)	(cfs)
0.00	221.00	0.000										0.000		0.000
1.00	222.00	736										0.172		0.172
2.00	223.00	2,502										0.504		0.504
3.00	224.00	5,555										0.665		0.665

### IB-6B Pond Drawdown



Hydrograph Type	= Junctio	า						Pe	ak Flo	W		= 0.0	000 cfs	
Storm Frequency	= 2-yr							Tin	ne to F	Peak		= 12	.33 hrs	
Time Interval	= 2 min						Hydrograph Volume				= 0.0	= 0.000 cuft		
nflow Hydrographs	graphs = 34, 36 Total Contrib. Area			= 1.7	79 ac									
				Qp	0.	00 c	fs							
3.8E-09														
3.6E-09														
3.4E-09 –														
3.2E-09														
3E-09 -														
2.8E-09 <del>-</del>														
2.6E-09 -														
2.4E-09														
2.2E-09														
(S) 2E-09														
O 1.8E-09														
1.6E-09														
1.4E-09 -														
1.2E-09														
1E-09														
8E-10														
6E-10 -														
4E-10														
2E-10 -														
0 1	2	3	4	5		Time (	7	8	9	1 1 1	10	11	12	1
				<u>—</u> IВ-										

Hydrograph Type	= Junction	Peak Flow	= 0.027 cfs	
Storm Frequency	= 10-yr	Time to Peak	= 14.93 hrs	
Time Interval	= 2 min	Hydrograph Volume	= 743 cuft = 1.79 ac	
Inflow Hydrographs	= 34, 36	Total Contrib. Area		
	Qp = 0.03	cfs		
0.028				
0.027				
0.026				
0.025				
0.024				
0.023				
0.022				
0.021				
0.02				
0.019				
0.018				
0.017				
0.016				
0.015				
(£) 0.014 - O 0.013 - O 0.				
o 0.013 −				
0.012				
0.011				
0.01				
0.009				
0.008		_		
0.007		_		
0.006				
0.005		<b>_</b>		
0.004				
0.003		1		
0.002				
0.001				
0				
-0.001				
	3 4 5 6 7 8 9 10 11 12	13 14 15 16 17 18 19 20		
	Time	(hrs)		

Hydrograph Type	= Junction	Peak Flow	= 0.146 cfs	
Storm Frequency	= 25-yr	Time to Peak	= 12.57 hrs	
Time Interval	= 2 min	Hydrograph Volume	= 2,131 cuft	
Inflow Hydrographs	= 34, 36	Total Contrib. Area		
	Qp = 0.15 cfs	S		
0.15				
0.14				
0.13				
0.12				
0.11				
0.1				
0.09				
0.08				
0.07 - 0.07 - 0.07 - 0.07 - 0.07				
0.06				
0.05				
0.04				
0.03				
0.02				
0.01				
0-				
-0.01 - 0 1 2 3		14 15 16 17 18 19 20		
	Time (hr. —— P-6A —— IB-6B —— F			

Hydrograph Type	= Junction	Peak Flow	= 0.702 cfs		
Storm Frequency	= 100-yr	Time to Peak	= 12.43 hrs		
Time Interval	= 2 min	Hydrograph Volume			
Inflow Hydrographs	= 34, 36	Total Contrib. Area	= 1.79 ac		
	Qp = 0.70 cf	is .			
1 -					
0.95					
-					
0.85					
0.8					
0.75					
0.7					
0.65					
0.65					
(\$\frac{9}{5}\) 0.5 - 0.45 - 0					
0.4					
0.35					
0.3					
0.25					
0.2					
0.15					
0.1					
0.05					
0					
0 1 2 3		3 14 15 16 17 18 19 20			
	Time (h				

SM-3719C
----------

Project:	Athens Street	By NC	Date 6/24/22
Location:	Stow, MA	Checked	Rev Date 10/13/2022 Date 6/17/2023
Circle one:	Present Developed	Subcatchment P-7A	1

1. Runoff curve number (CN)

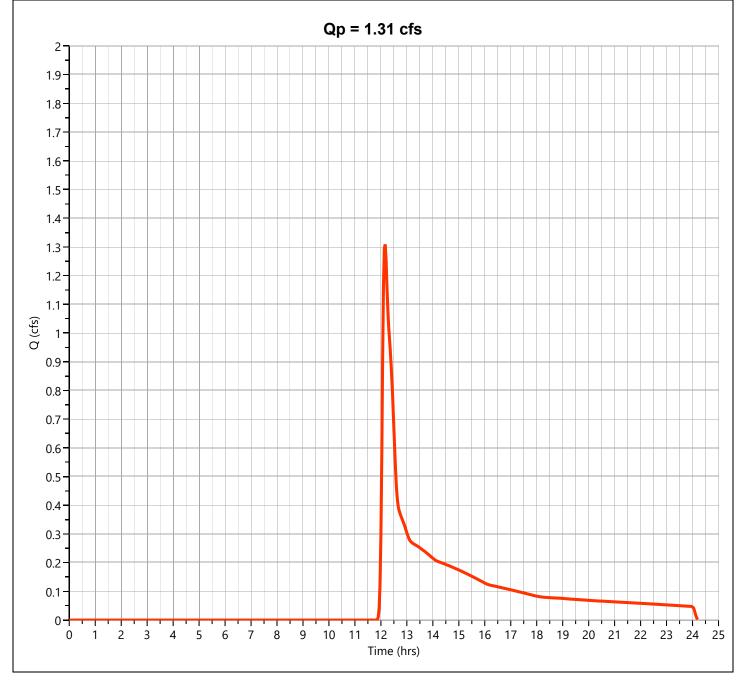
Soil name and hydrologic	(cover	Cover description type, treatment, and			CN 1/		Area	Product of CN x Area
group (appendix A)		hydrologic condition: percent impervious: unconnected/connected impervious area ratio)		Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious			98			1.47	144.27
А	Woods	Good Condition		30			0.12	3.62
Α	Open Space	Good Condition		39			2.37	92.58
Α	Open Space	Fair Condition		49			0.00	0.00
Α	Gravel			76			0.00	0.00
В	Woods	Good Condition		55			0.00	0.00
В	Open Space	Good Condition		61			0.00	0.00
В	Gravel			85			0.00	0.00
С	Woods	Good Condition		70			0.00	0.00
С	Open Space	Good Condition		74			0.00	0.00
С	Open Space	Poor Condition		86			0.00	0.00
С	Gravel			89			0.00	0.00
D	BVW			77			0.00	0.00
D	Woods	Good Condition		77			0.00	0.00
D	Open Space	Good Condition		80			0.00	0.00
1/ Use only one	e CN source per line.		172790			Totals =	3.97	240.47

CN (weighted) =	total product	_=	240.47 =	60.62 ;	Use CN =	61
	total area	_	3.97			

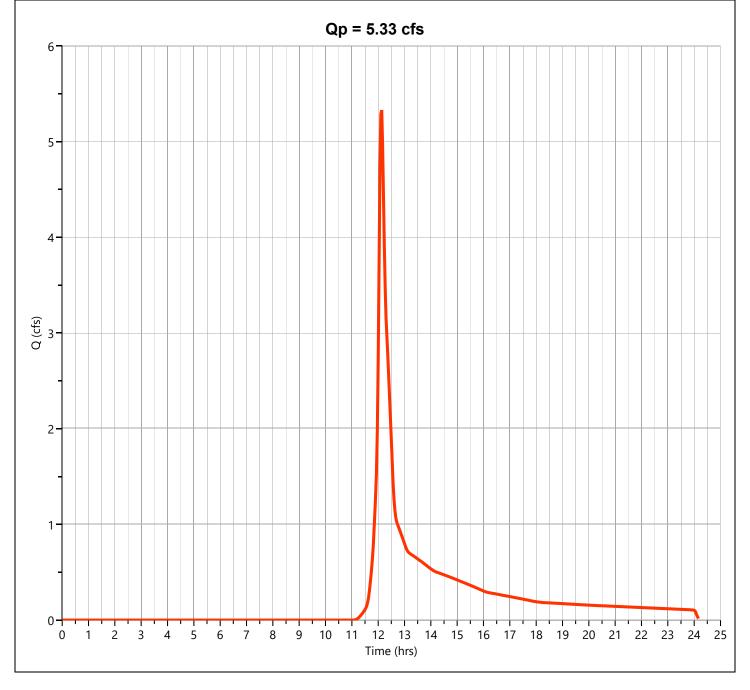
2. Runoff

Project:	Athens Street				Ву	NC NC		6/24/2022	
								10/13/2022	
Location:	Stow, MA				Checked		Date	6/17/2023	
Circle one:	Pre	esent D	eveloped		Subcatchm	nent P-7A			
Circle one:		Tc	Tt	through	Cubcatoriii	IOIRT TT			
		_		subarea					
Chart flam	/Annliaghla to Ta	l ()			Commont ID	۸۵			
Sheet llow	(Applicable to Tc o	only)			Segment ID	A-B			
1. Surface	Description (table	3-1)				LAWN			
	2000	• .,							
2. Manning	s roughness coeff	., n (table	3-1)			0.24			
3. Flow len	gth, L (total L <= 3	00 ft)			ft	50			
						2.4			
4. Two-yr 2	24-hr rainfall, P2				in	3.1			
5. Land Slo	nne s				ft/ft	0.045			
o. Lana oic	, po, o				1010	0.040			
6. Tt = 0.00	07 (nL)^0.8 / (P2^0	.5 s^0.4)		Compute Tt	hr	0.10			0.10
Shallow co	ncentrated Flow				Segment ID	B-C			
7. Surface	Description (paved	d or unpa	ved)			UNPAVED			
8. Flow Ler	nath I				ft	140			
O. I low Lei	igui, L				Tt.	140			
9. Waterco	urse slope, s				ft/ft	0.026			
	·								
10. Averag	e Velocity, V (figur	e 3-1)			ft/s	2.60			
						0.04			0.04
11. Tt = L /	3600V			Compute Ti	nr	0.01			0.01
Channel flo	DW.				Segment ID				
Onamicino					ocginent ib				
12. Cross s	sectional flow area	, a			sf				
13. Wetted	perimeter, pw				ft				
14. Hydrau	lic radius, r=a/wp			Compute r	ft				
15. Channe	el Slope, s				ft/ft				
16. Mannin	ıg's roughness coe	ff., n							
	9 r^2/3 s^1/2 / n			Compute V	ft/s				
18. Flow le				-	ft				
19. Tt = L /	-			Compute Ti	t hr				0
20. Waters	hed or subarea To	or Tt (ad	d Tt in ste	ps 6, 11, and	d 19)			hr	0.12
								min	6.9

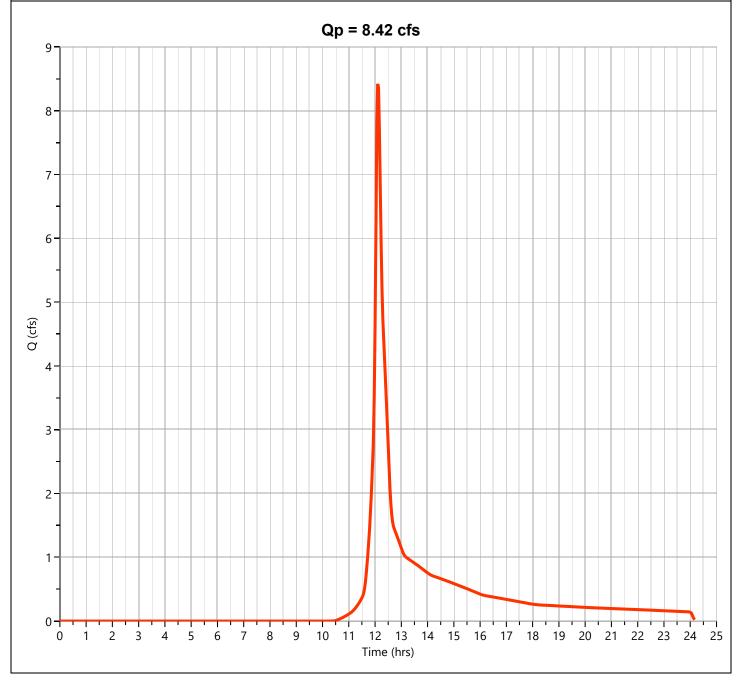
Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.309 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 6,815 cuft
Drainage Area	= 3.97 ac	Curve Number	= 61
Tc Method	= User	Time of Conc. (Tc)	= 6.9 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



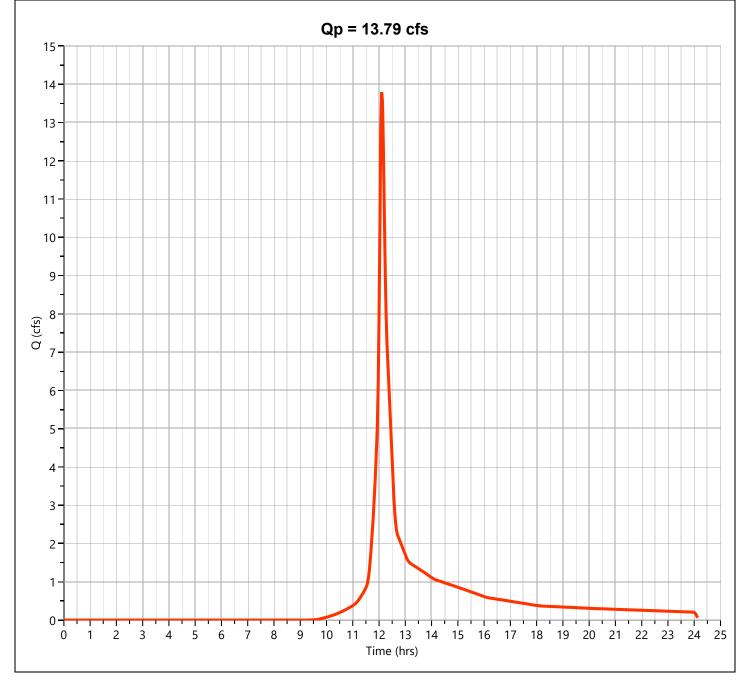
Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.329 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 20,077 cuft
Drainage Area	= 3.97 ac	Curve Number	= 61
Tc Method	= User	Time of Conc. (Tc)	= 6.9 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 8.421 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 30,260 cuft
Drainage Area	= 3.97 ac	Curve Number	= 61
Tc Method	= User	Time of Conc. (Tc)	= 6.9 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



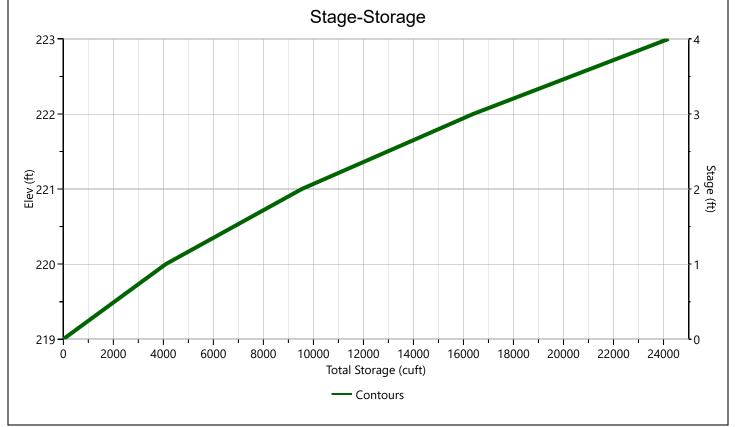
Hydrograph Type	= NRCS Runoff	Peak Flow	= 13.79 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 47,890 cuft
Drainage Area	= 3.97 ac	Curve Number	= 61
Tc Method	= User	Time of Conc. (Tc)	= 6.9 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



#### **IB-7A REVISED**

# Stage-Storage

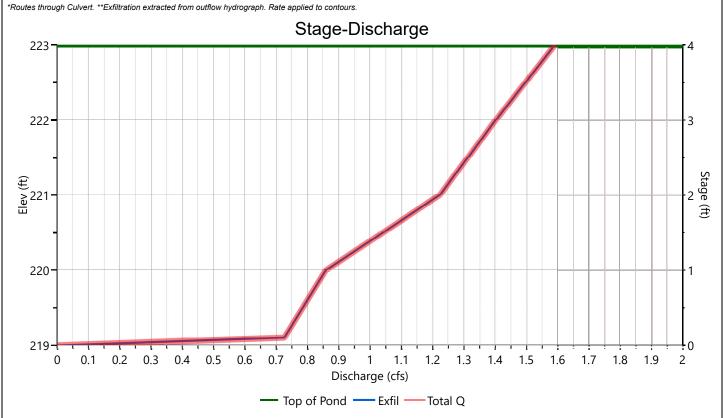
User Defined Conto	urs	Stage / Storage Table						
Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)		
Bottom Elevation, ft	219.00							
Voids (%)	100.00	0.00 1.00	219.00 220.00	3,716 4,485	0.000 4,101	0.000 4,101		
Volume Calc	Ave End Area	2.00	221.00	6,387	5,436	9,537		
volumo Galo	7110 Eng 7110a	3.00	222.00	7,320	6,854	16,390		
		4.00	223.00	8,310	7,815	24,205		
			l					



#### **IB-7A REVISED**

# Stage-Discharge

Culvert / Ovisions	Culvert		Orifices		Dorforated Diggs		
Culvert / Orifices	Cuivert	1 2		3	Perforated Riser		
Rise, in					Hole Diameter, in		
Span, in					No. holes		
No. Barrels	1				Invert Elevation, ft		
Invert Elevation, ft	219.00				Height, ft		
Orifice Coefficient, Co	0.60			Orifice Coefficient, Co			
Length, ft							
Barrel Slope, %							
N-Value, n	0.000						
Weirs	Riser*	Weirs			Ancilland		
vveirs	Kisei	1	2	3	Ancillary	y	
Shape / Type					Exfiltration, in/hr	8.27**	
Crest Elevation, ft							
Crest Length, ft							
Angle, deg							
Weir Coefficient, Cw							



#### **IB-7A REVISED**

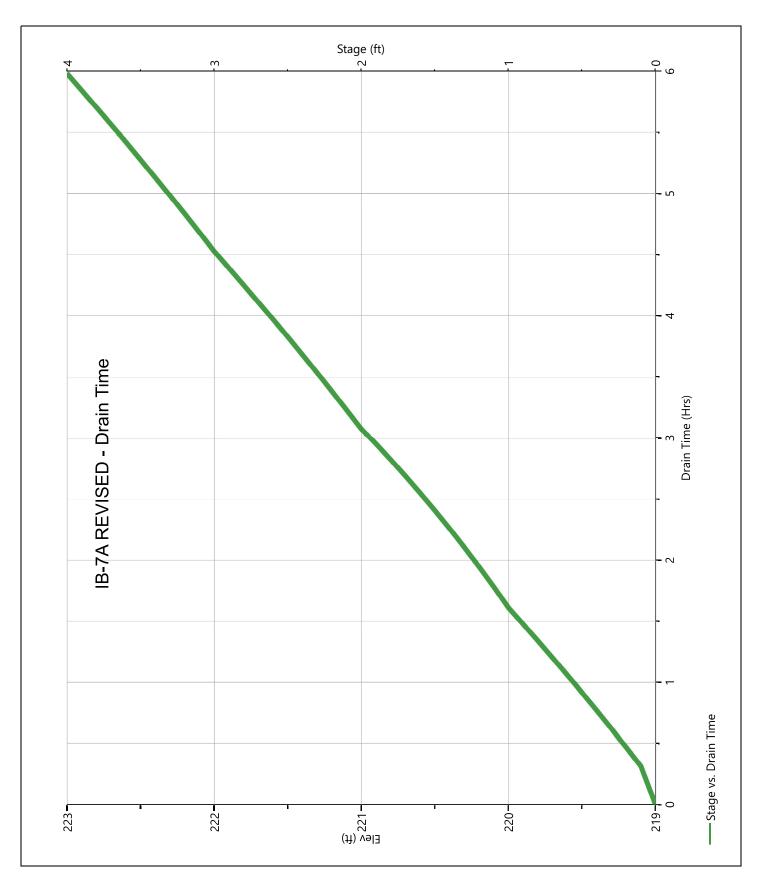
# **Stage-Storage-Discharge Summary**

Stage Elev. (ft) (ft)	Storage	(cuft)	Culvert	(	Orifices, cf	s	Riser		Weirs, cfs	i	Pf Riser	Exfil	User	Total
(ft)	(ft)		(cfs)	1	2	3	(cfs)	1	2	3	(cfs)	(cfs)	(cfs)	(cfs)
0.00	219.00	0.000										0.000		0.000
1.00	220.00	4,101										0.859		0.859
2.00	221.00	9,537										1.223		1.223
3.00	222.00	16,390										1.401		1.401
4.00	223.00	24,205										1.591		1.591

Hydrology Studio v 3.0.0.27 06-17-2023

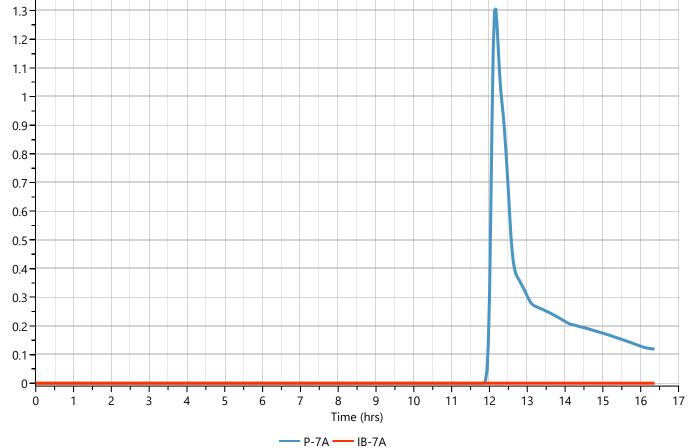
#### **IB-7A REVISED**

#### **Pond Drawdown**



Hydrology Studio v 3.0.0.27 06-17-2023

IB-7A			Hyd. No. 40
Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 16.33 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 39 - P-7A	Max. Elevation	= 219.17 ft
Pond Name	= IB-7A REVISED	Max. Storage	= 704 cuft
Pond Routing by Storage Inc	dication Method		
	Qp = 0.00	0 cfs	
2			
1.9			
1.8			
1.7			
1.6			
1.5			
1.4			
1.3			
1.2			
-			
1.1			
O (cfs)			



Hydrology Studio v 3.0.0.27 06-17-2023

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 10-yr	Time to Peak	= 22.73 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
nflow Hydrograph	= 39 - P-7A	Max. Elevation	= 220.34 ft
Pond Name	= IB-7A REVISED	Max. Storage	= 5,971 cuft
Pond Routing by Storage Inc	dication Method	Center of mas	ss detention time = 8.20 hr
_	Qp = 0.00	cfs	
6			
4			
5			
1			
4			
-			
3			
Q (CTS)			
α			
2-			
1			
1-			
-			

9 10 11

Time (hrs)

— P-7A — IB-7A

12 13 14 15 16 17 18 19 20 21 22 23

Hydrology Studio v 3.0.0.27 06-17-2023

lydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
torm Frequency	= 25-yr	Time to Peak	= 19.53 hrs
ime Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
nflow Hydrograph	= 39 - P-7A	Max. Elevation	= 221.14 ft
ond Name	= IB-7A REVISED	Max. Storage	= 10,526 cuft
ond Routing by Storage In	dication Method		
	Qp = 0.00 cfs		
9			
-			
8 -			
4			
7			
6			
1			
5			
-			
4			
g			
3			
1			
2			
4			
1 -			
_			
0			
1			
-1 <del>-1</del>		12 13 14 15 16	17 18 19
J 1 L	Time (hrs)	55 10	

Hydrology Studio v 3.0.0.27 06-17-2023

lydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
torm Frequency	= 100-yr	Time to Peak	= 11.27 hrs
ime Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
nflow Hydrograph	= 39 - P-7A	Max. Elevation	= 222.39 ft
ond Name	= IB-7A REVISED	Max. Storage	= 19,475 cuft
ond Routing by Storage Ind	dication Method		
	Qp = 0.00 cfs		
15			
14 -			
13			
12 -			
-			
11 -			
10-			
10			
9			
-			
(SE) 8			
7-			
-			
6			
5			
-			
4			
3 -			
-			
2			
1 -			
0 1	2 3 4 5 6	7 8 9 1	10 11
	Time (hrs)		

#### Worksheet 2: Runoff curve number and runoff

SM-3719C

Project:	Athens Street	By NC	Date 6/24/22
			Rev Date 10/13/2022
ocation:	Stow, MA	Checked	Date 6/17/2023
Circle one:	Present Developed	Subcatchment P-7B	

1. Runoff curve number (CN)

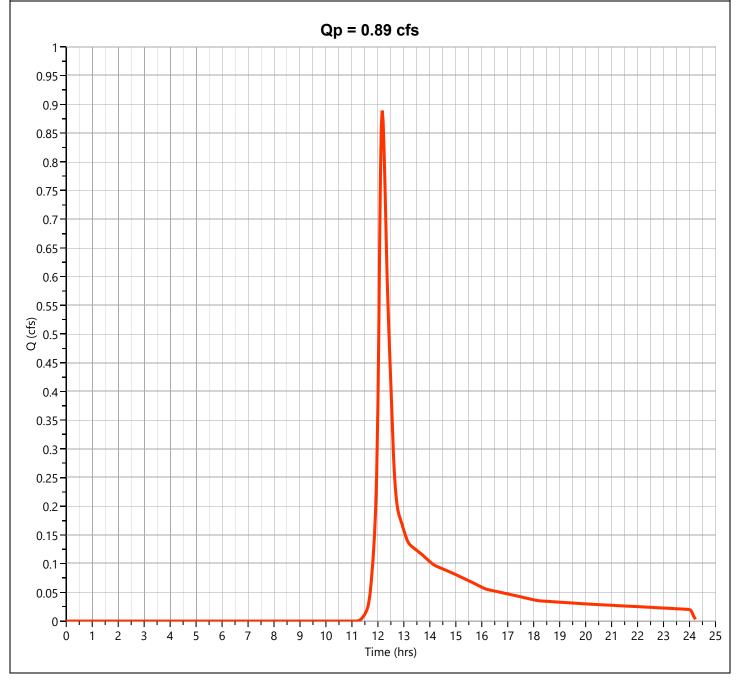
Soil name and hydrologic	(cover	Cover description type, treatment, and			CN 1/		Area	Product of CN x Area
group (appendix A)		hydrologic condition: percent impervious: unconnected/connected impervious area ratio)		Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious			98			0.61	60.11
А	Woods	Good Condition		30			0.00	0.00
А	Open Space	Good Condition		39			0.54	21.21
А	Open Space	Fair Condition		49			0.00	0.00
А	Gravel			76			0.00	0.00
В	Woods	Good Condition		55			0.00	0.00
В	Open Space	Good Condition		61			0.00	0.00
В	Gravel			85			0.00	0.00
С	Woods	Good Condition		70			0.00	0.00
С	Open Space	Good Condition		74			0.00	0.00
С	Open Space	Poor Condition		86			0.00	0.00
С	Gravel			89			0.00	0.00
D	BVW			77			0.00	0.00
D	Woods	Good Condition		77			0.00	0.00
D	Open Space	Good Condition		80			0.00	0.00
1/ Use only one	e CN source per line.		50411			Totals =	1.16	81.32

CN (weighted) =	total product	=	94.30 -	70.27		Use CN =	70
Civ (weighted) -	total product		01.32 -	10.21	,	USE CIV -	70
	total area	_	1.16				_

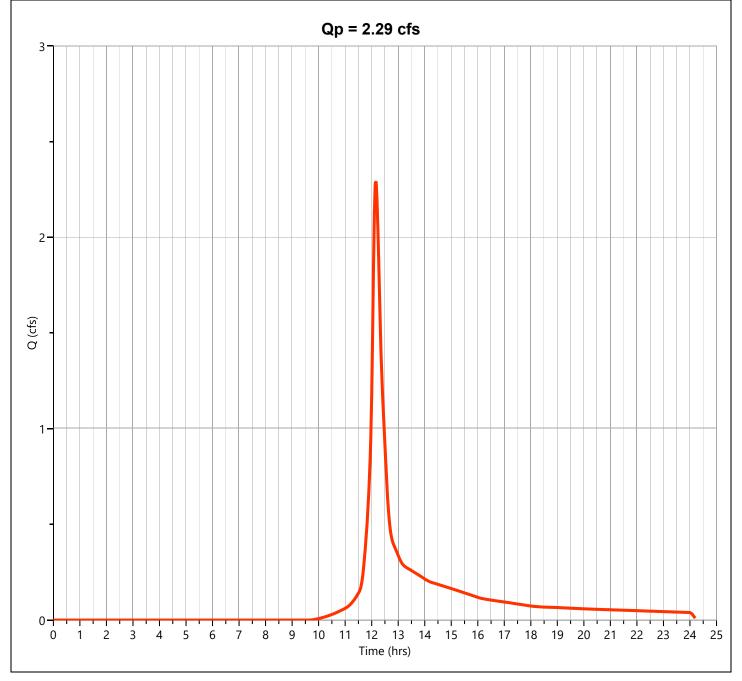
2. Runoff				
	S	Storm #1	Storm #2	Storm #3
Frequency	Vr	2	25	100

Developed   Subcatchment P-7B   Subcatchment	PV Date 10/13/2022   Date 6/17/2023
Developed   Tt	Date 0/11/2023
Sheet flow (Applicable to Tc only)   Segment ID   A-B	
Sheet flow (Applicable to Tc only)   Segment ID   A-B	
Sheet flow (Applicable to Tc only)   Segment ID   A-B	
1. Surface Description (table 3-1)  2. Mannings roughness coeff., n (table 3-1)  3. Flow length, L (total L <= 300 ft)  4. Two-yr 24-hr rainfall, P2  5. Land Slope, s  6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)  7. Surface Description (paved or unpaved)  7. Surface Description (paved or unpaved)  8. Flow Length, L  9. Watercourse slope, s  10. Average Velocity, V (figure 3-1)  11. Tt = L / 3600V  Channel flow  Segment ID  Channel flow  Segment ID  Segment ID  12. Cross sectional flow area, a	
1. Surface Description (table 3-1)  2. Mannings roughness coeff., n (table 3-1)  3. Flow length, L (total L <= 300 ft)  4. Two-yr 24-hr rainfall, P2  5. Land Slope, s  6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)  7. Surface Description (paved or unpaved)  7. Surface Description (paved or unpaved)  8. Flow Length, L  9. Watercourse slope, s  10. Average Velocity, V (figure 3-1)  11. Tt = L / 3600V  Channel flow  Segment ID  Channel flow  Segment ID  Segment ID  12. Cross sectional flow area, a	
1. Surface Description (table 3-1)  2. Mannings roughness coeff., n (table 3-1)  3. Flow length, L (total L <= 300 ft)  4. Two-yr 24-hr rainfall, P2  5. Land Slope, s  6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)  Compute Tt hr  Segment ID  B-C  B-C  UNPAVED  PA  10. Average Velocity, V (figure 3-1)  11. Tt = L / 3600V  Channel flow  Segment ID  Compute Tt hr  Segment ID  Compute Tt hr  Segment ID  Compute Tt hr  Segment ID  Segment ID  Compute Tt hr  Segment ID	
2. Mannings roughness coeff., n (table 3-1)  3. Flow length, L (total L <= 300 ft)  4. Two-yr 24-hr rainfall, P2  5. Land Slope, s  6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)  Compute Tt hr  Compute Tt hr  D.18  Segment ID  B-C  UNPAVED  PA  10. Average Velocity, V (figure 3-1)  11. Tt = L / 3600V  Channel flow  Segment ID  Compute Tt hr  Segment ID  Compute Tt hr  Segment ID  Compute Tt hr  Compute Tt hr  Segment ID  Compute Tt hr  Compute Tt hr  Segment ID  Segment ID  Compute Tt hr	
2. Mannings roughness coeff., n (table 3-1)  3. Flow length, L (total L <= 300 ft)  4. Two-yr 24-hr rainfall, P2  5. Land Slope, s  6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)  Compute Tt hr  Compute Tt hr  Compute Tt hr  D.18  B-C  E  UNPAVED  PA  3. Flow Length, L  6. Watercourse slope, s  ft/ft  1.61  2. Watersourse velocity, V (figure 3-1)  11. Tt = L / 3600V  Compute Tt hr  Com	
3. Flow length, L (total L <= 300 ft) 4. Two-yr 24-hr rainfall, P2 in 3.1 5. Land Slope, s ft/ft 0.010 6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)  Segment ID  Segment ID  B-C  B 7. Surface Description (paved or unpaved) 8. Flow Length, L 9. Watercourse slope, s ft/ft 0.010	
4. Two-yr 24-hr rainfall, P2 in 3.1  5. Land Slope, s ft/ft 0.010  6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4) Compute Tt hr 0.18  Shallow concentrated Flow Segment ID B-C E  7. Surface Description (paved or unpaved)  8. Flow Length, L ft 121 1  9. Watercourse slope, s ft/ft 0.010 0.  10. Average Velocity, V (figure 3-1) ft/s 1.61 2  11. Tt = L / 3600V Compute Tt hr 0.02 0  Channel flow Segment ID Segment ID 12. Cross sectional flow area, a	
4. Two-yr 24-hr rainfall, P2 in 3.1  5. Land Slope, s ft/ft 0.010  6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4) Compute Tt hr 0.18  Shallow concentrated Flow Segment ID B-C E  7. Surface Description (paved or unpaved)  8. Flow Length, L ft 121 1  9. Watercourse slope, s ft/ft 0.010 0.  10. Average Velocity, V (figure 3-1) ft/s 1.61 2  11. Tt = L / 3600V Compute Tt hr 0.02 0  Channel flow Segment ID Segment ID 12. Cross sectional flow area, a	
5. Land Slope, s  6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)  Compute Tt hr  Shallow concentrated Flow  7. Surface Description (paved or unpaved)  8. Flow Length, L  9. Watercourse slope, s  10. Average Velocity, V (figure 3-1)  11. Tt = L / 3600V  Compute Tt hr  12. Cross sectional flow area, a	
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)  Shallow concentrated Flow  7. Surface Description (paved or unpaved)  8. Flow Length, L  9. Watercourse slope, s  10. Average Velocity, V (figure 3-1)  11. Tt = L / 3600V  Channel flow  12. Cross sectional flow area, a  Compute Tt hr  0.18  UNPAVED  B-C  I  I  I  I  I  I  I  I  I  I  I  I  I	
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)  Shallow concentrated Flow  7. Surface Description (paved or unpaved)  8. Flow Length, L  9. Watercourse slope, s  10. Average Velocity, V (figure 3-1)  11. Tt = L / 3600V  Channel flow  12. Cross sectional flow area, a  Compute Tt hr  0.18  UNPAVED  B-C  I  I  I  I  I  I  I  I  I  I  I  I  I	
Shallow concentrated Flow  7. Surface Description (paved or unpaved)  8. Flow Length, L  9. Watercourse slope, s  10. Average Velocity, V (figure 3-1)  11. Tt = L / 3600V  Channel flow  12. Cross sectional flow area, a  Segment ID  B-C  E  UNPAVED PA  121  121  121  122  133  144  155  161  261  273  284  285  286  287  288  288  288  288  288  288	
7. Surface Description (paved or unpaved)  8. Flow Length, L  9. Watercourse slope, s  10. Average Velocity, V (figure 3-1)  11. Tt = L / 3600V  Channel flow  Segment ID  12. Cross sectional flow area, a	
7. Surface Description (paved or unpaved)  8. Flow Length, L  9. Watercourse slope, s  10. Average Velocity, V (figure 3-1)  11. Tt = L / 3600V  Channel flow  12. Cross sectional flow area, a  UNPAVED PA  121  121  121  121  121  121  121	
8. Flow Length, L ft 121 1 9. Watercourse slope, s ft/ft 0.010 0. 10. Average Velocity, V (figure 3-1) ft/s 1.61 2 11. Tt = L / 3600V Compute Tt hr 0.02 0  Channel flow Segment ID 12. Cross sectional flow area, a sf	B-C
8. Flow Length, L ft 121 1 9. Watercourse slope, s ft/ft 0.010 0. 10. Average Velocity, V (figure 3-1) ft/s 1.61 2 11. Tt = L / 3600V Compute Tt hr 0.02 0  Channel flow Segment ID 12. Cross sectional flow area, a sf	AVED
9. Watercourse slope, s ft/ft 0.010 0.  10. Average Velocity, V (figure 3-1) ft/s 1.61 2  11. Tt = L / 3600V Compute Tt hr 0.02 0  Channel flow Segment ID 12. Cross sectional flow area, a sf	
10. Average Velocity, V (figure 3-1)  11. Tt = L / 3600V  Channel flow  Segment ID  12. Cross sectional flow area, a	107
10. Average Velocity, V (figure 3-1)  11. Tt = L / 3600V  Channel flow  Segment ID  12. Cross sectional flow area, a	0.015
Channel flow  Cross sectional flow area, a  Compute Tt hr  Compute Tt hr  Compute Tt hr  Segment ID  segment ID	.010
Channel flow Segment ID  12. Cross sectional flow area, a sf	2.49
Channel flow Segment ID  12. Cross sectional flow area, a sf	0.01
12. Cross sectional flow area, a	5.01
14. Hydraulic radius, r=a/wp Compute r ft	
15. Channel Slope, s ft/ft	
16. Manning's roughness coeff., n	
17. V = 1.49 r^2/3 s^1/2 / n Compute V ft/s	
18. Flow length, L 19. Tt = L / 3600V Compute Tt hr	

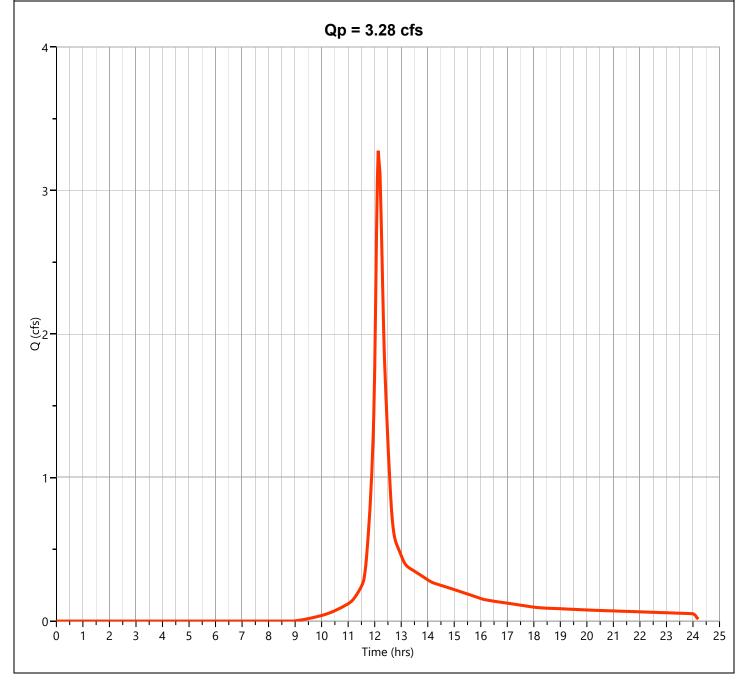
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.889 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 3,774 cuft
Drainage Area	= 1.16 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 13.0 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



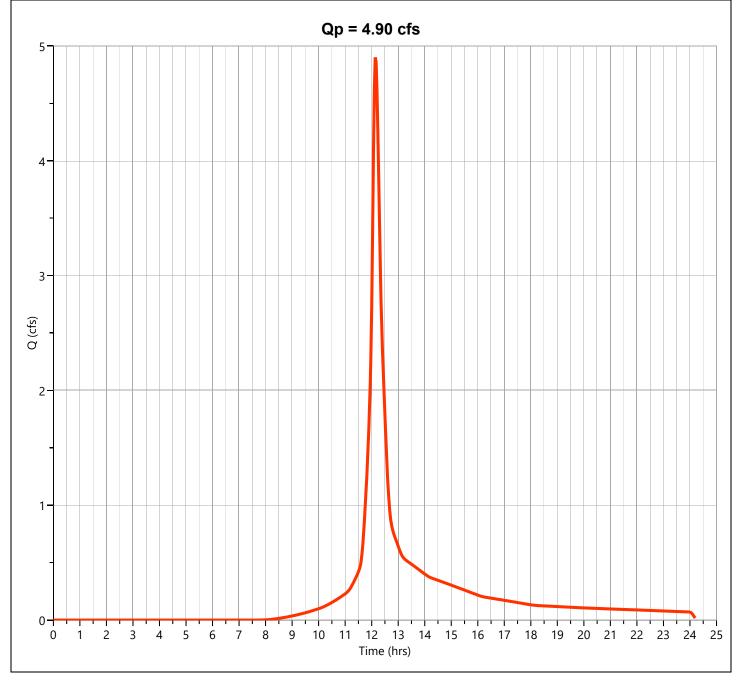
Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.292 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 8,971 cuft
Drainage Area	= 1.16 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 13.0 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



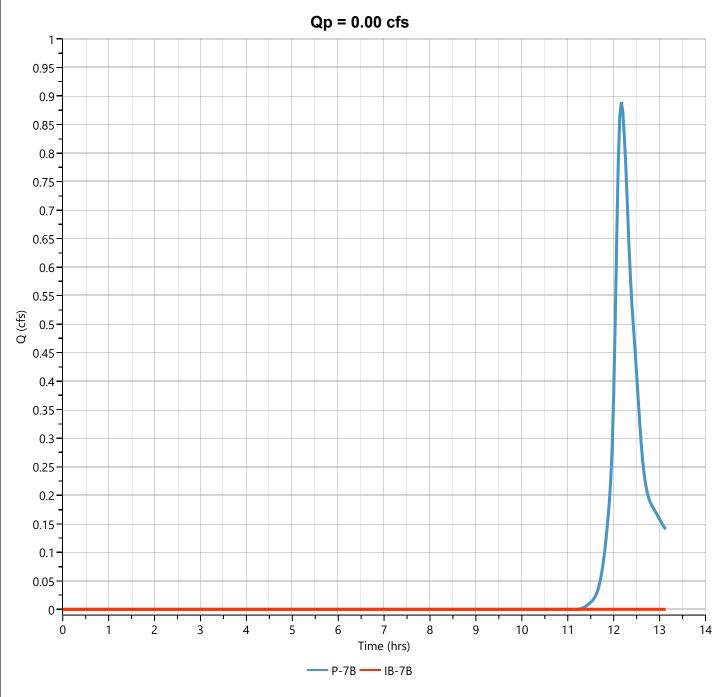
Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.277 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 12,665 cuft
Drainage Area	= 1.16 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 13.0 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.901 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 18,790 cuft
Drainage Area	= 1.16 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 13.0 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 13.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 41 - P-7B	Max. Elevation	= 224.17 ft
Pond Name	= IB-7B	Max. Storage	= 485 cuft
Pond Routing by Storage Inc	dication Method		



	n Frequer Interval	icy	= 1 = 2															to Po ograp		olur	ne		1.93 .000	hrs cuft	
nflov	w Hydrogr	aph	= 4	1 - I	P-7E	3										M	ах.	Elev	atio	n		= 2	24.8	3 ft	
	l Name		= IE													M	ax.	Stor	age			= 2	2,428	cuft	
ond F	Routing by Sto	rage Indi	cation	Meth	od																				
3	_								(	Qр	= 0	.00	cf	S											
3	-																								
2																									
(CTS)	-																								
0	-																								
0	-																								
-1	0 1		2	1	3		4	4	1 1	5		6	(hrs)		7	1	8		9	1 1	1	0	1	1	١.

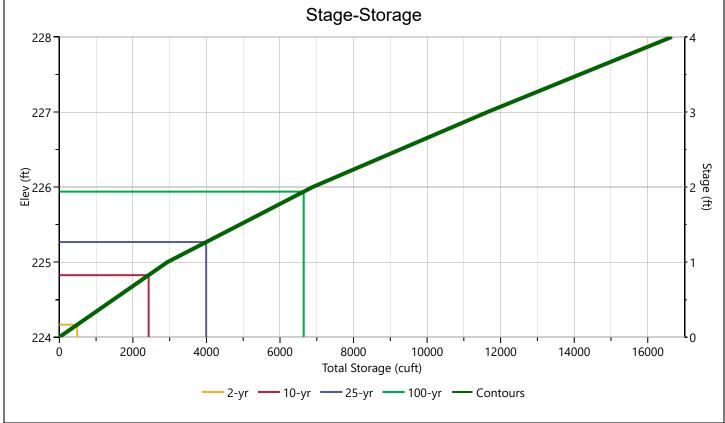
torn	ograph Type n Frequency	= 25-									Time	k Flow to Pe	ak	=	= 0.000 = 16.33	3 hrs	
	Interval	= 2 m											h Volum	ne =	= 0.000	cuft cuft	
	v Hydrograph		- P-7B									. Eleva			= 225.2		
	Name	= IB-7									Max	. Stora	ige	=	= 3,993	3 cuft	
ond R	Couting by Storage I	ndication Me	ethod														
						Qp	= 0.	00 с	fs								
4-																	
•	1																
3 <del>-</del>																	
•																	
												Ш					
2-																	
(slp) 7																	
J																	
1-																	
•	-																
														_			
0-																	
•																	
-1 <del>-</del>	0 1 2	3	4	5	6	7	8	-	)	10	11	12	12	1 1	16	16	-
	0 1 2	3	4	Э	Ö	1		ne (hr		10	11	12	13	14	15	16	

ydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
torm Frequency	= 100-yr	Time to Peak	= 10.77 hrs
ime Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
flow Hydrograph	= 41 - P-7B	Max. Elevation	= 225.94 ft
ond Name	= IB-7B	Max. Storage	= 6,644 cuft
ond Routing by Storage I	ndication Method		
-	Qp = 0.00 cfs	S	
5			
1			
4-			
4			
3			
2			
Z			
_			
1			
-			
0			
-			
-1-		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	<del>                                     </del>
0 1	2 3 4 5 Time (hrs)	6 7 8 9	10

#### IB-7B

# Stage-Storage

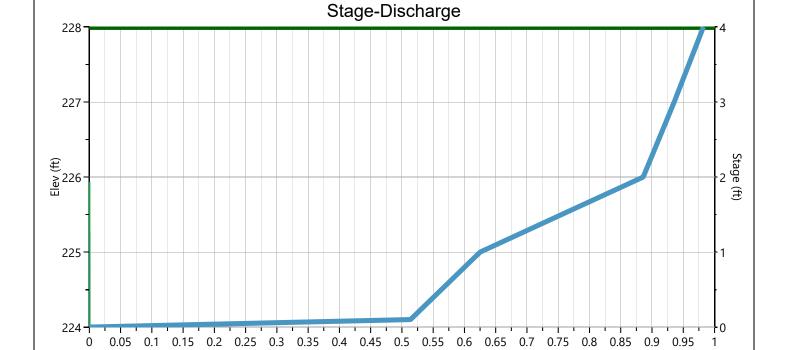
User Defined Conto	ırs			Stage / Stora	ge Table	
Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
Bottom Elevation, ft	224.00					
Voids (%)	100.00	0.00 1.00	224.00 225.00	2,619 3,266	0.000 2,943	0.000 2,943
Volume Calc		2.00	226.00	4,628	3,947	6,890
volume Calc	Ave End Area	3.00	227.00	4,887	4,758	11,647
		4.00	228.00	5,131	5,009	16,656
			I			1



#### IB-7B

#### Stage-Discharge

Outroot / Outfloor	Orderant		Orifices		Doufoueted Die	
Culvert / Orifices	Culvert	1	2	3	Perforated Ris	er
Rise, in					Hole Diameter, in	
Span, in					No. holes	
No. Barrels					Invert Elevation, ft	
Invert Elevation, ft					Height, ft	
Orifice Coefficient, Co					Orifice Coefficient, Co	
Length, ft						
Barrel Slope, %						
N-Value, n	0.000					
Waina	Riser*		Weirs		Anailland	
Weirs	Kiser"	1	2	3	Ancillary	
Shape / Type					Exfiltration, in/hr	8.27**
Crest Elevation, ft						
Crest Length, ft						
Angle, deg						
Weir Coefficient, Cw						
*Routes through Culvert. **Exfiltration extracted from	outflow hydrograph. Rate	applied to contours.				



Discharge (cfs)

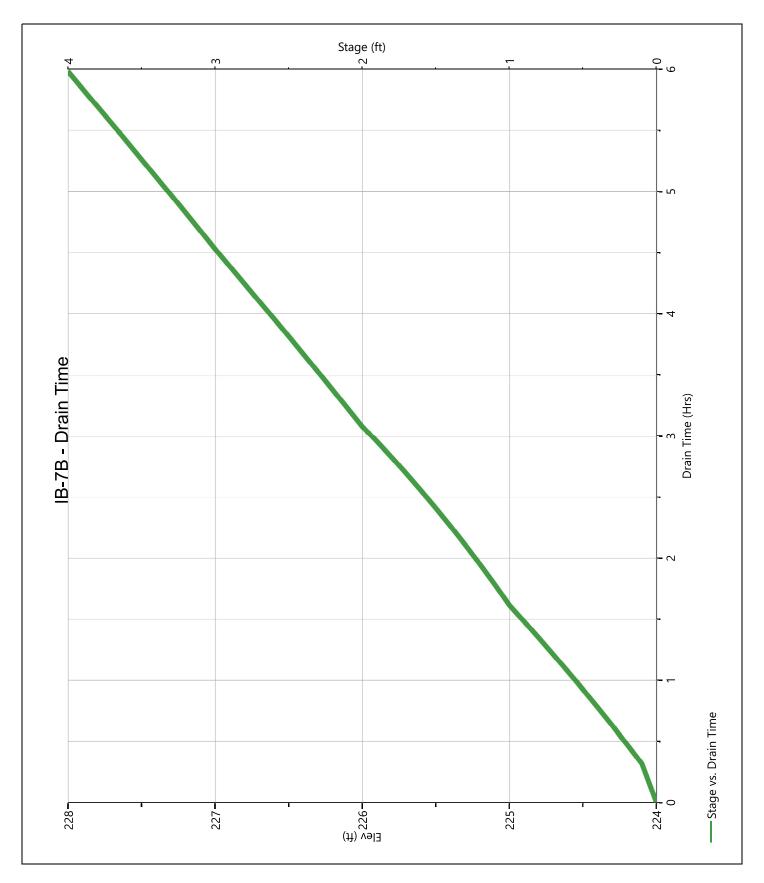
— Top of Pond — 2-yr — 10-yr — 25-yr — 100-yr — Pond Outflow

#### IB-7B

# **Stage-Storage-Discharge Summary**

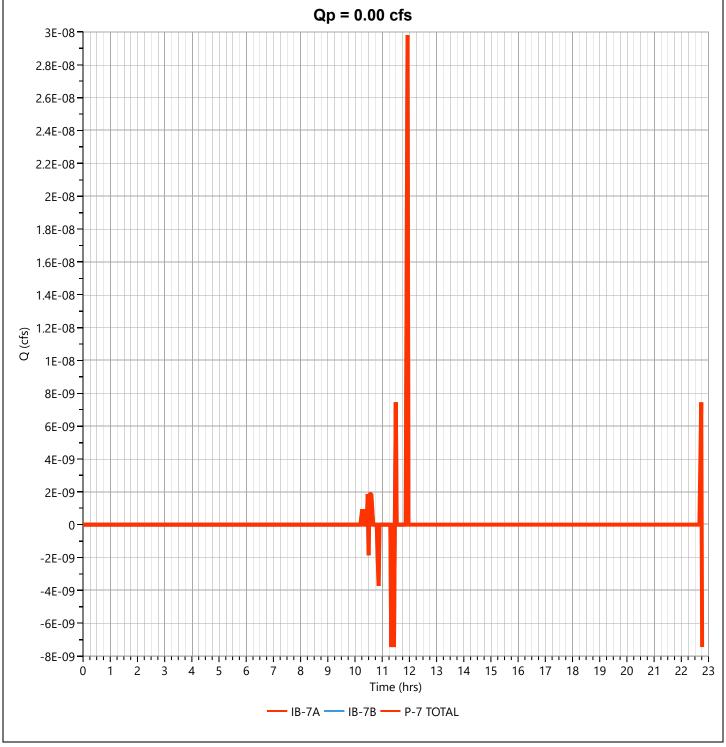
Stage	Elev.	Storage	Culvert	(	Orifices, cf	s	Riser		Weirs, cfs		Pf Riser	Exfil	User	Total
(ft)	(ft)	(cuft)	(cfs)	1	2	3	(cfs)	1	2	3	(cfs)	(cfs)	(cfs)	(cfs)
0.00	224.00	0.000										0.000		0.000
1.00	225.00	2,943										0.625		0.625
2.00	226.00	6,890										0.886		0.886
3.00	227.00	11,647										0.936		0.936
3.00 4.00	227.00	11,647										0.936		0.982

#### IB-7B Pond Drawdown



Hydrograph Type	= Junction							Peak	Flow		=	0.000	) cfs	
Storm Frequency	= 2-yr							Time 1	to Pea	k	=	: 13.10	) hrs	
Time Interval	= 2 min							Hydro	graph	Volum	e =	0.000	cuft cuft	
Inflow Hydrographs	= 40, 42							Total (	Contrib	. Area	=	0.0 a	С	
			C	<b>Q</b> p =	0.00	cfs								
1.4E-08														
1.2E-08 <del>-</del>														
1E-08														
8E-09														
6E-09														
4E-09														
2E-09														
0									₩					
-2E-09 -									┸					
-4E-09														
ු -6E-09 -														
O -8E-09													<u> </u>	
-1E-08 <del>-</del>														
-1.2E-08														
-1.4E-08														
-1.6E-08 <del>-</del>														
-1.8E-08														
-2E-08														
-2.2E-08 <del>-</del>														
-2.4E-08														
-2.6E-08														
-2.8E-08														
-3E-08 0 1	2 3 4	5	6	7	8	9	10	) 11	12	13	14	15	16	17
0 1	2 3 4	J	U	1		e (hrs)	10	, 11	14	13	14	13	10	17
		_	<del></del> IВ-7А	<u> </u>	3-7B <del></del>	<b>-</b> P-7	TOTAI	L						

3F-08 <del>-</del>	Qp = 0.0	00 cfs	
Inflow Hydrographs	= 40, 42	Total Contrib. Area	= 0.0 ac
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Storm Frequency	= 10-yr	Time to Peak	= 11.93 hrs
Hydrograph Type	= Junction	Peak Flow	= 0.000 cfs



Hydrograph Type	= Junction	Peak Flow	= 0.000 cfs
Storm Frequency	= 25-yr	Time to Peak	= 16.33 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrographs	= 40, 42	Total Contrib. Area	= 0.0 ac
	Qp = 0.00 c	efs	
1.4E-08			
1.2E-08 <del>-</del>			
1E-08			
8E-09			
4			
6E-09			
4E-09			
2E-09			
0			
-2E-09 <del>-</del>	·		
-4E-09			
€ -6E-09			
G -8E-09			
-1E-08			
-1.2E-08			
-1.4E-08			
-1.6E-08			
-1.8E-08			
-2E-08			
-2.2E-08			
-2.4E-08			
-2.6E-08			
-2.8E-08			
-3E-08			
-3E-08 <del>                                    </del>		0 11 12 13 14 15 16	17 18 19 20
	Time		
	—— IB-7A —— IB-7B —	P-7 TOTAL	

Hydrograph Type	= Junction					Peak Flow		= 0.	000 cfs	
Storm Frequency	= 100-yr					Time to Pe	ak	= 10	).77 hrs	
Time Interval	= 2 min					Hydrograp	h Volume	= 0.	000 cuft	
Inflow Hydrographs	= 40, 42					Total Contr	ib. Area	= 0.	0 ac	
		Q	p = 0.0	0 cfs						
3E-08 ]										
2.8E-08										
2.6E-08										
2.4E-08										
2.2E-08										
2E-08										
1.8E-08										
1.6E-08										
1.4E-08										
(s) 1.2E-08										
Ö 1E-08										
8E-09										
6E-09										
4E-09										
2E-09								$\mathbf{H}$		
0								₩		
-2E-09								╫		
-4E-09										
-6E-09										
-8E-09 0 1	2 3	4	5	6	7	8	9	10	11	12
0 1	۷ 3	4		ime (hrs)	/	ŏ	Э	10	11	12
		— IB-7A -	— IB-7B	P-7	TOTAL					

#### Worksheet 2: Runoff curve number and runoff

SM-3719C

Project:	Athens Street		Ву	NC	Date	6/24/22
					Rev Date	10/13/2022
ocation:	Stow, MA		Checked		Date	6/17/2023
Circle one:	Present Deve	eloped	Subcatchme	ent P-8		

1. Runoff curve number (CN)

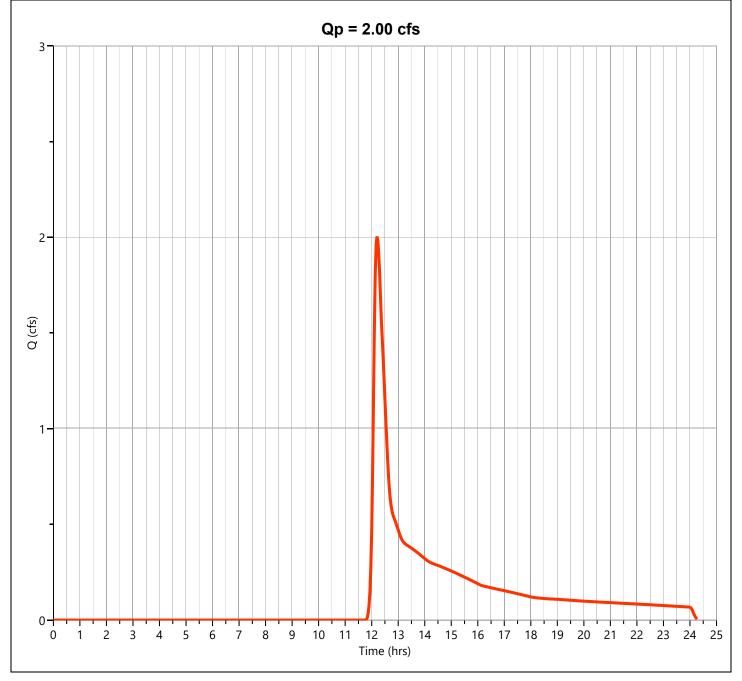
Soil name and hydrologic	(cover	Cover description type, treatment, and			CN 1/		Area	Product of CN x Area
group (appendix A)		hydrologic condition: percent impervious: unconnected/connected impervious area ratio)		Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious			98			2.06	201.90
А	Woods	Good Condition		30			0.00	0.00
А	Open Space	Good Condition		39			2.94	114.81
А	Open Space	Fair Condition		49			0.00	0.00
А	Gravel			76			0.03	1.92
В	Woods	Good Condition		55			0.00	0.00
В	Open Space	Good Condition		61			0.00	0.00
В	Gravel			85			0.00	0.00
С	Woods	Good Condition		70			0.00	0.00
С	Open Space	Good Condition		74			0.00	0.00
С	Open Space	Poor Condition		86			0.00	0.00
С	Gravel			89			0.00	0.00
D	BVW			77			0.00	0.00
D	Woods	Good Condition		77			0.00	0.00
D	Open Space	Good Condition		80			0.00	0.00
1/ Use only one	CN source per line.		219074			Totals =	5.03	318.63

CN (weighted) =	total product	_=	318.63 =	63.36 ;	Use CN =	63
-	total area		5.03			

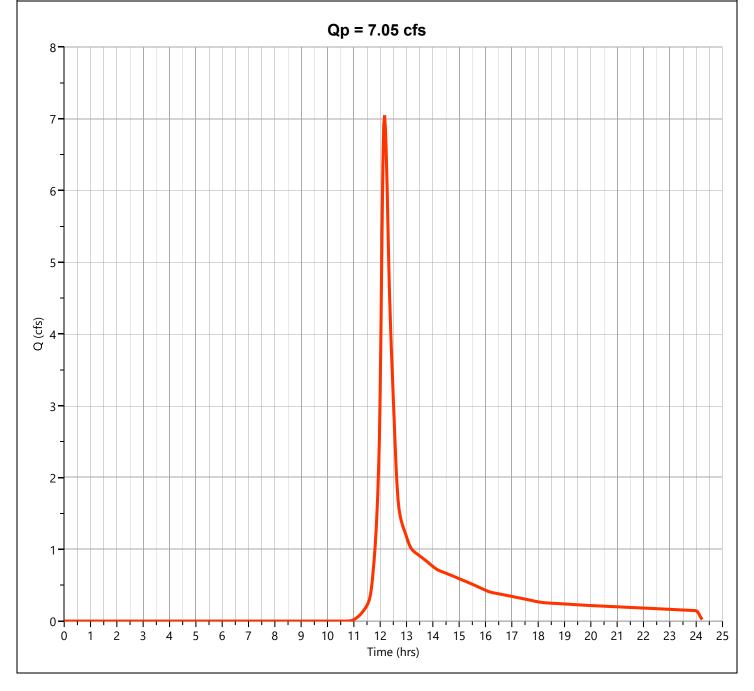
2.	Runoff				
			Storm #1	Storm #2	Storm #3
Free	quency	vr	2	25	100

Project:	Athens Street	_	Ву	NC NC	6/24/2022	
Location:	Stow, MA		Checked		10/13/2022 6/17/2023	
Circle one:	Present Developed Tc Tt	d through subarea	Subcatchi			
Sheet flow	(Applicable to Tc only)		Segment ID	A-B		
1. Surface	Description (table 3-1)			LAWN		
2. Manning	s roughness coeff., n (table 3-1)			0.24		
3. Flow len	gth, L (total L <= 300 ft)		ft	50		
4. Two-yr 2	4-hr rainfall, P2		in	3.1		
5. Land Slo	ppe, s		ft/ft	0.015		
6. Tt = 0.00	07 (nL)^0.8 / (P2^0.5 s^0.4)	Compute T	t hr	0.16		0.16
Shallow co	ncentrated Flow		Segment ID	B-C		
7. Surface	Description (paved or unpaved)			UNPAVED		
8. Flow Ler	ngth, L		ft	142		
9. Waterco	urse slope, s		ft/ft	0.015		
10. Averag	e Velocity, V (figure 3-1)		ft/s	1.98		
11. Tt = L /	3600V	Compute T	t hr	0.02		0.02
Channel flo	ow		Segment ID			
<ul><li>13. Wetted</li><li>14. Hydrau</li><li>15. Channe</li><li>16. Mannin</li></ul>	sectional flow area, a perimeter, pw lic radius, r=a/wp el Slope, s g's roughness coeff., n 9 r^2/3 s^1/2 / n	Compute r	ft/ft			
18. Flow le 19. Tt = L /	ngth, L	Compute T	ft			0
20. Waters	hed or subarea Tc or Tt (add Tt in st	eps 6, 11, an	d 19)		hr min	0.1 10.

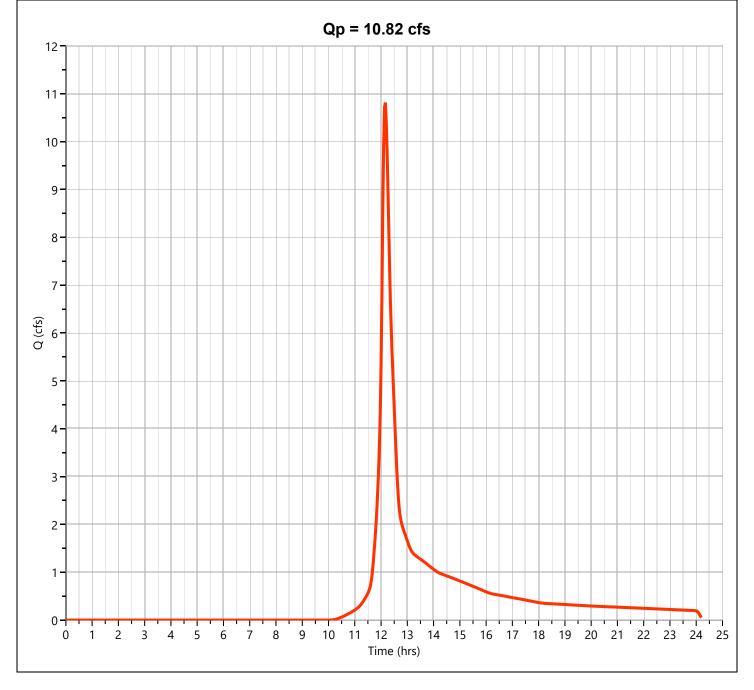
Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.005 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 10,375 cuft
Drainage Area	= 5.03 ac	Curve Number	= 63
Tc Method	= User	Time of Conc. (Tc)	= 10.5 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



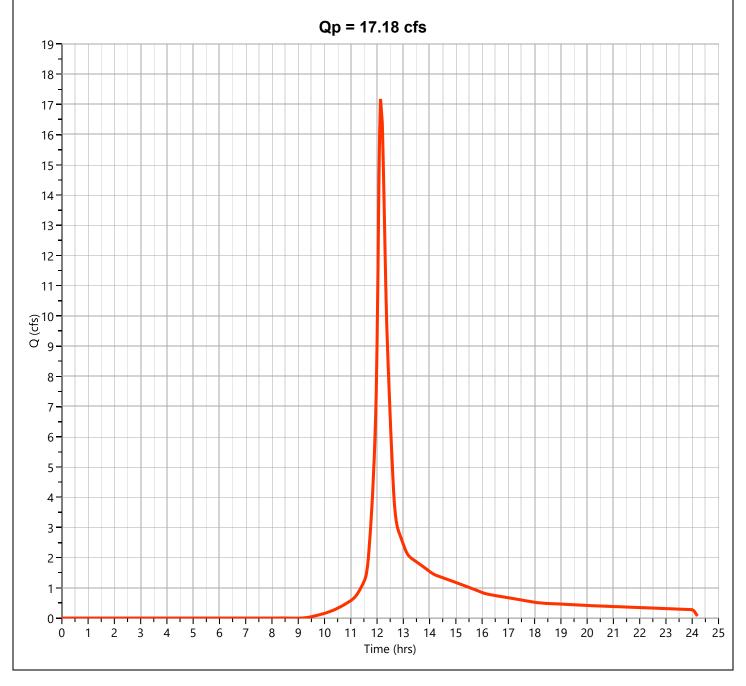
Hydrograph Type	= NRCS Runoff	Peak Flow	= 7.047 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 28,889 cuft
Drainage Area	= 5.03 ac	Curve Number	= 63
Tc Method	= User	Time of Conc. (Tc)	= 10.5 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 10.82 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 42,833 cuft
Drainage Area	= 5.03 ac	Curve Number	= 63
Tc Method	= User	Time of Conc. (Tc)	= 10.5 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 17.18 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 66,719 cuft
Drainage Area	= 5.03 ac	Curve Number	= 63
Tc Method	= User	Time of Conc. (Tc)	= 10.5 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



ydrograph Type	= Pond Route		Peak Flow	= 0.000 cfs
torm Frequency	= 2-yr		Time to Peak	= 12.17 hrs
me Interval	= 2 min		Hydrograph Volume	= 0.000 cuft
flow Hydrograph	= 44 - P-8		Max. Elevation	= 222.45 ft
ond Name	= IB-8		Max. Storage	= 1,039 cuft
and Routing by Storage In	dication Method			
2		Qp = 0.00 cfs		
37				
2				
2 1				
0				
_1				
0 1	2 3 4	5 6 7	8 9 10	11 12
		Time (hrs) —— P-8 —— IB-8		

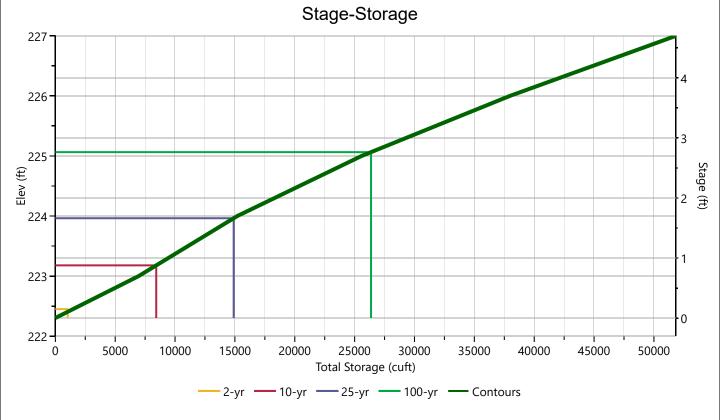
ydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
torm Frequency	= 10-yr	Time to Peak	= 16.17 hrs
ime Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
flow Hydrograph	= 44 - P-8	Max. Elevation	= 223.18 ft
ond Name	= IB-8	Max. Storage	= 8,430 cuft
ond Routing by Storage In	dication Method	Center of m	ass detention time = 8 m
	Qp = 0.00 cfs		
8			
1			
7			
6			
4			
5			
1			
4			
(cis)			
3			
-			
2			
1			
4			
0			
1			
-1 $0$ $1$ $2$	3 4 5 6 7 8 9	10 11 12 13 14	4 15 16
0 1 2	Time (hrs)	.0 11 12 13 14	. 15 10

lydrograph Type	= Pond Route		Peak Flow	= 0.000 cfs	
torm Frequency	= 25-yr		Time to Peak	= 11.77 hrs	
ime Interval	= 2 min		Hydrograph Volume	= 0.000 cuft	
nflow Hydrograph	= 44 - P-8		Max. Elevation	= 223.96 ft	
ond Name	= IB-8		Max. Storage	= 14,896 cuft	
ond Routing by Storage Ind	dication Method				
12		Qp = 0.00 cfs			
12					
11					
10					
-					
9					
-					
8					
-					
7					
6					
5 -					
-					
4					
-					
3					
2 -					
1 -					
-					
0					
1					
-1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -	2 3 4	5 6 7	8 9	<del>                                     </del>	
		Time (hrs)			

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs = 10.93 hrs = 0.000 cuft = 225.06 ft = 26,369 cuft		
Storm Frequency	= 100-yr	Time to Peak			
ime Interval	= 2 min	Hydrograph Volume			
nflow Hydrograph	= 44 - P-8	Max. Elevation			
ond Name	= IB-8	Max. Storage			
ond Routing by Storage In	dication Method				
	Qp = 0.00	cfs			
19 -					
18					
17					
16					
15 -					
14 -					
4					
13 -					
12					
11					
10					
9					
8-					
7					
-					
6					
5 -					
4					
3 =					
2 -					
1 -					
0					
-1 <del>- </del>	2 3 4 5	6 7 8 9	10		
	Time (I	hrs)			

# IB-8 Stage-Storage

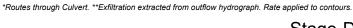
User Defined Contou	rs		Stage / Storage Table								
Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)					
Bottom Elevation, ft	222.30	0.00	222.30	6,571	0.000	0.000					
Voids (%)	100.00	1.00	223.00	7,372	6,972	6,972					
Volume Calc	None	2.00	224.00	9,089	8,231	15,202					
Volume Galc	None	3.00	225.00	11,652	10,371	25,573					
		4.00	226.00	13,110	12,381	37,954					
		5.00	227.00	14,624	13,867	51,821					

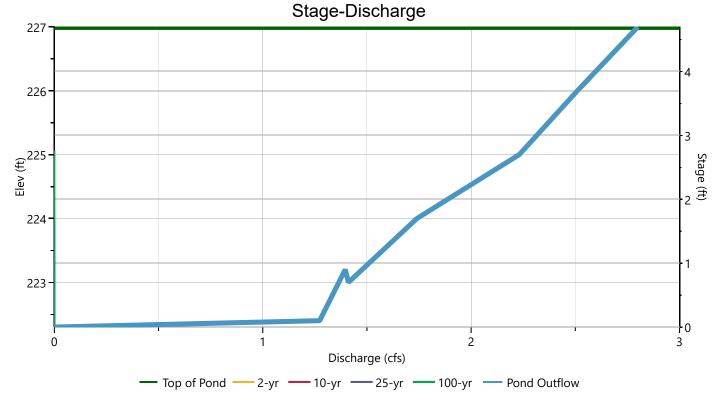


#### **IB-8**

# Stage-Discharge

Culuant / Onificas	Culvent		Doufounted Disco				
Culvert / Orifices	Culvert	1 2		3	Perforated Riser		
Rise, in					Hole Diameter, in		
Span, in					No. holes		
No. Barrels					Invert Elevation, ft		
Invert Elevation, ft					Height, ft		
Orifice Coefficient, Co					Orifice Coefficient, Co		
Length, ft							
Barrel Slope, %							
N-Value, n	0.000						
NA/a iva	Dinaut		Weirs		A maillam		
Weirs	Riser*	1	2	3	Ancillary		
Shape / Type					Exfiltration, in/hr	8.27**	
Crest Elevation, ft							
Crest Length, ft							
Angle, deg							
Weir Coefficient, Cw							



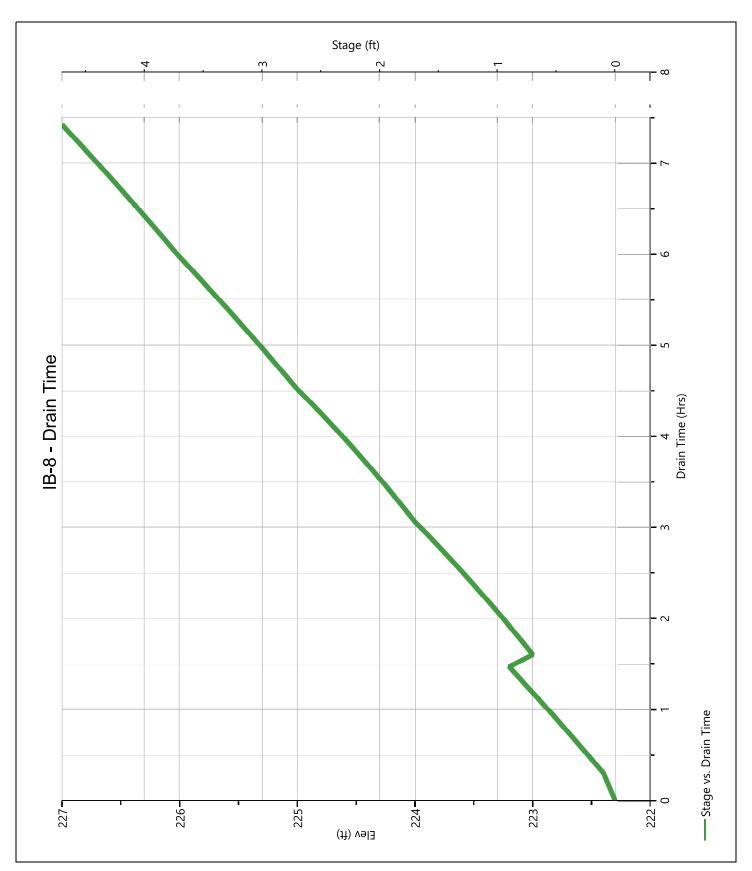


#### **IB-8**

# **Stage-Storage-Discharge Summary**

Stage	Elev.	Storage (cuft)	Storage Culvert (cfs)	Orifices, cfs		Riser	Weirs, cfs			Pf Riser	Exfil	User	Total	
(ft)	(ft)			1	2	3	(cfs)	1	2	3	(cfs)	(cfs)	(cfs)	(cfs)
0.00	222.30	0.000										0.000		0.000
1.00	223.00	6,972										1.411		1.411
2.00	224.00	15,202										1.740		1.740
3.00	225.00	25,573										2.231		2.231
4.00	226.00	37,954										2.510		2.510
5.00	227.00	51,821										2.800		2.800

#### IB-8 Pond Drawdown



#### Worksheet 2: Runoff curve number and runoff

SM-3719C

Project:	Athens Street	By PFK	Date 10/13/22
			Rev Date 6/17/2023
Location:	Stow, MA	Checked	Date
Circle one:	Present Developed	Subcatchment P-9B	

1. Runoff curve number (CN)

Soil name and hydrologic					CN 1/		Area	Product of CN x Area
group (appendix A)		hydrologic condition: percent impervious: unconnected/connected impervious area ratio)		Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious			98			1.01	98.85
Α	Woods	Good Condition		30			1.54	46.08
Α	Open Space	Good Condition		39			1.06	41.53
Α	Open Space	Fair Condition		49			0.00	0.00
А	Gravel			76			0.00	0.00
В	Woods	Good Condition		55			0.00	0.00
В	Open Space	Good Condition		61			0.00	0.00
С	Gravel			89			0.00	0.00
С	Woods	Good Condition		70			4.90	343.20
С	Open Space	Good Condition		74			3.41	252.00
D	Open Space	Good Condition		80			0.00	0.00
D	Open Space	Fair Condition		84			0.00	0.00
D	Woods	Good Condition		77			0.00	0.00
1/ Use only one	e CN source per line.		519132			Totals =	11.92	781.65

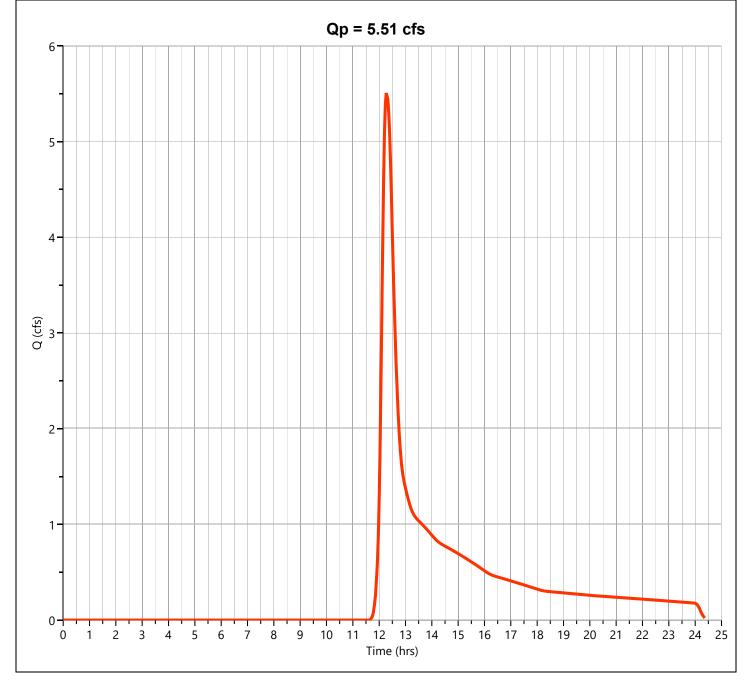
CN (weighted) =	total product	=	781.65 =	65.59	;	Use CN =	66
	total area	_	11.92		_		

