## **Stormwater Management Report**

For

### The Cottages at Wandering Pond Athens Street Stow, MA 01775

510W, 1411 01775

June 29, 2022

**Rev: October 27, 2022** 

Applicant: The Cottages at Wandering Pond Realty Trust

148 Park Street

North Reading, MA 01864

Owner: EFMC Associates Limited Partnership

35 Parmenter Road Hudson, MA 01749

Goshen Lane Realty Trust

148 Park Street

North Reading, MA 01864

Athens Street, LLC 148 Park Street

North Reading, MA 01864

Greystone Painting Corp. 21 Wellington Avenue Hudson, MA 01749

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

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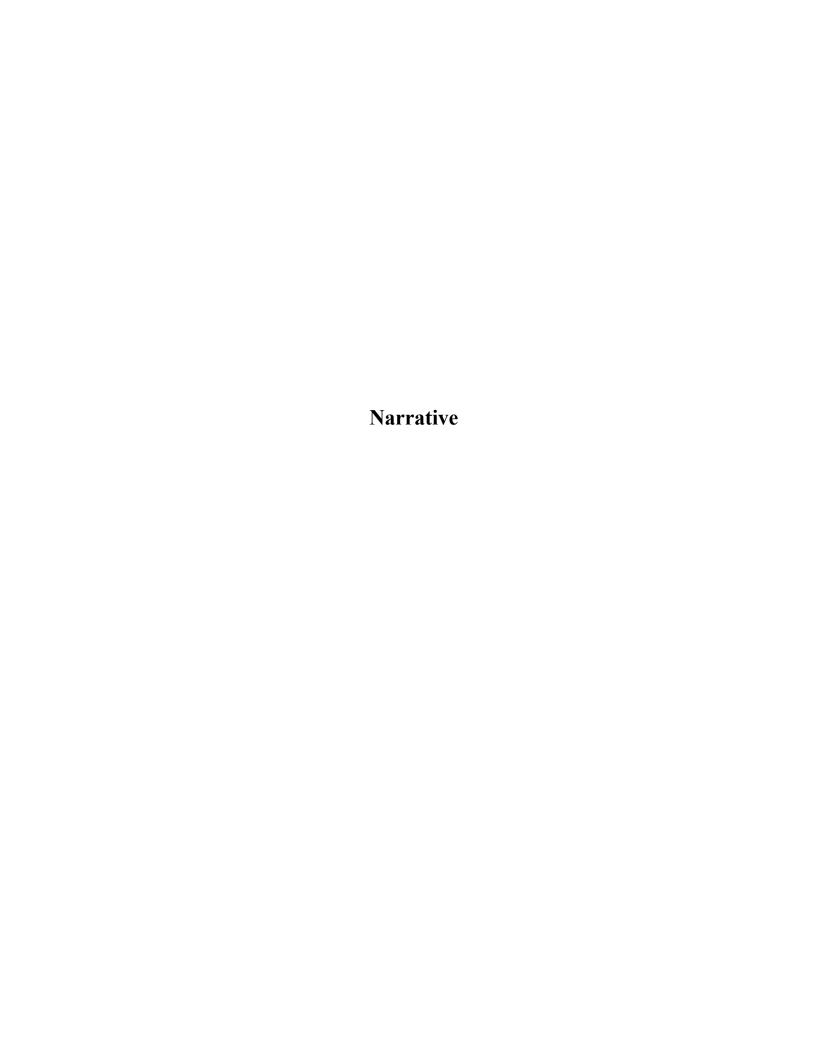
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### STORMWATER MANAGEMENT

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 infiltrated and recharged. 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 infiltrated and recharged. 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 infiltrated and recharged. 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 infiltrated and recharged. IB-5D is designed to overflow into IB-2B-A. 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, 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 infiltrated and recharged. 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 an 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 infiltrated and recharged. 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 in a series of catch basins located along the paved area and drains to IB-6B to be infiltrated and recharged. Roadway runoff is treated through a combination of deep sump hooded catch basins and a 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, associated parking, pool and associated patio/pool coping, 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, a portion of Sweet Pea Path, adjacent dwellings, 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

The state of the s											
	2-year St	torm	10-year	r Storm	25-year	r Storm	100-yea	r 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 0		3.52	52.4	52.4	228	228			

E-2A Compared to P-2A

	2-year	2-year Storm 10-y		r Storm	25-yea	year Storm 100-year St		ar 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	35,403	29,551	98,578	84,699	146,158	130,257	227,661	214,146					
(cf)													

E-2B Compared to P-2B

	2-year Storm		10-year	r Storm	25-year	Storm	100-yea	r Storm
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Peak Flow (cfs)	1.662	0.228	13.40	5.869	24.82	14.25	45.93	31.04
Total Volume (cf)	18,921	18,921 6,036		40,825	126,186	80,601	215,845	156,142

E-3 Compared to P-3

	2-year Storm		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	6.575	17.08	16.89	24.26	24.00	35.91	35.48		
Total Volume (cf)	35,200	30,154	30,154 82,096		115,182	101,147	169,813	149,710		

E-4 Compared to P-4

	2-year Storm		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	33,076 26,743		67,232	111,000	96,276	164,675	114,721		

E-5 Compared to P-5

	2-year Storm		2-year Storm		10-year Storm		25-year Storm		100-year Storm	
	Pre	Pre Post		Post	Pre	Post	Pre	Post		
Peak Flow (cfs)	2.571	1.706	11.19	9.312	18.21	16.89	30.49	30.16		
Total Volume (cf)	19,062			53,006	91,855	83,082	147,879	140,316		

E-6 Compared to P-6

	2-year Storm		10-year	r Storm	25-year	r Storm	100-yea	r Storm
	Pre Post		Pre	Post	Pre	Post	Pre	Post
Peak Flow (cfs)	0	0	0.056	0.014	0.315	0.058	1.157	0.445
Total Volume (cf)	0.024	0	1,451	390	3,584	1,408	8,335	4,014

E-7 Compared to P-7

	2-year Storm		10-year	r Storm	25-year	r Storm	100-yea	r 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 0		0	3,648	0	12,259	0

E-8 Compared to P-8

	2-year Storm Pre Post		2-year Storm		10-year	10-year Storm		25-year Storm		r Storm
			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 0		0	216	0	938	0		

E-10 Compared to P-10

	2-year Storm		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	13.86	30.87	26.48	52.40	56.23		
Total Volume (cf)	34,460	16,218	112,089	71,688	173,628	147,496	282,066	286,599		

E-11 Compared to P-11

	2-year Storm		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		2-year Storm		10-year	10-year Storm		25-year 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:**

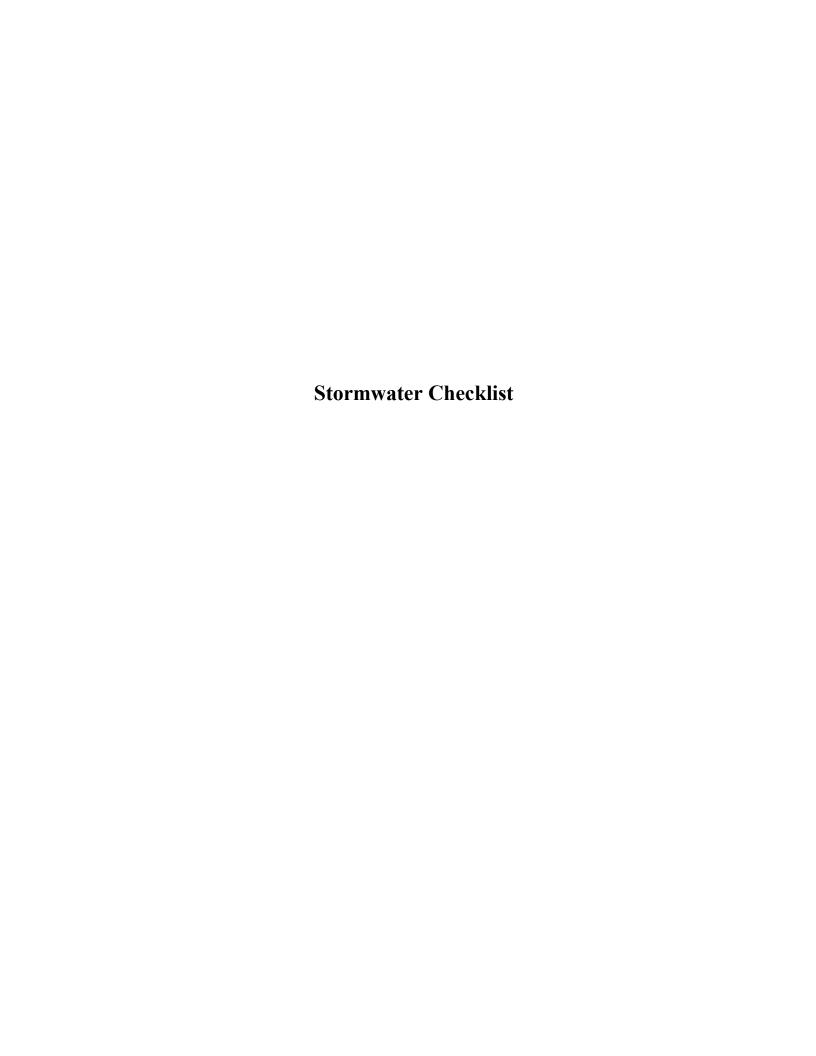
An Operation and Maintenance Plan has been prepared and is included in this report as well as shown on the plan set.

### 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.





### **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.

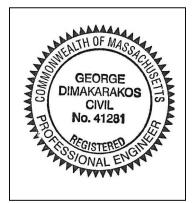
*Note:* Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that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

Hazo DM 10/28/22

Signature and Date

### Checklist

eject Type: Is the application for new development, redevelopment, or a mix of new and evelopment?
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 olanation 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 of 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
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			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 Tc Tt	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

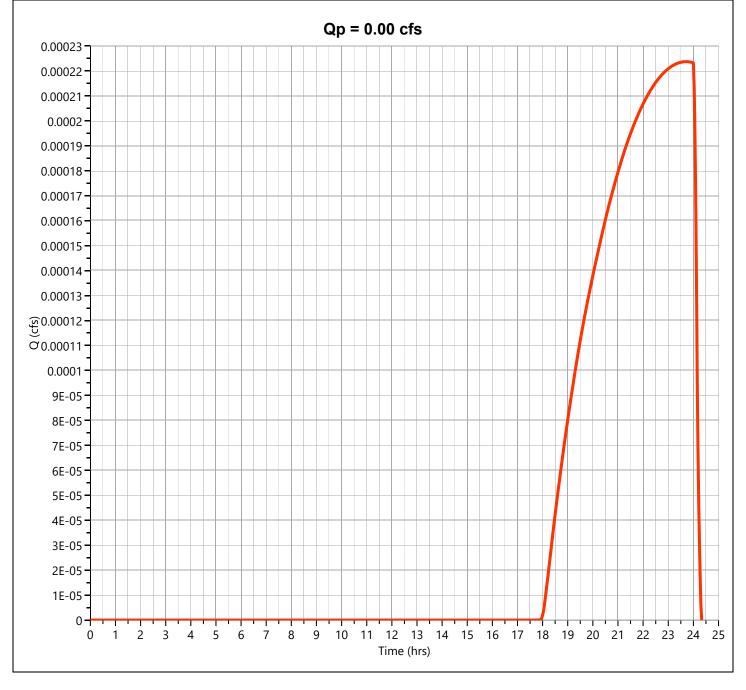
## E-1 Hyd. No. 1

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

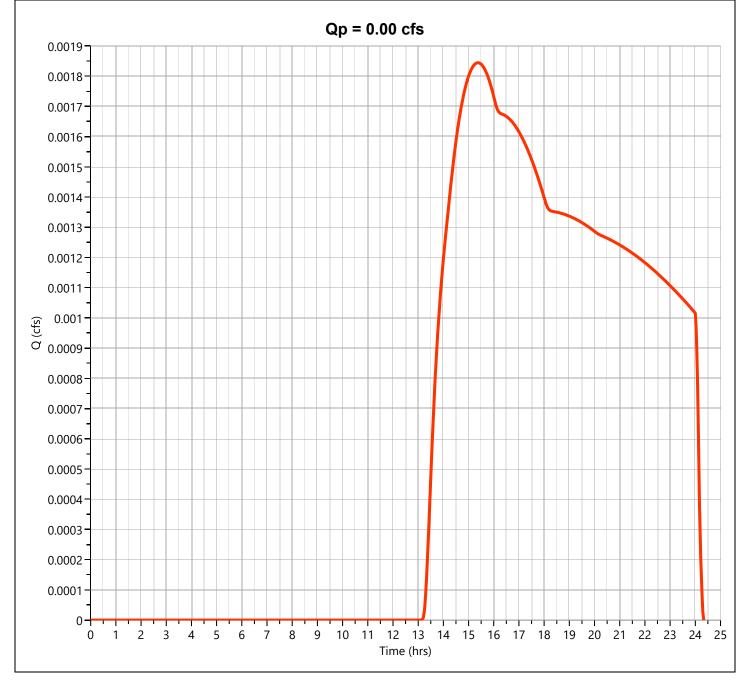
## E-1 Hyd. No. 1

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



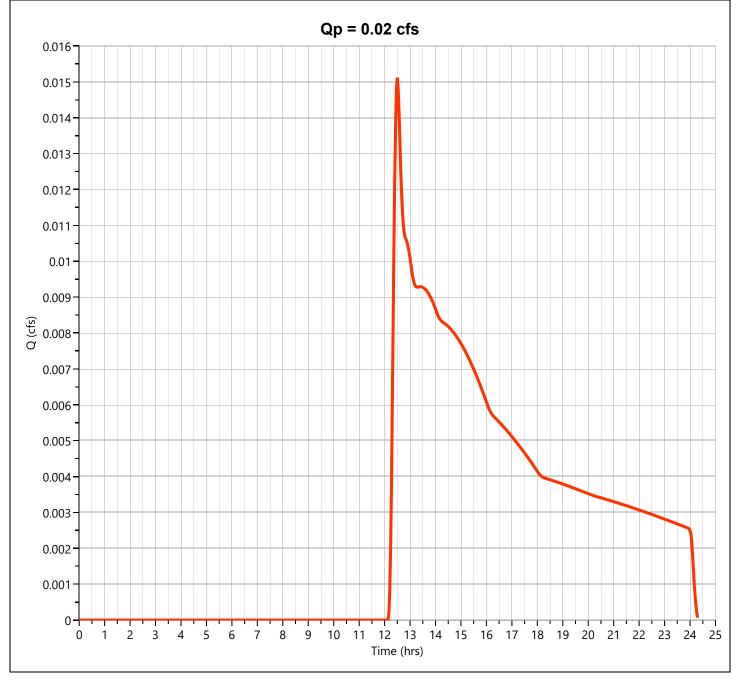
## E-1 Hyd. No. 1

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

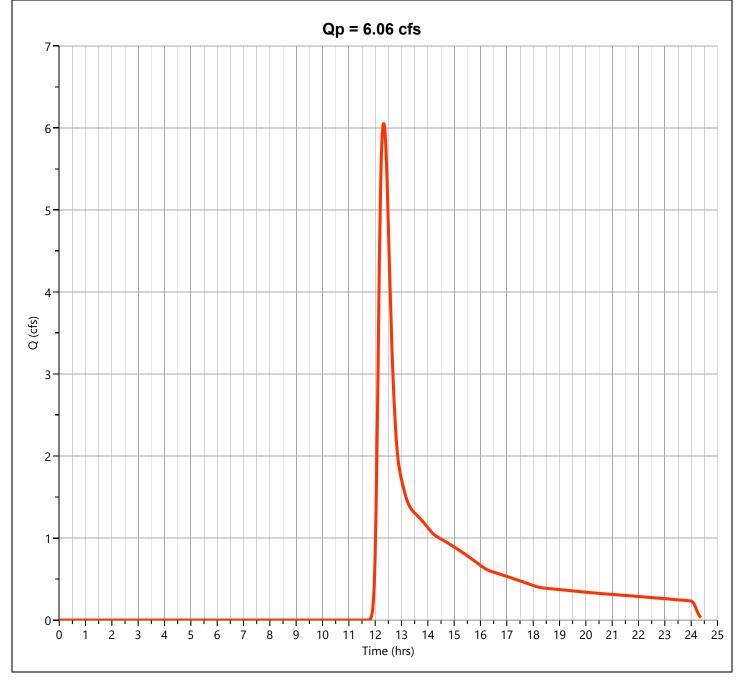
Frequency..... Rainfall, P (24-hour)....

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

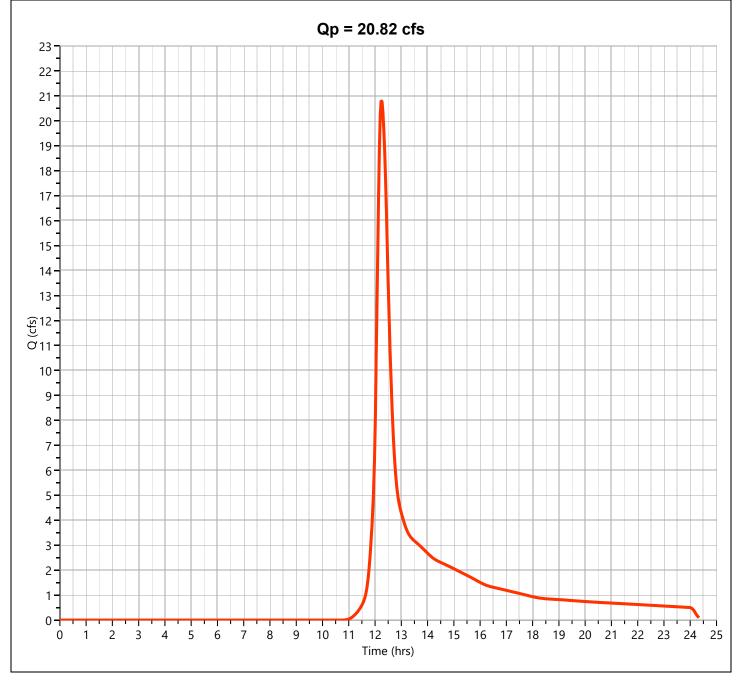
Runoff, Q......(Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)

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

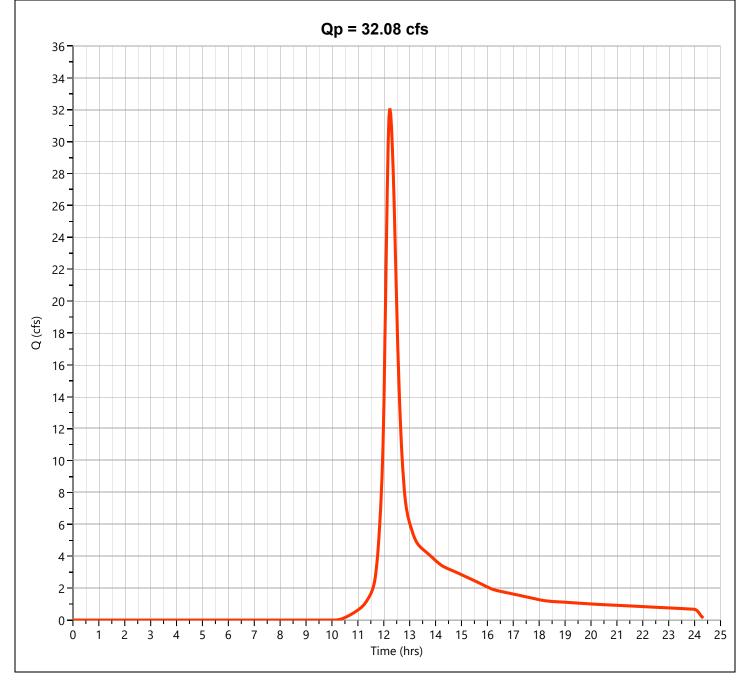
Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.063 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Runoff Volume	= 35,403 cuft
Drainage Area	= 17.7 ac	Curve Number	= 63
Tc Method	= User	Time of Conc. (Tc)	= 17.2 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



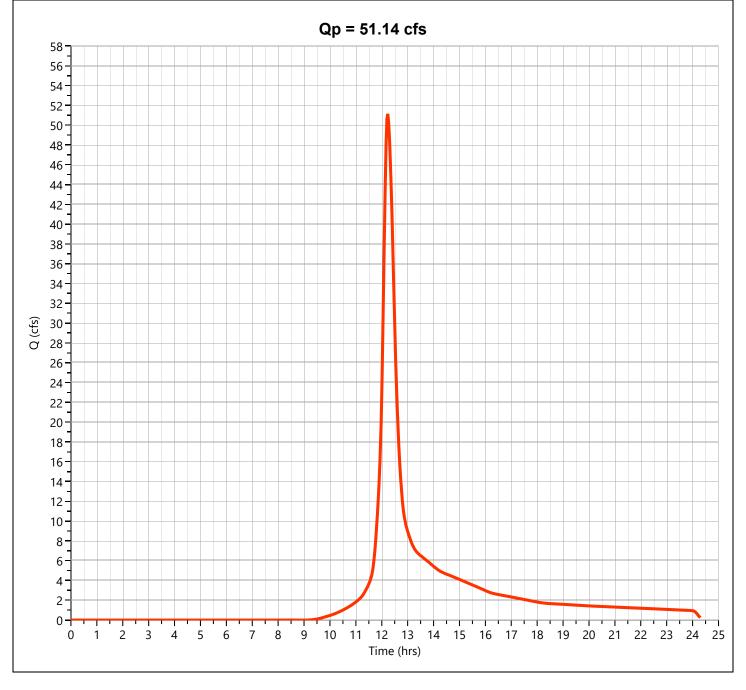
Hydrograph Type	= NRCS Runoff	Peak Flow	= 20.82 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 98,578 cuft
Drainage Area	= 17.7 ac	Curve Number	= 63
Tc Method	= User	Time of Conc. (Tc)	= 17.2 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 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 (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			0.34	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

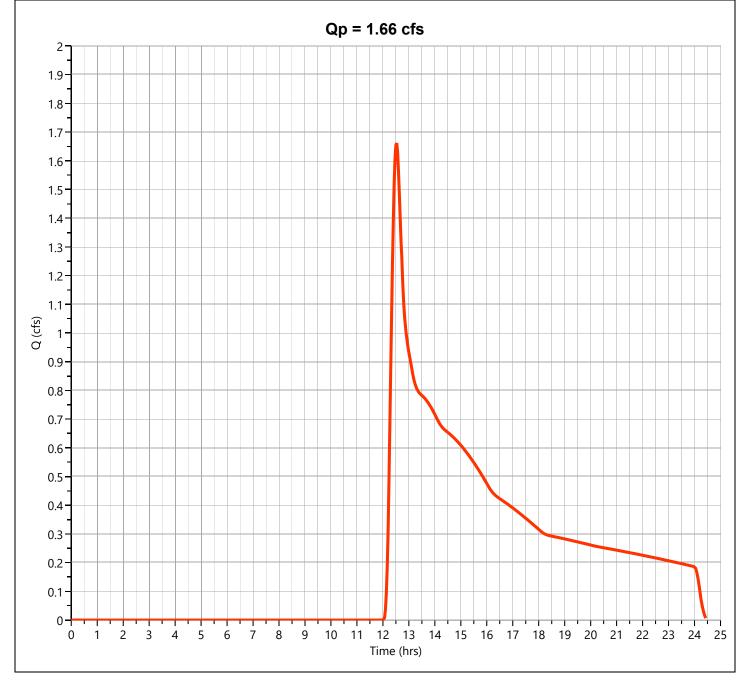
CN (weighted) =	total product	=	1278.07=	52.96 ;	Use CN =	53
•	total area		24.13			

2. Runoff

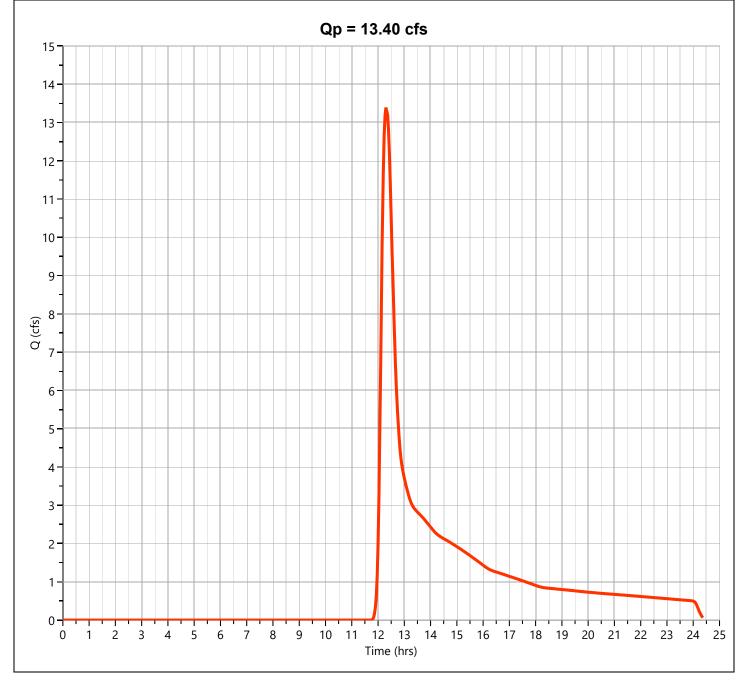
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.22	1.44	2.46

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

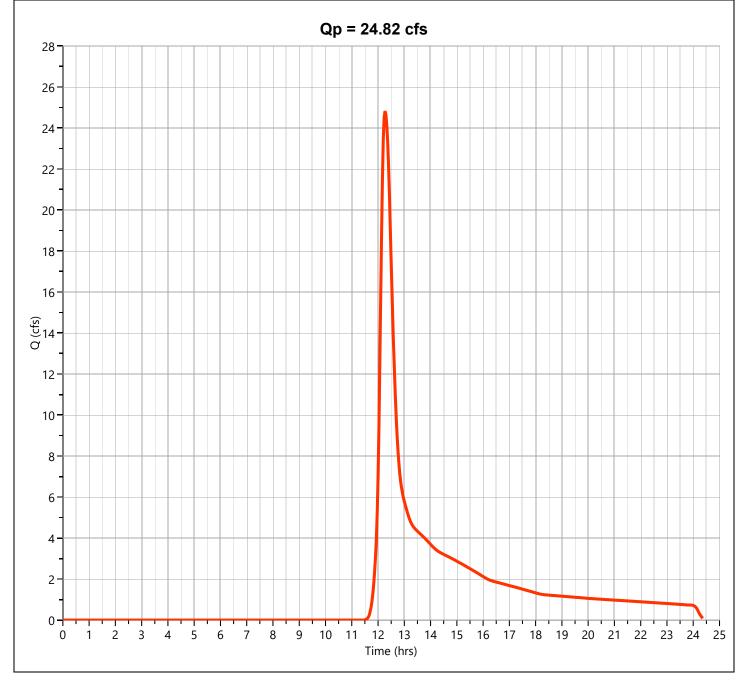


Hydrograph Type	= NRCS Runoff	Peak Flow	= 13.40 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Runoff Volume	= 77,016 cuft
Drainage Area	= 24.13 ac	Curve Number	= 53
Tc Method	= User	Time of Conc. (Tc)	= 17.3 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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



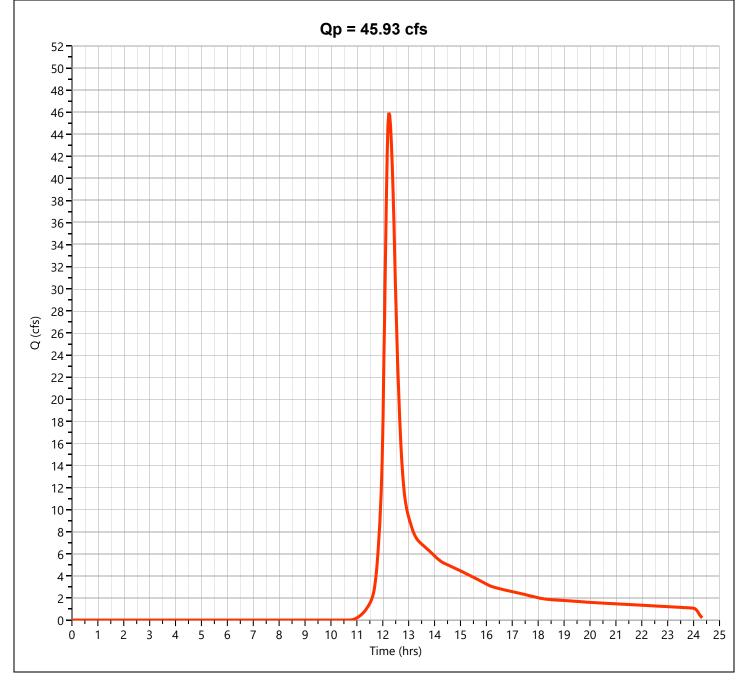
### E-2B Hyd. No. 3

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	Ву МКО	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			

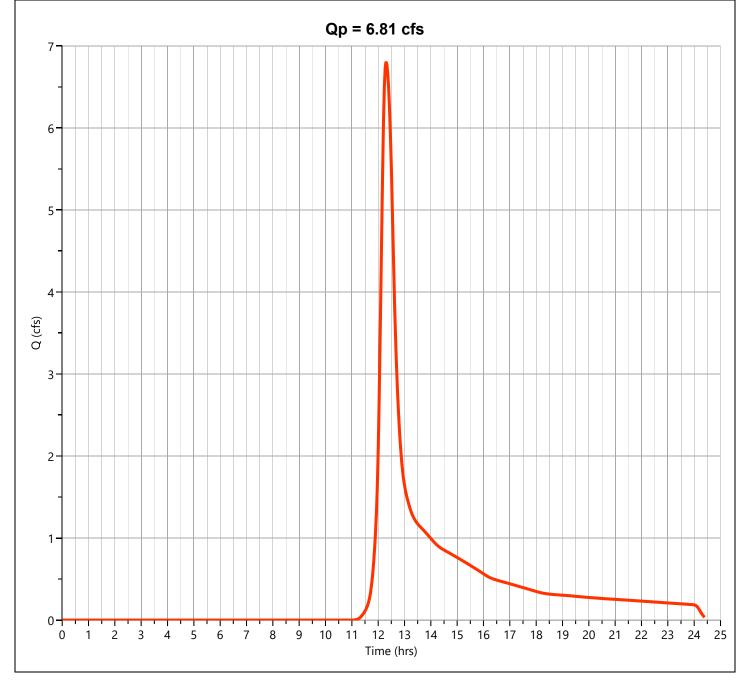
#### 2. Runoff

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

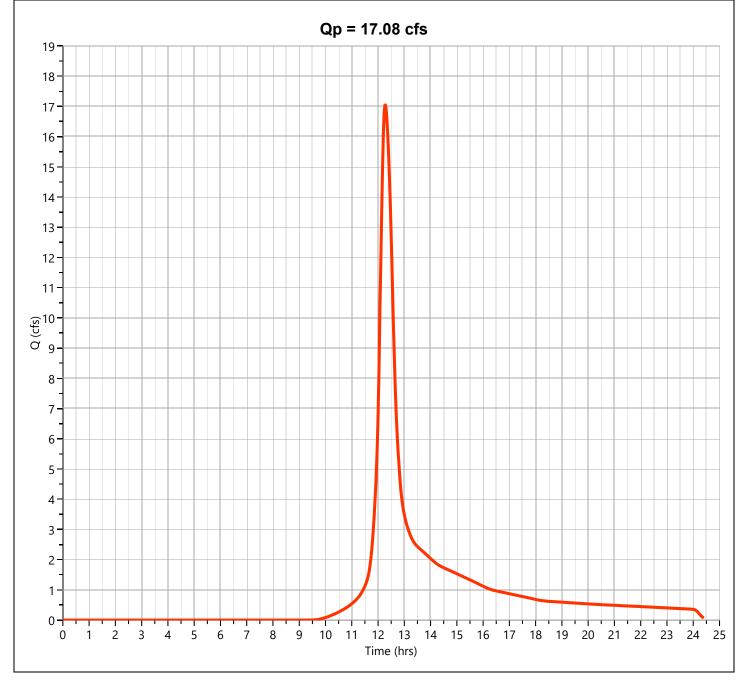
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.90	2.98	4.40

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 (add 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

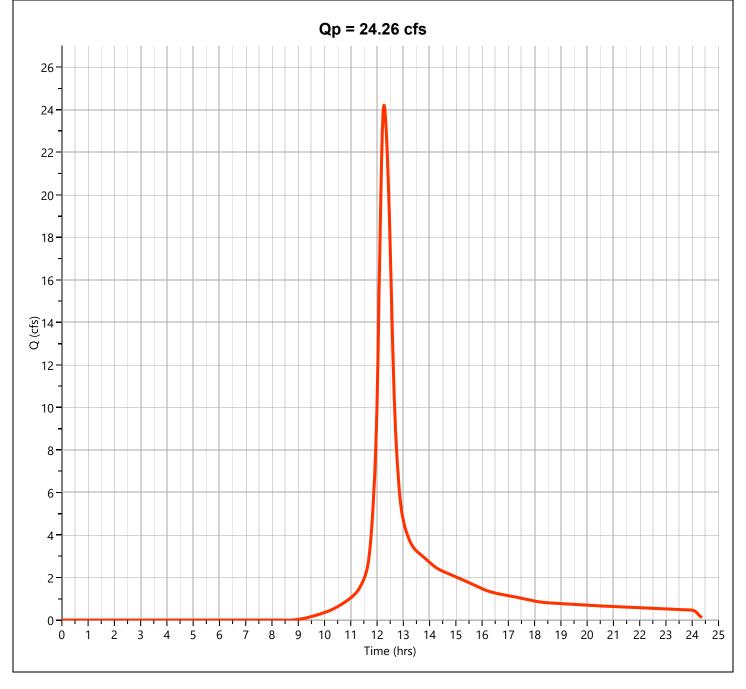
Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.809 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.30 hrs
Time Interval	= 2 min	Runoff Volume	= 35,200 cuft
Drainage Area	= 10.35 ac	Curve Number	= 71
Tc Method	= User	Time of Conc. (Tc)	= 22.4 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



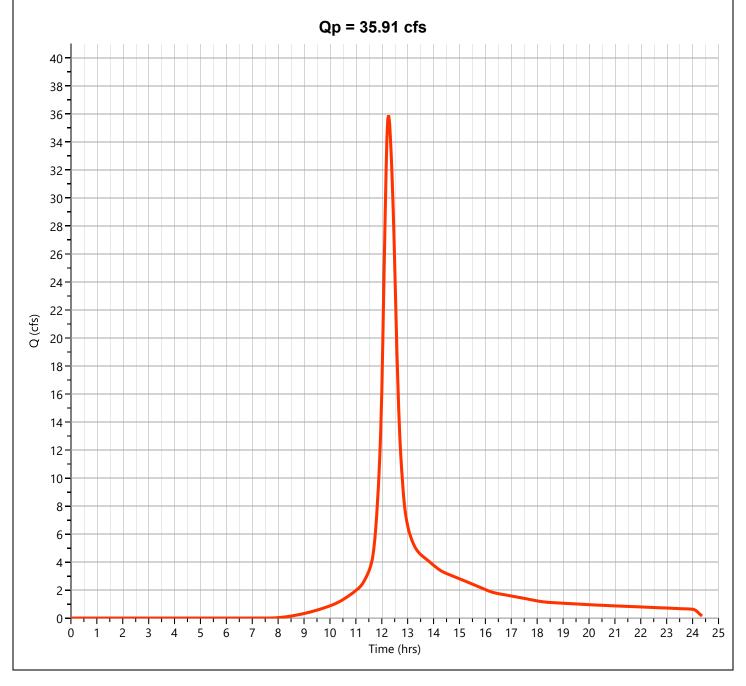
Hydrograph Type	= NRCS Runoff	Peak Flow	= 17.08 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Runoff Volume	= 82,096 cuft
Drainage Area	= 10.35 ac	Curve Number	= 71
Tc Method	= User	Time of Conc. (Tc)	= 22.4 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 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 9/27/2022 Date
Circle one:	Present Developed	Subcatchment E-4	<u> </u>

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	CN source per line.	Totals =	10.30	719.91		

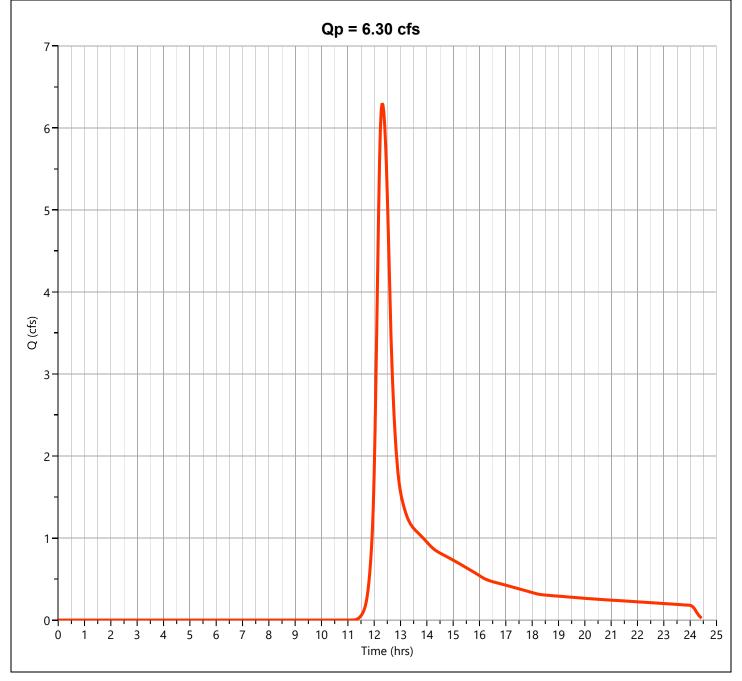
						_
CN (weighted) =	total product	=	719.91 =	69.91 ;	Use CN =	70
	total area		10.30			

2. Runoff

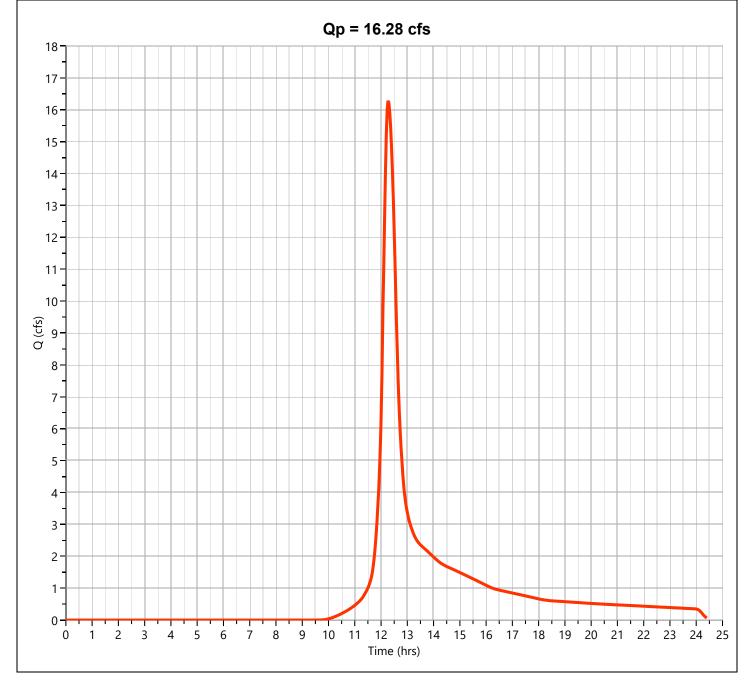
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.86	2.91	4.32

Project:	Athens Stre	et	_	Ву	MKO	Date	6/1/2022	
	costion. Stow MA					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. O.			
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

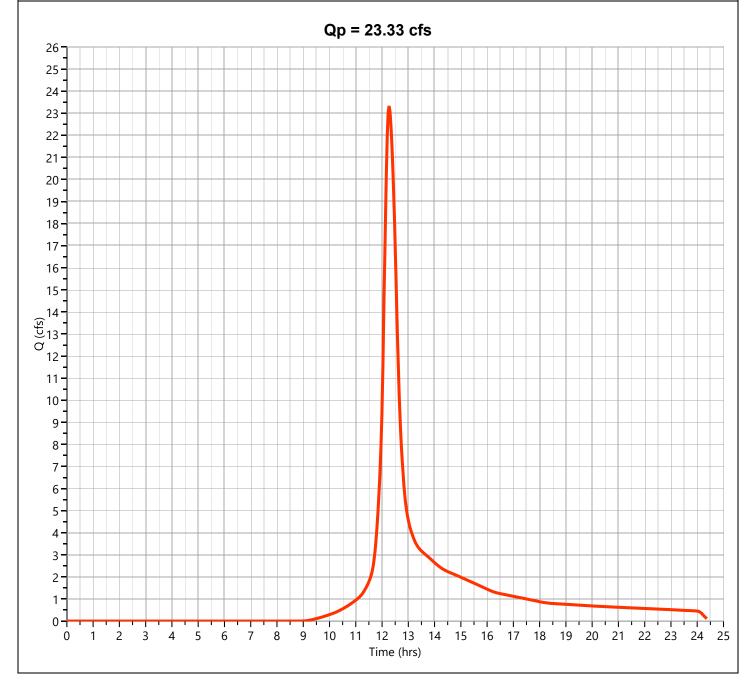
Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.300 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.30 hrs
Time Interval	= 2 min	Runoff Volume	= 33,076 cuft
Drainage Area	= 10.3 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 21.3 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



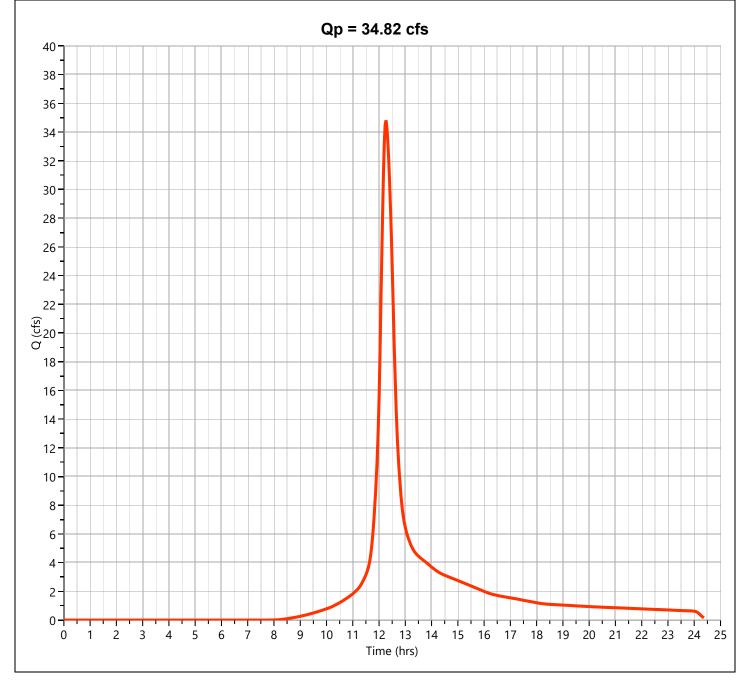
Hydrograph Type	= NRCS Runoff	Peak Flow	= 16.28 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Runoff Volume	= 78,626 cuft
Drainage Area	= 10.3 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 21.3 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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

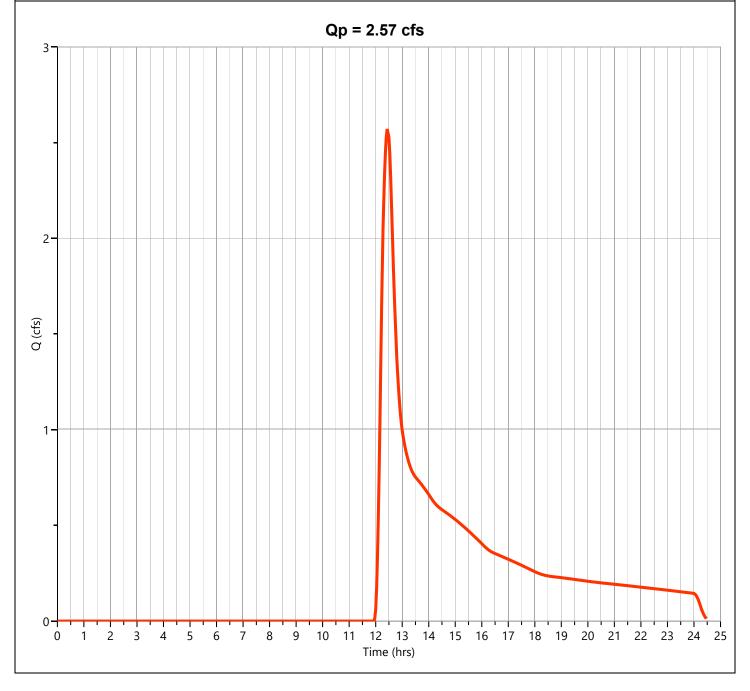
CN (weighted) =	total pr	roduct	=	761.55	=	59.06	;	Use CN =	59	1
!	total ar	ea		12.89	_					

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

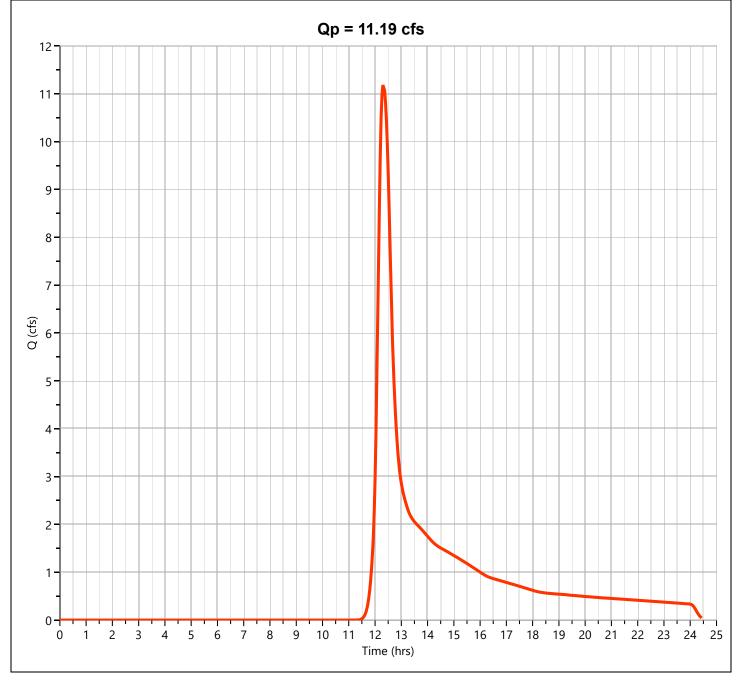
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.40	1.93	3.11

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	Subcatchment 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	7 (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

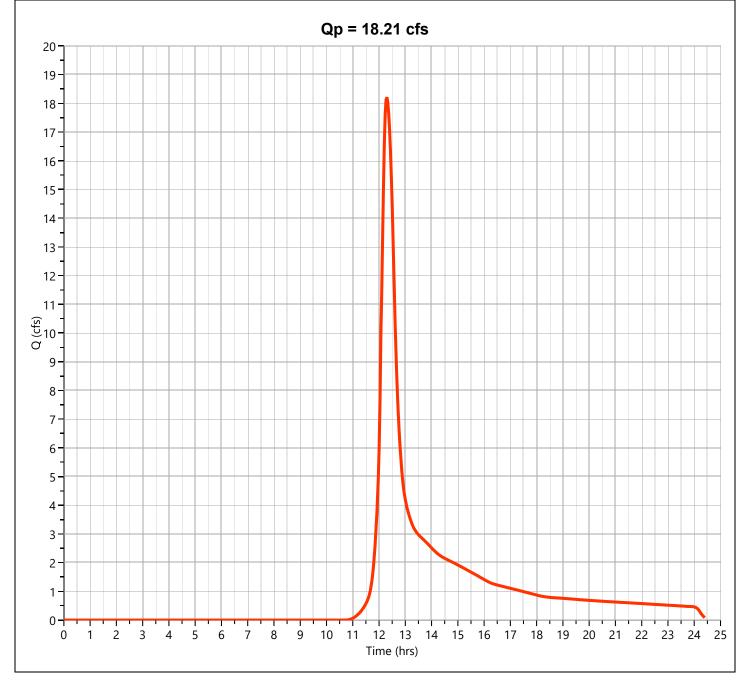
Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.571 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.47 hrs
Time Interval	= 2 min	Runoff Volume	= 19,062 cuft
Drainage Area	= 12.89 ac	Curve Number	= 59
Tc Method	= User	Time of Conc. (Tc)	= 20.3 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



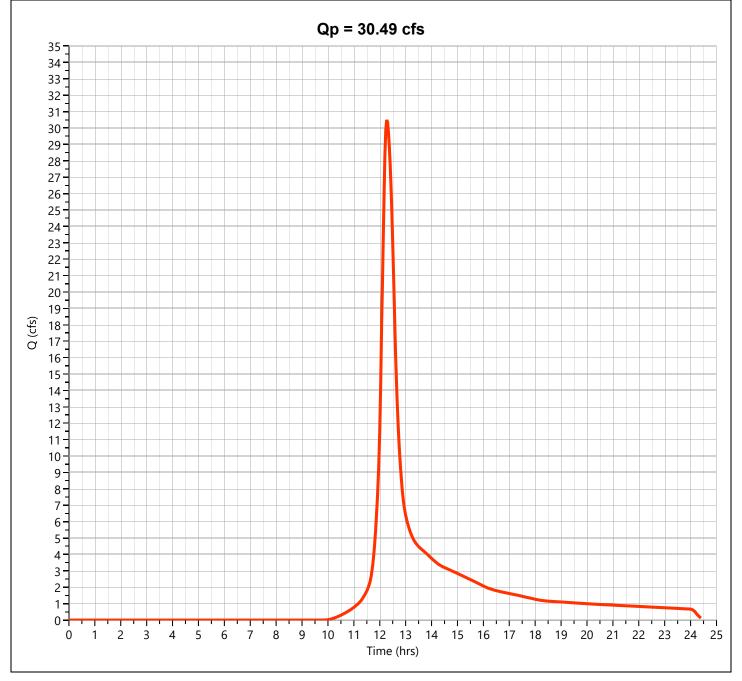
Hydrograph Type	= NRCS Runoff	Peak Flow	= 11.19 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Runoff Volume	= 59,868 cuft
Drainage Area	= 12.89 ac	Curve Number	= 59
Tc Method	= User	Time of Conc. (Tc)	= 20.3 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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

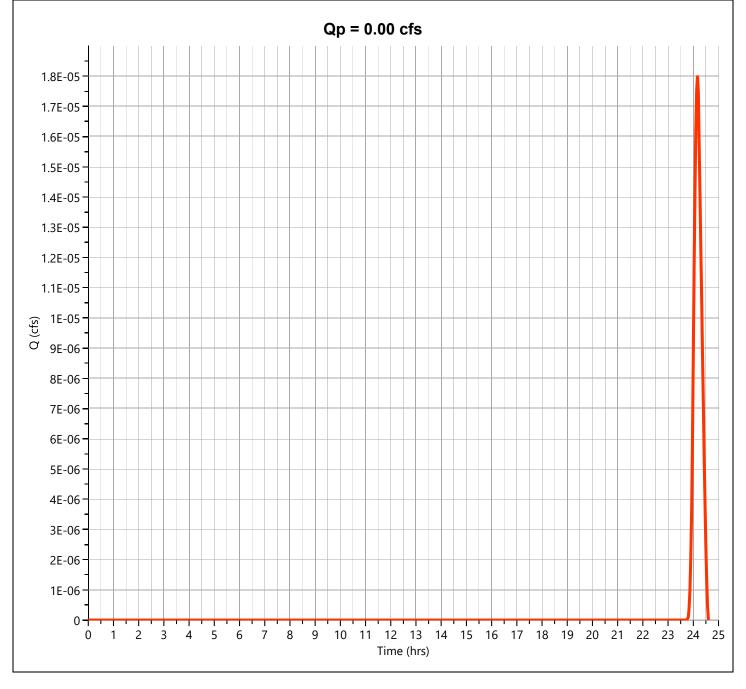
						_
CN (weighted) =	total product	=	85.03 =	37.76 ;	Use CN =	38
	total area		2.25			

2. Runoff

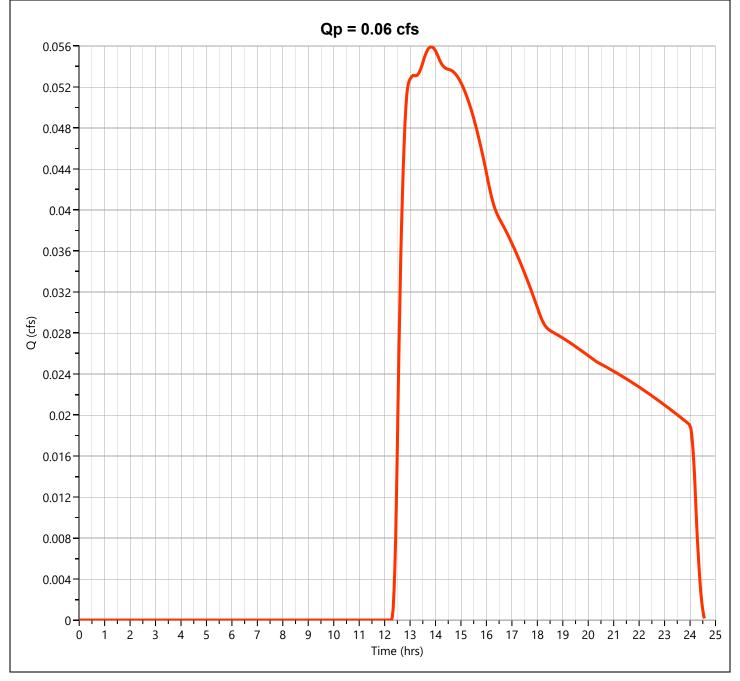
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.00	0.42	0.98

Project:	Athens Stre	et	_	Ву	MKO	Date	6/1/2022	
						Rev Date	9/27/2022	
Location:	Stow, MA		_	Checked		Date		
Cirolo ono		Dragant Davidona	J	Cubaatab	mant F 6			
Circle one:		Present Developed Tc Tt		Subcatchi	ment E-6	-		
Circle one.		10 11	through subarea			-		
			Subarea					
Sheet flow	(Applicable t	o Tc only)		Segment ID	A-B			
	7. 1.1	- · · - · · · <b>,</b>		9				
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	24-hr rainfall,	P2		in	3.1			
5. Land Slo	ppe, s			ft/ft	0.014			
6. Tt = 0.00	)7 (nL)^0.8 /	(P2^0.5 s^0.4)	Compute T	t hr	0.33			0.33
				1				1
Shallow co	ncentrated F	low		Segment ID	B-C			
7.0.6	D				LINDA) (ED			
7. Surrace	Description (	paved or unpaved)			UNPAVED			
9 Flour Lor	agth I			ft	297			
8. Flow Ler	igiii, L			IL	291			
0 Waterco	urse slope, s			ft/ft	0.050			
3. Waterco	uise siope, s			1010	0.030			
10 Average	e Velocity, V	(figure 3-1)		ft/s	3.61			
10.7110149	o volocity, v	(iigaio o 1)		140	0.01			
11. Tt = L /	3600V		Compute T	t hr	0.02			0.02
			·	ļ				
Channel flo	)W			Segment ID				
		•		Ū				
12. Cross s	sectional flow	area, a		sf				
13. Wetted	perimeter, p	W		ft				
14. Hydrau	lic radius, r=a	a/wp	Compute r	ft				
15. Channe	el Slope, s			ft/ft				
16. Mannin	g's roughnes	ss coeff., n						
17. V = 1.4	9 r^2/3 s^1/2	: / n	Compute V	ft/s				
18. Flow le				ft				
19. Tt = L /	3600V		Compute T	t hr				0
20. Waters	hed or subar	ea Tc or Tt (add Tt in st	eps 6, 11, and	d 19)			hr	0.36
							min	21.4

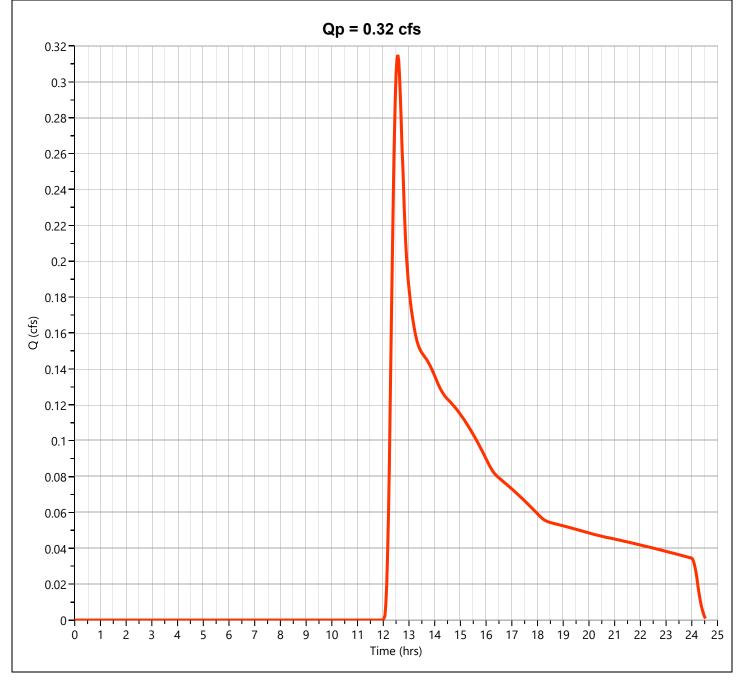
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 24.17 hrs
Time Interval	= 2 min	Runoff Volume	= 0.024 cuft
Drainage Area	= 2.25 ac	Curve Number	= 38
Tc Method	= User	Time of Conc. (Tc)	= 21.4 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



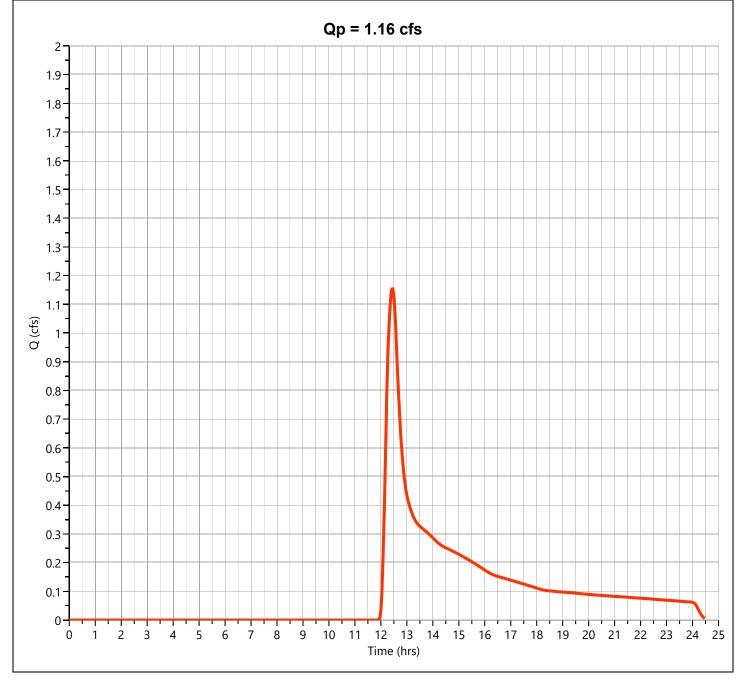
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.056 cfs
Storm Frequency	= 10-yr	Time to Peak	= 13.83 hrs
Time Interval	= 2 min	Runoff Volume	= 1,451 cuft
Drainage Area	= 2.25 ac	Curve Number	= 38
Tc Method	= User	Time of Conc. (Tc)	= 21.4 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 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	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			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
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Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.05	0.15	0.51

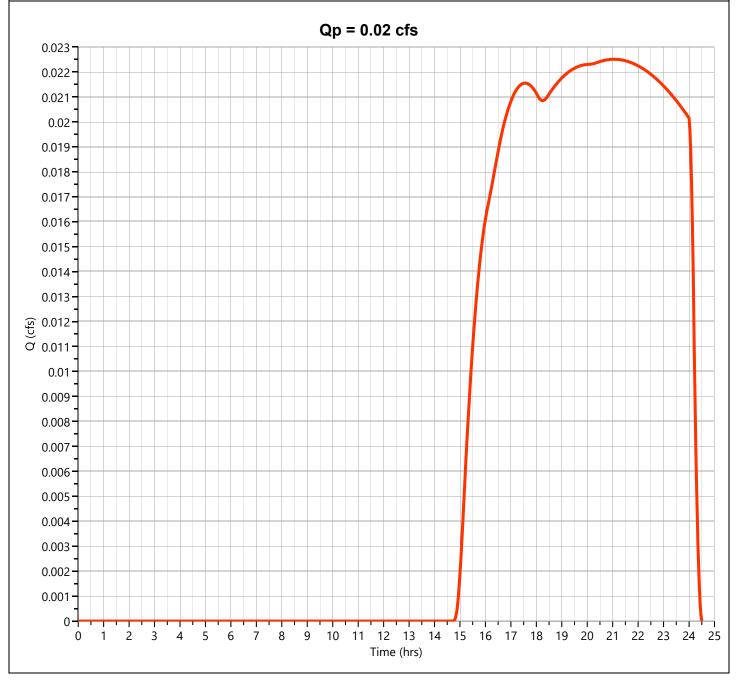
Project:	Athens Street	-	Ву	MKO	Date Rev Date	6/1/2022 9/27/2022	
Location:	Stow, MA	-	Checked		Date		
Circle one: Circle one:	Present Developed Tt	through subarea	Subcatchr	ment E-7			
Sheet flow	(Applicable to Tc only)		Segment ID	A-B			
1. Surface	Description (table 3-1)			WOODS			
2. Manning	s roughness 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

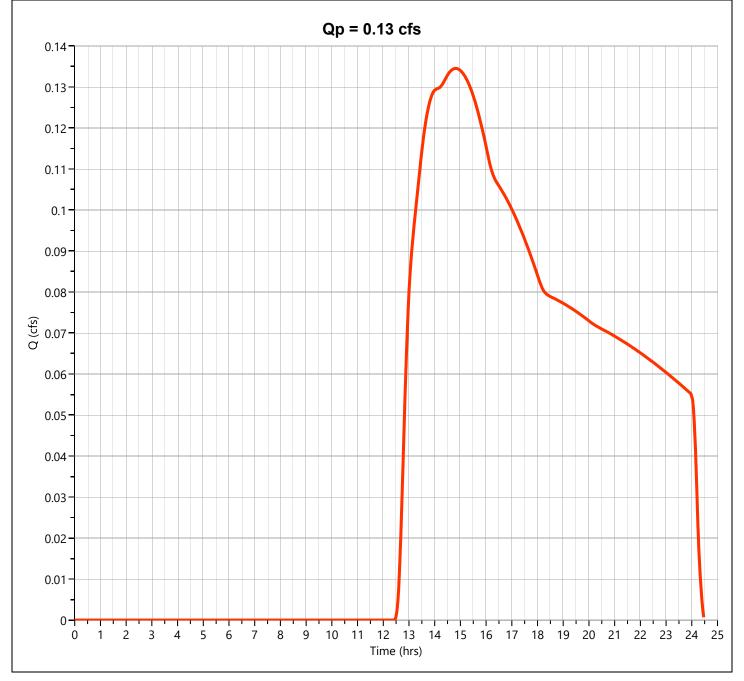
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.00 hrs
Time Interval	= 2 min	Runoff Volume	= 0.000 cuft
Drainage Area	= 6.51 ac	Curve Number	= 32
Tc Method	= User	Time of Conc. (Tc)	= 19.0 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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

Qp = 0.00 cfs

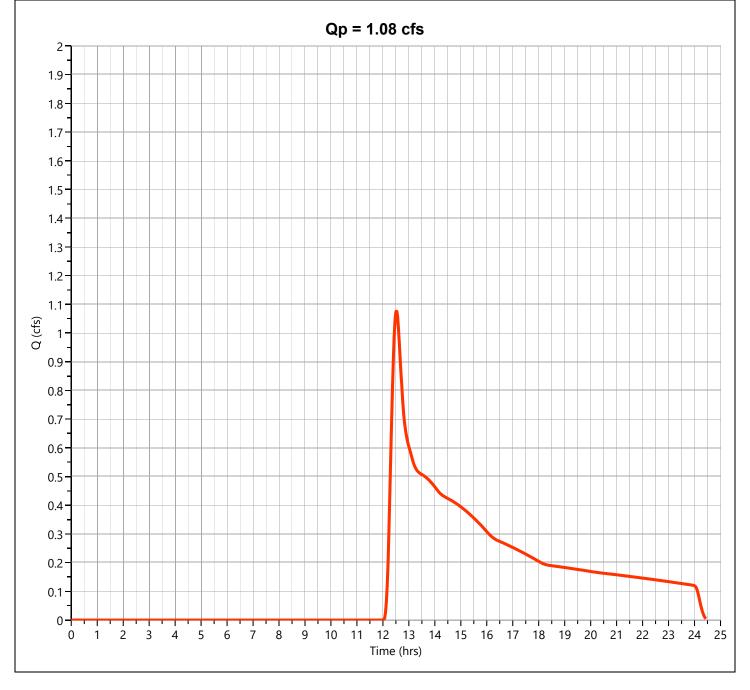
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.023 cfs
Storm Frequency	= 10-yr	Time to Peak	= 21.03 hrs
Time Interval	= 2 min	Runoff Volume	= 669 cuft
Drainage Area	= 6.51 ac	Curve Number	= 32
Tc Method	= User	Time of Conc. (Tc)	= 19.0 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 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 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			0.68	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	L

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

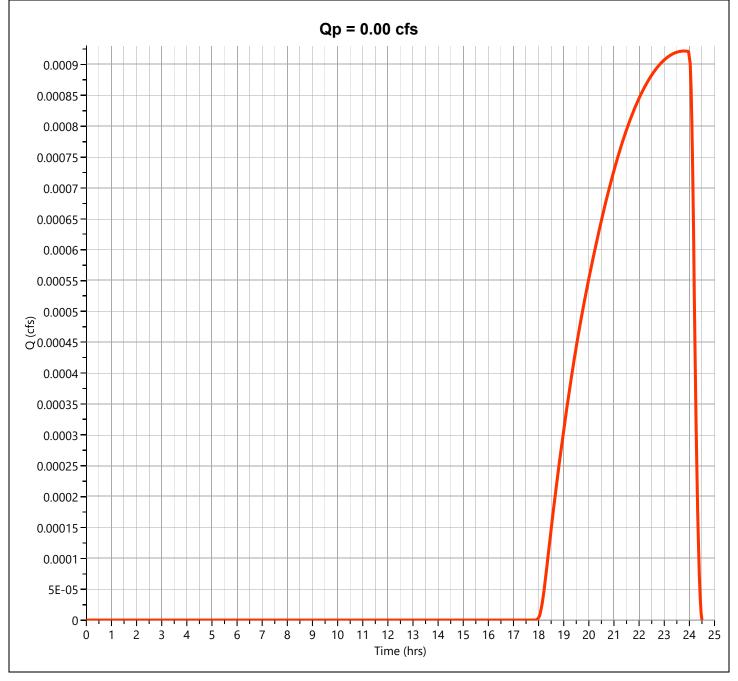
Project:	Athens Stre	et	_	Ву	MKO	Date	6/1/2022	
						Rev Date	9/27/2022	
Location:	Stow, MA		-	Checked		Date		
Cirolo ano	ı	Dragent Davidened		Cubaatab				
Circle one:		Present Developed Tc Tt		Subcatchr	ment E-8			
Circle one.		10 11	through subarea			•		
			Subarea					
Sheet flow	(Applicable to	o 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

# 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

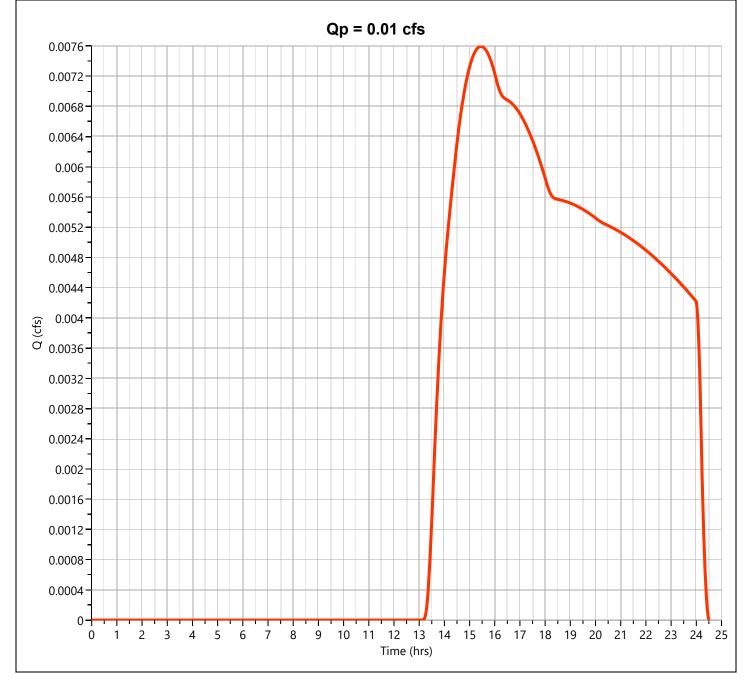
Qp = 0.00 cfs

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



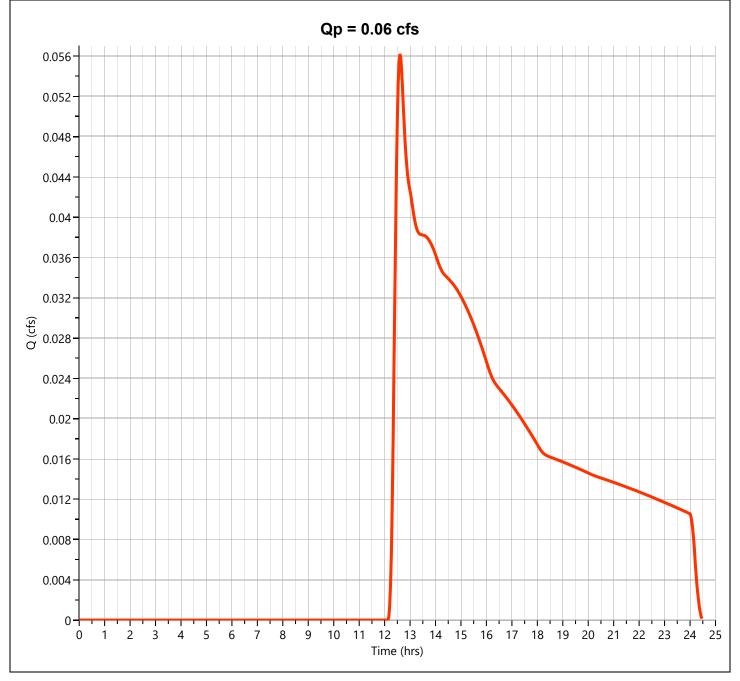
# E-8 Hyd. No. 9

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 (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			0.03	2.67
Α	Woods	Good Condition	30			1.57	47.09
Α	Open Space	Good Condition	39			0.00	0.00
Α	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

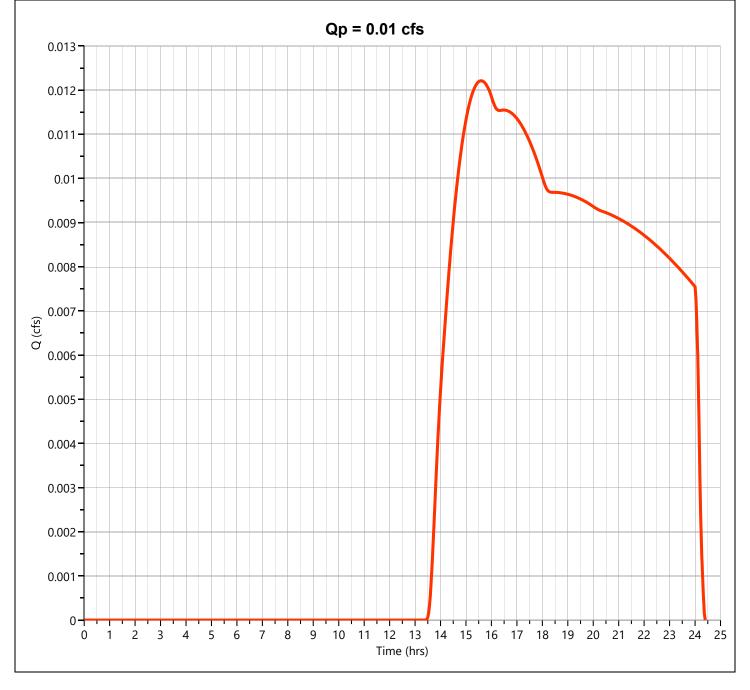
CN (weighted) = total product = 112.94 = 43.62 ; Use CN = 44 total area 2.59

2. Runoff

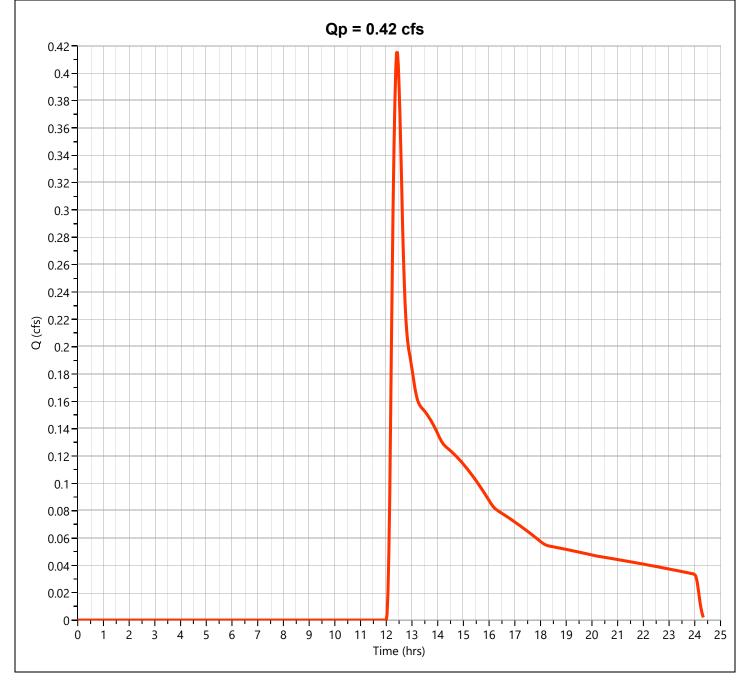
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.03	0.77	1.52

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	ngth, 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

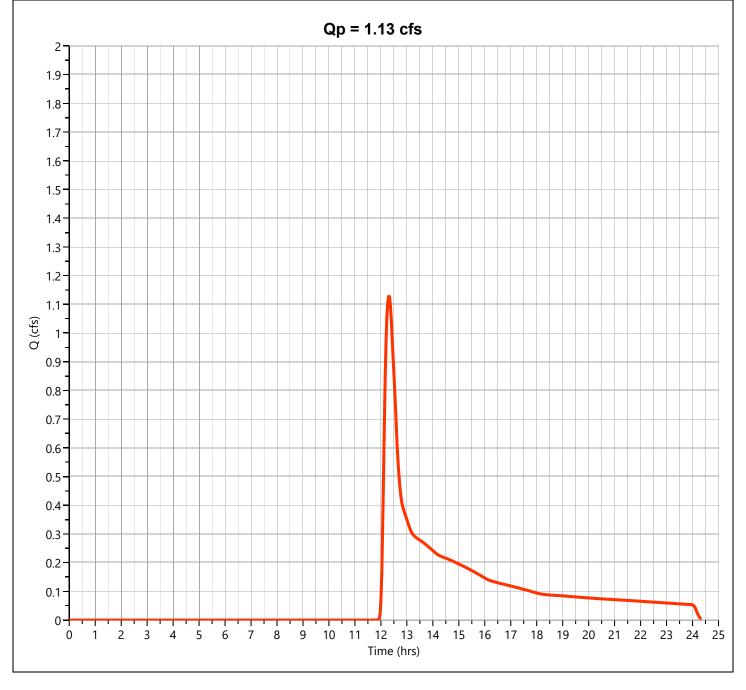
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.012 cfs
Storm Frequency	= 2-yr	Time to Peak	= 15.60 hrs
Time Interval	= 2 min	Runoff Volume	= 358 cuft
Drainage Area	= 2.59 ac	Curve Number	= 44
Tc Method	= User	Time of Conc. (Tc)	= 16.3 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	=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



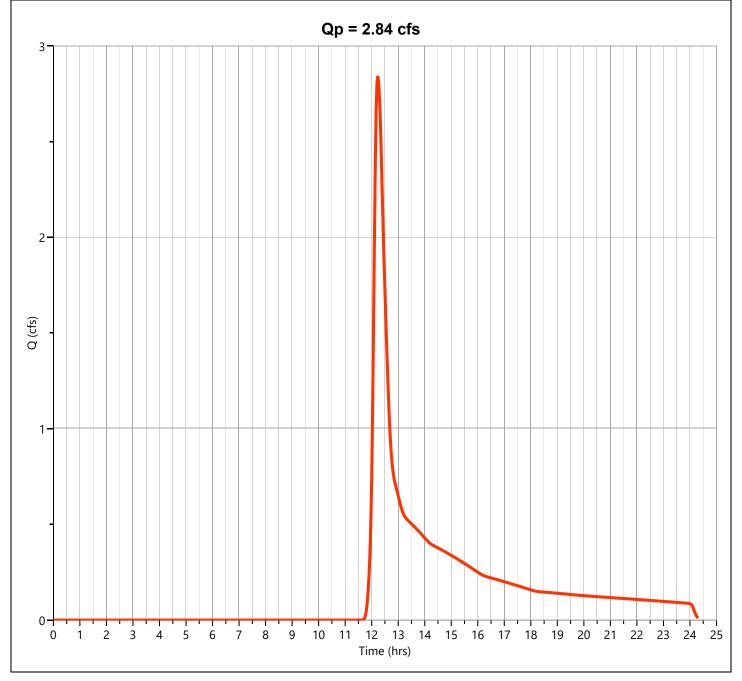
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.416 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.43 hrs
Time Interval	= 2 min	Runoff Volume	= 3,747 cuft
Drainage Area	= 2.59 ac	Curve Number	= 44
Tc Method	= User	Time of Conc. (Tc)	= 16.3 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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

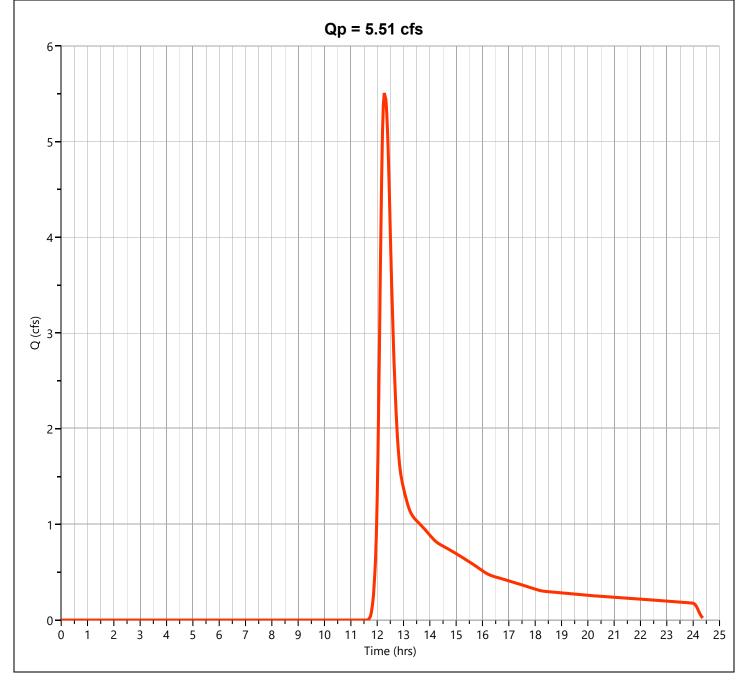
CN (weighted) =	total product	=	781.65 =	65.59	;	Use CN =	66
•	total area		11.92			'	

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

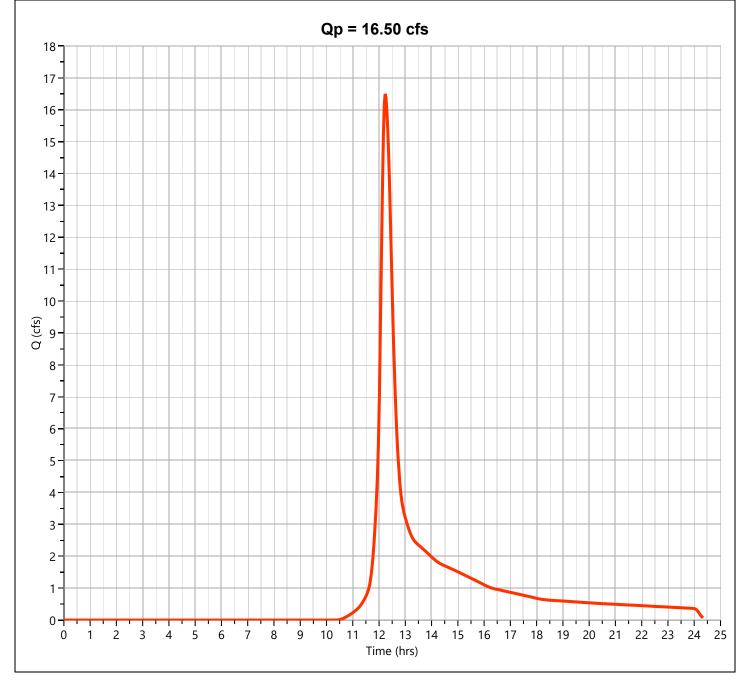
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.66	2.51	3.83

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

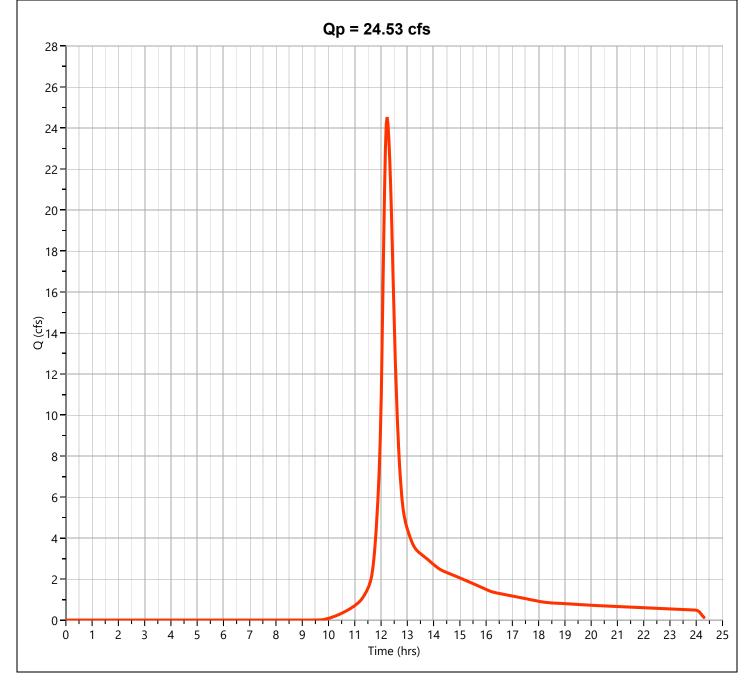
Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.513 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.30 hrs
Time Interval	= 2 min	Runoff Volume	= 29,366 cuft
Drainage Area	= 11.92 ac	Curve Number	= 66
Tc Method	= User	Time of Conc. (Tc)	= 17.9 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



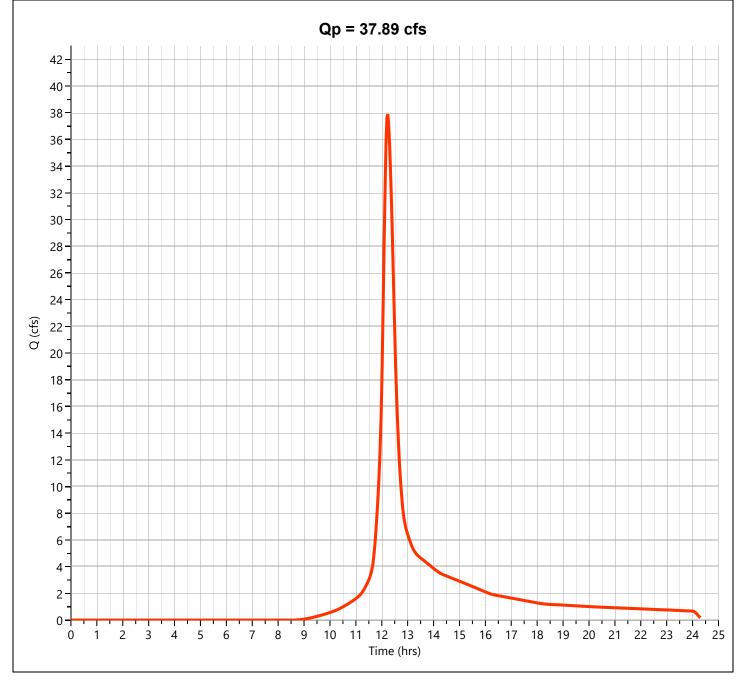
Hydrograph Type	= NRCS Runoff	Peak Flow	= 16.50 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 75,937 cuft
Drainage Area	= 11.92 ac	Curve Number	= 66
Tc Method	= User	Time of Conc. (Tc)	= 17.9 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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

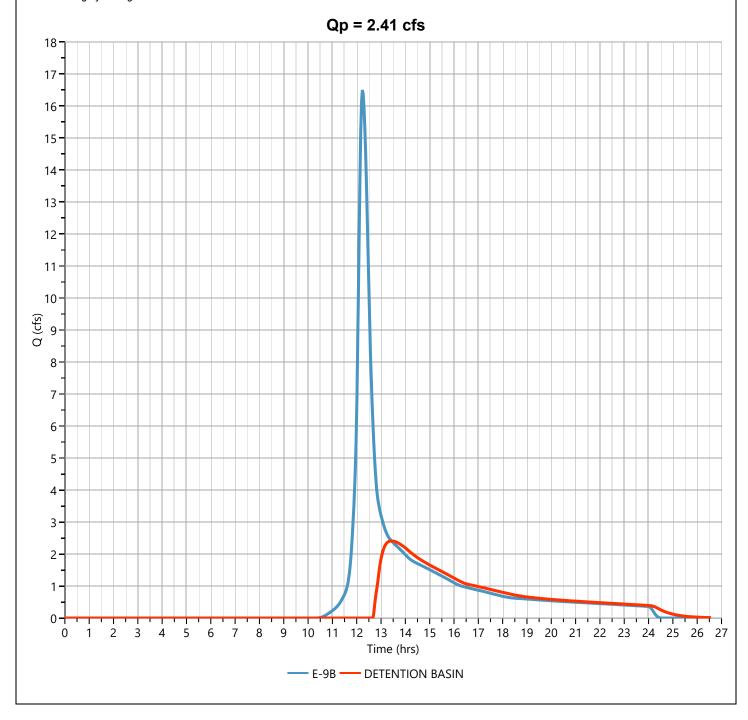
### **DETENTION BASIN**

### 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



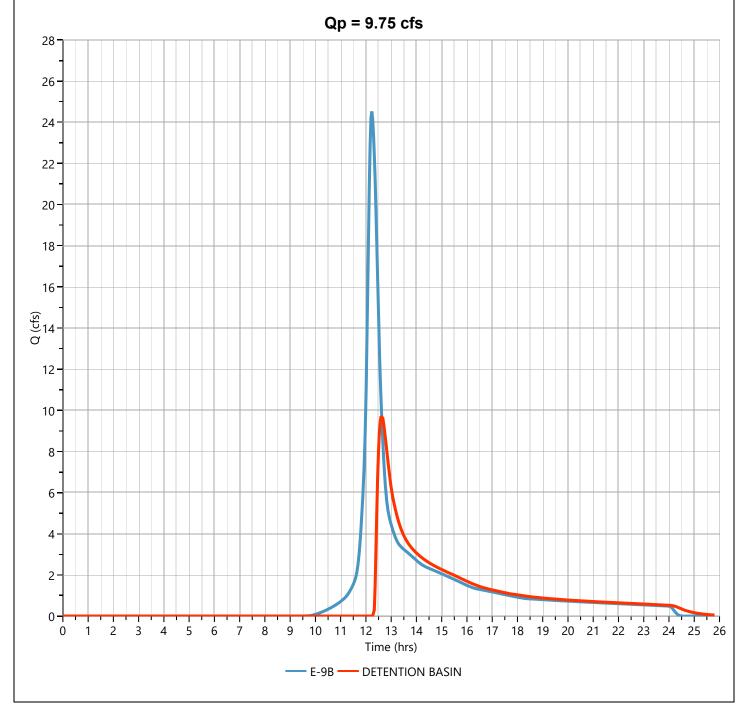
### **DETENTION BASIN**

## 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 as 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



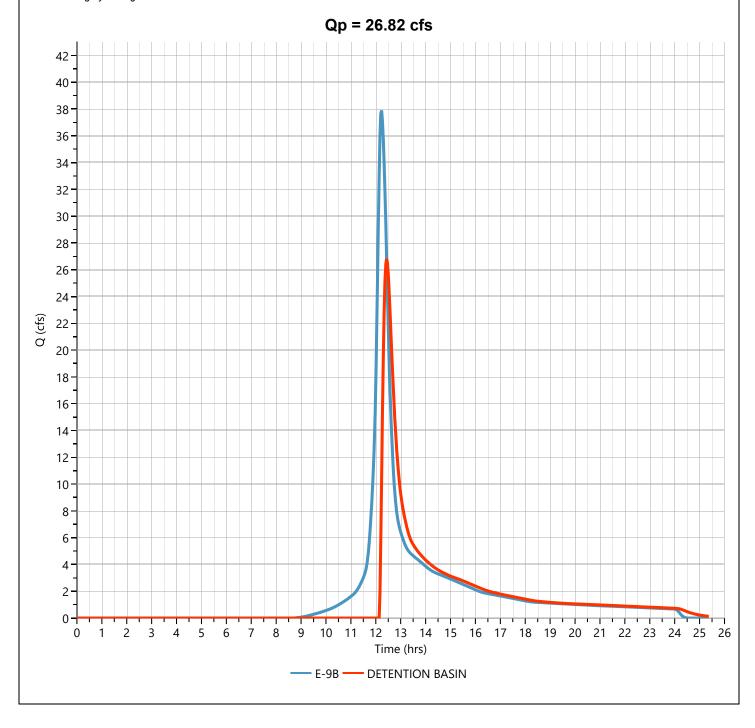
### **DETENTION BASIN**

### 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

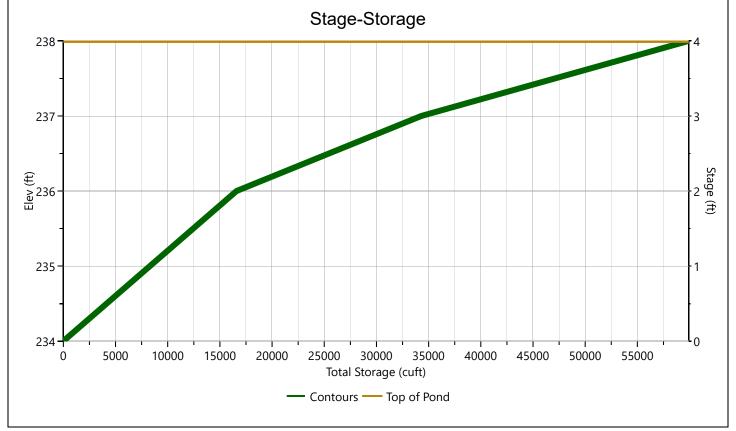
Center of mass detention time = 58 min



### **EXIST DETENTION**

## Stage-Storage

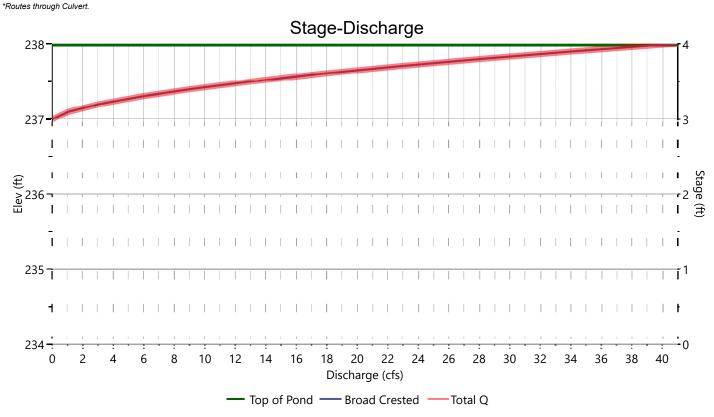
User Defined Contou			Stage / Stora	ge Table		
Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
Bottom Elevation, ft	234.00					
Voids (%)	100.00	0.00	234.00	2,400	0.000	0.000
		2.00	236.00	14,200	16,600	16,600
Volume Calc	Rectangular	3.00	237.00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



