STORMWATER MANAGEMENT REPORT

for

BEACON UNIVERSALIST CHURCH

695 SPRINGFIELD AVENUE
BLOCK No. 1702, LOT No. 47
CITY OF SUMMIT, UNION COUNTY, NEW JERSEY

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EXECUTIVE SUMMARY

The proposed stormwater management and conveyance systems for the proposed Beacon Universalist Church project have been designed in accordance with the New Jersey Department of Environmental Protection stormwater rules (NJAC 7:8), and the City of Summit stormwater regulations.

The proposed redevelopment includes the construction of:

- A 2-story building consisting of 18,024± Gross SF (11,795± SF footprint);
- Four solar canopy structures
- Associated driveways, sidewalks, parking areas, stormwater and utility infrastructure, and landscaping.

The proposed redevelopment disturbs more than one acre of land; therefore, this project is considered a "major development" from a stormwater management perspective, and the proposed design is required to address stormwater quantity, quality, and groundwater recharge requirements. The proposed stormwater management system consists of the following:

- A subsurface conveyance system consisting of inlets, manholes, and pipes to convey stormwater runoff from the 25-year design storm event;
- 2 small-scale underground infiltration basins;
- 1 rain garden;
- 3 porous asphalt pavement systems;
- Contech StormFilter manufactured treatment devices (SFMH48, Peak Diversion Stormfilter); and,
- Contech Filterra Bioscape Vault manufactured treatment device.

By using the stormwater management measures identified above and reviewing the results of the detailed calculations provided in this report, the stormwater management design is in accordance with the City of Summit and NJDEP stormwater rules, regulations, and ordinance requirements in effect at the time of the preparation of this report.

1.0 INTRODUCTION

This report addresses the engineering design of the stormwater conveyance and management system for the proposed redevelopment of an existing 2-story office building located at 695 Springfield Avenue in Summit, New Jersey. The proposed stormwater management system is designed in accordance with:

- New Jersey Department of Environmental Protection (NJDEP) stormwater rules (NJAC 7:8), last amended July 17, 2023;

- New Jersey Standards for Soil Erosion and Sediment Control;
- City of Summit, Development Regulations, Part III Environmental Requirements, Article XV Stormwater Management Requirements.

2.0 PROJECT DESCRIPTION

2.1 Existing Site Description

The project site is comprised of Block No. 1702, Lot No. 47 in the City of Summit, Union County, New Jersey. The 1.74± acre tract consists of a 2-story office building, detached garage building, and parking areas. Areas within the eastern portion of the site are covered mostly by grass with some trees and vegetation. The site is bound by Wilson Park to the west, Wilson Primary School and baseball field to the north, undeveloped City owned property to the east and Springfield Avenue (CR 512) to the south; refer to Figure 1 – Site Location Map. The site topography generally slopes from a high point near the center of the site toward the northeast and toward the south. Existing grades at the site generally range from approximately EL. 350 to EL. 356.

2.2 Subsurface Conditions

According to the United States Department of Agriculture (USDA) Natural Resources Conservation Service Soil Survey Map for Union County, New Jersey, the site soils are Boonton-Urban Land-Haledon Complex (BovB). A brief description of the soil type is provided below.

- Boonton-Urban Land-Haledon Complex (BovB): These areas are typically covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material. The natural soil typically consists of loam to gravelly fine sandy loam to silt loam to sandy loam to gravelly loam. When not covered by pavement, concrete, buildings, and other structures, the soil mapping unit is reported to be Hydrologic Soil Group C.

2.3 Flood Hazard Area

Based on a review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for Union County, Map #34039C0008F, dated effective September 20, 2006, the subject property is located outside of the 100-year flood hazard area (Zone X). Refer to Figure 2.

2.4 Proposed Development

The proposed redevelopment at the project site will consist of the following improvements:

- A 2-story building consisting of 18,024± Gross SF (11,795± SF footprint);
- Four solar canopy structures;
- Associated driveways, sidewalks, parking areas, utility infrastructure, and landscaping;
- A proposed stormwater management system consisting of the following:
    - A subsurface conveyance system consisting of inlets, manholes, and pipes to convey stormwater runoff from the 25-year design storm event;
    - 2 small-scale underground infiltration basins;
    - 1 rain garden;
    - 3 porous asphalt pavement systems;
    - Contech StormFilter manufactured treatment devices (SFMH48, Peak Diversion Stormfilter); and,
    - Contech Filterra Bioscape Vault manufactured treatment device.

3.0 STORMWATER MANAGEMENT

The proposed redevelopment disturbs over 1 acre of land; therefore, this project is considered a major development as defined by the NJDEP stormwater rules (NJAC 7:8). Projects that qualify as major developments are required to design stormwater management systems that address:

- Stormwater quantity;
- Stormwater quality;
- Groundwater recharge; and,
- Nonstructural measures

The following sections provided additional detail regarding each of the stormwater design regulations.

3.1 Stormwater Quantity Design

3.1.1 Design Criteria

In accordance with N.J.A.C. 7:8-5.6.(b).3, stormwater management measures are to be designed so that the post-construction peak runoff rates for the 2-, 10-, and 100-year design storm events are 50, 75, and 80%, respectively, of the pre-construction runoff rates for the portion of the site on which the proposed development is to be constructed. The portions of the project site that are to remain undisturbed in the post-construction condition are not subject to rate control measures.

Alternatively, in accordance with N.J.A.C. 7:8-5.6.(b).1, it can be demonstrated through hydrologic

and hydraulic analyses that the post-construction runoff hydrographs for the 2-, 10-, and 100-year design storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events.

The proposed redevelopment results in each point of analysis varying in terms of realizing an increase in post-construction peak runoff rates when compared to pre-construction peak runoff rates. Therefore, it shall be demonstrated in accordance with N.J.A.C. 7:8-5.6.(b).3 that the post-construction peak runoff rates for the 2-, 10-, and 100-year design storm events are 50, 75, and 80%, respectively, of the pre-construction runoff rates for the portion of the site on which the redevelopment is to take place and quantity control through the implementation of BMPs is required. For the points of analysis where there are no quantity control BMPs being implemented, and the total watershed area contributing to a point of analysis decreases in the post-construction condition, it shall be demonstrated in accordance with N.J.A.C. 7:8-5.6.(b).1 that the post-construction runoff hydrographs for the 2-, 10-, and 100-year design storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events.

Regardless of the applicable quantity control design criteria, in accordance with N.J.A.C. 7:8-5.7, the 2-, 10-, and 100-year design storm events must be analyzed for both the "current" and "future" rainfall events.

3.1.2 Design Methodology

This study was prepared utilizing the Natural Resources Conservation Service (NRCS - formerly SCS) method to analyze the pre- and post-development stormwater runoff rates and volumes. This methodology meets the NJDEP stormwater calculation requirements presented in Section 7:8-5.7.(a).1 of the New Jersey Administrative Code (N.J.A.C.) recognizing existing conditions. Stormwater hydrographs were developed utilizing the NOAA Atlas 14 Region D 24-hour storm distribution, and precipitation depths are referenced from the NOAA Atlas 14, Volume 2, Version 3 Point Precipitation Frequency Estimates Table for Summit, New Jersey, accessed on June 8, 2023, for the 2-, 10-, 25-, and 100-year return periods. The table below summarizes the rainfall event totals.

Table 1 – NOAA Atlas 14 Precipitation Summary for 24-Hour Storm Events

2-yr (in)	10-yr (in)	25-yr (in)	100-yr (in)
3.43	5.22	6.47	8.74

In accordance with N.J.A.C. 7:8-5.7.(c), the precipitation depths from NOAA Atlas 14 shall be

modified for the "current" storm events using the following precipitation adjustment factors, which are based on the project site's location within Union County.

Table 2 – Current Precipitation Adjustment Factors for Union County			
2-yr	**10-yr**	**25-yr**	**100-yr**
1.01	1.03	1.04	1.06

Note: The adjustment factor for the 25-year storm event was found using a weighted average of the 10-year and 100-year storm event adjustment factors. The purpose of determining the 25-year storm event adjustment factor is for inputting basin-routed discharge rates into the conveyance network design software, as the proposed conveyance networks are designed for the 25-year design storm event.

Table 3 – Current Precipitation Summary for 24-Hour Storm Events			
2-yr (in)	**10-yr (in)**	**25-yr (in)**	**100-yr (in)**
3.46	5.38	6.73	9.26

In accordance with N.J.A.C. 7:8-5.7.(d), the precipitation depths from NOAA Atlas 14 shall be modified for the "future" storm events using the following precipitation adjustment factors, which are based on the project site's location within Union County.

Table 4 – Future Precipitation Adjustment Factors for Union County			
2-yr	**10-yr**	**25-yr**	**100-yr**
1.20	1.23	1.27	1.35

Note: The adjustment factor for the 25-year storm event was found using a weighted average of the 10-year and 100-year storm event adjustment factors. The purpose of determining the 25-year storm event adjustment factor is for inputting basin-routed discharge rates into the conveyance network design software, as the proposed conveyance networks are designed for the 25-year design storm event.

Table 5 – Future Precipitation Summary for 24-Hour Storm Events			
2-yr (in)	**10-yr (in)**	**25-yr (in)**	**100-yr (in)**
4.12	6.42	8.23	11.80

A time of concentration was calculated for each watershed. The time of concentration is defined as the time for runoff to travel from the hydraulically most remote point of the watershed to the point of interest. Values of the time of concentration were determined for existing and proposed conditions based on land cover and slope of the flow path using methods described in TR-55 and Chapter 5 of the New Jersey Best Management Practices (BMP) Manual. A time of concentration calculation was performed for both the pervious and impervious land coverage areas within each watershed in order to more accurately model peak runoff rates. For the post-construction time of concentration calculations, the McCuen-Spiess limitation is applied to the sheet flow travel time portion of the calculation. Due to technical limitations of the hydrologic software used to develop hydrographs, the minimum time of concentration is 2 minutes.

A runoff curve number (CN) was selected based upon the land cover type and underlying soil hydrologic classification within each watershed. In accordance with Chapter 5 of the New Jersey BMP Manual, peak runoff rates are calculated for each individual land cover type within the watershed and then hydraulically added together to determine the peak runoff rate of the watershed, rather than using the weighted runoff curve number (CN) methodology. Runoff curve numbers are referenced from Tables 2-2a and 2-2c of TR-55: Urban Hydrology for Small Watersheds.

3.1.3 Points of Analysis

All stormwater runoff generated from the project site discharges to three points of analysis described below:

Point of Analysis 1 (POA-1) refers to an existing catch basin located along Springfield Avenue which is located to the southwest of the project site.

Point of Analysis 2 (POA-2) refers to an existing low point on the neighboring property located to the northeast of the site. Runoff is conveyed via overland flow to the POA and includes runoff from offsite areas to the north and west of the site which are conveyed through the site to POA-2.

Point of Analysis 3 (POA-3) refers to an existing catch basin located to the west of POA-1 along Springfield Avenue.

3.1.4 Existing Watersheds

The existing watersheds are depicted on Figure 4 – Existing Watershed Map.

Watershed EX-1 is approximately 0.51± acres and consists of portions of the existing office building, driveway, and landscape areas that are proposed to be disturbed in the post-construction condition. This watershed is conveyed via overland flow to the existing stormwater conveyance system in Springfield Avenue to Point of Analysis 1 (POA-1).

Watershed EX-2A is approximately 1.22± acres and consists of existing office building, garage, woods, landscaped areas, and pavement areas in the northern portion of the subject property that are proposed to be disturbed in the post-construction condition. This watershed is conveyed primarily via overland flow to the northeast, discharging to Point of Analysis 2 (POA-2).

Watershed EX-2B is approximately 0.75± acres and consists of existing off-site areas including a baseball field and other landscaped areas which are located to the north of the subject property, and which are proposed to remain undisturbed in the post-construction condition. This watershed is conveyed via overland flow through the northern portion of the site, discharging to Point of Analysis 2 (POA-2).

Watershed EX-3 is approximately 0.05± acres and consists of existing landscaped areas in the southwestern portion of the subject property. This watershed is conveyed primarily via overland flow to an existing catch basin located on Springfield Avenue, discharging to Point of Analysis 3 (POA-3).

A summary of the existing watershed characteristics and peak flows are presented in the table on the following page; refer to Appendix A for weighted curve number (CN) calculation worksheets and supporting hydrologic calculations.

Table 6 – Summary of Current Storm Event Existing Peak Discharges

Watershed	2-yr Storm Event Peak Flow (CFS)	10-yr Storm Event Peak Flow (CFS)	100-yr Storm Event Peak Flow (CFS)
EX-1	0.83	1.63	3.38
EX-2A	1.88	3.42	6.84
EX-2B	0.64	1.45	3.29
EX-3	0.05	0.11	0.27

Table 7 – Summary of Future Storm Event Existing Peak Discharges			
Watershed	**2-yr Storm Event Peak Flow (CFS)**	**10-yr Storm Event Peak Flow (CFS)**	**100-yr Storm Event Peak Flow (CFS)**
EX-1	1.09	2.09	4.55
EX-2A	2.39	4.32	9.13
EX-2B	0.91	1.93	4.54
EX-3	0.07	0.15	0.38

3.1.5 Allowable Peak Discharges

The proposed redevelopment increases the amount of impervious coverage compared to the existing condition, causing post-construction peak runoff rates to exceed pre-construction peak runoff rates within the watersheds with the most concentrated areas of development. Therefore, it shall be demonstrated in accordance with N.J.A.C. 7:8-5.6.(b).3 that the post-construction peak runoff rates for the 2-, 10-, and 100-year design storm events are 50, 75, and 80%, respectively, of the pre-construction runoff rates for the portions of the site on which the proposed development is to be constructed and quantity control BMPs are required to be implemented.

For the points of analysis where there are no quantity control BMPs being implemented and the total watershed area contributing to a point of analysis decreases, it shall be demonstrated in accordance with N.J.A.C. 7:8-5.6.(b).1 that the post-construction runoff hydrographs for the 2-, 10-, and 100-year design storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events.

Watersheds noted as being "disturbed" in the watershed descriptions in Section 3.1.4 of this report represent the areas on the project site that are to be disturbed as part of the proposed redevelopment and are therefore subject to post-construction peak rate reductions if post-construction peak runoff rates exceed pre-construction peak runoff rates and quantity control BMP's are required to be implemented.

Watersheds noted as being "undisturbed" in the watershed descriptions in Section 3.1.4 of this report represent the areas on the project site that are to remain undisturbed as part of the proposed redevelopment and are therefore not subject to peak rate reductions.

The following section summarizes the quantity control criteria being established for each point of analysis, which watersheds are subject to peak rate reductions, and the allowable peak discharges for each point of analysis.

- Point of Analysis 1 (POA-1): The proposed redevelopment within this watershed results in peak runoff rates increasing in the proposed condition, and quantity control BMPs are required to be implemented. Therefore, it shall be demonstrated in accordance with N.J.A.C. 7:8-5.6.(b).3 that the post-construction peak runoff rates for both the current and future 2-, 10-, and 100-year design storm events are 50, 75, and 80%, respectively, of the pre-construction runoff rates for the disturbed portions of the overall watershed.

Table 8 – POA-1 Allowable Peak Discharges (Current)		
Design Storm Event	**Existing Peak Discharge (CFS)**	**Allowable Peak Discharge (CFS)**
2-Year	0.83	0.41
10-Year	1.63	1.22
100-Year	3.38	2.70

Note: Total Allowable Peak Discharges are calculated by hydraulically adding runoff hydrographs and may not reflect the direct addition of peak discharge rates. Refer to the hydrograph report calculations in Appendix A.

Table 9 – POA-1 Allowable Peak Discharges (Future)		
Design Storm Event	**Existing Peak Discharge (CFS)**	**Allowable Peak Discharge (CFS)**
2-Year	1.09	0.55
10-Year	2.09	1.57
100-Year	4.56	3.64

Note: Total Allowable Peak Discharges are calculated by hydraulically adding runoff hydrographs and may not reflect the direct addition of peak discharge rates. Refer to the hydrograph report calculations in Appendix A.

- Point of Analysis 2 (POA-2): The proposed redevelopment within this watershed results in peak runoff rates increasing in the proposed condition, and quantity control BMPs are required to be implemented. Therefore, it shall be demonstrated in accordance with N.J.A.C. 7:8-5.6.(b).3 that the post-construction peak runoff rates for both the current and future 2-, 10-, and 100-year design storm events are 50, 75, and 80%, respectively, of the pre-construction runoff rates for the disturbed portions of the overall watershed.

Table 10 – POA-2 Allowable Peak Discharges (Current)		
Design Storm Event	**Existing Peak Discharge (CFS)**	**Allowable Peak Discharge (CFS)**
2-Year	2.31	1.39
10-Year	4.50	3.64
100-Year	9.37	8.00

Note: Total Allowable Peak Discharges are calculated by hydraulically adding runoff hydrographs and may not reflect the direct addition of peak discharge rates. Refer to the hydrograph report calculations in Appendix A.

Table 11 – POA-2 Allowable Peak Discharges (Future)		
Design Storm Event	**Existing Peak Discharge (CFS)**	**Allowable Peak Discharge (CFS)**
2-Year	3.03	1.85
10-Year	5.77	4.69
100-Year	12.65	10.83

Note: Total Allowable Peak Discharges are calculated by hydraulically adding runoff hydrographs and may not reflect the direct addition of peak discharge rates. Refer to the hydrograph report calculations in Appendix A.

- Point of Analysis 3 (POA-3): The total contributing watershed area is being reduced in the post-construction condition. Therefore, it shall be demonstrated in accordance with N.J.A.C. 7:8-5.6.(b).1 that the post-construction runoff hydrographs for both the current and future 2-, 10-, and 100-year design storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events.

Table 12 – POA-3 Allowable Peak Discharges (Current)		
Design Storm Event	**Existing Peak Discharge (CFS)**	**Allowable Peak Discharge (CFS)**
2-Year	0.05	0.05
10-Year	0.11	0.11
100-Year	0.27	0.27

Note: Total Allowable Peak Discharges are calculated by hydraulically adding runoff hydrographs and may not reflect the direct addition of peak discharge rates. Refer to the hydrograph report calculations in Appendix A.

Table 13 – POA-3 Allowable Peak Discharges (Future)		
Design Storm Event	**Existing Peak Discharge (CFS)**	**Allowable Peak Discharge (CFS)**
2-Year	0.07	0.07
10-Year	0.15	0.15
100-Year	0.38	0.38

Note: Total Allowable Peak Discharges are calculated by hydraulically adding runoff hydrographs and may not reflect the direct addition of peak discharge rates. Refer to the hydrograph report calculations in Appendix A.

3.1.6 Proposed Watersheds

The proposed watersheds are depicted on Figure 5 – Proposed Watershed Map.

Watershed PR-1A is approximately 0.24± acres and consists of portions of the proposed building roof area, pavement areas, and pervious landscape areas. Stormwater runoff is conveyed via overland flow and a proposed subsurface conveyance system to Small-Scale Underground Infiltration Basin 1-1 (UGD-INF1-1). The watershed is then ultimately conveyed to POA-1.

Watershed PR-1B is approximately 0.22± acres and consists of portions of the proposed building roof area, the proposed sidewalk, and pervious landscape areas. Stormwater runoff is conveyed via overland flow and a proposed subsurface conveyance system to Small-Scale Underground Infiltration Basin 1-2 (UGD-INF1-2). The watershed is then ultimately conveyed to POA-1.

Watershed PR-1C is approximately 0.05± acres and consists of portions of the proposed paver walkway and pervious landscape areas. Stormwater runoff is conveyed via overland flow to the Rain Garden. The watershed is then conveyed to UGD-INF1-2, ultimately discharging to POA-1.

Watershed PR-1D is approximately 0.17± acres and consists of portions of the proposed sidewalk, unit paver walkway, drive aisles, and pervious landscape areas. Stormwater runoff is conveyed via overland flow and a proposed subsurface conveyance system to Contech Peak Diversion StormFilter and to UGD-INF1-2. The watershed is ultimately conveyed to POA-1.

Watershed PR-1E is approximately 0.19± acres and consists of portions of proposed sidewalk and pervious landscape areas. Stormwater runoff is conveyed via overland flow to POA-1.

Watershed PR-2A is approximately 0.21± acres and consists of pervious landscaped areas and portions of the pavement areas consisting of both standard duty pavement and porous asphalt pavement. Stormwater runoff is conveyed via overland flow to Porous Asphalt Pavement

System 1. The watershed is then ultimately conveyed to POA-2.

Watershed PR-2B is approximately 0.12± acres and consists of pervious landscaped areas and sidewalk. Stormwater runoff is conveyed via overland flow and proposed subsurface conveyance system to Porous Asphalt Pavement System 3. The watershed is then ultimately conveyed to POA-2.

Watershed PR-2C is approximately 0.10± acres and consists of pervious landscaped areas and the porous asphalt pavement. Stormwater runoff is conveyed via overland flow to Porous Asphalt Pavement System 2. The watershed is then ultimately conveyed to POA-2.

Watershed PR-2D is approximately 0.66± acres and consists of offsite watershed to the north of the site and generally consists of pervious landscaped areas, existing baseball field and impervious walkways. Stormwater runoff is conveyed via overland flow to POA-2.

Watershed PR-2E is approximately 0.14± acres and consists of undetained pervious landscaped areas and sidewalk. Stormwater runoff is conveyed via overland flow and a proposed subsurface conveyance system to POA-2.

Watershed PR-2F is approximately 0.08± acres and consists of undetained offsite watershed to the west of the site and generally consists of pervious landscaped areas, and impervious walkways. Stormwater runoff is conveyed via overland flow and a proposed subsurface conveyance system to POA-2.

Watershed PR-2G is approximately 0.21± acres and consists of onsite undetained areas at the north end of the site and generally consists of pervious landscaped areas. Stormwater runoff is conveyed via overland flow to POA-2.

Watershed PR-2H is approximately 0.08 ± acres and consists of pervious landscaped areas, porous asphalt pavement, and sidewalk. Stormwater runoff is conveyed via overland flow to Porous Asphalt Pavement System 3. The watershed is then ultimately conveyed to POA-2.

Watershed PR-3 is approximately 0.03± acres and consists of onsite undetained areas at the southwest portion of the site and generally consists of pervious landscaped areas. Stormwater runoff is conveyed via overland flow to POA-3.

A summary of the existing watershed characteristics and peak flows are presented in the table below; refer to Appendix B for runoff curve number (CN) calculation worksheets and supporting hydrologic calculations.

Table 14 – Summary of Current Storm Event Proposed Peak Discharges				
Watershed	**2-yr Storm Peak Flow (CFS)**	**10-yr Storm Peak Flow (CFS)**	**25-yr Storm Peak Flow (CFS)**	**100-yr Storm Peak Flow (CFS)**
PR-1A	0.81	1.27	1.59	2.19
PR-1B	0.58	0.97	1.25	1.79
PR-1C	0.11	0.21	0.27	0.40
PR-1D	0.46	0.77	1.00	1.43
PR-1E	0.35	0.70	0.96	1.45
PR-2A	0.69	1.09	1.37	1.90
PR-2B	0.24	0.44	0.58	0.85
PR-2C	0.27	0.46	0.59	0.85
PR-2D	0.59	1.34	1.92	3.05
PR-2E	0.20	0.40	0.55	0.84
PR-2F	0.11	0.22	0.30	0.46
PR-2G	0.28	0.64	0.92	1.47
PR-2H	0.23	0.38	0.49	0.69
PR-3	0.04	0.10	0.14	0.22

Table 15 – Summary of Future Storm Event Proposed Peak Discharges				
Watershed	**2-yr Storm Peak Flow (CFS)**	**10-yr Storm Peak Flow (CFS)**	**25-yr Storm Peak Flow (CFS)**	**100-yr Storm Peak Flow (CFS)**
PR-1A	0.97	1.52	1.95	2.79
PR-1B	0.73	1.22	1.61	2.38
PR-1C	0.14	0.26	0.35	0.53
PR-1D	0.56	0.95	1.25	1.86
PR-1E	0.46	0.88	1.22	1.91
PR-2A	0.83	1.31	1.69	2.43
PR-2B	0.31	0.55	0.74	1.13
PR-2C	0.32	0.55	0.73	1.08
PR-2D	0.86	1.85	2.68	4.36
PR-2E	0.29	0.55	0.77	1.20
PR-2F	0.15	0.30	0.42	0.66
PR-2G	0.39	0.86	1.24	2.02
PR-2H	0.28	0.46	0.61	0.89
PR-3	0.06	0.13	0.18	0.30

3.1.7 Proposed Detention Routing

Two small-scale underground infiltration basins, three porous asphalt pavement systems, and one rain garden are proposed in order to meet the stormwater quantity requirements. According to N.J.A.C. 7:8-5.2.(f), small-scale infiltration basins, rain gardens and porous asphalt pavement systems qualify as green infrastructure BMP's that may be utilized for stormwater quantity,

stormwater runoff quality, and groundwater recharge requirements without a waiver or variance.

Routing calculations have been provided in order to demonstrate that the basins have adequate storage capacity to safely convey storm events up to the 100-year design storm for both the current and future rainfall events; refer to Appendix C for supporting calculations.

The total proposed peak discharge rate for the point of analysis can then be calculated by adding together the peak outflow from the proposed rain garden, small-scale underground infiltration basins, and porous asphalt pavement systems, along with the peak discharges from the undetained, undisturbed, and offsite watersheds.

Table 16 – Total Current Storm Event Proposed Peak Discharges

Point of Analysis	2-Year Storm	10-Year Storm	100-Year Storm
POA-1	0.37	0.90	2.59
POA-2	1.31	2.73	7.04
POA-3	0.04	0.10	0.22

Note: Total Proposed Peak Discharges are calculated by hydraulically adding runoff hydrographs and may not reflect the direct addition of peak discharge rates. Refer to hydrograph report calculations in Appendix B.

Table 17 – Total Future Storm Event Proposed Peak Discharges

Point of Analysis	2-Year Storm	10-Year Storm	100-Year Storm
POA-1	0.55	1.15	3.54
POA-2	1.84	3.93	10.03
POA-3	0.06	0.13	0.30

Note: Total Proposed Peak Discharges are calculated by hydraulically adding runoff hydrographs and may not reflect the direct addition of peak discharge rates. Refer to hydrograph report calculations in Appendix B.

3.1.8 Quantity Control BMP Design Summary

For small-scale underground infiltration basins, the following parameters must be met as part of the system design as per Chapter 9.8 of the New Jersey BMP Manual; all design criteria have been met – refer to calculations in the appendices of this report as well as the design drawings:

- Maximum contributory drainage area: 2.5 acres
- Minimum distance between basin bottom and seasonal high groundwater/bedrock: 2 feet

- Maximum water quality design storm event water depth: 24 inches
- Maximum design storm drain time: 72 hours

Per the NJDEP stormwater rules, credit can be taken for any runoff volume that is infiltrated into the subsoil (exfiltration) during the basin routing period. Refer to Section 3.3.3 for details regarding the exfiltration rate calculation as it relates to the quantity control analysis.

For the Rain Garden (under-drained small-scale bioretention basin), the following parameters must be met as part of the system design as per Chapter 9.7 of the New Jersey BMP Manual; all design criteria have been met – refer to calculations in the appendices of this report as well as the design drawings:
Rea

- Maximum contributory drainage area: 2.5 acres
- Minimum distance between basin bottom and seasonal high groundwater/bedrock: 1 foot
- Maximum water quality design storm event water depth: 12 inches
- Maximum design storm drain time: 72 hours

Porous asphalt pavement systems are proposed to meet the stormwater quantity requirements. The underlying stone storage bed has been sized in order to attenuate the 2-, 10-, and 100-year design storm events. The following parameters must be met as part of the system design as per Chapter 9.6 of the New Jersey BMP Manual; all design criteria has been met – refer to calculations in the appendices of this report as well as the design drawings:

- Maximum area of additional inflow: 3 times the porous pavement area
- Minimum distance between basin bottom and seasonal high groundwater/bedrock (under-drained systems): 1 foot
- Maximum design storm drain time: 72 hours

Table 18 – Proposed BMP Design Summary					
BMP	**Contributory Drainage Area[1] (AC)**	**WQDS Water Depth (FT)**	**Test Pits & Borings[2]**	**Bottom of BMP EL.[3]**	**Groundwater or Mottling EL.**
UGD-INF1-1	0.24	348.77	TP-5	348.00	342.00[4]
UGD-INF1-2	0.27	344.53	TP-1, TP-2, TP-3, TP-4	344.00	338.00[4]
Rain Garden	0.04	355.31	TP-5	351.50	342.00[4]
Porous Asphalt System 1	0.21	354.41	TP-6, TP-7	354.10	346.00
Porous Asphalt System 2	0.10	355.26	TP-7	355.10	346.00
Porous Asphalt System 3	0.20	354.39	TP-7	354.10	346.00

Notes:

1. *Contributory drainage area is the inflow drainage area to a BMP that excludes the area of the BMP itself in the case of a surface BMP.*
2. *Refer to the drainage plan, drawing CG102, for BMP locations. Refer to Appendix G for supporting geotechnical investigation information including test pit and boring logs.*
3. *The bottom of BMP elevation is either the bottom of the underdrain gravel layer for an under-drained bioretention basin or the bottom of the underlying gravel layer for subsurface infiltration basins and porous asphalt pavement systems.*
4. *If groundwater or soil mottling was not encountered, the depth of the deepest test pit or boring was assumed to be the groundwater elevation as a conservative measure.*

3.1.9 Stormwater Quantity Summary

A summary for each point of analysis, detailing the existing, allowable, and proposed peak discharge rates, is outlined in the table below.

Table 19 – POA-1 Peak Discharge Summary – Current Storm Events			
Design Storm Event	**POA-1**		
	Existing Peak Discharge (CFS)	**Allowable Peak Discharge (CFS)**	**Proposed Peak Discharge (CFS)**
2-Year	0.83	0.41	0.37
10-Year	1.63	1.22	0.90
100-Year	3.38	2.70	2.59

Table 20 – POA-1 Peak Discharge Summary – Future Storm Events			
Design Storm Event	**POA-1**		
	Existing Peak Discharge (CFS)	**Allowable Peak Discharge (CFS)**	**Proposed Peak Discharge (CFS)**
2-Year	1.09	0.55	0.55
10-Year	2.09	1.57	1.15
100-Year	4.56	3.64	3.54

Table 21 – POA-2 Peak Discharge Summary – Current Storm Events			
Design Storm Event	**POA-2**		
	Existing Peak Discharge (CFS)	**Allowable Peak Discharge (CFS)**	**Proposed Peak Discharge (CFS)**
2-Year	2.31	1.39	1.31
10-Year	4.50	3.64	2.73
100-Year	9.37	8.00	7.04

Table 22 – POA-2 Peak Discharge Summary – Future Storm Events			
Design Storm Event	**POA-2**		
	Existing Peak Discharge (CFS)	**Allowable Peak Discharge (CFS)**	**Proposed Peak Discharge (CFS)**
2-Year	3.03	1.85	1.84
10-Year	5.77	4.69	3.93
100-Year	12.65	10.83	10.03

Table 23 – POA-3 Peak Discharge Summary – Current Storm Events			
Design Storm Event	**POA-3**		
	Existing Peak Discharge (CFS)	**Allowable Peak Discharge (CFS)**	**Proposed Peak Discharge (CFS)**
2-Year	0.05	0.05	0.04
10-Year	0.11	0.11	0.10
100-Year	0.27	0.27	0.22

Table 24 – POA-3 Peak Discharge Summary – Future Storm Events			
Design Storm Event	**POA-3**		
	Existing Peak Discharge (CFS)	**Allowable Peak Discharge (CFS)**	**Proposed Peak Discharge (CFS)**
2-Year	0.07	0.07	0.06
10-Year	0.15	0.15	0.13
100-Year	0.38	0.38	0.30

3.2 Stormwater Quality Design

3.2.1 Design Criteria

The project site is not subject to water quality treatment requirements as the development results in a net zero change in regulated motor vehicle surface coverage. In accordance with N.J.A.C. 7:8-5.5.(a), major developments are subject to providing water quality treatment when the development results in an increase of one-quarter acre or more of regulated motor vehicle surface. In the existing condition, there is approximately 0.41± acres of regulated motor surface, and in the post-construction condition, there is approximately 0.41± acres of regulated motor vehicle surface; refer to Figure 7 – Existing Regulated Motor Vehicle Surface Map and Figure 8 – Proposed Regulated Motor Vehicle Surface Map for delineations.

Although the project is not subject to providing water quality treatment, the stormwater BMPs for the project site must nevertheless be designed in accordance with the standards and regulations set forth in Chapter 9 and Chapter 11 of the BMP Manual in order to provide effective water quality treatment.

3.2.2 Design Methodology

The proposed stormwater quality BMPs that have been chosen for the project design consist of small-scale underground infiltration basins, porous asphalt pavement systems, and mechanical treatment devices. Each of these BMPs achieves 80% TSS removal according to Chapter 9 and Chapter 11 of the BMP Manual.

The small-scale subsurface infiltration basins have been designed to achieve 80% TSS removal, meaning that they have been designed to store the entire water quality design storm event runoff volume below the first orifice opening of the outlet control structures, with the water surface elevations not exceeding 24 inches. The basins meet the criteria set forth in Chapter 9.8 of the BMP Manual for receiving TSS removal credit; refer to calculations in Appendix E.

In accordance with Chapter 9.8 of the BMP Manual, all non-roof generated runoff that is conveyed to a subsurface infiltration basin must be pretreated to remove 80% of total suspended solids (TSS) by any BMP in Chapter 9 or Chapter 11 of the BMP Manual. Manufactured treatment devices (MTDs), the Contech Filterra (a Chapter 9 green infrastructure MTD) and the Contech StormFilter (a Chapter 11 NJDEP-certified 80% TSS MTD), are utilized to provide pretreatment of non-roof generated runoff to both Small-Scale Underground Infiltration Basin 1-1 and Small-Scale Underground Infiltration Basin 1-2. These manufactured treatment devices have been adequately sized to treat the NJDEP water quality design storm event, and effectively bypass larger storm events; refer to the manufactured treatment device sizing calculations in Appendix E of this report.

The proposed porous pavement systems have also been designed to achieve 80% TSS removal. These systems consist of a porous asphalt surface course, a choker course that will filter pollutants, and an underlying stone storage bed subbase. The stone storage bed layer of the porous pavement system has been adequately sized to route the 100-year design storm event; therefore, there is more than adequate capacity to store the water quality storm event runoff volume, thus meeting the criteria to achieve 80% TSS removal. The porous asphalt pavement systems meet all of the design criteria set forth in Chapter 9.6 of the BMP Manual.

3.2.3 Design Summary

Although water quality treatment is not required according to the stormwater rules in N.J.A.C. 7:8, by virtue of the BMPs selected to provide quantity control measures, almost all of the regulated motor vehicle surface on the subject site will be treated either by the small-scale underground infiltration basins, porous asphalt pavement systems, and manufactured treatment devices, thus providing 80% TSS removal for the project site.

3.2.4 Trash and Waste

Catch basins are proposed to have Type N Eco curb pieces to prevent trash and floatables from entering the proposed conveyance systems. The BMP outlet control structures will also be fixed with trash racks and rock screens to prevent debris and floatables from entering the downstream conveyance systems.

3.3 Groundwater Recharge

3.3.1 Design Criteria

The subject site is located within the Metropolitan Planning area PA-1 as defined by the New

Jersey State Planning Area Map; however, portions of the project site are undeveloped, with wooded areas proposed to be removed in the post-construction condition. Therefore, per N.J.A.C. 7:8-5.4.(b).1.i, one hundred percent (100%) of the average annual pre-construction groundwater recharge volume for the disturbed area of the project site must be maintained in the post-construction condition.

3.3.2 Design Methodology

The groundwater recharge volume analysis has been performed using the NJDEP New Jersey Groundwater Recharge Spreadsheet (NJGRS), which is based on the data and computational procedures outlined in New Jersey Geological Survey Report GSR-32. The spreadsheet compares the pre-construction and post-construction land cover types within the property's native underlying soil classifications to develop the total annual recharge volume across the project site in both the pre-construction and post-construction conditions.

The post-development annual groundwater recharge deficit for the project site is calculated to be 21,784 cubic feet. This deficit must be rectified via the implementation of BMPs that provide infiltration.

3.3.3 BMP Design

Two small-scale underground infiltration basins (UGD-INF1-1 and UGD-INF1-2) have been designed to meet the recharge volume requirement for the project site.

The small-scale underground infiltration basins are designed with either perforated HDPE pipes, or a structural arch chamber system (Cultec), encased within a gravel storage layer that is designed with a minimum 40% void ratio. The first orifice opening within each basin is set high enough above the system invert to ensure that the NJDEP water quality design storm volume is recharged into the native underlying soils. Test pits and infiltration tests performed within the basin footprints indicate that groundwater is at a sufficient depth to enable infiltration. A summary of the test pit and infiltration test results are summarized below:

Table 25 – Small-Scale Underground Infiltration Basin 1-1 Design Infiltration Rate Calculation

Exploration	Permeability Test Result (in/hr)	Factor of Safety	Design Infiltration Rate (in/hr)
TP-5	9.4	2	4.7

Table 26 – Small-Scale Underground Infiltration Basin 1-2 Design Infiltration Rate Calculation			
Exploration	**Permeability Test Result (in/hr)**	**Factor of Safety**	**Design Infiltration Rate (in/hr)**
TP-1	15.1	2	6.65
TP-2	13.3		

Notes:

1. *Infiltration tests were performed at TP-3 and TP-4, which are also located within the footprint of Small-Scale Underground Infiltration 1-2. However, these tests were performed within a different soil layer at an elevation well above the bottom of the proposed BMP. These tests have therefore been discounted, as the infiltration tests performed at TP-1 and TP-2 are within the soil stratum that the basin will be recharging into.*

The NJGRS spreadsheet utilizes what is referred to as the BMP effective depth while calculating the annual recharge volume that a given BMP provides. Each underground infiltration basin is comprised of structural storage (e.g. pipes and Cultec arch chambers) with a 100% void ratio encased within a gravel storage bed with a 40% void ratio. For a basin with 100% void space, the distance from the bottom of the BMP to the first orifice opening is the effective BMP depth. Calculations have been performed to determine the average void ratio, which is then used as a multiplier to calculate the effective BMP depth; these calculations are provided in Appendix E of this report.

A groundwater mounding analysis, utilizing the NJDEP Hantush Excel Spreadsheet, was performed for each infiltration BMP as outlined in Chapter 13 of the BMP Manual. Each basin has been designed so that the maximum groundwater mounding height occurs below the respective bottom of the gravel storage; refer the basin design summary in the tables below. The maximum mounding height produced by the Hantush spreadsheet occurs at the geometric center of the basin, with lower mounding heights occurring at the perimeter.

Table 27 – Infiltration BMP Design Summary				
Infiltration Basin	**Max. Groundwater Elevation**	**Bottom of BMP Elevation**	**Max. Mounding Height (FT)**	**Max. Mounding Elevation**
1-1	342.00	348.00	5.98	347.98
1-2	338.00	344.00	5.13	343.13

Exfiltration credit will be taken toward the peak rate reduction requirements for the 2-, 10-, and 100-year design storm events; therefore, according to Chapter 13 of the BMP Manual, the duration of the infiltration period for the groundwater mounding analysis must reflect the

discarded volume via exfiltration for the respective storm event. Per guidance in Chapter 13 of the BMP manual, the recharge rate in the Hantush spreadsheet (which correlates to the exfiltration rate in the routing calculations) can be reduced, and the duration of the infiltration period proportionally increased, in order to show groundwater mounding staying at or below the bottom of the BMP.

The 100-year design storm event results in the most discarded runoff volume via exfiltration; therefore, the infiltration period and recharge rate that will be utilized for the groundwater mounding analysis will be calculated for this design storm event. Moreover, the calculated 100-year storm recharge rate will then be utilized as the exfiltration rate for the routing calculations for all storm events, which is a conservative measure considering that higher exfiltration rates could be utilized for smaller design storm events. The table below summarizes the reduction from the field-measured infiltration rates, to the design infiltration rates utilized for the basin routing (exfiltration) in order to demonstrate that groundwater mounding will be sufficiently below the bottom of the BMP:

Table 28 – Design Infiltration Rate (Exfiltration Rate) Summary

Infiltration Basin	Field-Tested Infiltration Rate (in/hr)	Factor of Safety	Design Infiltration Rate (in/hr)	Design Exfiltration Rate Per Groundwater Mounding (in/hr)
1-1	9.4	2	4.70	1.50
1-2	13.3	2	6.65	1.50

Refer to Appendix E for the groundwater mounding, infiltration period, and exfiltration calculations.

3.3.4 Design Summary

For the project site, the combined proposed annual post-construction groundwater recharge volume between Small-Scale Underground Infiltration Basin 1-1 and Small-Scale Underground Infiltration Basin 1-2 was calculated to be approximately 56,141 cubic feet, which exceeds the post-development annual groundwater recharge volume deficit of 22,336 cubic feet.

3.4 Non-Structural Stormwater Management Strategies

Nonstructural strategies were analyzed and implemented to the maximum extent practical for this project.

As per NJAC 7:8-5.3(b), there are nine nonstructural strategies:

1. Protect areas that provide water quality or are susceptible to erosion;
2. Minimize, break up and/or disconnect impervious surfaces;
3. Maximize protection of natural drainage features and vegetation;
4. Minimize decrease in time of concentration;
5. Minimize land disturbance, clearing and grading;
6. Minimize soil compaction;
7. Provide low maintenance vegetation;
8. Provide vegetated conveyance systems; and,
9. Provide pollutant source controls.

3.5 Stormwater Conveyance Design

3.5.1 Design Criteria

The on-site subsurface collection and conveyance system is designed to convey the 25-year design storm event. The conveyance systems conveying discharge from quantity control BMPs have been designed to convey the 100-year design storm event.

3.5.2 Design Methodology

The conveyance system was analyzed using the rational method for estimating runoff for the 25-year design storm event. The project site was divided into subareas based upon topography to determine the contributing runoff to each individual inlet or roof drain. Weighted runoff coefficients were calculated based upon the land cover type within each delineated sub-area. A runoff coefficient (C) was selected in accordance with Table 10-4: Recommended Coefficient of Runoff Values for Various Selected Land Uses from Section 10 of the 2015 New Jersey Department of Transportation (NJDOT) Roadway Design Manual. Values of time of concentration were chosen based on land cover and slope of the flow path from the hydraulically most distant point in the subarea to the appropriate inlet. Unless otherwise specified, the minimum time of concentration used for each on-site inlet is 5 minutes. Rainfall intensities were taken from the National Oceanic and Atmospheric Administration (NOAA) Precipitation Frequency Data Server for the project site; refer to Appendix D.

The proposed conveyance systems have been analyzed utilizing a starting tailwater elevation corresponding to the maximum design water elevation for the 25-year design storm event for the respective BMP that each conveyance network discharges into.

Detailed design calculations for the stormwater conveyance system are included in Appendix D of this report.

4.0 SOIL EROSION AND SEDIMENT CONTROL

Soil erosion and sediment control measures have been designed and located within the project site to minimize the amount of sediment carried by stormwater runoff, both during and after construction of the project. The SESC design was completed in accordance with the New Jersey Standards for Soil Erosion and Sediment Control.

5.0 STORMWATER MAINTENANCE PLAN

The stormwater management systems for the proposed development area are intended to collect, convey and detain the stormwater runoff. Regular maintenance procedures are required to verify the consistent and proper operation of the stormwater management facilities and prevent problems and malfunctions. The maintenance program provides the stormwater maintenance procedures for the site, which can be found under separate cover.

6.0 CONCLUSION

The stormwater management systems have been designed so that the post-construction peak runoff rates either meet the required peak rate reductions, or do not exceed at any point in time the pre-construction peak runoff rates, for the 2-, 10-, and 100-year design storm events, depending on the design criteria governing each point of analysis. The proposed rain garden (small-scale bioretention basin); small-scale underground infiltration basins and porous asphalt pavement systems have been designed in accordance with the BMP Manual in order to achieve the required quantity control for the 2-, 10-, and 100-year design storm events, while simultaneously providing 80% TSS removal for water quality treatment, even though water quality treatment is not required for the project site according to the stormwater rules in N.J.A.C. 7:8. The small-scale underground infiltration basins have been designed to satisfy the annual groundwater recharge requirements. The proposed stormwater conveyance systems have been designed to safely and effectively convey the runoff generated from the 25-year design storm event. Therefore, the engineering design of the stormwater management systems has been performed in accordance with and meets the regulations specified under the City of Summit Code of Ordinances and the NJDEP stormwater rules.

7.0 REFERENCES

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2. Hydrology Studio. Stormwater Studio 2022 v 3.0.0.29.
3. Urban Hydrology for Small Watersheds, Technical Release No. 55, USDA Soil Conservation Service Publication, June 1986.

4. New Jersey Stormwater Best Management Practices Manual, New Jersey Department of Environmental Protection, Division of Watershed Management, April 2004, last revised July 2023.

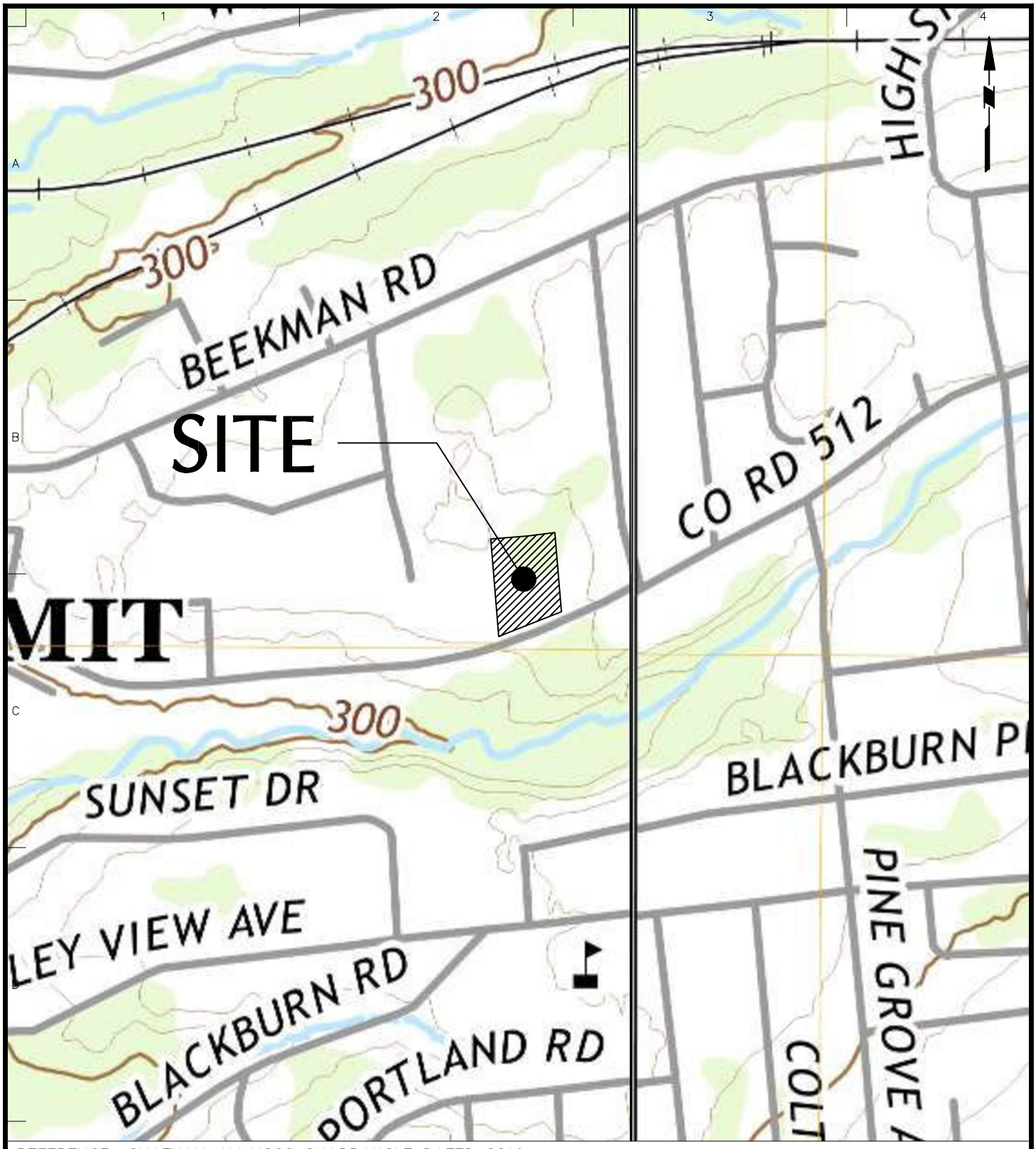
5. Summit – Chapter 26 Stormwater Management Regulations and Chapter 35 Development Regulations.

6. The Standards for Soil Erosion and Sediment Control in New Jersey, New Jersey Department of Agriculture, revised July 2017.

7. New Jersey Department of Transportation 2015 Roadway Design Manual, last revised July 13, 2022.

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FIGURES



REFERENCE: CHATHAM, NJ USGS QUADRANGLE DATED 2019
ROSELLE, NJ USGS QUADRANGLE DATED 2019

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NJ CERTIFICATE OF AUTHORIZATION NO. 24GA27996400

Project
BEACON UNITARIAN UNIVERSALIST CHURCH
SUMMIT
UNION COUNTY NEW JERSEY

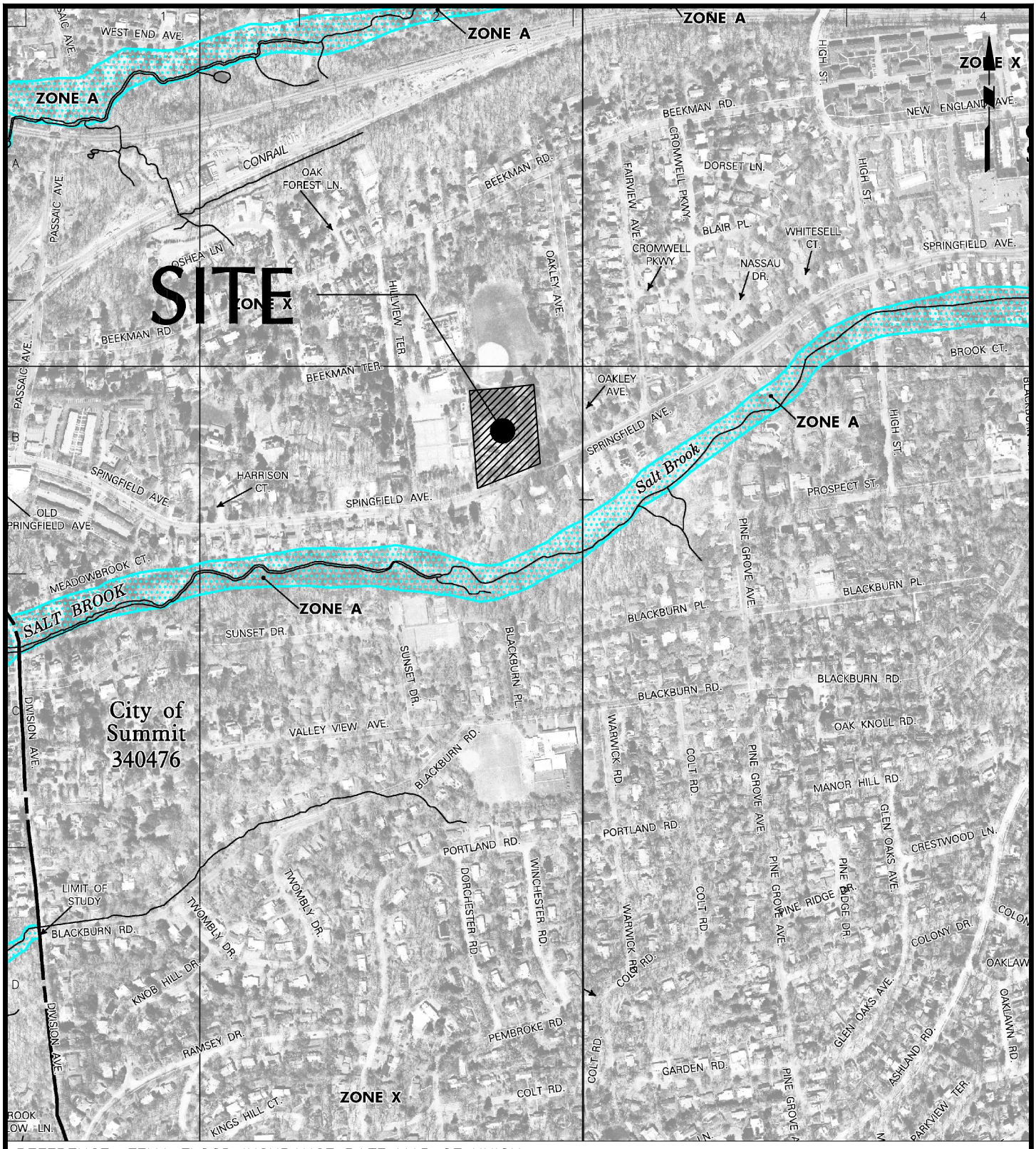
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Project No. 101007201
Date FEBRUARY 9, 2024
Drawn By SM
Checked By MJV

Figure
FG01

Sheet 1 of 1

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REFERENCE: FEMA FLOOD INSURANCE RATE MAP OF UNION COUNTY, NEW JERSEY, MAP NUMBER 34039C0008F AND 34039C0009F, EFFECTIVE DATE SEPTEMBER 20, 2006.

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SCALE: 1 INCH = 500 FEET

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UNION COUNTY NEW JERSEY

Drawing Title
FEMA FLOOD MAP

Project No. 101007201
Date FEBRUARY 9, 2024
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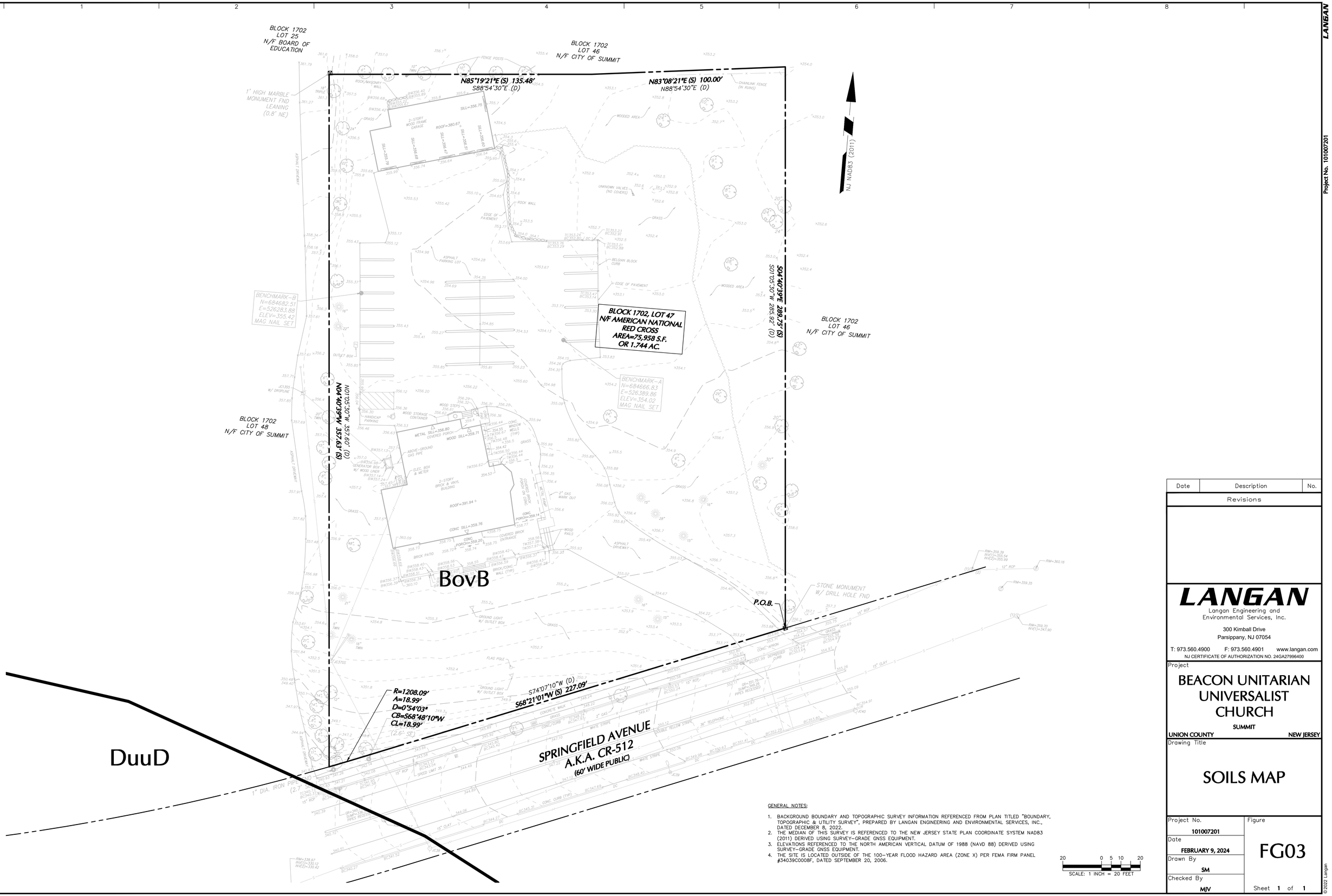
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GENERAL NOTES:

1. BACKGROUND BOUNDARY AND TOPOGRAPHIC SURVEY INFORMATION REFERENCED FROM PLAN TITLED "BOUNDARY, TOPOGRAPHIC & UTILITY SURVEY", PREPARED BY LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC., DATED DECEMBER 8, 2022.
2. THE MEDIAN OF THIS SURVEY IS REFERENCED TO THE NEW JERSEY STATE PLAN COORDINATE SYSTEM NAD83 (2011) DERIVED USING SURVEY-GRADE GNSS EQUIPMENT.
3. ELEVATIONS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) DERIVED USING SURVEY-GRADE GNSS EQUIPMENT.
4. THE SITE IS LOCATED OUTSIDE OF THE 100-YEAR FLOOD HAZARD AREA (ZONE X) PER FEMA FIRM PANEL #34039C0008F, DATED SEPTEMBER 20, 2006.