#### 2. Runoff

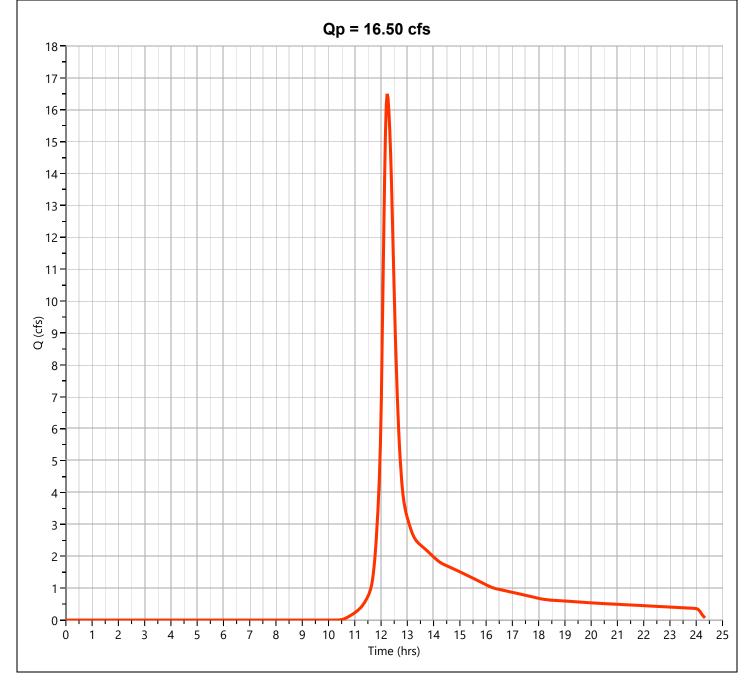
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.66	2.51	3.83

Project:	Athens Street	•	Ву	PFK	Date Rev Date	10/13/2022 6/17/2023	
Location:	Stow, MA		Checked		Date		
Circle one:	Present Developed Tc Tt	through subarea	Subcatchm	nent P-9B			
Sheet flow	(Applicable to Tc only)		Segment ID	A-B			
1. Surface I	Description (table 3-1)			WOODS			
2. Manning	s roughness coeff., n (table 3-1)			0.6			
3. Flow leng	gth, L (total L <= 300 ft)		ft	50			
4. Two-yr 2	4-hr rainfall, P2		in	3.1			
5. Land Slo	pe, s		ft/ft	0.026			
6. Tt = 0.00	7 (nL)^0.8 / (P2^0.5 s^0.4)	Compute T	thr	0.26			0.26
Shallow cor	ncentrated Flow		Segment ID	B-C			
7. Surface I	Description (paved or unpaved)			UNPAVED			
8. Flow Len	gth, L		ft	629			
9. Watercou	urse slope, s		ft/ft	0.080			
10. Average	e Velocity, V (figure 3-1)		ft/s	4.56			
11. Tt = L /	3600V	Compute T	thr	0.04			0.04
Channel flo	w		Segment ID				
<ul><li>13. Wetted</li><li>14. Hydraul</li><li>15. Channe</li><li>16. Mannin</li></ul>	ectional flow area, a perimeter, pw lic radius, r=a/wp ll Slope, s g's roughness coeff., n 9 r^2/3 s^1/2 / n	Compute r	ft/ft				
18. Flow ler 19. Tt = L /	<u> </u>	Compute T	ft thr				0
20. Watersl	ned or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	d 19)			hr min	0.30 17.9

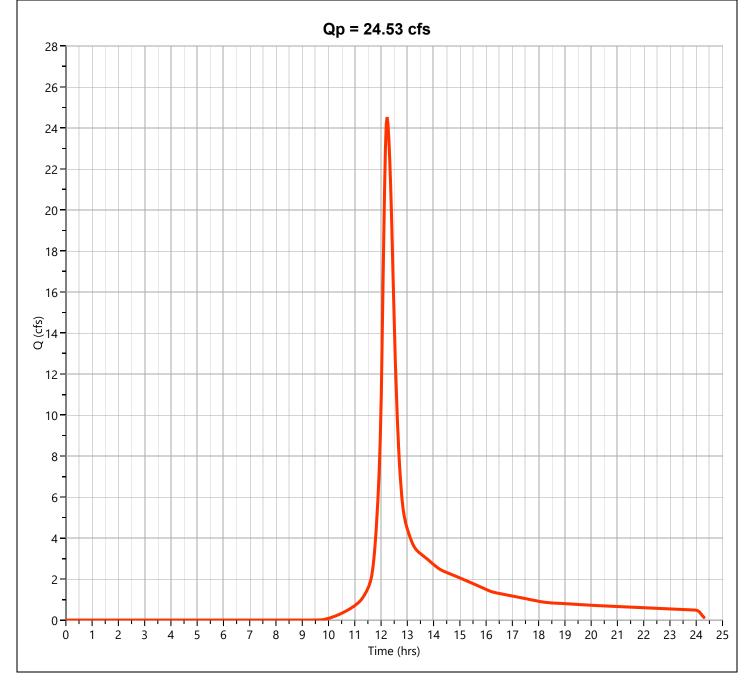
Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.513 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.30 hrs
Time Interval	= 2 min	Runoff Volume	= 29,366 cuft
Drainage Area	= 11.92 ac	Curve Number	= 66
Tc Method	= User	Time of Conc. (Tc)	= 17.9 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



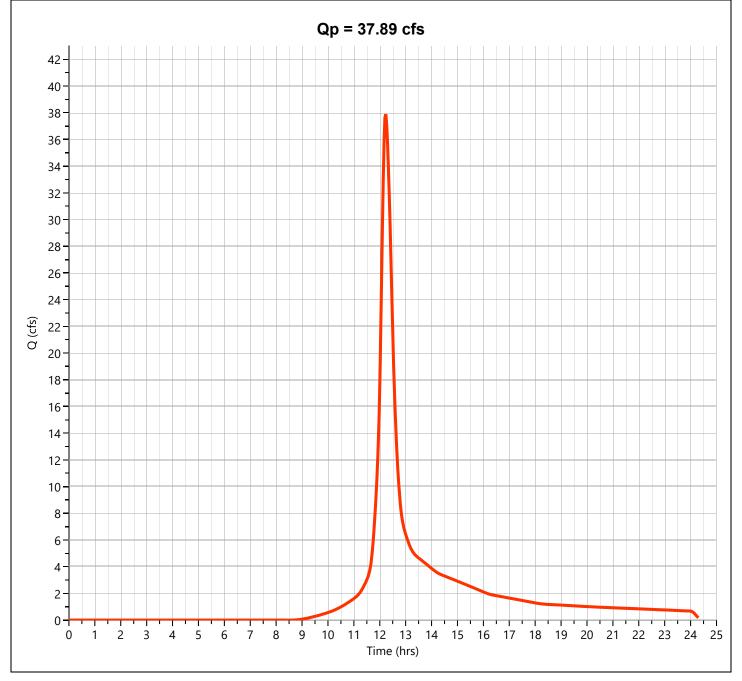
Hydrograph Type	= NRCS Runoff	Peak Flow	= 16.50 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 75,937 cuft
Drainage Area	= 11.92 ac	Curve Number	= 66
Tc Method	= User	Time of Conc. (Tc)	= 17.9 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 24.53 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 110,097 cuft
Drainage Area	= 11.92 ac	Curve Number	= 66
Tc Method	= User	Time of Conc. (Tc)	= 17.9 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 37.89 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 167,750 cuft
Drainage Area	= 11.92 ac	Curve Number	= 66
Tc Method	= User	Time of Conc. (Tc)	= 17.9 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



#### **DET. BASIN OUTFLOW**

Hyd. No. 50

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.00 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 49 - P-9B	Max. Elevation	= 236.72 ft
Pond Name	= EXIST DETENTION	Max. Storage	= 29,366 cuft

Pond Routing by Storage Indication Method

Qp = 0.00 cfs

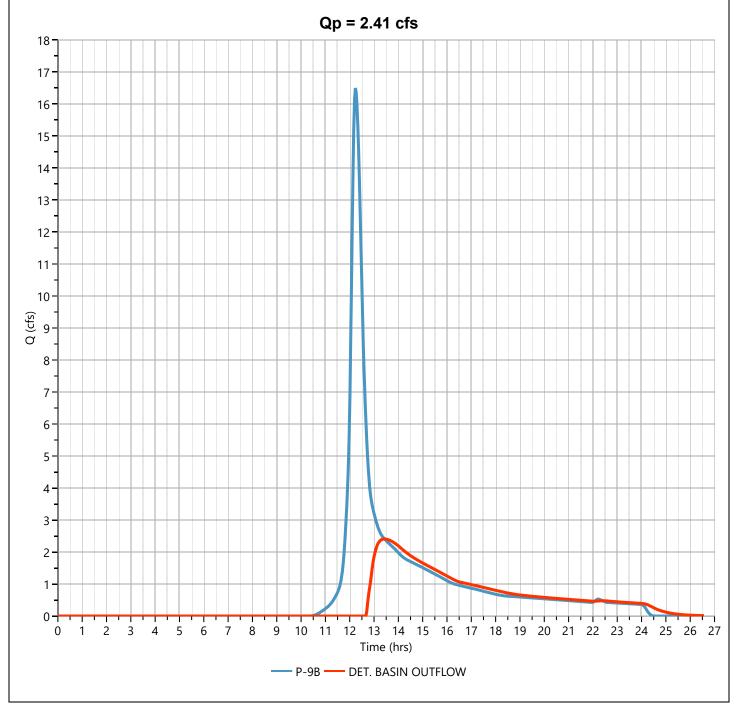
#### **DET. BASIN OUTFLOW**

Hyd. No. 50

Hydrograph Type	= Pond Route	Peak Flow	= 2.408 cfs
Storm Frequency	= 10-yr	Time to Peak	= 13.43 hrs
Time Interval	= 2 min	Hydrograph Volume	= 41,634 cuft
Inflow Hydrograph	= 49 - P-9B	Max. Elevation	= 237.17 ft
Pond Name	= EXIST DETENTION	Max. Storage	= 38,554 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.41 hrs



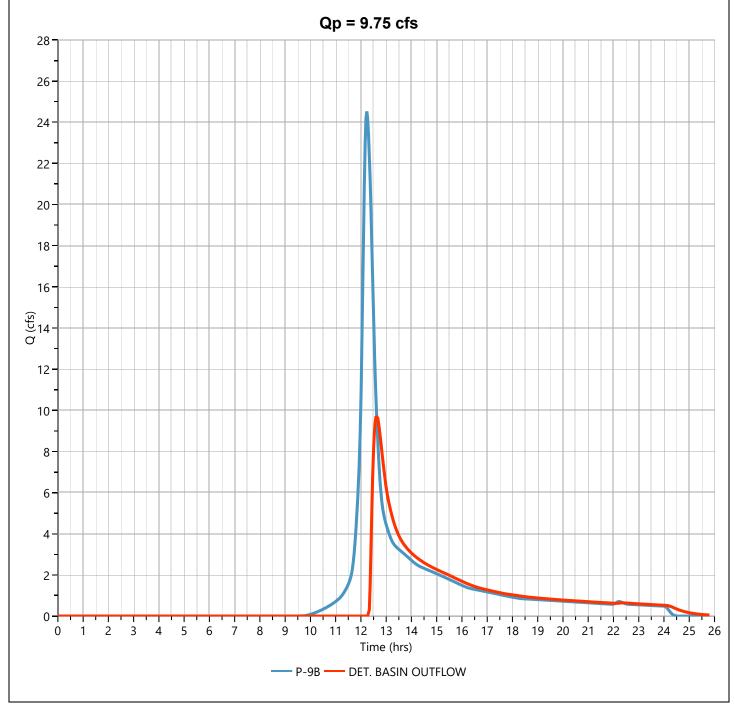
#### **DET. BASIN OUTFLOW**

Hyd. No. 50

Hydrograph Type	= Pond Route	Peak Flow	= 9.751 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.63 hrs
Time Interval	= 2 min	Hydrograph Volume	= 75,794 cuft
Inflow Hydrograph	= 49 - P-9B	Max. Elevation	= 237.42 ft
Pond Name	= EXIST DETENTION	Max. Storage	= 44,933 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.49 hrs



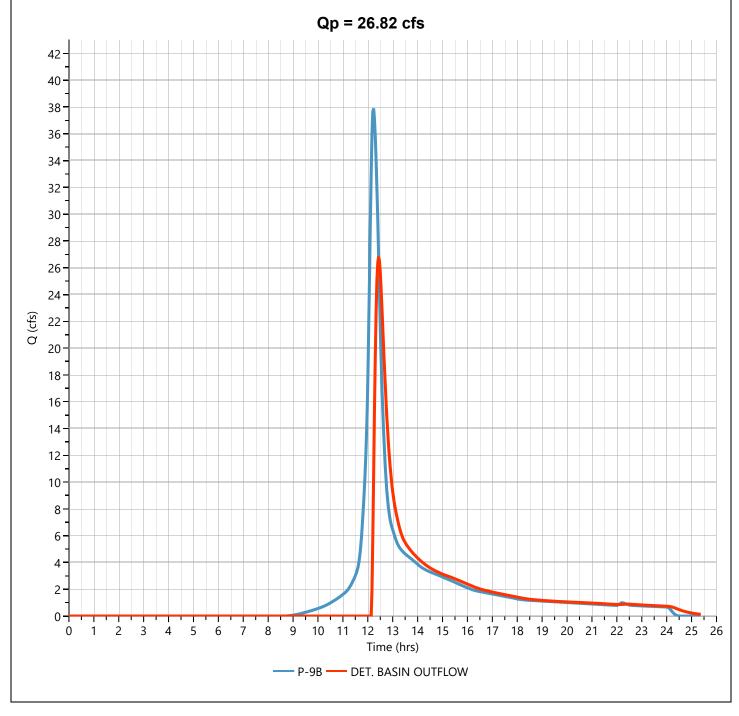
#### **DET. BASIN OUTFLOW**

Hyd. No. 50

Hydrograph Type	= Pond Route	Peak Flow	= 26.82 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.43 hrs
Time Interval	= 2 min	Hydrograph Volume	= 133,448 cuft
Inflow Hydrograph	= 49 - P-9B	Max. Elevation	= 237.78 ft
Pond Name	= EXIST DETENTION	Max. Storage	= 54,171 cuft

Pond Routing by Storage Indication Method

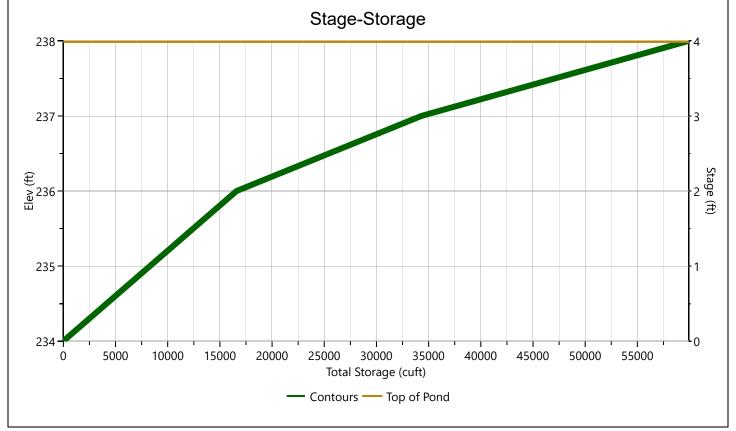
Center of mass detention time = 58 min



#### **EXIST DETENTION**

# Stage-Storage

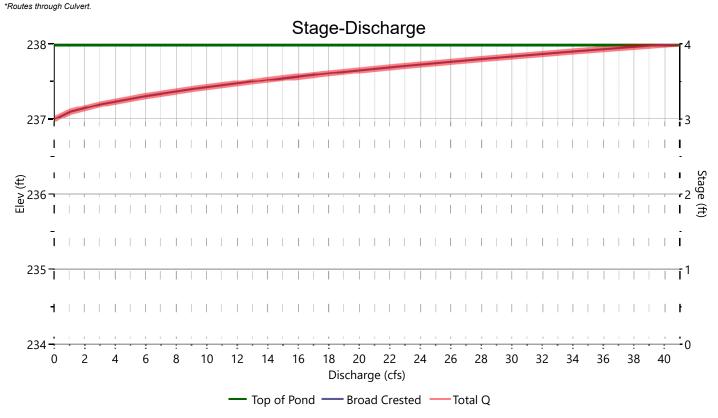
User Defined Contou	ırs	Stage / Storage Table				
Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
Bottom Elevation, ft	234.00					
Voids (%)	100.00	0.00	234.00	2,400	0.000	0.000
		2.00	236.00	14,200	16,600	16,600
Volume Calc	Rectangular	3.00	237.00	21,200	17,700	34,300
		4.00	238.00	30,000	25,600	59,900



#### **EXIST DETENTION**

#### Stage-Discharge

Culvert / Orifices	Culvert		Orifices		Perforated Riser			
Culvert / Orifices	Cuivert	1	2	3	Perioraleu Riser			
Rise, in					Hole Diameter, in			
Span, in					No. holes			
No. Barrels					Invert Elevation, ft			
Invert Elevation, ft					Height, ft			
Orifice Coefficient, Co					Orifice Coefficient, Co			
Length, ft								
Barrel Slope, %								
N-Value, n	0.000							
Weirs	Dioor*	Weirs			Weirs			Anaillan
vveirs	Riser*	1	2	3	Ancillary			
Shape / Type		Broad Crested			Exfiltration, in/hr			
Crest Elevation, ft		237						
Crest Length, ft		10						
Angle, deg		18.4 (3:1)						
Weir Coefficient, Cw		3.3						



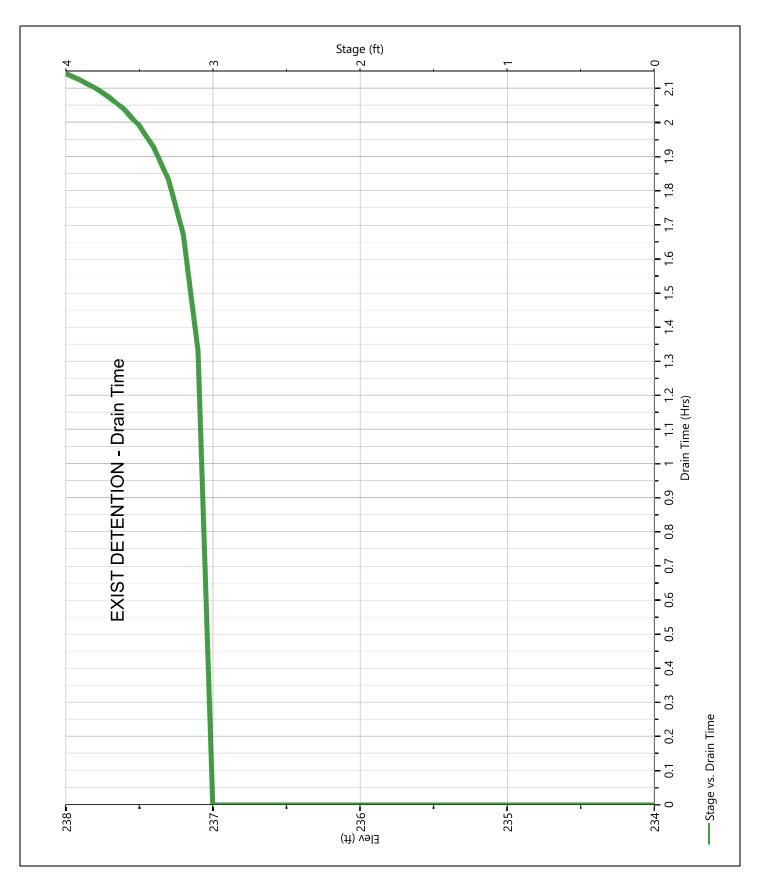
#### **EXIST DETENTION**

# **Stage-Storage-Discharge Summary**

Stage	Elev.	Storage	Culvert	(	Orifices, cfs		Riser		Weirs, cfs		Pf Riser	Exfil	User	Total
(ft)	(ft)	(cuft)	(cfs)	1	2	3	(cfs)	1	2	3	(cfs)	(cfs)	(cfs)	(cfs)
0.00	234.00	0.000						0.000						0.000
2.00	236.00	16,600						0.000						0.000
3.00	237.00	34,300						0.000						0.000
4.00	238.00	59,900						40.92						40.92

#### **EXIST DETENTION**

#### **Pond Drawdown**



#### Worksheet 2: Runoff curve number and runoff

SM-3719C

Project:	Athens Street	By PFK	Date	6/24/22
			Rev Date	10/13/2022
Location:	Stow, MA	Checked	Date	6/17/2023
Circle one:	Present Developed	Subcatchment P-10A		

1. Runoff curve number (CN)

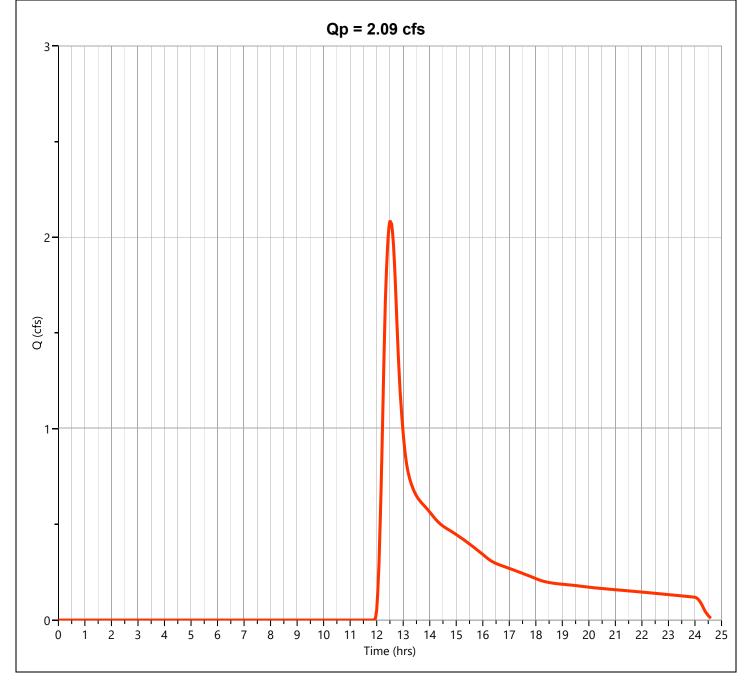
Soil name and hydrologic	(cover	Cover description type, treatment, and		CN 1/			Area	Product of CN x Area
group (appendix A)		hydrologic condition: percent impervious: unconnected/connected impervious area ratio)		Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious			98			0.00	0.00
А	Woods	Good Condition		30			1.73	51.76
А	Open Space	Good Condition		39			1.41	55.03
А	Open Space	Fair Condition		49			0.00	0.00
А	Gravel			76			0.14	10.95
В	Woods	Good Condition		55			0.00	0.00
В	Open Space	Good Condition		61			0.00	0.00
В	Gravel			85			0.00	0.00
С	Woods	Good Condition		70			5.28	369.49
С	Open Space	Good Condition		74			1.19	87.81
С	Open Space	Poor Condition		86			0.00	0.00
С	Gravel			89			0.12	11.00
D	BVW			77			0.35	26.97
D	Woods	Good Condition		77			0.00	0.00
D	Open Space	Good Condition		80			0.00	0.00
1/ Use only one	CN source per line.		445153			Totals =	10.22	613.01

CN (weighted) =	total	product	_=	613.01	_=	59.99	_;	Use CN =	Ī	60	I
•	total	area		10.22		<u></u>			_	-	•

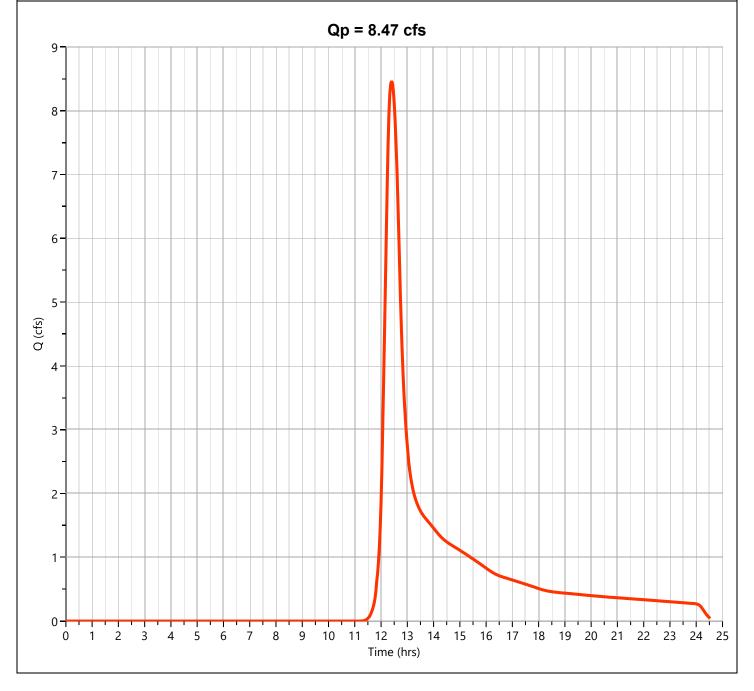
2. Runoff				
		Storm #1	Storm #2	Storm #3
Frequency	yr	2	25	100

Project:	Athens Street		_	Ву	PFK	6/24/2022	
Location:	Stow, MA			Checked		10/13/2022 6/17/2023	
Circle one:		Developed Tt	through subarea	Subcatchm	nent P-10A		
Sheet flow	_(Applicable to Tc only)			Segment ID	A-B		
1. Surface	Description (table 3-1)				WOODS		
2. Manning	gs roughness coeff., n (t	able 3-1)			0.6		
3. Flow len	ngth, L (total L <= 300 ft)	)		ft	50		
4. Two-yr 2	24-hr rainfall, P2			in	3.1		
5. Land Slo	ope, s			ft/ft	0.010		
6. Tt = 0.00	07 (nL)^0.8 / (P2^0.5 s^	0.4)	Compute T	t hr	0.38		0.38
Shallow co	oncentrated Flow	<u> </u>		Segment ID	B-C		
7. Surface	Description (paved or u	npaved)			UNPAVED		
8. Flow Le	ngth, L			ft	963		
9. Waterco	ourse slope, s			ft/ft	0.030		
10. Averag	ge Velocity, V (figure 3-1	)		ft/s	2.79		
11. Tt = L /	/ 3600V		Compute T	t hr	0.10		0.10
Channel flo	ow			Segment ID			
13. Wetted 14. Hydrau 15. Channo 16. Mannir 17. V = 1.4	ng's roughness coeff., n 19 r^2/3 s^1/2 / n		Compute r	ft/ft ft/s			
18. Flow le 19. Tt = L /	=		Compute T	ft t hr			0
20. Waters	shed or subarea Tc or T	t (add Tt in ste	eps 6, 11, an	d 19)		hr min	0.48 28.6

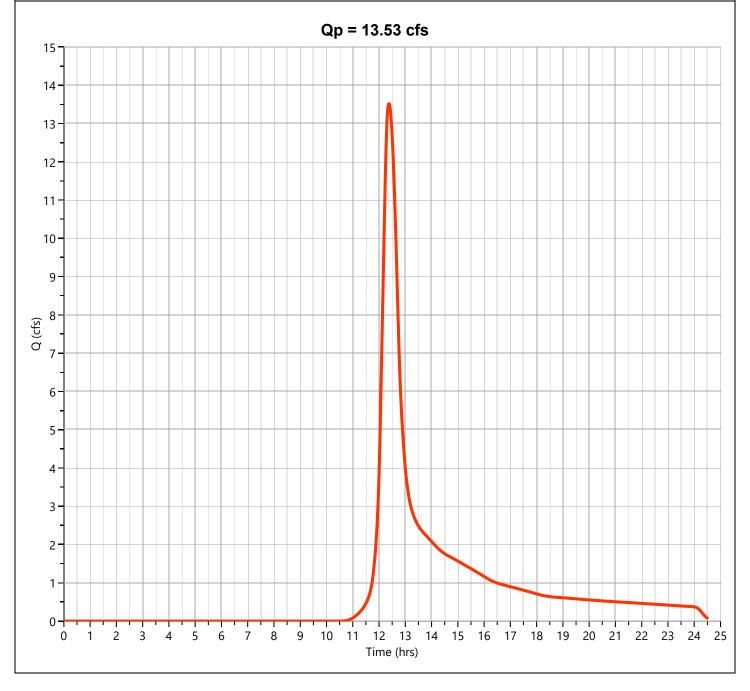
Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.091 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.53 hrs
Time Interval	= 2 min	Runoff Volume	= 16,170 cuft
Drainage Area	= 10.22 ac	Curve Number	= 60
Tc Method	= User	Time of Conc. (Tc)	= 28.6 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



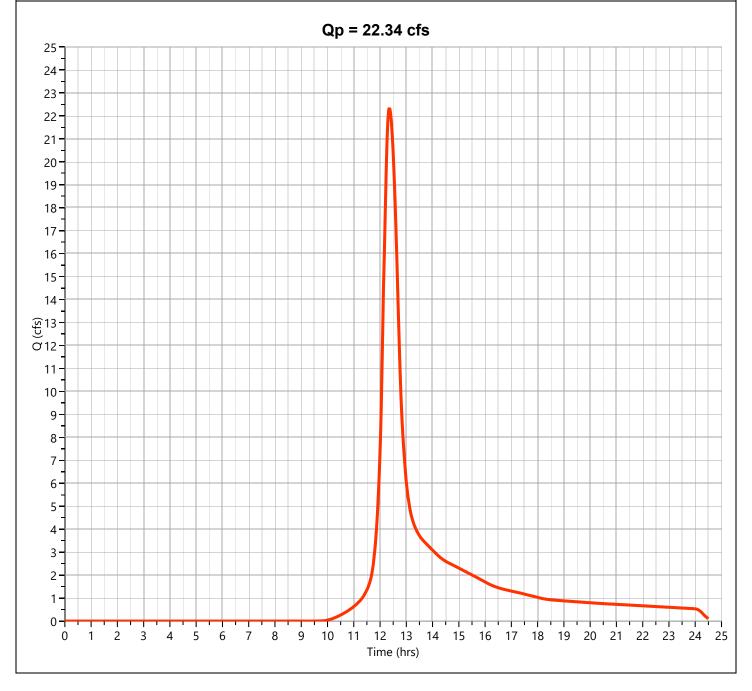
Hydrograph Type	= NRCS Runoff	Peak Flow	= 8.465 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.40 hrs
Time Interval	= 2 min	Runoff Volume	= 49,137 cuft
Drainage Area	= 10.22 ac	Curve Number	= 60
Tc Method	= User	Time of Conc. (Tc)	= 28.6 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 13.53 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.37 hrs
Time Interval	= 2 min	Runoff Volume	= 74,706 cuft
Drainage Area	= 10.22 ac	Curve Number	= 60
Tc Method	= User	Time of Conc. (Tc)	= 28.6 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 22.34 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.37 hrs
Time Interval	= 2 min	Runoff Volume	= 119,228 cuft
Drainage Area	= 10.22 ac	Curve Number	= 60
Tc Method	= User	Time of Conc. (Tc)	= 28.6 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



#### Worksheet 2: Runoff curve number and runoff

SM-3719C

Project:	Athens Street	By PFK'	Date 6/24/22
			Rev Date 10/13/2022
Location:	Stow, MA	Checked	Date 6/17/2023
Cinala ana	Decemb Developed	Cub actal mant D 40D	
Circle one:	Present Developed	Subcatchment P-10B	

1. Runoff curve number (CN)

Soil name and hydrologic	(cover t	Cover description ype, treatment, and		CN 1/			Area	Product of CN x Area
group (appendix A)		hydrologic condition: percent impervious: unconnected/connected impervious area ratio)		Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious			98			1.69	165.29
Α	Woods	Good Condition		30			0.00	0.00
Α	Open Space	Good Condition		39			0.52	20.21
Α	Open Space	Fair Condition		49			0.00	0.00
Α	Gravel			76			0.00	0.00
В	Woods	Good Condition		55			0.00	0.00
В	Open Space	Good Condition		61			0.00	0.00
В	Gravel			85			0.00	0.00
С	Woods	Good Condition		70			0.00	0.00
С	Open Space	Good Condition		74			0.69	51.41
С	Open Space	Poor Condition		86			0.00	0.00
С	Gravel			89			0.00	0.00
D	BVW			77			0.00	0.00
1/ Use only one	e CN source per line.	1:	26303			Totals =	2.90	236.91

CN (weighted) =	total product	_=	236.91 =	81.71	;	Use CN =	82
'	total area	_	2.90		_		

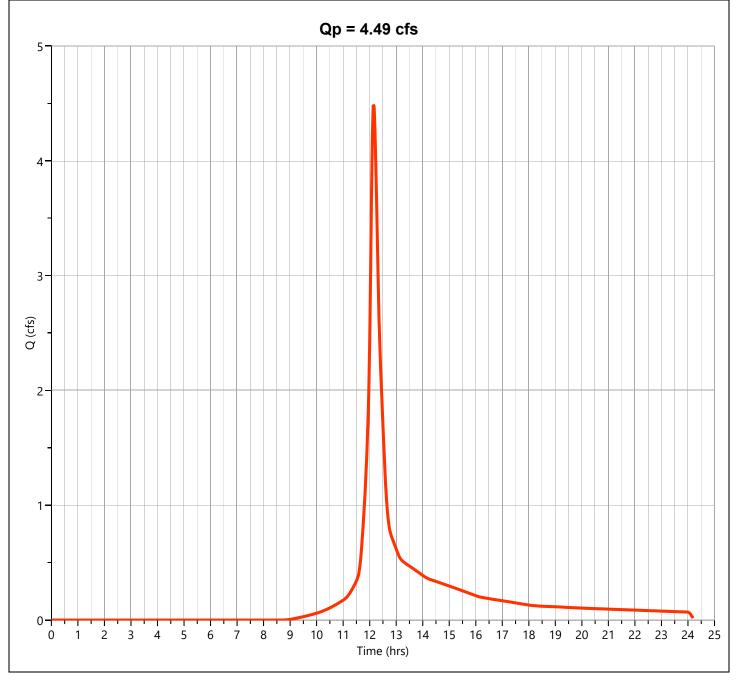
2. Runoff

Frequency..... yr Rainfall, P (24-hour)..... in Runoff, Q......(Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)

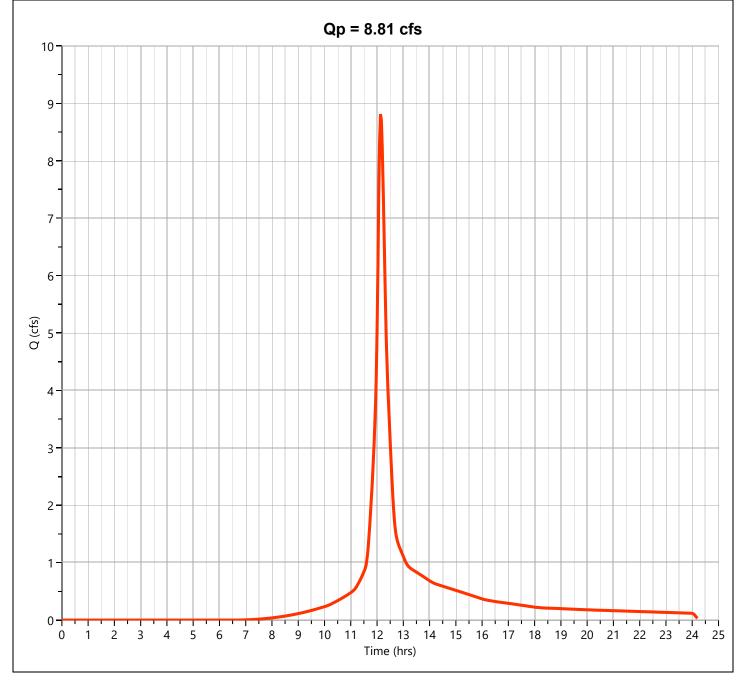
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
1.57	4.09	5.67

Project:	Athens Street		Ву	PFK		6/24/2022	
Location:	Stow, MA		Checked			10/13/2022 6/17/2023	
Circle one:	Present	Developed	Subcatchm		Date	0/11/2020	
Circle one:	Tc [	Tt through subarea					
Sheet flow	_(Applicable to Tc only)		Segment ID	A-B			
1. Surface	Description (table 3-1)			LAWN			
2. Manning	gs roughness coeff., n (tab	le 3-1)		0.24			
3. Flow len	ngth, L (total L <= 300 ft)		ft	50			
4. Two-yr 2	24-hr rainfall, P2		in	3.1			
5. Land Slo	ope, s		ft/ft	0.020			
6. Tt = 0.00	07 (nL)^0.8 / (P2^0.5 s^0.4	4) Compute Tt	hr	0.14			0.14
Shallow co	oncentrated Flow		Segment ID	B-C			
7. Surface	Description (paved or unp	paved)		UNPAVED			
8. Flow Le	ngth, L		ft	231			
9. Waterco	ourse slope, s		ft/ft	0.020			
10. Averag	ge Velocity, V (figure 3-1)		ft/s	2.28			
11. Tt = L /	/ 3600V	Compute Tt	hr	0.03			0.03
Channel flo	ow		Segment ID				
13. Wetted	sectional flow area, a I perimeter, pw ılic radius, r=a/wp	Compute r	sf ft				
15. Channe		Computer	ft/ft				
	19 r^2/3 s^1/2 / n	Compute V					
18. Flow le 19. Tt = L /	=	Compute Tt	ft hr				0
20. Waters	shed or subarea Tc or Tt (a	add Tt in steps 6, 11, and	i 19)			hr min	0.17 10.0

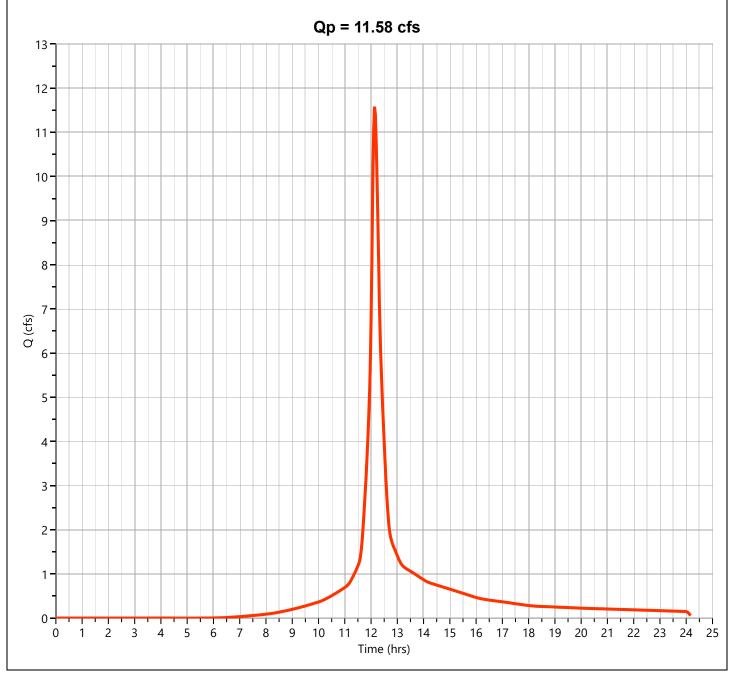
Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.488 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 17,311 cuft
Drainage Area	= 2.9 ac	Curve Number	= 82
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



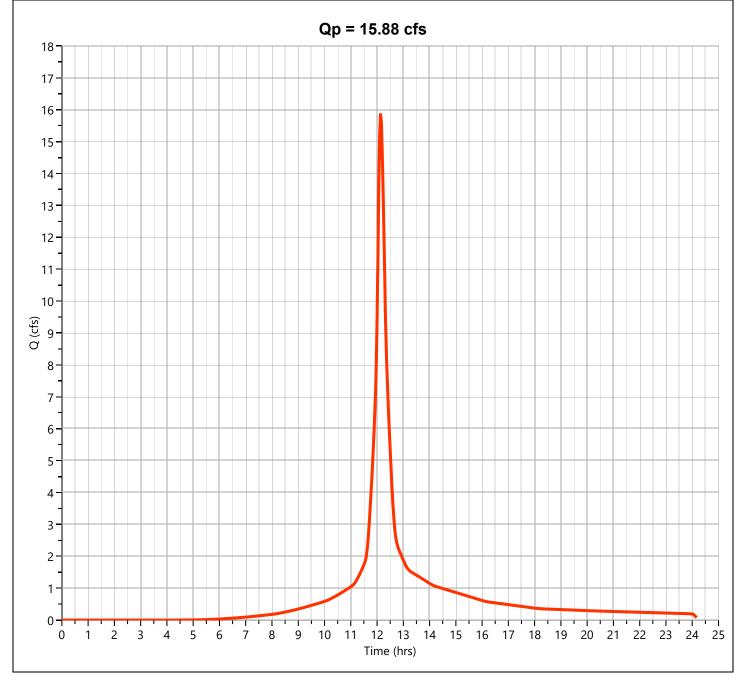
Hydrograph Type	= NRCS Runoff	Peak Flow	= 8.811 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 33,815 cuft
Drainage Area	= 2.9 ac	Curve Number	= 82
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 11.58 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 44,684 cuft
Drainage Area	= 2.9 ac	Curve Number	= 82
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



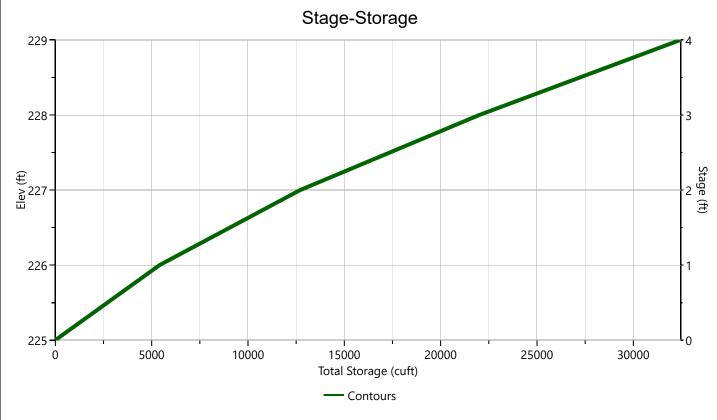
Hydrograph Type	= NRCS Runoff	Peak Flow	= 15.88 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 61,966 cuft
Drainage Area	= 2.9 ac	Curve Number	= 82
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



#### IB-10B

# Stage-Storage

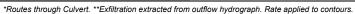
Input	Stage				
	(ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
225.00					
100.00					0.000
					5,415
Ave End Area					12,715
					22,007
	4.00	229.00	11,032	10,443	32,450
	100.00 Ave End Area	100.00 0.00	100.00	0.00     225.00     4,961       100.00     1.00     226.00     5,869       Ave End Area     2.00     227.00     8,731       3.00     228.00     9,853	0.00     225.00     4,961     0.000       100.00     1.00     226.00     5,869     5,415       Ave End Area     2.00     227.00     8,731     7,300       3.00     228.00     9,853     9,292

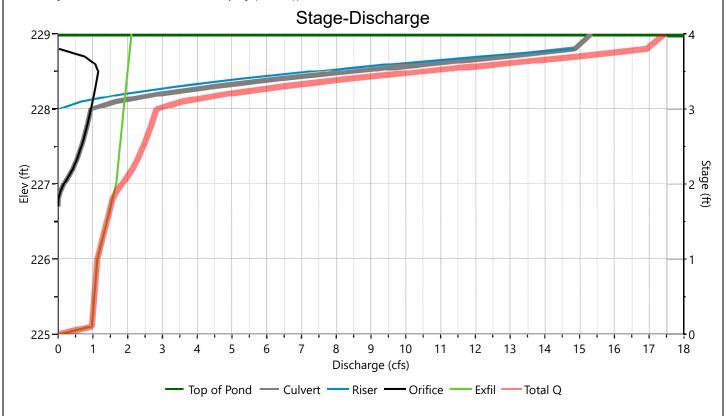


#### **IB-10B**

# Stage-Discharge

Outroot / Outlines	Ondrand	Orifices			Orifice Plate	
Culvert / Orifices	Culvert	1*	2	3	Orifice Plate	
Rise, in	18	6			Orifice Dia, in	
Span, in	18	6			No. Orifices	
No. Barrels	1	1			Invert Elevation, ft	
Invert Elevation, ft	225.00	226.75			Height, ft	
Orifice Coefficient, Co	0.60	0.60			Orifice Coefficient, Co	
Length, ft	55					
Barrel Slope, %	2					
N-Value, n	0.012					
Weirs	Riser*		Weirs		Anaillana	
vveirs	Kisei	1	2	3	Ancillary	
Shape / Type	Circular				Exfiltration, in/hr 8.27**	
Crest Elevation, ft	228					
Crest Length, ft	6.28					
Angle, deg						
Weir Coefficient, Cw	3.3					





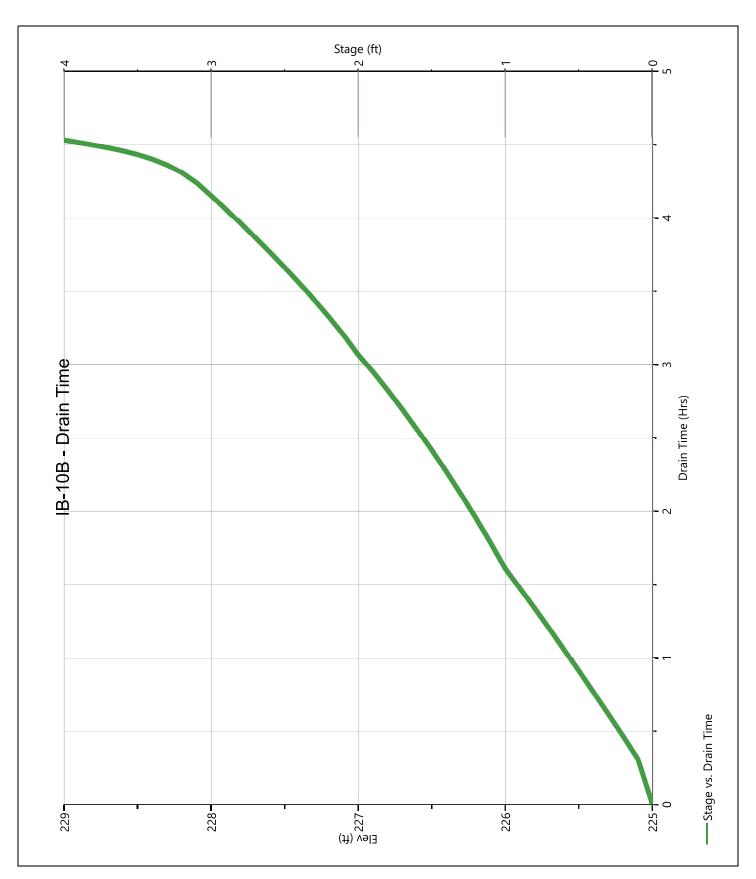
#### IB-10B

# **Stage-Storage-Discharge Summary**

Stage	Elev.	Storage	Culvert	(	Orifices, cf	s	Riser		Weirs, cfs	i	Pf Riser	Exfil	User	Total
(ft)	(ft)	(cuft)	(cfs)	1	2	3	(cfs)	1	2	3	(cfs)	(cfs)	(cfs)	(cfs)
0.00	225.00	0.000	0.000	0.000			0.000					0.000		0.000
1.00	226.00	5,415	0.000	0.000			0.000					1.124		1.124
2.00	227.00	12,715	0.167 ic	0.167			0.000					1.671		1.839
3.00	228.00	22,007	0.945 ic	0.945			0.000					1.886		2.832

#### IB-10B

#### **Pond Drawdown**



# IB-10B Hyd. No. 49

	2	3		4				6		7		8		9			10	1	
, -						Q	p = (	0.00	cfs	<b>;</b>									
y Storage Ind												Max	. Sto	rage	•		= :	4,886	cuπ
ograph							Max. Elevation												
al	= 2 min							Hydı	rogra	aph \	/olu	me	=	0.000	o cuft				
uency	= 2-y	r										Time	e to F	Peak	•				/ hrs
2	al ograph	uency = 2-y al = 2 m ograph = 48 = IB-	uency = 2-yr al = 2 min ograph = 48 - P-1	= 2-yr = 2 min = 2 min = 48 - P-10B = 1B-10B	uency = 2-yr al = 2 min ograph = 48 - P-10B = IB-10B	uency = 2-yr al = 2 min ograph = 48 - P-10B = IB-10B	uency = 2-yr  al = 2 min  ograph = 48 - P-10B  = IB-10B  Storage Indication Method	uency = 2-yr  al = 2 min  ograph = 48 - P-10B  = IB-10B  Storage Indication Method	al = 2 min  ograph = 48 - P-10B  = IB-10B  Storage Indication Method	al = 2 min  ograph = 48 - P-10B  = IB-10B  Storage Indication Method	al = 2 min ograph = 48 - P-10B = IB-10B	al = 2 min  ograph = 48 - P-10B  = IB-10B  Storage Indication Method	al = 2 min Hydrograph = 48 - P-10B Max = IB-10B Max  Storage Indication Method	al = 2 min Hydrogra  pgraph = 48 - P-10B Max. Ele  = IB-10B Max. Sto  Storage Indication Method	al = 2 min Hydrograph \ ograph = 48 - P-10B Max. Elevation E = IB-10B Max. Storage  of Storage Indication Method	ograph = 48 - P-10B Max. Elevation E = IB-10B Max. Storage  Storage Indication Method	ograph = 48 - P-10B Max. Elevation  = IB-10B Max. Storage  Storage Indication Method	ograph = 48 - P-10B Max. Elevation = He	al = 2 min Hydrograph Volume = 0.000 ograph = 48 - P-10B Max. Elevation = 225.9 = IB-10B Max. Storage = 4,886

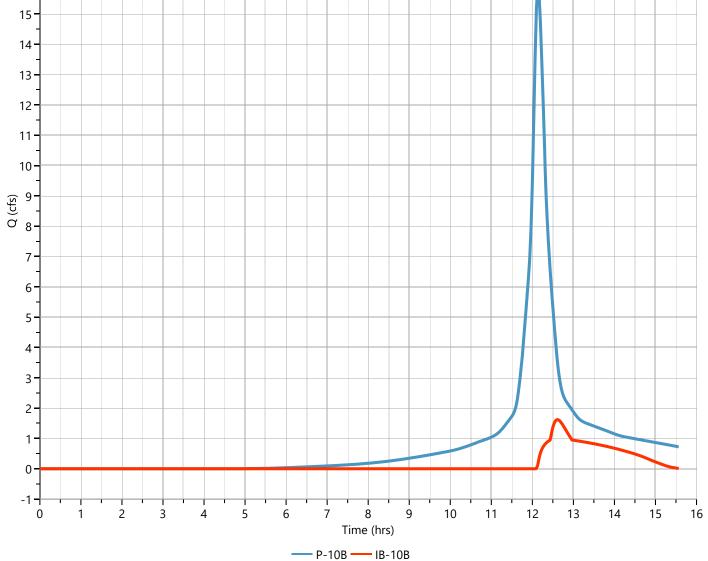
# IB-10B Hyd. No. 49

lydrograph Type	= Pond Route		Peak Flow	= 0.053 cfs
Storm Frequency	= 10-yr		Time to Peak	= 12.67 hrs
ïme Interval	= 2 min		Hydrograph Volume	= 88.3 cuft
nflow Hydrograph	= 48 - P-10B	Max. Elevation	= 226.88 ft	
ond Name	= IB-10B		Max. Storage	= 11,821 cuft
ond Routing by Storage Inc				
10 –		)p = 0.05 cfs		
9				
8				
1				
7 -				
-				
6				
-				
5				
(crs)				
4				
1				
3				<del>//                                   </del>
-				
2				$H \rightarrow H$
-				
1			<del>                                     </del>	
-				
0				
-				
-1				
0 1	2 3 4 5	6 7 8 Time (hrs)	9 10 11	12 13

# IB-10B Hyd. No. 49

Hydrograph Type	= Pond Route	Peak Flow	= 0.563 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.67 hrs
ime Interval	= 2 min	Hydrograph Volume	
nflow Hydrograph	= 48 - P-10B	Max. Elevation	= 227.36 ft
Pond Name	= IB-10B	Max. Storage	= 16,025 cuft
Pond Routing by Storage In			
13	Qp = 0.56	cfs	
13			
12			
-			
11			
10			
.			
9			
-			
8			
7			
_			
(SD) 6			
1			
5 -			
4			
-			
3			
2			
1 -			
-			
0			
-1			
0 1	2 3 4 5 6 7	8 9 10 11 12	13 14
	Time (h —— P-10B —— II		

B-10B				Hyd. No. 49
Hydrograph Type	= Pond Route		Peak Flow	= 1.619 cfs
Storm Frequency	= 100-yr		Time to Peak	= 12.60 hrs
Time Interval	= 2 min		Hydrograph Volume	= 8,312 cuft
Inflow Hydrograph	= 48 - P-10B		Max. Elevation	= 228.10 ft
Pond Name	= IB-10B		Max. Storage	= 23,009 cuft
Pond Routing by Storage Inc	dication Method			
		Qp = 1.62 cfs		
18				
17				
16				
15				
-				
14 -				
13 -				
12				
11 -				
-				
10				



#### Worksheet 2: Runoff curve number and runoff

SM-3719C

Project:	Athens Street	By PFK	Date	6/24/22
			Rev Date	10/13/22
Location:	Stow, MA	Checked	Date	6/17/2023
Circle one:	Present Developed	Subcatchment P-10C		

1. Runoff curve number (CN)

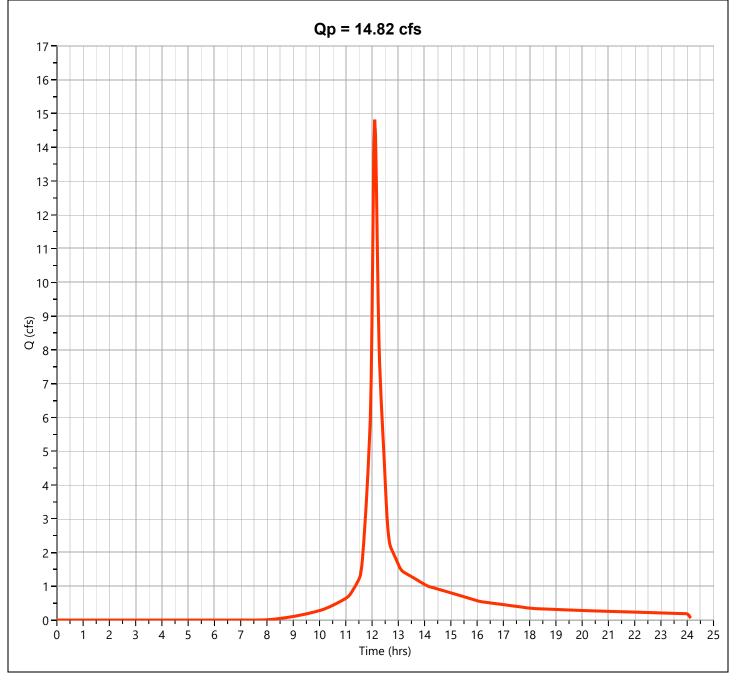
Soil name and	(22)	Cover description			CN 1/		Area	Product of CN x Area
hydrologic group (appendix A)	(cover	type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	-	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious			98			3.38	331.13
Α	Woods	Good Condition		30			0.00	0.00
Α	Open Space	Good Condition		39			0.00	0.00
Α	Open Space	Fair Condition		49			0.00	0.00
Α	Gravel			76			0.00	0.00
В	Woods	Good Condition		55			0.00	0.00
В	Open Space	Good Condition		61			0.00	0.00
В	Gravel			85			0.00	0.00
С	Woods	Good Condition		70			0.00	0.00
С	Open Space	Good Condition		74			4.29	317.26
С	Open Space	Poor Condition		86			0.00	0.00
С	Gravel			89			0.00	0.00
D	BVW			77			0.00	0.00
D	Woods	Good Condition		77			0.00	0.00
D	Open Space	Good Condition		80			0.00	0.00
1/ Use only one	CN source per line.		333940			Totals =	7.67	648.39

CN (weighted) =	total product	=	648.39 =	84.58 ;	Use CN =	85
· ·	total area		7.67			

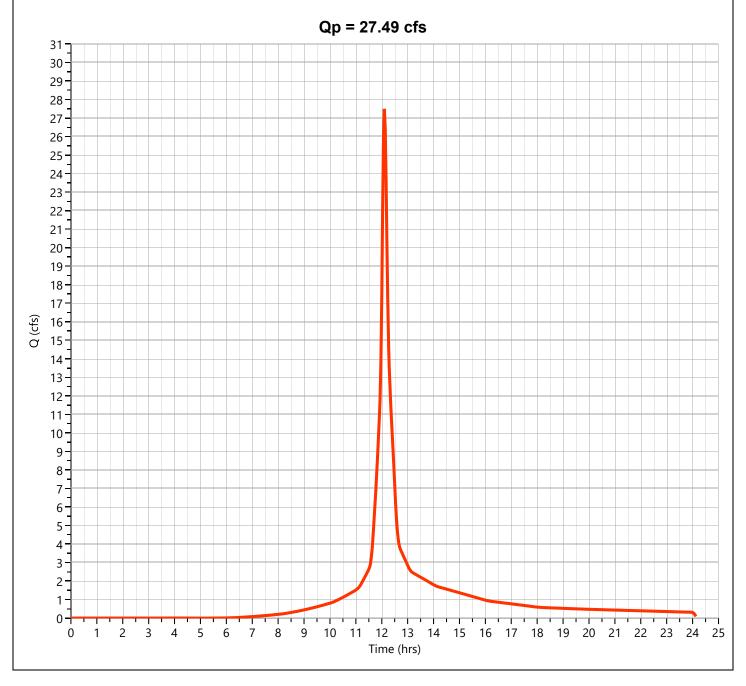
2. Runoff				
		Storm #1	Storm #2	Storm #3
Frequency	yr	2	25	100

Project:	Athens Street			•	Ву	PFK		6/24/2022	
Location:	Stow, MA				Checked			10/13/2022 6/17/2023	
Location.	Otow, IVIA			<u>.</u>	Officered		Date	0/11/2020	
Circle one:			eveloped		Subcatchm	nent P-10C			
Circle one:		Тс	Tt	through subarea			i		
				5454.54					
Sheet flow	(Applicable to Tc o	only)			Segment ID	A-B			
1 Surface	Description (table	3-1)				LAWN			
r. Gariago	Decempation (table	0 1)				27 (17)1			
2. Manning	s roughness coeff.	., n (table	3-1)			0.24			
3. Flow len	gth, L (total L <= 3	00 ft)			ft	50			
4. Two-yr 2	24-hr rainfall, P2				in	3.1			
5. Land Slo	ope, s				ft/ft	0.040			
6. Tt = 0.00	07 (nL)^0.8 / (P2^0	.5 s^0.4)		Compute T	t hr	0.11			0.11
Shallow co	ncentrated Flow				Segment ID	B-C			
7. Surface	Description (paved	l or unpav	ved)			UNPAVED			
8. Flow Lei	ngth, L				ft	495			
9. Waterco	ourse slope, s				ft/ft	0.056			
10. Averag	e Velocity, V (figur	e 3-1)			ft/s	3.82			
11. Tt = L /	' 3600V			Compute T	t hr	0.04			0.04
Channel flo	ow				Segment ID				
12 Cross (	sectional flow area	•			of				
	perimeter, pw	, а			sf ft				
	ilic radius, r=a/wp			Compute r					
15. Channe				Computer	ft/ft				
	ng's roughness coe	ff n							
	9 r^2/3 s^1/2 / n	,		Compute V	ft/s				
18. Flow le				Compato V	ft				
19. Tt = L /				Compute T					0
20. Waters	hed or subarea Tc	or Tt (add	d Tt in ste	ps 6, 11, and	d 19)			hr min	0.14 8.5

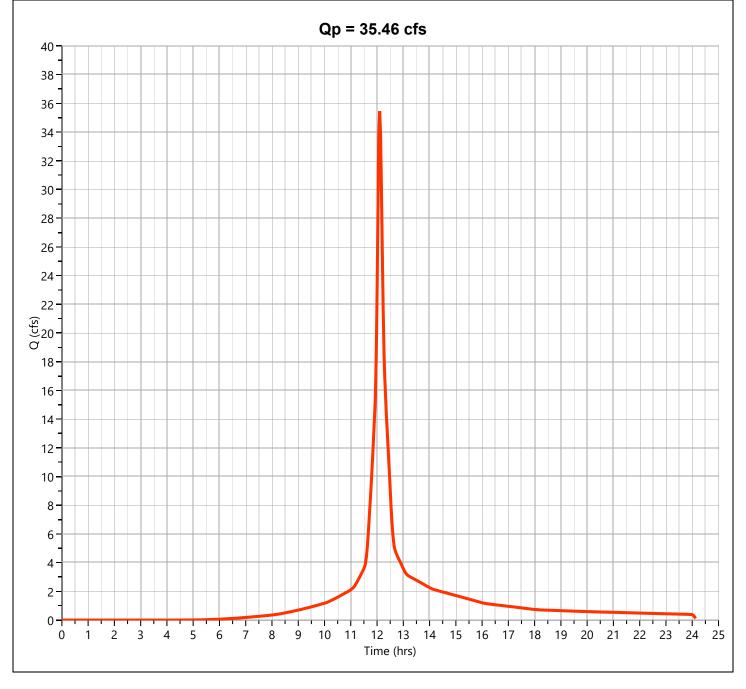
Hydrograph Type	= NRCS Runoff	Peak Flow	= 14.82 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 50,604 cuft
Drainage Area	= 7.67 ac	Curve Number	= 85
Tc Method	= User	Time of Conc. (Tc)	= 8.5 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



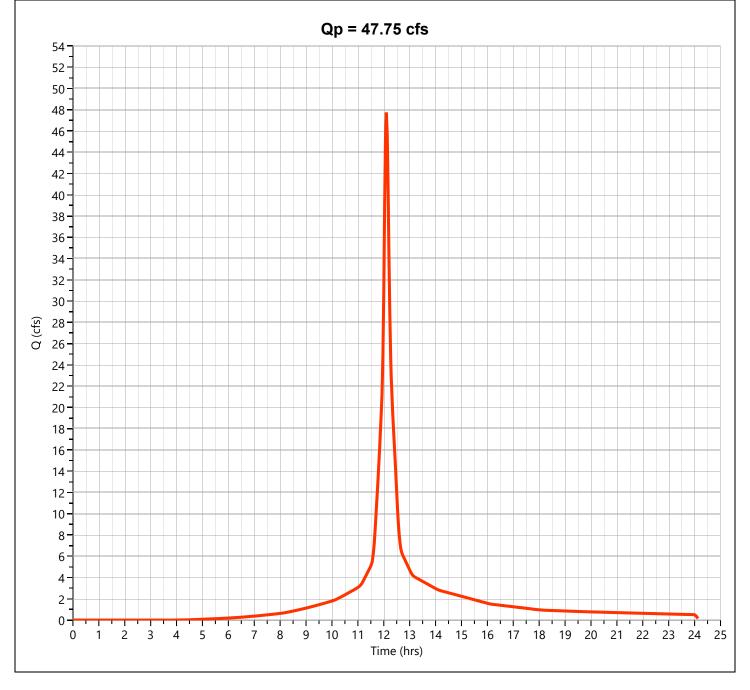
Hydrograph Type	= NRCS Runoff	Peak Flow	= 27.49 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 94,804 cuft
Drainage Area	= 7.67 ac	Curve Number	= 85
Tc Method	= User	Time of Conc. (Tc)	= 8.5 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 35.46 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 123,472 cuft
Drainage Area	= 7.67 ac	Curve Number	= 85
Tc Method	= User	Time of Conc. (Tc)	= 8.5 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 47.75 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 168,694 cuft
Drainage Area	= 7.67 ac	Curve Number	= 85
Tc Method	= User	Time of Conc. (Tc)	= 8.5 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



#### Worksheet 2: Runoff curve number and runoff

SM-3719C

Project:	Athens Street	By PFK	Date 10/13/22
			Rev Date 6/17/2023
Location:	Stow, MA	Checked	Date
Circle one:	Present Developed	Subcatchment P-9A	

1. Runoff curve number (CN)

Soil name and hydrologic	(cover	Cover description type, treatment, and		CN 1/			Area	Product of CN x Area
group (appendix A)		hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	s	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious			98			0.05	5.35
А	Woods	Good Condition		30			0.56	16.84
Α	Open Space	Good Condition		39			1.86	72.70
А	Open Space	Fair Condition		49			0.00	0.00
Α	Gravel			76			0.14	10.38
В	Woods	Good Condition		55			0.00	0.00
В	Open Space	Good Condition		61			0.00	0.00
С	Gravel			89			0.14	12.87
С	Woods	Good Condition		70			0.80	55.71
С	Open Space	Good Condition		74			1.20	88.57
D	Open Space	Good Condition		80			0.00	0.00
D	Open Space	Fair Condition		84			0.00	0.00
D	Woods	Good Condition		77			0.00	0.00
1/ Use only one	CN source per line.		207091			Totals =	4.75	262.43

CN (weighted) =	total product	=	262.43 =	55.20 ;	Use CN =	55
	total area		4.75		!	

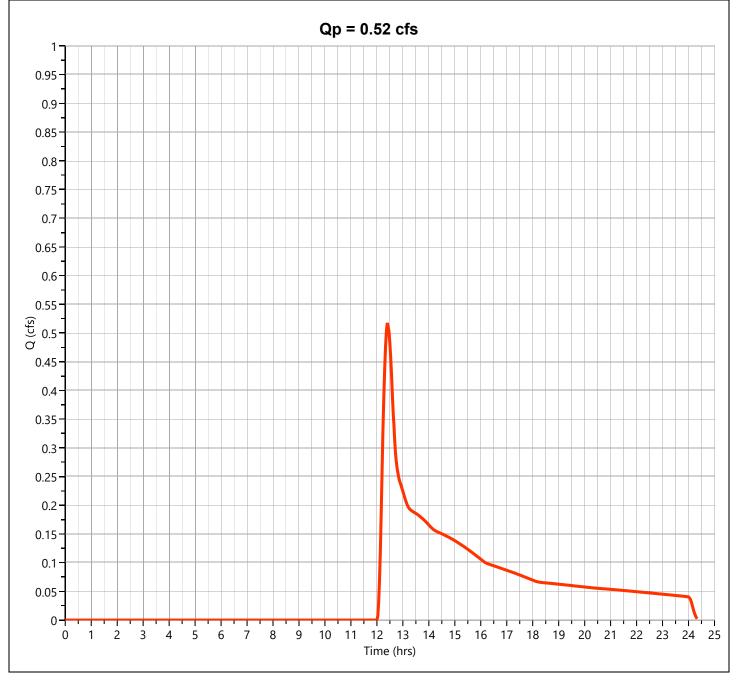
2. Runoff

Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.28	1.62	2.70

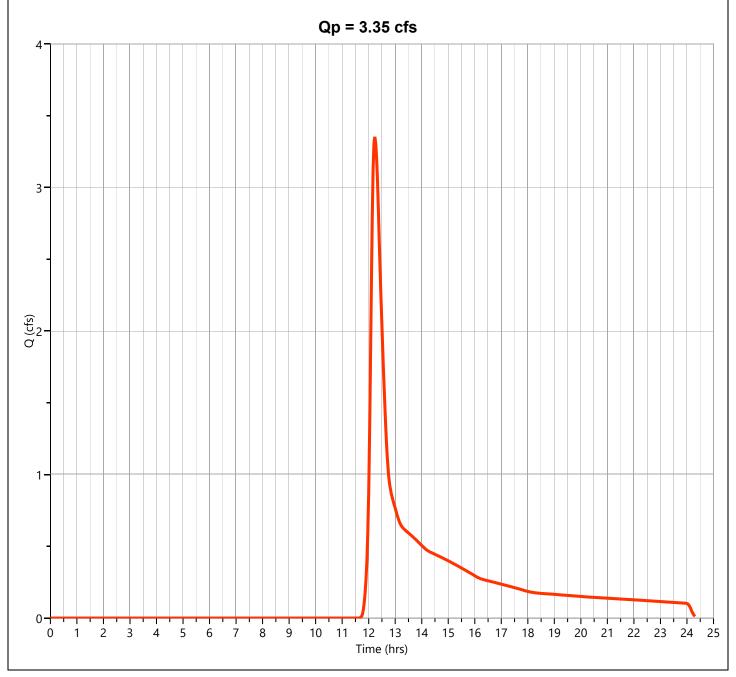
SM-3719C

Project:	Athens Street	•	Ву	PFK		10/13/2022	
Location:	Stow, MA		Checked		Rev Date Date	6/17/2023	
Circle one:	Present Developed Tc Tt	through subarea	Subcatchm		•		
Sheet flow	(Applicable to Tc only)		Segment ID	A-B			
1. Surface	Description (table 3-1)			WOODS			
2. Manning	s roughness coeff., n (table 3-1)			0.6			
3. Flow leng	gth, L (total L <= 300 ft)		ft	50			
4. Two-yr 2	4-hr rainfall, P2		in	3.1			
5. Land Slo	pe, s		ft/ft	0.043			
6. Tt = 0.00	7 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Ti	hr	0.21			0.21
Shallow cor	ncentrated Flow		Segment ID	B-C			
7. Surface	Description (paved or unpaved)			UNPAVED			
8. Flow Ler	ngth, L		ft	203			
9. Waterco	urse slope, s		ft/ft	0.030			
10. Average	e Velocity, V (figure 3-1)		ft/s	2.79			
11. Tt = L /	3600V	Compute Ti	hr	0.02			0.02
Channel flo	w		Segment ID				
<ul><li>13. Wetted</li><li>14. Hydrau</li><li>15. Channe</li><li>16. Mannin</li></ul>	g's roughness coeff., n 9 r^2/3 s^1/2 / n	Compute r	ft/ft				
19. Tt = L /		Compute Ti					0
20. Watersl	ned or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	d 19)			hr min	0.23 14.0

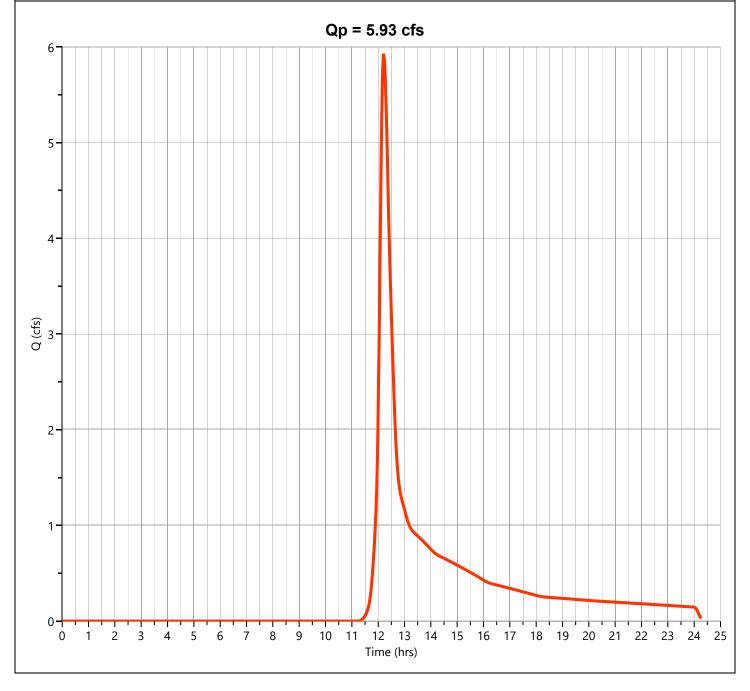
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.518 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.40 hrs
Time Interval	= 2 min	Runoff Volume	= 4,571 cuft
Drainage Area	= 4.75 ac	Curve Number	= 55
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



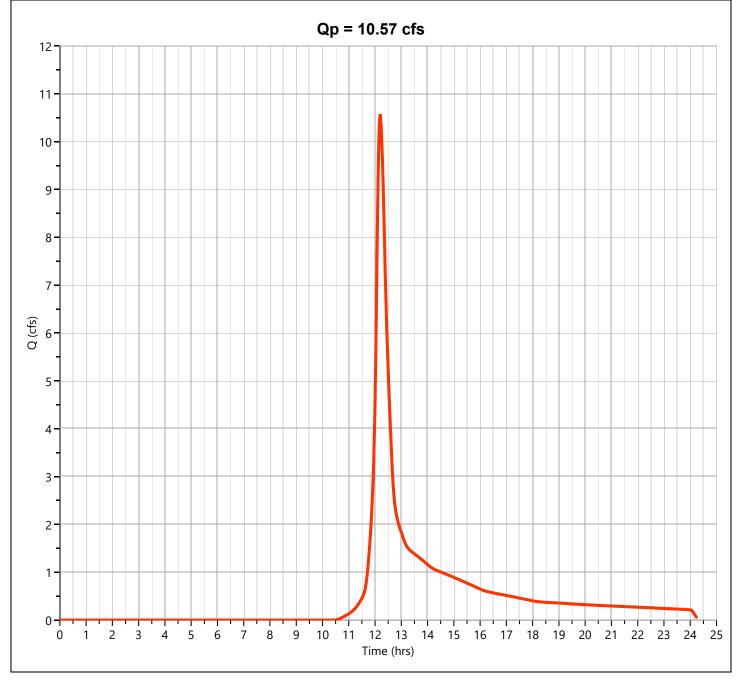
Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.353 cfs
Hydrograph Type	- NRCS RUIIOII	reak Flow	- 3.333 CIS
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 16,810 cuft
Drainage Area	= 4.75 ac	Curve Number	= 55
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.929 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 26,880 cuft
Drainage Area	= 4.75 ac	Curve Number	= 55
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

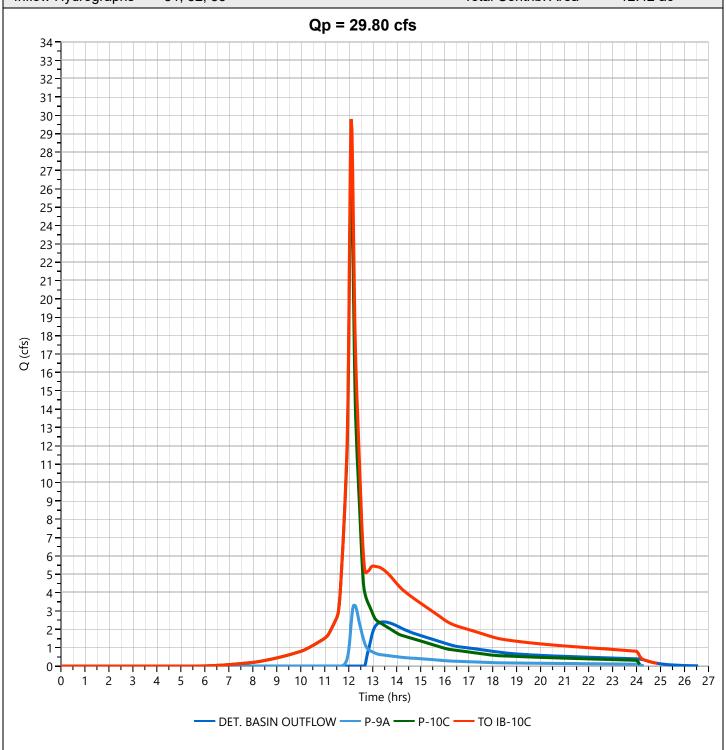


Hydrograph Type	= NRCS Runoff	Peak Flow	= 10.57 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 44,975 cuft
Drainage Area	= 4.75 ac	Curve Number	= 55
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



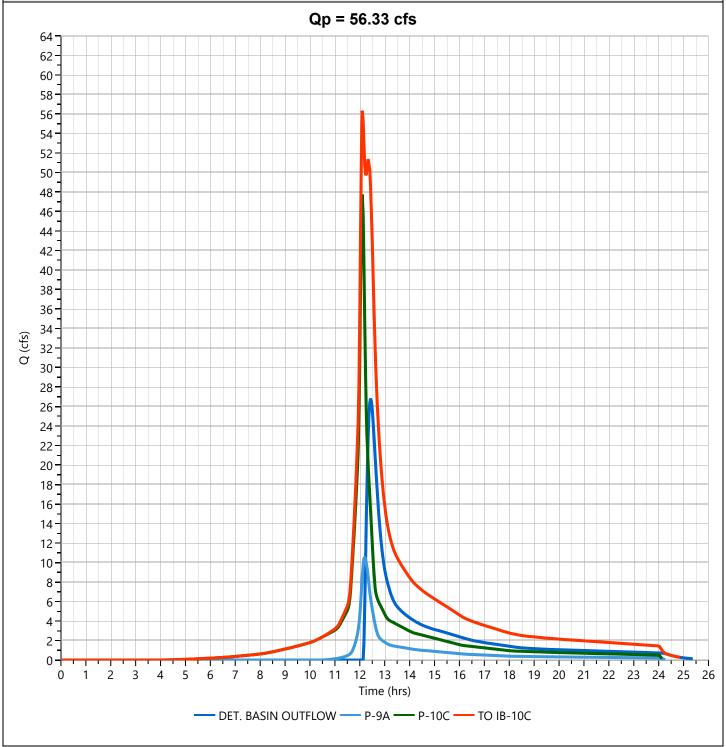
lydrograph Type	= Junction	Peak Flow	= 14.89 cfs	
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs	
īme Interval	= 2 min	Hydrograph Volume	= 55,175 cuft	
nflow Hydrographs	= 51, 52, 53	Total Contrib. Area	= 12.42 ac	
	Qp = 14.89 cfs			
17				
16				
-				
15				
14				
' <del>-</del> -				
13				
12				
11 -				
10				
-				
9				
ğ 8 <u>1</u>				
-				
7 =				
6				
4				
5				
4-				
4				
3				
2				
1 -				
0 1 2 3	4 5 6 7 8 9 10 11 12 13 14 Time (hrs)	15 16 17 18 19 20	21 22 23 24	
	— P-9A — P-10C — TO I	P 10C		

Time Interval	= 2 min	Hydrograph Volume	·
Inflow Hydrographs	= 51, 52, 53	Total Contrib. Area  Qp = 29.80 cfs	= 12.42 ac



Hydrograph Type	= Junction	Peak Flow	= 40.00 cfs		
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs		
Time Interval	= 2 min	Hydrograph Volume	= 226,146 cuft		
nflow Hydrographs	= 51, 52, 53 Total Contrib. Ar		= 12.42 ac		
	Qp = 40.00 cfs				
46 –					
44 -					
42					
40					
38					
36					
34 -					
32 -					
30					
28					
26	<b>_</b>				
ي 24 <del>-</del>					
(S) 24 - C 22 - C 22 - C 22 - C 24 -					
20	l l				
18					
16	I I I I I I I I I I I I I I I I I I I				
14					
12					
4					
10					
8 -					
6 -					
4 -					
2 -					
0	4 5 6 7 8 9 10 11 12 13 14 15	16 17 18 19 20 21	22 22 24 25		

Hydrograph Type	= Junction	Peak Flow	= 56.33 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 347,117 cuft
Inflow Hydrographs	= 51, 52, 53	Total Contrib. Area	= 12.42 ac

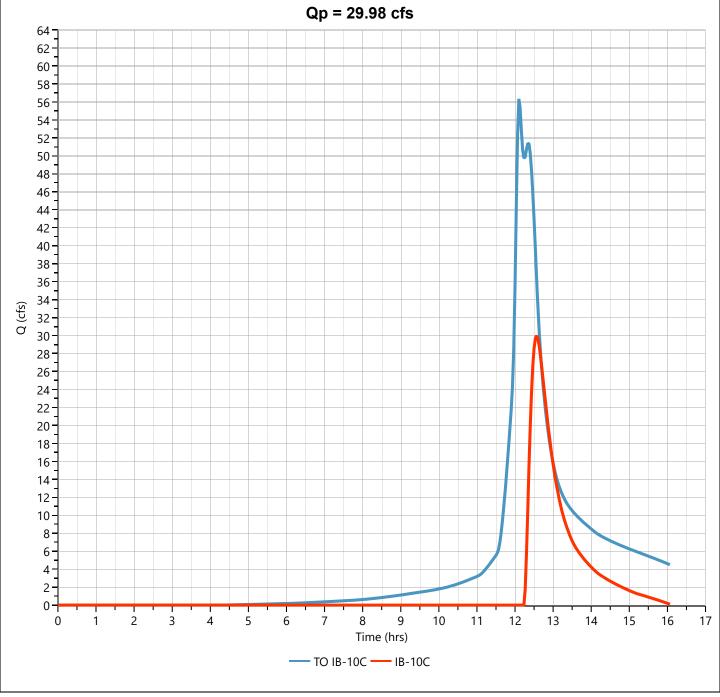


Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs	
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs	
Time Interval	= 2 min	Hydrograph Volume	= 0.005 cuft	
nflow Hydrograph	= 54 - TO IB-10C	Max. Elevation	= 225.77 ft	
Pond Name	= IB-10C	Max. Storage	= 14,103 cuft	
Pond Routing by Storage Inc	lication Method			
17	Qp = 0.00 cfs			
17 -				
16				
15				
14 -				
13				
12				
11				
10				
9 - 9				
g 8 ]				
7				
6				
5				
4				
3				
2				
1				
0	<del></del>			
0 1	2 3 4 5 6 7 Time (hrs)	8 9 10	11 12 1	

Hydrograph Type	= Pond Route	)				Pea	k Flow		= 0.00	00 cfs
Storm Frequency	= 10-yr	= 10-yr				Tim	Time to Peak		= 12.27 hrs	
ime Interval	= 2 min					Нус	Irograph	n Volume	= 0.0	06 cuft
nflow Hydrograph	= 54 - TO IB-	10C				Max	k. Eleva	tion	= 226	6.98 ft
Pond Name	= IB-10C					Max	k. Stora	ge	= 39,9	975 cuft
Pond Routing by Storage In	dication Method									
			Qp	= 0.00	cfs					
34 -										
33 - 32 - 32 - 32 - 32 - 32 - 32 - 32 -										
31 -										
30 -										
29 - 28 -										
27										
26 -										
25										
24 - 23 -										
22 -										
21 -										
20 - 19										
40 7										
(S) 18 17 17 16 17 16 17 16 17 16 17 16 17 16 17 16 17 16 17 17 16 17 17 17 17 17 17 17 17 17 17 17 17 17										
16 15										
14 -										
13 -										
12 <del>-</del> 11 <del>-</del>										
10										
9 🗍										
8 -										
7 - 6 -										
5 -										
4 -										
3 - 2										
1 = 1										
0 1	2 2	1 1 1	5	6	7	8	1 1 1	10	11	12
U I	2 3	4	Э		(hrs)	0	9	10	11	12

Hydrograph Type	= Pond Route	Peak Flow	= 4.215 cfs	
Storm Frequency	= 25-yr	Time to Peak	= 13.10 hrs	
Time Interval	= 2 min	Hydrograph Volume	= 17,119 cuft	
Inflow Hydrograph	= 54 - TO IB-10C	Max. Elevation	= 228.12 ft	
Pond Name	= IB-10C	Max. Storage	= 70,778 cuft	
Pond Routing by Storage Ind	ication Method			
	Qp = 4.22 cfs			
46 –				
44 -				
42				
40 -				
38				
36				
34				
32				
30				
28				
26				
(\$\frac{1}{2}\) 24 - \frac{1}{2}\				
σ 22 <del>-</del>				
20		<b></b>		
18				
16 -				
14		<del>-                                    </del>		
12 -		<del></del>		
10				
8 -				
6				
4				
2				
0				

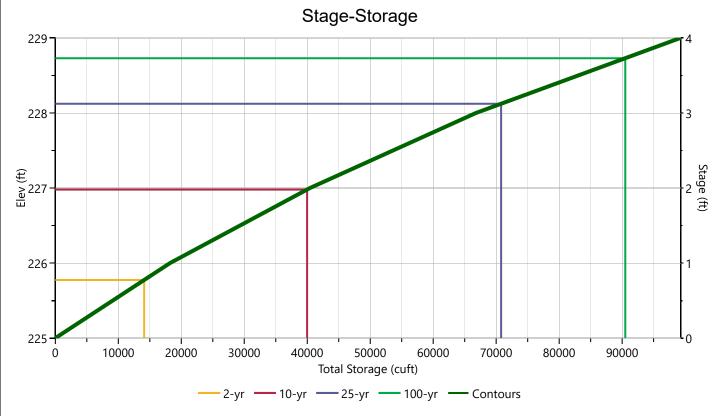
Hydrograph Type	= Pond Route	Peak Flow	= 29.98 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.57 hrs
Time Interval	= 2 min	Hydrograph Volume	= 99,598 cuft
Inflow Hydrograph	= 54 - TO IB-10C	Max. Elevation	= 228.73 ft
Pond Name	= IB-10C	Max. Storage	= 90,503 cuft
Pond Routing by Storage Inc	dication Method		
3 17 11 131			



#### IB-10C

# Stage-Storage

User Defined Contou	rs			Stage / Stora	ge Table	
Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
Bottom Elevation, ft	225.00				0.000	0.000
Voids (%)	100.00	0.00 1.00	225.00 226.00	16,867 19,567	0.000 18,217	18,217
Volume Calc	None	2.00	227.00	24,882	22,225	40,442
, Significant		3.00	228.00	27,822	26,352	66,794
		4.00	229.00	37,134	32,478	99,272

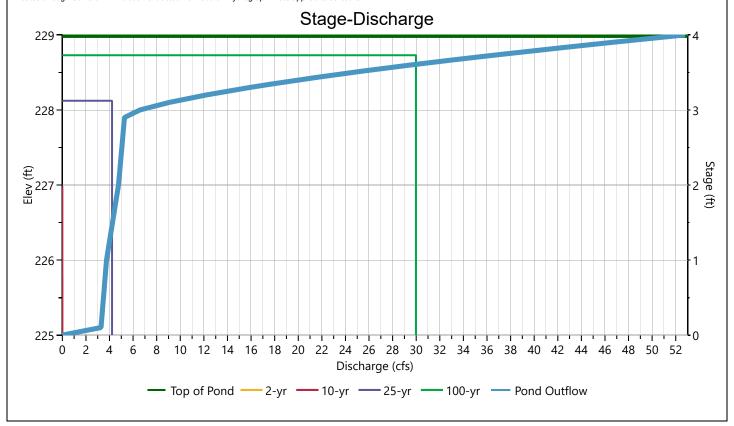


#### IB-10C

#### Stage-Discharge

Cultivant / Onificas	Culvert		Orifices		Doufoueted Die		
Culvert / Orifices	1		2	3	Perforated Riser		
Rise, in	36				Hole Diameter, in		
Span, in	36				No. holes		
No. Barrels	1				Invert Elevation, ft		
Invert Elevation, ft	223.50				Height, ft		
Orifice Coefficient, Co	0.60				Orifice Coefficient, Co		
Length, ft	31						
Barrel Slope, %	1						
N-Value, n	0.012						
Weirs	Riser*	Weirs			Ancillone		
weirs	Riser	1	2	3*	Ancillary		
Shape / Type	Circular			Rectangular	Exfiltration, in/hr	8.27**	
Crest Elevation, ft				227.9			
Crest Length, ft				12			
Angle, deg							
Weir Coefficient, Cw				3.3		_	

\*Routes through Culvert. \*\*Exfiltration extracted from outflow hydrograph. Rate applied to contours.