### **EXIST DETENTION**

### Stage-Discharge

Cubrant / Onitions	Culusant		Orifices		Dowforested Die :-
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	Riser*		Weirs		Ancilland
vveirs	Kisei	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			



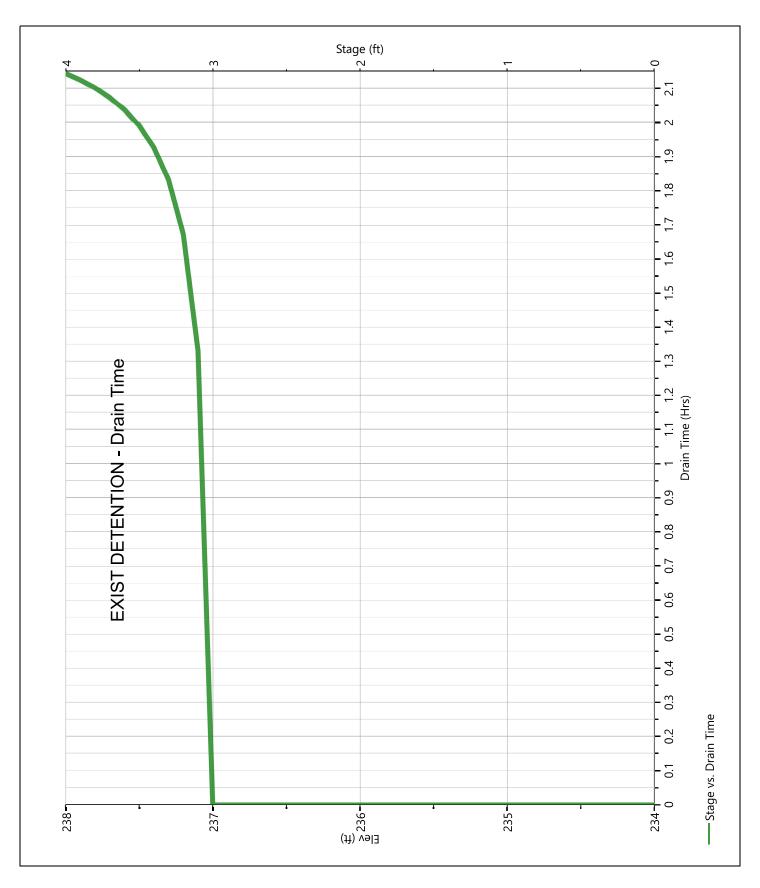
### **EXIST DETENTION**

## **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 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			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

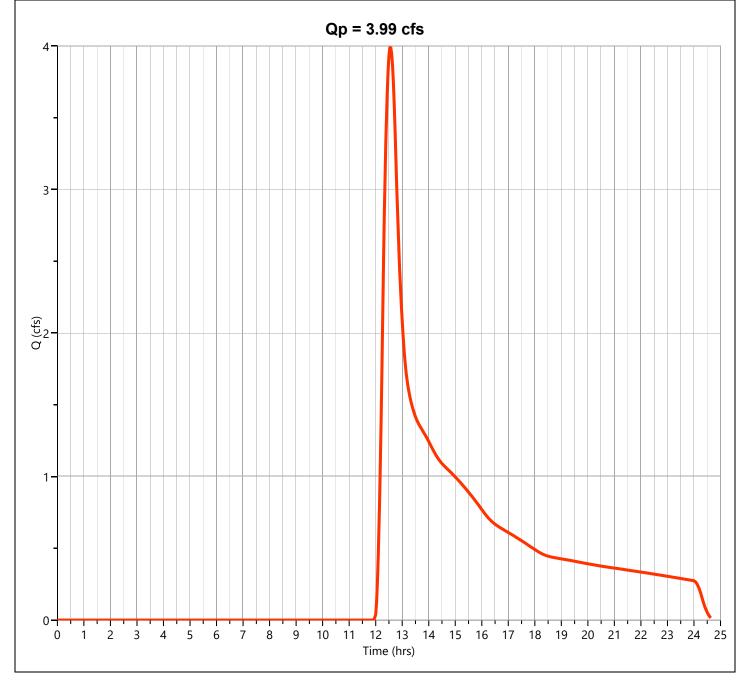
						_
CN (weighted) =	total product	=	1516.27 =	58.48 ;	Use CN =	58
	total area		25.93			

2. Runoff

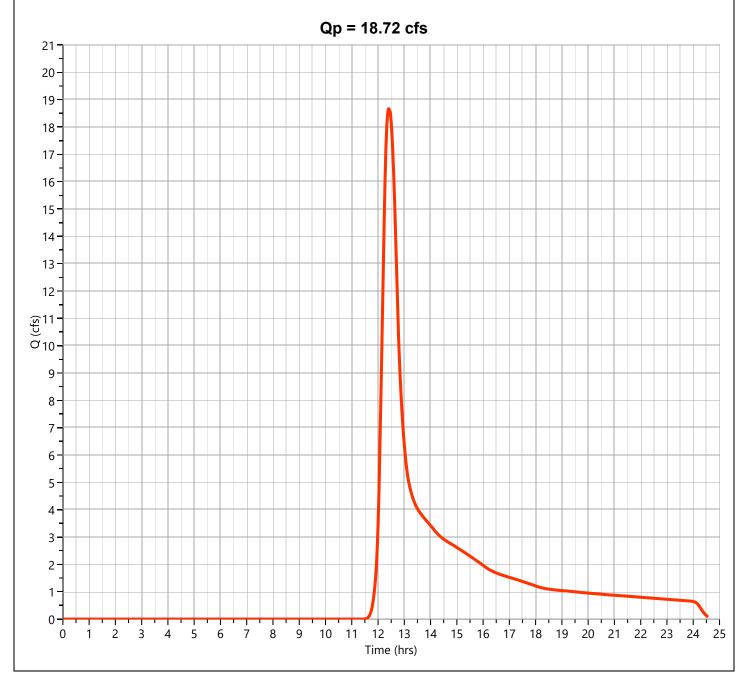
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.38	1.88	3.05

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

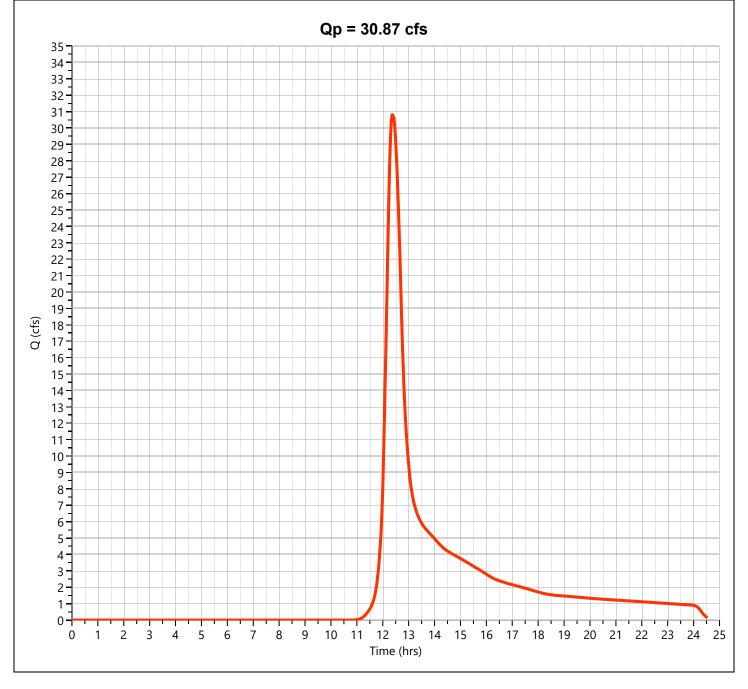
Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.993 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.57 hrs
Time Interval	= 2 min	Runoff Volume	= 34,460 cuft
Drainage Area	= 25.93 ac	Curve Number	= 58
Tc Method	= User	Time of Conc. (Tc)	= 29.8 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



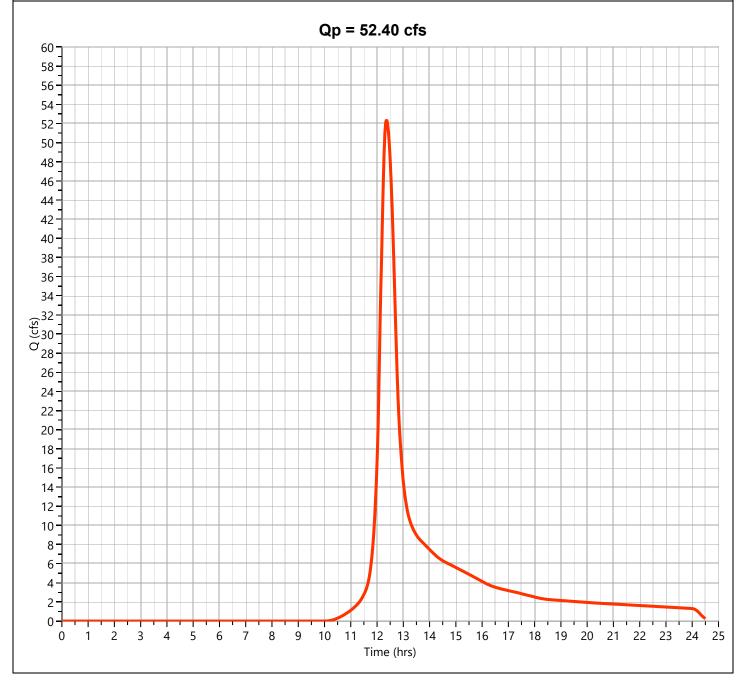
Hydrograph Type	= NRCS Runoff	Peak Flow	= 18.72 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.43 hrs
Time Interval	= 2 min	Runoff Volume	= 112,089 cuft
Drainage Area	= 25.93 ac	Curve Number	= 58
Tc Method	= User	Time of Conc. (Tc)	= 29.8 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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

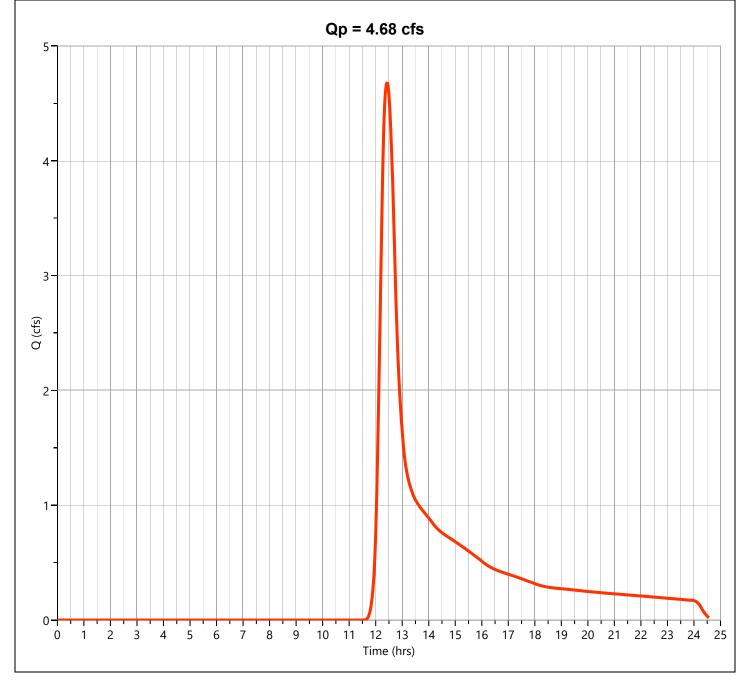
Athens Street

Date 6/1/2022

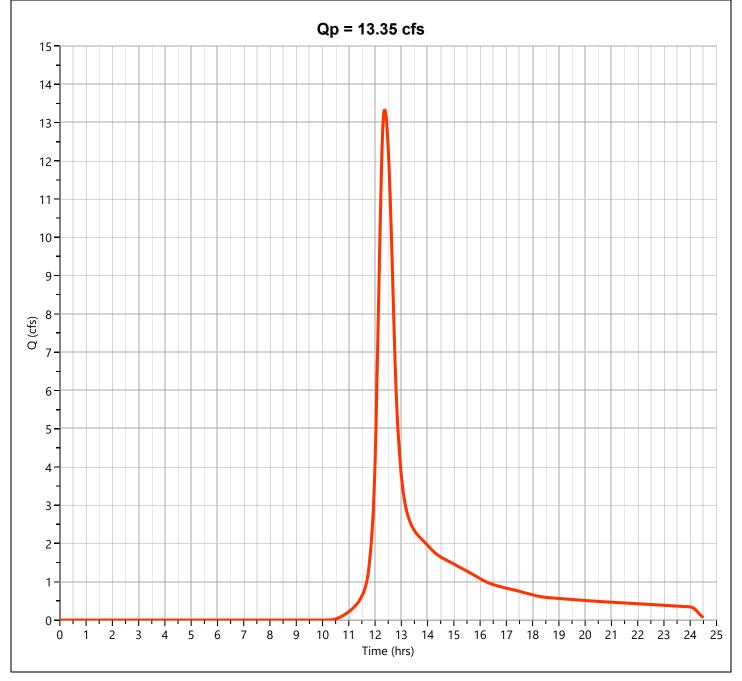
By MKO

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	l 19)			hr min	0.50 30.0
	(210-VI-TR-	55, Second	Ed., June 19	86)				D-3

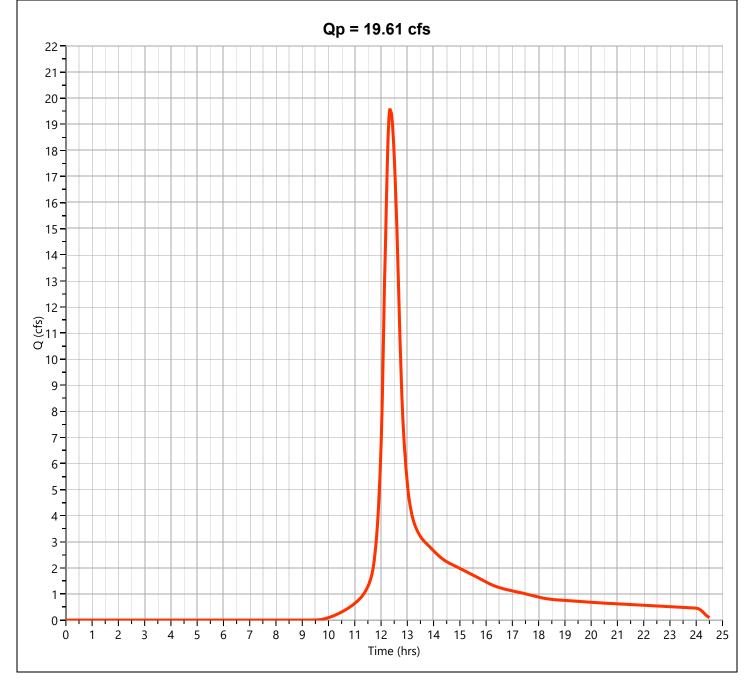
Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.684 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.43 hrs
Time Interval	= 2 min	Runoff Volume	= 28,624 cuft
Drainage Area	= 10.89 ac	Curve Number	= 67
Tc Method	= User	Time of Conc. (Tc)	= 30.0 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



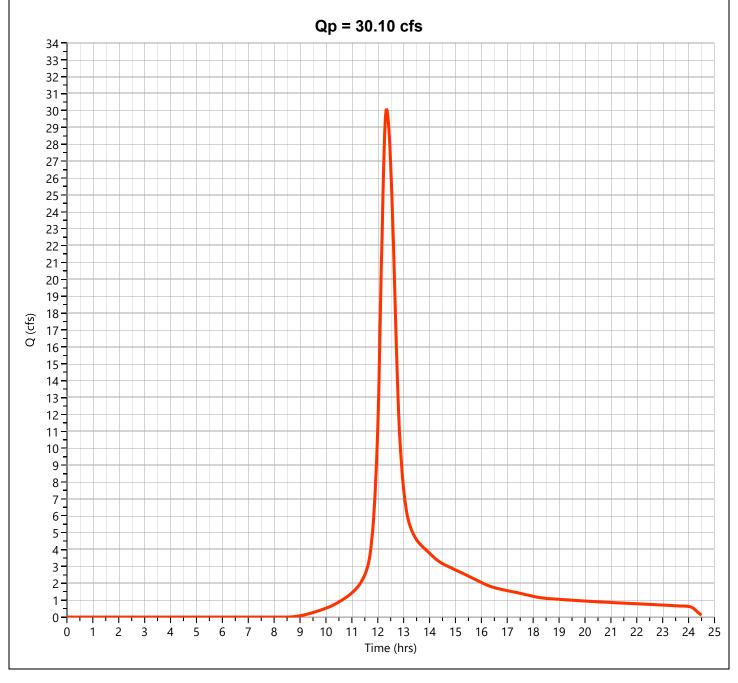
Hydrograph Type	= NRCS Runoff	Peak Flow	= 13.35 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.37 hrs
Time Interval	= 2 min	Runoff Volume	= 72,378 cuft
Drainage Area	= 10.89 ac	Curve Number	= 67
Tc Method	= User	Time of Conc. (Tc)	= 30.0 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 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	By 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/	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			0.22	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 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-12			
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	0.122			
6. Tt = 0.00	7 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.14			0.14
Shallow co	ncentrated Flow		Segment ID	B-C			
7. Surface	Description (paved or unpaved)			UNPAVED			
8. Flow Ler	gth, L		ft	57			
9. Waterco	urse slope, s		ft/ft	0.112			
10. Average	e Velocity, V (figure 3-1)		ft/s	5.40			
11. Tt = L /	3600V	Compute Tt	hr	0.00			0.00
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 let 19. Tt = L /	•	Compute Tt	ft hr				0
20. Waters	hed or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	l 19)			hr min	0.14 8.6

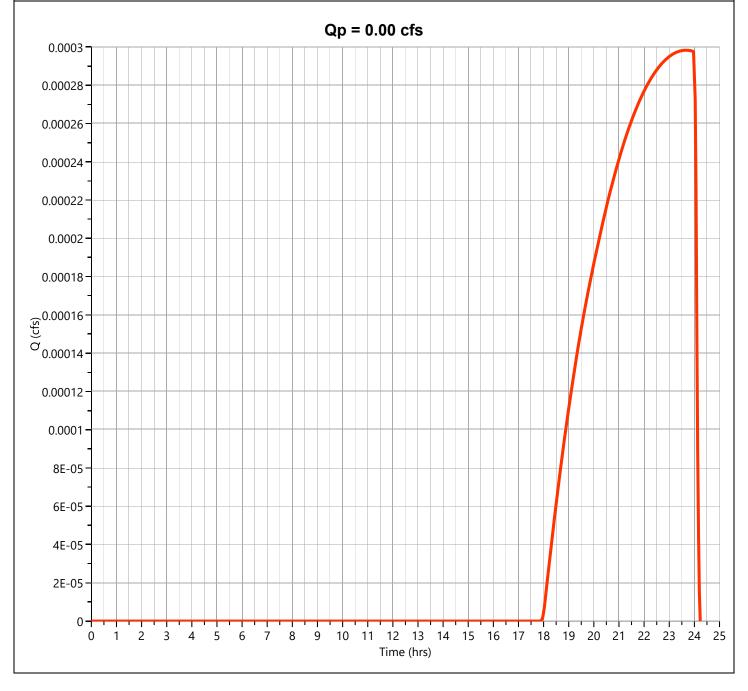
## E-12 Hyd. No. 16

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

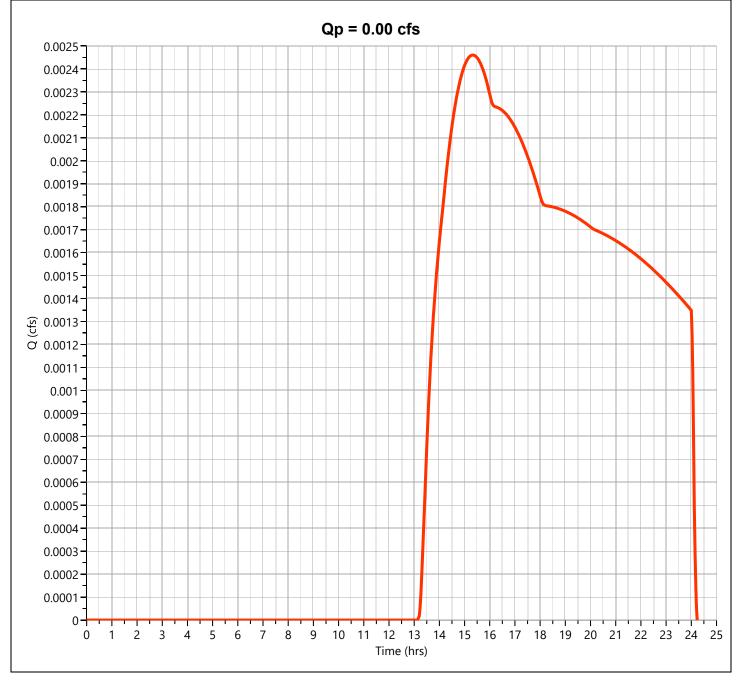
## E-12 Hyd. No. 16

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



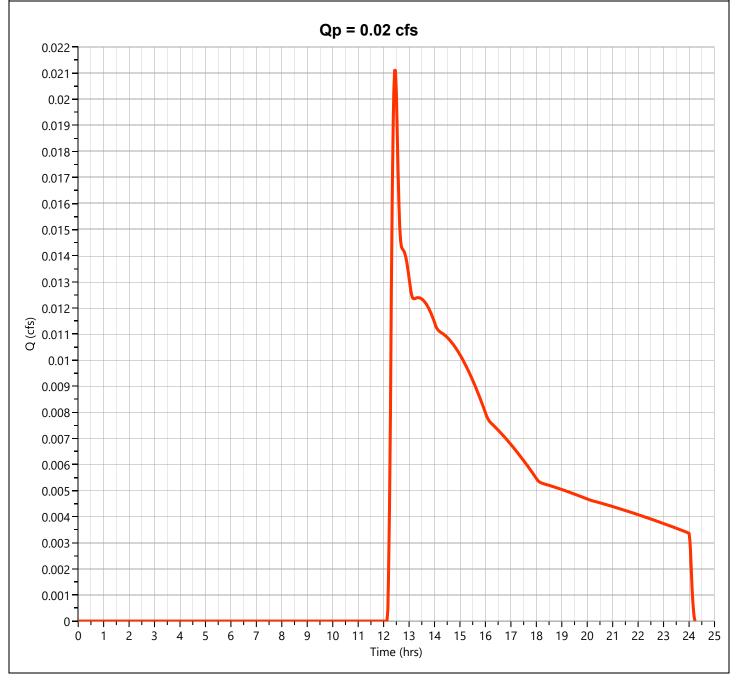
### E-12 Hyd. No. 16

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

		Ву	PFK	Date _	6/26/22
_				Rev Date	10/13/22
Location: St	itow, 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	20.4
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	1.47	84	9.6
P-2A2	1.43	81	14.2
P-2A3	15.44	62	11.5
P-2B-A	5.53	63	12.4
P-2B-B	15.81	48	11.3
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	1.99	53	24.9
P-8	4.67	64	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	84	20.4
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

10-27-2022 Hydrology Studio v 3.0.0.21 Time to Hydrograph Inflow Maximum Peak Maximum Hyd. Hydrograph Hydrograph Flow Peak Volume Hyd(s) Elevation Storage No. Type Name (cuft) (cfs) (hrs) (cuft) (ft) NRCS Runoff E-1 0.000 0.00 0.000 1 2 **NRCS Runoff** E-2A 6.063 12.33 35,403 3 NRCS Runoff E-2B 1.662 12.53 18,921 NRCS Runoff E-3 6.809 12.30 35,200 4 5 NRCS Runoff E-4 6.300 12.30 33,076 NRCS Runoff E-5 2.571 19,062 6 12.47 7 NRCS Runoff E-6 0.000 24.17 0.024 NRCS Runoff 0.000 0.00 0.000 8 E-7 NRCS Runoff 0.000 0.00 0.000 9 E-8 E-9A 0.012 15.60 10 NRCS Runoff 358 11 NRCS Runoff E-9B 5.513 12.30 29,366 12 Pond Route **DETENTION BASIN** 0.000 0.00 0.000 11 236.72 29,366 0.012 13 Junction E-9 TOTAL 15.60 358 10, 12 14 NRCS Runoff E-10 3.993 12.57 34,460 NRCS Runoff E-11 4.684 12.43 28,624 15 NRCS Runoff E-12 0.000 0.00 0.000 16

# Hydrograph 2-yr Summary Hydrology Studio v 3.0.0.21

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	0.473	12.47	2,397	3	290.19	2,228
5	NRCS Runoff	P-3B	6.260	12.20	27,756			
6	Junction	P-3 TOTAL	6.575	12.20	30,154	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	0.511	12.77	4,250	13	284.48	4,337
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	1.706	12.37	15,443	14, 16, 17		
20	NRCS Runoff	P-2A2	1.878	12.20	7,715			
21	Pond Route	IB-2A2	0.000	12.43	0.000	20	302.24	3,550
22	NRCS Runoff	P-2A1	2.719	12.10	9,291			
23	Pond Route	IB-2A1	0.000	12.33	0.000	22	306.99	4,049
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	2.204	12.20	11,406			
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	Junction	INFLOW TO IB-2B-A	2.204	12.20	11,406	27, 29		
31	Pond Route	IB-2B-A	0.000	12.50	0.000	30	229.10	1,006
32	NRCS Runoff	P-2B-B	0.228	13.80	6,036	_		
33	Junction	P-2B Total	0.228	13.80	6,036	31, 32		
35	NRCS Runoff	P-6A	0.000	0.00	0.000			
36	NRCS Runoff	P-6B	0.010	14.73	282			

## Hydrograph 2-yr Summary Hydrology Studio v 3.0.0.21

lydrology Studio v 3.0.0.21 10-27									
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	Pond Route	IB-6B	0.000	13.37	0.000	36	219.01	6.91	
38	Junction	P-6 TOTAL	0.000	13.37	0.000	35, 37			
40	NRCS Runoff	P-7A	1.309	12.17	6,815				
41	Pond Route	IB-7A	0.000	16.33	0.000	40	219.17	704	
42	NRCS Runoff	P-7B	0.122	12.63	1,536				
43	Pond Route	IB-7B	0.000	13.90	0.000	42	224.03	62.8	
44	Junction	P-7 TOTAL	0.000	16.33	0.000	41, 43			
46	NRCS Runoff	P-8	2.083	12.20	10,351				
47	Pond Route	IB-8	0.000	12.07	0.000	46	222.17	1,168	
49	NRCS Runoff	P-9B	5.513	12.30	29,366				
50	Pond Route	DET. BASIN OUTFLOW	0.000	0.00	0.000	49	236.72	29,366	
51	Junction	P-9 TOTAL	0.000	0.00	0.000	50			
53	NRCS Runoff	P-10A	2.097	12.53	16,218				
54	NRCS Runoff	P-10B	4.488	12.13	17,311				
55	Pond Route	IB-10B	0.000	12.10	0.000	54	225.90	4,886	
56	NRCS Runoff	P-10C	10.43	12.27	49,342				
57	NRCS Runoff	P-9A	0.520	12.40	4,590				
58	Junction	TO IB-10C	10.82	12.27	53,932	56, 57			
59	Pond Route	IB-10C	0.000	19.53	0.000	58	225.72	13,187	
60	Junction	P-10 TOTAL	2.097	12.53	16,218	53, 55, 59			
62	NRCS Runoff	P-11	4.637	12.43	28,334				
64	NRCS Runoff	P-12	0.000	0.00	0.000				
66	NRCS Runoff	Roof Runoff	0.153	12.07	517				
67	Pond Route	Roof Drywell	0.000	9.83	0.000	66	101.06	161	

# Hydrograph 10-yr Summary Hydrology Studio v 3.0.0.21

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	E-1	0.000	23.73	3.52			
2	NRCS Runoff	E-2A	20.82	12.23	98,578			
3	NRCS Runoff	E-2B	13.40	12.33	77,016			
4	NRCS Runoff	E-3	17.08	12.27	82,096			
5	NRCS Runoff	E-4	16.28	12.27	78,626			
6	NRCS Runoff	E-5	11.19	12.33	59,868			
7	NRCS Runoff	E-6	0.056	13.83	1,451			
8	NRCS Runoff	E-7	0.023	21.03	669			
9	NRCS Runoff	E-8	0.001	23.80	14.5			
10	NRCS Runoff	E-9A	0.416	12.43	3,747			
11	NRCS Runoff	E-9B	16.50	12.23	75,937			
12	Pond Route	DETENTION BASIN	2.408	13.43	41,634	11	237.17	38,554
13	Junction	E-9 TOTAL	2.562	13.43	45,381	10, 12		
14	NRCS Runoff	E-10	18.72	12.43	112,089			
15	NRCS Runoff	E-11	13.35	12.37	72,378			
16	NRCS Runoff	E-12	0.000	23.70	4.70			

## Hydrograph 10-yr Summary Hydrology Studio v 3.0.0.21

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	22.13	3.52			
3	NRCS Runoff	P-3A	3.704	12.10	12,702			
4	Pond Route	IB-3A	1.404	12.37	7,033	3	290.93	3,938
5	NRCS Runoff	P-3B	15.66	12.20	64,735			
6	Junction	P-3 TOTAL	16.89	12.20	71,767	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	3.299	12.47	15,199	13	285.26	7,582
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	9.312	12.27	53,006	14, 16, 17		
20	NRCS Runoff	P-2A2	3.755	12.17	15,288			
21	Pond Route	IB-2A2	0.043	14.43	133	20	303.51	8,289
22	NRCS Runoff	P-2A1	5.133	12.10	17,647			
23	Pond Route	IB-2A1	0.000	13.57	0.001	22	308.02	9,142
24	NRCS Runoff	P-2A3	20.40	12.17	84,566			
25	Junction	TOTAL P-2A	20.40	12.17	84,699	21, 23, 24		
27	NRCS Runoff	P-2B-A	7.748	12.17	31,761			
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	Junction	INFLOW TO IB-2B-A	7.748	12.17	40,272	27, 29		
31	Pond Route	IB-2B-A	1.516	12.63	5,181	30	229.90	8,937
32	NRCS Runoff	P-2B-B	5.432	12.27	35,644			
33	Junction	P-2B Total	5.869	12.30	40,825	31, 32		
35	NRCS Runoff	P-6A	0.014	15.57	390			
36	NRCS Runoff	P-6B	0.265	12.30	1,857			

# Hydrograph 10-yr Summary Hydrology Studio v 3.0.0.21

Туре	Name	Flow (cfs)	Peak (hrs)	Hydrograph Volume (cuft)	Hyd(s)	Elevation (ft)	Maximum Storage (cuft)
Pond Route	IB-6B	0.000	15.80	0.000	36	219.59	283
Junction	P-6 TOTAL	0.014	15.57	390	35, 37		
NRCS Runoff	P-7A	5.329	12.13	20,077			
Pond Route	IB-7A	0.000	22.73	0.000	40	220.34	5,971
NRCS Runoff	P-7B	0.987	12.43	6,252			
Pond Route	IB-7B	0.000	16.10	0.000	42	224.61	1,176
Junction	P-7 TOTAL	0.000	16.10	0.000	41, 43		
NRCS Runoff	P-8	6.918	12.17	28,087			
Pond Route	IB-8	0.000	11.87	0.000	46	223.18	8,244
NRCS Runoff	P-9B	16.50	12.23	75,937			
Pond Route	DET. BASIN OUTFLOW	2.408	13.43	41,634	49	237.17	38,554
Junction	P-9 TOTAL	2.408	13.43	41,634	50		
NRCS Runoff	P-10A	8.490	12.40	49,281			
NRCS Runoff	P-10B	8.811	12.13	33,815			
Pond Route	IB-10B	0.053	12.67	88.3	54	226.88	11,821
NRCS Runoff	P-10C	19.69	12.27	93,719			
NRCS Runoff	P-9A	3.367	12.23	16,881			
Junction	TO IB-10C	23.01	12.27	110,600	56, 57		
Pond Route	IB-10C	2.959	12.73	10,498	58	226.71	33,938
Junction	P-10 TOTAL	10.23	12.53	59,867	53, 55, 59		
NRCS Runoff	P-11	13.21	12.37	71,647			
NRCS Runoff	P-12	0.000	22.10	4.70			
NRCS Runoff	Roof Runoff	0.238	12.07	817			
Pond Route	Roof Drywell	0.000	10.43	0.000	66	101.75	291
	Junction  NRCS Runoff Pond Route NRCS Runoff Pond Route Junction  NRCS Runoff Pond Route  NRCS Runoff Pond Route Junction  NRCS Runoff NRCS Runoff NRCS Runoff Pond Route Junction  NRCS Runoff	Junction P-6 TOTAL  NRCS Runoff P-7A Pond Route IB-7A NRCS Runoff P-7B Pond Route IB-7B Junction P-7 TOTAL  NRCS Runoff P-8 Pond Route IB-8  NRCS Runoff P-9B Pond Route DET. BASIN OUTFLOW Junction P-9 TOTAL  NRCS Runoff P-10A NRCS Runoff P-10B Pond Route IB-10B NRCS Runoff P-10C NRCS Runoff P-9A Junction TO IB-10C Pond Route IB-10C Junction P-10 TOTAL  NRCS Runoff P-10 TOTAL  NRCS Runoff P-11  NRCS Runoff P-11  NRCS Runoff P-12  NRCS Runoff P-12	Junction         P-6 TOTAL         0.014           NRCS Runoff         P-7A         5.329           Pond Route         IB-7A         0.000           NRCS Runoff         P-7B         0.987           Pond Route         IB-7B         0.000           Junction         P-7 TOTAL         0.000           NRCS Runoff         P-8         6.918           Pond Route         IB-8         0.000           NRCS Runoff         P-9B         16.50           Pond Route         DET. BASIN OUTFLOW         2.408           Junction         P-9 TOTAL         2.408           NRCS Runoff         P-10A         8.490           NRCS Runoff         P-10B         8.811           Pond Route         IB-10B         0.053           NRCS Runoff         P-10C         19.69           NRCS Runoff         P-9A         3.367           Junction         TO IB-10C         23.01           Pond Route         IB-10C         2.959           Junction         P-10 TOTAL         10.23           NRCS Runoff         P-11         13.21           NRCS Runoff         P-12         0.000           NRCS Runoff         Roof Runoff <td>Junction         P-6 TOTAL         0.014         15.57           NRCS Runoff         P-7A         5.329         12.13           Pond Route         IB-7A         0.000         22.73           NRCS Runoff         P-7B         0.987         12.43           Pond Route         IB-7B         0.000         16.10           Junction         P-7 TOTAL         0.000         16.10           NRCS Runoff         P-8         6.918         12.17           Pond Route         IB-8         0.000         11.87           NRCS Runoff         P-9B         16.50         12.23           Pond Route         DET. BASIN OUTFLOW         2.408         13.43           Junction         P-9 TOTAL         2.408         13.43           NRCS Runoff         P-10A         8.490         12.40           NRCS Runoff         P-10B         8.811         12.13           Pond Route         IB-10B         0.053         12.67           NRCS Runoff         P-9A         3.367         12.23           Junction         TO IB-10C         23.01         12.27           Pond Route         IB-10C         2.959         12.73           Junction         P-</td> <td>Junction         P-6 TOTAL         0.014         15.57         390           NRCS Runoff         P-7A         5.329         12.13         20,077           Pond Route         IB-7A         0.000         22.73         0.000           NRCS Runoff         P-7B         0.987         12.43         6,252           Pond Route         IB-7B         0.000         16.10         0.000           Junction         P-7 TOTAL         0.000         16.10         0.000           NRCS Runoff         P-8         6.918         12.17         28,087           Pond Route         IB-8         0.000         11.87         0.000           NRCS Runoff         P-9B         16.50         12.23         75,937           Pond Route         DET. BASIN OUTFLOW         2.408         13.43         41,634           Junction         P-9 TOTAL         2.408         13.43         41,634           NRCS Runoff         P-10A         8.490         12.40         49,281           NRCS Runoff         P-10B         8.811         12.13         33,815           Pond Route         IB-10B         0.053         12.27         93,719           NRCS Runoff         P-9A</td> <td>  Junction   P-6 TOTAL   0.014   15.57   390   35,37    </td> <td>  Junction   P-6 TOTAL   0.014   15.57   390   35, 37      </td>	Junction         P-6 TOTAL         0.014         15.57           NRCS Runoff         P-7A         5.329         12.13           Pond Route         IB-7A         0.000         22.73           NRCS Runoff         P-7B         0.987         12.43           Pond Route         IB-7B         0.000         16.10           Junction         P-7 TOTAL         0.000         16.10           NRCS Runoff         P-8         6.918         12.17           Pond Route         IB-8         0.000         11.87           NRCS Runoff         P-9B         16.50         12.23           Pond Route         DET. BASIN OUTFLOW         2.408         13.43           Junction         P-9 TOTAL         2.408         13.43           NRCS Runoff         P-10A         8.490         12.40           NRCS Runoff         P-10B         8.811         12.13           Pond Route         IB-10B         0.053         12.67           NRCS Runoff         P-9A         3.367         12.23           Junction         TO IB-10C         23.01         12.27           Pond Route         IB-10C         2.959         12.73           Junction         P-	Junction         P-6 TOTAL         0.014         15.57         390           NRCS Runoff         P-7A         5.329         12.13         20,077           Pond Route         IB-7A         0.000         22.73         0.000           NRCS Runoff         P-7B         0.987         12.43         6,252           Pond Route         IB-7B         0.000         16.10         0.000           Junction         P-7 TOTAL         0.000         16.10         0.000           NRCS Runoff         P-8         6.918         12.17         28,087           Pond Route         IB-8         0.000         11.87         0.000           NRCS Runoff         P-9B         16.50         12.23         75,937           Pond Route         DET. BASIN OUTFLOW         2.408         13.43         41,634           Junction         P-9 TOTAL         2.408         13.43         41,634           NRCS Runoff         P-10A         8.490         12.40         49,281           NRCS Runoff         P-10B         8.811         12.13         33,815           Pond Route         IB-10B         0.053         12.27         93,719           NRCS Runoff         P-9A	Junction   P-6 TOTAL   0.014   15.57   390   35,37	Junction   P-6 TOTAL   0.014   15.57   390   35, 37

# 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)
1	NRCS Runoff	E-1	0.002	15.37	52.4			
2	NRCS Runoff	E-2A	32.08	12.23	146,158			
3	NRCS Runoff	E-2B	24.82	12.27	126,186			
4	NRCS Runoff	E-3	24.26	12.27	115,182			
5	NRCS Runoff	E-4	23.33	12.27	111,000			
6	NRCS Runoff	E-5	18.21	12.30	91,855			
7	NRCS Runoff	E-6	0.315	12.57	3,584			
8	NRCS Runoff	E-7	0.135	14.83	3,648			
9	NRCS Runoff	E-8	0.008	15.47	216			
10	NRCS Runoff	E-9A	1.130	12.30	7,257			
11	NRCS Runoff	E-9B	24.53	12.23	110,097			
12	Pond Route	DETENTION BASIN	9.751	12.63	75,794	11	237.42	44,933
13	Junction	E-9 TOTAL	10.37	12.60	83,051	10, 12		
14	NRCS Runoff	E-10	30.87	12.40	173,628			
15	NRCS Runoff	E-11	19.61	12.37	104,209			
16	NRCS Runoff	E-12	0.002	15.33	69.9			

# 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)
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	1.995	12.33	10,323	3	291.30	4,993
5	NRCS Runoff	P-3B	22.18	12.17	90,824			
6	Junction	P-3 TOTAL	24.00	12.20	101,147	4, 5		
8	NRCS Runoff	P-4A	5.848	12.13	22,412			
9	Pond Route	IB-4A	2.490	12.43	13,623	8	283.29	6,941
10	NRCS Runoff	P-4B	21.38	12.13	82,653			
11	Junction	P-4 TOTAL	22.81	12.17	96,276	9, 10		
13	NRCS Runoff	P-5B	7.910	12.23	34,951			
14	Pond Route	IB-5B	5.521	12.40	23,445	13	285.55	9,065
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	16.89	12.20	83,082	14, 16, 17		
20	NRCS Runoff	P-2A2	4.966	12.17	20,303			
21	Pond Route	IB-2A2	1.195	12.60	3,863	20	303.70	9,088
22	NRCS Runoff	P-2A1	6.659	12.10	23,093			
23	Pond Route	IB-2A1	0.000	13.00	0.001	22	308.65	12,760
24	NRCS Runoff	P-2A3	31.74	12.17	126,394			
25	Junction	TOTAL P-2A	31.74	12.17	130,257	21, 23, 24		
27	NRCS Runoff	P-2B-A	11.89	12.17	47,091			
28	NRCS Runoff	P-5D	8.876	12.10	30,386			
29	Pond Route	IB-5D	4.544	12.27	15,724	28	232.49	11,090
30	Junction	INFLOW TO IB-2B-A	15.32	12.20	62,815	27, 29		
31	Pond Route	IB-2B-A	4.277	12.57	17,500	30	230.44	15,611
32	NRCS Runoff	P-2B-B	12.41	12.20	63,102			
33	Junction	P-2B Total	14.25	12.27	80,601	31, 32		
35	NRCS Runoff	P-6A	0.058	12.77	1,408			
36	NRCS Runoff	P-6B	0.632	12.20	3,353			

# 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	Pond Route	IB-6B	0.000	18.73	0.000	36	220.48	846
38	Junction	P-6 TOTAL	0.058	12.77	1,408	35, 37		
40	NRCS Runoff	P-7A	8.421	12.10	30,260			
41	Pond Route	IB-7A	0.000	19.53	0.000	40	221.14	10,526
42	NRCS Runoff	P-7B	1.811	12.37	10,244			
43	Pond Route	IB-7B	0.000	17.40	0.000	42	225.33	2,841
44	Junction	P-7 TOTAL	0.000	17.40	0.000	41, 43		
46	NRCS Runoff	P-8	10.49	12.17	41,323			
47	Pond Route	IB-8	0.000	11.73	0.000	46	223.92	14,336
49	NRCS Runoff	P-9B	24.53	12.23	110,097			
50	Pond Route	DET. BASIN OUTFLOW	9.751	12.63	75,794	49	237.42	44,933
51	Junction	P-9 TOTAL	9.751	12.63	75,794	50		
53	NRCS Runoff	P-10A	13.57	12.37	74,925			
54	NRCS Runoff	P-10B	11.58	12.13	44,684			
55	Pond Route	IB-10B	0.563	12.67	2,416	54	227.36	16,025
56	NRCS Runoff	P-10C	25.55	12.27	122,644			
57	NRCS Runoff	P-9A	5.954	12.20	26,993			
58	Junction	TO IB-10C	31.44	12.23	149,637	56, 57		
59	Pond Route	IB-10C	7.352	12.63	28,854	58	227.18	45,158
60	Junction	P-10 TOTAL	19.74	12.50	106,195	53, 55, 59		
62	NRCS Runoff	P-11	19.41	12.37	103,157			
64	NRCS Runoff	P-12	0.002	15.33	69.9			
66	NRCS Runoff	Roof Runoff	0.290	12.07	1,004			
67	Pond Route	Roof Drywell	0.000	9.77	0.000	66	102.24	379

# Hydrograph 100-yr Summary Hydrology Studio v 3.0.0.21

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	E-1	0.015	12.50	228			
2	NRCS Runoff	E-2A	51.14	12.23	227,661			
3	NRCS Runoff	E-2B	45.93	12.23	215,845			
4	NRCS Runoff	E-3	35.91	12.27	169,813			
5	NRCS Runoff	E-4	34.82	12.27	164,675			
6	NRCS Runoff	E-5	30.49	12.27	147,879			
7	NRCS Runoff	E-6	1.157	12.43	8,335			
8	NRCS Runoff	E-7	1.078	12.53	12,259			
9	NRCS Runoff	E-8	0.056	12.60	938			
10	NRCS Runoff	E-9A	2.844	12.23	14,258			
11	NRCS Runoff	E-9B	37.89	12.23	167,750			
12	Pond Route	DETENTION BASIN	26.82	12.43	133,448	11	237.78	54,171
13	Junction	E-9 TOTAL	28.86	12.43	147,706	10, 12		
14	NRCS Runoff	E-10	52.40	12.37	282,066			
15	NRCS Runoff	E-11	30.10	12.33	157,683			
16	NRCS Runoff	E-12	0.021	12.43	303			

# Hydrograph 100-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)
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	2.929	12.30	15,808	3	291.83	6,527
5	NRCS Runoff	P-3B	32.90	12.17	133,902			
6	Junction	P-3 TOTAL	35.48	12.17	149,710	4, 5		
8	NRCS Runoff	P-4A	8.346	12.13	32,087			
9	Pond Route	IB-4A	4.180	12.37	22,100	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	144,721	9, 10		
13	NRCS Runoff	P-5B	11.28	12.20	50,037			
14	Pond Route	IB-5B	8.928	12.37	37,255	13	285.92	10,957
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	30.16	12.20	140,316	14, 16, 17		
20	NRCS Runoff	P-2A2	6.854	12.17	28,299			
21	Pond Route	IB-2A2	4.177	12.37	10,252	20	303.96	10,181
22	NRCS Runoff	P-2A1	9.017	12.10	31,706			
23	Pond Route	IB-2A1	2.026	12.50	5,471	22	308.99	14,669
24	NRCS Runoff	P-2A3	50.99	12.17	198,423			
25	Junction	TOTAL P-2A	50.99	12.17	214,146	21, 23, 24		
27	NRCS Runoff	P-2B-A	18.89	12.17	73,351			
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	Junction	INFLOW TO IB-2B-A	26.60	12.17	101,026	27, 29		
31	Pond Route	IB-2B-A	7.117	12.57	40,738	30	231.38	28,543
32	NRCS Runoff	P-2B-B	26.63	12.17	115,404			
33	Junction	P-2B Total	31.04	12.20	156,142	31, 32		
35	NRCS Runoff	P-6A	0.445	12.47	4,014			
36	NRCS Runoff	P-6B	1.411	12.17	6,232			

# Hydrograph 100-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	Pond Route	IB-6B	0.000	15.13	0.000	36	221.77	2,097
38	Junction	P-6 TOTAL	0.445	12.47	4,014	35, 37		
40	NRCS Runoff	P-7A	13.79	12.10	47,890			
41	Pond Route	IB-7A	0.000	11.27	0.000	40	222.39	19,475
42	NRCS Runoff	P-7B	3.343	12.33	17,523			
43	Pond Route	IB-7B	0.000	11.83	0.000	42	226.36	6,077
44	Junction	P-7 TOTAL	0.000	11.27	0.000	41, 43		
46	NRCS Runoff	P-8	16.50	12.13	63,880			
47	Pond Route	IB-8	0.000	11.37	0.000	46	224.97	25,111
49	NRCS Runoff	P-9B	37.89	12.23	167,750			
50	Pond Route	DET. BASIN OUTFLOW	26.82	12.43	133,448	49	237.78	54,171
51	Junction	P-9 TOTAL	26.82	12.43	133,448	50		
53	NRCS Runoff	P-10A	22.40	12.37	119,578			
54	NRCS Runoff	P-10B	15.88	12.13	61,966			
55	Pond Route	IB-10B	1.003	12.67	7,962	54	228.13	23,335
56	NRCS Runoff	P-10C	34.68	12.23	168,385			
57	NRCS Runoff	P-9A	10.62	12.20	45,165			
58	Junction	TO IB-10C	45.05	12.23	213,550	56, 57		
59	Pond Route	IB-10C	15.33	12.60	65,152	58	227.84	62,532
60	Junction	P-10 TOTAL	36.23	12.47	192,692	53, 55, 59		
62	NRCS Runoff	P-11	29.80	12.33	156,090			
64	NRCS Runoff	P-12	0.021	12.43	303			
66	NRCS Runoff	Roof Runoff	0.371	12.07	1,293			
67	Pond Route	Roof Drywell	0.000	8.90	0.000	66	103.25	521

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

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			0.16	4.80
А	Open Space Good Condition	39			0.00	0.00
А	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 =	0.16	4.80

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

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

Date 6/24/2022

Laastiani	Ctow MA				Chaalaad			10/27/2022	
Location:	Stow, MA				Checked		Date		
Circle one: Circle one:	Circle one: Tc Tt		through subarea	Subcatchi	ment P-1				
Sheet flow	(Applicable to	Tc only)			Segment ID	A-B			
1. Surface I	Description (ta	able 3-1)				WOODS			
2. Mannings	s roughness o	coeff., n (tab	ole 3-1)			0.6			
3. Flow leng	gth, L (total L	<= 300 ft)			ft	50			
4. Two-yr 2	4-hr rainfall, F	2			in	3.1			
5. Land Slo	pe, s				ft/ft	0.082			
6. Tt = 0.00	7 (nL)^0.8 / (F	P2^0.5 s^0.	4)	Compute Tt	hr	0.16			0.16
Shallow cor	ncentrated Flo	DW .	•		Segment ID	B-C			
7. Surface I	Description (p	aved or unp	paved)			UNPAVED			
8. Flow Len	ngth, L				ft	32			
9. Watercou	urse slope, s				ft/ft	0.047			
10. Average	e Velocity, V (	figure 3-1)			ft/s	3.50			
11. Tt = L /	3600V			Compute Tt	t hr	0.00			0.00
Channel flo	w				Segment ID				
	ectional flow perimeter, pw				sf ft				
	lic radius, r=a			Compute r					
15. Channe				•	ft/ft				
16. Manning	g's roughness	coeff., n							
	9 r^2/3 s^1/2 /			Compute V	ft/s				
18. Flow ler 19. Tt = L /				Compute Tt	ft t hr				0
20. Watersł	hed or subare	a Tc or Tt (	add Tt in ste	ps 6, 11, and	d 19)			hr min	0.17 10.0
									10.0

Ву

NC

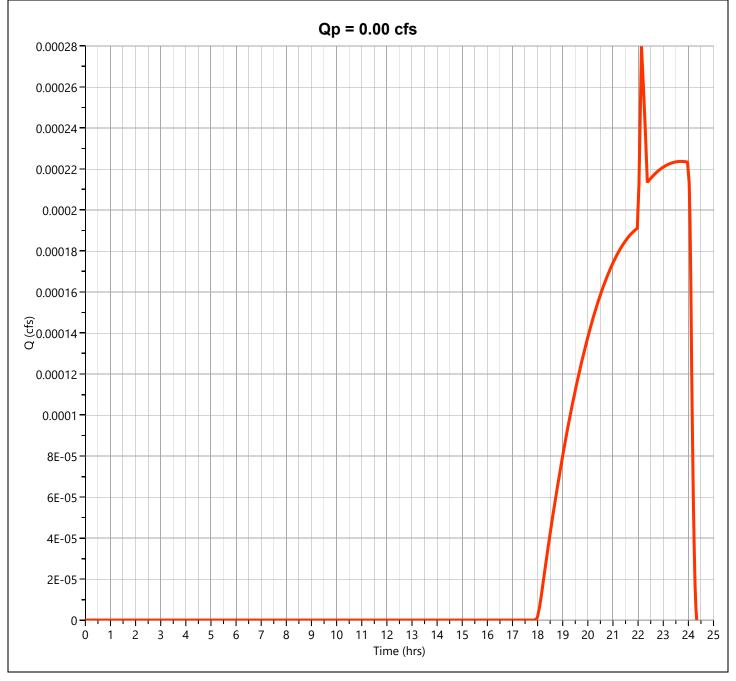
## P-1 Hyd. No. 1

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

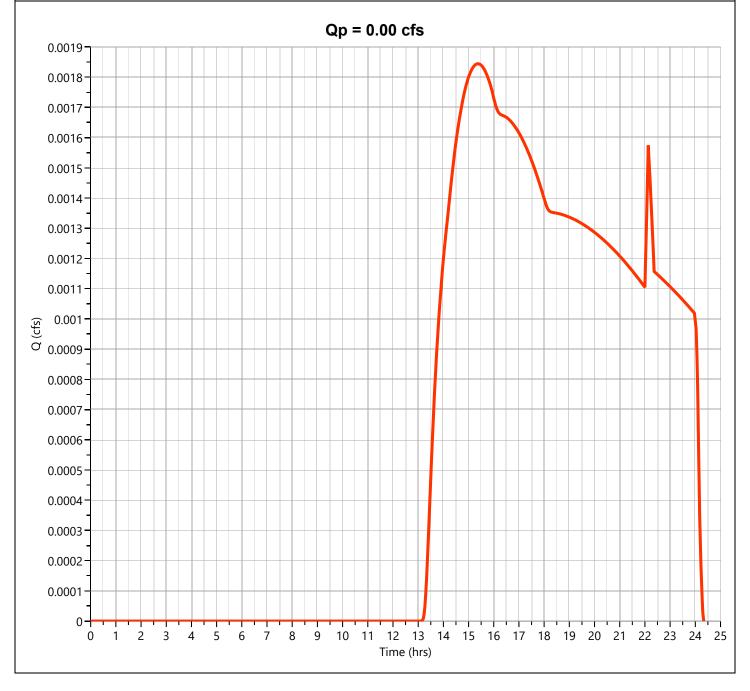
## P-1 Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.000 cfs
Storm Frequency	= 10-yr	Time to Peak	= 22.13 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



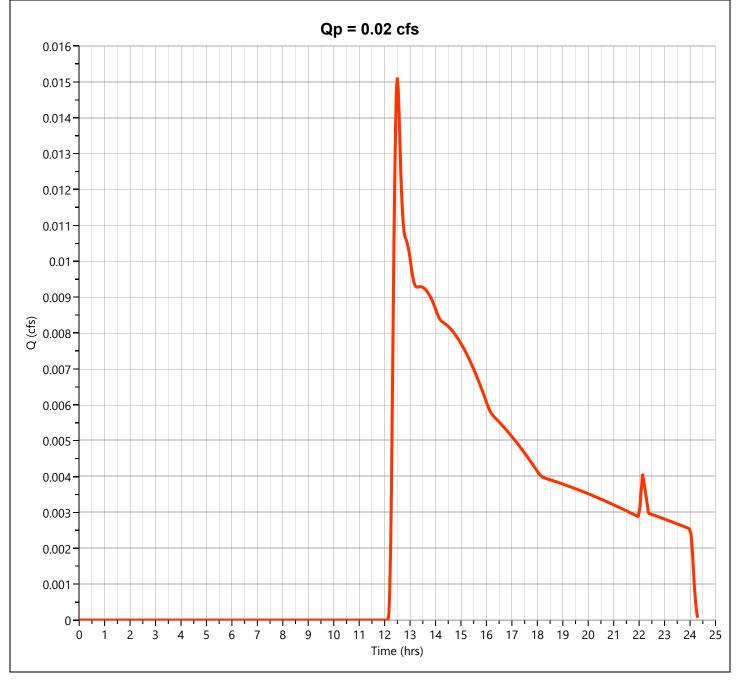
## P-1 Hyd. No. 1

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



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

SM-3719C

Project:	Athens Street	By PFK	Date 10/13/22
Location:	Stow, MA	Checked	Rev Date Date
Circle one:	Present Developed	Subcatchment P-2A2	
1. Runoff curv	e number (CN)		

Soil name and hydrologic	Cover description (cover type, treatment, and	(cover type, treatment, and			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			0.49	47.68
Α	Woods Good Condition	30			0.00	0.00
А	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	51.09
С	Gravel	89			0.00	0.00
1/ Use only one	e CN source per line. 62	083		Totals =	1.43	116.15

CN (weighted) =	total product	_=	116.15 =	81.50	<u>;</u>	Use CN =	81
	total area	_	1.43				

2.	Runoff

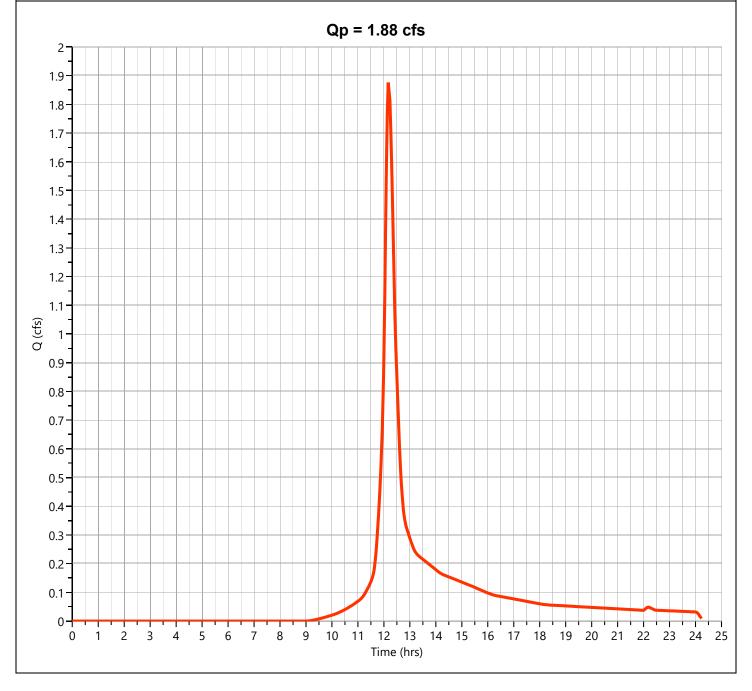
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
1.56	4.06	5.65

### Worksheet 3: Time of Concentration (Tc) or travel time (Tt)

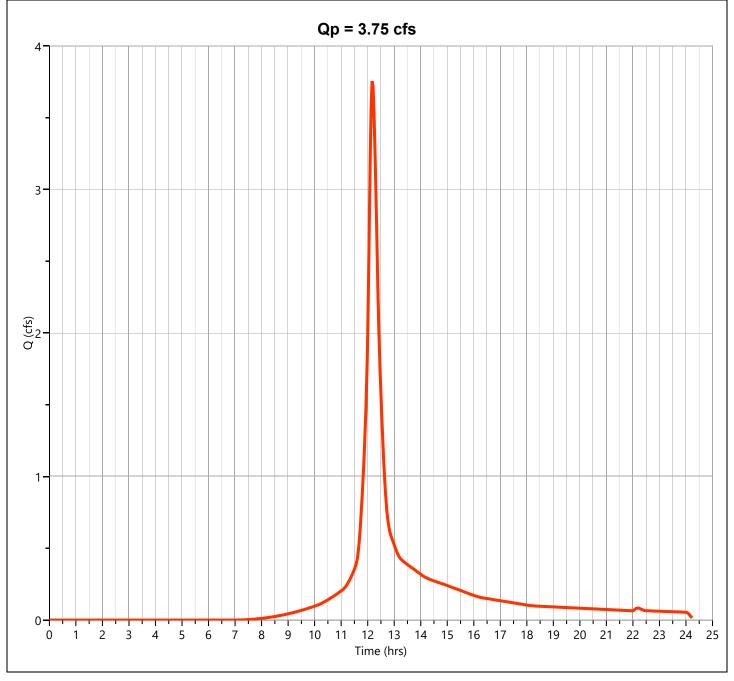
SM-3719C

Project:	Athens Street	_	Ву	PFK	Date Rev Date	10/13/2022	
Location:	Stow, MA	-	Checked		Date		
Circle one: Circle one:	Present Developed Tc Tt	through subarea	Subcatchm	ent P-2A2			
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	ppe, s		ft/ft	0.040			
6. Tt = 0.00	07 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.22			0.22
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	102	109	15	
9. Waterco	urse slope, s		ft/ft	0.040	0.065	0.07	
10. Average	e Velocity, V (figure 3-1)		ft/s	3.23	4.11	5.38	
11. Tt = L /	3600V	Compute Tt	hr	0.01	0.01	0.00	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 Tt					0
20. Waters	hed or subarea Tc or Tt (add Tt in ste	eps 6, 11, and	d 19)			hr min	0.24 14.2

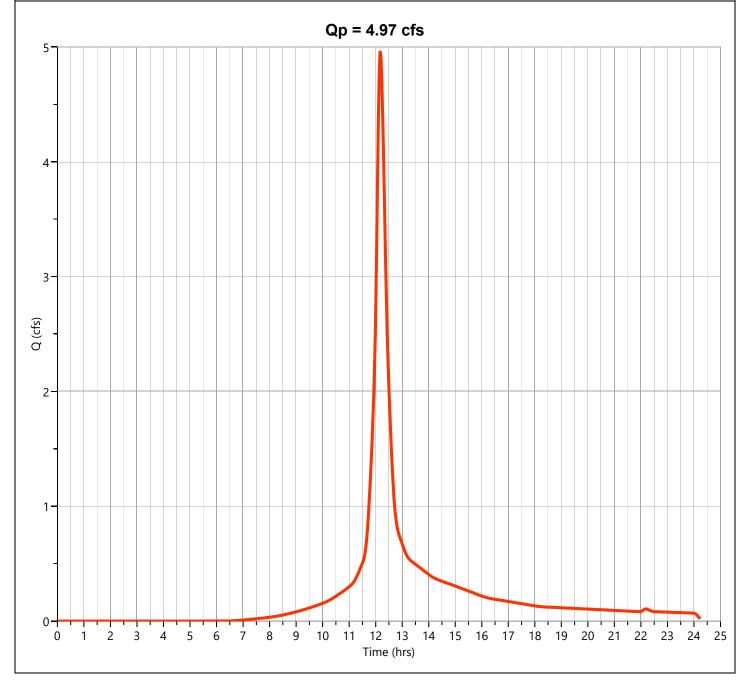
Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.878 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 7,715 cuft
Drainage Area	= 1.43 ac	Curve Number	= 81
Tc Method	= User	Time of Conc. (Tc)	= 14.2 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



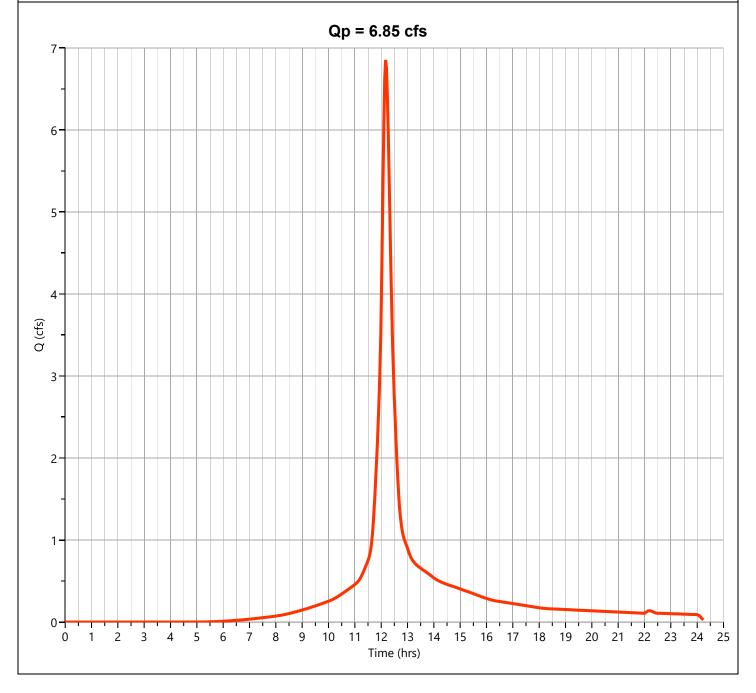
Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.755 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 15,288 cuft
Drainage Area	= 1.43 ac	Curve Number	= 81
Tc Method	= User	Time of Conc. (Tc)	= 14.2 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.966 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 20,303 cuft
Drainage Area	= 1.43 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	= 6.854 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 28,299 cuft
Drainage Area	= 1.43 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



0.1

Hydrology Studio v 3.0.0.21 10-27-2022

3-2A2				Hyd. No. 2		
Hydrograph Type	= Pond Route		Peak Flow	= 0.000 cfs		
Storm Frequency	= 2-yr		Time to Peak	= 12.43 hrs		
Time Interval	= 2 min		Hydrograph Volume	= 0.000 cuft		
Inflow Hydrograph	= 20 - P-2A2		Max. Elevation	= 302.24 ft		
Pond Name	= IB-2A2		Max. Storage	= 3,550 cuft		
Pond Routing by Storage In	dication Method					
	Qp =	= 0.00 cfs				
2						
1.9						
1.8				A		
1.7						
1.6						
4						
1.5						
1.4						
1.3						
1.2						
1.1						
(\$j) 0 -						
0.9						
0.8						
0.7						
0.6						
0.5						
4						
0.4						
0.3						
0.2						

1 10

8

Time (hrs)

— P-2A2 — IB-2A2

## IB-2A2 Hyd. No. 21

									Tim 2A2	e (hrs										
-1 <b>-</b>	0	1 2	)	3	4	5	6	-		8	9	10	11	12	13	14	15	1		
-	_																			
0-																				
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4-																				
nd R	Routing b	oy Storage li	ndicatio	n Metho	od			Qp	= 0.0	)4 c1	s			Cente	er of mass	s detention	time = 5	2 m		
ond	Nam	е	= 1	B-2A	2								ax. Sto	rage		= 8,28	9 cuft			
	Interv v Hyd	/al rograph		2 min 20 - F	P-2A2								/drogra ax. Ele	iph Vol vation	ume	= 133 cuft = 303.51 ft				
		quency		10-yr									ne to F			= 14.4				
		h Type			Route	)							ak Flo			= 0.04				

## IB-2A2 Hyd. No. 21

torm F	requency	=	25-	yr											Tir	me i	to Pe	ak		=	= 12.	60 h	rs
ime Int	erval	=	2 m	in											Ну	/dro	grap	h Vo	olum	e =	= 3,8	63 c	uft
nflow H	ydrograph	=	20 -	- P-2	A2										Ma	ax.	Eleva	ation		=	= 30	3.70	ft
ond Na	ame	=	IB-2	2A2											Ма	ax.	Stora	age		=	= 9,0	88 c	uft
ond Routi	ng by Storage I	ndicatio	on Me	ethod																			
								(	Qр	= 1	.20	cf	S										
5																							
4																							
3																							
_																							
2																							
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1																		$\mathbf{A}$					
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0																							
1																							
1																							
-1 <del> </del> 0	1 2	İ	3	4	•	i i 5	6	'	i 7	8		9	1	10	1	1	12	' i	3	14	15	' 1	i '

## IB-2A2 Hyd. No. 21

ydrograph Type torm Frequency	= Pond Route = 100-yr	Peak Flow Time to Peak	= 4.177 cfs = 12.37 hrs
me Interval	= 2 min	Hydrograph Volume	= 12.37 ms = 10,252 cuft
iflow Hydrograph	= 20 - P-2A2	Max. Elevation	= 303.96 ft
ond Name	= IB-2A2	Max. Storage	= 10,181 cuft
ond Name		Max. Storage	- 10,101 cuit
ona Routing by Glorage		_	
7 7	Qp = 4.18 cf	<b>S</b>	
1			
6			
1			
5			
4			
1			
3-			
_			
2			
4			
1-			
4			
0			
-			
-1-			
0 1 2	3 4 5 6 7 8 9	10 11 12 13 1	4 15 16
	Time (hrs) —— P-2A2 —— IB-		

### IB-2A2

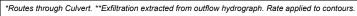
## Stage-Storage

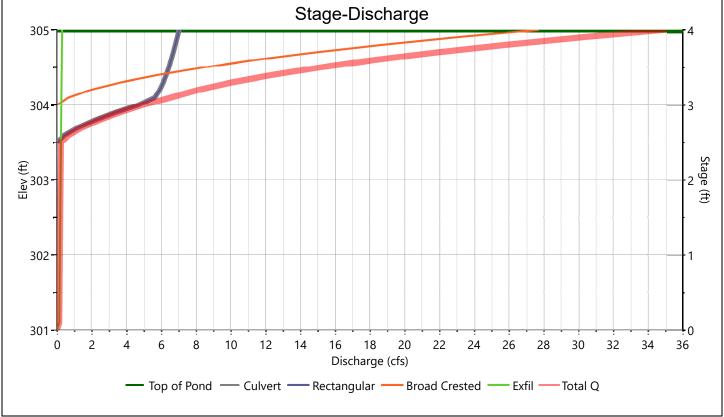
	User Defined C	ontours	3	Stage / Storage Table									
	Descript	tion	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)					
	Bottom Elevation	n, ft	301.00										
	Voids	(%)	100.00	0.00 1.00	301.00 302.00	2,397 3,064	0.000 2,731	0.000 2,731					
	Volume C		Ave End Area	2.00	303.00	3,788	3,426	6,157					
	volume C	Jaic /	Ave End Area	3.00	304.00	4,569	4,179	10,335					
				4.00	305.00	5,407	4,988	15,323					
				Stage-S	Storage								
305								4					
-													
304								3					
-													
<u>±</u> ≥303								2 9					
Ele													
1													
302								1					
301								0					
0	2000	4000	6000		0000 orage (cuft)	10000 120	14000	16000					
					Top of Po								

### IB-2A2

## Stage-Discharge

Culvert / Ouifices	Culvent		Orifices		Doufoueted 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	301.00				Height, ft	
Orifice Coefficient, Co	0.60				Orifice Coefficient, Co	
Length, ft	34					
Barrel Slope, %	8.8					
N-Value, n	0.013					
Weirs	Riser*		Weirs		Anoillana	
vveirs	Kisei	1*	2	3	Ancillary	
Shape / Type	Circular	Rectangular		Broad Crested	Exfiltration, in/hr	2.41**
Crest Elevation, ft		303.5		304		
Crest Length, ft		4		6		
Angle, deg				18.4 (3:1)		
Weir Coefficient, Cw		3.3		3.3		





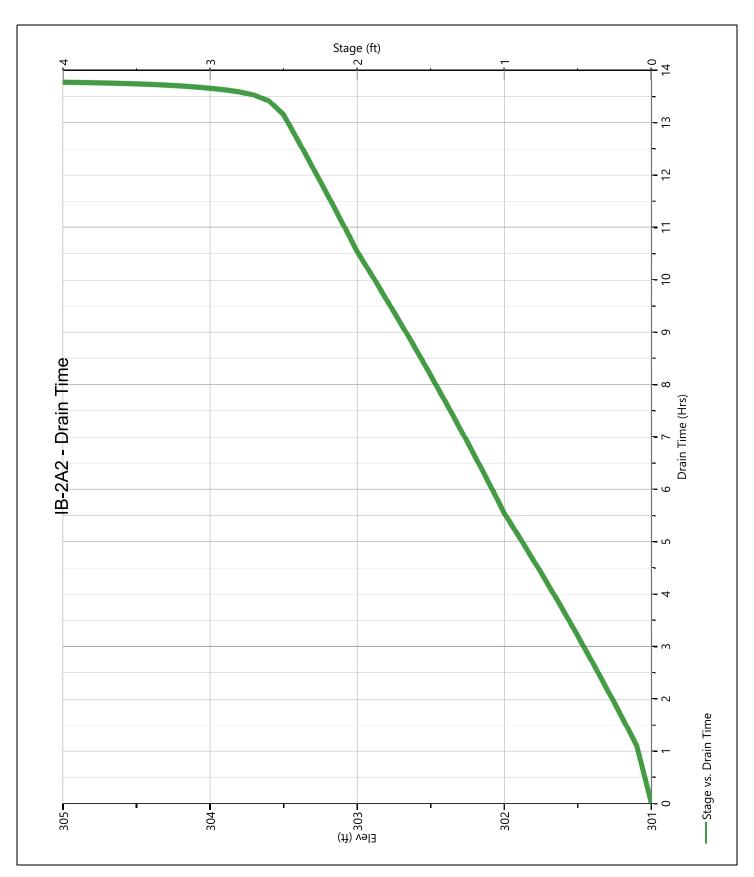
#### IB-2A2

# **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
1.00	302.00	2,731	0.000					0.000		0.000		0.171		0.171
2.00	303.00	6,157	0.000					0.000		0.000		0.211		0.211
3.00	304.00	10,335	4.667 ic					4.667		0.000		0.255		4.922
4.00	305.00	15,323	7.028 ic					7.028 s		27.72		0.302		35.05

#### IB-2A2

#### **Pond Drawdown**



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

SM-3719C

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

<ol> <li>Runoff curve number</li> </ol>	r (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			0.59	57.61
Α	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			0.00	0.00
С	Open Space Good Condition	74			0.89	65.57
С	Gravel	89			0.00	0.00
I/ Use only one	e CN source per line. 64	206	-	Totals =	1.47	123.18

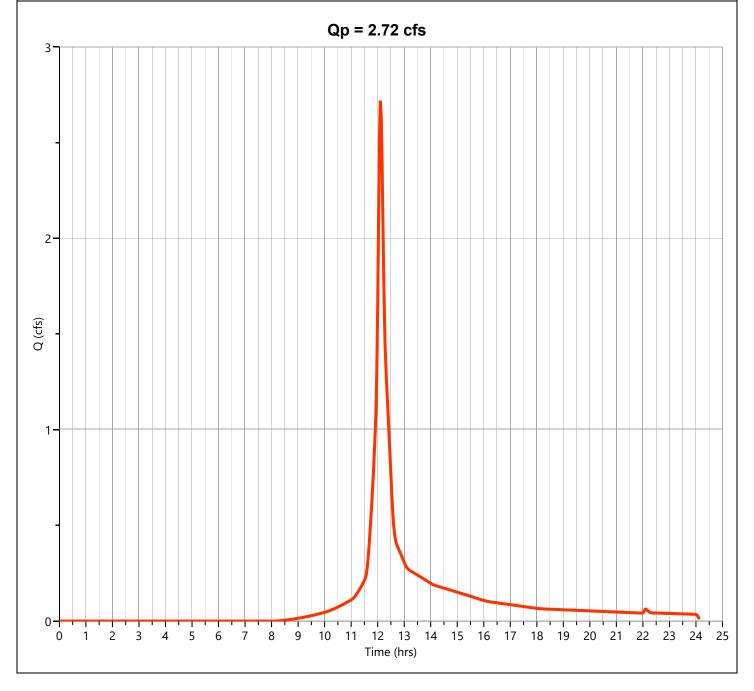
CN (weighted) =	total product	_=	123.18 =	83.57	;	Use CN =	84
	total area	_	1 47		•		

2	Runoff	

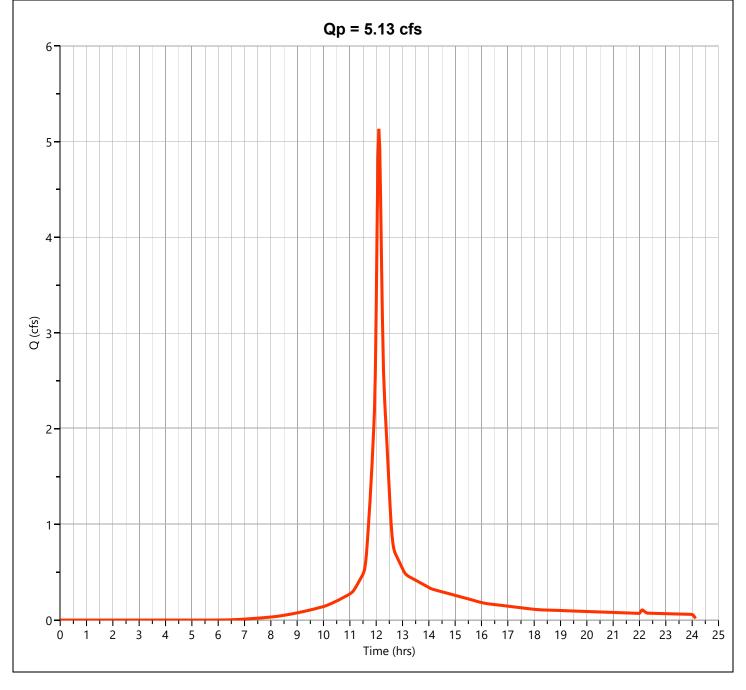
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
1.71	4.28	5.89

Project:	Athens Street	-	Ву	PFK	Date Rev Date	10/13/2022	
Location:	Stow, MA	_	Checked		Date		
Circle one: Circle one:	Present Developed Tc Tt	through subarea	Subcatchm	ent P-2A1			
Sheet flow	(Applicable to Tc only)		Segment ID	А-В			
1. Surface l	Description (table 3-1)			GRASS			
2. Manning	s roughness coeff., n (table 3-1)			0.24			
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	0.020			
6. Tt = 0.00	7 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.14			0.14
Shallow cor	ncentrated Flow		Segment ID	B-C	C-D		
7. Surface l	Description (paved or unpaved)			UNPAVED	PAVED		
8. Flow Ler	ngth, L		ft	153	21		
9. Waterco	urse slope, s		ft/ft	0.020	0.010		
10. Average	e Velocity, V (figure 3-1)		ft/s	2.28	2.03		
11. Tt = L /	3600V	Compute Tt	: hr	0.02	0.00		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. Waters	hed or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	d 19)			hr min	0.16 9.6

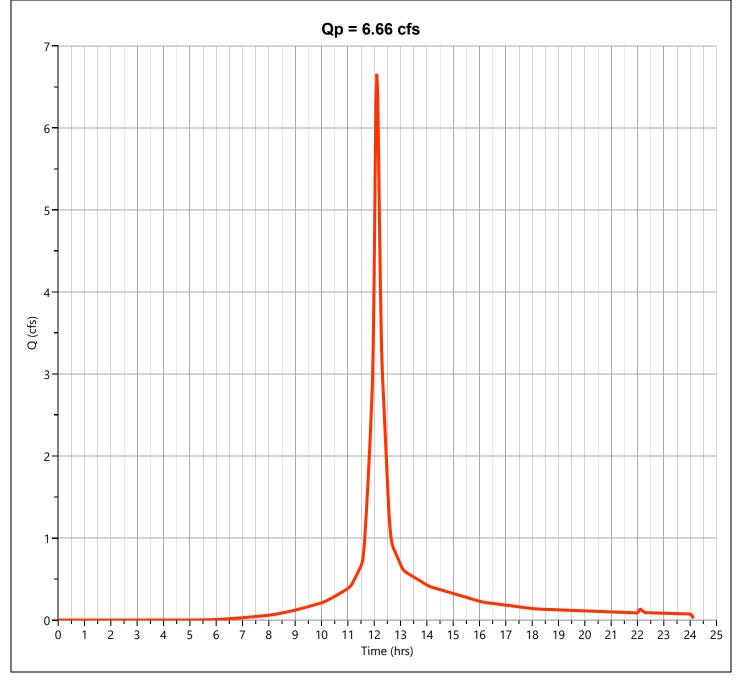
Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.719 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 9,291 cuft
Drainage Area	= 1.47 ac	Curve Number	= 84
Tc Method	= User	Time of Conc. (Tc)	= 9.6 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



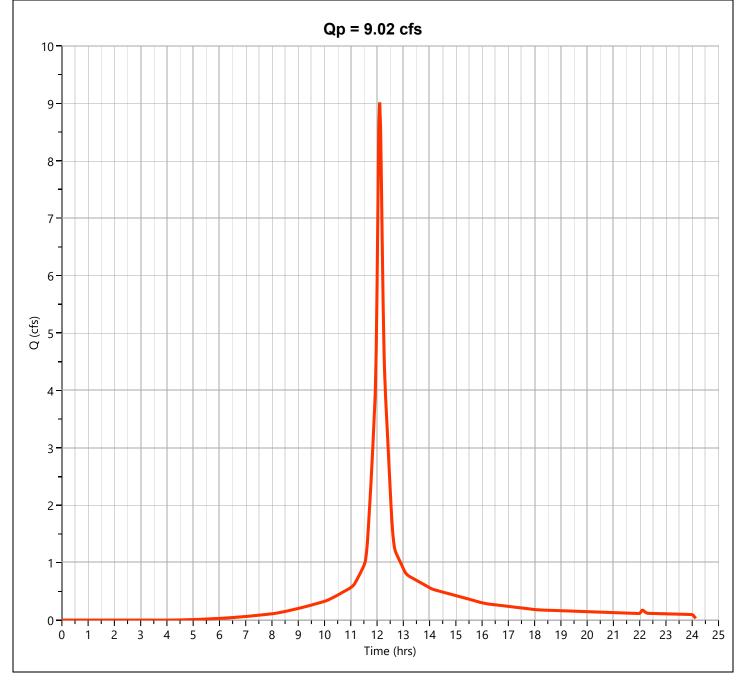
Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.133 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 17,647 cuft
Drainage Area	= 1.47 ac	Curve Number	= 84
Tc Method	= User	Time of Conc. (Tc)	= 9.6 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.659 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 23,093 cuft
Drainage Area	= 1.47 ac	Curve Number	= 84
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	= 9.017 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 31,706 cuft
Drainage Area	= 1.47 ac	Curve Number	= 84
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

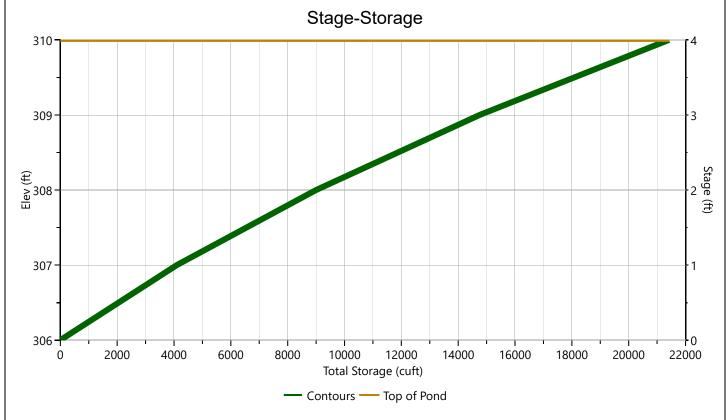


				— P-	Time (hrs) 2A1 —— IB-2A1		
-1-	0 1	2	3 4	5		8 9 10	11 12 1
	-						
0-	-						
2-	-						
3-	-						
	0 ) 0			Qp	= 0.00 cfs		
	Name Routing by Storage In	= IB-2A				Max. Storage	= 4,049 cuft
	v Hydrograph	= 22 - F				Max. Elevation	= 306.99 ft
	Interval	= 2 min				Hydrograph Volume	= 0.000 cuft
torm	n Frequency	= 2-yr				Peak Flow Time to Peak	= 0.000 cfs = 12.33 hrs

#### IB-2A1

# Stage-Storage

User Defined Conto	ırs	Stage / Storage 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 4,487	0.000 4,103	0.000 4,103	
		2.00	307.00	5,311	4,899	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	
				.,	-,	,	

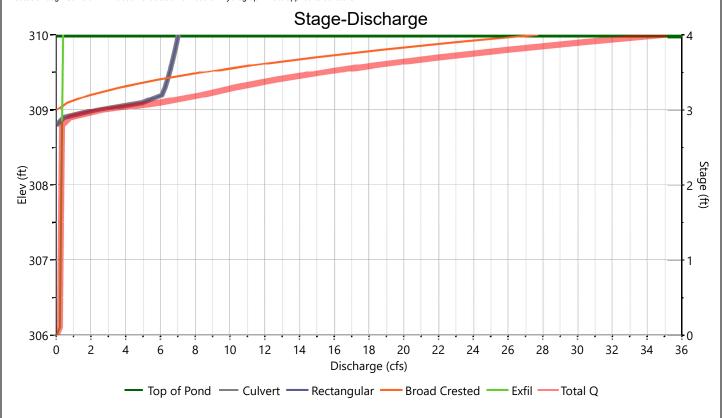


#### **IB-2A1**

# Stage-Discharge

Outrout / Outfine	Outroot		Doufouete d Disco			
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					
\A/a:wa	Dia a #*		Weirs		A 711	
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		

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



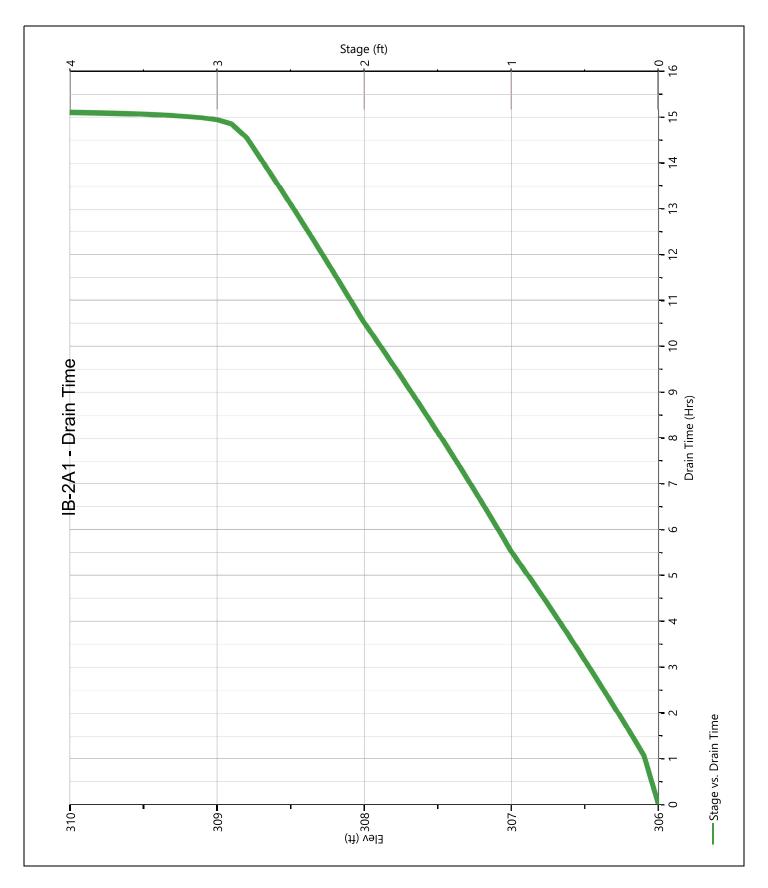
#### **IB-2A1**

# **Stage-Storage-Discharge Summary**

Stage	Elev.	Storage	Culvert	(	Orifices, cf	s	Riser	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	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**



lydrograph Type _	= Pond Route		Peak Flow	= 0.000 cfs
storm Frequency	= 10-yr		Time to Peak	= 13.57 hrs
îme Interval	= 2 min		Hydrograph Volume	
nflow Hydrograph	= 22 - P-2A1		Max. Elevation	= 308.02 ft
ond Name	= IB-2A1		Max. Storage	= 9,142 cuft
ond Routing by Storage Ind	ication Method		Center of mas	ss detention time = 1.14 h
6		Qp = 0.00 cfs		
6				
-				
5				
4				
-				
3-				
G (CLS)				
2-				
-				
1-				
0-				
1				
-1-				
0 1 2	3 4 5 6	7 8 9 10 Time (hrs)	11 12 13 14	4 15 16