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SCALE: 1 INCH = 20 FEET

Date	Description	No.
Revisions		

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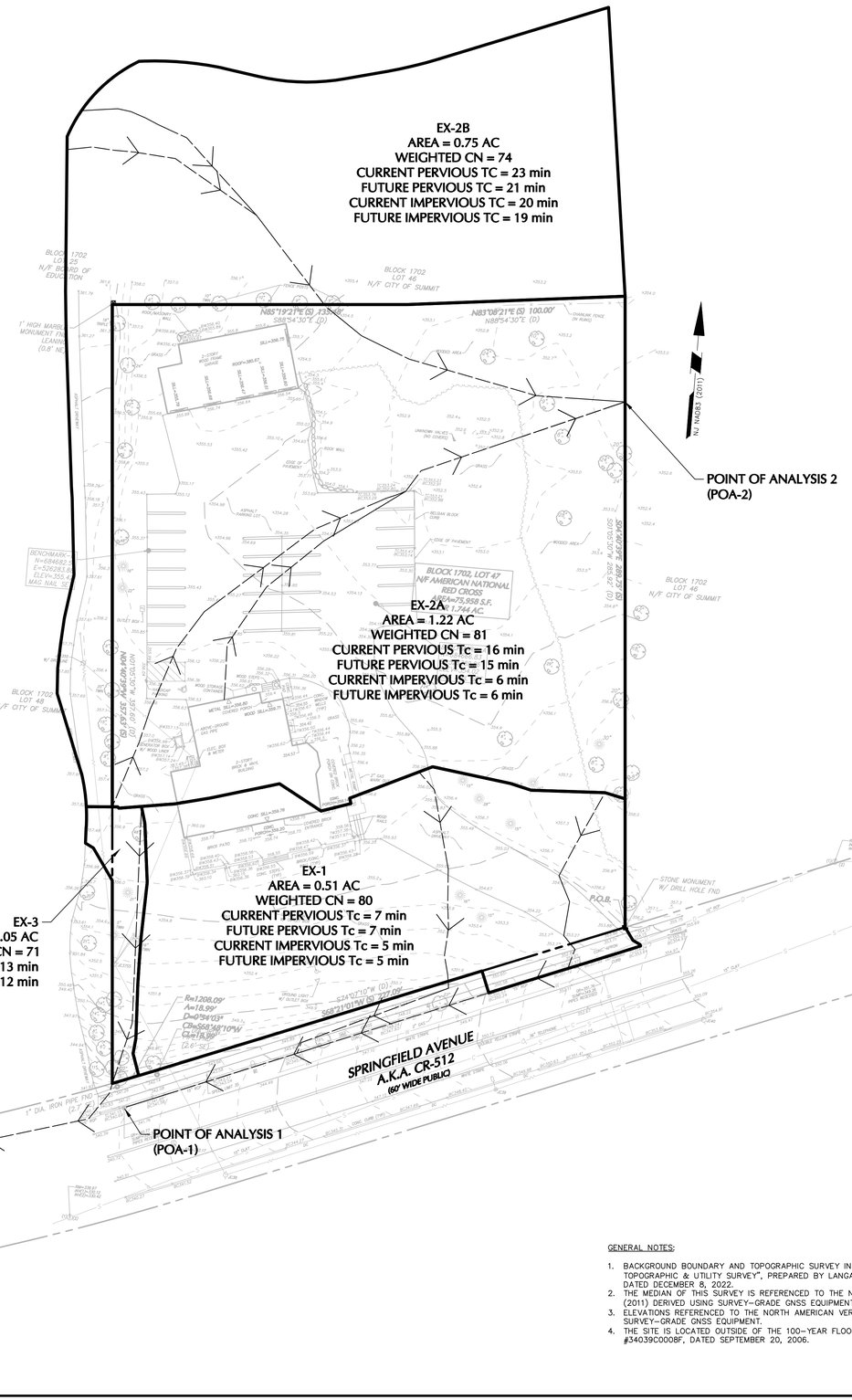
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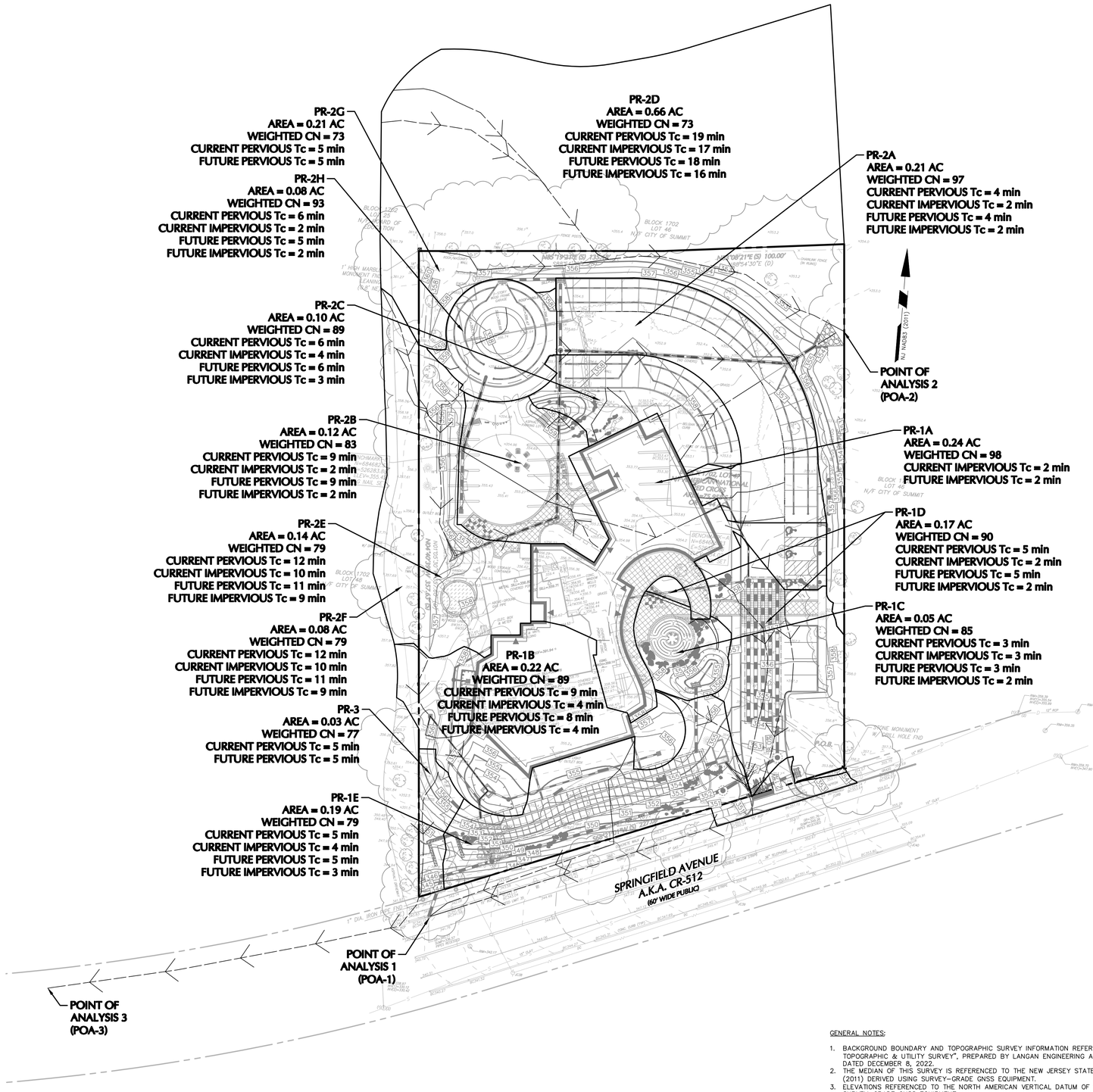
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Date: FEBRUARY 9, 2024	
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Date: 2/9/2024 Time: 11:11 User: tgreen Style Table: Langan.stb Layout: FG03 Document Code: FG03-101007201-0201-CS101-0101


EX-2B
AREA = 0.75 AC
WEIGHTED CN = 74
CURRENT PERVIOUS TC = 23 min
FUTURE PERVIOUS TC = 21 min
CURRENT IMPERVIOUS TC = 20 min
FUTURE IMPERVIOUS TC = 19 min
EX-2A
AREA = 1.22 AC
WEIGHTED CN = 81
CURRENT PERVIOUS Tc = 16 min
FUTURE PERVIOUS Tc = 15 min
CURRENT IMPERVIOUS Tc = 6 min
FUTURE IMPERVIOUS Tc = 6 min
EX-1
AREA = 0.51 AC
WEIGHTED CN = 80
CURRENT PERVIOUS Tc = 7 min
FUTURE PERVIOUS Tc = 7 min
CURRENT IMPERVIOUS Tc = 5 min
FUTURE IMPERVIOUS Tc = 5 min
EX-3
AREA = 0.05 AC
WEIGHTED CN = 71
CURRENT PERVIOUS Tc = 13 min
FUTURE PERVIOUS Tc = 12 min
POINT OF ANALYSIS 2
(POA-2)
POINT OF ANALYSIS 1
(POA-1)
POINT OF ANALYSIS 3
(POA-3)
SPRINGFIELD AVENUE
A.K.A. CR-512
(60' WIDE PUBLIC)
BLOCK 1702, LOT 47
N/F AMERICAN NATIONAL
RED CROSS
BLOCK 1702
LOT 46
N/F CITY OF SUMMIT
BLOCK 1702
LOT 48
N/F CITY OF SUMMIT
BLOCK 1702
LOT 25
N/F BD. OF EDUCATION
N85°19'21"E (S) 135.68'
S88°54'30"E (D)
N83°08'21"E (S) 100.00'
N88°54'30"E (D)
NJ NAD83 (2011)
STONE MONUMENT
W/ DRILL HOLE FND
P.O.B.
1" DIA. IRON PIPE FND
(2.6' DEEP)
BENCHMARK
N=684083.8
E=526283.8
ELEV.=355.5
MAG. NAIL SET
2-STORY WOOD FRAME GARAGE
ROOF=380.67
SILL=356.75
SILL=356.75
SILL=356.75
ROOF/WOODEN WALL
ROCK/WOODEN WALL
1" HIGH MARBLE MONUMENT FND LEANING (0.8' NE)
CHAINLINK FENCE (IN RUNS)
WOODED AREA
LANDSCAPE VALVES (NO COVERS)
ROCK WALL
EDGE OF PAVEMENT
ASPHALT PARKING LOT
BELGIAN BLOCK CURB
GRASS
WOOD STORAGE SHED
METAL SHED
METAL GUARD POST
ELEC. BOX
GUY WIRE
CONC. SILL=358.79
WOOD POLE
BRICK PATIO
CONC. SILL=358.75
CONC. SILL=358.71
CONC. SILL=358.67
CONC. SILL=358.63
CONC. SILL=358.59
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CONC. SILL=358.23
CONC. SILL=358.19
CONC. SILL=358.15
CONC. SILL=358.11
CONC. SILL=358.07
CONC. SILL=358.03
CONC. SILL=357.99
CONC.



LEGEND

	EXISTING	PROPOSED
PROPERTY LINE/ROW		
CONTOUR	120	118
SPOT ELEVATION	x122.53	x124.68
WATERSHED BOUNDARY		
TIME OF CONCENTRATION PATH		

GENERAL NOTES:

1. BACKGROUND BOUNDARY AND TOPOGRAPHIC SURVEY INFORMATION REFERENCED FROM PLAN TITLED "BOUNDARY, TOPOGRAPHIC & UTILITY SURVEY", PREPARED BY LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC., DATED DECEMBER 8, 2022.
2. THE MEDIAN OF THIS SURVEY IS REFERENCED TO THE NEW JERSEY STATE PLAN COORDINATE SYSTEM NAD83 (2011) DERIVED USING SURVEY-GRADE GNSS EQUIPMENT.
3. ELEVATIONS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) DERIVED USING SURVEY-GRADE GNSS EQUIPMENT.
4. THE SITE IS LOCATED OUTSIDE OF THE 100-YEAR FLOOD HAZARD AREA (ZONE X) PER FEMA FIRM PANEL #34039C0008F, DATED SEPTEMBER 20, 2006.

30 0 15 30
SCALE: 1 INCH = 30 FEET

Date	Description	No.
Revisions		

LANGAN
Langan Engineering and Environmental Services, Inc.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION NO. 24GA27996400

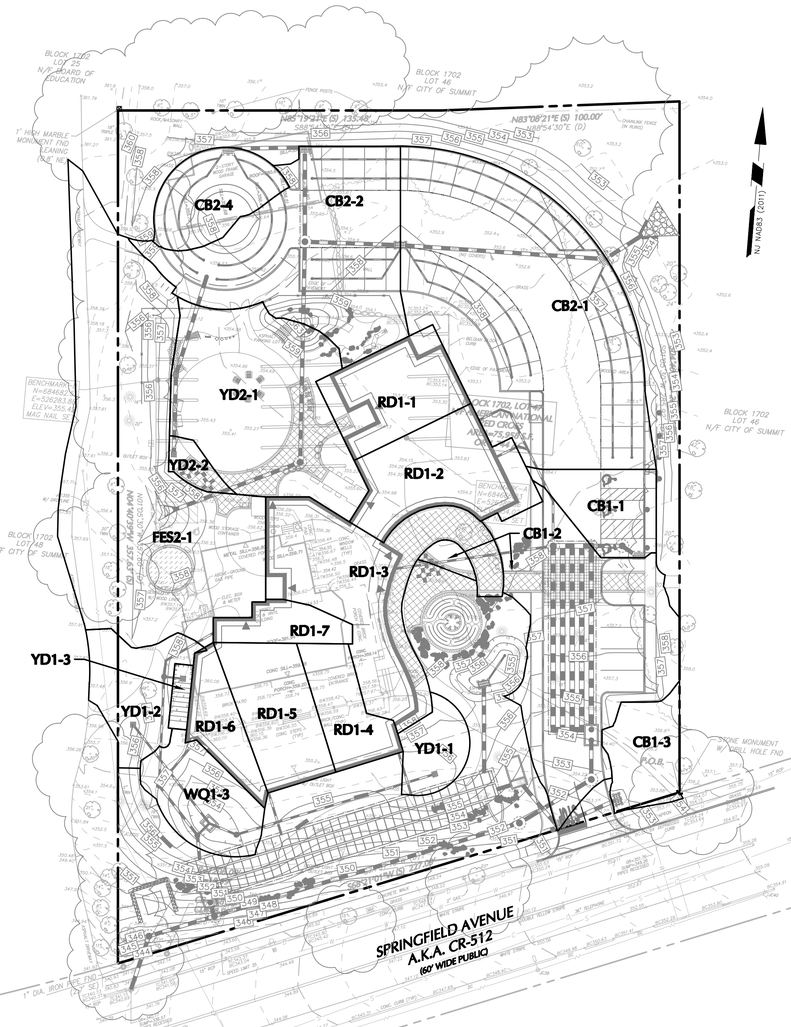
Project
BEACON UNITARIAN UNIVERSALIST CHURCH
SUMMIT
UNION COUNTY NEW JERSEY

Drawing Title
PROPOSED WATERSHED MAP

Project No.	Figure
101007201	FG05
Date: FEBRUARY 9, 2024	
Drawn By: SM	
Checked By: MJV	Sheet 1 of 1

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Project No. 101007201



LEGEND

	EXISTING	PROPOSED
PROPERTY LINE/ROW		
CONTOUR	120	118
SPOT ELEVATION	×122.53	×124.68
STORM MANHOLE		
CATCH BASIN		
STORM SEWER		
DRAINAGE AREA BOUNDARY		

GENERAL NOTES:

1. BACKGROUND BOUNDARY AND TOPOGRAPHIC SURVEY INFORMATION REFERENCED FROM PLAN TITLED "BOUNDARY, TOPOGRAPHIC & UTILITY SURVEY", PREPARED BY LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC., DATED DECEMBER 8, 2022.
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SCALE: 1 INCH = 30 FEET

Date	Description	No.

Revisions

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Project

BEACON UNITARIAN UNIVERSALIST CHURCH

SUMMIT
UNION COUNTY NEW JERSEY

Drawing Title

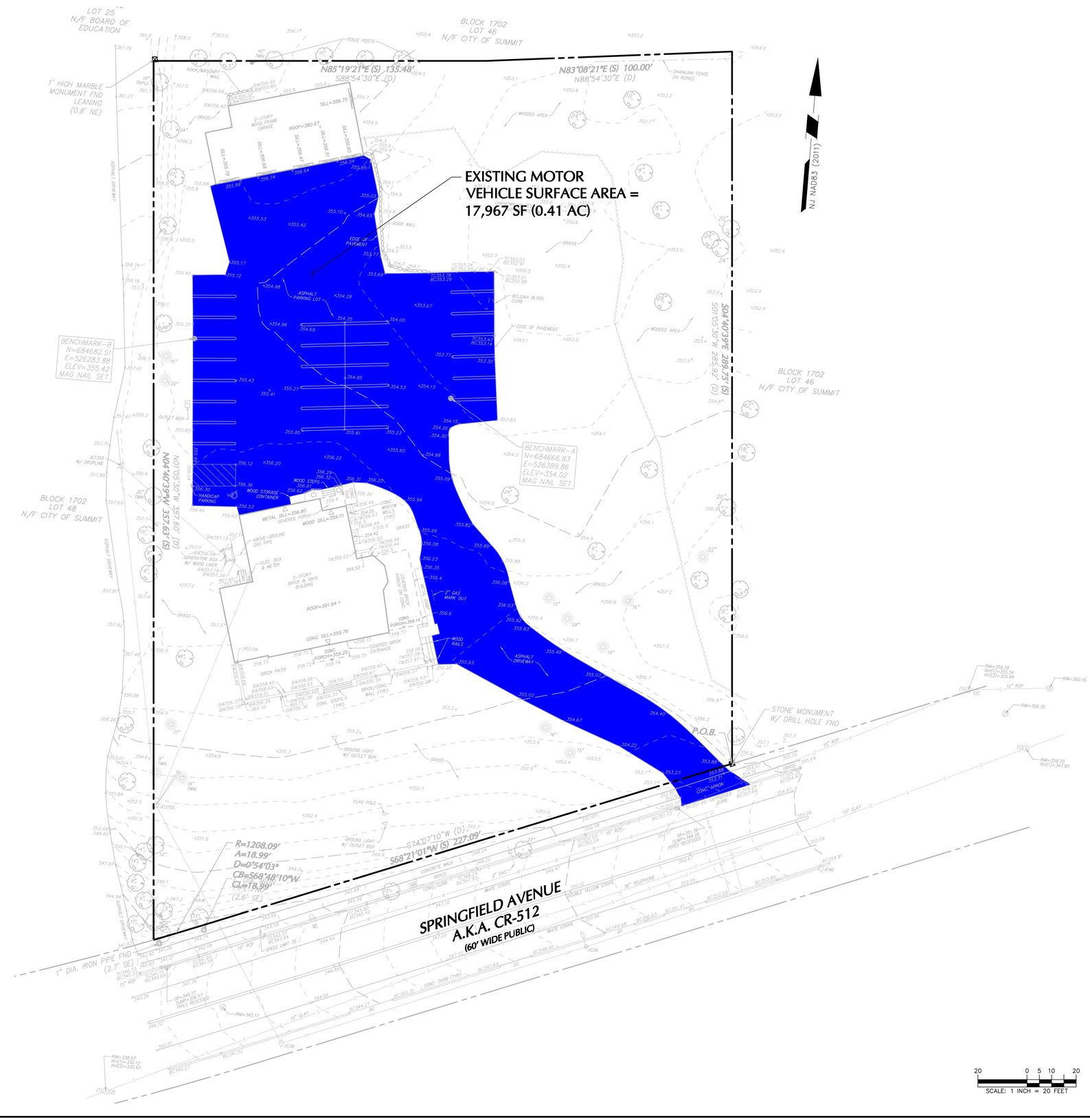
PROPOSED DRAINAGE SUBAREA MAP

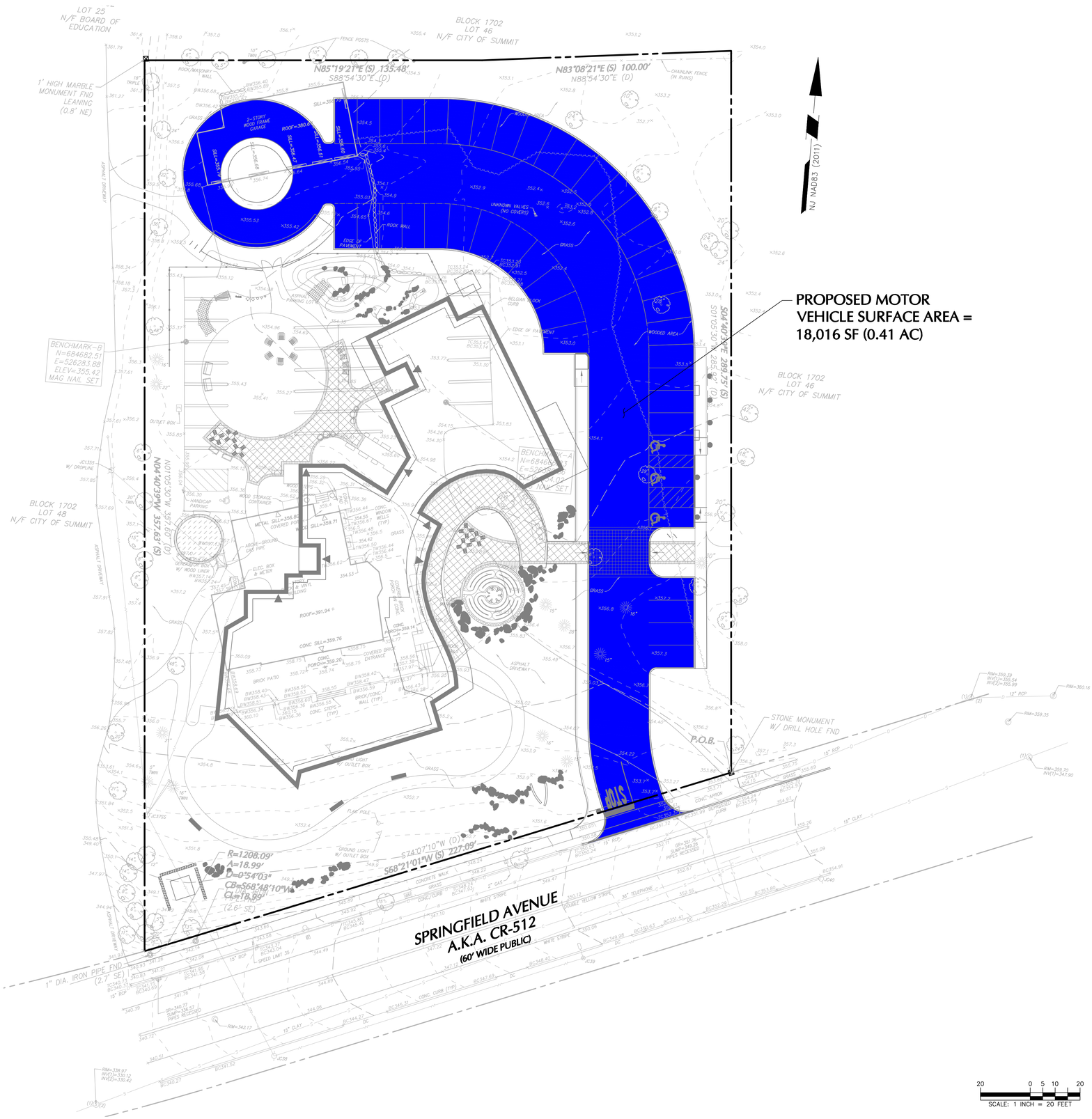
Project No.	Figure
101007201	FG06
Date: FEBRUARY 9, 2024	
Drawn By: SM	
Checked By: MJV	
	Sheet 1 of 1

LANGAN
Project No. 101007201

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Date: 2/9/2024 Time: 10:46 User: tgreen Style Table: Langan.stb Layout: FG05 Document Code: FG06-101007201-0201-CS101-0101


EXISTING MOTOR VEHICLE SURFACE AREA = 17,967 SF (0.41 AC)
N85°19'21"E (S) 135.48'
S88°54'30"E (D)
N83°08'21"E (S) 100.00'
N88°54'30"E (D)
S04°40'39"E 289.75' (S)
S01°05'30"W 285.92' (D)
N04°40'39"W 357.63' (S)
N01°05'30"W 357.60' (D)
S74°07'10"W (D) 227.09'
S68°21'01"W (S) 227.09'
R=1208.09'
A=18.99'
D=0°54'03"
CB=S68°48'10"W
CL=18.99'
P.O.B.
LOT 25
N/F BOARD OF EDUCATION
BLOCK 1702
LOT 46
N/F CITY OF SUMMIT
BLOCK 1702
LOT 48
N/F CITY OF SUMMIT
BLOCK 1702
LOT 46
N/F CITY OF SUMMIT
1" HIGH MARBLE MONUMENT FND LEANING (0.8' NE)
BENCHMARK-B
N=684682.51
E=526283.88
ELEV=355.42
MAG NAIL SET
BENCHMARK-A
N=684666.83
E=526389.86
ELEV=354.02
MAG NAIL SET
STONE MONUMENT W/ DRILL HOLE FND
1" DIA. IRON PIPE FND (2.7' SE)
(2.6' SE)
SPRINGFIELD AVENUE
A.K.A. CR-512
(60' WIDE PUBLIC)
NJ NAD83 (2011)
2-STORY WOOD FRAME GARAGE
2-STORY BRICK & VINYL BUILDING
ASPHALT PARKING LOT
ASPHALT DRIVEWAY
CONC. APRON
BRICK PATIO
COVERED BRICK ENTRANCE
COVERED FRONT PORCH ON CONC.
CONC. PORCH=359.14
CONC. PORCH=359.20
CONC. SILL=359.76
METAL SILL=356.80
COVERED PORCH
WOOD SILL=359.71
ROOF=391.94+
ROOF=380.67
WOOD STEPS
WOOD STORAGE CONTAINER
HANDICAP PARKING
OUTLET BOX
ELEC. BOX & METER
ABOVE-GROUND GAS PIPE
GENERATOR BOX W/ WOOD LINER
2" GAS MARK OUT
WOOD RAILS
CONC. STEPS (TYP)
BRICK/CONC. WALL (TYP)
CONC. WINDOW WELLS (TYP)
ROCK WALL
ROCK/MASONRY WALL
FENCE POSTS
CHAINLINK FENCE (IN RUINS)
WOODED AREA
GRASS
BELGIAN BLOCK CURB
EDGE OF PAVEMENT
CONCRETE WALK
CONC. CURB (TYP)
WHITE STRIPE
DOUBLE YELLOW STRIPE
36" TELEPHONE
2" GAS
15" RCP
12" RCP
15" CLAY
FLAG POLE
GROUND LIGHT W/ OUTLET BOX
SPEED LIMIT 35
ASPHALT DRIVEWAY
SILL=356.75
SILL=356.68
SILL=356.47
SILL=356.01
SILL=356.60
SILL=355.71
SILL=356.59
SILL=356.64
SILL=356.74
SILL=356.58
SILL=356.55
SILL=356.52
SILL=356.49
SILL=356.46
SILL=356.43
SILL=356.40
SILL=356.37
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SILL=356.10
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SILL=356.04
SILL=356.01
SILL=355.98
SILL=355.95
SILL=355.92
SILL=355.89
SILL=355.86
SILL=355.83
SILL=355.80
SILL=355.77
SILL=355.74
SILL=355.71
SILL=355.68
SILL=355.65
SILL=355.62
SILL=355.59
SILL=355.56
SILL=355.53
SILL=355.50
SILL=355.47
SILL=355.44
SILL=355.41



GENERAL NOTES:

1. BACKGROUND BOUNDARY AND TOPOGRAPHIC SURVEY INFORMATION REFERENCED FROM PLAN TITLED "BOUNDARY, TOPOGRAPHIC & UTILITY SURVEY", PREPARED BY LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC., DATED DECEMBER 8, 2022.
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4. THE SITE IS LOCATED OUTSIDE OF THE 100-YEAR FLOOD HAZARD AREA (ZONE X) PER FEMA FIRM PANEL #34039C0008F, DATED SEPTEMBER 20, 2006.

Date	Description	No.
Revisions		

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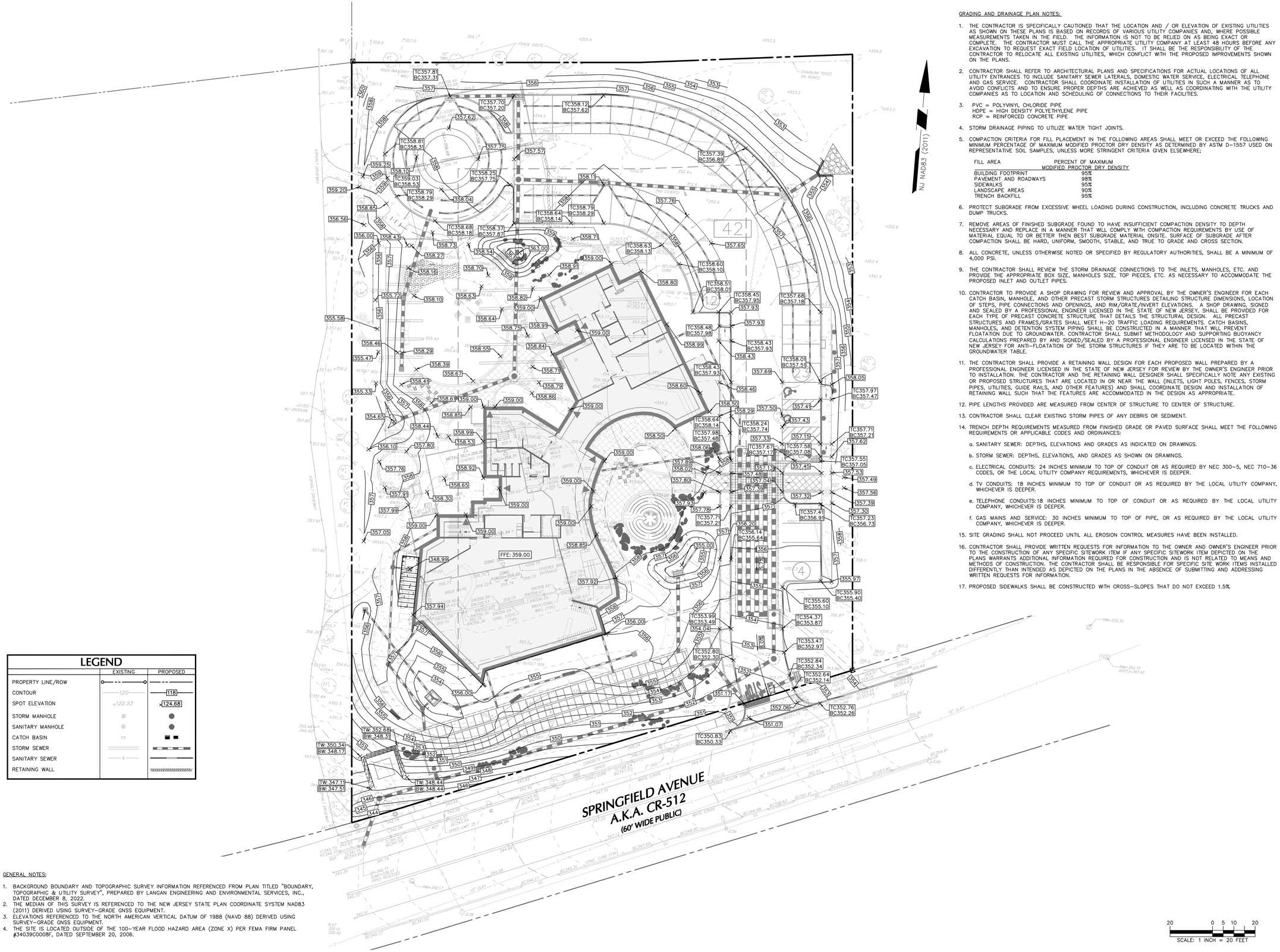
Project
BEACON UNITARIAN UNIVERSALIST CHURCH
SUMMIT
UNION COUNTY NEW JERSEY

Drawing Title
PROPOSED REGULATED MOTOR VEHICLE SURFACE MAP

Project No.	Figure
101007201	FG08
Date: FEBRUARY 9, 2024	
Drawn By: TEG	
Checked By: MJV	Sheet 1 of 1

LANGAN
Project No. 101007201
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DRAWINGS



LEGEND

	EXISTING	PROPOSED
PROPERTY LINE/ROW		
CONTOUR	120	118
SPOT ELEVATION	×122.53	×124.68
STORM MANHOLE		
SANITARY MANHOLE		
CATCH BASIN		
STORM SEWER		
SANITARY SEWER		
RETAINING WALL		

GENERAL NOTES:

1. BACKGROUND BOUNDARY AND TOPOGRAPHIC SURVEY INFORMATION REFERENCED FROM PLAN TITLED "BOUNDARY, TOPOGRAPHIC & UTILITY SURVEY", PREPARED BY LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC., DATED DECEMBER 8, 2022.
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GRADING AND DRAINAGE PLAN NOTES:

1. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND / OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF VARIOUS UTILITY COMPANIES AND, WHERE POSSIBLE MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANY AT LEAST 48 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES, WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS.
2. CONTRACTOR SHALL REFER TO ARCHITECTURAL PLANS AND SPECIFICATIONS FOR ACTUAL LOCATIONS OF ALL UTILITY ENTRANCES TO INCLUDE SANITARY SEWER LATERALS, DOMESTIC WATER SERVICE, ELECTRICAL TELEPHONE AND GAS SERVICE. CONTRACTOR SHALL COORDINATE INSTALLATION OF UTILITIES IN SUCH A MANNER AS TO AVOID CONFLICTS AND TO ENSURE PROPER DEPTHS ARE ACHIEVED AS WELL AS COORDINATING WITH THE UTILITY COMPANIES AS TO LOCATION AND SCHEDULING OF CONNECTIONS TO THEIR FACILITIES.
3. PVC = POLYVINYL CHLORIDE PIPE
   HDPE = HIGH DENSITY POLYETHYLENE PIPE
   RCP = REINFORCED CONCRETE PIPE
4. STORM DRAINAGE PIPING TO UTILIZE WATER TIGHT JOINTS.
5. COMPACTION CRITERIA FOR FILL PLACEMENT IN THE FOLLOWING AREAS SHALL MEET OR EXCEED THE FOLLOWING MINIMUM PERCENTAGE OF MAXIMUM MODIFIED PROCTOR DRY DENSITY AS DETERMINED BY ASTM D-1557 USED ON REPRESENTATIVE SOIL SAMPLES, UNLESS MORE STRINGENT CRITERIA GIVEN ELSEWHERE;

FILL AREA	PERCENT OF MAXIMUM MODIFIED PROCTOR DRY DENSITY
BUILDING FOOTPRINT	95%
PAVEMENT AND ROADWAYS	98%
SIDEWALKS	95%
LANDSCAPE AREAS	90%
TRENCH BACKFILL	95%

6. PROTECT SUBGRADE FROM EXCESSIVE WHEEL LOADING DURING CONSTRUCTION, INCLUDING CONCRETE TRUCKS AND DUMP TRUCKS.
7. REMOVE AREAS OF FINISHED SUBGRADE FOUND TO HAVE INSUFFICIENT COMPACTION DENSITY TO DEPTH NECESSARY AND REPLACE IN A MANNER THAT WILL COMPLY WITH COMPACTION REQUIREMENTS BY USE OF MATERIAL EQUAL TO OR BETTER THEN BEST SUBGRADE MATERIAL ONSITE. SURFACE OF SUBGRADE AFTER COMPACTION SHALL BE HARD, UNIFORM, SMOOTH, STABLE, AND TRUE TO GRADE AND CROSS SECTION.
8. ALL CONCRETE, UNLESS OTHERWISE NOTED OR SPECIFIED BY REGULATORY AUTHORITIES, SHALL BE A MINIMUM OF 4,000 PSI.
9. THE CONTRACTOR SHALL REVIEW THE STORM DRAINAGE CONNECTIONS TO THE INLETS, MANHOLES, ETC. AND PROVIDE THE APPROPRIATE BOX SIZE, MANHOLES SIZE, TOP PIECES, ETC. AS NECESSARY TO ACCOMMODATE THE PROPOSED INLET AND OUTLET PIPES.
10. CONTRACTOR TO PROVIDE A SHOP DRAWING FOR REVIEW AND APPROVAL BY THE OWNER'S ENGINEER FOR EACH CATCH BASIN, MANHOLE, AND OTHER PRECAST STORM STRUCTURES DETAILING STRUCTURE DIMENSIONS, LOCATION OF STEPS, PIPE CONNECTIONS AND OPENINGS, AND RIM/GRATE/INVERT ELEVATIONS. A SHOP DRAWING, SIGNED AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW JERSEY, SHALL BE PROVIDED FOR EACH TYPE OF PRECAST CONCRETE STRUCTURE THAT DETAILS THE STRUCTURAL DESIGN. ALL PRECAST STRUCTURES AND FRAMES/GRATES SHALL MEET H-20 TRAFFIC LOADING REQUIREMENTS. CATCH BASINS, MANHOLES, AND DETENTION SYSTEM PIPING SHALL BE CONSTRUCTED IN A MANNER THAT WILL PREVENT FLOATATION DUE TO GROUNDWATER. CONTRACTOR SHALL SUBMIT METHODOLOGY AND SUPPORTING BUOYANCY CALCULATIONS PREPARED BY AND SIGNED/SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW JERSEY FOR ANTI-FLOATATION OF THE STORM STRUCTURES IF THEY ARE TO BE LOCATED WITHIN THE GROUNDWATER TABLE.
11. THE CONTRACTOR SHALL PROVIDE A RETAINING WALL DESIGN FOR EACH PROPOSED WALL PREPARED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NEW JERSEY FOR REVIEW BY THE OWNER'S ENGINEER PRIOR TO INSTALLATION. THE CONTRACTOR AND THE RETAINING WALL DESIGNER SHALL SPECIFICALLY NOTE ANY EXISTING OR PROPOSED STRUCTURES THAT ARE LOCATED IN OR NEAR THE WALL (INLETS, LIGHT POLES, FENCES, STORM PIPES, UTILITIES, GUIDE RAILS, AND OTHER FEATURES) AND SHALL COORDINATE DESIGN AND INSTALLATION OF RETAINING WALL SUCH THAT THE FEATURES ARE ACCOMMODATED IN THE DESIGN AS APPROPRIATE.
12. PIPE LENGTHS PROVIDED ARE MEASURED FROM CENTER OF STRUCTURE TO CENTER OF STRUCTURE.
13. CONTRACTOR SHALL CLEAR EXISTING STORM PIPES OF ANY DEBRIS OR SEDIMENT.
14. TRENCH DEPTH REQUIREMENTS MEASURED FROM FINISHED GRADE OR PAVED SURFACE SHALL MEET THE FOLLOWING REQUIREMENTS OR APPLICABLE CODES AND ORDINANCES:
    a. SANITARY SEWER: DEPTHS, ELEVATIONS AND GRADES AS INDICATED ON DRAWINGS.
    b. STORM SEWER: DEPTHS, ELEVATIONS, AND GRADES AS SHOWN ON DRAWINGS.
    c. ELECTRICAL CONDUITS: 24 INCHES MINIMUM TO TOP OF CONDUIT OR AS REQUIRED BY NEC 300-5, NEC 710-36 CODES, OR THE LOCAL UTILITY COMPANY REQUIREMENTS, WHICHEVER IS DEEPER.
    d. TV CONDUITS: 18 INCHES MINIMUM TO TOP OF CONDUIT OR AS REQUIRED BY THE LOCAL UTILITY COMPANY, WHICHEVER IS DEEPER.
    e. TELEPHONE CONDUITS:18 INCHES MINIMUM TO TOP OF CONDUIT OR AS REQUIRED BY THE LOCAL UTILITY COMPANY, WHICHEVER IS DEEPER.
    f. GAS MAINS AND SERVICE: 30 INCHES MINIMUM TO TOP OF PIPE, OR AS REQUIRED BY THE LOCAL UTILITY COMPANY, WHICHEVER IS DEEPER.
15. SITE GRADING SHALL NOT PROCEED UNTIL ALL EROSION CONTROL MEASURES HAVE BEEN INSTALLED.
16. CONTRACTOR SHALL PROVIDE WRITTEN REQUESTS FOR INFORMATION TO THE OWNER AND OWNER'S ENGINEER PRIOR TO THE CONSTRUCTION OF ANY SPECIFIC SITEWORK ITEM IF ANY SPECIFIC SITEWORK ITEM DEPICTED ON THE PLANS WARRANTS ADDITIONAL INFORMATION REQUIRED FOR CONSTRUCTION AND IS NOT RELATED TO MEANS AND METHODS OF CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SPECIFIC SITE WORK ITEMS INSTALLED DIFFERENTLY THAN INTENDED AS DEPICTED ON THE PLANS IN THE ABSENCE OF SUBMITTING AND ADDRESSING WRITTEN REQUESTS FOR INFORMATION.
17. PROPOSED SIDEWALKS SHALL BE CONSTRUCTED WITH CROSS-SLOPES THAT DO NOT EXCEED 1.5%.

Date	Description	No.

Revisions

STATE OF NEW JERSEY · JOHN C. COTE · 24GE03705800 · LICENSED PROFESSIONAL ENGINEER

Digitally signed by John C Cote
Date: 2024.02.22 08:38:27-05'00'

SIGNATURE JOHN COTE DATE
PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800

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Project
BEACON UNITARIAN UNIVERSALIST CHURCH
SUMMIT
UNION COUNTY NEW JERSEY

Drawing Title
GRADING PLAN

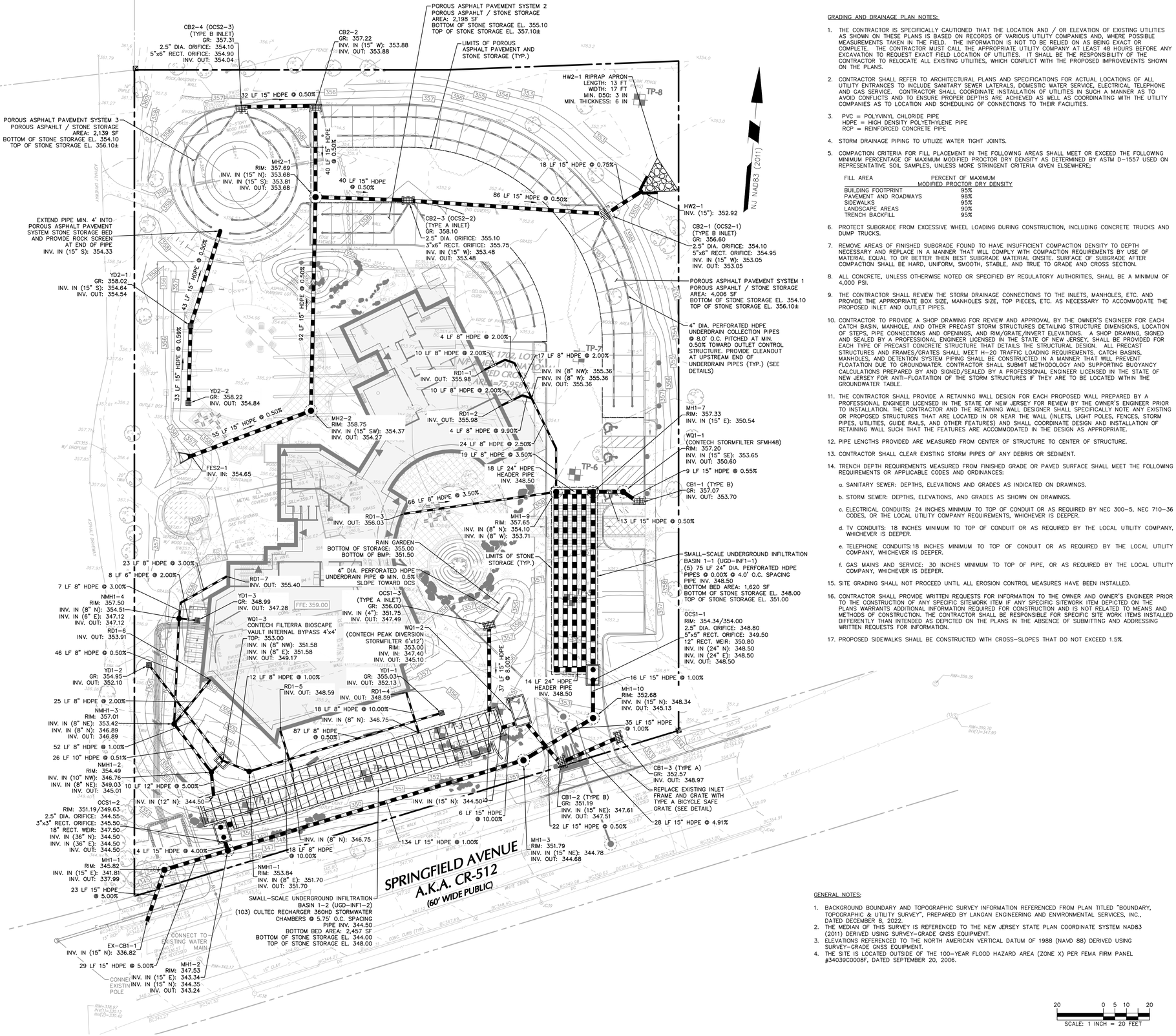
Project No.	Drawing No.
101007201	CG101
Date: FEBRUARY 9, 2024	
Drawn By: SM	
Checked By: TH	Sheet 7 of 19

SCALE: 1 INCH = 20 FEET

LANGAN Project No. 101007201

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Date: 2/7/2024 Time: 14:31 User: smelo Style Table: Langan.stb Layout: CG101 Document Code: 101007201-0301-CG101-0101



LEGEND

	EXISTING	PROPOSED
PROPERTY LINE/ROW		
CONTOUR	120	118
SPOT ELEVATION	x122.53	x124.68
STORM MANHOLE		
SANITARY MANHOLE		
CATCH BASIN		
STORM SEWER		
SANITARY SEWER	S	
RETAINING WALL		

GRADING AND DRAINAGE PLAN NOTES:

1. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND / OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF VARIOUS UTILITY COMPANIES AND, WHERE POSSIBLE MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANY AT LEAST 48 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RELOCATE ALL EXISTING UTILITIES, WHICH CONFLICT WITH THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS.
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FILL AREA	PERCENT OF MAXIMUM MODIFIED PROCTOR DRY DENSITY
BUILDING FOOTPRINT	95%
PAVEMENT AND ROADWAYS	98%
SIDEWALKS	95%
LANDSCAPE AREAS	90%
TRENCH BACKFILL	95%

6. PROTECT SUBGRADE FROM EXCESSIVE WHEEL LOADING DURING CONSTRUCTION, INCLUDING CONCRETE TRUCKS AND DUMP TRUCKS.
7. REMOVE AREAS OF FINISHED SUBGRADE FOUND TO HAVE INSUFFICIENT COMPACTION DENSITY TO DEPTH NECESSARY AND REPLACE IN A MANNER THAT WILL COMPLY WITH COMPACTION REQUIREMENTS BY USE OF MATERIAL EQUAL TO OR BETTER THEN BEST SUBGRADE MATERIAL ONSITE. SURFACE OF SUBGRADE AFTER COMPACTION SHALL BE HARD, UNIFORM, SMOOTH, STABLE, AND TRUE TO GRADE AND CROSS SECTION.
8. ALL CONCRETE, UNLESS OTHERWISE NOTED OR SPECIFIED BY REGULATORY AUTHORITIES, SHALL BE A MINIMUM OF 4,000 PSI.
9. THE CONTRACTOR SHALL REVIEW THE STORM DRAINAGE CONNECTIONS TO THE INLETS, MANHOLES, ETC. AND PROVIDE THE APPROPRIATE BOX SIZE, MANHOLES SIZE, TOP PIECES, ETC. AS NECESSARY TO ACCOMMODATE THE PROPOSED INLET AND OUTLET PIPES.
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    b. STORM SEWER: DEPTHS, ELEVATIONS, AND GRADES AS SHOWN ON DRAWINGS.
    c. ELECTRICAL CONDUITS: 24 INCHES MINIMUM TO TOP OF CONDUIT OR AS REQUIRED BY NEC 300-5, NEC 710-36 CODES, OR THE LOCAL UTILITY COMPANY REQUIREMENTS, WHICHEVER IS DEEPER.
    d. TV CONDUITS: 18 INCHES MINIMUM TO TOP OF CONDUIT OR AS REQUIRED BY THE LOCAL UTILITY COMPANY, WHICHEVER IS DEEPER.
    e. TELEPHONE CONDUITS:18 INCHES MINIMUM TO TOP OF CONDUIT OR AS REQUIRED BY THE LOCAL UTILITY COMPANY, WHICHEVER IS DEEPER.
    f. GAS MAINS AND SERVICE: 30 INCHES MINIMUM TO TOP OF PIPE, OR AS REQUIRED BY THE LOCAL UTILITY COMPANY, WHICHEVER IS DEEPER.
15. SITE GRADING SHALL NOT PROCEED UNTIL ALL EROSION CONTROL MEASURES HAVE BEEN INSTALLED.
16. CONTRACTOR SHALL PROVIDE WRITTEN REQUESTS FOR INFORMATION TO THE OWNER AND OWNER'S ENGINEER PRIOR TO THE CONSTRUCTION OF ANY SPECIFIC SITEWORK ITEM IF ANY SPECIFIC SITEWORK ITEM DEPICTED ON THE PLANS WARRANTS ADDITIONAL INFORMATION REQUIRED FOR CONSTRUCTION AND IS NOT RELATED TO MEANS AND METHODS OF CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SPECIFIC SITE WORK ITEMS INSTALLED DIFFERENTLY THAN INTENDED AS DEPICTED ON THE PLANS IN THE ABSENCE OF SUBMITTING AND ADDRESSING WRITTEN REQUESTS FOR INFORMATION.
17. PROPOSED SIDEWALKS SHALL BE CONSTRUCTED WITH CROSS-SLOPES THAT DO NOT EXCEED 1.5%.

GENERAL NOTES:

1. BACKGROUND BOUNDARY AND TOPOGRAPHIC SURVEY INFORMATION REFERENCED FROM PLAN TITLED "BOUNDARY, TOPOGRAPHIC & UTILITY SURVEY", PREPARED BY LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES, INC., DATED DECEMBER 8, 2022.
2. THE MEDIAN OF THIS SURVEY IS REFERENCED TO THE NEW JERSEY STATE PLAN COORDINATE SYSTEM NAD83 (2011) DERIVED USING SURVEY-GRADE GNSS EQUIPMENT.
3. ELEVATIONS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) DERIVED USING SURVEY-GRADE GNSS EQUIPMENT.
4. THE SITE IS LOCATED OUTSIDE OF THE 100-YEAR FLOOD HAZARD AREA (ZONE X) PER FEMA FIRM PANEL #34039C0008F, DATED SEPTEMBER 20, 2006.

SCALE: 1 INCH = 20 FEET

Date	Description	No.
Revisions		

Digitally signed by John C Cote
Date: 2024.02.22 08:38:39-05'00'

SIGNATURE JOHN COTE DATE
PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800

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Langan Engineering and Environmental Services, Inc.
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NJ CERTIFICATE OF AUTHORIZATION NO. 24GA27996400

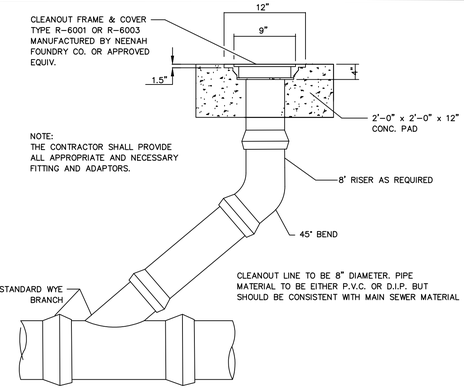
Project
BEACON UNITARIAN UNIVERSALIST CHURCH
SUMMIT
UNION COUNTY NEW JERSEY

Drawing Title
DRAINAGE PLAN

Project No.	Drawing No.
101007201	CG102
Date: FEBRUARY 9, 2024	
Drawn By: SM	
Checked By: TH	Sheet 8 of 19

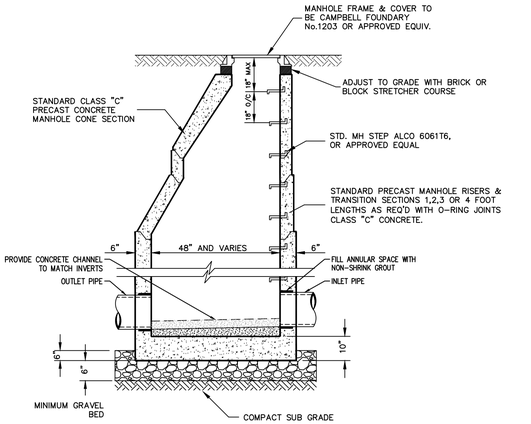
LANEAN
Project No. 101007201

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N.T.S.

STORM CLEANOUT

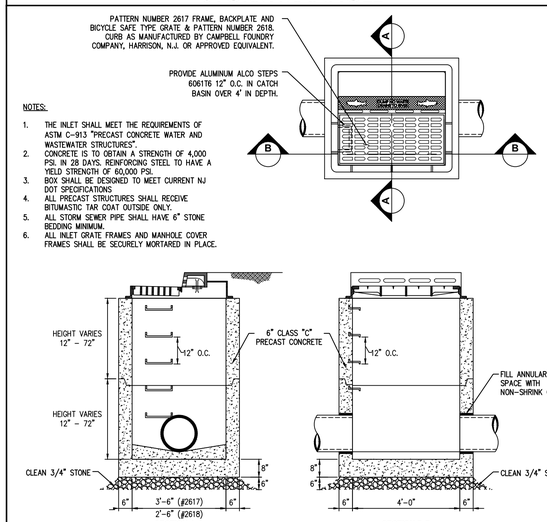


NOTES:

1. DIAMETER OF MANHOLE SHALL BE REVIEWED BY THE CONTRACTOR TO DETERMINE A LEGEND OF STANDARD MANHOLE DIMENSIONS WITH RESPECT TO PROPOSED PIPE SIZES, NUMBER AND GEOMETRY. OVER SIZE MANHOLES SHALL BE PROVIDED IF MINIMUM 6" WALL DIMENSION BETWEEN PIPES IS NOT MANUFACTURED.
2. MANHOLES SHALL BE STANDARD PRECAST CONCRETE UNITS AND SHALL BE DESIGNED AND CONSTRUCTED BY THE MANUFACTURER TO SUPPORT TRUCK HS20 LOADING.
3. EXISTING PIPES AND PROPOSED PIPES TO BE ACCOMMODATED IN PRECAST DESIGN DURING SHOP DRAWING REVIEW.

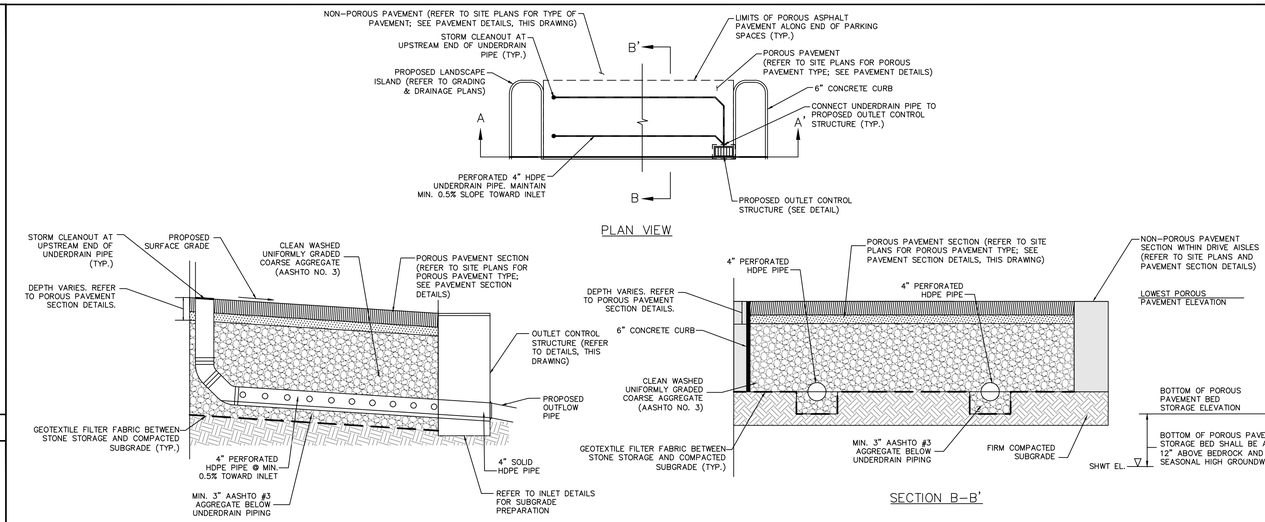
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STORM MANHOLE



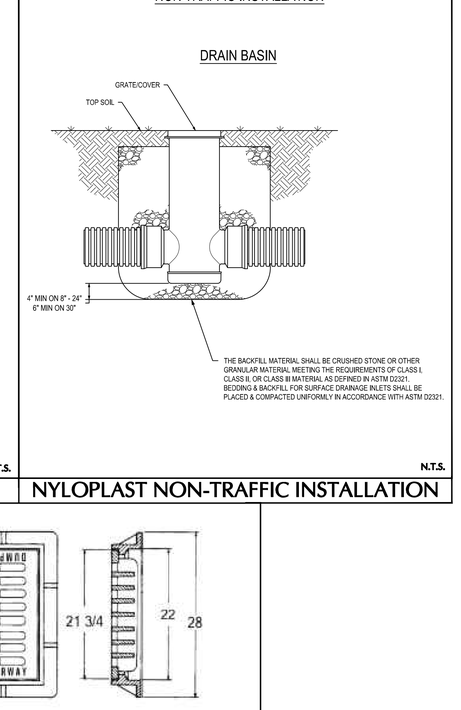
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TYPE B INLET



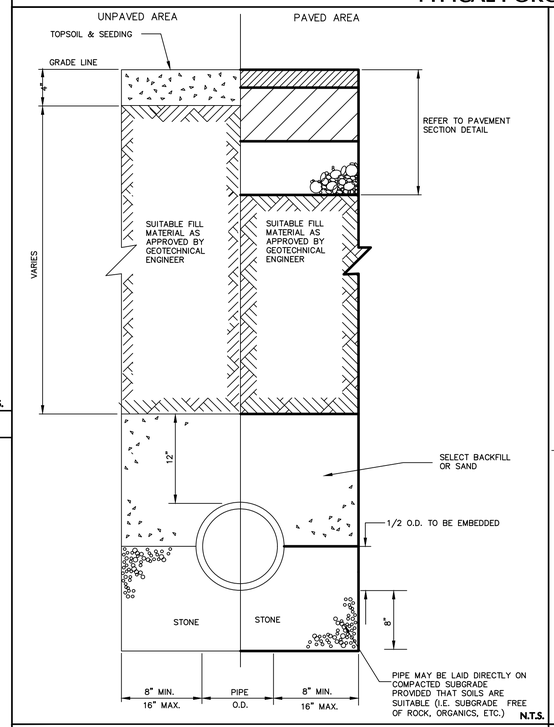
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TYPICAL POROUS PAVEMENT CROSS SECTION DETAIL



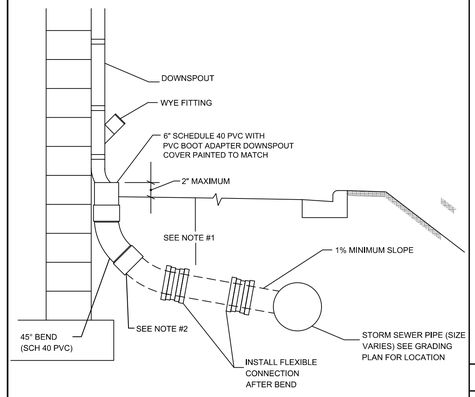
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NYLOPLAST NON-TRAFFIC INSTALLATION



N.T.S.

STORM SEWER TRENCH AND BEDDING

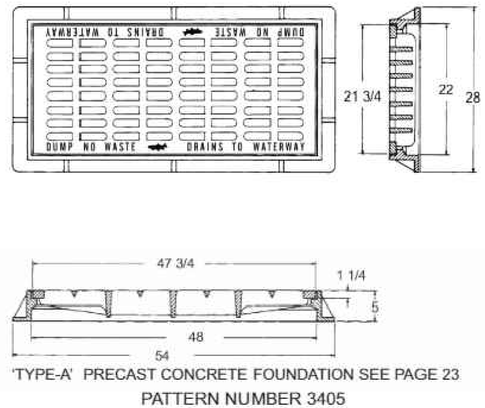


NOTES:

1. FOR ALL DEPTHS OF COVER LESS THAN TWO (2) FEET, PIPE MUST BE SCHEDULE 40 PVC. FOR DEPTHS OF COVER GREATER THAN TWO (2) FEET, FLEXIBLE PIPE MAY BE USED. REFER TO SPECIFICATIONS FOR ALLOWABLE PIPE TYPES.
2. A WATERTIGHT CONNECTION SHALL BE MAINTAINED WITH ANY TRANSITION FROM SCHEDULE 40 PVC PIPE TO ANY OTHER PIPE TYPE.
3. THE DOWNSPOUT COLLECTOR DRAIN SHALL BE INSTALLED BEFORE THE DOWNSPOUTS ARE INSTALLED ON THE BUILDING. SITEWORK CONTRACTOR SHALL BE RESPONSIBLE FOR ALL WORK INCLUDING THE RODENT SCREEN. BUILDING CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONNECTION AT THE POINT OF THE RODENT SCREEN.
4. IF NECESSARY, ADJUST FOOTING TO ALLOW DOWNSPOUT TO BE INSTALLED TIGHT AGAINST BUILDING

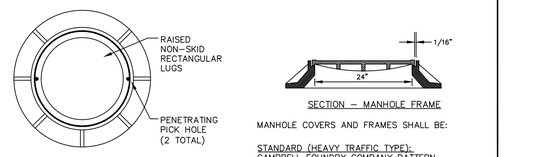
N.T.S.

BUILDING DOWNSPOUT CONNECTION



N.T.S.

INLET TYPE A BICYCLE SAFE GRATE



MANHOLE COVERS AND FRAMES SHALL BE:

STANDARD (HEAVY TRAFFIC TYPE):
CAMPBELL FOUNDRY COMPANY PATTERN NO. 1203, OR APPROVED EQUAL.

CONSTRUCTION NOTES:

1. MANHOLE FRAME AND COVER CASTINGS SHALL CONFORM TO THE LATEST ASTM A-48 CLASS 30 SPECIFICATION.
2. FRAME AND COVERS SHALL BE COATED WITH TWO COATS OF ASPHALTUM VARNISH.

N.T.S.

MANHOLE FRAME AND COVER

Date	Description	No.
Revisions		

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Date: 2024.02.22 08:38:51-05'00'

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PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800

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NJ CERTIFICATE OF AUTHORIZATION NO. 24GA27996400

Project
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SUMMIT
UNION COUNTY NEW JERSEY

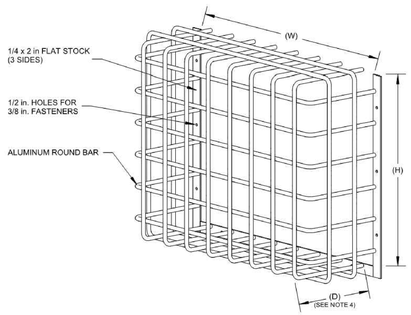
Drawing Title
DRAINAGE DETAILS

Project No.	Drawing No.
101007201	CG501
Date: FEBRUARY 9, 2024	
Drawn By: SM	
Checked By: TH	Sheet 9 of 19

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Date: 2/7/2024 Time: 14:32 User: smelo Style Table: Langan.stb Layout: CG501 Document Code: 101007201-0301-CG501-0101

LANGAN Project No. 101007201



TRASH RACK INFORMATION	
RACK WIDTH I.D. (W)	
RACK HEIGHT I.D. (H)	
RACK DEPTH O.D. (D)	
BAR DIAMETER (1/2" OR 3/4")	
BAR CENTERLINE SPACING	
STRUCTURE OPENING W	
STRUCTURE OPENING H	
WEIR EXTENDS TO TOP?	
FASTENERS (QTY)	
WIRE MESH?	
NOTES:	

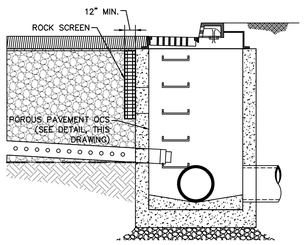
NOTES:
1. ALL MATERIALS TO BE ALUMINUM 6061-T6 ALLOY.
2. WELD ALL INTERSECTIONS.
3. FASTEN TO CONCRETE STRUCTURE WITH 3/8 in. x 3 in. STAINLESS STEEL CONCRETE WEDGE ANCHORS AT 18 in. MAX. SPACING. MINIMUM OF (4).
4. DEPTH TO O.D. OF RACK. IF THE CONCRETE WEIR EXTENDS TO THE TOP OF THE STRUCTURE, THE DEPTH OF THE TOP BARS WILL EXTEND TO MEET TOP GRATING OR FRAME OF STRUCTURE SO THERE IS NO GAP.
5. OVERALL RACK WIDTH = (W) + 4 INCHES
6. OVERALL RACK HEIGHT = (H) + BAR DIAMETER + 2 INCHES
7. OPTIONAL - 10g STAINLESS STEEL WIRE MESH WITH 1 in. GRID TO COVER RACK.

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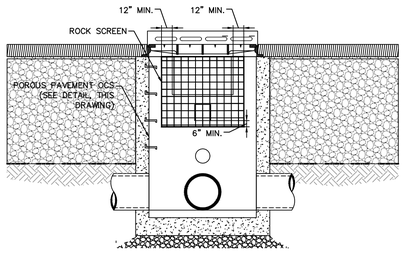
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PROJECT: ALUMINUM BOXED SERIES AB RACK
FILE #:
DATE:
SCALE:
DRAWN BY:

POROUS PAVEMENT OUTLET CONTROL STRUCTURE ALUMINUM ROCK SCREEN



SECTION A–A

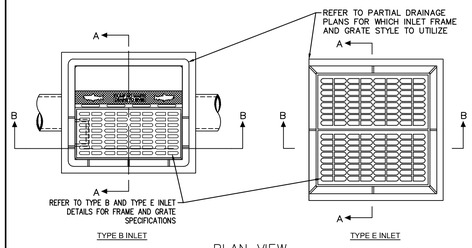


SECTION B–B

NOTES:
1. MAX OPENING BETWEEN PARALLEL BARS TO BE 1"
2. ROCK SCREEN TO EXTEND MIN. 12" IN BOTH DIRECTIONS BEYOND WIDTH OF RECTANGULAR WEIR, MIN 6" BELOW RECTANGULAR WEIR INVERT, AND MIN. 12" OUT FROM FACE OF OUTLET CONTROL STRUCTURE

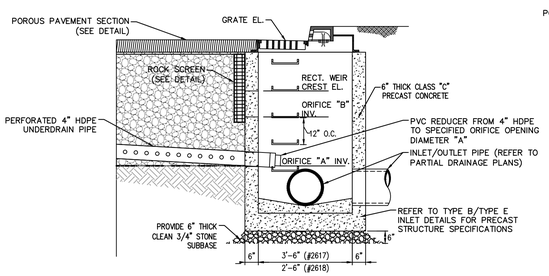
N.T.S.

