Stormwater Management Report

For

The Cottages at Wandering Pond
Athens Street
Stow, MA 01775

June 29, 2022
Rev: October 27, 2022
July 6, 2023
February 16, 2024

Applicant:	The Cottages at Wandering Pond Realty Trust 148 Park Street North Reading, MA 01864

SM-3719C

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Compliance with MA DEP Stormwater Management Standards

Compliance with the Stormwater Management Standards is as follows:

Standard #1 No Untreated Discharges:

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

Standard #2 Peak Rate Attenuation:

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

Discharge Summary Tables

E-1 Compared to P-1

	2-year Storm		10-year 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	0.015	0.015
Total Volume (cf)	0	0	3.52	3.52	52.4	52.4	228	228

E-2A Compared to P-2A

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

E-2B Compared to P-2B

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

E-3 Compared to P-3

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

E-4 Compared to P-4

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

E-5 Compared to P-5

	2-year Storm		10-year Storm		25-year Storm		100-year Storm	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Peak Flow (cfs)	2.571	1.549	11.19	9.173	18.21	16.83	30.49	30.35
Total Volume (cf)	19,062	14,387	59,868	51,772	91,855	81,739	147,879	138,839

E-6 Compared to P-6

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

E-7 Compared to P-7

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

E-8 Compared to P-8

	2-year Storm		10-year Storm		25-year Storm		100-year Storm	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Peak Flow (cfs)	0	0	0.001	0	0.008	0	0.056	0
Total Volume (cf)	0	0	14.5	0	216	0	938	0

E-10 Compared to P-10

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

E-11 Compared to P-11

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

E-12 Compared to P-12

	2-year Storm		10-year 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

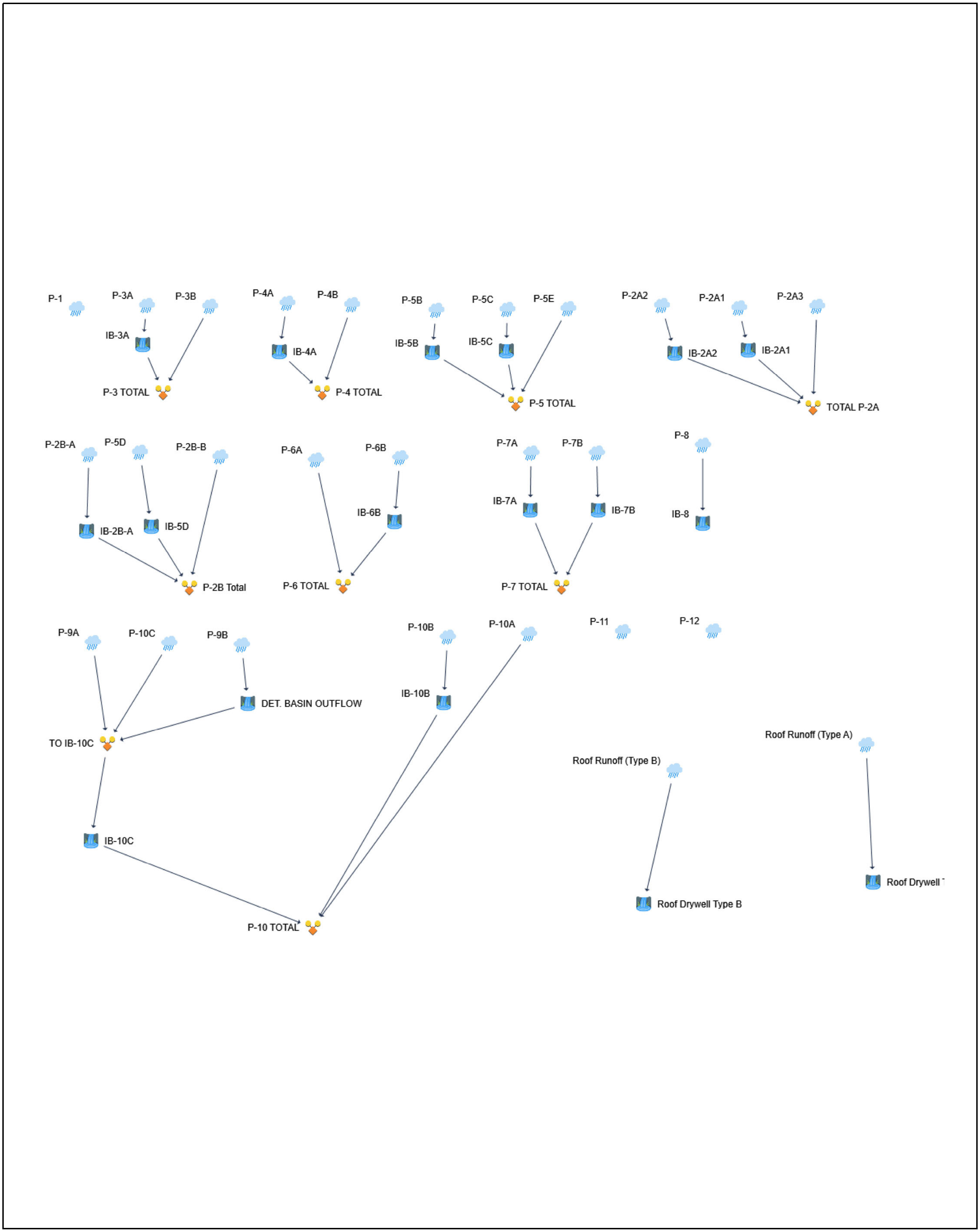
1. The United States Department of Agriculture Natural Resource Conservation Service (N.R.C.S.) TR55 methodology was used to determine offsite rates of runoff.
2. The twenty-four hour rainfall, taken from the NOAA Atlas, is 7.84 inches for the 100-year storm, 6.14 inches for the 25-year storm, 5.04 inches 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.

Basin Model

Hydrology Studio v 3.0.0.27

Project Name:

07-10-2023



Stormwater Checklist

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

Checklist for Stormwater Report

A. Introduction

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

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

The Stormwater Report must include:

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

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

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

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

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

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

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature

COMMONWEALTH OF MASSACHUSETTS
GEORGE DIMAKARAKOS
CIVIL
No. 41281
REGISTERED
PROFESSIONAL ENGINEER

2/21/2024

Signature and Date

Checklist

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

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist (continued)

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

- [ ] No disturbance to any Wetland Resource Areas
- [x] Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- [ ] Reduced Impervious Area (Redevelopment Only)
- [x] 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
- [x] Other (describe): Infiltration Basin, Treatment Trench, Contech Units

Standard 1: No New Untreated Discharges

- [x] No new untreated discharges
- [x] Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- [x] Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist (continued)

Standard 2: Peak Rate Attenuation

- ☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- ☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- ☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

- ☒ Soil Analysis provided.
- ☒ Required Recharge Volume calculation provided.
- ☐ Required Recharge volume reduced through use of the LID site Design Credits.
- ☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

  ☐ Static ☒ Simple Dynamic ☐ Dynamic Field[1]

- ☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.
- ☒ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- ☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- ☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
  - ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
  - ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
  - ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
  - ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- ☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- ☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

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

Checklist (continued)

Standard 3: Recharge (continued)

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

- [x] A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.
- [x] Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
  - [ ] is within the Zone II or Interim Wellhead Protection Area
  - [ ] is near or to other critical areas
  - [x] 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.
- [x] Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist (continued)

Standard 4: Water Quality (continued)

- [x] The BMP is sized (and calculations provided) based on:
  - [x] 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.
- [x] A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

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

- [ ] The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- [ ] The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.
- [ ] The NPDES Multi-Sector General Permit does ***not*** cover the land use.
- [ ] LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- [ ] All exposure has been eliminated.
- [ ] All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- [ ] The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

- [ ] The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- [ ] Critical areas and BMPs are identified in the Stormwater Report.

Checklist (continued)

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

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

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

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

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

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

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

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

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

Checklist (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.

Pre-Development Hydrology

Worksheet 2: Runoff curve number and runoff **SM-3719C**

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-1

1. Runoff curve number (CN)

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

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = $\frac{4.80}{0.16}$ = 30.00 ; Use CN = 30

2. Runoff

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

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By MKO Date 6/1/2022

Rev Date 9/27/2022

Location: Stow, MA Checked ______ Date ______

Circle one: **Present** Developed Subcatchment E-1

Circle one: **Tc** Tt through subarea

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	0.082			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.16			0.16
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	32			
9. Watercourse slope, s		ft/ft	0.047			
10. Average Velocity, V (figure 3-1)		ft/s	3.50			
11. Tt = L / 3600V	Compute Tt	hr	0.00			0.00
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.17

min 10.0

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

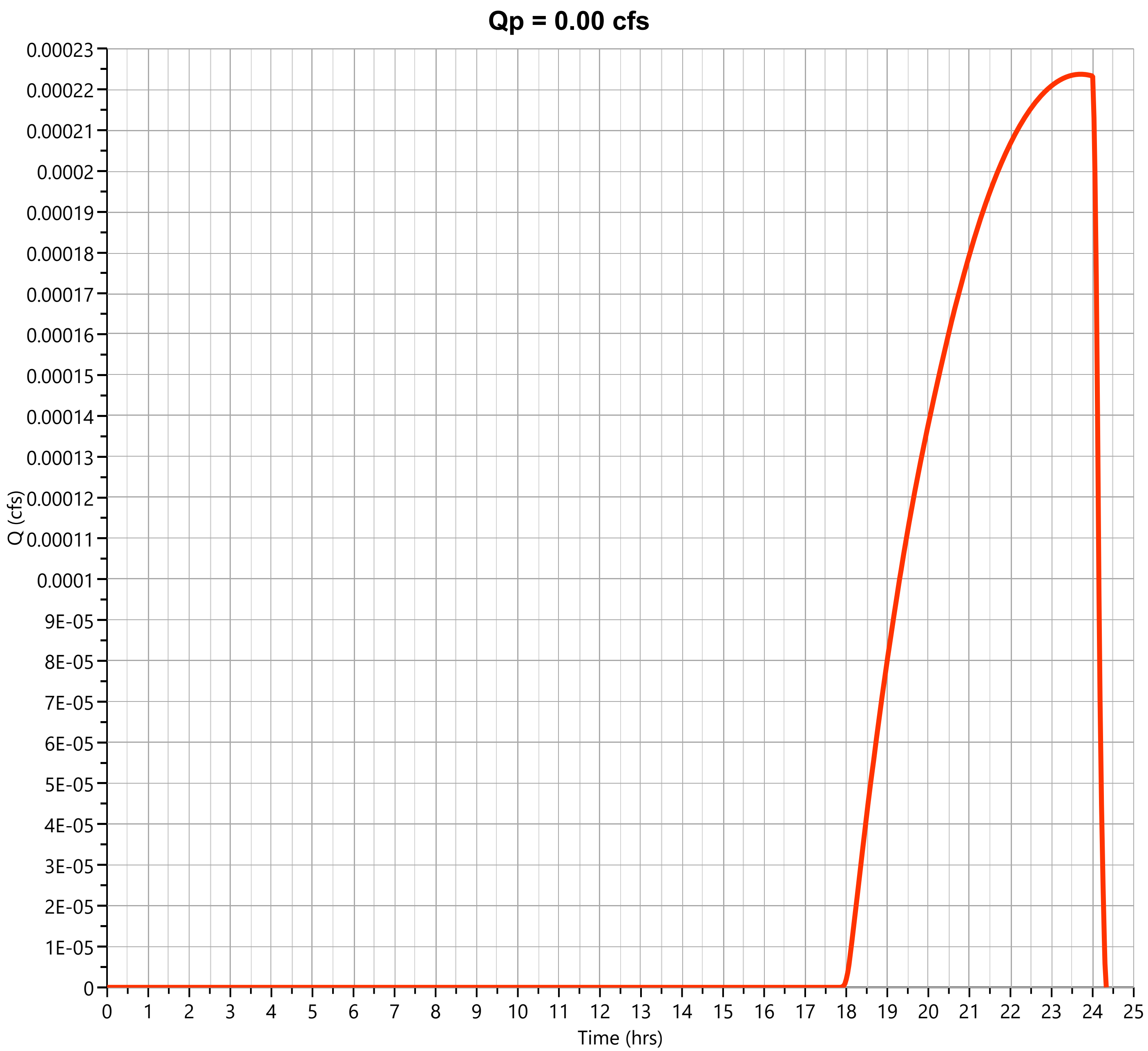
Qp = 0.00 cfs

Hydrograph Report

E-1

Hyd. No. 1

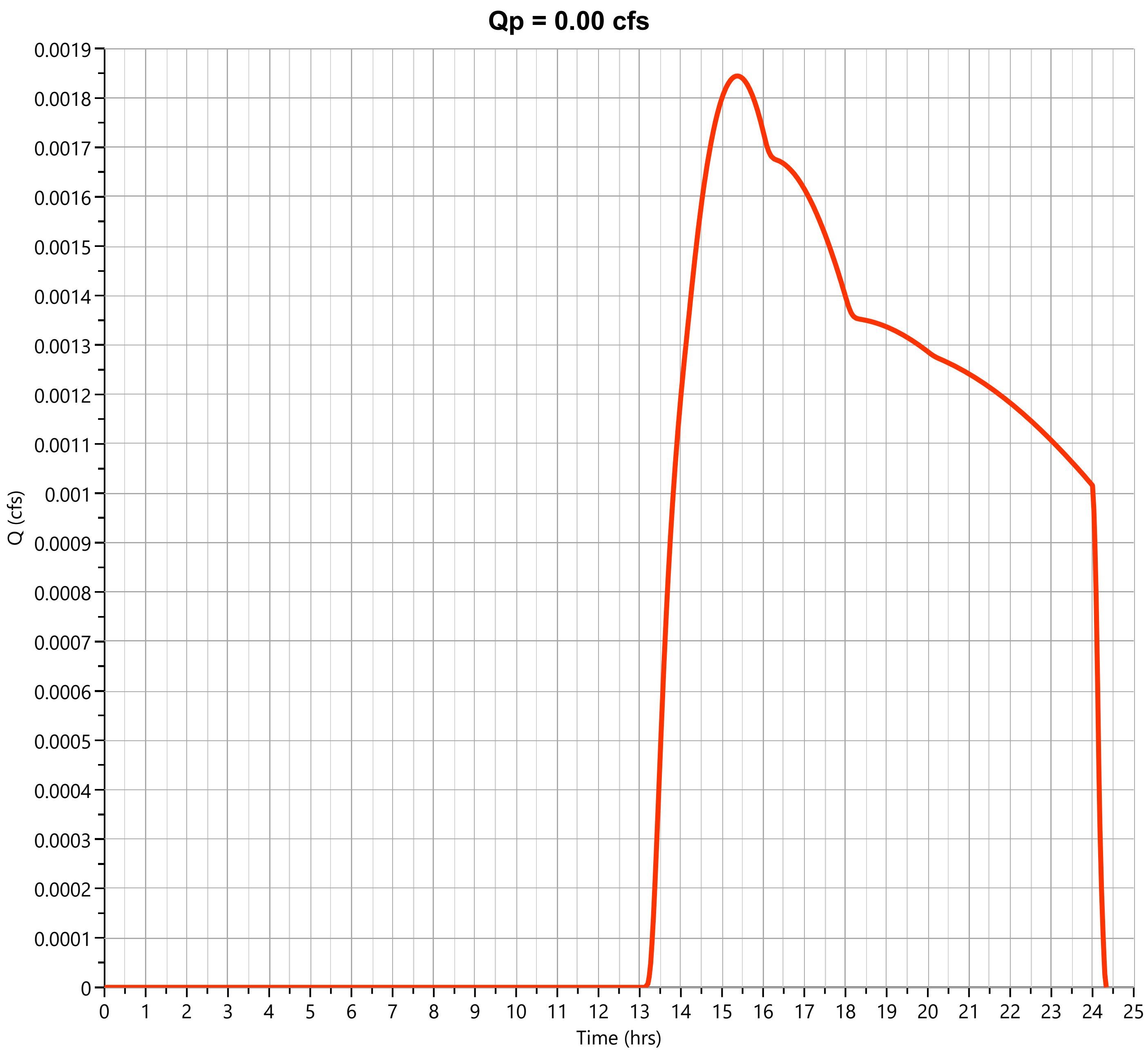
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.000 cfs
Storm Frequency	= 10-yr	Time to Peak	= 23.73 hrs
Time Interval	= 2 min	Runoff Volume	= 3.52 cuft
Drainage Area	= 0.16 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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

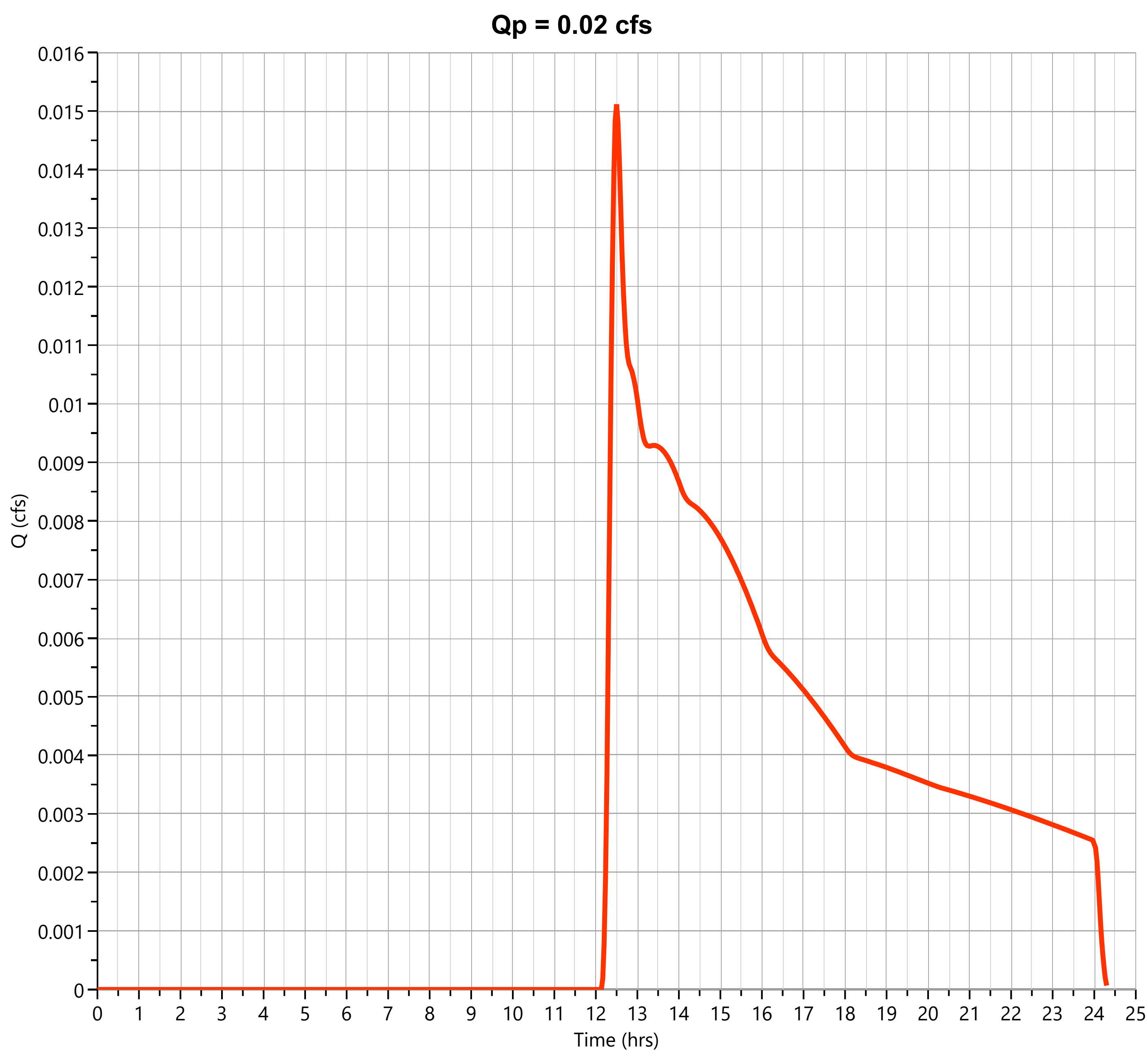


Hydrograph Report

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

Rev Date 9/27/2022

Location: Stow, MA Checked ______ Date ______

Circle one: Present Developed Subcatchment E-2A

1. Runoff curve number (CN)

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

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = $\frac{1108.18}{17.70}$ = 62.60 ; Use CN = 63

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency......................................	yr	2	25	100
Rainfall, P (24-hour).......................	in	3.27	6.14	7.84
Runoff, Q.. (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	0.54	2.24	3.50

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By MKO Date 6/1/2022
Rev Date 9/27/2022
Location: Stow, MA Checked ______ Date ______

Circle one: **Present** Developed Subcatchment E-2A
Circle one: **Tc** Tt through subarea

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	0.028			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.25			0.25
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	694			
9. Watercourse slope, s		ft/ft	0.128			
10. Average Velocity, V (figure 3-1)		ft/s	5.77			
11. Tt = L / 3600V	Compute Tt	hr	0.03			0.03
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.29
min 17.2

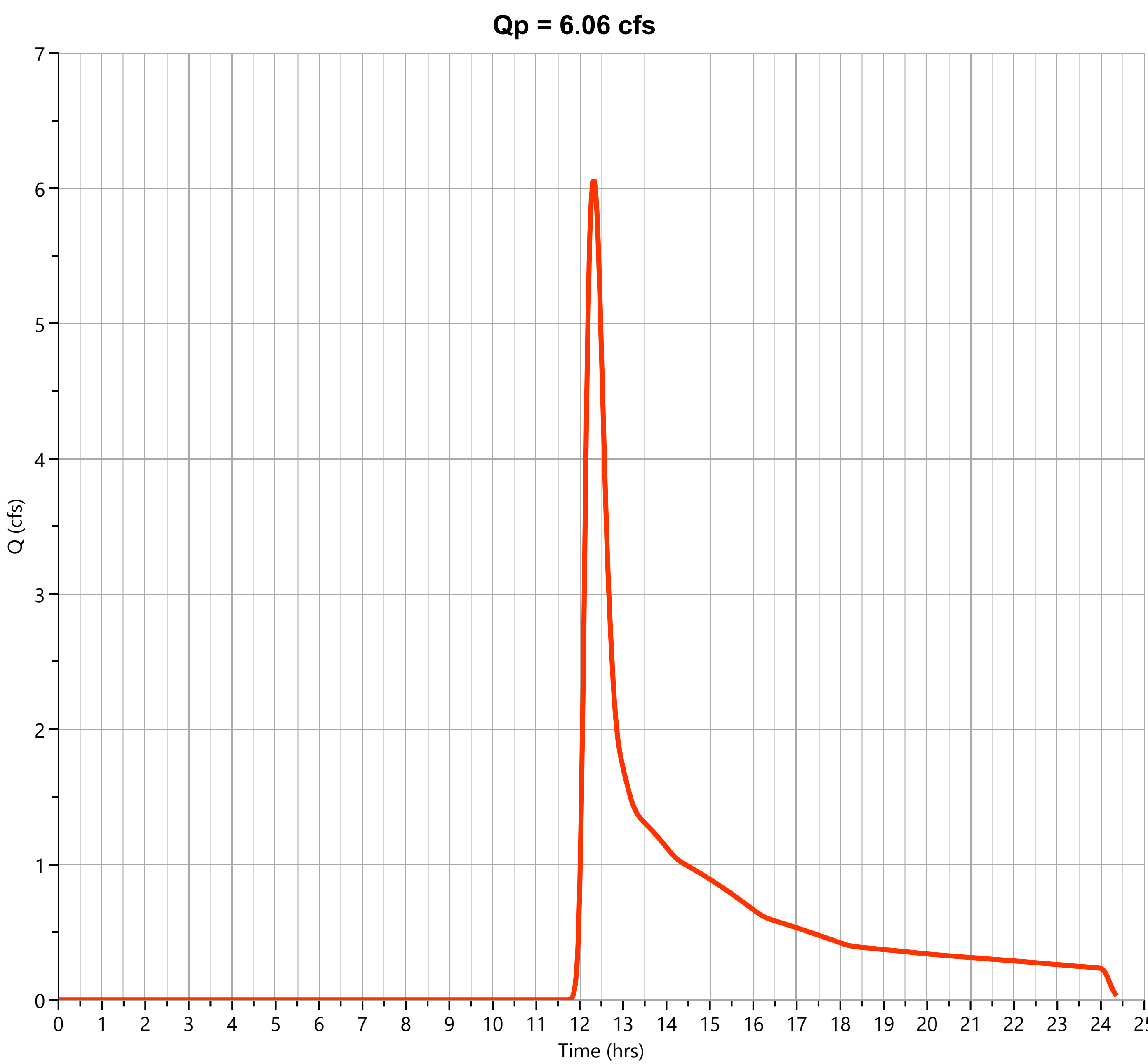
Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21 10-27-2022

E-2A Hyd. No. 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

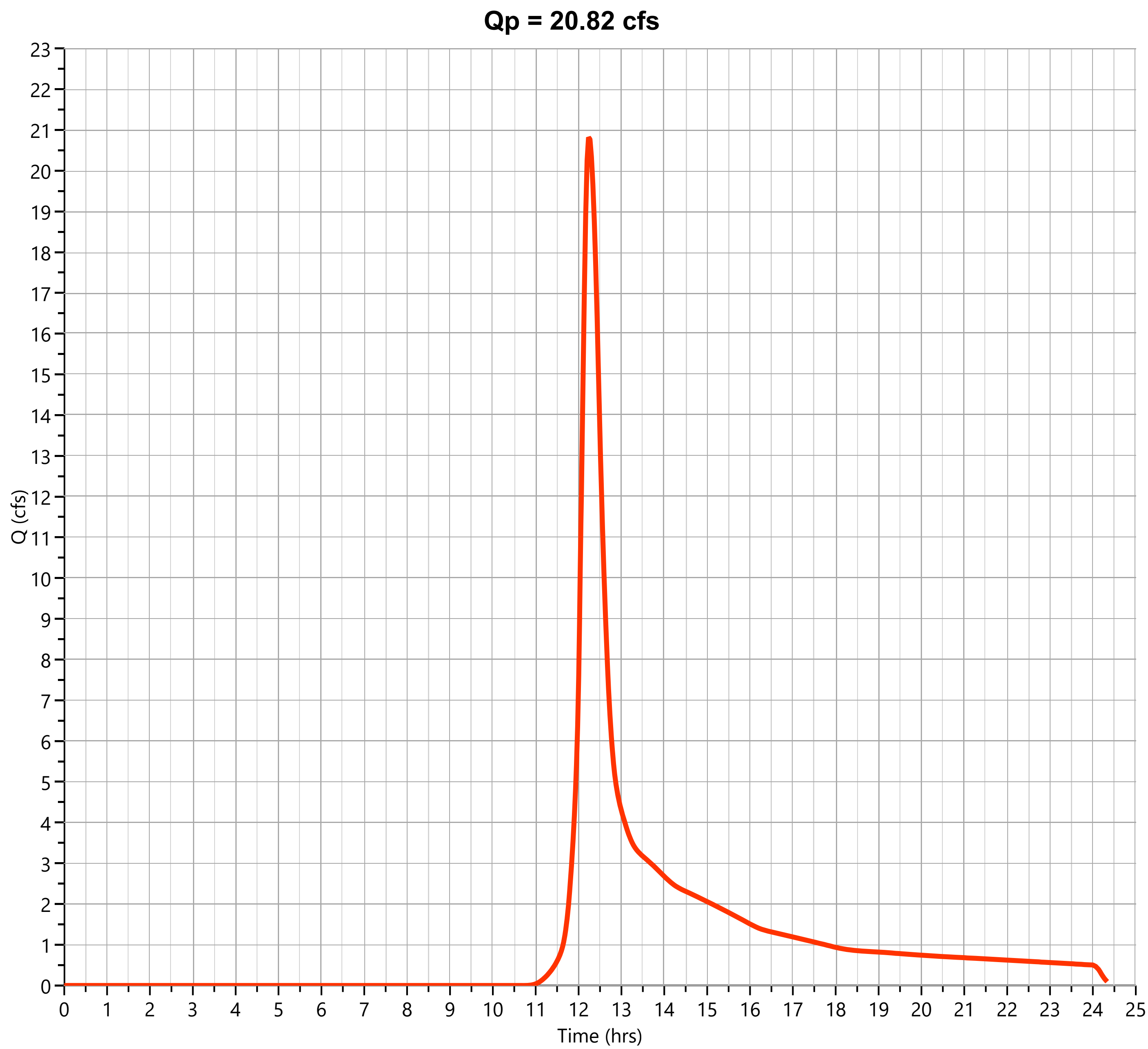


Hydrograph Report

Hydrology Studio v 3.0.0.21 10-27-2022

E-2A Hyd. No. 2

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 Report

Project Name:

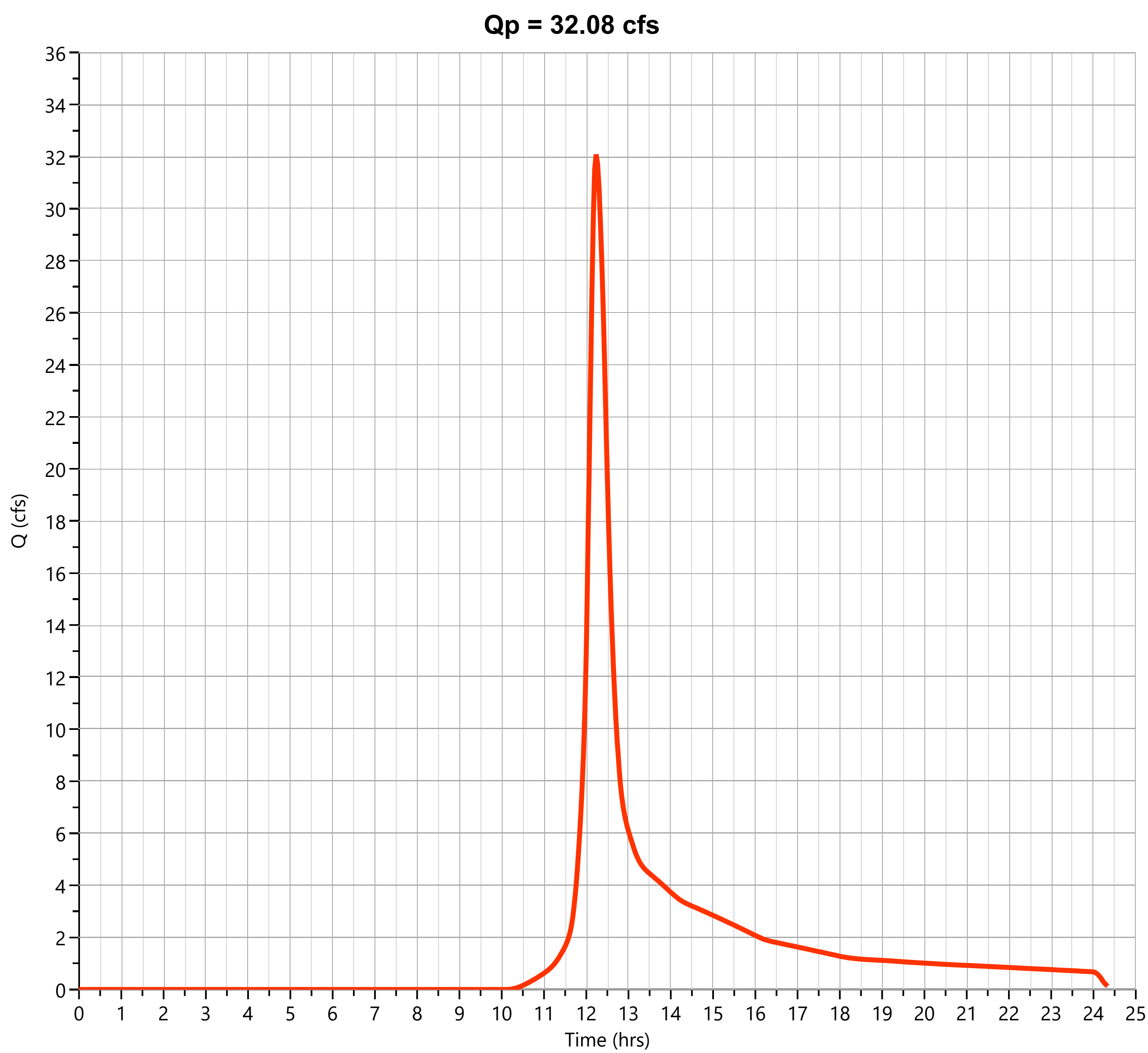
Hydrology Studio v 3.0.0.21

10-27-2022

E-2A

Hyd. No. 2

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

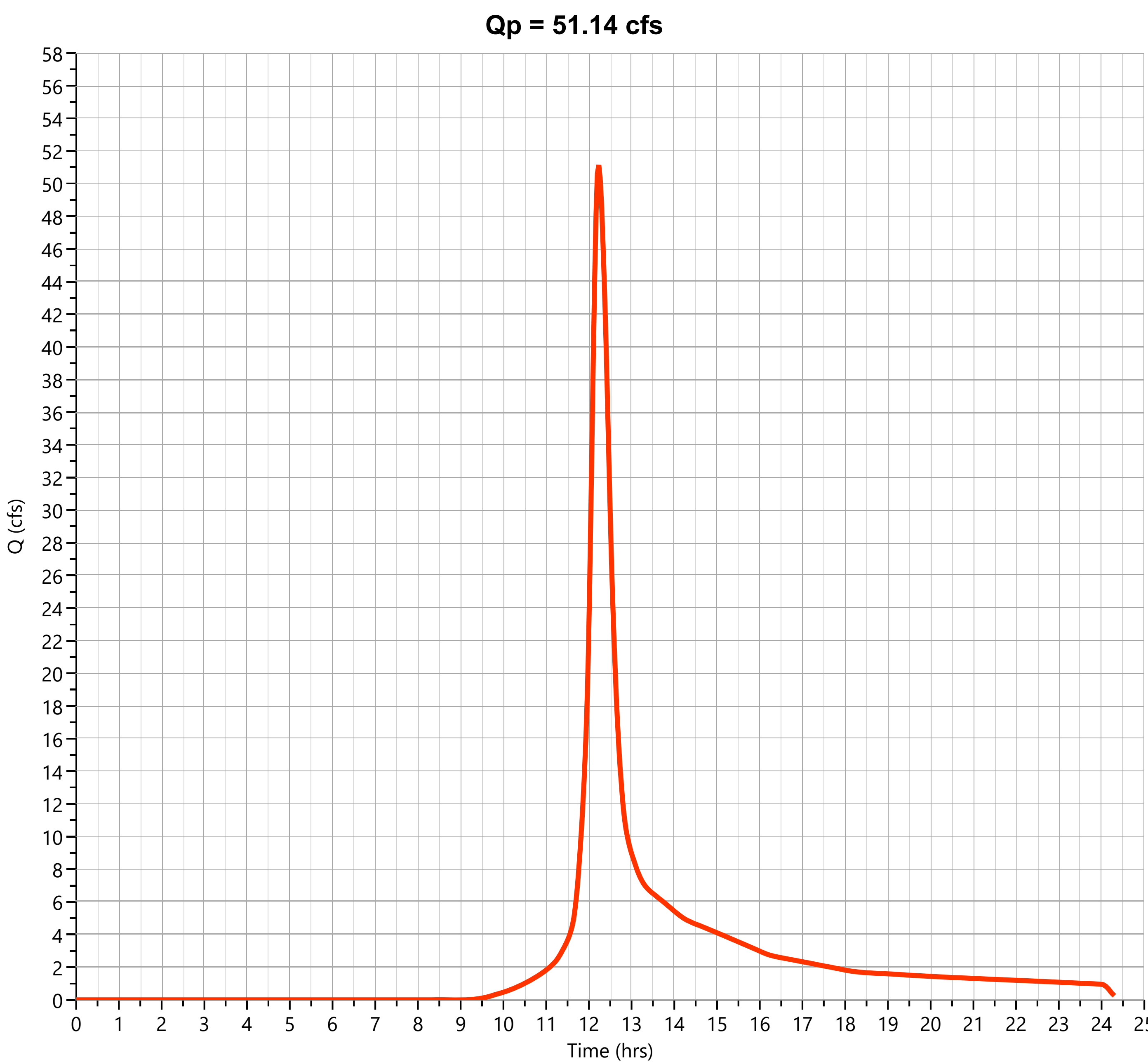


Hydrograph Report

E-2A

Hyd. No. 2

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 Street By MKO Date 6/1/22

Rev Date 9/27/2022

Location: Stow, MA Checked Date

Circle one: Present Developed Subcatchment E-2B

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)		CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
	Impervious		98			0.34	33.25
A	Woods	Good Condition	30			5.85	175.41
A	Open Space	Good Condition	39			2.78	108.36
A	Open Space	Fair Condition	49			1.89	92.39
A	Woods-Grass Combination	Good Condition	32			2.92	93.30
A	Gravel		76			0.84	63.70
B	Woods	Good Condition	55			0.00	0.00
B	Open Space	Good Condition	61			0.00	0.00
B	Gravel		85			0.00	0.00
C	Woods	Good Condition	70			3.65	255.18
C	Open Space	Fair Condition	79			1.74	137.62
C	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) = $\frac{\text{total product}}{\text{total area}} = \frac{1278.07}{24.13} =$ 52.96 ; Use CN = 53

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.......................................	yr	2	25	100
Rainfall, P (24-hour)........................	in	3.27	6.14	7.84
Runoff, Q... (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	0.22	1.44	2.46

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By MKO Date 6/1/2022
Rev Date 9/27/2022
Location: Stow, MA Checked ____ Date ____

Circle one: Present | Developed Subcatchment E-2B
Circle one: Tc | Tt through subarea

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	0.042			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.21			0.21

Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	1267			
9. Watercourse slope, s		ft/ft	0.088			
10. Average Velocity, V (figure 3-1)		ft/s	4.77			
11. Tt = L / 3600V	Compute Tt	hr	0.07			0.07

Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

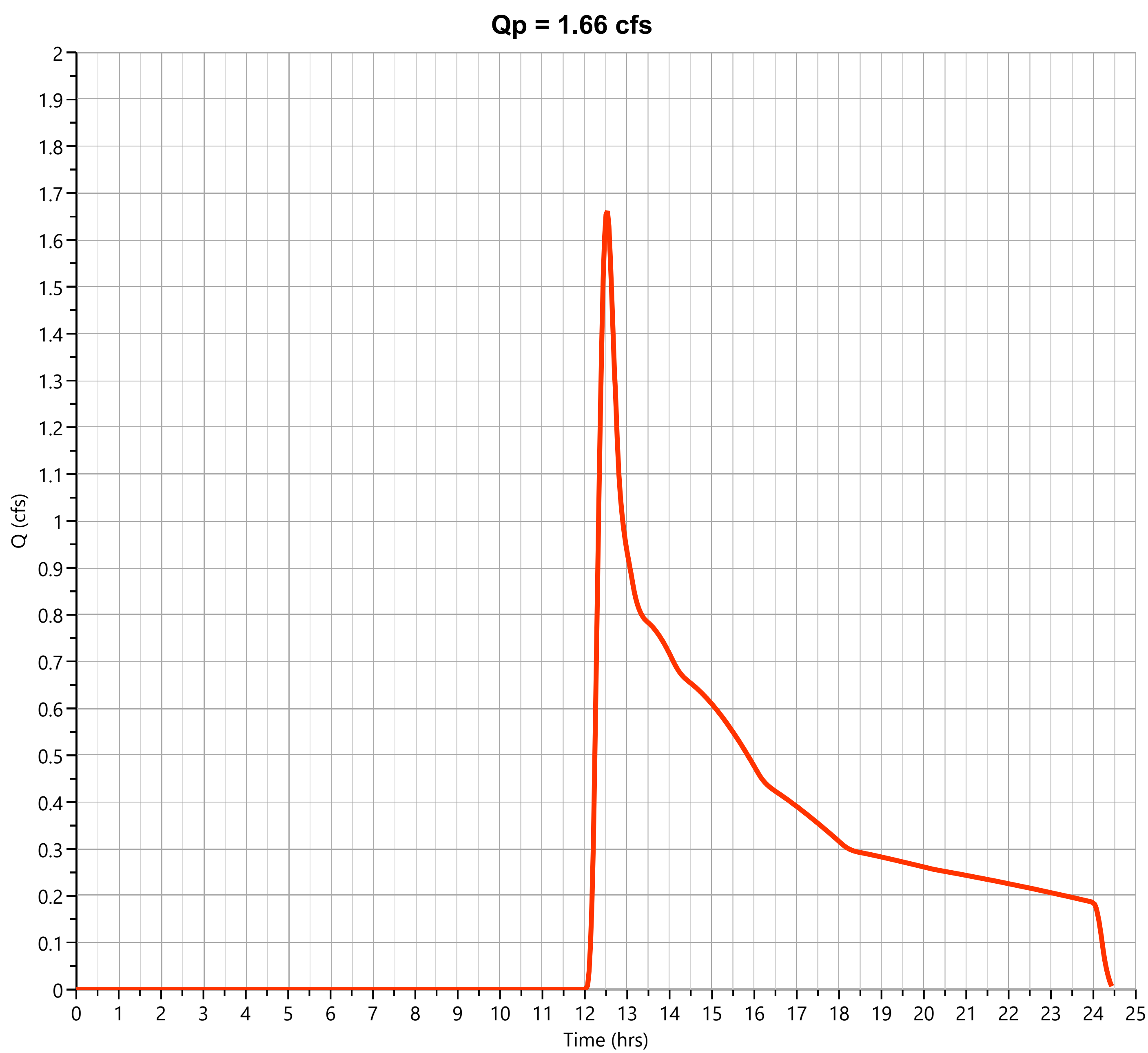
20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.29
min 17.3

Hydrograph Report

E-2B

Hyd. No. 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 Report

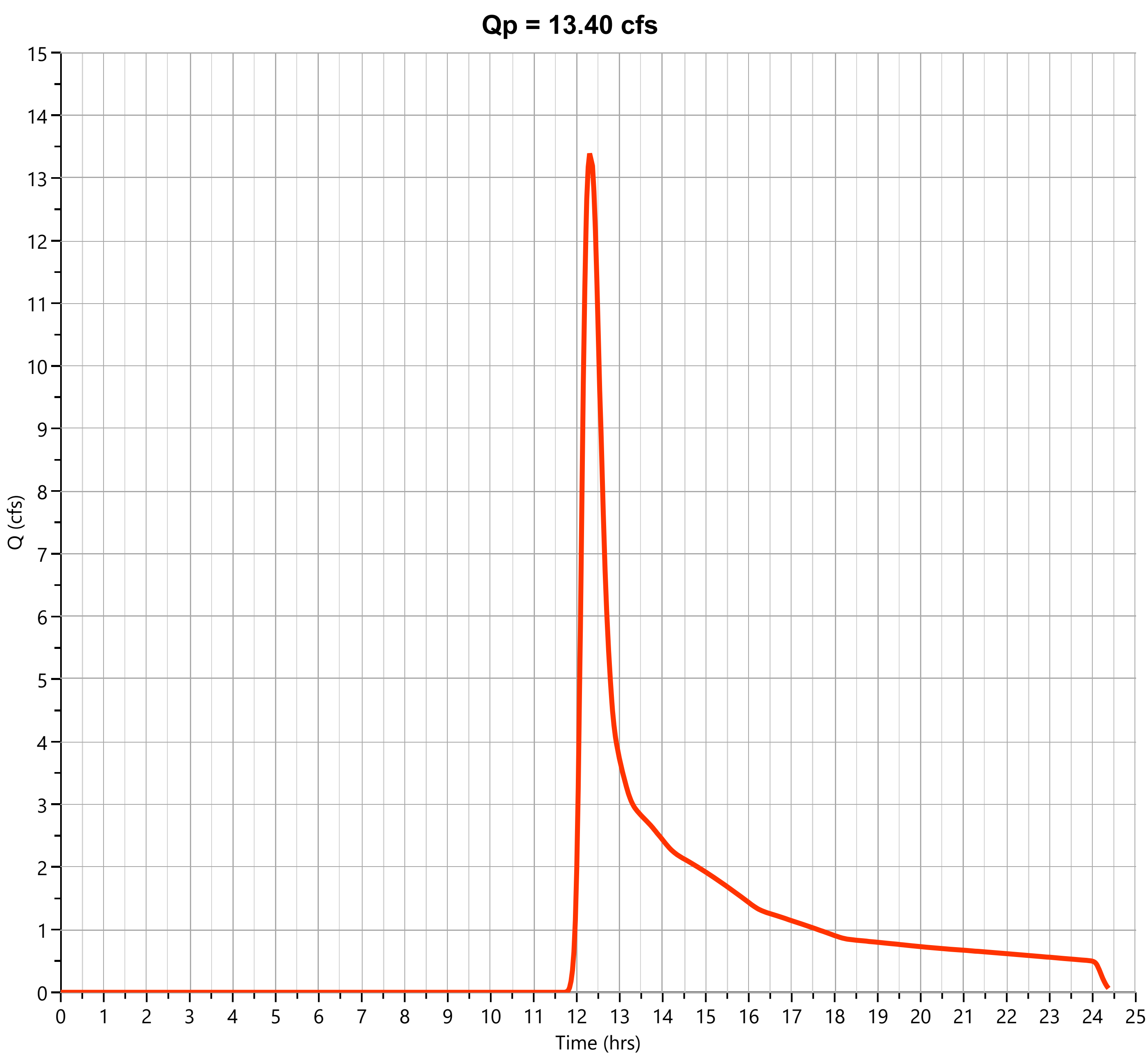
Project Name:

Hydrology Studio v 3.0.0.21 | 10-27-2022

E-2B

Hyd. No. 3

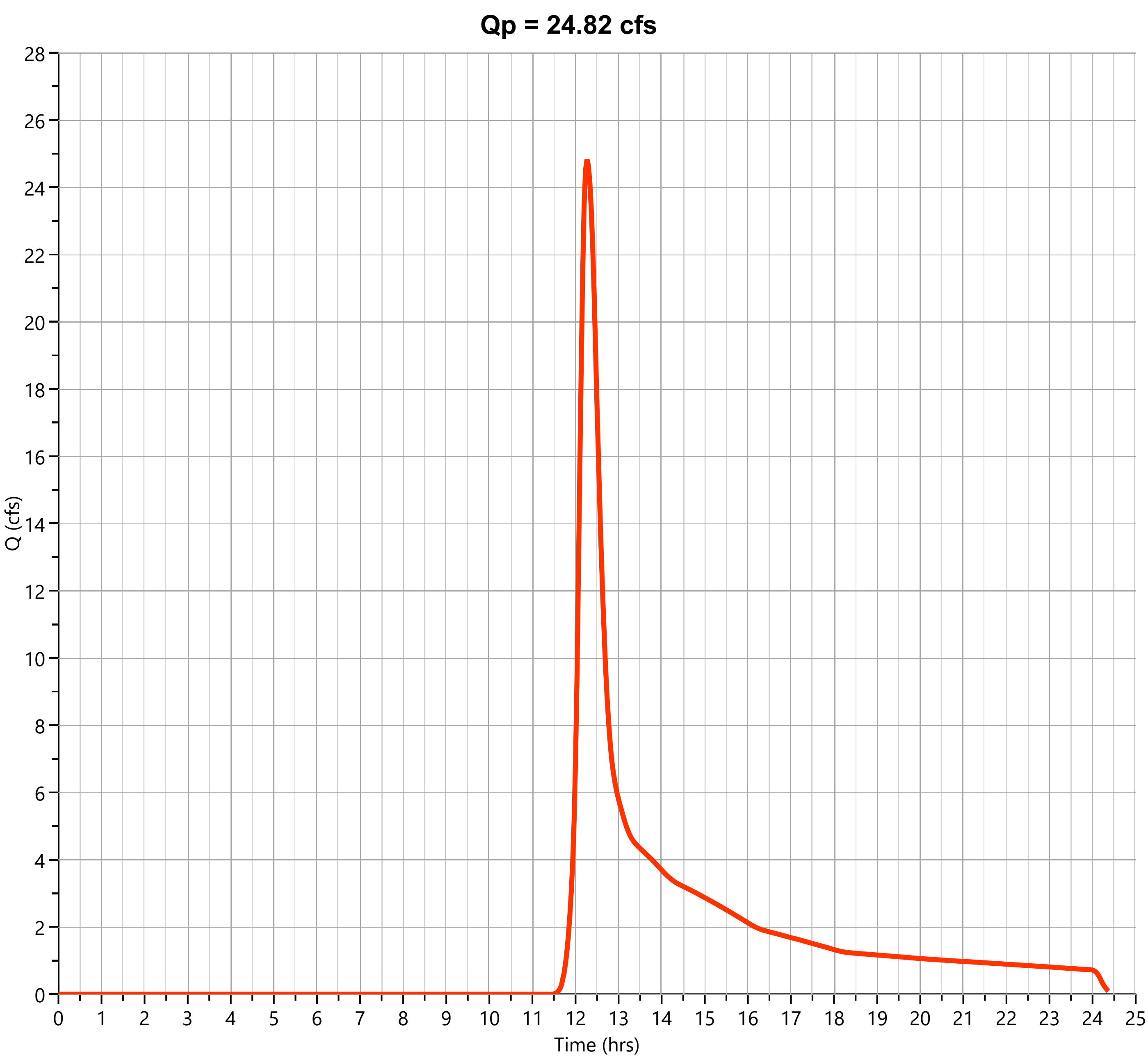
Hydrograph Type	= NRCS Runoff	Peak Flow	= 13.40 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Runoff Volume	= 77,016 cuft
Drainage Area	= 24.13 ac	Curve Number	= 53
Tc Method	= User	Time of Conc. (Tc)	= 17.3 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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



E-2B

Hyd. No. 3

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

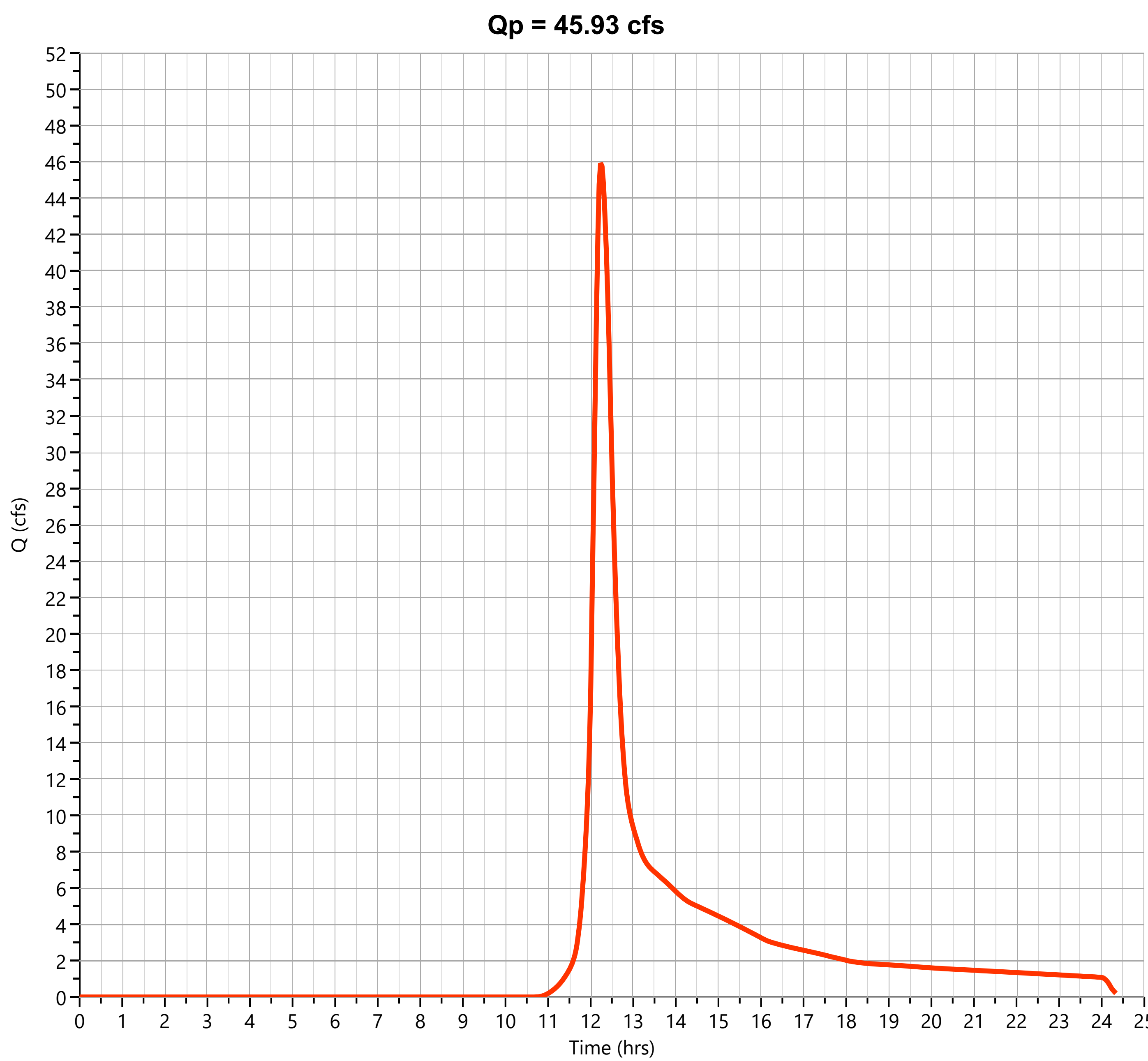


Hydrograph Report

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



Worksheet 2: Runoff curve number and runoff **SM-3719C**

Project: Athens Street By MKO Date 6/1/22
Rev Date 9/27/2022
Location: Stow, MA Checked Date

Circle one: Present Developed Subcatchment E-3

1. Runoff curve number (CN)

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

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

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency......................................	yr	2	25	100
Rainfall, P (24-hour).......................	in	3.27	6.14	7.84
Runoff, Q...	in	0.90	2.98	4.40

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By MKO Date 6/1/2022

Rev Date 9/27/2022

Location: Stow, MA Checked ______ Date ______

Circle one: Present Developed Subcatchment E-3

Circle one: Tc Tt through subarea

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	0.012			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.35			0.35
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	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 Tt	hr	0.02			0.02
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.37

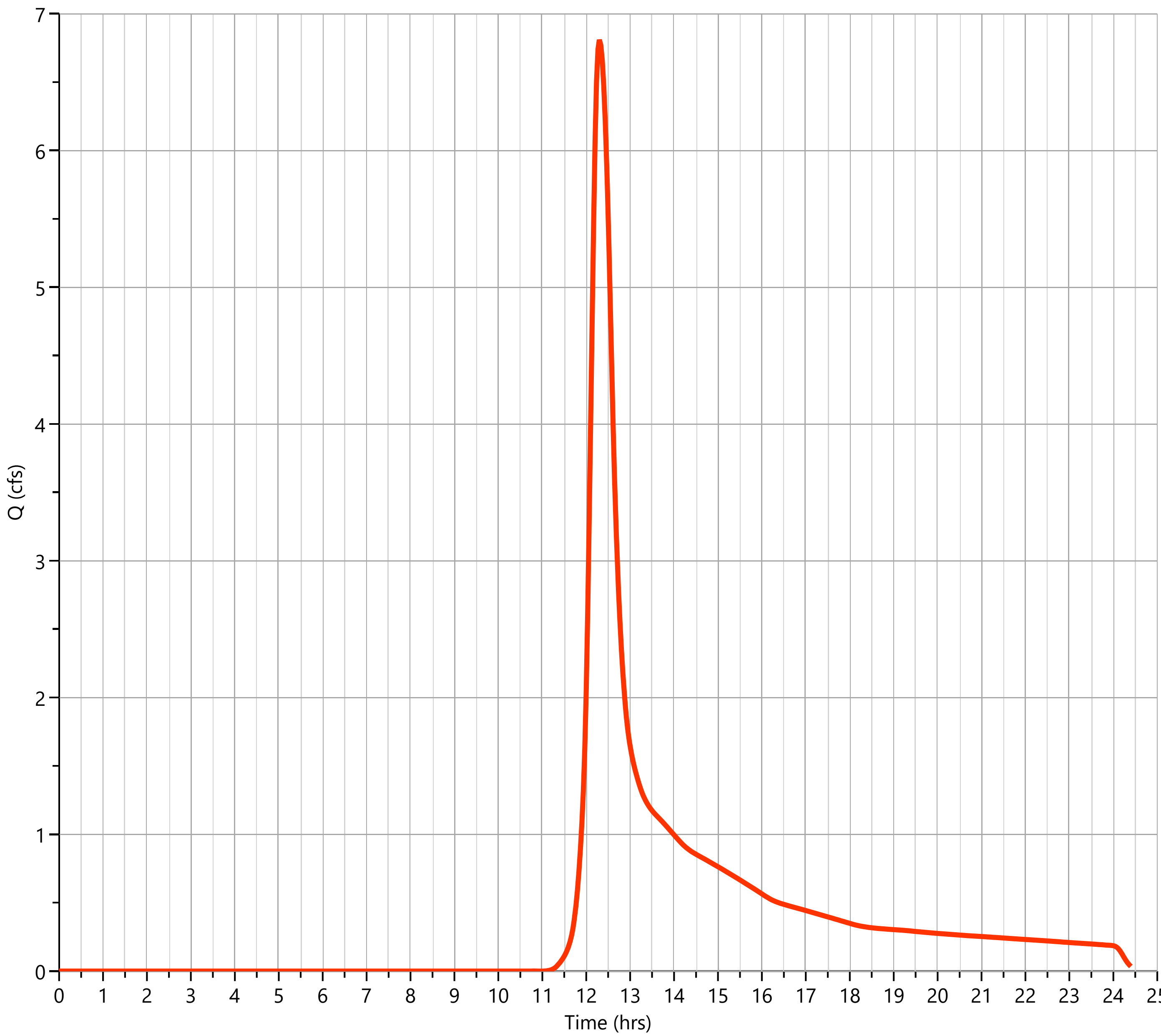
min 22.4

E-3

Hyd. No. 4

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

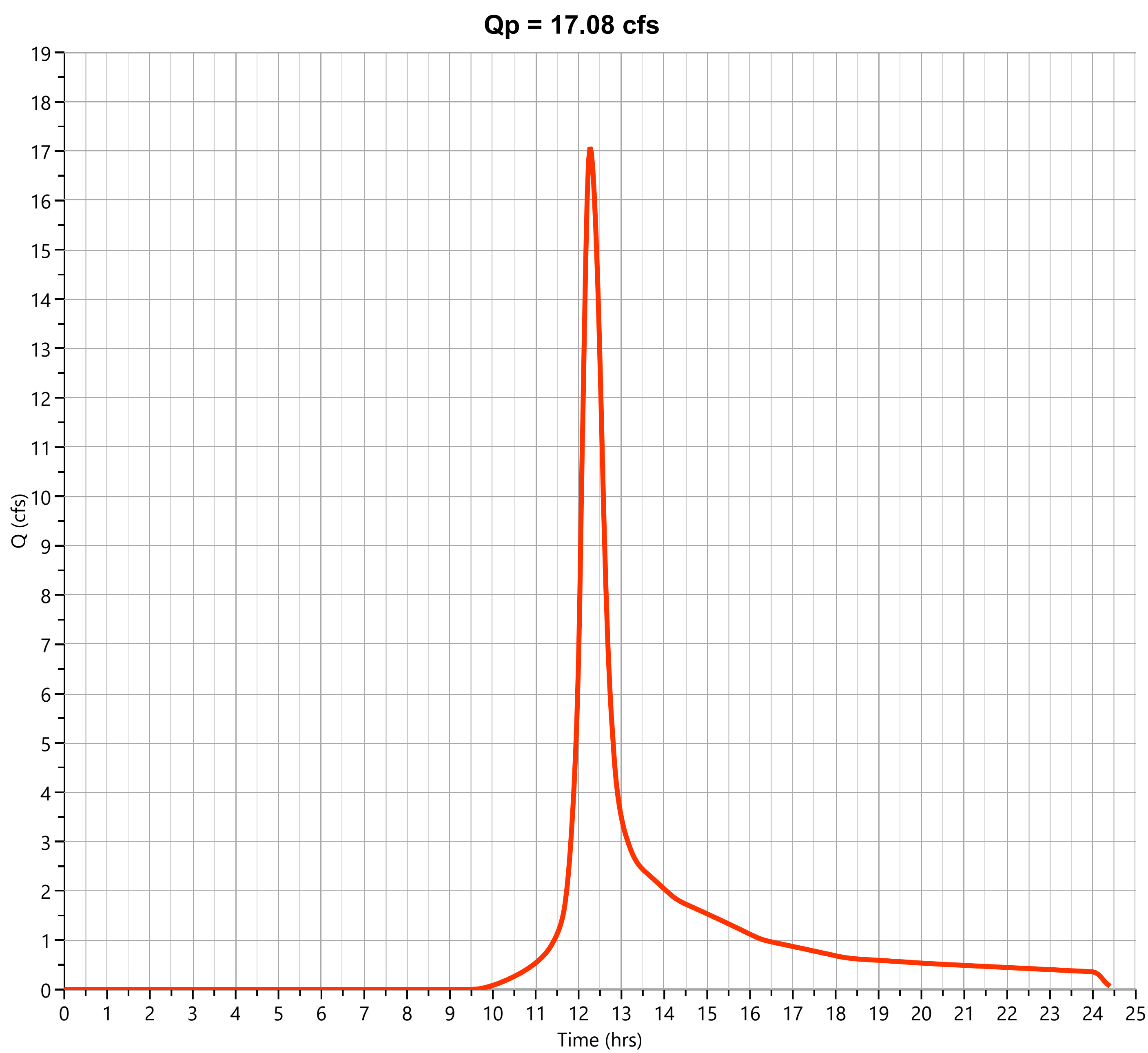
Qp = 6.81 cfs



E-3

Hyd. No. 4

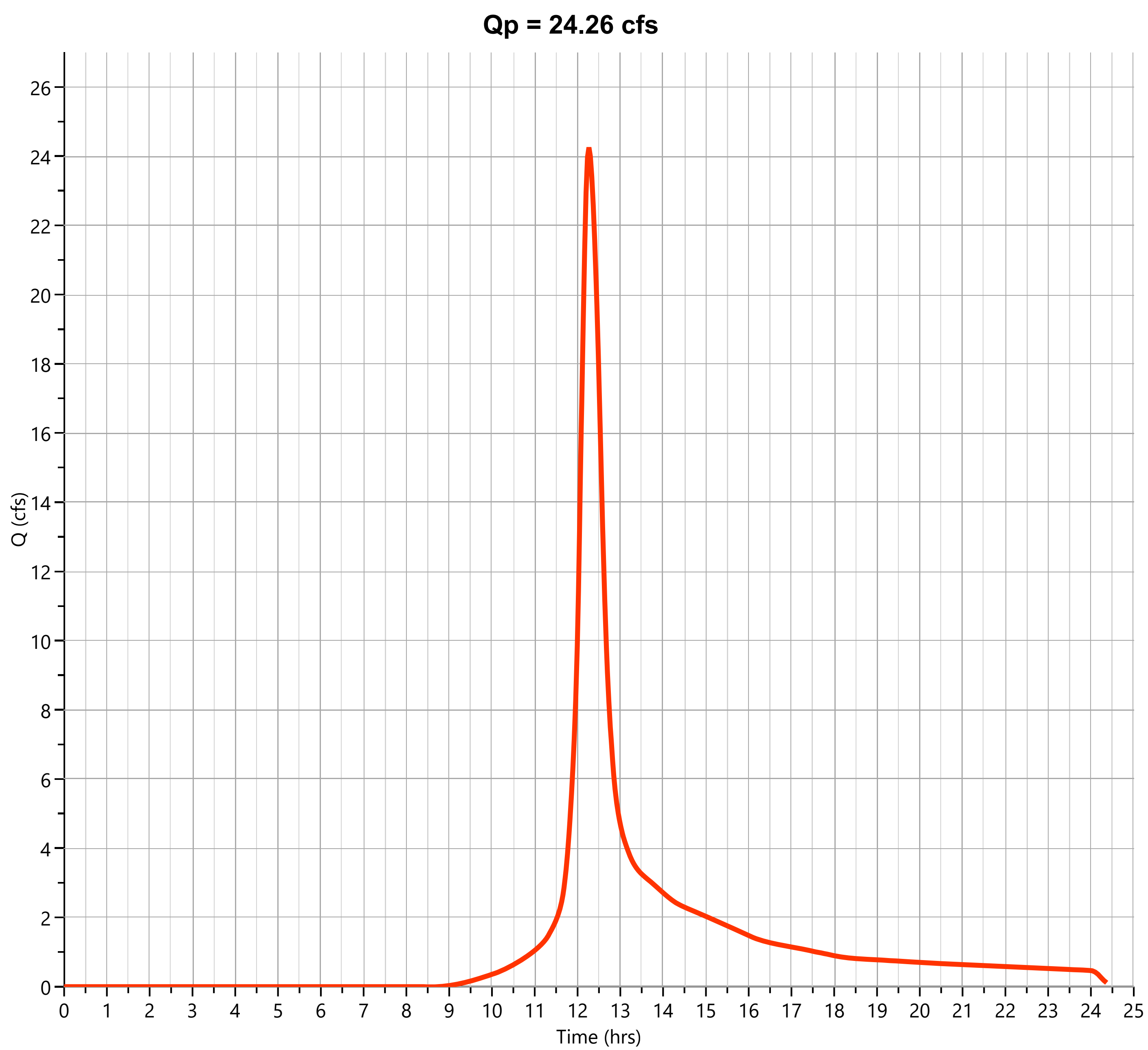
Hydrograph Type	= NRCS Runoff	Peak Flow	= 17.08 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Runoff Volume	= 82,096 cuft
Drainage Area	= 10.35 ac	Curve Number	= 71
Tc Method	= User	Time of Conc. (Tc)	= 22.4 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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



E-3

Hyd. No. 4

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 Report

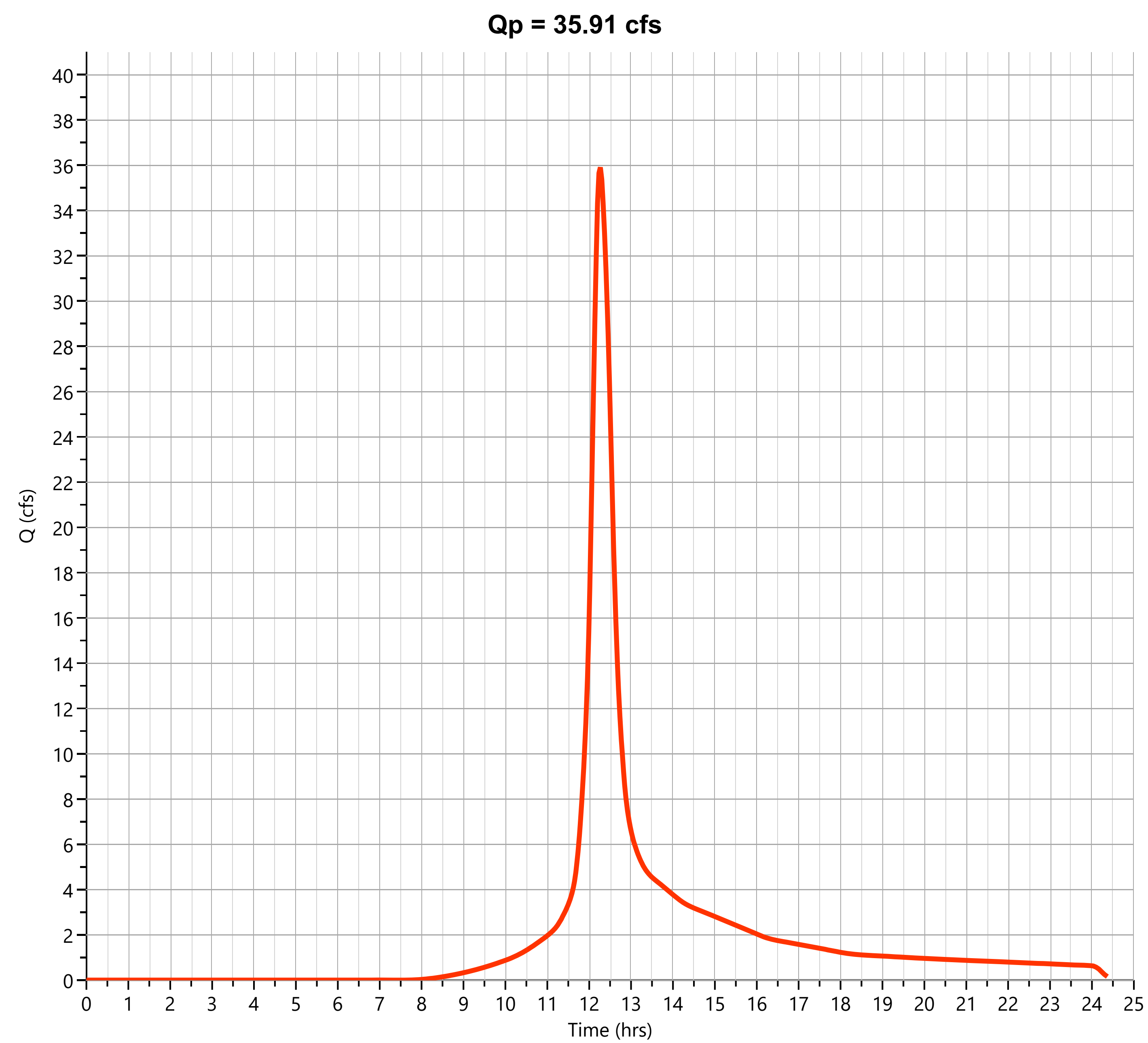
Project Name:

Hydrology Studio v 3.0.0.21 10-27-2022

E-3

Hyd. No. 4

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



Worksheet 2: Runoff curve number and runoff **SM-3719C**

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-4

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)		CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
	Impervious		98			0.00	0.00
A	Woods	Good Condition	30			0.18	5.55
A	Open Space	Good Condition	39			0.00	0.00
A	Brush	Fair	35			0.00	0.00
A	Gravel		76			0.05	3.63
B	Woods	Good Condition	55			0.00	0.00
B	Open Space	Good Condition	61			0.00	0.00
B	Gravel		85			0.00	0.00
C	Woods	Good Condition	70			9.72	680.19
C	Open Space	Good Condition	74			0.00	0.00
C	Gravel		89			0.31	28.03
D	BVW		77			0.03	2.51
					Totals =	10.30	719.91

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{719.91}{10.30} = 69.91$; Use CN = 70

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency......................................	yr	2	25	100
Rainfall, P (24-hour).......................	in	3.27	6.14	7.84
Runoff, Q...	in	0.86	2.91	4.32

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By MKO Date 6/1/2022
Rev Date 9/27/2022
Location: Stow, MA Checked ______ Date ______

Circle one: **Present** Developed Subcatchment E-4
Circle one: **Tc** Tt through subarea

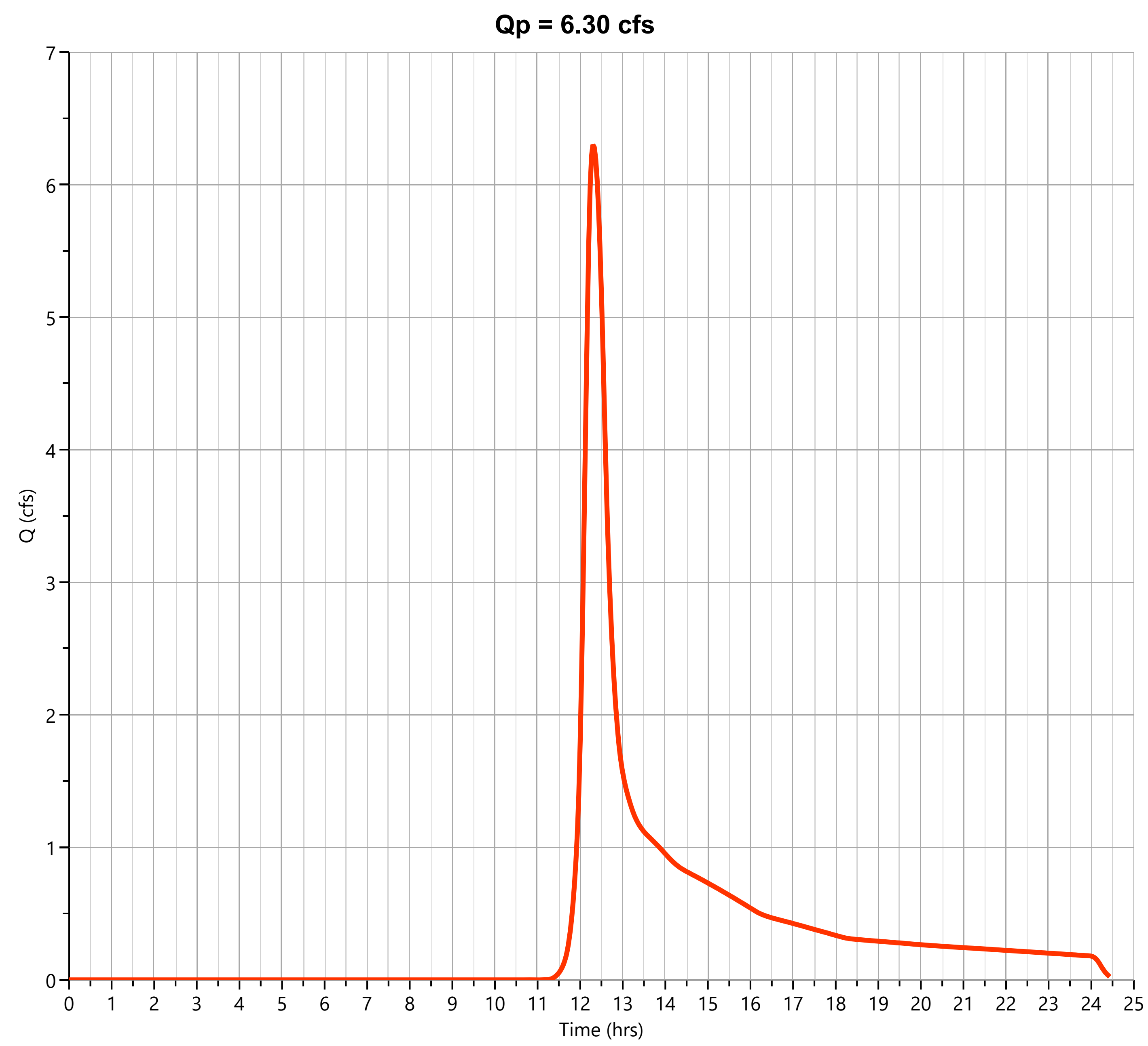
Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			WOODS			
2. Mannings roughness coeff., n (table 3-1)			0.6			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.016			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.32			0.32
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	735			
9. Watercourse slope, s		ft/ft	0.103			
10. Average Velocity, V (figure 3-1)		ft/s	5.18			
11. Tt = L / 3600V	Compute Tt	hr	0.04			0.04
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.36
min 21.3

E-4

Hyd. No. 5

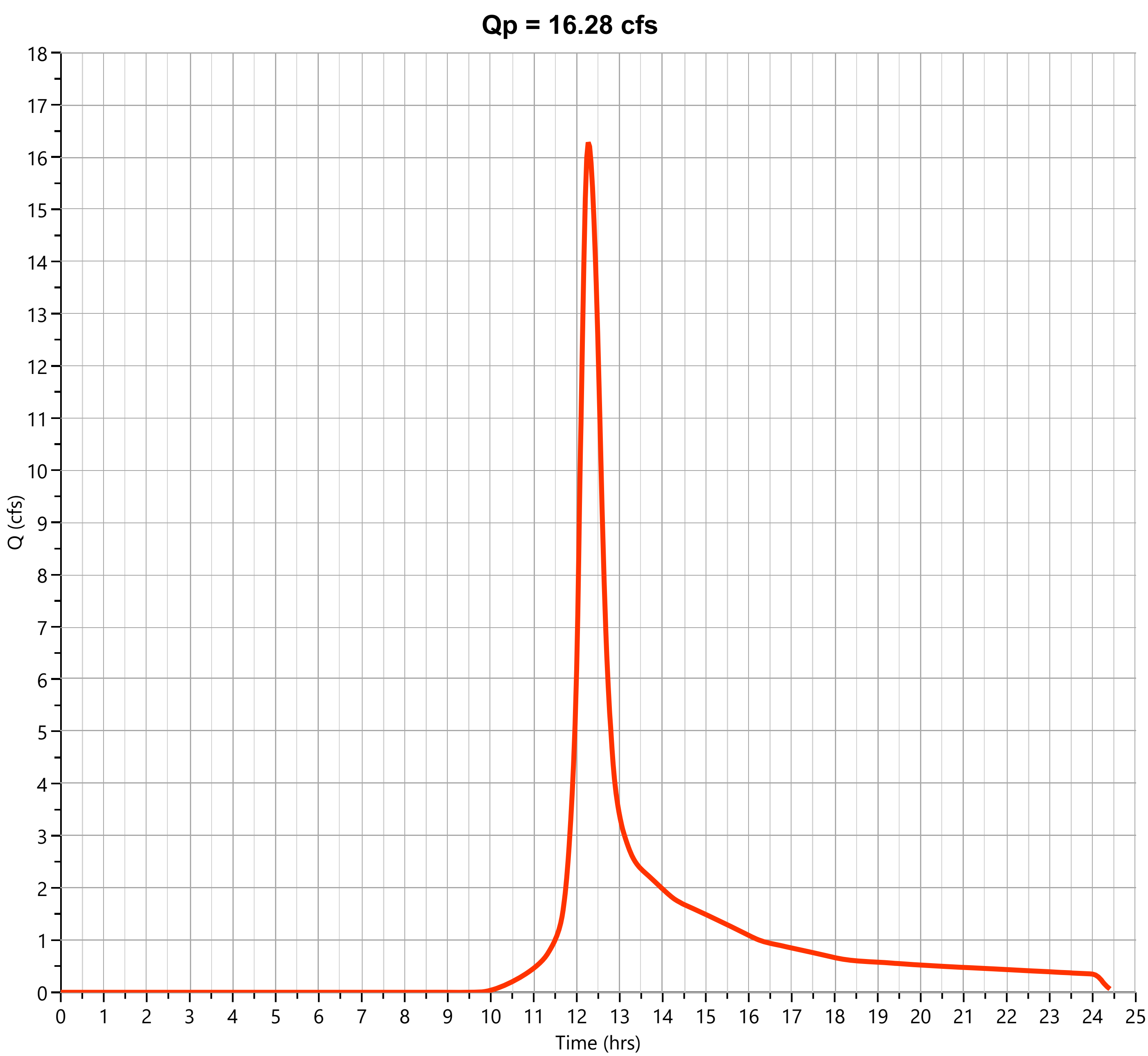
Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.300 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.30 hrs
Time Interval	= 2 min	Runoff Volume	= 33,076 cuft
Drainage Area	= 10.3 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 21.3 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



E-4

Hyd. No. 5

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 Report

Project Name:

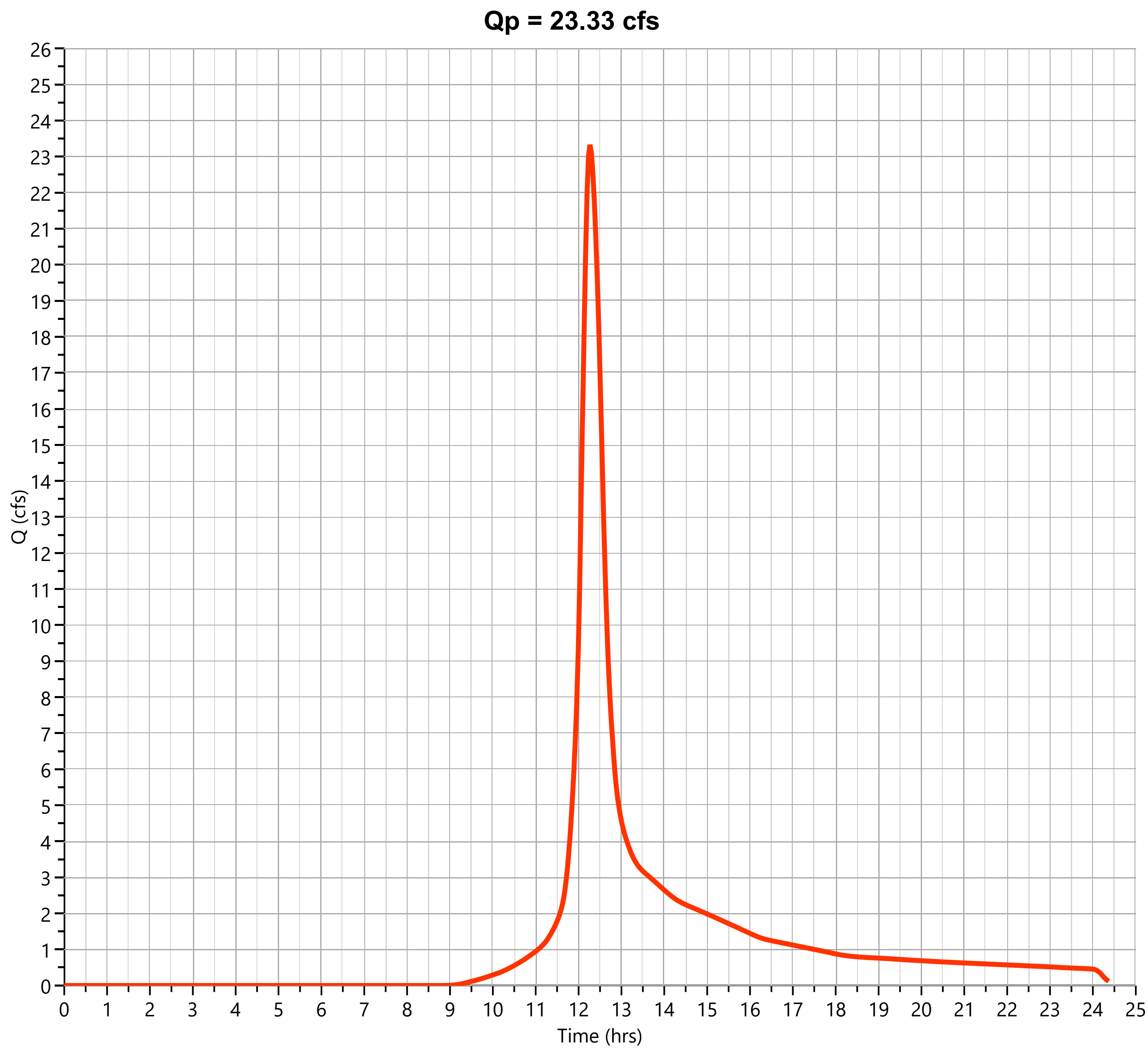
Hydrology Studio v 3.0.0.21

10-27-2022

E-4

Hyd. No. 5

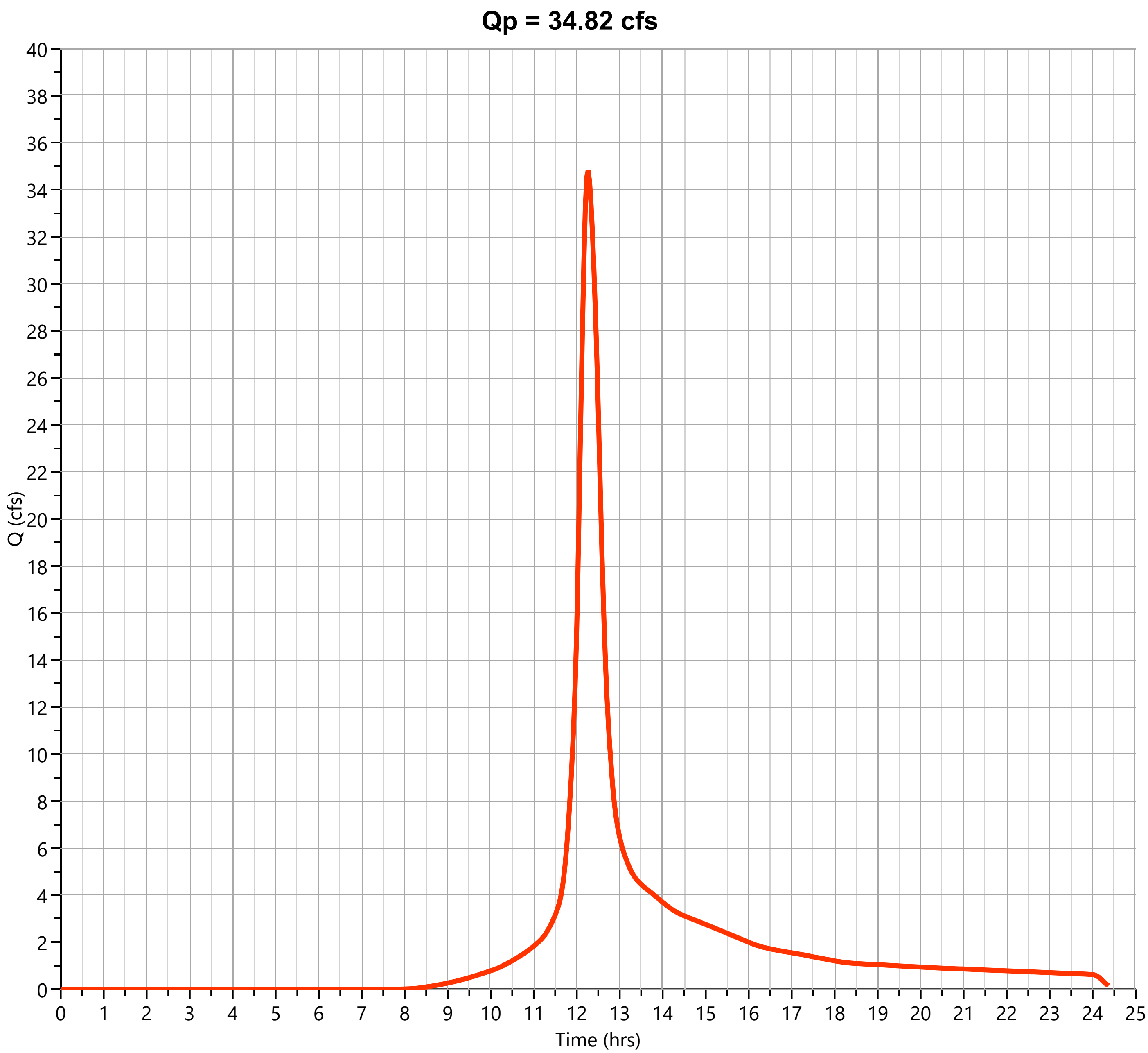
Hydrograph Type	= NRCS Runoff	Peak Flow	= 23.33 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Runoff Volume	= 111,000 cuft
Drainage Area	= 10.3 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 21.3 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration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



E-4

Hyd. No. 5

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



Worksheet 2: Runoff curve number and runoff **SM-3719C**

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-5

1. Runoff curve number (CN)

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

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = $\frac{761.55}{12.89}$ = 59.06 ; Use CN = 59

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.......................................	yr	2	25	100
Rainfall, P (24-hour)........................	in	3.27	6.14	7.84
Runoff, Q...	in	0.40	1.93	3.11

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By MKO Date 6/1/2022

Rev Date 9/27/2022

Location: Stow, MA Checked ______ Date ______

Circle one: **Present** Developed Subcatchment E-5

Circle one: **Tc** Tt through subarea

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	0.026			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.26			0.26
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	1260			
9. Watercourse slope, s		ft/ft	0.076			
10. Average Velocity, V (figure 3-1)		ft/s	4.45			
11. Tt = L / 3600V	Compute Tt	hr	0.08			0.08
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

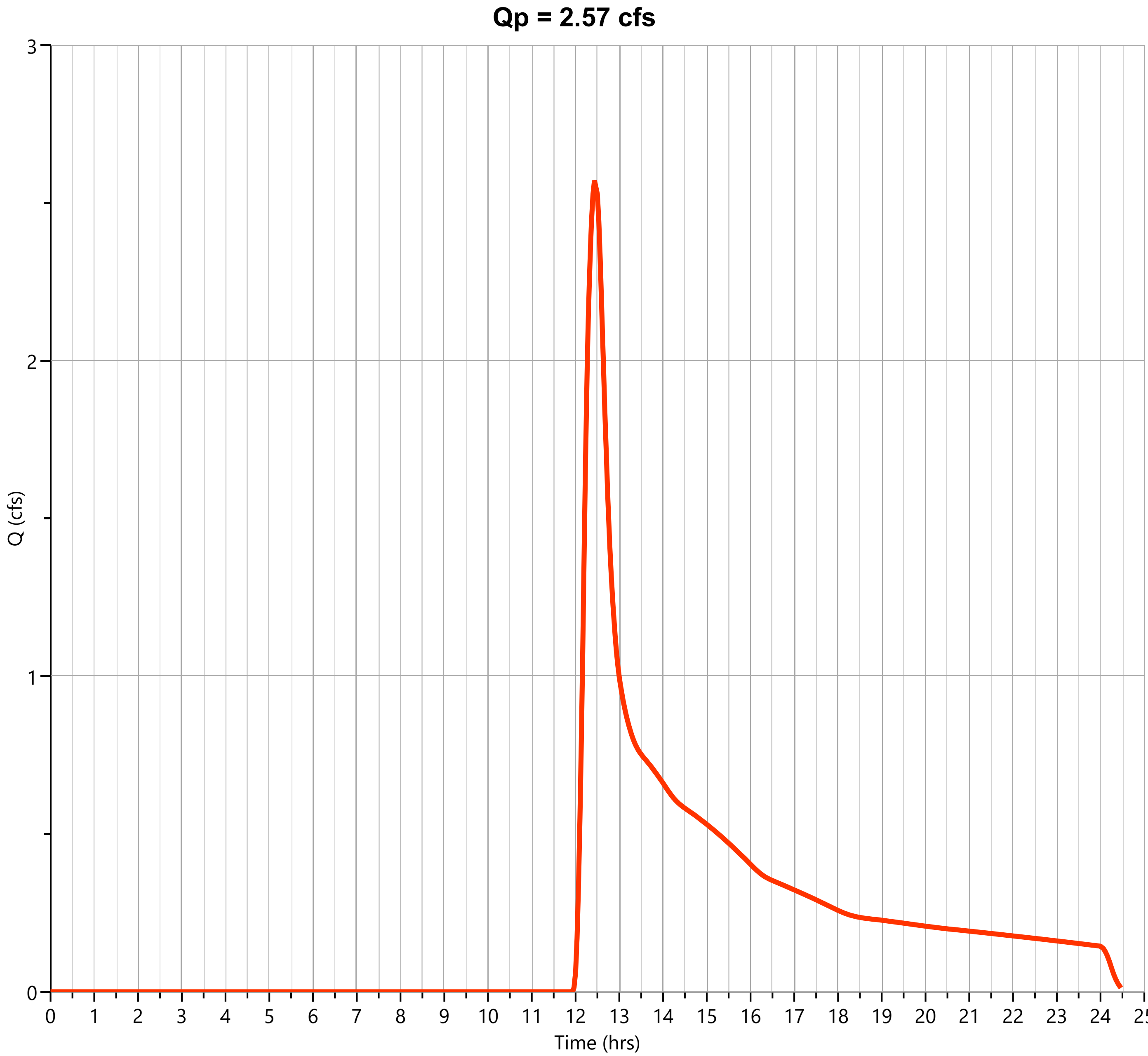
20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.34

min 20.3

E-5

Hyd. No. 6

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



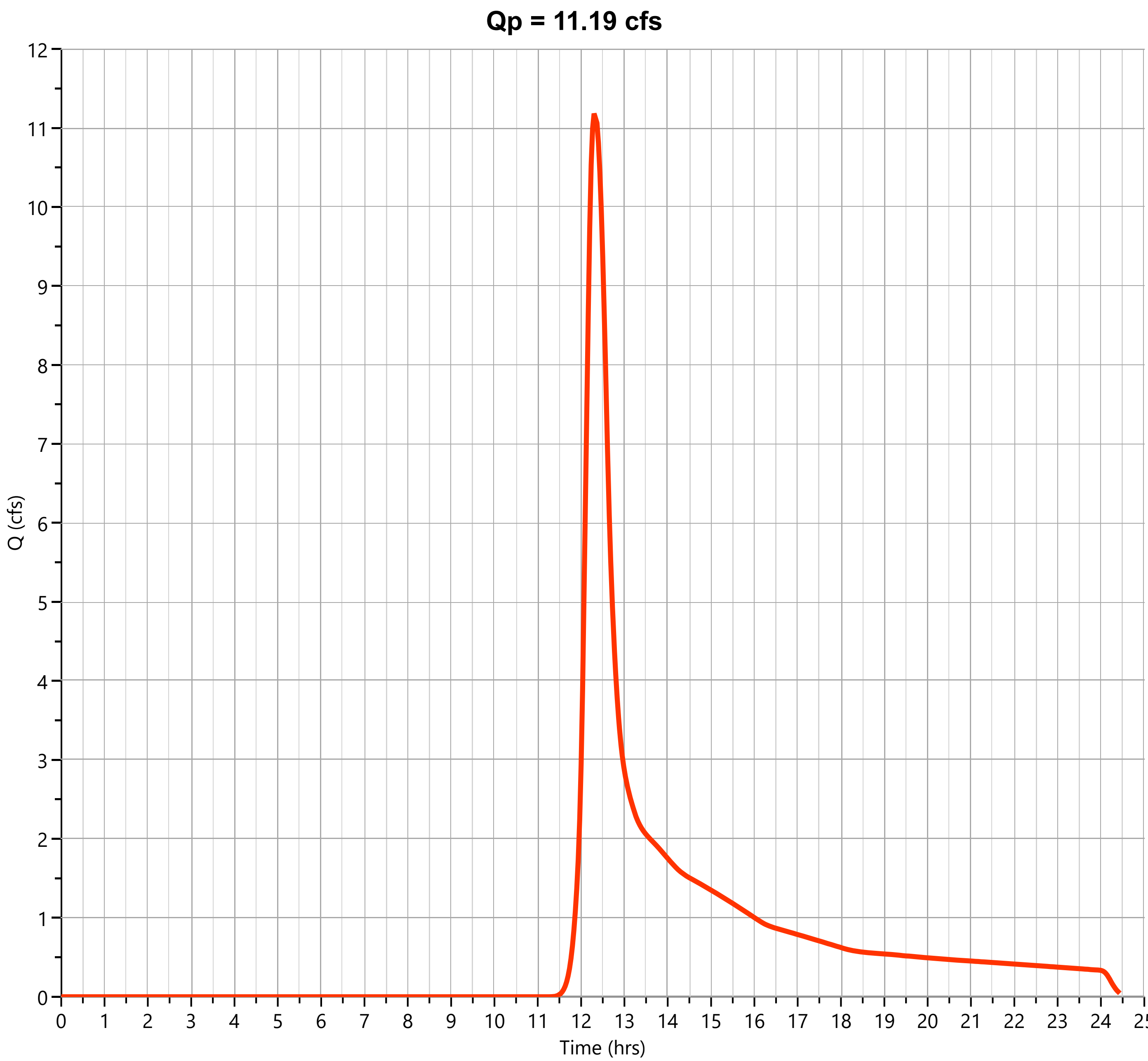
Hydrograph Report

Hydrology Studio v 3.0.0.21 10-27-2022

E-5

Hyd. No. 6

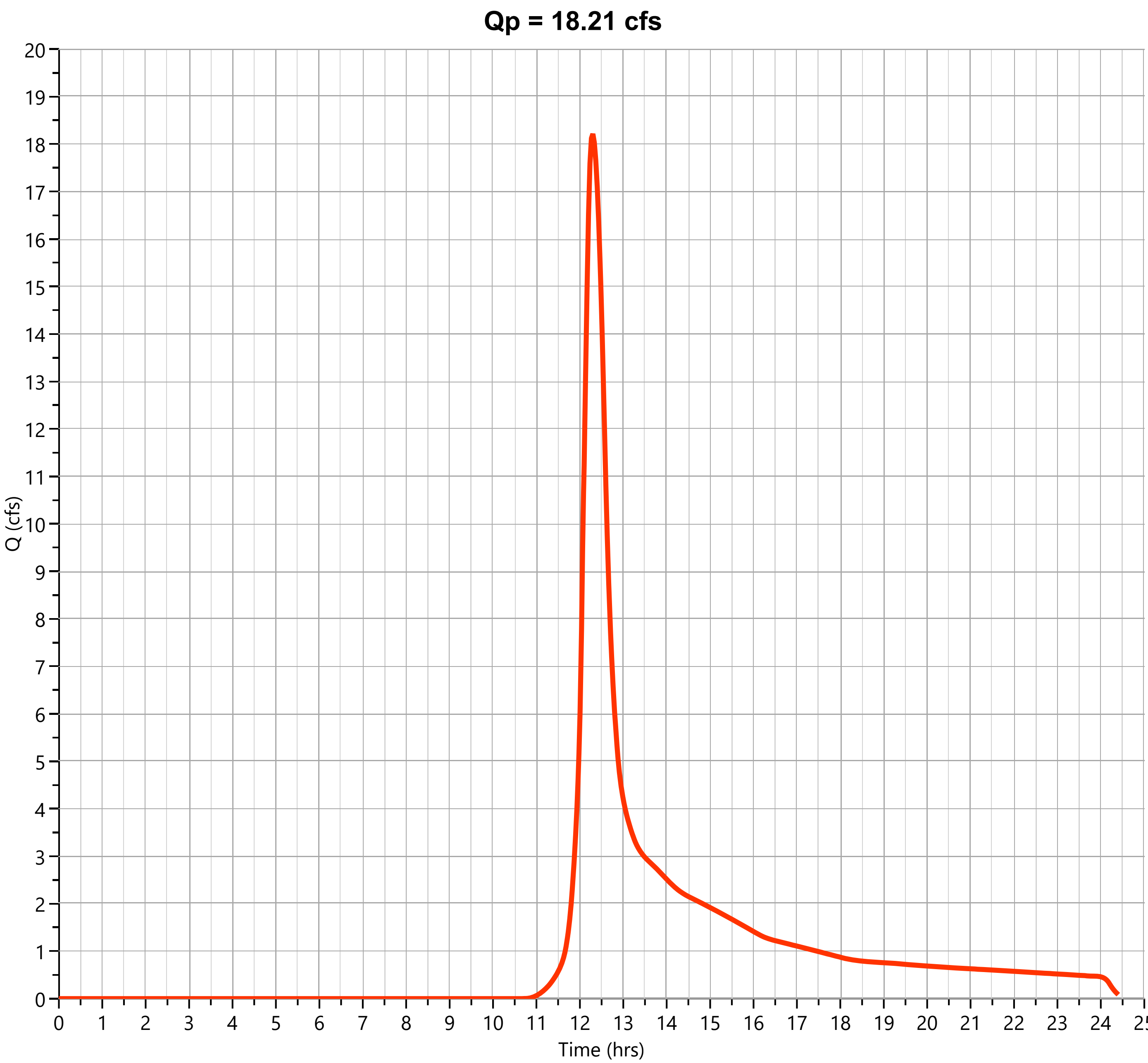
Hydrograph Type	= NRCS Runoff	Peak Flow	= 11.19 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Runoff Volume	= 59,868 cuft
Drainage Area	= 12.89 ac	Curve Number	= 59
Tc Method	= User	Time of Conc. (Tc)	= 20.3 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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



E-5

Hyd. No. 6

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



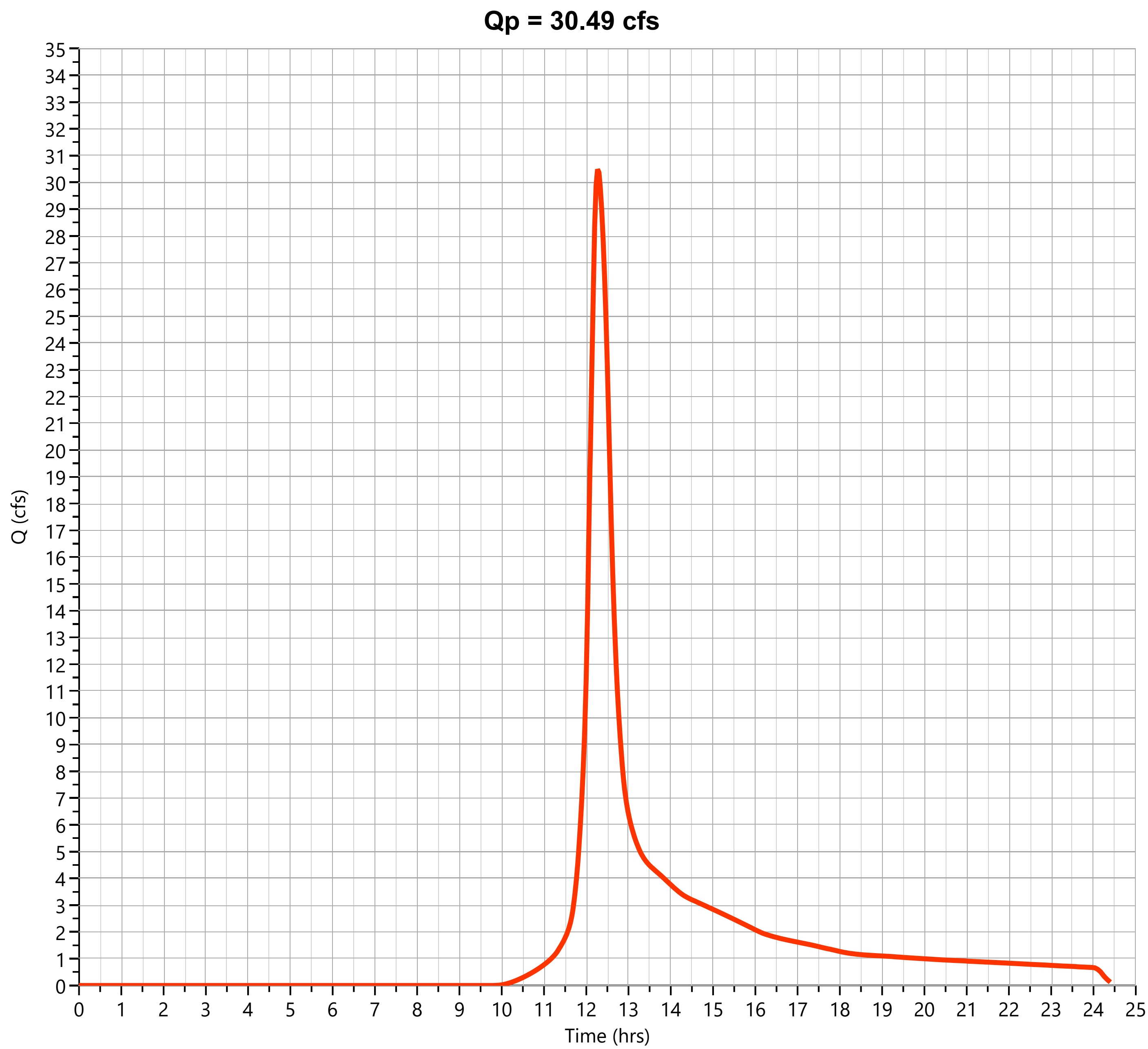
Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21 10-27-2022

E-5 Hyd. No. 6

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



Worksheet 2: Runoff curve number and runoff **SM-3719C**

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-6

1. Runoff curve number (CN)

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

1/ Use only one CN source per line.

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

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.......................................	yr	2	25	100
Rainfall, P (24-hour)........................	in	3.27	6.14	7.84
Runoff, Q...	in	0.00	0.42	0.98

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By MKO Date 6/1/2022
Rev Date 9/27/2022
Location: Stow, MA Checked ______ Date ______

Circle one: Present | Developed — Subcatchment E-6
Circle one: Tc | Tt through subarea

		Segment ID				
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	0.014			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.33			0.33
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	297			
9. Watercourse slope, s		ft/ft	0.050			
10. Average Velocity, V (figure 3-1)		ft/s	3.61			
11. Tt = L / 3600V	Compute Tt	hr	0.02			0.02
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

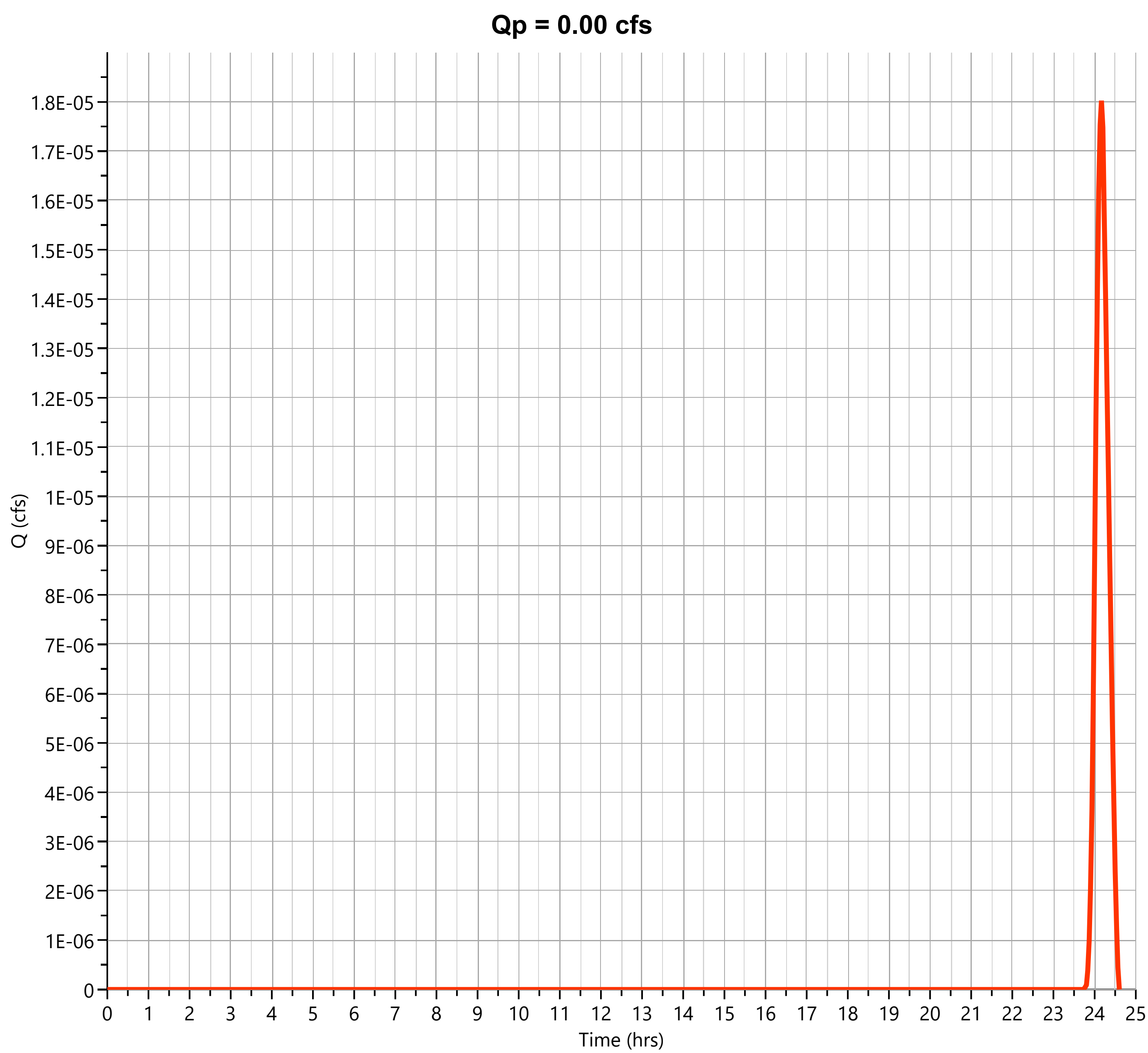
20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.36
min 21.4

Hydrograph Report

E-6

Hyd. No. 7

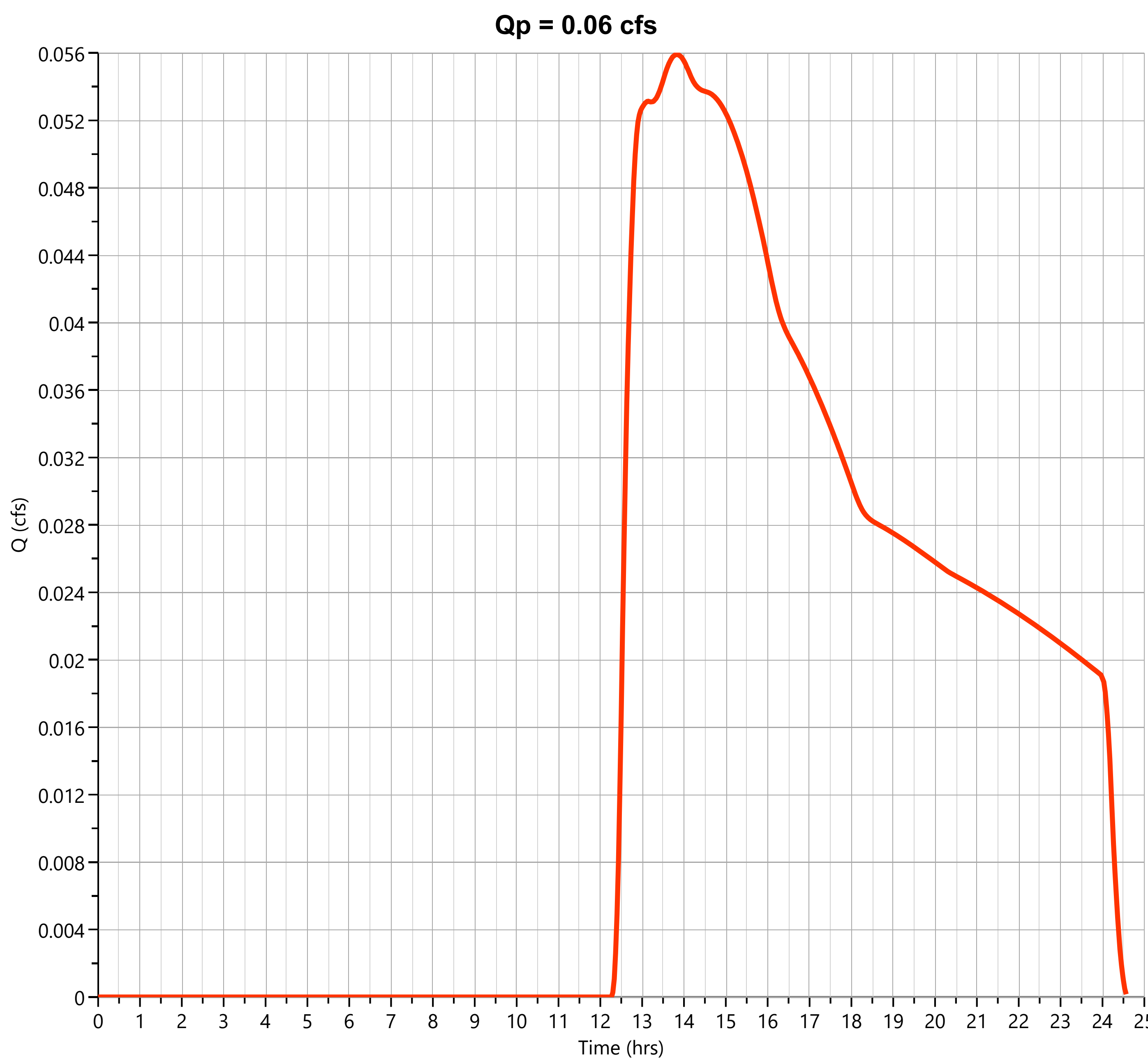
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 24.17 hrs
Time Interval	= 2 min	Runoff Volume	= 0.024 cuft
Drainage Area	= 2.25 ac	Curve Number	= 38
Tc Method	= User	Time of Conc. (Tc)	= 21.4 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



Hydrograph Report

E-6 Hyd. No. 7

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 Report

Project Name:

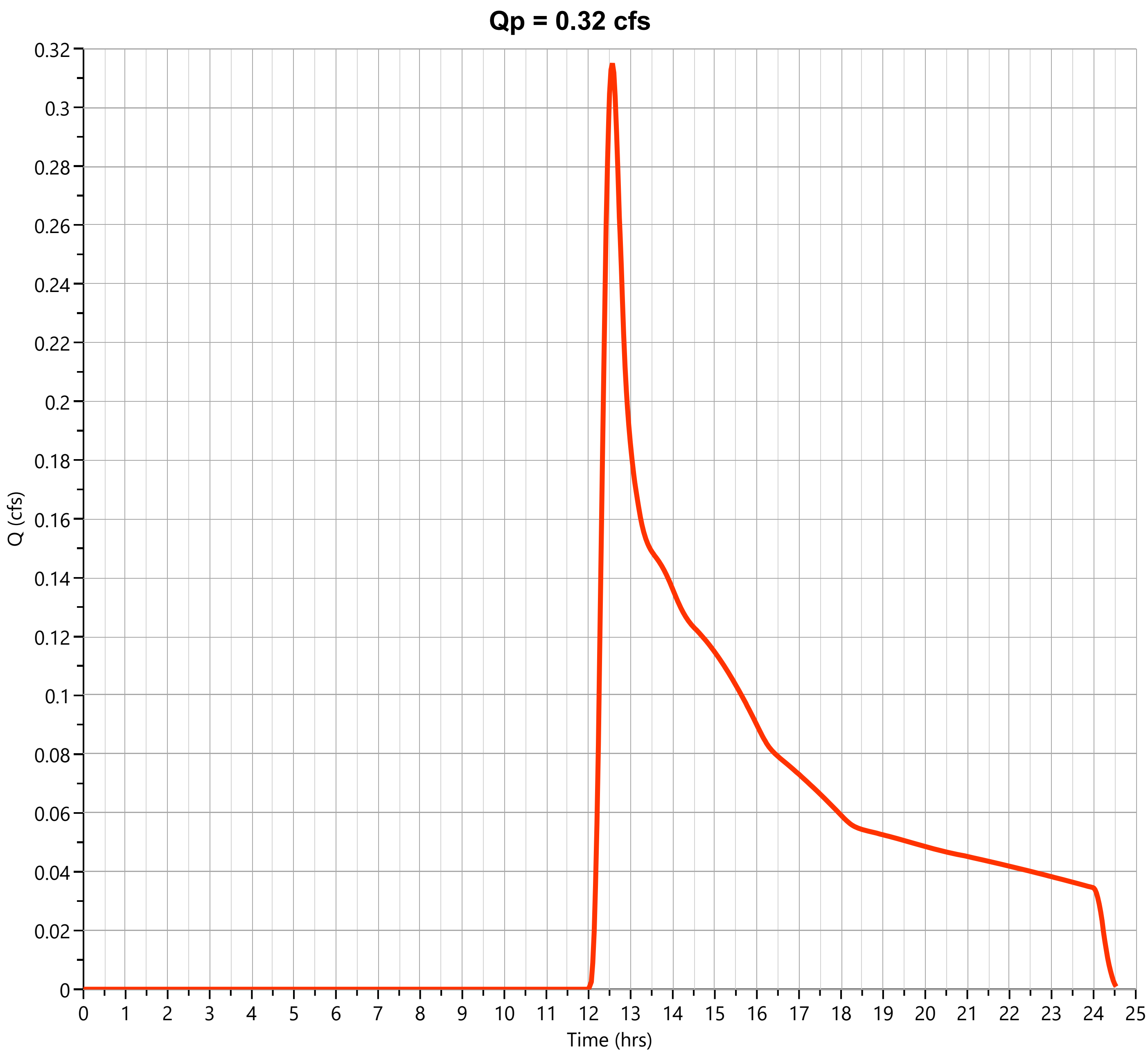
Hydrology Studio v 3.0.0.21

10-27-2022

E-6

Hyd. No. 7

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

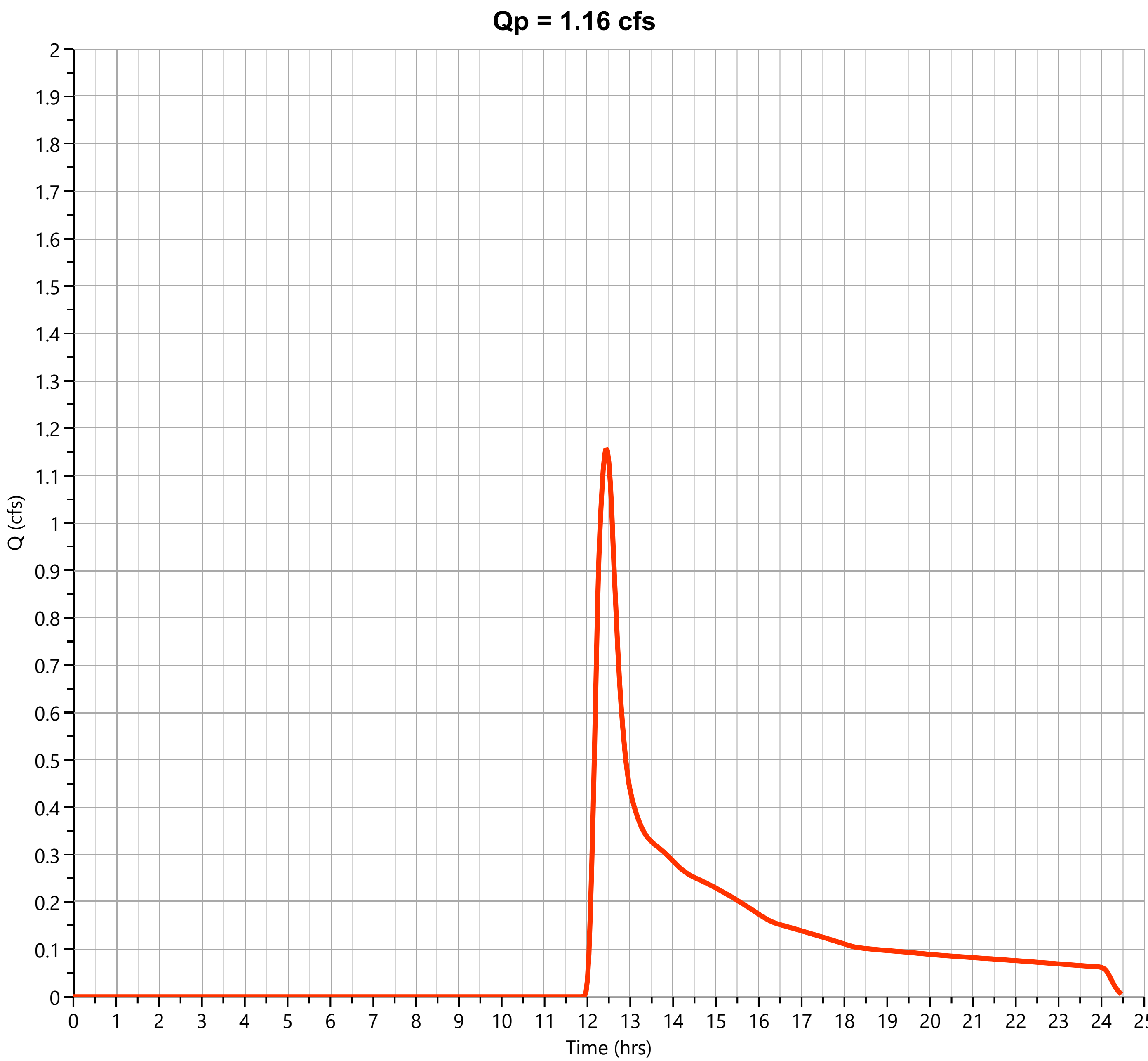


Hydrograph Report

E-6

Hyd. No. 7

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



Worksheet 2: Runoff curve number and runoff **SM-3719C**

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-7

1. Runoff curve number (CN)

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

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = $\frac{207.68}{6.51}$ = 31.91 ; Use CN = 32

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.......................................	yr	2	25	100
Rainfall, P (24-hour)........................	in	3.27	6.14	7.84
Runoff, Q...	in	0.05	0.15	0.51

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By MKO Date 6/1/2022

Rev Date 9/27/2022

Location: Stow, MA Checked ______ Date ______

Circle one: **Present** Developed Subcatchment E-7

Circle one: **Tc** Tt through subarea

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	0.036			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.23			0.23
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	533			
9. Watercourse slope, s		ft/ft	0.011			
10. Average Velocity, V (figure 3-1)		ft/s	1.69			
11. Tt = L / 3600V	Compute Tt	hr	0.09			0.09
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.32

min 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

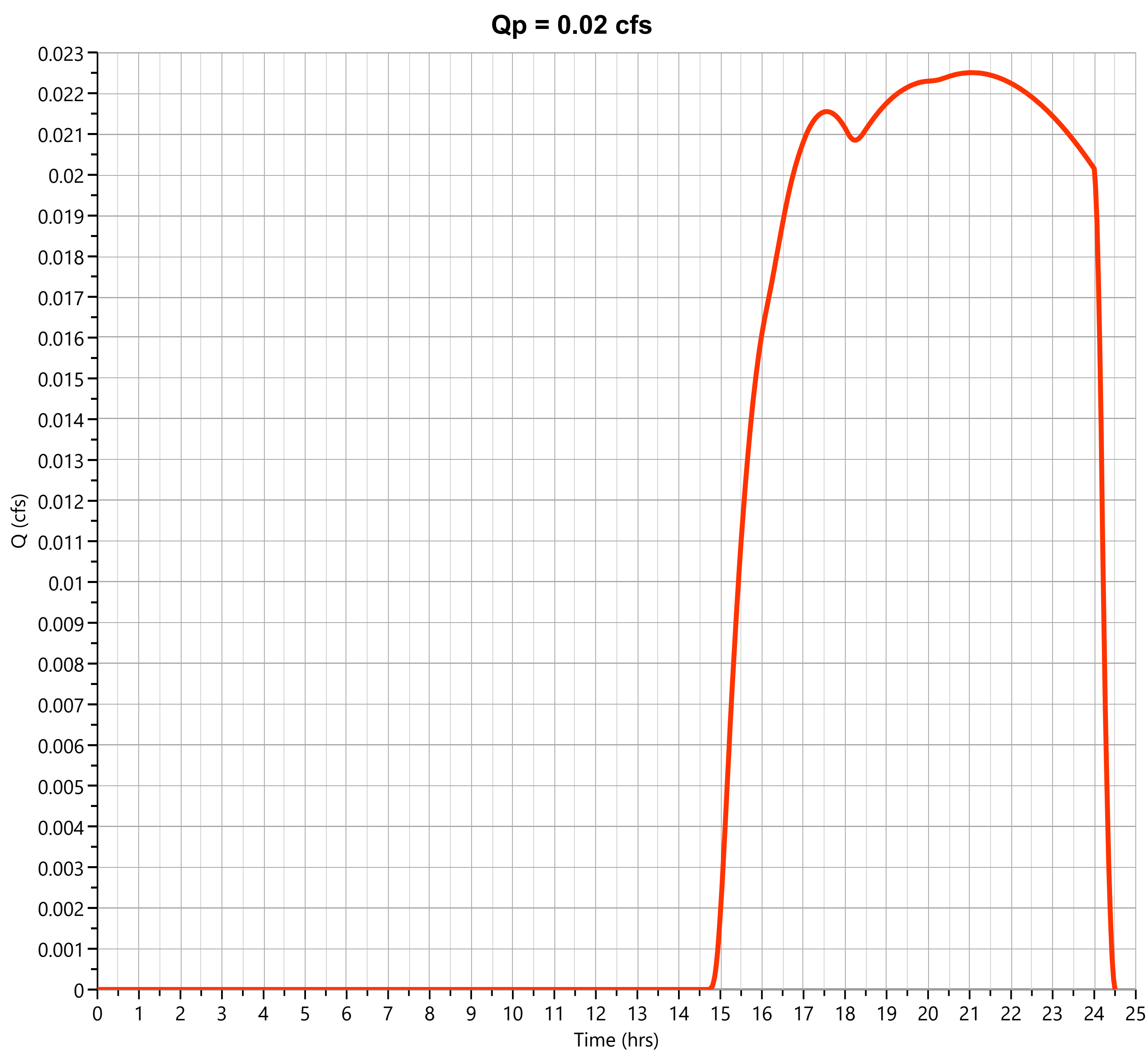
Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21 10-27-2022

E-7 Hyd. No. 8

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 Report

Project Name:

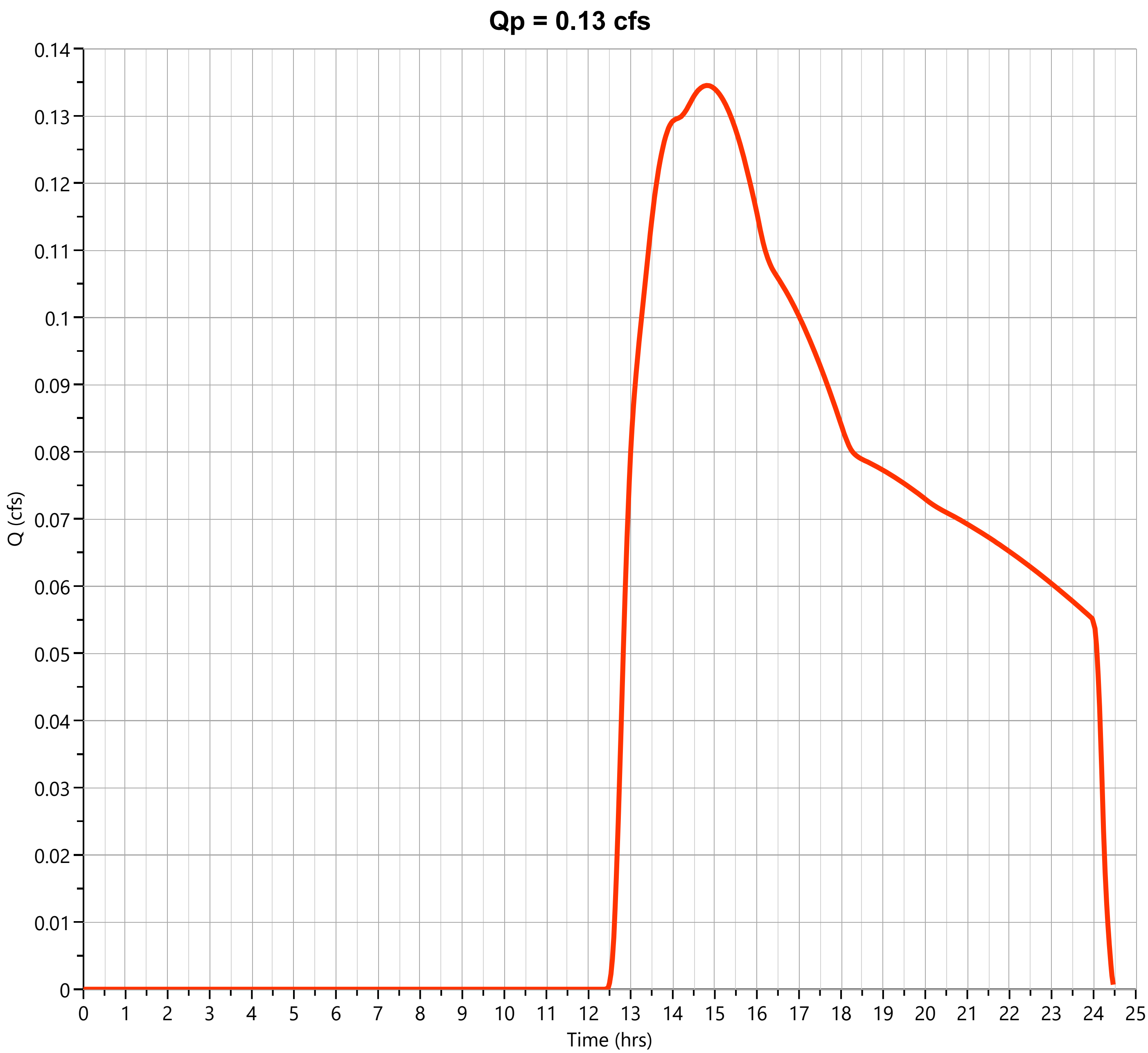
Hydrology Studio v 3.0.0.21

10-27-2022

E-7

Hyd. No. 8

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

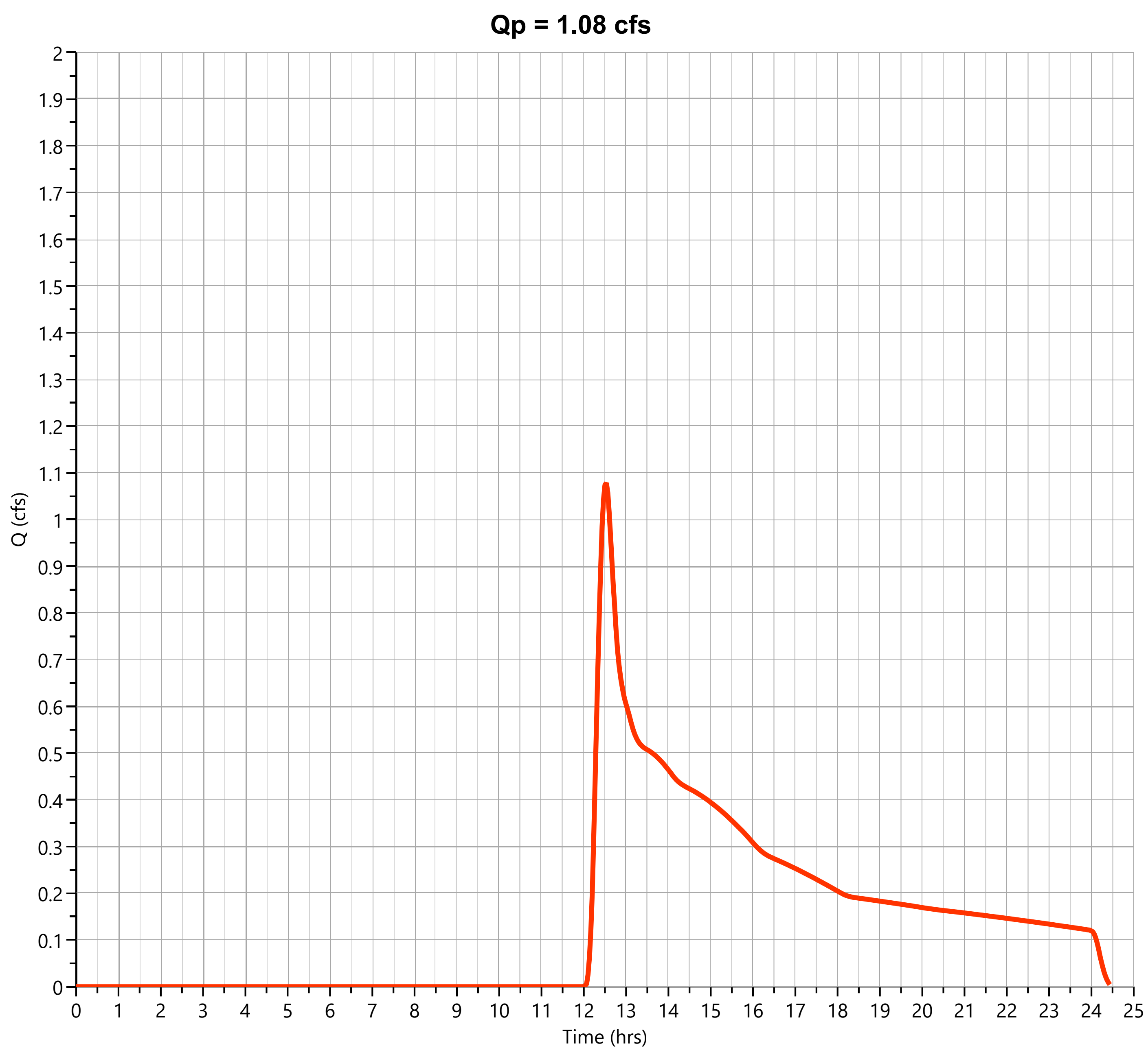


Hydrograph Report

E-7

Hyd. No. 8

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



Worksheet 2: Runoff curve number and runoff **SM-3719C**

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-8

1. Runoff curve number (CN)

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

1/ Use only one CN source per line.

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

2. Runoff

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

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By MKO Date 6/1/2022
Rev Date 9/27/2022
Location: Stow, MA Checked ______ Date ______

Circle one: **Present** Developed Subcatchment E-8
Circle one: **Tc** Tt through subarea

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	0.016			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.32			0.32
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	116			
9. Watercourse slope, s		ft/ft	0.038			
10. Average Velocity, V (figure 3-1)		ft/s	3.15			
11. Tt = L / 3600V	Compute Tt	hr	0.01			0.01
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.33
min 19.6

Hydrograph Report

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

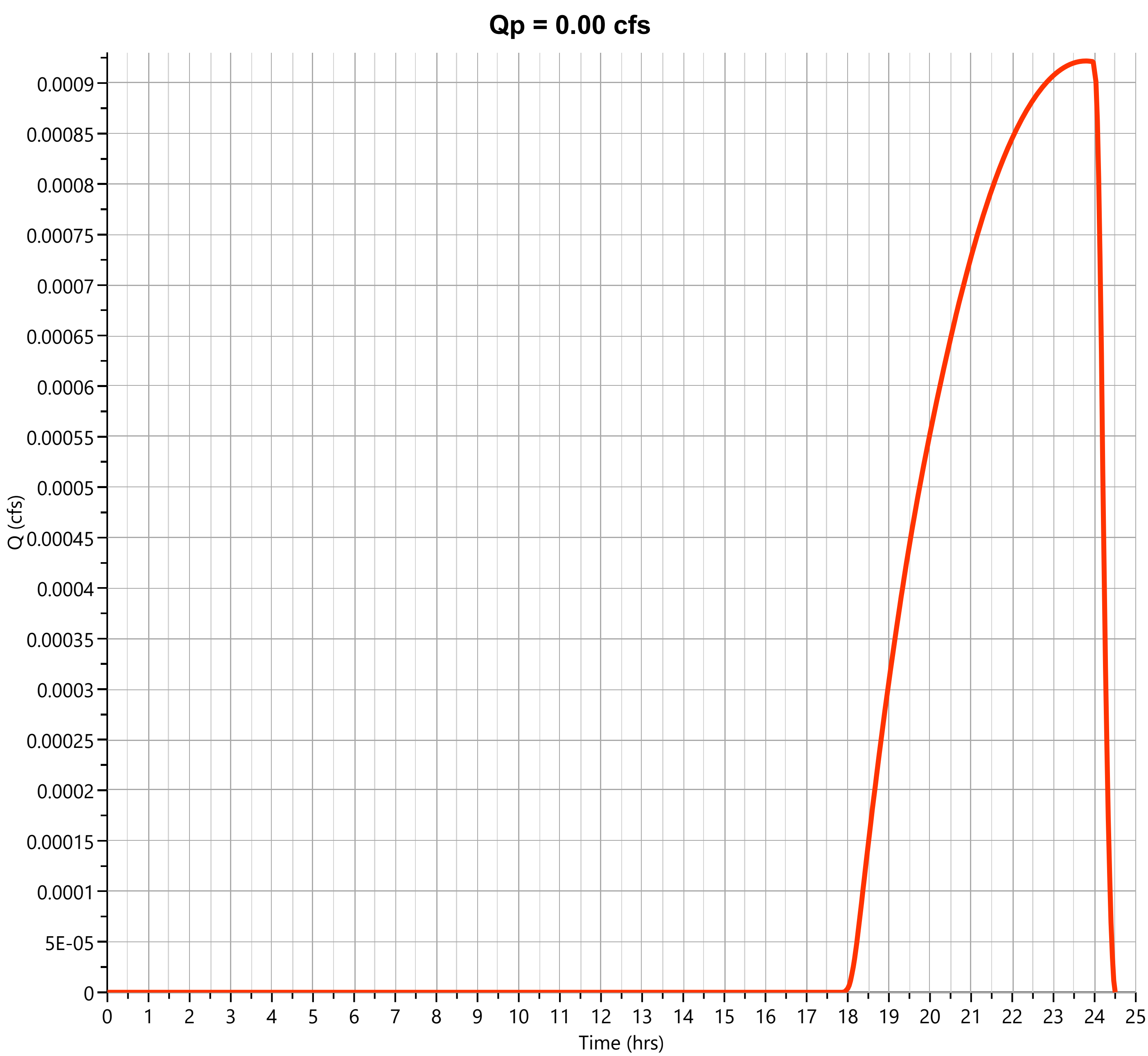
Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21 10-27-2022

E-8 Hyd. No. 9

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

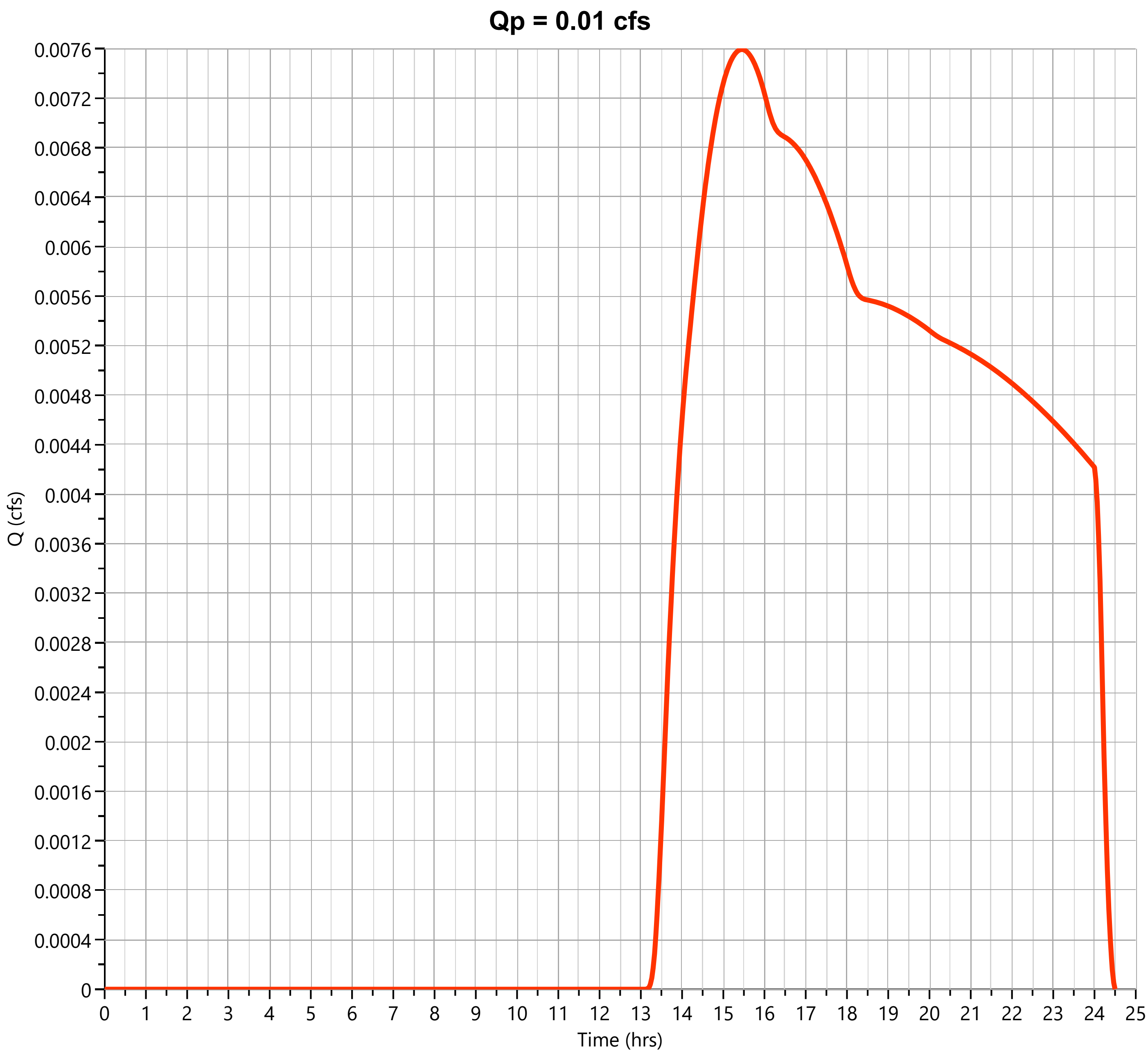


Hydrograph Report

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

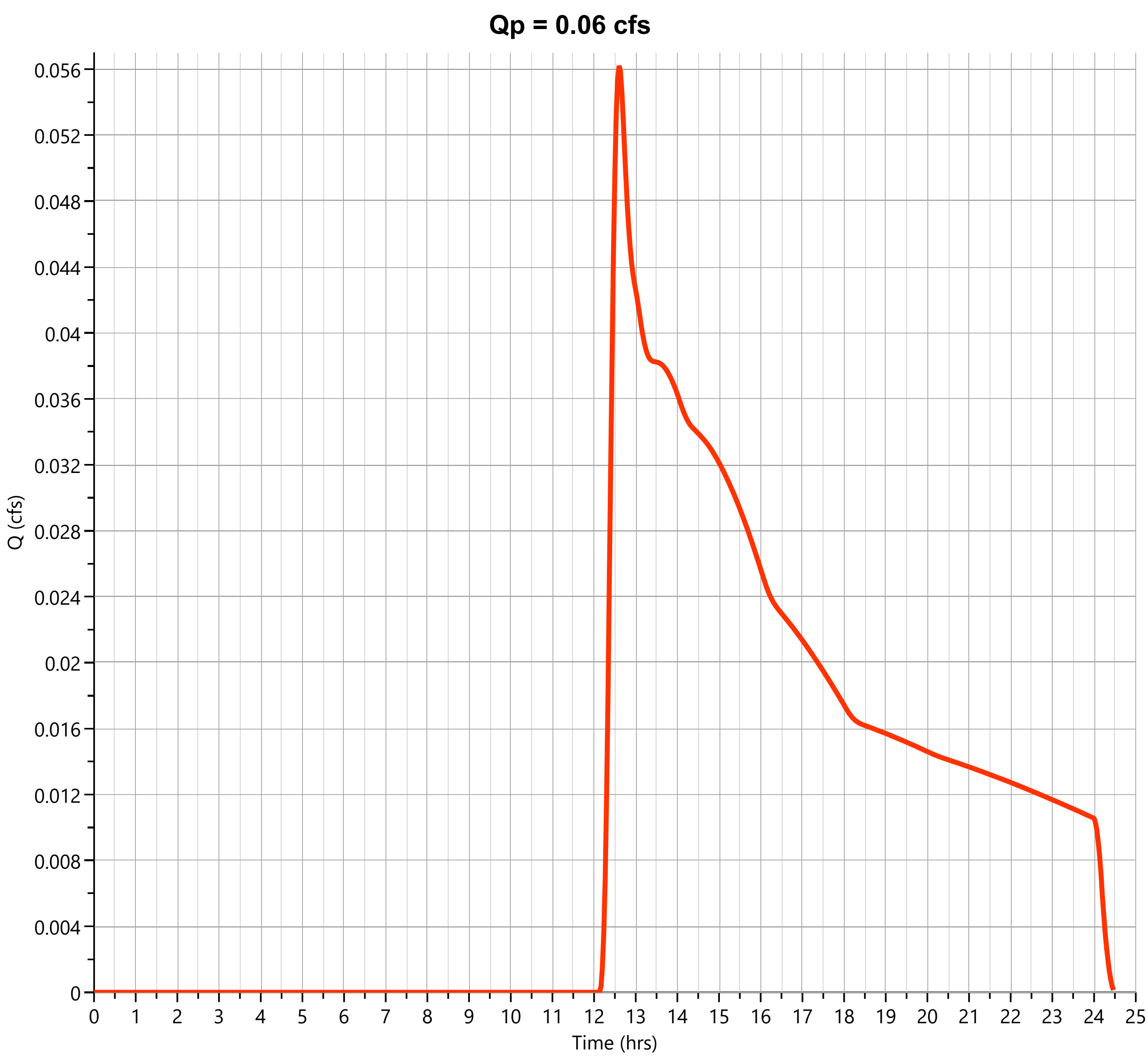


Hydrograph Report

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



Worksheet 2: Runoff curve number and runoff **SM-3719C**

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-9A

1. Runoff curve number (CN)

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

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{112.94}{2.59} = 43.62$; Use CN = 44

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.......................................	yr	2	25	100
Rainfall, P (24-hour)........................	in	3.27	6.14	7.84
Runoff, Q...	in	0.03	0.77	1.52

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By MKO Date 6/1/2022

Rev Date 9/27/2022

Location: Stow, MA Checked ______ Date ______

Circle one: **Present** Developed Subcatchment E-9A

Circle one: **Tc** Tt through subarea

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	0.043			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.21			0.21

Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	449			
9. Watercourse slope, s		ft/ft	0.017			
10. Average Velocity, V (figure 3-1)		ft/s	2.10			
11. Tt = L / 3600V	Compute Tt	hr	0.06			0.06

Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

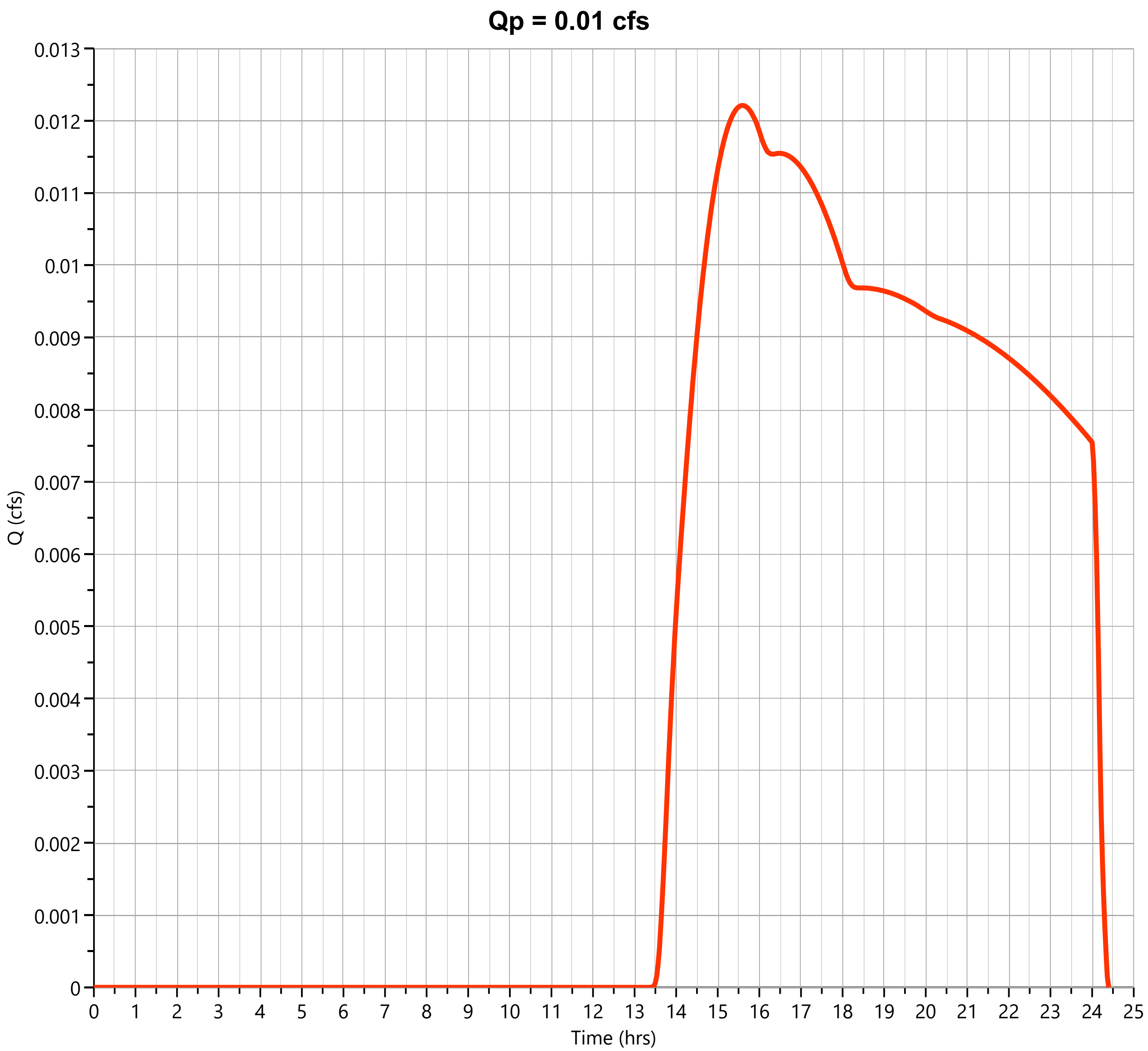
20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.27

min 16.3

E-9A

Hyd. No. 10

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 Report

Project Name:

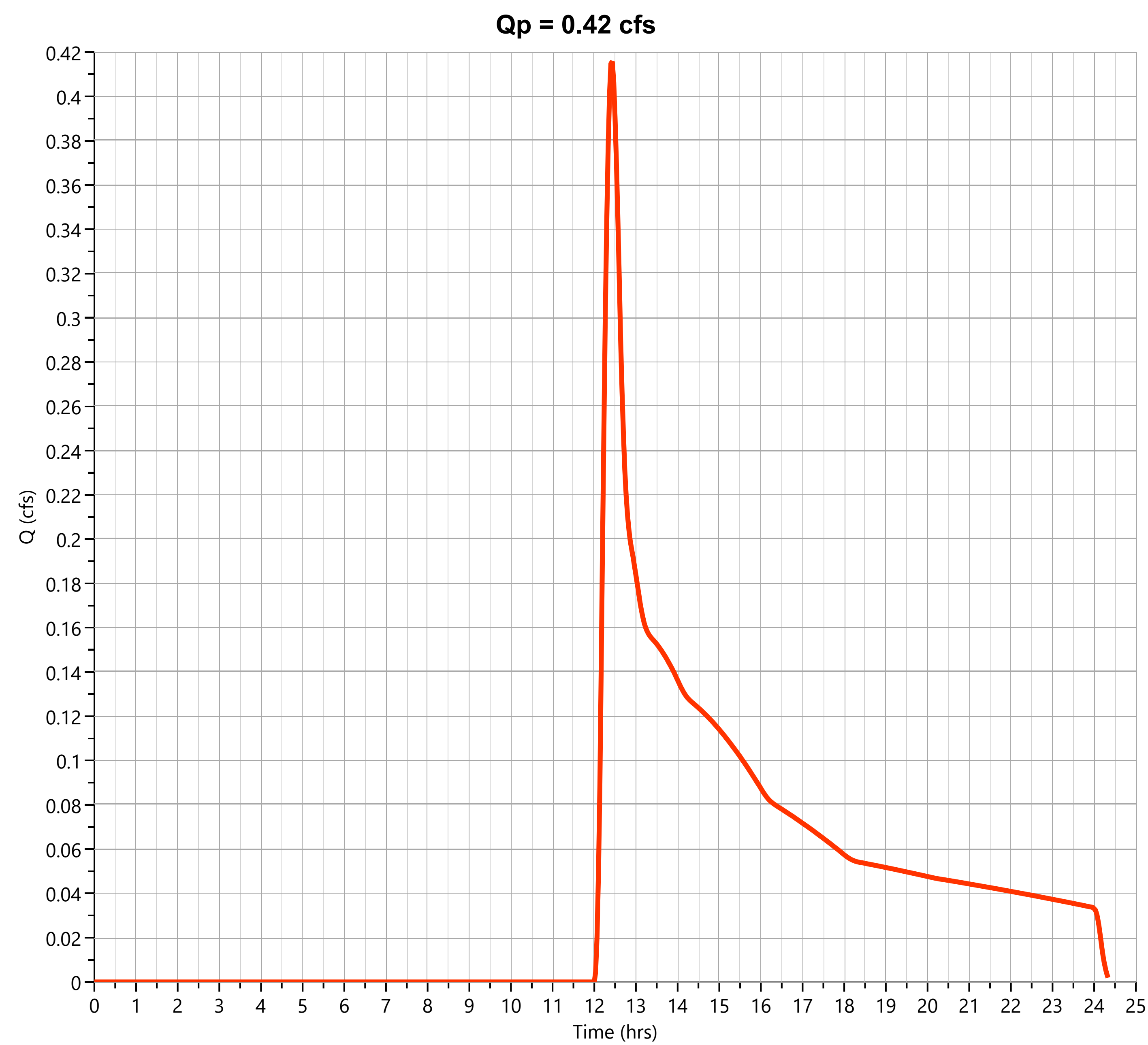
Hydrology Studio v 3.0.0.21

10-27-2022

E-9A

Hyd. No. 10

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 Report

Project Name:

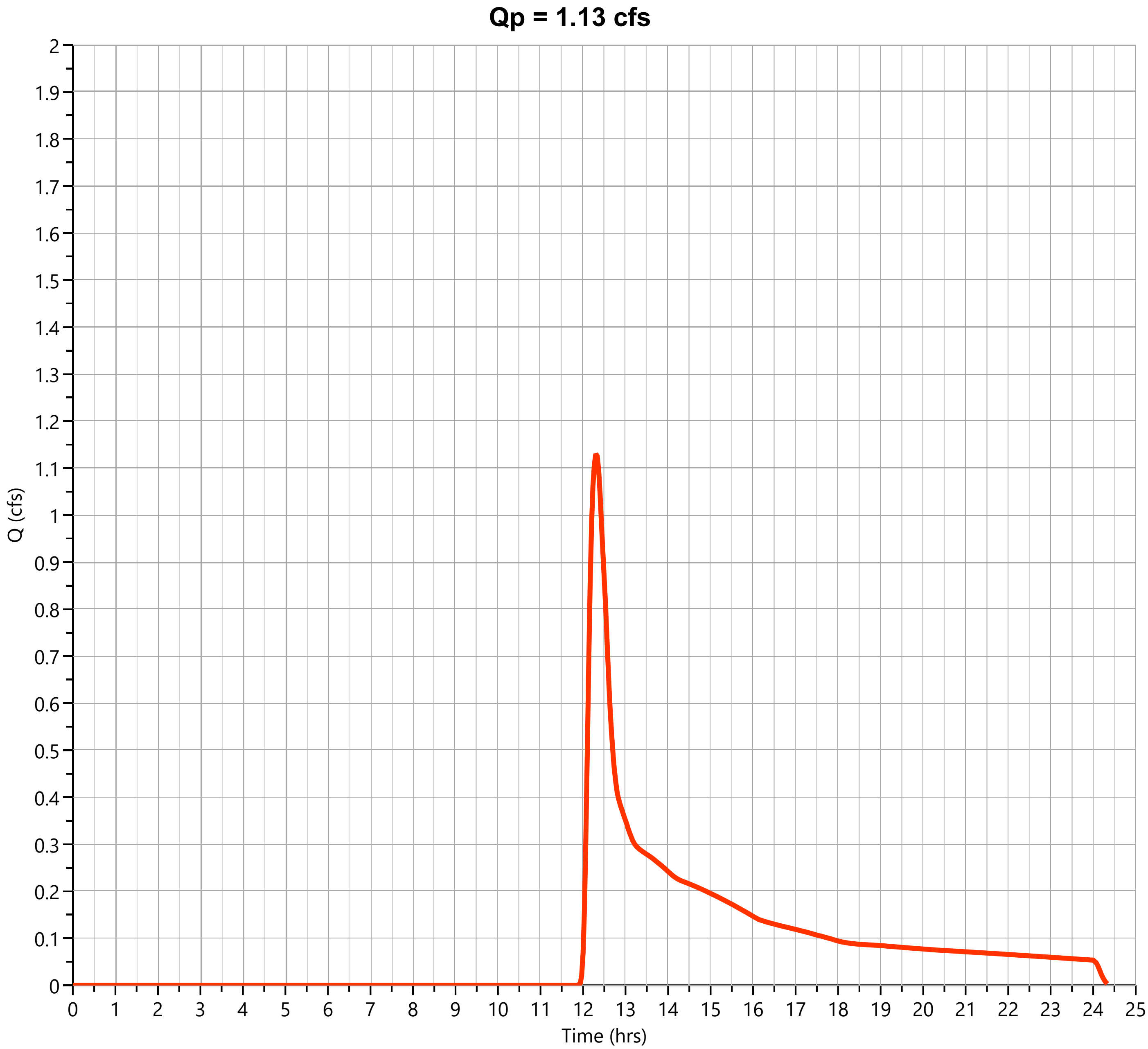
Hydrology Studio v 3.0.0.21

10-27-2022

E-9A

Hyd. No. 10

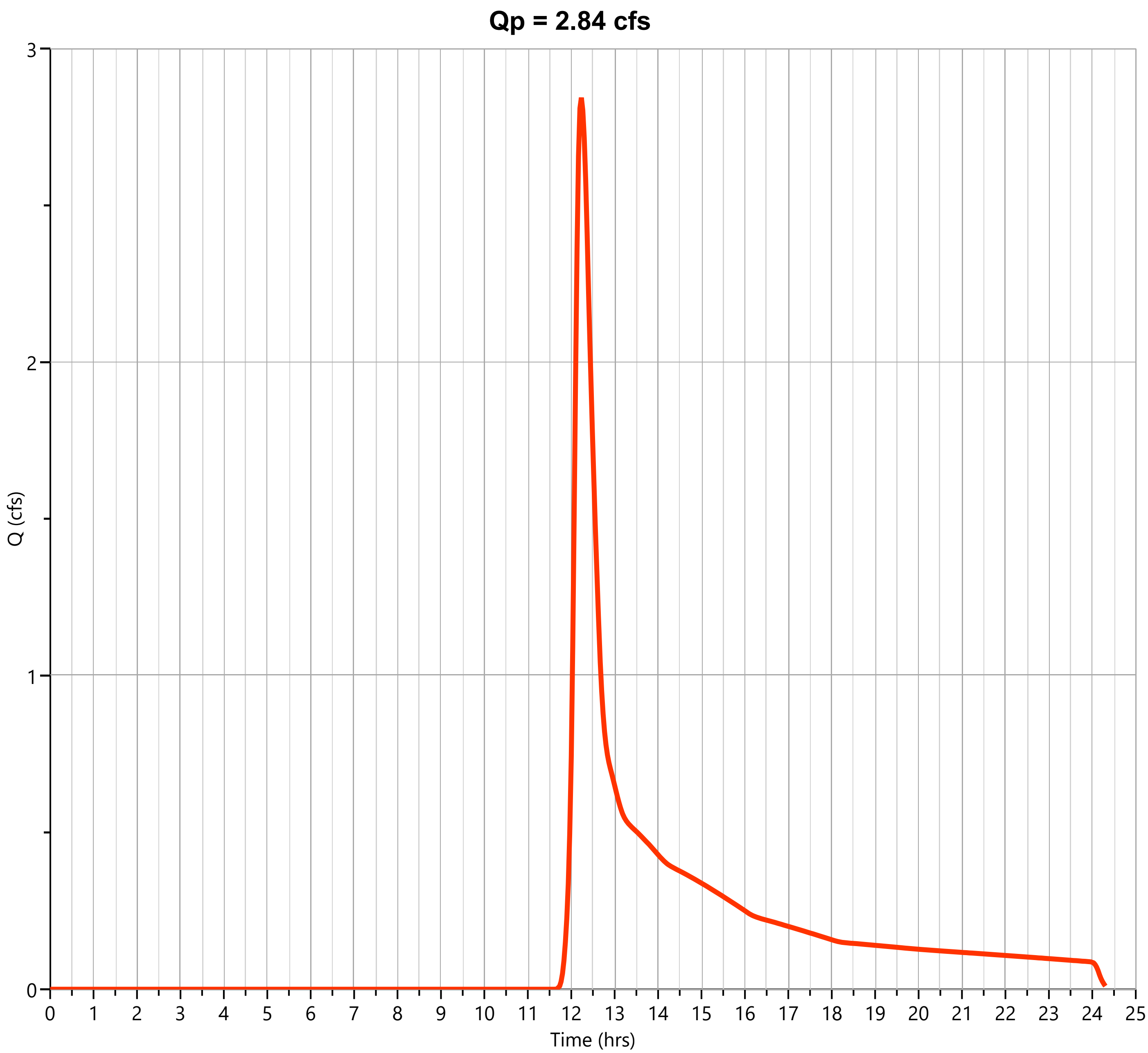
Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.130 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.30 hrs
Time Interval	= 2 min	Runoff Volume	= 7,257 cuft
Drainage Area	= 2.59 ac	Curve Number	= 44
Tc Method	= User	Time of Conc. (Tc)	= 16.3 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration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



E-9A

Hyd. No. 10

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



Worksheet 2: Runoff curve number and runoff **SM-3719C**

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 group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)		CN 1/			Area	Product of CN x Area
			Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious		98			1.01	98.85
A	Woods	Good Condition	30			1.54	46.08
A	Open Space	Good Condition	39			1.06	41.53
A	Open Space	Fair Condition	49			0.00	0.00
A	Gravel		76			0.00	0.00
B	Woods	Good Condition	55			0.00	0.00
B	Open Space	Good Condition	61			0.00	0.00
B	Gravel		85			0.00	0.00
C	Woods	Good Condition	70			4.90	343.20
C	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
					Totals =	11.92	781.65

1/ Use only one CN source per line.

$$\text{CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{781.65}{11.92} = 65.59 \quad ; \quad \text{Use CN} = 66$$

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency......................................	yr	2	25	100
Rainfall, P (24-hour).......................	in	3.27	6.14	7.84
Runoff, Q...	in	0.66	2.51	3.83

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By MKO Date 6/1/2022

Rev Date 9/27/2022

Location: Stow, MA Checked ______ Date ______

Circle one: Present Developed Subcatchment E-9B

Circle one: Tc Tt through subarea

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	0.026			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.26			0.26
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	629			
9. Watercourse slope, s		ft/ft	0.080			
10. Average Velocity, V (figure 3-1)		ft/s	4.56			
11. Tt = L / 3600V	Compute Tt	hr	0.04			0.04
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.30

min 17.9

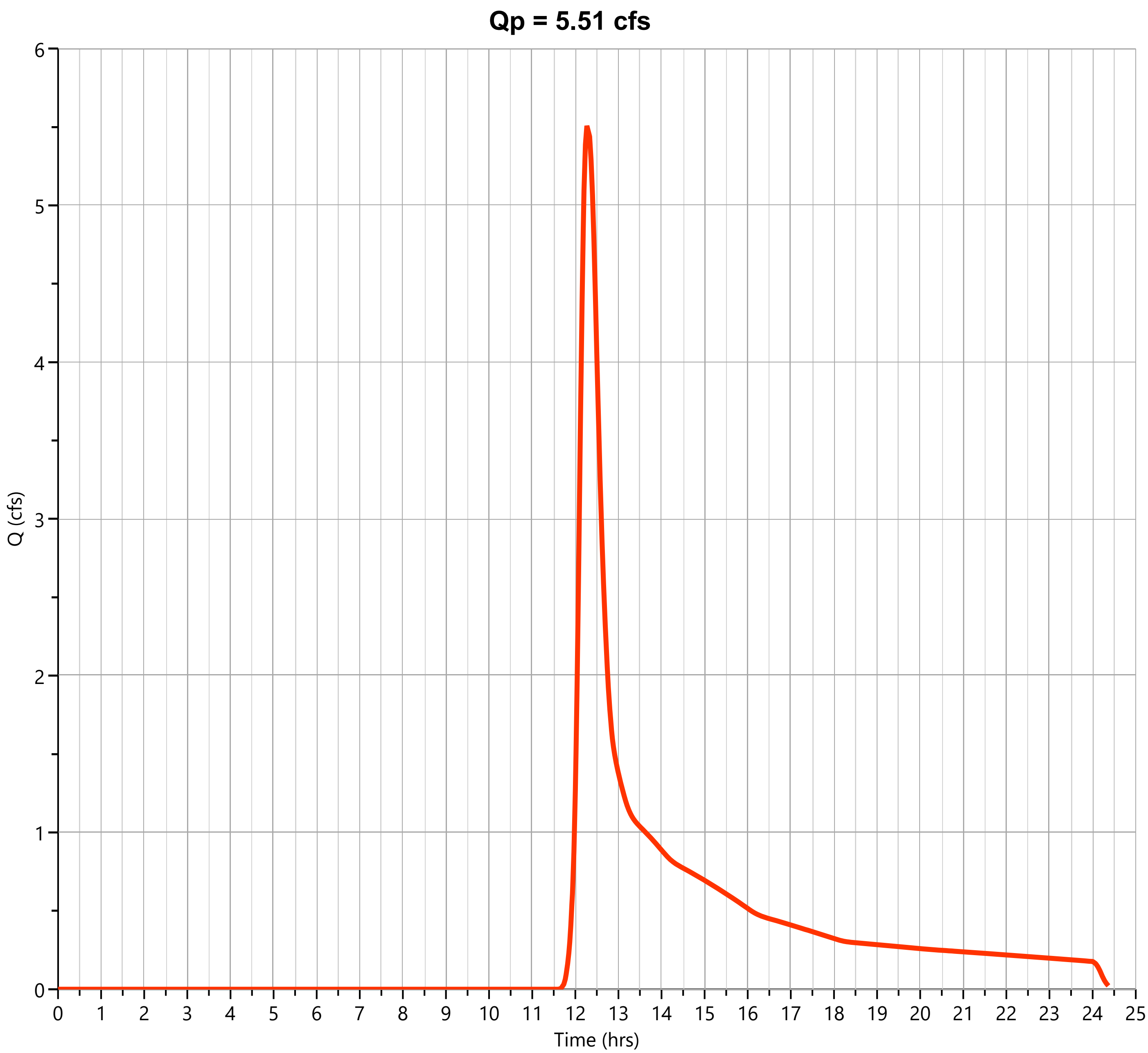
Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21 10-27-2022

E-9B Hyd. No. 11

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 Report

Project Name:

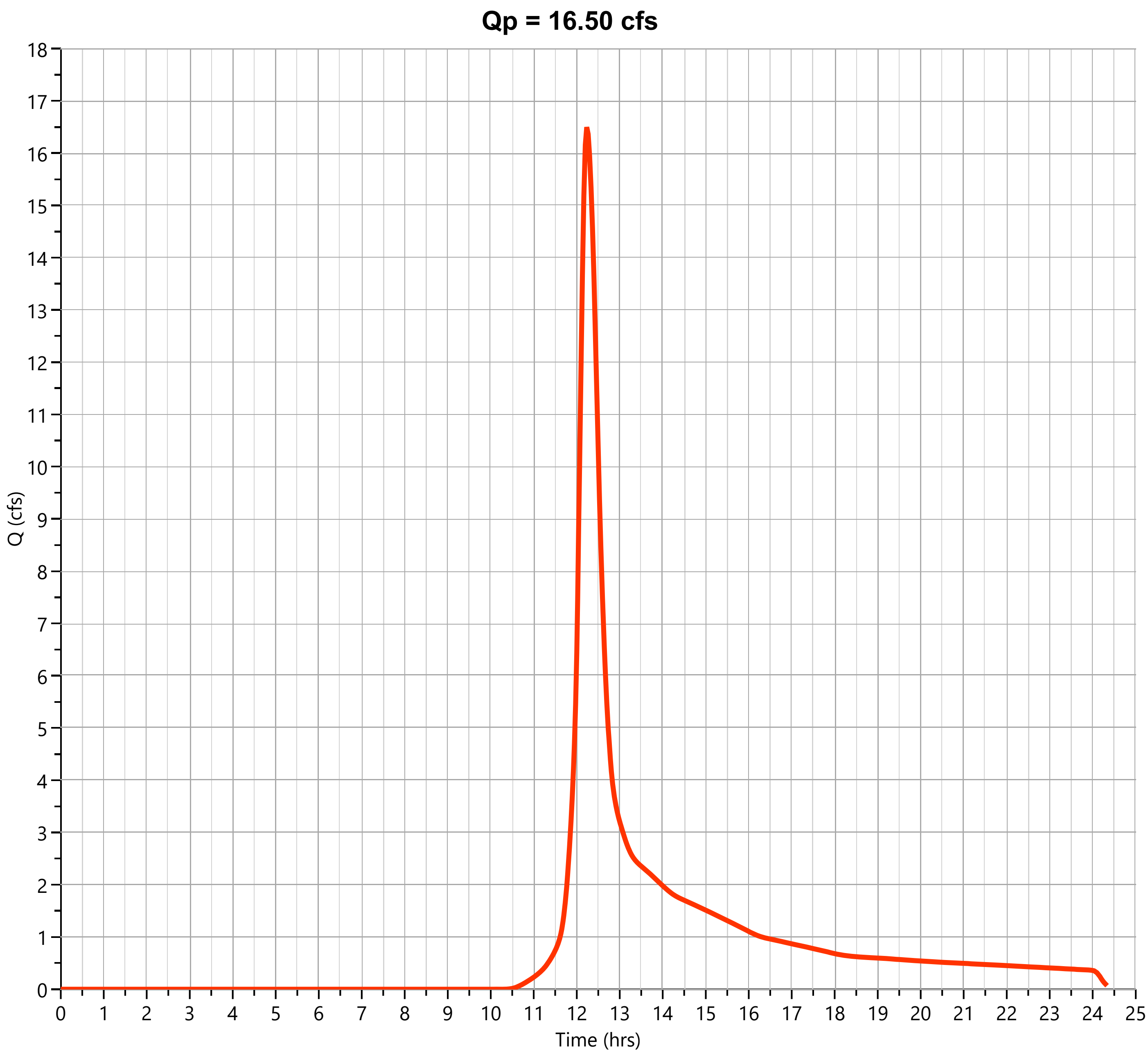
Hydrology Studio v 3.0.0.21

10-27-2022

E-9B

Hyd. No. 11

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

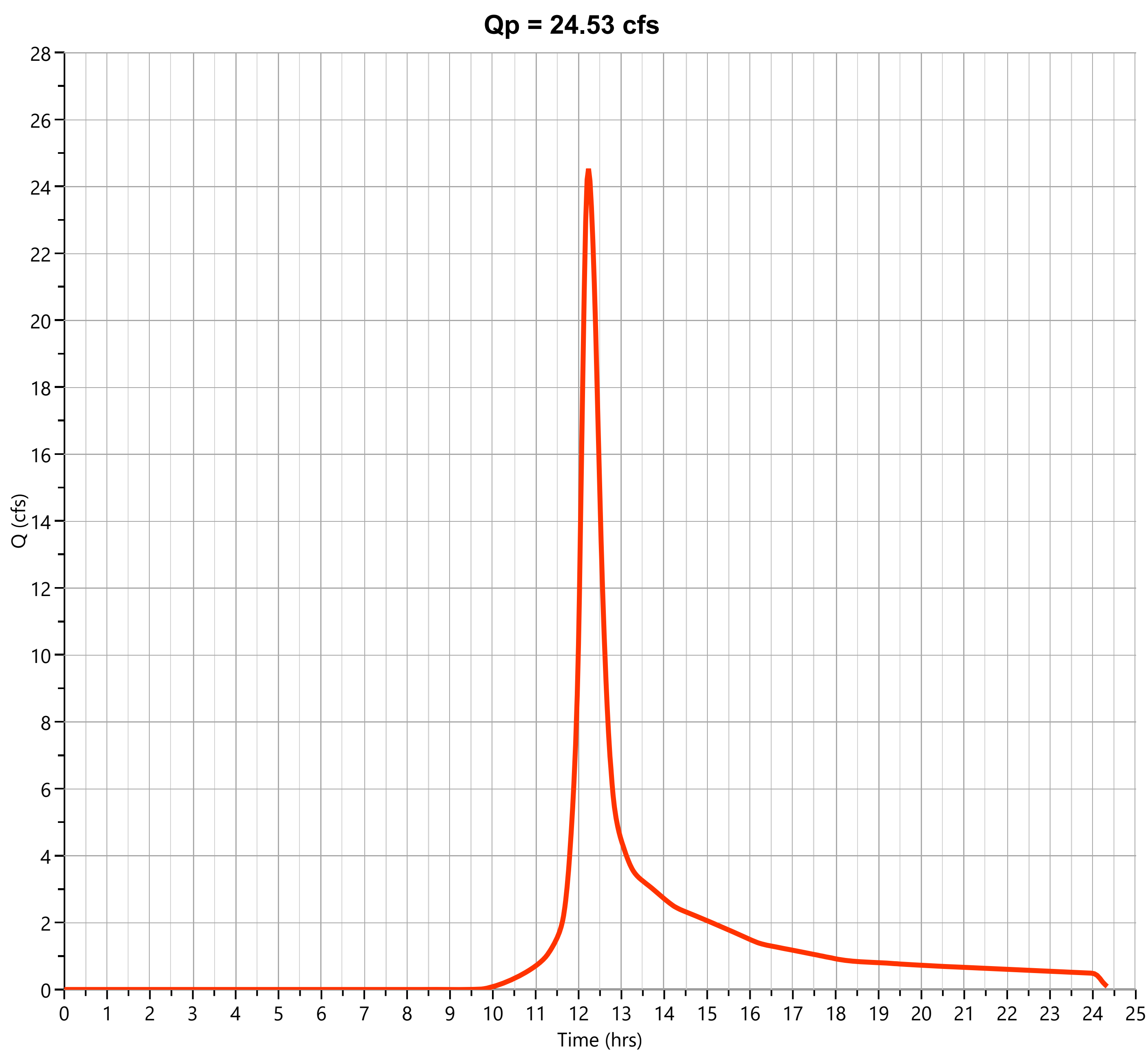


Hydrograph Report

E-9B

Hyd. No. 11

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 Report

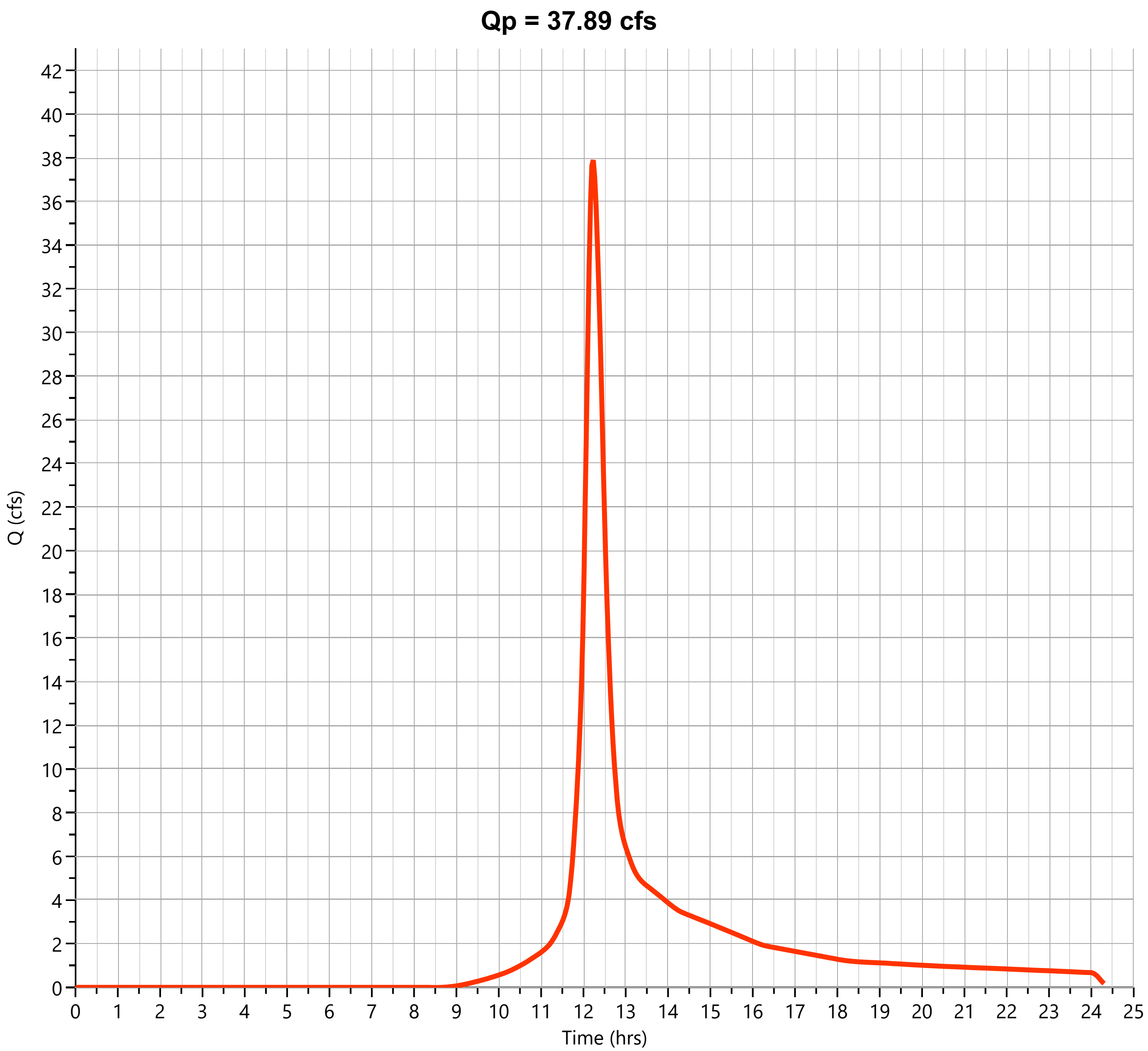
Project Name:

Hydrology Studio v 3.0.0.21 10-27-2022

E-9B

Hyd. No. 11

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

Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21

10-27-2022

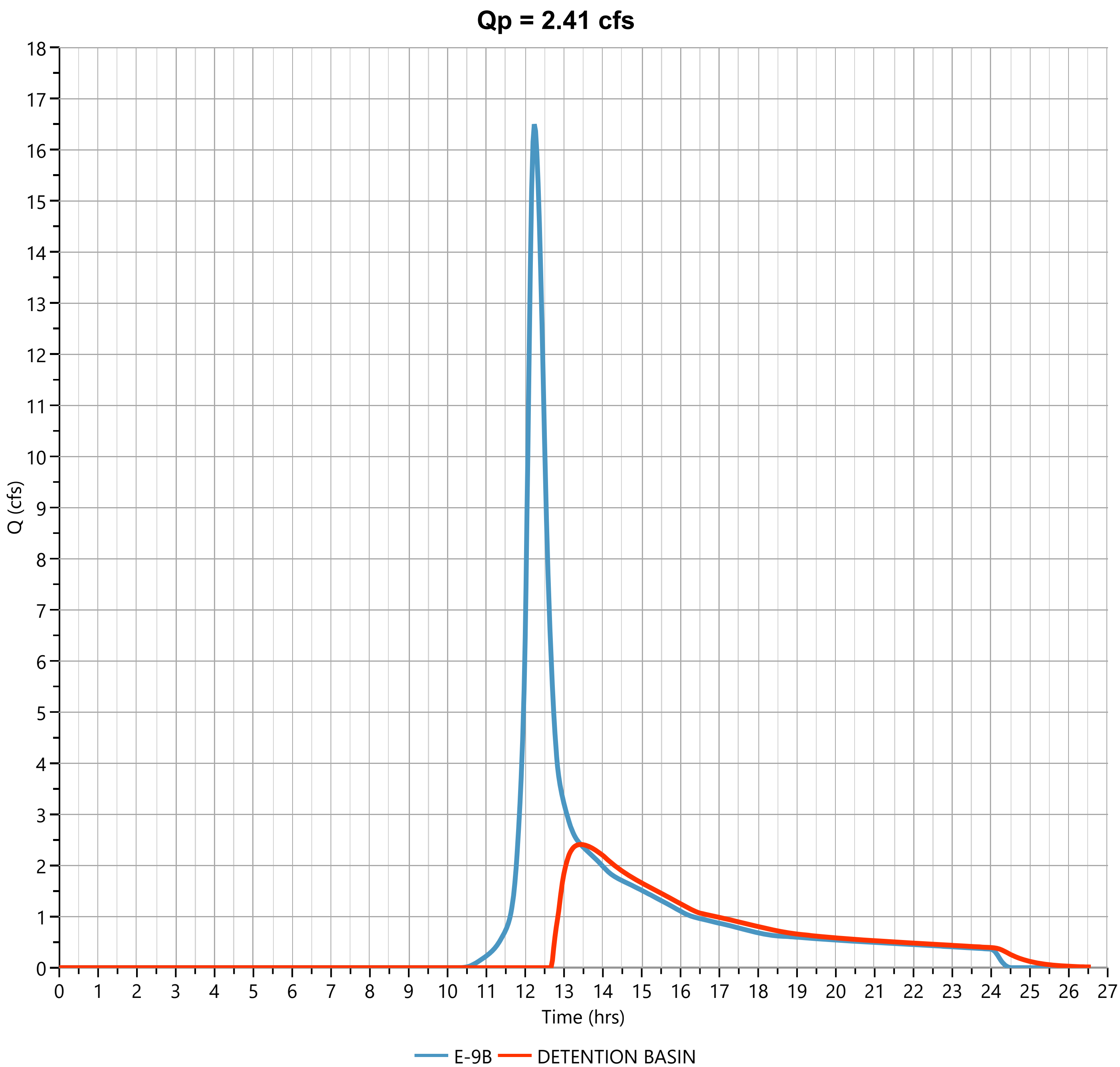
DETENTION BASIN

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



Hydrograph Report

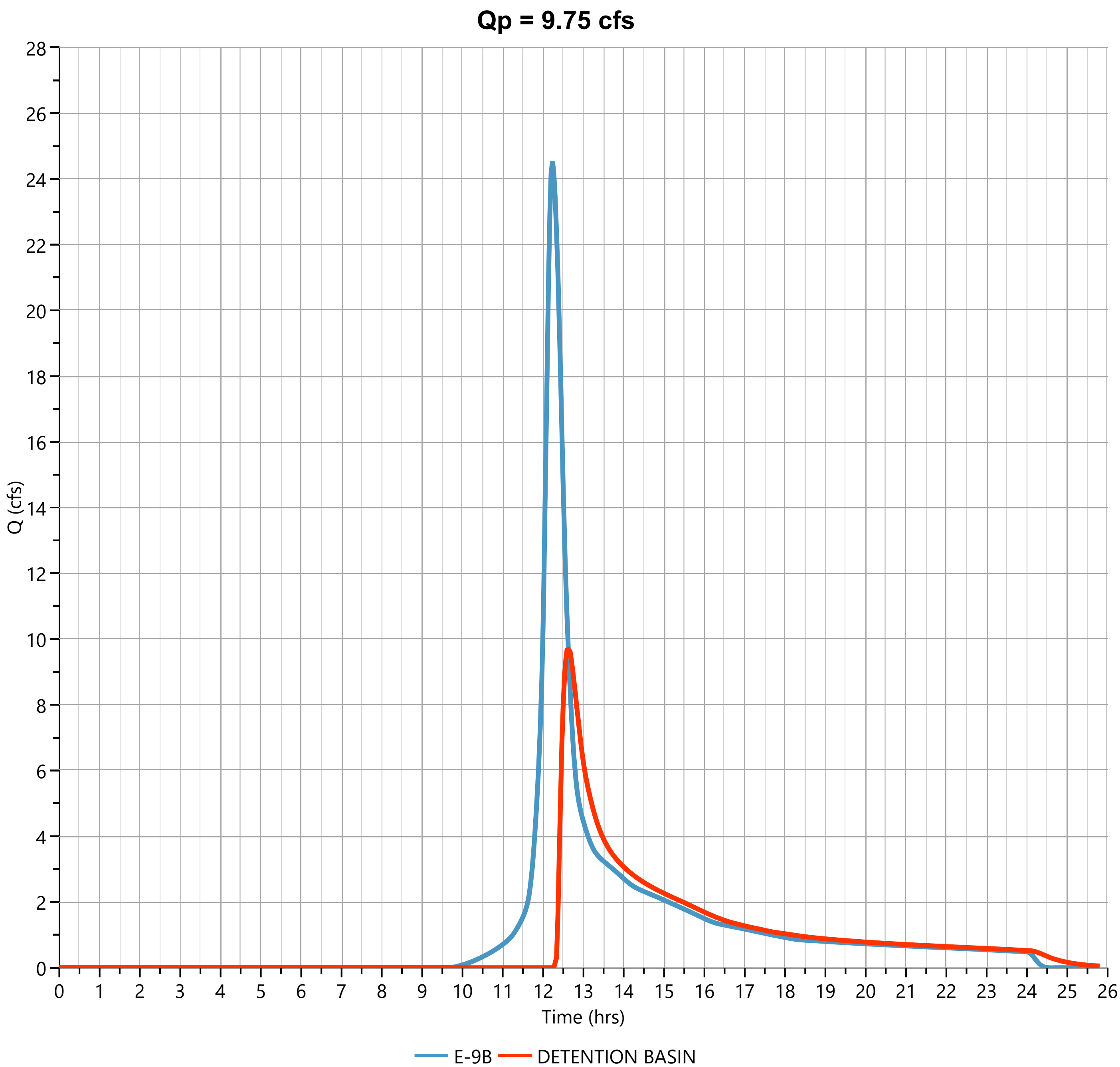
DETENTION BASIN

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

Pond Routing by Storage Indication Method

Center of mass detention time = 1.49 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21 10-27-2022

DETENTION BASIN

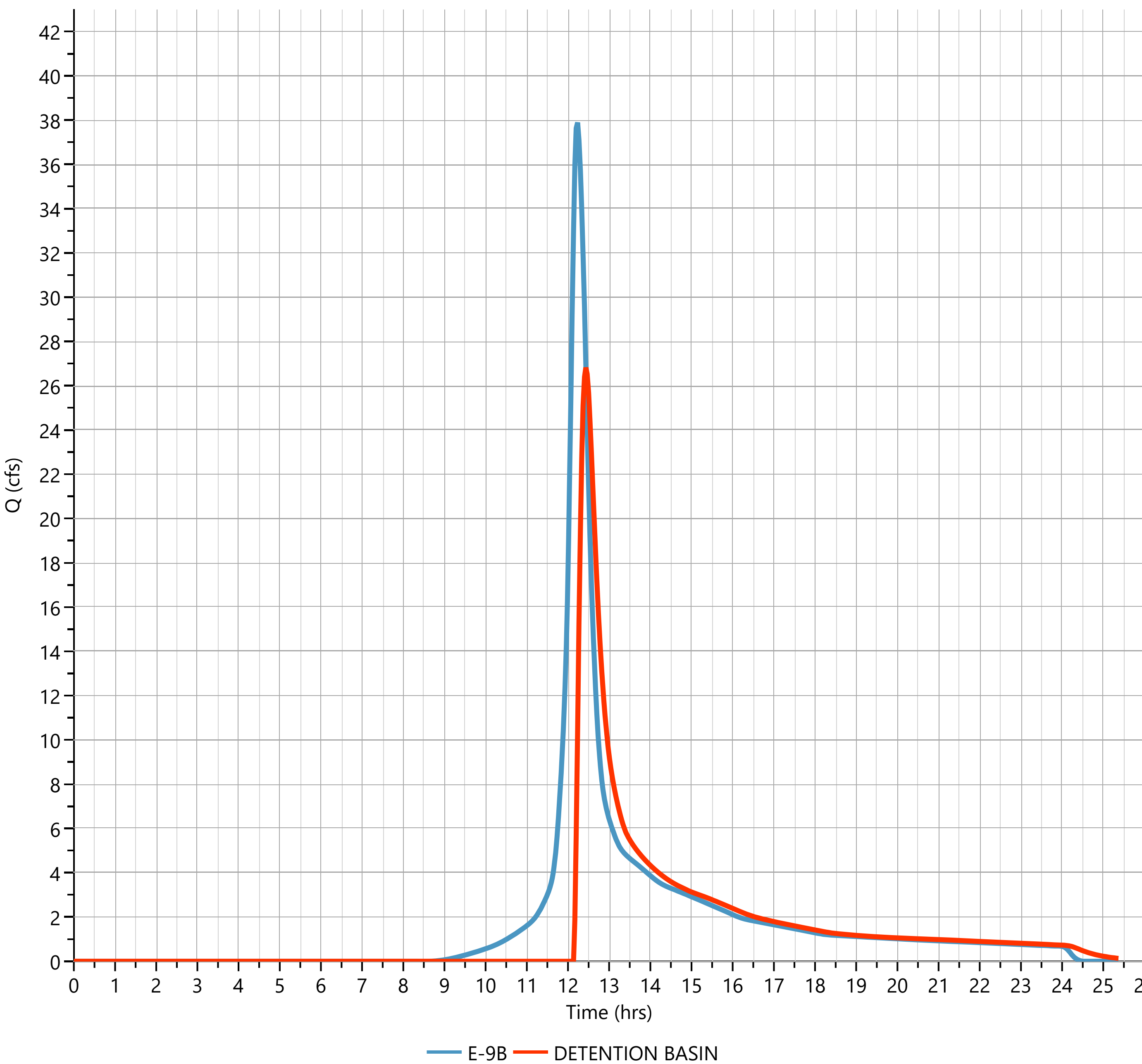
Hyd. No. 12

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

Qp = 26.82 cfs



EXIST DETENTION

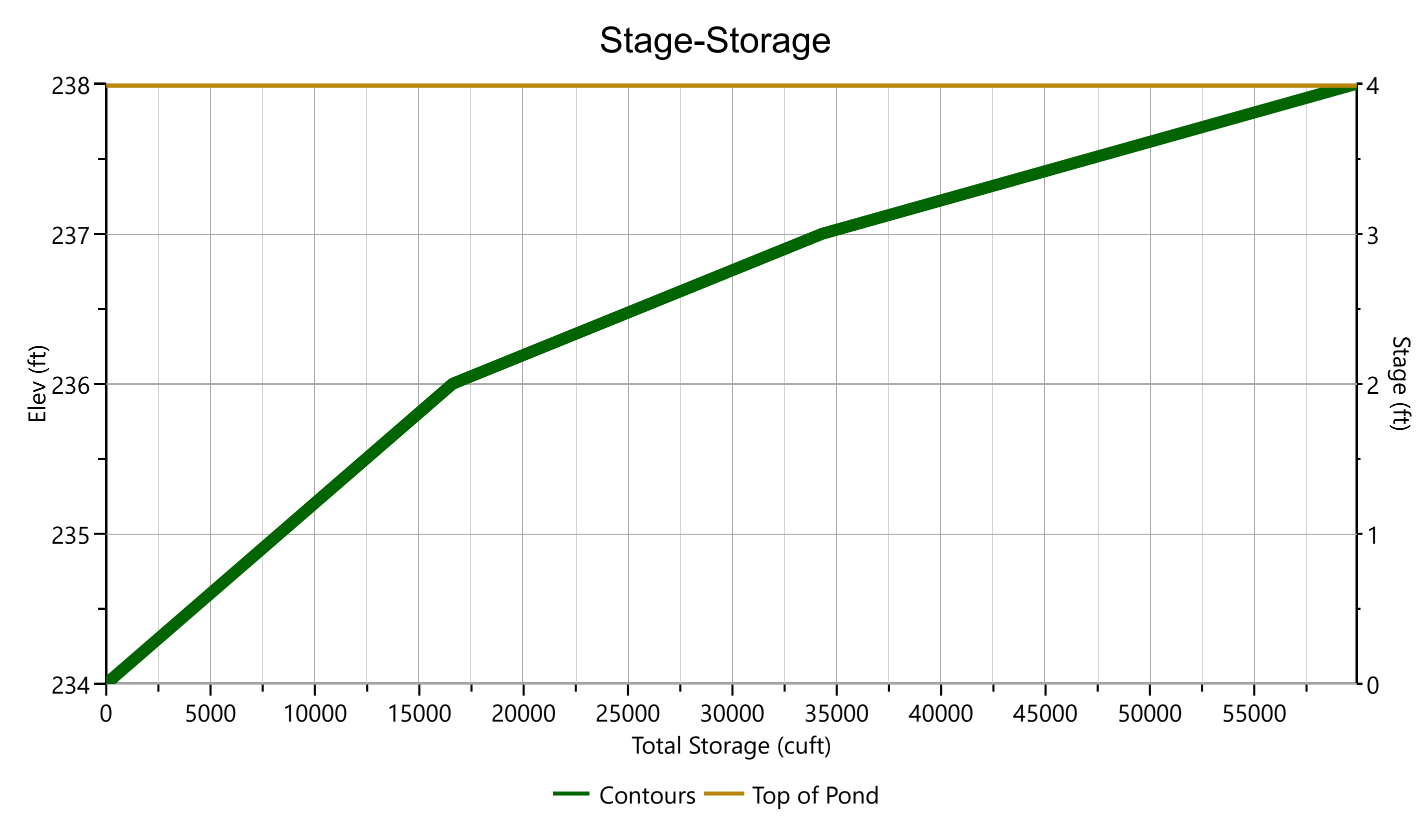
Stage-Storage

User Defined Contours

Description	Input
Bottom Elevation, ft	234.00
Voids (%)	100.00
Volume Calc	Rectangular

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	234.00	2,400	0.000	0.000
2.00	236.00	14,200	16,600	16,600
3.00	237.00	21,200	17,700	34,300
4.00	238.00	30,000	25,600	59,900

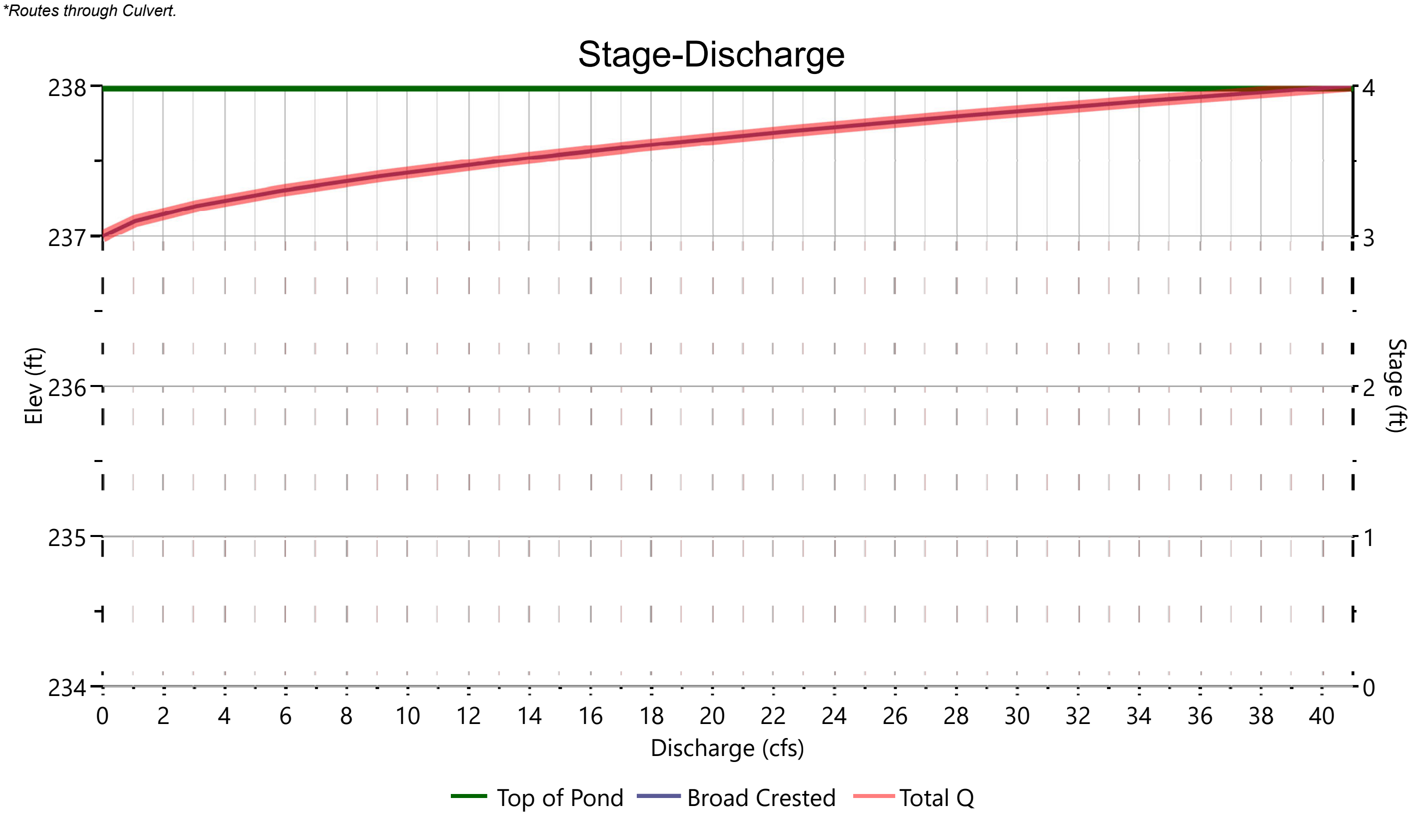


EXIST DETENTION

Stage-Discharge

Culvert / Orifices	Culvert	Orifices 1	Orifices 2	Orifices 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 1**	**Weirs 2**	**Weirs 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				

*Routes through Culvert.