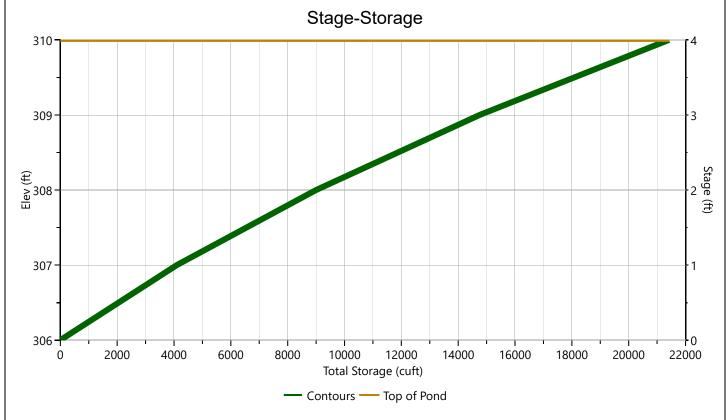
ydrograph Type	= Pond Route		Peak Flow	= 0.000 cfs
torm Frequency	= 25-yr		Time to Peak	= 13.00 hrs
ime Interval	= 2 min		Hydrograph Volume	= 0.001 cuft
iflow Hydrograp	n = 22 - P-2A1		Max. Elevation	= 308.65 ft
ond Name	= IB-2A1		Max. Storage	= 12,760 cuft
ond Routing by Storag	Indication Method		Center of mas	s detention time = 2.04 h
		Qp = 0.00 cfs		
7				
-				
6				
-				
5				
-				
4				
_				
3				
2				
1				
-				
0				
-				
-1				
	2 3 4 5 6		11 12 13 14	15 16 17
		Time (hrs) —— P-2A1 —— IB-2A1		

Storm Frequency = 100-yr  Time Interval = 2 min Hydrog Inflow Hydrograph = 22 - P-2A1 Max. El Pond Name = IB-2A1 Max. Si Pond Routing by Storage Indication Method  Qp = 2.03 cfs  10 9	aph Volume = evation =	= 12.50 hrs = 5,471 cuft								
Inflow Hydrograph = 22 - P-2A1 Max. El Pond Name = IB-2A1 Max. Si Pond Routing by Storage Indication Method  Qp = 2.03 cfs	evation =									
Pond Name = IB-2A1 Max. St Pond Routing by Storage Indication Method  Qp = 2.03 cfs  10		200 00 0								
Pond Routing by Storage Indication Method  Qp = 2.03 cfs  10	rage =	= 308.99 ft = 14,669 cuft								
Qp = 2.03 cfs  10  9  8  7  6  4  3  2  -										
10	Center or mass	detention time = 0 m								
9										
8 -										
8 -										
4 - 3 - 2										
4- - 3- 2- -										
-	// / /									
-										
1-	/									
0										
1										
0 1 2 3 4 5 6 7 8 9 10 11	12 13	14 15								
Time (hrs)	12 13	14 15								

#### IB-2A1

# Stage-Storage

User Defined Conto	ırs	Stage / Storage 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 4,487	0.000 4,103	0.000 4,103	
		2.00	307.00	5,311	4,899	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	
				.,	-,	,	

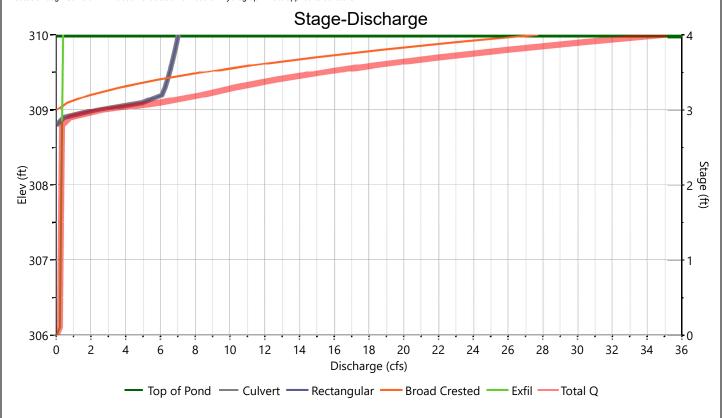


#### **IB-2A1**

# Stage-Discharge

Outrout / Outfine	Outroot		Doufouete d Disco			
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					
\A/a:wa	Dia a #*		Weirs		A 711	
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		

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



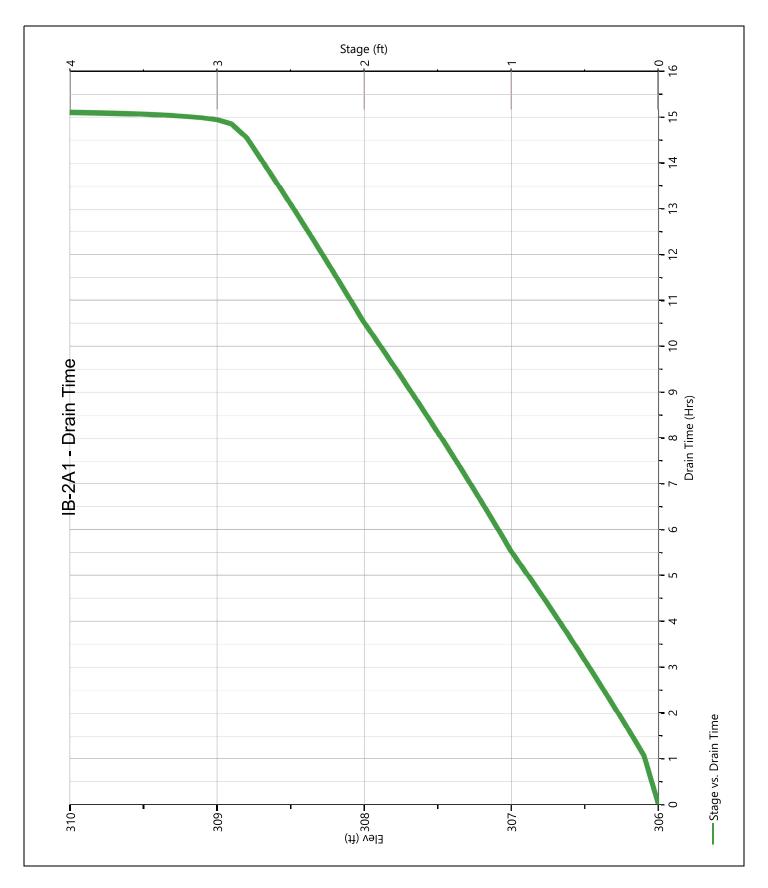
#### **IB-2A1**

# **Stage-Storage-Discharge Summary**

Stage	Elev.	Storage	Culvert	(	Orifices, cf	s	Riser	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	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
		<u></u>	Rev Date	
Location:	Stow, MA	Checked	Date	
Circle one:	Present Developed	Subcatchment P-2A3		
Circle one.	Present Developed	Subcatchinent P-2A3		

<ol> <li>Runoff curve number (</li> </ol>	(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			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 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	47.74
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	358		Totals =	15.44	951.92

CN (weighted) =	total product	_=	951.92 =	61.67	;	Use CN =	62
	total area	_	15 44		_		

2. Runoff

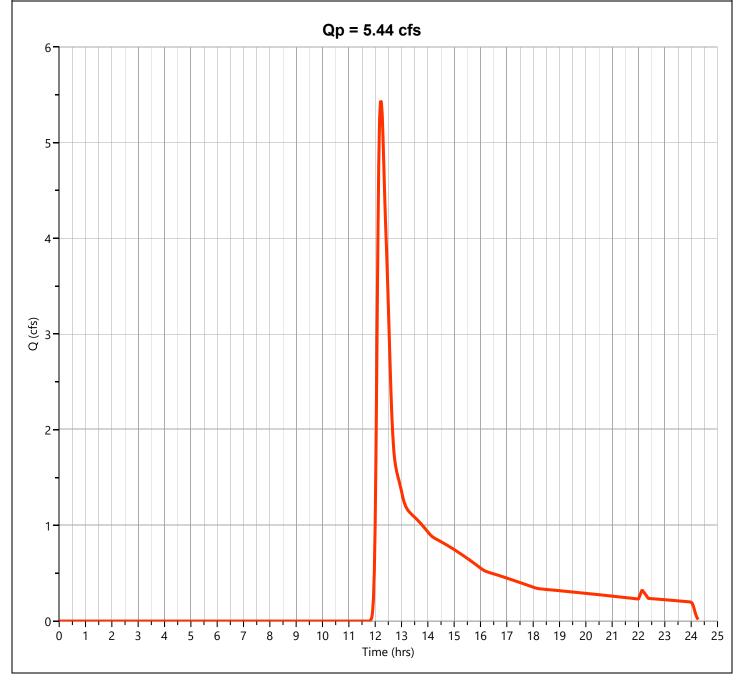
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.50	2.16	3.40

#### Worksheet 3: Time of Concentration (Tc) or travel time (Tt)

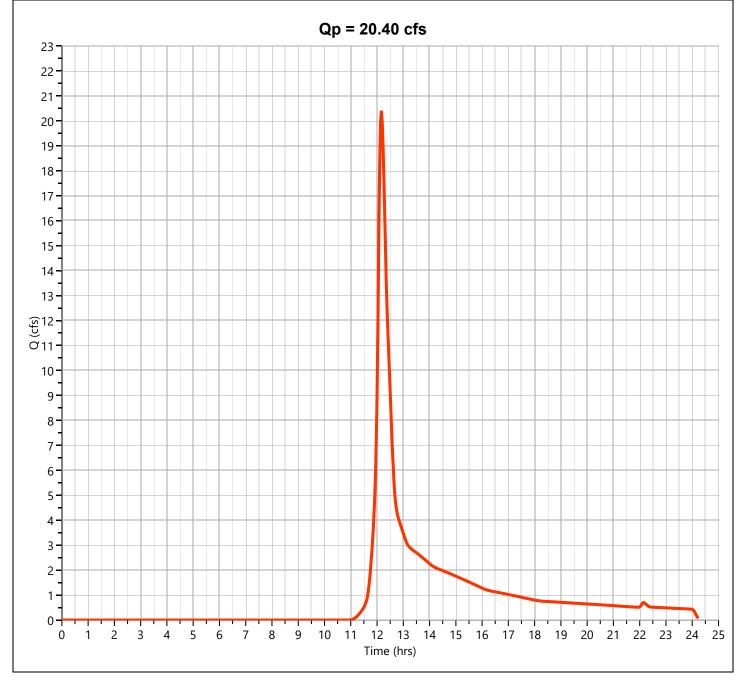
SM-3719C

Project:	Athens Street	-	Ву	PFK	Date Rev Date	10/13/2022	
Location:	Stow, MA	_	Checked		Date		
Circle one: Circle one:	Present Developed Tc Tt	through subarea	Subcatchm	ent P-2A3			
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	pe, s		ft/ft	0.080			
6. Tt = 0.00	7 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.17			0.17
Shallow co	ncentrated Flow		Segment ID	В-С	C-D	D-E	
7. Surface	Description (paved or unpaved)			UNPAVED	UNPAVED	UNPAVED	
8. Flow Ler	ngth, L		ft	213	146	162	
9. Waterco	urse slope, s		ft/ft	0.110	0.230	0.08	
10. Averag	e Velocity, V (figure 3-1)		ft/s	5.35	7.74	4.56	
11. Tt = L /	3600V	Compute Tt	hr	0.01	0.01	0.01	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>	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 /	_	Compute Tt	ft hr				0
20. Waters	hed or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	ป 19)			hr min	0.19 11.5

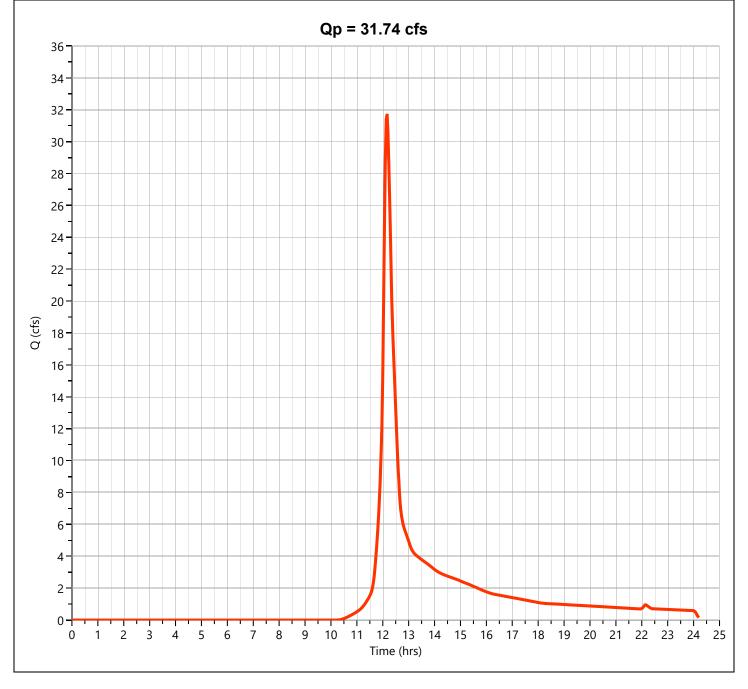
Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.436 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 29,551 cuft
Drainage Area	= 15.44 ac	Curve Number	= 62
Tc Method	= User	Time of Conc. (Tc)	= 11.5 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



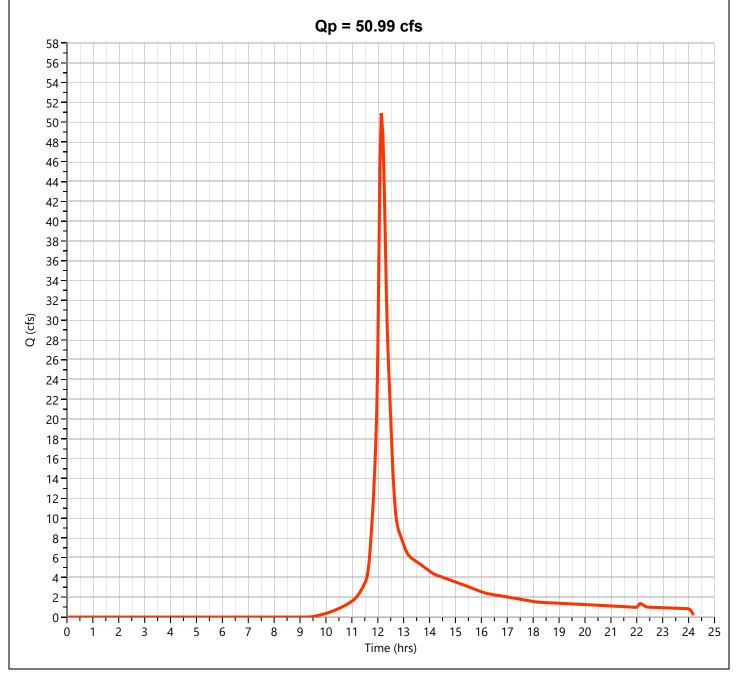
Hydrograph Type	= NRCS Runoff	Peak Flow	= 20.40 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 84,566 cuft
Drainage Area	= 15.44 ac	Curve Number	= 62
Tc Method	= User	Time of Conc. (Tc)	= 11.5 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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

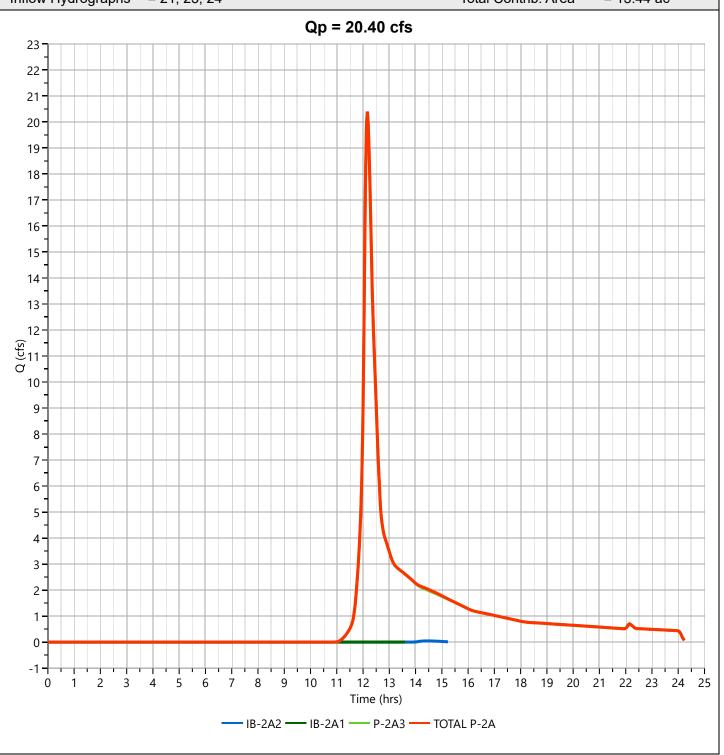


# TOTAL P-2A Hyd. No. 25

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
	<b>Qp = 5.44 cfs</b>		
6			
5			
-			
4			
1			
3 -			
Q (cfs)			
α			
2			
-			
1 +			
0			
4			
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 — TO	TAL 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	= 84,699 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	
Γime Interval	= 2 min	Hydrograph Volume	= 130,257 cuft	
nflow Hydrographs	= 21, 23, 24	Total Contrib. Area	= 15.44 ac	
	Qp = 31.74 cfs			
36 7	-			
35 =				
34 -				
33				
32 -				
31				
30 -				
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28				
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0				
0 1 2 3	4 5 6 7 8 9 10 11 12 13 1	4 15 16 17 18 19 20	21 22 23 24	
3	Time (hrs)	1 1 11 13 13 14	·	

# TOTAL P-2A Hyd. No. 25

Hydrograph Type	= Junction		Peak Flow	= 50.99 cfs	
Storm Frequency	= 100-yr		Time to Peak	= 12.17 hrs = 214,146 cuft	
Time Interval	= 2 min		Hydrograph Volume		
nflow Hydrographs	= 21, 23, 24		Total Contrib. Area	= 15.44 ac	
	Qp = 50.99	cfs			
58 –					
56 -					
54 -					
52 -					
50 🖠					
48 -					
46 =					
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42					
40	<del>                                     </del>				
38					
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8 -					
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2 ]					
0	3 4 5 6 7 8 9 10 11 12 1				

─ IB-2A2 ── IB-2A1 ── P-2A3 ── TOTAL P-2A

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

SM-3719C

Project:	Athens Stree	et		Ву	NC	Date	10/13/22	ı
Location:	Stow, MA			Checked		Rev Date Date		ı !
Circle one:		Present	Developed	Subcatchme	ent 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	79.01
Α	Woods Good Condition	30			0.02	0.52
Α	Open Space Good Condition	39			2.16	84.26
Α	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	124.64
1/ Use only one	CN source per line.			Totals =	5.53	349.81

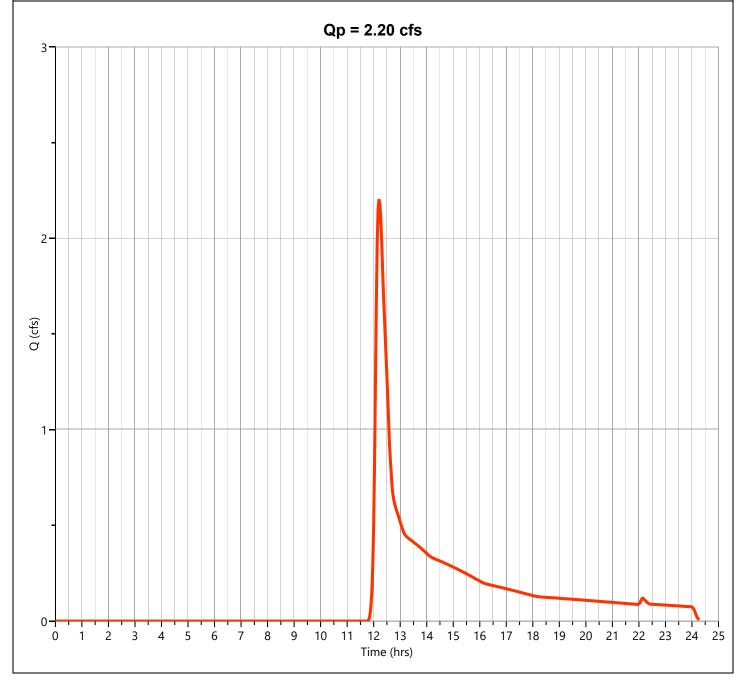
CN (weighted) =	total product	_=	349.81=	63.29	_;	Use CN =	63
•	total area	_	5.53				

2. Runoff

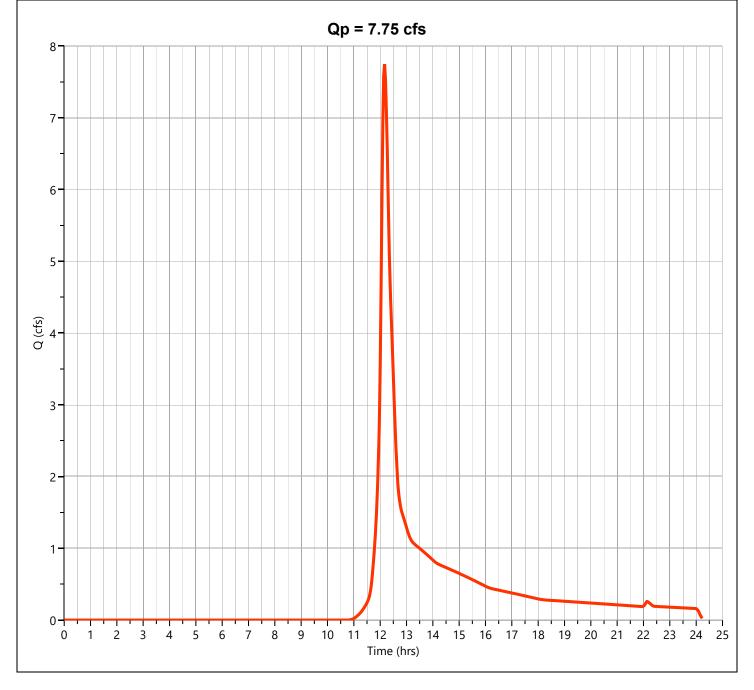
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.56	2.30	3.58

Project:	Athens Street	-	Ву	NC	Date Rev Date	10/13/2022	
Location:	Stow, MA	-	Checked		Date		
Circle one: Circle one:	Present Developed Tc Tt	through subarea	Subcatchme	ent P-2B-A			
Sheet flow	(Applicable to Tc only)		Segment ID	A-B			
1. Surface l	Description (table 3-1)			GRASS			
2. Manning	s roughness coeff., n (table 3-1)			0.24			
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	0.010			
6. Tt = 0.00	7 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.18			0.18
Shallow cor	ncentrated Flow		Segment ID	B-C			
7. Surface l	Description (paved or unpaved)			UNPAVED			
8. Flow Ler	ngth, L		ft	176			
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 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></ul>	g's roughness coeff., n 9 r^2/3 s^1/2 / n	Compute r Compute V	ft/ft				
19. Tt = L /	=	Compute Tt					0
20. Waters	hed or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	d 19)			hr min	0.21 12.4

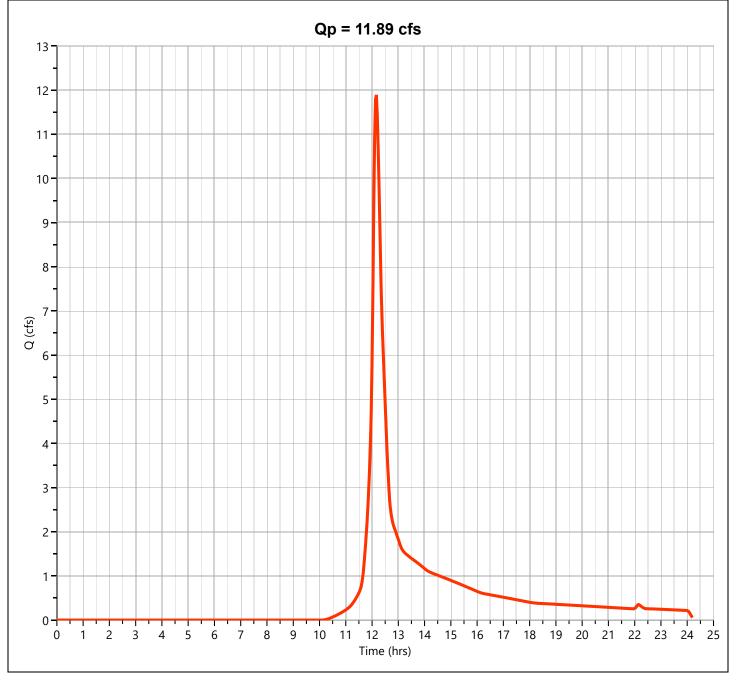
Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.204 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 11,406 cuft
Drainage Area	= 5.53 ac	Curve Number	= 63
Tc Method	= User	Time of Conc. (Tc)	= 12.4 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



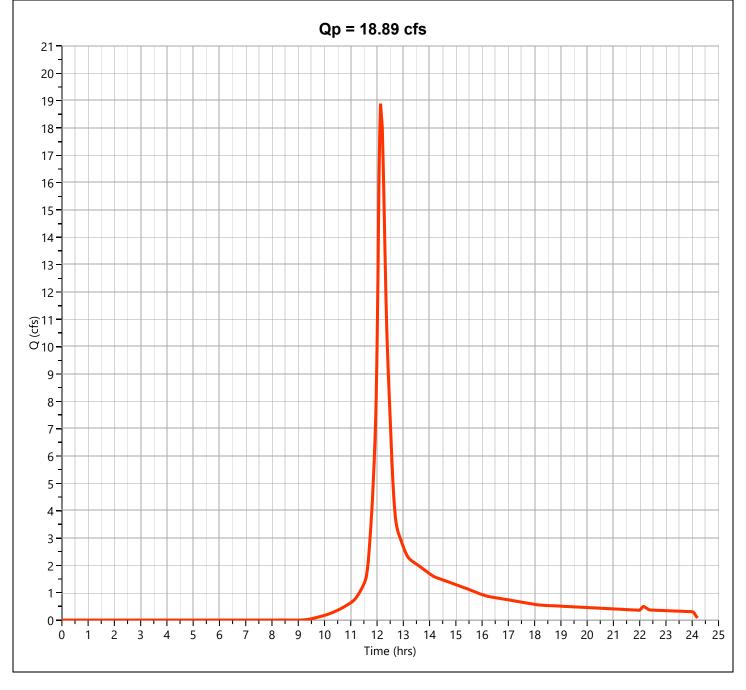
Hydrograph Type	= NRCS Runoff	Peak Flow	= 7.748 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 31,761 cuft
Drainage Area	= 5.53 ac	Curve Number	= 63
Tc Method	= User	Time of Conc. (Tc)	= 12.4 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 11.89 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 47,091 cuft
Drainage Area	= 5.53 ac	Curve Number	= 63
Tc Method	= User	Time of Conc. (Tc)	= 12.4 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 18.89 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 73,351 cuft
Drainage Area	= 5.53 ac	Curve Number	= 63
Tc Method	= User	Time of Conc. (Tc)	= 12.4 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

Athens Street	By PFK	Date 6/21/22
		Rev Date 10/13/2022
Stow, MA	Checked	Date
Present Developed	Subcatchment P-5D	
	Athens Street  Stow, MA  Present Developed	Stow, MA Checked

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			1.03	101.00
Α	Woods Good Condition	30			0.00	0.00
Α	Open Space Good Condition	39			0.28	10.87
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			0.89	62.57
D	Open Space Good Condition	80			0.00	0.00
1/ Use only one	CN source per line. 959	75		Totals =	2.20	174.45

CN (weighted) =	total product	_=	174.45=	79.18	;	Use CN =	79
•	total area	•	2.20		•		

2.	Runoff

Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
1.40	3.82	5.38

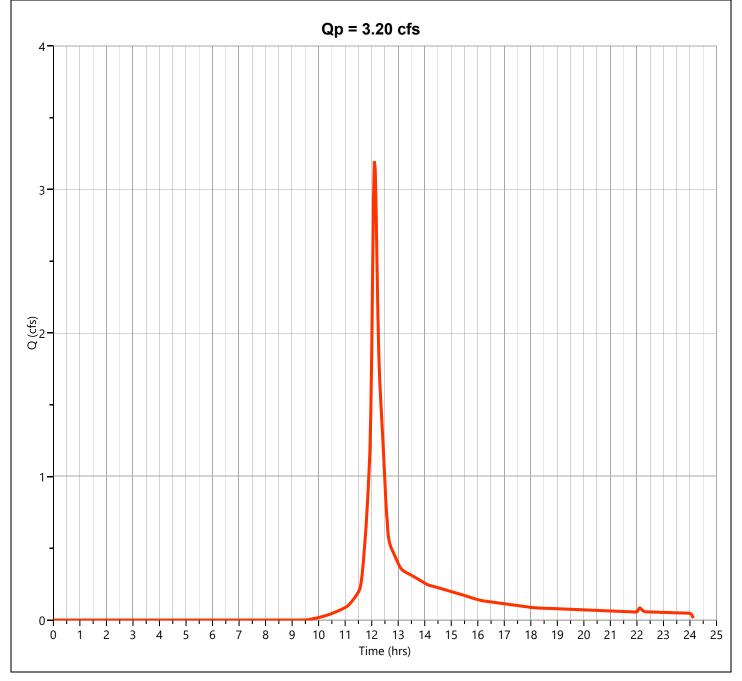
Project:

Athens Street

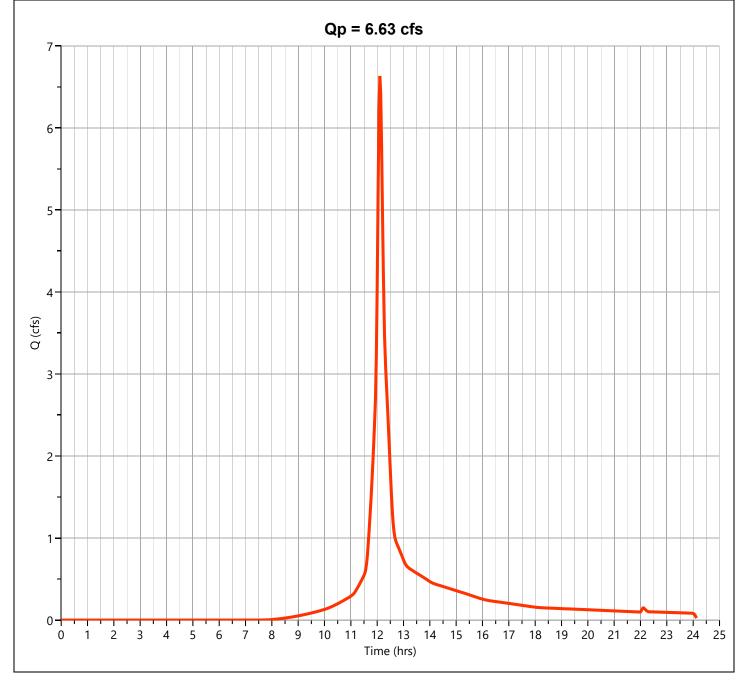
By PFK Date 6/21/2022

Location: Stow, MA		Checked		Rev Date	10/13/2022	
Circle one: Present Developed Circle one: Tc Tt	through subarea	Subcatchm				
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	20			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.070			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute T	t hr	0.08			0.08
Shallow concentrated Flow		Segment ID	B-C	C-D		
7. Surface Description (paved or unpaved)			UNPAVED	PAVED		
8. Flow Length, L		ft	47	489		
9. Watercourse slope, s		ft/ft	0.150	0.07		
10. Average Velocity, V (figure 3-1)		ft/s	6.25	5.38		
11. Tt = L / 3600V	Compute T	t hr	0.00	0.03		0.03
Channel flow		Segment ID				
<ul> <li>12. Cross sectional flow area, a</li> <li>13. Wetted perimeter, pw</li> <li>14. Hydraulic radius, r=a/wp</li> <li>15. Channel Slope, s</li> <li>16. Manning's roughness coeff., n</li> <li>17. V = 1.49 r^2/3 s^1/2 / n</li> <li>18. Flow length, L</li> </ul>	Compute r	ft/ft ft/s ft				
19. Tt = L / 3600V	Compute T	t hr				0
20. Watershed or subarea Tc or Tt (add Tt in ste	eps 6, 11, and	d 19)			hr min	0.11 6.7

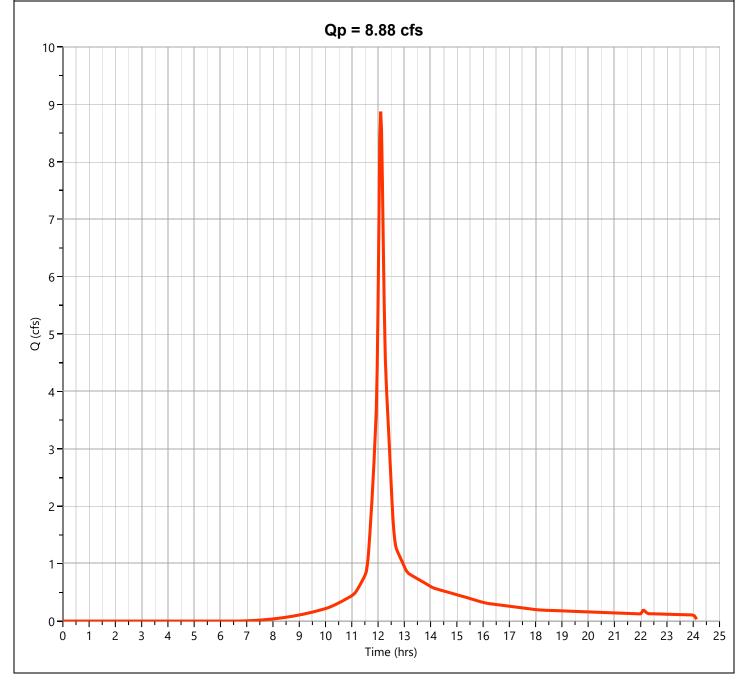
Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.197 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 11,097 cuft
Drainage Area	= 2.2 ac	Curve Number	= 79
Tc Method	= User	Time of Conc. (Tc)	= 6.7 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



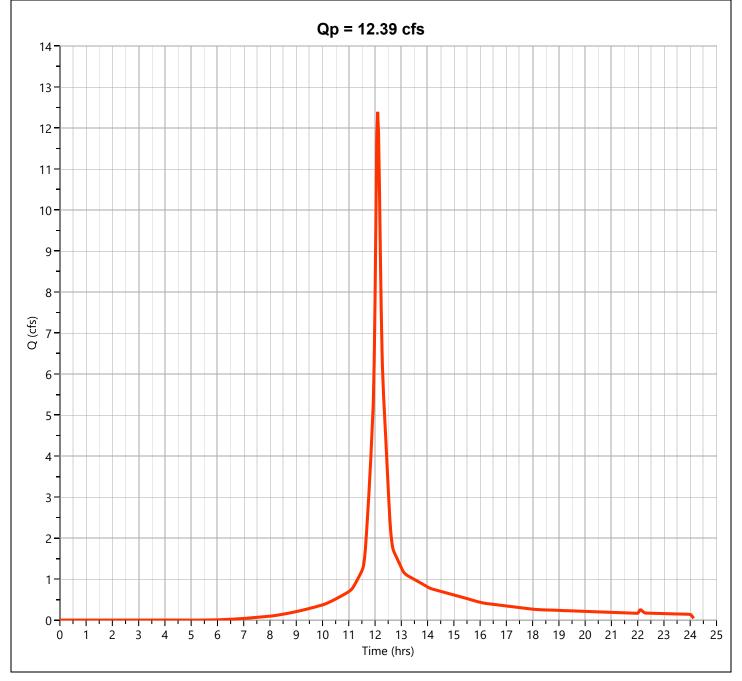
Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.634 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 22,649 cuft
Drainage Area	= 2.2 ac	Curve Number	= 79
Tc Method	= User	Time of Conc. (Tc)	= 6.7 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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



ydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs			
torm Frequency	= 2-yr	Time to Peak	= 16.13 hrs			
me Interval	= 2 min	Hydrograph Volume	= 0.002 cuft = 231.73 ft			
flow Hydrograph	= 28 - P-5D	Max. Elevation				
ond Name	= IB-5D	Max. Storage	= 7,020 cuft			
and Routing by Storage Inc	ication Method	Center of mass	s detention time = 4.15 h			
	Q <sub>I</sub>	o = 0.00 cfs				
47						
4						
3						
3-						
-						
2						
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-1		10 11 12 14 15 16 17 10	10 22 21			
0 1 2 3	4 5 6 7 8 9	10 11 12 13 14 15 16 17 18 Time (hrs)	19 20 21			

		reque erval				10- 2 m															to P ogra		olum	ie		2.47 3,511		
flo	w H	ydrog	grap	h	=	28	- P-5D Max. Eleva							/atior	ion = 232.28 ft													
on	d Na	ame			=	IB-	5D													Max	Stor	age			= 9	,862	cuft	
nd	Routii	ng by S	Storag	e Ind	dicatio	on M	ethod															Ce	enter d	of ma	ss det	tention	time =	2 m
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Hydrograph Type	= Pond Route	Peak Flow	= 4.544 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Hydrograph Volume	= 15,724 cuft
nflow Hydrograph	= 28 - P-5D	Max. Elevation	= 232.49 ft
Pond Name	= IB-5D	Max. Storage	= 11,090 cuft
Pond Routing by Storage Ind	dication Method		
	Qp = 4.54 cfs	<b>;</b>	
10			
-			
9			
-			
8-			
4			
7			
4			
6			
5			
(GTS)			
4			
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-			
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0			
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-1 -1 -1 -1 -1			
0 1 2	3 4 5 6 7 8 9 10 11 1. Time (hrs)	2 13 14 15 16 17 18	19 20 21
	— P-5D — IB-5I	D	

lydrograph Type	= Pond Route	Peak Flow	= 7.861 cfs
torm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
ïme Interval	= 2 min	Hydrograph Volume	= 27,675 cuft
nflow Hydrograph	= 28 - P-5D	Max. Elevation	= 232.88 ft
ond Name	= IB-5D	Max. Storage	= 13,292 cuft
ond Routing by Storage Ind	dication Method	Center of m	nass detention time = 2 m
	Qp = 7.86 cfs		
14			
13			
12 -			
1			
11			
10			
-			
9			
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5			
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-1 -1 -1 -1 -1			
0 1 2 3	4 5 6 7 8 9 10 11 12 13 1	4 15 16 17 18 19	20 21 22 23
	Time (hrs)		

## IB-5D Stage-Storage

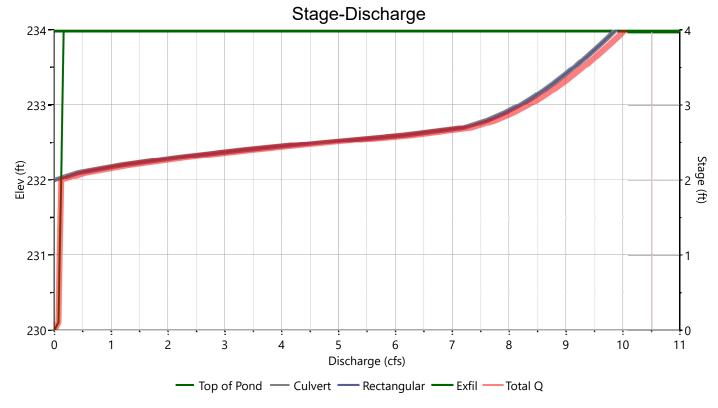
	Description  Bottom Elevation, ft  Voids (%)	<b>Input</b> 230.00	Stage (ft)	Elevation	Contour Area	Incr. Storage	Total Storage
		230.00		(ft)	(sqft)	(cuft)	(cuft)
	Voids (%)	200.00	0.00	230.00		0.000	0.000
		100.00	1.00	230.00	3,129 4,097	3,613	3,613
	Volume Calc	Ave End Area	2.00	232.00	5,259	4,678	8,291
	Volume Galo	7 WC End 7 WCd	3.00	233.00	6,149	5,704	13,995
			4.00	234.00	7,097	6,623	20,618
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233							3
-							
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-							
231							1
222							
230	2000 4000	6000 8000	1000	00 12000	14000 16	5000 18000	20000
J		0000		orage (cuft)	17000 10	7000	20000
				Top of Pon	d		

#### IB-5D

## Stage-Discharge

Out out / Outland	Orderant		Orifices		Poufouete d Piece	
Culvert / Orifices	Culvert	1	2	3	Perforated Riser	
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					
Woire	Riser*		Weirs		Anoillona	
Weirs	Riser	1*	2	3	Ancillary	
Shape / Type	Circular	Rectangular			Exfiltration, in/hr 1.02**	
Crest Elevation, ft		232				
Crest Length, ft		4				
Angle, deg						
Weir Coefficient, Cw		3.3				





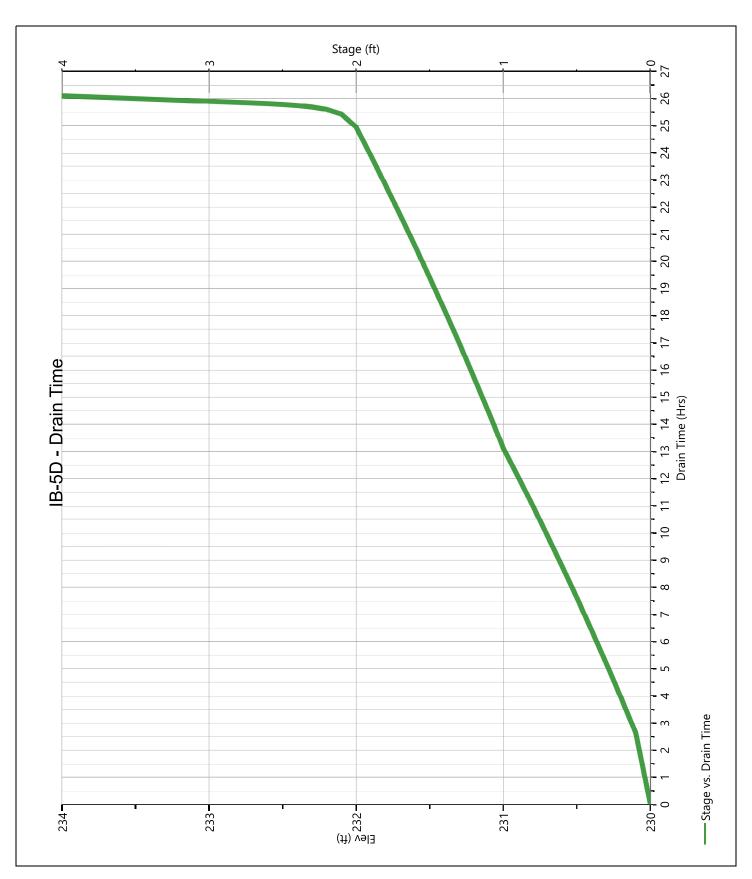
#### IB-5D

## **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	230.00	0.000	0.000					0.000				0.000		0.000
1.00	231.00	3,613	0.000					0.000				0.097		0.097
2.00	232.00	8,291	0.000					0.000				0.124		0.124
3.00	233.00	13,995	8.191 oc					8.191 s				0.145		8.337
3.00 4.00	233.00 234.00	13,995 20,618	8.191 oc 9.876 oc					8.191 s 9.876 s				0.145		8.337

# IB-5D

#### **Pond Drawdown**



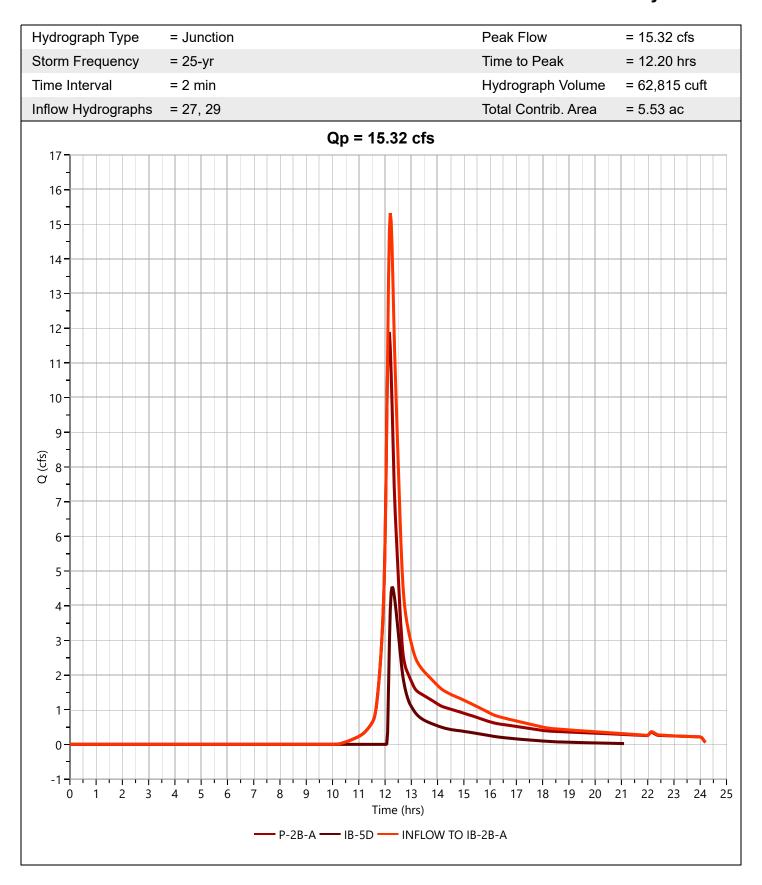
#### **INFLOW TO IB-2B-A**

Hydrograph Type	= Junction		Peak Flow	= 2.204 cfs
Storm Frequency	= 2-yr		Time to Peak	= 12.20 hrs
Time Interval	= 2 min		Hydrograph Volume	
nflow Hydrographs	= 27, 29		Total Contrib. Area	= 5.53 ac
3 7	<b>Q</b> p = 3	2.20 cfs		
2-				
- 1 (cts)				
0-				
-1 0 1 2 3	4 5 6 7 8 9 10 11	12 12 14 15	16 17 19 10 20	21 22 22 24 24
0 1 2 3		ime (hrs)	16 17 18 19 20 B-2B-A	21 22 23 24 23

#### **INFLOW TO IB-2B-A**

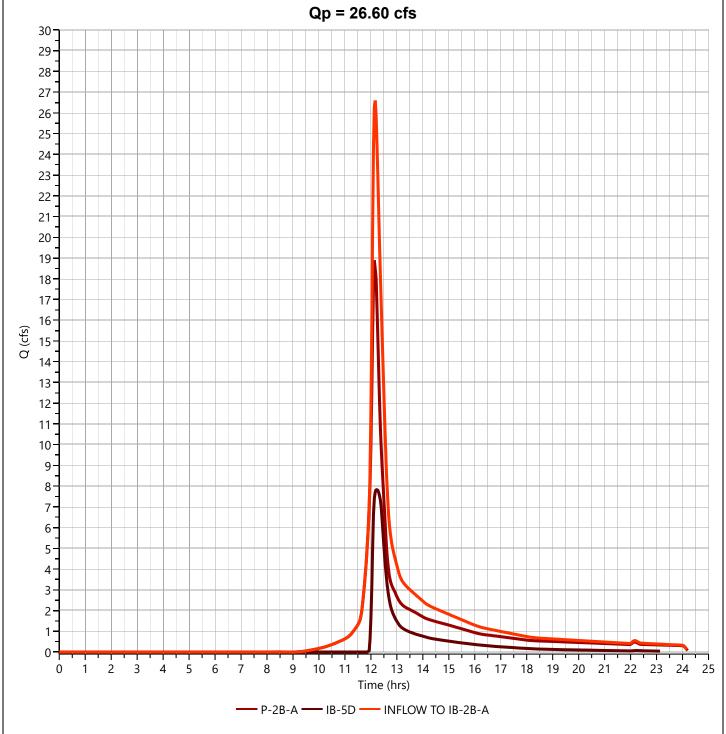
Hydrograph Type	= Junction	Peak Flow	= 7.748 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 40,272 cuft
Inflow Hydrographs	= 27, 29	Total Contrib. Area	= 5.53 ac
	Qp = 7.75 cfs		
87			
_			
7 -			
-			
6-			
-			
5			
-			
4-			
Q (cfs)			
Ö			
3			
_			
2			
-			
1 -			
-			
0			
-1	<del></del>		
0 1 2 3	4 5 6 7 8 9 10 11 12 13 14 1 Time (hrs)		
	— P-2B-A — IB-5D — INFLOW TO	IB-2B-Δ	
	וואו בסרים אי ביי אי ביי וואו בסרים אי	ID ED A	

#### **INFLOW TO IB-2B-A**



#### **INFLOW TO IB-2B-A**

Storm Frequency Time Interval	= 100-yr = 2 min	Time to Peak Hydrograph Volume	= 12.17 hrs = 101,026 cuft
Inflow Hydrographs	= 27, 29	Total Contrib. Area	= 5.53 ac

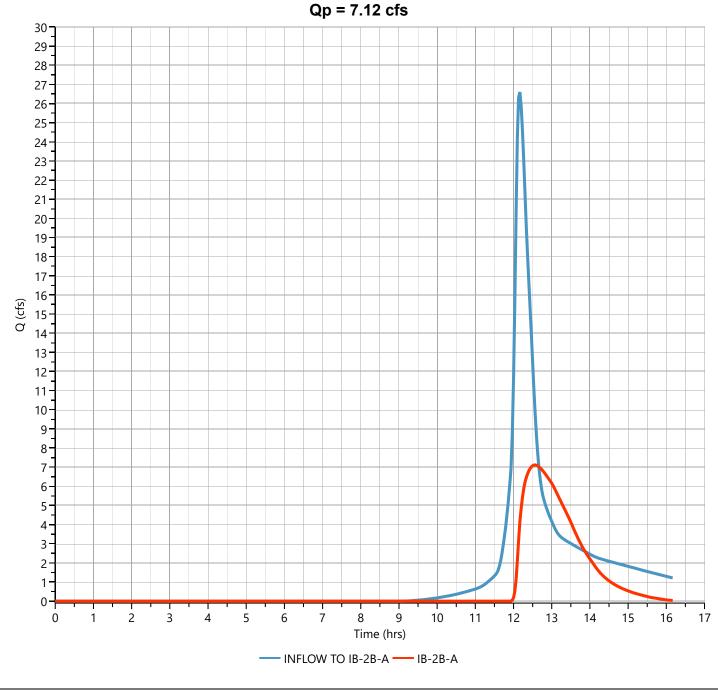


Hydrograp	h Type	= Por	nd Route					F	Peak Flow	/	= 0.0	00 cfs
Storm Free	quency	= 2-yı	-					T	Time to Pe	eak	= 12.	50 hrs
Time Inter	val	= 2 m	in					H	Hydrograp	h Volume	= 0.0	00 cuft
Inflow Hyd	lrograph	= 30 -	· INFLOV	V TO IB	-2B-A			N	Лах. Elev	ation	= 229	9.10 ft
Pond Nam	ne	= IB-2	2B-A					N	Лах. Stora	age	= 1,0	06 cuft
Pond Routing	by Storage In	dication Me	ethod									
					Qp	= 0.00	) cfs					
3												
-												
2												
-												
(fs)												
(cfs) 1												
0-												
_1												
-1 <del>-1 + +</del> 0	1	2	3	4	5	6	7	8	9	10	11	12 1
						Time						
					INFLOW <sup>-</sup>	TO IB-2B	-A <u> </u>	B-2B-A				

lydrograph Type	= Pond Route		Peak Flow	= 1.516 cfs
torm Frequency	= 10-yr		Time to Peak	= 12.63 hrs
ime Interval	= 2 min		Hydrograph Volume	= 5,181 cuft
nflow Hydrograph	= 30 - INFLOW	TO IB-2B-A	Max. Elevation	= 229.90 ft
ond Name	= IB-2B-A		Max. Storage	= 8,937 cuft
ond Routing by Storage Ind	lication Method			
87		Qp = 1.52 cfs		
1				
7			<del>                                     </del>	
4				
6				
1				
5				
_				
4				
4 -				
(GS)				
3				
-				
2				
1				
1				
0				
0 1 2	3 4	5 6 7 8 Time (hrs)	9 10 11 12	13 14

Hydrograph Type	= Pond Route	Peak Flow	= 4.277 cfs	
Storm Frequency	= 25-yr	Time to Peak	= 12.57 hrs	
Time Interval	= 2 min	Hydrograph Volume	= 17,500 cuft	
nflow Hydrograph	= 30 - INFLOW TO IB-2B-A	Max. Elevation	= 230.44 ft	
Pond Name	= IB-2B-A	Max. Storage	= 15,611 cuft	
Pond Routing by Storage In	dication Method			
4.7	Qp = 4.28 cfs			
17 -				
16				
15				
14				
13				
-				
12 -				
11 -				
10				
9				
0 8 d d d d d d d d d d d d d d d d d d				
7 -				
6				
5				
4				
3 -				
-				
2				
1 🖠				
0				
-1				
0 1 2		10 11 12 13	14 15	
	Time (hrs)  — INFLOW TO IB-2B-A — IB-2			

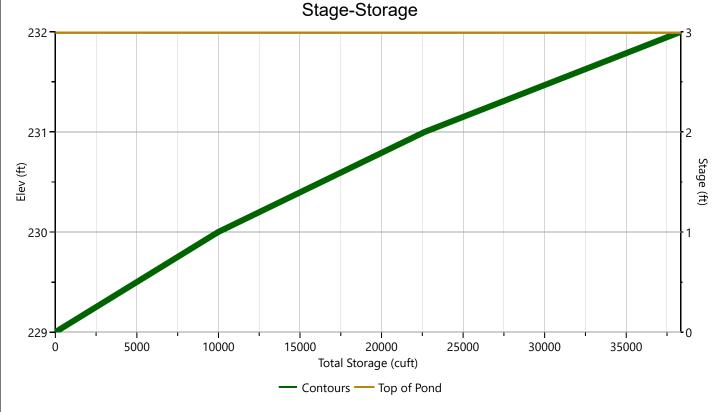
= Pond Route	Peak Flow	= 7.117 cfs
= 100-yr	Time to Peak	= 12.57 hrs
= 2 min	Hydrograph Volume	= 40,738 cuft
= 30 - INFLOW TO IB-2B-A	Max. Elevation	= 231.38 ft
= IB-2B-A	Max. Storage	= 28,543 cuft
ication Method		
i	= 100-yr = 2 min = 30 - INFLOW TO IB-2B-A = IB-2B-A	= 100-yr Time to Peak = 2 min Hydrograph Volume = 30 - INFLOW TO IB-2B-A Max. Elevation = IB-2B-A Max. Storage



#### IB-2B-A

## Stage-Storage

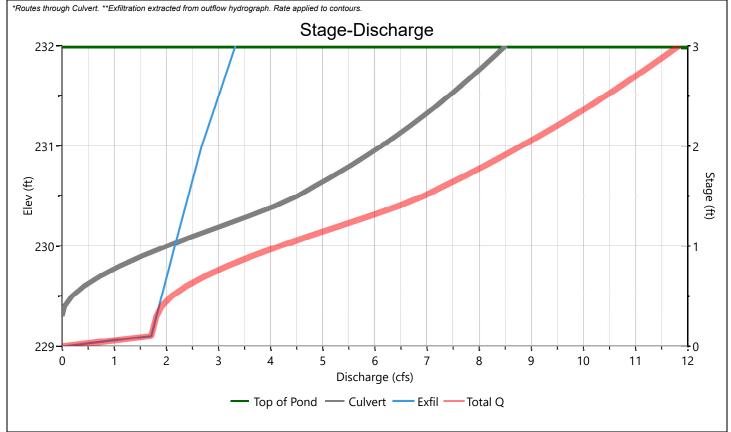
User Defined Conto	ırs	Stage / Storage Table					
Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)	
Bottom Elevation, ft	229.00						
Voids (%)	100.00	0.00 1.00	229.00 230.00	8,666 11,305	0.000 9,986	0.000 9,986	
Volume Calc	Ave End Area	2.00	231.00	14,000	12,653	22,638	
		3.00	232.00	17,383	15,692	38,330	
		ı	_		<u> </u>		
	S	Stage-S	Storage				



#### IB-2B-A

## Stage-Discharge

Cultivant / Outlines	Culvent		Orifices		Doufounted Dio	
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	229.30				Height, ft	
Orifice Coefficient, Co	0.60				Orifice Coefficient, Co	
Length, ft	60					
Barrel Slope, %	1					
N-Value, n	0.012					
Weirs	Riser*	Weirs		Ancillary		
vveirs	Kisei	1	2	3	Ancillary	
Shape / Type					Exfiltration, in/hr	8.27**
Crest Elevation, ft						
Crest Length, ft						
Angle, deg						
Weir Coefficient, Cw						

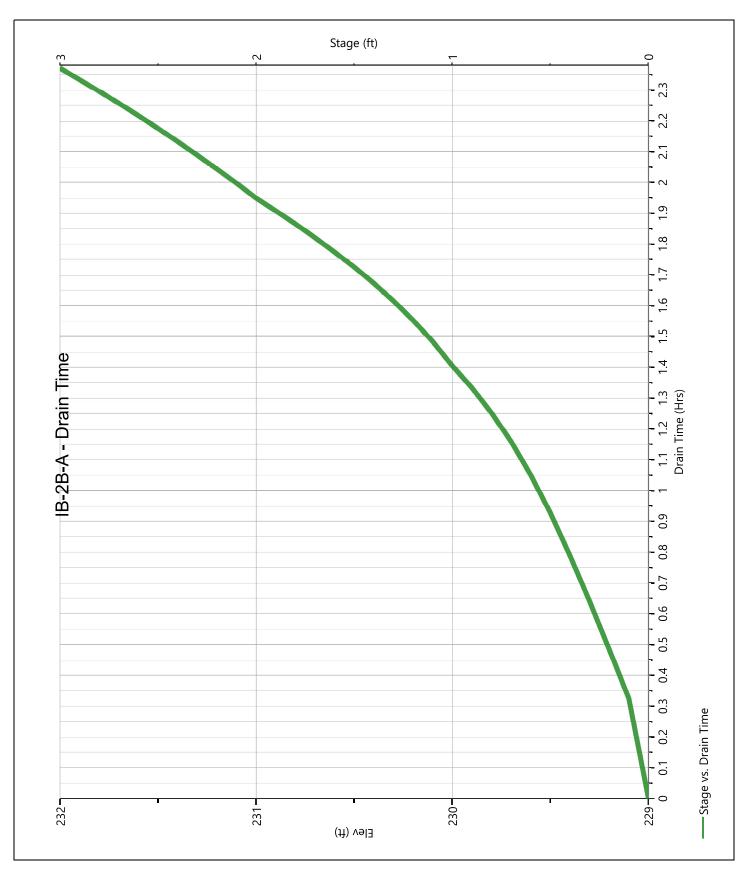


#### IB-2B-A

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

Stage	Elev.	Storage	Culvert	C	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	229.00	0.000	0.000									0.000		0.000
1.00	230.00	9,986	2.016 ic									2.164		4.180
2.00	231.00	22,638	6.126 ic									2.680		8.806
3.00	232.00	38,330	8.511 ic									3.328		11.84
		L					l		l	l	l			

## IB-2B-A Pond Drawdown



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

SM-3719C

Project:	Athens Street		Ву	NC	Date	10/13/22	
					Rev Date		
_ocation:	Stow, MA		Checked		Date		
Circle one:	Present	Developed	Subcatchment	P-2B-B			

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			7.63	228.79
А	Open Space Good Condition	39			2.63	102.40
Α	Open Space Fair Condition	49			0.00	0.00
Α	Woods-Grass Good Condition	32			0.00	0.00
Α	Gravel	76			0.03	2.16
В	Woods Good Condition	55			0.00	0.00
В	Open Space Good Condition	61			0.00	0.00
С	Gravel	89			0.01	1.32
С	Woods Good Condition	70			0.85	59.22
С	Open Space Fair Condition	79			0.00	0.00
С	Open Space Good Condition	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.			Totals =	15.81	751.52

CN (weighted) =	total product	_=	751.52 =	47.55 ;	Use CN =	48
'	total area		15.81			

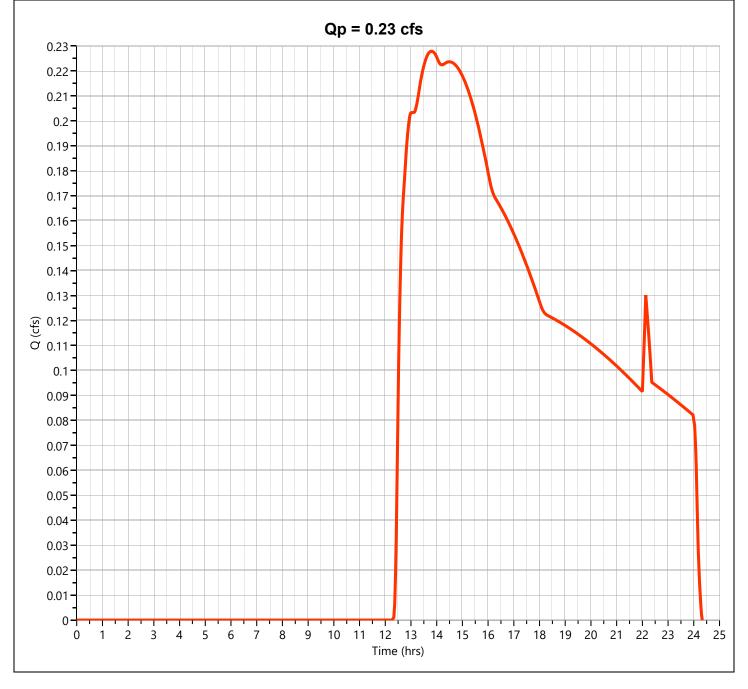
2. Runoff

Frequency	yr
Rainfall, P (24-hour)	in
Runoff, Q	in

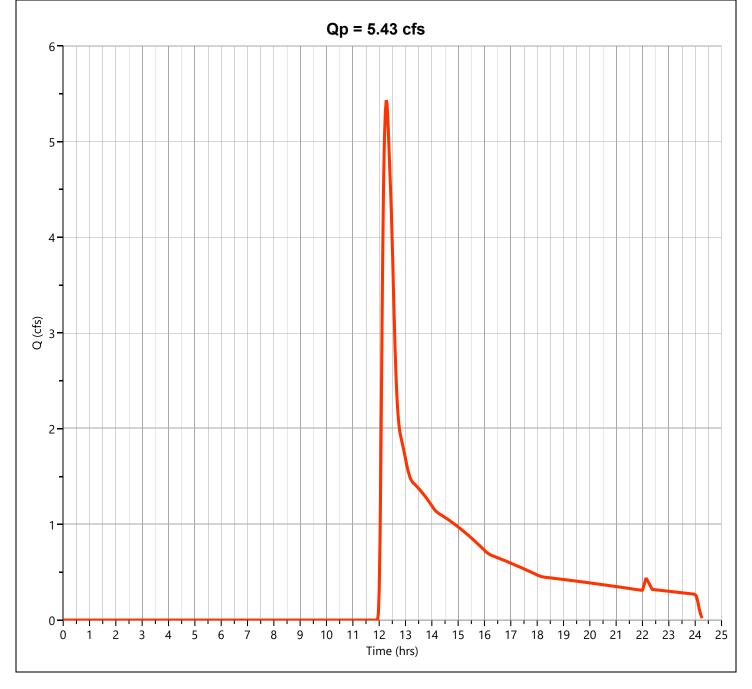
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.09	1.03	1.90

Project:	Athens Street	-	Ву	NC		10/13/2022	
Location:	Stow, MA	_	Checked		Rev Date Date		
Circle one: Circle one:	Present Developed Tc Tt	through subarea	Subcatchme	ent P-2B-B			
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	0.094			
6. Tt = 0.00	7 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.16			0.16
Shallow cor	ncentrated Flow		Segment ID	B-C			
7. Surface l	Description (paved or unpaved)			UNPAVED			
8. Flow Ler	ngth, L		ft	644			
9. Waterco	urse slope, s		ft/ft	0.110			
10. Average	e Velocity, V (figure 3-1)		ft/s	5.35			
11. Tt = L /	3600V	Compute Tt	hr	0.03			0.03
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. Waters	hed or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	d 19)			hr min	0.19 11.3

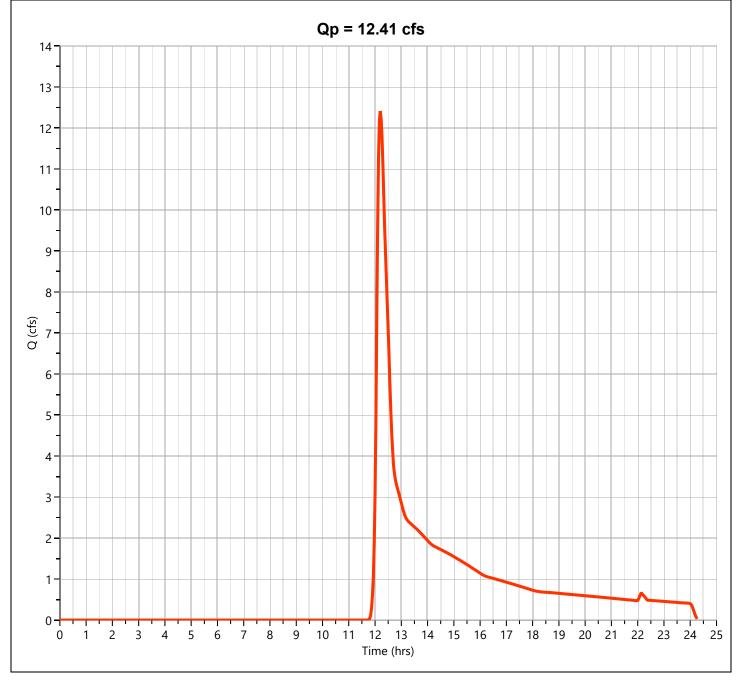
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.228 cfs
Storm Frequency	= 2-yr	Time to Peak	= 13.80 hrs
Time Interval	= 2 min	Runoff Volume	= 6,036 cuft
Drainage Area	= 15.81 ac	Curve Number	= 48
Tc Method	= User	Time of Conc. (Tc)	= 11.3 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



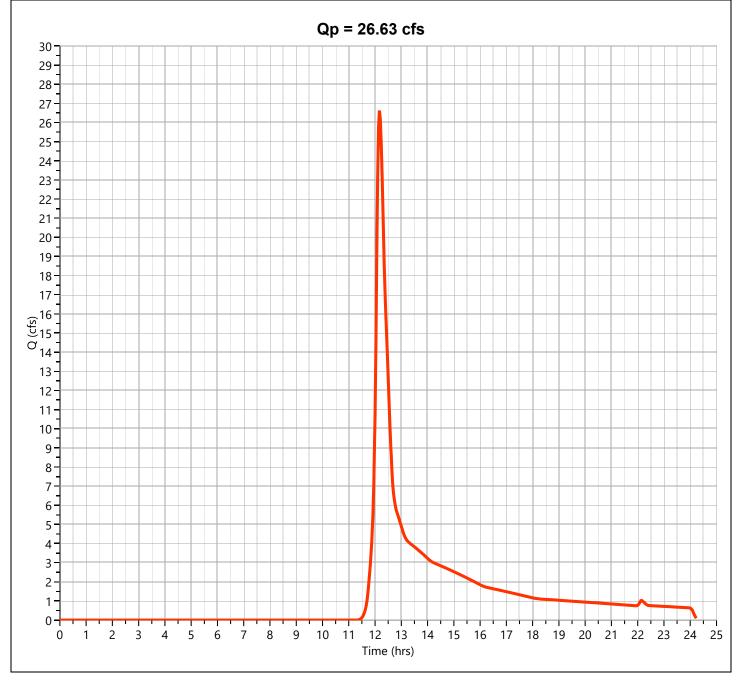
Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.432 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Runoff Volume	= 35,644 cuft
Drainage Area	= 15.81 ac	Curve Number	= 48
Tc Method	= User	Time of Conc. (Tc)	= 11.3 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



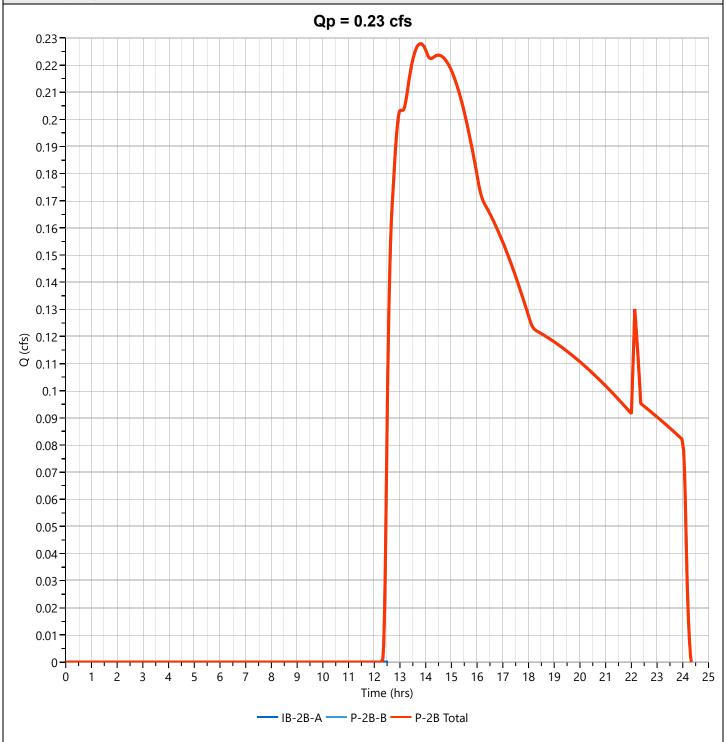
Hydrograph Type	= NRCS Runoff	Peak Flow	= 12.41 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 63,102 cuft
Drainage Area	= 15.81 ac	Curve Number	= 48
Tc Method	= User	Time of Conc. (Tc)	= 11.3 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 26.63 cfs		
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs		
Time Interval	= 2 min	Runoff Volume = 115,404 cu			
Drainage Area	= 15.81 ac	Curve Number	= 48		
Tc Method	= User	Time of Conc. (Tc)	= 11.3 min		
Total Rainfall	= 7.84 in	Design Storm	= Type III		
Storm Duration	= 24 hrs	Shape Factor	= 484		



Hydrograph Type	= Junction	Peak Flow	= 0.228 cfs
Storm Frequency	= 2-yr	Time to Peak	= 13.80 hrs
Time Interval	= 2 min	Hydrograph Volume	= 6,036 cuft
Inflow Hydrographs	= 31, 32	Total Contrib. Area	= 15.81 ac



Hydrograph Type	= Junction	Peak Flow	= 5.869 cfs	
Storm Frequency	= 10-yr	Time to Peak	= 12.30 hrs	
Time Interval	= 2 min	Hydrograph Volume	= 40,825 cuft	
Inflow Hydrographs	= 31, 32	Total Contrib. Area	= 15.81 ac	
	Qp = 5.87 cfs			
6				
	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-2B-A —— P-2B-B —— P-2B Tot	tal		

Hydrograph Type	= Junction	Peak Flow	= 14.25 cfs	
Storm Frequency	= 25-yr	Time to Peak		
īme Interval	= 2 min	Hydrograph Volume		
nflow Hydrographs	= 31, 32	Total Contrib. Area	= 15.81 ac	
	Qp = 14.25	cfs		
16 -				
15				
14 -				
13				
12				
11 -				
10				
9-				
-				
O (GE)				
7 -				
6-				
5				
4				
-				
3 -				
2				
1-				
0				
-1				
0 1 2 3	4 5 6 7 8 9 10 11 12 1 Time (h	3 14 15 16 17 18 19 20	21 22 23 24	
	—— IB-2B-A —— P-2B-B —	13)		

			Peak Flow		= 31.04 cfs	
Storm Frequency = 100-yr			Time to Peak Hydrograph Volume Total Contrib. Area		= 12.20 hrs = 156,142 cuft = 15.81 ac	
īme Interval	= 2 min					
nflow Hydrographs						
	Qp = 31.04 d	fs				
35 -						
34 -						
33 -						
32 -						
31 -						
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0						<u> </u>
0 1 2 3	4 5 6 7 8 9 10 11 12 13	3 14 1!	5 16 17 <i>′</i>	18 19 20	21 22 23	24

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

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			0.40	39.67
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			0.68	50.43
С	Gravel	89			0.00	0.00
1/ Use only one	e CN source per line. 473	17		Totals =	1.09	90.10

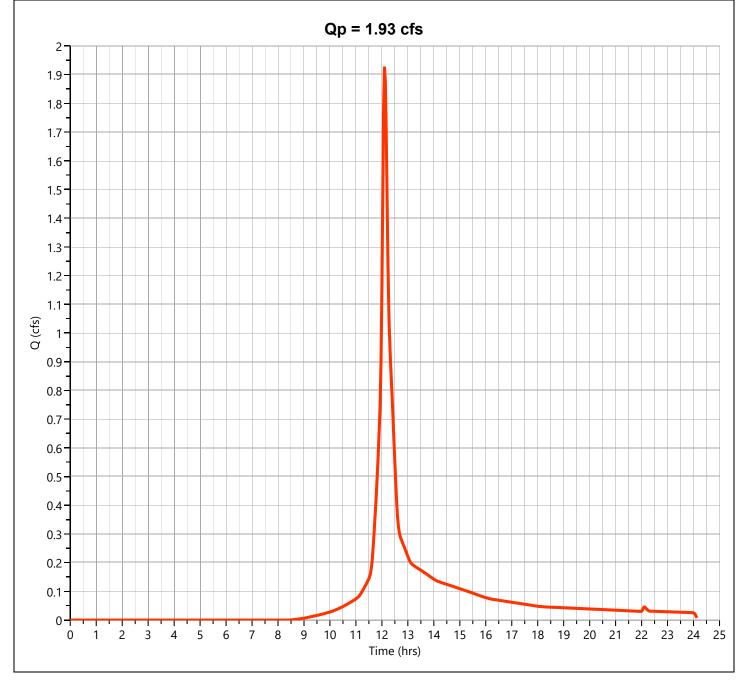
CN (weighted) =	total product	_=	90.10 =	82.94 ;	Use CN =	83
'	total area	•	1.09			

2.	Runoff

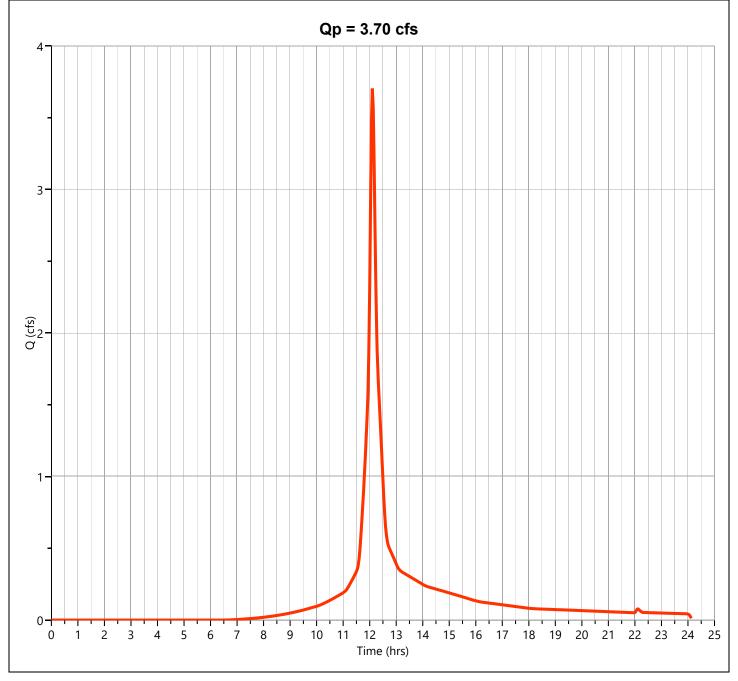
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
1.66	4.22	5.82

Project:	Athens Street	-	Ву	PFK		6/21/2022	
Location:	Stow, MA	-	Checked		Date	10/13/2022	
Circle one: Circle one:	Present Developed Tc Tt	through subarea	Subcatchm	nent P-3A			
Sheet flow	_(Applicable to Tc only)		Segment ID	А-В			
1. Surface	Description (table 3-1)			GRASS			
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	0.030			
6. Tt = 0.00	07 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Ti	hr	0.12			0.12
Shallow co	ncentrated Flow		Segment ID	B-C	C-D		
7. Surface	Description (paved or unpaved)			UNPAVED	PAVED		
8. Flow Ler	ngth, L		ft	78	259		
9. Waterco	urse slope, s		ft/ft	0.050	0.070		
10. Averag	e Velocity, V (figure 3-1)		ft/s	3.61	5.38		
11. Tt = L /	3600V	Compute Ti	t hr	0.01	0.01		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	ngth, L	Compute Ti	ft				0
	hed or subarea Tc or Tt (add Tt in ste		ļ			hr min	0.14 8.2

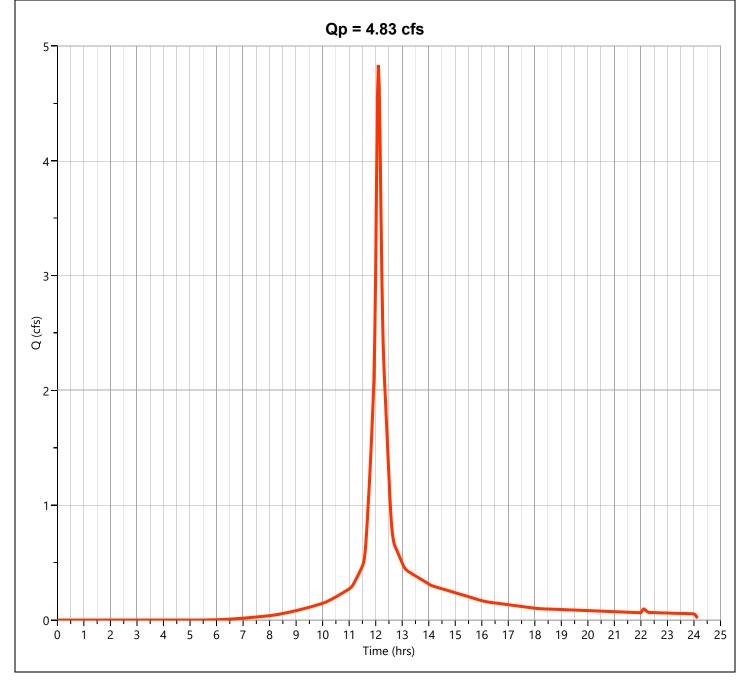
Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.928 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 6,595 cuft
Drainage Area	= 1.09 ac	Curve Number	= 83
Tc Method	= User	Time of Conc. (Tc)	= 8.2 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



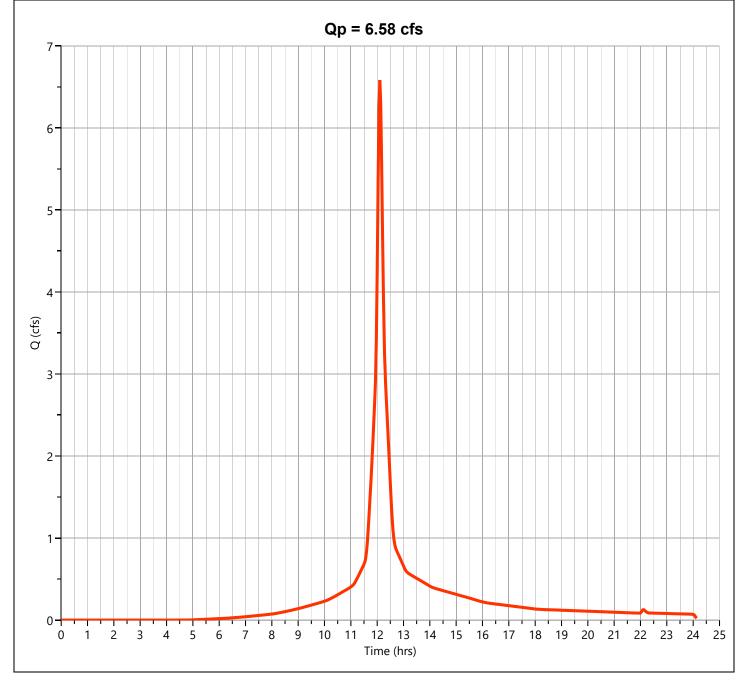
Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.704 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 12,702 cuft
Drainage Area	= 1.09 ac	Curve Number	= 83
Tc Method	= User	Time of Conc. (Tc)	= 8.2 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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



0.1-

Hydrology Studio v 3.0.0.21 10-27-2022

Hydrograph Type	= Pond Route		Peak Flow	= 0.473 cfs
Storm Frequency	= 2-yr		Time to Peak	= 12.47 hrs
Time Interval	= 2 min		Hydrograph Volume	= 2,397 cuft
nflow Hydrograph	= 3 - P-3A		Max. Elevation	= 290.19 ft
Pond Name	= IB-3A		Max. Storage	= 2,228 cuft
Pond Routing by Storage In	dication Method			
		Qp = 0.47 cfs		
2				
1.9				
1.8				
1.7				
1.6				
1.5				
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1.1				
(St) 1				
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0.3				
0.2				

10

8 Time (hrs)

— P-3A — IB-3A

Lludrograph Tuna	- Dond Pouto	Dook Flow	= 1.404 cfs
Hydrograph Type	= Pond Route	Peak Flow	
Storm Frequency	= 10-yr	Time to Peak	= 12.37 hrs
Time Interval	= 2 min	Hydrograph Volume	= 7,033 cuft
Inflow Hydrograph	= 3 - P-3A	Max. Elevation	= 290.93 ft
Pond Name	= IB-3A	Max. Storage	= 3,938 cuft
Pond Routing by Storage Indi			
	Qp = 1.40 cfs		
2- (\$j) O			
-1 0 1 2	3 4 5 6 7 8 9 10 11  Time (hrs)  — P-3A — IB-3A	12 13 14 15	16 17 18 19

ydrograph Type torm Frequency	= Pond Route = 25-yr	Peak Flow Time to Peak	= 1.995 cfs = 12.33 hrs
ime Interval	= 2 min	Hydrograph Volume	= 10,323 cuft
flow Hydrograph	= 3 - P-3A	Max. Elevation	= 291.30 ft
ond Name	= IB-3A	Max. Storage	= 4,993 cuft
ond Routing by Storage Ind	ication Method		
_	Qp = 2.00 cfs		
5			
4-			
4			
3			
-			
2			
1			
1			
'			
_			
0			
-			
0 1 2	3 4 5 6 7 8 9 10 1: Time (hrs)	1 12 13 14 15 16	17 18 19

ydrograph Type	= Pond Route	Peak Flow	= 2.929 cfs
torm Frequency	= 100-yr	Time to Peak	= 12.30 hrs
ime Interval	= 2 min	Hydrograph Volume	= 15,808 cuft
nflow Hydrograph	= 3 - P-3A	Max. Elevation	= 291.83 ft
ond Name	= IB-3A	Max. Storage	= 6,527 cuft
ond Routing by Storage Ind	ication Method		
	Qp = 2.93 cfs		
7			
4			
6			
4			
5			
4			
-			
S 3			
2 ,		$lack egin{array}{c c c c c c c c c c c c c c c c c c c $	
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1			
1-	<u> </u>		
1			
0			
1			
-1			
0 1 2	3 4 5 6 7 8 9 10 11 12 Time (hrs)	13 14 15 16 17	18 19 20

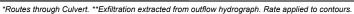
# IB-3A Stage-Storage

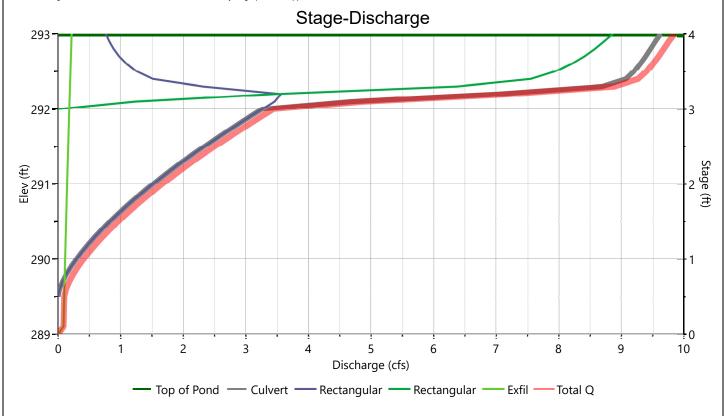
	User Defi	ned Con	tours Stage / Storage Table									
	Description Input				Stage Elevation Contour Area (ft) (ft) (sqft)				Incr. Storage (cuft)		Total Storage (cuft)	
	Bottom E	Elevation, ft	t 2	89.00						(0)		
		Voids (%)	) 1	00.00	0.00	289.00	1,5		0.000		0.000	
					1.00 2.00	290.00 291.00	2,0 2,6		1,787 2,325		1,787 4,112	
	Vo	olume Calc	;	None	3.00	291.00	3,2		2,920		7,032	
					4.00	293.00	3,9		3,571		10,602	
						200.00	0,0		5,5		.0,002	
					34 C	<b>N</b>						
				3	stage-s	Storage						
293											4	
-												
292											3	
1												
<u>-</u>											2	
291 <del>-</del>											2 9	
-												
290											1	
4												
289	1			1	1	1 1	ı	I		ı	0	
0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	
					Total Sto	rage (cuft)						
				<u> </u>	ontours =	Top of Po	nd					

#### IB-3A

# Stage-Discharge

Culvert / Orifices	Culvent		Orifices		Doufounted 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					
Maine	Riser*	Weirs			A w a illa m .	
Weirs	KISEI"	1*	2*	3	Ancillary	
Shape / Type	Circular	Rectangular	Rectangular		Exfiltration, in/hr	2.41**
Crest Elevation, ft		289.5	292			
Crest Length, ft		.25	11.75			
Angle, deg						
Weir Coefficient, Cw		3.3	3.3			



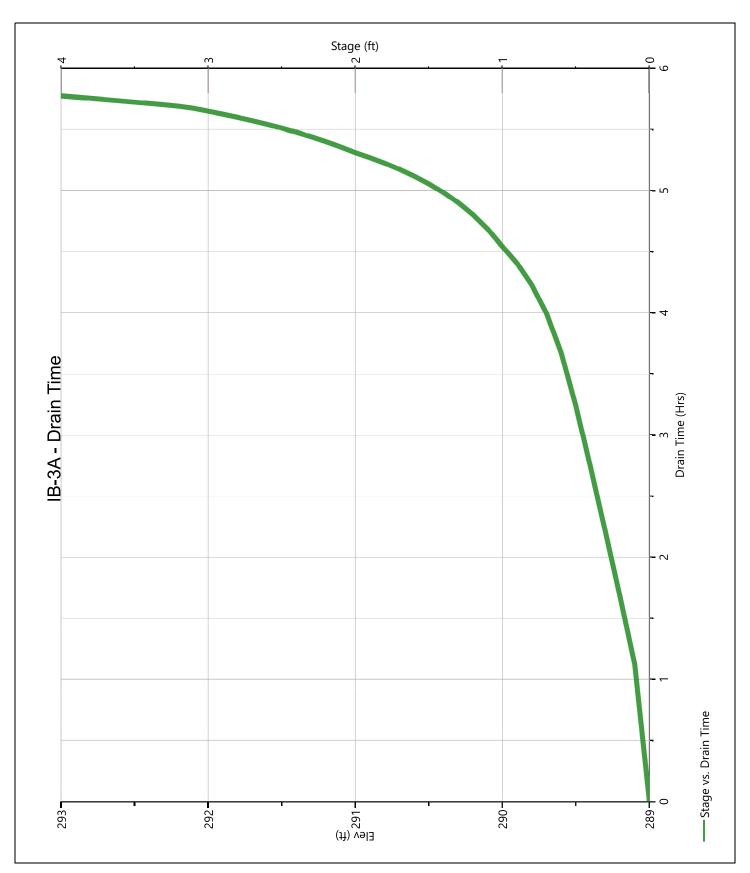


#### IB-3A

# **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	289.00	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			0.114		0.406
2.00	291.00	4,112	1.516 ic					1.516	0.000			0.145		1.661
3.00	292.00	7,032	3.261 ic					3.261	0.000			0.180		3.441
4.00	293.00	10,602	9.628 ic					0.763 s	8.865 s			0.218		9.846

#### IB-3A Pond Drawdown



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

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			0.00	0.00
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
С	Woods Good Condition	70			7.27	509.21
С	Open Space Good Condition	74			0.90	66.27
С	Gravel	89			0.35	30.80
1/ Use only one	CN source per line. 3709	60		Totals =	8.52	606.28

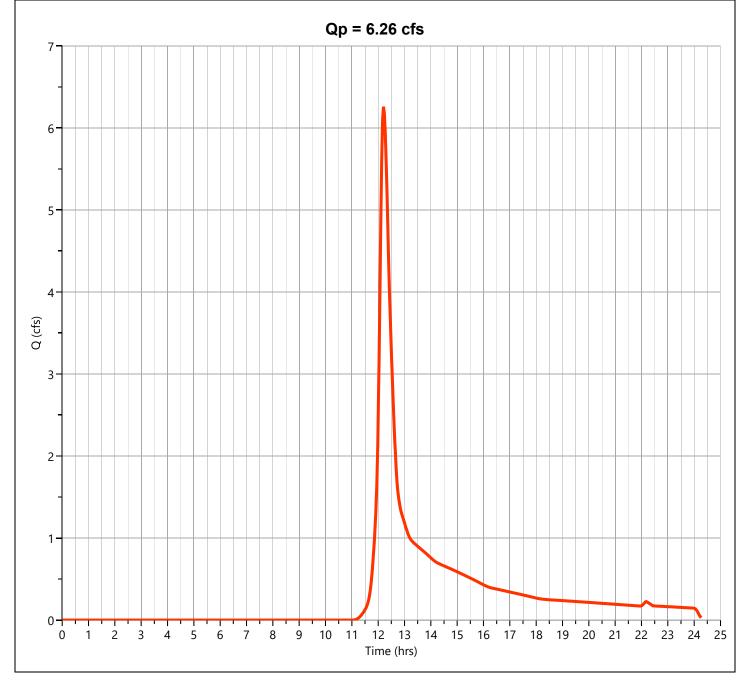
CN (weighted) =	total product	_=	606.28 =	71.19	;	Use CN =	71
	total area	_	8.52				