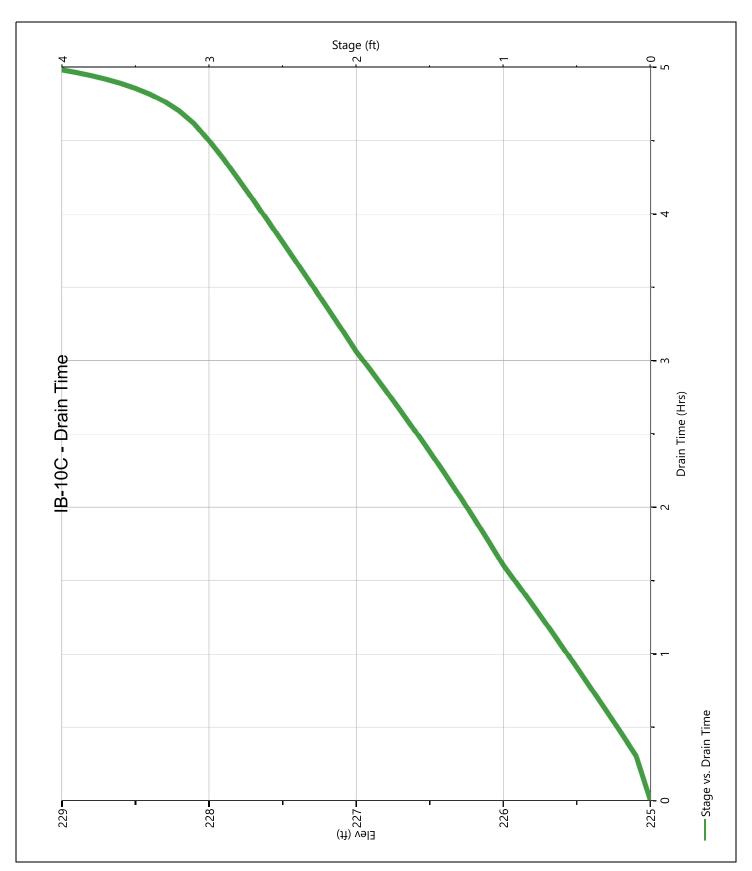


#### **IB-10C**

# **Stage-Storage-Discharge Summary**

Stage	Elev.	Storage	Culvert	(	Orifices, cf	's	Riser		Weirs, cfs		Pf Riser	Exfil	User	Total
Stage (ft)	(ft)	(cuft)	(cfs)	1	2	3	(cfs)	1	2	3	(cfs)	(cfs)	(cfs)	(cfs)
0.00	225.00	0.000	0.000							0.000		0.000		0.000
1.00	226.00	18,217	0.000 oc							0.000		3.746		3.746
2.00	227.00	40,442	0.000 oc							0.000		4.763		4.763
3.00	228.00	66,794	1.252 oc							1.252		5.326		6.578
4.00	229.00	99,272	45.69 oc							45.69		7.109		52.80

#### IB-10C Pond Drawdown



# P-10 TOTAL Hyd. No. 56

Hydrograph Type	= Junction	Peak Flow	= 2.091 cfs				
Storm Frequency	= 2-yr	Time to Peak	= 12.53 hrs				
Time Interval	= 2 min	Hydrograph Volume	= 16,170 cuft				
Inflow Hydrographs	= 47, 49, 55	Total Contrib. Area	= 10.22 ac				
37	<b>Qp = 2.09 cfs</b>						
-							
2 <del>-</del>							
1 -							
0 1 2 3	4 5 6 7 8 9 10 11 12 13 14 15 Time (hrs) —— P-10A —— IB-10B —— IB-10C —— P-1	16 17 18 19 20 2					

# P-10 TOTAL Hyd. No. 56

Hydrograph Type	= Junction	Peak Flow	= 8.467 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.40 hrs
Time Interval	= 2 min	Hydrograph Volume	= 49,225 cuft
Inflow Hydrographs	= 47, 49, 55	Total Contrib. Area	= 10.22 ac
	Qp = 8.47 cfs		
9-			
_			
8 -	Λ		
0			
-			
7 -			
<u>-</u>			
6 -			
-			
5-			
_			
(s)			
(cts) 4			
-			
3 -			
2-			
-			
1-			
0			
-1-			
0 1 2 3	4 5 6 7 8 9 10 11 12 13 14 15 Time (hrs)	16 17 18 19 20	21 22 23 24 25
	— P-10A — IB-10B — IB-10C — P-1	O TOTAI	
	ו או שו שו או ו או ו	o ioine	

# P-10 TOTAL Hyd. No. 56

lydrograph Type	= Junction	Peak Flow	= 13.94 cfs	
Storm Frequency = 25-yr		Time to Peak	= 12.40 hrs	
īme Interval	= 2 min	Hydrograph Volume	= 94,241 cuft	
nflow Hydrograph	s = 47, 49, 55	Total Contrib. Area	= 10.22 ac	
	Qp = 13.94	cfs		
16				
15				
14				
-				
13				
12				
11 -				
10 -				
-				
9 -				
(§ 8				
σ̈ <sub>7</sub> -				
6-				
-				
5 -				
4		1		
3		$\{\{\}, \{\}, \{\}, \{\}, \{\}, \{\}, \{\}, \{\}, \{\}, \{\},$		
2				
1 -				
-				
0				
-1 <del>-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1</del>		3 14 15 16 17 18 19 20		
	Time (hr	rs)		

#### P-10 TOTAL Hyd. No. 56

lydrograph Type	= Junction	Peak Flow	= 50.66 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.53 hrs
īme Interval	= 2 min	Hydrograph Volume	= 227,139 cuft
nflow Hydrographs	= 47, 49, 55	Total Contrib. Area	= 10.22 ac
	Qp = 50.66 c	fs	
58 _			
56			
54 -			
52			
50 =			
48			
46			
44	<del> </del>		
42 -	<del></del>		
40	<del></del>		
38			
36			
34			
32 -			
≨ 30 <del> </del>			
© 28 -			
26			
24			
22	<del></del>		
20			
18 -			
16			
14 -			
12			
10 -			
8			
6-			
4	<u> </u>		
2-			
0			

Time (hrs)

— P-10A — IB-10B — IB-10C — P-10 TOTAL

Project: Athens Street By NC	Date 6/24/22
	Rev Date 10/13/2022
Location: Stow, MA Checked	Date 6/17/2023
Circle one: Present Developed Subcatchment P-11	

1. Runoff curve number (CN)

Soil name and hydrologic	Cover description (cover type, treatment, and		CN 1/		Area	Product of CN x Area
group (appendix A)	hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious	98			0.00	0.00
Α	Woods Good Condition	30			0.80	24.12
Α	Open Space Good Condition	39			0.00	0.00
Α	Open Space Fair Condition	49			0.00	0.00
Α	Gravel	76			0.00	0.00
В	Woods Good Condition	55			0.00	0.00
В	Open Space Good Condition	61			0.00	0.00
В	Gravel	85			0.00	0.00
С	Woods Good Condition	70			9.97	698.11
С	Open Space Poor Condition	86			0.00	0.00
С	Gravel	89			0.00	0.00
D	BVW	77			0.00	0.00
1/ Use only one	CN source per line. 4694	46	-	Totals =	10.78	722.23

CN (weighted) =	total product	=	722.23 =	67.02 ;	Use CN =	67
!	total area	_	10.78			

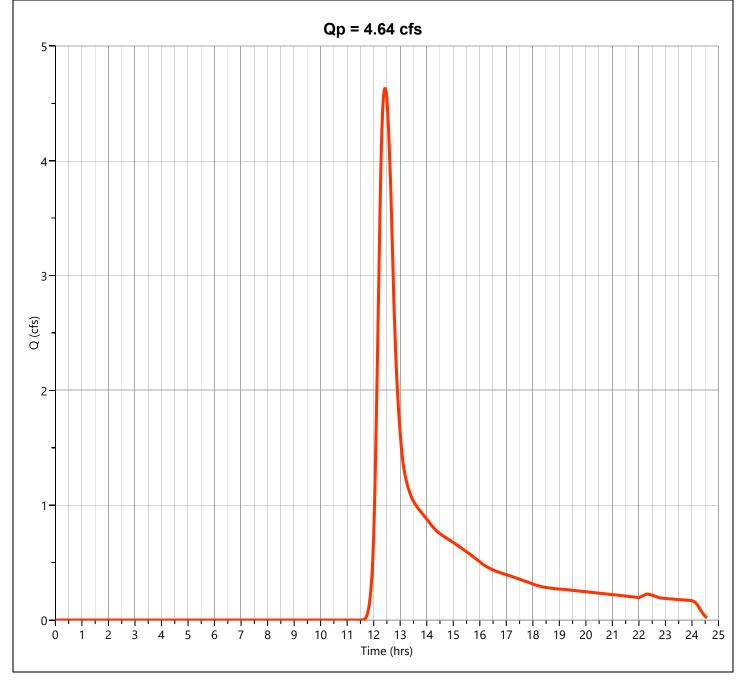
2. Runoff

Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.72	2.64	3.99

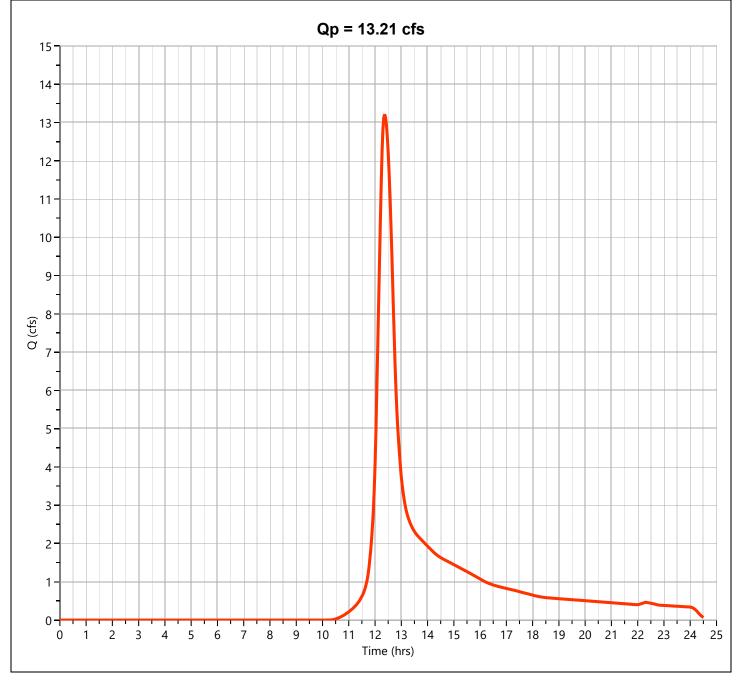
SM-3719C

Project: Athens Street	_	Ву	/ NC	Date		
		01 1 1		Rev Date		
Location: Stow, MA	_	Checked		Date	6/17/2023	
Circle one: Present Developed	ה	Subcatchr	ment P-11			
Circle one: Tc Tt	through	Oubcatorii	HOHET -TT	•		
	subarea			•		
Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			WOODS			
2 Mannings roughness spoff in (table 2.1)			0.6			
2. Mannings roughness coeff., n (table 3-1)			0.6			
3. Flow length, L (total L <= 300 ft)		ft	50			
o. How length, E (total E 1= 500 h)		11	30			
4. Two-yr 24-hr rainfall, P2		in	3.1			
,						
5. Land Slope, s		ft/ft	0.006			
6. Tt = $0.007 (nL)^0.8 / (P2^0.5 s^0.4)$	Compute T	t hr	0.47			0.47
Shallow concentrated Flow		Segment ID	B-C			
7. Ourface Description (proved an open and)			LINDAYED		-	
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	411			
o. I low Length, L		II.	411			
9. Watercourse slope, s		ft/ft	0.047			
10. Average Velocity, V (figure 3-1)		ft/s	3.50			
11. Tt = L / 3600V	Compute T	t hr	0.03			0.03
Channel flow		Segment ID				
40. Cross sectional flavores a					-	
<ul><li>12. Cross sectional flow area, a</li><li>13. Wetted perimeter, pw</li></ul>		sf #				
13. Wetted perimeter, pw 14. Hydraulic radius, r=a/wp	Compute r	ft ft			-	
15. Channel Slope, s	Computer	ft/ft				
16. Manning's roughness coeff., n		IVIL				
17. V = 1.49 r^2/3 s^1/2 / n	Computo	/ ft/o				
	Compute V					
18. Flow length, L 19. Tt = L / 3600V	Compute T	ft				0
18. II - L / 3000V	Compute T	CIII				0
20. Watershed or subarea Tc or Tt (add Tt in ste	ane 6 11 an	d 10)			hr	0.50
20. Trateration of Subarea 10 of 11 faut 11 111 Ste	, po 0, 11, all	u 10)			min	30.0
						00.0

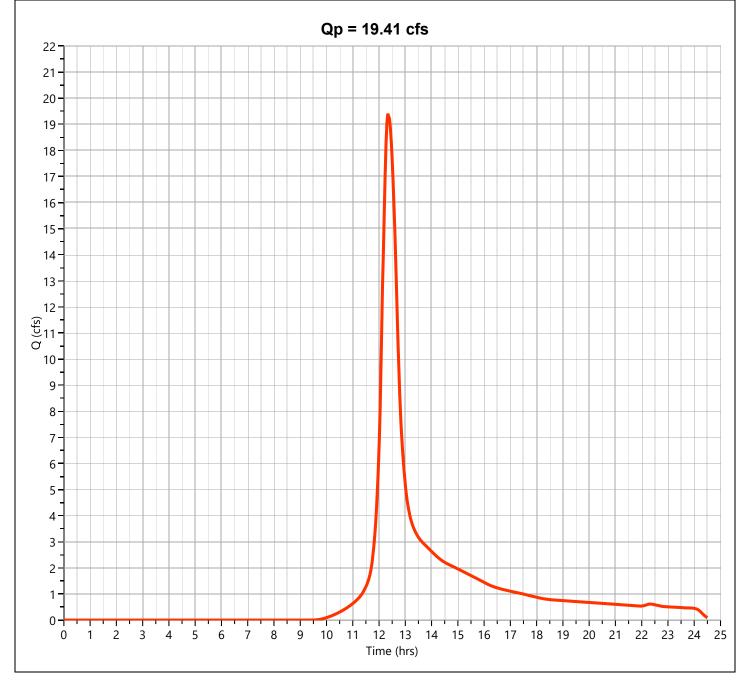
Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.637 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.43 hrs
Time Interval	= 2 min	Runoff Volume	= 28,334 cuft
Drainage Area	= 10.78 ac	Curve Number	= 67
Tc Method	= User	Time of Conc. (Tc)	= 30.0 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



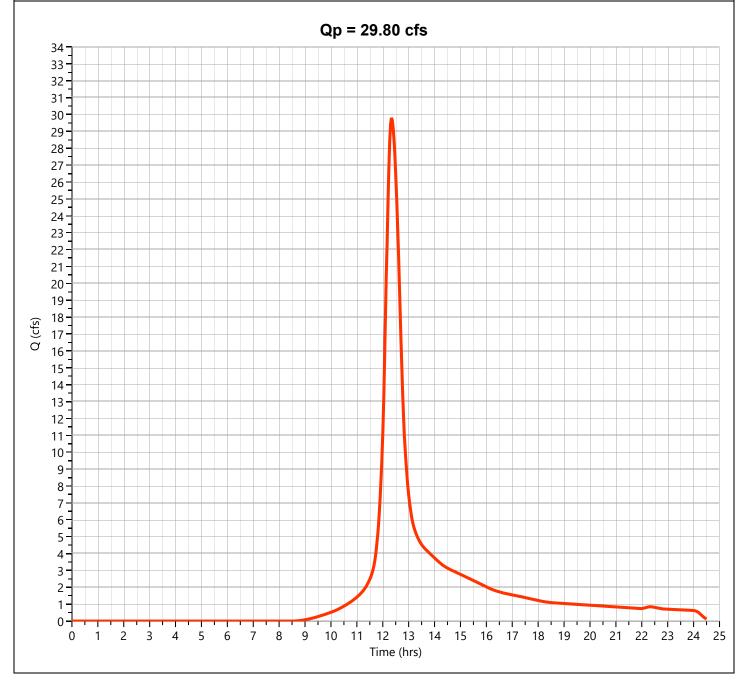
Hydrograph Type	= NRCS Runoff	Peak Flow	= 13.21 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.37 hrs
Time Interval	= 2 min	Runoff Volume	= 71,647 cuft
Drainage Area	= 10.78 ac	Curve Number	= 67
Tc Method	= User	Time of Conc. (Tc)	= 30.0 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 19.41 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.37 hrs
Time Interval	= 2 min	Runoff Volume	= 103,157 cuft
Drainage Area	= 10.78 ac	Curve Number	= 67
Tc Method	= User	Time of Conc. (Tc)	= 30.0 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 29.80 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Runoff Volume	= 156,090 cuft
Drainage Area	= 10.78 ac	Curve Number	= 67
Tc Method	= User	Time of Conc. (Tc)	= 30.0 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Project:	Athens Street	By NC	Date 6/24/22
			Rev Date 10/13/2022
Location:	Stow, MA	Checked	Date 6/17/2023
Circle one:	Present Developed	Subcatchment P-12	

1. Runoff curve number (CN)

Soil name and hydrologic	Cover description (cover type, treatment, and		CN 1/			Product of CN x Area
group (appendix A)	hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious	98			0.00	0.00
Α	Woods Good Condition	30			0.22	6.53
Α	Open Space Good Condition	39			0.00	0.00
Α	Open Space Fair Condition	49			0.00	0.00
Α	Gravel	76			0.00	0.00
В	Woods Good Condition	55			0.00	0.00
В	Open Space Good Condition	61			0.00	0.00
В	Gravel	85			0.00	0.00
С	Woods Good Condition	70			0.00	0.00
С	Open Space Poor Condition	86			0.00	0.00
С	Gravel	89			0.00	0.00
D	BVW	77			0.00	0.00
1/ Use only one	CN source per line. 944	32		Totals =	0.22	6.53

CN (weighted) =	total product	=	6.53 =	30.00	;	Use CN =	30
!	total area		0.22				

2. Runoff

Storm #1	Storm #2	Storm #3		
2	25	100		
3.27	6.14	7.84		
0.09	0.09	0.38		

Project: Athens Street	_	Ву	NC NC	Date	6/24/2022	
		01 1 1			10/13/2022	
Location: Stow, MA	_	Checked		Date	6/17/2023	
Circle one: Present Developed	ī	Subcatchr	ment P-12			
Circle one: Tc Tt	through	Capatoni	HOHET 12	•		
To It	subarea	-		•		
Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			WOODS			
2 Mannings sough account to (table 2.4)			0.0			
2. Mannings roughness coeff., n (table 3-1)			0.6			
3. Flow length, L (total L <= 300 ft)		ft	50			
o. How length, E (total E 1= 500 h)		TC .	30			
4. Two-yr 24-hr rainfall, P2		in	3.1			
,						
5. Land Slope, s		ft/ft	0.122			
6. Tt = $0.007 (nL)^0.8 / (P2^0.5 s^0.4)$	Compute T	t hr	0.14			0.14
Shallow concentrated Flow		Segment ID	B-C			
7 Surface Description (payed or uppayed)			LINDAYCD			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	57			
o. How Zongan, Z			01			
9. Watercourse slope, s		ft/ft	0.112			
10. Average Velocity, V (figure 3-1)		ft/s	5.40			
11. Tt = L / 3600V	Compute T	t hr	0.00			0.00
01 15						
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r					
15. Channel Slope, s	Compator	ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L	•	ft				
19. Tt = L / 3600V	Compute T	t hr				0
20. Watershed or subarea Tc or Tt (add Tt in ste	eps 6, 11, an	d 19)			hr	0.14
					min	8.6

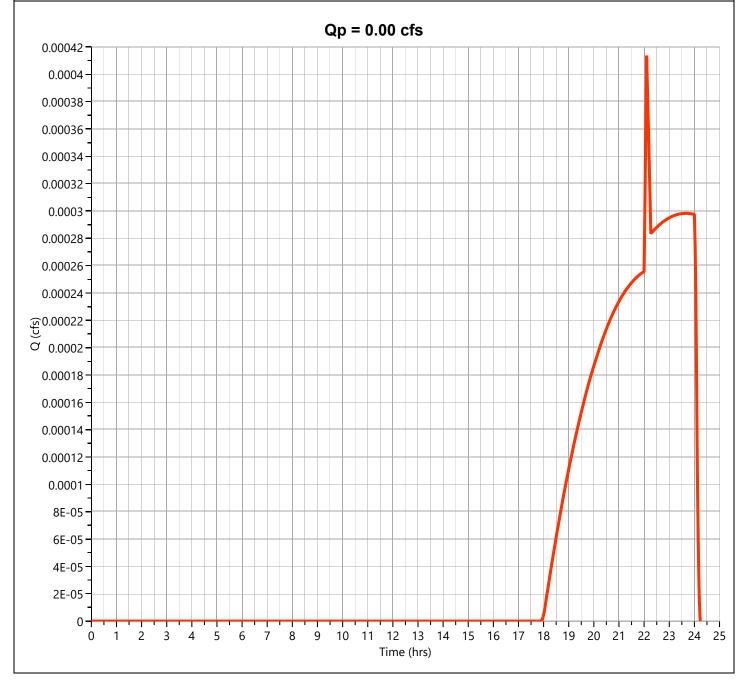
# P-12 Hyd. No. 64

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.00 hrs
Time Interval	= 2 min	Runoff Volume	= 0.000 cuft
Drainage Area	= 0.22 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 8.6 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 0.00 cfs

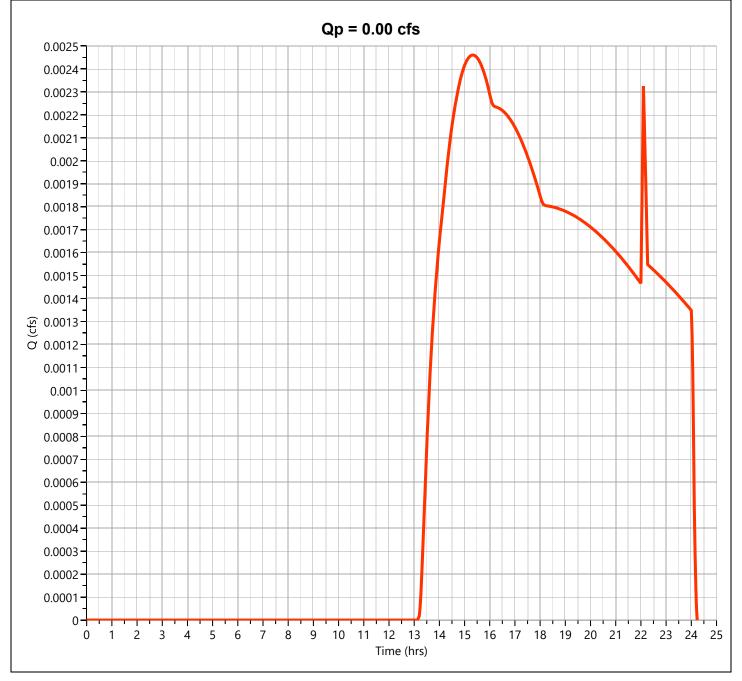
## P-12 Hyd. No. 64

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.000 cfs
Storm Frequency	= 10-yr	Time to Peak	= 22.10 hrs
Time Interval	= 2 min	Runoff Volume	= 4.70 cuft
Drainage Area	= 0.22 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 8.6 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



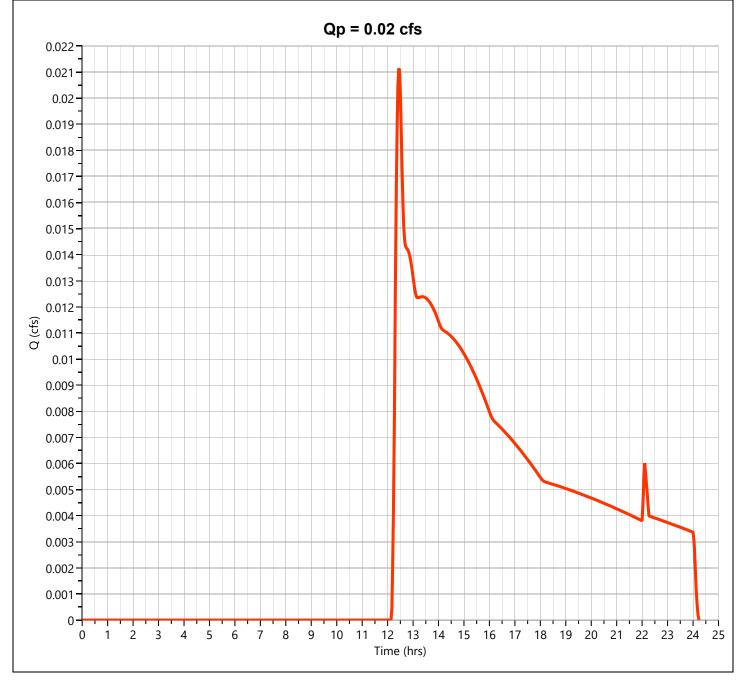
## P-12 Hyd. No. 64

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.002 cfs
Storm Frequency	= 25-yr	Time to Peak	= 15.33 hrs
Time Interval	= 2 min	Runoff Volume	= 69.9 cuft
Drainage Area	= 0.22 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 8.6 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



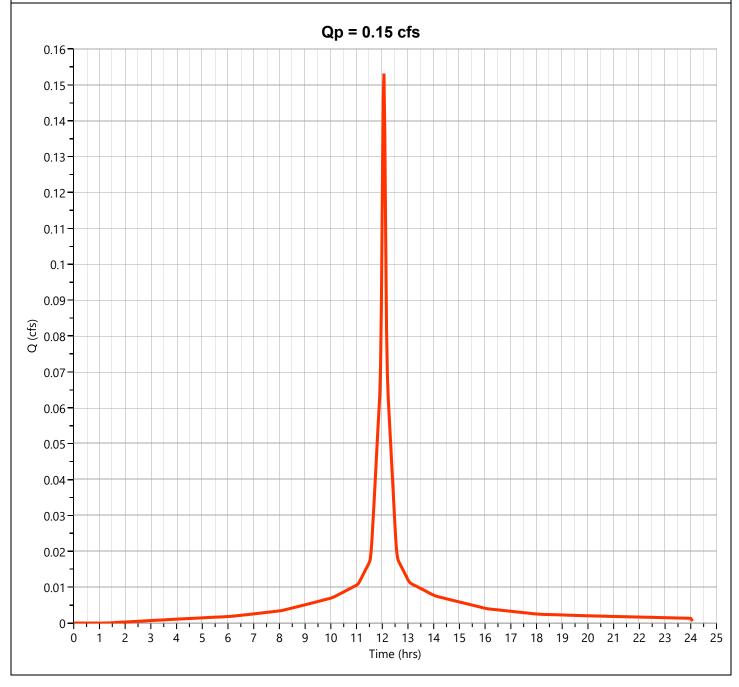
## P-12 Hyd. No. 64

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.021 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.43 hrs
Time Interval	= 2 min	Runoff Volume	= 303 cuft
Drainage Area	= 0.22 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 8.6 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



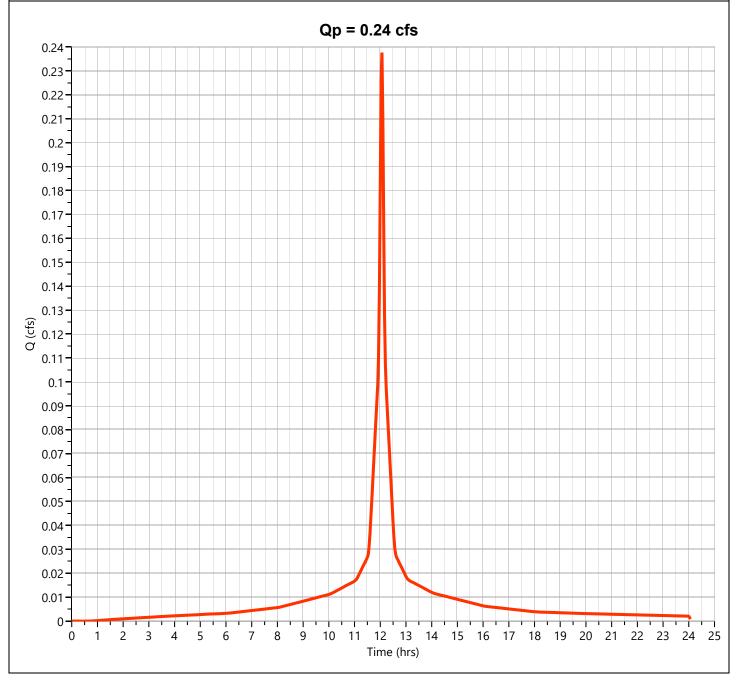
# Roof Runoff (Type A)

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.153 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.07 hrs
Time Interval	= 2 min	Runoff Volume	= 517 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



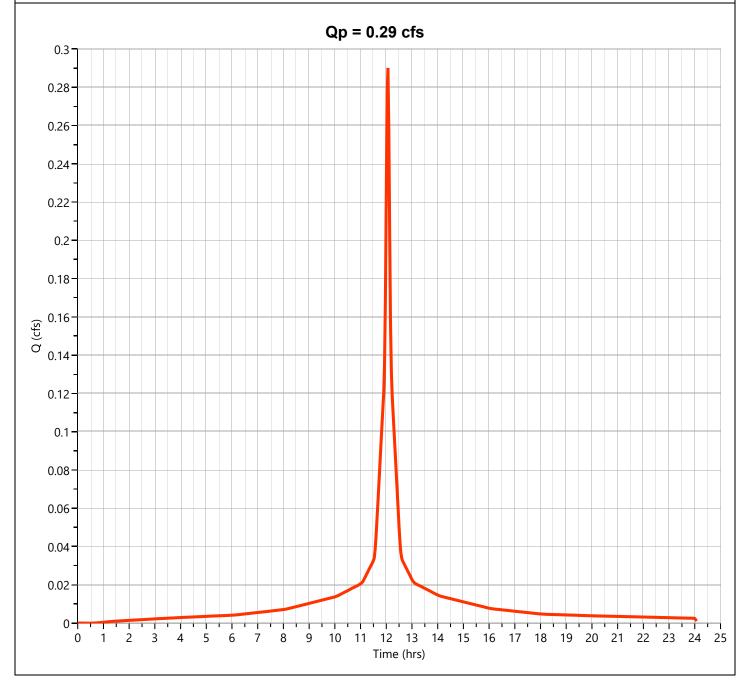
# Roof Runoff (Type A)

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.238 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.07 hrs
Time Interval	= 2 min	Runoff Volume	= 817 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



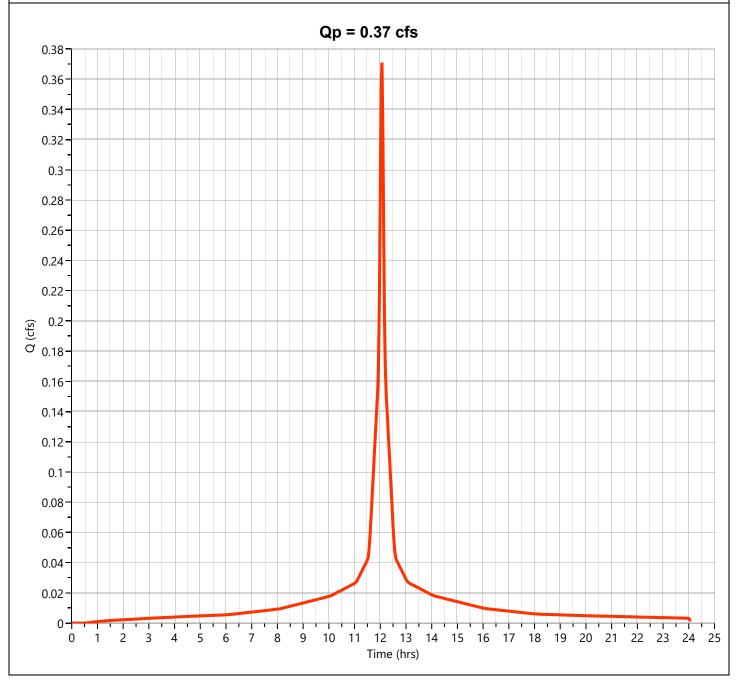
# Roof Runoff (Type A)

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.290 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.07 hrs
Time Interval	= 2 min	Runoff Volume	= 1,004 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



# Roof Runoff (Type A)

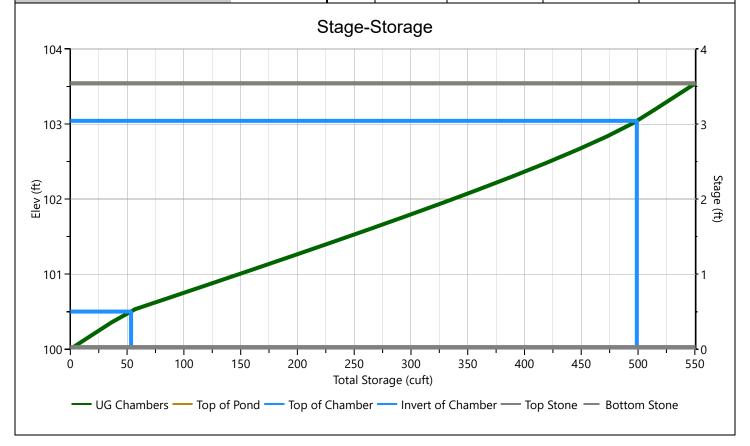
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.371 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.07 hrs
Time Interval	= 2 min	Runoff Volume	= 1,293 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



# **Roof Drywell Type A (Loamy Sand)**

## Stage-Storage

Cultec Recharger® 330XLHD	Stage / Storage Table						
Description	Input	Stage (in)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)	
Chamber Height, in	30.5	0.0	100.00	256	0.000	0.000	
Chamber Shape	Arch	2.1	100.00	256	18.1	18.1	
Chamber Width, in	52	4.2	100.35	256	18.1	36.3	
		6.4	100.53	256	20.9	57.2	
Installed Length, ft	7.00	8.5	100.71	256	34.8	92.0	
No. Chambers	6	10.6	100.89	256	34.7	127	
<b>5 6 1 6 6</b>	-	12.7	101.06	256	34.5	161	
Bare Chamber Stor, cuft	313	14.9	101.24	256	34.2	195	
No. Rows	3	17.0	101.42	256	33.9	229	
		19.1	101.59	256	33.4	263	
Space Between Rows, in	6	21.2	101.77	256	32.9	296	
Stone Above, in	6	23.4	101.95	256	32.2	328	
C: D:	0	25.5	102.13	256	31.4	359	
Stone Below, in	6	27.6	102.30	256	30.4	390	
Stone Sides, in	12	29.7	102.48	256	29.3	419	
0, 5,	40	31.9	102.66	256	27.8	447	
Stone Ends, in	12	34.0	102.83	256	25.9	473	
Encasement Voids, %	40.00	36.1	103.01	256	23.1	496	
Engagement Dattern Floristian #	100.00	38.2	103.19	256	18.7	514	
Encasement Bottom Elevation, ft	100.00	40.4	103.36	256	18.1	532	
		42.5	103.54	256	18.1	551	

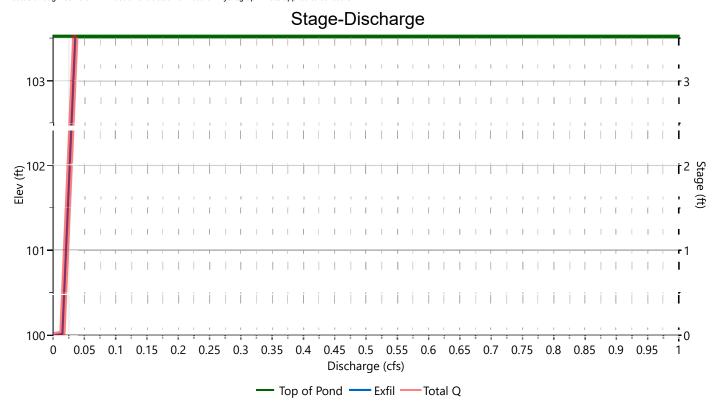


# **Roof Drywell Type A (Loamy Sand)**

### Stage-Discharge

Culvert / Ovisions	Culvert		Orifices		Dawfayatad Dia	
Culvert / Orifices	Cuivert	1	2	3	Perforated Ris	er
Rise, in					Hole Diameter, in	
Span, in					No. holes	
No. Barrels					Invert Elevation, ft	
Invert Elevation, ft					Height, ft	
Orifice Coefficient, Co					Orifice Coefficient, Co	
Length, ft						
Barrel Slope, %						
N-Value, n	0.000					
Maina	Riser*		Weirs		Anailland	
Weirs	Riser	1	2	3	Ancillary	
Shape / Type					Exfiltration, in/hr	2.41**
Crest Elevation, ft						
Crest Length, ft						
Angle, deg						
Weir Coefficient, Cw						

\*Routes through Culvert. \*\*Exfiltration extracted from outflow hydrograph. Rate applied to contours.



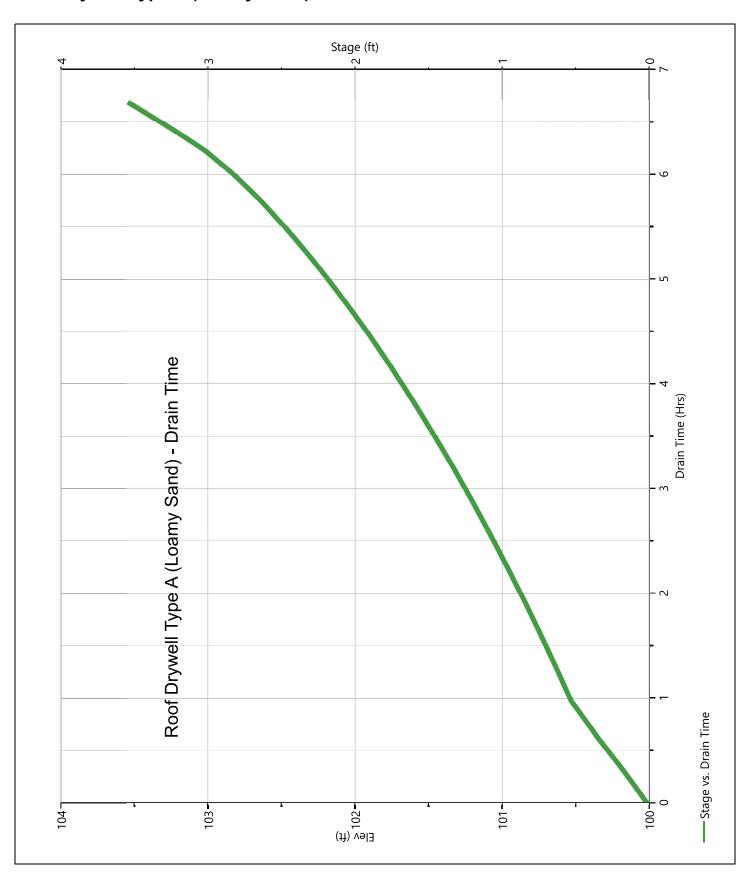
# **Roof Drywell Type A (Loamy Sand)**

# **Stage-Storage-Discharge Summary**

Stage	Elev.	Storage	Culvert	(	Orifices, cf	s	Riser		Weirs, cfs		Pf Riser	Exfil	User	Total
(ft)	(ft)	(cuft)	(cfs)	1	2	3	(cfs)	1	2	3	(cfs)	(cfs)	(cfs)	(cfs)
0.00	100.00	0.000										0.000		0.000
0.18	100.18	18.1										0.015		0.015
0.35	100.35	36.3										0.016		0.016
0.53	100.53	57.2										0.017		0.017
0.71	100.71	92.0										0.018		0.018
0.89	100.89	127										0.019		0.019
1.06	101.06	161										0.020		0.020
1.24	101.24	195										0.021		0.021
1.42	101.42	229										0.022		0.022
1.59	101.59	263										0.023		0.023
1.77	101.77	296										0.024		0.024
1.95	101.95	328										0.025		0.025
2.12	102.13	359										0.026		0.026
2.30	102.30	390										0.027		0.027
2.48	102.48	419										0.028		0.028
2.66	102.66	447										0.029		0.029
2.83	102.83	473										0.030		0.030
3.01	103.01	496										0.031		0.031
3.19	103.19	514										0.032		0.032
3.36	103.36	532										0.033		0.033
3.54	103.54	551										0.034		0.034

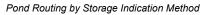
# **Roof Drywell Type A (Loamy Sand)**

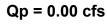
### **Pond Drawdown**

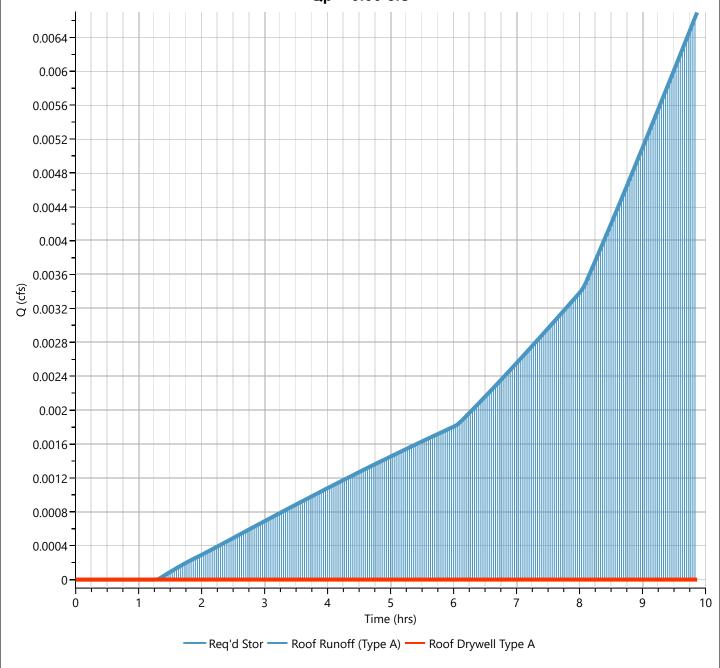


# **Roof Drywell Type A**

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 9.83 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 62 - Roof Runoff (Type A)	Max. Elevation	= 101.06 ft
Pond Name	= Roof Drywell Type A (Loamy Sand)	Max. Storage	= 161 cuft







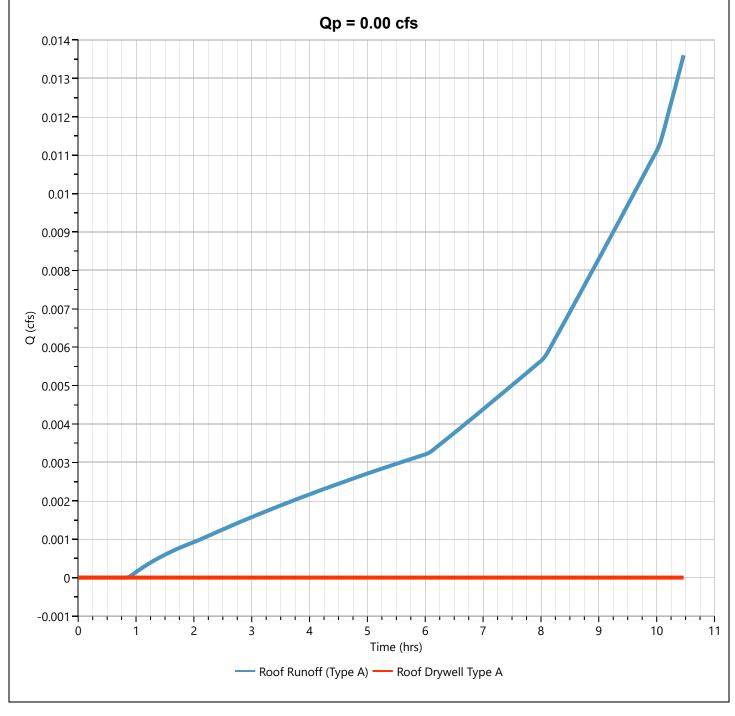
# **Roof Drywell Type A**

Hyd. No. 63

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 10-yr	Time to Peak	= 10.43 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 62 - Roof Runoff (Type A)	Max. Elevation	= 101.75 ft
Pond Name	= Roof Drywell Type A (Loamy Sand)	Max. Storage	= 291 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.77 hrs

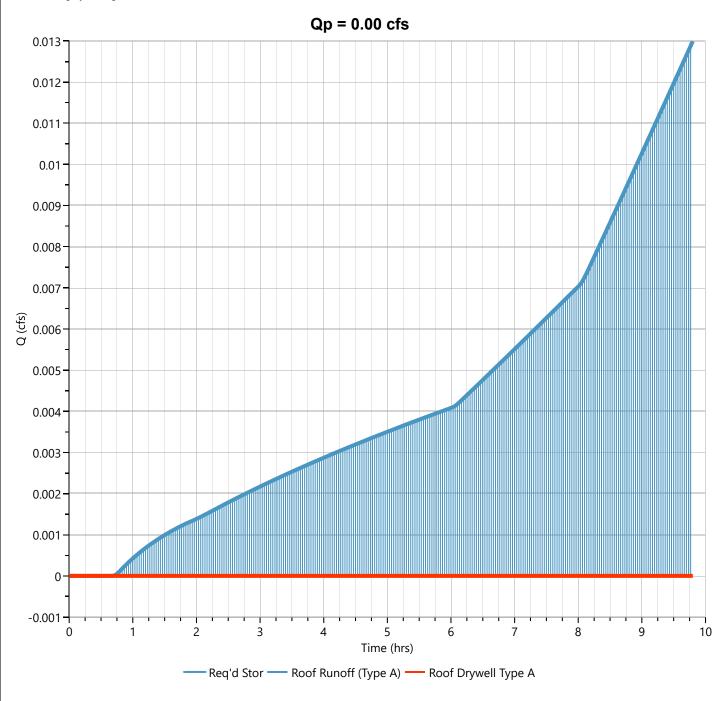


# **Roof Drywell Type A**

# Hyd. No. 63

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 25-yr	Time to Peak	= 9.77 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 62 - Roof Runoff (Type A)	Max. Elevation	= 102.24 ft
Pond Name	= Roof Drywell Type A (Loamy Sand)	Max. Storage	= 379 cuft
Pand Payting by Starage Inc	disation Mathed		

Pond Routing by Storage Indication Method

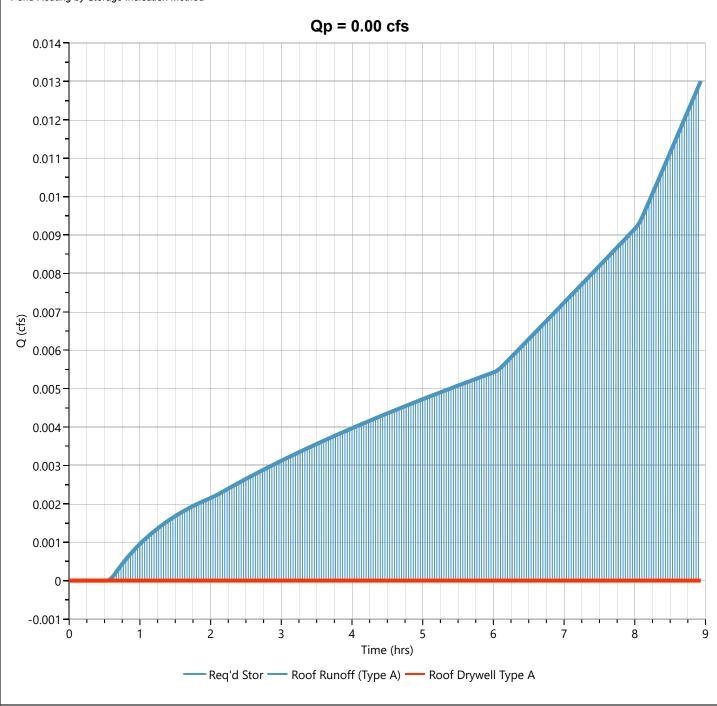


# **Roof Drywell Type A**

Hyd. No. 63

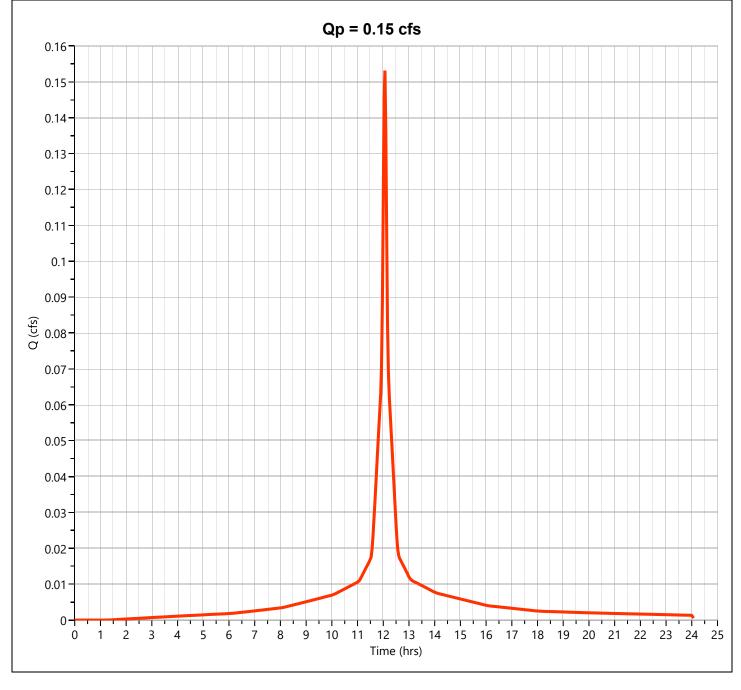
Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 100-yr	Time to Peak	= 8.90 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 62 - Roof Runoff (Type A)	Max. Elevation	= 103.25 ft
Pond Name	= Roof Drywell Type A (Loamy Sand)	Max. Storage	= 521 cuft

Pond Routing by Storage Indication Method



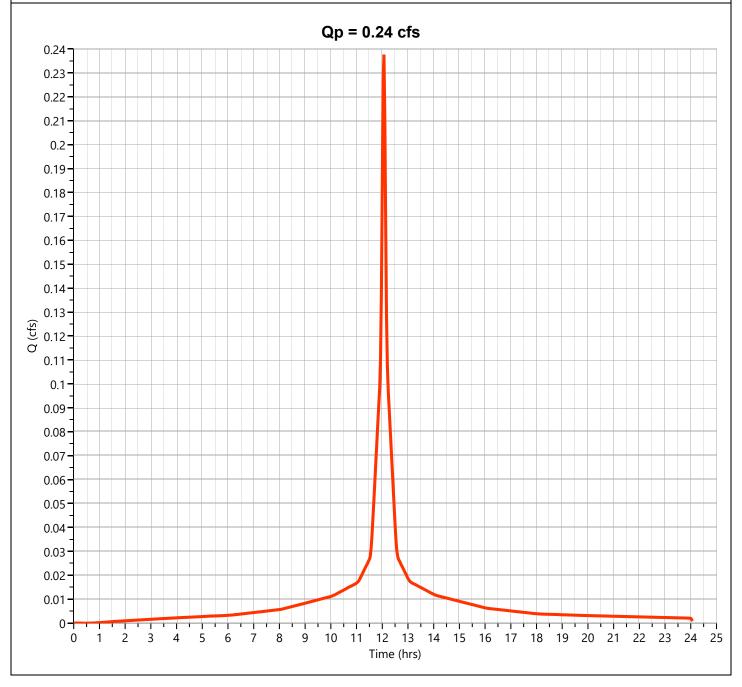
# Roof Runoff (Type B)

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.153 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.07 hrs
Time Interval	= 2 min	Runoff Volume	= 517 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



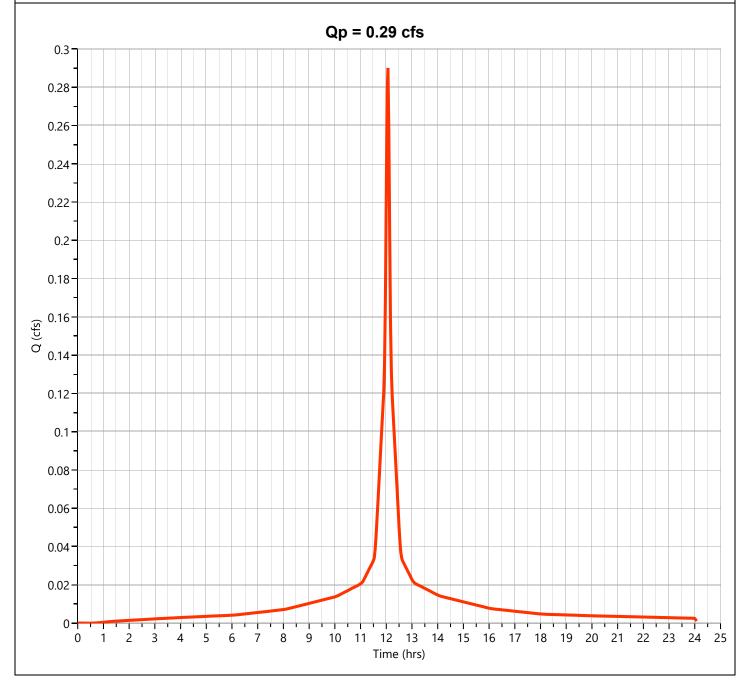
# Roof Runoff (Type B)

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.238 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.07 hrs
Time Interval	= 2 min	Runoff Volume	= 817 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



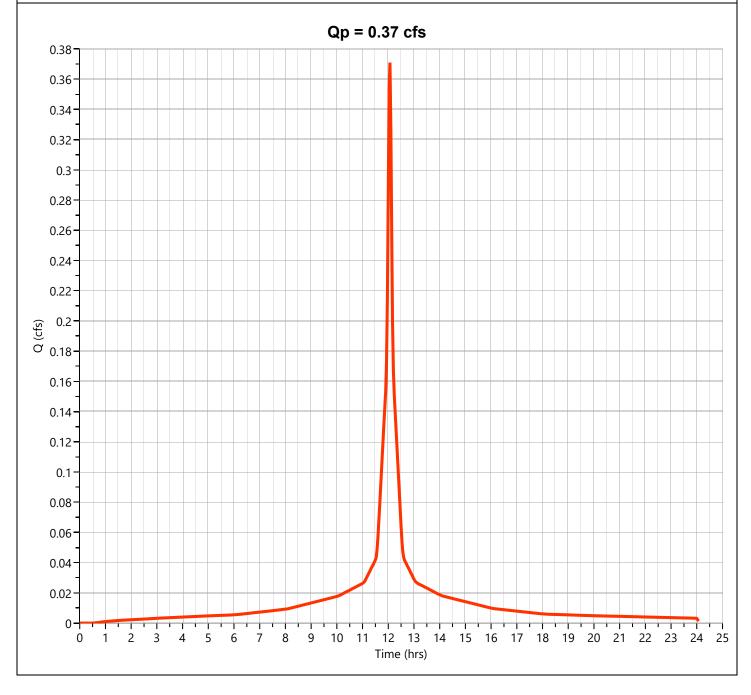
# Roof Runoff (Type B)

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.290 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.07 hrs
Time Interval	= 2 min	Runoff Volume	= 1,004 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



# Roof Runoff (Type B)

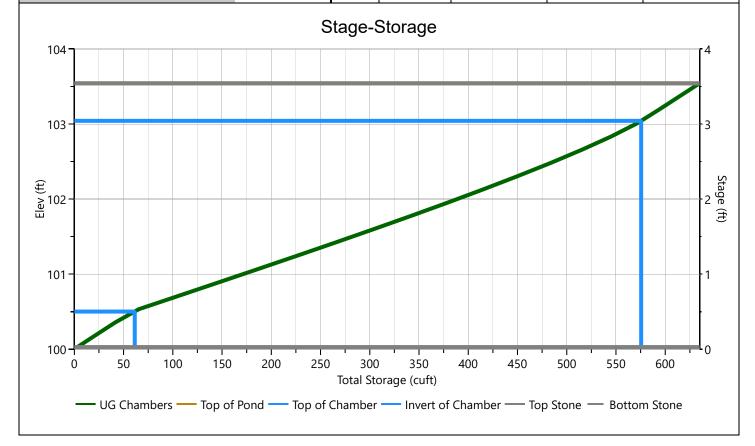
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.371 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.07 hrs
Time Interval	= 2 min	Runoff Volume	= 1,293 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



# Roof Drywell Type B (Sandy Loam)

## Stage-Storage

Cultec Recharger® 330XLHD			Stage / Stora	ge Table		
Description	Input	Stage (in)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
Chamber Height, in	30.5	0.0	100.00	293	0.000	0.000
Chamber Shape	Arch	2.1	100.00	293	20.8	20.8
Chamber Width, in	52	4.2	100.35	293	20.8	41.6
		6.4	100.53	293	24.0	65.6
Installed Length, ft	7.00	8.5	100.71	293	40.2	106
No. Chambers	7	10.6	100.89	293	40.1	146
D 01 1 01 1	005	12.7	101.06	293	39.9	186
Bare Chamber Stor, cuft	365	14.9	101.24	293	39.6	225
No. Rows	3	17.0	101.42	293	39.1	264
O D-t D i		19.1	101.59	293	38.6	303
Space Between Rows, in	6	21.2	101.77	293	38.0	341
Stone Above, in	6	23.4	101.95	293	37.2	378
Chama Dalaw in		25.5	102.13	293	36.3	414
Stone Below, in	6	27.6	102.30	293	35.1	450
Stone Sides, in	12	29.7	102.48	293	33.8	483
Otana Fuda in	40	31.9	102.66	293	32.1	515
Stone Ends, in	12	34.0	102.83	293	29.9	545
Encasement Voids, %	40.00	36.1	103.01	293	26.5	572
Engagement Bottom Flouration #	100.00	38.2	103.19	293	21.5	593
Encasement Bottom Elevation, ft	100.00	40.4	103.36	293	20.8	614
		42.5	103.54	293	20.8	635

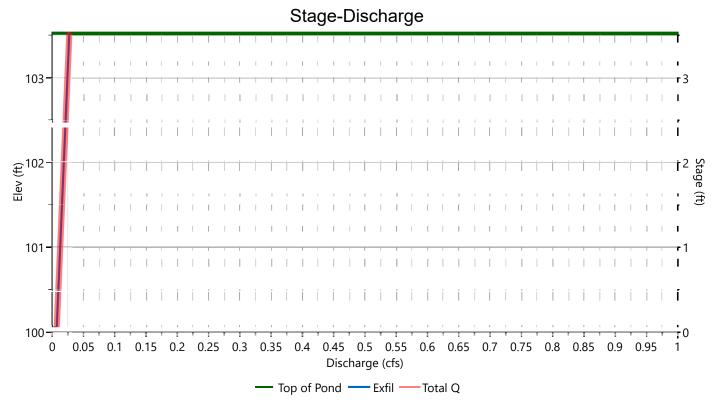


# Roof Drywell Type B (Sandy Loam)

### Stage-Discharge

Culvert / Ovisions	Culvert		Orifices		Perforated Riser			
Culvert / Orifices	Cuivert	1	2	3	Periorated Ris	er		
Rise, in					Hole Diameter, in			
Span, in					No. holes			
No. Barrels					Invert Elevation, ft			
Invert Elevation, ft					Height, ft			
Orifice Coefficient, Co					Orifice Coefficient, Co			
Length, ft								
Barrel Slope, %								
N-Value, n	0.000							
Waina	Riser*	Weirs		Weirs			Ancilland	
Weirs	Riser	1	2	3	Ancillary			
Shape / Type					Exfiltration, in/hr	1.02**		
Crest Elevation, ft								
Crest Length, ft								
Angle, deg								
Weir Coefficient, Cw								

\*Routes through Culvert. \*\*Exfiltration extracted from outflow hydrograph. Rate applied to contours.



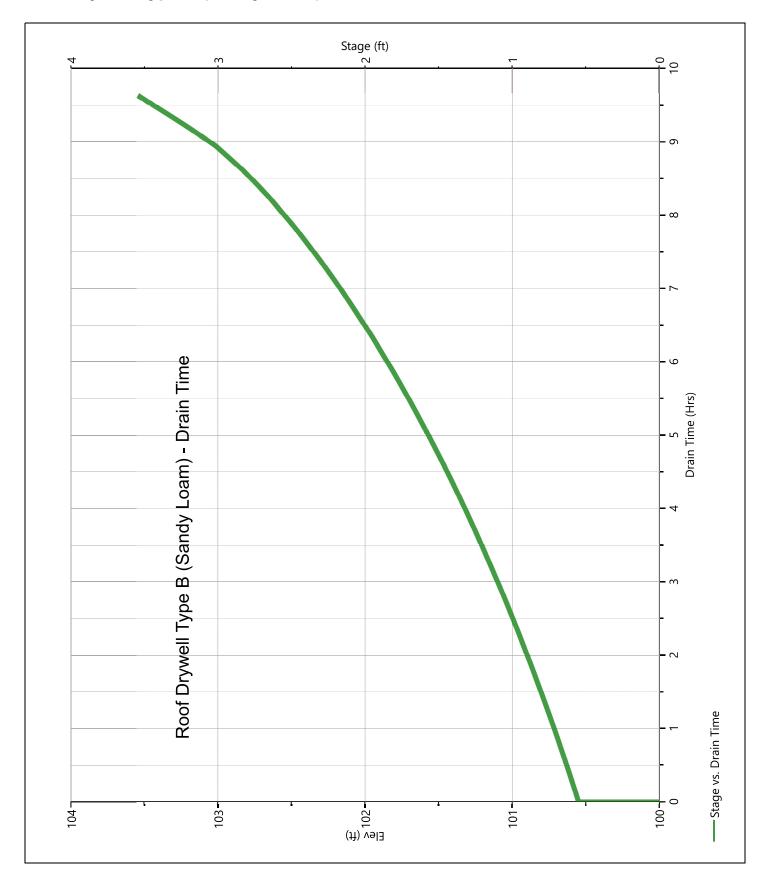
# Roof Drywell Type B (Sandy Loam)

# **Stage-Storage-Discharge Summary**

(cfs)	(cfs)  0.000 0.008 0.009 0.010 0.011 0.012 0.013 0.014 0.015 0.016 0.017 0.018	(cfs)	(cfs)  0.000 0.008 0.009 0.010 0.011 0.012 0.013 0.014 0.015 0.016
	0.008 0.009 0.010 0.011 0.012 0.013 0.014 0.015 0.016 0.017		0.008 0.009 0.010 0.011 0.012 0.013 0.014 0.015 0.016
	0.009 0.010 0.011 0.012 0.013 0.014 0.015 0.016 0.017		0.009 0.010 0.011 0.012 0.013 0.014 0.015 0.016
	0.010 0.011 0.012 0.013 0.014 0.015 0.016 0.017		0.010 0.011 0.012 0.013 0.014 0.015 0.016
	0.011 0.012 0.013 0.014 0.015 0.016 0.017		0.011 0.012 0.013 0.014 0.015 0.016
	0.012 0.013 0.014 0.015 0.016 0.017		0.012 0.013 0.014 0.015 0.016
	0.013 0.014 0.015 0.016 0.017 0.018		0.013 0.014 0.015 0.016
	0.014 0.015 0.016 0.017 0.018		0.014 0.015 0.016
	0.015 0.016 0.017 0.018		0.015 0.016
	0.016 0.017 0.018		0.016
	0.017 0.018		
	0.018		
			0.017
			0.018
	0.019		0.019
	0.020		0.020
	0.021		0.021
	0.022		0.022
	0.023		0.023
	0.024		0.024
	0.025		0.025
	0.026		0.026
	0.027		0.027
		0.022 0.023 0.024 0.025 0.026	0.022 0.023 0.024 0.025 0.026

# Roof Drywell Type B (Sandy Loam)

### **Pond Drawdown**

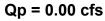


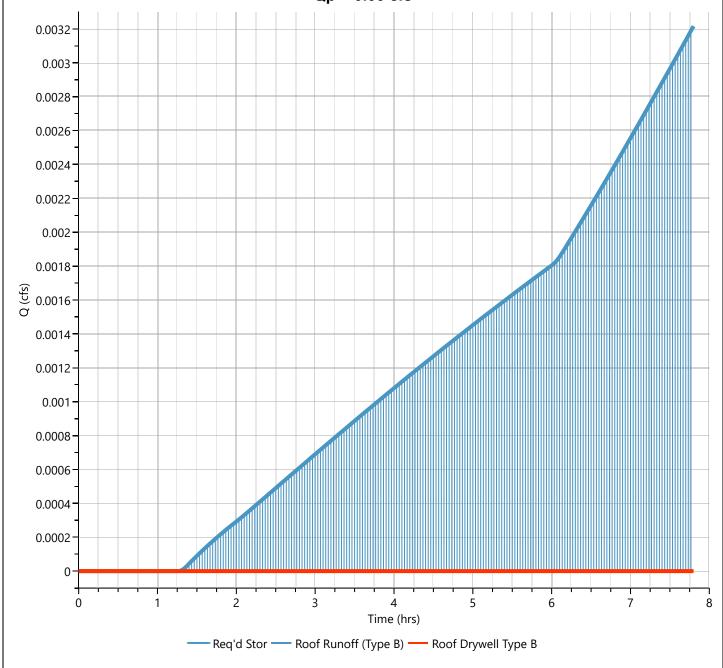
# **Roof Drywell Type B**

### Hyd. No. 66

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 7.77 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 65 - Roof Runoff (Type B)	Max. Elevation	= 101.15 ft
Pond Name	= Roof Drywell Type B (Sandy Loam)	Max. Storage	= 206 cuft
		·	<u> </u>

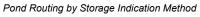
Pond Routing by Storage Indication Method

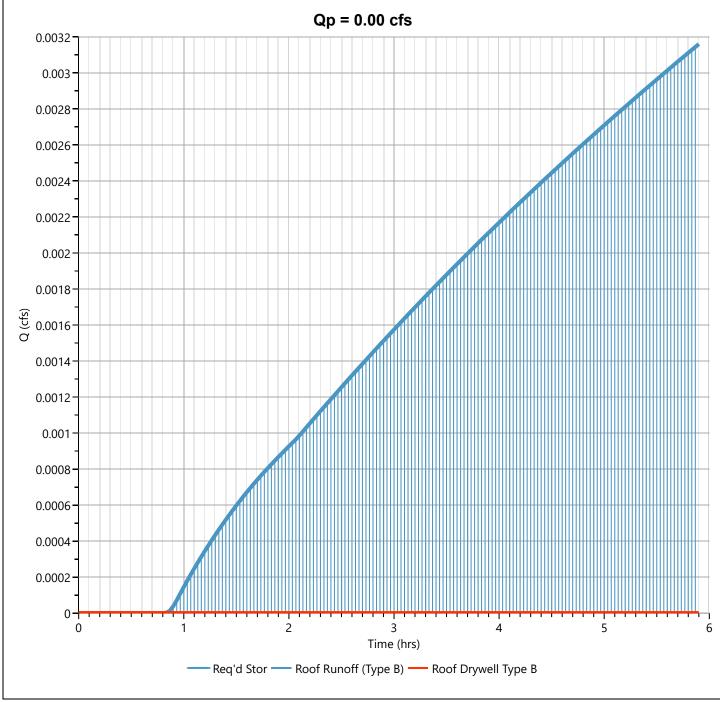




# **Roof Drywell Type B**

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 10-yr	Time to Peak	= 5.87 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 65 - Roof Runoff (Type B)	Max. Elevation	= 101.88 ft
Pond Name	= Roof Drywell Type B (Sandy Loam)	Max. Storage	= 364 cuft



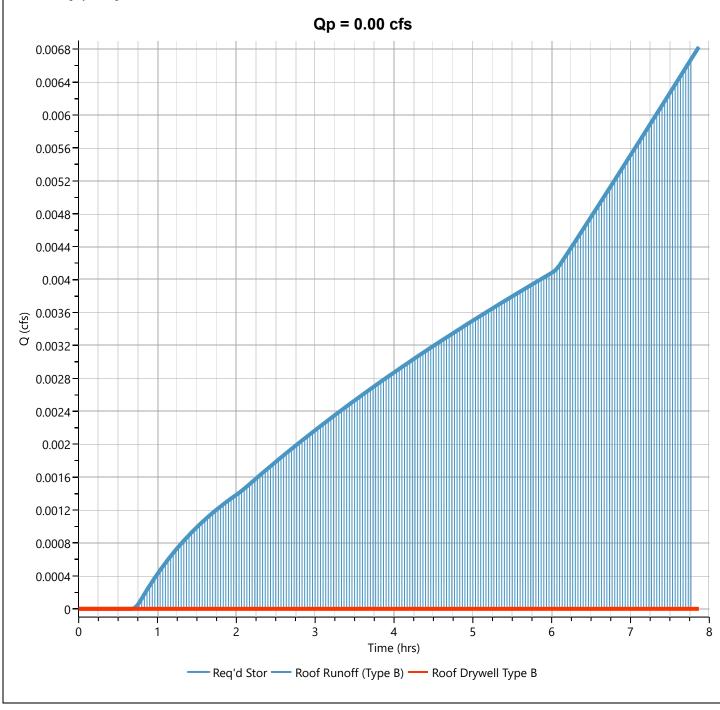


## **Roof Drywell Type B**

### Hyd. No. 66

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 25-yr	Time to Peak	= 7.77 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 65 - Roof Runoff (Type B)	Max. Elevation	= 102.39 ft
Pond Name	= Roof Drywell Type B (Sandy Loam)	Max. Storage	= 466 cuft
Bond Bouting by Storage Inc	disation Mothed		

Pond Routing by Storage Indication Method

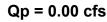


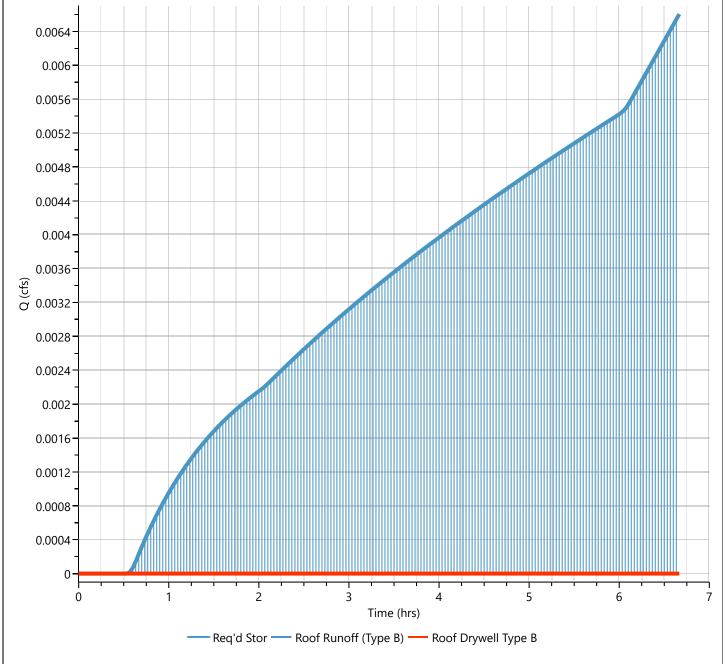
# **Roof Drywell Type B**

## Hyd. No. 66

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 100-yr	Time to Peak	= 6.63 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 65 - Roof Runoff (Type B)	Max. Elevation	= 103.45 ft
Pond Name	= Roof Drywell Type B (Sandy Loam)	Max. Storage	= 624 cuft

Pond Routing by Storage Indication Method







Job: 3719C Calculated NC

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

IB-2A1

Soils: Merrimac Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.25 inches of runoff x impervious area

Impervious area: 0.66 acres 28,538 s.f.