EXIST DETENTION

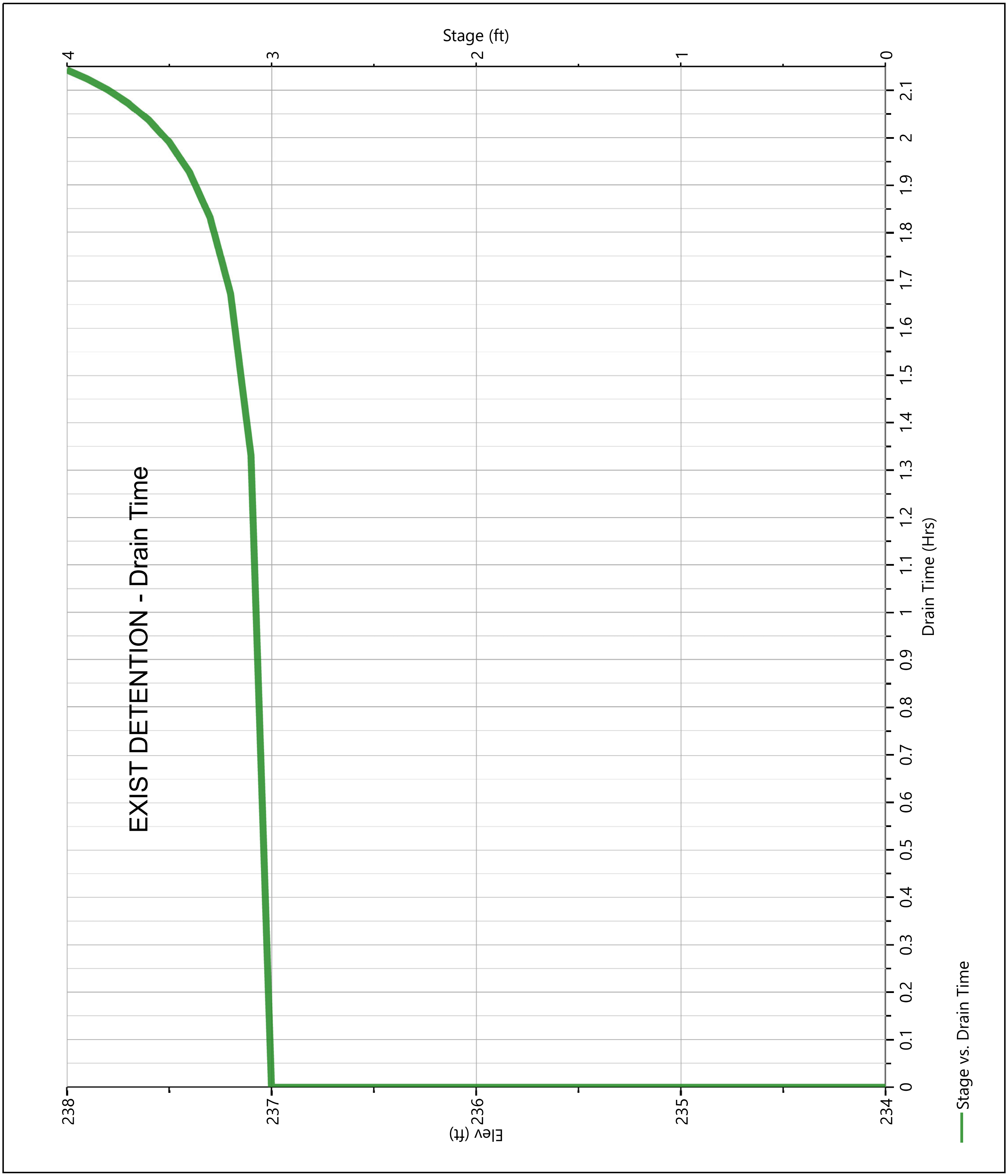
Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
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

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

EXIST DETENTION

Pond Drawdown



Worksheet 2: Runoff curve number and runoff **SM-3719C**

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 group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)		CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
	Impervious		98			0.00	0.00
A	Woods	Good Condition	30			7.61	228.33
A	Open Space	Good Condition	39			0.00	0.00
A	Open Space	Fair Condition	49			0.00	0.00
A	Gravel		76			0.14	10.92
B	Woods	Good Condition	55			0.00	0.00
B	Open Space	Good Condition	61			0.00	0.00
C	Woods	Good Condition	70			17.70	1239.05
C	Open Space	Fair Condition	79			0.00	0.00
C	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
					Totals =	25.93	1516.27

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{1516.27}{25.93} = 58.48$; Use CN = 58

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.......................................	yr	2	25	100
Rainfall, P (24-hour)........................	in	3.27	6.14	7.84
Runoff, Q...	in	0.38	1.88	3.05

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By MKO Date 6/1/2022

Rev Date 9/27/2022

Location: Stow, MA Checked ______ Date ______

Circle one: **Present** Developed Subcatchment E-10

Circle one: **Tc** Tt through subarea

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	0.008			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.42			0.42
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	1082			
9. Watercourse slope, s		ft/ft	0.055			
10. Average Velocity, V (figure 3-1)		ft/s	3.78			
11. Tt = L / 3600V	Compute Tt	hr	0.08			0.08
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.50

min 29.8

Hydrograph Report

Project Name:

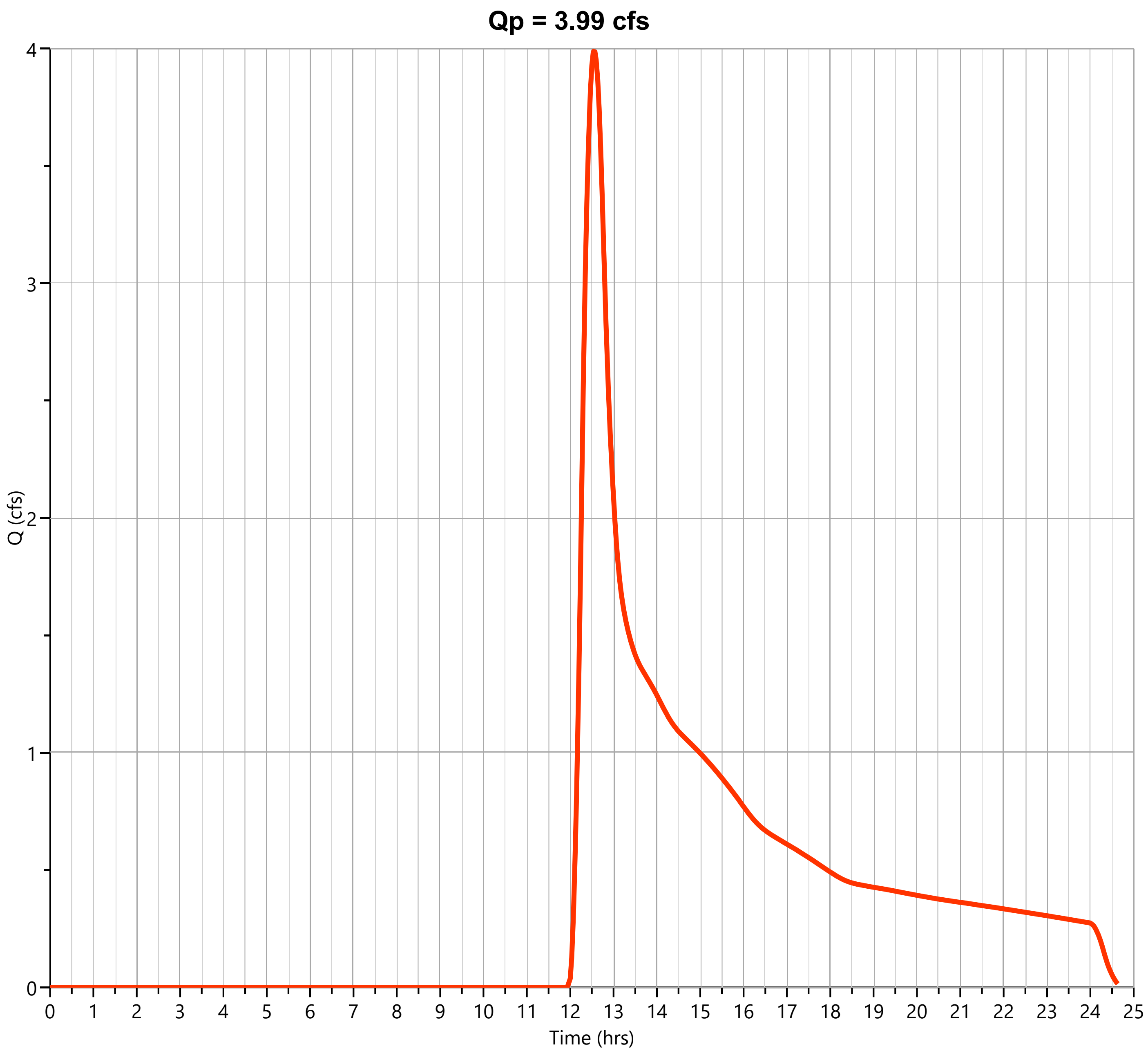
Hydrology Studio v 3.0.0.21

10-27-2022

E-10

Hyd. No. 14

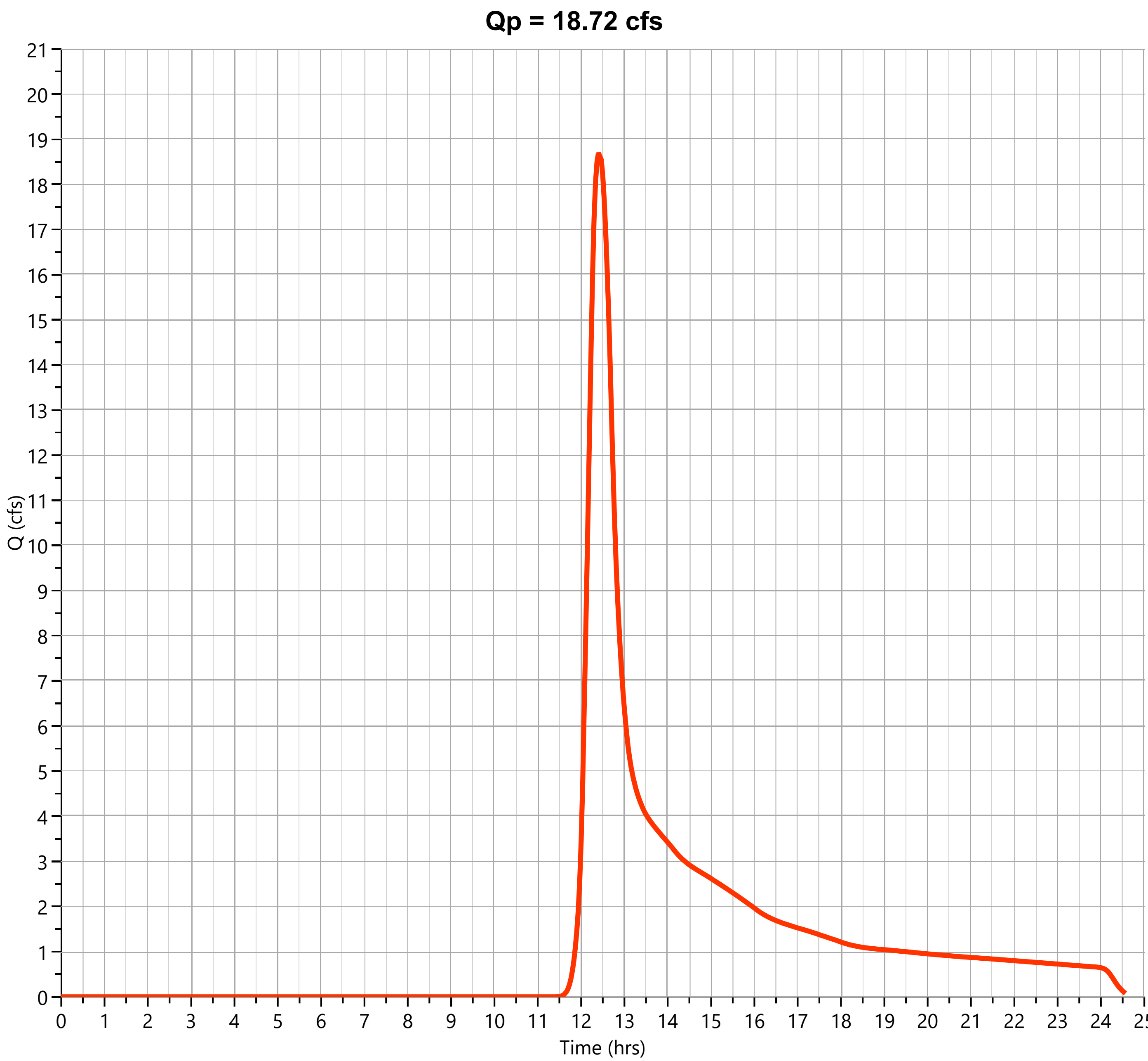
Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.993 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.57 hrs
Time Interval	= 2 min	Runoff Volume	= 34,460 cuft
Drainage Area	= 25.93 ac	Curve Number	= 58
Tc Method	= User	Time of Conc. (Tc)	= 29.8 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



Hydrograph Report

E-10 Hyd. No. 14

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 Report

Project Name:

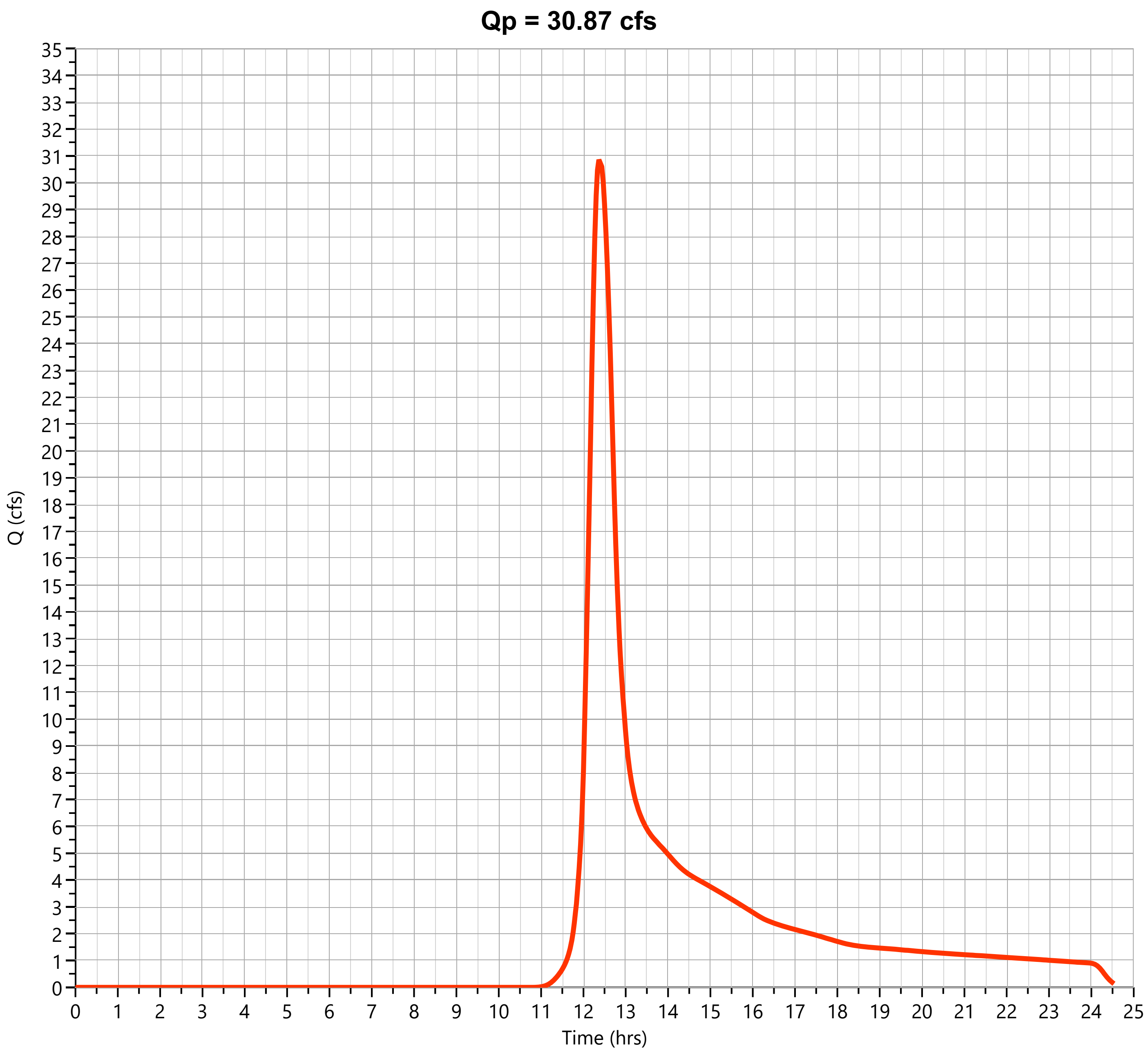
Hydrology Studio v 3.0.0.21

10-27-2022

E-10

Hyd. No. 14

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 Report

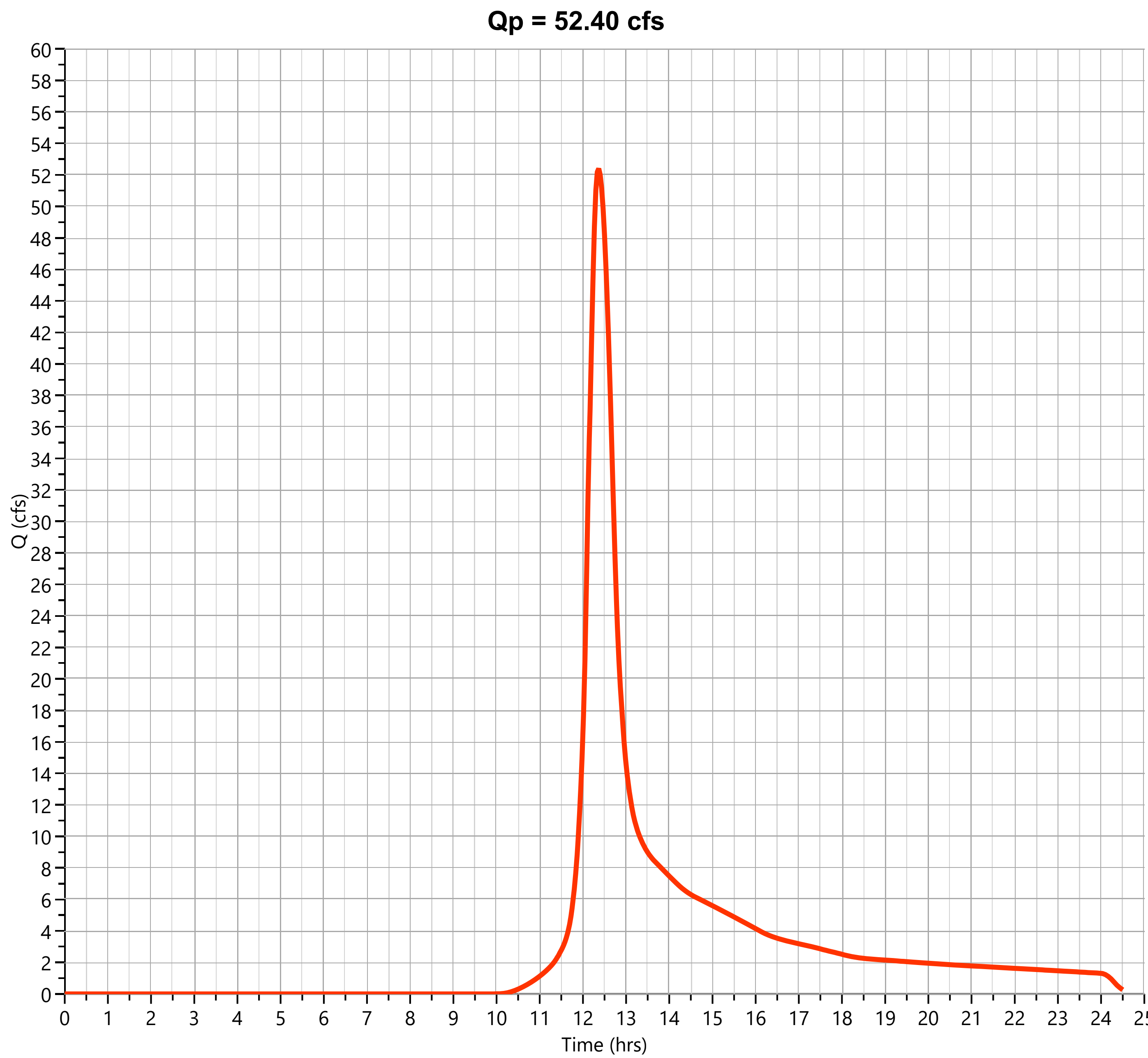
Hydrology Studio v 3.0.0.21

10-27-2022

E-10

Hyd. No. 14

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



Worksheet 2: Runoff curve number and runoff **SM-3719C**

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-11

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
	Impervious	98			0.00	0.00
A	Woods Good Condition	30			0.80	24.00
A	Open Space Good Condition	39			0.00	0.00
A	Open Space Fair Condition	49			0.00	0.00
A	Gravel	76			0.00	0.00
B	Woods Good Condition	55			0.00	0.00
B	Open Space Good Condition	61			0.00	0.00
B	Gravel	85			0.00	0.00
C	Woods Good Condition	70			10.09	706.53
C	Open Space Poor Condition	86			0.00	0.00
C	Gravel	89			0.00	0.00
D	BVW	77			0.00	0.00
				Totals =	10.89	730.54

1/ Use only one CN source per line.

CN (weighted) = total product / total area = 730.54 / 10.89 = 67.06 ; Use CN = 67

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.......................................	yr	2	25	100
Rainfall, P (24-hour)........................	in	3.27	6.14	7.84
Runoff, Q...	in	0.73	2.64	4.00

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By MKO Date 6/1/2022
Rev Date 9/27/2022
Location: Stow, MA Checked ____ Date ____

Circle one: **Present** Developed Subcatchment E-11
Circle one: **Tc** Tt through subarea

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 Tt	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 Tt	hr	0.03			0.03
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

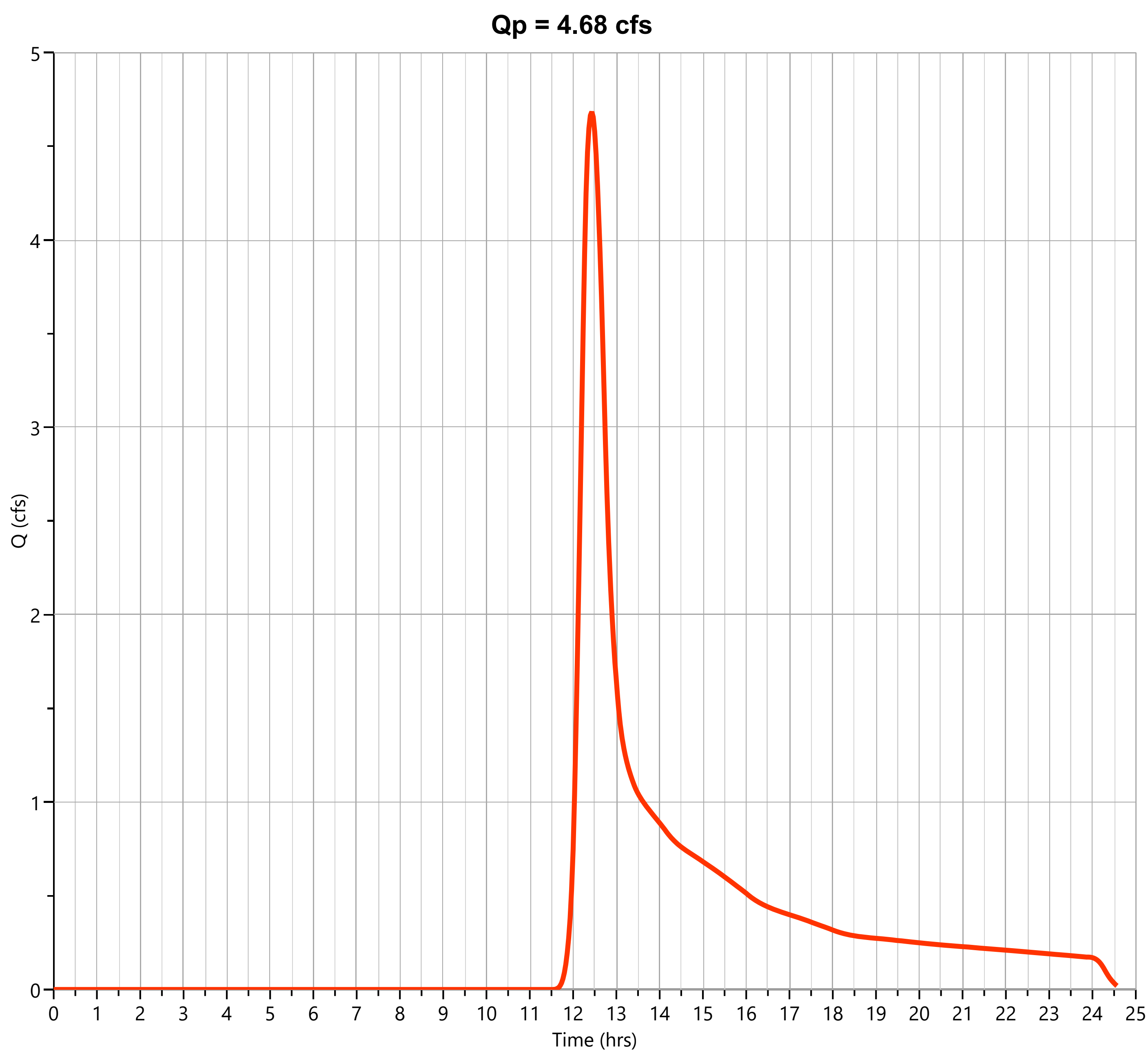
20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.50
min 30.0

Hydrograph Report

E-11

Hyd. No. 15

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 Report

Project Name:

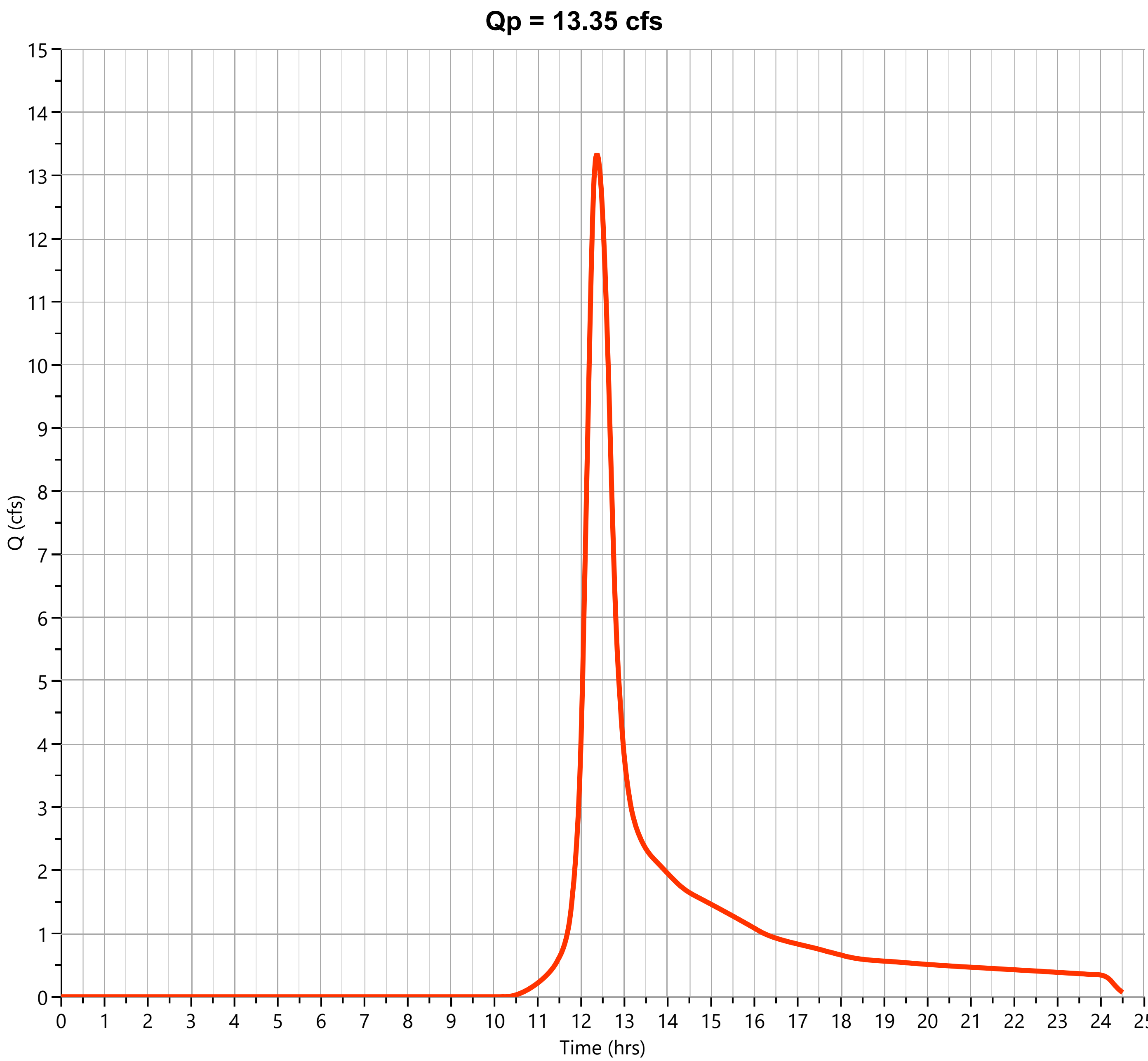
Hydrology Studio v 3.0.0.21

10-27-2022

E-11

Hyd. No. 15

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

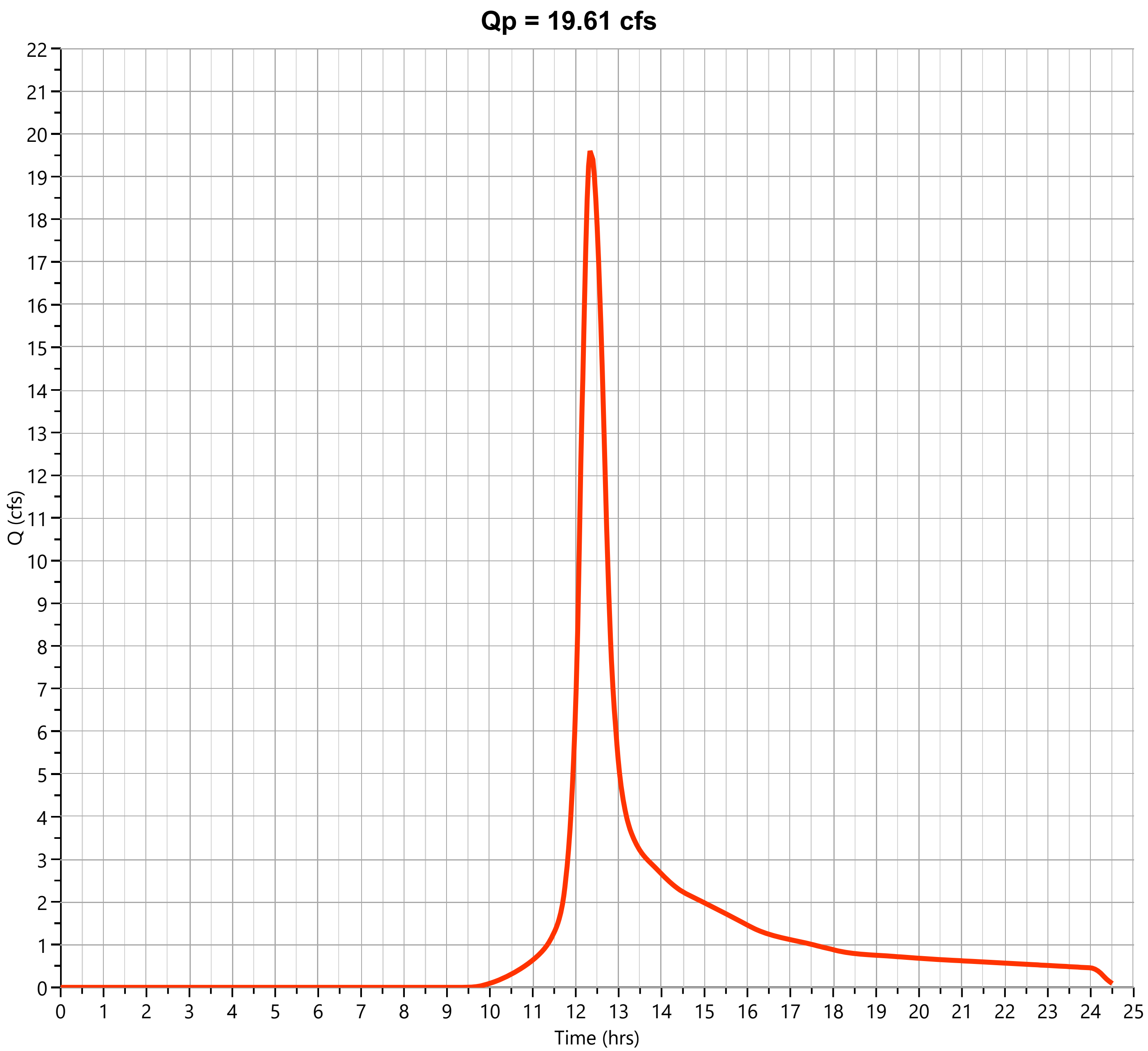


Hydrograph Report

E-11

Hyd. No. 15

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

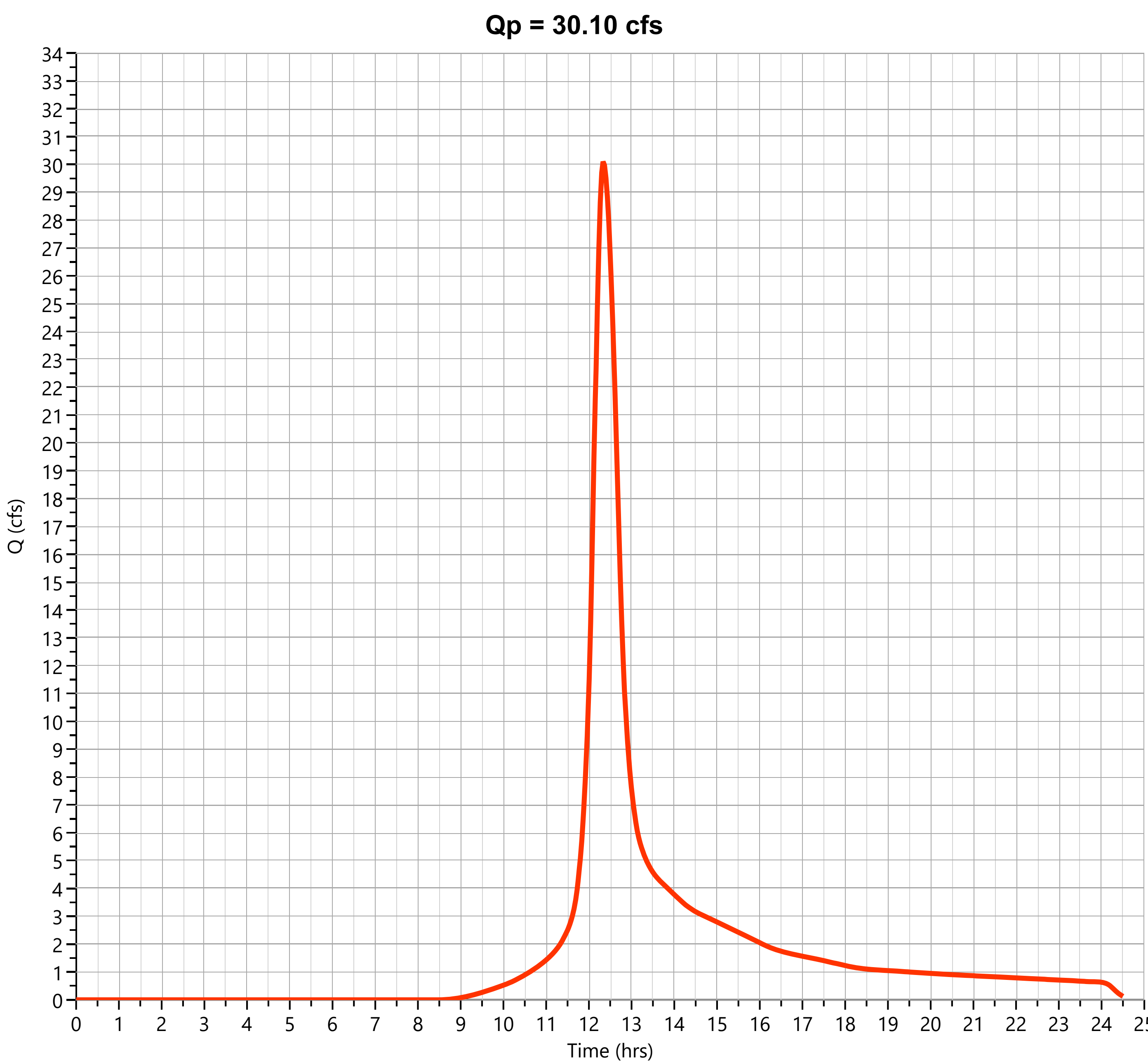


Hydrograph Report

E-11

Hyd. No. 15

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



Worksheet 2: Runoff curve number and runoff **SM-3719C**

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-12

1. Runoff curve number (CN)

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

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = $\frac{6.53}{0.22}$ = 30.00 ; Use CN = 30

2. Runoff

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

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By MKO Date 6/1/2022
Rev Date 9/27/2022
Location: Stow, MA Checked ______ Date ______

Circle one: Present Developed Subcatchment E-12
Circle one: Tc Tt through subarea

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	0.122			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.14			0.14
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	57			
9. Watercourse slope, s		ft/ft	0.112			
10. Average Velocity, V (figure 3-1)		ft/s	5.40			
11. Tt = L / 3600V	Compute Tt	hr	0.00			0.00
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.14
min 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

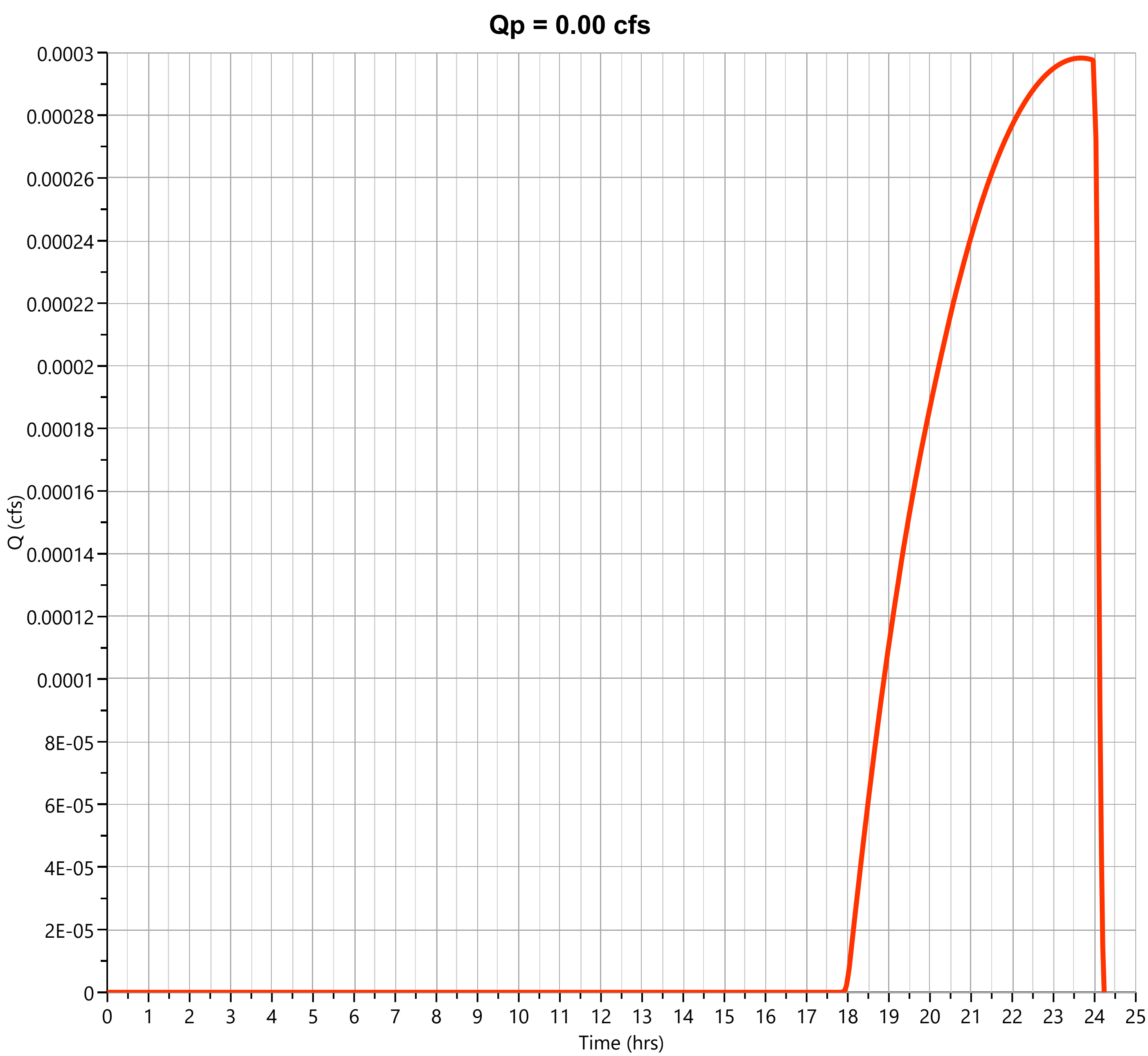
Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21 10-27-2022

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



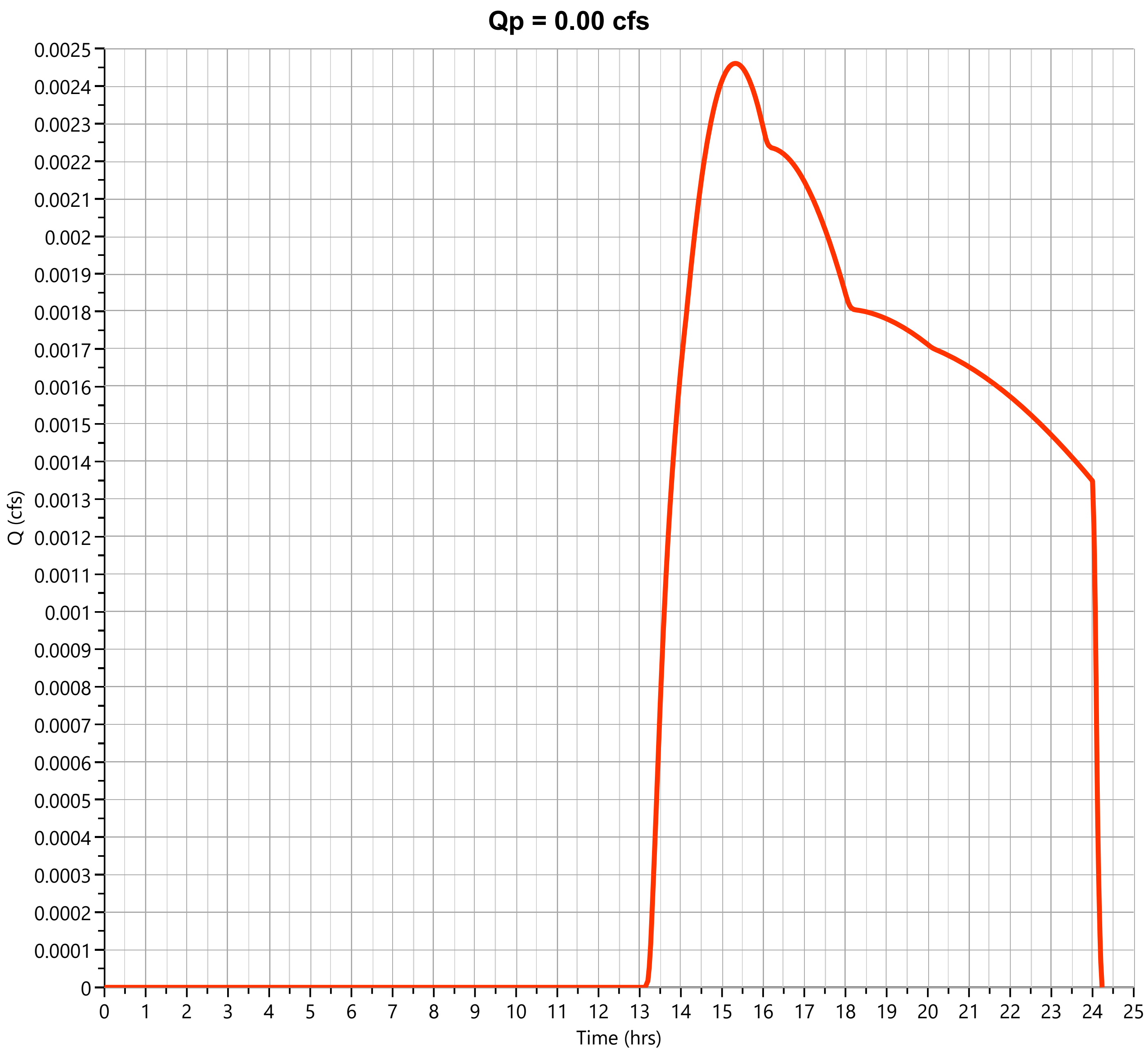
Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.21 10-27-2022

E-12 Hyd. No. 16

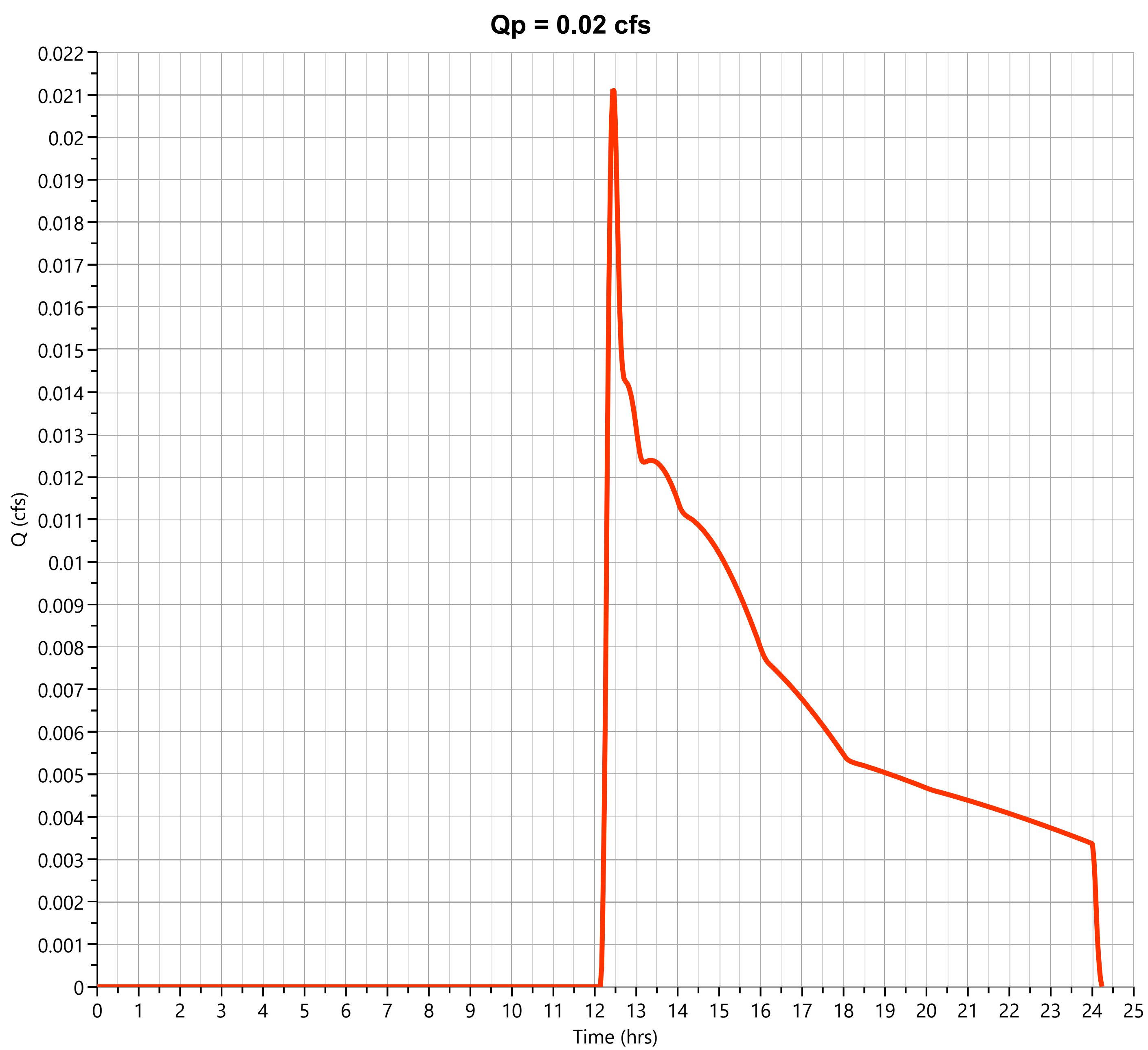
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.002 cfs
Storm Frequency	= 25-yr	Time to Peak	= 15.33 hrs
Time Interval	= 2 min	Runoff Volume	= 69.9 cuft
Drainage Area	= 0.22 ac	Curve Number	= 30
Tc Method	= User	Time of Conc. (Tc)	= 8.6 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration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



Hydrograph Report

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



Post-Development Hydrology

SUMMARY TABLE **SM-3719C**

Project: Athens Street By PFK Date 6/26/22

Rev Date 10/13/22

6/17/2023

Location: Stow, MA Checked Date

EXISTING	AREA	CN	TIME OF CONCENTRATION
E-1	0.16	30	10.0
E-2A	17.70	63	17.2
E-2B	24.13	53	17.3
E-3	10.35	71	22.4
E-4	10.30	70	21.3
E-5	12.89	59	20.3
E-6	2.25	38	21.4
E-7	6.51	32	19.0
E-8	0.68	30	19.6
E-9A	2.59	44	16.3
E-9B	11.92	66	17.9
E-10	25.93	58	8.5
E-11	10.89	67	30.0
E-12	0.22	30	8.6
Total	**136.52**		

PROPOSED	AREA	CN	TIME OF CONCENTRATION
P-1	0.16	30	10.0
P-2A1	1.49	84	9.6
P-2A2	1.40	81	14.2
P-2A3	15.44	62	11.5
P-2B-A	4.62	68	13.3
P-2B-B	17.11	46	11.4
P-3A	1.09	83	8.2
P-3B	8.52	71	13.4
P-4A	1.71	76	13.2
P-4B	7.57	70	10.5
P-5B	2.75	76	17.6
P-5C	1.22	84	10.9
P-5D	2.20	79	6.7
P-5E	8.97	57	12.8
P-6A	1.65	34	19.6
P-6B	0.90	47	10.9
P-7A	3.97	61	6.9
P-7B	1.70	56	25.7
P-8	4.55	65	10.5
P-9A	4.77	55	14.0
P-9B	11.92	66	17.9
P-10A	10.25	60	28.6
P-10B	2.90	82	10.0
P-10C	7.67	85	8.5
P-11	10.78	67	30.0
P-12	0.22	30	8.6
Roof Runoff (x19)	0.99	98	6.0
Total	**136.52**		

Hydrograph 2-yr Summary

Hydrology Studio v 3.0.0.31

Project Name:

02-15-2024

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

Hydrograph 2-yr Summary

Hydrology Studio v 3.0.0.31

Project Name:

02-15-2024

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

Hydrograph 10-yr Summary

Hydrology Studio v 3.0.0.31

Project Name:

02-15-2024

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

Hydrograph 10-yr Summary

Hydrology Studio v 3.0.0.31

Project Name:

02-15-2024

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

Hydrograph 25-yr Summary

Hydrology Studio v 3.0.0.31

Project Name:

02-15-2024

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

Hydrograph 25-yr Summary

Hydrology Studio v 3.0.0.31

Project Name:

02-15-2024

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

Hydrograph 100-yr Summary

Project Name:

Hydrology Studio v 3.0.0.31

02-15-2024

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

Hydrograph 100-yr Summary

Project Name:

Hydrology Studio v 3.0.0.31

02-15-2024

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

Worksheet 2: Runoff curve number and runoff **SM-3719C**

Project: Athens Street By NC Date 6/24/22

Rev Date 10/27/2022

Location: Stow, MA Checked Date 6/17/2023

Circle one: Present Developed Subcatchment P-1

1. Runoff curve number (CN)

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

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{4.80}{0.16} =$ 30.00 ; Use CN = 30

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency......................................	yr	2	25	100
Rainfall, P (24-hour)........................	in	3.27	6.14	7.84
Runoff, Q.. (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	0.09	0.09	0.38

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By NC Date 6/24/2022
Rev Date 10/27/2022
Location: Stow, MA Checked Date 6/17/2023

Circle one: Present **Developed** Subcatchment P-1
Circle one: Tc **Tt** through subarea

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	0.082				
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt hr	0.16				0.16

Shallow concentrated Flow

	Segment ID	B-C			
7. Surface Description (paved or unpaved)		UNPAVED			
8. Flow Length, L	ft	32			
9. Watercourse slope, s	ft/ft	0.047			
10. Average Velocity, V (figure 3-1)	ft/s	3.50			
11. Tt = L / 3600V	Compute Tt hr	0.00			0.00

Channel flow

	Segment ID				
12. Cross sectional flow area, a	sf				
13. Wetted perimeter, pw	ft				
14. Hydraulic radius, r=a/wp	Compute r ft				
15. Channel Slope, s	ft/ft				
16. Manning's roughness coeff., n					
17. V = 1.49 r^2/3 s^1/2 / n	Compute V ft/s				
18. Flow length, L	ft				
19. Tt = L / 3600V	Compute Tt hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.17
min 10.0

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

Hydrograph Report

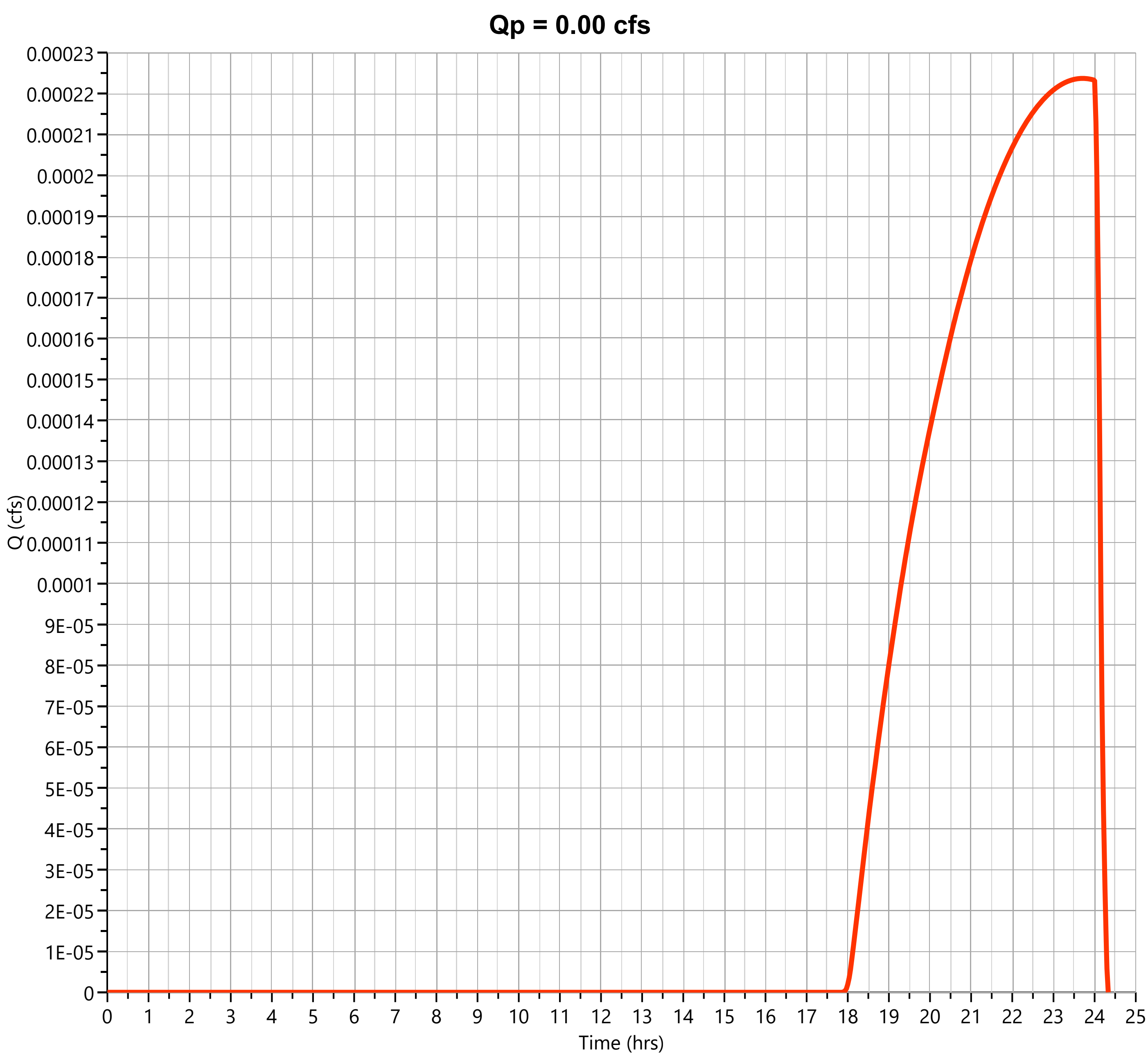
Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

P-1

Hyd. No. 1

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



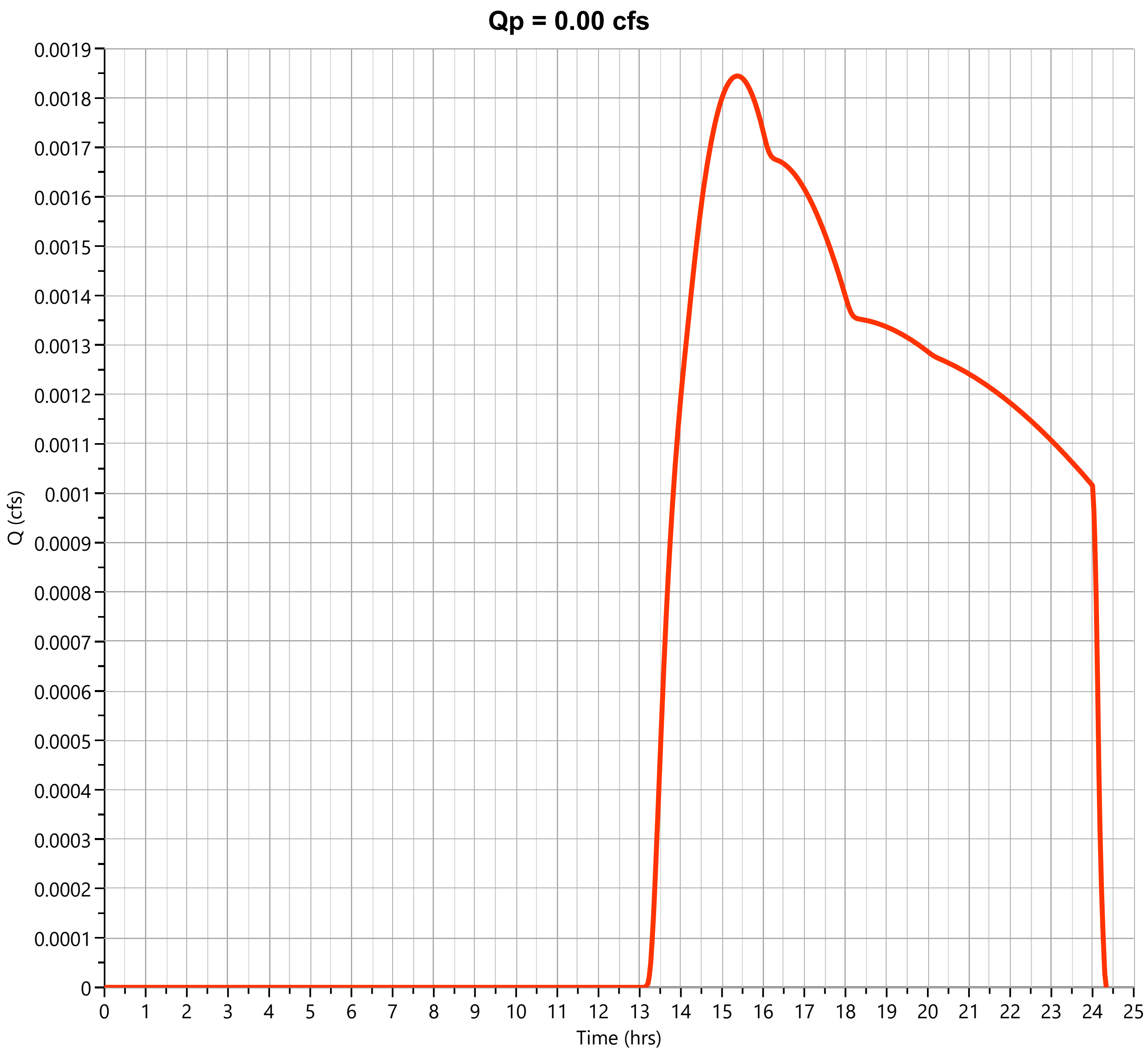
Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

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



Hydrograph Report

Project Name:

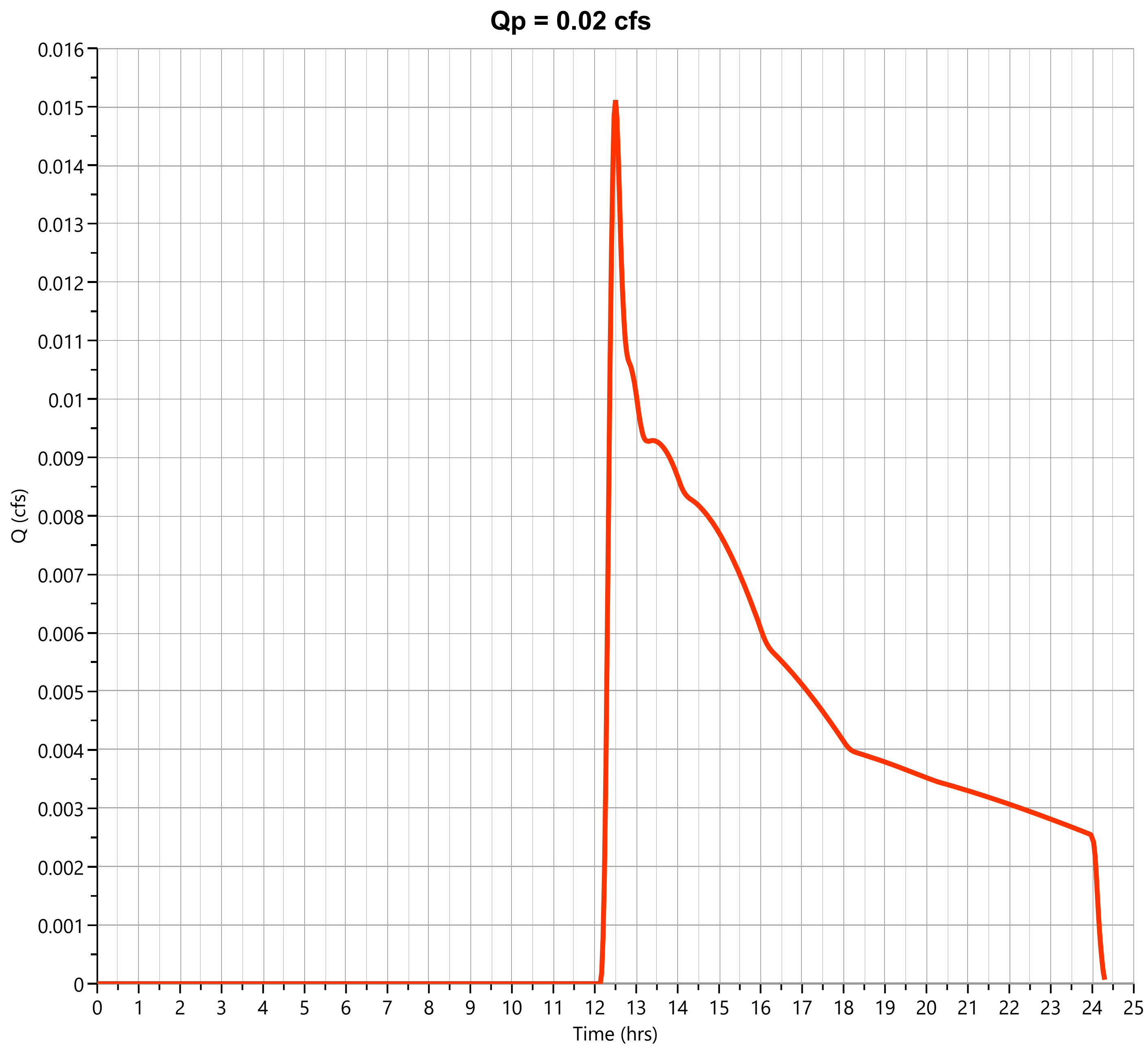
Hydrology Studio v 3.0.0.27

06-17-2023

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

Rev Date 6/17/2023

Location: Stow, MA Checked Date

Circle one: Present Developed Subcatchment P-2A2

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
	Impervious	98			0.47	45.81
A	Woods Good Condition	30			0.00	0.00
A	Open Space Good Condition	39			0.00	0.00
A	Gravel	76			0.00	0.00
C	Woods Good Condition	70			0.25	17.38
C	Open Space Good Condition	74			0.69	50.88
C	Gravel	89			0.00	0.00
1/ Use only one CN source per line.	61126			Totals =	1.40	114.07

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

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency......................................	yr	2	25	100
Rainfall, P (24-hour).......................	in	3.27	6.14	7.84
Runoff, Q..	in	1.54	4.04	5.62

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By PFK Date 10/13/2022
Rev Date 6/17/2023
Location: Stow, MA Checked Date

Circle one: Present **Developed** Subcatchment P-2A2
Circle one: **Tc** Tt through subarea

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	0.040			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.22			0.22

Shallow concentrated Flow

		Segment ID	B-C	C-D	D-E	
7. Surface Description (paved or unpaved)			UNPAVED	UNPAVED	PAVED	
8. Flow Length, L		ft	102	109	15	
9. Watercourse slope, s		ft/ft	0.040	0.065	0.07	
10. Average 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 flow

		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

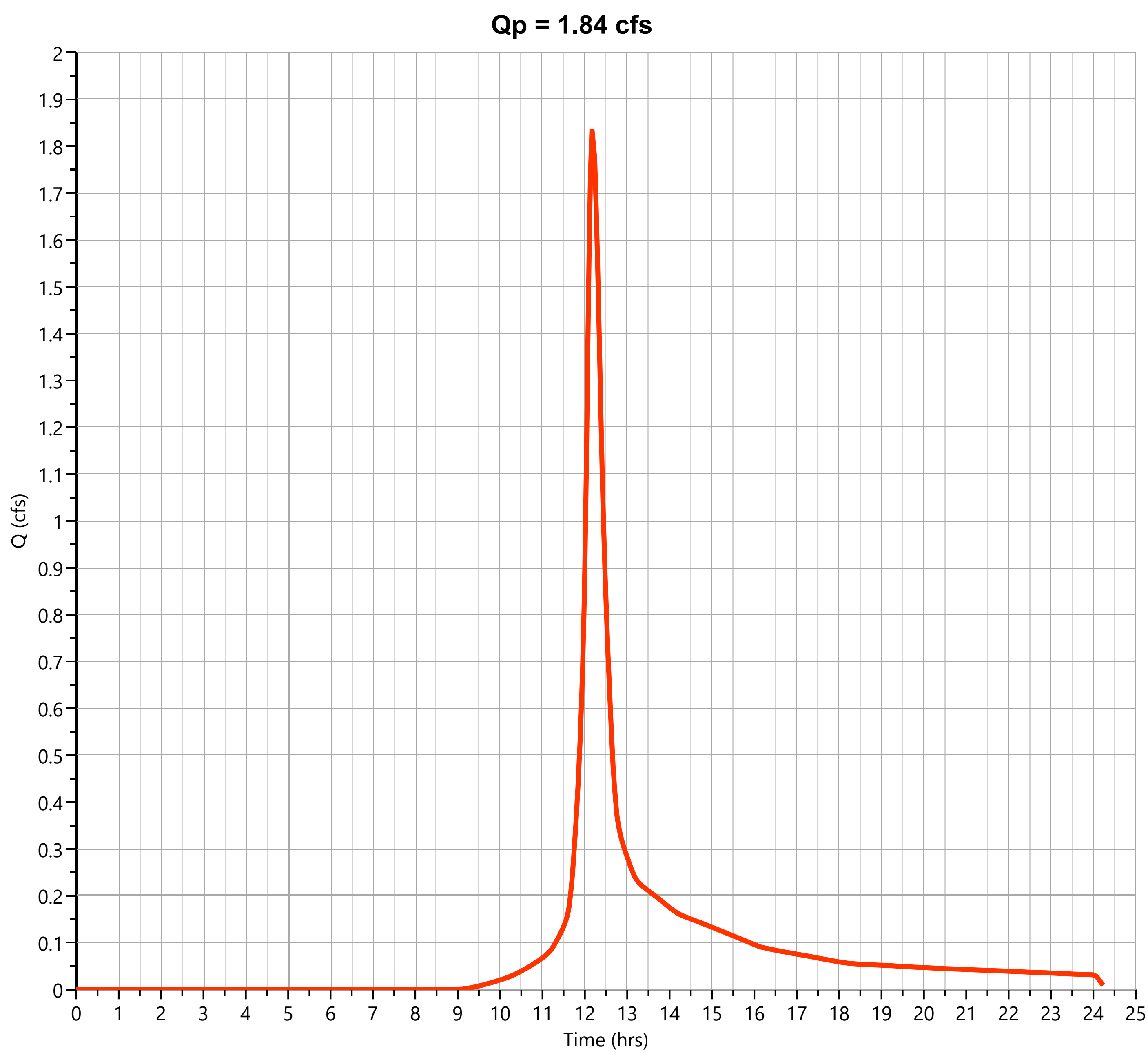
20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.24
min 14.2

Hydrograph Report

P-2A2

Hyd. No. 20

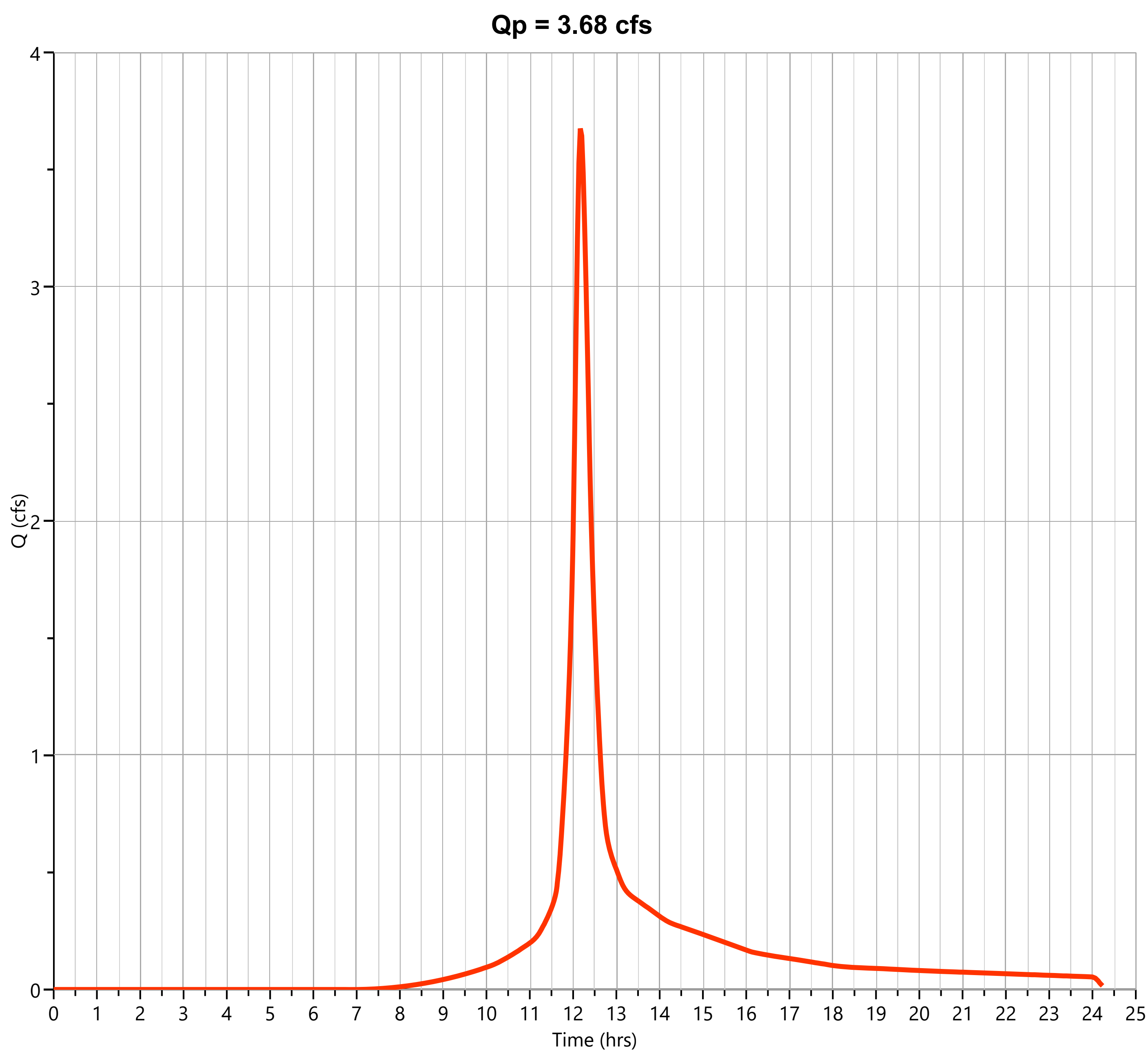
Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.838 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 7,553 cuft
Drainage Area	= 1.4 ac	Curve Number	= 81
Tc Method	= User	Time of Conc. (Tc)	= 14.2 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



P-2A2

Hyd. No. 20

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

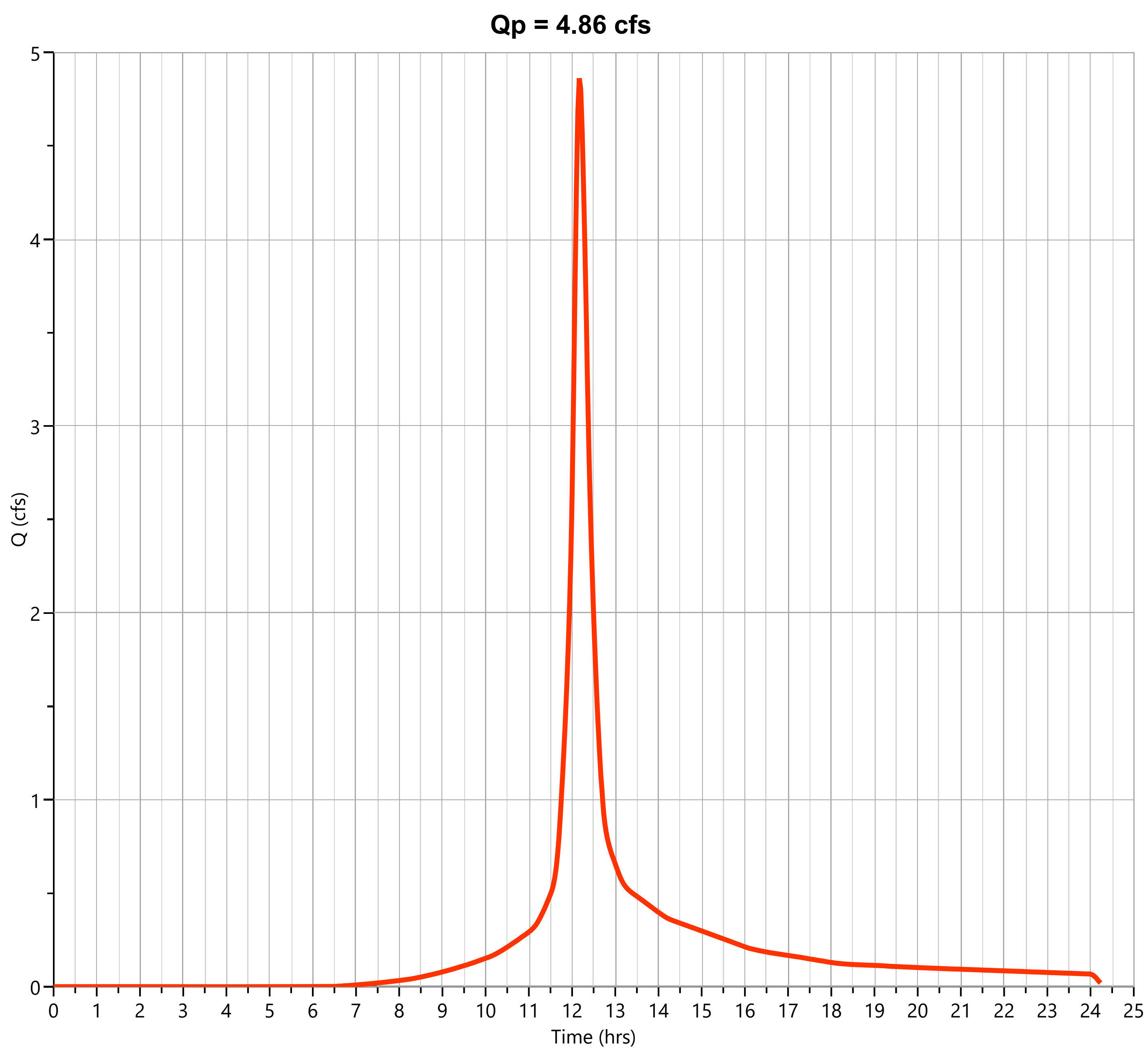


Hydrograph Report

P-2A2

Hyd. No. 20

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

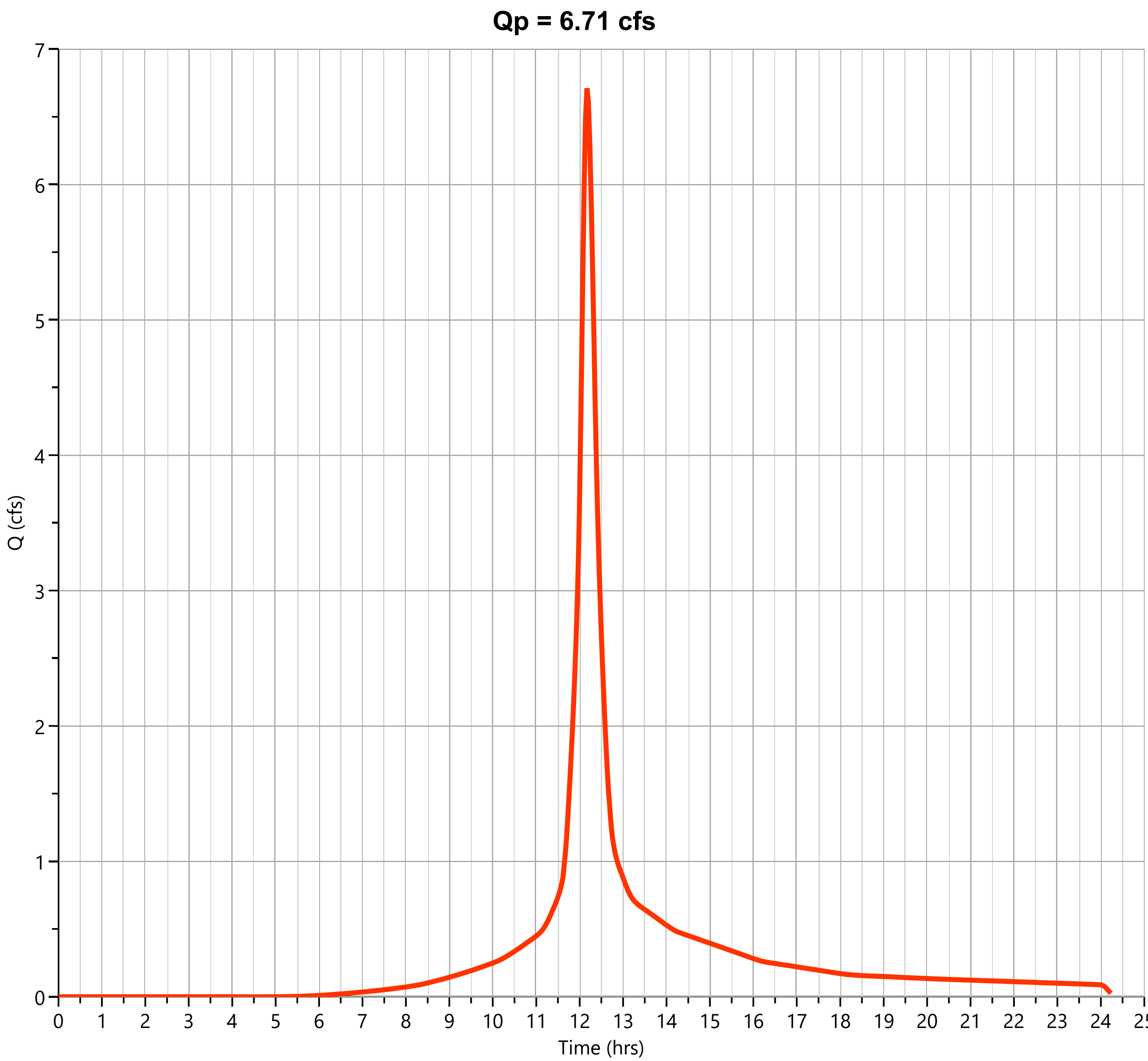


Hydrograph Report

P-2A2

Hyd. No. 20

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



IB-2A2

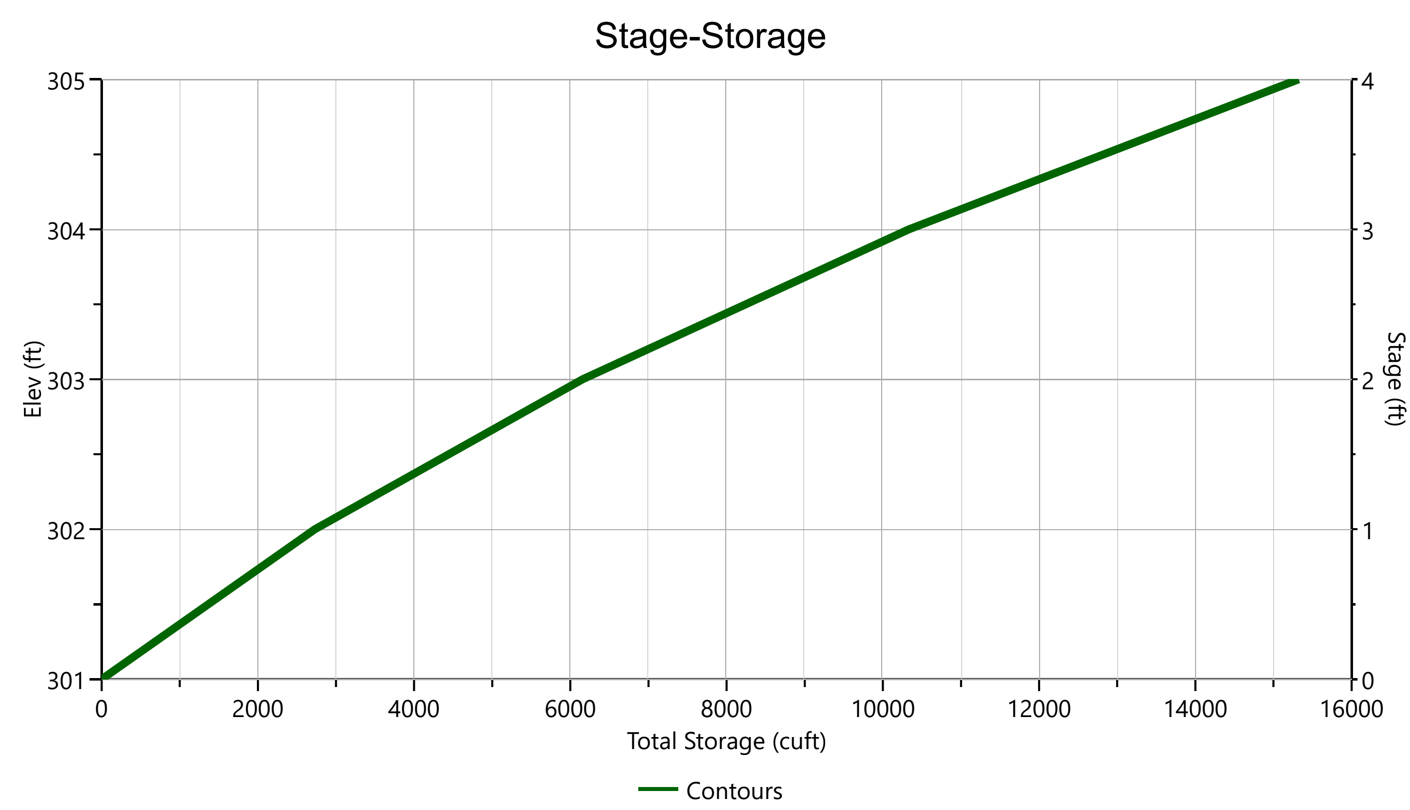
Stage-Storage

User Defined Contours

Description	Input
Bottom Elevation, ft	301.00
Voids (%)	100.00
Volume Calc	Ave End Area

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	301.00	2,397	0.000	0.000
1.00	302.00	3,064	2,731	2,731
2.00	303.00	3,788	3,426	6,157
3.00	304.00	4,569	4,179	10,335
4.00	305.00	5,407	4,988	15,323

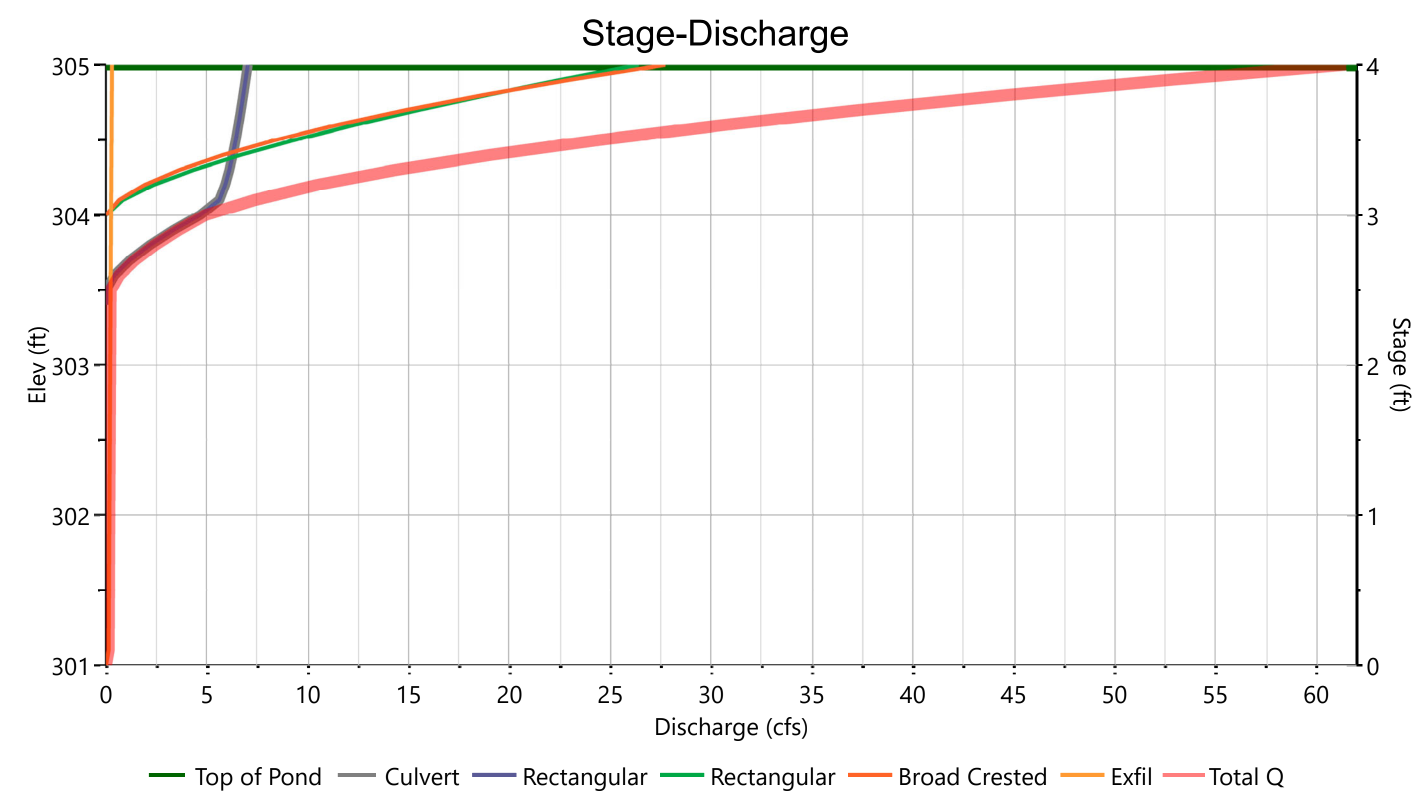


IB-2A2

Stage-Discharge

Culvert / Orifices	Culvert	Orifices 1	Orifices 2	Orifices 3	Perforated Riser	
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 1***	**Weirs 2**	**Weirs 3**	**Ancillary**	
Shape / Type	Circular	Rectangular	Rectangular	Broad Crested	Exfiltration, in/hr	2.41**
Crest Elevation, ft		303.5	304	304		
Crest Length, ft		4	8	6		
Angle, deg				18.4 (3:1)		
Weir Coefficient, Cw		3.3	3.3	3.3		

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



IB-2A2

Stage-Storage-Discharge Summary

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

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Pond Report

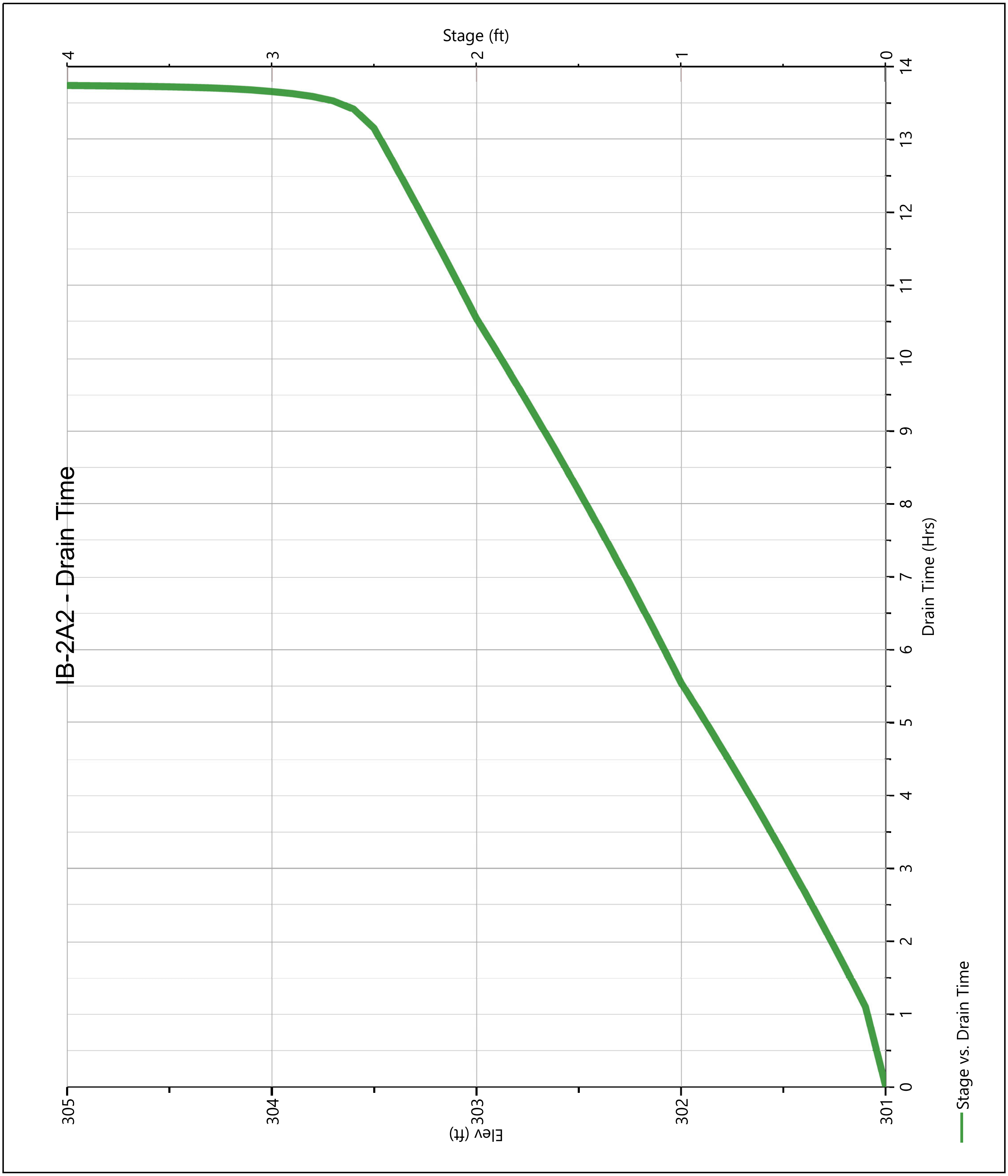
Project Name:

Hydrology Studio v 3.0.0.27

06-17-2023

IB-2A2

Pond Drawdown



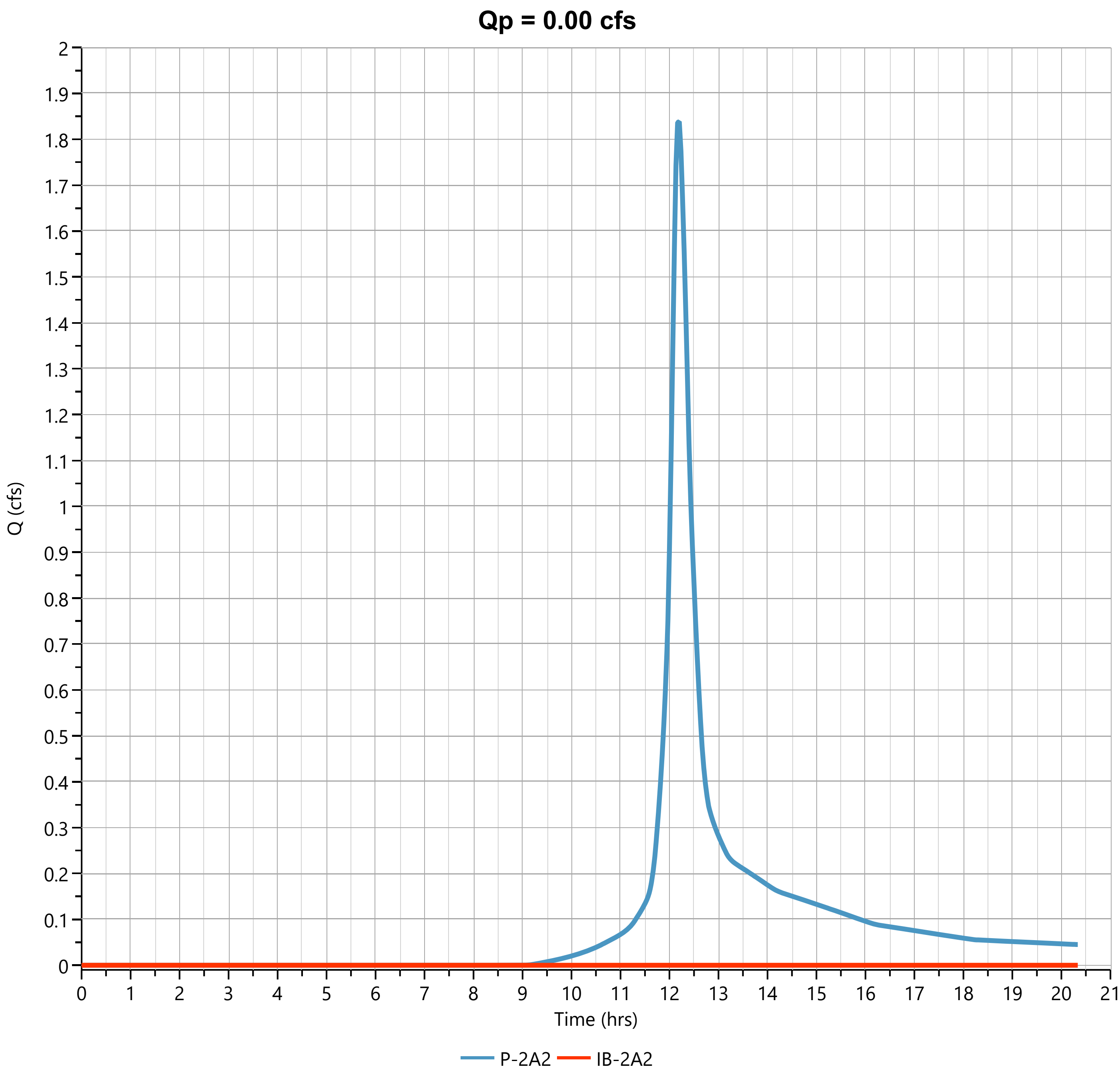
IB-2A2

Hyd. No. 21

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 17.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 20 - P-2A2	Max. Elevation	= 302.21 ft
Pond Name	= IB-2A2	Max. Storage	= 3,454 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 19.24 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

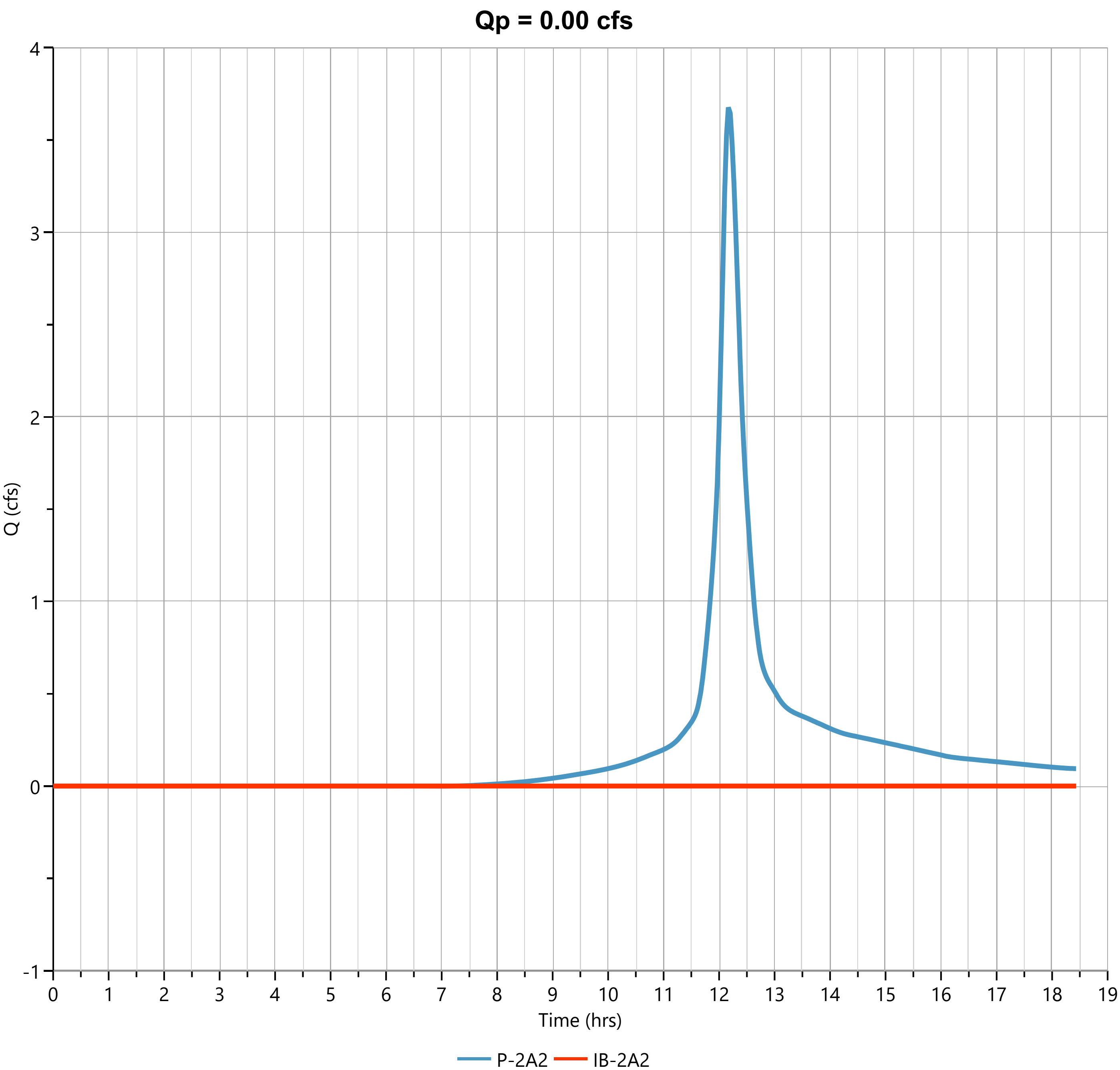
IB-2A2

Hyd. No. 21

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 10-yr	Time to Peak	= 15.00 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.016 cuft
Inflow Hydrograph	= 20 - P-2A2	Max. Elevation	= 303.48 ft
Pond Name	= IB-2A2	Max. Storage	= 8,168 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.45 hrs

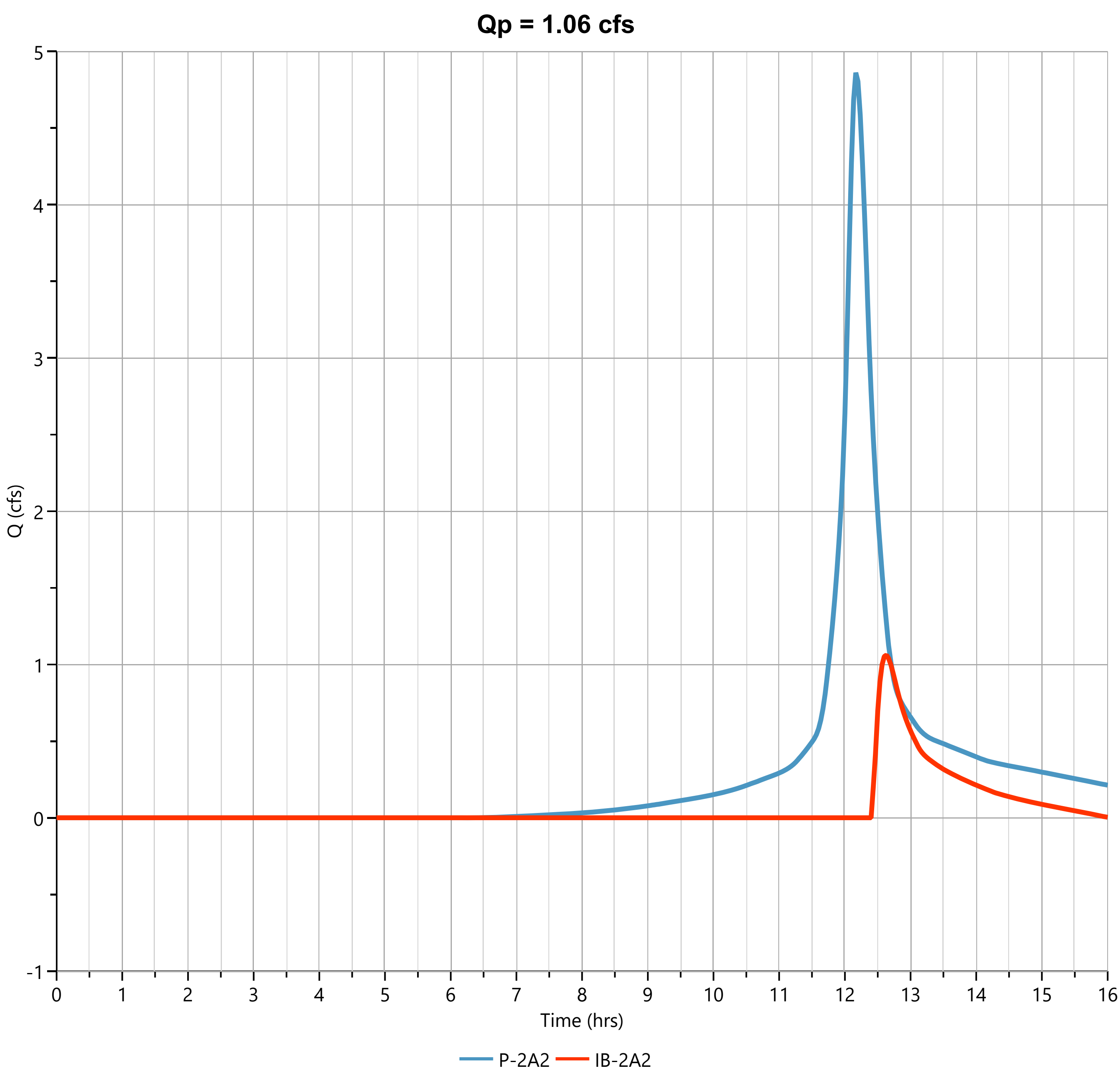


IB-2A2

Hyd. No. 21

Hydrograph Type	= Pond Route	Peak Flow	= 1.062 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.63 hrs
Time Interval	= 2 min	Hydrograph Volume	= 3,531 cuft
Inflow Hydrograph	= 20 - P-2A2	Max. Elevation	= 303.69 ft
Pond Name	= IB-2A2	Max. Storage	= 9,016 cuft

Pond Routing by Storage Indication Method



Hydrograph Report

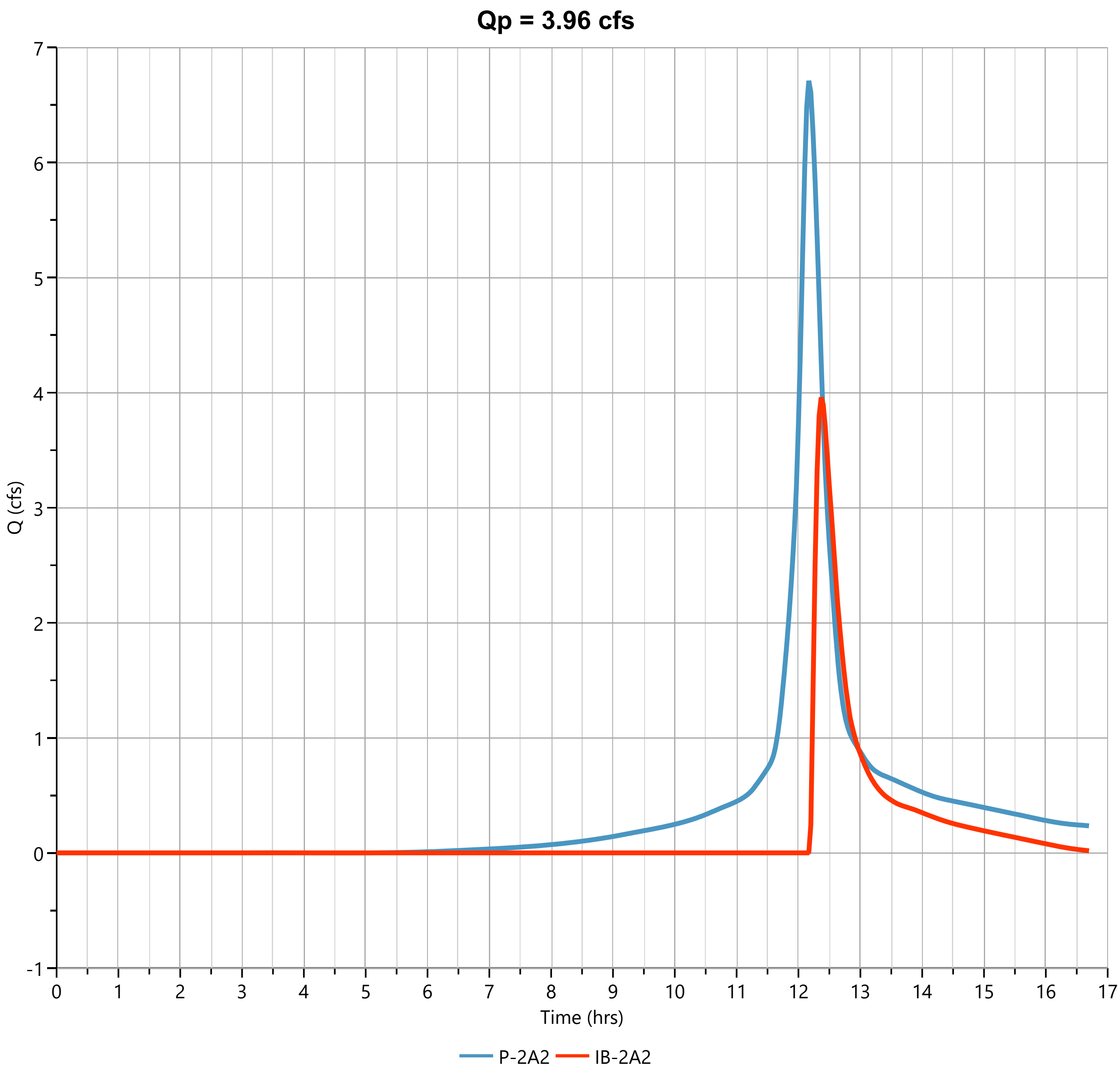
Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

IB-2A2 Hyd. No. 21

Hydrograph Type	= Pond Route	Peak Flow	= 3.959 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.37 hrs
Time Interval	= 2 min	Hydrograph Volume	= 9,757 cuft
Inflow Hydrograph	= 20 - P-2A2	Max. Elevation	= 303.95 ft
Pond Name	= IB-2A2	Max. Storage	= 10,112 cuft

Pond Routing by Storage Indication Method



Worksheet 2: Runoff curve number and runoff **SM-3719C**

Project: Athens Street By PFK Date 10/13/22
Rev Date 6/17/2023
Location: Stow, MA Checked Date

Circle one: Present **Developed** Subcatchment P-2A1

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
	Impervious	98			0.66	64.20
A	Woods Good Condition	30			0.00	0.00
A	Open Space Good Condition	39			0.00	0.00
A	Gravel	76			0.00	0.00
C	Woods Good Condition	70			0.00	0.00
C	Open Space Good Condition	74			0.84	62.01
C	Gravel	89			0.00	0.00
	65040			Totals =	1.49	126.21

1/ Use only one CN source per line.

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

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency......................................	yr	2	25	100
Rainfall, P (24-hour).......................	in	3.27	6.14	7.84
Runoff, Q..	in	1.78	4.38	6.00

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By PFK Date 10/13/2022

Rev Date 6/17/2023

Location: Stow, MA Checked ______ Date ______

Circle one: Present **Developed** Subcatchment P-2A1

Circle one: **Tc** Tt through subarea

Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			GRASS			
2. Mannings roughness coeff., n (table 3-1)			0.24			
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 Tt	hr	0.14			0.14
Shallow concentrated Flow		Segment ID	B-C	C-D		
7. Surface Description (paved or unpaved)			UNPAVED	PAVED		
8. Flow Length, L		ft	153	21		
9. Watercourse slope, s		ft/ft	0.020	0.010		
10. Average Velocity, V (figure 3-1)		ft/s	2.28	2.03		
11. Tt = L / 3600V	Compute Tt	hr	0.02	0.00		0.02
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

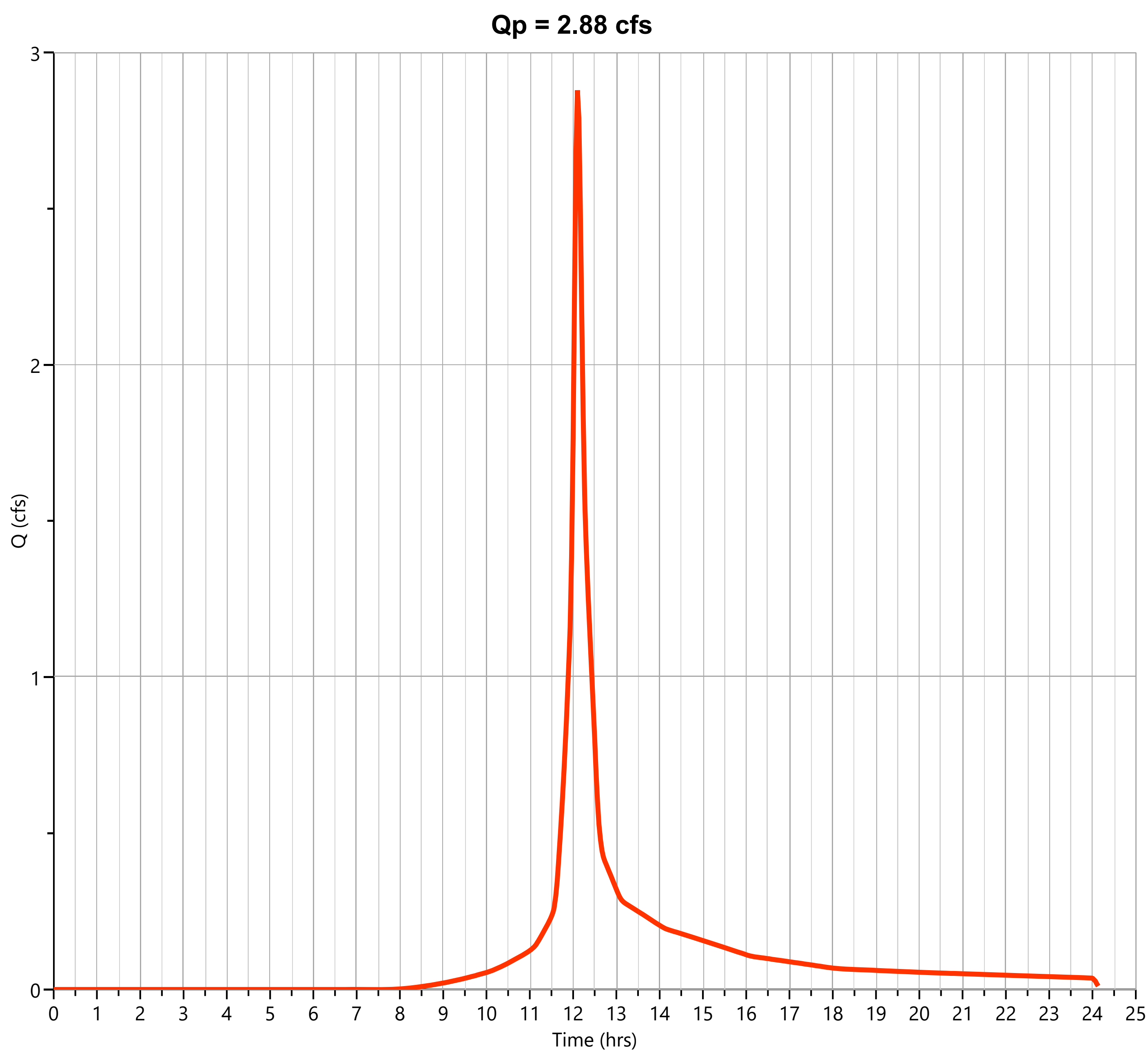
20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.16

min 9.6

P-2A1

Hyd. No. 22

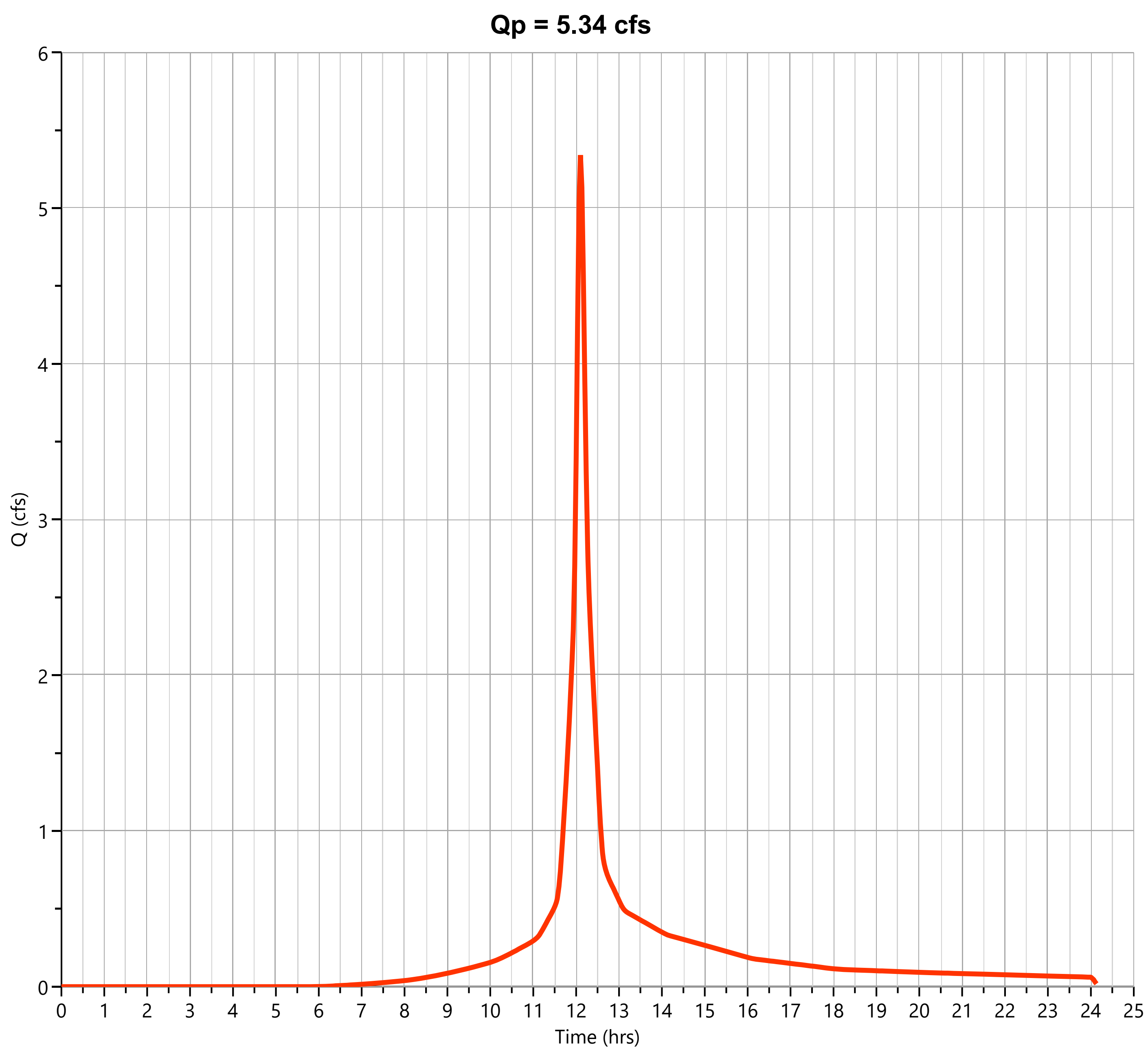
Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.879 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 9,830 cuft
Drainage Area	= 1.49 ac	Curve Number	= 85
Tc Method	= User	Time of Conc. (Tc)	= 9.6 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



P-2A1

Hyd. No. 22

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



Hydrograph Report

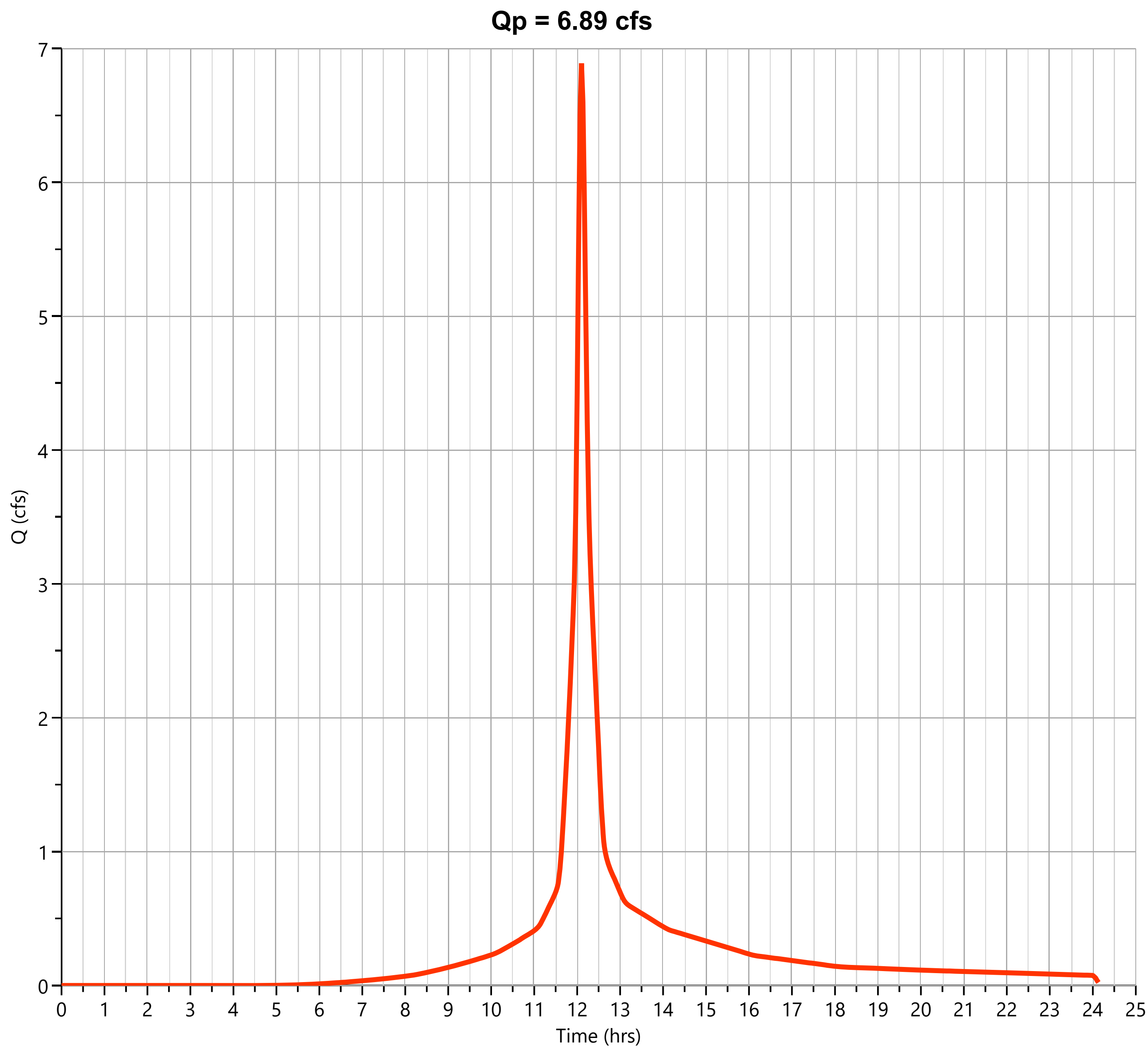
Hydrology Studio v 3.0.0.31

02-14-2024

P-2A1

Hyd. No. 22

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



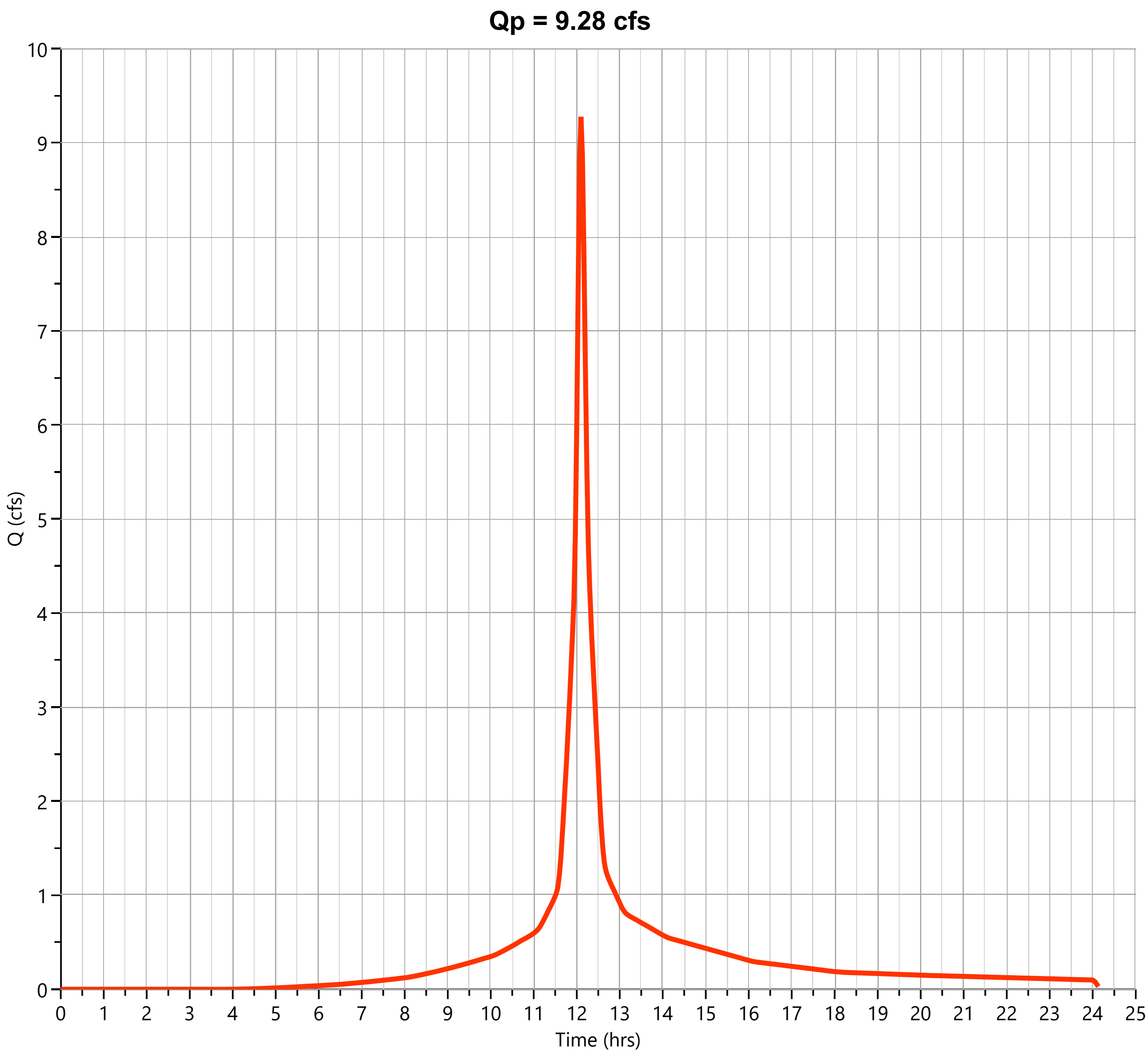
Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31 02-14-2024

P-2A1 Hyd. No. 22

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



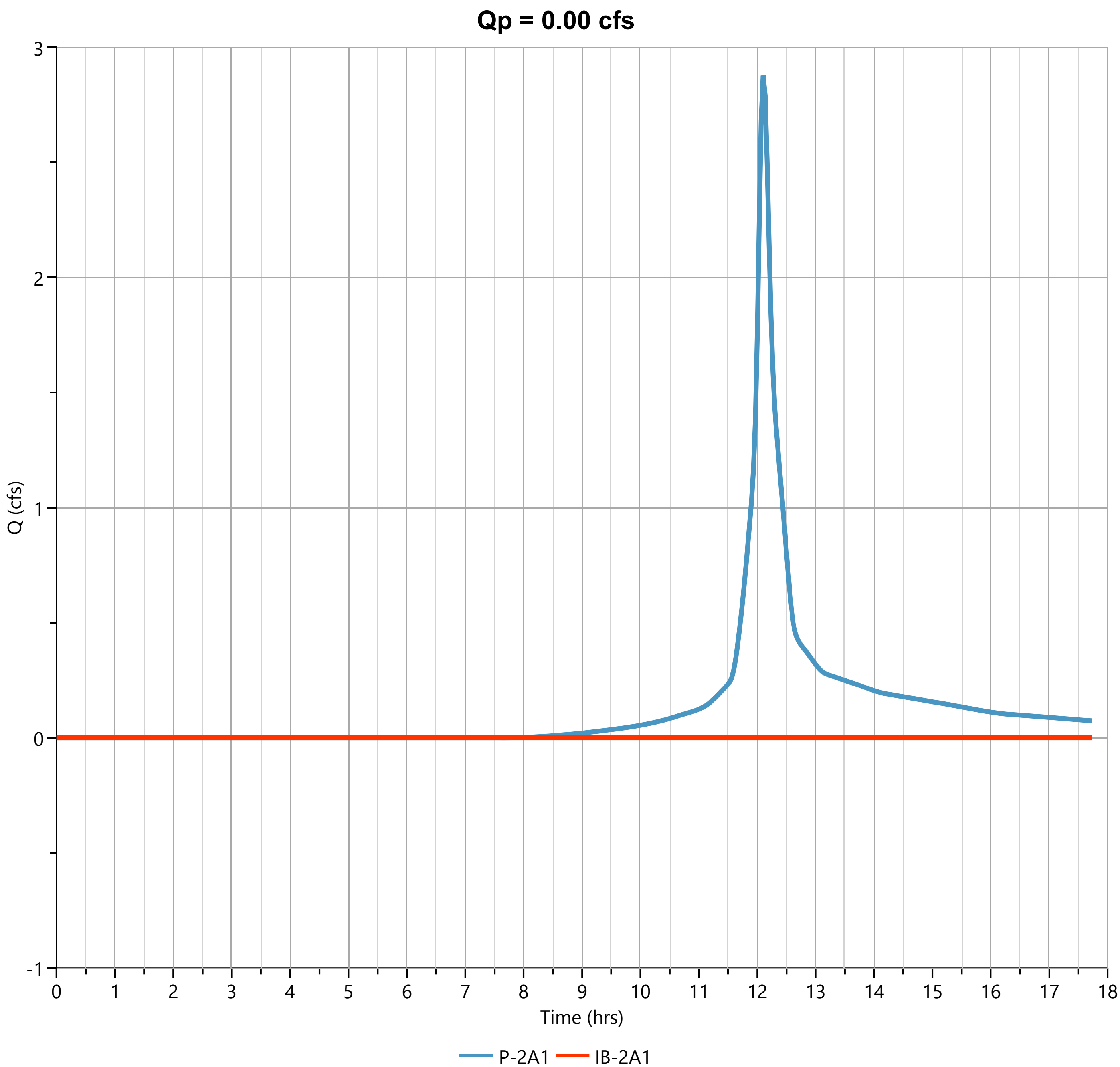
IB-2A1

Hyd. No. 23

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 16.63 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 22 - P-2A1	Max. Elevation	= 307.05 ft
Pond Name	= IB-2A1	Max. Storage	= 4,358 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 5.94 hrs



Hydrograph Report

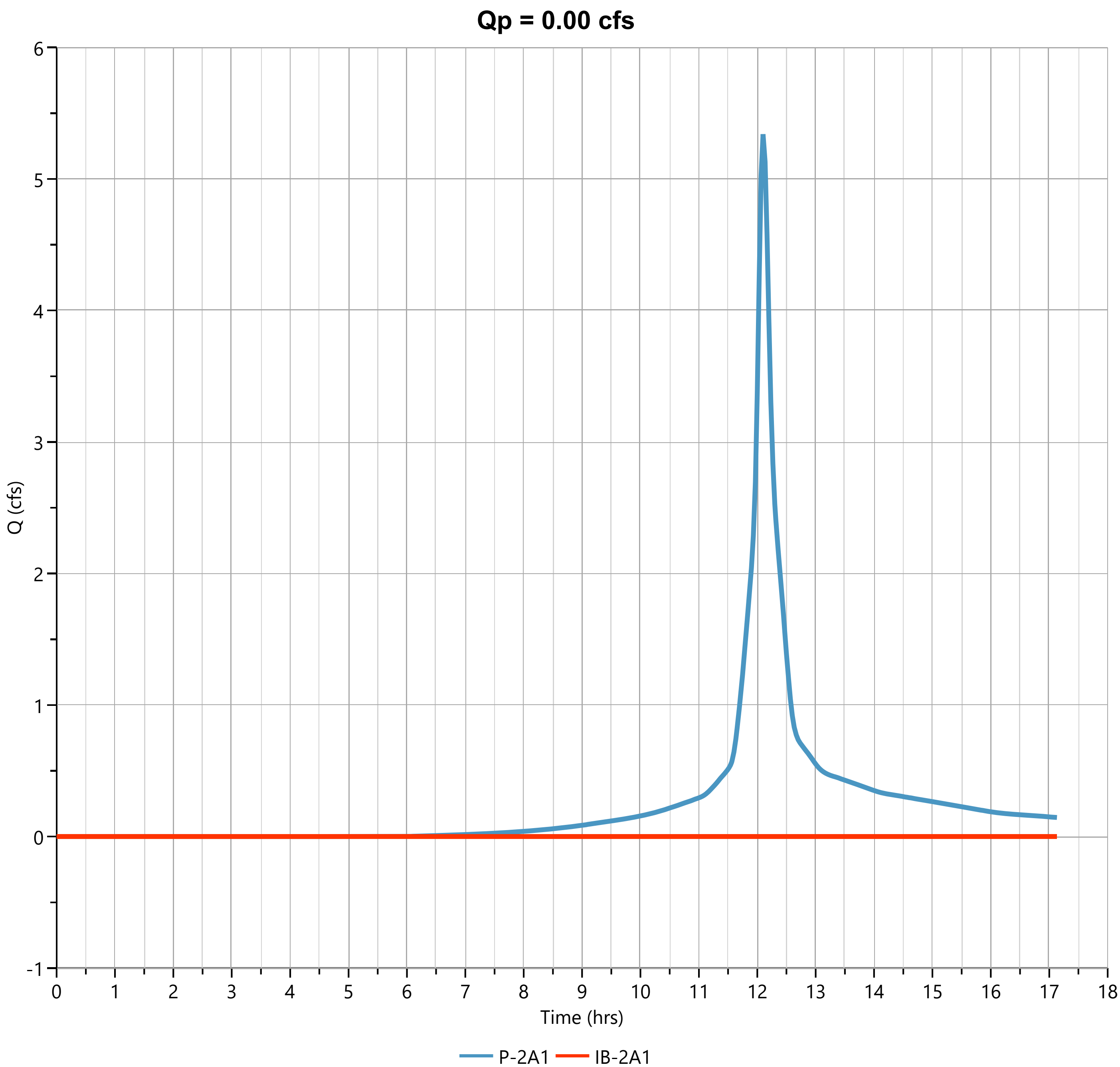
Project Name:

Hydrology Studio v 3.0.0.31 02-14-2024

IB-2A1 Hyd. No. 23

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.90 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.001 cuft
Inflow Hydrograph	= 22 - P-2A1	Max. Elevation	= 308.11 ft
Pond Name	= IB-2A1	Max. Storage	= 9,626 cuft

Pond Routing by Storage Indication Method *Center of mass detention time = 1.42 hrs*



Hydrograph Report

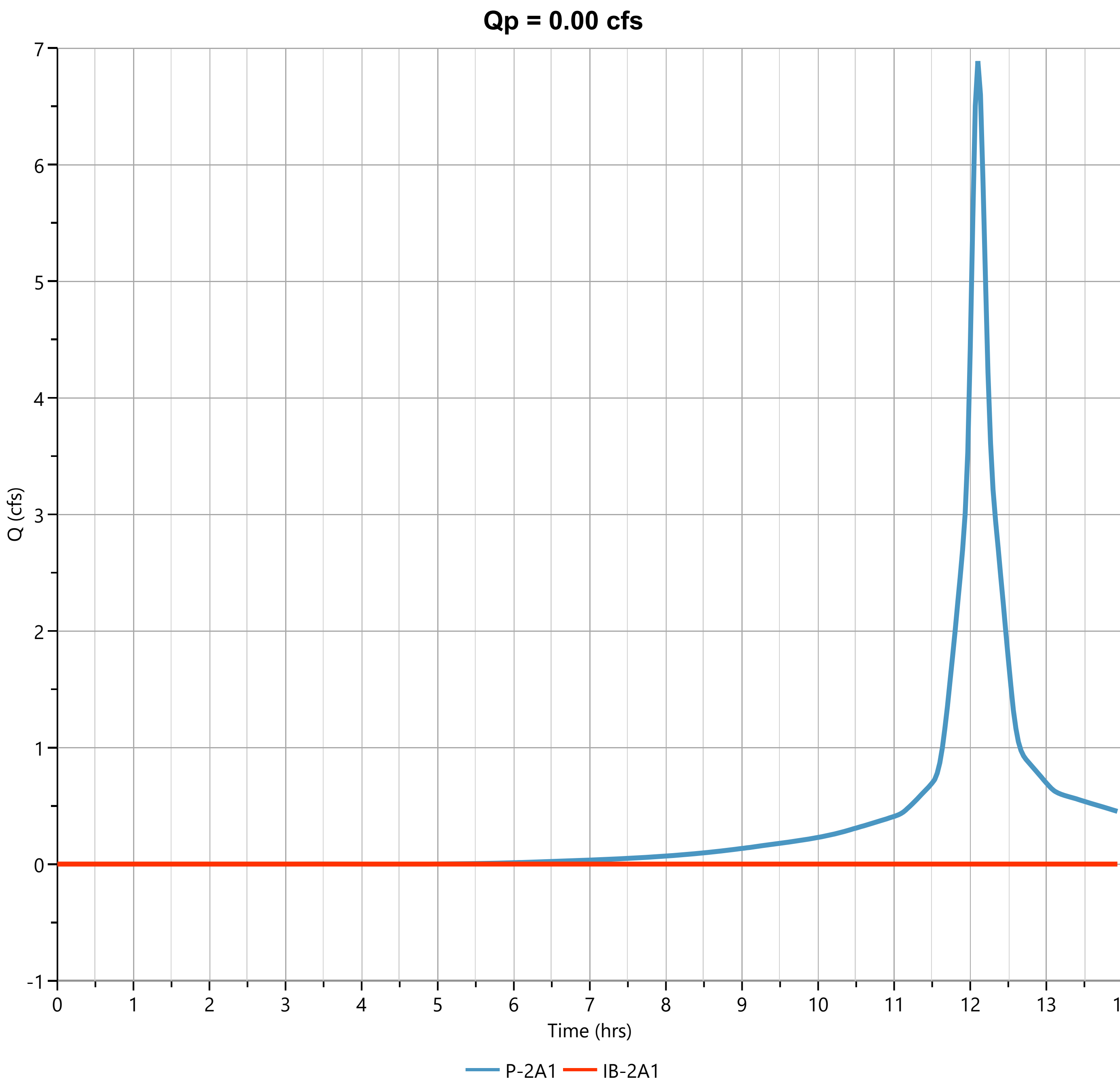
Project Name:

Hydrology Studio v 3.0.0.31 02-14-2024

IB-2A1 Hyd. No. 23

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.70 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.001 cuft
Inflow Hydrograph	= 22 - P-2A1	Max. Elevation	= 308.76 ft
Pond Name	= IB-2A1	Max. Storage	= 13,345 cuft

Pond Routing by Storage Indication Method



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

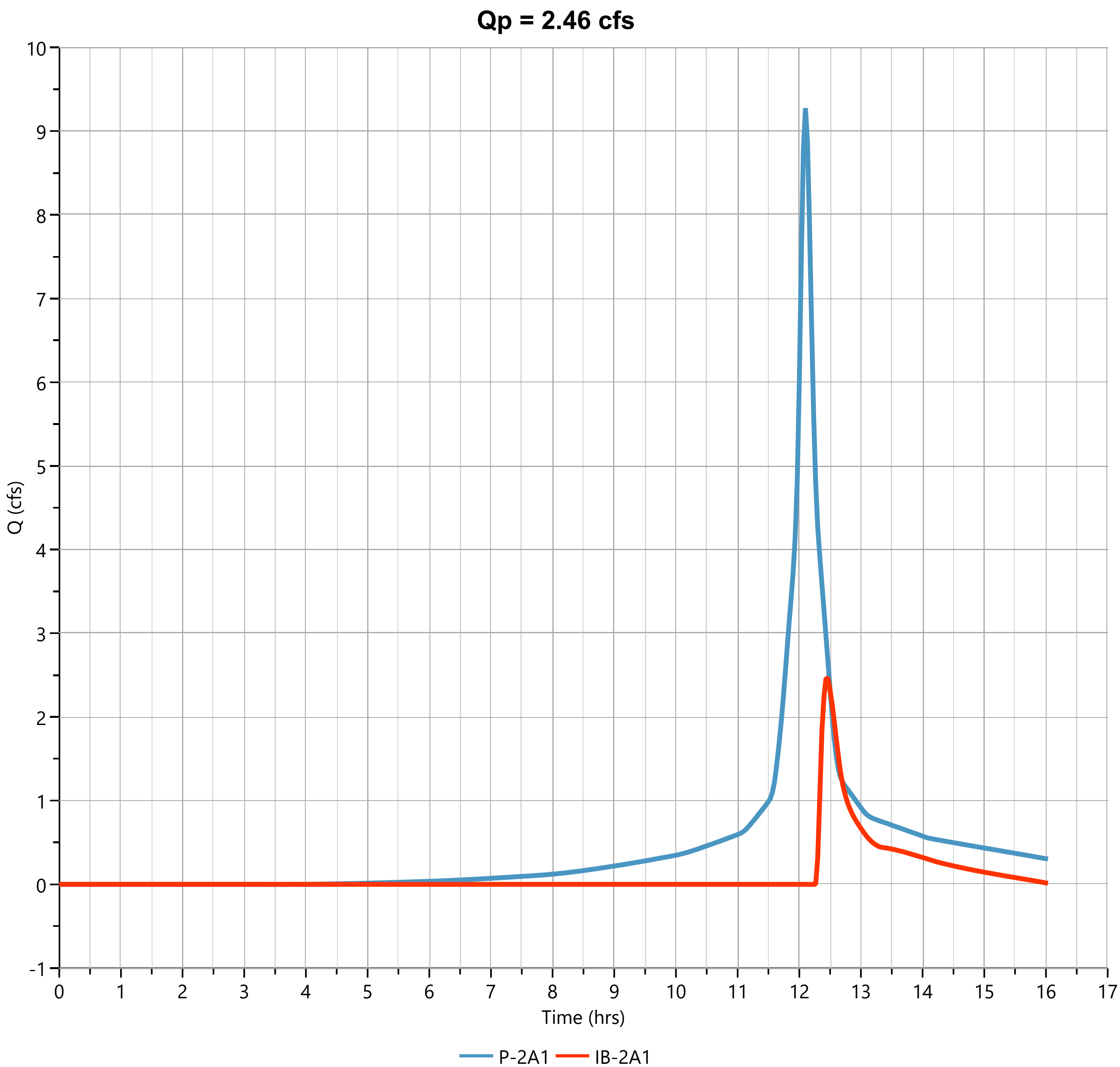
02-14-2024

IB-2A1

Hyd. No. 23

Hydrograph Type	= Pond Route	Peak Flow	= 2.462 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.43 hrs
Time Interval	= 2 min	Hydrograph Volume	= 6,265 cuft
Inflow Hydrograph	= 22 - P-2A1	Max. Elevation	= 309.00 ft
Pond Name	= IB-2A1	Max. Storage	= 14,786 cuft

Pond Routing by Storage Indication Method



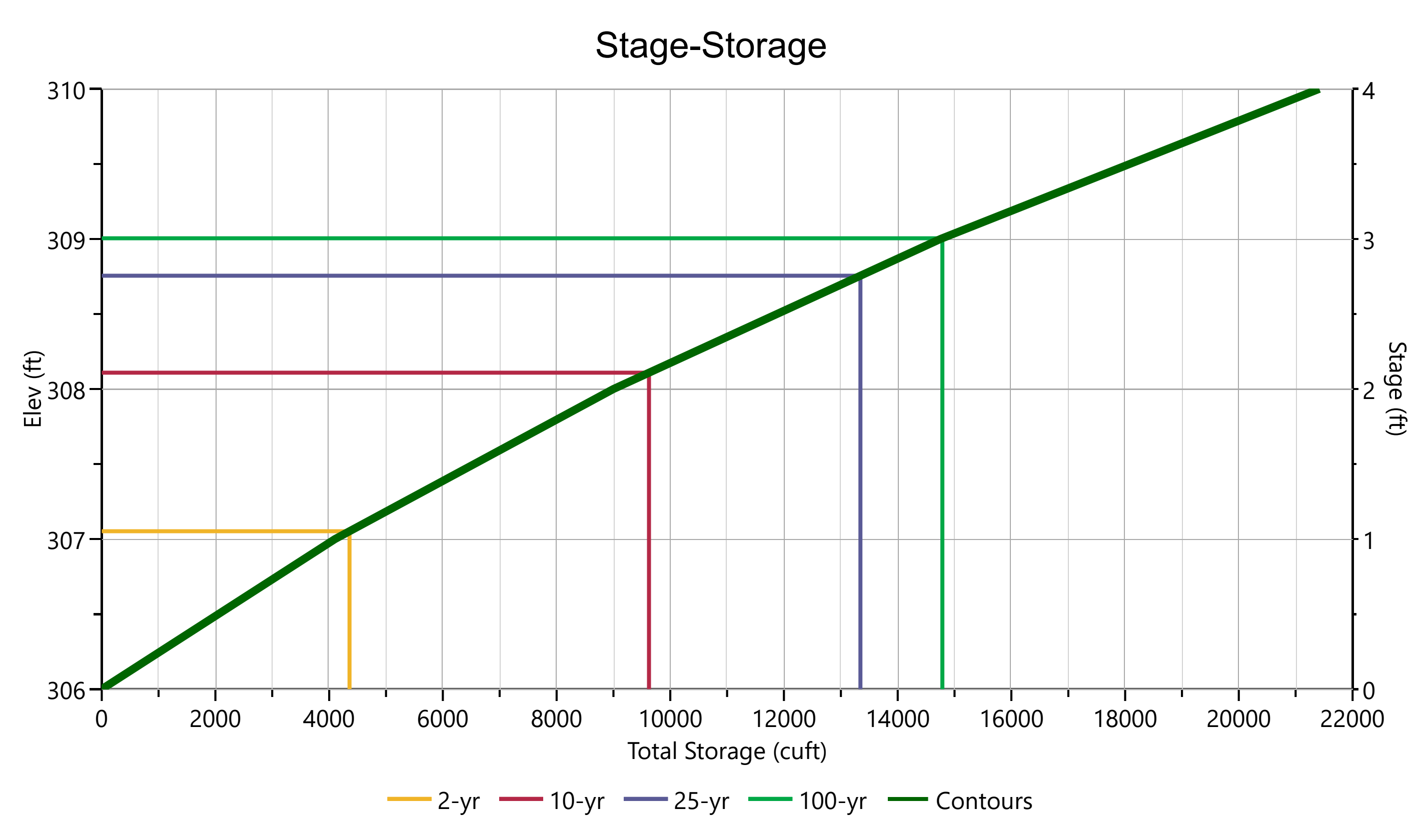
IB-2A1

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	306.00
Voids (%)	100.00
Volume Calc	Ave End Area

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	306.00	3,719	0.000	0.000
1.00	307.00	4,487	4,103	4,103
2.00	308.00	5,311	4,899	9,002
3.00	309.00	6,192	5,752	14,754
4.00	310.00	7,130	6,661	21,415

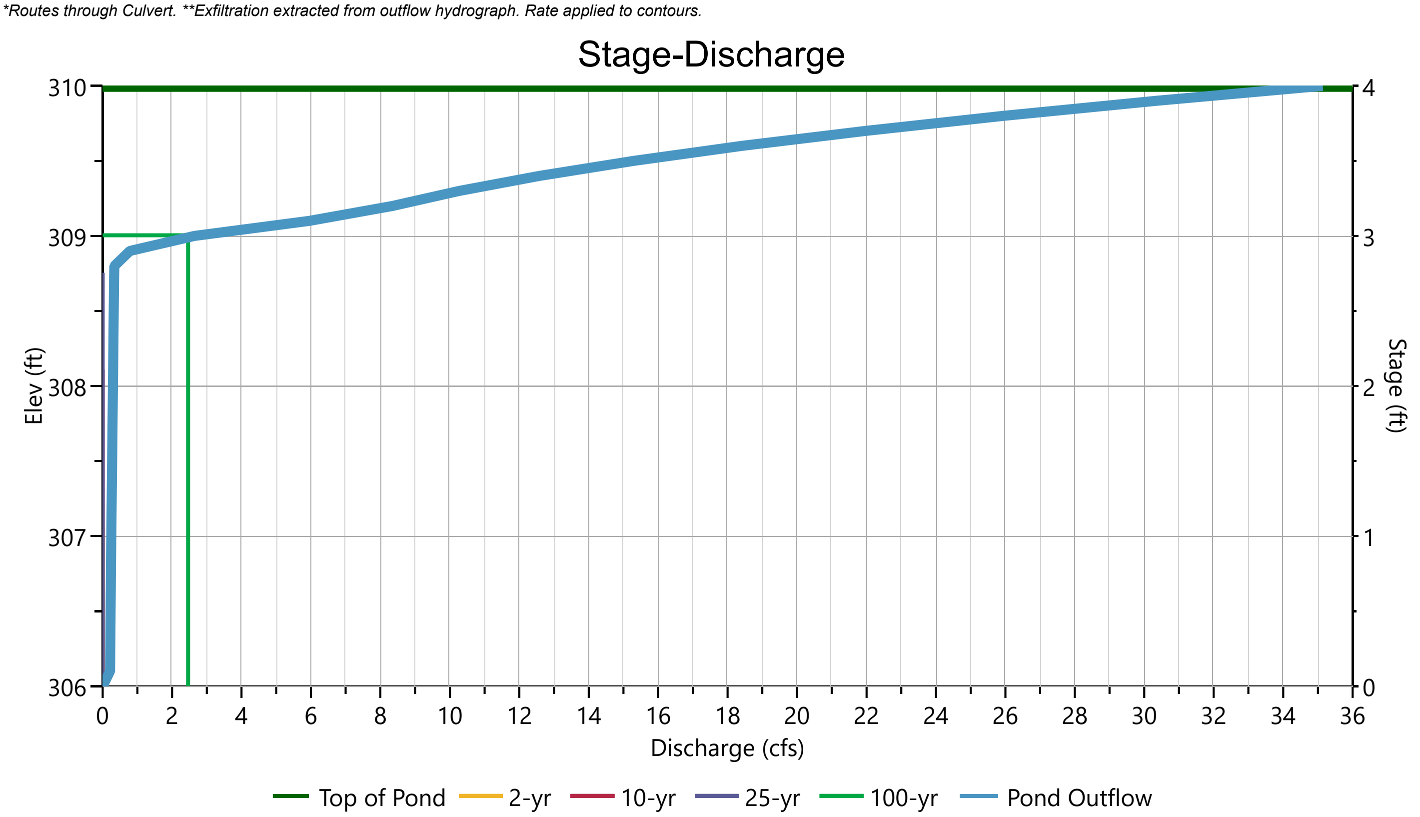


IB-2A1

Stage-Discharge

Culvert / Orifices	Culvert	Orifices 1	Orifices 2	Orifices 3	Perforated Riser	
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					
Weirs	**Riser***	**Weirs 1***	**Weirs 2**	**Weirs 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 (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
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

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Pond Report

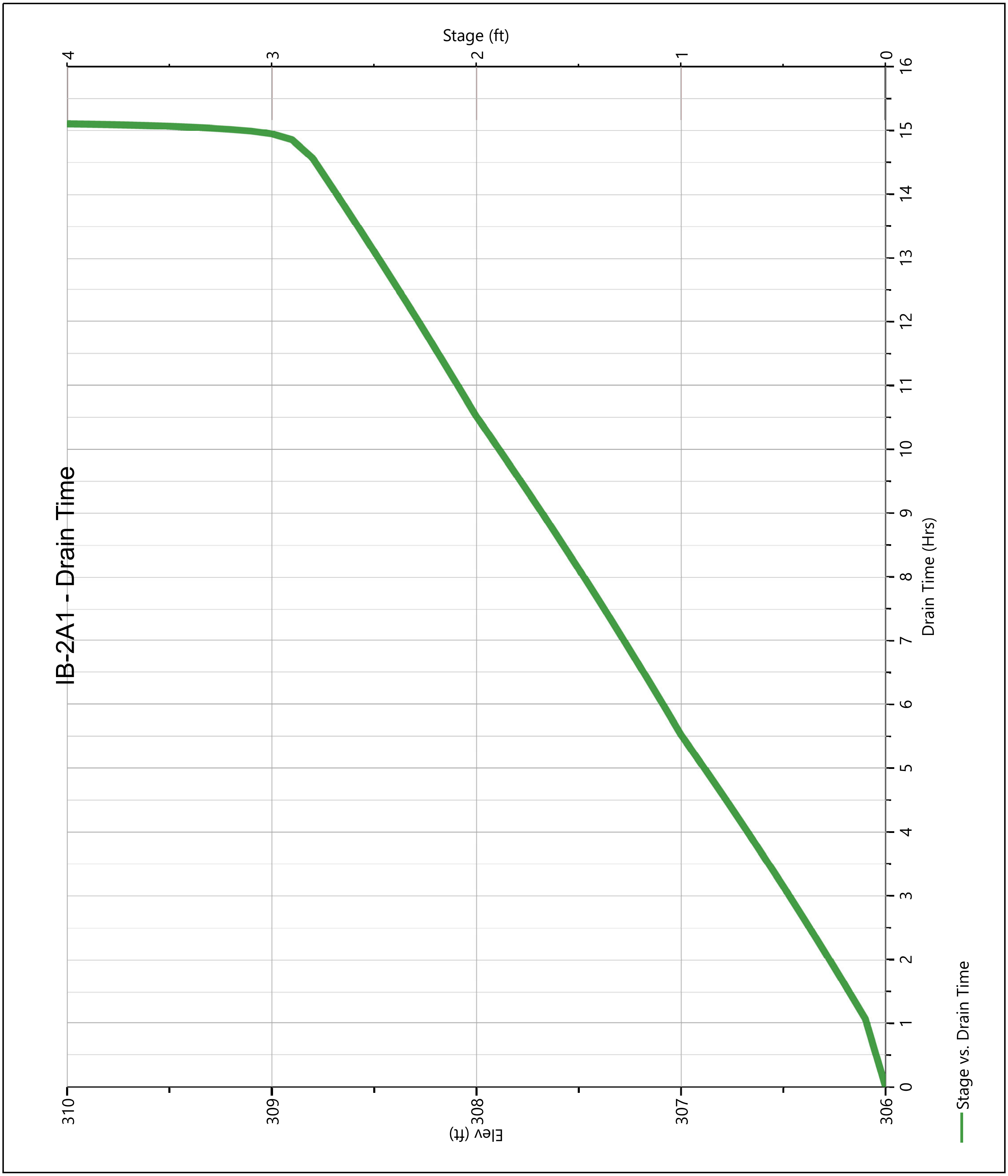
Project Name:

Hydrology Studio v 3.0.0.31

02-14-2024

IB-2A1

Pond Drawdown



Worksheet 2: Runoff curve number and runoff **SM-3719C**

Project: Athens Street By PFK Date 10/13/22
Rev Date 6/17/2023
Location: Stow, MA Checked Date

Circle one: Present Developed Subcatchment P-2A3

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)		CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
	Impervious		98			0.00	0.00
A	Woods	Good Condition	30			3.35	100.50
A	Open Space	Good Condition	39			1.16	45.15
A	Open Space	Fair Condition	49			0.00	0.00
A	Woods-Grass Combination	Good Condition	32			0.00	0.00
A	Gravel		76			0.22	16.35
B	Woods	Good Condition	55			0.00	0.00
B	Open Space	Good Condition	61			0.00	0.00
C	Open Space	Good Condition	77			0.62	47.91
C	Woods	Good Condition	70			5.20	364.14
C	Open Space	Fair Condition	79			0.00	0.00
C	Gravel		89			0.12	10.26
D	BVW		77			4.78	367.78
1/ Use only one CN source per line.		464455			Totals =	15.44	952.10

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{952.10}{15.44} = 61.67$; Use CN = 62

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency......................................	yr	2	25	100
Rainfall, P (24-hour).......................	in	3.27	6.14	7.84
Runoff, Q..	in	0.50	2.16	3.40

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By PFK Date 10/13/2022

Rev Date 6/17/2023

Location: Stow, MA Checked ______ Date ______

Circle one: Present **[Developed]** Subcatchment P-2A3

Circle one: **[Tc]** Tt through subarea

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 Tt	hr	0.17			0.17

Shallow concentrated Flow		Segment ID	B-C	C-D	D-E	
7. Surface Description (paved or unpaved)			UNPAVED	UNPAVED	UNPAVED	
8. Flow Length, L		ft	213	146	162	
9. Watercourse slope, s		ft/ft	0.110	0.230	0.08	
10. Average Velocity, V (figure 3-1)		ft/s	5.35	7.74	4.56	
11. Tt = L / 3600V	Compute Tt	hr	0.01	0.01	0.01	0.03

Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.19
	min	11.5

Hydrograph Report

Project Name:

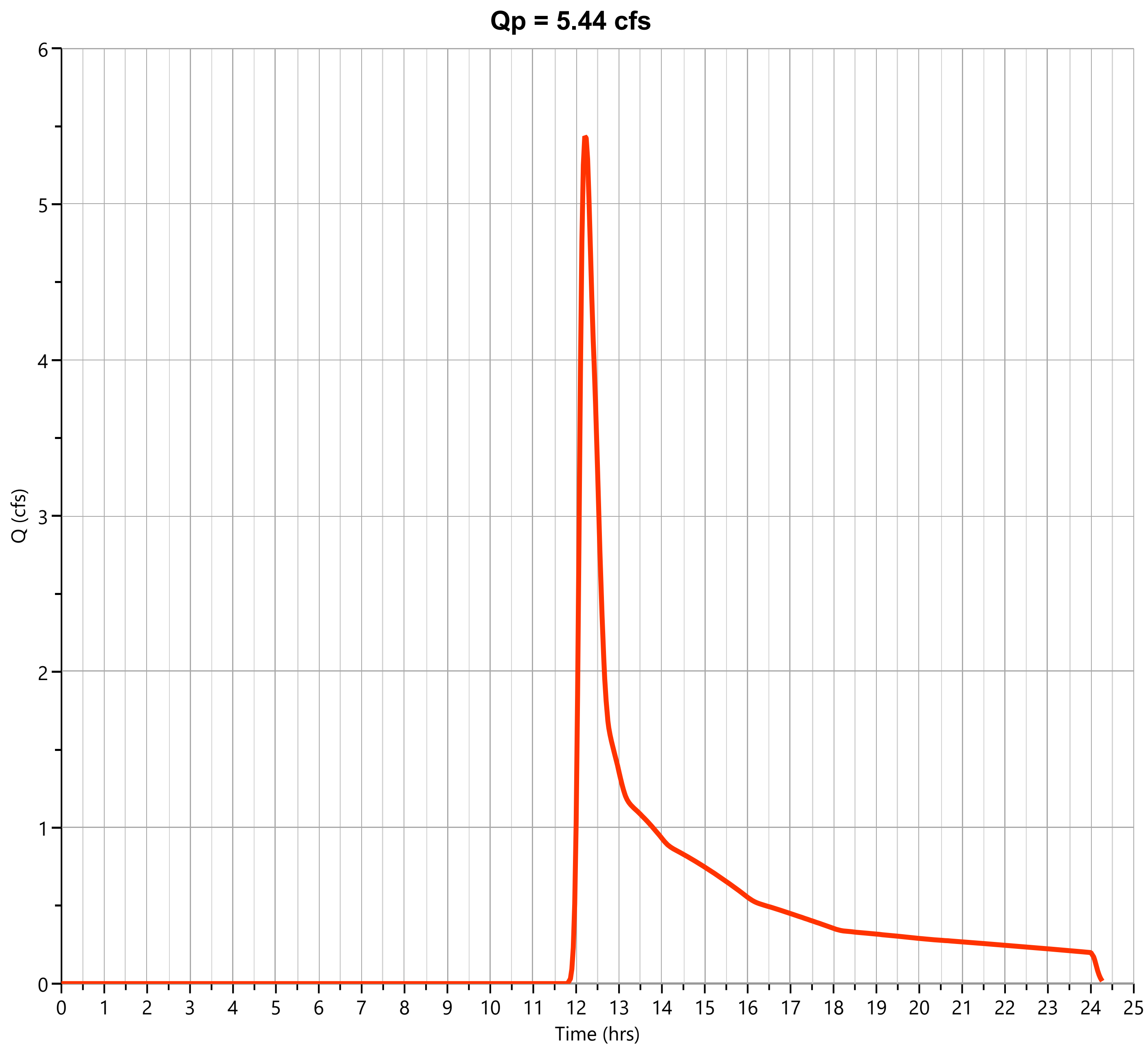
Hydrology Studio v 3.0.0.27

06-17-2023

P-2A3

Hyd. No. 24

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



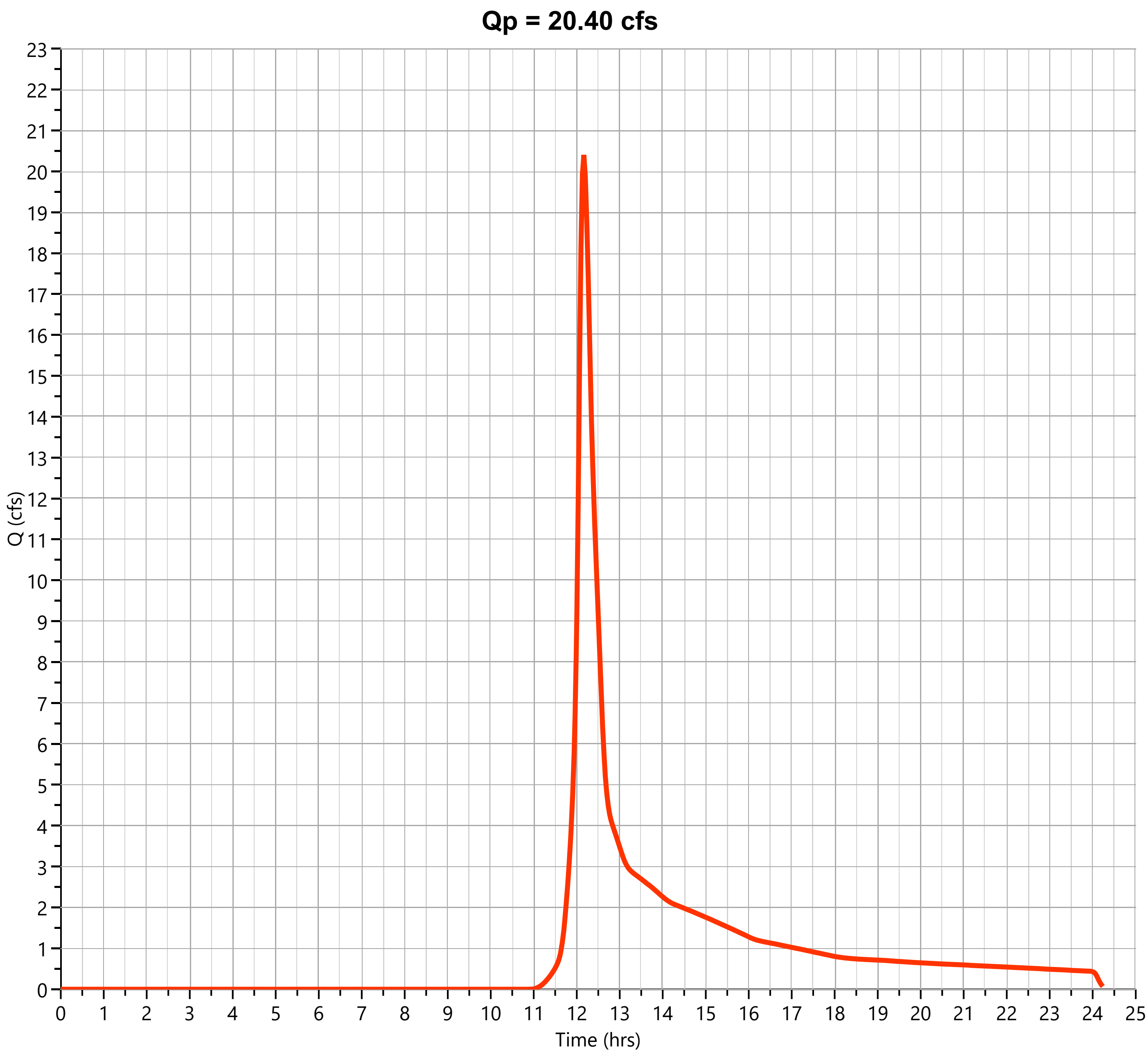
Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

P-2A3 Hyd. No. 24

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 Report

Project Name:

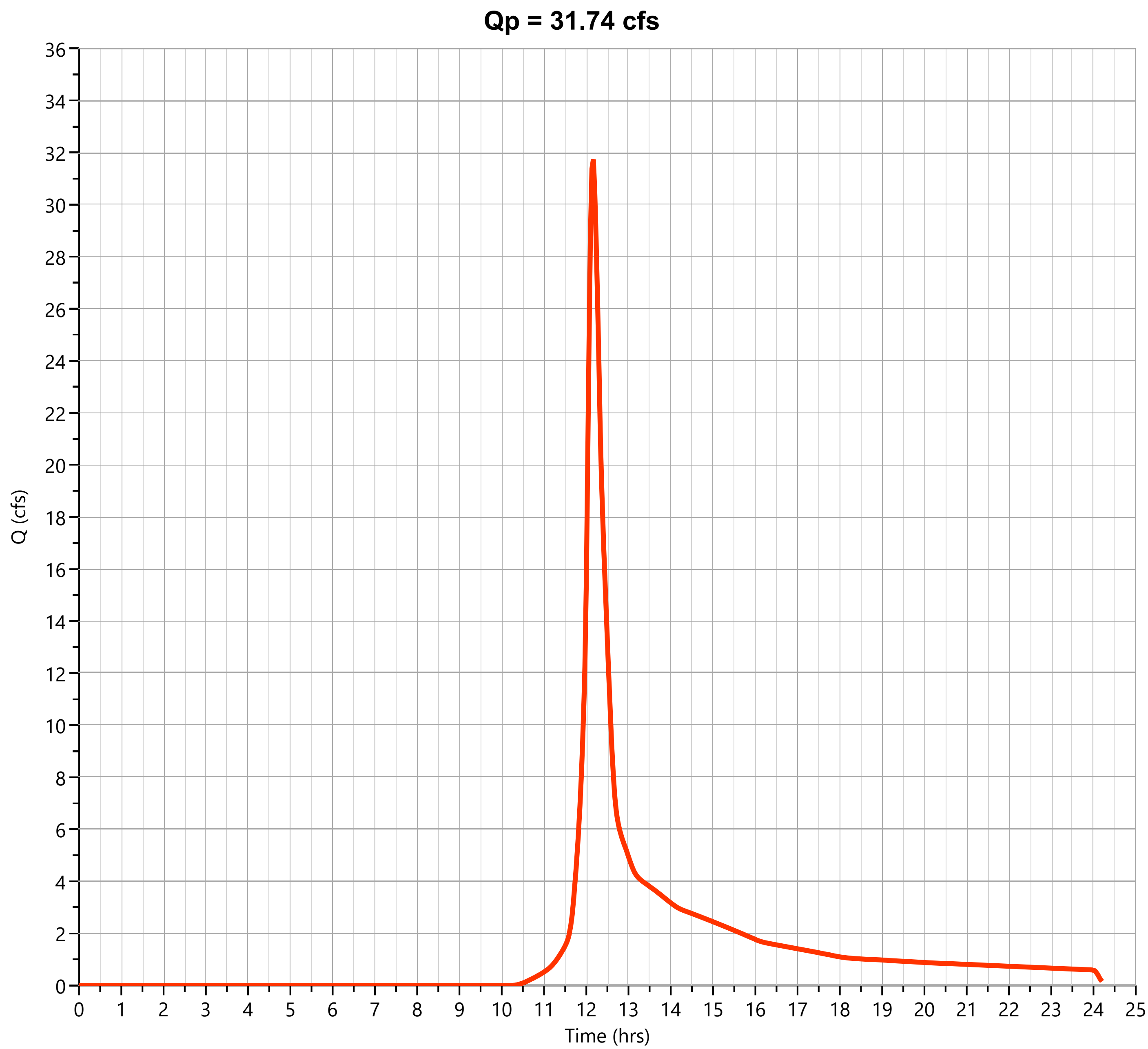
Hydrology Studio v 3.0.0.27

06-17-2023

P-2A3

Hyd. No. 24

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



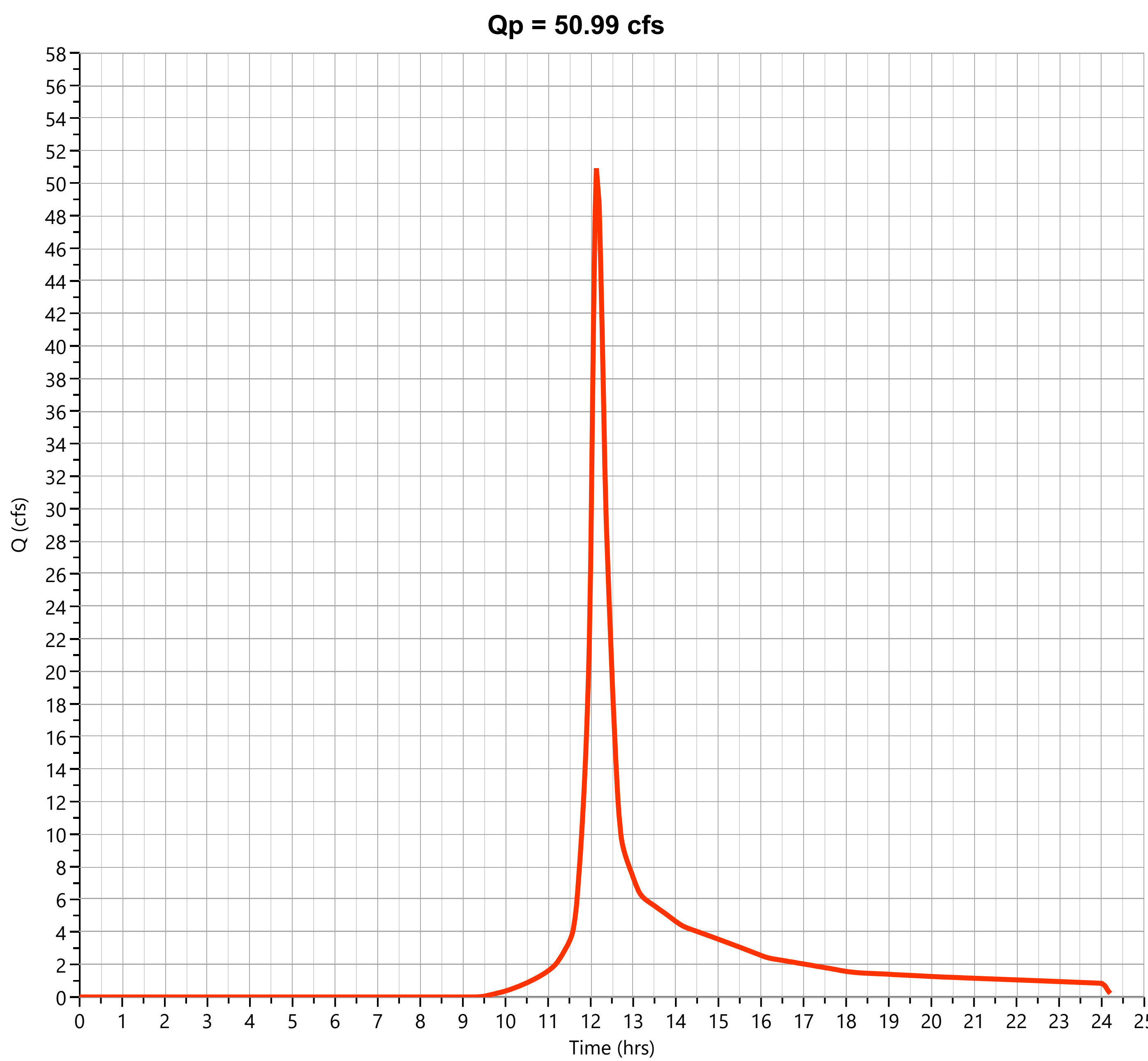
Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

P-2A3 Hyd. No. 24

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



Hydrograph Report

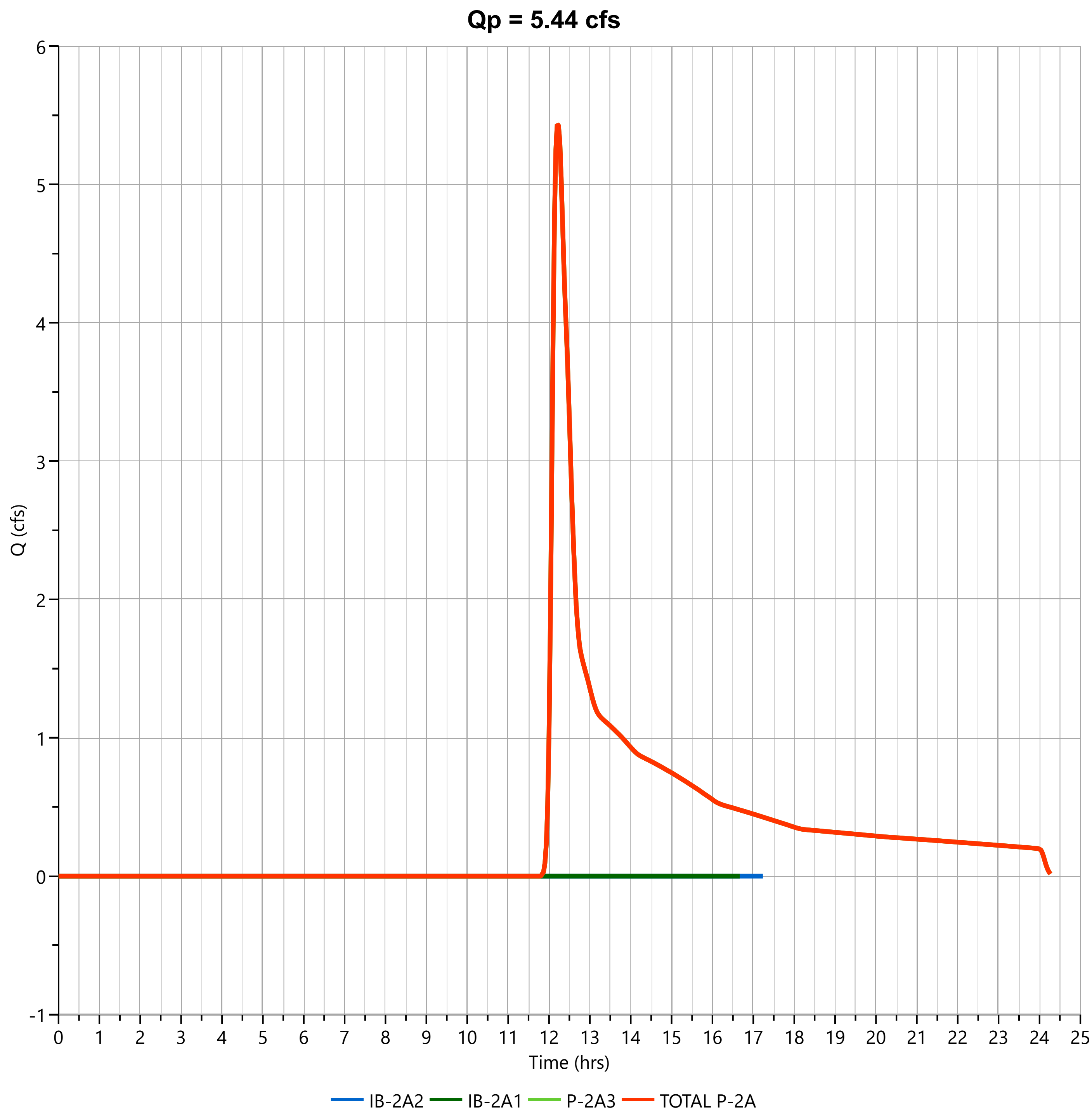
Project Name:

Hydrology Studio v 3.0.0.31 02-14-2024

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



Hydrograph Report

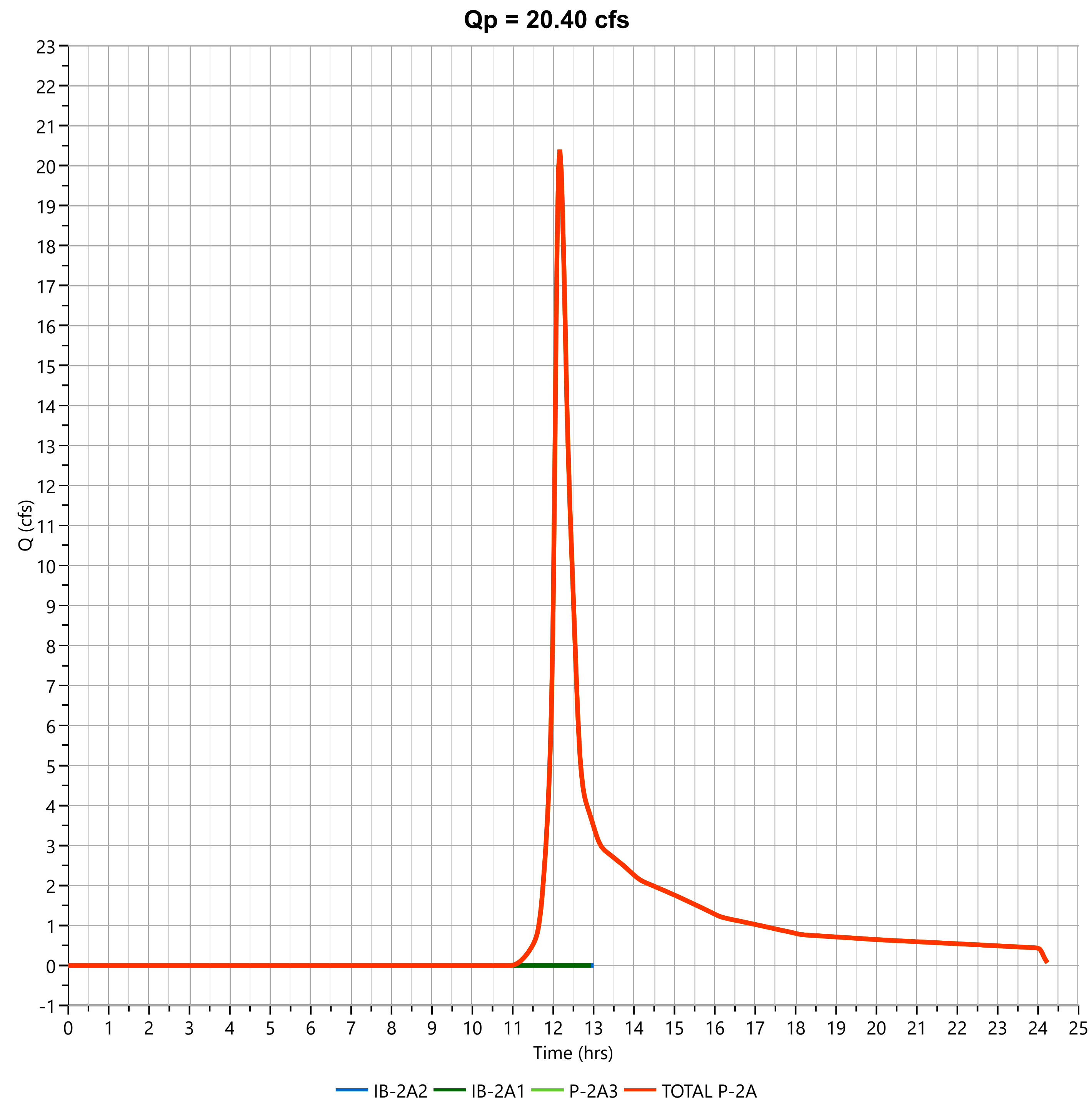
Project Name:

Hydrology Studio v 3.0.0.31 02-14-2024

TOTAL P-2A

Hyd. No. 25

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



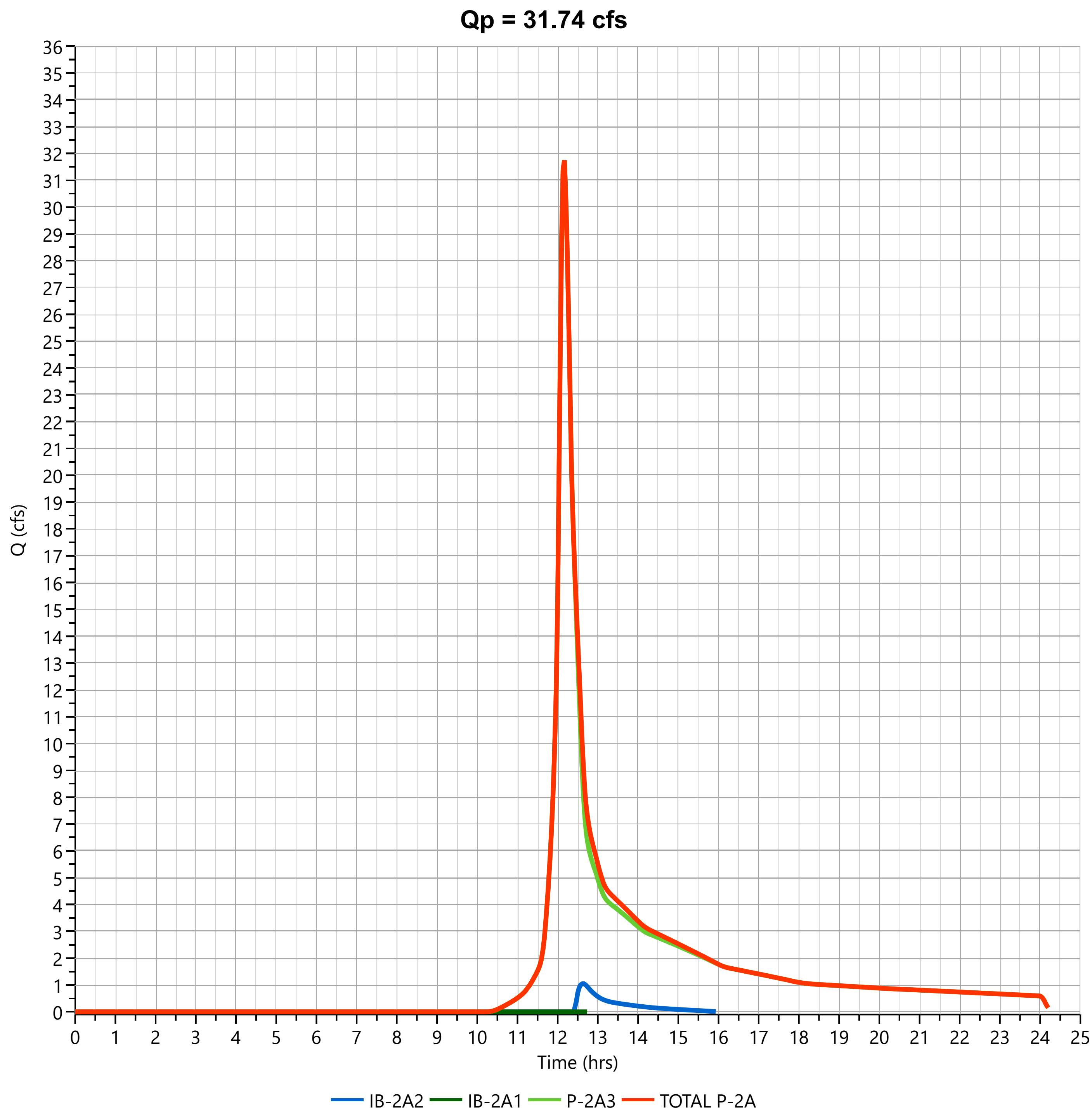
Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31 02-14-2024

TOTAL P-2A Hyd. No. 25

Hydrograph Type	= Junction	Peak Flow	= 31.74 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 129,925 cuft
Inflow Hydrographs	= 21, 23, 24	Total Contrib. Area	= 15.44 ac



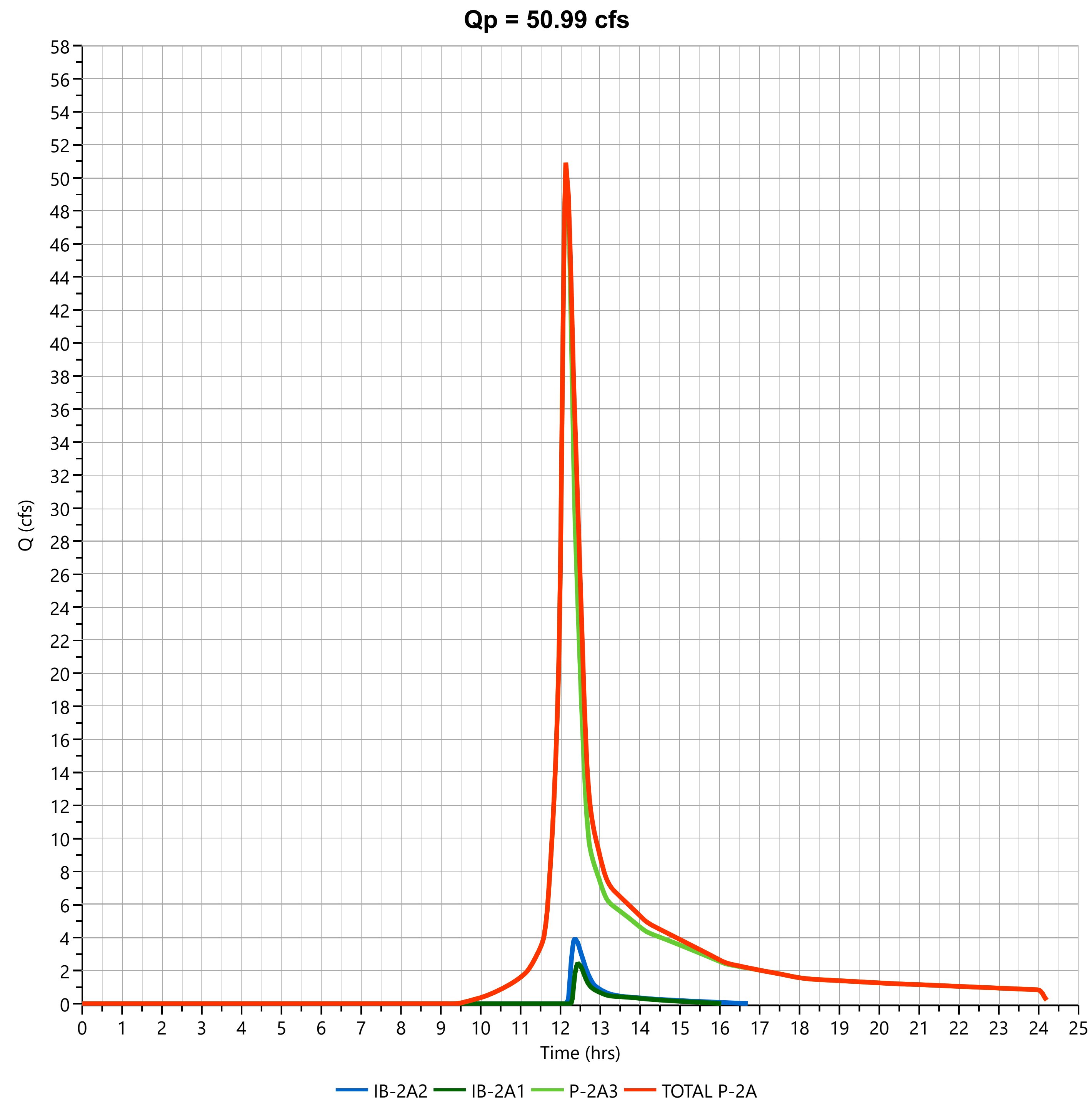
Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31 02-14-2024