2	Runoff	

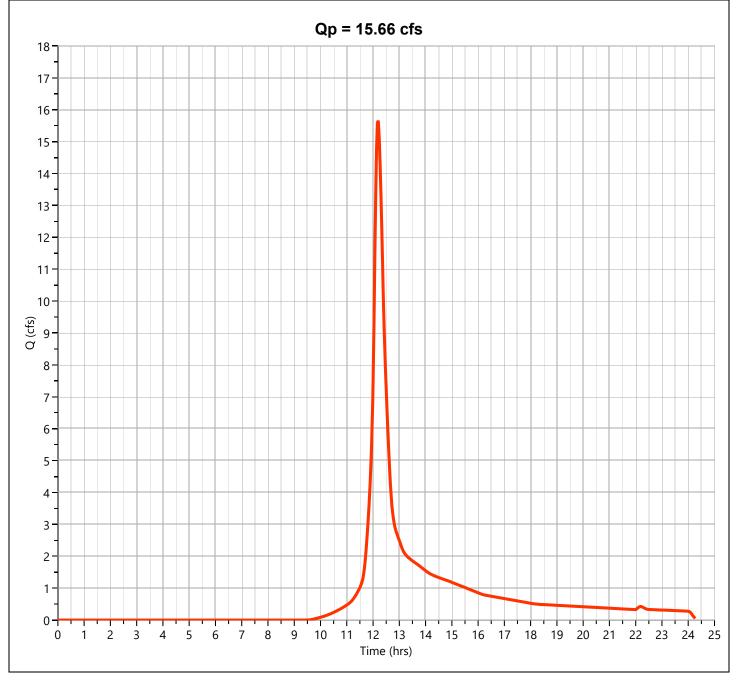
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.93	3.03	4.46

Project:	Athens Street	_	Ву	PFK	Date	6/21/2022	
Lagation	Ctour MA		Charlend			10/13/2022	
Location:	Stow, MA	-	Checked		. Date		
Circle one:	Present Developed	]	Subcatchm	nent P-3B	_		
Circle one:	Tc Tt	through			•		
		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			
Z. Mailing	s roughness coen., if (table 3-1)			0.0			
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	0.049			
6 Tt = 0.00	7 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	br	0.20			0.20
0. 11 - 0.00	(IL) 0.07 (I 2 0.3 3 0.4)	Compute 11	. 111	0.20			0.20
Shallow cor	ncentrated Flow		Segment ID	B-C			
			Ü				
7. Surface	Description (paved or unpaved)			UNPAVED			
			_				
8. Flow Ler	igth, L		ft	469			
9 Waterco	urse slope, s		ft/ft	0.140			
3. Waterco	urse stope, s		TUTE	0.140			
10. Average	e Velocity, V (figure 3-1)		ft/s	6.04			
11. Tt = L /	3600V	Compute Tt	t hr	0.02			0.02
01			0				
Channel flo	<u>w</u>		Segment ID				
12. Cross s	ectional flow area, a		sf				
	perimeter, pw		ft				
	lic radius, r=a/wp	Compute r	ft				
15. Channe		·	ft/ft				
	g's roughness coeff., n						
	9 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow le		•	ft				
19. Tt = L /	=	Compute Tt					0
		•					
20. Waters	hed or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	d 19)			hr	0.22
						min	13.4

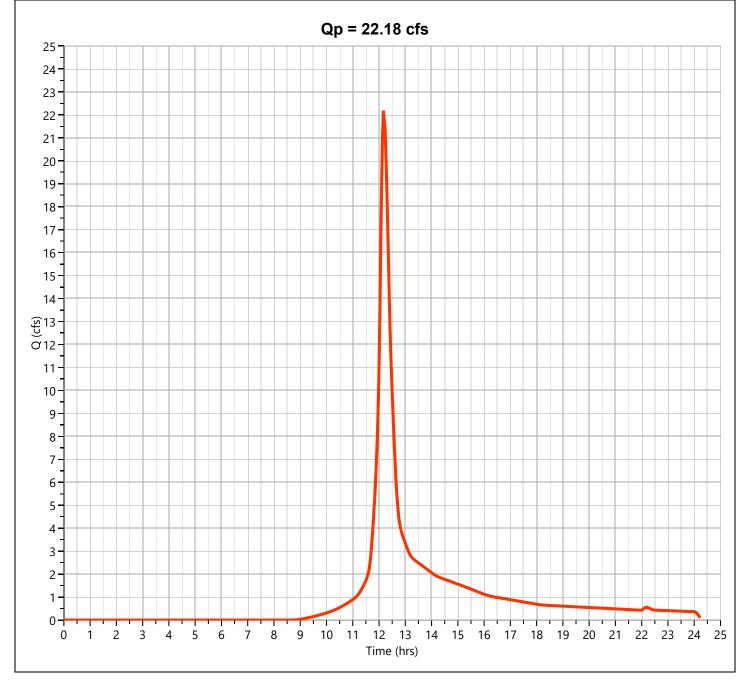
Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.260 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 27,756 cuft
Drainage Area	= 8.52 ac	Curve Number	= 71
Tc Method	= User	Time of Conc. (Tc)	= 13.4 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



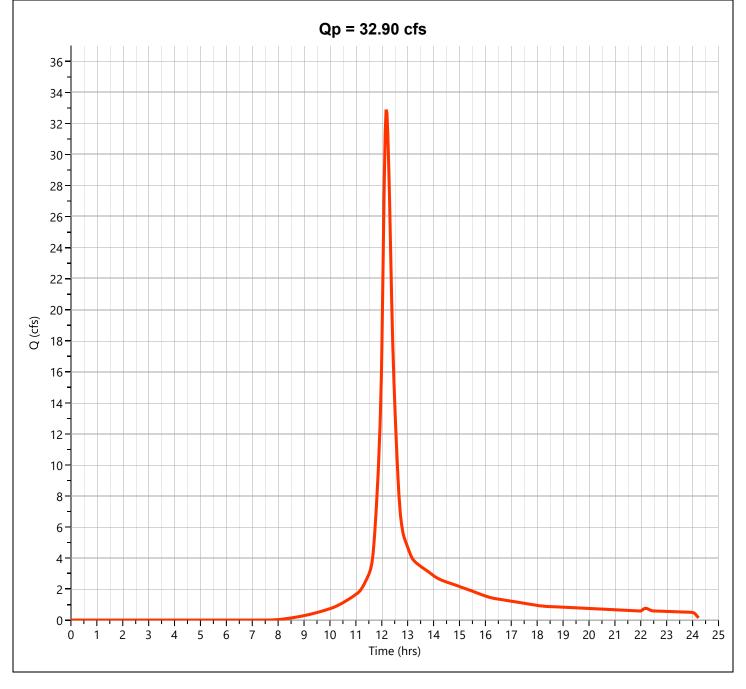
Hydrograph Type	= NRCS Runoff	Peak Flow	= 15.66 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 64,735 cuft
Drainage Area	= 8.52 ac	Curve Number	= 71
Tc Method	= User	Time of Conc. (Tc)	= 13.4 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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



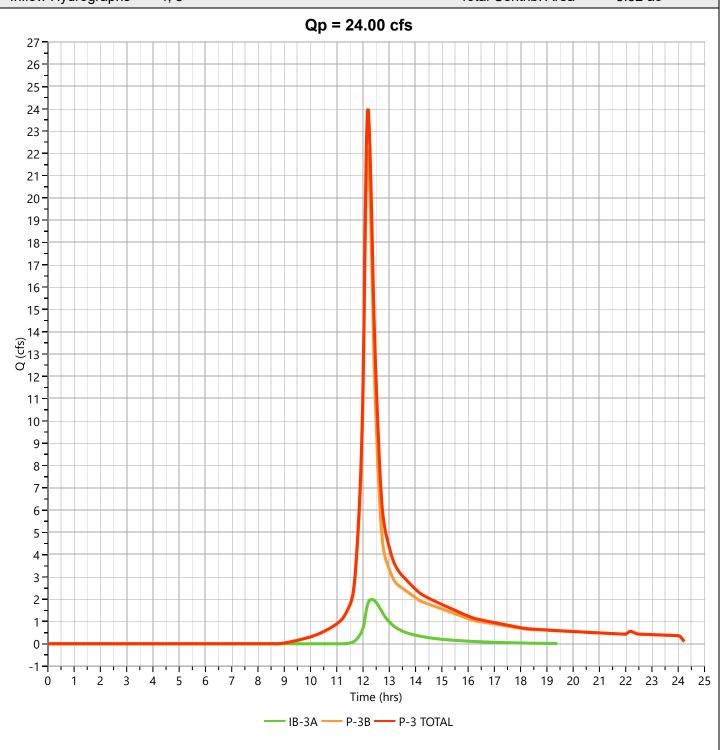
Hydrograph Type	= NRCS Runoff	Peak Flow	= 32.90 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 133,902 cuft
Drainage Area	= 8.52 ac	Curve Number	= 71
Tc Method	= User	Time of Conc. (Tc)	= 13.4 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration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



Hydrograph Type	= Junction	Peak Flow	= 6.575 cfs					
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs					
Time Interval	= 2 min	Hydrograph Volume	= 30,154 cuft					
Inflow Hydrographs	= 4, 5	Total Contrib. Area						
	Qp = 6.57 cfs							
7-								
6-								
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O (cfs) 3								
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-1-		16 17 10 10 0	21 22 22 25					
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					
	—— IB-3A —— P-3B —— P-3 TOTA	L						

Hydrograph Type	= Junction	Peak Flow	= 16.89 cfs	
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs	
ïme Interval	= 2 min	Hydrograph Volume	= 71,767 cuft	
nflow Hydrographs	= 4, 5	Total Contrib. Area	= 8.52 ac	
	Qp = 16.89 cfs			
19				
18 -				
17 -				
16				
15 -				
14 -				
13				
12				
11 -				
10				
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7				
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4 -				
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2				
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0				
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-3A —— P-3B —— P-3			

Inflow Hydrographs	= 4, 5	Total Contrib. Area	= 8.52 ac
Time Interval	= 2 min	Hydrograph Volume	= 101,147 cuft
Storm Frequency	= 25-yr	Time to Peak	= 12.20 hrs
Hydrograph Type	= Junction	Peak Flow	= 24.00 cfs



Hydrograph Type	= Junction	Peak Flow	= 35.48 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	
nflow Hydrographs	= 4, 5	Total Contrib. Area	= 8.52 ac
	Qp = 35.48 cfs		
40			
38			
36			
34			
32			
30-			
28-			
26			
24			
22			
(\$\frac{1}{5}\text{20}} 20			
18			
16			
14			
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8			
6			
4			
2			
0			
0 1 2 3	4 5 6 7 8 9 10 11 12 13 14 Time (hrs)	4 15 16 17 18 19 20	
-			

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

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			0.27	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	CN source per line. 74	362		Totals =	1.71	130.57

CN (weighted) =	total product	_=	130.57 =	76.48 ;	Use CN =	76
· ·	total area	_	1 71			

2.	Runoff

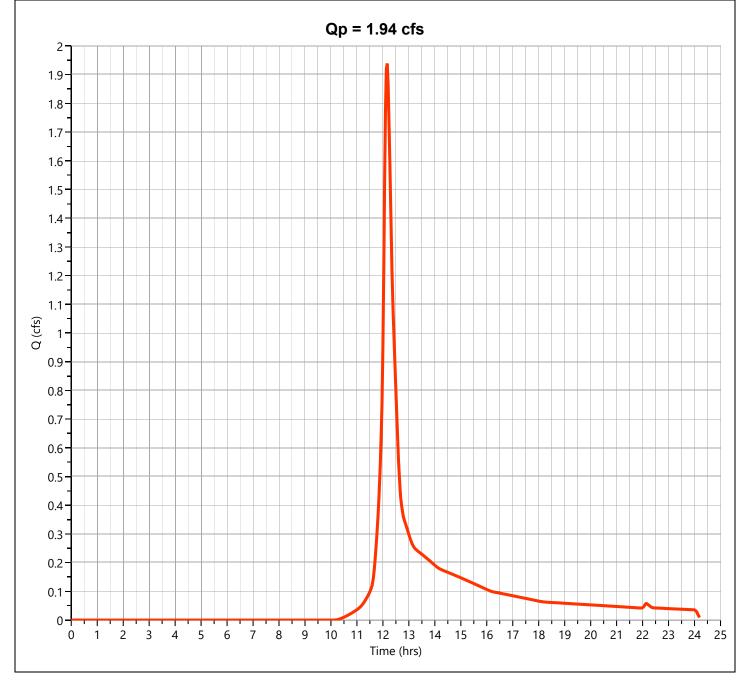
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
1.23	3.55	5.07

#### Worksheet 3: Time of Concentration (Tc) or travel time (Tt)

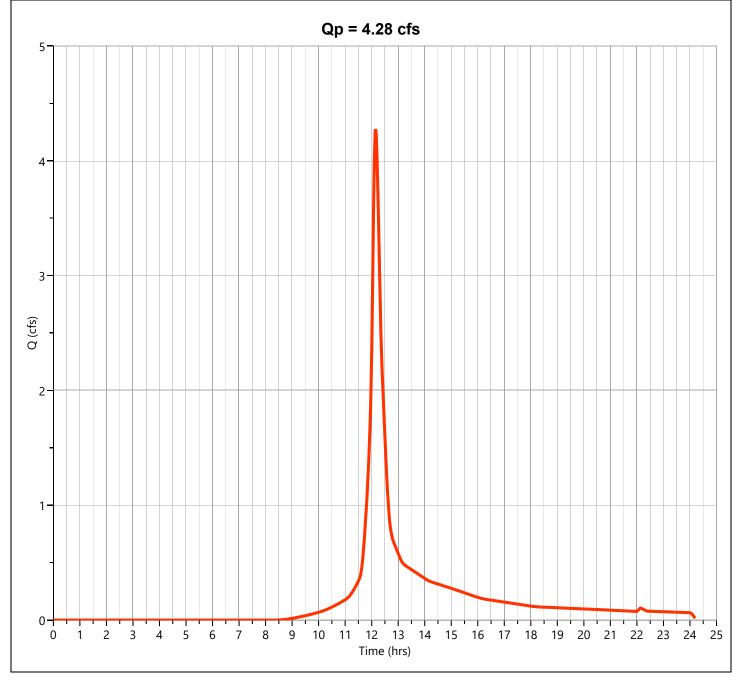
SM-3719C

Project:	Athens Street	-	Ву	PFK		6/21/2022	
Location:	Stow, MA	-	Checked			10/13/2022	
Circle one:	Present Developed Tc Tt	through subarea	Subcatchm	nent P-4A			
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	0.050			
6. Tt = 0.00	07 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.20			0.20
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	192	12	69	
9. Waterco	urse slope, s		ft/ft	0.100	0.33	0.01	
10. Averag	e Velocity, V (figure 3-1)		ft/s	5.10	9.27	2.03	
11. Tt = L /	3600V	Compute Ti	t hr	0.01	0.00	0.01	0.02
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				
18. Flow le 19. Tt = L /		Compute Ti	ft hr				0
20. Waters	hed or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	d 19)			hr min	0.22 13.2

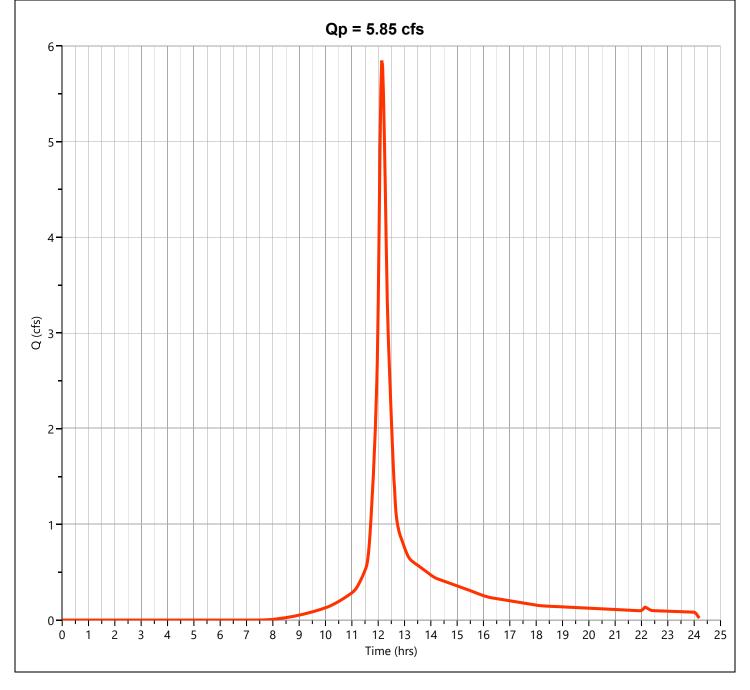
Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.939 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 7,688 cuft
Drainage Area	= 1.71 ac	Curve Number	= 76
Tc Method	= User	Time of Conc. (Tc)	= 13.2 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



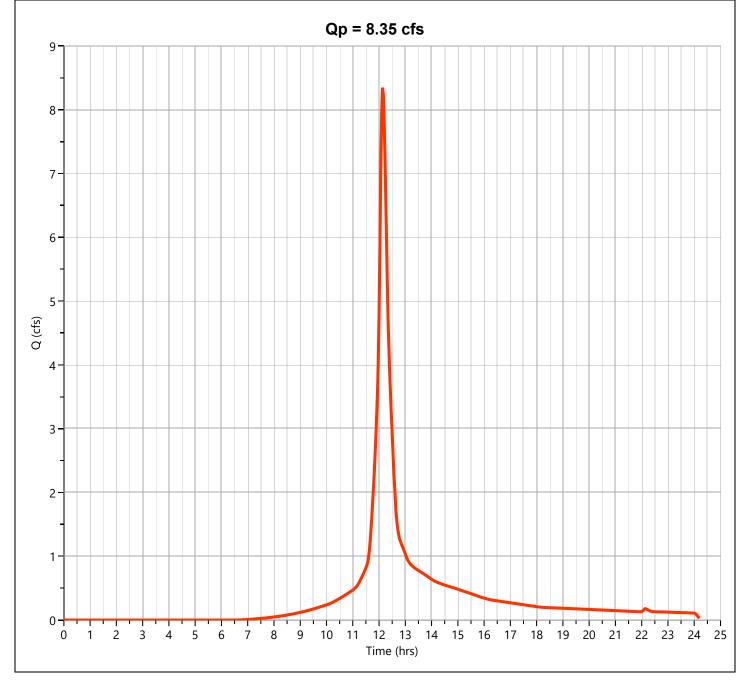
Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.275 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 16,442 cuft
Drainage Area	= 1.71 ac	Curve Number	= 76
Tc Method	= User	Time of Conc. (Tc)	= 13.2 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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



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	= 2,113 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	lication Method		
	Qp = 0.33	ofs	
2			
1.9			
1.8			
1.7			
1.6			
1.5			
1.4			
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(S) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
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-			
0.3			
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0	2 3 4 5 6 7 8	9 10 11 12 13 1	4 15 16

ydrograph Type torm Frequency	= Pond Route = 10-yr		Peak Flow Time to Peak	= 1.501 cfs = 12.47 hrs
ime Interval	= 2 min		Hydrograph Volume	= 8,685 cuft
iflow Hydrograph			Max. Elevation	= 0,003 cuit = 282.87 ft
ond Name	= IB-4A		Max. Storage	= 5,370 cuft
ond Routing by Storage			Max. Storage	- 3,370 Cuit
ond Rodling by Storage	marcation wethod	0 . 4 50 .5		
5		Qp = 1.50 cfs		
_				
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4-				
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			$\Lambda$	
1-				
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-1				
0 1 2	3 4 5 6 7		2 13 14 15 16	17 18 19
		Time (hrs)		

ydrograph Type	= Pond Route	Peak Flow	= 2.490 cfs
torm Frequency	= 25-yr	Time to Peak	= 12.43 hrs
me Interval	= 2 min	Hydrograph Volume	= 13,623 cuft
flow Hydrograph		Max. Elevation	= 283.29 ft
ond Name	= IB-4A	Max. Storage	= 6,941 cuft
and Routing by Storage	Indication Method		
		Qp = 2.49 cfs	
6			
_			
5			
1			
4			
-			
3			
-			
7			
2			
1-			
-			
0			
4			
0 1 2	3 4 5 6 7 8	9 10 11 12 13 14 15 16 17	
, . <u>.</u>		Time (hrs)	.5 .5 .5

ydrograph Typo orm Frequenc		Peak Flow Time to Peak	= 4.180 cfs = 12.37 hrs
me Interval	= 2 min	Hydrograph Volume	= 22,100 cuft
flow Hydrograp		Max. Elevation	= 283.87 ft
ond Name	= IB-4A	Max. Storage	= 9,308 cuft
nd Routing by Stora	e Indication Method		
	Qp = 4.18 cfs		
9			
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8-			
7-			
<u> </u>			
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3			
2			
2			
1			
-			
0			
-1			<del>                                     </del>
0 1 2	3 4 5 6 7 8 9 10 11 12 13 Time (hrs)	3 14 15 16 17 18	3 19 20 21 3
	— P-4A — IB-4A		

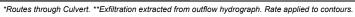
# IB-4A Stage-Storage

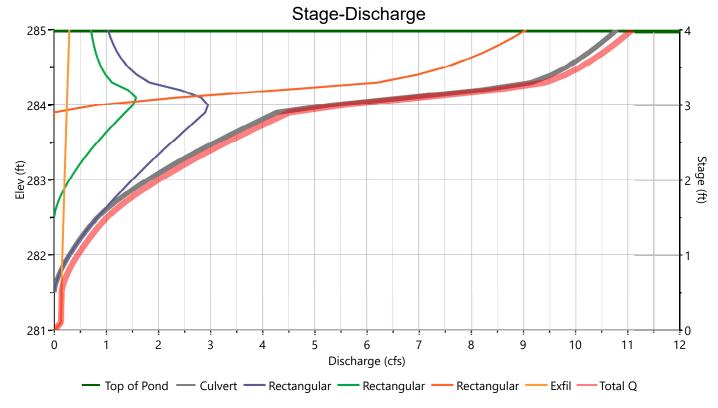
User Defined Contours			Stage / Storage Table						
	Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)		
Bottom Elevation, ft		281.00	0.00	281.00	2,195	0.000	0.000		
Voids (%)		100.00	1.00	282.00	2,883	2,539	2,539		
		Ave End Area	2.00	283.00	3,628	3,256	5,795		
Volume Calc Av		Ave End Area	3.00	284.00	4,429	4,029	9,823		
			4.00	285.00	5,286	4,858	14,681		
			-						
			-						
			-						
		5	Stage-S	Storage					
285 7			5				<del>-</del> 4		
-									
284							3		
4									
æ							Sta		
(±) ≥ 283 -							2 age		
ä							Stage (ft)		
4							<b> </b>		
282							1		
1 2							<u> </u>		
281	2000	4000	1	0000	10000	12000	14000		
0	2000	4000 600		8000 orage (cuft)	10000	12000	14000		
		<del></del> c	ontours =	Top of Por	nd				

#### IB-4A

# Stage-Discharge

Culvert / Orifices	Culvert		Orifices		Doufounted Disco	
Culvert / Orifices		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					
Maine	Riser*	Weirs			Anaillam	
Weirs		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	8		
Angle, deg						
Weir Coefficient, Cw		3.3	3.3	3.3		



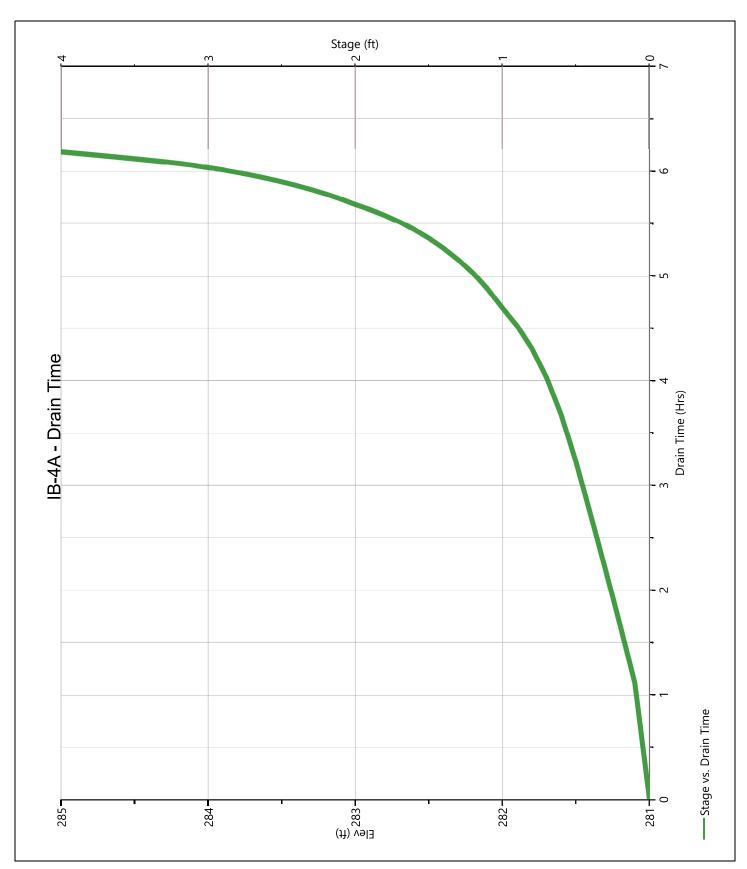


#### IB-4A

### **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	5.304 ic					2.953 s	1.516	0.835		0.247		5.551
3.00 4.00	285.00	9,823	5.304 ic 10.80 ic					2.953 s 1.031 s	1.516 0.708 s	0.835 9.057 s		0.247		5.551

#### IB-4A Pond Drawdown



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

SM-3719C

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

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			0.18	5.55
Α	Open Space Good Condition	39			0.00	0.00
Α	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
I/ Use only one	e CN source per line. 3297	08		Totals =	7.57	532.95

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

2. Runoff

Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.89	2.96	4.37

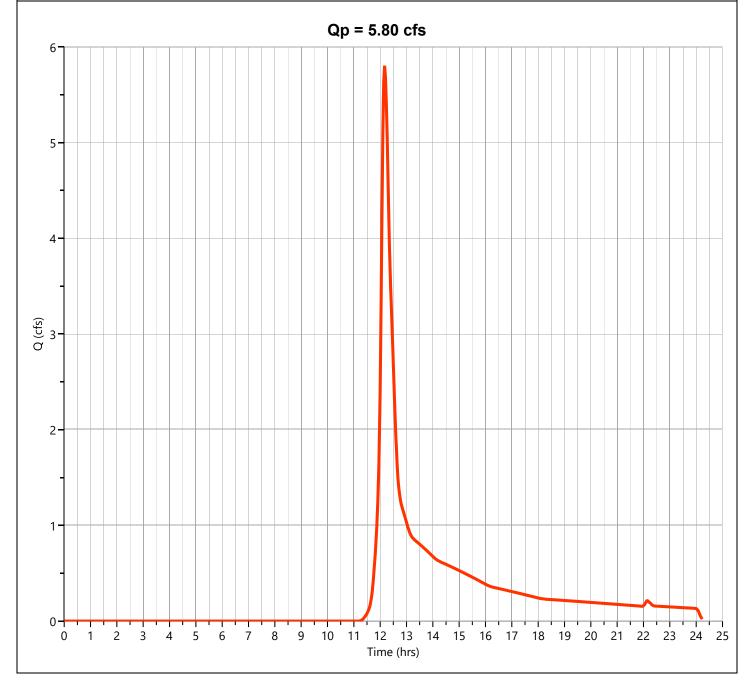
Project:

Athens Street

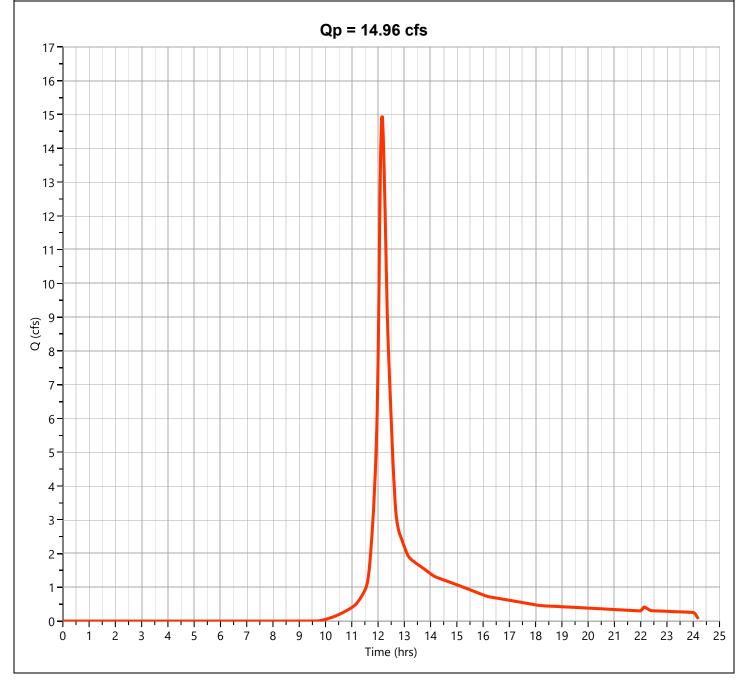
By PFK Date 6/21/2022

Location: Stow, MA		Checked		Rev Date Date	10/13/2022	
Circle one: Present Developed Circle one: Tc Tt	through subarea	Subcatchn	nent P-4B			
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			
5. Land Slope, s		ft/ft	0.080			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute T	t hr	0.17			0.17
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	189			
9. Watercourse slope, s		ft/ft	0.126			
10. Average Velocity, V (figure 3-1)		ft/s	5.73			
11. Tt = L / 3600V	Compute T	t hr	0.01			0.01
Channel flow		Segment ID				
<ul> <li>12. Cross sectional flow area, a</li> <li>13. Wetted perimeter, pw</li> <li>14. Hydraulic radius, r=a/wp</li> <li>15. Channel Slope, s</li> <li>16. Manning's roughness coeff., n</li> <li>17. V = 1.49 r^2/3 s^1/2 / n</li> <li>18. Flow length, L</li> </ul>	Compute r	ft/ft				
19. Tt = L / 3600V	Compute T					0
20. Watershed or subarea Tc or Tt (add Tt in ste	eps 6, 11, and	d 19)			hr min	0.18 10.5

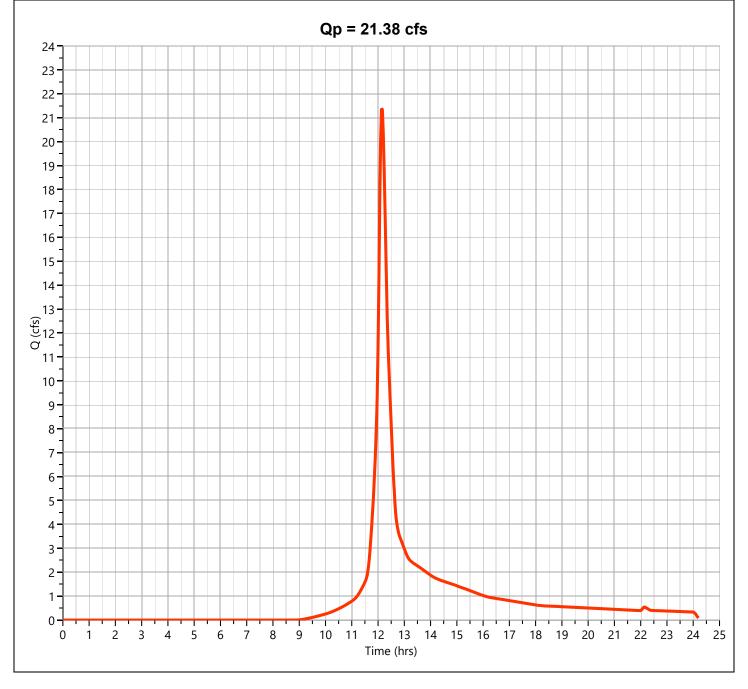
Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.803 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 24,629 cuft
Drainage Area	= 7.57 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 10.5 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



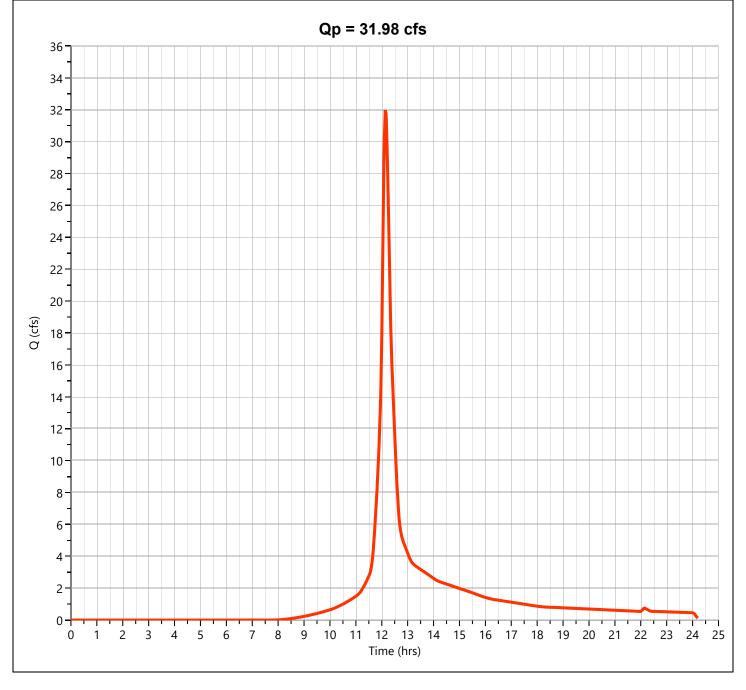
Hydrograph Type	= NRCS Runoff	Peak Flow	= 14.96 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 58,547 cuft
Drainage Area	= 7.57 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 10.5 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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



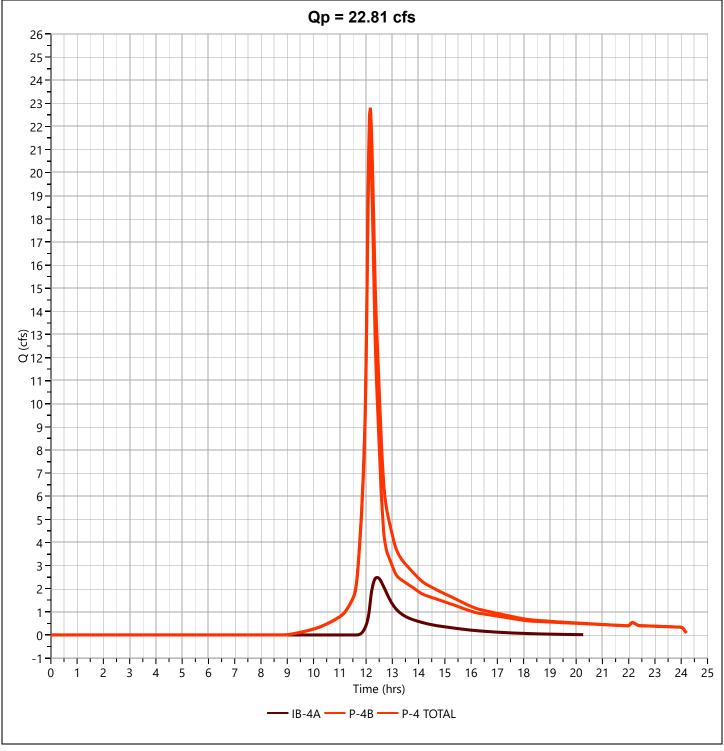
Hydrograph Type	= NRCS Runoff	Peak Flow	= 31.98 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 122,621 cuft
Drainage Area	= 7.57 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 10.5 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration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



Hydi	rogr	aph	Ту	ре		=	Ju	nct	ion												Pe	ak	Flo	W				=	5.8	17	cfs		
Stor	m F	req	uer	су		=	<b>2</b> -y	/r													Tin	ne	to F	Pea	k			=	12.	17	hrs		
Time	e Int	terv	al			=	2 r	nin													Ну	dro	gra	ph	Vo	lum	е	=	26,	742	2 cu	ft	
Inflo	w F	lydr	ogr	aph	าร	=	9,	10													Tot	tal	Cor	ntrik	o. A	rea		=	7.5	7 a	С		
													Q	p =	5.	82	2 cf	S															
6																																	
5	;-																																
4	1															H																	
3	; —															$\ $																	
Q (cfs)	-																																
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											_	IB-4	A =		P-4	·R =		P-4	· IO	IAL													

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

Г				
Hydrograph Type	= Junction		Peak Flow	= 22.81 cfs
Storm Frequency	= 25-yr		Time to Peak	= 12.17 hrs
Time Interval	= 2 min		Hydrograph Volume	= 96,276 cuft
Inflow Hydrographs	= 9, 10		Total Contrib. Area	= 7.57 ac
		Qp = 22.81 cfs		
26				



lydrograph Type	= Junction	Peak Flow	= 34.67 cfs
torm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
ime Interval	= 2 min	Hydrograph Volume	= 144,721 cuft
nflow Hydrographs	= 9, 10	Total Contrib. Area	= 7.57 ac
	Qp = 34.67 cfs		
38			
36			
34			
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Project:	Athens Street	By PFK	Date 6/21/22
_ocation:	Stow. MA	Checked	Rev Date 10/13/2022 Date
Circle one:	Present Developed	Subcatchment P-5B	
J., J., J., J., J., J., J., J., J., J.,	. rossiii <u>Baraiapaa</u>	0.000	

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			0.47	46.53
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			1.37	95.58
С	Open Space Good Condition	74			0.91	67.47
С	Gravel	89			0.00	0.00
I/ Use only one	CN source per line. 119	879		Totals =	2.75	209.59

CN (weighted) =	total product	_=	209.59 =	76.16 ;	Use CN =	76
	total area	_	2 75			

2.	Runoff

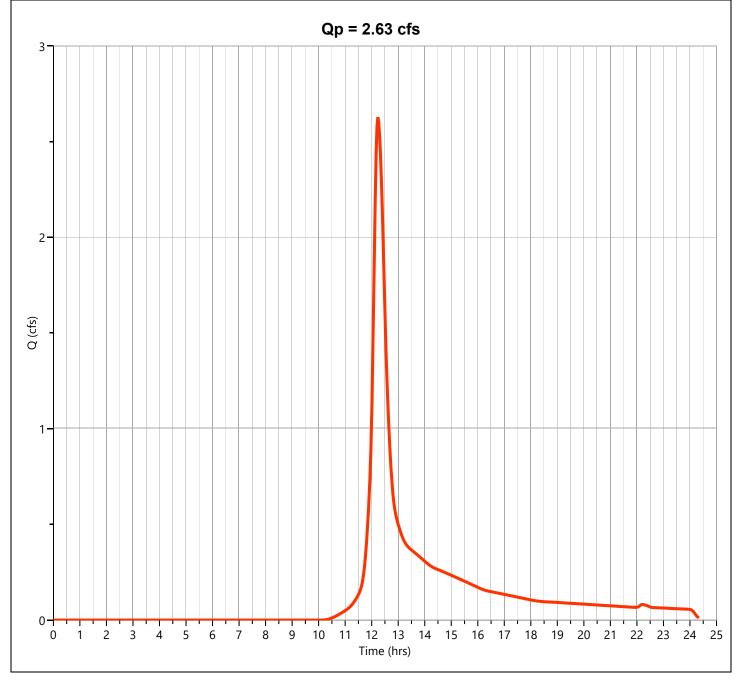
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
1.21	3.52	5.03

#### Worksheet 3: Time of Concentration (Tc) or travel time (Tt)

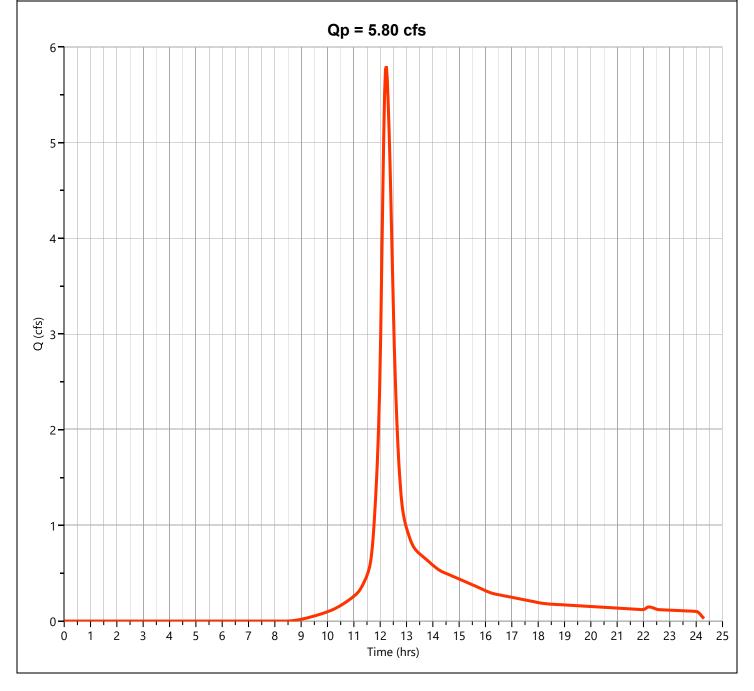
SM-3719C

Project:	Athens Street	-	Ву	PFK		6/21/2022	
Location:	Stow, MA	-	Checked		Date	10/13/2022	
Circle one: Circle one:	Present Developed Tc Tt	through subarea	Subcatchm	nent P-5B			
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	0.025			
6. Tt = 0.00	07 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	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	
9. Waterco	urse slope, s		ft/ft	0.090	0.330	0.01	
10. Averag	e Velocity, V (figure 3-1)		ft/s	4.84	9.27	2.03	
11. Tt = L /	3600V	Compute Tt	t hr	0.01	0.00	0.02	0.03
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	ngth, L	Compute Tt	ft				0
	hed or subarea Tc or Tt (add Tt in ste	-	ļ			hr min	0.29 17.6

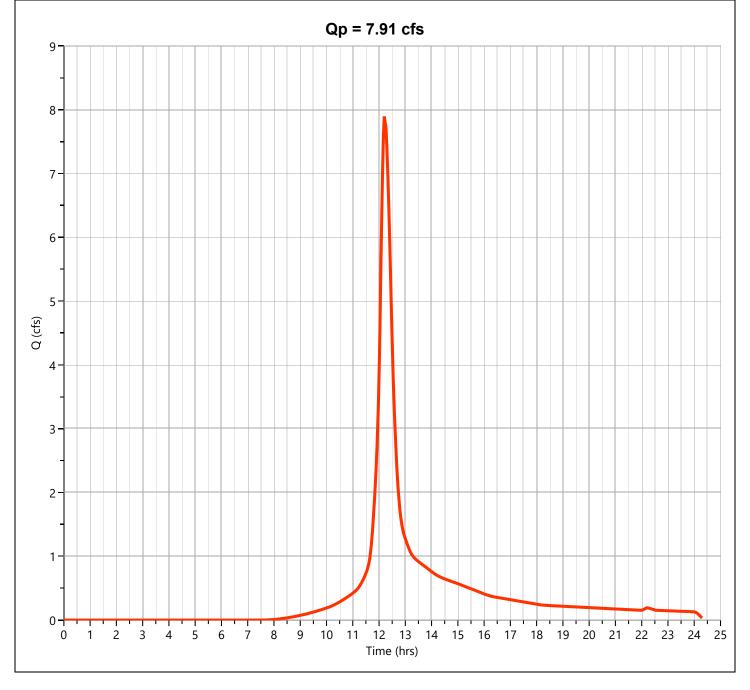
Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.628 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 11,989 cuft
Drainage Area	= 2.75 ac	Curve Number	= 76
Tc Method	= User	Time of Conc. (Tc)	= 17.6 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



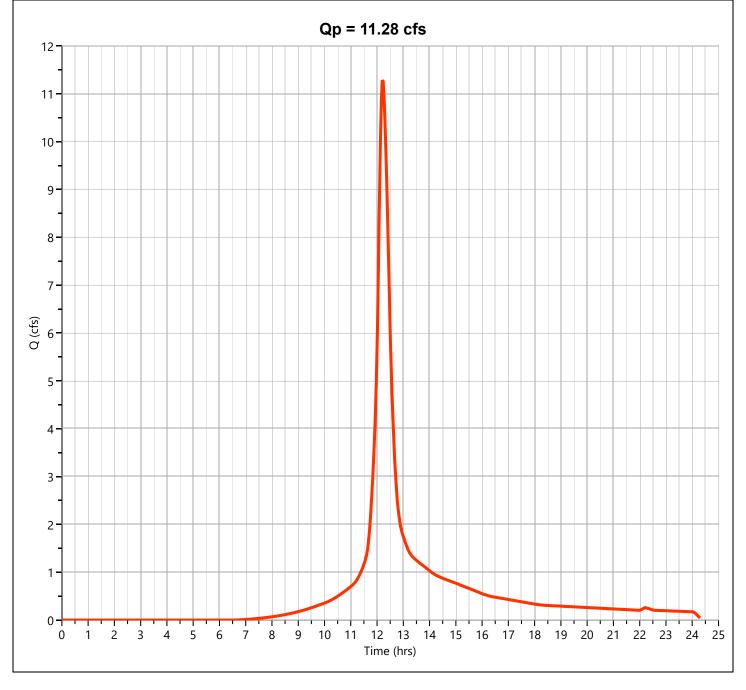
Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.798 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 25,640 cuft
Drainage Area	= 2.75 ac	Curve Number	= 76
Tc Method	= User	Time of Conc. (Tc)	= 17.6 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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



	n Frequency	= Pond Route = 2-yr	Peak Flow Time to Peak	= 0.511 cfs = 12.77 hrs
	Interval	= 2 min	Hydrograph Volume	
	v Hydrograph	= 13 - P-5B	Max. Elevation	= 284.48 ft
	Name	= IB-5B	Max. Storage	= 4,337 cuft
ond R	outing by Storage I	ndication Method		
		$Qp = 0.5^{\circ}$	1 cfs	
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	0 1 2	3 4 5 6 7 8 9 Time	10 11 12 13 14 15	16 17 18

lydrograph Type torm Frequency	= Pond Route = 10-yr	Peak Flow Time to Peak	= 3.299 cfs = 12.47 hrs	
ime Interval	= 2 min	Hydrograph Volume	= 15,199 cuft	
nflow Hydrograph	= 13 - P-5B	Max. Elevation		
ond Name	= IB-5B	Max. Storage	= 7,582 cuft	
ond Routing by Storage Indi			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
	Qp = 3.30 cfs			
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lydrograph Type	= Pond Route		Peak Flow	= 5.521 cfs
torm Frequency	= 25-yr		Time to Peak	= 12.40 hrs
Time Interval = 2 min Hydrograph Volume = 23,		= 23,445 cuft		
nflow Hydrograph	= 13 - P-5B		Max. Elevation	= 285.55 ft
ond Name	= IB-5B		Max. Storage	= 9,065 cuft
ond Routing by Storage Ind	lication Method			
		Qp = 5.52 cfs		
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0 1 2 3	4 5 6 / 8	9 10 11 12 13 14 Time (hrs)	4 15 10 1/ 18 19	1 20 21 22

ydrograph Type	= Pond Route	Peak Flow	= 8.928 cfs	
torm Frequency	= 100-yr	Time to Peak	= 12.37 hrs	
me Interval	Interval = 2 min Hydrograph Volume = 37,2			
flow Hydrograph	= 13 - P-5B	Max. Elevation		
ond Name	= IB-5B	Max. Storage	= 10,957 cuft	
and Routing by Storage	ndication Method	Ce	enter of mass detention time = 0 n	
40	Qp = 8.	93 cfs		
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11 -				
10				
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	— P-5B =	me (hrs)		

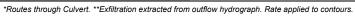
### IB-5B Stage-Storage

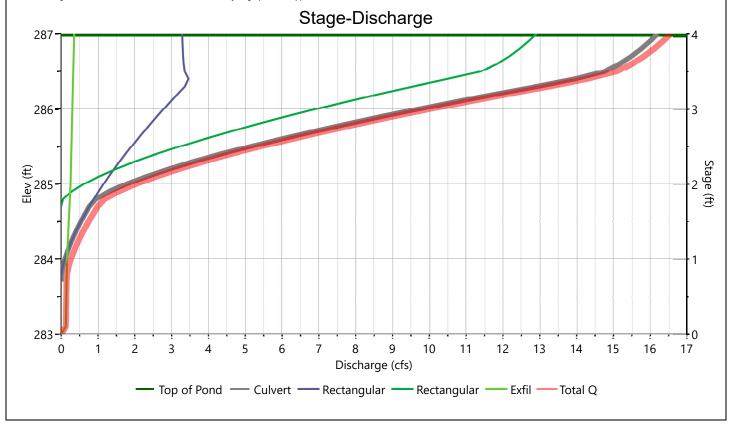
ι	Jser Defined	d Contours	5			Stage / Stor	age Table		
	Desc	ription	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Contour Area Incr. Storage (sqft) (cuft)		
	Bottom Elevation, ft 283.00			)				(cuft)	
	Vo	oids (%)	100.00	0.00 1.00	283.00 284.00	2,245 2,866	0.000 2,556	0.000 2,556	
		ne Calc	None	2.00	285.00	4,622	3,744	6,300	
	Volum	nc Galc	None	3.00	286.00	5,477	5,050	11,349	
				4.00	287.00	6,388	5,933	17,282	
				01 (	21				
207				Stage-S	Storage				
287								4	
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283	2000	4000	6000	8000	10000	12000	14000 160	00 18000	
v	_000		3000		orage (cuft)	000	1.000		
					Top of Por				

#### IB-5B

### Stage-Discharge

Outrout / Outlines	Orderant		Orifices		Doufouete d 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					
Waina	Riser*	Weirs			A mailleum.	
Weirs	Kiser"	1*	2*	3*	Ancillary	
Shape / Type	Circular	Rectangular	Rectangular	Rectangular	Exfiltration, in/hr	2.41**
Crest Elevation, ft		283.75	284.75	285.75		
Crest Length, ft		.25	1.5	11.25		
Angle, deg						
Weir Coefficient, Cw		3.3	3.3	3.3		



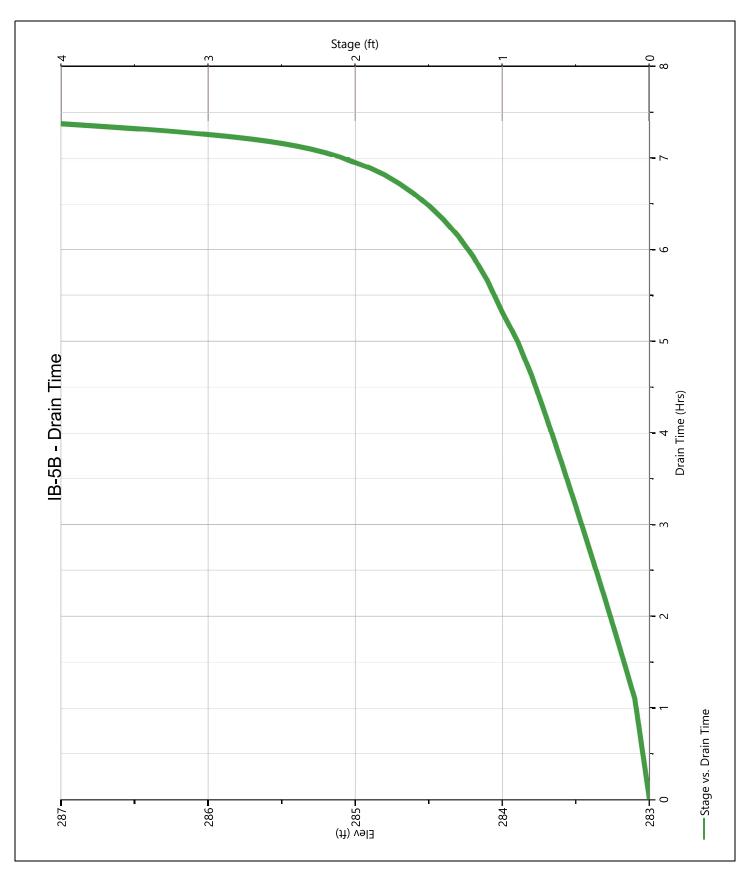


#### IB-5B

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

Stage	Elev.	Storage	Culvert	(	Orifices, cf	's	Riser		Weirs, cfs	i	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	0.103 ic					0.103	0.000	0.000		0.160		0.263
2.00	285.00	6,300	1.772 ic					1.153	0.619	0.000		0.258		2.030
3.00	286.00	11,349	9.702 ic					2.784	6.918	0.000		0.306		10.01
4.00	287.00	17,282	16.20 ic					3.288 s	12.91 s	0.000		0.356		16.56

#### IB-5B Pond Drawdown



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

SM-3719C

Project:	Athens Street	By PFK	Date 6/21/22
		·	Rev Date 10/13/2022
_ocation:	Stow, MA	Checked	Date
Circle one:	Present Developed	Subcatchment 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			0.60	58.73
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
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			0.62	43.13
D	Open Space Good Condition	80			0.00	0.00
I/ Use only one	CN source per line. 529	946		Totals =	1.22	101.86

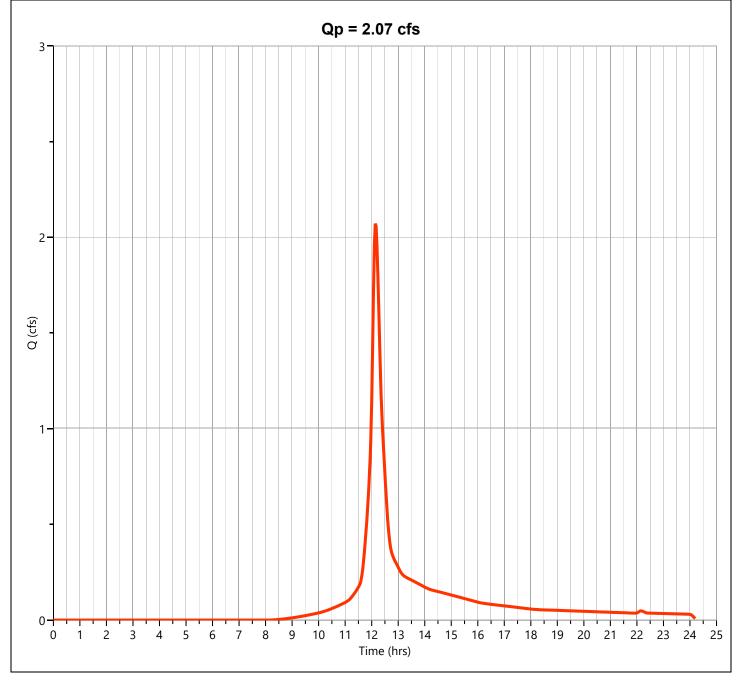
CN (weighted) =	total product	_=	101.86=	83.80;	Use CN =	84
•	total area	_	1.22			

2.	Runoff

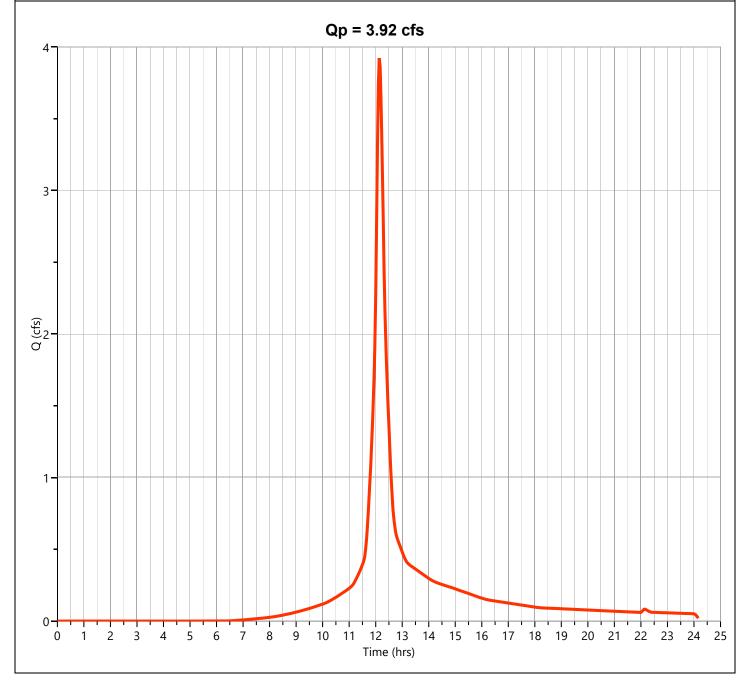
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
1.73	4.31	5.92

Project:	Athens Street	_	Ву	PFK	Date	6/21/2022	
Lagation	Ctour MA		Charlend			10/13/2022	
Location:	Stow, MA	-	Checked		. Date		
Circle one:	Present Developed	]	Subcatchm	nent P-5C			
Circle one:	Tc Tt	through			•		
		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			
Z. Mailing	s roughness coen., if (table 3-1)			0.0			
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	0.065			
6 Tt = 0.00	7 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Ti	t hr	0.18			0.18
0. 11 - 0.00	(IIL) 0.07 (FZ 0.3 5 0.4)	Compute 11	LIII	0.10			0.10
Shallow cor	ncentrated Flow		Segment ID	C-D			
			· ·				
7. Surface	Description (paved or unpaved)			UNPAVED			
			-				
8. Flow Ler	igth, L		ft	35			
0 Waterco	urse slope, s		ft/ft	0.200			
3. Waterco	urse stope, s		TOTE	0.200			
10. Average	e Velocity, V (figure 3-1)		ft/s	7.22			
11. Tt = L /	3600V	Compute Ti	t hr	0.00			0.00
01			0				
Channel flo	<u>w</u>		Segment ID				
12. Cross s	ectional flow area, a		sf				
	perimeter, pw		ft				
	lic radius, r=a/wp	Compute r	ft				
15. Channe		·	ft/ft				
	g's roughness coeff., n						
	9 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow le		·	ft				
19. Tt = L /	_	Compute Ti					0
		•					
20. Waters	hed or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	d 19)			hr	0.18
						min	10.9

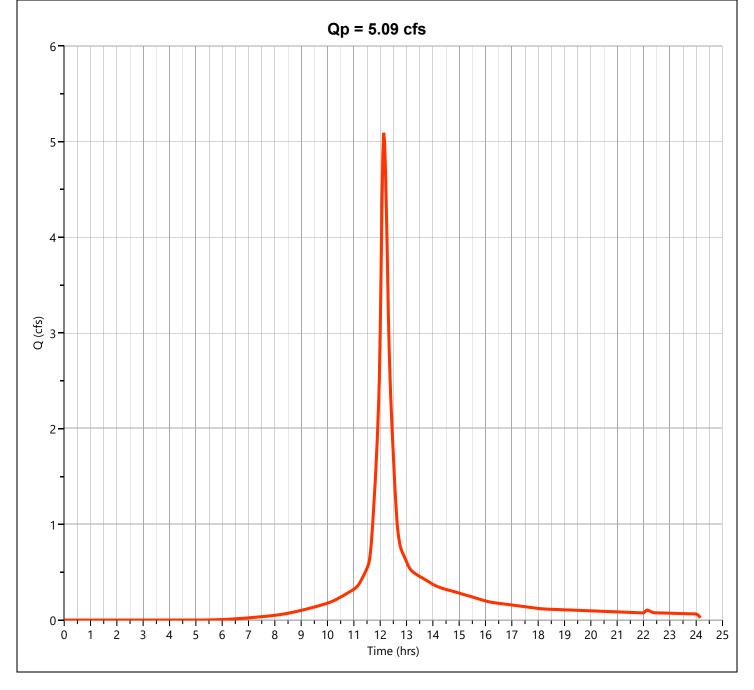
Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.072 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 7,952 cuft
Drainage Area	= 1.22 ac	Curve Number	= 84
Tc Method	= User	Time of Conc. (Tc)	= 10.9 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



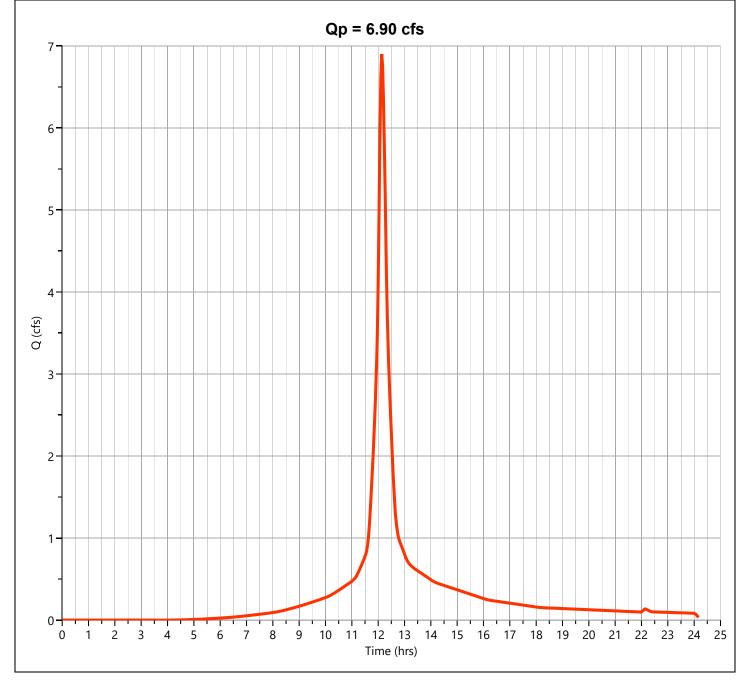
Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.921 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 15,103 cuft
Drainage Area	= 1.22 ac	Curve Number	= 84
Tc Method	= User	Time of Conc. (Tc)	= 10.9 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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



Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.87 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.002 cuft
Inflow Hydrograph	= 15 - P-5C	Max. Elevation	= 259.12 ft
Pond Name	= IB-5C	Max. Storage	= 3,568 cuft
Pond Routing by Storage Inc	lication Method	Center of m	ass detention time = 6 min
	Qp = 0.00 cfs		
3			
1			
2			
1			
(s)			
O (cfs)			
-			
0			
1			
-1 - 1 2	3 4 5 6 7 8 9	10 11 12 13	14 15 16
	Time (hrs)		
	— P-5C — IB-5C		

Hydrograph Type	= Pond Route		Peak Flow	= 0.000 cfs
Storm Frequency	= 10-yr		Time to Peak	= 12.13 hrs
Time Interval	= 2 min		Hydrograph Volume	= 0.001 cuft
Inflow Hydrograph	= 15 - P-5C		Max. Elevation	= 260.17 ft
Pond Name	= IB-5C		Max. Storage	= 7,907 cuft
Pond Routing by Storage Indi	ication Method			
		Qp = 0.00 cfs		
4				
-				
3 -				
1				
2-				
Q (cfs)				
σ				
1				
-				
0				
1				
-1				
0 1	2 3 4	5 6 7 Time (hrs)	8 9 10	11 12 13
		— P-5C — IB-5C		

	e Interval = 2 min Hydrograph Volume bw Hydrograph = 15 - P-5C Max. Elevation						ıme	= 483 cuft = 260.72 ft																	
ond	Name	;	=	B-5	C											Max. Storage					= 10,635 cuft				
ond R	outing by	/ Storage	Indicat	ion Me	thod													C	ente	r of ma	ss de	tentio	n time =	= 35 n	
									(	Др	= 0.	13	cf	s											
6-																									
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lydrograph Type	= Pond Route	Peak Flow	= 2.414 cfs				
torm Frequency	= 100-yr Time to Peak =						
ime Interval	= 2 min	Hydrograph Volume	= 6,054 cuft = 260.94 ft				
nflow Hydrograph	= 15 - P-5C	Max. Elevation					
ond Name	= IB-5C	Max. Storage	= 11,696 cuft				
ond Routing by Storage Ind	lication Method						
7_	Qp = 2.41 cf	fs					
7							
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6-							
1							
5							
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4							
3							
4							
2							
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1-							
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0							
-1 $0$ $1$ $2$	3 4 5 6 7 8	9 10 11 12 13	14 15				
V 1 2	Time (hrs		14 15				

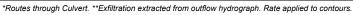
## IB-5C Stage-Storage

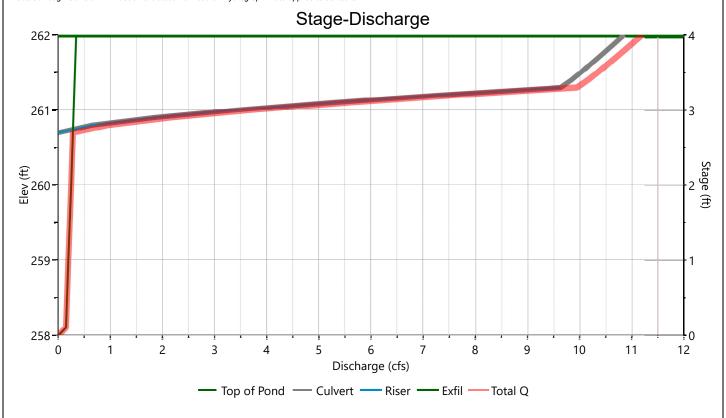
U	ser Defined Conto	urs			Stage / Stora	age Table	
	Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
	Bottom Elevation, ft	258.00					
	Voids (%)	100.00	0.00 1.00	258.00 259.00	2,638 3,517	0.000 3,078	0.000 3,078
	Volume Calc		2.00	260.00	4,505	4,011	7,089
	volume Calc	Ave End Area	3.00	261.00	5,340	4,923	12,011
			4.00	262.00	6,231	5,786	17,797
		S	Stage-S	Storage			
262							4
1							
261							
201							3
<u> </u>							
							လူ
(£) ≥260 -							2 e
E E							Stage (ft)
4							
259							1
4							<b> </b>
258	2000	6000	0000	10000	12000	14000 1600	0
0	2000 4000	6000	8000 Total St	10000	12000	14000 1600	0 18000
				orage (cuft)			
		<u>—</u> с	ontours -	Top of Por	nd		

#### IB-5C

## Stage-Discharge

Outroot / Outroo	Ondrant		Orifices		Oulflag Diete	
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					
Maine	Dia au*	Weirs			Anaillam	
Weirs	Riser*	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					





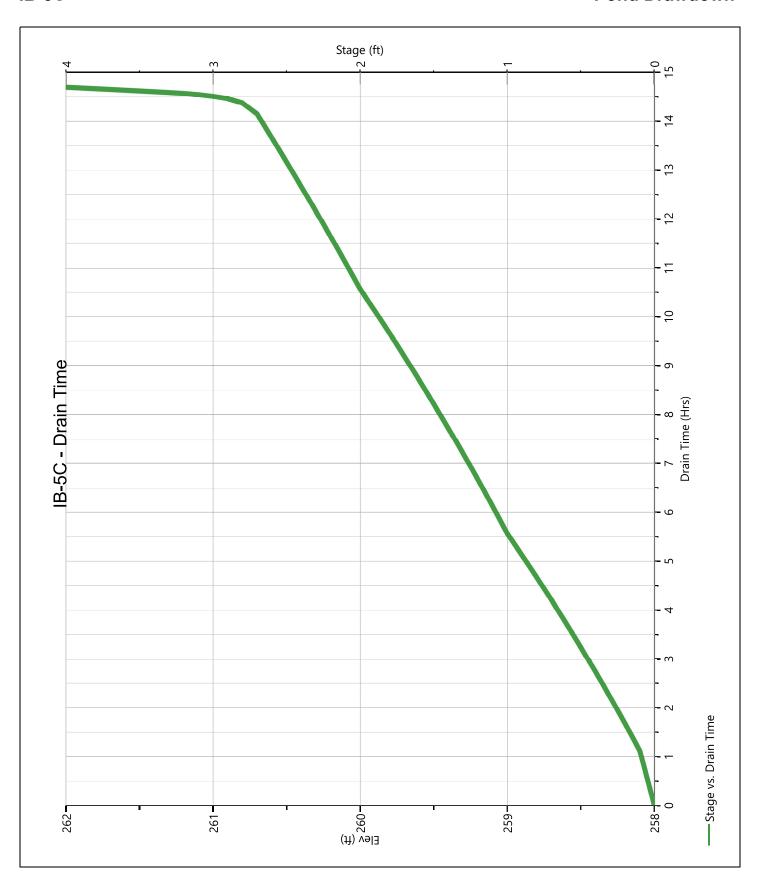
#### IB-5C

## **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	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**



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

SM-3719C

Project:	Athens Street	By PFK	Date	6/21/22
		_	Rev Date	10/13/2022
_ocation:	Stow, MA	Checked	Date	
Circle one:	Present Developed	Subcatchment P-5E	·	

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			1.09	106.43
А	Woods Good Condition	30			2.63	78.99
А	Open Space Good Condition	39			2.05	80.04
А	Open Space Fair Condition	49			0.00	0.00
А	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.	390664	-	Totals =	8.97	507.85

CN (weighted) =	total product	_=	507.85 =	56.63	;	Use CN =	57
· ·	total area	_	8 97				

2. Runoff

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

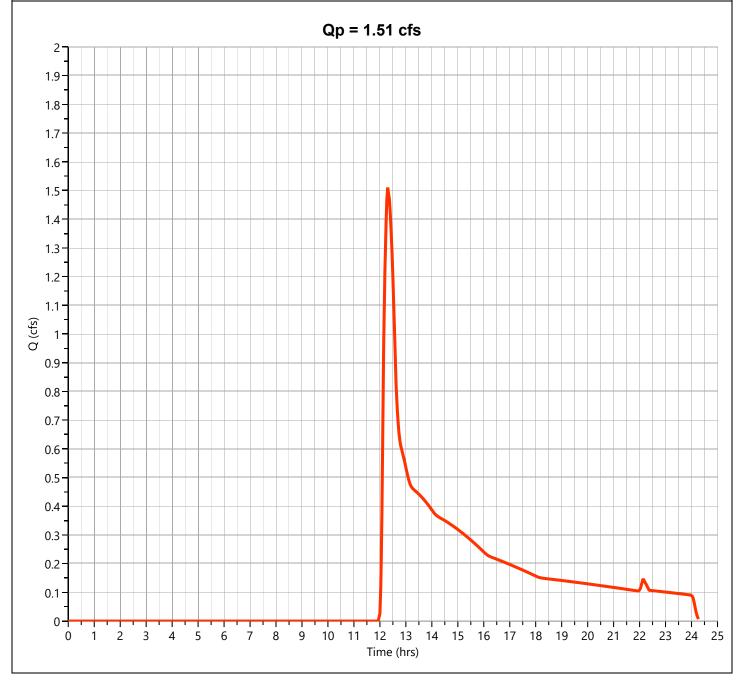
Project:

Athens Street

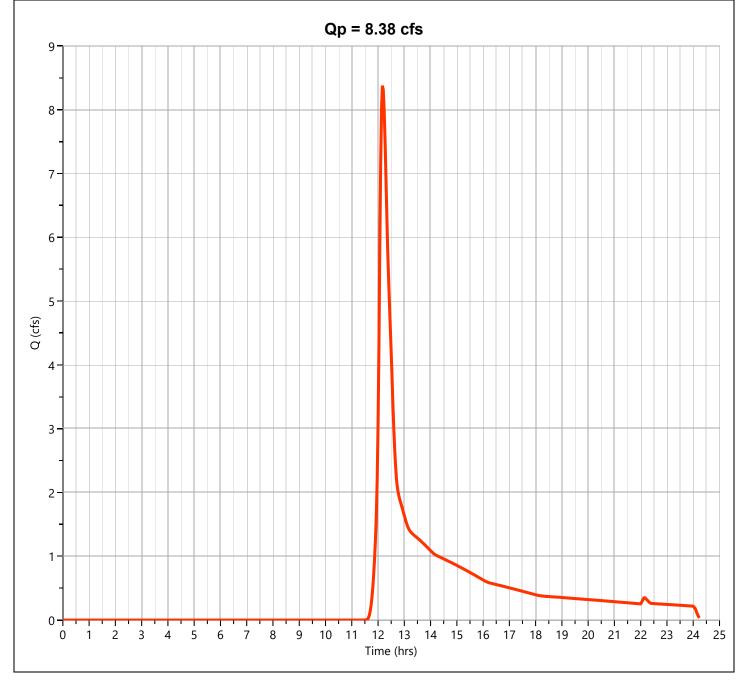
By PFK Date 6/21/2022

Location: Stow, MA		Checked		Rev Date Date	10/13/2022	
Circle one: Present Developed Circle one: Tc Tt	through subarea	Subcatchn	nent P-5E			
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			
5. Land Slope, s		ft/ft	0.060			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute T	hr	0.19			0.19
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	459			
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
Channel flow		Segment ID				
<ul> <li>12. Cross sectional flow area, a</li> <li>13. Wetted perimeter, pw</li> <li>14. Hydraulic radius, r=a/wp</li> <li>15. Channel Slope, s</li> <li>16. Manning's roughness coeff., n</li> <li>17. V = 1.49 r^2/3 s^1/2 / n</li> <li>18. Flow length, L</li> </ul>	Compute r	ft/ft ft/s ft				
19. Tt = L / 3600V	Compute T	hr				0
20. Watershed or subarea Tc or Tt (add Tt in ste	eps 6, 11, and	d 19)			hr min	0.21 12.8

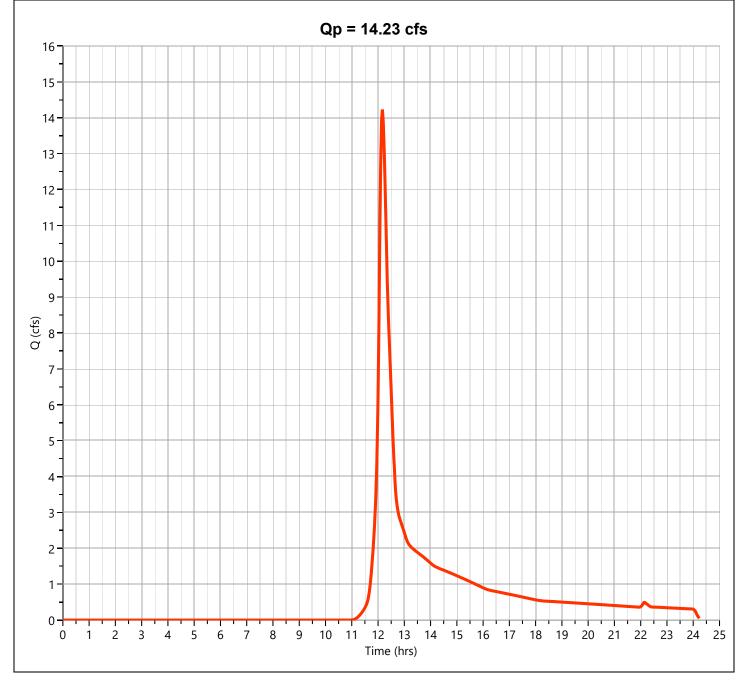
Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.511 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.30 hrs
Time Interval	= 2 min	Runoff Volume	= 11,193 cuft
Drainage Area	= 8.97 ac	Curve Number	= 57
Tc Method	= User	Time of Conc. (Tc)	= 12.8 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



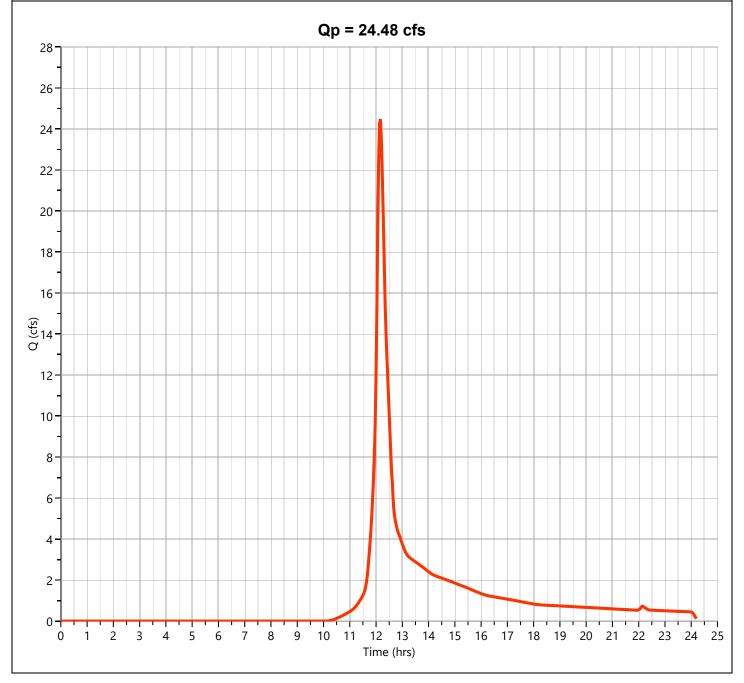
Hydrograph Type	= NRCS Runoff	Peak Flow	= 8.379 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 37,806 cuft
Drainage Area	= 8.97 ac	Curve Number	= 57
Tc Method	= User	Time of Conc. (Tc)	= 12.8 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 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	= 1.706 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.37 hrs
Γime Interval	= 2 min	Hydrograph Volume	= 15,443 cuft
nflow Hydrographs	= 14, 16, 17	Total Contrib. Area	= 8.97 ac
	Qp = 1.71 cfs	•	
2			
1.9			
1.8			
1.7			
1.6			
-			
1.5			
1.4			
1.3			
1.2	<del></del>		
1.1			
O (cfs)			
0.9			
0.8			
4			
0.7			
0.6	\		
0.5	$\wedge$		
0.4			
0.3			
0.2			
0.1			
0			

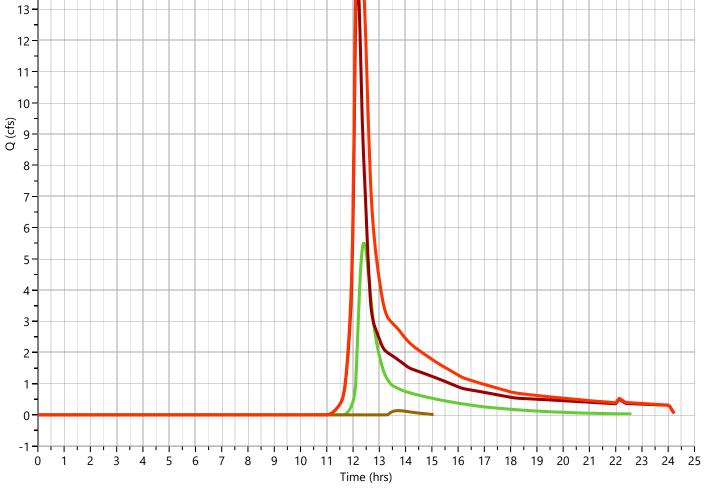
Time (hrs)

— IB-5B — IB-5C — P-5E — P-5 TOTAL

## P-5 TOTAL Hyd. No. 18

lydrograph Type	= Junction	Peak Flow	= 9.312 cfs
torm Frequency	= 10-yr	Time to Peak	= 12.27 hrs
ime Interval	= 2 min	Hydrograph Volume	= 53,006 cuft
nflow Hydrographs	= 14, 16, 17	Total Contrib. Area	= 8.97 ac
10 –	Qp = 9.31 cfs		
1			
9			
-			
8-	<u> </u>		
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7	<del>                                     </del>		
4			
6			
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4			
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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 2
	—— IB-5B —— IB-5C —— P-5E —— P-	-5 TOTAI	

Hydrograph Type = Junction	P-5 TOTAL				Hyd. No. 18
Time Interval = 2 min Hydrograph Volume = 83,082 cuft Inflow Hydrographs = 14, 16, 17  Total Contrib. Area = 8.97 ac   Qp = 16.89 cfs	Hydrograph Type	= Junction		Peak Flow	= 16.89 cfs
Inflow Hydrographs = 14, 16, 17   Qp = 16.89 cfs  19	Storm Frequency	= 25-yr		Time to Peak	= 12.20 hrs
Qp = 16.89 cfs  19 17 16- 15- 14-	Time Interval	= 2 min		Hydrograph Volume	= 83,082 cuft
19 - 18 - 17 - 16 - 15 - 14 - 14 - 14 - 14 - 14 - 15 - 15	Inflow Hydrographs	= 14, 16, 17		Total Contrib. Area	= 8.97 ac
19 - 18 - 17 - 16 - 15 - 14 - 14 - 14 - 14 - 15 - 14 - 16 - 16 - 16 - 16 - 16 - 16 - 16			Qp = 16.89 cfs		
12-	18 - 17 - 16 - 15 - 14 - 13 - 13 - 1				



— IB-5B — IB-5C — P-5E — P-5 TOTAL

## P-5 TOTAL Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 30.16 cfs		
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs		
Γime Interval	= 2 min	Hydrograph Volume	= 140,316 cuft		
nflow Hydrographs	= 14, 16, 17	Total Contrib. Area	= 8.97 ac		
	Qp = 30.16 cfs				
34 -	-				
33					
32					
31					
30 <del>-</del> 29 <del>-</del>					
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1 -					
0			21 22 22 2:		
0 1 2 3	3 4 5 6 7 8 9 10 11 12 13 14 Time (hrs)	4 15 16 17 18 19 20	21 22 23 24 1		
	—— IB-5B —— IB-5C —— P-5E ——	D E TOTAL			

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

1. Runoff curve number (CN)

Soil name and hydrologic	(cover	Cover description 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
А	Woods	Good Condition	30			1.27	38.21
А	Open Space	Good Condition	39			0.30	11.73
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
I/ Use only one	CN source per line.		71992		Totals =	1.65	55.97

CN (weighted) =	total	product	_=	55.97	_=	33.86	_;	Use CN =	34	
•	total	area		1.65						

2. Runoff

Storm #2	Storm #3
25	100
6.14	7.84
0.23	0.66
	25 6.14

Project:

Athens Street

By NC Date 6/24/2022

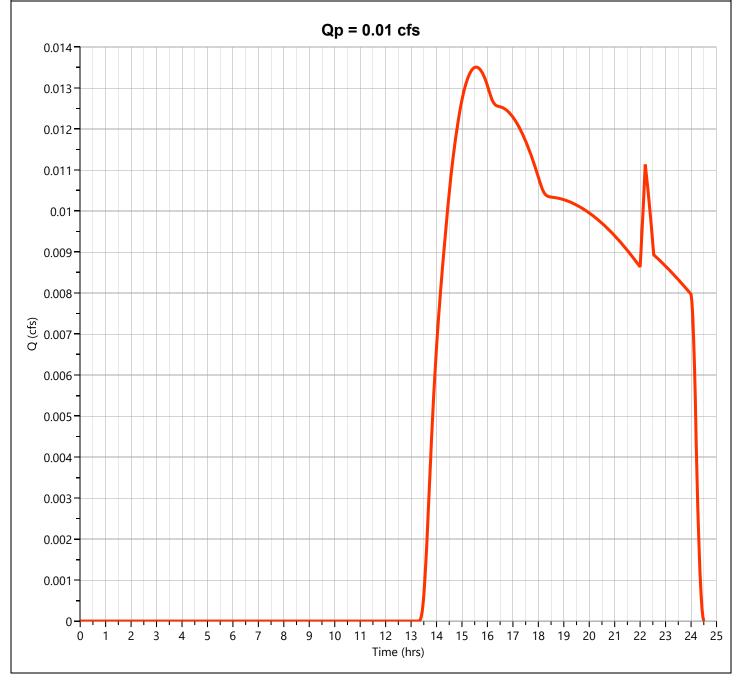
Location: Stow, MA		Checked		Rev Date Date	10/13/2022	
Circle one: Present Developed Circle one: Tc Tt	through subarea	Subcatchn	nent P-6A			
Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			WOODS			
2. Mannings roughness coeff., n (table 3-1)			0.6			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.020			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute T	t hr	0.29			0.29
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	381			
9. Watercourse slope, s		ft/ft	0.030			
10. Average Velocity, V (figure 3-1)		ft/s	2.79			
11. Tt = L / 3600V	Compute T	t hr	0.04			0.04
Channel flow		Segment ID				
<ul> <li>12. Cross sectional flow area, a</li> <li>13. Wetted perimeter, pw</li> <li>14. Hydraulic radius, r=a/wp</li> <li>15. Channel Slope, s</li> <li>16. Manning's roughness coeff., n</li> <li>17. V = 1.49 r^2/3 s^1/2 / n</li> </ul>	Compute r	ft/ft ft/s				
18. Flow length, L 19. Tt = L / 3600V	Compute T	ft t hr				0
20. Watershed or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	d 19)			hr min	0.33 19.6

## P-6A Hyd. No. 35

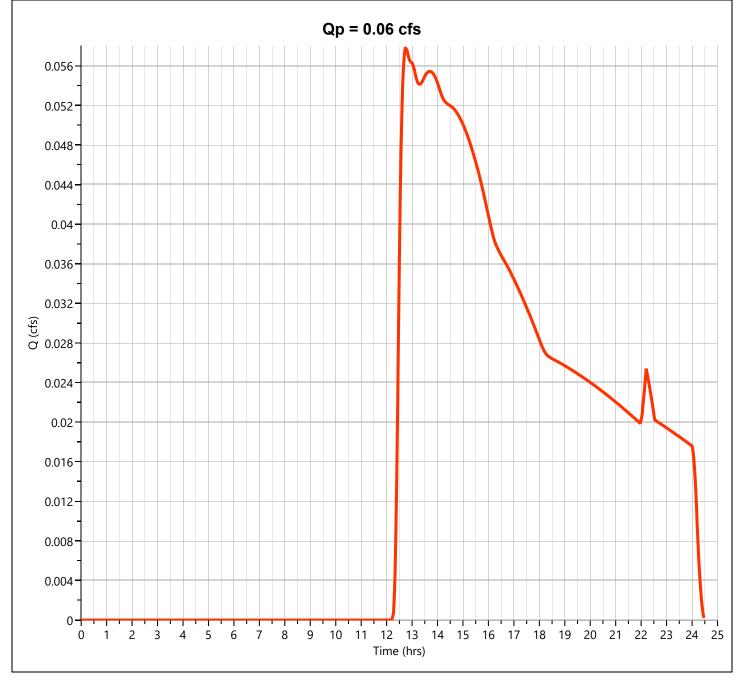
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.00 hrs
Time Interval	= 2 min	Runoff Volume	= 0.000 cuft
Drainage Area	= 1.65 ac	Curve Number	= 34
Tc Method	= User	Time of Conc. (Tc)	= 19.6 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484

Qp = 0.00 cfs

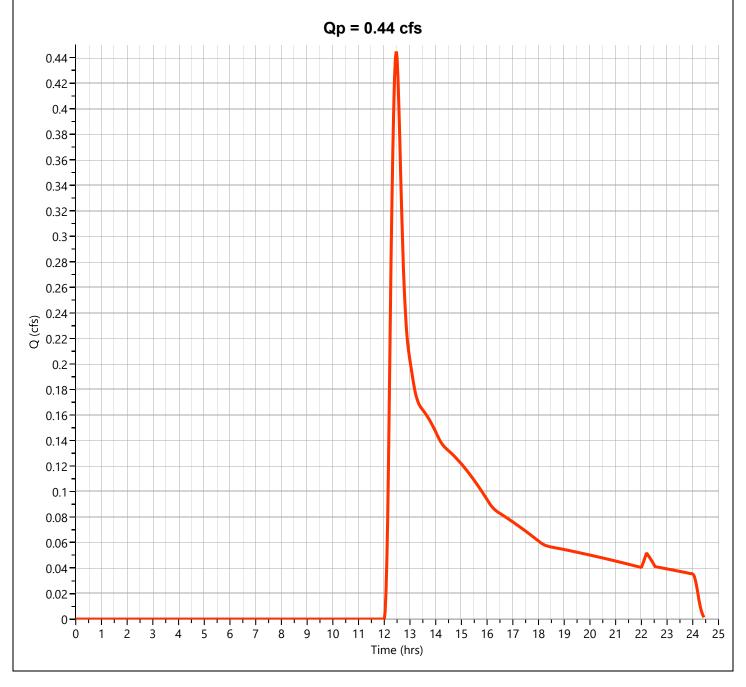
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.014 cfs
Storm Frequency	= 10-yr	Time to Peak	= 15.57 hrs
Time Interval	= 2 min	Runoff Volume	= 390 cuft
Drainage Area	= 1.65 ac	Curve Number	= 34
Tc Method	= User	Time of Conc. (Tc)	= 19.6 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.058 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.77 hrs
Time Interval	= 2 min	Runoff Volume	= 1,408 cuft
Drainage Area	= 1.65 ac	Curve Number	= 34
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	= 0.445 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.47 hrs
Time Interval	= 2 min	Runoff Volume	= 4,014 cuft
Drainage Area	= 1.65 ac	Curve Number	= 34
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	By NC	Date 6/24/22
			Rev Date 10/13/2022
Location:	Stow, MA	Checked	Date
Circle one:	Present Developed	Subcatchment P-6B	

1. Runoff curve number (CN)

Soil name and hydrologic	(cover	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			0.17	16.23
Α	Woods	Good Condition	30			0.32	9.71
А	Open Space	Good Condition	39			0.42	16.19
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
I/ Use only one	CN source per line.		39394		Totals =	0.90	42.13

CN (weighted) =	total product	_=	42.13=	46.58	_;	Use CN =	47
	total area	•	0.90				-

2.	Runoff

Storm #1	Storm #2	Storm #3
2	25	100
***************************************		
3.27	6.14	7.84
	3	
0.08	0.97	1.81
0.00	0.97	1.01