Required Recharge Volume (Rv)

Rv = 28,538 s.f. x 0.25 = **595** c.f.

12

Simple Dynamic Method

A=Rv / (D+KT) Rv=A(D+kT)

D (depth of infiltration facility): 2.85 ft

K (saturated hydraulic conductivity): 2.41 inches/hour

0.20 feet/hour

T (time): 2 hours A= 3,719 s.f.

Voids= 1.00

Rv= 12,093 c.f. > 595 c.f.

Basin Volume: 13,891 c.f. (Below Outlet)

72 Hour Drawdown

Rv/(K x Bottom Area)= 18.60 Hours

18.60 < 72 hours O.K.

Job: 3719C Calculated NC

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

IB-2A2

Soils: Merrimac Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.25 inches of runoff x impervious area

Impervious area: 0.47 acres 20,362 s.f.

Required Recharge Volume (Rv)

Rv = 20,362 s.f. x 0.25 = **424** c.f.

12

Simple Dynamic Method

A=Rv / (D+KT) Rv=A(D+kT)

D (depth of infiltration facility): 2.5 ft

K (saturated hydraulic conductivity): 2.41 inches/hour

0.20 feet/hour

T (time): 2 hours A= 3,902 s.f.

Voids= 1.00

Rv= 11,322 c.f. > 424 c.f.

Basin Volume: 8,246 c.f. (Below Outlet)

72 Hour Drawdown

Rv/(K x Bottom Area)= 10.52 Hours

10.52 < 72 hours O.K.

Job: 3719C Calculated NC

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

IB-2B-A

Soils: Merrimac Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.6 inches of runoff x impervious area

Impervious area: 0.81 acres 35,210 s.f.

Required Recharge Volume (Rv)

Rv = 35,210s.f. x 0.6 1,761 c.f.

12

Simple Dynamic Method

A=Rv / (D+KT) Rv=A(D+kT)

> D (depth of infiltration facility): 0.4 ft

K (saturated hydraulic conductivity): 2.41 inches/hour

0.20 feet/hour

T (time): 2 hours 8,967 s.f.

1.00 Voids=

7,189 c.f. Rv=

1,761 c.f.

Basin Volume: 3,888 c.f. (Below Outlet)

72 Hour Drawdown

Rv/(K x Bottom Area)= 2.16 Hours

2.16 < 72 hours O.K.

Job: 3719C Calculated NC

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

IB-3A

Soils: Paxton Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.25 inches of runoff x impervious area

Impervious area: 0.42 acres 18,277 s.f.

Required Recharge Volume (Rv)

Rv = 18,277s.f. x 0.25 381 c.f.

12

Simple Dynamic Method

A=Rv / (D+KT) Rv=A(D+kT)

> D (depth of infiltration facility): 0.5 ft

K (saturated hydraulic conductivity): 1.02 inches/hour

0.09 feet/hour

T (time): 2 hours 1,532 s.f. 1.00 Voids=

1,026 c.f. 381 c.f. Rv=

Basin Volume: 894 c.f. (Below Outlet)

72 Hour Drawdown

Rv/(K x Bottom Area)= 6.87 Hours

6.87 < 72 hours O.K.

Job: 3719C Calculated NC

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

IB-4A

Soils: Paxton Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.25 inches of runoff x impervious area

Impervious area: 0.27 acres 11,863 s.f.

Required Recharge Volume (Rv)

Rv = 11,863 s.f. x 0.25 = 247 c.f.

12

Simple Dynamic Method

A=Rv / (D+KT) Rv=A(D+kT)

D (depth of infiltration facility): 0.5 ft

K (saturated hydraulic conductivity): 2.41 inches/hour

0.20 feet/hour

T (time): 2 hours A= 2,195 s.f. Voids= 1.00

Rv= 1,979 c.f. > 247 c.f.

Basin Volume: 1,270 c.f. (Below Outlet)

72 Hour Drawdown

Rv/(K x Bottom Area)= 2.88 Hours 2.88 < 72 hours 0.K.

Job: 3719C Calculated NC

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

IB-5B

Soils: Paxton Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.25 inches of runoff x impervious area

Impervious area: 0.50 acres 21,969 s.f.

Required Recharge Volume (Rv)

Rv = 21,969s.f. x 0.25 458 c.f.

12

Simple Dynamic Method

A=Rv / (D+KT) Rv=A(D+kT)

> D (depth of infiltration facility): 1 ft

K (saturated hydraulic conductivity): 2.41 inches/hour

0.20 feet/hour

T (time): 2 hours 2,245 s.f. 1.00 Voids=

3,147 c.f. 458 c.f. Rv=

Basin Volume: 2,556 c.f. (Below Outlet)

72 Hour Drawdown

Rv/(K x Bottom Area)= 5.67 Hours

5.67 < 72 hours O.K.

Job: 3719C Calculated NC

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

IB-5C

Soils: Paxton Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.25 inches of runoff x impervious area

Impervious area: 0.61 acres 26,675 s.f.

Required Recharge Volume (Rv)

Rv = 26,675 s.f. x 0.25 = **556** c.f.

12

Simple Dynamic Method

A=Rv / (D+KT) Rv=A(D+kT)

D (depth of infiltration facility): 2.7 ft

K (saturated hydraulic conductivity): 2.41 inches/hour

0.20 feet/hour

T (time): 2 hours A= 2,250 s.f. Voids= 1.00

Rv= 6,979 c.f. > 556 c.f.

Basin Volume: 10,534 c.f. (Below Outlet)

72 Hour Drawdown

Rv/(K x Bottom Area)= 23.31 Hours **23.31 < 72 hours O.K.** 

Job: 3719C Calculated NC

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

IB-5D

Soils: Windsor Loamy Sand

Hydrologic Group:

Required Recharge Volume

0.25 inches of runoff x impervious area

Impervious area: 1.05 acres 45,838 s.f.

Required Recharge Volume (Rv)

Rv = 45,838s.f. x 0.25 955 c.f.

12

Simple Dynamic Method

A=Rv / (D+KT) Rv=A(D+kT)

> D (depth of infiltration facility): 2 ft

K (saturated hydraulic conductivity): 1.02 inches/hour

0.09 feet/hour

T (time): 2 hours 2,831 s.f. 1.00 Voids=

6,143 c.f. 955 c.f. Rv=

Basin Volume: 8,291 c.f. (Below Outlet)

72 Hour Drawdown

34.45 Hours Rv/(K x Bottom Area)=

34.45 < 72 hours O.K.

Job: 3719C Calculated NC

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

IB-6B

Soils: Merrimac Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.6 inches of runoff x impervious area

Impervious area: 0.21 acres 9,208 s.f.

Required Recharge Volume (Rv)

Rv = 9,208 s.f. x 0.6 460 c.f.

12

Simple Dynamic Method

A=Rv / (D+KT) Rv=A(D+kT)

> D (depth of infiltration facility): 3 ft

K (saturated hydraulic conductivity): 8.27 inches/hour

0.69 feet/hour

T (time): 2 hours 572 s.f. 1.00 Voids=

2,504 c.f. 460 c.f. Rv=

Basin Volume: 2,502 c.f. (Below Outlet)

72 Hour Drawdown

6.35 Hours Rv/(K x Bottom Area)=

6.35 < 72 hours O.K.

Job: 3719C Calculated NC

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

IB-7A

Soils: Merrimac Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.6 inches of runoff x impervious area

Impervious area: 1.47 acres 64,127 s.f.

Required Recharge Volume (Rv)

Rv = 64,127s.f. x 0.6 3,206 c.f.

12

Simple Dynamic Method

A=Rv / (D+KT) Rv=A(D+kT)

> D (depth of infiltration facility): 3.4 ft

K (saturated hydraulic conductivity): 8.27 inches/hour

0.69 feet/hour

T (time): 2 hours 3,716 s.f. 1.00 Voids=

17,756 c.f. 3,206 c.f. Rv=

Basin Volume: 18,663 c.f. (Below Outlet)

72 Hour Drawdown

Rv/(K x Bottom Area)= 7.29 Hours

7.29 < 72 hours O.K.

Job: 3719C Calculated NC

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

IB-7B

Soils: Merrimac Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.6 inches of runoff x impervious area

Impervious area: 0.61 acres 26,719 s.f.

Required Recharge Volume (Rv)

Rv = 26,719s.f. x 0.6 1,336 c.f.

12

Simple Dynamic Method

A=Rv / (D+KT) Rv=A(D+kT)

> D (depth of infiltration facility): 2.5 ft

K (saturated hydraulic conductivity): 8.27 inches/hour

0.69 feet/hour

T (time): 2 hours 2,619 s.f.

1.00 Voids=

10,157 c.f. 1,336 c.f. Rv=

Basin Volume: 9,268 c.f. (Below Outlet)

72 Hour Drawdown

Rv/(K x Bottom Area)= 5.13 Hours

5.13 < 72 hours O.K.

Job: 3719C Calculated NC

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

IB-8

Soils: Merrimac Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.6 inches of runoff x impervious area

Impervious area: 2.06 acres 89,744 s.f.

Required Recharge Volume (Rv)

Rv = 89,744s.f. x 0.6 4,487 c.f.

12

Simple Dynamic Method

A=Rv / (D+KT) Rv=A(D+kT)

> D (depth of infiltration facility): 4 ft

K (saturated hydraulic conductivity): 8.27 inches/hour

0.69 feet/hour

T (time): 2 hours 6,237 s.f. 1.00 Voids=

33,545 c.f. 4,487 c.f. Rv=

Basin Volume: 37,954 c.f. (Below Outlet)

72 Hour Drawdown

Rv/(K x Bottom Area)= 8.83 Hours

8.83 < 72 hours O.K.

Job: 3719C Calculated NC

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

IB-10B

Soils: Paxton Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.25 inches of runoff x impervious area

Impervious area: 1.69 acres 73,469 s.f.

Required Recharge Volume (Rv)

Rv = 73,469s.f. x 0.25 1,531 c.f.

12

Simple Dynamic Method

A=Rv / (D+KT) Rv=A(D+kT)

> D (depth of infiltration facility): 1.75 ft

K (saturated hydraulic conductivity): 8.27 inches/hour

0.69 feet/hour

T (time): 2 hours 4,961 s.f. 1.00 Voids=

15,520 c.f. 1,531 c.f. Rv=

Basin Volume: 10,890 c.f. (Below Outlet)

72 Hour Drawdown

Rv/(K x Bottom Area)= 3.19 Hours

3.19 < 72 hours O.K.

Job: 3719C Calculated NC

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

IB-10C

Soils: Woodbridge Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.6 inches of runoff x impervious area

Impervious area: 3.38 acres 147,186 s.f.

Required Recharge Volume (Rv)

Rv = 147,186s.f. x 0.6 7,359 c.f.

12

Simple Dynamic Method

A=Rv / (D+KT) Rv=A(D+kT)

> D (depth of infiltration facility): 3 ft

K (saturated hydraulic conductivity): 8.27 inches/hour

0.69 feet/hour

T (time): 2 hours 16,659 s.f. 1.00 Voids=

72,939 c.f. 7,359 c.f. Rv=

Basin Volume: 64,158 c.f. (Below Outlet)

72 Hour Drawdown

Rv/(K x Bottom Area)= 5.59 Hours

5.59 < 72 hours O.K.

Job: 3719C Calculated NC

Date: 6/27/2022 Rev: 10/27/2022

47 c.f.

6/17/2023

**Roof Drywell Type A** 

Soils: Paxton Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.25 inches of runoff x impervious area

Impervious area: 0.05 acres 2,274 s.f.

Required Recharge Volume (Rv)

Rv = 2,274s.f. x 0.25 47 c.f.

12

Simple Dynamic Method

A=Rv / (D+KT) Rv=A(D+kT)

> D (depth of infiltration facility): 3.54 ft

K (saturated hydraulic conductivity): 2.41 inches/hour

0.20 feet/hour

T (time): 2 hours 256 s.f. 0.40 Voids=

465 c.f. Rv=

Drywell Volume: 551 c.f. (Below Outlet)

72 Hour Drawdown

10.72 Hours Rv/(K x Bottom Area)=

10.72 < 72 hours O.K.

Job: 3719C Calculated NC

Date: 6/27/2022 Rev: 10/27/2022

47 c.f.

6/17/2023

**Roof Drywell Type B** 

Soils: Paxton Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.25 inches of runoff x impervious area

Impervious area: 0.05 acres 2,274 s.f.

Required Recharge Volume (Rv)

Rv = 2,274s.f. x 0.25 47 c.f.

12

Simple Dynamic Method

A=Rv / (D+KT) Rv=A(D+kT)

> D (depth of infiltration facility): 3.54 ft

K (saturated hydraulic conductivity): 1.02 inches/hour

0.09 feet/hour

T (time): 2 hours 301 s.f. 0.40 Voids=

477 c.f. Rv=

Drywell Volume: 635 c.f. (Below Outlet)

72 Hour Drawdown

24.82 Hours Rv/(K x Bottom Area)=

24.82 < 72 hours O.K.

**Required Recharge Volume** SM-3719C Calculated by: Job: NC Date: 6/27/2022 Rev: 10/27/2022 **Required Recharge Volume** 6/17/2023 Soils: Sand Hydrologic Group: A Required Recharge Volume 1 inches of runoff x impervious area Total Impervious Area: 17.37 acres 756,673 s.f. 1.) Required Recharge Volume (Rv) Rv = 756,673 1 63,056 c.f. s.f. x 63,056 c.f. Impervious Area draining to recharge faciliti 662,391 s.f. 756,673 1.14 = 662,391 2.) Adjusted Minimum Required Recharge Volume Rv= 63,056 s.f. x 1.14 72,031 c.f. 4.) Recharge Volume Provided 12,093 c.f. 159,610 26.19 IB-2A2 11,322 c.f. IB-2B-A 7,189 c.f. IB-3A 1,026 c.f. IB-4A 1,979 c.f. IB-5B 3,147 c.f. IB-5C 6,979 c.f. IB-5D 6,143 c.f. IB-6B 2,504 c.f. IB-7A 17,756 c.f. IB-7B 10,157 c.f. IB-8 33,545 c.f. IB-10B 15,520 c.f. IB-10C 72,939 c.f. Drywell A (x17) 7,910 c.f. Drywell B (x2) 955 c.f. **Total Recharge Volume Provided** 211,164 c.f.

72,031

<u>65%</u>

>

662,391

756,673

<u>></u>

<u>c.f.</u>

=

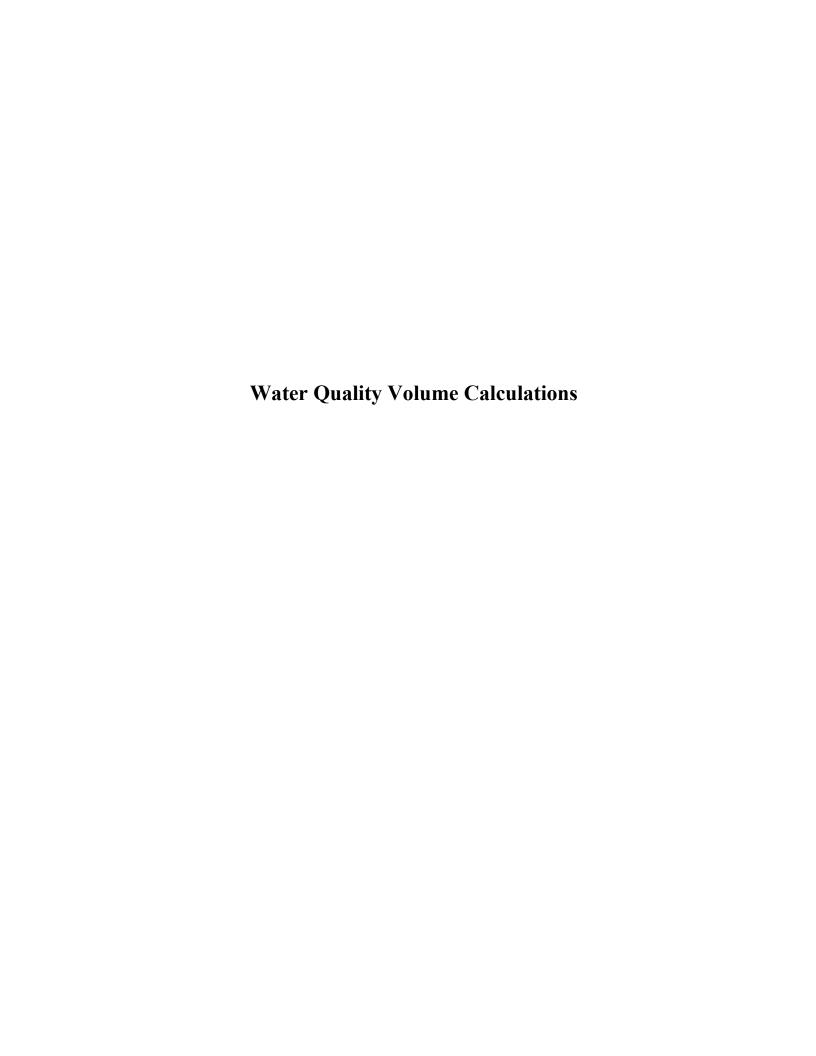
<u>OK</u>

88%

211,164

88%

Total Impervious area Impervious area being recharged <u>c.f.</u>



Job: 3719C Calculated by: NC

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

Location: The Cottages at Wandering Pond

IB-2A1

Soils: Merrimac Fine Sandy Loam

Hydrologic Group:

Required First Flush Volume

0.5 inch of runoff x impervious area

Impervious area: 0.66 acres 28,538 s.f.

Required Water Quality Volume

V= 28,538 s.f. x  $\frac{0.5}{1.2}$  = 1,189 c.f.

12

Volume Provided 13,891 c.f. (storage below outlet)

13,891 c.f. > 1,189 c.f. O.K.

Job: \_\_\_\_\_ Calculated by: NC

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

Location: The Cottages at Wandering Pond

IB-2A2

Soils: Merrimac Fine Sandy Loam

Hydrologic Group:

Required First Flush Volume

0.5 inch of runoff x impervious area

Impervious area: 0.47 acres 20,362 s.f.

Required Water Quality Volume

V= 20,362 s.f. x 0.5 = **848 c.f.** 

12

Volume Provided 8,246 c.f. (storage below outlet)

8,246 c.f. > 848 c.f. O.K.

Job: 3719C Calculated by: NC

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

Location: The Cottages at Wandering Pond

IB-2B-A

Soils: Merrimac Fine Sandy Loam

Hydrologic Group:

Required First Flush Volume

0.5 inch of runoff x impervious area

Impervious area: 0.81 acres 35,210 s.f.

Required Water Quality Volume

V= 35,210 s.f. x 0.5 = 1,467 c.f.

12

Volume Provided 3,888 c.f. (storage below outlet)

3,888 c.f. > 1,467 c.f. O.K.

Job: 3719C Calculated by: MKO

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

Location: The Cottages at Wandering Pond

IB-3A

Soils: Paxton Fine Sandy Loam

Hydrologic Group:

Required First Flush Volume

0.5 inch of runoff x impervious area

Impervious area: 0.42 acres 18,277 s.f.

Required Water Quality Volume

V= 18,277 s.f. x 0.5 = **762** c.f.

12

Volume Provided 894 c.f. (storage below outlet)

894 c.f. > 762 c.f. O.K.

Job: \_\_\_\_\_ Calculated by: NC

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

Location: The Cottages at Wandering Pond

IB-4A

Soils: Paxton Fine Sandy Loam

Hydrologic Group:

Required First Flush Volume

1 inch of runoff x impervious area

Impervious area: 0.27 acres 11,863 s.f.

Required Water Quality Volume

V= 11,863 s.f. x  $\frac{1}{10}$  = 989 c.f.

12

Volume Provided 1,270 c.f. (storage below outlet)

1,270 c.f. > 989 c.f. O.K.

Job: \_\_\_\_\_ Calculated by: NC

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

Location: The Cottages at Wandering Pond

IB-5B

Soils: Paxton Fine Sandy Loam

Hydrologic Group:

Required First Flush Volume

1 inch of runoff x impervious area

Impervious area: 0.50 acres 21,969 s.f.

Required Water Quality Volume

V= 21,969 s.f. x  $\frac{1}{10}$  = **1,831 c.f.** 

12

Volume Provided 2,556 c.f. (storage below outlet)

2,556 c.f. > 1,831 c.f. O.K.

Job: \_\_\_\_\_ Calculated by: NC

Date: 6/27/2022 Rev: 10/27/2022 6/17/2023

IB-5C

Soils: Paxton Fine Sandy Loam

Hydrologic Group:

Required First Flush Volume

Location: The Cottages at Wandering Pond

1 inch of runoff x impervious area

Impervious area: 0.61 acres 26,675 s.f.

Required Water Quality Volume

V= 26,675 s.f. x  $\frac{1}{10}$  = 2,223 c.f.

12

Volume Provided 10,534 c.f. (storage below outlet)

10,534 c.f. > 2,223 c.f. O.K.

Calculated by: NC 3719C Job:

Date: 6/27/2022 Rev: 10/27/2022

Location: The Cottages at Wandering Pond 6/17/2023

IB-5D

Windsor Loamy Sand Soils:

Hydrologic Group:

Required First Flush Volume 0.5 inch of runoff x impervious area

Impervious area: 1.05 acres 45,838 s.f.

Required Water Quality Volume

V= 45,838 0.5 1,910 c.f. s.f. x

12

Volume Provided 8,291 c.f. (storage below outlet)

> 8,291 c.f. > 1,910 c.f. O.K.

Job: 3719C Calculated by: NC

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

Location: The Cottages at Wandering Pond

IB-6B

Soils: Merrimac Fine Sandy Loam

Hydrologic Group:

Required First Flush Volume

1 inch of runoff x impervious area

Impervious area: 0.21 acres 9,208 s.f.

Required Water Quality Volume

V= 9,208 s.f. x  $\underline{1}$  = **767 c.f.** 

12

Volume Provided 2,502 c.f.

2,502 c.f. > 767 c.f. O.K.

3719C Calculated by: NC Job:

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

Location: The Cottages at Wandering Pond

IB-7A

Soils: Merrimac Fine Sandy Loam

Hydrologic Group:

Required First Flush Volume

1 inch of runoff x impervious area

Impervious area: 1.47 acres 64,127 s.f.

Required Water Quality Volume

V= 64,127 <u>1</u> 5,344 c.f. s.f. x

12

Volume Provided 18,663 c.f.

> 18,663 c.f. > 5,344 c.f. O.K.

Job: 3719C Calculated by: NC

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023 2/15/2024

Location: The Cottages at Wandering Pond

IB-7B Soils:

Merrimac Fine Sandy Loam

Hydrologic Group:

Required First Flush Volume

1 inch of runoff x impervious area

Impervious area: 0.61 acres 26,719 s.f.

Required Water Quality Volume

V= 26,719 s.f. x  $\frac{1}{12}$  = **2,227 c.f.** 

Volume Provided 9,268 c.f.

9,268 c.f. > 2,227 c.f. O.K.

Job: 3719C Calculated by: NC

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

Location: The Cottages at Wandering Pond

IB-8

Soils: Merrimac Fine Sandy Loam

Hydrologic Group:

Required First Flush Volume

1 inch of runoff x impervious area

Impervious area: 2.06 acres 89,744 s.f.

Required Water Quality Volume

V= 89,744 s.f. x  $\frac{1}{40}$  = **7,479 c.f.** 

12

Volume Provided 37,954 c.f.

37,954 c.f. > 7,479 c.f. O.K.

Calculated by: NC 3719C Job:

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

Location: The Cottages at Wandering Pond

**Treatment Trench** 

Soils: Hinckley Loamy Sand

Hydrologic Group:

Required First Flush Volume

1 inch of runoff x impervious area

0.05 acres Impervious area: 1,964 s.f.

Required Water Quality Volume

V= 1,964 <u>1</u> 164 c.f. s.f. x

12

Treatment Trench Volume Provided=  $L \times W \times D \times 0.4 =$ 176 c.f.

> 164 176 c.f. > c.f. O.K.

Job: 3719C Calculated by: NC

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

Location: The Cottages at Wandering Pond

IB-10B

Soils: Paxton Fine Sandy Loam

Hydrologic Group:

Required First Flush Volume

1 inch of runoff x impervious area

Impervious area: 1.69 acres 73,469 s.f.

Required Water Quality Volume

V= 73,469 s.f. x  $\frac{1}{10}$  = **6,122 c.f.** 

12

Volume Provided 10,890 c.f. (storage below outlet)

10,890 c.f. > 6,122 c.f. O.K.

Job: 3719C Calculated by: NC

Date: 6/27/2022 Rev: 10/27/2022

6/17/2023

Location: The Cottages at Wandering Pond

IB-10C

Soils: Woodbridge Fine Sandy Loam

Hydrologic Group:

Required First Flush Volume

1 inch of runoff x impervious area

Impervious area: 3.38 acres 147,186 s.f.

Required Water Quality Volume

V= 147,186 s.f. x  $\underline{1}$  = 12,266 c.f.

12

Volume Provided 64,158 c.f. (storage below outlet)

64,158 c.f. > 12,266 c.f. O.K.

Job: 3719C Calculated by: NC

Date: 6/27/2022 Rev: 6/12/2023 6/17/2023

·

Location: The Cottages at Wandering Pond

Roof Drywell Type A

Soils: Paxton Fine Sandy Loam

Hydrologic Group:

Required First Flush Volume

1 inch of runoff x impervious area

Impervious area: 0.05 acres 2,274 s.f.

Required Water Quality Volume

V= 2,274 s.f. x  $\frac{1}{10}$  = 190 c.f.

12

Volume Provided 551 c.f. (storage below outlet)

551 c.f. > 190 c.f. O.K.

Job: 3719C Calculated by: NC

Date: 6/27/2022 Rev: 6/12/2023

6/17/2023

**Roof Drywell Type B** 

Location: The Cottages at Wandering Pond

Soils: Paxton Fine Sandy Loam

Hydrologic Group:

Required First Flush Volume

0.5 inch of runoff x impervious area

Impervious area: 0.05 acres 2,274 s.f.

2,217

Required Water Quality Volume

V= 2,274 s.f. x 0.5 = 95 c.f.

12

Volume Provided 635 c.f. (storage below outlet)

635 c.f. > 95 c.f. O.K.

Project: Cottages at Wandering Pond

Location: Stow, MA
Prepared For: Stamski & McNary



<u>Purpose:</u> To calculate the water quality flow rate (WQF) over a given site area. In this situation the WQF is derived

from the first 1" of runoff from the contributing impervious surface.

Reference: Massachusetts Dept. of Environmental Protection Wetlands Program / United States Department of

Agriculture Natural Resources Conservation Service TR-55 Manual

**Procedure:** Determine unit peak discharge using Figure 1 or 2. Figure 2 is in tabular form so is preferred. Using the

tc, read the unit peak discharge (qu) from Figure 1 or Table in Figure 2. qu is expressed in the following

units: cfs/mi<sup>2</sup>/watershed inches (csm/in).

Compute Q Rate using the following equation:

Q = (qu) (A) (WQV)

where:

Q = flow rate associated with first 1" of runoff

qu = the unit peak discharge, in csm/in.

A = impervious surface drainage area (in square miles)

WQV = water quality volume in watershed inches (1" in this case)

Structure Name	Impv. (acres)	A (miles <sup>2</sup> )	t <sub>c</sub> (min)	t <sub>c</sub> (hr)	WQV (in)	qu (csm/in.)	Q (cfs)
DMH AS1	0.34	0.0005383	6.0	0.100	1.00	774.00	0.42
DMH AS2	0.33	0.0005203	6.0	0.100	1.00	774.00	0.40
DMH WPW1	0.07	0.0001094	6.0	0.100	1.00	774.00	0.08
DMH WPW2	0.23	0.0003566	6.0	0.100	1.00	774.00	0.28

The WQf sizing calculation selects the minimum size CDS/Cascade/StormCeptor model capable of operating at the computed WQf peak flowrate prior to bypassing. It assumes free discharge of the WQf through the unit and ignores the routing effect of any upstream storm drain piping. As with all hydrodynamic separators, there will be some impact to the Hydraulic Gradient of the corresponding drainage system, and evaluation of this impact should be considered in the design.



#### **Groundwater Mounding Analysis**

Project: The Cottages at Wandering Pond Location: Off of Hudson Road, Stow, MA SM-3719C

Date: 6/27/2022 Rev: 10/27/2022 By: NC

6/15/2023 2/15/2024

	Length of Application (ft)	Width of Application (ft)	Area (s.f.)	Required Recharge Volume (c.f.)	Application Rate (c.f./day/s.f.)	Duration of Application	Fillable Porosity	Hydraulic Conductivity (ft/day)	Bottom of Structure Elevation	E.S.H.G.W.	Initial Saturated Thickness Used (ft)	Mound Height
Infiltration Basin 2B-A	375	31.4	11,775	1,761	0.15		0.18	8	231.70	229.7	10	0.50
Infiltration Basin 6B	78.0	7.33	572	460	0.80		0.28	39	221.00	215.4	10	0.25
Infiltration Basin 7A	98.0	37.9	3,716	3,206	0.86		0.28	39	219.00	217.0	10	1.21
Infiltration Basin 8	146	42.7	6,237	4,442	0.71		0.28	39	222.30	220.3	10	1.21
Infiltration Basin 10B	106	46.8	4,961	1,531	0.31	1 day	0.28	39	225.00	222.0	10	0.52
Infiltration Basin 5D	108.0	26.2	2,831	955	0.34		0.16	6	230.00	227.8	10	1.19
Infiltration Basin 5C	68.4	46.9	3,208	556	0.17		0.18	8	258.00	254.3	10	0.65
Infiltration Basin 10C	278.5	98.3	27,377	7,359	0.27		0.28	39	225.00	223.0	10	0.79
Infiltration Basin 2A1	90.4	43.7	3,950	562	0.14		0.18	8	306.00	303.4	8	0.59

Application Rate = Required Recharge Volume

Bottom Area

**Duration of Application =** 1 day for analysis of 24-hour storm events

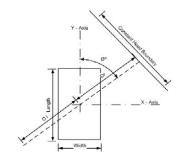
Fillable Porosity = Value based on soil classification from attached table

Hydraulic Conductivity = Value taken from attached table

Initial Saturated Thickness = Due to the lack of Saturated Thickness or Depth toBedrock data, a conservative value of 10 feet is used except where bedrock was found in IB-2A1.

Distance to Constant Head Boundary (Di & Dr):
Bordering Vegetated Wetland used as constant head boundary

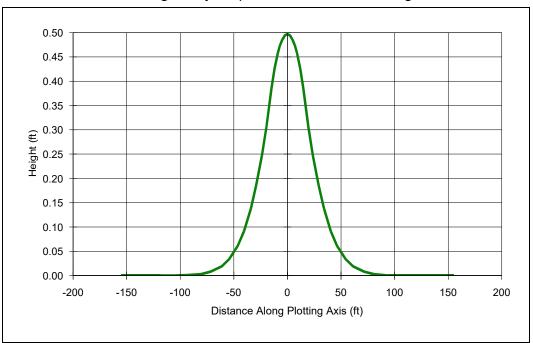
Angle from z-axis (Ø):



	SPECIFIC YIELD	VALUES (%)
4	Coarse gravel	0.23
	Medium gravel	0.24
	Fine gravel	0.25
	Coarse sand	0.27
	Medium sand	0.28
	Fine sand	0.23
	Silt	0.08
	Clay	0.03
		7

VA	LUES (FT/D	DAY)
MATERIAL	AVERAGE	RANGE
Fine gravel	1476	1181 - 3280
Medium gravel	886	689 - 1181
Coarse gravel	492	328 - 689
Coarse sand	148	65 - 328
Medium sand	39	16 - 65
Fine sand	8	3 - 16
Silt	0.3	0.03 - 3
Clay	0.0007	<0.03
S & G mix	172	16 - 328
S & G glacial till		<100
Glacial till		<10

<sup>\*</sup>Mass DEP Groundwater Mounding for Systems Larger than 2,000 GPD Presentation



COMPANY: Stamski & McNary

PROJECT: Wandering Pond IB-2B-A

ANALYST: RJM

DATE: 6/19/2023 TIME: 12:02:50 PM

#### **INPUT PARAMETERS**

Duration of application: 1 days
Fillable porosity: 0.18
Hydraulic conductivity: 8 ft/day
Initial saturated thickness: 10 ft
Length of application area: 375 ft
Width of application area: 31.4 ft
Constant head boundary used at: 154 ft
Plotting axis from Y-Axis: 75 degrees

Application rate: 0.15 c.ft/day/sq. ft

Edge of recharge area: positive X: 15.7 ft

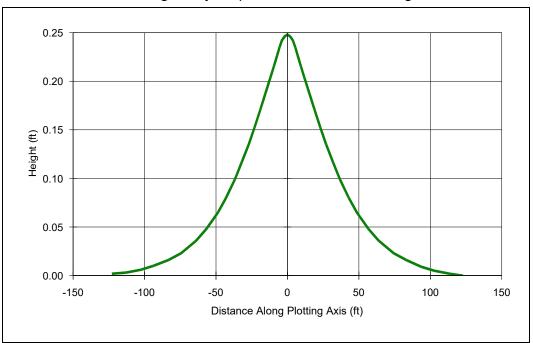
positive Y: 4.2 ft

Total volume applied: 1766.25 c.ft

#### MODEL RESULTS

Plot

X (ft)	Y (ft)	Axis (ft)	Height (ft)
-148.8 -125.1 -101.4 -77.8 -59.2 -44.8 -33 -23 -14.4 -8.6 -4.7 0 4.7 8.6 14.4 23 33 44.8 59.2 77.8 101.4 125.1 148.8	-39.9 -33.5 -27.2 -20.8 -15.9 -12 -8.8 -6.2 -3.9 -2.3 -1.3 0 1.3 2.3 3.9 6.2 8.8 12 15.9 20.8 27.2 33.5 39.9	-154 -130 -105 -81 -61 -46 -34 -24 -15 -9 -5 0 5 9 15 24 34 46 61 81 105 130 154	0 0 0 0.02 0.06 0.14 0.25 0.38 0.46 0.48 0.5 0.48 0.25 0.14 0.06 0.02 0
			-



PROJECT: Wandering Pond IB-6B

ANALYST: RJM

DATE: 2/15/2024 TIME: 1:59:50 PM

#### **INPUT PARAMETERS**

Application rate: 0.8 c.ft/day/sq. ft
Duration of application: 1 days
Fillable porosity: 0.28
Hydraulic conductivity: 39 ft/day
Initial saturated thickness: 10 ft
Length of application area: 78 ft
Width of application area: 7.33 ft
Constant head boundary used at: 122 ft
Plotting axis from Y-Axis: 42 degrees
Edge of recharge area:

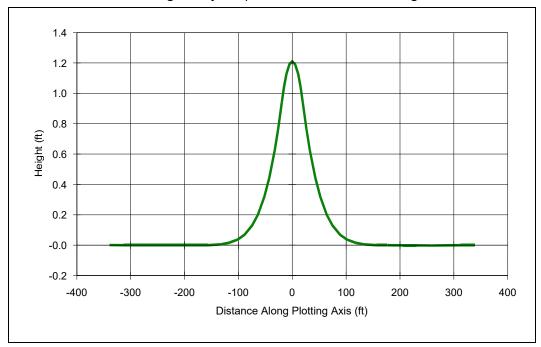
positive X: 3.7 ft positive Y: 4.1 ft

Total volume applied: 457.392 c.ft

#### MODEL RESULTS

Plot

X (ft)	Y (ft)	Axis (ft)	Height (ft)
-81.6 -68.7 -55.7 -42.7 -32.5 -24.6 -18.1 -12.6 -7.9 -4.7 -2.6 0 2.6 4.7 7.9 12.6 18.1 24.6 32.5 42.7 55.7 68.7	-90.7 -76.2 -61.8 -47.4 -36.1 -27.3 -20.1 -14 -8.8 -5.3 -2.9 0 2.9 5.3 8.8 14 20.1 27.3 36.1 47.4 61.8 76.2	-122 -103 -83 -64 -49 -37 -27 -19 -12 -7 -4 0 4 7 12 19 27 37 49 64 83 103	0 0.01 0.02 0.04 0.06 0.1 0.14 0.17 0.2 0.23 0.24 0.25 0.24 0.23 0.2 0.17 0.14 0.1 0.06 0.04 0.02
81.6	90.7	122	0



COMPANY: Stamski & McNary

PROJECT: Wandering Pond IB-7A

ANALYST: RJM

DATE: 6/19/2023 TIME: 12:16:41 PM

**INPUT PARAMETERS** 

Application rate: 0.86 c.ft/day/sq. ft Duration of application: 1 days Fillable porosity: 0.28

Hydraulic conductivity: 39 ft/day Initial saturated thickness: 10 ft Length of application area: 98 ft Width of application area: 37.9 ft

Constant head boundary used at: 337 ft Plotting axis from Y-Axis: 77 degrees

Edge of recharge area:

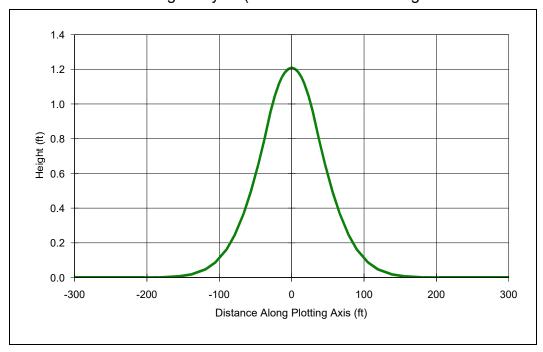
positive X: 19 ft positive Y: 4.4 ft

Total volume applied: 3194.212 c.ft

#### MODEL RESULTS

Plot

X (ft)	Y (ft)	Axis (ft)	Height (ft)
-328.4 -276.2 -223.9 -171.7 -130.7 -98.8 -72.8 -50.9 -31.8 -19 -10.3 0 10.3 19 31.8 50.9 72.8 98.8 130.7 171.7 223.9 276.2 328.4	-75.8 -63.8 -51.7 -39.6 -30.2 -22.8 -16.8 -11.7 -7.3 -4.4 -2.4 0 2.4 4.4 7.3 11.7 16.8 22.8 30.2 39.6 51.7 63.8 75.8	-337 -283 -230 -176 -134 -101 -75 -52 -33 -20 -11 0 11 20 33 52 75 101 134 176 230 283 337	0 0 0 0 0.04 0.13 0.32 0.62 0.94 1.13 1.21 1.13 0.94 0.62 0.32 0.13 0.04 0



COMPANY: Stamski & McNary

PROJECT: Wandering Pond IB-8

ANALYST: RJM

DATE: 6/19/2023 TIME: 12:18:29 PM

#### **INPUT PARAMETERS**

Application rate: 0.71 c.ft/day/sq. ft Duration of application: 1 days Fillable porosity: 0.28

Hydraulic conductivity: 39 ft/day Initial saturated thickness: 10 ft Length of application area: 146 ft Width of application area: 42.7 ft Constant head boundary used at: 299 ft Plotting axis from Y-Axis: 41 degrees

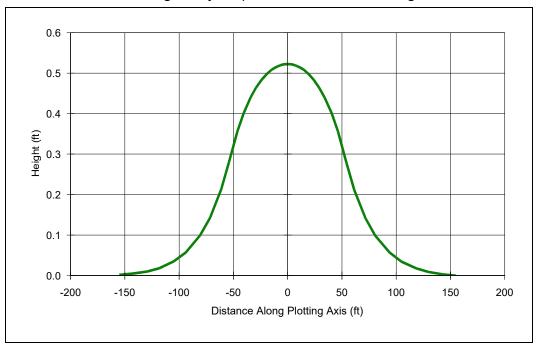
Edge of recharge area: positive X: 21.4 ft

positive Y: 24.6 ft

Total volume applied: 4426.282 c.ft

#### MODEL RESULTS

-196.2       -225.7       -299       0         -165       -189.8       -251       0         -133.8       -153.9       -204       0         -102.6       -118       -156       0.01         -78.1       -89.8       -119       0.05         -59       -67.9       -90       0.16         -43.5       -50.1       -66       0.37         -30.4       -35       -46       0.65         -19       -21.9       -29       0.96         -11.4       -13.1       -17       1.12         -6.2       -7.1       -9       1.18         0       0       0       1.21         6.2       7.1       9       1.18         11.4       13.1       17       1.12         19       21.9       29       0.96         30.4       35       46       0.65         43.5       50.1       66       0.37         59       67.9       90       0.16         78.1       89.8       119       0.05         102.6       118       156       0.01         133.8       153.9       204       0 <th>X (ft)</th> <th>Y (ft)</th> <th>Plot Axis (ft)</th> <th>Mound Height (ft)</th>	X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
	-165 -133.8 -102.6 -78.1 -59 -43.5 -30.4 -19 -11.4 -6.2 0 6.2 11.4 19 30.4 43.5 59 78.1 102.6 133.8 165	-189.8 -153.9 -118 -89.8 -67.9 -50.1 -35 -21.9 -13.1 -7.1 0 7.1 13.1 21.9 35 50.1 67.9 89.8 118 153.9 189.8	-251 -204 -156 -119 -90 -66 -46 -29 -17 -9 0 9 17 29 46 66 90 119 156 204 251	0 0.01 0.05 0.16 0.37 0.65 0.96 1.12 1.18 1.21 1.18 1.12 0.96 0.65 0.37 0.16 0.05 0.01 0



COMPANY: Stamski & McNary

PROJECT: Wandering Pond IB-10B

ANALYST: RJM

DATE: 6/19/2023 TIME: 12:20:18 PM

#### **INPUT PARAMETERS**

Application rate: 0.31 c.ft/day/sq. ft
Duration of application: 1 days
Fillable porosity: 0.28
Hydraulic conductivity: 39 ft/day
Initial saturated thickness: 10 ft
Length of application area: 106 ft
Width of application area: 46.8 ft
Constant head boundary used at: 154 ft
Plotting axis from Y-Axis: 6 degrees
Edge of recharge area:

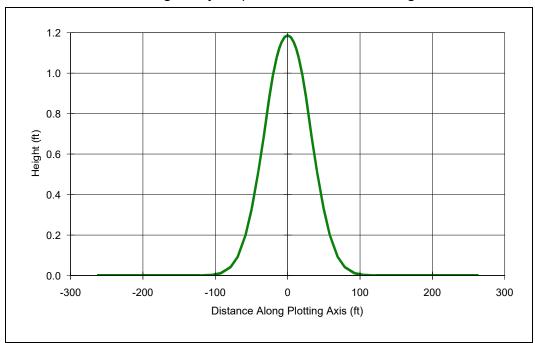
positive X: 5.6 ft positive Y: 53 ft

Total volume applied: 1537.848 c.ft

#### MODEL RESULTS

Plot

X (ft)	Y (ft)	Axis (ft)	Height (ft)
(11)	(10)	(11)	(11)
-16.1	-153.2	-154	0
-13.5	-128.8	-130	0.01
-11	-104.4	-105	0.04
-8.4	-80.1	-81	0.1
-6.4	-60.9	-61	0.21
-4.8	-46.1	-46	0.36
-3.6	-34	-34	0.44
-2.5	-23.7	-24	0.48
-1.6	-14.8	-15	0.51
-0.9	-8.9	-9	0.52
-0.5	-4.8	-5	0.52
0	0	0	0.52
0.5	4.8	5	0.52
0.9	8.9	9	0.52
1.6	14.8	15	0.51
2.5	23.7	24	0.48
3.6	34	34	0.44
4.8	46.1	46	0.36
6.4	60.9	61	0.21
8.4	80.1	81	0.1
11	104.4	105	0.03
13.5	128.8	130	0.01
16.1	153.2	154	0



COMPANY: Stamski & McNary

PROJECT: Wandering Pond IB-5D

ANALYST: RJM

DATE: 6/19/2023 TIME: 12:28:26 PM

## **INPUT PARAMETERS**

Application rate: 0.34 c.ft/day/sq. ft Duration of application: 1 days Fillable porosity: 0.16

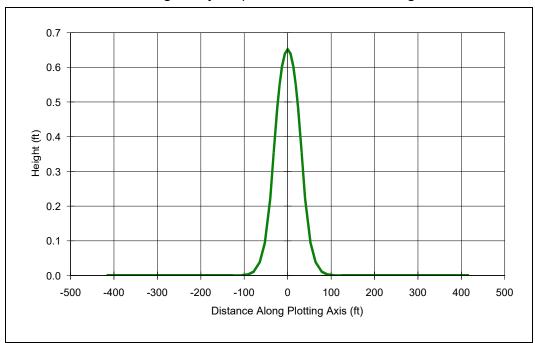
Hydraulic conductivity: 6 ft/day Initial saturated thickness: 10 ft Length of application area: 108 ft Width of application area: 26.2 ft Constant head boundary used at: 262 ft Plotting axis from Y-Axis: 29 degrees

Edge of recharge area: positive X: 13.1 ft

positive Y: 23.6 ft

Total volume applied: 962.064 c.ft

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-127 -106.8 -86.6 -66.4 -50.5 -38.2 -28.2 -19.7 -12.3 -7.4 -4 0 4 7.4 12.3 19.7 28.2 38.2 50.5 66.4 86.6 106.8	-229.2 -192.7 -156.3 -119.8 -91.2 -69 -50.8 -35.5 -22.2 -13.3 -7.2 0 7.2 13.3 22.2 35.5 50.8 69 91.2 119.8 156.3 192.7	-262 -220 -179 -137 -104 -79 -58 -41 -25 -15 -8 0 8 15 25 41 58 79 104 137 179 220	0 0 0 0 0.04 0.2 0.51 0.88 1.08 1.15 1.19 1.15 1.08 0.88 0.51 0.2 0.04 0
127	229.2	262	0



PROJECT: Wandering Pond IB-5C

ANALYST: RJM

DATE: 6/19/2023 TIME: 12:34:05 PM

## **INPUT PARAMETERS**

Application rate: 0.17 c.ft/day/sq. ft Duration of application: 1 days Fillable porosity: 0.18

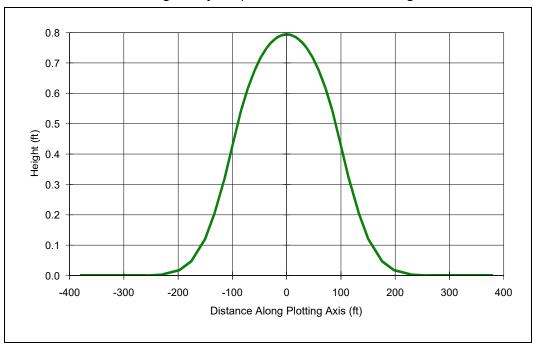
Hydraulic conductivity: 8 ft/day Initial saturated thickness: 10 ft Length of application area: 68.4 ft Width of application area: 46.9 ft Constant head boundary used at: 414 ft Plotting axis from Y-Axis: 43 degrees

Edge of recharge area: positive X: 23.4 ft

positive Y: 25.1 ft

Total volume applied: 545.3532 c.ft

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-282.3	-302.8	-414	0
-237.5	-254.6	-348	0
-192.5	-206.5	-282	0
-147.6	-158.3	-216	0
-112.3	-120.5	-165	0
-85	-91.1	-125	0
-62.6	-67.2	-92	0
-43.7	-46.9	-64	0.04
-27.4	-29.3	-40	0.22
-16.4	-17.6	-24	0.48
-8.9	-9.5	-13	0.6
0	0	0	0.65
8.9	9.5	13	0.6
16.4	17.6	24	0.48
27.4	29.3	40	0.22
43.7	46.9	64	0.04
62.6	67.2	92	0
85	91.1	125	0
112.3	120.5	165	0
147.6	158.3	216	0
192.5	206.5	282	0
237.5	254.6	348	0
282.3	302.8	414	0



COMPANY: Stamski & McNary

PROJECT: Wandering Pond IB-10C

ANALYST: RJM

DATE: 6/19/2023 TIME: 12:37:42 PM

## **INPUT PARAMETERS**

Application rate: 0.27 c.ft/day/sq. ft Duration of application: 1 days Fillable porosity: 0.28 Hydraulic conductivity: 39 ft/day

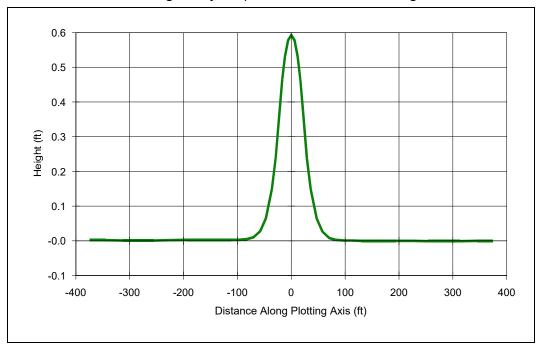
Hydraulic conductivity: 39 ft/day Initial saturated thickness: 10 ft Length of application area: 278.5 ft Width of application area: 98.3 ft Constant head boundary used at: 378 ft Plotting axis from Y-Axis: 30 degrees

Edge of recharge area:

positive X: 49.2 ft positive Y: 85.1 ft

Total volume applied: 7391.668 c.ft

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-189 -158.9 -98.8 -75.2 -56.9 -41.9 -29.3 -18.3 -11 -6 0 6 11 18.3 29.3 41.9 56.9 75.2 98.8 128.9 158.9 189	-327.4 -275.3 -223.2 -171.2 -130.3 -98.5 -72.6 -50.7 -31.7 -19 -10.3 0 10.3 19 31.7 50.7 72.6 98.5 130.3 171.2 223.2 275.3 327.4	-378 -318 -258 -198 -150 -114 -84 -59 -37 -22 -12 0 12 22 37 59 84 114 150 198 258 318 378	0 0 0 0.02 0.12 0.32 0.55 0.68 0.75 0.79 0.79 0.79 0.75 0.68 0.55 0.32 0.12 0.02 0



COMPANY:	Stamski & McNary
----------	------------------

PROJECT: Wandering Pond IB-2A1

ANALYST: RJM

DATE: 6/19/2023 TIME: 1:04:23 PM

## **INPUT PARAMETERS**

Application rate: 0.14 c.ft/day/sq. ft Duration of application: 1 days Fillable porosity: 0.18

Hydraulic conductivity: 8 ft/day Initial saturated thickness: 8 ft Length of application area: 90.4 ft Width of application area: 43.7 ft

Constant head boundary used at: 372 ft Plotting axis from Y-Axis: 85 degrees

Edge of recharge area: positive X: 21.8 ft

positive Y: 1.9 ft

Total volume applied: 553.0672 c.ft

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-370.6 -311.7 -252.7 -193.8 -147.5 -111.5 -82.2 -57.4 -35.9 -21.5 -11.7 0 11.7 21.5 35.9 57.4 82.2 111.5 147.5 193.8 252.7 311.7 370.6	-32.4 -27.3 -22.1 -17 -12.9 -9.8 -7.2 -5 -3.1 -1.9 -1 0 1 1.9 3.1 5 7.2 9.8 12.9 17 22.1 27.3 32.4	-372 -313 -254 -195 -148 -112 -83 -58 -36 -22 -12 0 12 22 36 58 83 112 148 195 254 313 372	0 0 0 0 0 0 0 0.03 0.15 0.38 0.53 0.59 0.53 0.15 0.03 0



**DESIGN STORM: 100 YEAR** STORM SEWER DESIGN 6/16/2023 DATE:

PFK, NC

SM-3719C

DONE BY:

FILE:

(ADS N-12)"n"= 0.012 4"-10" (ADS N-12)"n"= 0.012 12"-36" (ADS N-12)"n"= 0.012 42"-60"

(ADS N-12)"n"= 0.012	12"-36
(ADS N-12)"n"= 0.012	42"-60
(Cast Iron)"n"= 0.011	

PROJECT: SM-3719C

LOCATION: Stow, MA

		1	TRIBUTA	ARY AREA	TIME O	F FLOW						1				DESIGN	N FLOW				DRA	IN INV.
					TO				"Q"									TOTAL	MANHOLE		ELEV	/ATION
FROM	ТО	LENGTH	INCR.	TOTAL	UPPER	TIME IN	RUNOFF	RAINFALL	TOTAL	SLOPE of	DIAM	MANN.	CAPACITY	VELOCITY	VELOCITY	VELOCITY	DEPTH	ENERGY	INVERT	FALL	UPPER	LOWER
		(FT)	(ACRES)	(ACRES)	END	SECTION	COEFF.	INTENSITY	RUNOFF	PIPE		"n"	FULL	FULL		HEAD	OF FLOW	HEAD	DROP	IN PIPE	END	END
					(MIN)	(MIN)	"C"	(IN/HR)	(CFS)	(FT/FT)	(IN)		(CFS)	(FPS)	(FPS)	(FT)	(FT)	(FT)	(FT)	(FT)		
CB-WPC7	DMH-WPC6	14	0.28	0.28	10	0.05	0.59	7.8	1.30	0.011	12	0.012	3.99	5.08	4.53	0.32	0.39	0.71		0.15	309.53	309.38
CB-WPC8 DMH-WPC6	DMH-WPC6 DMH-WPC7	14 201	0.10	0.10 0.38	10 10	0.07 0.79	0.67 0.61	7.8 7.8	0.52 1.82	0.011 0.007	12 12	0.012	3.99 3.23	5.08 4.11	3.47 4.23	0.19 0.28	0.24 0.54	0.43 0.81		0.15 1.41	309.53 309.28	309.38 307.87
DMH-WPC7	DMH-WPC8	153	0.00	0.38	10	0.79	0.61	7.8	1.82	0.007	12	0.012	2.80	3.57	3.80	0.28	0.59	0.81	<del>                                     </del>	0.81	309.28	306.96
CB-WPC9	DMH-WPC8	28	0.47	0.47	10	0.04	0.39	7.8	1.43	0.105	12	0.012	12.48	15.90	10.48	1.71	0.23	1.93		2.94	309.90	306.96
CB-WPC10	DMH-WPC8	11	0.18	0.18	10	0.01	0.70	7.8	1.02	0.267	12	0.012	19.92	25.37	13.12	2.67	0.15	2.82		2.94	309.90	306.96
DMH-WPC8	IB-2A1	120	0.00	1.03	10	0.38	0.53	7.8	4.27	0.007	15	0.012	5.92	4.82	5.24	0.43	0.78	1.21		0.86	306.86	306.00
CB-WPC11	DMH-WPC9	14	0.83	0.83	10	0.05	0.35	7.8	2.31	0.010	12	0.012	3.85	4.91	5.12	0.41	0.56	0.96		0.14	302.58	302.44
CB-WPC12	DMH-WPC9	14	0.29	0.29	10	0.05	0.77	7.8	1.73	0.010	12	0.012	3.85	4.91	4.76	0.35	0.47	0.82		0.14	302.58	302.44
DMH-WPC9	IB-2A2	79	0.00	1.12	10	0.19	0.46	7.8	4.04	0.017	12	0.012	5.02	6.39	7.09	0.78	0.68	1.46		1.34	302.34	301.00
07.001.4	51411 6014	2.1	0.00	2.22	10	2.00	2.52			2 225	10	2.212	2 72	2						0.11	222.12	222.27
CB-SSL1	DMH-SSL1	21	0.32	0.32	10	0.09	0.69	7.8	1.71	0.005	12	0.012	2.79	3.55	3.73	0.22	0.57	0.78		0.11	236.18	236.07
CB-SSL2 DMH-SSL1	DMH-SSL1  DMH-SSL2	20 109	0.68 1.00	0.68 1.00	10 10	0.09 0.35	0.33 0.45	7.8 7.8	1.79 3.50	0.006 0.009	12 12	0.012	2.86 3.56	3.64 4.53	3.83 5.17	0.23 0.41	0.57 0.81	0.80 1.22		0.11 0.93	236.18 235.97	236.07 235.04
CB-SSL3	DMH-SSL2	43	0.04	0.04	10	0.33	0.45	7.8	0.23	0.009	12	0.012	2.88	3.67	2.19	0.41	0.81	0.26		0.93	235.97	235.04
CB-SSL4	DMH-SSL2	40	0.04	0.04	10	0.33	0.30	7.8	0.23	0.006	12	0.012	2.98	3.80	2.19	0.07	0.19	0.20		0.24	237.09	236.85
DMH-SSL2	IB-2B-A	135	1.17	1.17	10	0.26	0.44	7.8	4.03	0.029	12	0.012	6.58	8.38	8.80	1.20	0.57	1.77		3.94	234.94	231.00
CB-WPC5	DMH-WPC5	14	0.66	0.66	10	0.04	0.49	7.8	2.51	0.010	12	0.012	3.85	4.91	5.22	0.42	0.59	1.01		0.14	291.18	291.04
CB-WPC6	DMH-WPC5	14	0.19	0.19	10	0.06	0.69	7.8	1.05	0.010	12	0.012	3.85	4.91	4.17	0.27	0.36	0.62		0.14	291.18	291.04
DMH-WPC5	IB-3A	75	0.00	0.85	10	0.15	0.53	7.8	3.56	0.026	12	0.012	6.20	7.89	8.15	1.03	0.54	1.57		1.94	290.94	289.00
CB-WPC3	DMH-WPC2	20	1.19	1.19	10	0.07	0.23	7.8	2.11	0.010	12	0.012	3.85	4.91	5.01	0.39	0.53	0.91		0.20	287.57	287.37
CB-WPC4	DMH-WPC2	20	0.32	0.32	10	0.07	0.62	7.8	1.53	0.010	12	0.012	3.85	4.91	4.61	0.33	0.44	0.76		0.20	287.57	287.37
DMH-WPC2	DMH-WPC3 DMH-WPC4	107 74	1.51 1.51	1.51 1.51	10	0.32 0.22	0.31	7.8 7.8	3.64	0.010	12	0.012	3.85	4.91 4.94	5.58 5.61	0.48 0.49	0.77 0.77	1.25 1.25		1.07	287.27 286.10	286.20 285.35
DMH-WPC3 DMH-WPC4	DMH-WPC4A	115	1.51	1.51	10 10	0.22	0.31	7.8	3.64	0.010 0.028	12 12	0.012	3.88 6.48	8.25	8.48	1.12	0.77	1.65		0.75 3.25	285.25	283.33
DMH-WPC4A	IB-4A	37	1.51	1.51	10	0.08	0.31	7.8	3.62	0.024	12	0.012	6.01	7.65	7.98	0.99	0.56	1.54		0.90	281.90	281.00
		0.				0.00	0.01	,,,	0.02	0.02		0.011	0.02		7.00	0.00	0.00			0.00	101.00	
CB-WPC13	DMH-WPC10	55	0.25	0.25	10	0.15	0.63	7.8	1.24	0.026	12	0.012	6.17	7.86	6.10	0.58	0.30	0.88		1.41	289.41	288.00
DMH-WPC10	IB-5B	62	0.25	0.25	10	0.11	0.63	7.8	1.24	0.079	12	0.012	10.83	13.80	9.09	1.28	0.23	1.51		4.90	287.90	283.00
CB-WPC1	DMH-WPC1	77	1.99	1.99	10	0.24	0.22	7.8	3.48	0.009	12	0.012	3.75	4.78	5.42	0.46	0.76	1.22		0.73	288.23	287.50
CB-WPC2	DMH-WPC1	17	0.18	0.18	10	0.06	0.81	7.8	1.14	0.012	12	0.012	4.18	5.32	4.52	0.32	0.36	0.67		0.20	287.70	287.50
DMH-WPC1	IB-5B	70	2.42	2.42	10	0.09	0.31	7.8	5.87	0.063	12	0.012	9.66	12.30	12.87	2.57	0.56	3.13		4.40	287.40	283.00
CD M/DM/42	D	1.1	0.27	0.27	10	0.05	0.57	7.0	1.64	0.011	42	0.012	2.00	F 00	4.02	0.26	0.45	0.01		0.45	202.04	202.70
CB-WPW13	DMH-WPW12 DMH-WPW12	14 14	0.37 0.10	0.37 0.10	10	0.05 0.07	0.57 0.48	7.8 7.8	1.64 0.37	0.011 0.011	12 12	0.012 0.012	3.99 3.99	5.08 5.08	4.82 3.12	0.36 0.15	0.45 0.20	0.81 0.35		0.15 0.15	282.94 282.94	282.79 282.79
DMH-WPW12	DMH-WPW12	84	0.10	0.10	10	0.07	0.48	7.8	2.00	0.011	12	0.012	11.09	14.13	10.65	1.76	0.20	2.05		6.96	282.94	275.73
DMH-WPW11	DMH-WPW10	93	0.47	0.47	10	0.15	0.55	7.8	1.99	0.083	12	0.012	11.11	14.15	10.67	1.77	0.29	2.05		7.73	275.63	267.90
CB-WPW11	DMH-WPW10	14	0.37	0.37	10	0.04	0.70	7.8	2.06	0.021	12	0.012	5.64	7.18	6.60	0.68	0.42	1.09		0.30	268.20	267.90
CB-WPW12	DMH-WPW10	14	0.09	0.09	10	0.06	0.59	7.8	0.39	0.021	12	0.012	5.64	7.18	4.08	0.26	0.18	0.43		0.30	268.20	267.90
DMH-WPW10	DMH-WPW9	46	0.93	0.93	10	0.10	0.61	7.8	4.46	0.022	12	0.012	5.68	7.24	8.00	0.99	0.67	1.66		1.00	267.80	266.80
DMH-WPW9	IB-5C	108	0.93	0.93	10	0.14	0.61	7.8	4.46	0.081	12	0.012	10.93	13.93	13.22	2.71	0.45	3.16		8.70	266.70	258.00
						<b>-</b>											•					
CB-DFD3	DMH-DFD4	13	0.33	0.33	10	0.02	0.65	7.8	1.68	0.083	12	0.012	11.10	14.14	10.14	1.60	0.26	1.86		1.08	277.78	276.70
CB-DFD4	DMH-DFD4	14	0.11	0.11	10	0.04	0.51	7.8	0.43	0.077	12	0.012	10.70	13.63	6.60	0.68	0.14	0.81		1.08	277.78	276.70
DMH-DFD4  DMH-DFD3	DMH-DFD3 DMH-DFD2	95 47	0.44	0.44	10	0.14 0.10	0.61 0.61	7.8 7.8	2.11	0.090 0.030	12 12	0.012 0.012	11.53 6.62	14.69 8.44	11.19 7.47	1.95 0.87	0.29 0.39	2.24 1.25		8.51 1.39	276.60 267.99	268.09 266.60
DMH-DFD2	DMH-DFD1	47	0.44	0.44	10	0.10	0.61	7.8	2.10	0.030	12	0.012	6.70	8.53	7.47	0.87	0.38	1.25		1.33	266.50	265.17
CB-DFD1	DMH-DFD1	14	0.41	0.41	10	0.10	0.76	7.8	2.45	0.010	12	0.012	3.85	4.91	5.20	0.42	0.58	1.00		0.14	266.31	266.17
CB-DFD2	DMH-DFD1	13	0.42	0.42	10	0.05	0.28	7.8	0.91	0.011	12	0.012	4.00	5.09	4.09	0.26	0.32	0.58		0.14	266.31	266.17
DMH-DFD1	DMH-WFW8	51	1.27	1.27	10	0.07	0.55	7.8	5.47	0.066	12	0.012	9.90	12.61	12.92	2.59	0.53	3.12		3.37	266.07	262.70
DMH-WFW8	DMH-WFW7	100	1.27	1.27	10	0.12	0.55	7.8	5.47	0.076	12	0.012	10.58	13.48	13.59	2.87	0.51	3.38		7.55	262.60	255.05
CB-WFW9	DMH-WFW7	13	0.20	0.20	10	0.03	0.52	7.8	0.82	0.088	12	0.012	11.46	14.60	8.42	1.10	0.18	1.28		1.15	256.20	255.05
CB-WFW10	DMH-WFW7	13	0.24	0.24	10	0.02	0.72	7.8	1.33	0.088	12	0.012	11.46	14.60	9.75	1.48	0.23	1.71		1.15	256.20	255.05
DMH-WFW7	DMH-WPW6	70	1.70	1.70	10	0.08	0.57	7.8	7.62	0.080	12	0.012	10.91	13.89	15.02	3.50	0.62	4.12		5.61	254.95	249.34
DMH-WFW6	DMH-WPW4	108	1.70	1.70	10	0.12	0.57	7.8	7.58	0.079	12	0.012	10.86	13.83	14.95	3.47	0.62	4.09		8.58	249.24	240.66

CB-WFW7	DMH-WPW4	14	0.06	0.06	10	0.06	0.76	7.8	0.37	0.024	12	0.012	6.00	7.65	4.19	0.27	0.17	0.44		0.34	241.00	240.66
CB-WFW8	DMH-WPW4	14	0.15	0.15	10	0.05	0.58	7.8	0.68	0.024	12	0.012	6.00	7.65	5.04	0.39	0.23	0.62		0.34	241.00	240.66
DMH-WFW4	IB-5D	107	1.91	1.91	10	0.11	0.58	7.8	8.67	0.099	12	0.012	12.10	15.42	16.76	4.36	0.63	4.99		10.56	240.56	230.00
CB-WFW5	DMH-WPW3	14	0.10	0.10	10	0.07	0.70	7.8	0.56	0.011	12	0.012	3.99	5.08	3.56	0.20	0.25	0.45		0.15	231.08	230.93
CB-WFW6	DMH-WPW3	14	0.06	0.06	10	0.08	0.76	7.8	0.34	0.011	12	0.012	3.99	5.08	3.08	0.15	0.20	0.34		0.15	231.08	230.93
DMH-WFW3	IB-5D	48	2.07	2.07	10	0.09	0.59	7.8	9.58	0.017	18	0.012	14.96	8.47	8.98	1.25	0.87	2.12		0.83	230.83	230.00
CB-AS1	DMH-AS1A	24	0.30	0.30	10	0.09	0.53	7.8	1.24	0.010	12	0.012	3.85	4.91	4.34	0.29	0.39	0.68		0.24	215.20	214.96
CB-AS2	DMH-AS1A	13	0.23	0.23	10	0.04	0.90	7.8	1.59	0.018	12	0.012	5.23	6.67	5.82	0.53	0.38	0.90		0.24	215.20	214.96
DMH-AS1A	DMH-AS1B	66	0.53	0.53	10	0.22	0.69	7.8	2.85	0.008	12	0.012	3.55	4.52	5.02	0.39	0.68	1.07		0.56	214.86	214.30
DMH-AS1B	FLARED END	10	0.53	0.53	10	0.03	0.69	7.8	2.83	0.010	12	0.012	3.85	4.91	5.36	0.45	0.64	1.08		0.10	214.20	214.10
CB-AS3	DMH-AS3	23	0.16	0.16	10	0.12	0.77	7.8	0.96	0.005	12	0.012	2.78	3.54	3.20	0.16	0.40	0.56		0.12	215.22	215.10
CB-AS4	DMH-AS3	10	0.21	0.21	10	0.03	0.90	7.8	1.47	0.012	12	0.012	4.22	5.38	4.88	0.37	0.41	0.77		0.12	215.22	215.10
DMH-AS3	DMH-AS2	63	0.37	0.37	10	0.27	0.84	7.8	2.42	0.005	12	0.012	2.75	3.50	3.95	0.24	0.73	0.97		0.32	215.00	214.68
DMH-AS2	FLARED END	42	0.37	0.37	10	0.17	0.84	7.8	2.42	0.005	12	0.012	2.85	3.63	4.07	0.26	0.71	0.96		0.23	214.58	214.35
CB-WPW1	DMH-WPW1	30	0.04	0.04	10	0.16	0.90	7.8	0.30	0.012	12	0.012	4.22	5.38	3.10	0.15	0.18	0.33		0.36	227.80	227.44
CB-WPW2	DMH-WPW1	30	0.06	0.06	10	0.16	0.59	7.8	0.28	0.012	12	0.012	4.22	5.38	3.05	0.14	0.18	0.32		0.36	227.80	227.44
DMH-WPW1	FLARED END	66	0.10	0.10	10	0.40	0.72	7.8	0.59	0.005	12	0.012	2.76	3.52	2.78	0.12	0.31	0.43		0.34	227.34	227.00
CB-WPW3	DMH-WPW2	22	0.06	0.06	10	0.15	0.76	7.8	0.37	0.005	12	0.012	2.85	3.62	2.48	0.10	0.24	0.34		0.12	224.00	223.88
CB-WPW4	DMH-WPW2	10	0.31	0.31	10	0.03	0.65	7.8	1.56	0.012	12	0.012	4.22	5.38	4.97	0.38	0.42	0.80		0.12	224.00	223.88
DMH-WPW2	FLARED END	5	0.37	0.37	10	0.02	0.67	7.8	1.92	0.006	12	0.012	2.98	3.80	4.03	0.25	0.58	0.83		0.03	223.78	223.75
CD DV2	CD DV4	10	0.00	0.00	10	0.05	0.67	7.0	2.10	0.010	13	0.013	2.05	4.04	F 40	0.47	0.00	1 10	<u> </u>	0.10	222.44	222.25
CB-DY2	CB-DY1	16	0.60	0.60	10	0.05	0.67	7.8	3.19	0.010	12	0.012	3.85	4.91	5.48	0.47	0.69	1.16		0.16	222.41	222.25
CB-DY1	DI-DY1	29	0.97	0.97	10	0.05	0.60	7.8	4.57	0.038	12	0.012	7.47	9.51	9.95	1.54	0.56	2.10		1.09	222.15	221.06
DI-DY2	DI-DY1	43	0.97	0.97	10	0.11	0.60	7.8	4.55	0.014	12	0.012	4.55	5.80	6.61	0.68	0.82	1.49	1	0.60	221.49	220.89
DI-DY1 DMH-DY1	DMH-DY1 IB-7A	75 41	1.34	1.34 1.34	10	0.17 0.09	0.60 0.60	7.8 7.8	6.28	0.014 0.016	15 15	0.012 0.012	8.19 8.87	6.68 7.23	7.36 7.84	0.84 0.95	0.82 0.78	1.66 1.73		1.03 0.66	220.79 219.66	219.76 219.00
CB-BC1	CB-BC2		0.56	0.56	10	0.09	0.60	7.8	2.83		12		3.85			0.95	0.78				219.66	221.03
	DI-BC2	16								0.010		0.012		4.91	5.36	0.43		1.08		0.16	220.93	220.83
CB-BC2 DI-BC1	DI-BC2	10 32	0.55	0.55 0.37	10 10	0.03	0.65 0.65	7.8 7.8	2.79 1.87	0.010 0.010	12 12	0.012 0.012	3.85 3.85	4.91 4.91	5.34 4.86	0.44	0.63 0.49	1.07 0.86		0.10 0.32	220.93	220.83
DI-BC2	DMH-BCL1	97	1.48	1.48	10	0.11	0.65	7.8	7.47	0.010	18	0.012	9.52	5.39	5.96	0.55	1.00	1.55		0.52	220.73	220.85
DMH-BC1	IB-7A	136	1.48	1.48	10	0.27	0.65	7.8	7.47	0.007	18	0.012	9.51	5.38	5.96	0.55	1.00	1.56		0.08	219.95	219.00
DIVITI-DCI	10-7A	130	1.40	1.40	10	0.38	0.03	7.8	7.51	0.007	10	0.012	9.51	5.38	3.90	0.55	1.01	1.50		0.93	219.93	219.00
СВ-СНЗ	IB-7B	66	0.30	0.30	10	0.18	0.39	7.8	0.91	0.033	12	0.012	7.03	8.96	6.13	0.58	0.24	0.82	1	2.20	226.20	224.00
CB-CH2	IB-7B	248	0.53	0.53	10	0.18	0.49	7.8	2.02	0.010	12	0.012	3.85	4.91	4.95	0.38	0.51	0.89	1	2.48	226.48	224.00
CB-WF4	DMH-WF2	14	0.14	0.14	10	0.06	0.90	7.8	0.96	0.010	12	0.012	3.85	4.91	4.07	0.26	0.34	0.60		0.14	224.91	224.77
CB-WF3	DMH-WF2	14	0.08	0.08	10	0.07	0.90	7.8	0.57	0.010	12	0.012	3.89	4.96	3.52	0.19	0.26	0.45		0.14	224.92	224.77
DMH-WF2	DMH-WF1	73	0.22	0.22	10	0.34	0.90	7.8	1.53	0.005	12	0.012	2.71	3.45	3.54	0.19	0.54	0.73		0.36	224.67	224.31
DMH-WF1	IB-7B	40	0.05	0.05	10	0.28	0.90	7.8	0.34	0.005	12	0.012	2.72	3.47	2.35	0.09	0.24	0.32		0.20	224.20	224.00
CB-WF1	IB-7B	123	0.26	0.26	10	0.31	0.90	7.8	1.87	0.024	12	0.012	5.96	7.59	6.67	0.69	0.38	1.07		2.94	226.94	224.00
								-												-		
CB-LP6	DMH-LP3	21	0.40	0.40	10	0.07	0.66	7.8	2.06	0.010	12	0.012	3.90	4.97	5.02	0.39	0.52	0.91		0.22	226.33	226.12
CB-LP5	DMH-LP3	10	0.04	0.04	10	0.06	0.90	7.8	0.28	0.010	12	0.012	3.85	4.91	2.83	0.12	0.18	0.30		0.10	226.37	226.27
DMH-LP3	IB-8	204	0.44	0.44	10	0.70	0.68	7.8	2.35	0.009	12	0.012	3.56	4.53	4.83	0.36	0.59	0.95		1.74	224.04	222.30
CB-WF5	DMH-WF3A	81	0.09	0.09	10	0.48	0.90	7.8	0.63	0.005	12	0.012	2.71	3.45	2.80	0.12	0.33	0.45		0.40	223.37	222.97
CB-WF5A	DMH-WF3A	17	0.10	0.10	10	0.09	0.90	7.8	0.73	0.005	12	0.012	2.80	3.57	2.99	0.14	0.35	0.48		0.09	223.06	222.97
DMH-WF3A	IB-8	47	0.19	0.19	11	0.16	0.90	7.8	1.36	0.012	12	0.012	4.24	5.40	4.78	0.36	0.39	0.74		0.57	222.87	222.30
CB-WF6	DMH-WF3	44	0.12	0.12	10	0.19	0.90	7.8	0.86	0.010	12	0.012	3.90	4.96	3.96	0.24	0.32	0.56		0.45	223.65	223.20
DMH-WF3	DMH-WF4	62	0.12	0.12	10	0.28	0.90	7.8	0.86	0.008	12	0.012	3.52	4.48	3.69	0.21	0.34	0.55		0.52	223.10	222.58
DMH-WF4	IB-8	37	0.12	0.12	10	0.20	0.90	7.8	0.86	0.005	12	0.012	2.69	3.42	3.03	0.14	0.39	0.53		0.18	222.48	222.30
CB-LP4	DMH-LP2	16	0.70	0.70	10	0.05	0.68	7.8	3.73	0.010	12	0.012	3.89	4.95	5.64	0.49	0.78	1.27		0.16	225.77	225.61
CB-LP3	DMH-LP2	16	0.70	0.70	10	0.03	0.53	7.8	0.94	0.010	12	0.012	3.89	4.95	4.08	0.45	0.78	0.59		0.16	225.77	225.61
DMH-LP2	DMH-LP4	180	0.23	0.23	10	0.07	0.53	7.8	4.67	0.010	15	0.012	6.99	5.70	6.09	0.58	0.34	1.32		1.80	225.77	223.71
DMH-LP2	DMH-LP4					0.49		7.8	4.67	0.010				4.94	5.44	0.38	0.74	1.32		0.87	223.61	223.71
		116	0.92	0.92	10		0.64				15	0.012	6.05									
CB-LP1	DMH-LP1	13	0.24	0.24	10	0.05	0.66	7.8	1.22	0.008	12	0.012	3.38	4.30	3.96	0.24	0.42	0.66		0.10	223.07	222.97
CB-LP2	DMH-LP1	24	0.58	0.58	10	0.06	0.79	7.8	3.57	0.015	12	0.012	4.69	5.97	6.56	0.67	0.65	1.32		0.35	223.22	222.87
DMH-LP1	IB-8	67	1.74	1.74	10	0.20	0.69	7.8	9.46	0.005	21	0.012	12.23	5.09	5.62	0.49	1.16	1.64		0.34	222.64	222.30
CD MEMAZ	DAMI MEMA	4.4	0.53	0.53	10	0.02	0.72	7.0	2.00	0.024	12	0.013	F.C4	7.40	7.27	0.02	0.53	1.24		0.30	20445	363.05
CB-WFW17	DMH-WFW10	14	0.52	0.52	10	0.03	0.73	7.8	2.98	0.021	12	0.012	5.64	7.18	7.27	0.82	0.52	1.34		0.30	264.15	263.85
CB-WFW18	DMH-WFW10	14	0.19	0.19	10	0.04	0.65	7.8	0.95	0.021	12	0.012	5.64	7.18	5.32	0.44	0.28	0.71		0.30	264.15	263.85
DMH-WFW10	DMH-WFW9	81	0.71	0.71	10	0.13	0.71	7.8	3.93	0.049	12	0.012	8.55	10.89	10.65	1.76	0.48	2.24	<u> </u>	3.99	263.75	259.76
DMH-WFW9	DMH-WFW8	160	0.71	0.71	10	0.23	0.71	7.8	3.93	0.066	12	0.012	9.90	12.61	11.84	2.18	0.44	2.61		10.57	259.66	249.09
CB-WFW15	DMH-WFW8	14	0.41	0.41 0.26	10	0.03	0.68 0.49	7.8 7.8	2.16	0.028 0.028	12 12	0.012 0.012	6.43	8.19 8.19	7.35 5.93	0.84 0.55	0.40 0.27	1.23 0.81		0.39 0.39	249.48 249.48	249.09 249.09
DMH-MEM8	DMH-WFW7	14 278	1.37	1.37	10	0.04	0.49	7.8	1.00	0.028	12	0.012	10.53	13.41	14.38	3.21	0.27	3.81		20.76	249.48	249.09
CB-WFW13	DMH-WFW7	14	0.56	0.56	10	0.32	0.66	7.8	7.09 3.15	0.075	12	0.012	3.26	4.15	4.72	0.35	0.60	1.14		0.10	248.99	228.23
CB-WFW13	DMH-WFW7		0.36	0.36	10	0.05	0.72	7.8	1.05	0.007	12	0.012	3.26	4.15	3.67	0.33	0.79	0.59		0.10	228.33	228.23
CD-VVFVV14	DIVIN-VVFVV/	14	0.22	0.22	10	0.06	0.00	7.0	1.05	0.007	12	0.012	3.20	4.15	3.07	0.21	0.59	0.59	1	0.10	220.33	220.23