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

Hydrograph Type	= Junction	Peak Flow	= 50.99 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 214,445 cuft
Inflow Hydrographs	= 21, 23, 24	Total Contrib. Area	= 15.44 ac



Worksheet 2: Runoff curve number and runoff **SM-3719C**

Project: Athens Street By NC Date 10/13/22

Rev Date 6/17/2023

Location: Stow, MA Checked Date

Circle one: Present Developed Subcatchment P-2B-A

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/			Area	Product of CN x Area
		Table 2-2	Fig. 2-3	Fig. 2-4	Acres	
	Impervious	98			0.81	79.21
A	Woods Good Condition	30			0.02	0.52
A	Open Space Good Condition	39			1.25	48.94
A	Open Space Fair Condition	49			0.00	0.00
C	Gravel	89			0.07	5.95
C	Woods Good Condition	70			0.79	55.42
C	Open Space Poor Condition	86			0.00	0.00
C	Open Space Good Condition	74			1.68	124.49
1/ Use only one CN source per line.	201308			Totals =	4.62	314.54

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

2. Runoff

Storm #1	Storm #2	Storm #3

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By NC Date 10/13/2022

Rev Date 6/17/2023

Location: Stow, MA Checked Date

Circle one: Present **Developed** Subcatchment P-2B-A

Circle one: **Tc** Tt through subarea

Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			GRASS			
2. Mannings roughness coeff., n (table 3-1)			0.24			
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	hr	0.18			0.18
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	275			
9. Watercourse slope, s		ft/ft	0.015			
10. Average Velocity, V (figure 3-1)		ft/s	1.98			
11. Tt = L / 3600V	Compute Tt	hr	0.04			0.04
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.22

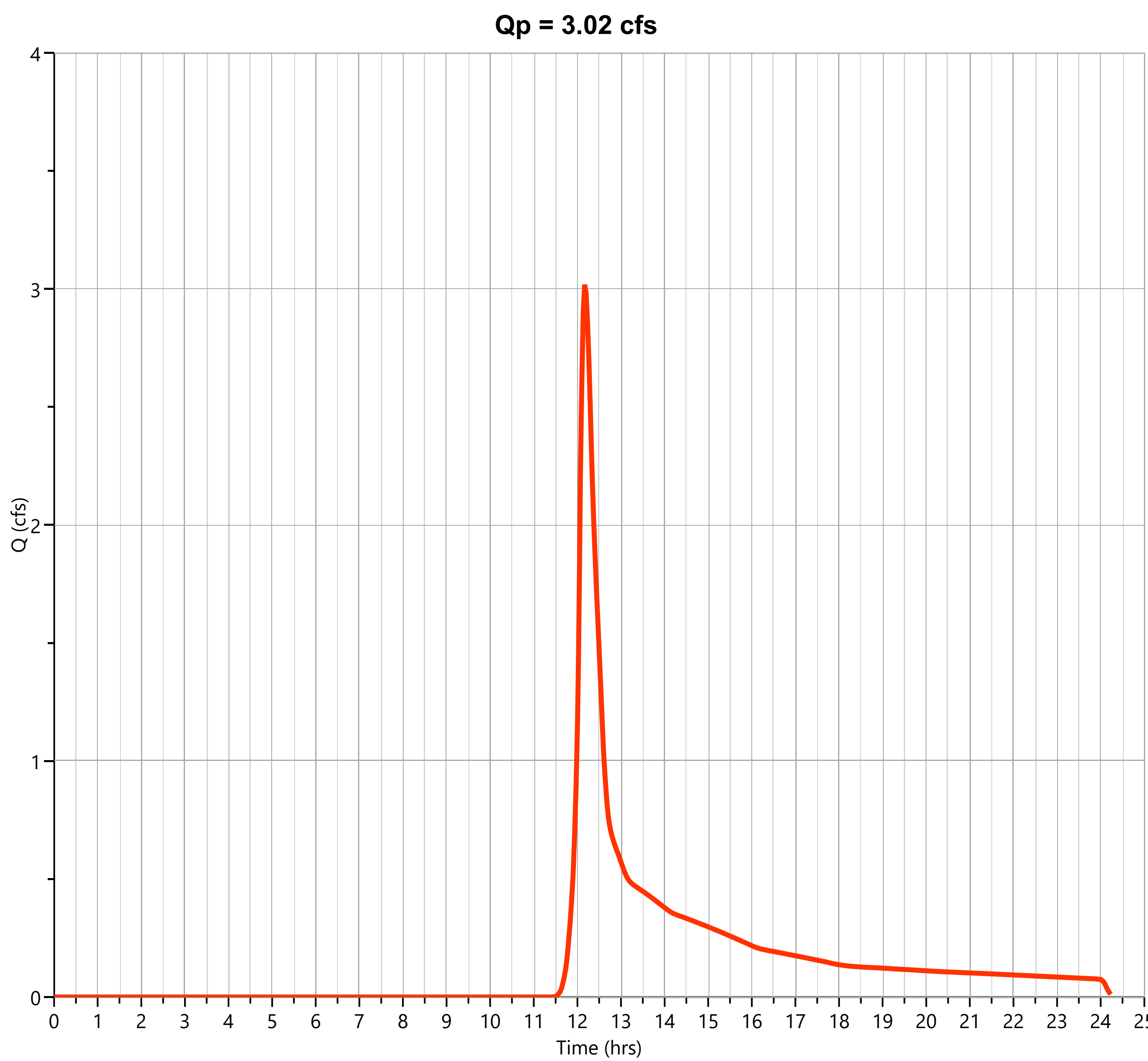
min 13.3

Hydrograph Report

P-2B-A

Hyd. No. 27

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



Hydrograph Report

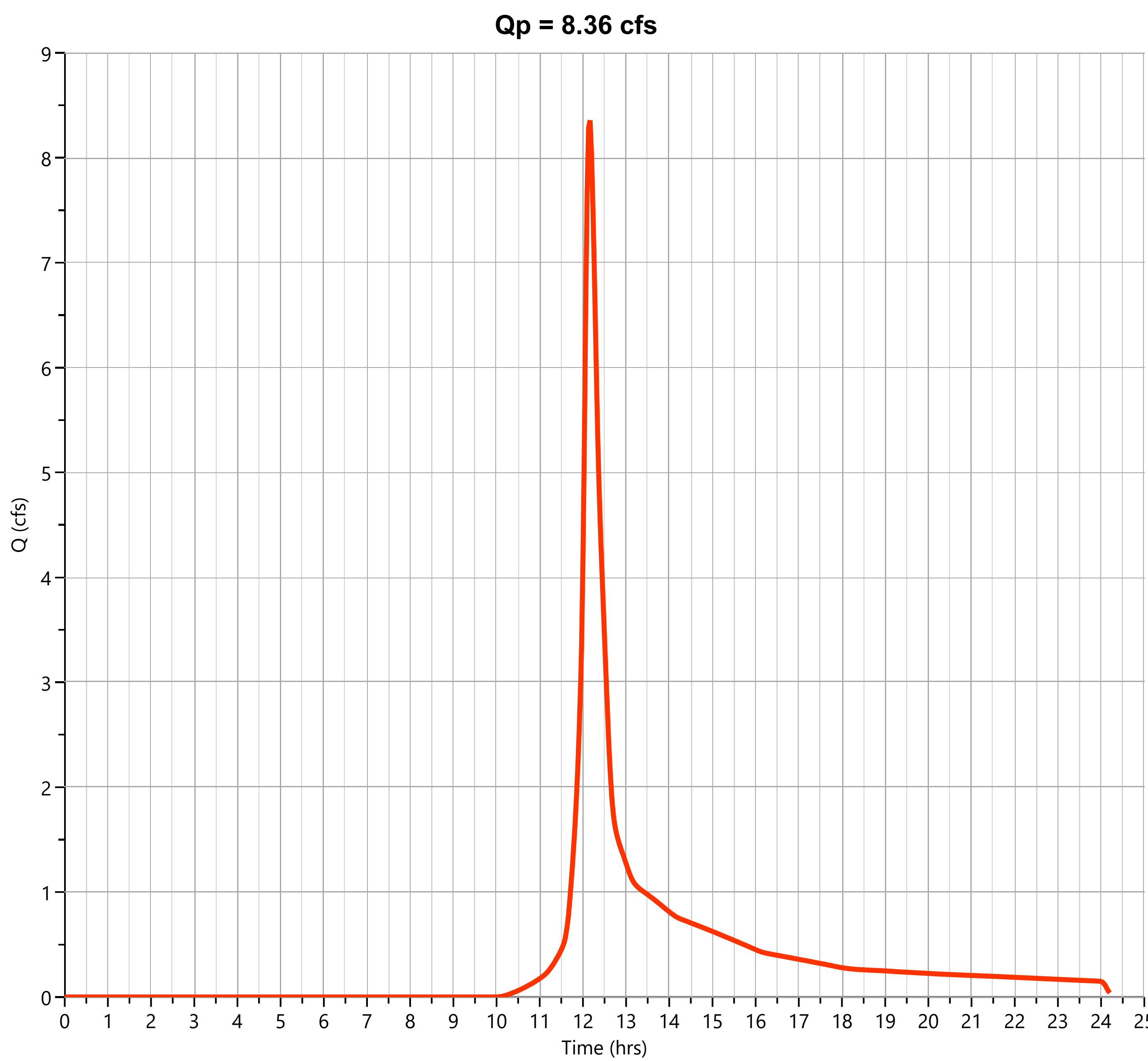
Project Name:

Hydrology Studio v 3.0.0.27 06-29-2023

P-2B-A

Hyd. No. 27

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



Hydrograph Report

Project Name:

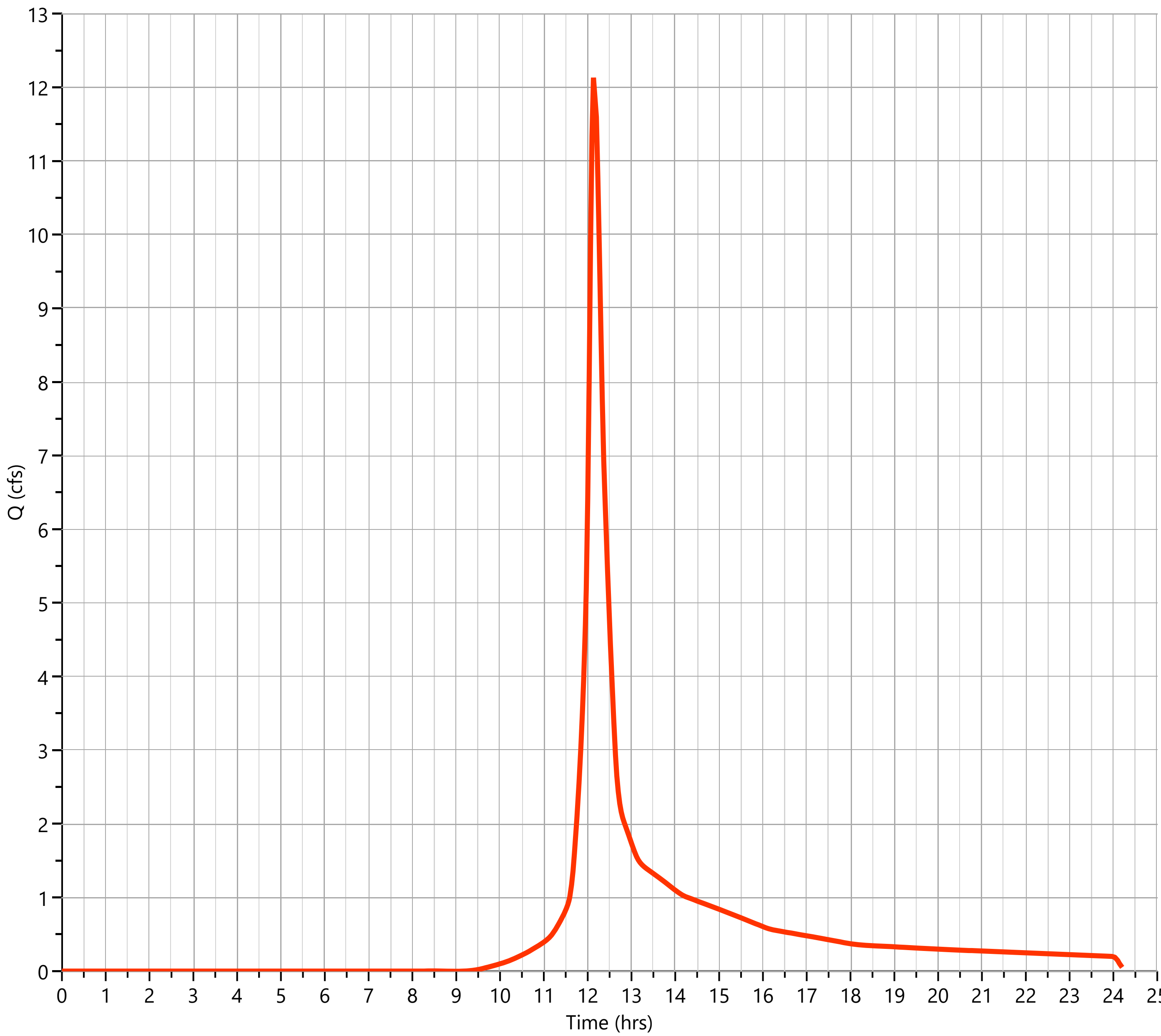
Hydrology Studio v 3.0.0.27 | 06-29-2023

P-2B-A

Hyd. No. 27

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

Qp = 12.14 cfs



Hydrograph Report

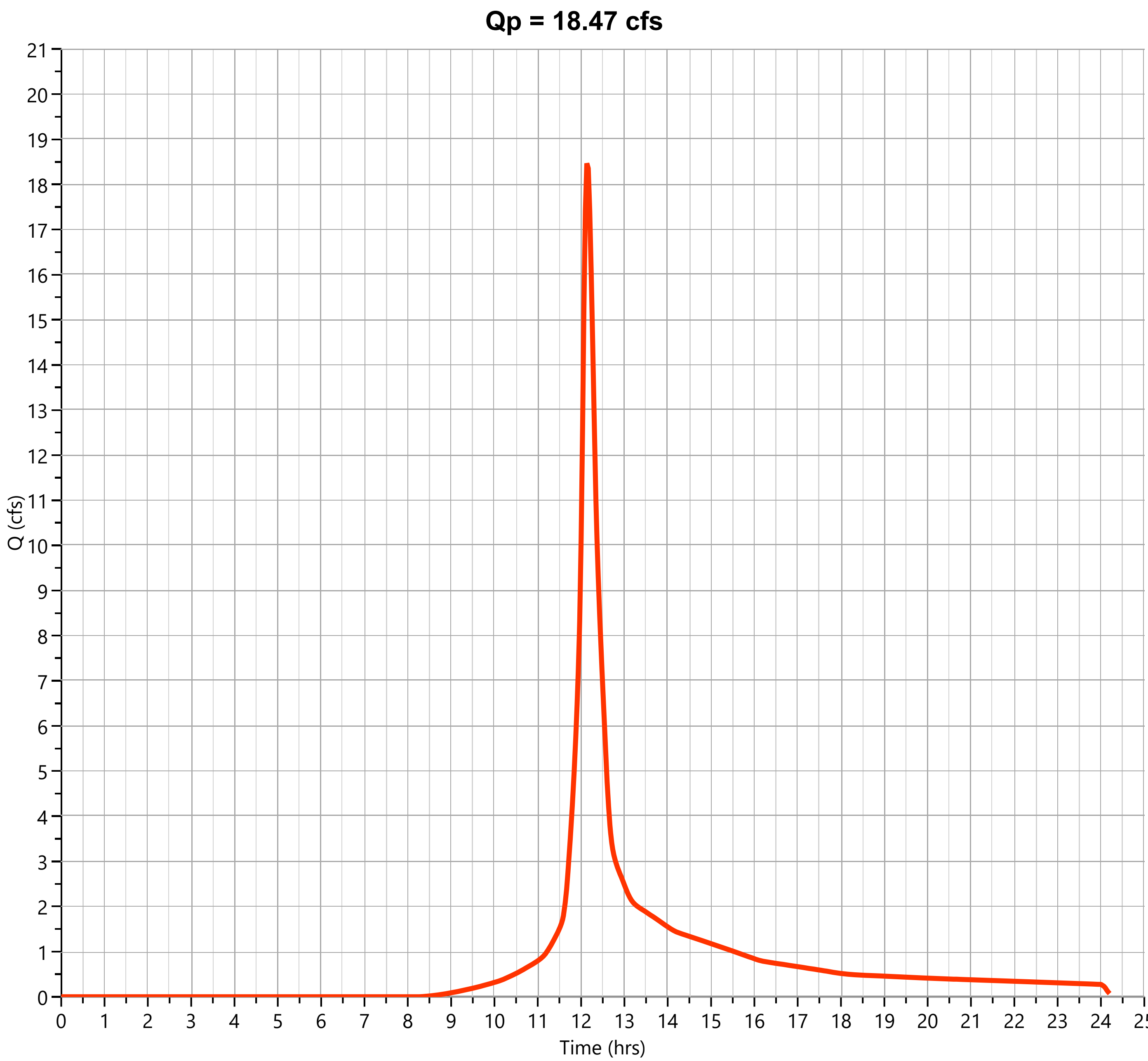
Project Name:

Hydrology Studio v 3.0.0.27 06-29-2023

P-2B-A

Hyd. No. 27

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

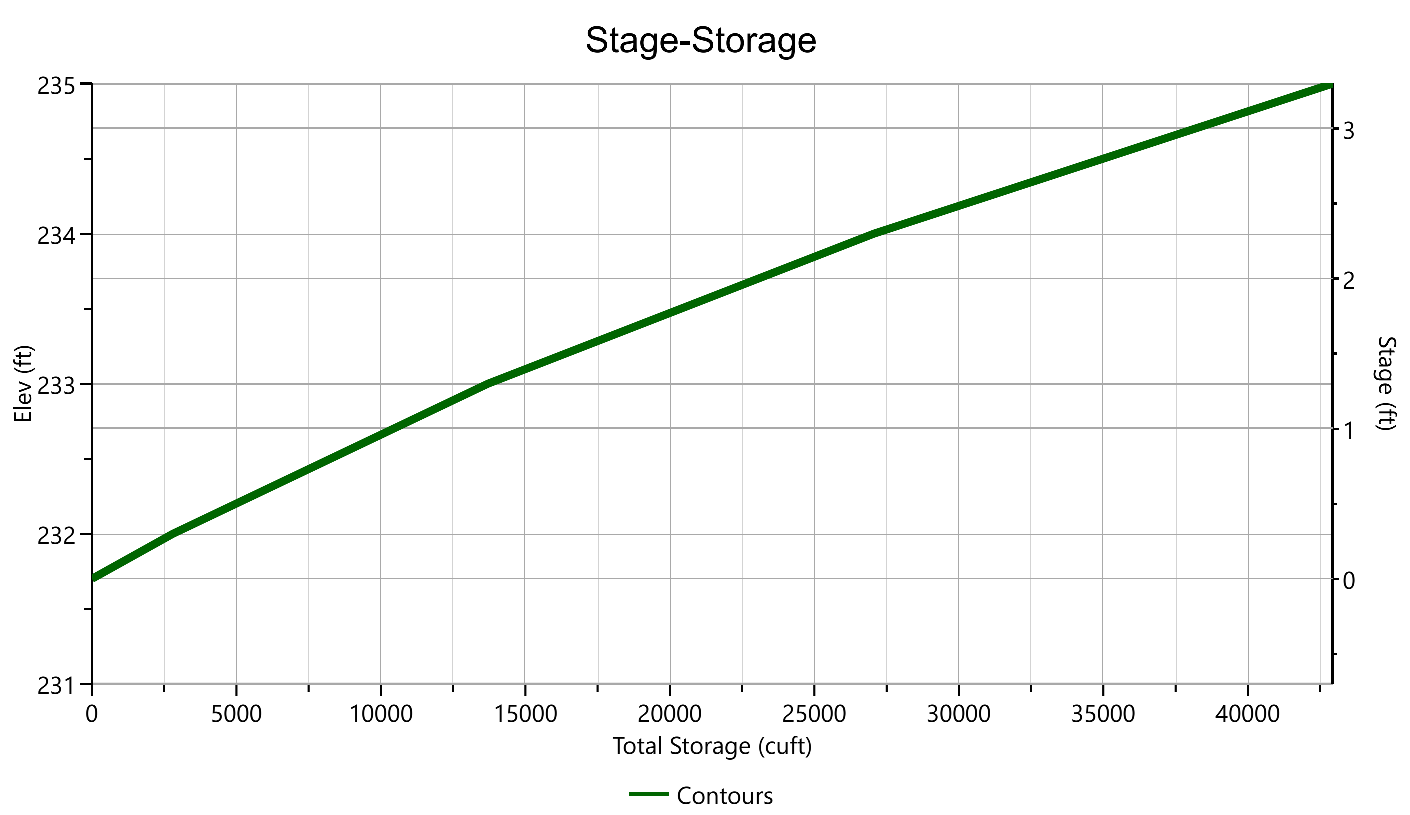


IB-2B-A

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	231.70
Voids (%)	100.00
Volume Calc	Circular

Stage / Storage Table				
Stage (ft)	**Elevation (ft)**	**Contour Area (sqft)**	**Incr. Storage (cuft)**	**Total Storage (cuft)**
0.00	231.70	8,967	0.000	0.000
0.30	232.00	9,686	2,798	2,798
1.30	233.00	12,116	10,901	13,699
2.30	234.00	14,605	13,361	27,059
3.30	235.00	17,149	15,877	42,936

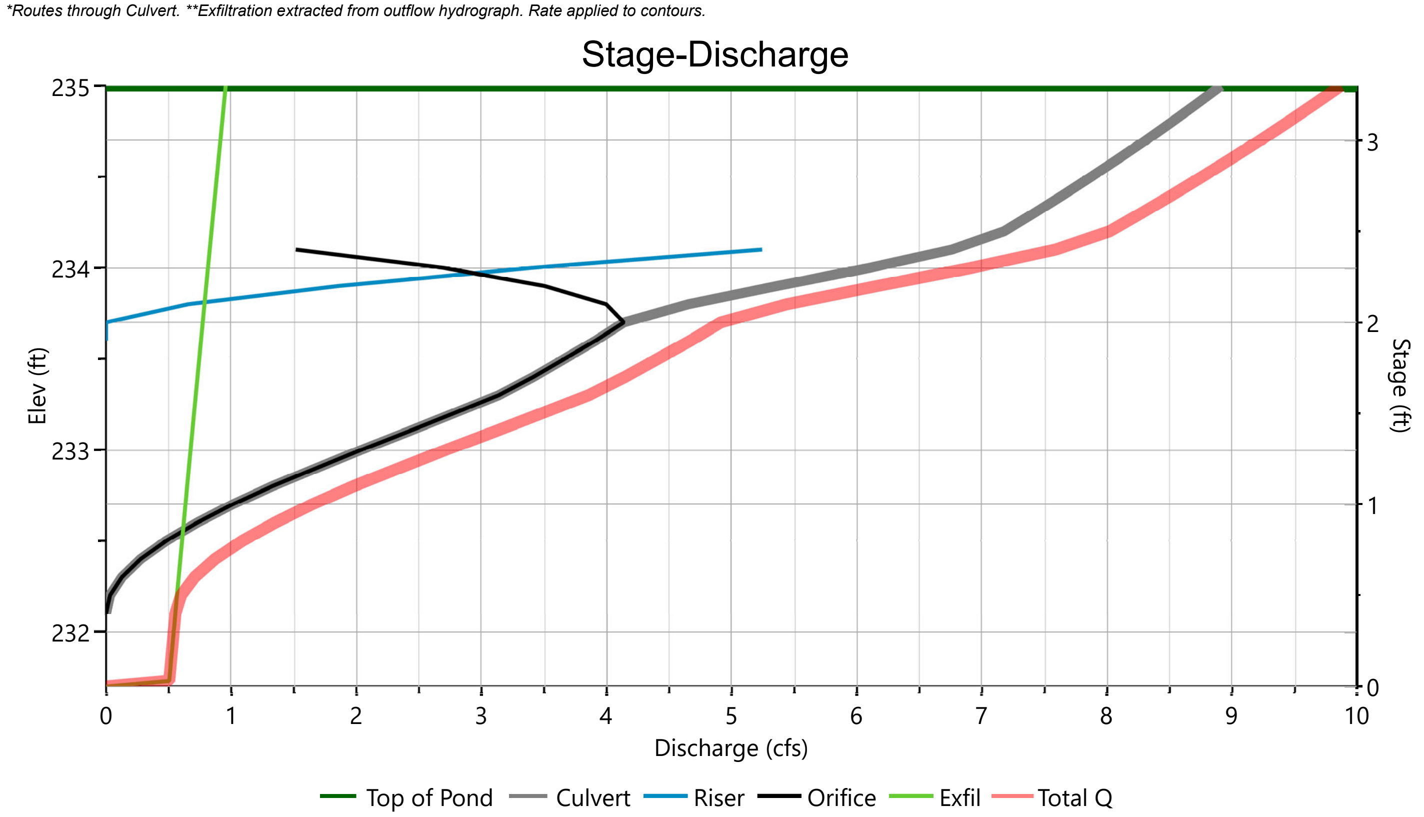


IB-2B-A

Stage-Discharge

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

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



Pond Report

IB-2B-A

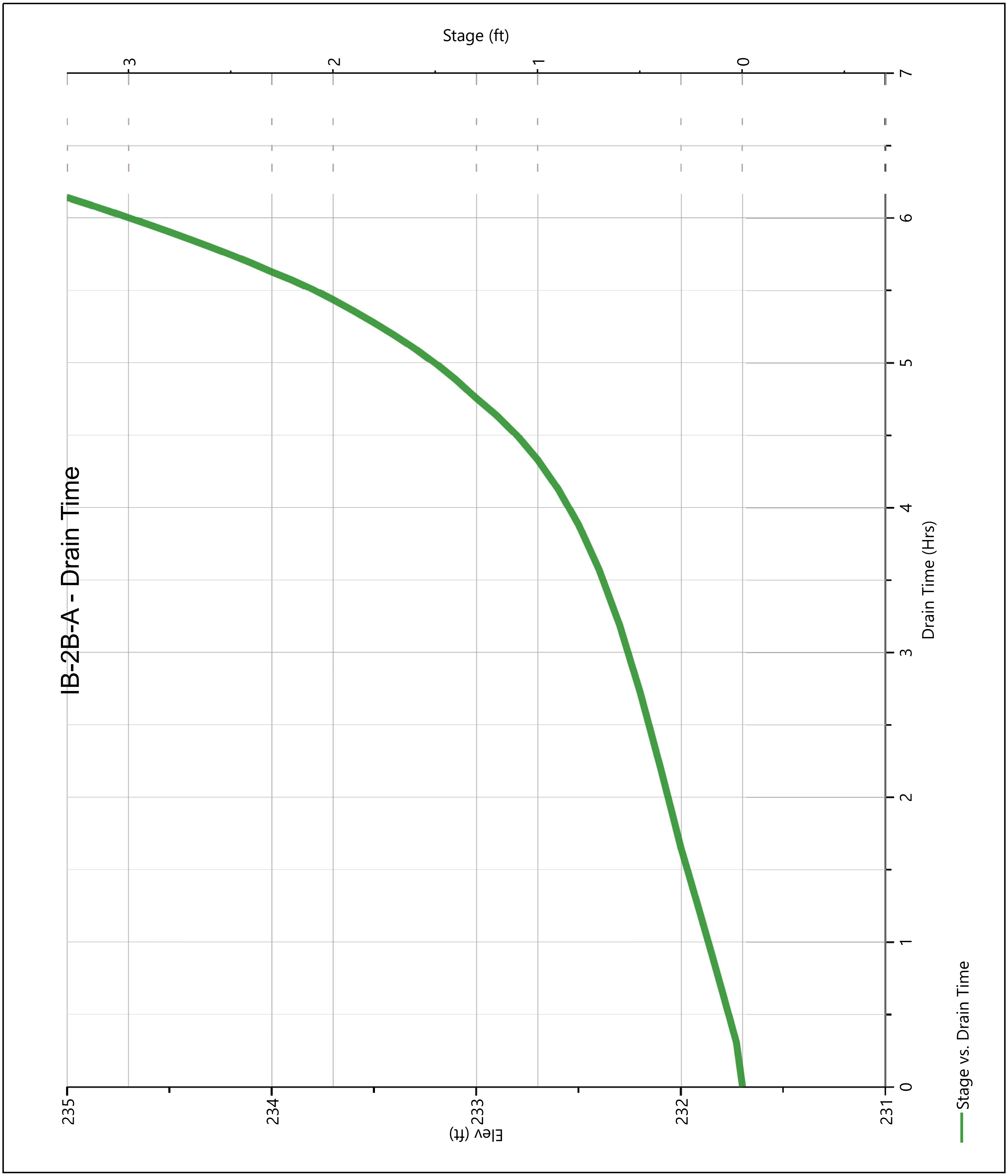
Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
0.00	231.70	0.000	0.000	0.000			0.000					0.000		0.000
0.30	232.00	2,798	0.000	0.000			0.000					0.540		0.540
1.30	233.00	13,699	2.041 ic	2.041			0.000					0.676		2.716
2.30	234.00	27,059	6.101 ic	2.696			3.405					0.815		6.916
3.30	235.00	42,936	8.911 ic	0.000			0.000					0.957		9.868

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

IB-2B-A

Pond Drawdown



Hydrograph Report

Project Name:

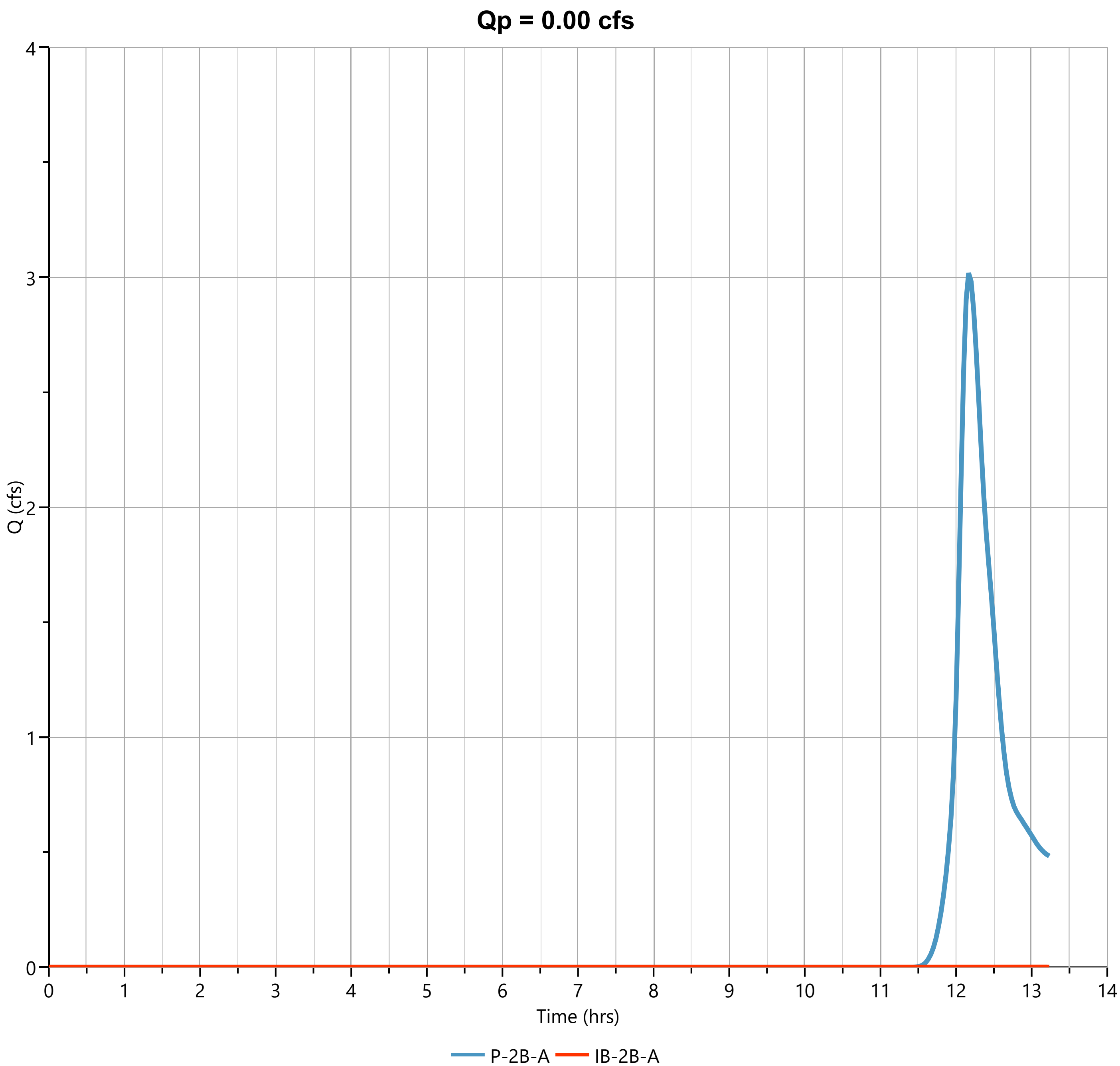
Hydrology Studio v 3.0.0.27 06-29-2023

IB-2B-A

Hyd. No. 30

Hydrograph Type	= Pond Route	Peak Flow	= 0.001 cfs
Storm Frequency	= 2-yr	Time to Peak	= 13.03 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.569 cuft
Inflow Hydrograph	= 27 - P-2B-A	Max. Elevation	= 232.10 ft
Pond Name	= IB-2B-A	Max. Storage	= 3,912 cuft

Pond Routing by Storage Indication Method

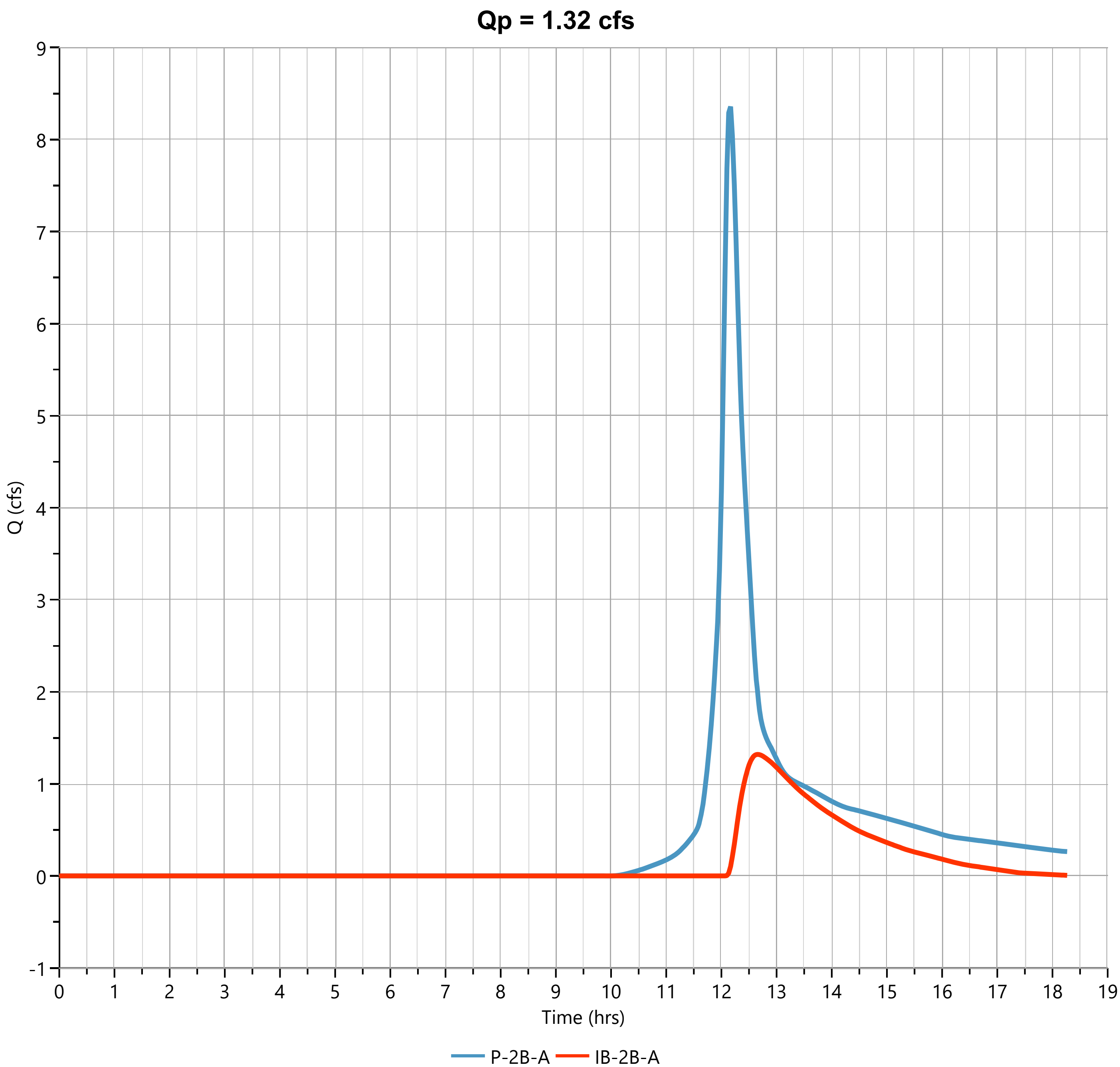


IB-2B-A

Hyd. No. 30

Hydrograph Type	= Pond Route	Peak Flow	= 1.320 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.67 hrs
Time Interval	= 2 min	Hydrograph Volume	= 9,693 cuft
Inflow Hydrograph	= 27 - P-2B-A	Max. Elevation	= 232.80 ft
Pond Name	= IB-2B-A	Max. Storage	= 11,480 cuft

Pond Routing by Storage Indication Method

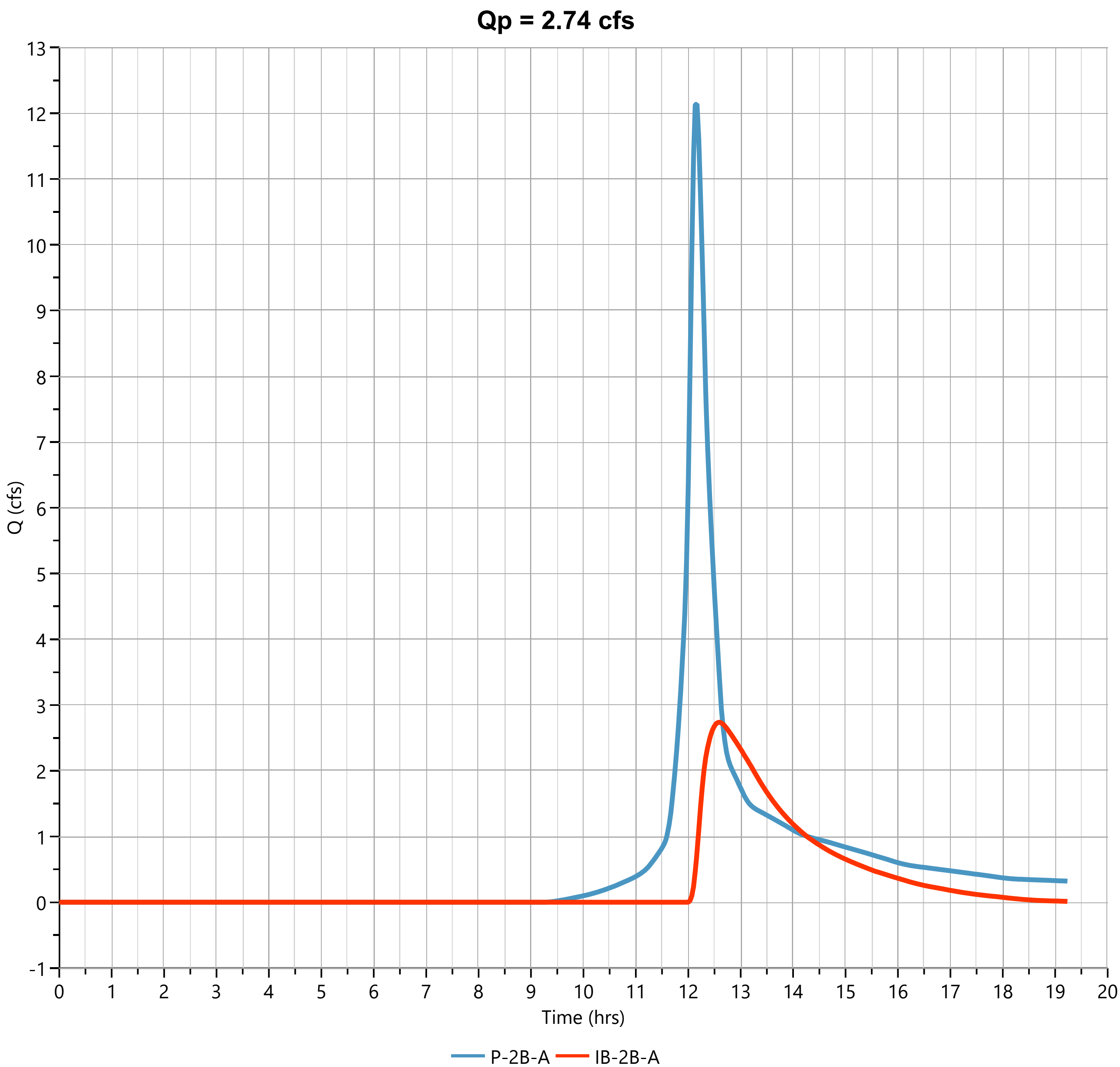


IB-2B-A

Hyd. No. 30

Hydrograph Type	= Pond Route	Peak Flow	= 2.737 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.60 hrs
Time Interval	= 2 min	Hydrograph Volume	= 19,907 cuft
Inflow Hydrograph	= 27 - P-2B-A	Max. Elevation	= 233.19 ft
Pond Name	= IB-2B-A	Max. Storage	= 16,227 cuft

Pond Routing by Storage Indication Method



Hydrograph Report

Project Name:

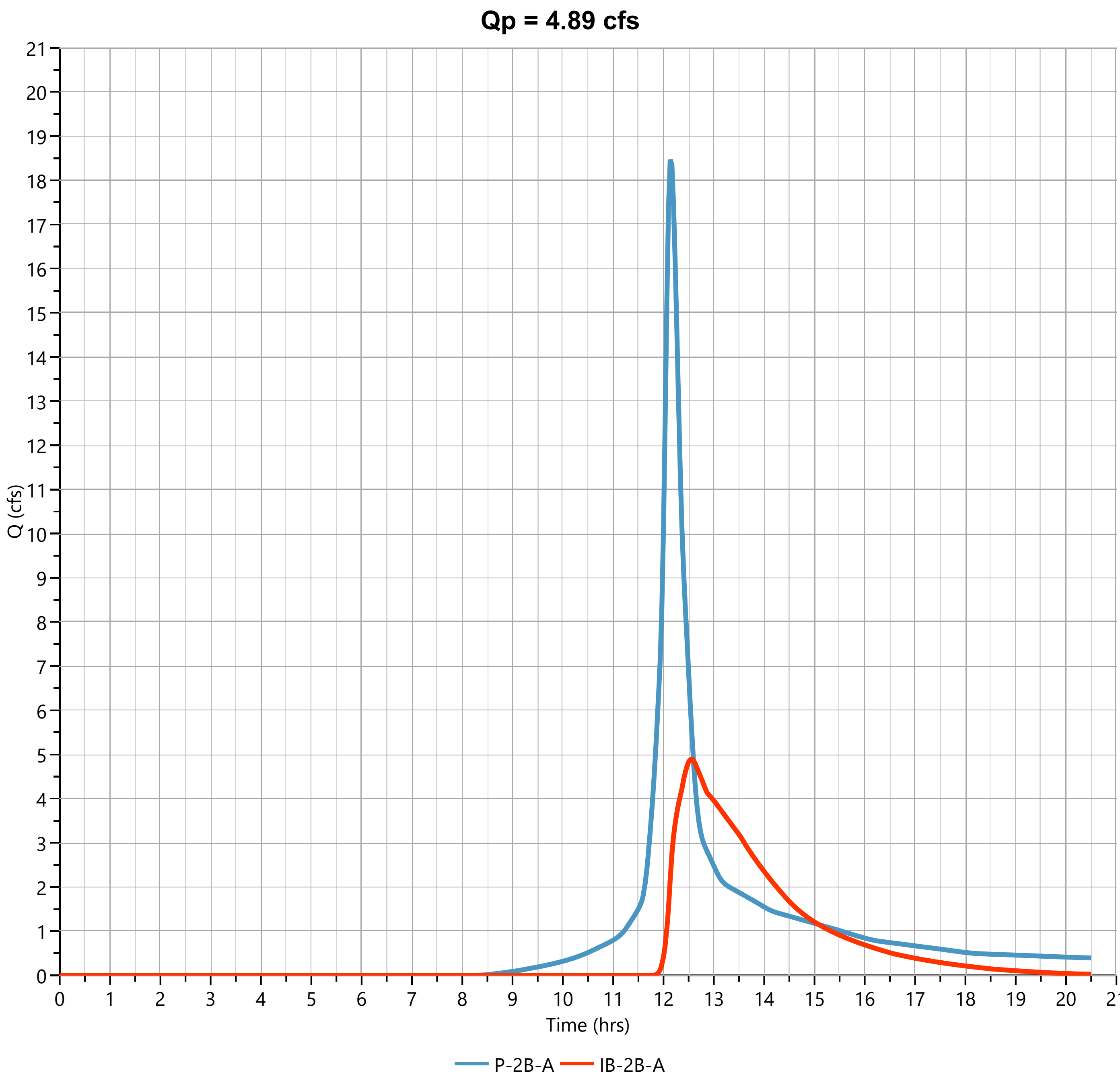
Hydrology Studio v 3.0.0.27 06-29-2023

IB-2B-A

Hyd. No. 30

Hydrograph Type	= Pond Route	Peak Flow	= 4.891 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.57 hrs
Time Interval	= 2 min	Hydrograph Volume	= 38,402 cuft
Inflow Hydrograph	= 27 - P-2B-A	Max. Elevation	= 233.84 ft
Pond Name	= IB-2B-A	Max. Storage	= 24,838 cuft

Pond Routing by Storage Indication Method



Worksheet 2: Runoff curve number and runoff **SM-3719C**

Project: Athens Street By PFK Date 6/21/22
Rev Date 10/13/2022
Location: Stow, MA Checked Date 6/17/2023

Circle one: Present Developed Subcatchment P-5D

1. Runoff curve number (CN)

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

CN (weighted) = total product / total area = 175.05 / 2.20 = 79.45 ; Use CN = 79

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency......................................	yr	2	25	100
Rainfall, P (24-hour).......................	in	3.27	6.14	7.84
Runoff, Q..	in	1.42	3.85	5.41

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By PFK Date 6/21/2022

Rev Date 10/13/2022

Location: Stow, MA Checked Date 6/17/2023

Circle one: Present **Developed** Subcatchment P-5D

Circle one: **Tc** Tt through subarea

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 Tt	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 Tt	hr	0.00	0.03		0.03

Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

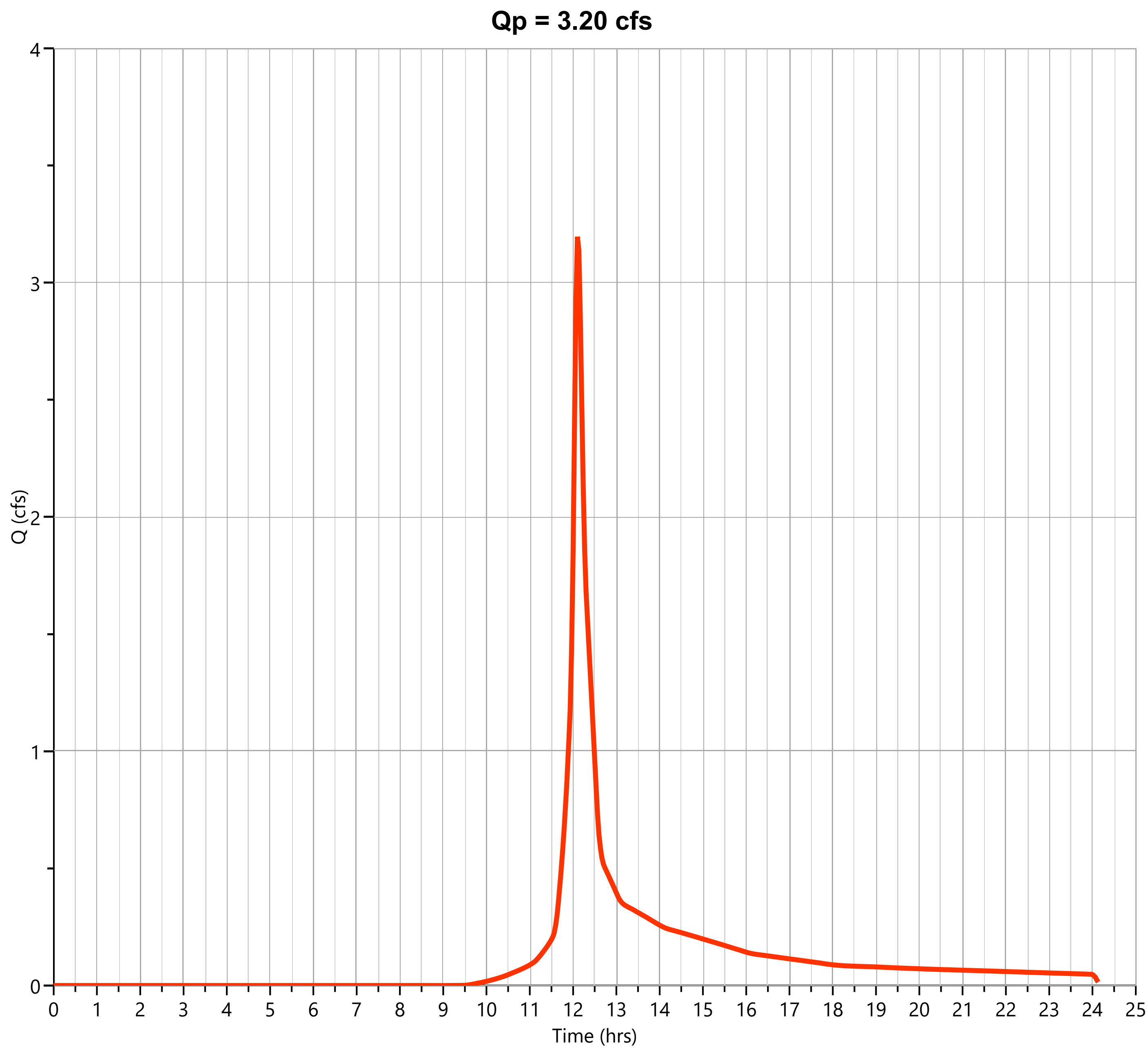
20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.11
	min	6.7

Hydrograph Report

P-5D

Hyd. No. 28

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 Report

Project Name:

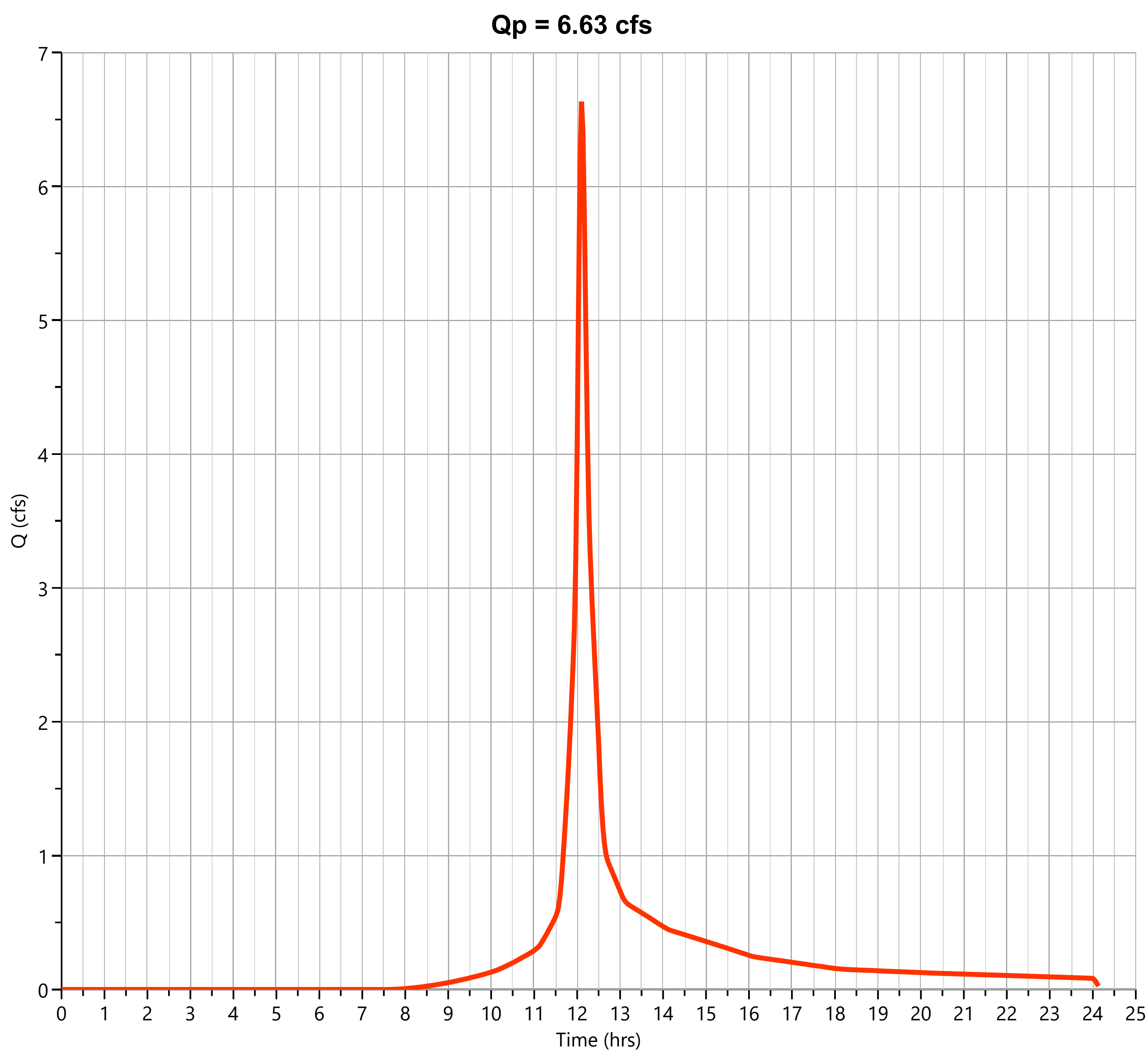
Hydrology Studio v 3.0.0.27

06-17-2023

P-5D

Hyd. No. 28

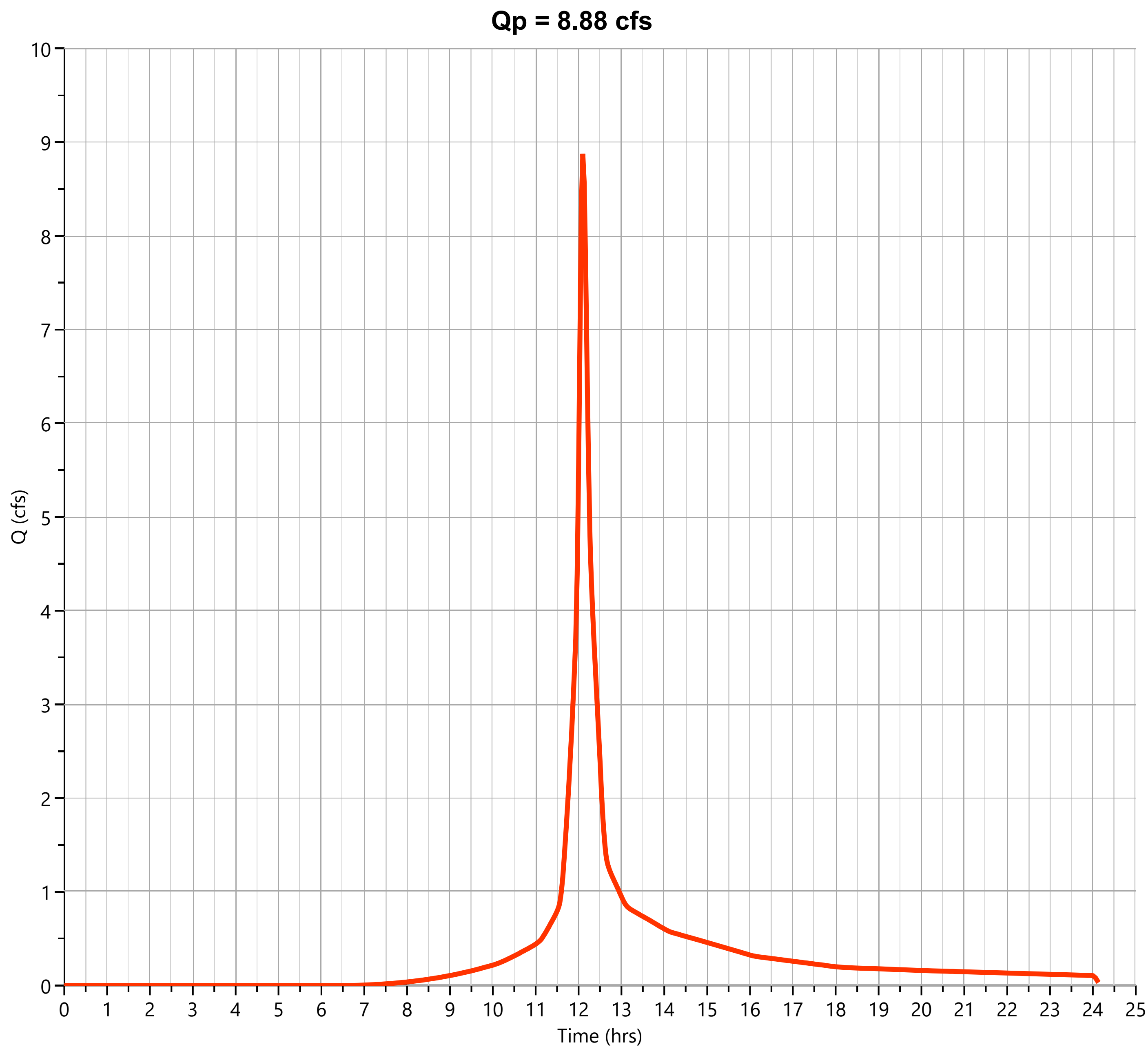
Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.634 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 22,649 cuft
Drainage Area	= 2.2 ac	Curve Number	= 79
Tc Method	= User	Time of Conc. (Tc)	= 6.7 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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



P-5D

Hyd. No. 28

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 Report

Project Name:

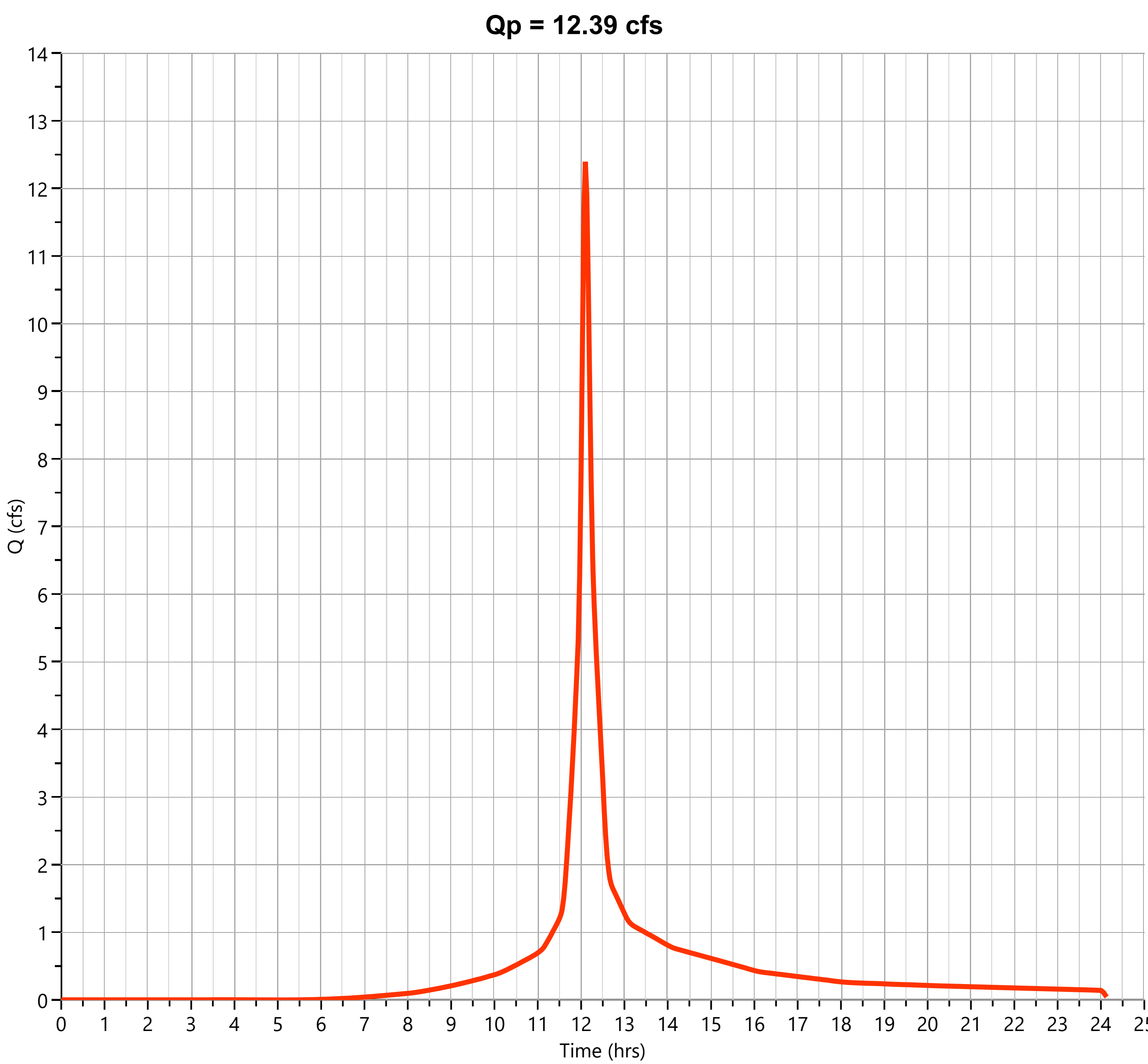
Hydrology Studio v 3.0.0.27

06-17-2023

P-5D

Hyd. No. 28

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



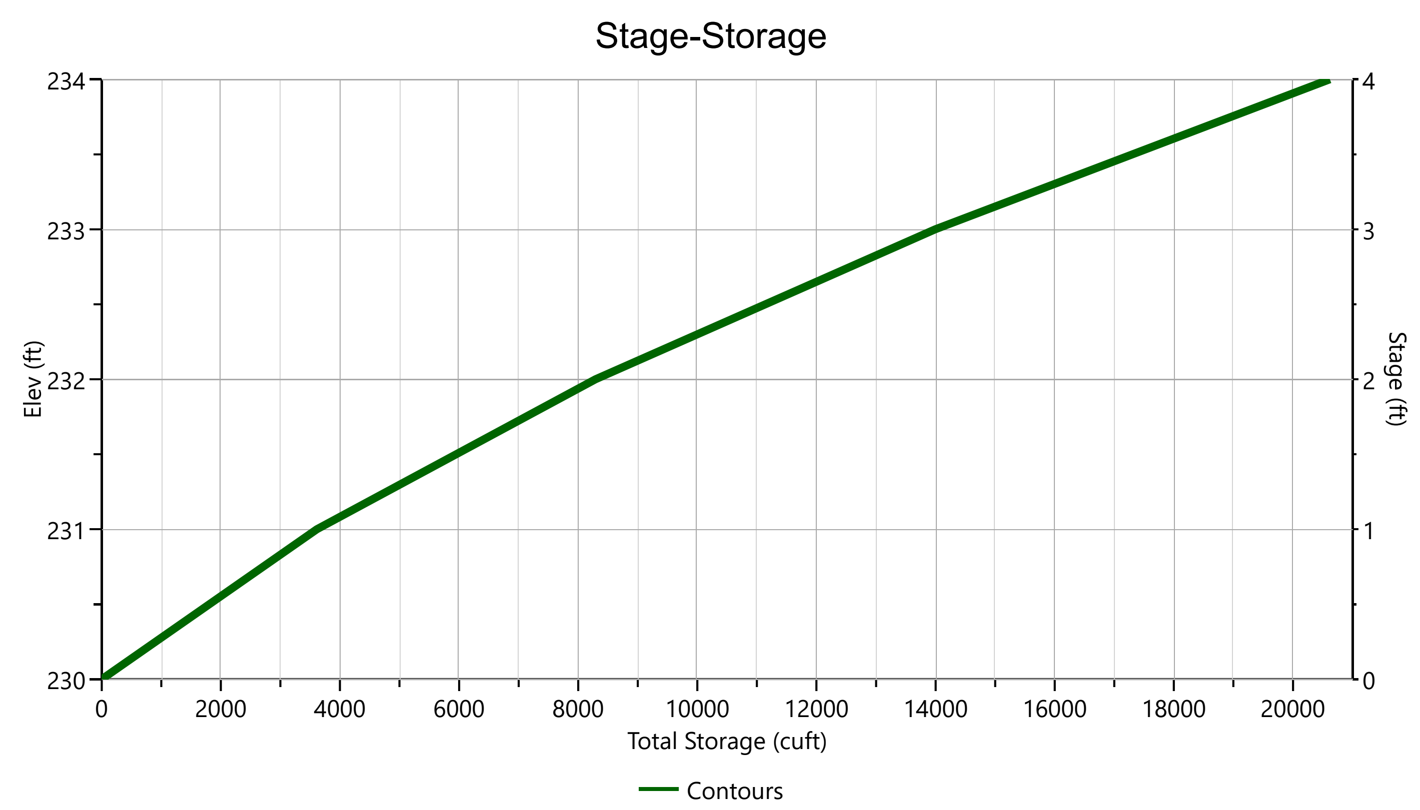
IB-5D

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	230.00
Voids (%)	100.00
Volume Calc	Ave End Area

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	230.00	3,129	0.000	0.000
1.00	231.00	4,097	3,613	3,613
2.00	232.00	5,259	4,678	8,291
3.00	233.00	6,149	5,704	13,995
4.00	234.00	7,097	6,623	20,618

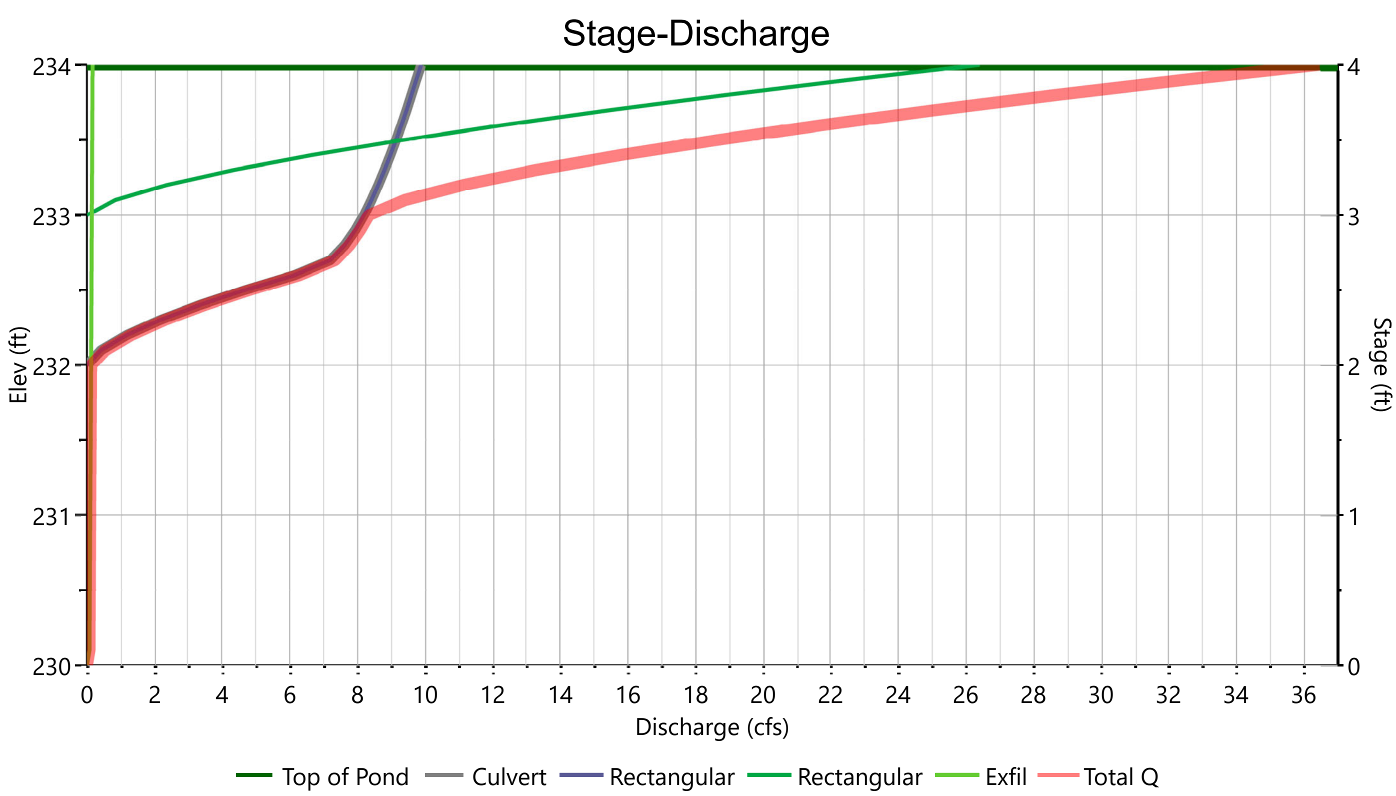


IB-5D

Stage-Discharge

Culvert / Orifices	Culvert	Orifices 1	Orifices 2	Orifices 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					
Weirs	**Riser***	**Weirs 1***	**Weirs 2**	**Weirs 3**	**Ancillary**	
Shape / Type	Circular	Rectangular	Rectangular		Exfiltration, in/hr	1.02**
Crest Elevation, ft		232	233			
Crest Length, ft		4	8			
Angle, deg						
Weir Coefficient, Cw		3.3	3.3			

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



IB-5D

Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
0.00	230.00	0.000	0.000					0.000	0.000			0.000		0.000
1.00	231.00	3,613	0.000					0.000	0.000			0.097		0.097
2.00	232.00	8,291	0.000					0.000	0.000			0.124		0.124
3.00	233.00	13,995	8.191 oc					8.191 s	0.000			0.145		8.336
4.00	234.00	20,618	9.884 oc					9.884 s	26.40			0.168		36.45

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Pond Report

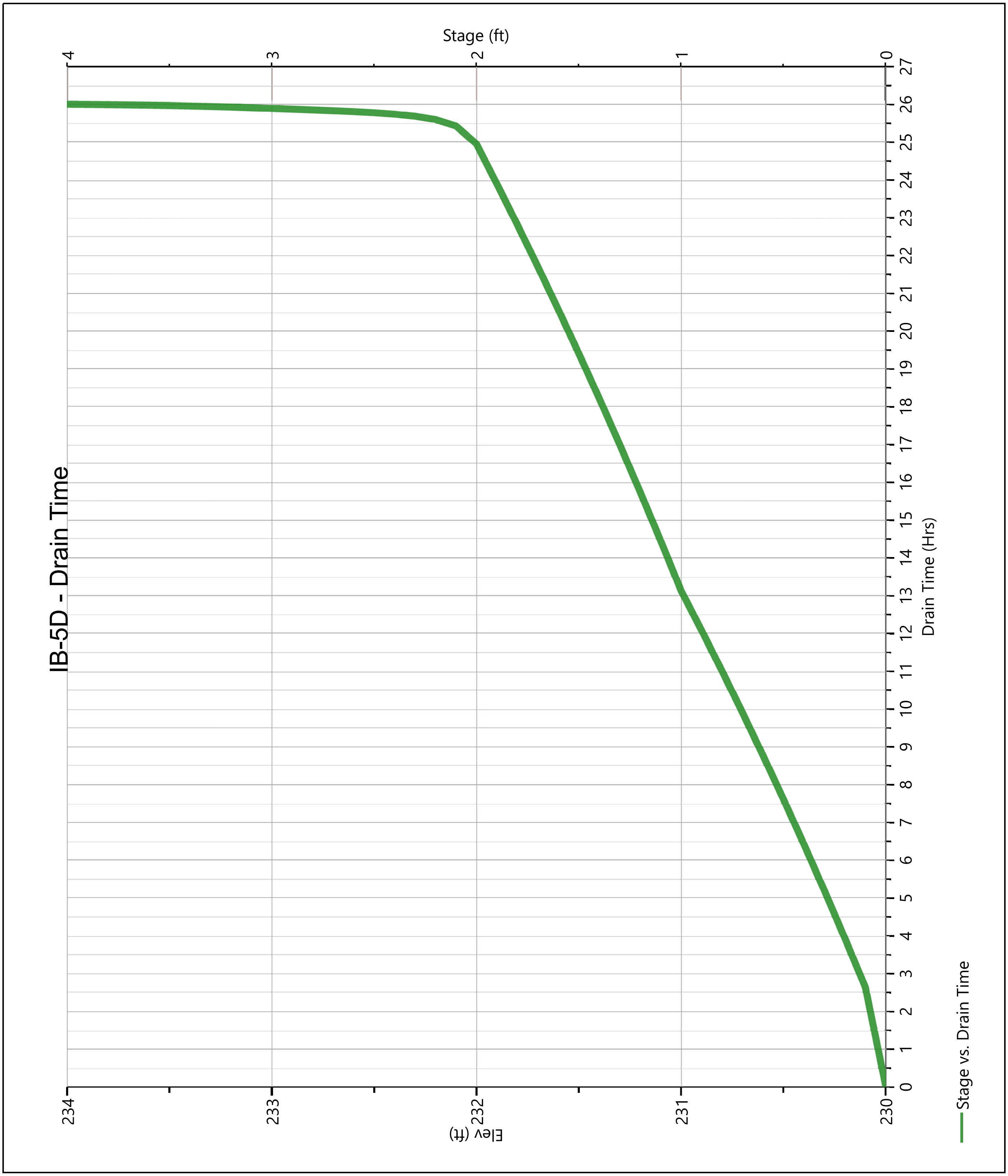
Project Name:

Hydrology Studio v 3.0.0.27

06-17-2023

IB-5D

Pond Drawdown



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

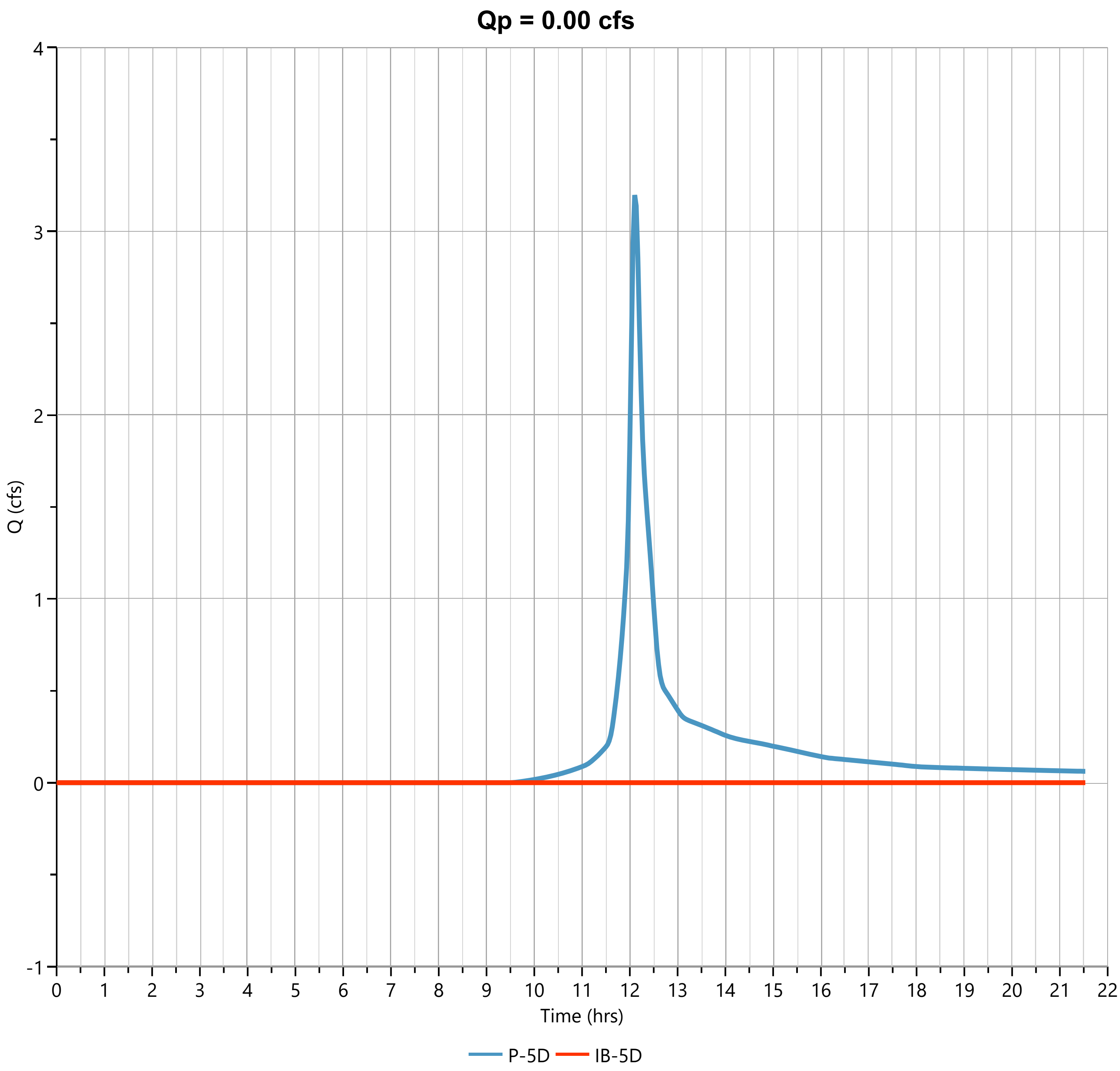
IB-5D

Hyd. No. 29

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 16.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.002 cuft
Inflow Hydrograph	= 28 - P-5D	Max. Elevation	= 231.73 ft
Pond Name	= IB-5D	Max. Storage	= 7,020 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 4.16 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.27

06-17-2023

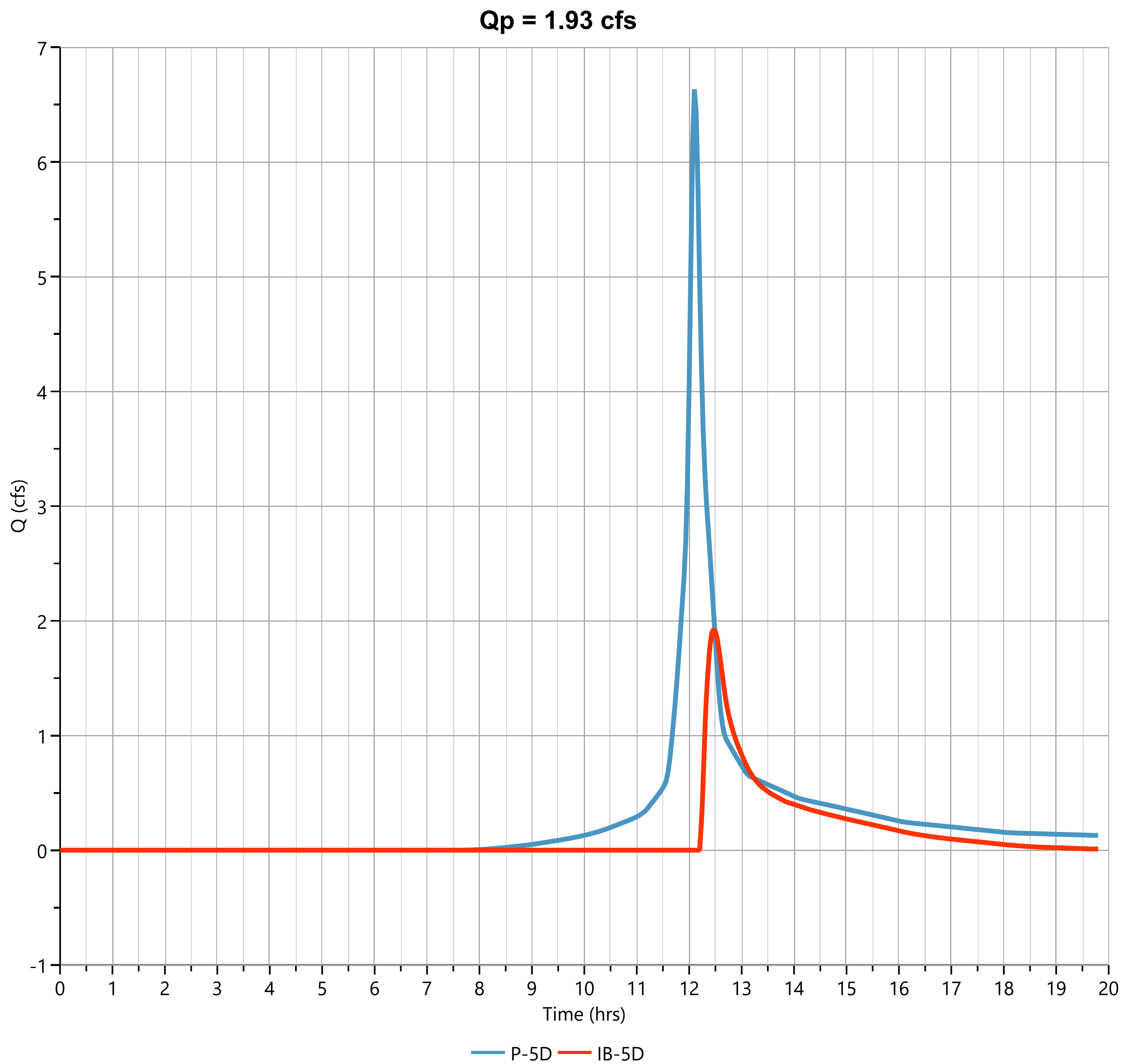
IB-5D

Hyd. No. 29

Hydrograph Type	= Pond Route	Peak Flow	= 1.926 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.47 hrs
Time Interval	= 2 min	Hydrograph Volume	= 8,511 cuft
Inflow Hydrograph	= 28 - P-5D	Max. Elevation	= 232.28 ft
Pond Name	= IB-5D	Max. Storage	= 9,862 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2 min



Hydrograph Report

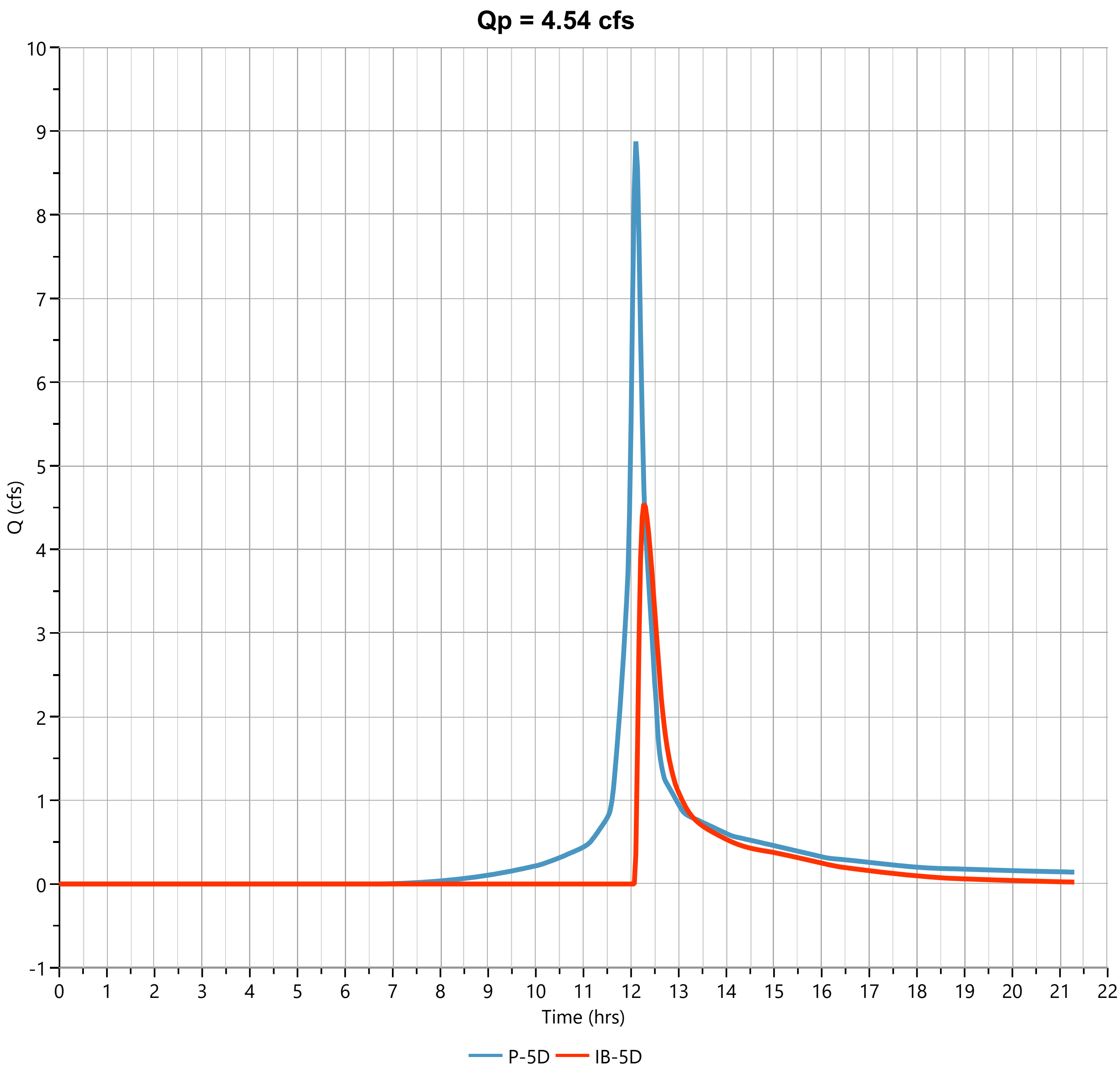
Hydrology Studio v 3.0.0.27 06-17-2023

IB-5D

Hyd. No. 29

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	= 15,726 cuft
Inflow Hydrograph	= 28 - P-5D	Max. Elevation	= 232.49 ft
Pond Name	= IB-5D	Max. Storage	= 11,090 cuft

Pond Routing by Storage Indication Method



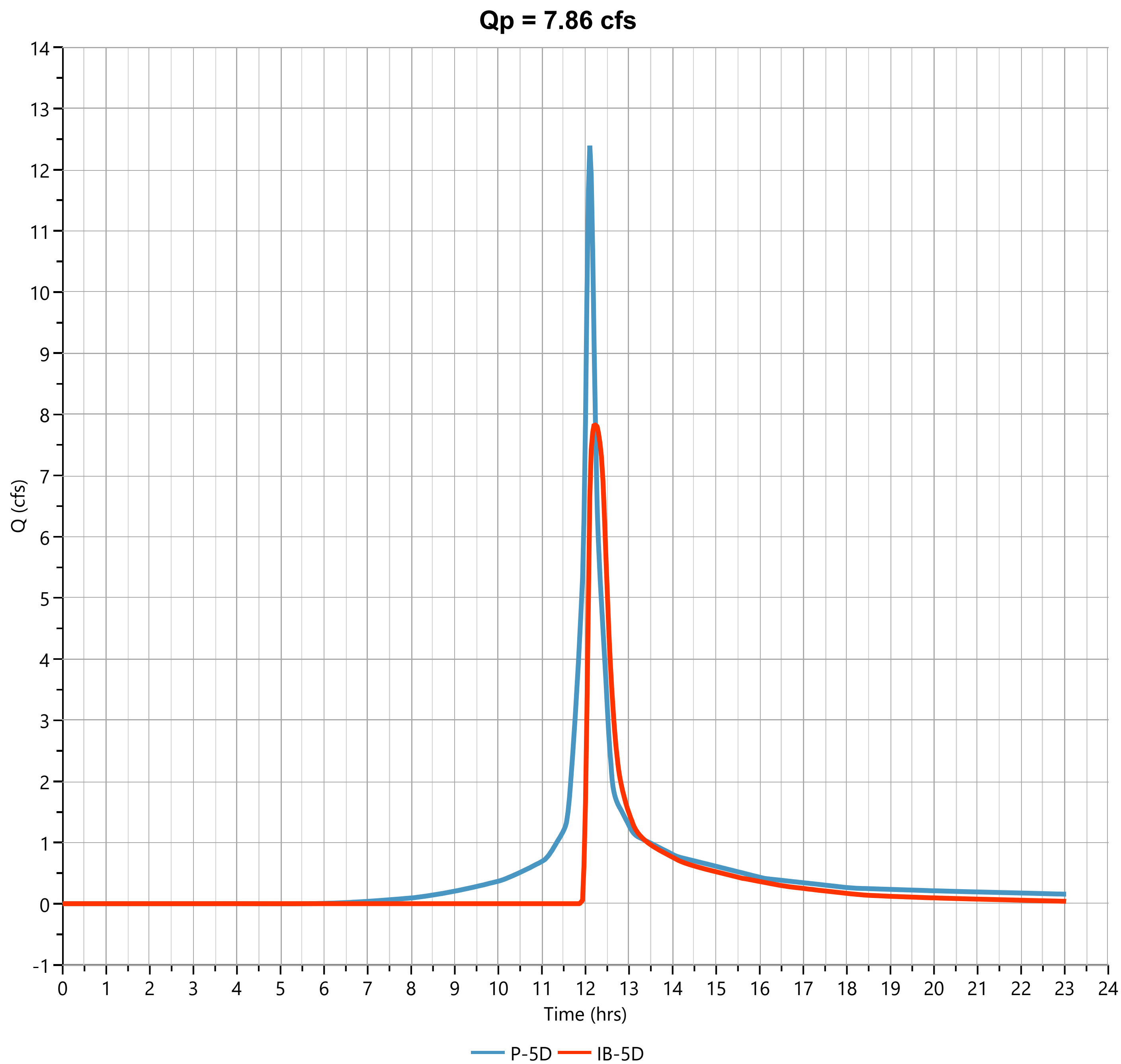
IB-5D

Hyd. No. 29

Hydrograph Type	= Pond Route	Peak Flow	= 7.861 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Hydrograph Volume	= 27,675 cuft
Inflow Hydrograph	= 28 - P-5D	Max. Elevation	= 232.88 ft
Pond Name	= IB-5D	Max. Storage	= 13,291 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2 min



Worksheet 2: Runoff curve number and runoff **SM-3719C**

Project: Athens Street By NC Date 10/13/22
Rev Date 6/17/2023
Location: Stow, MA Checked Date

Circle one: Present Developed Subcatchment P-2B-B

1. Runoff curve number (CN)

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

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

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.......................................	yr	2	25	100
Rainfall, P (24-hour).......................	in	3.27	6.14	7.84

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By NC Date 10/13/2022
Rev Date 6/17/2023
Location: Stow, MA Checked ______ Date ______

Circle one: Present **Developed** Subcatchment P-2B-B
Circle one: **Tc** Tt through subarea

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	0.094			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.16			0.16
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	653			
9. Watercourse slope, s		ft/ft	0.110			
10. Average Velocity, V (figure 3-1)		ft/s	5.35			
11. Tt = L / 3600V	Compute Tt	hr	0.03			0.03
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.19
min 11.4

P-2B-B

Hyd. No. 31

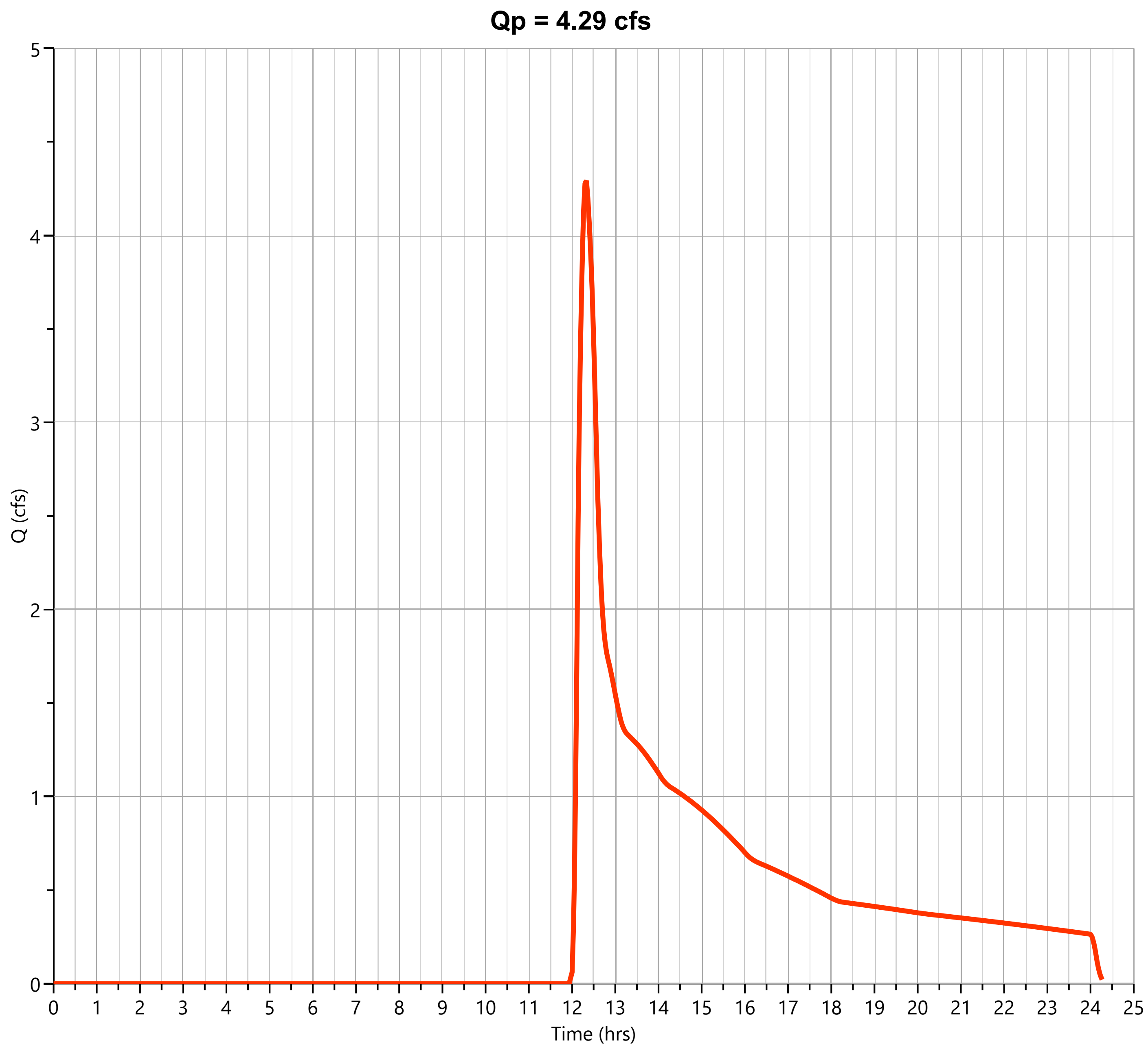
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.158 cfs
Storm Frequency	= 2-yr	Time to Peak	= 14.97 hrs
Time Interval	= 2 min	Runoff Volume	= 4,327 cuft
Drainage Area	= 17.21 ac	Curve Number	= 46
Tc Method	= User	Time of Conc. (Tc)	= 11.4 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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

Hydrograph Report

P-2B-B

Hyd. No. 31

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



Hydrograph Report

Project Name:

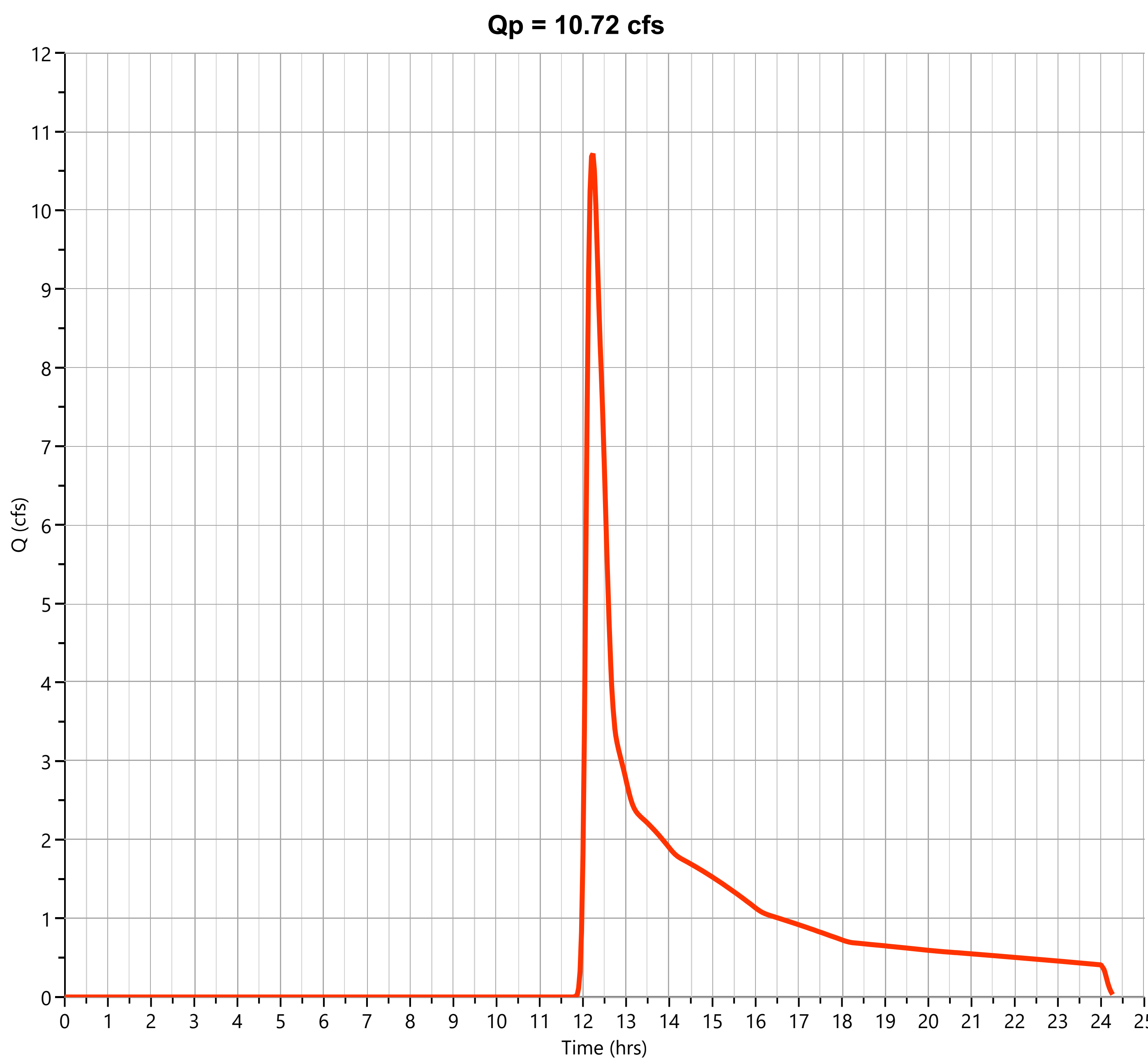
Hydrology Studio v 3.0.0.31

02-13-2024

P-2B-B

Hyd. No. 31

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

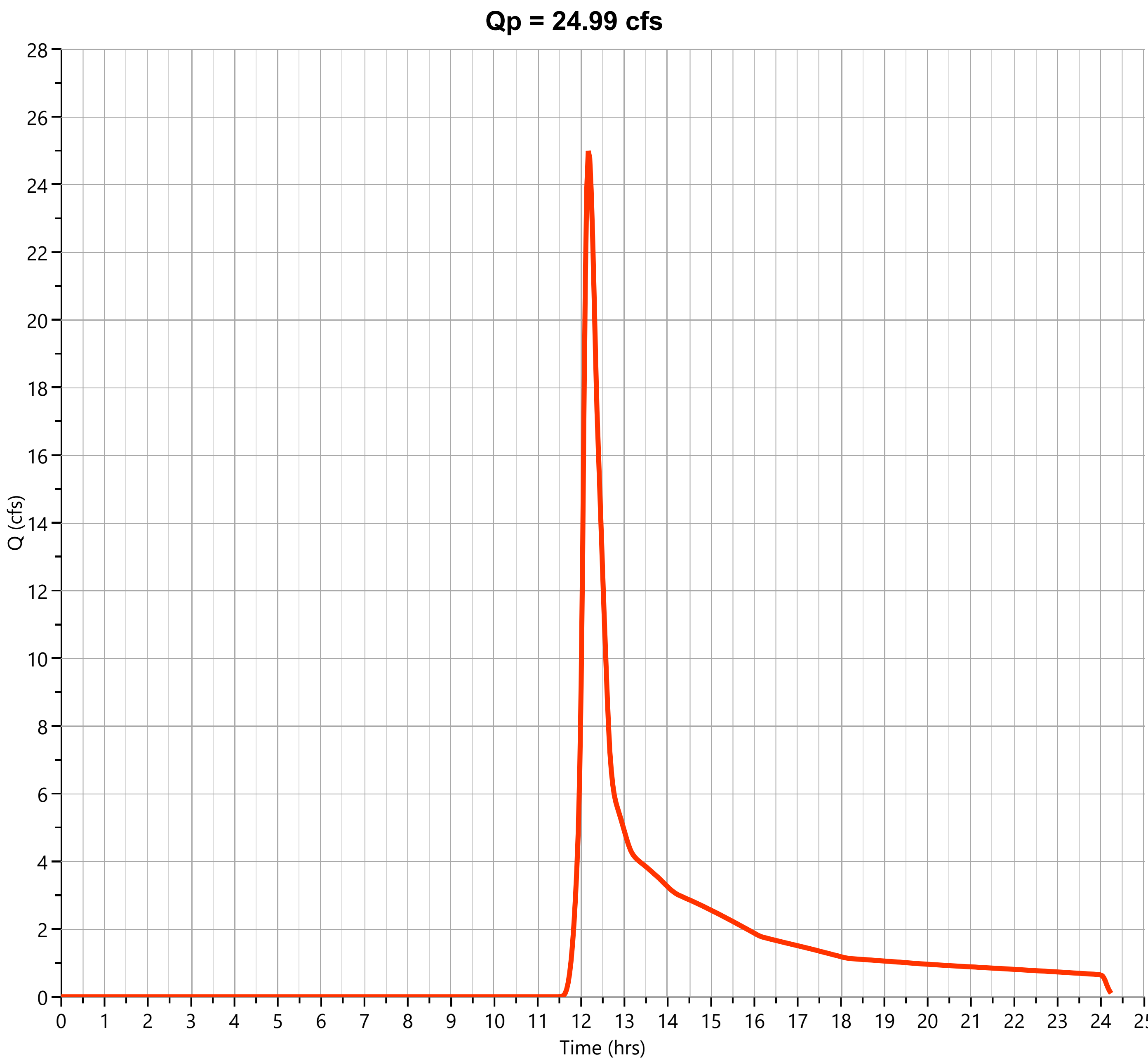


Hydrograph Report

P-2B-B

Hyd. No. 31

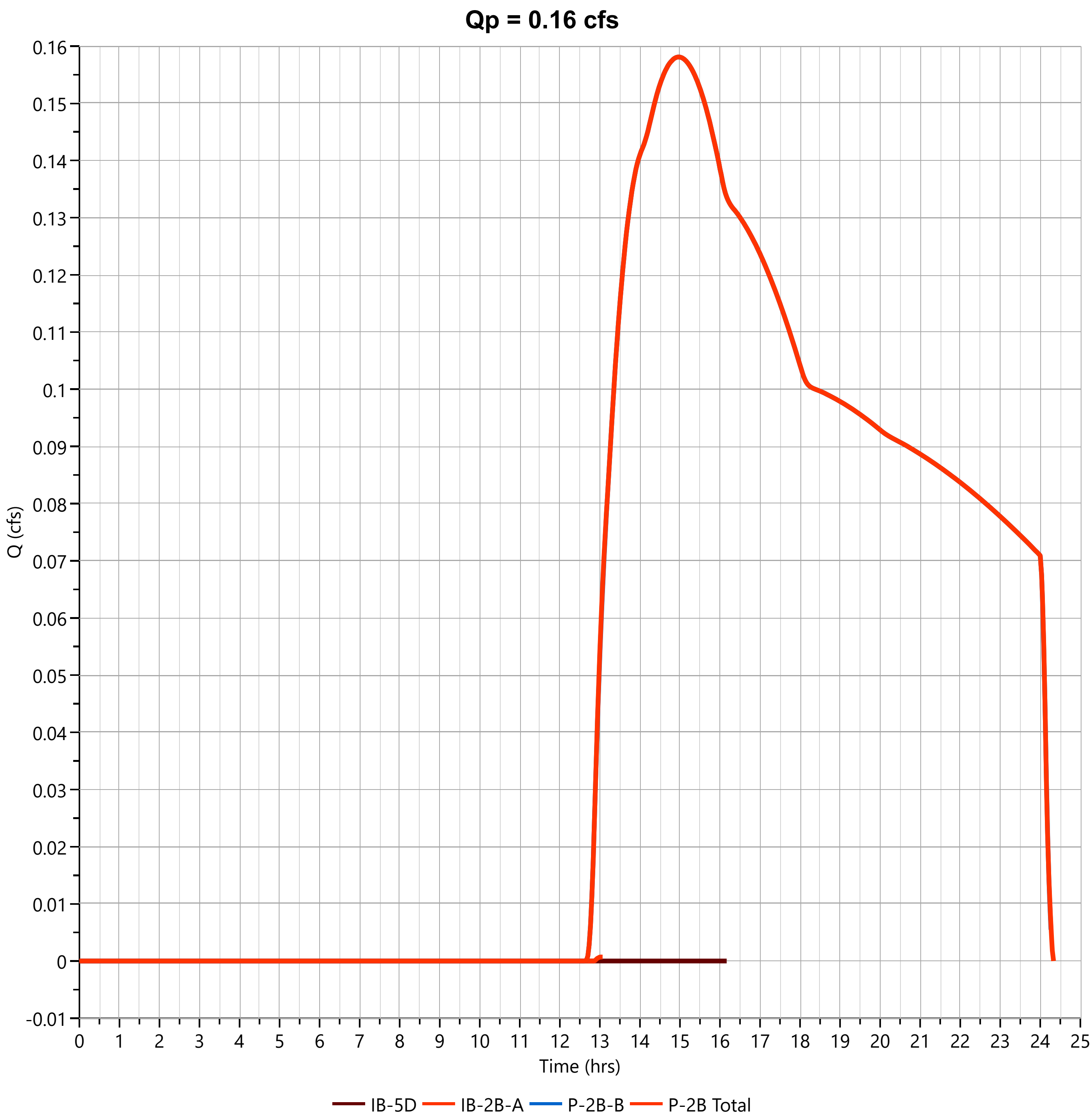
Hydrograph Type	= NRCS Runoff	Peak Flow	= 24.99 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 112,777 cuft
Drainage Area	= 17.21 ac	Curve Number	= 46
Tc Method	= User	Time of Conc. (Tc)	= 11.4 min
Total Rainfall	= 7.84 in	Design Storm	= Type III
Storm Duration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



P-2B Total

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 0.158 cfs
Storm Frequency	= 2-yr	Time to Peak	= 14.97 hrs
Time Interval	= 2 min	Hydrograph Volume	= 4,328 cuft
Inflow Hydrographs	= 29, 30, 31	Total Contrib. Area	= 17.21 ac



Hydrograph Report

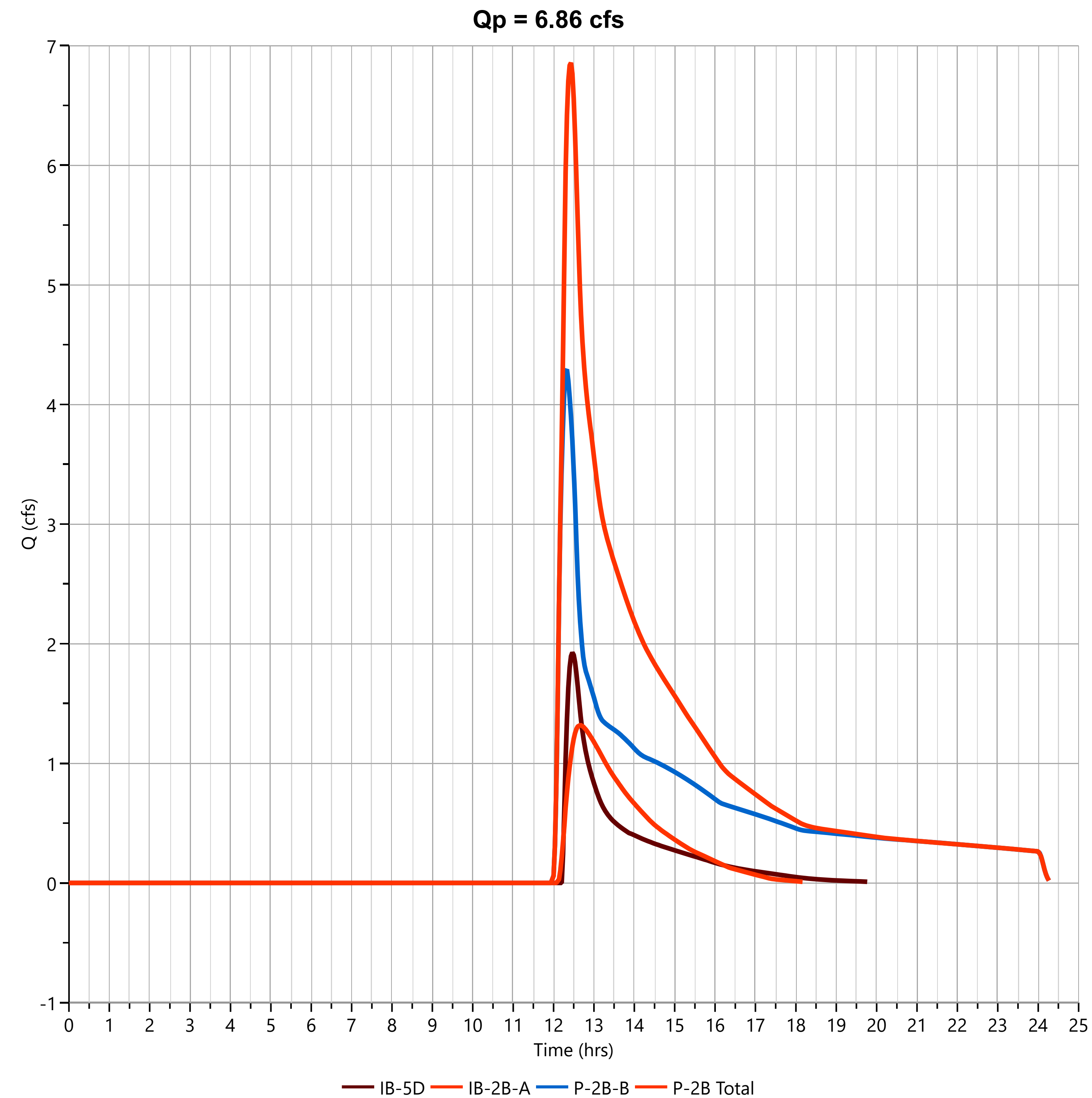
Hydrology Studio v 3.0.0.31

02-13-2024

P-2B Total

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 6.856 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.43 hrs
Time Interval	= 2 min	Hydrograph Volume	= 50,559 cuft
Inflow Hydrographs	= 29, 30, 31	Total Contrib. Area	= 17.21 ac



Hydrograph Report

Project Name:

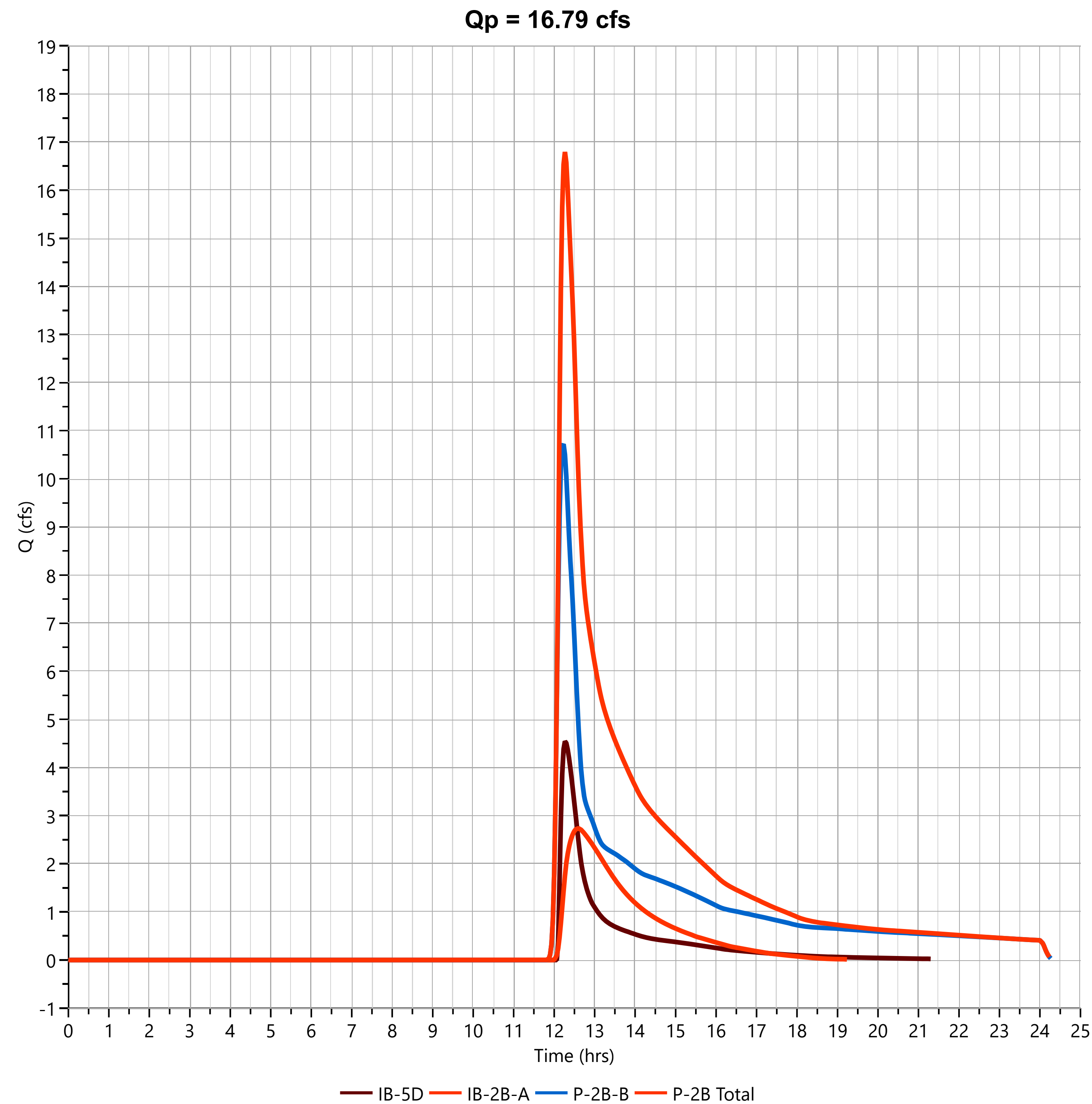
Hydrology Studio v 3.0.0.31

02-13-2024

P-2B Total

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 16.79 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Hydrograph Volume	= 95,281 cuft
Inflow Hydrographs	= 29, 30, 31	Total Contrib. Area	= 17.21 ac



Hydrograph Report

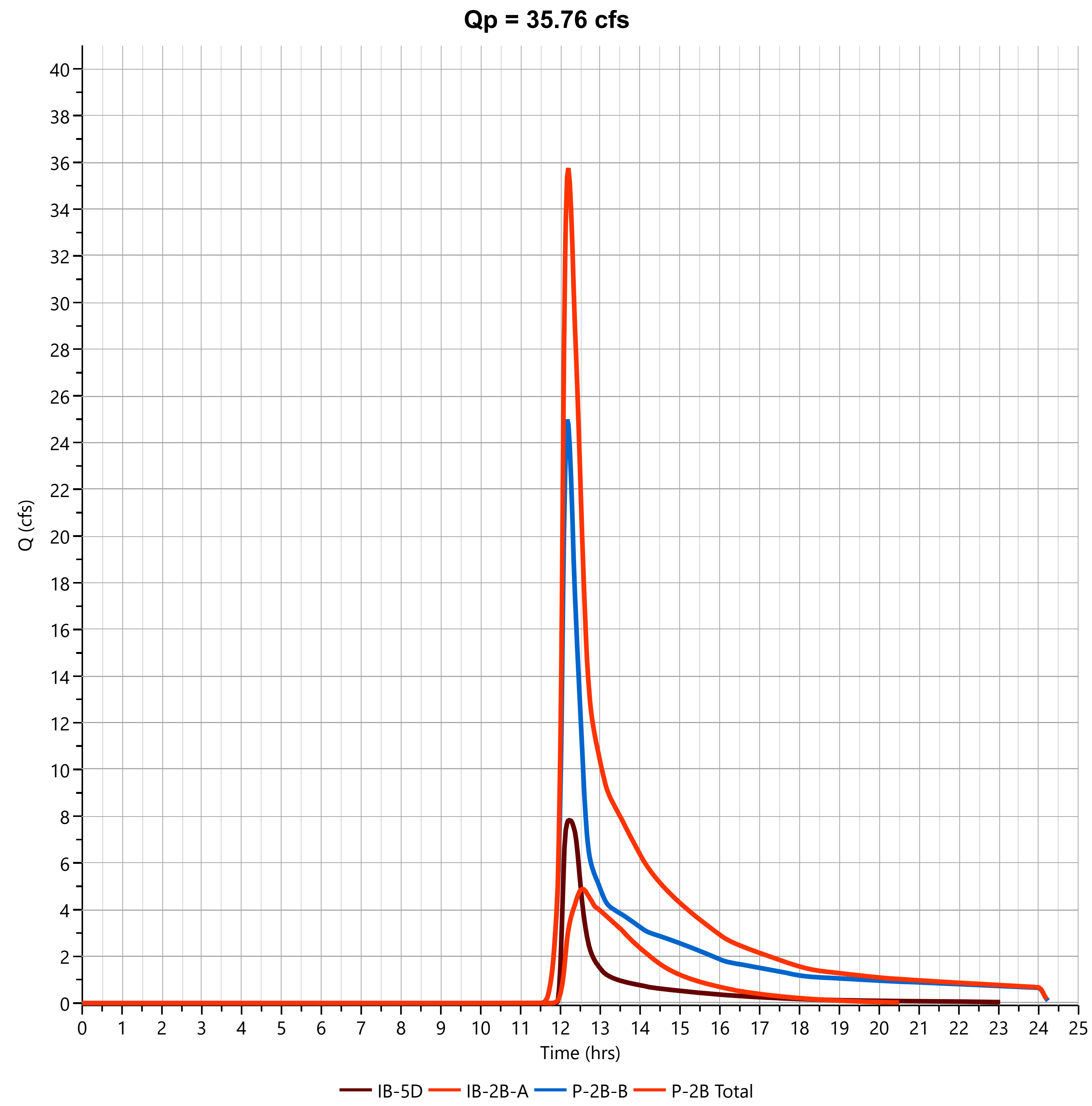
Project Name:

Hydrology Studio v 3.0.0.31 02-13-2024

P-2B Total

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 35.76 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 178,854 cuft
Inflow Hydrographs	= 29, 30, 31	Total Contrib. Area	= 17.21 ac



Worksheet 2: Runoff curve number and runoff **SM-3719C**

Project: Athens Street By PFK Date 6/21/22
Rev Date 10/13/2022
Location: Stow, MA Checked Date 6/17/2023

Circle one: Present Developed Subcatchment P-3A

1. Runoff curve number (CN)

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

1/ Use only one CN source per line. 47317

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

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency......................................	yr	2	25	100
Rainfall, P (24-hour).......................	in	3.27	6.14	7.84
Runoff, Q.. (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	1.69	4.25	5.86

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By PFK Date 6/21/2022
Rev Date 10/13/2022
Location: Stow, MA Checked ______ Date 6/17/2023

Circle one: Present **Developed** Subcatchment P-3A
Circle one: **Tc** Tt through subarea

			Segment 1	Segment 2	Segment 3	Total
Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			GRASS			
2. Mannings roughness coeff., n (table 3-1)			0.24			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.030			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.12			0.12
Shallow concentrated Flow		Segment ID	B-C	C-D		
7. Surface Description (paved or unpaved)			UNPAVED	PAVED		
8. Flow Length, L		ft	78	259		
9. Watercourse slope, s		ft/ft	0.050	0.070		
10. Average Velocity, V (figure 3-1)		ft/s	3.61	5.38		
11. Tt = L / 3600V	Compute Tt	hr	0.01	0.01		0.02
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.14
min 8.2

Hydrograph Report

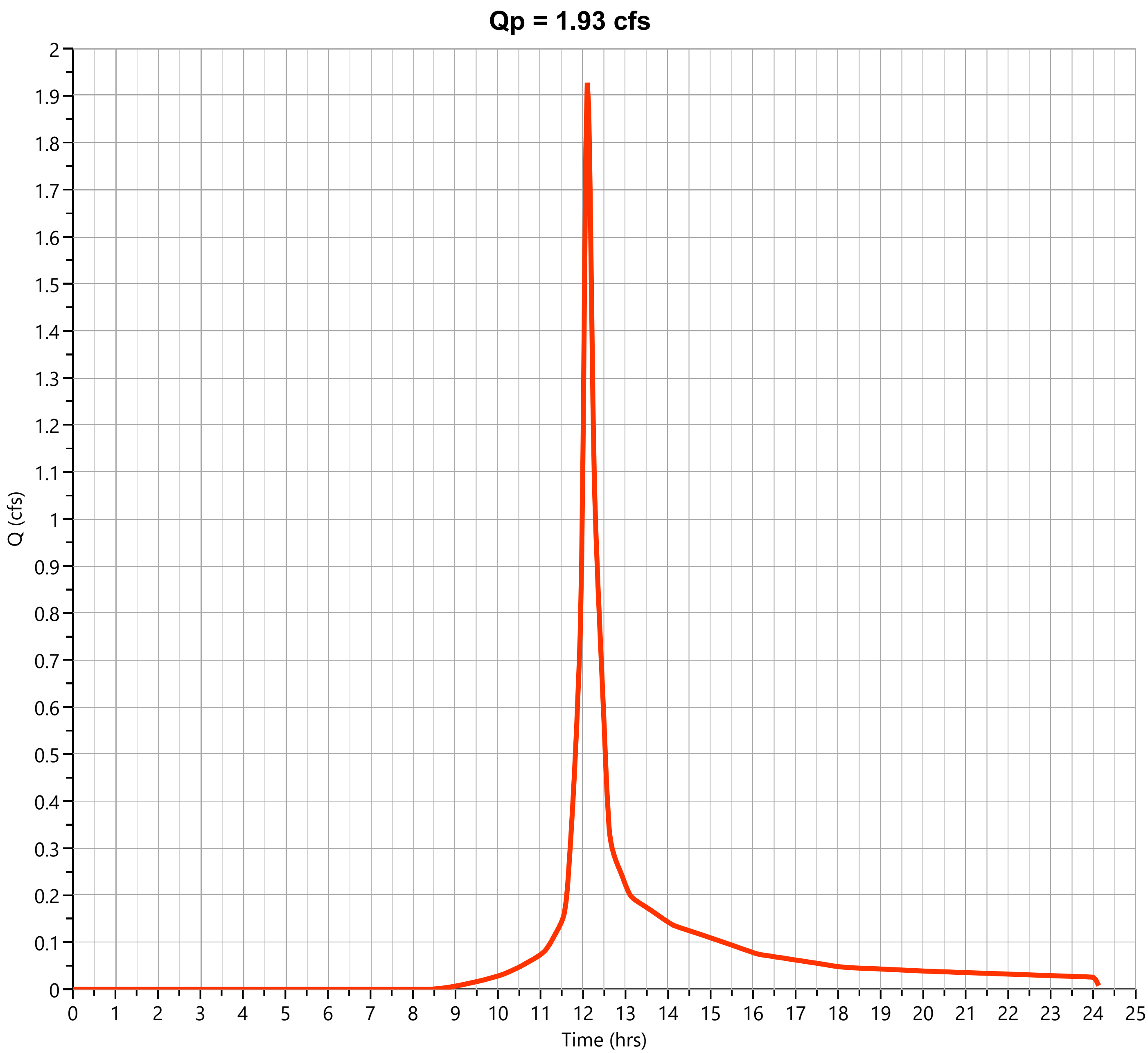
Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

P-3A

Hyd. No. 3

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 Report

Project Name:

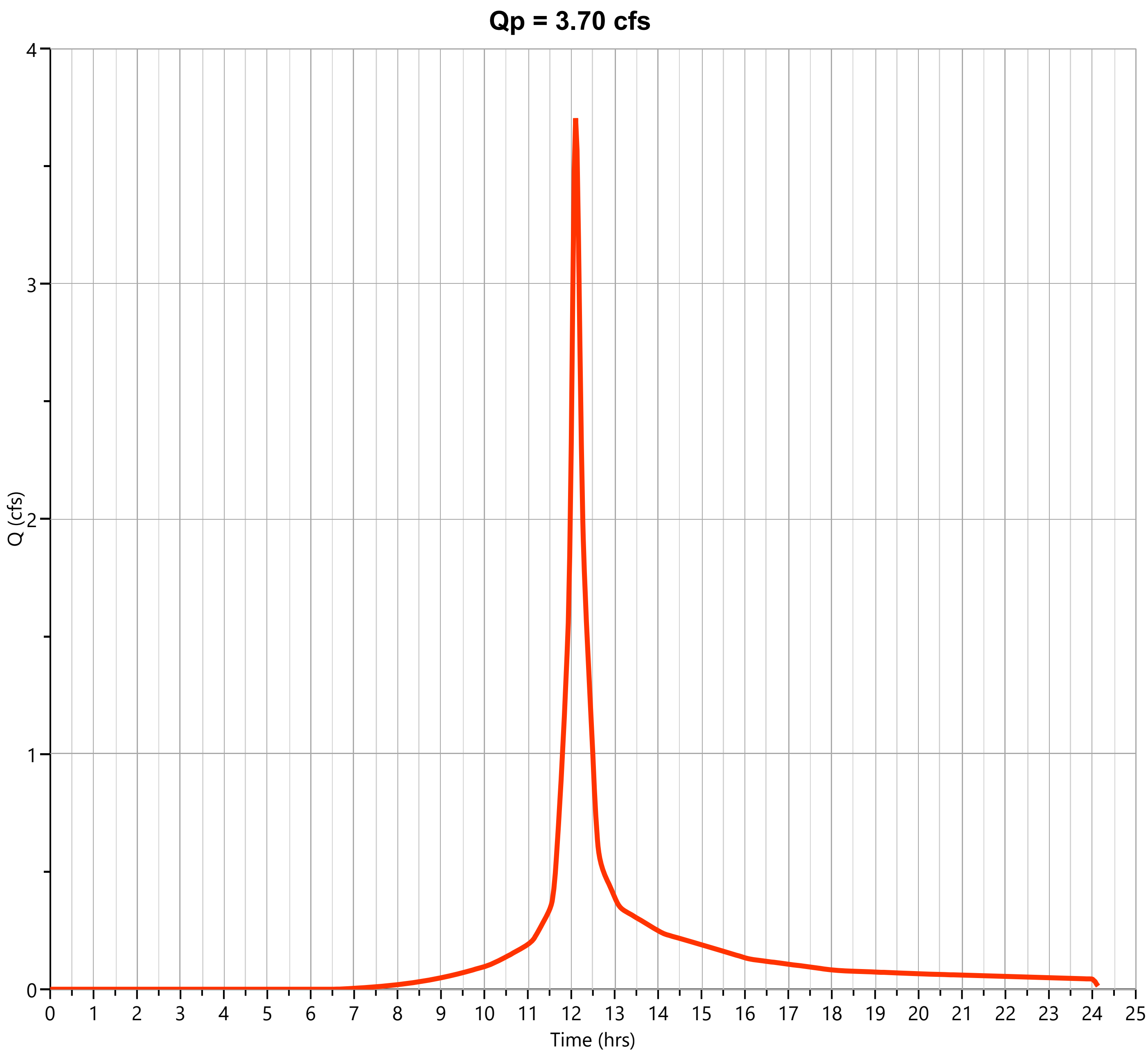
Hydrology Studio v 3.0.0.27

06-17-2023

P-3A

Hyd. No. 3

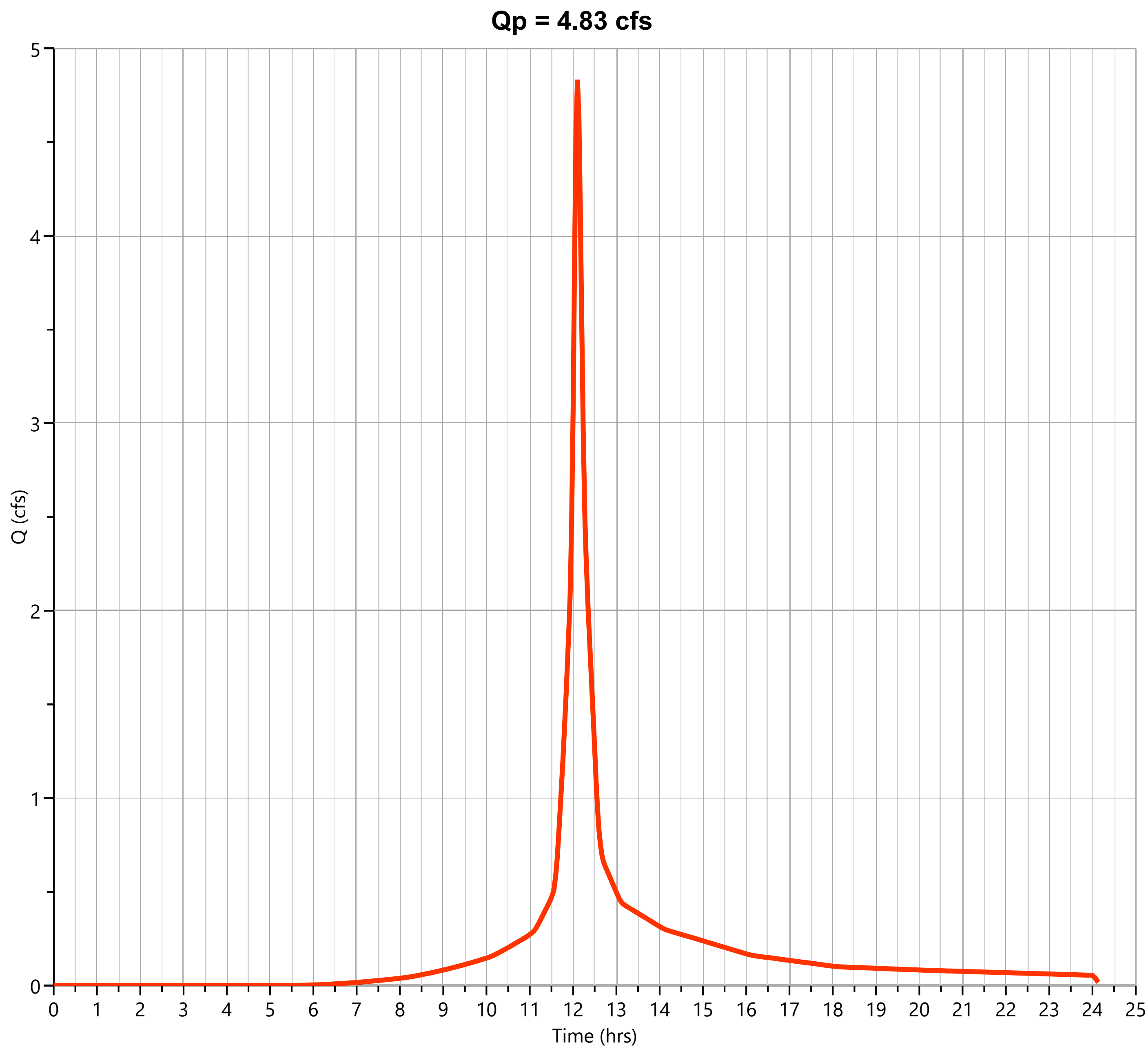
Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.704 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 12,702 cuft
Drainage Area	= 1.09 ac	Curve Number	= 83
Tc Method	= User	Time of Conc. (Tc)	= 8.2 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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



P-3A

Hyd. No. 3

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



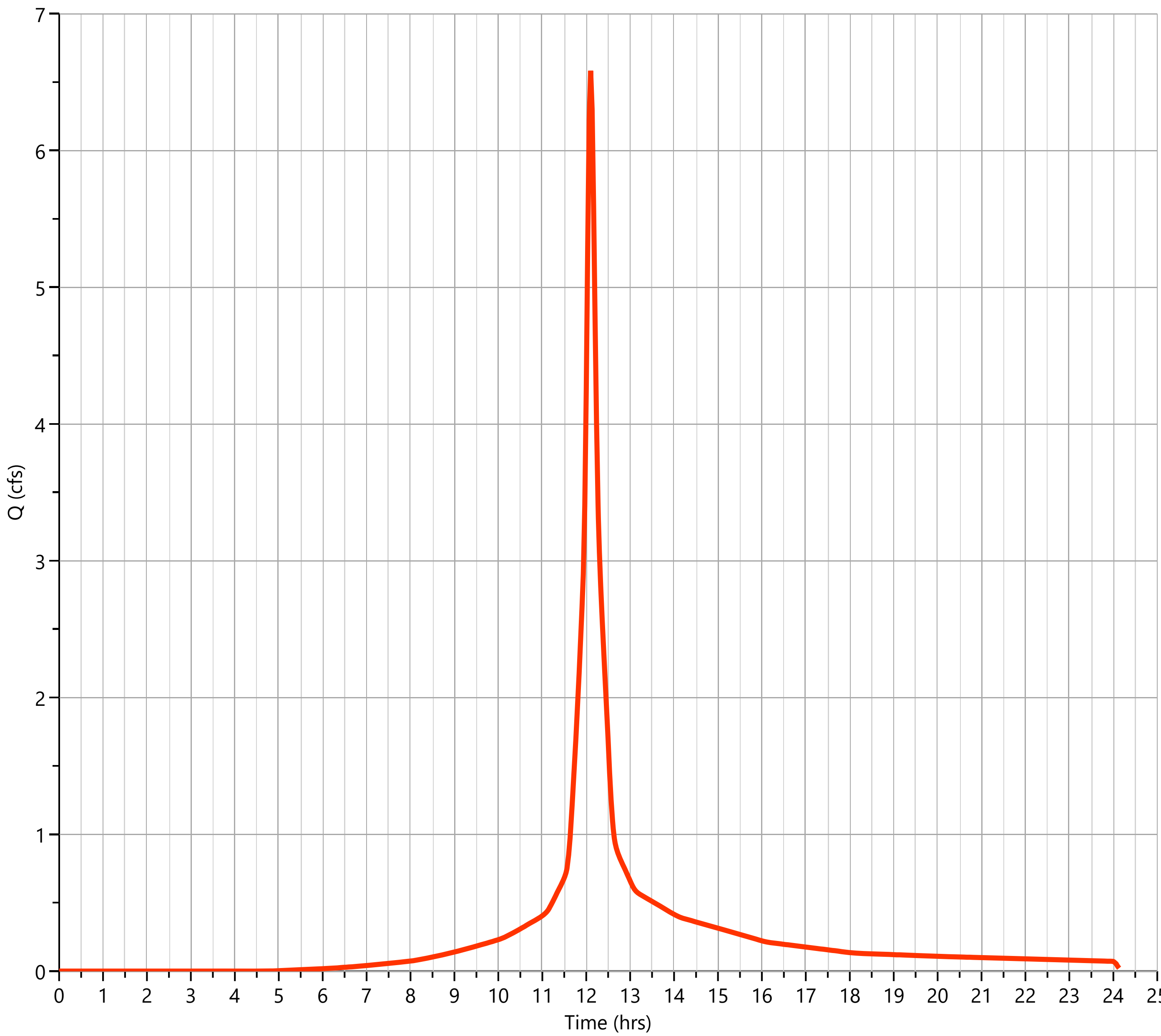
Hydrograph Report

P-3A

Hyd. No. 3

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

Qp = 6.58 cfs



IB-3A

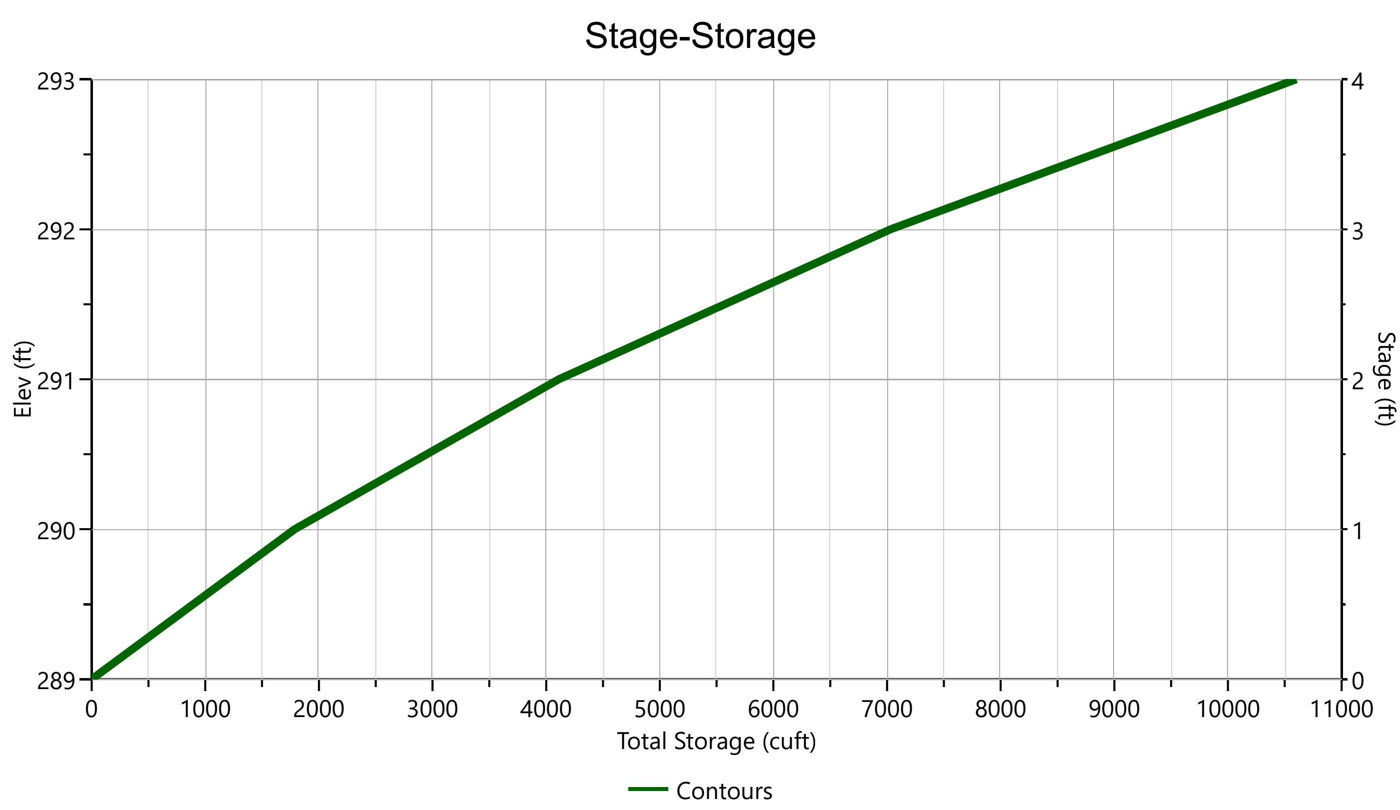
Stage-Storage

User Defined Contours

Description	Input
Bottom Elevation, ft	289.00
Voids (%)	100.00
Volume Calc	Ave End Area

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	289.00	1,532	0.000	0.000
1.00	290.00	2,042	1,787	1,787
2.00	291.00	2,608	2,325	4,112
3.00	292.00	3,231	2,920	7,032
4.00	293.00	3,910	3,571	10,602



Pond Report

Project Name:

Hydrology Studio v 3.0.0.27

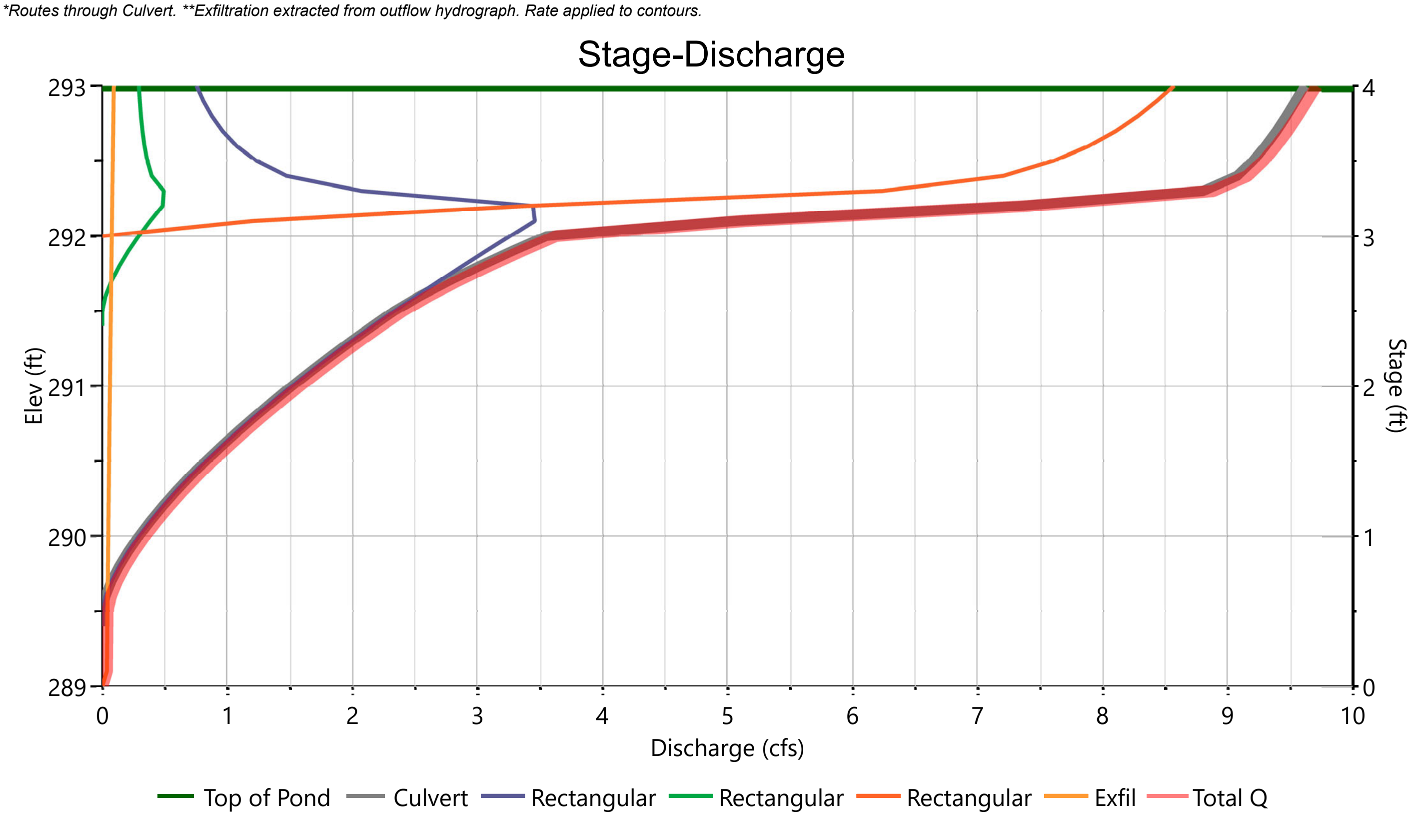
06-17-2023

IB-3A

Stage-Discharge

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

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



IB-3A

Stage-Storage-Discharge Summary

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

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Pond Report

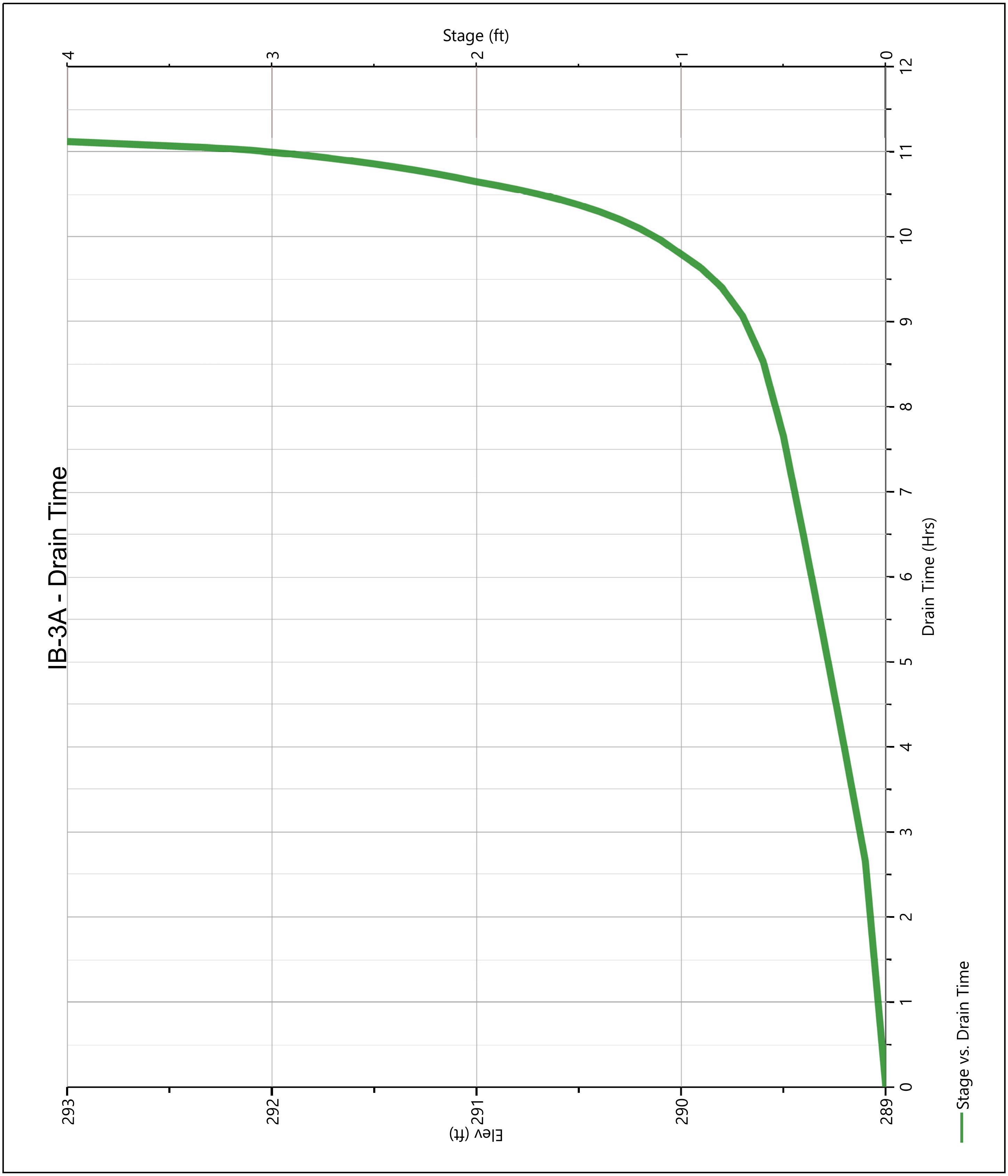
Project Name:

Hydrology Studio v 3.0.0.27

06-17-2023

IB-3A

Pond Drawdown

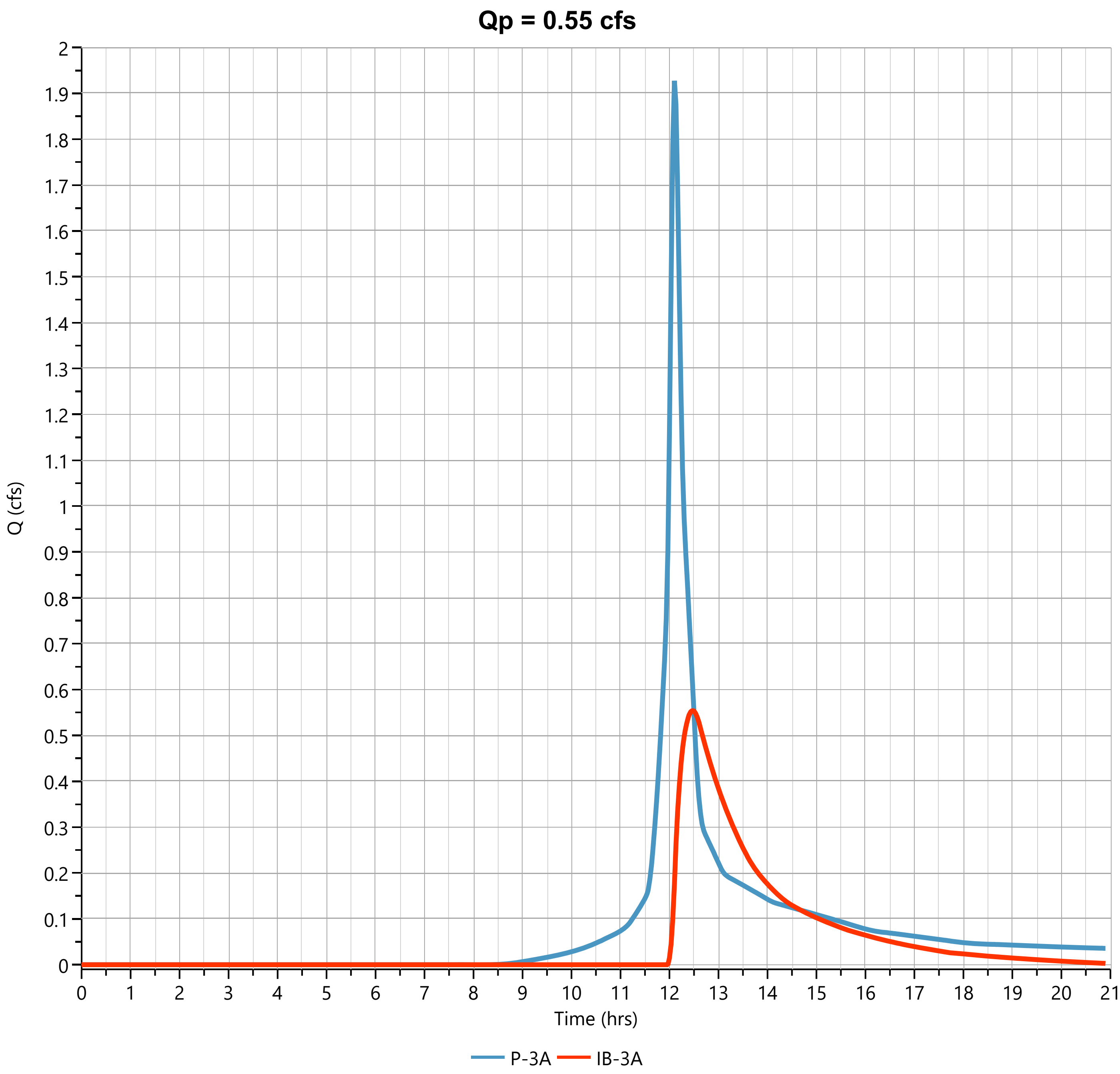


IB-3A

Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 0.554 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.47 hrs
Time Interval	= 2 min	Hydrograph Volume	= 3,671 cuft
Inflow Hydrograph	= 3 - P-3A	Max. Elevation	= 290.27 ft
Pond Name	= IB-3A	Max. Storage	= 2,406 cuft

Pond Routing by Storage Indication Method



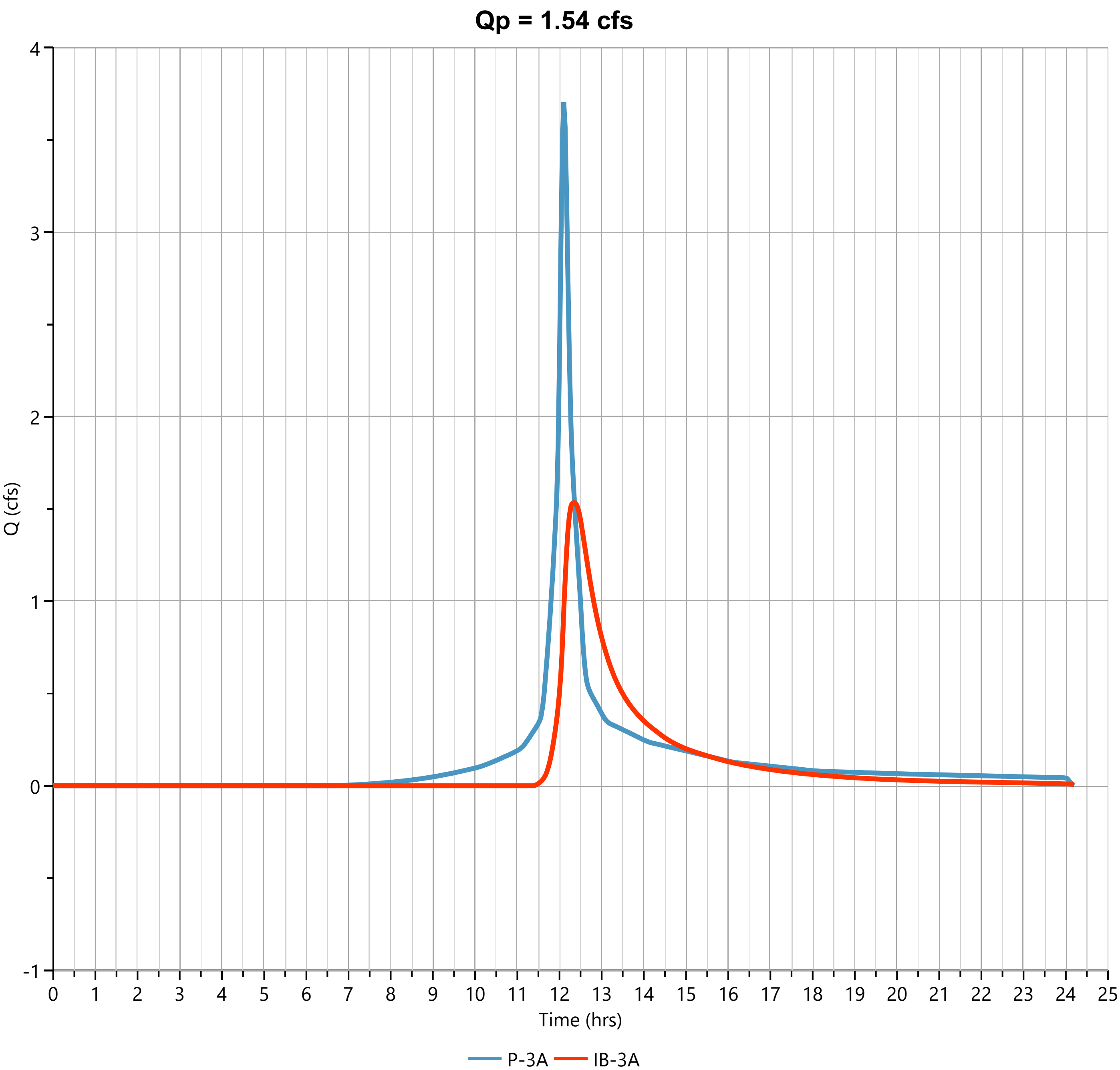
IB-3A

Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 1.538 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Hydrograph Volume	= 9,270 cuft
Inflow Hydrograph	= 3 - P-3A	Max. Elevation	= 291.01 ft
Pond Name	= IB-3A	Max. Storage	= 4,154 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 16 min



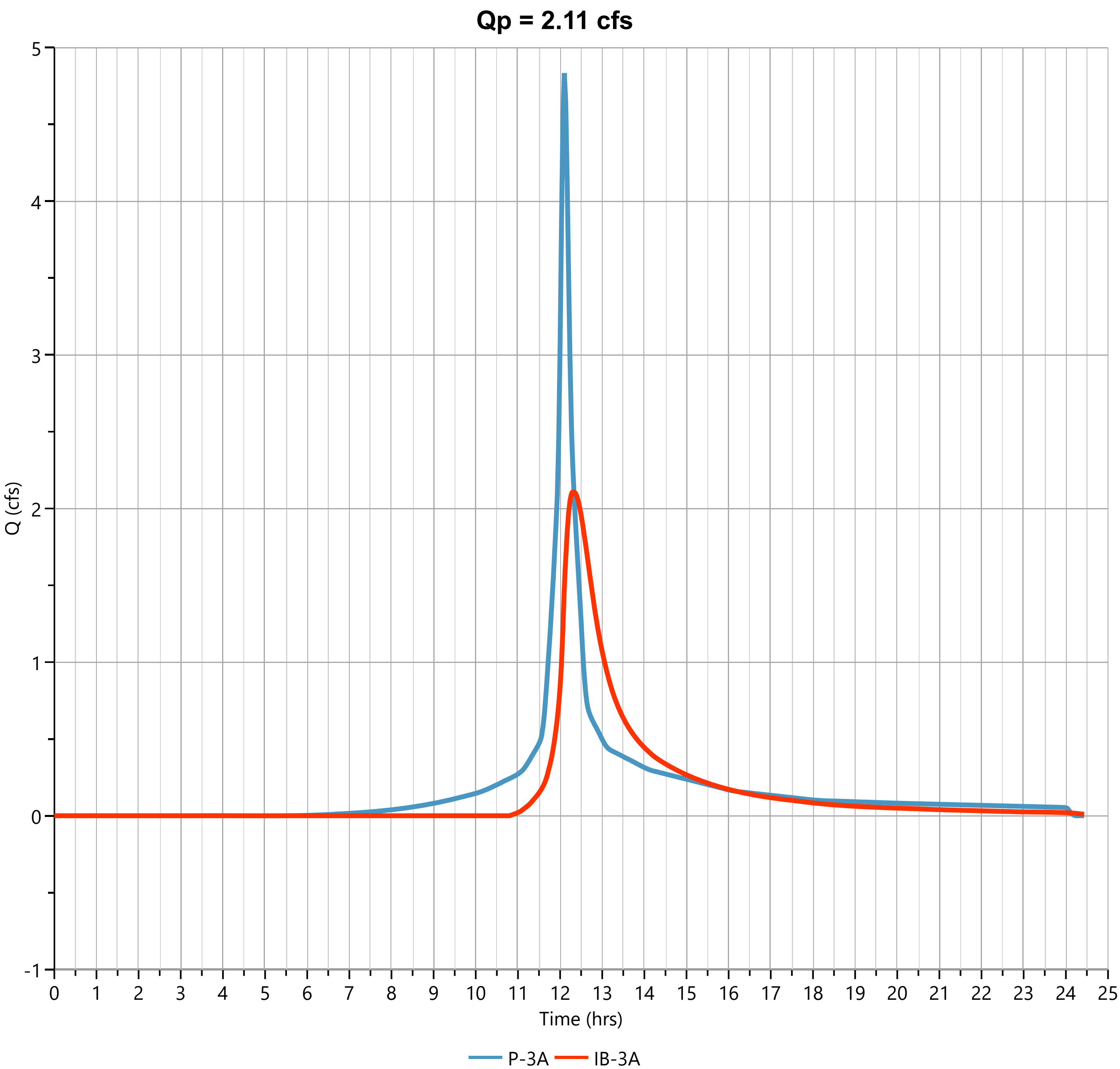
IB-3A

Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 2.111 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Hydrograph Volume	= 13,045 cuft
Inflow Hydrograph	= 3 - P-3A	Max. Elevation	= 291.37 ft
Pond Name	= IB-3A	Max. Storage	= 5,194 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 24 min



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.27

06-17-2023

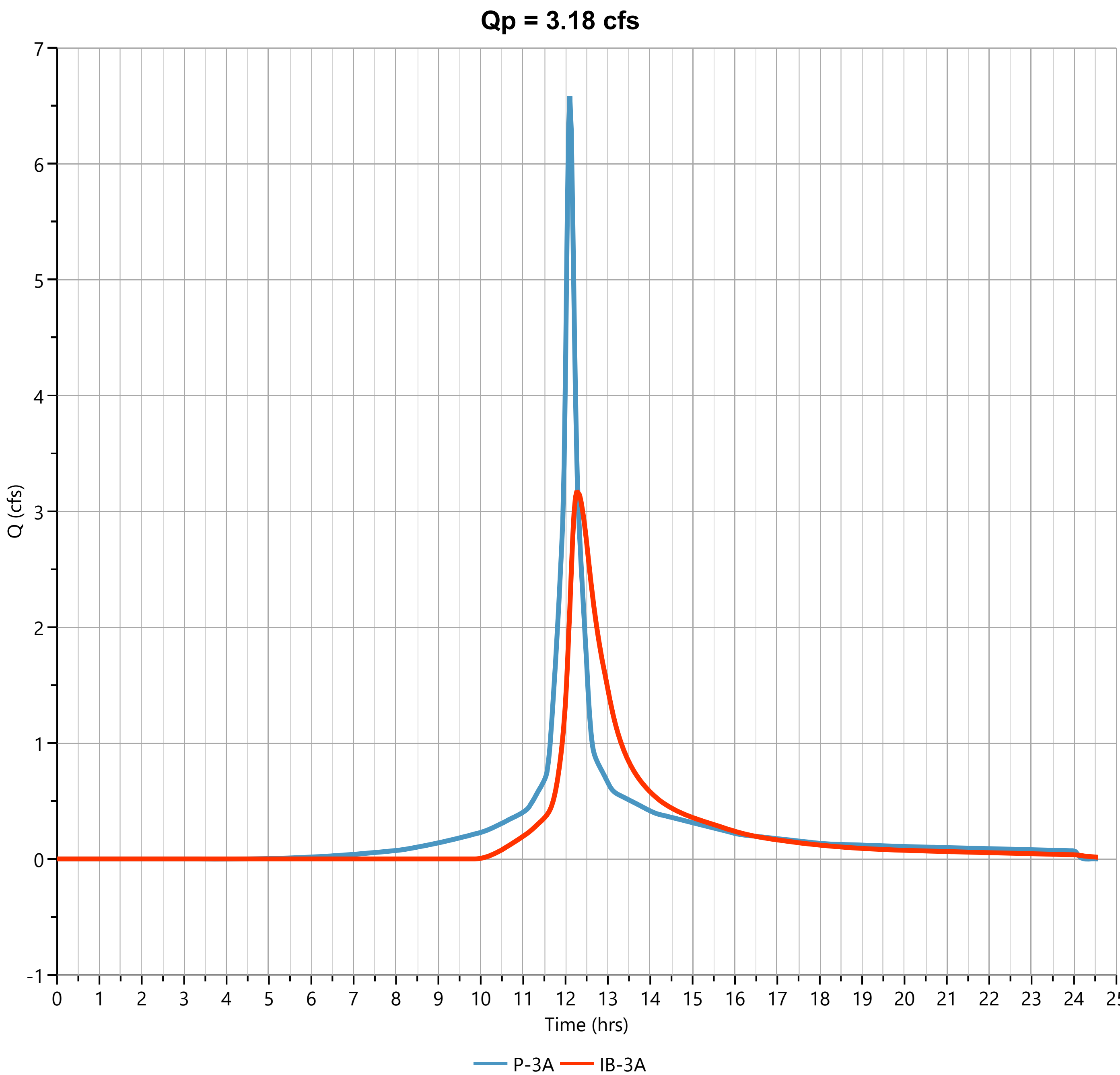
IB-3A

Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 3.175 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Hydrograph Volume	= 19,107 cuft
Inflow Hydrograph	= 3 - P-3A	Max. Elevation	= 291.87 ft
Pond Name	= IB-3A	Max. Storage	= 6,627 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 30 min



Worksheet 2: Runoff curve number and runofl **SM-3719C**

Project: Athens Street By PFK Date 6/21/22
Rev Date 10/13/2022
Location: Stow, MA Checked Date 6/17/2023

Circle one: Present $\boxed{\text{Developed}}$ Subcatchment P-3B

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)		CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
	Impervious		98			0.00	0.00
A	Woods	Good Condition	30			0.00	0.00
A	Open Space	Good Condition	39			0.00	0.00
A	Brush	Fair	35			0.00	0.00
A	Gravel		76			0.00	0.00
C	Woods	Good Condition	70			7.27	509.21
C	Open Space	Good Condition	74			0.90	66.31
C	Gravel		89			0.35	30.80
1/ Use only one CN source per line.		370986			Totals =	8.52	606.33

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = $\frac{606.33}{8.52}$ = 71.19 ; Use CN = 71

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency......................................	yr	2	25	100
Rainfall, P (24-hour).......................	in	3.27	6.14	7.84
Runoff, Q..	in	0.93	3.03	4.46

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By PFK Date 6/21/2022
Rev Date 10/13/2022
Location: Stow, MA Checked Date 6/17/2023

Circle one: Present **Developed** Subcatchment 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. 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	0.049			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.20			0.20
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	400			
9. Watercourse slope, s		ft/ft	0.110			
10. Average Velocity, V (figure 3-1)		ft/s	5.35			
11. Tt = L / 3600V	Compute Tt	hr	0.02			0.02
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

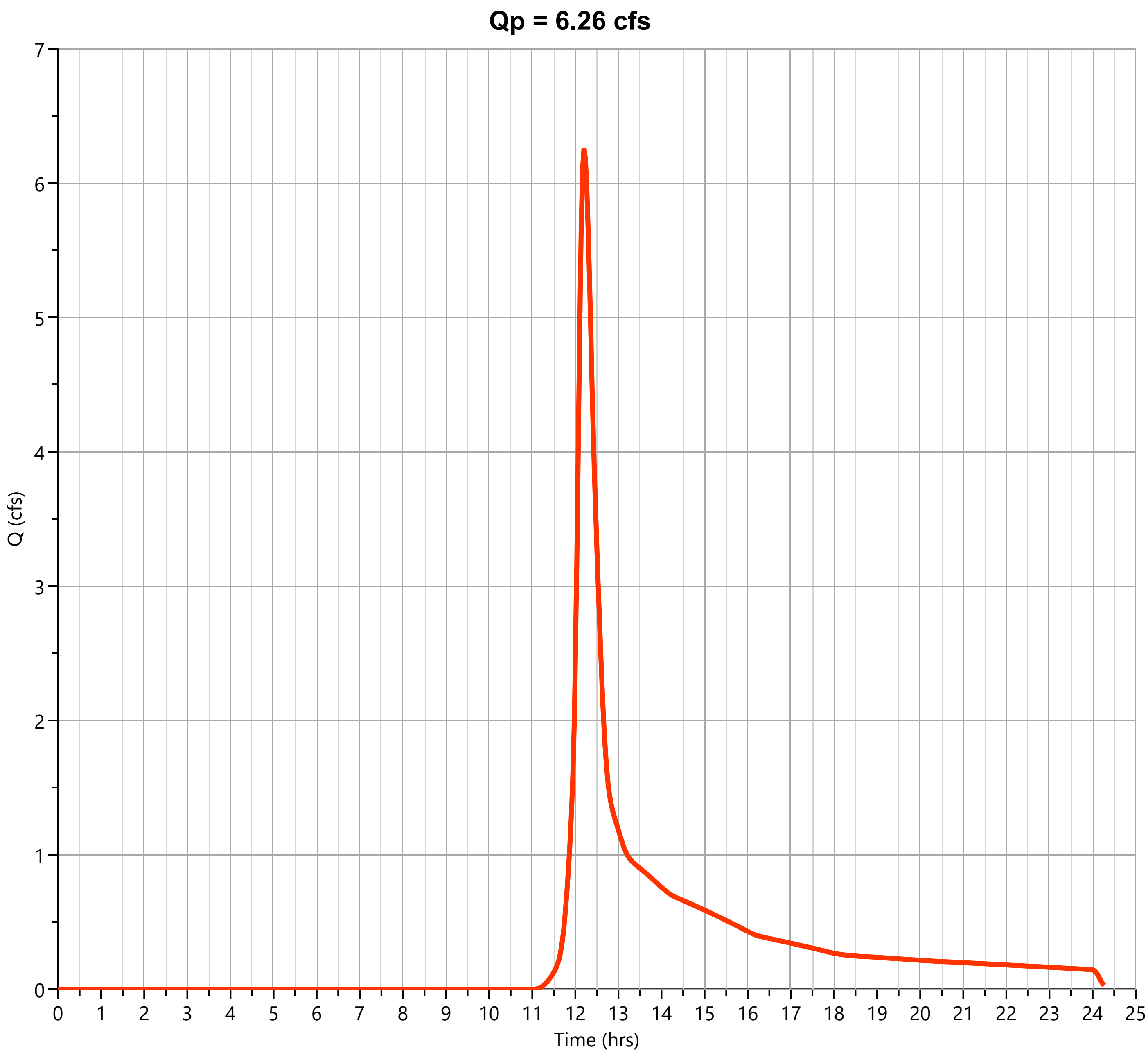
20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.22
min 13.4

Hydrograph Report

P-3B

Hyd. No. 5

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

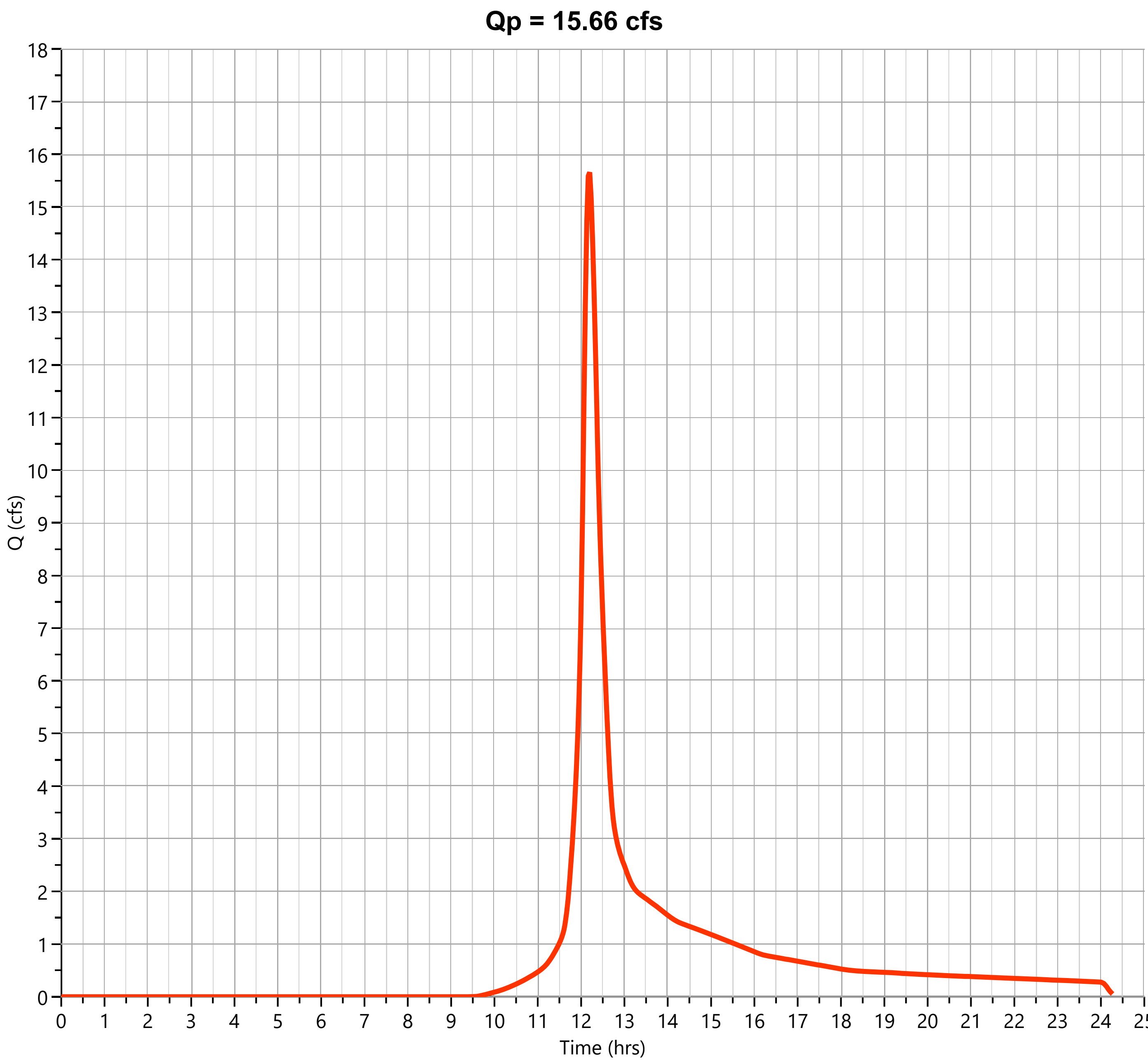


Hydrograph Report

P-3B

Hyd. No. 5

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

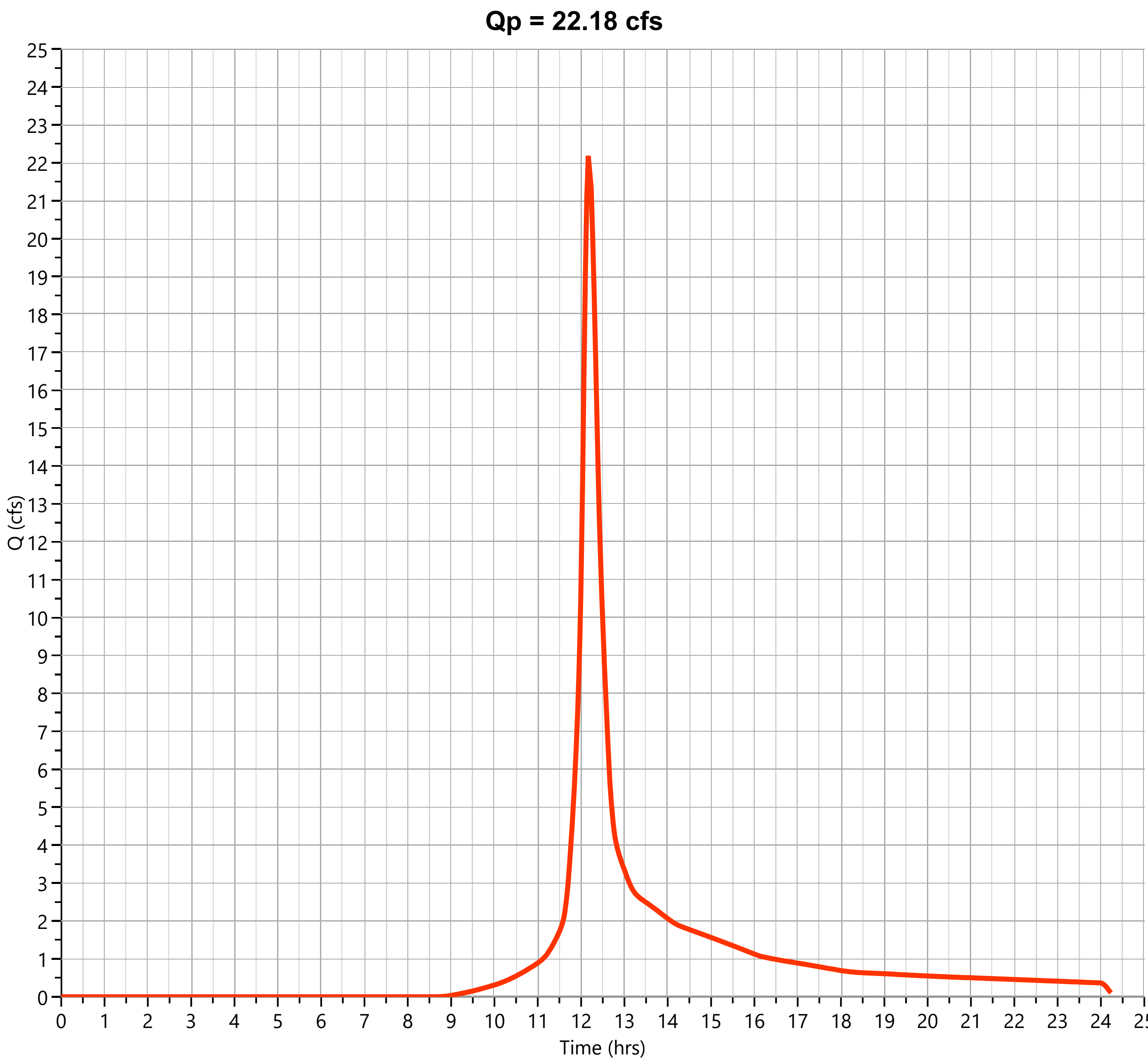


Hydrograph Report

P-3B

Hyd. No. 5

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

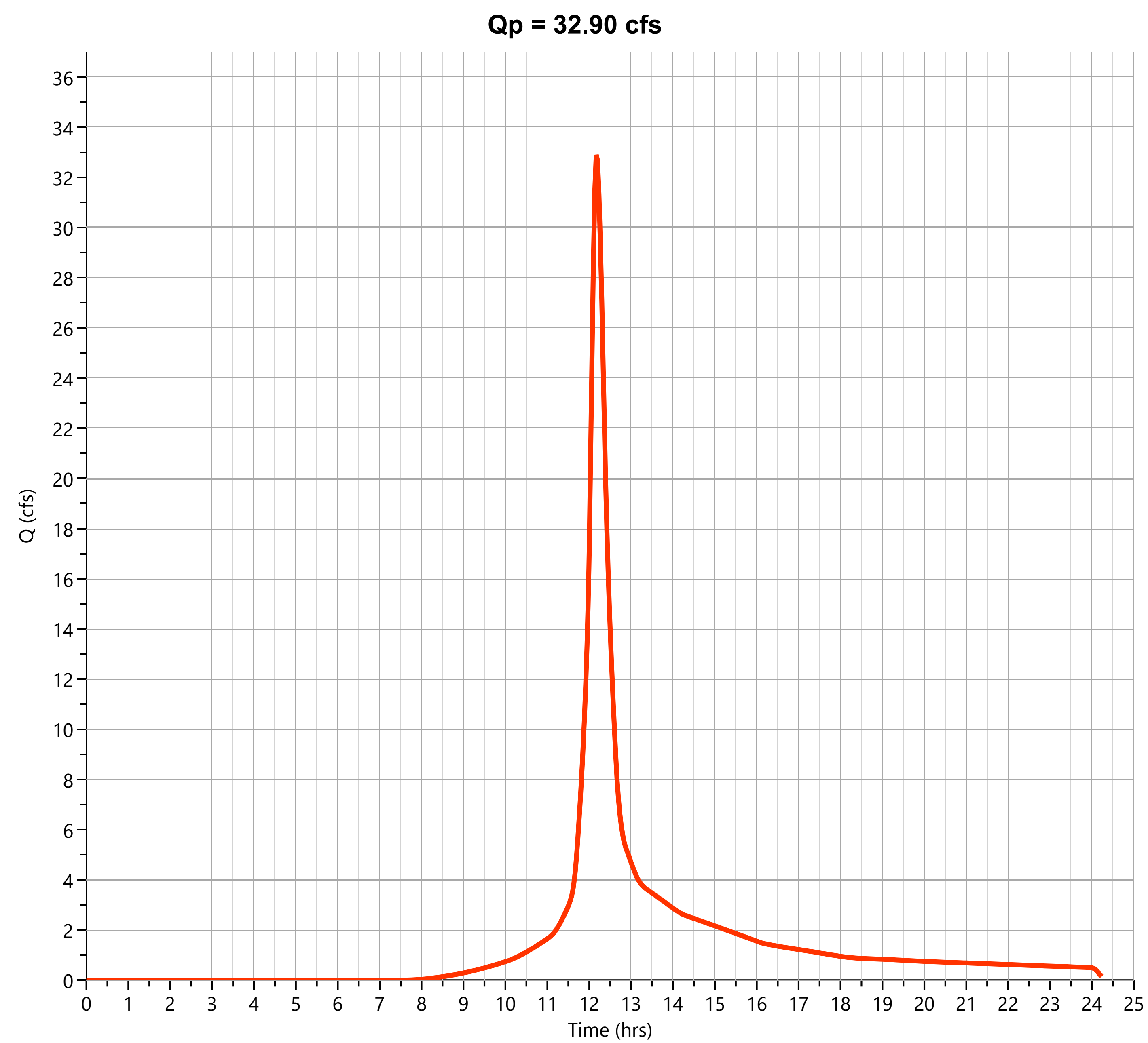


Hydrograph Report

P-3B

Hyd. No. 5

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 Report

Project Name:

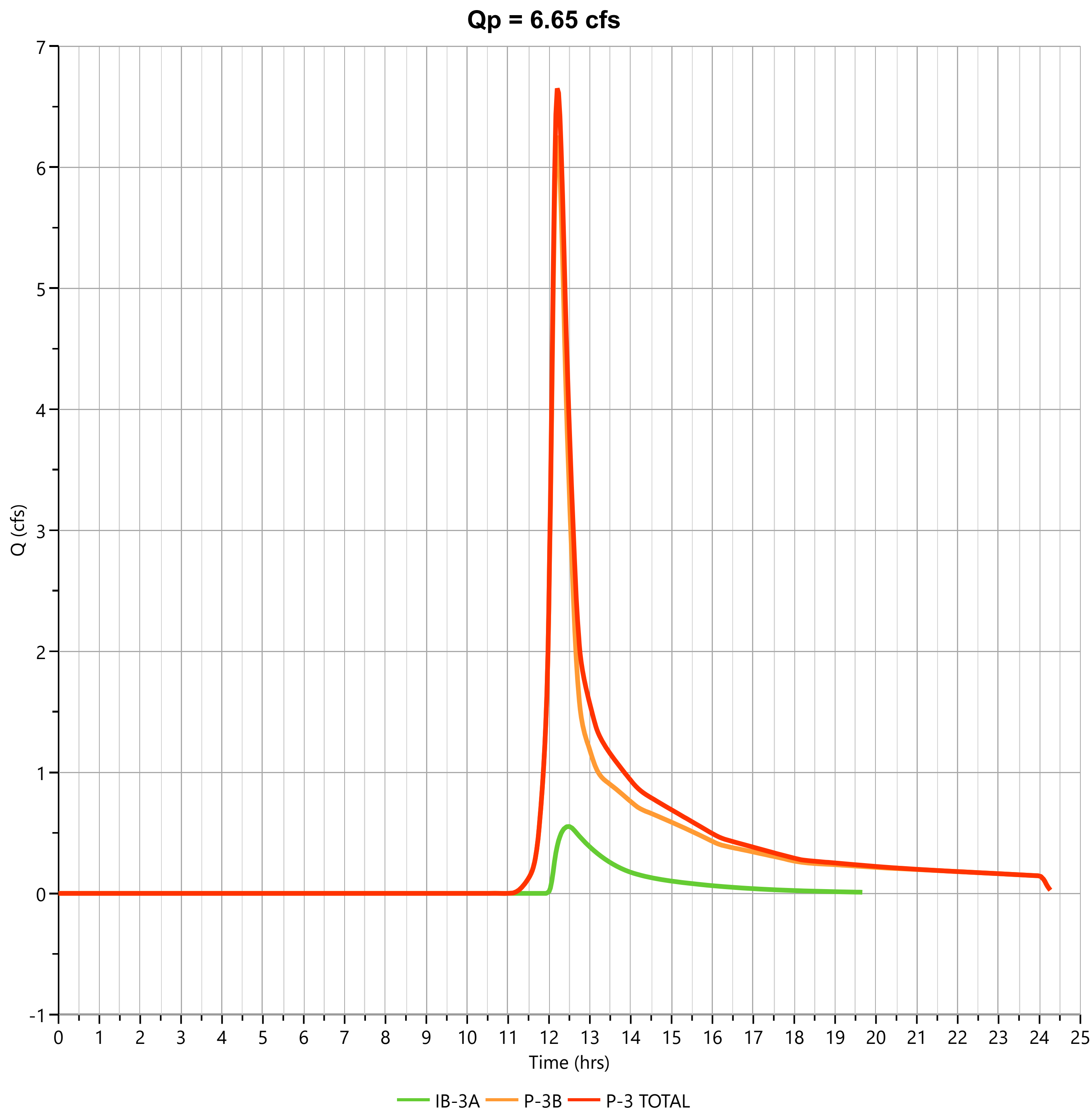
Hydrology Studio v 3.0.0.27

06-17-2023

P-3 TOTAL

Hyd. No. 6

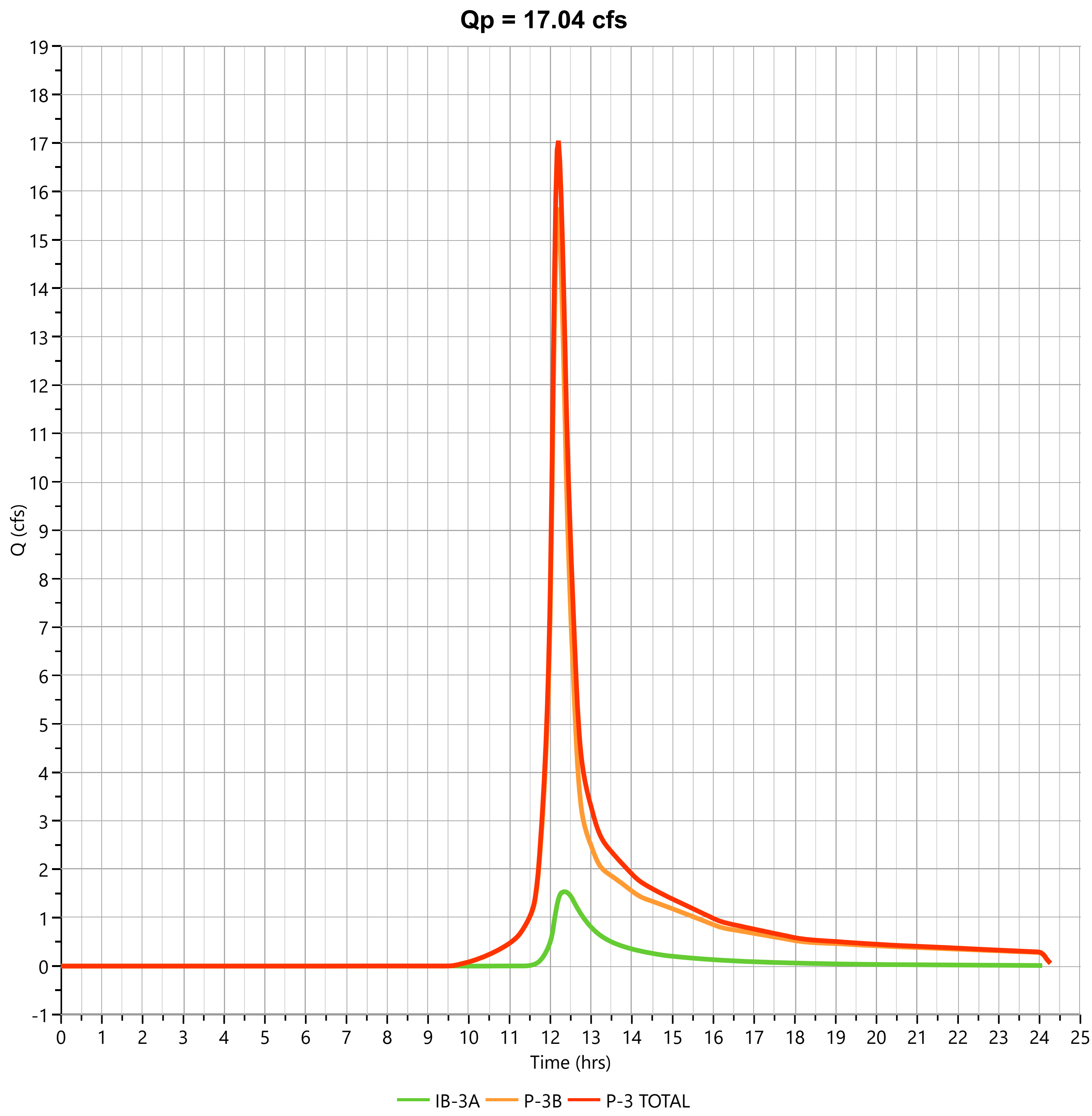
Hydrograph Type	= Junction	Peak Flow	= 6.651 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 31,428 cuft
Inflow Hydrographs	= 4, 5	Total Contrib. Area	= 8.52 ac



P-3 TOTAL

Hyd. No. 6

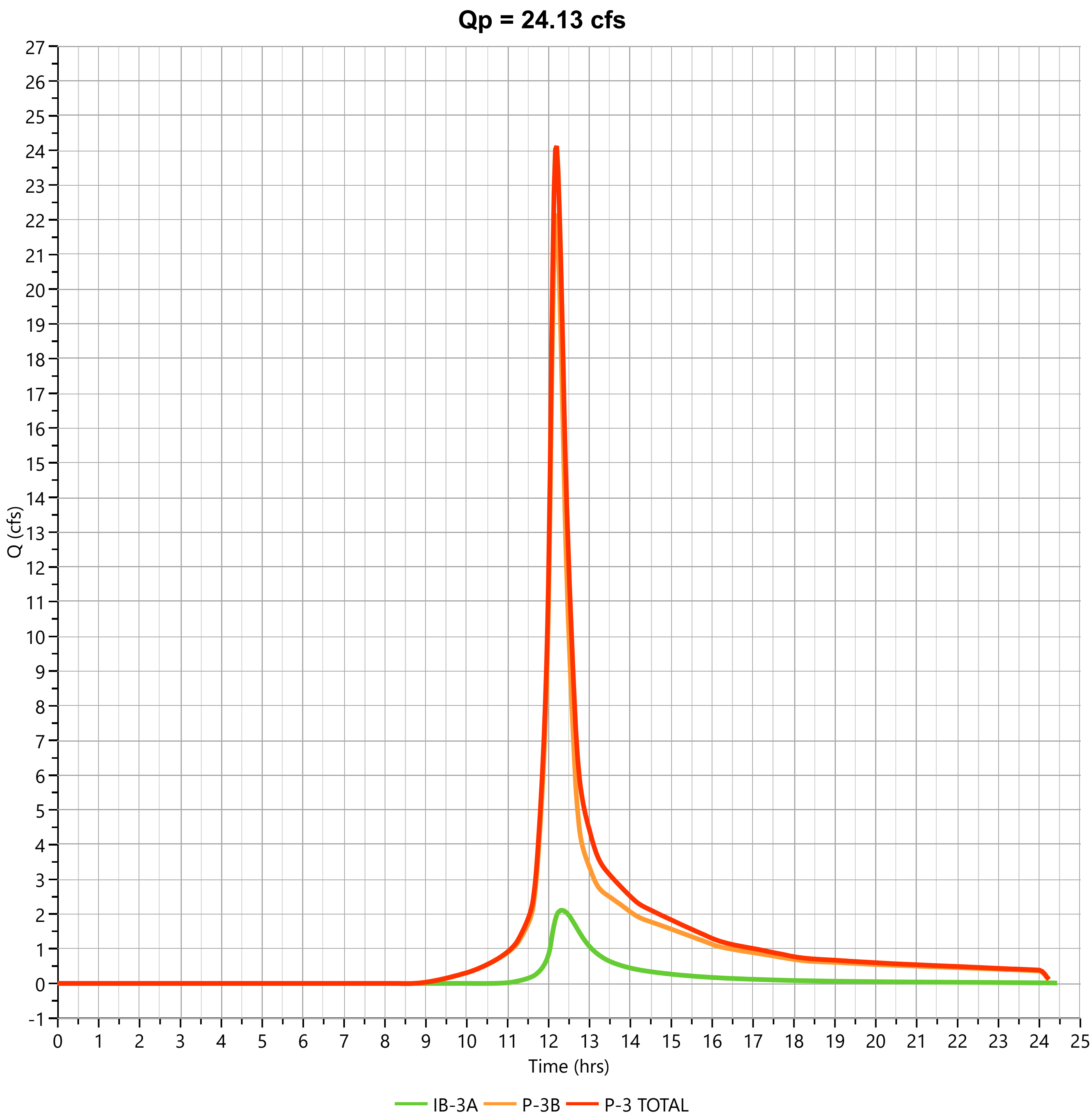
Hydrograph Type	= Junction	Peak Flow	= 17.04 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 74,005 cuft
Inflow Hydrographs	= 4, 5	Total Contrib. Area	= 8.52 ac