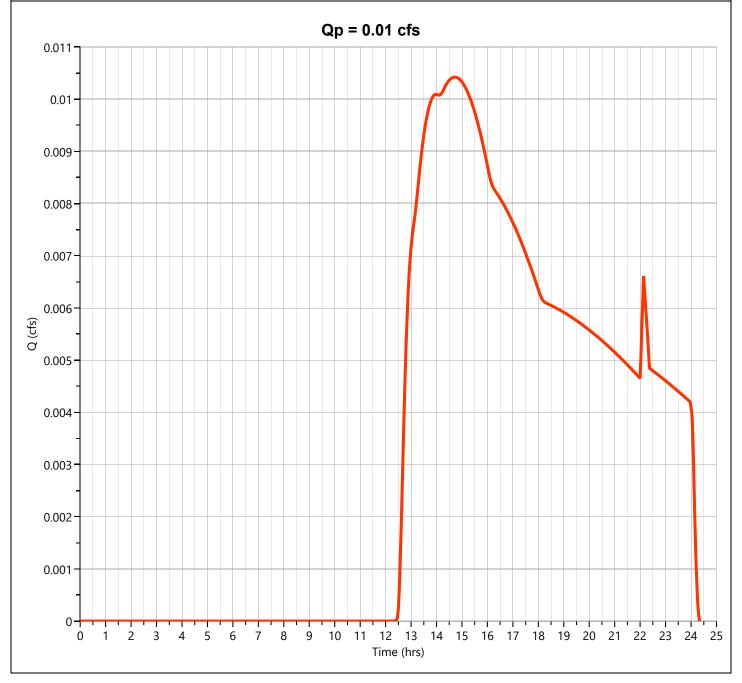
Project:

Athens Street

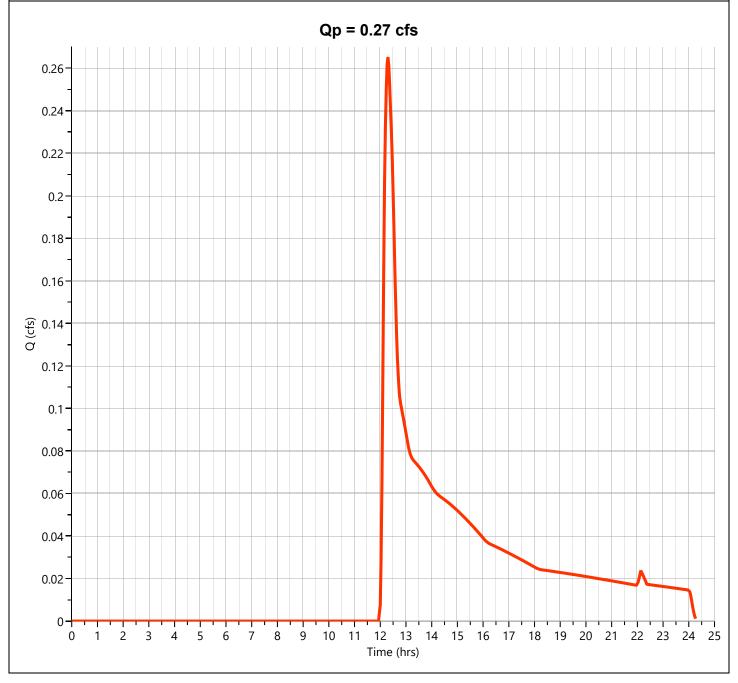
By NC Date 6/24/2022

Location: Stow, MA		Checked		Rev Date Date	10/13/2022	
Circle one: Present Developed Circle one: Tc Tt	through subarea	Subcatchm	nent P-6B			
Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			LAWN			
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	0.015			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute T	t hr	0.16			0.16
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	263			
9. Watercourse slope, s		ft/ft	0.030			
10. Average Velocity, V (figure 3-1)		ft/s	2.79			
11. Tt = L / 3600V	Compute T	t hr	0.03			0.03
Channel flow		Segment ID				
<ul> <li>12. Cross sectional flow area, a</li> <li>13. Wetted perimeter, pw</li> <li>14. Hydraulic radius, r=a/wp</li> <li>15. Channel Slope, s</li> <li>16. Manning's roughness coeff., n</li> <li>17. V = 1.49 r^2/3 s^1/2 / n</li> </ul>	Compute r	ft/ft				
18. Flow length, L 19. Tt = L / 3600V	Compute T	ft t hr				0
20. Watershed or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	d 19)			hr min	0.18 10.9

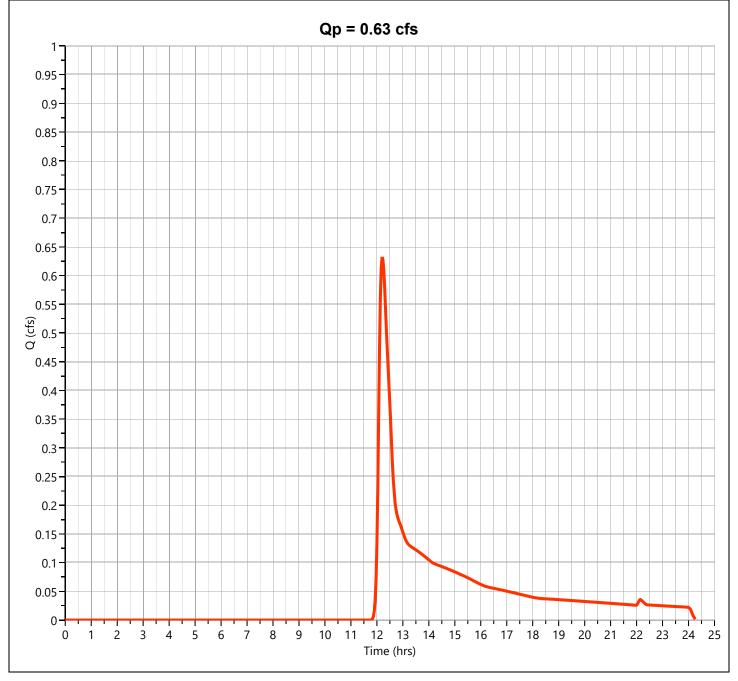
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.010 cfs
Storm Frequency	= 2-yr	Time to Peak	= 14.73 hrs
Time Interval	= 2 min	Runoff Volume	= 282 cuft
Drainage Area	= 0.9 ac	Curve Number	= 47
Tc Method	= User	Time of Conc. (Tc)	= 10.9 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



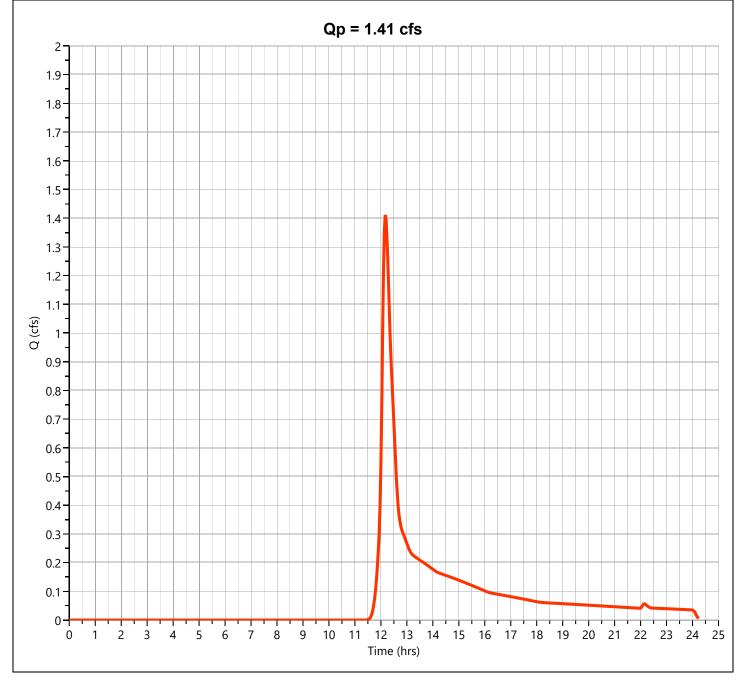
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.265 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.30 hrs
Time Interval	= 2 min	Runoff Volume	= 1,857 cuft
Drainage Area	= 0.9 ac	Curve Number	= 47
Tc Method	= User	Time of Conc. (Tc)	= 10.9 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.632 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 3,353 cuft
Drainage Area	= 0.9 ac	Curve Number	= 47
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	= 1.411 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 6,232 cuft
Drainage Area	= 0.9 ac	Curve Number	= 47
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



Hydrograph Type Storm Frequency	= Pond Route = 2-yr		Peak Flow Time to Peak	= 0.000 cfs = 13.37 hrs	
Fime Interval	= 2 min		Hydrograph Volume	= 0.000 cuft	
nflow Hydrograph	= 36 - P-6B	Max. Elevation	= 219.01 ft		
Pond Name	= IB-6B	= 6.91 cuft			
Pond Routing by Storage In	dication Method				
	Q	p = 0.00 cfs			
0.009					
0.0085					
0.008					
0.0075					
0.007					
0.0065					
0.006					
0.0055					
0.005					
(£) 0.0045					
0.004					
0.0035					
0.003					
0.0025					
0.002					
0.0015					
0.001					
0.0005					
0 1	2 3 4 5	6 7 8	9 10 11	12 13	
		Time (hrs)			

Hydrograph Type	= Pond Route		Peak Flow	= 0.000 cfs			
Storm Frequency	= 10-yr		Time to Peak	= 15.80 hrs			
Time Interval	= 2 min		Hydrograph Volume	= 0.000 cuft			
Inflow Hydrograph	= 36 - P-6B	6 - P-6B Max. Elevation = 219.59					
Pond Name	= IB-6B		Max. Storage	= 283 cuft			
Pond Routing by Storage Ind	dication Method		Center of ma	ss detention time = 13 mi			
	Q	p = 0.00 cfs					
0.26							
-							
0.24							
0.22							
0.2							
0.18							
0.16							
<u>ي</u> 0.14							
( <del>y</del> b) - 0.12							
0.1							
0.08			\				
0.06							
0.04							
0.02							
0							
0 1	2 3 4 5 6	7 8 9	10 11 12 13	14 15			
· 1		Time (hrs)	.0 11 12 13	13 13			
		P-6B — IB-6B					

lydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs	
Storm Frequency	= 25-yr	Time to Peak	= 18.73 hrs	
īme Interval	= 2 min	Hydrograph Volume	= 0.000 cuft	
nflow Hydrograph	= 36 - P-6B	= 220.48 ft		
Pond Name	= IB-6B	Max. Storage	= 846 cuft	
ond Routing by Storage Indi	ication Method	Center of mas	s detention time = 2.85 h	
	Qp = 0.00 cf	s		
0.95				
0.9				
0.85				
0.8				
0.75				
0.7				
0.65				
0.6				
0.55				
(§) 0.5 -				
0.45 -				
-				
0.4				
0.35				
0.3				
0.25				
0.2				
0.15				
0.1				
0.05				
0				

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs		
Storm Frequency	= 100-yr	Time to Peak	= 15.13 hrs		
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft		
Inflow Hydrograph	= 36 - P-6B	Max. Elevation	= 221.77 ft		
Pond Name	= IB-6B	Max. Storage	= 2,097 cuft		
Pond Routing by Storage In	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}\text{0}\text{0}\text{0}					
0.9					
0.8					
0.7					
0.6					
0.5					
-					
0.4					
0.3					
0.2					
0.1					
0					
0 1	2 3 4 5 6 7 T	8 9 10 11 12 13 ime (hrs)	3 14 15		
		IB-6B			

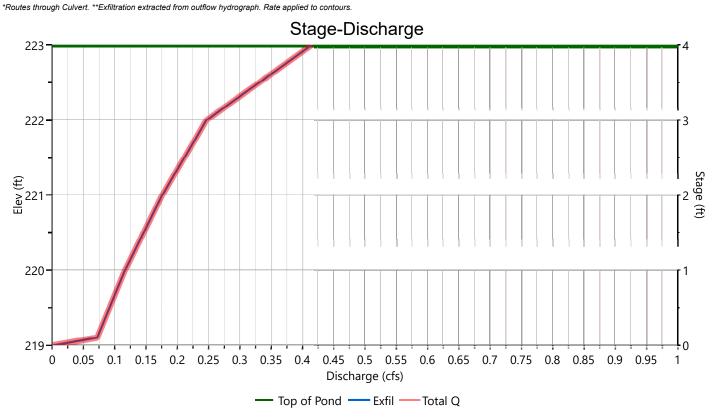
## IB-6B Stage-Storage

ļ	<b>Descrip</b> Bottom Elevatio Voids Volume (	on, ft (%)	100.00 None	Stage (ft)  0.00  1.00  2.00	Elevation (ft) 219.00 220.00	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
	Voids	(%)	100.00	1.00	219.00	351	0.000	0.000
				1.00				
	Volume (	Calc	None	2 00		608	480	480
					221.00	919	764	1,243
				3.00	222.00	1,288	1,104	2,347
				4.00	223.00	2,169	1,729	4,075
			į	Stage-	Storage	,		
223								4
-								
222								3
-								
£								Stag
<u>≥</u> 221 <del>-</del>								2 (ft)
ш								T. T.
1								
220								†1
210								
219 0	500	1000	1500		)000 2 prage (cuft)	2500 300	00 3500	4000
						1		
				Contours =	Top of Por	na		

#### IB-6B

#### Stage-Discharge

Outroot / Outro	Orderant		Orifices		Doufouete d 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					
\M/o;wo	Riser*		Weirs		Ancilland	
Weirs	Riser"	1	2	3	Ancillary	
Shape / Type					Exfiltration, in/hr	8.27**
Crest Elevation, ft						
Crest Length, ft						
Angle, deg						
Weir Coefficient, Cw						

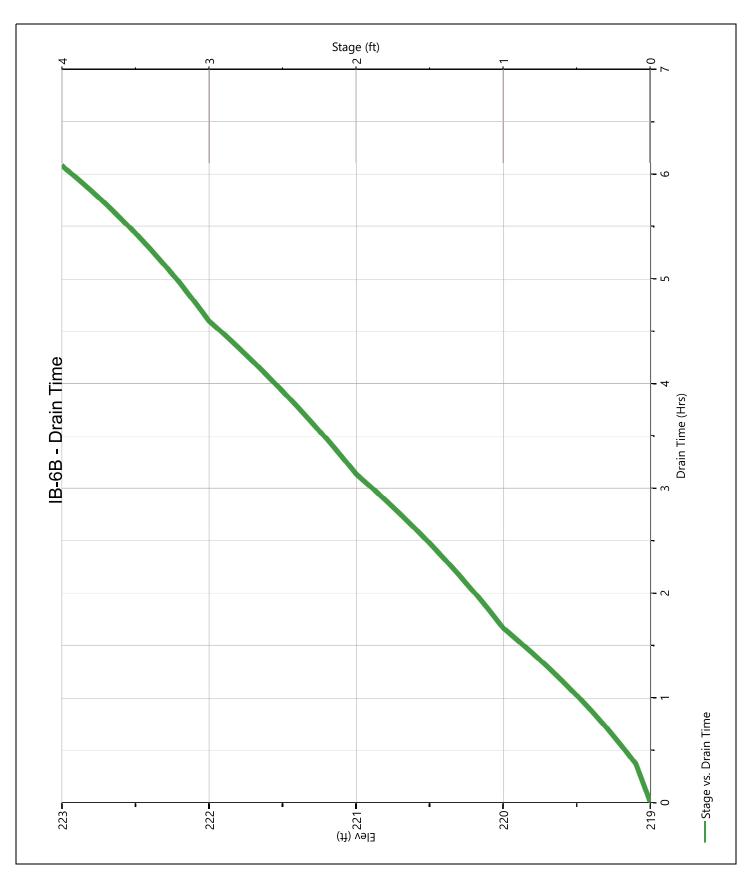


#### IB-6B

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

Stage	Elev.	Storage	Culvert	(	Orifices, cf	s	Riser		Weirs, cfs	eirs, cfs		Exfil	User	Total
Stage (ft)	(ft)	(cuft)	(cfs)	1	2	3	(cfs)	1	2	3	Pf Riser (cfs)	(cfs)	(cfs)	(cfs)
0.00	219.00	0.000										0.000		0.000
1.00	220.00	480										0.116		0.116
2.00	221.00	1,243										0.176		0.176
3.00	222.00	2,347										0.247		0.247
4.00	223.00	4,075										0.415		0.415

#### IB-6B Pond Drawdown



## P-6 TOTAL Hyd. No. 38

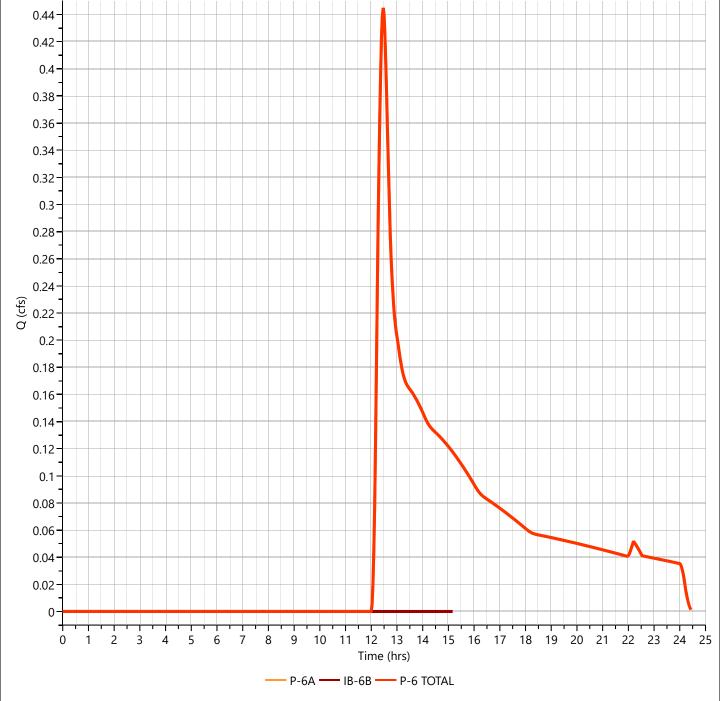
Time Interval = Inflow Hydrographs =  4.5E-10  4E-10	2-yr 2 min 35, 37		Q	p = 0.	00 cf	•	Нус		Peak ph Vo itrib. A			37 hrs 00 cuft 5 ac	
Inflow Hydrographs =  4.5E-10  4E-10			Q	p = 0.	00 cf								
4.5E-10 - 4E-10 -	35, 37		Q	p = 0.	00 cf		Tota	al Cor	itrib. A	rea	= 1.65	5 ac	
4E-10			Q	p = 0.	00 cf	_							
4E-10						>							
-			1										
3.5E-10													
3E-10													
2.5E-10												_	
2E-10													
1.5E-10													
1E-10													
5E-11													
Q (cfs)													
-5E-11													
-1E-10												╂╂	
-1.5E-10													
-2E-10												╂	
-2.5E-10												-	
-3E-10 -												$\dashv$	
-3.5E-10													
-4E-10 -													
-4.5E-10													
0 1	2 3	4	5	6	7 Time (l	rs)		,	10	11	12	13	14
			<u>—</u> IE	s-6B <del></del>									

## P-6 TOTAL Hyd. No. 38

Hydrograph Type	= Junction		Peak Flow	= 0.014 cfs
Storm Frequency	= 10-yr		Time to Peak	= 15.57 hrs
Time Interval	= 2 min		Hydrograph Volume	= 390 cuft
nflow Hydrographs	= 35, 37		Total Contrib. Area	= 1.65 ac
0.014		Qp = 0.01 cfs		
0.007 - 0.006 - 0.006 -				
0.005				
0.004				
0.003				
0.002				
0.001-				
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 2

Hydrograph Type	= Junction		Peak Flow	= 0.058 cfs			
Storm Frequency	= 25-yr		Time to Peak	= 12.77 hrs			
Time Interval	= 2 min		Hydrograph Volume	= 1,408 cuft			
Inflow Hydrographs	= 35, 37		Total Contrib. Area	= 1.65 ac			
	Qp = 0.06 cfs						
0.056							
0.052							
0.048							
0.044							
0.04							
0.036							
0.032							
O 0.028							
0.024				\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \			
0.02							
0.016							
0.012							
0.008							
0.004							
0		<del>                                     </del>		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 2			
	_	P-6A — IB-6B — P-6 TOTA	AL				

				•			
Hydrograph Type	= Junction		Peak Flow	= 0.445 cfs			
Storm Frequency	= 100-yr		Time to Peak	= 12.47 hrs			
Time Interval	= 2 min		Hydrograph Volume	= 4,014 cuft			
Inflow Hydrographs	= 35, 37		Total Contrib. Area	= 1.65 ac			
	Qp = 0.44 cfs						
0.44							
0.42							
0.4							



SM-3719C
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Project:	Athens Street	By NC	Date 6/24/22 Rev Date 10/13/2022
Location:	Stow, MA	Checked	Date Date
Circle one:	Present Developed	Subcatchment P-7A	

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
А	Open Space	Good Condition	39			2.37	92.58
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.		172790		Totals =	3.97	240.47

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

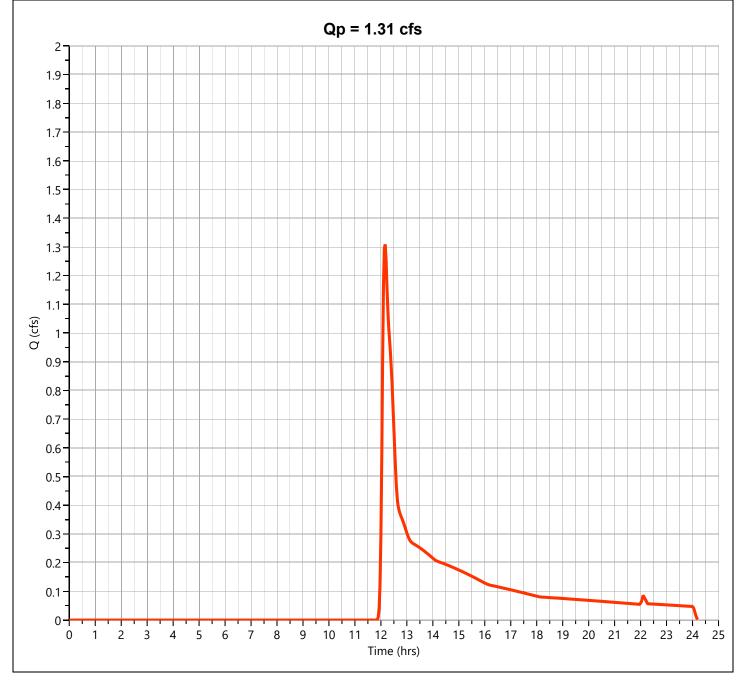
2. Runoff

Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.46	2.07	3.28

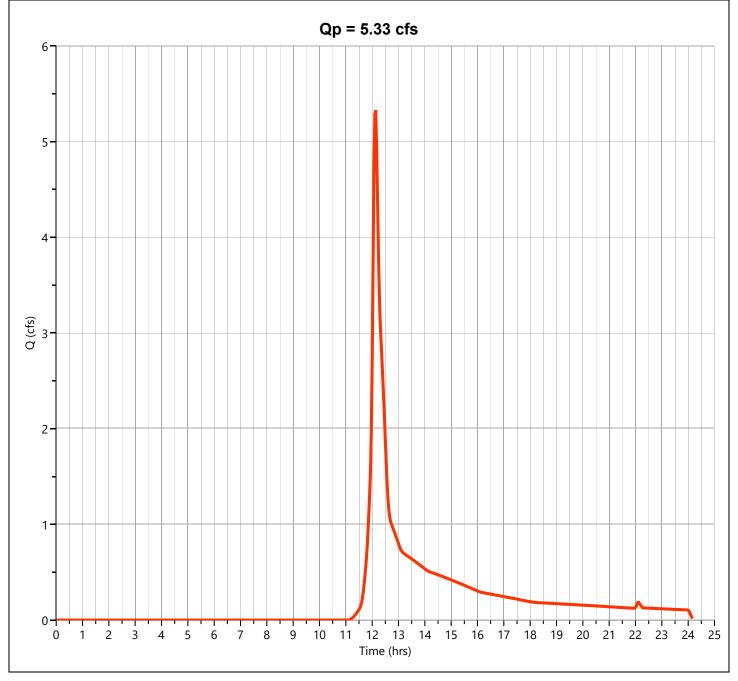
Runoff, Q......(Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)

Project:	Athens Street	_	Ву	NC	Date		
Location:	Stow, MA		Checked		Rev Date Date	10/13/2022	
Location.	Slow, IVIA	-	Checkeu		. Date		
Circle one:	Present Developed		Subcatchn	nent P-7A			
Circle one:	Tc Tt	through subarea					
		Subarca					
Sheet flow	(Applicable to Tc only)		Segment ID	A-B			
	( PP ) )		9				
1. Surface l	Description (table 3-1)			LAWN			
2. Manning	s roughness coeff., n (table 3-1)			0.24			
_							
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	0.045			
6. Tt = 0.00	7 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Ti	hr	0.10			0.10
Shallow co	ncentrated Flow		Segment ID	B-C			
Chanew con	iooniaatou i ion		oog.none12				
7. Surface l	Description (paved or unpaved)			UNPAVED			
8. Flow Ler	igth, L		ft	140			
9. Waterco	urse slope, s		ft/ft	0.026			
10. Average	e Velocity, V (figure 3-1)		ft/s	2.60			
44 70 1 /	00001	0		0.04			0.04
11. Tt = L /	3600V	Compute Ti	hr	0.01			0.01
Channel flo	w		Segment ID				
10 0	actional flow area		-f				
	ectional flow area, a perimeter, pw		sf ft				
	lic radius, r=a/wp	Compute r					
15. Channe		Computer	ft/ft				
	-		IVIL				
	g's roughness coeff., n	0	£1-				
	9 r^2/3 s^1/2 / n	Compute V					
18. Flow le	_	_	ft				
19. Tt = L /	3600V	Compute Ti	hr				0
20. Waters	hed or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	d 19)			hr	0.12
						min	6.9

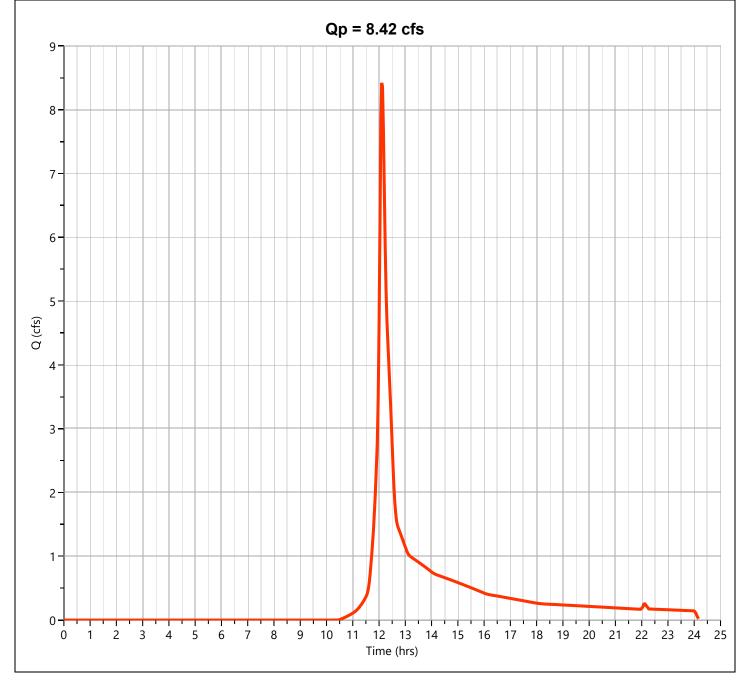
Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.309 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 6,815 cuft
Drainage Area	= 3.97 ac	Curve Number	= 61
Tc Method	= User	Time of Conc. (Tc)	= 6.9 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



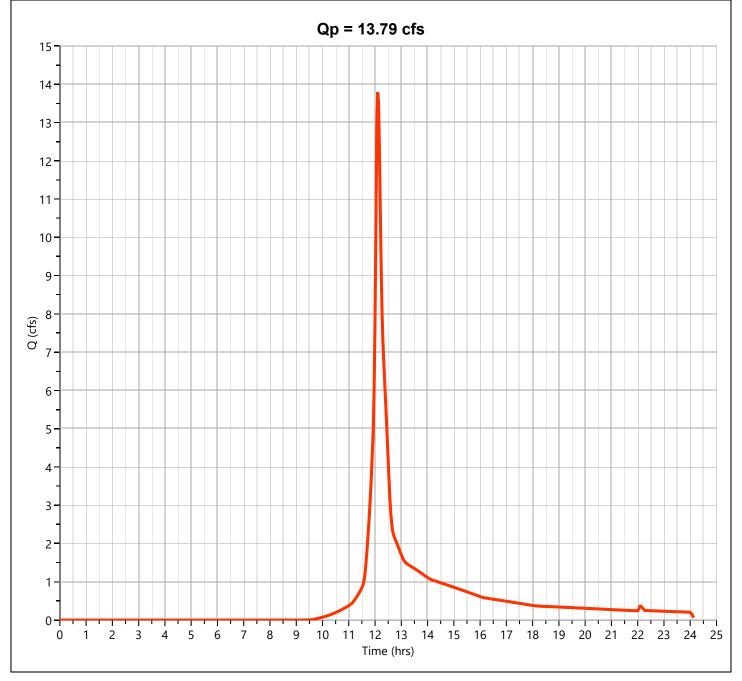
Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.329 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 20,077 cuft
Drainage Area	= 3.97 ac	Curve Number	= 61
Tc Method	= User	Time of Conc. (Tc)	= 6.9 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 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 Hyd. No. 41

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			
nflow Hydrograph	= 40 - P-7A	Max. Elevation	= 219.17 ft			
Pond Name	= IB-7A REVISED	Max. Storage	= 704 cuft			
Pond Routing by Storage Ind	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 <del> </del>						
(S) 1 - C (Ctg)						
0.9						
0.8						
0.7						
0.6						
0.5						
0.4						
0.3						
0.2						
-						
0.1						
0 1 2	2 3 4 5 6 7 8 9 Time (hrs)	10 11 12 13 1	4 15 16			

# IB-7A Hyd. No. 41

			,
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	= 40 - P-7A	Max. Elevation	= 220.34 ft
Pond Name	= IB-7A REVISED	Max. Storage	= 5,971 cuft
Pond Routing by Storage Inc	dication Method		
	Qp = 0.00 cfs		
6			
5			
1			
4			
-			
3			
Q (cfs)			
σ			
2-			
1			
1-			
-			
0			
-1			
0 1 2 3	4 5 6 7 8 9 10 11 12 13 1 Time (hrs)	4 15 16 17 18 19	<i>3</i> 20 21 22 3

— P-7A — IB-7A

# IB-7A Hyd. No. 41

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	= 40 - P-7A	Max. Elevation	= 221.14 ft			
ond Name	= IB-7A REVISED	Max. Storage	= 10,526 cuft			
ond Routing by Storage Ind	dication Method					
	Qp = 0.00 cfs					
9						
-						
8						
-						
7-						
6						
1						
5						
-						
2 4						
7 ]						
3-						
3						
1						
2						
-						
1 -						
4						
0						
-1 <del>-                                      </del>		12 13 14 15 16	17 18 19			
	Time (hrs)					

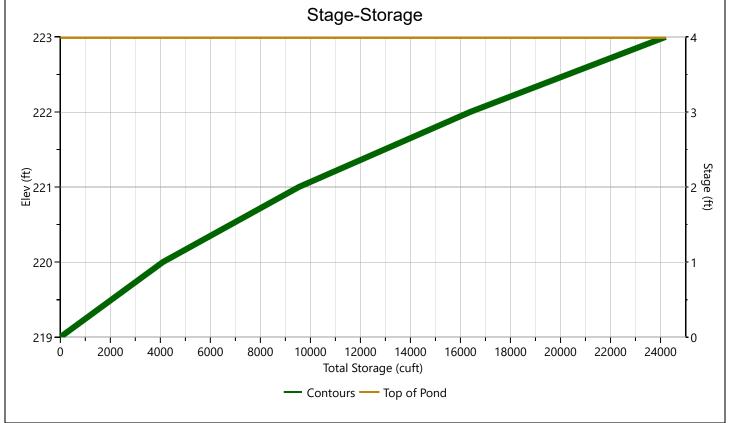
# IB-7A Hyd. No. 41

lydrograph Type Storm Frequency	= 100-yr		Time to Peak	= 11.27 hrs
ime Interval nflow Hydrograph	= 2 min = 40 - P-7A		Hydrograph Volume  Max. Elevation	= 0.000 cuft = 222.39 ft
ond Name	= IB-7A REVISED		Max. Storage	= 19,475 cuft
ond Routing by Storage Inc			Wax. Otorage	- 13,473 Cuit
		= 0.00 cfs		
15				
14				
-				
13				
12-				
-				
11 -				
10				
-				
9 -				
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

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

# Stage-Storage

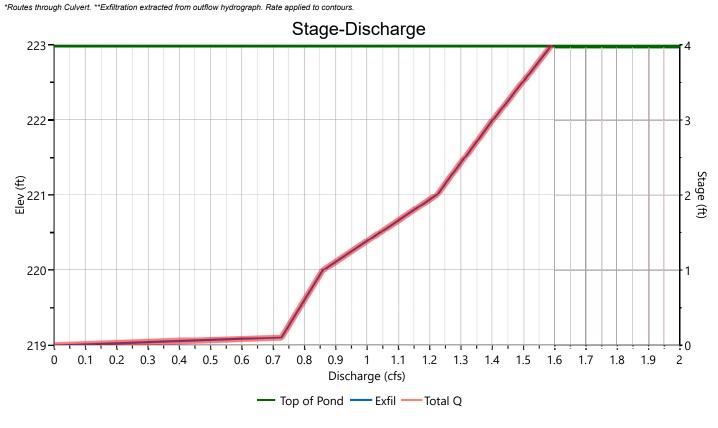
User Defined Conto	ırs			Stage / Stora	ge Table	
Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
Bottom Elevation, ft	219.00	0.00	219.00		0.000	0.000
Voids (%)	100.00	1.00	219.00	3,716 4,485	4,101	4,101
Volume Calc	Ave End Area	2.00	221.00	6,387	5,436	9,537
volume date	AVC LITA AICA	3.00	222.00	7,320	6,854	16,390
		4.00	223.00	8,310	7,815	24,205
		1				ı



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

# Stage-Discharge

Cubrent / Onitions	Culvent		Orifices		Dowforestad Dia		
Culvert / Orifices	Culvert	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	Kiser"	1	2	3	Ancillary		
Shape / Type					Exfiltration, in/hr	8.27**	
Crest Elevation, ft							
Crest Length, ft							
Angle, deg							
Weir Coefficient, Cw							



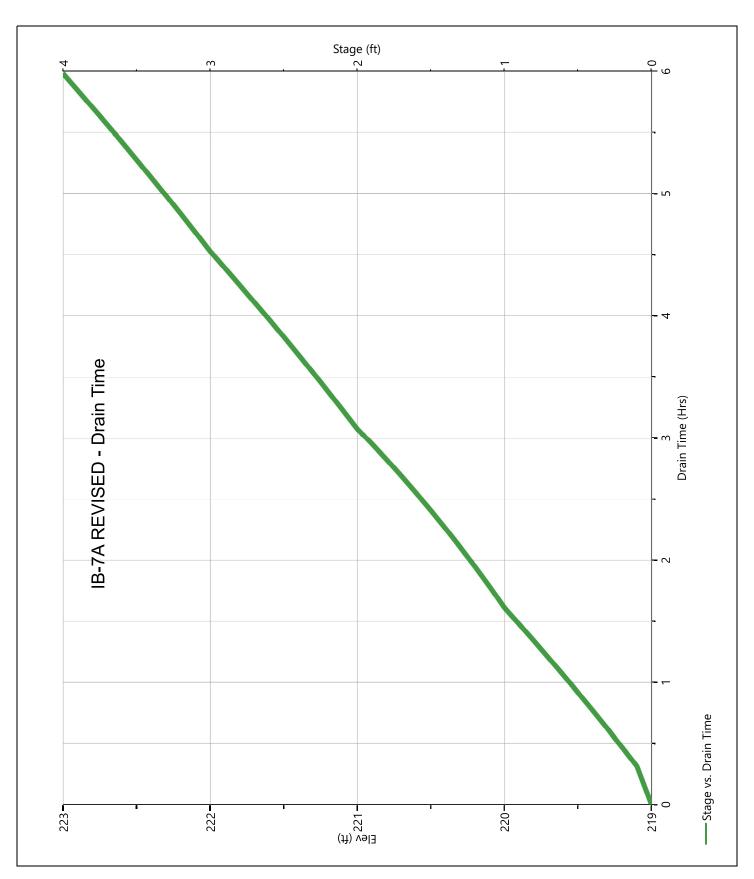
#### **IB-7A REVISED**

# **Stage-Storage-Discharge Summary**

Stage	Elev.	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	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
3.00	222.00	16,390 24,205										1.401		1.401 1.591

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

#### **Pond Drawdown**



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

1. Runoff curve number (CN)

Soil name and hydrologic	(cover	Cover description		CN 1/		Area		
group (appendix A)	group hydrologic condition: percent impervious: unconnected/connected impervious		Table 2-2	Fig. 2-3	Fig. 2-4	Acres		
	Impervious		98			0.52	50.59	
А	Woods	Good Condition	30			0.20	6.13	
А	Open Space	Good Condition	39			1.27	49.48	
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.		86653		Totals =	1.99	106.20	

CN (weighted) =	total	product	=	106.20	=	53.39	)	;	Use CN =	Ī	53	l
	total	area		1.99	•					_		

2. Runoff

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

Storm #2	Storm #3
3(01111#2	3101111#3
25	100
6.14	7.84
1 47	2.50
	6.14

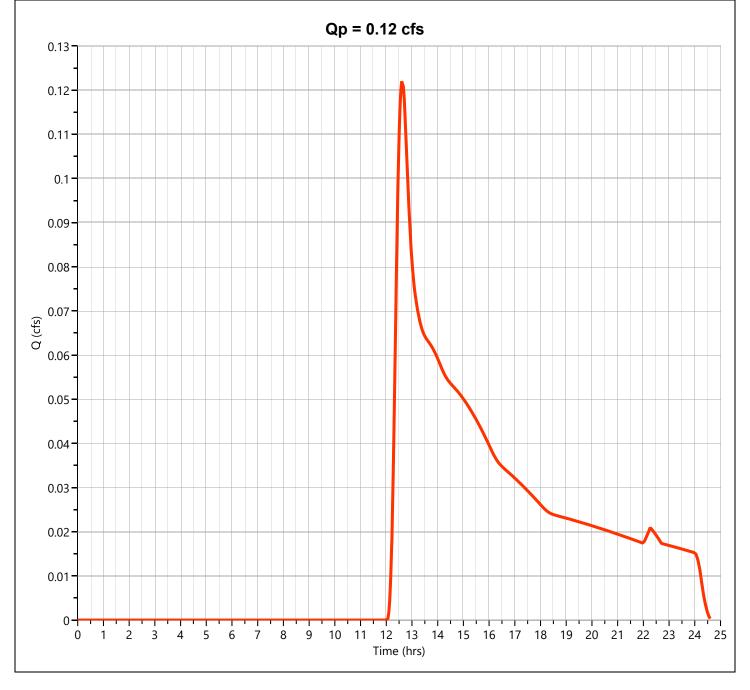
Project:

Athens Street

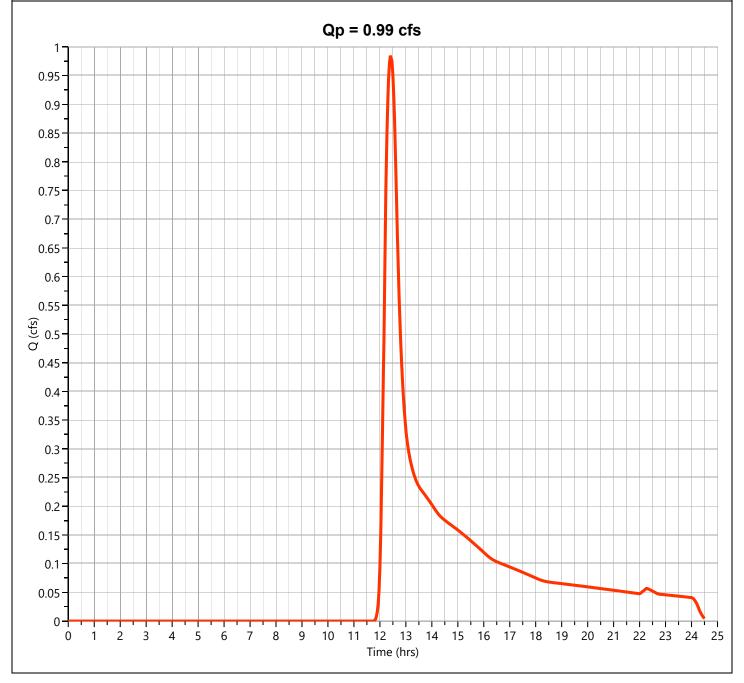
By NC Date 6/24/2022

Location: Stow, MA		Checked		Rev Date Date	10/13/2022	
Circle one: Present Developed Circle one: Tc Tt	through subarea	Subcatchn	nent P-7B			
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			
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	0.38			0.38
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	200			
9. Watercourse slope, s		ft/ft	0.010			
10. Average Velocity, V (figure 3-1)		ft/s	1.61			
11. Tt = L / 3600V	Compute T	t hr	0.03			0.03
Channel flow		Segment ID				
<ul> <li>12. Cross sectional flow area, a</li> <li>13. Wetted perimeter, pw</li> <li>14. Hydraulic radius, r=a/wp</li> <li>15. Channel Slope, s</li> <li>16. Manning's roughness coeff., n</li> <li>17. V = 1.49 r^2/3 s^1/2 / n</li> <li>18. Flow length, L</li> </ul>	Compute r	ft/ft				
19. Tt = L / 3600V	Compute T					0
20. Watershed or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	d 19)			hr min	0.42 24.9

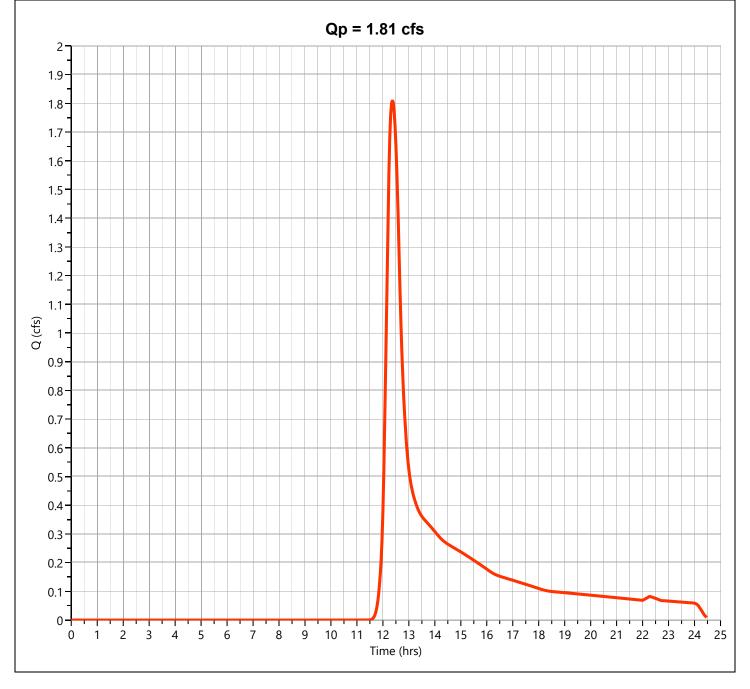
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.122 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.63 hrs
Time Interval	= 2 min	Runoff Volume	= 1,536 cuft
Drainage Area	= 1.99 ac	Curve Number	= 53
Tc Method	= User	Time of Conc. (Tc)	= 24.9 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



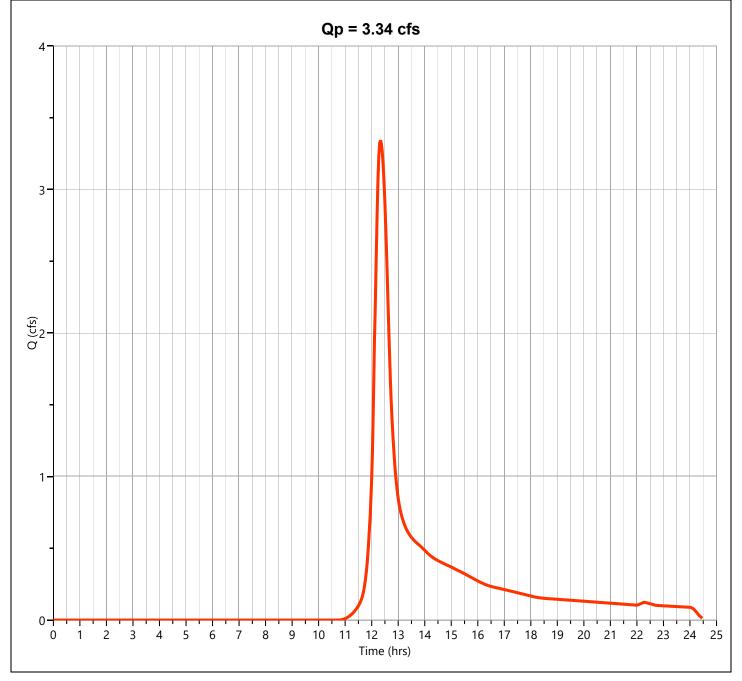
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.987 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.43 hrs
Time Interval	= 2 min	Runoff Volume	= 6,252 cuft
Drainage Area	= 1.99 ac	Curve Number	= 53
Tc Method	= User	Time of Conc. (Tc)	= 24.9 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.811 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.37 hrs
Time Interval	= 2 min	Runoff Volume	= 10,244 cuft
Drainage Area	= 1.99 ac	Curve Number	= 53
Tc Method	= User	Time of Conc. (Tc)	= 24.9 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.343 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Runoff Volume	= 17,523 cuft
Drainage Area	= 1.99 ac	Curve Number	= 53
Tc Method	= User	Time of Conc. (Tc)	= 24.9 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



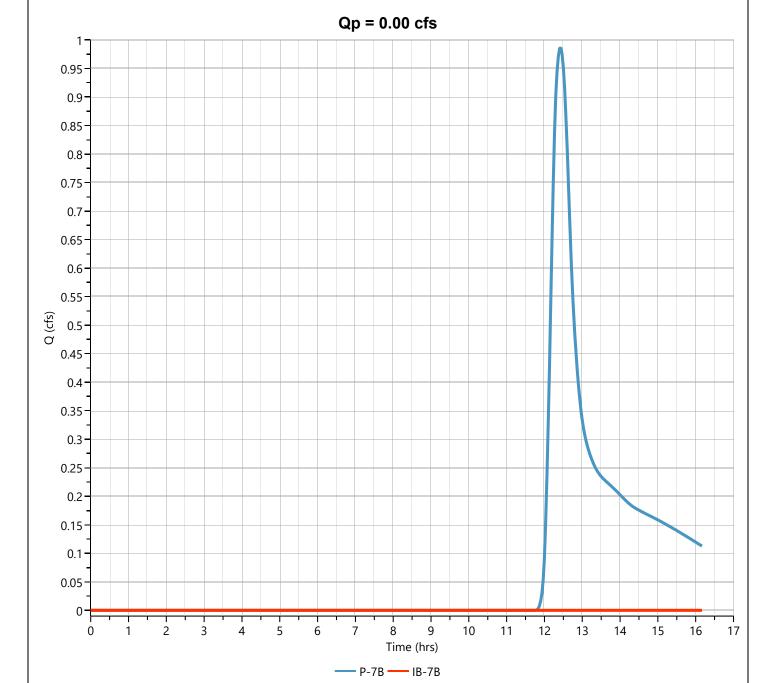
# IB-7B Hyd. No. 43

lydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 13.90 hrs
īme Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
nflow Hydrograph	= 42 - P-7B	Max. Elevation	= 224.03 ft
Pond Name	= IB-7B	Max. Storage	= 62.8 cuft
ond Routing by Storage Ind	ication Method		
	Qp	= 0.00 cfs	
0.13			
0.12			Λ.
-			
0.11			
-			
0.1			
0.09			
-			
0.08			
0.07			
0.06			
1			
0.05			
0.04			
-			
0.03			
0.00			
0.02			
0.01			
-			
0			
-0.01			
0 1	2 3 4 5	6 7 8 9 10 11	12 13

# IB-7B Hyd. No. 43

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 10-yr	Time to Peak	= 16.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 42 - P-7B	Max. Elevation	= 224.61 ft
Pond Name	= IB-7B	Max. Storage	= 1,176 cuft

Pond Routing by Storage Indication Method



# IB-7B Hyd. No. 43

Hydrograph Type	= Pond Route		Peak Flow	= 0.000 cfs		
Storm Frequency	= 25-yr		Time to Peak	= 17.40 hrs		
Γime Interval	= 2 min		Hydrograph Volume	= 0.000 cuft		
nflow Hydrograph	= 42 - P-7B		Max. Elevation	= 225.33 ft		
Pond Name	= IB-7B		Max. Storage	= 2,841 cuft		
Pond Routing by Storage Ind	dication Method		Center of mass	s detention time = 9.07 h		
		Qp = 0.00 cfs				
2-						
1.9						
1.8			<u> </u>			
1.7						
1.6						
1.5						
1.4						
1.3						
1.2						
-						
1.1 <del> </del>						
(St) 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		11 12 13 14	15 16 17		
		Time (hrs)				

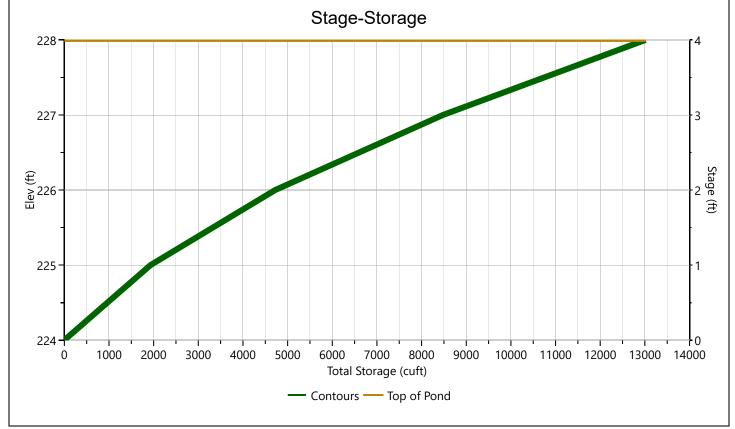
# IB-7B Hyd. No. 43

torm Frequency ime Interval	= 100-yr										
me Interval			ne to Peak	= 11.83 hrs							
	= 2 min		drograph Volume	= 0.000 cuft							
flow Hydrograph	= 42 - P-7B		x. Elevation	= 226.36 ft							
ond Name	= IB-7B	Max	x. Storage	= 6,077 cuft							
Pond Routing by Storage Indication Method											
Qp = 0.00 cfs											
4											
-											
3-											
_											
2											
(3)											
1 -											
0											
-1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -	2 3 4 5	6 7	8 9 1	0 11							
	_	ime (hrs)									

#### IB-7B

# Stage-Storage

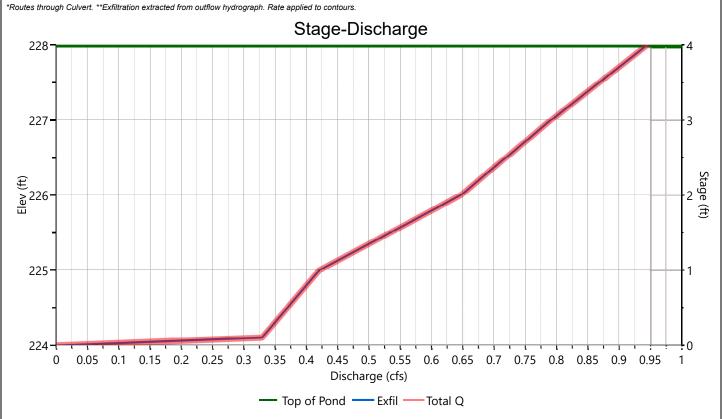
User Defined Conto	urs			Stage / Stora	ge Table	
Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
Bottom Elevation, ft	224.00					
Voids (%)	100.00	0.00	224.00 225.00	1,667	0.000	0.000
		1.00 2.00	225.00	2,198	1,933	1,933
Volume Calc	Ave End Area	3.00	227.00	3,381 4,132	2,790 3,757	4,722 8,479
		4.00	228.00	4,939	4,536	13,014
		4.00	220.00	4,939	4,550	13,014
			l			1



#### IB-7B

#### Stage-Discharge

Outroot / Outro	Orderant		Orifices		Doufoveted Discu		
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						
\M/o;wo	Riser*		Weirs		Ancilland		
Weirs	Riser"	1	2	3	Ancillary		
Shape / Type					Exfiltration, in/hr	8.27**	
Crest Elevation, ft							
Crest Length, ft							
Angle, deg							
Weir Coefficient, Cw							

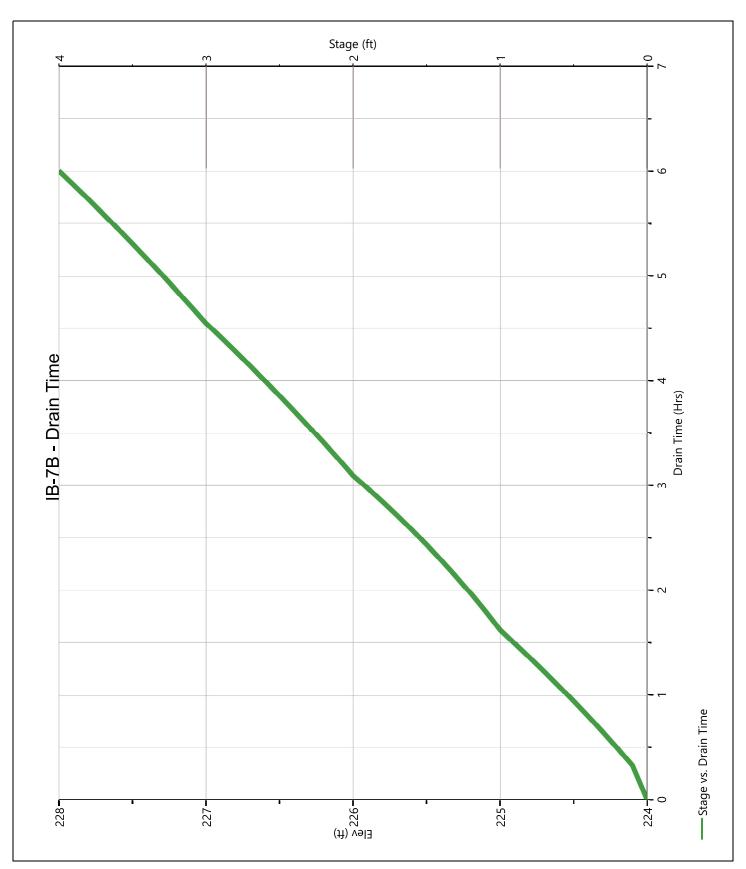


#### IB-7B

# **Stage-Storage-Discharge Summary**

Stage	Elev.	Storage	Culvert	(	Orifices, cf	s	Riser		Weirs, cfs Pf Ris		Pf Riser	Pf Riser Exfil User		Total
Stage (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	1,933										0.421		0.421
2.00	226.00	4,722										0.647		0.647
3.00	227.00	8,479										0.791		0.791
4.00	228.00	13,014										0.945		0.945

#### IB-7B Pond Drawdown



Hydrograph Type	= Junction		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 Hydrographs	= 41, 43		Total Contrib. Area	= 0.0 ac		
	Qp	= 0.00 cfs				
8E-09						
7E-09						
6E-09						
5E-09						
4E-09						
3E-09						
2E-09 <del>-</del>						
1E-09						
0						
-1E-09						
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(y) -3E-09 - C -4E-09 - C						
-5E-09						
-6E-09						
-7E-09						
-8E-09 <del> </del>						
-9E-09 <del> </del>						
-1E-08						
-1.1E-08						
-1.2E-08						
-1.3E-08						
-1.4E-08						
-1.5E-08						
0 1	2 3 4 5 6	7 8 9 10 Time (hrs)	0 11 12 13	14 15 16		

Hydrograph Type = Junction		Peak Flow	= 0.000 cfs	
Storm Frequency	= 10-yr		Time to Peak	= 16.10 hrs
Time Interval	= 2 min		Hydrograph Volume	= 0.000 cuft
Inflow Hydrographs	= 41, 43		Total Contrib. Area	= 0.0 ac
		Qp = 0.00 cfs		
8E-09		-		
7E-09				
6E-09				
5E-09				
4E-09				
3E-09				
2E-09				
1E-09				
0				
-1E-09				
-2E-09				
4				
(y) -3E-09 - O -4E-09 -				
-5E-09				
-6E-09				
-7E-09				
-8E-09			<u> </u>	
-9E-09				
-1E-08				
-				
-1.1E-08				
-1.2E-08				
-1.3E-08				
-1.4E-08 <del>-</del>				
-1.5E-08 <del>           </del> 0 1 2	3 4 5 6	7 8 9 10 11 12 Time (hrs)	13 14 15 16 17 18	19 20 21 22 23
		— IB-7A — IB-7B — P-7 1	ГОТАL	

Hydrograph Type	= Junction		Peak Flow	1	= 0.000 cfs				
Storm Frequency	= 25-yr				Time to Pe	eak	= 17.40 hrs		
Time Interval	= 2 min				Hydrograp	h Volume	= 0.000 cuft = 0.0 ac		
Inflow Hydrographs	= 41, 43				Total Cont	rib. Area			
		(	Qp = 0.0	00 cfs					
1.4E-08								+	
1.2E-08									
1E-08 -								$\blacksquare$	
8E-09 -									
6E-09									
4E-09									
2E-09									
Q (cfs)					M .			┨	
-2E-09									
-4E-09									
-6E-09									
-8E-09 <del>-</del>									
-1E-08 <del>-</del>									
-1.2E-08 <del>-</del>									
-1.4E-08									
0 1	2 3 4 5	6 7	-	10 11 Time (hrs)		15 16	17 18 19	9 20	
		IB-7A	M —— IB-7I	B — P-7 TO	TAL				

Hydrograph Type	= Junction			Peak Flow	= 0.000 cfs	
Storm Frequency	= 100-yr			Time to Peak	= 11.27 hrs	
Time Interval	= 2 min			Hydrograph Volume	= 0.000 cuft	
Inflow Hydrographs	= 41, 43			Total Contrib. Area	= 0.0 ac	
		Qp	= 0.00 cfs			
3E-08						
2.8E-08						
2.6E-08						
2.4E-08						
2.2E-08						
2E-08						
1.8E-08 <del>-</del>						
1.6E-08 <del>-</del>						
1.4E-08 - C 1.2E-08						
O <sub>1.2E-08</sub>						
1E-08 -						
8E-09						
6E-09						
4E-09						
2E-09						
0						
-2E-09 <del>-</del>						
-4E-09 <del>                                     </del>	2 3	4	5 6 Time (hrs)	7 8 9	10 11 12	
		— IB-7A —	■ IB-7B — P-7 TOT	AL		

Project:	Athens Street	By NC	Date 6/24/22 Rev Date 10/13/2022
Location:	Stow, MA	Checked	Date Date
Circle one:	Present Developed	Subcatchment 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)	pup hydrologic condition: percent impervious: unconnected/connected impervious		Table 2-2			Acres	
	Impervious		98			2.01	197.18
А	Woods	Good Condition	30			0.00	0.00
А	Open Space	Good Condition	39			2.65	103.50
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			0.00	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.	26	03242		Totals =	4.67	300.68

CN (weighted) =	total	product	=	300.68	=	64.44	;	Use CN =	64	
	total	area		4.67						

2. Runoff

Storm #1	Storm #2	Storm #3
		_
2	25	100
3.27	6.14	7.84
0.61	2.40	3.70

Project:

Athens Street

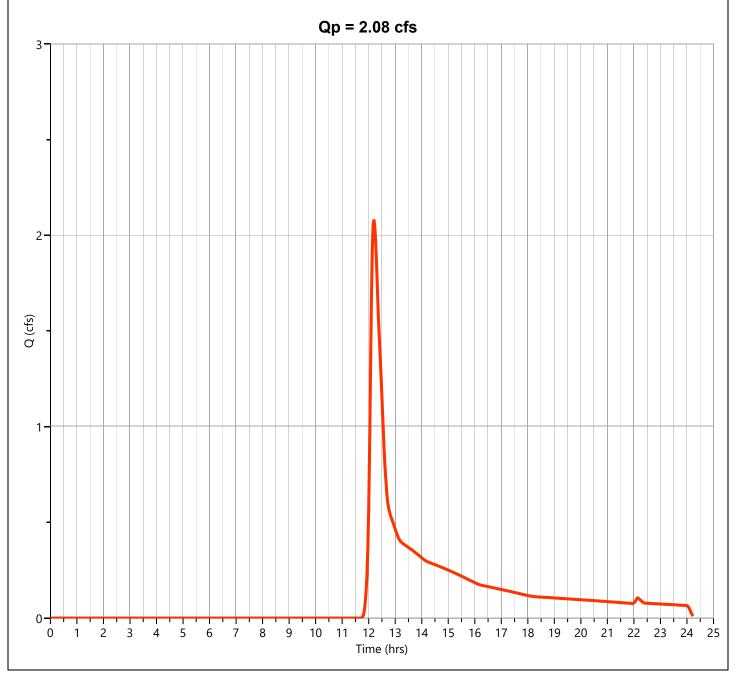
Date 6/24/2022

Location	Stow MA				Chaakad		Rev Date Date	10/13/2022	
Location:	Stow, MA			•	Checked		Date		
Circle one: Circle one:			through subarea	Subcatchi	ment P-8				
Sheet flow	(Applicable to	Tc only)			Segment ID	A-B			
1. Surface I	Description (ta	able 3-1)				LAWN			
2. Mannings	s roughness o	coeff., n (tab	ole 3-1)			0.24			
3. Flow leng	gth, L (total L	<= 300 ft)			ft	50			
4. Two-yr 2	4-hr rainfall, F	P2			in	3.1			
5. Land Slo	pe, s				ft/ft	0.015			
6. Tt = 0.00	7 (nL)^0.8 / (l	P2^0.5 s^0.	4)	Compute Tt	hr	0.16			0.16
Shallow cor	ncentrated Flo	ow	-		Segment ID	B-C			
7. Surface I	Description (p	aved or unp	paved)			UNPAVED			
8. Flow Len	ngth, L				ft	142			
9. Watercou	urse slope, s				ft/ft	0.015			
10. Average	e Velocity, V (	(figure 3-1)			ft/s	1.98			
11. Tt = L /	3600V			Compute Tt	hr	0.02			0.02
Channel flo	w				Segment ID				
	ectional flow perimeter, pv				sf ft				
	lic radius, r=a			Compute r					
15. Channe	el Slope, s				ft/ft				
	g's roughness			_					
	9 r^2/3 s^1/2	/ n		Compute V					
18. Flow ler 19. Tt = L /				Compute Tt	ft hr				0
20. Watersl	hed or subare	ea Tc or Tt (	add Tt in ste	ps 6, 11, and	d 19)			hr	0.18
								min	10.5

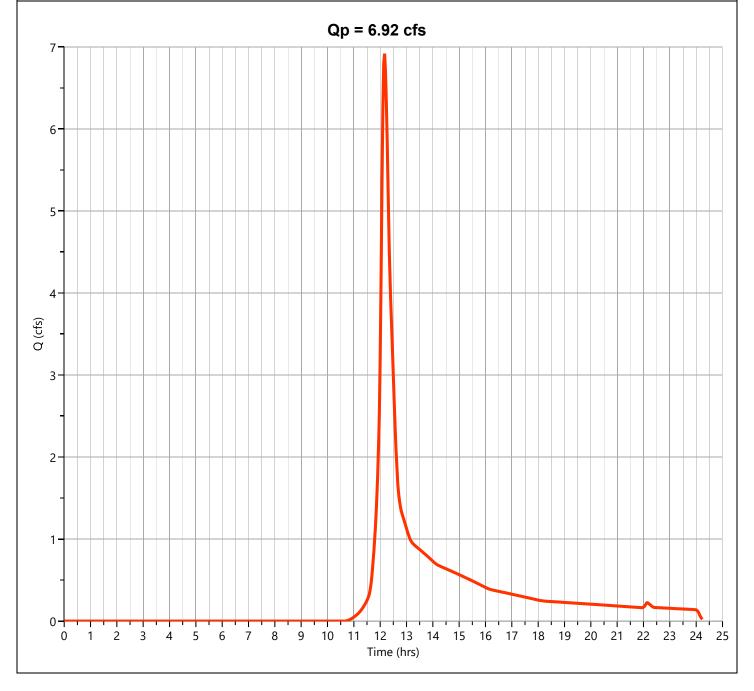
Ву

NC

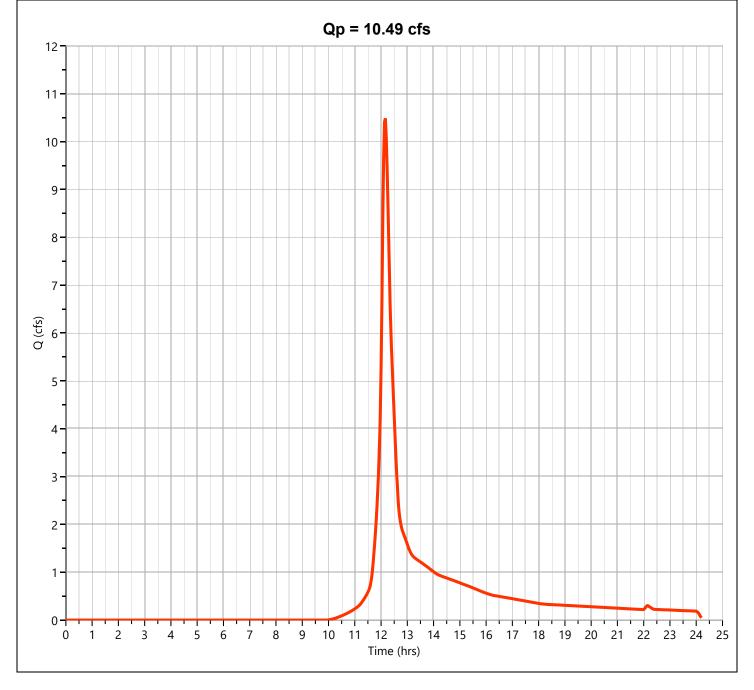
Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.083 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 10,351 cuft
Drainage Area	= 4.67 ac	Curve Number	= 64
Tc Method	= User	Time of Conc. (Tc)	= 10.5 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



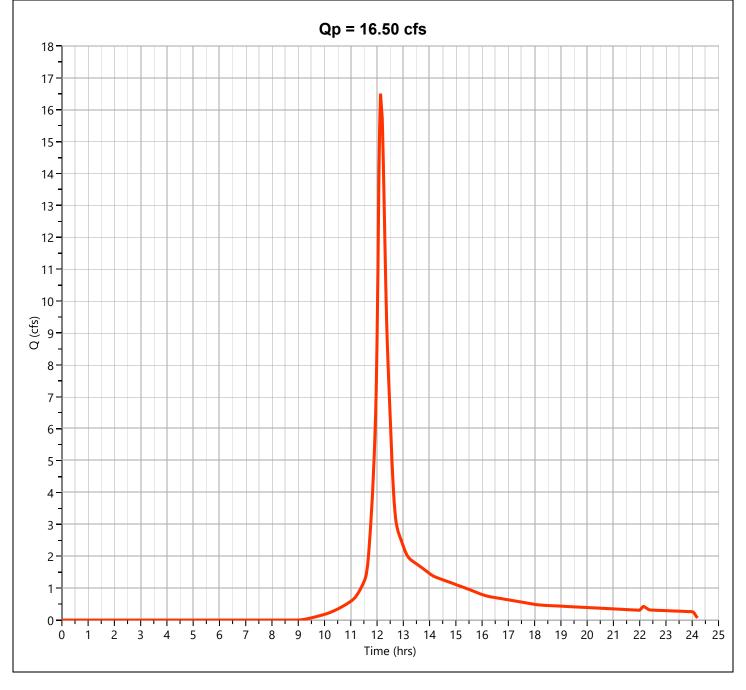
Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.918 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 28,087 cuft
Drainage Area	= 4.67 ac	Curve Number	= 64
Tc Method	= User	Time of Conc. (Tc)	= 10.5 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 10.49 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 41,323 cuft
Drainage Area	= 4.67 ac	Curve Number	= 64
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	= 16.50 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 63,880 cuft
Drainage Area	= 4.67 ac	Curve Number	= 64
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



lydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs							
Storm Frequency	= 2-yr	Time to Peak	= 12.07 hrs							
îme Interval	= 2 min	Hydrograph Volume	= 0.000 cuft							
nflow Hydrograph	= 46 - P-8	Max. Elevation	= 222.17 ft							
Pond Name	= IB-8	Max. Storage	= 1,168 cuft							
Pond Routing by Storage Indication Method										
Qp = 0.00 cfs										
3										
2- (35) O										
0 1	2 3 4 5 6 7	9 10	11 12 1							
Time (hrs)										

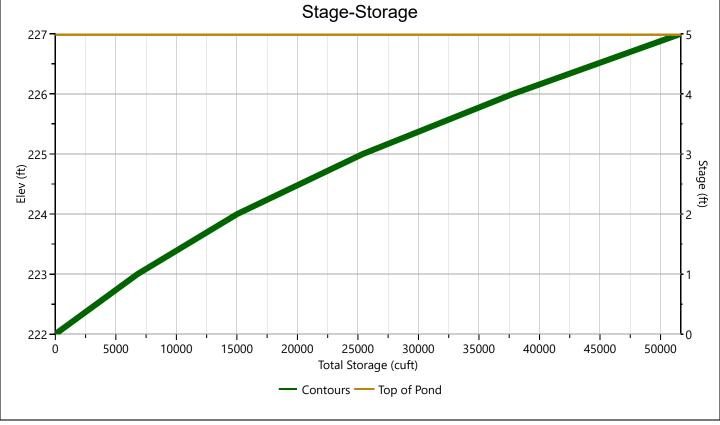
Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs							
Storm Frequency	= 10-yr	Time to Peak	= 11.87 hrs							
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft							
Inflow Hydrograph	= 46 - P-8	Max. Elevation	= 223.18 ft							
Pond Name	= IB-8	Max. Storage	= 8,244 cuft							
Pond Routing by Storage Indication Method										
	Qp = 0.00	cfs								
7										
-										
6										
-										
5										
1										
4										
Q (cfs) 3										
_										
2										
-										
1-										
17										
-										
0										
1										
-1										
0 1	2 3 4 5 6 Time (h		10 11 12							
	— P-8 — II									

lydrograph Type	= Pond Route					
torm Frequency ime Interval				= 11.73 hrs = 0.000 cuft		
nflow Hydrograph	= 2 min = 46 - P-8		Hydrograph Volume Max. Elevation	= 0.000 cuit = 223.92 ft		
ond Name	= 40 - F-6 = IB-8		Max. Storage	= 14,336 cuft		
ond Routing by Storage I			Wax. Otorage	- 14,000 cuit		
		Qp = 0.00 c	fe			
12 –		<b>QP</b> - 0.00 C				
-						
11 -						
10						
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0						
-1 -1 -1 -1						
0 1	2 3	4 5 6		10 11		
		Time (hrs	s)			

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs		
Storm Frequency	= 100-yr	Time to Peak	= 11.37 hrs		
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft		
Inflow Hydrograph	= 46 - P-8	Max. Elevation	= 224.97 ft		
Pond Name	= IB-8	Max. Storage	= 25,111 cuft		
Pond Routing by Storage Ind	dication Method				
	Qp = 0.00 cf	·s			
18 7					
17					
16-					
4					
15 -					
14 -					
13 -					
12 -					
11 -					
-					
10 -					
0 (dg)					
Ö 8					
7					
-					
6 -					
5 -					
4					
3					
-					
2-					
1 -					
0					
-1					
0 1	2 3 4 5 6		10 11 1		
	Time (hrs —— P-8 —— IB-	)			

## IB-8 Stage-Storage

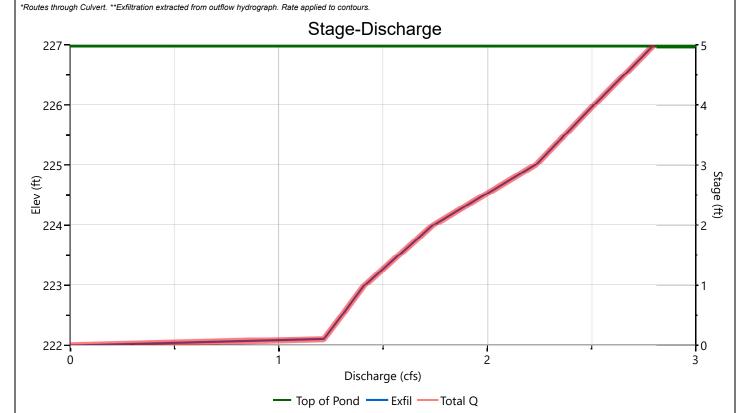
User Defined Contour	rs		Stage / Storage Table						
Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)			
Bottom Elevation, ft	222.00								
Voids (%)	100.00	0.00 1.00	222.00 223.00	6,237 7,372	0.000 6,805	0.000 6,805			
		2.00	223.00	9,089	8,231	15,035			
Volume Calc	None	3.00	225.00	11,652	10,371	25,406			
		4.00	226.00	13,110	12,381	37,787			
		5.00	227.00	14,624	13,867	51,654			
		Stage-S	Storage						
227						5			



#### **IB-8**

## Stage-Discharge

Culvert / Orifices	Culvert		Orifices		Perforated Ris		
Culvert / Orinices	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						
Weirs	Riser*		Weirs		Ancilland		
vveirs	Kisei	1	2	3	Ancillary		
Shape / Type					Exfiltration, in/hr	8.27**	
Crest Elevation, ft							
Crest Length, ft							
Angle, deg							
Weir Coefficient, Cw							

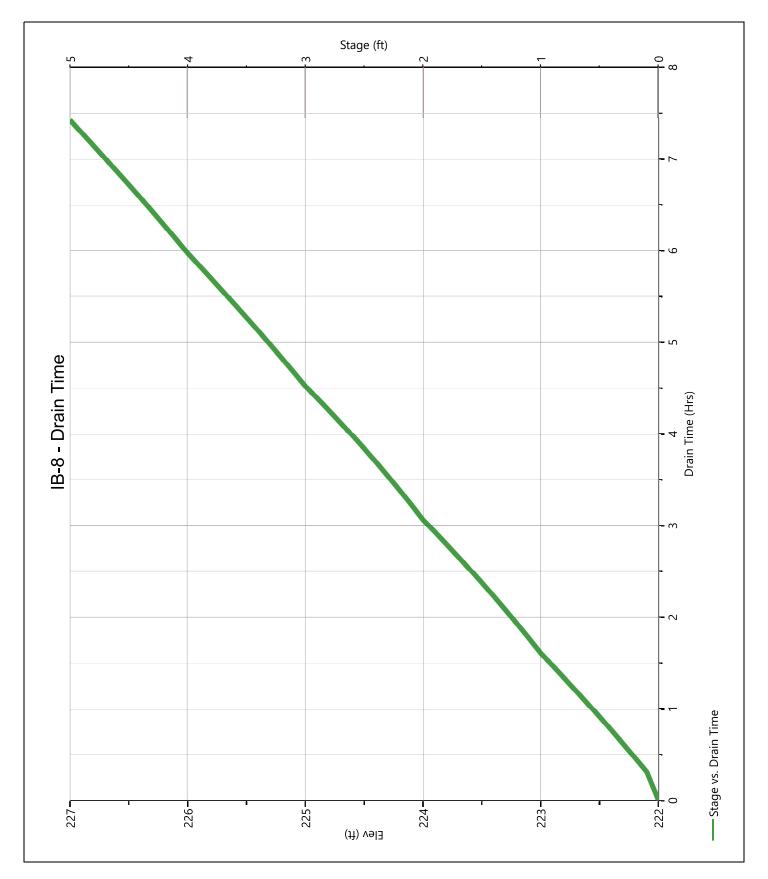


#### **IB-8**

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

Stage	Elev.	Storage	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	222.00	0.000										0.000		0.000
1.00	223.00	6,805										1.411		1.411
2.00	224.00	15,035										1.740		1.740
3.00	225.00	25,406										2.231		2.231
4.00	226.00	37,787										2.510		2.510
5.00	227.00	51,654										2.800		2.800

#### IB-8 Pond Drawdown



Project:	Athens Street	By PFK	Date 6/24/22
Location:	Stow, MA	Checked	Rev Date 10/13/2022 Date
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)	(cover	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			1.73	51.77
А	Open Space	Good Condition	39			1.43	55.89
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
В	Gravel		85			0.00	0.00
С	Woods	Good Condition	70			5.28	369.48
С	Open Space	Good Condition	74			1.19	88.14
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	e CN source per line.	4	46305		Totals =	10.25	614.17

CN (weighted) =	total product	=	614.17	_=	59.94 ; Use CN = 60
'	total area	•	10.25	_	

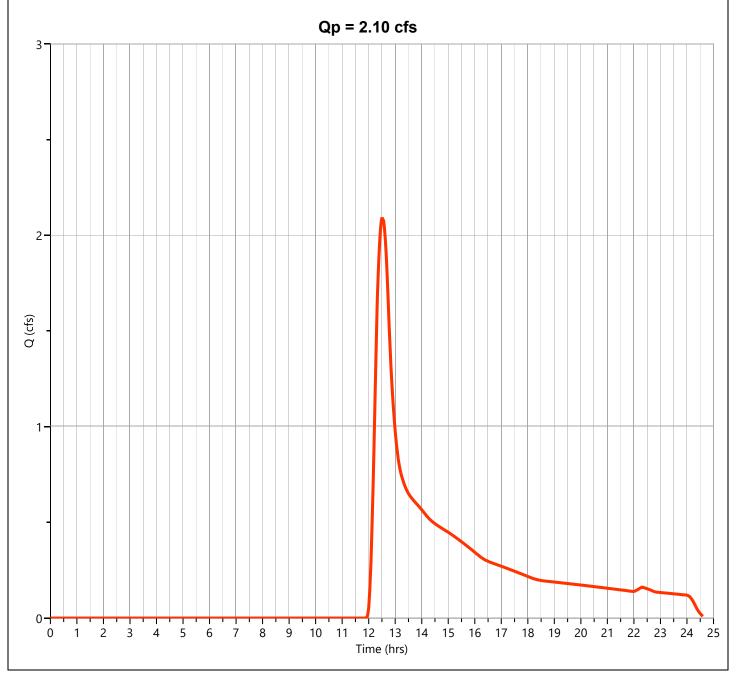
2. Runoff

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

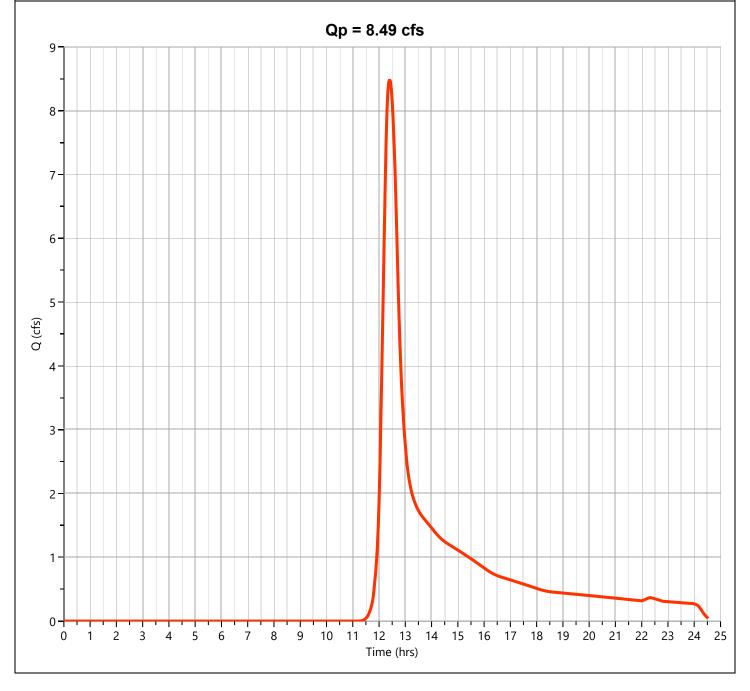
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.43	2.01	3.21

Project: Athens Street	-	Ву	PFK	Date		
Location: Stow, MA	-	Checked		Rev Date Date	10/13/2022	
Circle one: Present Developed Circle one: Tc Tt	through subarea	Subcatchm	ent P-10A			
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	0.010			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	t hr	0.38			0.38
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	963			
9. Watercourse slope, s		ft/ft	0.030			
10. Average Velocity, V (figure 3-1)		ft/s	2.79			
11. Tt = L / 3600V	Compute Ti	t hr	0.10			0.10
Channel flow		Segment ID				
<ul> <li>12. Cross sectional flow area, a</li> <li>13. Wetted perimeter, pw</li> <li>14. Hydraulic radius, r=a/wp</li> <li>15. Channel Slope, s</li> <li>16. Manning's roughness coeff., n</li> <li>17. V = 1.49 r^2/3 s^1/2 / n</li> <li>18. Flow length, L</li> </ul>	Compute r	ft/ft				
19. Tt = L / 3600V	Compute Ti					0
20. Watershed or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	d 19)			hr min	0.48 28.6

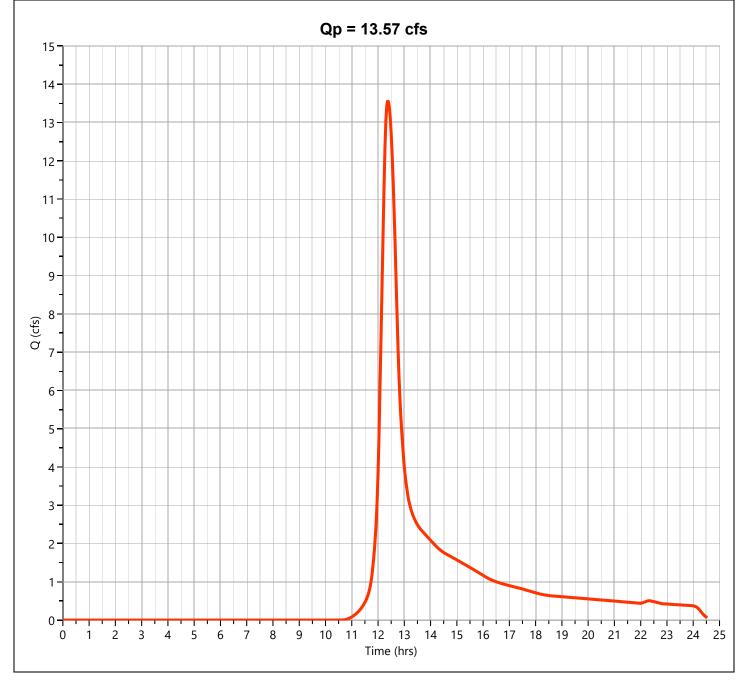
Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.097 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.53 hrs
Time Interval	= 2 min	Runoff Volume	= 16,218 cuft
Drainage Area	= 10.25 ac	Curve Number	= 60
Tc Method	= User	Time of Conc. (Tc)	= 28.6 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



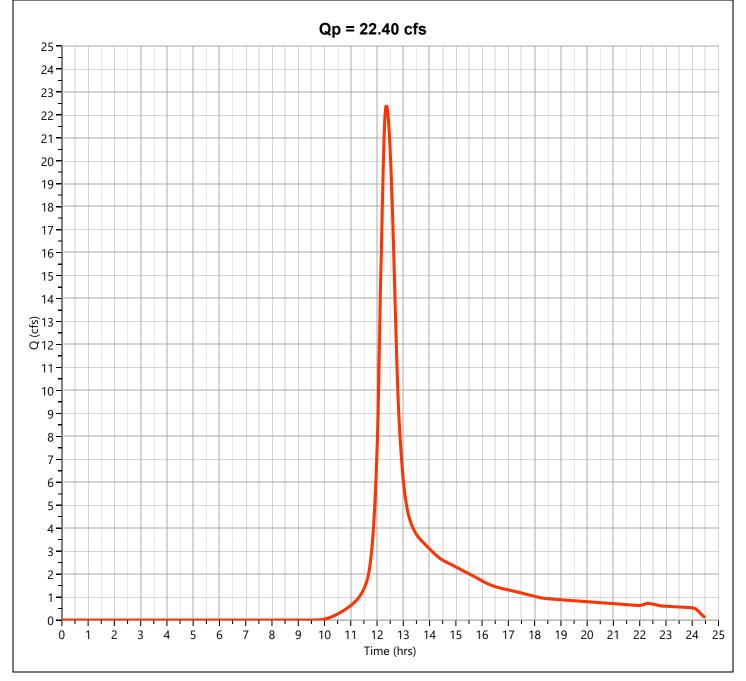
Hydrograph Type	= NRCS Runoff	Peak Flow	= 8.490 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.40 hrs
Time Interval	= 2 min	Runoff Volume	= 49,281 cuft
Drainage Area	= 10.25 ac	Curve Number	= 60
Tc Method	= User	Time of Conc. (Tc)	= 28.6 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 13.57 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.37 hrs
Time Interval	= 2 min	Runoff Volume	= 74,925 cuft
Drainage Area	= 10.25 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	= 22.40 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.37 hrs
Time Interval	= 2 min	Runoff Volume	= 119,578 cuft
Drainage Area	= 10.25 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



SM-3719C

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

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)	Tab 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious		98			1.68	164.30
А	Woods	Good Condition	30			0.00	0.00
А	Open Space	Good Condition	39			0.52	20.21
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			0.70	52.16
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.		126303		Totals =	2.90	236.67

CN (weighted) =	total product	=	236.67 =	81.62 ;	Use CN =	82
	total area	-	2.90			

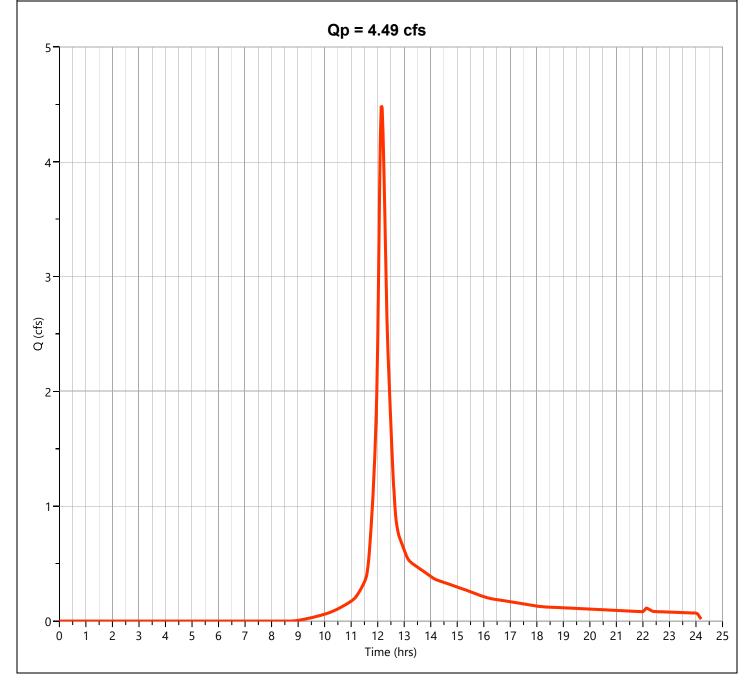
2. Runoff

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

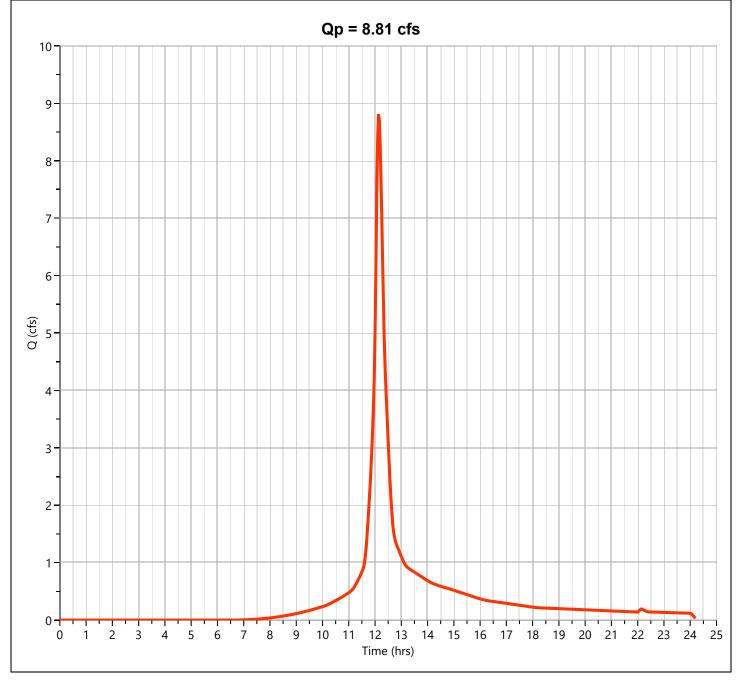
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
1.57	4.08	5.66

Project:	Athens Street	_	Ву	PFK		6/24/2022	
Location:	Stow, MA		Checked		Rev Date Date	10/13/2022	
Circle one: Circle one:	Present Developed Tc Tt	through subarea	Subcatchmo	ent P-10B			
Sheet flow	(Applicable to Tc only)		Segment ID	A-B			
1. Surface I	Description (table 3-1)			LAWN			
2. Manning	s roughness coeff., n (table 3-1)			0.24			
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	0.020			
6. Tt = 0.00	7 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	: hr	0.14			0.14
Shallow cor	ncentrated Flow		Segment ID	B-C			
7. Surface I	Description (paved or unpaved)			UNPAVED			
8. Flow Len	gth, L		ft	231			
9. Waterco	urse slope, s		ft/ft	0.020			
10. Average	e Velocity, V (figure 3-1)		ft/s	2.28			
11. Tt = L /	3600V	Compute Tt	: hr	0.03			0.03
Channel flo	w		Segment ID				
13. Wetted 14. Hydraul 15. Channe	• •	Compute r	sf ft ft ft/ft				
	g's roughness coeff., n 9 r^2/3 s^1/2 / n nath T	Compute V	ft/s ft				
19. Tt = L /	•	Compute Tt					0
20. Watersl	ned or subarea Tc or Tt (add Tt in ste	eps 6, 11, and	d 19)			hr min	0.17 10.0

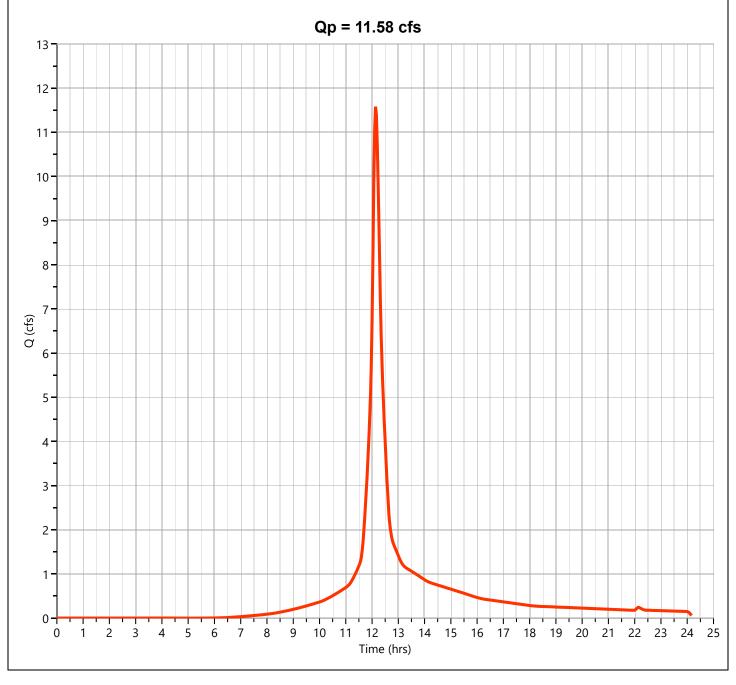
Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.488 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 17,311 cuft
Drainage Area	= 2.9 ac	Curve Number	= 82
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



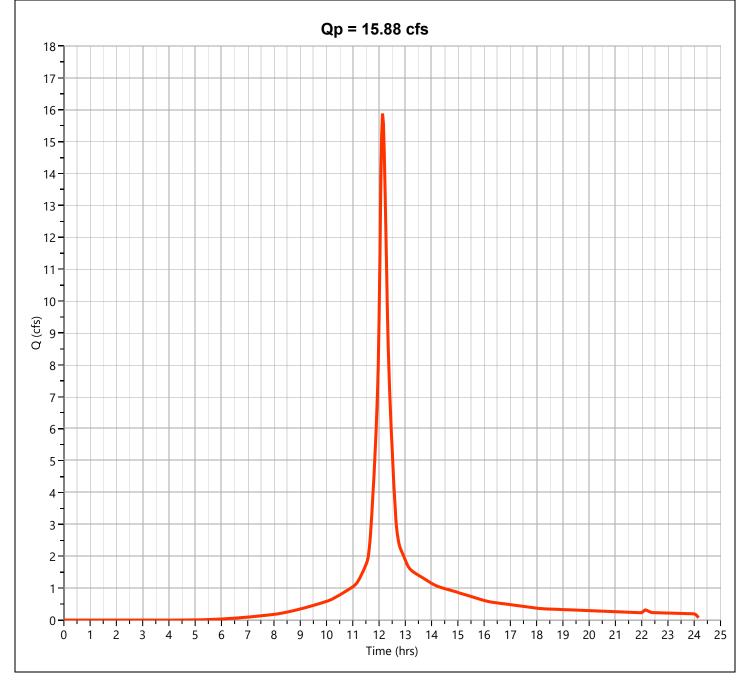
Hydrograph Type	= NRCS Runoff	Peak Flow	= 8.811 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 33,815 cuft
Drainage Area	= 2.9 ac	Curve Number	= 82
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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



ydrograph Type torm Frequency	= Pond Route = 2-yr		Peak Flow Time to Peak	= 0.000 cfs = 12.10 hrs
me Interval	= 2 min		Hydrograph Volume	= 0.000 cuft
flow Hydrograph			Max. Elevation	= 225.90 ft
ond Name	= IB-10B		Max. Storage	= 4,886 cuft
and Routing by Storage				.,
		Qp = 0.00 cfs		
57		<b>цр</b> 0.00 0.0		
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4				
4				
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y				
2-				
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-				
0				
0 1	2 3 4	5 6 7 Time (hrs)	8 9 10	11 12
		—— P-10B —— IB-10B		

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	= 54 - P-10B		Max. Elevation	= 226.88 ft
ond Name	= IB-10B		Max. Storage	= 11,821 cuft
ond Routing by Storage Ind	dication Method			
10 –		Qp = 0.05 cfs		
9				
9				
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1-				
4				
0				
-				
-1				
0 1	2 3 4 5	6 7 8 Time (hrs)	9 10 11	12 13

lydrograph Type	= Pond Route	Peak Flow	= 0.563 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.67 hrs
ime Interval	= 2 min	Hydrograph Volume	= 2,416 cuft
nflow Hydrograph	= 54 - P-10B	Max. Elevation	= 227.36 ft
ond Name	= IB-10B	Max. Storage	= 16,025 cuft
ond Routing by Storage I			
13	Qp = 0.5	6 cfs	
13			
12 -			
-			
11			
10			
9			
-			
8			
7			
( <del>g</del> ) 6			
1			
5			
4			
-			
3			
2			
_			
1			
-			
0			
-1			
0 1	2 3 4 5 6 7	8 9 10 11 12	13 14
	—— P-10B —	e (hrs)	

lydrograph Type	= Pond Route	Peak Flow	= 1.003 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.67 hrs
îme Interval	= 2 min	Hydrograph Volume	
nflow Hydrograph	= 54 - P-10B	Max. Elevation	= 228.13 ft
ond Name	= IB-10B	Max. Storage	= 23,335 cuft
ond Routing by Storage Ind	ication Method	Center of r	mass detention time = 5 m
	Qp = 1.00	cfs	
18 -			
17			
16			
15			
-			
14 -			
13 -			
12			
11 -			
10-			
+			
(Cts) 7 (Cts) 8 -			
Z 8-			
7-			
6 -			
-			
5 -			
4 🖠			
3			
2 -			
1 -			
-			
0 -			
-1 $0$ $1$ $2$	3 4 5 6 7 8	9 10 11 12 13	3 14 15

## IB-10B Stage-Storage

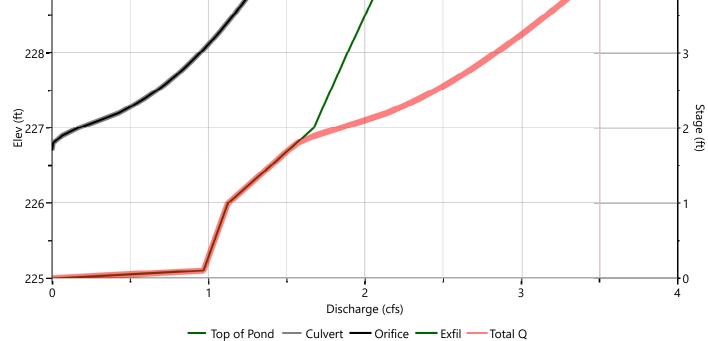
Us	er Defined Conto	urs	Stage / Storage Table				
	Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
	Bottom Elevation, ft	225.00	0.00	225.00	4,961	0.000	0.000
	Voids (%) 100.0		1.00	226.00	5,869	5,415	5,415
	Volume Calc Ave End Area		2.00	227.00	8,731	7,300	12,715
			3.00	228.00	9,853	9,292	22,007
			4.00	229.00	11,032	10,443	32,450
		S	Stage-S	Storage			1
229			13.9				4
†							•
228							3
1							
(£)							Stag
<u>}</u> 227 <del>- − − −</del>							2 ge (ft)
1							
226							
226							
J							
1 /							
225							
0	5000	10000	15000	2	0000 2	5000	30000
				orage (cuft)			
		<del></del> c		Top of Por	nd		
		C	J.11.0013	100 01 101	•••		

#### IB-10B

## Stage-Discharge

Outroot / Outfloor	Ondrand		Orifices		Doufounted Disco		
Culvert / Orifices	Culvert	1* 2 3		Perforated Riser			
Rise, in	18	6			Hole Diameter, in		
Span, in	18	6			No. holes		
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						
Maira	Riser*		Weirs		Anailland		
Weirs	Riser	1	2	3	Ancillary		
Shape / Type	Circular				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.					