POROUS PAVEMENT SYSTEM OUTLET CONTROL STRUCTURE

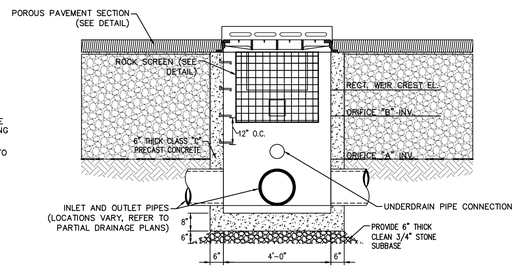


PLAN VIEW

	ORIFICE "A"		ORIFICE "B"		RECT. WEIR		INLET PIPE		OUTLET PIPE		GRATE EL.
	SIZE	INVERT	SIZE	INVERT	LENGTH	CREST EL.	SIZE	INVERT	SIZE	INVERT	
OCS2–1	2.5" DIA.	354.10	5"X6"	354.95	–	–	N/A	N/A	15" HDPE	353.05	356.60
OCS2–2	2.5" DIA.	355.10	3"X6"	355.75	–	–	15" HDPE	353.48	15" HDPE	353.48	358.10
OCS2–3	2.5" DIA.	354.10	5"X6"	354.90	–	–	N/A	N/A	15" HDPE	354.04	357.31

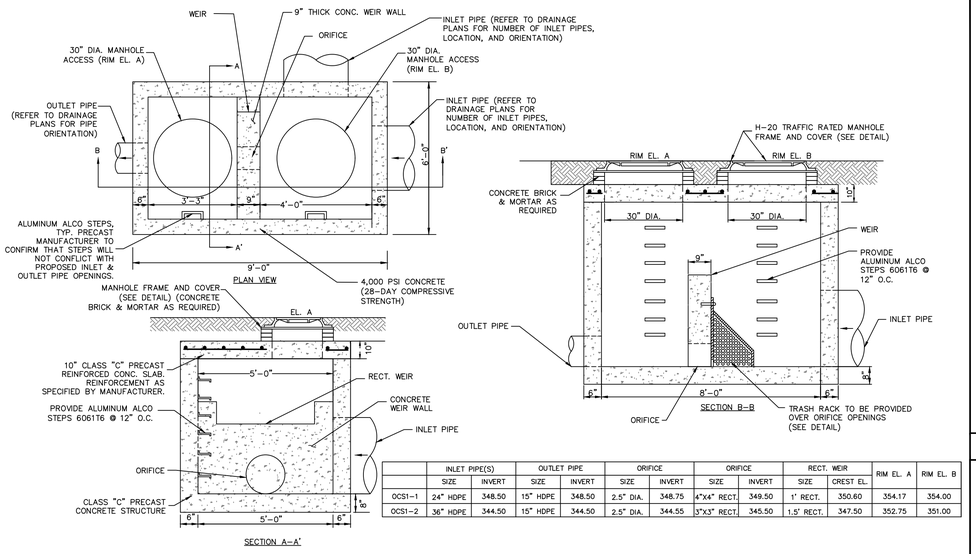


SECTION A–A



SECTION B–B

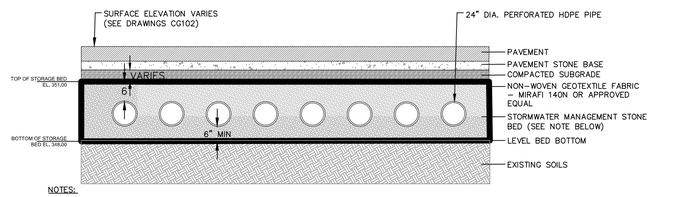
N.T.S.



	INLET PIPE(S)		OUTLET PIPE		ORIFICE		ORIFICE		RECT. WEIR		RIM EL. A	RIM EL. B
	SIZE	INVERT	SIZE	INVERT	SIZE	INVERT	SIZE	INVERT	SIZE	CREST EL.		
OCS1–1	24" HDPE	348.50	15" HDPE	348.50	2.5" DIA.	348.75	4"X4" RECT.	349.50	1' RECT.	350.60	354.17	354.00
OCS1–2	36" HDPE	344.50	15" HDPE	344.50	2.5" DIA.	344.55	3"X3" RECT.	345.50	1.5' RECT.	347.50	352.75	351.00

N.T.S.

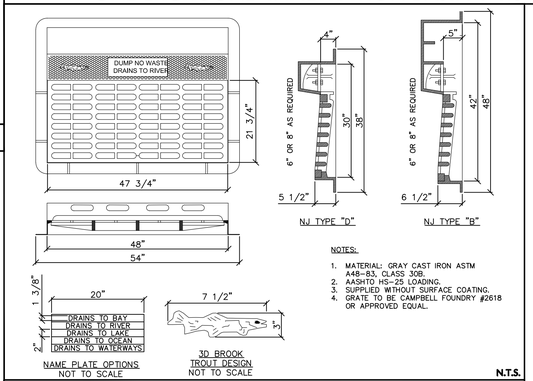
UNDERGROUND INFILTRATION BASIN OUTLET CONTROL STRUCTURES



NOTES:
1. STORMWATER MANAGEMENT STONE BED SHALL BE 2–INCH TO 1–INCH UNIFORMLY GRADED COARSE AGGREGATE, WITH A WASH LOSS OF NO MORE THAN 0.5%. AASHTO SIZE NUMBER 3 PER AASHTO SPECIFICATIONS, PART I, 19TH ED., 1998, OR LATER AND SHALL HAVE VOIDS 40% AS MEASURED BY ASTM–C29.
2. SEE DRAWING FOR PIPE LAYOUT, CONNECTIONS AND CLEAN–OUTS.
3. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF THE STORMWATER SYSTEM TO THE DESIGN ENGINEER FOR REVIEW PRIOR TO ORDERING/ CONSTRUCTION. THIS SUBMITTAL MUST INCLUDE THE WITHDRAWAL STRUCTURES AND CONNECTION TO THE UNDERGROUND STORMWATER SYSTEM.
4. EXISTING SUBGRADE UNDER THE INFILTRATION BMP'S SHALL NOT BE COMPACTED OR SUBJECT TO EXCESSIVE CONSTRUCTION EQUIPMENT TRAFFIC PRIOR TO CONSTRUCTION OF THE INFILTRATION BMP. SHOULD INFILTRATION BMP AREAS RECEIVE EXCESSIVE CONSTRUCTION TRAFFIC OR SUBJECTED TO COMPACTION, ADDITIONAL INFILTRATION TESTS MUST BE PERFORMED.
5. PRIOR TO CONSTRUCTION, INFILTRATION AREAS SHALL BE MARKED OFF IN THE FIELD. THE AREAS SHALL BE DELINEATED WITH CONSTRUCTION FENCING OR TAPE IN SUCH A MANNER AS TO PREVENT THE PARKING OF OR REPEATED MOVEMENT OF CONSTRUCTION EQUIPMENT ACROSS THE INFILTRATION AREAS.

N.T.S.

UNDERGROUND INFILTRATION BASIN 1-1 SECTION



NOTES:
1. MATERIAL: GRAY CAST IRON ASTM A48–83, CLASS 30B
2. AASHTO HS–25 LOADING.
3. SUPPLIED WITHOUT SURFACE COATING.
4. GRATE TO BE CAMPBELL FOUNDRY #2618 OR APPROVED EQUAL.

N.T.S.

TYPE B INLET BICYCLE SAFE GRATE WITH TYPE "N-ECO" CURB PIECE

Date	Description	No.

Revisions

Digitally signed by John C Cote
Date: 2024.02.22 08:39:05-05'00'

SIGNATURE JOHN COTE DATE
PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800

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NJ CERTIFICATE OF AUTHORIZATION NO. 24GA27996400

Project
BEACON UNITARIAN UNIVERSALIST CHURCH
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UNION COUNTY NEW JERSEY

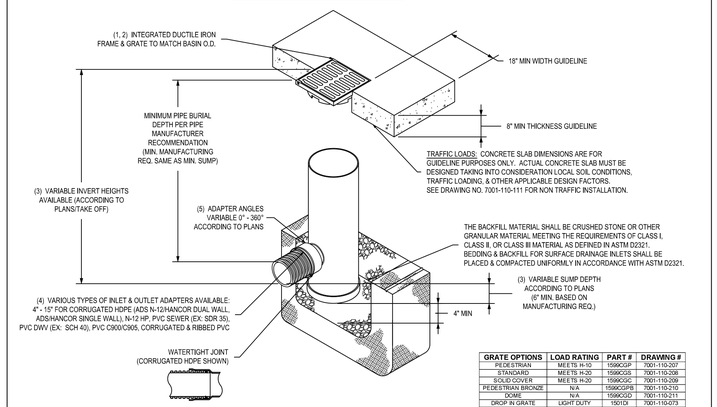
Drawing Title
DRAINAGE DETAILS

Project No.	Drawing No.
101007201	CG502
Date: FEBRUARY 9, 2024	
Drawn By: SM	
Checked By: TH	Sheet 10 of 19

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LANGAN Project No. 101007201

NYLOPLAST 15" DRAIN BASIN: 2815AG _ _ X



GRATE OPTIONS	LOAD RATING	PART #	DRAWING #
PEDESTRIAN	MEETS H-10	1596CGP	7001-110-207
STANDARD	MEETS H-20	1596CGS	7001-110-208
SOLID COVER	MEETS H-20	1596CGC	7001-110-209
PEDESTRIAN BRONZE	N/A	1596CGPB	7001-110-210
DOME	N/A	1596CGD	7001-110-211
DROP IN GRATE	LIGHT DUTY	1501DI	7001-110-073

1 - GRATES/SOLID COVER SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05, WITH THE EXCEPTION OF THE BRONZE GRATE.
2 - FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-40-05
3 - DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS. RISERS ARE NEEDED FOR BASINS OVER 84" DUE TO SHIPPING RESTRICTIONS. SEE DRAWING NO. 7001-110-065
4 - DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS N-12/HANCOR DUAL WALL), N-12 HP, & PVC SEWER.
5 - ADAPTERS CAN BE MOUNTED ON ANY ANGLE 0° TO 360°. TO DETERMINE MINIMUM ANGLE BETWEEN ADAPTERS SEE DRAWING NO. 7001-110-012.

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DRAWN BY	EBC	MATERIAL	
DATE	03-30-06		
REVISED BY	NMH	PROJECT NO./NAME	
DATE	03-14-16		
DWG SIZE	A	SCALE 1:25 SHEET 1 OF 1	

Nyloplast — 3130 VERONA AVE BUFORD, GA 30518 PHN (770) 932-2443 FAX (770) 932-2490 www.nyloplast-us.com

TITLE: 15 IN DRAIN BASIN QUICK SPEC INSTALLATION DETAIL

DWG NO. 7001-110-190 REV E

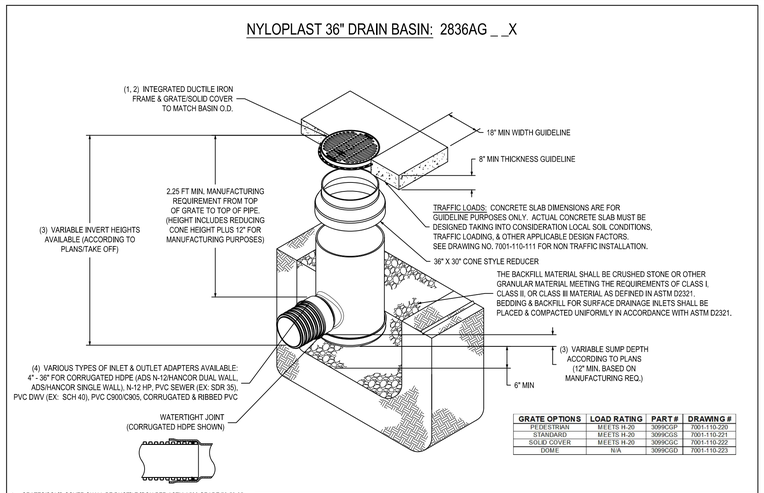
NOTES:

1. INLET GRATE STYLE AND COLOR TO BE COORDINATED WITH LANDSCAPE ARCHITECT.
2. INLET GRATES SHALL HAVE SAFETY LOCK.
3. REFER TO NYLOPLAST NON-TRAFFIC INSTALLATION DETAIL FOR YARD INLETS TO BE INSTALLED OUTSIDE OF DRIVEWAY LIMITS.

N.T.S.

NYLOPLAST YARD INLET

NYLOPLAST 36" DRAIN BASIN: 2836AG _ _X



GRATE OPTIONS	LOAD RATING	PART #	DRAWING #
PEDESTRIAN	MEETS H-20	3099CGP	7001-110-220
STANDARD	MEETS H-20	3099CGS	7001-110-221
SOLID COVER	MEETS H-20	3099CGC	7001-110-222
DOME	N/A	3099CGD	7001-110-223

1 - GRATES/SOLID COVER SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
2 - FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-40-05.
3 - DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS. RISERS ARE NEEDED FOR BASIN BODIES OVER 84" DUE TO SHIPPING RESTRICTIONS.
4 - DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS N-12/HANCOR DUAL WALL), N-12 HP, & PVC SEWER.
5 - ADAPTERS CAN BE MOUNTED ON ANY ANGLE 0° TO 360°. TO DETERMINE MINIMUM ANGLE BETWEEN ADAPTERS SEE DRAWING NO. 7001-110-012.

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DATE	9-21-18		
APPD BY	NMH	PROJECT NO./NAME	
DATE	9-21-18		
DWG SIZE	A	SCALE 1:40 SHEET 1 OF 1	

Nyloplast — 3130 VERONA AVE BUFORD, GA 30518 PHN (770) 932-2443 FAX (770) 932-2490 www.nyloplast-us.com

TITLE: 36" DRAIN BASIN QUICK SPEC INSTALLATION DETAIL

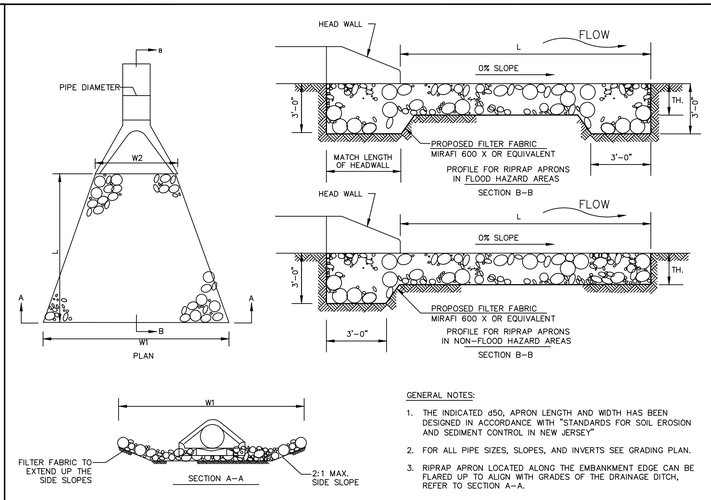
DWG NO. 7001-110-526 REV A

NOTES:

1. STORM MANHOLES SHALL HAVE A SOLID, LOCKABLE COVER. COVER STYLE AND COLOR TO BE COORDINATED WITH THE LANDSCAPE ARCHITECT.
2. POLYPROPYLENE STEPS OR LADDER SHALL BE REQUIRED WHEN THE STRUCTURE DEPTH EXCEEDS 3 FEET. FOLLOW MANUFACTURER RECOMMENDATIONS FOR INSTALLATION.
3. REFER TO NYLOPLAST NON-TRAFFIC INSTALLATION DETAIL FOR MANHOLES TO BE INSTALLED OUTSIDE OF DRIVEWAY LIMITS.

N.T.S.

NYLOPLAST STORM MANHOLE



OUTLET	LENGTH	d50	W1	W2	THICKNESS
HW2-1	13.0'	3.0"	17.0'	3.75'	6"

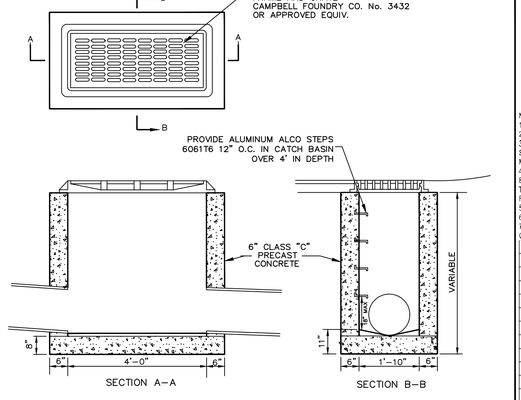
LENGTH, W1 AND W2 ARE DIMENSIONED IN FEET

GENERAL NOTES:

1. THE INDICATED d50, APRON LENGTH AND WIDTH HAS BEEN DESIGNED IN ACCORDANCE WITH "STANDARDS FOR SOIL EROSION AND SEDIMENT CONTROL IN NEW JERSEY."
2. FOR ALL PIPE SIZES, SLOPES, AND INVERTS SEE GRADING PLAN.
3. RIPRAP APRON LOCATED ALONG THE EMBANKMENT EDGE CAN BE FLARED UP TO ALIGN WITH GRADES OF THE DRAINAGE DITCH, REFER TO SECTION A-A.

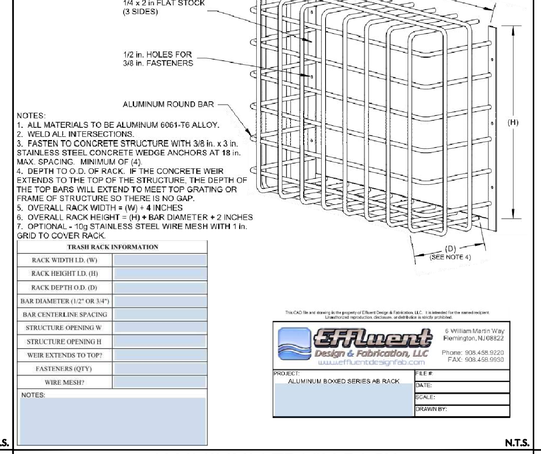
N.T.S.

RIPRAP APRON



N.T.S.

TYPE A INLET



TRASH RACK INFORMATION	
RACK WIDTH I.D. (W)	
RACK HEIGHT I.D. (H)	
RACK DEPTH O.D. (D)	
BAR DIAMETER (1/2" OR 3/4")	
BAR CENTERLINE SPACING	
STRUCTURE OPENING W	
STRUCTURE OPENING H	
WEIR EXTENDS TO TOP?	
FASTENERS (QTY)	
WIRE MESH?	
NOTES:	

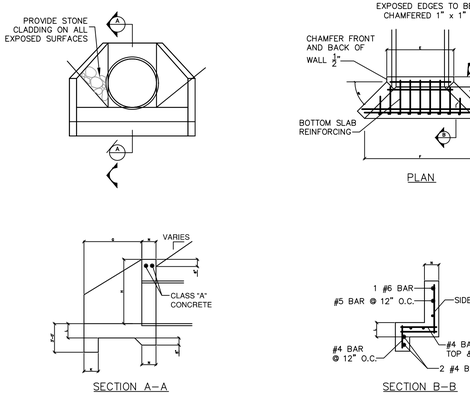
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Effluent Design & Fabrication, LLC — www.effluentdesignfab.com — 5 William Martin Way, Pennington, NJ 08534 — Phone: 908.458.5220 FAX: 908.458.9950

PROJECT: ALUMINUM BOXED SERIES AB RACK — FILE #: — DATE: — SCALE: — DRAWN BY:

N.T.S.

ALUMINUM TRASH RACK



NOTES:

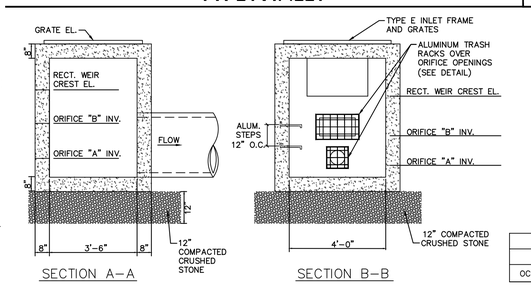
1. HEAD WALLS MAY BE PRECAST OR CAST-IN-PLACE WITH STONE FACING.
2. STRUCTURAL DESIGN (WALL AND SLAB THICKNESS AND ALL REINFORCING) BY PRECASTER AND SHALL MEET STATE DEPARTMENT OF TRANSPORTATION STANDARDS AND SUPPORT HS-20 OR HS-25 LOADING AS REQUIRED.

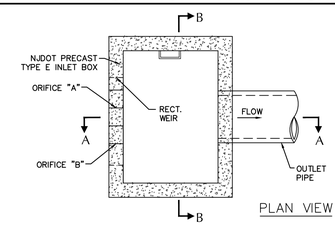
D	E	F	G	H	J	K	L	N	R	VOL. C.Y.*
18"	3'-0"	8'-6"	3'-0"	3'-0"	2'-0"	8"	8"		#5-12" O/C	1.70
21"	3'-4"	8'-9"		3'-3"	2'-0"					1.80
24"	3'-8"	9'-0"	3'-0"	3'-6"	2'-0"	8"	8"	8"	#5-12" O/C	1.90
27"	3'-11"	9'-3"		3'-9"	2'-0"					2.00
30"	4'-2"	9'-6"	3'-0"	4'-0"	2'-1"	8"	8"	10"	#5-12" O/C	2.85
36"	4'-8"	11'-0"	3'-6"	4'-6"	2'-3"	8"	10"	10"	#5-12" O/C	3.15
42"	5'-3"	12'-6"	4'-0"	5'-0"	2'-9"	8"	10"	10"	#5-12" O/C	3.87
48"	5'-10"	14'-0"	4'-6"	5'-6"	3'-0"	8"	10"	12"	#5-12" O/C	5.08
54"	6'-5"	15'-6"	5'-0"	6'-0"	3'-3"	9"	12"	12"	#6-8" O/C	6.50
60"	7'-0"	17'-0"	5'-6"	6'-6"	3'-6"	9"	12"	12"	#6-8" O/C	7.98
66"	7'-7"	18'-6"	6'-0"	7'-0"	3'-9"	9"	12"	14"	#6-8" O/C	9.14
72"	8'-2"	20'-0"	6'-6"	7'-6"	4'-3"	9"	12"	14"	#6-8" O/C	11.10

* BASED ON 2:1 CHANNEL SIDE SLOPES

N.T.S.

CONCRETE HEADWALL





	ORIFICE "A"		ORIFICE "B"		RECT. WEIR		OUTLET PIPE		GRATE EL.
	SIZE	INVERT	SIZE	INVERT	LENGTH	CREST EL.	SIZE	INVERT	
OCS1-3	4" DIA	351.75	–	–	–	–	15" HDPE	347.49	356.00

N.T.S.

RAIN GARDEN OUTLET CONTROL STRUCTURE

Date	Description	No.

Revisions

Digitally signed by John C Cote
Date: 2024.02.22 08:39:21-05'00'

SIGNATURE — JOHN COTE, PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800 — DATE

LANGAN
Langan Engineering and Environmental Services, Inc.
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION NO. 24GA27996400

Project

BEACON UNITARIAN UNIVERSALIST CHURCH

SUMMIT

UNION COUNTY — NEW JERSEY

Drawing Title

DRAINAGE DETAILS

Project No.	101007201
Date	FEBRUARY 9, 2024
Drawn By	SS
Checked By	TH

Drawing No. CG503

Sheet 11 of 19

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LANGAN Project No. 101007201

Date: 2/7/2024 Time: 14:32 User: smelo Style Table: Langan.stb Layout: CG503 Document Code: 101007201-0301-CG501-0103

CULTEC RECHARGER® 360HD PRODUCT SPECIFICATIONS

GENERAL
CULTEC RECHARGER® 360HD CHAMBERS ARE DESIGNED FOR UNDERGROUND STORMWATER MANAGEMENT. THE CHAMBERS MAY BE USED FOR RETENTION, RECHARGING, DETENTION OR CONTROLLING THE FLOW OF ON-SITE STORMWATER RUNOFF.

CHAMBER PARAMETERS
1. THE CHAMBERS SHALL BE MANUFACTURED IN THE U.S.A. OR CANADA BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE CHAMBERS SHALL BE DESIGNED AND TESTED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". THE LOAD CONFIGURATION SHALL INCLUDE:
   A. INSTANTANEOUS AASHTO DESIGN TRUCK LIVE LOAD AT MINIMUM COVER
   B. MAXIMUM PERMANENT (50-YEAR) COVER LOAD
   C. 1-WEEK PARKED AASHTO DESIGN TRUCK LOAD
3. THE CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F3430-20 "STANDARD SPECIFICATION FOR CELLULAR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. THE INSTALLED CHAMBER SYSTEM SHALL PROVIDE RESISTANCE TO THE LOADS AND LOAD FACTORS AS DEFINED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12, WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS. THE STRUCTURAL DESIGN OF THE CHAMBERS SHALL INCLUDE THE FOLLOWING:
   A. THE CREEP MODULUS SHALL BE 50-YEAR AS SPECIFIED IN ASTM F3430
   B. THE MINIMUM SAFETY FACTOR FOR LIVE LOADS SHALL BE 1.75
   C. THE MINIMUM SAFETY FACTOR FOR DEAD LOADS SHALL BE 1.95
5. THE CHAMBER SHALL BE STRUCTURAL FOAM INJECTION MOLDED OF BLUE VIRGIN HIGH MOLECULAR WEIGHT IMPACT-MODIFIED POLYPROPYLENE.
6. THE CHAMBER SHALL BE ARCHED IN SHAPE.
7. THE CHAMBER SHALL BE OPEN-BOTTOMED.
8. THE CHAMBER SHALL BE JOINED USING AN INTERLOCKING OVERLAPPING RIB METHOD. CONNECTIONS MUST BE FULLY SHOULDERED OVERLAPPING RIBS, HAVING NO SEPARATE COUPLINGS.
9. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC RECHARGER® 360HD SHALL BE 36 INCHES (915 mm) TALL, 60 INCHES (1525 mm) WIDE AND 50 INCHES (1275 mm) LONG. THE INSTALLED LENGTH OF A JOINED RECHARGER® 360HD SHALL BE 3.67 FEET (1.12 m).
10. MULTIPLE CHAMBERS MAY BE CONNECTED TO FORM DIFFERENT LENGTH ROWS. EACH ROW SHALL BEGIN AND END WITH A SEPARATELY FORMED CULTEC RECHARGER® 360HD END CAP. MAXIMUM INLET OPENING ON THE END CAP IS 24 INCH (600 mm) HDPE OR 30 INCH (750mm) PVC.
11. THE CHAMBER SHALL HAVE TWO SIDE PORTALS TO ACCEPT CULTEC HVLV™ FC-48 FEED CONNECTORS TO CREATE AN INTERNAL MANIFOLD. MAXIMUM ALLOWABLE PIPE SIZE IN THE SIDE PORTAL IS 10 INCH (250mm) HDPE OR 12 INCH (300mm) PVC.
12. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC HVLV™ FC-48 FEED CONNECTOR SHALL BE 12 INCHES (305 mm) TALL, 16 INCHES (406 mm) WIDE AND 49 INCHES (1245 mm) LONG.
13. THE NOMINAL STORAGE VOLUME OF THE RECHARGER® 360HD CHAMBER SHALL BE 10.0 FT³ / FT (.928 m³ / m) - WITHOUT STONE. THE NOMINAL STORAGE VOLUME OF A JOINED RECHARGER® 360HD SHALL BE 36.66 FT³ / UNIT (1.038 m³ / UNIT) - WITHOUT STONE.
14. THE NOMINAL STORAGE VOLUME OF THE HVLV™ FC-48 FEED CONNECTOR SHALL BE 0.913 FT³ / FT (0.085 m³ / m) - WITHOUT STONE.
15. THE RECHARGER® 360HD CHAMBER SHALL HAVE 7 CORRUGATIONS.
16. THE CHAMBER SHALL BE MANUFACTURED IN A FACILITY EMPLOYING CULTEC'S QUALITY CONTROL AND ASSURANCE PROCEDURES.
17. MAXIMUM ALLOWABLE COVER OVER THE TOP OF THE CHAMBER SHALL BE 12.0 FEET (3.66 m).

END CAP PARAMETERS
1. THE CULTEC RECHARGER® 360HD END CAP (REFERRED TO AS 'END CAP') SHALL BE MANUFACTURED IN THE U.S.A. OR CANADA BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE END CAP SHALL BE STRUCTURAL FOAM INJECTION MOLDED OF BLUE VIRGIN HIGH MOLECULAR WEIGHT IMPACT-MODIFIED POLYPROPYLENE.
3. THE END CAP SHALL BE ARCHED IN SHAPE.
4. THE END CAP SHALL BE OPEN-BOTTOMED.
5. THE END CAP SHALL BE JOINED AT THE BEGINNING AND END OF EACH ROW OF CHAMBERS USING AN INTERLOCKING OVERLAPPING RIB METHOD. CONNECTIONS MUST BE FULLY SHOULDERED OVERLAPPING RIBS, HAVING NO SEPARATE COUPLINGS.
6. THE END CAP SHALL HAVE 5 CORRUGATIONS.
7. THE NOMINAL DIMENSIONS OF THE END CAP SHALL BE 36.5 INCHES (927 mm) TALL, 60 INCHES (1525 mm) WIDE AND 18 INCHES (458 mm) LONG. WHEN JOINED WITH A RECHARGER 360HD CHAMBER, THE INSTALLED LENGTH OF THE END CAP SHALL BE 15 INCHES (381 mm).
8. THE NOMINAL STORAGE VOLUME OF THE END CAP SHALL BE 5.17 FT³ / FT (0.48 m³ / m) - WITHOUT STONE. THE NOMINAL STORAGE VOLUME OF AN INTERLOCKED END CAP SHALL BE 6.46 FT³ / UNIT (0.183 m³ / UNIT) - WITHOUT STONE.
9. MAXIMUM INLET OPENING ON THE END CAP IS 24 INCH (600 mm) HDPE OR 30 INCH (750mm) PVC.
10. THE CHAMBER SHALL BE MANUFACTURED IN A FACILITY EMPLOYING CULTEC'S QUALITY CONTROL AND ASSURANCE PROCEDURES
11. THE END CAP SHALL PROVIDE RESISTANCE TO THE LOADS AND LOAD FACTORS AS DEFINED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12.

CULTEC HVLV FC-48 FEED CONNECTOR PRODUCT SPECIFICATIONS

GENERAL
CULTEC HVLV FC-48 FEED CONNECTORS ARE DESIGNED TO CREATE AN INTERNAL MANIFOLD FOR CULTEC RECHARGER MODEL 360HD STORMWATER CHAMBERS.

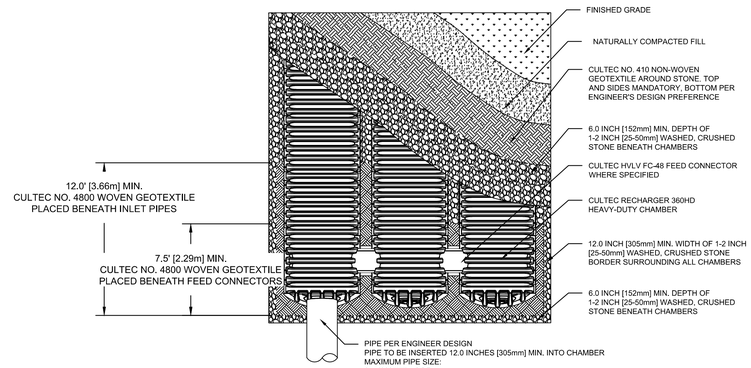
FEED CONNECTOR PARAMETERS
1. THE FEED CONNECTOR SHALL BE MANUFACTURED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE FEED CONNECTOR SHALL BE VACUUM THERMOFORMED OF BLACK HIGH MOLECULAR WEIGHT HIGH DENSITY POLYETHYLENE (HMWHDPE).
3. THE FEED CONNECTOR SHALL BE ARCHED IN SHAPE.
4. THE FEED CONNECTOR SHALL BE OPEN-BOTTOMED.
5. THE NOMINAL DIMENSIONS OF THE CULTEC HVLV FC-48 FEED CONNECTOR SHALL BE 12 INCHES (305 mm) TALL, 16 INCHES (406 mm) WIDE AND 49 INCHES (1245 mm) LONG.
6. THE NOMINAL STORAGE VOLUME OF THE HVLV FC-48 FEED CONNECTOR SHALL BE 0.913 FT³ / FT (0.085 m³ / m) - WITHOUT STONE.
7. THE HVLV FC-48 FEED CONNECTOR SHALL HAVE 4 CORRUGATIONS.
8. THE HVLV FC-48 FEED CONNECTOR MUST BE FORMED AS A WHOLE UNIT HAVING TWO OPEN END WALLS AND HAVING NO SEPARATE END PLATES OR SEPARATE END WALLS. THE UNIT SHALL FIT INTO THE SIDE PORTALS OF THE CULTEC RECHARGER STORMWATER CHAMBER AND ACT AS CROSS FEED CONNECTIONS CREATING AN INTERNAL MANIFOLD.
9. THE FEED CONNECTOR SHALL BE DESIGNED TO WITHSTAND AASHTO HS-25 DEFINED LOADS WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS.
10. THE FEED CONNECTOR SHALL BE MANUFACTURED IN AN ISO 9001:2008 CERTIFIED FACILITY.

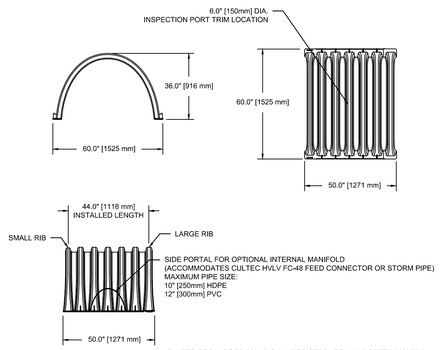
CULTEC NO. 410™ NON-WOVEN GEOTEXTILE
CULTEC NO. 410™ NON-WOVEN GEOTEXTILE MAY BE USED WITH CULTEC CONTACTOR® AND RECHARGER® STORMWATER INSTALLATIONS TO PROVIDE A BARRIER THAT PREVENTS SOIL INTRUSION INTO THE STONE.

GEOTEXTILE PARAMETERS
1. THE GEOTEXTILE SHALL BE PROVIDED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE GEOTEXTILE SHALL BE BLACK IN APPEARANCE.
3. THE GEOTEXTILE SHALL HAVE A TYPICAL WEIGHT OF 4.5 OZ/SY (142 G/M).
4. THE GEOTEXTILE SHALL HAVE A TENSILE STRENGTH VALUE OF 120 LBS (533 N) PER ASTM D4632 TESTING METHOD.
5. THE GEOTEXTILE SHALL HAVE AN ELONGATION @ BREAK VALUE OF 50% PER ASTM D4632 TESTING METHOD.
6. THE GEOTEXTILE SHALL HAVE A MULLEN BURST VALUE OF 225 PSI (1551 KPA) PER ASTM D3786 TESTING METHOD.
7. THE GEOTEXTILE SHALL HAVE A PUNCTURE STRENGTH VALUE OF 65 LBS (289 N) PER ASTM D4833 TESTING METHOD.
8. THE GEOTEXTILE SHALL HAVE A CBR PUNCTURE VALUE OF 340 LBS (1513 N) PER ASTM D6241 TESTING METHOD.
9. THE GEOTEXTILE SHALL HAVE A TRAPEZOID TEAR VALUE OF 50 LBS (222 N) PER ASTM D4533 TESTING METHOD.
10. THE GEOTEXTILE SHALL HAVE A AOS VALUE OF 70 U.S. SIEVE (0.212 MM) PER ASTM D4751 TESTING METHOD.
11. THE GEOTEXTILE SHALL HAVE A PERMITTIVITY VALUE OF 1.7 SEC-1 PER ASTM D4491 TESTING METHOD.
12. THE GEOTEXTILE SHALL HAVE A WATER FLOW RATE VALUE OF 135 GAL/MIN/SF (5500 L/MIN/SM) PER ASTM D4491 TESTING METHOD.
13. THE GEOTEXTILE SHALL HAVE A UV STABILITY @ 500 HOURS VALUE OF 70% PER ASTM D4355 TESTING METHOD.

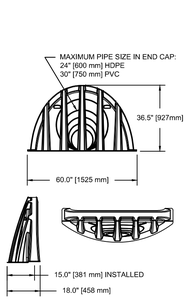
CULTEC NO. 4800™ WOVEN GEOTEXTILE
CULTEC NO. 4800 WOVEN GEOTEXTILE IS DESIGNED AS A UNDERLAYMENT TO PREVENT SCOURING CAUSED BY WATER MOVEMENT WITHIN THE CULTEC CHAMBERS AND FEED CONNECTORS UTILIZING THE CULTEC MANIFOLD FEATURE. IT MAY ALSO BE USED AS A COMPONENT OF THE CULTEC SEPARATOR ROW TO ACT AS A BARRIER TO PREVENT SOIL/CONTAMINANT INTRUSION INTO THE STONE WHILE ALLOWING FOR MAINTENANCE.

GEOTEXTILE PARAMETERS
1. THE GEOTEXTILE SHALL BE PROVIDED BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)
2. THE GEOTEXTILE SHALL BE BLACK IN APPEARANCE.
3. THE GEOTEXTILE SHALL HAVE A TENSILE STRENGTH OF 550 X 550 LBS (2,448 X 2,448 N) PER ASTM D4632 TESTING METHOD.
4. THE GEOTEXTILE SHALL HAVE A ELONGATION @ BREAK RESISTANCE OF 20 X 20% PER ASTM D4632 TESTING METHOD.
5. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE OF 5,070 X 5,070 LBS/FT (74 X 74 KN/M) PER ASTM D4595 TESTING METHOD.
6. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 2% STRAIN OF 960 X 1,096 LBS/FT (14 X 16 KN/M) PER ASTM D4595 TESTING METHOD.
7. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 5% STRAIN OF 2,740 X 2, 740 LBS/FT (40 X 40 KN/M) PER ASTM D4595 TESTING METHOD.
8. THE GEOTEXTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE @ 10% STRAIN OF 4,800 X 4,800 LBS/FT (70 X 70 KN/M) PER ASTM D4595 TESTING METHOD.
9. THE GEOTEXTILE SHALL HAVE A CBR PUNCTURE RESISTANCE OF 1,700 LBS (7,560 N) PER ASTM D6241 TESTING METHOD.
10. THE GEOTEXTILE SHALL HAVE A TRAPEZOIDAL TEAR RESISTANCE OF 180 X 180 LBS (801 X 801 N) PER ASTM D4533 TESTING METHOD.
11. THE GEOTEXTILE SHALL HAVE AN APPARENT OPENING SIZE OF 40 US STD. SIEVE (0.425 MM) PER ASTM D4751 TESTING METHOD.
12. THE GEOTEXTILE SHALL HAVE A PERMITTIVITY RATING OF 0.15 SEC-1 PER ASTM D4491 TESTING METHOD.
13. THE GEOTEXTILE SHALL HAVE A WATER FLOW RATING OF 11.5 GPM/FT2 (470 LPM/M2) PER ASTM D4491 TESTING METHOD.
14. THE GEOTEXTILE SHALL HAVE A UV RESISTANCE OF 80% @ 500 HRS. PER ASTM D4355 TESTING METHOD.

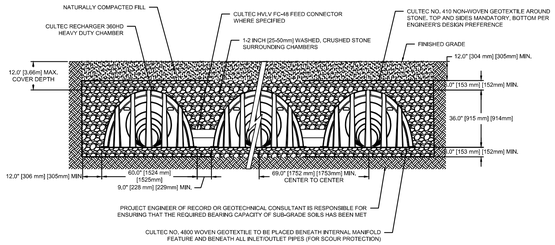




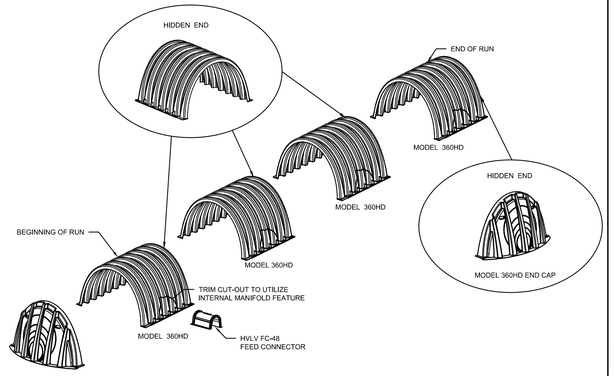
CULTEC RECHARGER 360HD CHAMBER STORAGE = 10.0 CF/FT [.928m³/m]
CHAMBER STORAGE VOLUME = 36.66 CF [1.038m³]
INSTALLED LENGTH ADJUSTMENT = 0.50' [0.15m]
SIDE PORTAL ACCEPTS CULTEC HVLV FC-48 FEED CONNECTOR



CULTEC RECHARGER 360HD END CAP
STORAGE = 5.17 CF/FT [0.48 m³/m]
END CAP STORAGE VOLUME = 6.46 CF [0.183 m3]
INSTALLED LENGTH ADJUSTMENT = 0.25' [0.08 m]

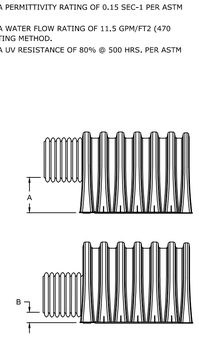


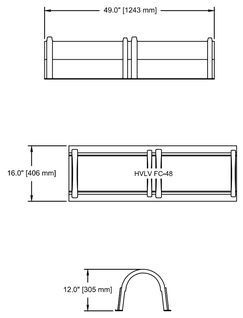
NOTES:
1. THE CHAMBERS SHALL BE DESIGNED AND TESTED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS." THE LOAD CONFIGURATION SHALL INCLUDE:
   1.a. INSTANTANEOUS AASHTO DESIGN TRUCK LIVE LOAD AT MINIMUM COVER
   1.b. MAXIMUM PERMANENT (50-YEAR) COVER LOAD
   1.c. 1-WEEK PARKED AASHTO DESIGN TRUCK LOAD
2. THE CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F3430-20 "STANDARD SPECIFICATION FOR CELLULAR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS"
3. THE INSTALLED CHAMBER SYSTEM SHALL PROVIDE RESISTANCE TO THE LOADS AND LOAD FACTORS AS DEFINED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12, WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS. THE STRUCTURAL DESIGN OF THE CHAMBERS SHALL INCLUDE THE FOLLOWING:
   3.a. THE CREEP MODULUS SHALL BE 50-YEAR AS SPECIFIED IN ASTM F3430
   3.b. THE MINIMUM SAFETY FACTOR FOR LIVE LOADS SHALL BE 1.75
   3.c. THE MINIMUM SAFETY FACTOR FOR DEAD LOADS SHALL BE 1.95

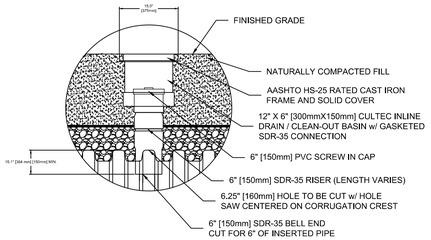


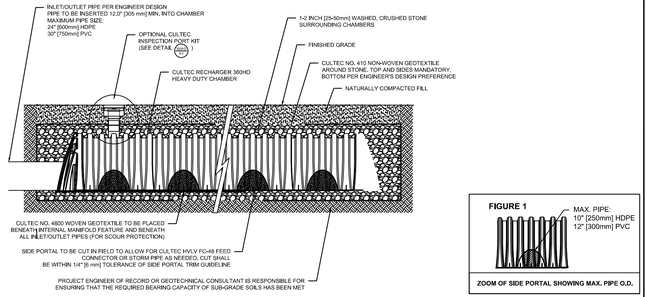
PIPE	A	B
6" [150 mm]	26.00" [660 mm]	0.75" [20 mm]
8" [200 mm]	24.00" [600 mm]	1.00" [25 mm]
10" [250 mm]	21.00" [525 mm]	1.25" [32 mm]
12" [300 mm]	18.00" [450 mm]	1.75" [45 mm]
15" [375 mm]	15.00" [375 mm]	2.00" [50 mm]
18" [450 mm]	12.00" [300 mm]	2.25" [58 mm]
24" [600 mm]	6.00" [150 mm]	2.50" [64 mm]

*THE TYPICAL INVERT TABLE ABOVE IS BASED ON THE INSIDE DIAMETER OF STANDARD CORRUGATED PLASTIC PIPE. THE HEAVY DUTY END CAP HAS PRE-MARKED TRIM LINES FOR PIPE DIAMETERS 12" (300mm), 15" (375mm), 18" (450mm) AND 24" (600mm). PIPES OF ANY SIZE AND MATERIAL UP TO 24" (600mm) MAY BE PLACED AT CUSTOM LOCATIONS AND CUSTOM INVERTS. 30" (750 mm) SMOOTH-WALL SDR-35 PVC PIPE MAY BE USED AT THE BOTTOM OF THE END CAP. THE CROWN OF THE PIPE MUST REMAIN A MINIMUM OF 3" (75mm) FROM THE EDGE OF THE HEAVY DUTY END CAP.









NOTES:
1. THE CHAMBERS SHALL BE DESIGNED AND TESTED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS." THE LOAD CONFIGURATION SHALL INCLUDE:
   1.a. INSTANTANEOUS AASHTO DESIGN TRUCK LIVE LOAD AT MINIMUM COVER
   1.b. MAXIMUM PERMANENT (50-YEAR) COVER LOAD
   1.c. 1-WEEK PARKED AASHTO DESIGN TRUCK LOAD
2. THE CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F3430-20 "STANDARD SPECIFICATION FOR CELLULAR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS"
3. THE INSTALLED CHAMBER SYSTEM SHALL PROVIDE RESISTANCE TO THE LOADS AND LOAD FACTORS AS DEFINED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12, WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS. THE STRUCTURAL DESIGN OF THE CHAMBERS SHALL INCLUDE THE FOLLOWING:
   3.a. THE CREEP MODULUS SHALL BE 50-YEAR AS SPECIFIED IN ASTM F3430
   3.b. THE MINIMUM SAFETY FACTOR FOR LIVE LOADS SHALL BE 1.75
   3.c. THE MINIMUM SAFETY FACTOR FOR DEAD LOADS SHALL BE 1.95

FIGURE 1
MAX. PIPE: 10" [250mm] HDPE 12" [300mm] PVC
ZOOM OF SIDE PORTAL SHOWING MAX. PIPE O.D.

N.T.S.

SMALL SCALE SUBSURFACE INFILTRATION BASIN 1-2 INSTALLATION DETAILS (CULTEC RECHARGER 360HD)

Date	Description	No.
Revisions		

Digitally signed by John C Cote
Date: 2024.02.22 08:39:36-05'00'

SIGNATURE JOHN COTE DATE
PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800

LANGAN
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300 Kimball Drive
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T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ CERTIFICATE OF AUTHORIZATION NO. 24GA27996400

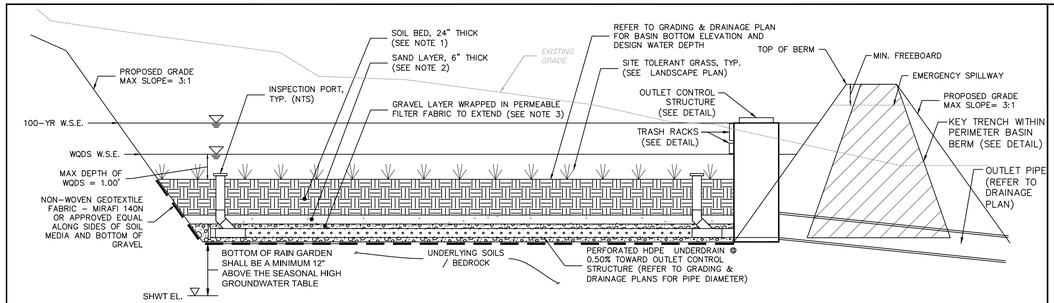
Project
BEACON UNITARIAN UNIVERSALIST CHURCH
SUMMIT
UNION COUNTY **NEW JERSEY**

Drawing Title
DRAINAGE DETAILS

Project No.	Drawing No.
101007201	CG504
Date: FEBRUARY 9, 2024	
Drawn By: SS	
Checked By: TH	Sheet 12 of 19

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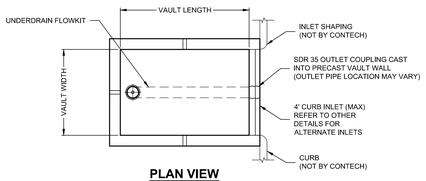
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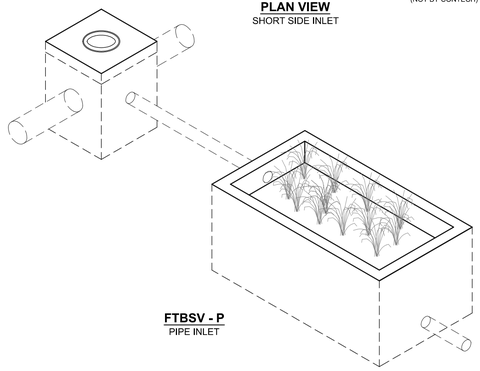
NOTES:
1. SOIL BED SPECIFICATIONS
   - 1.1. THE SOIL BED MATERIAL MUST CONSIST OF THE FOLLOWING MIX, BY WEIGHT: 85 TO 95% SAND, WITH NO MORE THAN 25% OF THE SAND AS FINE OR VERY FINE SANDS; NO MORE THAN 15% SILT AND CLAY WITH 2% TO 5% CLAY CONTENT. THE ENTIRE MIX MUST THEN BE AMENDED WITH 3 TO 7% ORGANICS, BY WEIGHT.
   - 1.2. PRE-MIXED SOIL MUST BE CERTIFIED TO BE CONSISTENT WITH THE REQUIREMENT ABOVE BY EITHER THE VENDOR OR BY A PROFESSIONAL ENGINEER LICENSED BY THE STATE OF NEW JERSEY. THE CONTENT OF ANY SOIL MIXED ON-SITE MUST BE CERTIFIED BY A PROFESSIONAL ENGINEER LICENSED BY THE STATE OF NEW JERSEY; IN ADDITION, THE ENGINEER MUST BE PRESENT WHILE THE SOIL IS MIXED.
   - 1.3. THE PH OF THE SOIL BED MATERIAL MUST RANGE FROM 5.5 TO 6.5.
   - 1.4. THE SOIL BED MATERIAL MUST BE PLACED IN LIFTS NOT TO EXCEED 8 INCHES. ADDITIONAL MATERIALS MAY BE NECESSARY TO ACCOUNT FOR SETTLING OVER TIME.
2. SAND LAYER SPECIFICATIONS
   - 2.1. THE SAND LAYER MUST BE AT LEAST 6 INCHES IN DEPTH AND MUIST CONSIST OF CLEAN, MEDIUM-AGGREGATE CONCRETE SAND (AASHTO M-6/ASTM C-33).
3. GRAVEL LAYER SPECIFICATIONS
   - 3.1. THE GRAVEL LAYER MUST BE AASHTO #57 AND HAVE SUFFICIENT DEPTH TO PROVIDE AT LEAST 3 INCHES OF GRAVEL ABOVE AND BELOW THE PERFORATED UNDERDRAIN AND MUST CONSIST OF 0.5 TO 1.5 INCH CLEAN, BROKEN STONE OR PEA GRAVEL (AASHTO M-43).
4. GEOTEXTILE FILTER FABRIC SHALL BE INSTALLED ALONG THE SIDES AND THE BOTTOM OF THE BASIN AND IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
5. FLEXIBLE CORRUGATED PERFORATED PLASTIC DRAIN PIPE SHOULD NOT BE USED AS UNDERDRAIN PIPE.
6. REFER TO THE GRADING & DRAINAGE PLANS FOR RAIN GARDEN ELEVATIONS, PIPE INVERTS, AND GRATE ELEVATIONS.
7. REFER TO THE OUTLET CONTROL STRUCTURE DETAIL FOR SPECIFICATIONS.
8. REFER TO LANDSCAPING PLANS AND DETAILS FOR PROPOSED PLANTINGS WITHIN RAIN GARDEN AND FOR PLANTING SOIL DETAILS AND SPECIFICATIONS.

N.T.S.

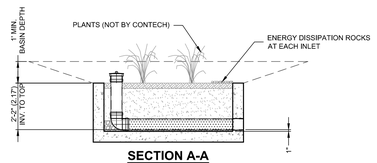
UNDERDRAINED RAIN GARDEN TYPICAL CROSS SECTION



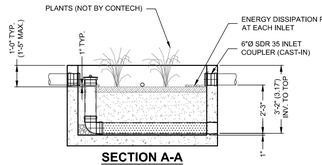
PLAN VIEW
SHORT SIDE INLET



FTBSV - P
PIPE INLET



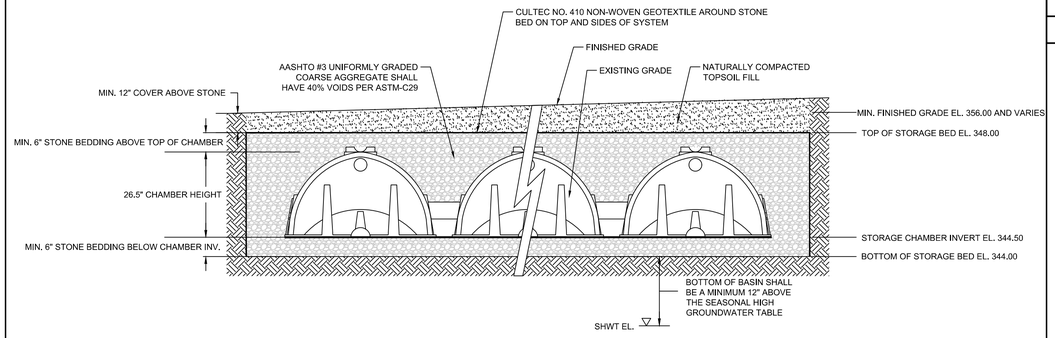
SECTION A-A
BASIN - CURB INLET OR PIPE INLETS OPTIONAL



SECTION A-A
PIPE INLET

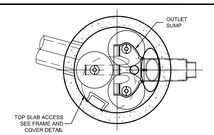
N.T.S.

CONTECH FILTERRA



N.T.S.

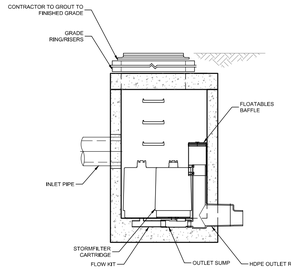
SMALL-SCALE SUBSURFACE INFILTRATION BASIN 1-2 TYPICAL SECTION



PLAN VIEW
STANDARD OUTLET RISER
FLOWKIT: 40A



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.



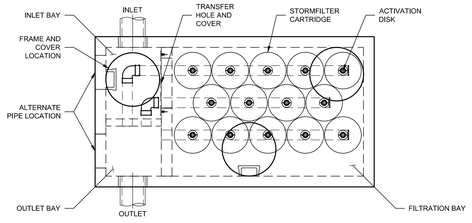
SECTION A-A

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR SITE SPECIFIC DRAWINGS WITH DETAILED VAULT DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
4. STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS-20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 5' [1524 mm] AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
6. FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. RADIAL MEDIA DEPTH SHALL BE 7-INCHES [178 mm]. FILTER MEDIA CONTACT TIME SHALL BE AT LEAST 38 SECONDS.
7. SPECIFIC FLOW RATE IS EQUAL TO THE FILTER TREATMENT CAPACITY (gpm) [L/s] DIVIDED BY THE FILTER CONTACT SURFACE AREA (sq ft)[m^2].
8. STORMFILTER STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-478 AND AASHTO LOAD FACTOR DESIGN METHOD.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE.
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET PIPE(S).
E. CONTRACTOR TO PROVIDE AND INSTALL CONNECTOR TO THE OUTLET RISER STUB. STORMFILTER EQUIPPED WITH A DUAL DIAMETER HDPE OUTLET STUB AND SAND COLLAR. IF OUTLET PIPE IS LARGER THAN 8 INCHES [200 mm], CONTRACTOR TO REMOVE THE 8 INCH [200 mm] OUTLET STUB AT MOLDED-IN CUT LINE. COUPLING BY FERNCO OR EQUAL AND PROVIDED BY CONTRACTOR.
F. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.

N.T.S.

CONTECH STORMFILTER 48" MANHOLE



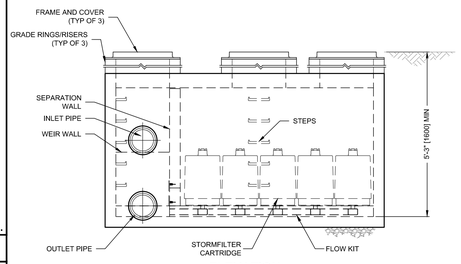
PLAN



FRAME AND GRATE
(24" SQUARE)
(NOT TO SCALE)



FRAME AND COVER
(30" ROUND)
(NOT TO SCALE)



ELEVATION

N.T.S.

PERFORMANCE SPECIFICATION
FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. **RADIAL MEDIA DEPTH SHALL BE 7" [178].** FILTER MEDIA CONTACT TIME SHALL BE AT LEAST **38 SECONDS.** SPECIFIC FLOW RATE SHALL BE **2 GPM/SF [1.36 L/s/m^2] (MAXIMUM).** SPECIFIC FLOW RATE IS THE MEASURE OF THE FLOW (GPM) DIVIDED BY THE MEDIA SURFACE CONTACT AREA (SF). MEDIA VOLUMETRIC FLOW RATE SHALL BE **6 GPM/CF [13.39 L/s/m^3] OF MEDIA (MAXIMUM).**

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. ALTERNATE DIMENSIONS ARE IN MILLIMETERS [mm] UNLESS NOTED OTHERWISE.
4. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.ContechES.com
5. STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
6. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 10' [3048] AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD,
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE.
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH OUTLET PIPE INVERT WITH OUTLET BAY FLOOR.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.
F. CONTRACTOR TO REMOVE THE TRANSFER OPENING COVER WHEN THE SYSTEM IS BROUGHT ONLINE.