DMH-WFW7	IB-10B	72	2.15	2.15	10	0.09	0.67	7.8	11.29	0.044	15	0.012	14.69	11.98	13.20	2.70	0.82	3.52	3.18	228.18	225.00
CB -WFW11	DMH-WFW5	76	0.11	0.11	10	0.43	0.90	7.8	0.76	0.005	12	0.012	2.72	3.47	2.97	0.14	0.36	0.50	0.38	227.20	226.82
CB-WFW12	DMH-WFW5	82	0.19	0.19	10	0.43	0.67	7.8	1.00	0.005	12	0.012	2.72	3.47	3.19	0.16	0.42	0.57	0.41	226.02	225.61
DMH-WFW5	IB-10B	98	0.30	0.30	10	0.44	0.75	7.8	1.76	0.005	12	0.012	2.78	3.54	3.74	0.22	0.58	0.79	0.51	225.51	225.00
CB-WF19	DMH-WF11	14	0.58	0.58	10	0.03	0.72	7.8	3.26	0.021	12	0.012	5.64	7.18	7.44	0.86	0.55	1.41	0.30	265.80	265.50
CB-WF20	DMH-WF11	14	0.36	0.36	10	0.03	0.76	7.8	2.17	0.021	12	0.012	5.64	7.18	6.71	0.70	0.43	1.13	0.30	265.80	265.50
DMH-WF11	DMH-WF12	165	0.94	0.94	10	0.21	0.73	7.8	5.43	0.073	12	0.012	10.43	13.29	13.40	2.79	0.51	3.30	12.10	265.40	253.30
DMH-WF12	DMH-WF13	85	0.94	0.94	10	0.12	0.73	7.8	5.43	0.053	12	0.012	8.86	11.29	11.86	2.18	0.57	2.75	4.50	253.20	248.70
CB-WF21	DMH-WF13	14	0.46	0.46	10	0.03	0.73	7.8	2.64	0.021	12	0.012	5.64	7.18	7.06	0.77	0.48	1.25	0.30	249.00	248.70
CB-WF22	DMH-WF13	14	0.29	0.29	10	0.04	0.58	7.8	1.31	0.021	12	0.012	5.64	7.18	5.83	0.53	0.33	0.85	0.30	249.00	248.70
DMH-WF13	DMH-WF14	56	1.69	1.69	10	0.07	0.71	7.8	9.39	0.060	12	0.012	9.45	12.04	13.72	2.92	0.81	3.73	3.37	248.60	245.23
DMH-WF14	DMH-WF15	94	1.69	1.69	10	0.11	0.71	7.8	9.39	0.060	12	0.012	9.44	12.03	13.72	2.92	0.81	3.73	5.65	245.13	239.48
DMH-WF15	DMH-WF16	192	1.69	1.69	10	0.23	0.71	7.8	9.39	0.060	12	0.012	9.44	12.03	13.72	2.92	0.81	3.73	11.54	239.38	227.84
DMH-WF16	IB-10C	51	1.69	1.69	10	0.06	0.71	7.8	9.39	0.054	15	0.012	16.20	13.21	13.68	2.91	0.68	3.59	2.74	227.74	225.00
CB-WF23	DMH-WF17	153	0.56	0.56	10	0.24	0.46	7.8	2.00	0.080	12	0.012	10.87	13.85	10.55	1.73	0.29	2.02	12.18	246.23	234.05
CB-WF24	DMH-WF17	29	1.14	1.14	10	0.05	0.32	7.8	2.85	0.045	12	0.012	8.16	10.39	9.43	1.38	0.41	1.79	1.30	235.35	234.05
DMH-WF17	DMH-WF18	77	3.33	3.33	10	0.08	0.37	7.8	9.52	0.076	12	0.012	10.59	13.49	15.26	3.62	0.74	4.36	5.82	233.95	228.13
CB-WF27	DMH-WF21	14	1.11	1.11	10	0.04	0.45	7.8	3.93	0.011	12	0.012	3.99	5.08	5.79	0.52	0.81	1.33	0.15	230.59	230.44
CB-WF28	DMH-WF21	14	0.35	0.35	10	0.05	0.77	7.8	2.12	0.011	12	0.012	3.99	5.08	5.14	0.41	0.52	0.93	0.15	230.59	230.44
DMH-WF21	DMH-WF18	182	1.46	1.46	10	0.47	0.53	7.8	6.05	0.010	15	0.012	6.99	5.70	6.41	0.64	0.89	1.53	1.82	229.95	228.13
CB-WF25	DMH-WF18	22	0.91	0.91	10	0.02	0.54	7.8	3.84	0.176	12	0.012	16.16	20.58	16.82	4.39	0.33	4.72	3.87	232.00	228.13
DMH-WF18	DMH-WF19	116	5.97	5.97	10	0.18	0.45	7.8	20.98	0.017	24	0.012	31.54	10.05	10.74	1.79	1.19	2.98	1.92	228.03	226.11
DMH-WF19	DMH-WF20	59	5.97	5.97	10	0.11	0.45	7.8	20.98	0.010	24	0.012	24.72	7.87	8.83	1.21	1.41	2.62	0.60	226.01	225.41
DMH-WF20	IB-10C	31	5.97	5.97	10	0.06	0.45	7.8	20.98	0.010	24	0.012	24.52	7.81	8.77	1.19	1.42	2.61	0.31	225.31	225.00

Location:

## SM-3719C

Date

Checked

Project: The Cottages at Wandering Pond By PFK, NC Date 10/13/2022

**Rational Method** 

Q = peak flow rate, (cfs) i = rainfall intensity inches/hour

C = runoff coefficient, A = area (ac)

C = 0.90 impervious

C = 0.20 landscaped / grass

Stow, MA

C = 0.15 woods

## **CB-WPC7 TO DMH-WPC6**

Surface Cover		A (ac)	С		Product A x C
impervious		0.16	0.9		0.141095
lands/grass		0.12	0.2		0.024706
woods		0.00	0.15		0
	sum =	0.28		sum =	0.17
	C =	0.59	= total product / total	area	

## **CB-WPC8 TO DMH-WPC6**

Surface Cover		A (ac)	С		Product A x C
impervious		0.07	0.9		0.059421
lands/grass		0.03	0.2		0.006433
woods		0.00	0.15		0
	sum =	0.10		sum =	0.07
	C =	0.67	= total product / total	area	

## **DMH-WPC6 TO DMH-WPC7**

Cover		(ac)			AxC		
impervious		0.22	0.9		0.200517		
lands/grass		0.16	0.2		0.031139		
woods		0.00	0.15		0		
	sum =	0.38		sum =	0.23		
	C =	0.61	= total product / total	area			
DMH-W <u>PC7 TO DM</u> H	-WPC 8						
Surface Cover		A (ac)	С		Product A x C		
impervious		0.22	0.9		0.200517		
lands/grass		0.16	0.2		0.031139		
woods		0.00	0.15		0		
	sum =	0.38		sum =	0.23		
	C =	0.61	= total product / total	area			
СВ-WРС9 ТО DMH-	WPC8						
Surface Cover		A (ac)	С		Product A x C		
impervious		0.13	0.9		0.115145		
lands/grass		0.34	0.2		0.067847		
woods		0.00	0.15		0		
	sum =	0.47		sum =	0.18		
	C =	0.39	= total product / total	area			
CB-WPC10 TO DMH	CB-WPC10 TO DMH-WPC8						
Surface Cover		A (ac)	С		Product A x C		

impervious		0.13	0.9		0.119401
lands/grass		0.05	0.2		0.010413
woods		0.00	0.15		0
	sum =	0.18		sum =	0.13
C = <b>0.70</b> = total product / total area					

# **DMH-WPC8 TO FLARED END**

Surface Cover		A (ac)	С		Product A x C
impervious		0.48	0.9		0.435062
lands/grass		0.55	0.2		0.109399
woods		0.00	0.15		0
	sum =	1.03		sum =	0.54

C = **0.53** = total product / total area

#### SM-3719C

Project: The Cottages at Wandering Pond By PFK, NC Date 10/13/2022

Location: Stow, MA Checked Date

#### **Rational Method**

Q = peak flow rate, (cfs) i = rainfall intensity inches/hour

C = runoff coefficient, A = area (ac)

C = 0.90 impervious

C = 0.20 landscaped / grass

C = 0.15 woods

## **CB-WPC11 TO DMH-WPC9**

Surface Cover		A (ac)	С		Product A x C
impervious		0.20	0.9		0.180248
lands/grass		0.38	0.2		0.076878
woods		0.25	0.15		0.037238
	sum =	0.83		sum =	0.29
	C =	0.35	= total product / total	area	

## **CB-WPC12 TO DMH-WPC9**

0.23	0.9		0.210661
0.05	0.2		0.010275
0.00	0.15		0
0.29		sum =	0.22
	0.05	0.05     0.2       0.00     0.15	0.05

C = **0.77** = total product / total area

## **DMH-WPC9 TO FLARED END**

Cover		(ac)		AxC		
impervious		0.43	0.9	0.390909		
lands/grass		0.44	0.2	0.087153		
woods		0.25	0.15	0.037238		
	sum =	1.12	sum =	0.52		
C = 0.46 = total product / total area						

Location:

## SM-3719C

Date

Checked

Project: The Cottages at Wandering Pond By NC Date 10/4/2022

**Rational Method** 

Q = peak flow rate, (cfs) i = rainfall intensity inches/hour

C = runoff coefficient, A = area (ac)

C = 0.90 impervious

C = 0.20 landscaped / grass

Stow, MA

C = 0.15 woods

## **CB-SSL1 TO DMH-SSL1**

Surface Cover		A (ac)	С		Product A x C
impervious		0.22	0.9		0.199504
lands/grass		0.10	0.2		0.019013
woods		0.00	0.15		0
	sum =	0.32		sum =	0.22
	C =	0.69	= total product / total a	area	

## **CB-SSL2 TO DMH-SSL1**

Surface Cover		A (ac)	С		Product A x C
impervious		0.13	0.9		0.117665
lands/grass		0.55	0.2		0.110165
woods		0.00	0.15		0
	sum =	0.68		sum =	0.23
	C =	0.33	= total product / total a	rea	

## **DMH-SSL1 TO DMH-SSL2**

Cover		(ac)			AxC
impervious		0.35	0.9		0.317169
lands/grass		0.65	0.2		0.129178
woods		0.00	0.15		0
	sum =	1.00		sum =	0.45
	C =	0.45	= total product / total	area	
DMH-SSL2 TO DMH	I-SSL3				
Surface Cover		A (ac)	С		Product A x C
impervious		0.35	0.9		0.317169
lands/grass		0.65	0.2		0.129178
woods		0.00	0.15		0
	sum =	1.00		sum =	0.45
	C =	0.45	= total product / total	area	
CB-SSL3 TO DMH-	SSL3				
Surface Cover		A (ac)	С		Product A x C
impervious		0.03	0.9		0.027107
lands/grass		0.01	0.2		0.002576
woods		0.00	0.15		0
	sum =	0.04		sum =	0.03
	C =	0.69	= total product / total	area	
CB-SSL4 TO DMH-	SSL3				
Surface Cover		A (ac)	С		Product A x C

impervious		0.02	0.9		0.016446
lands/grass		0.11	0.2		0.022144
woods		0.00	0.15		0
S	um =	0.13		sum =	0.04
	C =	0.30	= total product / total a	area	
SSL3 TO DMH-SSL4					

## DMH-S

Surface Cover		A (ac)	С		Product A x C
impervious		0.40	0.9		0.360723
lands/grass		0.77	0.2		0.153898
woods		0.00	0.15		0
	sum =	1.17		sum =	0.51
	C =	0.44	= total product / total a	area	

# DMH-SSL4 TO DMH-SSL5

Surface Cover		A (ac)	С		Product A x C
impervious		0.40	0.9		0.360723
lands/grass		0.77	0.2		0.153898
woods		0.00	0.15		0
	sum =	1.17		sum =	0.51
	C =	0.44	= total product / total	area	

# DMH-SSL5 TO IB-2B-A

Surface	Α	С	Product
Cover	(ac)		AxC
impervious	0.40	0.9	0.360723

 lands/grass
 0.77
 0.2
 0.153898

 woods
 0.00
 0.15
 0

 sum =
 1.17
 sum =
 0.51

 C =
 0.44
 = total product / total area

Closed Dr	ainage Syste	m					SM-3719C		
Project:	-	The Cottag	es at Wande	ring Pond		Ву	PFK, NC	Date	10/13/2022
Location:	<u>:</u>	Stow, MA				Checked		Date	
	Rational Me		s)	i	= rainfall i	ntensity in	ches/hour		
	C = runoff c C = 0.90 imp C = 0.20 lan C = 0.15 wo	pervious dscaped / pods	grass	Α	A = area (a	c)			
CB-WF	PC5 TO DMH	-WPC5							
	Surface Cover		A (ac)		С		Product A x C		
	impervious		0.27		0.9		0.242066		
	lands/grass		0.39		0.2		0.077759		
	woods		0.00		0.15		0		
		sum =	0.66			sum =	0.32		
		C =	0.49	= total prod	uct / total	area			
CB-WI	C6 TO DMH	-WPC6							
	Surface Cover		A (ac)		С		Product A x C		
	impervious		0.14		0.9		0.122252		
	lands/grass		0.06		0.2		0.01174		
	woods		0.00		0.15		0	ı	
		sum =	0.19			sum =	0.13		
		C =	0.69	total prod	uct / total	area			
DMH-W	PC6 TO FLAR	RED END							
	Surface Cover		A (ac)		С		Product A x C		
	impervious		0.40		0.9		0.364318		
	lands/grass		0.45		0.2		0.0895		

0.00

0.85

0.53

woods

sum =

0.15

= total product / total area

sum =

0.45

Location:

#### SM-3719C

Date

Checked

Project: The Cottages at Wandering Pond By PFK Date 10/13/2022

#### **Rational Method**

Q = peak flow rate, (cfs) i = rainfall intensity inches/hour

C = runoff coefficient, A = area (ac)

C = 0.90 impervious

C = 0.20 landscaped / grass

Stow, MA

C = 0.15 woods

## **CB-WPC3 TO DMH-WPC2**

Surface Cover		A (ac)	С		Product A x C
impervious		0.08	0.9		0.075723
lands/grass		0.54	0.2		0.107337
woods		0.57	0.15		0.086085
	sum =	1.19		sum =	0.27
	C =	0.23	= total product / total	area	

# CB-WPC4 TO DMH-WPC2

Surface Cover		A (ac)	С		Product A x C
impervious		0.19	0.9		0.16938
lands/grass		0.13	0.2		0.025693
woods		0.00	0.15		0
	sum =	0.32		sum =	0.20
	C =	0.62	= total product / total	area	

## DMH-WPC2 TO DMH-WPC3

Cover		(ac)			AxC
impervious		0.27	0.9		0.245103
lands/grass		0.67	0.2		0.13303
woods		0.57	0.15		0.086085
	sum =	1.51		sum =	0.46
	C =	0.31	= total product / total	area	

# DMH-WPC3 TO DMH-WPC4

	A (2.5)	С		Product
	(ac)			AxC
	0.27	0.0		0.245102
	0.27	0.9		0.245103
	0.67	0.2		0.13303
	0.57	0.15		0.086085
sum =	1.51		sum =	0.46
C =	0.31	= total product / total a	area	
	_	(ac)  0.27  0.67  0.57  sum = 1.51	(ac)  0.27  0.9  0.67  0.2  0.57  0.15  sum = 1.51	(ac)  0.27  0.9  0.67  0.2  0.57  0.15  sum = 1.51  sum =

# **DMH-WPC4 TO FLARED END**

Surface Cover		A (ac)	С		Product A x C
impervious		0.27	0.9		0.245103
lands/grass		0.67	0.2		0.13303
woods		0.57	0.15		0.086085
	sum =	1.51		sum =	0.46
	C =	0.31	= total product / total	area	

Location:

## SM-3719C

Date

Checked

Project: The Cottages at Wandering Pond By NC Date 10/13/2022

## **Rational Method**

Q = peak flow rate, (cfs) i = rainfall intensity inches/hour

C = runoff coefficient, A = area (ac)

C = 0.90 impervious

C = 0.20 landscaped / grass

Stow, MA

C = 0.15 woods

## **CB-WPC13 TO DMH-WPC10**

Surface Cover		A (ac)	С		Product A x C
impervious		0.15	0.9		0.13938
lands/grass		0.10	0.2		0.01916
woods		0.00	0.15		0
	sum =	0.25		sum =	0.16
	C =	0.63	= total product / total a	area	

## DMH-WPC10 TO DMH-WPC1

Surface Cover		A (ac)	С		Product A x C
impervious		0.15	0.9		0.13938
lands/grass		0.10	0.2		0.01916
woods		0.00	0.15		0
	sum =	0.25		sum =	0.16
	C =	0.63	= total product / total	area	

## **CB-WPC1 TO DMH-WPC1**

Cover		(ac)			AxC
impervious		0.16	0.9		0.147149
lands/grass		0.46	0.2		0.092507
woods		1.37	0.15		0.204814
	sum =	1.99		sum =	0.44
	C =	0.22	= total product / total	area	

# CB-WPC2 TO DMH-WPC1

Surface		Α	С		Product
Cover		(ac)			AxC
impervious		0.16	0.9		0.140847
lands/grass		0.02	0.2		0.00477
woods		0.00	0.15		0
	sum =	0.18		sum =	0.15
	C =	0.81	= total product / total a	area	

# **DMH-WPC1 TO FLARED END**

Surface Cover		A (ac)	С		Product A x C
impervious		0.47	0.9		0.427376
lands/grass		0.58	0.2		0.116437
woods		1.37	0.15		0.204814
	sum =	2.42		sum =	0.75
	C =	0.31	= total product / total a	area	

## SM-3719C

Project: The Cottages at Wandering Pond By NC Date 10/13/2022

Location: Stow, MA Checked Date

#### **Rational Method**

Q = peak flow rate, (cfs) i = rainfall intensity inches/hour

C = runoff coefficient, A = area (ac)

C = 0.90 impervious

C = 0.20 landscaped / grass

C = 0.15 woods

## **CB-WPW13 TO DMH-WPW10**

Surface Cover		A (ac)	С		Product A x C
impervious		0.19	0.9		0.174029
lands/grass		0.17	0.2		0.034913
woods		0.00	0.15		0
	sum =	0.37		sum =	0.21
	C =	0.57	= total product / total	area	

## **CB-WPW14 TO DMH-WPW10**

Surface Cover		A (ac)	С		Product A x C
impervious		0.04	0.9		0.034793
lands/grass		0.06	0.2		0.01185
woods		0.00	0.15		0
	sum =	0.10		sum =	0.05
	C =	0.48	= total product / total a	area	

## DMH-WPW10 TO DMH-WPW9

Cover		(ac)			AxC
impervio	us	0.23	0.9		0.208822
lands/gra	ISS	0.23	0.2		0.046763
woods		0.00	0.15		0
	sum =	0.47		sum =	0.26
	C =	0.55	= total product / tota	l area	
CB-WFW11 TO DI	MH-WFW9				
Surface Cover	2	A (ac)	С		Product A x C
impervio	us	0.27	0.9		0.242211
lands/gra	iss	0.11	0.2		0.021102
woods		0.00	0.15		0
	sum =	0.37		sum =	0.26
	C =	0.70	= total product / tota	l area	
CB-WFW12 TO DI	MH-WFW9				
Surface Cover	2	A (ac)	С		Product A x C
impervio	us	0.05	0.9		0.042541
lands/gra	iss	0.04	0.2		0.007635
woods		0.00	0.15		0
	sum =	0.09		sum =	0.05
	C =	0.59	= total product / tota	l area	
DMH-WFW9 TO D	MH-WFW8				
Surface Cover	2	A (ac)	С		Product A x C

impervious		0.55	0.9		0.493574
lands/grass		0.38	0.2		0.0755
woods		0.00	0.15		0
	sum =	0.93		sum =	0.57
	C =	0.61	= total product / total	area	

# DMH-WFW8 TO IB-5C

Surface Cover		A (ac)	С		Product A x C
impervious		0.55	0.9		0.493574
lands/grass		0.38	0.2		0.0755
woods		0.00	0.15		0
	sum =	0.93		sum =	0.57

C = **0.61** = total product / total area

## SM-3719C

Project: The Cottages at Wandering Pond By NC Date 10/13/2022

Location: Stow, MA Checked Date

## **Rational Method**

Q = peak flow rate, (cfs)

i = rainfall intensity inches/hour

C = runoff coefficient, A = area (ac)

C = 0.90 impervious

C = 0.20 landscaped / grass

C = 0.15 woods

#### **CB-DFD3 TO DMH-DFD2**

Surface Cover		A (ac)	С		Product A x C
impervious		0.21	0.9		0.190124
lands/grass		0.12	0.2		0.023898
woods		0.00	0.15		0
	sum =	0.33		sum =	0.21
	C =	0.65	= total product / total	area	

## **CB-DFD4 TO DMH-DFD2**

Surface Cover		A (ac)	С		Product A x C
impervious		0.05	0.9		0.043285
lands/grass		0.06	0.2		0.01185
woods		0.00	0.15		0
	sum =	0.11		sum =	0.06
	C =	0.51	= total product / total a	area	

## DMH-DFD2 TO DMH-DFD1

Cover		(ac)			AxC	
impervious		0.26	0.9		0.233409	
lands/grass		0.18	0.2		0.035748	
woods		0.00	0.15		0	
	sum =	0.44		sum =	0.27	
	C =	0.61	= total product / total	area		
CB-DFD1 TO DMH-	DFD1					
Surface Cover		A (ac)	С		Product A x C	
impervious		0.33	0.9		0.297107	
lands/grass		0.08	0.2		0.015969	
woods		0.00	0.15		0	
	sum =	0.41		sum =	0.31	
	C =	0.76	= total product / total	area		
CB-DFD2 TO DMH-	DFD1					
Surface Cover		A (ac)	С		Product A x C	
impervious		0.05	0.9		0.04157	
lands/grass		0.37	0.2		0.074279	
woods		0.00	0.15		0	
	sum =	0.42		sum =	0.12	
	C =	0.28	= total product / total	area		
DMH-DFD1 TO DMH-WFW7						
Surface Cover		A (ac)	С		Product A x C	

impervious		0.64	0.9		0.572087	
lands/grass		0.63	0.2		0.125996	
woods		0.00	0.15		0	
	sum =	1.27		sum =	0.70	
C = <b>0.55</b> = total product / total area						

# DMH-WFW7 TO DMH-WFW6

Surface		Α	С		Product
Cover		(ac)			AxC
impervious		0.64	0.9		0.572087
lands/grass		0.63	0.2		0.125996
woods		0.00	0.15		0
	sum =	1.27		sum =	0.70
	C =	0.55	= total product / total	area	

# **CB-WFW9 TO DMH-WFW6**

Surface Cover		A (ac)	С		Product A x C
impervious		0.09	0.9		0.082893
lands/grass		0.11	0.2		0.021341
woods		0.00	0.15		0
	sum =	0.20		sum =	0.10
	C =	0.52	= total product / total a	area	

## **CB-WFW10 TO DMH-WFW6**

Surface Cover	A (ac)	С	Product A x C
impervious	0.18	0.9	0.157934
lands/grass	0.06	0.2	0.012025

woods		0.00	0.15	0
	sum =	0.24	sum =	= 0.17
	C =	0.72 =	total product / total area	
DMH-WFW6 TO DMH	I-WFW4			
Surface Cover		A (ac)	С	Product A x C
impervious		0.90	0.9	0.812913
lands/grass		0.80	0.2	0.159362
woods		0.00	0.15	0
	sum =	1.70	sum =	= 0.97
	_			
	C =	0.57 =	total product / total area	
CB-WFW7 TO DMH-	•	0.57	total product / total area	
CB-WFW7 TO DMH- Surface Cover	•	0.57 =	total product / total area  C	Product A x C
Surface	•	A		
Surface Cover	•	A (ac)	С	AxC
Surface Cover impervious	•	A (ac) 0.05	C 0.9	0.044483
Surface Cover impervious lands/grass	•	A (ac) 0.05 0.01	0.9 0.2	0.044483 0.002553
Surface Cover impervious lands/grass	WFW4	A (ac) 0.05 0.01 0.00 0.06	0.9 0.2 0.15	0.044483 0.002553
Surface Cover impervious lands/grass	wFW4  sum = C =	A (ac) 0.05 0.01 0.00 0.06	0.9 0.2 0.15	0.044483 0.002553

(ac)

0.08

0.07

0.00

0.9

0.2

0.15

AxC

0.07314

0.013866

0

Cover

impervious

lands/grass

woods

$$sum = 0.15 sum = 0.09$$

$$C = 0.58 = total product / total area$$

# DMH-WFW4 TO DMH-WFW3

Surface Cover		A (ac)	С		Product A x C
impervious		1.03	0.9		0.930537
lands/grass		0.88	0.2		0.175781
woods		0.00	0.15		0
	sum =	1.91		sum =	1.11
	C =	0.58	= total product / total	area	

# **CB-WFW5 TO DMH-WFW3**

Surface Cover		A (ac)	С		Product A x C
impervious		0.07	0.9		0.06593
lands/grass		0.03	0.2		0.005927
woods		0.00	0.15		0
	sum =	0.10		sum =	0.07
	C =	0.70	= total product / total a	area	

# **CB-WFW6 TO DMH-WFW3**

Surface Cover		A (ac)	С		Product A x C
impervious		0.05	0.9		0.041467
lands/grass		0.01	0.2		0.002296
woods		0.00	0.15		0
	sum =	0.06		sum =	0.04

# DMH-WFW3 TO IB-5D

Surface Cover		A (ac)	С		Product A x C
impervious		1.15	0.9		1.037934
lands/grass		0.92	0.2		0.184004
woods		0.00	0.15		0
	sum =	2.07		sum =	1.22
	C =	0.59	= total product / total a	area	

Location:

#### SM-3719C

Date

Checked

The Cottages at Wandering Pond Project: Ву NC Date 10/13/2022 Stow, MA

#### **Rational Method**

Q = peak flow rate, (cfs) i = rainfall intensity inches/hour

C = runoff coefficient, A = area (ac)

C = 0.90 impervious

C = 0.20 landscaped / grass

C = 0.15 woods

## **CB-AS1 TO DMH-AS1**

Surface Cover		A (ac)	С		Product A x C
impervious		0.14	0.9		0.12595
lands/grass		0.16	0.2		0.032231
woods		0.00	0.15		0
	sum =	0.30		sum =	0.16
	C =	0.53	= total product / total	area	

## **CB-AS2 TO DMH-AS1**

Surface Cover		A (ac)	С		Product A x C
impervious		0.23	0.9		0.202583
lands/grass		0.00	0.2		0
woods		0.00	0.15		0
	sum =	0.23		sum =	0.20
	C =	0.90	= total product / total	area	

## **DMH-AS1 TO FLARED END**

С Surface Α **Product** 

Cover		(ac)			AxC
impervious		0.37	0.9		0.328533
lands/grass		0.16	0.2		0.032231
woods		0.00	0.15		0
	sum =	0.53		sum =	0.36
	C =	0.69	= total product / total	area	
CB-AS3 TO DMH-	AS3				
Surface Cover		A (ac)	С		Product A x C
impervious		0.13	0.9		0.11593
lands/grass		0.03	0.2		0.006116
woods		0.00	0.15		0
	sum =	0.16		sum =	0.12
	C =	0.77	= total product / total	area	
CB-AS4 TO DMH-	AS3				
Surface Cover		A (ac)	С		Product A x C
impervious		0.21	0.9		0.187087
lands/grass		0.00	0.2		0
woods		0.00	0.15		0
	sum =	0.21		sum =	0.19
	C =	0.90	= total product / total	area	
DMH-AS3 TO DMH	I-AS2				
Surface Cover		A (ac)	С		Product A x C

impervious		0.34	0.9		0.303017
lands/grass		0.03	0.2		0.006116
woods		0.00	0.15		0
	sum =	0.37		sum =	0.31
	C =	0.84	= total product / total	area	

# DMH-AS2 TO FLARED END

Surface Cover		A (ac)	С		Product A x C
impervious		0.34	0.9		0.303017
lands/grass		0.03	0.2		0.006116
woods		0.00	0.15		0
	sum =	0.37		sum =	0.31
	C =	0.84	= total product / total	area	

# CB-WWP1 TO DMH-WPW1

Surface Cover		A (ac)	С		Product A x C
impervious		0.04	0.9		0.038595
lands/grass		0.00	0.2		0
woods		0.00	0.15		0
	sum =	0.04		sum =	0.04
	C =	0.90	= total product / total	area	

## **CB-WPW2 TO DMH-WPW1**

Surface Cover	A (ac)	С	Product A x C
impervious	0.03	0.9	0.030847
lands/grass	0.03	0.2	0.005335

woods		0.00	0.15	0					
	sum =	0.06	sum =	0.04					
	C =	0.59	= total product / total area						
DMH-WPW1 TO FLARED END									
Surface Cover		A (ac)	С	Product A x C					
impervious		0.08	0.9	0.069442					
lands/grass		0.03	0.2	0.005335					
woods		0.00	0.15	0					
	sum =	0.10	sum =	0.07					
	. –		1						
	C =	0.72	= total product / total area						
CB-WPW3 TO DMH-	_	0.72	= total product / total area						
CB-WPW3 TO DMH- Surface Cover	_	A (ac)	= total product / total area  C	Product A x C					
Surface	_	А							
Surface Cover	_	A (ac)	С	AxC					
Surface Cover impervious	_	A (ac) 0.05	C 0.9	0.044483					
Surface Cover impervious lands/grass	_	A (ac) 0.05 0.01	C 0.9 0.2	0.044483 0.002553					
Surface Cover impervious lands/grass	WPW2	A (ac) 0.05 0.01 0.00	0.9 0.2 0.15	0.044483 0.002553					
Surface Cover impervious lands/grass	wpw2  sum =  C =	A (ac) 0.05 0.01 0.00 0.06	C 0.9 0.2 0.15 sum =	0.044483 0.002553					

(ac)

0.20

0.11

0.00

0.9

0.2

0.15

AxC

0.176756

0.021736

0

Cover

impervious

lands/grass

woods

sum = 
$$0.31$$
 sum =  $0.20$ 

C =  $0.65$  = total product / total area

# DMH-WPW2 TO FLARED END

Surface Cover		A (ac)	С		Product A x C	
		0.05			0.00404	
impervious		0.25	0.9		0.22124	
lands/grass		0.12	0.2		0.024288	
woods		0.00	0.15		0	
	sum =	0.37		sum =	0.25	
C = <b>0.67</b> = total product / total area						

#### SM-3719C

Project: The Cottages at Wandering Pond By NC Date 10/4/2022

Location: Stow, MA Checked Date

#### **Rational Method**

Q = peak flow rate, (cfs) i = rainfall intensity inches/hour

C = runoff coefficient, A = area (ac)

C = 0.90 impervious

C = 0.20 landscaped / grass

C = 0.15 woods

#### **CB-DY2 TO CB-DY1**

Surface Cover		A (ac)	С		Product A x C
impervious		0.41	0.9		0.367583
lands/grass		0.20	0.2		0.039022
woods		0.00	0.15		0
	sum =	0.60		sum =	0.41
	C =	0.67	= total product / total a	area	

## CB-DY1 TO DI-DY1

Surface Cover		A (ac)	С		Product A x C
impervious		0.56	0.9		0.500021
lands/grass		0.41	0.2		0.082911
woods		0.00	0.15		0
	sum =	0.97		sum =	0.58
	C =	0.60	= total product / total a	area	

#### DI-DY1 TO IB-7A

Surface A C Product

Cover		(ac)			AxC
impervious		0.56	0.9		0.500021
lands/grass		0.41	0.2		0.082911
woods		0.00	0.15		0
	sum =	0.97	s	um =	0.58
	C =	0.60	= total product / total are	ea	
CB-BC1 TO CB-B	C2				
Surface Cover		A (ac)	С		Product A x C
impervious		0.36	0.9		0.319876
lands/grass		0.21	0.2		0.041561
woods		0.00	0.15		0
	sum =	0.56	s	um =	0.36
	C =	0.64	= total product / total are	ea	
CB-BC2 TO DI-B	C2				
Surface Cover		A (ac)	С		Product A x C
impervious		0.71	0.9		0.638905
lands/grass		0.40	0.2		0.080376
woods		0.00	0.15		0
	sum =	1.11	s	um =	0.72
	C =	0.65	= total product / total are	ea	
DI-BC2 TO IB-7	A				
Surface Cover		A (ac)	С		Product A x C

impervious		0.71	0.9		0.638905
lands/grass		0.40	0.2		0.080376
woods		0.00	0.15		0
	sum =	1.11		sum =	0.72
	C =	0.65	= total product / total	area	

Location:

#### SM-3719C

Date

Project: The Cottages at Wandering Pond By NC Date 10/4/2022

**Rational Method** 

Q = peak flow rate, (cfs)

Stow, MA

i = rainfall intensity inches/hour

Checked

C = runoff coefficient, A = area (ac)

C = 0.90 impervious

C = 0.20 landscaped / grass

C = 0.15 woods

#### CB-CH3 TO IB-7B

Surface Cover		A (ac)	С		Product A x C
impervious		0.09	0.9		0.07936
lands/grass		0.11	0.2		0.022163
woods		0.10	0.15		0.014931
	sum =	0.30		sum =	0.12
	C =	0.39	= total product / total a	area	

#### **CB-CH2 TO IB-7B**

Surface Cover		A (ac)	С		Product A x C
impervious		0.23	0.9		0.203244
lands/grass		0.19	0.2		0.038921
woods		0.10	0.15		0.015706
	sum =	0.53		sum =	0.26
	C =	0.49	= total product / total a	area	

#### **CB-WF4 TO DMH-WF2**

Surface A C Product

Cover		(ac)			AxC
impervious		0.14	0.9		0.122583
lands/grass		0.00	0.2		0
woods		0.00	0.15		0
	sum =	0.14		sum =	0.12
	C =	0.90	= total product / total	area	
CB-WF3 TO DMH-	WF2				
Surface Cover		A (ac)	С		Product A x C
impervious		0.08	0.9		0.072479
lands/grass		0.00	0.2		0
woods		0.00	0.15		0
	sum =	0.08		sum =	0.07
	C =	0.90	= total product / total	area	
DMH-WF2 TO DMH	I-WF1				
Surface Cover		A (ac)	С		Product A x C
impervious		0.22	0.9		0.195062
lands/grass		0.00	0.2		0
woods		0.00	0.15		0
	sum =	0.22		sum =	0.20
	C =	0.90	= total product / total	area	
CB-WF1 TO DMH-	WF1				
Surface Cover		A (ac)	С		Product A x C

impervious		0.05	0.9		0.04312
lands/grass		0.00	0.2		0
woods		0.00	0.15		0
	sum =	0.05		sum =	0.04
	C =	0.90	= total product / total	area	

# DMH-WF1 TO IB-7B

Surface Cover		A (ac)	С		Product A x C
impervious		0.26	0.9		0.238182
lands/grass		0.00	0.2		0
woods		0.00	0.15		0
	sum =	0.26		sum =	0.24
	C =	0.90	= total product / total	area	

Location:

#### SM-3719C

Date

Checked

Project: The Cottages at Wandering Pond By NC Date 10/4/2022

**Rational Method** 

Q = peak flow rate, (cfs) i = rainfall intensity inches/hour

C = runoff coefficient, A = area (ac)

C = 0.90 impervious

C = 0.20 landscaped / grass

Stow, MA

C = 0.15 woods

#### **CB-LP6 TO DMH-LP3**

Surface Cover		A (ac)	С		Product A x C
impervious		0.26	0.9		0.236054
lands/grass		0.14	0.2		0.027172
woods		0.00	0.15		0
	sum =	0.40		sum =	0.26
	C =	0.66	= total product / total a	area	

### **CB-LP5 TO DMH-LP3**

Surface Cover		A (ac)	С		Product A x C
impervious		0.04	0.9		0.03626
lands/grass		0.00	0.2		0
woods		0.00	0.15		0
	sum =	0.04		sum =	0.04
	C =	0.90	= total product / total a	area	

#### **DMH-LP3 TO IB-8**

Surface A C Product

Cover		(ac)			AxC
impervious		0.30	0.9		0.272314
lands/grass		0.14	0.2		0.027172
woods		0.00	0.15		0
	sum =	0.44		sum =	0.30
	C =	0.68	= total product / total	area	
CB-WF5 TO DMH-\	WF3A				
Surface Cover		A (ac)	С		Product A x C
impervious		0.09	0.9		0.080517
lands/grass		0.00	0.2		0
woods		0.00	0.15		0
	sum =	0.09		sum =	0.08
	C =	0.90	= total product / total	area	
CB-WF5A TO DMH-	WF3A				
Surface Cover		A (ac)	С		Product A x C
impervious		0.10	0.9		0.092645
lands/grass		0.00	0.2		0
woods		0.00	0.15		0
	sum =	0.10		sum =	0.09
	C =	0.90	= total product / total	area	
DMH-WF3A TO	B-8				
Surface Cover		A (ac)	С		Product A x C

impervious		0.19	0.9		0.173161	
lands/grass		0.00	0.2		0	
woods		0.00	0.15		0	
	sum =	0.19		sum =	0.17	
C = <b>0.90</b> = total product / total area						
VF6 TO DMH-WF3						

## CB-W

Surface Cover		A (ac)	С		Product A x C
impervious		0.12	0.9		0.109215
lands/grass		0.00	0.2		0
woods		0.00	0.15		0
	sum =	0.12		sum =	0.11
	C =	0.90	= total product / total	area	

### DMH-WF3 TO DMH-WF4

Surface Cover		A (ac)	С		Product A x C
impervious		0.12	0.9		0.109215
lands/grass		0.00	0.2		0
woods		0.00	0.15		0
	sum =	0.12		sum =	0.11
	C =	0.90	= total product / total	area	

# DMH-WF4 TO IB-8

Surface	Α	С	Product
Cover	(ac)		AxC
impervious	0.12	0.9	0.109215

lands/grass		0.00	0.2	0
woods		0.00	0.15	0
	sum =	0.12	sum =	0.11
	C =	0.90	= total product / total area	
CB-LP4 TO DMH-	LP2			
Surface Cover		A (ac)	С	Product A x C
impervious		0.48	0.9	0.431529
lands/grass		0.22	0.2	0.0436
woods		0.00	0.15	0
	sum =	0.70	sum =	0.48
	C =	0.68	= total product / total area	
CB-LP3 TO DMH-	LP2			
CB-LP3 TO DMH- Surface Cover	LP2	A (ac)	С	Product A x C
Surface	LP2		C 0.9	
Surface Cover	LP2	(ac)		AxC
Surface Cover impervious	LP2	(ac) 0.11	0.9	0.096736
Surface Cover impervious lands/grass	sum =	0.11 0.12	0.9	0.096736 0.023783
Surface Cover impervious lands/grass		0.11 0.12 0.00 0.23	0.9 0.2 0.15	0.096736 0.023783
Surface Cover impervious lands/grass	sum = C =	0.11 0.12 0.00 0.23	0.9 0.2 0.15 sum =	0.096736 0.023783
Surface Cover impervious lands/grass woods	sum = C =	0.11 0.12 0.00 0.23	0.9 0.2 0.15 sum =	0.096736 0.023783
Surface Cover  impervious lands/grass woods  DMH-LP2 TO DMH-	sum = C =	(ac)  0.11  0.12  0.00  0.23  0.53	0.9 0.2 0.15 sum =	A x C  0.096736  0.023783  0  0.12

woods		0.00	0.15		0	
	sum =	0.92		sum =	0.60	
	C =	0.64	= total product / total a	irea		
DMH-LP4 TO DMH	I-LP1					
Surface Cover		A (ac)	С		Product A x C	
impervious		0.59	0.9		0.528264	
lands/grass		0.34	0.2		0.067383	
woods		0.00	0.15		0	
	sum =	0.92		sum =	0.60	
	C =	0.64	= total product / total a	irea		
CB-LP1 TO DMH-	LP1					
Surface Cover		A (ac)	С		Product A x C	
impervious		0.15	0.9		0.13938	
lands/grass		0.08	0.2		0.016607	
woods		0.00	0.15		0	
	sum =	0.24		sum =	0.16	
	C =	0.66	= total product / total a	irea		
CB-LP2 TO DMH-	LP1					
Surface Cover		A (ac)	С		Product A x C	
impervious		0.49	0.9		0.436529	
lands/grass		0.10	0.2		0.019068	
woods		0.00	0.15		0	

sum = 
$$0.58$$
 sum =  $0.46$ 

C =  $0.79$  = total product / total area

### DMH-LP1 TO IB-8

Surface		Α	С		Product
Cover		(ac)			AxC
impervious		1.23	0.9		1.104174
lands/grass		0.52	0.2		0.103058
woods		0.00	0.15		0
	sum =	1.74		sum =	1.21
	C =	0.69	= total product / total	area	

#### SM-3719C

Project: The Cottages at Wandering Pond By PFK, NC Date 10/13/2022

Location: Stow, MA Checked Date

#### **Rational Method**

Q = peak flow rate, (cfs) i = rainfall intensity inches/hour

C = runoff coefficient, A = area (ac)

C = 0.90 impervious

C = 0.20 landscaped / grass

C = 0.15 woods

#### **CB-WFW17 TO DMH-WFW10**

Surface Cover		A (ac)	С		Product A x C
impervious		0.39	0.9		0.354525
lands/grass		0.13	0.2		0.025753
woods		0.00	0.15		0
	sum =	0.52		sum =	0.38

C = **0.73** = total product / total area

#### **CB-WFW18 TO DMH-WFW10**

Surface Cover		A (ac)	С		Product A x C
impervious		0.12	0.9		0.107934
lands/grass		0.07	0.2		0.013072
woods		0.00	0.15		0
	sum =	0.19		sum =	0.12
	_				

C = **0.65** = total product / total area

### DMH-WFW10 TO DMH-WFW9

Surface A C Product

Cover		(ac)			AxC
impervious		0.51	0.9		0.462459
lands/grass		0.19	0.2		0.038825
woods		0.00	0.15		0
	sum =	0.71		sum =	0.50
	C =	0.71	= total product / total	area	
DMH-WFW9 TO DMH	I-WFW8				
Surface Cover		A (ac)	С		Product A x C
impervious		0.51	0.9		0.462459
lands/grass		0.19	0.2		0.038825
woods		0.00	0.15		0
	sum =	0.71		sum =	0.50
	C =	0.71	= total product / total	area	
CB-WFW15 TO DMH	-WFW8				
Surface Cover		A (ac)	С		Product A x C
impervious		0.28	0.9		0.250083
lands/grass		0.13	0.2		0.025514
woods		0.00	0.15		0
	sum =	0.41		sum =	0.28
	C =	0.68	= total product / total	area	
CB-WFW16 TO DMH	-WFW8				
Surface Cover		A (ac)	С		Product A x C

impervious		0.11	0.9		0.097273	
lands/grass		0.15	0.2		0.029931	
woods		0.00	0.15		0	
	sum =	0.26		sum =	0.13	
C = <b>0.49</b> = total product / total area						

#### DMH-WFW8 TO DMH-WFW7

Surface		Α	С		Product
Cover		(ac)			AxC
impervious		0.90	0.9		0.809814
lands/grass		0.47	0.2		0.09427
woods		0.00	0.15		0
	sum =	1.37		sum =	0.90
			_		
	C =	0.66	= total product / total a	area	

# CB-WFW13 TO DMH-WFW7

Surface Cover		A (ac)	С		Product A x C
impervious		0.41	0.9		0.373079
lands/grass		0.15	0.2		0.029031
woods		0.00	0.15		0
	sum =	0.56		sum =	0.40
	c =	0.72	= total product / total a	area	

### **CB-WFW14 TO DMH-WFW7**

Surface Cover	A (ac)	С	Product A x C
impervious	0.13	0.9	0.114153
lands/grass	0.10	0.2	0.01933

woods		0.00	0.15		0
	sum =	0.22		sum =	0.13
	C =	0.60	= total product / total	area	
DMH-WFW7 TO FLAR	ED END				
Surface Cover		A (ac)	С		Product A x C
impervious		1.44	0.9		1.297045
lands/grass		0.71	0.2		0.142631
woods		0.00	0.15		0
	sum =	2.15		sum =	1.44
	C =	0.67	= total product / total	area	
CB-WFW11 TO DMH-	WFW5				
Surface Cover		A (ac)	С		Product A x C
impervious		0.11	0.9		0.096653
lands/grass		0.00	0.2		0
woods		0.00	0.15		0
	sum =	0.11		sum =	0.10

# **CB-WFW12 TO DMH-WFW5**

Surface Cover	A (ac)	С	Product A x C
impervious	0.13	0.9	0.115145
lands/grass	0.06	0.2	0.012397
woods	0.00	0.15	0

0.90

= total product / total area

sum = 
$$0.19$$
 sum =  $0.13$  C =  $0.67$  = total product / total area

# DMH-WFW5 TO FLARED END

Surface Cover		A (ac)	С		Product A x C
impervious		0.24	0.9		0.211798
lands/grass		0.06	0.2		0.012397
woods		0.00	0.15		0
	sum =	0.30		sum =	0.22
C = <b>0.75</b> = total product / total area					

#### SM-3719C

Date

The Cottages at Wandering Pond Project: Ву NC Date 10/13/2022 Location: Stow, MA Checked

#### **Rational Method**

Q = peak flow rate, (cfs) i = rainfall intensity inches/hour

C = runoff coefficient, A = area (ac)

C = 0.90 impervious

C = 0.20 landscaped / grass

C = 0.15 woods

#### **CB-WF19 TO DMH-WF11**

Surface Cover		A (ac)	С		Product A x C
impervious		0.43	0.9		0.385764
lands/grass		0.15	0.2		0.030441
woods		0.00	0.15		0
	sum =	0.58		sum =	0.42

C = 0.72 = total product / total area

#### **CB-WF20 TO DMH-WF11**

Surface Cover		A (ac)	С		Product A x C
impervious		0.29	0.9		0.262851
lands/grass		0.07	0.2		0.014118
woods		0.00	0.15		0
	sum =	0.36		sum =	0.28
			•		

0.76 = total product / total area

#### DMH-WF11 TO DMH-WF12

С Surface Α **Product** 

Cover		(ac)			AxC
impervious		0.72	0.9		0.648616
lands/grass		0.22	0.2		0.044559
woods		0.00	0.15		0
	sum =	0.94		sum =	0.69
	C =	0.73	= total product / total	area	
DMH-WF12 TO DMH	I-WF13				
Surface Cover		A (ac)	С		Product A x C
impervious		0.72	0.9		0.648616
lands/grass		0.22	0.2		0.044559
woods		0.00	0.15		0
	sum =	0.94		sum =	0.69
	C =	0.73	= total product / total	area	
CB-WF21 TO DMH-	WF13				
Surface Cover		A (ac)	С		Product A x C
impervious		0.35	0.9		0.314256
lands/grass		0.11	0.2		0.022819
woods		0.00	0.15		0
	sum =	0.46		sum =	0.34
	C =	0.73	= total product / total	area	
CB-WF22 TO DMH-WF13					
Surface Cover		A (ac)	С		Product A x C

impervious		0.16	0.9		0.141736
lands/grass		0.13	0.2		0.025808
woods		0.00	0.15		0
	sum =	0.29		sum =	0.17
C = 0.58 = total product / total area					

## DMH-WF13 TO DMH-WF14

Surface		A (26)	С		Product
Cover		(ac)			AxC
impervious		1.23	0.9		1.104607
lands/grass		0.47	0.2		0.093186
woods		0.00	0.15		0
	sum =	1.69		sum =	1.20
	C =	0.71	= total product / total	area	

# DMH-WF14 TO DMH-WF15

Surface Cover		A (ac)	С		Product A x C
impervious		1.23	0.9		1.104607
lands/grass		0.47	0.2		0.093186
woods		0.00	0.15		0
	sum =	1.69		sum =	1.20
	C =	0.71	= total product / total	area	

### DMH-WF15 TO DMH-WF16

Surface Cover	A (ac)	С	Product A x C
impervious	1.23	0.9	1.104607
lands/grass	0.47	0.2	0.093186

woods		0.00	0.15		0		
	sum =	1.69		sum =	1.20		
	C =	0.71	total product / total	area			
DMH-WF16 TO IB-10C							
Surface Cover		A (ac)	С		Product A x C		
impervious		1.23	0.9		1.104607		
lands/grass		0.47	0.2		0.093186		
woods		0.00	0.15		0		
	sum =	1.69		sum =	1.20		
	C =	0.71 =	total product / total	area			
CB-WF23 TO DMH-WF17							
Surface Cover		A (ac)	С		Product A x C		
impervious		0.09	0.9		0.076715		
lands/grass		0.02	0.2		0.004408		
woods		0.00	0.15		0		
	sum =	0.11		sum =	0.08		
	C =	0.76 =	total product / total	area			
CB-WF24 TO DMH-WF17							
Surface Cover		A (ac)	С		Product A x C		
impervious		0.70	0.9		0.629215		
lands/grass		2.52	0.2		0.503724		
woods		0.00	0.15		0		

# DMH-WF17 TO DMH-WF18

Surface		Α	С		Product
Cover		(ac)			AxC
impervious		0.78	0.9		0.70593
lands/grass		2.54	0.2		0.508131
woods		0.00	0.15		0
su	ım =	3.33		sum =	1.21
	C =	0.37	= total product / total a	area	

### CB-69 TO DMH-WF21

Surface Cover		A (ac)	С		Product A x C
impervious		0.40	0.9		0.359483
lands/grass		0.71	0.2		0.141368
woods		0.00	0.15		0
	sum =	1.11		sum =	0.50

= total product / total area

0.45

# CB-70 TO DMH-WF21

Surface Cover		A (ac)	С		Product A x C
impervious		0.29	0.9		0.257934
lands/grass		0.06	0.2		0.012736
woods		0.00	0.15		0
	sum =	0.35		sum =	0.27

C =	0.77	= total product / total area
C -	0.77	- total product / total area

## DMH-WF21 TO DMH-WF18

Surface Cover		A (ac)	С		Product A x C
impervious		0.69	0.9		0.617417
lands/grass		0.77	0.2		0.154105
woods		0.00	0.15		0
	sum =	1.46		sum =	0.77
	C =	0.53	= total product / total a	area	

# CB-WF25 TO DMH-WF18

Surface Cover		A (ac)	С		Product A x C
impervious		0.56	0.9		0.507831
lands/grass		0.14	0.2		0.028999
woods		0.00	0.15		0
	sum =	0.71		sum =	0.54
	C =	0.76	= total product / total	area	

# CB-WF26 TO DMH-WF18

Surface Cover		A (ac)	С		Product A x C
impervious		0.08	0.9		0.076343
lands/grass		0.39	0.2		0.077902
woods		0.00	0.15		0
	sum =	0.47		sum =	0.15

C = **0.33** = total product / total area

### DMH-WF18 TO DMH-WF19

Surface Cover		A (ac)	С		Product A x C
impervious		2.12	0.9		1.907521
lands/grass		3.85	0.2		0.769137
woods		0.00	0.15		0
	sum =	5.97		sum =	2.68
	C =	0.45	= total product / total	area	

### DMH-WF19 TO DMH-WF20

Surface Cover		A (ac)	С		Product A x C
impervious		2.12	0.9		1.907521
lands/grass		3.85	0.2		0.769137
woods		0.00	0.15		0
	sum =	5.97		sum =	2.68
	C =	0.45	= total product / total	area	

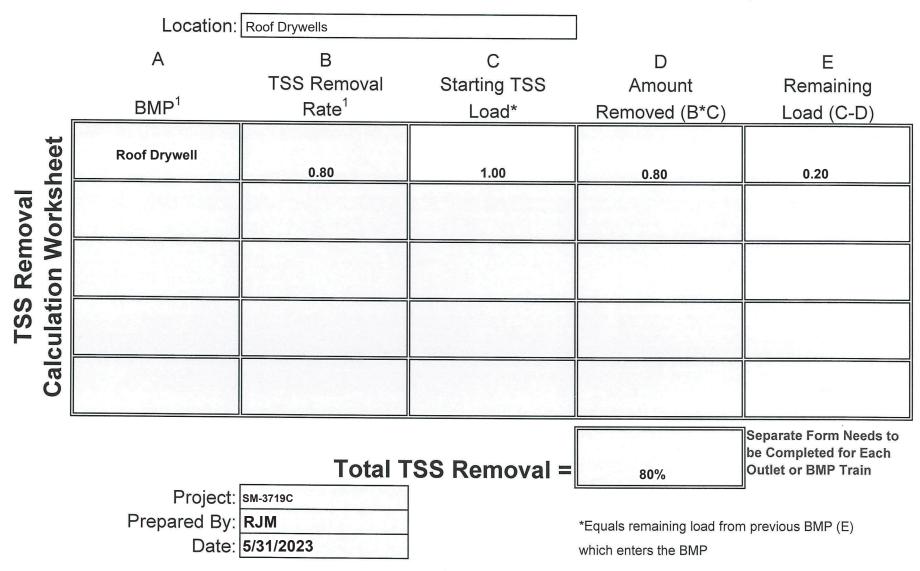
## DMH-WF20 TO IB-10C

Surface Cover		A (ac)	С		Product A x C
impervious		2.12	0.9		1.907521
lands/grass		3.85	0.2		0.769137
woods		0.00	0.15		0
	sum =	5.97		sum =	2.68

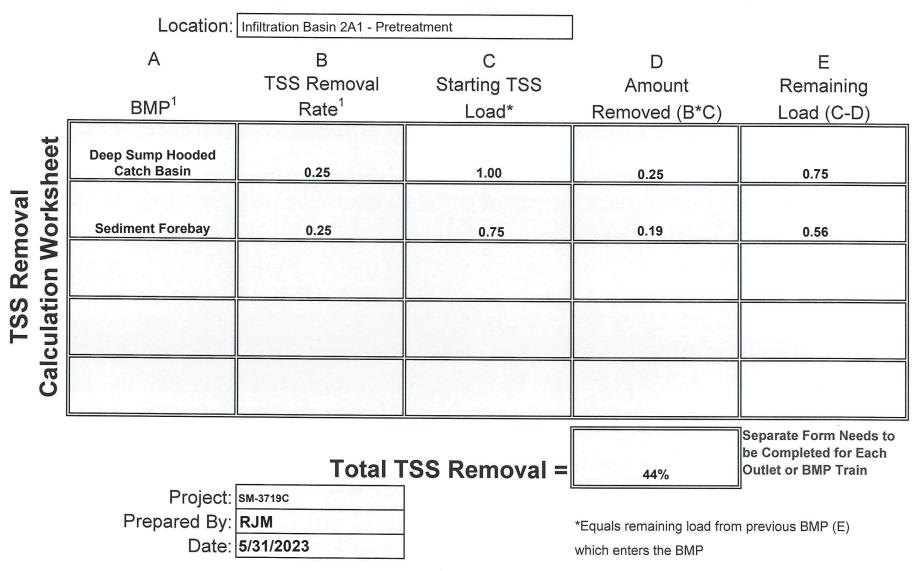
C = **0.45** = total product / total area



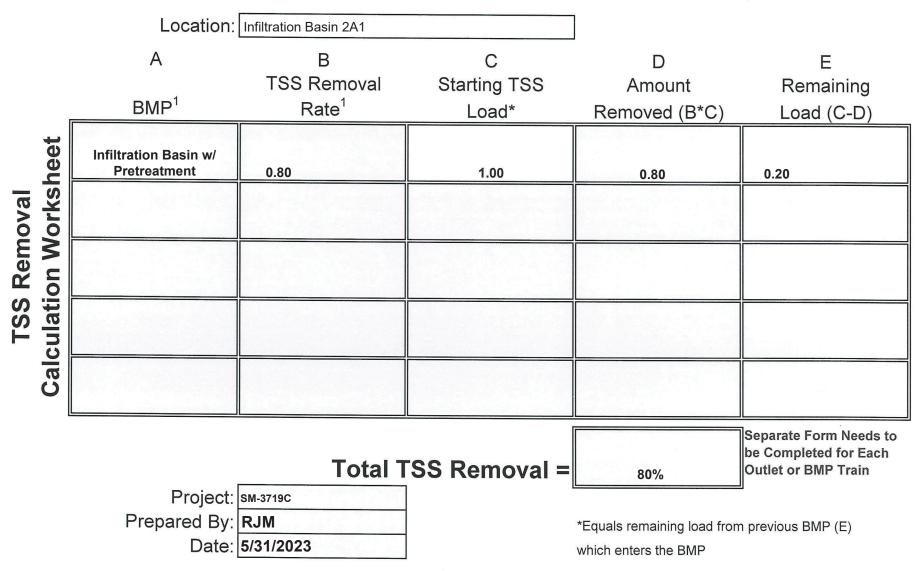
- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D



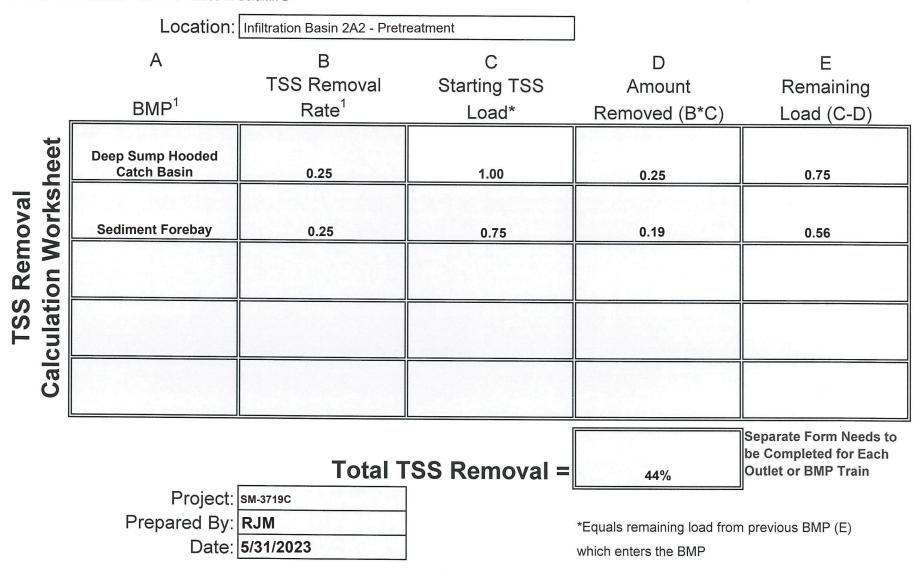
- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D



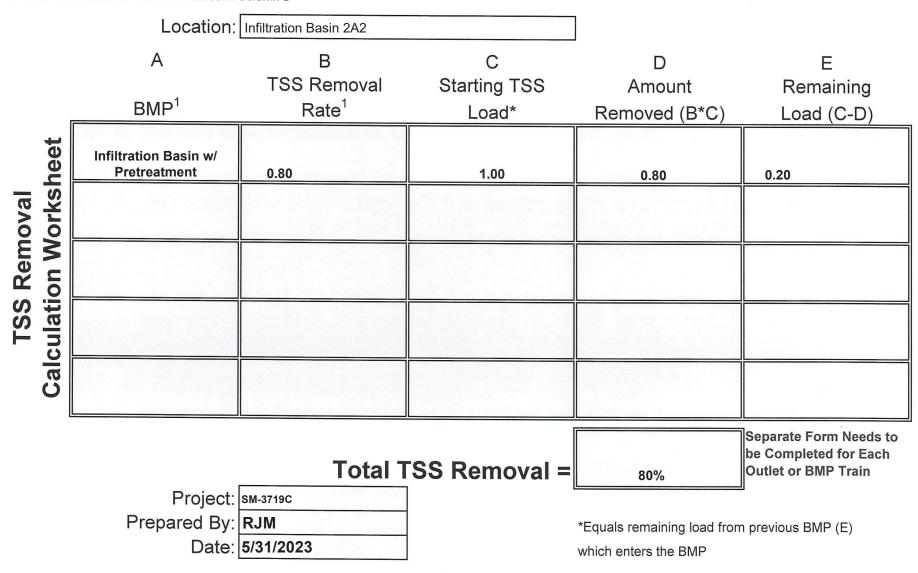
- 1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D



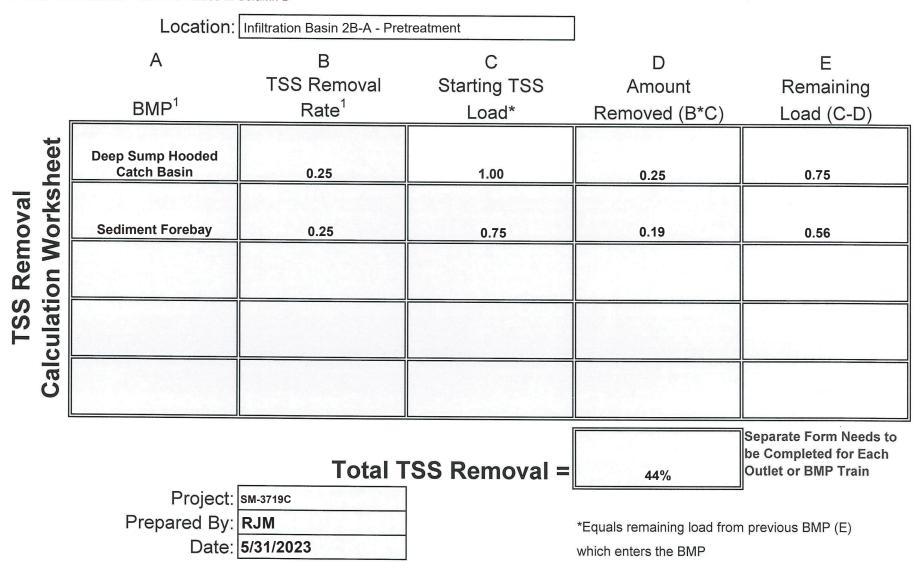
- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D



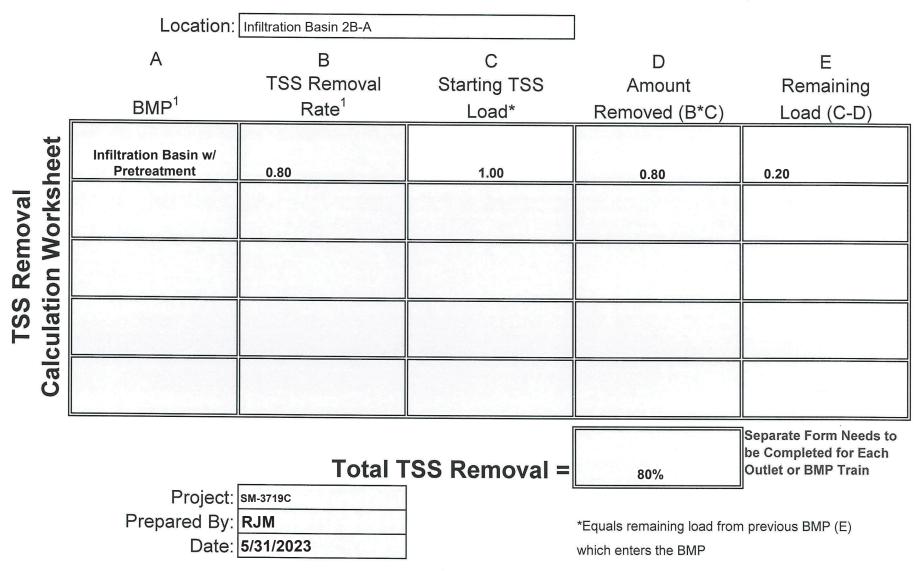
- 1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D



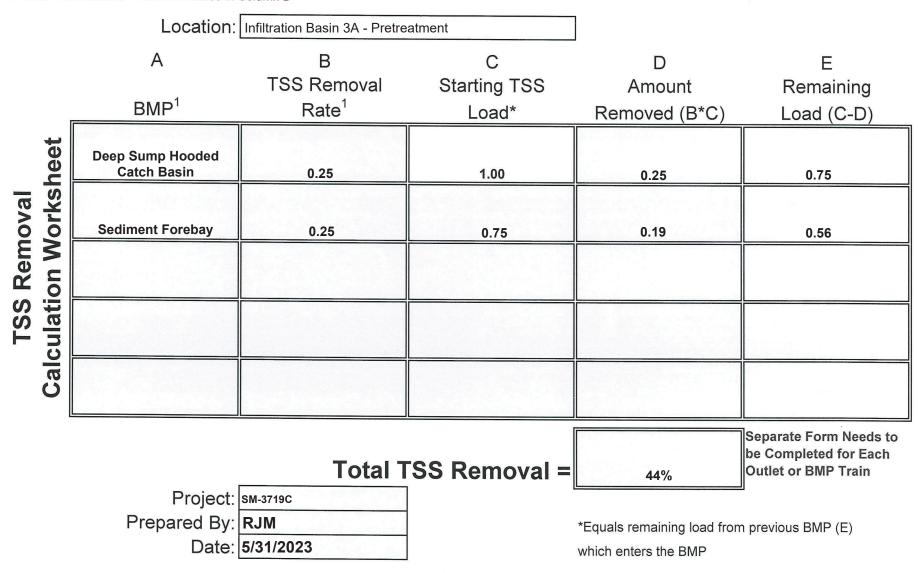
- 1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D



- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D

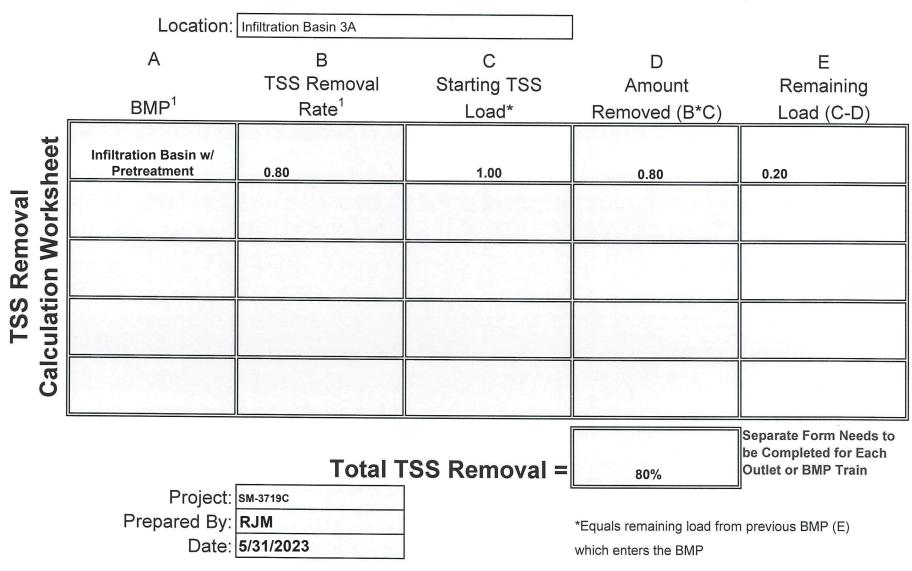


- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D

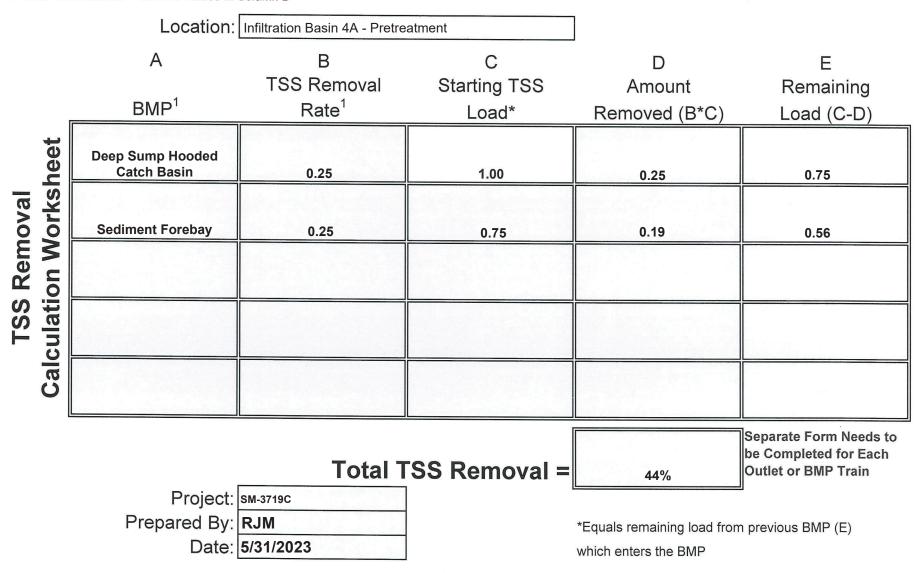


Non-automated: Mar. 4, 2008

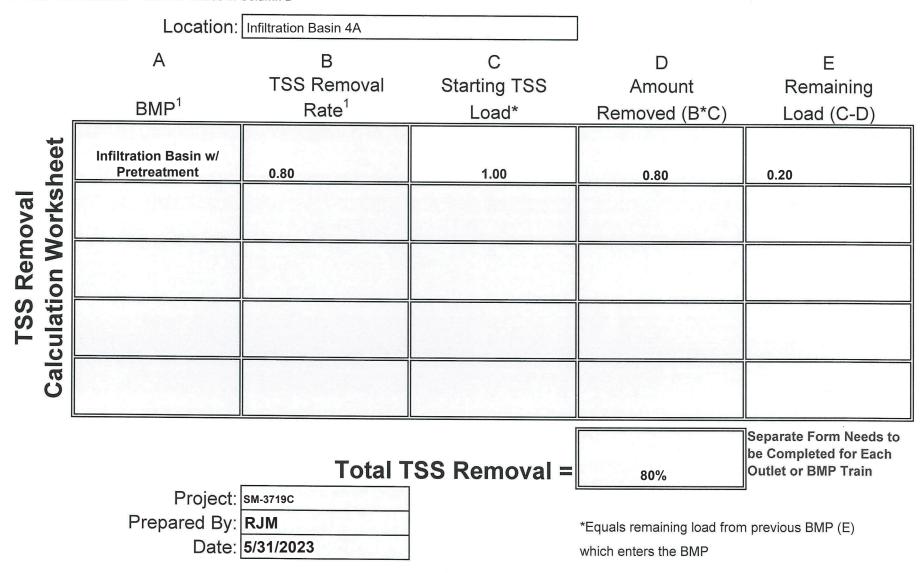
- 1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D



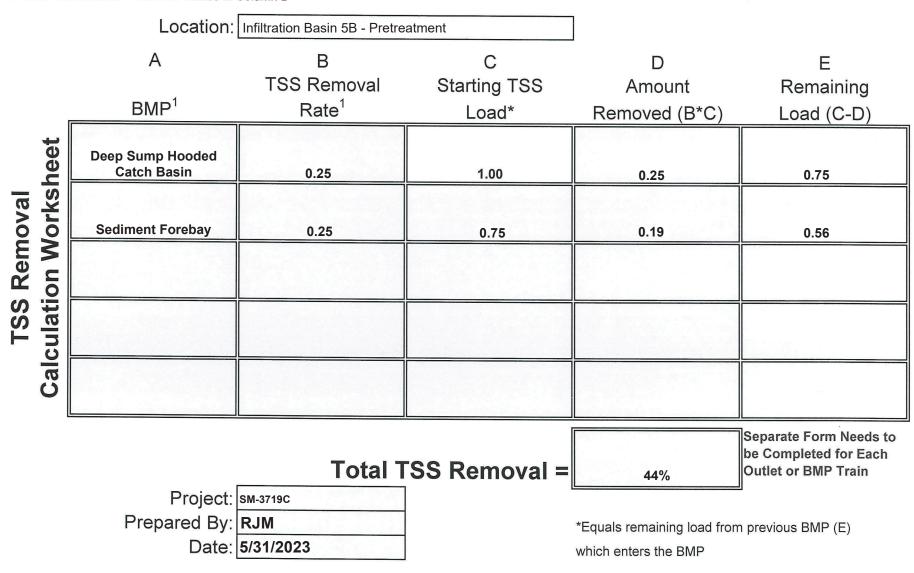
- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D



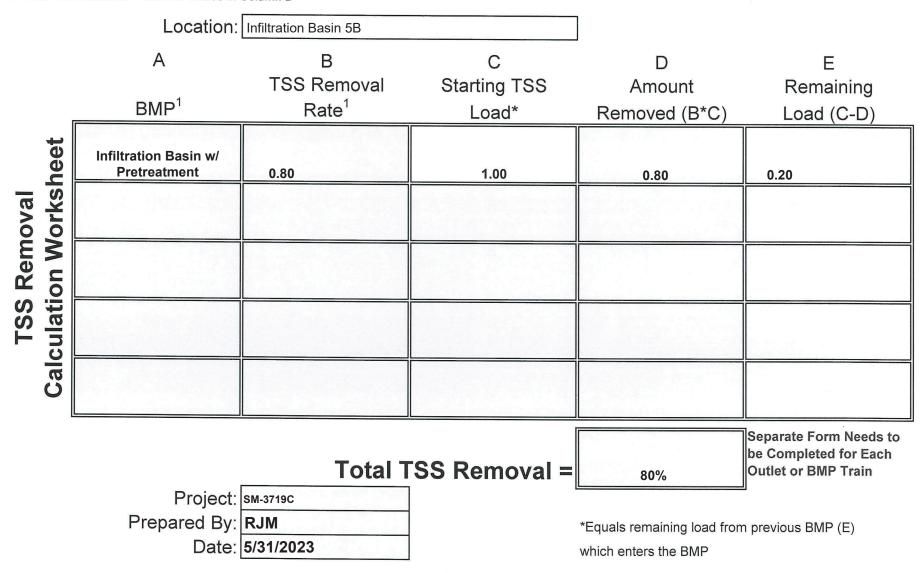
- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D



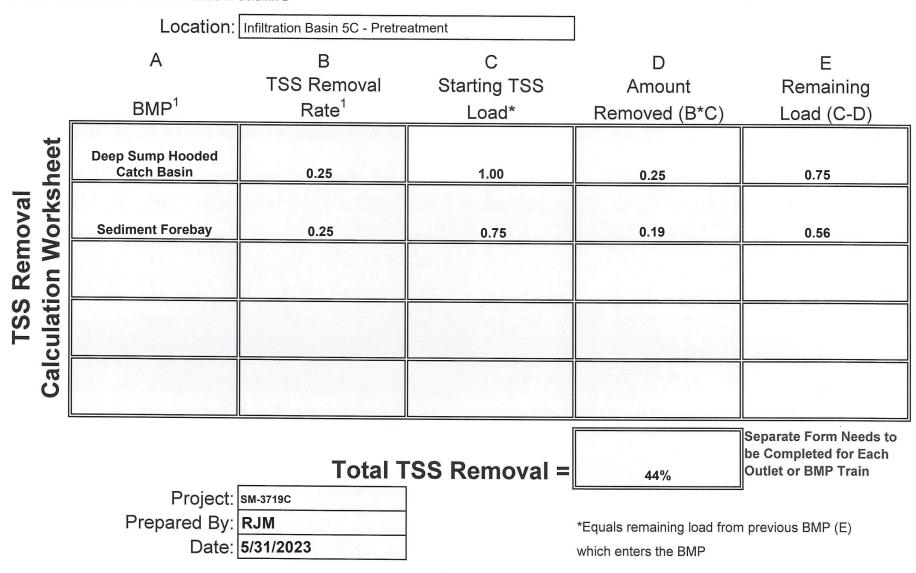
- 1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D



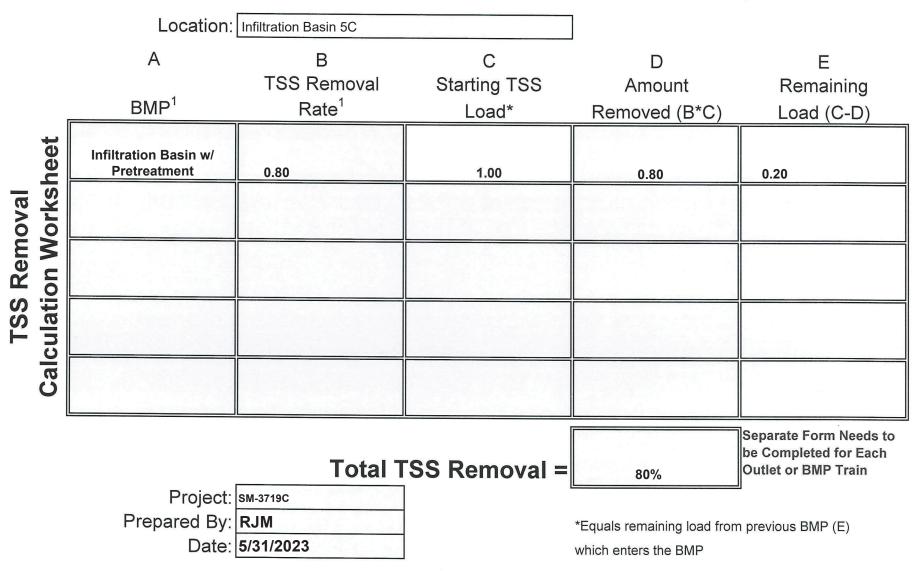
- 1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D