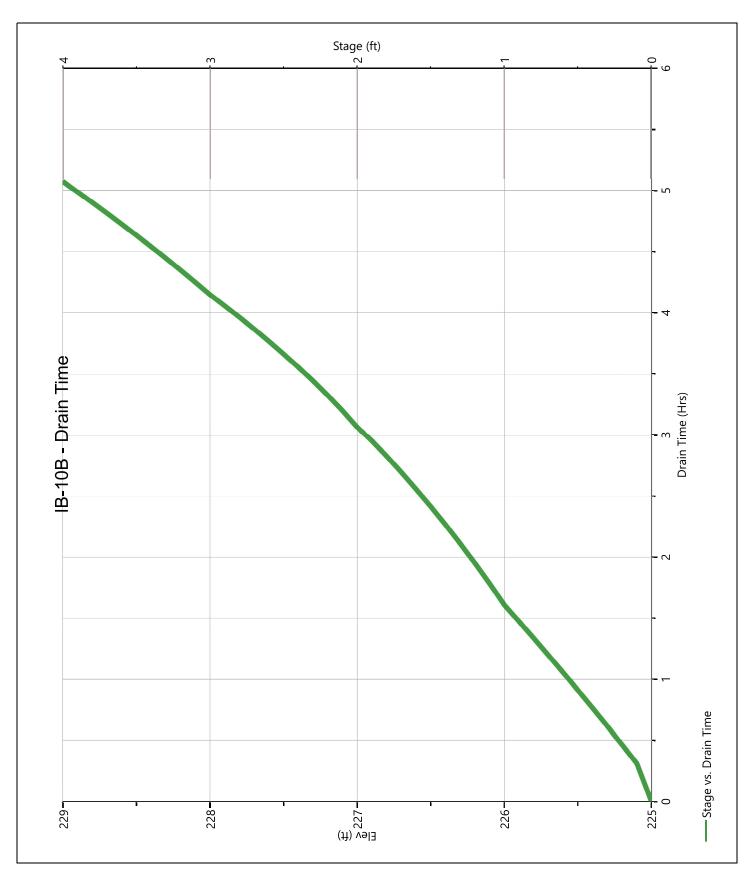
Stage-Discharge



#### IB-10B

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

#### IB-10B Pond Drawdown



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

SM-3719C

Project:	Athens Street		Ву	PFK	Date	10/13/22
Location:	Stow, MA		Checked		Rev Date Date	
Circle one:	Present De	eveloped	Subcatchme	ent P-9B		

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)	(0070.	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
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
I/ Use only one	e CN source per line.		519132		Totals =	11.92	781.65

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

2. Runoff

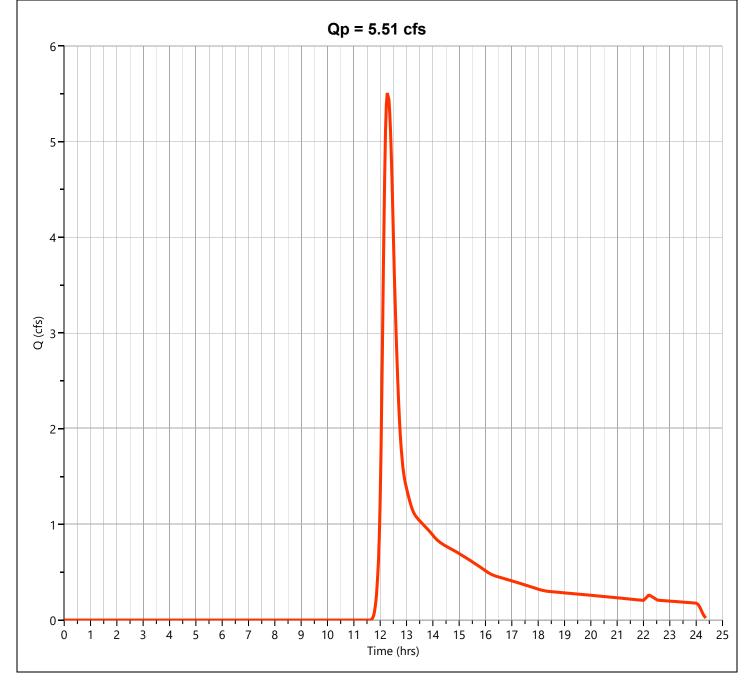
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.66	2.51	3.83

PFK

Project:	Athens Street	t		-	Ву	PFK		10/13/2022	-
Location:	Stow, MA				Checked		Rev Date Date		
Circle one:		Present Tc	Developed Tt	through subarea	Subcatchm	nent P-9B	-		
	_(Applicable to Description (ta				Segment ID	A-B WOODS			
2. Manning	s roughness c	oeff., n (tab	ole 3-1)			0.6			
3. Flow len	gth, L (total L ·	<= 300 ft)			ft	50			
4. Two-yr 2	4-hr rainfall, P	2			in	3.1			
5. Land Slo	ppe, s				ft/ft	0.026			
6. Tt = 0.00	)7 (nL)^0.8 / (F	2^0.5 s^0.4	1)	Compute Tt	hr	0.26			0.26
Shallow co	ncentrated Flo	w			Segment ID	В-С			İ
7. Surface	Description (pa	aved or unp	paved)			UNPAVED			
8. Flow Ler	ngth, L				ft	629			
9. Waterco	urse slope, s				ft/ft	0.080			
10. Average	e Velocity, V (1	igure 3-1)			ft/s	4.56			
11. Tt = L /	3600V			Compute Tt	: hr	0.04			0.04
Channel flo	ow				Segment ID				]
13. Wetted 14. Hydrau 15. Channe 16. Mannin 17. V = 1.4	g's roughness 9 r^2/3 s^1/2 /	wp coeff., n		Compute r	ft/ft ft/s				
18. Flow le 19. Tt = L /				Compute Tt	ft hr				0
20. Waters	hed or subare	a Tc or Tt (a	add Tt in ste	ps 6, 11, and	d 19)			hr min	0.30 17.9
	(	210-VI-TR-	55, Second	Ed., June 19	86)				D-3

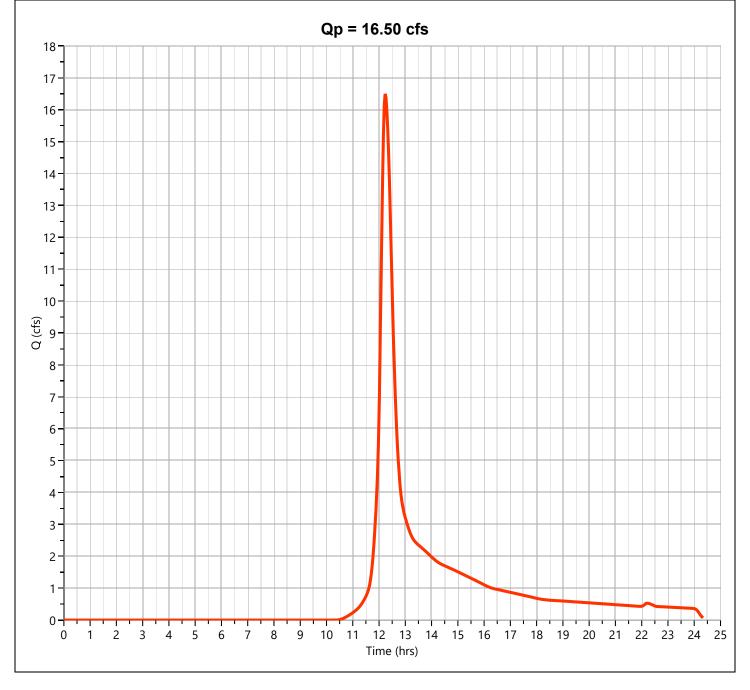
## P-9B Hyd. No. 49

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

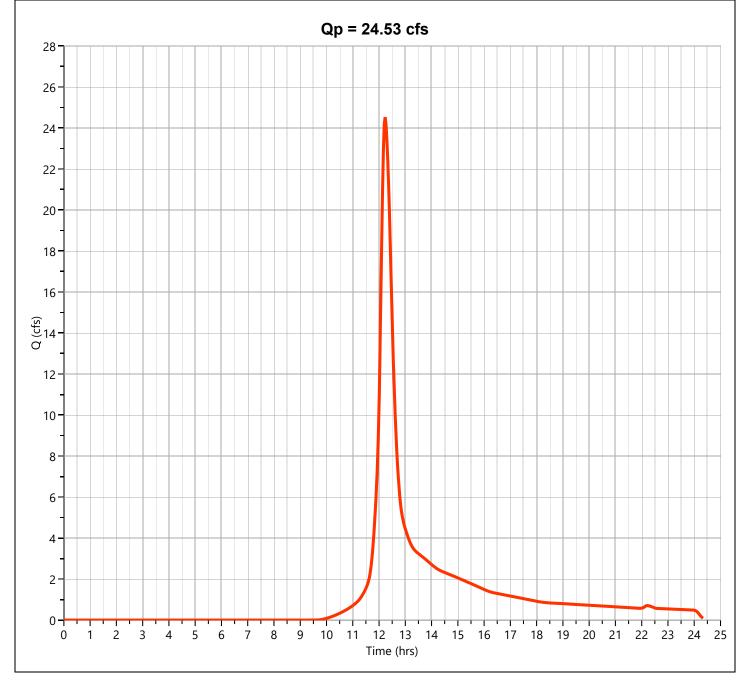


## P-9B Hyd. No. 49

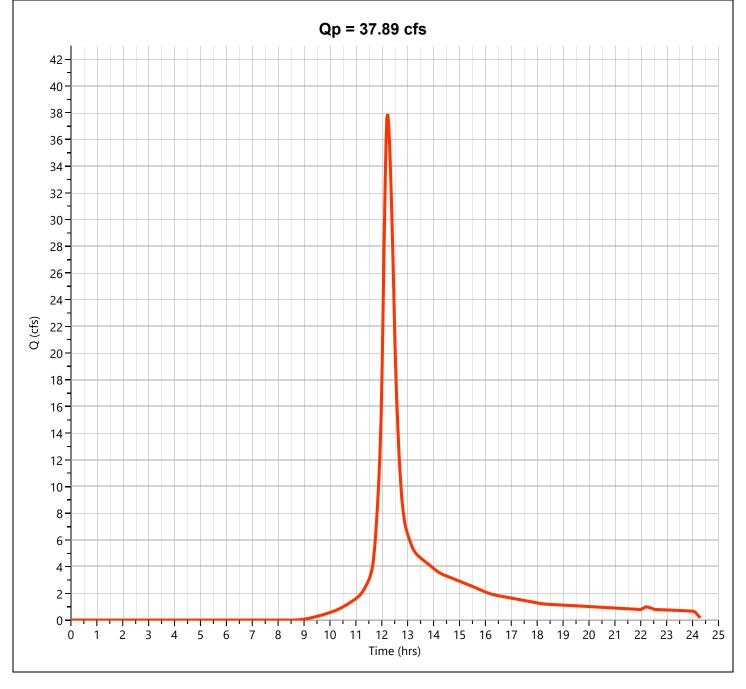
Hydrograph Type	= NRCS Runoff	Peak Flow	= 16.50 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 75,937 cuft
Drainage Area	= 11.92 ac	Curve Number	= 66
Tc Method	= User	Time of Conc. (Tc)	= 17.9 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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

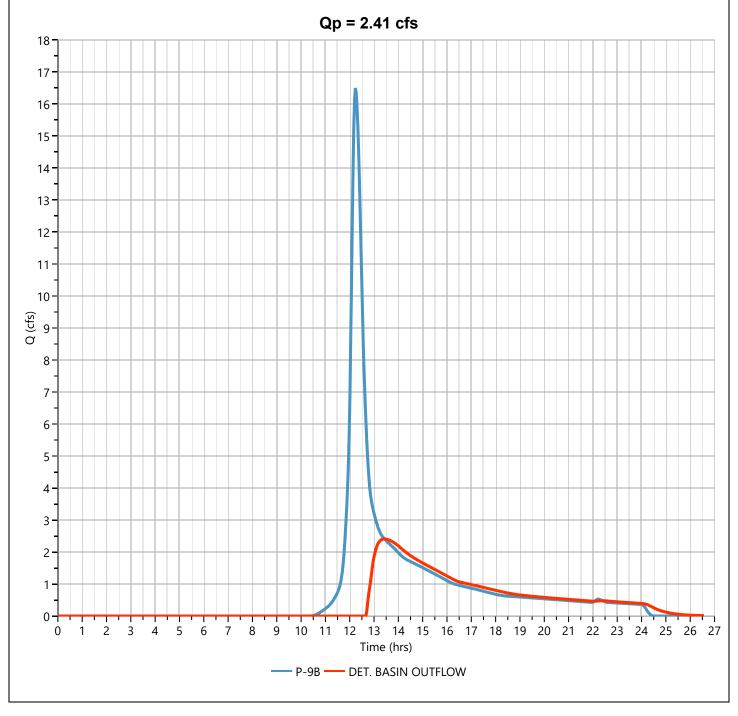
#### **DET. BASIN OUTFLOW**

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



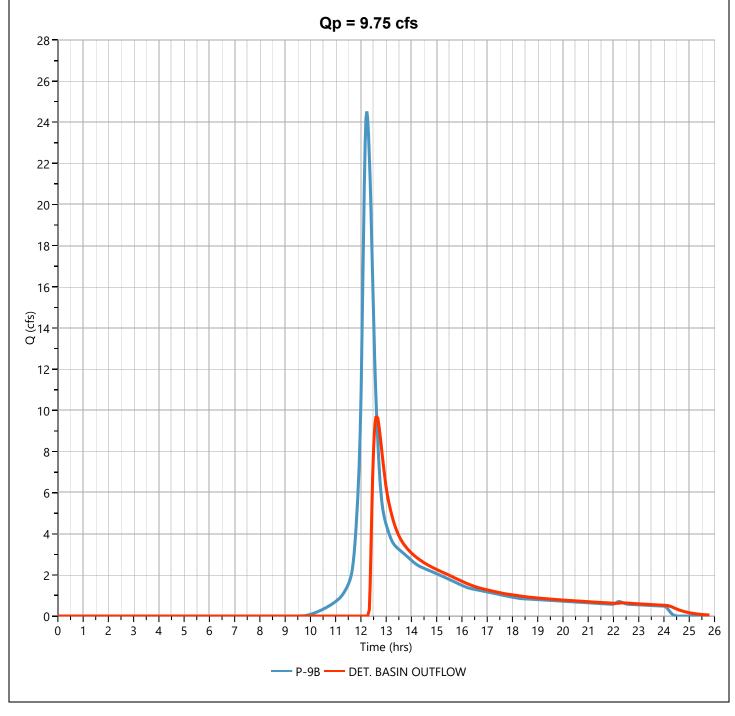
#### **DET. BASIN OUTFLOW**

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



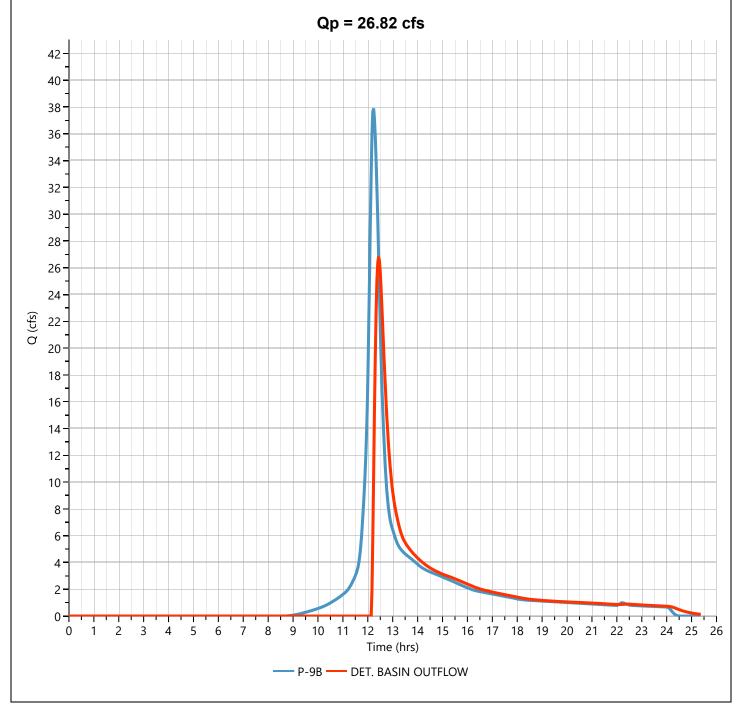
#### **DET. BASIN OUTFLOW**

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



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

SM-3719C

Project:	Athens Street	Ву	PFK	Date	10/13/22
Location:	Stow, MA	Checked		Rev Date Date	
Circle one:	Present Developed	Subcatchm	nent P-9A		

1. Runoff curve number (CN)

Soil name and hydrologic	Cover description (cover type, treatment, and		CN 1/		Area	Product o CN x Area
group (appendix A)	hydrologic condition: percent impervious: unconnected/connected impervi area ratio)	Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious	98			0.05	5.35
А	Woods Good Condition	30			0.60	18.12
А	Open Space Good Condition	39			1.83	71.41
А	Open Space Fair Condition	49			0.00	0.00
Α	Gravel	76			0.13	9.51
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			1.22	90.21
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.	207971		Totals =	4.77	263.19

CN (weighted) =	total product	_=	263.19=	55.13	;	Use CN =	55
	total area	•	4.77				

2. Runoff

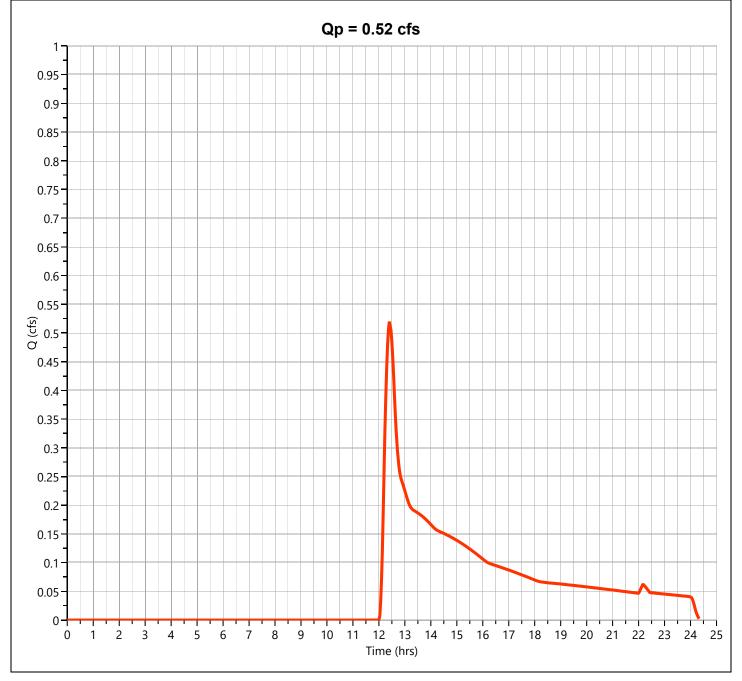
Frequency..... Rainfall, P (24-hour).... Runoff, Q.....(Use P and CN with table 2-1 or eqs. 2-3 and 2-4.)

	yr	2
	in	3.27
	in	0.28
-1, fig. 2-1,)		

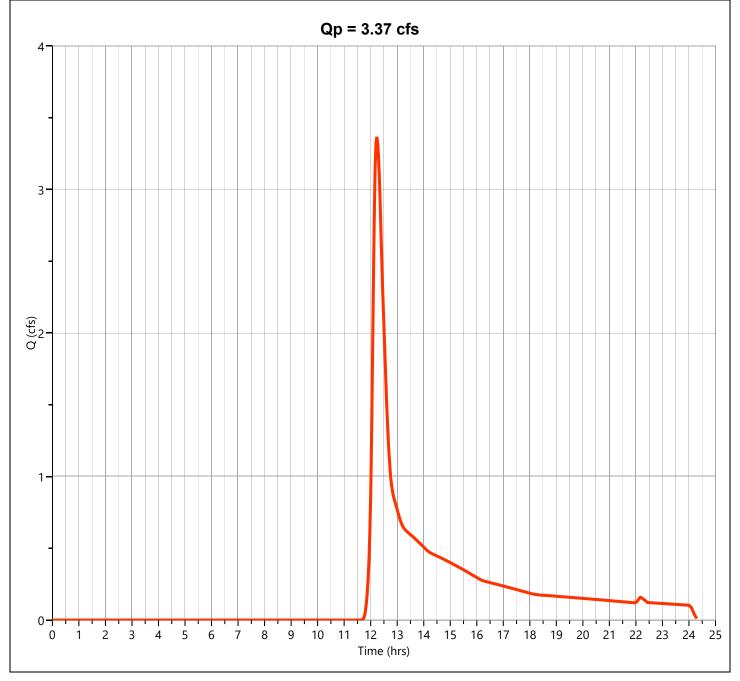
Storm #1	Storm #2	Storm #3
2	25	100
3.27	6.14	7.84
0.28	1.61	2.69

Project:	Athens Street	-	Ву	PFK	Date Rev Date	10/13/2022	
Location:	Stow, MA		Checked		Date		
Circle one: Circle one:	Present Developed Tc Tt	through subarea	Subcatchm	nent P-9A			
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	0.043			
6. Tt = 0.00	7 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.21			0.21
Shallow cor	ncentrated Flow		Segment ID	B-C			
7. Surface l	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 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></ul>	g's roughness coeff., n 9 r^2/3 s^1/2 / n	Compute r	ft/ft				
19. Tt = L /		Compute Tt					0
20. Waters	hed or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	d 19)			hr min	0.23 14.0

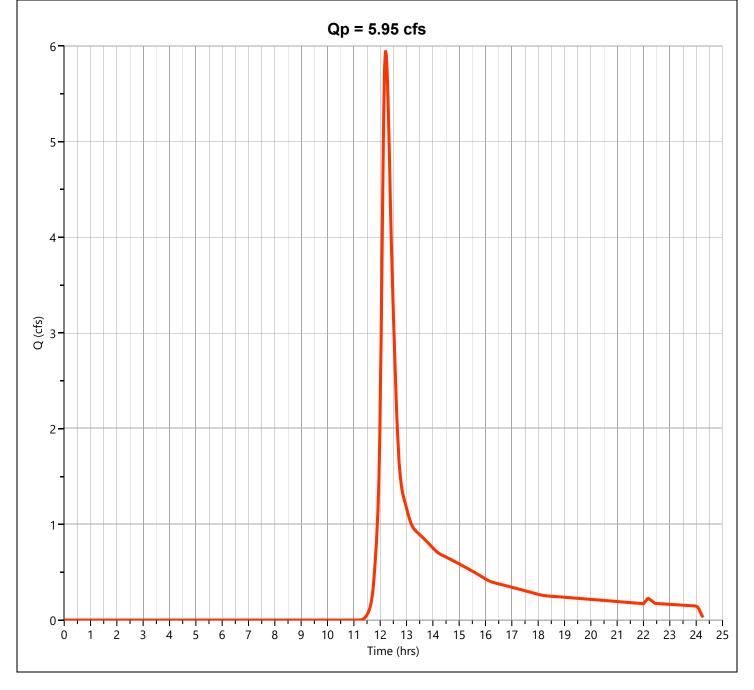
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.520 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.40 hrs
Time Interval	= 2 min	Runoff Volume	= 4,590 cuft
Drainage Area	= 4.77 ac	Curve Number	= 55
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



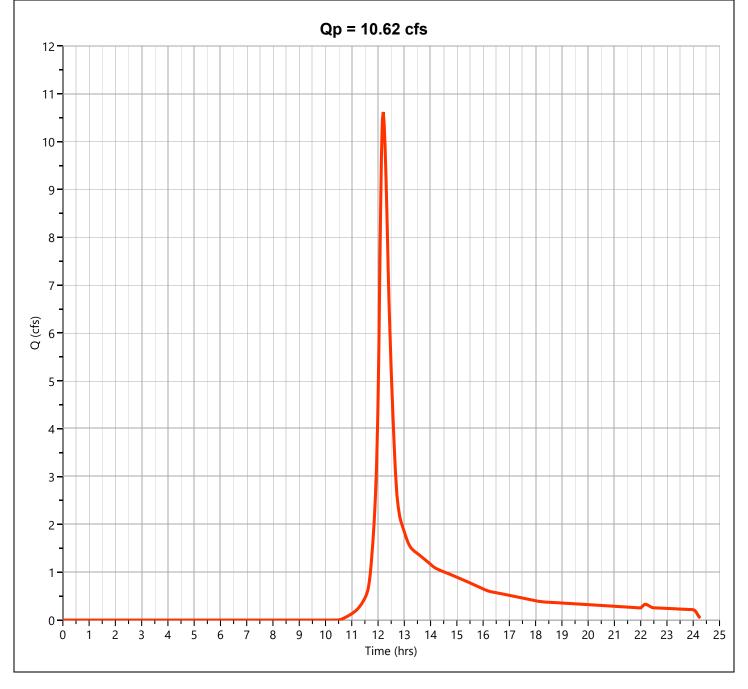
Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.367 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 16,881 cuft
Drainage Area	= 4.77 ac	Curve Number	= 55
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.954 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 26,993 cuft
Drainage Area	= 4.77 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	= 10.62 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 45,165 cuft
Drainage Area	= 4.77 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



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

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			3.35	328.03
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
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			4.32	319.60
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. 33	3940		Totals =	7.67	647.63

CN (weighted) =	total product	_=	647.63=	84.48	_;	Use CN =	84
	total area	_	7.67				

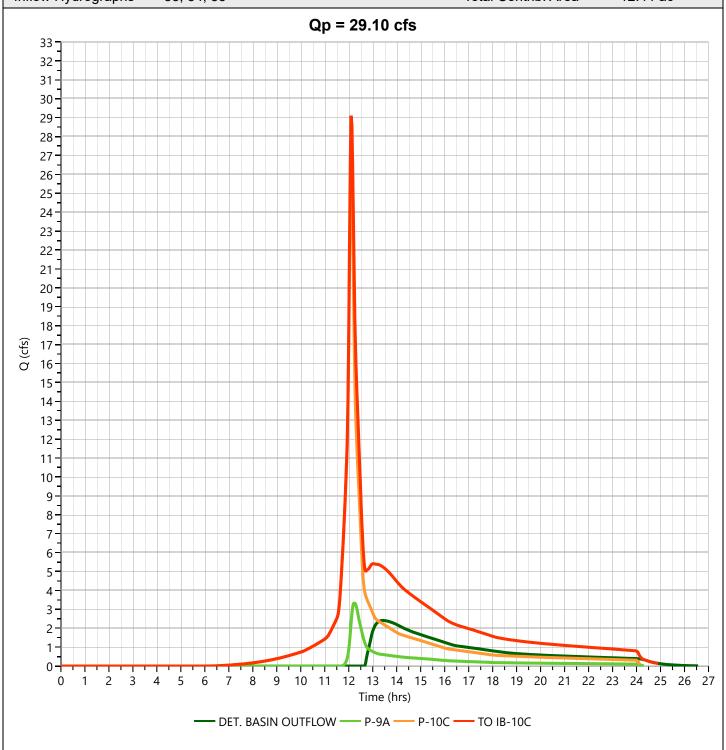
2. Runoff

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	PFK	Date Rev Date	6/24/2022	
Location:	Stow, MA	_	Checked		Date	10/10/2022	
Circle one:	Present Developed Tc Tt	through subarea	Subcatchm	ent P-10C			
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	pe, s		ft/ft	0.040			
6. Tt = 0.00	07 (nL)^0.8 / (P2^0.5 s^0.4)	Compute T	hr	0.11			0.11
Shallow co	ncentrated Flow		Segment ID	B-C			
7. Surface	Description (paved or unpaved)			UNPAVED			
8. Flow Ler	ngth, L		ft	495			
9. Waterco	urse slope, s		ft/ft	0.056			
10. Average	e Velocity, V (figure 3-1)		ft/s	3.82			
11. Tt = L /	3600V	Compute T	hr	0.04			0.04
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 ngth, L	Compute r Compute V Compute Tr	ft/ft ft/s ft				0
20. Waters	hed or subarea Tc or Tt (add Tt in ste	ps 6, 11, and	d 19)			hr min	0.14 8.5

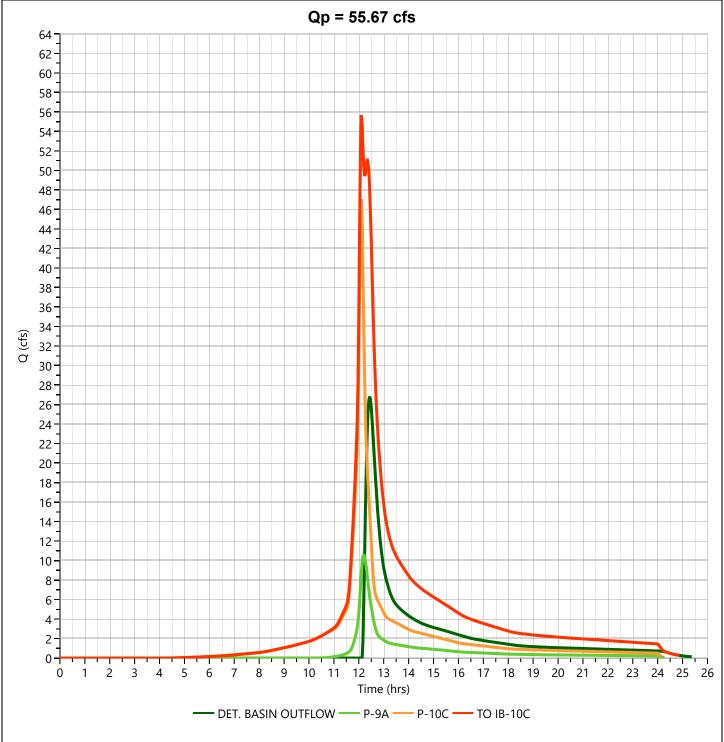
lydrograph Type	= Junction	Peak Flow	= 14.26 cfs		
storm Frequency	= 2-yr Time to Peak		= 12.10 hrs		
îme Interval	= 2 min	Hydrograph Volume	= 53,067 cuft		
nflow Hydrographs	= 53, 54, 55	Total Contrib. Area	= 12.44 ac		
	Qp = 14.26 cfs				
16					
15					
-					
14					
13					
-					
12					
11					
-					
10					
9					
8 1					
7					
6					
5					
-					
4					
3					
4					
2					
1-					
'-					
0			21 25 25 2		
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		

Hydrograph Type	= Junction	Peak Flow	= 29.10 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 150,590 cuft
Inflow Hydrographs	= 53, 54, 55	Total Contrib. Area	= 12.44 ac



lydrograph Type	= Junction	Peak Flow	= 39.30 cfs		
Storm Frequency	= 25-yr				
ime Interval	= 2 min	Hydrograph '			
nflow Hydrograph	s = 53, 54, 55	Total Contrib			
	Qp = 39.30	cfs			
44					
42					
40					
38					
36 -					
34 -					
32					
30 -					
28					
26					
<u>24</u>					
gg 24					
20	<del></del>				
18	<del></del>				
16					
14					
12					
10					
8-					
6					
4					
2					
-					
0 1 2	3 4 5 6 7 8 9 10 11 12 1: Time	3 14 15 16 17 18 19	20 21 22 23 24 25		
	— DET. BASIN OUTFLOW — P-9A				

Hydrograph Type	= Junction	Peak Flow	= 55.67 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 344,043 cuft
Inflow Hydrographs	= 53, 54, 55	Total Contrib. Area	= 12.44 ac

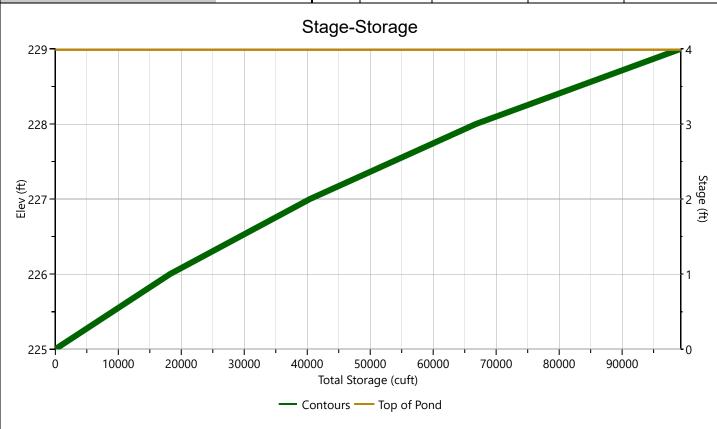


Hydrograph Type	= Pond Route		Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr		Time to Peak	= 12.13 hrs
Time Interval	= 2 min		Hydrograph Volume	= 0.006 cuft
Inflow Hydrograph	= 56 - TO IB-10C		Max. Elevation	= 225.73 ft
Pond Name	= IB-10C		Max. Storage	= 13,225 cuft
Pond Routing by Storage Ind	lication Method			
		Qp = 0.00 cfs		
16				
15				
14				
13				
12				
-				
11 -				
10				
9				
Q (cfs)				
7				
-				
6 -				
5 -				
4				
3				
2				
1-				
0				
0 1	2 3 4		8 9 10	11 12 13
		— TO IB-10C — IB-10C		

#### IB-10C

## Stage-Storage

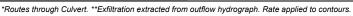
User Defined Contours			Stage / Storage Table					
Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)		
Bottom Elevation, ft	225.00							
Voids (%)	100.00	0.00	225.00 226.00	16,867	0.000	0.000		
		1.00 2.00	227.00	19,567 24,882	18,217 22,225	18,217 40,442		
Volume Calc	None	3.00	227.00	27,822	26,352	66,794		
		4.00	229.00	37,134	32,478	99,272		
		4.00	223.00	37,134	52,470	33,212		

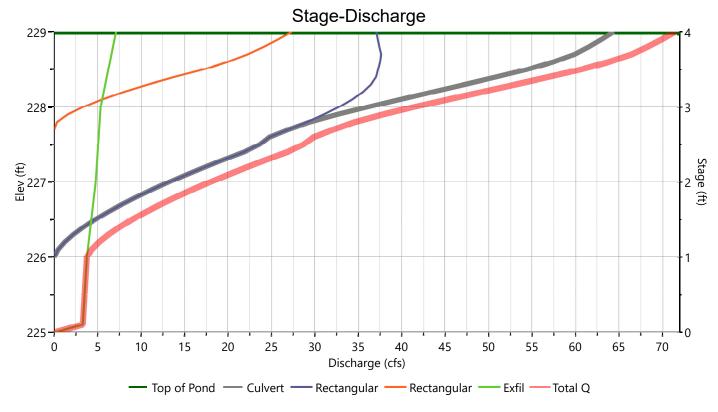


#### IB-10C

## Stage-Discharge

Culvert / Orifices	Cultivant		Orifices		Dowforeted Die	
Culvert / Orifices	Culvert	1	2	3	Perforated Ris	er
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					
Maine	Riser*	Weirs			Anaillam	
Weirs	Kiser"	1*	2*	3*	Ancillary	
Shape / Type	Circular	Rectangular	Rectangular	Rectangular	Exfiltration, in/hr	8.27**
Crest Elevation, ft		226	226.5	227.75		
Crest Length, ft		4	2	8		
Angle, deg						
Weir Coefficient, Cw		3.3	3.3	3.3		



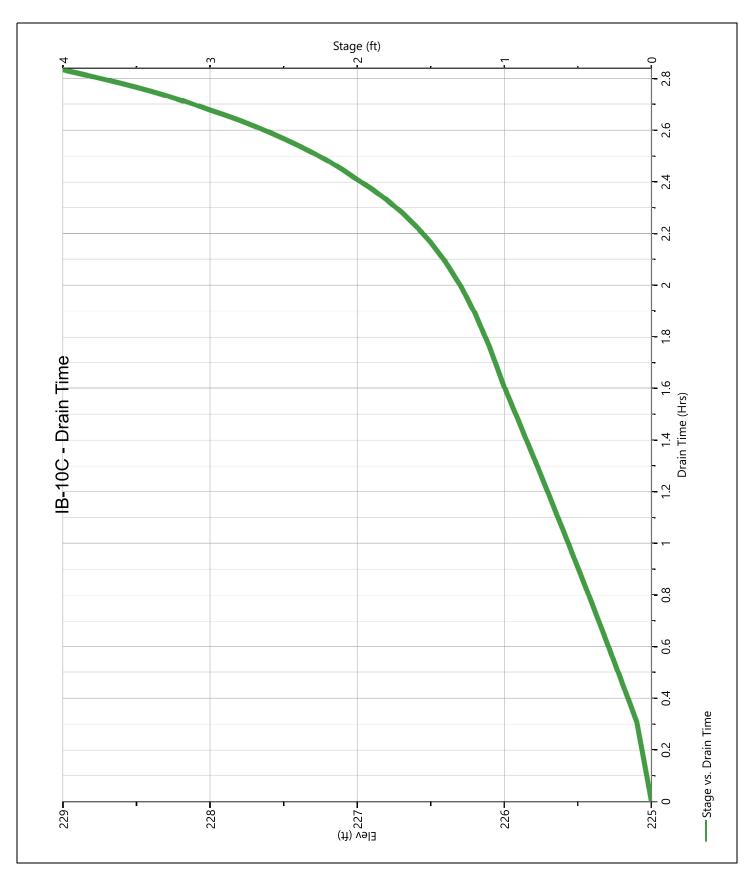


#### **IB-10C**

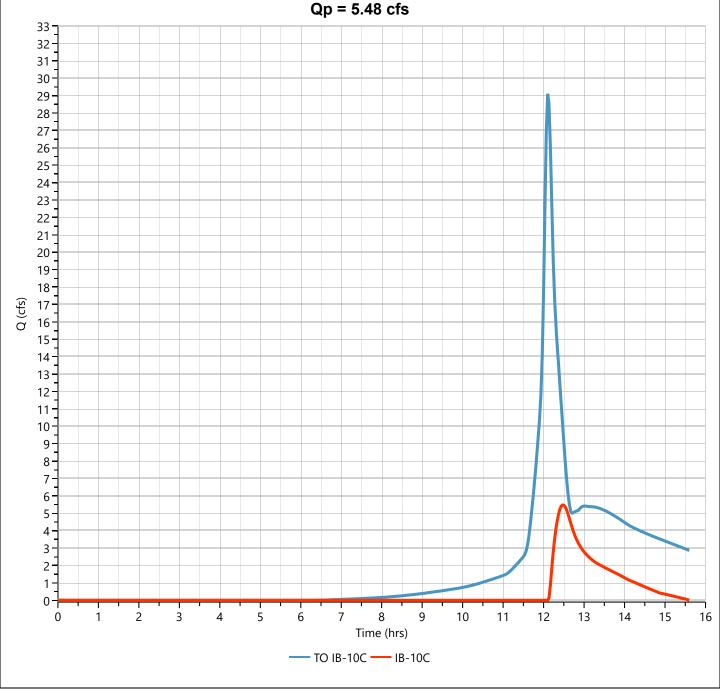
## **Stage-Storage-Discharge Summary**

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		0.000
1.00	226.00	18,217	0.000 oc					0.000	0.000	0.000		3.746		3.746
2.00	227.00	40,442	13.20 oc					13.20	0.000	0.000		4.763		17.96
3.00	228.00	66,794	36.05 oc					32.75 s	0.000	3.300		5.326		41.38
4.00	229.00	99,272	64.39 ic					37.07 s	0.000	27.32 s		7.109		71.50

#### IB-10C Pond Drawdown

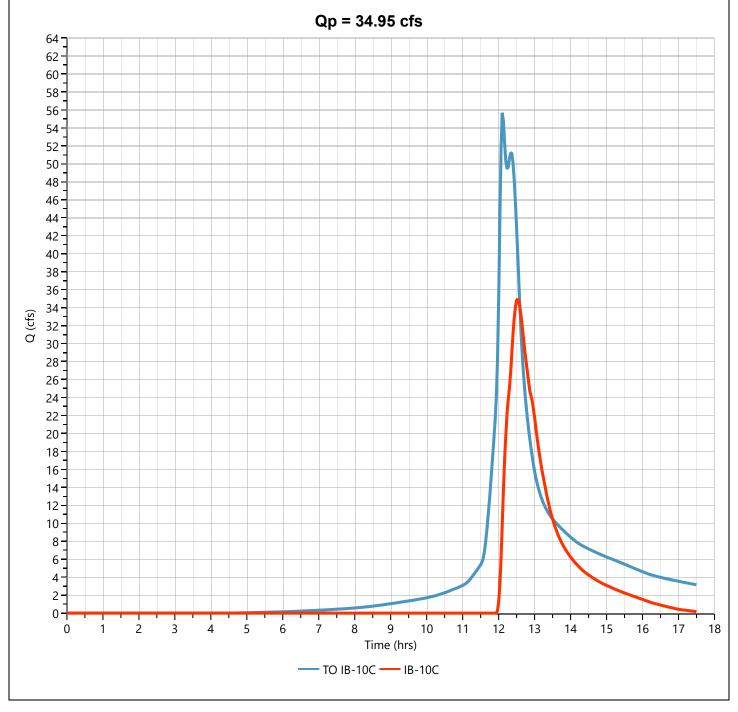


Hydrograph Type	Hydrograph Type = Pond Route				Peak Flow	= 5.480 cfs				
Storm Frequency	= 10-yr				Time to Peak	= 12.47 hrs				
Time Interval	= 2 min				Hydrograph Volume	= 22,319 cuft				
Inflow Hydrograph	= 56 - TO IB-10C	= 56 - TO IB-10C			Max. Elevation	= 226.56 ft				
Pond Name	= IB-10C				Max. Storage	= 30,560 cuft				
Pond Routing by Storage Inc	dication Method									
Qp = 5.48 cfs										
33 -										
32										



Hydrograph Type	= Pond Route	Peak Flow	= 13.45 cfs	
Storm Frequency	= 25-yr	Time to Peak	= 12.60 hrs	
Time Interval	= 2 min	Hydrograph Volume	= 70,155 cuft = 227.01 ft	
Inflow Hydrograph	= 56 - TO IB-10C	Max. Elevation		
Pond Name	= IB-10C	Max. Storage	= 40,760 cuft	
Pond Routing by Storage Ind	lication Method			
	Qp = 13.45 cfs			
44				
42				
40				
4				
38				
36				
34 -				
32				
30				
28				
26				
24 - 1				
(\$\frac{1}{2}\) \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \				
20				
18				
16				
14				
12				
10				
-				
8				
6 -				
4 -				
2 -				
0 1 2		10 11 12 13 14	4 15 16	
	Time (hrs)			

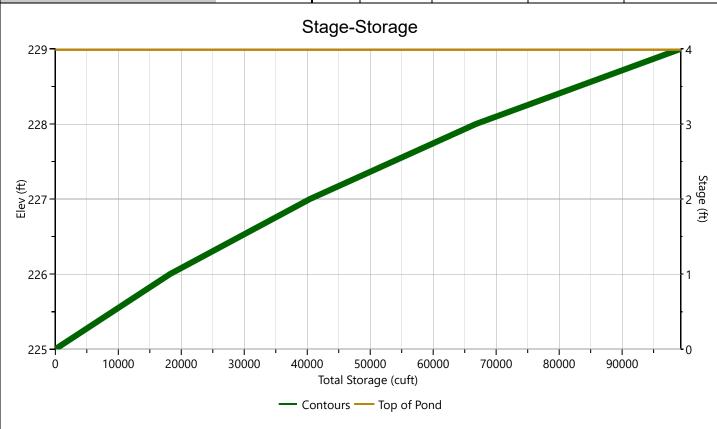
Hydrograph Type	= Pond Route	Peak Flow	= 34.95 cfs				
Storm Frequency	= 100-yr	Time to Peak	= 12.53 hrs				
Time Interval	= 2 min	Hydrograph Volume	= 159,059 cuft				
Inflow Hydrograph	= 56 - TO IB-10C	Max. Elevation	= 227.97 ft				
Pond Name	= IB-10C	Max. Storage	= 65,966 cuft				
Pond Routing by Storage Inc	Pond Routing by Storage Indication Method						



#### IB-10C

## Stage-Storage

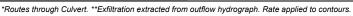
User Defined Contours			Stage / Storage Table					
Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)		
Bottom Elevation, ft	225.00							
Voids (%)	100.00	0.00	225.00 226.00	16,867	0.000	0.000		
		1.00 2.00	227.00	19,567 24,882	18,217 22,225	18,217 40,442		
Volume Calc	None	3.00	227.00	27,822	26,352	66,794		
		4.00	229.00	37,134	32,478	99,272		
		4.00	223.00	37,134	52,470	33,212		

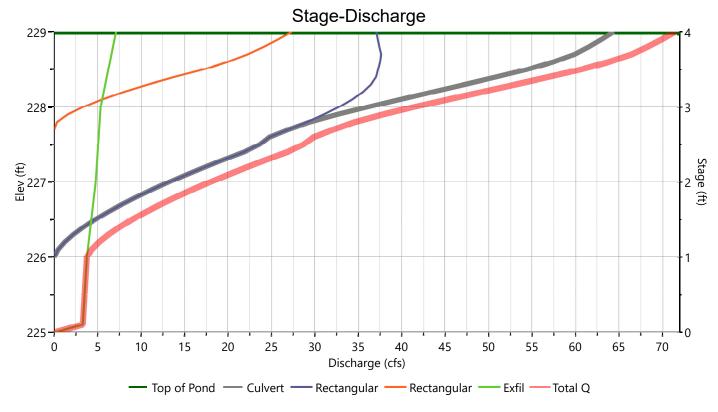


#### IB-10C

## Stage-Discharge

Culvert / Orifices	Cultivant		Orifices		Dowforeted Die	
Culvert / Orifices	Culvert	1	2	3	Perforated Ris	er
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					
Maine	Riser*	Weirs			Anaillam	
Weirs	Kiser"	1*	2*	3*	Ancillary	
Shape / Type	Circular	Rectangular	Rectangular	Rectangular	Exfiltration, in/hr	8.27**
Crest Elevation, ft		226	226.5	227.75		
Crest Length, ft		4	2	8		
Angle, deg						
Weir Coefficient, Cw		3.3	3.3	3.3		



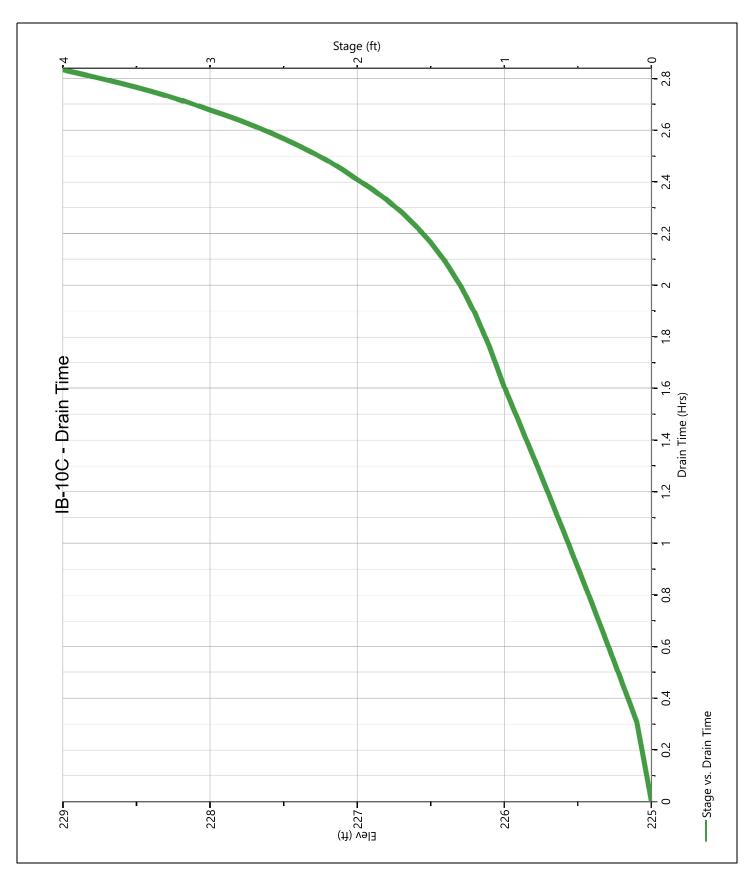


#### **IB-10C**

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

Stage	Stage Elev. (ft)	Storage (cuft)	v. Storage (cuft)	ev. Storage	Culvert	(	Orifices, cf	fs	Riser		Weirs, cfs	;	Pf Riser	Exfil	User	Total
(ft)				(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		0.000		
1.00	226.00	18,217	0.000 oc					0.000	0.000	0.000		3.746		3.746		
2.00	227.00	40,442	13.20 oc					13.20	0.000	0.000		4.763		17.96		
3.00	228.00	66,794	36.05 oc					32.75 s	0.000	3.300		5.326		41.38		
4.00	229.00	99,272	64.39 ic					37.07 s	0.000	27.32 s		7.109		71.50		

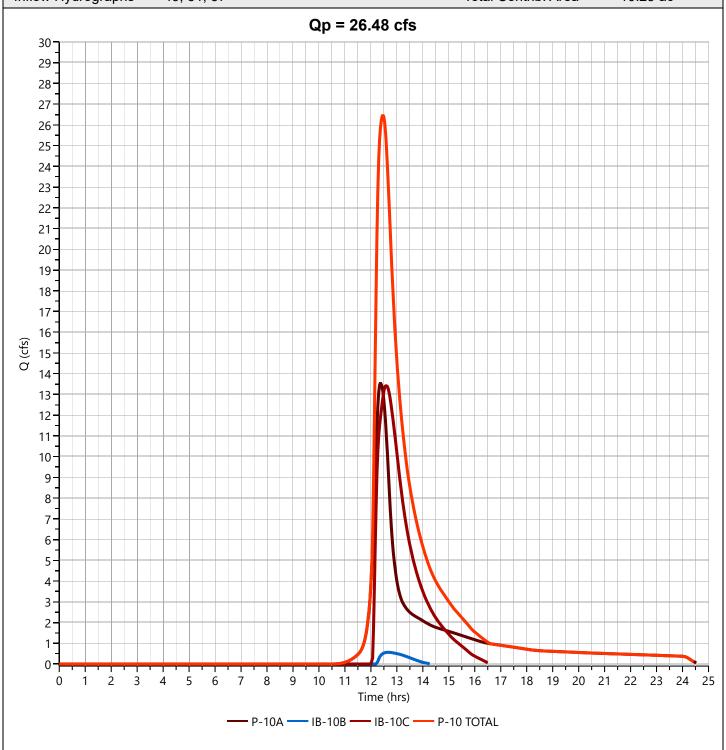
#### IB-10C Pond Drawdown



Hydrograph Type	= Junction	Peak Flow	= 2.097 cfs				
Storm Frequency	= 2-yr	Time to Peak	= 12.53 hrs				
Time Interval	= 2 min	Hydrograph Volume	= 16,218 cuft				
Inflow Hydrographs	= 49, 51, 57	Total Contrib. Area	= 10.25 ac				
	Qp = 2.10 cfs						
3							
2-							
Q (cfs)							
_							
0 1 2 3	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)  —— P-10A —— IB-10B —— IB-10C —— P-10 TOTAL						

Hydrograph Type	= Junction	Peak Flow	= 13.86 cfs	
Storm Frequency	= 10-yr	Time to Peak	= 12.43 hrs	
Time Interval	= 2 min	Hydrograph Volume	= 71,688 cuft	
Inflow Hydrographs	= 49, 51, 57	Total Contrib. Area	= 10.25 ac	
	Qp = 13.86 cfs			
15				
14				
4				
13				
12				
-				
11				
10				
9				
-				
8-	Al			
(Sy) 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7				
α -				
6				
5	A A			
1				
4				
3-				
-				
2				
1 -				
0				
	4 5 6 7 8 9 10 11 12 13 14 Time (hrs)	15 16 17 18 19 20	21 22 23 24 2	
	— P-10A — IB-10B — IB-10C — F	P-10 TOTAL		

Hydrograph Type	= Junction	Peak Flow	= 26.48 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.47 hrs
Time Interval	= 2 min	Hydrograph Volume	= 147,496 cuft
Inflow Hydrographs	= 49, 51, 57	Total Contrib. Area	= 10.25 ac



Hydrograph Type	= Junction	Peak Flow	= 56.23 cfs		
Storm Frequency	= 100-yr	Time to Peak	= 12.47 hrs		
īme Interval	= 2 min	Hydrograph Volume	= 286,599 cuft		
nflow Hydrographs	= 49, 51, 57	Total Contrib. Area	= 10.25 ac		
	Qp = 56.23 cfs				
64 -					
62 =					
60 -					
58 -					
56					
54 =					
52 - 50					
48					
46 - 46 -					
44 -					
42					
40					
38					
36					
24					
β 32 - 32 - 32 - 32 - 32 - 32 - 32 - 32					
30 -					
28 -	<del></del>				
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24 =	<del></del>				
22					
20					
18 -	<del></del>				
16 -					
14 -					
12					
10					
8 -					
6					
4 - 2					
0					
0 1 2 3	4 5 6 7 8 9 10 11 12 13 1 <sup>4</sup> Time (hrs)	1 15 16 17 18 19 20	21 22 23 24		

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

SM-3719C

Project:	Athens Street	By NC	Date 6/24/22
_ocation:	Stow, MA	Checked	Rev Date 10/13/2022 Date
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
А	Woods Good Condition	30			0.80	24.12
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
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.	69446		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

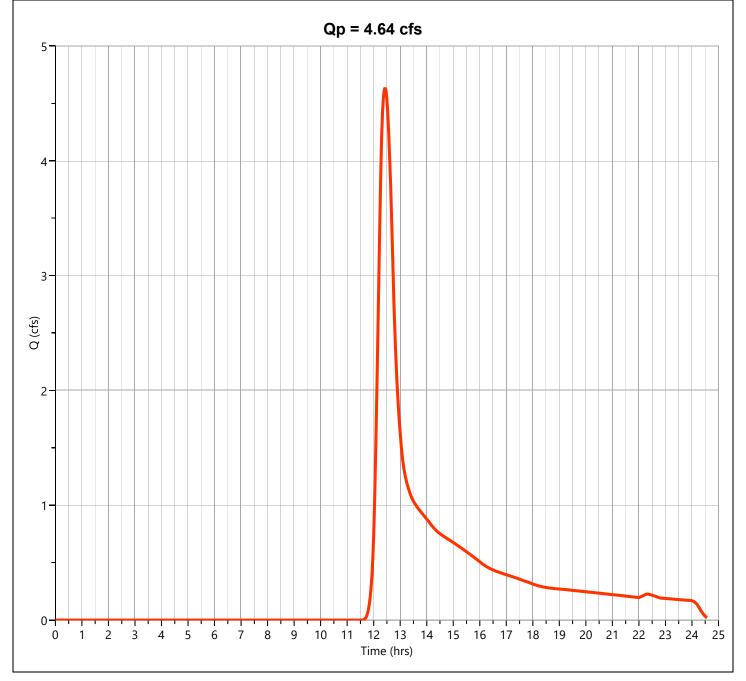
Project:

Athens Street

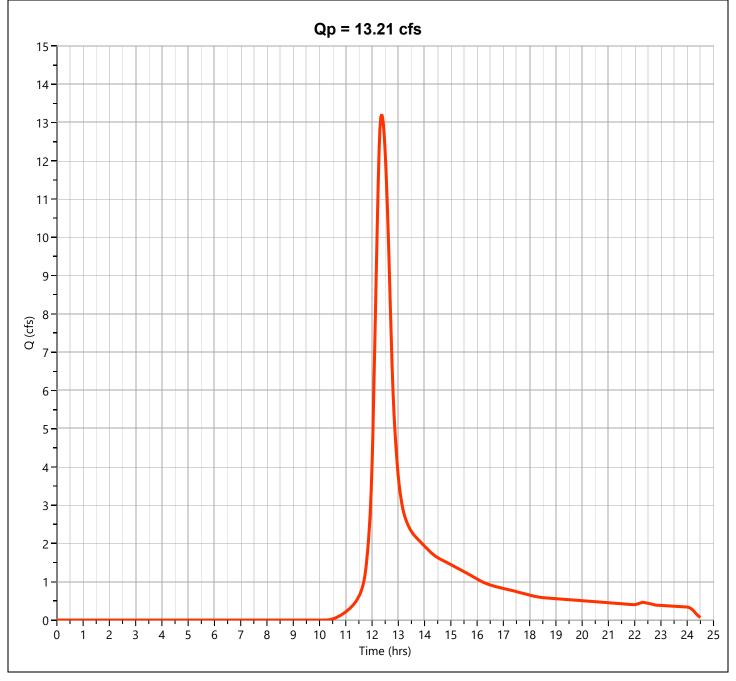
By NC Date 6/24/2022

Location: Stow, MA	_	Checked		Rev Date Date	10/13/2022	
Circle one: Present Developed Circle one: Tc Tt	through subarea	Subcatchn	nent P-11			
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			
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. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	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				
<ul> <li>12. Cross sectional flow area, a</li> <li>13. Wetted perimeter, pw</li> <li>14. Hydraulic radius, r=a/wp</li> <li>15. Channel Slope, s</li> <li>16. Manning's roughness coeff., n</li> <li>17. V = 1.49 r^2/3 s^1/2 / n</li> <li>18. Flow length, L</li> </ul>	Compute r	ft/ft				
19. Tt = L / 3600V	Compute T	t hr				0
20. Watershed or subarea Tc or Tt (add Tt in ste	eps 6, 11, and	d 19)			hr min	0.50 30.0

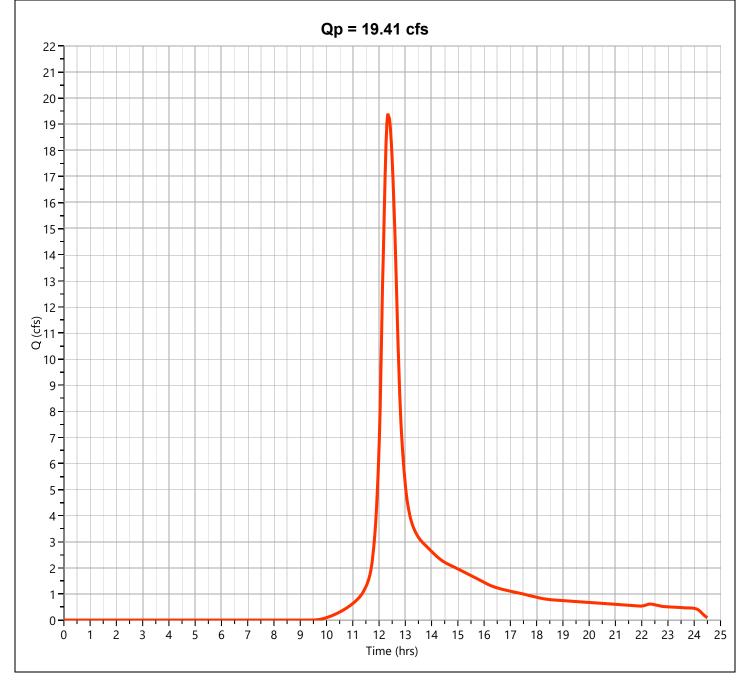
Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.637 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.43 hrs
Time Interval	= 2 min	Runoff Volume	= 28,334 cuft
Drainage Area	= 10.78 ac	Curve Number	= 67
Tc Method	= User	Time of Conc. (Tc)	= 30.0 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



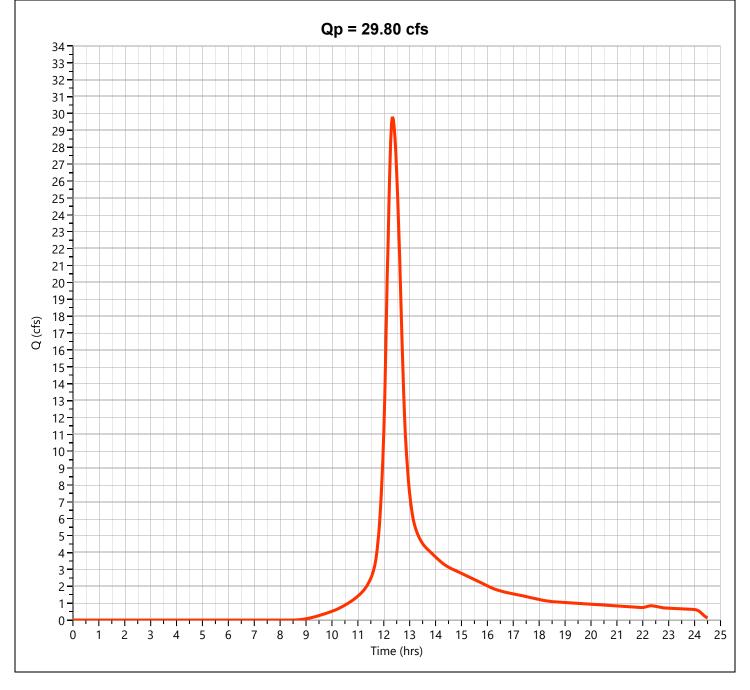
Hydrograph Type	= NRCS Runoff	Peak Flow	= 13.21 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.37 hrs
Time Interval	= 2 min	Runoff Volume	= 71,647 cuft
Drainage Area	= 10.78 ac	Curve Number	= 67
Tc Method	= User	Time of Conc. (Tc)	= 30.0 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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



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

SM-3719C

Project:	Athens Street			Ву_	NC	Date	6/24/22
_ocation:	Stow. MA			Checked		Rev Date Date	10/13/2022
	,			 •		Date	
Circle one:	F	Present	Developed	Subcatchm	ent P-12		

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)	(6676)	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			0.22	6.53
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
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
/ Use only one	CN source per line.	ę	9482		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

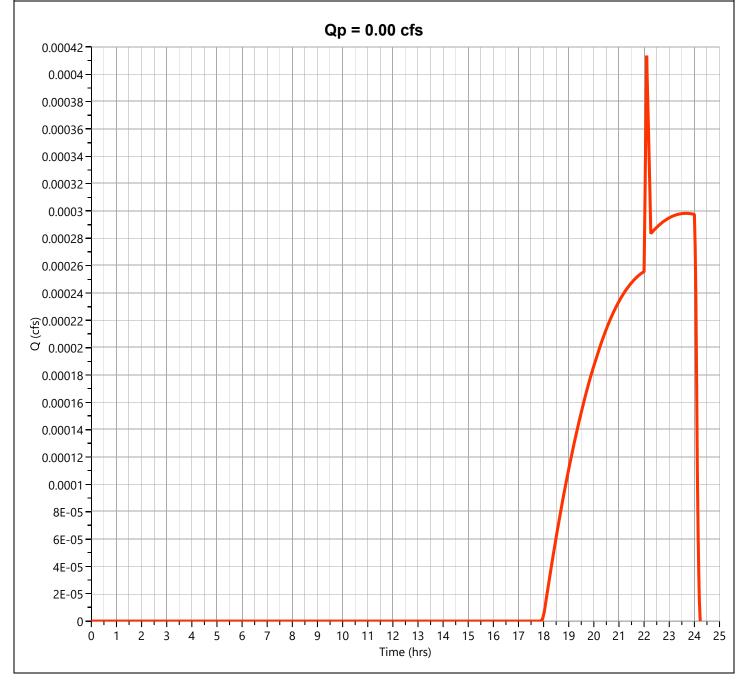
Project:	Athens Street		Ву	NC	Date Rev Date	6/24/2022	
Location:	Stow, MA		Checked		Date	10/10/2022	
Circle one:	Present De	eveloped Tt through subarea	Subcatchn	nent P-12			
Sheet flow	(Applicable to Tc only)		Segment ID	А-В			
1. Surface	Description (table 3-1)			WOODS			
2. Manning	s roughness coeff., n (table 3	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	0.122			
6. Tt = 0.00	7 (nL)^0.8 / (P2^0.5 s^0.4)	Compute To	t hr	0.14			0.14
Shallow co	ncentrated Flow		Segment ID	B-C			
7. Surface	Description (paved or unpave	ed)		UNPAVED			
8. Flow Ler	ngth, L		ft	57			
9. Waterco	urse slope, s		ft/ft	0.112			
10. Average	e Velocity, V (figure 3-1)		ft/s	5.40			
11. Tt = L /	3600V	Compute Tr	t hr	0.00			0.00
Channel flo	w		Segment ID				
<ul><li>13. Wetted</li><li>14. Hydrau</li><li>15. Channe</li><li>16. Mannin</li></ul>	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 Compute V	ft/ft				
18. Flow let	ngth, L	Compute Ti	ft				0
20. Waters	hed or subarea Tc or Tt (add	Tt in steps 6, 11, and	d 19)			hr min	0.14 8.6

## P-12 Hyd. No. 64

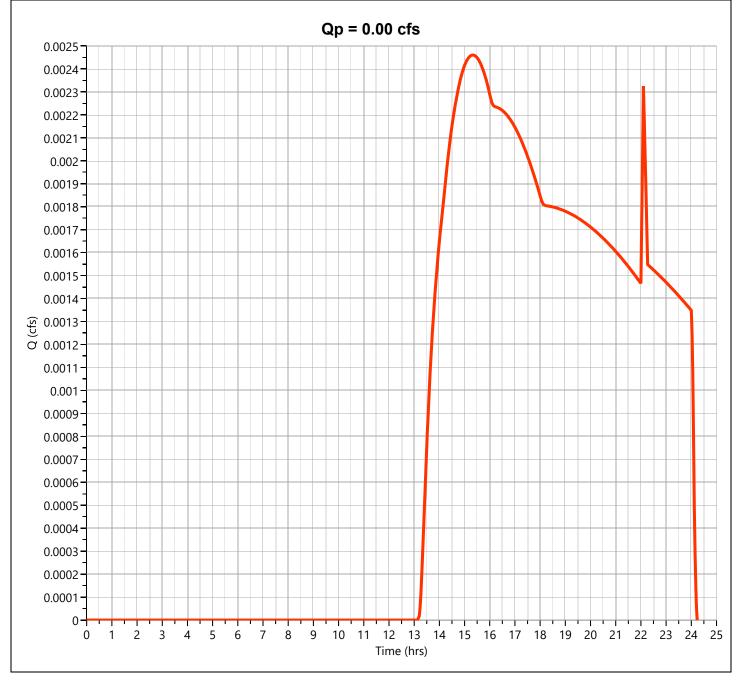
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.00 hrs
Time Interval	= 2 min	Runoff Volume	= 0.000 cuft
Drainage Area	= 0.22 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 8.6 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	=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

Qp = 0.00 cfs

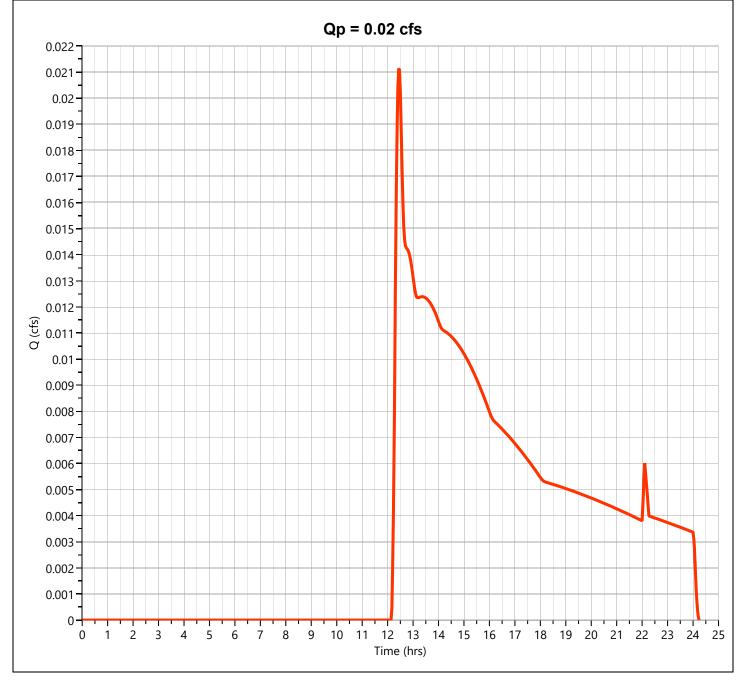
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.000 cfs
Storm Frequency	= 10-yr	Time to Peak	= 22.10 hrs
Time Interval	= 2 min	Runoff Volume	= 4.70 cuft
Drainage Area	= 0.22 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 8.6 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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



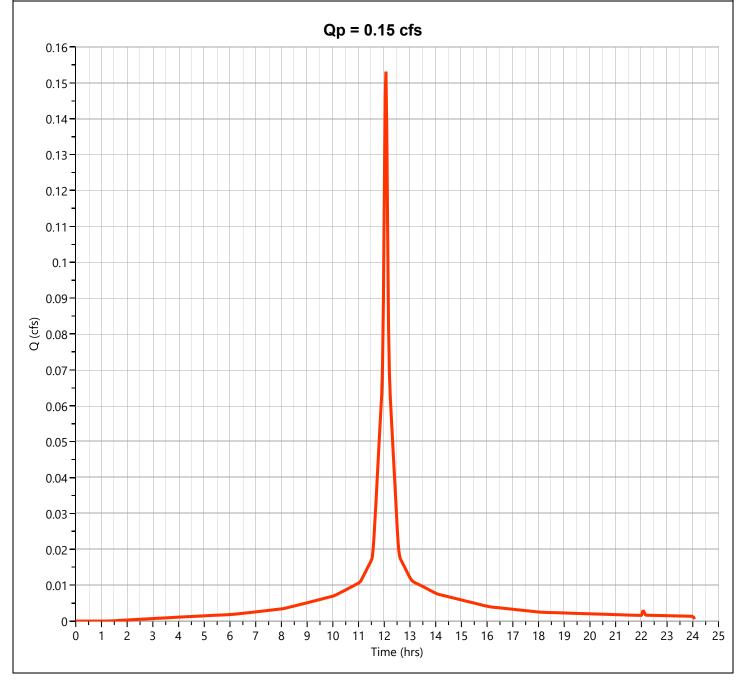
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.002 cfs
Storm Frequency	= 25-yr	Time to Peak	= 15.33 hrs
Time Interval	= 2 min	Runoff Volume	= 69.9 cuft
Drainage Area	= 0.22 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 8.6 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration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



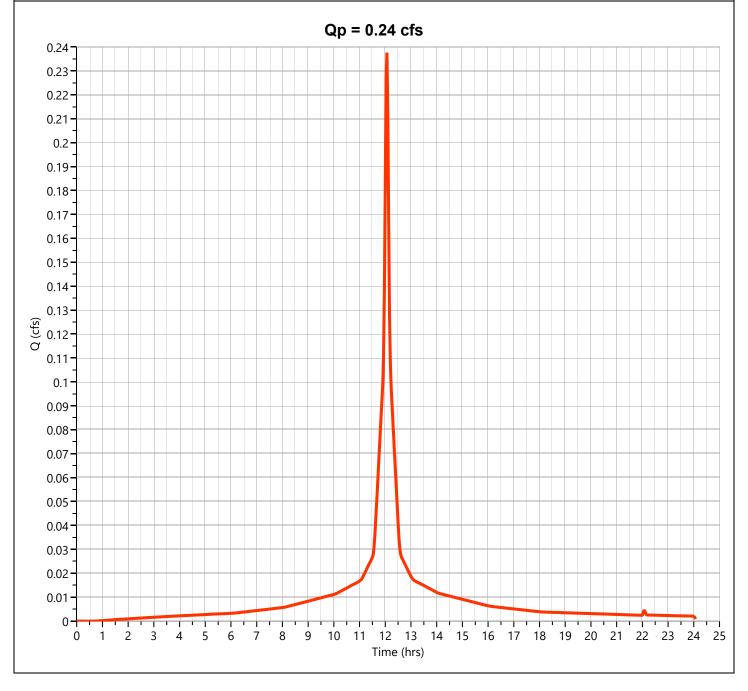
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.021 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.43 hrs
Time Interval	= 2 min	Runoff Volume	= 303 cuft
Drainage Area	= 0.22 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 8.6 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration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



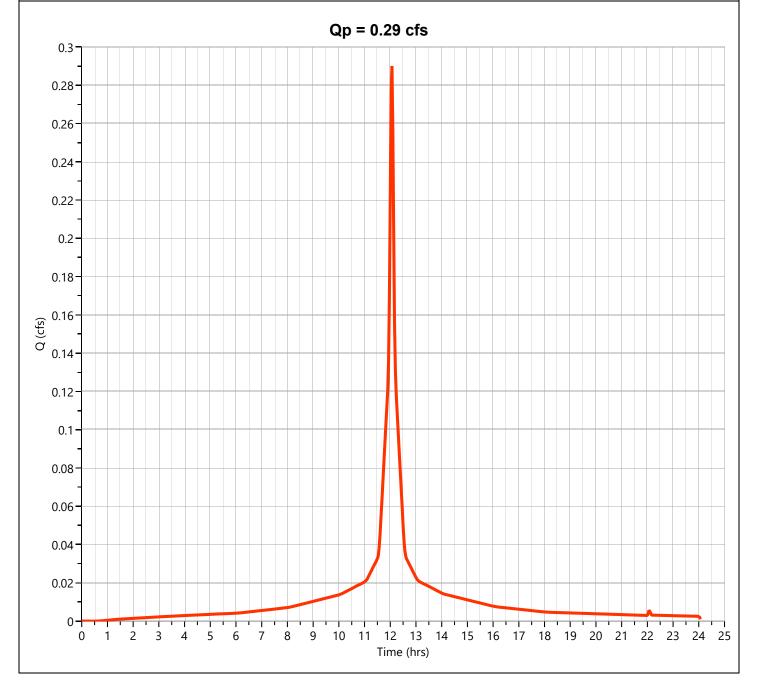
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.153 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.07 hrs
Time Interval	= 2 min	Runoff Volume	= 517 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration	=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



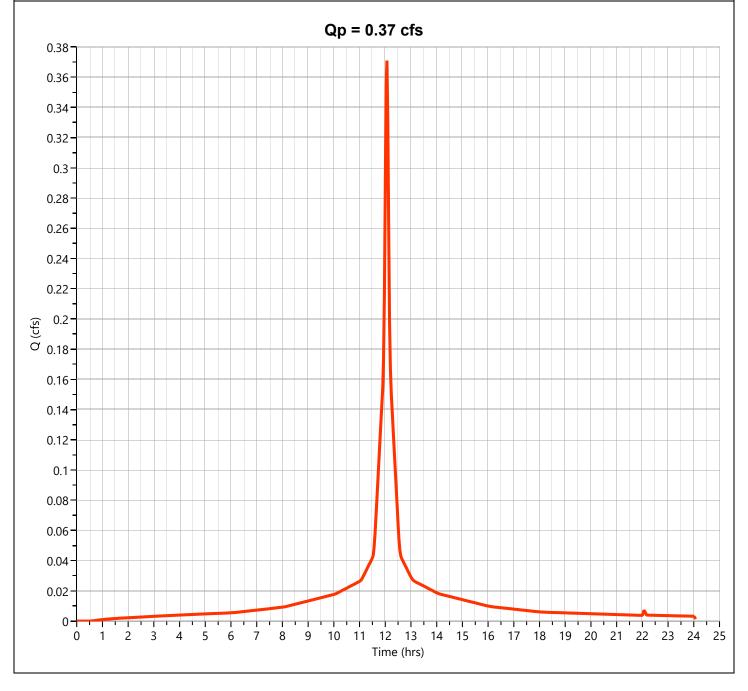
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.238 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.07 hrs
Time Interval	= 2 min	Runoff Volume	= 817 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	=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



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



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

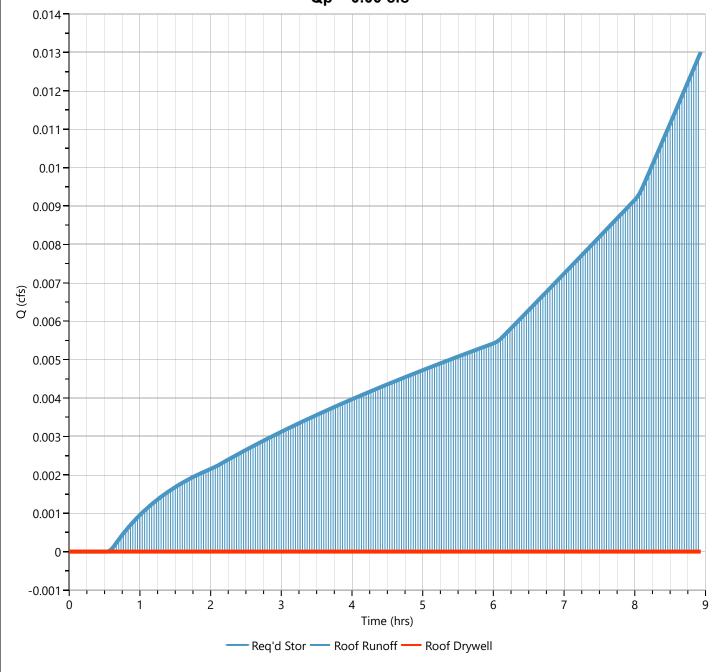


lydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 9.83 hrs
īme Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
nflow Hydrograph	= 66 - Roof Runoff	Max. Elevation	= 101.06 ft
Pond Name	= Roof Drywell	Max. Storage	= 161 cuft
ond Routing by Storage	ndication Method		
	Qp = 0.00 cf	·s	
4			
0.0064			
0.006			
0.0056			
0.0052			
0.0048			
-			
0.0044			
0.004			
0.0036			
(£) 0.0032			1
o.0032			
0.0028			
-			
0.0024			
0.002			
0.0016			
-			
0.0012			
0.0008			
0.0004			
0			
0	1 2 3 4 5 Time (h	6 7 8	9
	Req'd Stor — Roof Runoff		

•			,
Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 10-yr	Time to Peak	= 10.43 hrs
Γime Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
nflow Hydrograph	= 66 - Roof Runoff	Max. Elevation	= 101.75 ft
Pond Name	= Roof Drywell	Max. Storage	= 291 cuft
Pond Routing by Storage Ind	dication Method	Center of ma	ss detention time = 2.77 l
	Qp = 0.0	00 cfs	
0.014			
0.013			
0.012			
0.011			
0.01 -			
0.009			
0.008		<del></del>	
<u>\$\tilde{\pi}\$</u> 0.007			
O.006			
0.005			
0.004			
0.003			
0.002			
0.001			
-0.001	2 3 4 5		9 10
		Fime (hrs)	
	Roof Runoff		

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	= 66 - Roof Runoff	Max. Elevation	= 102.24 ft								
Pond Name	= Roof Drywell	Max. Storage	= 379 cuft								
Pond Routing by Storage Inc	·	Wax. Otorage	- 070 ouit								
<b>Qp = 0.00 cfs</b>											
0.012											
0.011											
0.01											
0.009											
0.008											
0.007											
O.006											
0.005											
0.004											
0.003											
0.002											
0.001											
-0.001	2 3 4 5	6 7 8	9 10								
	Time (hrs)										
	Req'd Stor Roof Runoff Roo	f Drywell									

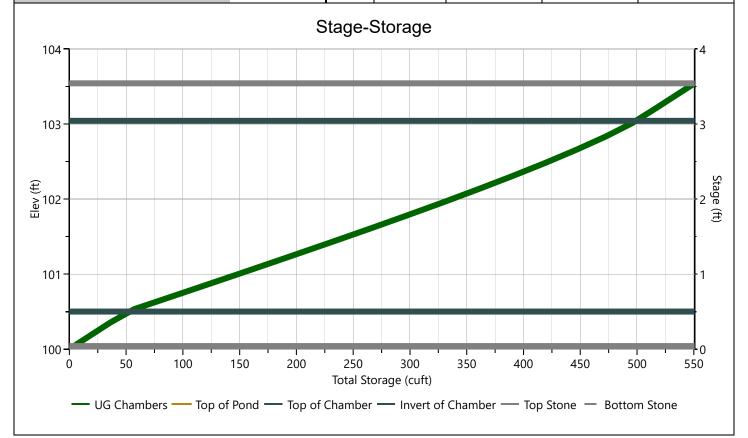
11001 Di y 11011			119 41 1101 01						
Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs						
Storm Frequency	= 100-yr	Time to Peak	= 8.90 hrs						
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft						
Inflow Hydrograph	= 66 - Roof Runoff	Max. Elevation	= 103.25 ft						
Pond Name	= Roof Drywell	Max. Storage	= 521 cuft						
Pond Routing by Storage Inc	dication Method								
Qp = 0.00 cfs									
0.014									



## **Roof Drywell**

# Stage-Storage

		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		
·	<b>50</b>	4.2	100.16	256	18.1	36.3		
Chamber Width, in	52	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		
1137 2138118 213	0	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		
Ctana Balaw in		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		
Stone Ends, in	12	31.9	102.66	256	27.8	447		
Storie Erids, III	12	34.0	102.83	256	25.9	473		
Encasement Voids, %	40.00	36.1	103.01	256	23.1	496		
Encasement Bottom Elevation, ft	100.00	38.2	103.19	256	18.7	514		
Energoment Bottom Elovation, it	100.00	40.4	103.36	256	18.1	532		
		42.5	103.54	256	18.1	551		

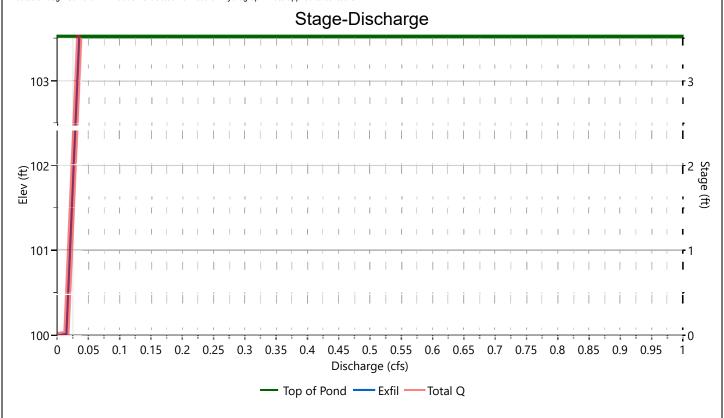


## **Roof Drywell**

## Stage-Discharge

Cultivant / Onificas	Culvernt		Orifices		Dowforested Discor		
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						
Weirs	Riser*		Weirs		A a!lla		
vveirs	Riser	1 2		3	Ancillary	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.