CONTECH STORMFILTER PEAK DIVERSION 6' X 12'

Date	Description	No.
Revisions		

Digitally signed by John C Cote
Date: 2024.02.22 08:39:49-05'00'

SIGNATURE JOHN COTE DATE
PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800

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NJ CERTIFICATE OF AUTHORIZATION NO. 24GA27996400

Project
BEACON UNITARIAN UNIVERSALIST CHURCH
SUMMIT
UNION COUNTY NEW JERSEY

Drawing Title
DRAINAGE DETAILS

Project No. 101007201	Drawing No. CG505
Date FEBRUARY 9, 2024	
Drawn By SS	
Checked By TH	Sheet 13 of 19

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LANGAN Project No. 101007201

APPENDIX A

Existing Stormwater Discharge Calculations

APPENDIX A
TABLE OF CONTENTS

NOAA RAINFALL PRECIPITATION DATA

NOAA REGION D RAINFALL DISTRIBUTION

EXISTING RUNOFF CURVE NUMBER CALCULATIONS

CURRENT HYDROGRAPH CALCULATIONS

- **EX-1 WATERSHED (TOTAL EXISTING FLOW TO POA-1)**
  - **Time of Concentration Calculation**
  - **2 Year Design Storm Event**
  - **10 Year Design Storm Event**
  - **100 Year Design Storm Event**

- **TOTAL ALLOWABLE FLOW TO POA-1**
  - **2 Year Design Storm Event**
  - **10 Year Design Storm Event**
  - **100 Year Design Storm Event**

- **EX-2A WATERSHED**
  - **Time of Concentration Calculation**
  - **2 Year Design Storm Event**
  - **10 Year Design Storm Event**
  - **100 Year Design Storm Event**

- **EX-2A WATERSHED ALLOWABLE PEAK DISCHARGE**
  - **2 Year Design Storm Event**
  - **10 Year Design Storm Event**
  - **100 Year Design Storm Event**

- **EX-2B WATERSHED**
  - **Time of Concentration Calculation**
  - **2 Year Design Storm Event**
  - **10 Year Design Storm Event**
  - **100 Year Design Storm Event**

- **TOTAL EXISTING FLOW TO POA-2**
  - **2 Year Design Storm Event**
  - **10 Year Design Storm Event**
  - **100 Year Design Storm Event**

- **TOTAL ALLOWABLE FLOW TO POA-2**
  - **2 Year Design Storm Event**
  - **10 Year Design Storm Event**
  - **100 Year Design Storm Event**

EX-3 WATERSHED (TOTAL EXISTING FLOW TO POA-3)
Time of Concentration Calculation
2 Year Design Storm Event
10 Year Design Storm Event
100 Year Design Storm Event

SUMMARY OF EXISTING PEAK DISCHARGES

FUTURE HYDROGRAPH CALCULATIONS

EX-1 WATERSHED (TOTAL EXISTING FLOW TO POA-1)
Time of Concentration Calculation
2 Year Design Storm Event
10 Year Design Storm Event
100 Year Design Storm Event

TOTAL ALLOWABLE FLOW TO POA-1
2 Year Design Storm Event
10 Year Design Storm Event
100 Year Design Storm Event

EX-2A WATERSHED
Time of Concentration Calculation
2 Year Design Storm Event
10 Year Design Storm Event
100 Year Design Storm Event

EX-2A WATERSHED ALLOWABLE PEAK DISCHARGE
2 Year Design Storm Event
10 Year Design Storm Event
100 Year Design Storm Event

EX-2B WATERSHED
Time of Concentration Calculation
2 Year Design Storm Event
10 Year Design Storm Event
100 Year Design Storm Event

TOTAL EXISTING FLOW TO POA-2
2 Year Design Storm Event
10 Year Design Storm Event
100 Year Design Storm Event

TOTAL ALLOWABLE FLOW TO POA-2
2 Year Design Storm Event
10 Year Design Storm Event
100 Year Design Storm Event

EX-3 WATERSHED (TOTAL EXISTING FLOW TO POA-3)

- **Time of Concentration Calculation**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **100 Year Design Storm Event**

SUMMARY OF EXISTING PEAK DISCHARGES

NOAA RAINFALL PRECIPITATION DATA

NOAA Atlas 14, Volume 2, Version 3
Location name: Summit, New Jersey, USA*
Latitude: 40.7128°, Longitude: -74.3766°
Elevation: 357 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.336** (0.307-0.369)	**0.400** (0.366-0.439)	**0.473** (0.431-0.520)	**0.525** (0.478-0.577)	**0.590** (0.535-0.647)	**0.634** (0.573-0.695)	**0.679** (0.609-0.743)	**0.718** (0.641-0.787)	**0.770** (0.681-0.846)	**0.806** (0.708-0.887)
10-min	**0.536** (0.490-0.589)	**0.639** (0.585-0.702)	**0.757** (0.690-0.831)	**0.839** (0.764-0.922)	**0.938** (0.851-1.03)	**1.01** (0.911-1.11)	**1.08** (0.967-1.18)	**1.14** (1.01-1.24)	**1.21** (1.07-1.33)	**1.26** (1.11-1.39)
15-min	**0.669** (0.612-0.735)	**0.803** (0.735-0.882)	**0.957** (0.872-1.05)	**1.06** (0.966-1.17)	**1.19** (1.08-1.30)	**1.28** (1.15-1.40)	**1.36** (1.22-1.49)	**1.44** (1.28-1.57)	**1.53** (1.35-1.68)	**1.58** (1.39-1.74)
30-min	**0.917** (0.838-1.01)	**1.11** (1.01-1.22)	**1.36** (1.24-1.49)	**1.54** (1.40-1.69)	**1.76** (1.60-1.93)	**1.92** (1.73-2.11)	**2.08** (1.87-2.28)	**2.23** (1.99-2.44)	**2.42** (2.14-2.66)	**2.56** (2.25-2.82)
60-min	**1.14** (1.04-1.26)	**1.39** (1.27-1.53)	**1.74** (1.59-1.91)	**2.00** (1.82-2.20)	**2.34** (2.12-2.57)	**2.60** (2.35-2.85)	**2.86** (2.57-3.14)	**3.12** (2.79-3.42)	**3.47** (3.07-3.81)	**3.73** (3.28-4.11)
2-hr	**1.40** (1.27-1.54)	**1.70** (1.55-1.88)	**2.16** (1.96-2.39)	**2.51** (2.27-2.78)	**3.00** (2.70-3.31)	**3.41** (3.05-3.76)	**3.82** (3.39-4.21)	**4.26** (3.75-4.69)	**4.86** (4.23-5.36)	**5.34** (4.61-5.90)
3-hr	**1.56** (1.42-1.73)	**1.90** (1.74-2.11)	**2.42** (2.20-2.68)	**2.82** (2.55-3.11)	**3.37** (3.04-3.72)	**3.82** (3.42-4.21)	**4.28** (3.81-4.72)	**4.77** (4.21-5.26)	**5.44** (4.75-6.01)	**5.98** (5.17-6.62)
6-hr	**2.01** (1.83-2.23)	**2.44** (2.23-2.70)	**3.10** (2.81-3.41)	**3.63** (3.28-3.98)	**4.38** (3.93-4.81)	**5.02** (4.47-5.49)	**5.69** (5.03-6.23)	**6.42** (5.62-7.02)	**7.46** (6.44-8.17)	**8.33** (7.10-9.12)
12-hr	**2.51** (2.29-2.77)	**3.05** (2.78-3.37)	**3.88** (3.54-4.28)	**4.59** (4.16-5.04)	**5.62** (5.05-6.15)	**6.51** (5.80-7.11)	**7.48** (6.58-8.15)	**8.55** (7.43-9.32)	**10.1** (8.64-11.0)	**11.5** (9.65-12.5)
24-hr	**2.84** (2.62-3.08)	**3.43** (3.18-3.74)	**4.40** (4.07-4.79)	**5.22** (4.81-5.68)	**6.47** (5.91-7.02)	**7.55** (6.85-8.18)	**8.74** (7.86-9.48)	**10.1** (8.95-11.0)	**12.1** (10.6-13.2)	**13.8** (11.9-15.1)
2-day	**3.35** (3.08-3.65)	**4.05** (3.73-4.42)	**5.17** (4.76-5.64)	**6.11** (5.60-6.66)	**7.48** (6.82-8.15)	**8.65** (7.84-9.42)	**9.93** (8.92-10.8)	**11.3** (10.1-12.4)	**13.4** (11.7-14.7)	**15.1** (13.0-16.7)
3-day	**3.52** (3.25-3.84)	**4.26** (3.93-4.64)	**5.42** (4.99-5.90)	**6.38** (5.86-6.94)	**7.77** (7.10-8.44)	**8.94** (8.12-9.72)	**10.2** (9.19-11.1)	**11.6** (10.3-12.6)	**13.6** (11.9-14.9)	**15.3** (13.2-16.8)
4-day	**3.70** (3.42-4.02)	**4.48** (4.14-4.86)	**5.66** (5.23-6.16)	**6.64** (6.11-7.22)	**8.05** (7.37-8.73)	**9.23** (8.40-10.0)	**10.5** (9.47-11.4)	**11.8** (10.6-12.9)	**13.8** (12.2-15.1)	**15.4** (13.5-17.0)
7-day	**4.38** (4.06-4.74)	**5.25** (4.88-5.69)	**6.52** (6.05-7.06)	**7.58** (7.00-8.19)	**9.08** (8.34-9.83)	**10.3** (9.43-11.2)	**11.7** (10.6-12.6)	**13.1** (11.8-14.2)	**15.1** (13.4-16.5)	**16.8** (14.7-18.4)
10-day	**5.02** (4.68-5.42)	**6.00** (5.59-6.47)	**7.34** (6.83-7.91)	**8.44** (7.83-9.10)	**10.0** (9.23-10.8)	**11.3** (10.4-12.2)	**12.6** (11.5-13.6)	**14.0** (12.7-15.2)	**16.0** (14.3-17.4)	**17.6** (15.6-19.3)
20-day	**6.79** (6.37-7.26)	**8.06** (7.56-8.62)	**9.62** (9.01-10.3)	**10.8** (10.1-11.6)	**12.5** (11.6-13.4)	**13.8** (12.8-14.8)	**15.1** (14.0-16.2)	**16.4** (15.1-17.6)	**18.2** (16.6-19.6)	**19.6** (17.7-21.2)
30-day	**8.46** (8.00-8.95)	**9.98** (9.44-10.6)	**11.7** (11.0-12.3)	**13.0** (12.2-13.7)	**14.6** (13.8-15.5)	**15.9** (14.9-16.8)	**17.2** (16.1-18.2)	**18.4** (17.1-19.5)	**19.9** (18.4-21.2)	**21.1** (19.4-22.5)
45-day	**10.7** (10.2-11.3)	**12.6** (12.0-13.3)	**14.6** (13.8-15.4)	**16.0** (15.2-16.9)	**17.9** (16.9-18.9)	**19.3** (18.2-20.4)	**20.7** (19.4-21.8)	**22.0** (20.6-23.2)	**23.6** (22.0-25.0)	**24.8** (23.0-26.4)
60-day	**12.9** (12.3-13.5)	**15.1** (14.4-15.9)	**17.3** (16.4-18.1)	**18.9** (17.9-19.8)	**20.9** (19.8-22.0)	**22.3** (21.1-23.5)	**23.7** (22.4-25.0)	**24.9** (23.5-26.4)	**26.5** (24.9-28.1)	**27.6** (25.8-29.3)

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

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

Please refer to NOAA Atlas 14 document for more information.

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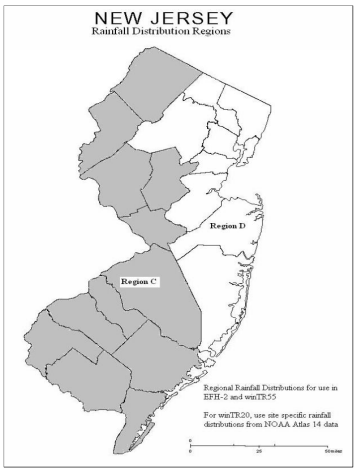
PF graphical

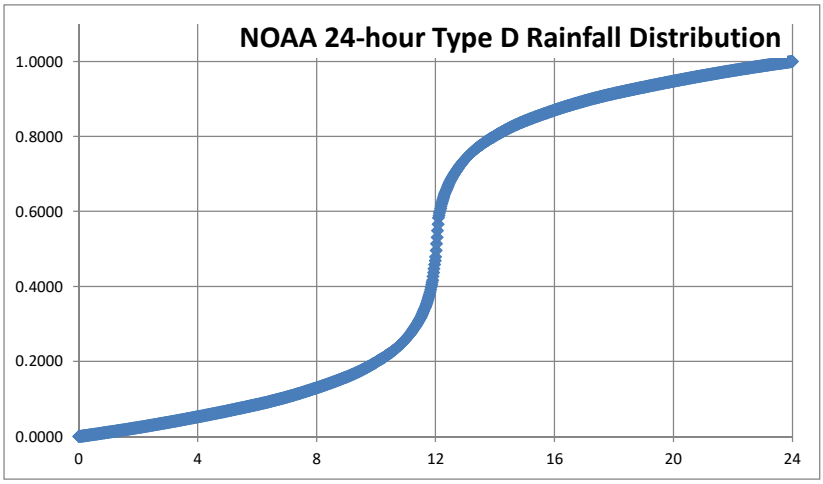
Frequency of Storms	NOAA NWS PFDS 24-Hour Rainfall Depth (inches)	Current Precipitation Adjustment Factor for Union County	Current Rainfall Depth (inches)	Future Precipitation Adjustment Factor for Union County	Future Rainfall Depth (inches)
2-Year	3.43	1.01	3.46	1.20	4.12
10-Year	5.22	1.03	5.38	1.23	6.42
25-Year[1]	6.47	1.04	6.73	1.27	8.23
100-Year	8.74	1.06	9.26	1.35	11.80

Notes:

1. The adjustment factors for the current and future 25-year storms was found using a weighted average of the 10- and 100-year adjustment factors.

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Time (hrs)	Cumulative Rainfall (%)	Time (hrs)	Cumulative Rainfall (%)	Time (hrs)	Cumulative Rainfall (%)	Time (hrs)	Cumulative Rainfall (%)	Time (hrs)	Cumulative Rainfall (%)	Time (hrs)	Cumulative Rainfall (%)
0	0.0000	4	0.0489	8	0.1198	12	0.4766	16	0.8802	20	0.9511
0.1	0.0013	4.1	0.0504	8.1	0.1222	12.1	0.5933	16.1	0.8826	20.1	0.9525
0.2	0.0023	4.2	0.0518	8.2	0.1247	12.2	0.6338	16.2	0.885	20.2	0.9539
0.3	0.0033	4.3	0.0532	8.3	0.1273	12.3	0.663	16.3	0.8873	20.3	0.9553
0.4	0.0044	4.4	0.0547	8.4	0.1298	12.4	0.6843	16.4	0.8896	20.4	0.9566
0.5	0.0055	4.5	0.0562	8.5	0.1324	12.5	0.7045	16.5	0.8918	20.5	0.958
0.6	0.0065	4.6	0.0576	8.6	0.1351	12.6	0.7175	16.6	0.894	20.6	0.9594
0.7	0.0076	4.7	0.0591	8.7	0.1378	12.7	0.7298	16.7	0.8962	20.7	0.9607
0.8	0.0087	4.8	0.0606	8.8	0.1405	12.8	0.7409	16.8	0.8983	20.8	0.9621
0.9	0.0098	4.9	0.0621	8.9	0.1432	12.9	0.751	16.9	0.9004	20.9	0.9634
1	0.0109	5	0.0636	9	0.1461	13	0.76	17	0.9025	21	0.9647
1.1	0.0121	5.1	0.0651	9.1	0.149	13.1	0.7679	17.1	0.9045	21.1	0.966
1.2	0.0132	5.2	0.0667	9.2	0.1521	13.2	0.7753	17.2	0.9064	21.2	0.9673
1.3	0.0143	5.3	0.0682	9.3	0.1554	13.3	0.7821	17.3	0.9084	21.3	0.9686
1.4	0.0155	5.4	0.0697	9.4	0.1588	13.4	0.7883	17.4	0.9103	21.4	0.9699
1.5	0.0167	5.5	0.0713	9.5	0.1623	13.5	0.7939	17.5	0.9121	21.5	0.9712
1.6	0.0178	5.6	0.0729	9.6	0.166	13.6	0.799	17.6	0.9139	21.6	0.9724
1.7	0.019	5.7	0.0745	9.7	0.1699	13.7	0.8039	17.7	0.9157	21.7	0.9737
1.8	0.0202	5.8	0.076	9.8	0.1739	13.8	0.8086	17.8	0.9174	21.8	0.9749
1.9	0.0214	5.9	0.0776	9.9	0.178	13.9	0.8132	17.9	0.9191	21.9	0.9762
2	0.0226	6	0.0793	10	0.1823	14	0.8177	18	0.9208	22	0.9774
2.1	0.0238	6.1	0.0809	10.1	0.1868	14.1	0.822	18.1	0.9224	22.1	0.9786
2.2	0.0251	6.2	0.0826	10.2	0.1914	14.2	0.8261	18.2	0.924	22.2	0.9798
2.3	0.0263	6.3	0.0843	10.3	0.1961	14.3	0.8301	18.3	0.9255	22.3	0.981
2.4	0.0276	6.4	0.0861	10.4	0.201	14.4	0.834	18.4	0.9271	22.4	0.9822
2.5	0.0288	6.5	0.0879	10.5	0.2061	14.5	0.8377	18.5	0.9287	22.5	0.9833
2.6	0.0301	6.6	0.0897	10.6	0.2117	14.6	0.8412	18.6	0.9303	22.6	0.9845
2.7	0.0314	6.7	0.0916	10.7	0.2179	14.7	0.8446	18.7	0.9318	22.7	0.9857
2.8	0.0327	6.8	0.0936	10.8	0.2247	14.8	0.8479	18.8	0.9334	22.8	0.9868
2.9	0.034	6.9	0.0955	10.9	0.2321	14.9	0.851	18.9	0.9349	22.9	0.9879
3	0.0353	7	0.0975	11	0.24	15	0.854	19	0.9364	23	0.9891
3.1	0.0366	7.1	0.0996	11.1	0.249	15.1	0.8568	19.1	0.9379	23.1	0.9902
3.2	0.0379	7.2	0.1017	11.2	0.2591	15.2	0.8595	19.2	0.9394	23.2	0.9913
3.3	0.0393	7.3	0.1038	11.3	0.2702	15.3	0.8622	19.3	0.9409	23.3	0.9924
3.4	0.0406	7.4	0.106	11.4	0.2824	15.4	0.8649	19.4	0.9424	23.4	0.9935
3.5	0.042	7.5	0.1082	11.5	0.2955	15.5	0.8676	19.5	0.9438	23.5	0.9945
3.6	0.0434	7.6	0.1104	11.6	0.3157	15.6	0.8702	19.6	0.9453	23.6	0.9956
3.7	0.0447	7.7	0.1127	11.7	0.337	15.7	0.8727	19.7	0.9468	23.7	0.9966
3.8	0.0461	7.8	0.115	11.8	0.3662	15.8	0.8753	19.8	0.9482	23.8	0.9977
3.9	0.0475	7.9	0.1174	11.9	0.4067	15.9	0.8777	19.9	0.9496	23.9	0.9987
										24	1.0000

Reference: USDA Natural Resources Conservation Service New Jersey, Engineering Guidelines

EXISTING RUNOFF CURVE NUMBER CALCULATIONS

EXISTING RUNOFF CURVE NUMBER CALCULATIONS
BEACON UNITARIAN UNIVERSALIST CHURCH
LANGAN PROJECT #101007201

EXISTING CONDITIONS

EXISTING WATERSHED AREAS	OPEN SPACE HSGC C CN = 74 (SF)	OPEN SPACE HSGC C CN = 74 (AC)	WOODS HSGC C CN = 70 (SF)	WOODS HSGC C CN = 70 (AC)	IMPERVIOUS AREA CN = 98 (SF)	IMPERVIOUS AREA CN = 98 (AC)	TOTAL AREA (SF)	TOTAL AREA (AC)	CURVE NUMBER CN (Weighted)
POA-1									
EX-1	12,042	0.28	4,356	0.10	5,850	0.13	22,248	0.51	80
POA-2									
EX-2A	13,690	0.32	19,816	0.46	19,295	0.44	52,801	1.22	81
EX-2B	7,672	0.18	21,802	0.50	3,168	0.07	32,643	0.75	74
POA-3									
EX-3	289	0.01	1,645	0.04	0	0.00	1,934	0.05	71

NOTES:
1. Runoff curve numbers referenced from Technical Release 55 (TR-55) Table 2-2a: Runoff Curve Numbers for Urban Areas and Table 2-2c: Runoff Curve Numbers for Other Agricultura Lands. Pervious areas are assumed to be in good hydrologic condition.

CURRENT HYDROGRAPH CALCULATIONS

EX-1 WATERSHED (TOTAL EXISTING FLOW TO POA-1)

Project:	**Beacon Unitarian Universalist Church**	**By:**	**SM**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: (**Present**) Developed — **Current Existing Watershed EX-1 Impervious**

Circle One: (T_c) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		2		
1. Surface Description (NEH table 15-1)			Smooth Surfaces		Dense Grasses		
2. Manning's Roughness Coeff., n (NEH table 15-1)			0.011		0.24		
3. Flow Length, L (total L < 100 ft)		ft	51		49		
4. Two-year 24-hr rainfall, P_2		in	3.46		3.46		
5. Land Slope, s		ft/ft	0.024		0.093		
6. Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.011	+	0.070	+	
					Sheet Flow Sub-Total		0.080 hours

Shallow Concentrated Flow		Segment ID	3				
7. Surface Description			Pavement				
8. Flow Length, L		ft	163				
9. Watercourse Slope, s		ft/ft	0.059				
10. Average Velocity, V (NEH table 15-3)		ft/s	4.93				
11. Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.009	+		+	
					Shallow Conc. Flow Sub-Total		0.009 hours

Channel Flow		Segment ID					
12. Flow Length, L		ft					
13. Cross Sectional flow area, a		ft^2					
14. Wetted Perimeter, P_w		ft					
15. Hydraulic Radius, r	$r = a / P_w$	ft					
16. Channel Slope, s		ft/ft					
17. Manning's Roughness Coeff., n							
18. Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s					
19. Compute T_t	$T_t = \frac{L}{3600\,V}$	hr		+		+	
					Channel Flow Sub-Total		0.000 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.090 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	5 minutes

Project:	**Beacon Unitarian Universalist Church**	**By:**	**SM**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: (**Present**) Developed — **Current Existing Watershed EX-1 Pervious**

Circle One: (**T_c**) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

			Segment ID	1		2		
1.	Surface Description (NEH table 15-1)			Woods Dense Underbrush		Smooth Surfaces		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.40		0.011		
3.	Flow Length, L (total L < 100 ft)		ft	44		29		
4.	Two-year 24-hr rainfall, P_2		in	3.46		3.46		
5.	Land Slope, s		ft/ft	0.080		0.043		
6.	Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.102	+	0.005	+	

Sheet Flow Sub-Total **0.107 hours**

Shallow Concentrated Flow

			Segment ID	3				
7.	Surface Description			Pavement				
8.	Flow Length, L		ft	230				
9.	Watercourse Slope, s		ft/ft	0.054				
10.	Average Velocity, V (NEH table 15-3)		ft/s	4.74				
11.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.013	+		+	

Shallow Conc. Flow Sub-Total **0.013 hours**

Channel Flow

			Segment ID					
12.	Flow Length, L		ft					
13.	Cross Sectional flow area, a		ft^2					
14.	Wetted Perimeter, P_w		ft					
15.	Hydraulic Radius, r	$r = a / P_w$	ft					
16.	Channel Slope, s		ft/ft					
17.	Manning's Roughness Coeff., n							
18.	Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s					
19.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr		+		+	

Channel Flow Sub-Total **0.000 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) =	**0.121 hours**
Total Tc (minutes) =	**7 minutes**

Hydrograph Report

Project Name:

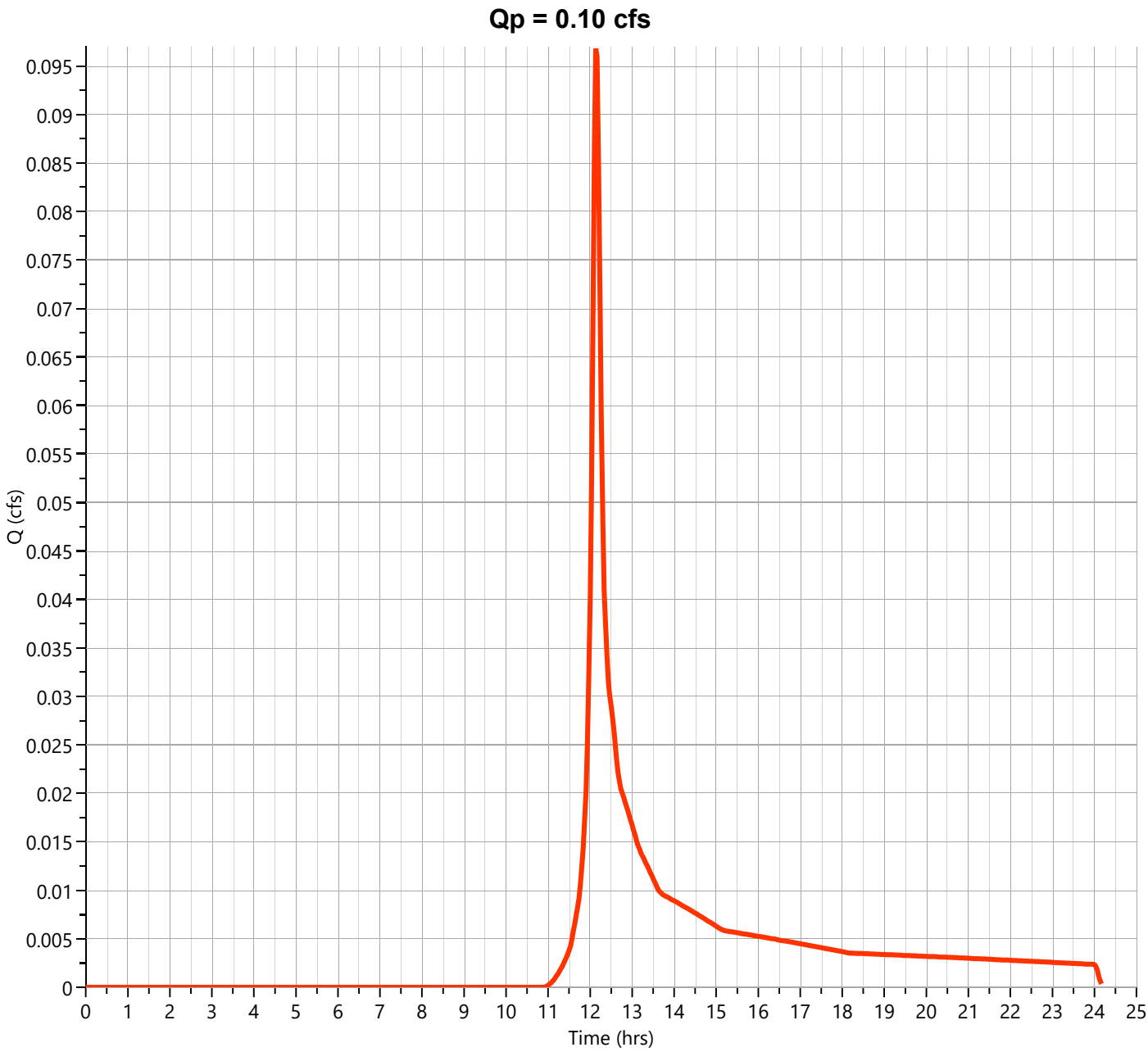
Hydrology Studio v 3.0.0.29

11-29-2023

EX-1 Woods C

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.097 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 357 cuft
Drainage Area	= 0.1 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 7.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

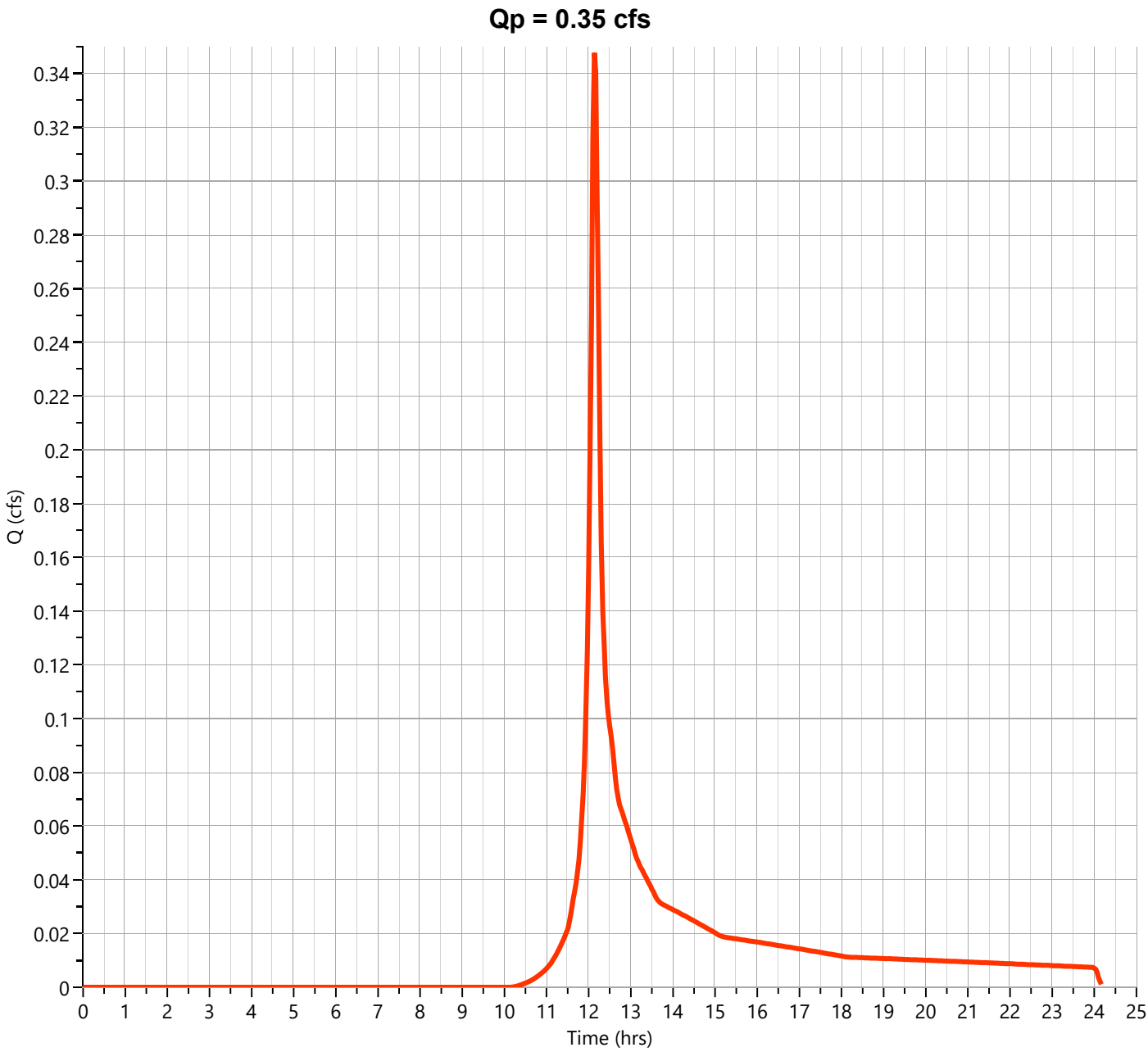
Hydrology Studio v 3.0.0.29

11-29-2023

EX-1 Grass C

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.348 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 1,232 cuft
Drainage Area	= 0.28 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 7.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

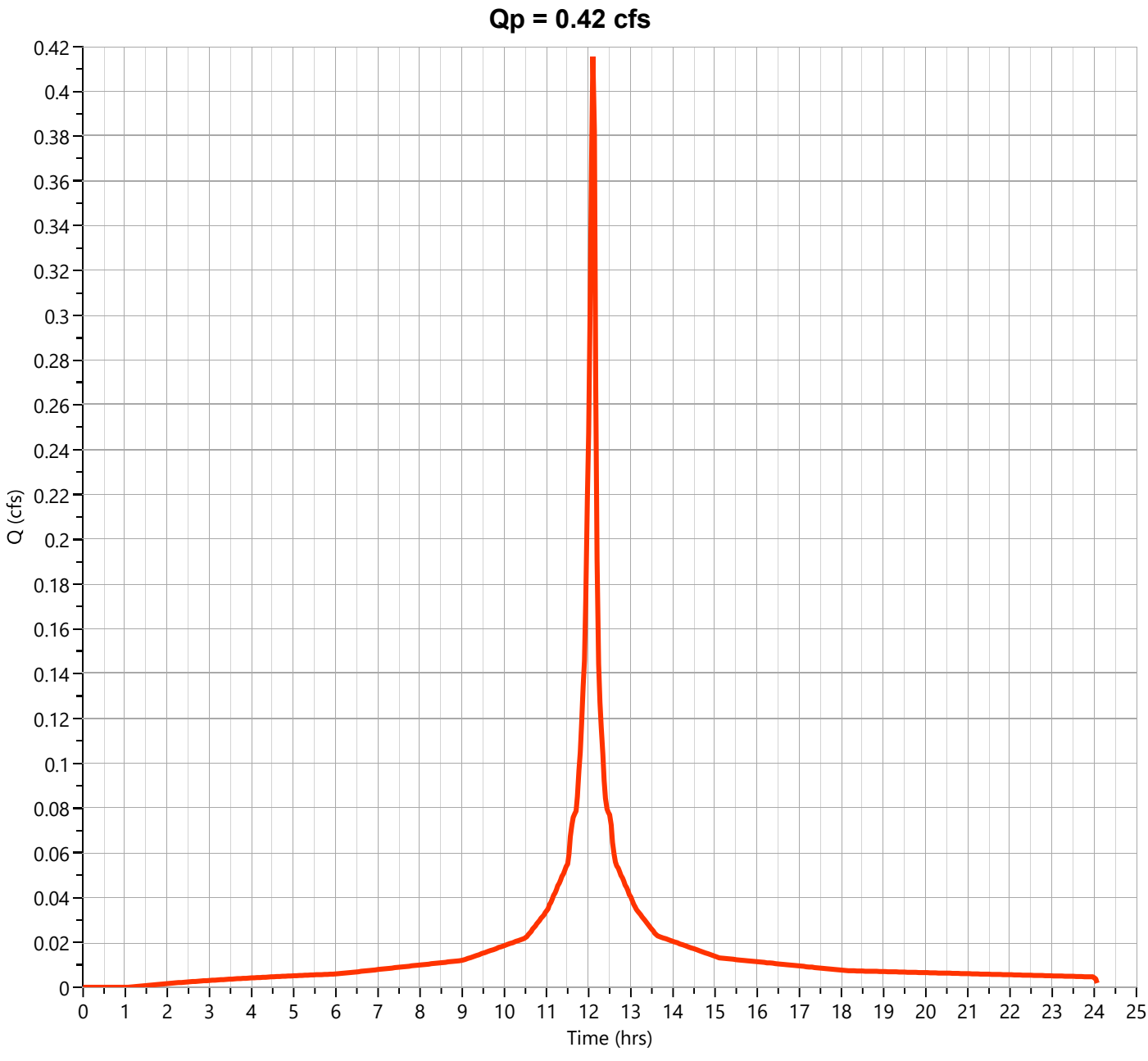
Hydrology Studio v 3.0.0.29

11-29-2023

EX-1 Impervious

Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.416 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 1,427 cuft
Drainage Area	= 0.13 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

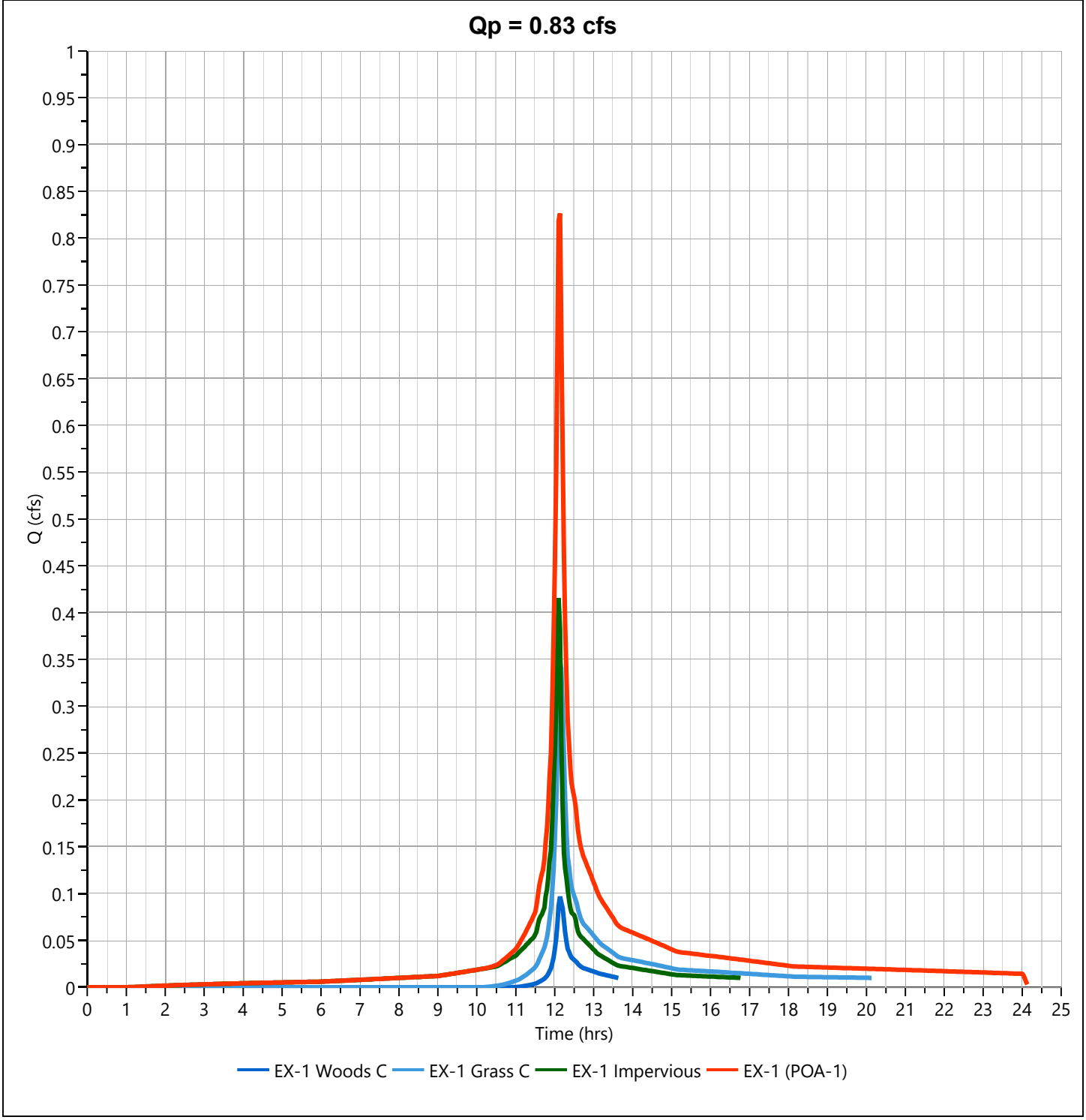
Hydrology Studio v 3.0.0.29

11-29-2023

EX-1 (POA-1)

Hyd. No. 4

Hydrograph Type	= Junction	Peak Flow	= 0.826 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 3,017 cuft
Inflow Hydrographs	= 1, 2, 3	Total Contrib. Area	= 0.51 ac



Hydrograph Report

Project Name:

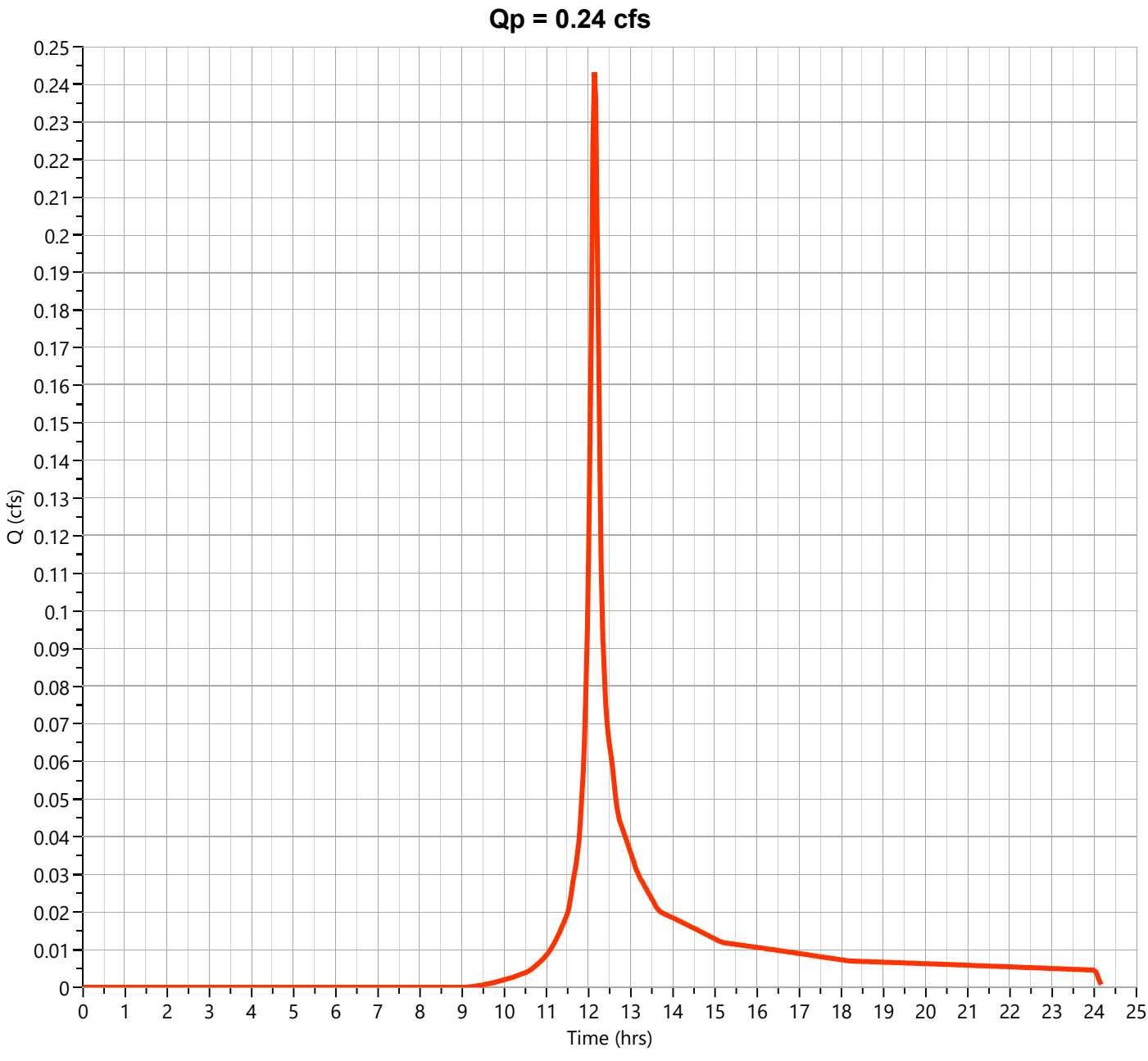
Hydrology Studio v 3.0.0.29

11-29-2023

EX-1 Woods C

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.243 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 843 cuft
Drainage Area	= 0.1 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 7.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

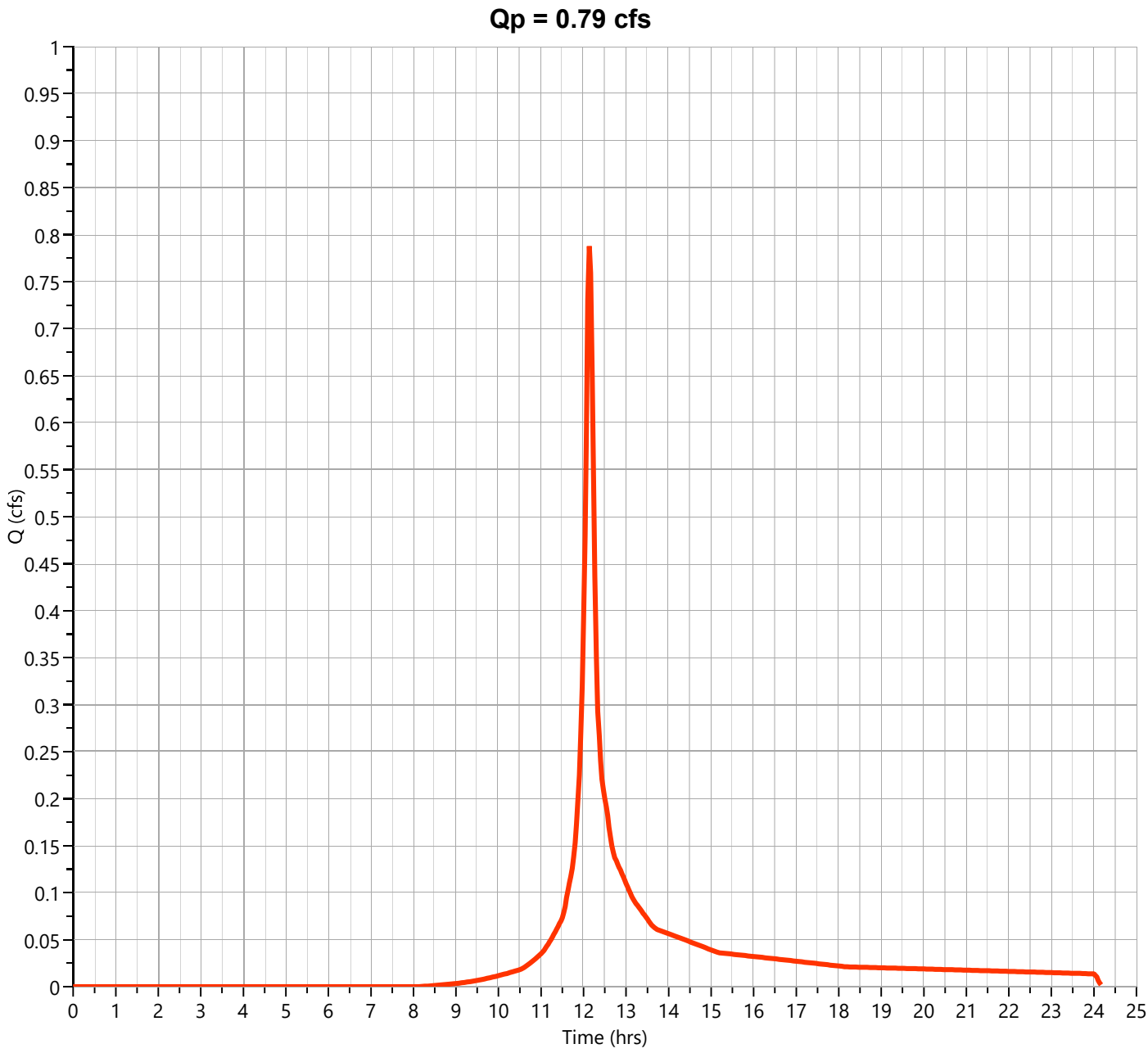
Hydrology Studio v 3.0.0.29

11-29-2023

EX-1 Grass C

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.788 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 2,715 cuft
Drainage Area	= 0.28 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 7.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

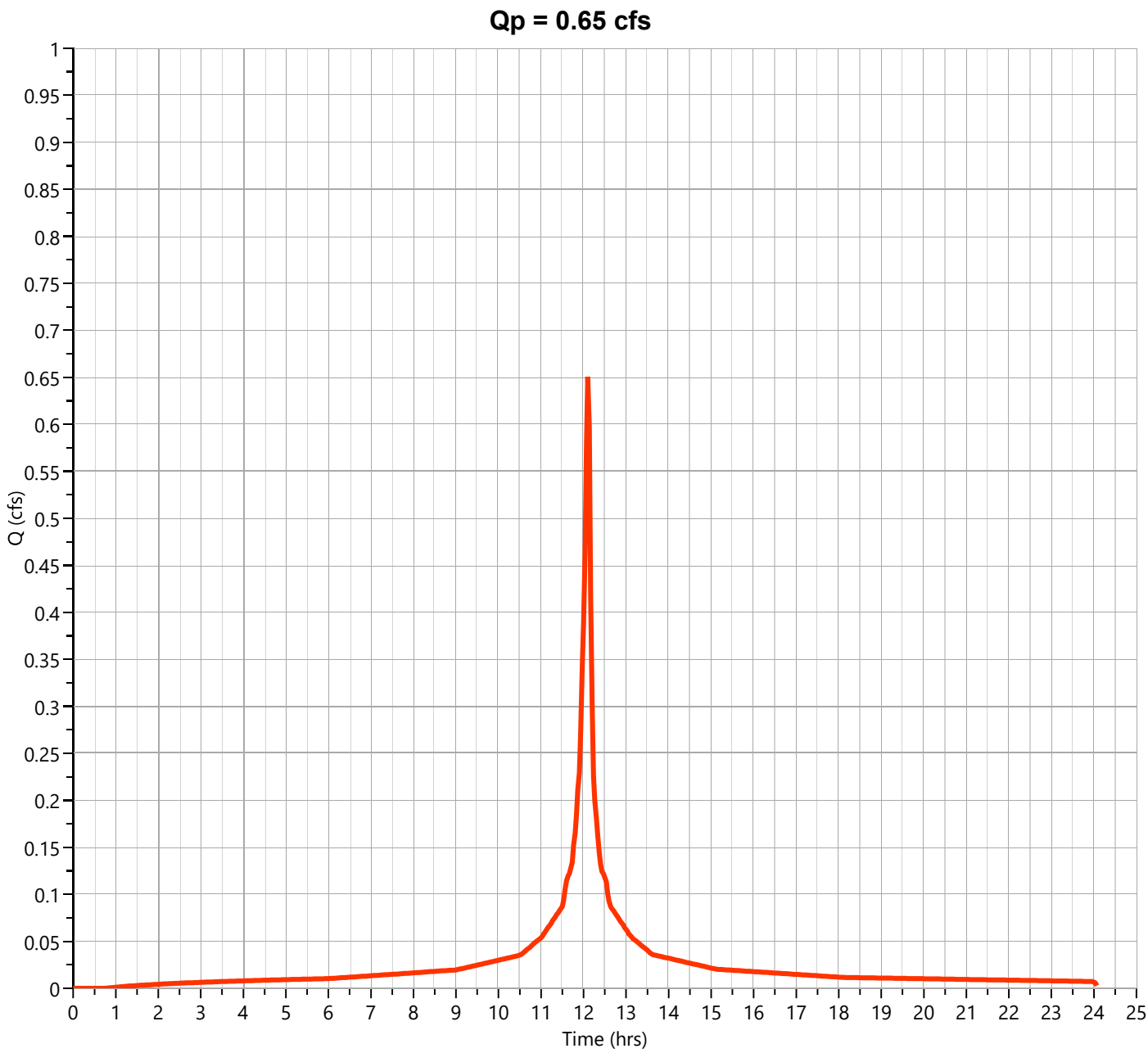
Hydrology Studio v 3.0.0.29

11-29-2023

EX-1 Impervious

Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.650 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 2,275 cuft
Drainage Area	= 0.13 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

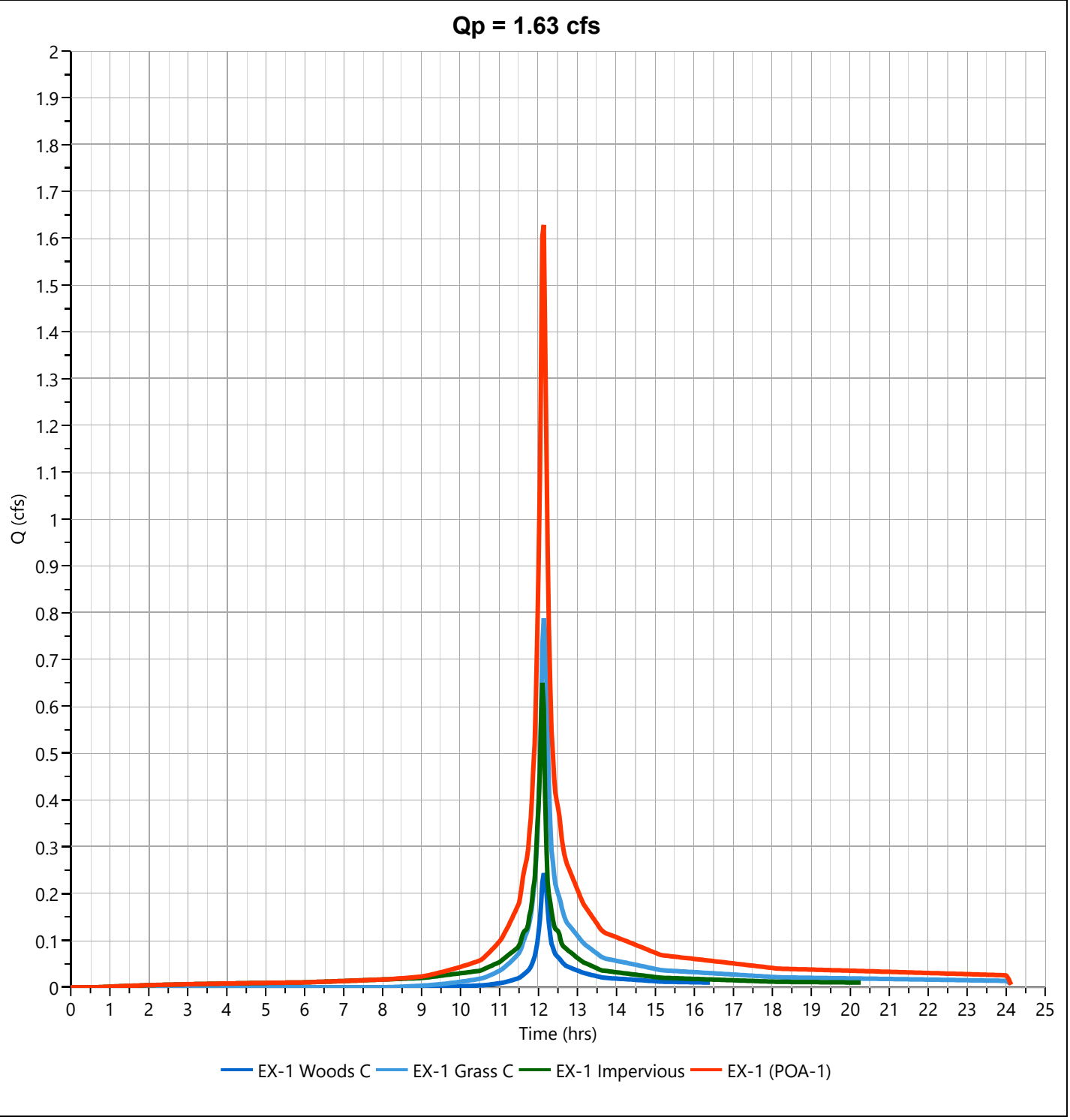
Hydrology Studio v 3.0.0.29

11-29-2023

EX-1 (POA-1)

Hyd. No. 4

Hydrograph Type	= Junction	Peak Flow	= 1.628 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 5,833 cuft
Inflow Hydrographs	= 1, 2, 3	Total Contrib. Area	= 0.51 ac



Hydrograph Report

Project Name:

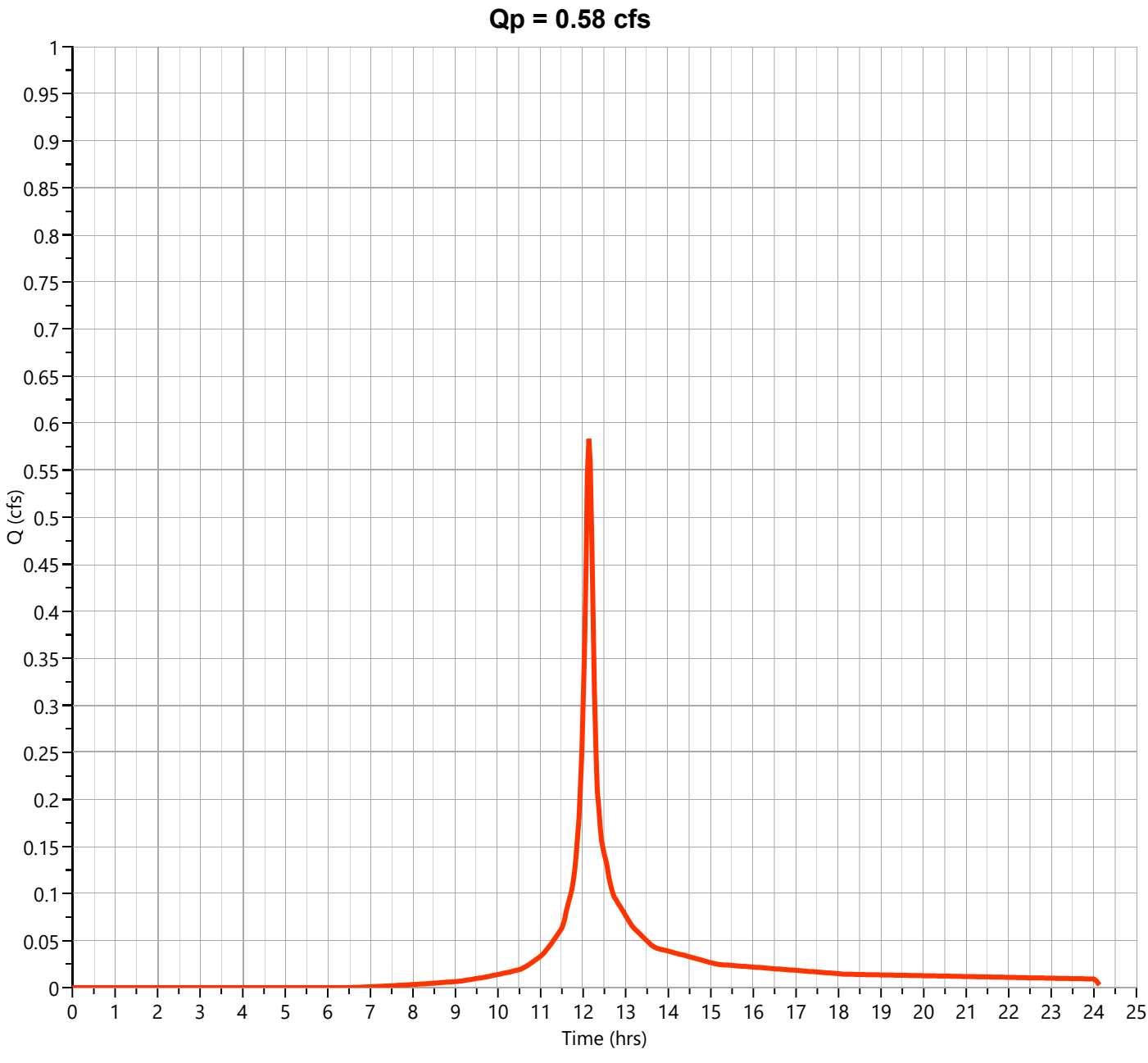
Hydrology Studio v 3.0.0.29

11-29-2023

EX-1 Woods C

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.583 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 2,020 cuft
Drainage Area	= 0.1 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 7.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

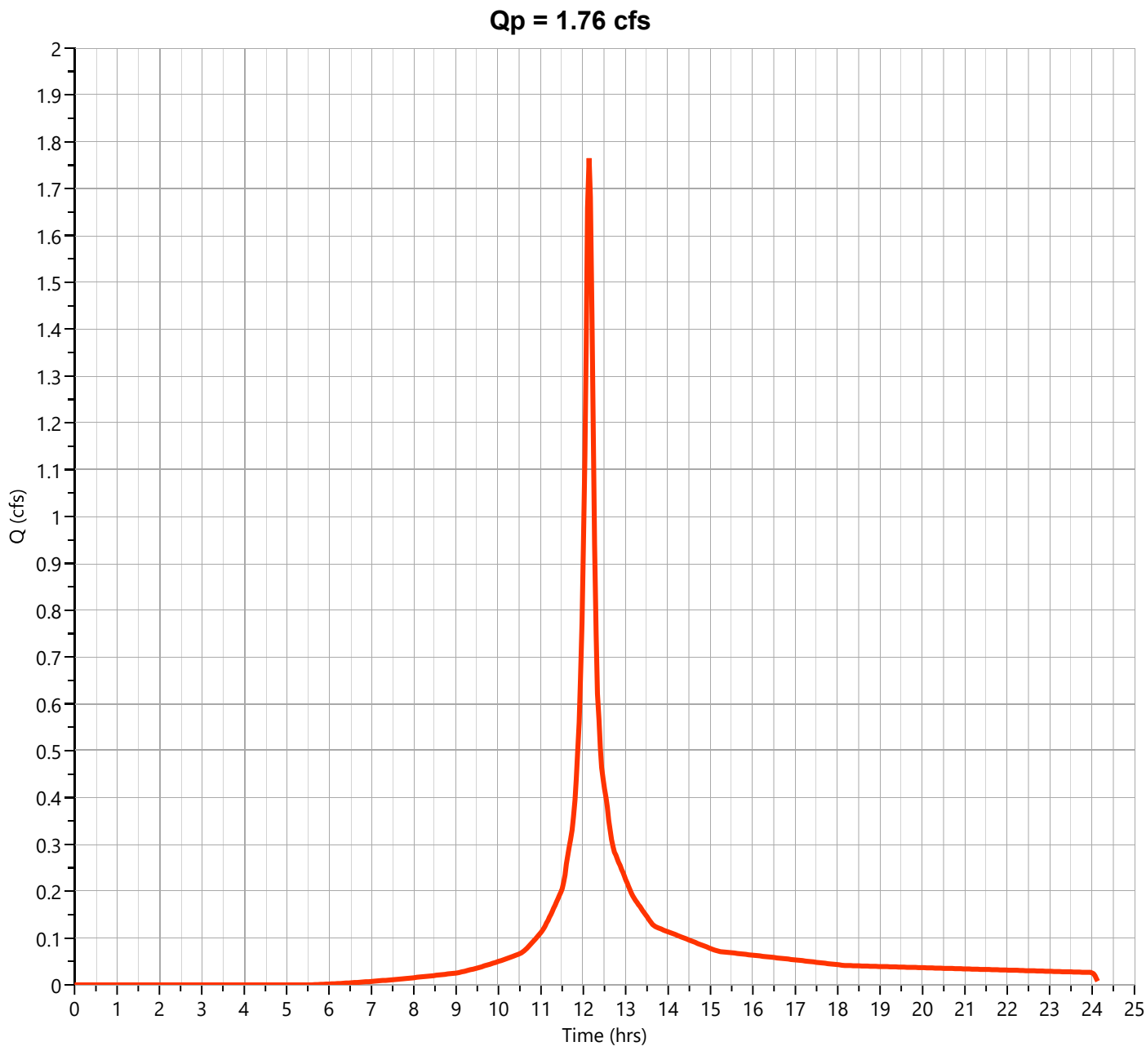
Hydrology Studio v 3.0.0.29

11-29-2023

EX-1 Grass C

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.765 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 6,166 cuft
Drainage Area	= 0.28 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 7.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

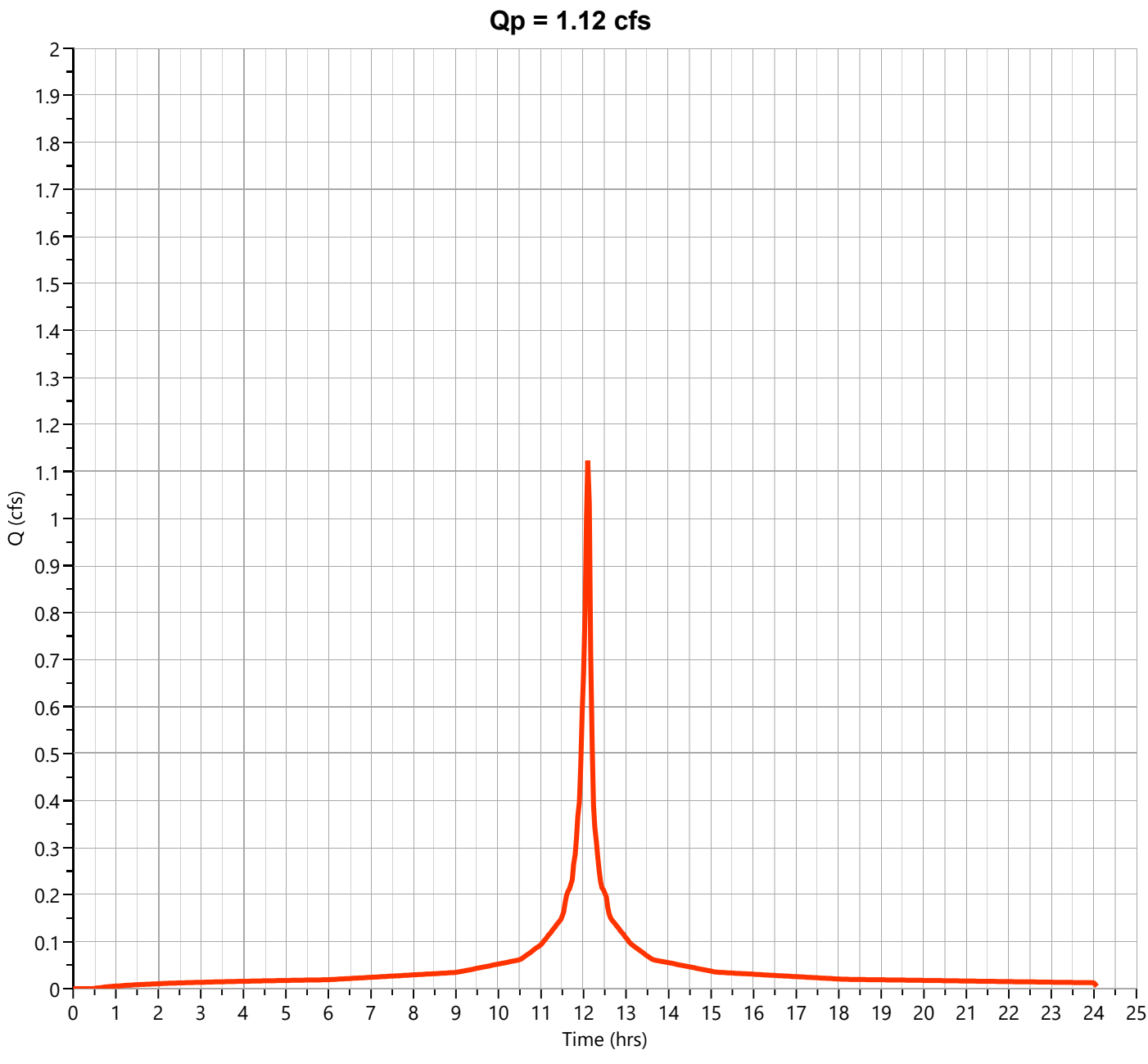
Hydrology Studio v 3.0.0.29

11-29-2023

EX-1 Impervious

Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.122 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 3,990 cuft
Drainage Area	= 0.13 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