P-3 TOTAL

Hyd. No. 6

Hydrograph Type	= Junction	Peak Flow	= 24.13 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 103,869 cuft
Inflow Hydrographs	= 4, 5	Total Contrib. Area	= 8.52 ac

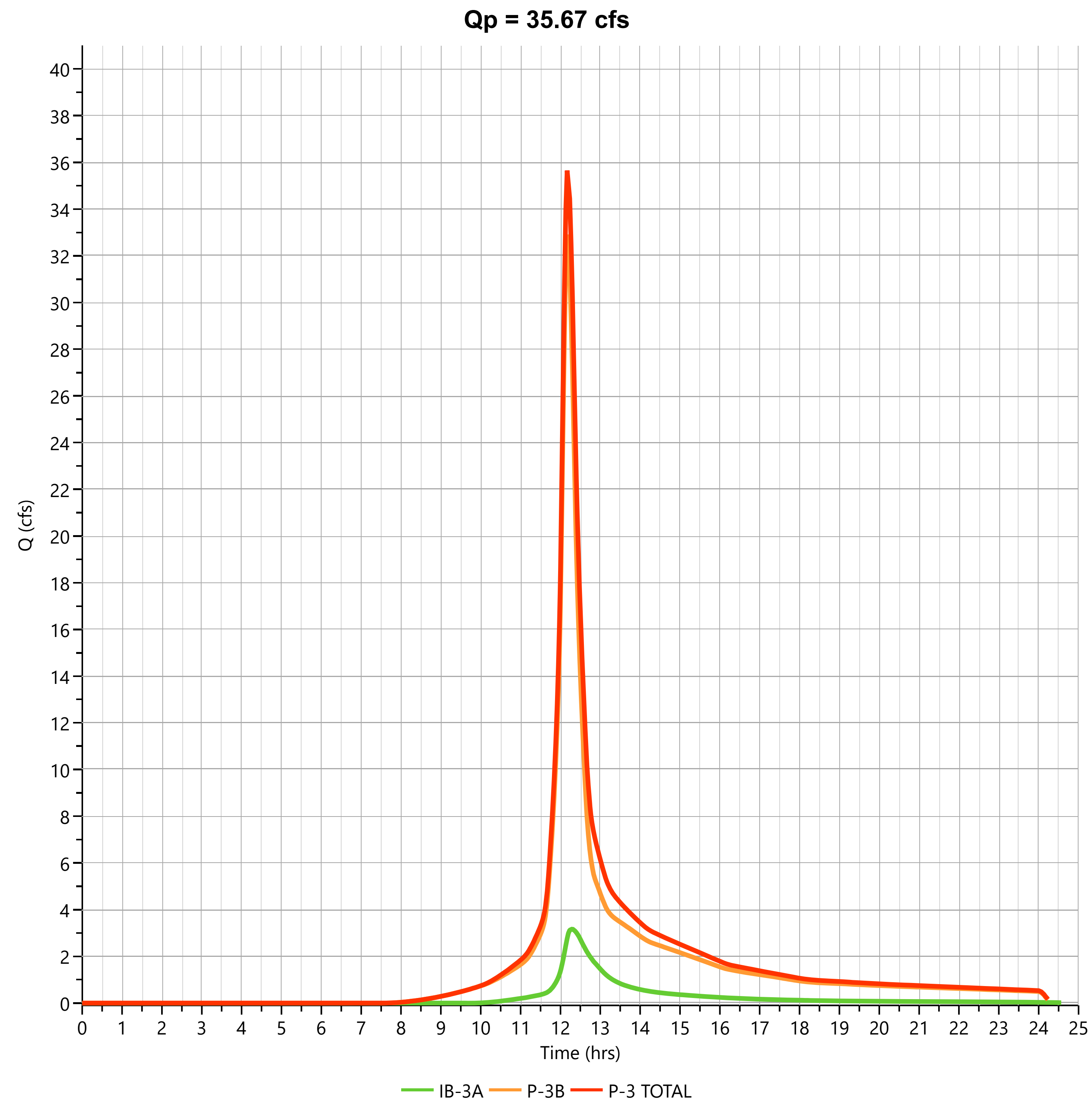


Hydrograph Report

P-3 TOTAL

Hyd. No. 6

Hydrograph Type	= Junction	Peak Flow	= 35.67 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 153,009 cuft
Inflow Hydrographs	= 4, 5	Total Contrib. Area	= 8.52 ac



Worksheet 2: Runoff curve number and runoff **SM-3719C**

Project: Athens Street By PFK Date 6/21/22
Rev Date 10/13/2022
Location: Stow, MA Checked Date 6/17/2023

Circle one: Present **Developed** Subcatchment P-4A

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)		CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
	Impervious		98			0.27	26.69
A	Woods	Good Condition	30			0.00	0.00
A	Open Space	Good Condition	39			0.00	0.00
A	Gravel		76			0.00	0.00
C	Woods	Good Condition	70			0.57	40.17
C	Open Space	Good Condition	74			0.86	63.71
C	Gravel		89			0.00	0.00
D	BVW		77			0.00	0.00
1/ Use only one CN source per line.			74362		Totals =	1.71	130.57

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{130.57}{1.71} = 76.48$; Use CN = 76

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.......................................	yr	2	25	100
Rainfall, P (24-hour)........................	in	3.27	6.14	7.84
Runoff, Q...	in	1.23	3.55	5.07

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By PFK Date 6/21/2022

Rev Date 10/13/2022

Location: Stow, MA Checked ______ Date 6/17/2023

Circle one: Present **Developed** Subcatchment P-4A

Circle one: **Tc** Tt through subarea

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	0.050			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.20			0.20
Shallow concentrated Flow		Segment ID	B-C	C-D	D-E	
7. Surface Description (paved or unpaved)			UNPAVED	UNPAVED	PAVED	
8. Flow Length, L		ft	192	12	69	
9. Watercourse slope, s		ft/ft	0.100	0.33	0.01	
10. Average Velocity, V (figure 3-1)		ft/s	5.10	9.27	2.03	
11. Tt = L / 3600V	Compute Tt	hr	0.01	0.00	0.01	0.02
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

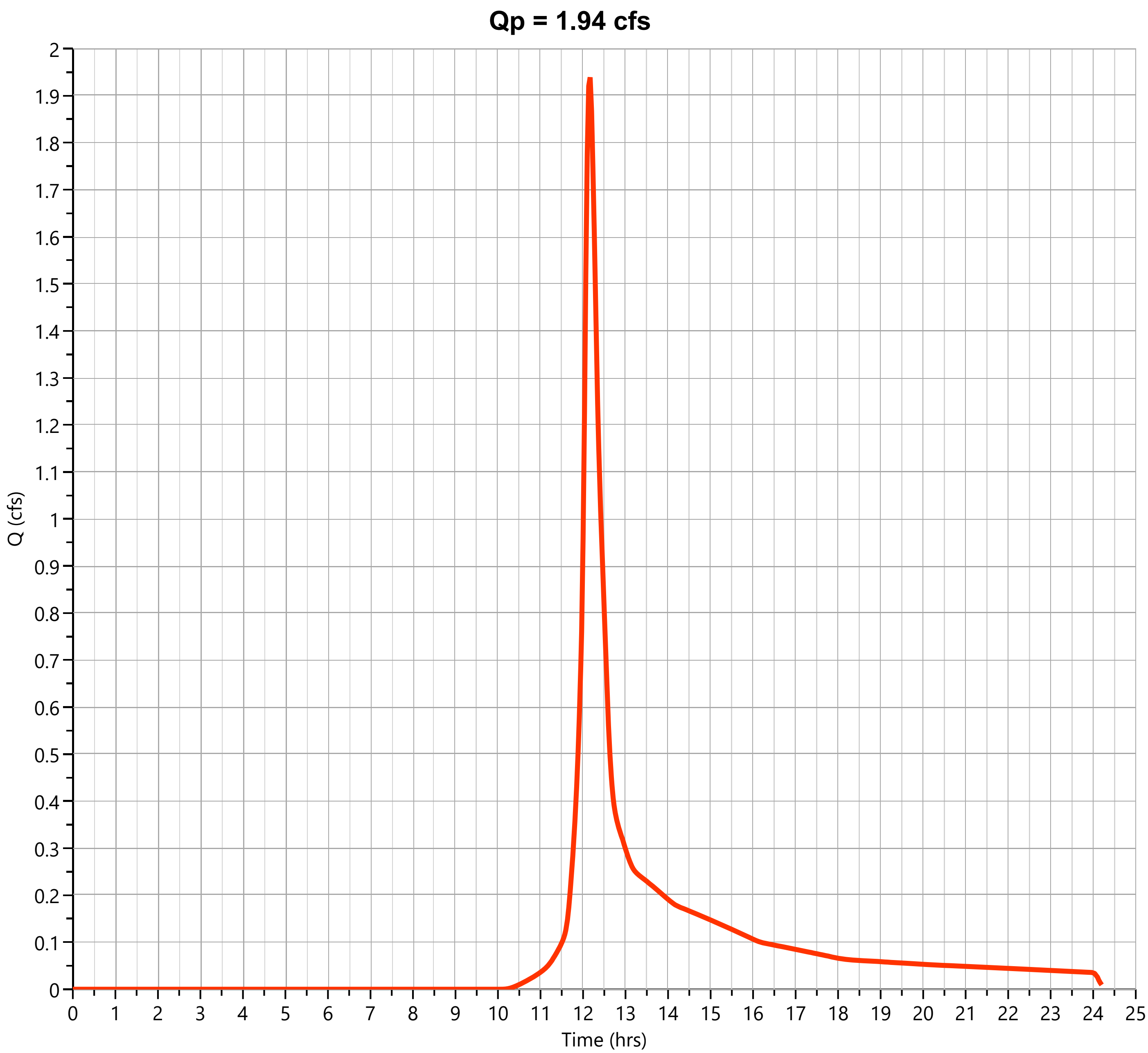
20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.22

min 13.2

P-4A

Hyd. No. 8

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 Report

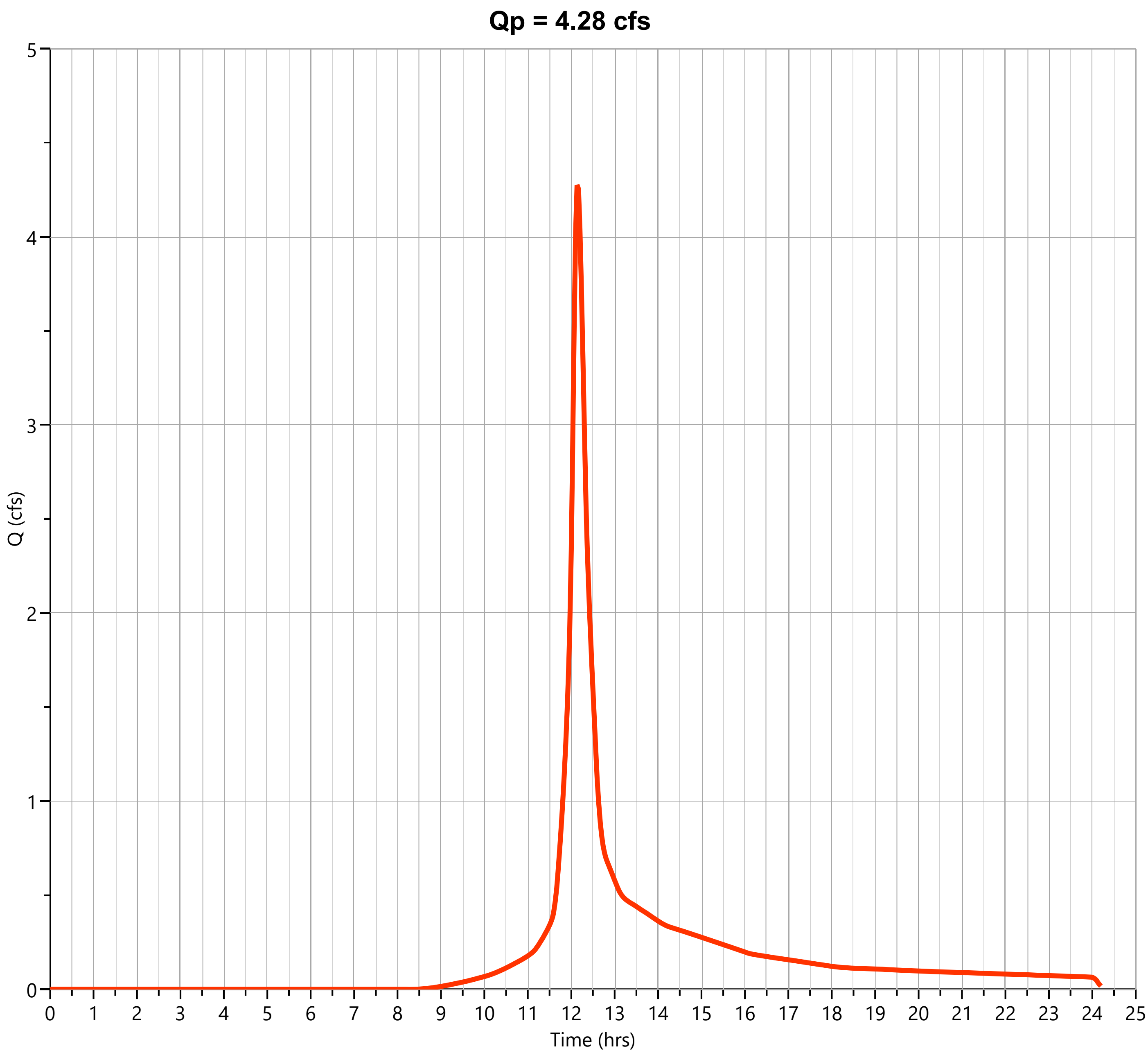
Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

P-4A

Hyd. No. 8

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 Report

Project Name:

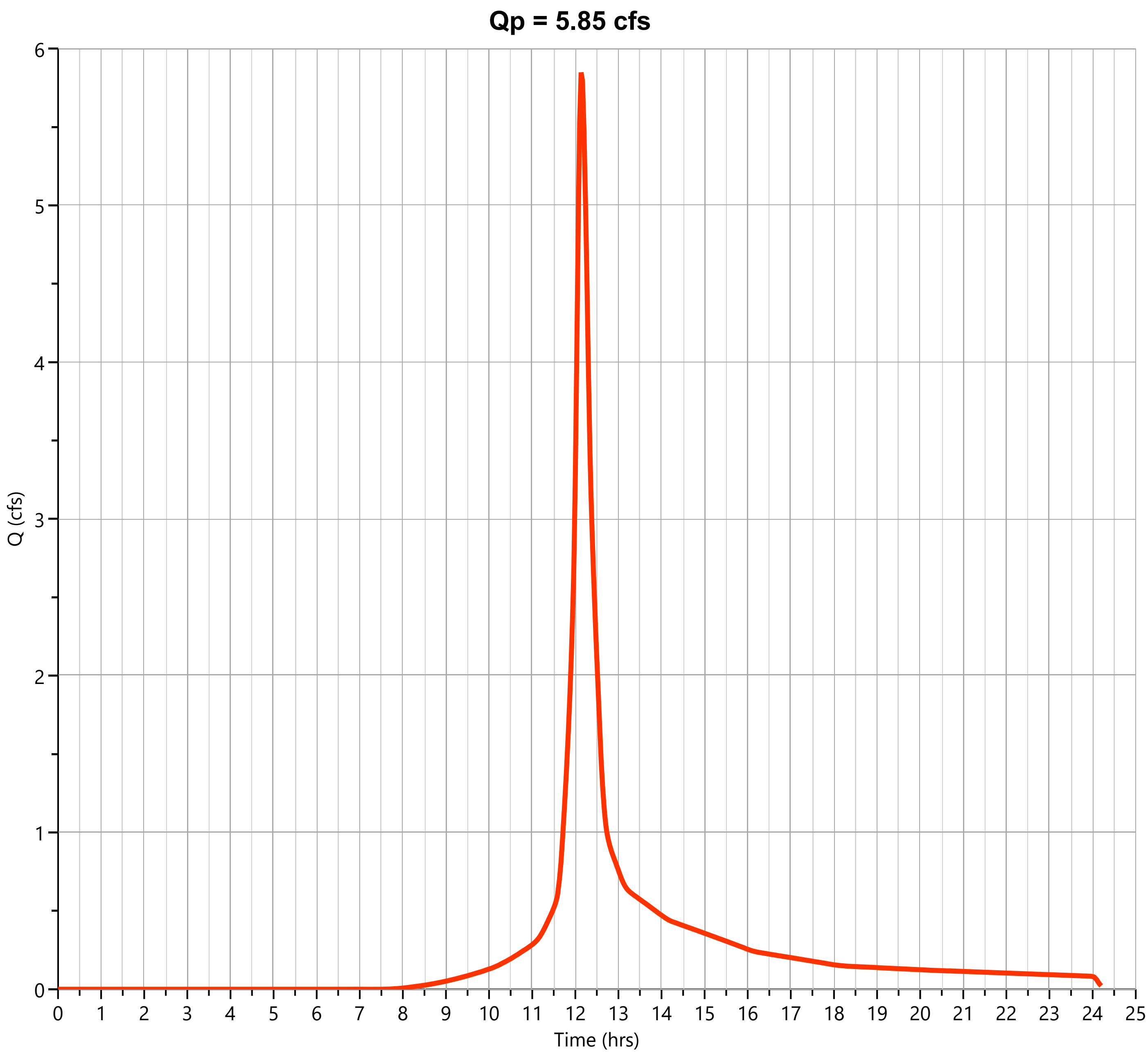
Hydrology Studio v 3.0.0.27

06-17-2023

P-4A

Hyd. No. 8

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

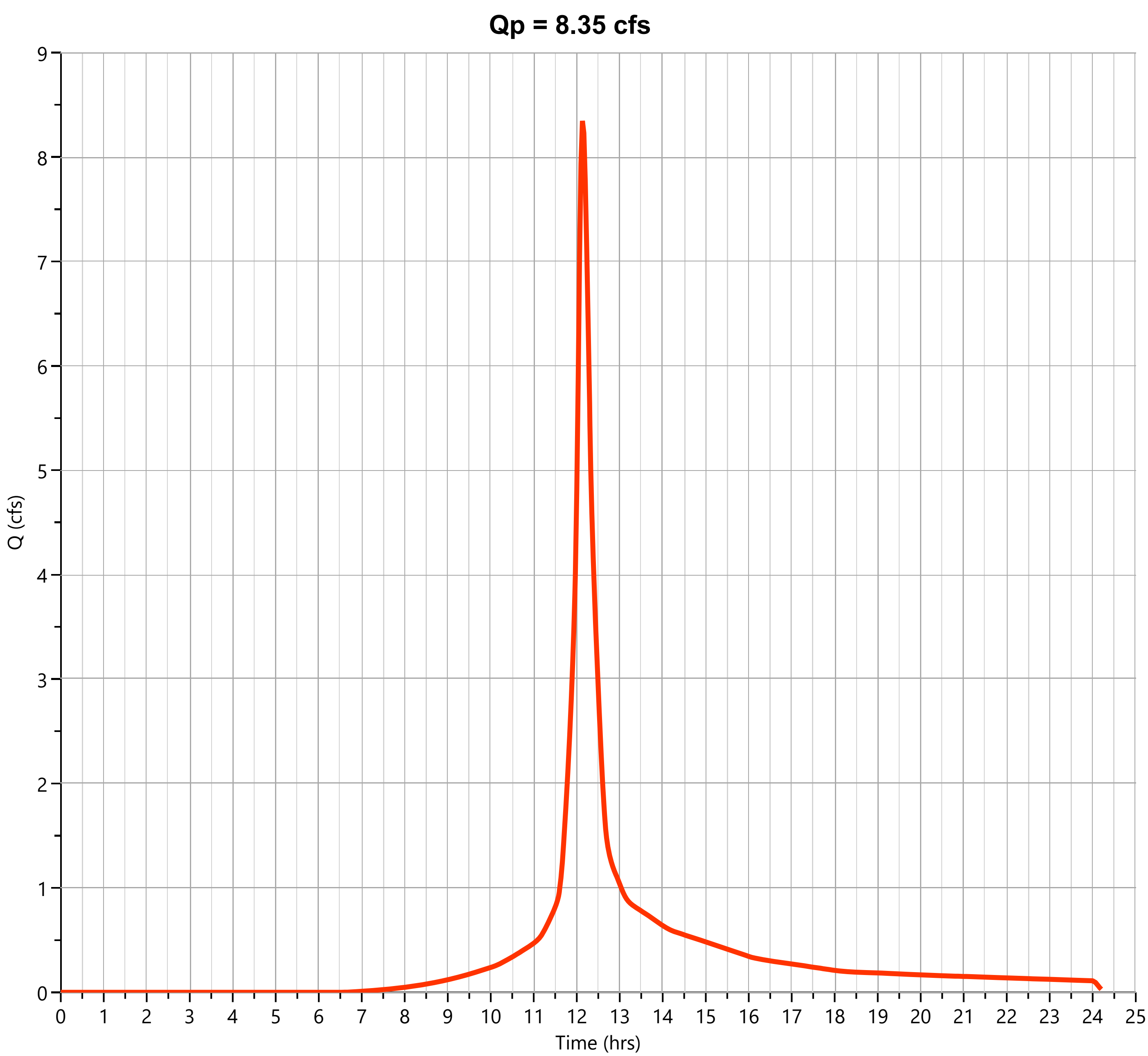


Hydrograph Report

P-4A

Hyd. No. 8

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



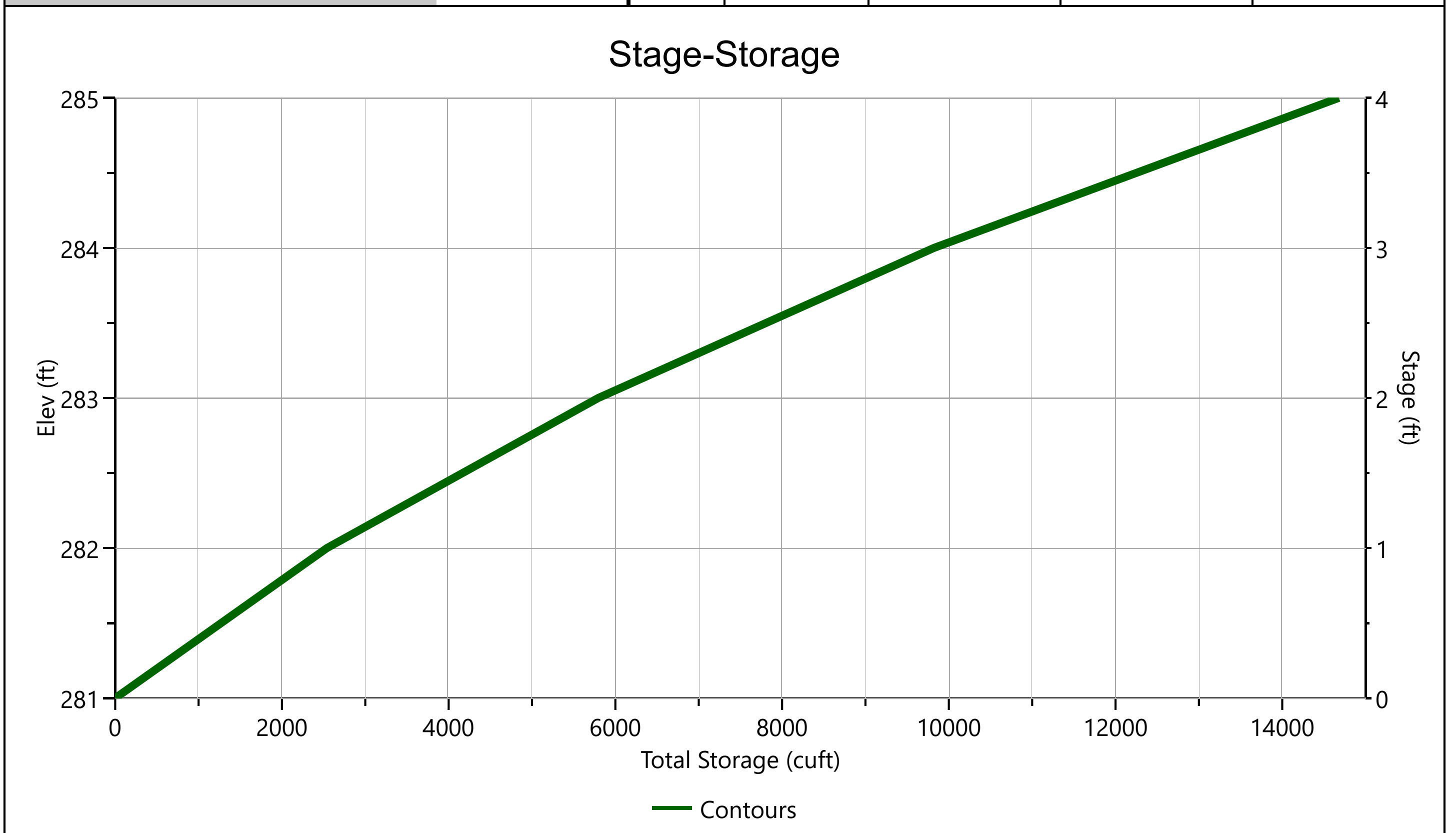
IB-4A

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	281.00
Voids (%)	100.00
Volume Calc	Ave End Area

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	281.00	2,195	0.000	0.000
1.00	282.00	2,883	2,539	2,539
2.00	283.00	3,628	3,256	5,795
3.00	284.00	4,429	4,029	9,823
4.00	285.00	5,286	4,858	14,681

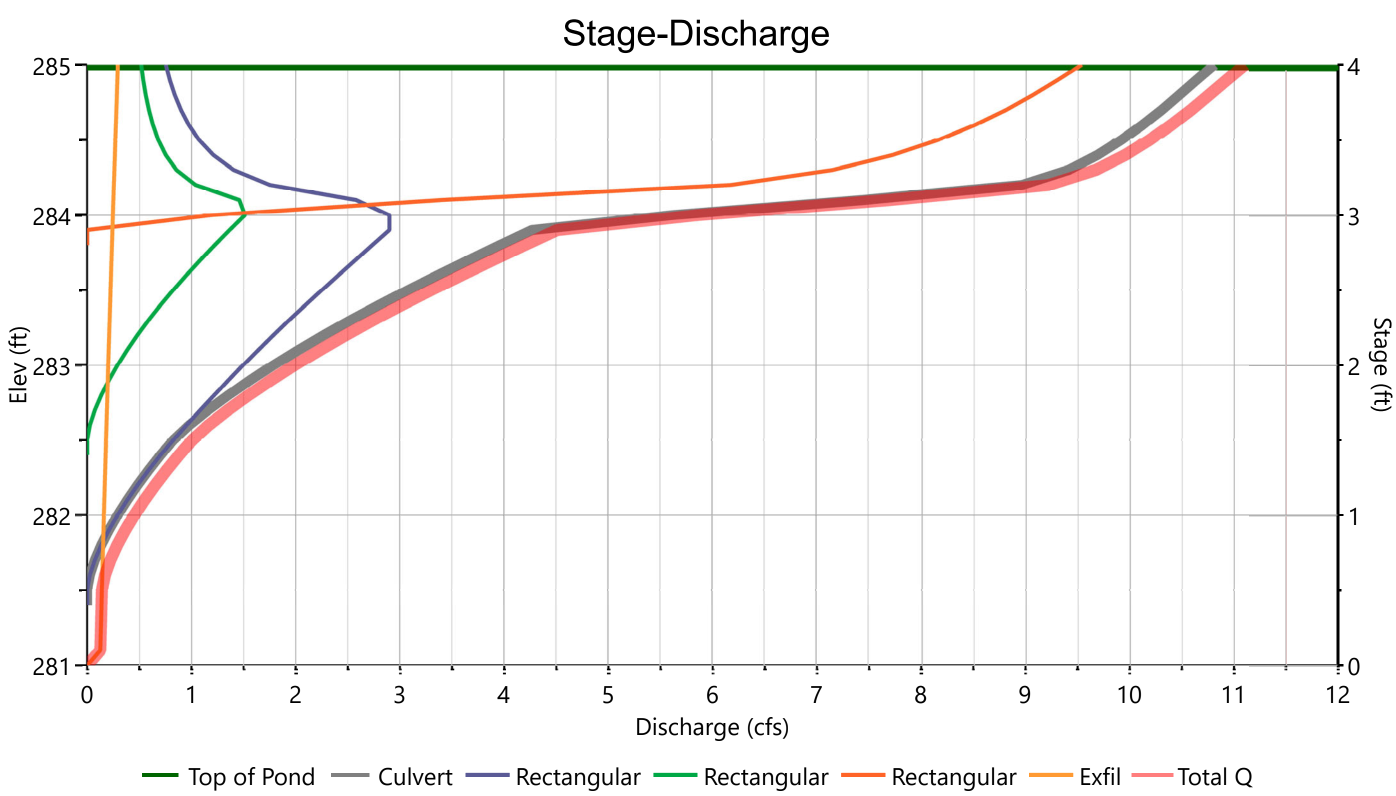


IB-4A

Stage-Discharge

Culvert / Orifices	Culvert	Orifices 1	Orifices 2	Orifices 3	Perforated Riser	
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					
Weirs	**Riser***	**Weirs 1***	**Weirs 2***	**Weirs 3***	**Ancillary**	
Shape / Type		Rectangular	Rectangular	Rectangular	Exfiltration, in/hr	2.41**
Crest Elevation, ft		281.5	282.5	283.9		
Crest Length, ft		.25	.25	11.5		
Angle, deg						
Weir Coefficient, Cw		3.3	3.3	3.3		

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



IB-4A

Stage-Storage-Discharge Summary

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

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Pond Report

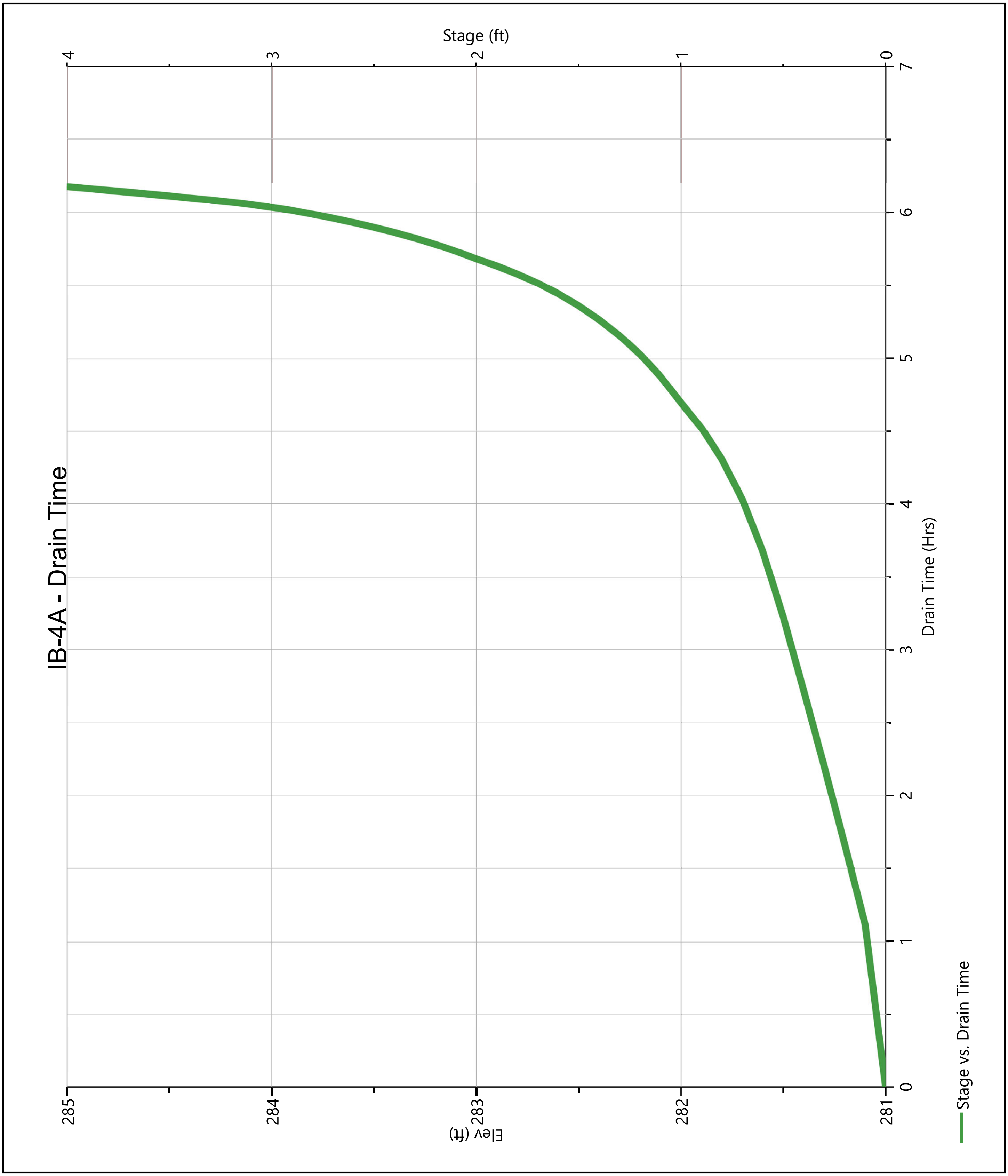
Project Name:

Hydrology Studio v 3.0.0.27

06-17-2023

IB-4A

Pond Drawdown



Hydrograph Report

Project Name:

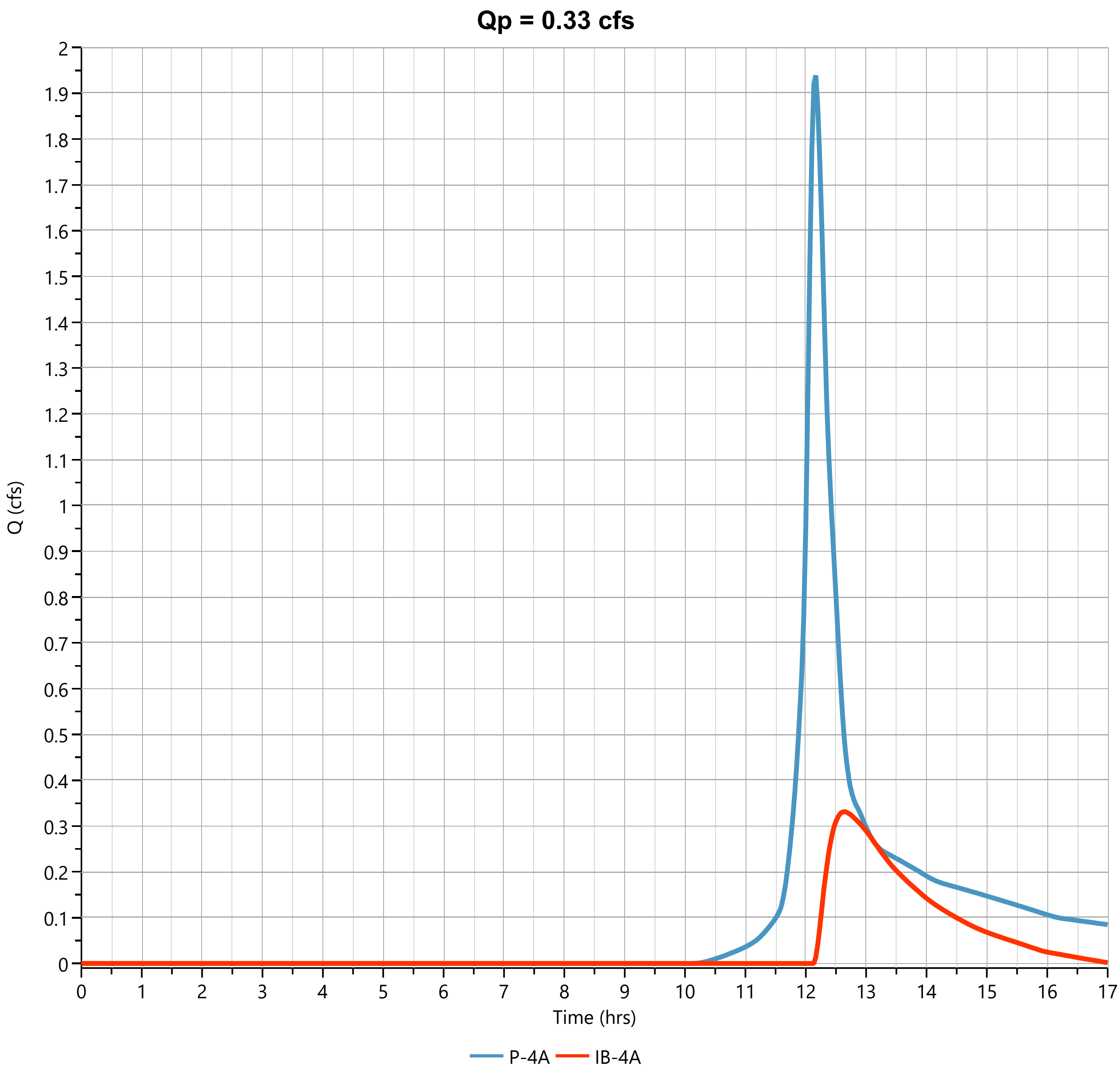
Hydrology Studio v 3.0.0.27 06-17-2023

IB-4A

Hyd. No. 9

Hydrograph Type	= Pond Route	Peak Flow	= 0.331 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.63 hrs
Time Interval	= 2 min	Hydrograph Volume	= 2,114 cuft
Inflow Hydrograph	= 8 - P-4A	Max. Elevation	= 282.04 ft
Pond Name	= IB-4A	Max. Storage	= 2,679 cuft

Pond Routing by Storage Indication Method

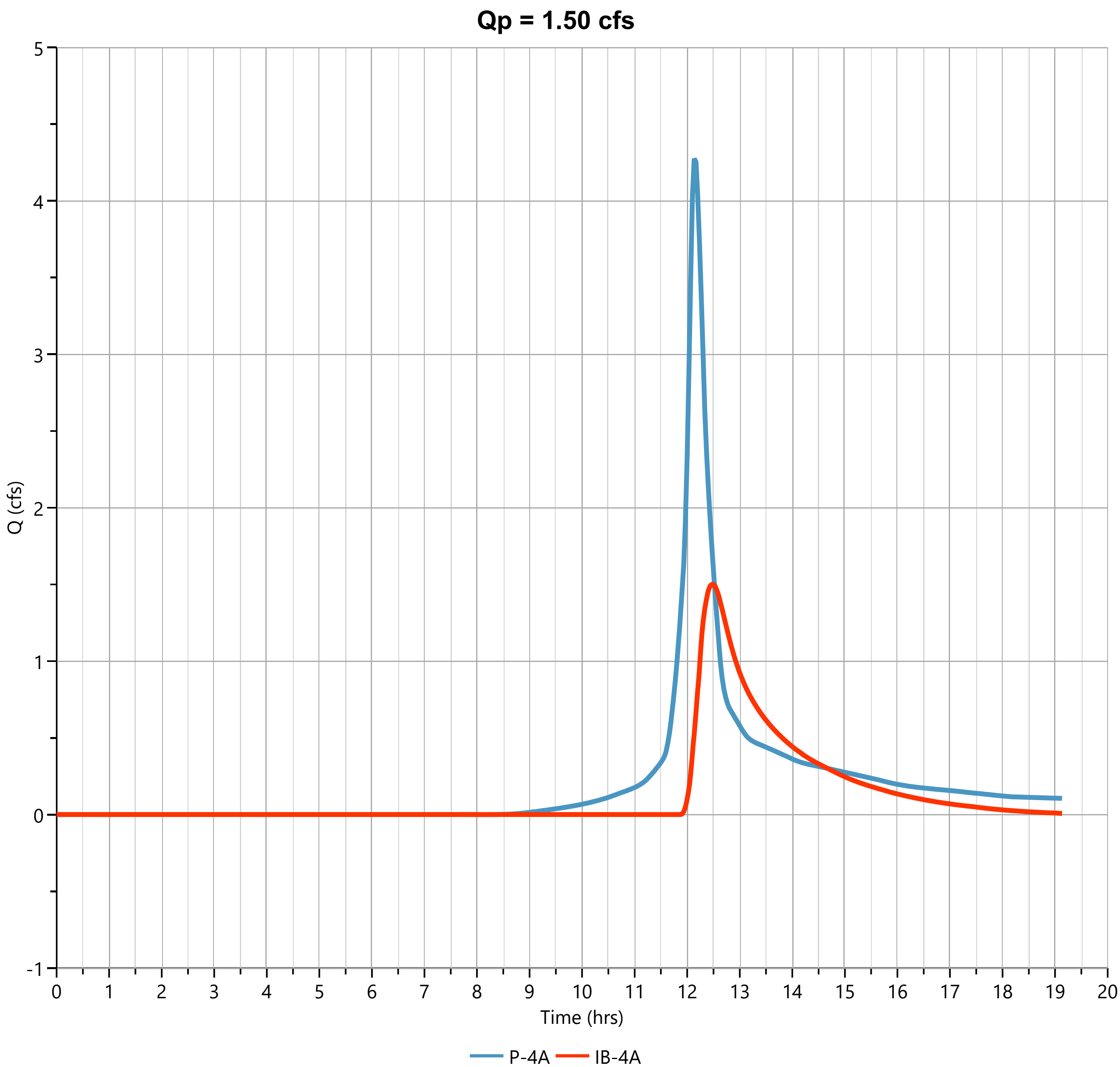


IB-4A

Hyd. No. 9

Hydrograph Type	= Pond Route	Peak Flow	= 1.501 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.47 hrs
Time Interval	= 2 min	Hydrograph Volume	= 8,685 cuft
Inflow Hydrograph	= 8 - P-4A	Max. Elevation	= 282.87 ft
Pond Name	= IB-4A	Max. Storage	= 5,370 cuft

Pond Routing by Storage Indication Method



Hydrograph Report

Project Name:

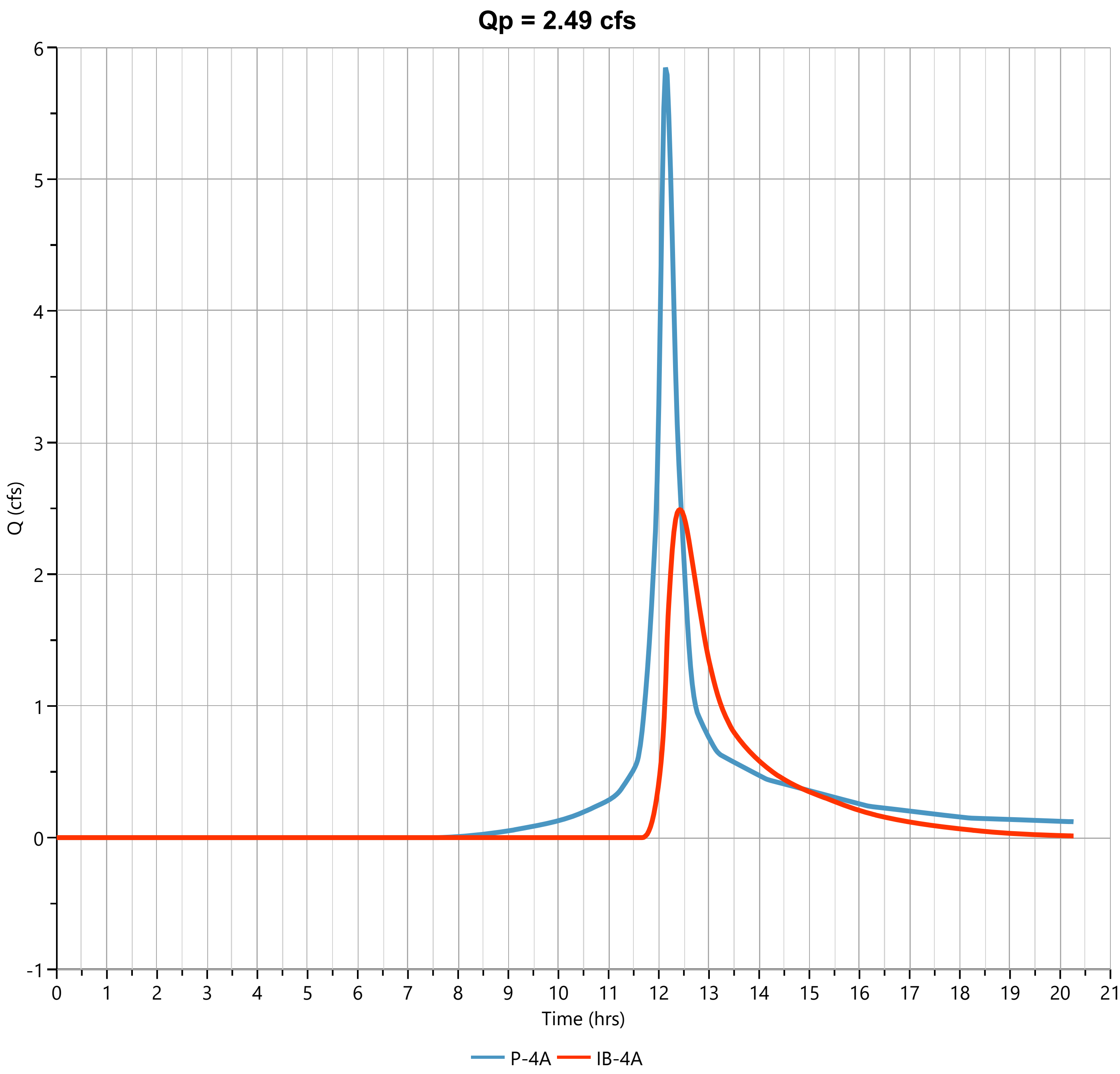
Hydrology Studio v 3.0.0.27 06-17-2023

IB-4A

Hyd. No. 9

Hydrograph Type	= Pond Route	Peak Flow	= 2.490 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.43 hrs
Time Interval	= 2 min	Hydrograph Volume	= 13,624 cuft
Inflow Hydrograph	= 8 - P-4A	Max. Elevation	= 283.29 ft
Pond Name	= IB-4A	Max. Storage	= 6,941 cuft

Pond Routing by Storage Indication Method

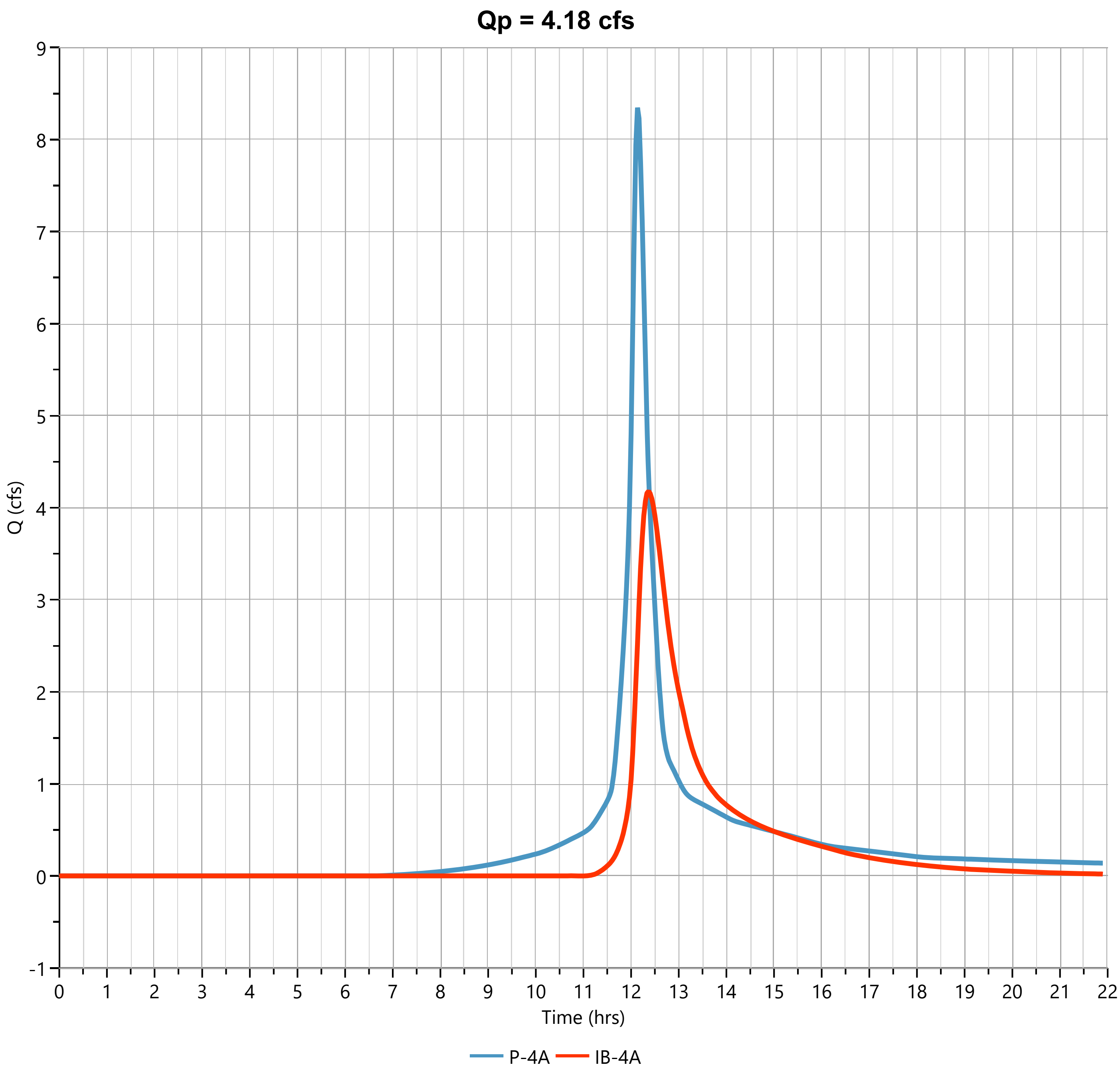


IB-4A

Hyd. No. 9

Hydrograph Type	= Pond Route	Peak Flow	= 4.180 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.37 hrs
Time Interval	= 2 min	Hydrograph Volume	= 22,104 cuft
Inflow Hydrograph	= 8 - P-4A	Max. Elevation	= 283.87 ft
Pond Name	= IB-4A	Max. Storage	= 9,308 cuft

Pond Routing by Storage Indication Method



Worksheet 2: Runoff curve number and runoff **SM-3719C**

Project: Athens Street By PFK Date 6/21/22
Rev Date 10/13/2022
Location: Stow, MA Checked Date 6/17/2023

Circle one: Present **Developed** Subcatchment P-4B

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
	Impervious	98			0.00	0.00
A	Woods Good Condition	30			0.18	5.55
A	Open Space Good Condition	39			0.00	0.00
A	Gravel	76			0.05	3.63
C	Woods Good Condition	70			5.99	418.99
C	Open Space Good Condition	74			1.00	74.21
C	Gravel	89			0.31	28.03
D	BVW	77			0.03	2.55
1/ Use only one CN source per line.	329708			Totals =	7.57	532.95

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

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency......................................	yr	2	25	100
Rainfall, P (24-hour).......................	in	3.27	6.14	7.84
Runoff, Q..	in	0.89	2.96	4.37

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street	By PFK	Date 6/21/2022	
		Rev Date 10/13/2022	
Location: Stow, MA	Checked	Date 6/17/2023	

Circle one: Present **Developed** — Subcatchment P-4B

Circle one: **Tc** Tt through subarea

			Segment			Total
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 Tt	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 Tt	hr	0.01			0.01
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) — hr 0.18; min 10.5

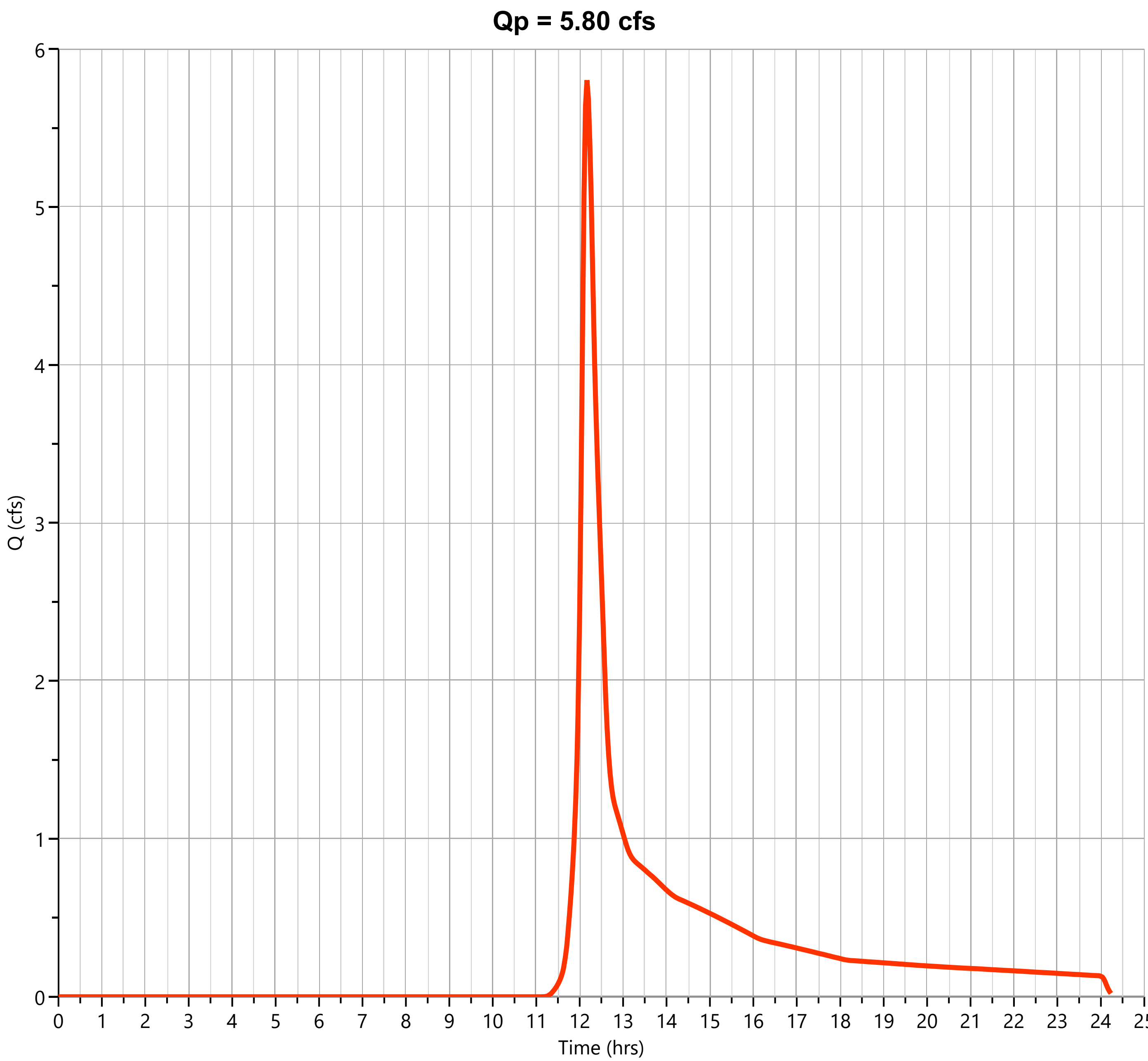
Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

P-4B Hyd. No. 10

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 Report

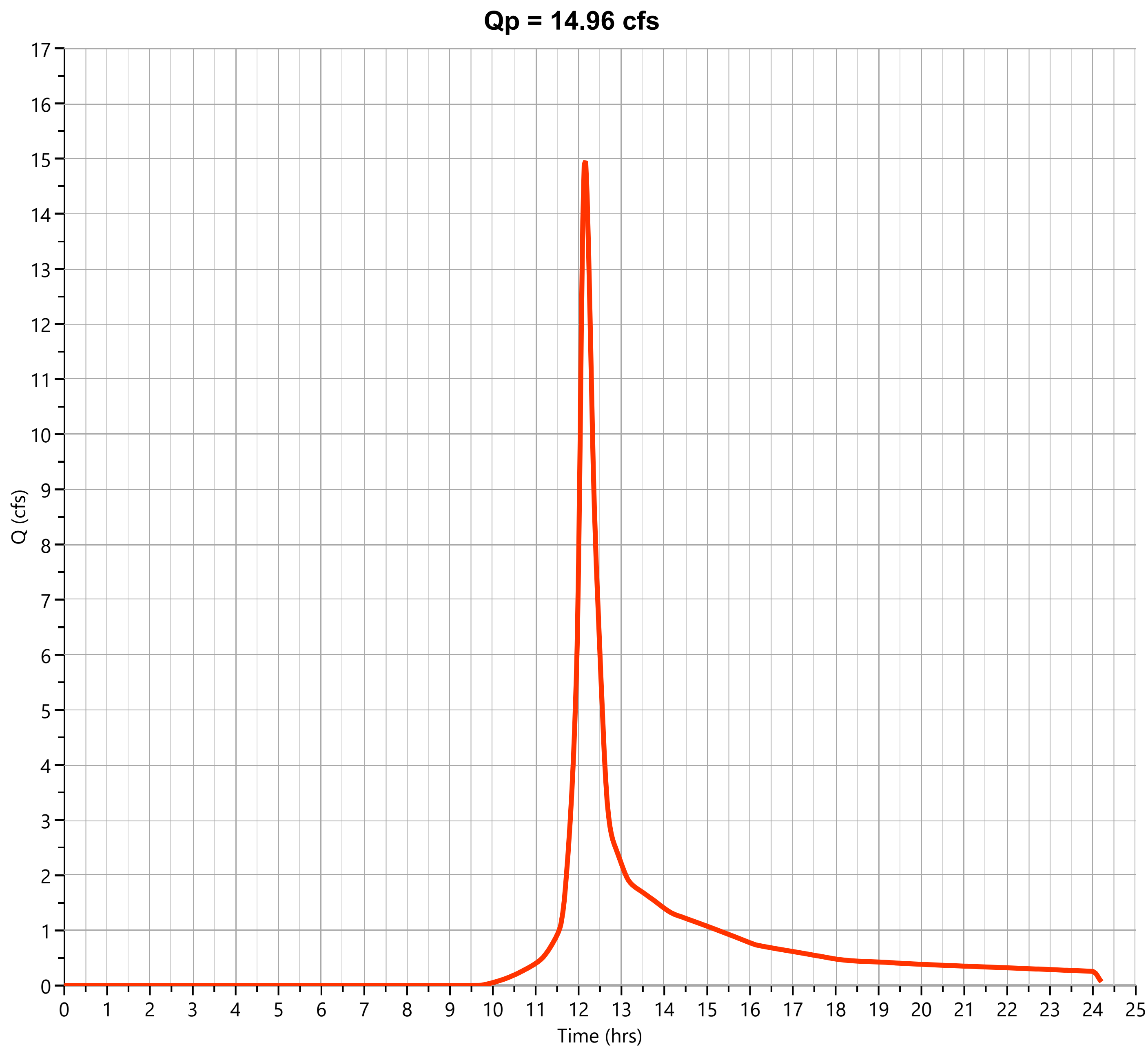
Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

P-4B

Hyd. No. 10

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 Report

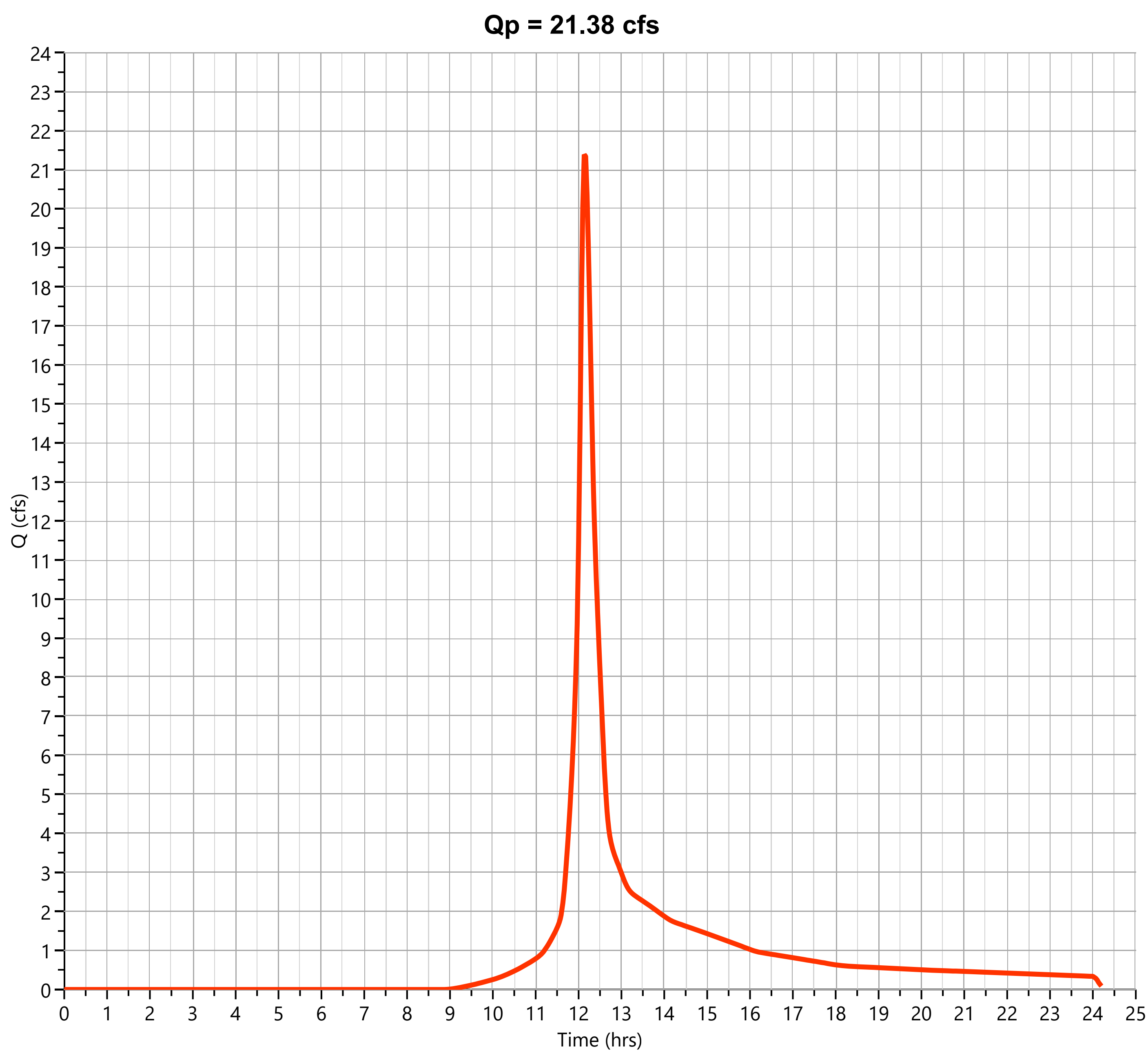
Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

P-4B

Hyd. No. 10

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 Report

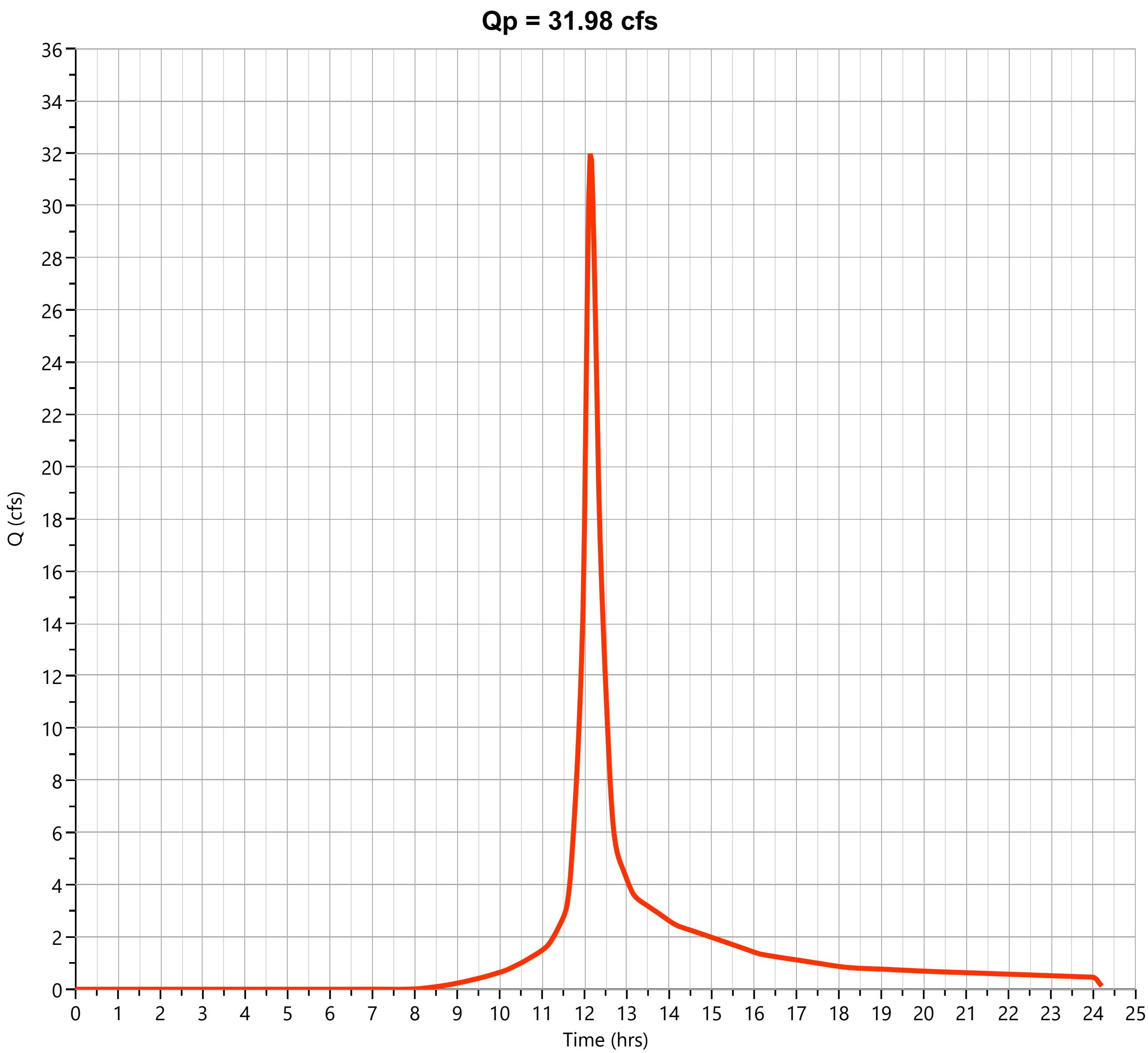
Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

P-4B

Hyd. No. 10

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



Hydrograph Report

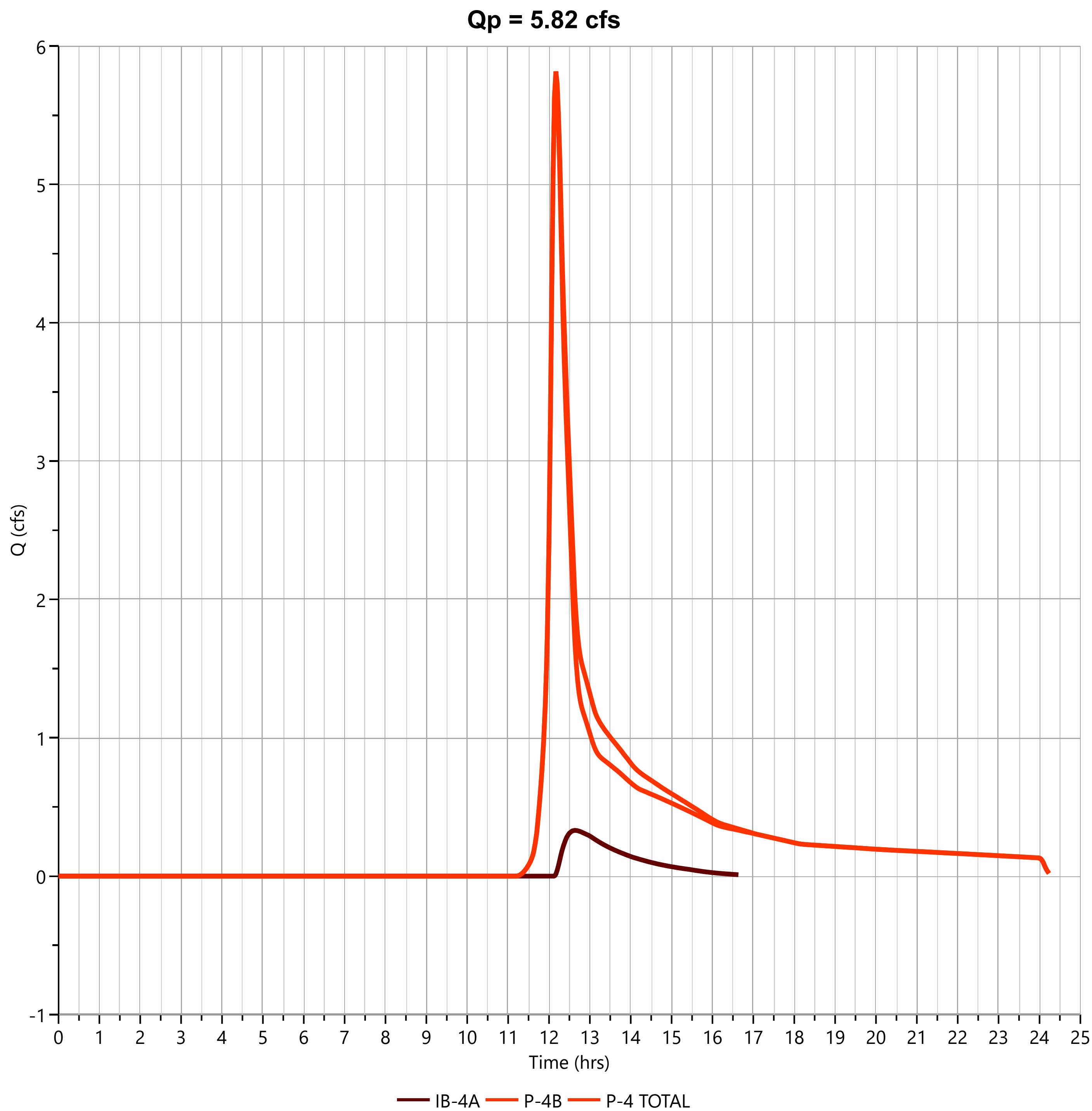
Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

P-4 TOTAL

Hyd. No. 11

Hydrograph Type	= Junction	Peak Flow	= 5.817 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 26,743 cuft
Inflow Hydrographs	= 9, 10	Total Contrib. Area	= 7.57 ac

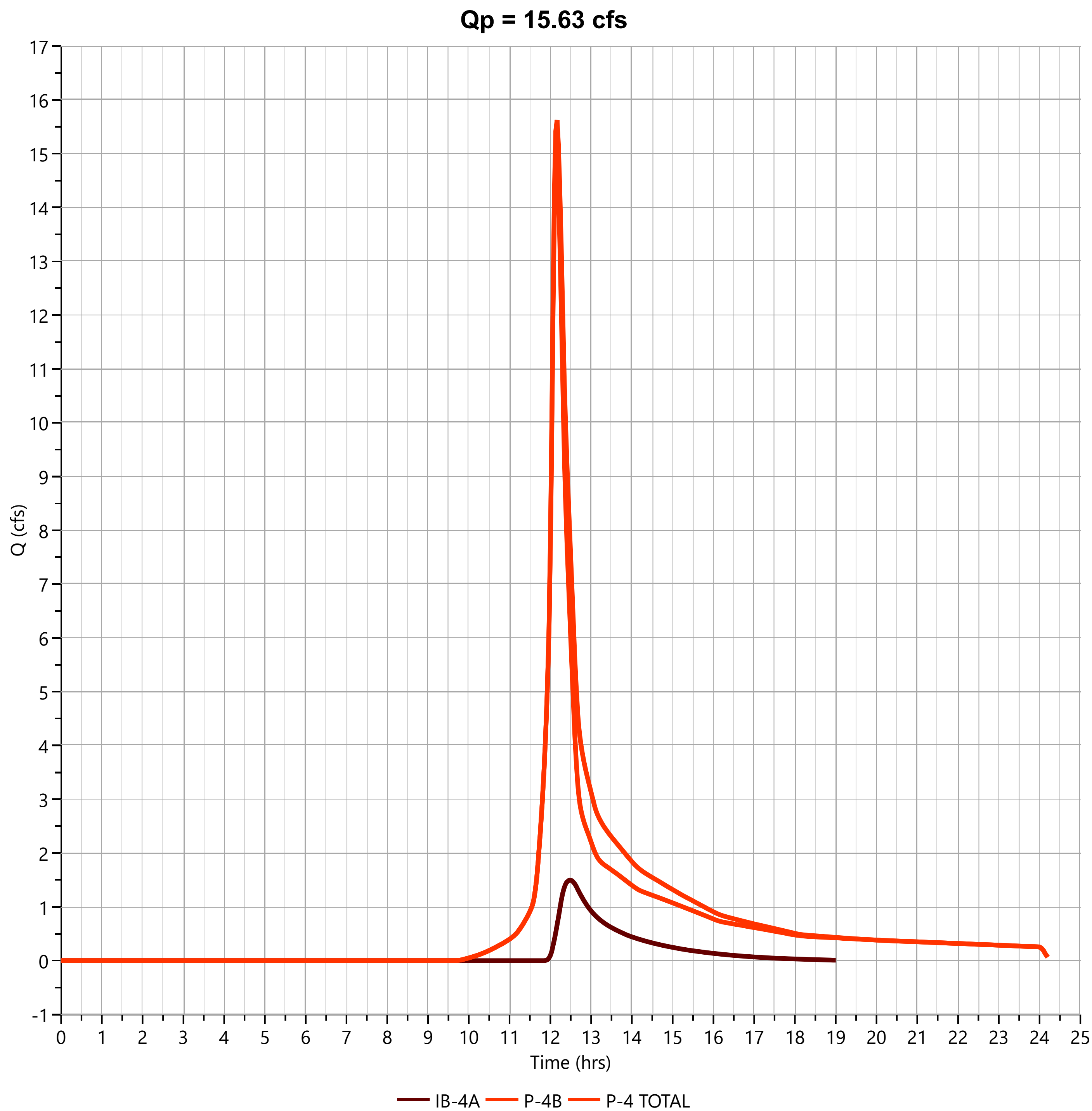


Hydrograph Report

P-4 TOTAL

Hyd. No. 11

Hydrograph Type	= Junction	Peak Flow	= 15.63 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 67,232 cuft
Inflow Hydrographs	= 9, 10	Total Contrib. Area	= 7.57 ac



Hydrograph Report

Project Name:

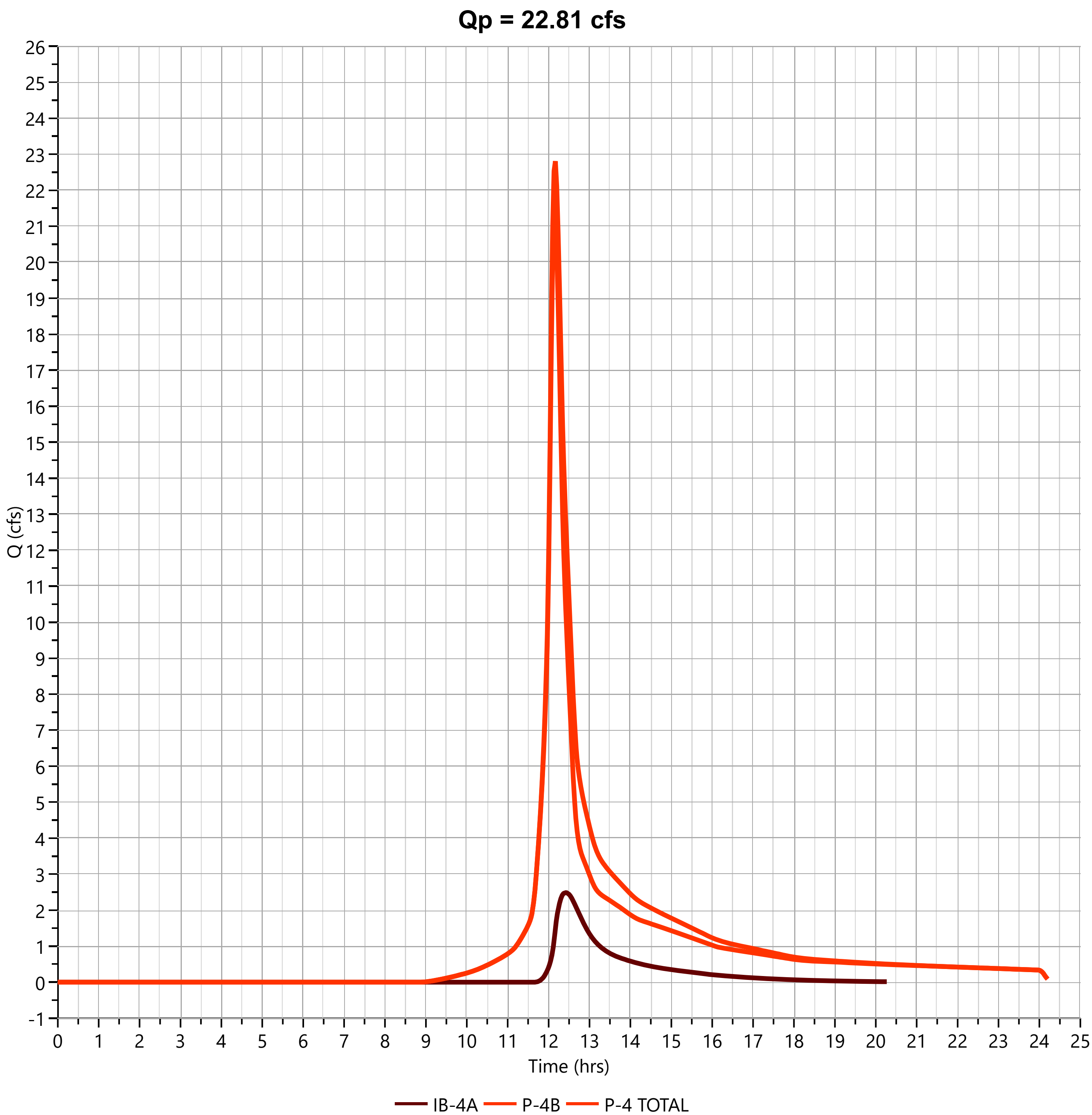
Hydrology Studio v 3.0.0.27

06-17-2023

P-4 TOTAL

Hyd. No. 11

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

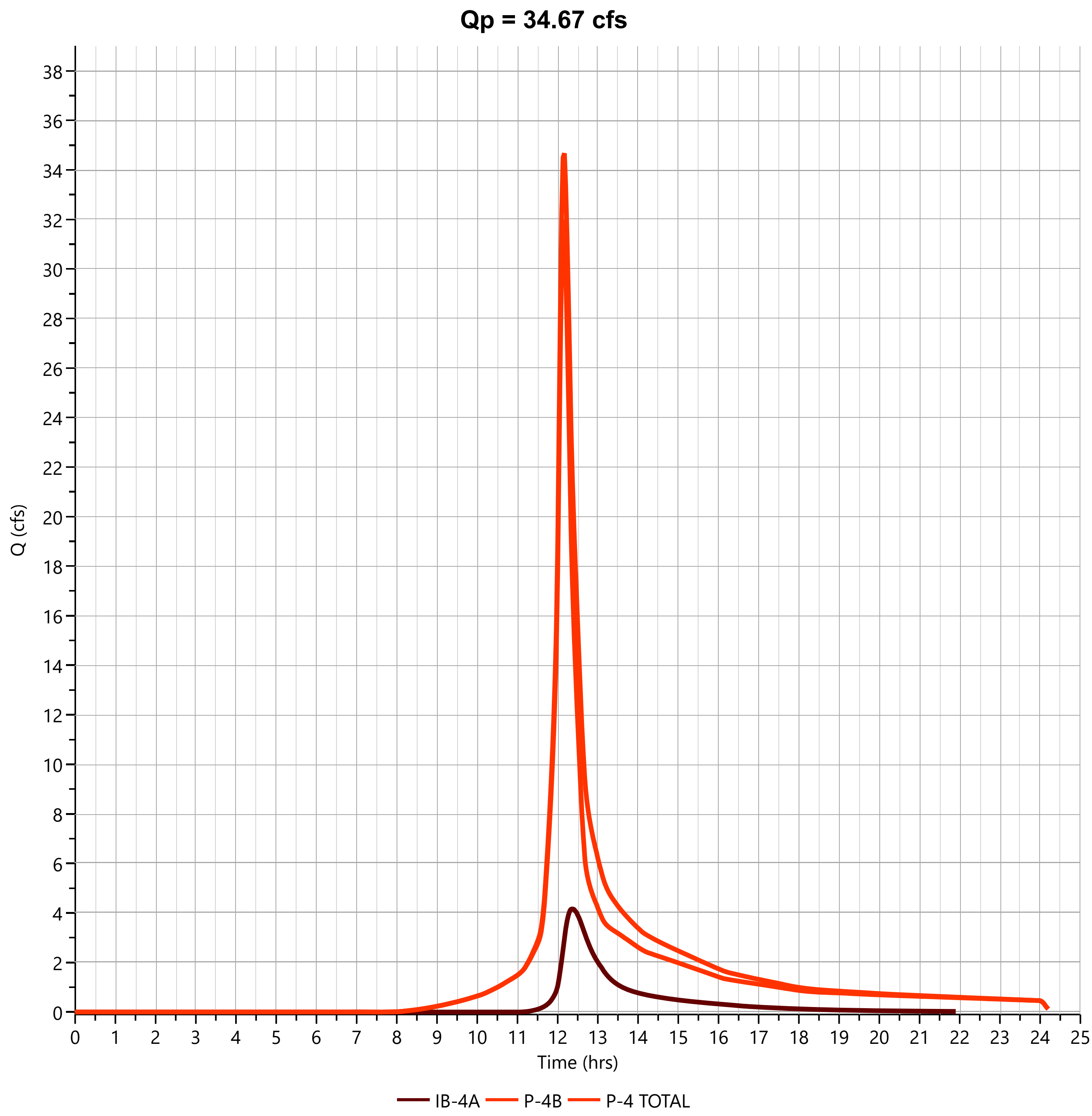


Hydrograph Report

P-4 TOTAL

Hyd. No. 11

Hydrograph Type	= Junction	Peak Flow	= 34.67 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 144,724 cuft
Inflow Hydrographs	= 9, 10	Total Contrib. Area	= 7.57 ac



Worksheet 2: Runoff curve number and runoff **SM-3719C**

Project: Athens Street By PFK Date 6/21/22
Rev Date 10/13/2022
Location: Stow, MA Checked Date 6/17/2023

Circle one: Present Developed Subcatchment P-5B

1. Runoff curve number (CN)

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

1/ Use only one CN source per line. 119879

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

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.......................................	yr	2	25	100
Rainfall, P (24-hour)........................	in	3.27	6.14	7.84
Runoff, Q...	in	1.23	3.54	5.06

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By PFK Date 6/21/2022

Rev Date 10/13/2022

Location: Stow, MA Checked Date 6/17/2023

Circle one: Present **Developed** Subcatchment P-5B

Circle one: **Tc** Tt through subarea

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	0.025			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.26			0.26

Shallow concentrated Flow		Segment ID	B-C	C-D	D-E	
7. Surface Description (paved or unpaved)			UNPAVED	UNPAVED	PAVED	
8. Flow Length, L		ft	204	22	120	
9. Watercourse slope, s		ft/ft	0.090	0.330	0.01	
10. Average Velocity, V (figure 3-1)		ft/s	4.84	9.27	2.03	
11. Tt = L / 3600V	Compute Tt	hr	0.01	0.00	0.02	0.03

Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.29

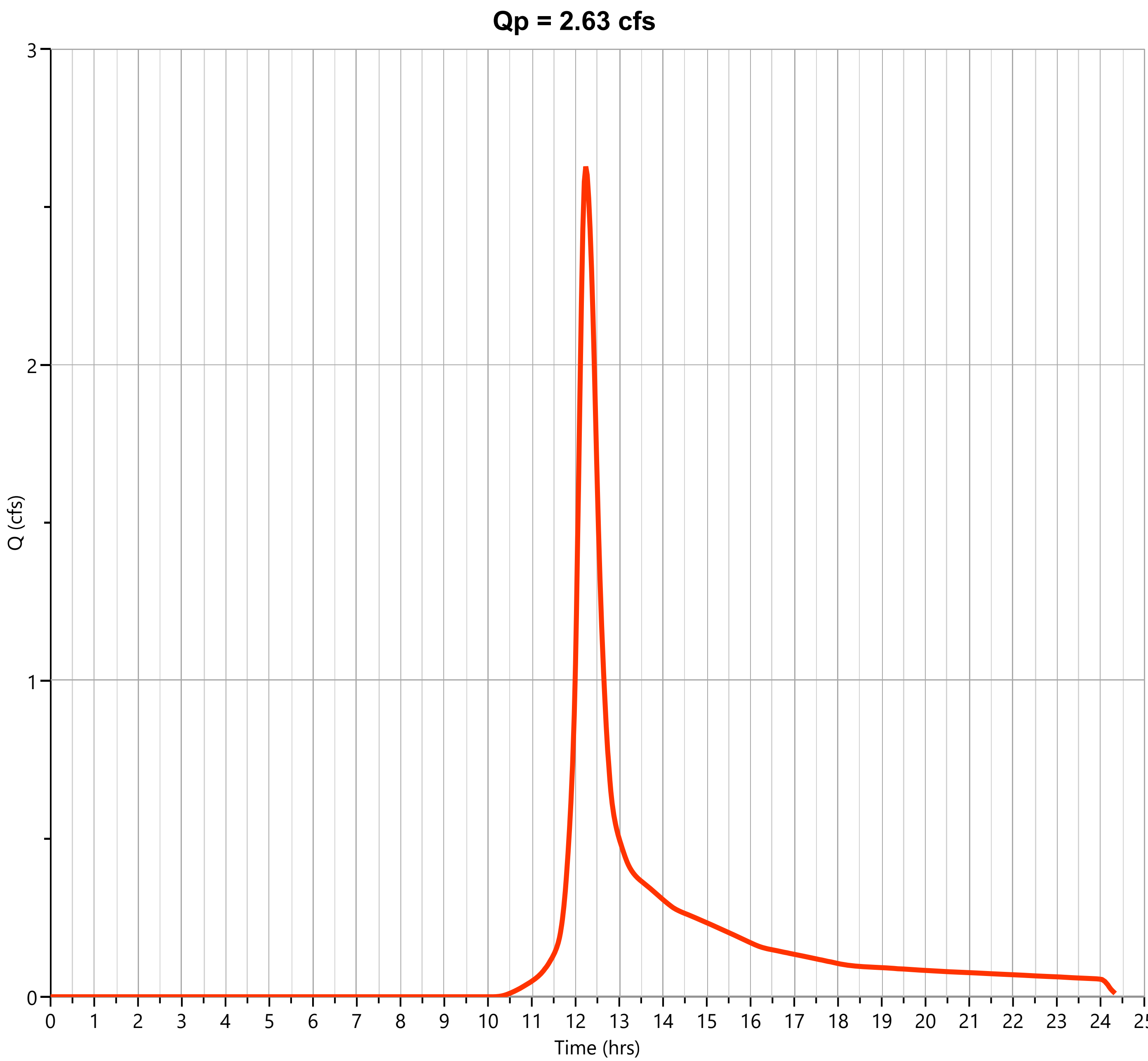
min 17.6

Hydrograph Report

P-5B

Hyd. No. 13

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 Report

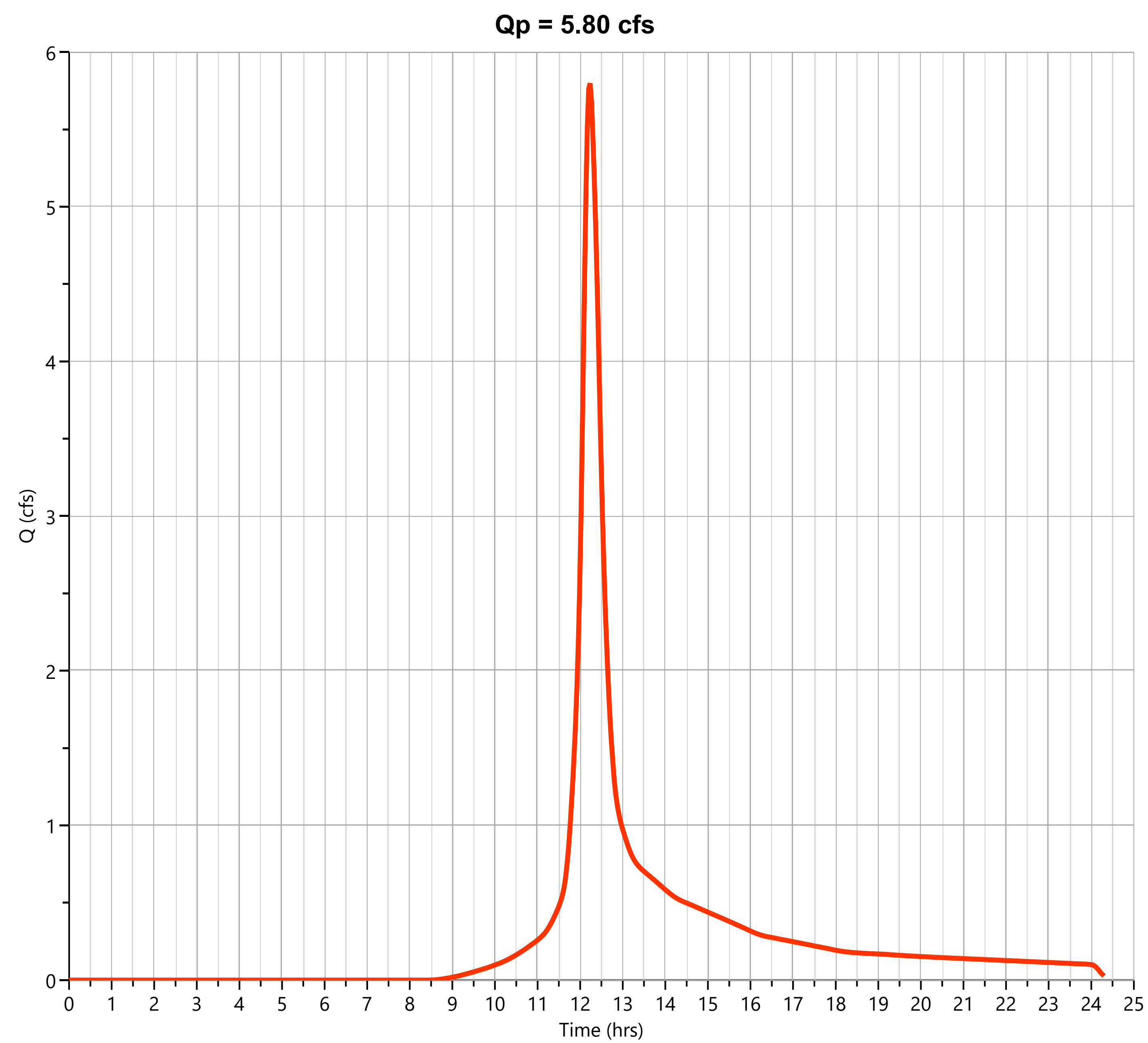
Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

P-5B

Hyd. No. 13

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 Report

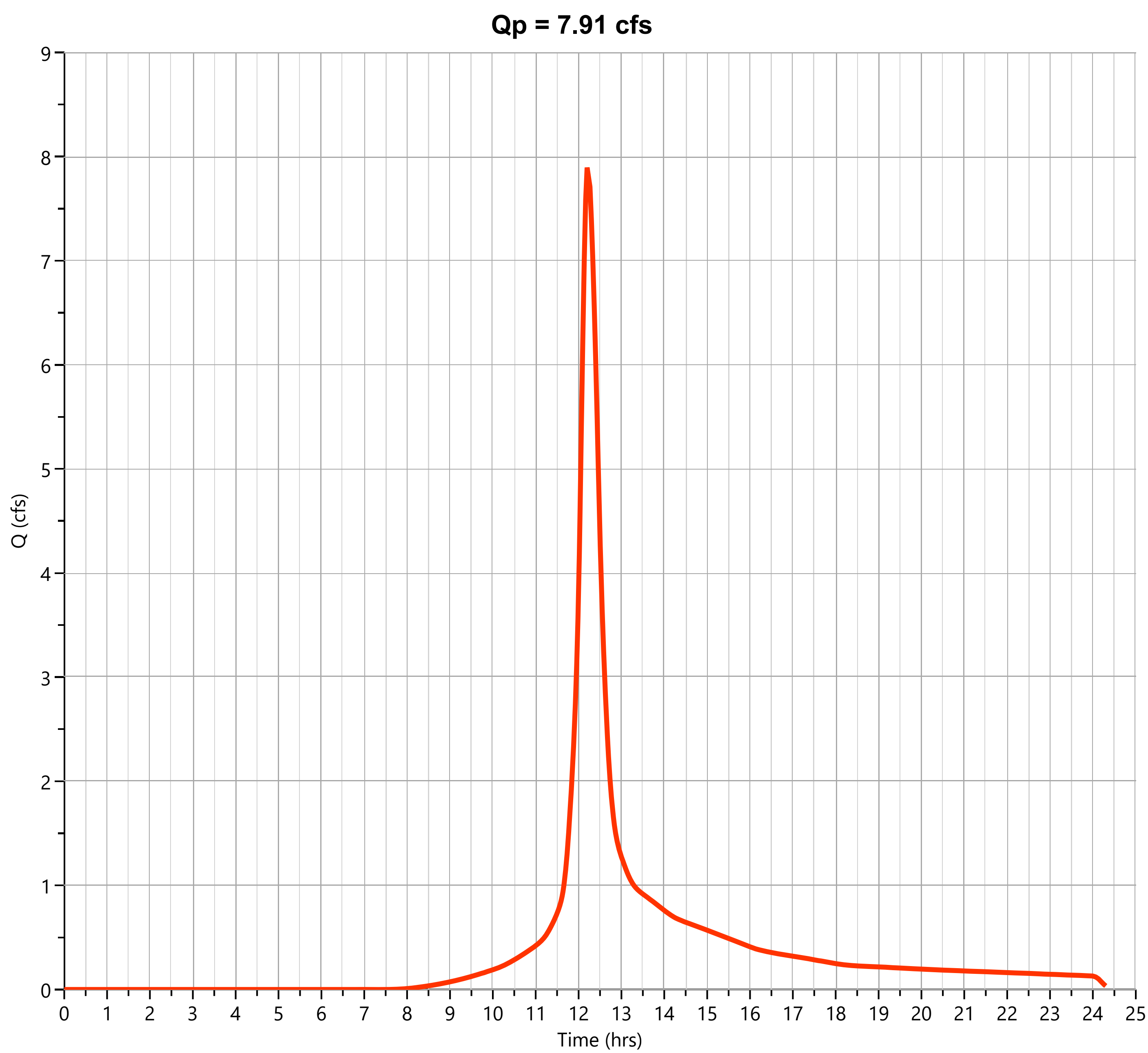
Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

P-5B

Hyd. No. 13

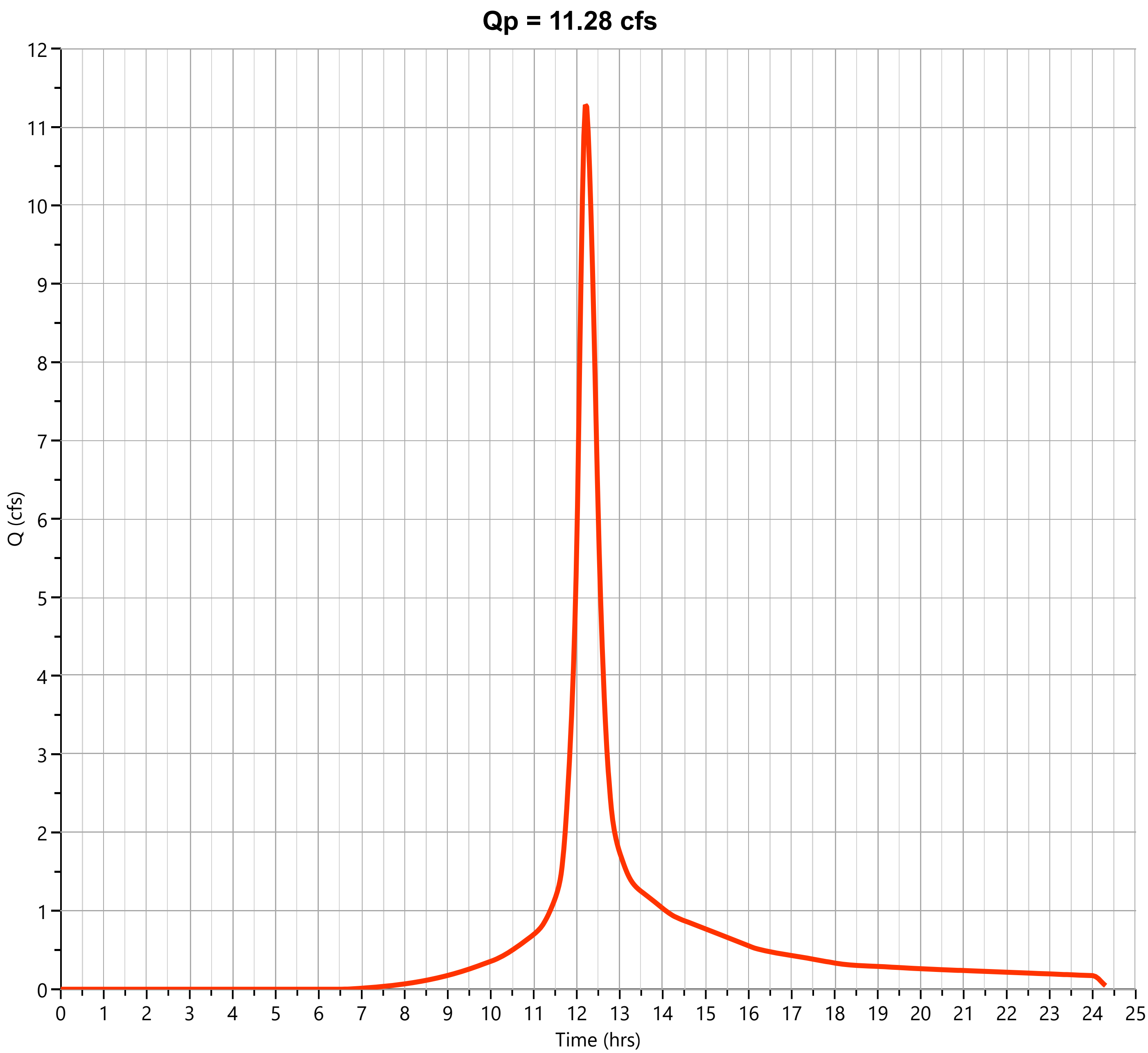
Hydrograph Type	= NRCS Runoff	Peak Flow	= 7.910 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 34,951 cuft
Drainage Area	= 2.75 ac	Curve Number	= 76
Tc Method	= User	Time of Conc. (Tc)	= 17.6 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration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



P-5B

Hyd. No. 13

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



IB-5B

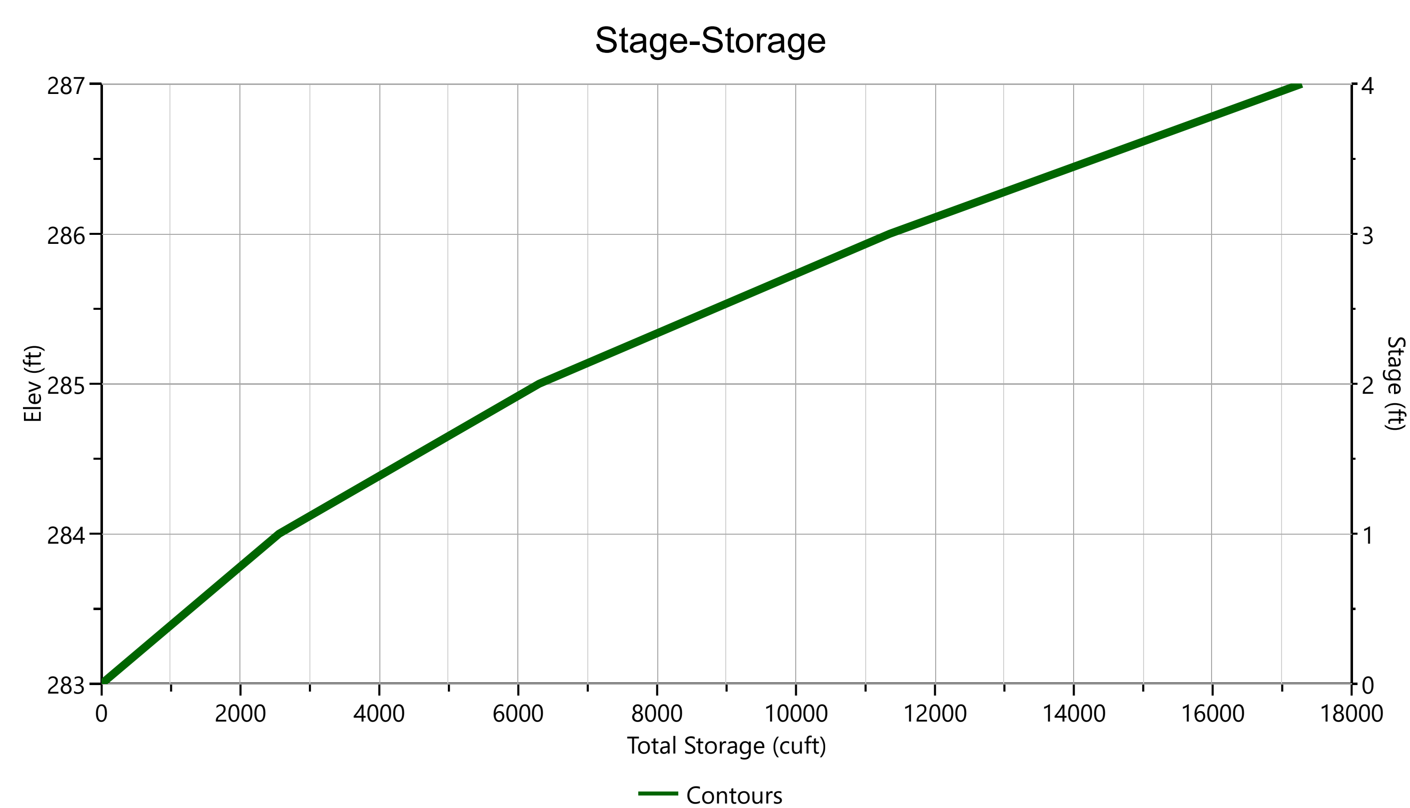
Stage-Storage

User Defined Contours

Description	Input
Bottom Elevation, ft	283.00
Voids (%)	100.00
Volume Calc	Ave End Area

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	283.00	2,245	0.000	0.000
1.00	284.00	2,866	2,556	2,556
2.00	285.00	4,622	3,744	6,300
3.00	286.00	5,477	5,050	11,349
4.00	287.00	6,388	5,933	17,282

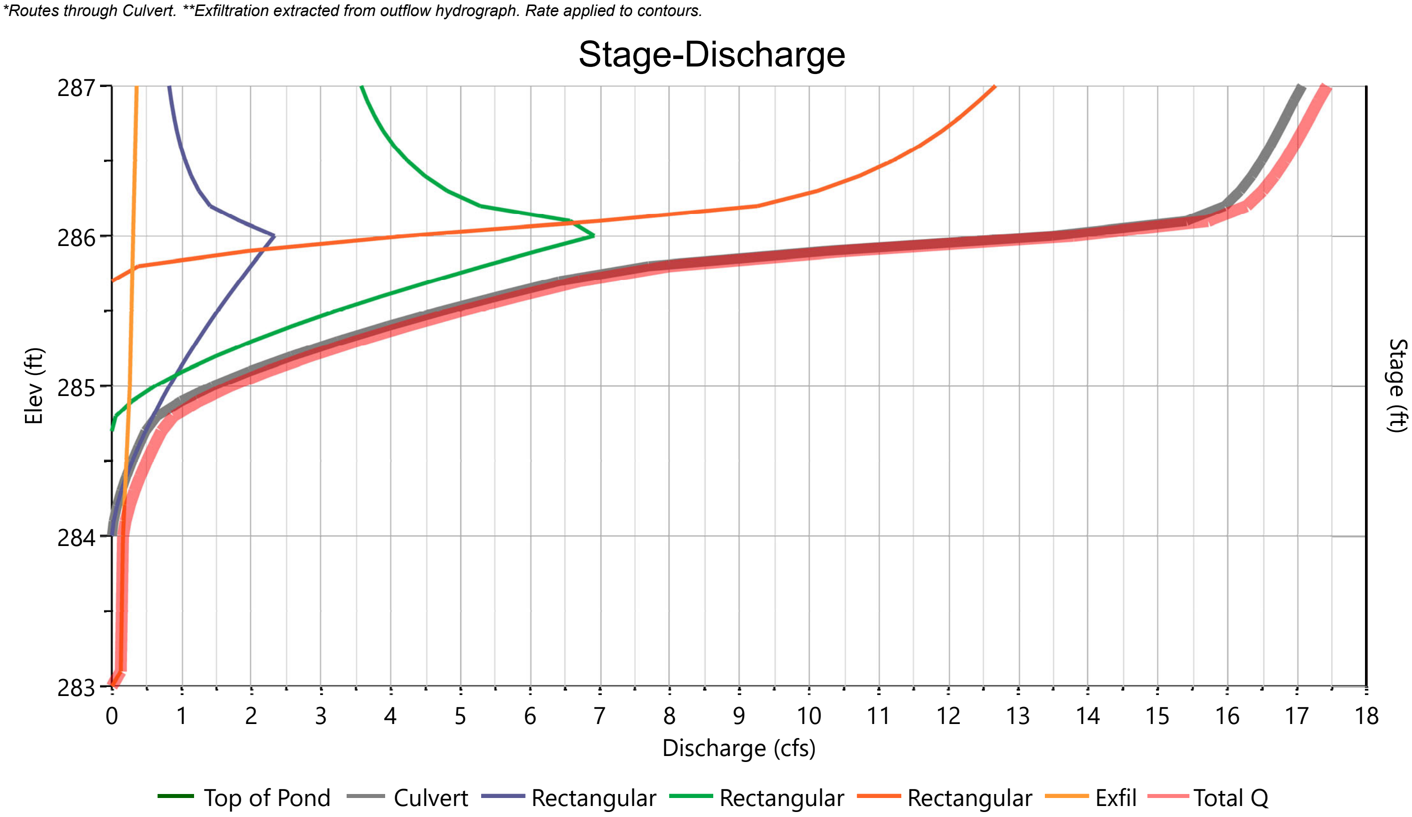


IB-5B

Stage-Discharge

Culvert / Orifices	Culvert	Orifices 1	Orifices 2	Orifices 3	Perforated Riser	
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					
Weirs	**Riser***	**Weirs 1***	**Weirs 2***	**Weirs 3***	**Ancillary**	
Shape / Type	Circular	Rectangular	Rectangular	Rectangular	Exfiltration, in/hr	2.41**
Crest Elevation, ft		284	284.75	285.75		
Crest Length, ft		.25	1.5	10.25		
Angle, deg						
Weir Coefficient, Cw		3.3	3.3	3.3		

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



IB-5B

Stage-Storage-Discharge Summary

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

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Pond Report

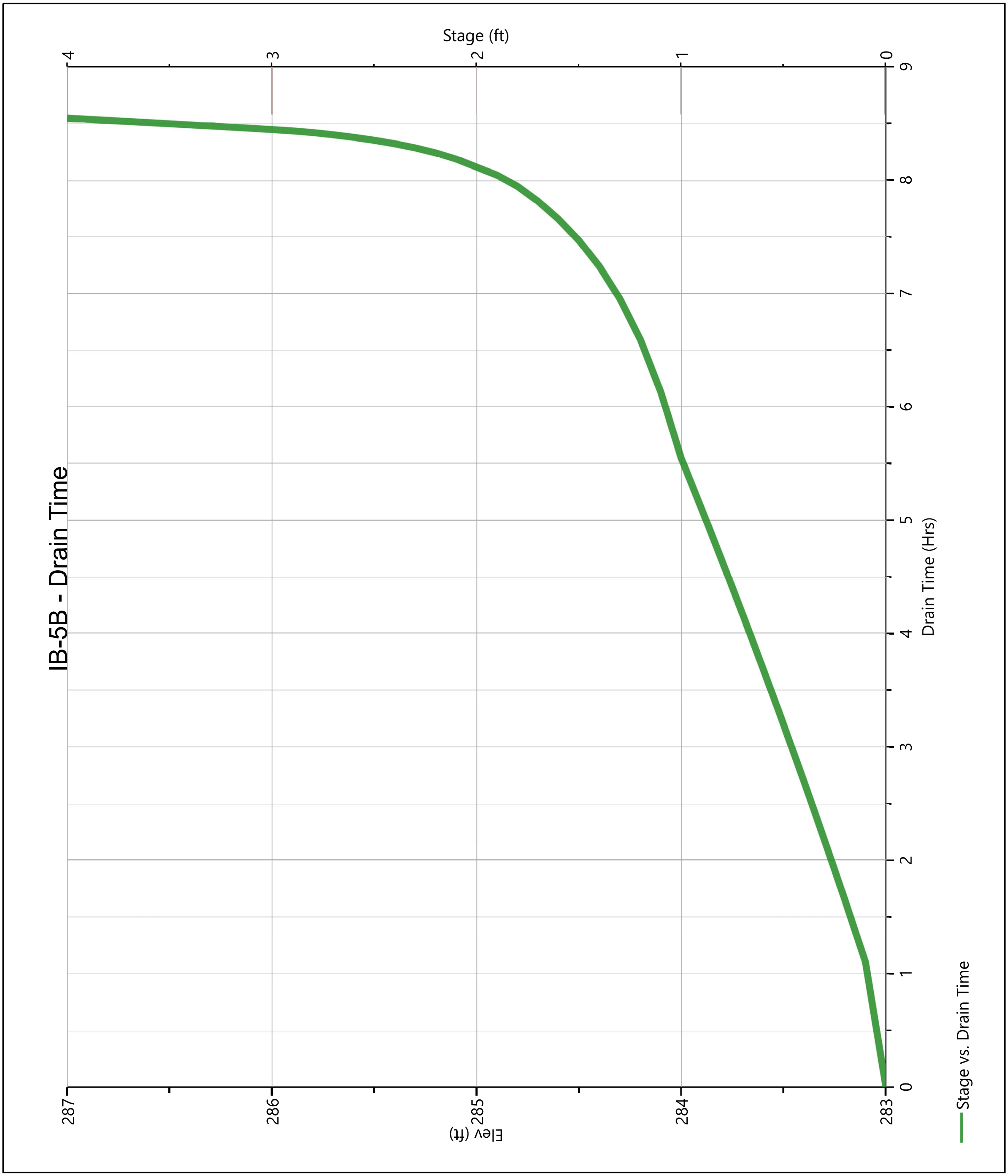
Project Name:

Hydrology Studio v 3.0.0.27

06-17-2023

IB-5B

Pond Drawdown



Hydrograph Report

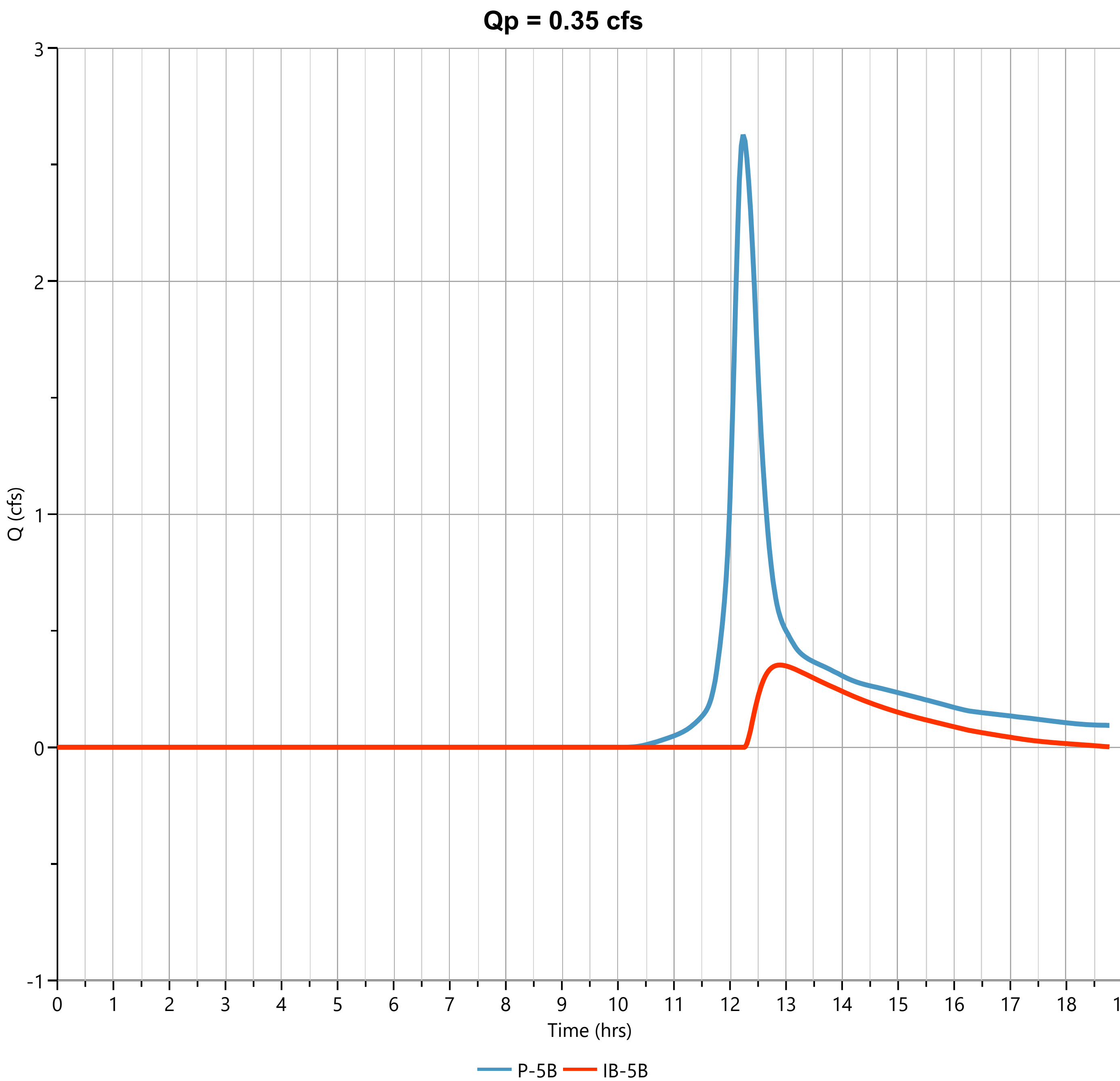
Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

IB-5B Hyd. No. 14

Hydrograph Type	= Pond Route	Peak Flow	= 0.352 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.90 hrs
Time Interval	= 2 min	Hydrograph Volume	= 3,194 cuft
Inflow Hydrograph	= 13 - P-5B	Max. Elevation	= 284.57 ft
Pond Name	= IB-5B	Max. Storage	= 4,674 cuft

Pond Routing by Storage Indication Method



Hydrograph Report

Project Name:

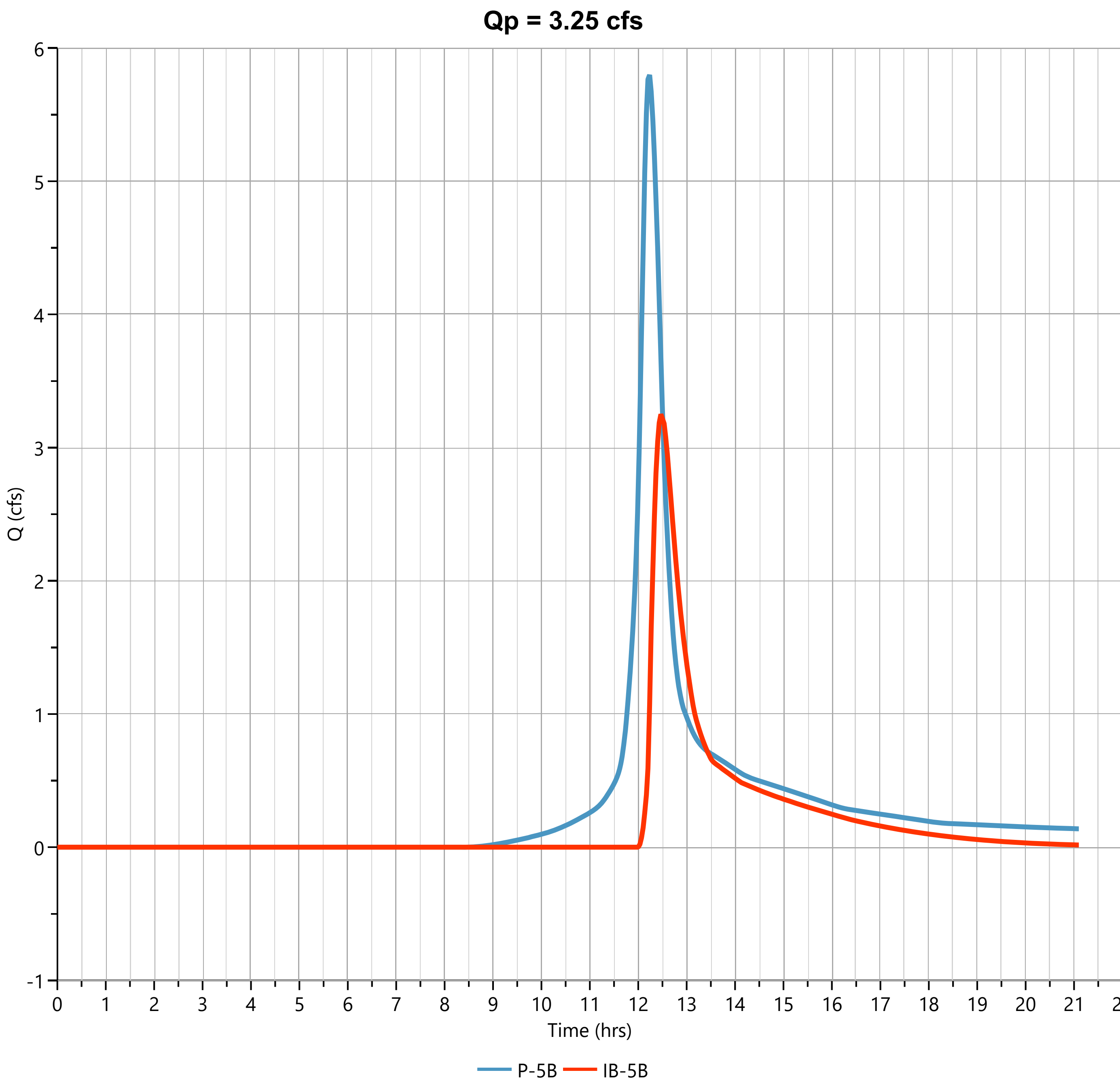
Hydrology Studio v 3.0.0.27 | 06-17-2023

IB-5B

Hyd. No. 14

Hydrograph Type	= Pond Route	Peak Flow	= 3.250 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.47 hrs
Time Interval	= 2 min	Hydrograph Volume	= 13,966 cuft
Inflow Hydrograph	= 13 - P-5B	Max. Elevation	= 285.30 ft
Pond Name	= IB-5B	Max. Storage	= 7,820 cuft

Pond Routing by Storage Indication Method

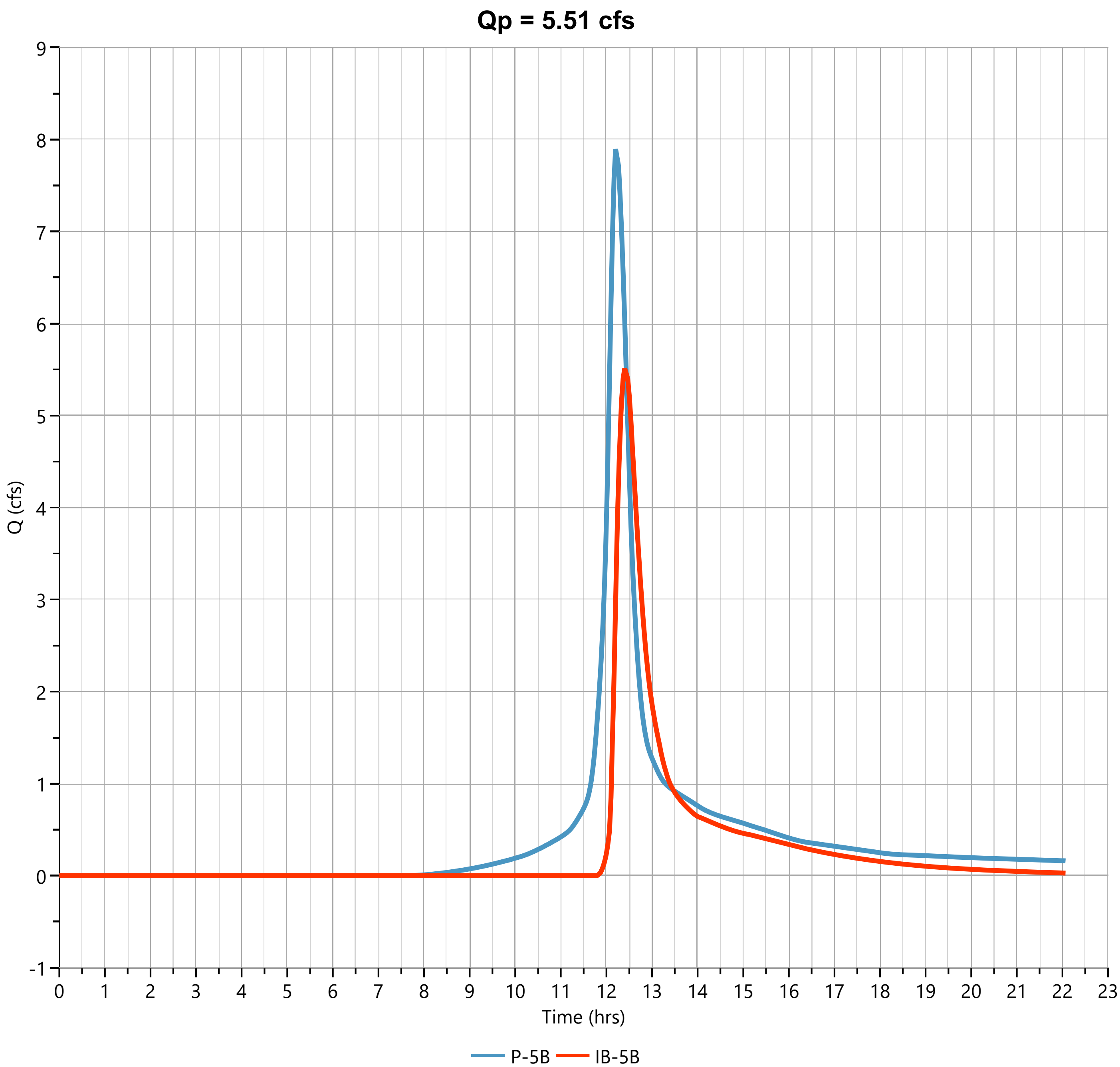


IB-5B

Hyd. No. 14

Hydrograph Type	= Pond Route	Peak Flow	= 5.512 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.40 hrs
Time Interval	= 2 min	Hydrograph Volume	= 22,102 cuft
Inflow Hydrograph	= 13 - P-5B	Max. Elevation	= 285.60 ft
Pond Name	= IB-5B	Max. Storage	= 9,306 cuft

Pond Routing by Storage Indication Method



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.27

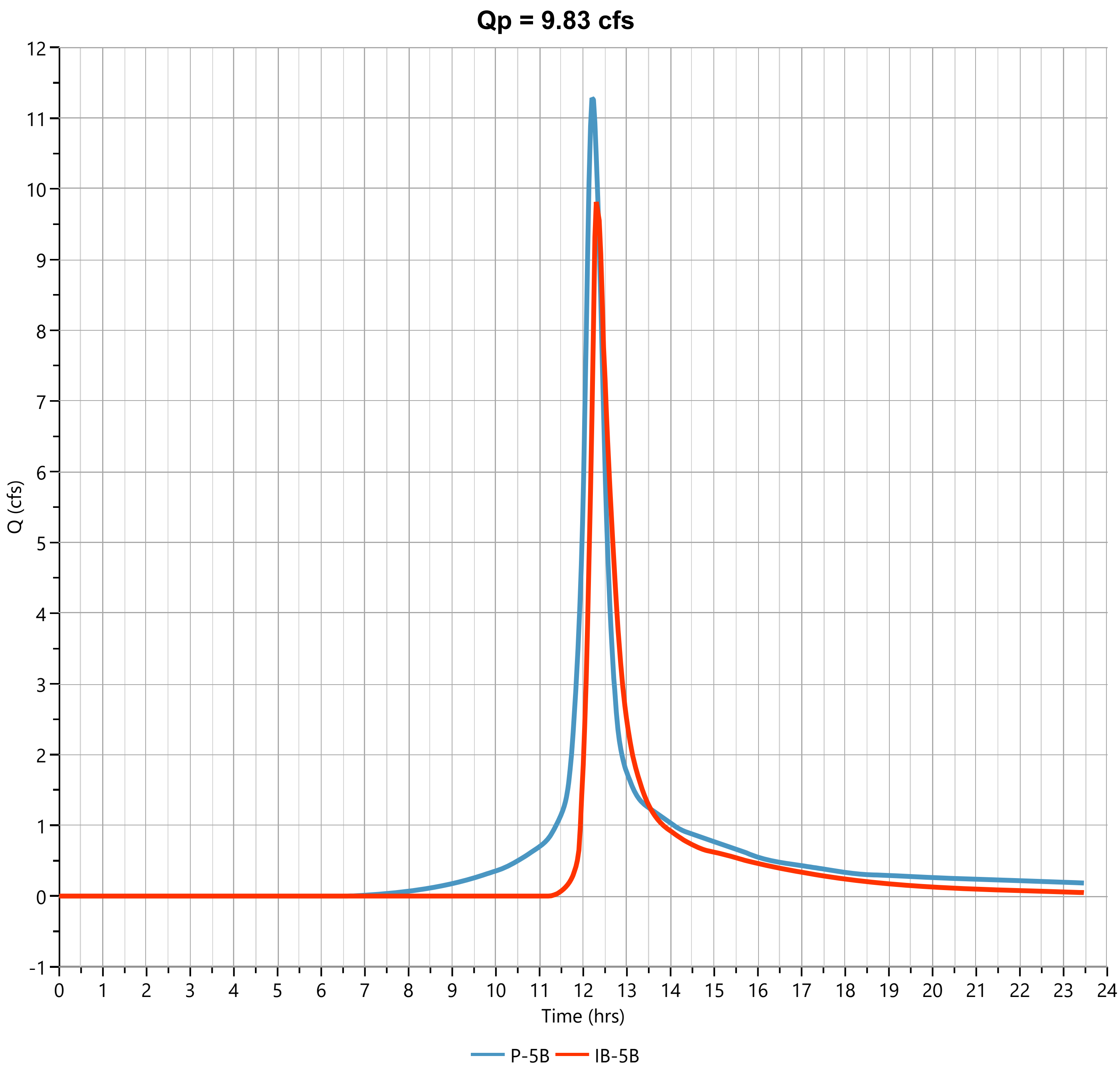
06-17-2023

IB-5B

Hyd. No. 14

Hydrograph Type	= Pond Route	Peak Flow	= 9.833 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Hydrograph Volume	= 35,778 cuft
Inflow Hydrograph	= 13 - P-5B	Max. Elevation	= 285.89 ft
Pond Name	= IB-5B	Max. Storage	= 10,765 cuft

Pond Routing by Storage Indication Method



Worksheet 2: Runoff curve number and runoff **SM-3719C**

Project: Athens Street By PFK Date 6/21/22

Rev Date 10/13/2022

Location: Stow, MA Checked Date 6/17/2023

Circle one: Present [Developed] Subcatchment P-5C

1. Runoff curve number (CN)

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

1/ Use only one CN source per line. 52946

$$\text{CN (weighted)} = \frac{\text{total product}}{\text{total area}} = \frac{102.23}{1.22} = 84.11;$$

Use CN = 84

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency......................................	yr	2	25	100
Rainfall, P (24-hour).......................	in	3.27	6.14	7.84
Runoff, Q.. (Use P and CN with table 2-1, fig. 2-1,) or eqs. 2-3 and 2-4.)	in	1.75	4.34	5.95

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By PFK Date 6/21/2022

Rev Date 10/13/2022

Location: Stow, MA Checked ______ Date 6/17/2023

Circle one: Present **Developed** Subcatchment P-5C

Circle one: **Tc** Tt through subarea

Sheet flow (Applicable to Tc only)

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	0.065			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.18			0.18
Shallow concentrated Flow		Segment ID	C-D			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	35			
9. Watercourse slope, s		ft/ft	0.200			
10. Average Velocity, V (figure 3-1)		ft/s	7.22			
11. Tt = L / 3600V	Compute Tt	hr	0.00			0.00
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.18

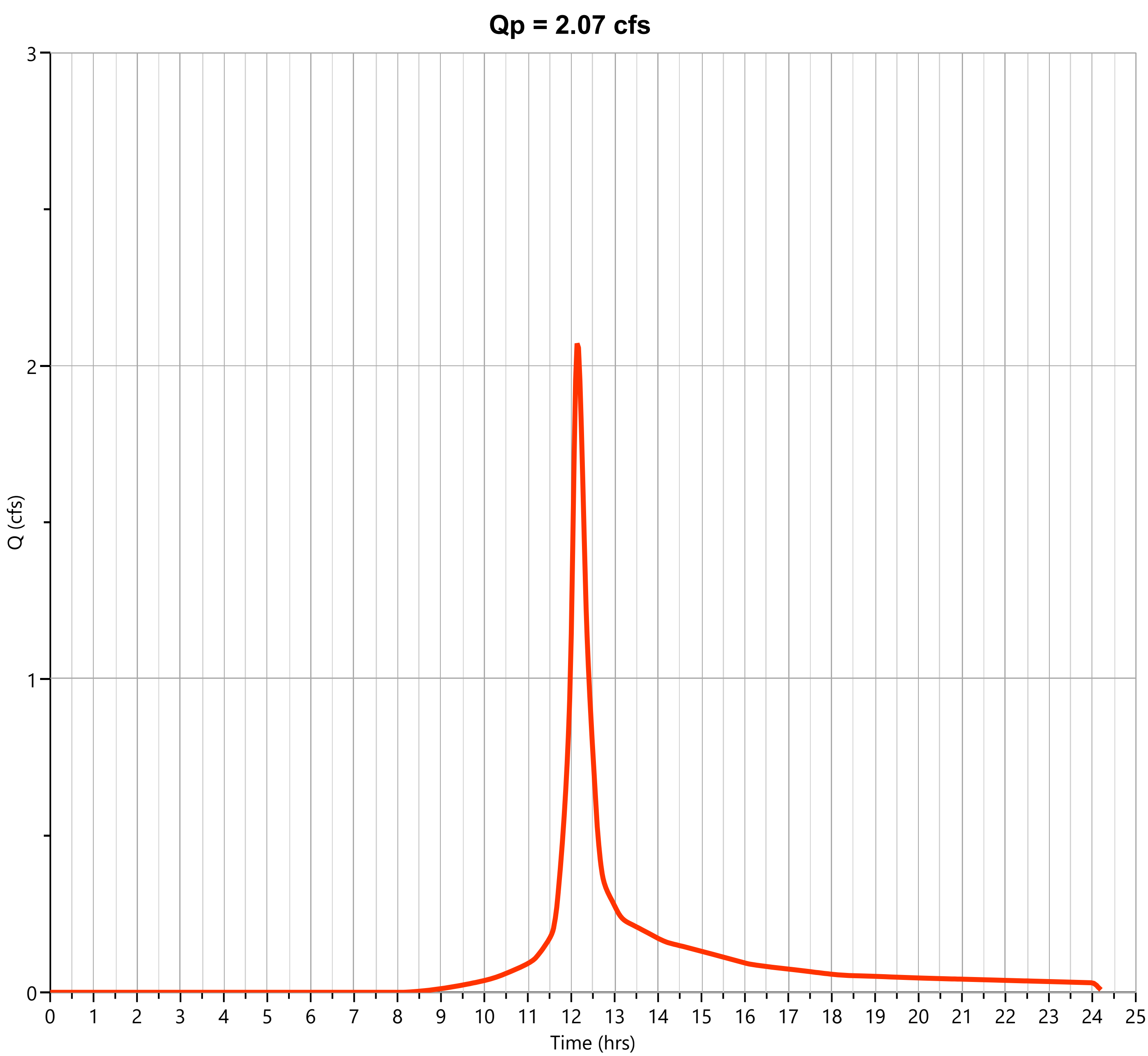
min 10.9

Hydrograph Report

P-5C

Hyd. No. 15

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 Report

Project Name:

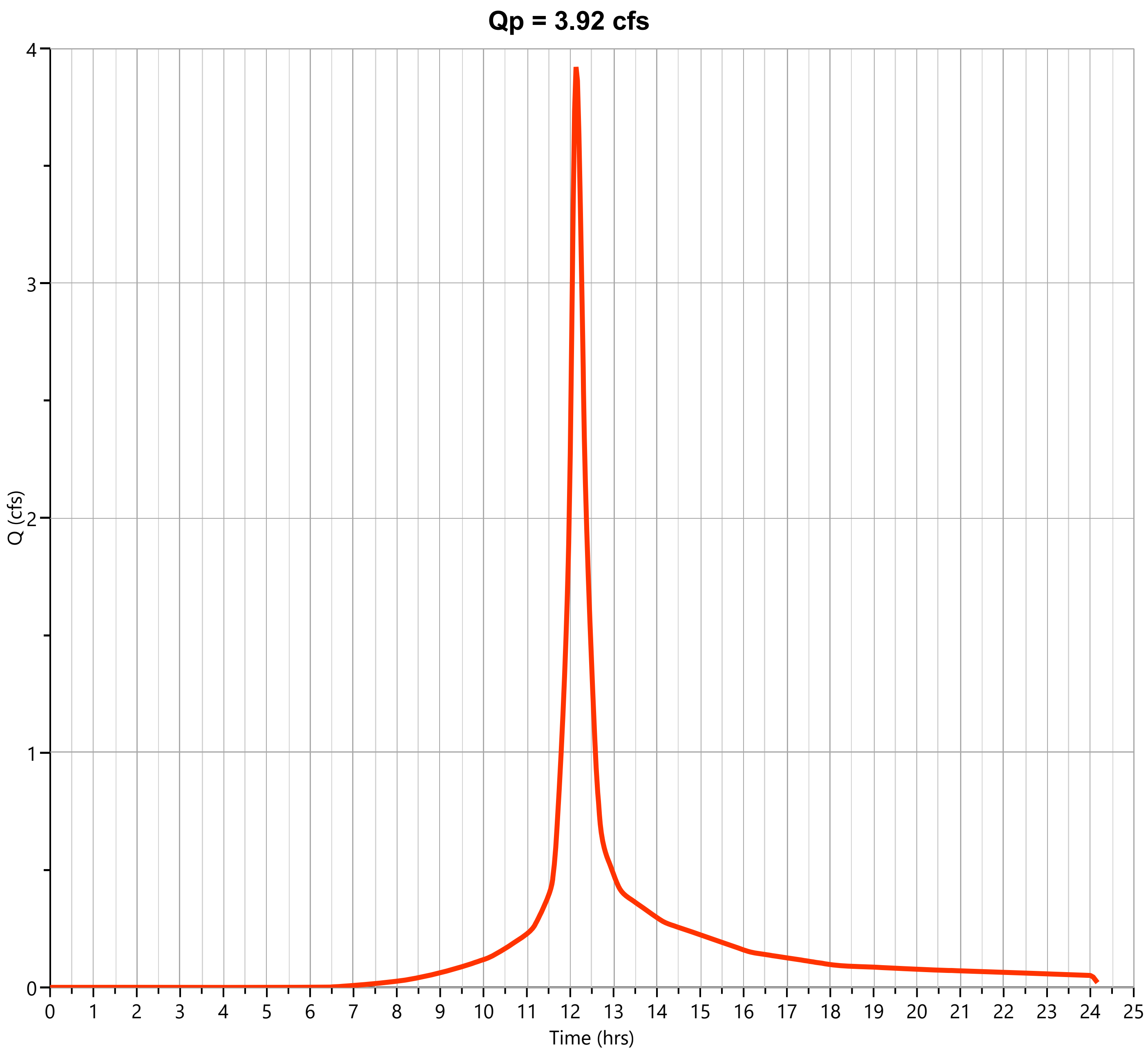
Hydrology Studio v 3.0.0.27

06-17-2023

P-5C

Hyd. No. 15

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 Report

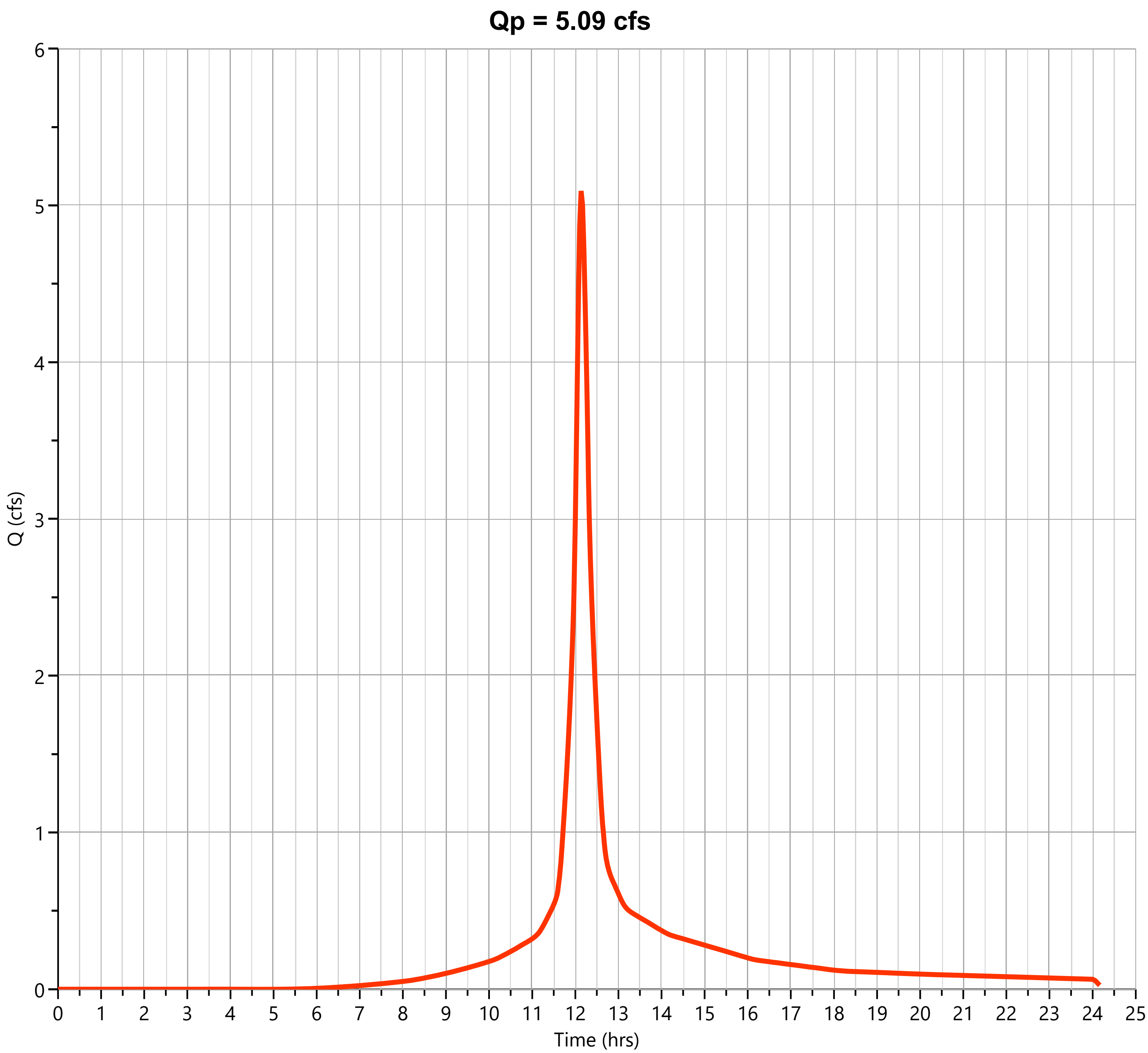
Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

P-5C

Hyd. No. 15

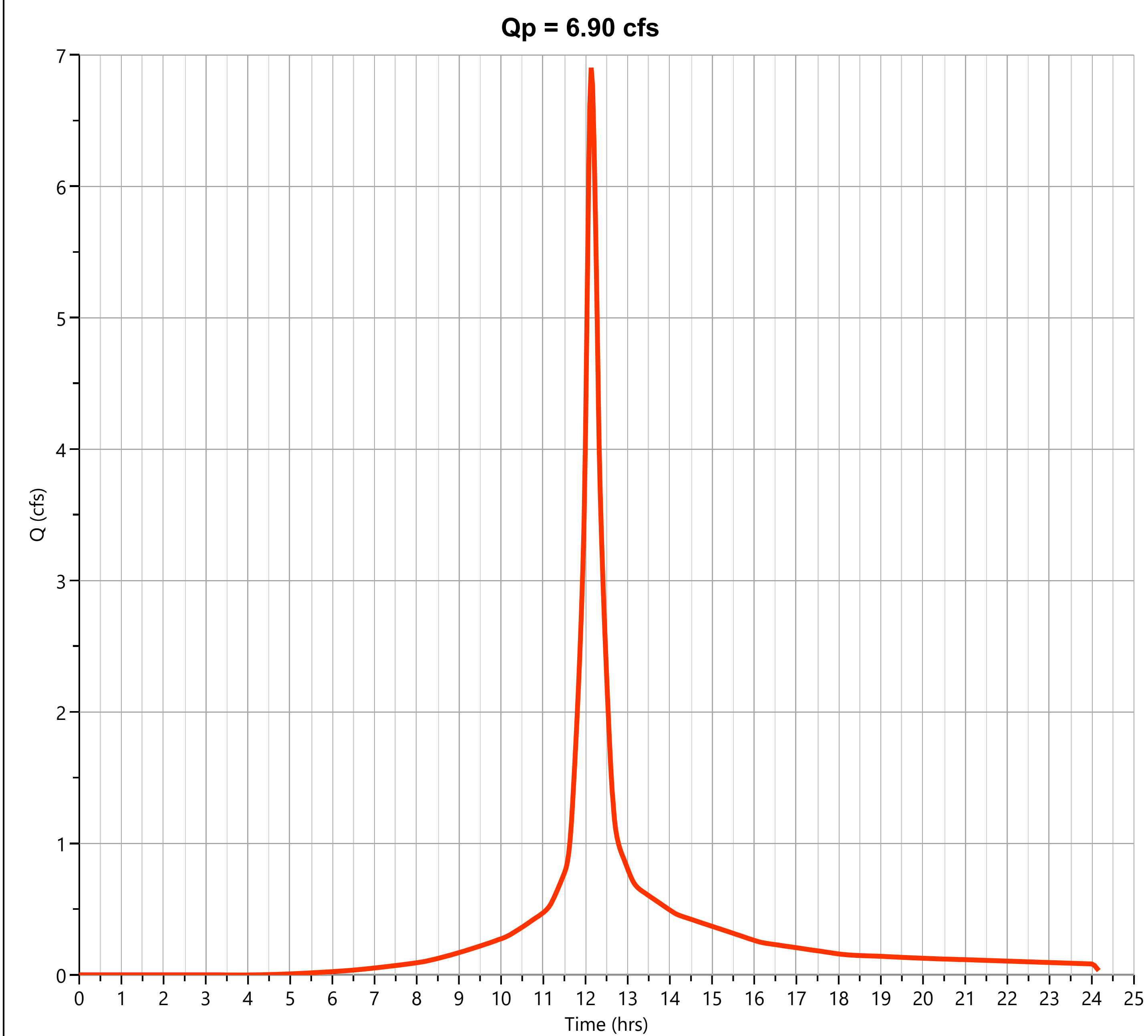
Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.092 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 19,765 cuft
Drainage Area	= 1.22 ac	Curve Number	= 84
Tc Method	= User	Time of Conc. (Tc)	= 10.9 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration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



P-5C

Hyd. No. 15

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



IB-5C

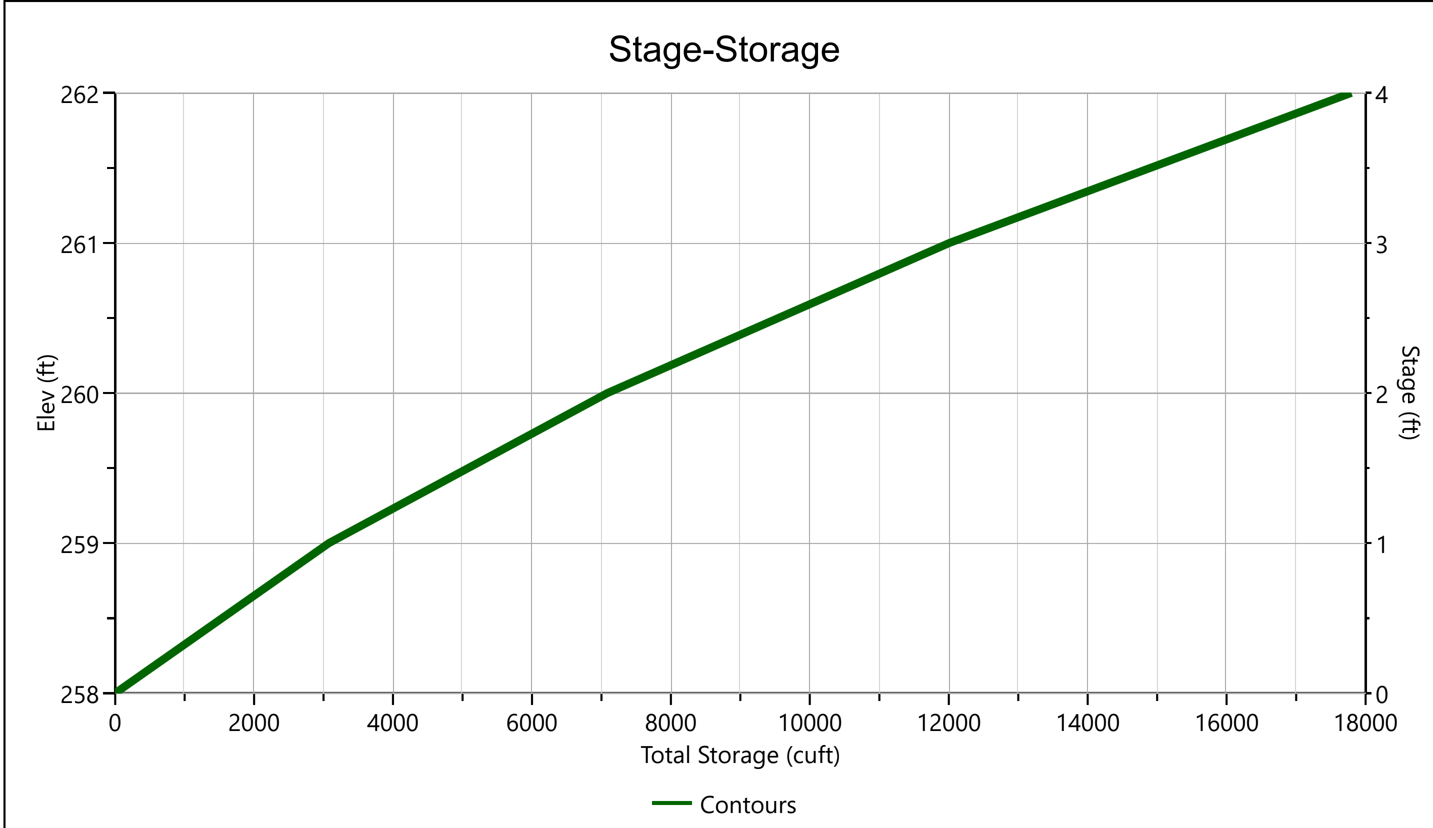
Stage-Storage

User Defined Contours

Description	Input
Bottom Elevation, ft	258.00
Voids (%)	100.00
Volume Calc	None

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	258.00	2,638	0.000	0.000
1.00	259.00	3,517	3,078	3,078
2.00	260.00	4,505	4,011	7,089
3.00	261.00	5,340	4,923	12,011
4.00	262.00	6,231	5,786	17,797

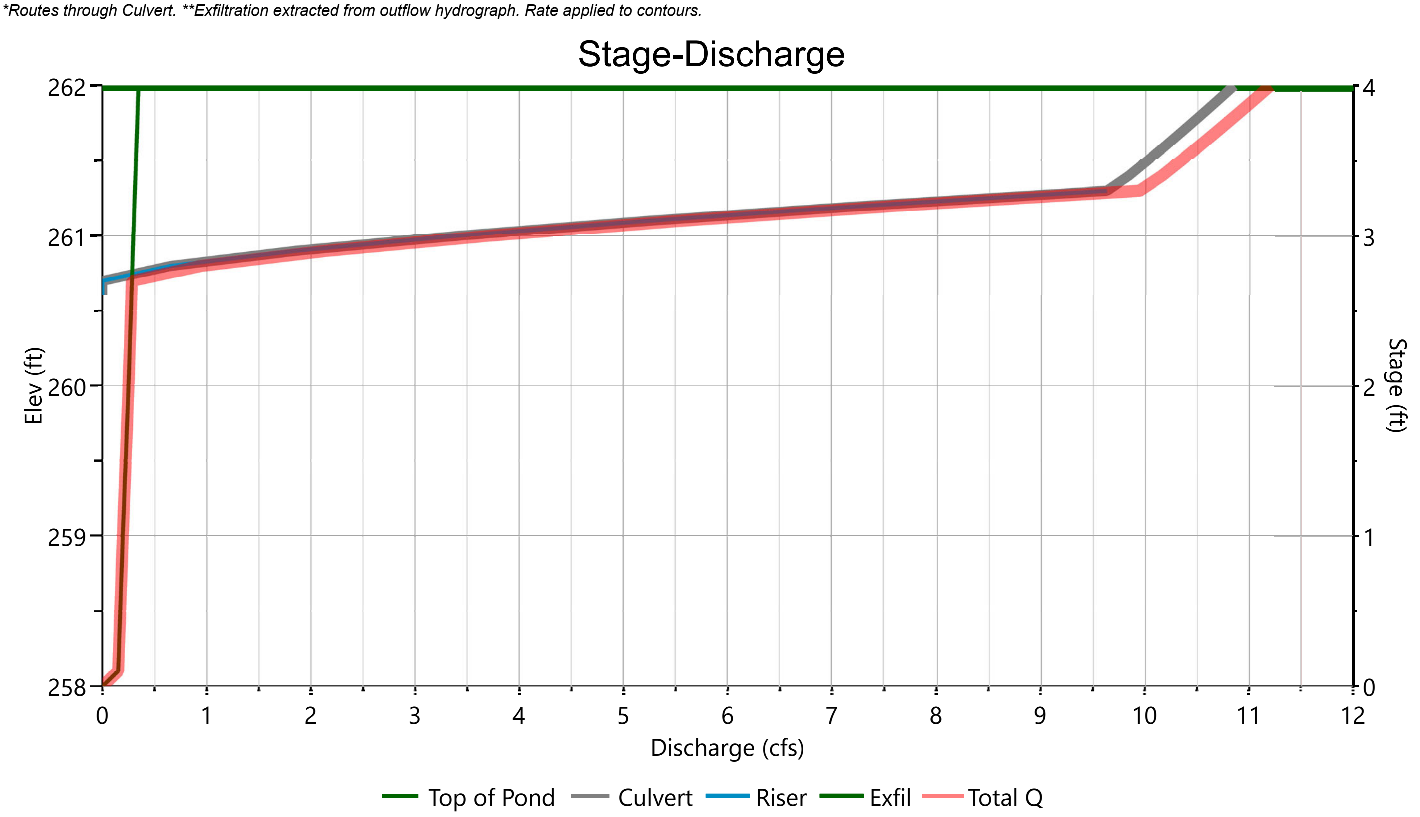


IB-5C

Stage-Discharge

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

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



IB-5C

Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
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

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Pond Report

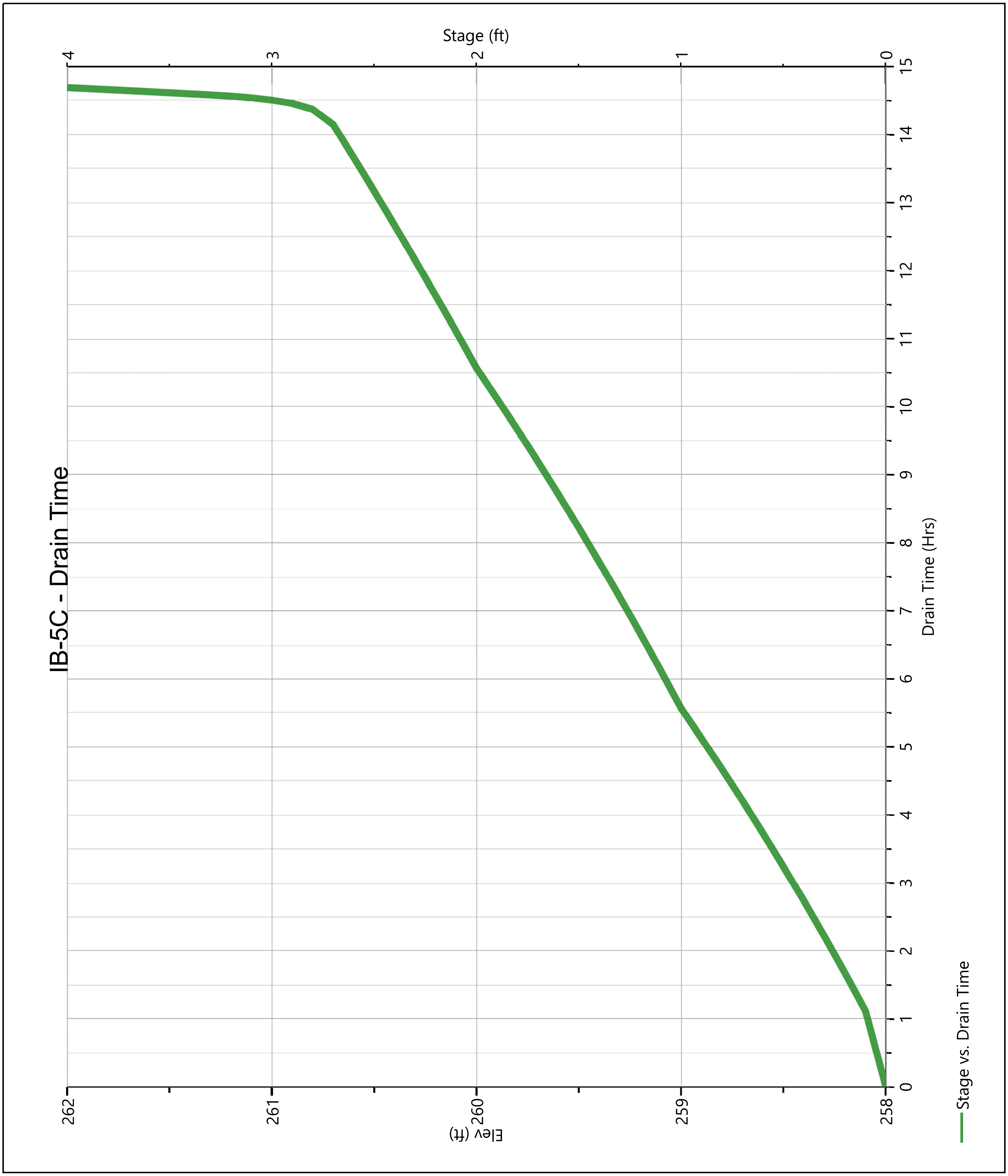
Project Name:

Hydrology Studio v 3.0.0.27

06-17-2023

IB-5C

Pond Drawdown



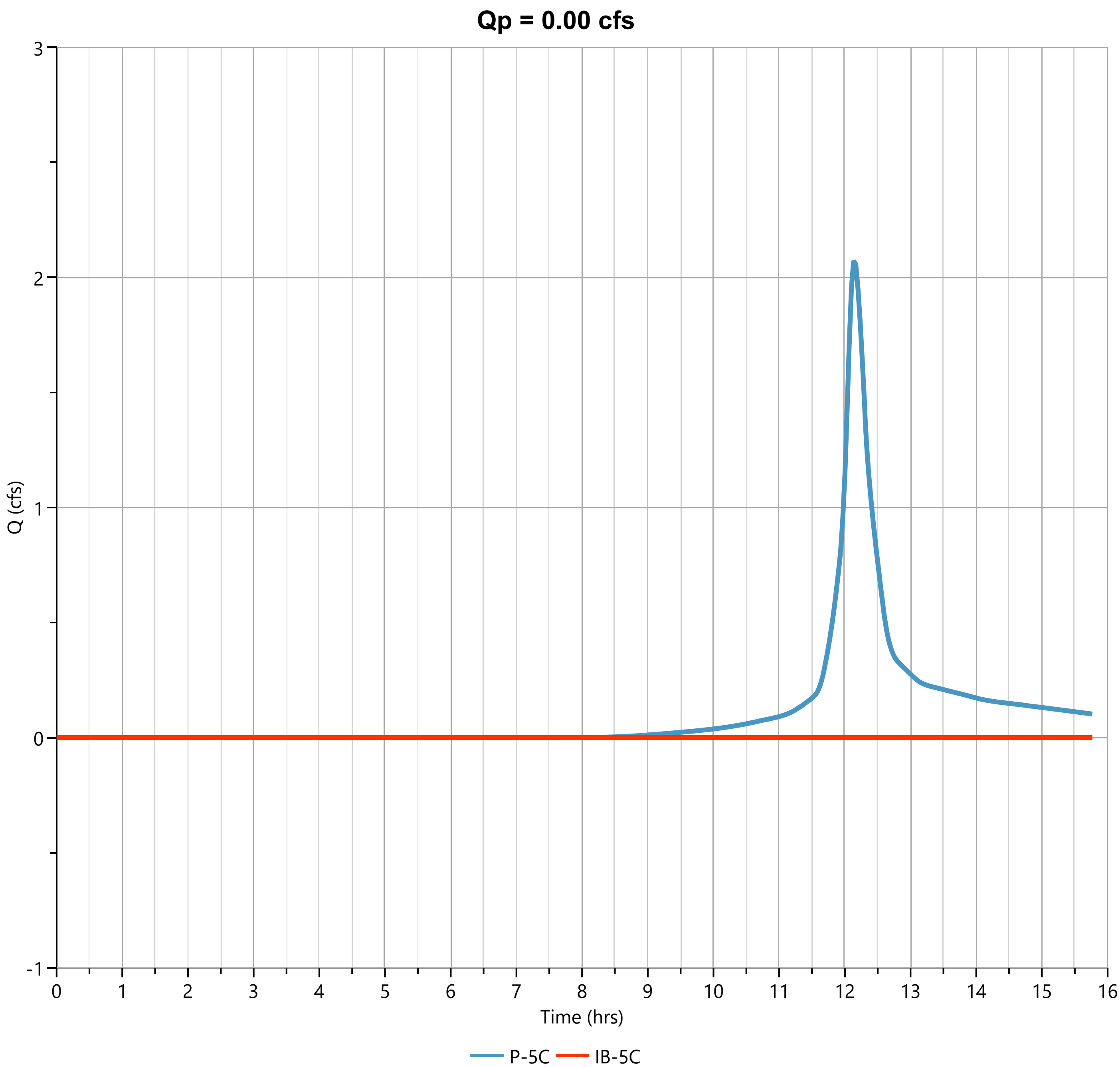
IB-5C

Hyd. No. 16

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 Indication Method

Center of mass detention time = 6 min



Hydrograph Report

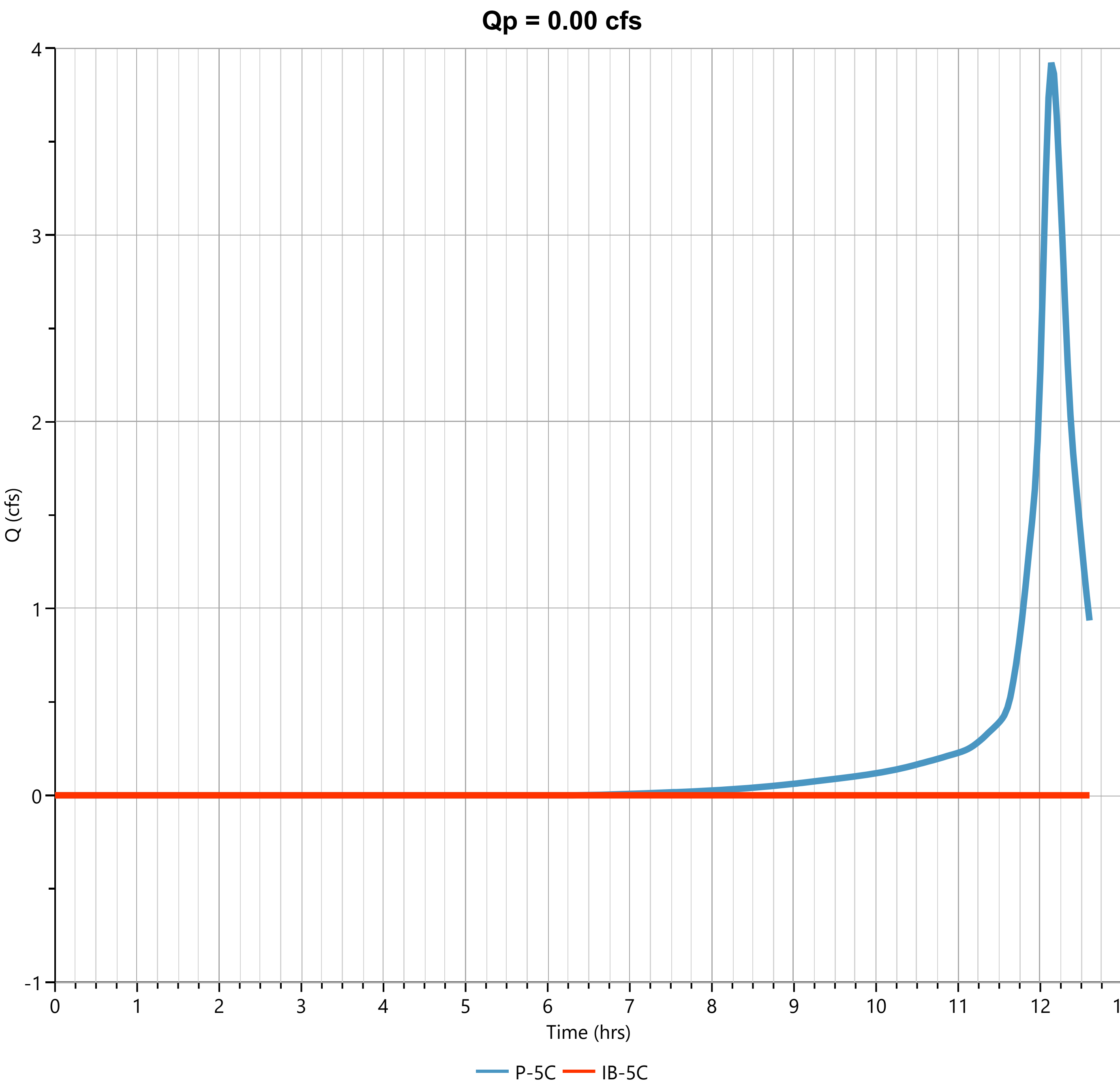
Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

IB-5C Hyd. No. 16

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 Indication Method



Hydrograph Report

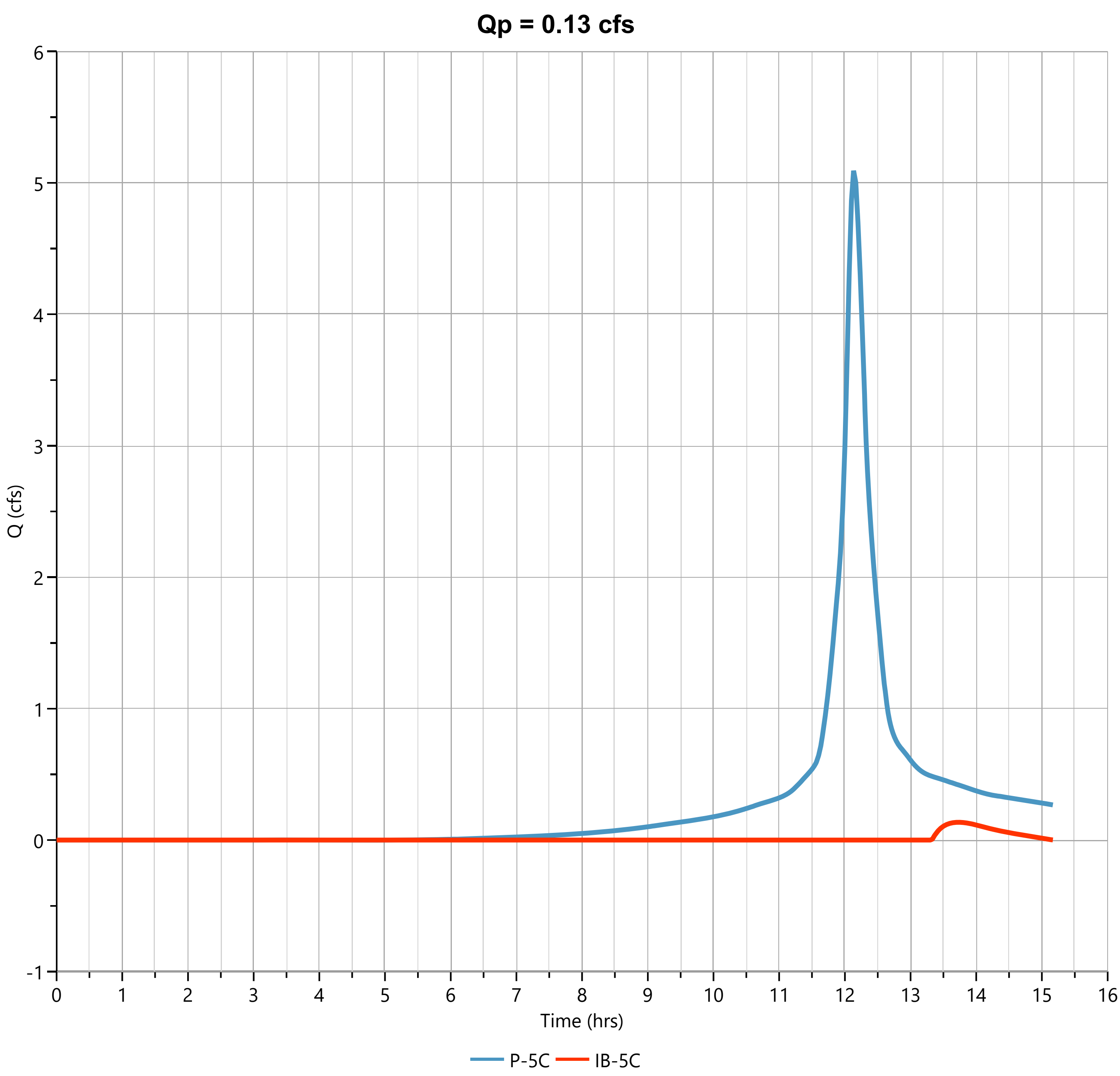
Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

IB-5C Hyd. No. 16

Hydrograph Type	= Pond Route	Peak Flow	= 0.135 cfs
Storm Frequency	= 25-yr	Time to Peak	= 13.73 hrs
Time Interval	= 2 min	Hydrograph Volume	= 483 cuft
Inflow Hydrograph	= 15 - P-5C	Max. Elevation	= 260.72 ft
Pond Name	= IB-5C	Max. Storage	= 10,635 cuft

Pond Routing by Storage Indication Method *Center of mass detention time = 35 min*



Hydrograph Report

Project Name:

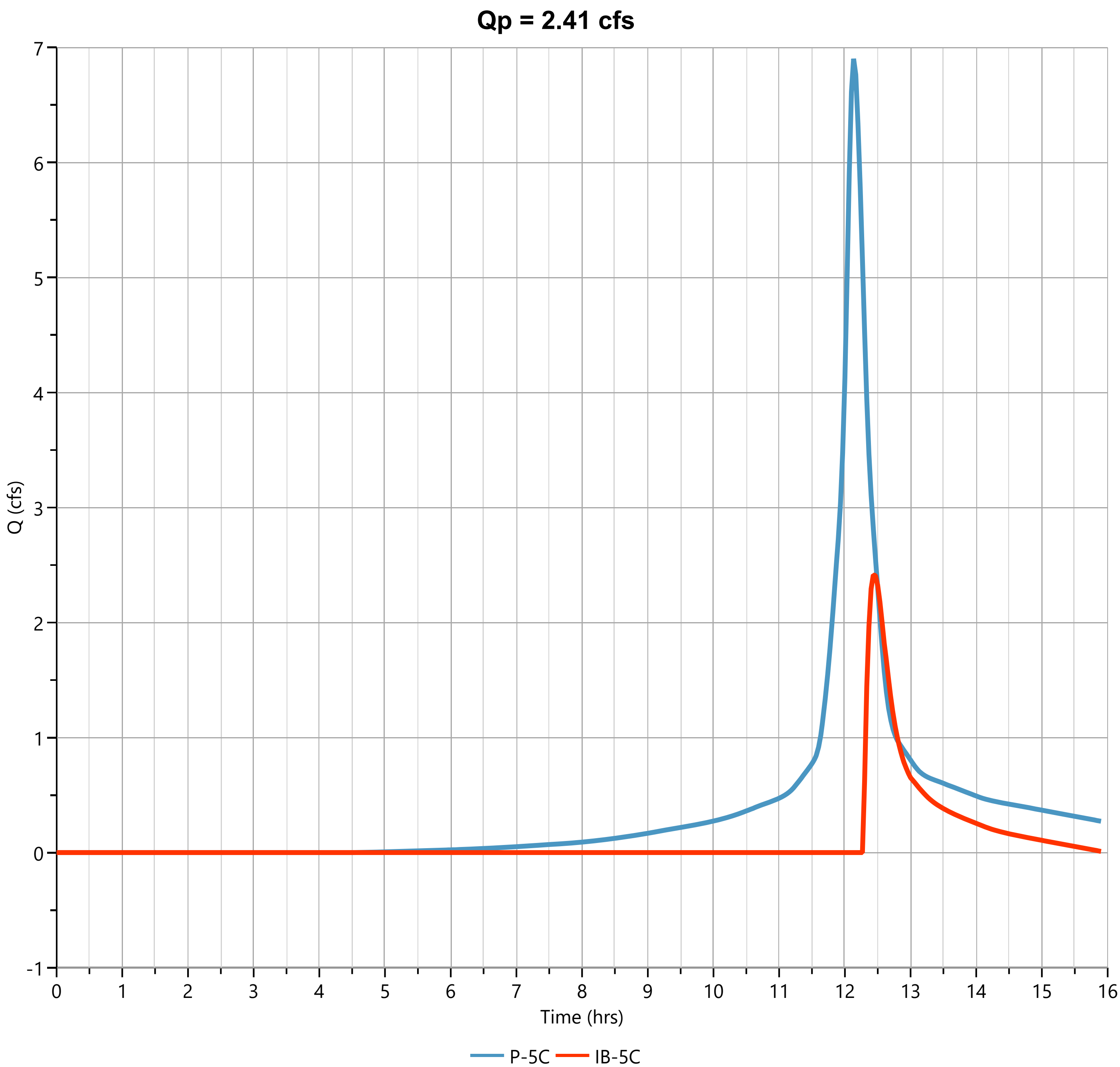
Hydrology Studio v 3.0.0.27 06-17-2023

IB-5C

Hyd. No. 16

Hydrograph Type	= Pond Route	Peak Flow	= 2.414 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.43 hrs
Time Interval	= 2 min	Hydrograph Volume	= 6,054 cuft
Inflow Hydrograph	= 15 - P-5C	Max. Elevation	= 260.94 ft
Pond Name	= IB-5C	Max. Storage	= 11,696 cuft

Pond Routing by Storage Indication Method



Worksheet 2: Runoff curve number and runoff **SM-3719C**

Project: Athens Street By PFK Date 6/21/22
Rev Date 10/13/2022
Location: Stow, MA Checked Date 6/17/2023

Circle one: Present Developed Subcatchment P-5E

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)		CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
	Impervious		98			1.09	106.43
A	Woods	Good Condition	30			2.63	78.99
A	Open Space	Good Condition	39			2.05	80.04
A	Open Space	Fair Condition	49			0.00	0.00
A	Gravel		76			0.00	0.00
C	Woods	Good Condition	70			0.54	37.93
C	Open Space	Good Condition	77			0.43	33.48
C	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 / total area = 507.85 / 8.97 = 56.63 ; Use CN = 57

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency......................................	yr	2	25	100
Rainfall, P (24-hour).......................	in	3.27	6.14	7.84
Runoff, Q..	in	0.32	1.73	2.85

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project:	Athens Street	By PFK	Date	6/21/2022
			Rev Date	10/13/2022
Location:	Stow, MA	Checked	Date	6/17/2023

Circle one: Present **Developed** Subcatchment P-5E

Circle one: **Tc** Tt through subarea

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 Tt	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 Tt	hr		0.03			0.03
Channel flow			Segment ID				
12. Cross sectional flow area, a		sf					
13. Wetted perimeter, pw		ft					
14. Hydraulic radius, r=a/wp	Compute r	ft					
15. Channel Slope, s		ft/ft					
16. Manning's roughness coeff., n							
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s					
18. Flow length, L		ft					
19. Tt = L / 3600V	Compute Tt	hr					0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.21

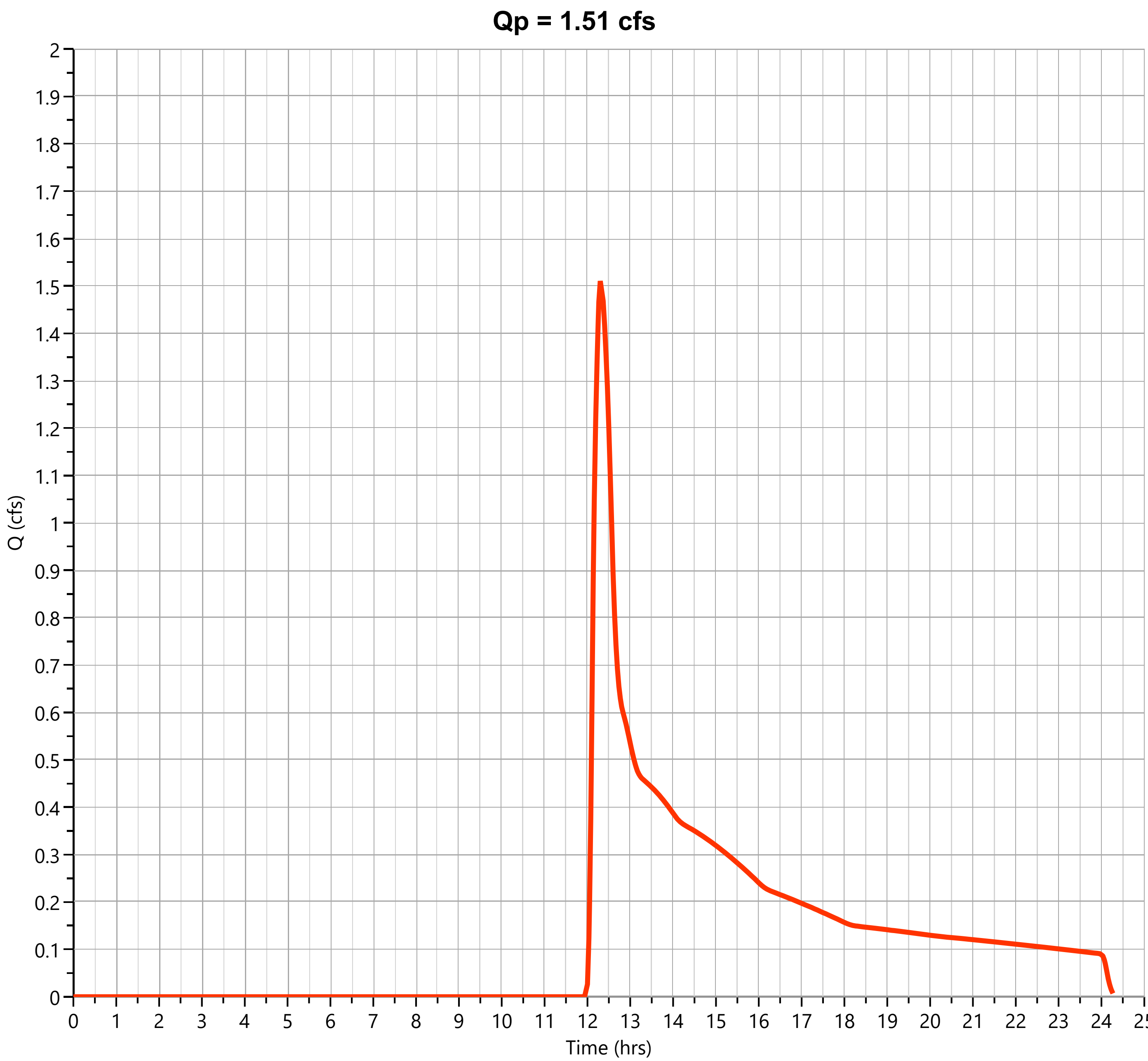
min 12.8

Hydrograph Report

P-5E

Hyd. No. 17

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 Report

Project Name:

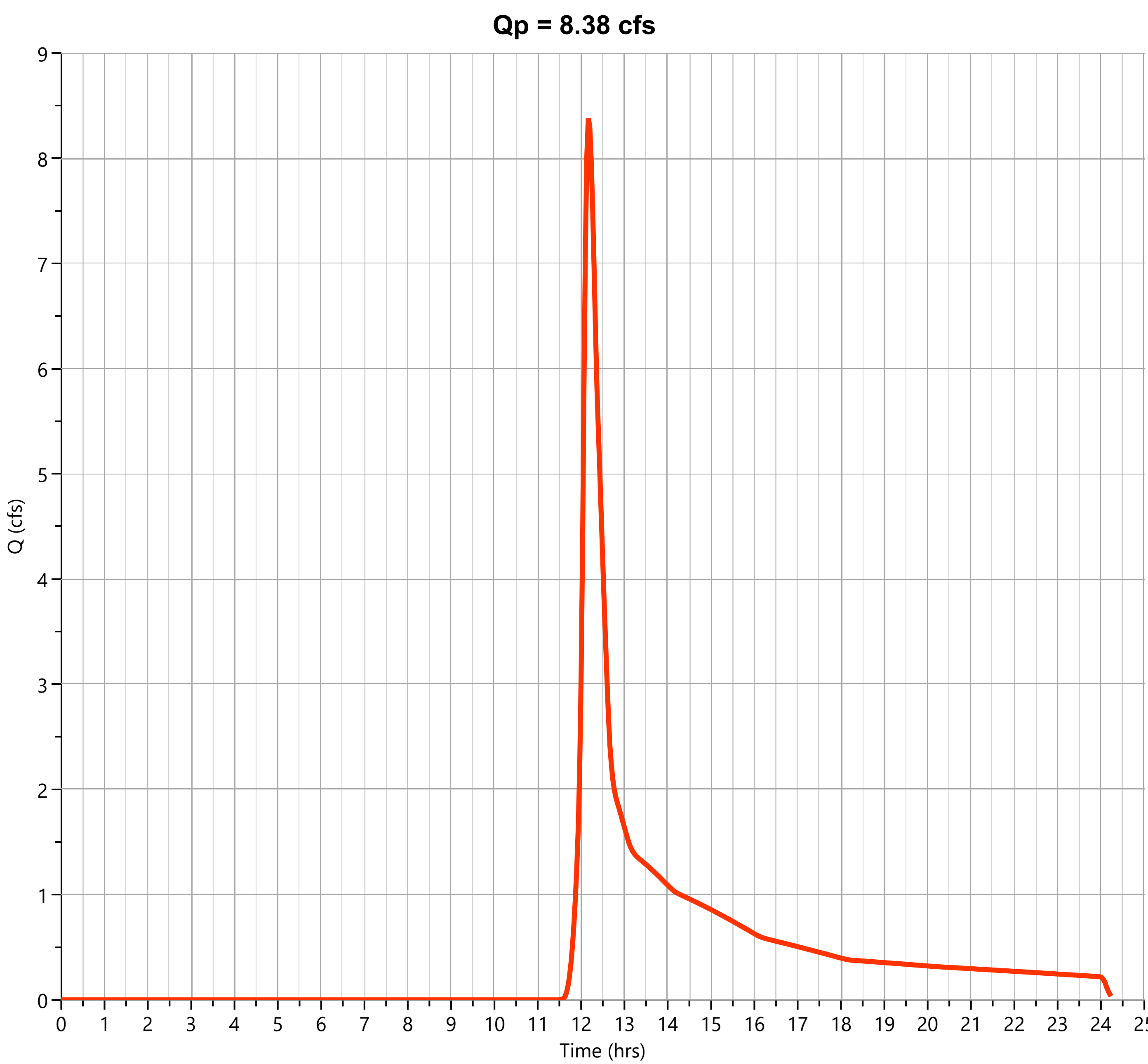
Hydrology Studio v 3.0.0.27

06-17-2023

P-5E

Hyd. No. 17

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

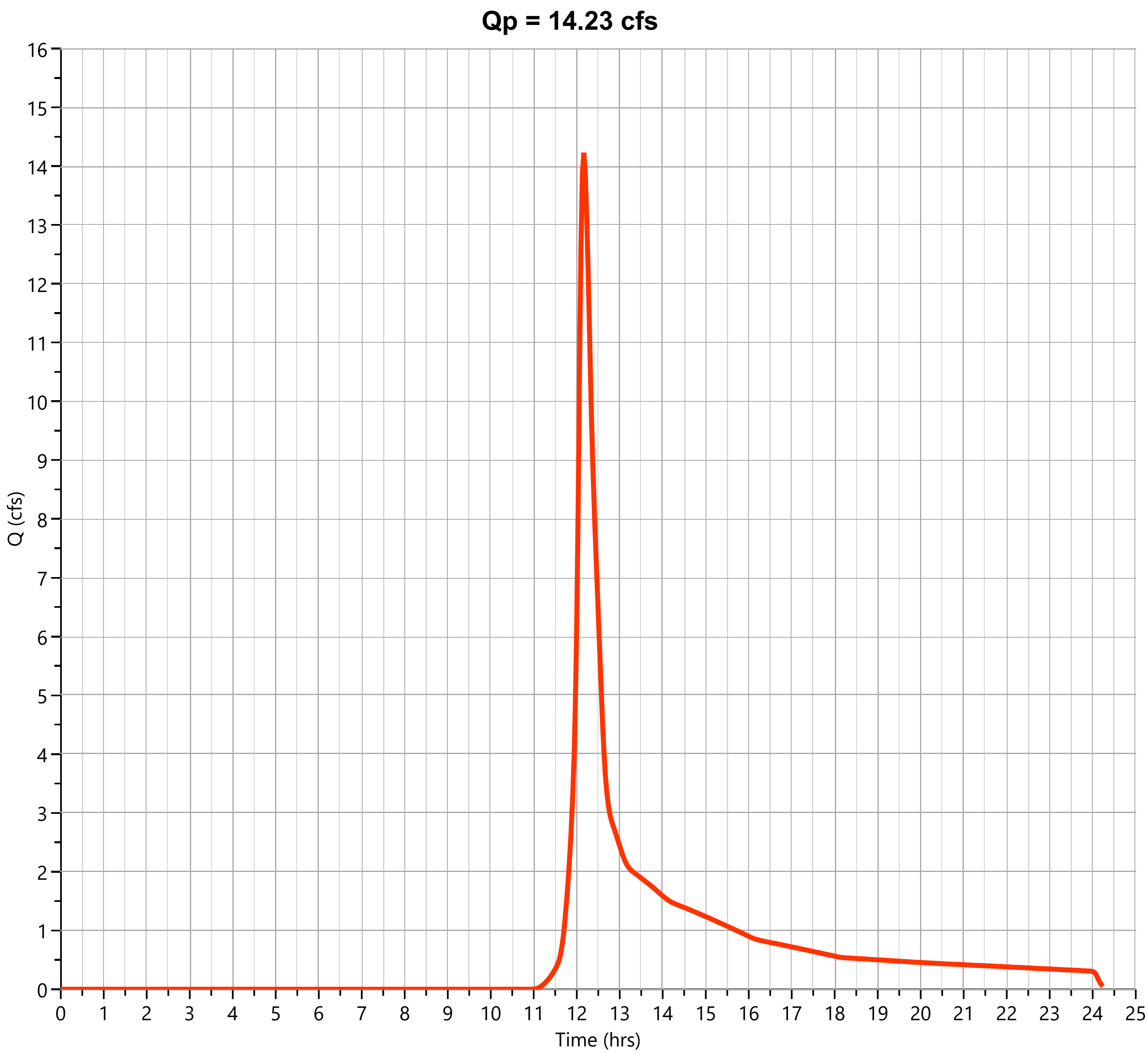


Hydrograph Report

P-5E

Hyd. No. 17

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

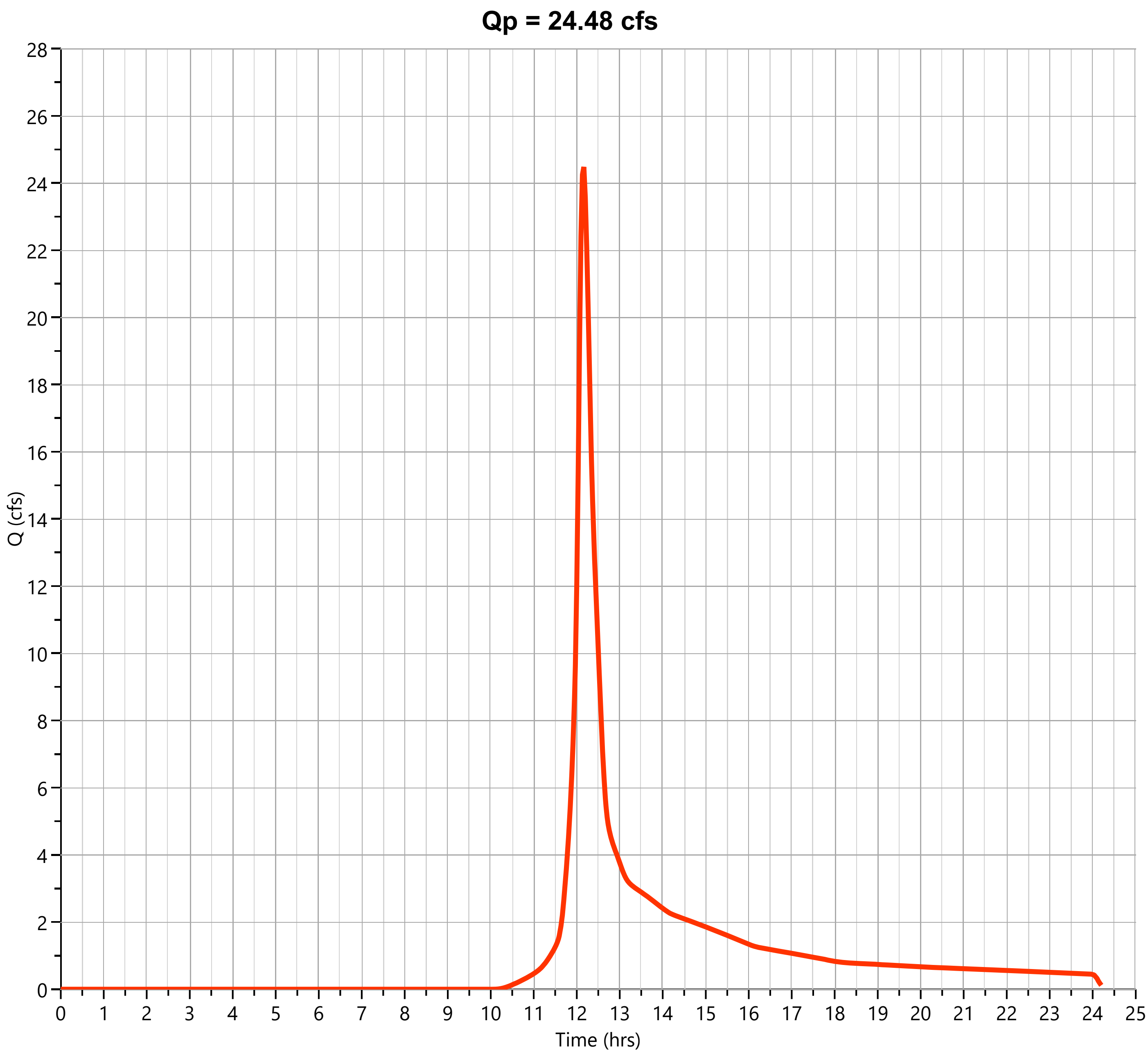


Hydrograph Report

P-5E

Hyd. No. 17

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



Hydrograph Report

Project Name:

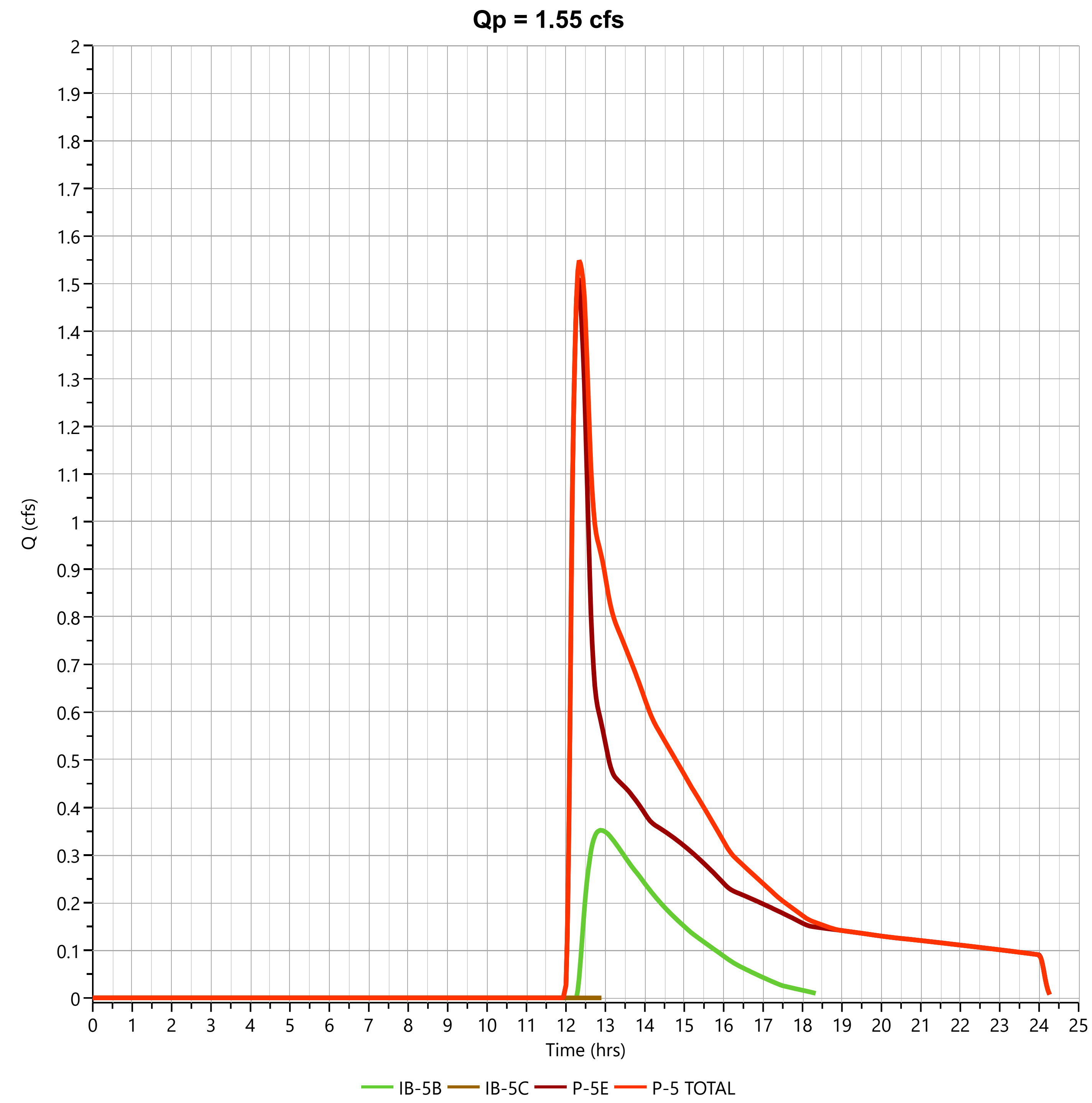
Hydrology Studio v 3.0.0.27

06-17-2023

P-5 TOTAL

Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 1.549 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Hydrograph Volume	= 14,387 cuft
Inflow Hydrographs	= 14, 16, 17	Total Contrib. Area	= 8.97 ac

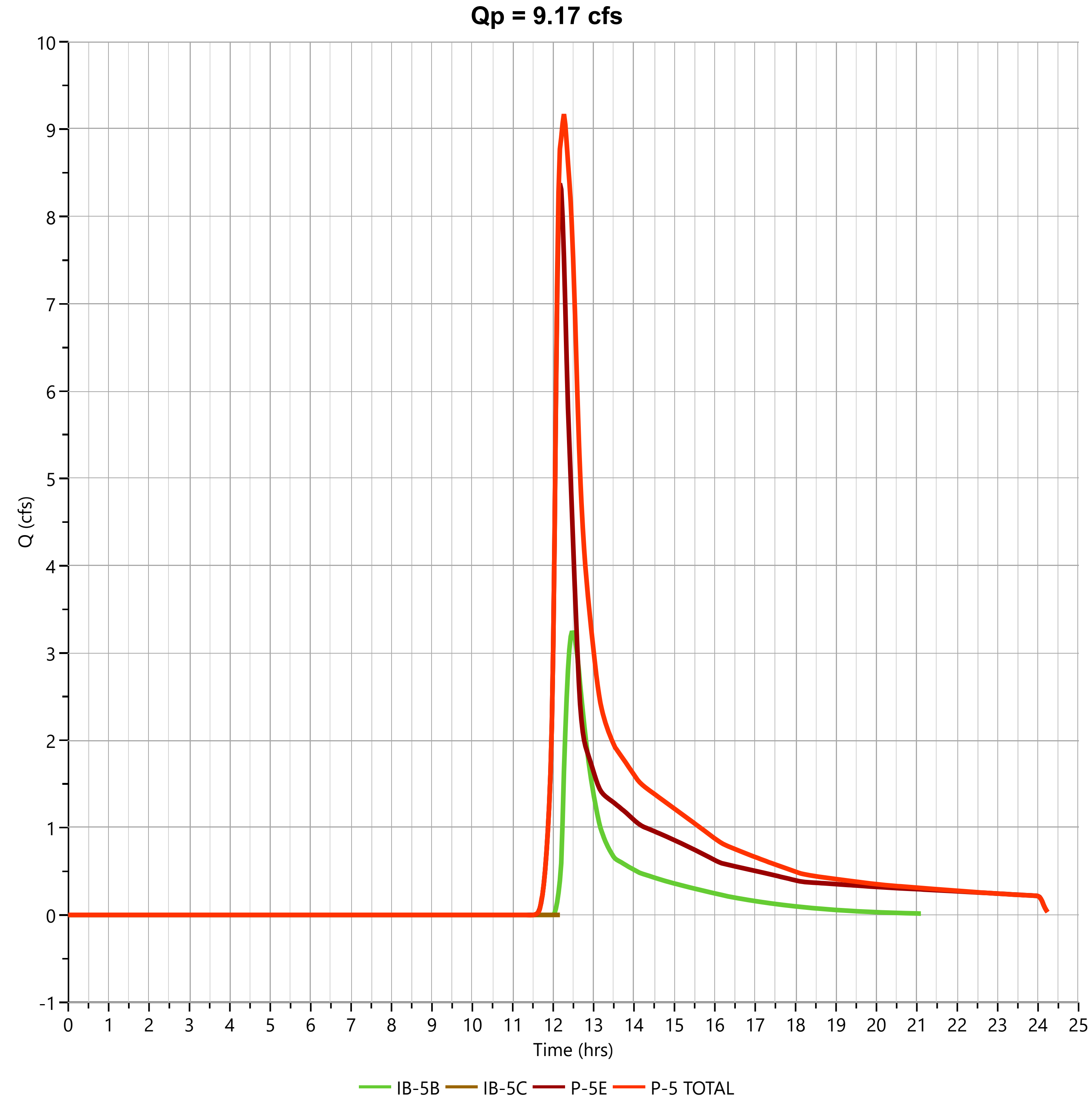


Hydrograph Report

P-5 TOTAL

Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 9.173 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Hydrograph Volume	= 51,772 cuft
Inflow Hydrographs	= 14, 16, 17	Total Contrib. Area	= 8.97 ac



Hydrograph Report

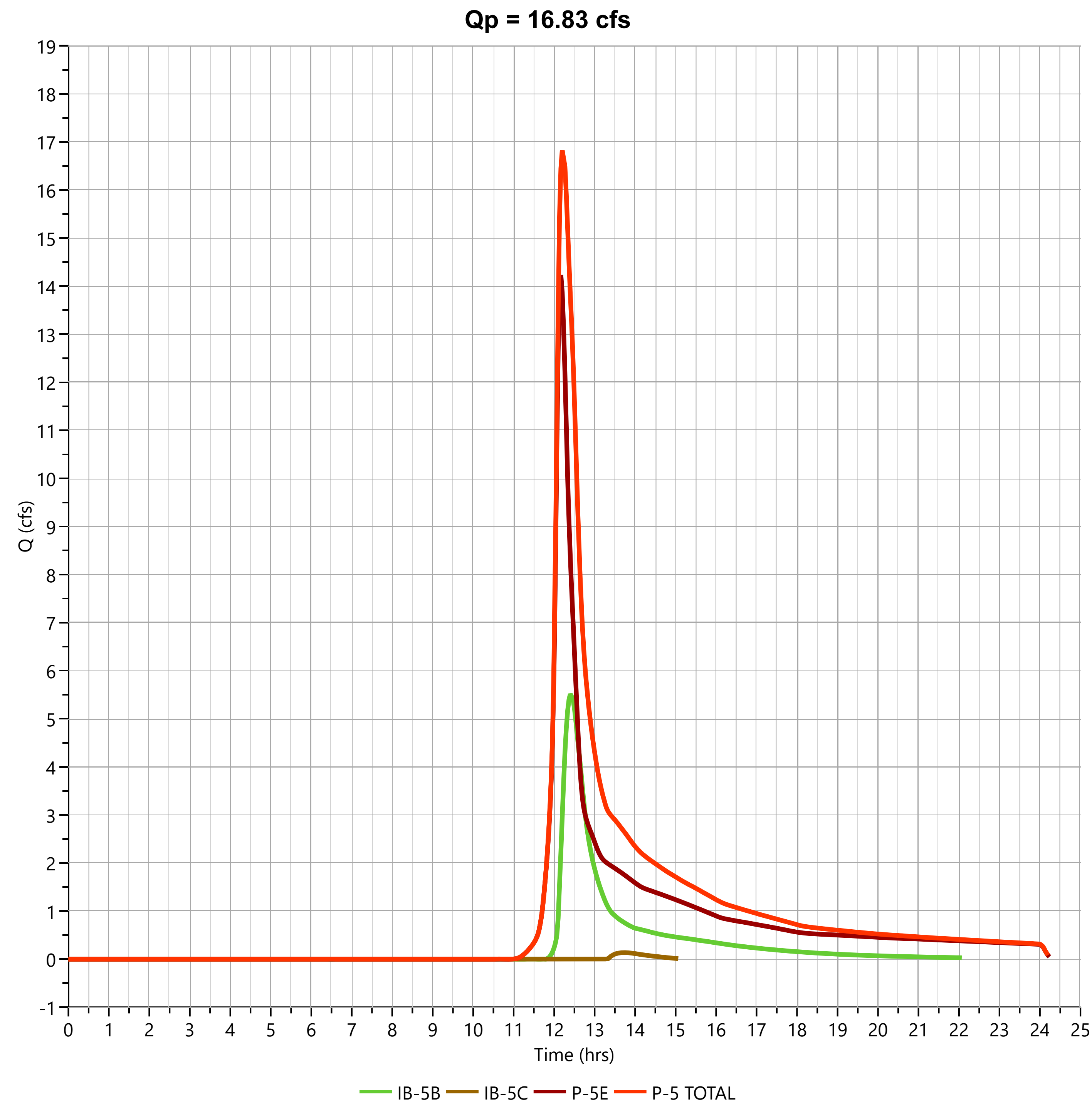
Hydrology Studio v 3.0.0.27

06-17-2023

P-5 TOTAL

Hyd. No. 18

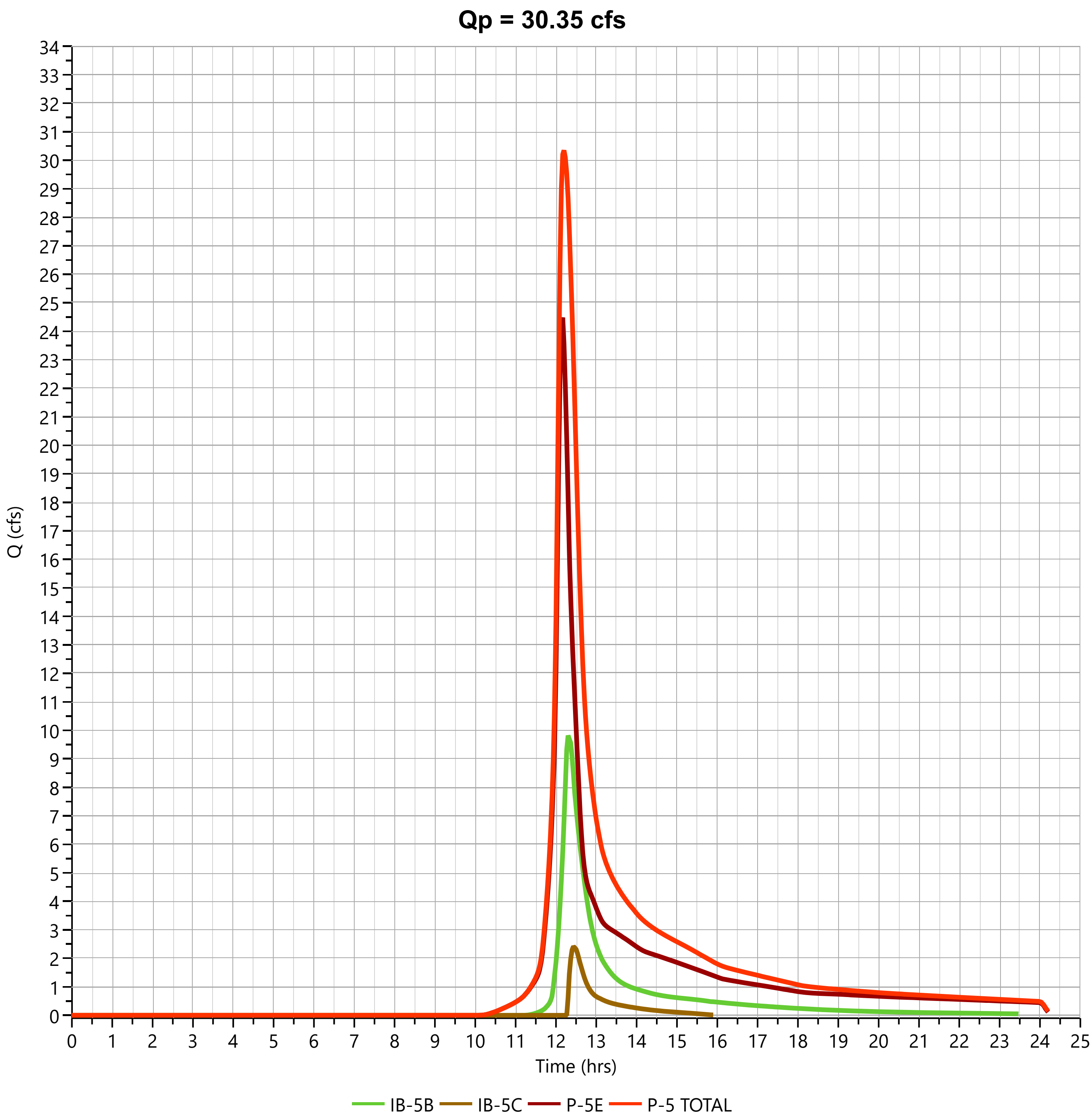
Hydrograph Type	= Junction	Peak Flow	= 16.83 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 81,739 cuft
Inflow Hydrographs	= 14, 16, 17	Total Contrib. Area	= 8.97 ac



P-5 TOTAL

Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 30.35 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 138,839 cuft
Inflow Hydrographs	= 14, 16, 17	Total Contrib. Area	= 8.97 ac



Worksheet 2: Runoff curve number and runoff **SM-3719C**

Project: Athens Street By NC Date 6/24/22
Rev Date 10/13/2022
Location: Stow, MA Checked Date 6/17/2023

Circle one: Present Developed Subcatchment P-6A

1. Runoff curve number (CN)

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

CN (weighted) = total product / total area = 64.65 / 1.79 = 36.19 ; Use CN = 36

2. Runoff

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By NC Date 6/24/2022
Rev Date 10/13/2022
Location: Stow, MA Checked Date 6/17/2023

Circle one: Present **Developed** Subcatchment P-6A
Circle one: Tc **Tt** through subarea

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 Tt	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 Tt	hr	0.04			0.04
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.33
min 19.6

P-6A

Hyd. No. 34

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

Qp = 0.00 cfs

Hydrograph Report

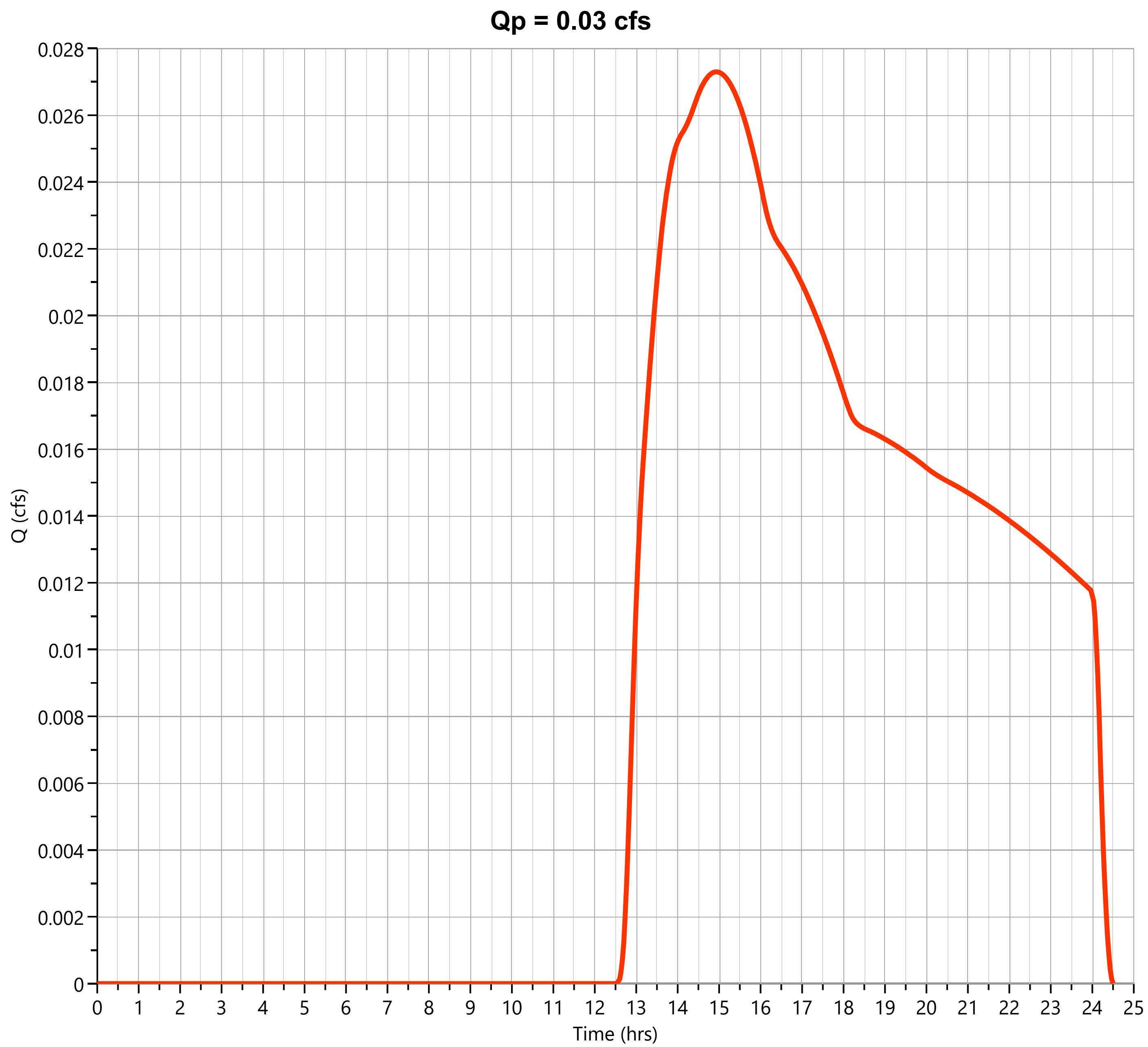
Hydrology Studio v 3.0.0.31

02-14-2024

P-6A

Hyd. No. 34

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

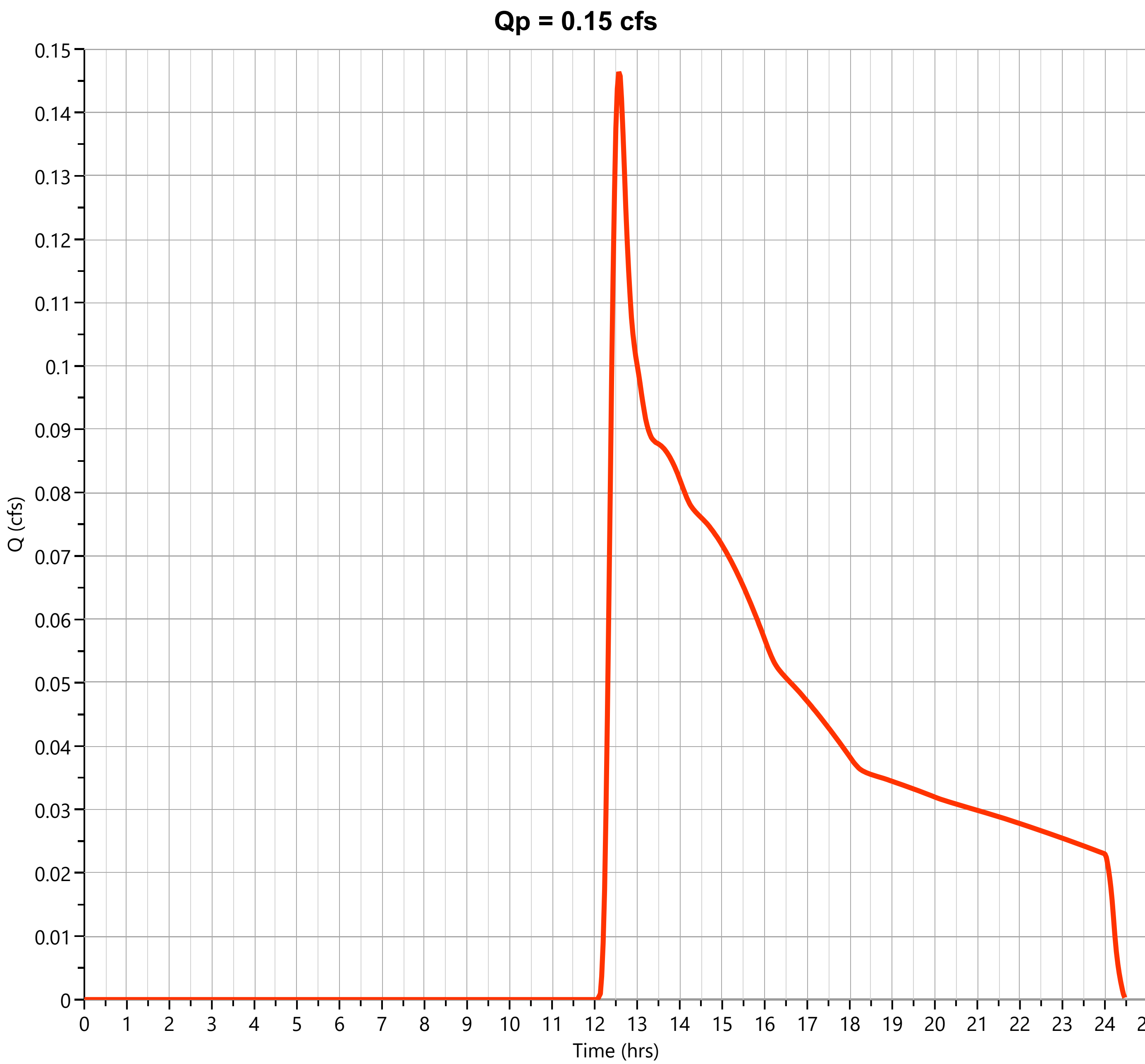


Hydrograph Report

P-6A

Hyd. No. 34

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

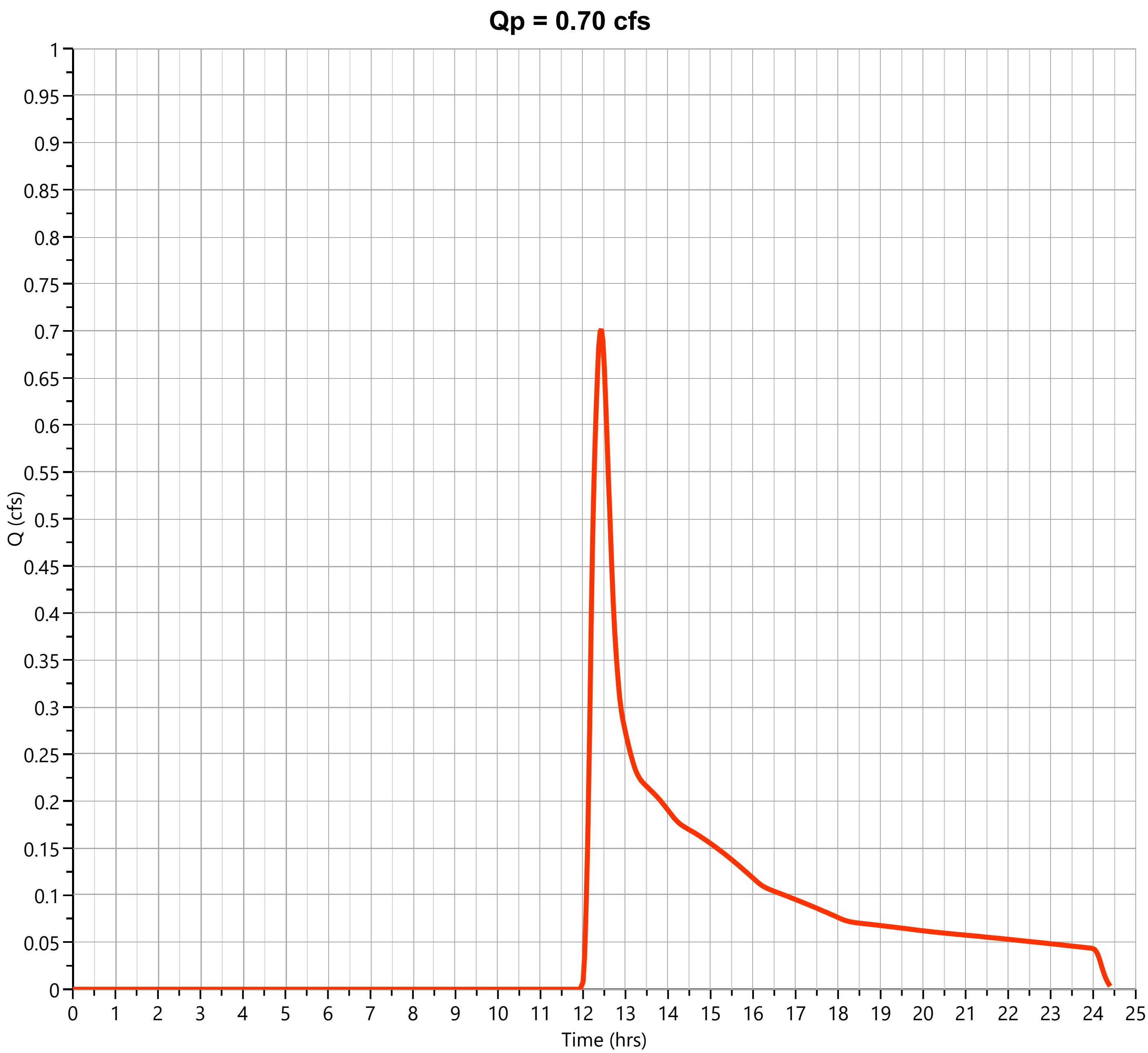


Hydrograph Report

P-6A

Hyd. No. 34

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



Worksheet 2: Runoff curve number and runoff **SM-3719C**

Project: Athens Street By NC Date 6/24/22
Rev Date 10/13/2022
Location: Stow, MA Checked Date 6/17/2023

Circle one: Present $\boxed{\text{Developed}}$ Subcatchment P-6B

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)		CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
	Impervious		98			0.21	20.72
A	Woods	Good Condition	30			0.00	0.00
A	Open Space	Good Condition	39			0.64	24.86
A	Open Space	Fair Condition	49			0.00	0.00
A	Gravel		76			0.00	0.00
B	Woods	Good Condition	55			0.00	0.00
B	Open Space	Good Condition	61			0.00	0.00
B	Gravel		85			0.00	0.00
C	Woods	Good Condition	70			0.00	0.00
C	Open Space	Good Condition	74			0.00	0.00
C	Open Space	Poor Condition	86			0.00	0.00
C	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
					Totals =	0.85	45.58

1/ Use only one CN source per line. 36974

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{45.58}{0.85} = 53.69$; Use CN = $\boxed{54}$

2. Runoff

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By NC Date 6/24/2022
Rev Date 10/13/2022
Location: Stow, MA Checked Date 6/17/2023

Circle one: Present **Developed** Subcatchment P-6B
Circle one: Tc **Tt** through subarea

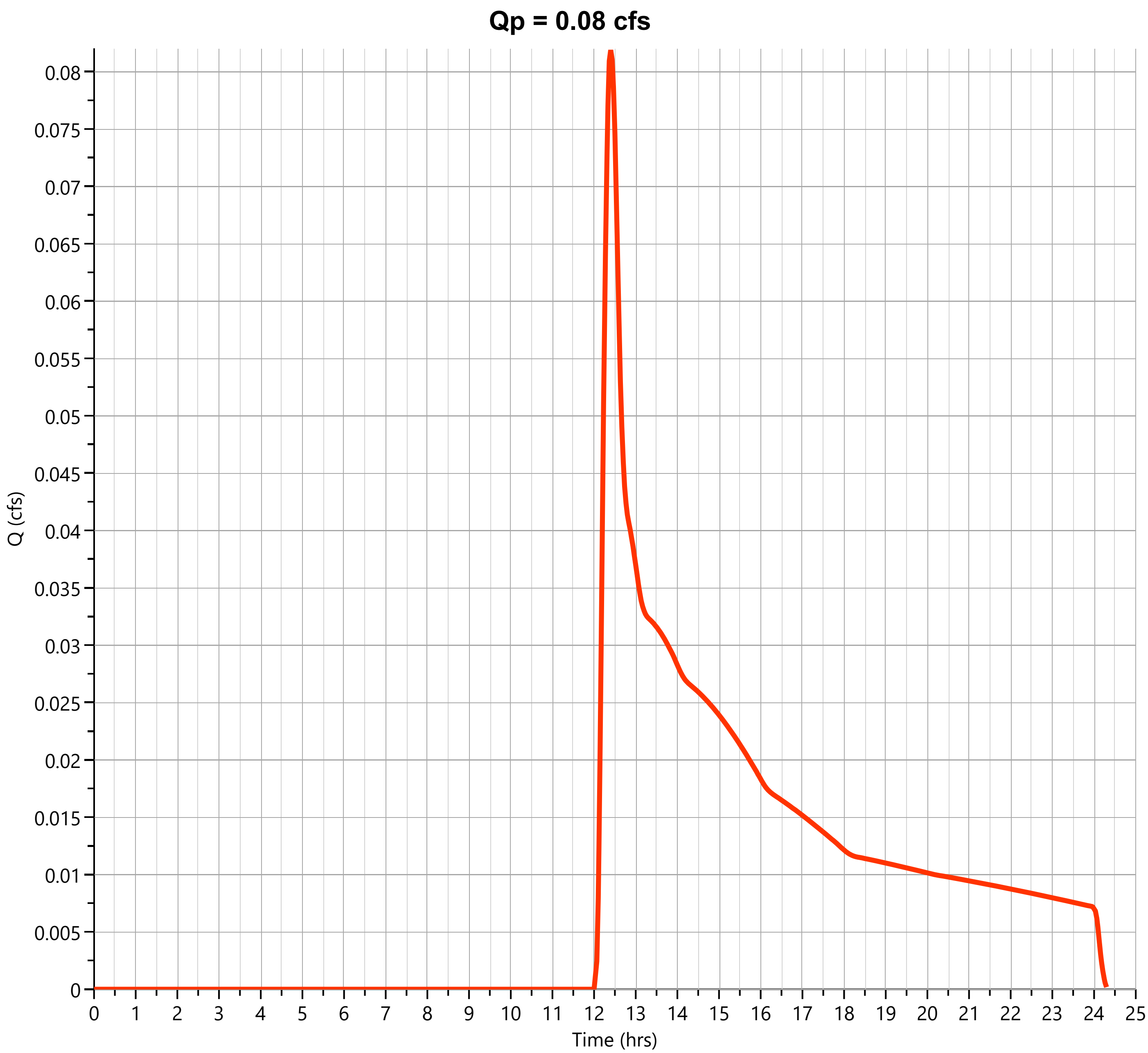
Sheet flow (Applicable to Tc only)		Segment ID	A-B			
1. Surface Description (table 3-1)			LAWN			
2. Mannings roughness coeff., n (table 3-1)			0.24			
3. Flow length, L (total L <= 300 ft)		ft	50			
4. Two-yr 24-hr rainfall, P2		in	3.1			
5. Land Slope, s		ft/ft	0.015			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.16			0.16
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	198			
9. Watercourse slope, s		ft/ft	0.030			
10. Average Velocity, V (figure 3-1)		ft/s	2.79			
11. Tt = L / 3600V	Compute Tt	hr	0.02			0.02
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.18
min 10.5

Hydrograph Report

P-6B Hyd. No. 35

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

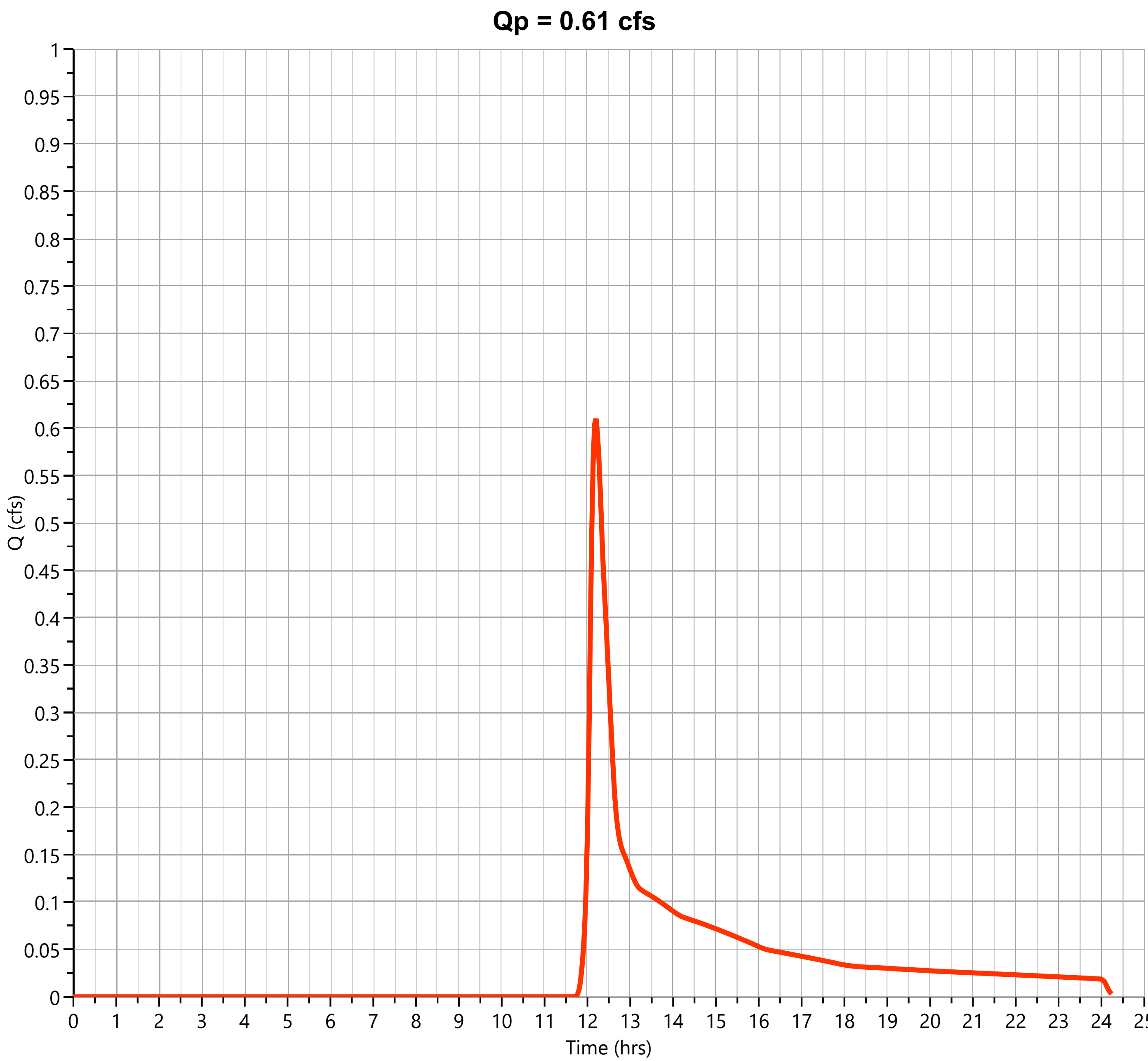


Hydrograph Report

P-6B

Hyd. No. 35

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

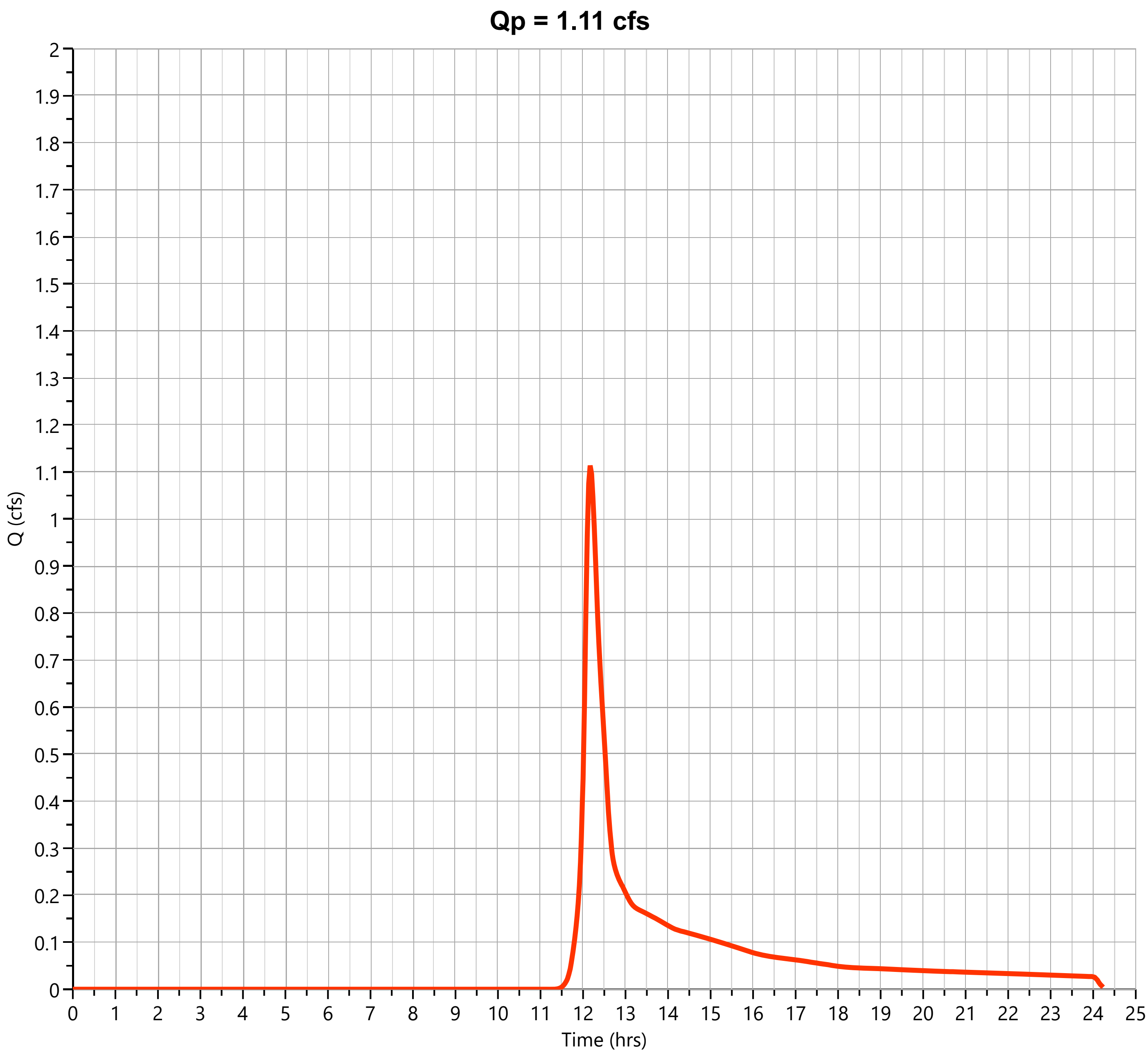


Hydrograph Report

P-6B

Hyd. No. 35

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



Hydrograph Report

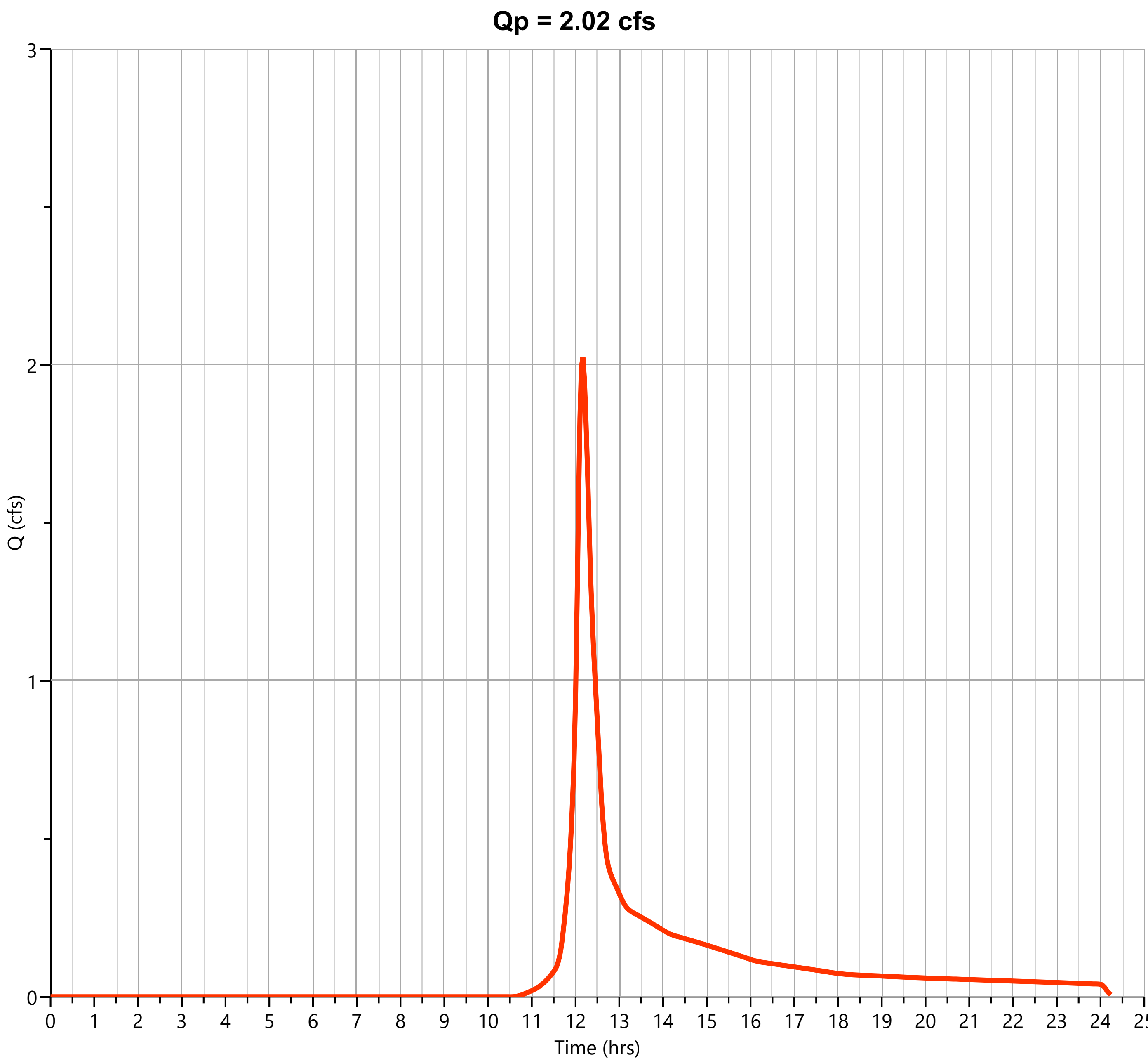
Project Name:

Hydrology Studio v 3.0.0.31 02-14-2024

P-6B

Hyd. No. 35

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



Hydrograph Report

Project Name:

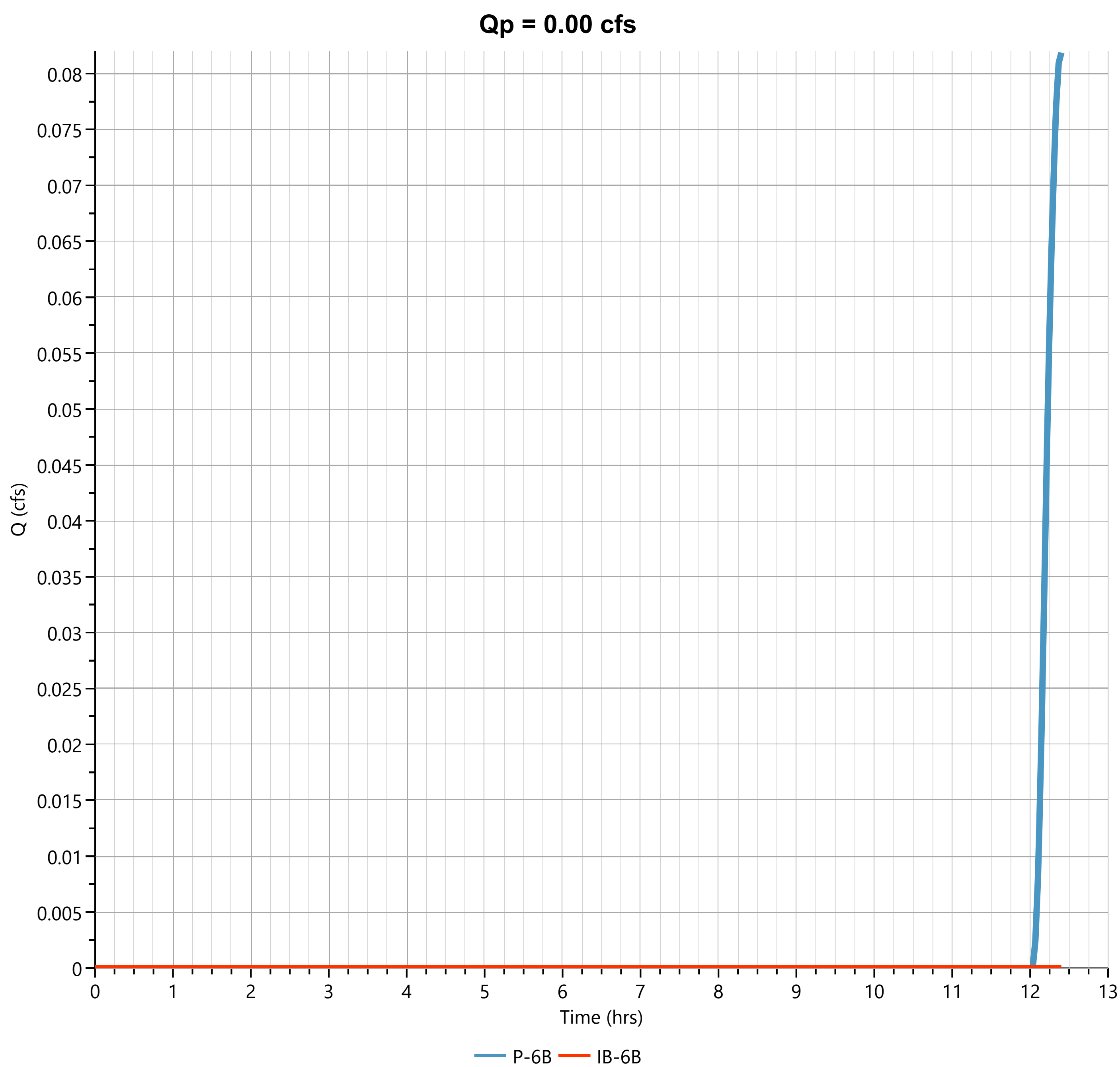
Hydrology Studio v 3.0.0.31 02-14-2024

IB-6B

Hyd. No. 36

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 35 - P-6B	Max. Elevation	= 221.06 ft
Pond Name	= IB-6B	Max. Storage	= 41.5 cuft

Pond Routing by Storage Indication Method

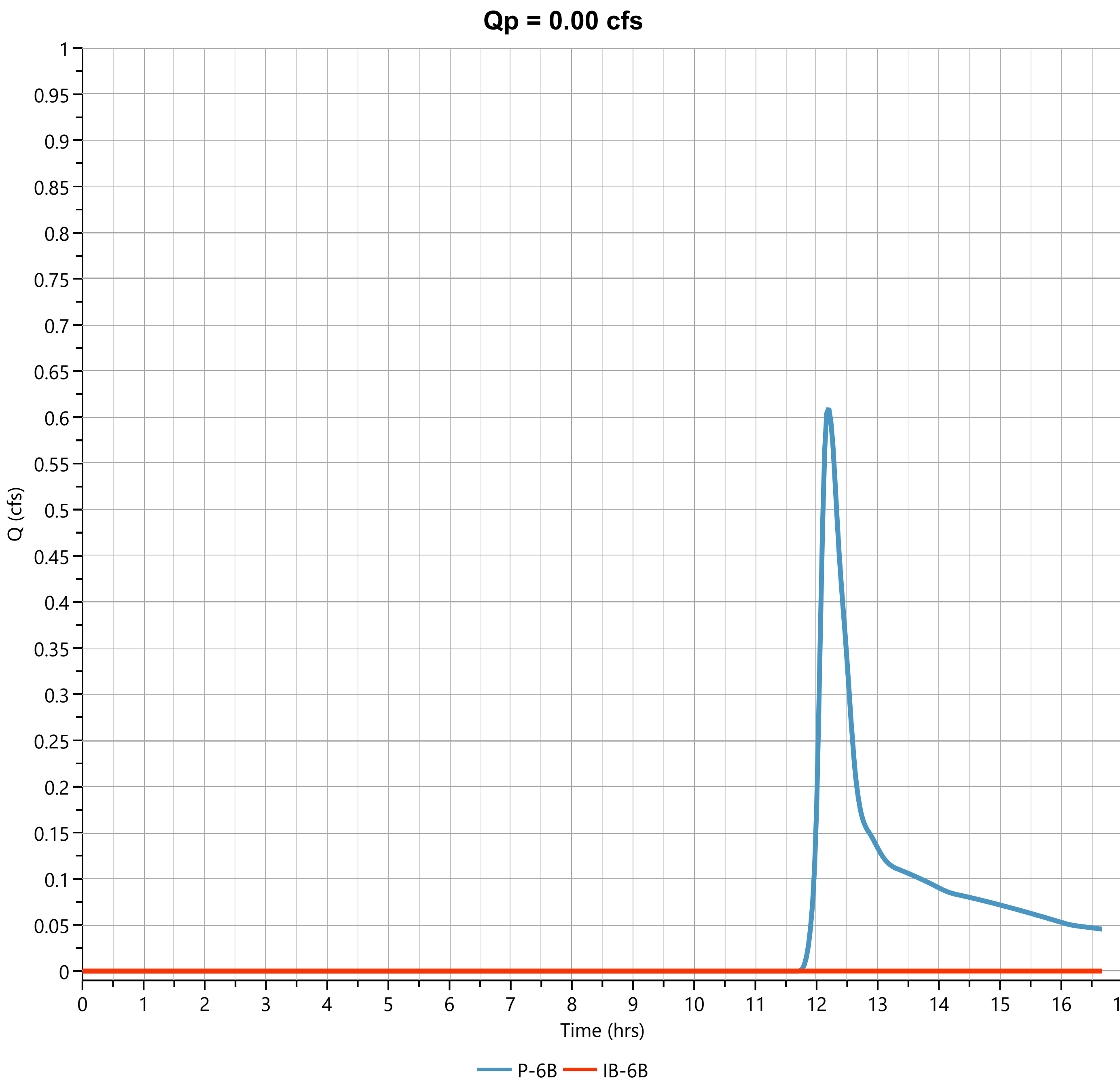


IB-6B

Hyd. No. 36

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

Pond Routing by Storage Indication Method



Hydrograph Report

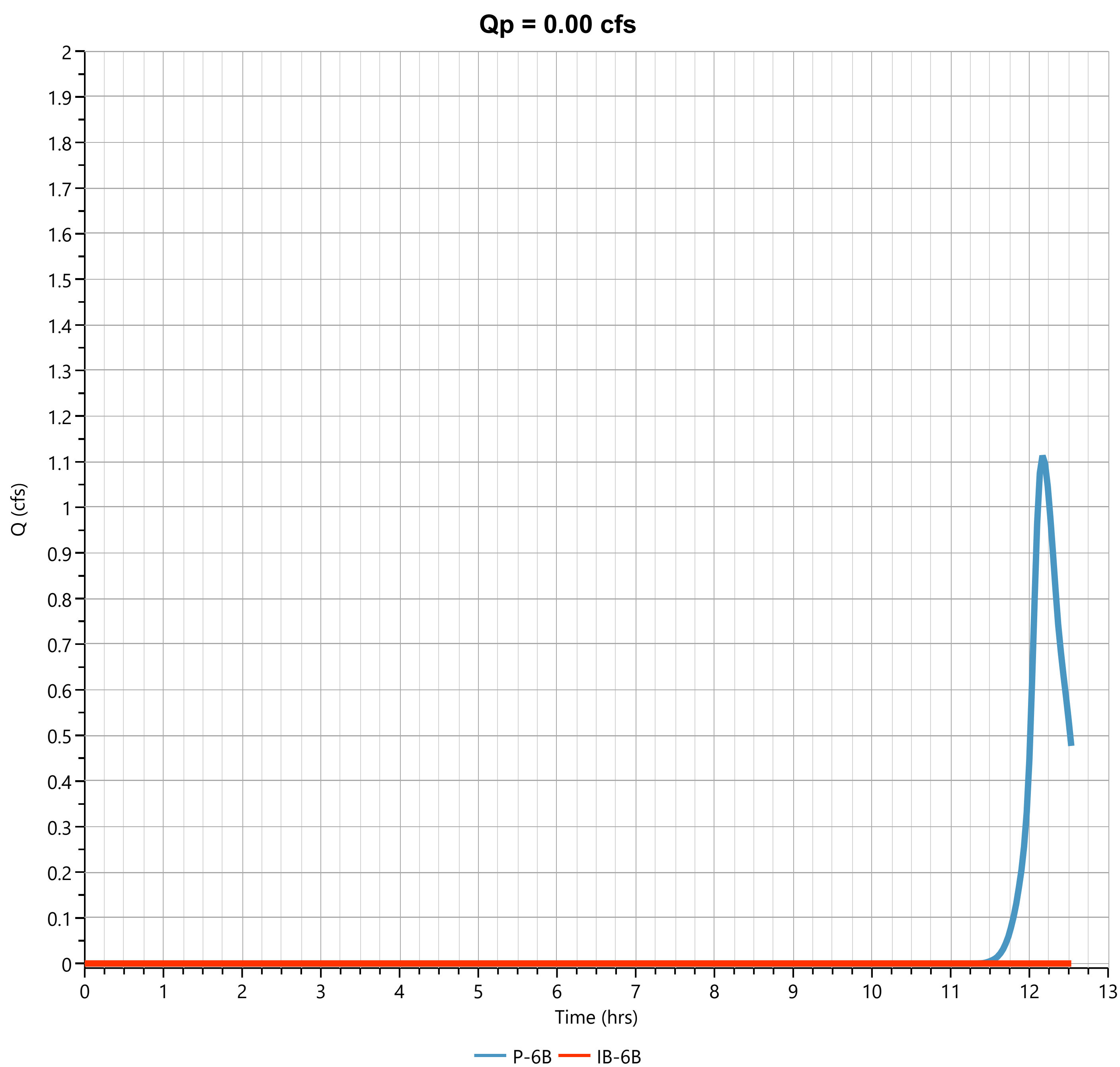
Project Name:

Hydrology Studio v 3.0.0.31 02-14-2024

IB-6B Hyd. No. 36

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.50 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 35 - P-6B	Max. Elevation	= 222.35 ft
Pond Name	= IB-6B	Max. Storage	= 1,356 cuft

Pond Routing by Storage Indication Method



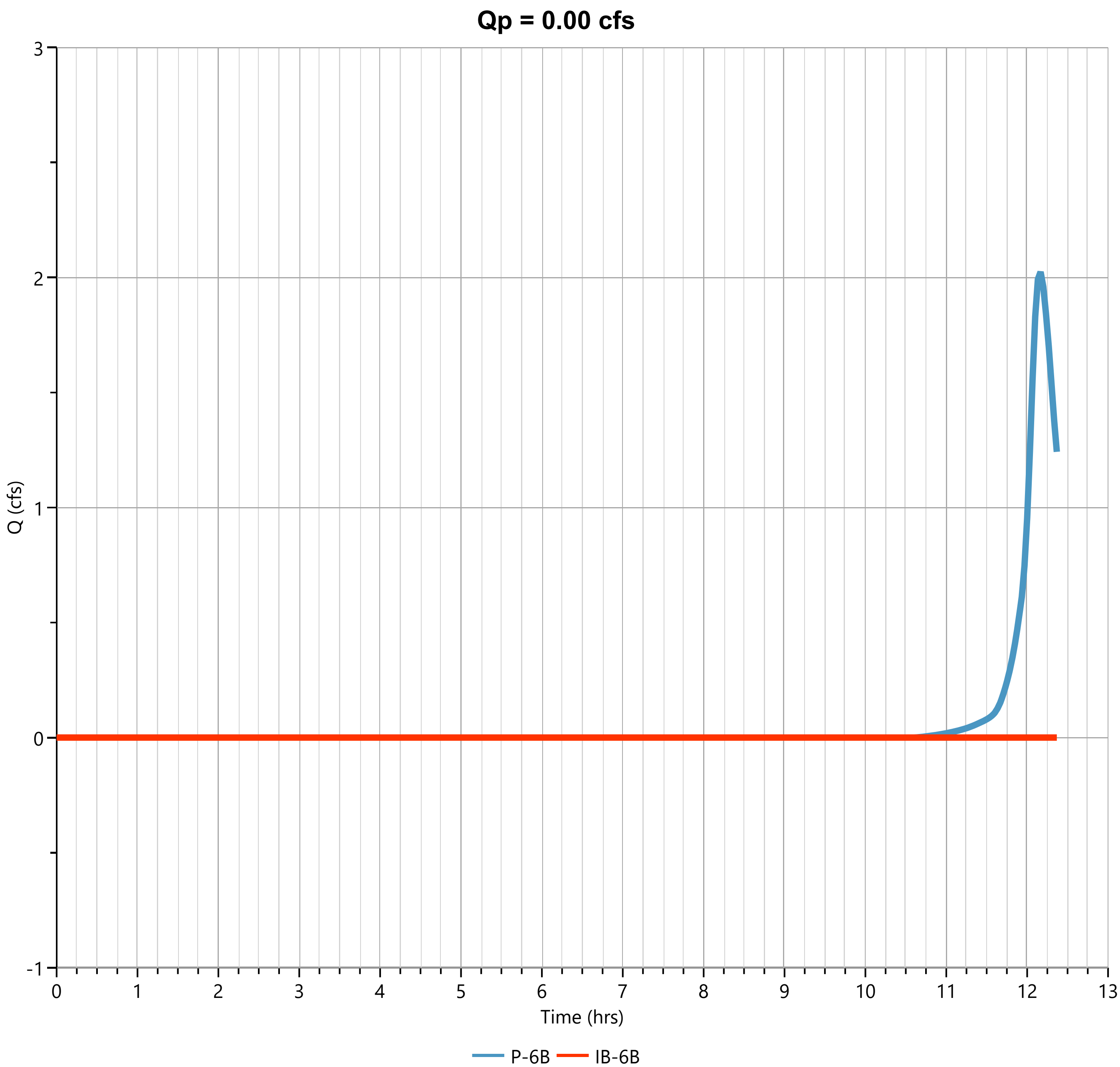
Hydrograph Report

IB-6B

Hyd. No. 36

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 35 - P-6B	Max. Elevation	= 223.03 ft
Pond Name	= IB-6B	Max. Storage	= 2,580 cuft

Pond Routing by Storage Indication Method



Pond Report

Project Name:

Hydrology Studio v 3.0.0.31 02-14-2024

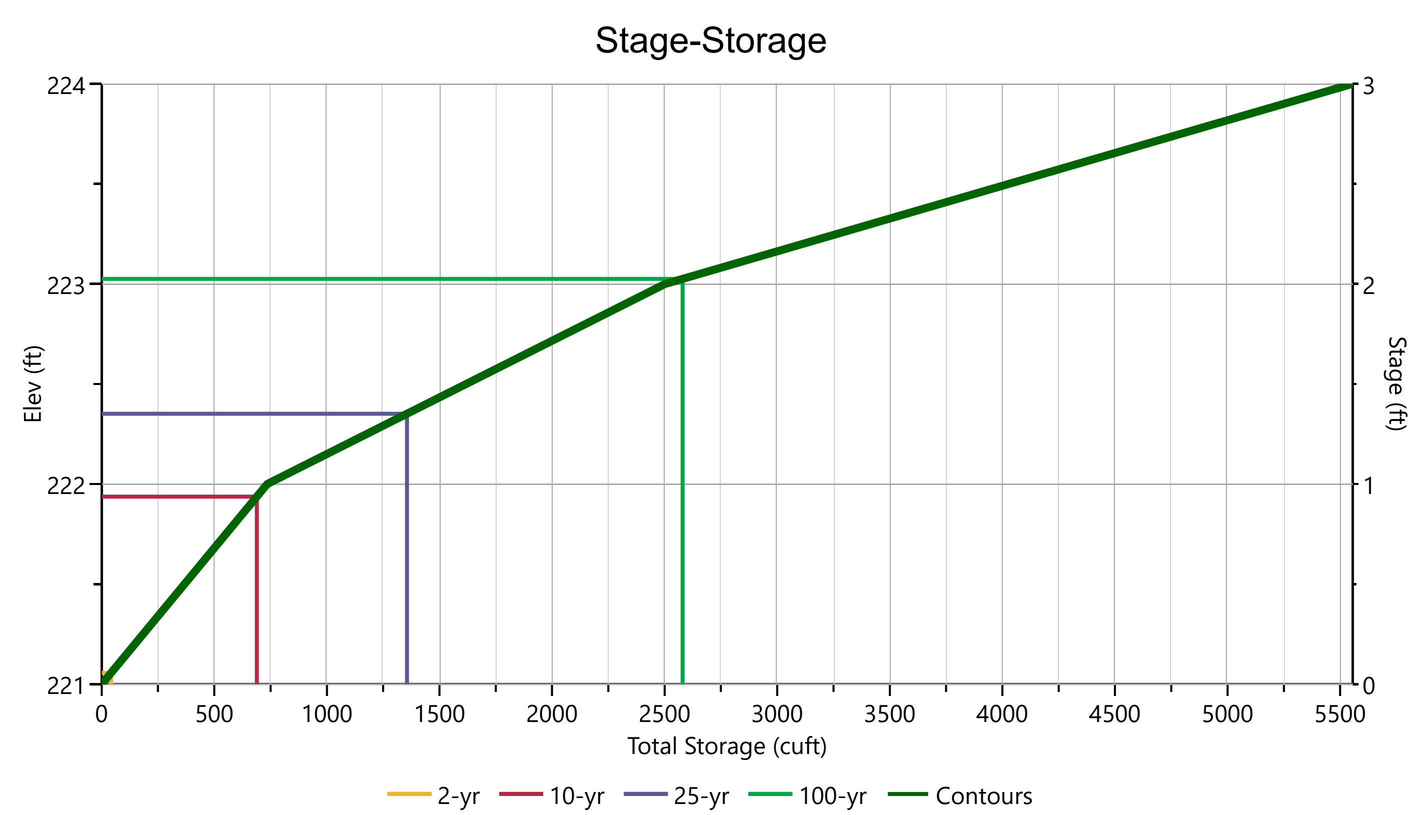
IB-6B

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	221.00
Voids (%)	100.00
Volume Calc	Ave End Area

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	221.00	572	0.000	0.000
1.00	222.00	899	736	736
2.00	223.00	2,633	1,766	2,502
3.00	224.00	3,474	3,054	5,555

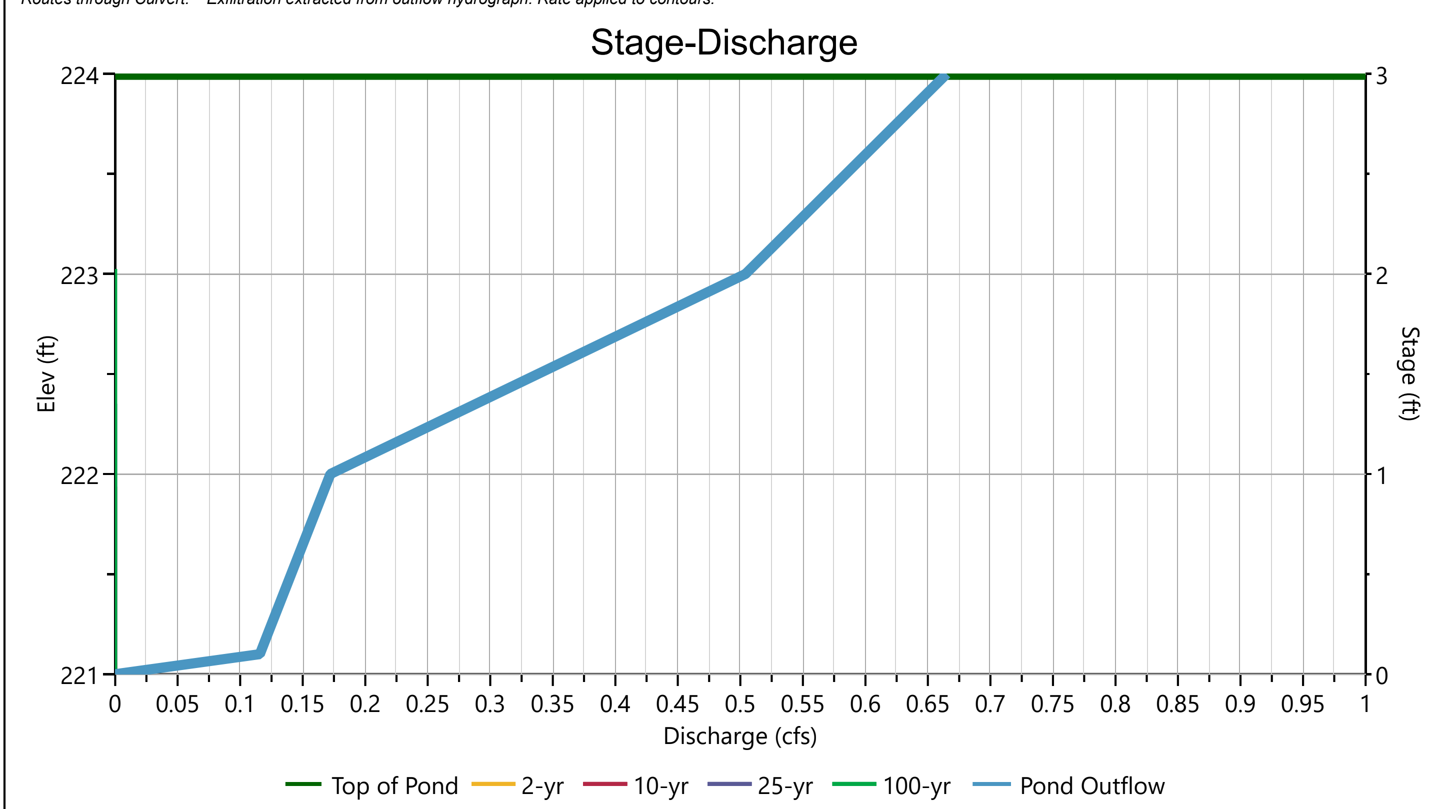


IB-6B

Stage-Discharge

Culvert / Orifices	Culvert	Orifices 1	Orifices 2	Orifices 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 1**	**Weirs 2**	**Weirs 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.



Pond Report

IB-6B

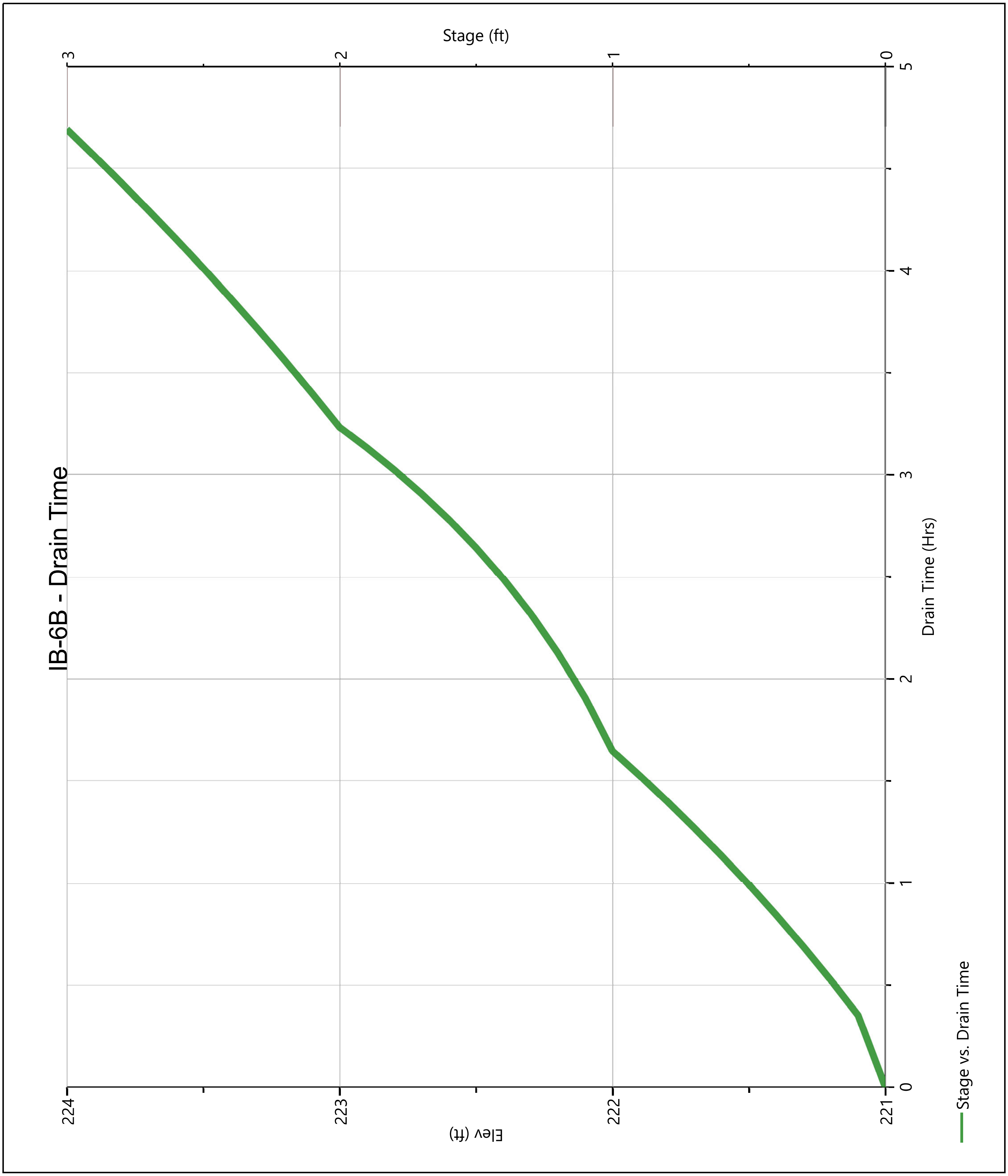
Stage-Storage-Discharge Summary

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

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

IB-6B

Pond Drawdown



Hydrograph Report

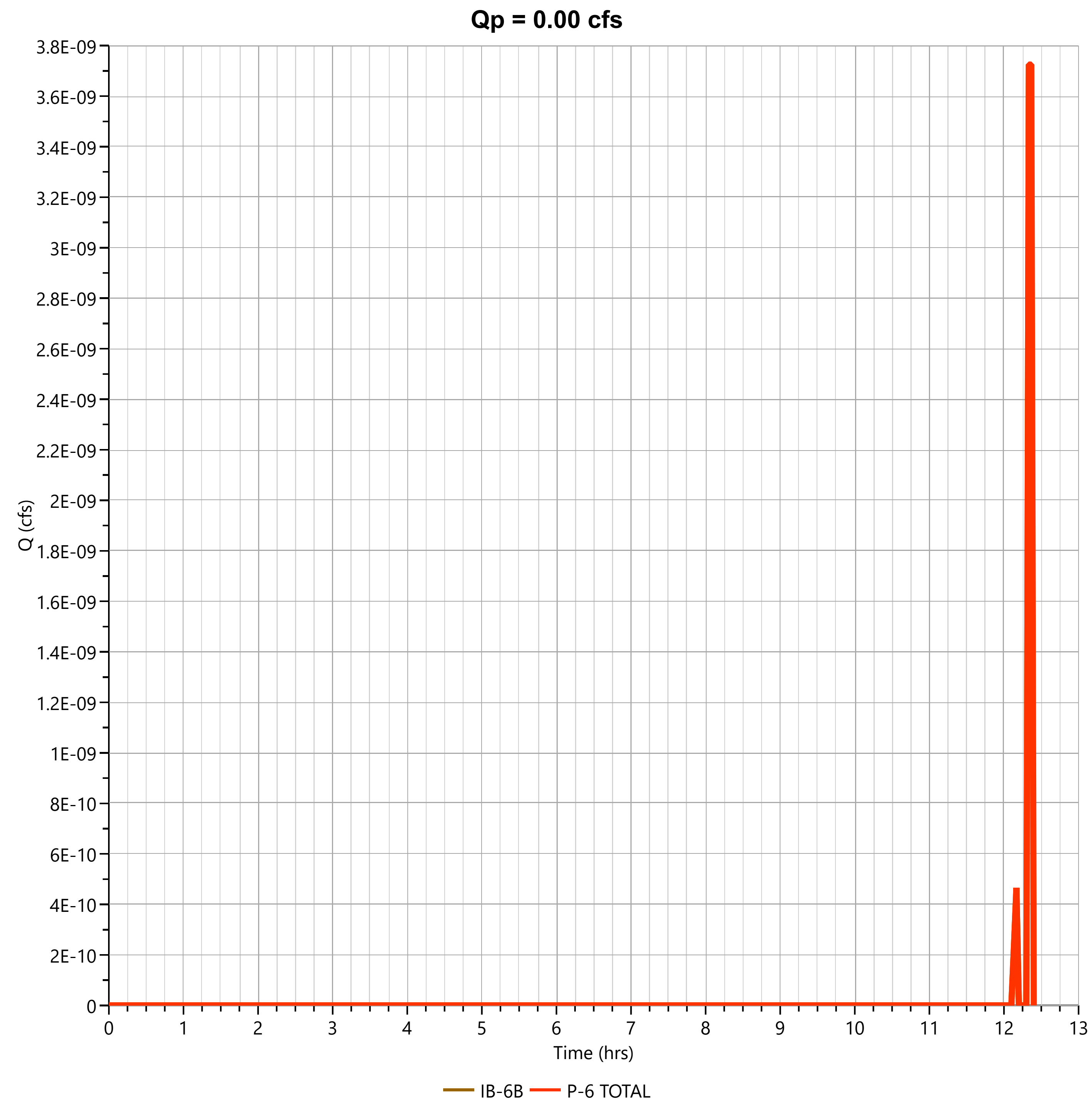
Project Name:

Hydrology Studio v 3.0.0.31 02-14-2024

P-6 TOTAL

Hyd. No. 37

Hydrograph Type	= Junction	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.33 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrographs	= 34, 36	Total Contrib. Area	= 1.79 ac



Hydrograph Report

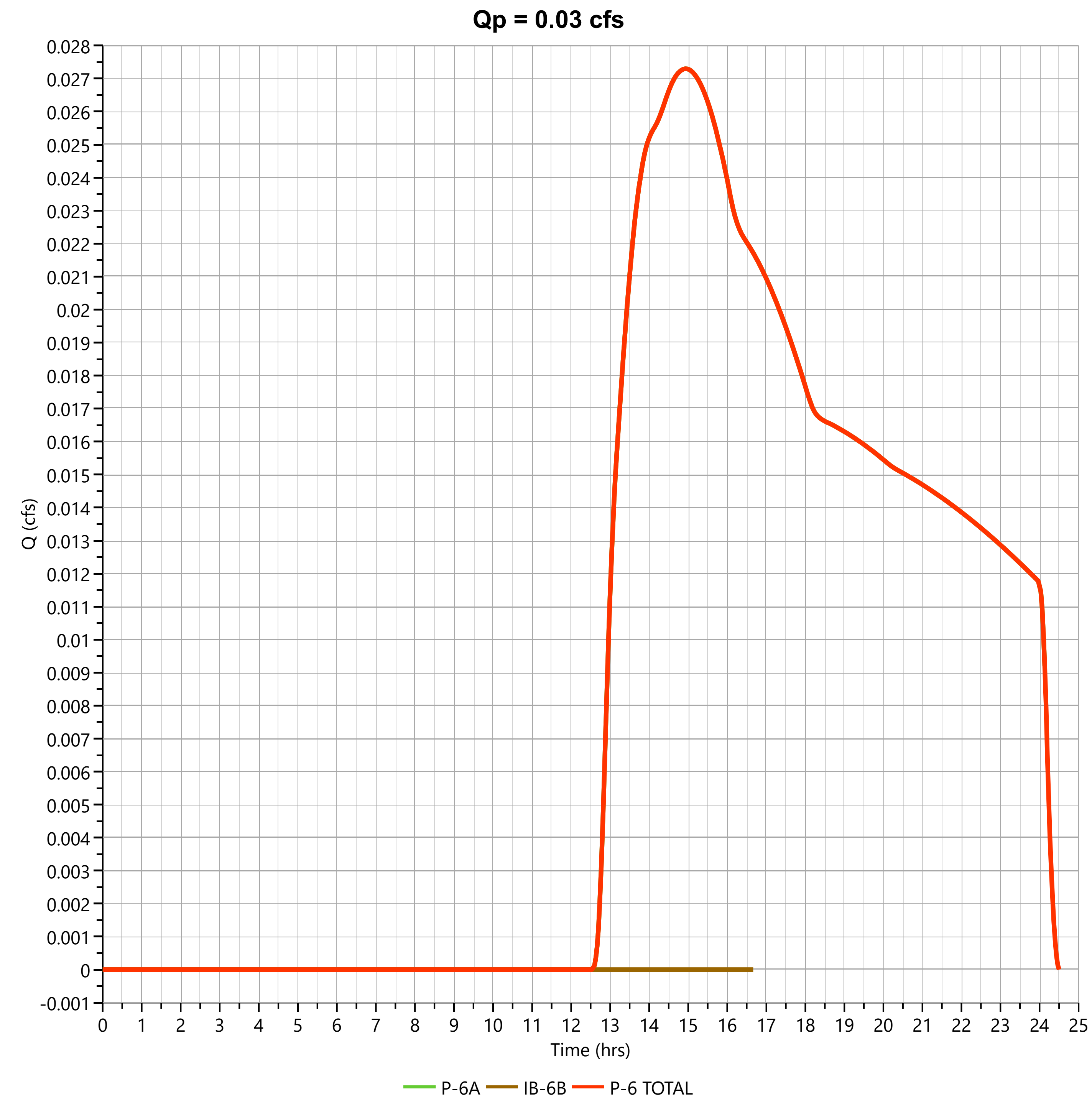
Project Name:

Hydrology Studio v 3.0.0.31 02-14-2024

P-6 TOTAL

Hyd. No. 37

Hydrograph Type	= Junction	Peak Flow	= 0.027 cfs
Storm Frequency	= 10-yr	Time to Peak	= 14.93 hrs
Time Interval	= 2 min	Hydrograph Volume	= 743 cuft
Inflow Hydrographs	= 34, 36	Total Contrib. Area	= 1.79 ac



Hydrograph Report

Project Name:

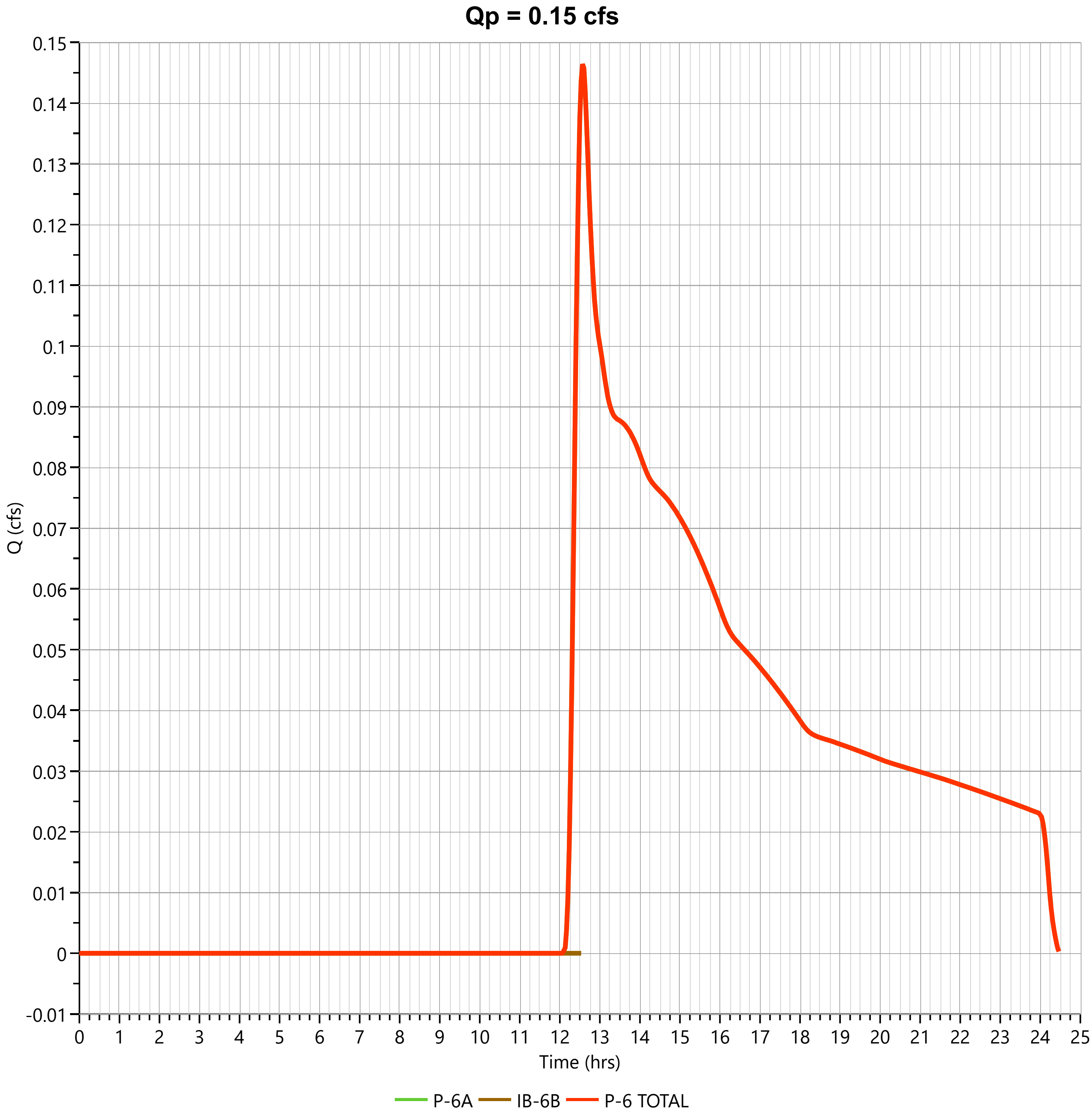
Hydrology Studio v 3.0.0.31

02-14-2024

P-6 TOTAL

Hyd. No. 37

Hydrograph Type	= Junction	Peak Flow	= 0.146 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.57 hrs
Time Interval	= 2 min	Hydrograph Volume	= 2,131 cuft
Inflow Hydrographs	= 34, 36	Total Contrib. Area	= 1.79 ac



Hydrograph Report

Project Name:

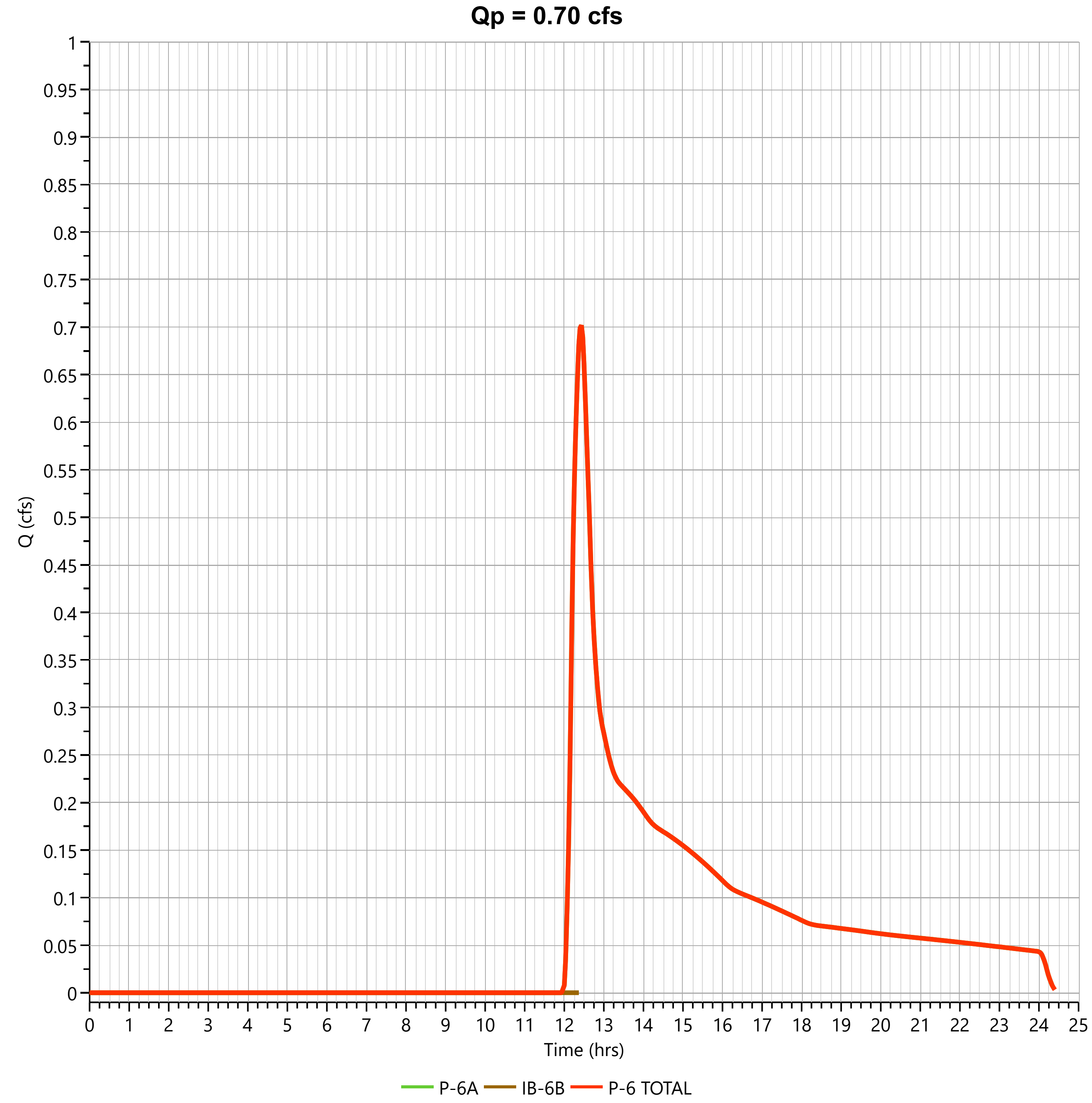
Hydrology Studio v 3.0.0.31

02-14-2024

P-6 TOTAL

Hyd. No. 37

Hydrograph Type	= Junction	Peak Flow	= 0.702 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.43 hrs
Time Interval	= 2 min	Hydrograph Volume	= 5,404 cuft
Inflow Hydrographs	= 34, 36	Total Contrib. Area	= 1.79 ac



Worksheet 2: Runoff curve number and runofl **SM-3719C**

Project: Athens Street By NC Date 6/24/22
Rev Date 10/13/2022
Location: Stow, MA Checked Date 6/17/2023

Circle one: Present Developed Subcatchment P-7A

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)		CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
	Impervious		98			1.47	144.27
A	Woods	Good Condition	30			0.12	3.62
A	Open Space	Good Condition	39			2.37	92.58
A	Open Space	Fair Condition	49			0.00	0.00
A	Gravel		76			0.00	0.00
B	Woods	Good Condition	55			0.00	0.00
B	Open Space	Good Condition	61			0.00	0.00
B	Gravel		85			0.00	0.00
C	Woods	Good Condition	70			0.00	0.00
C	Open Space	Good Condition	74			0.00	0.00
C	Open Space	Poor Condition	86			0.00	0.00
C	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) = $\frac{\text{total product}}{\text{total area}}$ = $\frac{240.47}{3.97}$ = 60.62 ; Use CN = 61

2. Runoff

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By NC Date 6/24/2022

Rev Date 10/13/2022

Location: Stow, MA Checked Date 6/17/2023

Circle one: Present **Developed** Subcatchment P-7A

Circle one: Tc **Tt** through subarea

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	0.045			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.10			0.10
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	140			
9. Watercourse slope, s		ft/ft	0.026			
10. Average Velocity, V (figure 3-1)		ft/s	2.60			
11. Tt = L / 3600V	Compute Tt	hr	0.01			0.01
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.12

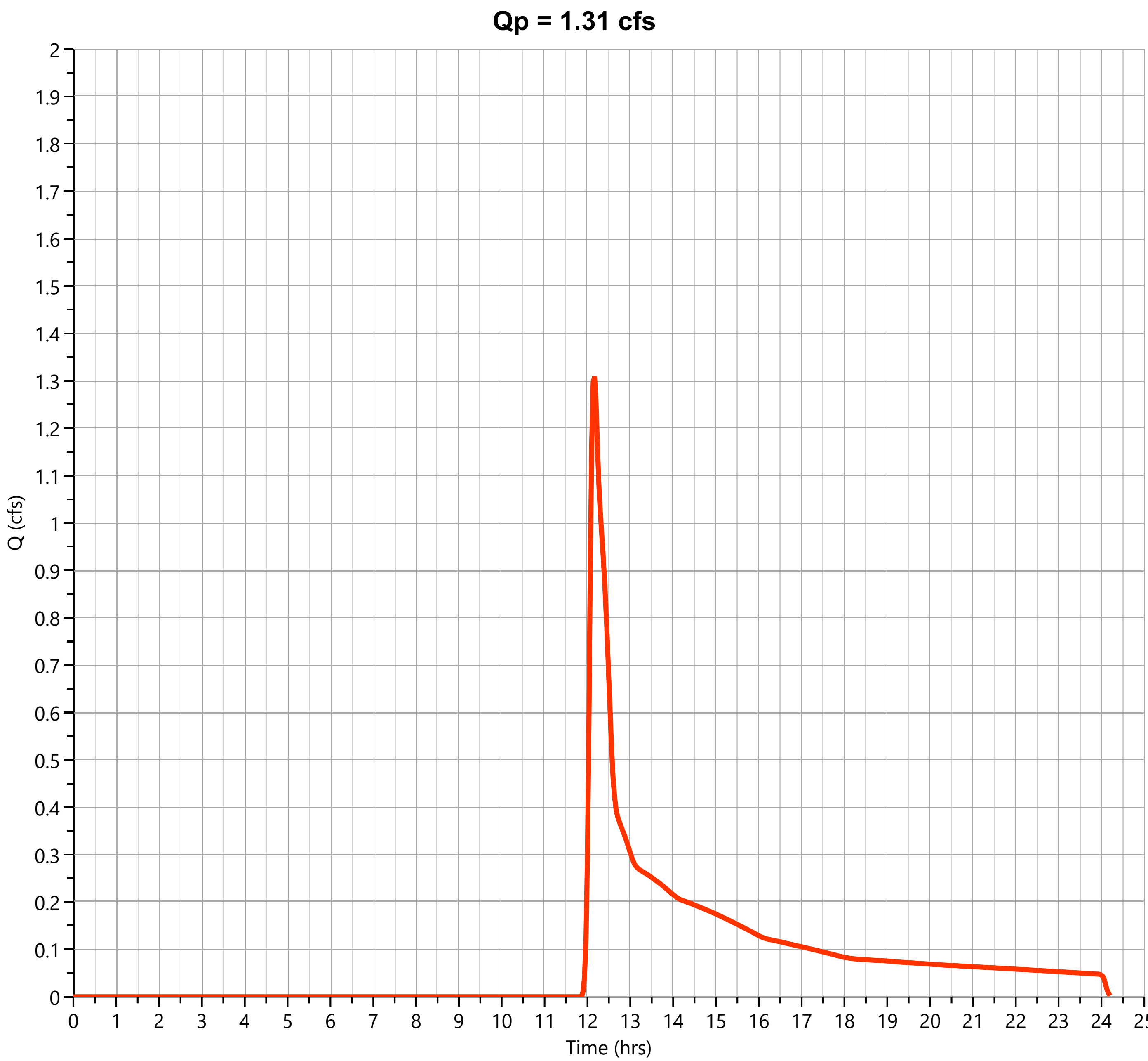
min 6.9

Hydrograph Report

P-7A

Hyd. No. 39

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 Report

Project Name:

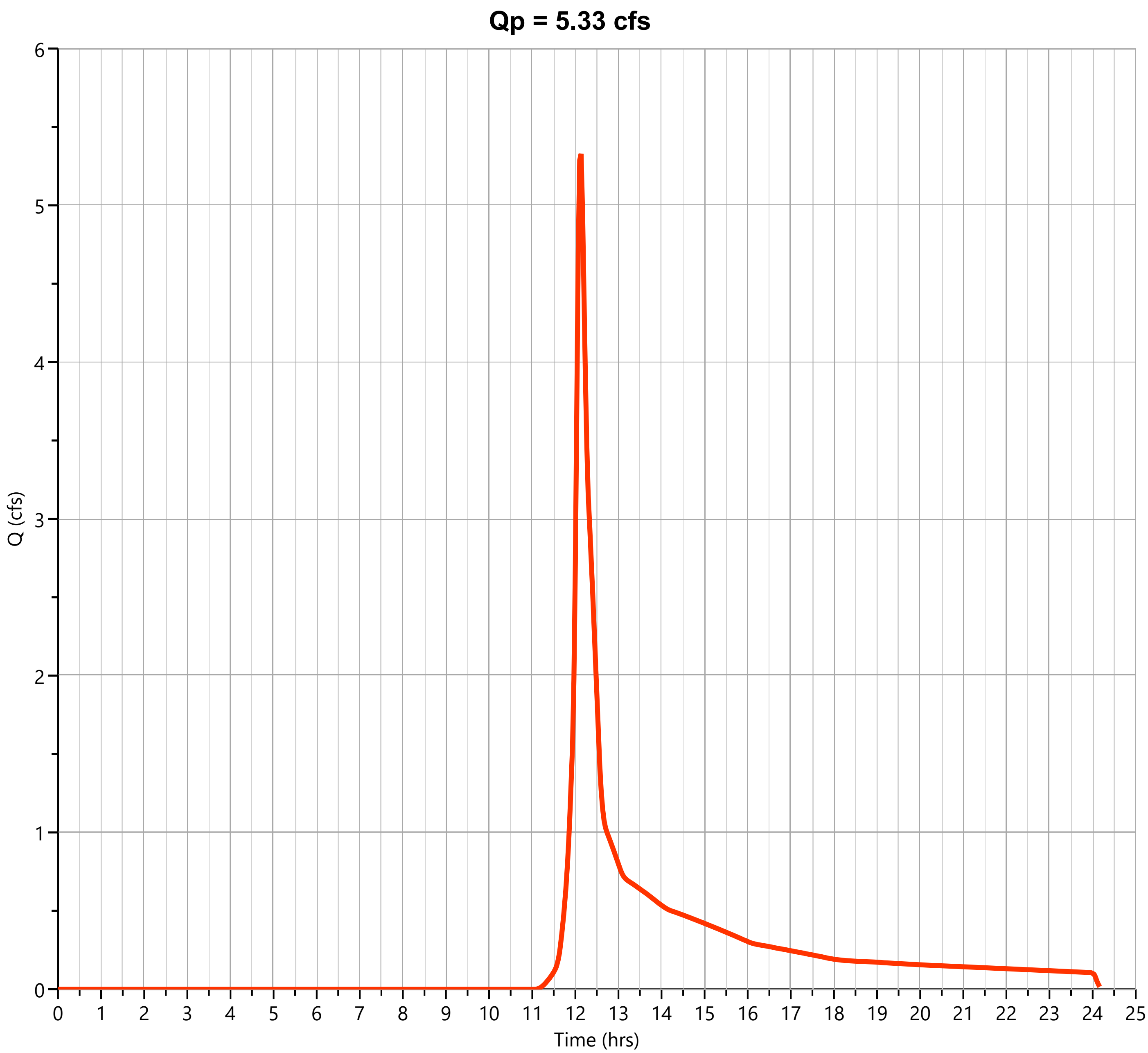
Hydrology Studio v 3.0.0.27

06-17-2023

P-7A

Hyd. No. 39

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 Report

Project Name:

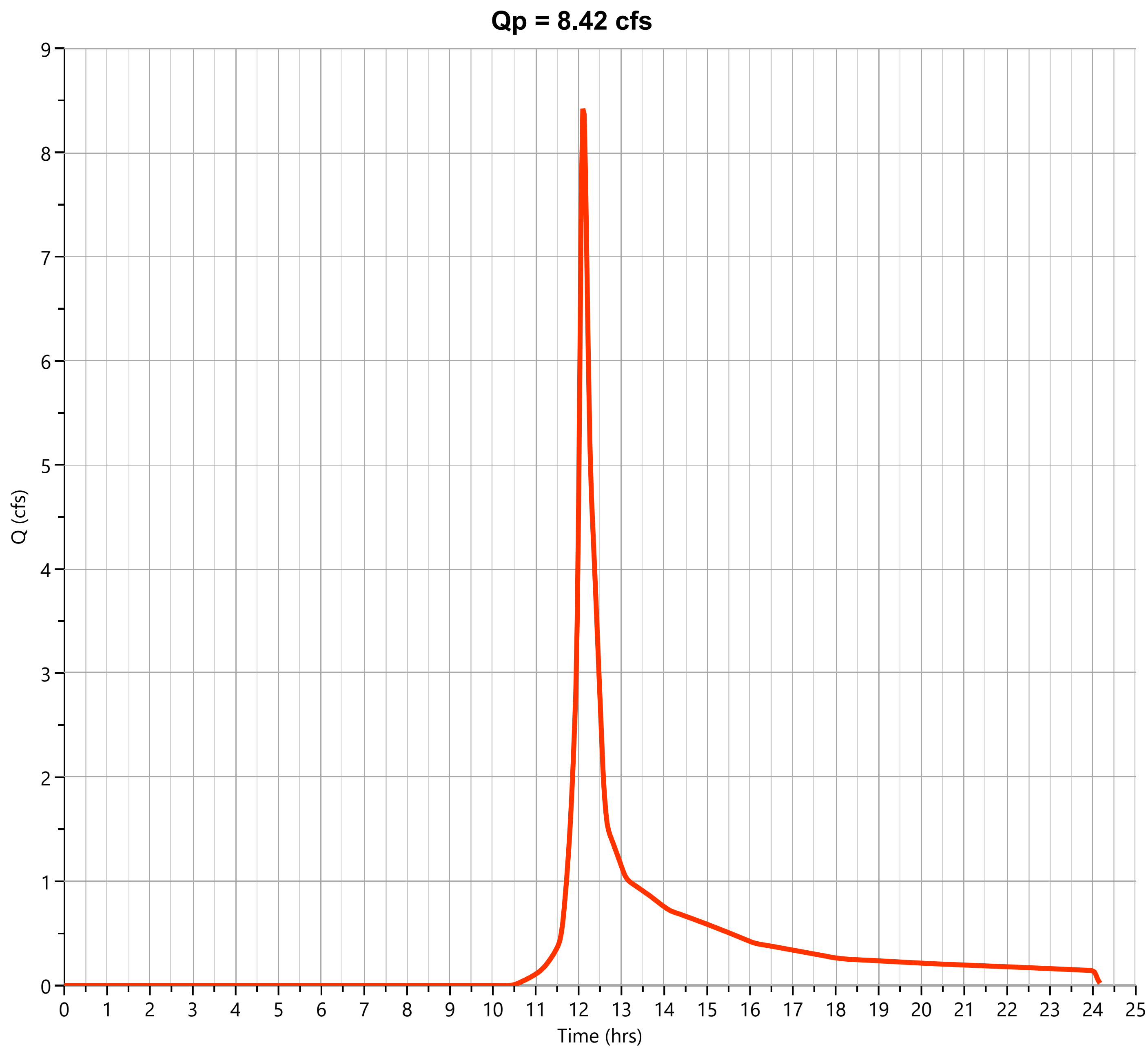
Hydrology Studio v 3.0.0.27

06-17-2023

P-7A

Hyd. No. 39

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

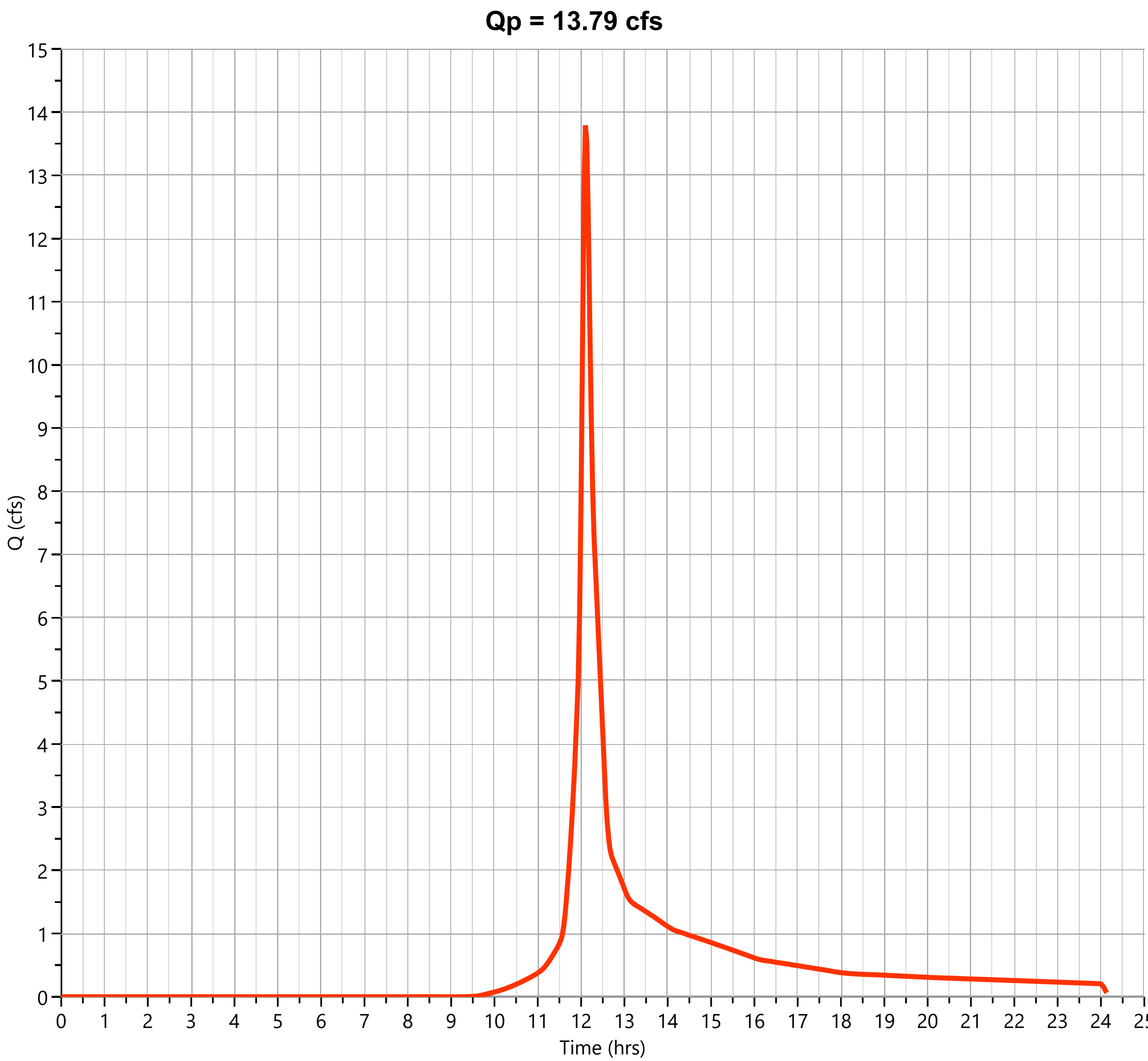


Hydrograph Report

P-7A

Hyd. No. 39

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



IB-7A REVISED

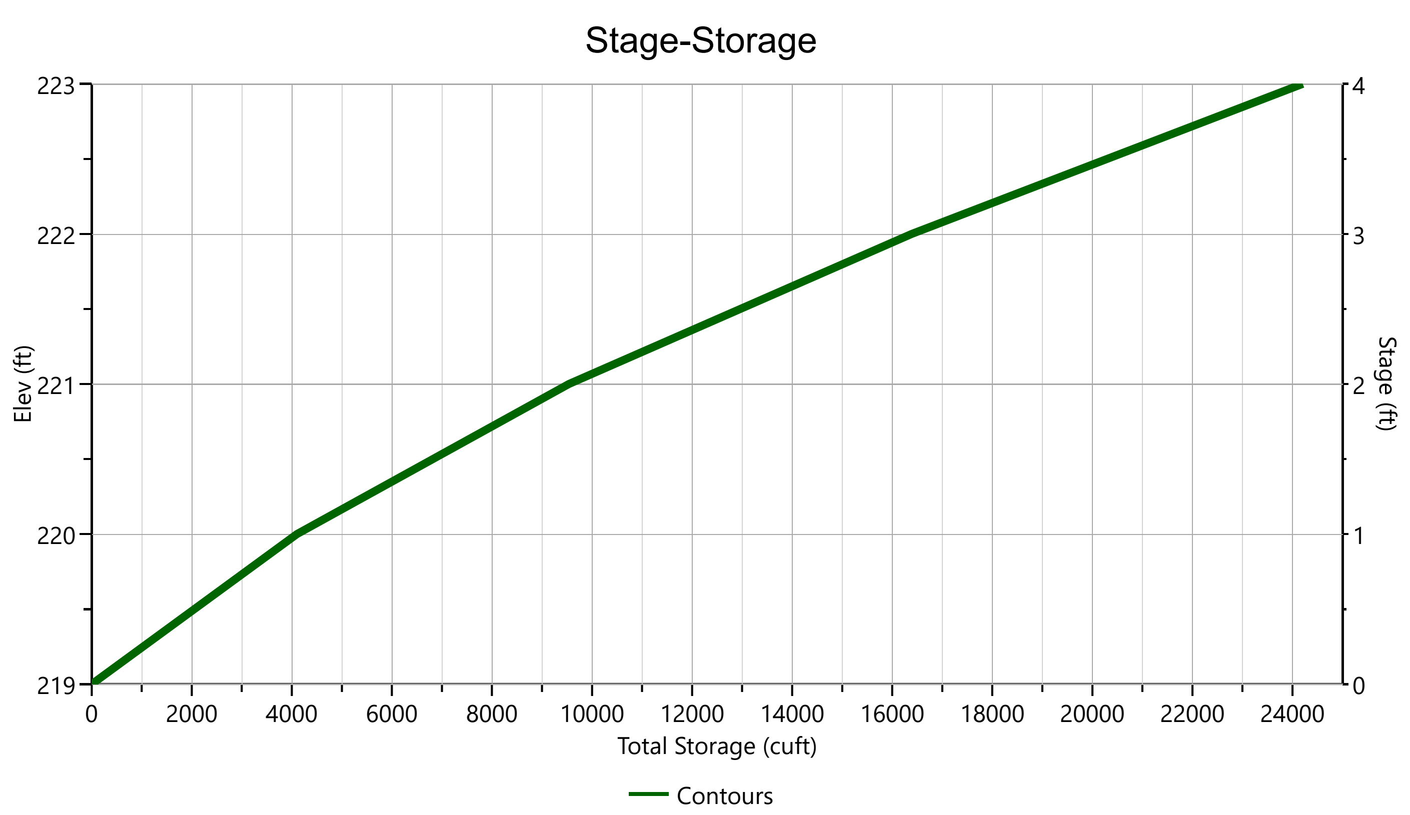
Stage-Storage

User Defined Contours

Description	Input
Bottom Elevation, ft	219.00
Voids (%)	100.00
Volume Calc	Ave End Area

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	219.00	3,716	0.000	0.000
1.00	220.00	4,485	4,101	4,101
2.00	221.00	6,387	5,436	9,537
3.00	222.00	7,320	6,854	16,390
4.00	223.00	8,310	7,815	24,205



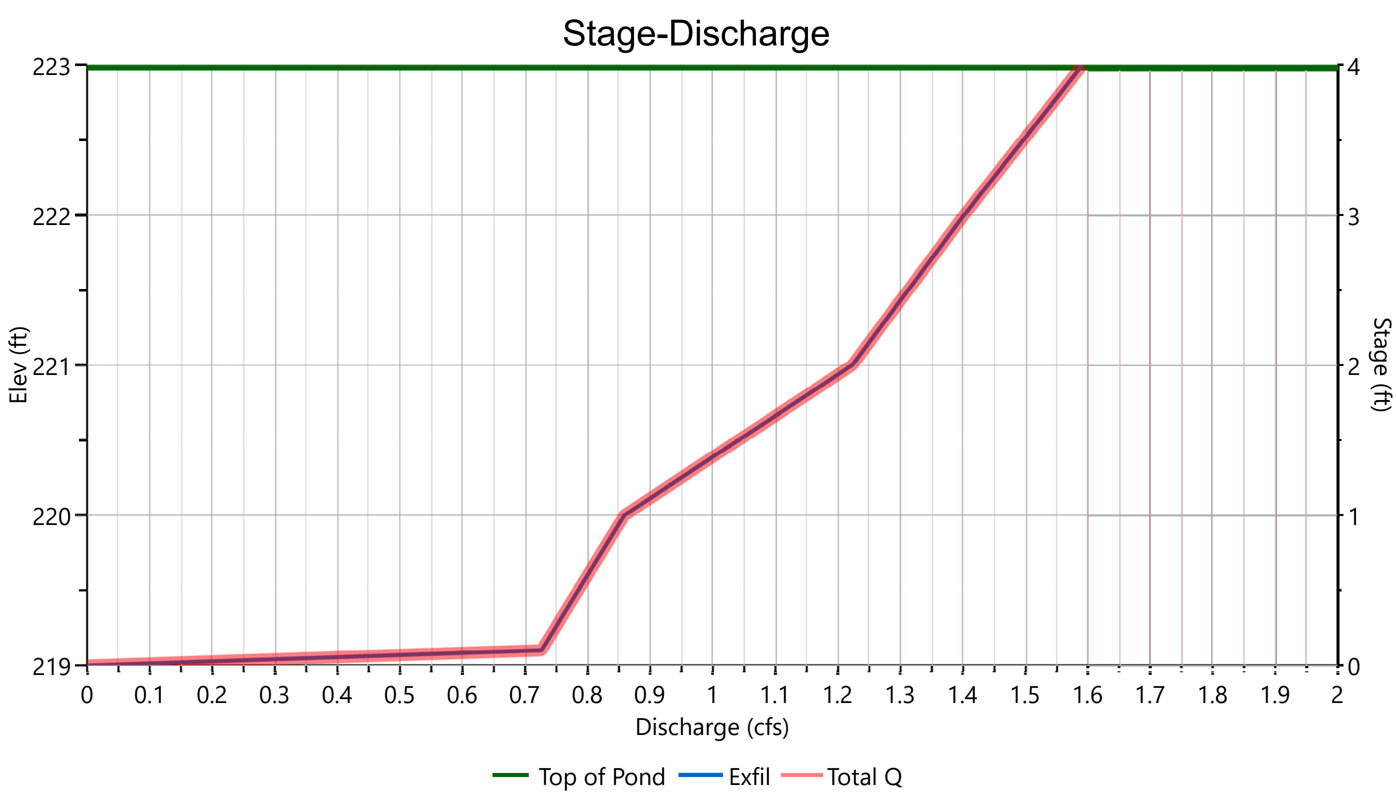
Pond Report

IB-7A REVISED

Stage-Discharge

Culvert / Orifices	Culvert	Orifices 1	Orifices 2	Orifices 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 1**	**Weirs 2**	**Weirs 3**	**Ancillary**	
Shape / Type					Exfiltration, in/hr	8.27**
Crest Elevation, ft						
Crest Length, ft						
Angle, deg						
Weir Coefficient, Cw						

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



IB-7A REVISED

Stage-Storage-Discharge Summary

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

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Pond Report

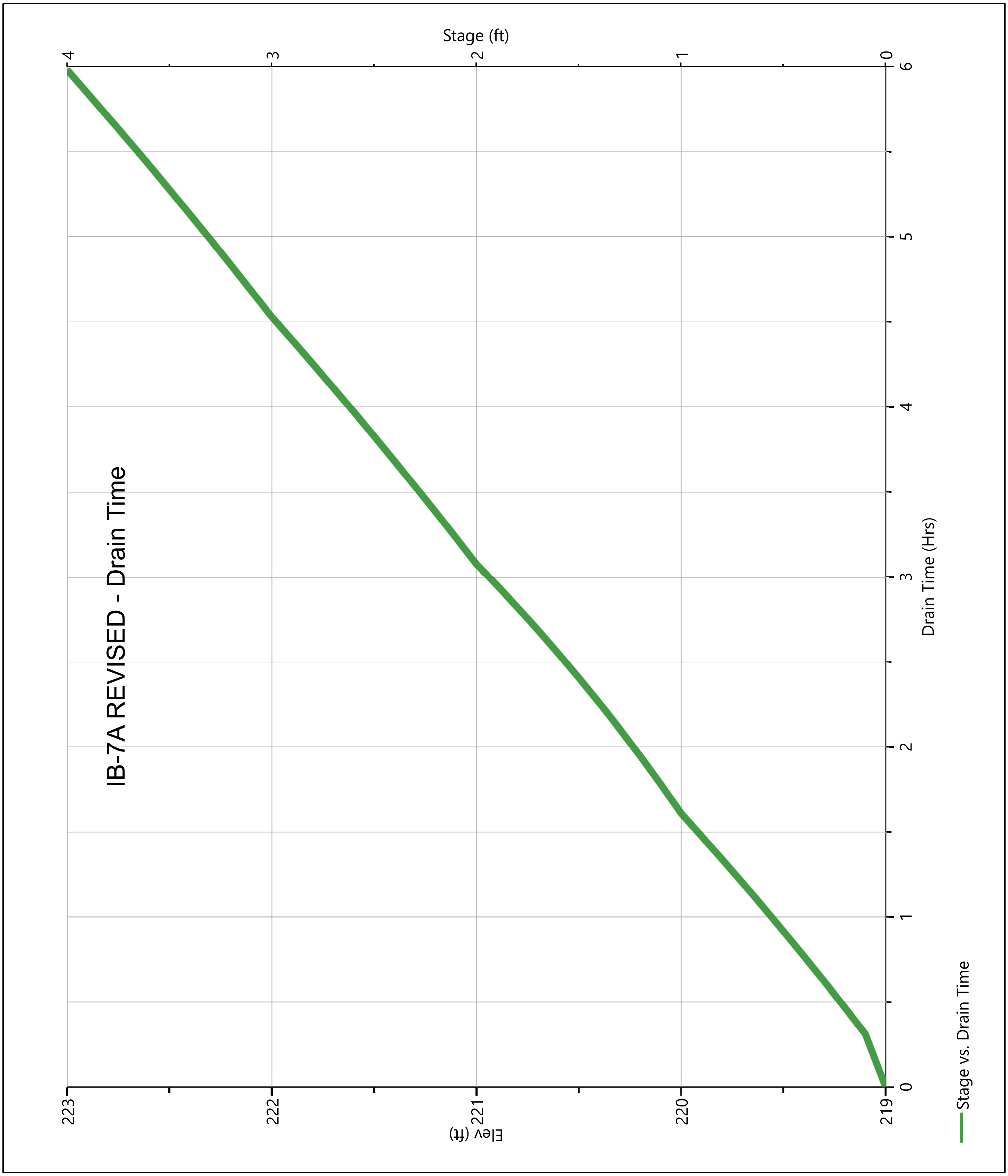
Project Name:

Hydrology Studio v 3.0.0.27

06-17-2023

IB-7A REVISED

Pond Drawdown



Hydrograph Report

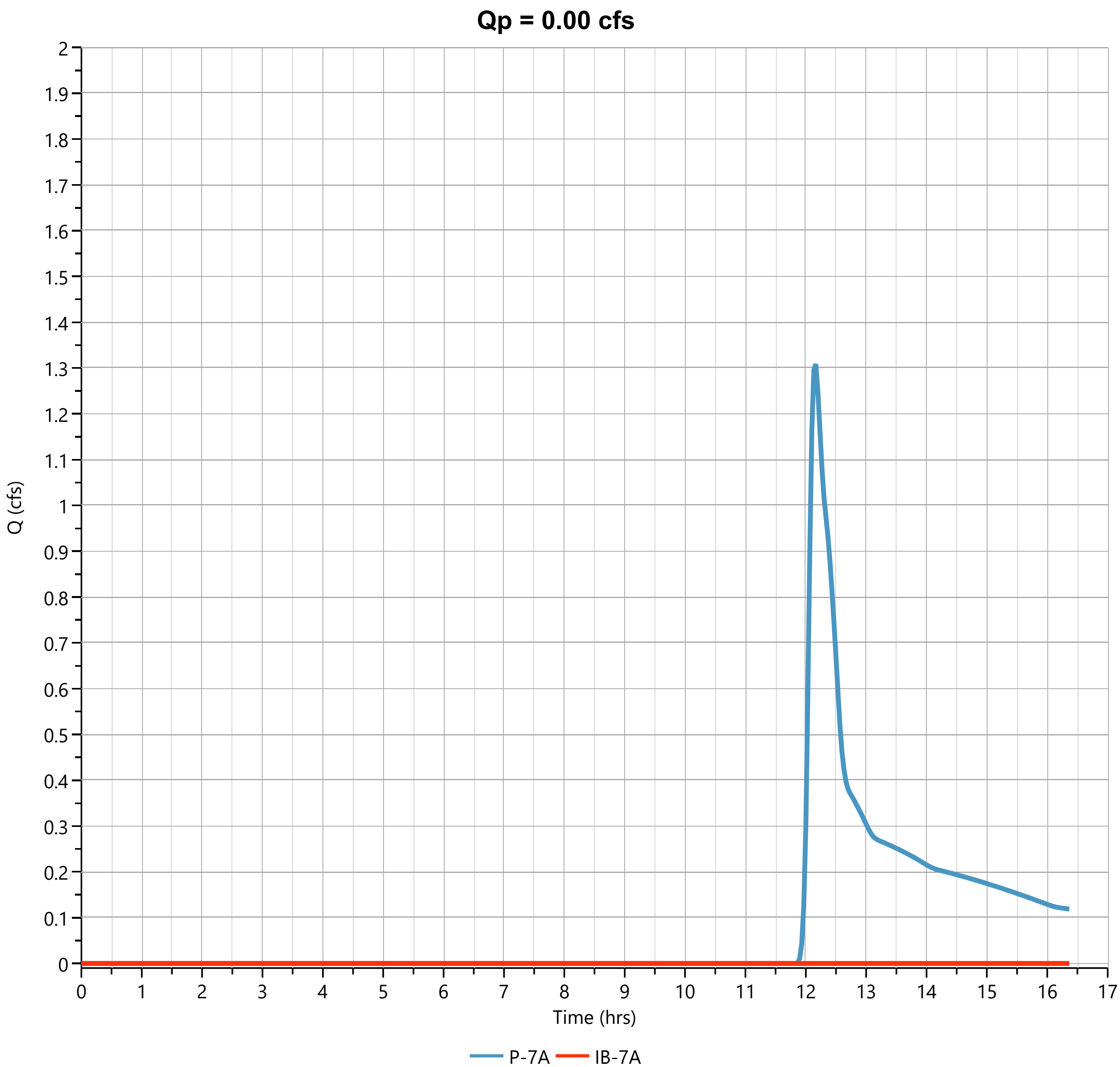
Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

IB-7A Hyd. No. 40

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 16.33 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 39 - P-7A	Max. Elevation	= 219.17 ft
Pond Name	= IB-7A REVISED	Max. Storage	= 704 cuft

Pond Routing by Storage Indication Method



Hydrograph Report

IB-7A

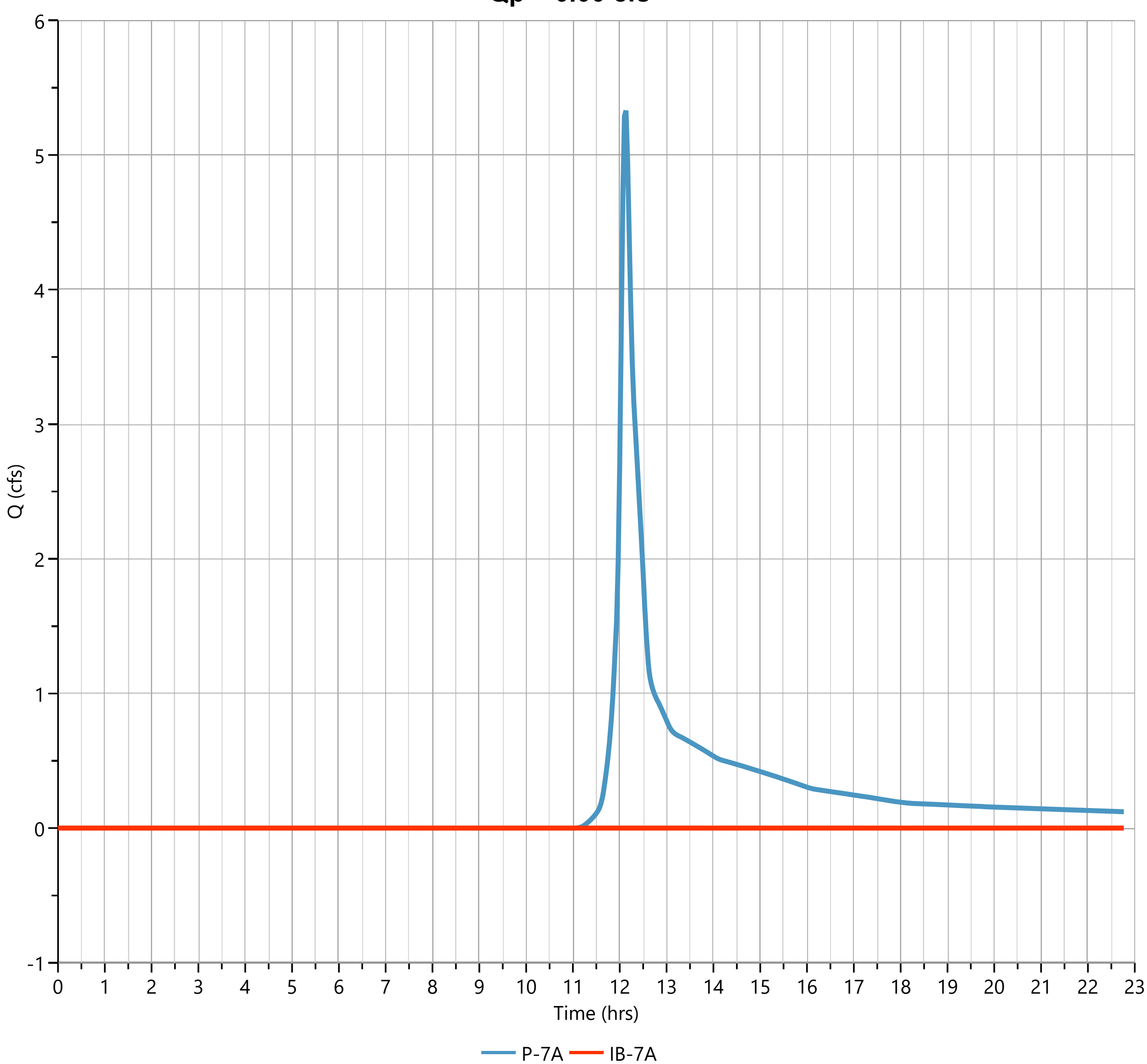
Hyd. No. 40

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
Inflow Hydrograph	= 39 - P-7A	Max. Elevation	= 220.34 ft
Pond Name	= IB-7A REVISED	Max. Storage	= 5,971 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 8.20 hrs

Qp = 0.00 cfs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.27

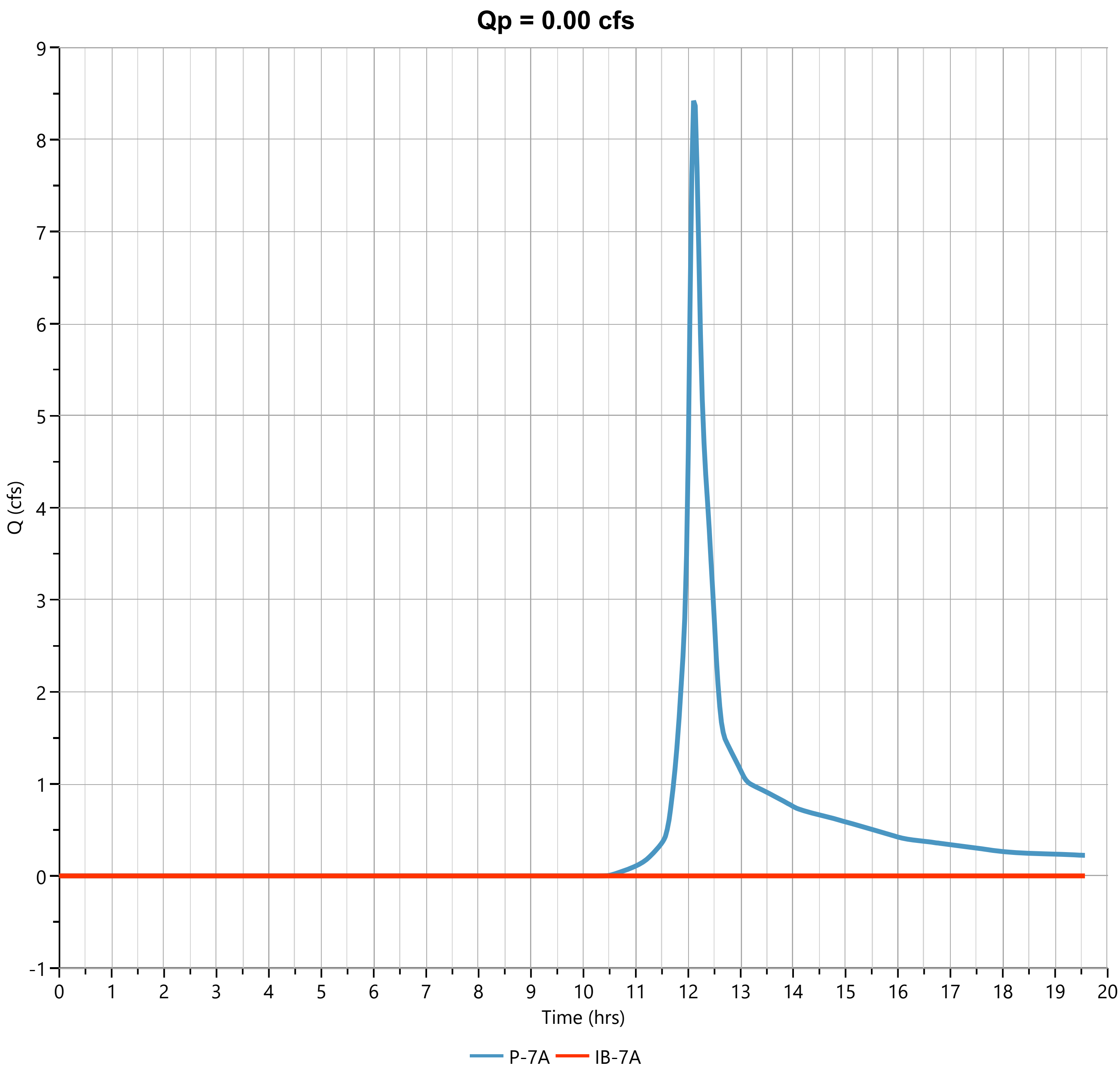
06-17-2023

IB-7A

Hyd. No. 40

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 25-yr	Time to Peak	= 19.53 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 39 - P-7A	Max. Elevation	= 221.14 ft
Pond Name	= IB-7A REVISED	Max. Storage	= 10,526 cuft

Pond Routing by Storage Indication Method



Hydrograph Report

Project Name:

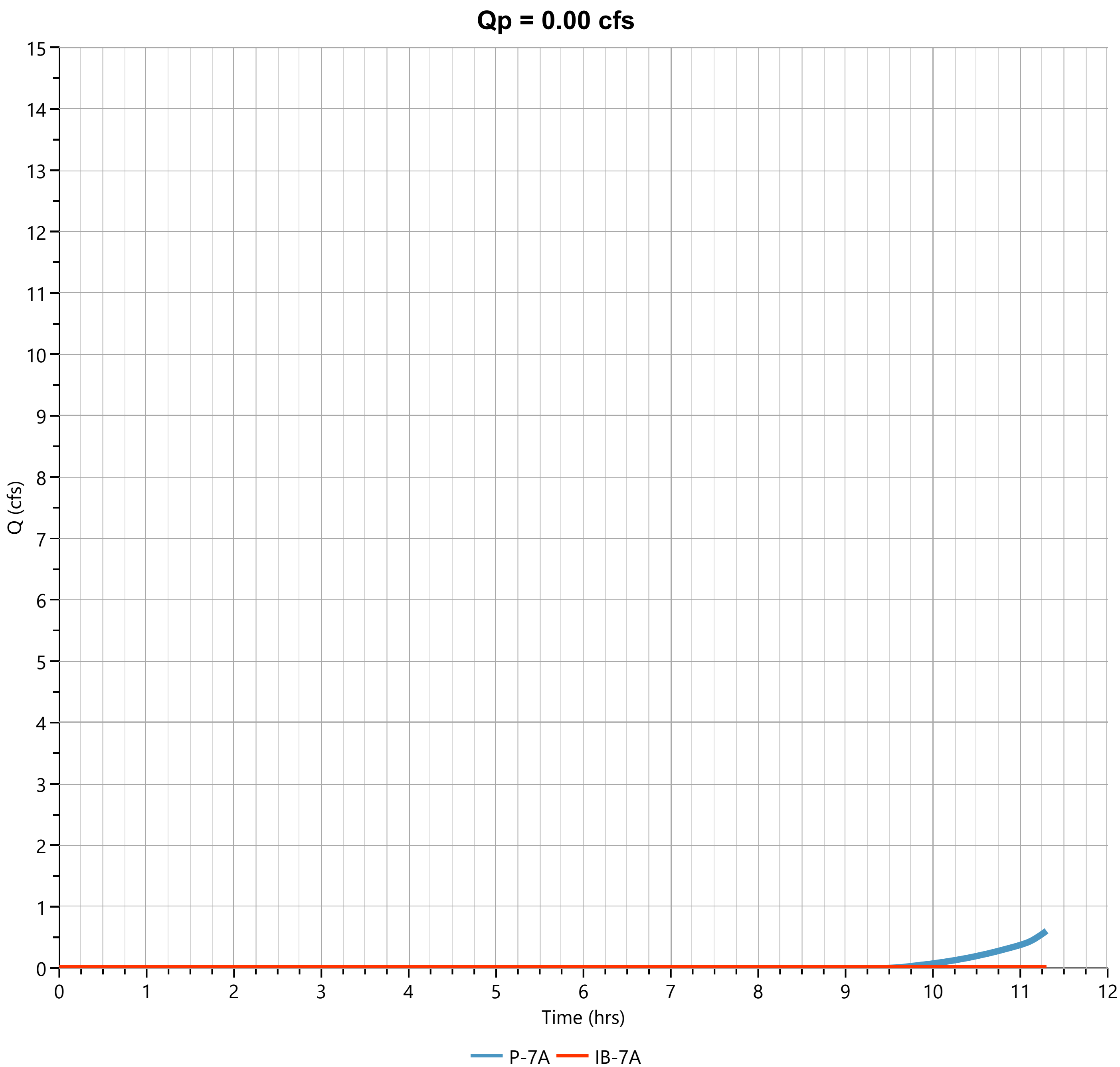
Hydrology Studio v 3.0.0.27 06-17-2023

IB-7A

Hyd. No. 40

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 100-yr	Time to Peak	= 11.27 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 39 - P-7A	Max. Elevation	= 222.39 ft
Pond Name	= IB-7A REVISED	Max. Storage	= 19,475 cuft

Pond Routing by Storage Indication Method



Worksheet 2: Runoff curve number and runoff **SM-3719C**

Project: Athens Street By NC Date 6/24/22

Rev Date 10/13/2022

Location: Stow, MA Checked Date 6/17/2023

Circle one: Present Developed Subcatchment P-7B

1. Runoff curve number (CN)

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

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = $\frac{81.32}{1.16}$ = 70.27 ; Use CN = 70

2. Runoff

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project:	Athens Street	By NC	Date	6/24/2022
			Rev Date	10/13/2022
Location:	Stow, MA	Checked	Date	6/17/2023

Circle one: Present **Developed** Subcatchment P-7B

Circle one: Tc **Tt** through subarea

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	0.010			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.18			0.18
Shallow concentrated Flow		Segment ID	B-C	B-C		
7. Surface Description (paved or unpaved)			UNPAVED	PAVED		
8. Flow Length, L		ft	121	107		
9. Watercourse slope, s		ft/ft	0.010	0.015		
10. Average Velocity, V (figure 3-1)		ft/s	1.61	2.49		
11. Tt = L / 3600V	Compute Tt	hr	0.02	0.01		0.03
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.22

min 13.0

Hydrograph Report

Project Name:

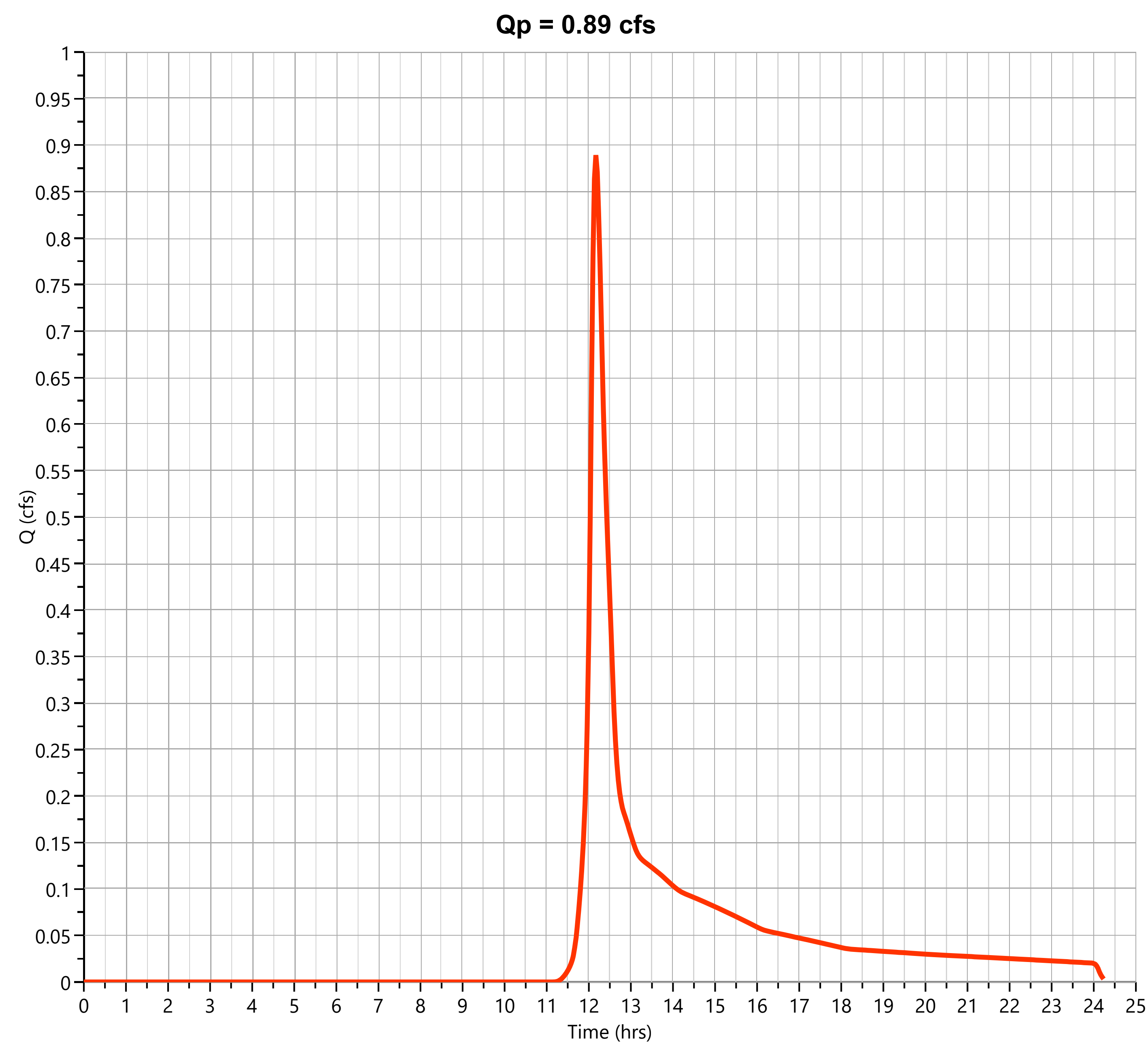
Hydrology Studio v 3.0.0.31

02-15-2024

P-7B

Hyd. No. 41

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



Hydrograph Report

Project Name:

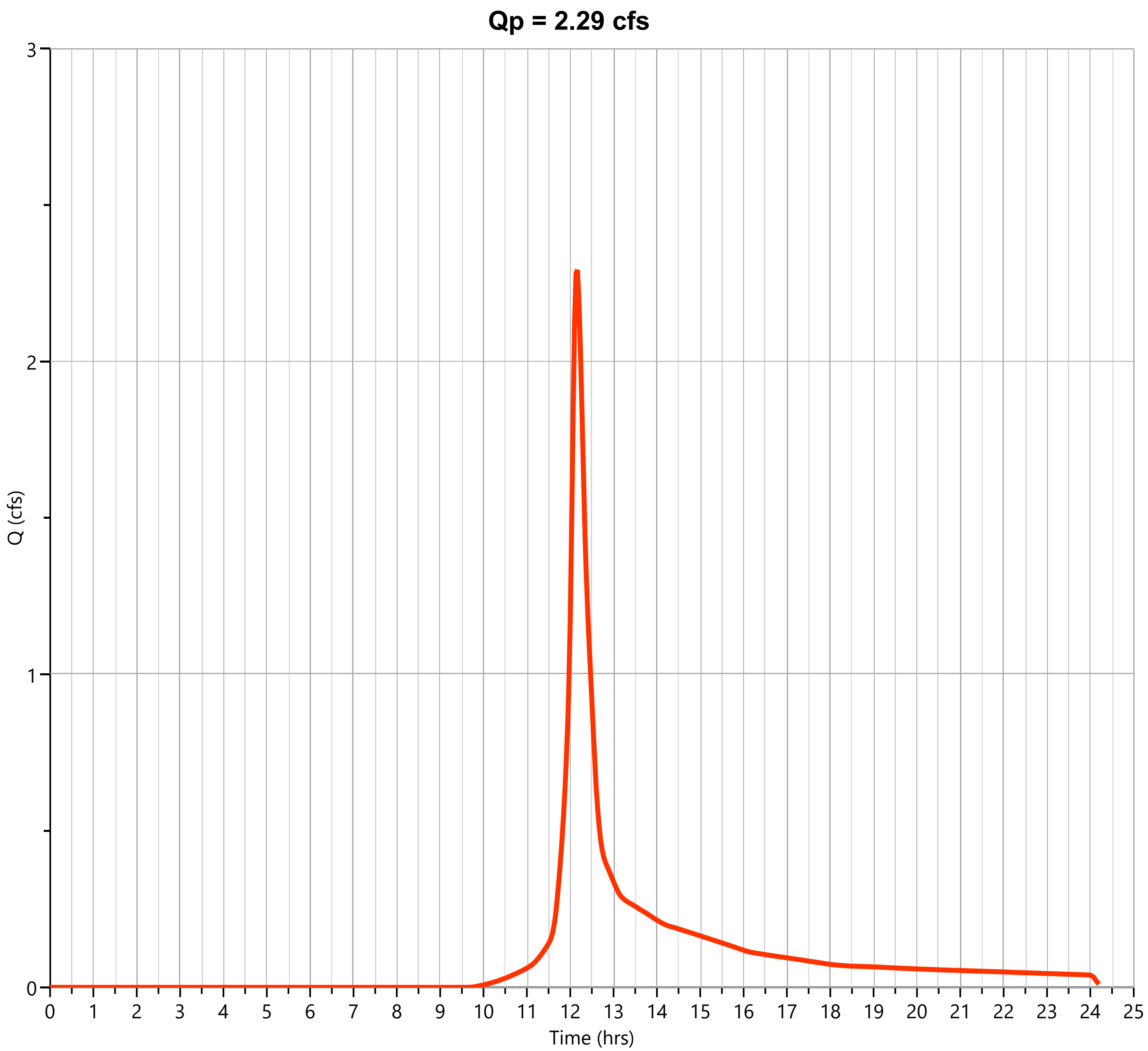
Hydrology Studio v 3.0.0.31

02-15-2024

P-7B

Hyd. No. 41

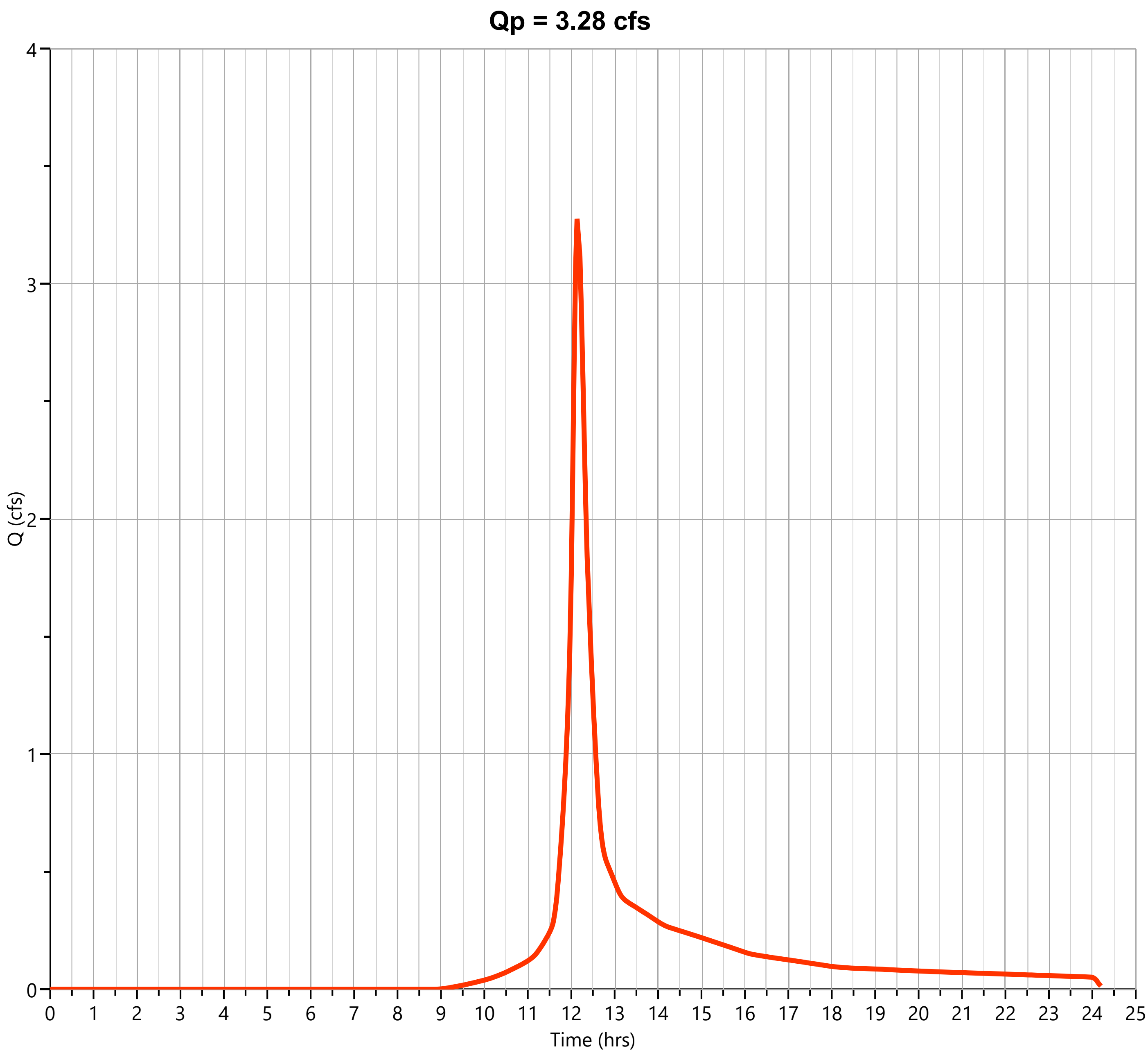
Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.292 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 8,971 cuft
Drainage Area	= 1.16 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 13.0 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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



P-7B

Hyd. No. 41

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



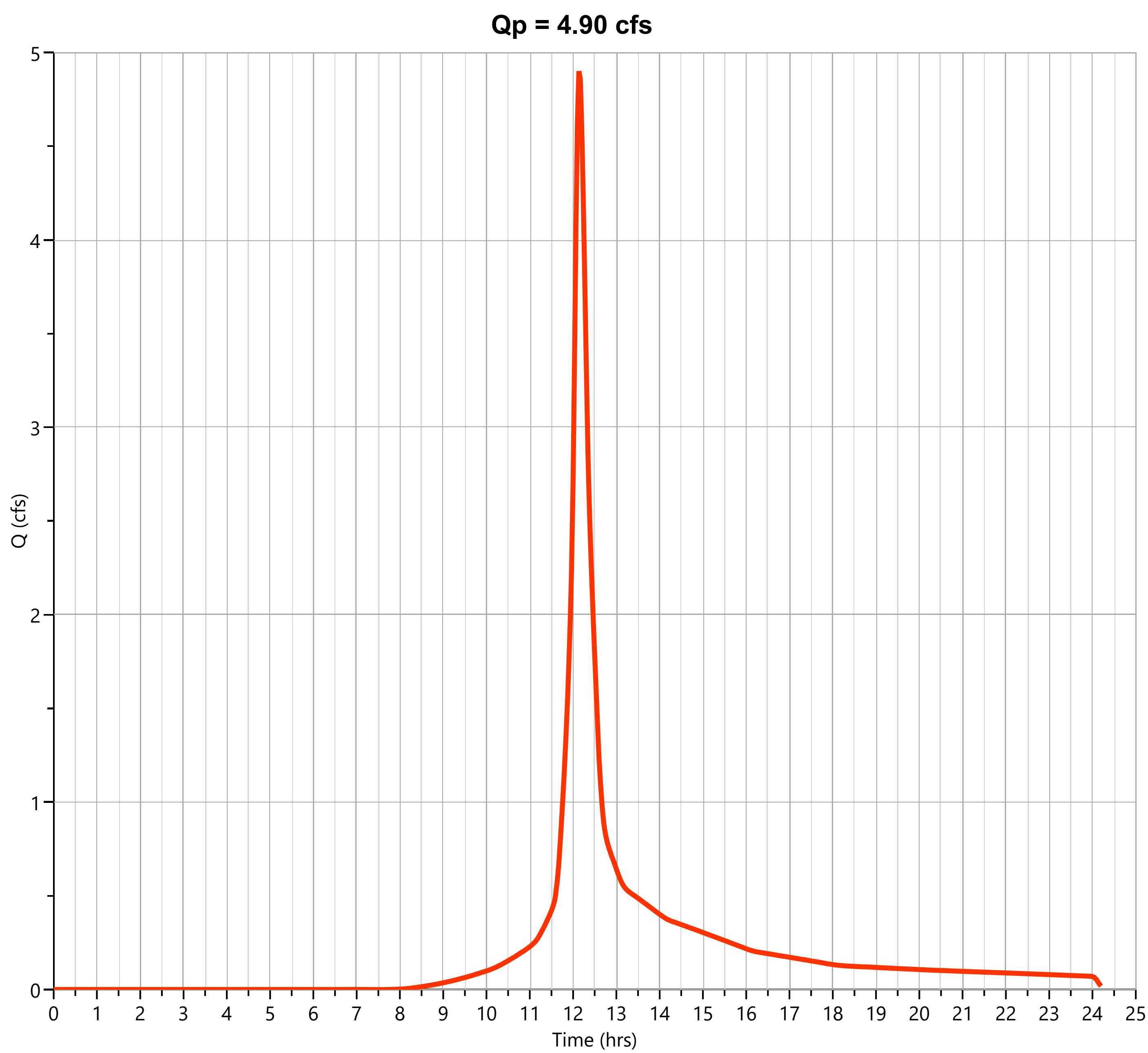
Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31 02-15-2024

P-7B Hyd. No. 41

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



Hydrograph Report

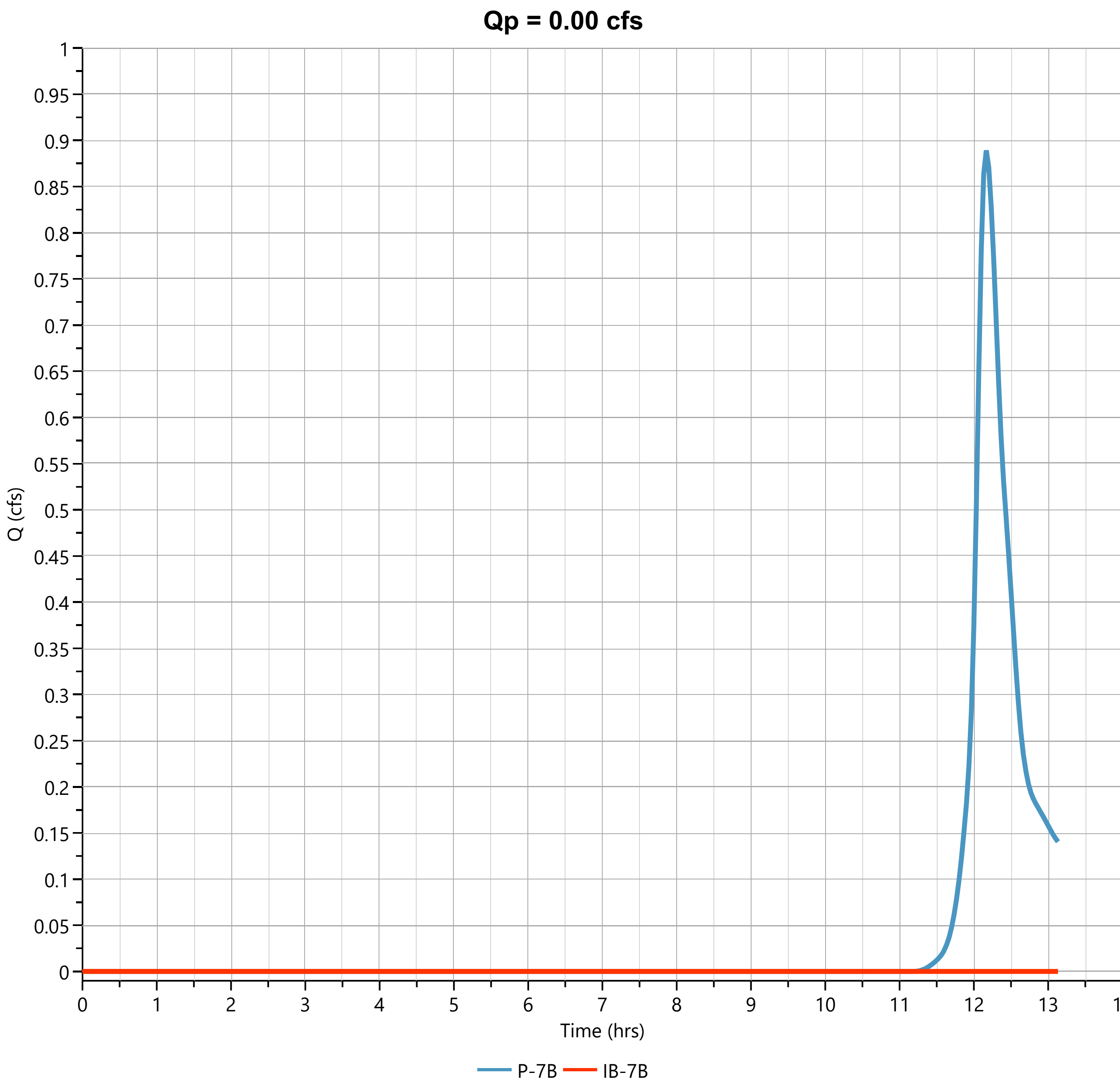
Project Name:

Hydrology Studio v 3.0.0.31 02-15-2024

IB-7B Hyd. No. 42

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

Pond Routing by Storage Indication Method



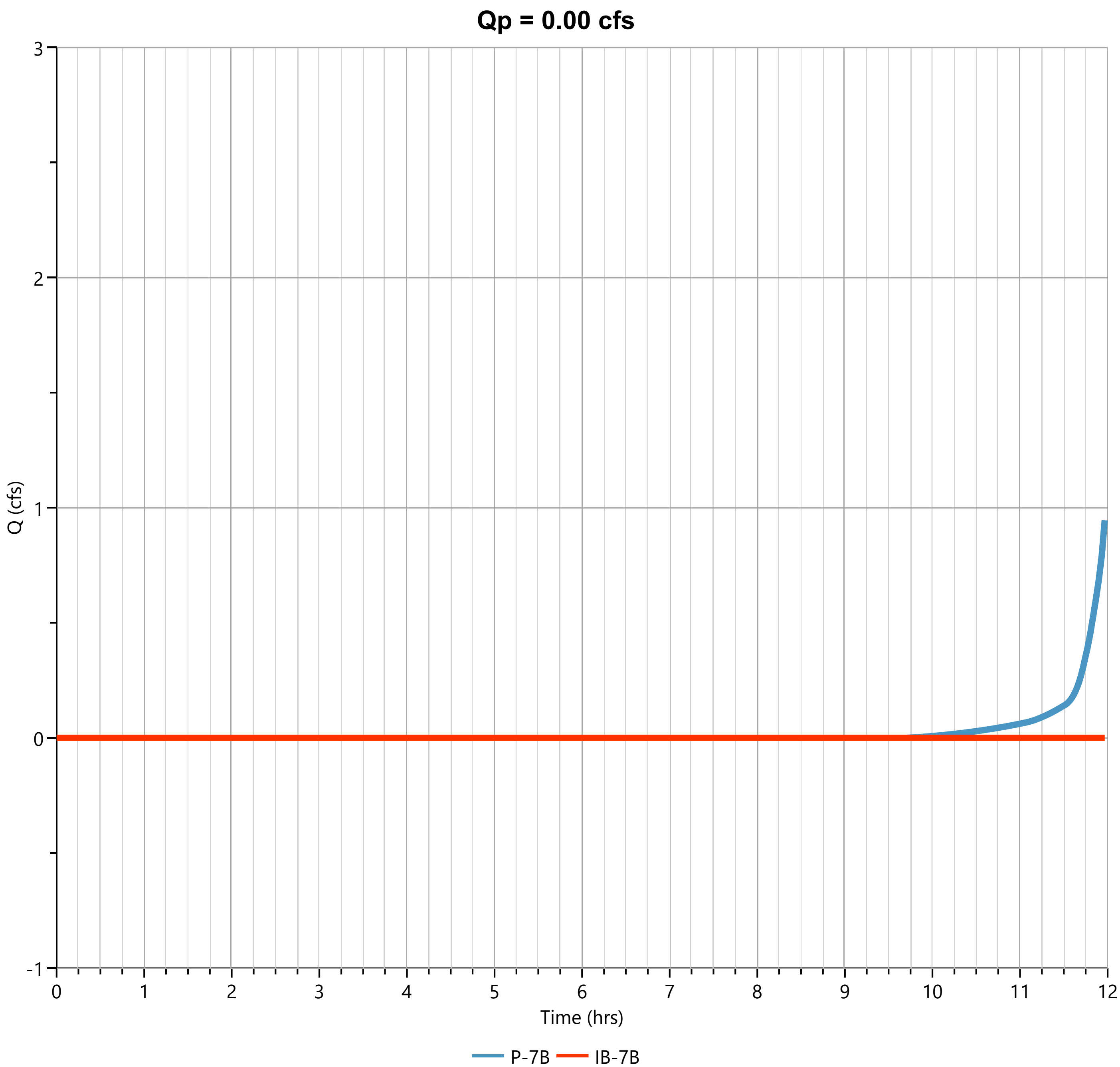
Hydrograph Report

IB-7B

Hyd. No. 42

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 10-yr	Time to Peak	= 11.93 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 41 - P-7B	Max. Elevation	= 224.83 ft
Pond Name	= IB-7B	Max. Storage	= 2,428 cuft

Pond Routing by Storage Indication Method



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

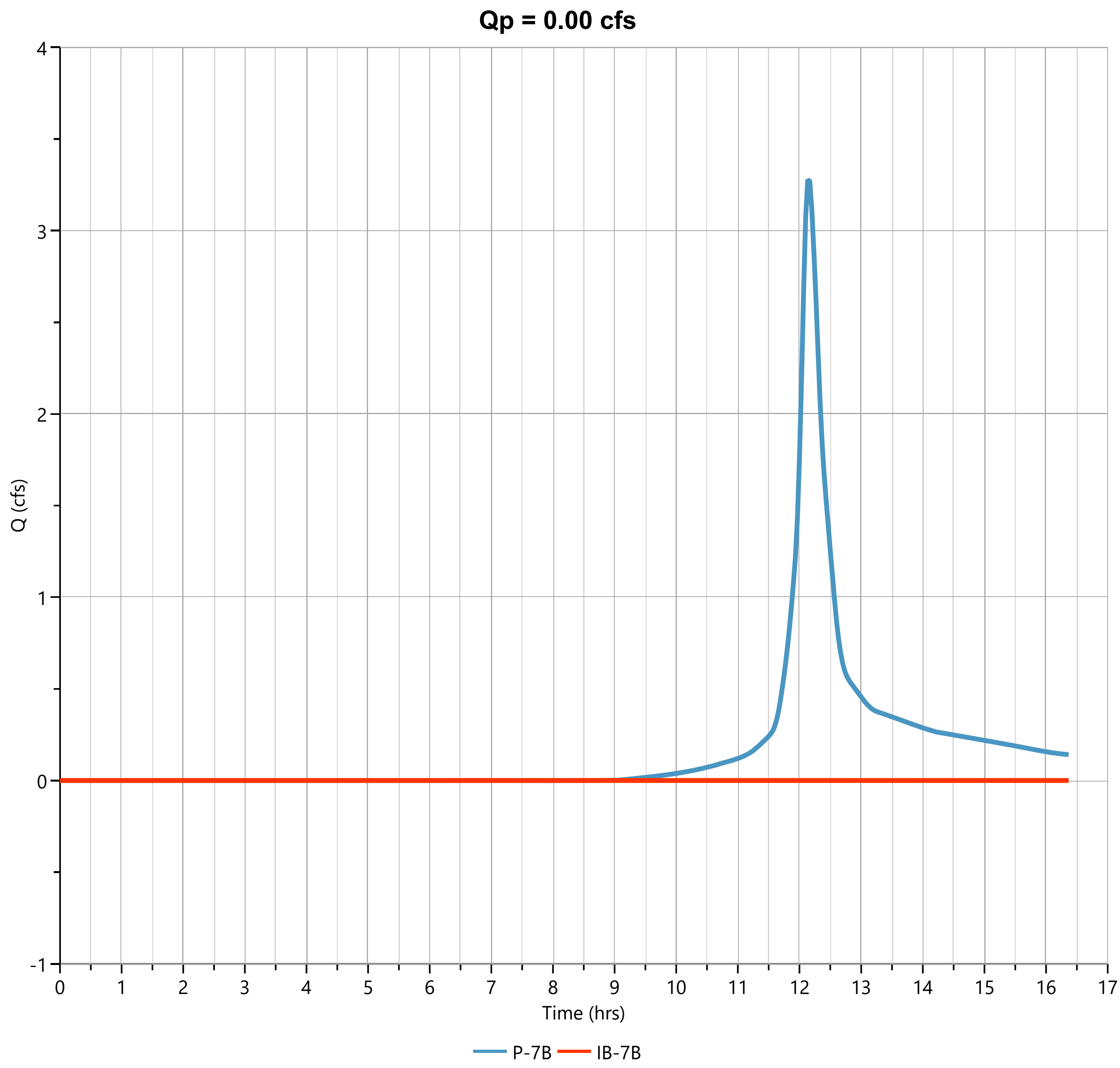
02-15-2024

IB-7B

Hyd. No. 42

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 25-yr	Time to Peak	= 16.33 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 41 - P-7B	Max. Elevation	= 225.27 ft
Pond Name	= IB-7B	Max. Storage	= 3,993 cuft

Pond Routing by Storage Indication Method



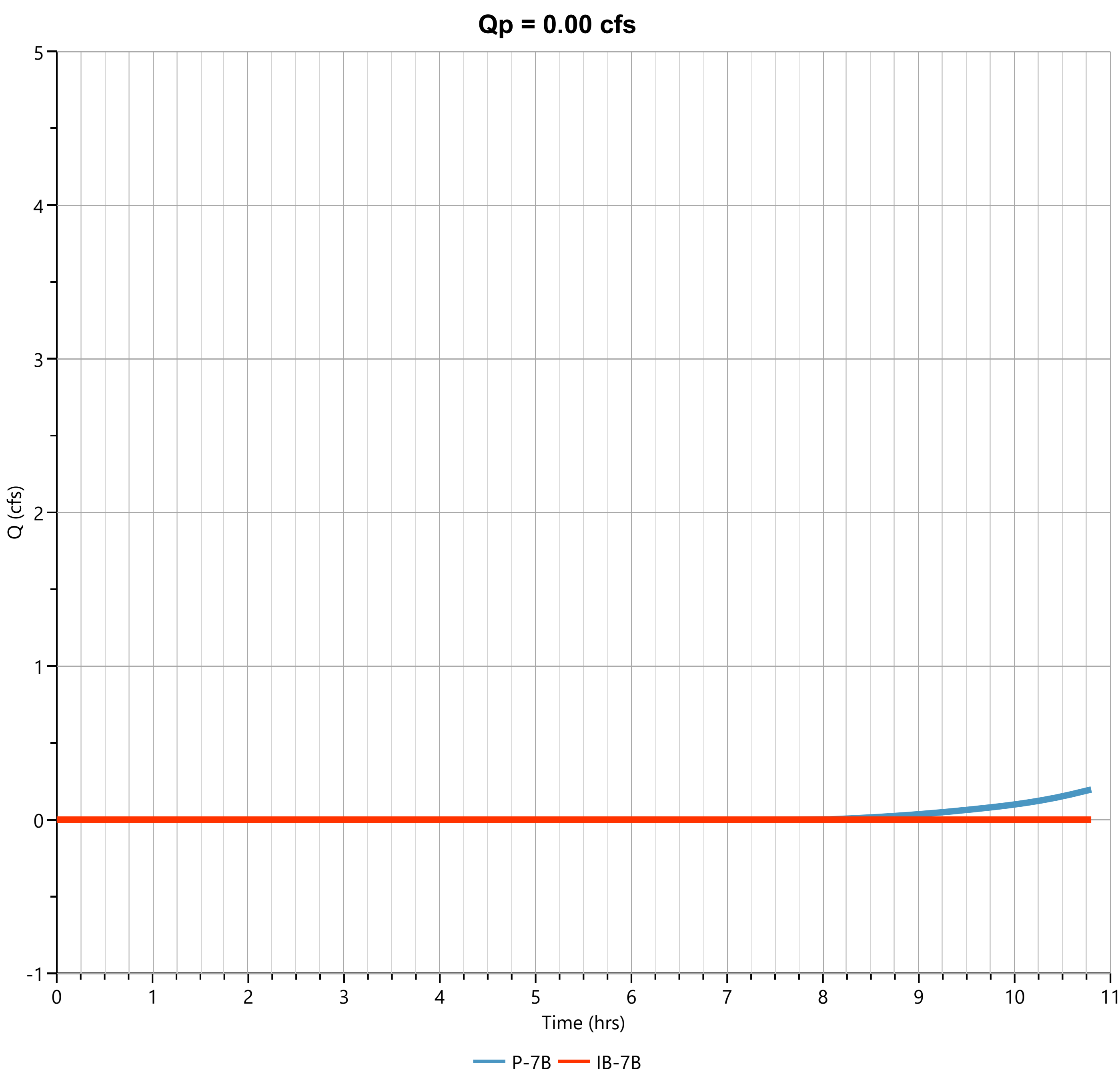
Hydrograph Report

IB-7B

Hyd. No. 42

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 100-yr	Time to Peak	= 10.77 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 41 - P-7B	Max. Elevation	= 225.94 ft
Pond Name	= IB-7B	Max. Storage	= 6,644 cuft

Pond Routing by Storage Indication Method



Pond Report

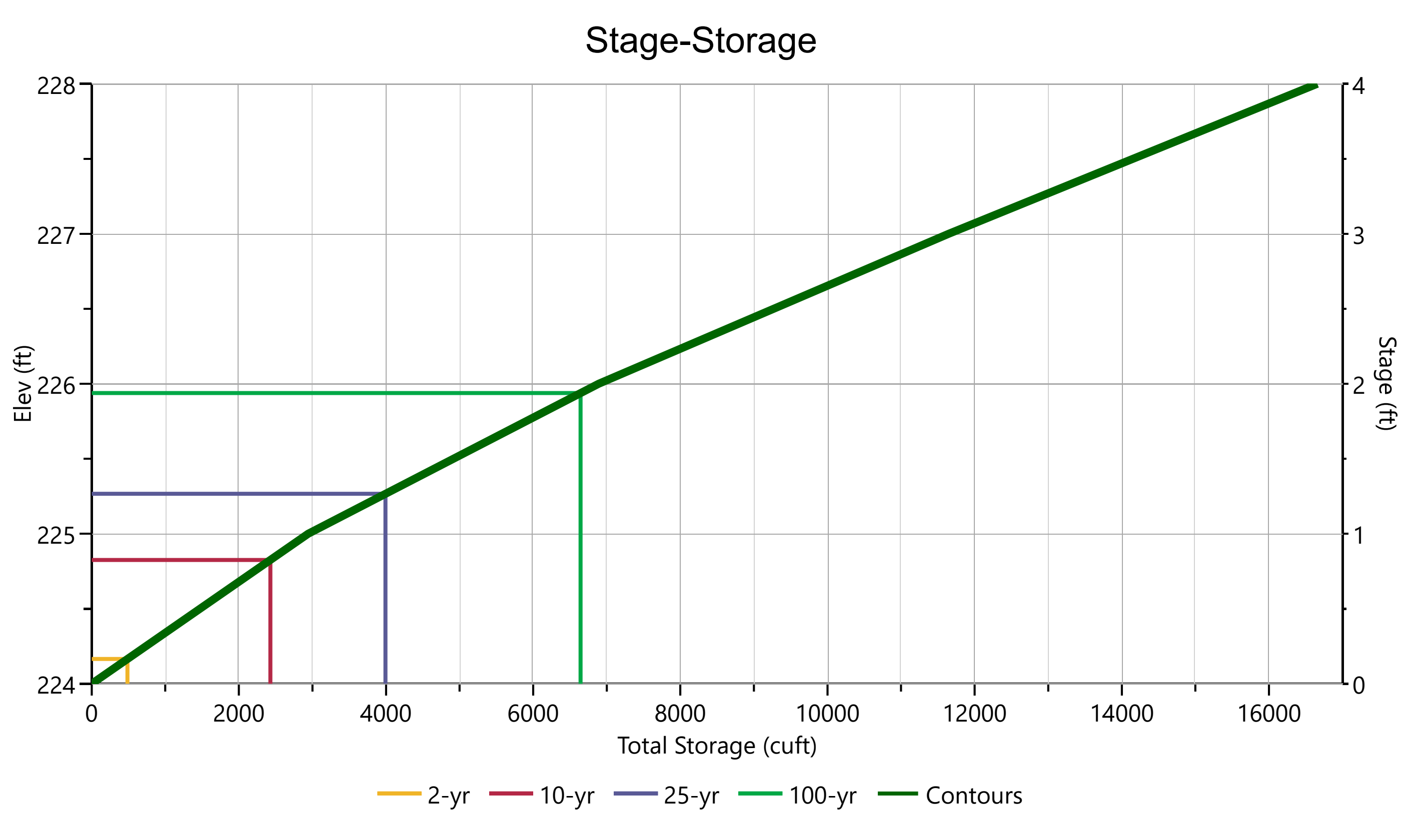
IB-7B

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	224.00
Voids (%)	100.00
Volume Calc	Ave End Area

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	224.00	2,619	0.000	0.000
1.00	225.00	3,266	2,943	2,943
2.00	226.00	4,628	3,947	6,890
3.00	227.00	4,887	4,758	11,647
4.00	228.00	5,131	5,009	16,656

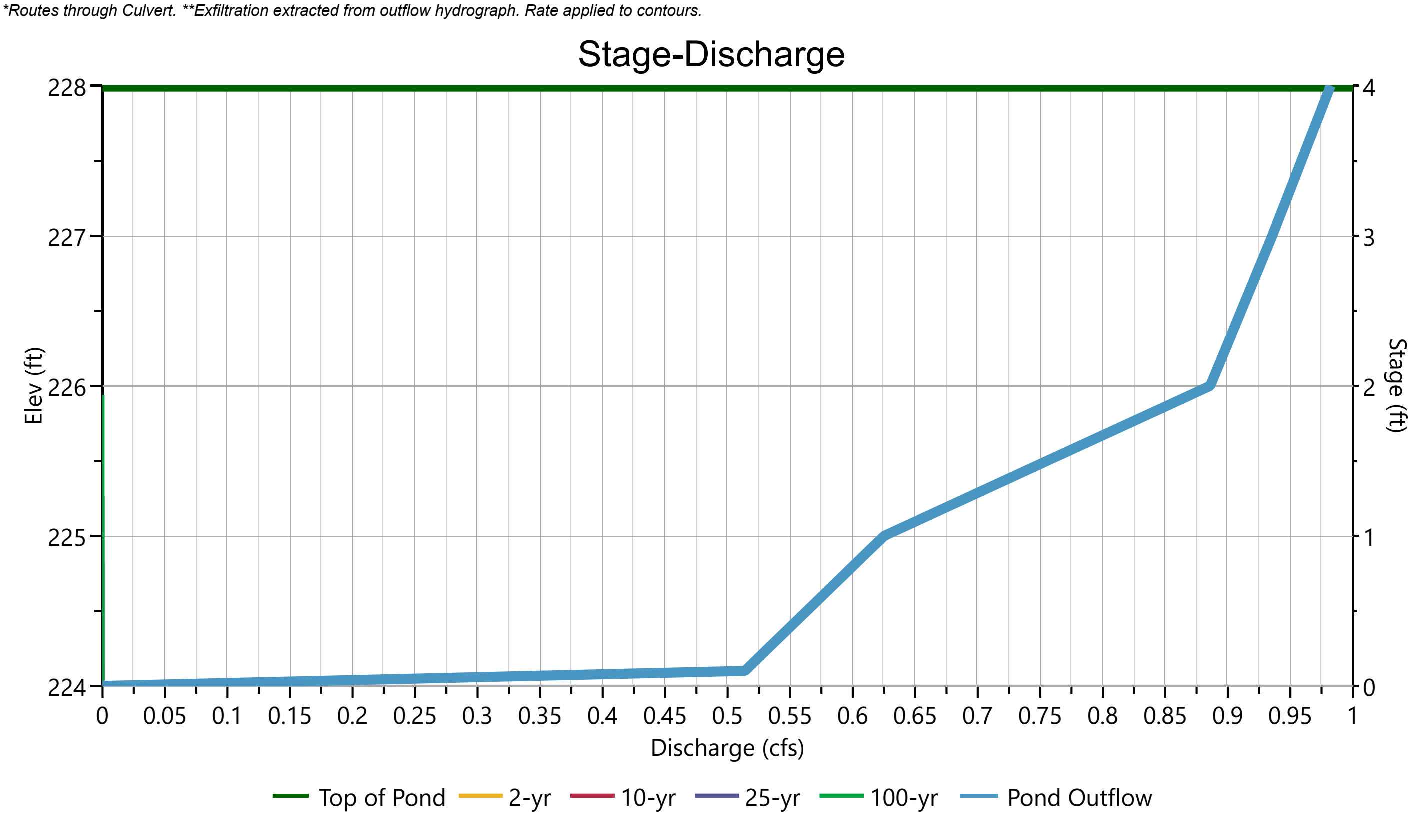


IB-7B

Stage-Discharge

Culvert / Orifices	Culvert	Orifices 1	Orifices 2	Orifices 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 1**	**Weirs 2**	**Weirs 3**	**Ancillary**	
Shape / Type					Exfiltration, in/hr	8.27**
Crest Elevation, ft						
Crest Length, ft						
Angle, deg						
Weir Coefficient, Cw						

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



Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-15-2024

IB-7B

Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
0.00	224.00	0.000										0.000		0.000
1.00	225.00	2,943										0.625		0.625
2.00	226.00	6,890										0.886		0.886
3.00	227.00	11,647										0.936		0.936
4.00	228.00	16,656										0.982		0.982

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Pond Report

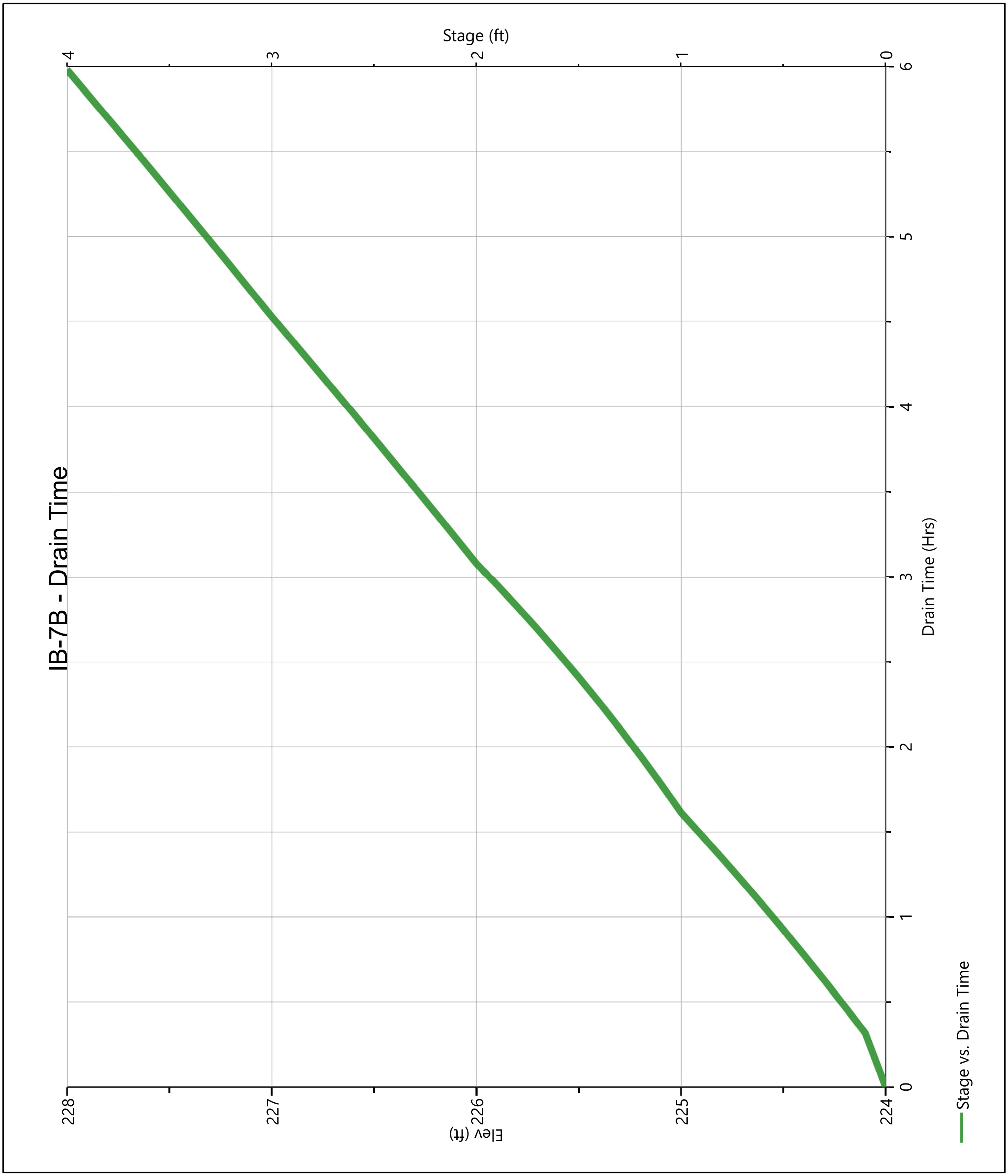
Project Name:

Hydrology Studio v 3.0.0.31

02-15-2024

IB-7B

Pond Drawdown



Hydrograph Report

Project Name:

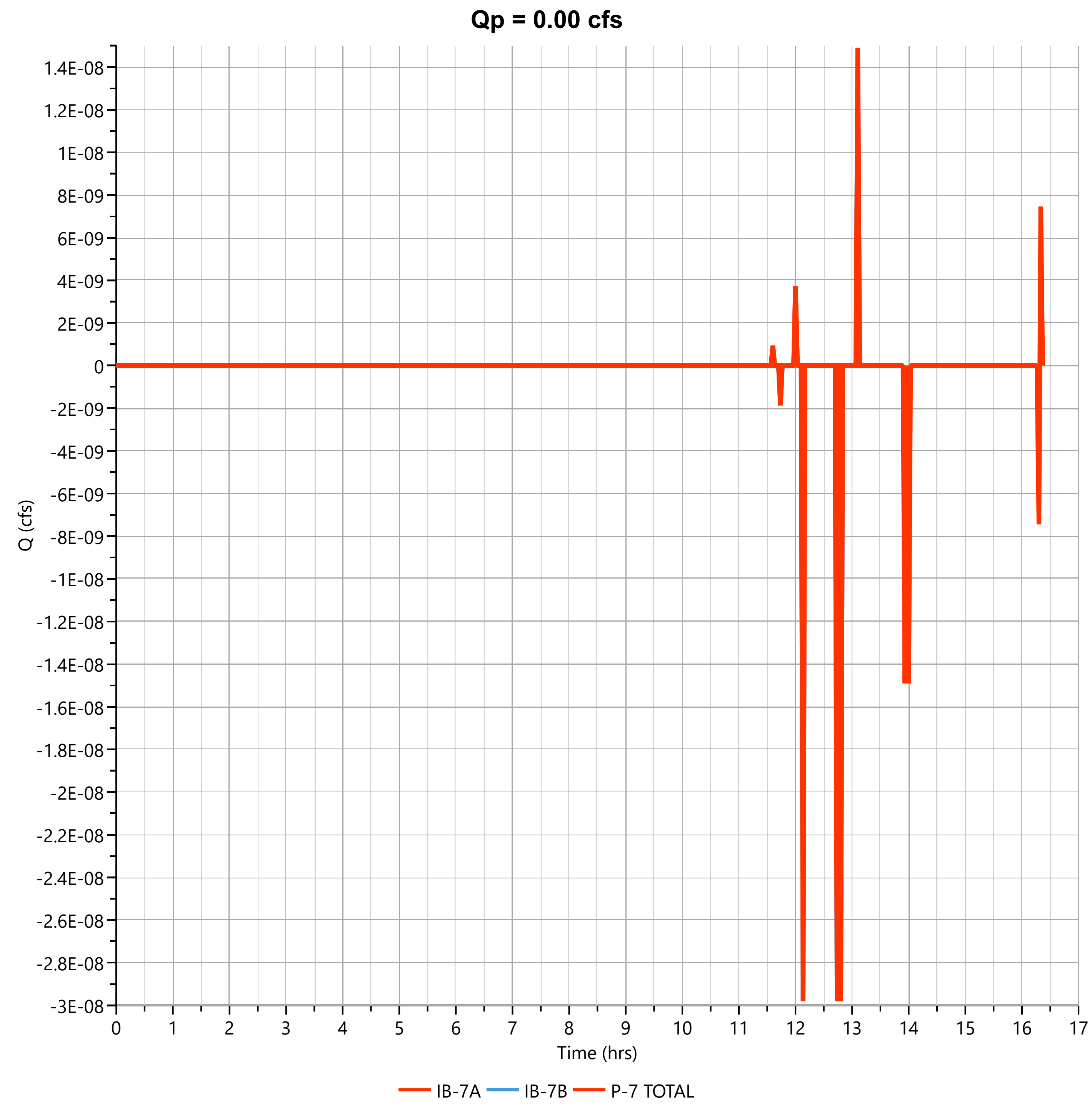
Hydrology Studio v 3.0.0.31

02-15-2024

P-7 TOTAL

Hyd. No. 43

Hydrograph Type	= Junction	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 13.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrographs	= 40, 42	Total Contrib. Area	= 0.0 ac



Hydrograph Report

Project Name:

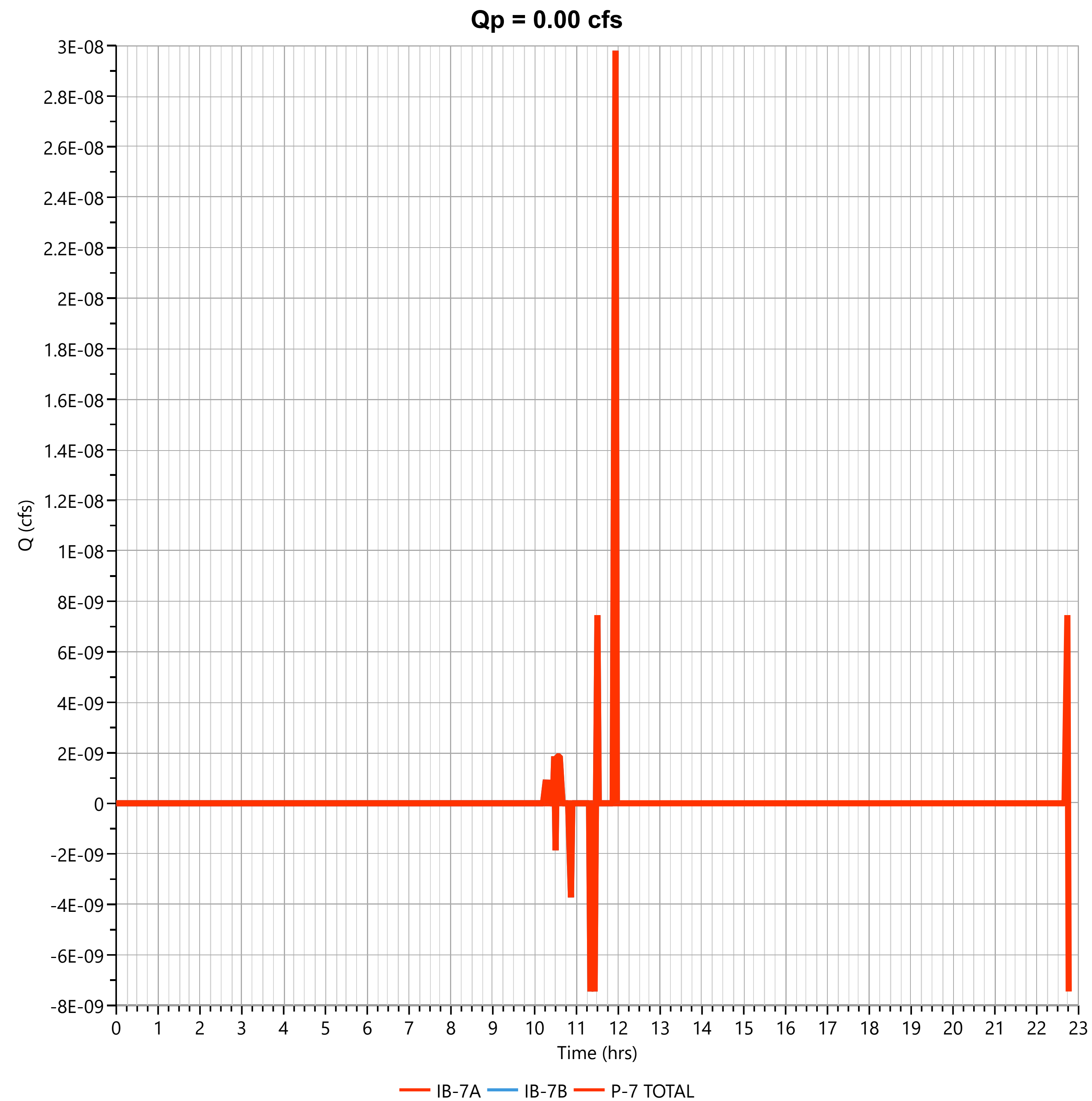
Hydrology Studio v 3.0.0.31

02-15-2024

P-7 TOTAL

Hyd. No. 43

Hydrograph Type	= Junction	Peak Flow	= 0.000 cfs
Storm Frequency	= 10-yr	Time to Peak	= 11.93 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrographs	= 40, 42	Total Contrib. Area	= 0.0 ac



Hydrograph Report

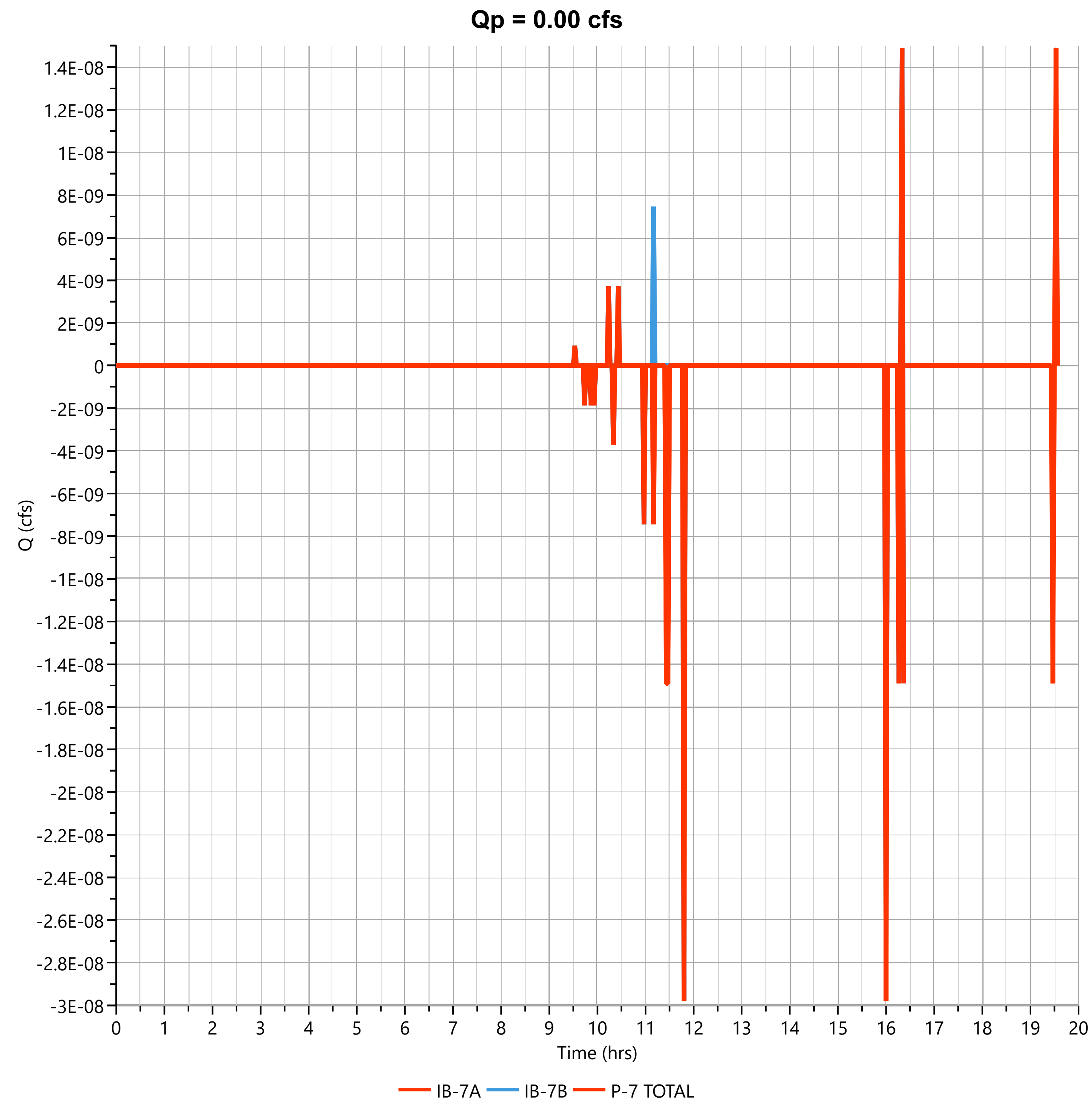
Project Name:

Hydrology Studio v 3.0.0.31 02-15-2024

P-7 TOTAL

Hyd. No. 43

Hydrograph Type	= Junction	Peak Flow	= 0.000 cfs
Storm Frequency	= 25-yr	Time to Peak	= 16.33 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrographs	= 40, 42	Total Contrib. Area	= 0.0 ac



Hydrograph Report

Project Name:

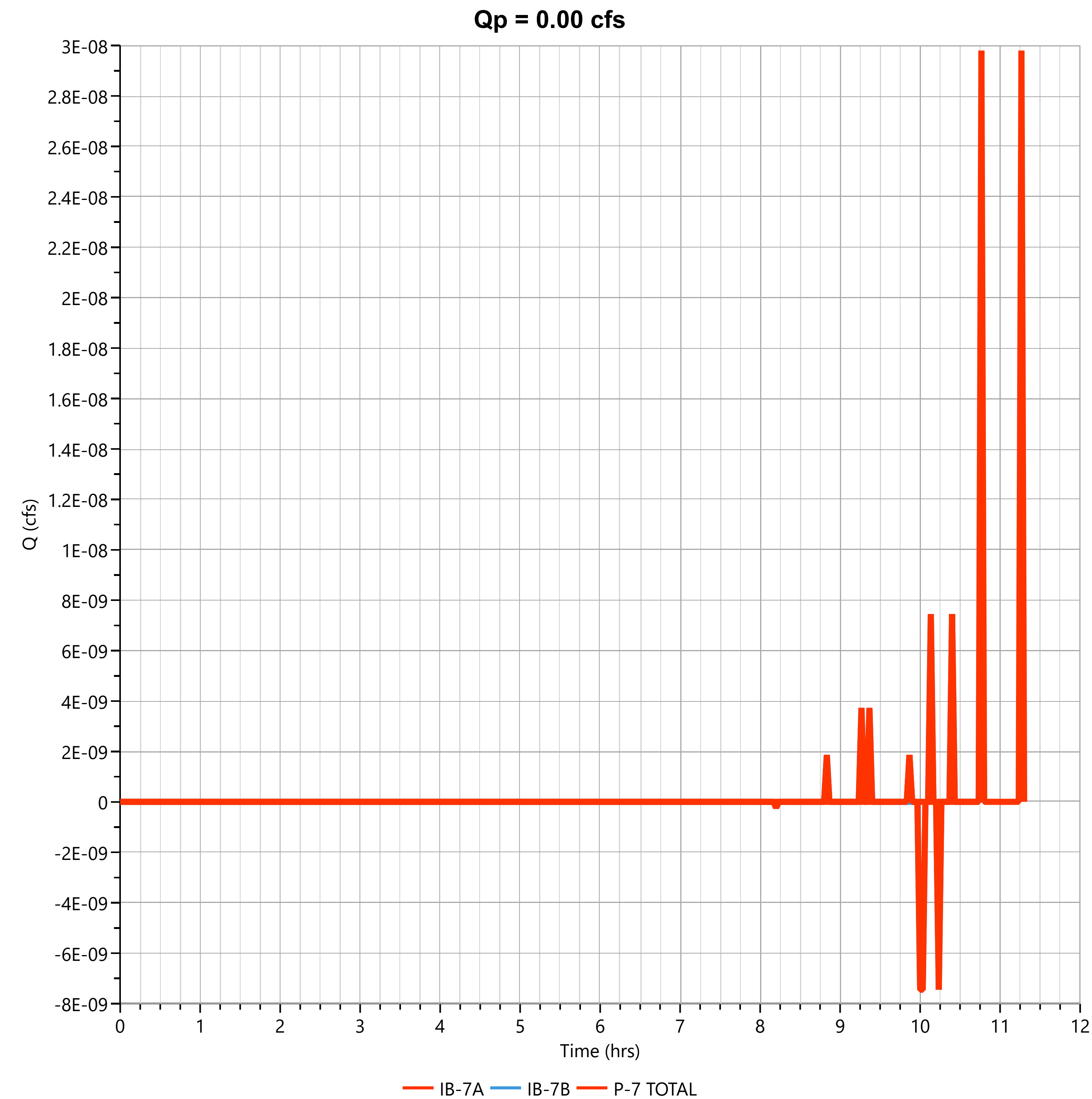
Hydrology Studio v 3.0.0.31

02-15-2024

P-7 TOTAL

Hyd. No. 43

Hydrograph Type	= Junction	Peak Flow	= 0.000 cfs
Storm Frequency	= 100-yr	Time to Peak	= 10.77 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrographs	= 40, 42	Total Contrib. Area	= 0.0 ac



Worksheet 2: Runoff curve number and runoff **SM-3719C**

Project: Athens Street By NC Date 6/24/22

Rev Date 10/13/2022

Location: Stow, MA Checked Date 6/17/2023

Circle one: Present Developed Subcatchment P-8

1. Runoff curve number (CN)

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

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

2. Runoff

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project:	Athens Street	By NC	Date	6/24/2022
			Rev Date	10/13/2022
Location:	Stow, MA	Checked	Date	6/17/2023

Circle one: Present **Developed** Subcatchment P-8

Circle one: Tc **Tt** through subarea

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 Tt	hr	0.16			0.16
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	142			
9. Watercourse slope, s		ft/ft	0.015			
10. Average Velocity, V (figure 3-1)		ft/s	1.98			
11. Tt = L / 3600V	Compute Tt	hr	0.02			0.02
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.18
	min	10.5

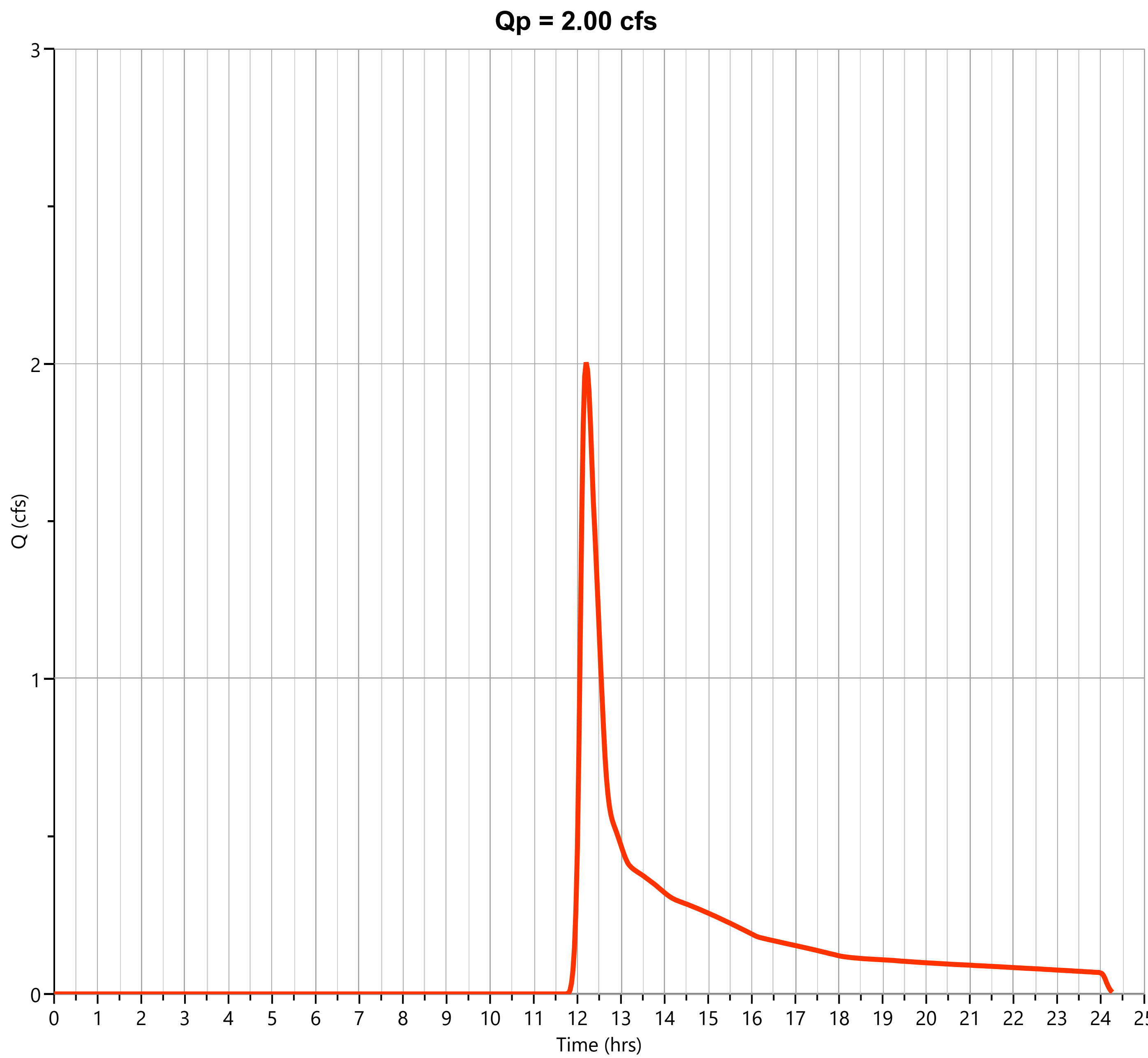
Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31 02-15-2024

P-8 Hyd. No. 44

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

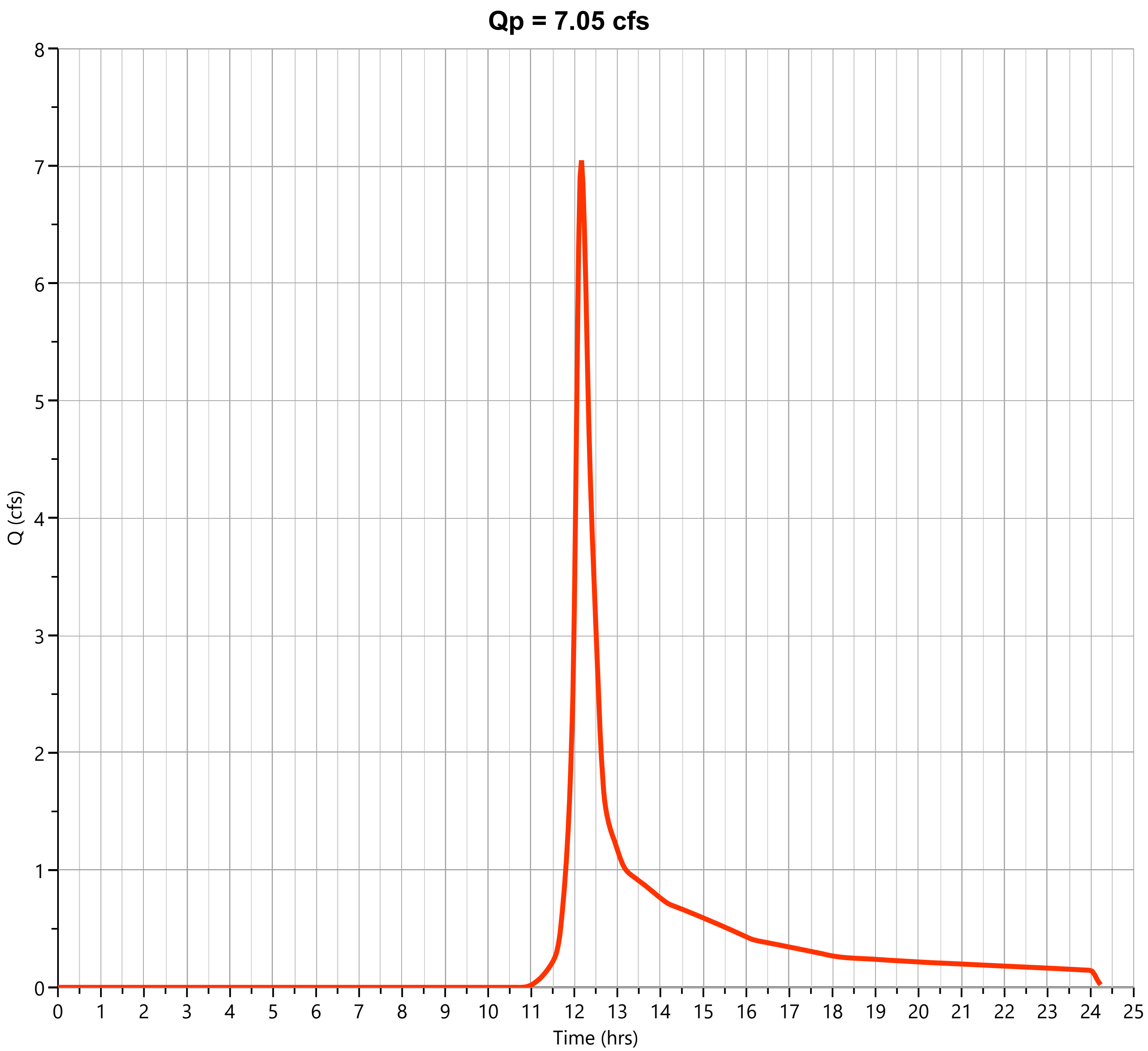


Hydrograph Report

P-8

Hyd. No. 44

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



Hydrograph Report

Project Name:

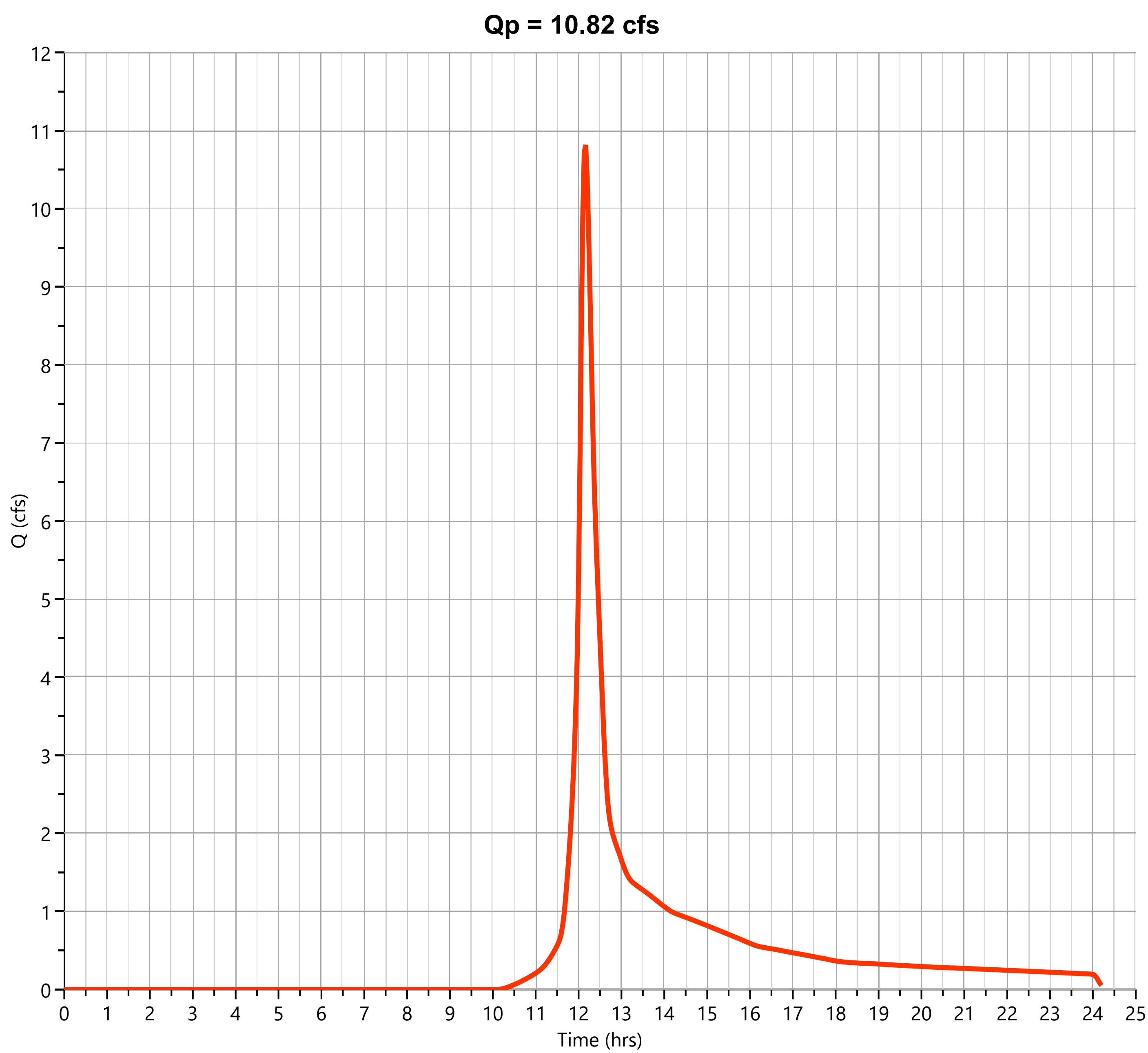
Hydrology Studio v 3.0.0.31

02-15-2024

P-8

Hyd. No. 44

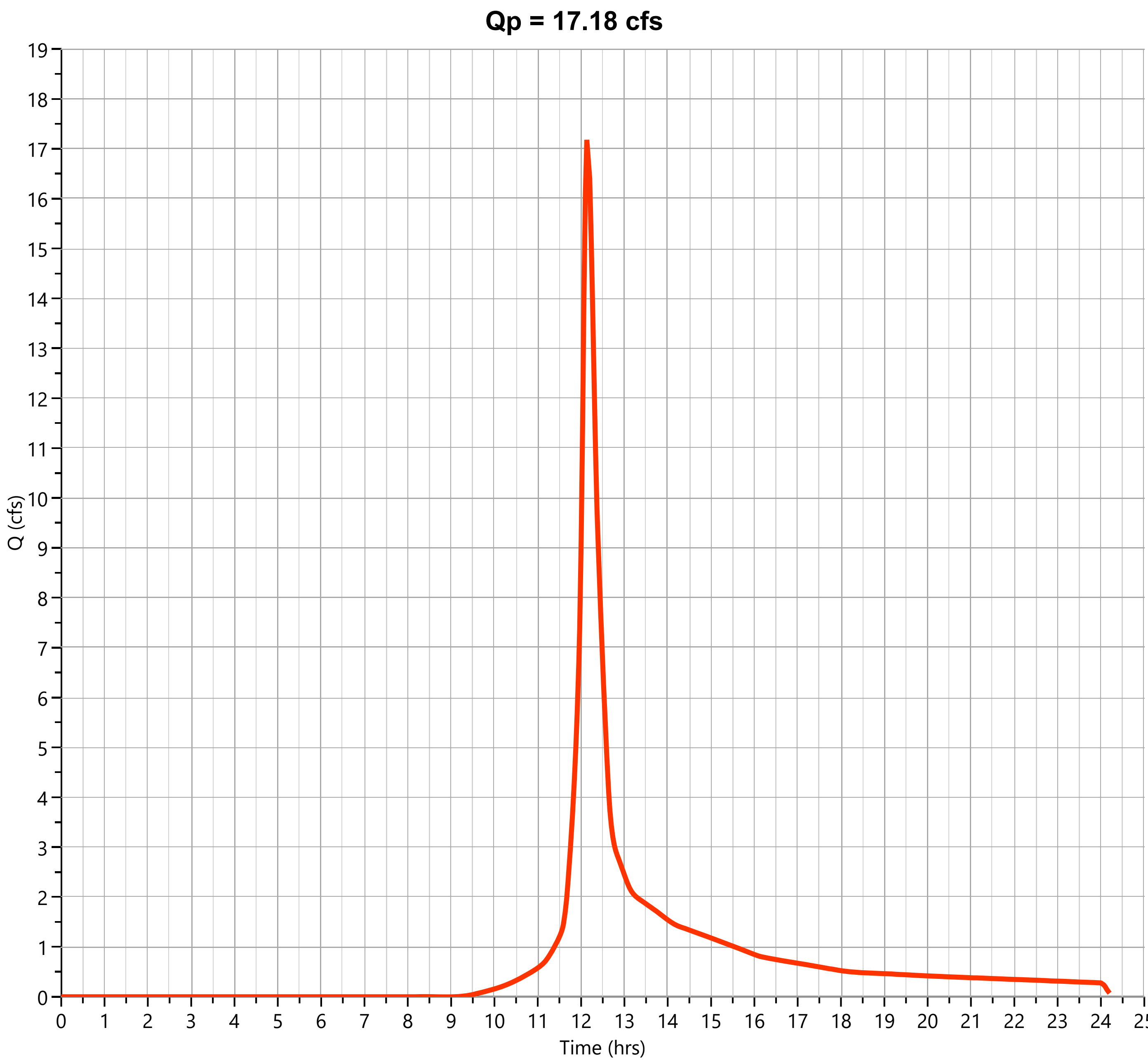
Hydrograph Type	= NRCS Runoff	Peak Flow	= 10.82 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 42,833 cuft
Drainage Area	= 5.03 ac	Curve Number	= 63
Tc Method	= User	Time of Conc. (Tc)	= 10.5 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration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



P-8

Hyd. No. 44

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



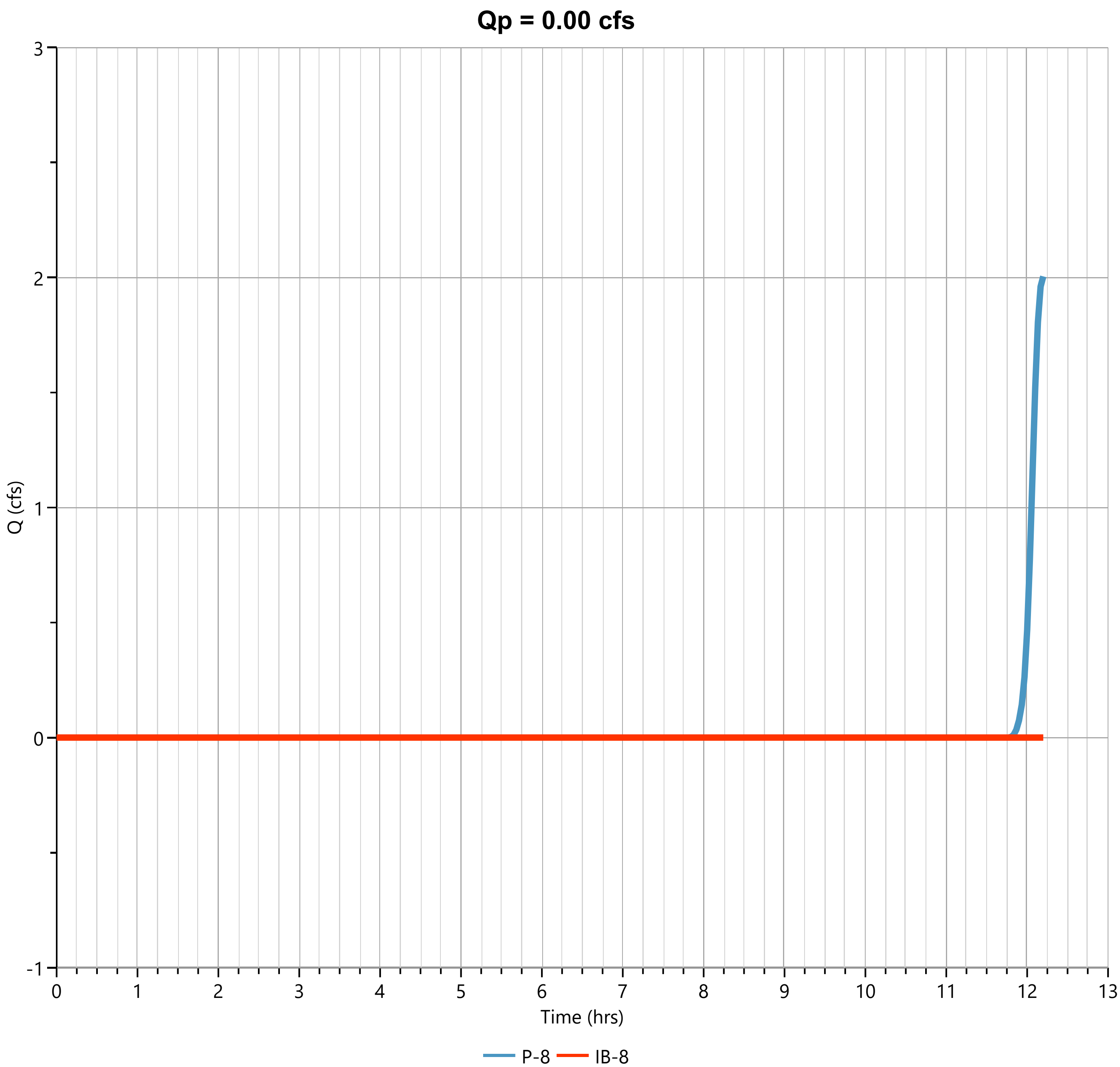
Hydrograph Report

IB-8

Hyd. No. 45

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 44 - P-8	Max. Elevation	= 222.45 ft
Pond Name	= IB-8	Max. Storage	= 1,039 cuft

Pond Routing by Storage Indication Method



Hydrograph Report

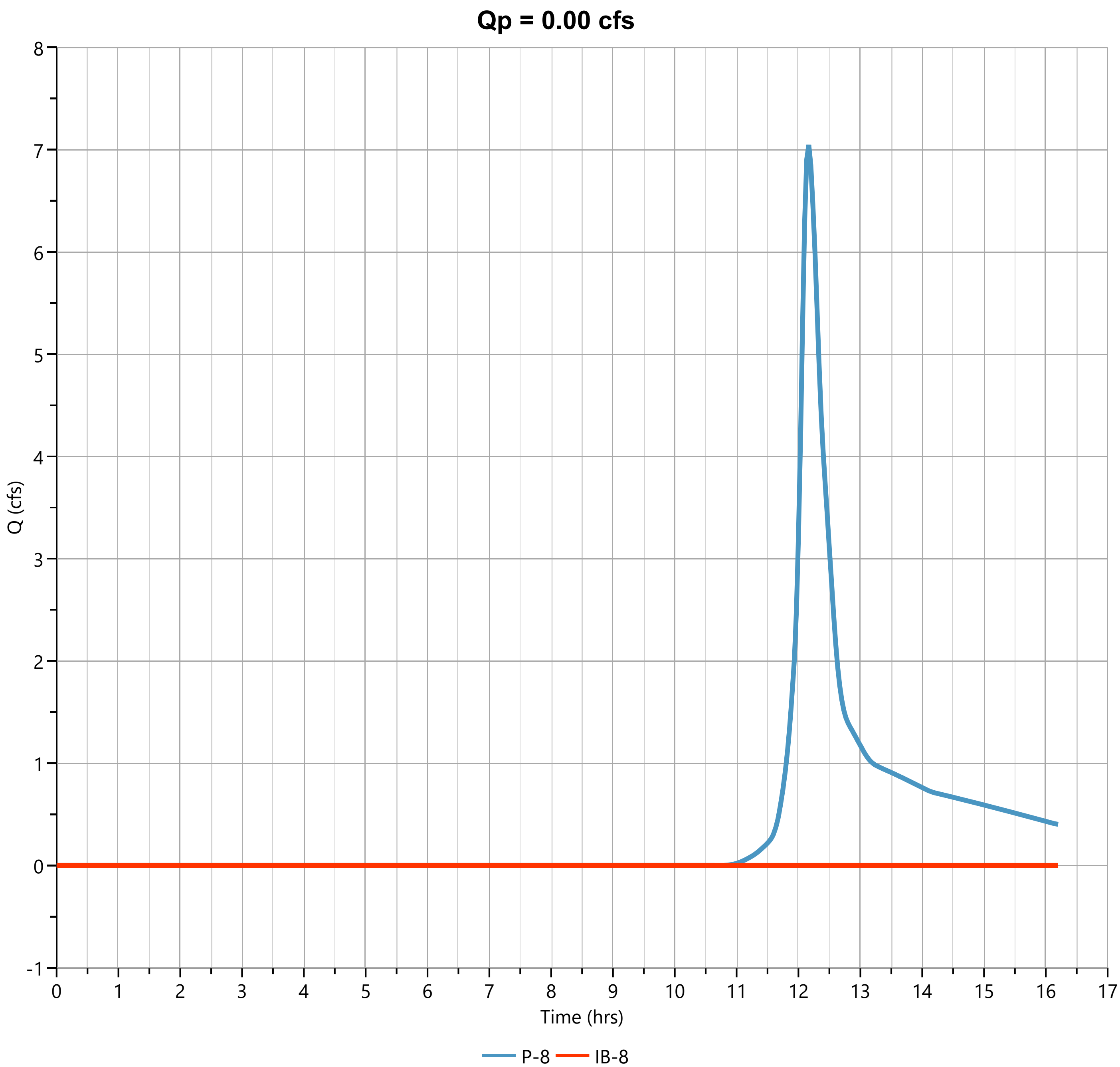
Project Name:

Hydrology Studio v 3.0.0.31 02-15-2024

IB-8 Hyd. No. 45

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 10-yr	Time to Peak	= 16.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 44 - P-8	Max. Elevation	= 223.18 ft
Pond Name	= IB-8	Max. Storage	= 8,430 cuft

Pond Routing by Storage Indication Method *Center of mass detention time = 8 min*



Hydrograph Report

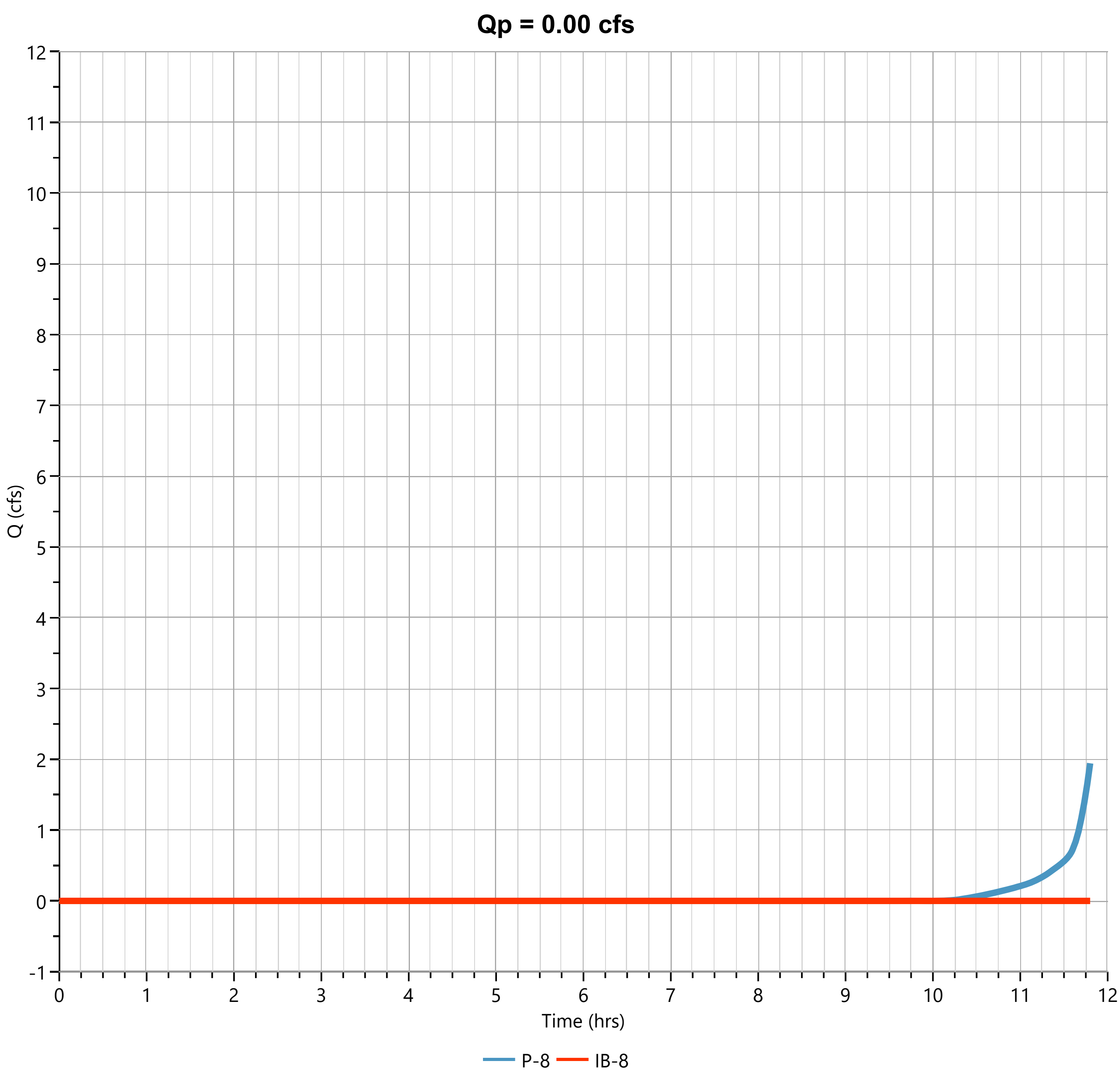
Project Name:

Hydrology Studio v 3.0.0.31 02-15-2024

IB-8 Hyd. No. 45

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 25-yr	Time to Peak	= 11.77 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 44 - P-8	Max. Elevation	= 223.96 ft
Pond Name	= IB-8	Max. Storage	= 14,896 cuft

Pond Routing by Storage Indication Method



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

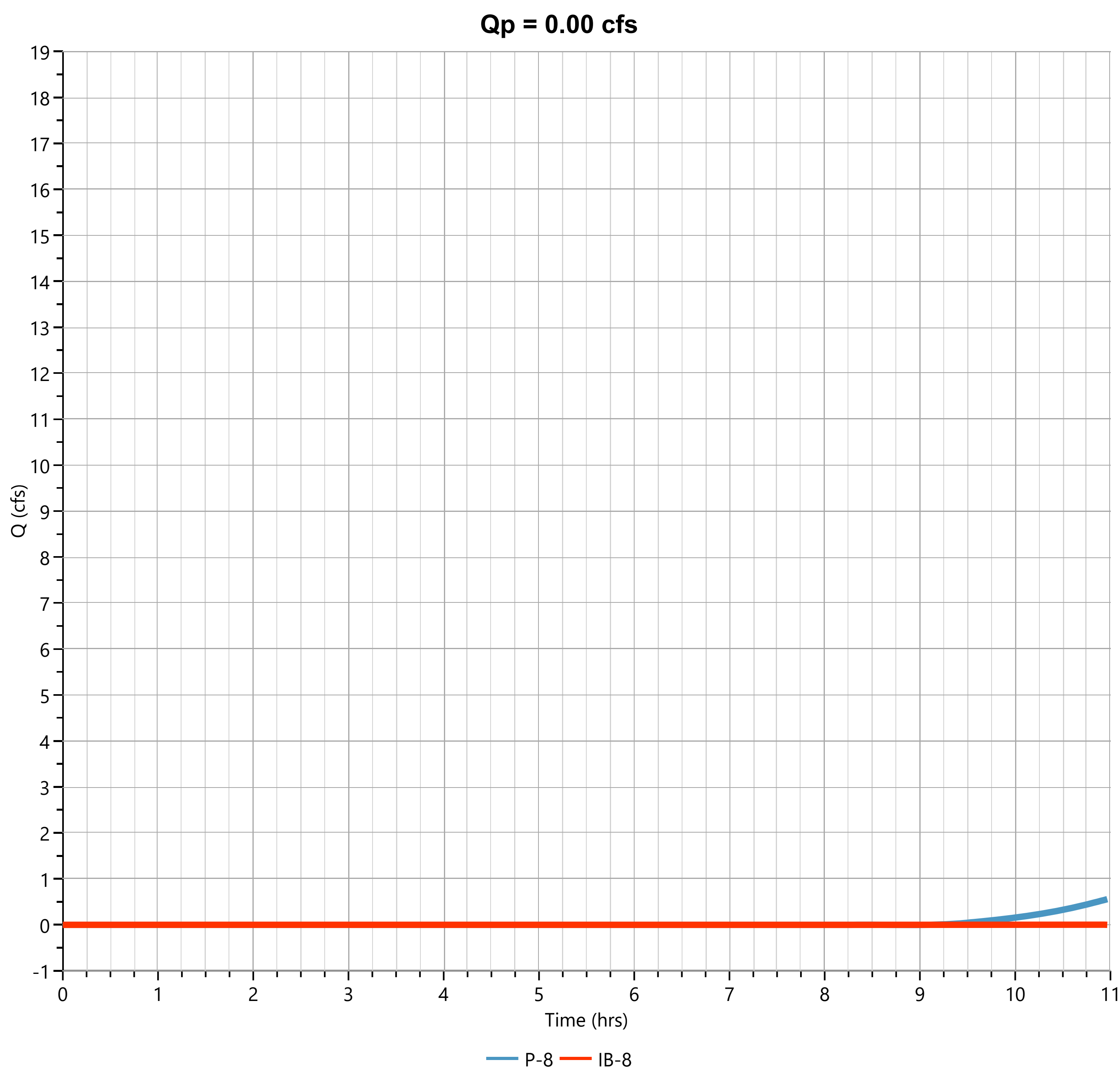
02-15-2024

IB-8

Hyd. No. 45

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 100-yr	Time to Peak	= 10.93 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 44 - P-8	Max. Elevation	= 225.06 ft
Pond Name	= IB-8	Max. Storage	= 26,369 cuft

Pond Routing by Storage Indication Method



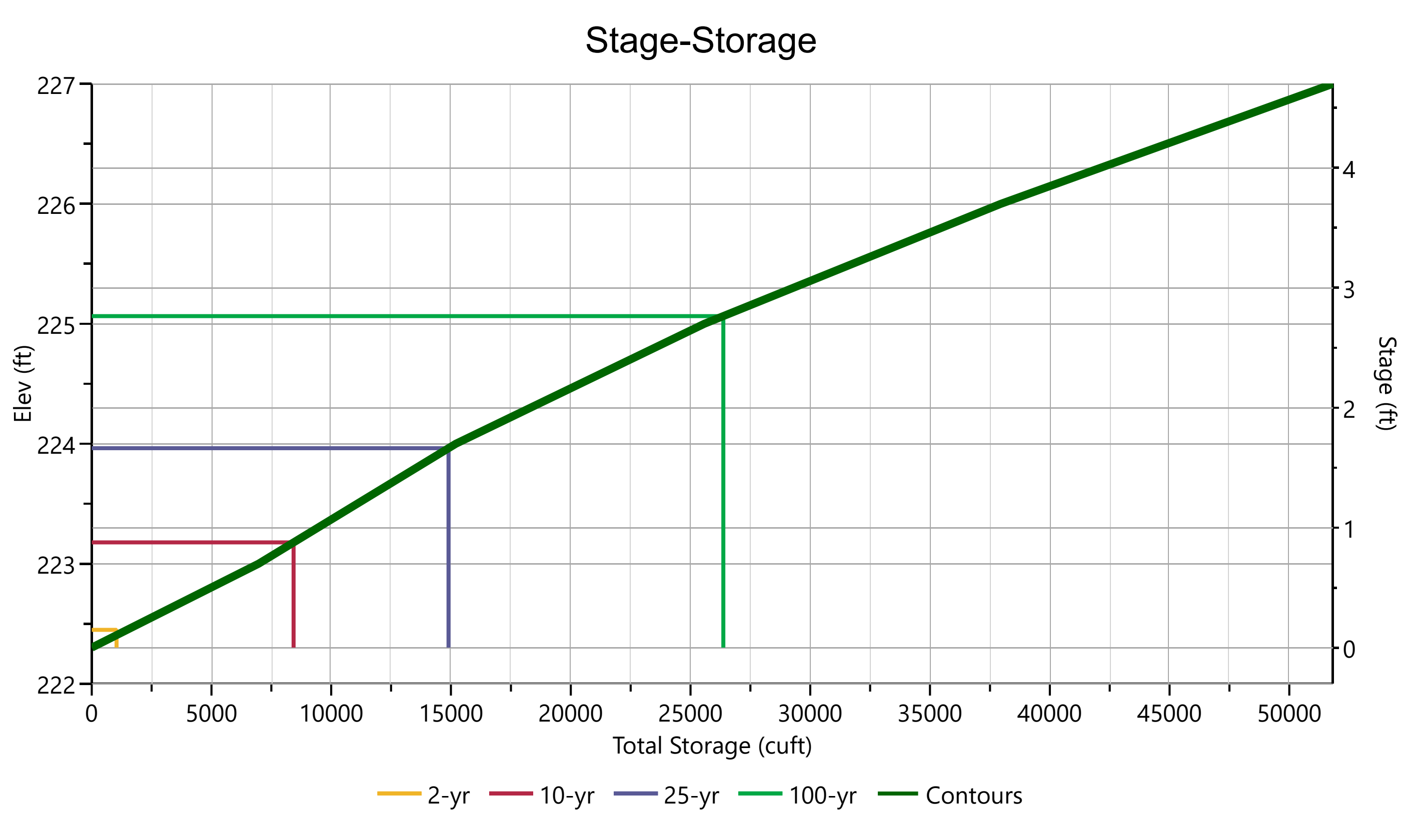
IB-8

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	222.30
Voids (%)	100.00
Volume Calc	None

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	222.30	6,571	0.000	0.000
1.00	223.00	7,372	6,972	6,972
2.00	224.00	9,089	8,231	15,202
3.00	225.00	11,652	10,371	25,573
4.00	226.00	13,110	12,381	37,954
5.00	227.00	14,624	13,867	51,821

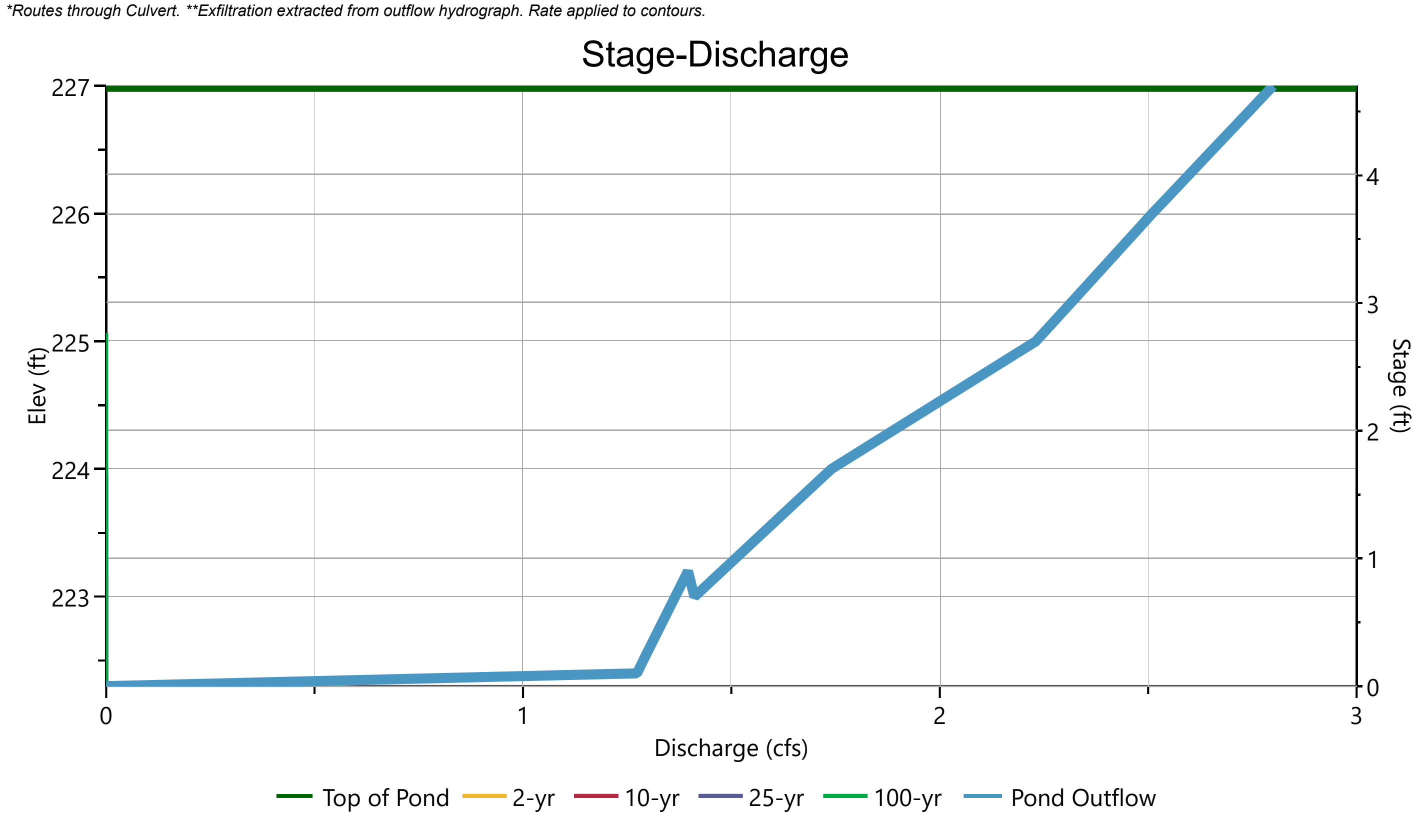


IB-8

Stage-Discharge

Culvert / Orifices	Culvert	Orifices 1	Orifices 2	Orifices 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 1**	**Weirs 2**	**Weirs 3**	**Ancillary**	
Shape / Type					Exfiltration, in/hr	8.27**
Crest Elevation, ft						
Crest Length, ft						
Angle, deg						
Weir Coefficient, Cw						

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



Pond Report

Project Name:

Hydrology Studio v 3.0.0.31 02-15-2024

IB-8

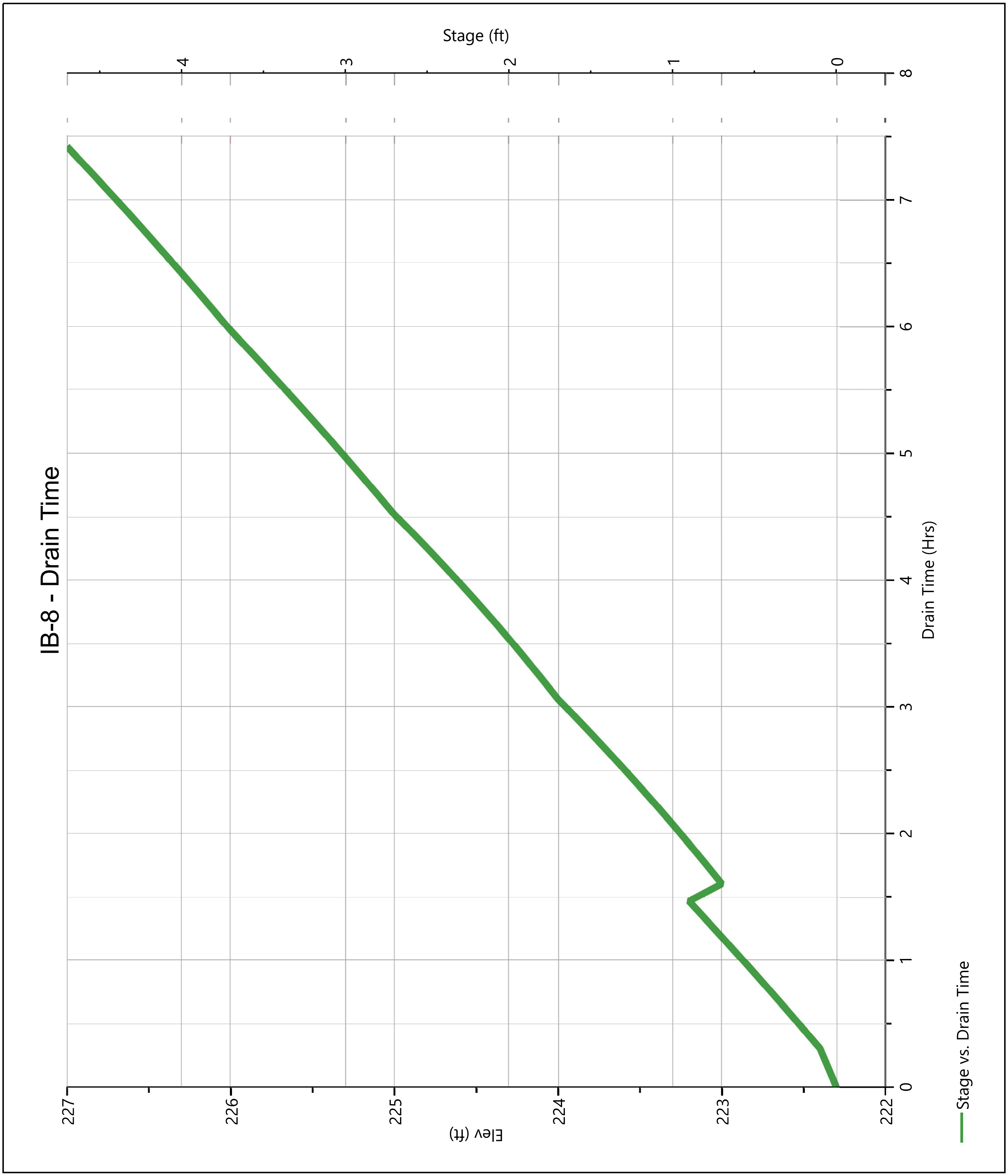
Stage-Storage-Discharge Summary

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

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

IB-8

Pond Drawdown



Worksheet 2: Runoff curve number and runoff **SM-3719C**

Project: Athens Street By PFK Date 10/13/22
Rev Date 6/17/2023
Location: Stow, MA Checked Date

Circle one: Present [Developed] Subcatchment P-9B

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)		CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
	Impervious		98			1.01	98.85
A	Woods	Good Condition	30			1.54	46.08
A	Open Space	Good Condition	39			1.06	41.53
A	Open Space	Fair Condition	49			0.00	0.00
A	Gravel		76			0.00	0.00
B	Woods	Good Condition	55			0.00	0.00
B	Open Space	Good Condition	61			0.00	0.00
C	Gravel		89			0.00	0.00
C	Woods	Good Condition	70			4.90	343.20
C	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
					Totals =	11.92	781.65

1/ Use only one CN source per line. 519132

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{781.65}{11.92} =$ 65.59 ; Use CN = 66

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency......................................	yr	2	25	100
Rainfall, P (24-hour).......................	in	3.27	6.14	7.84
Runoff, Q..	in	0.66	2.51	3.83

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By PFK Date 10/13/2022
Rev Date 6/17/2023
Location: Stow, MA Checked ______ Date ______

Circle one: Present **Developed** Subcatchment P-9B
Circle one: Tc **Tt** through subarea

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	0.026			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.26			0.26
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	629			
9. Watercourse slope, s		ft/ft	0.080			
10. Average Velocity, V (figure 3-1)		ft/s	4.56			
11. Tt = L / 3600V	Compute Tt	hr	0.04			0.04
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.30
min 17.9

Hydrograph Report

Project Name:

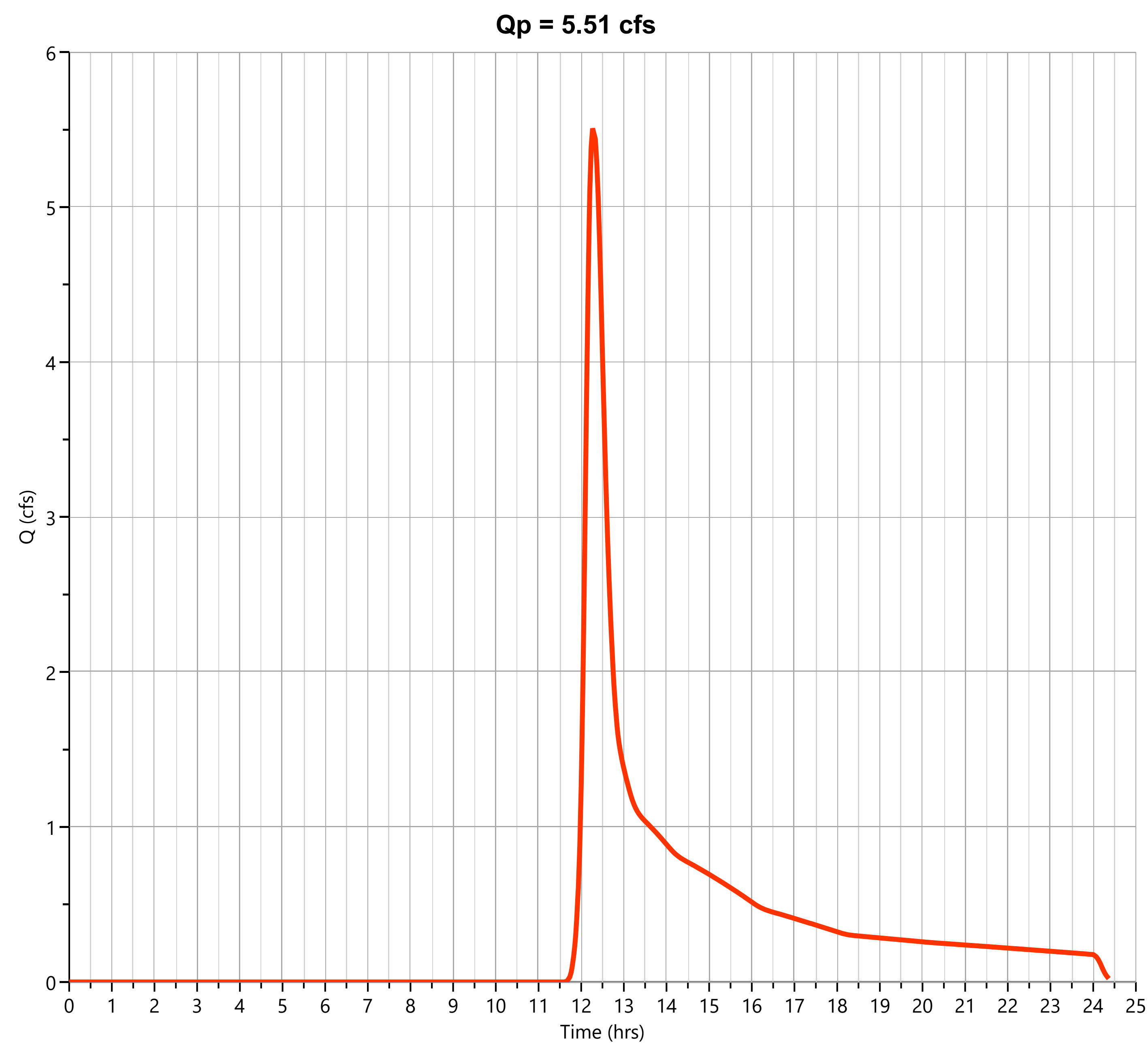
Hydrology Studio v 3.0.0.27

06-17-2023

P-9B

Hyd. No. 50

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

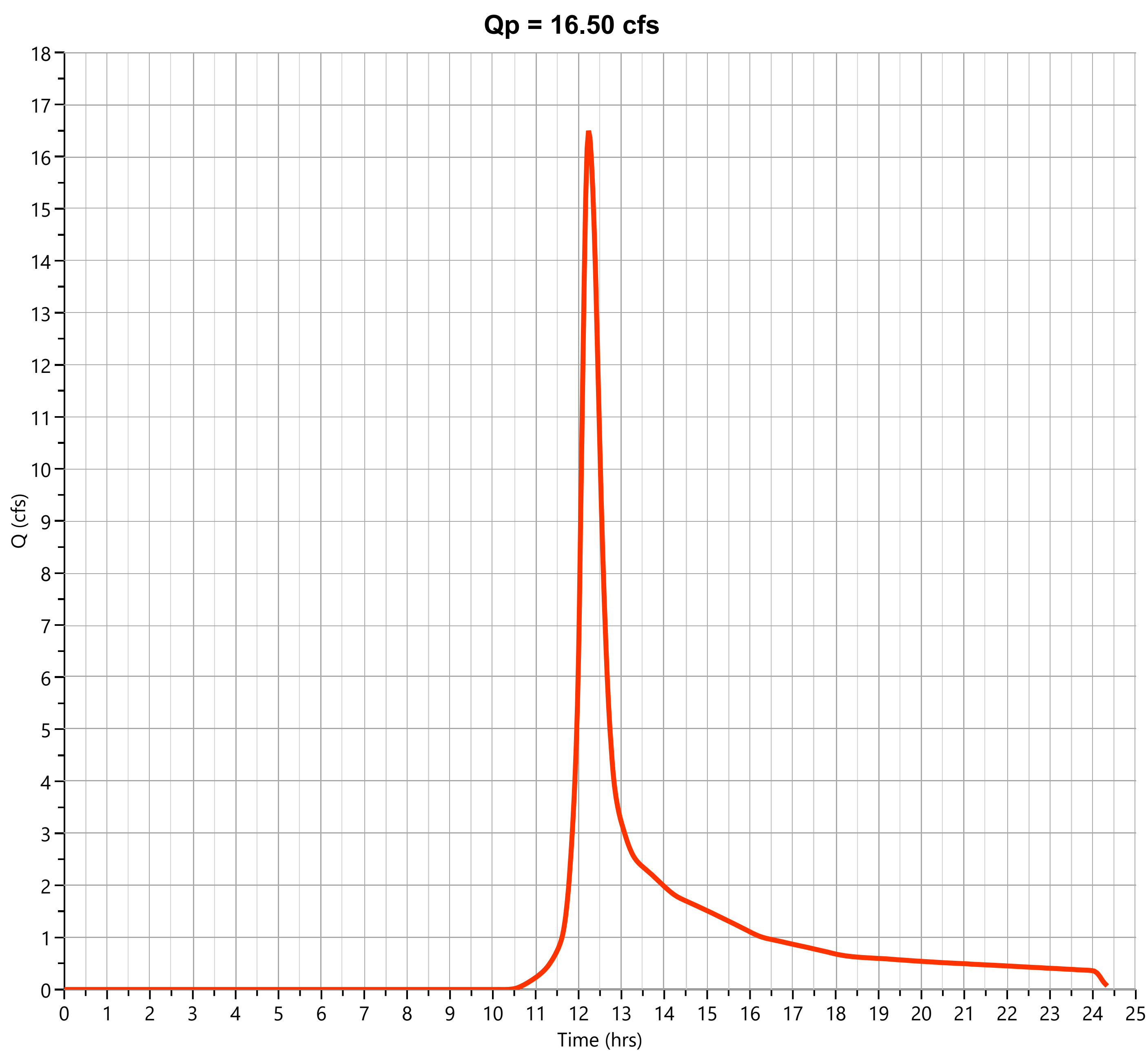


Hydrograph Report

P-9B

Hyd. No. 50

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

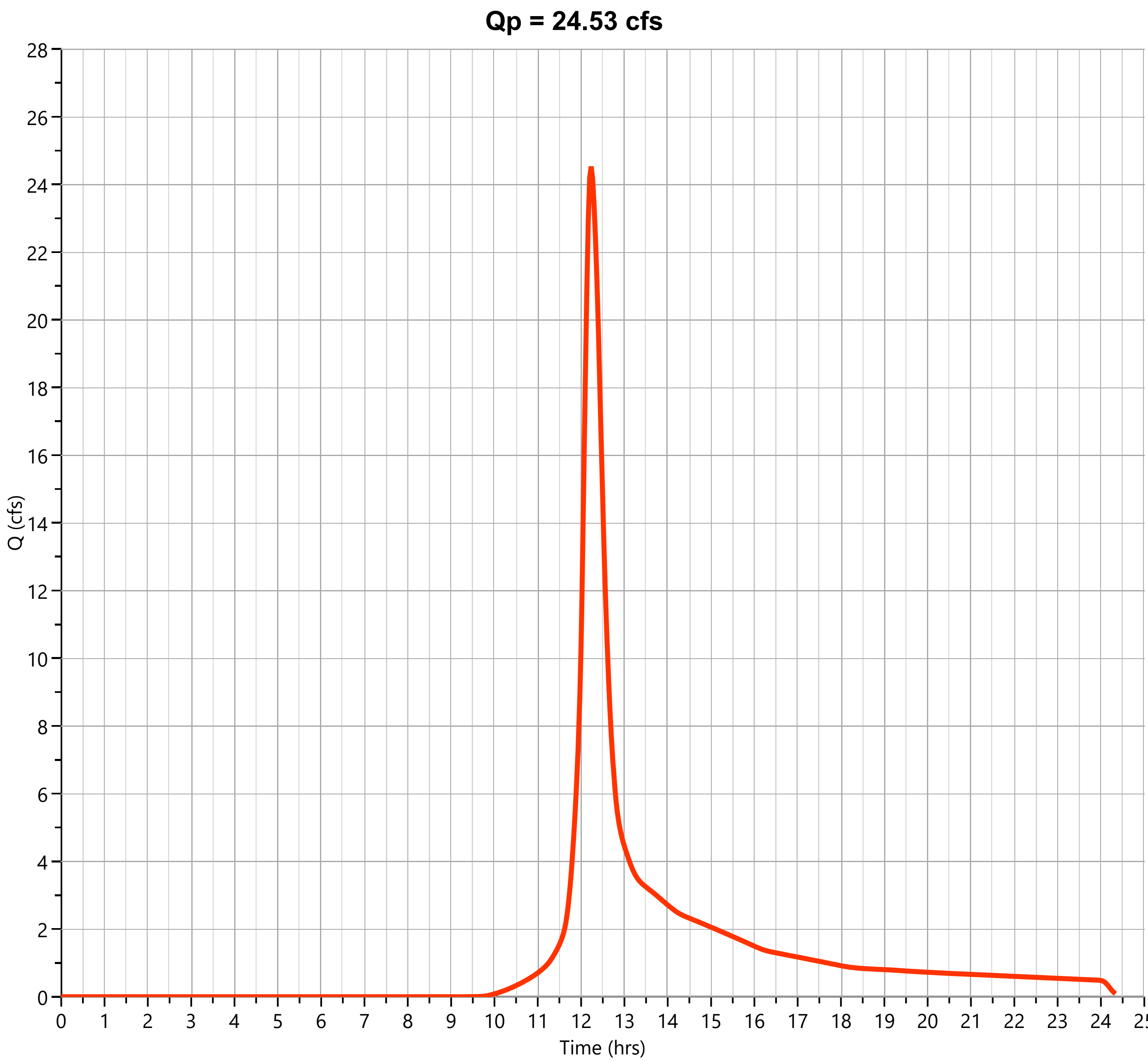


Hydrograph Report

P-9B

Hyd. No. 50

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 Report

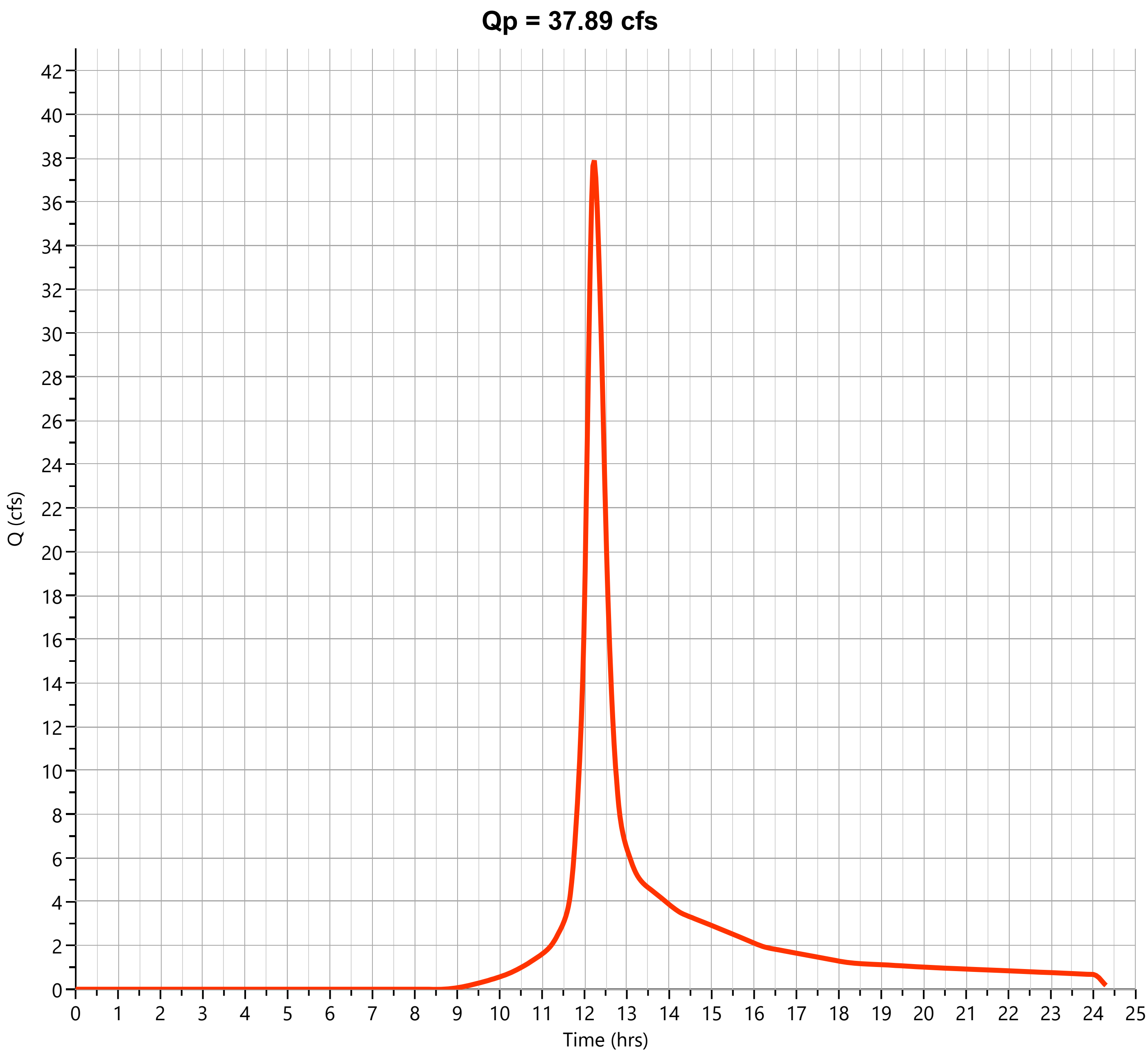
Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

P-9B

Hyd. No. 50

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

Hydrograph Report

Hydrology Studio v 3.0.0.21

10-27-2022

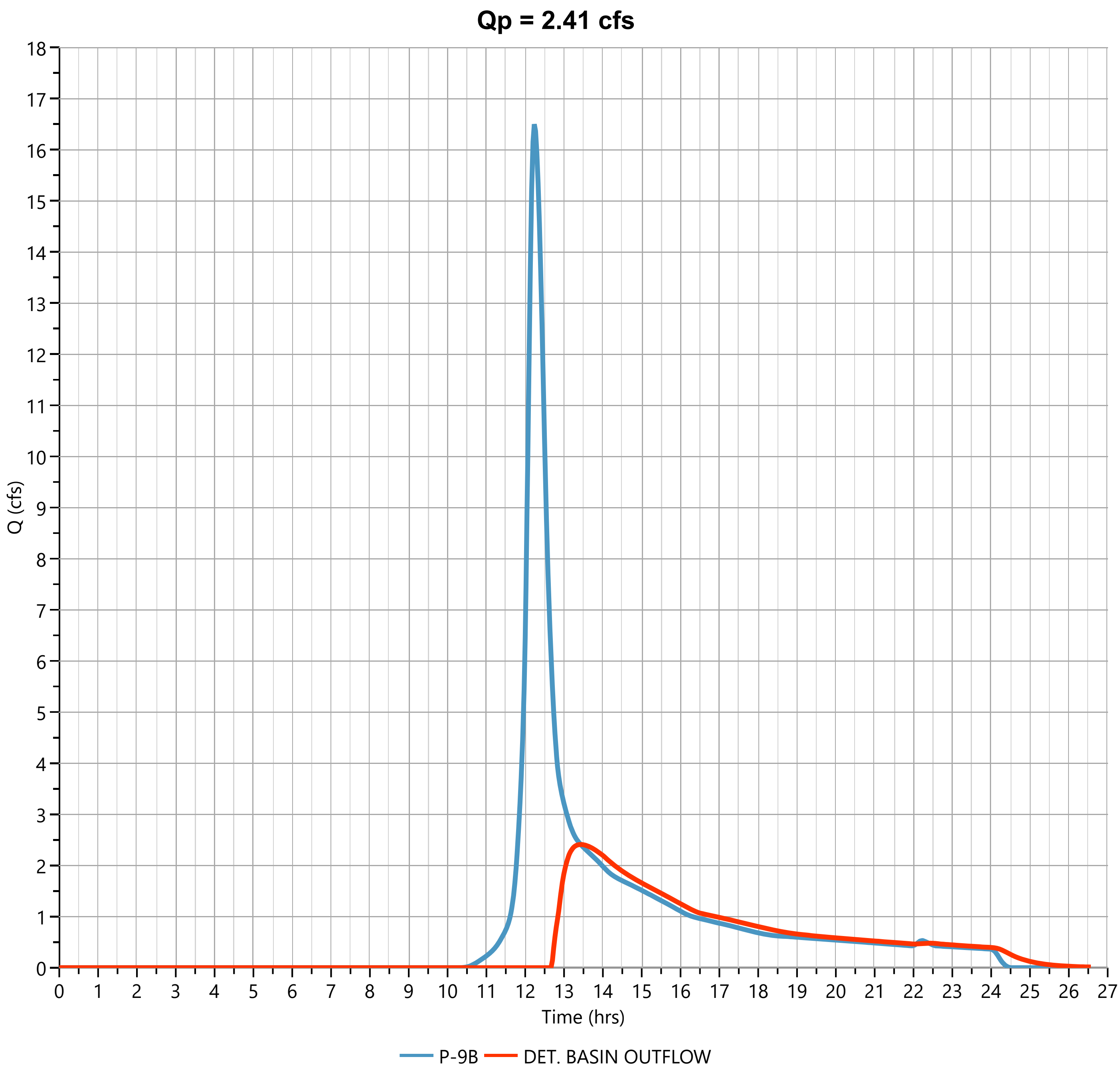
DET. BASIN OUTFLOW

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



Hydrograph Report

Hydrology Studio v 3.0.0.21 10-27-2022

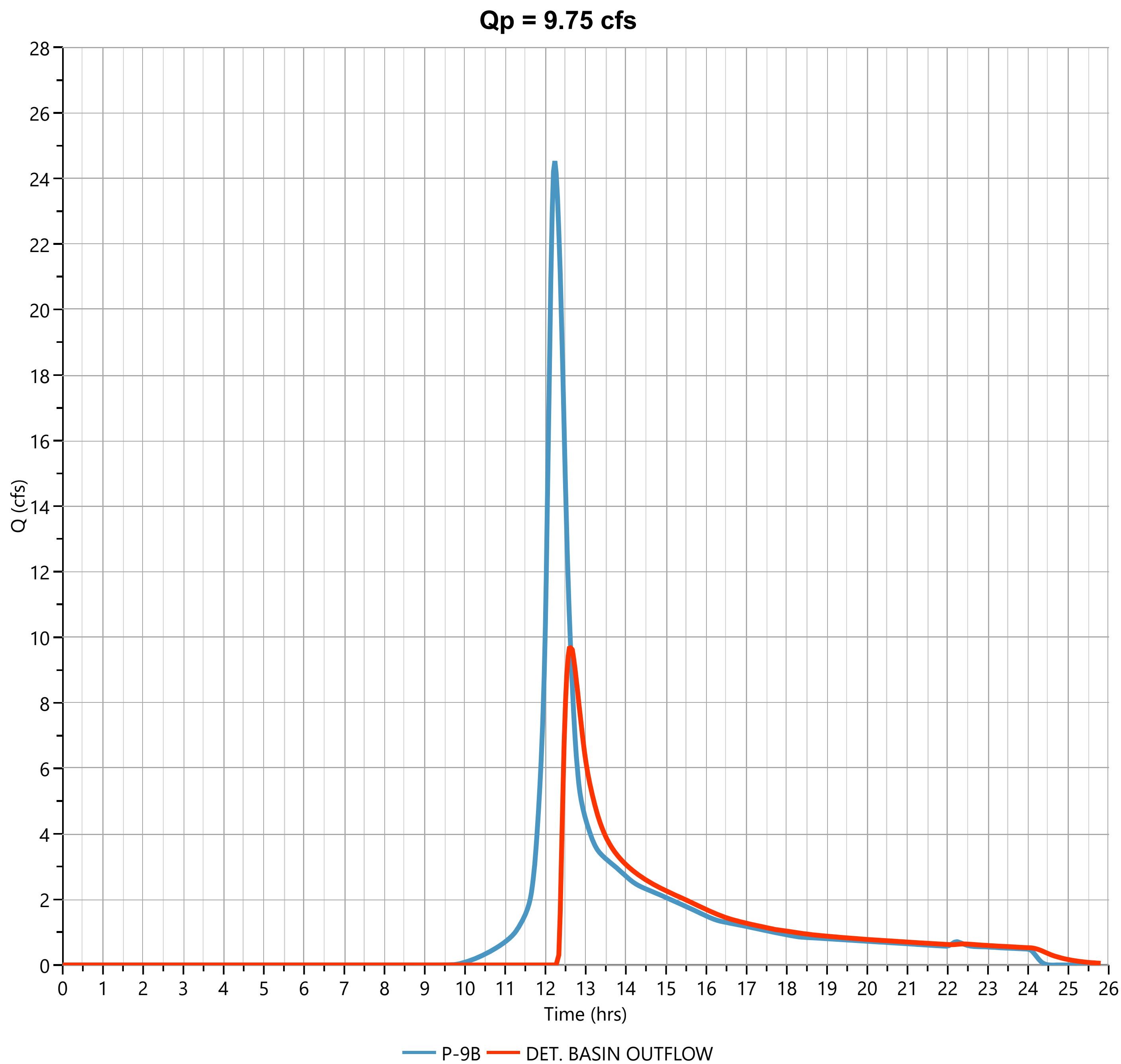
DET. BASIN OUTFLOW

Hyd. No. 50

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

Pond Routing by Storage Indication Method

Center of mass detention time = 1.49 hrs



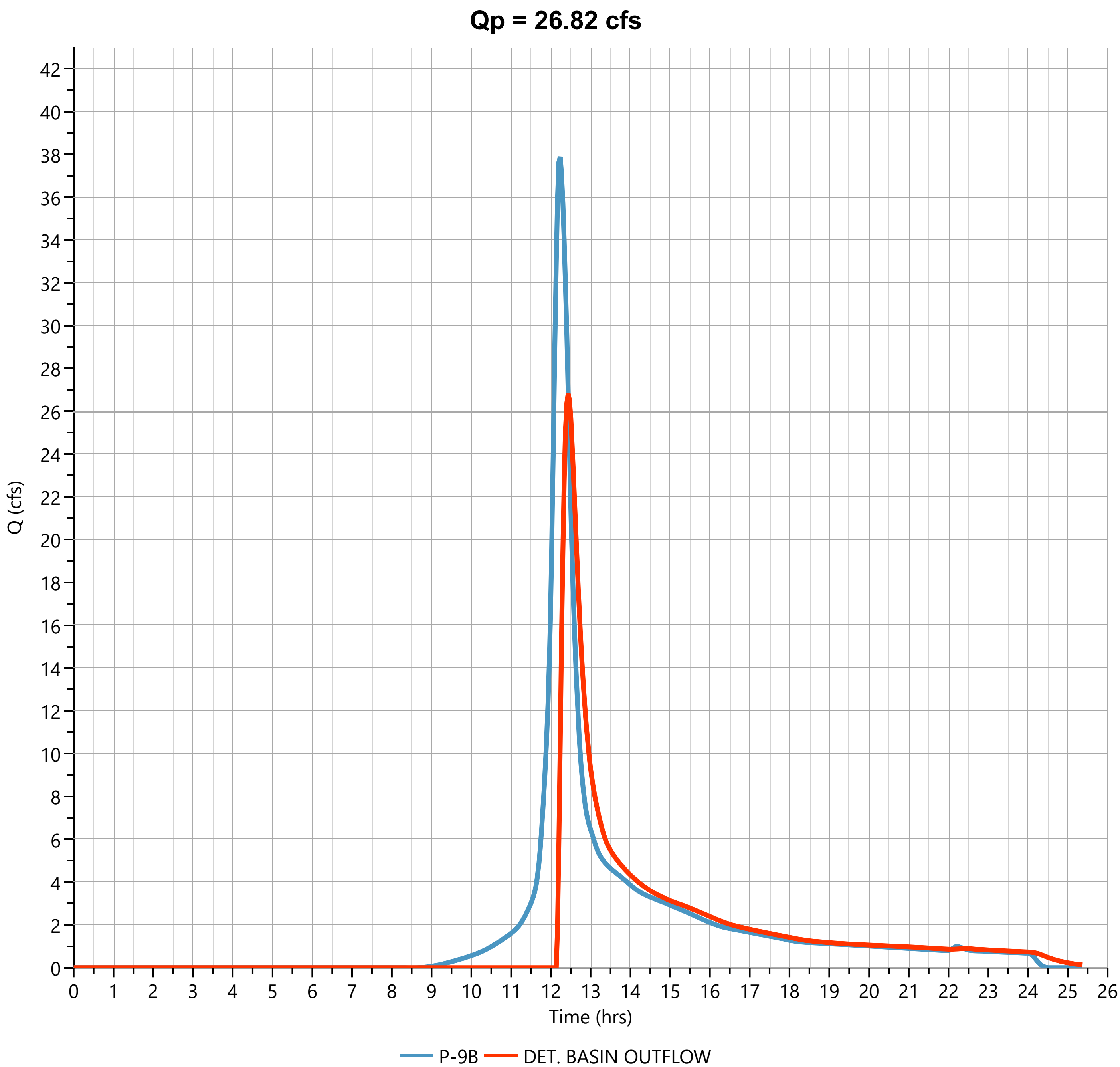
DET. BASIN OUTFLOW

Hyd. No. 50

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

Pond Routing by Storage Indication Method

Center of mass detention time = 58 min



EXIST DETENTION

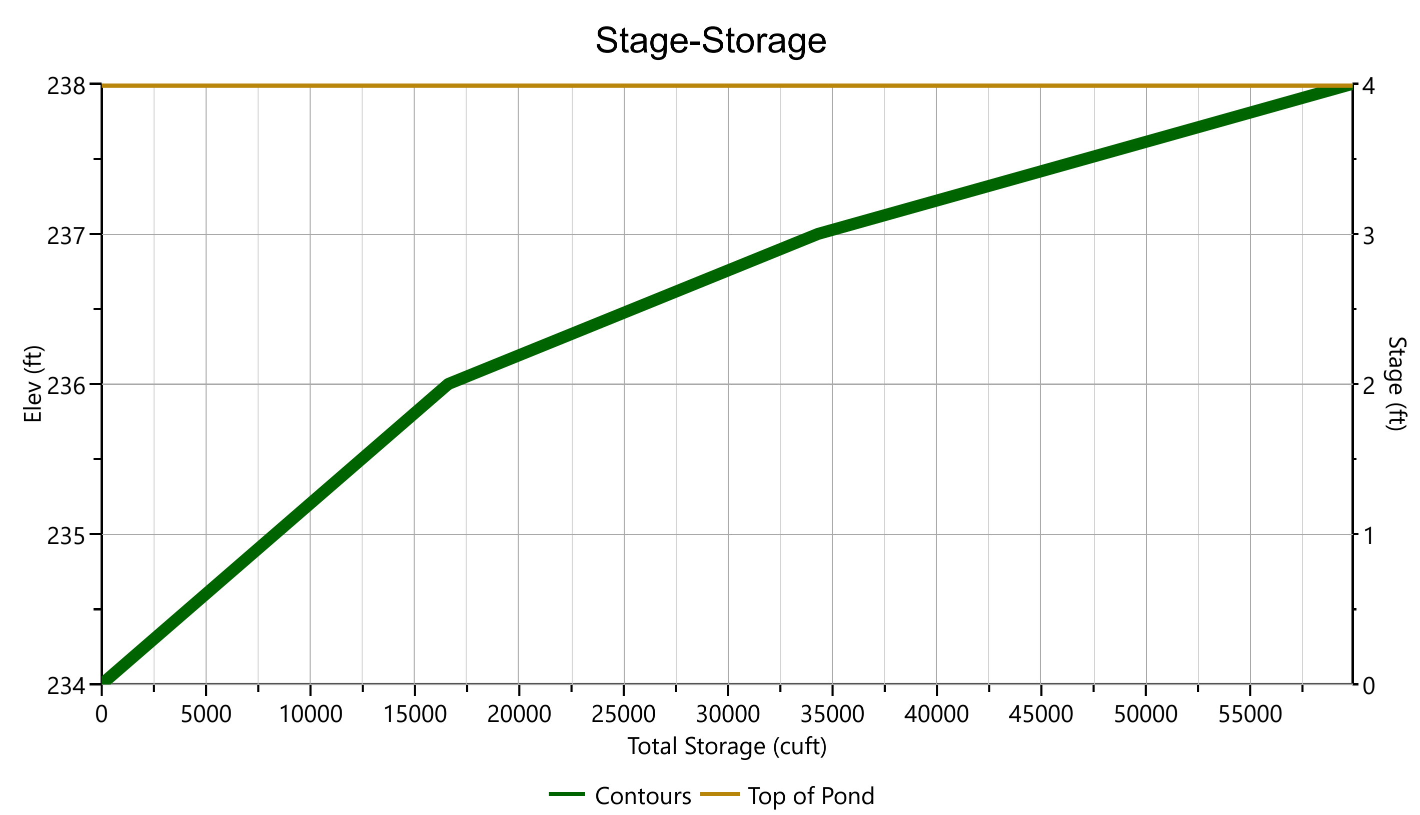
Stage-Storage

User Defined Contours

Description	Input
Bottom Elevation, ft	234.00
Voids (%)	100.00
Volume Calc	Rectangular

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	234.00	2,400	0.000	0.000
2.00	236.00	14,200	16,600	16,600
3.00	237.00	21,200	17,700	34,300
4.00	238.00	30,000	25,600	59,900

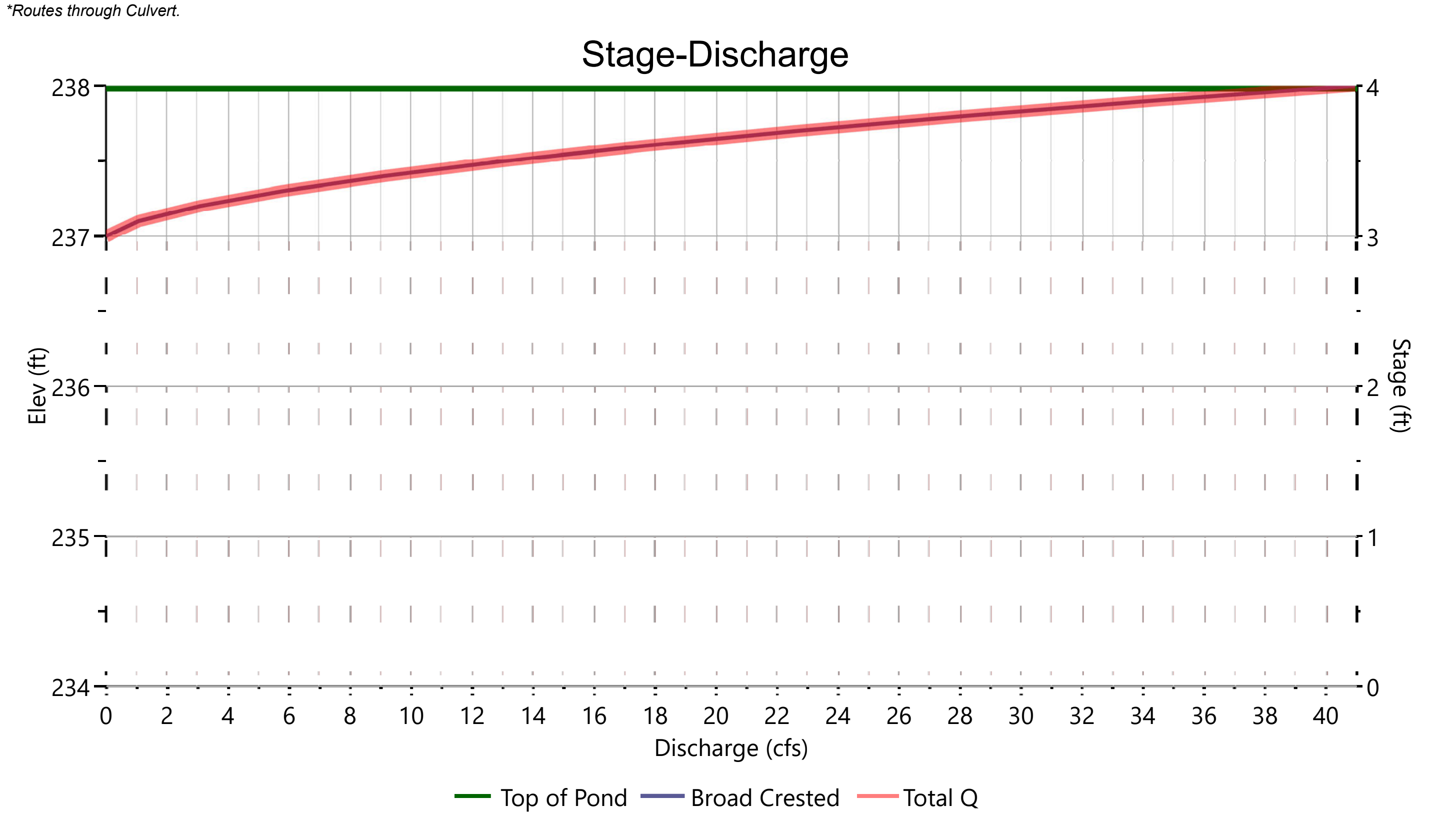


EXIST DETENTION

Stage-Discharge

Culvert / Orifices	Culvert	Orifices 1	Orifices 2	Orifices 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 1**	**Weirs 2**	**Weirs 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				

Routes through Culvert.



EXIST DETENTION

Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
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

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Pond Report

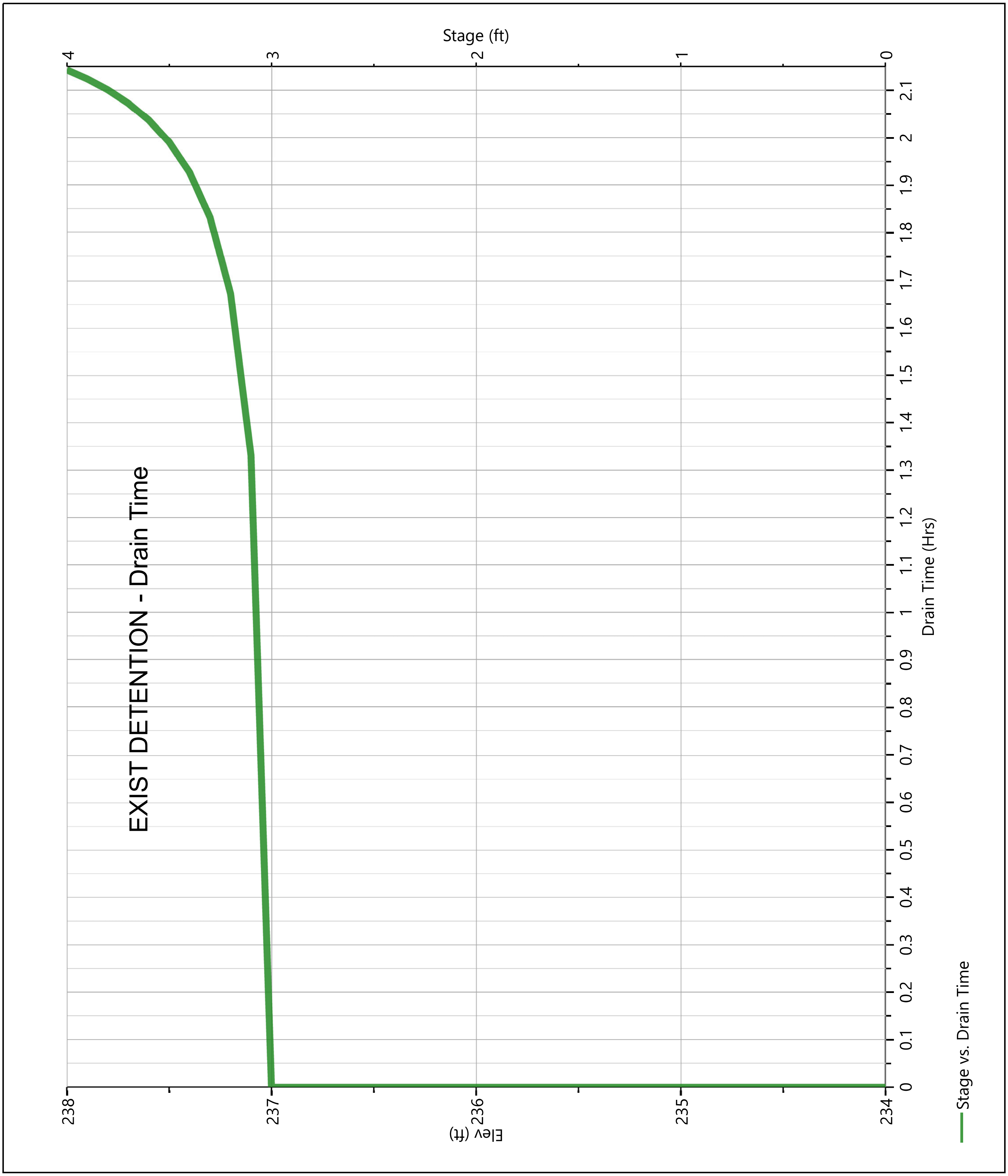
Project Name:

Hydrology Studio v 3.0.0.21

10-27-2022

EXIST DETENTION

Pond Drawdown



Worksheet 2: Runoff curve number and runoff **SM-3719C**

Project: Athens Street By PFK Date 6/24/22
Rev Date 10/13/2022
Location: Stow, MA Checked Date 6/17/2023

Circle one: Present $\boxed{\text{Developed}}$ Subcatchment P-10A

1. Runoff curve number (CN)

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

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = $\frac{613.01}{10.22}$ = 59.99 ; Use CN = $\boxed{60}$

2. Runoff

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By PFK Date 6/24/2022
Rev Date 10/13/2022
Location: Stow, MA Checked Date 6/17/2023

Circle one: Present **Developed** Subcatchment P-10A
Circle one: Tc **Tt** through subarea

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 Tt	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 Tt	hr	0.10			0.10
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.48
min 28.6

Hydrograph Report

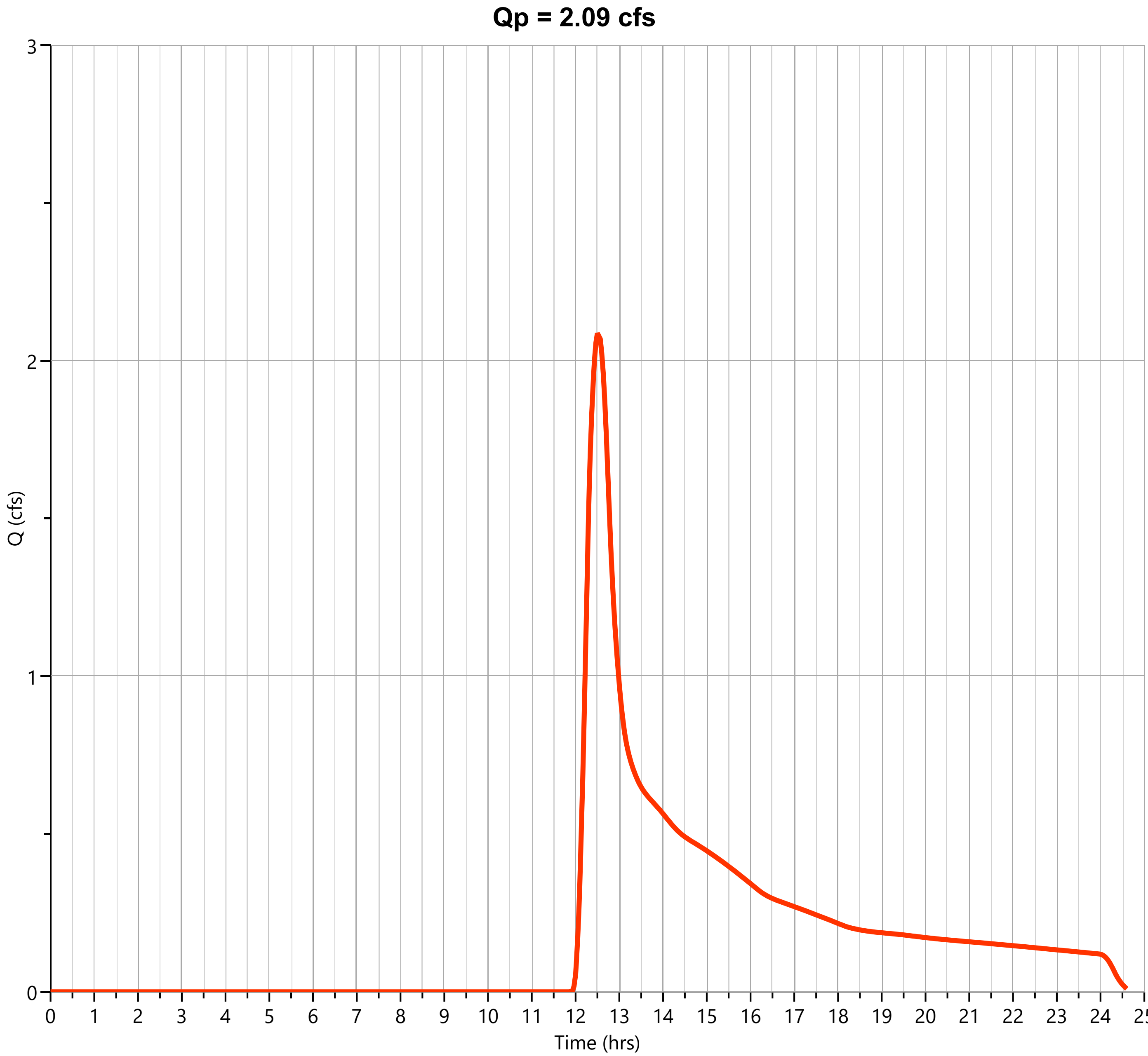
Hydrology Studio v 3.0.0.31

02-14-2024

P-10A

Hyd. No. 47

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



Hydrograph Report

Project Name:

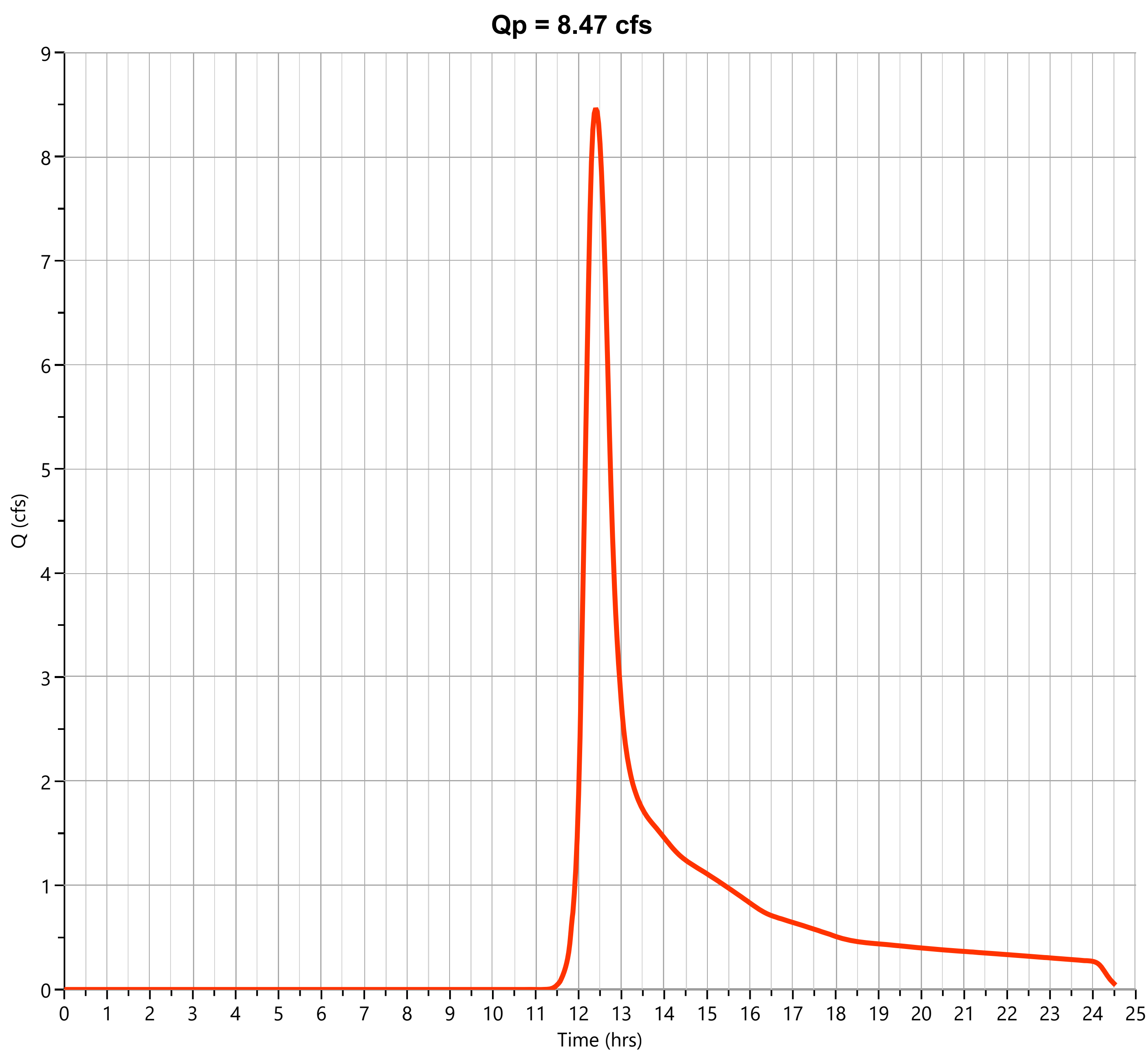
Hydrology Studio v 3.0.0.31

02-14-2024

P-10A

Hyd. No. 47

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



Hydrograph Report

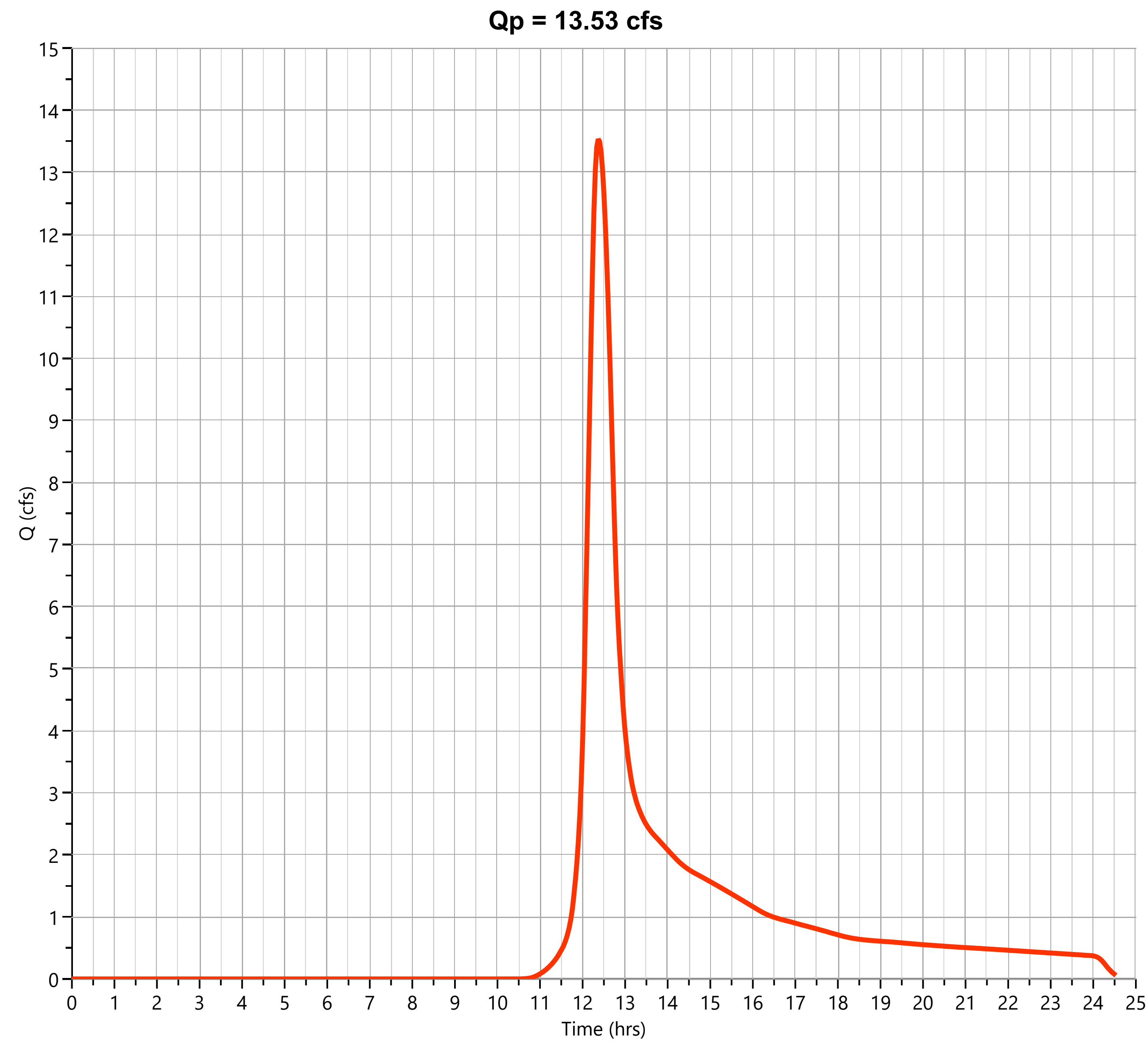
Project Name:

Hydrology Studio v 3.0.0.31 02-14-2024

P-10A

Hyd. No. 47

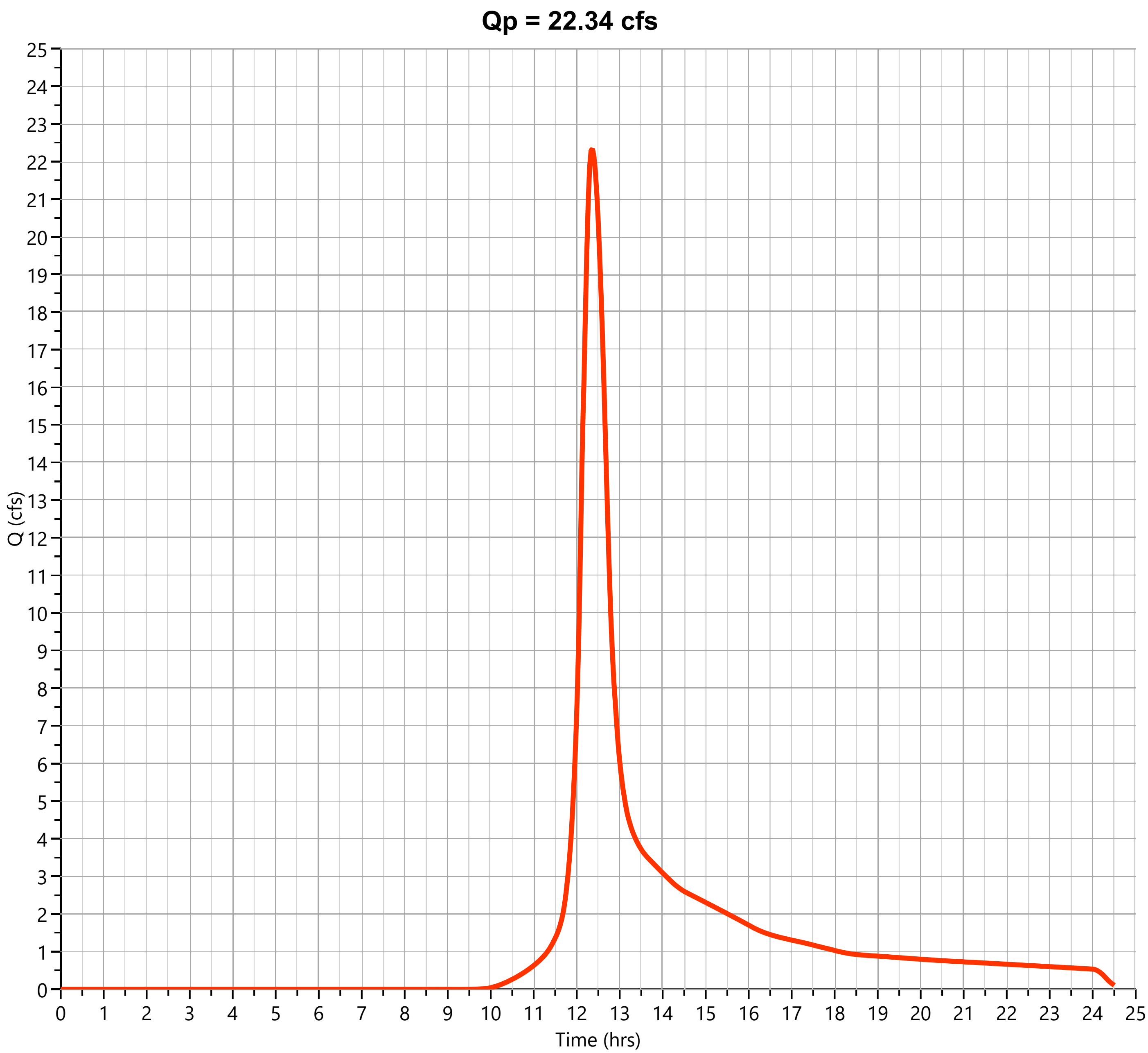
Hydrograph Type	= NRCS Runoff	Peak Flow	= 13.53 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.37 hrs
Time Interval	= 2 min	Runoff Volume	= 74,706 cuft
Drainage Area	= 10.22 ac	Curve Number	= 60
Tc Method	= User	Time of Conc. (Tc)	= 28.6 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration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



P-10A

Hyd. No. 47

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



Worksheet 2: Runoff curve number and runoff **SM-3719C**

Project: Athens Street By PFK' Date 6/24/22
Rev Date 10/13/2022
Location: Stow, MA Checked Date 6/17/2023

Circle one: Present $\boxed{\text{Developed}}$ Subcatchment P-10B

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition: percent impervious: unconnected/connected impervious area ratio)		CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area Acres	Product of CN x Area
	Impervious		98			1.69	165.29
A	Woods	Good Condition	30			0.00	0.00
A	Open Space	Good Condition	39			0.52	20.21
A	Open Space	Fair Condition	49			0.00	0.00
A	Gravel		76			0.00	0.00
B	Woods	Good Condition	55			0.00	0.00
B	Open Space	Good Condition	61			0.00	0.00
B	Gravel		85			0.00	0.00
C	Woods	Good Condition	70			0.00	0.00
C	Open Space	Good Condition	74			0.69	51.41
C	Open Space	Poor Condition	86			0.00	0.00
C	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	236.91

CN (weighted) = $\frac{\text{total product}}{\text{total area}}$ = $\frac{236.91}{2.90}$ = 81.71 ; Use CN = 82

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.......................................	yr	2	25	100
Rainfall, P (24-hour)........................	in	3.27	6.14	7.84
Runoff, Q...	in	1.57	4.09	5.67

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By PFK Date 6/24/2022
Rev Date 10/13/2022
Location: Stow, MA Checked Date 6/17/2023

Circle one: Present **Developed** Subcatchment P-10B
Circle one: Tc **Tt** through subarea

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	0.020			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.14			0.14
Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	231			
9. Watercourse slope, s		ft/ft	0.020			
10. Average Velocity, V (figure 3-1)		ft/s	2.28			
11. Tt = L / 3600V	Compute Tt	hr	0.03			0.03
Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.17
min 10.0

Hydrograph Report

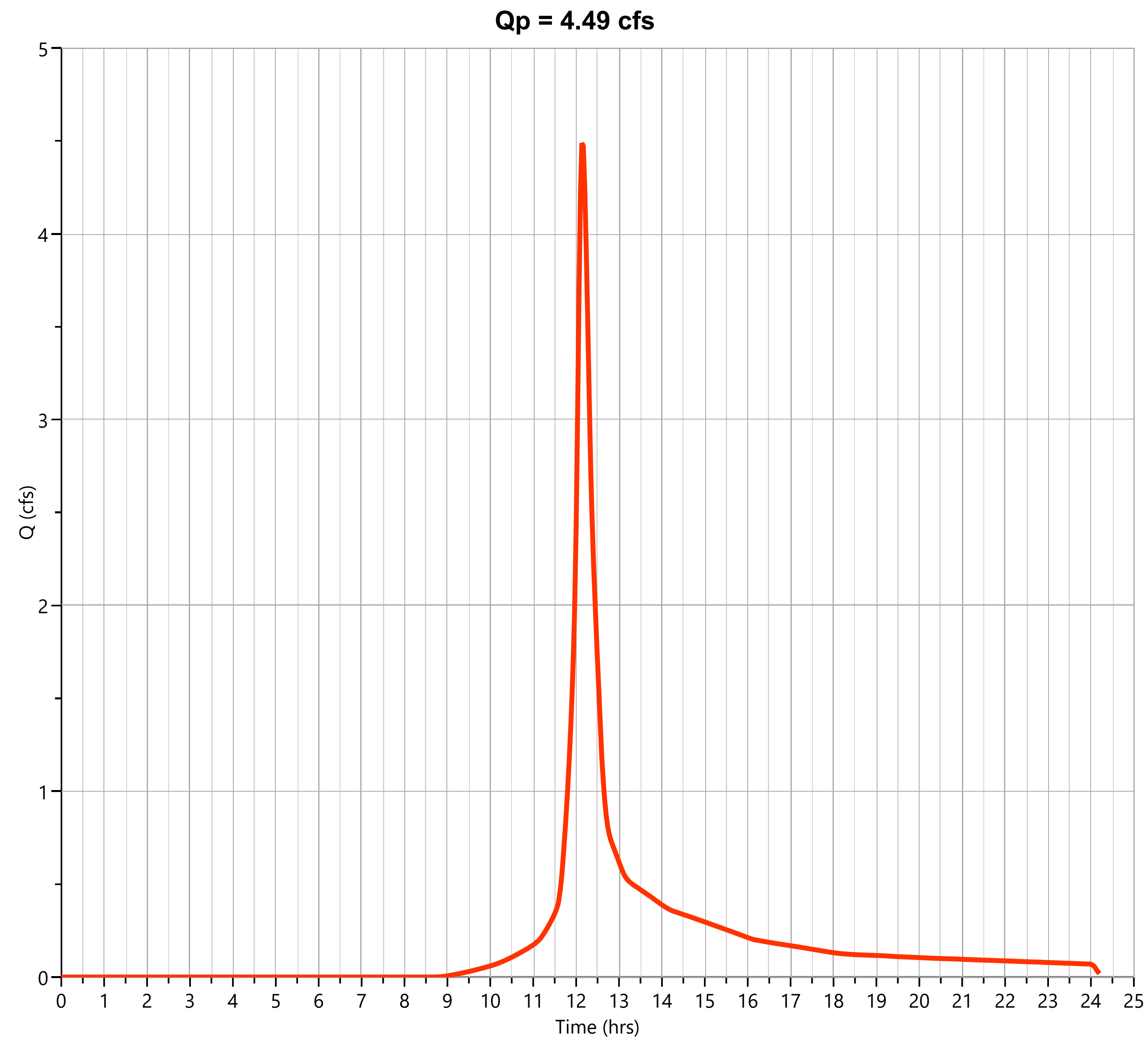
Hydrology Studio v 3.0.0.27

06-17-2023

P-10B

Hyd. No. 48

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

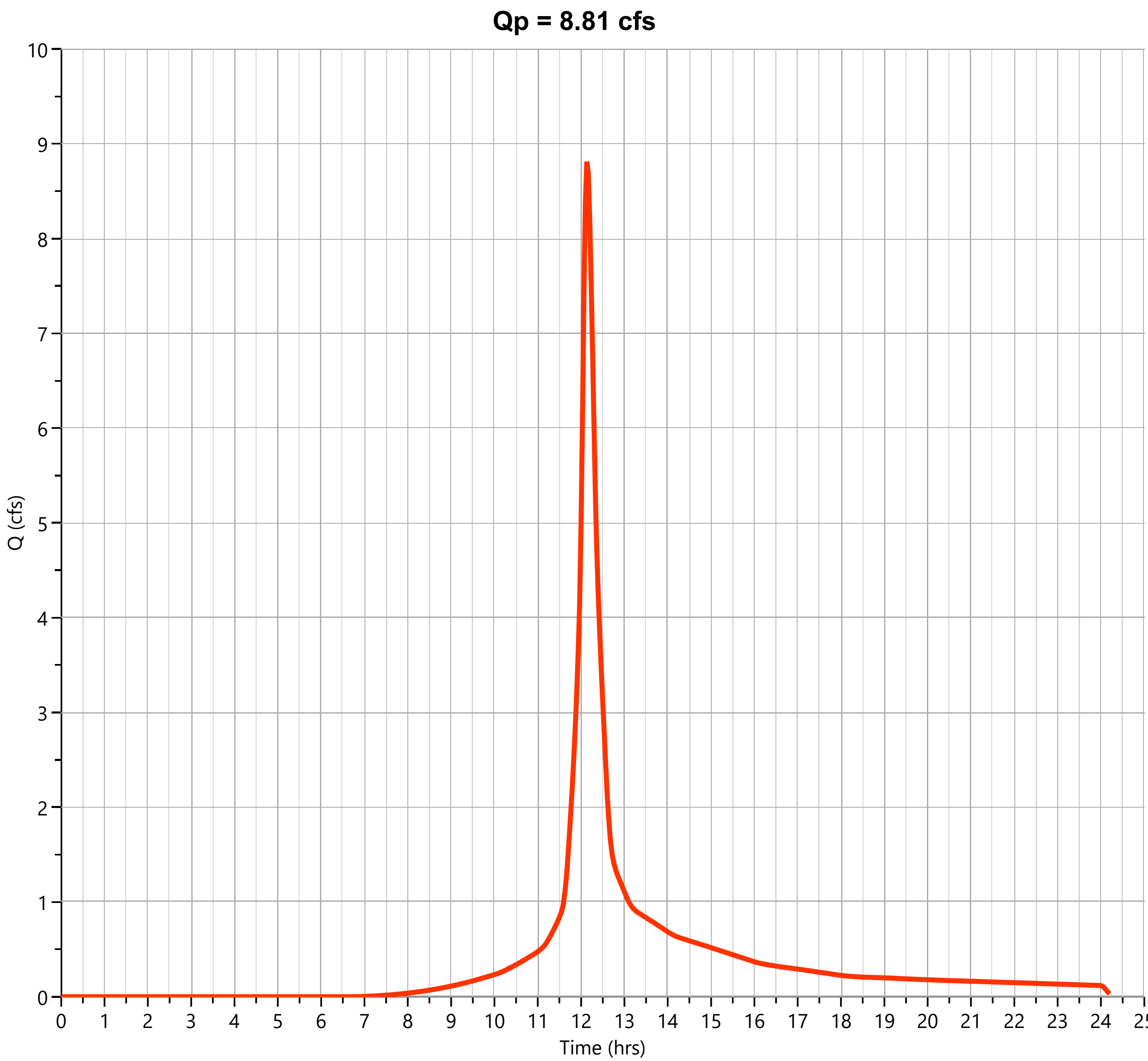


Hydrograph Report

P-10B

Hyd. No. 48

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 Report

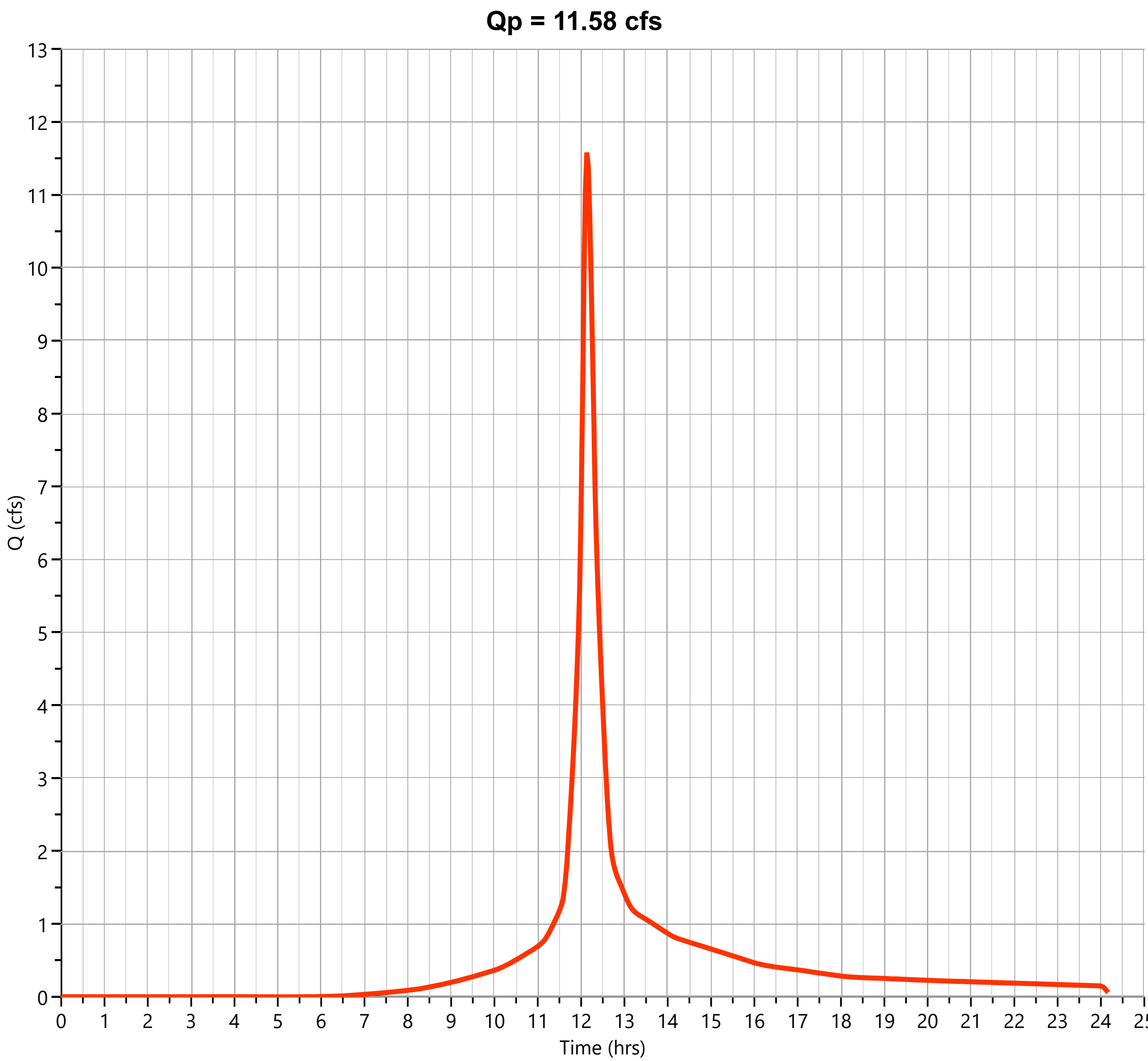
Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

P-10B

Hyd. No. 48

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



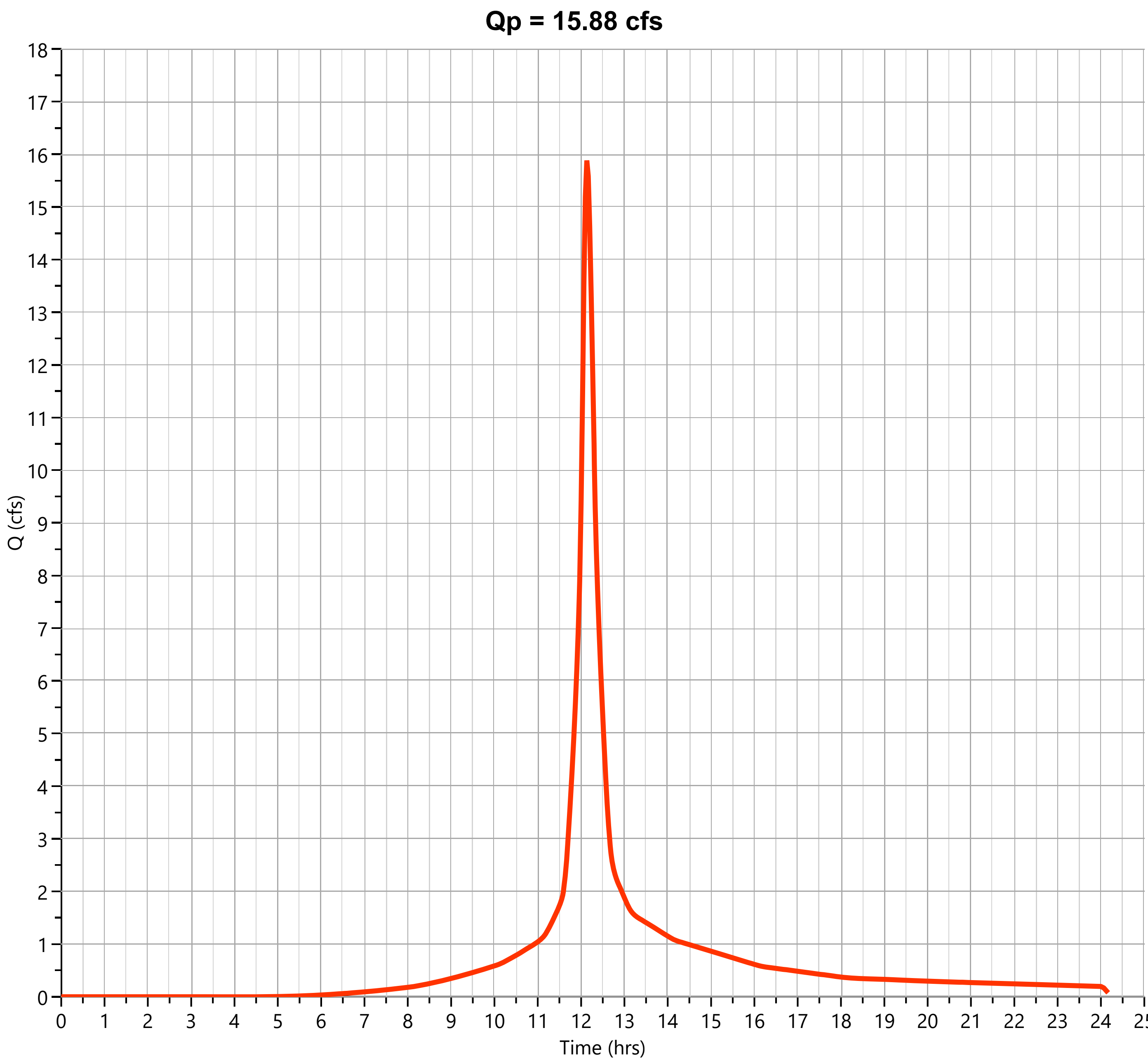
Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

P-10B Hyd. No. 48

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



Pond Report

IB-10B

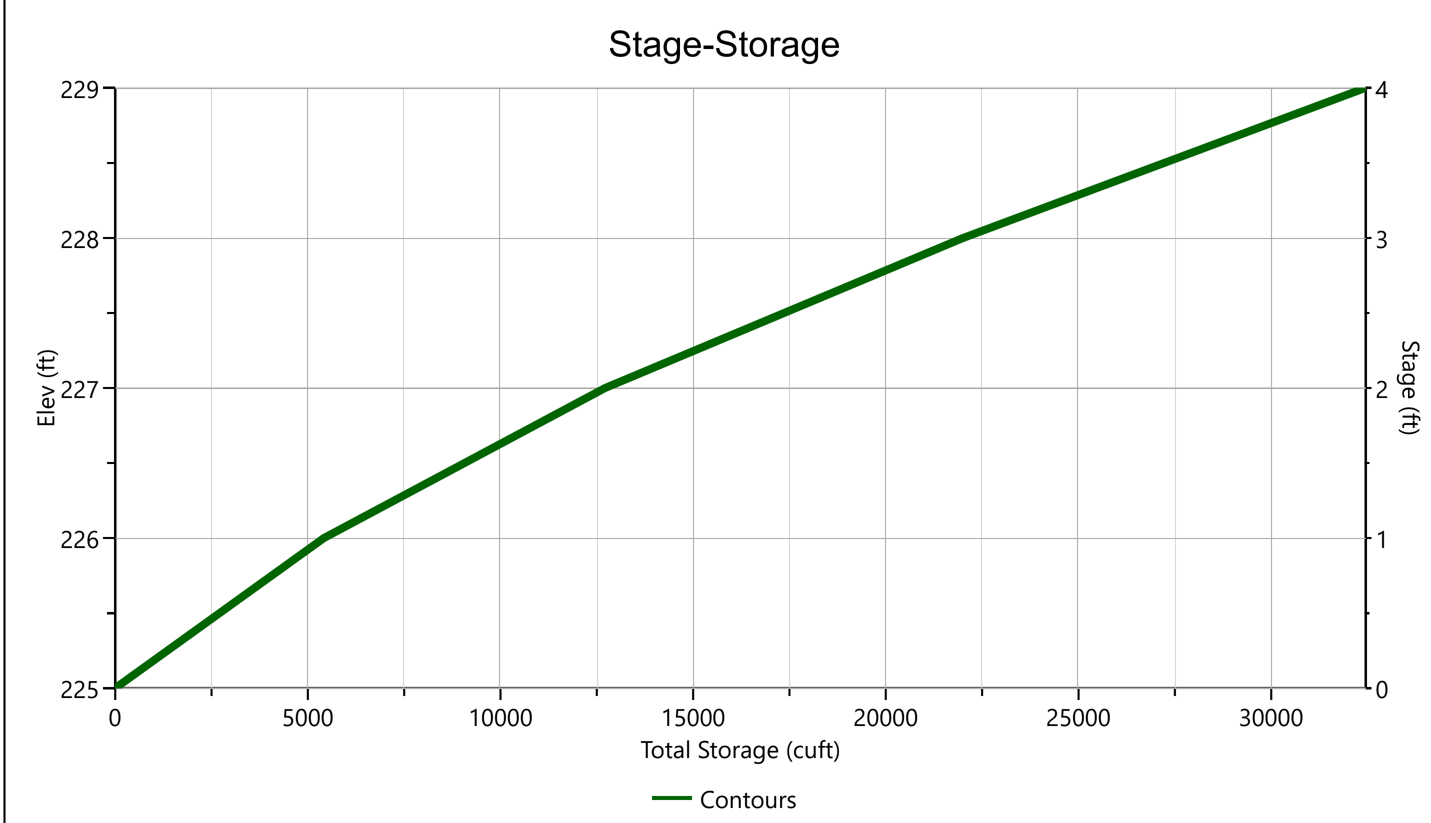
Stage-Storage

User Defined Contours

Description	Input
Bottom Elevation, ft	225.00
Voids (%)	100.00
Volume Calc	Ave End Area

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	225.00	4,961	0.000	0.000
1.00	226.00	5,869	5,415	5,415
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



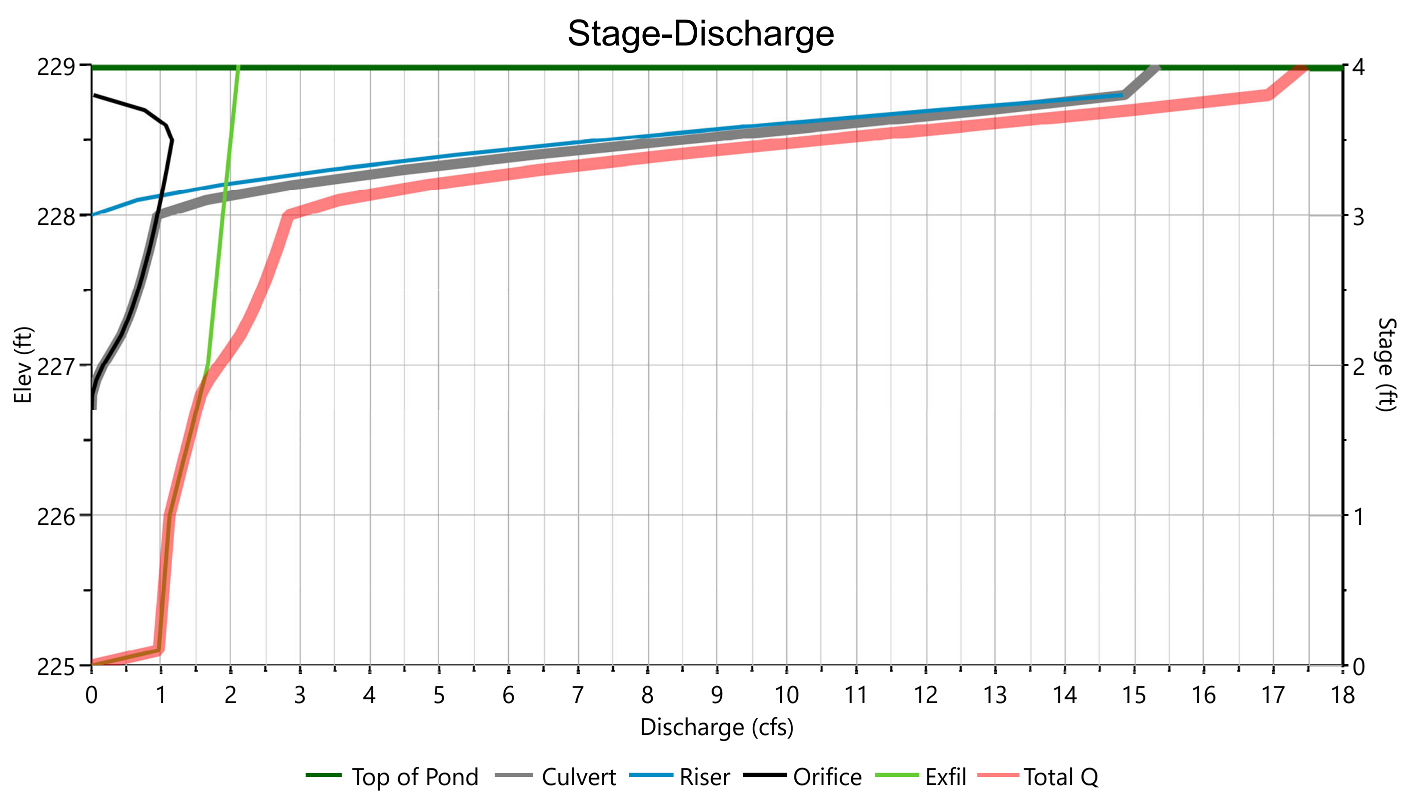
IB-10B

Stage-Discharge

Culvert / Orifices	Culvert	Orifices 1*	Orifices 2	Orifices 3	Orifice Plate	
Rise, in	18	6			Orifice Dia, in	
Span, in	18	6			No. Orifices	
No. Barrels	1	1			Invert Elevation, ft	
Invert Elevation, ft	225.00	226.75			Height, ft	
Orifice Coefficient, Co	0.60	0.60			Orifice Coefficient, Co	
Length, ft	55					
Barrel Slope, %	2					
N-Value, n	0.012					

Weirs	Riser*	Weirs 1	Weirs 2	Weirs 3	Ancillary	
Shape / Type	Circular				Exfiltration, in/hr	8.27**
Crest Elevation, ft	228					
Crest Length, ft	6.28					
Angle, deg						
Weir Coefficient, Cw	3.3					

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



IB-10B

Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
0.00	225.00	0.000	0.000	0.000			0.000					0.000		0.000
1.00	226.00	5,415	0.000	0.000			0.000					1.124		1.124
2.00	227.00	12,715	0.167 ic	0.167			0.000					1.671		1.839
3.00	228.00	22,007	0.945 ic	0.945			0.000					1.886		2.832
4.00	229.00	32,450	15.34 ic	0.000			0.000					2.112		17.45

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Pond Report

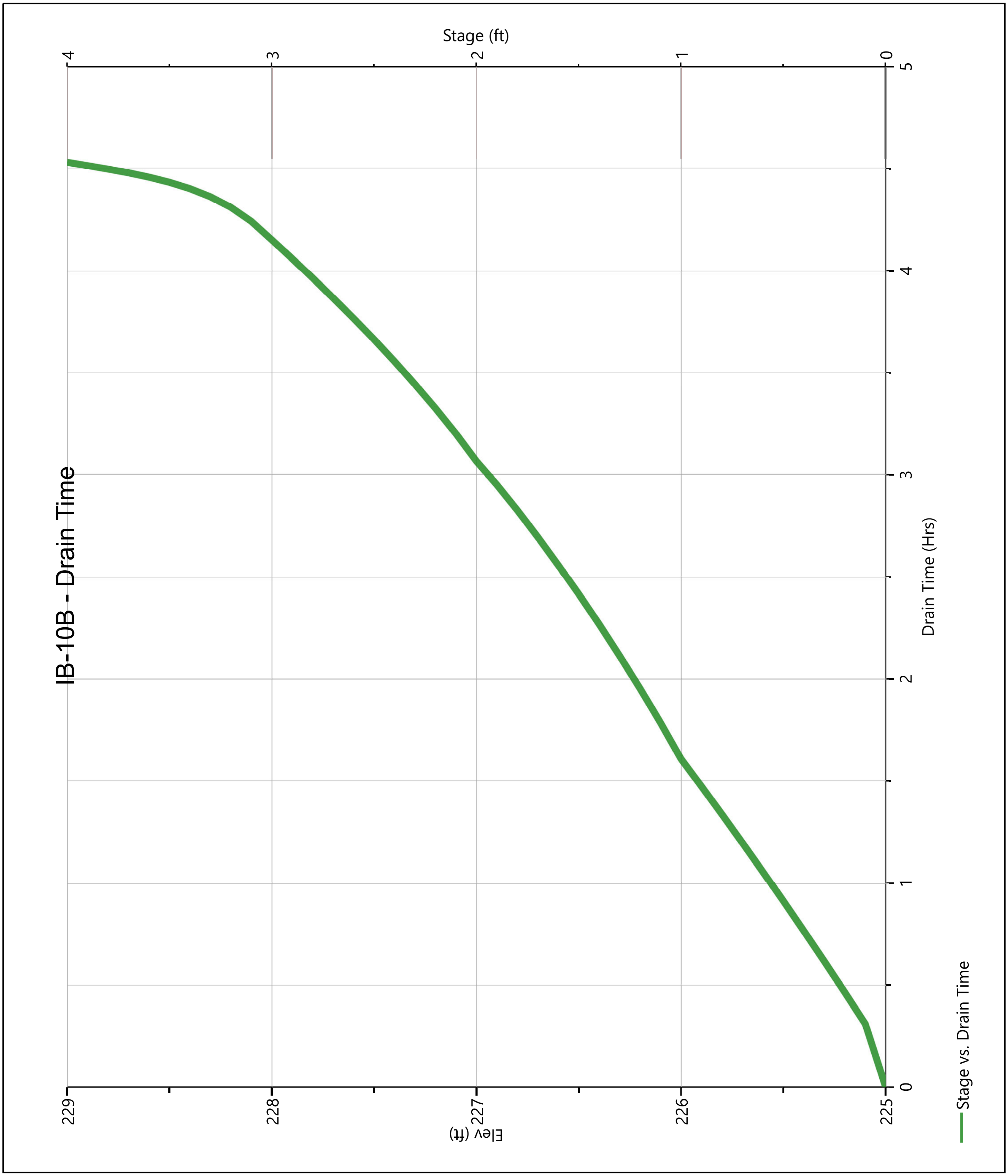
Project Name:

Hydrology Studio v 3.0.0.27

06-17-2023

IB-10B

Pond Drawdown



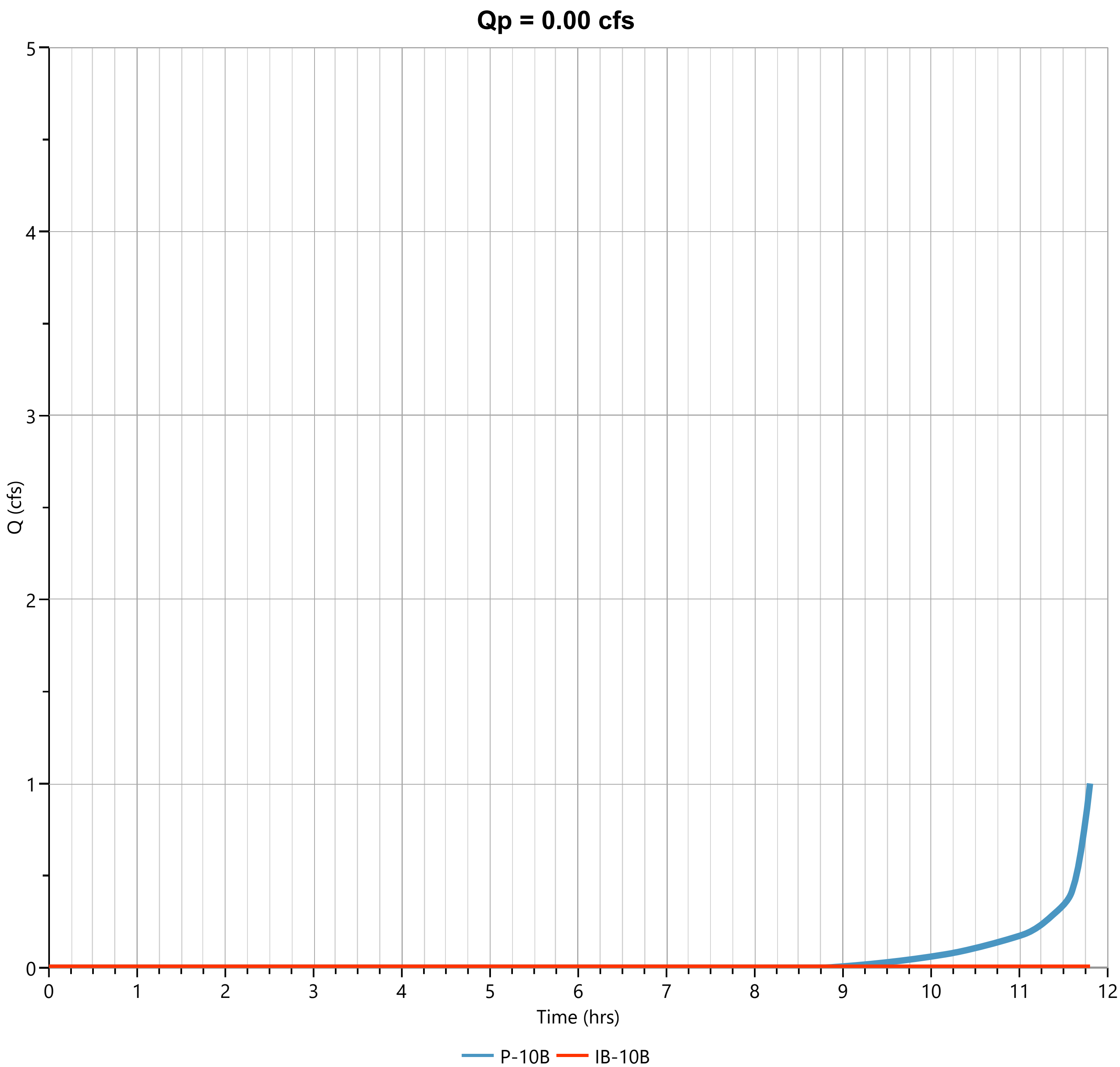
Hydrograph Report

IB-10B

Hyd. No. 49

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 11.77 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 48 - P-10B	Max. Elevation	= 225.90 ft
Pond Name	= IB-10B	Max. Storage	= 4,886 cuft

Pond Routing by Storage Indication Method



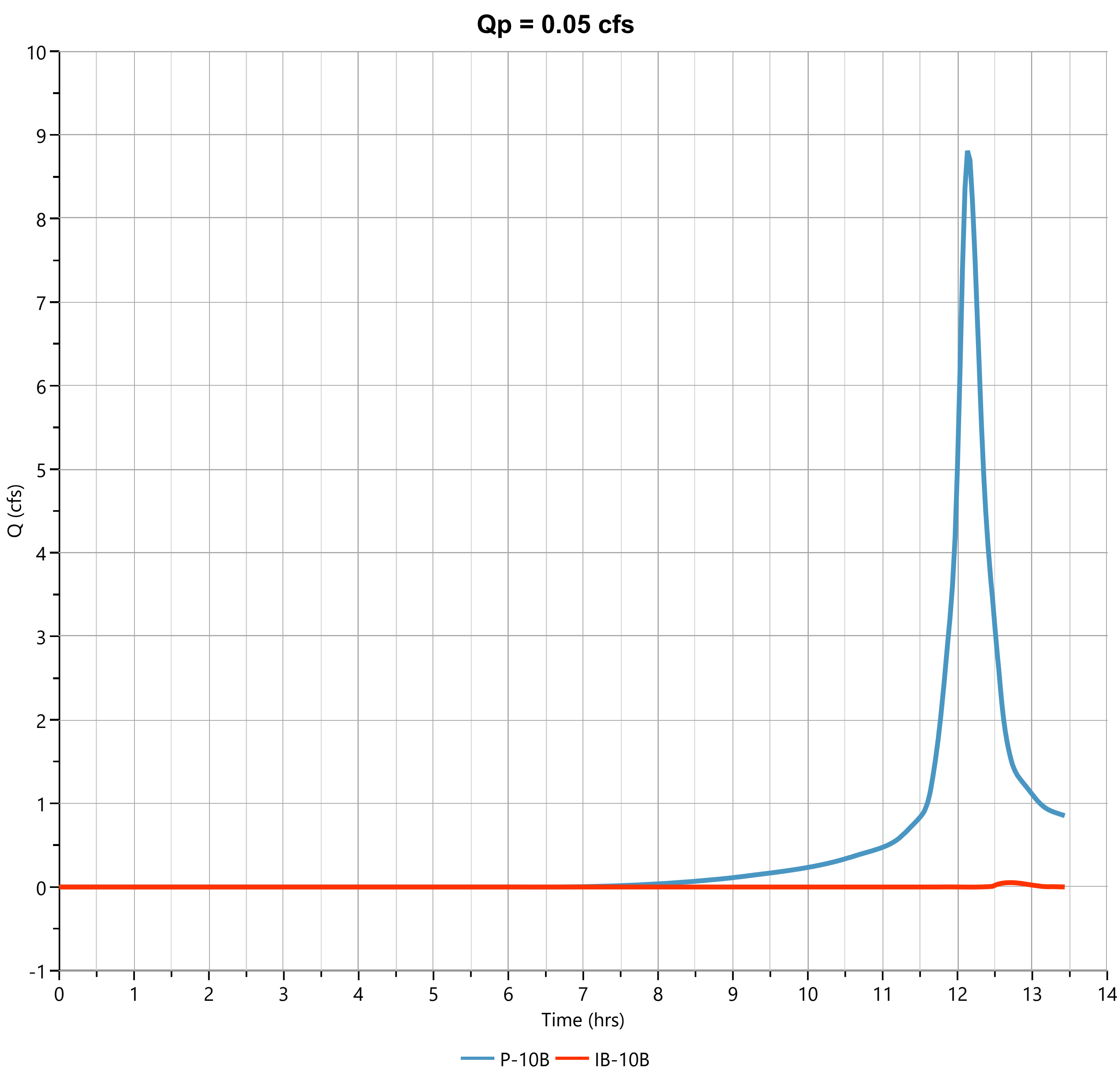
Hydrograph Report

IB-10B

Hyd. No. 49

Hydrograph Type	= Pond Route	Peak Flow	= 0.053 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.67 hrs
Time Interval	= 2 min	Hydrograph Volume	= 88.3 cuft
Inflow Hydrograph	= 48 - P-10B	Max. Elevation	= 226.88 ft
Pond Name	= IB-10B	Max. Storage	= 11,821 cuft

Pond Routing by Storage Indication Method



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.27

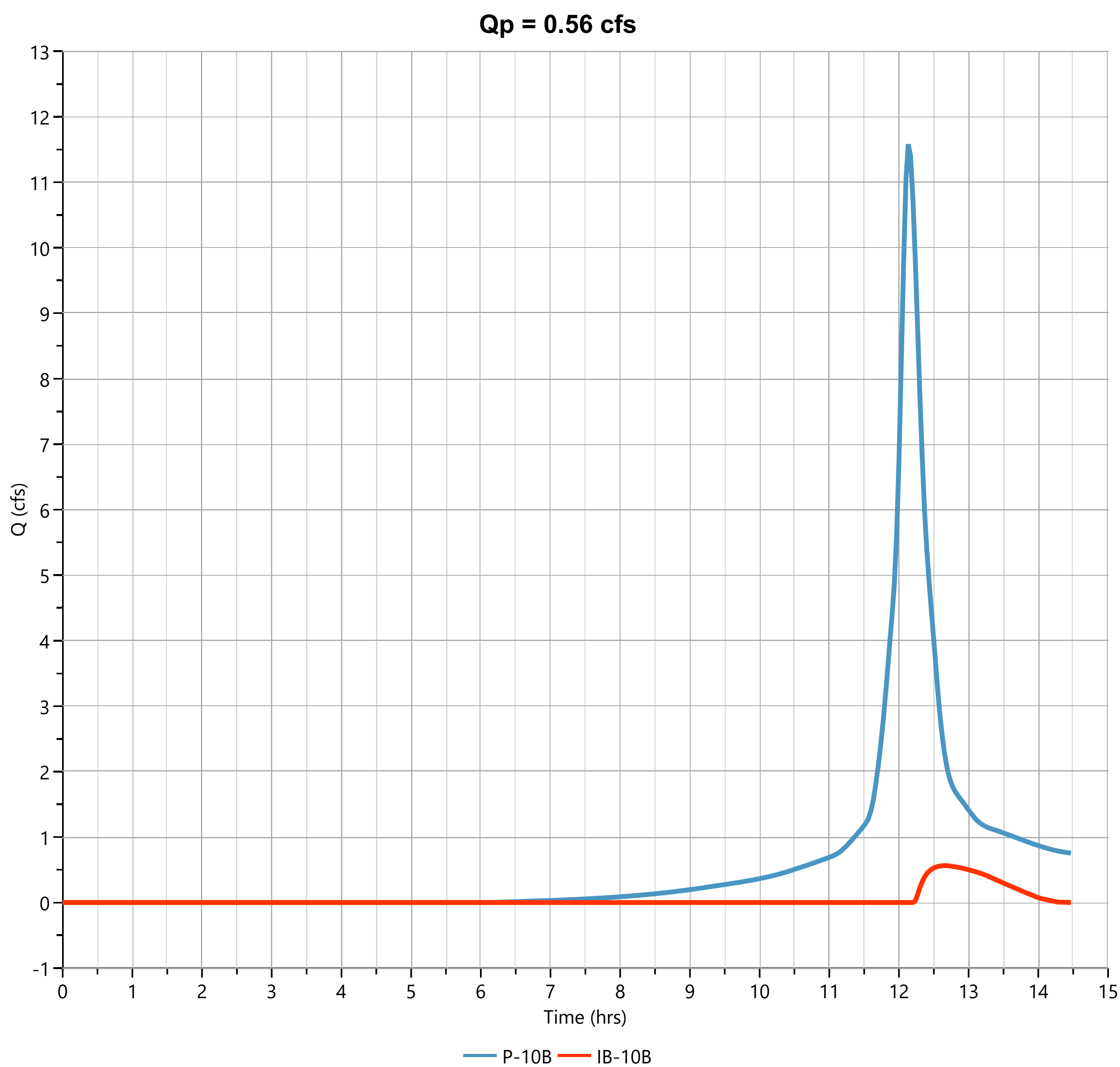
06-17-2023

IB-10B

Hyd. No. 49

Hydrograph Type	= Pond Route	Peak Flow	= 0.563 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.67 hrs
Time Interval	= 2 min	Hydrograph Volume	= 2,416 cuft
Inflow Hydrograph	= 48 - P-10B	Max. Elevation	= 227.36 ft
Pond Name	= IB-10B	Max. Storage	= 16,025 cuft

Pond Routing by Storage Indication Method



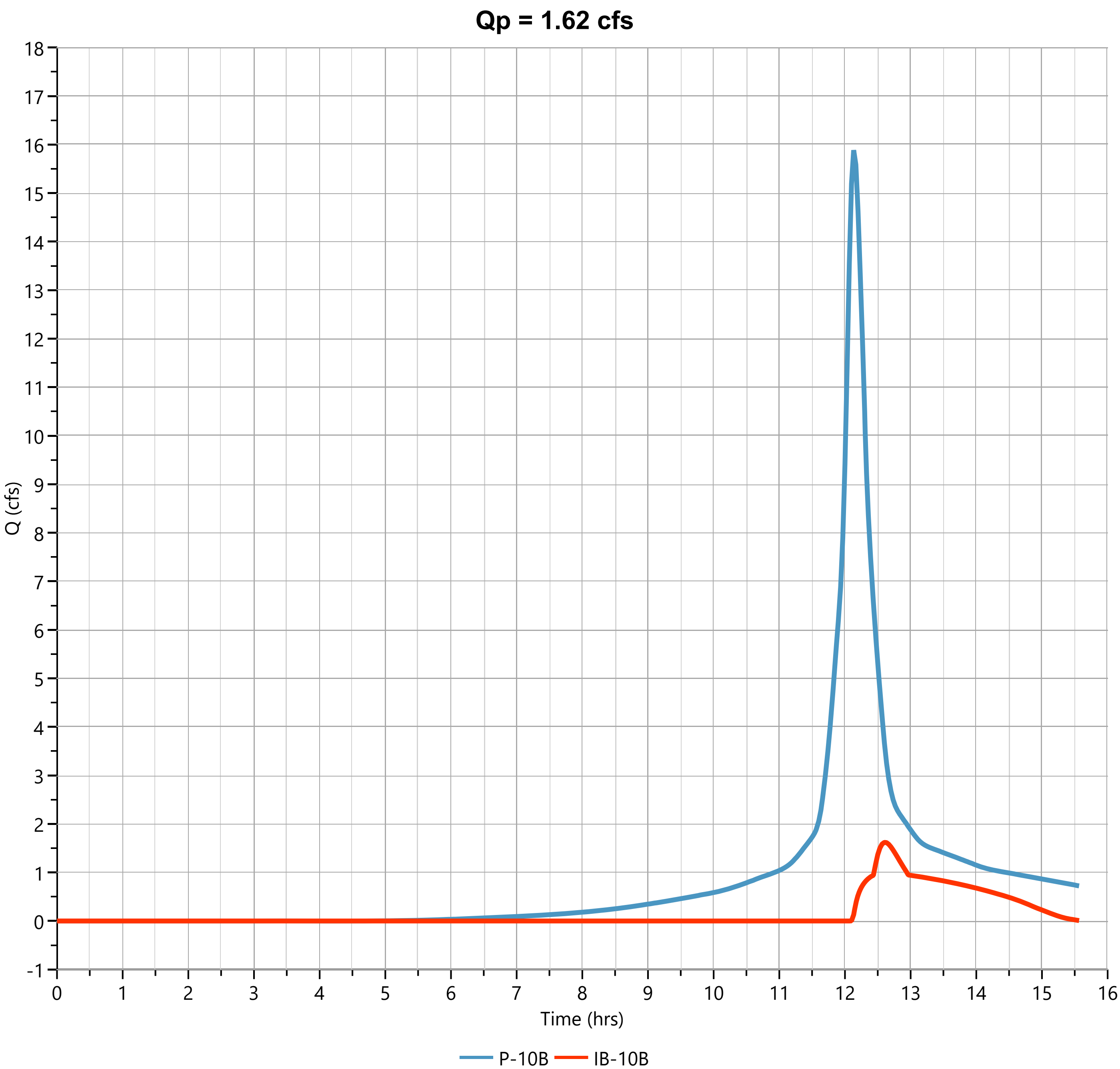
Hydrograph Report

IB-10B

Hyd. No. 49

Hydrograph Type	= Pond Route	Peak Flow	= 1.619 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.60 hrs
Time Interval	= 2 min	Hydrograph Volume	= 8,312 cuft
Inflow Hydrograph	= 48 - P-10B	Max. Elevation	= 228.10 ft
Pond Name	= IB-10B	Max. Storage	= 23,009 cuft

Pond Routing by Storage Indication Method



Worksheet 2: Runoff curve number and runoff **SM-3719C**

Project: Athens Street By PFK Date 6/24/22

Rev Date 10/13/22

Location: Stow, MA Checked Date 6/17/2023

Circle one: Present Developed Subcatchment P-10C

1. Runoff curve number (CN)

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

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{648.39}{7.67} =$ 84.58 ; Use CN = 85

2. Runoff

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By PFK Date 6/24/2022

Rev Date 10/13/2022

Location: Stow, MA Checked Date 6/17/2023

Circle one: Present **Developed** Subcatchment P-10C

Circle one: Tc **Tt** through subarea

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		0.040			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr		0.11			0.11
Shallow concentrated Flow			Segment ID	B-C			
7. Surface Description (paved or unpaved)				UNPAVED			
8. Flow Length, L		ft		495			
9. Watercourse slope, s		ft/ft		0.056			
10. Average Velocity, V (figure 3-1)		ft/s		3.82			
11. Tt = L / 3600V	Compute Tt	hr		0.04			0.04
Channel flow			Segment ID				
12. Cross sectional flow area, a		sf					
13. Wetted perimeter, pw		ft					
14. Hydraulic radius, r=a/wp	Compute r	ft					
15. Channel Slope, s		ft/ft					
16. Manning's roughness coeff., n							
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s					
18. Flow length, L		ft					
19. Tt = L / 3600V	Compute Tt	hr					0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.14

min 8.5

Hydrograph Report

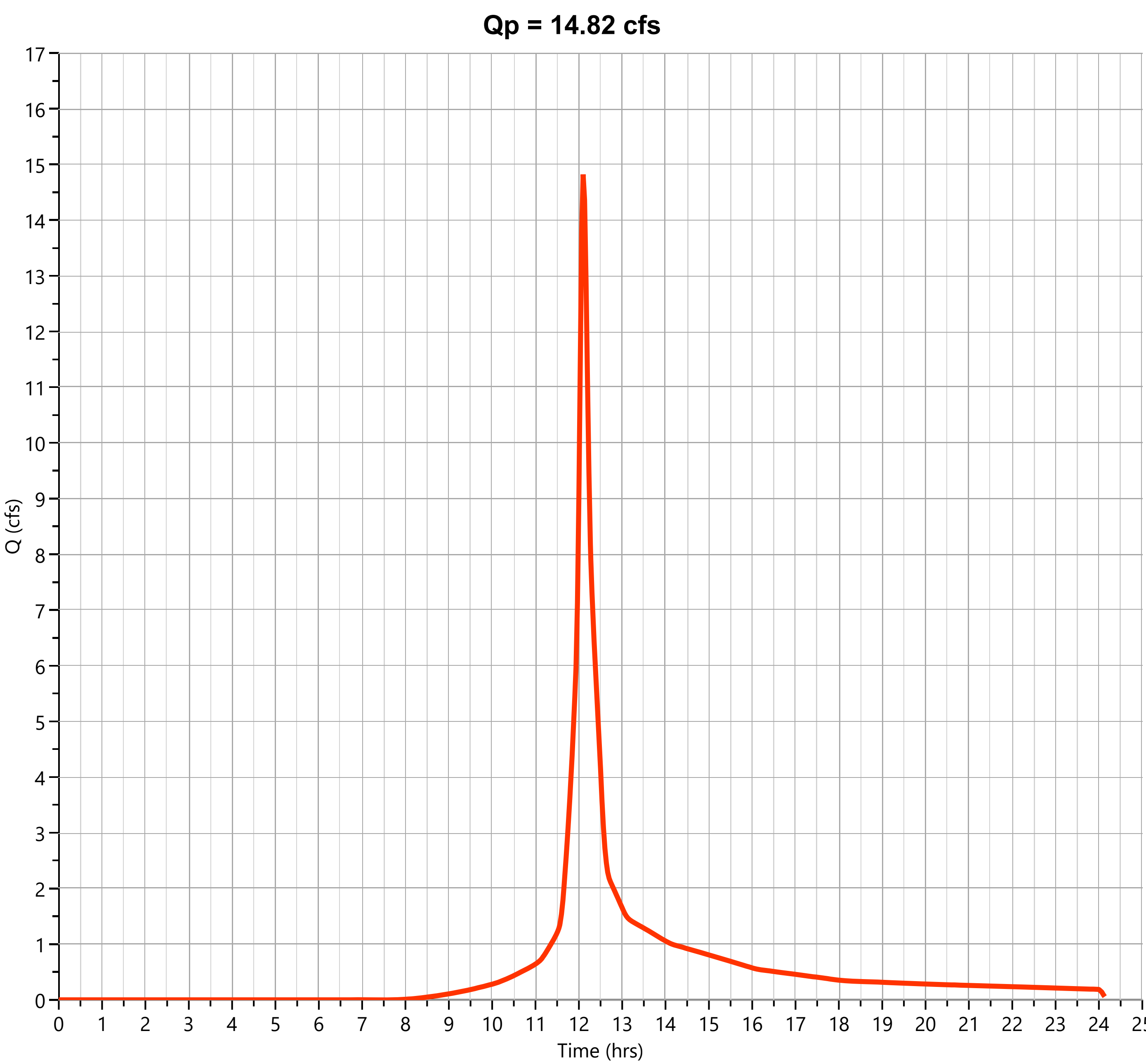
Hydrology Studio v 3.0.0.27

06-17-2023

P-10C

Hyd. No. 53

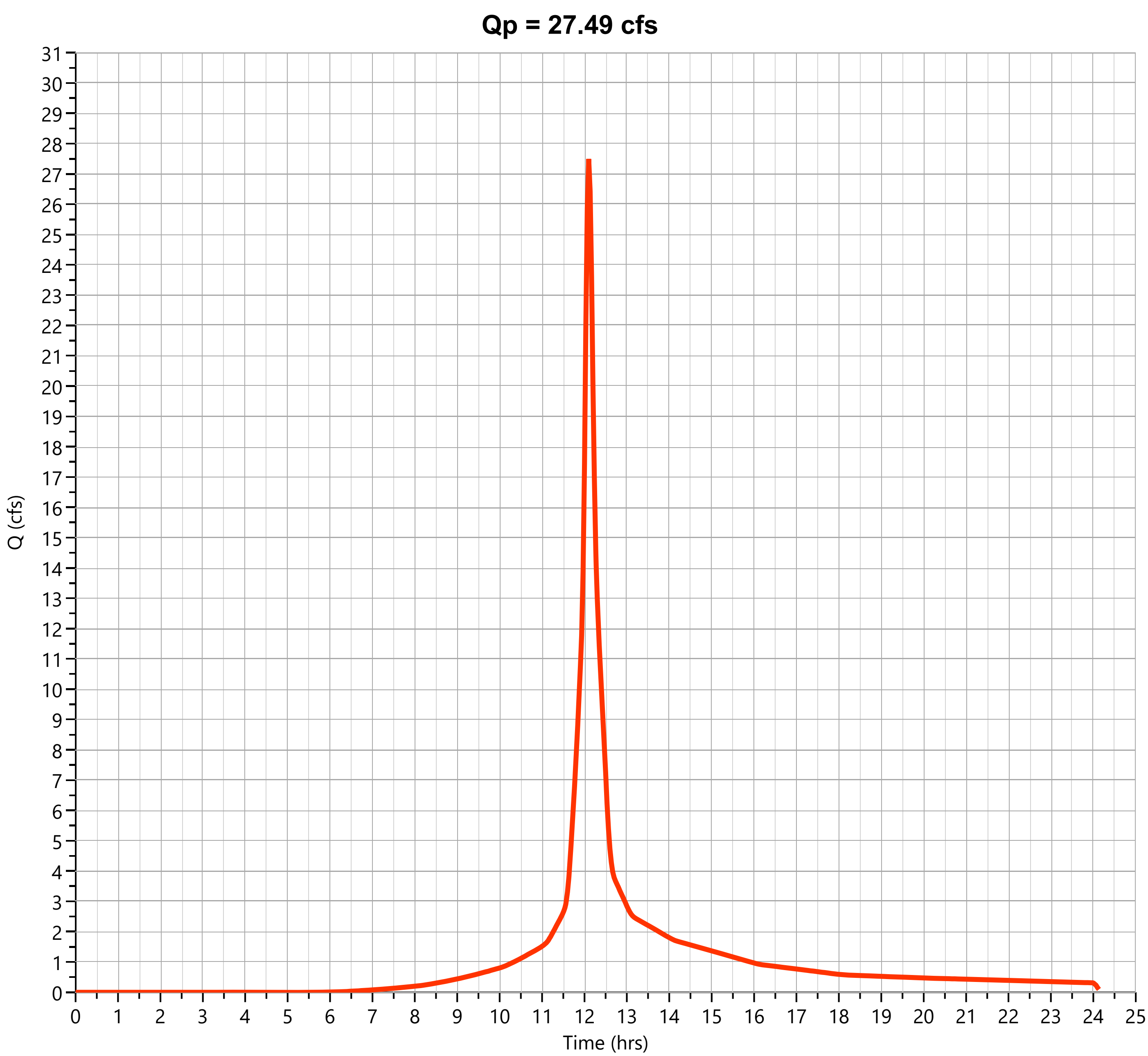
Hydrograph Type	= NRCS Runoff	Peak Flow	= 14.82 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 50,604 cuft
Drainage Area	= 7.67 ac	Curve Number	= 85
Tc Method	= User	Time of Conc. (Tc)	= 8.5 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



P-10C

Hyd. No. 53

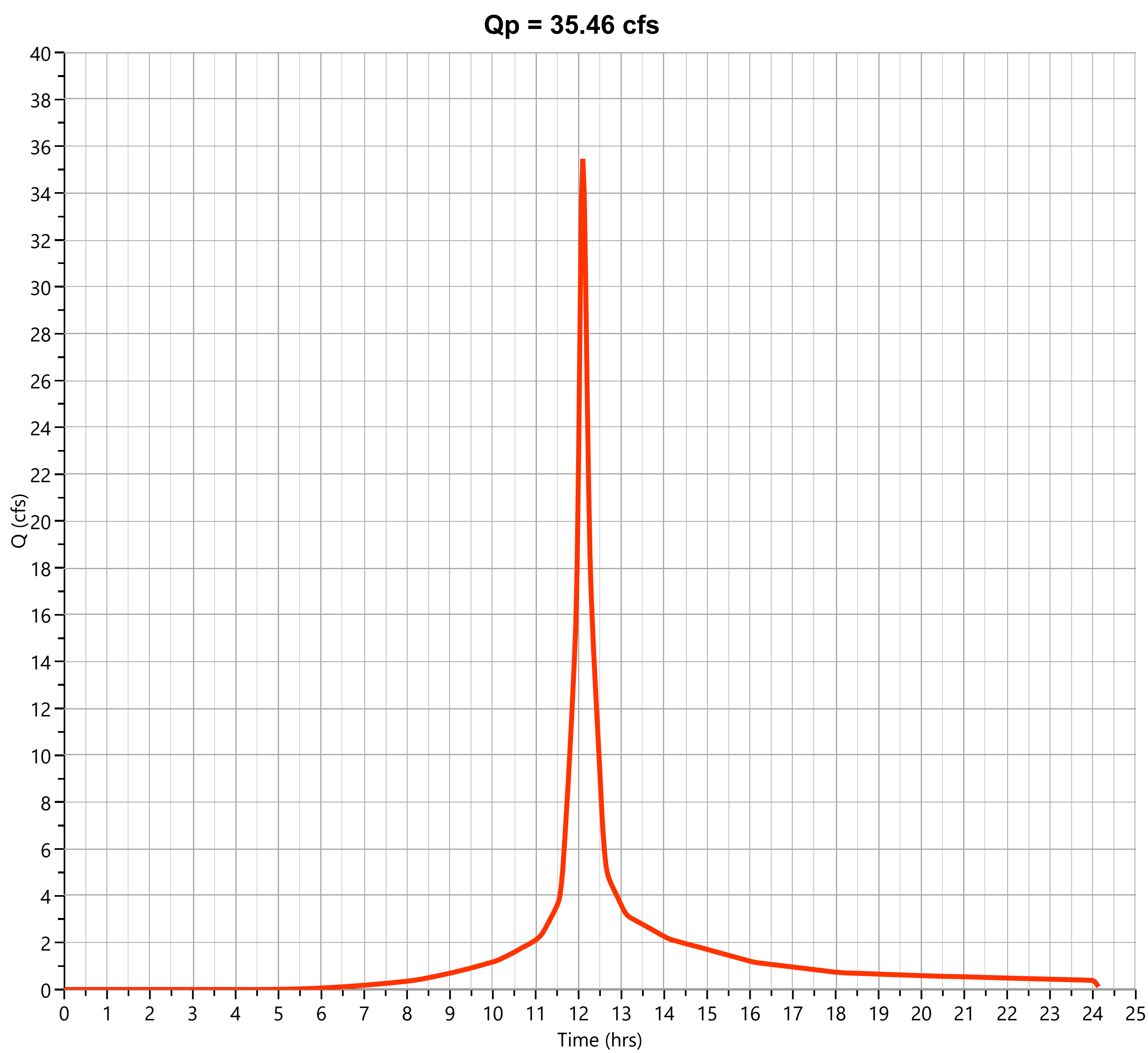
Hydrograph Type	= NRCS Runoff	Peak Flow	= 27.49 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 94,804 cuft
Drainage Area	= 7.67 ac	Curve Number	= 85
Tc Method	= User	Time of Conc. (Tc)	= 8.5 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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



P-10C

Hyd. No. 53

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



Hydrograph Report

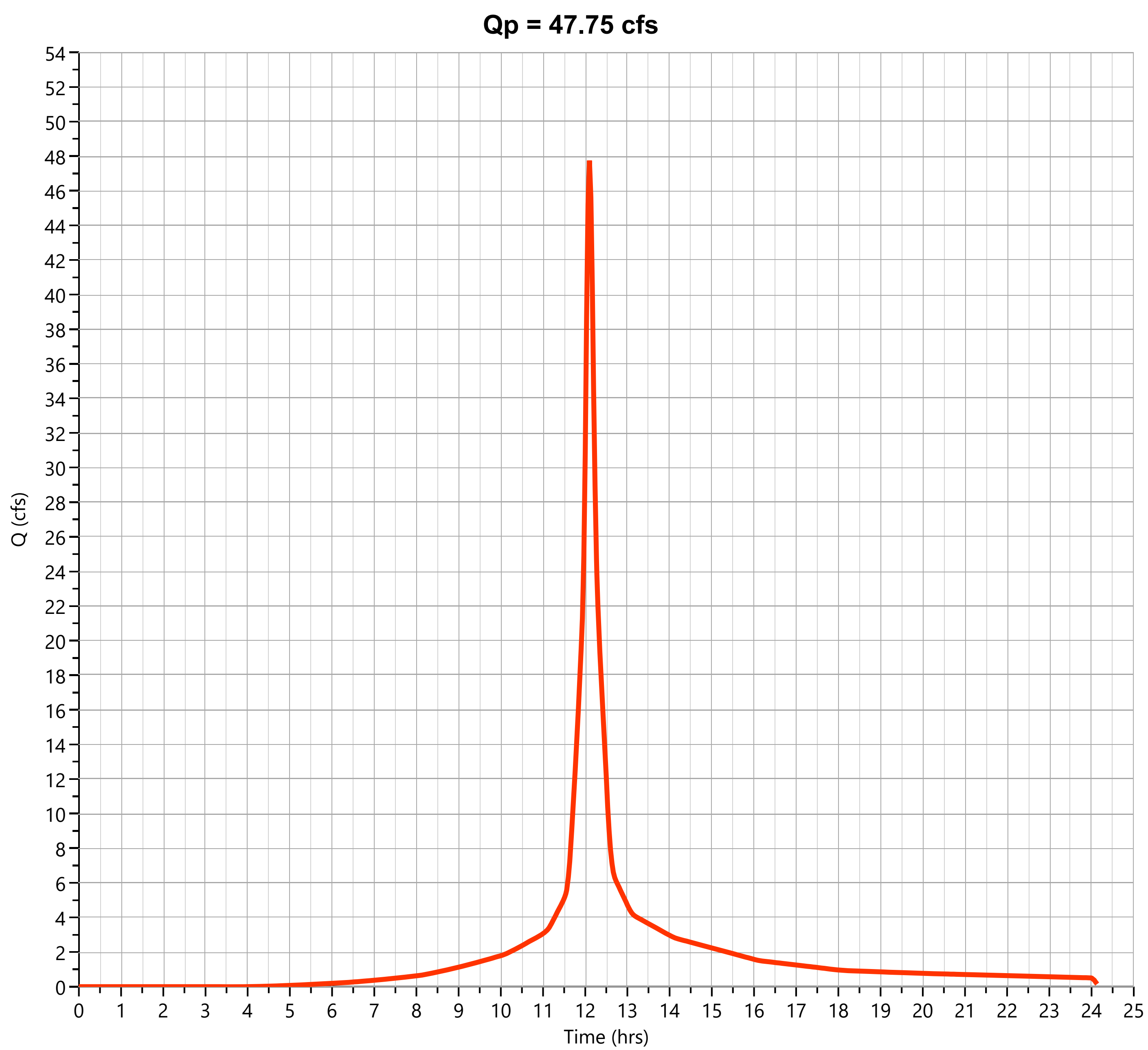
Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

P-10C

Hyd. No. 53

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



Worksheet 2: Runoff curve number and runoff **SM-3719C**

Project: Athens Street By PFK Date 10/13/22
Rev Date 6/17/2023
Location: Stow, MA Checked Date

Circle one: Present $\boxed{\text{Developed}}$ Subcatchment P-9A

1. Runoff curve number (CN)

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

1/ Use only one CN source per line. 207091

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{262.43}{4.75} =$ 55.20 ; Use CN = $\boxed{55}$

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.......................................	yr	2	25	100
Rainfall, P (24-hour)........................	in	3.27	6.14	7.84
Runoff, Q...	in	0.28	1.62	2.70

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By PFK Date 10/13/2022
Rev Date 6/17/2023
Location: Stow, MA Checked ______ Date ______

Circle one: Present **Developed** Subcatchment P-9A
Circle one: Tc **Tt** through subarea

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	0.043			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr	0.21			0.21

Shallow concentrated Flow		Segment ID	B-C			
7. Surface Description (paved or unpaved)			UNPAVED			
8. Flow Length, L		ft	203			
9. Watercourse slope, s		ft/ft	0.030			
10. Average Velocity, V (figure 3-1)		ft/s	2.79			
11. Tt = L / 3600V	Compute Tt	hr	0.02			0.02

Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.23
min 14.0

Hydrograph Report

Project Name:

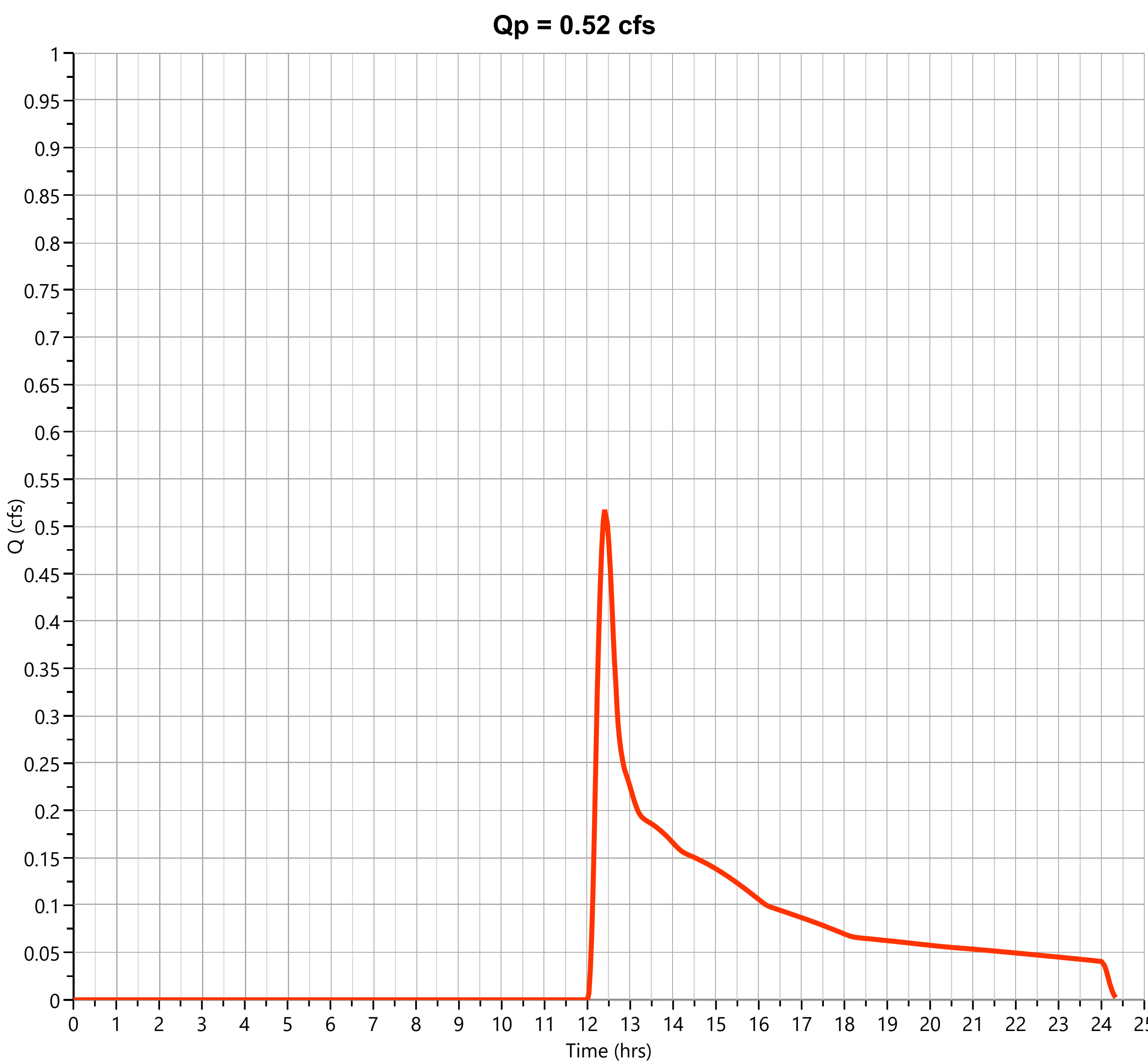
Hydrology Studio v 3.0.0.31

02-14-2024

P-9A

Hyd. No. 52

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

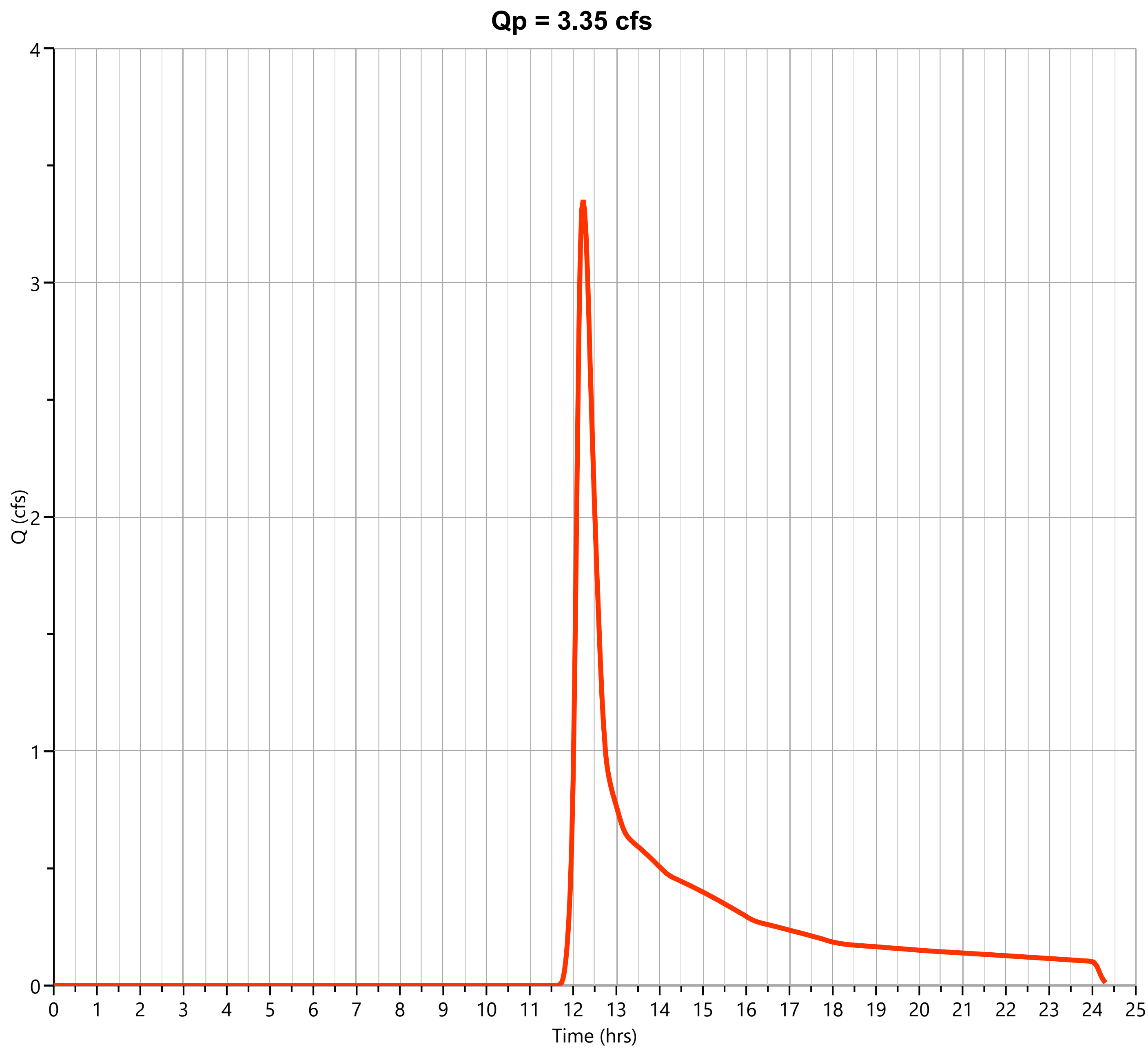


Hydrograph Report

P-9A

Hyd. No. 52

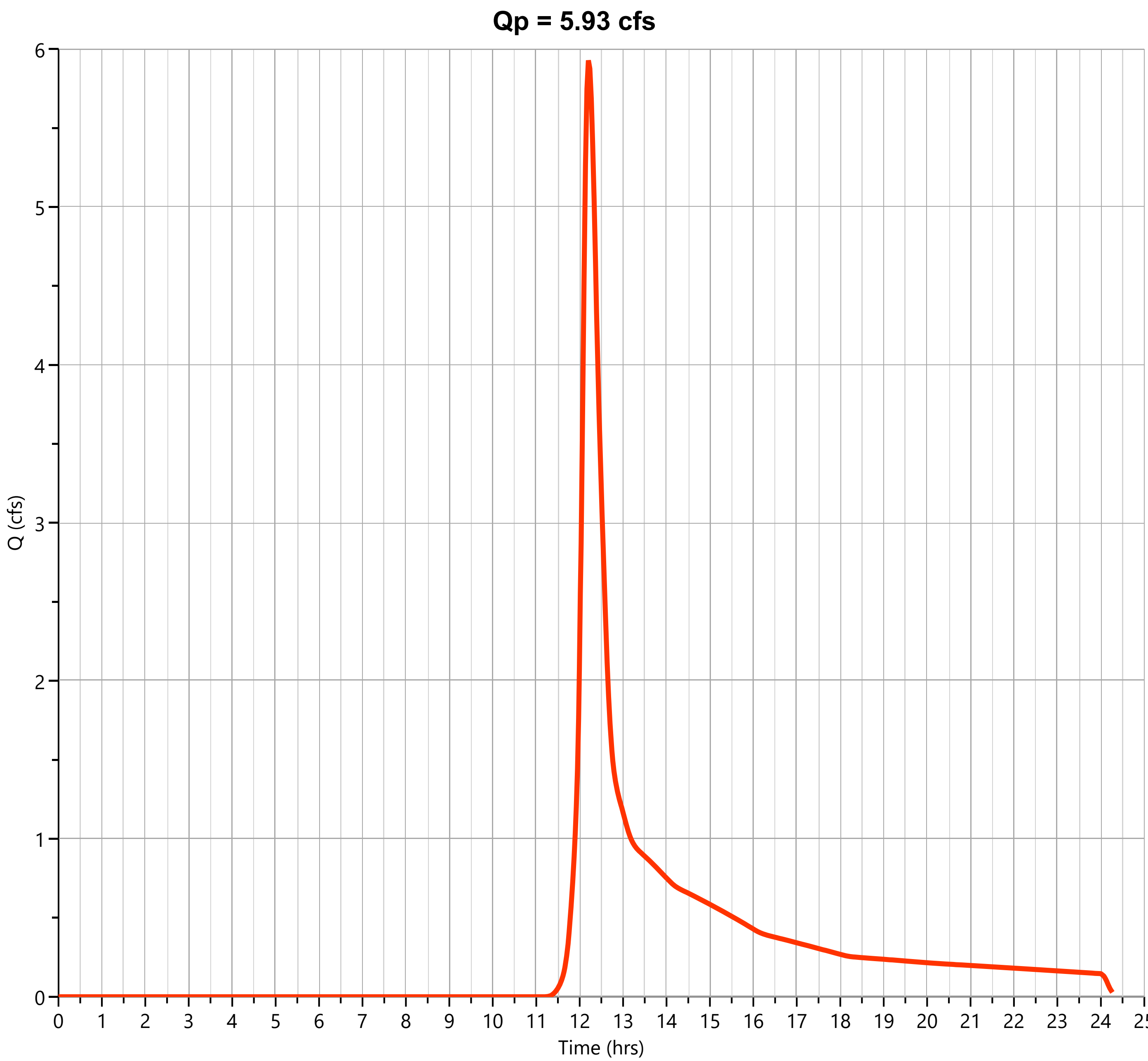
Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.353 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 16,810 cuft
Drainage Area	= 4.75 ac	Curve Number	= 55
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration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



P-9A

Hyd. No. 52

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



Hydrograph Report

Project Name:

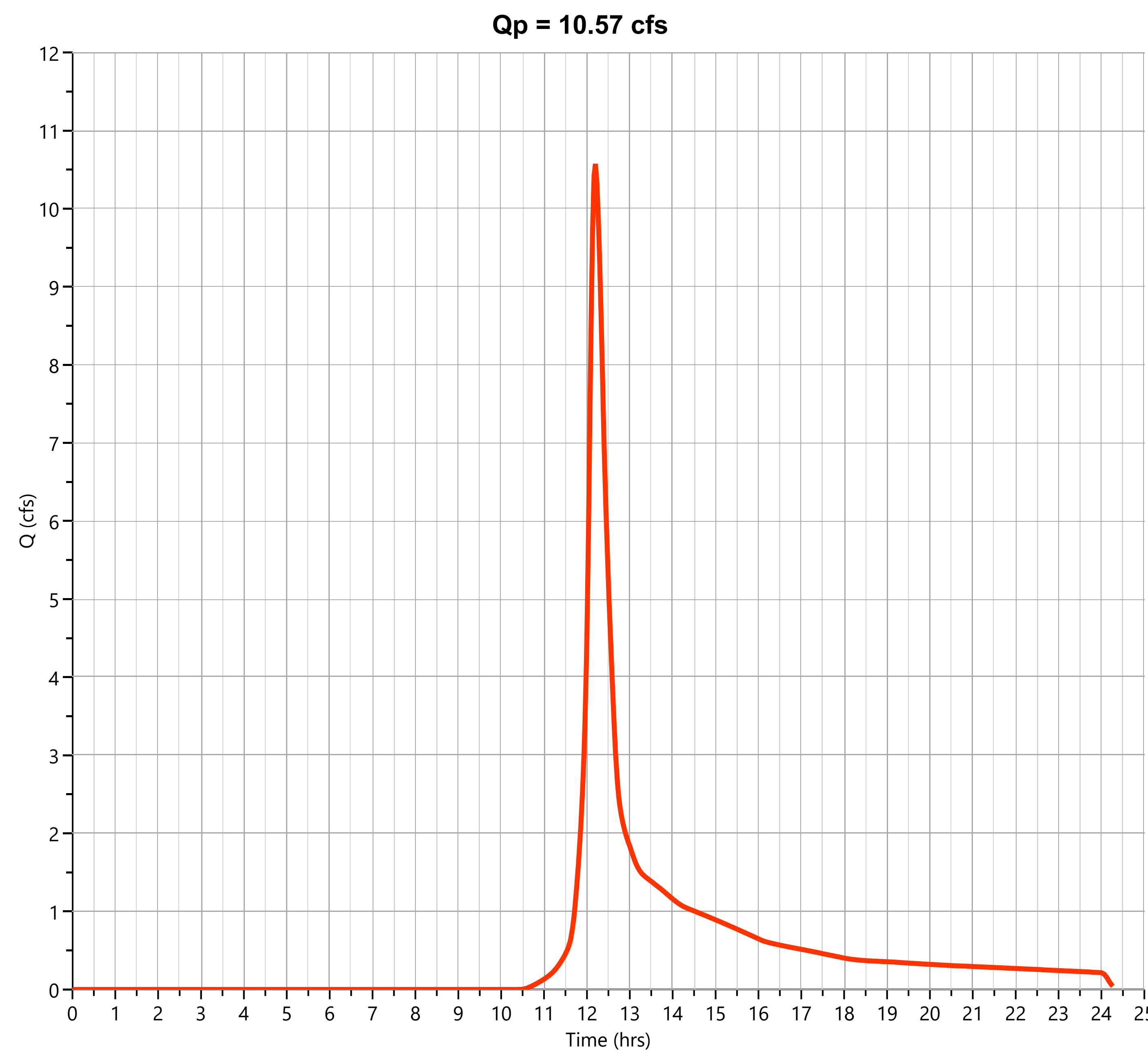
Hydrology Studio v 3.0.0.31

02-14-2024

P-9A

Hyd. No. 52

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



Hydrograph Report

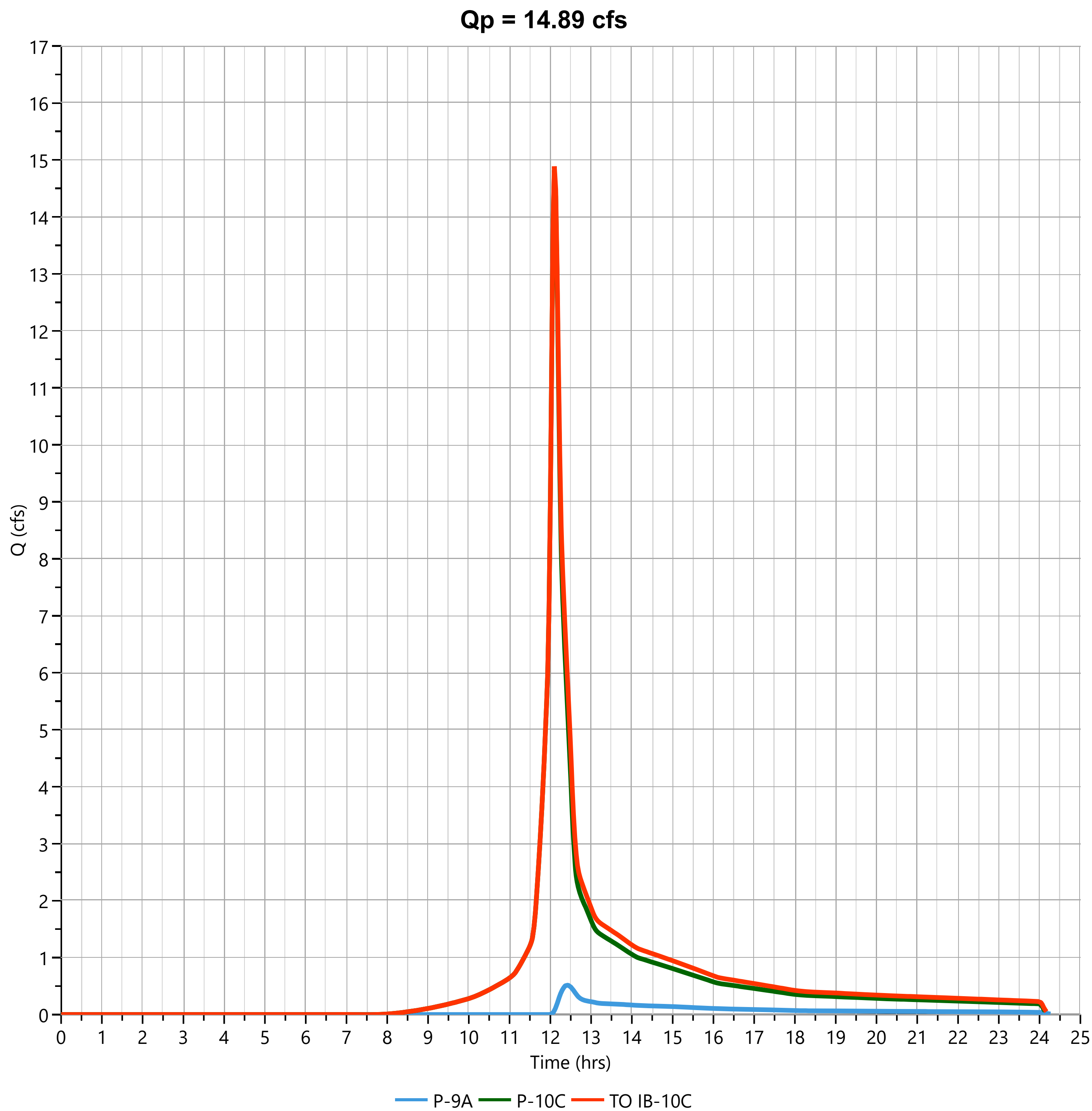
Project Name:

Hydrology Studio v 3.0.0.31 02-14-2024

TO IB-10C

Hyd. No. 54

Hydrograph Type	= Junction	Peak Flow	= 14.89 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 55,175 cuft
Inflow Hydrographs	= 51, 52, 53	Total Contrib. Area	= 12.42 ac



Hydrograph Report

Project Name:

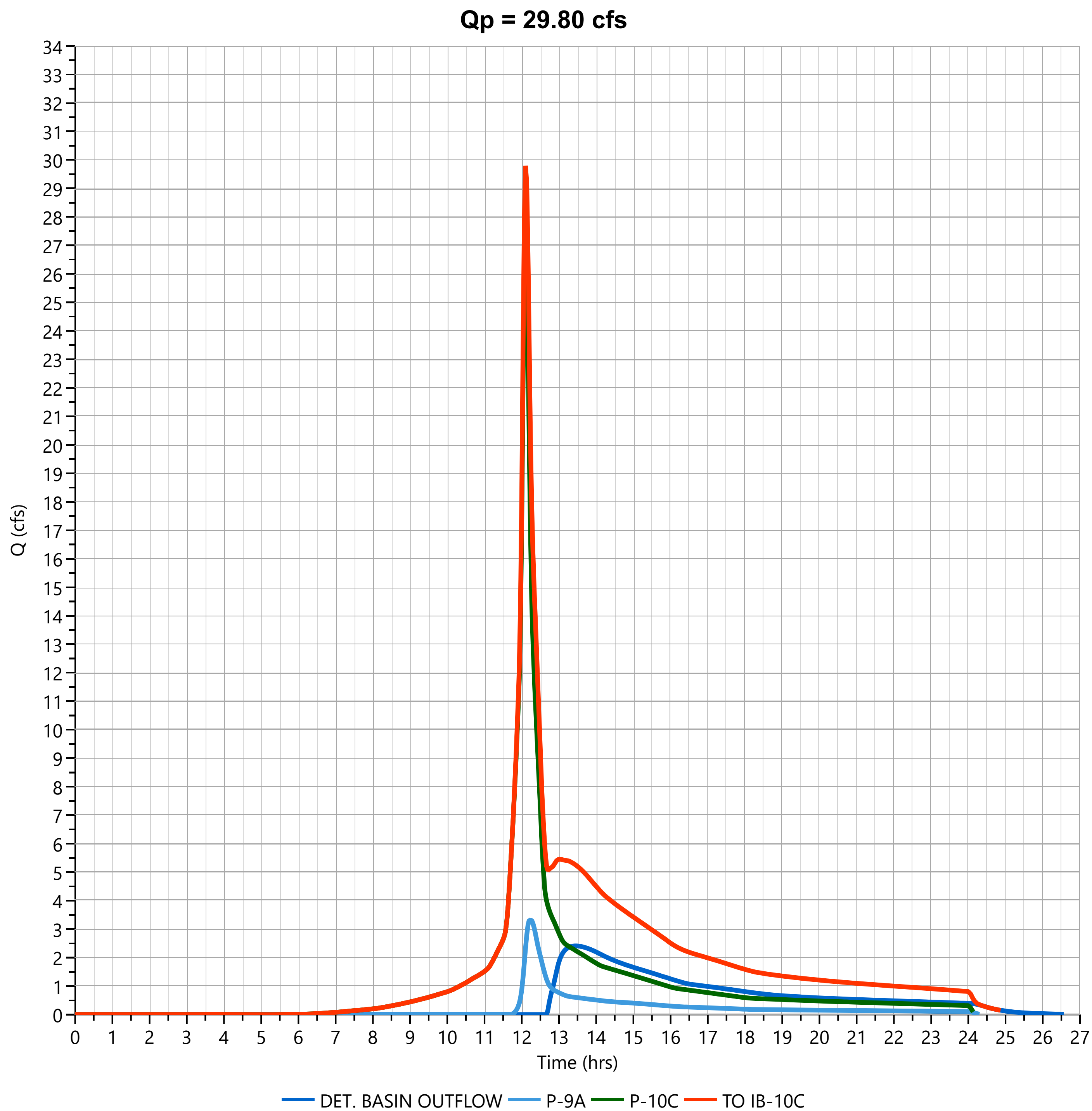
Hydrology Studio v 3.0.0.31

02-14-2024

TO IB-10C

Hyd. No. 54

Hydrograph Type	= Junction	Peak Flow	= 29.80 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 153,248 cuft
Inflow Hydrographs	= 51, 52, 53	Total Contrib. Area	= 12.42 ac