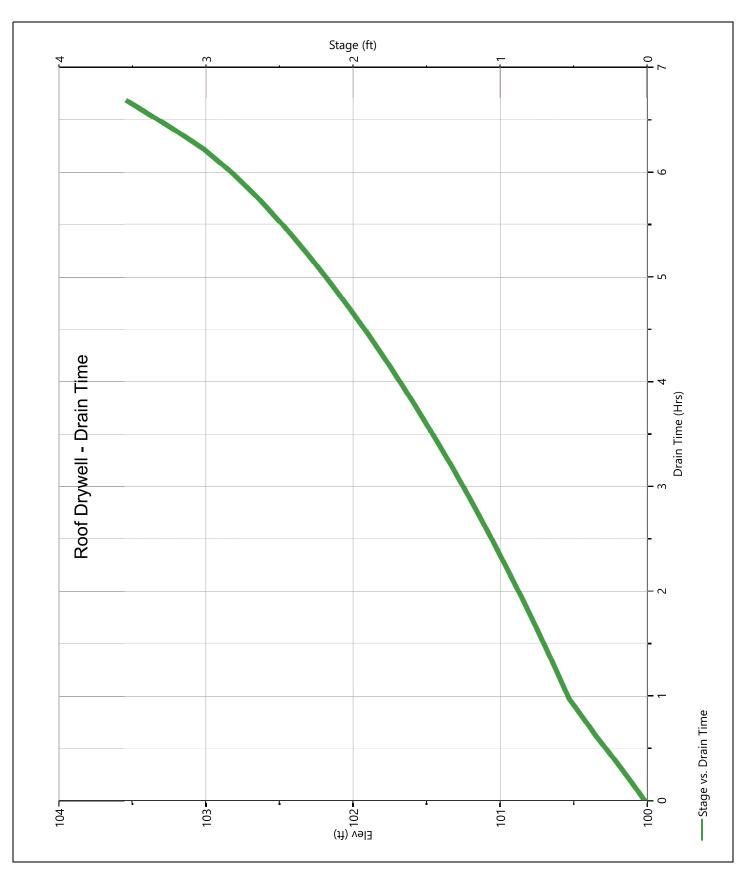
## **Roof Drywell**

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

Stage	Elev.	Storage	Culvert	C	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	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
														<u> </u>

## **Roof Drywell**

### **Pond Drawdown**





Job: 3719C Calculated NC

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

IB-2A1

Soils: Merrimac Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.6 inches of runoff x impervious area

Impervious area: 0.59 acres

25,607 s.f.

Required Recharge Volume (Rv)

Rv = 25,607 s.f. x 0.6 = 1,280 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): 8.27 inches/hour

0.69 feet/hour

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

Voids= 1.00

Rv= 15,725 c.f. > 1,280 c.f.

Basin Volume: 20,415 c.f. (Below Outlet)

72 Hour Drawdown

Rv/(K x Bottom Area)= 1.88 Hours 1.88 < 72 hours O.K.

Job: 3719C Calculated NC

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

IB-2A2

Soils: Merrimac Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.6 inches of runoff x impervious area

Impervious area: 0.49 acres 21,194 s.f.

Required Recharge Volume (Rv)

Rv = 21,194 s.f. x 0.6 = 1,060 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 A= 3,902 s.f.

Voids= 1.00

Rv= 15,133 c.f. > 1,060 c.f.

Basin Volume: 15,103 c.f. (Below Outlet)

72 Hour Drawdown

Rv/(K x Bottom Area)= 1.45 Hours 1.45 < 72 hours O.K.

Job: 3719C Calculated NC

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

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

35,120 s.f.

Required Recharge Volume (Rv)

Rv = 35,120 s.f. x 0.6 = 1,756 c.f.

12

Simple Dynamic Method

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

D (depth of infiltration facility): 0.3 ft

K (saturated hydraulic conductivity): 8.27 inches/hour

0.69 feet/hour

T (time): 2 hours A= 8,666 s.f.

Voids= 1.00

Rv= 14,544 c.f. > 1,756 c.f.

Basin Volume: 15,103 c.f. (Below Outlet)

72 Hour Drawdown

Rv/(K x Bottom Area)= 1.51 Hours 1.51 < 72 hours O.K.

Job: 3719C Calculated NC

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

IB-3A

Soils: Paxton Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.25 inches of runoff x impervious area

Impervious area: 0.40 acres

17,634 s.f.

Required Recharge Volume (Rv)

Rv = 17,634s.f. x 0.25 367 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= 1,532 s.f.

Voids= 1.00

Rv= 1,381 c.f.

367 c.f.

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

72 Hour Drawdown

3.22 Hours Rv/(K x Bottom Area)=

3.22 < 72 hours O.K.

Job: 3719C Calculated NC

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

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

1,979 c.f. Rv=

247 c.f.

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

72 Hour Drawdown

3.20 Hours Rv/(K x Bottom Area)= 3.20 < 72 hours O.K.

Job: 3719C Calculated NC

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

IB-5B

Soils: Paxton Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.25 inches of runoff x impervious area

Impervious area: 0.47 acres

20,683 s.f.

Required Recharge Volume (Rv)

Rv = 20,683 s.f. x 0.25 431 c.f.

12

Simple Dynamic Method

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

> D (depth of infiltration facility): 0.75 ft

K (saturated hydraulic conductivity): 2.41 inches/hour

0.20 feet/hour

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

Rv= 2,585 c.f.

431 c.f.

Basin Volume: 1,917 c.f. (Below Outlet)

72 Hour Drawdown

Rv/(K x Bottom Area)= 3.69 Hours 3.69 < 72 hours O.K.

Job: 3719C Calculated NC

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

IB-5C

Soils: Paxton Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.25 inches of runoff x impervious area

Impervious area: 0.60 acres

26,104 s.f.

Required Recharge Volume (Rv)

Rv = 26,104 s.f. x 0.25 = 544 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.

Rv= 6,979 c.f. > 544 c.f.

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

72 Hour Drawdown

Rv/(K x Bottom Area)= 7.52 Hours **7.52 < 72 hours O.K.** 

Job: 3719C Calculated NC

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

IB-5D

Soils: Windsor Loamy Sand

Hydrologic Group:

Required Recharge Volume

0.25 inches of runoff x impervious area

Impervious area: 1.03 acres 44,895 s.f.

Required Recharge Volume (Rv)

Rv = 44,895 s.f. x 0.25 935 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 A= 2,831 s.f.

Voids= 1.00

Rv= 6,143 c.f.

935 c.f.

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

72 Hour Drawdown

Rv/(K x Bottom Area)= 15.88 Hours 15.88 < 72 hours O.K.

Job: 3719C Calculated NC

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

IB-6B

Soils: Merrimac Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.6 inches of runoff x impervious area

Impervious area: 0.17 acres

7,213 s.f.

Required Recharge Volume (Rv)

Rv = 7,213 s.f. x 0.6 = 361 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 A= 351 s.f.

Voids= 1.00 Rv= 1.537 c.f.

Rv= 1,537 c.f. > 361 c.f.

Basin Volume: 2,347 c.f. (Below Outlet)

72 Hour Drawdown

Rv/(K x Bottom Area)= 2.22 Hours 2.22 < 72 hours O.K.

Job: 3719C Calculated NC

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

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 = 64,127 s.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 A= 3,716 s.f.

Voids= 1.00

Rv= 17,756 c.f.

3,206 c.f.

Basin Volume: 19,516 c.f. (Below Outlet)

72 Hour Drawdown

Rv/(K x Bottom Area)= 1.59 Hours 1.59 < 72 hours O.K.

Job: 3719C Calculated NC

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

IB-7B

Soils: Merrimac Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.6 inches of runoff x impervious area

Impervious area: 0.52 acres

22,486 s.f.

Required Recharge Volume (Rv)

Rv = 22,486 s.f. x 0.6 1,124 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= 1,667 s.f.

Voids= 1.00

Rv= 4,837 c.f.

1,124 c.f.

Basin Volume: 6,600 c.f. (Below Outlet)

72 Hour Drawdown

6.79 Hours Rv/(K x Bottom Area)= 6.79 < 72 hours O.K.

Job: 3719C Calculated NC

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

IB-8

Soils: Merrimac Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.6 inches of runoff x impervious area

Impervious area: 2.01 acres

87,645 s.f.

Required Recharge Volume (Rv)

Rv = 87,645 s.f. x 0.6 4,382 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 A= 6,237 s.f.

Voids= 1.00

Rv= 33,545 c.f.

4,382 c.f.

Basin Volume: 37,787 c.f. (Below Outlet)

72 Hour Drawdown

Rv/(K x Bottom Area)= 1.63 Hours 1.63 < 72 hours O.K.

Job: 3719C Calculated NC

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

IB-10B

Soils: Paxton Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.25 inches of runoff x impervious area

Impervious area: 1.68 acres

73,029 s.f.

Required Recharge Volume (Rv)

Rv = 73,029s.f. x 0.25 1,521 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): 2.41 inches/hour

0.20 feet/hour

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

Voids= 1.00

Rv= 10,674 c.f. 1,521 c.f.

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

72 Hour Drawdown

Rv/(K x Bottom Area)= 5.08 Hours 5.08 < 72 hours O.K.

## **Recharge Volume Calculations**

Job: 3719C Calculated NC

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

IB-10C

Soils: Woodbridge Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.6 inches of runoff x impervious area

Impervious area: 3.35 acres 145,806 s.f.

Required Recharge Volume (Rv)

Rv = 145,806 s.f. x 0.6 7,290 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): 8.27 inches/hour

0.69 feet/hour

T (time): 2 hours

A= 16,659 s.f. Voids= 1.00

39,621 c.f. Rv=

7,290 c.f.

Basin Volume: 18,217 c.f. (Below Outlet)

72 Hour Drawdown

0.67 Hours Rv/(K x Bottom Area)= 0.67 < 72 hours O.K.

## **Recharge Volume Calculations**

Job: 3719C Calculated NC

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

Drywell

Soils: Paxton Fine Sandy Loam

Hydrologic Group:

Required Recharge Volume

0.6 inches of runoff x impervious area

Impervious area: 0.05 acres

2,274 s.f.

Required Recharge Volume (Rv)

Rv = 2,274 s.f. x 0.6 = 114 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): 8.27 inches/hour

0.69 feet/hour

T (time): 2 hours A= 256 s.f.

Voids= 0.40

Rv= 715 c.f. > 114 c.f.

Drywell Volume: 551 c.f. (Below Outlet)

72 Hour Drawdown

Rv/(K x Bottom Area)= 1.12 Hours 1.12 < 72 hours O.K. Job: SM-3719C Calculated by: NC

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

### Required Recharge Volume

Soils: Sand Hydrologic Group: A

Required Recharge Volume

1 inches of runoff x impervious area

Total Impervious Area: 16.99 acres **740,236 s.f.** 

#### 1.) Required Recharge Volume (Rv)

Rv = 740,236 s.f. x 
$$\underline{1}$$
 = **61,686** c.f.  $12$ 

= 61,686 c.f.

646,612 = **1.14** 

## 2.) Adjusted Minimum Required Recharge Volume

3.)

4.)

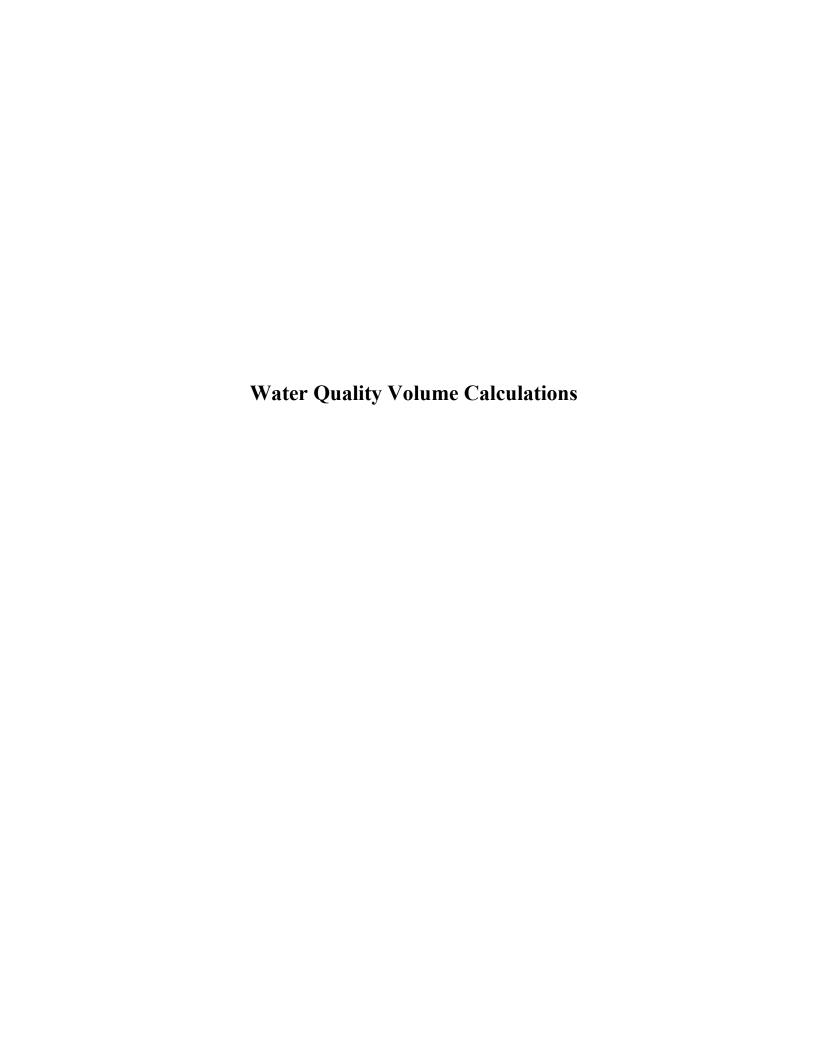
#### **Recharge Volume Provided**

IB-2A1	=	15,725 c.f.
IB-2A2	=	15,133 c.f.
IB-2B-A	=	14,544 c.f.
IB-3A	=	1,381 c.f.
IB-4A	=	1,979 c.f.
IB-5B	=	2,585 c.f.
IB-5C	=	6,979 c.f.
IB-5D	=	6,143 c.f.
IB-6B	=	1,537 c.f.
IB-7A	=	17,756 c.f.
IB-7B	=	4,837 c.f.
IB-8	=	33,545 c.f.
IB-10B	=	10,674 c.f.
IB-10C	=	39,621 c.f.
Drywell (x19)	=	13,592 c.f.
Total Recharge Volume Provided	=	186,032 c.f.

<u>646,612</u> = 87% 740,236

Total Impervious area

<u>Impervious area being recharged</u> <u>87%</u> ≥ <u>65%</u>



3719C Calculated by: NC Job:

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

Location: The Cottages at Wandering Pond

IB-2A1

Soils: Merrimac Fine Sandy Loam

Hydrologic Group:

Required First Flush Volume

1 inch of runoff x impervious area

Impervious area: 0.59 acres

25,607 s.f.

Required Water Quality Volume

<u>1</u> 12 V= 25,607 2,134 c.f. s.f. x

Volume Provided 20,415 c.f. (storage below outlet)

> 20,415 c.f. > 2,134 c.f. O.K.

Job: 3719C Calculated by: NC

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

Location: The Cottages at Wandering Pond

IB-2A2

Soils: Merrimac Fine Sandy Loam

Hydrologic Group:

Required First Flush Volume

1 inch of runoff x impervious area

Impervious area: 0.49 acres

21,194 s.f.

15,103 c.f.

Required Water Quality Volume

Volume Provided

V= 21,194 s.f. x  $\frac{1}{12}$  = **1,766 c.f.** 

(storage below outlet)

15,103 c.f. > 1,766 c.f. O.K.

3719C Calculated by: NC Job:

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

Location: The Cottages at Wandering Pond

IB-2B-A

Soils: Merrimac Fine Sandy Loam

Hydrologic Group:

Required First Flush Volume

1 inch of runoff x impervious area

0.81 acres Impervious area:

35,120 s.f.

Required Water Quality Volume

<u>1</u> 12 V= 35,120 2,927 c.f. s.f. x

Volume Provided 2,996 c.f. (storage below outlet)

> c.f. > 2,927 c.f. O.K. 2,996

Job: 3719C Calculated by: MKO

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

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: 0.40 acres 17,634 s.f.

Required Water Quality Volume

V= 17,634 s.f. x  $\frac{0.5}{10}$  = **735** c.f.

12

Volume Provided 894 c.f. (storage below outlet)

894 c.f. > 735 c.f. O.K.

Job: 3719C Calculated by: NC

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

Location: The Cottages at Wandering Pond

IB-4A

Soils: Paxton Fine Sandy Loam

Hydrologic Group:

Required First Flush Volume

0.5 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  $\frac{0.5}{10}$  = 494 c.f.

12

Volume Provided 1,270 c.f. (storage below outlet)

1,270 c.f. > 494 c.f. O.K.

Job: 3719C Calculated by: NC

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

Location: The Cottages at Wandering Pond

IB-5B

Soils: Paxton Fine Sandy Loam

Hydrologic Group:

Required First Flush Volume

0.5 inch of runoff x impervious area

Impervious area: 0.47 acres

20,683 s.f.

Required Water Quality Volume

V= 20,683 s.f. x  $\frac{0.5}{10}$  = 862 c.f.

12

Volume Provided 1,917 c.f. (storage below outlet)

1,917 c.f. > 862 c.f. O.K.

Calculated by: NC 3719C Job:

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

Location: The Cottages at Wandering Pond

IB-5C

Soils: Paxton Fine Sandy Loam

Hydrologic Group:

Required First Flush Volume

0.5 inch of runoff x impervious area

0.60 acres Impervious area: 26,104 s.f.

Required Water Quality Volume

V= 26,104 0.5 1,088 c.f. s.f. x

12

Volume Provided 10,534 c.f. (storage below outlet)

> 10,534 c.f. > 1,088 c.f. O.K.

3719C Calculated by: NC Job:

Date: 6/27/2022 Rev: 10/27/2022 Location: The Cottages at Wandering Pond

IB-5D

Soils: Windsor Loamy Sand

Hydrologic Group:

Required First Flush Volume

1 inch of runoff x impervious area

1.03 acres Impervious area: 44,895 s.f.

Required Water Quality Volume

<u>1</u> 12 V= 44,895 3,741 c.f. s.f. x

8,291 c.f. Volume Provided (storage below outlet)

> 8,291 c.f. > 3,741 c.f. O.K.

Job: 3719C Calculated by: NC

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

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: 0.17 acres 7,213 s.f.

Required Water Quality Volume

V= 7,213 s.f. x  $\frac{1}{12}$  = **601 c.f.** 

Volume Provided 2,347 c.f.

2,347 c.f. > 601 c.f. O.K.

Job: 3719C Calculated by: NC

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

.....

IB-7A

Soils: Merrimac Fine Sandy Loam

Hydrologic Group:

Required First Flush Volume

Location: The Cottages at Wandering Pond

1 inch of runoff x impervious area

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

Required Water Quality Volume

V= 64,127 s.f. x  $\frac{1}{12}$  = **5,344 c.f.** 12

Volume Provided 19,516 c.f.

19,516 c.f. > 5,344 c.f. O.K.

Job: 3719C Calculated by: NC

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

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: 0.52 acres

22,486 s.f.

**Required Water Quality Volume** 

V= 22,486 s.f. x  $\frac{1}{12}$  = 1,874 c.f.

Volume Provided 6,600 c.f.

6,600 c.f. > 1,874 c.f. O.K.

Job: 3719C Calculated by: NC

Location: The Cottages at Wandering Pond Date: 6/27/2022

Rev: 10/27/2022

IB-8

Soils: Merrimac Fine Sandy Loam

Hydrologic Group:

Required First Flush Volume

1 inch of runoff x impervious area

37,787 c.f.

Impervious area: 2.01 acres 87,645 s.f.

**Required Water Quality Volume** 

Volume Provided

V= 87,645 s.f. x  $\frac{1}{12}$  = **7,304 c.f.** 12

37,787 c.f. > 7,304 c.f. O.K.

Job: 3719C Calculated by: NC

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

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

Impervious area: 0.05 acres 1,964 s.f.

Required Water Quality Volume

V= 1,964 s.f. x  $\frac{1}{12}$  = **164 c.f.** 12

Treatment Trench Volume Provided= L x W x D x 0.4 = 176 c.f.

176 c.f. > 164 c.f. O.K.

3719C Calculated by: NC Job:

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

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: 1.68 acres 73,029 s.f.

Required Water Quality Volume

V= 73,029 <u>1</u> 12 6,086 c.f. s.f. x

Volume Provided 10,890 c.f. (storage below outlet)

> 10,890 c.f. > 6,086 c.f. O.K.

Calculated by: NC 3719C Job:

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

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

3.35 acres Impervious area: 145,806 s.f.

Required Water Quality Volume

<u>1</u> 12 V= 145,806 12,151 c.f. s.f. x

Volume Provided 18,217 c.f. (storage below outlet)

> 18,217 c.f. > 12,151 c.f. O.K.

Job: 3719C Calculated by: NC

Date: 6/27/2022 Rev: 10/27/2002

Drywell

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: 0.05 acres

2,274 s.f.

**Required Water Quality Volume** 

V= 2,274 s.f. x  $\frac{1}{12}$  = **190 c.f.** 

Volume Provided 551 c.f. (storage below outlet)

551 c.f. > 190 c.f. O.K.



#### **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

	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	426	20.3	8,666	1,756	0.20				229.00	226.00	5.5	0.25
Infiltration Basin 6B	43.0	8.16	351	361	1.03				219.00	215.37	3	0.62
Infiltration Basin 7A	98.0	37.9	3,716	3,206	0.86	1 day	0.28	39	219.00	217.00	13	1.05
Infiltration Basin 8	146	42.7	6,237	4,382	0.70				222.00	218.50	4.5	1.63
Infiltration Basin 10B	106	46.8	4,961	1,521	0.31				225.00	222.13	5.33	0.69
Infiltration Basin 5B	60.0	37.4	2,245	431	0.19	1 day	0.18	8	283.00	279.10	13	0.55
Infiltration Basin 5D	108.0	26.2	2,831	935	0.33	1 day	0.16	6	230.00	226.80	13	1.04

Required Recharge Volume Application Rate =

Bottom Area

Duration of Application = 1 day for analysis of 24-hour storm events

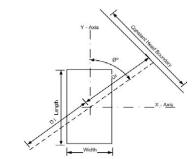
Fillable Porosity = Value based on soil classification from attached table

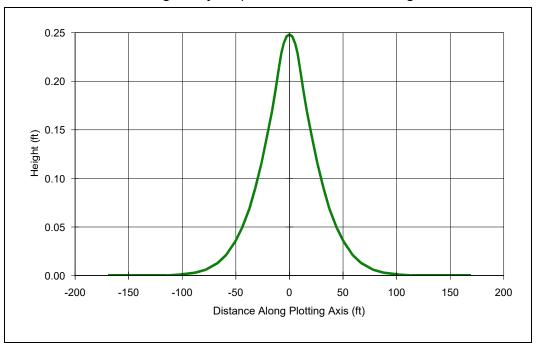
Hydraulic Conductivity = Value taken from attached table

Initial Saturated Thickness = Depth from bottom of deepest test pit (since depth to ledge is unknown) to estimated seasonal high groundwater (ESHGW)

Distance to Constant Head Boundary (Di & Dr): Bordering Vegetated Wetland used as constant head boundary

Angle from z-axis (Ø):





COMPANY: Stamski and McNary

PROJECT: 3719C IB-2B-A

ANALYST: NC

DATE: 10/27/2022 TIME: 4:39:30 PM

## **INPUT PARAMETERS**

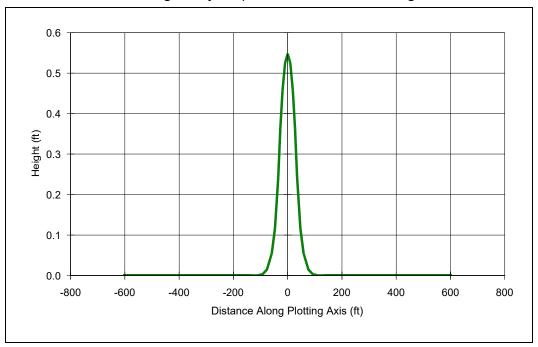
Application rate: 0.2 c.ft/day/sq. ft Duration of application: 1 days Fillable porosity: 0.28 Hydraulic conductivity: 39 ft/day Initial saturated thickness: 5.5 ft Length of application area: 426 ft Width of application area: 20.3 ft Constant head boundary used at: 168 ft Plotting axis from Y-Axis: 90 degrees Edge of recharge area:

positive X: 10.2 ft positive Y: 0 ft

Total volume applied: 1729.56 c.ft

#### MODEL RESULTS

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-168 -141.3 -114.6 -87.8 -66.8 -50.6 -37.3 -26 -16.3	0 0 0 0 0 0 0	-168 -141 -115 -88 -67 -51 -37 -26 -16	0 0 0 0 0.01 0.04 0.07 0.12 0.17
-9.7 -5.3 0 5.3 9.7 16.3 26	0 0 0 0 0 0	-10 -5 0 5 10 16 26	0.21 0.24 0.25 0.24 0.21 0.17 0.12
37.3 50.6 66.8 87.8 114.6 141.3	0 0 0 0 0 0	37 51 67 88 115 141 168	0.07 0.04 0.01 0 0 0



COMPANY: Stamski and McNary

PROJECT: 3719C IB-5B

ANALYST: NC

DATE: 10/27/2022 TIME: 5:11:43 PM

**INPUT PARAMETERS** 

Application rate: 0.19 c.ft/day/sq. ft Duration of application: 1 days Fillable porosity: 0.18

Hydraulic conductivity: 8 ft/day Initial saturated thickness: 13 ft Length of application area: 60 ft Width of application area: 37.4 ft Constant head boundary used at: 601 ft

Plotting axis from Y-Axis: 22 degrees

Edge of recharge area: positive X: 12.1 ft

positive Y: 30 ft

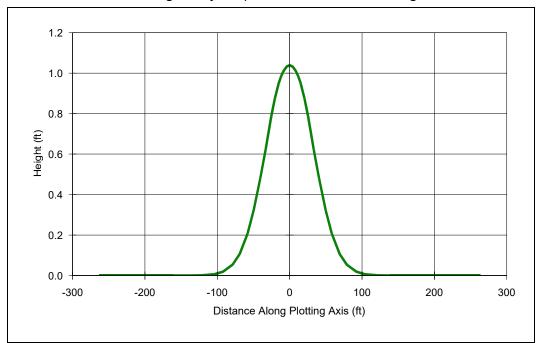
Total volume applied: 426.36 c.ft

#### MODEL RESULTS

Plot

Mound

X (ft)	Y (ft)	Axis (ft)	Height (ft)
-225.1 -189.3 -153.5 -117.7 -89.6 -67.8 -49.9 -34.9 -21.8 -13.1 -7.1 0 7.1 13.1 21.8 34.9 49.9 67.8 89.6 117.7 153.5 189.3	-557.2 -468.6 -380 -291.4 -221.7 -167.7 -123.6 -86.3 -54 -32.3 -17.6 0 17.6 32.3 54 86.3 123.6 167.7 221.7 291.4 380 468.6	-601 -505 -410 -314 -239 -181 -133 -93 -58 -35 -19 0 19 35 58 93 133 181 239 314 410 505	0 0 0 0 0 0 0 0 0.06 0.24 0.46 0.55 0.46 0.24 0.06 0
225.1	557.2	601	0



COMPANY: Stamski and McNary

PROJECT: 3719C IB-5D

ANALYST: NC

DATE: 10/27/2022 TIME: 5:10:26 PM

## **INPUT PARAMETERS**

Application rate: 0.33 c.ft/day/sq. ft Duration of application: 1 days Fillable porosity: 0.16 Hydraulic conductivity: 6 ft/day Initial saturated thickness: 13 ft Length of application area: 108 ft Width of application area: 26.2 ft Constant head boundary used at: 262 ft

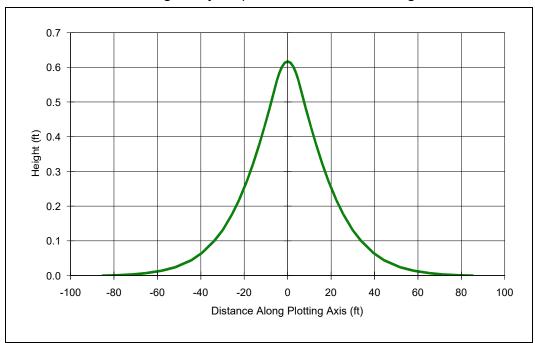
Plotting axis from Y-Axis: 29 degrees Edge of recharge area:

positive X: 13.1 ft positive Y: 23.6 ft

Total volume applied: 933.768 c.ft

#### MODEL RESULTS

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 86.6 106.8 127	-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 91.2 119.8 156.3 192.7 229.2	-262 -220 -179 -137 -104 -79 -58 -41 -25 -15 -8 0 8 15 25 41 58 79 104 137 179 220 262	0 0 0 0 0.01 0.05 0.21 0.48 0.79 0.95 1.01 1.04 1.01 0.95 0.79 0.48 0.21 0.05 0.01 0



COMPANY: Stamski and McNary

PROJECT: 3719C IB-6B

ANALYST: NC

DATE: 10/27/2022 TIME: 4:45:03 PM

## **INPUT PARAMETERS**

Duration of application: 1 days
Fillable porosity: 0.28
Hydraulic conductivity: 39 ft/day
Initial saturated thickness: 3 ft
Length of application area: 43 ft
Width of application area: 8.16 ft
Constant head boundary used at: 85 ft
Plotting axis from Y-Axis: 48 degrees

Application rate: 1.03 c.ft/day/sq. ft

Edge of recharge area: positive X: 4.1 ft

positive X: 4.1 ft positive Y: 3.7 ft

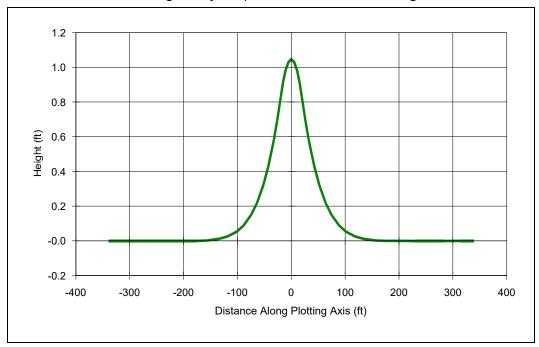
Total volume applied: 361.4064 c.ft

#### MODEL RESULTS

Plot

Mound

X (ft)	Y (ft)	Axis (ft)	Height (ft)
-63.2 -53.1 -43.1 -33 -25.1 -19 -14 -9.8 -6.1 -3.7 -2 0 2 3.7 6.1 9.8 14 19 25.1 33 43.1 53.1 63.2	-56.9 -47.8 -38.8 -29.7 -22.6 -17.1 -12.6 -8.8 -5.5 -3.3 -1.8 0 1.8 3.3 5.5 8.8 12.6 17.1 22.6 29.7 38.8 47.8 56.9	-85 -71 -58 -44 -34 -26 -19 -13 -8 -5 -3 0 3 5 8 13 19 26 34 44 58 71 85	0 0.01 0.04 0.1 0.18 0.27 0.38 0.48 0.56 0.6 0.62 0.6 0.56 0.48 0.38 0.27 0.18 0.1 0.04 0.01 0



COMPANY: Stamski and McNary

PROJECT: 3719C IB-7A

ANALYST: NC

DATE: 10/27/2022 TIME: 4:57:45 PM

## **INPUT PARAMETERS**

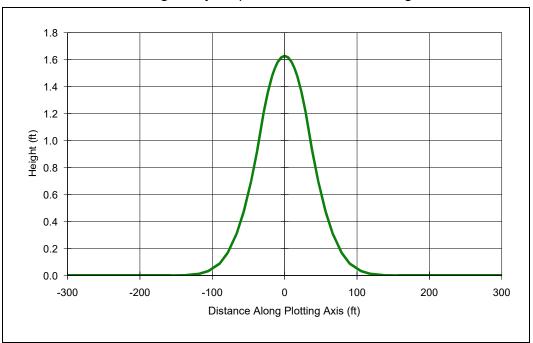
Application rate: 0.86 c.ft/day/sq. ft Duration of application: 1 days Fillable porosity: 0.28 Hydraulic conductivity: 39 ft/day Initial saturated thickness: 13 ft Length of application area: 98 ft Width of application area: 37.9 ft Constant head boundary used at: 337 ft Plotting axis from Y-Axis: 77 degrees Edge of recharge area:

positive X: 19 ft positive Y: 4.4 ft

Total volume applied: 3194.212 c.ft

#### MODEL RESULTS

X (ft)	Y (ft)	Plot Axis (ft)	Mound 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 0.01 0.05 0.15 0.32 0.58 0.83 0.98 1.05 0.98 0.83 0.58 0.32 0.15 0.05 0.01 0



COMPANY: Stamski and McNary

PROJECT: 3719C IB-8

ANALYST: NC

DATE: 10/27/2022 TIME: 4:55:50 PM

## **INPUT PARAMETERS**

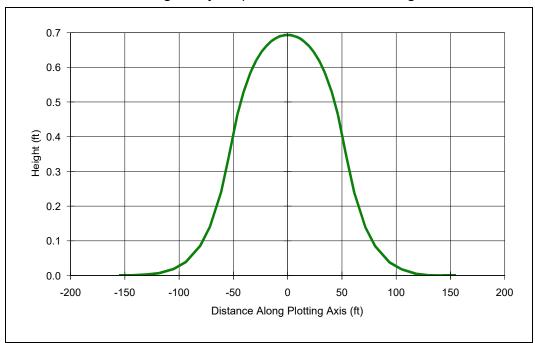
Application rate: 0.7 c.ft/day/sq. ft Duration of application: 1 days Fillable porosity: 0.28 Hydraulic conductivity: 39 ft/day Initial saturated thickness: 4.5 ft Length of application area: 146 ft Width of application area: 42.7 ft Constant head boundary used at: 299 ft Plotting axis from Y-Axis: 41 degrees Edge of recharge area:

positive X: 21.4 ft positive Y: 24.6 ft

Total volume applied: 4363.94 c.ft

#### MODEL RESULTS

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-196.2 -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 78.1 102.6 133.8 165 196.2	-225.7 -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 89.8 118 153.9 189.8 225.7	-299 -251 -204 -156 -119 -90 -66 -46 -29 -17 -9 0 9 17 29 46 66 90 119 156 204 251 299	0 0 0 0 0.01 0.09 0.31 0.7 1.21 1.48 1.58 1.63 1.58 1.48 1.21 0.7 0.31 0.09 0.01 0



COMPANY: Stamski and McNary

PROJECT: 3719C IB-10B

ANALYST: NC

DATE: 10/27/2022 TIME: 5:02:34 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: 5.33 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

Mound

X (ft)	Y (ft)	Axis (ft)	Height (ft)
-16.1 -13.5 -11 -8.4 -6.4 -4.8 -3.6 -2.5 -1.6 -0.9 -0.5 0 0.5 0.9 1.6 2.5 3.6 4.8 6.4 8.4 11 13.5 16.1	-153.2 -128.8 -104.4 -80.1 -60.9 -46.1 -34 -23.7 -14.8 -8.9 -4.8 0 4.8 8.9 14.8 23.7 34 46.1 60.9 80.1 104.4 128.8 153.2	-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 0.02 0.09 0.24 0.46 0.59 0.65 0.68 0.69 0.69 0.69 0.69 0.68 0.64 0.58 0.46 0.24 0.08 0.02 0
10.1	100.2	101	J



DESIGN STORM: 100 YEAR 10/13/2022 PFK, NC SM-3719C DATE: DONE BY: FILE:

STORM SEWER DESIGN

(ADS N-12)"n"= 0.012 4"-10" (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

			TRIBUTA	ARY AREA	TIME O	F FLOW										DESIGN	I FLOW				DRA	AIN INV.
					TO		Ī		"Q"									TOTAL	MANHOLE			VATION
FROM	то	LENGTH (FT)	INCR. (ACRES)	TOTAL (ACRES)	UPPER END	TIME IN SECTION	RUNOFF COEFF.	RAINFALL INTENSITY	TOTAL RUNOFF	SLOPE of PIPF	DIAM	MANN. "n"	CAPACITY FULL	VELOCITY FULL	VELOCITY	VELOCITY HEAD	DEPTH OF FLOW	ENERGY HEAD	INVERT DROP	FALL IN PIPE	UPPER END	LOWER END
		(F1)	(ACKES)	(ACILES)	(MIN)	(MIN)	"C"	(IN/HR)	(CFS)	(FT/FT)	(IN)		(CFS)	(FPS)	(FPS)	(FT)	(FT)	(FT)	(FT)	(FT)	LIVE	LIND
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	14	0.10	0.10	10	0.07	0.67	7.8	0.52	0.011	12	0.012	3.99	5.08	3.47	0.19	0.24	0.43		0.15	309.53	309.38
DMH-WPC6	DMH-WPC7 DMH-WPC8	201 121	0.00	0.38	10	0.79	0.61	7.8 7.8	1.82 1.82	0.007	12 12	0.012 0.012	3.23 3.15	4.11 4.02	4.23 4.14	0.28	0.54	0.81		1.41 0.81	309.28 307.77	307.87 306.96
CB-WPC9	DMH-WPC8	42	0.00	0.38	10	0.43	0.39	7.8	1.43	0.065	12	0.012	9.82	12.51	8.87	1.22	0.26	1.48		2.73	309.69	306.96
CB-WPC10	DMH-WPC8	42	0.18	0.18	10	0.09	0.70	7.8	1.02	0.065	12	0.012	9.82	12.51	8.03	1.00	0.22	1.22		2.73	309.69	306.96
DMH-WPC8	FLARED END	122	0.00	1.03	10	0.39	0.53	7.8	4.27	0.007	15	0.012	5.87	4.78	5.21	0.42	0.79	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-WPC11	DMH-WPC9	14	0.83	0.83	10	0.05	0.33	7.8	1.73	0.010	12	0.012	3.85	4.91	4.76	0.41	0.36	0.96		0.14	302.58	302.44
DMH-WPC9	FLARED END	79	0.00	1.12	10	0.22	0.46	7.8	4.04	0.011	15	0.012	7.29	5.95	6.09	0.58	0.66	1.24		0.86	306.86	306.00
CB-SSL1	DMH-SSL1	13	0.32	0.32	10	0.05	0.69	7.8	1.71	0.010	12	0.012	3.81	4.85	4.70	0.34	0.47	0.81		0.13	235.78	235.66
CB-SSL2 DMH-SSL1	DMH-SSL1 DMH-SSL2	13 109	1.00	0.68 1.00	10 10	0.05	0.33	7.8 7.8	1.79 3.50	0.010 0.010	12	0.012 0.012	3.81	4.85 4.91	4.77 5.56	0.35	0.48	0.83 1.23		0.13 1.09	235.78 235.56	235.66 234.46
DMH-SSL2	DMH-SSL3	63	1.00	1.00	10	0.19	0.45	7.8	3.50	0.010	12	0.012	3.86	4.92	5.57	0.48	0.75	1.23		0.63	234.36	233.73
CB-SSL3	DMH-SSL3	16	0.04	0.04	10	0.10	0.69	7.8	0.23	0.010	12	0.012	3.85	4.91	2.69	0.11	0.17	0.28		0.16	236.00	235.84
CB-SSL4	DMH-SSL3	15	0.13	0.13	10	0.09	0.30	7.8	0.30	0.010	12	0.012	3.85	4.91	2.88	0.13	0.19	0.31		0.15	236.00	235.85
DMH-SSL3 DMH-SSL4	DMH-SSL4 DMH-SSL5	52 71	1.17	1.17	10 10	0.15 0.20	0.44	7.8 7.8	4.03 4.03	0.010 0.010	15 15	0.012 0.012	7.00 6.99	5.70 5.70	5.89 5.90	0.54 0.54	0.68	1.21		0.52 0.71	230.90 230.28	230.38 229.57
DMH-SSL4  DMH-SSL5	IB-2B-A	47	1.17	1.17	10	0.20	0.44	7.8	4.03	0.010	15	0.012	7.00	5.70	5.90	0.54	0.68	1.22		0.71	230.28	229.57
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	DMH-WPC5 FLARED END	14 75	0.19	0.19	10 10	0.06	0.69	7.8 7.8	1.05 3.56	0.010	12 12	0.012 0.012	3.85 6.20	4.91 7.89	4.17 8.15	0.27 1.03	0.36	0.62 1.57		0.14	291.18 290.94	291.04
DIVIN-WPC5	PLAKED END	/5	0.00	0.85	10	0.15	0.55	7.8	3.30	0.020	12	0.012	0.20	7.89	9.13	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-WPC3	107 74	1.51	1.51	10	0.32	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	0.77	1.25		1.07	287.27	286.20
DMH-WPC3 DMH-WPC4	FLARED END	115	1.51	1.51	10 10	0.22 0.21	0.31	7.8	3.64	0.010	12	0.012	7.41	9.43	9.35	1.36	0.77	1.25		0.75 4.25	286.10 285.25	285.35 281.00
Julia Wi C4	TO INCO END	113	2.51	2.51	- 10	0.21	0.51	,.0	3.04	5.557		0.012	7.71	5.75	5.33	1.50	0.43	1.00		-1.23	203.23	101.00
CB-WPC13	DMH-WPC10	39	0.25	0.25	10	0.08	0.63	7.8	1.24	0.056	12	0.012	9.09	11.58	8.02	1.00	0.25	1.24		2.17	291.65	289.48
DMH-WPC10	DMH-WPC1	128	0.25	0.25	10 10	0.54	0.63	7.8	1.24	0.008	12	0.012	3.37 3.85	4.29	3.97	0.24	0.42	0.66		0.98	289.38 288.53	288.40
CB-WPC1 CB-WPC2	DMH-WPC1	43 41	1.99 0.18	1.99 0.18	10	0.13 0.12	0.22	7.8 7.8	1.14	0.010 0.024	12	0.012	5.85	4.91 7.63	5.55 5.86	0.48	0.74	1.22 0.83		0.43	289.09	288.10 288.10
DMH-WPC1	FLARED END	53	2.42	2.42	10	0.12	0.31	7.8	5.87	0.019	15	0.012	9.60	7.83	8.19	1.04	0.70	1.74		1.00	288.00	287.00
CB-WPW13	DMH-WPW10	14	0.37	0.37	10	0.05	0.57	7.8	1.64	0.011	12	0.012	3.99	5.08	4.82	0.36	0.45	0.81		0.15	282.94	282.79
CB-WPW14 DMH-WPW10	DMH-WPW10 DMH-WPW9	14 175	0.10	0.10	10 10	0.07 0.27	0.48	7.8 7.8	0.37 2.00	0.011	12	0.012 0.012	3.99 11.20	5.08 14.27	3.12 10.76	0.15 1.80	0.20	0.35 2.08		0.15 14.79	282.94 282.69	282.79 267.90
CB-WPW11	DMH-WPW9	14	0.37	0.37	10	0.04	0.70	7.8	2.06	0.033	12	0.012	5.64	7.18	6.60	0.68	0.42	1.09		0.30	268.20	267.90
CB-WPW12	DMH-WPW9	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-WPW9	DMH-WPW8	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-WPW8	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
CB-DFD3	DMH-DFD2	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-DFD2	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-DFD2	DMH-DFD1	187	0.44	0.44	10	0.33	0.61	7.8	2.11	0.056	12	0.012	9.10	11.59	9.40	1.37	0.33	1.70		10.43	276.60	266.17
CB-DFD1 CB-DFD2	DMH-DFD1  DMH-DFD1	14 13	0.41	0.41	10 10	0.04	0.76 0.28	7.8 7.8	2.45 0.91	0.010 0.011	12 12	0.012 0.012	3.85 4.00	4.91 5.09	5.20 4.09	0.42	0.58	1.00 0.58		0.14	266.31 266.31	266.17 266.17
DMH-DFD1	DMH-WFW7	51	1.27	1.27	10	0.03	0.55	7.8	5.47	0.011	12	0.012	9.90	12.61	12.92	2.59	0.52	3.12		3.37	266.07	262.70
DMH-WFW7	DMH-WFW6	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-WFW6	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-WFW6	DMH-WFW6	13 179	0.24 1.70	0.24 1.70	10	0.02	0.72	7.8 7.8	1.33 7.62	0.088	12	0.012	11.46	14.60 13.87	9.75 14.99	1.48	0.23	1.71 4.10		1.15	256.20 254.95	255.05 240.66
CB-WFW7	DMH-WPW4	1/9	0.06	0.06	10	0.20	0.57	7.8	0.37	0.080	12	0.012	6.00	7.65	4.19	0.27	0.62	0.44		0.34	254.95	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	DMH-WPW3	149	1.91	1.91	10	0.18	0.58	7.8	8.67	0.065	12	0.012	9.84	12.54	14.15	3.11	0.73	3.83		9.73	240.56	230.83
CB-WFW5	DMH-WPW3	14	0.10	0.10	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-WFW3	DMH-WPW3 IB-5D	14 48	0.06 2.07	0.06 2.07	10 10	0.08	0.76	7.8 7.8	0.34 9.58	0.011	12 18	0.012	3.99 14.96	5.08 8.47	3.08 8.98	0.15 1.25	0.20	0.34 2.12		0.15	231.08 230.83	230.93
	.5 55		2.07	2.07		0.03	0.55	7.0	3.30	0.017		0.012	21.50	5.47	0.50	1.25	0.07			0.03	250.05	200.00
CB-AS1	DMH-AS1	84	0.30	0.30	10	0.19	0.53	7.8	1.24	0.041	12	0.012	7.77	9.90	7.25	0.82	0.27	1.09		3.42	217.71	214.29
CB-AS2	DMH-AS1	82	0.23	0.23	10	0.38	0.90	7.8	1.59	0.005	12	0.012	2.76	3.51	3.62	0.20	0.54	0.74		0.42	214.71	214.29
DMH-AS1 CB-AS3	FLARED END DMH-AS3	10 23	0.53	0.53 0.16	10 10	0.03 0.12	0.69	7.8 7.8	2.83 0.96	0.009	12 12	0.012	3.65 2.78	4.66 3.54	5.14 3.20	0.41	0.66	1.07 0.56		0.09	214.19 215.22	214.10 215.10
CB-AS3	DMH-AS3	10	0.16	0.16	10	0.12	0.77	7.8	1.47	0.005	12	0.012	4.22	5.38	4.88	0.16	0.40	0.56		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 30	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		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

DMH-WPW1	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
	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
CB-DY2	CB-DY1	14	0.60	0.60	10	0.04	0.67	7.8	3.19	0.010	12	0.012	3.85	4.91	5.48	0.47	0.69	1.16	0.14	222.40	222.26
CB-DY1	DI-DY1	26	0.97	0.97	10	0.06	0.60	7.8	4.57	0.020	12	0.012	5.45	6.94	7.77	0.94	0.70	1.64	0.52	222.16	221.64
DI-DY1	IB-7A	156	0.97	0.97	10	0.37	0.60	7.8	4.57	0.016	12	0.012	4.88	6.21	7.06	0.77	0.77	1.54	2.50	221.50	219.00
CB-BC1	CB-BC2	14	0.56	0.56	10	0.04	0.64	7.8	2.83	0.010	12	0.012	3.85	4.91	5.36	0.45	0.64	1.08	0.14	221.09	220.95
CB-BC2	DI-BC2	6	1.11	1.11	10	0.01	0.65	7.8	5.64	0.025	12	0.012	6.09	7.76	8.80	1.20	0.76	1.96	0.15	220.85	220.70
DI-BC2	IB-7A	231	1.11	1.11	10	0.71	0.65	7.8	5.64	0.007	15	0.012	5.82	4.74	5.40	0.45	0.99	1.44	1.60	220.60	219.00
СВ-СНЗ	IB-7B	66	0.30	0.30	10	0.21	0.39	7.8	0.91	0.021	12	0.012	5.61	7.15	5.23	0.43	0.27	0.70	1.40	225.40	224.00
CB-CH2	IB-7B	248	0.53	0.53	10	0.21	0.39	7.8	2.02	0.021	12	0.012	3.85	4.91	4.95	0.43	0.51	0.70	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	8	0.012	1.30	3.74	4.08	0.26	0.42	0.68	0.14	224.91	224.77
CB-WF3	DMH-WF3	14	0.08	0.08	10	0.06	0.90	7.8	0.57	0.010	8	0.012	1.32	3.78	3.62	0.20	0.30	0.51	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
CB-WF1	DMH-WF1	122	0.05	0.05	10	0.51	0.90	7.8	0.34	0.020	8	0.012	1.85	5.30	3.99	0.25	0.19	0.44	2.45	226.95	224.50
DMH-WF1	IB-7B	41	0.26	0.26	10	0.18	0.90	7.8	1.87	0.005	12	0.012	2.76	3.51	3.76	0.22	0.60	0.82	0.21	224.21	224.00
CB-I P6	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	0.40	0.40	10	0.07	0.00	7.8	0.28	0.010	12	0.012	3.85	4.91	2.83	0.39	0.52	0.30	0.10	226.33	226.12
DMH-LP3	IB-8	204	0.44	0.44	10	0.66	0.68	7.8	2.35	0.010	12	0.012	3.85	4.91	5.13	0.41	0.56	0.97	2.04	224.04	222.00
CB-WF5	DMH-WF3A	81	0.09	0.09	10	0.37	0.90	7.8	0.63	0.010	8	0.012	1.30	3.72	3.68	0.21	0.33	0.54	0.80	223.37	222.57
CB-WF5A	DMH-WF3A	16	0.10	0.10	10	0.07	0.90	7.8	0.73	0.011	8	0.012	1.34	3.86	3.92	0.24	0.35	0.58	0.17	222.74	222.57
DMH-WF3A	IB-8	47	0.19	0.19	11	0.18	0.90	7.8	1.36	0.010	12	0.012	3.85	4.91	4.46	0.31	0.41	0.71	0.47	222.47	222.00
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	0.26	0.90	7.8	0.86	0.010	12	0.012	3.86	4.92	3.92	0.24	0.32	0.55	0.62	223.10	222.48
DMH-WF4	IB-8 DMH-LP2	37	0.12	0.12	10	0.16	0.90	7.8	0.86	0.010	12	0.012	3.88	4.94	3.94	0.24	0.32	0.56	0.38	222.38	222.00
CB-LP4		16		0.70		0.00	0.00	7.8	3.73 0.94	0.010		0.012		4.95	5.64		0.78	1.27	0.16	225.77	225.61
CB-LP3 DMH-LP2	DMH-LP2 DMH-LP4	16 180	0.23	0.23	10 10	0.07	0.53	7.8 7.8	4.67	0.010 0.010	12 15	0.012 0.012	3.89 6.99	4.95 5.70	4.08 6.09	0.26 0.58	0.34 0.74	0.59 1.32	0.16 1.80	225.77 225.51	225.61 223.71
DMH-LP4	DMH-LP1	116	0.92	0.92	10	0.45	0.64	7.8	4.67	0.008	15	0.012	6.24	5.09	5.58	0.48	0.74	1.29	0.92	223.97	223.04
CB-LP1	DMH-LP1	10	0.24	0.24	10	0.04	0.66	7.8	1.22	0.010	12	0.012	3.85	4.91	4.34	0.29	0.39	0.68	0.10	223.07	222.97
CB-LP2	DMH-LP1	20	0.58	0.58	10	0.06	0.79	7.8	3.57	0.010	12	0.012	3.90	4.97	5.63	0.49	0.75	1.24	0.20	223.07	222.87
DMH-LP1	IB-8	71	1.74	1.74	10	0.19	0.69	7.8	9.46	0.007	18	0.012	9.54	5.40	6.16	0.59	1.22	1.80	0.50	222.50	222.00
CB-WFW17	DMH-WFW10	14	0.52 0.19	0.52	10	0.03	0.73	7.8 7.8	2.98	0.021	12	0.012 0.012	5.64	7.18	7.27	0.82	0.52	1.34	0.30	264.15	263.85
CB-WFW18	DMH-WFW10			0.19	10	0.04	0.65		0.95	0.021	12		5.64	7.18	5.32	0.44	0.28			264.15	263.85
DAMIL MEMO		14		0.71	10	0.12				0.0			0.55	10.00	10.00	1.70	0.40	0.71	0.30		
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	3.99	263.75	259.76
DMH-WFW9	DMH-WFW9	81 160	0.71 0.71	0.71	10 10 10	0.23	0.71 0.71	7.8 7.8		0.049 0.066		0.012 0.012	9.90	12.61	11.84	2.18	0.44	2.24	3.99 10.57	263.75 259.66	259.76 249.09
	DMH-WFW9	81	0.71	_	10		0.71	7.8	3.93 3.93	0.049	12 12	0.012						2.24	3.99	263.75	259.76
DMH-WFW9 CB-WFW15	DMH-WFW9 DMH-WFW8 DMH-WFW8	81 160 14	0.71 0.71 0.41	0.71 0.41	10 10	0.23 0.03	0.71 0.71 0.68	7.8 7.8 7.8	3.93 3.93 2.16	0.049 0.066 0.028	12 12 12	0.012 0.012 0.012	9.90 6.43	12.61 8.19	11.84 7.35	2.18 0.84	0.44 0.40	2.24 2.61 1.23	3.99 10.57 0.39	263.75 259.66 249.48	259.76 249.09 249.09
DMH-WFW9 CB-WFW15 CB-WFW16 DMH-WFW8 CB-WFW13	DMH-WFW9 DMH-WFW8 DMH-WFW8 DMH-WFW8 DMH-WFW7 DMH-WFW7	81 160 14 14 278 14	0.71 0.71 0.41 0.26 1.37 0.56	0.71 0.41 0.26 1.37 0.56	10 10 10 10 10	0.23 0.03 0.04 0.34 0.04	0.71 0.71 0.68 0.49 0.66 0.72	7.8 7.8 7.8 7.8 7.8 7.8	3.93 3.93 2.16 1.00	0.049 0.066 0.028 0.028 0.065 0.011	12 12 12 12 12 12	0.012 0.012 0.012 0.012 0.012 0.012	9.90 6.43 6.43 9.82 3.99	12.61 8.19 8.19 12.51 5.08	11.84 7.35 5.93 13.60 5.63	2.18 0.84 0.55 2.87 0.49	0.44 0.40 0.27 0.63 0.67	2.24 2.61 1.23 0.81 3.50 1.16	3.99 10.57 0.39 0.39 18.06 0.15	263.75 259.66 249.48 249.48 248.99 231.08	259.76 249.09 249.09 249.09 230.93 230.93
DMH-WFW9 CB-WFW15 CB-WFW16 DMH-WFW8 CB-WFW13 CB-WFW14	DMH-WFW9 DMH-WFW8 DMH-WFW8 DMH-WFW8 DMH-WFW7 DMH-WFW7 DMH-WFW7	81 160 14 14 278 14 14	0.71 0.71 0.41 0.26 1.37 0.56	0.71 0.41 0.26 1.37 0.56	10 10 10 10 10 10	0.23 0.03 0.04 0.34 0.04 0.05	0.71 0.71 0.68 0.49 0.66 0.72 0.60	7.8 7.8 7.8 7.8 7.8 7.8 7.8	3.93 3.93 2.16 1.00 7.09 3.15 1.05	0.049 0.066 0.028 0.028 0.065 0.011 0.011	12 12 12 12 12 12 12 12	0.012 0.012 0.012 0.012 0.012 0.012 0.012	9.90 6.43 6.43 9.82 3.99 3.99	12.61 8.19 8.19 12.51 5.08 5.08	11.84 7.35 5.93 13.60 5.63 4.25	2.18 0.84 0.55 2.87 0.49	0.44 0.40 0.27 0.63 0.67 0.35	2.24 2.61 1.23 0.81 3.50 1.16 0.63	3.99 10.57 0.39 0.39 18.06 0.15	263.75 259.66 249.48 249.48 248.99 231.08	259.76 249.09 249.09 249.09 230.93 230.93 230.93
DMH-WFW9 CB-WFW15 CB-WFW16 DMH-WFW8 CB-WFW13 CB-WFW14 DMH-WFW7	DMH-WFW9 DMH-WFW8 DMH-WFW8 DMH-WFW8 DMH-WFW7 DMH-WFW7 DMH-WFW7 FLARED END	81 160 14 14 278 14 14 80	0.71 0.71 0.41 0.26 1.37 0.56 0.22 2.15	0.71 0.41 0.26 1.37 0.56 0.22 2.15	10 10 10 10 10 10 10	0.23 0.03 0.04 0.34 0.04 0.05	0.71 0.68 0.49 0.66 0.72 0.60 0.67	7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	3.93 3.93 2.16 1.00 7.09 3.15 1.05	0.049 0.066 0.028 0.028 0.065 0.011 0.011	12 12 12 12 12 12 12 12 12 15	0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012	9.90 6.43 6.43 9.82 3.99 3.99 18.87	12.61 8.19 8.19 12.51 5.08 5.08 15.38	11.84 7.35 5.93 13.60 5.63 4.25 16.05	2.18 0.84 0.55 2.87 0.49 0.28 4.00	0.44 0.40 0.27 0.63 0.67 0.35 0.69	2.24 2.61 1.23 0.81 3.50 1.16 0.63 4.69	3.99 10.57 0.39 0.39 18.06 0.15 0.15 5.83	263.75 259.66 249.48 249.48 248.99 231.08 231.08 230.83	259.76 249.09 249.09 249.09 230.93 230.93 230.93 225.00
DMH-WFW9 CB-WFW15 CB-WFW16 DMH-WFW8 CB-WFW13 CB-WFW14 DMH-WFW7 CB-WFW11	DMH-WFW9 DMH-WFW8 DMH-WFW8 DMH-WFW8 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW7 FLARED END DMH-WFW5	81 160 14 14 278 14 14 80	0.71 0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11	0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11	10 10 10 10 10 10 10 10	0.23 0.03 0.04 0.34 0.04 0.05 0.08 0.06	0.71 0.71 0.68 0.49 0.66 0.72 0.60 0.67 0.90	7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	3.93 3.93 2.16 1.00 7.09 3.15 1.05 11.29 0.76	0.049 0.066 0.028 0.028 0.065 0.011 0.011 0.073 0.011	12 12 12 12 12 12 12 12 12 12 15	0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012	9.90 6.43 6.43 9.82 3.99 3.99 18.87 3.99	12.61 8.19 8.19 12.51 5.08 5.08 15.38 5.08	11.84 7.35 5.93 13.60 5.63 4.25 16.05 3.91	2.18 0.84 0.55 2.87 0.49 0.28 4.00 0.24	0.44 0.40 0.27 0.63 0.67 0.35 0.69 0.30	2.24 2.61 1.23 0.81 3.50 1.16 0.63 4.69	3.99 10.57 0.39 0.39 18.06 0.15 0.15 5.83 0.15	263.75 259.66 249.48 249.48 248.99 231.08 231.08 230.83 226.85	259.76 249.09 249.09 249.09 230.93 230.93 230.93 225.00 226.70
DMH-WFW9 CB-WFW15 CB-WFW16 DMH-WFW8 CB-WFW13 CB-WFW14 DMH-WFW7	DMH-WFW9 DMH-WFW8 DMH-WFW8 DMH-WFW8 DMH-WFW7 DMH-WFW7 DMH-WFW7 FLARED END	81 160 14 14 278 14 14 80 14	0.71 0.71 0.41 0.26 1.37 0.56 0.22 2.15	0.71 0.41 0.26 1.37 0.56 0.22 2.15	10 10 10 10 10 10 10	0.23 0.03 0.04 0.34 0.04 0.05	0.71 0.68 0.49 0.66 0.72 0.60 0.67	7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	3.93 3.93 2.16 1.00 7.09 3.15 1.05	0.049 0.066 0.028 0.028 0.065 0.011 0.011	12 12 12 12 12 12 12 12 15 15	0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012	9.90 6.43 6.43 9.82 3.99 3.99 18.87	12.61 8.19 8.19 12.51 5.08 5.08 15.38	11.84 7.35 5.93 13.60 5.63 4.25 16.05	2.18 0.84 0.55 2.87 0.49 0.28 4.00	0.44 0.40 0.27 0.63 0.67 0.35 0.69	2.24 2.61 1.23 0.81 3.50 1.16 0.63 4.69	3.99 10.57 0.39 0.39 18.06 0.15 0.15 5.83	263.75 259.66 249.48 249.48 248.99 231.08 231.08 230.83	259.76 249.09 249.09 249.09 230.93 230.93 230.93 225.00
DMH-WFW9 CB-WFW15 CB-WFW16 DMH-WFW8 CB-WFW13 CB-WFW14 DMH-WFW7 CB-WFW11 CB-WFW11	DMH-WFW9 DMH-WFW8 DMH-WFW8 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW7 EARED END DMH-WFW5 DMH-WFW5	81 160 14 14 278 14 14 80	0.71 0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19	0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19	10 10 10 10 10 10 10 10 10 10	0.23 0.03 0.04 0.34 0.04 0.05 0.08 0.06 0.06	0.71 0.71 0.68 0.49 0.66 0.72 0.60 0.67 0.90 0.67	7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	3.93 3.93 2.16 1.00 7.09 3.15 1.05 11.29 0.76 1.00	0.049 0.066 0.028 0.028 0.065 0.011 0.011 0.073 0.011	12 12 12 12 12 12 12 12 12 12 15	0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012	9.90 6.43 6.43 9.82 3.99 3.99 18.87 3.99 3.99	12.61 8.19 8.19 12.51 5.08 5.08 15.38 5.08 5.08	11.84 7.35 5.93 13.60 5.63 4.25 16.05 3.91 4.22	2.18 0.84 0.55 2.87 0.49 0.28 4.00 0.24 0.28	0.44 0.40 0.27 0.63 0.67 0.35 0.69 0.30 0.34	2.24 2.61 1.23 0.81 3.50 1.16 0.63 4.69 0.53 0.62	3.99 10.57 0.39 0.39 18.06 0.15 0.15 5.83 0.15	263.75 259.66 249.48 249.48 248.99 231.08 231.08 230.83 226.85 226.85	259.76 249.09 249.09 249.09 230.93 230.93 230.93 225.00 226.70
DMH-WFW9 CB-WFW15 CB-WFW16 DMH-WFW8 CB-WFW13 CB-WFW14 DMH-WFW7 CB-WFW11 CB-WFW12 DMH-WFW5 CB-WF19	DMH-WFW9 DMH-WFW8 DMH-WFW8 DMH-WFW8 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW7 FLARED END DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW1	81 160 14 14 278 14 14 80 14 14 165	0.71 0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30	0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30	10 10 10 10 10 10 10 10 10 10 10	0.23 0.03 0.04 0.34 0.05 0.08 0.06 0.06 0.58	0.71 0.71 0.68 0.49 0.66 0.72 0.60 0.67 0.90 0.67 0.75	7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	3.93 3.93 2.16 1.00 7.09 3.15 1.05 11.29 0.76 1.00 1.76	0.049 0.066 0.028 0.028 0.065 0.011 0.011 0.073 0.011 0.010 0.010	12 12 12 12 12 12 12 12 12 15 12 12 12 12	0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012	9.90 6.43 6.43 9.82 3.99 3.99 18.87 3.99 3.99 3.79	12.61 8.19 8.19 12.51 5.08 5.08 15.38 5.08 4.83	11.84 7.35 5.93 13.60 5.63 4.25 16.05 3.91 4.22 4.73	2.18 0.84 0.55 2.87 0.49 0.28 4.00 0.24 0.28 0.35	0.44 0.40 0.27 0.63 0.67 0.35 0.69 0.30 0.34 0.48	2.24 2.61 1.23 0.81 3.50 1.16 0.63 4.69 0.53 0.62 0.82	3.99 10.57 0.39 0.39 18.06 0.15 0.15 5.83 0.15 0.15 1.60	263.75 259.66 249.48 249.48 248.99 231.08 230.83 226.85 226.85 226.80	259.76 249.09 249.09 249.09 230.93 230.93 230.93 225.00 226.70 225.00
DMH-WFW9 CB-WFW15 CB-WFW16 DMH-WFW8 CB-WFW14 DMH-WFW7 CB-WFW14 DMH-WFW7 CB-WFW11 CB-WFW12 DMH-WFW5 CB-WF19 CB-WF20	DMH-WFW9 DMH-WFW8 DMH-WFW8 DMH-WFW8 DMH-WFW7 DMH-WFW7 DMH-WFW7 FLARED END DMH-WFW5 FLARED END DMH-WFW5 FLARED END DMH-WFW11 DMH-WF11	81 160 14 14 278 14 14 80 14 14 165	0.71 0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30	0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.36	10 10 10 10 10 10 10 10 10 10 10 10	0.23 0.03 0.04 0.34 0.05 0.08 0.06 0.06 0.58	0.71 0.71 0.68 0.49 0.66 0.72 0.60 0.67 0.90 0.67 0.75	7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	3.93 3.93 2.16 1.00 7.09 3.15 1.05 11.29 0.76 1.00 1.76	0.049 0.066 0.028 0.065 0.011 0.011 0.011 0.011 0.011 0.010 0.021	12 12 12 12 12 12 12 12 15 12 12 12 12 12	0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012	9.90 6.43 6.43 9.82 3.99 3.99 18.87 3.99 3.79 5.64	12.61 8.19 8.19 12.51 5.08 5.08 5.08 5.08 4.83 7.18	11.84 7.35 5.93 13.60 4.25 16.05 3.91 4.22 4.73 7.44 6.71	2.18 0.84 0.55 2.87 0.49 0.28 4.00 0.24 0.28 0.35 0.86 0.70	0.44 0.40 0.27 0.63 0.67 0.35 0.69 0.30 0.34 0.48	2.24 2.61 1.23 0.81 3.50 1.16 0.63 4.69 0.53 0.62 0.82	3.99 10.57 0.39 0.39 18.06 0.15 5.83 0.15 5.15 0.15 0.15 0.30	263.75 259.66 249.48 248.99 231.08 231.08 230.83 226.85 226.85 226.60	259.76 249.09 249.09 249.09 230.93 230.93 230.93 225.00 226.70 226.70 225.00
DMH-WFW9 CB-WFW16 DMH-WFW8 CB-WFW13 CB-WFW13 CB-WFW11 CB-WFW12 DMH-WFW7 CB-WFW12 DMH-WFW5 CB-WF19 CB-WF19 CB-WF20 DMH-WFU5	DMH-WFW9 DMH-WFW8 DMH-WFW8 DMH-WFW9 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW7 FLARED END DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW1 DMH-WF11 DMH-WF11 DMH-WF12	81 160 14 14 278 14 14 80 14 14 165	0.71 0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30	0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.36 0.94	10 10 10 10 10 10 10 10 10 10 10 10	0.23 0.03 0.04 0.34 0.05 0.08 0.06 0.06 0.58 0.03 0.03 0.03	0.71 0.71 0.68 0.49 0.66 0.72 0.60 0.67 0.90 0.67 0.75 0.72	7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	3.93 3.93 2.16 1.00 7.09 3.15 1.05 11.29 0.76 1.00 1.76	0.049 0.066 0.028 0.028 0.065 0.011 0.011 0.011 0.011 0.010 0.021 0.021 0.021	12 12 12 12 12 12 12 12 15 12 12 12 12 12 12	0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012	9.90 6.43 6.43 9.82 3.99 3.99 18.87 3.99 3.79 5.64 10.43	12.61 8.19 8.19 12.51 5.08 5.08 15.38 5.08 4.83 7.18	11.84 7.35 5.93 13.60 5.63 4.25 16.05 3.91 4.22 4.73 7.44 6.71 13.40	2.18 0.84 0.55 2.87 0.49 0.28 4.00 0.24 0.28 0.35 0.86 0.70 2.79	0.44 0.40 0.27 0.63 0.67 0.35 0.69 0.30 0.34 0.48 0.55 0.43	2.24 2.61 1.23 0.81 3.50 1.16 0.63 4.69 0.53 0.62 0.82	3.99 10.57 0.39 18.06 0.15 0.15 5.83 0.15 0.15 1.60	263.75 259.66 249.48 249.48 248.99 231.08 231.08 230.83 226.85 226.85 226.60 265.80 265.40	259.76 249.09 249.09 249.09 230.93 230.93 225.00 226.70 226.70 225.00 265.50 265.50 253.30
DMH-WFW9 CB-WFW15 CB-WFW16 DMH-WFW8 CB-WFW13 CB-WFW14 DMH-WFW7 CB-WFW12 DMH-WFW9 CB-WFW12 DMH-WFW5 CB-WF19 CB-WF19 CB-WF20 DMH-WF11 DMH-WF12	DMH-WFW9 DMH-WFW8 DMH-WFW8 DMH-WFW8 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW7 FLARED END DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFU5 DMH-WF11 DMH-WF11 DMH-WF12 DMH-WF12	81 160 14 14 278 14 14 80 14 165	0.71 0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.19 0.30 0.58 0.36 0.94	0.71 0.41 0.26 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.36 0.94 0.94	10 10 10 10 10 10 10 10 10 10 10 10 10	0.23 0.03 0.04 0.34 0.05 0.08 0.06 0.06 0.58 0.03 0.03 0.03	0.71 0.71 0.68 0.49 0.66 0.72 0.60 0.67 0.90 0.67 0.75 0.75	7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	3.93 3.93 2.16 1.00 7.09 3.15 10.5 11.29 0.76 1.00 1.76 3.26 2.17 5.43	0.049 0.066 0.028 0.028 0.065 0.011 0.073 0.011 0.010 0.010 0.021 0.021 0.021 0.073 0.053	12 12 12 12 12 12 12 12 15 15 12 12 12 12 12 12	0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012	9.90 6.43 6.43 9.82 3.99 3.99 18.87 3.99 3.79 5.64 5.64 10.43 8.86	12.61 8.19 8.19 12.51 5.08 5.08 15.38 5.08 4.83 7.18 7.18 13.29	11.84 7.35 5.93 13.60 5.63 4.25 16.05 3.91 4.22 4.73 7.44 6.71 13.40 11.86	2.18 0.84 0.55 2.87 0.49 0.28 4.00 0.24 0.28 0.35 0.86 0.70 2.79 2.18	0.44 0.40 0.27 0.63 0.67 0.35 0.69 0.30 0.34 0.48 0.55 0.43 0.51	2.24 2.61 1.23 0.81 3.50 1.16 0.63 4.69 0.53 0.62 0.82 1.41 1.13 3.30 2.75	3.99 10.57 0.39 0.39 18.06 0.15 5.83 0.15 0.15 1.60 0.30 0.30 0.30	263.75 259.66 249.48 249.48 248.99 231.08 231.08 230.83 226.85 226.85 226.60 265.80 265.80 265.80 253.20	259.76 249.09 249.09 249.09 230.93 230.93 230.93 225.00 226.70 226.70 225.00 265.50 265.50 265.50 248.70
DMH-WFW9 CB-WFW15 CB-WFW16 DMH-WFW8 CB-WFW14 CB-WFW14 DMH-WFW7 CB-WFW12 DMH-WFW5 CB-WFW12 DMH-WFW5 CB-WF20 DMH-WF11 DMH-WF11 DMH-WF12 CB-WF20	DMH-WFW9 DMH-WFW8 DMH-WFW8 DMH-WFW9 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW7 FLARED END DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW1 DMH-WF11 DMH-WF11 DMH-WF12	81 160 14 14 278 14 14 80 14 14 165	0.71 0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.36 0.94 0.94 0.94	0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.36 0.94 0.94	10 10 10 10 10 10 10 10 10 10 10 10 10 1	0.23 0.03 0.04 0.34 0.05 0.08 0.06 0.06 0.58 0.03 0.03 0.03	0.71 0.71 0.68 0.49 0.66 0.72 0.60 0.67 0.90 0.67 0.75 0.72	7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	3.93 3.93 2.16 1.00 7.09 3.15 1.05 11.29 0.76 1.00 1.76	0.049 0.066 0.028 0.028 0.065 0.011 0.011 0.011 0.011 0.010 0.021 0.021 0.021	12 12 12 12 12 12 12 12 15 12 12 12 12 12 12 12 12	0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012	9.90 6.43 6.43 9.82 3.99 3.99 18.87 3.99 3.79 5.64 10.43	12.61 8.19 8.19 12.51 5.08 5.08 5.08 5.08 4.83 7.18 7.18 13.29 11.29 7.18	11.84 7.35 5.93 13.60 5.63 4.25 16.05 3.91 4.22 4.73 7.44 6.71 13.40 11.86 7.06	2.18 0.84 0.55 2.87 0.49 0.28 4.00 0.24 0.28 0.35 0.86 0.70 2.79 2.18 0.77	0.44 0.40 0.27 0.63 0.67 0.35 0.69 0.30 0.34 0.48 0.55 0.43 0.51 0.57	2.24 2.61 1.23 0.81 3.50 1.16 0.63 4.69 0.53 0.62 0.82	3.99 10.57 0.39 0.39 18.06 0.15 0.15 5.83 0.15 1.60 0.30 0.30 0.30	263.75 259.66 249.48 249.48 248.99 231.08 231.08 230.83 226.85 226.85 226.60 265.80 265.40	259.76 249.09 249.09 249.09 230.93 230.93 225.00 226.70 226.70 225.00 265.50 265.50 253.30
DMH-WFW9 CB-WFW15 CB-WFW16 DMH-WFW8 CB-WFW13 CB-WFW14 DMH-WFW7 CB-WFW12 DMH-WFW9 CB-WFW12 DMH-WFW5 CB-WF19 CB-WF19 CB-WF20 DMH-WF11 DMH-WF12	DMH-WFW9 DMH-WFW8 DMH-WFW8 DMH-WFW9 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WF11 DMH-WF11 DMH-WF12 DMH-WF13	81 160 14 14 278 14 14 80 14 165	0.71 0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.19 0.30 0.58 0.36 0.94	0.71 0.41 0.26 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.36 0.94 0.94	10 10 10 10 10 10 10 10 10 10 10 10 10	0.23 0.03 0.04 0.34 0.05 0.08 0.06 0.06 0.58 0.03 0.03 0.03 0.03	0.71 0.71 0.68 0.49 0.66 0.72 0.60 0.67 0.90 0.67 0.75 0.72 0.75	7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	3.93 3.93 2.16 1.00 7.09 3.15 11.29 0.76 1.00 1.76 3.26 2.17 5.43	0.049 0.066 0.028 0.028 0.065 0.011 0.011 0.011 0.010 0.021 0.021 0.021 0.021	12 12 12 12 12 12 12 12 15 15 12 12 12 12 12 12	0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012	9.90 6.43 6.43 9.82 3.99 3.99 18.87 3.99 3.79 5.64 5.64 10.43 8.86 5.64	12.61 8.19 8.19 12.51 5.08 5.08 15.38 5.08 4.83 7.18 7.18 13.29	11.84 7.35 5.93 13.60 5.63 4.25 16.05 3.91 4.22 4.73 7.44 6.71 13.40 11.86	2.18 0.84 0.55 2.87 0.49 0.28 4.00 0.24 0.28 0.35 0.86 0.70 2.79 2.18	0.44 0.40 0.27 0.63 0.67 0.35 0.69 0.30 0.34 0.48 0.55 0.43 0.51	2.24 2.61 1.23 0.81 3.50 1.16 0.63 4.69 0.53 0.62 0.82 1.41 1.13 3.30 2.75 1.25	3.99 10.57 0.39 0.39 18.06 0.15 5.83 0.15 0.15 1.60 0.30 0.30 0.30	263.75 259.66 249.48 249.48 248.99 231.08 231.08 226.85 226.85 226.60 265.80 265.80 265.40 253.20 249.00	259.76 249.09 249.09 249.09 230.93 230.93 225.00 226.70 225.00 265.50 265.50 253.30 248.70
DMH-WFW9 CB-WFW15 CB-WFW16 DMH-WFW8 CB-WFW14 DMH-WFW1 CB-WFW11 CB-WFW11 CB-WFW11 CB-WFW11 CB-WFW12 DMH-WFW5 CB-WF20 CB-WF20 DMH-WF11 DMH-WF12 CB-WF21 CB-WF21	DMH-WFW9 DMH-WFW8 DMH-WFW8 DMH-WFW9 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW7 FLARED END DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WF11 DMH-WF11 DMH-WF12 DMH-WF13 DMH-WF13 DMH-WF13	81 160 14 14 278 14 18 80 14 14 165 14 165 85 14 14 165	0.71 0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.36 0.94 0.94 0.94 0.94	0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.36 0.94 0.94 0.46 0.29	10 10 10 10 10 10 10 10 10 10 10 10 10 1	0.23 0.03 0.04 0.34 0.05 0.08 0.06 0.06 0.05 0.03 0.12 0.03 0.21 0.12 0.03	0.71 0.71 0.68 0.49 0.66 0.72 0.60 0.67 0.90 0.67 0.75 0.72 0.75 0.73 0.73 0.73 0.73	7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	3.93 3.93 3.93 2.16 1.00 7.09 3.15 1.05 1.129 0.76 1.00 1.76 2.17 5.43 5.43 5.43	0.049 0.066 0.028 0.028 0.028 0.065 0.011 0.073 0.011 0.010 0.010 0.010 0.021 0.021 0.021 0.021	12 12 12 12 12 12 12 12 15 12 12 12 12 12 12 12 12	0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0.012	9.90 6.43 6.43 9.82 3.99 3.99 3.99 3.79 5.64 10.43 8.86 5.64 5.64	12.61 8.19 8.19 12.51 5.08 5.08 15.38 5.08 4.83 7.18 13.29 11.29 7.18	11.84 7.35 5.93 13.60 5.63 4.25 16.05 3.91 4.22 4.73 7.44 6.71 13.40 11.86 5.83	2.18 0.84 0.55 2.87 0.49 0.28 4.00 0.24 0.28 0.35 0.86 0.70 2.79 2.18 0.77 0.53	0.44 0.40 0.27 0.63 0.67 0.35 0.69 0.30 0.34 0.48 0.55 0.43 0.51 0.57 0.48	2.24 2.61 1.23 0.81 3.50 1.16 0.63 4.69 0.53 0.62 0.82 1.41 1.13 3.30 2.75 1.25	3.99 10.57 0.39 18.06 0.15 0.15 5.83 0.15 1.60 0.30 0.30 0.30 12.10 4.50 0.30	263.75 259.66 249.48 249.48 248.99 231.08 231.08 230.83 226.85 226.85 226.80 265.80 265.40 253.20 249.00	259.76 249.09 249.09 249.09 249.09 230.93 230.93 230.93 225.00 226.70 225.00 255.50 255.30 248.70 248.70 248.70
DMH-WFW9 CB-WFW15 CB-WFW16 DMH-WFW8 CB-WFW14 DMH-WFW7 CB-WFW14 DMH-WFW7 CB-WFW12 DMH-WFW5 CB-WF20 DMH-WF11 DMH-WF12 CB-WF20 DMH-WF13 DMH-WF13 DMH-WF13 DMH-WF13 DMH-WF13	DMH-WFW9 DMH-WFW8 DMH-WFW8 DMH-WFW8 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW7 FLARED END DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WF11 DMH-WF11 DMH-WF12 DMH-WF13 DMH-WF13 DMH-WF13 DMH-WF13 DMH-WF14 DMH-WF14 DMH-WF15 DMH-WF15 DMH-WF15 DMH-WF15	81 160 14 14 14 14 14 14 14 15 15 14 165 85 14 165 85 14 165 94 192	0.71 0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.36 0.94 0.94 0.46 0.29 1.69 1.69	0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.36 0.94 0.94 0.94 0.46 0.29 1.69 1.69	10 10 10 10 10 10 10 10 10 10 10 10 10 1	0.23 0.03 0.04 0.34 0.05 0.08 0.06 0.05 0.03 0.03 0.03 0.03 0.03 0.03 0.01 0.01 0.05 0.05	0.71 0.71 0.68 0.49 0.66 0.72 0.60 0.67 0.75 0.75 0.72 0.73 0.73 0.73 0.73 0.73 0.73 0.73	7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	3.93 3.93 3.93 2.16 1.00 7.09 3.15 1.05 11.29 0.76 1.00 1.76 3.26 2.17 5.43 5.43 2.64 1.31 9.39 9.39 9.39	0.049 0.066 0.028 0.028 0.028 0.055 0.011 0.011 0.011 0.011 0.010 0.010 0.021 0.021 0.053 0.053 0.051 0.060 0.060	12 12 12 12 12 12 12 12 15 12 12 12 12 12 12 12 12 12 12 12 12 12	0.012 0.012	9.90 6.43 9.82 3.99 3.99 18.87 3.99 3.79 5.64 10.43 8.86 5.64 9.45 9.44	12.61 8.19 12.51 5.08 5.08 5.08 5.08 5.08 7.18 13.29 11.29 7.18 7.18 12.04 12.04	11.84 7.35 5.93 13.60 5.63 4.25 16.05 3.91 4.22 4.73 7.44 6.71 13.40 11.86 7.06 5.83 13.72 13.72	2.18 0.84 0.55 2.87 0.49 0.28 4.00 0.24 0.28 0.35 0.70 2.79 2.18 0.77 0.53 2.92 2.92	0.44 0.40 0.27 0.63 0.67 0.35 0.69 0.30 0.34 0.48 0.55 0.43 0.51 0.57 0.48 0.57 0.48	2.24 2.61 1.23 0.81 3.50 1.16 0.63 4.69 0.53 0.62 0.82 1.41 1.13 3.30 2.75 1.25 0.85 3.73 3.73	3.99 10.57 0.39 18.06 0.15 0.15 5.83 0.15 1.60 0.30 0.30 12.10 4.50 0.30 0.30 3.37 5.65	263.75 259.66 249.48 249.48 248.99 231.08 231.08 230.83 226.85 226.60 253.80 255.40 253.20 249.00 248.60 245.33	259.76 249.09 249.09 249.09 230.93 230.93 230.93 225.00 226.70 225.00 255.30 248.70 248.70 248.70 248.70 245.23
DMH-WFW9 CB-WFW16 CB-WFW16 DMH-WFW8 CB-WFW14 DMH-WFW7 CB-WFW14 DMH-WFW7 CB-WFW12 DMH-WFW5 CB-WF20 DMH-WFW5 CB-WF20 DMH-WF11 DMH-WF12 CB-WF21 DMH-WF13 DMH-WF13 DMH-WF13 DMH-WF13	DMH-WFW9 DMH-WFW8 DMH-WFW8 DMH-WFW8 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW7 FLARED END DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WF11 DMH-WF11 DMH-WF11 DMH-WF13 DMH-WF13 DMH-WF13 DMH-WF14 DMH-WF14 DMH-WF15 DMH-WF15 DMH-WF16 BB-10C	81 160 14 14 14 14 14 14 165 14 165 14 165 15 16 17 18 18 19 19 19 19 19 19 19 19 19 19	0.71 0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.36 0.94 0.94 0.46 0.29 1.69 1.69	0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.36 0.94 0.94 0.94 0.46 0.29 1.69 1.69 1.69	10 10 10 10 10 10 10 10 10 10 10 10 10 1	0.23 0.03 0.04 0.34 0.05 0.08 0.06 0.06 0.06 0.06 0.06 0.06 0.06 0.07 0.01 0.03 0.03 0.03 0.03 0.03 0.03 0.03 0.04 0.05	0.71 0.71 0.68 0.49 0.66 0.72 0.60 0.67 0.90 0.67 0.75 0.72 0.76 0.73 0.73 0.73 0.73 0.73 0.71	7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	3.93 3.93 3.93 2.16 1.00 7.09 3.15 1.05 11.29 0.76 1.00 1.76 2.17 3.26 2.17 3.26 2.17 3.26 4.31 3.32 3.35 3.35 3.35 3.35 3.35 3.35 3.35	0.049 0.066 0.028 0.028 0.028 0.065 0.011 0.011 0.011 0.010 0.010 0.021 0.021 0.053 0.021 0.060 0.060 0.060	12 12 12 12 12 12 12 12 15 15 12 12 12 12 12 12 12 12 12 12 12 12 12	0.012 0.012	9.90 6.43 9.82 3.99 18.87 3.99 3.79 5.64 5.64 5.64 5.64 9.45 9.44 9.44	12.61 8.19 8.19 12.51 5.08 5.08 15.38 5.08 4.83 7.18 7.18 13.29 7.18 11.29 11.29 12.04 12.03 12.03 12.03	11.84 7.35 5.93 13.60 5.63 4.25 16.05 3.91 4.22 4.73 7.44 6.71 13.40 7.06 5.83 13.72 13.72 13.72 13.72 13.72	2.18 0.84 0.55 2.87 0.49 0.28 4.00 0.24 0.35 0.86 0.70 2.79 2.18 0.77 0.53 2.92 2.92 2.92 2.91	0.44 0.40 0.27 0.63 0.67 0.35 0.69 0.30 0.34 0.48 0.55 0.43 0.57 0.48 0.57 0.48 0.57 0.48	2.24 2.61 1.23 0.81 3.50 1.16 0.63 4.69 0.53 0.62 0.82 1.41 1.13 3.30 2.75 1.25 0.85 3.73 3.73 3.73	3.99 10.57 0.39 18.06 0.15 0.15 5.83 0.15 0.15 1.60 0.30 0.30 12.10 4.50 0.30 0.30 3.37 5.65 11.54 2.74	263.75 259.68 249.48 249.48 248.99 231.08 231.08 230.83 226.85 226.85 226.80 265.80 265.40 253.20 249.00 249.00 249.00 245.13 239.83 239.83 245.13 245.13	259.76 249.09 249.09 249.09 230.93 230.93 225.00 226.70 225.00 265.50 265.50 265.50 248.70 248.70 248.70 248.70 249.72 24
DMH-WFW9 CB-WFW15 CB-WFW16 DMH-WFW8 CB-WFW14 DMH-WFW7 CB-WFW14 DMH-WFW7 CB-WFW12 DMH-WFW5 CB-WF20 DMH-WF15 CB-WF20 DMH-WF15 CB-WF20 DMH-WF14 DMH-WF15 CB-WF20 DMH-WF15 CB-WF20 DMH-WF15 CB-WF20 CB-WF20 DMH-WF16 CB-WF20 CB-WF20 DMH-WF16 CB-WF20 CB-WFW16 CB-WF20 CB-WF20 CB-WFW16 CB-WF20 CB-WFW16 CB-WF20 CB-WFW16 CB-WF20 CB-WFW16 CB-WF20 CB-WFW16 CB-WFW1	DMH-WFW9 DMH-WFW8 DMH-WFW8 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WF11 DMH-WF11 DMH-WF13 DMH-WF13 DMH-WF13 DMH-WF13 DMH-WF14 DMH-WF15 DMH-WF16 DMH-WF16 DMH-WF16 DMH-WF16 DMH-WF17	81 160 14 14 14 14 14 14 15 14 165 14 165 85 14 14 165 85 14 12 22 22	0.71 0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.94 0.94 0.94 0.46 0.29 1.69 1.69 1.69	0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.36 0.94 0.94 0.46 0.29 1.69 1.69 1.69 1.69 0.11	10 10 10 10 10 10 10 10 10 10 10 10 10 1	0.23 0.03 0.04 0.34 0.05 0.08 0.06 0.58 0.03 0.03 0.03 0.03 0.03 0.01 0.03 0.04 0.05	0.71 0.71 0.68 0.49 0.66 0.72 0.60 0.67 0.90 0.67 0.72 0.76 0.73 0.73 0.73 0.73 0.73 0.73 0.71 0.71	7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	3.93 3.93 3.93 2.16 1.00 7.09 3.15 1.05 11.29 0.76 1.00 1.76 2.17 5.43 5.43 5.43 9.39 9.39 9.39 9.39	0.049 0.066 0.028 0.028 0.028 0.065 0.011 0.011 0.011 0.011 0.011 0.011 0.011 0.021 0.021 0.021 0.021 0.060 0.060 0.060 0.060	12 12 12 12 12 12 12 12 12 15 12 12 12 12 12 12 12 12 12 12 12 12 12	0.012 0.012	9.90 6.43 9.82 3.99 18.87 3.99 3.79 5.64 5.64 10.43 8.86 5.64 9.45 9.44 9.44 16.20	12.61 8.19 12.51 5.08 15.38 5.08 15.38 5.08 4.83 7.18 13.29 11.29 7.18 12.04 12.03 12.03 13.21 9.65	11.84 7.35 5.93 13.60 5.63 4.25 16.05 3.91 4.22 4.73 7.44 6.71 13.40 11.80 5.83 13.72 13.72 13.72	2.18 0.84 0.55 2.87 0.49 0.28 4.00 0.24 0.28 0.35 0.35 0.86 0.70 2.79 2.18 0.77 0.53 2.92 2.92 2.92 2.91 0.53	0.44 0.40 0.27 0.63 0.67 0.35 0.69 0.30 0.48 0.55 0.43 0.51 0.57 0.48 0.33 0.51 0.51 0.51 0.51 0.51 0.51 0.51 0.51 0.51 0.51 0.51 0.51 0.51	2.24 2.61 1.23 0.81 3.50 1.16 0.63 4.69 0.53 0.62 0.82 1.41 1.13 3.30 2.75 1.25 0.85 3.73 3.73 3.73	3.99 10.57 0.39 0.39 18.06 0.15 5.83 0.15 1.60 0.30 0.30 0.30 12.10 4.50 0.30 0.30 3.37 5.65 11.54 2.74 0.85	263.75 259.66 249.48 249.48 248.99 231.08 231.08 231.08 226.85 226.85 226.85 226.85 226.80 265.40 253.20 249.00 249.00 248.60 245.13 239.38 227.74 239.38	259.76 249.09 249.09 249.09 230.93 230.93 230.93 225.00 226.70 225.00 255.00 265.50 253.30 248.70 248.70 248.70 245.23 239.48 227.84 227.84 227.84
DMH-WFW9 CB-WFW16 DMH-WFW8 CB-WFW14 DMH-WFW7 CB-WFW14 DMH-WFW7 CB-WFW12 DMH-WFW5 CB-WF21 DMH-WFW5 CB-WF20 DMH-WF11 DMH-WF12 CB-WF20 DMH-WF13 DMH-WF13 DMH-WF13 DMH-WF15 DMH-WF15 DMH-WF15 DMH-WF15 DMH-WF16 CB-WF20 CB-WF20 DMH-WF13 DMH-WF15 DMH-WF15 DMH-WF15 DMH-WF15 DMH-WF16 CB-WF20 CB-WF20 DMH-WF15 DMH-WF16 CB-WF20 DMH-WF16 CB-WF20 DMH-WF16 CB-WF20	DMH-WFW9 DMH-WFW8 DMH-WFW8 DMH-WFW8 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW7 FLARED END DMH-WFW5 DMH-WFW5 DMH-WFU5 DMH-WF11 DMH-WF11 DMH-WF12 DMH-WF13 DMH-WF13 DMH-WF13 DMH-WF14 DMH-WF14 DMH-WF15 DMH-WF15 DMH-WF16 IB-10C DMH-WF17 DMH-WF17	81 160 14 14 14 14 14 14 14 14 15 14 165 14 165 85 14 165 85 14 165 27 28 29 20 20 20 20 20 20 20 20 20 20	0.71 0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.36 0.94 0.94 0.46 0.29 1.69 1.69 1.69 0.11 1.69 1.69 1.69 1.69 1.69 1.69 1.69	0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.36 0.94 0.94 0.94 0.46 0.29 1.69 1.69 1.69 1.69	10 10 10 10 10 10 10 10 10 10 10 10 10 1	0.23 0.03 0.04 0.34 0.05 0.08 0.06 0.05 0.03 0.03 0.03 0.03 0.03 0.01 0.01 0.02 0.03 0.03 0.01 0.05 0.05 0.06 0.05 0.06 0.05 0.06 0.06 0.06 0.06 0.06 0.07 0.07 0.07 0.08 0.09	0.71 0.71 0.78 0.68 0.49 0.66 0.72 0.60 0.67 0.75 0.72 0.76 0.73 0.73 0.73 0.73 0.73 0.73 0.75	7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	3.93 3.93 3.93 2.16 1.00 7.09 3.15 1.05 11.29 0.76 1.00 1.76 3.26 2.17 5.43 5.43 2.64 1.31 9.39 9.39 9.39 9.39 9.39 9.39	0.049 0.066 0.028 0.028 0.028 0.057 0.011 0.011 0.011 0.011 0.010 0.011 0.010 0.021 0.021 0.053 0.053 0.053 0.060 0.060 0.060 0.064 0.054	12 12 12 12 12 12 12 12 15 12 12 12 12 12 12 12 12 12 12 12 12 12	0.012 0.012	9.90 6.43 6.43 9.82 3.99 18.87 3.99 3.79 5.64 5.64 10.43 8.86 5.64 9.45 9.44 9.44 9.45 9.44 9.45 9.45 9.44 9.45 9.45 9.45 9.46 9.47 9.47 9.48	12.61 8.19 12.51 5.08 15.38 5.08 4.83 7.18 7.18 13.29 11.29 7.18 12.04 12.03 12.03 13.21 9.65	11.84 7.35 5.93 13.60 5.63 4.25 16.05 3.91 4.22 4.73 7.44 6.71 13.40 11.86 7.06 5.83 13.72 13.72 13.68 5.83	2.18 0.84 0.55 2.87 0.49 0.28 4.00 0.24 0.28 0.35 0.86 0.70 2.79 2.18 0.77 0.53 2.92 2.92 2.91 0.53 2.74	0.44 0.40 0.27 0.63 0.67 0.35 0.69 0.30 0.34 0.48 0.55 0.43 0.51 0.57 0.48 0.51 0.57 0.48 0.69 0.30 0.69 0.30 0.69 0.30 0.69 0.30 0.69 0.30 0.69 0.30 0.69 0.30 0.69 0.30 0.69 0.30 0.69 0.30 0.69 0.30 0.69 0.30 0.69 0.30 0.69 0.30 0.69 0.69 0.70	2.24 2.61 1.23 0.81 3.50 1.16 0.63 4.69 0.53 0.62 0.82 1.41 1.13 3.30 2.75 1.25 0.85 3.73 3.73 3.73 3.59 0.73	3.99 10.57 0.39 18.06 0.15 5.83 0.15 0.15 1.60 0.30 0.30 0.30 12.10 4.50 0.30 0.30 0.30 15.65 11.54 1.74 1.74	263.75 259.66 249.48 249.48 248.99 231.08 231.08 230.83 226.85 226.60 255.80 255.40 253.20 249.00 248.60 245.33 247.74 235.35	259.76 249.09 249.09 249.09 230.93 230.93 230.93 225.00 226.70 225.00 255.30 248.70 248.70 248.70 248.72 245.23 249.23 248.70
DMH-WFW9 CB-WFW16 DMH-WFW8 CB-WFW16 DMH-WFW8 CB-WFW14 DMH-WFW7 CB-WFW12 DMH-WFW7 CB-WFW12 DMH-WFW5 CB-WF20 DMH-WF11 DMH-WF12 CB-WF21 DMH-WF13 DMH-WF14 DMH-WF15 DMH-WF14 DMH-WF15 DMH-WF14 DMH-WF16 CB-WF22 CB-WF22 CB-WF21 DMH-WF16 CB-WF24 DMH-WF16 CB-WF24 DMH-WF16	DMH-WFW9 DMH-WFW8 DMH-WFW8 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WF11 DMH-WF11 DMH-WF12 DMH-WF13 DMH-WF13 DMH-WF13 DMH-WF13 DMH-WF13 DMH-WF14 DMH-WF15 DMH-WF15 DMH-WF16 DMH-WF17 DMH-WF17	81 160 14 14 14 14 14 14 16 16 16 16 16 16 17 18 18 19 10 11 11 11 11 12 13 14 15 16 16 16 17 17 18 18 18 18 18 18 18 18 18 18	0.71 0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.36 0.94 0.94 0.46 0.29 1.69 1.69 1.69 1.69 0.11 3.22	0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.36 0.94 0.46 0.29 1.69 1.69 1.69 0.11 3.22	10 10 10 10 10 10 10 10 10 10 10 10 10 1	0.23 0.03 0.04 0.34 0.05 0.08 0.06 0.05 0.03 0.03 0.03 0.01 0.03 0.01 0.03 0.03 0.03 0.03 0.03 0.05 0.06 0.05 0.06 0.05 0.06 0.05 0.06 0.05 0.06 0.05 0.06 0.05 0.06 0.05 0.06 0.05 0.06 0.05 0.06 0.05	0.71 0.71 0.68 0.49 0.66 0.72 0.60 0.67 0.90 0.67 0.75 0.72 0.76 0.73 0.73 0.73 0.73 0.71 0.71 0.71 0.71 0.76 0.35	7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	3.93 3.93 3.93 2.16 1.00 7.09 3.15 1.05 11.29 0.76 1.00 1.76 2.17 5.43 5.43 5.43 9.39 9.39 9.39 9.39 9.39 9.39 9.39 9	0.049 0.066 0.028 0.028 0.028 0.065 0.011 0.011 0.011 0.012 0.021 0.021 0.021 0.021 0.021 0.053 0.053 0.053 0.053 0.053 0.053	12 12 12 12 12 12 12 12 12 12 12 12 12 1	0.012 0.012	9.90 6.43 9.82 3.99 18.87 3.99 3.79 5.64 5.64 5.64 5.64 9.45 9.45 9.45 9.41 9.42 9.45	12.61 8.19 12.51 5.08 15.38 5.08 15.38 5.08 4.83 7.18 7.18 13.29 7.18 12.04 12.03 12.03 12.03 12.03 13.21 9.65 11.67	11.84 7.35 5.93 13.60 5.63 4.25 16.05 3.91 4.22 4.73 7.44 6.71 13.40 7.06 5.83 13.72 13.72 13.72 13.72 13.72 13.72 13.72 13.72 13.72 13.72 13.72 13.72 13.72	2.18 0.84 0.55 2.87 0.49 0.28 4.00 0.24 0.35 0.86 0.70 2.79 2.18 0.77 0.53 2.92 2.92 2.92 2.92 2.91 0.53 2.74 4.57	0.44 0.40 0.27 0.63 0.67 0.35 0.69 0.30 0.48 0.55 0.43 0.57 0.48 0.57 0.48 0.57 0.48 0.57 0.48 0.69 0.79 0.69 0.79 0.70	2.24 2.61 1.23 0.81 3.50 0.63 4.69 0.53 0.62 0.82 1.41 1.13 3.30 2.75 0.85 3.73 3.73 3.73 3.73 3.73 3.59 0.73	3.99 10.57 0.39 0.39 18.06 0.15 0.15 5.83 0.15 1.60 0.30 0.30 0.30 12.10 4.50 0.30 3.37 5.65 11.54 2.74 0.85	263.75 259.66 249.48 249.48 231.08 231.08 231.08 226.85 226.85 226.85 226.80 265.80 265.40 249.00 249.00 249.00 249.00 245.13 239.38 227.74 225.35 235.35 235.35 235.35	259.76 249.09 249.09 249.09 249.09 230.93 230.93 230.93 225.00 226.70 226.70 226.70 225.50 265.50 265.50 248.70 248.70 248.70 248.23 239.48 227.84 227.84 227.84 225.00 234.50 234.50 234.55
DMH-WFW9 CB-WFW15 CB-WFW16 DMH-WFW8 CB-WFW14 DMH-WFW1 CB-WFW11 CB-WFW11 CB-WFW11 CB-WFW11 DMH-WFW5 CB-WF12 DMH-WFW5 CB-WF12 DMH-WFW5 CB-WF12 DMH-WF14 DMH-WF15 DMH-WF15 DMH-WF15 DMH-WF15 DMH-WF15 DMH-WF16 CB-WF22 DMH-WF17 CB-WF28 CB-WF21 DMH-WF17 CB-GB-WF28 CB-WF28 CB-WF28 CB-WF28 CB-WF28 CB-WF29 CB-WF	DMH-WFW9 DMH-WFW8 DMH-WFW8 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WF11 DMH-WF11 DMH-WF12 DMH-WF13 DMH-WF13 DMH-WF13 DMH-WF14 DMH-WF14 DMH-WF15 DMH-WF15 DMH-WF15 DMH-WF16 DMH-WF17 DMH-WF17 DMH-WF17 DMH-WF17 DMH-WF17 DMH-WF17	81 160 14 14 14 14 14 14 14 165 14 165 85 14 14 165 85 14 12 22 23 58 14	0.71 0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.94 0.94 0.94 0.46 0.29 1.69 1.69 1.69 1.69 1.69 1.69 1.10	0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.36 0.94 0.94 0.46 0.29 1.69 1.69 1.69 1.69 1.69 1.69 1.69 1.69 1.69 1.10	10 10 10 10 10 10 10 10 10 10 10 10 10 1	0.23 0.03 0.04 0.34 0.05 0.08 0.06 0.06 0.58 0.03 0.01 0.12 0.03 0.04 0.07 0.11 0.23 0.06 0.06 0.06	0.71 0.71 0.78 0.68 0.49 0.66 0.72 0.60 0.67 0.90 0.67 0.75 0.72 0.76 0.73 0.73 0.73 0.73 0.73 0.73 0.73 0.58	7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	3.93 3.93 3.93 2.16 1.00 7.09 3.15 10.5 11.29 0.76 1.00 1.76 2.17 5.43 5.43 5.43 5.43 9.39 9.39 9.39 9.39 9.39 9.64 8.88 9.55	0.049 0.066 0.028 0.028 0.028 0.055 0.011 0.011 0.011 0.010 0.010 0.010 0.010 0.010 0.010 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.001 0.000 0.000	12 12 12 12 12 12 12 12 12 12 12 12 12 1	0.012 0.012	9.90 6.43 9.82 3.99 18.87 3.99 3.79 5.64 5.64 10.43 8.86 5.64 9.45 9.44 16.20 7.57 9.16 12.20	12.61 8.19 8.19 12.51 5.08 15.38 5.08 5.08 4.83 7.18 7.18 7.18 7.18 13.29 11.29 11.29 12.04 12.03 13.21 9.65 11.67 15.56	11.84 7.35 5.93 13.60 5.63 4.25 16.05 3.91 4.22 4.73 7.44 6.71 13.40 11.86 7.06 7.08 13.72 13.72 13.72 13.72 13.72 13.72 13.78 13.79 17.16	2.18 0.84 0.55 2.87 0.49 0.28 4.00 0.24 0.28 0.35 0.86 0.70 2.19 2.18 0.77 0.53 2.92 2.92 2.92 2.91 0.53 2.74 4.57 0.55 0.55 0.74 0.55 0.74 0.55 0.75	0.44 0.40 0.27 0.63 0.67 0.35 0.69 0.30 0.34 0.48 0.55 0.48 0.55 0.48 0.51 0.57 0.48 0.61 0.62 0.79 0.63 0.69 0.30 0.34 0.48	2.24 2.61 1.23 0.81 3.50 1.16 0.63 4.69 0.53 0.62 0.82 1.41 3.30 2.75 1.25 0.85 3.73 3.73 3.73 3.53 5.23 3.53 3.53 3.53	3.99 10.57 0.39 0.39 18.06 0.15 0.15 0.15 0.15 0.15 0.30 0.30 12.10 4.50 0.30 0.30 12.15 4.50 0.30 0.30 0.30 0.30 0.30 0.30 0.30 0	263.75 259.66 249.48 249.48 241.08 231.08 231.08 231.08 226.85 226.85 226.85 226.85 226.80 265.40 245.20 249.00 249.00 249.00 249.03 245.13 239.38 227.74 235.35 235.35 235.35 235.35	259.76 249.09 249.09 249.09 249.09 230.93 230.93 230.93 225.00 226.70 225.00 255.50 255.30 248.70 248.70 248.70 248.70 245.23 239.48 227.84 227.84 227.84 225.00 234.50 234.05
DMH-WFW9 CB-WFW16 DMH-WFW8 CB-WFW16 DMH-WFW8 CB-WFW14 DMH-WFW7 CB-WFW12 DMH-WFW7 CB-WFW12 DMH-WFW5 CB-WF20 DMH-WF11 DMH-WF12 CB-WF21 DMH-WF13 DMH-WF14 DMH-WF15 DMH-WF14 DMH-WF15 DMH-WF14 DMH-WF16 CB-WF22 CB-WF22 CB-WF21 DMH-WF16 CB-WF24 DMH-WF16 CB-WF24 DMH-WF16	DMH-WFW9 DMH-WFW8 DMH-WFW8 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WF11 DMH-WF11 DMH-WF12 DMH-WF13 DMH-WF13 DMH-WF13 DMH-WF13 DMH-WF13 DMH-WF14 DMH-WF15 DMH-WF15 DMH-WF16 DMH-WF17 DMH-WF17	81 160 14 14 14 14 14 14 16 16 16 16 16 16 17 18 18 19 10 11 11 11 11 12 13 14 15 16 16 16 17 17 18 18 18 18 18 18 18 18 18 18	0.71 0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.36 0.94 0.94 0.46 0.29 1.69 1.69 1.69 1.69 0.11 3.22	0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.36 0.94 0.46 0.29 1.69 1.69 1.69 0.11 3.22	10 10 10 10 10 10 10 10 10 10 10 10 10 1	0.23 0.03 0.04 0.34 0.05 0.08 0.06 0.05 0.03 0.03 0.03 0.01 0.03 0.01 0.03 0.03 0.03 0.03 0.03 0.05 0.06 0.05 0.06 0.05 0.06 0.05 0.06 0.05 0.06 0.05 0.06 0.05 0.06 0.05 0.06 0.05 0.06 0.05 0.06 0.05	0.71 0.71 0.68 0.49 0.66 0.72 0.60 0.67 0.90 0.67 0.75 0.72 0.76 0.73 0.73 0.73 0.73 0.71 0.71 0.71 0.71 0.76 0.35	7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	3.93 3.93 3.93 2.16 1.00 7.09 3.15 1.05 11.29 0.76 1.00 1.76 2.17 5.43 5.43 5.43 9.39 9.39 9.39 9.39 9.39 9.39 9.39 9	0.049 0.066 0.028 0.028 0.028 0.065 0.011 0.011 0.011 0.012 0.021 0.021 0.021 0.021 0.021 0.053 0.053 0.053 0.053 0.053 0.053	12 12 12 12 12 12 12 12 12 12 12 12 12 1	0.012 0.012	9.90 6.43 9.82 3.99 18.87 3.99 3.79 5.64 5.64 5.64 5.64 9.45	12.61 8.19 12.51 5.08 15.38 5.08 15.38 5.08 4.83 7.18 7.18 13.29 7.18 12.04 12.03 12.03 12.03 12.03 13.21 9.65 11.67	11.84 7.35 5.93 13.60 5.63 4.25 16.05 3.91 4.22 4.73 7.44 6.71 13.40 7.06 5.83 13.72 13.72 13.72 13.72 13.72 13.72 13.72 13.72 13.72 13.72 13.72 13.72 13.72	2.18 0.84 0.55 2.87 0.49 0.28 4.00 0.24 0.35 0.86 0.70 2.79 2.18 0.77 0.53 2.92 2.92 2.92 2.92 2.91 0.53 2.74 4.57	0.44 0.40 0.27 0.63 0.67 0.35 0.69 0.30 0.48 0.55 0.43 0.57 0.48 0.57 0.48 0.57 0.48 0.57 0.48 0.69 0.79 0.69 0.79 0.70	2.24 2.61 1.23 0.81 3.50 0.63 4.69 0.53 0.62 0.82 1.41 1.13 3.30 2.75 0.85 3.73 3.73 3.73 3.73 3.73 3.59 0.73	3.99 10.57 0.39 0.39 18.06 0.15 0.15 5.83 0.15 1.60 0.30 0.30 0.30 12.10 4.50 0.30 3.37 5.65 11.54 2.74 0.85	263.75 259.66 249.48 249.48 231.08 231.08 231.08 226.85 226.85 226.85 226.80 265.80 265.40 249.00 249.00 249.00 249.00 245.13 239.38 227.74 225.35 235.35 235.35 235.35	259.76 249.09 249.09 249.09 249.09 230.93 230.93 230.93 225.00 226.70 226.70 226.70 225.50 265.50 265.50 248.70 248.70 248.70 248.23 239.48 227.84 227.84 227.84 225.00 234.50 234.50 234.55
DMH-WFW9 CB-WFW16 DMH-WFW8 CB-WFW16 DMH-WFW8 CB-WFW14 DMH-WFW7 CB-WFW12 DMH-WFW5 CB-WF20 DMH-WFW5 CB-WF20 DMH-WF11 DMH-WF12 CB-WF22 DMH-WF13 DMH-WF13 DMH-WF14 CB-WF24 DMH-WF15 DMH-WF16 CB-WF26 CB-WF27 DMH-WF17 CB-WF27 DMH-WF17 CB-WF28 DMH-WF18 DMH-WF18 DMH-WF18 CB-WF28 DMH-WF18 CB-WF28 DMH-WF18 CB-WF28 DMH-WF19 CB-WF28 DMH-WF19 CB-WF28 DMH-WF19 CB-WF28 DMH-WF19 CB-WF28 DMH-WF19 CB-WF28 DMH-WF19 CB-F0	DMH-WFW9 DMH-WFW8 DMH-WFW8 DMH-WFW8 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW7 FLARED END DMH-WFW5 DMH-WFU5 DMH-WFU5 DMH-WF11 DMH-WF11 DMH-WF13 DMH-WF13 DMH-WF13 DMH-WF14 DMH-WF14 DMH-WF15 DMH-WF15 DMH-WF17 DMH-WF17 DMH-WF17 DMH-WF17 DMH-WF17 DMH-WF17 DMH-WF17 DMH-WF17 DMH-WF17 DMH-WF17 DMH-WF17 DMH-WF18	81 160 14 14 14 14 14 14 14 14 165 14 165 85 14 165 85 14 165 26 27 28 28 29 20 20 20 20 20 20 20 20 20 20	0.71 0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.36 0.94 0.94 0.46 0.29 1.69 1.69 1.69 1.69 1.69 1.10	0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.36 0.94 0.94 0.46 0.29 1.69 1.69 1.69 1.69 1.69 1.69 1.10	10 10 10 10 10 10 10 10 10 10 10 10 10 1	0.23 0.03 0.04 0.34 0.05 0.08 0.06 0.58 0.03 0.03 0.03 0.03 0.03 0.01 0.05 0.05 0.05 0.05 0.06 0.05 0.06 0.05 0.05 0.06 0.05 0.06 0.06 0.05 0.06 0.05 0.06 0.06 0.06 0.07 0.07 0.07 0.08 0.09	0.71 0.71 0.78 0.68 0.49 0.66 0.72 0.60 0.67 0.75 0.72 0.76 0.73 0.73 0.73 0.73 0.73 0.73 0.73 0.73	7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	3.93 3.93 3.93 2.16 1.00 7.09 3.15 1.05 11.29 0.76 1.00 1.76 3.26 2.17 5.43 2.64 1.31 9.39 9.39 9.39 9.39 9.39 9.39 9.39	0.049 0.066 0.028 0.028 0.028 0.057 0.011 0.011 0.011 0.010 0.011 0.010 0.021 0.021 0.021 0.053 0.021 0.060 0.060 0.060 0.054 0.039 0.057 0.100 0.011	12 12 12 12 12 12 12 12 12 15 12 12 12 12 12 12 12 12 12 12 12 12 12	0.012 0.012	9.90 6.43 6.43 9.82 3.99 18.87 3.99 3.79 5.64 5.64 10.43 8.86 5.64 9.45 9.44 9.45 9.44 16.20 7.57 9.16 12.20 3.99	12.61 8.19 12.51 5.08 5.08 15.38 5.08 4.83 7.18 7.18 13.29 11.29 7.18 12.04 12.03 13.21 9.65 5.08 15.38 5.08	11.84 7.35 5.93 13.60 5.63 4.25 16.05 3.91 4.22 4.73 7.44 6.71 13.40 11.86 7.06 5.83 13.72 13.72 13.68 5.85 13.72 13.68 5.85 13.29 17.16 5.79	2.18 0.84 0.55 2.87 0.49 0.28 4.00 0.24 0.35 0.66 0.70 2.79 2.18 0.77 0.53 2.92 2.92 2.91 0.53 2.92 2.91 0.55 2.87 0.49 0.28 0.35 0.35	0.44 0.40 0.27 0.63 0.67 0.35 0.69 0.30 0.34 0.48 0.55 0.43 0.51 0.57 0.48 0.81 0.81 0.81 0.68 0.20 0.79 0.66 0.79 0.69 0.79 0.69 0.70	2.24 2.61 1.23 0.81 3.50 1.16 0.63 4.69 0.53 0.62 0.82 1.41 1.13 3.30 2.75 1.25 0.85 3.73 3.73 3.73 3.59 0.73 3.59 0.73 3.59 0.73 3.73 3.73 3.73 3.73 3.73 3.73 3.73	3.99 10.57 0.39 0.39 18.06 0.15 0.15 5.83 0.15 1.60 0.30 0.30 12.10 4.50 0.30 3.37 5.65 11.54 2.74 0.85 1.30 5.82 0.15	263.75 259.66 249.48 249.48 249.48 231.08 231.08 231.08 226.85 226.85 226.60 255.80 255.40 255.20 249.00 248.60 245.33 227.74 235.35 233.95 230.20	259.76 249.09 249.09 249.09 230.93 230.93 230.93 225.00 226.70 225.00 265.50 265.50 265.50 248.70 248.70 248.70 248.72 245.23 249.23 245.23 245.23 245.23 230.48 227.84 225.00 234.50 234.50 234.50 234.50 234.50 234.05 228.13
DMH-WFW9 CB-WFW16 DMH-WFW8 CB-WFW16 DMH-WFW8 CB-WFW14 DMH-WFW7 CB-WFW12 DMH-WFW5 CB-WF20 DMH-WFW5 CB-WF20 DMH-WF11 DMH-WF12 CB-WF21 CB-WF21 CB-WF22 CB-WF22 CB-WF22 CB-WF22 CB-WF22 CB-WF23 CB-WF23 CB-WF23 CB-WF24 CB-WF24 DMH-WF15 CB-WF28 CB-WF28 CB-WF28 CB-WF29 C	DMH-WFW9 DMH-WFW8 DMH-WFW8 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WF11 DMH-WF11 DMH-WF11 DMH-WF12 DMH-WF13 DMH-WF13 DMH-WF13 DMH-WF13 DMH-WF13 DMH-WF14 DMH-WF15 DMH-WF15 DMH-WF15 DMH-WF16 BR-10C DMH-WF17 DMH-WF17 DMH-WF17 DMH-WF17 DMH-WF17 DMH-WF18 DMH-WF18 DMH-WF18	81 160 14 14 14 14 14 14 165 14 14 165 85 14 14 165 85 12 22 23 23 23 24 14 14 165 165 165 17 18 18 18 18 18 18 18 18 18 18	0.71 0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.36 0.94 0.46 0.29 1.69 1.69 1.69 1.69 1.10	0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.36 0.94 0.94 0.94 0.94 0.94 0.169 1.69 1.69 1.69 1.11 3.22 3.33 1.11 0.35 1.46 0.71 0.71 0.71 0.72 0.73 0.73 0.74 0.75	10 10 10 10 10 10 10 10 10 10 10 10 10 1	0.23 0.03 0.04 0.34 0.05 0.08 0.06 0.05 0.08 0.03 0.01 0.01 0.02 0.03 0.03 0.01 0.04 0.05 0.06 0.06 0.06 0.06 0.06 0.06 0.06	0.71 0.71 0.68 0.49 0.66 0.72 0.60 0.67 0.90 0.67 0.72 0.76 0.73 0.73 0.73 0.73 0.71 0.71 0.71 0.71 0.76 0.35 0.37 0.45	7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	3.93 3.93 3.93 2.16 1.00 7.09 3.15 1.05 1.129 0.76 1.00 1.76 2.17 5.43 5.43 5.43 9.39 9.39 9.39 9.39 9.39 9.39 9.39 0.64 8.88 9.52 3.93 0.64 8.88 9.52 9.53 0.64 8.88 9.53 9.53 9.53 9.53 9.53 9.53 9.53 9.53	0.049 0.066 0.028 0.028 0.028 0.011 0.011 0.011 0.013 0.011 0.010 0.021 0.021 0.021 0.021 0.021 0.033 0.051 0.050 0.060 0.060 0.060 0.060 0.054 0.039 0.057 0.011 0.011 0.011	12 12 12 12 12 12 12 12 12 12 12 12 12 1	0.012 0.012	9.90 6.43 9.82 3.99 18.87 3.99 3.79 5.64 5.64 5.64 5.64 9.45 9.45 9.45 9.41 9.42 9.45	12.61 8.19 8.19 12.51 5.08 15.38 5.08 15.38 7.18 7.18 7.18 13.29 7.18 13.29 7.18 12.04 12.03 12.03 12.03 12.03 12.03 15.55 5.08 5.08	11.84 7.35 5.93 13.60 5.63 4.25 16.05 3.91 4.22 4.73 7.44 6.71 13.40 11.86 7.06 5.83 13.72 13.72 13.72 13.72 13.75 13.68 5.85 13.29 17.16 5.79 5.14	2.18 0.84 0.55 2.87 0.49 0.28 4.00 0.24 0.35 0.86 0.70 2.79 2.18 0.77 0.53 2.92 2.92 2.92 2.91 0.53 2.74 4.57 0.55 0.54 0.75	0.44 0.40 0.27 0.63 0.67 0.35 0.69 0.30 0.48 0.55 0.43 0.57 0.48 0.57 0.48 0.57 0.48 0.59 0.30 0.69 0.30 0.30 0.69 0.30 0.69 0.30 0.69 0.30 0.69 0.30 0.69 0.30 0.69 0.30 0.69 0.30 0.69 0.69 0.69 0.69 0.69 0.69 0.69 0.69 0.75 0.85	2.24 2.61 1.23 0.81 3.50 1.16 0.63 4.69 0.53 0.62 0.82 1.41 1.13 3.30 2.75 1.25 0.85 3.73 3.73 3.73 3.59 0.73 3.59 0.73 3.59 0.75 3.75 3.75 3.75 3.75 3.75 3.75 3.75 3	3.99 10.57 0.39 0.39 18.06 0.15 0.15 0.15 0.15 0.05 0.30 0.30 12.10 4.50 0.30 0.30 12.10 4.50 0.30 0.30 5.65 11.54 2.74 0.85 1.30 5.82	263.75 259.66 249.48 249.48 231.08 231.08 231.08 226.85 226.85 226.85 226.80 265.80 265.40 249.00 249.00 249.00 245.13 239.33 227.74 235.35 23	259.76 249.09 249.09 249.09 249.09 230.93 230.93 230.93 225.50 226.70 226.70 225.50 255.30 255.30 248.70 248.70 248.70 248.70 248.70 249.23 239.48 227.84 227.84 227.84 225.00 234.50 234.50 234.50 234.50 238.13 230.05 228.13
DMH-WFW9 CB-WFW16 DMH-WFW8 CB-WFW16 DMH-WFW8 CB-WFW14 DMH-WFW7 CB-WFW12 DMH-WFW5 CB-WF20 DMH-WFW5 CB-WF20 DMH-WF11 DMH-WF12 CB-WF21 CB-WF22 CB-WF22 CB-WF22 CB-WF22 CB-WF22 CB-WF23 CB-WF23 CB-WF24 DMH-WF15 CB-WF28 CB-WF28 CB-WF28 CB-WF28 CB-WF28 CB-WF29 CB-WF29 CB-WF29 CB-WF29 CB-WF29 CB-WF20 C	DMH-WFW9 DMH-WFW8 DMH-WFW8 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WFW5 DMH-WF11 DMH-WF11 DMH-WF12 DMH-WF13 DMH-WF13 DMH-WF13 DMH-WF13 DMH-WF14 DMH-WF15 DMH-WF15 DMH-WF16 B-10C DMH-WF17 DMH-WF17 DMH-WF17 DMH-WF17 DMH-WF18 DMH-WF18 DMH-WF18 DMH-WF18 DMH-WF18 DMH-WF18	81 160 14 14 14 14 14 18 80 14 14 165 14 165 85 14 14 15 27 80 14 15 16 16 16 16 16 16 16 16 16 16	0.71 0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.36 0.94 0.94 0.94 0.46 0.29 1.69 1.69 1.13 3.23 3.31 1.11 0.35 1.46 0.71 0.47 0.71 0.47 0.71 0.47 0.71 0.47 0.71 0.47 0.71 0.47 0.71 0.47 0.71 0.47 0.71 0.47 0.71	0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.36 0.94 0.94 0.94 0.94 0.94 0.94 1.69 1.69 1.69 1.69 1.11 3.22 3.33 1.11 0.35 1.46 0.71 0.47	10 10 10 10 10 10 10 10 10 10 10 10 10 1	0.23 0.03 0.04 0.34 0.05 0.08 0.06 0.05 0.03 0.03 0.01 0.01 0.05 0.06 0.06 0.06 0.06 0.07 0.01 0.07 0.01 0.07 0.07 0.09 0.09 0.09 0.09 0.09 0.09	0.71 0.71 0.78 0.68 0.49 0.66 0.72 0.60 0.67 0.70 0.75 0.72 0.76 0.73 0.73 0.73 0.73 0.73 0.74 0.71 0.71 0.76 0.35 0.76 0.35 0.76 0.35 0.76 0.35 0.76 0.35 0.76 0.35 0.76 0.35 0.76 0.35 0.76 0.35 0.76 0.35 0.76 0.35 0.36	7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	3.93 3.93 2.16 1.00 7.09 3.15 1.05 1.129 0.76 1.00 1.76 2.17 5.43 5.43 5.43 9.39 9.39 9.39 9.39 9.39 9.39 0.64 8.88 9.52 3.93 2.16 6.05 6.05 6.05 6.05 6.05 6.05 6.05 6.0	0.049 0.066 0.028 0.028 0.028 0.065 0.011 0.011 0.013 0.073 0.011 0.010 0.021 0.021 0.021 0.021 0.021 0.021 0.021 0.021 0.021 0.021 0.021 0.021 0.021 0.021 0.060 0.060 0.060 0.060 0.057 0.039 0.057 0.011 0.011 0.011 0.011 0.010 0.085	12 12 12 12 12 12 12 12 12 12 12 12 12 1	0.012 0.012	9.90 6.43 9.82 3.99 18.87 3.99 3.79 5.64 5.64 5.64 5.64 9.45 9.45 9.45 9.45 9.45 9.45 9.45 9.40 9.82 9.82 9.82 10.43 8.86 5.64 9.45	12.61 8.19 8.19 12.51 5.08 15.38 5.08 15.38 7.18 7.18 7.18 13.29 7.18 7.18 13.21 9.65 11.67 15.55 5.08 5.08	11.84 7.35 5.93 13.60 5.63 4.25 16.05 3.91 4.22 4.73 7.44 6.71 13.40 6.71 13.40 7.06 5.83 13.72	2.18 0.84 0.55 2.87 0.49 0.28 4.00 0.24 0.35 0.86 0.70 2.79 2.18 0.77 0.53 2.92 2.92 2.92 2.91 0.53 2.74 4.57 0.55 0.54 0.64 0.75 0.77	0.44 0.40 0.27 0.63 0.67 0.35 0.69 0.30 0.48 0.55 0.43 0.57 0.48 0.57 0.48 0.59 0.30 0.30 0.30 0.31 0.69 0.30 0.30 0.30 0.30 0.31 0.69 0.30 0.30 0.30 0.30 0.48 0.55 0.43 0.57 0.48 0.57 0.48 0.57 0.48 0.57 0.48 0.57 0.48 0.57	2.24 2.61 1.23 0.81 3.50 0.63 4.69 0.53 0.62 0.82 1.41 1.13 3.30 2.75 1.25 0.85 3.73 3.73 3.73 3.59 0.73 3.53 1.53 1.53 1.53 1.53 1.53 1.53 1.5	3.99 10.57 0.39 0.39 18.06 0.15 0.15 0.15 0.15 0.15 0.16 0.30 0.30 12.10 4.50 0.30 0.30 12.10 4.50 0.30 0.30 12.10 4.50 0.30 12.10 1.60 1.60 1.60 1.60 1.60 1.60 1.60 1	263.75 259.64 249.48 249.48 249.48 231.08 231.08 231.08 230.83 226.85 226.85 226.80 265.80 265.80 265.80 249.00 249.00 249.00 245.13 239.38 227.74 235.35 235.35 235.35 230.20 230.20 229.95 230.00 230.00 230.00	259.76 249.09 249.09 249.09 230.93 230.93 230.93 225.00 226.70 225.00 255.50 253.30 248.70 248.70 248.70 248.72 248.73 239.48 227.84 227.84 227.84 227.84 227.84 228.13 230.05 238.13 228.13 228.13 228.13
DMH-WFW9 CB-WFW16 CB-WFW16 DMH-WFW8 CB-WFW14 DMH-WFW7 CB-WFW14 DMH-WFW7 CB-WFW12 DMH-WFW5 CB-WF20 DMH-WFW5 CB-WF20 DMH-WF11 DMH-WF11 DMH-WF12 CB-WF20 DMH-WF13 DMH-WF13 CB-WF20 DMH-WF13 CB-WF20 DMH-WF13 CB-WF20 DMH-WF13 CB-WF20 DMH-WF13 CB-WF20 DMH-WF13 CB-WF20 DMH-WF15 CB-WF20 DMH-WF15 CB-WF20 DMH-WF17 CB-WF20 CB-WF20 DMH-WF17 CB-WF20 CB-WF	DMH-WFW9 DMH-WFW8 DMH-WFW8 DMH-WFW8 DMH-WFW7 DMH-WFW7 DMH-WFW7 DMH-WFW7 FLARED END DMH-WFW5 DMH-WFW5 DMH-WF11 DMH-WF11 DMH-WF11 DMH-WF12 DMH-WF13 DMH-WF13 DMH-WF13 DMH-WF14 DMH-WF14 DMH-WF15 DMH-WF15 DMH-WF16 IB-10C DMH-WF17 DMH-WF17 DMH-WF17 DMH-WF18 DMH-WF18 DMH-WF18 DMH-WF18 DMH-WF18 DMH-WF18 DMH-WF18 DMH-WF18 DMH-WF18 DMH-WF18 DMH-WF18 DMH-WF18	81 160 14 14 14 14 14 14 14 165 14 165 85 14 165 85 14 192 56 94 192 51 22 23 58 14 14 23 24	0.71 0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.36 0.94 0.46 0.29 1.69 1.69 1.69 1.69 1.10	0.71 0.41 0.26 1.37 0.56 0.22 2.15 0.11 0.19 0.30 0.58 0.36 0.94 0.94 0.94 0.94 0.94 0.169 1.69 1.69 1.69 1.11 3.22 3.33 1.11 0.35 1.46 0.71 0.71 0.71 0.72 0.73 0.73 0.74 0.75	10 10 10 10 10 10 10 10 10 10 10 10 10 1	0.23 0.03 0.04 0.34 0.05 0.08 0.06 0.58 0.03 0.03 0.03 0.03 0.01 0.05 0.05 0.05 0.06 0.05 0.06 0.05	0.71 0.71 0.78 0.68 0.49 0.66 0.72 0.60 0.67 0.75 0.72 0.76 0.73 0.73 0.73 0.73 0.73 0.73 0.73 0.73	7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8 7.8	3.93 3.93 3.93 2.16 1.00 7.09 3.15 1.05 11.29 0.76 1.00 1.76 3.26 2.17 5.43 2.64 1.31 9.39 9.39 9.39 9.39 9.39 9.39 9.39	0.049 0.066 0.028 0.028 0.028 0.057 0.011 0.011 0.011 0.010	12 12 12 12 12 12 12 12 12 12 15 12 12 12 12 12 12 12 12 12 12 12 12 12	0.012 0.012	9.90 6.43 6.43 9.82 3.99 18.87 3.99 3.79 5.64 5.64 10.43 8.86 5.64 9.45 9.44 16.20 7.57 9.16 12.20 3.99 6.99 11.23	12.61 8.19 8.19 12.51 5.08 5.08 15.38 5.08 4.83 7.18 7.18 13.29 11.29 7.18 12.04 12.03 13.21 9.65 11.67 15.55 5.08 5.08 5.08	11.84 7.35 5.93 13.60 5.63 4.25 16.05 3.91 4.22 4.73 7.44 6.71 13.40 11.86 7.06 5.83 13.72 13.72 13.68 5.85 13.72 13.68 5.85 13.72 13.68 5.85 13.72 13.68 5.85 13.79 13.68 5.85 13.79 13.68 5.85 13.79 13.68 5.85 13.99 17.16 5.79	2.18 0.84 0.85 2.87 0.49 0.28 4.00 0.24 0.35 0.86 0.70 2.79 2.18 0.77 0.53 2.92 2.92 2.91 0.53 2.92 2.91 0.55 0.64 0.75 0.77	0.44 0.40 0.27 0.63 0.67 0.35 0.69 0.30 0.34 0.48 0.55 0.43 0.51 0.57 0.48 0.59 0.30 0.51 0.57 0.48 0.69 0.30 0.69 0.30 0.69 0.30 0.69 0.30 0.34 0.48 0.55 0.43 0.57 0.48 0.57 0.48 0.57 0.48 0.57 0.69 0.69 0.75	2.24 2.61 1.23 0.81 3.50 1.16 0.63 4.69 0.53 0.62 0.82 1.41 1.13 3.30 2.75 1.25 0.85 3.73 3.73 3.73 3.59 0.73 3.59 0.73 3.59 0.75 3.75 3.75 3.75 3.75 3.75 3.75 3.75 3	3.99 10.57 0.39 0.39 18.06 0.15 0.15 5.83 0.15 1.60 0.30 0.30 12.10 4.50 0.30 3.37 5.65 11.54 2.74 0.85 1.30 5.82 0.15 1.82 1.87	263.75 259.66 249.48 249.48 249.48 231.08 231.08 231.08 231.08 236.85 226.85 226.85 226.80 255.20 249.00 248.60 245.31 249.00 248.60 245.33 227.74 235.35 233.95 230.20 229.95 230.00	259.76 249.09 249.09 249.09 230.93 230.93 230.93 225.00 225.00 225.00 265.50 265.50 265.50 248.70 248.70 248.70 248.70 248.23 248.70 248.23 239.48 227.84 225.00 234.50 234.50 234.50 234.50 234.50 234.50 234.51 228.13