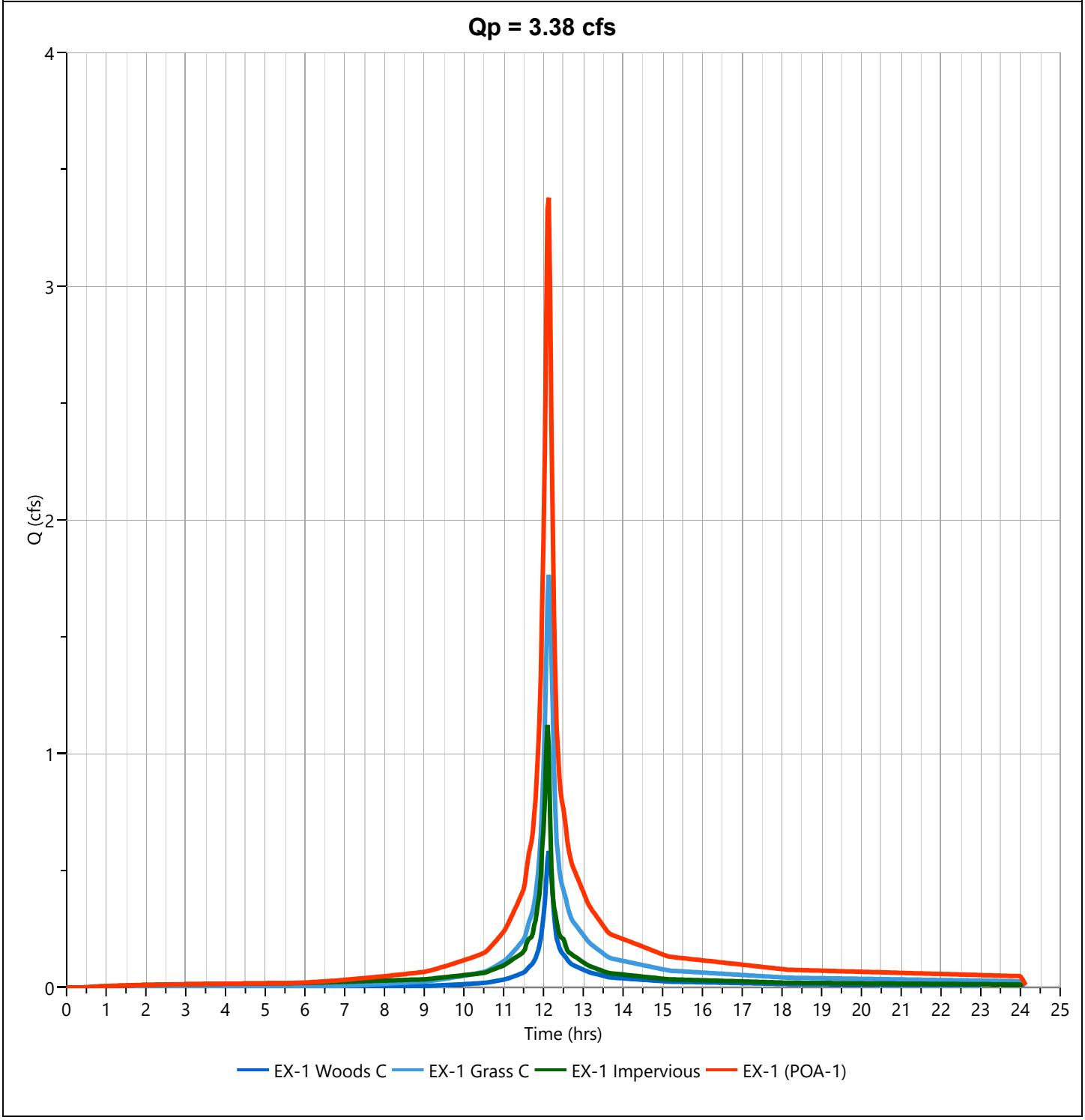
Hydrology Studio v 3.0.0.29

11-29-2023

EX-1 (POA-1)

Hyd. No. 4

Hydrograph Type	= Junction	Peak Flow	= 3.379 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 12,176 cuft
Inflow Hydrographs	= 1, 2, 3	Total Contrib. Area	= 0.51 ac



TOTAL ALLOWABLE FLOW TO POA-1

Hydrograph Report

Project Name:

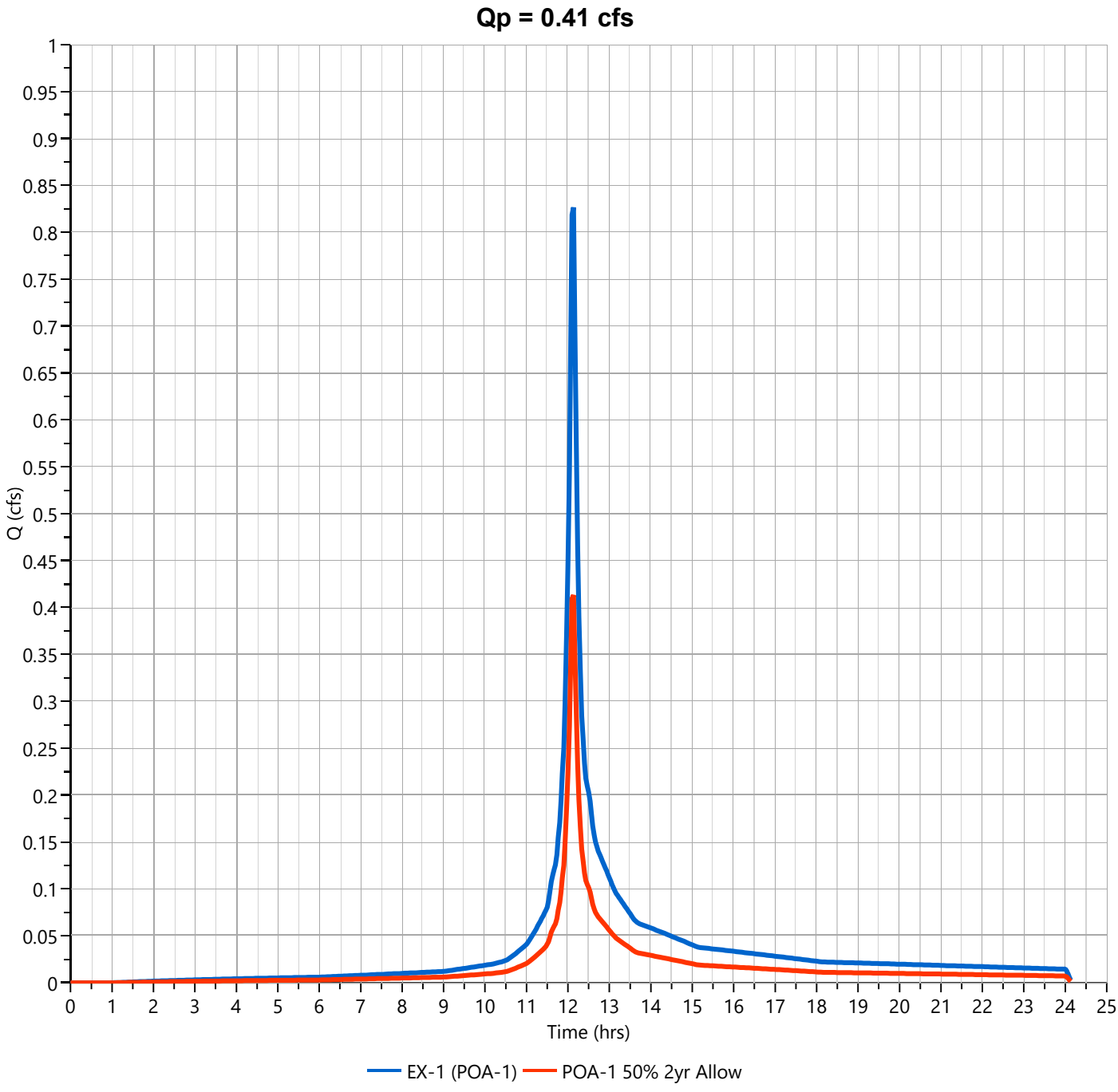
Hydrology Studio v 3.0.0.29

11-29-2023

POA-1 50% 2yr Allow

Hyd. No. 5

Hydrograph Type	= Diversion	Peak Flow	= 0.413 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 1,508 cuft
Inflow Hydrograph	= 4 - EX-1 (POA-1)	Diversion Method	= Flow Ratio
Companion Hyd	= 6 - <name>	Flow Ratio	= 0.5



Hydrograph Report

Project Name:

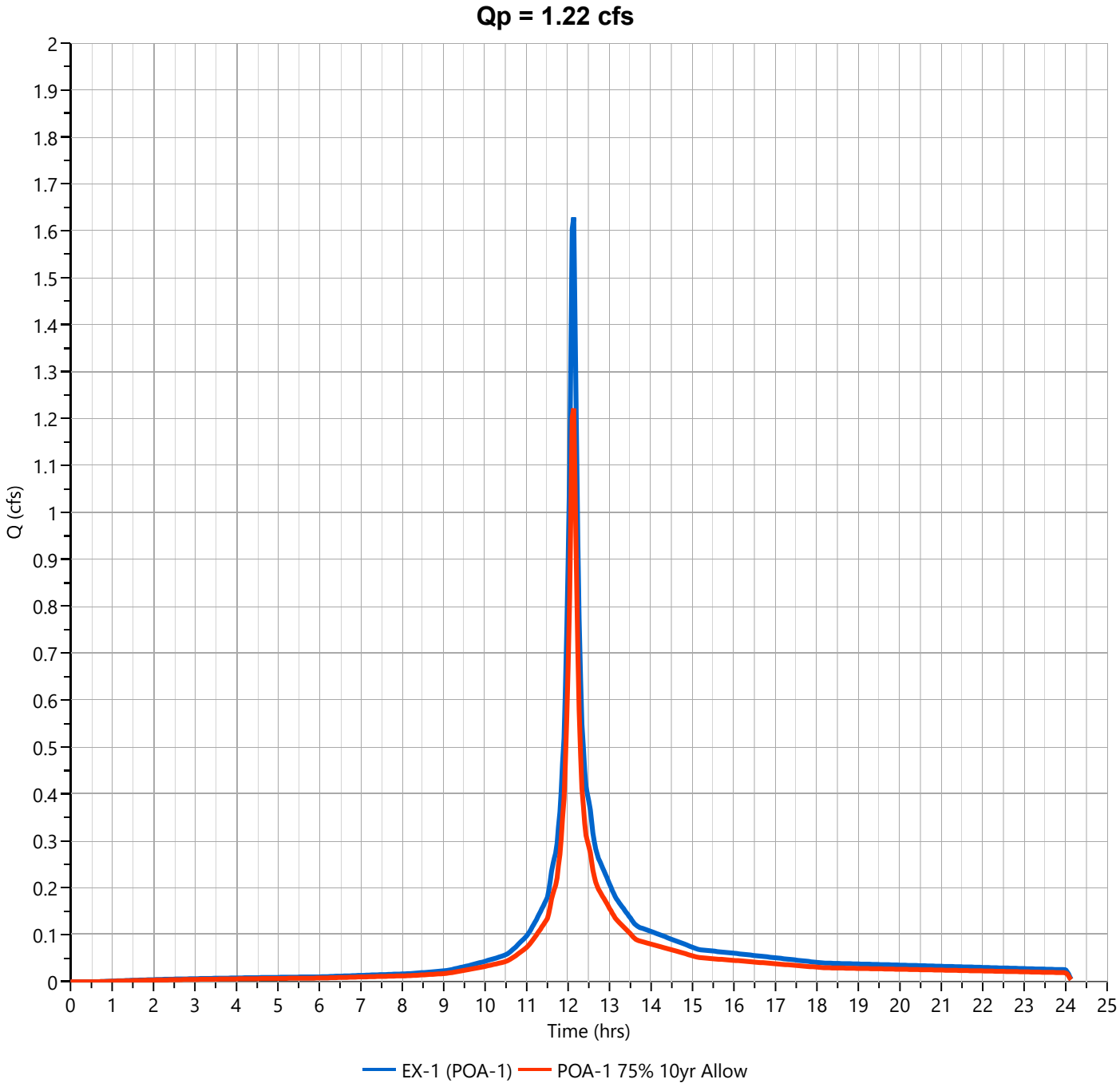
Hydrology Studio v 3.0.0.29

11-29-2023

POA-1 75% 10yr Allow

Hyd. No. 7

Hydrograph Type	= Diversion	Peak Flow	= 1.221 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 4,375 cuft
Inflow Hydrograph	= 4 - EX-1 (POA-1)	Diversion Method	= Flow Ratio
Companion Hyd	= 8 - <name>	Flow Ratio	= 0.75



Hydrograph Report

Project Name:

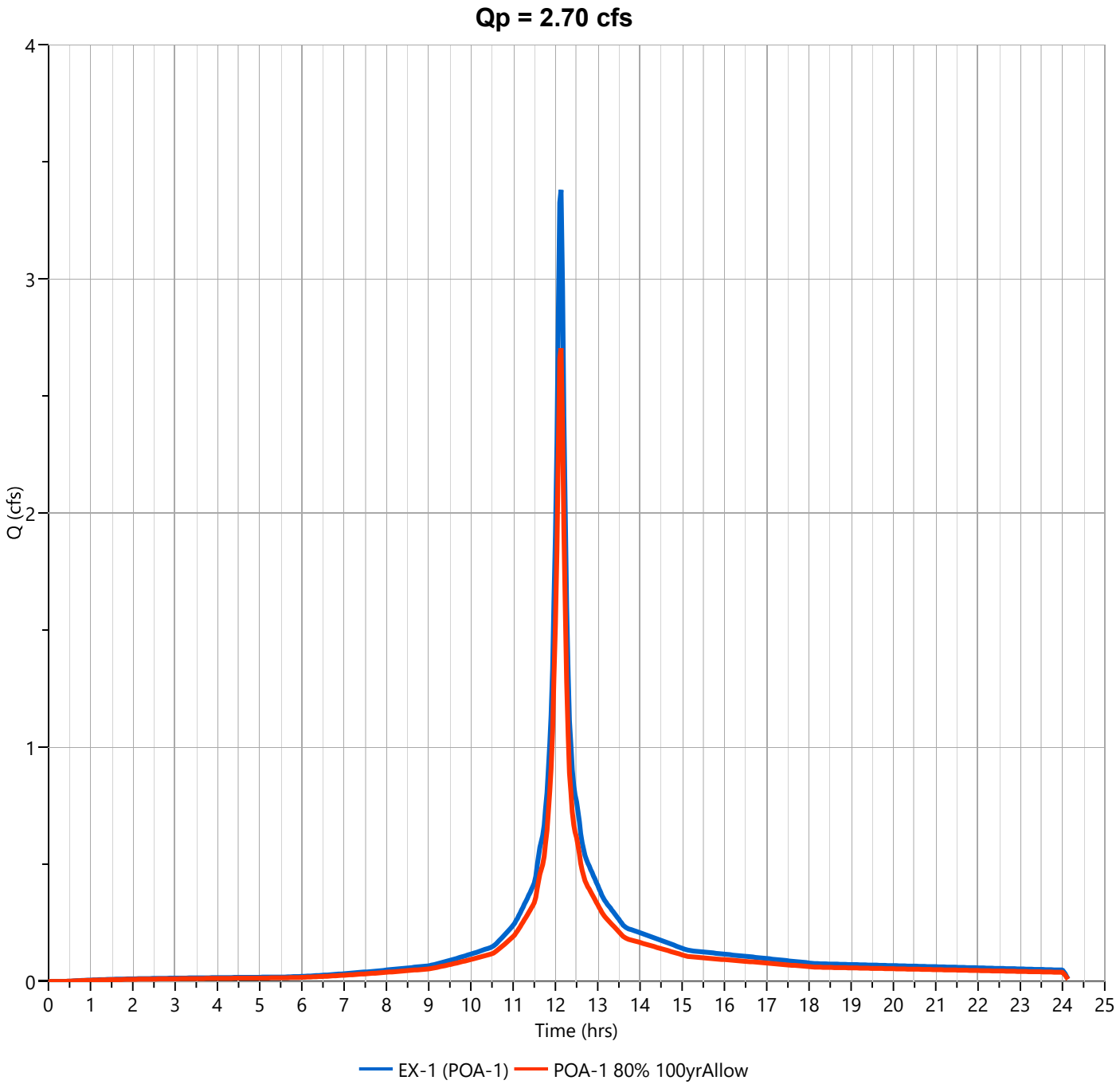
Hydrology Studio v 3.0.0.29

11-29-2023

POA-1 80% 100yrAllow

Hyd. No. 9

Hydrograph Type	= Diversion	Peak Flow	= 2.703 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 9,741 cuft
Inflow Hydrograph	= 4 - EX-1 (POA-1)	Diversion Method	= Flow Ratio
Companion Hyd	= 10 - <name>	Flow Ratio	= 0.8



EX-2A WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**SM**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: (**Present**) Developed — **Current Existing Watershed EX-2A Impervious**

Circle One: (**T_c**) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

			Segment ID	1		
1.	Surface Description (NEH table 15-1)			Smooth Surfaces		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.011		
3.	Flow Length, L (total L < 100 ft)		ft	100		
4.	Two-year 24-hr rainfall, P_2		in	3.46		
5.	Land Slope, s		ft/ft	0.028		
6.	Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.017	+	+

Sheet Flow Sub-Total: **0.017 hours**

Shallow Concentrated Flow

			Segment ID	2	3	4
7.	Surface Description			Pavement	Grassed Waterways	Woodlands
8.	Flow Length, L		ft	35	60	49
9.	Watercourse Slope, s		ft/ft	0.016	0.003	0.003
10.	Average Velocity, V (NEH table 15-3)		ft/s	2.55	0.83	0.26
11.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.004	+ 0.020	+ 0.053

Shallow Conc. Flow Sub-Total: **0.076 hours**

Channel Flow

			Segment ID			
12.	Flow Length, L		ft			
13.	Cross Sectional flow area, a		ft^2			
14.	Wetted Perimeter, P_w		ft			
15.	Hydraulic Radius, r	$r = a / P_w$	ft			
16.	Channel Slope, s		ft/ft			
17.	Manning's Roughness Coeff., n					
18.	Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s			
19.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	+	+	+

Channel Flow Sub-Total: **0.000 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) = **0.093 hours**

Total Tc (minutes) = **6 minutes**

Project:	**Beacon Unitarian Universalist Church**	**By:**	**SM**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: (**Present**) Developed — **Current Existing Watershed EX-2A Pervious**

Circle One: (**T_c**) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

		Segment ID	1		2		
1.	Surface Description (NEH table 15-1)		Woods Light Underbrush		Smooth Surfaces		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.40		0.011		
3.	Flow Length, L (total L < 100 ft)	ft	48		52		
4.	Two-year 24-hr rainfall, P_2	in	3.46		3.46		
5.	Land Slope, s	ft/ft	0.026		0.020		
6.	Compute T_t $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.172	+	0.012	+	

Sheet Flow Sub-Total **0.184 hours**

Shallow Concentrated Flow

		Segment ID	3		4		5
7.	Surface Description		Pavement		Grassed Waterways		Woodlands
8.	Flow Length, L	ft	109		60		49
9.	Watercourse Slope, s	ft/ft	0.022		0.003		0.003
10.	Average Velocity, V (NEH table 15-3)	ft/s	2.99		0.83		0.26
11.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr	0.010	+	0.020	+	0.053

Shallow Conc. Flow Sub-Total **0.083 hours**

Channel Flow

		Segment ID					
12.	Flow Length, L	ft					
13.	Cross Sectional flow area, a	ft^2					
14.	Wetted Perimeter, P_w	ft					
15.	Hydraulic Radius, r $r = a / P_w$	ft					
16.	Channel Slope, s	ft/ft					
17.	Manning's Roughness Coeff., n						
18.	Velocity, V $V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s					
19.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr		+		+	

Channel Flow Sub-Total **0.000 hours**

Watershed or subarea T_c or T_t	Total Tc (hours) =	**0.266 hours**
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	**16 minutes**

Hydrograph Report

Project Name:

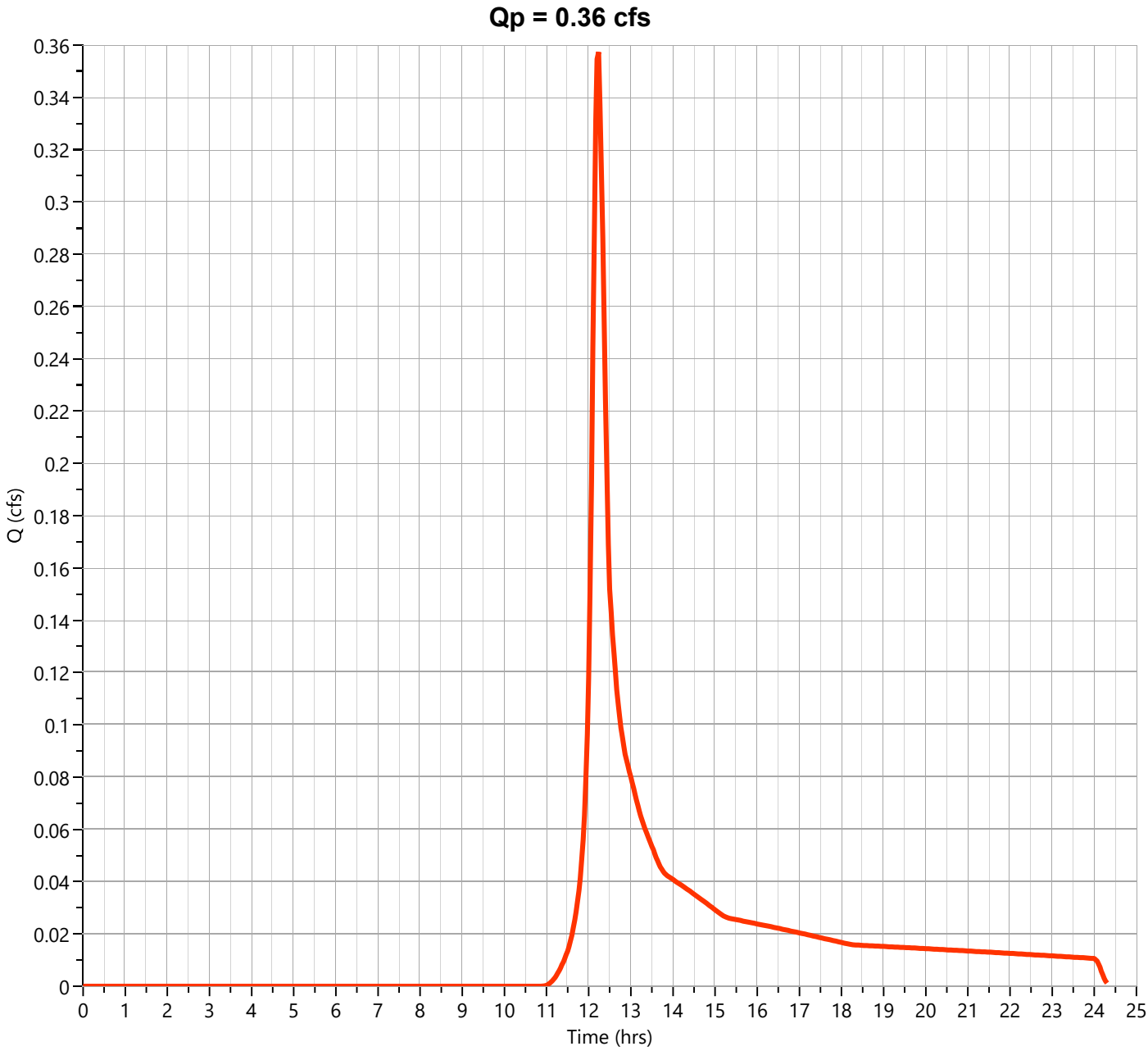
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A Woods C

Hyd. No. 12

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.357 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 1,601 cuft
Drainage Area	= 0.46 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 16.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

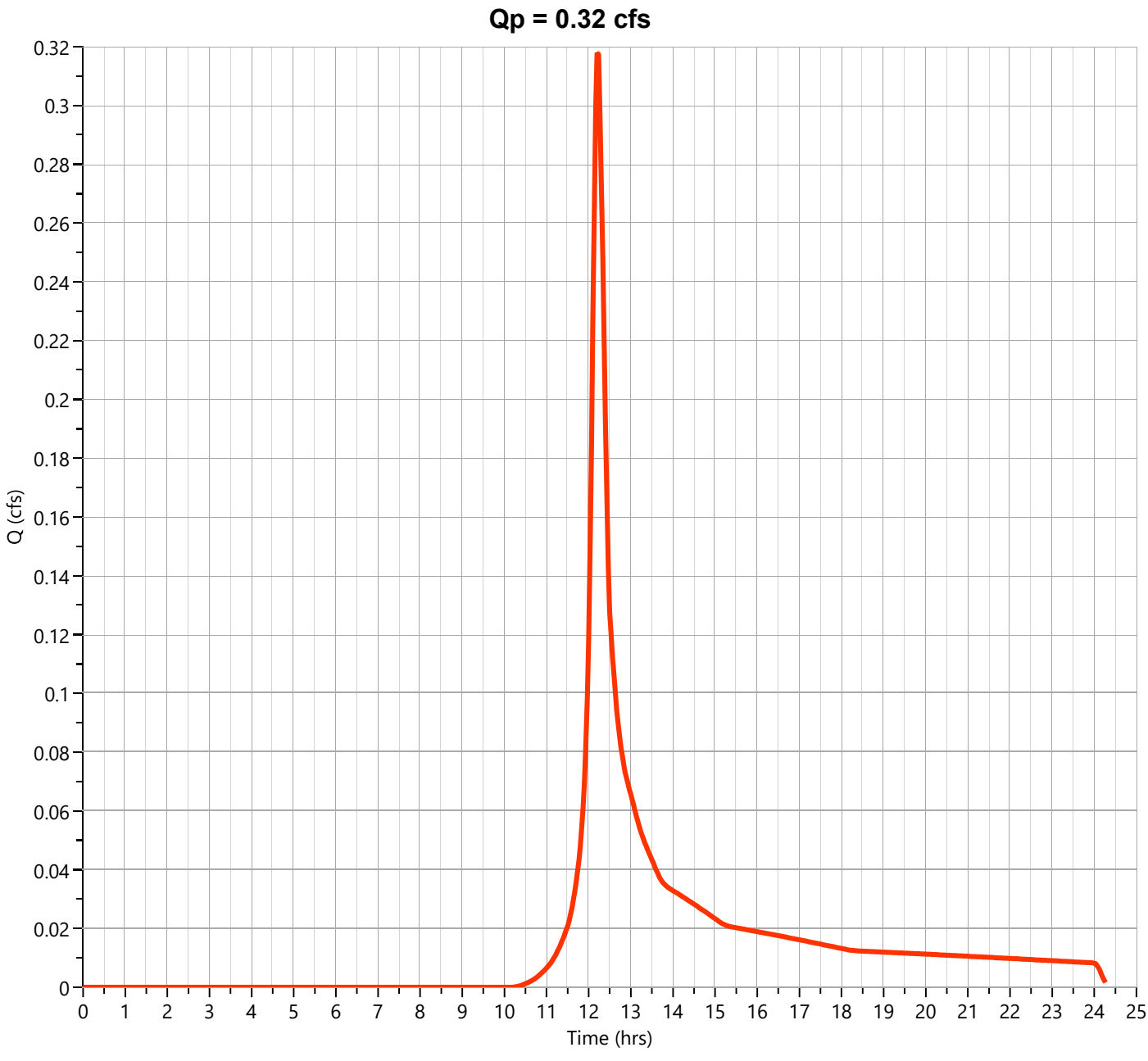
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A Grass C

Hyd. No. 13

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.318 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 1,373 cuft
Drainage Area	= 0.32 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 16.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

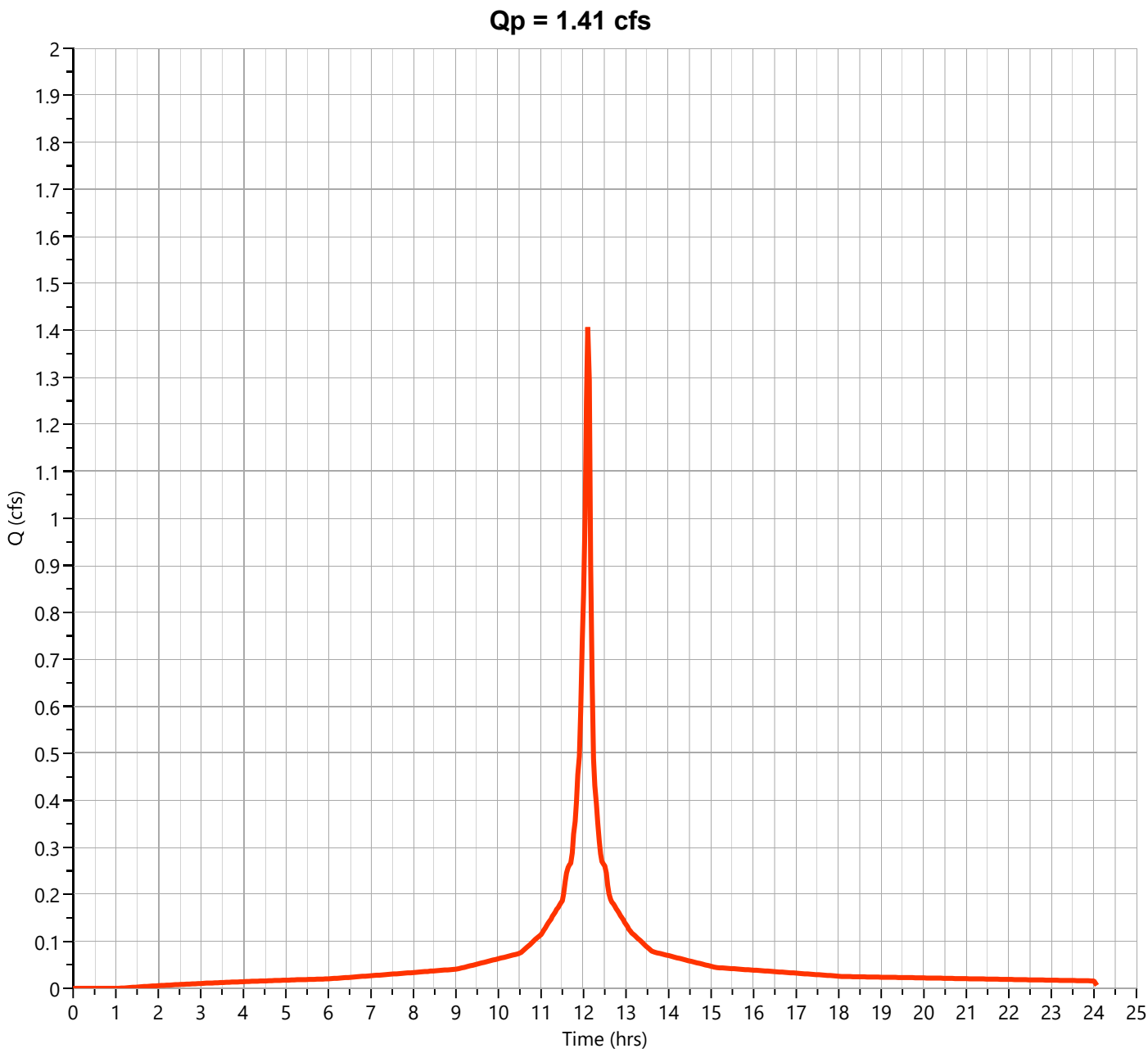
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A Impervious

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.406 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 4,831 cuft
Drainage Area	= 0.44 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

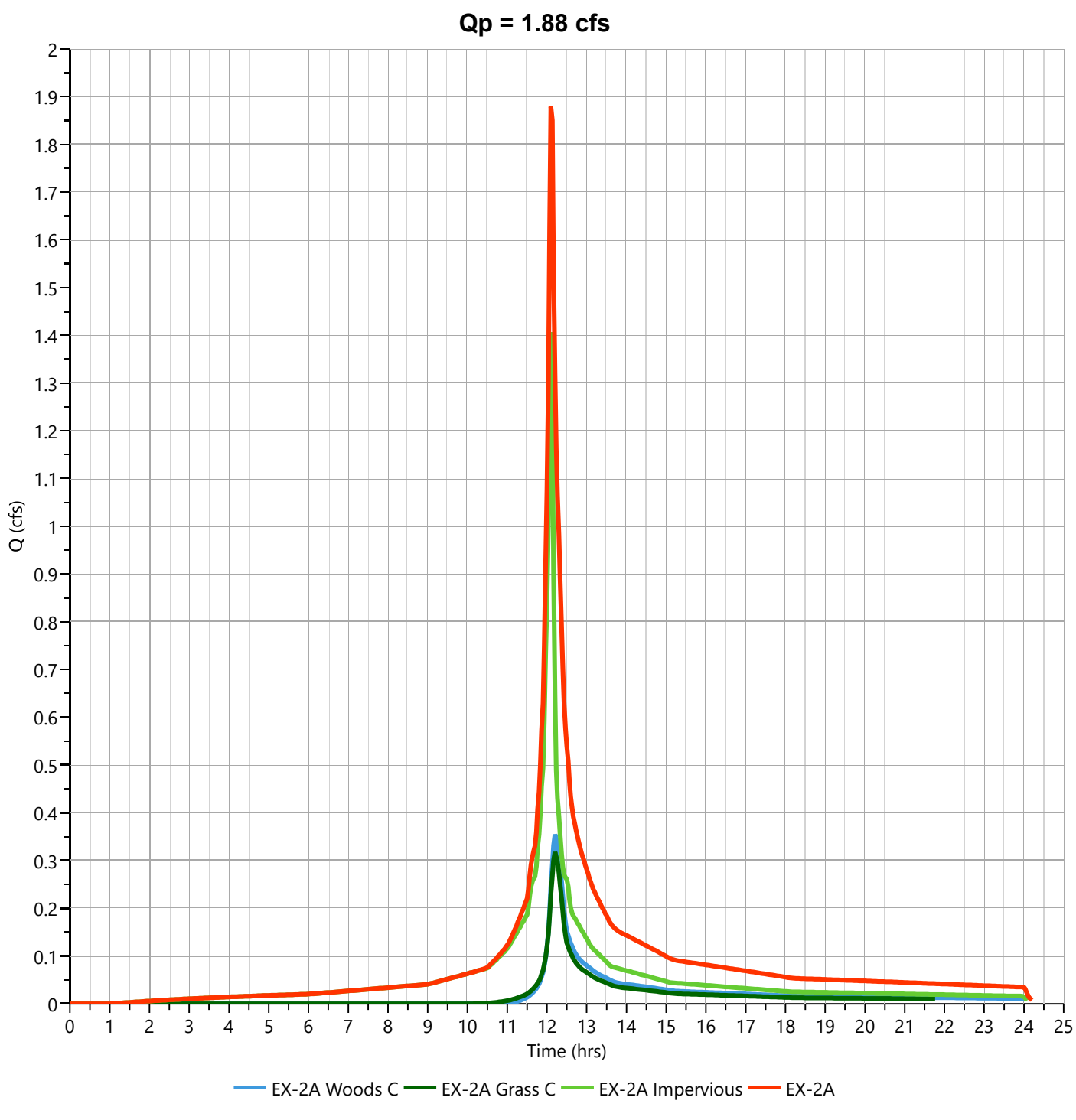
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A

Hyd. No. 15

Hydrograph Type	= Junction	Peak Flow	= 1.879 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 7,806 cuft
Inflow Hydrographs	= 12, 13, 14	Total Contrib. Area	= 1.22 ac



Hydrograph Report

Project Name:

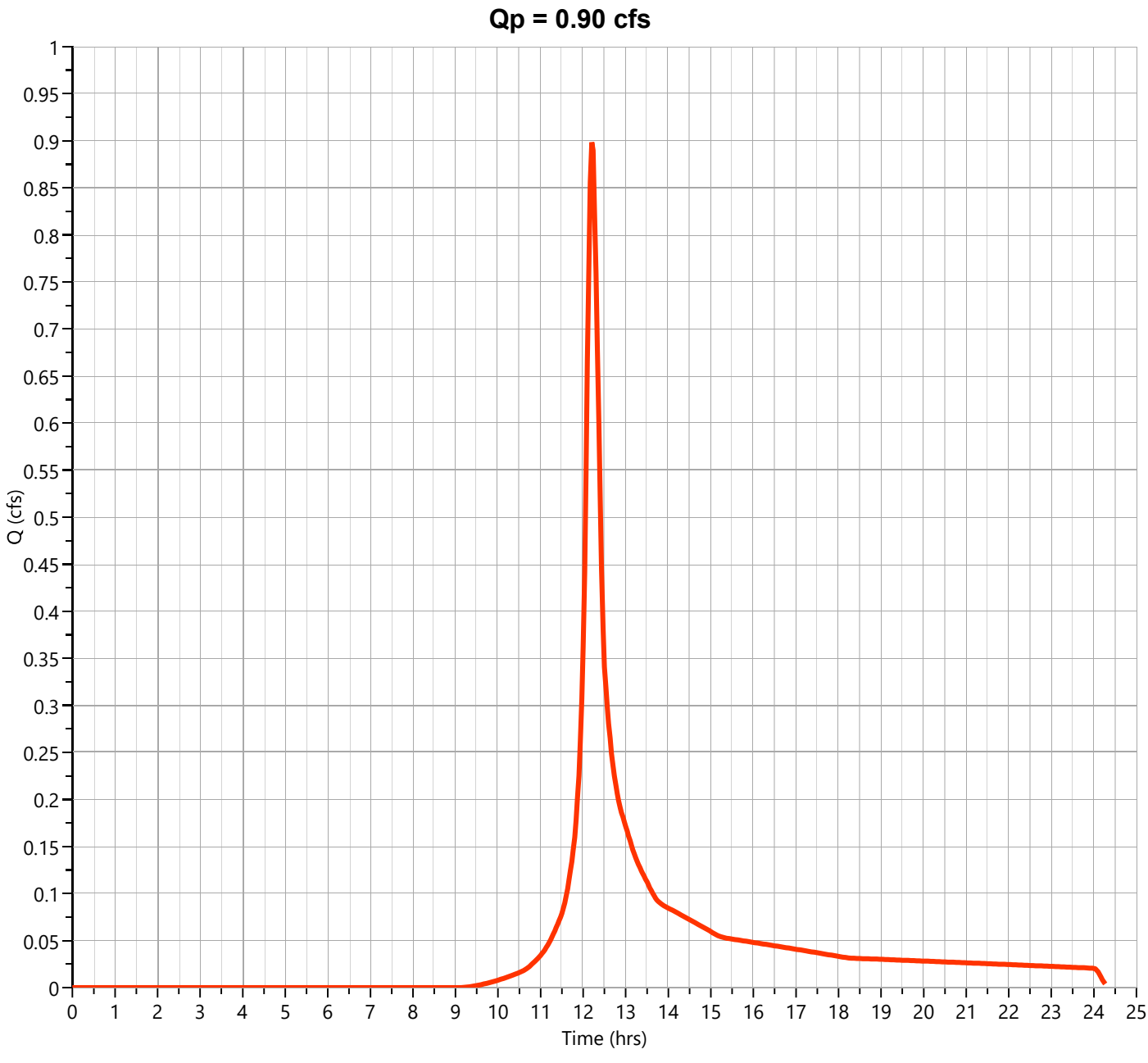
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A Woods C

Hyd. No. 12

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.898 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 3,781 cuft
Drainage Area	= 0.46 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 16.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

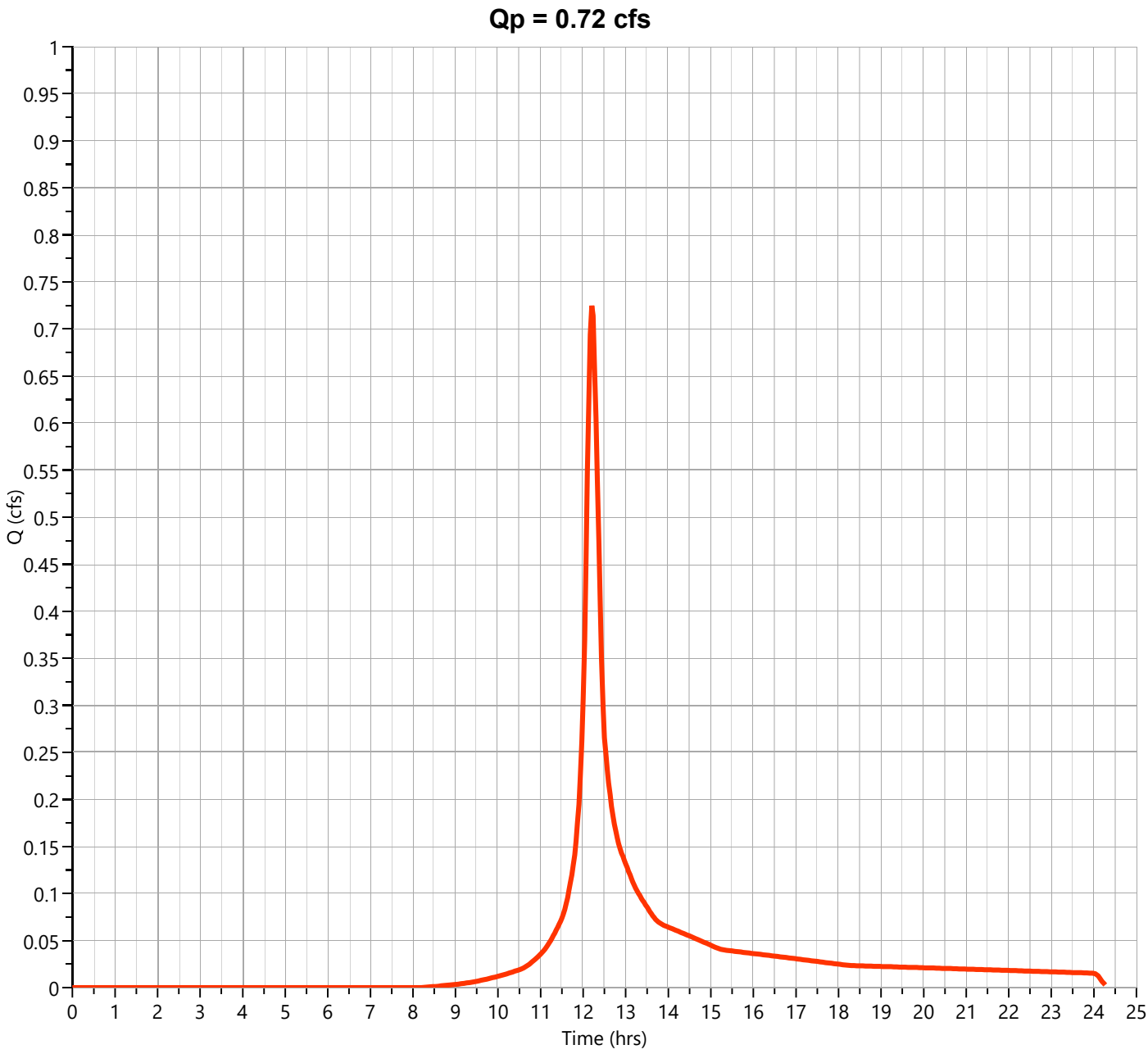
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A Grass C

Hyd. No. 13

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.725 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 3,025 cuft
Drainage Area	= 0.32 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 16.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

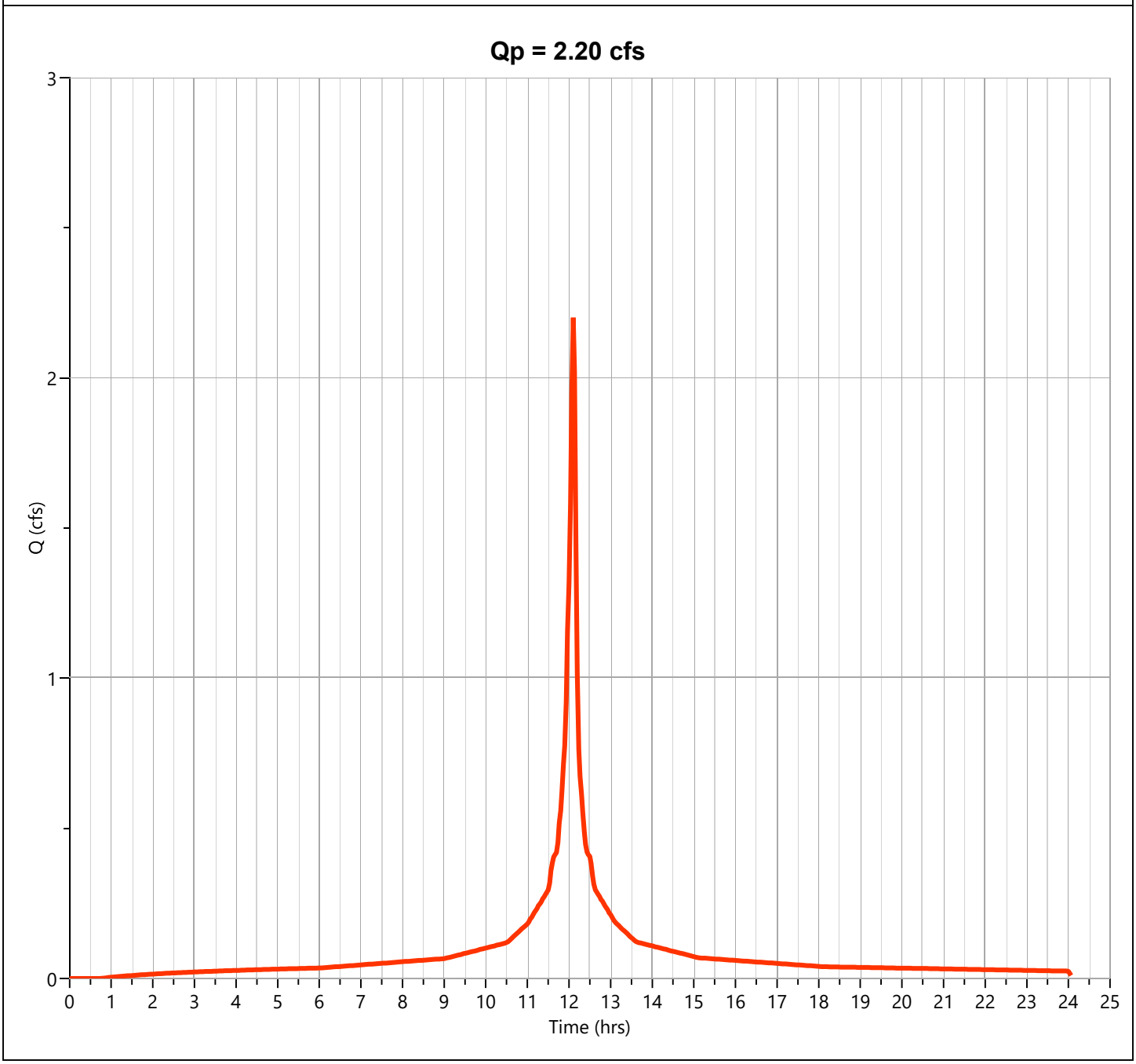
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A Impervious

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.200 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 7,700 cuft
Drainage Area	= 0.44 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

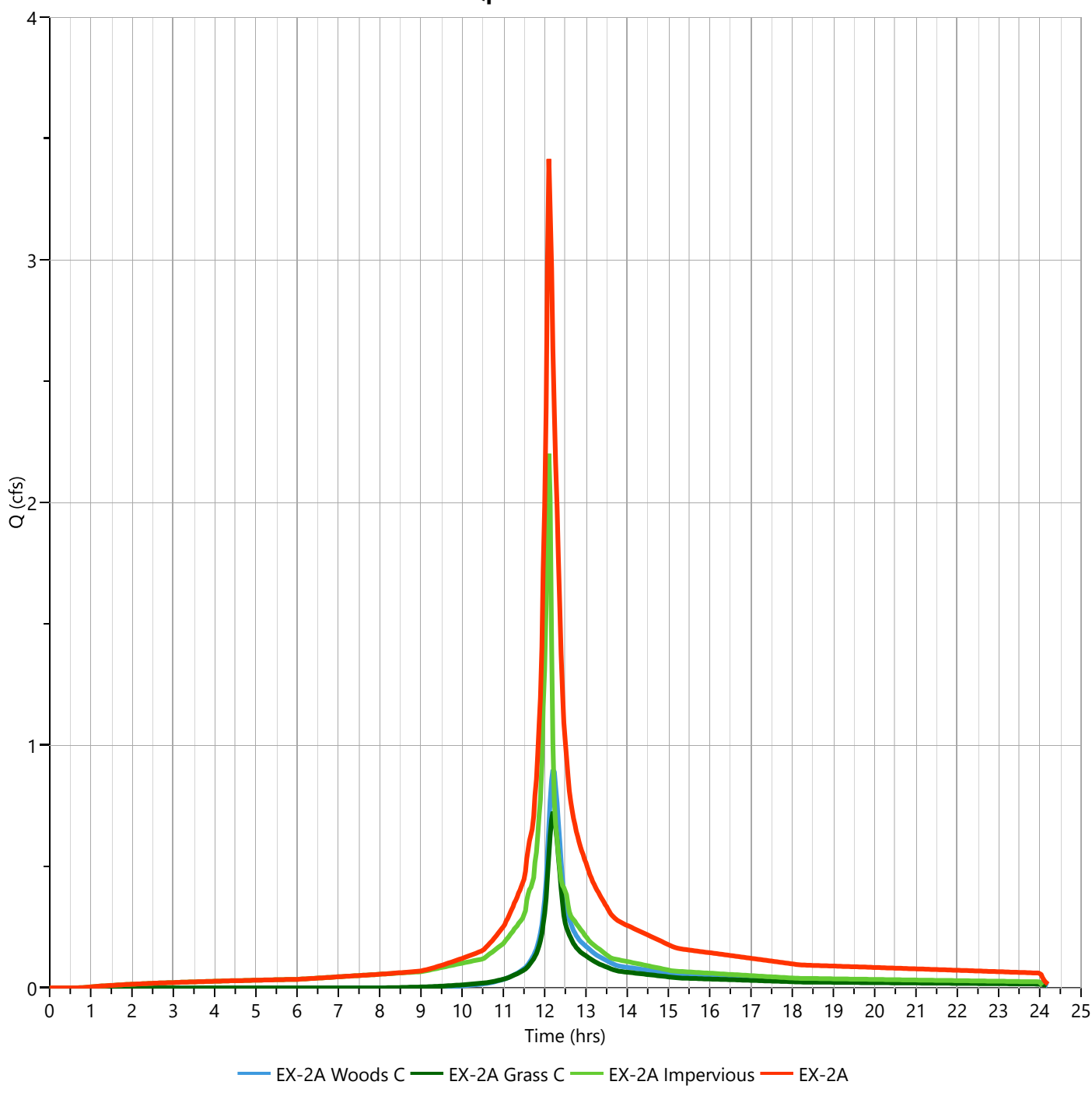
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A

Hyd. No. 15

Hydrograph Type	= Junction	Peak Flow	= 3.418 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 14,506 cuft
Inflow Hydrographs	= 12, 13, 14	Total Contrib. Area	= 1.22 ac



Hydrograph Report

Project Name:

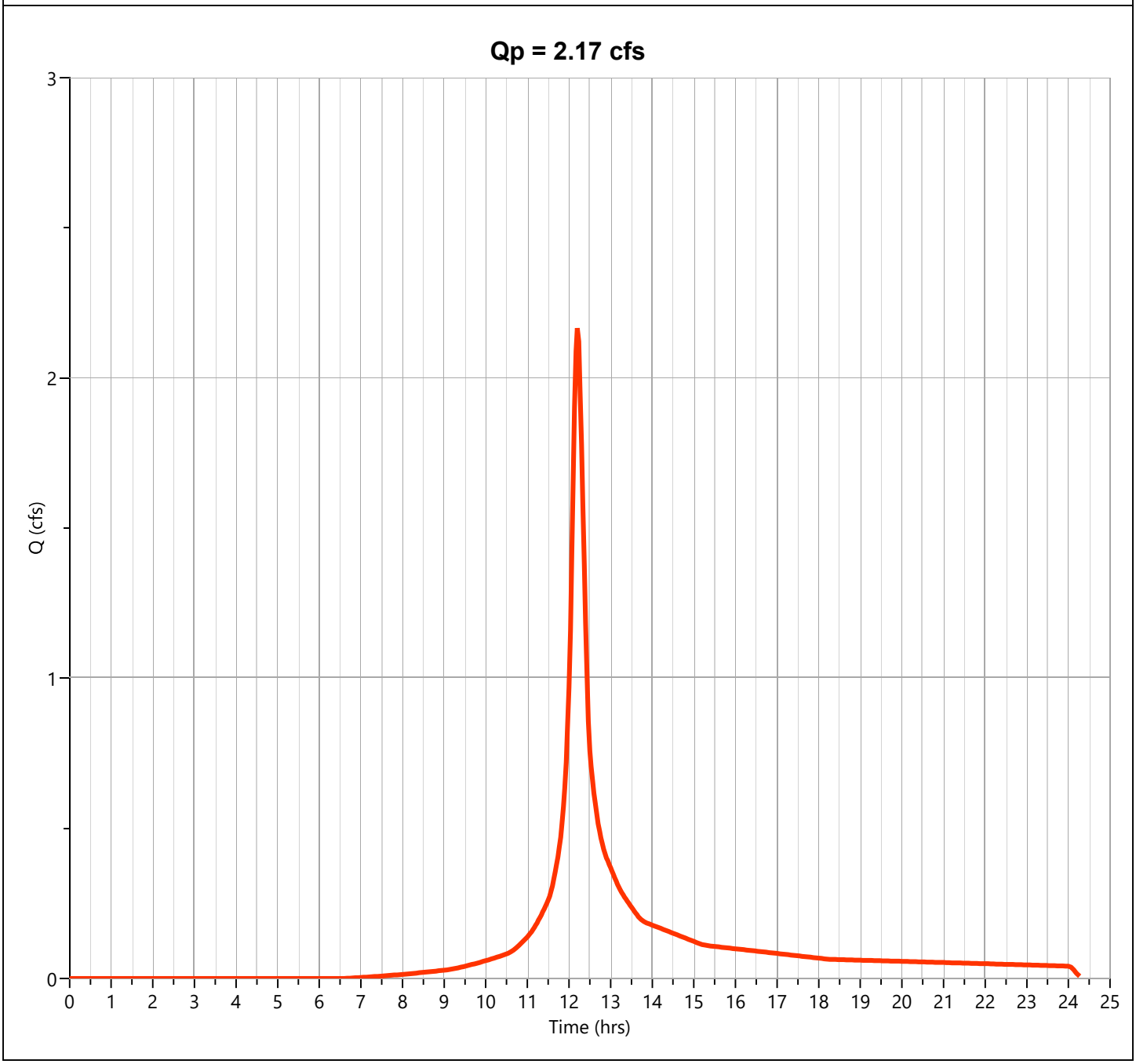
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A Woods C

Hyd. No. 12

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.166 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 9,060 cuft
Drainage Area	= 0.46 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 16.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

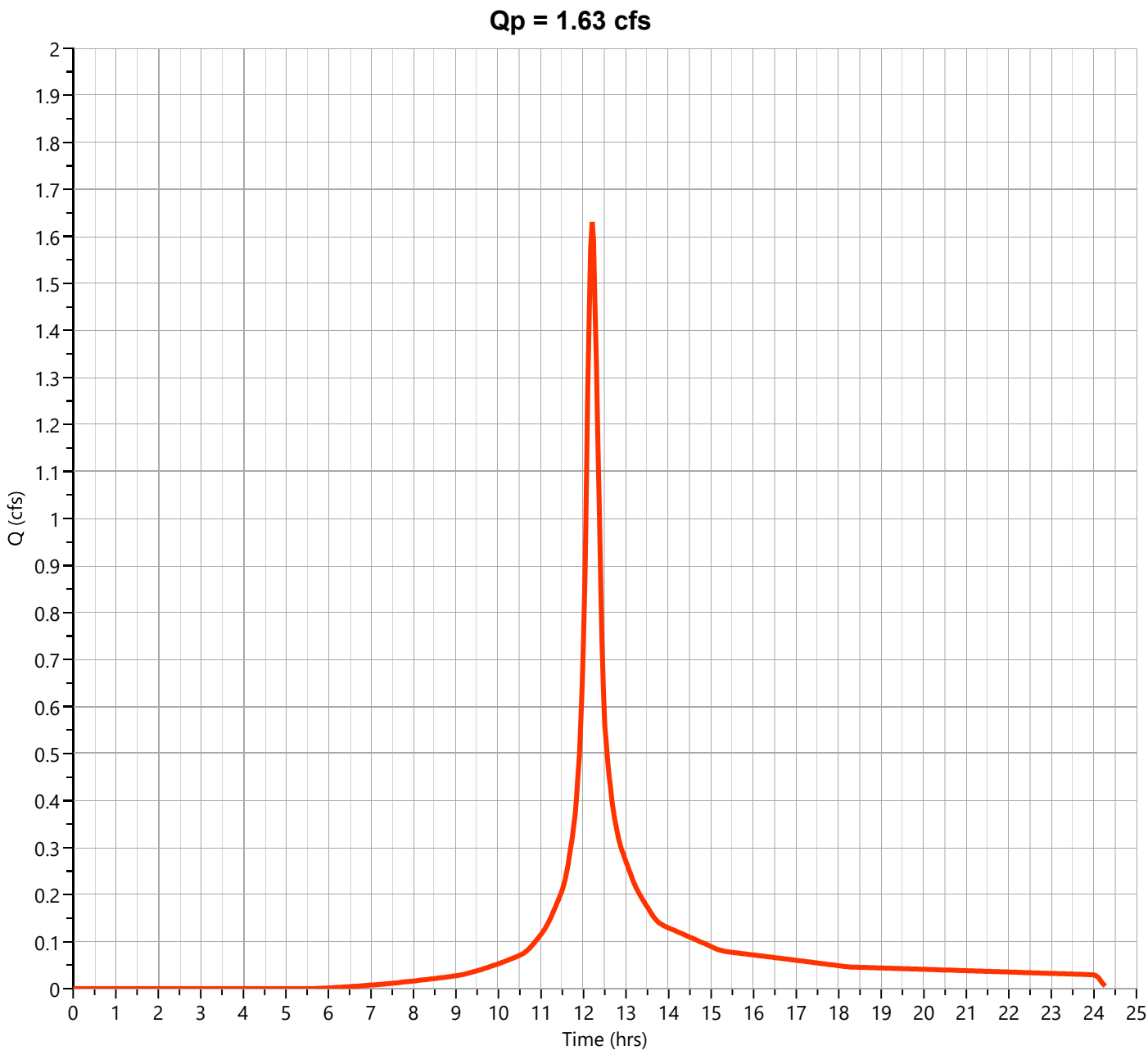
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A Grass C

Hyd. No. 13

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.631 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 6,871 cuft
Drainage Area	= 0.32 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 16.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

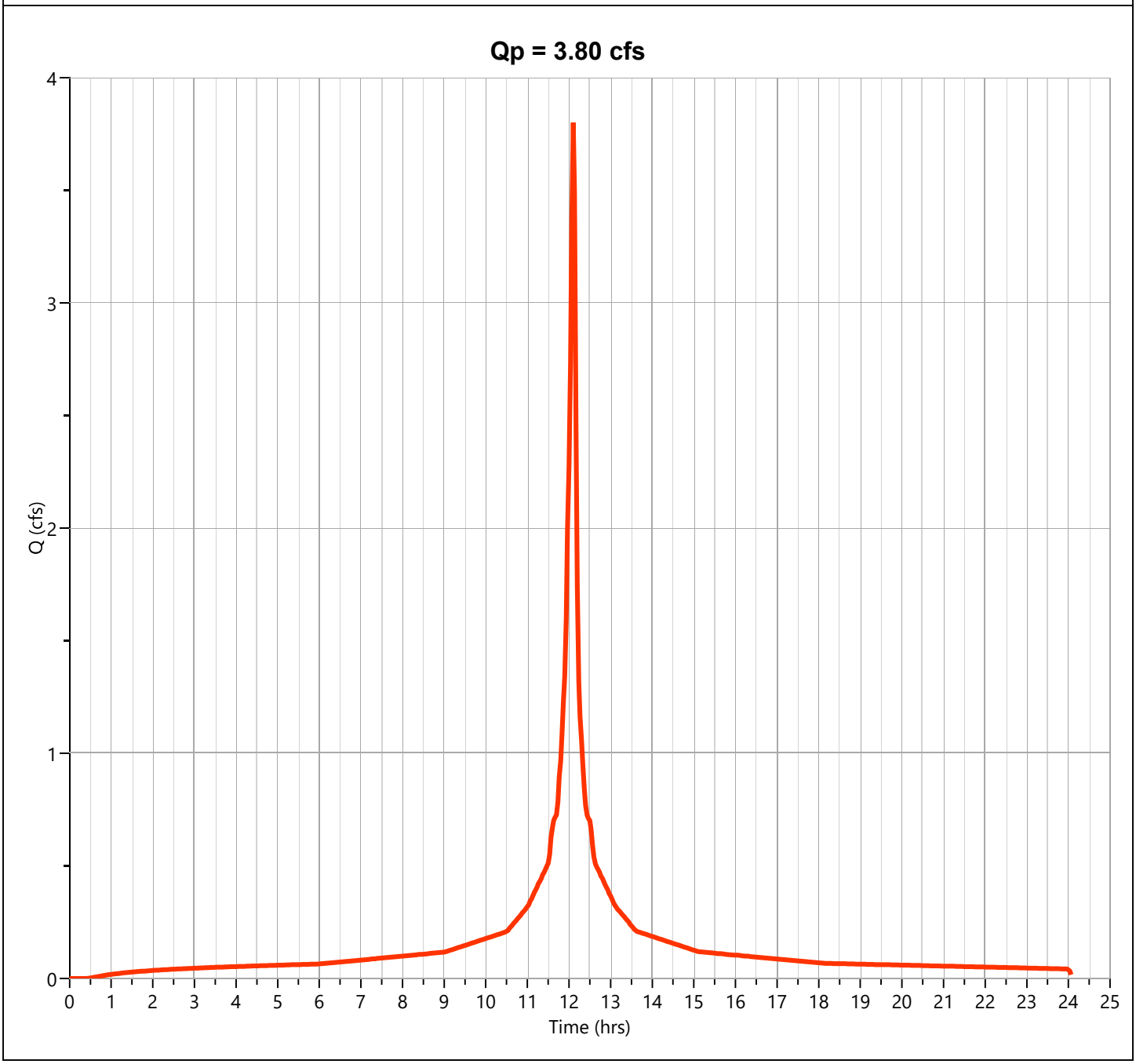
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A Impervious