Hydrograph Report

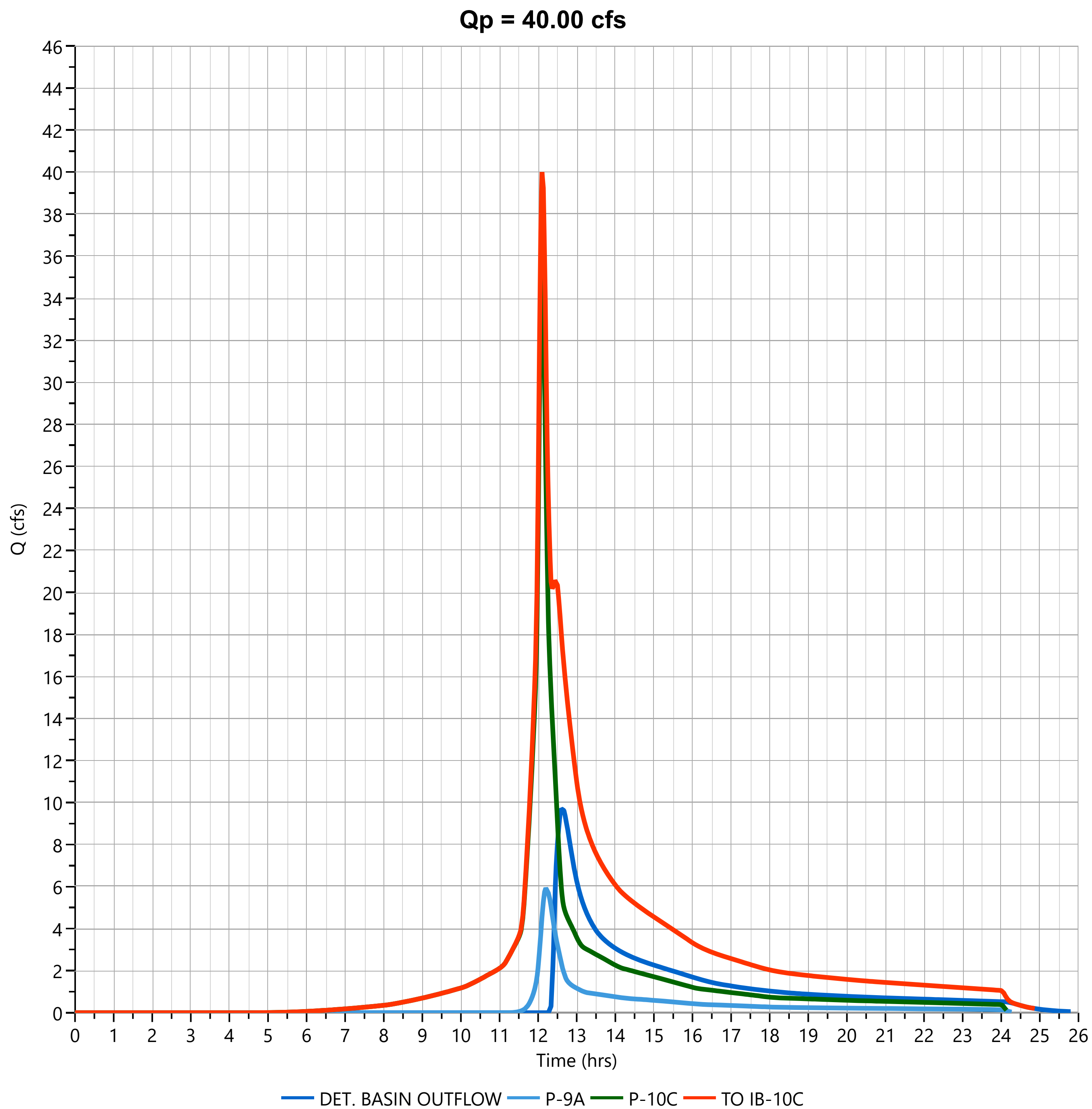
Project Name:

Hydrology Studio v 3.0.0.31 02-14-2024

TO IB-10C

Hyd. No. 54

Hydrograph Type	= Junction	Peak Flow	= 40.00 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 226,146 cuft
Inflow Hydrographs	= 51, 52, 53	Total Contrib. Area	= 12.42 ac

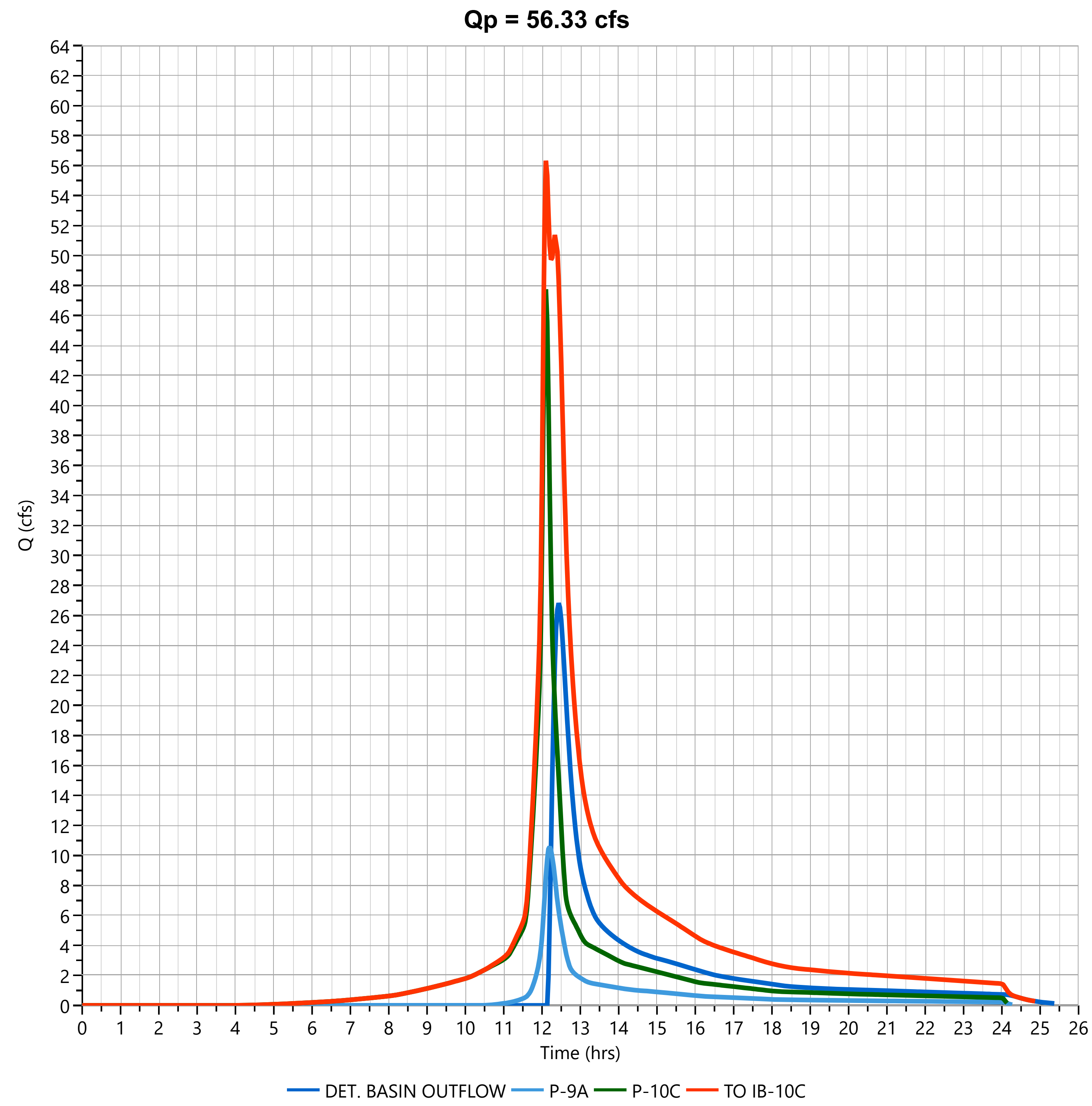


Hydrograph Report

TO IB-10C

Hyd. No. 54

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



Hydrograph Report

Project Name:

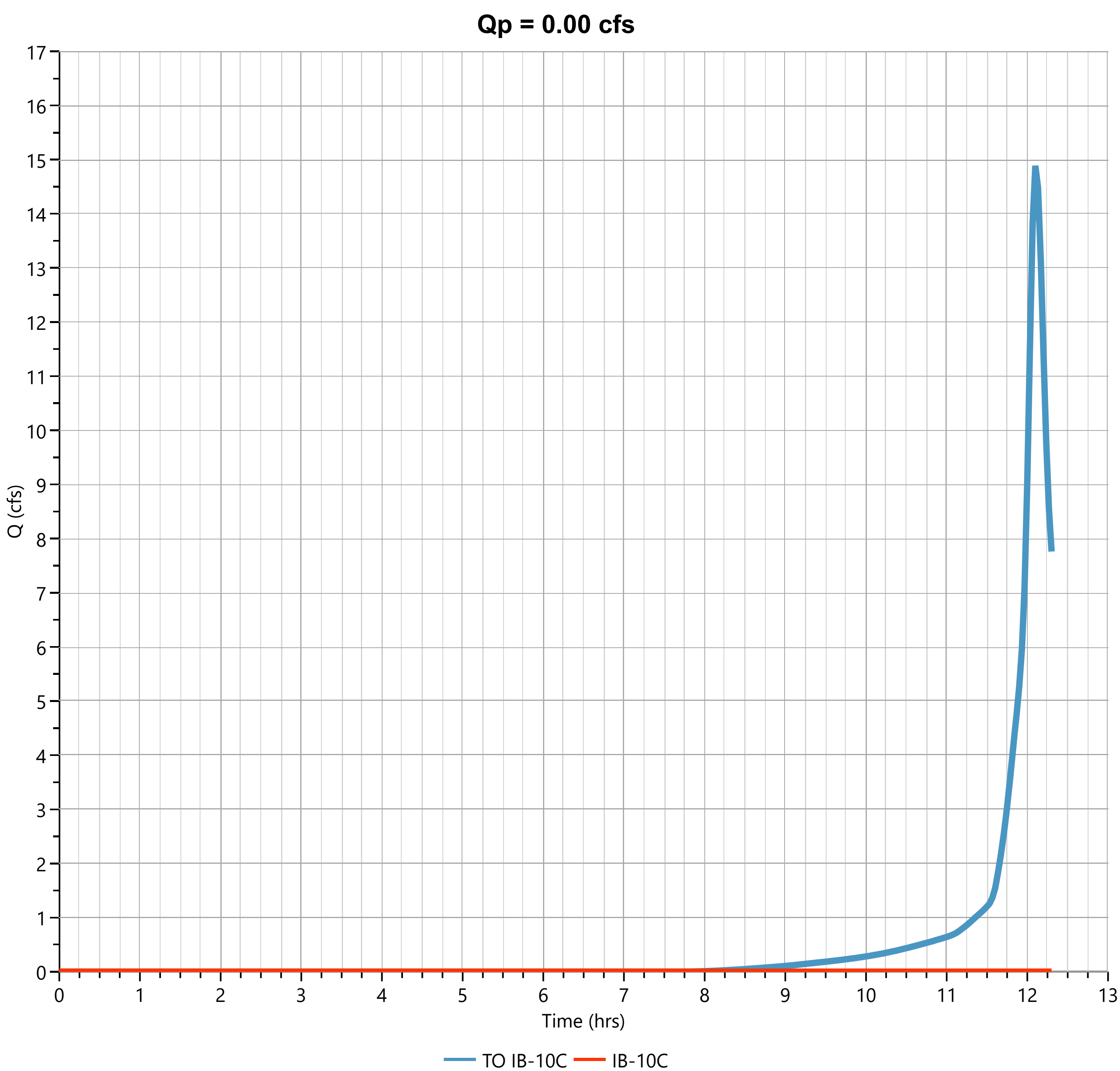
Hydrology Studio v 3.0.0.31 02-14-2024

IB-10C

Hyd. No. 55

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.005 cuft
Inflow Hydrograph	= 54 - TO IB-10C	Max. Elevation	= 225.77 ft
Pond Name	= IB-10C	Max. Storage	= 14,103 cuft

Pond Routing by Storage Indication Method



Hydrograph Report

Project Name:

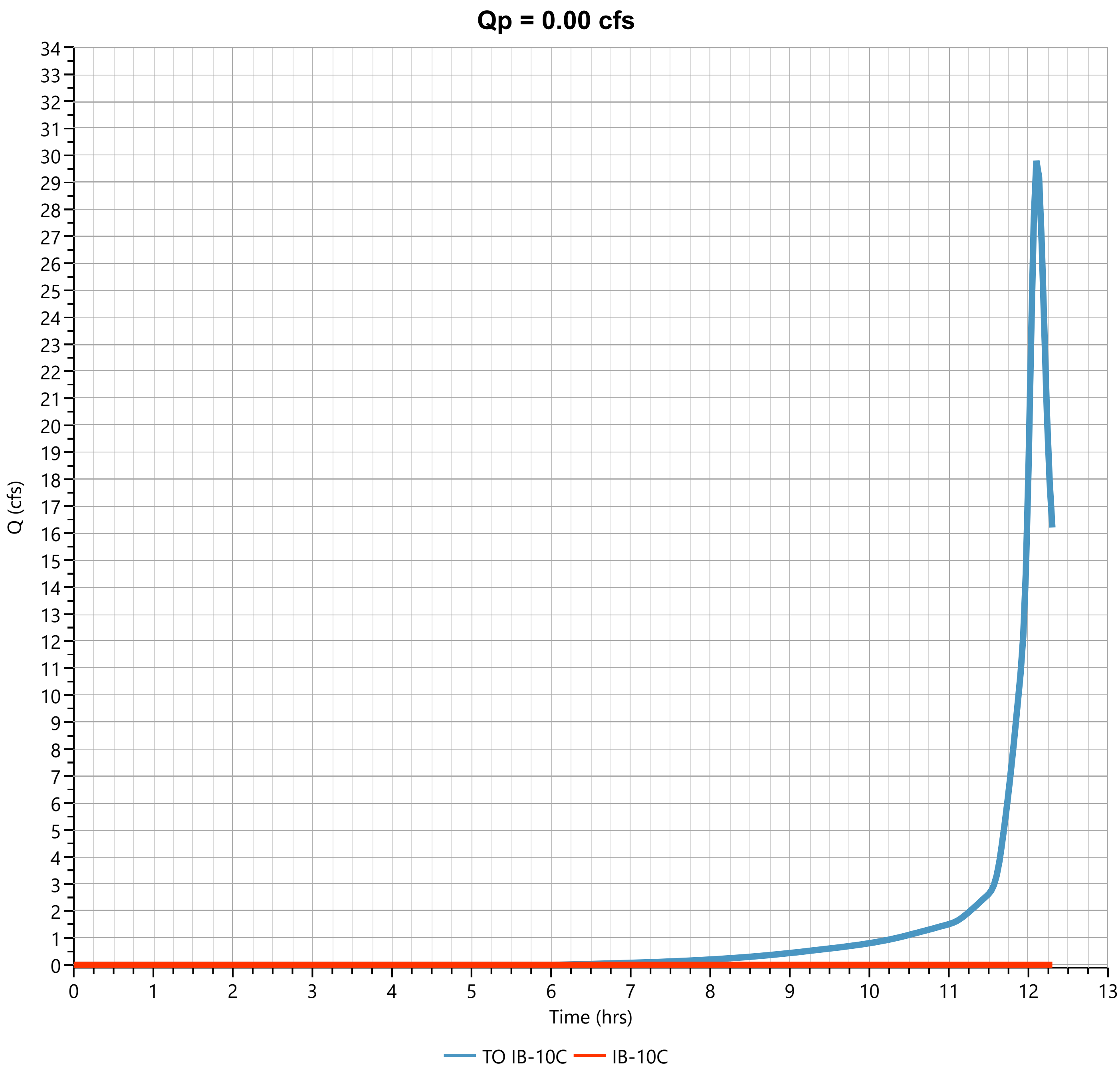
Hydrology Studio v 3.0.0.31 02-14-2024

IB-10C

Hyd. No. 55

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Hydrograph Volume	= 0.006 cuft
Inflow Hydrograph	= 54 - TO IB-10C	Max. Elevation	= 226.98 ft
Pond Name	= IB-10C	Max. Storage	= 39,975 cuft

Pond Routing by Storage Indication Method

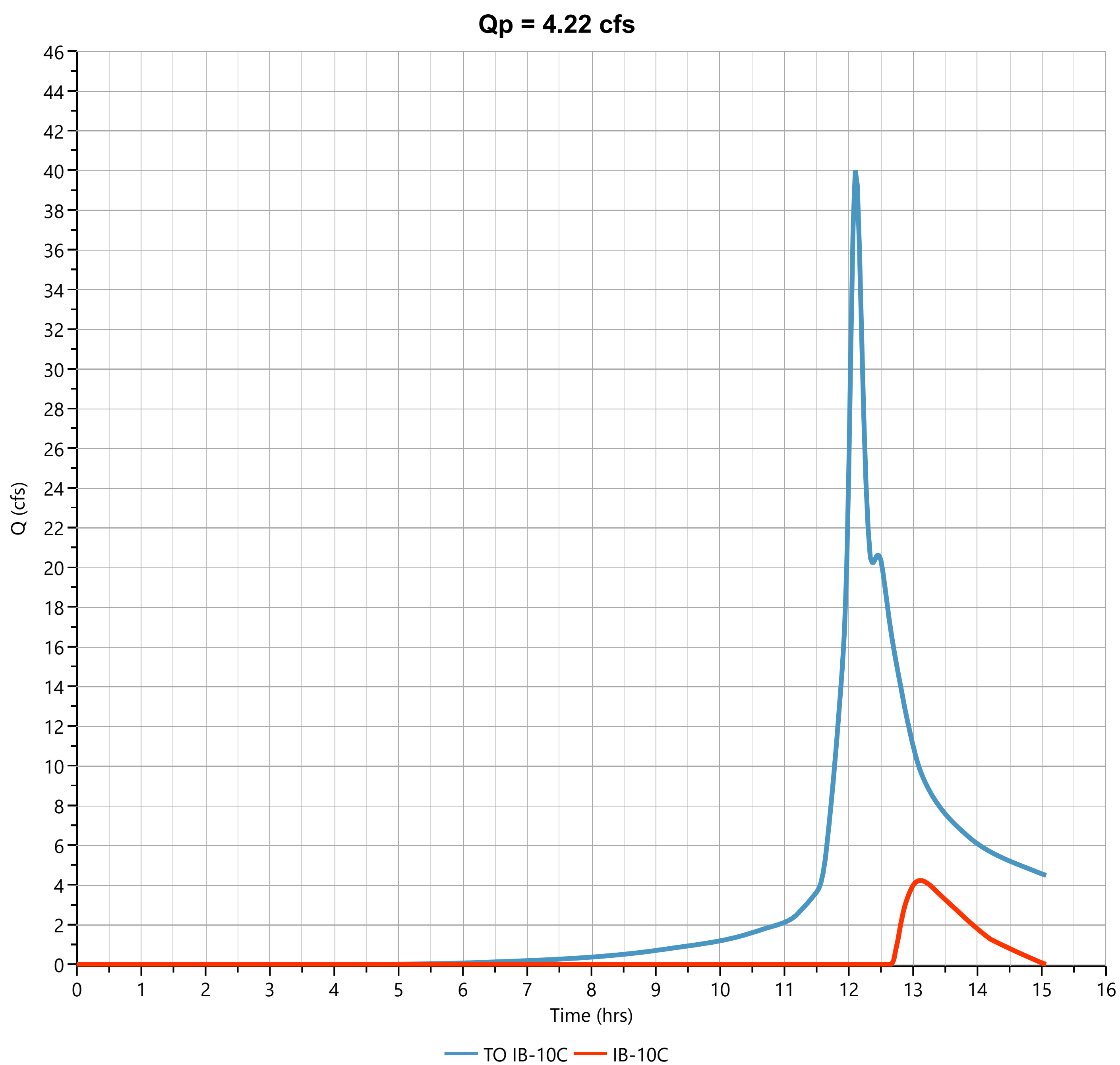


IB-10C

Hyd. No. 55

Hydrograph Type	= Pond Route	Peak Flow	= 4.215 cfs
Storm Frequency	= 25-yr	Time to Peak	= 13.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 17,119 cuft
Inflow Hydrograph	= 54 - TO IB-10C	Max. Elevation	= 228.12 ft
Pond Name	= IB-10C	Max. Storage	= 70,778 cuft

Pond Routing by Storage Indication Method



Hydrograph Report

Project Name:

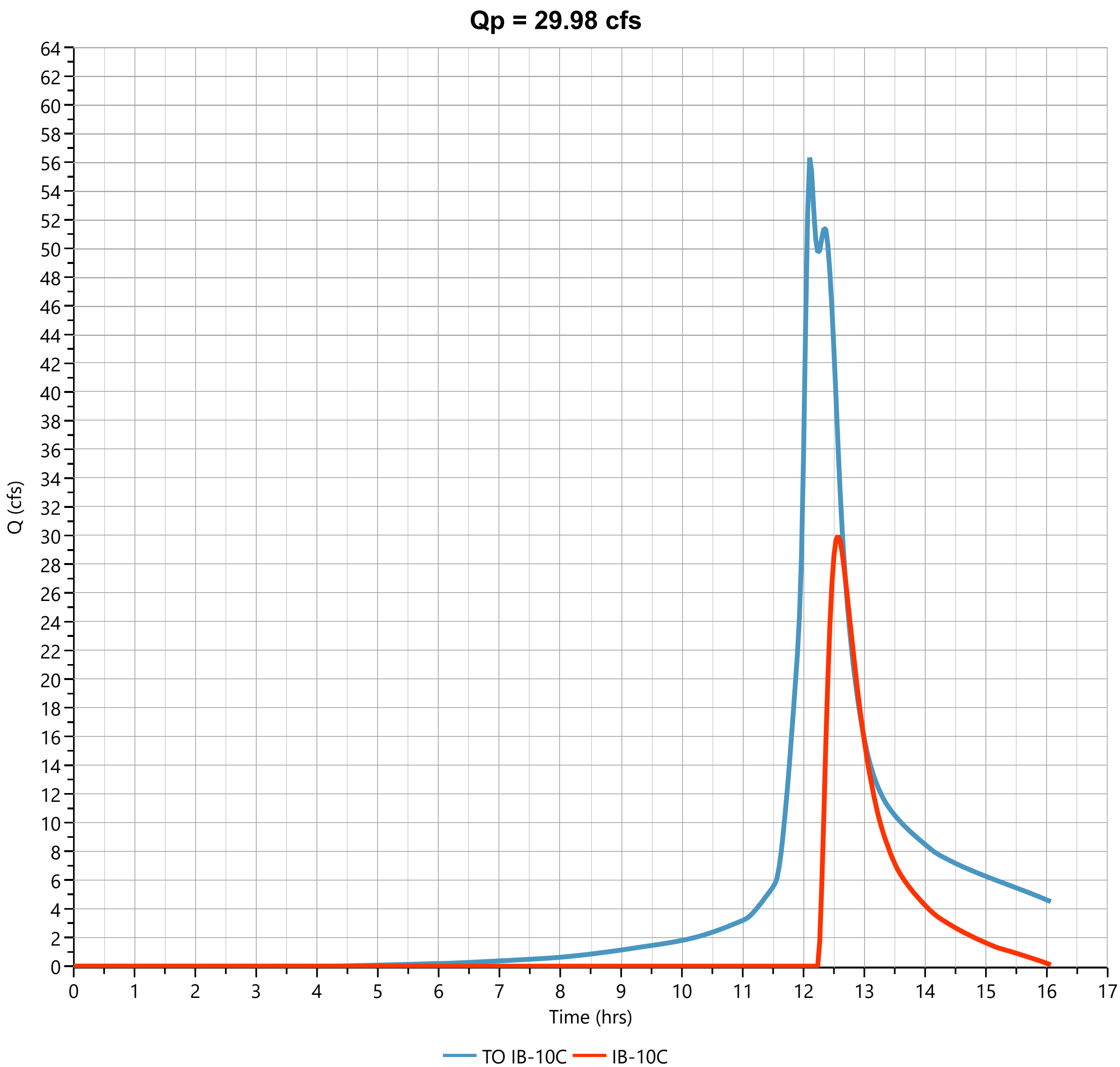
Hydrology Studio v 3.0.0.31 02-14-2024

IB-10C

Hyd. No. 55

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

Pond Routing by Storage Indication Method



IB-10C

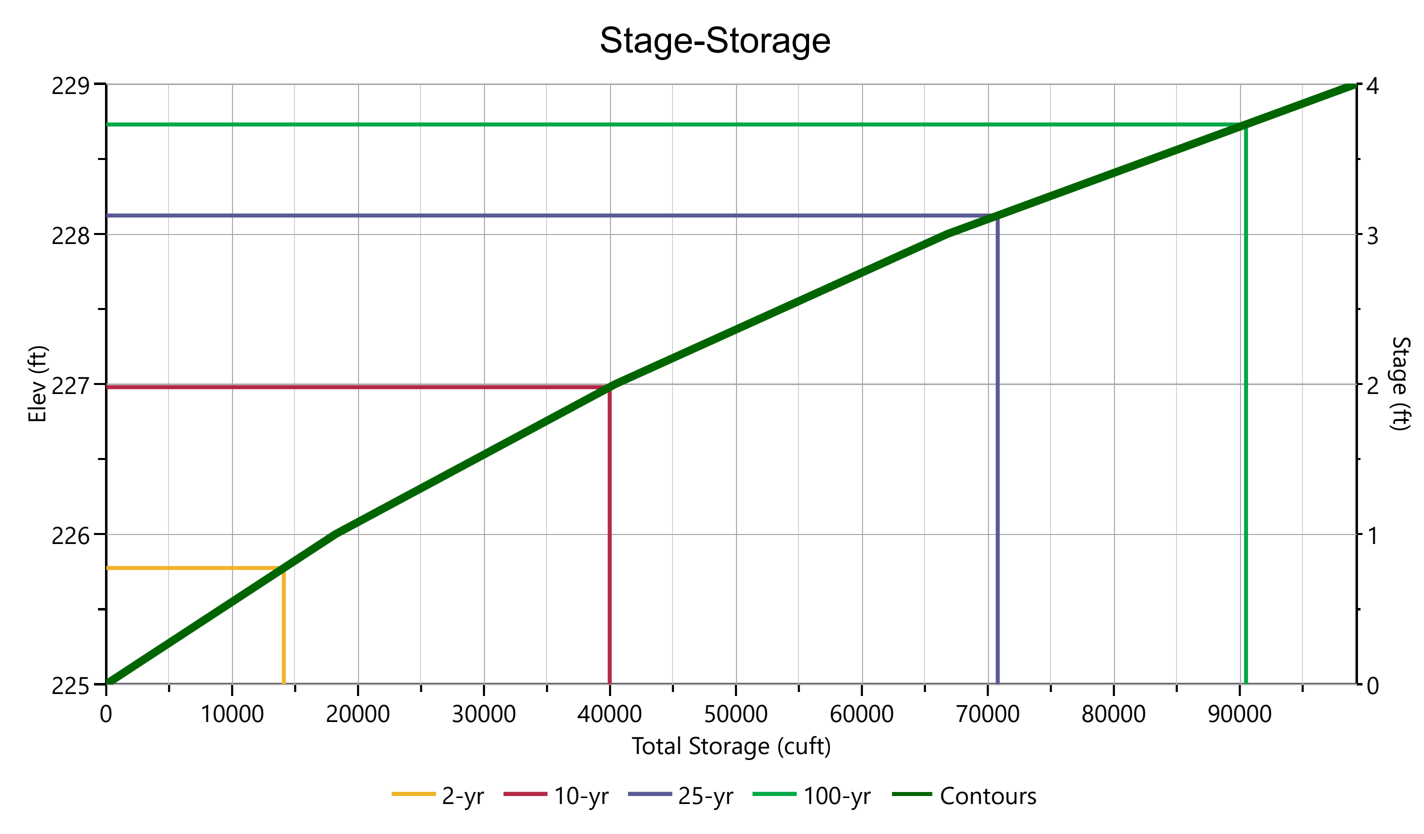
Stage-Storage

User Defined Contours

Description	Input
Bottom Elevation, ft	225.00
Voids (%)	100.00
Volume Calc	None

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	225.00	16,867	0.000	0.000
1.00	226.00	19,567	18,217	18,217
2.00	227.00	24,882	22,225	40,442
3.00	228.00	27,822	26,352	66,794
4.00	229.00	37,134	32,478	99,272

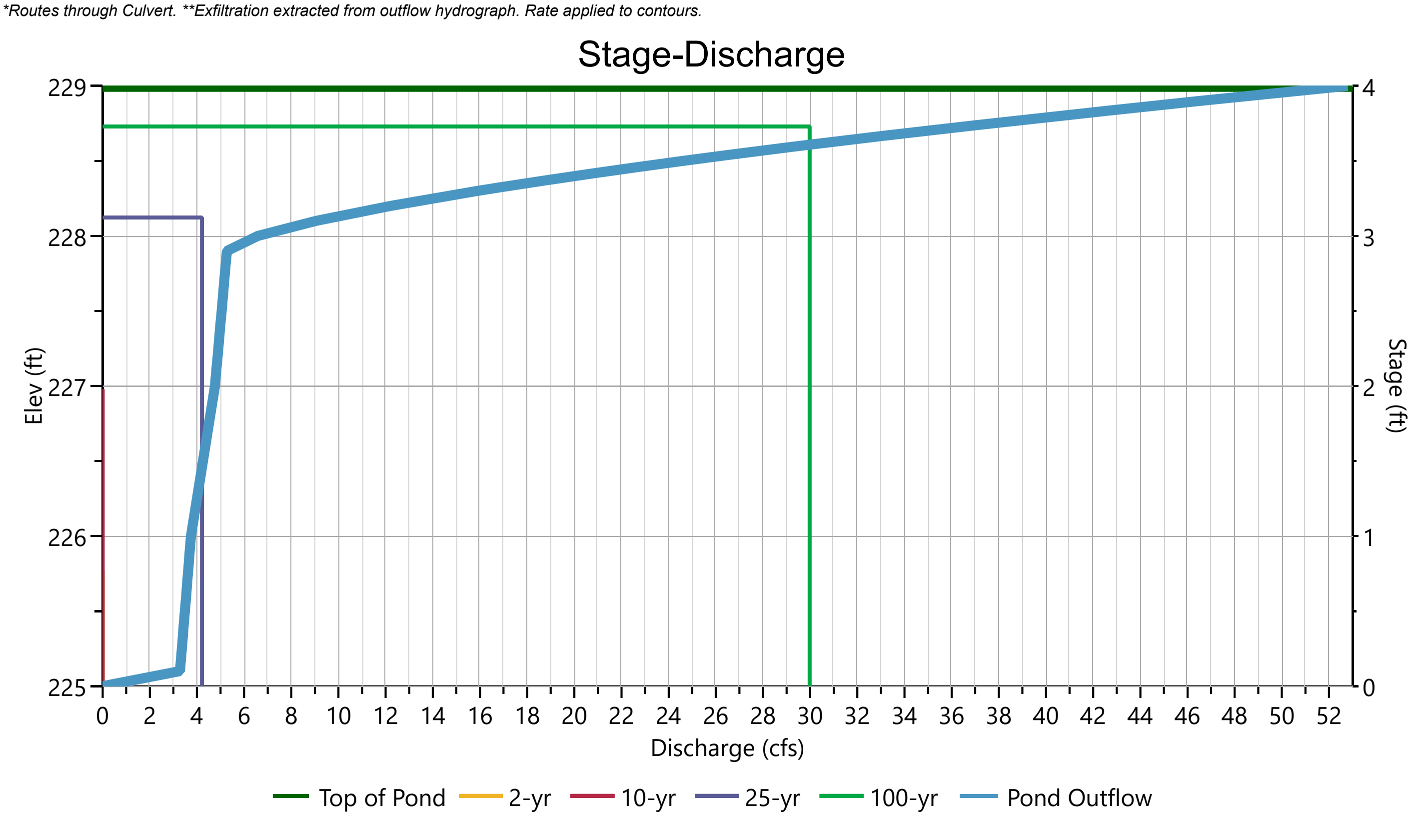


IB-10C

Stage-Discharge

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

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



Pond Report

Project Name:

Hydrology Studio v 3.0.0.31 02-14-2024

IB-10C

Stage-Storage-Discharge Summary

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

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Pond Report

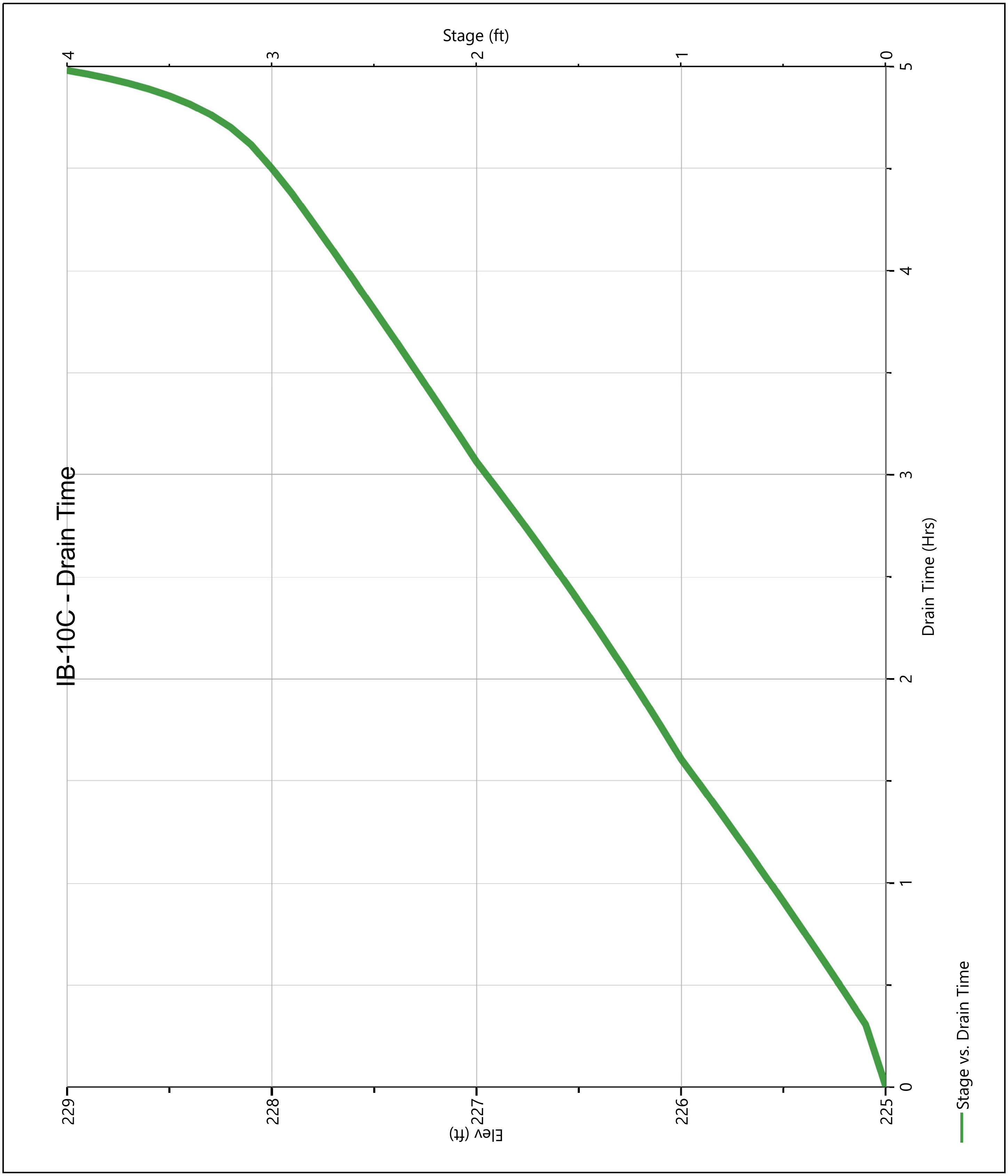
Project Name:

Hydrology Studio v 3.0.0.31

02-14-2024

IB-10C

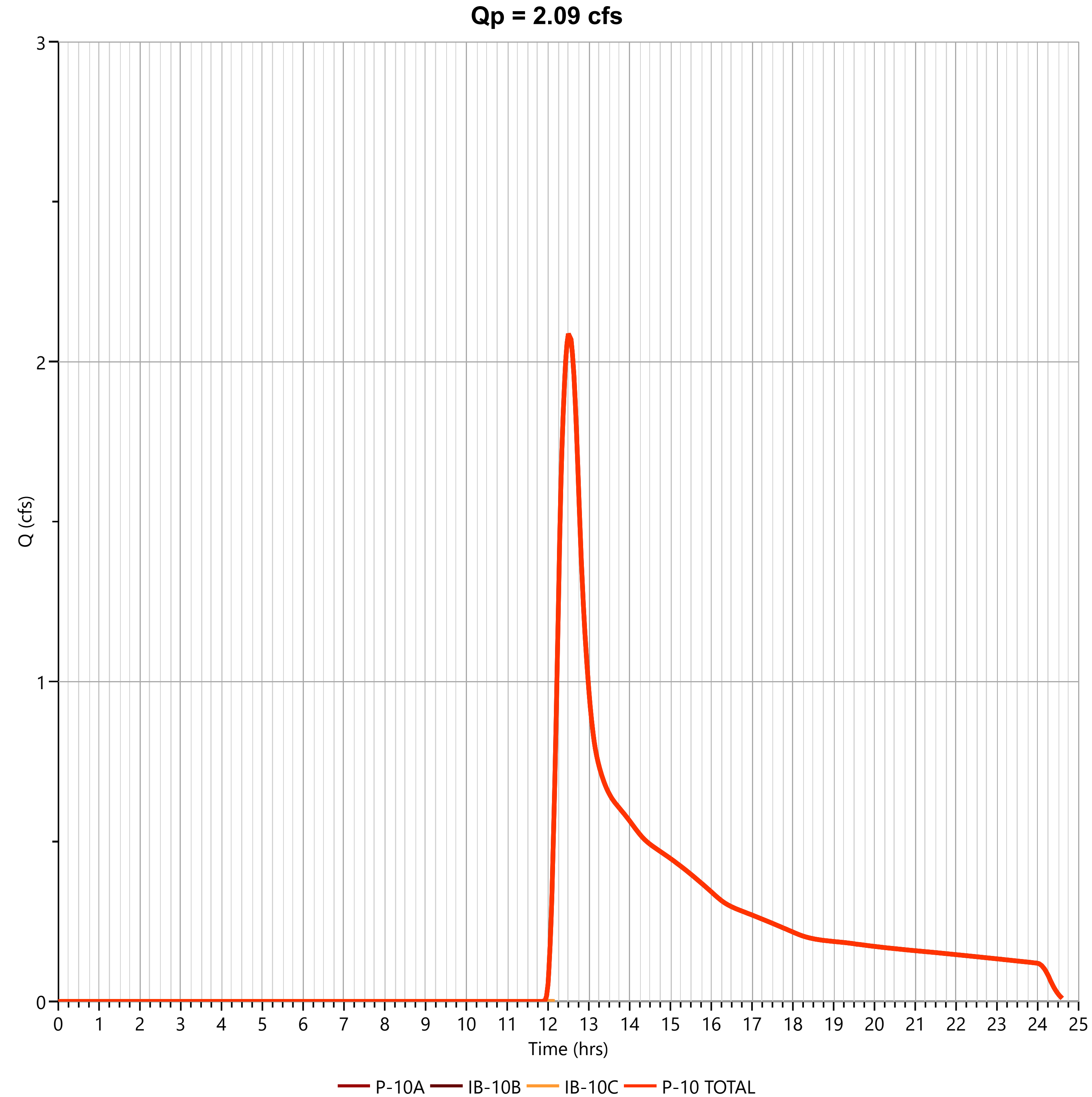
Pond Drawdown



P-10 TOTAL

Hyd. No. 56

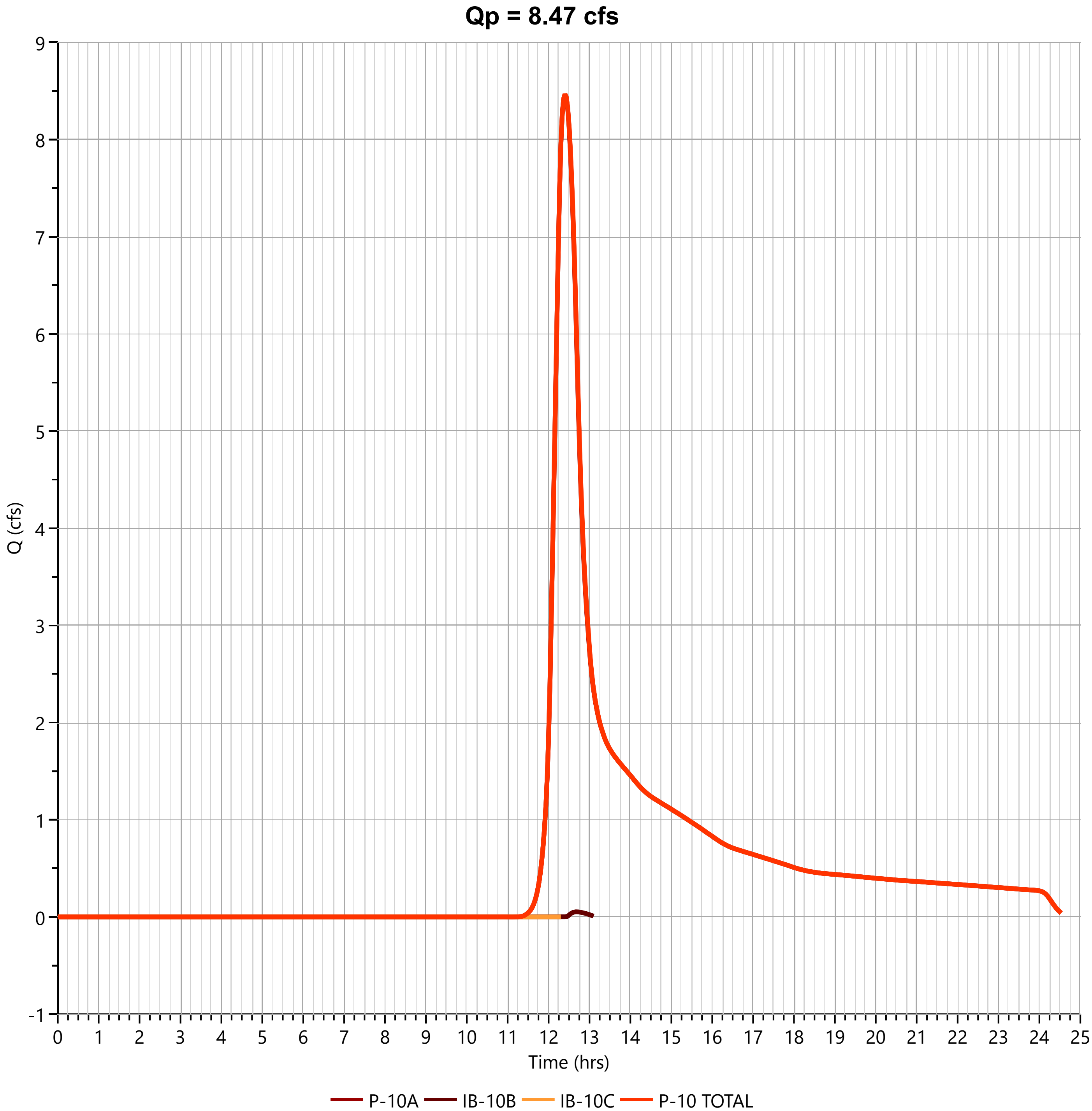
Hydrograph Type	= Junction	Peak Flow	= 2.091 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.53 hrs
Time Interval	= 2 min	Hydrograph Volume	= 16,170 cuft
Inflow Hydrographs	= 47, 49, 55	Total Contrib. Area	= 10.22 ac



P-10 TOTAL

Hyd. No. 56

Hydrograph Type	= Junction	Peak Flow	= 8.467 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.40 hrs
Time Interval	= 2 min	Hydrograph Volume	= 49,225 cuft
Inflow Hydrographs	= 47, 49, 55	Total Contrib. Area	= 10.22 ac



Hydrograph Report

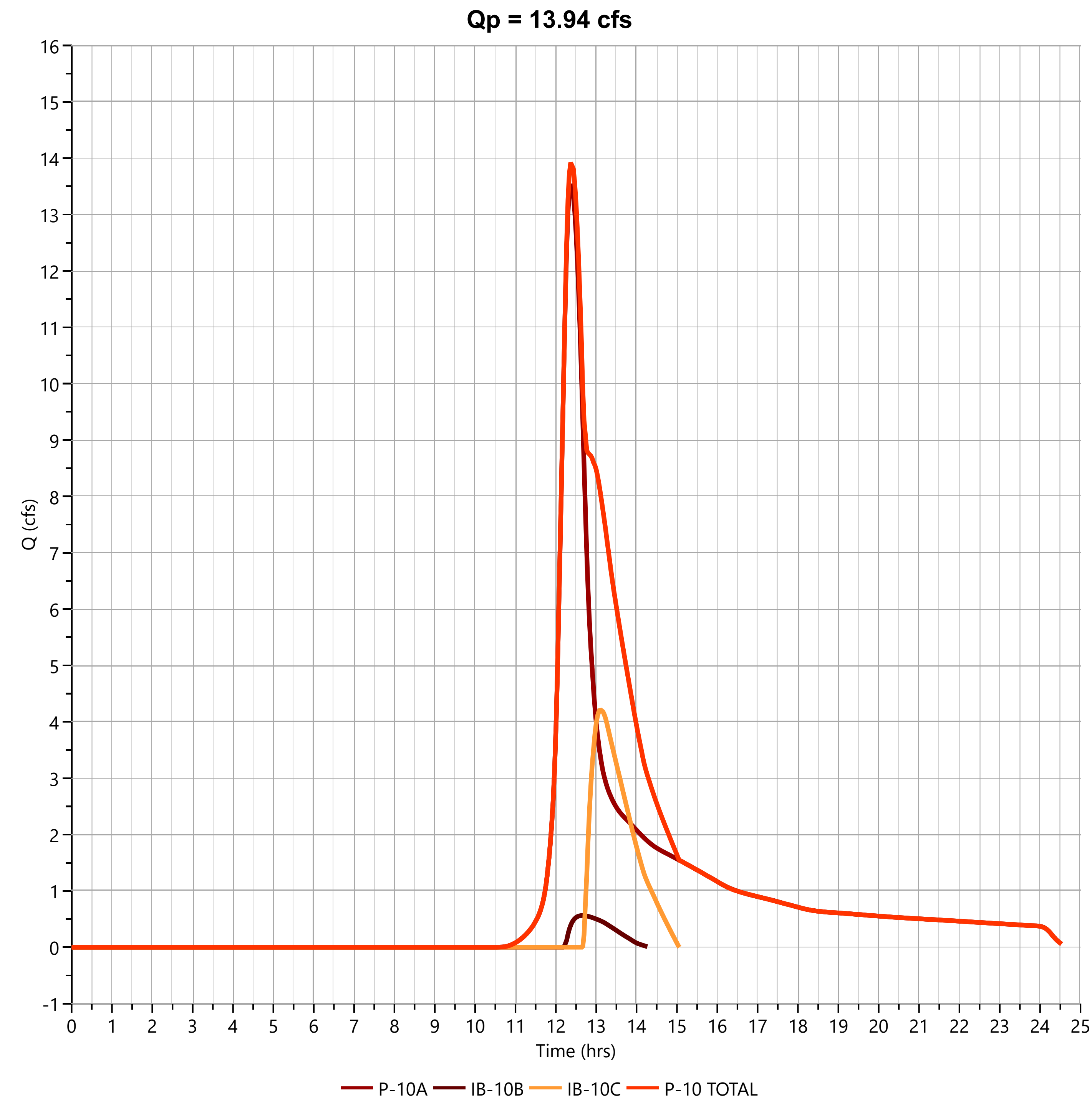
Project Name:

Hydrology Studio v 3.0.0.31 02-14-2024

P-10 TOTAL

Hyd. No. 56

Hydrograph Type	= Junction	Peak Flow	= 13.94 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.40 hrs
Time Interval	= 2 min	Hydrograph Volume	= 94,241 cuft
Inflow Hydrographs	= 47, 49, 55	Total Contrib. Area	= 10.22 ac



Hydrograph Report

Project Name:

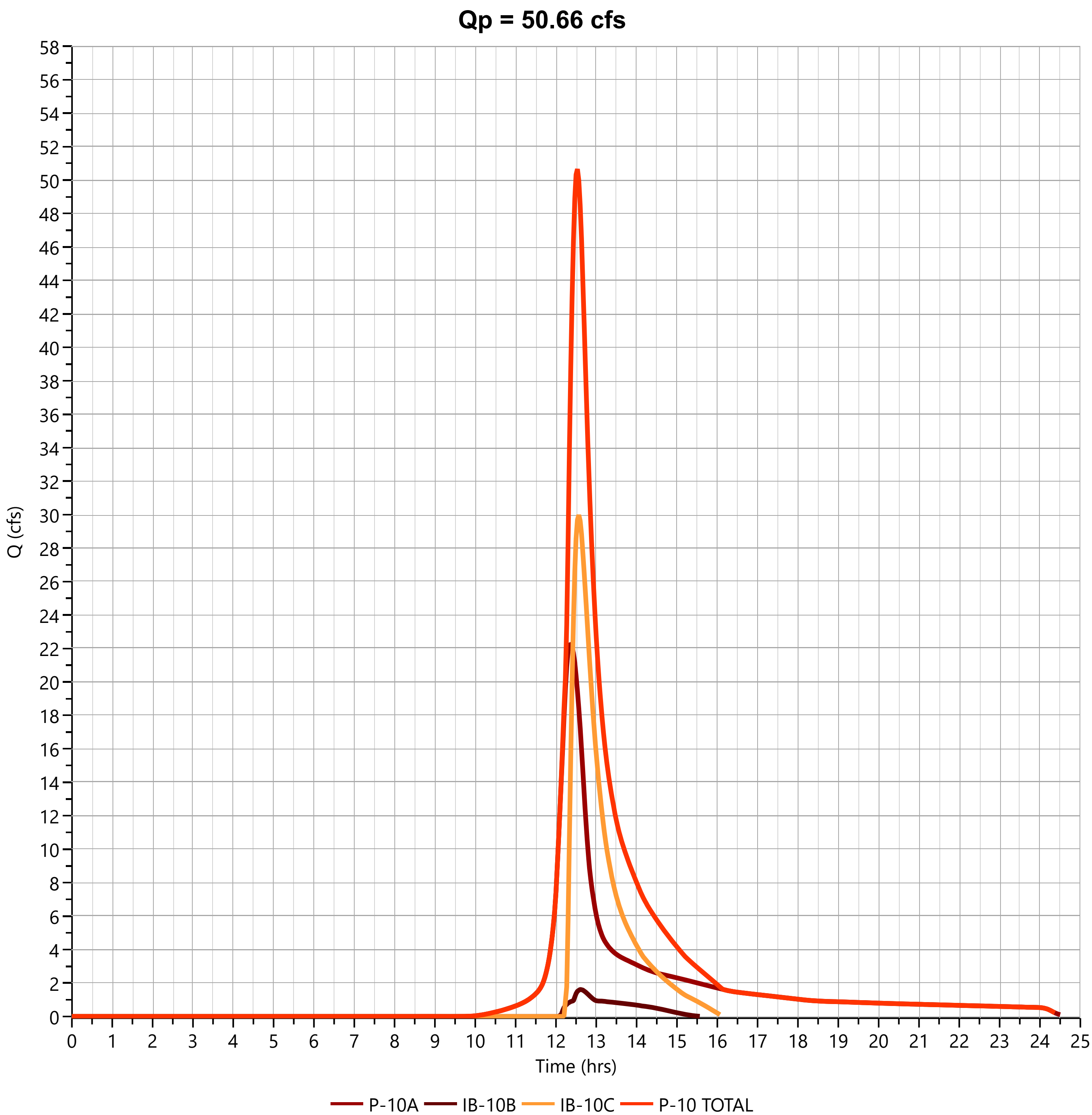
Hydrology Studio v 3.0.0.31

02-14-2024

P-10 TOTAL

Hyd. No. 56

Hydrograph Type	= Junction	Peak Flow	= 50.66 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.53 hrs
Time Interval	= 2 min	Hydrograph Volume	= 227,139 cuft
Inflow Hydrographs	= 47, 49, 55	Total Contrib. Area	= 10.22 ac



Worksheet 2: Runoff curve number and runoff **SM-3719C**

Project: Athens Street By NC Date 6/24/22

Rev Date 10/13/2022

Location: Stow, MA Checked Date 6/17/2023

Circle one: Present Developed Subcatchment P-11

1. Runoff curve number (CN)

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

1/ Use only one CN source per line. 469446

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

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency.......................................	yr	2	25	100
Rainfall, P (24-hour).......................	in	3.27	6.14	7.84
Runoff, Q...	in	0.72	2.64	3.99

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project:	Athens Street	By NC	Date	6/24/2022
			Rev Date	10/13/2022
Location:	Stow, MA	Checked	Date	6/17/2023

Circle one: Present **Developed** — Subcatchment P-11

Circle one: Tc **Tt** through subarea

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 Tt	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 Tt	hr	0.03			0.03

Channel flow		Segment ID				
12. Cross sectional flow area, a		sf				
13. Wetted perimeter, pw		ft				
14. Hydraulic radius, r=a/wp	Compute r	ft				
15. Channel Slope, s		ft/ft				
16. Manning's roughness coeff., n						
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s				
18. Flow length, L		ft				
19. Tt = L / 3600V	Compute Tt	hr				0

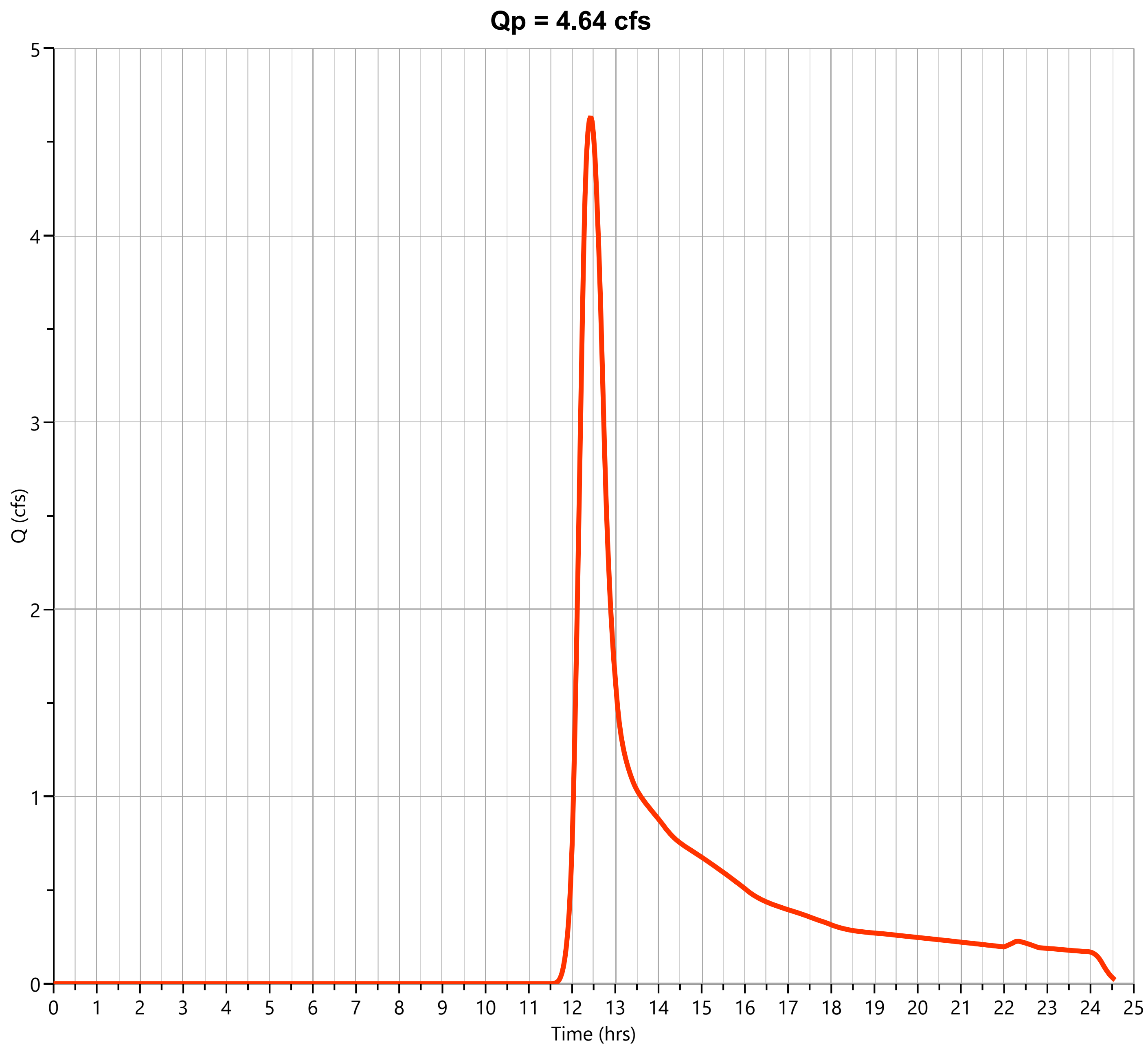
20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.50
	min	30.0

Hydrograph Report

P-11

Hyd. No. 62

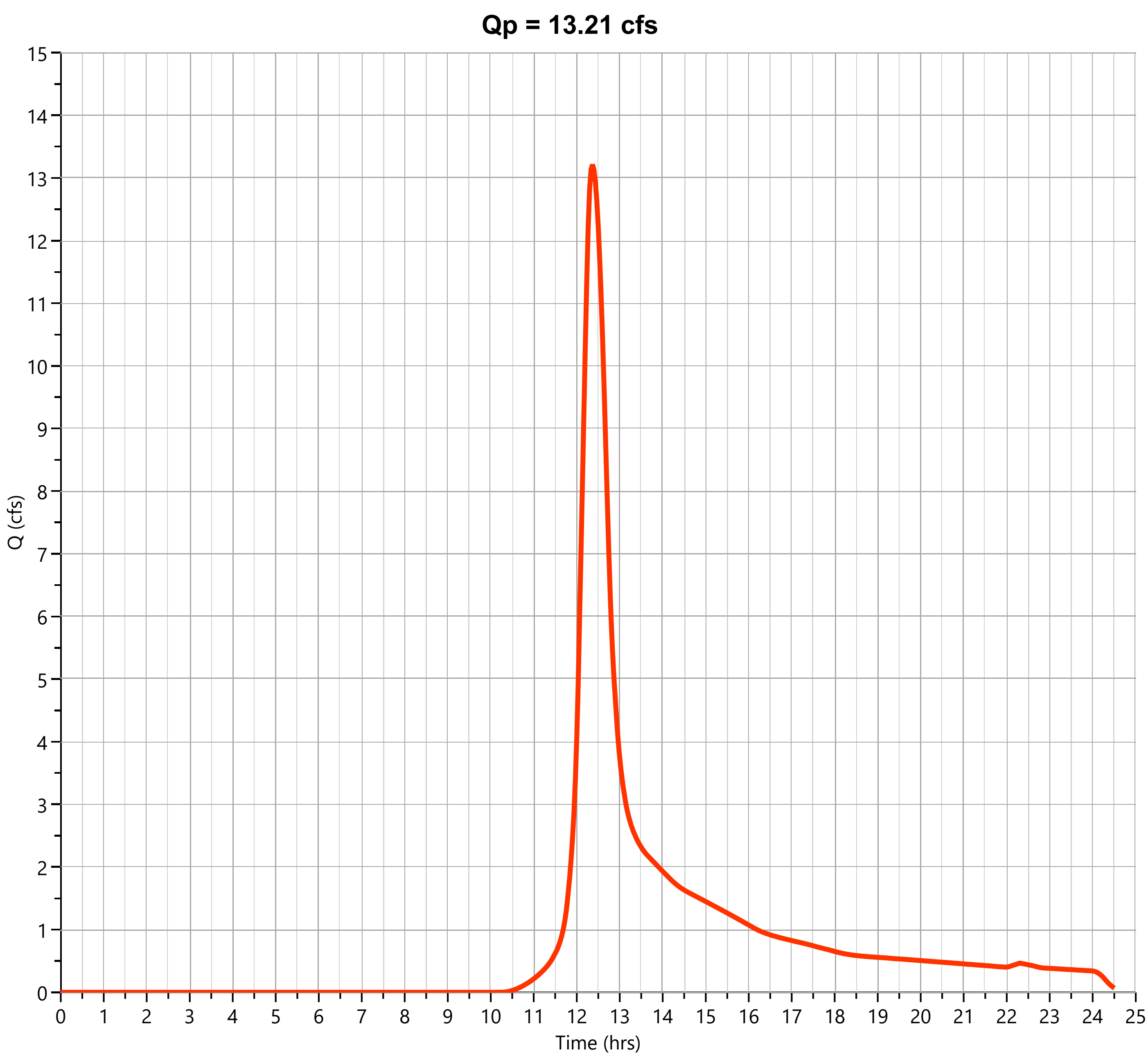
Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.637 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.43 hrs
Time Interval	= 2 min	Runoff Volume	= 28,334 cuft
Drainage Area	= 10.78 ac	Curve Number	= 67
Tc Method	= User	Time of Conc. (Tc)	= 30.0 min
Total Rainfall	= 3.27 in	Design Storm	= Type III
Storm Duration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



P-11

Hyd. No. 62

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

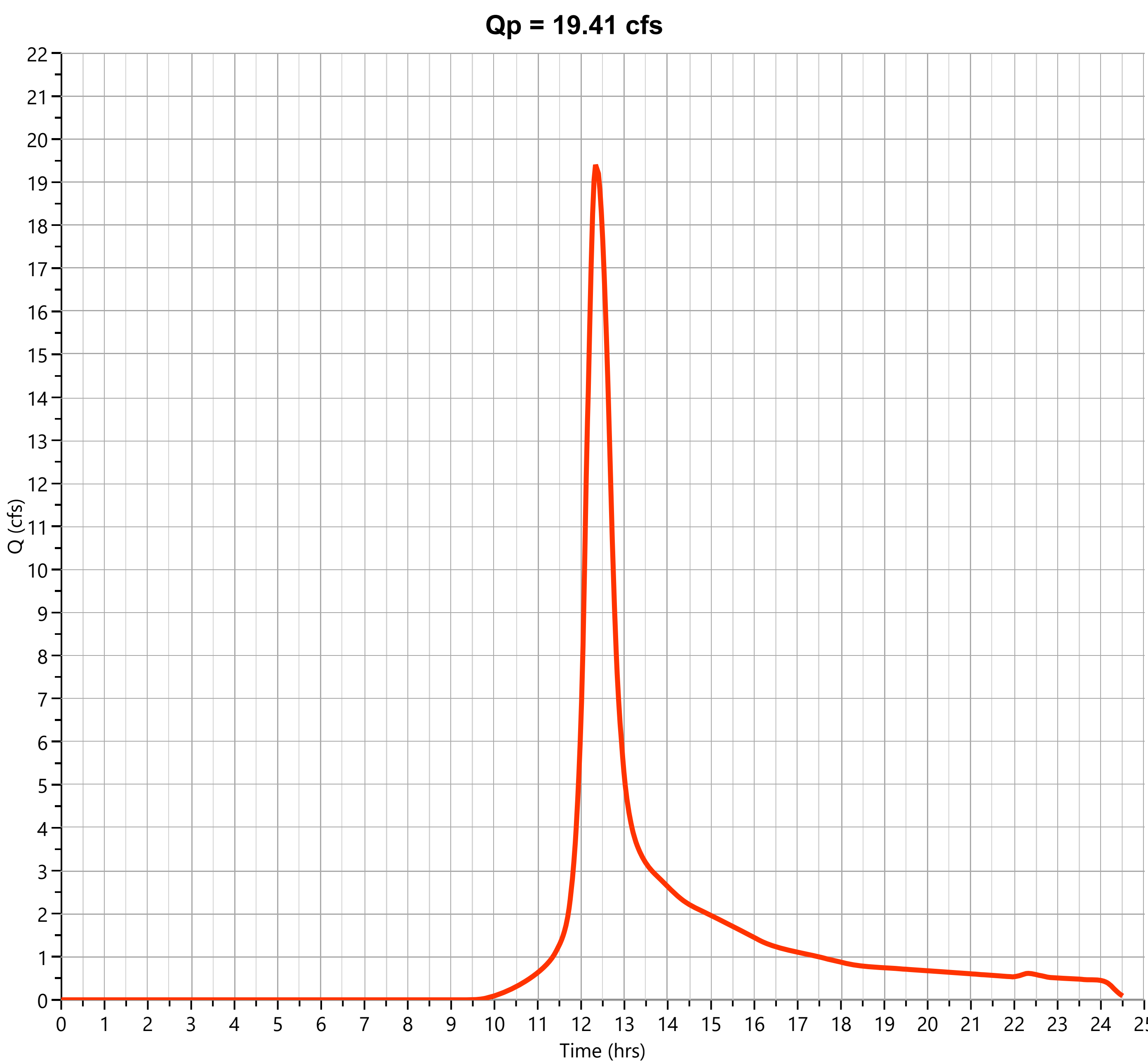


Hydrograph Report

P-11

Hyd. No. 62

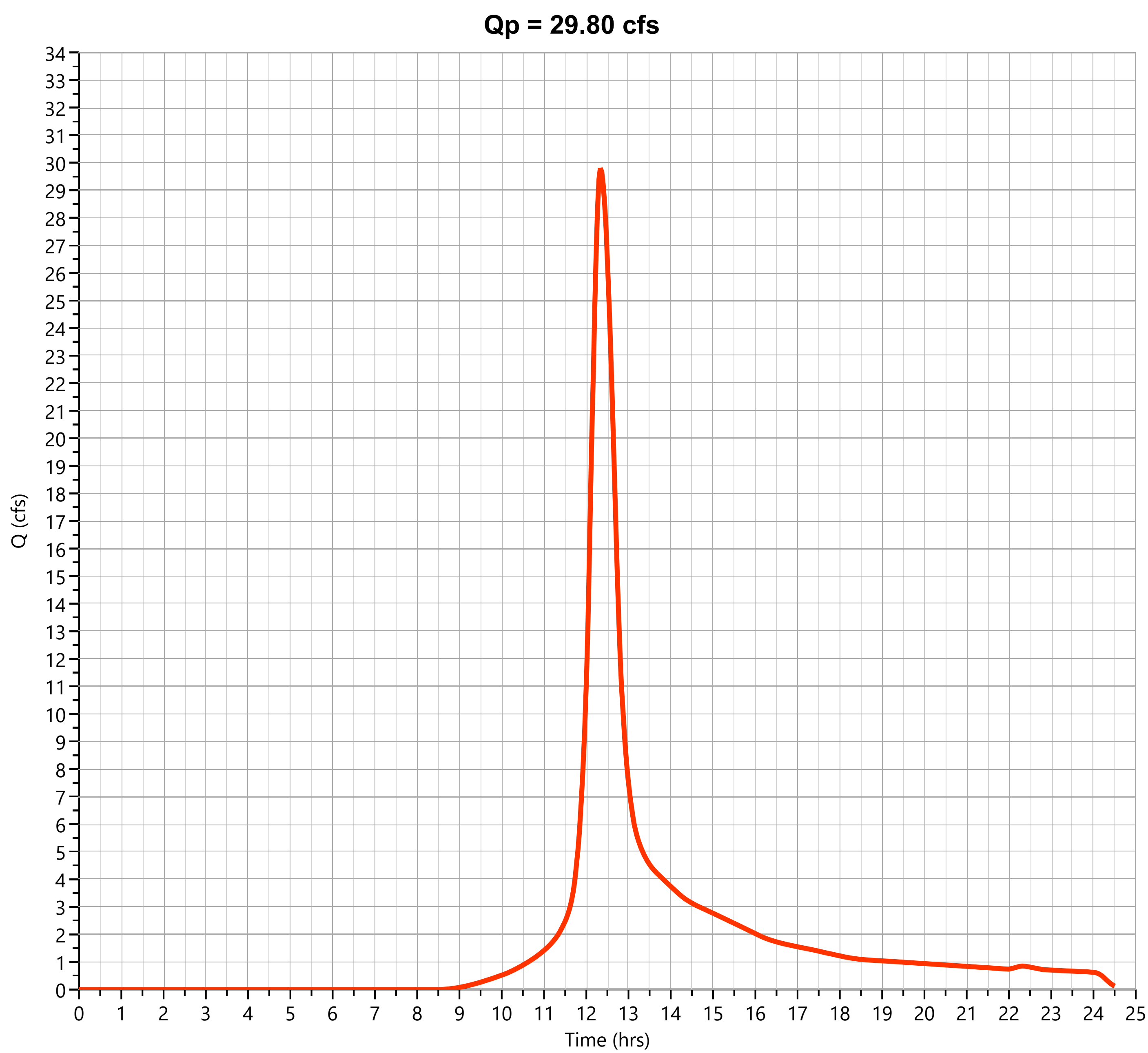
Hydrograph Type	= NRCS Runoff	Peak Flow	= 19.41 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.37 hrs
Time Interval	= 2 min	Runoff Volume	= 103,157 cuft
Drainage Area	= 10.78 ac	Curve Number	= 67
Tc Method	= User	Time of Conc. (Tc)	= 30.0 min
Total Rainfall	= 6.14 in	Design Storm	= Type III
Storm Duration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



P-11

Hyd. No. 62

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 By NC Date 6/24/22

Rev Date 10/13/2022

Location: Stow, MA Checked Date 6/17/2023

Circle one: Present **Developed** Subcatchment P-12

1. Runoff curve number (CN)

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

1/ Use only one CN source per line. 9482

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

2. Runoff

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

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

Worksheet 3: Time of Concentration (Tc) or travel time (Tt) SM-3719C

Project: Athens Street By NC Date 6/24/2022

Rev Date 10/13/2022

Location: Stow, MA Checked Date 6/17/2023

Circle one: Present **Developed** Subcatchment P-12

Circle one: Tc **Tt** through subarea

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		0.122			
6. Tt = 0.007 (nL)^0.8 / (P2^0.5 s^0.4)	Compute Tt	hr		0.14			0.14
Shallow concentrated Flow			Segment ID	B-C			
7. Surface Description (paved or unpaved)				UNPAVED			
8. Flow Length, L		ft		57			
9. Watercourse slope, s		ft/ft		0.112			
10. Average Velocity, V (figure 3-1)		ft/s		5.40			
11. Tt = L / 3600V	Compute Tt	hr		0.00			0.00
Channel flow			Segment ID				
12. Cross sectional flow area, a		sf					
13. Wetted perimeter, pw		ft					
14. Hydraulic radius, r=a/wp	Compute r	ft					
15. Channel Slope, s		ft/ft					
16. Manning's roughness coeff., n							
17. V = 1.49 r^2/3 s^1/2 / n	Compute V	ft/s					
18. Flow length, L		ft					
19. Tt = L / 3600V	Compute Tt	hr					0

20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19) hr 0.14

min 8.6

P-12

Hyd. No. 64

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

Qp = 0.00 cfs

Hydrograph Report

Project Name:

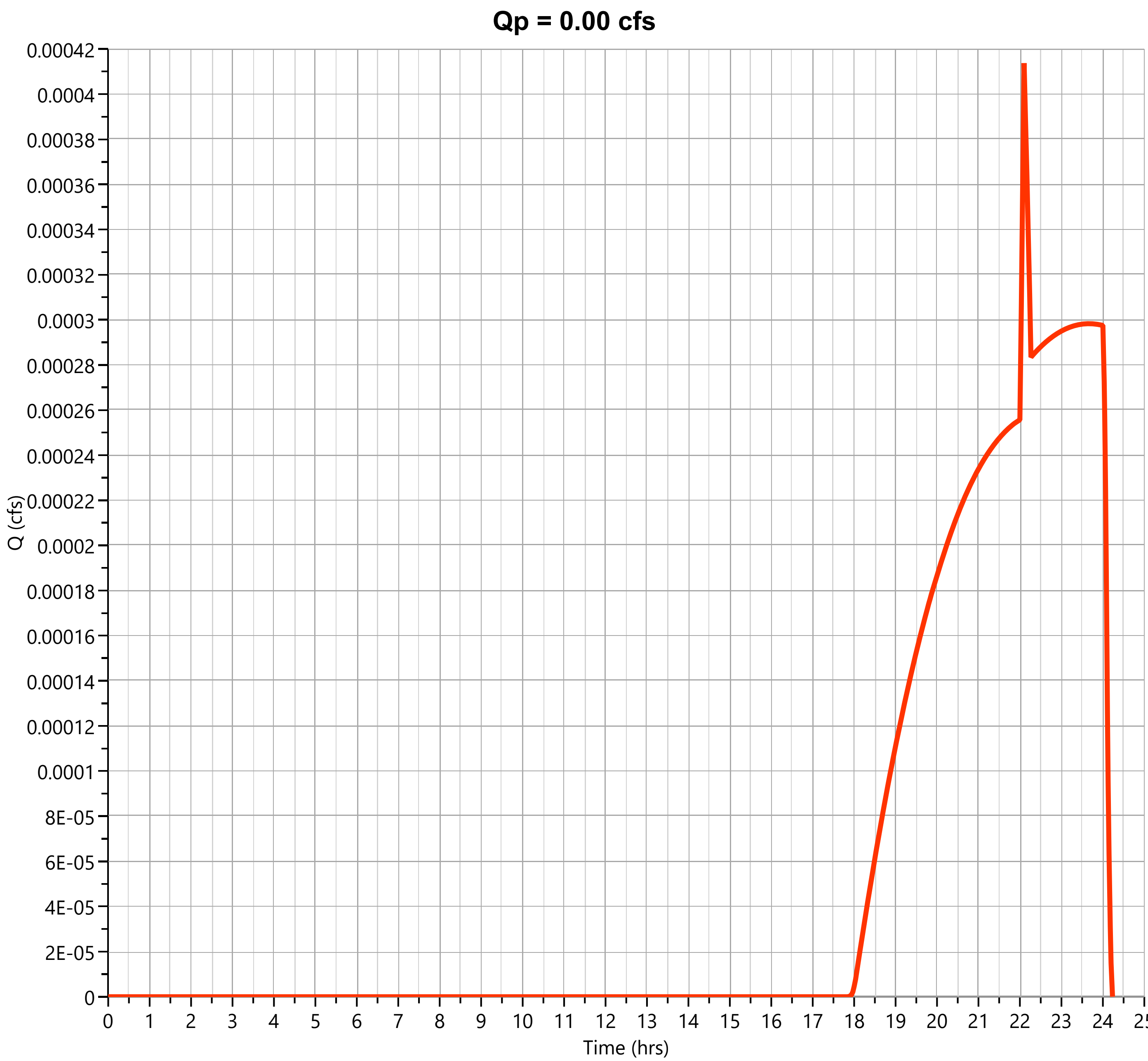
Hydrology Studio v 3.0.0.21

10-27-2022

P-12

Hyd. No. 64

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



Hydrograph Report

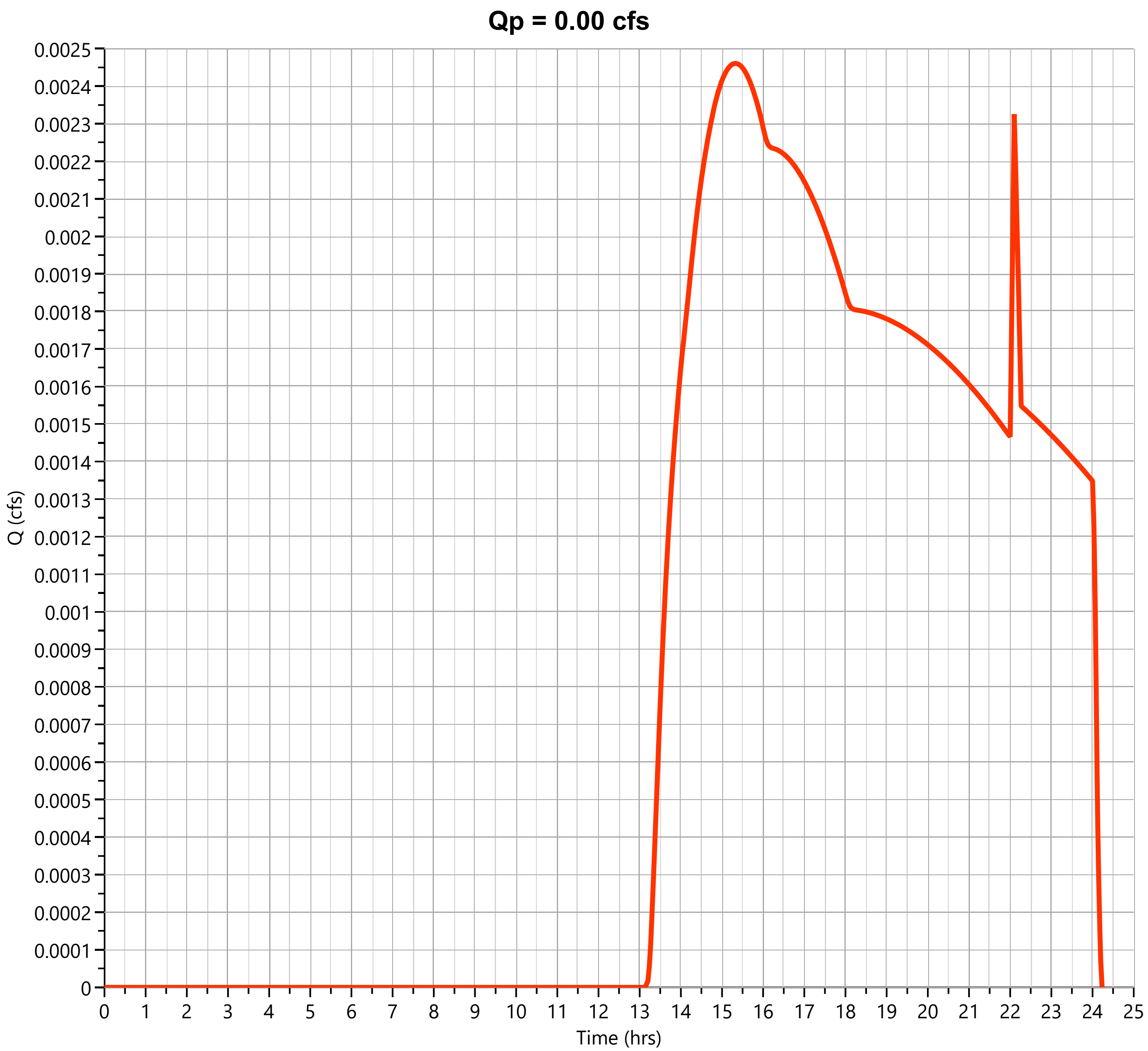
Project Name:

Hydrology Studio v 3.0.0.21 10-27-2022

P-12

Hyd. No. 64

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

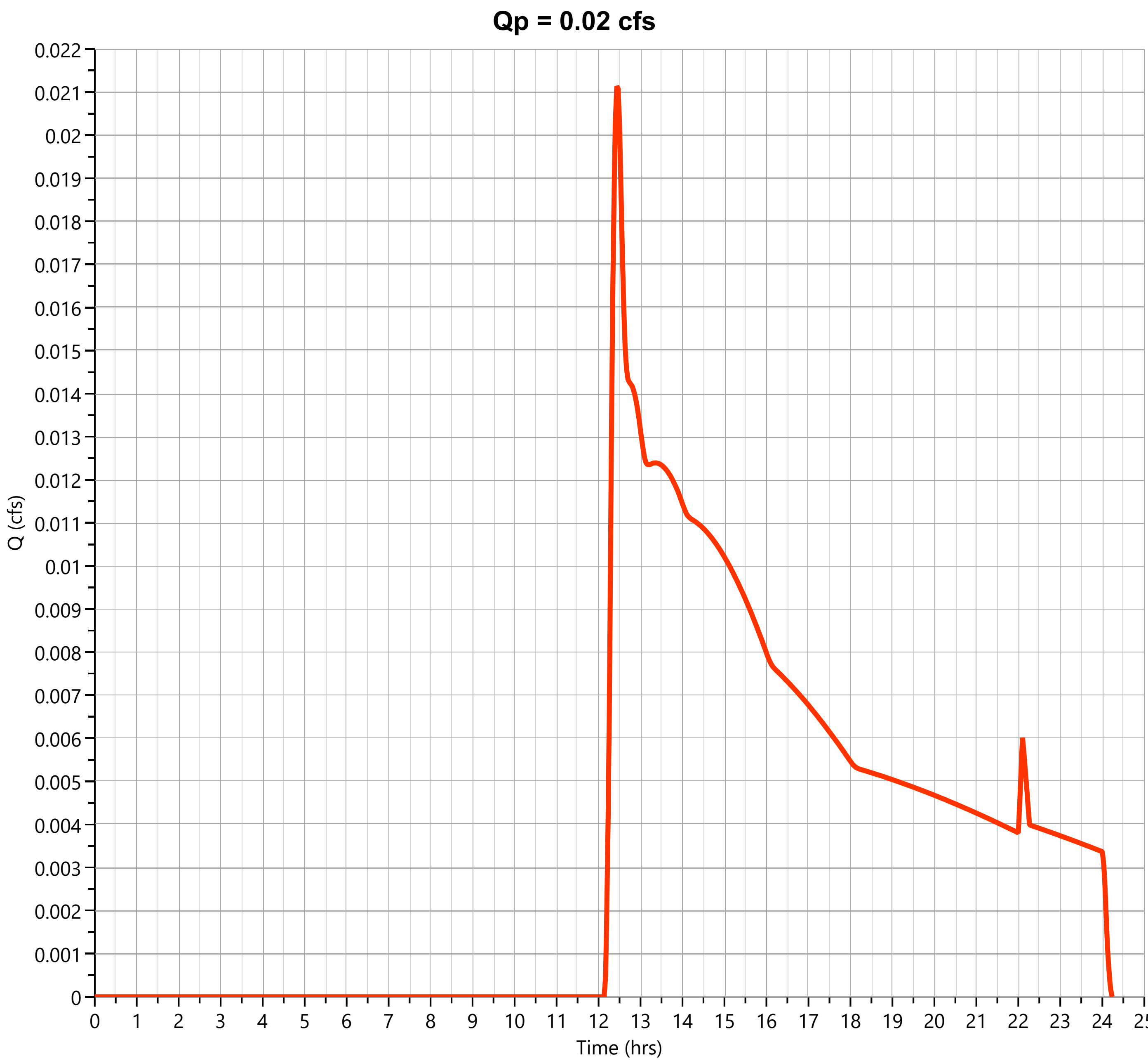


Hydrograph Report

P-12

Hyd. No. 64

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



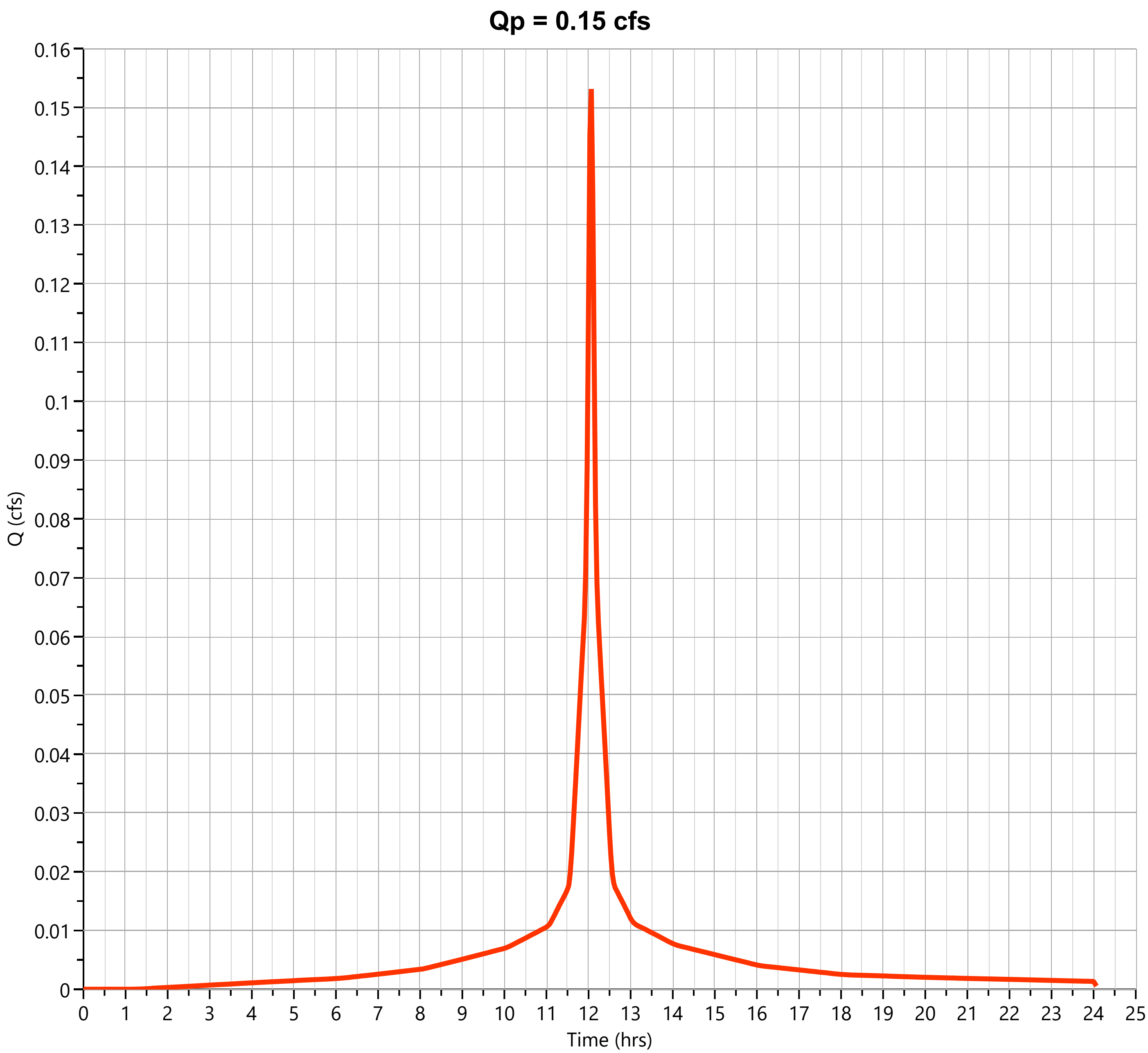
Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

Roof Runoff (Type A) Hyd. No. 62

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



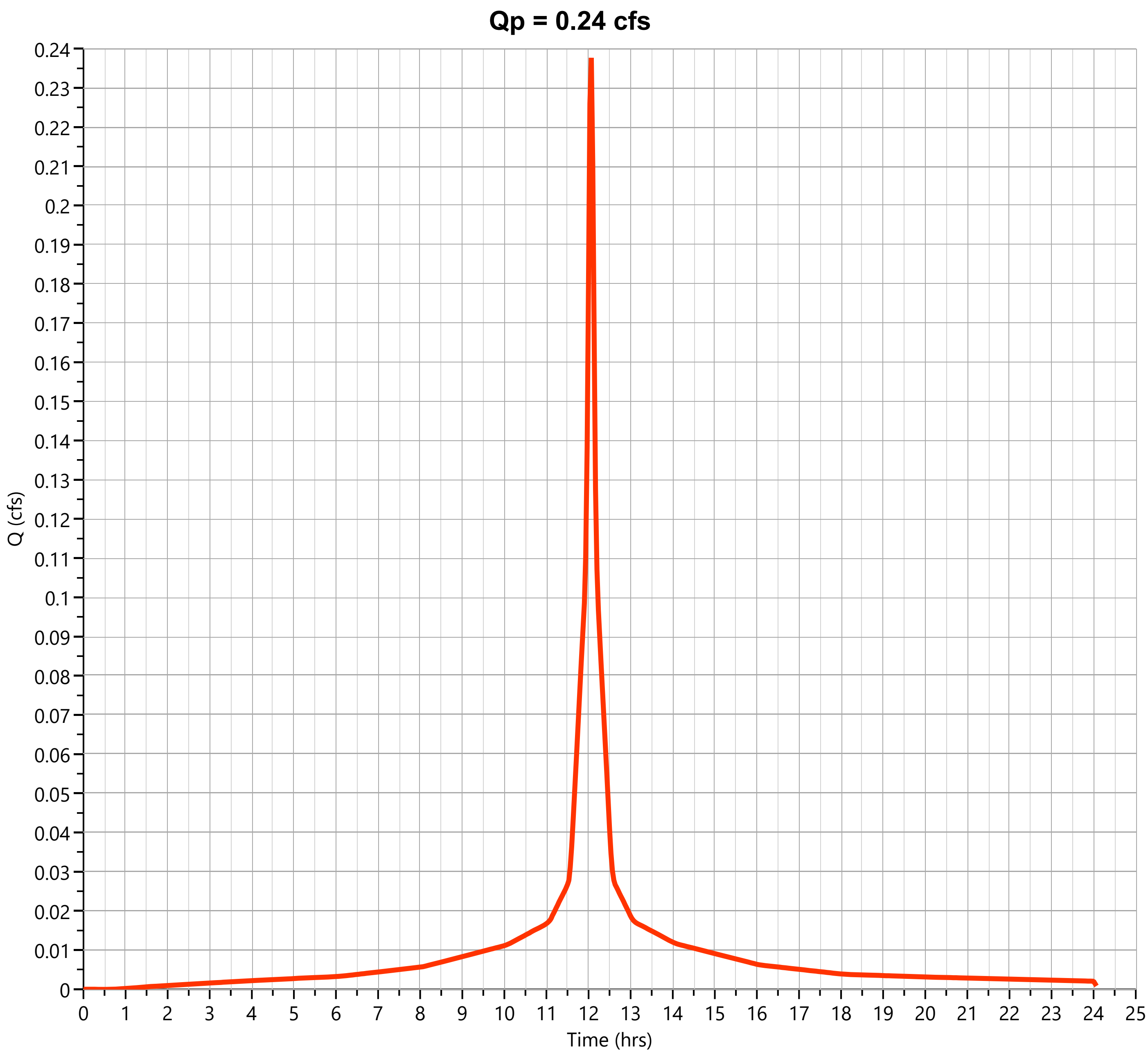
Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

Roof Runoff (Type A) Hyd. No. 62

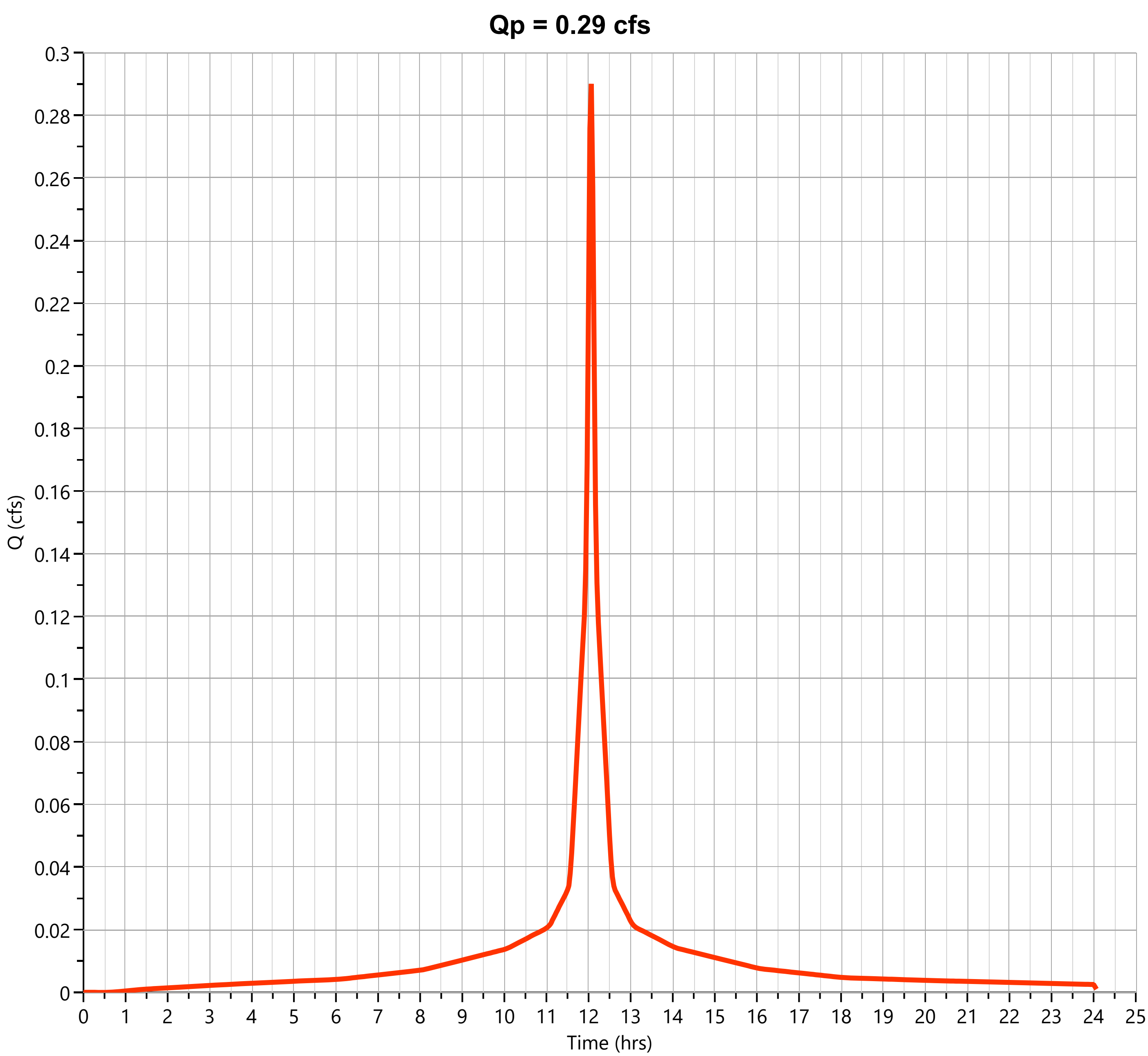
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.238 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.07 hrs
Time Interval	= 2 min	Runoff Volume	= 817 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 5.04 in	Design Storm	= Type III
Storm Duration	=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



Roof Runoff (Type A)

Hyd. No. 62

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 Report

Project Name:

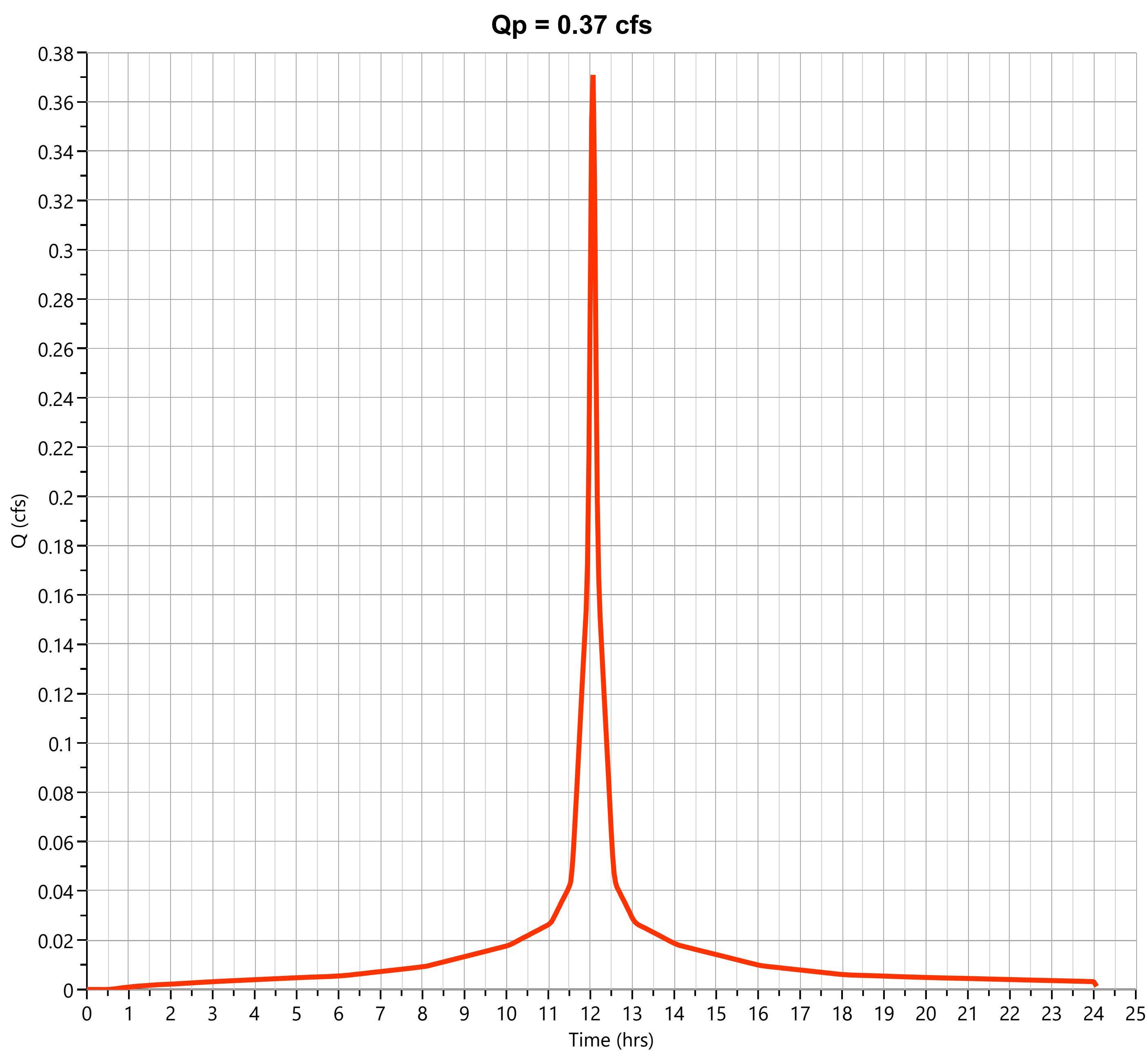
Hydrology Studio v 3.0.0.27

06-17-2023

Roof Runoff (Type A)

Hyd. No. 62

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



Roof Drywell Type A (Loamy Sand)

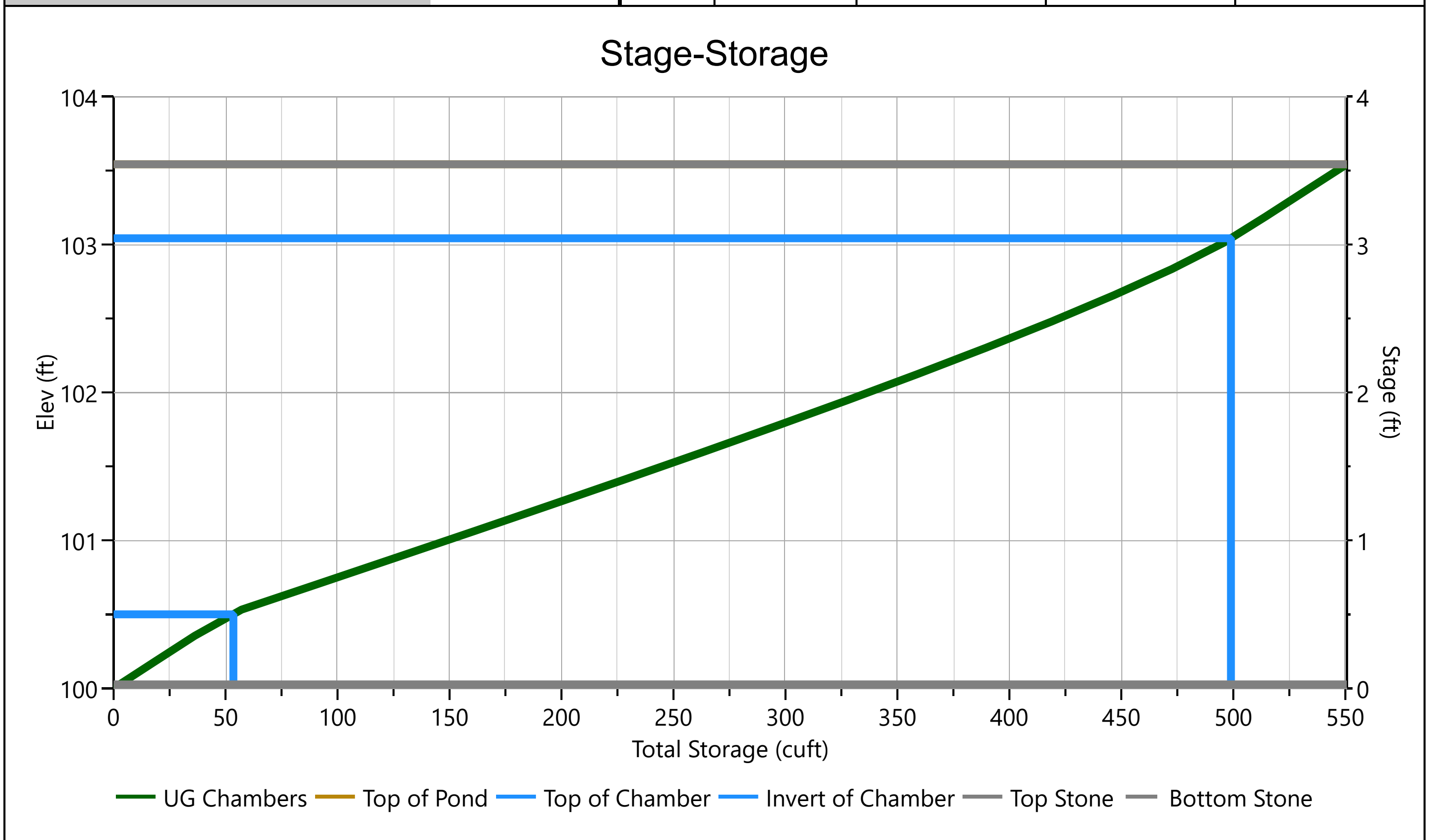
Stage-Storage

Cultec Recharger® 330XLHD Chamber

Description	Input
Chamber Height, in	30.5
Chamber Shape	Arch
Chamber Width, in	52
Installed Length, ft	7.00
No. Chambers	6
Bare Chamber Stor, cuft	313
No. Rows	3
Space Between Rows, in	6
Stone Above, in	6
Stone Below, in	6
Stone Sides, in	12
Stone Ends, in	12
Encasement Voids, %	40.00
Encasement Bottom Elevation, ft	100.00

Stage / Storage Table

Stage (in)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.0	100.00	256	0.000	0.000
2.1	100.18	256	18.1	18.1
4.2	100.35	256	18.1	36.3
6.4	100.53	256	20.9	57.2
8.5	100.71	256	34.8	92.0
10.6	100.89	256	34.7	127
12.7	101.06	256	34.5	161
14.9	101.24	256	34.2	195
17.0	101.42	256	33.9	229
19.1	101.59	256	33.4	263
21.2	101.77	256	32.9	296
23.4	101.95	256	32.2	328
25.5	102.13	256	31.4	359
27.6	102.30	256	30.4	390
29.7	102.48	256	29.3	419
31.9	102.66	256	27.8	447
34.0	102.83	256	25.9	473
36.1	103.01	256	23.1	496
38.2	103.19	256	18.7	514
40.4	103.36	256	18.1	532
42.5	103.54	256	18.1	551

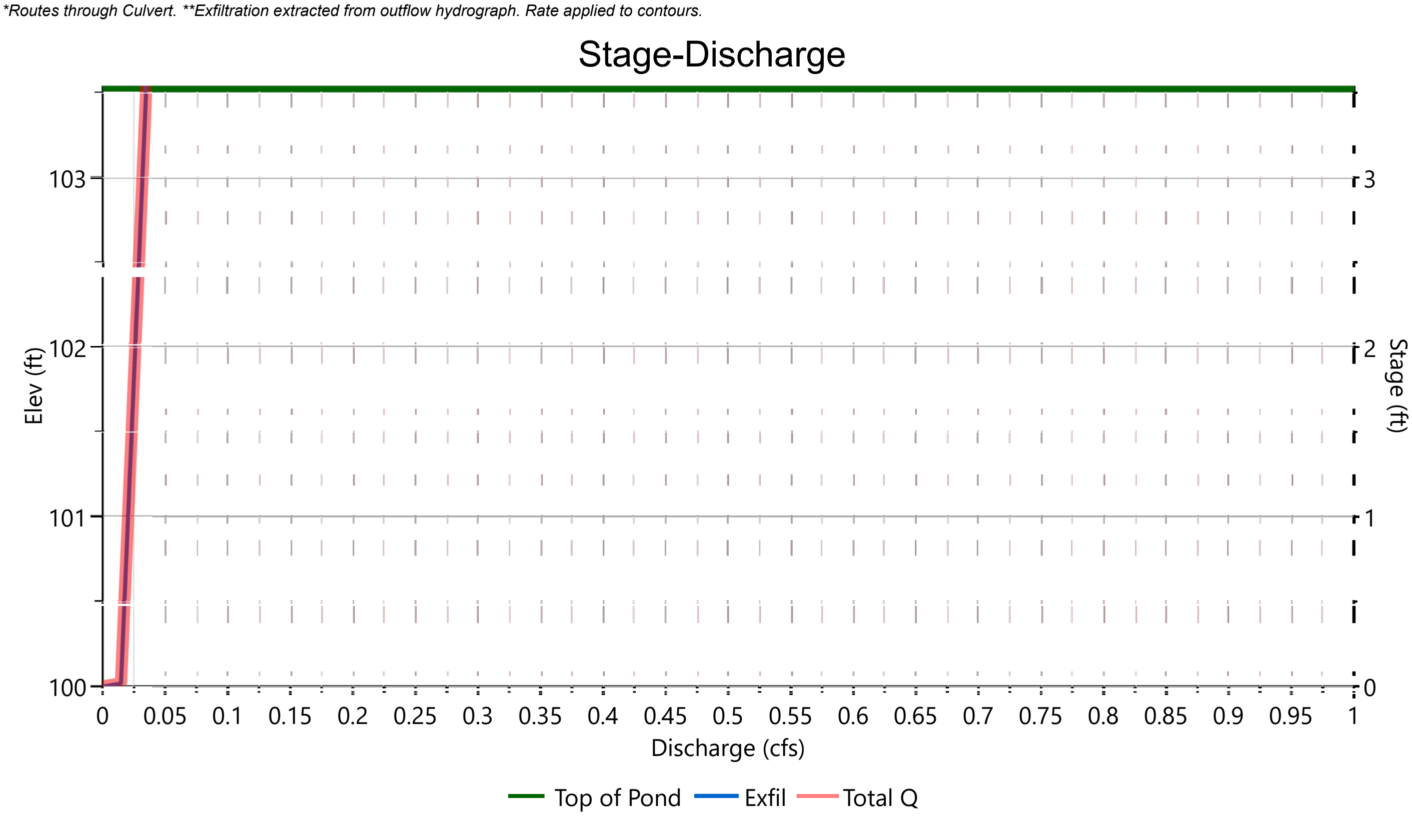


Roof Drywell Type A (Loamy Sand)

Stage-Discharge

Culvert / Orifices	Culvert	Orifices			Perforated Riser	
		1	2	3		
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**			**Ancillary**	
		1	2	3		
Shape / Type					Exfiltration, in/hr	2.41**
Crest Elevation, ft						
Crest Length, ft						
Angle, deg						
Weir Coefficient, Cw						

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



Roof Drywell Type A (Loamy Sand)

Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
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

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Pond Report

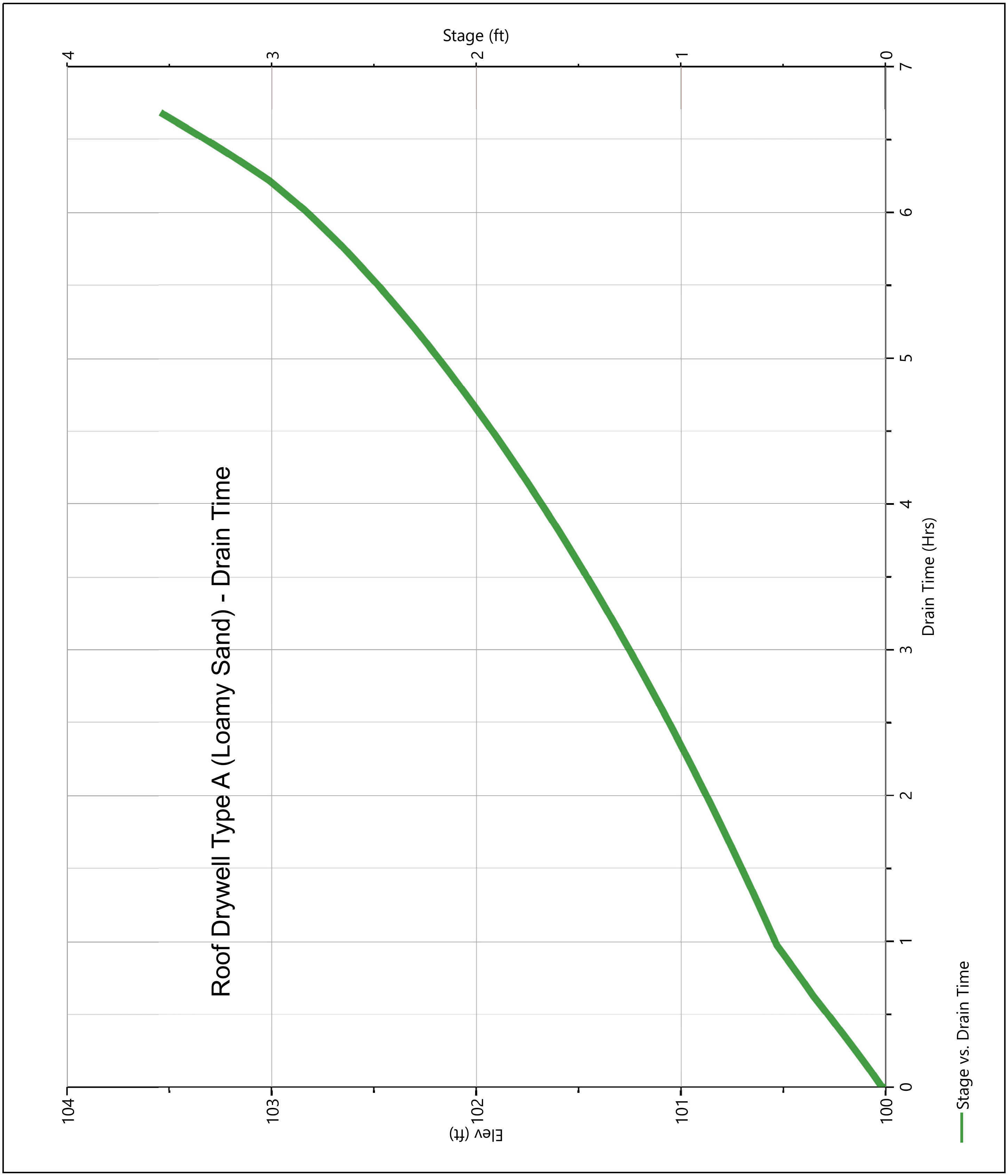
Project Name:

Hydrology Studio v 3.0.0.27

06-17-2023

Roof Drywell Type A (Loamy Sand)

Pond Drawdown



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.27

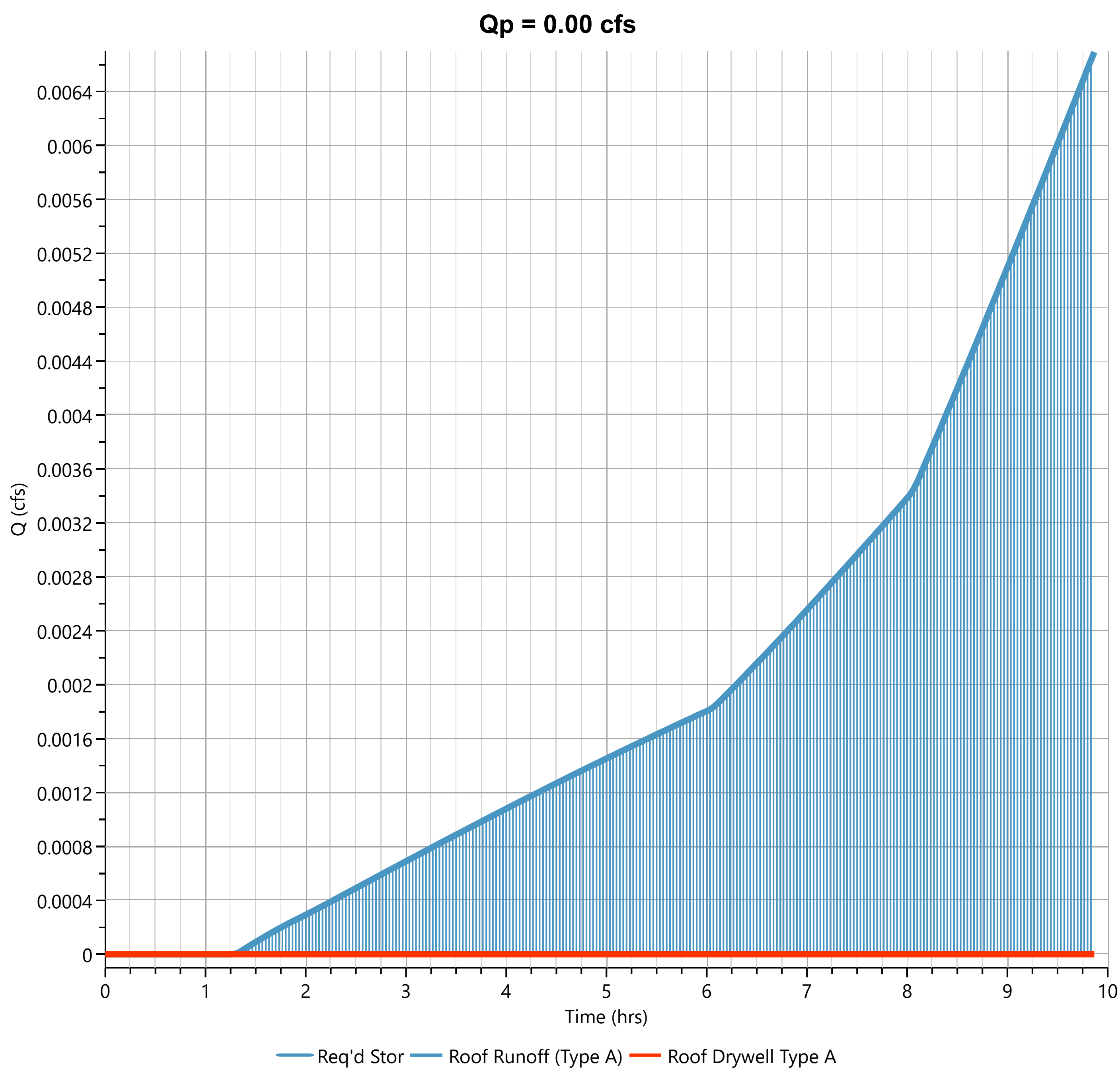
06-17-2023

Roof Drywell Type A

Hyd. No. 63

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

Pond Routing by Storage Indication Method



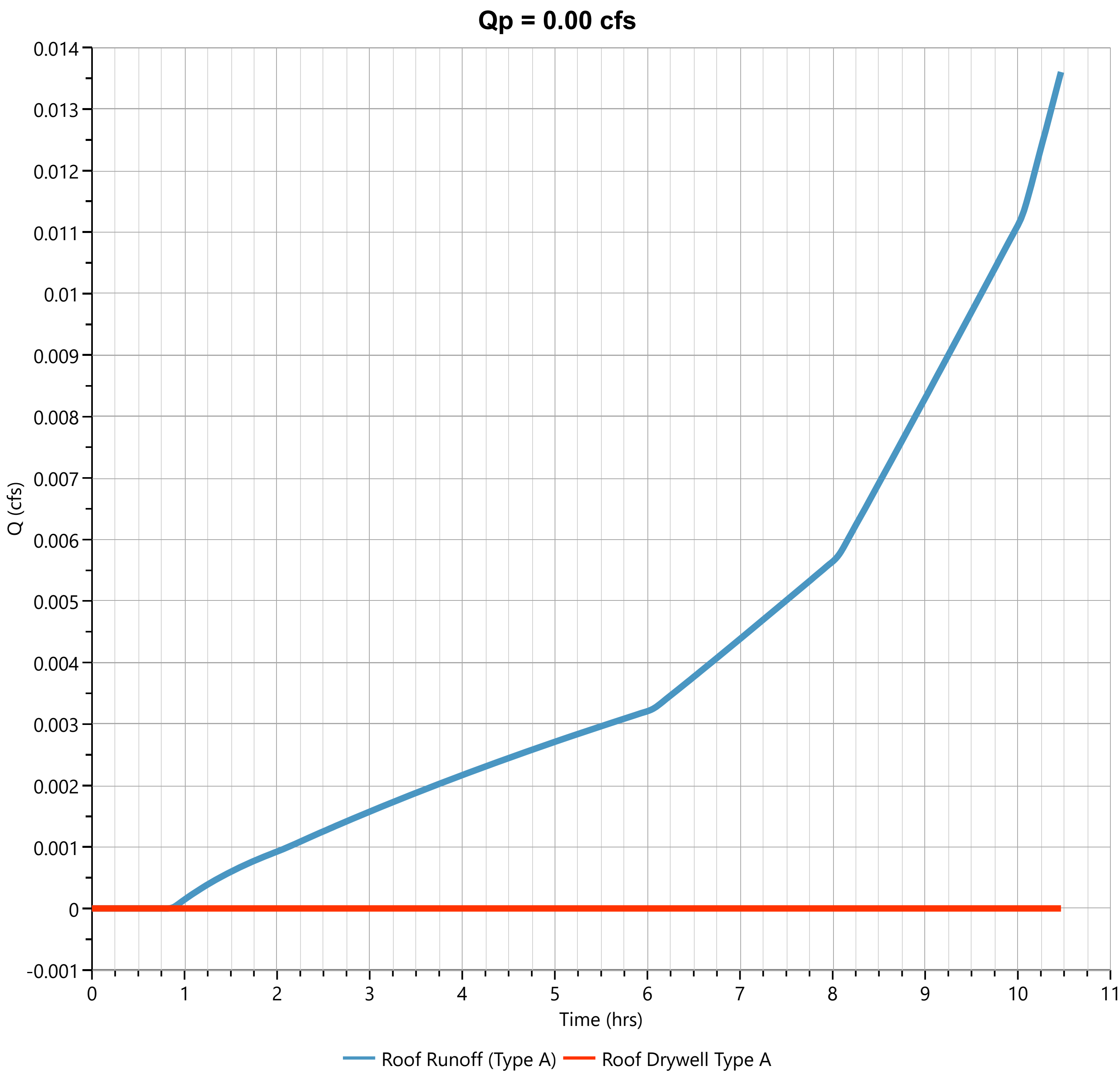
Roof Drywell Type A

Hyd. No. 63

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

Pond Routing by Storage Indication Method

Center of mass detention time = 2.77 hrs



Hydrograph Report

Project Name:

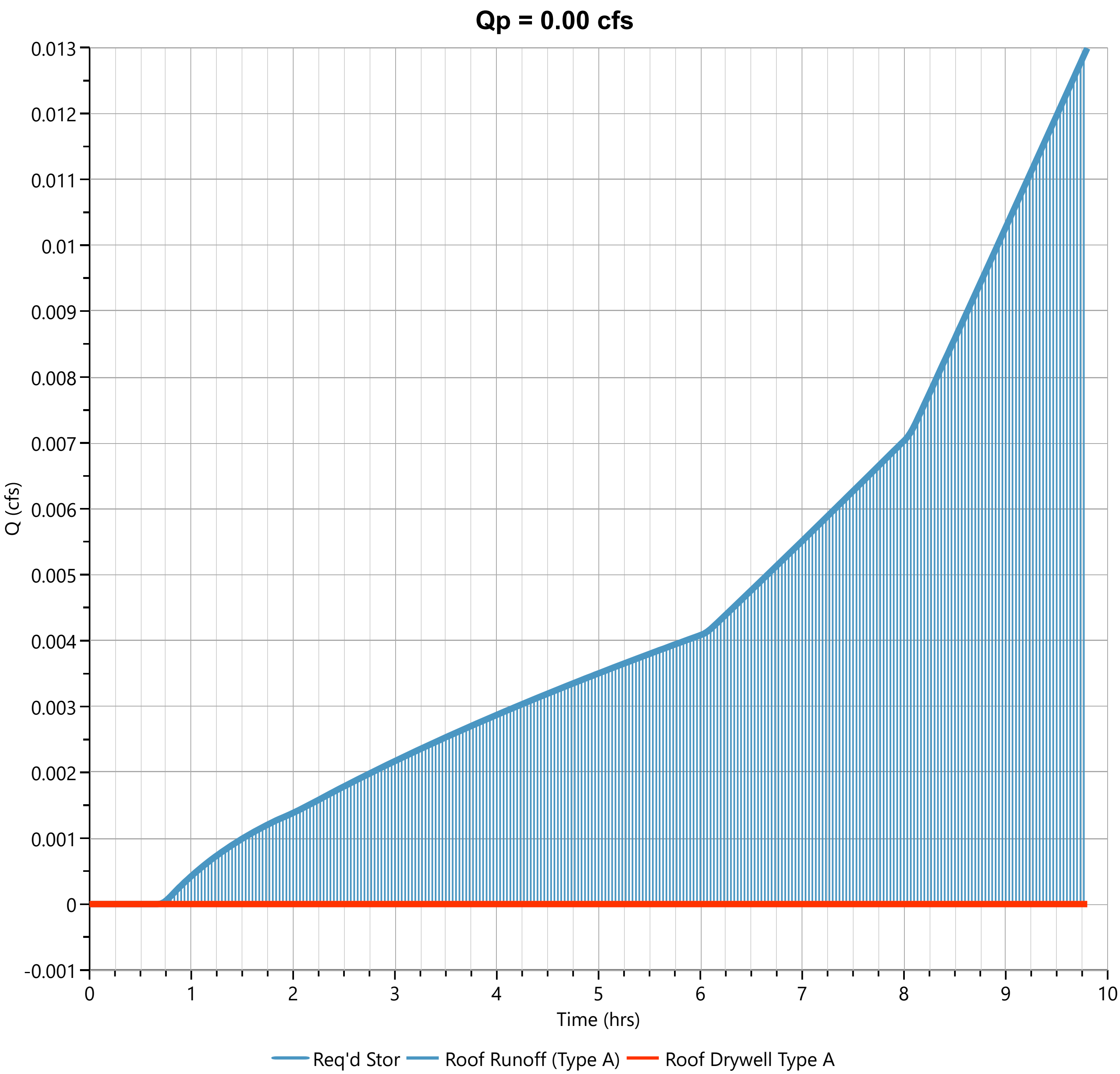
Hydrology Studio v 3.0.0.27 | 06-17-2023

Roof Drywell Type A

Hyd. No. 63

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

Pond Routing by Storage Indication Method

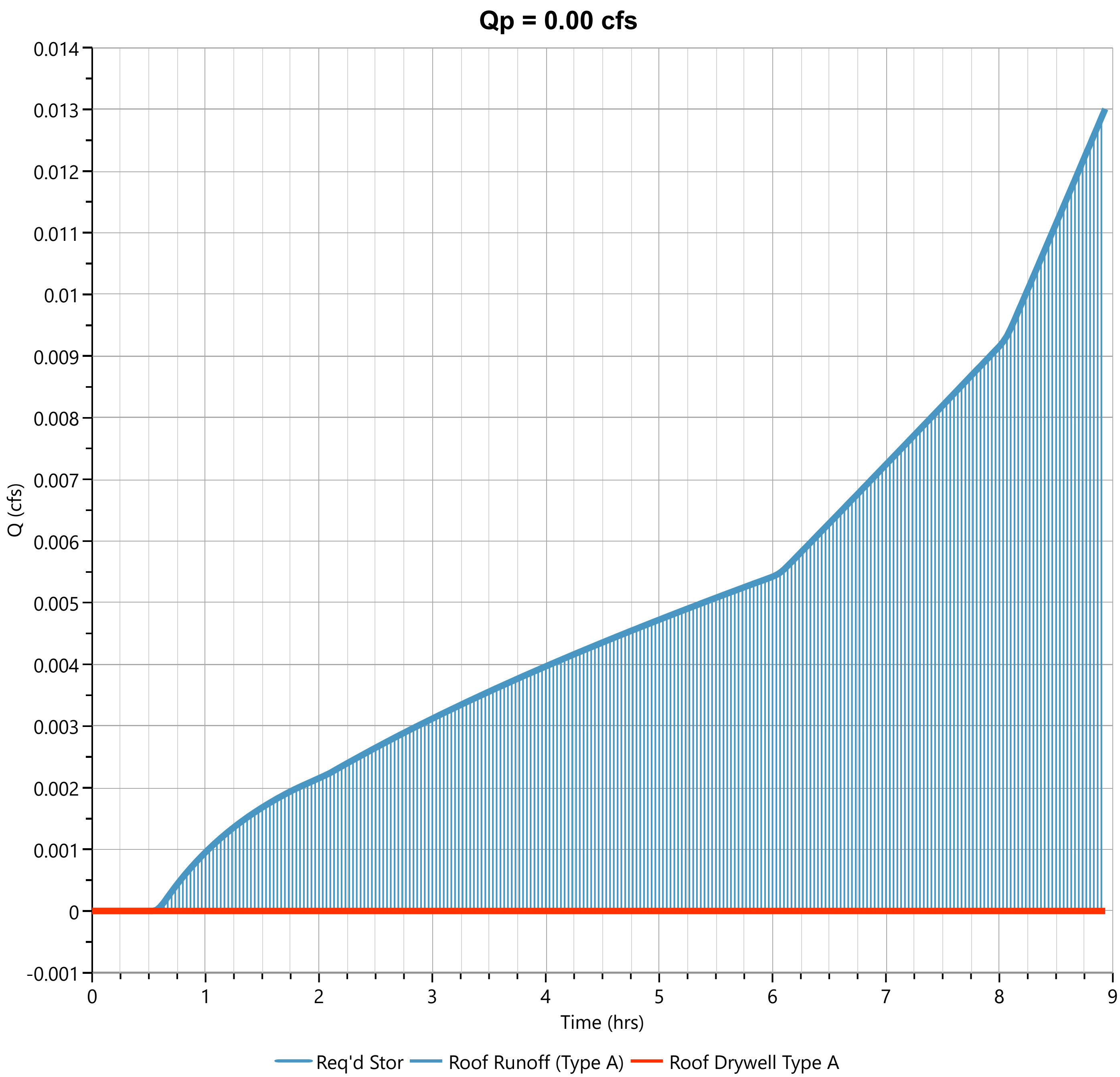


Roof Drywell Type A

Hyd. No. 63

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

Pond Routing by Storage Indication Method



Hydrograph Report

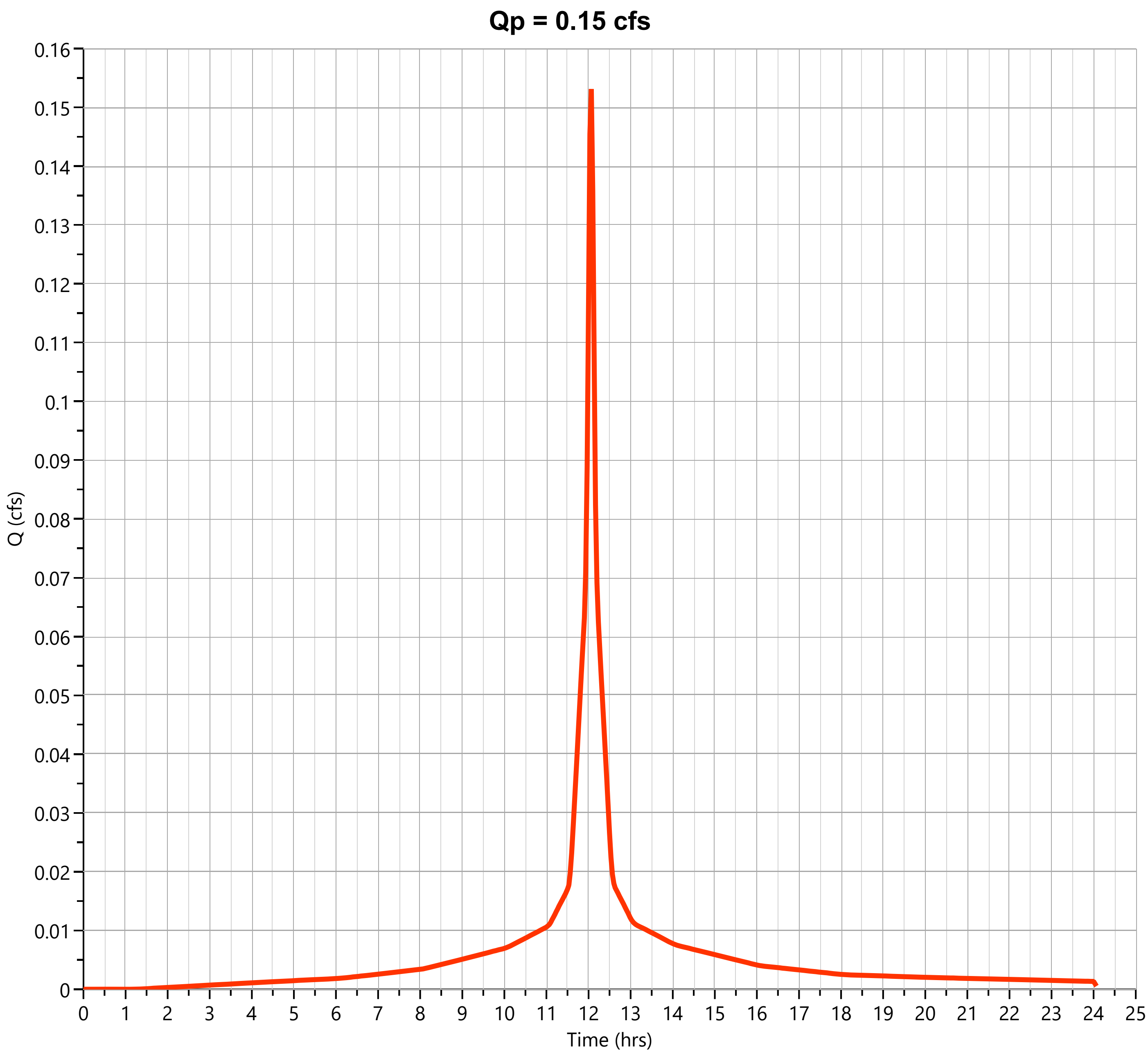
Project Name:

Hydrology Studio v 3.0.0.27 | 06-17-2023

Roof Runoff (Type B)

Hyd. No. 65

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



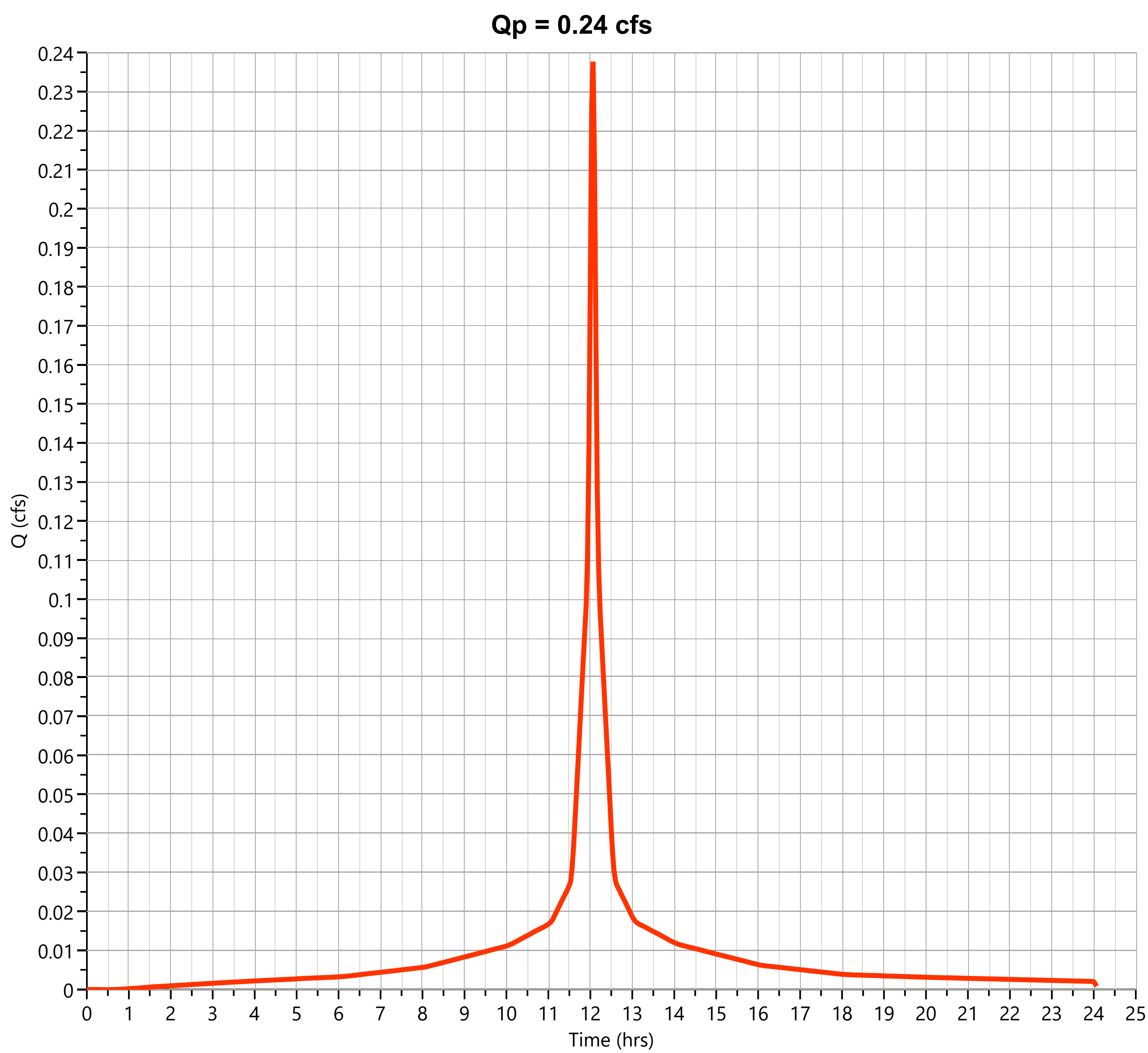
Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.27 06-17-2023

Roof Runoff (Type B) Hyd. No. 65

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

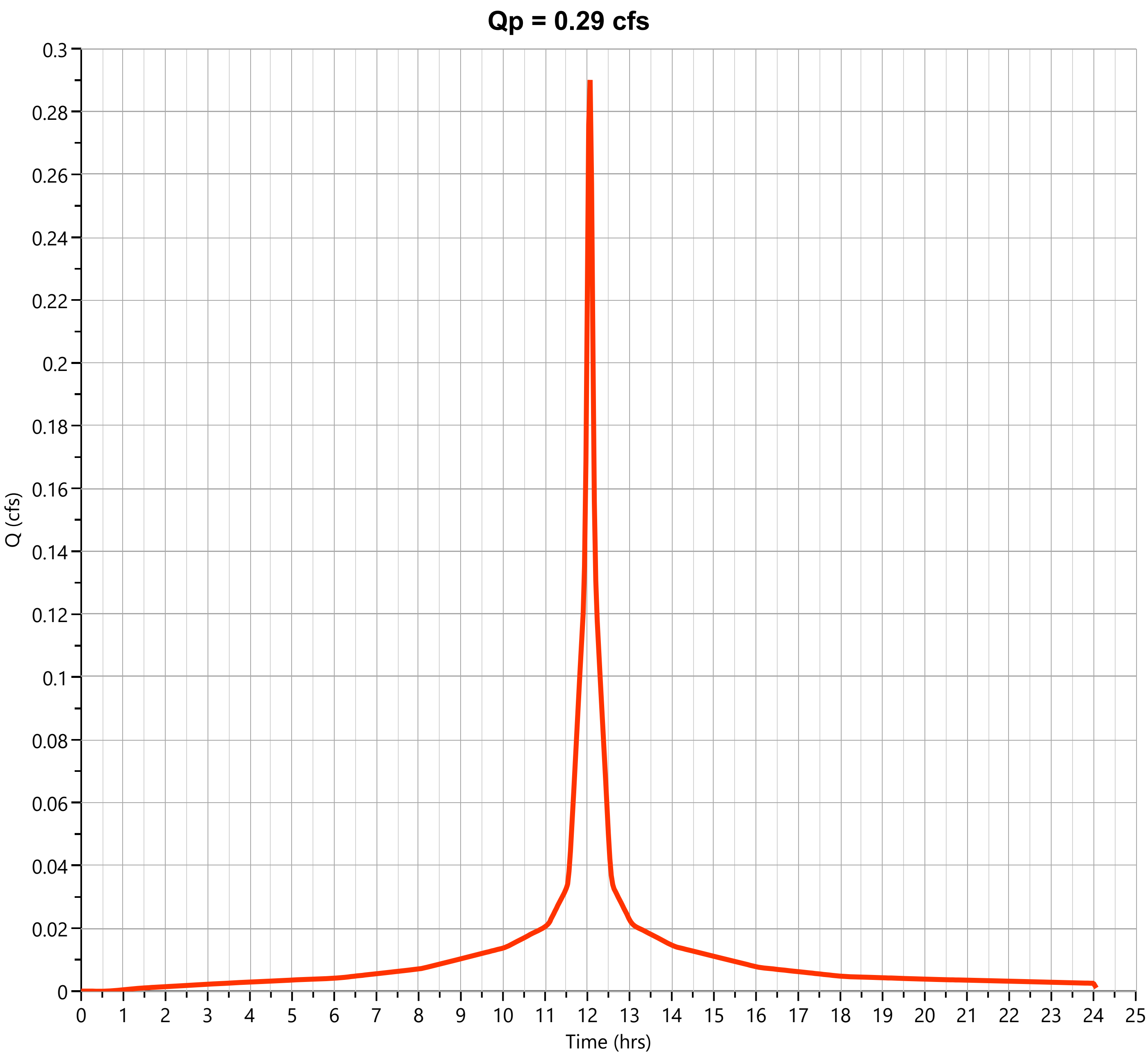


Hydrograph Report

Roof Runoff (Type B)

Hyd. No. 65

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

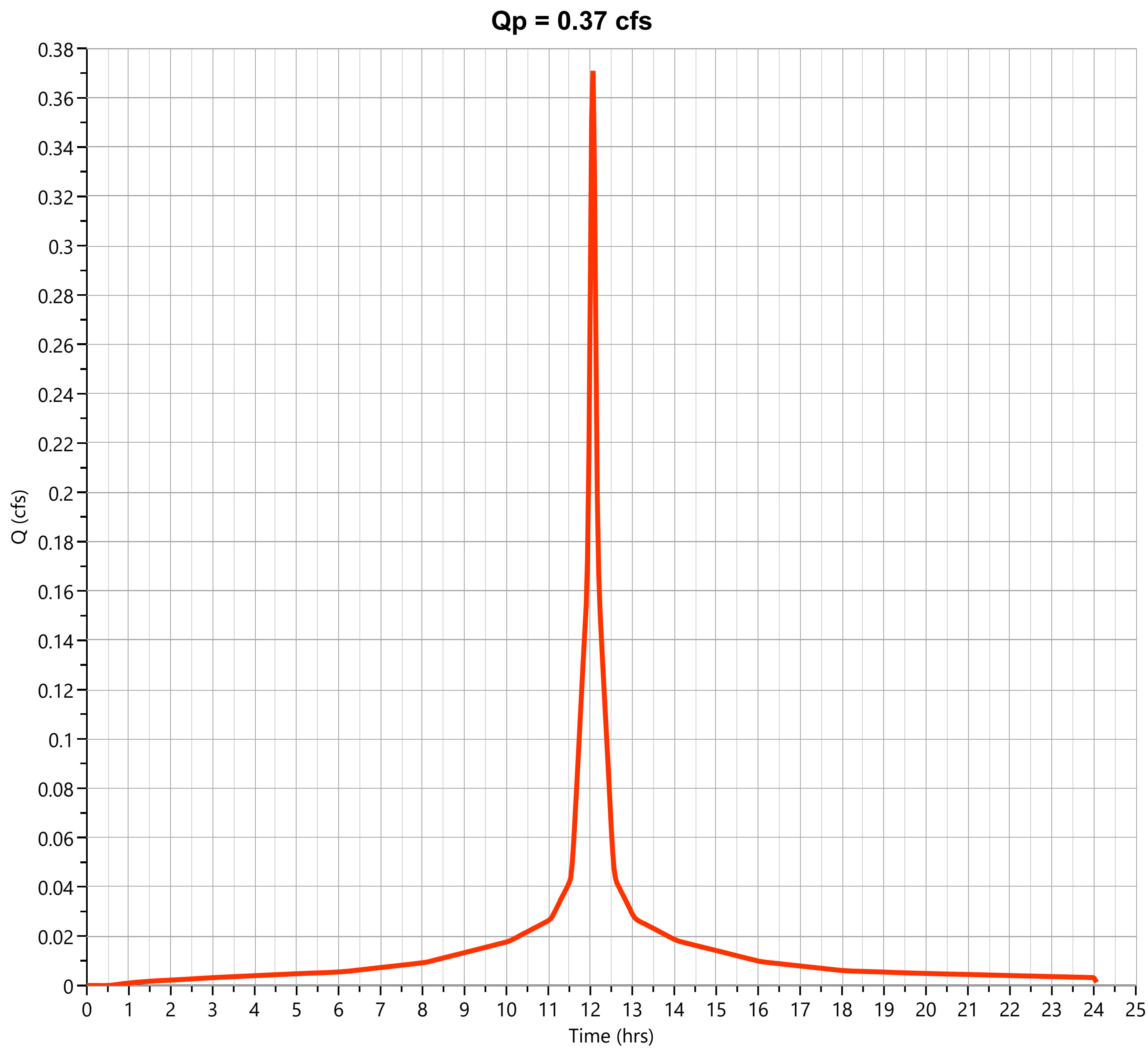


Hydrograph Report

Roof Runoff (Type B)

Hyd. No. 65

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



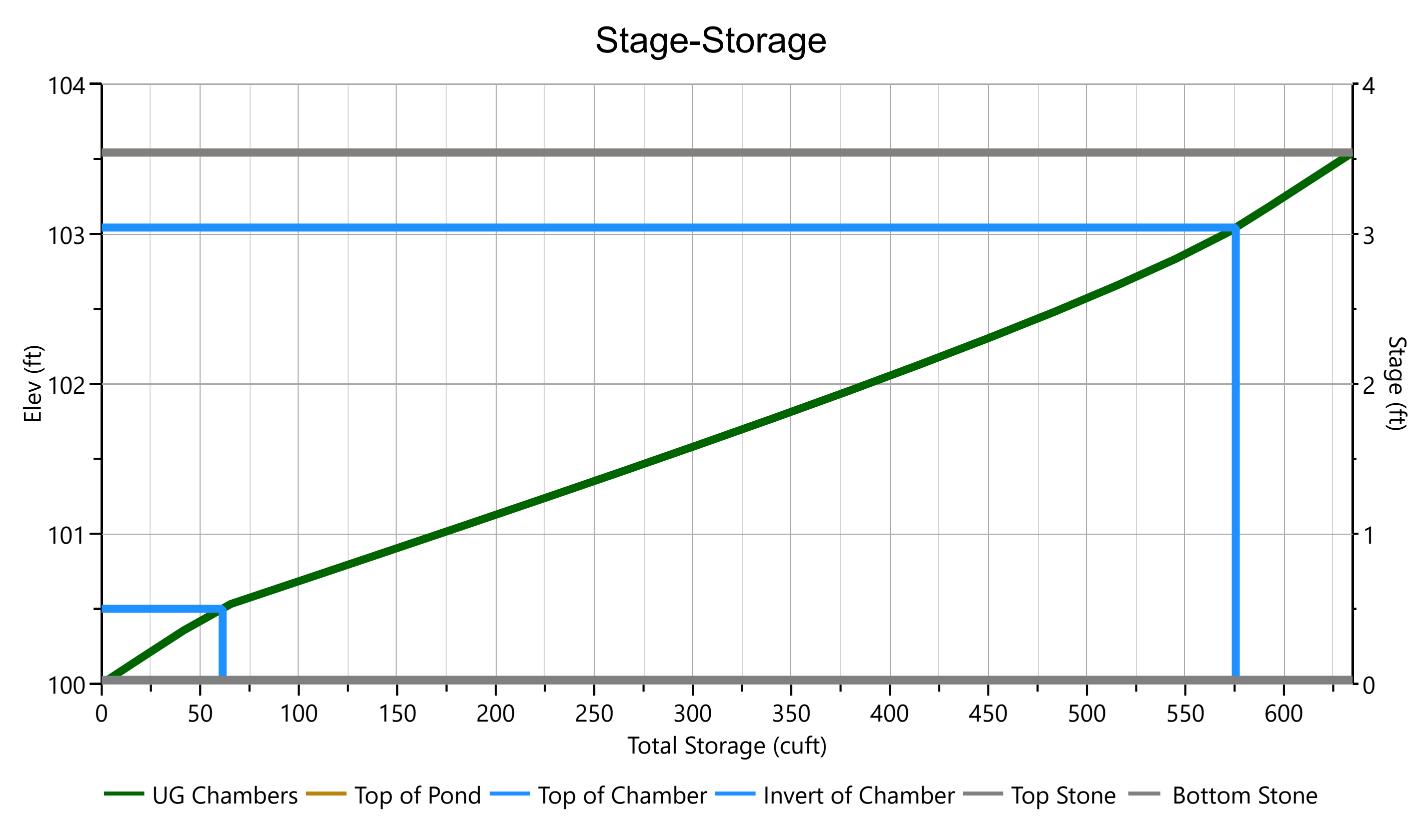
Roof Drywell Type B (Sandy Loam)

Stage-Storage

Cultec Recharger® 330XLHD Chamber	
Description	**Input**
Chamber Height, in	30.5
Chamber Shape	Arch
Chamber Width, in	52
Installed Length, ft	7.00
No. Chambers	7
Bare Chamber Stor, cuft	365
No. Rows	3
Space Between Rows, in	6
Stone Above, in	6
Stone Below, in	6
Stone Sides, in	12
Stone Ends, in	12
Encasement Voids, %	40.00
Encasement Bottom Elevation, ft	100.00

Stage / Storage Table

Stage (in)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.0	100.00	293	0.000	0.000
2.1	100.18	293	20.8	20.8
4.2	100.35	293	20.8	41.6
6.4	100.53	293	24.0	65.6
8.5	100.71	293	40.2	106
10.6	100.89	293	40.1	146
12.7	101.06	293	39.9	186
14.9	101.24	293	39.6	225
17.0	101.42	293	39.1	264
19.1	101.59	293	38.6	303
21.2	101.77	293	38.0	341
23.4	101.95	293	37.2	378
25.5	102.13	293	36.3	414
27.6	102.30	293	35.1	450
29.7	102.48	293	33.8	483
31.9	102.66	293	32.1	515
34.0	102.83	293	29.9	545
36.1	103.01	293	26.5	572
38.2	103.19	293	21.5	593
40.4	103.36	293	20.8	614
42.5	103.54	293	20.8	635

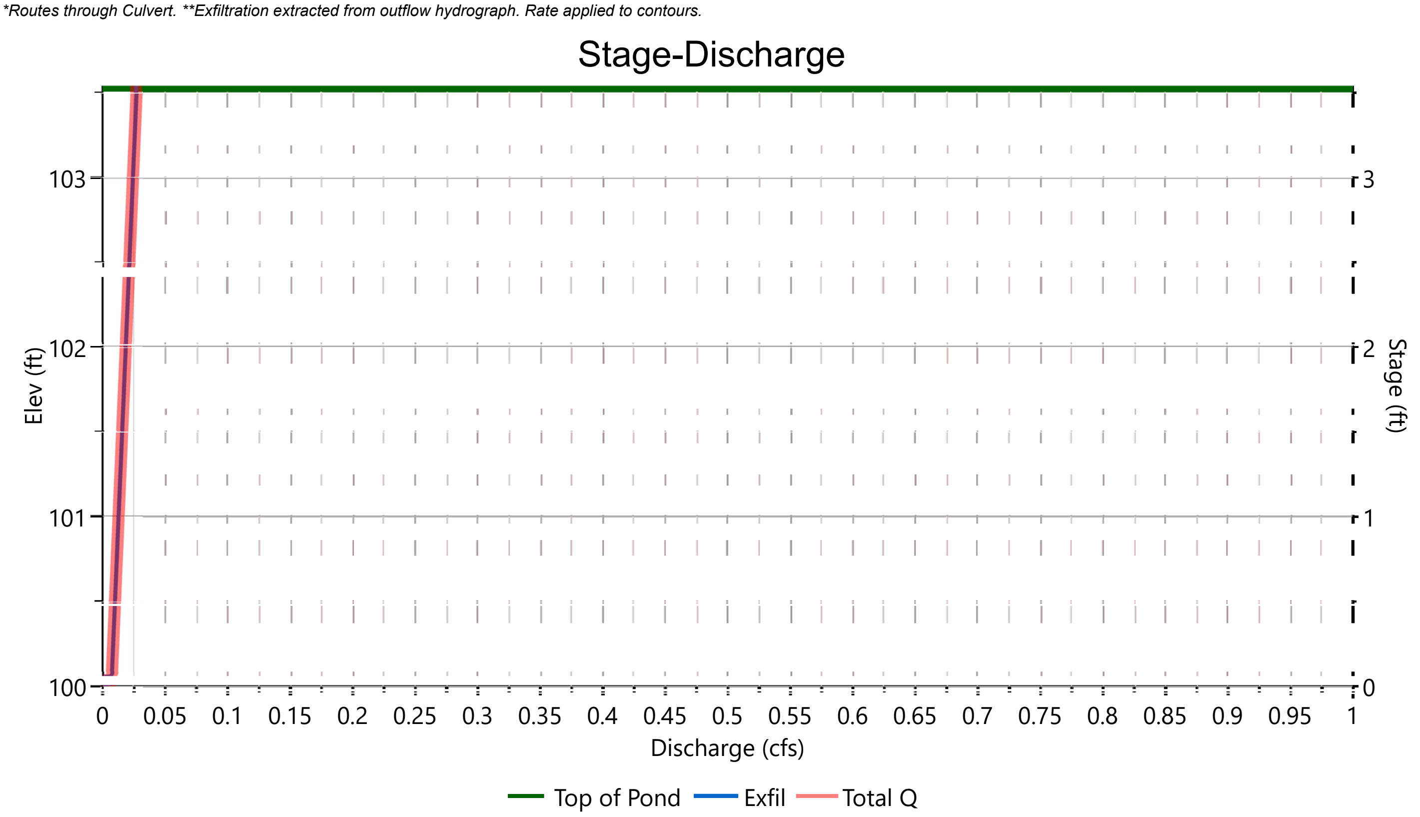


Roof Drywell Type B (Sandy Loam)

Stage-Discharge

Culvert / Orifices	Culvert	Orifices 1	Orifices 2	Orifices 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 1**	**Weirs 2**	**Weirs 3**	**Ancillary**	
Shape / Type					Exfiltration, in/hr	1.02**
Crest Elevation, ft						
Crest Length, ft						
Angle, deg						
Weir Coefficient, Cw						

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



Roof Drywell Type B (Sandy Loam)

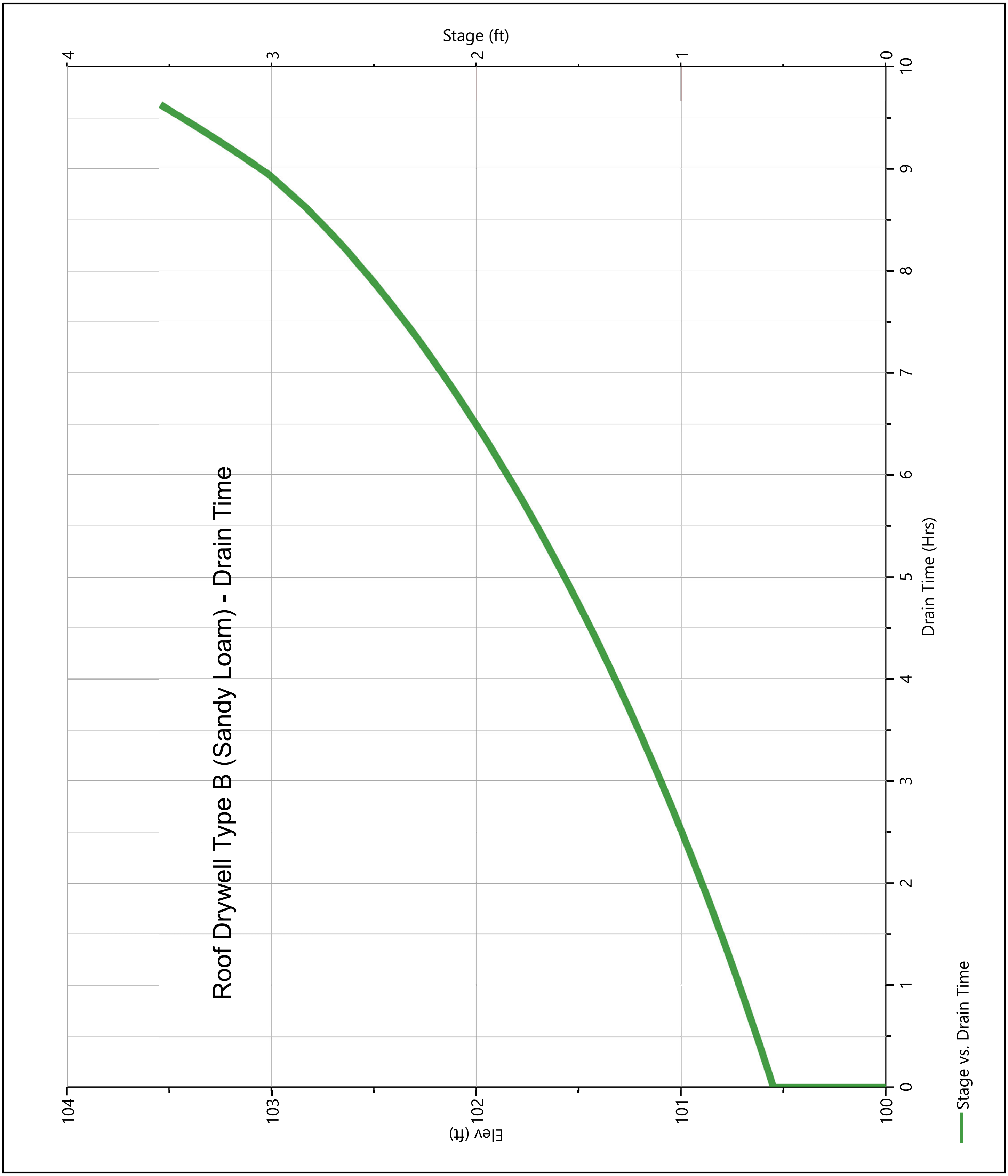
Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
0.00	100.00	0.000										0.000		0.000
0.18	100.18	20.8										0.008		0.008
0.35	100.35	41.6										0.009		0.009
0.53	100.53	65.6										0.010		0.010
0.71	100.71	106										0.011		0.011
0.89	100.89	146										0.012		0.012
1.06	101.06	186										0.013		0.013
1.24	101.24	225										0.014		0.014
1.42	101.42	264										0.015		0.015
1.59	101.59	303										0.016		0.016
1.77	101.77	341										0.017		0.017
1.95	101.95	378										0.018		0.018
2.12	102.13	414										0.019		0.019
2.30	102.30	450										0.020		0.020
2.48	102.48	483										0.021		0.021
2.66	102.66	515										0.022		0.022
2.83	102.83	545										0.023		0.023
3.01	103.01	572										0.024		0.024
3.19	103.19	593										0.025		0.025
3.36	103.36	614										0.026		0.026
3.54	103.54	635										0.027		0.027

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Roof Drywell Type B (Sandy Loam)

Pond Drawdown



Hydrograph Report

Project Name:

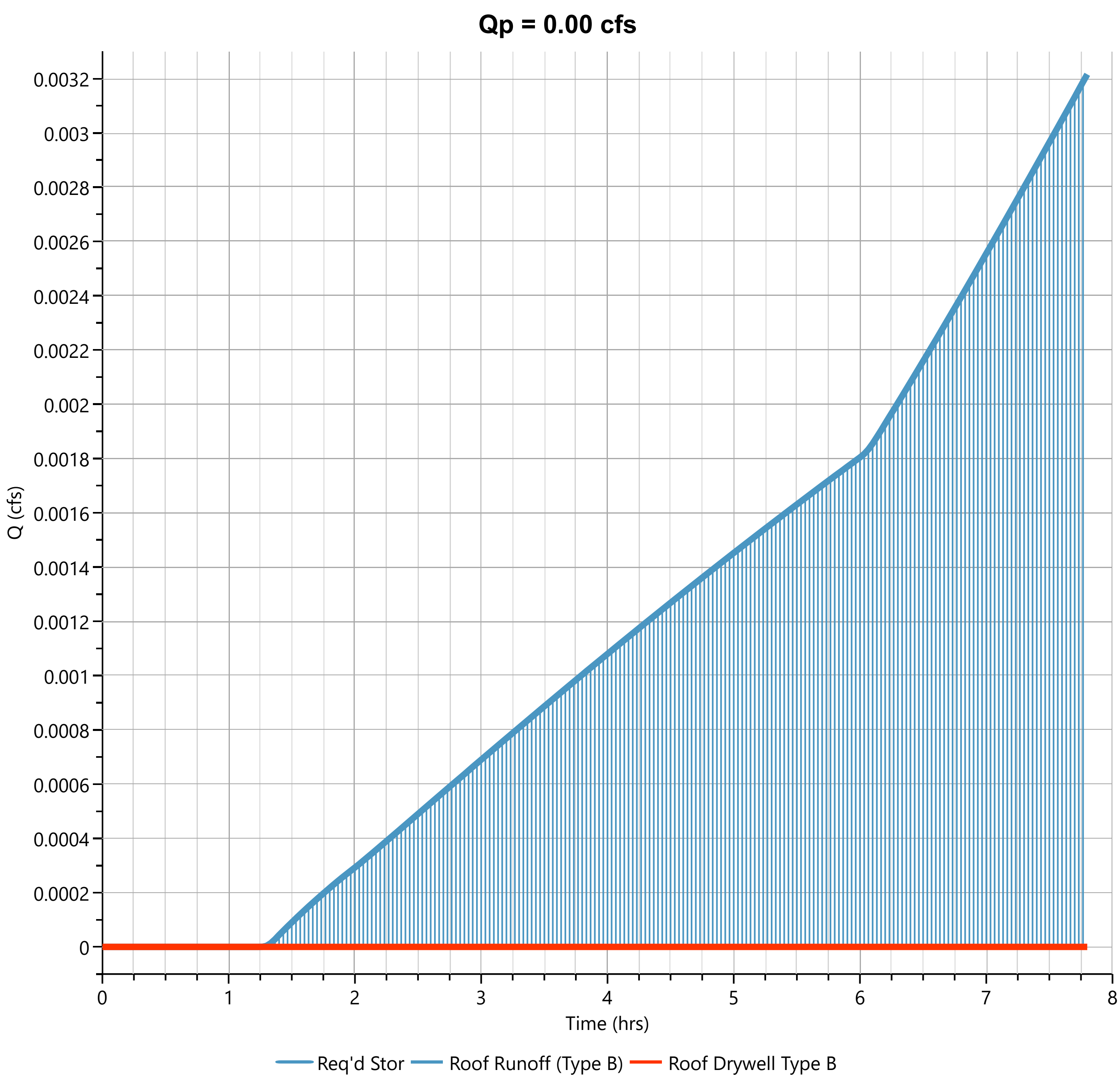
Hydrology Studio v 3.0.0.27 06-17-2023

Roof Drywell Type B

Hyd. No. 66

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

Pond Routing by Storage Indication Method

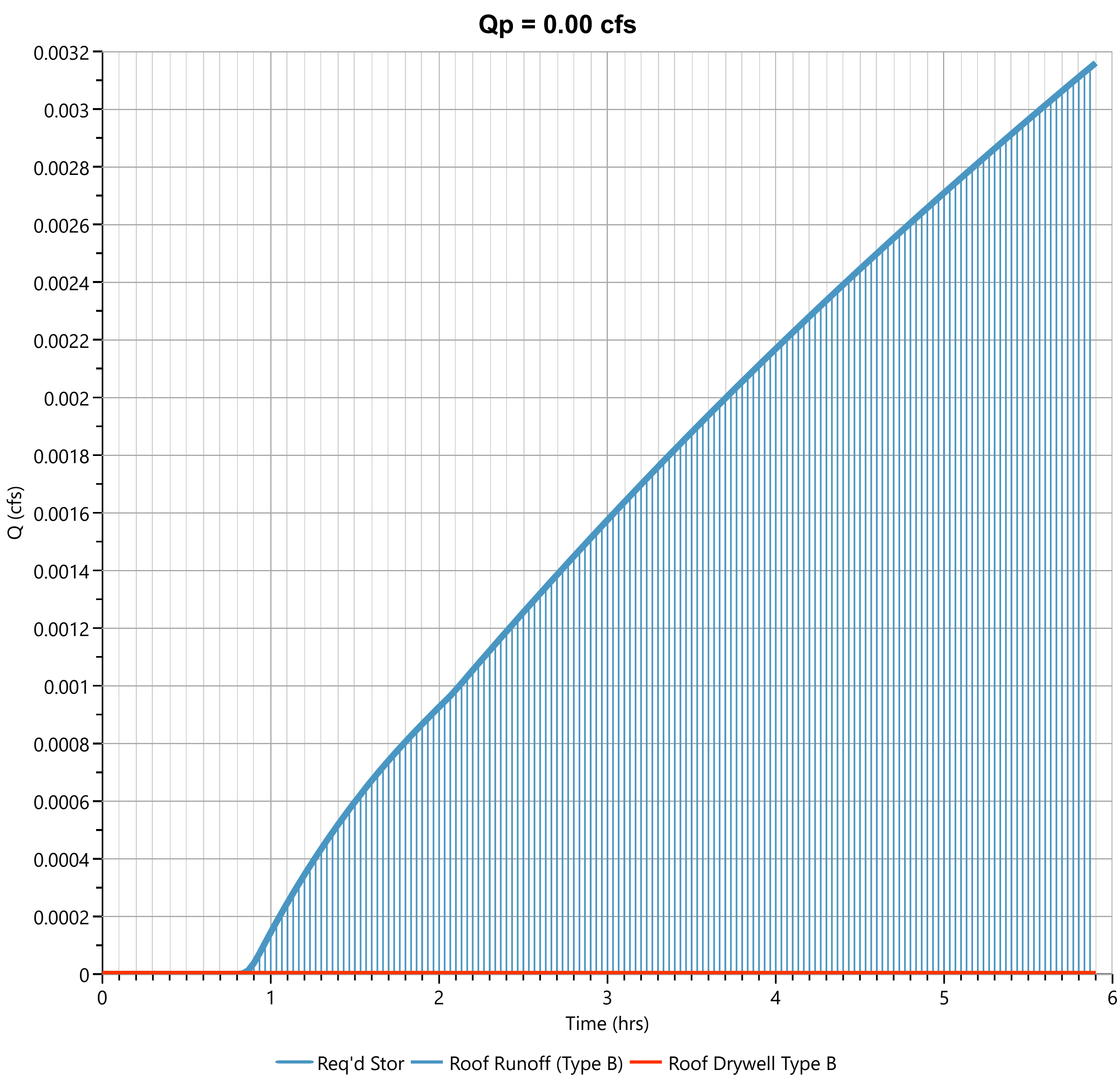


Roof Drywell Type B

Hyd. No. 66

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

Pond Routing by Storage Indication Method

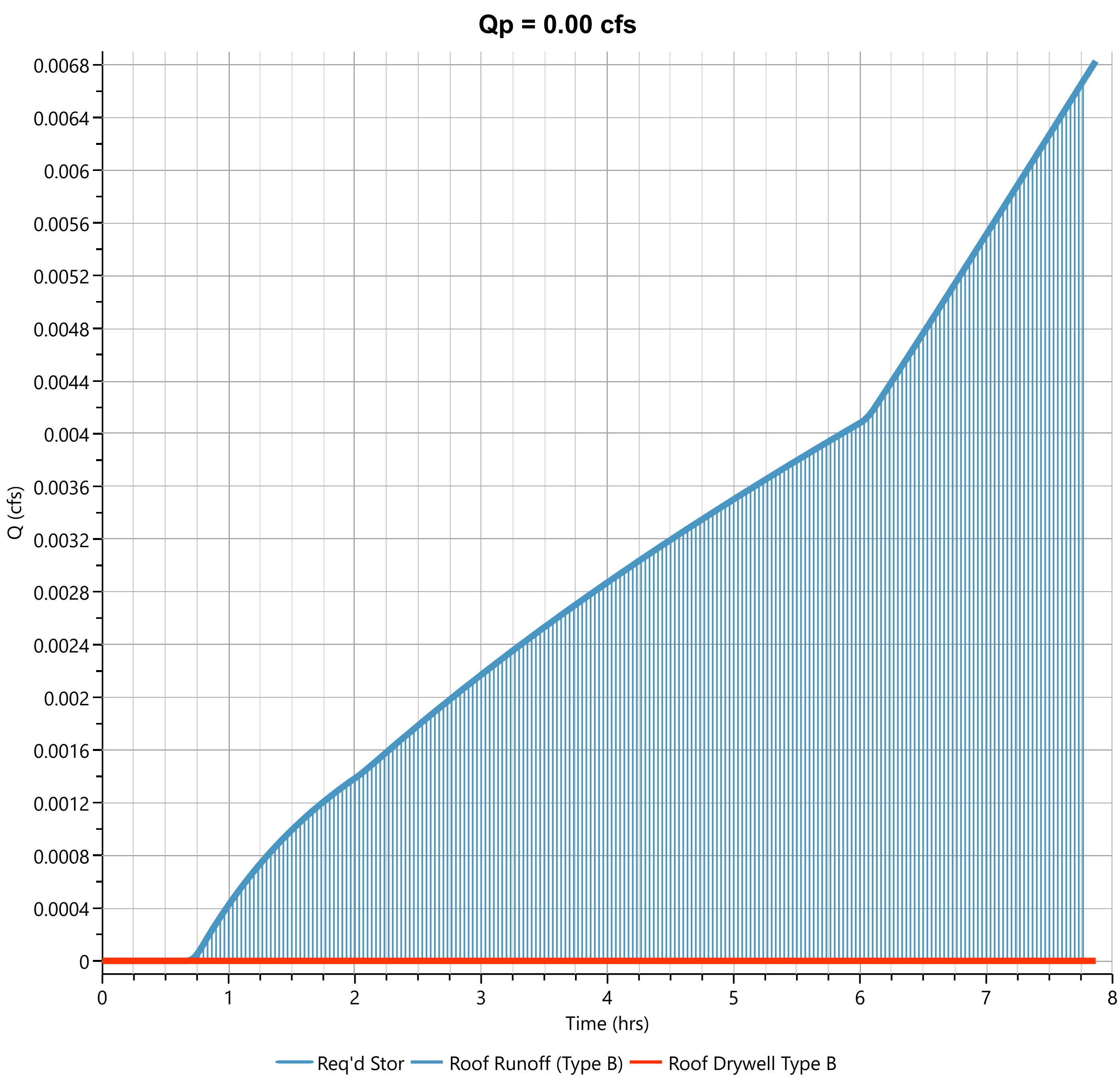


Roof Drywell Type B

Hyd. No. 66

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

Pond Routing by Storage Indication Method



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.27

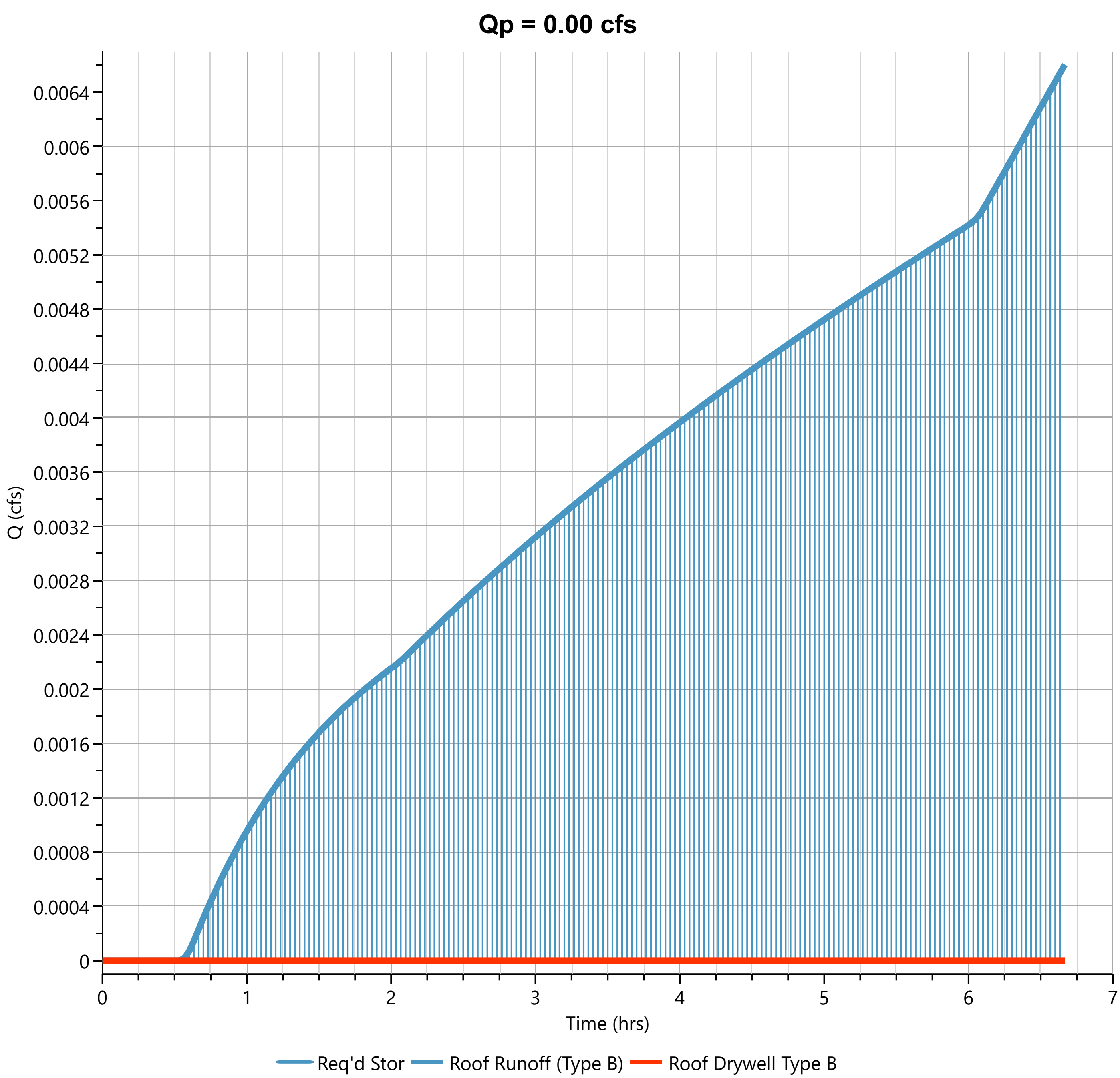
06-17-2023

Roof Drywell Type B

Hyd. No. 66

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

Pond Routing by Storage Indication Method



Recharge Volume Calculations

Recharge Volume Calculations

Job: 3719C

Calculated NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

IB-2A1

Soils:		Merrimac Fine Sandy Loam
Hydrologic Group:		C
Required Recharge Volume		
	0.25	inches of runoff x impervious area
Impervious area:	0.66	acres
	28,538	s.f.

Required Recharge Volume (Rv)

$$Rv = 28{,}538 \text{ s.f. x } \frac{0.25}{12} = \mathbf{595 \text{ c.f.}}$$

Simple Dynamic Method

A=Rv / (D+KT)

Rv=A(D+kT)

D (depth of infiltration facility):	2.85	ft			
K (saturated hydraulic conductivity):	2.41	inches/hour			
	0.20	feet/hour			
T (time):	2	hours			
A=	3,719	s.f.			
Voids=	1.00				
Rv=	12,093	c.f.		>	595 c.f.
Basin Volume:	13,891	c.f.	(Below Outlet)		

72 Hour Drawdown

Rv/(K x Bottom Area)= 18.60 Hours

18.60 < 72 hours O.K.

Recharge Volume Calculations

Job: 3719C

Calculated NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

IB-2A2

Soils:	Merrimac Fine Sandy Loam	
Hydrologic Group:	C	
Required Recharge Volume		
0.25	inches of runoff x impervious area	
Impervious area:	0.47	acres
	20,362	s.f.

Required Recharge Volume (Rv)

Rv = 20,362 s.f. x $\frac{0.25}{12}$ = **424 c.f.**

Simple Dynamic Method

A=Rv / (D+KT)

Rv=A(D+kT)

D (depth of infiltration facility):	2.5	ft				
K (saturated hydraulic conductivity):	2.41	inches/hour				
	0.20	feet/hour				
T (time):	2	hours				
A=	3,902	s.f.				
Voids=	1.00					
Rv=	11,322	c.f.		>	424	c.f.
Basin Volume:	8,246	c.f.	(Below Outlet)			

72 Hour Drawdown

Rv/(K x Bottom Area)= 10.52 Hours

10.52 < 72 hours O.K.

Recharge Volume Calculations

Job: 3719C

Calculated NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

IB-2B-A

Soils:	Merrimac Fine Sandy Loam
Hydrologic Group:	A
Required Recharge Volume	
0.6	inches of runoff x impervious area
Impervious area:	0.81 acres
	35,210 s.f.

Required Recharge Volume (Rv)

Rv = 35,210 s.f. x $\frac{0.6}{12}$ = **1,761 c.f.**

Simple Dynamic Method

A=Rv / (D+KT)

Rv=A(D+kT)

D (depth of infiltration facility):	0.4	ft			
K (saturated hydraulic conductivity):	2.41	inches/hour			
	0.20	feet/hour			
T (time):	2	hours			
A=	8,967	s.f.			
Voids=	1.00				
Rv=	7,189	c.f.		>	1,761 c.f.
Basin Volume:	3,888	c.f.	(Below Outlet)		

72 Hour Drawdown

Rv/(K x Bottom Area)= 2.16 Hours

2.16 < 72 hours O.K.

Recharge Volume Calculations

Job: 3719C

Calculated NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

IB-3A

Soils:		Paxton Fine Sandy Loam
Hydrologic Group:		C
Required Recharge Volume		
	0.25	inches of runoff x impervious area
Impervious area:	0.42	acres
	18,277	s.f.

Required Recharge Volume (Rv)

$$Rv = 18{,}277 \text{ s.f.} \times \frac{0.25}{12} = \mathbf{381 \text{ c.f.}}$$

Simple Dynamic Method

A=Rv / (D+KT)

Rv=A(D+kT)

D (depth of infiltration facility):	0.5	ft				
K (saturated hydraulic conductivity):	1.02	inches/hour				
	0.09	feet/hour				
T (time):	2	hours				
A=	1,532	s.f.				
Voids=	1.00					
Rv=	1,026	c.f.		>	381	c.f.
Basin Volume:	894	c.f.	(Below Outlet)			

72 Hour Drawdown

Rv/(K x Bottom Area)=	6.87	Hours
	6.87	**< 72 hours O.K.**

Recharge Volume Calculations

Job: 3719C

Calculated NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

IB-4A

Soils:		Paxton Fine Sandy Loam
Hydrologic Group:		C
Required Recharge Volume		
	0.25	inches of runoff x impervious area
Impervious area:	0.27	acres
	11,863	s.f.

Required Recharge Volume (Rv)

$$Rv = 11{,}863 \text{ s.f.} \times \frac{0.25}{12} = \mathbf{247\ c.f.}$$

Simple Dynamic Method
A=Rv / (D+KT)
Rv=A(D+kT)

D (depth of infiltration facility):	0.5	ft			
K (saturated hydraulic conductivity):	2.41	inches/hour			
	0.20	feet/hour			
T (time):	2	hours			
A=	2,195	s.f.			
Voids=	1.00				
Rv=	1,979	c.f.		>	247 c.f.
Basin Volume:	1,270	c.f.	(Below Outlet)		

72 Hour Drawdown

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

Recharge Volume Calculations

Job: 3719C

Calculated NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

IB-5B

Soils:		Paxton Fine Sandy Loam				
Hydrologic Group:		C				
Required Recharge Volume						
	0.25	inches of runoff x impervious area				
Impervious area:	0.50	acres				
	21,969	s.f.				

Required Recharge Volume (Rv)

Rv = 21,969 s.f. x $\frac{0.25}{12}$ = **458** **c.f.**

Simple Dynamic Method

A=Rv / (D+KT)

Rv=A(D+kT)

D (depth of infiltration facility):	1	ft			
K (saturated hydraulic conductivity):	2.41	inches/hour			
	0.20	feet/hour			
T (time):	2	hours			
A=	2,245	s.f.			
Voids=	1.00				
Rv=	3,147	c.f.		>	458 c.f.
Basin Volume:	2,556	c.f.	(Below Outlet)		

72 Hour Drawdown

Rv/(K x Bottom Area)= 5.67 Hours

5.67 < 72 hours O.K.

Recharge Volume Calculations

Job: 3719C

Calculated NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

IB-5C

Soils:	Paxton Fine Sandy Loam	
Hydrologic Group:	C	
Required Recharge Volume		
0.25	inches of runoff x impervious area	
Impervious area:	0.61	acres
	26,675	s.f.

Required Recharge Volume (Rv)

$$Rv = 26{,}675 \text{ s.f.} \times \frac{0.25}{12} = \mathbf{556} \text{ c.f.}$$

Simple Dynamic Method

A=Rv / (D+KT)

Rv=A(D+kT)

D (depth of infiltration facility):	2.7	ft				
K (saturated hydraulic conductivity):	2.41	inches/hour				
	0.20	feet/hour				
T (time):	2	hours				
A=	2,250	s.f.				
Voids=	1.00					
Rv=	6,979	c.f.		>	556	c.f.
Basin Volume:	10,534	c.f.	(Below Outlet)			

72 Hour Drawdown

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

Recharge Volume Calculations

Job: 3719C

Calculated NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

IB-5D

Soils:	Windsor Loamy Sand	
Hydrologic Group:	C	
Required Recharge Volume		
0.25	inches of runoff x impervious area	
Impervious area:	1.05	acres
	45,838	s.f.

Required Recharge Volume (Rv)

$$Rv = 45{,}838 \text{ s.f.} \times \frac{0.25}{12} = \mathbf{955 \text{ c.f.}}$$

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.		>	955 c.f.
Basin Volume:	8,291	c.f.	(Below Outlet)		

72 Hour Drawdown

Rv/(K x Bottom Area)= 34.45 Hours

34.45 < 72 hours O.K.

Recharge Volume Calculations

Job: 3719C

Calculated NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

IB-6B

Soils:	Merrimac Fine Sandy Loam
Hydrologic Group:	A
Required Recharge Volume	
0.6	inches of runoff x impervious area
Impervious area:	0.21 acres
	9,208 s.f.

Required Recharge Volume (Rv)

$$Rv = 9{,}208 \text{ s.f.} \times \frac{0.6}{12} = \mathbf{460 \text{ c.f.}}$$

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=	572 s.f.			
Voids=	1.00			
Rv=	2,504 c.f.		>	460 c.f.
Basin Volume:	2,502 c.f.	(Below Outlet)		

72 Hour Drawdown

Rv/(K x Bottom Area)= 6.35 Hours

6.35 < 72 hours O.K.

Recharge Volume Calculations

Job: 3719C

Calculated NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

IB-7A

Soils:		Merrimac Fine Sandy Loam
Hydrologic Group:		A
Required Recharge Volume		
	0.6	inches of runoff x impervious area
Impervious area:	1.47	acres
	64,127	s.f.

Required Recharge Volume (Rv)

$$Rv = 64{,}127 \text{ s.f.} \times \frac{0.6}{12} = \mathbf{3{,}206 \text{ c.f.}}$$

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

72 Hour Drawdown

Rv/(K x Bottom Area)= 7.29 Hours

7.29 < 72 hours O.K.

Recharge Volume Calculations

Job: 3719C

Calculated NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

IB-7B

Soils:		Merrimac Fine Sandy Loam
Hydrologic Group:		A
Required Recharge Volume		
	0.6	inches of runoff x impervious area
Impervious area:	0.61	acres
	26,719	s.f.

Required Recharge Volume (Rv)

$$Rv = 26{,}719 \text{ s.f.} \times \frac{0.6}{12} = \mathbf{1{,}336 \text{ c.f.}}$$

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=	2,619	s.f.				
Voids=	1.00					
Rv=	10,157	c.f.		>	1,336	c.f.
Basin Volume:	9,268	c.f.	(Below Outlet)			

72 Hour Drawdown

Rv/(K x Bottom Area)=	5.13	Hours
5.13	**< 72 hours O.K.**	

Recharge Volume Calculations

Job: 3719C

Calculated NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

IB-8

Soils:	Merrimac Fine Sandy Loam
Hydrologic Group:	C
Required Recharge Volume	
0.6	inches of runoff x impervious area
Impervious area:	2.06 acres
	89,744 s.f.

Required Recharge Volume (Rv)

Rv = 89,744 s.f. x $\frac{0.6}{12}$ = **4,487 c.f.**

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.		>	4,487 c.f.
Basin Volume:	37,954	c.f.	(Below Outlet)		

72 Hour Drawdown

Rv/(K x Bottom Area)= 8.83 Hours

8.83 < 72 hours O.K.

Recharge Volume Calculations

Job: 3719C

Calculated NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

IB-10B

Soils:		Paxton Fine Sandy Loam
Hydrologic Group:		C
Required Recharge Volume		
	0.25	inches of runoff x impervious area
Impervious area:	1.69	acres
	73,469	s.f.

Required Recharge Volume (Rv)

$$Rv = 73{,}469 \text{ s.f.} \times \frac{0.25}{12} = \mathbf{1{,}531 \text{ c.f.}}$$

Simple Dynamic Method

A=Rv / (D+KT)

Rv=A(D+kT)

D (depth of infiltration facility):	1.75	ft				
K (saturated hydraulic conductivity):	8.27	inches/hour				
	0.69	feet/hour				
T (time):	2	hours				
A=	4,961	s.f.				
Voids=	1.00					
Rv=	15,520	c.f.		>	1,531	c.f.
Basin Volume:	10,890	c.f.	(Below Outlet)			

72 Hour Drawdown

Rv/(K x Bottom Area)=	3.19	Hours
3.19	**< 72 hours O.K.**	

Recharge Volume Calculations

Job: 3719C

Calculated NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

IB-10C

Soils:		Woodbridge Fine Sandy Loam
Hydrologic Group:		C
Required Recharge Volume		
	0.6	inches of runoff x impervious area
Impervious area:	3.38	acres
	147,186	s.f.

Required Recharge Volume (Rv)

$$Rv = 147{,}186 \text{ s.f.} \times \frac{0.6}{12} = \mathbf{7{,}359 \text{ c.f.}}$$

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=	16,659	s.f.			
Voids=	1.00				
Rv=	72,939	c.f.		>	7,359 c.f.
Basin Volume:	64,158	c.f.	(Below Outlet)		

72 Hour Drawdown

Rv/(K x Bottom Area)=	5.59	Hours
5.59	**< 72 hours O.K.**	

Recharge Volume Calculations

Job: 3719C

Calculated NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

Roof Drywell Type A

Soils:	Paxton Fine Sandy Loam
Hydrologic Group:	C
Required Recharge Volume	
0.25	inches of runoff x impervious area

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

Required Recharge Volume (Rv)

$$Rv = 2{,}274 \text{ s.f.} \times \frac{0.25}{12} = \mathbf{47 \text{ c.f.}}$$

Simple Dynamic Method

A=Rv / (D+KT)

Rv=A(D+kT)

D (depth of infiltration facility):	3.54	ft			
K (saturated hydraulic conductivity):	2.41	inches/hour			
	0.20	feet/hour			
T (time):	2	hours			
A=	256	s.f.			
Voids=	0.40				
Rv=	465	c.f.		>	47 c.f.
Drywell Volume:	551	c.f.	(Below Outlet)		

72 Hour Drawdown

Rv/(K x Bottom Area)=	10.72	Hours
10.72	**< 72 hours O.K.**	

Recharge Volume Calculations

Job: 3719C

Calculated NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

Roof Drywell Type B

Soils:		Paxton Fine Sandy Loam
Hydrologic Group:		C
Required Recharge Volume		
	0.25	inches of runoff x impervious area
Impervious area:	0.05	acres
	2,274	s.f.

Required Recharge Volume (Rv)

$$Rv = 2,274 \text{ s.f.} \times \frac{0.25}{12} = \mathbf{47} \text{ c.f.}$$

Simple Dynamic Method

A=Rv / (D+KT)

Rv=A(D+kT)

D (depth of infiltration facility):	3.54	ft				
K (saturated hydraulic conductivity):	1.02	inches/hour				
	0.09	feet/hour				
T (time):	2	hours				
A=	301	s.f.				
Voids=	0.40					
Rv=	477	c.f.		>	47	c.f.
Drywell Volume:	635	c.f.	(Below Outlet)			

72 Hour Drawdown

Rv/(K x Bottom Area)=	24.82	Hours
24.82	**< 72 hours O.K.**	

Required Recharge Volume

Job: **SM-3719C**

Calculated by: NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

Required Recharge Volume

Soils: Sand
Hydrologic Group: A
Required Recharge Volume
1 inches of runoff x impervious area
Total Impervious Area: 17.37 acres
756,673 s.f.

1.) Required Recharge Volume (Rv)

$$Rv = 756{,}673 \text{ s.f.} \times \frac{1}{12} = \mathbf{63{,}056 \text{ c.f.}}$$

= **63,056 c.f.**

Impervious Area draining to recharge faciliti = **662,391 s.f.**

$$\frac{756{,}673}{662{,}391} = \mathbf{1.14}$$

2.) Adjusted Minimum Required Recharge Volume
3.)

$$Rv = 63{,}056 \text{ s.f.} \times 1.14 = \mathbf{72{,}031 \text{ c.f.}}$$

4.)

Recharge Volume Provided

IB-2A1	=	12,093	c.f.	159,610	26.19
IB-2A2	=	11,322	c.f.		
IB-2B-A	=	7,189	c.f.		
IB-3A	=	1,026	c.f.		
IB-4A	=	1,979	c.f.		
IB-5B	=	3,147	c.f.		
IB-5C	=	6,979	c.f.		
IB-5D	=	6,143	c.f.		
IB-6B	=	2,504	c.f.		
IB-7A	=	17,756	c.f.		
IB-7B	=	10,157	c.f.		
IB-8	=	33,545	c.f.		
IB-10B	=	15,520	c.f.		
IB-10C	=	72,939	c.f.		
Drywell A (x17)	=	7,910	c.f.		
Drywell B (x2)	=	955	c.f.		
Total Recharge Volume Provided	=	**211,164**	**c.f.**		

211,164 c.f. ≥ 72,031 c.f. OK

$$= \frac{662{,}391}{756{,}673} = 88\%$$

Total Impervious area
Impervious area being recharged **88% ≥ 65% OK**

Water Quality Volume Calculations

Water Quality Volume Calculations

Job: 3719C

Location: The Cottages at Wandering Pond

Calculated by: NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

IB-2A1

Soils: Merrimac Fine Sandy Loam
Hydrologic Group: C
Required First Flush Volume
0.5 inch of runoff x impervious area

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

Required Water Quality Volume

$$V = 28{,}538 \text{ s.f.} \times \frac{0.5}{12} = \mathbf{1{,}189 \text{ c.f.}}$$

Volume Provided 13,891 c.f. (storage below outlet)

13,891 c.f. > 1,189 c.f. O.K.

Water Quality Volume Calculations

Job: 3719C

Calculated by: NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

Location: The Cottages at Wandering Pond

IB-2A2

Soils: Merrimac Fine Sandy Loam
Hydrologic Group: C
Required First Flush Volume
0.5 inch of runoff x impervious area

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

Required Water Quality Volume

$$V = 20{,}362 \text{ s.f.} \times \frac{0.5}{12} = \mathbf{848 \text{ c.f.}}$$

Volume Provided 8,246 c.f. (storage below outlet)

8,246 c.f. > 848 c.f. O.K.

Water Quality Volume Calculations

Job: 3719C

Calculated by: NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

Location: The Cottages at Wandering Pond

IB-2B-A

Soils: Merrimac Fine Sandy Loam
Hydrologic Group: C
Required First Flush Volume
0.5 inch of runoff x impervious area

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

<u>Required Water Quality Volume</u>

$$V = 35{,}210 \text{ s.f.} \times \frac{0.5}{12} = \mathbf{1{,}467 \text{ c.f.}}$$

Volume Provided 3,888 c.f. (storage below outlet)

3,888	**c.f. >**	**1,467**	**c.f. O.K.**

Water Quality Volume Calculations

Job: 3719C

Calculated by: MKO
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

Location: The Cottages at Wandering Pond

IB-3A

Soils: Paxton Fine Sandy Loam

Hydrologic Group: C

Required First Flush Volume

0.5 inch of runoff x impervious area

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

Required Water Quality Volume

$$V = 18{,}277 \text{ s.f.} \times \frac{0.5}{12} = \mathbf{762 \text{ c.f.}}$$

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

894	**c.f. >**	**762**	**c.f. O.K.**

Water Quality Volume Calculations

Job: 3719C

Location: The Cottages at Wandering Pond

Calculated by: NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

IB-4A

Soils: Paxton Fine Sandy Loam
Hydrologic Group: C
Required First Flush Volume
1 inch of runoff x impervious area

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

Required Water Quality Volume

$$V = 11{,}863 \text{ s.f.} \times \frac{1}{12} = \mathbf{989 \text{ c.f.}}$$

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

1,270 c.f. > 989 c.f. O.K.

Water Quality Volume Calculations

Job: 3719C

Location: The Cottages at Wandering Pond

Calculated by: NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

IB-5B

Soils: Paxton Fine Sandy Loam
Hydrologic Group: C
Required First Flush Volume
1 inch of runoff x impervious area

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

<u>Required Water Quality Volume</u>

$$V = 21{,}969 \text{ s.f.} \times \frac{1}{12} = \mathbf{1{,}831 \text{ c.f.}}$$

Volume Provided 2,556 c.f. (storage below outlet)

2,556 c.f. > 1,831 c.f. O.K.

Water Quality Volume Calculations

Job:	3719C	Calculated by:	NC
		Date:	6/27/2022
Location:	The Cottages at Wandering Pond	Rev:	10/27/2022
			6/17/2023

IB-5C

Soils:	Paxton Fine Sandy Loam
Hydrologic Group:	C
Required First Flush Volume	
	1 inch of runoff x impervious area
Impervious area:	0.61 acres
	26,675 s.f.

Required Water Quality Volume

$$V = 26{,}675 \text{ s.f.} \times \frac{1}{12} = \mathbf{2{,}223 \text{ c.f.}}$$

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

10,534 c.f. > 2,223 c.f. O.K.

Water Quality Volume Calculations

Job:	3719C	Calculated by:	NC
		Date:	6/27/2022
Location:	The Cottages at Wandering Pond	Rev:	10/27/2022
			6/17/2023

IB-5D

Soils:	Windsor Loamy Sand
Hydrologic Group:	C
Required First Flush Volume	
0.5	inch of runoff x impervious area
Impervious area:	1.05 acres
	45,838 s.f.