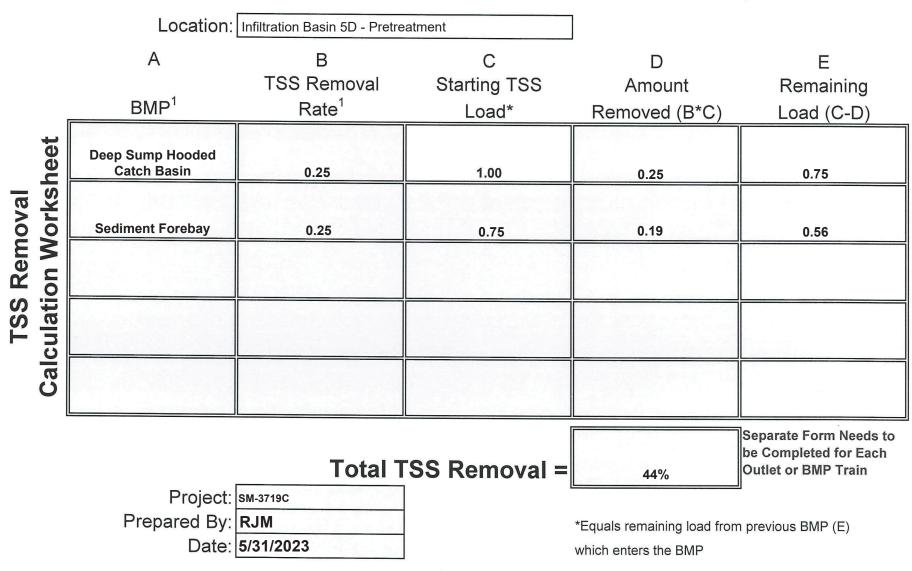
- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D



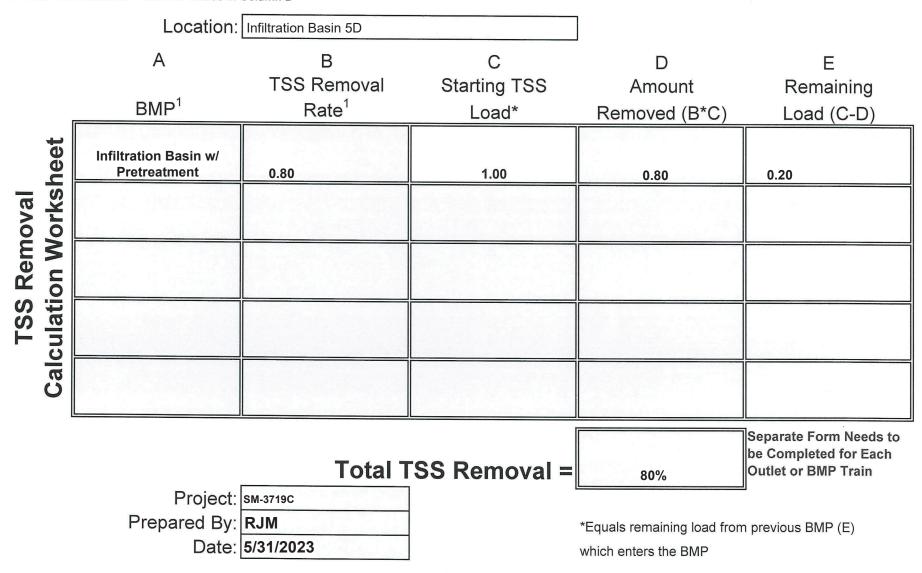
- 1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D



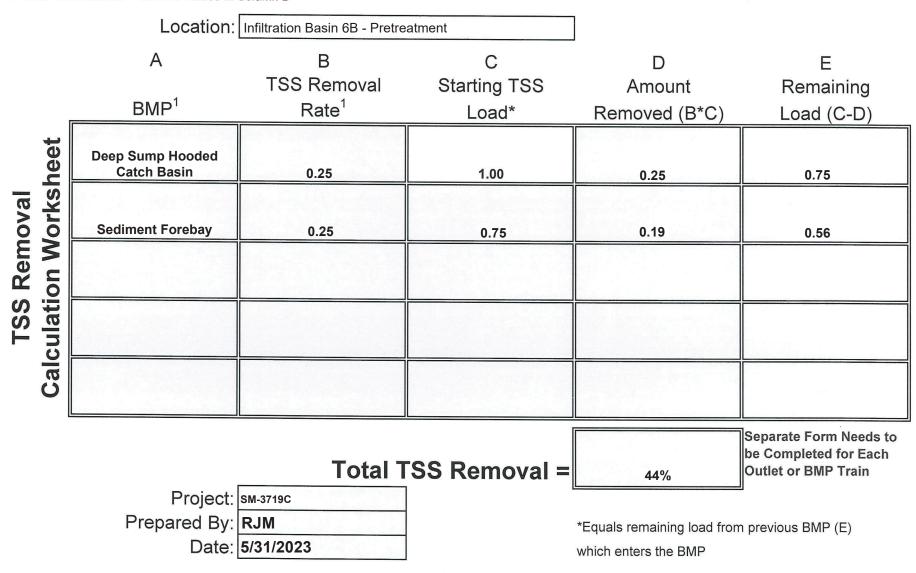
- 1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D



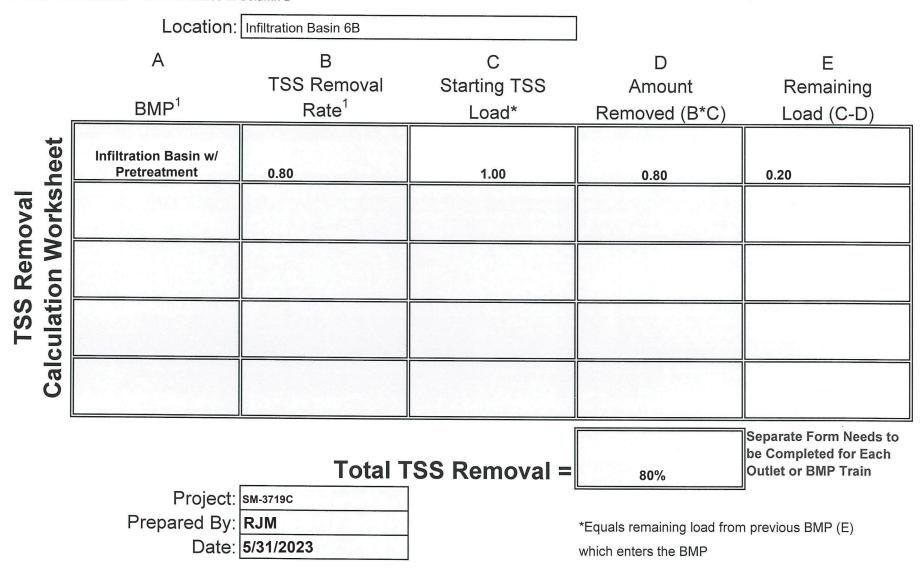
- 1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D



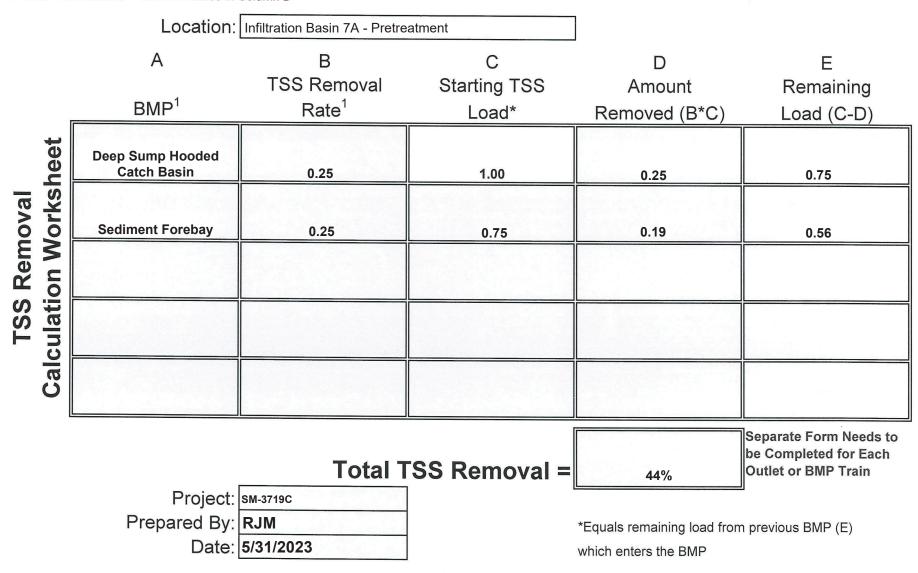
- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D



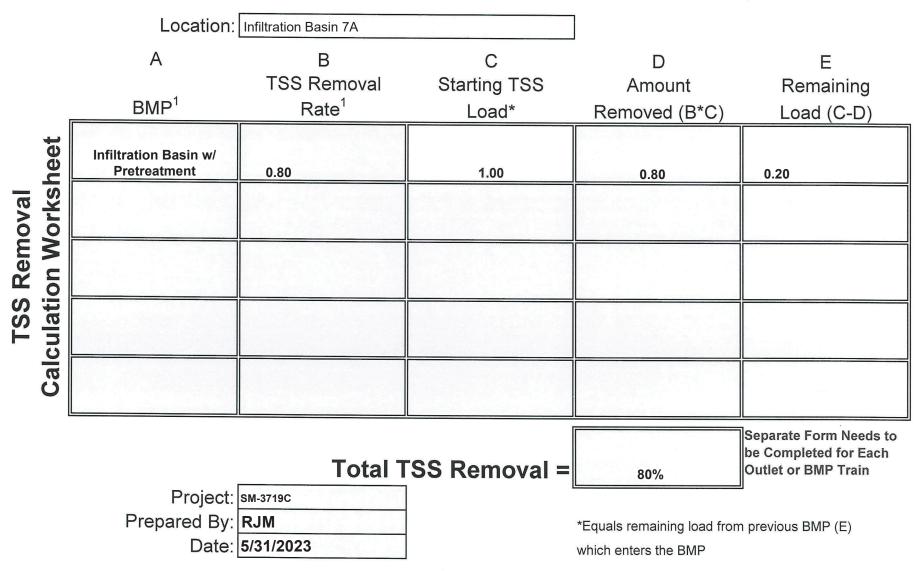
- 1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D



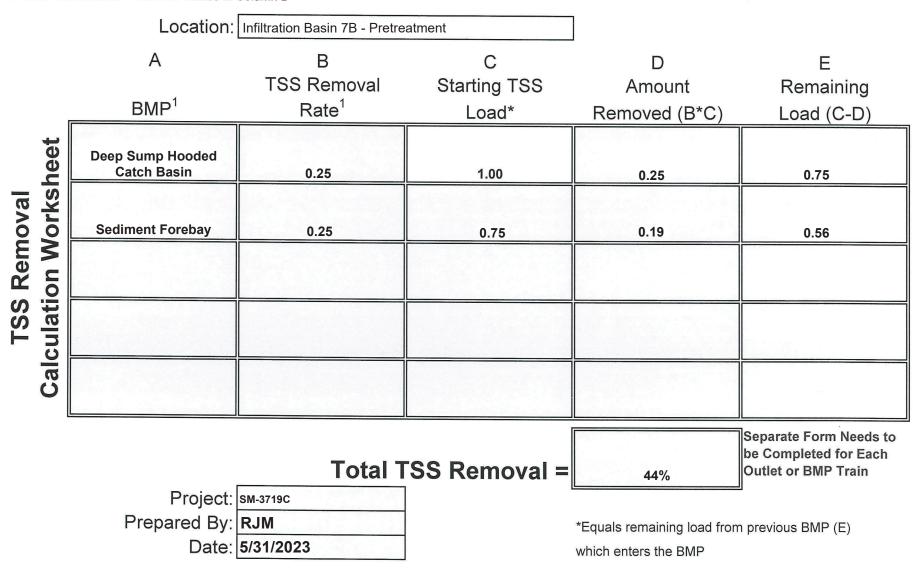
- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D



- 1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D

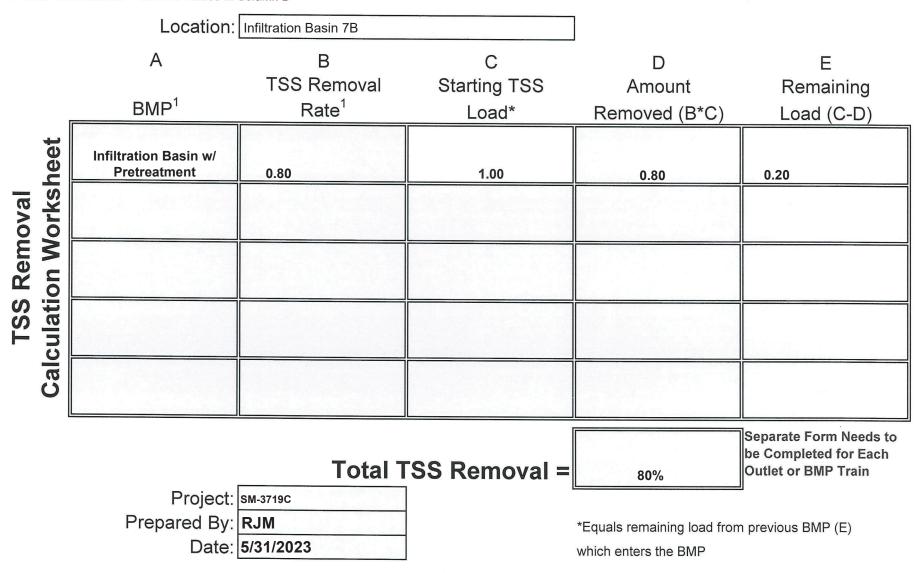


- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D

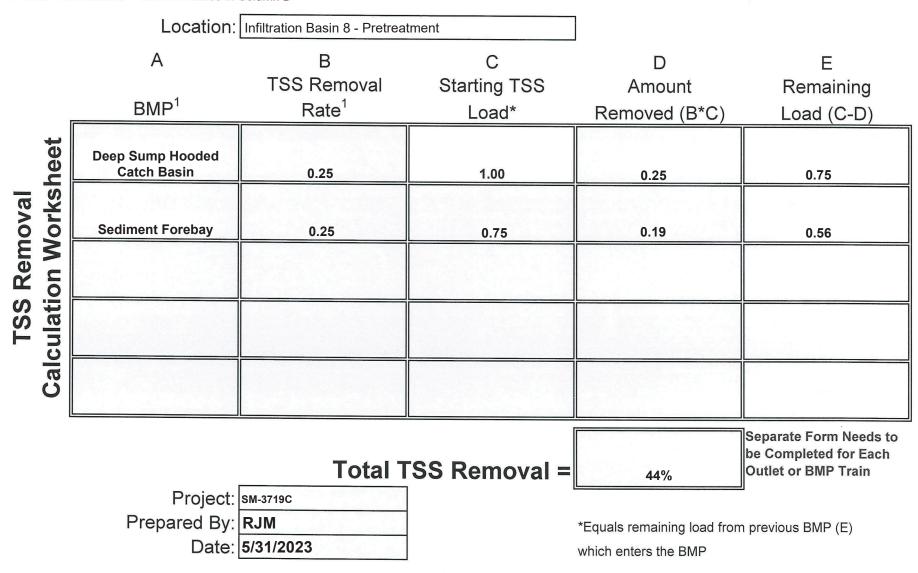


Non-automated: Mar. 4, 2008

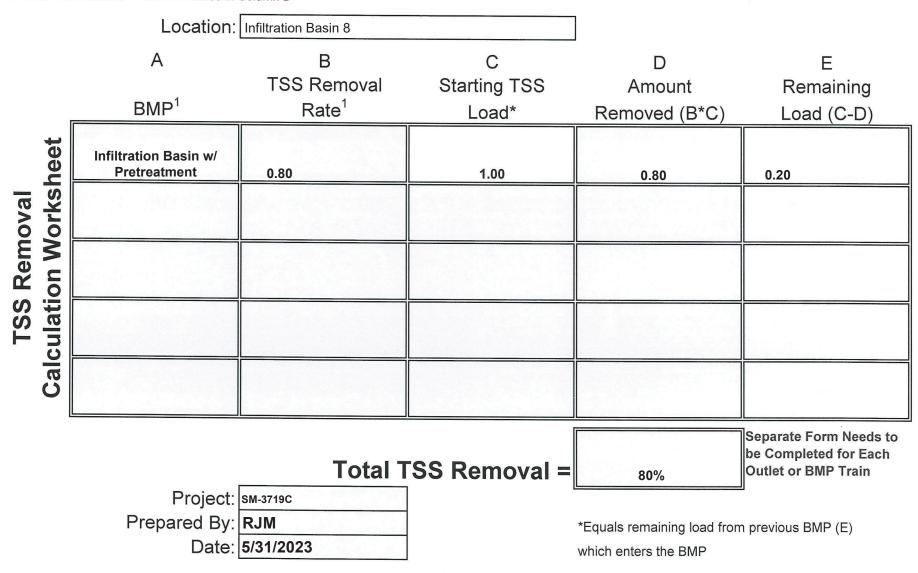
- 1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D



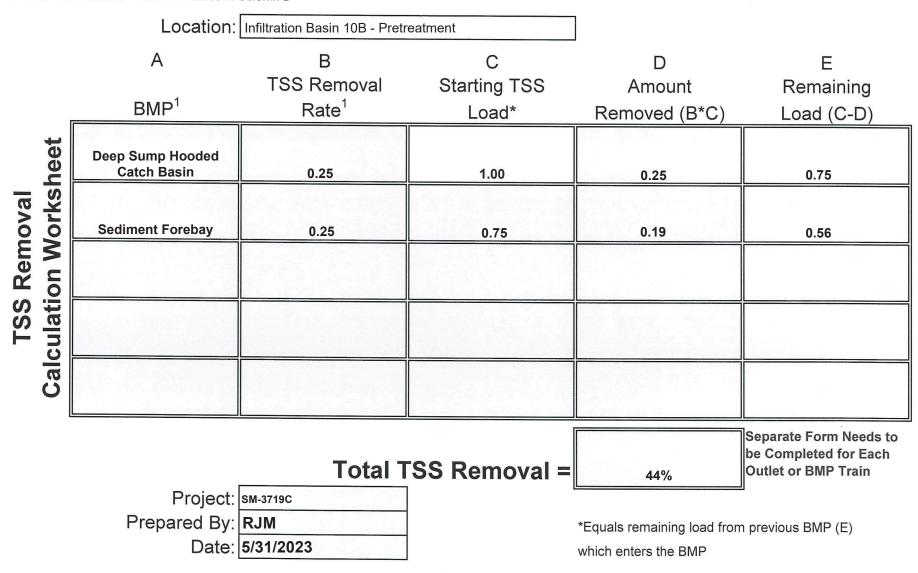
- 1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D



- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D

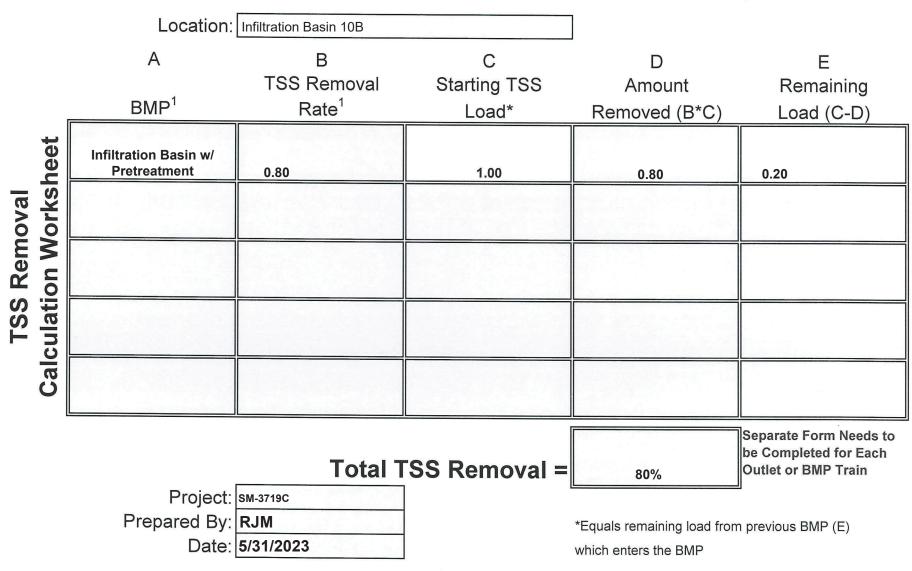


- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D

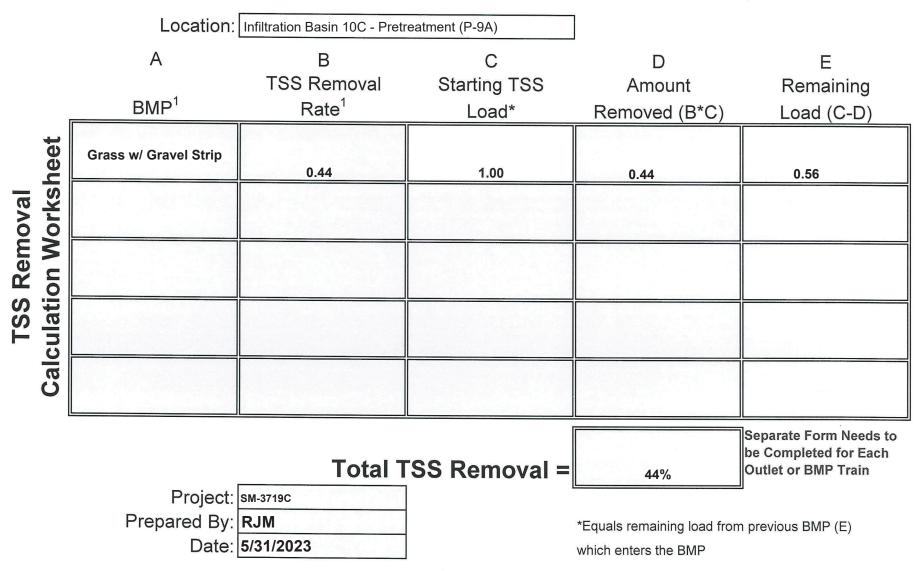


Non-automated: Mar. 4, 2008

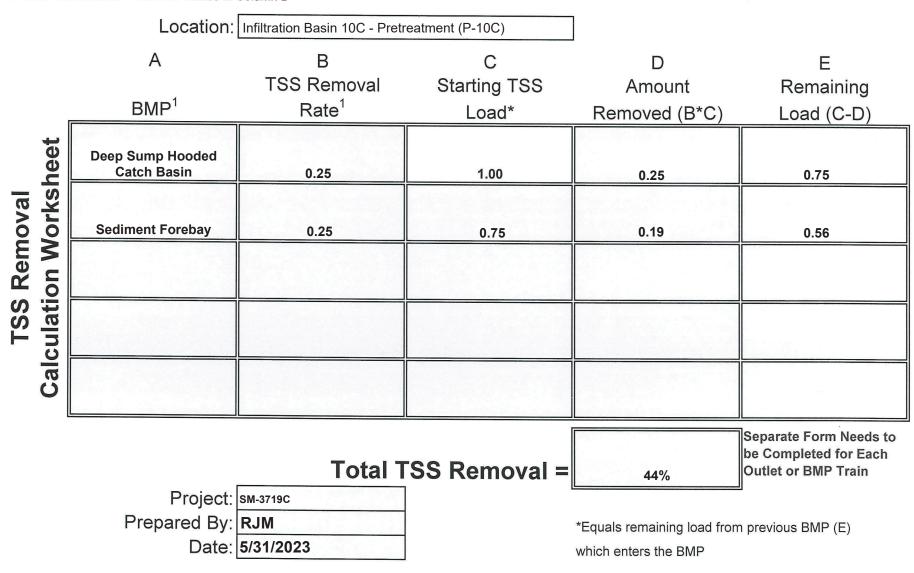
- 1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D



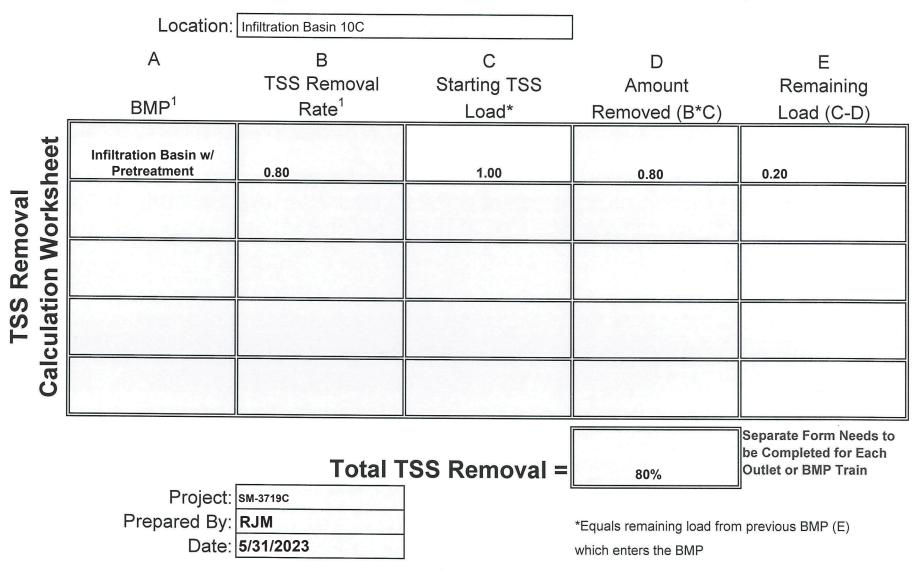
- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D



- 1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D



- 1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
- 2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
- 3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
- 4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
- 5. Total TSS Removal = Sum All Values in Column D







#### CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION **BASED ON THE RATIONAL RAINFALL METHOD**

#### **COTTAGES AT WANDERING POND** STOW, MA

0.34 ac Unit Site Designation **DMH AS1** Area Weighted C 69

Rainfall Station # 0.9

6 min

CDS Model 1515-3 **CDS Treatment Capacity** 1.0 cfs

<u>Rainfall</u> <u>Intensity<sup>1</sup></u> (in/hr)	Percent Rainfall  Volume <sup>1</sup>	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	10.2%	10.2%	0.01	0.01	9.8
0.04	9.6%	19.8%	0.01	0.01	9.3
0.06	9.4%	29.3%	0.02	0.02	9.1
0.08	7.7%	37.0%	0.02	0.02	7.4
0.10	8.6%	45.6%	0.03	0.03	8.2
0.12	6.3%	51.9%	0.04	0.04	6.0
0.14	4.7%	56.5%	0.04	0.04	4.4
0.16	4.6%	61.2%	0.05	0.05	4.4
0.18	3.5%	64.7%	0.06	0.06	3.3
0.20	4.3%	69.1%	0.06	0.06	4.0
0.25	8.0%	77.1%	0.08	0.08	7.4
0.30	5.6%	82.7%	0.09	0.09	5.1
0.35	4.4%	87.0%	0.11	0.11	3.9
0.40	2.5%	89.5%	0.12	0.12	2.2
0.45	2.5%	92.1%	0.14	0.14	2.2
0.50	1.4%	93.5%	0.16	0.16	1.2
0.75	5.0%	98.5%	0.23	0.23	4.1
1.00	1.0%	99.5%	0.31	0.31	0.8
1.50	0.0%	99.5%	0.47	0.47	0.0
2.00	0.0%	99.5%	0.62	0.62	0.0
3.00	0.5%	100.0%	0.93	0.93	0.2
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					92.9

Removal Efficiency Adjustment<sup>2</sup> = 6.5% Predicted % Annual Rainfall Treated = 93.5%

Predicted Net Annual Load Removal Efficiency = 86.4%

<sup>1 -</sup> Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA

<sup>2 -</sup> Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.





#### CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION **BASED ON THE RATIONAL RAINFALL METHOD**

#### **COTTAGES AT WANDERING POND** STOW, MA

0.33 ac Unit Site Designation **DMH AS2** Area **69** 

Rainfall Station # Weighted C 0.9

6 min

CDS Model 1515-3 **CDS Treatment Capacity** 1.0 cfs

<u>Rainfall</u> <u>Intensity<sup>1</sup></u> (in/hr)	Percent Rainfall Volume <sup>1</sup>	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	10.2%	10.2%	0.01	0.01	9.8
0.04	9.6%	19.8%	0.01	0.01	9.3
0.06	9.4%	29.3%	0.02	0.02	9.1
0.08	7.7%	37.0%	0.02	0.02	7.4
0.10	8.6%	45.6%	0.03	0.03	8.2
0.12	6.3%	51.9%	0.04	0.04	6.0
0.14	4.7%	56.5%	0.04	0.04	4.4
0.16	4.6%	61.2%	0.05	0.05	4.4
0.18	3.5%	64.7%	0.05	0.05	3.3
0.20	4.3%	69.1%	0.06	0.06	4.0
0.25	8.0%	77.1%	0.07	0.07	7.4
0.30	5.6%	82.7%	0.09	0.09	5.1
0.35	4.4%	87.0%	0.10	0.10	3.9
0.40	2.5%	89.5%	0.12	0.12	2.3
0.45	2.5%	92.1%	0.13	0.13	2.2
0.50	1.4%	93.5%	0.15	0.15	1.2
0.75	5.0%	98.5%	0.22	0.22	4.1
1.00	1.0%	99.5%	0.30	0.30	0.8
1.50	0.0%	99.5%	0.45	0.45	0.0
2.00	0.0%	99.5%	0.60	0.60	0.0
3.00	0.5%	100.0%	0.90	0.90	0.2
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					93.0

Removal Efficiency Adjustment<sup>2</sup> = 6.5% Predicted % Annual Rainfall Treated = 93.5%

Predicted Net Annual Load Removal Efficiency = 86.6%

<sup>1 -</sup> Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA

<sup>2 -</sup> Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.





## CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD

# COTTAGES AT WANDERING POND STOW, MA

Area 0.07 ac Unit Site Designation DMH WPW1

Weighted C 0.9 Rainfall Station # 69

t<sub>c</sub> 6 min

CDS Model 2015-4 CDS Treatment Capacity 1.4 cfs

Rainfall Intensity <sup>1</sup> (in/hr)	Percent Rainfall  Volume <sup>1</sup>	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	10.2%	10.2%	0.00	0.00	9.9
0.04	9.6%	19.8%	0.00	0.00	9.4
0.06	9.4%	29.3%	0.00	0.00	9.2
0.08	7.7%	37.0%	0.01	0.01	7.5
0.10	8.6%	45.6%	0.01	0.01	8.3
0.12	6.3%	51.9%	0.01	0.01	6.1
0.14	4.7%	56.5%	0.01	0.01	4.5
0.16	4.6%	61.2%	0.01	0.01	4.5
0.18	3.5%	64.7%	0.01	0.01	3.4
0.20	4.3%	69.1%	0.01	0.01	4.2
0.25	8.0%	77.1%	0.02	0.02	7.7
0.30	5.6%	82.7%	0.02	0.02	5.4
0.35	4.4%	87.0%	0.02	0.02	4.2
0.40	2.5%	89.5%	0.03	0.03	2.4
0.45	2.5%	92.1%	0.03	0.03	2.4
0.50	1.4%	93.5%	0.03	0.03	1.3
0.75	5.0%	98.5%	0.05	0.05	4.8
1.00	1.0%	99.5%	0.06	0.06	1.0
1.50	0.0%	99.5%	0.09	0.09	0.0
2.00	0.0%	99.5%	0.13	0.13	0.0
3.00	0.5%	100.0%	0.19	0.19	0.4
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					96.6

Removal Efficiency Adjustment<sup>2</sup> = 6.5% Predicted % Annual Rainfall Treated = 93.5%

Predicted Net Annual Load Removal Efficiency = 90.1%

<sup>1 -</sup> Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA

<sup>2 -</sup> Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.





# CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD

# COTTAGES AT WANDERING POND STOW, MA

Area 0.23 ac Unit Site Designation DMH WPW2

Weighted C 0.9 Rainfall Station # 69

t<sub>c</sub> 6 min

CDS Model 1515-3 CDS Treatment Capacity 1.0 cfs

Rainfall Intensity <sup>1</sup> (in/hr)	Percent Rainfall Volume <sup>1</sup>	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	10.2%	10.2%	0.00	0.00	9.9
0.04	9.6%	19.8%	0.01	0.01	9.3
0.06	9.4%	29.3%	0.01	0.01	9.1
0.08	7.7%	37.0%	0.02	0.02	7.4
0.10	8.6%	45.6%	0.02	0.02	8.2
0.12	6.3%	51.9%	0.02	0.02	6.0
0.14	4.7%	56.5%	0.03	0.03	4.4
0.16	4.6%	61.2%	0.03	0.03	4.4
0.18	3.5%	64.7%	0.04	0.04	3.4
0.20	4.3%	69.1%	0.04	0.04	4.1
0.25	8.0%	77.1%	0.05	0.05	7.5
0.30	5.6%	82.7%	0.06	0.06	5.2
0.35	4.4%	87.0%	0.07	0.07	4.0
0.40	2.5%	89.5%	0.08	0.08	2.3
0.45	2.5%	92.1%	0.09	0.09	2.3
0.50	1.4%	93.5%	0.10	0.10	1.2
0.75	5.0%	98.5%	0.15	0.15	4.4
1.00	1.0%	99.5%	0.21	0.21	0.8
1.50	0.0%	99.5%	0.31	0.31	0.0
2.00	0.0%	99.5%	0.41	0.41	0.0
3.00	0.5%	100.0%	0.62	0.62	0.3
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
	-		-		94.3

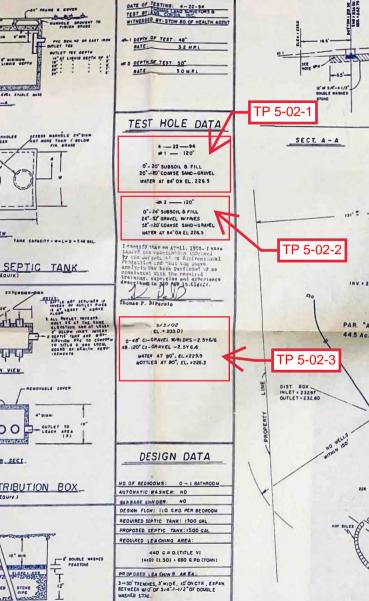
Removal Efficiency Adjustment<sup>2</sup> = 6.5% Predicted % Annual Rainfall Treated = 93.5%

Predicted Net Annual Load Removal Efficiency = 87.9%

<sup>1 -</sup> Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA

<sup>2 -</sup> Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.





Location Address or Lot No. PEL, A-Athens Lave-(BARK),

[11 3-02-3 ]	<u> In-site Review</u>
Deep Hole Number 3 Date: 5/3/2 Location (identify on site plan)	SE Plan 3:45 Weather AIR
Land Use FARM Slope ( Vegetation FIELD GRASS Landform TERRACE	%) 190 Surface Stones
Position on landscape (sketch on the back) Distances from:	JEE PLAN
Open Water Body 306 feet Possible Wet Area //5 feet Drinking Water Well /60 feet	Property Line 180 feet Other
DEEP OBS	ERVATION HOLE LOG*

- 1	DEEP OBSERVATION HOLE LOG*							
			DELI OD	JENVA	HON HO	LE LOG		
}	Depth from	Soil Horizon	Soil Texture	Sall Calan				
	Surface (Inches)		(USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)		
	48"	Cı	GRAVE L W/BouldER	2.54%	No	COARSE LOOSE BOUIDERS		
	,120"	Cz	w/Boulden GZAVEL	2.546/6	80"	COARSE, MASSIVE		
			a .					
	·							
_	4 17070							

\* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) SAND DepthtoBedrock: More than 125"

Depth to Groundwater: Standing Water in the Hole: 90" Weeping from Pit Face: 90"

Estimated Seasonal High Ground Water: 80"



DEP APPROVED FORM - 12/07/95



Sheet: I of

100 HO: 51 5



Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 Soil Suitability Apparatus of the Conference of the

MAPRIZ PARCEL 4 +5

alla Addrass or Man/I of Number

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

QUIRK PROPERTY

### STAMSKI AND MCHADY, INC.

	C. On-Site Review  Deep Observation Hole  1. Deep Observation Hole	Date Time	very proposed disposal area)  Weather	PREVARED FOR: FELTION & SON MCTON, MA
	Deep Observation Hole Lo     Deep Hole Number     Location (Identify on Pl	Ground Elevation at Surface of	of Hole	140101011141
	Bau	ricultural field, vacant lot, etc.)	Surface Stones	Slope (%)
	Vegetation	Landform		n on landscape (attach sheet)
P 7-05-	Property	ter Body Drainage Way  [set] Line Drinking Water Well  [set]	Other	-
	4. Parent Material:		Unsuitable Materials Present: Y	es No 🗹
	If Yes: Disturbed Soil.	Fill Material Impervious Layer(s)	Weathered/Fractured Rock	Bedrock
	5. Groundwater Observed: Y	es ☐ No 🗹		•
	If Yes: Depth Weeping fi Estimated Depth to High Gr	roundwater: 40	ater in Hole	

LK	
(1)	1

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program

MAP R-Z PADCELS 415

Sile Address or Map/Lol Number

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Deep	Observation Hole A:	Deep Hole Number:_	and the same of th
			,

Depth (In.)	Soll Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redo	eximorphic Fea (mottles)	tures	Soll Texture (USDA)		ragments /olume.	Soll Structure	Soil Consistence (Moist)	Other
(111.7			Depth	Color	Percent		Gravel	Cobbles & Stones		, ,	
6	A	かって				5	gercari	10	М		
20	B	5/6	nemone.		Nessanidi	SL	<sub>оргун</sub> ай <sup>ду</sup>	smert!	M	- Court	
135	C	6/2	40	5/8 5/8	>(0	SALLAD PORTUN				UEMY FREI ANSUR	
			,								
			,	**************************************							
				-							

Additional Notes	



Massachusetts Department of Environmental Protection

Bureau of Resource Protection – Wastewater Permitting Program

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

GUIRK PROPERTY

Stramski	<b>A+D</b>	MCNARY, INC.
----------	------------	--------------

C. On-Site Review (mir	nimum of two holes required at every pro-	roposed disposal area) SM 95° Weather	Prevared for: Felton & Son
Deep Observation Hole Logs			ACTON, MA
Deep Hole Number	Ground Elevation at Surface of Hole	*****	•
Location (Identity on Plan )			
2. Land Use: FIF-10			across agency
(a.g. woodland, agricultural fiel		Surface Stones	Slope (%)
Vegetation Vegetation	Landform	Position	on landscape (attach sheel)
3. Distances from: Open Water Body  7-05-8  Property Line feet	Prainage Way Feet Feet Drinking Water Well Feet Feet Feet Feet Feet Feet Feet F	Possible Wet Area <u>&gt;(Q)</u> Other	PER RECOVED
4. Parent Material:	Unsui	table Materials Present: Ye	s No 🖄
			•
lf Yes; Disturbed Soil☐ Fill Mate	erial   Impervious Layer(s)   Wea	athered/Fractured Rock	Bedrock[]
If Yes: Disturbed Soil☐ Fill Mate	. — · · · · · · · · · · · · · · · · · ·	athered/Fractured Rock[]	Bedrock[]
· · · · · · · · · · · · · · · · · · ·	40 <b>a</b>	· —	Bedrock[]

-	
7	
<b>1</b> . N	
	V.4
	'\_

Massachusetts Department of Environmental Protection Bureau of Resource Protection - Wastewater Permitting Program MAP R-Z PACCELS 415

STOW, MA Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Depth	Soll Horizon/ Layer	Soli Matrix: Color-Moist (Munsell)	Color-Moist (mottles) (Munsell)		tures	Soll Texture (USDA)	Coarse Fragments % by Volume		Soll Structure	Soll Consistence (Molst)	Other
(ln.)			Depth	Color	Percent	,	Gravel	Cobbles & Stones			
6	Α	10y/2 31Z	<u> </u>	-		90		Witcom	M	F	
20	B	SIC	o.,		-parent-i	SU	agriculation.		11	-	
132	C	2.5%	40	902 5/8	>5	SANO	***************************************		M	FRANCE	
,			ŀ	·					,		
***************************************											
			,								
						,					

Additional Notes	S



Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program

MAPRIZ PARCEL 445

Sile Address or Map/Lol Number

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

dvirk property

#### STAMSKI AND MCNARY, INC.

C. On-Site Review (minimum of two holes required at every proposed disposal area)  Deep Observation Hole A: Time Weather	Prevared for: - Felton & 500
Deep Observation Hole Logs     Deep Hole Number	ACTON, MA
Location (Identify on Plan )	
2. Land Use: TEW (e.g. woodland, agricultural field, vacant jol, etc.)  Surface Stones	Sippe (%)
P 7-05-9	lon on landscape (attach sheet)
3. Distances from: Open Water Body Drainage Way Possible Wet Area Feet Property Line Drinking Water Well Geet  Feet Feet Feet Feet Feet Feet Feet	-> 200 TO PERENTURE STREAM
4. Parent Material: Unsuitable Materials Present:	Yes No 🗹
If Yes: Disturbed Soil Fill Material Impervious Layer(s) Weathered/Fractured Rock	Bedrock[]
5. Groundwater Observed: Yes 🗀 No 🔃	
If Yes: Depth Weeping from Pit 99 Depth Standing Water in Hole	
Estimated Depth to High Groundwater:  Inches elevation	

	ı
7	
$\sim 10^{-1}$	l
	i

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program

MAP R-Z PADCELS 415

Sile Address or Map/Loi Number

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

			a a
Deep Observatio	n Hole A:	Deep Hole Number:	

Depth (In.) Soll Layer	Soll Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soll Texture (USDA)		ragments Volume	Soil Structure	Soil Consistence (Moist)	Other	
(111.)			Depth	Color	Percent		Gravel	Cobbles & Stones		, ,	
Ч	A	104C 31Z	arterior,		grice,	SL	Wasaisharin.	estadu)	M	. 15	
18	ß	104R 5/G	Name of the last o		Sauce	SL	All the second s		M	F	
130	C	254	32	218	OK OK	LS	-	STATE OF THE PARTY.	M	The same of the sa	
		·	,		210			·			
				,							
			,								

Additional Notes	



Massachusetts Department of Environmental Protection

Bureau of Resource Protection – Wastewater Permitting Program

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

TOU, MA

MAPRIZ PARCEL 445

### STAMSKI AND MCHANY, INC

QUIRK PROPERTY

	-Site Review bservation Hole A		to holes required at evi	ery proposed disposal are	Prevared for Feature & 500
1. Deep	Observation Hole Logs	00.6	inne	AABSIDEL	ACTON, MA
	ep Hole Numbe 10		Elevation at Surface of		
	Jse: Fig. Woodland, agricult		elc.)	Surface Stones	Slope (%)
	Vegetation		Landform		Position on landscape (attach sheet)
3. Distand	es from: Open Water Property Line	Body leet B Drink leet	Drainage Way	Possible Wet Area	> (1) PER RECOVED
4. Parent l	Material:			Insuitable Materials Prese	ent: Yes No S A
If Yes:	Disturbed Soil Fi			Insuitable Materials Prese	•
If Yes:	Disturbed Soil Fi	□ No D}	pervious Layer(s) 🗌	Weathered/Fractured Ro	•
If Yes:  5. Ground  If Yes:	Disturbed Soil Fi	□ No 🔀	pervious Layer(s)   Depth Standing Wate	Weathered/Fractured Ro	•
If Yes:  5. Ground If Yes: Estimate	Disturbed Soil Fi vater Observed: Yes Depth Weeping from ed Depth to High Groun assachusetts Dep	Pit	Depth Standing Wate  30 11 electron  vironmental Protests astewater Permittir	Weathered/Fractured Ro	MAP R-Z PADCELS  Sile Address or Mac/Lot Num
If Yes:  5. Ground If Yes: Estimate	Disturbed Soil Fi vater Observed: Yes Depth Weeping from ed Depth to High Groun assachusetts Dep	Pit	Depth Standing Wate  30 11 electron  vironmental Protests astewater Permittir	Weathered/Fractured Ro	ock Bedrock SULFILE
If Yes:  5. Ground If Yes: Estimate  MB	Disturbed Soil Fi	Pit	Depth Standing Water  Soft s elections  vironmental Protestewater Permittir  Assessment	Weathered/Fractured Ro	MAP R-Z PADCELS  Sile Address or Mac/Lot Num

Depth (In.)	Soll Horizon/ Layer	Soll Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soll Consistence (Moist)	Other
(111.)		:.	Depth	Color	Percent		Gravel	Cobbles & Stones		(	
6	A	10ya 31z		was	Janeses,	<b>ラ</b> レ		る	M	A Commence of the Commence of	
19	ß	slo	Reducina arm	Military and a second	Newson .	SL	with the second second	- marketen.	M.	Para de la constante de la con	
130	C	2.58	30"	1918 15/8	>10	6ANY SANO	Managaran da		Mess a	Proces.	
			,								
			,		,						

Additional Notes	



Massachusetts Department of Environmental Protection

Bureau of Resource Protection – Wastewater Permitting Program

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

IPRIZ PARCEL 445

QUIRK PROPERTY

## STAMSKI AND MCNADY, INC.

C. On-Site Review  Deep Observation Hole A	(minimum of two holes required at every p	roposed disposal area)  Weather	prevared for: Felton & 500
Deep Observation Hole Logs     Deep Hole Number     Location (Identify on Plan)	Ground Elevation at Surface of Hole		ACTON, MA
7-05-11  2. Land Use:  (e.g. woodland, agriculting the state of the st	ural field, vacant lot, etc.)	Surface Stones	Slope (%) on landscape (attach sheet)
3. Distances from: Open Water I Property Line	Body Drainage Way feet  Feet Drinking Water Well feet	Possible Wet Area	Par RECORD RAN
3. Distances from: Open Water to Property Line  4. Parent Material:	e Drinking Water Well feet	Possible Wet Area	
Property Line  4. Parent Material:	e Drinking Water Well feet	Otheritable Materials Present: Yes	5□ NOØ FILL WITH
Property Line  4. Parent Material:	e Drinking Water Well feet Unsu	Otheritable Materials Present: Yes	S□ NOØ FILE WTHN Bedrock□ A & B
Property Line  4. Parent Material:	Drinking Water Well feet    Unsu	Otheritable Materials Present: Yes	5□ NO Ø FILL WITH

Massachusetts Department of Environmental Protection

Bureau of Resource Protection – Wastewater Permitting Program

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MAP R-Z PACCELS 415

Sile Address or Map/Lot Number

510W, MA

Deep Observation Hole A:	Deep Hole Number:

Depth	Soll Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)			atures	Soll Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
(In.)			Depth	Color	Percent		Gravel	Cobbles & Stones		, ,	
18	A+ FILC	101L	<u> </u>	essenticipare*	entanonic.	SL	Palacinisminister	15	W		BOWERS
26	B	WAR		. فييند	No.	54			M	The state of the s	
120	C	58R 4/1	34"	5/8	for	LOAMY	**************************************		W	Fig. 40U	
			5					·			
				,				·			
					,						

Additional Notes	



Massachusetts Department of Environmental Protection Bureau of Resource Protection - Wastewater Permitting Program

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal GUIRK PROPERTY AND MCNAMY TWO

	On-Site Review (	minimum of two holes required to the second	uired at every propose · · ·	d disposal area)  Swg 90	Prefaced for: Felton d Son
1. D	Deep Hole Number 12  Location (Identify on Plan )	_ Ground Elevation at a	Surface of Hole		Метон, МА
<sup>2. 1</sup> 7-05-12	and Use: 60 (e.g. woodland, agricultura Vegetation	I field, vacant lot, etc.)		urface Stones	Slope (%) on landscape (attach sheet)
3. D	stances from: Open Water Bo Property Line	dy Drainage W   Teet	feet	le Wet Area	
	rent Material:			Materials Present: Ye	
· ·	/es: Disturbed Soil□ Fill N  oundwater Observed: Yes □		ayer(s) 🗍 Weathere	d/Fractured Rock	Bedrock Sprann
lf.	es: Depth Weeping from Pi	t Depth Sta	anding Water in Hole _	***************************************	18, act our

Massachusetts Department of Environmental Protection

Bureau of Resource Protection – Wastewater Permitting Program

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MAP R-Z PACCELS 415

Other

elevation

neet	Observ	ation note A	<i>D</i>	eeb noie v	iumber				
Depth	Soll Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redo	ximorphic Fe (mottles)	atures	Soll Texture (USDA)	Coarse Fragments % by Volume	Soil Structure	Soil Consistence (Moist)
(ln.)	-		Depth	Color	Percent		Gravel Cobbles		

Depth	Layer	(Munsell)				(USDA)				(Moist)	
(in.)			Depth	Color	Percent	, ,	Gravel	Cobbles & Stones		, ,	
6	A	10412 512	gr. 4.		madelific.	SU	nggagatilika dikur.	alifetida estas	M	· F	
18	ß	5/6			Negacio	ŞL	Napoduje politecimo r	The plant of the	M	Antonia.	
72	C	2.57	38	5/8	>56	Sylva	all frame and the second of	5	M	Market in	
132	CZ	2.54 5/4	,	~		SANO	15	2	<b>3</b>	W	
		,									
			,				•				

Additional Notes	



Massachusetts Department of Environmental Protection

Bureau of Resource Protection – Wastewater Permitting Program

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

QUIRK PROPERTY

### STAMSKI AND MCNARY, INC.

C. On-Site Review (r	ninimum of two holes required at every	proposed disposal area)  Sun 70  Wealher	Prevared for: Felton & 500
Deep Observation Hole Logs			ACTON, MA
Deep Hole Number	Ground Elevation at Surface of Ho	e	
2. Land Use: Fieto	- ADJAZENT TO CHICK		
7-05-13 (e.g. woodland, agricultural		Surface Stones	Slope (%)
Vegetation	Landform		n on landscape (attach sheet)
	Drainage Way    Geet	166	- AN HACENAD CALL
÷			
4. Parent Material:	Uns	ultable Materials Present: Y	es   No ld
If Yes: Disturbed Soil□ Fill M	aterial impervious Layer(s) W	eathered/Fractured Rock	Bedrock
5. Groundwater Observed: Yes 🏖	No 🗌		
If Yes: Depth Weeping from Pit	Oepth Standing Water I	n Hole	
Estimated Depth to High Groundw	ater: 35 elevati	20	



Massachusetts Department of Environmental Protection

Bureau of Resource Protection – Wastewater Permitting Program

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MAP R-Z PACCELS 415

Sile Address or Map/Lol Number

Deep Hole Number:\_ Deep Observation Hole A:

Depth	Soll Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redo	ximorphic Fea (mottles)	tures	Soll Texture (USDA)		ragments /olume	Soil Structure	Soll Consistence (Moist)	Other
(In.)			Depth	Color	Percent		Gravel	Cobbles & Stones			
7	А	104R	digital franchis ;	·	angerparing	<b>シ</b> し		70	M	<u> </u>	BOLLEUS
14	ß	101R 5/6	*wind-	<b>N</b> ARTISEP <sup>2</sup>	describing)	らし	Marine and Articles	Amustania	M	No. of Street,	
35	C	2.54 5/4	35	518	>10%	5A10	2	N <sub>200</sub> eV <sup>2</sup>	M	50-ASU	
120	Cz	6/3	ı			SAN	market of the second		M.	THE FIRST	
			,								

Additional Notes	



Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program

MAPR. 2 PARCEL 4 \$5

Sile Address or Map/Lol Number

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

dview property

### STAMSKI AND MCNADY, INC.

	C. On-Site Review  Deep Observation Hole A			roposed disposal area)	Prefared for: Felton d Son
	1. Deep Observation Hole Logs				ACTON, MA
	. Deep Hole Number		on at Surface of Hole		
	location (Identify on Plan )	- NEAR	BOXTONEL	Manager of the second s	
	2. Land Use: FEW				and the second
7-05-1	(e.g. woodland, agricult	tural field, vacant lot, etc.)		Surface Stones	Slope (%)
	Vegetation		Landform	Positio	n on landscape (attach sheet)
	3. Distances from: Open Water Property Line	e Drinking W	Vater Well feet	Possible Wet Area <u>&gt;(0)</u> Other	PLAN
	4. Parent Material:		Unsui	table Materials Present: Ye	es 🗌 No 🐧
	If Yes: Disturbed Soil□ Fi	III Material Impervio	ous Layer(s) 🗌 Wei	athered/Fractured Rock	Bedrock D
	5. Groundwater Observed: Yes	□ No 個			
	If Yes: Depth Weeping from	Pit (O Dept	th Standing Water In	Hole	

7	7
	V-4

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program

MAP R-Z PADCELS 415

Sile Address or Map/Lol Number

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Deep Observation Hole A:	Deep Hole Number:	14
--------------------------	-------------------	----

Depth (In.)	Soll Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redo	xlmorphic Fea (mottles)	tures	Soll Texture (USDA)		ragments /olume	Soil Structure	Soll Consistence (Moist)	Other
(in.)			Depth	Color	Percent		Gravel	Cobbles & Stones		, ,	
18	+A	1012	<b>a</b> likkh	enter service of the	er commonly in a	SU	Minima	15	M	garantis George	BOULERS,
24	B	5/6	Merica	second of	ONE CONTRACTOR	50	Magazari -	10	Pr-1	North	FLERMS
120	C	2.58	34	SYS! S/B	15	LOAMY SVAVO	gant	15	V**	r	
			ر								
								-			
			,		,						

Additional Notes	



Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program

MAPRIZ PARCEL 445

Sile Address or Map/I of Number

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

dvirk property

## STAMSKI AND MCNADY, INC.

	C. On-Site Review  Deep Observation Hole A:	(minimum of two holes required at	every proposed disposal area)	PREMARED FOR: Fenton & SON
	Deep Observation Hole Logs     Deep Hole Number	Date Time  Ground Elevation at Surface	Wealher of Hole	ACTON, MA
	Location (Identify on Plan )		<del> </del>	
7-05-1	2. Land Use: 60 (e.g. woodland, agricultu	Aral field, vacant lot, etc.)	Surface Stones	Slope (%)
7-05-1	Vegetation Vegetation	Landform	Positio	n on landscape (attach sheet)
3	3. Distances from: Open Water E Property Line	Body Drainage Way Feet Drinking Water Well Feet	Other	-
4	4. Parent Material:		Unsultable Materials Present: Y	es 🗆 No 🛱
	If Yes: Disturbed Soil Fil	Material     Impervious Layer(s)	Weathered/Fractured Rock	Bedrock
5	5. Groundwater Observed: Yes (	No		
	If Yes: Depth Weeping from	Pit Depth Standing W	/ater in Hole	
	Estimated Depth to High Groun		elevation	

-		1
1	7	
	$C \sim 1$	
i		
ı	$\sim 10^{-1}$	
ı,		

Massachusetts Department of Environmental Protection Bureau of Resource Protection – Wastewater Permitting Program MAP R-Z PADCELS 415

Sile Address or Map/Lol Number

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Deep	Observation Hole A:	Deep Hole Number:	15

Depth (In.)	Soll Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)		ximorphic Fea (mottles)		Soil Texture (USDA)	% by \	ragments /olume	Soil Structure	Soil Consistence (Moist)	Other
(1111)		:.	Depth	Color	Percent		Gravel	Cobbles & Stones			
6	A	1041C 31 Z	No. of Section 1997	##Skipsocities**	de mariante de la companya de la co	SL			M	· Marie	
20	B	1048	NONO CENTRAL	<sup>th</sup> anged	stifohosen**	SU		43.000	M	gray, ye c.	
130	C	a.53 613	52	218 218	75	6AMY SAMO	10	3	M	Joss E	Sun
			,								
			,								

Additional Notes	S



Massachusetts Department of Environmental Protection

Bureau of Resource Protection – Wastewater Permitting Program

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

QUIRK PROPERTY

#### STAMSKI AND MCHAOY, INC.

<ul><li>C. On-Site Review</li><li>Deep Observation Hole A:</li></ul>			Prefared for:
Deep Observation Hole Logs	Date Time	Weather	FELTON & SON ACTON, MA
Deep Hole Number  Location (Identify on Plan)	Ground Elevation at Surface of		
	Mex ural field, vacant lot, etc.)	Surface Stones	Slope (%)
7-05-16	Landform		on on landscape (attach sheet)
3. Distances from: Open Water E Property Line	Body Drainage Way feet Drainage Water Well feet	Possible Wet Area Confeet	-
4. Parent Material:		nsuitable Materials Present: `	res No L
If Yes: Disturbed Soil Fill	Material   Impervious Layer(s)	Weathered/Fractured Rock	Bedrock
5. Groundwater Observed: Yes [	□ No Ø		
If Yes: Depth Weeping from	Pit Depth Standing Water	er in Hole	
Estimated Depth to High Ground .	dwater: Lipo inches ele	rallon	



Massachusetts Department of Environmental Protection

Bureau of Resource Protection – Wastewater Permitting Program

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MAP R-Z PACCELS 415

Sile Address or Map/Lol Number

STOW, MA

Deep Observation Hole A:	Deep Hole Number:	16
--------------------------	-------------------	----

Depth	Soll Horizon/ Layer	Soli Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soll Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
(in.)			Depth	Color	Percent		Gravel	Cobbles & Stones			
7	Α	loya siz	,	, addingonal conference	alisten,	SL	Olimoto),	15	M	gamaco.	Burroses
26	B	1048 5/6	Alleman,	sunsoi.	Bayoner"	SŁ	walkin.	5	Μ	F	
124	C	2.5%	40	218	>5	LS	3	5	M	F.	
			j								
			,								

Additional Notes _	 ····	***************************************	 	



TP 6-19-1

The Street												
C. On-	Site Revi	ew (minim	um of two hole	es requ	ired at ever	y propo	sed prim	nary and r	eserve disp	osal area)		
Deep	Observation	Hole Numb	Hole #	Date	1/19	Time		Weather	N6	Latitude		Longitude:
1. Land Des	Use (e.g., wo	odland, agriculti	ural field, vacant lot, e		Vegetation			Surface Stone	s (e.g., cobbles,	stones, boulder	rs, etc.)	Slope (%)
	arent Materia	_	twah						BS			
				1001	Lar	ndform			tion on Landscap			Nan!
3. Distar	nces from:		n Water Body					/ay <u>&gt;100′</u>				2/00 feet
4	lala Makadala			2/0' fee				/ell <u>&gt;/60                                    </u>	feet Neathered/Fra		Other	feet
4. Unsulta	able Materials	s Present: _	Yes 🗵 No	rres: [	Disturbed S	9011 🔲 1	riii watena		/vealliered/Fra	clured Rock	Пре	diock
5. Grour	ndwater Obse	rved: Yes	No 🗵 No		If yes	S:	Depth Wee	ping from Pit	_	Depth S	tanding \	Water in Hole
						Soil Log						
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Red	oximorphic Fea	tures	Coarse %	Fragments Volume	Soil Structure	Soil Consistence		Other
Depui (III)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	oon on dotal	(Moist)		
0-10	Aρ	SL	10 YA 3/2	1	-	,	-	_	M	of the second		
10-34	Bu	LS	104R 4/6	1	-	_	_		M	F		
34-115		Sand	107R 5/6	87"	10484/4	37.	7%	12%	SG	100se		
			,				e.					
Additi	onal Notes:	1										



TP 6-19-2

0											
			um of two hole	es requi	ired at ever	ry propo	sed prim	ary and r	eserve disp	osal area)	
Deep	Observation	Hole Numb	er: <u>TP-a</u>	6	4/19						
	1.	NICHTSON CECM		Date	•	Time		Weather		Latitude	Longitude:
1. Land	Use (e.g., wo	odland, agricultu	ural field, vacant lot, e	tc.)	Vegetation	-		Surface Stone	s (e.g., cobbles,	stones, boulder	Slope (%)
Des	scription of Lo	ocation:	Olf curt pa	ith							
2. Soil P	arent Materia	al:	twash							BS	
				iant		ndform		R.	tion on Landscap		
3. Distar	nces from:		n Water Body	_ 0				ay <u>2000</u>			tlands <u>2/00</u> feet
4. Unquito	blo Motorial		Property Line ⊃ ] Yes ⊠ No ⊣	2/0 fee		-	-	/ell <u>&gt; /00</u> ′	feet Neathered/Fra		Other feet
4. Ulisuita	ible Material	s Present.	j res ⊵jino i	rres. L		5011 🔲 1	-III Iviateriai		vealliereu/Fra	clured Rock	☐ Bedrock
5. Grour	ndwater Obse	erved:  Yes	s ⊠ No		If yes	s: <u> </u>	Depth Wee	ping from Pit	-	Depth S	tanding Water in Hole
		r				Soil Log					
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Redo	oximorphic Fea	itures		ragments Volume	Soil Structure	Soil Consistence	Other
Dopar (m)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones		(Moist)	
0-12	Ap	SL	104R3/2	_	1	u-	_	-	M	F	
12-34	Bw	LS	10 4R 7/6	Ü		-		-	M	F	
34-120	C	Sand	10YR 3/6		_	_	101.	77.	SG	Loose	
		,				,					
					P e						
Additi	onal Notes:	110	redox, n	o v	ecping						
-											



TP 6-19-3

		/									
-Site Revi	ew (minim	um of two hole	G	R	ry propo	sed prin	nary and r	eserve disp	osal area)		
Observation	Hole Numb	er: <u>1P-3</u>	6/4	2019	<del>_</del>		. Weether		Latituda		
1	Noodlan	Hole #			Time		vveatner	Jo	Latitude	Longitude:	
Use (e.g., wo	odland agricultu	ural field, vacant lot, e		Vegetation			Surface Stone	s (e.g., cobbles,	stones, boulder	s, etc.) Slope (%)	
scription of Lo	ocation:	Utt cart	path								
Parent Materia	al: Out	wash									
,	•		106								
inces from:							200 Security (1997)			3	
ahla Matariak											
		er e e e e e e e e e e e e e e e e e e	1103.						-		
ndwater Obse	erved: Yes	s ⊠ No		If yes			ping from Pit	-	Depth S	tanding Water in Hole	
	<u> </u>				Soil Log		F				
Soil Horizon	Soil Texture	Soil Matrix: Color-	Redo	oximorphic Fea	atures		Volume	Soil Structure	Soil Consistence	Other	
/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Stones		(Moist)	~~~	
Aρ	SL	10 YR 3/2	_	<del>-</del>	_	No.	_	M	F		
Bω	LS	10 YR 4/6	_	_	-		-	m	F		
C	Sand	10YR 5/6	_			7%.	12%	56	Loose		*
		,									
	ы										
				e)					a		
tional Notes:	No	redox, no	s we	ping,	no sta	nding	نعيا ا	ter			
	Observation  Use (e.g., wo escription of Local Parent Material ances from:  Table Materials andwater Observation (Layer)  Soil Horizon (Layer)	Site Review (minimal of Observation Hole Number Observation Hole Number Observation Hole Number Observation:    Use   (e.g., woodland, agricultrescription of Location:	Site Review (minimum of two holes of Observation Hole Number: 1P-3 Hole # 1 Use (e.g., woodland, agricultural field, vacant lot, execription of Location: OFF Caff Caff Caff Caff Caff Caff Caff Ca	Parent Materials Present:   Soil Horizon //Layer  Soil Horizon //Layer  Soil Texture (USDA  Soil No Sand  10 YR 3/2  C  Sand  10 YR 3/2  C  Sand  10 YR 5/6  C	Observation Hole Number:  Vegetation  Vegetation  Vegetation  Vegetation  Vegetation  Observation Hole Number:  Observatio	Site Review (minimum of two poles required at every propore proposed by Observation Hole Number: 1P-3   Color pate   Time   Time	Site Review (minimum of two poles required at every proposed print to Observation Hole Number:    Observation Hole Number: 1P-3	Site Review (minimum of two holes required at every proposed primary and representation Hole Number:    Observation Hole Number: 1	Surface Stones (e.g., cobbles, cobbervation Hole Number: 10-3   Date   Date   Time   Weather   Weather   Weather   Date   Time   Weather   Weather   Date   Date	Surface Stories (e.g., woodland, agricultural field, vacant lot, etc.)  Parent Material:  Open Water Body Property Line Able Materials Present:  Able Metatron Soil Texture (USDA Moist (Munsell))  Soil Horizon April 10 Matrix: Color-Moist (Munsell)  April 10 Matrix: Color-Moist (Munsell	Description of Location:  Open Water Body Property Line Property Line Water Observed:  Soil Horizon Soil Texture (USDA Soil Matrix: Color Moist (Munsell) Depth Color Percent Gravel Color Co



Commonwealth of Massachusetts

City/Town of

TP 6-19-4

_											
C. On-	Site Revi	ew (minim	um of two hole			ry propo	sed prim	nary and r	eserve disp	osal area)	
Deep	Observation	Hole Numb	er: 10-4 Hole #	Date	1/2019	Time		Weather		Latitude	Longitude:
	Land Use (e.g., woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g., cobbles, stones, boulders, etc.) Slope (%)  Description of Location: Off Cach Cach Cach Soil Parent Material: Other Soil Parent Material: Open Water Body Moving feet Drainage Way 100 feet Wetlands 100 feet Property Line 100 feet Drainage Way 100 feet Other feet Other feet Unsuitable Materials Present: Yes No If Yes: Disturbed Soil Fill Material Depth Weeping from Pit Depth Standing Water in Hole Soil Log  Depth (in) Soil Hortron Clushar Closh Clushar Clusha										
				•							
		1	Property Line	10' fee	et et	D Drinking	g Water W	/ay <u>₹/00′</u> /ell <u>&gt;/00′</u>	feet feet	We	tlands <u>&gt;/OO'</u> feet Other feet
5. Grou	ndwater Obse	erved: Yes	S ⊠ No		If ye		į.		-	Depth S	tanding Water in Hole
Depth (in)			The second secon				% by	Volume Cobbles &	Soil Structure	Consistence	Other
0-15	Ap	SL	104R 3/2	Depart		-	ſ	Stolles	M	F	
15-34	Bw	LS	10 YR 4/6	_	_	_	_	-	M	F	
34-120	С	Sand	,	_		_	15%	167.	S6	Loose	-
,											
			,		×						
Addit	ional Notes:	No	redox, r	ið w	ceping,	00 5	itardin	g wat	e/		



**Commonwealth of Massachusetts** 

City/Town of

-												
C. On-	Site Revi	ew (minim	um of two hole	es requ	ired at ever	y propo	sed prim	nary and r	eserve disp	osal area)		
Deep	Observation	n Hole Numb	er: <u>TP-5</u>	6/1	1/2019				100			
			11010 #	Date '	,	Time		Weather	Nh	Latitude		Longitude:
1. Land	30-40 By LS 10 4x 4/6 M F											
Des	scription of Lo	ocation:	Off cart	patr	1				****			
2. Soil P	arent Materia	al: Outi	vaih									
				11 01							2 5	Stand
3. Distar	nces from:	•						-				-
4 Uneuita	able Materials			X								
				ii 165. [			riii iviateriai		veallieleu/Fla	Clured Nock		uiock
5. Grour	ndwater Obse	erved: Yes	s ⊠ No		If yes	s: <u> </u>	Depth Wee	ping from Pit	_	Depth S	tanding V	Vater in Hole
		<b>-</b>				Soil Log						
Depth (in)		the probability of the probability of the	ADMINISTRATION OF THE PROPERTY OF THE PROPERTY OF	Red	oximorphic Fea	tures		Volume	Soil Structure			Other
(,	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel					
0-20	Aρ	SL	10 YR 3/2	_	-	_		_	M	F		
20-40	Bh	LS	10 4R 4/6	_	_	-	\ -	-	M	F		
40-120	C	Sand	10 YR 3/6	86"	104R4/a	37.	16%	10%	SG	Loose		
			0		,							
			9									
Additi	onal Notes:	Po	weeping	or s	tarding	, nte	27					
		<u>:</u>			- $J$	- WW	***	and the second				



TP 6-19-6

_											
C. On-	Site Revi	ew (minim	um of two hole	es requi	red at ever	ry propo	sed prim	ary and r	eserve disp	osal area)	
Deep	Observation	n Hole Numb	er: TP-6	6/1	4/19						<del></del>
	11	Woodlar	d Hole #	Date '		Time			No		
	Deep Observation Hole Number: TPC   Hole #   Date   Time   Weather   Latitude   Longitude:										
		<u>~</u>		Pall	9					RC	
2. Soil F	arent Materia	al: <u>Ow</u>	Wash			ndform		Posi	tion on Landscar		FS, TS)
3. Distai	nces from:	Oper	n Water Body	7(00' fee			rainage W				4 4
							-		feet	(	Other feet
4. Unsuita	able Materials	s Present:	] Yes 🔼 No	If Yes:	Disturbed S	Soil 🗌 F	Fill Material		Weathered/Fra	ctured Rock	Bedrock
5. Grou	ndwater Obse	rved: Yes	⊠ No		If yes	s: <u> </u>	Depth Wee	ping from Pit	_	Depth S	tanding Water in Hole
						Soil Log					
Depth (in)			CONTROL OF THE STREET, STATE OF THE STREET, STATE OF THE STREET, STATE OF THE STREET, STATE OF THE STATE OF T	Redo	oximorphic Fea	itures		Volume	Soil Structure		Other
Боран (н.)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel		00.101.101.10	Accessors your release	
0 -12	Ap	SL	104R3/2	_	_	_	_	_	m	F	
1230	Bu	LS	104R4/6	_	_	_	/	_	m	F	
30-144	C	Sand	104R 5/4	_			7%	7%	SG	Loose	·
	Land Use (e.g., woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g., cobbles, stones, boulders, etc.) Slope (%)  Description of Location:  Soil Parent Material:  Open Water Body Property Line Proper										
			8								
Additi	Land Use (e.g., woodland, agricultural feld, vacant lot, etc.) Vegetation  Description of Location:  Soil Parent Material:  Open Water Body Property Line Property Line Property Line Unsuitable Materials Present:  Open Water Observed:  Fig. 18  Soil Horizon Noil Horizon Moist (Munsell)  Soil Horizon Moist (Munsell)  Additional Notes:  Additional Notes:  Description of Location:  Surface Stones (e.g., cobbles, stones, boulders, etc.)  Slope (%)  Surface Stones (e.g., cobbles, stones, boulders, etc.)  Slope (%)  Surface Stones (e.g., cobbles, stones, boulders, etc.)  Slope (%)  BS  Landform Position on Landscape (SU, SH, BS, FS, TS)										



S.W. Test Pit, not witnessed

4 O 10												
				es requ	ired at ever	y propo	sed prim	ary and r	eserve disp	osal area)		
Deep	Observation	Hole Numb	er: 19-7	6/2	1/19					1 10 1		
4 1	(	Modlan	Hole #	Date !		Time		1	Jo			
1. Land	Use (e.g., wo	odland, agricultu	ural field, vacant lot, e	tc.)	Vegetation			Surface Stone	es (e.g., cobbles,	stones, boulder	rs, etc.)	Slope (%)
				pona						1 5		
2. Soil F	arent Materia	ıl: <u>Ou</u>	twash			ndform					FS. TS)	
3. Distar	nces from:	Oper	n Water Body	<u>100</u> fee			rainage W					
		ı	Property Line 👤	/ <u>/</u> fee	et	Drinking	g Water W	/ell <u> </u>	feet	(	Other	feet
4. Unsuita	ble Materials	s Present:	] Yes ⊠ No I	f Yes: [	☐ Disturbed S	Soil 🗌 l	Fill Material	·	Weathered/Fra	ctured Rock	□Ве	drock
5. Groun	ndwater Obse	rved: Yes	i ⊠ No		If yes	: <u> </u>	Depth Wee	ping from Pit	<u>.</u>	Depth S	Standing V	Vater in Hole
						Soil Log						
Denth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Red	oximorphic Fea	tures		Volume	Soil Structure	Soil Consistence		Other
4. Unsuitable Materials Present: Yes No If Yes: Disturbed Soil Fill Material Weathered/Fractured Rock Bedrock  5. Groundwater Observed: Yes No If Yes: Depth Weeping from Pit Depth Standing Water in Hole  Soil Log  Depth (in) Soil Horizon / Layer (USDA Soil Matrix: Color-Moist (Munsell))  Depth Color Percent Gravel Stones  Soil Structure (Moist)  Fill Material Weathered/Fractured Rock Bedrock  Depth Weeping from Pit Depth Standing Water in Hole  Soil Log  Coarse Fragments % by Volume Soil Structure Colonsistence (Moist)  Other  Percent Gravel Stones  Soil Structure Companies Stones  Other												
5-9	Aρ	SL	10 YR 3/2	_	_	_	_	_	m	F		\
9-20	Bu	LS	104R 4/6	_	_	_	_	_	M	F		
26-120	C	Sand		92"	104R4/6	5%	5;	_	SG	Loose		
					1-							
Additi	onal Notes:	1	Jo weep	ing (	or stanc	ling	water	for	5			



S.W. Test Pit, Not Witnessed

							9.00			
Site Revi	ew (minin	num of two	holes re	equired at	every p	roposed p	rimary and	reserve disp	oosal area)	
Observation	n Hole Num	ber: <u> 19-8</u>	<u>6</u>	14/2019	S. American		and Constant			- <del></del>
1.0	Mondi				l ime	VVe	ather	Latitude		Longitude:
Jse: (e.g.	, woodland, agr	icultural field, va	cant lot, etc	.) Vege	etation		Surface Stor	nes (e.g., cobbles,	stones, boulders,	etc.) Slope (%)
iption of Loca			tot	pond						
arent Materia	al: <u>0</u>	utwarh				Landform			الحا الم	scape (SU, SH, BS, FS, TS)
ces from:	Open Wate	r Body 7/1	feet			10-10-11-11-11-11-11-11-11-11-11-11-11-1	100 feet	Wetla	•	
				D			e- 6			
	☐ Yes 🕅	No If Yes:	□ Distu	rbed Soil - [	☐ Fill Mat	erial [	☐ Weathered/	Fractured Rock	□ Bedrock	
										Standing Water in Hole
	•				So					
Soil Horizon	Soil Texture	Soil Matrix:	Redo	ximorphic Fea	atures			Soil Structure	Soil Consistence	Other
/Layer	(USDA)	Color-Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Con Guadare	(Moist)	o and
Ap	SL	104K3/a	_	-	<b>V</b> 34~		_	M	F	
BW	LS	10YR 4/6	_		8800-		-	M	F	
C	Sand	104R 5/6	96"	10 YR46	3%	_	_	SG	Loose	
				,						
							2			
onal Notes:	A manufacture	Vo u	reeping	OT	stand	ing we	der			
	Observation  Jse: (e.g.	Observation Hole Number    Jse: (e.g., woodland, agription of Location: arent Material: Open Water    Proper ble   Is Present: Yes    dwater Observed: Yes    Soil Horizon   /Layer    Soil Texture   (USDA)  Ap	Observation Hole Number:  Jes: Woodland (e.g., woodland, agricultural field, value)  iption of Location:  arent Material: Outwark  Ices from: Open Water Body Property Line Property Lin	Observation Hole Number: TP-8 Hole # Grand Hole # Hole # Date	Observation Hole Number: IP-8 Hole # G/4 2019  Jse: Woodland agricultural field, vacant lot, etc.) Vegiciption of Location: East of ponditionary of feet property Line Pro	Observation Hole Number: 1-8	Observation Hole Number: 1	Observation Hole Number: IP-8 Hole # Date   Time   Weather    Jse: (e.g., woodland, agricultural field, vacant lot, etc.)   Vegetation   Surface Stoription of Location:   East of Power    arrent Material:   Landform   Landform    Description of Location:   Landform    Description of Locatio	Observation Hole Number: IPS Hole # Date   Time   Weather Latitude   Latitude	Jse: (e.g., woodland, agricultural field, vacant lot, etc.) Vegetation Surface Stones (e.g., cobbles, stones, boulders, ption of Location:  arent Material:

S.W. Test Pit, Not Witnessed

Commonwealth of Massachusetts

City/Town of

TP 6-19-9

AND THE									•	-	
C. On-S	Site Rev	i <b>ew</b> (minin	num of two	poles r	equired at	every p	proposed p	orimary and	reserve dis	posal area)	
Deep			Hole #	Da	<u>  4   1 9</u> ate	Time	Wea	ather	Latitude		 Longitude:
1. Land l	Jse: (e.g.	Wood (, , woodland, agr	icultural field, va	cant lot, etc	veg	etation	f.cv.	Surface Stor	nes (e.g., cobbles,	stones, boulders,	, etc.) Slope (%)
Descri	ption of Loca			01	Graver	1000	70161	5			
2. Soil Pa	arent Materia	al: Ou	twash				Landform			Position on Land	
3. Distan	ces from:	Open Wate	r Body >/(OC	feet		Drair		<u>රර </u> feet	Wetla		
		Proper	ty Line <u>≥(6</u>	feet	D						
		☐ Yes 🖂	No If Yes:	☐ Distu	rbed Soil [	☐ Fill Mat	erial [	☐ Weathered/	Fractured Rock	☐ Bedrock	
							-				Standing Water in Hole
	ı					So					
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix:	Redo	ximorphic Fea	atures			Soil Structure	Soil	Other
	Deep Observation Hole Number: TP-9 Hole # Date   Time   Weather   Latitude   Longitude:    Land Use:   Wood(and)   Hole # Date   Time   Weather   Latitude   Longitude:    Land Use:   Land Use:   Latitude   Longitude:   Longitude:   Longitude:    Description of Location:   South   Office   Coard   Forestern   Coard   Coard										
0-9	Ap		10 YR3/2	taye	~	(	Rite.	are.	M	F	
9-24	Bw	Ls	104R4/6	tree-	_	*	<del></del>	~	M	F	
14-106	CI			90"	164P4/G	3).	7%.	_	SG	Loose	
106-132	Ca	Fine sardy loam	104R 5/6	,	-	-			M	=	
Additio	nal Notes:		y .								