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.799 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 13,506 cuft
Drainage Area	= 0.44 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

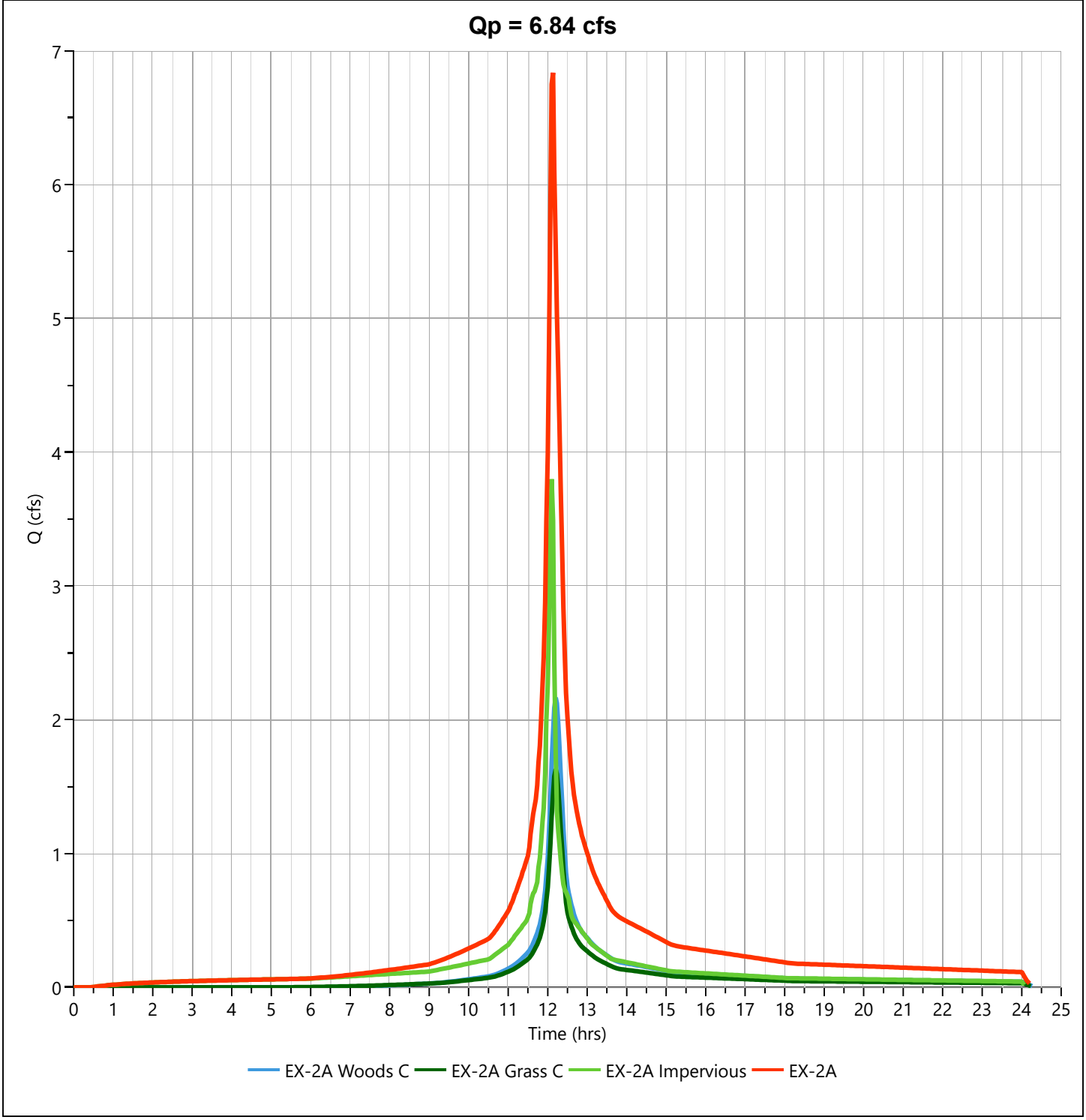
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A

Hyd. No. 15

Hydrograph Type	= Junction	Peak Flow	= 6.836 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 29,436 cuft
Inflow Hydrographs	= 12, 13, 14	Total Contrib. Area	= 1.22 ac



EX-2A WATERSHED ALLOWABLE PEAK DISCHARGE

Hydrograph Report

Project Name:

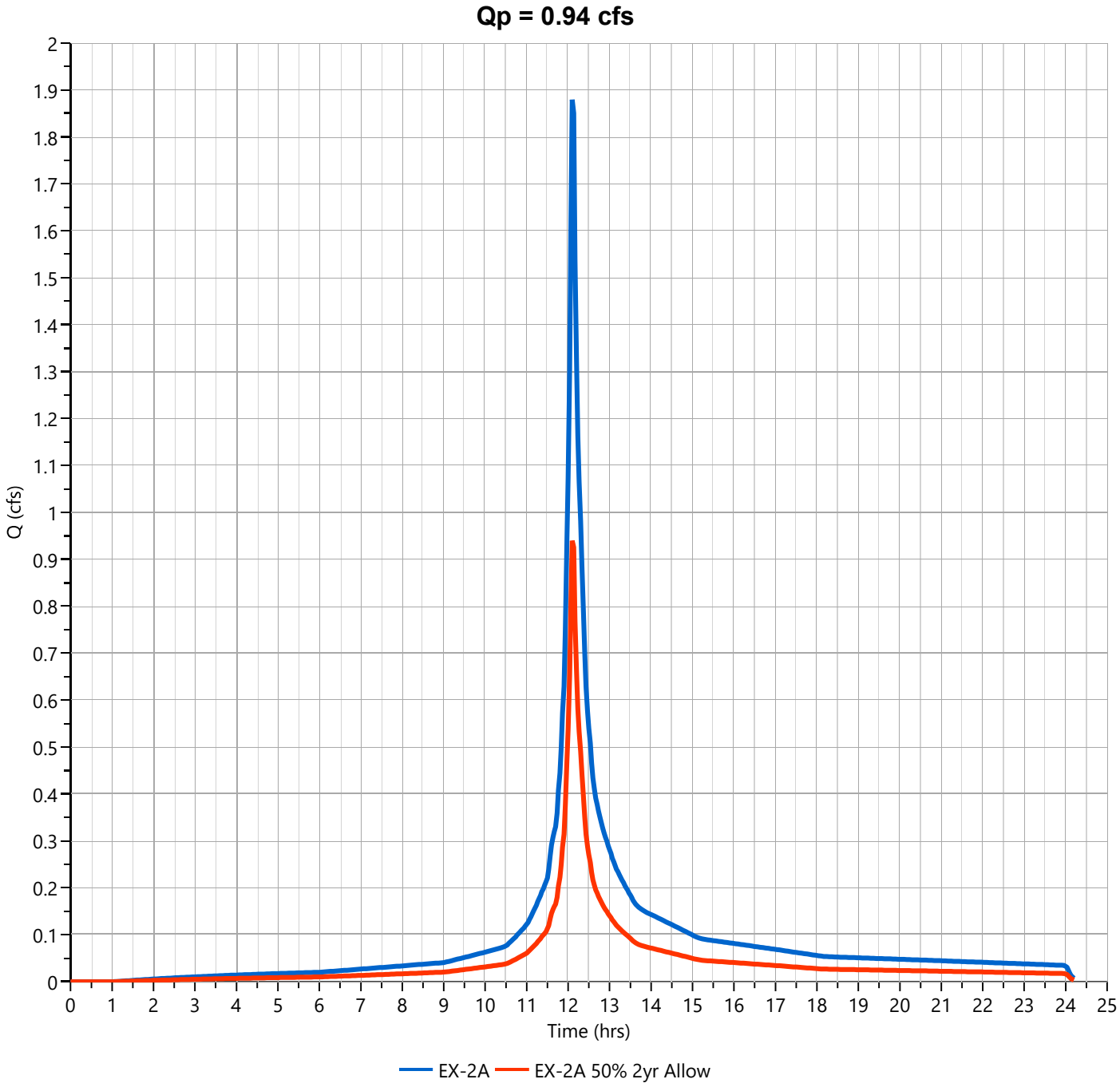
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A 50% 2yr Allow

Hyd. No. 16

Hydrograph Type	= Diversion	Peak Flow	= 0.940 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 3,903 cuft
Inflow Hydrograph	= 15 - EX-2A	Diversion Method	= Flow Ratio
Companion Hyd	= 17 - <name>	Flow Ratio	= 0.5



Hydrograph Report

Project Name:

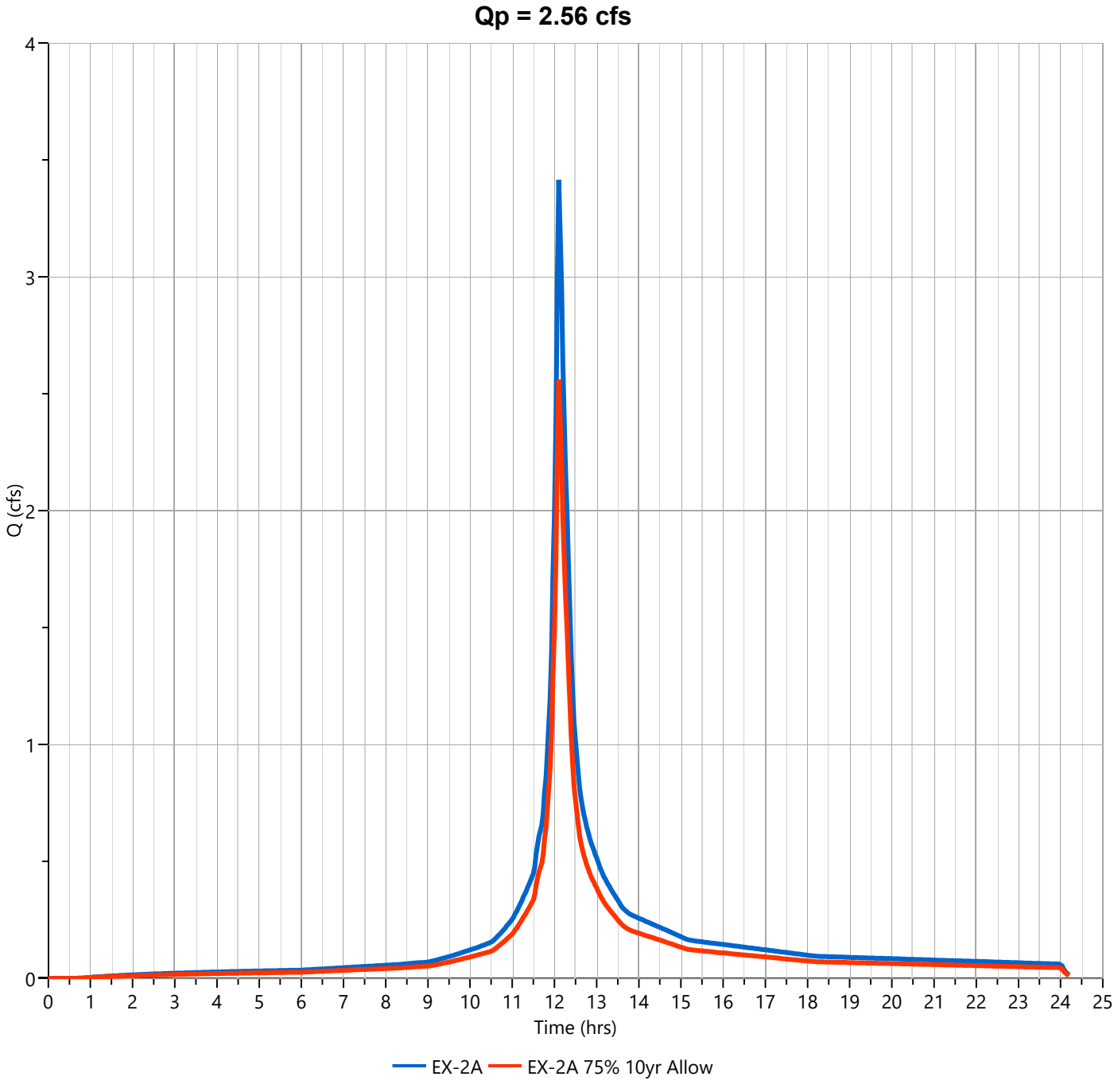
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A 75% 10yr Allow

Hyd. No. 18

Hydrograph Type	= Diversion	Peak Flow	= 2.564 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 10,880 cuft
Inflow Hydrograph	= 15 - EX-2A	Diversion Method	= Flow Ratio
Companion Hyd	= 19 - <name>	Flow Ratio	= 0.75



Hydrograph Report

Project Name:

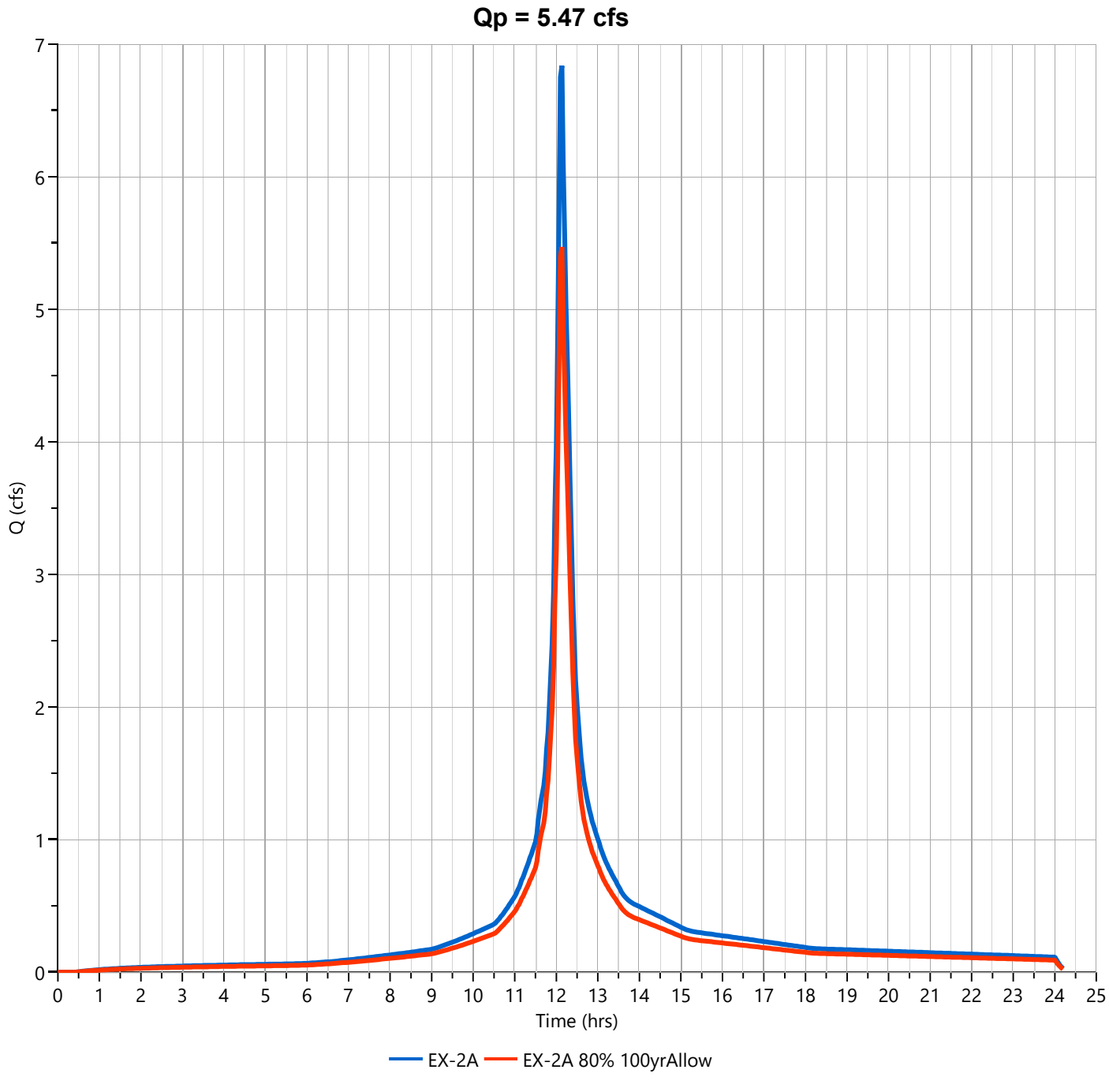
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A 80% 100yrAllow

Hyd. No. 20

Hydrograph Type	= Diversion	Peak Flow	= 5.469 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 23,549 cuft
Inflow Hydrograph	= 15 - EX-2A	Diversion Method	= Flow Ratio
Companion Hyd	= 21 - <name>	Flow Ratio	= 0.8



EX-2B WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**SM**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: (**Present**) Developed — **Current Existing Watershed EX-2B Impervious**

Circle One: (T_c) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

			Segment ID	1		2		
1.	Surface Description (NEH table 15-1)			Smooth Surfaces		Woods Light Underbrush		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.011		0.40		
3.	Flow Length, L (total L < 100 ft)		ft	6		94		
4.	Two-year 24-hr rainfall, P_2		in	3.46		3.46		
5.	Land Slope, s		ft/ft	0.050		0.046		
6.	Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.001	+	0.235	+	

Sheet Flow Sub-Total **0.237 hours**

Shallow Concentrated Flow

			Segment ID	3		4		
7.	Surface Description			Woodlands		Woodlands		
8.	Flow Length, L		ft	69		126		
9.	Watercourse Slope, s		ft/ft	0.028		0.008		
10.	Average Velocity, V (NEH table 15-3)		ft/s	0.84		0.46		
11.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.023	+	0.076	+	

Shallow Conc. Flow Sub-Total **0.099 hours**

Channel Flow

			Segment ID					
12.	Flow Length, L		ft					
13.	Cross Sectional flow area, a		ft^2					
14.	Wetted Perimeter, P_w		ft					
15.	Hydraulic Radius, r	$r = a / P_w$	ft					
16.	Channel Slope, s		ft/ft					
17.	Manning's Roughness Coeff., n							
18.	Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s					
19.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr		+		+	

Channel Flow Sub-Total **0.000 hours**

Watershed or subarea T_c or T_t	Total Tc (hours) =	**0.336 hours**
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	**20 minutes**

Project:	**Beacon Unitarian Universalist Church**	**By:**	**SM**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: (**Present**) Developed — **Current Existing Watershed EX-2B Pervious**

Circle One: (**T_c**) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

		Segment ID	1		2		
1.	Surface Description (NEH table 15-1)		Dense Grasses		Woods Light Underbrush		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.24		0.40		
3.	Flow Length, L (total L < 100 ft)	ft	37		63		
4.	Two-year 24-hr rainfall, P_2	in	3.46		3.46		
5.	Land Slope, s	ft/ft	0.065		0.025		
6.	Compute T_t $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.064	+	0.216	+	

Sheet Flow Sub-Total **0.281 hours**

Shallow Concentrated Flow

		Segment ID	3		4		
7.	Surface Description		Woodlands		Woodlands		
8.	Flow Length, L	ft	69		126		
9.	Watercourse Slope, s	ft/ft	0.028		0.008		
10.	Average Velocity, V (NEH table 15-3)	ft/s	0.84		0.46		
11.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr	0.023	+	0.076	+	

Shallow Conc. Flow Sub-Total **0.099 hours**

Channel Flow

		Segment ID					
12.	Flow Length, L	ft					
13.	Cross Sectional flow area, a	ft^2					
14.	Wetted Perimeter, P_w	ft					
15.	Hydraulic Radius, r $r = a / P_w$	ft					
16.	Channel Slope, s	ft/ft					
17.	Manning's Roughness Coeff., n						
18.	Velocity, V $V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s					
19.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr		+		+	

Channel Flow Sub-Total **0.000 hours**

Watershed or subarea T_c or T_t	Total Tc (hours) =	**0.380 hours**
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	**23 minutes**

Hydrograph Report

Project Name:

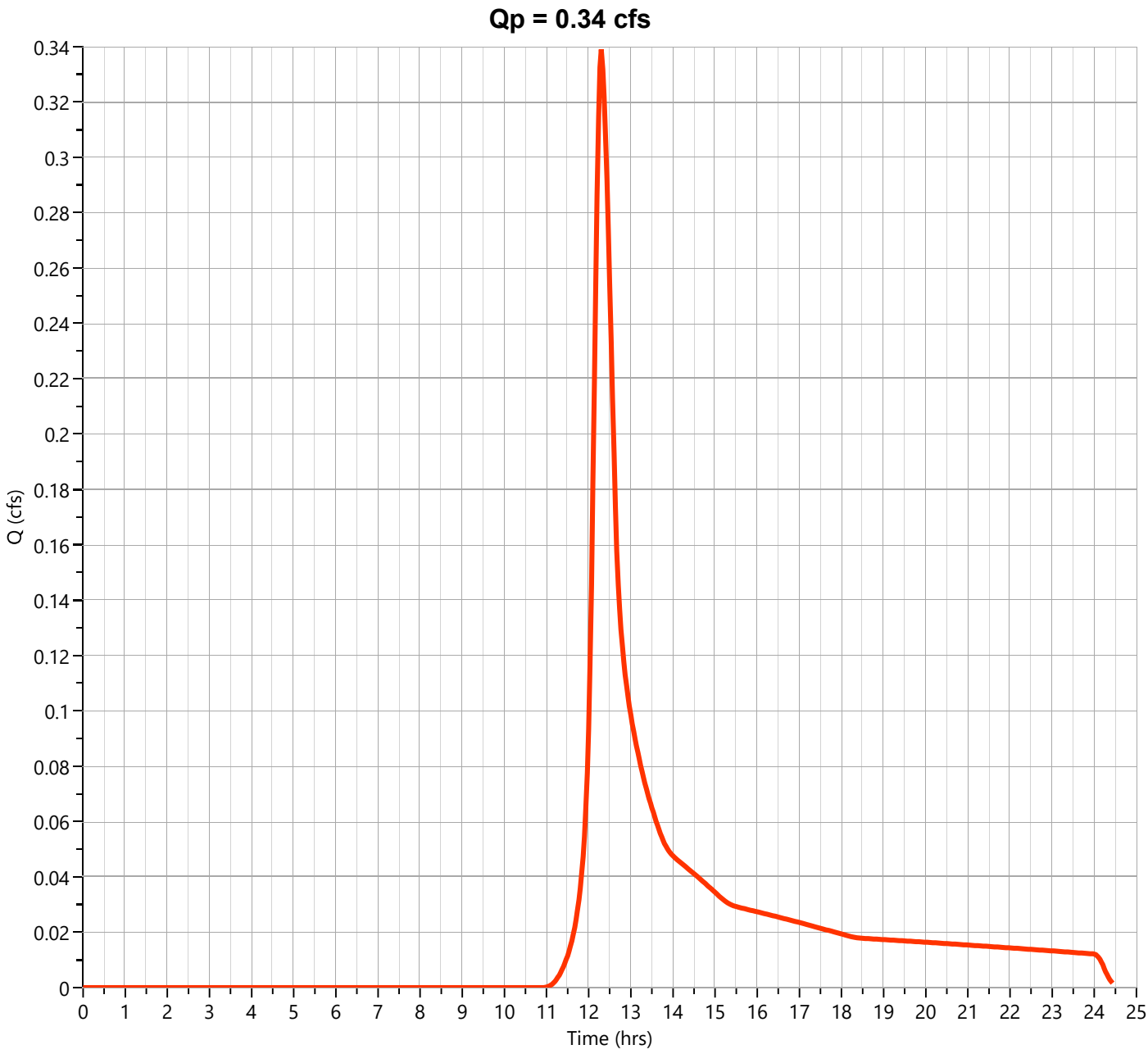
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2B Woods C

Hyd. No. 23

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.339 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.30 hrs
Time Interval	= 2 min	Runoff Volume	= 1,817 cuft
Drainage Area	= 0.5 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 23.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

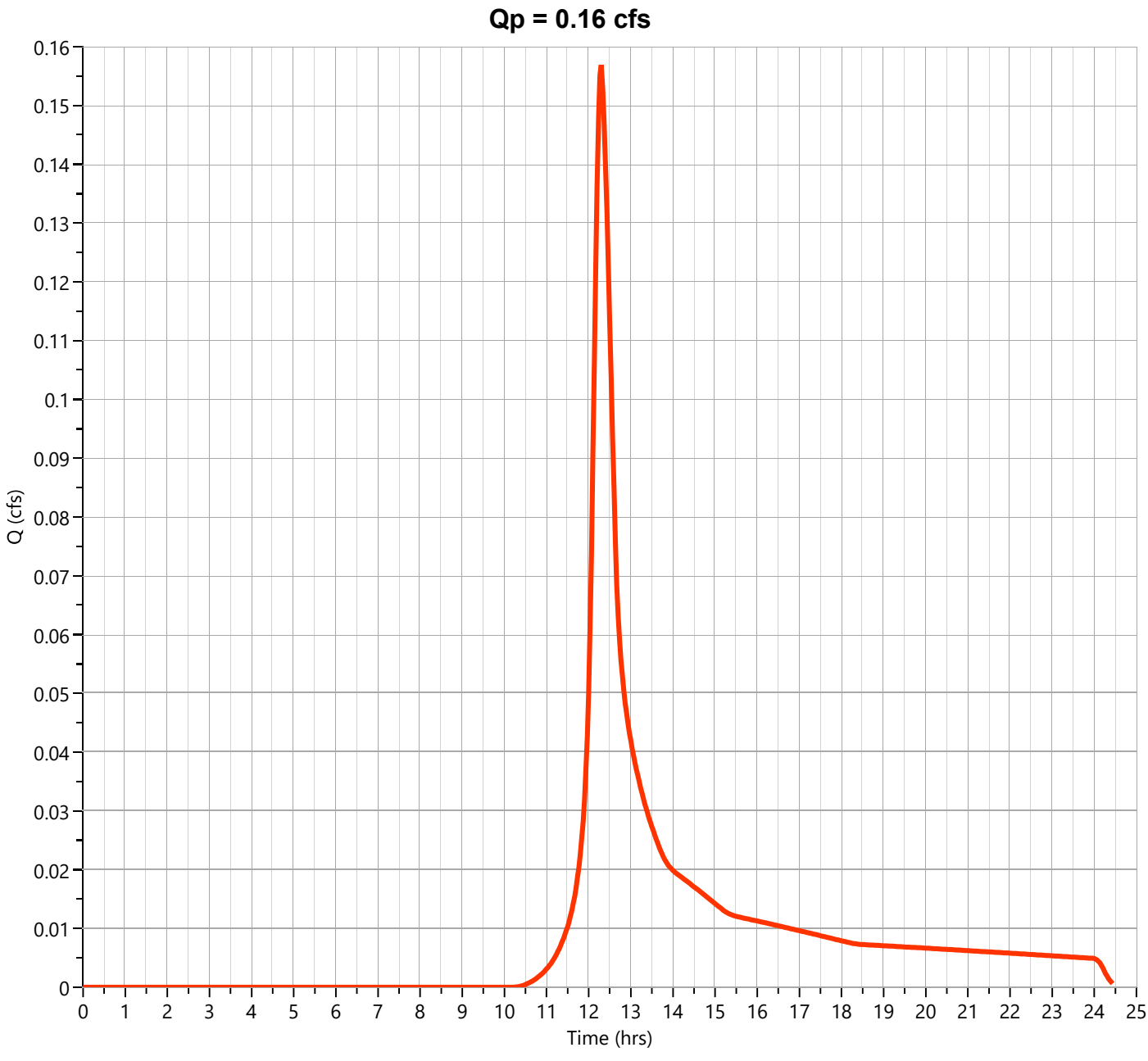
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2B Grass C

Hyd. No. 24

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.157 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.30 hrs
Time Interval	= 2 min	Runoff Volume	= 806 cuft
Drainage Area	= 0.18 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 23.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

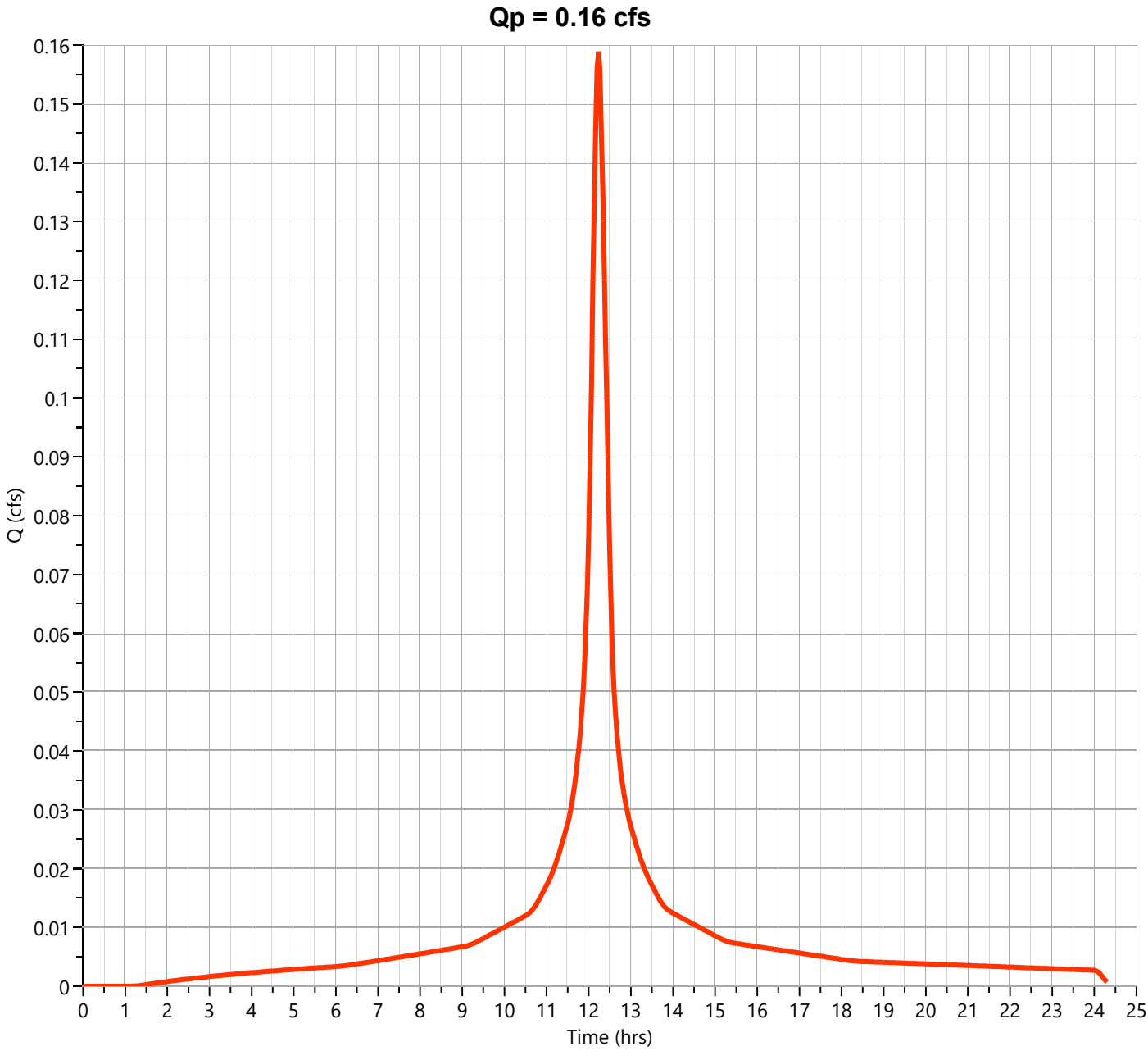
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2B Impervious

Hyd. No. 25

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.159 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 820 cuft
Drainage Area	= 0.07 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 20.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

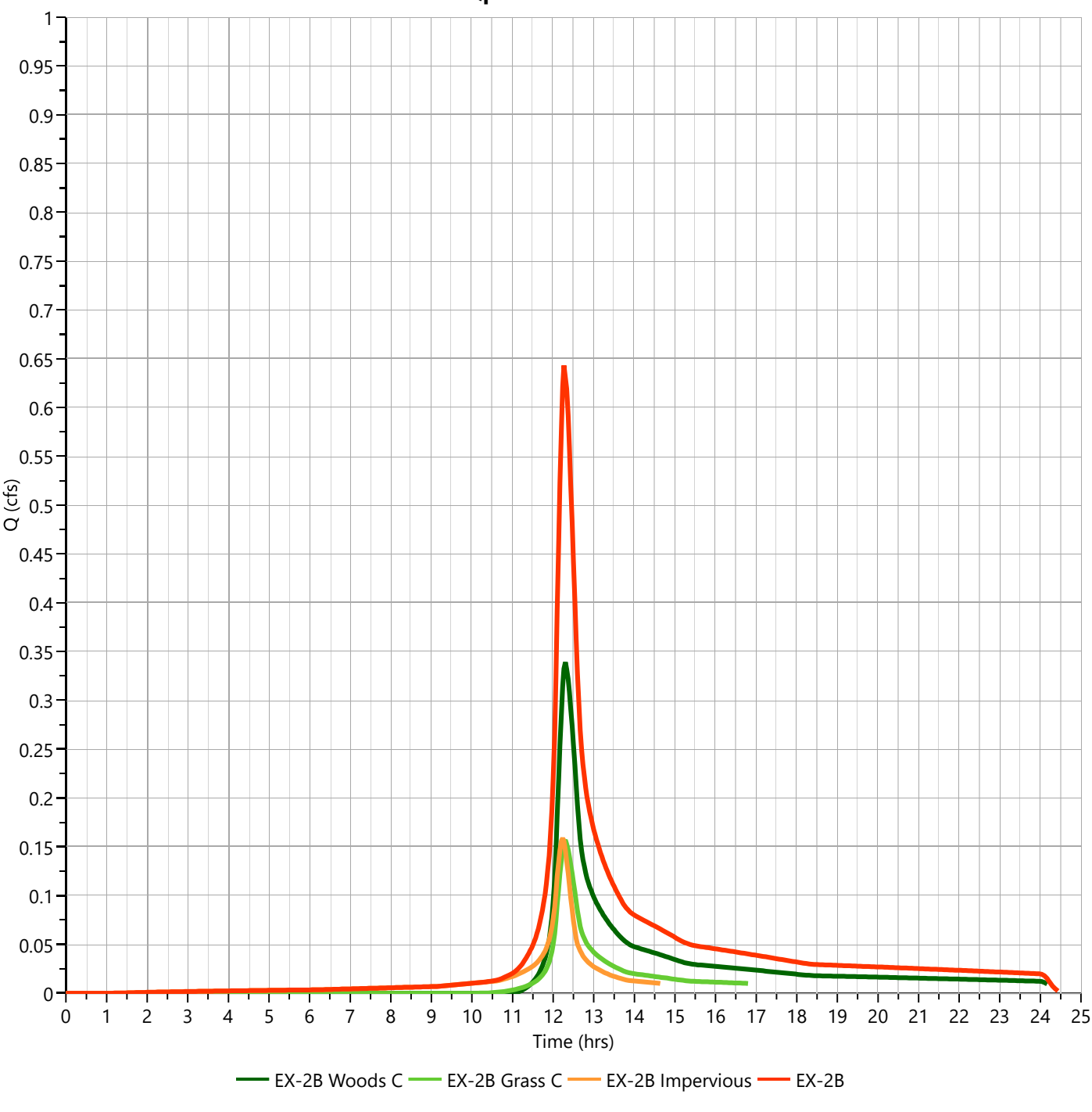
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2B

Hyd. No. 26

Hydrograph Type	= Junction	Peak Flow	= 0.643 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Hydrograph Volume	= 3,443 cuft
Inflow Hydrographs	= 23, 24, 25	Total Contrib. Area	= 0.75 ac



Hydrograph Report

Project Name:

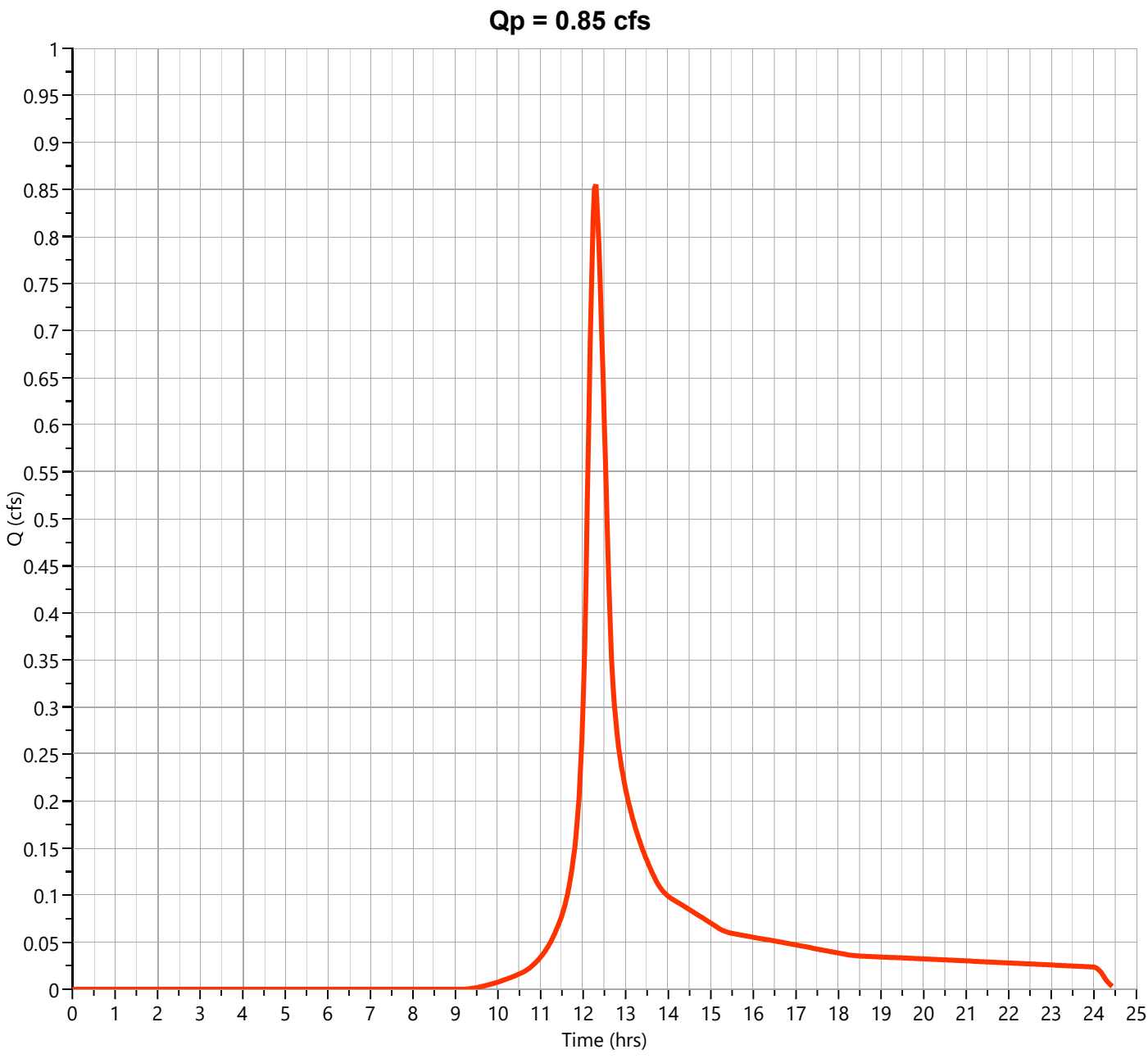
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2B Woods C

Hyd. No. 23

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.855 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.30 hrs
Time Interval	= 2 min	Runoff Volume	= 4,290 cuft
Drainage Area	= 0.5 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 23.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

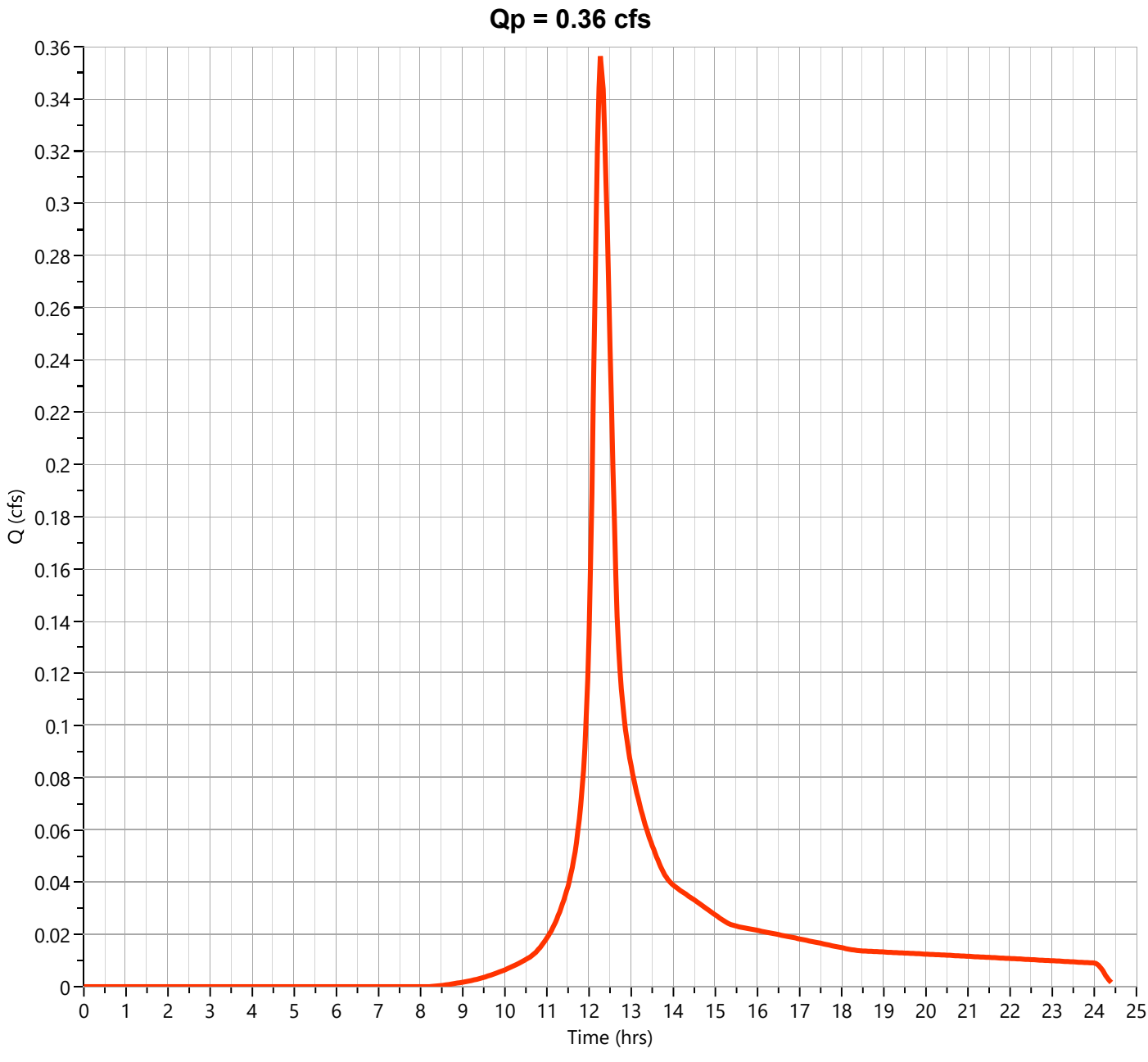
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2B Grass C

Hyd. No. 24

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.357 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.30 hrs
Time Interval	= 2 min	Runoff Volume	= 1,776 cuft
Drainage Area	= 0.18 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 23.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

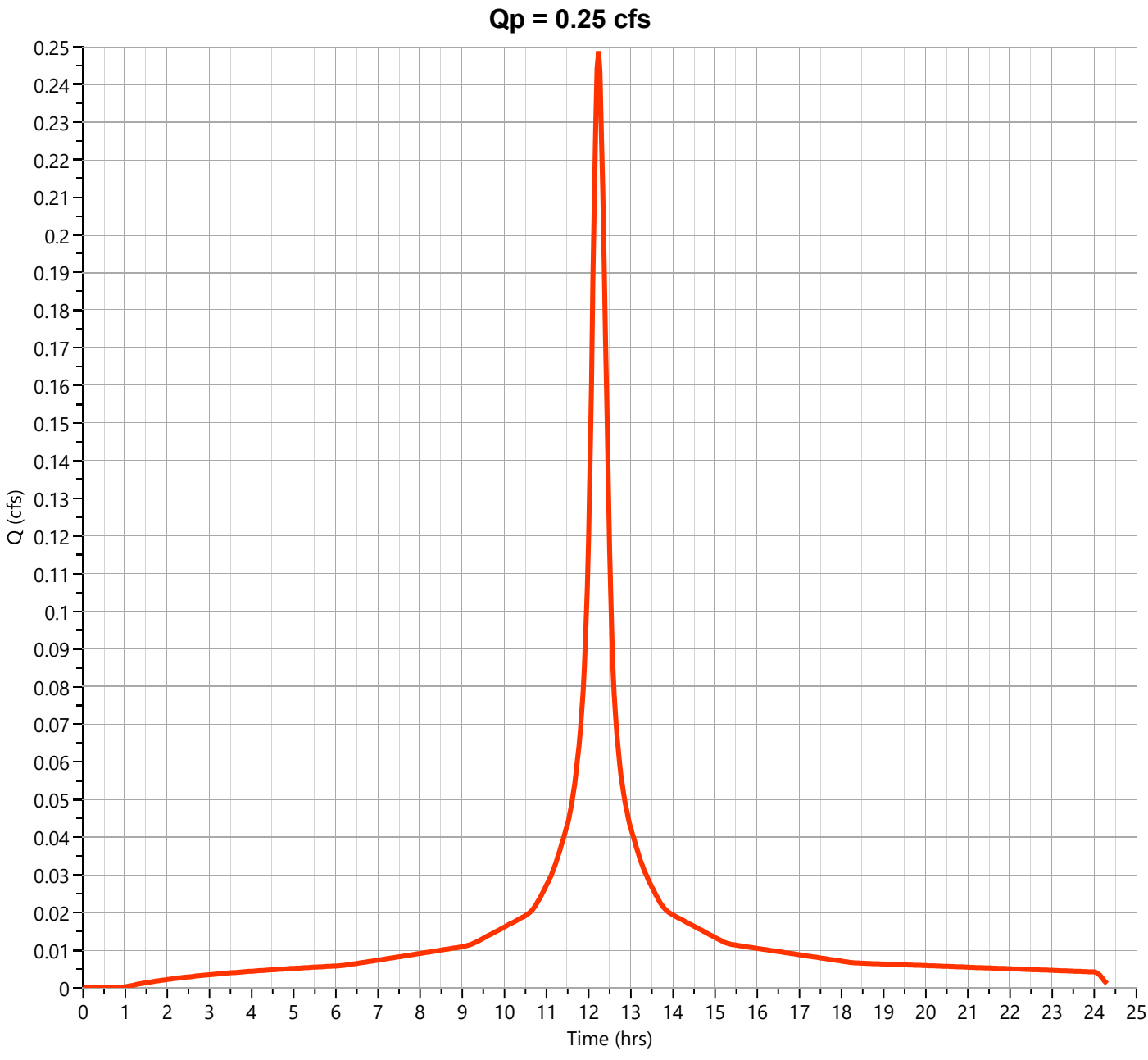
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2B Impervious

Hyd. No. 25

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.249 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 1,307 cuft
Drainage Area	= 0.07 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 20.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

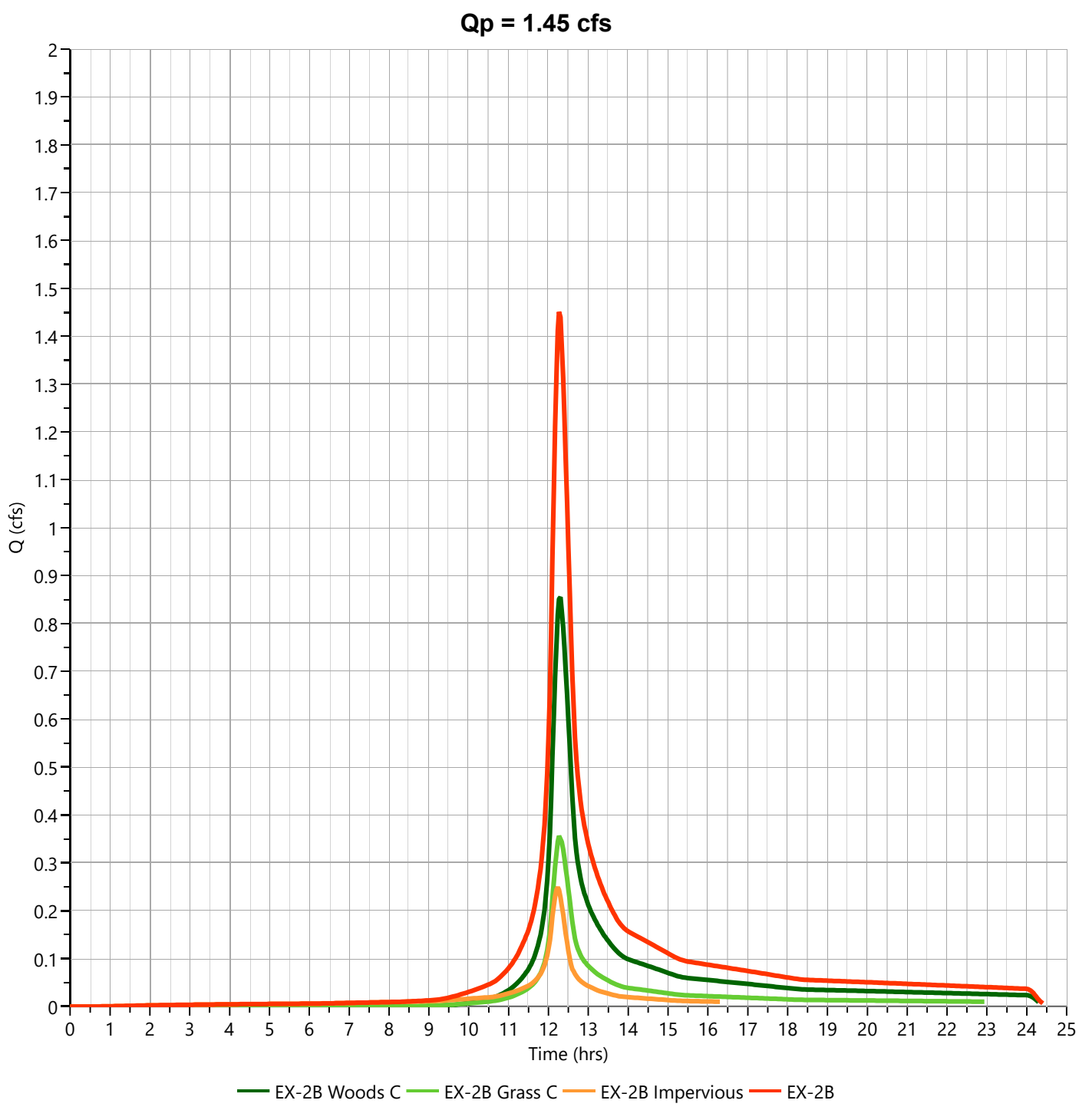
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2B

Hyd. No. 26

Hydrograph Type	= Junction	Peak Flow	= 1.451 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Hydrograph Volume	= 7,373 cuft
Inflow Hydrographs	= 23, 24, 25	Total Contrib. Area	= 0.75 ac



Hydrograph Report

Project Name:

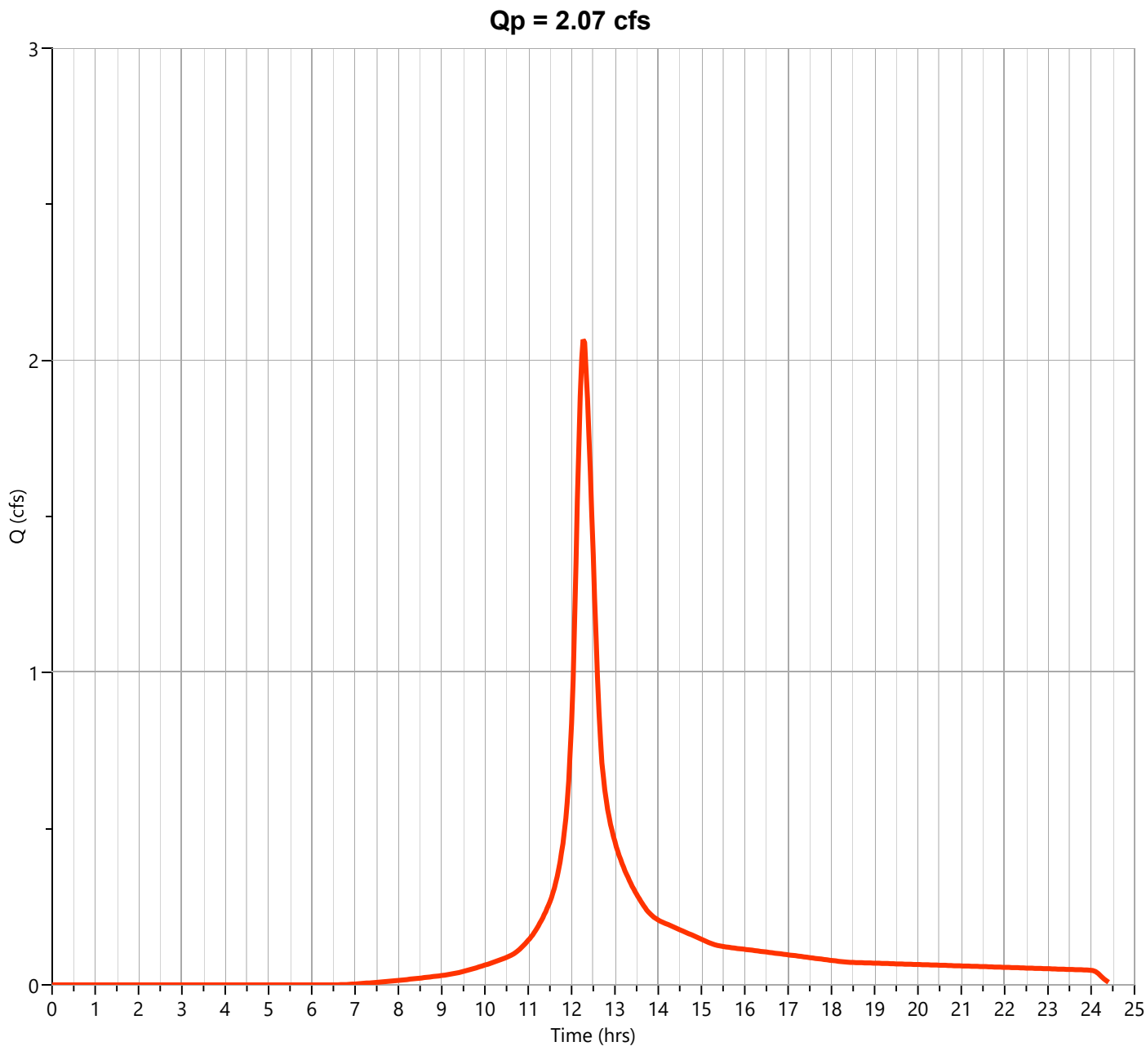
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2B Woods C

Hyd. No. 23

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.066 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Runoff Volume	= 10,280 cuft
Drainage Area	= 0.5 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 23.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

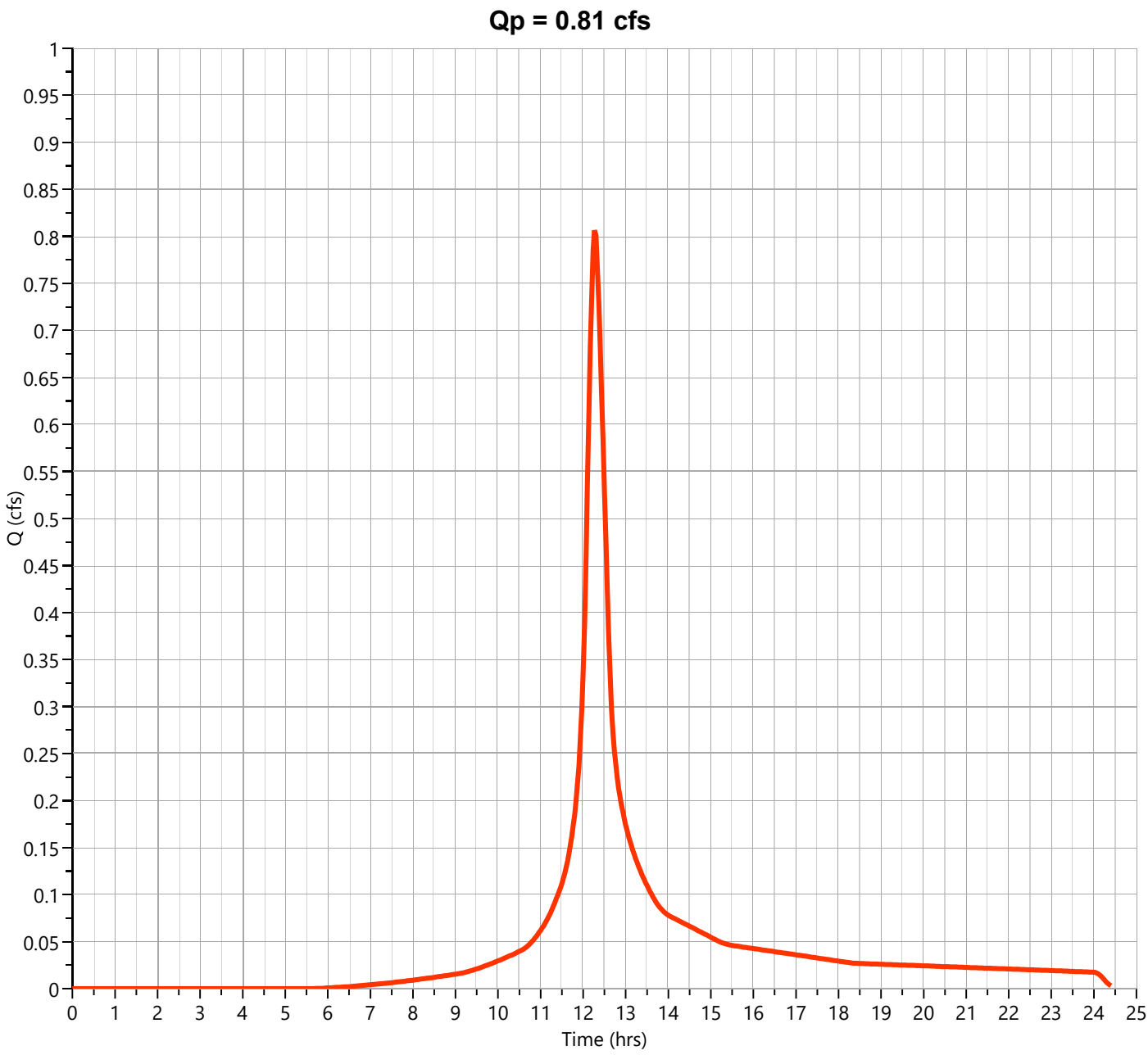
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2B Grass C

Hyd. No. 24

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.806 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Runoff Volume	= 4,035 cuft
Drainage Area	= 0.18 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 23.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

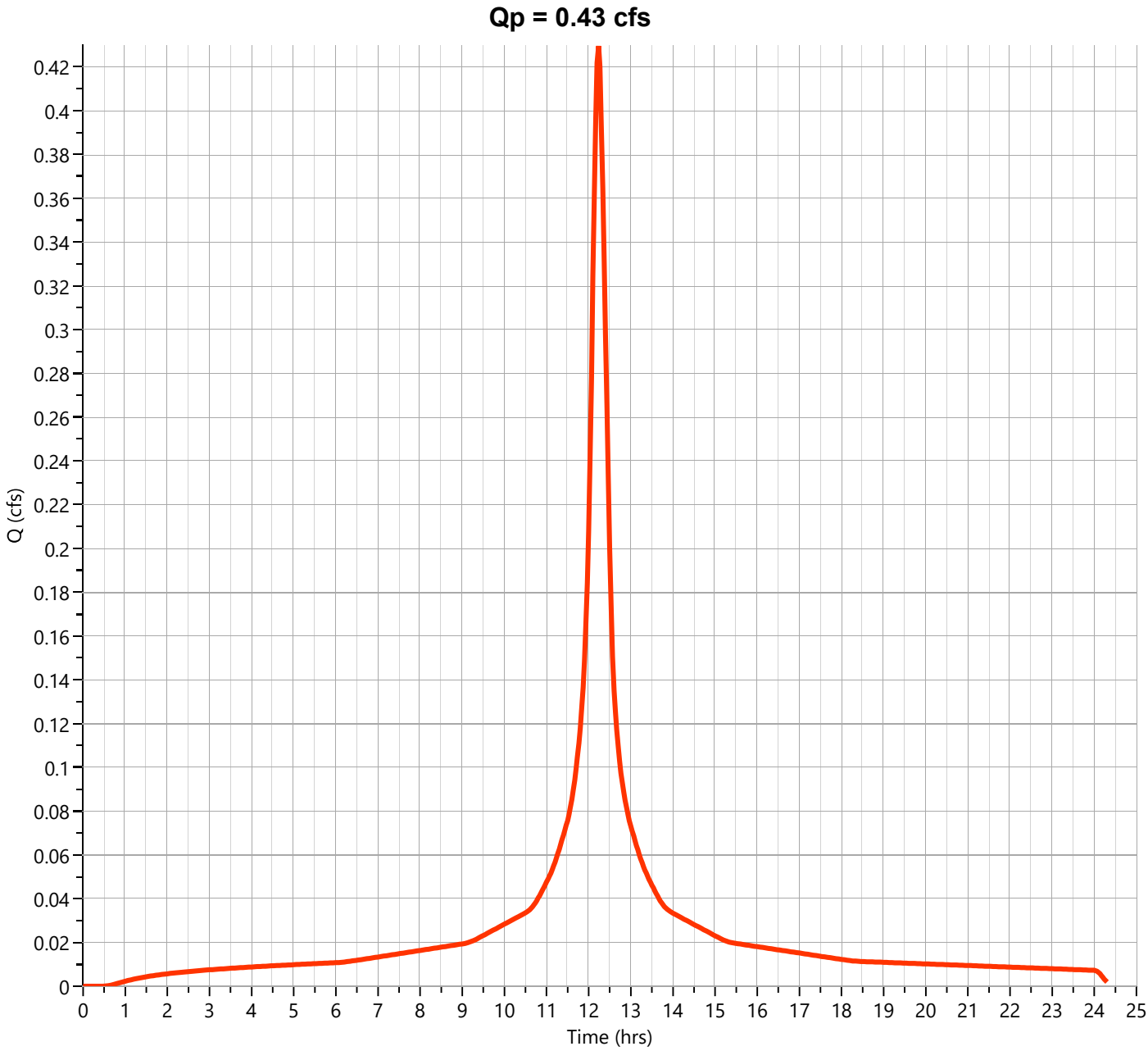
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2B Impervious