Required Water Quality Volume

$$V = 45{,}838 \text{ s.f.} \times \frac{0.5}{12} = \mathbf{1{,}910 \text{ c.f.}}$$

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

8,291 c.f. > 1,910 c.f. O.K.

Water Quality Volume Calculations

Job: 3719C

Location: The Cottages at Wandering Pond

Calculated by: NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

IB-6B

Soils:	Merrimac Fine Sandy Loam
Hydrologic Group:	A
Required First Flush Volume	
	1 inch of runoff x impervious area
Impervious area:	0.21 acres
	9,208 s.f.

Required Water Quality Volume

$$V = 9{,}208 \text{ s.f.} \times \frac{1}{12} = \mathbf{767} \textbf{ c.f.}$$

Volume Provided 2,502 c.f.

2,502	**c.f. >**	**767**	**c.f. O.K.**

Water Quality Volume Calculations

Job:	3719C	Calculated by:	NC
		Date:	6/27/2022
Location:	The Cottages at Wandering Pond	Rev:	10/27/2022
			6/17/2023

IB-7A

Soils: Merrimac Fine Sandy Loam
Hydrologic Group: A
Required First Flush Volume
1 inch of runoff x impervious area

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

Required Water Quality Volume

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

Volume Provided 18,663 c.f.

18,663 c.f. > 5,344 c.f. O.K.

Water Quality Volume Calculations

Job: 3719C

Location: The Cottages at Wandering Pond

Calculated by: NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023
2/15/2024

IB-7B

Soils: Merrimac Fine Sandy Loam
Hydrologic Group: A
Required First Flush Volume
1 inch of runoff x impervious area

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

Required Water Quality Volume

V= 26,719 s.f. x $\frac{1}{12}$ = **2,227 c.f.**

Volume Provided 9,268 c.f.

9,268 c.f. > 2,227 c.f. O.K.

Water Quality Volume Calculations

Job: 3719C

Location: The Cottages at Wandering Pond

Calculated by: NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

IB-8

Soils: Merrimac Fine Sandy Loam
Hydrologic Group: C
Required First Flush Volume
1 inch of runoff x impervious area

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

Required Water Quality Volume

$$V = 89{,}744 \text{ s.f.} \times \frac{1}{12} = \mathbf{7{,}479 \text{ c.f.}}$$

Volume Provided 37,954 c.f.

37,954 c.f. > 7,479 c.f. O.K.

Water Quality Volume Calculations

Job:	3719C	Calculated by:	NC
		Date:	6/27/2022
Location:	The Cottages at Wandering Pond	Rev:	10/27/2022
			6/17/2023

Treatment Trench

Soils:	Hinckley Loamy Sand	
Hydrologic Group:	A	
Required First Flush Volume		
	1	inch of runoff x impervious area
Impervious area:	0.05	acres
	1,964	s.f.

Required Water Quality Volume

$$V = 1{,}964 \text{ s.f.} \times \frac{1}{12} = \mathbf{164 \text{ c.f.}}$$

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

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

Water Quality Volume Calculations

Job: 3719C

Location: The Cottages at Wandering Pond

Calculated by: NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

IB-10B

Soils:	Paxton Fine Sandy Loam
Hydrologic Group:	C
Required First Flush Volume	
	1 inch of runoff x impervious area
Impervious area:	1.69 acres
	73,469 s.f.

Required Water Quality Volume

$$V = 73{,}469 \text{ s.f.} \times \frac{1}{12} = \mathbf{6{,}122 \text{ c.f.}}$$

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

10,890 c.f. > 6,122 c.f. O.K.

Water Quality Volume Calculations

Job: 3719C

Calculated by: NC
Date: 6/27/2022
Rev: 10/27/2022
6/17/2023

Location: The Cottages at Wandering Pond

IB-10C

Soils: Woodbridge Fine Sandy Loam
Hydrologic Group: C
Required First Flush Volume
1 inch of runoff x impervious area

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

Required Water Quality Volume

$$V = 147{,}186 \text{ s.f.} \times \frac{1}{12} = \mathbf{12{,}266 \text{ c.f.}}$$

Volume Provided 64,158 c.f. (storage below outlet)

64,158 c.f. > 12,266 c.f. O.K.

Water Quality Volume Calculations

Job: 3719C

Location: The Cottages at Wandering Pond

Calculated by: NC
Date: 6/27/2022
Rev: 6/12/2023
6/17/2023

Roof Drywell Type A

Soils:	Paxton Fine Sandy Loam
Hydrologic Group:	C
Required First Flush Volume	
	1 inch of runoff x impervious area

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

Required Water Quality Volume

$$V = 2{,}274 \text{ s.f.} \times \frac{1}{12} = \mathbf{190 \text{ c.f.}}$$

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

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

Water Quality Volume Calculations

Job: 3719C

Location: The Cottages at Wandering Pond

Calculated by: NC
Date: 6/27/2022
Rev: 6/12/2023
6/17/2023

Roof Drywell Type B

Soils: Paxton Fine Sandy Loam

Hydrologic Group: C

Required First Flush Volume

0.5 inch of runoff x impervious area

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

<u>Required Water Quality Volume</u>

$$V = 2{,}274 \text{ s.f.} \times \frac{0.5}{12} = \mathbf{95 \text{ c.f.}}$$

Volume Provided 635 c.f. (storage below outlet)

635 c.f. > 95 c.f. O.K.

Project: **Cottages at Wandering Pond**
Location: **Stow, MA**
Prepared For: **Stamski & McNary**

CONTECH ENGINEERED SOLUTIONS

Purpose: To calculate the water quality flow rate (WQF) over a given site area. In this situation the WQF is derived from the first 1" of runoff from the contributing impervious surface.

Reference: Massachusetts Dept. of Environmental Protection Wetlands Program / United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual

Procedure: Determine unit peak discharge using Figure 1 or 2. Figure 2 is in tabular form so is preferred. Using the tc, read the unit peak discharge (qu) from Figure 1 or Table in Figure 2. qu is expressed in the following units: cfs/mi^2/watershed inches (csm/in).

Compute Q Rate using the following equation:

Q = (qu) (A) (WQV)

where:

Q = flow rate associated with first 1" of runoff
qu = the unit peak discharge, in csm/in.
A = impervious surface drainage area (in square miles)
WQV = water quality volume in watershed inches (1" in this case)

Structure Name	Impv. (acres)	A (miles^2)	t_c (min)	t_c (hr)	WQV (in)	qu (csm/in.)	Q (cfs)
DMH AS1	0.34	0.0005383	6.0	0.100	1.00	774.00	0.42
DMH AS2	0.33	0.0005203	6.0	0.100	1.00	774.00	0.40
DMH WPW1	0.07	0.0001094	6.0	0.100	1.00	774.00	0.08
DMH WPW2	0.23	0.0003566	6.0	0.100	1.00	774.00	0.28

The WQf sizing calculation selects the minimum size CDS/Cascade/StormCeptor model capable of operating at the computed WQf peak flowrate prior to bypassing. It assumes free discharge of the WQf through the unit and ignores the routing effect of any upstream storm drain piping. As with all hydrodynamic separators, there will be some impact to the Hydraulic Gradient of the corresponding drainage system, and evaluation of this impact should be considered in the design.

Groundwater Mounding Calculations

Groundwater Mounding Analysis

SM-3719C

Project: The Cottages at Wandering Pond
Location: Off of Hudson Road, Stow, MA

Date: 6/27/2022
Rev: 10/27/2022 6/15/2023
By: NC 2/15/2024

	Length of Application (ft)	Width of Application (ft)	Area (s.f.)	Required Recharge Volume (c.f.)	**Application Rate (c.f./day/s.f.)**	**Duration of Application**	**Fillable Porosity**	**Hydraulic Conductivity (ft/day)**	Bottom of Structure Elevation	**E.S.H.G.W.**	**Initial Saturated Thickness Used (ft)**	**Mound Height**
Infiltration Basin 2B-A	375	31.4	11,775	1,761	0.15	1 day	0.18	8	231.70	229.7	10	0.50
Infiltration Basin 6B	78.0	7.33	572	460	0.80		0.28	39	221.00	215.4	10	0.25
Infiltration Basin 7A	98.0	37.9	3,716	3,206	0.86		0.28	39	219.00	217.0	10	1.21
Infiltration Basin 8	146	42.7	6,237	4,442	0.71		0.28	39	222.30	220.3	10	1.21
Infiltration Basin 10B	106	46.8	4,961	1,531	0.31		0.28	39	225.00	222.0	10	0.52
Infiltration Basin 5D	108.0	26.2	2,831	955	0.34		0.16	6	230.00	227.8	10	1.19
Infiltration Basin 5C	68.4	46.9	3,208	556	0.17		0.18	8	258.00	254.3	10	0.65
Infiltration Basin 10C	278.5	98.3	27,377	7,359	0.27		0.28	39	225.00	223.0	10	0.79
Infiltration Basin 2A1	90.4	43.7	3,950	562	0.14		0.18	8	306.00	303.4	8	0.59

Application Rate = $\frac{\text{Required Recharge Volume}}{\text{Bottom Area}}$

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

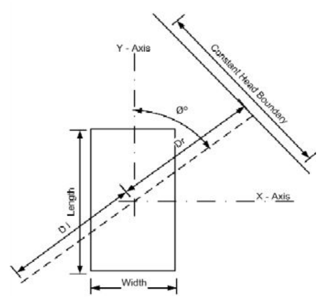
Fillable Porosity = Value based on soil classification from attached table

Hydraulic Conductivity = Value taken from attached table

Initial Saturated Thickness = Due to the lack of Saturated Thickness or Depth toBedrock data, a conservative value of 10 feet is used except where bedrock was found in IB-2A1.

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

Angle from z-axis (Ø):



SPECIFIC YIELD VALUES (%)

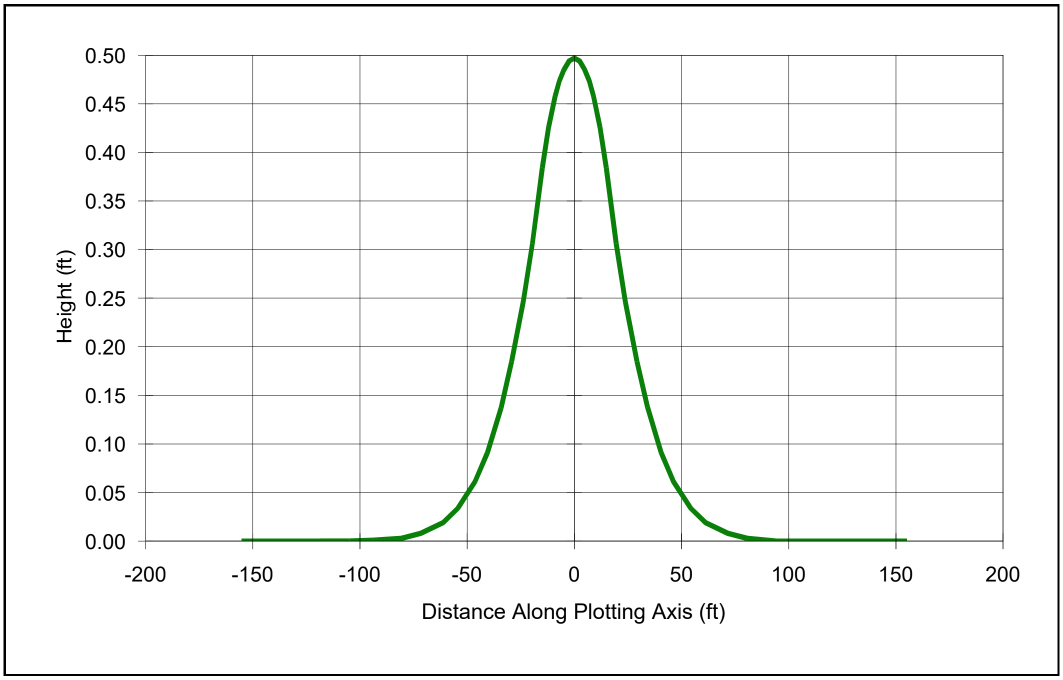
Coarse gravel	0.23
Medium gravel	0.24
Fine gravel	0.25
Coarse sand	0.27
Medium sand	0.28
Fine sand	0.23
Silt	0.08
Clay	0.03

HYDRAULIC CONDUCTIVITY VALUES (FT/DAY)

MATERIAL	AVERAGE	RANGE
Fine gravel	1476	1181 - 3280
Medium gravel	886	689 - 1181
Coarse gravel	492	328 – 689
Coarse sand	148	65 - 328
Medium sand	39	16 - 65
Fine sand	8	3 - 16
Silt	0.3	0.03 – 3
Clay	0.0007	<0.03
S & G mix	172	16 – 328
S & G glacial till		<100
Glacial till		<10

*Mass DEP Groundwater Mounding for Systems Larger than 2,000 GPD Presentation

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Stamski & McNary

PROJECT: Wandering Pond IB-2B-A

ANALYST: RJM

DATE: 6/19/2023 TIME: 12:02:50 PM

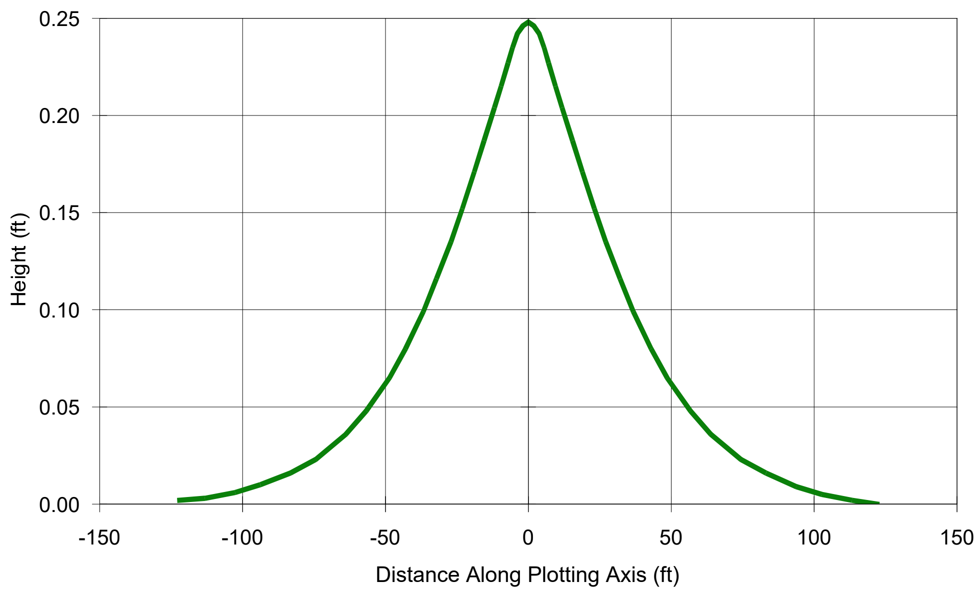
INPUT PARAMETERS

Application rate: 0.15 c.ft/day/sq. ft
Duration of application: 1 days
Fillable porosity: 0.18
Hydraulic conductivity: 8 ft/day
Initial saturated thickness: 10 ft
Length of application area: 375 ft
Width of application area: 31.4 ft
Constant head boundary used at: 154 ft
Plotting axis from Y-Axis: 75 degrees
Edge of recharge area:
positive X: 15.7 ft
positive Y: 4.2 ft
Total volume applied: 1766.25 c.ft

MODEL RESULTS

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-148.8	-39.9	-154	0
-125.1	-33.5	-130	0
-101.4	-27.2	-105	0
-77.8	-20.8	-81	0
-59.2	-15.9	-61	0.02
-44.8	-12	-46	0.06
-33	-8.8	-34	0.14
-23	-6.2	-24	0.25
-14.4	-3.9	-15	0.38
-8.6	-2.3	-9	0.46
-4.7	-1.3	-5	0.48
0	0	0	0.5
4.7	1.3	5	0.48
8.6	2.3	9	0.46
14.4	3.9	15	0.38
23	6.2	24	0.25
33	8.8	34	0.14
44.8	12	46	0.06
59.2	15.9	61	0.02
77.8	20.8	81	0
101.4	27.2	105	0
125.1	33.5	130	0
148.8	39.9	154	0

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Stamski & McNary

PROJECT: Wandering Pond IB-6B

ANALYST: RJM

DATE: 2/15/2024 TIME: 1:59:50 PM

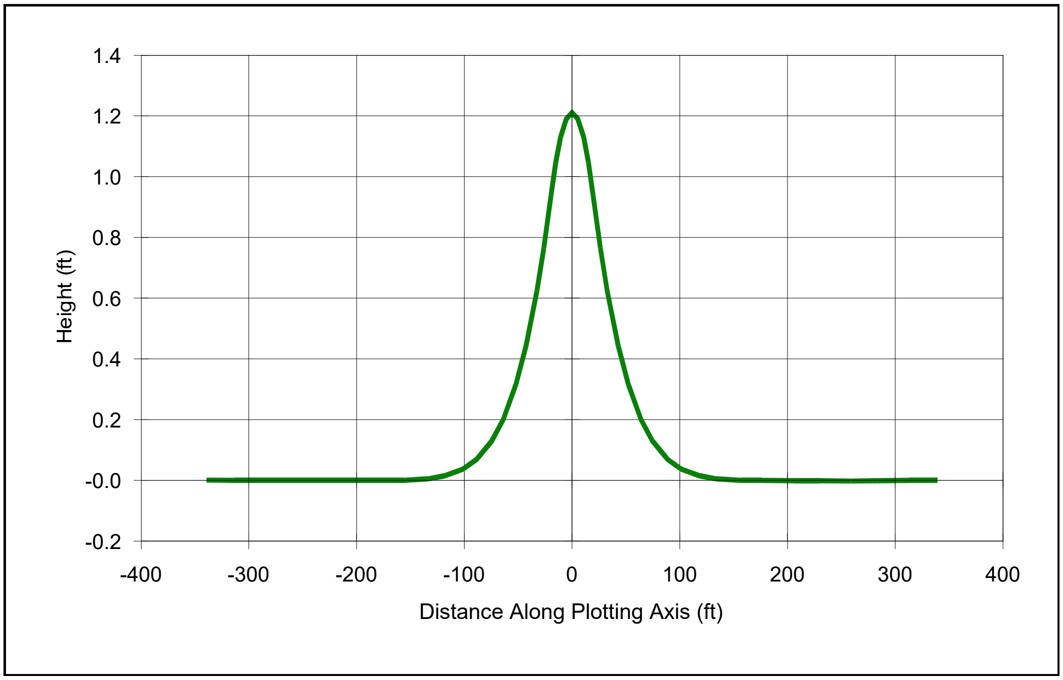
INPUT PARAMETERS

Application rate: 0.8 c.ft/day/sq. ft
Duration of application: 1 days
Fillable porosity: 0.28
Hydraulic conductivity: 39 ft/day
Initial saturated thickness: 10 ft
Length of application area: 78 ft
Width of application area: 7.33 ft
Constant head boundary used at: 122 ft
Plotting axis from Y-Axis: 42 degrees
Edge of recharge area:
positive X: 3.7 ft
positive Y: 4.1 ft
Total volume applied: 457.392 c.ft

MODEL RESULTS

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-81.6	-90.7	-122	0
-68.7	-76.2	-103	0.01
-55.7	-61.8	-83	0.02
-42.7	-47.4	-64	0.04
-32.5	-36.1	-49	0.06
-24.6	-27.3	-37	0.1
-18.1	-20.1	-27	0.14
-12.6	-14	-19	0.17
-7.9	-8.8	-12	0.2
-4.7	-5.3	-7	0.23
-2.6	-2.9	-4	0.24
0	0	0	0.25
2.6	2.9	4	0.24
4.7	5.3	7	0.23
7.9	8.8	12	0.2
12.6	14	19	0.17
18.1	20.1	27	0.14
24.6	27.3	37	0.1
32.5	36.1	49	0.06
42.7	47.4	64	0.04
55.7	61.8	83	0.02
68.7	76.2	103	0
81.6	90.7	122	0

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Stamski & McNary

PROJECT: Wandering Pond IB-7A

ANALYST: RJM

DATE: 6/19/2023 TIME: 12:16:41 PM

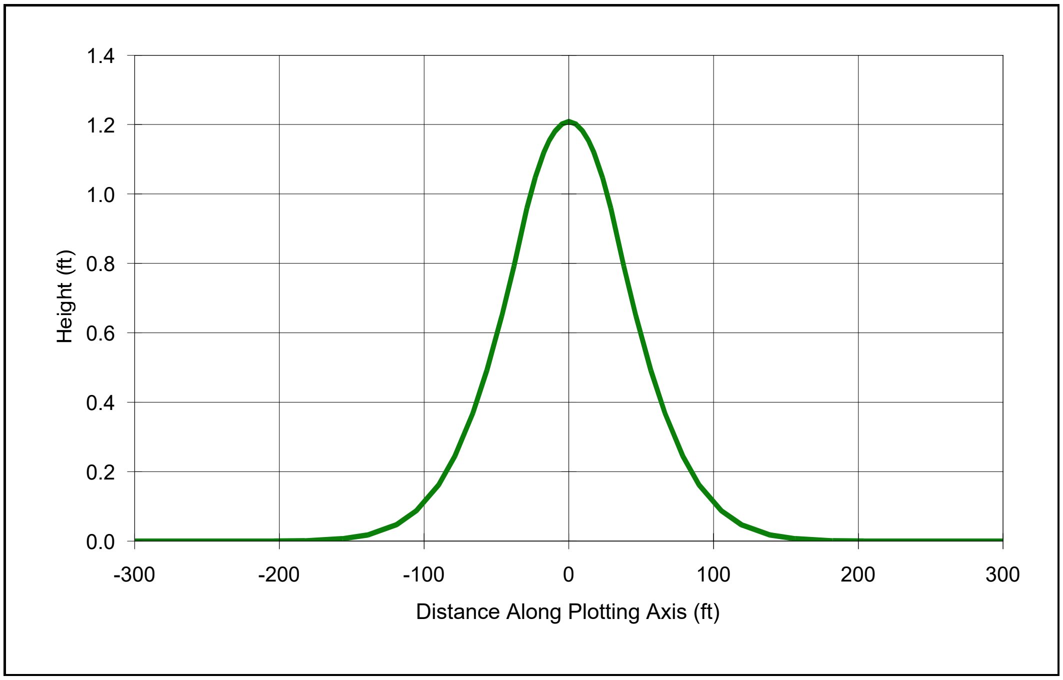
INPUT PARAMETERS

Application rate: 0.86 c.ft/day/sq. ft
Duration of application: 1 days
Fillable porosity: 0.28
Hydraulic conductivity: 39 ft/day
Initial saturated thickness: 10 ft
Length of application area: 98 ft
Width of application area: 37.9 ft
Constant head boundary used at: 337 ft
Plotting axis from Y-Axis: 77 degrees
Edge of recharge area:
positive X: 19 ft
positive Y: 4.4 ft
Total volume applied: 3194.212 c.ft

MODEL RESULTS

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-328.4	-75.8	-337	0
-276.2	-63.8	-283	0
-223.9	-51.7	-230	0
-171.7	-39.6	-176	0
-130.7	-30.2	-134	0
-98.8	-22.8	-101	0.04
-72.8	-16.8	-75	0.13
-50.9	-11.7	-52	0.32
-31.8	-7.3	-33	0.62
-19	-4.4	-20	0.94
-10.3	-2.4	-11	1.13
0	0	0	1.21
10.3	2.4	11	1.13
19	4.4	20	0.94
31.8	7.3	33	0.62
50.9	11.7	52	0.32
72.8	16.8	75	0.13
98.8	22.8	101	0.04
130.7	30.2	134	0
171.7	39.6	176	0
223.9	51.7	230	0
276.2	63.8	283	0
328.4	75.8	337	0

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Stamski & McNary

PROJECT: Wandering Pond IB-8

ANALYST: RJM

DATE: 6/19/2023 TIME: 12:18:29 PM

INPUT PARAMETERS

Application rate: 0.71 c.ft/day/sq. ft
Duration of application: 1 days
Fillable porosity: 0.28
Hydraulic conductivity: 39 ft/day
Initial saturated thickness: 10 ft
Length of application area: 146 ft
Width of application area: 42.7 ft
Constant head boundary used at: 299 ft
Plotting axis from Y-Axis: 41 degrees
Edge of recharge area:
positive X: 21.4 ft
positive Y: 24.6 ft
Total volume applied: 4426.282 c.ft

MODEL RESULTS

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-196.2	-225.7	-299	0
-165	-189.8	-251	0
-133.8	-153.9	-204	0
-102.6	-118	-156	0.01
-78.1	-89.8	-119	0.05
-59	-67.9	-90	0.16
-43.5	-50.1	-66	0.37
-30.4	-35	-46	0.65
-19	-21.9	-29	0.96
-11.4	-13.1	-17	1.12
-6.2	-7.1	-9	1.18
0	0	0	1.21
6.2	7.1	9	1.18
11.4	13.1	17	1.12
19	21.9	29	0.96
30.4	35	46	0.65
43.5	50.1	66	0.37
59	67.9	90	0.16
78.1	89.8	119	0.05
102.6	118	156	0.01
133.8	153.9	204	0
165	189.8	251	0
196.2	225.7	299	0

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)

COMPANY: Stamski & McNary

PROJECT: Wandering Pond IB-10B

ANALYST: RJM

DATE: 6/19/2023 TIME: 12:20:18 PM

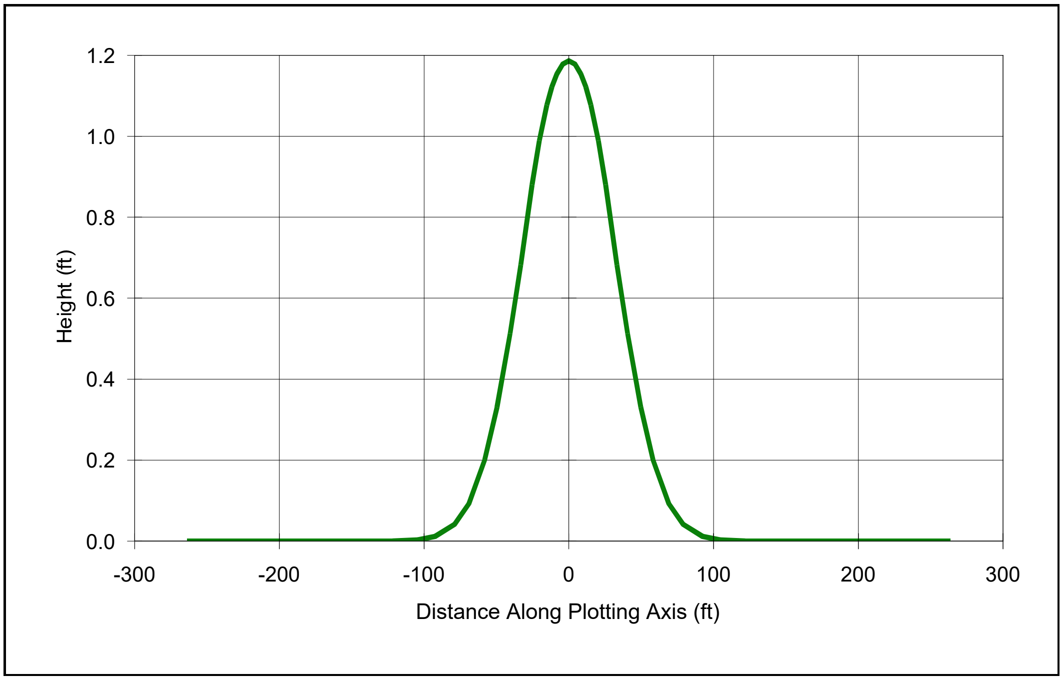
INPUT PARAMETERS

Application rate: 0.31 c.ft/day/sq. ft
Duration of application: 1 days
Fillable porosity: 0.28
Hydraulic conductivity: 39 ft/day
Initial saturated thickness: 10 ft
Length of application area: 106 ft
Width of application area: 46.8 ft
Constant head boundary used at: 154 ft
Plotting axis from Y-Axis: 6 degrees
Edge of recharge area:
positive X: 5.6 ft
positive Y: 53 ft
Total volume applied: 1537.848 c.ft

MODEL RESULTS

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-16.1	-153.2	-154	0
-13.5	-128.8	-130	0.01
-11	-104.4	-105	0.04
-8.4	-80.1	-81	0.1
-6.4	-60.9	-61	0.21
-4.8	-46.1	-46	0.36
-3.6	-34	-34	0.44
-2.5	-23.7	-24	0.48
-1.6	-14.8	-15	0.51
-0.9	-8.9	-9	0.52
-0.5	-4.8	-5	0.52
0	0	0	0.52
0.5	4.8	5	0.52
0.9	8.9	9	0.52
1.6	14.8	15	0.51
2.5	23.7	24	0.48
3.6	34	34	0.44
4.8	46.1	46	0.36
6.4	60.9	61	0.21
8.4	80.1	81	0.1
11	104.4	105	0.03
13.5	128.8	130	0.01
16.1	153.2	154	0

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Stamski & McNary

PROJECT: Wandering Pond IB-5D

ANALYST: RJM

DATE: 6/19/2023 TIME: 12:28:26 PM

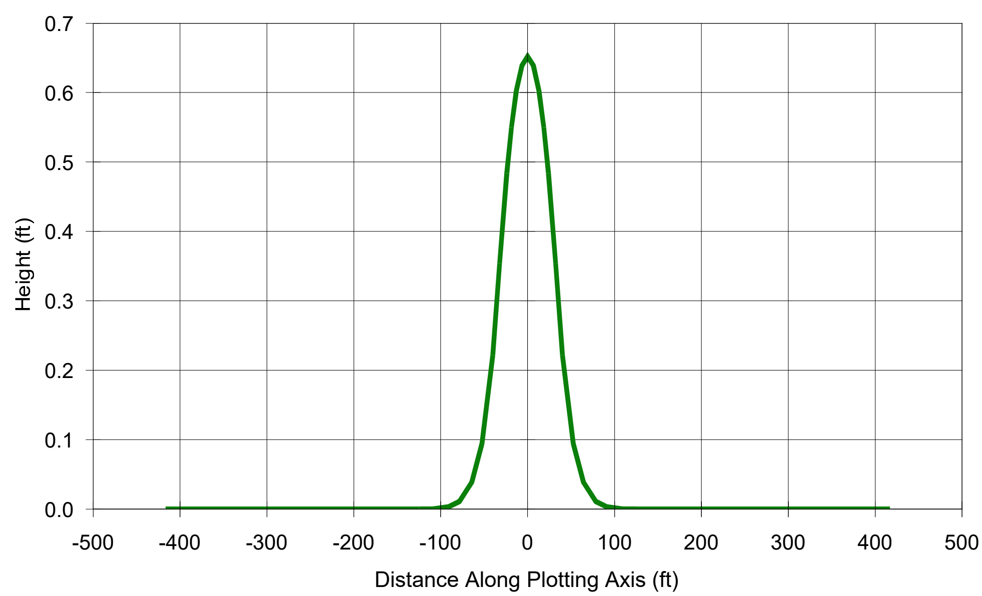
INPUT PARAMETERS

Application rate: 0.34 c.ft/day/sq. ft
Duration of application: 1 days
Fillable porosity: 0.16
Hydraulic conductivity: 6 ft/day
Initial saturated thickness: 10 ft
Length of application area: 108 ft
Width of application area: 26.2 ft
Constant head boundary used at: 262 ft
Plotting axis from Y-Axis: 29 degrees
Edge of recharge area:
positive X: 13.1 ft
positive Y: 23.6 ft
Total volume applied: 962.064 c.ft

MODEL RESULTS

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-127	-229.2	-262	0
-106.8	-192.7	-220	0
-86.6	-156.3	-179	0
-66.4	-119.8	-137	0
-50.5	-91.2	-104	0
-38.2	-69	-79	0.04
-28.2	-50.8	-58	0.2
-19.7	-35.5	-41	0.51
-12.3	-22.2	-25	0.88
-7.4	-13.3	-15	1.08
-4	-7.2	-8	1.15
0	0	0	1.19
4	7.2	8	1.15
7.4	13.3	15	1.08
12.3	22.2	25	0.88
19.7	35.5	41	0.51
28.2	50.8	58	0.2
38.2	69	79	0.04
50.5	91.2	104	0
66.4	119.8	137	0
86.6	156.3	179	0
106.8	192.7	220	0
127	229.2	262	0

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Stamski & McNary

PROJECT: Wandering Pond IB-5C

ANALYST: RJM

DATE: 6/19/2023 TIME: 12:34:05 PM

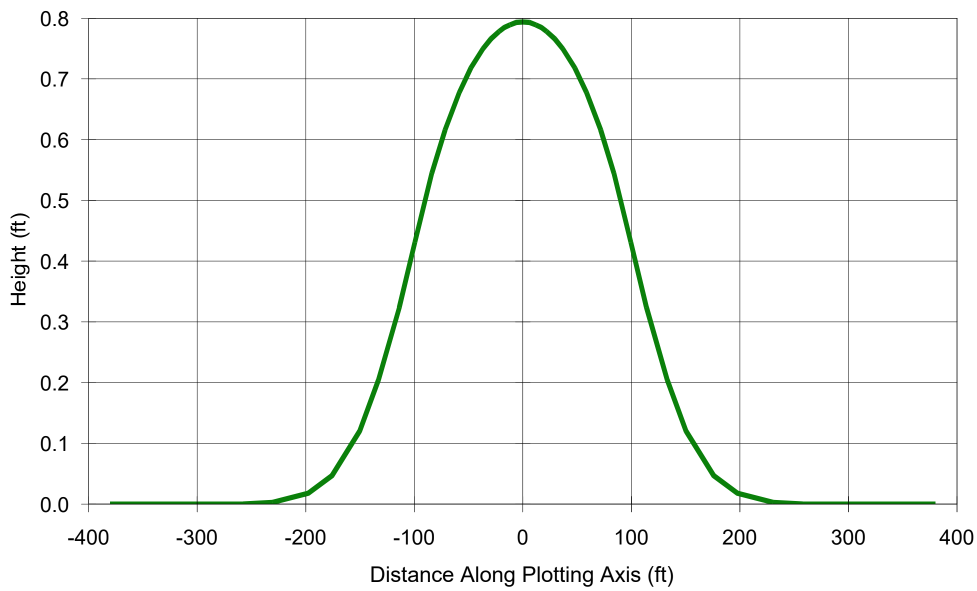
INPUT PARAMETERS

Application rate: 0.17 c.ft/day/sq. ft
Duration of application: 1 days
Fillable porosity: 0.18
Hydraulic conductivity: 8 ft/day
Initial saturated thickness: 10 ft
Length of application area: 68.4 ft
Width of application area: 46.9 ft
Constant head boundary used at: 414 ft
Plotting axis from Y-Axis: 43 degrees
Edge of recharge area:
positive X: 23.4 ft
positive Y: 25.1 ft
Total volume applied: 545.3532 c.ft

MODEL RESULTS

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-282.3	-302.8	-414	0
-237.5	-254.6	-348	0
-192.5	-206.5	-282	0
-147.6	-158.3	-216	0
-112.3	-120.5	-165	0
-85	-91.1	-125	0
-62.6	-67.2	-92	0
-43.7	-46.9	-64	0.04
-27.4	-29.3	-40	0.22
-16.4	-17.6	-24	0.48
-8.9	-9.5	-13	0.6
0	0	0	0.65
8.9	9.5	13	0.6
16.4	17.6	24	0.48
27.4	29.3	40	0.22
43.7	46.9	64	0.04
62.6	67.2	92	0
85	91.1	125	0
112.3	120.5	165	0
147.6	158.3	216	0
192.5	206.5	282	0
237.5	254.6	348	0
282.3	302.8	414	0

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Stamski & McNary

PROJECT: Wandering Pond IB-10C

ANALYST: RJM

DATE: 6/19/2023 TIME: 12:37:42 PM

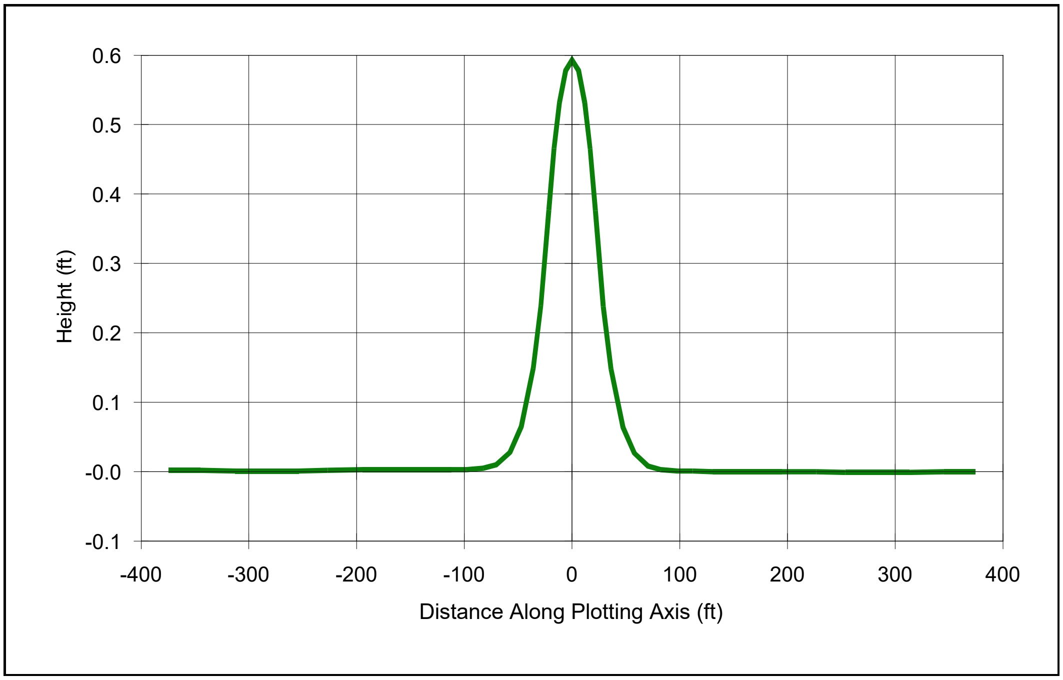
INPUT PARAMETERS

Application rate: 0.27 c.ft/day/sq. ft
Duration of application: 1 days
Fillable porosity: 0.28
Hydraulic conductivity: 39 ft/day
Initial saturated thickness: 10 ft
Length of application area: 278.5 ft
Width of application area: 98.3 ft
Constant head boundary used at: 378 ft
Plotting axis from Y-Axis: 30 degrees
Edge of recharge area:
positive X: 49.2 ft
positive Y: 85.1 ft
Total volume applied: 7391.668 c.ft

MODEL RESULTS

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-189	-327.4	-378	0
-158.9	-275.3	-318	0
-128.9	-223.2	-258	0
-98.8	-171.2	-198	0.02
-75.2	-130.3	-150	0.12
-56.9	-98.5	-114	0.32
-41.9	-72.6	-84	0.55
-29.3	-50.7	-59	0.68
-18.3	-31.7	-37	0.75
-11	-19	-22	0.78
-6	-10.3	-12	0.79
0	0	0	0.79
6	10.3	12	0.79
11	19	22	0.78
18.3	31.7	37	0.75
29.3	50.7	59	0.68
41.9	72.6	84	0.55
56.9	98.5	114	0.32
75.2	130.3	150	0.12
98.8	171.2	198	0.02
128.9	223.2	258	0
158.9	275.3	318	0
189	327.4	378	0

Groundwater Mounding Analysis (Hantush's Method using Glover's Solution)



COMPANY: Stamski & McNary

PROJECT: Wandering Pond IB-2A1

ANALYST: RJM

DATE: 6/19/2023 TIME: 1:04:23 PM

INPUT PARAMETERS

Application rate: 0.14 c.ft/day/sq. ft
Duration of application: 1 days
Fillable porosity: 0.18
Hydraulic conductivity: 8 ft/day
Initial saturated thickness: 8 ft
Length of application area: 90.4 ft
Width of application area: 43.7 ft
Constant head boundary used at: 372 ft
Plotting axis from Y-Axis: 85 degrees
Edge of recharge area:
positive X: 21.8 ft
positive Y: 1.9 ft
Total volume applied: 553.0672 c.ft

MODEL RESULTS

X (ft)	Y (ft)	Plot Axis (ft)	Mound Height (ft)
-370.6	-32.4	-372	0
-311.7	-27.3	-313	0
-252.7	-22.1	-254	0
-193.8	-17	-195	0
-147.5	-12.9	-148	0
-111.5	-9.8	-112	0
-82.2	-7.2	-83	0
-57.4	-5	-58	0.03
-35.9	-3.1	-36	0.15
-21.5	-1.9	-22	0.38
-11.7	-1	-12	0.53
0	0	0	0.59
11.7	1	12	0.53
21.5	1.9	22	0.38
35.9	3.1	36	0.15
57.4	5	58	0.03
82.2	7.2	83	0
111.5	9.8	112	0
147.5	12.9	148	0
193.8	17	195	0
252.7	22.1	254	0
311.7	27.3	313	0
370.6	32.4	372	0

Pipe Sizing Calculations

DESIGN STORM: 100 YEAR
DATE: **6/16/2023**
DONE BY: PFK, NC
FILE: SM-3719C

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

FROM	TO	LENGTH (FT)	TRIBUTARY AREA INCR. (ACRES)	TRIBUTARY AREA TOTAL (ACRES)	TIME OF FLOW TO UPPER END (MIN)	TIME OF FLOW TIME IN SECTION (MIN)	RUNOFF COEFF. "C"	RAINFALL INTENSITY (IN/HR)	"Q" TOTAL RUNOFF (CFS)	SLOPE of PIPE (FT/FT)	DIAM (IN)	MANN. "n"	CAPACITY FULL (CFS)	VELOCITY FULL (FPS)	DESIGN FLOW VELOCITY (FPS)	DESIGN FLOW VELOCITY HEAD (FT)	DESIGN FLOW DEPTH OF FLOW (FT)	DESIGN FLOW TOTAL ENERGY HEAD (FT)	MANHOLE INVERT DROP (FT)	FALL IN PIPE (FT)	DRAIN INV. ELEVATION UPPER END	DRAIN INV. ELEVATION LOWER END
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	201	0.00	0.38	10	0.79	0.61	7.8	1.82	0.007	12	0.012	3.23	4.11	4.23	0.28	0.54	0.81		1.41	309.28	307.87
DMH-WPC7	DMH-WPC8	153	0.00	0.38	10	0.67	0.61	7.8	1.82	0.005	12	0.012	2.80	3.57	3.80	0.22	0.59	0.81		0.81	307.77	306.96
CB-WPC9	DMH-WPC8	28	0.47	0.47	10	0.04	0.39	7.8	1.43	0.105	12	0.012	12.48	15.90	10.48	1.71	0.23	1.93		2.94	309.90	306.96
CB-WPC10	DMH-WPC8	11	0.18	0.18	10	0.01	0.70	7.8	1.02	0.267	12	0.012	19.92	25.37	13.12	2.67	0.15	2.82		2.94	309.90	306.96
DMH-WPC8	IB-2A1	120	0.00	1.03	10	0.38	0.53	7.8	4.27	0.007	15	0.012	5.92	4.82	5.24	0.43	0.78	1.21		0.86	306.86	306.00
CB-WPC11	DMH-WPC9	14	0.83	0.83	10	0.05	0.35	7.8	2.31	0.010	12	0.012	3.85	4.91	5.12	0.41	0.56	0.96		0.14	302.58	302.44
CB-WPC12	DMH-WPC9	14	0.29	0.29	10	0.05	0.77	7.8	1.73	0.010	12	0.012	3.85	4.91	4.76	0.35	0.47	0.82		0.14	302.58	302.44
DMH-WPC9	IB-2A2	79	0.00	1.12	10	0.19	0.46	7.8	4.04	0.017	12	0.012	5.02	6.39	7.09	0.78	0.68	1.46		1.34	302.34	301.00
CB-SSL1	DMH-SSL1	21	0.32	0.32	10	0.09	0.69	7.8	1.71	0.005	12	0.012	2.79	3.55	3.73	0.22	0.57	0.78		0.11	236.18	236.07
CB-SSL2	DMH-SSL1	20	0.68	0.68	10	0.09	0.33	7.8	1.79	0.006	12	0.012	2.86	3.64	3.83	0.23	0.57	0.80		0.11	236.18	236.07
DMH-SSL1	DMH-SSL2	109	1.00	1.00	10	0.35	0.45	7.8	3.50	0.009	12	0.012	3.56	4.53	5.17	0.41	0.81	1.22		0.93	235.97	235.04
CB-SSL3	DMH-SSL2	43	0.04	0.04	10	0.33	0.69	7.8	0.23	0.006	12	0.012	2.88	3.67	2.19	0.07	0.19	0.26		0.24	237.09	236.85
CB-SSL4	DMH-SSL2	40	0.13	0.13	10	0.27	0.30	7.8	0.30	0.006	12	0.012	2.98	3.80	2.44	0.09	0.22	0.31		0.24	237.09	236.85
DMH-SSL2	IB-2B-A	135	1.17	1.17	10	0.26	0.44	7.8	4.03	0.029	12	0.012	6.58	8.38	8.80	1.20	0.57	1.77		3.94	234.94	231.00
CB-WPC5	DMH-WPC5	14	0.66	0.66	10	0.04	0.49	7.8	2.51	0.010	12	0.012	3.85	4.91	5.22	0.42	0.59	1.01		0.14	291.18	291.04
CB-WPC6	DMH-WPC5	14	0.19	0.19	10	0.06	0.69	7.8	1.05	0.010	12	0.012	3.85	4.91	4.17	0.27	0.36	0.62		0.14	291.18	291.04
DMH-WPC5	IB-3A	75	0.00	0.85	10	0.15	0.53	7.8	3.56	0.026	12	0.012	6.20	7.89	8.15	1.03	0.54	1.57		1.94	290.94	289.00
CB-WPC3	DMH-WPC2	20	1.19	1.19	10	0.07	0.23	7.8	2.11	0.010	12	0.012	3.85	4.91	5.01	0.39	0.53	0.91		0.20	287.57	287.37
CB-WPC4	DMH-WPC2	20	0.32	0.32	10	0.07	0.62	7.8	1.53	0.010	12	0.012	3.85	4.91	4.61	0.33	0.44	0.76		0.20	287.57	287.37
DMH-WPC2	DMH-WPC3	107	1.51	1.51	10	0.32	0.31	7.8	3.64	0.010	12	0.012	3.85	4.91	5.58	0.48	0.77	1.25		1.07	287.27	286.20
DMH-WPC3	DMH-WPC4	74	1.51	1.51	10	0.22	0.31	7.8	3.64	0.010	12	0.012	3.88	4.94	5.61	0.49	0.77	1.25		0.75	286.10	285.35
DMH-WPC4	DMH-WPC4A	115	1.51	1.51	10	0.23	0.31	7.8	3.64	0.028	12	0.012	6.48	8.25	8.48	1.12	0.54	1.65		3.25	285.25	282.00
DMH-WPC4A	IB-4A	37	1.51	1.51	10	0.08	0.31	7.8	3.62	0.024	12	0.012	6.01	7.65	7.98	0.99	0.56	1.54		0.90	281.90	281.00
CB-WPC13	DMH-WPC10	55	0.25	0.25	10	0.15	0.63	7.8	1.24	0.026	12	0.012	6.17	7.86	6.10	0.58	0.30	0.88		1.41	289.41	288.00
DMH-WPC10	IB-5B	62	0.25	0.25	10	0.11	0.63	7.8	1.24	0.079	12	0.012	10.83	13.80	9.09	1.28	0.23	1.51		4.90	287.90	283.00
CB-WPC1	DMH-WPC1	77	1.99	1.99	10	0.24	0.22	7.8	3.48	0.009	12	0.012	3.75	4.78	5.42	0.46	0.76	1.22		0.73	288.23	287.50
CB-WPC2	DMH-WPC1	17	0.18	0.18	10	0.06	0.81	7.8	1.14	0.012	12	0.012	4.18	5.32	4.52	0.32	0.36	0.67		0.20	287.70	287.50
DMH-WPC1	IB-5B	70	2.42	2.42	10	0.09	0.31	7.8	5.87	0.063	12	0.012	9.66	12.30	12.87	2.57	0.56	3.13		4.40	287.40	283.00
CB-WPW13	DMH-WPW12	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-WPW12	14	0.10	0.10	10	0.07	0.48	7.8	0.37	0.011	12	0.012	3.99	5.08	3.12	0.15	0.20	0.35		0.15	282.94	282.79
DMH-WPW12	DMH-WPW11	84	0.47	0.47	10	0.13	0.55	7.8	2.00	0.083	12	0.012	11.09	14.13	10.65	1.76	0.29	2.05		6.96	282.69	275.73
DMH-WPW11	DMH-WPW10	93	0.47	0.47	10	0.15	0.55	7.8	1.99	0.083	12	0.012	11.11	14.15	10.67	1.77	0.29	2.05		7.73	275.63	267.90
CB-WPW11	DMH-WPW10	14	0.37	0.37	10	0.04	0.70	7.8	2.06	0.021	12	0.012	5.64	7.18	6.60	0.68	0.42	1.09		0.30	268.20	267.90
CB-WPW12	DMH-WPW10	14	0.09	0.09	10	0.06	0.59	7.8	0.39	0.021	12	0.012	5.64	7.18	4.08	0.26	0.18	0.43		0.30	268.20	267.90
DMH-WPW10	DMH-WPW9	46	0.93	0.93	10	0.10	0.61	7.8	4.46	0.022	12	0.012	5.68	7.24	8.00	0.99	0.67	1.66		1.00	267.80	266.80
DMH-WPW9	IB-5C	108	0.93	0.93	10	0.14	0.61	7.8	4.46	0.081	12	0.012	10.93	13.93	13.22	2.71	0.45	3.16		8.70	266.70	258.00
CB-DFD3	DMH-DFD4	13	0.33	0.33	10	0.02	0.65	7.8	1.68	0.083	12	0.012	11.10	14.14	10.14	1.60	0.26	1.86		1.08	277.78	276.70
CB-DFD4	DMH-DFD4	14	0.11	0.11	10	0.04	0.51	7.8	0.43	0.077	12	0.012	10.70	13.63	6.60	0.68	0.14	0.81		1.08	277.78	276.70
DMH-DFD4	DMH-DFD3	95	0.44	0.44	10	0.14	0.61	7.8	2.11	0.090	12	0.012	11.53	14.69	11.19	1.95	0.29	2.24		8.51	276.60	268.09
DMH-DFD3	DMH-DFD2	47	0.44	0.44	10	0.10	0.61	7.8	2.10	0.030	12	0.012	6.62	8.44	7.47	0.87	0.39	1.25		1.39	267.99	266.60
DMH-DFD2	DMH-DFD1	44	0.44	0.44	10	0.10	0.61	7.8	2.10	0.030	12	0.012	6.70	8.53	7.50	0.87	0.38	1.25		1.33	266.50	265.17
CB-DFD1	DMH-DFD1	14	0.41	0.41	10	0.04	0.76	7.8	2.45	0.010	12	0.012	3.85	4.91	5.20	0.42	0.58	1.00		0.14	266.31	266.17
CB-DFD2	DMH-DFD1	13	0.42	0.42	10	0.05	0.28	7.8	0.91	0.011	12	0.012	4.00	5.09	4.09	0.26	0.32	0.58		0.14	266.31	266.17
DMH-DFD1	DMH-WFW8	51	1.27	1.27	10	0.07	0.55	7.8	5.47	0.066	12	0.012	9.90	12.61	12.92	2.59	0.53	3.12		3.37	266.07	262.70
DMH-WFW8	DMH-WFW7	100	1.27	1.27	10	0.12	0.55	7.8	5.47	0.076	12	0.012	10.58	13.48	13.59	2.87	0.51	3.38		7.55	262.60	255.05
CB-WFW9	DMH-WFW7	13	0.20	0.20	10	0.03	0.52	7.8	0.82	0.088	12	0.012	11.46	14.60	8.42	1.10	0.18	1.28		1.15	256.20	255.05
CB-WFW10	DMH-WFW7	13	0.24	0.24	10	0.02	0.72	7.8	1.33	0.088	12	0.012	11.46	14.60	9.75	1.48	0.23	1.71		1.15	256.20	255.05
DMH-WFW7	DMH-WPW6	70	1.70	1.70	10	0.08	0.57	7.8	7.62	0.080	12	0.012	10.91	13.89	15.02	3.50	0.62	4.12		5.61	254.95	249.34
DMH-WFW6	DMH-WPW4	108	1.70	1.70	10	0.12	0.57	7.8	7.58	0.079	12	0.012	10.86	13.83	14.95	3.47	0.62	4.09		8.58	249.24	240.66

CB-WFW7	DMH-WPW4	14	0.06	0.06	10	0.06	0.76	7.8	0.37	0.024	12	0.012	6.00	7.65	4.19	0.27	0.17	0.44		0.34	241.00	240.66
CB-WFW8	DMH-WPW4	14	0.15	0.15	10	0.05	0.58	7.8	0.68	0.024	12	0.012	6.00	7.65	5.04	0.39	0.23	0.62		0.34	241.00	240.66
DMH-WFW4	IB-5D	107	1.91	1.91	10	0.11	0.58	7.8	8.67	0.099	12	0.012	12.10	15.42	16.76	4.36	0.63	4.99		10.56	240.56	230.00
CB-WFW5	DMH-WPW3	14	0.10	0.10	10	0.07	0.70	7.8	0.56	0.011	12	0.012	3.99	5.08	3.56	0.20	0.25	0.45		0.15	231.08	230.93
CB-WFW6	DMH-WPW3	14	0.06	0.06	10	0.08	0.76	7.8	0.34	0.011	12	0.012	3.99	5.08	3.08	0.15	0.20	0.34		0.15	231.08	230.93
DMH-WFW3	IB-5D	48	2.07	2.07	10	0.09	0.59	7.8	9.58	0.017	18	0.012	14.96	8.47	8.98	1.25	0.87	2.12		0.83	230.83	230.00
CB-AS1	DMH-AS1A	24	0.30	0.30	10	0.09	0.53	7.8	1.24	0.010	12	0.012	3.85	4.91	4.34	0.29	0.39	0.68		0.24	215.20	214.96
CB-AS2	DMH-AS1A	13	0.23	0.23	10	0.04	0.90	7.8	1.59	0.018	12	0.012	5.23	6.67	5.82	0.53	0.38	0.90		0.24	215.20	214.96
DMH-AS1A	DMH-AS1B	66	0.53	0.53	10	0.22	0.69	7.8	2.85	0.008	12	0.012	3.55	4.52	5.02	0.39	0.68	1.07		0.56	214.86	214.30
DMH-AS1B	FLARED END	10	0.53	0.53	10	0.03	0.69	7.8	2.83	0.010	12	0.012	3.85	4.91	5.36	0.45	0.64	1.08		0.10	214.20	214.10
CB-AS3	DMH-AS3	23	0.16	0.16	10	0.12	0.77	7.8	0.96	0.005	12	0.012	2.78	3.54	3.20	0.16	0.40	0.56		0.12	215.22	215.10
CB-AS4	DMH-AS3	10	0.21	0.21	10	0.03	0.90	7.8	1.47	0.012	12	0.012	4.22	5.38	4.88	0.37	0.41	0.77		0.12	215.22	215.10
DMH-AS3	DMH-AS2	63	0.37	0.37	10	0.27	0.84	7.8	2.42	0.005	12	0.012	2.75	3.50	3.95	0.24	0.73	0.97		0.32	215.00	214.68
DMH-AS2	FLARED END	42	0.37	0.37	10	0.17	0.84	7.8	2.42	0.005	12	0.012	2.85	3.63	4.07	0.26	0.71	0.96		0.23	214.58	214.35
CB-WPW1	DMH-WPW1	30	0.04	0.04	10	0.16	0.90	7.8	0.30	0.012	12	0.012	4.22	5.38	3.10	0.15	0.18	0.33		0.36	227.80	227.44
CB-WPW2	DMH-WPW1	30	0.06	0.06	10	0.16	0.59	7.8	0.28	0.012	12	0.012	4.22	5.38	3.05	0.14	0.18	0.32		0.36	227.80	227.44
DMH-WPW1	FLARED END	66	0.10	0.10	10	0.40	0.72	7.8	0.59	0.005	12	0.012	2.76	3.52	2.78	0.12	0.31	0.43		0.34	227.34	227.00
CB-WPW3	DMH-WPW2	22	0.06	0.06	10	0.15	0.76	7.8	0.37	0.005	12	0.012	2.85	3.62	2.48	0.10	0.24	0.34		0.12	224.00	223.88
CB-WPW4	DMH-WPW2	10	0.31	0.31	10	0.03	0.65	7.8	1.56	0.012	12	0.012	4.22	5.38	4.97	0.38	0.42	0.80		0.12	224.00	223.88
DMH-WPW2	FLARED END	5	0.37	0.37	10	0.02	0.67	7.8	1.92	0.006	12	0.012	2.98	3.80	4.03	0.25	0.58	0.83		0.03	223.78	223.75
CB-DY2	CB-DY1	16	0.60	0.60	10	0.05	0.67	7.8	3.19	0.010	12	0.012	3.85	4.91	5.48	0.47	0.69	1.16		0.16	222.41	222.25
CB-DY1	DI-DY1	29	0.97	0.97	10	0.05	0.60	7.8	4.57	0.038	12	0.012	7.47	9.51	9.95	1.54	0.56	2.10		1.09	222.15	221.06
DI-DY2	DI-DY1	43	0.97	0.97	10	0.11	0.60	7.8	4.55	0.014	12	0.012	4.55	5.80	6.61	0.68	0.82	1.49		0.60	221.49	220.89
DI-DY1	DMH-DY1	75	1.34	1.34	10	0.17	0.60	7.8	6.28	0.014	15	0.012	8.19	6.68	7.36	0.84	0.82	1.66		1.03	220.79	219.76
DMH-DY1	IB-7A	41	1.34	1.34	10	0.09	0.60	7.8	6.31	0.016	15	0.012	8.87	7.23	7.84	0.95	0.78	1.73		0.66	219.66	219.00
CB-BC1	CB-BC2	16	0.56	0.56	10	0.05	0.64	7.8	2.83	0.010	12	0.012	3.85	4.91	5.36	0.45	0.64	1.08		0.16	221.19	221.03
CB-BC2	DI-BC2	10	0.55	0.55	10	0.03	0.65	7.8	2.79	0.010	12	0.012	3.85	4.91	5.34	0.44	0.63	1.07		0.10	220.93	220.83
DI-BC1	DI-BC2	32	0.37	0.37	10	0.11	0.65	7.8	1.87	0.010	12	0.012	3.85	4.91	4.86	0.37	0.49	0.86		0.32	221.15	220.83
DI-BC2	DMH-BCL1	97	1.48	1.48	10	0.27	0.65	7.8	7.47	0.007	18	0.012	9.52	5.39	5.96	0.55	1.00	1.55		0.68	220.73	220.05
DMH-BC1	IB-7A	136	1.48	1.48	10	0.38	0.65	7.8	7.51	0.007	18	0.012	9.51	5.38	5.96	0.55	1.01	1.56		0.95	219.95	219.00
CB-CH3	IB-7B	66	0.30	0.30	10	0.18	0.39	7.8	0.91	0.033	12	0.012	7.03	8.96	6.13	0.58	0.24	0.82		2.20	226.20	224.00
CB-CH2	IB-7B	248	0.53	0.53	10	0.84	0.49	7.8	2.02	0.010	12	0.012	3.85	4.91	4.95	0.38	0.51	0.89		2.48	226.48	224.00
CB-WF4	DMH-WF2	14	0.14	0.14	10	0.06	0.90	7.8	0.96	0.010	12	0.012	3.85	4.91	4.07	0.26	0.34	0.60		0.14	224.91	224.77
CB-WF3	DMH-WF2	14	0.08	0.08	10	0.07	0.90	7.8	0.57	0.010	12	0.012	3.89	4.96	3.52	0.19	0.26	0.45		0.14	224.92	224.77
DMH-WF2	DMH-WF1	73	0.22	0.22	10	0.34	0.90	7.8	1.53	0.005	12	0.012	2.71	3.45	3.54	0.19	0.54	0.73		0.36	224.67	224.31
DMH-WF1	IB-7B	40	0.05	0.05	10	0.28	0.90	7.8	0.34	0.005	12	0.012	2.72	3.47	2.35	0.09	0.24	0.32		0.20	224.20	224.00
CB-WF1	IB-7B	123	0.26	0.26	10	0.31	0.90	7.8	1.87	0.024	12	0.012	5.96	7.59	6.67	0.69	0.38	1.07		2.94	226.94	224.00
CB-LP6	DMH-LP3	21	0.40	0.40	10	0.07	0.66	7.8	2.06	0.010	12	0.012	3.90	4.97	5.02	0.39	0.52	0.91		0.22	226.33	226.12
CB-LP5	DMH-LP3	10	0.04	0.04	10	0.06	0.90	7.8	0.28	0.010	12	0.012	3.85	4.91	2.83	0.12	0.18	0.30		0.10	226.37	226.27
DMH-LP3	IB-8	204	0.44	0.44	10	0.70	0.68	7.8	2.35	0.009	12	0.012	3.56	4.53	4.83	0.36	0.59	0.95		1.74	224.04	222.30
CB-WF5	DMH-WF3A	81	0.09	0.09	10	0.48	0.90	7.8	0.63	0.005	12	0.012	2.71	3.45	2.80	0.12	0.33	0.45		0.40	223.37	222.97
CB-WF5A	DMH-WF3A	17	0.10	0.10	10	0.09	0.90	7.8	0.73	0.005	12	0.012	2.80	3.57	2.99	0.14	0.35	0.48		0.09	223.06	222.97
DMH-WF3A	IB-8	47	0.19	0.19	11	0.16	0.90	7.8	1.36	0.012	12	0.012	4.24	5.40	4.78	0.36	0.39	0.74		0.57	222.87	222.30
CB-WF6	DMH-WF3	44	0.12	0.12	10	0.19	0.90	7.8	0.86	0.010	12	0.012	3.90	4.96	3.96	0.24	0.32	0.56		0.45	223.65	223.20
DMH-WF3	DMH-WF4	62	0.12	0.12	10	0.28	0.90	7.8	0.86	0.008	12	0.012	3.52	4.48	3.69	0.21	0.34	0.55		0.52	223.10	222.58
DMH-WF4	IB-8	37	0.12	0.12	10	0.20	0.90	7.8	0.86	0.005	12	0.012	2.69	3.42	3.03	0.14	0.39	0.53		0.18	222.48	222.30
CB-LP4	DMH-LP2	16	0.70	0.70	10	0.05	0.68	7.8	3.73	0.010	12	0.012	3.89	4.95	5.64	0.49	0.78	1.27		0.16	225.77	225.61
CB-LP3	DMH-LP2	16	0.23	0.23	10	0.07	0.53	7.8	0.94	0.010	12	0.012	3.89	4.95	4.08	0.26	0.34	0.59		0.16	225.77	225.61
DMH-LP2	DMH-LP4	180	0.92	0.92	10	0.49	0.64	7.8	4.67	0.010	15	0.012	6.99	5.70	6.09	0.58	0.74	1.32		1.80	225.51	223.71
DMH-LP4	DMH-LP1	116	0.92	0.92	10	0.36	0.64	7.8	4.67	0.008	15	0.012	6.05	4.94	5.44	0.46	0.82	1.28		0.87	223.61	222.74
CB-LP1	DMH-LP1	13	0.24	0.24	10	0.05	0.66	7.8	1.22	0.008	12	0.012	3.38	4.30	3.96	0.24	0.42	0.66		0.10	223.07	222.97
CB-LP2	DMH-LP1	24	0.58	0.58	10	0.06	0.79	7.8	3.57	0.015	12	0.012	4.69	5.97	6.56	0.67	0.65	1.32		0.35	223.22	222.87
DMH-LP1	IB-8	67	1.74	1.74	10	0.20	0.69	7.8	9.46	0.005	21	0.012	12.23	5.09	5.62	0.49	1.16	1.64		0.34	222.64	222.30
CB-WFW17	DMH-WFW10	14	0.52	0.52	10	0.03	0.73	7.8	2.98	0.021	12	0.012	5.64	7.18	7.27	0.82	0.52	1.34		0.30	264.15	263.85
CB-WFW18	DMH-WFW10	14	0.19	0.19	10	0.04	0.65	7.8	0.95	0.021	12	0.012	5.64	7.18	5.32	0.44	0.28	0.71		0.30	264.15	263.85
DMH-WFW10	DMH-WFW9	81	0.71	0.71	10	0.13	0.71	7.8	3.93	0.049	12	0.012	8.55	10.89	10.65	1.76	0.48	2.24		3.99	263.75	259.76
DMH-WFW9	DMH-WFW8	160	0.71	0.71	10	0.23	0.71	7.8	3.93	0.066	12	0.012	9.90	12.61	11.84	2.18	0.44	2.61		10.57	259.66	249.09
CB-WFW15	DMH-WFW8	14	0.41	0.41	10	0.03	0.68	7.8	2.16	0.028	12	0.012	6.43	8.19	7.35	0.84	0.40	1.23		0.39	249.48	249.09
CB-WFW16	DMH-WFW8	14	0.26	0.26	10	0.04	0.49	7.8	1.00	0.028	12	0.012	6.43	8.19	5.93	0.55	0.27	0.81		0.39	249.48	249.09
DMH-WFW8	DMH-WFW7	278	1.37	1.37	10	0.32	0.66	7.8	7.09	0.075	12	0.012	10.53	13.41	14.38	3.21	0.60	3.81		20.76	248.99	228.23
CB-WFW13	DMH-WFW7	14	0.56	0.56	10	0.05	0.72	7.8	3.15	0.007	12	0.012	3.26	4.15	4.72	0.35	0.79	1.14		0.10	228.33	228.23
CB-WFW14	DMH-WFW7	14	0.22	0.22	10	0.06	0.60	7.8	1.05	0.007	12	0.012	3.26	4.15	3.67	0.21	0.39	0.59		0.10	228.33	228.23

DMH-WFW7	IB-10B	72	2.15	2.15	10	0.09	0.67	7.8	11.29	0.044	15	0.012	14.69	11.98	13.20	2.70	0.82	3.52		3.18	228.18	225.00
CB -WFW11	DMH-WFW5	76	0.11	0.11	10	0.43	0.90	7.8	0.76	0.005	12	0.012	2.72	3.47	2.97	0.14	0.36	0.50		0.38	227.20	226.82
CB-WFW12	DMH-WFW5	82	0.19	0.19	10	0.43	0.67	7.8	1.00	0.005	12	0.012	2.72	3.47	3.19	0.16	0.42	0.57		0.41	226.02	225.61
DMH-WFW5	IB-10B	98	0.30	0.30	10	0.44	0.75	7.8	1.76	0.005	12	0.012	2.78	3.54	3.74	0.22	0.58	0.79		0.51	225.51	225.00
CB-WF19	DMH-WF11	14	0.58	0.58	10	0.03	0.72	7.8	3.26	0.021	12	0.012	5.64	7.18	7.44	0.86	0.55	1.41		0.30	265.80	265.50
CB-WF20	DMH-WF11	14	0.36	0.36	10	0.03	0.76	7.8	2.17	0.021	12	0.012	5.64	7.18	6.71	0.70	0.43	1.13		0.30	265.80	265.50
DMH-WF11	DMH-WF12	165	0.94	0.94	10	0.21	0.73	7.8	5.43	0.073	12	0.012	10.43	13.29	13.40	2.79	0.51	3.30		12.10	265.40	253.30
DMH-WF12	DMH-WF13	85	0.94	0.94	10	0.12	0.73	7.8	5.43	0.053	12	0.012	8.86	11.29	11.86	2.18	0.57	2.75		4.50	253.20	248.70
CB-WF21	DMH-WF13	14	0.46	0.46	10	0.03	0.73	7.8	2.64	0.021	12	0.012	5.64	7.18	7.06	0.77	0.48	1.25		0.30	249.00	248.70
CB-WF22	DMH-WF13	14	0.29	0.29	10	0.04	0.58	7.8	1.31	0.021	12	0.012	5.64	7.18	5.83	0.53	0.33	0.85		0.30	249.00	248.70
DMH-WF13	DMH-WF14	56	1.69	1.69	10	0.07	0.71	7.8	9.39	0.060	12	0.012	9.45	12.04	13.72	2.92	0.81	3.73		3.37	248.60	245.23
DMH-WF14	DMH-WF15	94	1.69	1.69	10	0.11	0.71	7.8	9.39	0.060	12	0.012	9.44	12.03	13.72	2.92	0.81	3.73		5.65	245.13	239.48
DMH-WF15	DMH-WF16	192	1.69	1.69	10	0.23	0.71	7.8	9.39	0.060	12	0.012	9.44	12.03	13.72	2.92	0.81	3.73		11.54	239.38	227.84
DMH-WF16	IB-10C	51	1.69	1.69	10	0.06	0.71	7.8	9.39	0.054	15	0.012	16.20	13.21	13.68	2.91	0.68	3.59		2.74	227.74	225.00
CB-WF23	DMH-WF17	153	0.56	0.56	10	0.24	0.46	7.8	2.00	0.080	12	0.012	10.87	13.85	10.55	1.73	0.29	2.02		12.18	246.23	234.05
CB-WF24	DMH-WF17	29	1.14	1.14	10	0.05	0.32	7.8	2.85	0.045	12	0.012	8.16	10.39	9.43	1.38	0.41	1.79		1.30	235.35	234.05
DMH-WF17	DMH-WF18	77	3.33	3.33	10	0.08	0.37	7.8	9.52	0.076	12	0.012	10.59	13.49	15.26	3.62	0.74	4.36		5.82	233.95	228.13
CB-WF27	DMH-WF21	14	1.11	1.11	10	0.04	0.45	7.8	3.93	0.011	12	0.012	3.99	5.08	5.79	0.52	0.81	1.33		0.15	230.59	230.44
CB-WF28	DMH-WF21	14	0.35	0.35	10	0.05	0.77	7.8	2.12	0.011	12	0.012	3.99	5.08	5.14	0.41	0.52	0.93		0.15	230.59	230.44
DMH-WF21	DMH-WF18	182	1.46	1.46	10	0.47	0.53	7.8	6.05	0.010	15	0.012	6.99	5.70	6.41	0.64	0.89	1.53		1.82	229.95	228.13
CB-WF25	DMH-WF18	22	0.91	0.91	10	0.02	0.54	7.8	3.84	0.176	12	0.012	16.16	20.58	16.82	4.39	0.33	4.72		3.87	232.00	228.13
DMH-WF18	DMH-WF19	116	5.97	5.97	10	0.18	0.45	7.8	20.98	0.017	24	0.012	31.54	10.05	10.74	1.79	1.19	2.98		1.92	228.03	226.11
DMH-WF19	DMH-WF20	59	5.97	5.97	10	0.11	0.45	7.8	20.98	0.010	24	0.012	24.72	7.87	8.83	1.21	1.41	2.62		0.60	226.01	225.41
DMH-WF20	IB-10C	31	5.97	5.97	10	0.06	0.45	7.8	20.98	0.010	24	0.012	24.52	7.81	8.77	1.19	1.42	2.61		0.31	225.31	225.00

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-WPC7 TO DMH-WPC6

Surface Cover	A (ac)	C	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)	C	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)		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

DMH-WPC7 TO DMH-WPC 8

Surface Cover	A (ac)	C	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

CB-WPC9 TO DMH-WPC8

Surface Cover	A (ac)	C	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)	C	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)	C	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)	C	Product A x C
impervious	0.20	0.9	0.180248
lands/grass	0.38	0.2	0.076878
woods	0.25	0.15	0.037238
sum =	0.83	sum =	0.29

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

CB-WPC12 TO DMH-WPC9

Surface Cover	A (ac)	C	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)		A x C
impervious	0.43	0.9	0.390909
lands/grass	0.44	0.2	0.087153
woods	0.25	0.15	0.037238
sum =	1.12	sum =	0.52

C = **0.46** = total product / total area

Closed Drainage System **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-SSL1 TO DMH-SSL1

Surface Cover	A (ac)	C	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 area

CB-SSL2 TO DMH-SSL1

Surface Cover	A (ac)	C	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 area

DMH-SSL1 TO DMH-SSL2

Surface	A	C	Product

Cover	(ac)		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

DMH-SSL2 TO DMH-SSL3

Surface Cover	A (ac)	C	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)	C	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)	C	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
sum =	0.13	sum =	0.04

C = **0.30** = total product / total area

DMH-SSL3 TO DMH-SSL4

Surface Cover	A (ac)	C	Product A x C
impervious	0.40	0.9	0.360723
lands/grass	0.77	0.2	0.153898
woods	0.00	0.15	0
sum =	1.17	sum =	0.51

C = **0.44** = total product / total area

DMH-SSL4 TO DMH-SSL5

Surface Cover	A (ac)	C	Product A x C
impervious	0.40	0.9	0.360723
lands/grass	0.77	0.2	0.153898
woods	0.00	0.15	0
sum =	1.17	sum =	0.51

C = **0.44** = total product / total area

DMH-SSL5 TO IB-2B-A

Surface Cover	A (ac)	C	Product A x C
impervious	0.40	0.9	0.360723

lands/grass	0.77	0.2	0.153898
woods	0.00	0.15	0
sum =	1.17	sum =	0.51

C = **0.44** = total product / total area

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-WPC5 TO DMH-WPC5

Surface Cover	A (ac)	C	Product A x C
impervious	0.27	0.9	0.242066
lands/grass	0.39	0.2	0.077759
woods	0.00	0.15	0
sum =	0.66	sum =	0.32

C = **0.49** = total product / total area

CB-WPC6 TO DMH-WPC6

Surface Cover	A (ac)	C	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 = **0.69** = total product / total area

DMH-WPC6 TO FLARED END

Surface Cover	A (ac)	C	Product 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

Closed Drainage System **SM-3719C**

Project:	The Cottages at Wandering Pond	By	PFK	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-WPC3 TO DMH-WPC2

Surface Cover	A (ac)	C	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)	C	Product A x C
impervious	0.19	0.9	0.16938
lands/grass	0.13	0.2	0.025693
woods	0.00	0.15	0
sum =	0.32	sum =	0.20

C = **0.62** = total product / total area

DMH-WPC2 TO DMH-WPC3

Surface	A	C	Product

Cover	(ac)		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 = $\boxed{\mathbf{0.31}}$ = total product / total area

DMH-WPC3 TO DMH-WPC4

Surface Cover	A (ac)	C	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 = $\boxed{\mathbf{0.31}}$ = total product / total area

DMH-WPC4 TO FLARED END

Surface Cover	A (ac)	C	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 = $\boxed{\mathbf{0.31}}$ = total product / total area

Closed Drainage System 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)	C	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)	C	Product A x C
impervious	0.15	0.9	0.13938
lands/grass	0.10	0.2	0.01916
woods	0.00	0.15	0
sum =	0.25	sum =	0.16

C = **0.63** = total product / total area

CB-WPC1 TO DMH-WPC1

Surface	A	C	Product

Cover	(ac)		A x C
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)	C	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)	C	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 area

Closed Drainage System 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,
C = 0.90 impervious
C = 0.20 landscaped / grass
C = 0.15 woods

A = area (ac)

CB-WPW13 TO DMH-WPW10

Surface Cover	A (ac)	C	Product A x C
impervious	0.19	0.9	0.174029
lands/grass	0.17	0.2	0.034913
woods	0.00	0.15	0
sum =	0.37	sum =	0.21

C = **0.57** = total product / total area

CB-WPW14 TO DMH-WPW10

Surface Cover	A (ac)	C	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 area

DMH-WPW10 TO DMH-WPW9

Surface	A	C	Product

Cover	(ac)		A x C
impervious	0.23	0.9	0.208822
lands/grass	0.23	0.2	0.046763
woods	0.00	0.15	0
sum =	0.47	sum =	0.26

C = **0.55** = total product / total area

CB-WFW11 TO DMH-WFW9

Surface Cover	A (ac)	C	Product A x C
impervious	0.27	0.9	0.242211
lands/grass	0.11	0.2	0.021102
woods	0.00	0.15	0
sum =	0.37	sum =	0.26

C = **0.70** = total product / total area

CB-WFW12 TO DMH-WFW9

Surface Cover	A (ac)	C	Product A x C
impervious	0.05	0.9	0.042541
lands/grass	0.04	0.2	0.007635
woods	0.00	0.15	0
sum =	0.09	sum =	0.05

C = **0.59** = total product / total area

DMH-WFW9 TO DMH-WFW8

Surface Cover	A (ac)	C	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)	C	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

Closed Drainage System 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)	C	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)	C	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

Surface	A	C	Product

Cover	(ac)		A x C
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)	C	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)	C	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)	C	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 = **0.55** = total product / total area

DMH-WFW7 TO DMH-WFW6

Surface Cover	A (ac)	C	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 = **0.55** = total product / total area

CB-WFW9 TO DMH-WFW6

Surface Cover	A (ac)	C	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 area

CB-WFW10 TO DMH-WFW6

Surface Cover	A (ac)	C	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-WFW4

Surface Cover	A (ac)	C	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-WFW4

Surface Cover	A (ac)	C	Product A x C
impervious	0.05	0.9	0.044483
lands/grass	0.01	0.2	0.002553
woods	0.00	0.15	0
sum =	0.06	sum =	0.05

C = **0.76** = total product / total area

CB-WFW8 TO DMH-WFW4

Surface Cover	A (ac)	C	Product A x C
impervious	0.08	0.9	0.07314
lands/grass	0.07	0.2	0.013866
woods	0.00	0.15	0

sum =	0.15	sum =	0.09

C = **0.58** = total product / total area

DMH-WFW4 TO DMH-WFW3

Surface Cover	A (ac)	C	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)	C	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)	C	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

C = **0.76** = total product / total area

DMH-WFW3 TO IB-5D

Surface Cover	A (ac)	C	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 area

Closed Drainage System 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-AS1 TO DMH-AS1

Surface Cover	A (ac)	C	Product A x C
impervious	0.14	0.9	0.12595
lands/grass	0.16	0.2	0.032231
woods	0.00	0.15	0
sum =	0.30	sum =	0.16

C = **0.53** = total product / total area

CB-AS2 TO DMH-AS1

Surface Cover	A (ac)	C	Product A x C
impervious	0.23	0.9	0.202583
lands/grass	0.00	0.2	0
woods	0.00	0.15	0
sum =	0.23	sum =	0.20

C = **0.90** = total product / total area

DMH-AS1 TO FLARED END

Surface	A	C	Product

Cover	(ac)		A x C
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)	C	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)	C	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-AS2

Surface Cover	A (ac)	C	Product A x C

impervious	0.34	0.9	0.303017
lands/grass	0.03	0.2	0.006116
woods	0.00	0.15	0
sum =	0.37	sum =	0.31

C = **0.84** = total product / total area

DMH-AS2 TO FLARED END

Surface Cover	A (ac)	C	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)	C	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)	C	Product A x C
impervious	0.03	0.9	0.030847
lands/grass	0.03	0.2	0.005335

woods	0.00	0.15	0
	sum = 0.06		sum = 0.04

C = **0.59** = total product / total area

DMH-WPW1 TO FLARED END

Surface Cover	A (ac)	C	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

C = **0.72** = total product / total area

CB-WPW3 TO DMH-WPW2

Surface Cover	A (ac)	C	Product A x C
impervious	0.05	0.9	0.044483
lands/grass	0.01	0.2	0.002553
woods	0.00	0.15	0
	sum = 0.06		sum = 0.05

C = **0.76** = total product / total area

CB-WPW4 TO DMH-WPW2

Surface Cover	A (ac)	C	Product A x C
impervious	0.20	0.9	0.176756
lands/grass	0.11	0.2	0.021736
woods	0.00	0.15	0

	sum =	0.31		sum =	0.20

C = **0.65** = total product / total area

DMH-WPW2 TO FLARED END

Surface Cover	A (ac)	C	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

C = **0.67** = total product / total area

Closed Drainage System **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)	C	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 area

CB-DY1 TO DI-DY1

Surface Cover	A (ac)	C	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 area

DI-DY1 TO IB-7A

Surface	A	C	Product

Cover	(ac)		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 area

CB-BC1 TO CB-BC2

Surface Cover	A (ac)	C	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 area

CB-BC2 TO DI-BC2

Surface Cover	A (ac)	C	Product A x C
impervious	0.71	0.9	0.638905
lands/grass	0.40	0.2	0.080376
woods	0.00	0.15	0
sum =	1.11	sum =	0.72

C = **0.65** = total product / total area

DI-BC2 TO IB-7A

Surface Cover	A (ac)	C	Product A x C

impervious	0.71	0.9	0.638905
lands/grass	0.40	0.2	0.080376
woods	0.00	0.15	0
sum =	1.11	sum =	0.72

C = **0.65** = total product / total area

Closed Drainage System **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-CH3 TO IB-7B

Surface Cover	A (ac)	C	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 area

CB-CH2 TO IB-7B

Surface Cover	A (ac)	C	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 area

CB-WF4 TO DMH-WF2

Surface	A	C	Product

Cover	(ac)		A x C
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)	C	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-WF1

Surface Cover	A (ac)	C	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)	C	Product A x C

impervious	0.05	0.9	0.04312
lands/grass	0.00	0.2	0
woods	0.00	0.15	0
sum =	0.05	sum =	0.04

C = **0.90** = total product / total area

DMH-WF1 TO IB-7B

Surface Cover	A (ac)	C	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

Closed Drainage System **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-LP6 TO DMH-LP3

Surface Cover	A (ac)	C	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 area

CB-LP5 TO DMH-LP3

Surface Cover	A (ac)	C	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 area

DMH-LP3 TO IB-8

Surface	A	C	Product

Cover	(ac)		A x C
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)	C	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)	C	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 IB-8

Surface Cover	A (ac)	C	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 = **0.90** = total product / total area

CB-WF6 TO DMH-WF3

Surface Cover	A (ac)	C	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)	C	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 Cover	A (ac)	C	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

CB-LP4 TO DMH-LP2

Surface Cover	A (ac)	C	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

Surface Cover	A (ac)	C	Product A x C
impervious	0.11	0.9	0.096736
lands/grass	0.12	0.2	0.023783
woods	0.00	0.15	0
sum =	0.23	sum =	0.12

C = **0.53** = total product / total area

DMH-LP2 TO DMH-LP4

Surface Cover	A (ac)	C	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 area

DMH-LP4 TO DMH-LP1

Surface Cover	A (ac)	C	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 area

CB-LP1 TO DMH-LP1

Surface Cover	A (ac)	C	Product A x C
impervious	0.15	0.9	0.13938
lands/grass	0.08	0.2	0.016607
woods	0.00	0.15	0
sum =	0.24	sum =	0.16

C = **0.66** = total product / total area

CB-LP2 TO DMH-LP1

Surface Cover	A (ac)	C	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 Cover	A (ac)	C	Product A x C
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,
C = 0.90 impervious
C = 0.20 landscaped / grass
C = 0.15 woods

A = area (ac)

CB-WFW17 TO DMH-WFW10

Surface Cover	A (ac)	C	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)	C	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)		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

DMH-WFW9 TO DMH-WFW8

Surface Cover	A (ac)	C	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)	C	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)	C	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 = **0.49** = total product / total area

DMH-WFW8 TO DMH-WFW7

Surface Cover	A (ac)	C	Product A x C
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 area

CB-WFW13 TO DMH-WFW7

Surface Cover	A (ac)	C	Product A x C
impervious	0.41	0.9	0.373079
lands/grass	0.15	0.2	0.029031
woods	0.00	0.15	0
sum =	0.56	sum =	0.40

C = **0.72** = total product / total area

CB-WFW14 TO DMH-WFW7

Surface Cover	A (ac)	C	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 FLARED END

Surface Cover	A (ac)	C	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)	C	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

C = **0.90** = total product / total area

CB-WFW12 TO DMH-WFW5

Surface Cover	A (ac)	C	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

sum =	0.19	sum =	0.13

C = **0.67** = total product / total area

DMH-WFW5 TO FLARED END

Surface Cover	A (ac)	C	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 = **0.75** = total product / total area

Closed Drainage System 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-WF19 TO DMH-WF11

Surface Cover	A (ac)	C	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)	C	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

C = **0.76** = total product / total area

DMH-WF11 TO DMH-WF12

Surface	A	C	Product

Cover	(ac)		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

DMH-WF12 TO DMH-WF13

Surface Cover	A (ac)	C	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)	C	Product A x C
impervious	0.35	0.9	0.314256
lands/grass	0.11	0.2	0.022819
woods	0.00	0.15	0
sum =	0.46	sum =	0.34

C = **0.73** = total product / total area

CB-WF22 TO DMH-WF13

Surface Cover	A (ac)	C	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 Cover	A (ac)	C	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-WF14 TO DMH-WF15

Surface Cover	A (ac)	C	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)	C	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)	C	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)	C	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)	C	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

sum =	3.22	sum =	1.13

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

DMH-WF17 TO DMH-WF18

Surface Cover	A (ac)	C	Product A x C
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 Cover	A (ac)	C	Product A x C
impervious	0.40	0.9	0.359483
lands/grass	0.71	0.2	0.141368
woods	0.00	0.15	0
sum =	1.11	sum =	0.50

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

CB-70 TO DMH-WF21

Surface Cover	A (ac)	C	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

DMH-WF21 TO DMH-WF18

Surface Cover	A (ac)	C	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 area

CB-WF25 TO DMH-WF18

Surface Cover	A (ac)	C	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)	C	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)	C	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)	C	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)	C	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

TSS Removal Calculations

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Roof Drywells

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Roof Drywell	**0.80**	**1.00**	**0.80**	**0.20**

Total TSS Removal = 80%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: SM-3719C
Prepared By: RJM
Date: 5/31/2023

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 2A1 - Pretreatment

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Sediment Forebay	**0.25**	**0.75**	**0.19**	**0.56**

Total TSS Removal = 44%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project:	SM-3719C
Prepared By:	RJM
Date:	5/31/2023

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 2A1

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Basin w/ Pretreatment	**0.80**	**1.00**	**0.80**	**0.20**

Total TSS Removal = **80%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **SM-3719C**

Prepared By: **RJM**

Date: **5/31/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

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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

Location: Infiltration Basin 2A2 - Pretreatment

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Sediment Forebay	**0.25**	**0.75**	**0.19**	**0.56**

Total TSS Removal = **44%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **SM-3719C**

Prepared By: **RJM**

Date: **5/31/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 2A2

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Basin w/ Pretreatment	**0.80**	**1.00**	**0.80**	**0.20**

Total TSS Removal = 80%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **SM-3719C**

Prepared By: **RJM**

Date: **5/31/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 2B-A - Pretreatment

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Sediment Forebay	**0.25**	**0.75**	**0.19**	**0.56**

Total TSS Removal = **44%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **SM-3719C**

Prepared By: **RJM**

Date: **5/31/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 2B-A

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Basin w/ Pretreatment	**0.80**	**1.00**	**0.80**	**0.20**

Total TSS Removal = 80%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **SM-3719C**

Prepared By: **RJM**

Date: **5/31/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 3A - Pretreatment

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Sediment Forebay	**0.25**	**0.75**	**0.19**	**0.56**

Total TSS Removal = 44%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: SM-3719C
Prepared By: RJM
Date: 5/31/2023

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 3A

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Basin w/ Pretreatment	**0.80**	**1.00**	**0.80**	**0.20**

Total TSS Removal = **80%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **SM-3719C**
Prepared By: **RJM**
Date: **5/31/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 4A - Pretreatment

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Sediment Forebay	**0.25**	**0.75**	**0.19**	**0.56**

Total TSS Removal = 44%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **SM-3719C**
Prepared By: **RJM**
Date: **5/31/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 4A

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Basin w/ Pretreatment	**0.80**	**1.00**	**0.80**	**0.20**

Total TSS Removal = 80%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: SM-3719C

Prepared By: RJM

Date: 5/31/2023

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

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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

Location: Infiltration Basin 5B - Pretreatment

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Sediment Forebay	**0.25**	**0.75**	**0.19**	**0.56**

Total TSS Removal = 44%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **SM-3719C**

Prepared By: **RJM**

Date: **5/31/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 5B

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Basin w/ Pretreatment	**0.80**	**1.00**	**0.80**	**0.20**

Total TSS Removal = **80%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **SM-3719C**

Prepared By: **RJM**

Date: **5/31/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 5C - Pretreatment

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Sediment Forebay	**0.25**	**0.75**	**0.19**	**0.56**

Total TSS Removal = **44%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **SM-3719C**
Prepared By: **RJM**
Date: **5/31/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 5C

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Basin w/ Pretreatment	**0.80**	**1.00**	**0.80**	**0.20**

Total TSS Removal = 80%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **SM-3719C**
Prepared By: **RJM**
Date: **5/31/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 5D - Pretreatment

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Sediment Forebay	**0.25**	**0.75**	**0.19**	**0.56**

Total TSS Removal = **44%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **SM-3719C**
Prepared By: **RJM**
Date: **5/31/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 5D

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Basin w/ Pretreatment	**0.80**	**1.00**	**0.80**	**0.20**

Total TSS Removal = **80%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **SM-3719C**

Prepared By: **RJM**

Date: **5/31/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 6B - Pretreatment

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Sediment Forebay	**0.25**	**0.75**	**0.19**	**0.56**

Total TSS Removal = **44%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **SM-3719C**
Prepared By: **RJM**
Date: **5/31/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 6B

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Basin w/ Pretreatment	**0.80**	**1.00**	**0.80**	**0.20**

Total TSS Removal = 80%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **SM-3719C**

Prepared By: **RJM**

Date: **5/31/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 7A - Pretreatment

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Sediment Forebay	**0.25**	**0.75**	**0.19**	**0.56**

Total TSS Removal = 44%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **SM-3719C**
Prepared By: **RJM**
Date: **5/31/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 7A

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Basin w/ Pretreatment	0.80	1.00	0.80	0.20

Total TSS Removal = 80%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: SM-3719C
Prepared By: RJM
Date: 5/31/2023

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 7B - Pretreatment

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Sediment Forebay	**0.25**	**0.75**	**0.19**	**0.56**

Total TSS Removal = **44%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **SM-3719C**
Prepared By: **RJM**
Date: **5/31/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 7B

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Basin w/ Pretreatment	**0.80**	**1.00**	**0.80**	**0.20**

Total TSS Removal = 80%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **SM-3719C**
Prepared By: **RJM**
Date: **5/31/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 8 - Pretreatment

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Sediment Forebay	**0.25**	**0.75**	**0.19**	**0.56**

Total TSS Removal = 44%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **SM-3719C**
Prepared By: **RJM**
Date: **5/31/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 8

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Basin w/ Pretreatment	**0.80**	**1.00**	**0.80**	**0.20**

Total TSS Removal = **80%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **SM-3719C**

Prepared By: **RJM**

Date: **5/31/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 10B - Pretreatment

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Sediment Forebay	**0.25**	**0.75**	**0.19**	**0.56**

Total TSS Removal = 44%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **SM-3719C**
Prepared By: **RJM**
Date: **5/31/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 10B

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Basin w/ Pretreatment	**0.80**	**1.00**	**0.80**	**0.20**

Total TSS Removal = 80%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **SM-3719C**
Prepared By: **RJM**
Date: **5/31/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 10C - Pretreatment (P-9A)

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Grass w/ Gravel Strip	**0.44**	**1.00**	**0.44**	**0.56**

Total TSS Removal = 44%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: SM-3719C

Prepared By: RJM

Date: 5/31/2023

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 10C - Pretreatment (P-10C)

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Sediment Forebay	**0.25**	**0.75**	**0.19**	**0.56**

Total TSS Removal = 44%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **SM-3719C**
Prepared By: **RJM**
Date: **5/31/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Infiltration Basin 10C

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Infiltration Basin w/ Pretreatment	**0.80**	**1.00**	**0.80**	**0.20**

Total TSS Removal = **80%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project:	**SM-3719C**
Prepared By:	**RJM**
Date:	**5/31/2023**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

COTTAGES AT WANDERING POND
STOW, MA

Area	0.34 ac	Unit Site Designation	DMH AS1
Weighted C	0.9	Rainfall Station #	69
t_c	6 min		
CDS Model	1515-3	CDS Treatment Capacity	1.0 cfs

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	10.2%	10.2%	0.01	0.01	9.8
0.04	9.6%	19.8%	0.01	0.01	9.3
0.06	9.4%	29.3%	0.02	0.02	9.1
0.08	7.7%	37.0%	0.02	0.02	7.4
0.10	8.6%	45.6%	0.03	0.03	8.2
0.12	6.3%	51.9%	0.04	0.04	6.0
0.14	4.7%	56.5%	0.04	0.04	4.4
0.16	4.6%	61.2%	0.05	0.05	4.4
0.18	3.5%	64.7%	0.06	0.06	3.3
0.20	4.3%	69.1%	0.06	0.06	4.0
0.25	8.0%	77.1%	0.08	0.08	7.4
0.30	5.6%	82.7%	0.09	0.09	5.1
0.35	4.4%	87.0%	0.11	0.11	3.9
0.40	2.5%	89.5%	0.12	0.12	2.2
0.45	2.5%	92.1%	0.14	0.14	2.2
0.50	1.4%	93.5%	0.16	0.16	1.2
0.75	5.0%	98.5%	0.23	0.23	4.1
1.00	1.0%	99.5%	0.31	0.31	0.8
1.50	0.0%	99.5%	0.47	0.47	0.0
2.00	0.0%	99.5%	0.62	0.62	0.0
3.00	0.5%	100.0%	0.93	0.93	0.2
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					92.9
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.5%
				Predicted Net Annual Load Removal Efficiency =	**86.4%**

1 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CONTECH ENGINEERED SOLUTIONS

CDS TECHNOLOGIES

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD

COTTAGES AT WANDERING POND
STOW, MA

Area	0.33 ac	Unit Site Designation	DMH AS2
Weighted C	0.9	Rainfall Station #	69
t_c	6 min		
CDS Model	1515-3	CDS Treatment Capacity	1.0 cfs

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	10.2%	10.2%	0.01	0.01	9.8
0.04	9.6%	19.8%	0.01	0.01	9.3
0.06	9.4%	29.3%	0.02	0.02	9.1
0.08	7.7%	37.0%	0.02	0.02	7.4
0.10	8.6%	45.6%	0.03	0.03	8.2
0.12	6.3%	51.9%	0.04	0.04	6.0
0.14	4.7%	56.5%	0.04	0.04	4.4
0.16	4.6%	61.2%	0.05	0.05	4.4
0.18	3.5%	64.7%	0.05	0.05	3.3
0.20	4.3%	69.1%	0.06	0.06	4.0
0.25	8.0%	77.1%	0.07	0.07	7.4
0.30	5.6%	82.7%	0.09	0.09	5.1
0.35	4.4%	87.0%	0.10	0.10	3.9
0.40	2.5%	89.5%	0.12	0.12	2.3
0.45	2.5%	92.1%	0.13	0.13	2.2
0.50	1.4%	93.5%	0.15	0.15	1.2
0.75	5.0%	98.5%	0.22	0.22	4.1
1.00	1.0%	99.5%	0.30	0.30	0.8
1.50	0.0%	99.5%	0.45	0.45	0.0
2.00	0.0%	99.5%	0.60	0.60	0.0
3.00	0.5%	100.0%	0.90	0.90	0.2
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					93.0
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.5%
				Predicted Net Annual Load Removal Efficiency =	**86.6%**

1 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA

2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CONTECH ENGINEERED SOLUTIONS

CDS TECHNOLOGIES

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION BASED ON THE RATIONAL RAINFALL METHOD

COTTAGES AT WANDERING POND
STOW, MA

Area	**0.07 ac**	Unit Site Designation	**DMH WPW1**
Weighted C	**0.9**	Rainfall Station #	**69**
t_c	**6 min**		
CDS Model	**2015-4**	CDS Treatment Capacity	**1.4 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	10.2%	10.2%	0.00	0.00	9.9
0.04	9.6%	19.8%	0.00	0.00	9.4
0.06	9.4%	29.3%	0.00	0.00	9.2
0.08	7.7%	37.0%	0.01	0.01	7.5
0.10	8.6%	45.6%	0.01	0.01	8.3
0.12	6.3%	51.9%	0.01	0.01	6.1
0.14	4.7%	56.5%	0.01	0.01	4.5
0.16	4.6%	61.2%	0.01	0.01	4.5
0.18	3.5%	64.7%	0.01	0.01	3.4
0.20	4.3%	69.1%	0.01	0.01	4.2
0.25	8.0%	77.1%	0.02	0.02	7.7
0.30	5.6%	82.7%	0.02	0.02	5.4
0.35	4.4%	87.0%	0.02	0.02	4.2
0.40	2.5%	89.5%	0.03	0.03	2.4
0.45	2.5%	92.1%	0.03	0.03	2.4
0.50	1.4%	93.5%	0.03	0.03	1.3
0.75	5.0%	98.5%	0.05	0.05	4.8
1.00	1.0%	99.5%	0.06	0.06	1.0
1.50	0.0%	99.5%	0.09	0.09	0.0
2.00	0.0%	99.5%	0.13	0.13	0.0
3.00	0.5%	100.0%	0.19	0.19	0.4
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					96.6
				Removal Efficiency Adjustment[2] =	6.5%
				Predicted % Annual Rainfall Treated =	93.5%
				Predicted Net Annual Load Removal Efficiency =	**90.1%**

1 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD

COTTAGES AT WANDERING POND
STOW, MA

Area	**0.23 ac**	Unit Site Designation	**DMH WPW2**
Weighted C	**0.9**	Rainfall Station #	**69**
t_c	**6 min**		
CDS Model	**1515-3**	CDS Treatment Capacity	**1.0 cfs**

Rainfall Intensity[1] (in/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (cfs)	Treated Flowrate (cfs)	Incremental Removal (%)
0.02	10.2%	10.2%	0.00	0.00	9.9
0.04	9.6%	19.8%	0.01	0.01	9.3
0.06	9.4%	29.3%	0.01	0.01	9.1
0.08	7.7%	37.0%	0.02	0.02	7.4
0.10	8.6%	45.6%	0.02	0.02	8.2
0.12	6.3%	51.9%	0.02	0.02	6.0
0.14	4.7%	56.5%	0.03	0.03	4.4
0.16	4.6%	61.2%	0.03	0.03	4.4
0.18	3.5%	64.7%	0.04	0.04	3.4
0.20	4.3%	69.1%	0.04	0.04	4.1
0.25	8.0%	77.1%	0.05	0.05	7.5
0.30	5.6%	82.7%	0.06	0.06	5.2
0.35	4.4%	87.0%	0.07	0.07	4.0
0.40	2.5%	89.5%	0.08	0.08	2.3
0.45	2.5%	92.1%	0.09	0.09	2.3
0.50	1.4%	93.5%	0.10	0.10	1.2
0.75	5.0%	98.5%	0.15	0.15	4.4
1.00	1.0%	99.5%	0.21	0.21	0.8
1.50	0.0%	99.5%	0.31	0.31	0.0
2.00	0.0%	99.5%	0.41	0.41	0.0
3.00	0.5%	100.0%	0.62	0.62	0.3
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
0.00	0.0%	100.0%	0.00	0.00	0.0
					94.3

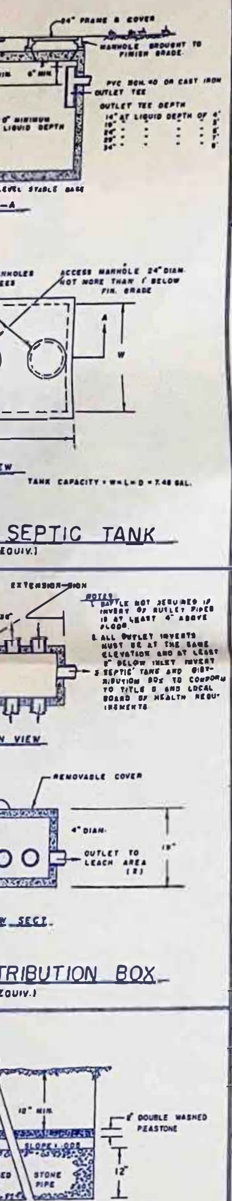
Removal Efficiency Adjustment[2] = 6.5%

Predicted % Annual Rainfall Treated = 93.5%

Predicted Net Annual Load Removal Efficiency = 87.9%

1 - Based on 10 years of hourly precipitation data from NCDC Station 770, Boston WSFO AP, Suffolk County, MA
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

Soil Evaluation



DATE OF TESTING: 4-22-94
TEST BY: THOMAS LAND SURVEYORS & ENG. CONSUL. INC.
WITNESSED BY: STOW BD. OF HEALTH AGENT

#1 DEPTH OF TEST: 40"
RATE: 3.2 M.P.I.

#2 DEPTH OF TEST: 50"
RATE: 3.0 M.P.I.

TEST HOLE DATA

4—22—94
#1 — 120"

0"-20" SUBSOIL & FILL
20"-120" COARSE SAND-GRAVEL
WATER AT 84" OR EL. 226.5

#2 —— 120"

0"-24" SUBSOIL & FILL
24"-52" GRAVEL W/FINES
52"-120" COARSE SAND-GRAVEL
WATER AT 84" OR EL 226.5

I certify that on April, 1995, I have passed the examination approved by the Department of Environmental Protection and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017(2).

Thomas F. DiPersio

5/3/02
(EL. = 233.0)
0-48" C1-GRAVEL W/BLDRS - 2.5Y6/6
48-120" C2-GRAVEL - 2.5Y 6/6
WATER AT 90", EL. = 225.5
MOTTLES AT 80", EL. = 226.3

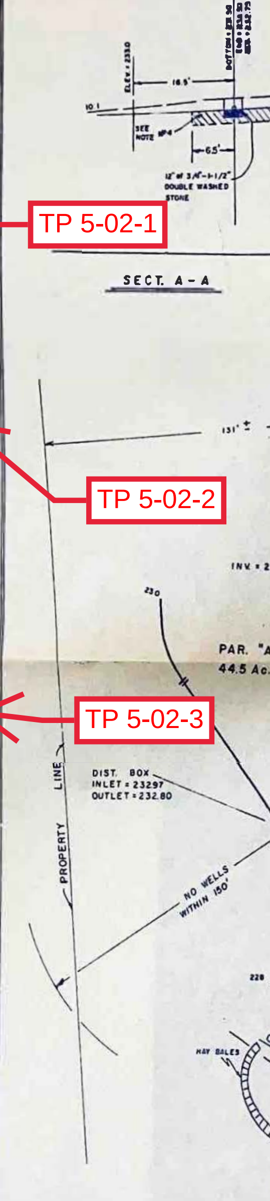
DESIGN DATA

NO. OF BEDROOMS: 0 - 1 BATHROOM
AUTOMATIC WASHER: NO
GARBAGE GRINDER: NO
DESIGN FLOW: 110 G.P.D. PER BEDROOM
REQUIRED SEPTIC TANK: 1500 GAL.
PROPOSED SEPTIC TANK: 1500 GAL.
REQUIRED LEACHING AREA:

440 G.P.D. (TITLE V)
(440) (1.50) = 660 G.P.D. (TOWN)

PROPOSED LEACHING AREA:

3-50' TRENCHES, 3' WIDE, 10' ON CTR., EXPAN. BETWEEN W/12" OF 3/4"-1-1/2" OF DOUBLE WASHED STONE.



Location Address or Lot No. PCL. A-ATHENS LANE-(BARN)

On-site Review

TP 5-02-3

Deep Hole Number 3 Date: 5/3/02 Time: 3:45 Weather FAIR

Location (identify on site plan) SEE PLAN

Land Use FARM Slope (%) 1% Surface Stones NO

Vegetation FIELD GRASS

Landform TERRACE

Position on landscape (sketch on the back) SEE PLAN

Distances from:

Open Water Body 300± feet
Possible Wet Area 115 feet
Drinking Water Well 160 feet
Drainage way 115 feet
Property Line 180 feet
Other

DEEP OBSERVATION HOLE LOG*

Depth from Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
48"	C1	GRAVEL w/BOULDERS	2.5Y6/6	NO	COARSE, LOOSE BOULDERS.
120"	C2	GRAVEL	2.5Y6/6	80"	COARSE, MASSIVE

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) SAND

Depth to Bedrock: MORE THAN 120"

Depth to Groundwater: Standing Water in the Hole: 90" Weeping from Pit Face: 90"

Estimated Seasonal High Ground Water: 80"

DEP

DEP APPROVED FORM - 12/07/95

RECEIVED 8/5/02 CD

Sheet: 1 of 1 Job no.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MAP R-2 PARCEL 4 & 5
Site Address or Map/Lot Number
STOW, MA
QUIRK PROPERTY

STAMSKI AND McNARY, INC.

C. On-Site Review

(minimum of two holes required at every proposed disposal area)

PREPARED FOR:
FENTON & SON
ACTON, MA

Deep Observation Hole A: 7/27/2005 Date ________ Time Sun Weather

1. Deep Observation Hole Logs

Deep Hole Number 7 Ground Elevation at Surface of Hole ________

TP 7-05-7

Location (Identify on Plan) ________

2. Land Use: FIELD (e.g. woodland, agricultural field, vacant lot, etc.) ________ Surface Stones ________ Slope (%)

BRUSH Vegetation ________ Landform ________ Position on landscape (attach sheet)

3. Distances from: Open Water Body ____ feet Drainage Way ____ feet Possible Wet Area >100 feet PER RECORD PLAN

Property Line ____ feet Drinking Water Well ____ feet Other ________

4. Parent Material: ________ Unsuitable Materials Present: Yes ☐ No ☑

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☒

If Yes: Depth Weeping from Pit – Depth Standing Water in Hole –

Estimated Depth to High Groundwater: 40 Inches ________ elevation

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MAP R-2 PARCELS 4 & 5
Site Address or Map/Lot Number
STOW, MA

Deep Observation Hole A: Deep Hole Number: 7

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
6	A	10YR 3/2	–	–	–	SL	–	10	M	F	
20	B	10YR 5/6	–	–	–	SL	–	–	M	F	
135	C	2.5Y 6/2	40	5YR 5/8	>10	LOAMY SAND	–	–	M	VERY FRIABLE	

Additional Notes ________

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MAP R-2 PARCEL 4 & 5
Site Address or Map/Lot Number
STOW, MA
QUIRK PROPERTY

STAMSKI AND McNARY, INC.

C. On-Site Review

(minimum of two holes required at every proposed disposal area)

PREPARED FOR: FENTON & SON ACTON, MA

Deep Observation Hole A: 7/27/2005 Date ______ Time SUN 95° Weather

1. Deep Observation Hole Logs

Deep Hole Number 8 Ground Elevation at Surface of Hole ______

Location (Identify on Plan) ______

TP 7-05-8

2. Land Use: FIELD (e.g. woodland, agricultural field, vacant lot, etc.) ______ Surface Stones | Slope (%)

BRUSH Vegetation ______ Landform ______ Position on landscape (attach sheet)

3. Distances from: Open Water Body — feet Drainage Way ______ feet Possible Wet Area >100 feet PER RECORD PLAN

Property Line ______ feet Drinking Water Well ______ feet Other ______

4. Parent Material: ______ Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☒

If Yes: Depth Weeping from Pit — Depth Standing Water in Hole —

Estimated Depth to High Groundwater: 40 Inches ______ elevation

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MAP R-2 PARCELS 4 & 5
Site Address or Map/Lot Number
STOW, MA

Deep Observation Hole A: Deep Hole Number: 8

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
6	A	10YR 3/2	–	–	–	SL	–	–	M	F	
20	B	10YR 5/6	–	–	–	SL	–	–	M	F	
132	C	2.5Y 6/2	40	5YR 5/8	>5	LOAMY SAND	–	–	M	VERY FRIABLE	

Additional Notes ______

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MAP R-2 PARCEL 4 & 5
Site Address or Map/Lot Number
STOW, MA
QUIRK PROPERTY

STAMSKI AND McNARY, INC.

PREPARED FOR:
FENTON & SON
ACTON, MA

TP 7-05-9

C. On-Site Review

(minimum of two holes required at every proposed disposal area)

Deep Observation Hole A: 7/27/2005 Date ______ Time SUN 95° Weather

1. Deep Observation Hole Logs

Deep Hole Number 9 Ground Elevation at Surface of Hole ______

Location (Identify on Plan) ______

2. Land Use: FIELD (e.g. woodland, agricultural field, vacant lot, etc.) ______ Surface Stones | Slope (%)

______ Vegetation ______ Landform ______ Position on landscape (attach sheet)

3. Distances from: Open Water Body >100 feet Drainage Way — feet Possible Wet Area >100 feet PER RECORD PLAN

Property Line — feet Drinking Water Well — feet Other >200 TO PERENNIAL STREAM

4. Parent Material: ______ Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☒

If Yes: Depth Weeping from Pit 94 Depth Standing Water in Hole —

Estimated Depth to High Groundwater: 32 Inches ______ elevation

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MAP R-2 PARCELS 4 & 5
Site Address or Map/Lot Number
STOW, MA

Deep Observation Hole A: Deep Hole Number: 9

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
4	A	10YR 3/2	—	—	—	SL	—	—	M	F	
18	B	10YR 5/6	—	—	—	SL	—	—	M	F	
130	C	2.5Y 6/2	32	5YR 5/8	~~10~~ >10	LS	—	—	M	F	

Additional Notes ______

TP 7-05-10

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MAP R-2 PARCEL 4 & 5
Site Address or Map/Lot Number
STOW, MA
QUIRK PROPERTY

STAMSKI AND McNARY, INC.

PREPARED FOR:
FENTON & SON
ACTON, MA

C. On-Site Review

(minimum of two holes required at every proposed disposal area)

Deep Observation Hole A: 7/27/2005 (Date) ______ (Time) Sun 95° (Weather)

1. Deep Observation Hole Logs

   Deep Hole Number 10 Ground Elevation at Surface of Hole ______

   Location (Identify on Plan) ______

2. Land Use: FIELD (e.g. woodland, agricultural field, vacant lot, etc.) ______ Surface Stones ______ Slope (%)

   BRUSH Vegetation ______ Landform ______ Position on landscape (attach sheet)

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Possible Wet Area ≥ 100 feet PER RECORD PLAN

   Property Line ______ feet Drinking Water Well ______ feet Other ______

4. Parent Material: ______ Unsuitable Materials Present: Yes ☐ No ☒ FILL AT SURFACE

   If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☒

   If Yes: Depth Weeping from Pit — Depth Standing Water in Hole —

   Estimated Depth to High Groundwater: 30" (Inches) ______ (elevation)

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MAP R-2 PARCELS 4 & 5
Site Address or Map/Lot Number
STOW, MA

Deep Observation Hole A: Deep Hole Number: 10

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
6	A	10YR 3/2	–	–	–	SL	–	20	M	F	
19	B	10YR 5/6	–	–	–	SL	–	–	M	F	
130	C	2.5Y 6/2	30"	10YR 5/8	>10	LOAMY SAND	–	–	VERY FINE MASSIVE	F	

Additional Notes ______

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MAP R-2 PARCEL 4 & 5
Site Address or Map/Lot Number
STOW, MA
QUIRK PROPERTY

STAMSKI AND McNARY, INC.

PREPARED FOR:
FENTON & SON
ACTON, MA

C. On-Site Review

(minimum of two holes required at every proposed disposal area)

Deep Observation Hole A: 7/27/2005 Date ______ Time Sun 95° Weather

1. Deep Observation Hole Logs

Deep Hole Number 11 Ground Elevation at Surface of Hole ______

Location (Identify on Plan) ______

TP 7-05-11

2. Land Use: FIELD (e.g. woodland, agricultural field, vacant lot, etc.) ______ Surface Stones ______ Slope (%)

BRUSH Vegetation ______ Landform ______ Position on landscape (attach sheet)

3. Distances from: Open Water Body – feet Drainage Way – feet Possible Wet Area >100 Per RECORD PLAN feet

Property Line – feet Drinking Water Well – feet Other –

4. Parent Material: ______ Unsuitable Materials Present: Yes ☐ No ☒ FILL WITHIN A & B HORIZON ONLY

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☐

If Yes: Depth Weeping from Pit 76 Depth Standing Water in Hole –

Estimated Depth to High Groundwater: 34" inches ______ elevation

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MAP R-2 PARCELS 4 & 5
Site Address or Map/Lot Number
STOW, MA

Deep Observation Hole A: Deep Hole Number: 11

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles) Depth	Color	Percent	Soil Texture (USDA)	Coarse Fragments % by Volume Gravel	Cobbles & Stones	Soil Structure	Soil Consistence (Moist)	Other
18	A + FILL	10YR 3/2	–	–	–	SL	–	15	M	F	BOULDERS
26	B	10YR 5/6	–	–	–	SL	–	–	M	F	
120	C	5YR 4/1	34"	5YR 5/8	>10%	LOAMY SAND	–	–	M	FRIABLE	

Additional Notes ______

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MAP R-2 PARCEL 4 & 5
Site Address or Map/Lot Number
STOW, MA
QUIRK PROPERTY

STAMSKI AND McNARY, INC.

PREPARED FOR:
FENTON & SON
ACTON, MA

C. On-Site Review

(minimum of two holes required at every proposed disposal area)

Deep Observation Hole A: 7/27/2005 (Date) ______ (Time) Sun 90° (Weather)

1. Deep Observation Hole Logs

Deep Hole Number 12 Ground Elevation at Surface of Hole ______

Location (Identify on Plan) ADJACENT TO BARN

TP 7-05-12

2. Land Use: ~~SEED~~ GRASS (e.g. woodland, agricultural field, vacant lot, etc.) ______ Surface Stones ______ Slope (%)

BRUSH (Vegetation) ______ Landform ______ Position on landscape (attach sheet)

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Possible Wet Area ______ feet

Property Line ______ feet Drinking Water Well ______ feet Other ______

4. Parent Material: ______ Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil☐ Fill Material☐ Impervious Layer(s) ☐ Weathered/Fractured Rock☐ Bedrock☐

~~SLAB~~
6" DRAIN TILE
3-4' DEEP
18' OFF BARN

5. Groundwater Observed: Yes ☐ No ☒

If Yes: Depth Weeping from Pit ______ Depth Standing Water in Hole ______

Estimated Depth to High Groundwater: ~~49~~ 38" inches ______ elevation

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MAP R-2 PARCELS 4 & 5
Site Address or Map/Lot Number
STOW, MA

Deep Observation Hole A: Deep Hole Number: 12

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
6	A	10YR 3/2	–	–	–	SL	–	–	M	F	
18	B	10YR 5/6		–	–	SL	–	–	M	F	
72	C_1	2.5Y 6/4	38	5YR 5/8	>5%	LOAMY SAND	–	5	M	F	
132	C_2	2.5Y 5/4				SAND	15	2	SG	LOOSE	

Additional Notes ______

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MAP R-2 PARCEL 4 + 5
Site Address or Map/Lot Number
STOW, MA
QUIRK PROPERTY

STAMSKI AND McNARY, INC.

PREPARED FOR:
FENTON & SON
ACTON, MA

C. On-Site Review *(minimum of two holes required at every proposed disposal area)*

Deep Observation Hole A: 7/27/2005 Date ______ Time Sun 90° Weather

1. Deep Observation Hole Logs

Deep Hole Number 13 Ground Elevation at Surface of Hole ______

Location (Identify on Plan) ______

TP 7-05-13

2. Land Use: FIELD - ADJACENT TO CHICKEN COOP (e.g. woodland, agricultural field, vacant lot, etc.) ______ Surface Stones ______ Slope (%)

BRUSH Vegetation ______ Landform ______ Position on landscape (attach sheet)

3. Distances from: Open Water Body >100 feet Drainage Way — feet Possible Wet Area >100 feet PER RECORD PLAN

Property Line — feet Drinking Water Well — feet Other ______

4. Parent Material: ______ Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☒ No ☐

If Yes: Depth Weeping from Pit 94 Depth Standing Water in Hole —

Estimated Depth to High Groundwater: 35" inches ______ elevation

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MAP R-2 PARCELS 4 + 5
Site Address or Map/Lot Number
STOW, MA

Deep Observation Hole A: Deep Hole Number: 13

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
7	A	10YR 3/2	—	—	—	SL	—	20	M	F	BOULDERS
14	B	10YR 5/6	—	—	—	SL	—	—	M	F	
35	C1	2.5Y 5/4	35	5YR 5/8	>10%	SAND	2	—	M	VERY FRIABLE	
120	C2	2.5Y 6/3				LOAMY SAND	—	—	M	VERY FINE	

Additional Notes ______

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MAP R-2 PARCEL 4 & 5
Site Address or Map/Lot Number
STOW, MA
QUIRK PROPERTY

STAMSKI AND McNARY, INC.

TP 7-05-14

C. On-Site Review

(minimum of two holes required at every proposed disposal area)

PREPARED FOR: FENTON & SON ACTON, MA

Deep Observation Hole A: 7/27/2005 (Date) ______ (Time) Sun 90° (Weather)

1. Deep Observation Hole Logs

   Deep Hole Number 14 Ground Elevation at Surface of Hole ______

   Location (Identify on Plan) NEAR BOXTRUCK

2. Land Use: FIELD (e.g. woodland, agricultural field, vacant lot, etc.) ______ Surface Stones 1 Slope (%)

   BRUSH (Vegetation) ______ (Landform) ______ (Position on landscape (attach sheet))

3. Distances from: Open Water Body >100 feet Drainage Way — feet Possible Wet Area >100 feet PER RECORD PLAN

   Property Line — feet Drinking Water Well — feet Other ______

4. Parent Material: ______ Unsuitable Materials Present: Yes ☐ No ☒

   If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☒

   If Yes: Depth Weeping from Pit 110 Depth Standing Water in Hole ______

   Estimated Depth to High Groundwater: 34" (inches) ______ (elevation)

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MAP R-2 PARCELS 4 & 5
Site Address or Map/Lot Number
STOW, MA

Deep Observation Hole A: Deep Hole Number: 14

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles) Depth	Color	Percent	Soil Texture (USDA)	Coarse Fragments % by Volume Gravel	Cobbles & Stones	Soil Structure	Soil Consistence (Moist)	Other
18	A +FILL	10YR 3/2	—	—	—	SL	—	15	M	F	BOULDERS MINOR
24	B	10YR 5/6	—	—	—	SL	—	10	M	F	FILL AT SURFACE
120	C	2.5Y 6/3	34	5YR 5/8	15	LOAMY SAND	-	15	M	F	

Additional Notes ______

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MAP R-2 PARCEL 4 & 5
Site Address or Map/Lot Number
STOW, MA
QUIRK PROPERTY

STAMSKI AND McNARY, INC.

TP 7-05-15

C. On-Site Review (minimum of two holes required at every proposed disposal area)

PREPARED FOR:
FENTON & SON
ACTON, MA

Deep Observation Hole A: 7/27/2005 Date ______ Time ______ Weather

1. Deep Observation Hole Logs

Deep Hole Number 15 Ground Elevation at Surface of Hole ______

Location (Identify on Plan) ______

2. Land Use: GRASS (e.g. woodland, agricultural field, vacant lot, etc.) ______ Surface Stones ______ Slope (%)

______ Vegetation ______ Landform ______ Position on landscape (attach sheet)

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Possible Wet Area ______ feet

Property Line ______ feet Drinking Water Well ______ feet Other ______

4. Parent Material: ______ Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☒

If Yes: Depth Weeping from Pit ______ Depth Standing Water in Hole ______

Estimated Depth to High Groundwater: 52 inches ______ elevation

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MAP R-2 PARCELS 4 & 5
Site Address or Map/Lot Number
STOW, MA

Deep Observation Hole A: Deep Hole Number: 15

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
6	A	10YR 3/2	–	–	–	SL	–	–	M	F	
20	B	10YR 5/6	–	–	–	SL	–	–	M	F	
130	C	2.5Y 6/3	52	5YR 5/8	75	LOAMY SAND	10	3	M	VERY FRIABLE TO LOOSE	

Additional Notes ______

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MAP R-2 PARCEL 4 & 5
Site Address or Map/Lot Number
STOW, MA
QUIRK PROPERTY

STAMSKI AND McNARY, INC.

C. On-Site Review

(minimum of two holes required at every proposed disposal area)

PREPARED FOR:
FENTON & SON
ACTON, MA

Deep Observation Hole A: 7/27/2005 Date ______ Time ______ Weather

1. Deep Observation Hole Logs

Deep Hole Number 16 Ground Elevation at Surface of Hole ______

Location (Identify on Plan) ______

TP 7-05-16

2. Land Use: LAWN AREA (e.g. woodland, agricultural field, vacant lot, etc.) ______ Surface Stones ______ Slope (%)

BRUSH Vegetation ______ Landform ______ Position on landscape (attach sheet)

3. Distances from: Open Water Body — feet Drainage Way — feet Possible Wet Area >100 feet

Property Line — feet Drinking Water Well — feet Other —

4. Parent Material: ______ Unsuitable Materials Present: Yes ☐ No ☒

If Yes: Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock ☐

5. Groundwater Observed: Yes ☐ No ☒

If Yes: Depth Weeping from Pit — Depth Standing Water in Hole —

Estimated Depth to High Groundwater: 40 inches ______ elevation

Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wastewater Permitting Program
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

MAP R-2 PARCELS 4 & 5
Site Address or Map/Lot Number
STOW, MA

Deep Observation Hole A: Deep Hole Number: 16

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
7	A	10YR 3/2	—	—	-	SL	—	15	M	F	BOULDERS
26	B	10YR 5/6	—	-	-	SL	-	15	M	F	
124	C	2.5Y 6/3	40	5YR 5/8	>5	LS	3	5	M	F	

Additional Notes ______

Commonwealth of Massachusetts
City/Town of

TP 6-19-1

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-1 (Hole #) | 6/4/19 (Date) | ____ (Time) | ____ (Weather) | ____ (Latitude) | ____ (Longitude:)

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | ____ (Vegetation) | No (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | ____ (Slope (%))

   Description of Location: Off cart path

2. Soil Parent Material: Outwash | ____ (Landform) | BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >100' feet | Drainage Way >100' feet | Wetlands >100' feet

   Property Line >10' feet | Drinking Water Well >100' feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: — Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-10	Ap	SL	10YR 3/2	–	–	–	–	–	M	F	
10-34	Bw	LS	10YR 4/6	–	–	–	–	–	M	F	
34-115	C	Sand	10YR 5/6	87"	10YR4/6	3%	7%	12%	SG	Loose	

Additional Notes:

Commonwealth of Massachusetts
City/Town of

TP 6-19-2

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-2 (Hole #) 6/4/19 (Date) ____ (Time) ____ (Weather) ____ (Latitude) ____ (Longitude:)

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) ____ (Vegetation) ____ (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ____ (Slope (%))

   Description of Location: Off cart path

2. Soil Parent Material: Outwash ____ (Landform) BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >100' feet; Drainage Way >100' feet; Wetlands >100' feet; Property Line >10' feet; Drinking Water Well >100' feet; Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: — Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	Ap	SL	10YR 3/2	–	–	–	–	–	M	F	
12-34	Bw	LS	10YR 4/6	–	–	–	–	–	M	F	
34-120	C	Sand	10YR 3/6	–	–	–	10%	7%	SG	Loose	

Additional Notes: No redox, no weeping

TP 6-19-3

Commonwealth of Massachusetts
City/Town of

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-3 (Hole #) 6/4/2019 (Date) ____ (Time) ____ (Weather) ____ (Latitude) ____ (Longitude:)

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) ____ (Vegetation) NO (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ____ (Slope (%))

   Description of Location: Off cart path

2. Soil Parent Material: Outwash ____ (Landform) BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >100' feet Drainage Way >100' feet Wetlands >100' feet

   Property Line >10' feet Drinking Water Well >100' feet Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: — Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-9	Ap	SL	10YR 3/2	–	–	–	–	–	M	F	
9-30	Bw	LS	10YR 4/6	–	–	–	–	–	m	F	
30-132	C	Sand	10YR 5/6	–	–	–	7%	12%	SG	Loose	

Additional Notes: No redox, no weeping, no standing water

Commonwealth of Massachusetts
City/Town of

TP 6-19-4

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-4 (Hole #) | 6/4/2019 (Date) | ____ (Time) | ____ (Weather) | ____ (Latitude) | ____ (Longitude:)

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | ____ Vegetation | ____ Surface Stones (e.g., cobbles, stones, boulders, etc.) | ____ Slope (%)

   Description of Location: Off cart path

2. Soil Parent Material: Outwash | ____ Landform | BS Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body >100' feet | Drainage Way >100' feet | Wetlands >100' feet

   Property Line >10' feet | Drinking Water Well >100' feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: – Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-15	Ap	SL	10YR 3/2	–	–	–	–	–	M	F	
15-34	Bw	LS	10YR 4/6	–	–	–	–	–	M	F	
34-120	C	Sand	10YR 3/6	–	–	–	15%	10%	SG	Loose	

Additional Notes: No redox, no weeping, no standing water

Commonwealth of Massachusetts
City/Town of

TP 6-19-5

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-5 (Hole #) 6/4/2019 (Date) ____ (Time) ____ (Weather) ____ (Latitude) ____ (Longitude:)

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) ____ (Vegetation) No (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ____ (Slope (%))

   Description of Location: Off cart path

2. Soil Parent Material: Outwash ____ (Landform) BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >100' feet Drainage Way >100' feet Wetlands >100' feet

   Property Line >10' feet Drinking Water Well >100' feet Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: — Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-20	Ap	SL	10YR 3/2	–	–	–	–	–	m	F	
20-40	Bw	LS	10YR 4/6	–	–	–	–	–	m	F	
40-120	C	Sand	10YR 3/6	86"	10YR 4/6	3%	16%	10%	SG	Loose	

Additional Notes: No weeping or standing water

Commonwealth of Massachusetts
City/Town of

TP 6-19-6

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-6 (Hole #) 6/4/19 (Date) ______ (Time) ______ (Weather) ______ (Latitude) ______ (Longitude:)

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) ______ (Vegetation) No (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ______ (Slope (%))

   Description of Location: Off cart path

2. Soil Parent Material: Outwash ______ (Landform) BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >100' feet; Drainage Way >100' feet; Wetlands >100' feet
   Property Line >10' feet; Drinking Water Well >100' feet; Other ______ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: — Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	Ap	SL	10YR3/2	—	—	—	—	—	m	F	
12-30	Bw	LS	10YR4/6	—	—	—	—	—	m	F	
30-144	C	Sand	10YR 5/4	—	—	—	7%	7%	SG	Loose	

Additional Notes: No redox, no weeping, no standing water

TP 6-19-7

Commonwealth of Massachusetts
City/Town of

S.W. Test Pit, not witnessed

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-7 (Hole #) 6/4/19 (Date) ____ (Time) ____ (Weather) ____ (Latitude) ____ (Longitude:)

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) ____ (Vegetation) No (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ____ (Slope (%))

   Description of Location: West of pond

2. Soil Parent Material: Outwash ____ (Landform) SU (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >100' feet Drainage Way >100' feet Wetlands >100' feet

   Property Line >10' feet Drinking Water Well >100' feet Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: — Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-9	Ap	SL	10YR 3/2	–	–	–	–	–	M	F	
9-20	Bw	LS	10YR 4/6	–	–	–	–	–	M	F	
20-120	C	Sand	10YR 5/6	92"	10YR 4/6	5%	5%	–	SG	Loose	

Additional Notes: No weeping or standing water

TP 6-19-8

Commonwealth of Massachusetts
City/Town of

S.W. Test Pit, Not witnessed

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-8 (Hole #) 6/4/2019 (Date) ____ Time ____ Weather ____ Latitude ____ Longitude:

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) ____ Vegetation No Surface Stones (e.g., cobbles, stones, boulders, etc.) ____ Slope (%)

   Description of Location: East of pond

2. Soil Parent Material: Outwash ____ Landform SU Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body >100' feet Drainage Way >100' feet Wetlands >100' feet

   Property Line >10' feet Drinking Water Well >100' feet Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: — Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	Ap	SL	10YR 3/2	—	—	—	—	—	M	F	
12-22	Bw	LS	10YR 4/6	—	—	—	—	—	M	F	
22-124	C	Sand	10YR 5/6	96"	10YR 4/6	3%	—	—	SG	Loose	

Additional Notes: No weeping or standing water

S.W. Test Pit, Not Witnessed

TP 6-19-9

Commonwealth of Massachusetts
City/Town of

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-9 (Hole #) 6/4/19 (Date) ______ (Time) ______ (Weather) ______ (Latitude) ______ (Longitude:)

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) ______ Vegetation No Surface Stones (e.g., cobbles, stones, boulders, etc.) ______ Slope (%)

   Description of Location: South of gravel road forking

2. Soil Parent Material: Outwash ______ Landform TS Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body >100' feet Drainage Way >100' feet Wetlands >100' feet

   Property Line >10' feet Drinking Water Well >100' feet Other ______ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: — Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-9	Ap	SL	10YR3/2	–	–	–	–	–	M	F	
9-24	Bw	LS	10YR 4/6	–	–	–	–	–	M	F	
24-106	C1	Sand	10YR 5/6	90"	10YR 4/6	3%	7%	–	SG	Loose	
106-132	C2	Fine sandy loam	10YR 5/6	–	–	–	–	–	M	F	

Additional Notes:

Commonwealth of Massachusetts
City/Town of

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-21-1 (Hole #) 10/25/2021 (Date) 8:00AM (Time) 45d, rain (Weather) ____ (Latitude) ____ (Longitude:)

1. Land Use AGRICULTURAL FIELD (e.g., woodland, agricultural field, vacant lot, etc.) MEADOW (Vegetation) SOME (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 0-10 (Slope (%))

   Description of Location: ____

2. Soil Parent Material: OUTWASH MORAINE (Landform) BS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >>100 feet Drainage Way ____ feet Wetlands >>100 feet

   Property Line >>10 feet Drinking Water Well >100 feet Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: ____ Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
8	A	SL	10YR 3/3	-	-	-	-	-	M	F	
20	B	LS	10YR 5/6	-	-	-	-	-	M	F	
84	C1	SAND	10YR 6/2	50	high/low	2	-	-	SG	L	
164	C2	SAND	10YR 5/3	-	-	-	-	-	SG	L	

Additional Notes:

Commonwealth of Massachusetts
City/Town of

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-21-2 (Hole #) 10/25/2021 (Date) ______ (Time) ______ (Weather) ______ (Latitude) ______ (Longitude:)

1. Land Use: ______ (e.g., woodland, agricultural field, vacant lot, etc.) ______ Vegetation ______ Surface Stones (e.g., cobbles, stones, boulders, etc.) ______ Slope (%)

   Description of Location: ______

2. Soil Parent Material: ______ ______ Landform ______ Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Wetlands ______ feet

   Property Line ______ feet Drinking Water Well ______ feet Other ______ feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: ______ Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
8	A	SL	10YR 3/3	-	-	-	-	-	M	F	
24	B	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	

Additional Notes:

Commonwealth of Massachusetts
City/Town of

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-21-3 (Hole #) 10/25/2021 (Date) ______ Time ______ Weather ______ Latitude ______ Longitude:

1. Land Use ______ (e.g., woodland, agricultural field, vacant lot, etc.) ______ Vegetation ______ Surface Stones (e.g., cobbles, stones, boulders, etc.) ______ Slope (%)

   Description of Location: ______

2. Soil Parent Material: ______ ______ Landform ______ Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Wetlands ______ feet

   Property Line ______ feet Drinking Water Well ______ feet Other ______ feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: ______ Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
6	A	SL	10YR 3/3	-	-	-	-	-	M	F	
24	B	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	

Additional Notes:

Commonwealth of Massachusetts
City/Town of

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-21-4 (Hole #) 10/25/2021 (Date) ______ (Time) ______ (Weather) ______ (Latitude) ______ (Longitude:)

1. Land Use ______ (e.g., woodland, agricultural field, vacant lot, etc.) ______ (Vegetation) R02, PARCEL4 (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ______ (Slope (%))

   Description of Location: ______

2. Soil Parent Material: ______ ______ (Landform) ______ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Wetlands ______ feet

   Property Line ______ feet Drinking Water Well ______ feet Other ______ feet

4. Unsuitable Materials Present: ☑ Yes ☐ No If Yes: ☐ Disturbed Soil ☑ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: ______ Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
22	FILL	-	-	-	-	-	-	-	-	-	
48	C1	LS	10YR 6/2	-	-	-	-	-	M	F	
66	C2	C. SAND	10YR 5/6	48	high/low	2	-	-	SG	L	
162	C3	SAND	10YR 5/3	-	-	-	-	-	SG	L	

Additional Notes:

Commonwealth of Massachusetts
City/Town of

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-21-5 (Hole #) 10/25/2021 (Date) ______ Time ______ Weather ______ Latitude ______ Longitude:

1. Land Use Athens Stre (e.g., woodland, agricultural field, vacant lot, etc.) ______ Vegetation ______ Surface Stones (e.g., cobbles, stones, boulders, etc.) ______ Slope (%)

   Description of Location: ______

2. Soil Parent Material: ______ ______ Landform ______ Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Wetlands ______ feet

   Property Line ______ feet Drinking Water Well ______ feet Other ______ feet

4. Unsuitable Materials Present: ☑ Yes ☐ No If Yes: ☐ Disturbed Soil ☑ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: ______ Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
26	FILL	-	-	-	-	-	-	-	-	-	
76	C1	C. SAND	10YR 5/6	48	high/low	2	-	-	SG	L	
156	C2	SAND	10YR 5/3	-	-	-	-	-	SG	L	

Additional Notes:

Commonwealth of Massachusetts
City/Town of

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-21-6 (Hole #) 10/25/2021 (Date) ______ Time ______ Weather ______ Latitude ______ Longitude:

1. Land Use ______ (e.g., woodland, agricultural field, vacant lot, etc.) ______ Vegetation ______ Surface Stones (e.g., cobbles, stones, boulders, etc.) ______ Slope (%)

   Description of Location: ______

2. Soil Parent Material: ______ ______ Landform ______ Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Wetlands ______ feet

   Property Line ______ feet Drinking Water Well ______ feet Other ______ feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: ______ Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
8	A	SL	10YR 3/3	-	-	-	-	-	M	F	
20	B	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	

Additional Notes:

Commonwealth of Massachusetts
City/Town of STOW

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-10-25-1 (Hole #) | 10/25/2021 (Date) | 8:30 (Time) | RAINY (Weather) | ____ (Latitude) | ____ (Longitude:)

1. Land Use: VACANT (e.g., woodland, agricultural field, vacant lot, etc.) | WOODED (Vegetation) | SOME (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | ~2 (Slope (%))

   Description of Location: ____

2. Soil Parent Material: GLACIOFLUVIAL | ____ (Landform) | ____ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 7200 feet; Drainage Way - feet; Wetlands 7100 feet; Property Line 710 feet; Drinking Water Well - feet; Other - feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: - Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-10	A	SL	10YR 3/3	-	-	-	-	-	m	F	
10-24	B	LS	10YR 4/6	-	-	-	2	-	m	F	
24-60	C1	S	10YR 3/6	-	-	-	5	10	SG	L	
60-138	C2	S	10YR 5/2	-	-	-	10	5	SG	L	

Additional Notes:

Commonwealth of Massachusetts
City/Town of STOW

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-10-25-2 (Hole #) 10/25/2021 (Date) 9:30 (Time) RAINY (Weather) ______ (Latitude) ______ (Longitude:)

1. Land Use: VACANT (e.g., woodland, agricultural field, vacant lot, etc.) WOODED (Vegetation) SOME (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ~5 (Slope (%))

Description of Location: ______

2. Soil Parent Material: TILL ______ (Landform) FS (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body >200 feet Drainage Way - feet Wetlands >100 feet
Property Line >10 feet Drinking Water Well - feet Other - feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☑ Yes ☐ No If yes: 84" Depth Weeping from Pit 132" 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-14	A	10YR 3/3	SL	-	-	-	-	-	M	F	
14-40	B	10YR 5/4	SL	-	-	-	-	-	M	F	
40-60	C1	10YR 5/2	S	60"	HIGH/LOW	75	5	5	SG	L	
60-72	C2	10YR 5/2	SL	↓	↓	↓	-	-	M	F	
72-138	C3	10YR 4/3	S	↓	↓	↓	10	15	SG	L	

Additional Notes: ______

Commonwealth of Massachusetts
City/Town of STOW

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-10-25-3 (Hole #) 10/25/2021 (Date) 10:30 (Time) RAINY (Weather) ______ (Latitude) ______ (Longitude:)

1. Land Use VACANT (e.g., woodland, agricultural field, vacant lot, etc.) WOODED (Vegetation) SOME (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ~2 (Slope (%))

   Description of Location: ______

2. Soil Parent Material: GLACIOFLUVIAL ______ (Landform) ______ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 7200 feet Drainage Way - feet Wetlands 7100 feet

   Property Line 710 feet Drinking Water Well - feet Other - feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: - Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	A	SL	10YR 3/3	-	-	-	-	-	M	F	
12-24	B	SL	10YR 3/6	-	-	-	-	-	M	F	
24-160	C	S	10YR 5/2	-	-	-	10	15	SG	L	

Additional Notes:

Commonwealth of Massachusetts
City/Town of STOW

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-10-25-4 (Hole #) 10/25/2021 (Date) 11:00 (Time) RAINY (Weather) ____ (Latitude) ____ (Longitude:)

1. Land Use VACANT (e.g., woodland, agricultural field, vacant lot, etc.) WOODED (Vegetation) SOME (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ~2 (Slope (%))

   Description of Location: ____

2. Soil Parent Material: GLACIOFLUVIAL ____ (Landform) ____ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 7200 feet Drainage Way – feet Wetlands 7100 feet
   Property Line 710 feet Drinking Water Well – feet Other – feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: – Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	A	SL	10YR 3/3	-	-	-	-	-	M	F	
12-24	B	SL	10YR 3/6	-	-	-	-	-	M	F	
24-96	C1	S	10YR 5/2	-	-	-	5	5	SG	L	
96-104	C2	FINE S	10YR 4/2	-	-	-	-	-	SG	L	
104-156	C3	S	10YR 5/2	-	-	-	5	5	SG	L	

Additional Notes:

Commonwealth of Massachusetts
City/Town of STOW

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-10-25-5 (Hole #) 10/25/2021 (Date) 11:30 (Time) RAINY (Weather) ____ (Latitude) ____ (Longitude:)

1. Land Use: VACANT (e.g., woodland, agricultural field, vacant lot, etc.) WOODED (Vegetation) SOME (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ~2 (Slope (%))

Description of Location: ____

2. Soil Parent Material: GLACIOFLUVIAL ____ (Landform) ____ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 7200 feet Drainage Way - feet Wetlands 7100 feet
Property Line 710 feet Drinking Water Well - feet Other - feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: - Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-16	A	SL	10YR 3/3	-	-	-	-	-	M	F	
16-36	B	SL	10YR 3/6	-	-	-	-	-	M	F	
36-156	C	S	10YR 5/2	-	-	-	10	15	SG	L	

Additional Notes:

Commonwealth of Massachusetts
City/Town of

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-8-1 (Hole #) 4/8/2022 (Date) 12PM (Time) 55d, CLOUDY (Weather) ______ (Latitude) ______ (Longitude:)

1. Land Use WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) WOODED (Vegetation) SOME (Surface Stones (e.g., cobbles, stones, boulders, etc.)) 0-10 (Slope (%))

Description of Location: ______

2. Soil Parent Material: ______ ______ (Landform) ______ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Wetlands ______ feet
Property Line ______ feet Drinking Water Well ______ feet Other ______ feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: ______ Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
16	A	SL	10YR 3/3	-	-	-	-	-	M	F	
32	B	S	10YR 5/8	-	-	-	-	-	SG	L	
48	C1	S	10YR 5/3	-	-	-	-	-	SG	L	
84	C2	COARSE SAND	10YR 5/3	-	-	-	10	10	SG	L	
136	C3	S	10YR 5/3	84	HIGH/LOW	2	-	-	SG	L	

Additional Notes:

Commonwealth of Massachusetts
City/Town of

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-8-2 (Hole #) 4/8/2022 (Date) ______ Time ______ Weather ______ Latitude ______ Longitude:

1. Land Use: ______ (e.g., woodland, agricultural field, vacant lot, etc.) ______ Vegetation ______ Surface Stones (e.g., cobbles, stones, boulders, etc.) ______ Slope (%)

   Description of Location: ______

2. Soil Parent Material: ______ ______ Landform ______ Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Wetlands ______ feet
   Property Line ______ feet Drinking Water Well ______ feet Other ______ feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: ______ Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
16	A	SL	10YR 3/3	-	-	-	-	-	M	F	
32	B	S	10YR 5/8	-	-	-	-	-	SG	L	
48	C1	S	10YR 5/3	-	-	-	-	-	SG	L	
86	C2	COARSE SAND	10YR 5/3	-	-	-	10	10	SG	L	
144	C3	S	10YR 5/3	86	HIGH/LOW	2	-	-	SG	L	

Additional Notes:

Commonwealth of Massachusetts
City/Town of

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-8-3 (Hole #) 4/8/2022 (Date) ______ (Time) ______ (Weather) ______ (Latitude) ______ (Longitude:)

1. Land Use ______ (e.g., woodland, agricultural field, vacant lot, etc.) ______ Vegetation ______ Surface Stones (e.g., cobbles, stones, boulders, etc.) ______ Slope (%)

   Description of Location: ______

2. Soil Parent Material: ______ ______ Landform ______ Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Wetlands ______ feet

   Property Line ______ feet Drinking Water Well ______ feet Other ______ feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☑ Yes ☐ No If yes: 112 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
12	A	SL	10YR 3/3	-	-	-	-	-	M	F	
38	B	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	

Additional Notes: ______

Commonwealth of Massachusetts
City/Town of

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-8-4 (Hole #) 4/8/2022 (Date) ______ Time ______ Weather ______ Latitude ______ Longitude:

1. Land Use: ______ (e.g., woodland, agricultural field, vacant lot, etc.) ______ Vegetation ______ Surface Stones (e.g., cobbles, stones, boulders, etc.) ______ Slope (%)

   Description of Location: ______

2. Soil Parent Material: ______ ______ Landform ______ Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Wetlands ______ feet

   Property Line ______ feet Drinking Water Well ______ feet Other ______ feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☑ Yes ☐ No If yes: ______ Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
8	A	SL	10YR 3/3	-	-	-	-	-	M	F	
20	B	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	

Additional Notes:

Commonwealth of Massachusetts
City/Town of STOW

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: D1 (Hole #) 4/7/22 (Date) 9:05 (Time) OVERCAST (Weather) ____ (Latitude) ____ (Longitude:)

1. Land Use VACANT (e.g., woodland, agricultural field, vacant lot, etc.) WOODED (Vegetation) SOME (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ~2 (Slope (%))

   Description of Location: ____

2. Soil Parent Material: GLACIOFLUVIAL ____ (Landform) ____ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body - feet Drainage Way - feet Wetlands >200 feet

   Property Line >200 feet Drinking Water Well - feet Other - feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☑ Yes ☐ No If yes: 60" Depth Weeping from Pit BOTTOM 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-4	A	SL	10YR 2/2	-	-	-	-	-	M	F	
4-20	B	SL	10YR 3/6	-	-	-	-	-	M	F	
20-112	C	LS	10YR 5/2	32"	HIGH/LOW	75	10	5	M	F	BOULDER

Additional Notes: ____

Commonwealth of Massachusetts
City/Town of STOW

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: D2 (Hole #) 4/7/22 (Date) 9:40 (Time) OVERCAST (Weather) ____ (Latitude) ____ (Longitude:)

1. Land Use VACANT (e.g., woodland, agricultural field, vacant lot, etc.) WOODED (Vegetation) SOME (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ~2 (Slope (%))

   Description of Location: ____

2. Soil Parent Material: GLACIOFLUVIAL ____ (Landform) ____ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body - feet Drainage Way - feet Wetlands 7200 feet

   Property Line 7200 feet Drinking Water Well - feet Other - feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☑ Yes ☐ No If yes: 84" Depth Weeping from Pit BOTTOM 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0 - 6	A	SL	10YR 3/3	-	-	-	-	-	M	F	
6 - 24	B	SL	10YR 3/6	-	-	-	-	-	M	F	
24 - 96	C	LS	10YR 4/2	60"	HIGH/LOW	~5	5	10	M	F	BOULDER

Additional Notes:

Commonwealth of Massachusetts
City/Town of STOW

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: D3 (Hole #) 4/7/22 (Date) 10:30 (Time) OVERCAST (Weather) ____ (Latitude) ____ (Longitude:)

1. Land Use VACANT (e.g., woodland, agricultural field, vacant lot, etc.) WOODED (Vegetation) NONE (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ~5 (Slope (%))

   Description of Location: ____

2. Soil Parent Material: GLACIOFLUVIAL ____ (Landform) ____ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body - feet Drainage Way - feet Wetlands >100 feet

   Property Line >50 feet Drinking Water Well - feet Other - feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☑ Yes ☐ No If yes: 114" Depth Weeping from Pit 114" 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-3	A	SL	10YR 3/2	-	-	-	-	-	M	F	
3-12	B	LS	10YR 3/6	-	-	-	-	-	M	F	
12-56	C1	S	10YR 5/3	56"	HIGH/LOW	>5	20	15	SG	L	
56-72	C2	LS	2.5Y 5/3	↓	↓	↓	-	-	M	F	
72-120	C3	S	10YR 5/3	↓	↓	↓	10	10	SG	L	

Additional Notes:

Commonwealth of Massachusetts
City/Town of STOW

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: D4 (Hole #) | 4/7/22 (Date) | 11:00 (Time) | OVERCAST (Weather) | ____ (Latitude) | ____ (Longitude:)

1. Land Use: VACANT (e.g., woodland, agricultural field, vacant lot, etc.) | WOODED (Vegetation) | NONE (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | ~10 (Slope (%))

   Description of Location: ____

2. Soil Parent Material: GLACIOFLUVIAL | ____ (Landform) | ____ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body - feet | Drainage Way - feet | Wetlands 750 feet

   Property Line 7100 feet | Drinking Water Well - feet | Other - feet

4. Unsuitable Materials Present: ☐ Yes ☑ No | If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No | If yes: - Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0 - 8	A	SL	10YR 3/2	-	-	-	-	-	M	F	
8 - 24	B	LS	10YR 3/6	-	-	-	-	-	M	F	
24 - 84	C1	S	10YR 5/3	84"	HIGH/LOW	75	10	15	SG	L	
84 - 120	C2	FINE SAND	2.5Y 5/3	↓	↓	↓	-	-	SG	L	

Additional Notes:

Commonwealth of Massachusetts
City/Town of STOW

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: D5 (Hole #) — 4/7/22 (Date) — 11:30 (Time) — OVERCAST (Weather) — ____ (Latitude) — ____ (Longitude:)

1. Land Use: VACANT (e.g., woodland, agricultural field, vacant lot, etc.) — WOODED (Vegetation) — NO (Surface Stones (e.g., cobbles, stones, boulders, etc.)) — ~0-2 (Slope (%))

   Description of Location: ____

2. Soil Parent Material: GLACIOFLUVIAL — ____ (Landform) — ____ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body – feet; Drainage Way – feet; Wetlands >150 feet; Property Line >200 feet; Drinking Water Well – feet; Other – feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: – Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-10	A	10 SL	10 YR 3/2	–	–	–	–	–	M	F	
10-18	B	SL	10YR 3/6	–	–	–	–	–	M	F	
18-120	C	S	10YR 5/3	–	–	–	10	10	SG	L	

Additional Notes:

Commonwealth of Massachusetts
City/Town of STOW

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: D6 (Hole #) 4/7/22 (Date) 12:00 (Time) OVERCAST (Weather) ____ (Latitude) ____ (Longitude:)

1. Land Use COMMERCIAL (e.g., woodland, agricultural field, vacant lot, etc.) GRAVEL (Vegetation) YES (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ~0 (Slope (%))

   Description of Location: NEXT TO OLD LANDSCAPE BUILDING

2. Soil Parent Material: GLACIOFLUVIAL ____ (Landform) ____ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body - feet Drainage Way - feet Wetlands - feet

   Property Line >10 feet Drinking Water Well - feet Other - feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: - Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0 - 16	FILL	-	-	-	-	-	-	-	-	-	
16 - 36	B	SL	10YR 3/6	-	-	-	2	2	M	F	
36 - 120	C	S	10YR 5/2	-	-	-	10	10	SG	L	

Additional Notes:

Commonwealth of Massachusetts
City/Town of STOW

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: D7 Hole # | 4/7/22 Date | 12:30 Time | OVERCAST Weather | ___ Latitude | ___ Longitude:

1. Land Use VACANT (e.g., woodland, agricultural field, vacant lot, etc.) | WOODED Vegetation | NONE Surface Stones (e.g., cobbles, stones, boulders, etc.) | ~2 Slope (%)

   Description of Location: ___

2. Soil Parent Material: GLACIOFLUVIAL | ___ Landform | ___ Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body - feet | Drainage Way - feet | Wetlands - feet
   Property Line 7100 feet | Drinking Water Well - feet | Other - feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: - Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	A	SL	10YR 3/3	-	-	-	-	-	M	F	
12-32	B	LS	10YR 3/6	-	-	-	-	-	M	F	
32-120	C	S	10YR 5/2	-	-	-	15	15	SG	L	CAVE IN

Additional Notes:

Commonwealth of Massachusetts
City/Town of STOW

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: D8 (Hole #) 4/7/22 (Date) 1:00 (Time) OVERCAST (Weather) ____ (Latitude) ____ (Longitude:)

1. Land Use VACANT (e.g., woodland, agricultural field, vacant lot, etc.) WOODED (Vegetation) NONE (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ~2 (Slope (%))

   Description of Location: ____

2. Soil Parent Material: GLACIOFLUVIAL ____ (Landform) ____ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body - feet Drainage Way - feet Wetlands - feet

   Property Line 7100 feet Drinking Water Well - feet Other - feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: - Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0 - 12	A	SL	10 YR 3/3	-	-	-	-	-	M	F	
12 - 26	B	SL	10 YR 3/6	-	-	-	-	-	M	F	
26 - 96	C1	S	10 YR 5/3	-	-	-	10	5	SG	L	
96 - 132	C2	FINE LS	2.5Y 5/3	-	-	-	-	-	M	F	

Additional Notes:

Commonwealth of Massachusetts
City/Town of STOW

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: D9 (Hole #) 4/7/22 (Date) 1:30 (Time) OVERCAST (Weather) ____ (Latitude) ____ (Longitude:)

1. Land Use VACANT (e.g., woodland, agricultural field, vacant lot, etc.) WOODED (Vegetation) NONE (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ~2 (Slope (%))

   Description of Location: ____

2. Soil Parent Material: GLACIOFLUVIAL ____ (Landform) ____ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body - feet Drainage Way - feet Wetlands - feet
   Property Line 750 feet Drinking Water Well - feet Other - feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☑ Yes ☐ No If yes: 90" Depth Weeping from Pit BOTTOM 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0 - 32	A	SL	10YR 3/2	-	-	-	-	-	M	F	
32 - 48	B	SL	10YR 3/6	-	-	-	2	5	M	F	
48 - 120	C	S	10YR 5/3	66"	HIGH/LOW	75	10	10	SG	L	

Additional Notes:

Commonwealth of Massachusetts
City/Town of STOW

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: D10 (Hole #) 4/7/22 (Date) 2:20 (Time) OVERCAST (Weather) ____ (Latitude) ____ (Longitude:)

1. Land Use VACANT (e.g., woodland, agricultural field, vacant lot, etc.) WOODED (Vegetation) YES (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ~2 (Slope (%))

   Description of Location: ____

2. Soil Parent Material: GLACIOFLUVIAL ____ (Landform) ____ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body - feet Drainage Way - feet Wetlands - feet

   Property Line - feet Drinking Water Well - feet Other - feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: - Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0 - 9	A	SL	10 YR 3/2	-	-	-	-	-	M	F	
9 - 32	B	SL	10 YR 3/6	-	-	-	-	-	M	F	
32 - 120	C	LS	10 YR 5/3	-	-	-	5	20	M	F	COMPACT ROCKS

Additional Notes:

Commonwealth of Massachusetts
City/Town of STOW

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: D11 (Hole #) 4/7/22 (Date) 3:00 (Time) OVERCAST (Weather) ______ (Latitude) ______ (Longitude:)

1. Land Use AGRICULTURAL FIELD (e.g., woodland, agricultural field, vacant lot, etc.) FIELD/MEADOW (Vegetation) NO (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ~0-2 (Slope (%))

   Description of Location: ______

2. Soil Parent Material: GLACIOFLUVIAL ______ (Landform) ______ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body - feet Drainage Way - feet Wetlands >100 feet

   Property Line >100 feet Drinking Water Well - feet Other - feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: - Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-8	A	SL	10YR 3/2	-	-	-	-	-	M	F	
8-20	B	SL	10YR 3/6	-	-	-	-	-	M	F	
20-72	C1	S	10YR 5/3	-	-	-	-	-	SG	L	
72-132	C2	FINE SAND	2.5Y 5/3	-	-	-	-	-	SG	L	

Additional Notes:

Commonwealth of Massachusetts
City/Town of STOW

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: DI2 (Hole #) 4/7/22 (Date) 3:30 (Time) OVERCAST (Weather) ___ (Latitude) ___ (Longitude:)

1. Land Use AGRICULTURAL FIELD (e.g., woodland, agricultural field, vacant lot, etc.) FIELD / MEADOW (Vegetation) NO (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ~0-2 (Slope (%))

   Description of Location: ___

2. Soil Parent Material: GLACIOFLUVIAL ___ (Landform) ___ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body – feet; Drainage Way – feet; Wetlands >100 feet; Property Line 750 feet; Drinking Water Well – feet; Other – feet

4. Unsuitable Materials Present: ☑ Yes ☐ No If Yes: ☐ Disturbed Soil ☑ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☑ Yes ☐ No If yes: 72" Depth Weeping from Pit 108" 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-54	FILL	–	–	–	–	–	–	–	–	–	
54-72	C1	S	10YR 5/3	54"	HIGH/LOW	75	–	–	SG	L	
72-120	C2	FINE SAND	5YR 3/2	↓	↓	–	–	–	M	F	

Additional Notes:

Commonwealth of Massachusetts
City/Town of STOW

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: D13 (Hole #) 4/7/22 (Date) 4:15 (Time) OVERCAST (Weather) ____ (Latitude) ____ (Longitude:)

1. Land Use AGRICULTURAL FIELD (e.g., woodland, agricultural field, vacant lot, etc.) BRUSH | MOSS (Vegetation) SOME (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ~2 (Slope (%))

   Description of Location: ____

2. Soil Parent Material: GLACIOFLUVIAL ____ Landform ____ Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body - feet Drainage Way - feet Wetlands >200 feet

   Property Line >100 feet Drinking Water Well - feet Other - feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: - Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-6	A	SL	10YR 3/4	-	-	-	-	-	M	F	
6-20	B	SL	10YR 3/6	-	-	-	2	2	M	F	
20-120	C	LS	10YR 5/3	-	-	-	15	25	M	F	

Additional Notes:

Commonwealth of Massachusetts
City/Town of STOW

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: D14 (Hole #) 4/7/22 (Date) 4:45 (Time) OVERCAST (Weather) ____ (Latitude) ____ (Longitude:)

1. Land Use AGRICULTURAL (e.g., woodland, agricultural field, vacant lot, etc.) BRUSH/MEADOW (Vegetation) SOME (Surface Stones (e.g., cobbles, stones, boulders, etc.)) NO-2 (Slope (%))

   Description of Location: ____

2. Soil Parent Material: GLACIOFLUVIAL ____ (Landform) ____ (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body - feet Drainage Way - feet Wetlands >100 feet
   Property Line >100 feet Drinking Water Well - feet Other - feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: - Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-10	A	SL	10YR 3/4	-	-	-	-	-	M	F	
10-120	C	SL	10YR 4/3	72"	HIGH/LOW	75	10	25	M	F	VERY ROCKY

Additional Notes:

Commonwealth of Massachusetts
City/Town of

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-7-1 (Hole #) 7/20/22 (Date) 8:30 AM (Time) 90d, SUNNY (Weather) ______ (Latitude) ______ (Longitude)

1. Land Use WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) WOODED (Vegetation) MANY (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ______ (Slope (%))

Description of Location: ON DRUMLIN NEAR FARM

2. Soil Parent Material: TILL ______ (Landform) ______ (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Wetlands >>100 feet

Property Line >>10 feet Drinking Water Well ______ feet Other ______ feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: ______ Depth to Weeping in Hole ______ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
4	A	SL	10YR 3/3/	-	Cnc : Dpl:	-	-	-	M	F	
20	B	LS	10YR 5/8	-	Cnc : Dpl:	-	-	-	M	F	
48	C1	LS	10YR 6/2	-	Cnc : Dpl:	-	15	15	M	F	
120	C2	LS	10YR 5/3	-	Cnc : Dpl:	-	15	15	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

Commonwealth of Massachusetts
City/Town of

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-7-2 (Hole #) 7/20/22 (Date) ______ (Time) ______ (Weather) ______ (Latitude) ______ (Longitude)

1. Land Use: ______ (e.g., woodland, agricultural field, vacant lot, etc.) ______ (Vegetation) ______ (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ______ (Slope (%))

   Description of Location: ______

2. Soil Parent Material: ______ ______ (Landform) ______ (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Wetlands ______ feet

   Property Line ______ feet Drinking Water Well ______ feet Other ______ feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: ______ Depth to Weeping in Hole ______ Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
4	A	SL	10YR 3/3	-	Cnc : Dpl:	-	-	-	M	F	
22	B	LS	10YR 5/8	-	Cnc : Dpl:	-	-	-	M	F	
60	C1	LS	10YR 6/2	-	Cnc : Dpl:	-	15	15	M	F	
132	C2	LS	10YR 5/3	-	Cnc : Dpl:	-	15	15	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes: ______

Commonwealth of Massachusetts
City/Town of

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

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-7-3 (Hole #) 7/20/22 (Date) ______ (Time) ______ (Weather) ______ (Latitude) ______ (Longitude)

1. Land Use: ______ (e.g., woodland, agricultural field, vacant lot, etc.) ______ Vegetation ______ Surface Stones (e.g., cobbles, stones, boulders, etc.) ______ Slope (%)

   Description of Location: ______

2. Soil Parent Material: ______ ______ Landform ______ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Wetlands ______ feet

   Property Line ______ feet Drinking Water Well ______ feet Other ______ feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: ______ Depth to Weeping in Hole ______ Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
4	A	SL	10YR 3/3	-	Cnc : Dpl:	-	-	-	M	F	
22	B	LS	10YR 5/8	-	Cnc : Dpl:	-	-	-	M	F	
126	C	LS	10YR 6/2	-	Cnc : Dpl:	-	15	15	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

Commonwealth of Massachusetts
City/Town of

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-7-4 (Hole #) 7/20/22 (Date) ______ Time ______ Weather ______ Latitude ______ Longitude

1. Land Use: ______ (e.g., woodland, agricultural field, vacant lot, etc.) ______ Vegetation ______ Surface Stones (e.g., cobbles, stones, boulders, etc.) ______ Slope (%)

Description of Location: ______

2. Soil Parent Material: ______ ______ Landform ______ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Wetlands ______ feet

Property Line ______ feet Drinking Water Well ______ feet Other ______ feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: ______ Depth to Weeping in Hole ______ Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
4	A	SL	10YR 3/3	-	Cnc : Dpl:	-	-	-	M	F	
24	B	LS	10YR 5/8	-	Cnc : Dpl:	-	-	-	M	F	
78	C1	LS	10YR 6/2	-	Cnc : Dpl:	-	15	15	M	F	
126	C2	LS	10YR 5/3	-	Cnc : Dpl:	-	15	15	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

Commonwealth of Massachusetts
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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-7-5 (Hole #) 7/20/22 (Date) ____ (Time) ____ (Weather) ____ (Latitude) ____ (Longitude)

1. Land Use: ____ (e.g., woodland, agricultural field, vacant lot, etc.) ____ Vegetation ____ Surface Stones (e.g., cobbles, stones, boulders, etc.) ____ Slope (%)

   Description of Location: ____

2. Soil Parent Material: ____ ____ Landform ____ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ____ feet Drainage Way ____ feet Wetlands ____ feet

   Property Line ____ feet Drinking Water Well ____ feet Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: ____ Depth to Weeping in Hole ____ Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
4	A	SL	10YR 3/3	-	Cnc : Dpl:	-	-	-	M	F	
24	B	LS	10YR 5/8	-	Cnc : Dpl:	-	-	-	M	F	
84*	C	LS	10YR 6/2	-	Cnc : Dpl:	-	15	15	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:
*NO REFUSAL, JUST LARGE BOULDERS

Commonwealth of Massachusetts
City/Town of

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

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area*)

Deep Observation Hole Number: TP-7-6 (Hole #) 7/20/22 (Date) ______ Time ______ Weather ______ Latitude ______ Longitude

1. Land Use: ______ (e.g., woodland, agricultural field, vacant lot, etc.) ______ Vegetation ______ Surface Stones (e.g., cobbles, stones, boulders, etc.) ______ Slope (%)

   Description of Location: ______

2. Soil Parent Material: ______ ______ Landform ______ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Wetlands ______ feet

   Property Line ______ feet Drinking Water Well ______ feet Other ______ feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: ______ Depth to Weeping in Hole ______ Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
4	A	SL	10YR 3/3	-	Cnc : Dpl:	-	-	-	M	F	
22	B	LS	10YR 5/8	-	Cnc : Dpl:	-	-	-	M	F	
120	C	LS	10YR 6/2	-	Cnc : Dpl:	-	15	15	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

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

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area*)

Deep Observation Hole Number: TP-7-7 (Hole #) 7/20/22 (Date) ______ (Time) ______ (Weather) ______ (Latitude) ______ (Longitude)

1. Land Use: ______ (e.g., woodland, agricultural field, vacant lot, etc.) ______ Vegetation ______ Surface Stones (e.g., cobbles, stones, boulders, etc.) ______ Slope (%)

   Description of Location: ______

2. Soil Parent Material: ______ ______ Landform ______ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Wetlands ______ feet

   Property Line ______ feet Drinking Water Well ______ feet Other ______ feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: ______ Depth to Weeping in Hole ______ Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
4	A	SL	10YR 3/3	-	Cnc : Dpl:	-	-	-	M	F	
24	B	LS	10YR 5/8	-	Cnc : Dpl:	-	-	-	M	F	
120	C	LS	10YR 6/2	-	Cnc : Dpl:	-	15	15	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

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City/Town of

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

C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-7-8 (Hole #) 7/20/22 (Date) ______ (Time) ______ (Weather) ______ (Latitude) ______ (Longitude)

1. Land Use: ______ (e.g., woodland, agricultural field, vacant lot, etc.) ______ Vegetation ______ Surface Stones (e.g., cobbles, stones, boulders, etc.) ______ Slope (%)

   Description of Location: ______

2. Soil Parent Material: ______ ______ Landform ______ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Wetlands ______ feet

   Property Line ______ feet Drinking Water Well ______ feet Other ______ feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: ______ Depth to Weeping in Hole ______ Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
4	A	SL	10YR 3/3	-	Cnc : Dpl:	-	-	-	M	F	
22	B	LS	10YR 5/8	-	Cnc : Dpl:	-	-	-	M	F	
120	C	LS	10YR 6/2	-	Cnc : Dpl:	-	15	15	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-7-9 (Hole #) 7/22/22 (Date) 8:30 AM (Time) ______ Weather ______ Latitude ______ Longitude

1. Land Use: ______ (e.g., woodland, agricultural field, vacant lot, etc.) ______ Vegetation ______ Surface Stones (e.g., cobbles, stones, boulders, etc.) ______ Slope (%)

   Description of Location: ______

2. Soil Parent Material: ______ ______ Landform ______ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Wetlands ______ feet

   Property Line ______ feet Drinking Water Well ______ feet Other ______ feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: ______ Depth to Weeping in Hole ______ Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
4	A	SL	10YR 3/3	-	Cnc : Dpl:	-	-	-	M	F	
28	B	LS	10YR 5/8	-	Cnc : Dpl:	-	-	-	M	F	
120	C	LS	10YR 6/2	-	Cnc : Dpl:	-	15	15	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-7-10 (Hole #) 7/22/22 (Date) ______ (Time) ______ (Weather) ______ (Latitude) ______ (Longitude)

1. Land Use: ______ (e.g., woodland, agricultural field, vacant lot, etc.) ______ (Vegetation) ______ (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ______ (Slope (%))

   Description of Location: ______

2. Soil Parent Material: ______ ______ (Landform) ______ (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Wetlands ______ feet

   Property Line ______ feet Drinking Water Well ______ feet Other ______ feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: ______ Depth to Weeping in Hole ______ Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
4	A	SL	10YR 3/3	-	Cnc : Dpl:	-	-	-	M	F	
30	B	LS	10YR 5/8	-	Cnc : Dpl:	-	-	-	M	F	
100*	C	LS	10YR 6/2	-	Cnc : Dpl:	-	15	15	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:
*NO REFUSAL, JUST LARGE BOULDERS

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C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-7-11 (Hole #) 7/22/22 (Date) ______ Time ______ Weather ______ Latitude ______ Longitude

1. Land Use: ______ (e.g., woodland, agricultural field, vacant lot, etc.) ______ Vegetation ______ Surface Stones (e.g., cobbles, stones, boulders, etc.) ______ Slope (%)

   Description of Location: ______

2. Soil Parent Material: ______ ______ Landform ______ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Wetlands ______ feet

   Property Line ______ feet Drinking Water Well ______ feet Other ______ feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☑ No If yes: ______ Depth to Weeping in Hole ______ Depth 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
4	A	SL	10YR 3/3	-	Cnc : Dpl:	-	-	-	M	F	
28	B	LS	10YR 5/8	-	Cnc : Dpl:	-	-	-	M	F	
90	C1	LS	10YR 6/2	-	Cnc : Dpl:	-	15	15	M	F	
120	C2	LS	10YR 5/3	96	Cnc : Dpl:	5	15	15	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

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C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-E1 (Hole #) 6/15/25 (Date) 9 00 (Time) Cloudy (Weather) ______ (Latitude) ______ (Longitude)

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Trees + litter (Vegetation) None (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ______ *Slope (%)*

Description of Location: ______

2. Soil Parent Material: ______ ______ Landform ______ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ____ feet Drainage Way ____ feet Wetlands ____ feet

Property Line ____ feet Drinking Water Well ____ feet Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ____ Depth to Weeping in Hole ____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
8	A	SL	10YR 3/2		Cnc : Dpl:		-	-	M	F	
22	B	LS	10YR 5/3		Cnc : Dpl:		-	5	M	F	
94	C1	Sand	10YR 6/4	92	Cnc : Dpl:		2	5	SG	L	
120	C2	LS	10YR 5/2		Cnc : Dpl:		-	-	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

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C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-E2 07 (Hole #) | 6/9/23 (Date) | 11:50 (Time) | Overcast (Weather) | ______ Latitude | ______ Longitude

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | trees + litter (Vegetation) | ______ Surface Stones (e.g., cobbles, stones, boulders, etc.) | ______ Slope (%)

Description of Location: ______

2. Soil Parent Material: ______ | ______ Landform | ______ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ____ feet | Drainage Way ____ feet | Wetlands ____ feet
Property Line ____ feet | Drinking Water Well ____ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ____ Depth to Weeping in Hole ____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features: Depth	Redoximorphic Features: Color	Redoximorphic Features: Percent	Coarse Fragments % by Volume: Gravel	Coarse Fragments % by Volume: Cobbles & Stones	Soil Structure	Soil Consistence (Moist)	Other
6'	A	SL	10YR	-	Cnc : Dpl:				M	F	
32	B	LS	10YR	-	Cnc : Dpl:		10%	20%	M	F	
92	C1	Sand	10YR	-	Cnc : Dpl:		5	5	SG	L	
120	C2	Fine Sand	10YR		Cnc : Dpl:		0	0	SG	L	
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

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C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-3 (Hole #) 6/15/23 (Date) 9:30 (Time) Sunny (Weather) ____ (Latitude) ____ (Longitude)

1. Land Use Landscaping (e.g., woodland, agricultural field, vacant lot, etc.) low shrubs (Vegetation) Some (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ____ (Slope (%))

Description of Location: ____

2. Soil Parent Material: ____ ____ (Landform) ____ (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body ____ feet Drainage Way ____ feet Wetlands ____ feet
Property Line ____ feet Drinking Water Well ____ feet Other ____ feet

4. Unsuitable Materials Present: ☒ Yes ☐ No If Yes: ☒ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ____ Depth to Weeping in Hole ____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
24"	Fill				Cnc : Dpl:		–	–	A	–	
32"	B	LS	2.5Y 6/4		Cnc : Dpl:		2	5	M	F	
54"	C1	Fine S	10YR 5/8	96"	Cnc : Dpl:		10	10	SG	L	
120"	C2	Coarse S	10YR 6/6		Cnc : Dpl:		10	10	SG	L	
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

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C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-E4 (Hole #) 6/15/23 (Date) 10:20 (Time) Sunny (Weather) ______ (Latitude) ______ (Longitude)

1. Land Use: woodland (e.g., woodland, agricultural field, vacant lot, etc.) trees + litter (Vegetation) none (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ______ (Slope (%))

Description of Location: ______

2. Soil Parent Material: ______ ______ (Landform) ______ (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body ____ feet Drainage Way ____ feet Wetlands ____ feet
Property Line ____ feet Drinking Water Well ____ feet Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ____ Depth to Weeping in Hole ____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
10	A	SL	10YR 3/2		Cnc : Dpl:		–	–	M	F	
38	B	LS	10YR 4/4		Cnc : Dpl:		10	5	M	F	
110	C1	Coarse S	10YR 4/6	108"	Cnc : Dpl:		20	20	SG	L	
120	C2	S	10YR 5/3		Cnc : Dpl:		10	10	SG	L	
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

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C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-E5 (Hole #) 6/8/23 (Date) 8:30 (Time) Overcast (Weather) ______ (Latitude) ______ (Longitude)

1. Land Use Vacant (e.g., woodland, agricultural field, vacant lot, etc.) Low Shrubs (Vegetation) Some (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ______ Slope (%)

Description of Location: ______

2. Soil Parent Material: ______ ______ Landform ______ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ____ feet Drainage Way ____ feet Wetlands ____ feet

Property Line ____ feet Drinking Water Well ____ feet Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☒ Yes ☐ No If yes: ____ Depth to Weeping in Hole 114" Depth to 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
8"	Ap	SL	10YR 3/4		Cnc : Dpl:		–	–	M	F	
90"	C1	SL	10YR 4/3	84"	Cnc : Dpl:		2%	10%	M	F	
124"	C2	Coarse Sand	10YR 4/3		Cnc : Dpl:		25%	10%	SG	L	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

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C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-E6 (Hole #) 6/8/23 (Date) 9:00 (Time) Overcast (Weather) ____ (Latitude) ____ (Longitude)

1. Land Use: Off Ground Drain (e.g., woodland, agricultural field, vacant lot, etc.) Grass / low shrubs (Vegetation) ____ Surface Stones (e.g., cobbles, stones, boulders, etc.) ____ Slope (%)

   Description of Location: ____

2. Soil Parent Material: ____ ____ Landform ____ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ____ feet Drainage Way ____ feet Wetlands ____ feet

   Property Line ____ feet Drinking Water Well ____ feet Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☐ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☐ No If yes: ____ Depth to Weeping in Hole 112' Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features: Depth	Redoximorphic Features: Color	Redoximorphic Features: Percent	Coarse Fragments % by Volume: Gravel	Coarse Fragments % by Volume: Cobbles & Stones	Soil Structure	Soil Consistence (Moist)	Other
6"	Ap	SL	10YR 2/3		Cnc: Dpl:		-	-	M	F	
54"	B	SL	10YR 3/4	52"	Cnc: Dpl:		2%	5%	M	F	
126	C	Course Sand	10YR 4/3		Cnc: Dpl:		26%	5%	SG	L	
					Cnc: Dpl:						
					Cnc: Dpl:						
					Cnc: Dpl:						

Additional Notes:

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C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-E7 (Hole #) 6/8/23 (Date) 10 15 (Time) Overcast (Weather) ______ (Latitude) ______ (Longitude)

1. Land Use Vacant (e.g., woodland, agricultural field, vacant lot, etc.) low shrubs (Vegetation) some (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ______ Slope (%)

Description of Location: ______

2. Soil Parent Material: ______ ______ Landform ______ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ____ feet Drainage Way ____ feet Wetlands ____ feet

Property Line ____ feet Drinking Water Well ____ feet Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☑ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☑ Yes ☐ No If yes: 78" Depth to Weeping in Hole 90" Depth to 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 Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
12"	Ap	SL	10YR		Cnc : Dpl:		–	–	M	F	
44"	B	SL	10YR	40	Cnc : Dpl:		2%	5%	M	F	
120"	C	LS	10YR		Cnc : Dpl:		15%	10%	SG	L	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

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C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-E8 (Hole #) 6/8/23 (Date) 10:00 (Time) Overcast (Weather) ______ (Latitude) ______ (Longitude)

1. Land Use ______ (e.g., woodland, agricultural field, vacant lot, etc.) ______ Vegetation ______ Surface Stones (e.g., cobbles, stones, boulders, etc.) ______ Slope (%)

Description of Location: ______

2. Soil Parent Material: ______ ______ Landform ______ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ____ feet Drainage Way ____ feet Wetlands ____ feet

Property Line ____ feet Drinking Water Well ____ feet Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☐ No If yes: ____ Depth to Weeping in Hole ____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
6"	Ap	SL	10YR 3/4		Cnc : Dpl:		-	-	M	F	
24"	B	SL	10YR 3/6		Cnc : Dpl:		0	5	M	F	
128"	C	LS	10YR 5/3	None	Cnc : Dpl:		5	5	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

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C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-E9 (Hole #) 6/8/23 (Date) 10:15 (Time) Overcast (Weather) ____ (Latitude) ____ (Longitude)

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) trees, lilac (Vegetation) many stones (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ____ (Slope (%))

Description of Location: ____

2. Soil Parent Material: ____ ____ (Landform) ____ (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body ____ feet Drainage Way ____ feet Wetlands ____ feet
   Property Line ____ feet Drinking Water Well ____ feet Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ____ Depth to Weeping in Hole ____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
6"	A	SL	10YR 3/3	-	Cnc : Dpl:				M	F	
30"	B	LS	10YR 5/8	-	Cnc : Dpl:		2%	10%	M	F	
120"	C	LS	10YR 6/2	-	Cnc : Dpl:		10	15%	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

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C. On-Site Review (*minimum of two holes required at every proposed primary and reserve disposal area*)

Deep Observation Hole Number: TP-E10 (Hole #) 6/9/23 (Date) 8:30 (Time) Overcast (Weather) ______ (Latitude) ______ (Longitude)

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Small pines (Vegetation) many (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ______ Slope (%)

Description of Location: ______

2. Soil Parent Material: ______ ______ Landform ______ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ____ feet Drainage Way ____ feet Wetlands ____ feet
Property Line ____ feet Drinking Water Well ____ feet Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ____ Depth to Weeping in Hole ____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
6	A	SL	10YR 3/3	–	Cnc : Dpl:				M	F	
28"	B	LS	10YR 5/8	–	Cnc : Dpl:				M	F	
50"	C1	LS	10YR 6/2	–	Cnc : Dpl:				M	F	
128	C2	SL	10YR 6/3		Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

Commonwealth of Massachusetts
City/Town of

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-E11 (Hole #) 6/9/23 (Date) 9:00 (Time) Overcast (Weather) ____ Latitude ____ Longitude

1. Land Use ____ (e.g., woodland, agricultural field, vacant lot, etc.) ____ Vegetation ____ Surface Stones (e.g., cobbles, stones, boulders, etc.) ____ Slope (%)

Description of Location: ____

2. Soil Parent Material: ____ Landform ____ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ____ feet Drainage Way ____ feet Wetlands ____ feet

Property Line ____ feet Drinking Water Well ____ feet Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ____ Depth to Weeping in Hole ____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
6	A	SL	10YR 3/3	–	Cnc : Dpl:		–	–	M	F	
28	B	SL	10YR 5/8	–	Cnc : Dpl:		5%	10%	M	F	
60	C1	LS	10YR 6/2	–	Cnc : Dpl:		5%	5%	M	F	
132	C2	SL	10YR 6/3	–	Cnc : Dpl:		2%	2%	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

Commonwealth of Massachusetts
City/Town of

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-E12 (Hole #) | 6/9/23 (Date) | 9:30 (Time) | Overcast (Weather) | ______ (Latitude) | ______ (Longitude)

1. Land Use: Wood land (e.g., woodland, agricultural field, vacant lot, etc.) | ______ Vegetation | ______ Surface Stones (e.g., cobbles, stones, boulders, etc.) | ______ Slope (%)

Description of Location: ______

2. Soil Parent Material: ______ | ______ Landform | ______ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ____ feet | Drainage Way ____ feet | Wetlands ____ feet
   Property Line ____ feet | Drinking Water Well ____ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ____ Depth to Weeping in Hole ____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
6"	A	SL	10YR 3/3	–	Cnc : Dpl:		–	–	M	F	
30	B	LS	10YR 5/8	–	Cnc : Dpl:		5%	5%	M	F	
120"	C	LS	10YR 6/2	–	Cnc : Dpl:		5%	5%	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes: ______

Commonwealth of Massachusetts
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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-E13 (Hole #) 6/9/23 (Date) 9:30 (Time) Overcast (Weather) ____ Latitude ____ Longitude

1. Land Use woodland (e.g., woodland, agricultural field, vacant lot, etc.) trees + lt Hv (Vegetation) some (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ____ Slope (%)

Description of Location: ____

2. Soil Parent Material: ____ ____ Landform ____ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ____ feet Drainage Way ____ feet Wetlands ____ feet
Property Line ____ feet Drinking Water Well ____ feet Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ____ Depth to Weeping in Hole ____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
6"	A	SL	10YR 3/3	–	Cnc : Dpl:		–	–	M	F	
42"	B	LS	10YR 5/8	–	Cnc : Dpl:		5%	5%	M	F	
124"	C	LS	10YR 6/2	–	Cnc : Dpl:		5%	5%	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

Commonwealth of Massachusetts
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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-E14 Hole # | 6/9/23 Date | 10:00 Time | Overcast Weather | ____ Latitude | ____ Longitude

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) | trees + (:Ar Vegetation | some Surface Stones (e.g., cobbles, stones, boulders, etc.) | ____ Slope (%)

Description of Location: ____

2. Soil Parent Material: ____ | ____ Landform | ____ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ____ feet | Drainage Way ____ feet | Wetlands ____ feet
Property Line ____ feet | Drinking Water Well ____ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ____ Depth to Weeping in Hole ____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
6	A	SL	10YR 3/3	–	Cnc : Dpl:		–	–	M	F	
24	B	SL	10YR 5/8	–	Cnc : Dpl:		2	2	M	F	
120	C	LS	10YR 6/1	–	Cnc : Dpl:		5	5	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

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C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-E15 (Hole #) 6/9/23 (Date) 10:30 (Time) Overcast (Weather) ____ Latitude ____ Longitude

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) trees + litter (Vegetation) some (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ____ Slope (%)

Description of Location: ____

2. Soil Parent Material: ____ ____ Landform ____ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ____ feet Drainage Way ____ feet Wetlands ____ feet
Property Line ____ feet Drinking Water Well ____ feet Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ____ Depth to Weeping in Hole ____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
6"	A	SL	10YR 3/3	–	Cnc : Dpl:		–	–	M	F	
28"	B	LS	10YR 5/8	–	Cnc : Dpl:		5	5	M	F	
96"	C	LS	10YR 6/2	–	Cnc : Dpl:		10	10	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes: Refusal @ 96"

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C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-E16 (Hole #) 6/8/23 (Date) 4:30 (Time) Overcast (Weather) ____ (Latitude) ____ (Longitude)

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) trees (Vegetation) Some (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ____ (Slope (%))

Description of Location: ____

2. Soil Parent Material: ____ ____ (Landform) ____ (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body ____ feet Drainage Way ____ feet Wetlands ____ feet

Property Line ____ feet Drinking Water Well ____ feet Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ____ Depth to Weeping in Hole ____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
6"	A	SL	10YR 2/2	-	Cnc : Dpl:		-	-	M	F	
30"	B	SL	10YR 5/8	-	Cnc : Dpl:		5%	2%	M	F	
120"	C	LS	10YR 4/3	-	Cnc : Dpl:		15%	5%	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

Commonwealth of Massachusetts
City/Town of

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-E17 (Hole #) 6/8/23 (Date) 4:00 (Time) Overcast (Weather) ____ (Latitude) ____ (Longitude)

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) forest litter (Vegetation) Some stones (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ____ Slope (%)

Description of Location: ____

2. Soil Parent Material: ____ ____ Landform ____ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ____ feet Drainage Way ____ feet Wetlands ____ feet
Property Line ____ feet Drinking Water Well ____ feet Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ____ Depth to Weeping in Hole ____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features: Depth	Redoximorphic Features: Color	Redoximorphic Features: Percent	Coarse Fragments % by Volume: Gravel	Coarse Fragments % by Volume: Cobbles & Stones	Soil Structure	Soil Consistence (Moist)	Other
6"	A	SL	10YR 2/2	-	Cnc : Dpl:		-	-	M	F	
26"	B	SL	10YR 5/8	-	Cnc : Dpl:		2	2	M	F	
120"	C	LS	10YR 4/2	-	Cnc : Dpl:		5	5	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-E18 (Hole #) 6/8/23 (Date) 3.00 (Time) Overcast (Weather) ____ (Latitude) ____ (Longitude)

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) Birch trees - brush (Vegetation) many stones (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ____ Slope (%)

Description of Location: ____

2. Soil Parent Material: ____ ____ Landform ____ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ____ feet Drainage Way ____ feet Wetlands ____ feet

Property Line ____ feet Drinking Water Well ____ feet Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ____ Depth to Weeping in Hole ____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
6"	A	SL	10YR 2/2	-	Cnc : Dpl:				M	F	
26"	B	SL	10YR 5/8	-	Cnc : Dpl:		2	2	M	F	
120"	C	LS	10YR 3/6	-	Cnc : Dpl:		10	10	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

Commonwealth of Massachusetts
City/Town of

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-E19 (Hole #) 6/8/23 (Date) 2:45 (Time) Overcast (Weather) ____ (Latitude) ____ (Longitude)

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) trees + litter (Vegetation) some (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ____ Slope (%)

Description of Location: ____

2. Soil Parent Material: ____ ____ Landform ____ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ____ feet Drainage Way ____ feet Wetlands ____ feet

Property Line ____ feet Drinking Water Well ____ feet Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ____ Depth to Weeping in Hole ____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
6"	A	SL	10YR 2/2	–	Cnc : Dpl:		–	–	M	F	
30"	B	SL	10YR	–	Cnc : Dpl:		2	5	M	F	
96"	C	SL	10YR	–	Cnc : Dpl:		2	5	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes: Refusal @ 96" (ledge)

Commonwealth of Massachusetts
City/Town of

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-E20 (Hole #) 6/8/23 (Date) 2:20 (Time) Overcast (Weather) ______ (Latitude) ______ (Longitude)

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) trees + litter (Vegetation) Some stones (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ______ Slope (%)

Description of Location: ______

2. Soil Parent Material: ______ ______ Landform ______ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ______ feet Drainage Way ______ feet Wetlands ______ feet

Property Line ______ feet Drinking Water Well ______ feet Other ______ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ______ Depth to Weeping in Hole ______ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
6"	A	SL	10YR 2/2	–	Cnc : Dpl:		–	–	M	F	
70"	B	SL	10YR 5/6	–	Cnc : Dpl:		0%	5%	M	F	
120"	C	SL	10YR 6/2	–	Cnc : Dpl:		0%	5%	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

Commonwealth of Massachusetts
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C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-E21 (Hole #) 6/8/23 (Date) 1:45 (Time) Overcast (Weather) ____ (Latitude) ____ (Longitude)

1. Land Use ____ (e.g., woodland, agricultural field, vacant lot, etc.) ____ Vegetation ____ Surface Stones (e.g., cobbles, stones, boulders, etc.) ____ Slope (%)

Description of Location: ____

2. Soil Parent Material: ____ ____ Landform ____ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ____ feet Drainage Way ____ feet Wetlands ____ feet

Property Line ____ feet Drinking Water Well ____ feet Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ____ Depth to Weeping in Hole ____ Depth to Standing Water in Hole

Soil Log

Depth (In)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
6'	A	SL	10YR 3/3	-	Cnc : Dpl:		-	-	M	F	
20'	B	SL	10YR 5/8	-	Cnc : Dpl:		5	5	M	F	
112"	C	SL	10YR 6/2	-	Cnc : Dpl:		10	10	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes: Refusal @ 112".

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C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-22 (Hole #) 6/8/23 (Date) 1:10 (Time) Overcast (Weather) ____ (Latitude) ____ (Longitude)

1. Land Use ____ (e.g., woodland, agricultural field, vacant lot, etc.) ____ Vegetation ____ Surface Stones (e.g., cobbles, stones, boulders, etc.) ____ Slope (%)

Description of Location: ____

2. Soil Parent Material: ____ Landform ____ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ____ feet Drainage Way ____ feet Wetlands ____ feet

Property Line ____ feet Drinking Water Well ____ feet Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ____ Depth to Weeping in Hole ____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
6"	A	SL	10YR 3/3	-	Cnc : Dpl:		-	-	M	F	
26"	B	SL	10YR 5/8	-	Cnc : Dpl:		2	5	M	F	
112	C	LS	10YR 6/6	-	Cnc : Dpl:		10	10	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

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C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-E23 (Hole #) 6/8/23 (Date) 12:15 (Time) Overcast (Weather) ____ (Latitude) ____ (Longitude)

1. Land Use Woodland (e.g., woodland, agricultural field, vacant lot, etc.) trees litter (Vegetation) many stones (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ____ Slope (%)

Description of Location: ____________________

2. Soil Parent Material: ____________ ____ Landform ____ Position on Landscape (SU, SH, BS, FS, TS, Plain)

3. Distances from: Open Water Body ____ feet Drainage Way ____ feet Wetlands ____ feet
Property Line ____ feet Drinking Water Well ____ feet Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☐ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☐ No If yes: ____ Depth to Weeping in Hole ____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features Depth	Color	Percent	Coarse Fragments % by Volume Gravel	Cobbles & Stones	Soil Structure	Soil Consistence (Moist)	Other
6"	A	SL	10YR 3/3	-	Cnc : Dpl:				M	F	
30"	B	SL	10YR 5/6	-	Cnc : Dpl:		25%	10%	M	F	
110"	C	LS	10YR 6/3	-	Cnc : Dpl:		20%	10%	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes: Refusal @ 110"

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C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: TP-E24 (Hole #) 6/8/23 (Date) 10:30 (Time) Overcast (Weather) ____ (Latitude) ____ (Longitude)

1. Land Use: Woodland (e.g., woodland, agricultural field, vacant lot, etc.) trees, litter (Vegetation) many stones (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ____ (Slope (%))

Description of Location: ____

2. Soil Parent Material: ____ ____ (Landform) ____ (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body ____ feet Drainage Way ____ feet Wetlands ____ feet

Property Line ____ feet Drinking Water Well ____ feet Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ____ Depth to Weeping in Hole ____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
4'	A	SL	10YR 3/3	–	Cnc : Dpl:				M	F	
28"	B	LS	10YR 3/8	–	Cnc : Dpl:		2	10	M	F	
120"	C	LS	10YR 6/2	–	Cnc : Dpl:		20	10	M	F	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:

Stormwater Operation and Maintenance Manual

Schedule for Inspection and Maintenance:

Street Sweeping:
The pavement shall be swept of all sediment twice a year with concentrations in the spring and the fall.

Deep Sump Hooded Catch Basins:
During construction, catch basin grates shall be wrapped with filter fabric. Catch basins shall be cleaned upon the completion of construction. After construction, the deep sumps for all catch basins shall be inspected four times a year and cleaned four times a year. Sediment removed shall be disposed of in accordance with applicable local, state, and federal guidelines and regulations. The depth of the sediment in a basin shall not exceed a depth of 18 inches as determined by probing with a stick. If the stick hits the bottom within 30 inches of the water level, more than 18 inches of sediment has accumulated and must be removed. Licensed persons should remove and dispose of the contents of the sump in accordance with applicable regulations.

Sediment Forebay:
The floor and sidewalls of the sediment forebay must be stabilized before use. Sediment forebay shall be inspected monthly and cleaned a minimum of four times per year when sediment depth is between 3-6 inches. After sediment removal, any damaged vegetation must be replaced. Grass in the forebay shall not exceed 6 inches in length and any scouring and gullying shall be repaired as necessary.

Infiltration Basin:
Preventative maintenance should be performed at least twice a year, and ideally sediment should be removed from the sediment forebay after every major storm event. Sediment shall be disposed of in accordance with applicable local, state, and federal guidelines and regulations. Once online, the basins shall be inspected after every major storm even (1" in 24 hours), for the first 3 months. thereafter, the basin should be inspected at least twice per year. Important items to check for include: differential settlement, cracking, erosion, leakage, or tree growth on the embankments, condition of riprap, sediment accumulation and the health of the turf. At least twice a year, the buffer area and side slopes of the basin should be mowed. Grass clippings and accumulated organic matter should be removed to prevent the formation of an impervious organic mat. Trash and debris should also be removed at this time. Scarify bottom area and add additional sand if necessary. Sediment should be removed from the basin as necessary. Removal procedures should not take place until the floor of the basin is thoroughly dry. Pretreatment devices associated with basins should be inspected and cleaned at least twice a year and ideally every other month.

Treatment Trench:
Trench shall be inspected annually. The filter fabric shall be inspected for excessive sediment build up. If appreciable amounts of sediment are observed the top layer of stone shall be moved aside and the filter fabric cleaned or replaced. The top layer of stone shall then be washed and placed over the filter fabric.

Emergency Contacts:
In the event of a hazardous materials spill on the site the following parties shall be contacted:
Fire Department: ph: 978-897-4537

Records:
The Homeowners Association shall maintain an inspection log of all elements of the storm water management plan. The Homeowners Association shall maintain a maintenance log documenting the inspection and maintenance of the drainage structures. A copy of the erosion control and storm water maintenance plan and inspection logs shall be kept onsite at all times.

Responsible Party:
After construction the Homeowners Association shall be responsible for the inspection and maintenance of the street sweeping, snow removal, and all components of the stormwater management system. Each individual homeowner shall be responsible for their own drywell.

Budget: The estimated annual operation and maintenance budget is $5,000.

Illicit Discharges: There will be no illicit discharges on site. The Site Plan identifies the locations for the proposed stormwater management system on site which shows that these systems do not allow entry of any illicit discharge into the municipal stormwater system. The Site Plan also shows that there are no connections between the stormwater and wastewater system.

Name: _______________________

Signature: ____________________

Date: _________

The Cottages at Wandering Pond

Operation and Maintenance Inspection Log

Year: ______________________

Inspection Items:	**Frequency:**
Street Sweeping	**Two times per year**
Catch Basin	**Four times per year**
Infiltration Basin	**Two times per year**
Sediment Forebay	**Monthly**
Treatment Trench	**Annually**

Street Sweeping:

Previous Inspection Date: ______________

Inspection Date: ______________________________

Inspector Name: ______________________________

Comments:

Action Required:

Catch Basin:

Previous Inspection Date: ______________

Inspection Date: ______________________________

Inspector Name: ______________________________

Sediment Depth: ______________________________ (Remove if depth greater than 18")

Comments:

Action Required:

Infiltration Basin:

Previous Inspection Date: ______________

Inspection Date: ______________________________

Inspector Name: ______________________________

Sediment Depth: ______________________________ (Remove if depth greater than 18")

Erosion in Basin: ______________________________

Outlet Structure: ______________________________

Comments:

Action Required:

Sediment Forebay:

Previous Inspection Date: ____________

Inspection Date: ________________________

Inspector Name: ________________________

Sediment Depth: ________________________ (Remove if depth is between 3"-6")

Comments:

Action Required:

Treatment Trench:

Previous Inspection Date: ____________

Inspection Date: ________________________

Inspector Name: ________________________

Comments:

Action Required:

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CDS® Inspection and Maintenance Guide

CDS TECHNOLOGIES

Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.

CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y^3	m^3
CDS1515	3	0.9	3.0	0.9	0.5	0.4
CDS2015	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.3	3.0	0.9	1.3	1.0
CDS2020	5	1.3	3.5	1.1	1.3	1.0
CDS2025	5	1.3	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3025	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

Contech Engineered Solutions LLC provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, sanitary sewer, stormwater, earth stabilization and wastewater treament products. For information, visit www.ContechES.com or call 800.338.1122

The product(s) described may be protected by one or more of the following US patents: 5,322,629; 5,624,576; 5,707,527; 5,759,415; 5,788,848; 5,985,157; 6,027,639; 6,350,374; 6,406,218; 6,641,720; 6,511,595; 6,649,048; 6,991,114; 6,998,038; 7,186,058; 7,296,692; 7,297,266; 7,517,450 related foreign patents or other patents pending.

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CDS Inspection & Maintenance Log

CDS Model: ____________________ Location: ____________________

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.

Drainage Maps

Routing Map