### **Closed Drainage System**

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

Surface A C Product

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-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 =	0.70	= 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	

### **Closed Drainage System**

#### 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
	_		<i>.</i> .		

C = **0.35** = total product / total area

### **CB-WPC12 TO DMH-WPC9**

Surface Cover		A (ac)	С		Product A x C
impervious		0.23	0.9		0.210661
lands/grass		0.05	0.2		0.010275
woods		0.00	0.15		0
	sum =	0.29		sum =	0.22
	C =	0.77	= total product / total	area	

### **DMH-WPC9 TO FLARED END**

Surface A C Product

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	ı = 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 area						
-SSL3 TO DMH-S	SL4					

### 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 a	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 Di	rainage Syste	m				SM-3719C		
Project:	-	The Cottag	es at Wandering Pond	_	Ву	PFK, NC	Date	10/13/2022
Location:	<u>.</u>	Stow, MA			Checked		Date	
	Rational M	othod						
	Q = peak flo		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 /	grass	A = area (ad	c)			
CB-W	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 =	<b>0.49</b> = total pr	oduct / total	area			
CB-W	P <u>C6 TO DMH</u>	-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		
		sum =	0.19		sum =	0.13		
		C =	<b>0.69</b> = total pr	oduct / total	area			
DMH-W	VPC6 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		

Cover		(ac)	C		A x C
impervious		0.40	0.9		0.364318
lands/grass		0.45	0.2		0.0895
woods		0.00	0.15		0
	sum =	0.85		sum =	0.45

C = 0.53 = total product / total area

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 a	rea	

### 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	

#### 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-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	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
			Ī		

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 Cover		A (ac)	С		Product A x C
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 :	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 a	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	irea	

### **DMH-WPW10 TO DMH-WPW9**

Cove	r	(ac)			AxC
impervi	ous	0.23	0.9		0.208822
lands/gr	rass	0.23	0.2		0.046763
wood	S	0.00	0.15		0
	sum =	0.47		sum =	0.26
	C =	0.55	= total product / tot	al area	
CB-WFW11 TO D	MH-WFW9				
Surfac Cove		A (ac)	С		Product A x C
impervi	ous	0.27	0.9		0.242211
lands/gr	rass	0.11	0.2		0.021102
wood	S	0.00	0.15		0
	sum =	0.37		sum =	0.26
	C =	0.70	= total product / tot	al area	
CB-WFW12 TO D	MH-WFW9				
Surfac Cove		A (ac)	С		Product A x C
impervi	ous	0.05	0.9		0.042541
lands/gr	rass	0.04	0.2		0.007635
wood	S	0.00	0.15		0
	sum =	0.09		sum =	0.05
	C =	0.59	= total product / tot	al area	
DMH-WF <u>W9</u> TO	DMH-WFW8				
Surfac Cove		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	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	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	

#### SM-3719C

Date

Project: The Cottages at Wandering Pond Ву NC Date 10/13/2022 Location: 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

Stow, MA

C = 0.15 woods

### **CB-AS1 TO DMH-AS1**

	A (ac)	С		Product A x C
	0.14	0.9		0.12595
	0.16	0.2		0.032231
	0.00	0.15		0
sum =	0.30		sum =	0.16
	sum =	0.14 0.16 0.00	(ac)  0.14  0.9  0.16  0.2  0.00  0.15	0.14 0.9 0.16 0.2 0.00 0.15

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

### **DMH-AS1 TO FLARED END**

С Surface Α **Product** 

= total product / total area

0.90

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 = <b>0.84</b> = 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	
	_	0.00		
DMH-WPW1 TO FLAF	RED 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
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
	Juiii	0.57		Juili	0.23
	C =	0.67	= 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

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		sum =	0.58
	C =	0.60	= total product / total a	rea	
СВ-ВС1 ТО СВ-В	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		sum =	0.36
	C =	0.64	= total product / total ar	rea	
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		sum =	0.72
	C =	0.65	= total product / total ar	rea	
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 = <b>0.65</b> = 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**

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 = <b>0.90</b> = 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**

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					
NF6 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-	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	rea		
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	rea		
CB-L <u>P1 TO DMH</u> -	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 = <b>0.66</b> = total product / total area						
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	

#### **Closed Drainage System**

#### 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 = <b>[</b>	0.72	= total product / total	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	RED 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					

#### **Closed Drainage System**

#### 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-	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		A (2.5)	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
	sum =	3.33		sum =	1.21
	C =	0.37	= total product / total	area	

#### CB-69 TO DMH-WF21

Surface		Α	С		Product
Cover		(ac)			AxC
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

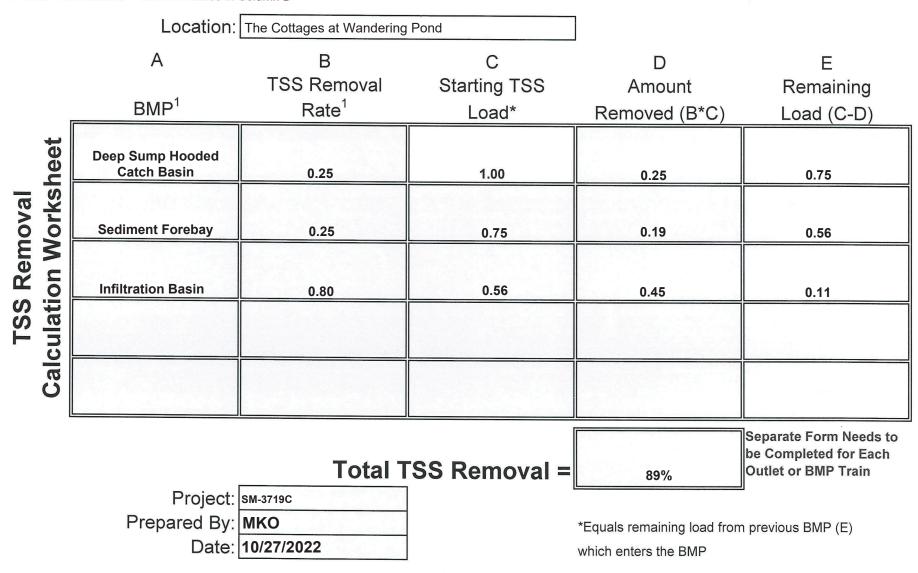
Surface Cover		A (ac)	С		Product A x C
impervious		2.12	0.9		1.907521
lands/grass		3.85	0.2		0.769137
woods		0.00	0.15		0
	sum =	5.97		sum =	2.68

C = **0.45** = total product / total area



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







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 Herizon Soil Texture Soil Matrix: Color Redoximorphic Features % by Volume 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)	nth /in\ Oon Honzon Oon Fortail		Soil Matrix:	Redo	oximorphic Fe	c Features C		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)		
Беер	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 Harizon Soil Touture Soil Metrica Color Redoximorphic Features 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	



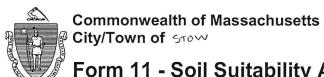
C. On-	Site Revi	ew (minim	num of two hole	es requ	iired at eve	ery propo	sed prin	nary and r	eserve disp	oosal area)	)	
Deep	Observation	n Hole Numb	er: TP-21-4 Hole #	10/25	/2021							
			Hole #	Date		Time		Weather		Latitude		Longitude:
1. Land	Use (e.g., w	oodland, agricult	ural field, vacant lot, e	etc.)	Vegetation		K	02, PARCE Surface Stone	L4 es (e.g., cobbles,	stones, boulder	rs, etc.)	Slope (%)
2 Soil F	Parent Materia	al·										
2. 00111	archi matchi	AI				andform		Posi	tion on Landscar	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	□Be	drock
5 Groui	ndwater Ohse	erved: Yes	s 🛭 No		If ve	<i>7</i> 6.	Describ W			David O	Mara dia 1	Vatan Sa I I ala
o. Groui	nawater Obse	ived. 🔲 Tes	, <u>v</u> 140		ii ye			eping from Pit	_	Depth S	standing V	Vater in Hole
				<del></del>		Soil Log	2	Fragments				
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color- Moist (Munsell)		loximorphic Fe	eatures	% by	Volume Cobbles &	Soil Structure	Soil Consistence		Other
	/Layer	(USDA	Worst (Wurisen)	Depth	Color	Percent	Gravel	Stones		(Moist)		
22	FILL	_	_	_	_	_	_		_	_		
	1122											
48	C1	LS	10YR 6/2	-	-	-	-	-	М	F		
66	C2	C. SAND	10YR 5/6	48	high/low	2	_	_	SG	L		
00	02	C. SAND	1011370	40	Tilgil/low		-	<del>-</del>	30	L		
162	C3	SAND	10YR 5/3	-	-	-	-	-	SG	L		
۸dditi	ional Notes:											



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>		·				
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)	Coarse Fragments  Redoximorphic Features  (A by Volume							Other				
Depth (in)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Soil Structure	Consistence (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	ry 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: Time	30	PAI	νY	1 - 64 - 1 -		<del></del> .	
			TIOIC #	Date		Time		vveamer		Latitude		Longitude:	
1. Land	Use (e.g. wo	Odland agricultu	ural field, vacant lot, e	itc.)	Vegetation	•		Surface Stone	e le a cobbles	etones houldon	rs oto \	~ 2 Slope (%)	
								Juliace Storie	s (e.g., cobbles,	stories, boulder	15, 610.)	Slope (76)	
Des	scription of Lo	ocation:											
2. Soil F	arent Materia	al: _ GLAC	LIOFLUVIAL			ndform		Posi	tion on Landscap	ne (SU SH BS	FS TS)		-
3 Dieta	nces from:	Oner	n Water Body	7700 for				/ay					
J. Dista	ices nom.		- Total	150						We			
			Property Line _										
<ol><li>Unsuita</li></ol>	able Materials	s Present:	] Yes ☑ No	If Yes:	Disturbed S	Soil 🔲	Fill Materia	ı 🗀 '	Weathered/Fra	ctured Rock	□Ве	drock	
5. Groui	ndwater Obse	erved: 🗌 Yes	s ⊻ No		If yes	3:	Depth Wee	ping from Pit	_	Depth S	Standing V	Vater in Hole	
						Soil Log	ľ						
				D			X	Fragments			Ι		
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Read	oximorphic Fea	tures		Volume	Soil Structure	Soil Consistence		Other	
Dopan (III)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	con otructure	(Moist)		Other	
0-10	A	SL	104R 3/3	-	,	-	·	-	m	F		,	
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		1.00					,	1	3-1				
60-138	C2	5	104R 5/2	-	-	-	10	5	54	L			
Δdditi	onal Notes	1				I.		1					



C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal 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	2. Soil Parent Material: FS  Landform Fosition on Landscape (SU, SH, BS, FS, TS)													
3. Distan	3. Distances from: Open Water Body 7200 feet Drainage Way feet Wetlands 7100 feet													
			ty Line 710				/ater Well _			her fe				
4. Unsuital	. Unsuitable													
	Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock													
5. Ground	. Groundwater Observed:   Yes  No  If yes: <u>৪৭"</u> Depth Weeping 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:													



1,5440														
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>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	oodland, 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	al: GLACIO	SFLUNAL											
0 5: 1		•				ndform			tion on Landscap					
3. Distai	nces from:		n Water Body					ay				<u>7100</u> feet		
T 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. Groui	. Groundwater Observed: Yes Vo No If yes: Depth Weeping from Pit Depth Standing Water in Hole													
Soil Log														
	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	-	~	٩				
24-160	C	5	104R 5/2			-	lo	15	54	١				
												74		
۸ طط:+:	onal Notes		•											



C. On-	Site Revi	ew (minim	um of two hole	es requi	red 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	υO	- RAI	NY	Latitude	<del></del> .	
									Some	Latitude	Longitude:	
1. Land	Use (e.g., wo	oodland, agricultu	ural field, vacant lot, e	etc.)	Vegetation	2 1-		Surface Stone	s (e.g., cobbles,	stones, boulder	Slope (%)	
Des	scription of Lo	ocation:	*			-00						
2. Soil P	arent Materia	al: GLACI	OFLUVIAL									
						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 <u>7:06</u> fee	t
			Property Line _								Other fee	t
4. Unsuita	able Materials	s Present:	] Yes ☑ No	If Yes:	Disturbed S	Soil 🗌 I	Fill Materia		Weathered/Fra	ctured Rock	Bedrock	
5. Grour	ndwater Obse	erved: Yes	s M No		If ves	3: -	Donth Woo	ning from Dit		Donth C	tanding Water in Hole	
					, 50	Soil Log		ping nom Pit	_	Deptin S	tanding water in Hole	
				Dode	wimenshie Fee		2)	Fragments		0.11	-	
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color- Moist (Munsell)		oximorphic Fea	Tures	% by	Volume Cobbles &	Soil Structure	Soil Consistence	Other	
	/Layer	(OSDA	Moist (Mulisell)	Depth	Color	Percent	Gravel	Stones		(Moist)		
0-12	Α	SL	104R 3/3	-	-	-	-	-	m	۴		
12-24	В	SL	104R 3/6	•	-	~	-	-	М	F		
24-96	LI	5	10 4R 5/2	-	•	-	5	5	54	L		
96-104	n	FINE	10-12- 4/2	٠	-		-	***	54	L		
104 - 156	43	5	10 MR 5/2	-	_	-	5	5	Sد	L		
Additi	onal Notes:											



C. On-S	Site Revi	ew (minin	num of two	holes re	equired at	every p	roposed p	rimary and	reserve disp	oosal area)					
Deep	Observation	n Hole Numl	ber: <u>1P-10-7</u> Hole #	.s-5 <u>lo</u>	25/2021	11:30		RAINY	Latitude						
									Som E les (e.g., cobbles,		Longitude:				
	ption of Loca		3 <del></del>			1996				to the second se					
2. Soil Pa	arent Materia	al: <u>aca</u>	CIOFLUNAL				Landform			Position on Land	scape (SU, SH, BS, FS, TS)				
3. Distan	ces from:	Open Wate	r Body 720	o feet				feet		nds <u>7000</u> fe					
4. I Inquitab	Property Line feet														
Material	Materials Present:       ☐ Yes       ☐ No       If Yes:       ☐ Disturbed Soil       ☐ Fill Material       ☐ Weathered/Fractured Rock       ☐ Bedrock         Groundwater Observed:       ☐ Yes       ☑ No       If yes:       Depth Weeping from Pit       Depth Standing Water in Hole														
	Soil Log														
Depth (in)		Soil Texture	Soil Matrix:	Redo	kimorphic Fe	atures		ragments Volume	Soil Structure	Soil Consistence	Other				
	/Layer	(USDA)	Color-Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	on on dotain	(Moist)	Other				
0-16	Α	ŞC	104R 3/3	**		-	, pare	-	M	F					
16-36	В	SL	104R 3/L	,	201	-		eton.	M	F					
36-156	۷	5	1042 5/2	u.	٠	-	10	15	54	L					
Additio	nal Notes:	ı													



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		
									_			



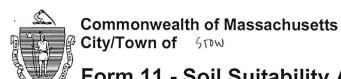
Deep (	Observation	n Hole Numl	ber: TP-8-	_	/8/2022							
			Hole #	D	ate	Time	We	ather	Latitude		Lor	ngitude:
. Land L	Jse: (e.g.	, woodland, agr	icultural field, va	cant lot, et	c.) Ve	egetation		Surface Sto	nes (e.g., cobbles	stones, boulders,	etc.)	Slope (%)
Descri	ption of Loca	ation:										
. 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>- L</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
		ļ	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)	Soil Horizon	Soil Texture	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 Numl	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	
		Proper	ty Line	feet	I	Drinking W	Vater Well	feet	Ot	ther feet	
	s Present: [		No If Yes:	☐ Distu	urbed Soil				Fractured Rock	Bedrock Depth Sta	nding Water in Hole
						Sc	oil 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	
				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	ad.	•					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	DFR	
		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: D2 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 havilde	\	~ 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	weatherea/i 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		
		1	Property Line _	7.50 fe	et	Drinking	g Water W	/ell	feet	(	Other	feet		
4. Unsuita	Unsuitable Materials Present:  Yes  No If Yes: Disturbed Soil Fill Material Weathered/Fractured Rock Bedrock													
5. Grour	Groundwater Observed: ✓ Yes □ No If yes: <u>\\(\frac{114''}{}\)</u> Depth Weeping from Pit \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\													
	. Groundwater Observed: া Yes া No if Yes: <u>মেন</u> Depth Weeping from Pit <u>মেন</u> Depth Standing Water 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	СI	5	10 YR 5/3	56"	HIGHLOW	75	20	15	54	Lo				
56-72	c2	L-5	2.54 5/3				_	-	M	F		4		
72-120	C3	5	10 4R 5/3		$\downarrow$	Ų.	10	10	SA	L				
					;									
Additi	onal Notes:													



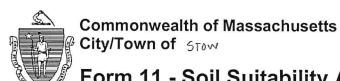
C. On-	Site Revi	ew (minim	um of two hole	es requ	ired at ever	ry propo	sed prim	nary and r	eserve disp	osal area)			
Deep	Observation	n Hole Numb	er: D4 Hole#	니 기 Date	122	{l1} Time	··00	. <u>ØVF</u> Weather	PLAST	Latitude		 Longitude:	
1 Land	Use .	VACANT	ıral field, vacant lot, e		and the second second				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 🔲 l	- 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	
5. Groundwater Observed: Yes V No If yes: Depth Weeping from Pit Depth Standing Water in Hole  Soil Log													
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	10 4R 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 5 :		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#	4171	22	11:3	0	ove	RCAST			
								Weather		Latitude		Longitude:
1. Land	Use (e.g., wo	oodland, agricultu	ural field, vacant lot, e	tc.)	Vegetation Vegetation	D		Surface Stone	s (e.g., cobbles,	stones, boulders	s, etc.)	~ 0 - 2 Slope (%)
Des	scription of Lo	cation:										
2 Soil P	arent Materia	al: C. Acio	07 W(A)									
2. 00			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> </u>
			Property Line									
4. Unsuita	able Materials	s Present:	] Yes ☑ No	If Yes:	Disturbed S	Soil 🔲 l	Fill Material		Weathered/Fra	ctured Rock	☐ Bed	rock
5. Grour	ndwater Obse	rved:□ Yes	√ No		If ves	3: _	Donth Woo	ning from Dit	_	- Donth St	tonding \\	ataria Uala
						Soil Log		ping nom r it	_	Deptil Si	lanuing vv	ater in noie
				Redo	oximorphic Fea		Coarse F	ragments		Soil		
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color- Moist (Munsell)	Depth	Color	Percent	% by ' Gravel	Volume Cobbles &	Soil Structure			Other
				Бериі		reiteilt	Graver	Stones		(MOISL)		
0-10	A	10 SL	10 42 3/2	-	ha-	-	••	und	M	F		
10 - 18	В	SL	104R 3/6	•	***	-	<b>-</b>	-	M	F		
18-120	C	5	1642 5/3		<u>~</u>	-	10	lo	Sa	L		
Additi	onal Notes:											
											_	



C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)													
Deep	Observation	n Hole Numb	er: D6 Hole#	<u>4 7 </u>	22	12:	00	OV\$	RLAST	1 - 424 - 1			
		COMMERCIA	11010 11	Date	(. P. ANE	Time		vveatner	11-6	Latitude	Longitude		
1. Land	Land Use Commercial (e.g., woodland, agricultural field, vacant lot, etc.)  GRAVEL Vegetation Surface Stones (e.g., cobbles, stones, boulders,									s, etc.) $\sim 0$	%)		
Description of Location:NEXT_TO OLD LANDSCAPE BUILDING													
2. Soil P	arent Materia	al: GLACI	AE UVIAL										
2. Soil Parent Material: GLACIAFLUVIAL Landform Position on Landscape (SU, SH, BS, FS, TS)											FS, TS)		
3. Distances from: Open Water Body feet Drainage Way feet Wetlands												feet	
Property Line _> 10 feet Drinking Water Well feet 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	Soil Texture (USDA	Soil Matrix: Color- Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume			Soil			
				Depth	Color	Percent	Gravel	Cobbles & Stones	Soil Structure	Consistence (Moist)	Other	Other	
0 - 16	FILL			-	_	-	-	-	_	-			
16-36	В	SL	10 4R 3/6	_	-	-	2	2	M	£			
36-120	C	5	10-12 5/2	_	, <del>e</del> l	,	10	10	Sa	L			
				,	ď								
					s								
Addition	Additional 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: D7 Hole#	U/7/	11_	12: Time	30	- <u>OV</u> Weather	ERCAST	Latitude		 Longitude:
									MONE			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.)	Slope (%)
Des	scription of Lo	ocation:										
2. Soil P	arent Materia	al: GLACIO	PLUVIAL	· · · · · · · · · · · · · · · · · · ·		ndform			e 1	(011 011 00	50 50	
3 Dietar	nces from:	Oper	n Water Body	£			1A		tion on Landscap			200
J. Distai	ices iroin.							/ay		We		
4 Upouito	bla Matarial		Property Line _							(	Other	feet
4. Unsuita	ible Material	s Present	] Yes ☑ No	ir Yes: L	_ Disturbed S	5011 🔲 1	Fill Material		Weathered/Fra	ctured Rock	∐ Bedr	ock
5. Grour	ndwater Obse	erved: Yes	s ☑ No		If yes	s:	Depth Wee	ping from Pit	_	Depth S	tanding Wa	ater in Hole
						Soil Log						
	Soil Horizon	Soil Texture	Soil Matrix: Color-	Redo	oximorphic Fea	itures		Fragments Volume		Soil		
Depth (in)	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Soil Structure	Consistence (Moist)		Other
0-12	A	SL	10 4R 3/3		ì	_		wo	M	F		
12- 32	В	LŞ	10 yr 3/6	-		-	us.		М	F		
32-120	C	5	104R 5/2	we.		-	15	15	Sa	L	CAVE	11)
7			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>N8</u> Hole#	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 🔲 I	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  Coarse Fragments	,									
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 Mp 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 10 m 10 m 10 m 10 m 10 m 10 m 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	Soil 🔲 I	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	eping 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				



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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			,	IES			~ 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	ndwater Obse	rved: Yes	. ✓ No		If yes	S:	Depth Wee	ping from Pit	,_	Depth St	tanding Wate	er in Hole
						Soil Log			•			
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Redo	ximorphic Fea	tures		ragments Volume	0-1104	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#						-		 Longitude:
		4GRICULTURA	L FIELD	Duto	FIELD	MEADON	1	VVCatrici	No	Latitude	Longitude.
1. Land	Use (e.g., wo	oodland, agricultu	rL FIELD ural field, vacant lot, e	tc.)	Vegetation	1		Surface Stone	s (e.g., cobbles,	stones, boulder	s, etc.) Slope (%)
		cation:									
2. Soil P	arent Materia	al:GLACI	OFLUVIAL			ndform		- Deci	£:	(011 011 00	F0. T0.
2 Dieter		0	Matau Dayle	_					tion on Landscap	-	
3. Distar	ices from:		Water Body _					/ay			tlands 7100 feet
			Property Line _	ל <u>וס</u> 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	erved: Yes	☑ No		If yes	s: <u>-</u>	Depth Wee	ping from Pit	_	Depth S	tanding Water in Hole
						Soil Log					
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Redo	oximorphic Fea	tures		Fragments Volume	Soil Structure	Soil Consistence	Other
/	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones		(Moist)	Other
0-8	A	SL	10 4R 3/2	•	1800 P	·us-	•	-	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	n Hole Numb	er: DIZ Hole#	U]-  Date	22	3:3 Time	U		PLAST	Latitude		 Longitude:
1 Land	llse A	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	al: <u>GLACIO</u>	FLUMAL									
						ndform			tion on Landscap	e (SU, SH, BS,	FS, TS)	
<ol><li>Distar</li></ol>	nces from:		n Water Body _							We		
		F	Property Line _	750 fee	et	Drinking	g Water W	/ell	feet	(	Other .	feet
4. Unsuita	able Materials	s Present: 🗹	Yes No	If Yes: [	Disturbed S	Boil 🗹 F	Fill Material	I 🗆 '	Weathered/Fra	ctured Rock	Bedr	ock
5. Grour	ndwater Obse	erved: 🗹 Yes	☐ No		If yes	s: <u>72"</u>	Depth Wee	ping from Pit	۷	<u>กร"</u> Depth S	tanding Wa	iter in Hole
		TObserved: ✓ Yes No If yes: 77 Depth Weeping from Pit 168 Depth Standing V  Soil Log  Redoximorphic Features Coarse Fragments Soil										
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	on on dotale	(Moist)		Guici
0- 54	FILL	-	, marrie	ı	-		*	NA.	-			
54-72	cl	5	10 4p 5/3	54"	HIGH LOW	75		~	sa	L	6	
72-120	CZ	FINE SAND	54R 3/2	$\downarrow$		,	-		m	F		
		1									8	
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)		
Deep	Observation	n Hole Numb	er: <u>D13</u> Hole #	니 기 Date	122	၂:) Time	5		2(AST	Latitude	Longitude	
1. Land	Use Ge.g., wo	excultural	FIELD ural field, vacant lot, e	tc.)	Vegetation Vegetation	Moss		Surface Stone	om E	stones houlder	~ 2 S, etc.) Slope (%	
	scription of Lo			,						stories, boulder		0)
2. Soil P	arent Materia	al: GLACIO	FLUVIAL									
					Lai	ndform		Posi	tion on Landscap	e (SU, SH, BS,	FS, TS)	
<ol><li>Distar</li></ol>	nces from:	Oper	Water Body _	fee	et	D	rainage W	/ay	feet	Wet	lands <u>7200</u> f	eet
		I	Property Line _	7 100 fee	t	Drinking	g Water W	/ell	feet	(	Other f	eet
4. Unsuita	ble Materials	s Present:	Yes ☑ No	f Yes:	Disturbed S	Soil 🔲 I	Fill Material		Neathered/Fra	ctured Rock	Bedrock	
5. Grour	ndwater Obse	erved: Yes	☑ No		If yes	s: <u>-</u>	Depth Wee	ping from Pit	_	Depth St	tanding Water in Hole	Э
						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)	Other	
0-6	Α	SL	104R 3/4	-	. ~			60.00	M	۴		
6-20	В	5L	104R 3/6	e	9-	-	2	2	M	F		
20-120	С	LS	10 4R 5/3		~	-	15	25	M	F		
							101					**
Additio	onal Notes:							1				



	O'1 D '										
			num of two hole					1000	-	-	
Dee	o Observation	n Hole Numb	er: <u>DIY</u> Hole#	4/7	22	4,	45	OVE	2CAST		
		ACCUMD	Hole #	Date	20.41	Time	esterna	Weather	2.2100 1	Latitude	Longitude:
. Lanc	Use (e.g., wo	oodland, agriculti	were ural field, vacant lot, e	etc.)	Vegetation	- WIE A- DO		Surface Stone	es (e.g., cobbles,	stones, boulder	rs, etc.) Slope (%)
D€	scription of Lo	ocation:	9								<u> </u>
. Soil	Parent Materia	al: GLACIO	DECUVIAL.								
			1001110		La	ındform		Posi	tion on Landscap	e (SU, SH, BS,	, FS, TS)
. Dista	inces from:	Oper	n Water Body _	fe	et	D	rainage W	/ay	feet	We	tlands <u>7100</u> feet
			Property Line _								Other feet
. Unsuif	able Materials	s Present:	] Yes ☑ No	If Yes: [	☐ Disturbed S	Soil 🔲 I	Fill Materia	ı 🔲 '	Weathered/Fra	ctured Rock	Bedrock
. Grou	ındwater Obse	erved: \( \text{Yes}	s 17 No		If ves	s: _	Donth Woo	ning from Dit		- Donth C	Standing Water in Hole
0.00	manator oboc	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			yo.	Soil Log		ping from Pit	-	Depth S	standing water in Hole
	T			Pod	oximorphic Fea			Fragments		Cail	
Depth (in	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color- Moist (Munsell)	- 1		T		Volume Cobbles &	Soil Structure		Other
	,	(		Depth	Color	Percent	Gravel	Stones		(Moist)	
0-10	А	<b>S</b> L	104R 3/4	~	-	-		-	₩	F	
10-120	C	SL	104R43	72"	HIGHLOW	75	10	25	м	F	very rocky
			,								
	tional Notes:	•				•		*	•		



#### Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

ACT-28-2								•	•		
C. On-	Site Revi	iew (minim	num of two hole	es requ	ired at every p	proposed p	orimary	and reserv	∕e dispo	sal area)	
Deep	Observation	n Hole Numb	er: TP-7-1	7/20/2	22	8:30 AM		90d, SUNN	Υ		
•			Hole #	Date		Time		Weather		Latitude	Longitude
1. Land		DLAND			WOODED		MAN				
	(e.g., w		ural field, vacant lot, e				Surfa	ce Stones (e.g.,	cobbles, sto	ones, boulders, e	tc.) Slope (%)
Description	on of Location	n: <u>O</u>	N DRUMLIN N	EAR FA	.RM						
		. TILL									
2. Soil F	Parent Materia	ai: IILL			Landfo	rm		Position on	Landecane	(SU, SH, BS, FS,	TQ Plain\
O D'-1-		0	· Matan Davi				- 10/-		·	•	•
3. Dista	nces from:	Ope	n Water Body	te	et	Drainag	je way	feet		vvetian	ds >> <u>100</u> feet
			Property Line _	>>10 fe	et D	rinking Wat	er Well	feet		Oth	er feet
			Troporty Emo _			mining vvac	or vvon			Our	
4. Unsu	iitable Materi	ials Present:	☐ Yes ☑ No	If Yes:	☐ Disturbed So	il/Fill Material		☐ Weathered/	Fractured	Rock 🗌 Be	drock
		_									
5. Grou	ndwater Obse	erved: 🗌 Yes	s 🛭 No		If yes:	Depth	to Weepin	g in Hole		Depth to Sta	anding Water in Hole
					Sc	oil Log					
							Coars	e Fragments		0	
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-		Redoximorphic Fea	tures		y Volume	Soil	Soil Consistence	Other
,	/Layer	(USDA	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Structure	(Moist)	
					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:						
					Dpl:						
					Cnc:						
İ					Dpl:						

Additional Notes:



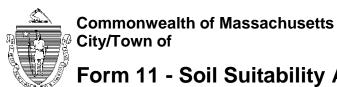
C. On-S	Site Revi	i <b>ew</b> (minim	um of two hole	es requ	uired at eve	ry proposed p	rimary	and reser	ve dispo	sal area)	
Deep	Observation	n Hole Numb	er: TP-7-2	7/20	/22						- Leader
1. Land l			Hole #	Date		Time	V	Veather		Latitude	Longitude
i. Lanu C	(e.g.	, woodland, agric	cultural field, vacant lo	ot, etc.)	Vegetation	<u> </u>	Surfac	e Stones (e.g.,	cobbles, sto	nes, boulders, etc	Slope (%)
Descri	ption of Loca	ation:									
2. Soil Pa	arent Materia	al:									
					La	ındform		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
		1	Property Line _	fe	et	Drinking Wate	r Well	feet		Oth	er feet
4 Unsuital	hle Materials	Present:	Yes ☑ No I	f Yes	□ Disturbed S	Soil/Fill Material		Weathered/Fr	actured Ro	ck 🗌 Bedro	ck
r. Orioditai	olo iviatoriale	71 100011ti	100 1	1 100.		John III Matorial		vvoaii ioroa/i i	aotaroa 110	ok	or .
5. Groun	dwater Obse	erved: Yes	s 🛭 No			If yes:	_ Depth to	Weeping in Ho	ole _	Depth Sta	nding Water in Hole
						Soil Log					
	Cail Harizan	Soil Texture	Soil Matrix: Color-		Redoximorphic			e Fragments v Volume	Soil	Soil	
Depth (in)	Soil Horizon /Layer	(USDA)	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Soil Structure	Consistence (Moist)	Other
4	Α	SL	10YR 3/3		Cnc:				М	F	
4	^	OL .	101103/3	-	Dpl: Cnc :	<u></u>	-	<u>-</u>	IVI	1	
22	В	LS	10YR 5/8	-	Dpl:	-	-	-	М	F	
60	C1	LS	10YR 6/2	_	Cnc:		15	15	М	F	
		LS			Cnc:						
132	C2	LS	10YR 5/3	-	Dpl:	-	15	15	М	F	
					Cnc: Dpl:						
					Cnc:						
					Dpl:						
				1		1		1	111		



			<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: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: 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: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: 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		Time	1	Neather		Latitude	Longitude
. Land l											
	, •		cultural field, vacant lo	ot, etc.)	Veget	tation	Surfac	ce 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)
s. Distan	ces from:	Oper	n Water Body	fe	et	Drain	age Way	feet		Wetlan	ds feet
										•	
			Property Line _	fe	et	Drinking W	ater Well	feet		Oth	er feet
Unquital	nla Matarials	Procent:	Voc 🗸 No 1	f Voor	□ D:-4l	10 11/511111		Weathered/Fr	actured Ro	ck 🗌 Bedro	ol.
. Ulibuliai	DIE Malenais	. r 1656111. 1 1	169 N 1 110 1	i res.	i i disturb	oed Soil/Fill Materia	1 1			ck i i bearo	CK
. Orisultai	ole iviateriais	Fresent. $\square$	res 🔽 NO i	res.	☐ Disturb	oed Soil/Fill Materia		vveathered/1 1	actarca 110	ck bearo	CK
				i res.	□ Disturd						
		erved: Yes		res.	□ Disturb	If yes:		Weeping in Ho			nding Water in Hole
				res.	□ Disturb		Depth to	) Weeping in Ho			
. Ground						If yes:	Depth to			Depth Star	nding Water in Hole
	dwater Obse	erved: Yes	s ☑ No		Redoximo	If yes: Soil Log	Depth to	Weeping in Ho	ole _	Depth Sta	
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)		Redoximo	If yes: Soil Log orphic Features	Depth to	e Fragments by Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	nding Water in Hole
i. Ground	dwater Obse	erved: Yes	Soil Matrix: Color-		Redoximo Co Cnc: Dpl:	If yes: Soil Log orphic Features	Depth to	e Fragments by Volume Cobbles &	ole _	Soil Consistence	nding Water in Hole
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)		Redoximo Co Cnc: Dpl: Cnc:	If yes: Soil Log orphic Features	Depth to	e Fragments by Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	nding Water in Hole
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)		Redoximo Co Cnc: Dpl: Cnc: Dpl: Dpl:	If yes: Soil Log orphic Features	Depth to	e Fragments by Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	nding Water in Hole
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)		Redoximo Co Cnc: Dpl: Cnc:	If yes: Soil Log orphic Features	Depth to	e Fragments by 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		Redoximo Coc Cnc: Dpl: Cnc: Dpl: Cnc: Cnc:	If yes: Soil Log orphic Features	Coars % t Gravel -	e Fragments by 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		Redoximo Co Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Dpl:	If yes: Soil Log orphic Features	Coars % t Gravel -	e Fragments by 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		Redoximo Co Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc:	If yes: Soil Log orphic Features	Coars % t Gravel -	e Fragments by 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		Redoximo Co Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Dpl:	If yes: Soil Log orphic Features	Coars % t Gravel -	e Fragments by Volume Cobbles & Stones	Soil Structure M	Soil Consistence (Moist)	nding Water in Hole

\*NO REFUSAL, JUST LARGE BOULDERS



C. On-	Site Revi	i <b>ew</b> (minim	um of two hole	es requ	uired at every	proposed p	orimary	and reserv	e dispo	sal area)	
Deep	Observation	n Hole Numb	er: <u>TP-7-</u> 6	7/20	/22						
			Hole #	Date		Time	V	Veather		Latitude	Longitude
1. Land l	Jse: (e.g.	, woodland, agric	cultural field, vacant lo	ot, etc.)	Vegetation		Surfac	e Stones (e.g.,	cobbles, stor	nes, boulders, etc	.) Slope (%)
Descri	ption of Loca										<u> </u>
2. Soil Pa	arent Materia	al:									
					Land	form		Position on	Landscape	(SU, SH, BS, FS,	TS, Plain)
<ol><li>Distan</li></ol>	ces from:	Oper	n Water Body _	fe	et	Drainage	e Way _	feet		Wetlan	ds feet
		I	Property Line _	fe	et	Drinking Wate	er Well	feet		Othe	er feet
4. Unsuital	ble Materials	s Present:	Yes ☑ No I	f Yes:	☐ Disturbed Soi	I/Fill Material		Weathered/Fr	actured Ro	ck 🗌 Bedroo	ck
5. Groun	dwater Obse	erved:  Yes	☑ No			If yes:	_ Depth to	Weeping in Ho	le _	Depth Star	nding Water in Hole
	1			T	;	Soil Log	_		•		
Danth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-		Redoximorphic F	eatures		e Fragments y Volume	Soil	Soil	Other
Depth (in)	/Layer	(USDA)	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Structure	Consistence (Moist)	Other
4	Α	SL	10YR 3/3	-	Cnc: Dpl:		-	-	М	F	
22	В	LS	10YR 5/8	_	Cnc:	_	_	_	М	F	
120	С	LS	10YR 6/2		Cnc :		15	15	М	F	
120	C	LS	10111 0/2	_	Dpl: Cnc:		13	13	IVI	1	
					Dpl:						
					Cnc :						
					Dpl:						
					Cnc: Dpl:						
Additio	nal Notes:		1		υþi.						
, waiti											



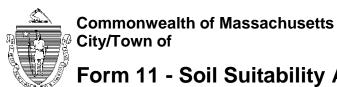
C. On-S	Site Revi	ew (minim	um of two hole	es requ	uired at eve	ry proposed p	rimary	and reser	ve dispo	sal area)	
Deep	Observation	n Hole Numb	er: TP-7-7	7/20	/22						<del></del>
1. Land l			Hole #	Date		Time	V	Veather		Latitude	Longitude
i. Lanu (	(e.g.	, woodland, agric	cultural field, vacant lo	ot, etc.)	Vegetation	1	Surfac	e Stones (e.g.,	cobbles, sto	nes, boulders, etc	s.) Slope (%)
Descri	ption of Loca	ation:									
2. Soil Pa	arent Materia	al:									
					La	ındform		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
		ı	Property Line _	fe	et	Drinking Wate	r Well	feet		Oth	er feet
4. Unsuital	ole Materials	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-		Redoximorphic			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	
	/ /	OL .	1011110/0		Dpl: Cnc :				101	•	
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 :						
	1	1	1								
					Dpl:						



C. On-S			TD 7.0								
Deep	Observatior	n Hole Numb	er: 1P-7-8 Hole #	7/20/ Date	22	Time		Veather		Latituda	 Longitude
I. Land l	lco:		Hole #	Date		rime	V	veatner		Latitude	Longitude
. Lanu C		, woodland, agric	cultural field, vacant lo	ot, etc.)	Vegetation	on	Surface	e Stones (e.g.,	cobbles, stor	nes, boulders, etc	Slope (%)
Descri	ption of Loca	ation:									
Soli Pa	arent Materia	<u></u>			<u>_</u>	_andform		Position on	Landscape	(SU, SH, BS, FS,	TS, Plain)
3. Distan	ces from:	Oper	n Water Body	fe	et	Drainag	e Way	feet	·		nds feet
			, _			_					· · · · · · · · · · · · · · · · · · ·
			Property Line _	fe	et	Drinking Wate	r Well _	feet		Oth	er feet
. Unsuital	ole Materials	Present:	Yes ☑ No I	f Yes:	Disturbed	Soil/Fill Material	□ \	Neathered/Fr	actured Ro	ck 🗌 Bedro	ck
. Groun	dwater Obse	erved:  Yes	s 🔽 No			If yes:	_ Depth to	Weeping in Ho	le _	Depth Sta	nding Water in Hole
i. Ground	dwater Obse	erved:  Yes	s ☑ No			If yes:	_ Depth to	Weeping in Ho	le _	Depth Sta	nding Water in Hole
					Redoximorph	Soil Log	Coarse	e Fragments		Soil	nding Water in Hole
	Soil Horizon	Soil Texture	Soil Matrix: Color-Moist (Munsell)		<u> </u>	Soil Log	Coarse % b	e Fragments y Volume Cobbles &	Soil Structure	Soil Consistence	nding Water in Hole Other
	Soil Horizon	Soil Texture	Soil Matrix: Color-	Depth	Colo	Soil Log	Coarse	e Fragments y Volume	Soil	Soil	-
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-	Depth	<u> </u>	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	Color 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	Color Cnc: Dpl: 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)	Depth	Color 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	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) 4 22	Soil Horizon /Layer A B	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)  10YR 3/3  10YR 5/8	Depth	Color Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: 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	Color Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: 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	Color Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Dpl: Dpl: Dpl:	Soil Log	Coarse % b Gravel	e Fragments y Volume Cobbles & Stones	Soil Structure M	Soil Consistence (Moist)	-



			um of two hole	-	-		orimary	and reser	e dispo	sal area)	
Deep	Observation	n Hole Numb	er: TP-7-9 Hole #	7/22	22	8:30 AM					
			Hole #	Date		Time	V	Veather		Latitude	Longitude
1. Land l	Jse: (e.a.	. woodland, agric	ultural field, vacant lo	ot. etc.)	Vegetation		Surfac	e Stones (e.g.,	cobbles, sto	nes, boulders, etc	) Slope (%)
Descri	ption of Loca			ot, 0to.)	vogotation		Carrao	o otonoo (o.g.,	0000100, 0101	noo, boalaoro, oto	
2. SOII Pa	arent Materia	al:			Land	dform		Position on	Landscape	(SU, SH, BS, FS,	TS, Plain)
3. Distan	ces from:	Oper	n Water Body _	fe	et	Drainage	e Way	feet	·	•	ds feet
		ı	Property Line _	fo	ot .	Drinking Wate	r Well	feet		Othe	r feet
											1661
4. Unsuital	ole Materials	Present:	Yes ☑ No I	f Yes:	☐ Disturbed So	il/Fill Material	□ \	Weathered/Fr	actured Ro	ck 🗌 Bedroo	k
5. Groun	dwater Obse	erved:  Yes	✓ No			If ves:	Depth to	Weeping in Ho	le	Depth Star	ding Water in Hole
							_ = 0 1		_		g
						Soil Log	Coarse	e Fragments			
Depth (in)	Soil Horizon	Soil Texture	Soil Matrix: Color-		Redoximorphic I	Features		y Volume	Soil	Soil Consistence	Other
. , ,	/Layer	(USDA)	Moist (Munsell)	Depth	Color	Percent	Gravel	Cobbles & Stones	Structure	(Moist)	
4	Α	SL	10YR 3/3	_	Cnc : Dpl:		_	_	М	F	
					Cnc:						
28	В	LS	10YR 5/8	-	Dpl:	-	-	-	М	F	
120	С	LS	10YR 6/2	_	Cnc: Dpl:		15	15	М	F	
					Cnc :						
					Dpl:						
					Cnc: Dpl:						
					Cnc:						
					Dpl:						
	nal Notes:		1						1		



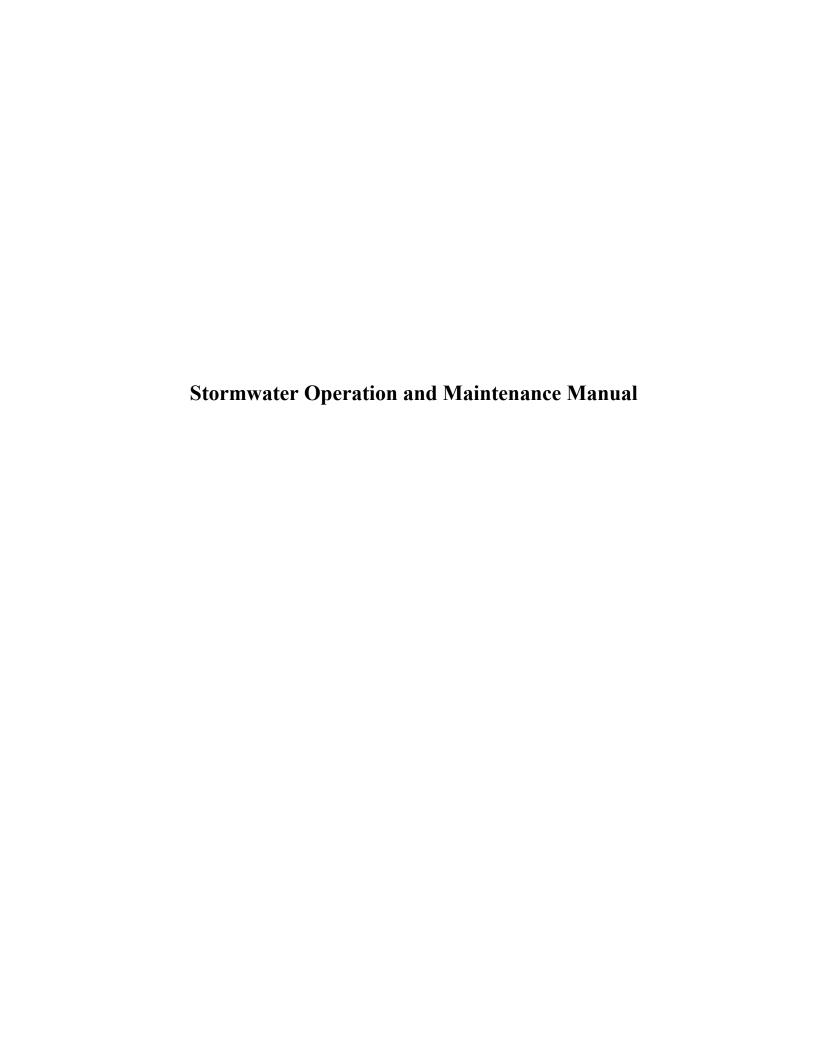
#### Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Deen (	Ohservation	Hole Numb	er: <u>TP-7</u> -10	7/22	/22						
Всср	obsci valioi	THOIC HUILD	Hole #	Date	· ——	Time		Veather		Latitude	Longitude
. Land l											
	(e.g.	, woodland, agric	cultural field, vacant lo	ot, etc.)	Vegetation	on	Surface	e Stones (e.g.,	cobbles, sto	nes, boulders, etc	Slope (%)
Descri	ption of Loca	ation:									<u></u>
. Soil Pa	arent Materia	al:									
		<del></del>			Ī	_andform		Position on	Landscape	(SU, SH, BS, FS,	TS, Plain)
. Distan	ces from:	Oper	n Water Body	fe	eet	Drainag	e Way _	feet		Wetlan	ids feet
		1	Property Line _	fo	ot.	Drinking Wate	r Well	foot		Oth	er feet
		'	Toperty Line _	16	: <del>C</del> 1	Dilliking wate	i vveii _	1661		Our	
. Unsuital	ole Materials	Present:	Yes ☑ No I	f Yes:	☐ Disturbed	Soil/Fill Material	□ \	Neathered/Fr	actured Ro	ck 🗌 Bedro	ck
						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
					Redoximorph	Soil Log	Coarse	e Fragments		Soil	-
. Ground	dwater Obse Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Depth	Redoximorph	Soil Log	Coarse		Soil Structure		nding Water in Hole Other
Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color- Moist (Munsell)		Colo	Soil Log	Coarse % b	e Fragments y Volume Cobbles &	Soil Structure	Soil Consistence (Moist)	-
	Soil Horizon	Soil Texture	Soil Matrix: Color-		Colo 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)		Colo 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		Colo 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)		Colo Cnc: Dpl: Cnc: 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		Colo 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		Colo Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Cnc: Dpl: Dpl:	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: 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		Colo 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)	-

\*NO REFUSAL, JUST LARGE BOULDERS



	Site Revi					7 1 -1 1	,	ana recert	o alopo.		
Deep (	Observation	n Hole Numb	er: TP-7-11	7/22 Date	/22	Time		Veather		Latitude	 Longitude
. Land U	Jse:						•	· Catiloi		Lantado	3
	(e.g.	, woodland, agric	cultural field, vacant lo	ot, etc.)	Vegetatio	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	Drainag	e Way _	feet		Wetlan	ds feet
		ı	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/Fra	actured Ro	ck 🗌 Bedro	CK
_	-lt Ol					.,		\\/			P 147 c 1 1 1
Ground	awater Obse	erved: 🗌 Yes	i ⊠ No			If yes:	Depth to	vveeping in Ho	le	Depth Star	nding Water in Hole
. Ground	dwater Obse	ervea: 🔲 Yes	i ⊠ No			If yes:	_ Depth to	vveeping in Ho	le	Depth Stai	nding Water in Hole
Ground	dwater Obse	ervea: Yes	i ⊠ No			Soil Log			ie _		nding Water in Hole
	Soil Horizon	Soil Texture	Soil Matrix: Color-		Redoximorph	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) 4	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 ic 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 ic 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 ic Features  Percent	Coarse % b Gravel 15	e Fragments y Volume Cobbles & Stones	Soil Structure M M	Soil Consistence (Moist) F	-



#### **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:		
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Date:		

#### The Cottages at Wandering Pond

Operation and Maintenance Inspection Log

Year:

Inspection Items: Street Sweeping Catch Basin Infiltration Basin Sediment Forebay Treatment Trench		Frequency: Two times per year Four times per year Two times per year Monthly Annually	r
Street Sweeping:			
Previous Inspection Da Inspection Date: Inspector Name: Comments:	nte:		
Action Required:			
Catch Basin:			
Previous Inspection Da Inspection Date: Inspector Name: Sediment Depth: Comments:	ite:		(Remove if depth greater than 18")
Action Required:			
Infiltration Basin:			
Previous Inspection Date: Inspection Date: Inspector Name: Sediment Depth: Erosion in Basin: Outlet Structure: Comments:	ate:		(Remove if depth greater than 18")
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:	