C. On-	Site Rev	iew (minim	num of two ho	les requ	iired at ev	ery propo	sed prin	nary and r	eserve disp	oosal area)	)	
Deep	Observatio	n Hole Numb		10/25	/2021	8:00A	M	45d, ra				<del></del>
1 land	AGRIC	CULTURAL FIELD	Hole #	Date	MEADOW	Time		Weather SOME		Latitude		Longitude: 0-10
			ural field, vacant lot,		Vegetation			Surface Stone	es (e.g., cobbles,	stones, boulde	rs, etc.)	Slope (%)
2. Soil F	Parent Materi	al: OUTWA	SH			MORAINE		BS				
						Landform			tion on Landscap			
<ol><li>Dista</li></ol>	nces from:	Opei	n Water Body	>>100 <sub>fe</sub>	et	D	rainage W	/ay	feet	We	tlands	>>100 <sub>feet</sub>
			Property Line	>>10 fe	et	Drinkin	g Water V	Vell >100	feet		Other	feet
4. Unsuita	able Materia		] Yes ☑ No							ctured Rock	□Ве	drock
5. Grou	ndwater Obs	erved: Yes	s 🛭 No		lf y	yes:	_ Depth Wee	eping from Pit	_	Depth S	Standing V	Vater in Hole
						Soil Log	J					
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Red	loximorphic I	Features		Fragments Volume	Soil Structure	Soil		Other
Deptii (iii)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	3011 Structure	(Moist)		Other
8	Α	SL	10YR 3/3	-	-	-	-	-	M	F		
20	В	LS	10YR 5/6	-	-	-	-	-	М	F		
84	C1	SAND	10YR 6/2	50	high/low	2	-	-	SG	L		
164	C2	SAND	10YR 5/3	-	-	-	-	-	SG	L		
Addit	ional Notes:			1	1		1		l		<u> </u>	



C. On-S		n Hole Numi	TD 04		0/25/2021			•	·	•	
реер (	Jusei valioi	i iioie ivaiiii	Hole #	_	ate	Time	We	eather	Latitude		Longitude:
. Land L	Jse: (e.g.	, woodland, agr	icultural field, va	acant lot, et	c.) Ve	getation		Surface Sto	nes (e.g., cobbles,	stones, boulders, e	Slope (%)
Descri	otion of Loca	ation:									
2. Soil Pa	rent Materia	al: ———					Landform			Position on Landso	ape (SU, SH, BS, FS, T
3. Distan	ces from:	Open Wate	r Body	feet		Drair	nage Way	feet	Wetla	ands fee	
	s Present: [	_ Yes ☑	ty Line No If Yes: es ☑ No	☐ Distu		☐ Fill Ma		☐ Weathered/	Fractured Rock		anding Water in Hole
						Sc	il Log				
Depth (in)	Soil Horizon		Soil Matrix:	Redo	oximorphic Fe	atures		Fragments Volume	Soil Structure	Soil Consistence	Other
- <b> </b>	/Layer	(USDA)	Color-Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones		(Moist)	
8	Α	SL	10YR 3/3	-	-	-	_	-	M	F	
24	В	LS	10YR 5/6	-	-	-	-	-	M	F	
82	C1	SAND	10YR 6/2	52	high/low	2	-	-	SG	L	
156	C2	SAND	10YR 5/3	-	-	-	-	-	SG	L	



			num of two hole			ery propo	sea prin	nary ana r	eserve aisp	osai area)		
реер	Observation	1 Hole Numb	er: TP-21-3 Hole #	10/25 Date	12021	Time		Weather		Latitude		Longitude:
			ural field, vacant lot, $\epsilon$					Surface Stone	es (e.g., cobbles,	stones, boulder	rs, etc.)	Slope (%)
2. Soil P	Parent Materia	al:				andform		Posi	tion on Landscap	00 (SII SH BS	EQ TQ\	
3. Distar	nces from:	Ope	n Water Body	fe				Vay		We		
4. Unsuita	able Material		Property Line ] Yes ☑ No					Vell		ctured Rock		
5. Grour	ndwater Obse	erved: Yes	s ☑ No		If ye	es: Soil Log		eping from Pit	-	Depth S	standing V	Vater in Hole
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Red	loximorphic Fe	atures		Fragments Volume	Soil Structure	Soil		Other
Deptii (iii)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Son Structure	(Moist)		Other
6	А	SL	10YR 3/3	-	-	-	-	-	M	F		
24	В	LS	10YR 5/6	-	-	-	-	-	M	F		
56	C1	SAND	10YR 6/2	56	high/low	2	-	-	SG	L		
156	C2	SAND	10YR 5/3	_	_	_	-	-	SG	L		
Additi	onal Notes	1	<u>I</u>	1		1	1	1	1	1	l	



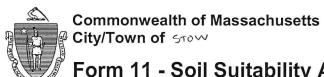
C. On-	Site Revi	ew (minim	num of two hole	es requ	iired at eve	ery propo	sed prin	nary and r	eserve disp	oosal area)	)	
Deep	Observation	n Hole Numb	er: TP-21-4 Hole #	10/25	/2021							
			Hole #	Date		Time		Weather		Latitude		Longitude:
1. Land	Use (e.g., w	oodland, agricult	ural field, vacant lot, e	etc.)	Vegetation		K	02, PARCE Surface Stone	L4 es (e.g., cobbles,	stones, boulder	rs, etc.)	Slope (%)
2 Soil E	Parant Mataria	al·										
2. 3011 F	areni matena	ai				andform		Posi	tion on Landscap	oe (SU, SH, BS,	, FS, TS)	
3. Distai	nces from:	Opei	n Water Body	fe	eet	D	rainage W	Vay	feet	We	tlands	feet
			Property Line _	fe	et	Drinkin	g Water V	Vell	feet	(	Other	feet
4. Unsuita	able Material	s Present: 🔽	] Yes □ No	If Yes:	☐ Disturbed	Soil 🗸	Fill Materia	al 🔲 '	Weathered/Fra	ctured Rock	□Ве	drock
5 Groun	ndwator Obco	erved: Yes	s 🔽 No		If vo	ve:						
o. Gioui	ildwater Obse	rveu. 🔝 Tes	s ⊠ 140		пуе			eping from Pit	_	Depth S	Standing V	Vater in Hole
	1	1	1	1		Soil Log	2	Fragments	1			
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Red	loximorphic Fe	atures		Volume	Soil Structure	Soil Consistence		Other
-   -	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones		(Moist)		
22	FILL				_							
	FILL	-	-	-	-	-	-	-	-	-		
48	C1	LS	10YR 6/2	-	-	-	-	-	М	F		
						1_						
66	C2	C. SAND	10YR 5/6	48	high/low	2	-	-	SG	L		
162	C3	SAND	10YR 5/3	_	_	_	_	_	SG	L		
Λ dditi	ional Notes	1	•						1	ı	1	



C. On-	Site Revi	ew (minim	num of two hole	es requ	iired at eve	ery propo	sed prin	nary and r	eserve disp	osal area)	)		
Deep	Observation	n Hole Numb	er: TP-21-5	10/25 Date	/2021	Time		Weather		Latitude		 Longitude:	
1. Ather	ns Stre Use (e.g., wo	oodland, agriculti	ural field, vacant lot, ε	etc.)	Vegetation				es (e.g., cobbles,	stones, boulder	rs, etc.)	Slope (%)	_
	Parent Materia												
2. 00	aroni matoric				La	andform		Posi	tion on Landscap	oe (SU, SH, BS,	FS, TS)		
3. Dista	nces from:	Oper	n Water Body	fe	et	D	rainage W	/ay	feet	We	tlands	feet	
		I	Property Line _	fe	et	Drinkin	g Water W	/ell	feet	(	Other	feet	
4. Unsuita	able Material	s Present: 🔽	Yes 🗌 No	If Yes:	☐ Disturbed :	Soil 🗸	Fill Material	I 🔲 '	Weathered/Fra	ctured Rock	Be	drock	
5. Groui	ndwater Obse	erved:  Yes	s ☑ No		If ye			ping from Pit	<del>-</del>	Depth S	tanding V	√ater in Hole	
						Soil Log	<u> </u>		<b>.</b>				
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Red	loximorphic Fe	atures		Fragments Volume	Soil Structure	Soil Consistence		Other	
Deptii (iii)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Son Structure	(Moist)		Other	
26	FILL	-	-	-	-	_	-	-	-	-			
76	C1	C. SAND	10YR 5/6	48	high/low	2	-	-	SG	L			
156	C2	SAND	10YR 5/3	-	-	-	-	-	SG	L			
Addit	ional Notes:	I	1	1	1	ı	ı	ı	ı				



			num of two hole			ery propo	sed prin	nary and r	eserve disp	oosal area)	)	
Deep	Observation	n Hole Numb	er: TP-21-6 Hole #	10/25 Date	/2021	Time		Weather		Latitude		Longitude:
			ural field, vacant lot, e					Surface Stone	es (e.g., cobbles,	stones, boulder	rs, etc.)	Slope (%)
2. Soil P	arent Materia	al:				andform			t:	(CII CII DC	FC TC\	
3. Distar	nces from:	Ope	n Water Body	fe				Vay	tion on Landscar feet	ve (SU, SH, BS, We		
4. Unsuita	able Materials		Property Line ] Yes ☑ No					Vell				feet drock
5. Grour	ndwater Obse	erved: 🗌 Yes	S 🛭 No		If ye	es: Soil Log		eping from Pit	-	Depth S	Standing V	Vater in Hole
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Red	loximorphic Fe		Coarse	Fragments Volume	Soil Structure	Soil Consistence		Other
Depth (in)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Son Structure	(Moist)		Other
8	Α	SL	10YR 3/3	-	-	-	_	-	М	F		
20	В	SAND	10YR 5/6	-	-	-	-	-	SG	L		
60	C1	C. SAND	10YR 5/3	60	high/low	2	-	-	SG	L		
150	C2	SAND	10YR 5/3	_	-	-	-	-	SG	L		
Additi	onal Notes:	1	<u>I</u>	<u>l</u>	I	1	1	1	l	l	l	



C. On-	Site Revi	ew (minim	um of two hole	es requi	ired at ever	y propo	sed prin	nary and r	eserve disp	osal area)	)		
Deep	Observation	n Hole Numb	<b>er:</b> <u>TP-10-</u> 25-1 Hole#	10 7	25/2021	8: Times	30	PAI	νY	1.00.1			
			TIOIC #	Date		Time		vveamer		Latitude		Longitude:	
1. Land	Use (e.g. wo	Odland agricultu	ural field, vacant lot, e	itc.)	Vegetation	•		Surface Stone	om E	etones houldon	rs. oto \	~ 2 Slope (%)	
								Juliace Storie	sa (e.g., cobbles,	stories, boulder	15, 610.)	Slope (76)	
Des	scription of Lo	ocation:			-								
2. Soil P	arent Materia	al: _ GLAC	LIOFLUVIAL			ndform		Posi	tion on Landscap	ne (SU SH BS	FS TS)		
3 Dietar	nces from:	Oper	n Water Body	7700 for				/ay					
J. Distai	ices nom.		- Total	150						We			
			Property Line _										
4. Unsuita	able Materials	s Present:	] Yes ☑ No	If Yes:	Disturbed S	ioil 🗌	Fill Materia	ı 🗀 '	Weathered/Fra	ctured Rock	□Ве	drock	
		_											
5. Grour	ndwater Obse	erved: 🗌 Yes	s ⊻ No		If yes	i:	Depth Wee	ping from Pit	_	Depth S	Standing V	Vater in Hole	
						Soil Log	ı						
				D			×X	Fragments			1		
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Read	oximorphic Fea	tures		Volume	Soil Structure	Soil Consistence		Other	
Dopan (m)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	oon otructure	(Moist)		Other	
0-10	A	SL	104R 3/3	-	,	-	~	-	m	F		1	
10-24	3	LS	104R416	-	-	-	2	_	m	F			
			10 11- 10										
24-60	CI	S	10-1R 3/6	_	-	_	5	10	59	L			
21-40		1.50					,	1	3 -1				
60-138	C2	S	104R 5/2	-	-	-	10	5	54	L			
								<u> </u>					
					_								
Δdditi	onal Notes							•					



C. On-S	Site Revi	ew (minin	num of two	holes r	equired at	t every p	proposed p	orimary and	reserve dis	posal area)	
Deep	Observatio	n Hole Numl	ber: <u>TP-10-</u> Hole #	25-Z <u>1</u> 0	0/25/2021	9:30		RAINY			
									Latitude		Longitude:
1. Land U	Jse: (e.a.	VACANI woodland.agr	icultural field, va	cant lot, etc	.) Veo	WOUDE letation	D	Surface Stor	nes (e.g., cobbles,	stones houlders	etc.) Slope (%)
Docori	ption of Loca				,				100 (0.g., 0000100,	otorios, boulders,	ото.)
2. Soil Pa	arent Materia	al: TIL				-	Landform			Position on Land	scape (SU, SH, BS, FS, TS)
3. Distan	ces from:	Open Wate	r Body אנכ	e feet			nage Way _	- feet	Wetla	nds <u>7100</u> fe	. ,
			ty Line 710				/ater Well _			her fe	
4. Unsuital	ole o Drogonti (	,	No If Yes:			¬		¬			
			s No If Yes:	☐ Distu	irbed Soil				Fractured Rock		_
5. Ground	uwater Obse	rveu. [v] fe	S   NO					_ Depth Weepin	g from Pit	132 Depth	Standing Water in Hole
							il Log	Fragments			T .
Depth (in)	THE COLORS SERVED BY A PROPERTY OF	Soil Texture	Soil Matrix:	Redo	ximorphic Fe	atures		Volume	Soil Structure	Soil Consistence	Other
	/Layer	(USDA)	Color-Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones		(Moist)	5.1.0
0-14	Α	104R 3/3	SL	-	-	_	-	-	w	F	
14-40	В	104R 5/4	8 L	1	-	-	-	-	M	F	
40-66	CI	104R 5/2	5	50"	HIGH/LOW	75	5	5	54	L	
60-72	CZ.	104R 5/2	SL			-	-	_	M	F	
72-138	۷3	104R4/3	5		1	1	(0	15	54	L	
Additio	nal Notes:										



1,3443												
C. On-	Site Revi	ew (minim	um of two hole	es requi	red at ever	ry propo	sed prim	ary and r	eserve disp	osal area)		
Deep	Observation	Hole Numb	er: <u>TP-10-</u> 25-3 Hole#	10/2	5/2021	10:	30	- RAI	NY	8		
	\/ /	10015	Hole #	Date <sup>'</sup>	100014	Time		Weather	Count	Latitude		Longitude:
1. Land	Use (e.g., wo	odland, agricultu	ural field, vacant lot, e	etc.)	Vegetation			Surface Stone	s (e.g., cobbles,	stones, boulder	rs, etc.)	Slope (%)
Des	scription of Lo	cation:										
2. Soil F	arent Materia	II: GLACIO	SFLUNAL									
0 5: 1						ndform			tion on Landscap			
3. Distai	nces from:		n Water Body					ay				<u>7100</u> feet
X 11			Property Line _							(		
4. Unsuita	able Materials	s Present: L	Yes ☑ No	If Yes: L		Soil 📙 l	Fill Material	□ <i>\</i>	Neathered/Fra	ctured Rock	☐ Bed	rock
5. Grour	ndwater Obse	rved: Yes	. ✓ No		If yes	S:	Depth Wee	ping from Pit	_	- Depth S	standing W	ater in Hole
						Soil Log			\ <u>-</u>			
	Soil Horizon	Soil Texture	Soil Matrix: Color-	Redo	ximorphic Fea	itures		ragments Volume		Soil		
Depth (in)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Soil Structure	Consistence (Moist)		Other
0-12	Α	SL	104R 3/3	-	-	-	1	-	m	F		
12-24	B	SL	104R 3/6	-	_	_	1	-	M	9		
24-160	C	S	104R 5/2			-	lo	15	54	١		
												74
۸ ماما:+:	onal Notes											



C. On-	Site Revi	ew (minim	um of two hole	es requi	ired at eve	ry propo	sed prim	nary and r	eserve disp	osal area)		
Deep	Observation	n Hole Numb	er: <u>17-10-</u> 25-4 Hole #	10 /2	5/2021	(1'.0	υ <b>υ</b>	- RAI	NY	Latitude		
									Some	Lalllude	Longitud	ie: - 2.
1. Land	Use (e.g., wo	oodland, agricultu	ural field, vacant lot, e	etc.)	Vegetation			Surface Stone	es (e.g., cobbles,	stones, boulder	s, etc.) Slope	
Des	scription of Lo	ocation:	*									
2. Soil P	arent Materia	al: GLACI	OFI UVIAL									
			0, 000,740		La	ndform		Posi	tion on Landscap	oe (SU, SH, BS,	FS, TS)	
<ol><li>Distar</li></ol>	nces from:	Oper	n Water Body	7200 fee	et	D	rainage W	/ay	feet	We	tlands 7100	feet
		1	Property Line _	710 fee	et	Drinking	g Water W	/ell	feet		Other	feet
4. Unsuita	able Materials	s Present:	] Yes ☑ No	If Yes:	Disturbed S	Soil 🔲 I	Fill Materia	ı 🗆 '	Weathered/Fra	ctured Rock	Bedrock	
5 Groun	ndwater Obse	erved: Yes	s M No		If you							
J. Gloui	idwater Obse	iveu. 🔲 Tes	. <u>•</u> 140		ii yes			ping from Pit	-	Depth S	tanding Water in Ho	ole
						Soil Log	9	Fragments				
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Redo	oximorphic Fea	tures		Volume	Soil Structure	Soil	Othe	ar
(,	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	oon on acture	(Moist)	Othe	51
0-12	А	SL	104R 3/3	-	-	-	-	Mar.	m	۴		
12-24	В	SL	104R 3/6	r		-	-	-	м	F		
24-96	LI	5	10 MR 5/2	-	-	-	5	5	54	L		
96-104	U	FINE	10-12- 4/2	-	-	-	-	-	54	L		
104 - 156	L3	5	10-12 5/2	-	_	-	5	5	Sد	L		
Additi	onal Notes:							•	•	•		



C. On-	Site Revi	i <b>ew</b> (minin	num of two	holes re	equired at	t every p	roposed p	rimary and	reserve disp	oosal area)	(con) (con)
Deep	Observation	n Hole Numl	ber: <u>1P-10-7</u> Hole #	.5-5 <u>lo</u>	25/2021	11:30 Time	Wes	RAINY	Latitude		Longitude:
									Som E les (e.g., cobbles,		
Descr	ption of Loca	ation:	9							5	
2. Soil P	arent Materia	al: <u>aca</u>	CIOFLUNAL	<u> </u>			Landform			Position on Land	scape (SU, SH, BS, FS, TS)
3. Distan	ces from:	Open Wate	r Body 720	o feet				feet		nds 7100 fe	
4 . I.I	hi.	Propert	ty Line <u>710</u>	feet		rinking W	ater Well _	feet	Ot	her fe	eet
	ls Present: [		No If Yes: s ☑ No	☐ Distu	rbed Soil				Fractured Rock		Standing Water in Hole
				_		So	il Log				
Depth (in)		Soil Texture	Soil Matrix:	Redo	ximorphic Fe	atures		ragments Volume	Soil Structure	Soil Consistence	Other
	/Layer	(USDA)	Color-Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones		(Moist)	Cinci
0-16	Α	ŞL	104R 3/3	ets	w*	-	<b></b>	-	M	F	
16-36	В	SL	104R 3/6		an.	~	ě	wan.	M	F	
36-156	۲	5	1042 5/2	U	~	-	10	15	54	L	
Additio	onal Notes:										



Door	Observation	n Hala Numb	or: TP-8-1	4/8/20	122	12PM	1	55d, C	LOUDY			
реер	Upservation	II HOIE NUMD	er: TP-8-1 Hole #	Date	WOODED	Time	I	Weather SOME	LOODT	Latitude		Longitude: 0-10
. Land	Use (e.g., w	סטואט oodland, agricultu	ural field, vacant lot, e	etc.)	Vegetation				es (e.g., cobbles,	stones, boulder	rs, etc.)	Slope (%)
												,
	•											
3011 P	areni maten	غا. 				ndform		Posi	tion on Landscap	oe (SU, SH, BS,	FS, TS)	
. Distar	nces from:	Oper	n Water Body _	fe			rainage W	/ay	feet	We	tlands	feet
			Property Line _	fe	et							
. Unsuita	able Material		Yes 🛭 No									
		erved:  Yes										
. Grour	idwater Obse	erveu. 🔲 1es	M INO		ii yes			eping from Pit	_	Depth S	tanding W	ater in Hole
		<u> </u>		<u> </u>		Soil Log	•	Fragments	<u> </u>	<u> </u>		
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Red	oximorphic Fea	itures		Volume	Soil Structure	Soil Consistence		Other
,	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones		(Moist)		<b>Cu</b>
16	А	SL	10YR 3/3	_	_	_	_	_	M	F		
32	В	S	10YR 5/8	-	-	-	-	-	SG	L		
48	C1	s	10YR 5/3	_	_	_	_	_	SG	L		
		COARSE										
84	C2	SAND	10YR 5/3	-	-	-	10	10	SG	L		
136	C3	S	10YR 5/3	84	HIGH/LOW	2	_	_	SG	L		
									_			



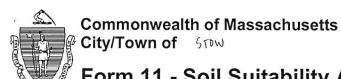
Deep (	Observation	n Hole Numl	ber: TP-8-	_	/8/2022						_	
			Hole #	D	ate	Time	We	ather	Latitude		Lor	ngitude:
. Land L	Jse: (e.g.	, woodland, agr	icultural field, va	cant lot, et	c.) Ve	egetation		Surface Sto	nes (e.g., cobbles	stones, boulders,	etc.)	Slope (%)
Descri	ption of Loca	ation:										
. Soil Pa	arent Materia	al: ———					Landform			Position on Lands	scape (St	J, SH, BS, FS, T
. Distan	ces from:	Open Wate	r Body	feet		Draii	nage Way	feet	Wetla	ands fe	• `	
		Proper	ty Line	feet			Vater Well			ther fe	et	
	s Present: [		No If Yes:	☐ Distu	urbed Soil	☐ Fill Ma	terial	☐ Weathered	/Fractured Rock	Bedrock		
. Ground	dwater Obse	erved:  Ye	s 🛭 No					Depth Weepir	ng from Pit	Depth S	Standing '	Water in Hole
				Redo	oximorphic F			Fragments		Soil		
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Depth	Color	Percent	% by Gravel	Volume Cobbles & Stones	Soil Structure	Consistence (Moist)		Other
16	Α	SL	10YR 3/3	-	-	-	-	-	М	F		
32	В	S	10YR 5/8	-	-	-	-	-	SG	L		
18	C1	S	10YR 5/3	-	-	-	_	-	SG	L		
36	C2	COARSE SAND	10YR 5/3	-	-	-	10	10	SG	L		
144	C3	S	10YR 5/3	86	HIGH/LOW	2	-	-	SG	L		
Additio	nal Notes:	ı	L	ı	1	1	1	<u> </u>	l	<u>ı</u>		



C. On-	Site Revi	ew (minim	num of two hole	es requ	iired at eve	ry propo	sed prin	nary and r	eserve disp	osal area)		
Deep	Observation	n Hole Numb	er: TP-8-3	4/8/20 Date	)22	Time		Weather		Latitude		Longitude:
			ural field, vacant lot, $\epsilon$					Surface Stone	es (e.g., cobbles,	stones, boulder	s, etc.)	Slope (%)
	•											
2. SOII F	arent Materia	AI			La	ndform		Posi	tion on Landscap	pe (SU, SH, BS,	FS, TS)	
3. Dista	nces from:	Oper	n Water Body	fe	et	D	rainage V	Vay	feet	We	tlands	feet
		l	Property Line _	fe	et	Drinkin	g Water V	Vell	feet	(	Other	feet
4. Unsuita	able Materials	s Present:	Yes 🛭 No	If Yes:	☐ Disturbed S	Soil 🗌	Fill Materia	al 🗌 '	Weathered/Fra	ctured Rock	☐ Be	drock
5. Groui	ndwater Obse	erved: 🛭 Yes	s 🗌 No		If yes			eping from Pit	-	Depth S	tanding V	Vater in Hole
	1		Ī			Soil Log	•	Fragments				
Depth (in)	nth (in)		Soil Matrix: Color-	Red	loximorphic Fea	itures		Volume	Soil Structure	Soil Consistence		Other
. , ,	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones		(Moist)		
12	А	SL	10YR 3/3	-	-	-	-	-	М	F		
38	В	S	10YR 5/8	-	-	-	-	-	SG	L		
62	C1	s	10YR 5/3	-	-	-	-	_	SG	L		
100	C2	COARSE SAND	10YR 5/3	-	-	-	10	10	SG	L		
136	C3	S	10YR 5/3	100	HIGH/LOW	2	-	_	SG	L		
Additi	ional Notes:	I	1	1	1	1	1	1	I	I		



Deen (	Observation	n Hole Numb	oer: TP-8-	-4 4	/8/2022						
Боор			Hole #		ate	Time	We	eather	Latitude		Longitude:
. Land L	Jse: (e.g.	, woodland, agr	icultural field, va	cant lot, et	c.) Ve	getation		Surface Sto	nes (e.g., cobbles,	stones, boulders, etc	Slope (%)
Descri	otion of Loca	ation:									
. Soil Pa	rent Materia	al: ———					Landform			Position on Landsca	pe (SU, SH, BS, FS, T
. Distan	ces from:	Open Wate	r Body	feet		Drair	nage Way	feet	Wetla	ands feet	
		Propert	y Line	feet	I	Drinking W	/ater Well	feet	Ot	ther feet	
	s Present: [		No If Yes:	☐ Dist	urbed Soil				Fractured Rock	☐ Bedrock Depth Sta	nding Water in Hole
						Sc	il Log				
Donth (in)	Soil Horizon	Soil Texture	Soil Matrix:	Redo	oximorphic Fe	eatures		Fragments Volume	Soil Structure	Soil	Othor
Depth (in)	/Layer	(USDA)	Color-Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Son Structure	Consistence (Moist)	Other
8	Α	SL	10YR 3/3	_	_	-	_	_	М	F	
20	В	COARSE SAND	10YR 5/8	-	-	-	-	-	SG	L	
56	C1	FINE SAND	10YR 5/3	46	HIGH/LOW	2	-	-	SG	L	
96	C2	COARSE SAND	10YR 5/3	-	-	_	-	-	SG	L	
	nal Notes:			1				_1	l	1	



-0-														
C. On-	Site Revi	ew (minim	um of tw	o hole	es requ	ired at ever	y propo	sed prin	nary and r	eserve disp	osal area)			
Deep	Observation	n Hole Numb	er: <u>Dl</u>		4/7/	22	9:0	15	_ OVER	LAST				
			Hole #		Datė '		Time		Weather		Latitude		Longitude:	
1. Land	Use (e.g., wo	ACANT podland, agricultu	ural field, vac	ant lot, e	etc.)	Vegetation			Surface Stone	Som E es (e.g., cobbles.	stones, boulder	rs. etc.)	~ 2 Slope (%)	
		ocation:								, , , , , , , , , , , , , , , , , , , ,	,	-,,		
	•													
2. Soil P	arent Materia	al: GLACIO	PLUVIAL		2		ndform			tion on Landage	o /CII CII DO	FO TO		
2 Dietor	acco from:	Onor	a Water Da	, du	•					tion on Landscap				
o. Distai	ices iroin.	Oper									We			
						et —					(			
4. Unsuita	ible Materials	s Present:	J Yes [✓	No	If Yes: [	_ Disturbed S	Soil 🔲 I	Fill Materia	al 🔲 '	Weathered/Fra	ctured Rock	Bec	Irock	
5. Grour	ndwater Obse	erved: 🗹 Yes		0		If ves	S: 60"	Donth Woo	oning from Dit	13	MTTaur Donth C	tonding \A	lotor in I lala	
						,			sping from Eit	2	<u>onom</u> Deptil S	itanding w	rater in noie	
			Г			W 1997	Soil Log		Fragments					_
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix		Red	oximorphic Fea	tures	% by	Volume	Soil Structure	Soil Consistence		Other	
	/Layer	(USDA	Moist (Mu	ınsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	con cu dotare	(Moist)		Other	
0-4	А	54	1048	42	-	-	-	-	-	М	F			
4-20	В	SL	1042	3/6	-	-	_	-	_	М	F			
20-112	C	L5	1048	5/2	32"	HaHLOW	75	10	5	M	F	Boul	DKR	
		v.												
		1												
Additi	onal Notes:													



# Commonwealth of Massachusetts City/Town of $570\,\mathrm{W}$

-0-												
C. On-S	Site Revi	ew (minim	num of two hole	es requ	ired at eve	ry propo	sed prin	nary and r	eserve disp	oosal area)	)	
Deep (	Observation	n Hole Numb	er: <u>D2</u> Hole#	4/7	22	<u> </u>	40		PLAST			
			Hole #	Date		Time		Weather		Latitude		Longitude:
1. Land U	Jse (e.g. w	NACANT	ural field, vacant lot, e	etc )	Vegetation	)		Surface Stone	SOME	stones baulds	1- \	~ 2 Slope (%)
								Surface Stone	es (e.g., cobbles,	stones, boulde	rs, etc.)	Slope (%)
Desc	cription of Lo	cation:										
2. Soil Pa	arent Materia	al: GLACIC	FLUVIAL									
					La	ındform		Posi	tion on Landscap			
<ol><li>Distant</li></ol>	ces from:	Oper	n Water Body	fe	et	D	rainage V	√ay <u> </u>	feet	We	tlands	7200 feet
			Property Line _									
4. Unsuitat	ble Material		Yes ☑ No							ctured Rock	ПВ	drock
		,				3011 🔲 1	iii watena	" L	weatherean ra	ctarea Nock	П ре	diock
5. Ground	dwater Obse	erved: ☑ Yes	No 🗌 No		If yes	s: 84"	Depth Wee	epina from Pit	8	ottom Denth S	Standing V	Vater in Hole
						Soil Log		,	22		ranang .	14(0) 111 1010
								Fragments		T		
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Red	oximorphic Fea	atures	% by	Volume	Soil Structure	Soil		Other
Dopan (m)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Son Structure	(Moist)		Other
0-6	Α	SL	104R 3/3	-	-	-	Sec		М	F		
6- 24	В	SL	104R 3/6		-	-	*	-	Μ	ţ		
24-96	С	LS	10 4R 4/2	60"	HIGH/LOW	75	5	10	Μ	F	BOU	LDER
Additio	nal Notes:		•					•		•	•	



C. On-	Site Revi	ew (minim	um of two hole	es requ	ired at ever	y propo	sed prim	nary and r	eserve disp	osal area)	ſ	
Deep	Observation	Hole Numb	er: D3 Hole#	4/7	22	10:	30	OVE	2CAST	1.00		
1 Land		VACANT	ural field, vacant lot, e	Date	MOODED	Time		vveatner	NONE	Latitude		Longitude:
				etc.)	Vegetation			Surface Stone	s (e.g., cobbles,	stones, boulder	s, etc.)	Slope (%)
	scription of Lo											
2. Soil P	arent Materia	al: GLAC	IOFLUVIAL			ndform		Posit	ion on Landscap	e (SII SH RS	FS TS)	
3. Distar	nces from:	Oper	n Water Body	fe			rainage W		feet		1000	າໄວບ feet
		ï	Property Line _	7.50 fe	et	Drinking	g Water W	/ell	feet	(	Other	feet
4. Unsuita	able Materials	s Present:	] Yes ☑ No	If Yes: [	☐ Disturbed S	Soil 🔲 I	Fill Materia	l 🗆 \	Weathered/Fra	ctured Rock	Bed	drock
5. Grour	ndwater Obse	erved: 🗹 Yes	☐ No		If yes	s: <u>114</u> "	Depth Wee	ping from Pit	.1	14 Depth S	tanding W	/ater in Hole
						Soil Log			_			
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Red	oximorphic Fea	tures		Fragments Volume	0-11044	Soil		
Deptii (iii)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Soil Structure	(Moist)		Other
0 - 3	A	SL	1042 3/2		-		-	_	М	Cons.		
3- 12	В	15	10412 3/6	-	-	-	-	-	М	۴		
12- 56	C١	5	10 YR 5/3	56"	HIGHLOW	75	20	15	54	L		
56-72	c2	L-5	2.54 5/3				_	-	M	F		
72-120	C3	5	10 4R 5/3		1	<b>↓</b>	10	10	SA	L		
					3							
Additi	onal Notes:											



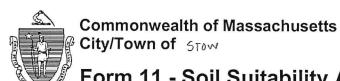
C. On-	Site Revi	ew (minim	um of two hole	es requ	ired at ever	ry propo	sed prim	nary and r	eserve disp	osal area)			
Deep	Observation	n Hole Numb	er: D4 Hole#	니 기 Date	122	{l1} Time	.00	. <u>ØVF</u> Weather	PLAST	Latitude		 Longitude:	
1 Land	Use .	VACANT	ıral field, vacant lot, e		and the second second				None s (e.g., cobbles,			~10	
			ıral field, vacant lot, e					Surface Stone	s (e.g., cobbles,	stones, boulder	rs, etc.)	Slope (%)	
	•												
2. Soil P	arent Materia	ol: GLAC	IOFLUVIAL			ndform		Posi	tion on Landscap	ne (SII SH BS	FS TS)		
3. Distar	nces from:	Oper	Water Body _	fe			rainage W			We	8	750 feet	
			Property Line _										
4. Unsuita	ble Materials	s Present:	Yes ☑ No	f Yes:	☐ Disturbed S	Soil 🔲 I	- Fill Material		Weathered/Fra	ctured Rock	☐ Bed	rock	
5. Grour	ndwater Obse	erved: Yes	☑ No		If yes	S:	Denth Wee	ning from Pit	_	- Denth S	tanding W	ater in Hole	
					,	Soil Log		ping nom r it	-	Deptil 0	nanaing vv	ater in Fiole	
Donth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Red	oximorphic Fea	tures		ragments Volume	0 1104	Soil			
Depth (in)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Soil Structure	Consistence (Moist)		Other	
0-8	А	SL	104R 3/2	~	NO.	~	)	-	M	F			
8-24	В	LS	104R 3/6	at-	746	-	<b>~</b>	-	M	F			
24 - 34	CI	S	104R 5/3	84"	HIGHLOW	75	10	15	5 4	L			
84-120	CZ	FINE SAND	2.54 5/3		J	1	1	_	Sa	L			
Additi	onal Notes:												



	014		29-3									
C. On-	Site Revi	ew (minim	um of two hole	es requi	red at ever	ry propo	sed prim	ary and r	eserve disp	osal area)		
Deep	Observation	n Hole Numb	er: D5 Hole#	4/7/	22	11:3	0	OVE	RCAST			
								Weather	, , , , , , , , , , , , , , , , , , , ,	Latitude		Longitude:
1. Land	Use (e.g., wo	oodland, agricultu	ural field, vacant lot, e	tc.)	Vegetation	D		Surface Stone	s (e.g., cobbles,	stones, boulders	s, etc.)	~ 0 - 2 Slope (%)
		ocation:										, ,
2 Soil F	arent Materia	al: _GLACIO	ST									
2. 00111	aront matoric	_ WLACIC	FEUVIAL		Lai	ndform		Posi	tion on Landscap	e (SU, SH, BS,	FS, TS)	
<ol><li>Distar</li></ol>	nces from:	Oper	n Water Body _	fee	et -	D	rainage W	ay	feet	Wet	tlands	<u>7150</u> feet
			Property Line _									
4. Unsuita	able Materials	s Present:	] Yes ☑ No	If Yes:	Disturbed S	Boil 🔲 l	Fill Material		Weathered/Fra	ctured Rock	☐ Bed	rock
5. Grour	ndwater Obse	erved: Yes	. I√ No		If ves	S: _	Donth Woo	ning from Dit	_	Donath Co		atan in II ala
					, 500	Soil Log		ping irom Pit	-	Depth S	tanding vv	ater in Hole
				Redo	oximorphic Fea		Coarse F	ragments		Soil		
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color- Moist (Munsell)					Volume Cobbles &	Soil Structure	Consistence		Other
			,	Depth	Color	Percent	Gravel	Stones		(Moist)		
0-10	A	10 SL	10 42 3/2		-	_		ya.e	M	F		
10 - 18	В	SL	104R 3/6	-	war	-	ĵ	-	M	F		
18-120	C	S	1042 5/3	-		-	10	lo	Sa	L		
												77.00
Additi	onal Notes:											



C. On-	Site Revi	ew (minim	um of two hole	es requi	ired at ever	ry propo	sed prim	nary and r	eserve disp	osal area)		
Deep	Observation	n Hole Numb	er: D6 Hole#	<u>4 -1 </u>	22	12:0	00	OV\$	RLAST			<b>-</b> ,
		COMMERCIA	11010 11	Date	(.a. n./E	Time		vveatner	\ <i>I=</i> 6	Latitude	Longit	
1. Land	Use (e.g., wo	odland, agricultu	ural field, vacant lot, e	etc.)	Vegetation	, , ,		Surface Stone	es (e.g., cobbles,	stones, boulder	s, etc.) Slop	e (%)
Des	scription of Lo	ocation:	NEXT TO OLD	LANDS	APE BUILD	NNG						
2. Soil P	arent Materia	al: GLACI	NFLUVIAL									
			Bicovii		La	ndform		Posi	tion on Landscap	e (SU, SH, BS,	FS, TS)	
<ol><li>Distar</li></ol>	nces from:	Oper	n Water Body _	fee	et	D	rainage W	/ay	feet	We	tlands	_ feet
		. 1	Property Line _	<u>&gt; 10</u> fee	et							
4. Unsuita	ble Materials	s Present:	] Yes ☑ No	If Yes:	Disturbed S	Soil 🔲 F	Fill Material	ıı	Weathered/Fra	ctured Rock	☐ Bedrock	
			,									
5. Grour	ndwater Obse	erved: Yes	i ⊻ No		If yes	3:	Depth Wee	ping from Pit		Depth S	tanding Water in	Hole
						Soil Log						
D 41- (i)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Redo	oximorphic Fea	tures		Fragments Volume	Nation (Intelligence of the Intelligence of th	Soil		
Depth (in)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Soil Structure	Consistence (Moist)	Ot	her
0 - 16	FILL			-	-	-	1	-	_	-		
16-36	В	SL	10 4R 3/6	-	-	-	2	2	М	F		
36-120	C	٤	10-12 5/2	-	÷		10	10	Sa	L		
					et.							
					6							
Additio	onal Notes:											



C. On-	Site Revi	ew (minim	um of two hole	es requi	ired at ever	ry propo	sed prin	nary and r	eserve disp	osal area)			
Deep	Observation	n Hole Numb	er: D7 Hole#	4/7/	22	1Z:	30		ERCAST				
		VACANT	Hole #	Date'	MONDE	Time		Weather	MONE	Latitude		Longitude:	
1. Land	Use (e.g., wo	oodland, agricultu	ural field, vacant lot, e	etc.)	Vegetation			Surface Stone	s (e.g., cobbles,	stones, boulder	rs, etc.)	~ <u>2</u> Slope (%)	
Des	scription of Lo	ocation:			4								
2. Soil P	arent Materia	al: GLACIO	FLUVIAL										
0 Di-t-	6		W. D. I	2018		ndform			tion on Landscap				
3. Distar	nces from:		n Water Body _						feet				
4 Unquita	able Materials		Property Line _ ] Yes ☑ No										
			/										
5. Grour	ndwater Obse	erved: Yes	i ☑ No		If yes	s: <u>-</u>	Depth Wee	eping from Pit	_	Depth S	tanding V	Vater in Hole	
Soil Log													
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Redo	oximorphic Fea	itures	Coarse % by	Fragments Volume	Soil Structure	Soil		044	
Deptii (iii)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Son Structure	(Moist)		Other	
0-12	A	SL	10 4R 3/3	_	-	-	<b>4</b> 0.	we	M	F			
12- 32	В	LS	104R 3/6	-		-	ų.	1414	М	F			
32-120	C	5	104R 5/2	ster.		-	15	15	Sa	L	CAVE	lN	
2			1.										
Additi	onal Notes:												



C. On-	Site Revi	ew (minim	um of two hole	es requ	ired at ever	ry propo	sed prim	nary and r	eserve disp	osal area)	)	
Deep	Observation	n Hole Numb	er: <u>\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \</u>	Uate 7	22	Time	00	<u>o√⊧₽</u> Weather	CAST	Latitude		Longitude:
1 Lond	Llee ———	VACANT	ural field, vacant lot, e									~ 2
			ural field, vacant lot, e					Surface Stone	NOME. es (e.g., cobbles,	stones, boulder	rs, etc.)	Slope (%)
2. Soil P	arent Materia	al: GLACI	OFLUVIAL			ndform		Posi	tion on Landscap	ne (SU SH RS	FS TS)	
3. Distar	nces from:	Oper	n Water Body _	- fee			rainage W		feet	-		- foot
			Property Line _									
4. Unsuita	ble Materials	s Present:	Yes 🗹 No	If Yes: [	☐ Disturbed S	Soil	Fill Material		Weathered/Fra	ctured Rock	☐ Bed	rock
5. Grour	ndwater Obse	erved: Yes	; ☑ No		If yes	s:	Depth Wee	ping from Pit	_	Depth S	Standing W	ater in Hole
						Soil Log						,
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Redo	oximorphic Fea	itures		Fragments Volume	Cail Charactura	Soil		04
Deptii (iii)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Soil Structure	(Moist)		Other
0-12	А	SL	10 4R 3/3	-	0 <del></del> 0	-	_	_	M	F		
12-26	В	SL	10 4pc 3/6	1		•	-	-	M	F		
26-96	Cl	S	104R 5/3	_	7	-	10	5	SU	L		
96-132	(2	FINE LS	2.54 5/3	-	منت	-		_	М	F		
						х						
Additi	onal Notes:											



~~	0:4 D			9							_	
C. On-	Site Revi	ew (minim	um of two hole	es requ	ired at ever	y propo	sed prin	nary and r	eserve disp	osal area)		
Deep	Observation	n Hole Numb	er: <u>D9</u> Hole#	4/7	12	1:2	0	OVER	-CAST			
		10 m	Hole #	Date <sup>l</sup>		Time		Weather		Latitude		Longitude:
1. Land	Use (e.g., wo	oodland, agricultu	ural field, vacant lot, e	etc.)	Vegetation Vegetation	D	. 12	Surface Stone	s (e.g., cobbles,	stones, boulder	rs. etc.)	≥ 2 Slope (%)
									- (5-)		0, 0.0.,	0.000 (70)
o Coil D	orant Mataria	de :										
2. 3011 P	areni Materia	II. <u>GLACIO</u>	DFLUVIAL			ndform		— Posi	tion on Landscap	ne (SU. SH. BS.	FS TS)	
3. Distar	nces from:	Oper	n Water Body	- fee			rainage W		-			
			Property Line _									
4. Unsuita	ble Materials	s Present:	Yes 🗹 No	If Yes: [	☐ Disturbed S		Fill Materia		Neathered/Fra	ctured Rock	□ Bec	drock
		erved: Yes										
5. Grour	idwater Obse	erved: ☑ Yes	☐ No		If yes	s: <u>90"</u>	Depth Wee	ping from Pit	В	Depth S בידול	tanding W	ater in Hole
						Soil Log		_				
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Red	oximorphic Fea	tures		Fragments Volume	Cail Charactura	Soil		Other
Deptii (iii)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Soil Structure	Consistence (Moist)		Other
0 - 32	А	SL	104E 3/2	ı		water	-	_	M	۴		
32 - 48	В	SL	1042 3/6	+	-	-	2	5	M	F		
48-120	L	5	104R 5/3	66"	HIGH LOW	75	10	10	Sa	L		
	8				4							
							1					
Additi	onal Notes:							и				



#### 

C. On-	Site Revi	ew (minim	um of two hole	es requi	red at ever	ry propo	sed prim	ary and r	eserve disp	osal area)				
Deep	Observation	n Hole Numb	er: <u>D10</u> Hole#	니기 Date	22	Z::	20	 Weather	RCAST	Latitude		ongitude:		
1. Land	Use 7-	VACAM	ural field, vacant lot, e		MOODED			,	1ES			~ 2		
Doc	(e.g., wo	oodand, agriculti	urai field, vacant lot, e	tc.)	Vegetation			Surface Stone	s (e.g., cobbles,	stones, boulders	s, etc.)	Slope (%)		
2. Soil P	arent Materia	il:CLAC	IOFLUVIAL		Lai	ndform		Posi	tion on Landscap	e (SU, SH, BS,	FS, TS)			
3. Distar	nces from:	Oper	n Water Body	fee	t	D	rainage W			Wet		feet		
		ſ	Property Line _	fee	t	Drinking	g Water W	/ell	feet	(	Other _	feet		
4. Unsuita	able Materials	s Present:	] Yes ☑ No □	f Yes:	Disturbed S	Soil 🔲 I	Fill Material		Weathered/Fra	ctured Rock	☐ Bedro	ck		
5. Grour	Groundwater Observed: Yes No If yes: Depth Weeping from Pit Depth Standing Water in Hole  Soil Log													
	Soil Log													
Depth (in)	Soil Herizon Soil Texture Soil Matrix: Color Redoximorphic Features Coarse Fragments Soil													
Deptii (iii)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Soil Structure	(Moist)		Other		
0 - 9	А	SL	10 VR 3/2	-	_	-	-	_	М	F				
9-32	В	ŞL	10 4R 3/6	_	-	_	_	-	M	F				
32-120	С	L5	10 42 5/3	-	=	-	5	20	IVV	F	compa	CT ROCKS		
Additi	onal Notes:													



C. On-	Site Revi	ew (minim	um of two hole	es requi	red at ever	ry propo	sed prim	nary and r	eserve disp	osal area)		
			er: DII Hole#						-			
	/	AGRICUITURA	L FIELD	Date	FIELD	MEADON	1	vveatrier	NO	Latitude	Longitude:	
1. Land	Use (e.g., wo	odland, agricultu	rL FIELD ural field, vacant lot, e	tc.)	Vegetation	Trichoun		Surface Stone	es (e.g., cobbles,	stones, boulder	rs, etc.) Slope (%)	
		ocation:										
2. Soil P	arent Materia	al: GLACI	OFLUVIAL									
. 5.		_				ndform			tion on Landscap	-		
3. Distar	ices from:		n Water Body _					/ay			tlands <u>7100</u> feet	
		F	Property Line	ל <i>וסט</i> fee	t	Drinking	g Water W	/ell	feet	(	Other feet	
4. Unsuita	ble Materials	s Present:	Yes ☑ No	If Yes:	Disturbed S	Soil 🔲 I	Fill Materia	ı 🗆 '	Weathered/Fra	ctured Rock	☐ Bedrock	
5. Grour	ndwater Obse	rved: Yes	☑ No		If yes	S:	Depth Wee	ping from Pit		<ul><li>Depth S</li></ul>	tanding Water in Hole	
						Soil Log			_			
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Redo	oximorphic Fea	tures		Fragments Volume	Soil Structure	Soil	Other	
	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	con ou actare	(Moist)	Other	
0-8	A	SL	10 4R 3/2	•	100°	· ·	i	-	М	F		
8-20	В	SL	10 4R 3/6	-	-	-	ı		M	F		
20-12	Cl	5	10 YR 5/3	-	-	-	+	**	Sa	L		
72-132	CZ	FINE SAND	2.54 5/3	-	-	-		ŭ,	54	L		
									,			
Additi	onal Notes:											



C. On-	Site Revi	ew (minim	um of two hole	es requ	ired at ever	ry propo	sed prim	nary and r	eserve disp	osal area)		
Deep	Observation	Hole Numb	er: DIZ Hole#	U]-  Date	22	3:3 Time	U		PLAST	Latitude	<u> </u>	ongitude:
1 Land	Ilso - At	GRICULTURAL	FIELD ural field, vacant lot, e		FIELD	MEADOW		N	0			~0-2
		oodland, agricultu ocation:		tc.)	Vegetation	•		Surface Stone	s (e.g., cobbles,	stones, boulder	rs, etc.)	Slope (%)
2. Soil P	arent Materia	il: <u>GLACIO</u>	FLUNAL									
						ndform			tion on Landscap	e (SU, SH, BS,	FS, TS)	
<ol><li>Distar</li></ol>	nces from:		Water Body _							We		
		F	Property Line _	750 fee	et	Drinking	g Water W	/ell	feet	(	Other _	feet
4. Unsuita	ble Materials	s Present: 🗹	Yes No	If Yes: [	Disturbed S	Soil 🗹 F	Fill Material	l 🗆 '	Weathered/Fra	ctured Rock	Bedro	ck
5. Grour	ndwater Obse	rved: 🗹 Yes	☐ No		If yes	s: <u>72"</u>	Depth Wee	ping from Pit	۷	<u>กร"</u> Depth S	tanding Wate	er in Hole
						Soil Log			_			
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Red	oximorphic Fea	tures		Fragments Volume	Soil Structure	Soil Consistence		Other
	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	on on dotale	(Moist)		
0- 54	FILL	-	page 4	ı	-	_	*	NA.	-			
54-72	cl	5	10 4p 5/3	54"	HIGH LOW	75		~	sa	L	a	
72-120	CZ	FINE SAND	54R 3/2	$\downarrow$		,	-		m	F		
											ij	
Additi	onal Notes:											



C. On-	Site Revi	ew (minim	um of two hole	es requi	red at ever	ry propo	sed prim	nary and r	eserve disp	osal area)	1	
Deep	Observation	n Hole Numb	er: D13 Hole#	니 기 Date	122	၂:) Time	5		2CAST	Latitude		ngitude:
1. Land	Use (e.g., wo	excultural	FIELD ural field, vacant lot, e	tc.)	Vegetation Vegetation	Moss		Surface Stone	S/e a cobbles	stones houlder	s etc.)	~ 2 lope (%)
	scription of Lo								a (e.g., cobbles,	stories, boulder	s, etc.)	поре (%)
2. Soil P	arent Materia	al: GLACIO	FLUVIAL									
					La	ndform		Posi	tion on Landscap	e (SU, SH, BS,	FS, TS)	
<ol><li>Distar</li></ol>	nces from:	Oper	n Water Body _	fee	et	D	rainage W	/ay	feet	Wet	tlands <u>72</u>	Loo feet
		I	Property Line _	7 100 fee	t	Drinking	g Water W	/ell	feet	(	Other	feet
4. Unsuita	ble Materials	s Present:	Yes ☑ No	f Yes:	Disturbed S	Soil 🔲 I	Fill Material		Neathered/Fra	ctured Rock	☐ Bedroc	k
5. Groun	ndwater Obse	erved: Yes	☑ No		If yes	s: <u>-</u>	Depth Wee	ping from Pit	_	Depth Si	tanding Water	in Hole
-						Soil Log						
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Redo	ximorphic Fea	itures	Coarse F % by	ragments Volume	Soil Structure	Soil Consistence		Other
	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones		(Moist)		
0-6	Α	5L	104R 3/4	-	. ~		•	60.94	M	۴		
6-20	В	5 L	10 4R 3/6		96.	-	2	2	M	F		
20-120	C	LS	10 4R 5/3		~	-	15	25	M	F		
					7317							
Additio	onal Notes:							I				



_	011 D 1										
			um of two hole					1000	-	-	
Dee	Observation	n Hole Numb	er: <u>DIY</u> Hole#	4/7	12	4,	45	OVE	2CAST		
		Accump	Hole #	Date	20.41	Time		Weather	2-2200	Latitude	Longitude:
Lanc	Use (e.g., wo	oodland, agriculti	wal field, vacant lot, e	etc.)	Vegetation	FIMEATOR		Surface Stone	es (e.g., cobbles,	stones, boulder	rs, etc.) Slope (%)
D€	scription of Lo	cation:									
Soil	Parent Materia	al: GLACIO	DECUVIAL								
					La	ındform		Posi	tion on Landscap	e (SU, SH, BS,	, FS, TS)
Dista	inces from:		n Water Body _				-	/ay			tlands <u>7100</u> feet
			Property Line _								Other <u>-</u> feet
Unsuit	able Materials	s Present:	] Yes ☑ No	If Yes: [	☐ Disturbed S	Soil 🔲 I	Fill Materia	' 🗆 '	Weathered/Fra	ctured Rock	☐ Bedrock
Grou	ndwater Obse	erved: Yes	s ☑ No		If yes	s: _	Depth Wee	enina from Pit		- Denth S	Standing Water in Hole
						Soil Log		pring from the	_	Bopair c	randing water in Flore
-	0.11.11	0-11	O. II Mandalan O. Ian	Red	oximorphic Fea		Coarse	Fragments		Soil	
epth (in	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color- Moist (Munsell)	Depth	Color	Percent	% by Gravel	Cobbles & Stones	Soil Structure	Consistence (Moist)	Other
0-10	Α	SL	104R 3/4	~	-	-		-	₩	F	
0-120	C	SL	164243	72"	HIGH COW	75	10	25	m	F	very rocky
			,								
									-		



#### Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Dpl:

~					-				_	_		
C. On	-Site	Revie	ew (minim	um of two hole	es requ	ired at every	proposed p	orimary	and reserv	∕e dispo	sal area)	
Dee	n Ohse	rvation	Hole Numb	er: <u>TP-7-</u> 1	7/20/2	22	8:30 AM	ç	90d, SUNN	Υ		
Dec	h Onse	vation	Hole Nullib	Hole #	Date		Time		Weather	<u> </u>	Latitude	Longitude
1. Land	41160	WOOD	DLAND			WOODED		MAN	ΙΥ			-
i. Lain	u 03 <del>0</del>	(e.g., wo		ural field, vacant lot, e				Surfac	ce Stones (e.g.,	cobbles, sto	ones, boulders, e	tc.) Slope (%)
Descript	ion of Lo	ocation:	0	N DRUMLIN NE	EAR FA	RM						
2. Soil	Parent I	Material	l: TILL									
						Land	form		Position on	Landscape	(SU, SH, BS, FS,	TS, Plain)
3. Dista	ances fr	om:	Oper	n Water Body	fe	et	Drainag	ge Way _	feet		Wetlar	nds >>100 feet
			ı	Property Line	>>10 fee	et	Drinking Wat	er Well _	feet		Oth	er feet
4. Uns	uitable	Materia	als Present:	☐ Yes ☑ No	If Yes:	☐ Disturbed S	Soil/Fill Materia	ı [	] Weathered/	Fractured	Rock 🗌 Be	drock
5. Grou	undwate	r Obsei	rved: 🗌 Yes	☑ No		If yes:	Depth	to Weeping	g in Hole		Depth to Sta	anding Water in Hole
			_			•	Soil Log		-			-
				T		<u>`</u>	Soli Log				1	
5 4 6	Soil H	orizon	Soil Texture	Soil Matrix: Color-	ı	Redoximorphic Fe	eatures		Fragments y Volume	Soil	Soil	0.1
Depth (in		ıyer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Structure	Consistence (Moist)	Other
						Cnc:						
4	Α		SL	10YR 3/3/	-	Dpl:	-	-	-	M	F	
						Cnc:						
20	В		LS	10YR 5/8	-	Dpl:	-	-	-	M	F	
						Cnc:						
48	C1		LS	10YR 6/2	-	Dpl:	-	15	15	M	F	
						Cnc:						
120	C2		LS	10YR 5/3	-	Dpl:	]	15	15	M	F	
						Cnc:						
<u> </u>						Dpl:						
		-				Cnc ·						

Additional Notes:



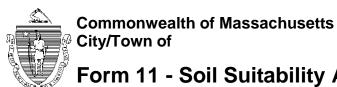
Deen	Ohearvation	n Hole Numb	or: TP-7-2	7/20	122						
реер (	ODSEI VALIOI	i i iole ivaliib	Hole #	Date		Time		Veather		Latitude	Longitude
. Land l	Jse:										
	(e.g.	, woodland, agric	cultural field, vacant lo	ot, etc.)	Vegetat	ion	Surfac	e Stones (e.g.,	cobbles, sto	nes, boulders, etc	Slope (%)
Descri	ption of Loca	ation:	-								
. Soil Pa	arent Materia	al:									
						Landform		Position on	Landscape	(SU, SH, BS, FS,	TS, Plain)
Distan	ces from:	Oper	n Water Body	fe	et	Drainag	e Way _	feet		Wetlan	ds feet
		ı	Property Line _	fo	ot.	Drinking Wate	r Wall	foot		Oth	er feet
		'	Toperty Line _	16	eı	Dilliking water	:i vveii _	1661		Ott	Ci ieei
Unsuital	ole Materials	Present:	Yes 🛭 No 🛚	f Yes:	☐ Disturbed	d Soil/Fill Material	□ \	Neathered/Fra	actured Ro	ck 🗌 Bedro	ck
0						16					
Groun	dwater Obse	erved:  Yes	No 🔽 No			If yes:	_ Depth to	Weeping in Ho	le _	Depth Star	nding Water in Hole
Ground	dwater Obse	erved:  Yes	s ☑ No			If yes: Soil Log			le	Depth Star	nding Water in Hole
					Redoximorp		Coarse	e Fragments		Soil	
	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Depth	Redoximorp	Soil Log	Coarse		Soil Structure		nding Water in Hole Other
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color- Moist (Munsell)		Cold	Soil Log	Coarse % b Gravel	e Fragments y Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	
Ground	Soil Horizon	Soil Texture	Soil Matrix: Color-		Cold	Soil Log	Coarse % b	e Fragments y Volume Cobbles &	Soil	Soil Consistence	
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color- Moist (Munsell)		Cnc: Dpl: Cnc:	Soil Log	Coarse % b Gravel	e Fragments y Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	
Depth (in)	Soil Horizon /Layer A B	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8		Cold	Soil Log	Coarse % b Gravel	e Fragments y Volume Cobbles & Stones	Soil Structure M	Soil Consistence (Moist)	
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color- Moist (Munsell)		Cold Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl:	Soil Log	Coarse % b Gravel	e Fragments y Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	
Depth (in)  1 22	Soil Horizon /Layer A B	Soil Texture (USDA)  SL  LS	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8  10YR 6/2		Cold Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Cnc: Cnc:	Soil Log	Coarse % b Gravel	e Fragments y Volume Cobbles & Stones	Soil Structure M M	Soil Consistence (Moist) F	
Depth (in)	Soil Horizon /Layer A B	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8		Cold Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl:	Soil Log	Coarse % b Gravel 15	Fragments y Volume Cobbles & Stones - -	Soil Structure M	Soil Consistence (Moist)	
Depth (in)  1 22	Soil Horizon /Layer A B	Soil Texture (USDA)  SL  LS	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8  10YR 6/2		Cold Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Dpl: Dpl:	Soil Log	Coarse % b Gravel 15	Fragments y Volume Cobbles & Stones - -	Soil Structure M M	Soil Consistence (Moist) F	
Depth (in)  1 22	Soil Horizon /Layer A B	Soil Texture (USDA)  SL  LS	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8  10YR 6/2		Colo Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Cnc: Cnc:	Soil Log	Coarse % b Gravel 15	Fragments y Volume Cobbles & Stones - -	Soil Structure M M	Soil Consistence (Moist) F	



			<b></b> - •					and reserv			
Deep (	Observation	n Hole Numb	er: 1P-7-3 Hole #	7/20	/22	<b>T</b> *****		M = = (b = ::		1 - 60 - 4-	Longitudo
Londi	loo		Hole #	Date		Time	V	Veather		Latitude	Longitude
. Land U		, woodland, agric	cultural field, vacant lo	ot, etc.)	Vegetation		Surfac	e Stones (e.g.,	cobbles, stor	nes, boulders, etc	:.) Slope (%)
Descri	ption of Loca	_			_				•		
,	•	_									
i. Soil Pa	arent Materia	al: 				dform		Position on	Landscape	(SU, SH, BS, FS,	TS. Plain)
B Distan	ces from:	Oper	n Water Body	fe			e Wav	feet		•	ds feet
· Diotair		Opo.				2.a.i.ag	_			T O tial i	<u> </u>
		I	Property Line _	fe	et	Drinking Wate	r Well _	feet		Oth	er feet
. Unsuital	ole Materials	Present:	Yes ☑ No I	f Yes:	☐ Disturbed So	oil/Fill Material	Пι	Weathered/Fr	actured Ro	ck 🗌 Bedro	ck
		_					_				
. Groun	dwater Obse	erved: 🗌 Yes	s 🛭 No			If yes:	_ Depth to	Weeping in Ho	le _	Depth Star	nding Water in Hole
						Soil Log					
					Redoximorphic			e Fragments		Soil	
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color- Moist (Munsell)		Redoximorphic	Features	% b	y Volume	Soil Structure	Soil Consistence	Other
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color- Moist (Munsell)	Depth	Color						Other
	/Layer	(USDA)	Moist (Munsell)	Depth -	Color	Features	% b	y Volume Cobbles &	Structure	Consistence (Moist)	Other
4				Depth	Color	Features	% b	y Volume Cobbles &		Consistence (Moist)	Other
4	/Layer	(USDA)	Moist (Munsell)	Depth	Color Cnc: Dpl:	Features	% b	y Volume Cobbles &	Structure	Consistence (Moist)	Other
Depth (in) 4 22	/Layer A B	SL LS	Moist (Munsell)  10YR 3/3  10YR 5/8	Depth	Color Cnc: Dpl: Cnc: Dpl: Cnc: Cnc:	Features	% b Gravel -	y Volume Cobbles & Stones -	Structure M M	Consistence (Moist)  F	Other
4	/Layer	(USDA)	Moist (Munsell)	Depth -	Color Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl:	Features	% b	y Volume Cobbles &	Structure	Consistence (Moist)	Other
4 22	/Layer A B	SL LS	Moist (Munsell)  10YR 3/3  10YR 5/8	Depth	Color Cnc: Dpl: Cnc: Dpl: Cnc: Cnc:	Features	% b Gravel -	y Volume Cobbles & Stones -	Structure M M	Consistence (Moist)  F	Other
4 22	/Layer A B	SL LS	Moist (Munsell)  10YR 3/3  10YR 5/8	Depth	Color Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Cnc: Cnc: Cnc:	Features	% b Gravel -	y Volume Cobbles & Stones -	Structure M M	Consistence (Moist)  F	Other
4 22	/Layer A B	SL LS	Moist (Munsell)  10YR 3/3  10YR 5/8	Depth	Color  Cnc: Dpl: Cnc:	Features	% b Gravel -	y Volume Cobbles & Stones -	Structure M M	Consistence (Moist)  F	Other
4 22	/Layer A B	SL LS	Moist (Munsell)  10YR 3/3  10YR 5/8	Depth	Color Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Cnc: Cnc: Cnc:	Features	% b Gravel -	y Volume Cobbles & Stones -	Structure M M	Consistence (Moist)  F	Other



Deep (	Observation	n Hole Numb	er: <u>TP-7</u> -4	7/20	/22						
•			Hole #	Date		Time	V	Veather		Latitude	Longitude
. Land l	Jse:				_						
	, -		cultural field, vacant lo	ot, etc.)	Vegetat	ion	Surface	e Stones (e.g.,	cobbles, sto	nes, boulders, etc	Slope (%)
Descri	ption of Loca	ation:									
. Soil Pa	arent Materia	al:									
						Landform		Position on	Landscape	(SU, SH, BS, FS,	TS, Plain)
. Distan	ces from:	Oper	n Water Body	fe	et	Drainag	e Way _	feet		Wetlan	ds feet
		ī	Property Line _	40	o.t	Drinking Wate	r Wall	foot		Oth	er feet
		'	rioperty Line _	ie	eı	Dilliking wate	i vveii _	reet		Oth	eiieei
. Unsuital	ole Materials	Present:	Yes ☑ No I	f Yes:	☐ Disturbed	d Soil/Fill Material	□ \	Weathered/Fr	actured Ro	ck 🗌 Bedro	ck
_		. —	<b>—</b>								
Groun	dwater Obse	erved:  Yes	s 🔽 No			If yes:	_ Depth to	Weeping in Ho	le _	Depth Star	nding Water in Hole
. Ground	dwater Obse	erved:  Yes	s ☑ No			If yes:	_ Depth to	Weeping in Ho	le	Depth Star	nding Water in Hole
. Groun					Redoximorp		Coarse	e Fragments		Depth Star	nding Water in Hole
	dwater Obse	Soil Texture	Soil Matrix: Color-Moist (Munsell)		1	Soil Log	Coarse % b		Soil Structure	Soil Consistence	nding Water in Hole Other
	Soil Horizon	Soil Texture	Soil Matrix: Color-	Depth	Cold	Soil Log	Coarse	e Fragments y Volume	Soil	Soil	•
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-		Cold	Soil Log	Coarse % b	e Fragments y Volume Cobbles &	Soil	Soil Consistence	•
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color- Moist (Munsell)		Cold	Soil Log	Coarse % b	e Fragments y Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	•
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color- Moist (Munsell)		Cold Cnc: Dpl: Cnc: Dpl:	Soil Log	Coarse % b	e Fragments y Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	•
Depth (in)	Soil Horizon /Layer A B	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8		Cold Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc:	Soil Log	Coarse % b Gravel	e Fragments y Volume Cobbles & Stones	Soil Structure M	Soil Consistence (Moist)	•
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color- Moist (Munsell)		Cold Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl:	Soil Log	Coarse % b	e Fragments y Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	•
Depth (in)	Soil Horizon /Layer A B	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8		Cold Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc:	Soil Log	Coarse % b Gravel	e Fragments y Volume Cobbles & Stones	Soil Structure M	Soil Consistence (Moist)	•
Depth (in)  1  24	Soil Horizon /Layer A B	Soil Texture (USDA)  SL  LS	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8  10YR 6/2		Color Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Cnc: Cnc:	Soil Log	Coarse % b Gravel 15	e Fragments y Volume Cobbles & Stones - -	Soil Structure M M	Soil Consistence (Moist) F	•
Depth (in)  1  24	Soil Horizon /Layer A B	Soil Texture (USDA)  SL  LS	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8  10YR 6/2		Colo Cnc: Dpl:	Soil Log	Coarse % b Gravel 15	e Fragments y Volume Cobbles & Stones - -	Soil Structure M M	Soil Consistence (Moist) F	•
Depth (in)  1  24	Soil Horizon /Layer A B	Soil Texture (USDA)  SL  LS	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8  10YR 6/2		Color Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Cnc: Cnc:	Soil Log	Coarse % b Gravel 15	e Fragments y Volume Cobbles & Stones - -	Soil Structure M M	Soil Consistence (Moist) F	•



#### Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Deep (	Observation	n Hole Numb	er: TP-7-5	7/20	/22							<del></del> .
			Hole #	Date		Ti	me	V	Veather		Latitude	Longitude
. Land l					- <del></del>							<u> </u>
	, •		cultural field, vacant lo	ot, etc.)	Vege	etation		Surface	e Stones (e.g.,	cobbles, sto	nes, boulders, etc	Slope (%)
Descri	ption of Loca	ation:										
. Soil Pa	arent Materia	al:										
						Landforn	1		Position on	Landscape	(SU, SH, BS, FS,	TS, Plain)
. Distan	ces from:	Oper	n Water Body	fe	eet		Drainage	e Way _	feet		Wetlan	ds feet
			Property Line _	fe	et	Dri	nking Wate	r Well _	feet		Oth	er feet
Unsuital	ble Materials	Present	Yes ☑ No I	f Yes	□ Distur	rhed Soil/Fil	l Material	Пν	Neathered/Fr	actured Ro	ck 🗌 Bedro	ck
. Orioditai	oro matoriale	71 1000mi. <u> </u>			Diotai	1000 001/1 11	i Matoriai	_				
					_ Diotai				Weeping in Ho	ile		
		erved: Yes		. 100.	_ Diotai	If	yes:		Weeping in Ho	le _		nding Water in Hole
						If		_ Depth to		le _		
. Ground						If	yes:	_ Depth to	Weeping in Ho Fragments y Volume	le _	Depth Sta	nding Water in Hole
	dwater Obse	erved: Yes	s ☑ No		Redoxim	lf Soi	yes:	_ Depth to	e Fragments		Depth Sta	
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)		Redoxim Cnc:	lf Soi norphic Feat	yes: il Log ures	_ Depth to	e Fragments y Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	nding Water in Hole
. Ground	dwater Obse	erved: Yes	Soil Matrix: Color-		Redoxim Cnc: Dpl:	lf Soi norphic Feat	yes: il Log ures	_ Depth to	e Fragments y Volume Cobbles &	Soil	Soil Consistence	nding Water in Hole
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)		Redoxim Cnc: Dpl: Cnc:	lf Soi norphic Feat	yes: il Log ures	_ Depth to	e Fragments y Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	nding Water in Hole
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)		Redoxim Cnc: Dpl: Cnc: Dpl: Cnc: Dpl:	lf Soi norphic Feat	yes: il Log ures	_ Depth to	e Fragments y Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	nding Water in Hole
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)		Redoxim Cnc: Dpl: Cnc:	lf Soi norphic Feat	yes: il Log ures	_ Depth to	e Fragments y Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	nding Water in Hole
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA) SL	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8		Redoxim Cnc: Dpl: Cnc: Dpl: Cnc: Cnc:	lf Soi norphic Feat	yes: il Log ures	_ Depth to  Coarse % b  Gravel -	e Fragments y Volume Cobbles & Stones	Soil Structure M	Soil Consistence (Moist)	nding Water in Hole
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA) SL	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8		Redoxim  Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Dpl: Dpl:	lf Soi norphic Feat	yes: il Log ures	_ Depth to  Coarse % b  Gravel -	e Fragments y Volume Cobbles & Stones	Soil Structure M	Soil Consistence (Moist)	nding Water in Hole
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA) SL	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8		Redoxim  Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Cnc: Cnc:	lf Soi norphic Feat	yes: il Log ures	_ Depth to  Coarse % b  Gravel -	e Fragments y Volume Cobbles & Stones	Soil Structure M	Soil Consistence (Moist)	nding Water in Hole
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA) SL	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8		Redoxim  Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Dpl: Dpl:	lf Soi norphic Feat	yes: il Log ures	_ Depth to  Coarse % b  Gravel -	e Fragments y Volume Cobbles & Stones	Soil Structure M	Soil Consistence (Moist)	nding Water in Hole

\*NO REFUSAL, JUST LARGE BOULDERS



Deep Observation Hole Number: TP-7-6 Hole # Drainage Way feet	C. On-S	Site Revi	<b>ew</b> (minim	um of two hole	es requ	uired at eve	ery proposed p	orimary	and reser	ve dispo	sal area)	
1. Land Use:    Ce.g., woodland, agricultural field, vacant lot, etc.  Vegetation   Surface Stones (e.g., cobbles, stones, boulders, etc.)   Slope (%)	Deep (	Observation	n Hole Numb	er: TP-7-6		/22						- Lander
Ce.g., woodland, agricultural field, vacant lot, etc.  Vegetation   Surface Stones (e.g., cobbles, stones, boulders, etc.)   Slope (%)	1 Landl	leo:		Hole #	Date		Time	V	Veather		Latitude	Longitude
2. Soil Parent Material:    Landform	i. Lanu C		, woodland, agric	cultural field, vacant lo	ot, etc.)	Vegetation	1	Surfac	e Stones (e.g.,	cobbles, sto	nes, boulders, etc	Slope (%)
3. Distances from: Open Water Body feet	Descri	ption of Loca	ation:									
Landform   Position on Landscape (SU, SH, BS, FS, TS, Plain)	2. Soil Pa	arent Materia	al:									
Property Line						La	andform		Position on	Landscape	(SU, SH, BS, FS,	TS, Plain)
4. Unsuitable Materials Present:	<ol><li>Distan</li></ol>	ces from:	Oper	n Water Body _	fe	et	Drainage	e Way _	feet		Wetlan	ds feet
Soil Horizon   Cush   Character   Cush   Character   Cush   Character   Cush   Character   Cush   Character   Cush   Cu			I	Property Line _	fe	et	Drinking Wate	er Well	feet		Oth	er feet
Soil Horizon   Cush   Character   Cush   Character   Cush   Character   Cush   Character   Cush   Character   Cush   Cush   Cush   Character   Cush   Cush	4. Unsuitak	ole Materials	Present:	Yes ☑ No I	f Yes	□ Disturbed 9	Soil/Fill Material		Weathered/Fr	actured Ro	ck □ Bedro	rk
Soil Horizon   Percent   Grave   Coarse Fragments   Soil Matrix: Color   Percent   Grave   Cobbles & Stones   Stones   Soil Matrix: Color   Conc :   Conc	T. OriSultai	oc materials	or resent.	103 12 140 1	1 163.		John III Waterial	ٔ ب	vveatriered/i i	actured ivo	ck	OK
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	5. Ground	dwater Obse	erved: Yes	s 🔽 No			If yes:	_ Depth to	Weeping in Ho	ole _	Depth Sta	nding Water in Hole
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$							Soil Log					
Depth (in)   Soli Horizon   CusDA    Moist (Munsell)   Depth   Color   Percent   Gravel   Cobbles & Structure   Consistence (Moist)   Color   Cobbles & Structure   Consistence (Moist)   Color   Complex   Consistence (Moist)   Color   Co						Redoximorphi					Soil	
4 A SL 10YR 3/3 - Cnc: Dpl: M F  22 B LS 10YR 5/8 - Dpl: M F  120 C LS 10YR 6/2 - Dpl: - 15 15 M F  Cnc: Dpl: - 15 15 M F  Cnc: Dpl: - 15 15 M F	Depth (in)					<u> </u>	-		,	_	Consistence	Other
4       A       SL       10YR 3/3       -       Dpl:       -       -       -       M       F         22       B       LS       10YR 5/8       -       Dpl:       -       -       -       M       F         120       C       LS       10YR 6/2       -       Dpl:       -       -       15       15       M       F         Cnc:       Dpl:       -       -       15       15       M       F					Depth		Percent	Gravei	Stones		(MOISI)	
22 B LS 10YR 5/8 -	4	Α	SL	10YR 3/3	_			-	_	М	F	
120 C LS 10YR 6/2 - Cnc: Dpl: Dpl: Dpl: Dpl: Dpl: Dpl: Dpl: Dpl		_		10) (5 - 10		<u> </u>				1	_	
120 C LS 10YR 6/2 - Dpl: - 15 15 M F  Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Dpl: Dpl: Dpl: Dpl: Dpl: Dpl: Dpl	22	В	LS	10YR 5/8	-	<u> </u>	-	-	-	M	F	
Cnc :	120	С	LS	10YR 6/2	_			15	15	М	F	
Cnc : Dpl: Cnc : Dpl: Cnc : Dpl:						Cnc :						
Dpl:						+ '						
Cnc : Dpl:												
						•						
						Dpl:						



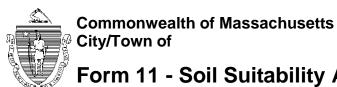
C. On-S	Site Revi	i <b>ew</b> (minim	um of two hole	es requ	uired at eve	ery proposed p	rimary	and reser	ve dispo	sal area)	
Deep (	Observation	n Hole Numb	er: TP-7-7	7/20	/22	-					<del></del> ,
1. Land U			Hole #	Date		Time	V	Veather		Latitude	Longitude
i. Lailu C	(e.g.	, woodland, agric	cultural field, vacant lo	ot, etc.)	Vegetation	1	Surfac	e Stones (e.g.,	cobbles, sto	nes, boulders, etc	Slope (%)
Descri	ption of Loca	ation:									
2. Soil Pa	arent Materia	al:									
					La	andform		Position on	Landscape	(SU, SH, BS, FS,	TS, Plain)
3. Distan	ces from:	Oper	n Water Body _	fe	et	Drainage	e Way _	feet		Wetlan	ds feet
		I	Property Line _	fe	et	Drinking Wate	r Well	feet		Oth	er feet
4. Unsuital	ble Materials	s Present: □	Yes ☑ No I	f Yes:	☐ Disturbed S	Soil/Fill Material	Пν	Weathered/Fr	actured Ro	ck 🗌 Bedro	ck
		_					_				
5. Groun	dwater Obse	erved: Yes	s 🛭 No			If yes:	_ Depth to	Weeping in Ho	le _	Depth Sta	nding Water in Hole
						Soil Log					
	Soil Horizon	Soil Texture	Soil Matrix: Color-		Redoximorphi	c Features		e Fragments v Volume	Soil	Soil	
Depth (in)	/Layer	(USDA)	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Structure	Consistence (Moist)	Other
4	Α	SL	10YR 3/3	_	Cnc :		_	_	М	F	
<u> </u>		OL .	10111070		Dpl: Cnc :				141	•	
24	В	LS	10YR 5/8	-	Dpl:	-	-	-	M	F	
120	С	LS	10YR 6/2	_	Cnc: Dpl:		15	15	М	F	
					Cnc :						
					Dpl:						
					Cnc :						
					Dpl: Cnc :						
					Dpl:						
		•	1	1	I - L	I	1	1	1		



C. On-S			TD 7.0								
Deep	Observatior	n Hole Numb	er: <u>TP-7-</u> 8 Hole #	7/20/ Date	22	Time		Veather		1	 Longitude
I. Land l	lco:		Hole #	Date		Time	V	veatner		Latitude	Longitude
. Lanu C		, woodland, agric	cultural field, vacant lo	ot, etc.)	Vegeta	tion	Surfac	e Stones (e.g.,	cobbles, stor	nes, boulders, etc	c.) Slope (%)
Descri	ption of Loca	ation:									
		_									
Soli Pa	arent Materia	AII.				Landform		Position on	Landscape	(SU, SH, BS, FS,	, TS, Plain)
3. Distan	ces from:	Oper	n Water Body	fe	et	Drainag	je Way	feet	·	•	nds feet
			, _								
			Property Line _	fe	et	Drinking Wat	er Well _	feet		Oth	er feet
. Unsuital	ole Materials	Present:	Yes ☑ No I	f Yes:	Disturbe	ed Soil/Fill Material	□ \	Neathered/Fr	actured Ro	ck 🗌 Bedro	ck
. Groun	dwater Obse	erved:  Yes	No			If yes:	Depth to	Weeping in Ho	le _	Depth Sta	nding Water in Hole
5. Groun	dwater Obse	erved:  Yes	s ☑ No			If yes:	Depth to	Weeping in Ho	le	Depth Sta	nding Water in Hole
					Redoximor		Coarse	e Fragments		Soil	nding Water in Hole
	dwater Obse	Soil Texture	Soil Matrix: Color-Moist (Munsell)		1	Soil Log	Coarse % b	e Fragments y Volume Cobbles &	Soil	Soil Consistence	nding Water in Hole Other
	Soil Horizon	Soil Texture	Soil Matrix: Color-	Depth	Col	Soil Log	Coarse	e Fragments y Volume	Soil	Soil	•
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Depth	1	Soil Log	Coarse % b	e Fragments y Volume Cobbles &	Soil	Soil Consistence	•
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color- Moist (Munsell)	Depth	Col Cnc : Dpl: Cnc :	Soil Log	Coarse % b	e Fragments y Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	•
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color- Moist (Munsell)	Depth	Col Cnc : Dpl: Cnc : Dpl:	Soil Log	Coarse % b	e Fragments y Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	•
Depth (in) 4 22	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color- Moist (Munsell)	Depth	Col Cnc : Dpl: Cnc :	Soil Log	Coarse % b	e Fragments y Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	•
Depth (in) 4 22	Soil Horizon /Layer A B	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8	Depth	Col Cnc : Dpl: Cnc : Dpl: Cnc :	Soil Log	Coarse % b Gravel	e Fragments y Volume Cobbles & Stones	Soil Structure M	Soil Consistence (Moist)	•
Depth (in) 4 22	Soil Horizon /Layer A B	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8	Depth	Col Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Dpl: Dpl:	Soil Log	Coarse % b Gravel	e Fragments y Volume Cobbles & Stones	Soil Structure M	Soil Consistence (Moist)	•
Depth (in) 4 22	Soil Horizon /Layer A B	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8	Depth	Col Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Cnc: Cnc:	Soil Log	Coarse % b Gravel	e Fragments y Volume Cobbles & Stones	Soil Structure M	Soil Consistence (Moist)	•
Depth (in) 4 22 120	Soil Horizon /Layer A B	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8	Depth	Col Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Dpl: Dpl:	Soil Log	Coarse % b Gravel	e Fragments y Volume Cobbles & Stones	Soil Structure M	Soil Consistence (Moist)	•