Hyd. No. 25

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.430 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 2,292 cuft
Drainage Area	= 0.07 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 20.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

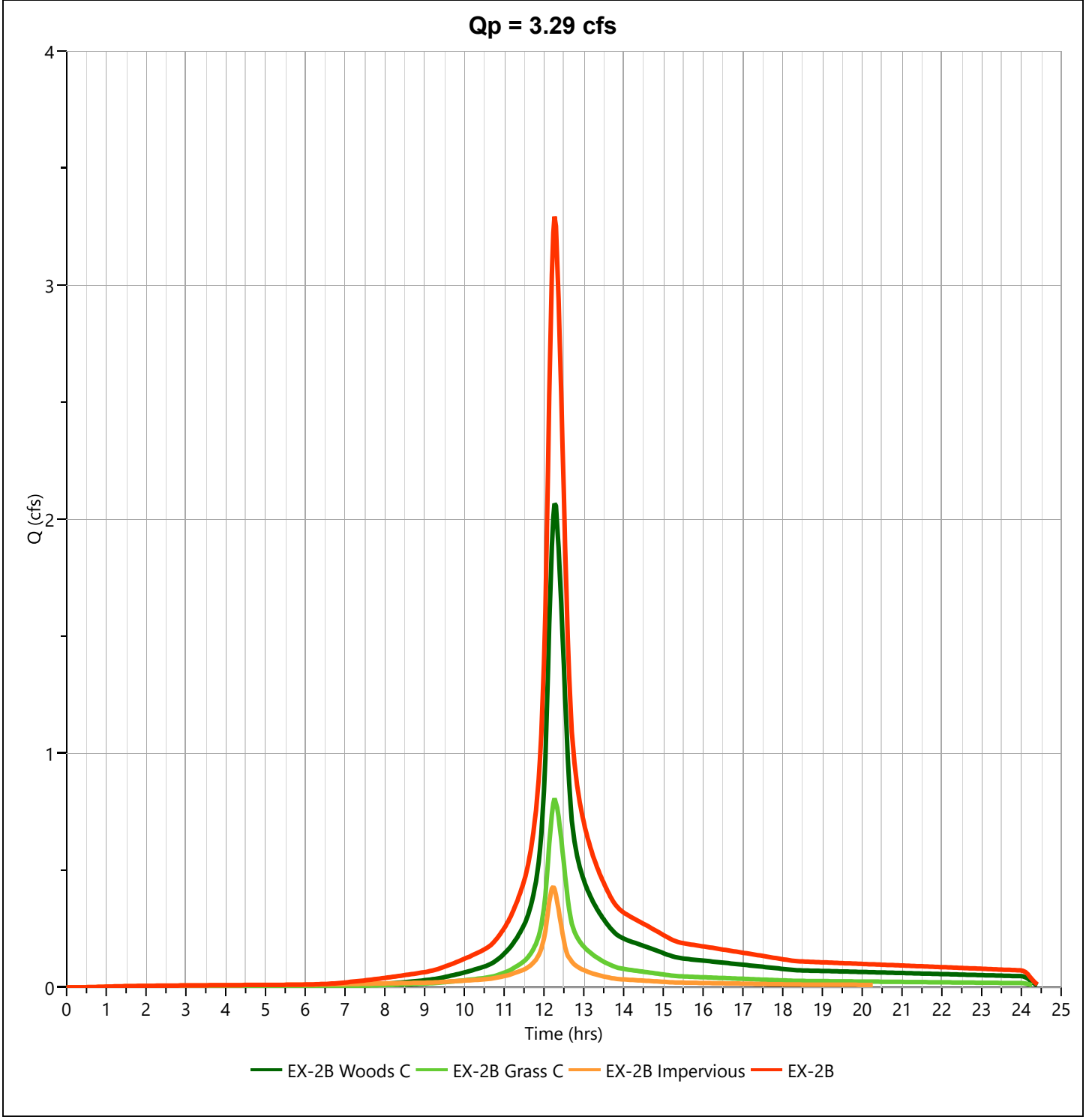
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2B

Hyd. No. 26

Hydrograph Type	= Junction	Peak Flow	= 3.292 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Hydrograph Volume	= 16,607 cuft
Inflow Hydrographs	= 23, 24, 25	Total Contrib. Area	= 0.75 ac



TOTAL EXISTING FLOW TO POA-2

Hydrograph Report

Project Name:

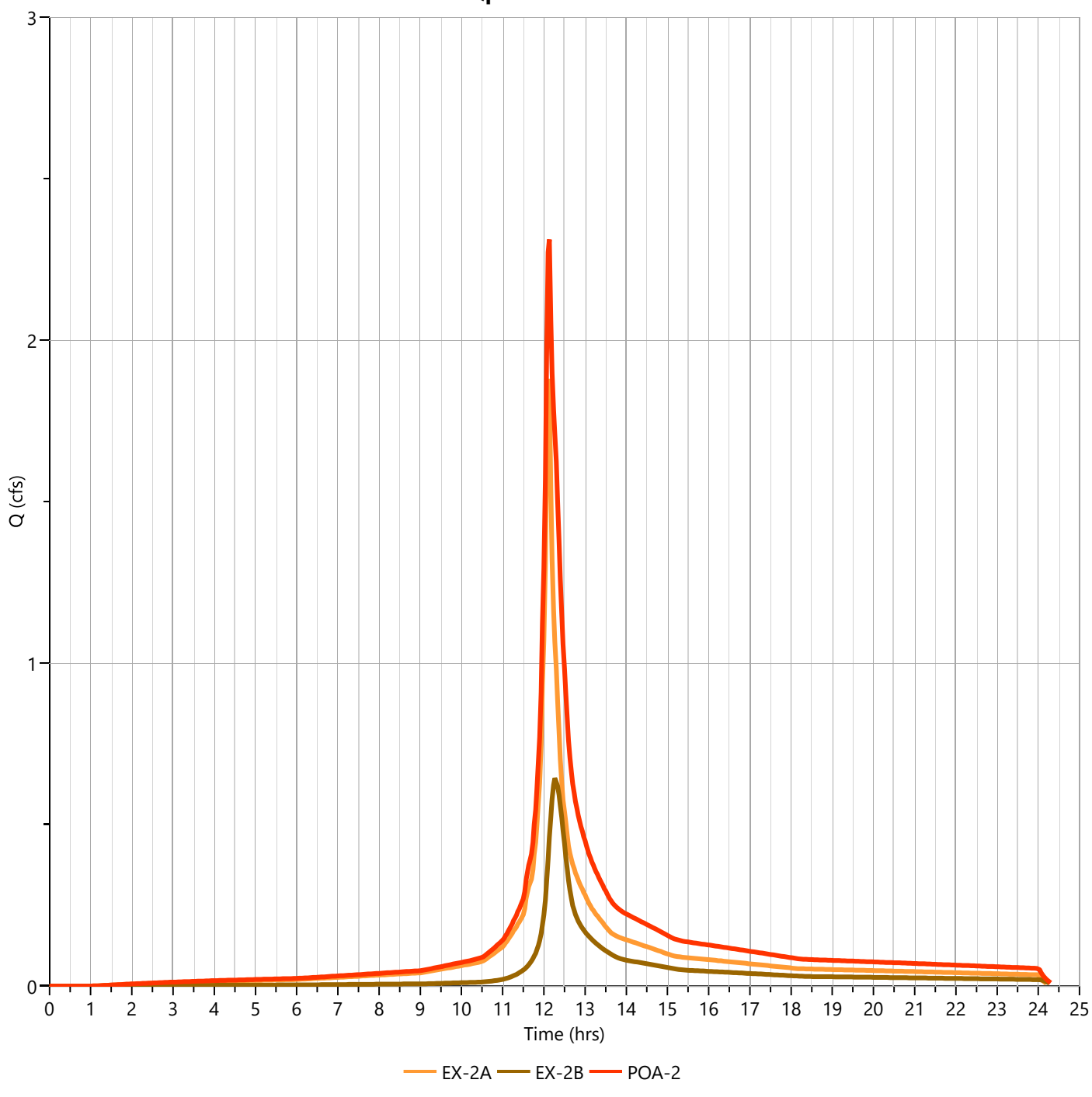
Hydrology Studio v 3.0.0.29

11-29-2023

POA-2

Hyd. No. 28

Hydrograph Type	= Junction	Peak Flow	= 2.311 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 11,249 cuft
Inflow Hydrographs	= 15, 26	Total Contrib. Area	= 1.97 ac



Hydrograph Report

Project Name:

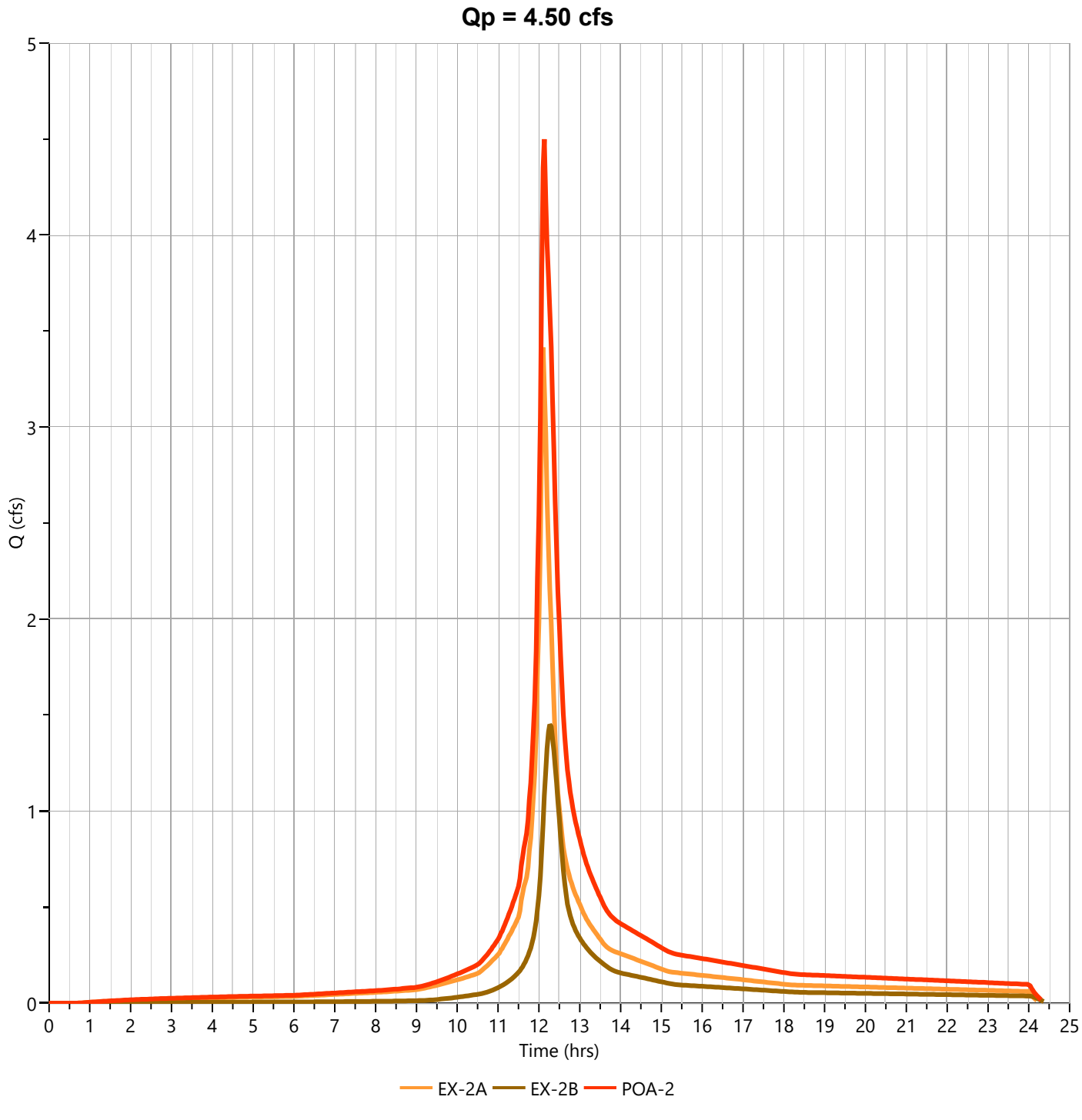
Hydrology Studio v 3.0.0.29

11-29-2023

POA-2

Hyd. No. 28

Hydrograph Type	= Junction	Peak Flow	= 4.499 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 21,880 cuft
Inflow Hydrographs	= 15, 26	Total Contrib. Area	= 1.97 ac



Hydrograph Report

Project Name:

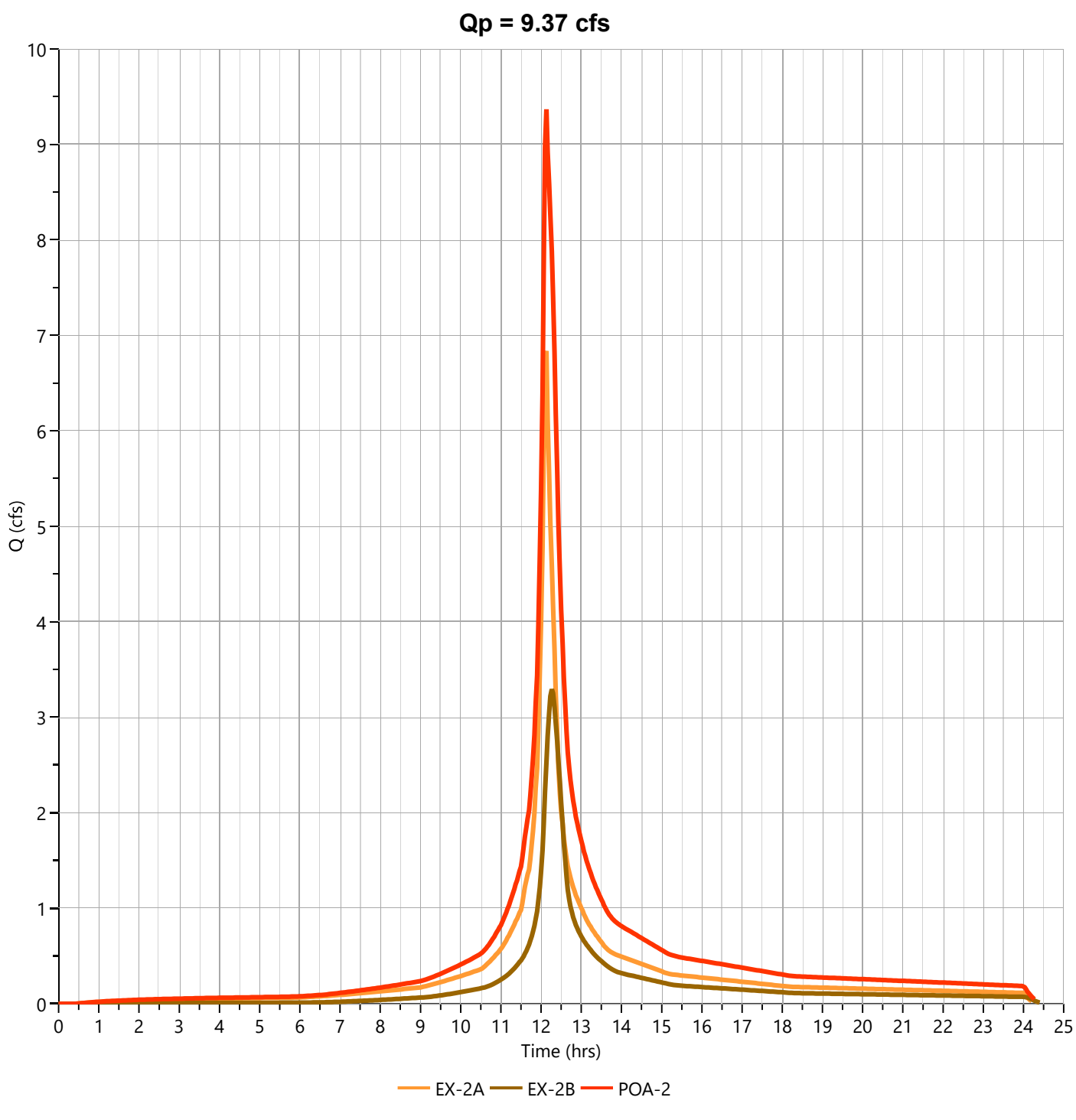
Hydrology Studio v 3.0.0.29

11-29-2023

POA-2

Hyd. No. 28

Hydrograph Type	= Junction	Peak Flow	= 9.365 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 46,043 cuft
Inflow Hydrographs	= 15, 26	Total Contrib. Area	= 1.97 ac



TOTAL ALLOWABLE FLOW TO POA-2

Hydrograph Report

Project Name:

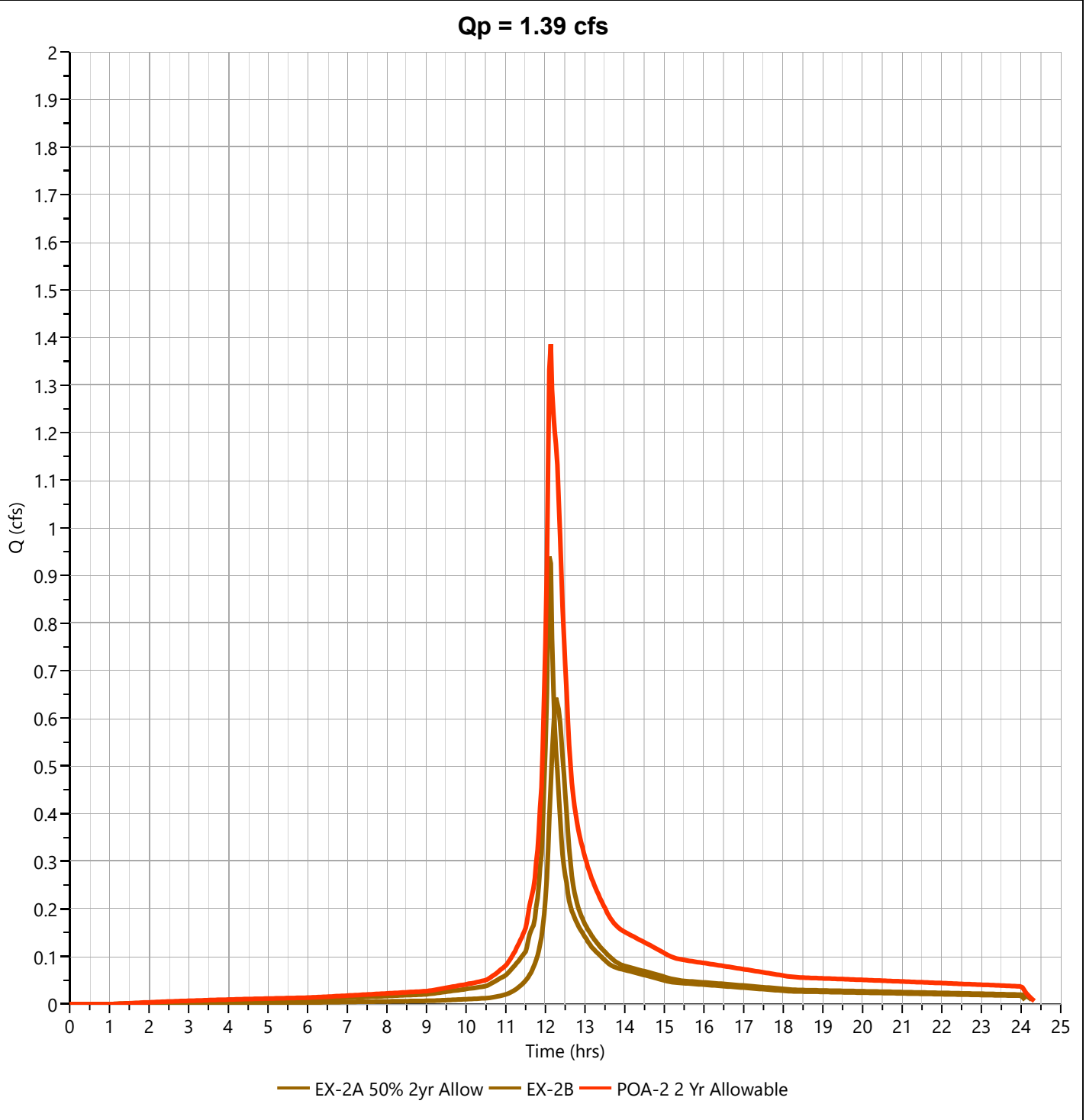
Hydrology Studio v 3.0.0.29

11-29-2023

POA-2 2 Yr Allowable

Hyd. No. 29

Hydrograph Type	= Junction	Peak Flow	= 1.386 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 7,346 cuft
Inflow Hydrographs	= 16, 26	Total Contrib. Area	= 0.75 ac



Hydrograph Report

Project Name:

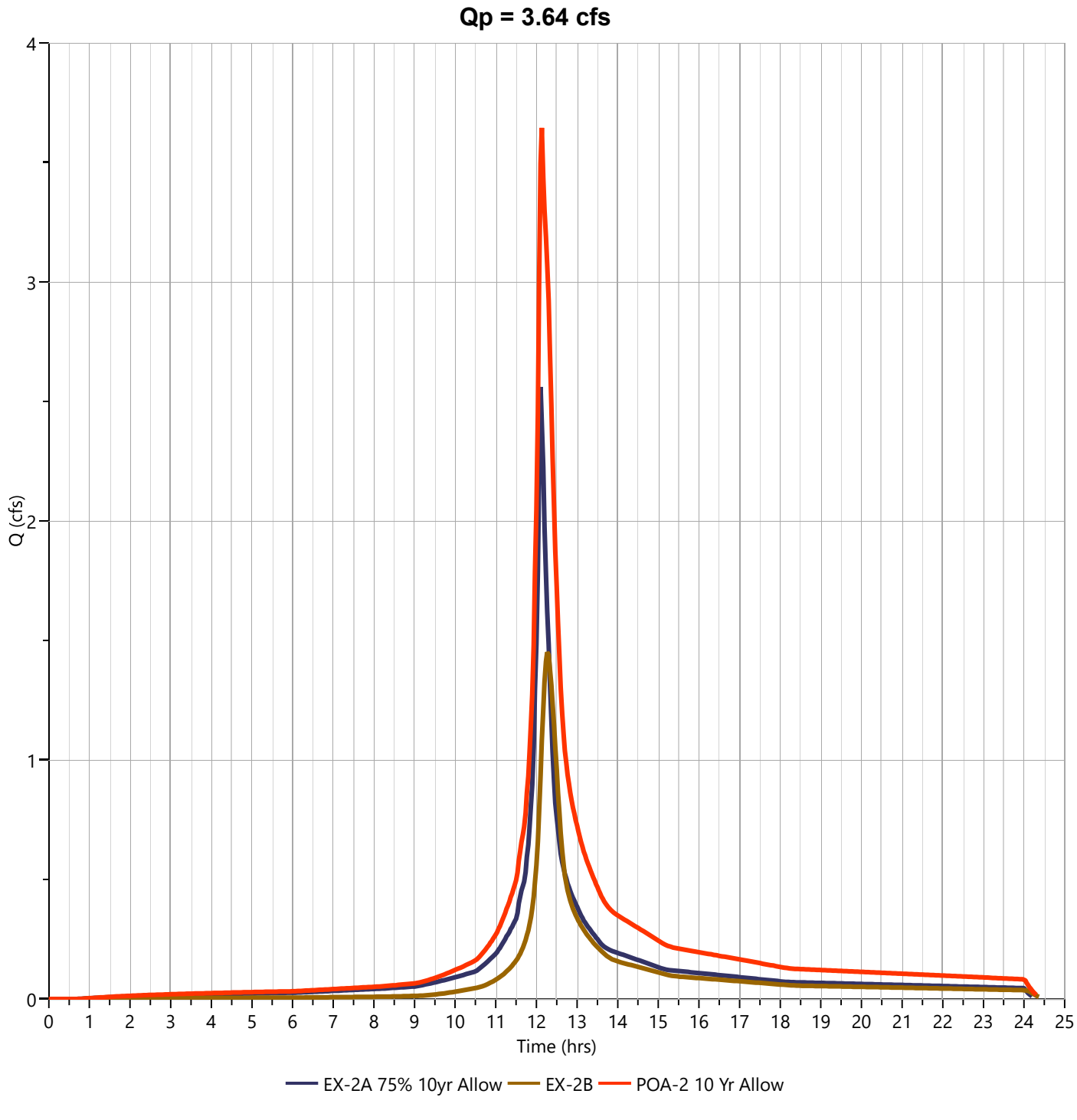
Hydrology Studio v 3.0.0.29

11-29-2023

POA-2 10 Yr Allow

Hyd. No. 30

Hydrograph Type	= Junction	Peak Flow	= 3.644 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 18,253 cuft
Inflow Hydrographs	= 18, 26	Total Contrib. Area	= 0.75 ac



Hydrograph Report

Project Name:

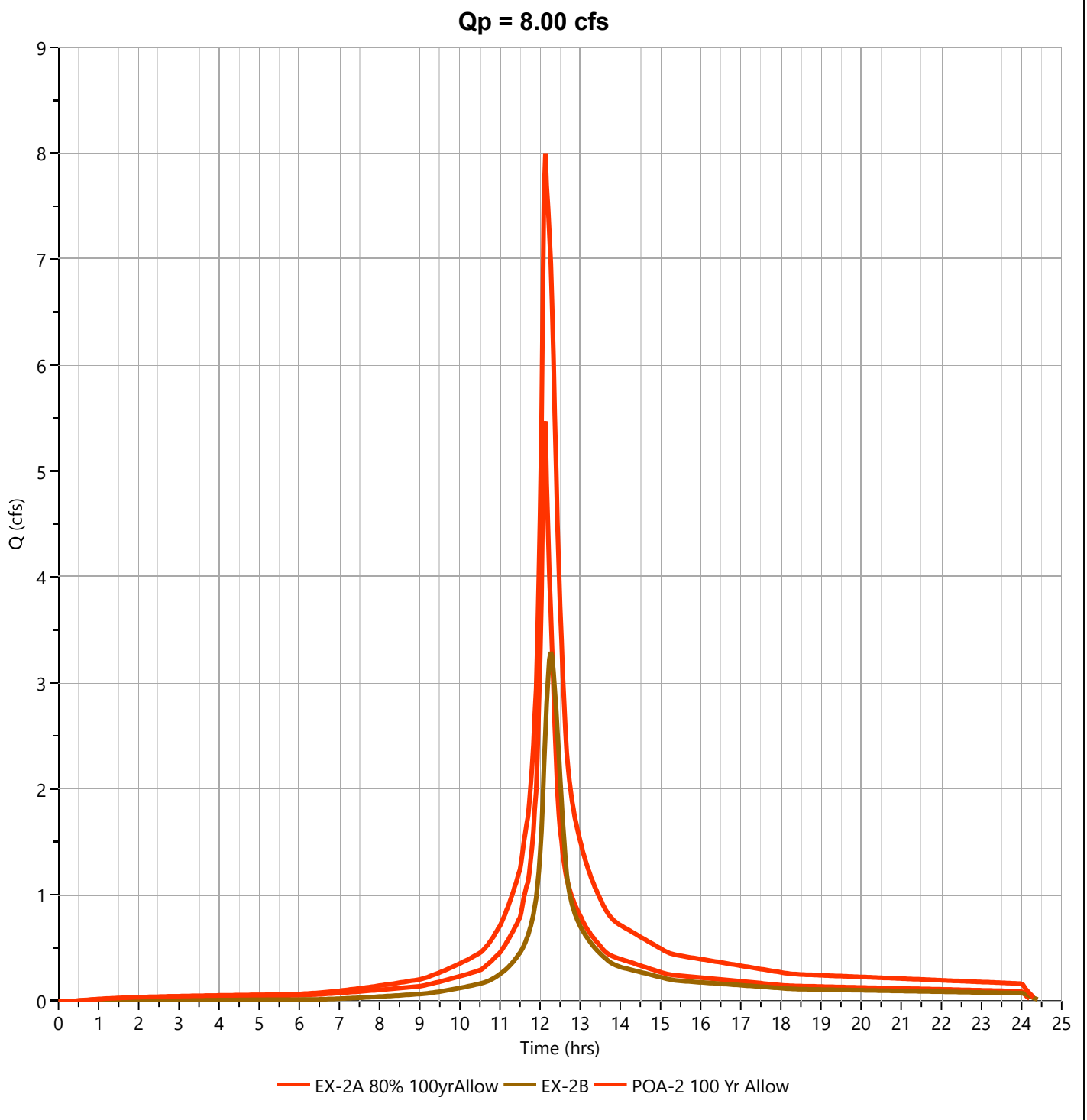
Hydrology Studio v 3.0.0.29

11-29-2023

POA-2 100 Yr Allow

Hyd. No. 31

Hydrograph Type	= Junction	Peak Flow	= 7.998 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 40,155 cuft
Inflow Hydrographs	= 20, 26	Total Contrib. Area	= 0.75 ac



EX-3 WATERSHED (TOTAL EXISTING FLOW TO POA-3)

Project:	**Beacon Unitarian Universalist Church**	**By:**	**SM**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: (**Present**) Developed — **Current Existing Watershed EX-3 Pervious**

Circle One: (**T_c**) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

			Segment ID	1		
1.	Surface Description (NEH table 15-1)			Woods Dense Underbrush		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.40		
3.	Flow Length, L (total L < 100 ft)		ft	100		
4.	Two-year 24-hr rainfall, P_2		in	3.46		
5.	Land Slope, s		ft/ft	0.077		
6.	Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.201	+	+

Sheet Flow Sub-Total: **0.201 hours**

Shallow Concentrated Flow

			Segment ID	2	3	
7.	Surface Description			Woodlands	Pavement	
8.	Flow Length, L		ft	29	217	
9.	Watercourse Slope, s		ft/ft	0.241	0.059	
10.	Average Velocity, V (NEH table 15-3)		ft/s	2.47	4.95	
11.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.003	+ 0.012	+

Shallow Conc. Flow Sub-Total: **0.015 hours**

Channel Flow

			Segment ID			
12.	Flow Length, L		ft			
13.	Cross Sectional flow area, a		ft^2			
14.	Wetted Perimeter, P_w		ft			
15.	Hydraulic Radius, r	$r = a / P_w$	ft			
16.	Channel Slope, s		ft/ft			
17.	Manning's Roughness Coeff., n					
18.	Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s			
19.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr		+	+

Channel Flow Sub-Total: **0.000 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) =	**0.217 hours**
Total Tc (minutes) =	**13 minutes**

Hydrograph Report

Project Name:

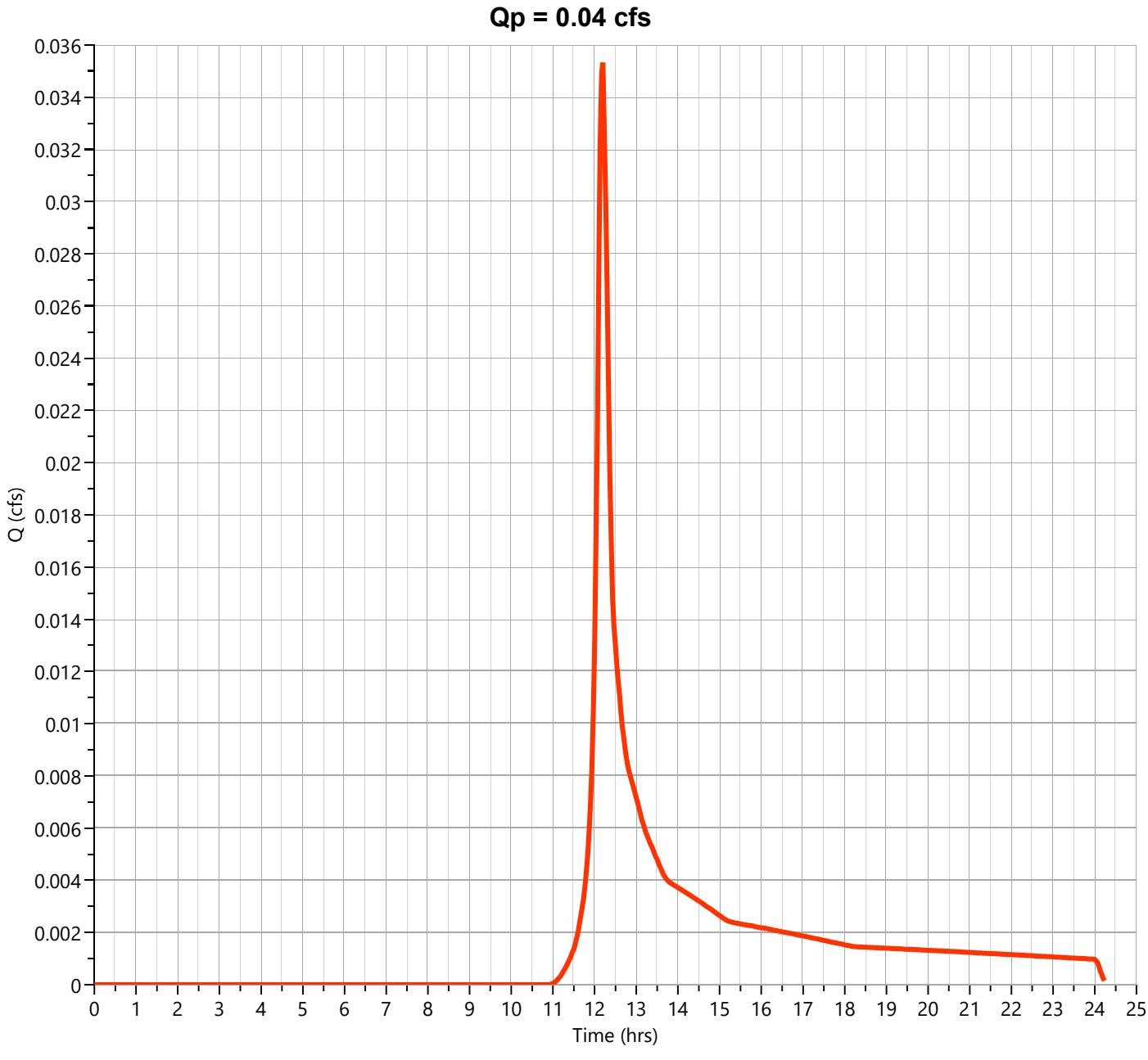
Hydrology Studio v 3.0.0.29

11-29-2023

EX-3 Woods C

Hyd. No. 33

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.035 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 147 cuft
Drainage Area	= 0.04 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 13.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

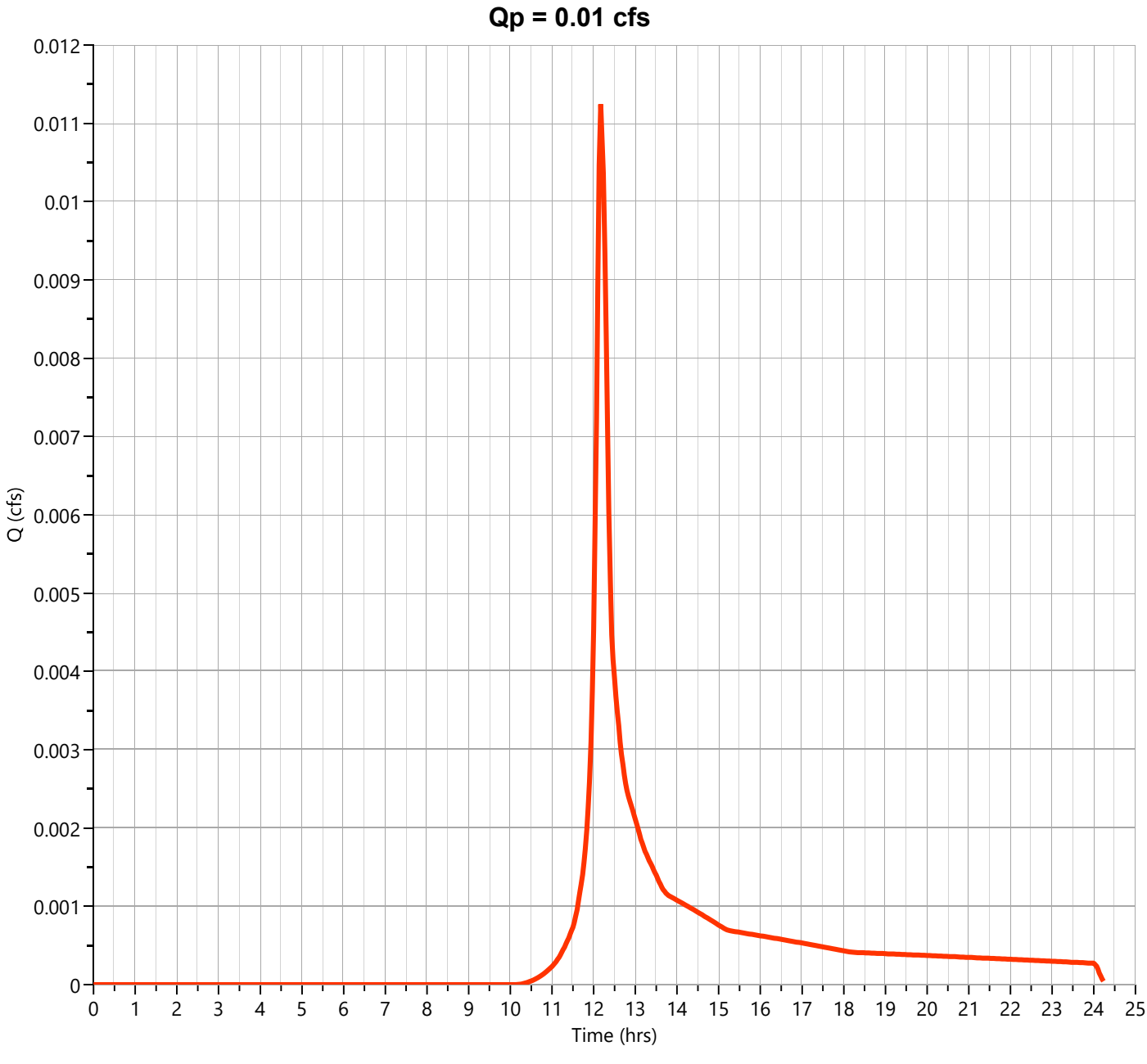
Hydrology Studio v 3.0.0.29

11-29-2023

EX-3 Grass C

Hyd. No. 34

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.011 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 45.4 cuft
Drainage Area	= 0.01 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 13.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

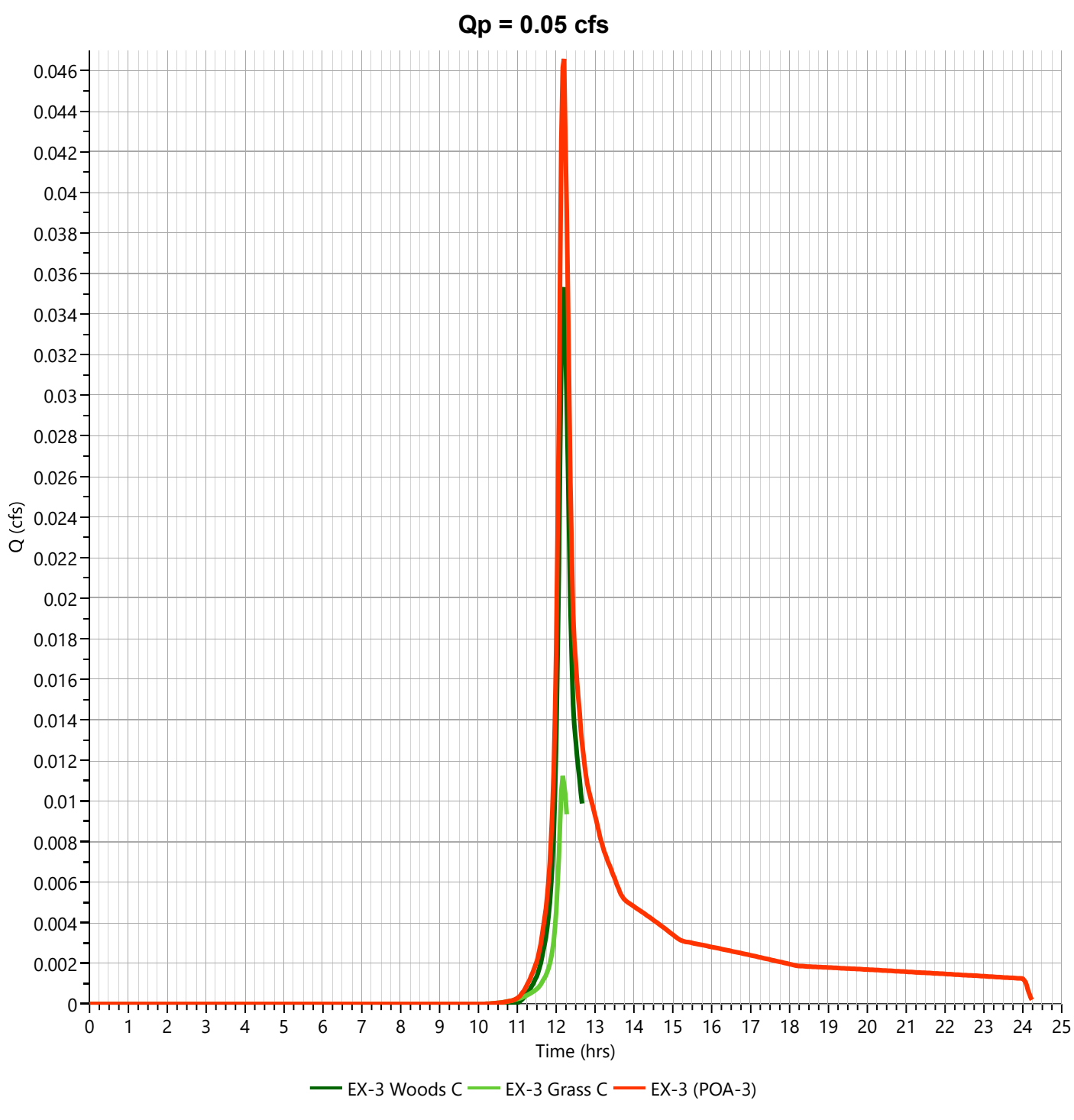
Hydrology Studio v 3.0.0.29

11-29-2023

EX-3 (POA-3)

Hyd. No. 35

Hydrograph Type	= Junction	Peak Flow	= 0.047 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 193 cuft
Inflow Hydrographs	= 33, 34	Total Contrib. Area	= 0.05 ac



Hydrograph Report

Project Name:

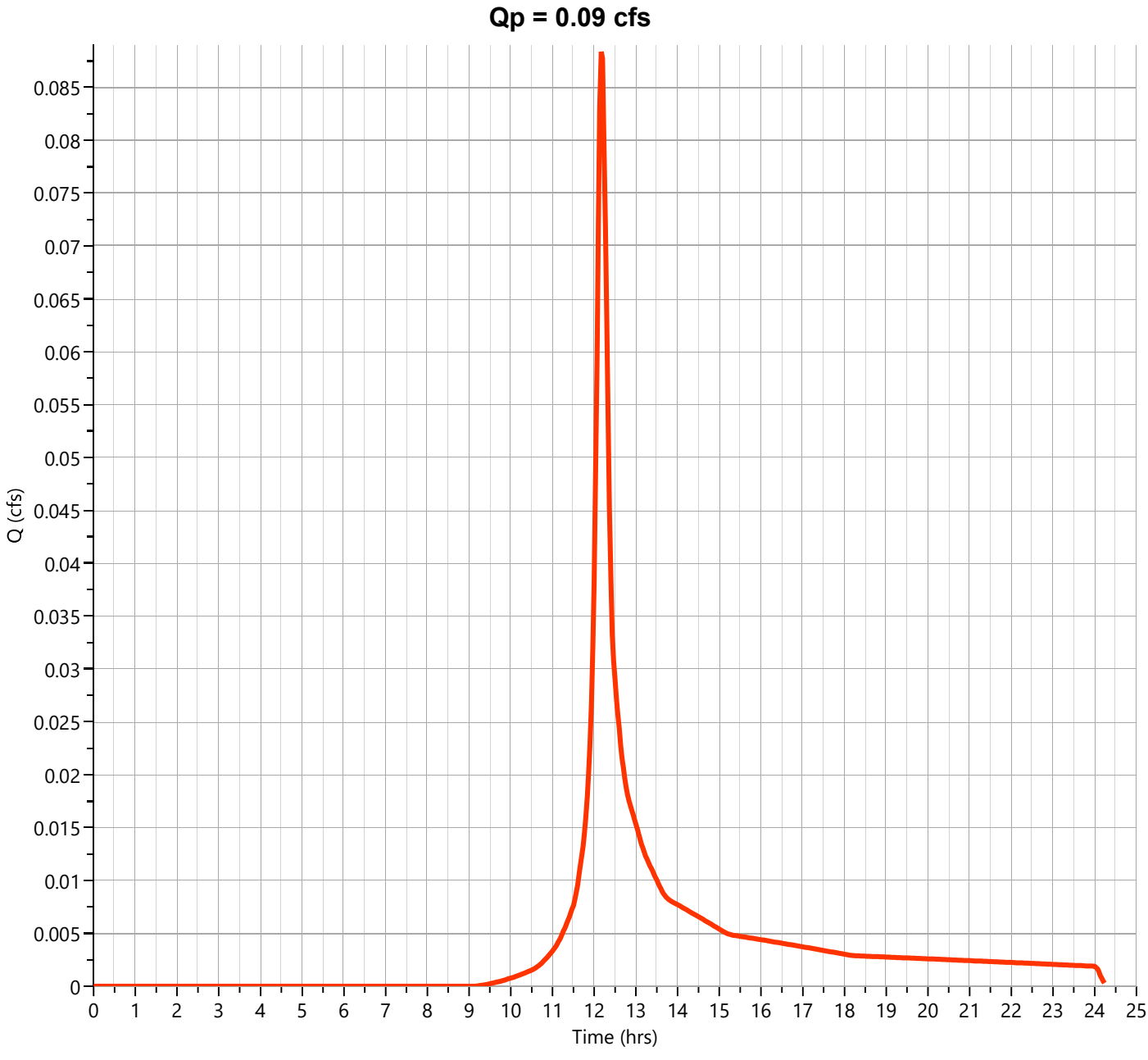
Hydrology Studio v 3.0.0.29

11-29-2023

EX-3 Woods C

Hyd. No. 33

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.088 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 348 cuft
Drainage Area	= 0.04 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 13.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

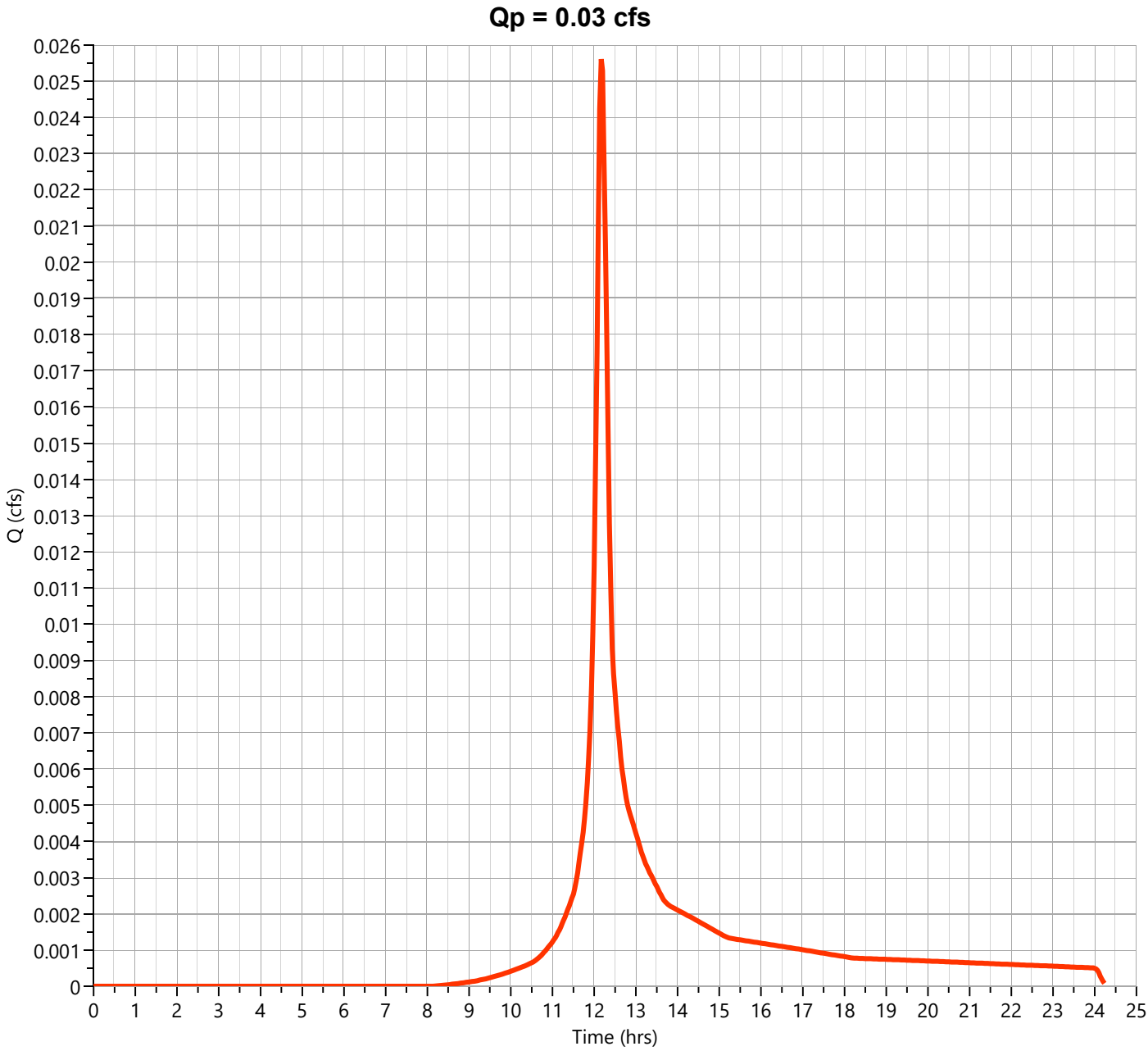
Hydrology Studio v 3.0.0.29

11-29-2023

EX-3 Grass C

Hyd. No. 34

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.026 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 100.0 cuft
Drainage Area	= 0.01 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 13.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

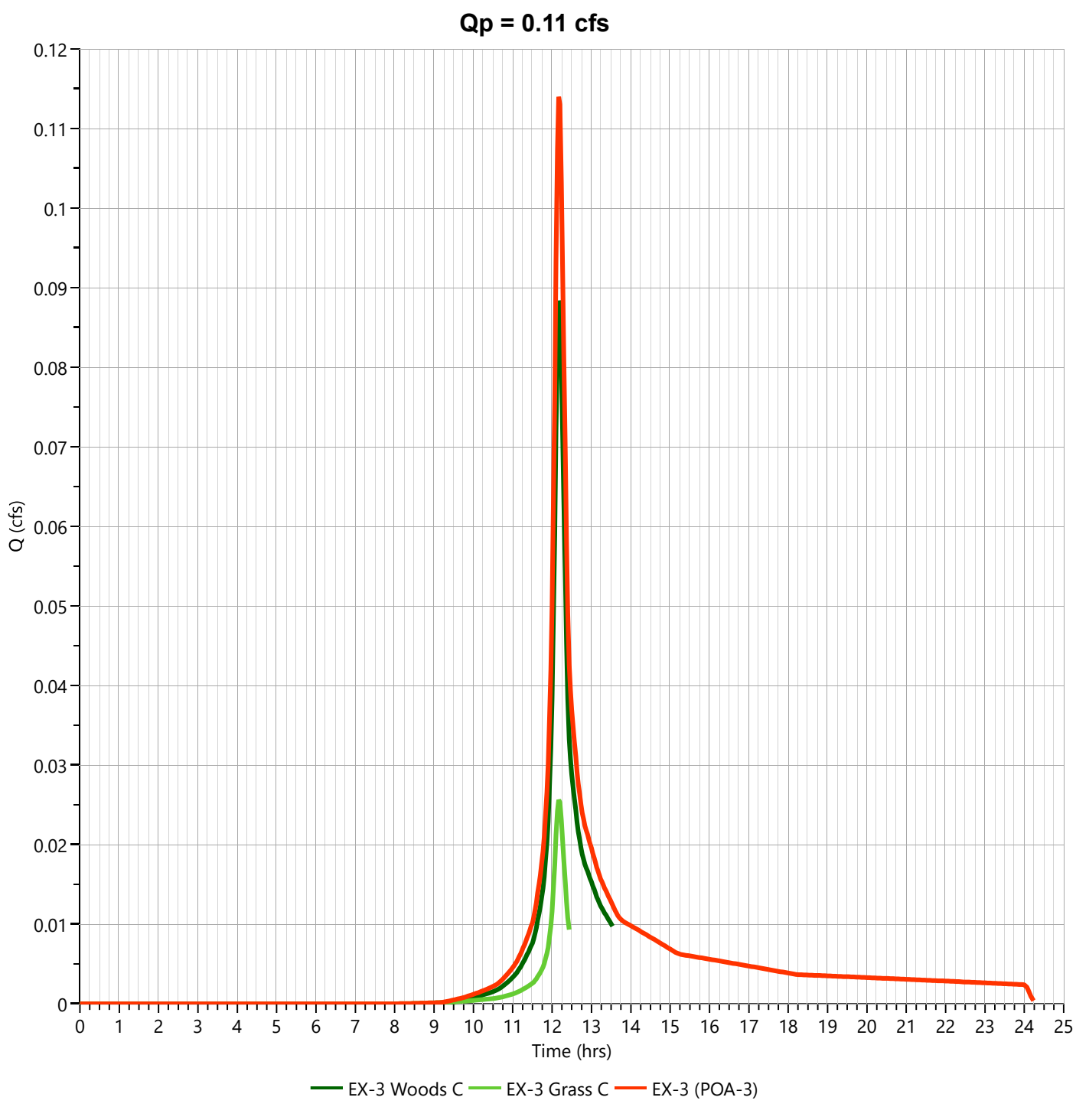
Hydrology Studio v 3.0.0.29

11-29-2023

EX-3 (POA-3)

Hyd. No. 35

Hydrograph Type	= Junction	Peak Flow	= 0.114 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 448 cuft
Inflow Hydrographs	= 33, 34	Total Contrib. Area	= 0.05 ac



Hydrograph Report

Project Name:

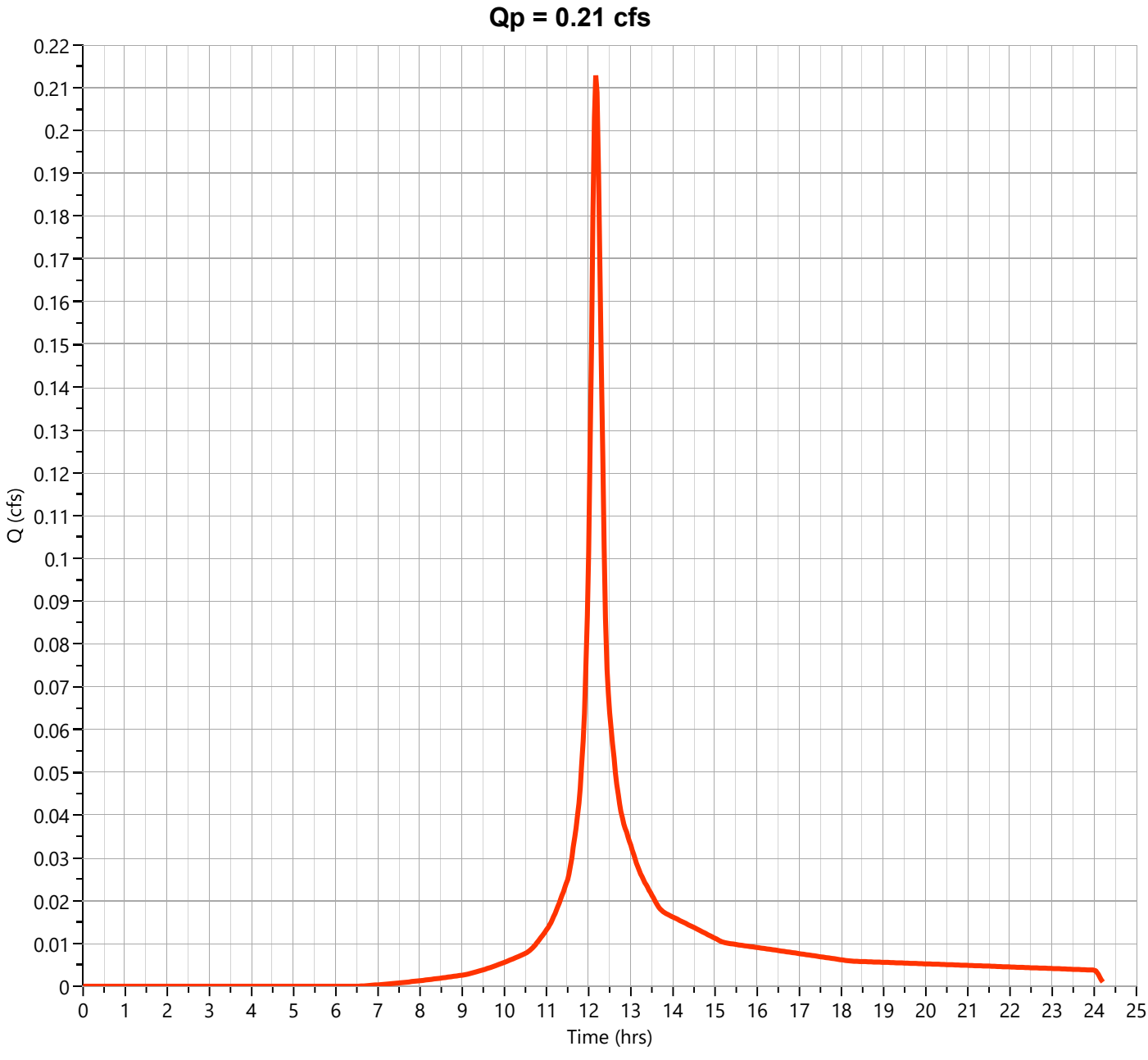
Hydrology Studio v 3.0.0.29

11-29-2023

EX-3 Woods C

Hyd. No. 33

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.213 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 833 cuft
Drainage Area	= 0.04 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 13.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

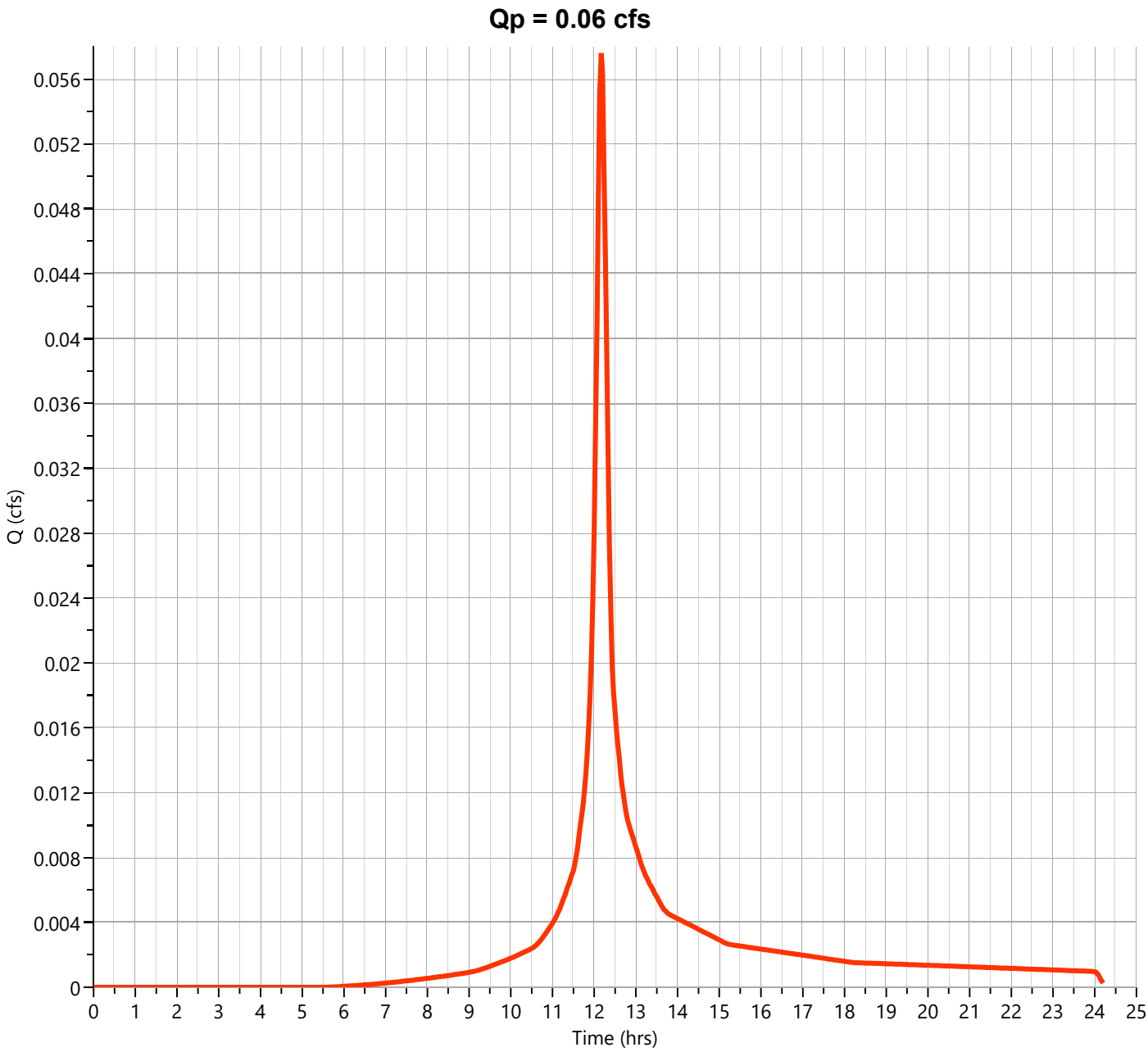
Hydrology Studio v 3.0.0.29

11-29-2023

EX-3 Grass C

Hyd. No. 34

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.058 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 227 cuft
Drainage Area	= 0.01 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 13.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