Deen	Observation	n Hole Numb	er: TP-7-9	7/22/	22	8:30 AM					
Всср		Jio Italiib	Hole #	Date		Time		Veather		Latitude	Longitude
. Land l	Jse:										
	(e.g.	, woodland, agric	cultural field, vacant lo	ot, etc.)	Vegetatio	n	Surface	e Stones (e.g.,	cobbles, stor	nes, boulders, etc	Slope (%)
Descri	ption of Loca	ation:									
. Soil Pa	arent Materia	al:									
					L	andform		Position on	Landscape	(SU, SH, BS, FS,	TS, Plain)
. Distan	ces from:	Oper	n Water Body	fe	et	Drainage	e Way _	feet		Wetlan	ds feet
		ı	Property Line _	fe	⊇t	Drinking Wate	r Well	feet		Oth	er feet
. Unsuital	ole Materials	Present:	Yes 🛭 No 🛚	f Yes:	Disturbed	Soil/Fill Material	□ <i>\</i>	Neathered/Fr	actured Ro	ck 🗌 Bedro	ck
Croun	ductor Oboo	muodi 🗆 Voo	. [7] No			lf voor	Don'th to	\\\\-\-\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	I.	Davida Ota	a dia a Marta dia 11ata
. Groun	dwater Obse	erved:  Yes	No 🔽 No			If yes:	_ Depth to	Weeping in Ho	le	Depth Star	nding Water in Hole
. Groun	dwater Obse	erved:  Yes	S ☑ No	Γ		If yes:			le	Depth Star	nding Water in Hole
	dwater Obse	erved: Yes	No No Soil Matrix: Color-		Redoximorph	Soil Log	Coarse	Weeping in Ho Fragments Volume	Soil	Soil	
. Ground				Depth	Redoximorph Color	Soil Log	Coarse	e Fragments			nding Water in Hole Other
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color- Moist (Munsell)		Color	Soil Log	Coarse % b	e Fragments y Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	
	Soil Horizon	Soil Texture	Soil Matrix: Color-		Color Cnc : Dpl:	Soil Log	Coarse % b	e Fragments y Volume Cobbles &	Soil	Soil Consistence	
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color- Moist (Munsell)		Color Cnc : Dpl: Cnc :	Soil Log	Coarse % b	e Fragments y Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	
Depth (in)	Soil Horizon /Layer A B	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8		Color Cnc : Dpl:	Soil Log	Coarse % b Gravel	e Fragments y Volume Cobbles & Stones	Soil Structure M	Soil Consistence (Moist)	
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color- Moist (Munsell)		Color Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl:	Soil Log	Coarse % b	e Fragments y Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	
Depth (in)	Soil Horizon /Layer A B	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8		Color Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc:	Soil Log	Coarse % b Gravel	e Fragments y Volume Cobbles & Stones	Soil Structure M	Soil Consistence (Moist)	
Depth (in)	Soil Horizon /Layer A B	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8		Color Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl:	Soil Log	Coarse % b Gravel	e Fragments y Volume Cobbles & Stones	Soil Structure M	Soil Consistence (Moist)	
Depth (in)	Soil Horizon /Layer A B	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8		Color Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Dpl: Dpl:	Soil Log	Coarse % b Gravel	e Fragments y Volume Cobbles & Stones	Soil Structure M	Soil Consistence (Moist)	
Depth (in)	Soil Horizon /Layer A B	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8		Color Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Cnc: Cnc:	Soil Log	Coarse % b Gravel	e Fragments y Volume Cobbles & Stones	Soil Structure M	Soil Consistence (Moist)	



#### Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Deen	Ohservation	Hole Numb	er: <u>TP-7</u> -10	7/22	/22						
Всср	obsci valioi	THOIC HUILD	Hole #	Date	· <del></del>	Time		Veather		Latitude	Longitude
. Land l											
	(e.g.	, woodland, agric	cultural field, vacant lo	ot, etc.)	Vegetat	ion	Surfac	e Stones (e.g.,	cobbles, sto	nes, boulders, etc	Slope (%)
Descri	ption of Loca	ation:	-								
. Soil Pa	arent Materia	al:									
						Landform		Position on	Landscape	(SU, SH, BS, FS,	TS, Plain)
. Distan	ces from:	Oper	n Water Body	fe	et	Drainag	e Way _	feet		Wetlan	ids feet
		1	Property Line _	fo	ot	Drinking Wate	r Wall	foot		Oth	er feet
		'	Toperty Line _	16	G.	Dilliking water	i vveii _	1661		Otti	ieet
. Unsuital	ole Materials	Present:	Yes 🛭 No 🛚	f Yes:	☐ Disturbe	d Soil/Fill Material	□ \	Neathered/Fr	actured Ro	ck 🗌 Bedro	ck
0						16	_				
. Ground	dwater Obse	erved: \( \) Yes	s ☑ No			If yes:	_ Depth to	Weeping in Ho	le _	Depth Sta	nding Water in Hole
. Ground	dwater Obse	erved: Yes	s ☑ No			If yes:			le _	Depth Sta	nding Water in Hole
					Redoximorp		Coarse	e Fragments		Soil	-
. Ground	dwater Obse Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Depth	Redoximorp	Soil Log	Coarse	e Fragments y Volume Cobbles &	Soil Structure		nding Water in Hole Other
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color- Moist (Munsell)		1	Soil Log	Coarse % b	e Fragments y Volume	Soil Structure	Soil Consistence (Moist)	-
	Soil Horizon	Soil Texture	Soil Matrix: Color-		Cold Cnc : Dpl:	Soil Log	Coarse % b	e Fragments y Volume Cobbles &	Soil	Soil Consistence	-
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color- Moist (Munsell)		Cnc: Dpl: Cnc:	Soil Log	Coarse % b	e Fragments y Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	-
Depth (in) 4 30	Soil Horizon /Layer A B	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8		Cold Cnc : Dpl:	Soil Log	Coarse % b	e Fragments y Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	-
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color- Moist (Munsell)		Cnc: Dpl: Cnc: Dpl: Dpl:	Soil Log	Coarse % b	e Fragments y Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	-
Depth (in) 4 30	Soil Horizon /Layer A B	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8		Color Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Cnc: Cnc:	Soil Log	Coarse % b Gravel	e Fragments y Volume Cobbles & Stones	Soil Structure M	Soil Consistence (Moist)	-
Depth (in) 4 30	Soil Horizon /Layer A B	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8		Cold Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Dpl: Dpl: Cnc:	Soil Log	Coarse % b Gravel	e Fragments y Volume Cobbles & Stones	Soil Structure M	Soil Consistence (Moist)	-
Depth (in) 4 30	Soil Horizon /Layer A B	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8		Colo Cnc: Dpl: Cnc:	Soil Log	Coarse % b Gravel	e Fragments y Volume Cobbles & Stones	Soil Structure M	Soil Consistence (Moist)	-
Depth (in) 4 30	Soil Horizon /Layer A B	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8		Cold Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Dpl: Dpl: Cnc:	Soil Log	Coarse % b Gravel	e Fragments y Volume Cobbles & Stones	Soil Structure M	Soil Consistence (Moist)	-

\*NO REFUSAL, JUST LARGE BOULDERS



						ny propossa p	a. y	and reserv	o alopo.	sar aroay	
Deep (	Observation	Hole Numb	er: TP-7-11	7/22 Date	/22	Time		Veather		Latitude	 Longitude
. Land U	Jse:						•	vodino.		Lantado	3
	(e.g.	, woodland, agric	cultural field, vacant lo	ot, etc.)	Vegetation	n	Surface	e Stones (e.g.,	cobbles, sto	nes, boulders, etc	Slope (%)
Descri	ption of Loca	ation:									
. Soil Pa	arent Materia	al:									
					La	andform		Position on	Landscape	(SU, SH, BS, FS,	TS, Plain)
. Distan	ces from:	Oper	n Water Body _	fe	et	Drainage	e Way _	feet		Wetlan	ds feet
		i	Property Line _	fe	et	Drinking Wate	r Well	feet		Oth	er feet
11 26.1											
Unsuitat	ole iviateriais	Present: 🔲	Yes ☑ No I	f Yes:	□ Disturbed :	Soil/Fill Material	□ \	Weathered/Fr	actured Ro	ck 🗌 Bedro	CK
0	duator Oboo	erved: Yes	. [7] No			14	5	Magning in Ha	la.	5 4 0	a d'a a Marta d'a Hala
Ground	dwater Obse	ervea: 🔲 🕆 es	S M INO			if yes:	Depth to	weeping in no	ie	Depth Sta	nding Water in Hole
. Ground	uwater Obse	ervea: res	i ⊠ INO			If yes:	_ Depth to	weeping in no		Depth Sta	nding water in Hole
Ground	uwater Obse	erved Yes	i ⊠ NO			Soil Log					nding water in Hole
	Soil Horizon	Soil Texture	Soil Matrix: Color-		Redoximorphi	Soil Log	Coarse	e Fragments y Volume	Soil	Soil	-
				Depth	Color	Soil Log	Coarse	e Fragments			Other
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color- Moist (Munsell)		Color	Soil Log	Coarse % b	e Fragments y Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	-
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-		Color Cnc: Dpl:	Soil Log	Coarse % b	e Fragments y Volume Cobbles &	Soil	Soil Consistence	-
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color- Moist (Munsell)		Color	Soil Log	Coarse % b	e Fragments y Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	-
Depth (in)	Soil Horizon /Layer A B	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8		Color Cnc: Dpl: Cnc: Dpl: Cnc: Cnc:	Soil Log	Coarse % b Gravel	e Fragments y Volume Cobbles & Stones	Soil Structure M	Soil Consistence (Moist)	-
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color- Moist (Munsell)		Color Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl:	Soil Log	Coarse % b	e Fragments y Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	-
Depth (in)	Soil Horizon /Layer A B	Soil Texture (USDA)	Soil Matrix: Color- Moist (Munsell)  10YR 3/3  10YR 5/8		Color Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Cnc: Cnc:	Soil Log	Coarse % b Gravel	e Fragments y Volume Cobbles & Stones	Soil Structure M	Soil Consistence (Moist)	-
Depth (in)	Soil Horizon /Layer A B	Soil Texture (USDA)  SL  LS	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8  10YR 6/2	Depth	Color Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl:	Soil Log c Features Percent	Coarse % b Gravel 15	e Fragments y Volume Cobbles & Stones - -	Soil Structure M M	Soil Consistence (Moist) F	-
Depth (in)  4  28	Soil Horizon /Layer A B	Soil Texture (USDA)  SL  LS	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8  10YR 6/2	Depth	Color Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Dpl: Dpl: Cnc:	Soil Log c Features Percent	Coarse % b Gravel 15	e Fragments y Volume Cobbles & Stones - -	Soil Structure M M	Soil Consistence (Moist) F	-
Depth (in) 4 28 90	Soil Horizon /Layer A B	Soil Texture (USDA)  SL  LS	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8  10YR 6/2	Depth	Color  Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Cnc: Cnc:	Soil Log c Features Percent	Coarse % b Gravel 15	e Fragments y Volume Cobbles & Stones - -	Soil Structure M M	Soil Consistence (Moist) F	-



C. On-	Site Revi	ew (minim	um of two hole	s requ	ired at every	proposed p	nimary	and reser	ve dispo	sal area)	
Deep	Observation	Hole Numbe	er: TP-F   Albert	6/	15/25	900		Cloudy			
1   Land	llea \	Joadland	noie #	Date	Tunk	Time	V	Veather /		Latitude	Longitude
	(e.g., wo	odland, agricultu	ıral field, vacant lot, e	tc.)	Vegetation	. ]. 0	Surfac	e Stones (e.g.,	cobbles, st	ones, boulders, e	etc.) Slope (%)
Descriptio	n of Location			· ·							
2. Soil P	arent Materia	l:									
3 Distan	ices from:	Open	Water Body _							SU, SH, BS, FS,	
o. Distai	ices irom.	Oper	water body _	te	et	Drainag	e vvay _	feet		Wetlar	nds feet
			Property Line _							Oth	
4. Unsui	table Materia	als Present:	☐ Yes ☑ No	If Yes:	☐ Disturbed S	oil/Fill Material		Weathered/	Fractured I	Rock 🔲 Be	drock
5. Grour	ndwater Obse	erved:  Yes	No No		If yes:	Depth	o Weeping	in Hole		Depth to Sta	anding Water in Hole
		3.3				oil Log					
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	I	Redoximorphic Fe	atures		Fragments Volume	Soil	Soil	011
	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Structure	Consistence (Moist)	Other
8	А	SL	10NR 3/2		Cnc : Dpl:	-	_	_	M	F	
22	B	LS	10VR 5/3		Cnc : Dpl:		1	2	M	F	
94	()	Suns	10 VR 6/4	92	Cnc :		2	4	01	1	
		20%			Dpl: Cnc :		L	)	156	レ	
120	66	L>	11)YR 5/2		Dpl:		_	_	M	F	
					Cnc :	_					
					Dpl: Cnc :						
					Dpl:						
Additio	nal Notes:										



ep Obs	ervation Ho	le Number:	TP-EZDT (	6   9 P	d at every prop	50	$-\frac{\sqrt{\sqrt{\sqrt{Weat}}}}{Weat}$	r cost her	ī	atitude	Longitude
and Use	(e.ġ., woodla	and, agricultural	field, vacant lot, etc.)		Time	HW_	Surface S	tones (e.g., ∞	bbles, stone	es, boulders, etc.)	Slope (%)
ription o	f Location:										
Soil Pare	ent Material:				Landform			Position on La	indscape (SI	J, SH, BS, FS, TS	S, Plain)
			Water Body		<u> </u>	Drainage				Wetlands	S feet
		_		foot	Drin	king Water	Well	feet			feet
			T Yes A No	If Ves	☐ Disturbed Soil/F	ill Material		Weathered/F	ractured R	ock 🔲 Bedr	ock
			,	11 163.	If yes:	Depth to	Weeping in	n Hole	n 2	Depth to Stan	iding Water in Hole
Ground	dwater Obser	ved:□ Yes	₽ NO			Log					
т			a was sin Calar		Redoximorphic Featu			Fragments Volume	Soil	Soil Consistence	Other
1								_	Campagner		
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color- Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Structure	(Moist)	
		(USDA	Moist (Munsell)	Depth	Cnc :	Percent	Gravel	Cobbles &	Structure		
Depth (in)		••••	Moist (Munsell)	Depth	Cnc : Dpl:	Percent		Cobbles & Stones	W	(Moist)	
( <b>6</b>	/Layer	SL	Moist (Munsell)	Depth	Cnc :	Percent	Gravel	Cobbles &		(Moist)	
		SL LS	Moist (Munsell)	Depth	Cnc: Dpl: Cnc: Dpl: Cnc:	Percent		Cobbles & Stones	W	(Moist)	
16'	/Layer	SL	Moist (Munsell)	Depth	Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc:	Percent		Cobbles & Stones	26 W	(Moist)	
6' 32 91	/Layer  A  // // // // // // // // // // // //	SL Scal	Moist (Munsell)  10/R  10/R	Depth	Cnc: Dpl: Cnc: Dpl: Cnc:	Percent		Cobbles & Stones	W	(Moist)	
16'	/Layer	SL LS	Moist (Munsell)  10/R  10/R	Depth	Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Cnc:	Percent	10%	Cobbles & Stones	26 W	(Moist)	
6' 32 91	/Layer  A  // // // // // // // // // // // //	SL Scal	Moist (Munsell)  10/R  10/R	Depth	Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc:	Percent	10%	Cobbles & Stones	26 W	(Moist)	



	Sito Povid	AM (minimu	um of two hole:	s requii	red at every nr	roposed pr	imarv aı	nd reserve	disposa	al area)		
Deep	Observation	Hole Numbe	er: <u>TP-</u> 3	6/1	$\frac{5/23}{7}$	9.36	$-\frac{S_0}{We}$	inn.		Latitude	Longitude	
I. Land l	Jse (e.g., wo	odland, agricultu	ral field, vacant lot, et	c.)	Vegetation		Surface	Stones (e.g., $\alpha$	obbles, ston	es, boulders, etc.	Slope (%)	
Description	n of Location:										_	
. Soil Pa	arent Materia	l:			Landfor			Position on La	andscape (S	SU, SH, BS, FS, T	S, Plain)	
B Distan	ces from:	Open	Water Body _	fee			Way	feet		Wetland	S feet	
		·	Property Line _	fee		rinking Wate					r feet	
I. Unsui	table Materia	als Present:	y Yes □ No	If Yes:	☑ Disturbed Soi	il/Fill Material		Weathered/F	Fractured F	Rock 🔲 Bed	rock	
Groun	dwater Obse	rved: Yes	No		If yes:	Depth t	o Weeping	in Hole		Depth to Star	nding Water in Hole	
. 0.00			,		Sc	oil Log						
	Cail Harizon	Soil Texture	Soil Matrix: Color-		Redoximorphic Fea	tures		Fragments Volume	Soil Structure	Soil Consistence	Other	
Depth (in)	Soil Horizon /Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Structure	(Moist)		
24"	F, II				Cnc : Dpl:	$\dashv$	_		P-			
32"	B	LS	254 6/4		Cnc :		Z	5	M	F	ζ,	
54"	<u> </u>	Fines	10VN 5/8	96"	Cnc:		10	10	56	L		
120"		Corse	10VR 6/6		Cnc :		10	10	56	L		
120	02	5	1011110		Cnc :							
					Cnc :							
					Dpl:		1					
Additi	onal Notes:										~ Sc.	



C. On-	Site Revi	ew (minim	num of two hole	es requ	ired at every p	roposed p	rimary a	and reserv	e dispos	sal area)		
Deep	Observation	n Hole Numb	er: <u>F-F4</u>	6/	15/23	10:10		Onn J		Latituda	Longitude	
1. Land	Use	Woodles	ural field, vacant lot, e		+114P) +	1: Av		Onc		Lantoce		
	e.g., wo n of Location		ural field, vacant lot, e	tc.)	Vegetation		Surfáce	Stones (e.g.,	∞bbles, sto	nes, boulders, et	c.) Slope (%)	
							-				_	
2. Soil P	arent Materia	n:			Landfor	m		Position on L	andscape (	SU, SH, BS, FS,	TS, Plain)	<u> </u>
3. Distan	ices from:	Opei	n Water Body _	fe	et						ds fee	et C
			Property Line _	fo	et D					Oth		(
4	4-61- 84-4- <i>-</i> :		,									
4. Unsui	table Materi	als Present:	☐ Yes ☑ No	If Yes:	☐ Disturbed Soi	ıl/Fıll Material	Ц	Weathered/	Fractured	Rock LI Bed	drock	2
5. Groun	dwater Obse	erved: Yes	s 🗖 No		If yes:	Depth	o Weeping	in Hole		Depth to Sta	anding Water in Ho	le
			•		Sc	oil Log						<u>.</u>
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-		Redoximorphic Feat	tures		Fragments Volume	Soil	Soil Consistence	Othe	le ±
Dopan (III)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Structure	(Moist)		
10	A	51_	10/12 3/2		Cnc : Dpl:		_	-	M	F		
38	13	LLS	10VR 4/4	11	Cnc : Dpl:		10	5	h	F		
170	CI	Cogse	1012 A/6	108"	Cnc : Dpl:		20	20	36	L		
170	(1	5	10/R 5/3	į.	Cnc : Dpl:		10	10	56	1_		
		2	7		Cnc : Dpl:							
					Cnc :							
Additio	onal Notes:	L	1		- P-1	· ,	I				1	



Deep Observation Hole Number: TP S						red at every pro							
Land Use   Cog., woodland, agricultural field, vacant lot, etc.)   Vegetation   Surface Stones (e.g., cobbles, stones, boulders, etc.)   Slope (%)	Deep	Observation	Hole Numbe	er: TP-ES Hole #	Date 8	123 Tin	8:30 ne		Vorce, F		Latitude	Longitude	
Description of Location:	1. Land l	Jse <u>√ ( (</u> (e.g., wo	on tool	iral field, vacant lot, et	tc.)	Low Strubs Vegetation		Surface	Stones (e.g., o	obbles, sto	nes, boulders, et	c.) Slope (%)	
Distances from:   Open Water Body													
Distances from:   Open Water Body	2 Soil P	arent Materia	1.	1					,.				
Property Line	2. 0011	archi Matcha				Landform	1		Position on L	andscape (	SU, SH, BS, FS,	TS, Plain)	
4. Unsuitable Materials Present: Yes No If Yes: Disturbed Soil/Fill Material Weathered/Fractured Rock Bedrock  5. Groundwater Observed: Yes No If Yes: Depth to Weeping in Hole Soil Log  Depth (In) Soil Horizon / (USDA Soil Texture (USDA Molst (Munsell))  Depth (In) Soil Horizon / (USDA Soil Texture (USDA Molst (Munsell))  Beth Color Percent Gravel Cobles & Structure Completed Structure (Molst)  Conc: Depth Gravel Color Structure Structure (Molst)  Conc: Depth (In) Soil Matrix: Color Depth Color Depth (In) Soil Matrix: Color Depth (In) Soil Consistence (Molst)  Conc: Depth (In) Soil Matrix: Color Depth (In) Soil Matrix: Color Depth (In) Soil Consistence (Molst)  Conc: Depth (In) Soil Matrix: Color Depth (In) Soil Matrix: Color Depth (In) Soil Consistence (Molst)  Conc: Depth (In) Soil Matrix: Color Depth (In) Soil Matrix: Color Depth (In) Soil Consistence (Molst)  Conc: Depth (In) Soil Matrix: Color Depth (In) Soil Matrix: Color Depth (In) Soil Consistence (In) Soil Consistence (In) Soil Consistence (In) Soil Matrix: Color Depth (In) Soil Ma	3. Distar	nces from:	Oper	n Water Body _	fee	et	Drainage	e Way _	feet		Wetlan	ds feet	
Soli Horizon   Soli Horizon   Soli Texture   (USDA   Moist (Munsell)   Depth   Color   Percent   Gravel   Cobbles & Stones   Structure   (Moist)   Other			F	Property Line _	fee	et Dri	nking Wate	er Well	feet		Oth	er feet	
Depth (In)   Soil Horizon   Layer   Soil Texture (USDA   Munsell)   Depth   Color   Percent   Gravel   Cobbles & Stones   Structure (Moist)   Other	4. Unsui	itable Materia	als Present:	☐ Yes 🛱 No	If Yes:	☐ Disturbed Soil/	Fill Material		Weathered/F	ractured F	Rock 🔲 Bed	drock	
Depth (in)   Soil Horizon   Layer   Soil Texture (USDA   Moist (Munsell)   Depth   Color   Percent   Gravel   Cobbles & Stones   Soil Structure   Consistence (Moist)   Other	5. Grour	ndwater Obse	erved:⊠ Yes	s □ No		If yes: _	Depth	to Weeping	in Hole	114	// Depth to Sta	nding Water in Hole	
Depth (in)   Soil Horizon   ILayer   Soil Texture (USDA   Moist (Munsell)   Depth   Color   Percent   Gravel   Cobbles & Stones   Stones   Consistence (Moist)						Soi	l Log						
No.	Donth (in)		• • • • • • • • • • • • • • • • • • • •			Redoximorphic Featu	res		Volume			Other	
81 AP SC 10 yR 3/4 Dpl:  90' C1 SL 10 yR 4/3 84" Dpl:  124" C2 Course Suns 10 yr 4/3 Dpl:  Cnc: Dpl: Dpl: Dpl: Dpl: Dpl: Dpl: Dpl: Dpl	Depth (III)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel		Structure			
90 C1 SC 10 yp 4/3 84 Dpl: 21. 101. M 12  124" C2 Course Suns 10 yp 4/3 Dpl: 2590 10% 56 L  Cnc: Dpl: Dpl: Cnc: Dpl: Dpl: Cnc: Dpl: Dpl: Dpl: Dpl: Dpl: Dpl: Dpl: Dpl	8)	AR	SL	10 yr 3/4				_	_	m	F		
C2   Course   DYR 4/3   Cnc:   Dpl:   CS3   10%   SC   L	٠. <i>0</i> کھ	CI	SL	10 yp 4/3	84".		-	ŹI.	101.	M	F		
Cnc :		C2						2590	10%	56	L		
Cric :								ĺ					
Cnc : Dpl:						Cnc :	- A-4						
Opl:						Opl:				_			
							4	1		1			
						Dpl:		1					



J. OII-3	Site Revi	ew (minim	um of two hole	es requ	ired at every	proposed p	nimary	and reser	ve dispo	sal area)	
Deep (	Observation	Hole Numbe	er: 1P-E6 Hole #	<u>(</u> ∫8 Date	/23	9 . 0 0 Time	<u>C</u>	Ovecast Veather		Latitude	Longitude
. Land U	Jse: <u>()</u> (e.g.	, woodland, agric	cultural field, vacant k	ot, etc.)	Vegetation	low shrubs	Surfac	e Stones (e.g.,	cobbles, sto	nes, boulders, etc	Slope (%)
	ption of Loca										_
. Soil Pa	arent Materia	al:									
						lform			Landscape	(SU, SH, BS, FS,	
J. Distan	ices from:	Oper	n Water Body _	fe	et	Drainage	e Way _	feet		Wetland	ds feet
		F	Property Line _	fe	et	Drinking Wate	r Well	feet		Othe	er feet
. Unsuital	ble Materials	Present:	Yes 🗌 No I	If Yes:		il/Fill Material	□V	Veathered/Fra	actured Ro	ck 🔲 Bedroc	:K
Ground	dwater Ohse	erved:  Yes	. □ No			If ves:	Depth to	Weepina in Ho	le /	Z Depth Stan	ding Water in Hole
. Cround	dwater obse							g	_		<b>-</b>
						Soil Log	Coarse	Fragments			
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-		Redoximorphic F	eatures		/ Volume	Soil	Soil Consistence	Other
Deptii (iii)	/Layer	(USDA)	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles &	Structure	(Moist)	
							1	Stones		(moist)	
<b>(</b> '	Ap	5L	16V/2 2/3		Cnc :			Stones	М	[F	
6		SL FCI	164/2 2/3		Dpl: Cnc :		-	-	<del>  '</del>	F	
ξ4' 	Ap B	"SL		C11.	Dpl: Cnc : Dpl:		- [1]	- 51-	M	-	
		"SL	10VR 3/4	52"	Dpl: Cnc :		- [1]	- 51-	<del>  '</del>	F	
54° 126		•		52"	Dpl: Cnc : Dpl: Cnc :		-	- 51-	M	F	
		"SL	10VR 3/4	51"	Dpl: Cnc : Dpl: Cnc : Dpl: Cnc : Dpl: Cnc : Dpl:		- [1]	- 51-	M	F	
		"SL	10VR 3/4	52"	Dpl: Cnc :		- [1]	- 51-	M	F	
		"SL	10VR 3/4	52"	Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl:		- [1]	- 51-	M	F	
		"SL	10VR 3/4	52"	Dpl: Cnc :		- [1]	- 51-	M	F	



			um of two hole								
Deep	Observation	Hole Number	er: <u>10-5</u> 7 Hole #	Date	8/23	\() 15 Time	<u>(</u>	) Vec us f Veather		Latitude	Longitude
<ol> <li>Land l</li> <li>Description</li> </ol>	Use (e.g., wo n of Location	oodland, agricultu	ural field, vacant lot, e	tc.)	Vegetation		Surface	ce Stones (e.g.,	cobbles, sto	ones, boulders, e	Slope (%)
2. Soil P	arent Materia	al:			Landfo	m		Position on	Landscape (	(SU, SH, BS, FS,	TS, Plain)
3. Distar	nces from:	Oper	n Water Body _	fe	et	Drainag	e Way _	feet		Wetlan	ds feet
4. Unsui	itable Materi		Property Line _ ☐ Yes ☑ No								er feet
		erved: 🛱 Yes			If yes:	77' Depth					
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-		Redoximorphic Fea	tures		Fragments Volume	Soil Structure	Soil Consistence	Other
	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Structure	(Moist)	
12	Ap	SL	IUVN		Cnc : Dpl:		_	_	M	F	
44"	B	SL	1401	40	Cnc : Dpl:		26	51.	M	F	
120	(	1_5	10/12		Cnc : Dpl:		15%	10%	56	L	
					Cnc : Dpl:			,			
					Cnc : Dpl:						
					Cnc:						
	onal Notes:				Dpl:		<u> </u>	1			



Deep Observation Hole Number: Hole # Date   Latitude   Longitude   Land Use	C. On-S	Site Revie	<b>∋w</b> (minim	um of two hole	s requi	red at every p	proposed p	rimary	and reserv	e dispo	sal area)	
Soil Parent Material:   Landform   Position on Landscape (SU, SH, BS, FS, TS, Plain)	Deep (	Observation	Hole Numbe	er: 7/- E8 Hole #	Date S	123	( <u>() : ()</u> ()	<u>(</u>	Veather		Latitude	Longitude
Soil Parent Material:   Landform   Position on Landscape (SU, SH, BS, FS, TS, Plain)	. Land L	Jse (e.g., wo	odland, agricultu	ral field, vacant lot, et	ic.)	Vegetation		Surfac	e Stones (e.g.,	cobbles, sto	nes, boulders, e	tc.) Slope (%)
Distances from: Open Water Body feet	escription	n of Location:										
Distances from: Open Water Body	. Soil Pa	arent Materia	l:			Landfo	ırm		Position on L	andscape (	SU, SH, BS, FS,	TS, Plain)
Unsuitable Materials Present:	. Distan	ces from:	Oper	Water Body _	fee							
Groundwater Observed: Yes No If yes: Depth to Weeping in Hole Depth to Standing Water in Hole Soil Log    Depth (in)   Soil Horizon   Itayer   Soil Texture (USDA   Moist (Munsell)   Depth   Color   Percent   Gravel   Cobbles & Stones   Structure   Soil Structure (Moist)   Conc :			F	Property Line _	fee	et C	rinking Wate	r Well _	feet		Oth	er feet
Soil Log	. Unsui	table Materia	als Present:	☐ Yes ☒ No	If Yes:	☐ Disturbed So	il/Fill Material		] Weathered/I	Fractured F	Rock 🔲 Be	drock
Depth (in)   Soil Horizon   ILayer   VISDA   Soil Matrix: Color   Depth   Color   Depth   Color   Percent   Gravel   Soil Stones   Soil Stones   Consistence (Moist)	. Groun	dwater Obse	erved: Yes	. □ No		If yes:	Depth	o Weeping	ı in Hole		Depth to Sta	anding Water in Hole
Depth (in) Soil Horizon /Layer Soil Texture (USDA Soil Matrix: Color-Moist (Munsell) Depth Color Percent Gravel Cobbles & Stones						S	oil Log					
Depth (in)   ILayer   (USDA   Moist (Munsell)   Depth   Color   Percent   Gravel   Cobbles & Structure   (Moist)		Soil Horizon	Soil Texture	Soil Matrix: Color-	ı	Redoximorphic Fea	itures			Account to the second		Other
24 B SL 104N 3/6	Depth (in)			Moist (Munsell)	Depth	Color	Percent	Gravel		Structure	(Moist)	
24 B SL 104N 3/6	6"	Do.	51-	10VR 3/4			_	_	-	M	F	
128' C LS 10VN \$ 3 Flone, Dpl:  Cnc: Dpl: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Dpl: Dpl: Dpl: Dpl: Dpl: Dpl: Dpl	14							0	5	M	<i>F</i> -	
Cnc :		C	1		Flane	Cnc :		5	5	M	r	
Cnc : Dpl: Cnc :	ILD		12	(011-1)	11076	Cnc :		/				
Dpl:						-						
Dpl:						Cnc :						
				k.		Dpl:		<u> </u>				



C. On-	Site Revi	ew (minim	um of two hole	es requ	ired at every pr	oposed p	nimary	and resen	∕e dispo	sal area)		
Deep	Observation	Hole Numb	er: F	G Date	8/23 1 Ti	():15'	<u>(</u>	Ovucusł Veather		Latitude	Longitude	
. Land	Use\	No od ka J	iral field, vacent let, o	<u>, to )</u>	Vegetation 1. H.C.		M.	w, sto	eshblas etc	ance houlders e	etc.) Slope (%)	
	n of Location		arai neid, vacant lot, e	etc.)	vegetation		Surrac	e Stones (e.g.,	cobbies, sic	ones, boulders, e	sic.) Slope (70)	
. Soil P	arent Materia	l:			Landform			Position on	andecane (	SU, SH, BS, FS,	TS Plain)	
Nietai	oces from:	Oper	Nator Rody						Lanuscape (		nds feet	
i. Distai	ices iioiii.	Орег	- T vvaler body	re	et	Diamag	e vvay _	reet		VVCtiai	103 1661	
		1	Property Line _	fe	et Dri	nking Wate	er Well _	feet		Oth	er feet	
i. Unsu	itable Materia	als Present:	☐ Yes ဩ́ No	If Yes:	☐ Disturbed Soil/	Fill Material		Weathered/	Fractured F	Rock ☐ Bed	drock	
			1				_			_		
5. Groui	ndwater Obse	erved:  Yes	s ∯ No		If yes: _	Depth	to Weeping	in Hole		Depth to Sta	anding Water in Hole	
					Soi	l Log						
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-		Redoximorphic Featu	res		Fragments Volume	Soil	Soil Consistence	Other	.,
Deptii (iii)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Structure	(Moist)		
6"	A	5L	10 m 3/3	-	Cnc : Dpl:				M	F		
30	B	LS	1641 218	_	Cnc : Dpl:		Zho	10%	M	F		
120"		LS	10VL 6/2	_	Cnc : Dpl:		10	151-	Μ	F		
					Cnc : Dpl:							
					Cnc:							
					Dpl:							
				×	Cnc :	-						
			1		Dpl:					<u> </u>		



C. On-	Site Revi	ew (minim	um of two hole	s requi	red at every pro	posed p	imary a	nd reserve	e dispos	al area)	
Deep	Observation	Hole Numb	er: <u>1P-</u> E10 Hole#	Date (	1/23 <u>8</u>	. 3 0 ne	<u>()</u> 	vvcust eather		Latitude	Longitude
			ural field, vacant lot, e	tc.)	Smull pines Vegetation		<u>⟨</u> M⟨ <sub>l</sub> ∩\ Surface	Stones (e.g., o	obbles, stor	nes, boulders, etc	Slope (%)
Descriptio	n of Location	:									_
2. Soil P	arent Materia	al:			Landform			Position on L	andscape (S	SU, SH, BS, FS, 1	ΓS, Plain)
3. Distar	nces from:	Oper	n Water Body _	fee							ds feet
		1	Property Line _	fee	et Drir	nking Wate	r Well _	feet		Othe	er feet
4. Unsu	itable Materi	als Present:	☐ Yes 🗗 No	If Yes:	☐ Disturbed Soil/I	Fill Material		Weathered/F	Fractured F	Rock 🔲 Bed	lrock
5. Grour	ndwater Obse	erved: Yes	s 🔀 No		If yes:	Depth	o Weeping	in Hole		Depth to Sta	nding Water in Hole
			•		Soil	Log					
	Soil Horizon	Soil Texture	Soil Matrix: Color-		Redoximorphic Featu	res		Fragments Volume	Soil	Soil Consistence	Other
Depth (in)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Structure	(Moist)	-
6	Α	SŁ	10VR 3/3	I	Cnc : Dpl:				M	F	
	B	LS	51	_	Cnc :				M	ド	
50"			61		Cnc :				M	F	
1 <u>8</u> 0	CI	LS			Dpl: Cnc :						
128	CZ_	SL	10YR 1/3	,	Dpl:	ļ	-				
				~ y	Cnc: Dpl:	-{					
					Cnc:						
				۸	Dpl:						



Deel			num of two hole per: <u>[P-F </u>   Hole#			7:00 ime				Latitude	Longitude
l. Land Description	Use (e.g., wo		tural field, vacant lot, ε	etc.)	Vegetation				cobbles, sto	nes, boulders, etc.	
. Soil F	Parent Materia	al:			Landfor	<b></b>		Docition on 1	andacana (f	CII CH DC EC T	'S Plain
. Dista	nces from:	Оре	n Water Body	fe			e Way _		andscape (	su, sн, вѕ, ғѕ, т Wetland	S feet
			Property Line _	fe	et Dr	inking Wate	er Well _	feet		Othe	Г feet
. Unsu	itable Materi	als Present:	☐ Yes ☐ No	If Yes:	☐ Disturbed Soil	/Fill Material		Weathered/l	Fractured F	Rock 🔲 Bedr	rock
. Grou	ndwater Obse	erved: Yes	s ₽ No			Depth t	to Weeping	in Hole		Depth to Stan	ding Water in Hole
	Soil Horizon	Soil Texture	Soil Matrix: Color-		Redoximorphic Feat	-	Coarse % by	Fragments Volume	Soil	Soil Consistence	Other
epth (in)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Structure	(Moist)	Other
										l l	
6	Ą	SE	10VR 3/3	_	Cnc: Dpl:		/	-	Μ	F	
		_	10VR 3/3				57.	10.1	M	F	
28	A (S)	50	10YR 5/8	_	Dpl: Cnc : Dpl: Cnc :			- (01.			
28 60		S.L. L.S	10/R 6/2	- , , 	Dpl: Cnc : Dpl: Cnc : Dpl: Cnc : Dpl: Cnc :		57.	51.	M		
28	B ()	50	10YR 5/8		Dpl: Cnc :		57.		M		
28	B ()	S.L. L.S	10/R 6/2	- ノ	Dpl: Cnc : Dpl: Cnc : Dpl: Cnc : Dpl: Cnc :		57.	51.	M		

# eated With Tiny Scanner



## Commonwealth of Massachusetts City/Town of

	Observation \	n Hole Numb	Hole #	Date	19/23	1.10 ime		Ovvost Weather		Latitude	Longitude
Land	Use <u>√</u> (e.g., w	oodland, agricult	tural field, vacant lot, e	etc.)	Vegetation	-	Surfac	ce Stones (e.g.	, cobbles, st	ones, boulders, e	etc.) Slope (%)
scription	n of Location	n: _									
Soil F	arent Materia	al:									
					Landfor	m		Position on	Landscape	(SU, SH, BS, FS,	, TS, Plain)
Dista	nces from:	Ope	n Water Body	fe	eet	Drainag	e Way _	feet		Wetlar	nds feet
•			Property Line	fe	eet Dr	inking Wat	er Well	feet		Oth	erfeet
Uncu	itabla Matari		,								
Unst	itable Mater	iais Present:	LI YES THINO	If Yes:	☐ Disturbed Soil	/Fill Material		J Weathered/	Fractured i	Rock 🗌 Be	drock
Grou	ndwater Obse	erved: Yes	s 🗖 No		If yes:	Depth	to Weeping	ı in Hole		Denth to Sta	anding Water in Hole
			•			il Log					
					Redoximorphic Featu		Coarse	Fragments			
epth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-		read Aminor pinio i cate	1163	% by	Volume	Soil	Soil	<b></b>
epth (in)	Soll Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color- Moist (Munsell)	Depth	Color	Percent	% by Gravel		Soil Structure	Soil Consistence (Moist)	Other
epth (in)		_D D NORTH DOL						Volume Cobbles &		Consistence	Other
6"	/Layer	(USDA	Moist (Munsell)		Color			Cobbles & Stones	Structure	Consistence (Moist)	Other
6" 50	/Layer	(USDA	Moist (Munsell)		Color Cnc: Dpl: Cnc:		Gravel	Cobbles & Stones	Structure	Consistence (Moist)	Other
6" 50	/Layer	SL LS	Moist (Munsell)		Color Cnc: Dpl: Cnc: Dpl: Cnc:		Gravel	Cobbles & Stones	Structure  M	Consistence (Moist)	Other
6" 50	/Layer	SL LS	Moist (Munsell)		Color Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc:		Gravel	Cobbles & Stones	Structure  M	Consistence (Moist)	Other
6"	/Layer	SL LS	Moist (Munsell)		Color Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Cnc:		Gravel	Cobbles & Stones	Structure  M	Consistence (Moist)	Other
6" 50	/Layer	SL LS	Moist (Munsell)		Color Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl:		Gravel	Cobbles & Stones	Structure  M	Consistence (Moist)	Other
6" 50	/Layer	SL LS	Moist (Munsell)		Color Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc:		Gravel	Cobbles & Stones	Structure  M	Consistence (Moist)	Oth



Deep (	Observation	Hole Numbe	Im of two hole	<u></u>	$\frac{9/13}{2}$	1.70	( <u>w</u>	)yv (Uz*		Latitude	Longitude
Land l	Jse (e.g., woo	ما ه ما ارسا odland, agricultu	Hole #	tc.)	Vegetation	HV	Surface	ห <sub></sub> Stones (e.g.,	∞bbles, sto	nes, boulders, etc	.) Slope (%)
scriptio	n of Location:										
Soil P	arent Materia	:			Landfo	m		Position on I	_andscape (	SU, SH, BS, FS, T	S, Plain)
Distar	ices from:	Oper	n Water Body	fee			e Way _	feet		Wetland	s feet
<b>D</b> 101a.		1	Property Line _	fee	et D	rinking Wate	r Well _	feet		Othe	r feet
. Unsu	itable Materia		☐ Yes ∯ No			il/Fill Material		Weathered/	Fractured f	Rock 🔲 Bedi	rock
. Grou	ndwater Obse	erved: Yes	s 💆 No				o Weeping	in Hole		Depth to Stan	ding Water in Hole
					Redoximorphic Fea	oil Log tures		Fragments Volume	Soil	Soil Consistence	Other
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color- Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Structure	(Moist)	
6	A	ŚL	1010 3/3	7-	Cnc : Dpl:		_	_	M	F	
40	B	LS	101/1 1/8	-	Cnc :		51.	5%	M	F	
124	(	LS	10/R 6/2	-	Cnc :		51.	5%	M	F	
(E)		1-5	TOTA IL		Cnc :			-			_
					Dpl: Cnc :				-		
		1	1	1	Dpl:						
					PP						
					Cnc :						



	ite Kevie	w (IIIIIIIII		roquii	red at every pro		•	1			
Deep O	bservation l	Hole Number	r: 17- <u>F</u> 14 Hole #	Date	123 III	):0 () ne		eather		Latitude	Longitude
Land U	se (e.g., woo	odland, agricultur	al field, vacant lot, et	c.)	+rees + (: Vegetation	fv	Surface	Stones (e.g., c	obbles, stor	nes, boulders, etc.)	Slope (%)
	of Location:										-
. Soil Pa	arent Material	:			Landform			Position on L	andscape (\$	SU, SH, BS, FS, TS	S, Plain)
					et					Wetlands	feet
					et Dri					Other	feet
4. Unsui	table Materia		/		☐ Disturbed Soil/				ractured F	Rock 🔲 Bedro	ock
			,								
5. Grour	ndwater Obse	rved: Yes	No LA No		If yes:	Depth t I Log	o Weeping	in Hole		Depth to Stand	ling water in Hole
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-		Redoximorphic Featu			Fragments Volume	Soil	Soil Consistence	Other
Deptil (iii)	/Layer	(USDA	Moist (Munsell)	Depth				Cobbles &	Structure	Consistence	
				Depth	Color	Percent	Gravel	Stones	Cauciaic	(Moist)	
6	A	SI	10VR 3/3	Depth	Cnc :	Percent	Gravel		M	(Moist)	<del>,</del>
6	A	SL	10m 7/8	_	Cnc :	Percent	Gravel			(Moist)	
	B		10m 7/8	_	Cnc : Dpl: Cnc :	Percent	_	Stones	M	(Moist)	
24	B	SL	1012 1/8	_	Cnc: Dpl: Cnc: Dpl: Cnc:	Percent	-	Stones	M	(Moist)	
24	B	SL	10m 7/8	_	Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc:	Percent	-	Stones	M	(Moist)	
24	B	SL	10m 7/8	_	Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl:	Percent	-	Stones	M	(Moist)	



C. On	Site Rev	iew (minir	num of two hol	les real	uired at every p	proposed	nriman	and reser	ve diene	ool orgal		
Dee	Observatio	n Hole Numi	ber: <u>TP-E1</u> 5	C/	9/23	10:30	primary	O macust	ve uispo	isai area)		
1. Land	Use $\frac{}{(e,q,w)}$	ool In	Hole #	Date	$\frac{9/23}{\text{tres}  \nu}$ Vegetation	Time #	ا — د_	Weather Om C		Latitude	Longitude	
Descripti	on of Location	n:	turar neid, vacant lot,	etc.)	Vegetation	,	Surfa	ce Stones (e.g.	, ∞bbles, st	ones, boulders,	etc.) Slope (%)	
2. Soil I	Parent Materi	al:									<del></del>	
3. Dista	nces from:	Ope	n Water Body	fe	Landfor			Position on feet	Landscape	(SU, SH, BS, FS Wetla	S, TS, Plain)  nds feet	anne
			Property Line	fe	et Dr	rinking Wate	er Well _	feet		Oti	ner feet	So
				If Yes:	☐ Disturbed Soil	/Fill Material		] Weathered	Fractured	Rock Be	edrock	iny
5. Groun	ndwater Obse	erved: Yes	s ⊠ No				to Weeping	in Hole		Depth to St	anding Water in Hole	th
9				1	50	il Log						$\geq$
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color- Moist (Munsell)		Redoximorphic Featu	ıres	Coarse % by	Fragments Volume	Soil	Soil Consistence	04	d \
	•			Depth	Color	Percent	Gravel	Cobbles & Stones	Structure	(Moist)	Other	reated
6	Ą	SIL	10VR 3/3	_	Cnc : Dpl:				M	F		Cre
28"	B	LS	10vn 5/8		Cnc : Dpl:		5	9	M	F		
96	C	LS	10VR 6/2	_	Cnc : Dpl:		16	16	M	F		
					Cnc :					-		
					Dpl: Cnc :			,				
					Dpl:				-			
	-			1 6 1	Cnc :							
Additio	nal Notes:	Refuso	a 76		υμ.							



C. On-S	ite Revie	ew (minim	um of two hole	s requi	red at every p	roposed p	rimary a	and reserv	e dispos	sal area)	
Deep (	Observation	Hole Numbe	er: TP-E16	6/8	123	4130		burcus +			Longitude
. Land U	Use $\frac{\sqrt{60}}{(e.g., wo)}$	odland, agricultu	Hole # ral field, vacant lot, et	ic.)	Vegetation		Surface	Me Stones (e.g.,	cobbles, sto	nes, boulders, et	c.) Slope (%)
Description	of Location:								,		
. Soil Pa	arent Materia	l:			Landfor			D		SU, SH, BS, FS,	TC Disin)
. Distan	ces from:	Open	Water Body _	fee					.andscape (		ds feet
		F	Property Line _	fee	et Dr	rinking Wate	r Well _	feet		Oth	er feet
. Unsuit	table Materia	als Present:	☐ Yes 🙀 No	If Yes:	☐ Disturbed Soil	I/Fill Material		Weathered/I	Fractured F	Rock Bed	Irock
. Groun	dwater Obse	rved: Yes	⊠ No		If yes:	Depth	to Weeping	in Hole	_	Depth to Sta	nding Water in Hole
					So	il Log					
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	l	Redoximorphic Feat	ures		Fragments Volume	Soil	Soil Consistence	Other
bepui (iii)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Structure	(Moist)	
6	А	<b>SL</b>	10VR Z/Z	)	Cnc : Dpl:		<u>-</u>	_	m	F	
30"	B	SL	10VR 5/8	1	Cnc : Dpl:		54	Zi.	M	F	
120'	C	LS	10VR 413	1	Cnc : Dpl:		151.	51,	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc :						
	onal Notes:				Dpl:		l	<u> </u>	1		<u></u>



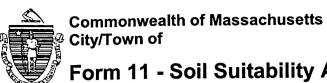
Deep Observation Hole Number: TP-F1	C. On-	Site Revi	ew (minim	um of two hole	es reau	ired at every pr	onosed i	nimanı	and recon	o diene	nol orgal	
2. Soil Parent Material:    Landform	Deep	Observation	n Hole Numb	er: <u>TP-</u> E17	4/	8123	4100)	illiaiy .	and reserv	re uispo	sai aiea)	
2. Soil Parent Material:    Landform	1. Land	Use	Woolly	Hole #	Date	forest little	me	<del>v</del> — 2	Veather		Latitude	Longitude
A   Depth (in)   Soil Horizon   Landlor   Landlor   Landlor   Landlor   Property Line   Landlor   Landlor   Landlor   Property Line   Landlor   Landlor   Landlor   Property Line   Landlor   Landlor   Landlor   Landlor   Property Line   Landlor	Descriptio	n of Location	i:	urai field, vacant lot, e	tc.)	Vegetation		Surfac	e Stones (e.g.,	cobbles, sto	ones, boulders, et	c.) Slope (%)
Depth   Dept	2. Soil P	arent Materia	al:									
Property Line	2 Dieter		_				n		Position on I	Landscape (	SU, SH, BS, FS,	TS, Plain)
4. Unsuitable Materials Present:  Yes No If Yes: Disturbed Soil/Fill Material Weathered/Fractured Rock Bedrock  5. Groundwater Observed:  Yes No If Yes: Depth to Weeping in Hole Depth to Standing Water in Hole Soil Log  Depth (In) Soil Horizon / ILayer Soil Matrix: Color / Moist (Munsell) Depth Color Percent Gravel Cobbles & Stones    Soil Matrix: Color Moist (Munsell)   Color Percent Gravel Cobbles & Stones   Consistence (Moist)   Cons	s. Distar	ices from:	Ope	n Water Body _	fe	et	Drainag	e Way _	feet		Wetlan	ds feet
Depth (in)   Soil Horizon   Layer   Soil Texture (USDA   Depth (Munsell)   Depth   Color   Depth   Gravel   Cobbles & Structure   Conc : Depth   Depth   Color   Depth   De											Othe	er feet
Depth (in)   Soil Horizon   Clusture (USDA   Depth   Color   Depth	4. Unsu	itable Materi	als Present:	☐ Yes ☐ No	If Yes:	☐ Disturbed Soil/	Fill Material		Weathered/	Fractured I	Rock 🔲 Bed	rock
Depth (in)   Soil Horizon   ILayer   Soil Texture (USDA   Moist (Munsell)   Depth   Color   Percent   Gravel   Cobbles & Stones   Soil Structure   Consistence (Moist)   Other	5. Grour	ndwater Obse	erved: Yes	No 🗵 No		If yes: _	Depth	to Weeping	in Hole		Depth to Star	nding Water in Hole
Depth (in)   Soil Horizon   (USDA   Moist (Munsell)   Depth   Color   Percent   Gravel   Cobbles & Stones   Structure   Consistence (Moist)					,	Soil	Log					
Depth   Color   Percent   Gravel   Cobbles & Stones   Choist   C	Depth (in)					Redoximorphic Featu	res	Coarse % by	Fragments Volume	Soil		211
6 A SL 10VR 2/12 - Dpl: M F  16' B SL 10VR 3/8 - Dpl: 2 2 M F  170' C LS 10VR 4/2 - Dpl: 5 5 M F  Cnc: Dpl: 5 5 M F  Cnc: Dpl: 5 5 M F		Layer	(USDA	Moist (Munsell)	Depth		Percent	Gravel		Structure		Other
2 2 2 M F  120" C LS 10VR 4/2 - Dpl:	6	A						-	_	M	F	
126	26"	B	SL	10VR 3/8	_			2	1	Μ	F	
Dpl:	125	$\mathcal{C}$			-			5	5	M	F	
Dpl:												
Cnc: Opl:						Cnc :						
Opi:						Opl:						
	Additio	onal Notes:				Dbi:						



C. On-	Site Revi	ew (minim	um of two hole	es requ	ired at every p	ronosed r	nimanı	and resen	ve disno	sal argal	
Deep	Observation	Hole Numbe	er: <u>TP -</u> F 18	6	$\frac{1}{5}$	7.00		Jyarcust			
1. Land l	Use\	Loodland		Date	Birch trees Vegetation	ime	W	Veather	nes	Latitude	Longitude
Description	e.g., wo n of Location	odland, agricultu	ural field, vacant lot, 'e	tc.)	Vegetation	Dr (31)	Surfac	e Stones (e.g.,	cobbles, st	ones, boulders, e	tc.) Slope (%)
. Soil Pa	arent Materia	l:	•								
D:-4		_			Landfor	m		Position on	Landscape	(SU, SH, BS, FS,	TS, Plain)
. Distan	ices from:	Oper	n Water Body	fe	et	Drainag	e Way _	feet		Wetlar	ids feet
			Property Line			inking Wate	er Well _	feet		Oth	er feet
			,	If Yes:	☐ Disturbed Soil	/Fill Material		Weathered/	Fractured	Rock 🔲 Be	drock
. Groun	idwater Obse	rved: Yes	s ⊠ No				to Weeping	in Hole		Depth to Sta	inding Water in Hole
					So	il Log					
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color- Moist (Munsell)		Redoximorphic Feat	ures		Fragments Volume	Soil	Soil	
	yo.	(GODA )	Moist (Mulisell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Structure	Consistence (Moist)	Other
6'	Δ	SL,	10VR 2/2	_	Cnc : Dpl:				M	F	
26'	B	SL	10VR 3/8	1	Cnc : Dpl:		۷	7	M	F	
120'		LS	101R 3/6	,	Cnc : Dpl:		/υ	10	M	F	
		*			Cnc:				-/-		
		•			Dpl:						
					Cnc: Dpl:	-					
					Cnc:						
					Dpl:	1					
Additio	onal Notes:										



C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)  Deep Observation Hole Number: The Hole # Date
2. Soil Parent Material:    Landform   Position on Landscape (SU, SH, BS, FS, TS, Plain)
2. Soil Parent Material:    Landform   Position on Landscape (SU, SH, BS, FS, TS, Plain)
A. Unsuitable Materials Present:  Yes No If Yes: Disturbed Soil/Fill Material Weathered/Fractured Rock Bedrock  Soil Log  Depth (in) Soil Horizon / Layer (USDA Soil Texture (USDA Soil Matrix: Color-Moist (Munsell))  Landform Position on Landscape (SU, SH, BS, FS, TS, Plain)  Property Line Feet Drinking Water Well Feet Wetlands Feet Property Line Feet Drinking Water Well Feet Drinking Water Well Feet Property Line Feet Property Line Feet Drinking Water Well Feet Property Line Feet Drinking Water Well Feet Property Line Feet Property Line Feet Drinking Water Well Feet Drinking
A. Unsuitable Materials Present:
Property Line feet
4. Unsuitable Materials Present:  Yes No If Yes: Disturbed Soil/Fill Material Weathered/Fractured Rock Bedrock  5. Groundwater Observed: Yes No If yes: Depth to Weeping in Hole Depth to Standing Water in Hole  Soil Log  Depth (in) Soil Horizon / Layer (USDA Soil Texture (USDA Moist (Munsell))  RedoxImorphic Features Coarse Fragments % by Volume Soil Structure (Moist)  Percent Gravel Cobbles & Stones  Soil Coarse Fragments Soil Soil Consistence (Moist)
4. Unsuitable Materials Present:  Yes No If Yes: Disturbed Soil/Fill Material Weathered/Fractured Rock Bedrock  5. Groundwater Observed: Yes No If yes: Depth to Weeping in Hole Depth to Standing Water in Hole  Soil Log  Depth (in) Soil Horizon / Layer (USDA Soil Matrix: Color-Moist (Munsell) Depth Color Percent Gravel Cobbles & Stones  Soil Consistence (Moist)
5. Groundwater Observed: Yes No If yes: Depth to Weeping in Hole Depth to Standing Water in Hole Soil Log  Depth (in) Soil Horizon / Layer Soil Texture (USDA Soil (Munsell))  RedoxImorphic Features Coarse Fragments % by Volume Soil Structure (Moist)  Depth Color Percent Gravel Cobbles & Stones  Soil Consistence (Moist)
Depth (in) Soil Horizon /Layer Soil Texture (USDA Moist (Munsell))  Depth Color Percent Gravel Cobbles & Structure (Moist)  Depth to Standing Water in Hole Color Color (Moist)  Depth to Standing Water in Hole Color C
Depth (in) Soil Horizon /Layer Soil Texture (USDA Soil Matrix: Color- Moist (Munsell) Depth Color Percent Gravel Soil Coarse Fragments % by Volume Soil Consistence (Moist)  Other
Depth (in)   Soil Texture (USDA   Soil Texture (USDA   Moist (Munsell)   Depth   Color   Percent   Gravel   Cobbles & Stones   Soil Consistence (Moist)   Other
Depth Color Percent Gravel Stones (Moist)
6" A SL 1V/R 2/2 - Cnc: M F
30' B SL 1WM - Cnc: 2 5 M F
91' C C1 2011 - Cnc:
76
Dpl:
Cnc:
Dpl:
Cnc : DDI:
Additional Notes: RAUSW Q 96" ( ) du



C. On-										nal araal	
	Site Revi	<b>ew</b> (minim	um of two hole	es requ	ired at every p	roposed p	rimary a	and reserv	e aispo	sai area)	
Deep	<b>Observation</b>	Hole Numb	er: TP.F.20 Hole#		$\frac{1}{1}$ $\frac{1}{1}$ $\frac{1}{1}$ Vegetation	1:20 ime		Ver Con Veather	<u>f</u>	Latitude	Longitude
1. Land	Use (e.g., wo	<u>′ ೧०८≀೯೧ √</u> oodland, agricultu	ural field, vacant lot, e	tc.)	Vegetation	710	Surfac	e Stones (e.g.,	cobbles, sto	nes, boulders, etc	.) Slope (%)
	on of Location										_
0 0 1 5		1.									
2. Soil P	Parent Materia	ıı:			Landfor	 m		Position on I	_andscape (	SU, SH, BS, FS, T	S, Plain)
3. Dista	nces from:	Oper	n Water Body _	fe	et	Drainag	e Way _	feet		Wetland	S feet
		1	Property Line _	fe	et Di	rinking Wate	er Well _	feet		Othe	r feet
4 Heer	itable Materi	ale Present	□ Vas □ Na	If Voc					Fractured I	Rock   Redi	rock
4. Unsu	ilabie Maleri	ais Fieseiil.	П 162 121 IAO	ii res:	☐ Disturbed Soi	ırılı ivialenai	ں	vvcauleleu/	i iacidied i	YOUR DEGI	
5. Groui	ndwater Obse	rved: Yes	s ⊠ No		If yes:	Depth	to Weeping	in Hole		Depth to Stan	ding Water in Hole
			<b>-</b>		_	il Log					
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-		Redoximorphic Feat			Fragments Volume	C-II	Soil	
		OUII TOXIGIO		ľ			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Volume	Soil		Other
zopin (m)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Structure	Consistence (Moist)	Other
	/Layer	(USDA	Moist (Munsell)	•	Cnc :	Percent	<u> </u>	Cobbles &		Consistence	Other
6	/Layer	(USDA	Moist (Munsell)	_		Percent	Gravel	Cobbles & Stones	Structure	Consistence (Moist)	Other
	/Layer	(USDA	Moist (Munsell)	_	Cnc : Dpl:	Percent	<u> </u>	Cobbles &	Structure	Consistence (Moist)	Other
6'	/Layer	SL	Moist (Munsell)  1 / V/2 7/2  1 6 V/2 5/6	_	Cnc: Dpl: Cnc: Dpl: Cnc:	Percent	Gravel  — (').	Cobbles & Stones	Structure	Consistence (Moist)	Other
6	/Layer	(USDA	Moist (Munsell)	_	Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc:	Percent	Gravel	Cobbles & Stones	Structure	Consistence (Moist)	Other
6'	/Layer	SL	Moist (Munsell)  1 / V/2 7/2  1 6 V/2 5/6	_	Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Cnc:	Percent	Gravel  — (').	Cobbles & Stones	Structure	Consistence (Moist)	Other
6'	/Layer	SL	Moist (Munsell)  1 / V/2 7/2  1 6 V/2 5/6	_	Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc:	Percent	Gravel  — (').	Cobbles & Stones	Structure	Consistence (Moist)	Other
6'	/Layer	SL	Moist (Munsell)  1 / V/2 7/2  1 6 V/2 5/6	_	Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Dpl: Cnc:	Percent	Gravel  — (').	Cobbles & Stones	Structure	Consistence (Moist)	Other
6'	/Layer	SL	Moist (Munsell)  1 / V/2 7/2  1 6 V/2 5/6	_	Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Cnc:	Percent	Gravel  — (').	Cobbles & Stones	Structure	Consistence (Moist)	Other



Site Revie	Dag / mainting									
	ew (minimi	um of two hol	es requi	red at every pr	oposed p	rimary a	and reserv	e dispos	sal area)	
Observation	Hole Numbe	er: 1P-E21	6/8	3   23	1:45	_ (	Durcust			<del></del>
•						W	eather		Latitude	Longitude
(e.g., wo	odland, agricultu	ral field, vacant lot,	etc.)	Vegetation		Surface	Stones (e.g.,	cobbles, sto	nes, boulders, etc	s.) Slope (%)
arent Materia	l:			Landform	•		Decition on I	andaana (6	CH CH DC TO	CO District
ices from:	Open	Water Body	fe							ds feet
					_	-				
table Materia	als Present:	☐ Yes ဩ No	If Yes:	☐ Disturbed Soil/	Fill Material		Weathered/I	ractured F	Rock 🔲 Bed	rock
dwater Obse	rved: Yes	. ⊠ No		If yes:	Depth	to Weeping	in Hole		Denth to Sta	nding Water in Hole
						·- ·····g			Dopar to can	iding Water III Tole
Soil Horizon	Soil Texture	Soll Matrix: Color		Redoximorphic Featu	ires			Soil	Soil	
/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Structure	(Moist)	Other
A	SL	INR 3/3		Cnc : Dpl:	19	. * =		M	F	
ß				Cnc:		8	5	M	F	
D	26	10416 2118	<del> </del>	<del></del>				1	, ,	
	SL	104R 6/2	_	Dpl:		10	40	M	F	
				Cnc:						
			+	· · · · · · · · · · · · · · · · · · ·					-	
				Dpl:						
				Cnc :	4					
onal Notes:	0.0	\ \ \				1		1	1	1
	Jse (e.g., wo n of Location) arent Materia aces from: table Materia adwater Obse Soll Horizon /Layer	Jse (e.g., woodland, agricultum of Location: arent Material: aces from: Oper table Materials Present: Individual of Location:  Soil Horizon /Layer Soil Texture (USDA)  B S S S S S S S S S S S S S S S S S S	Ge.g., woodland, agricultural field, vacant lot, on of Location:   Gees from: Open Water Body	Ge.g., woodland, agricultural field, vacant lot, etc.)   n of Location:   arent Material:	JSE	JSE	JSE   (e.g., woodland, agricultural field, vacant lot, etc.)   Vegetation   Surface	Ce.g., woodland, agricultural field, vacant lot, etc.)   Vegetation   Surface Stones (e.g., on of Location:   arent Material:	JSE   (e.g., woodland, agricultural field, vacant lot, etc.)   Vegetation   Surface Stones (e.g., cobbles, stonent of Location:	Joe   (e.g., woodland, agricultural field, vacant lot, etc.)   Vegetation   Surface Stones (e.g., cobbles, stones, boulders, etc.)   Toe   Coarse   Coarse



C. On	-Site Rev	iew (minin	num of two hol	es requ	ired at every pr	oposed p	rimary	and reser	ve dispo	sal area)	
Deep	Observatio	n Hole Numb	per: <u>TP-1</u> 2	6/	8/13 TI	1:10		Overest	·		
1. Land	Llee							Veather		Latitude	Longitude
Descripti	e.g., w) on of Location		tural field, vacant lot, e	etc.)	Vegetation		Surfac	ce Stones (e.g.	cobbles, ste	ones, boulders, e	tc.) Slope (%)
2. Soil l	Parent Materi	al:									
					Landform	1		Position on	Landscape	(SU, SH, BS, FS,	TS, Plain)
. Dista	nces from:	Ope	n Water Body	fe	eet	Drainag	e Way _	feet		Wetlan	ds feet
			Property Line	fe	et Dri	nking Wate	r Well _	feet		Oth	er feet
l. Unsu	iitable Materi	als Present:	☐ Yes 💆 No	If Yes:	☐ Disturbed Soil/	Fill Material		Weathered	Fractured	Rock 🔲 Be	drock
. Grou	ndwater Obse	erved: Yes	s ⊠ No		If yes:	Depth t	o Weeping	in Hole	****	Depth to Sta	inding Water in Hole
		<b>-</b>	7.00		Soil	Log					
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-		Redoximorphic Featu	res		Fragments Volume	Soil	Soil	
	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Structure	Consistence (Moist)	Other
61	A	SL	10 VR 3/3	_	Cnc : Dpl:	x ,,	_	_	Μ	F	
26	SB	S.L	10/R 5/9	1	Cnc : Dpl:		2	9	Μ	F	
112	10	LS	10VR 6/C	)	Cnc : Dpl:		10	10	M	F	
					Cnc :						
					Dpl:						*
					Cnc : Dpl:						
									<del>                                     </del>		
					Cnc 1						
			3		Cnc: Dpl:						



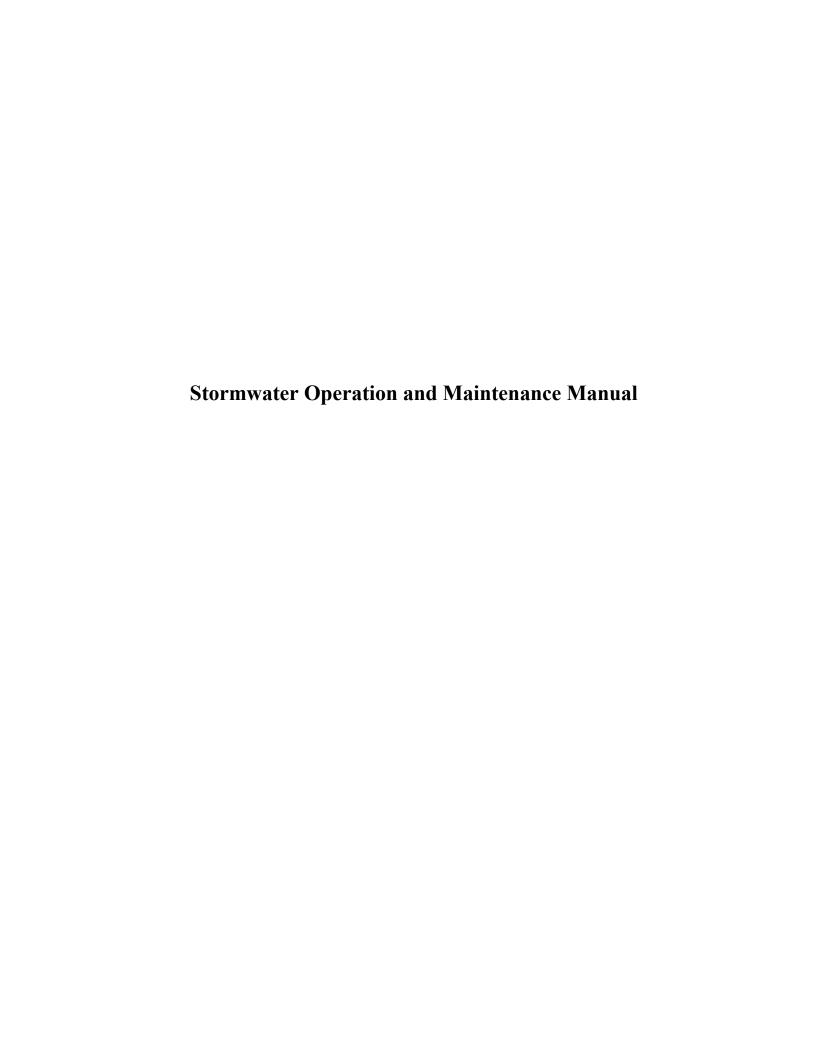
0. 0	-Site Kev	iew (minin	num of two hol	es regi	uired at everv p	roposed	nriman	and rese	nya dien	ocal areal		
реер	Observatio	n Hole Numi	ber: 11/ ことろ	6	8/23	12:15		Overcest				
1. Land	Use	Landlan	11010 11	Date	+rory   Ho	ime		Weather		Latitude	Longitude	
	(e.g., w	oodland, agricul	tural field, vacant lot,	etc.)	Vegetation	)	– <u>∭</u> Surfa	CON Stones (e.a.	cobbles s	tones houlders	etc.) Slope (%)	
Description	on of Location	n: _							,, 0000.00, 0	torics, boulders,	etc.) Slope (%)	
2. Soil P	Parent Materi	al:										
2 D:-4-		_			Landfor	m		Position on	Landscape	(SU, SH, BS, FS	S, TS, Plain)	
3. Distar	nces from:	Ope	n Water Body	fe	eet	Drainag	ge Way _	feet		Wetla	nds feet	
			Property Line	fe	eet Dri	inking Wat	er Well _	feet		Oti	ner feet	
4. Unsui	itable Materi	als Present:	☐ Yes ☐ No	If Yes:	☐ Disturbed Soil/				/Fractured	Rock Be		
5. Groun	ndwater Obse	erved: 🗌 Yes	s 🗌 No		If yes: _	Depth	to Weeping	in Hole		Depth to St	anding Water in Hole	
					Soil	l Log						
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color- Moist (Munsell)		Redoximorphic Featu	res	Coarse % by	Fragments Volume	Soil	Soil Consistence	Other	
11	/Luyer	(OODA	moist (muriseri)	Depth	Color	Percent	Gravel	Cobbles & Stones	Structure	(Moist)	Other	
16"	A	SL	104/23/3	_	Cnc : Dpl:				M	1-		
30"	B	SL	104R 516	~	Cnc : Dpl:	<u> </u>	25.	10%	M	F		
110"	_	LS	101R 613	_	Cnc:		20%	10%	M	F		
1.0			10115 017		Dpl:		- 01,	7070	<i>)</i> , (			
1.0	(		19116 917		Cnc :		201,	7070	7	•		
1.0			13112 3/7		Cnc : Dpl:		201,	7070	7. 0	,		
			13112 3 / /		Cnc :			, 070	<i>y</i> · c	,		
			13112 3 / /		Cnc : Dpl: Cnc :			, 0/0	, ,	,		
	onal Notes:		13112 3 / /		Cnc:  Dpl:  Cnc:  Dpl:			7 0 7 9		,		



# Commonwealth of Massachusetts City/Town of

## Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

					uired at every <sub>l</sub>						
Deep	Observation	n Hole Numi	ber: <u>10- E</u> 24 Hole#	გ ∫ე Date	3/23	1() 3() Time		Ovvcos f Weather		Latitude	Longitude
1. Land	Use (e.g., w	<u>) กอิสไขกป</u> oodland, agricul	tural field, vacant lot,	etc.)	Vegetation (; )	16	Surfa	ice Stones (e.g	., cobbles, s	tones, boulders,	etc.) Slope (%)
	on of Location	•									
2. Soil F	Parent Materia	al:			Landfo	om	<del></del>	Position on	Landscape	(SU, SH, BS, FS	S, TS, Plain)
3. Dista	nces from:	Оре	n Water Body	fo	eet						nds feet
			Property Line	fe	eet D	rinking Wa	ter Well _	feet		Oth	ner feet
4. Unsu	itable Materi	als Present:	☐ Yes Ø No	If Yes:	☐ Disturbed So	il/Fill Materia	ı [	] Weathered	/Fractured	Rock 🔲 Be	drock
5. Groui	ndwater Obse	erved: Yes	s 🗹 No		If yes:	Depth	to Weeping	g in Hole		Depth to Sta	anding Water in Hole
					So	il Log	·				
D 41- (i)	Soil Horizon	Soil Horizon   Soil Texture	Soil Matrix: Color-	Redoximorphic Features		ures	Coarse Fragments % by Volume		Soil	Soil Consistence	Other
Depth (in)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Structure	(Moist)	
4	Α	SL	101/2 3/3	_	Cnc : Dpl:				Λ	F	
28"	B	L-S	1012 3/8	-	Cnc : Dpl:		1	10	M	F	
120	( ,	LS	1011 6/2	-	Cnc: Dpl:		20	10	M	F	
1,20,					Cnc :						
					Dpl:						
					Cnc : Dpl:	-					
				1	PP1.	1					
	1				Cnc :						
					Cnc : Dpl:						



#### **Schedule for Inspection and Maintenance:**

#### **Street Sweeping:**

The pavement shall be swept of all sediment twice a year with concentrations in the spring and the fall.

#### **Deep Sump Hooded Catch Basins:**

During construction, catch basin grates shall be wrapped with filter fabric. Catch basins shall be cleaned upon the completion of construction. After construction, the deep sumps for all catch basins shall be inspected four times a year and cleaned four times a year. Sediment removed shall be disposed of in accordance with applicable local, state, and federal guidelines and regulations. The depth of the sediment in a basin shall not exceed a depth of 18 inches as determined by probing with a stick. If the stick hits the bottom within 30 inches of the water level, more than 18 inches of sediment has accumulated and must be removed. Licensed persons should remove and dispose of the contents of the sump in accordance with applicable regulations.

#### **Sediment Forebay:**

The floor and sidewalls of the sediment forebay must be stabilized before use. Sediment forebay shall be inspected monthly and cleaned a minimum of four times per year when sediment depth is between 3-6 inches. After sediment removal, any damaged vegetation must be replaced. Grass in the forebay shall not exceed 6 inches in length and any scouring and gullying shall be repaired as necessary.

#### **Infiltration Basin:**

Preventative maintenance should be performed at least twice a year, and ideally sediment should be removed from the sediment forebay after every major storm event. Sediment shall be disposed of in accordance with applicable local, state, and federal guidelines and regulations. Once online, the basins shall be inspected after every major storm even (1" in 24 hours), for the first 3 months. thereafter, the basin should be inspected at least twice per year. Important items to check for include: differential settlement, cracking, erosion, leakage, or tree growth on the embankments, condition of riprap, sediment accumulation and the health of the turf. At least twice a year, the buffer area and side slopes of the basin should be mowed. Grass clippings and accumulated organic matter should be removed to prevent the formation of an impervious organic mat. Trash and debris should also be removed at this time. Scarify bottom area and add additional sand if necessary. Sediment should be removed from the basin as necessary. Removal procedures should not take place until the floor of the basin is thoroughly dry. Pretreatment devices associated with basins should be inspected and cleaned at least twice a year and ideally every other month.

#### **Treatment Trench:**

Trench shall be inspected annually. The filter fabric shall be inspected for excessive sediment build up. If appreciable amounts of sediment are observed the top layer of stone shall be moved aside and the filter fabric cleaned or replaced. The top layer of stone shall then be washed and placed over the filter fabric.

#### **Emergency Contacts:**

In the event of a hazardous materials spill on the site the following parties shall be contacted: Fire Department: ph: 978-897-4537

#### **Records:**

The Homeowners Association shall maintain an inspection log of all elements of the storm water management plan. The Homeowners Association shall maintain a maintenance log documenting the inspection and maintenance of the drainage structures. A copy of the erosion control and storm water maintenance plan and inspection logs shall be kept onsite at all times.

#### **Responsible Party:**

After construction the Homeowners Association shall be responsible for the inspection and maintenance of the street sweeping, snow removal, and all components of the stormwater management system. Each individual homeowner shall be responsible for their own drywell.

**Budget:** The estimated annual operation and maintenance budget is \$5,000.

**Illicit Discharges:** There will be no illicit discharges on site. The Site Plan identifies the locations for the proposed stormwater management system on site which shows that these systems do not allow entry of any illicit discharge into the municipal stormwater system. The Site Plan also shows that there are no connections between the stormwater and wastewater system.

Name:	 	
Signature:	 	
Date:		

### The Cottages at Wandering Pond

Operation and Maintenance Inspection Log

Year:

Inspection Items:		Frequency:	
Street Sweeping		Two times per year	r
Catch Basin		Four times per yea	
Infiltration Basin		Two times per year	
Sediment Forebay		Monthly	
Treatment Trench		Annually	
		•	
Street Sweeping:			
Previous Inspection D	ate:		
Inspection Date:	ate.		<u>-</u>
Inspector Name:			<u>-</u>
Comments:			_
comments.			
Action Required:			
Catch Basin:			
Previous Inspection D	ate.		
Inspection Date:	ate.		_
Inspector Name:			-
Sediment Depth:			- (Remove if depth greater than 18")
Comments:			_(
Action Required:			
Infiltration Basin:			
Previous Inspection D	ate:		
Inspection Date:			-
Inspector Name:			-
Sediment Depth:			- (Remove if depth greater than 18")
Erosion in Basin:			<u>-</u>
Outlet Structure:			-
Comments:			-
Action Required:			

Sediment Forebay:	
Previous Inspection Date:	
Inspection Date:	
Inspector Name:	
Sediment Depth:	(Remove if depth is between 3"-6")
Comments:	,
Action Required:	
Treatment Trench:	
Previous Inspection Date:	
Inspection Date:	
Inspector Name:	
Comments:	
Action Required:	



## **CDS®** Inspection and Maintenance Guide





#### Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

#### Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

#### Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.



CDS Model	Diameter			Water Surface ediment Pile	Sediment Storage Capacity	
	ft	m	ft	m	y³	m³
CDS1515	3	0.9	3.0	0.9	0.5	0.4
CDS2015	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.3	3.0	0.9	1.3	1.0
CDS2020	5	1.3	3.5	1.1	1.3	1.0
CDS2025	5	1.3	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3025	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities



#### Suppor

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

©2017 Contech Engineered Solutions LLC, a QUIKRETE Company

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, earth stabilization and wastewater treament products. For information, visit www.ContechES.com or call 800.338.1122

NOTHING IN THIS CATALOG SHOULD BE CONSTRUED AS AN EXPRESSED WARRANTY OR AN IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. SEE THE CONTECH STANDARD CONDITION OF SALES (VIEWABLE AT WWW.CONTECHES.COM/COS) FOR MORE INFORMATION.

The product(s) described may be protected by one or more of the following US patents: 5,322,629; 5,624,576; 5,707,527; 5,759,415; 5,788,848; 5,985,157; 6,027,639; 6,350,374; 6,406,218; 6,641,720; 6,511,595; 6,649,048; 6,991,114; 6,998,038; 7,186,058; 7,296,692; 7,297,266; 7,517,450 related foreign patents or other patents pending.



### **CDS Inspection & Maintenance Log**

CDS Model:	Location:
CDS WIGHT.	Eocation:

Date	Water depth to sediment <sup>1</sup>	Floatable Layer Thickness <sup>2</sup>	Describe Maintenance Performed	Maintenance Personnel	Comments

<sup>1.</sup> The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.