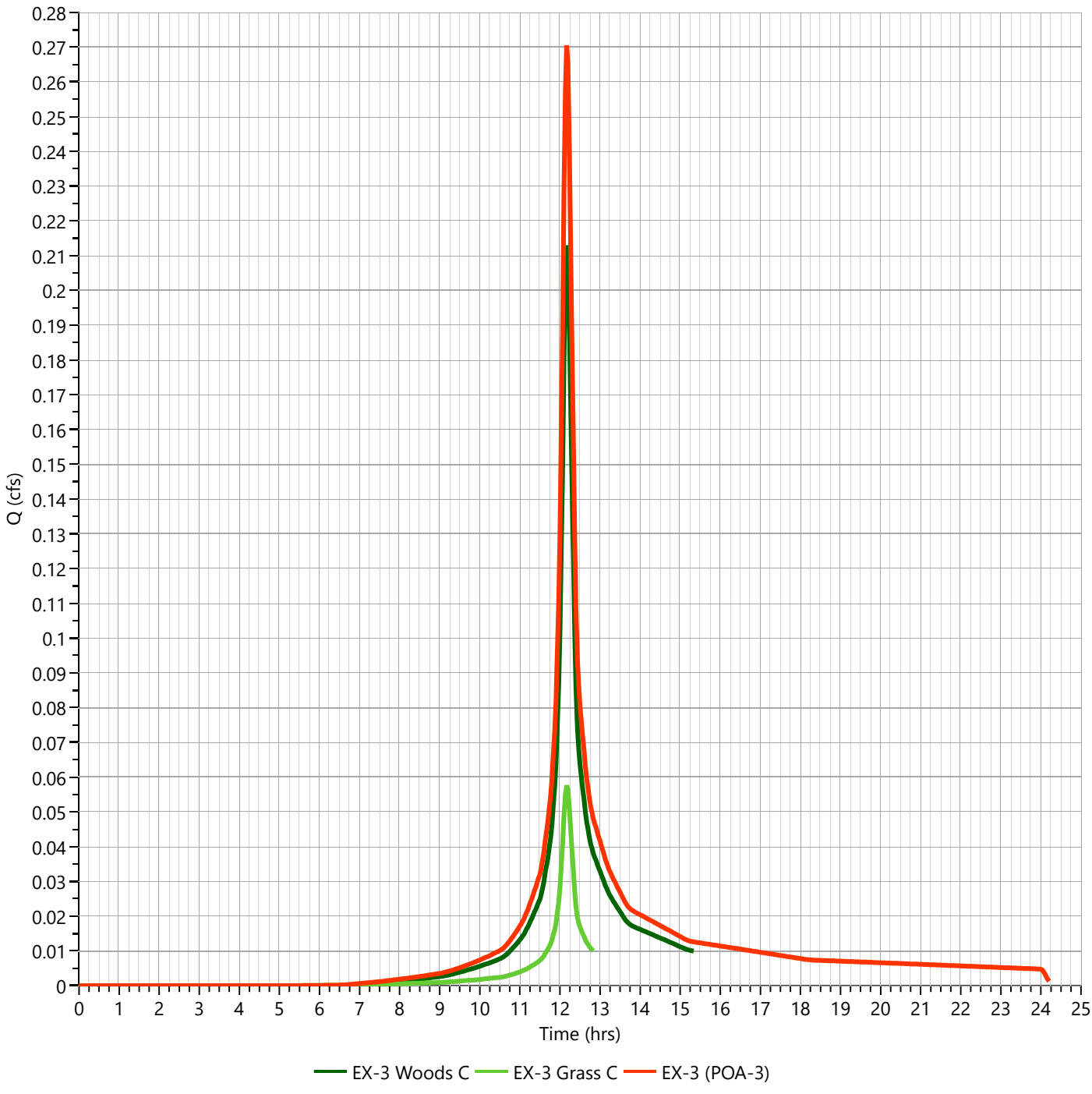
Hydrology Studio v 3.0.0.29

11-29-2023

EX-3 (POA-3)

Hyd. No. 35

Hydrograph Type	= Junction	Peak Flow	= 0.271 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 1,060 cuft
Inflow Hydrographs	= 33, 34	Total Contrib. Area	= 0.05 ac



SUMMARY OF EXISTING PEAK DISCHARGES

Hydrograph 2-yr Summary

Project Name:

11-29-2023

Hydrology Studio v 3.0.0.29

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	EX-1 Woods C	0.097	12.13	357	----		
2	NRCS Runoff	EX-1 Grass C	0.348	12.13	1,232	----		
3	NRCS Runoff	EX-1 Impervious	0.416	12.10	1,427	----		
4	Junction	EX-1 (POA-1)	0.826	12.13	3,017	1, 2, 3		
5	Diversion1	POA-1 50% 2yr Allow	0.413	12.13	1,508	4		
6	Diversion2	<name>	0.413	12.13	1,508	4		
7	Diversion1	POA-1 75% 10yr Allow	0.620	12.13	2,263	4		
8	Diversion2	<name>	0.207	12.13	754	4		
9	Diversion1	POA-1 80% 100yrAllow	0.661	12.13	2,413	4		
10	Diversion2	<name>	0.165	12.13	603	4		
12	NRCS Runoff	EX-2A Woods C	0.357	12.23	1,601	----		
13	NRCS Runoff	EX-2A Grass C	0.318	12.20	1,373	----		
14	NRCS Runoff	EX-2A Impervious	1.406	12.10	4,831	----		
15	Junction	EX-2A	1.879	12.10	7,806	12, 13, 14		
16	Diversion1	EX-2A 50% 2yr Allow	0.940	12.10	3,903	15		
17	Diversion2	<name>	0.940	12.10	3,903	15		
18	Diversion1	EX-2A 75% 10yr Allow	1.409	12.10	5,854	15		
19	Diversion2	<name>	0.470	12.10	1,951	15		
20	Diversion1	EX-2A 80% 100yrAllow	1.503	12.10	6,245	15		
21	Diversion2	<name>	0.376	12.10	1,561	15		
23	NRCS Runoff	EX-2B Woods C	0.339	12.30	1,817	----		
24	NRCS Runoff	EX-2B Grass C	0.157	12.30	806	----		
25	NRCS Runoff	EX-2B Impervious	0.159	12.23	820	----		
26	Junction	EX-2B	0.643	12.27	3,443	23, 24, 25		
28	Junction	POA-2	2.311	12.13	11,249	15, 26		
29	Junction	POA-2 2 Yr Allowable	1.386	12.13	7,346	16, 26		
30	Junction	POA-2 10 Yr Allow	1.848	12.13	9,297	18, 26		
31	Junction	POA-2 100 Yr Allow	1.941	12.13	9,688	20, 26		
33	NRCS Runoff	EX-3 Woods C	0.035	12.20	147	----		
34	NRCS Runoff	EX-3 Grass C	0.011	12.20	45.4	----		
35	Junction	EX-3 (POA-3)	0.047	12.20	193	33, 34		

Hydrograph 10-yr Summary

Project Name:

11-29-2023

Hydrology Studio v 3.0.0.29

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	EX-1 Woods C	0.243	12.13	843	----		
2	NRCS Runoff	EX-1 Grass C	0.788	12.13	2,715	----		
3	NRCS Runoff	EX-1 Impervious	0.650	12.10	2,275	----		
4	Junction	EX-1 (POA-1)	1.628	12.13	5,833	1, 2, 3		
5	Diversion1	POA-1 50% 2yr Allow	0.814	12.13	2,916	4		
6	Diversion2	<name>	0.814	12.13	2,916	4		
7	Diversion1	POA-1 75% 10yr Allow	1.221	12.13	4,375	4		
8	Diversion2	<name>	0.407	12.13	1,458	4		
9	Diversion1	POA-1 80% 100yrAllow	1.303	12.13	4,666	4		
10	Diversion2	<name>	0.326	12.13	1,167	4		
12	NRCS Runoff	EX-2A Woods C	0.898	12.20	3,781	----		
13	NRCS Runoff	EX-2A Grass C	0.725	12.20	3,025	----		
14	NRCS Runoff	EX-2A Impervious	2.200	12.10	7,700	----		
15	Junction	EX-2A	3.418	12.13	14,506	12, 13, 14		
16	Diversion1	EX-2A 50% 2yr Allow	1.709	12.13	7,253	15		
17	Diversion2	<name>	1.709	12.13	7,253	15		
18	Diversion1	EX-2A 75% 10yr Allow	2.564	12.13	10,880	15		
19	Diversion2	<name>	0.855	12.13	3,627	15		
20	Diversion1	EX-2A 80% 100yrAllow	2.735	12.13	11,605	15		
21	Diversion2	<name>	0.684	12.13	2,901	15		
23	NRCS Runoff	EX-2B Woods C	0.855	12.30	4,290	----		
24	NRCS Runoff	EX-2B Grass C	0.357	12.30	1,776	----		
25	NRCS Runoff	EX-2B Impervious	0.249	12.23	1,307	----		
26	Junction	EX-2B	1.451	12.27	7,373	23, 24, 25		
28	Junction	POA-2	4.499	12.13	21,880	15, 26		
29	Junction	POA-2 2 Yr Allowable	2.790	12.13	14,626	16, 26		
30	Junction	POA-2 10 Yr Allow	3.644	12.13	18,253	18, 26		
31	Junction	POA-2 100 Yr Allow	3.815	12.13	18,978	20, 26		
33	NRCS Runoff	EX-3 Woods C	0.088	12.17	348	----		
34	NRCS Runoff	EX-3 Grass C	0.026	12.17	100.0	----		
35	Junction	EX-3 (POA-3)	0.114	12.17	448	33, 34		

Hydrograph 100-yr Summary

Project Name:

11-29-2023

Hydrology Studio v 3.0.0.29

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	EX-1 Woods C	0.583	12.13	2,020	----		
2	NRCS Runoff	EX-1 Grass C	1.765	12.13	6,166	----		
3	NRCS Runoff	EX-1 Impervious	1.122	12.10	3,990	----		
4	Junction	EX-1 (POA-1)	3.379	12.13	12,176	1, 2, 3		
5	Diversion1	POA-1 50% 2yr Allow	1.689	12.13	6,088	4		
6	Diversion2	<name>	1.689	12.13	6,088	4		
7	Diversion1	POA-1 75% 10yr Allow	2.534	12.13	9,132	4		
8	Diversion2	<name>	0.845	12.13	3,044	4		
9	Diversion1	POA-1 80% 100yrAllow	2.703	12.13	9,741	4		
10	Diversion2	<name>	0.676	12.13	2,435	4		
12	NRCS Runoff	EX-2A Woods C	2.166	12.20	9,060	----		
13	NRCS Runoff	EX-2A Grass C	1.631	12.20	6,871	----		
14	NRCS Runoff	EX-2A Impervious	3.799	12.10	13,506	----		
15	Junction	EX-2A	6.836	12.13	29,436	12, 13, 14		
16	Diversion1	EX-2A 50% 2yr Allow	3.418	12.13	14,718	15		
17	Diversion2	<name>	3.418	12.13	14,718	15		
18	Diversion1	EX-2A 75% 10yr Allow	5.127	12.13	22,077	15		
19	Diversion2	<name>	1.709	12.13	7,359	15		
20	Diversion1	EX-2A 80% 100yrAllow	5.469	12.13	23,549	15		
21	Diversion2	<name>	1.367	12.13	5,887	15		
23	NRCS Runoff	EX-2B Woods C	2.066	12.27	10,280	----		
24	NRCS Runoff	EX-2B Grass C	0.806	12.27	4,035	----		
25	NRCS Runoff	EX-2B Impervious	0.430	12.23	2,292	----		
26	Junction	EX-2B	3.292	12.27	16,607	23, 24, 25		
28	Junction	POA-2	9.365	12.13	46,043	15, 26		
29	Junction	POA-2 2 Yr Allowable	5.947	12.13	31,325	16, 26		
30	Junction	POA-2 10 Yr Allow	7.656	12.13	38,684	18, 26		
31	Junction	POA-2 100 Yr Allow	7.998	12.13	40,155	20, 26		
33	NRCS Runoff	EX-3 Woods C	0.213	12.17	833	----		
34	NRCS Runoff	EX-3 Grass C	0.058	12.17	227	----		
35	Junction	EX-3 (POA-3)	0.271	12.17	1,060	33, 34		

FUTURE HYDROGRAPH CALCULATIONS

EX-1 WATERSHED (TOTAL EXISTING FLOW TO POA-1)

Project:	**Beacon Unitarian Universalist Church**	**By:**	**SM**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: (**Present**) Developed — **Future Existing Watershed EX-1 Impervious**

Circle One: (**T_c**) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

			Segment ID	1		2		
1.	Surface Description (NEH table 15-1)			Smooth Surfaces		Dense Grasses		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.011		0.24		
3.	Flow Length, L (total L < 100 ft)		ft	51		49		
4.	Two-year 24-hr rainfall, P_2		in	4.12		4.12		
5.	Land Slope, s		ft/ft	0.024		0.093		
6.	Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.010	+	0.064	+	
						Sheet Flow Sub-Total		0.074 hours

Shallow Concentrated Flow

			Segment ID	3				
7.	Surface Description			Pavement				
8.	Flow Length, L		ft	163				
9.	Watercourse Slope, s		ft/ft	0.059				
10.	Average Velocity, V (NEH table 15-3)		ft/s	4.93				
11.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.009	+		+	
						Shallow Conc. Flow Sub-Total		0.009 hours

Channel Flow

			Segment ID					
12.	Flow Length, L		ft					
13.	Cross Sectional flow area, a		ft^2					
14.	Wetted Perimeter, P_w		ft					
15.	Hydraulic Radius, r	$r = a / P_w$	ft					
16.	Channel Slope, s		ft/ft					
17.	Manning's Roughness Coeff., n							
18.	Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s					
19.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr		+		+	
						Channel Flow Sub-Total		0.000 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	**0.083 hours**
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	**5 minutes**

Project:	**Beacon Unitarian Universalist Church**	**By:**	**SM**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: (**Present**) Developed — **Future Existing Watershed EX-1 Pervious**

Circle One: (**T_c**) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

			Segment ID	1		2		
1.	Surface Description (NEH table 15-1)			Woods Dense Underbrush		Smooth Surfaces		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.40		0.011		
3.	Flow Length, L (total L < 100 ft)		ft	44		29		
4.	Two-year 24-hr rainfall, P_2		in	4.12		4.12		
5.	Land Slope, s		ft/ft	0.080		0.043		
6.	Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.093	+	0.005	+	

Sheet Flow Sub-Total **0.098 hours**

Shallow Concentrated Flow

			Segment ID	3				
7.	Surface Description			Pavement				
8.	Flow Length, L		ft	230				
9.	Watercourse Slope, s		ft/ft	0.054				
10.	Average Velocity, V (NEH table 15-3)		ft/s	4.74				
11.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.013	+		+	

Shallow Conc. Flow Sub-Total **0.013 hours**

Channel Flow

			Segment ID					
12.	Flow Length, L		ft					
13.	Cross Sectional flow area, a		ft^2					
14.	Wetted Perimeter, P_w		ft					
15.	Hydraulic Radius, r	$r = a / P_w$	ft					
16.	Channel Slope, s		ft/ft					
17.	Manning's Roughness Coeff., n							
18.	Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s					
19.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr		+		+	

Channel Flow Sub-Total **0.000 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) =	**0.112 hours**
Total Tc (minutes) =	**7 minutes**

Hydrograph Report

Project Name:

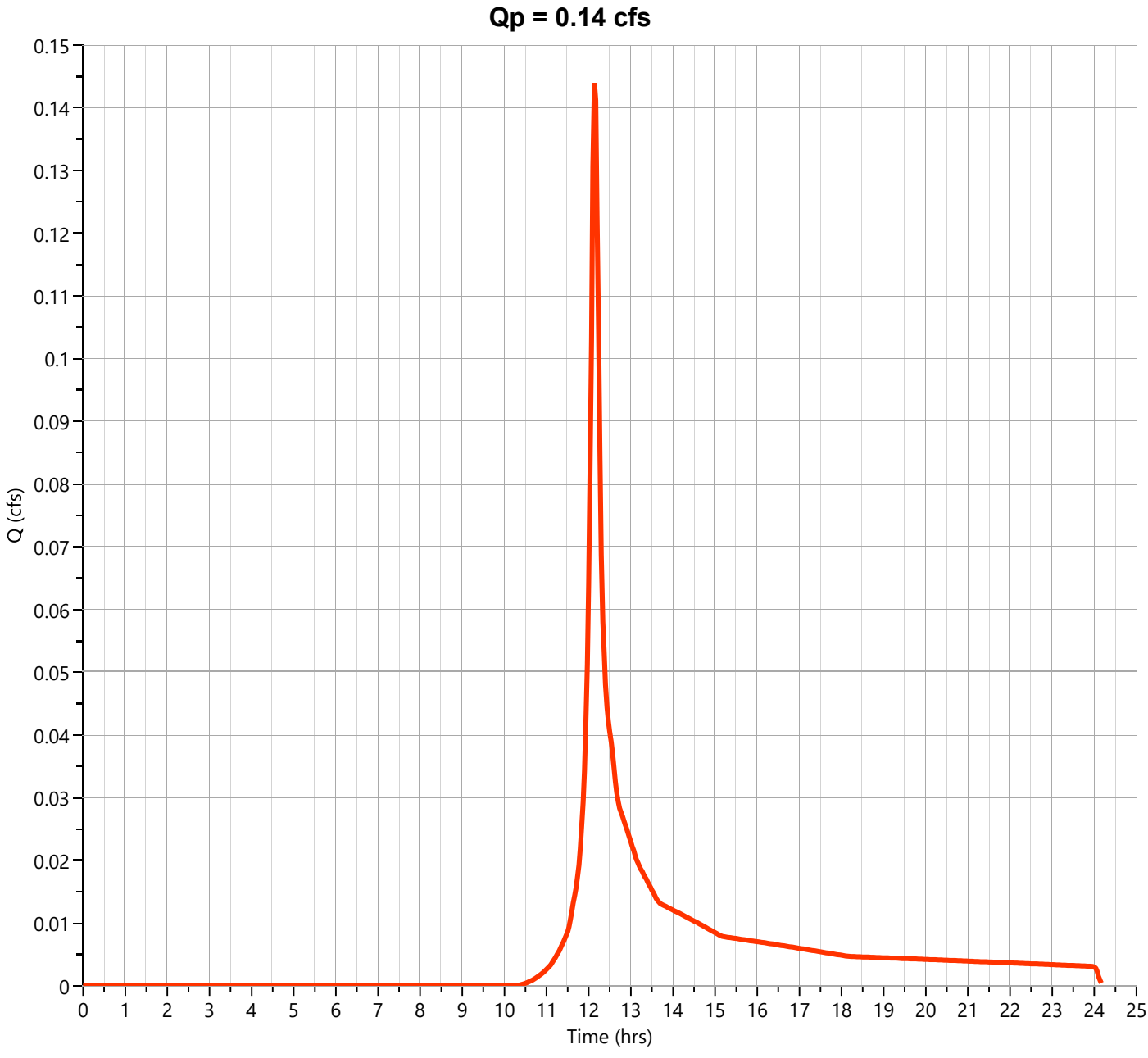
Hydrology Studio v 3.0.0.29

11-29-2023

EX-1 Woods C

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.144 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 512 cuft
Drainage Area	= 0.1 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 7.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

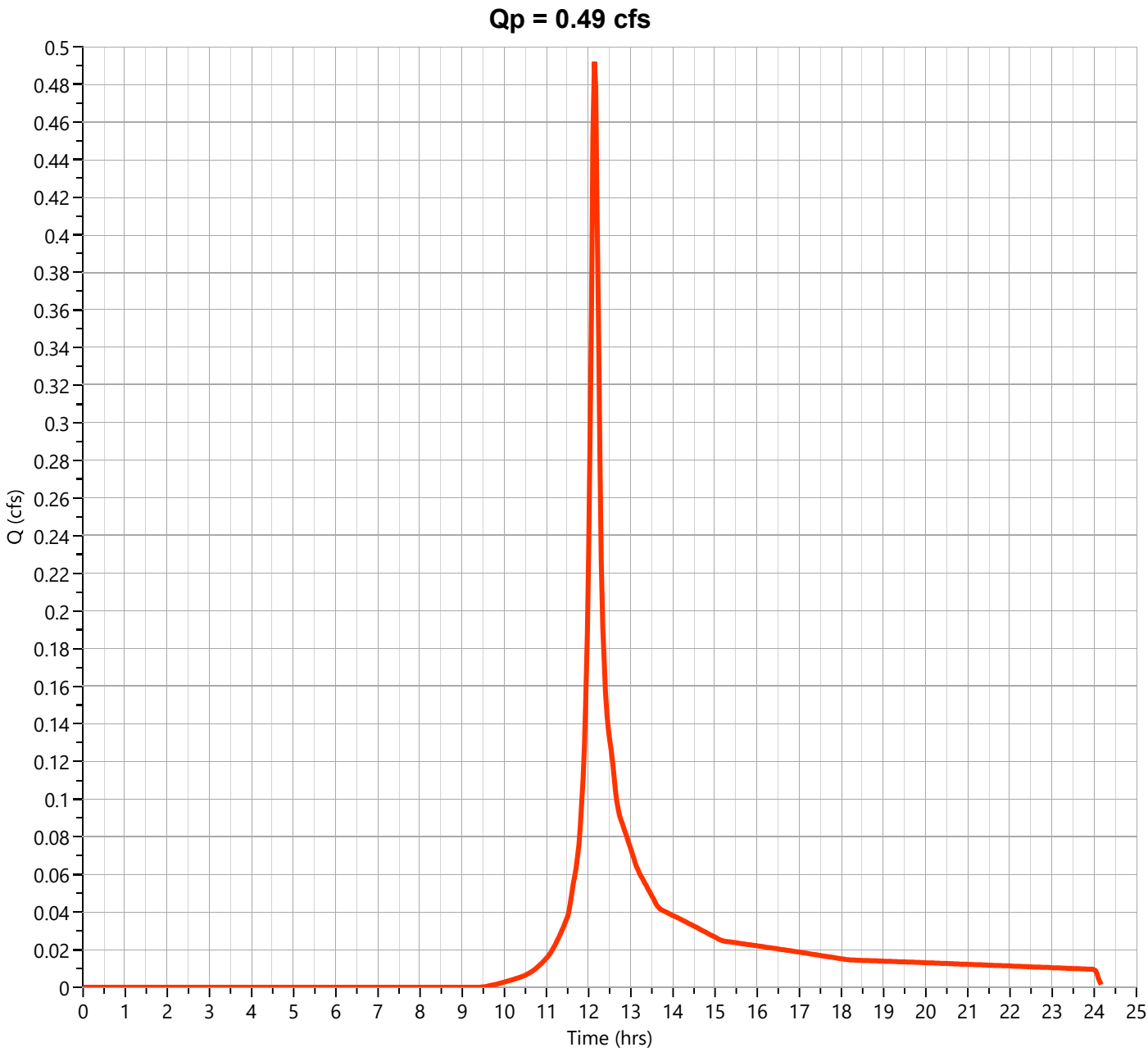
Hydrology Studio v 3.0.0.29

11-29-2023

EX-1 Grass C

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.492 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 1,713 cuft
Drainage Area	= 0.28 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 7.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

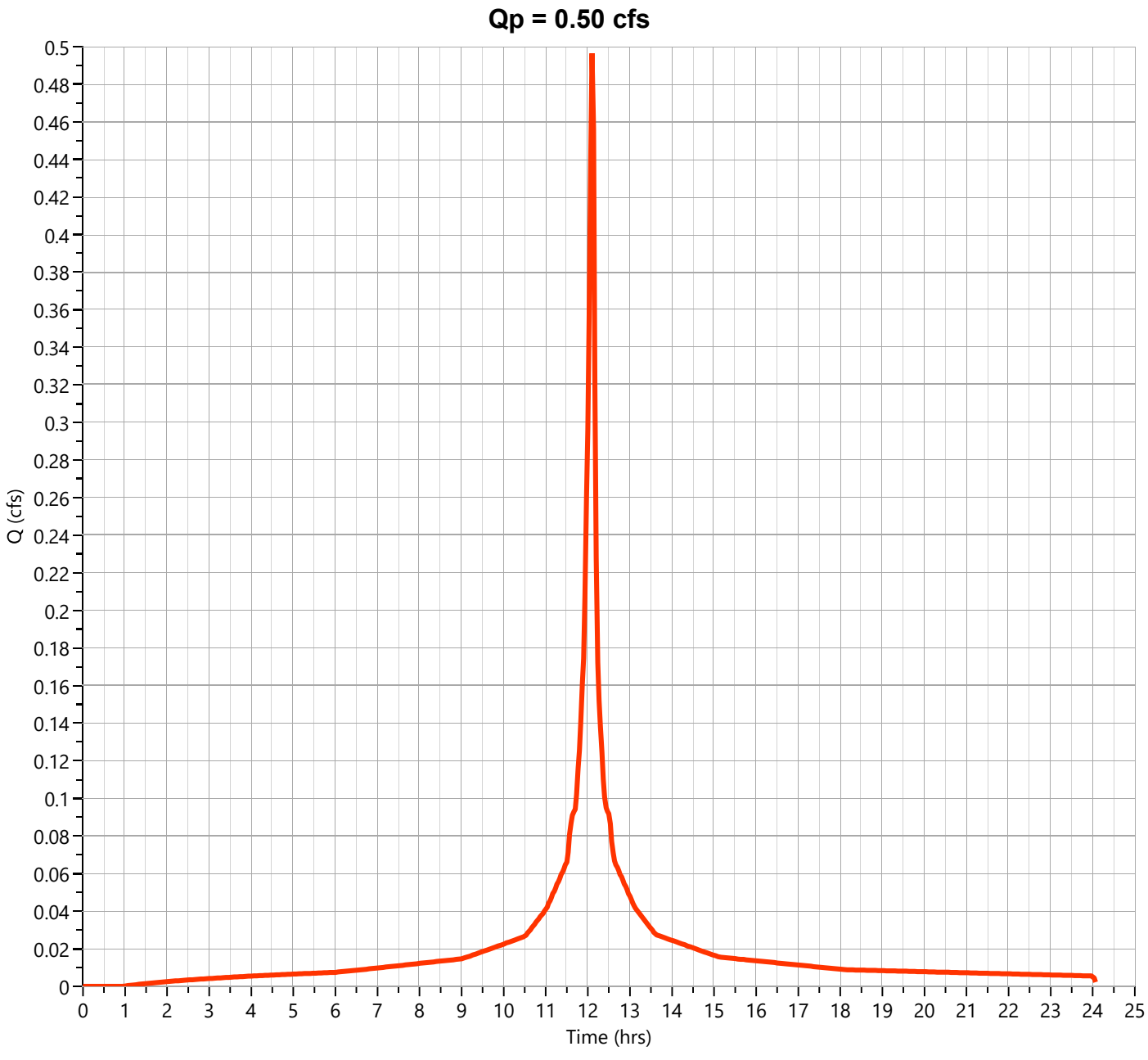
Hydrology Studio v 3.0.0.29

11-29-2023

EX-1 Impervious

Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.496 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 1,719 cuft
Drainage Area	= 0.13 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

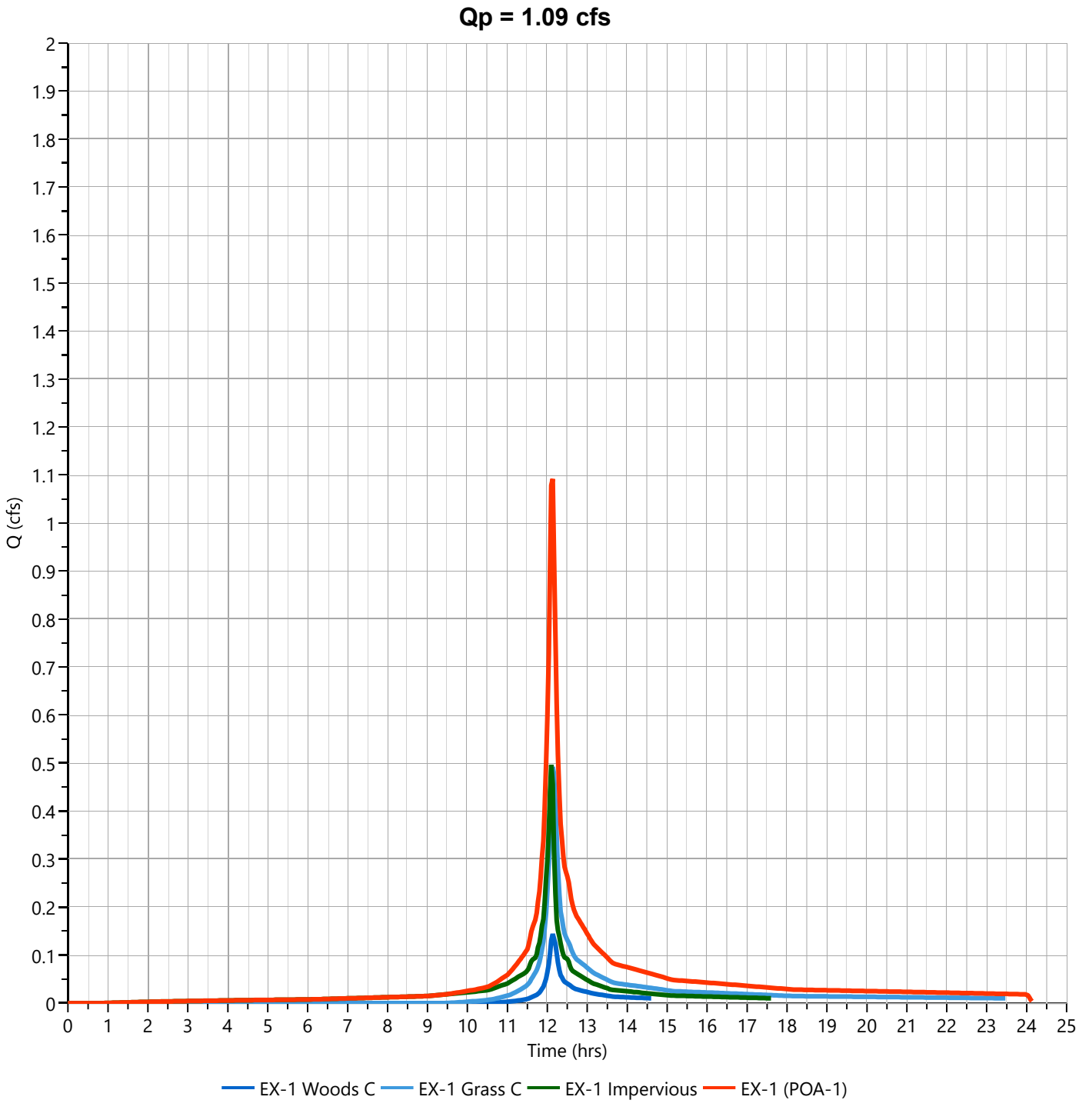
Hydrology Studio v 3.0.0.29

11-29-2023

EX-1 (POA-1)

Hyd. No. 4

Hydrograph Type	= Junction	Peak Flow	= 1.092 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 3,943 cuft
Inflow Hydrographs	= 1, 2, 3	Total Contrib. Area	= 0.51 ac



Hydrograph Report

Project Name:

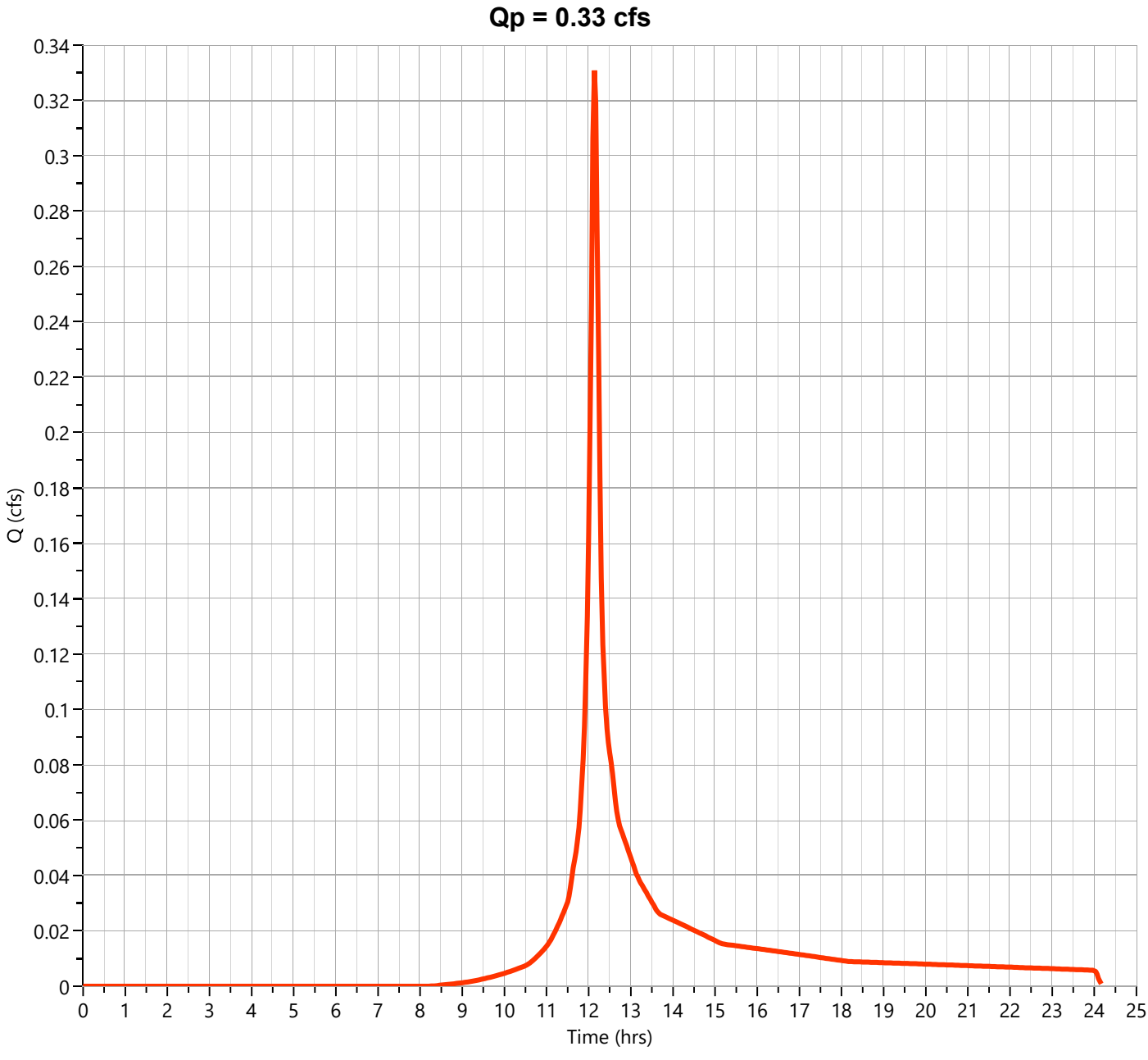
Hydrology Studio v 3.0.0.29

11-29-2023

EX-1 Woods C

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.331 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 1,141 cuft
Drainage Area	= 0.1 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 7.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

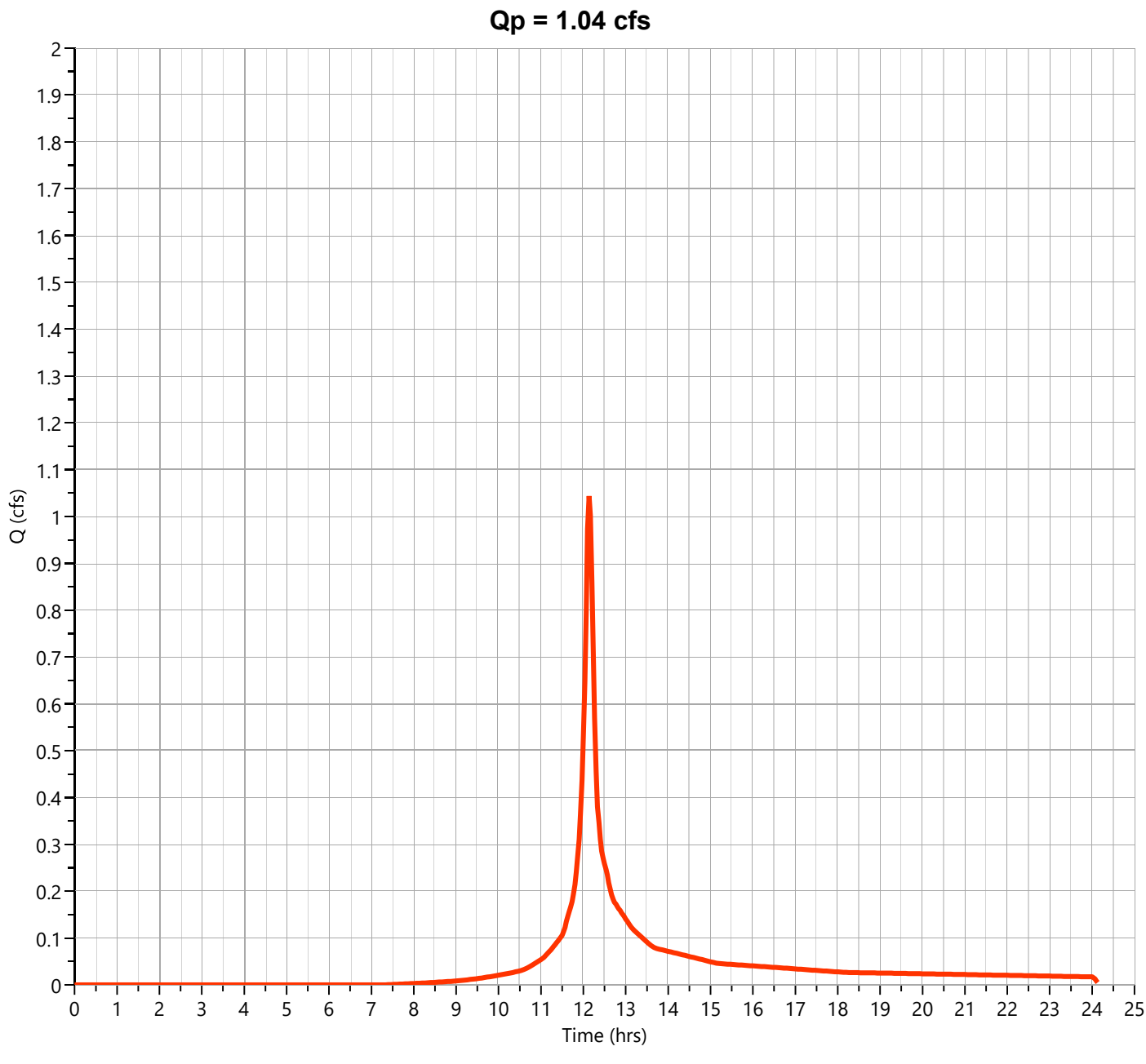
Hydrology Studio v 3.0.0.29

11-29-2023

EX-1 Grass C

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.043 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 3,599 cuft
Drainage Area	= 0.28 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 7.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

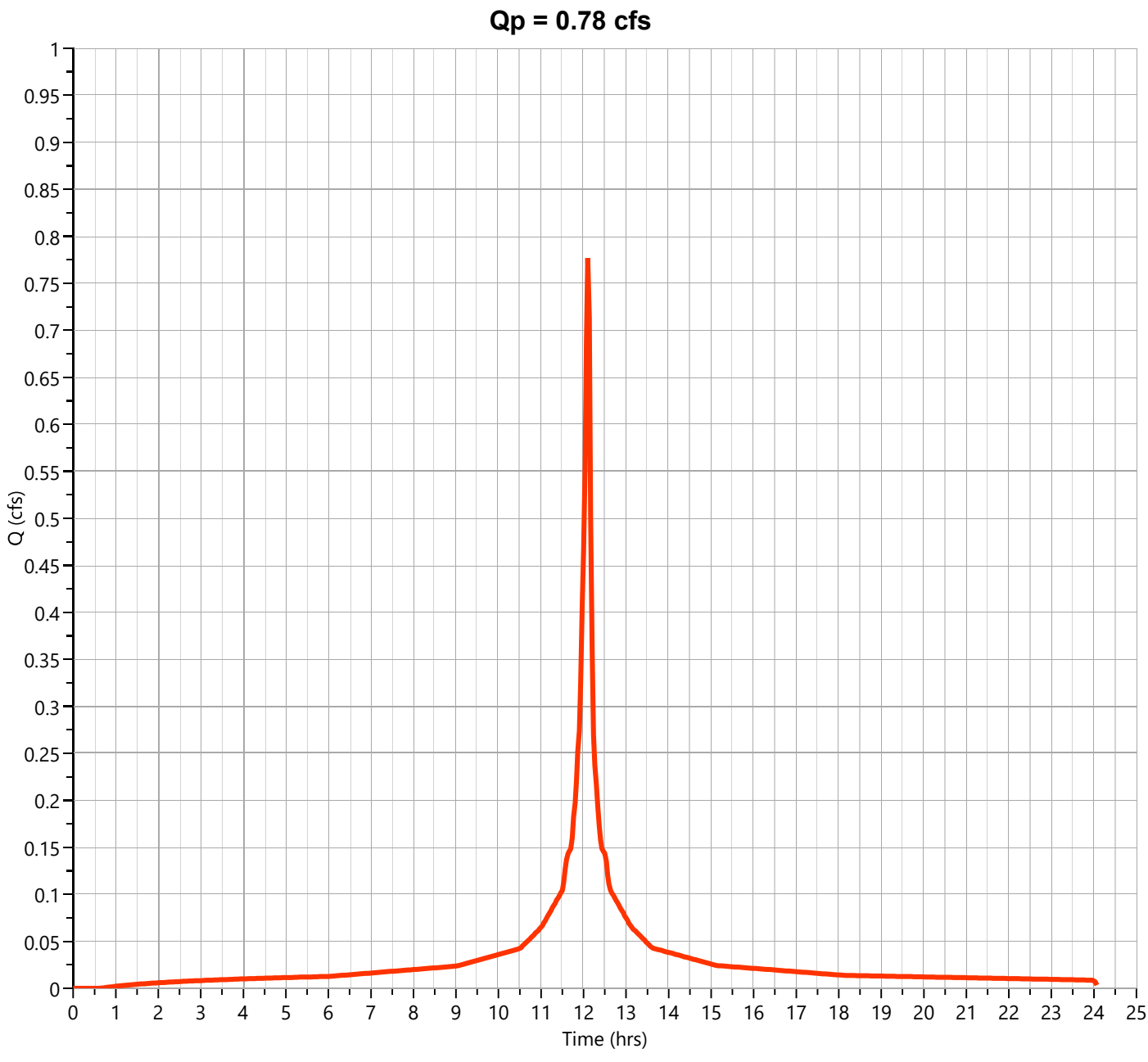
Hydrology Studio v 3.0.0.29

11-29-2023

EX-1 Impervious

Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.777 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 2,735 cuft
Drainage Area	= 0.13 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

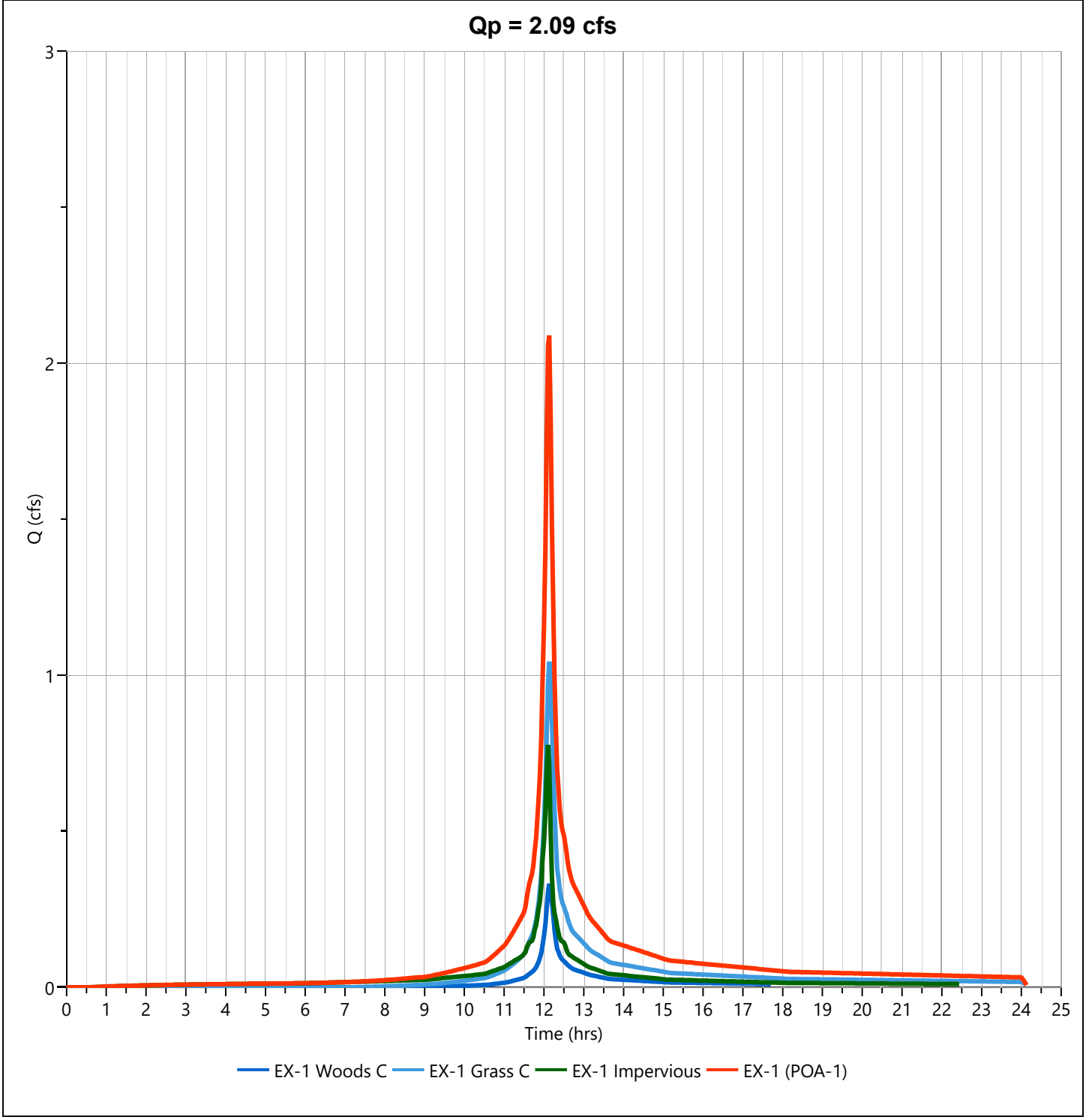
Hydrology Studio v 3.0.0.29

11-29-2023

EX-1 (POA-1)

Hyd. No. 4

Hydrograph Type	= Junction	Peak Flow	= 2.088 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 7,474 cuft
Inflow Hydrographs	= 1, 2, 3	Total Contrib. Area	= 0.51 ac



Hydrograph Report

Project Name:

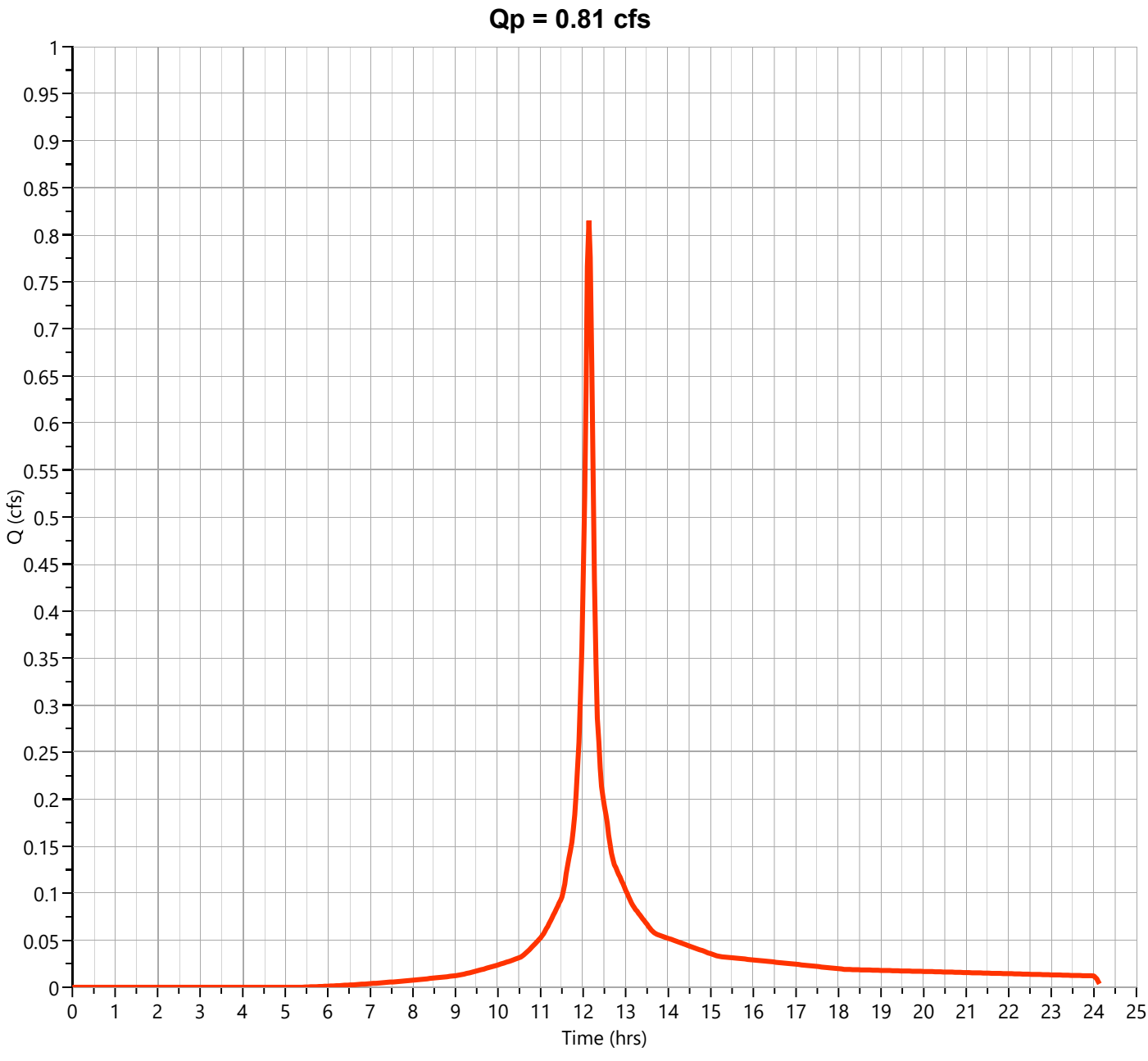
Hydrology Studio v 3.0.0.29

11-29-2023

EX-1 Woods C

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.815 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 2,854 cuft
Drainage Area	= 0.1 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 7.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

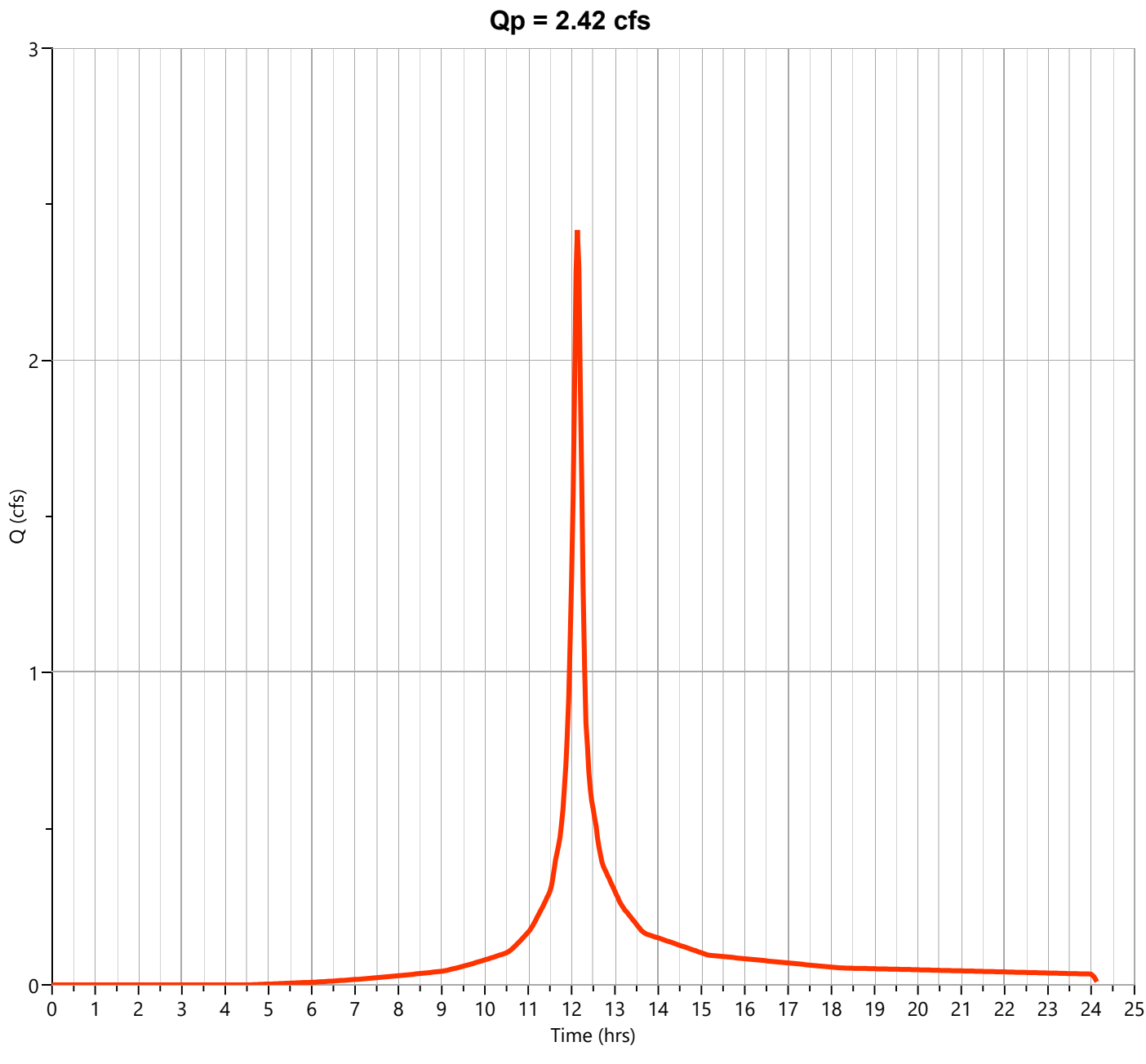
Hydrology Studio v 3.0.0.29

11-29-2023

EX-1 Grass C

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.417 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Runoff Volume	= 8,567 cuft
Drainage Area	= 0.28 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 7.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

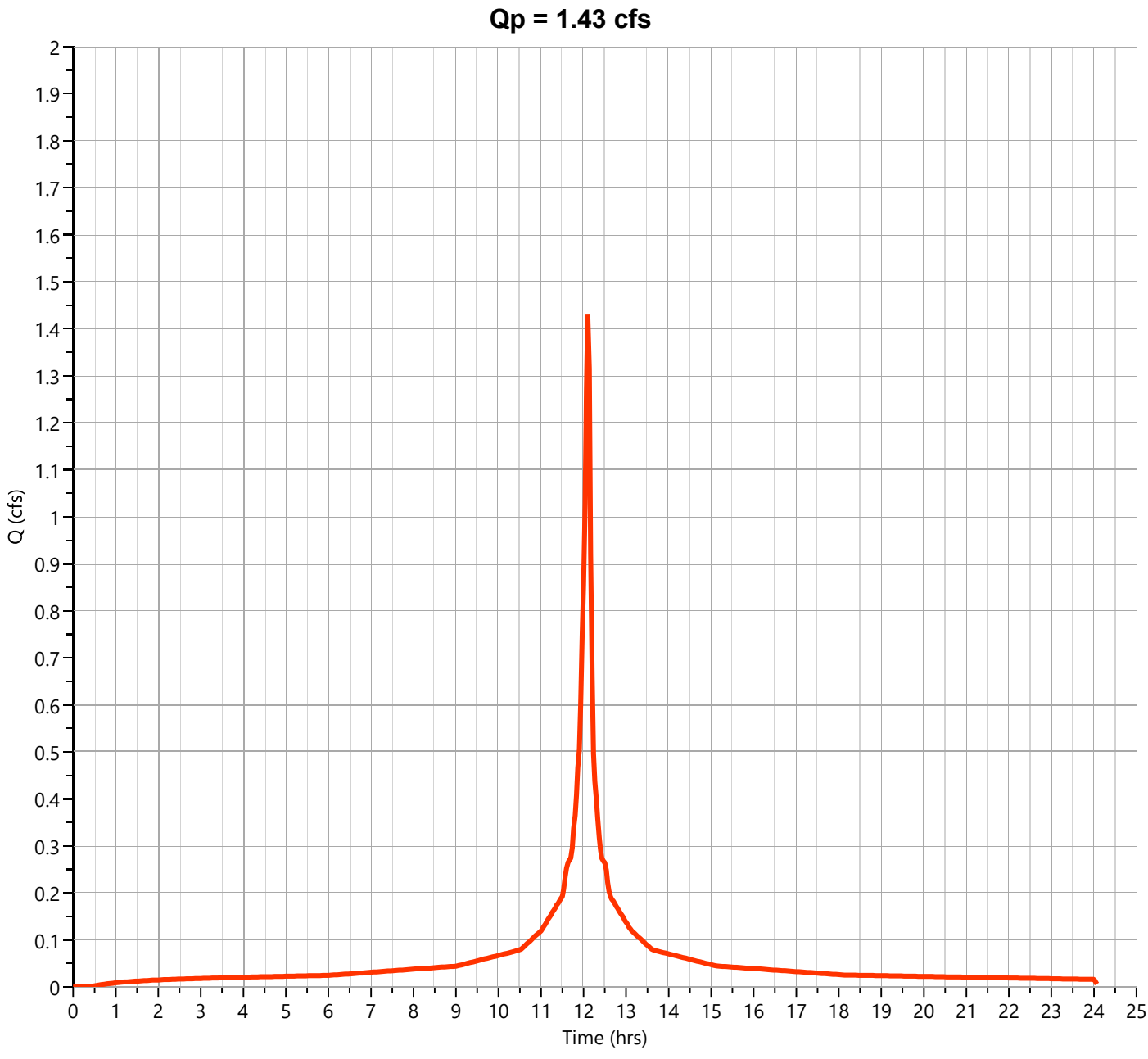
Hydrology Studio v 3.0.0.29

11-29-2023

EX-1 Impervious

Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.431 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 5,114 cuft
Drainage Area	= 0.13 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

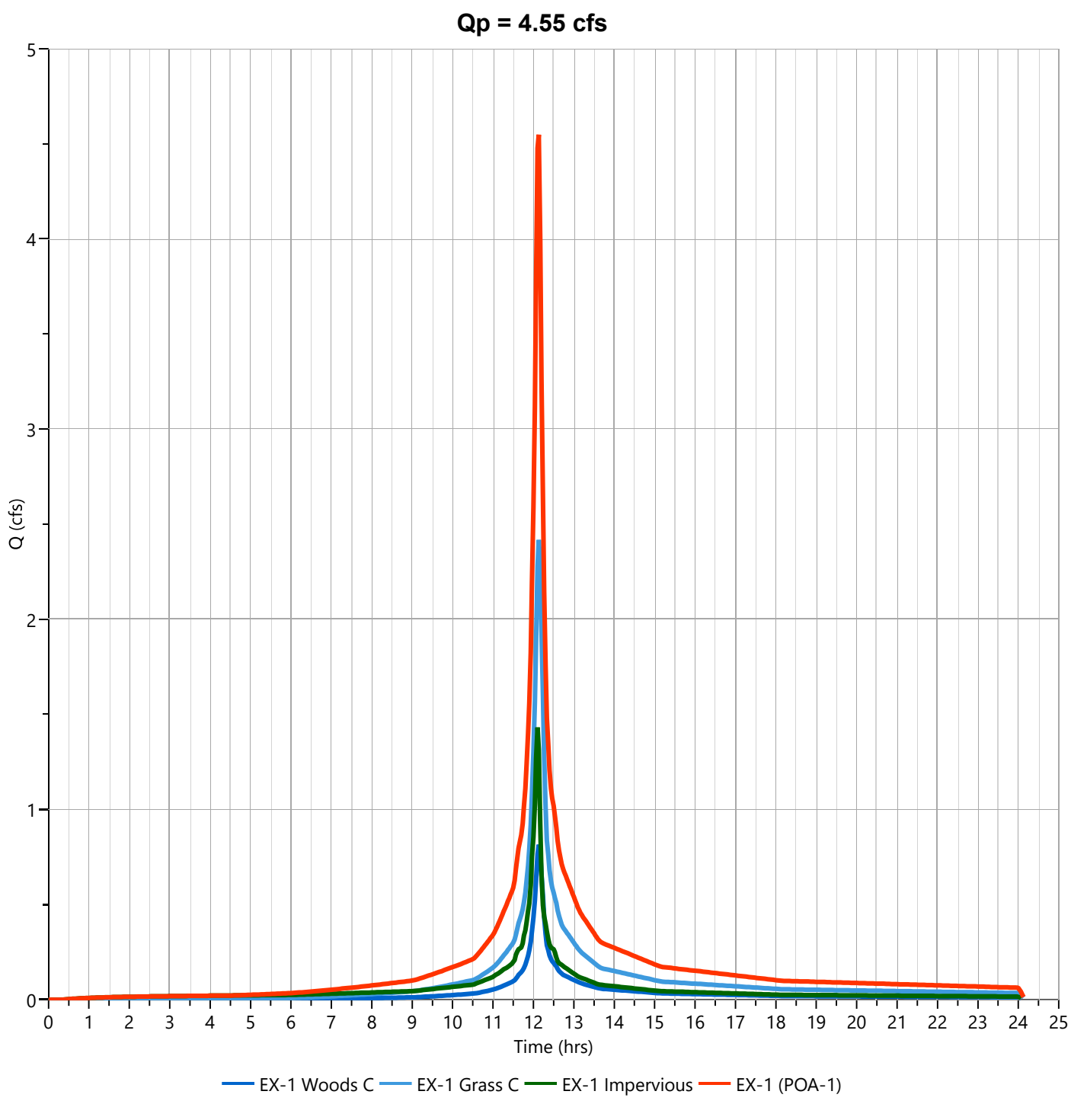
Hydrology Studio v 3.0.0.29

11-29-2023

EX-1 (POA-1)

Hyd. No. 4

Hydrograph Type	= Junction	Peak Flow	= 4.547 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 16,535 cuft
Inflow Hydrographs	= 1, 2, 3	Total Contrib. Area	= 0.51 ac



TOTAL ALLOWABLE FLOW TO POA-1

Hydrograph Report

Project Name:

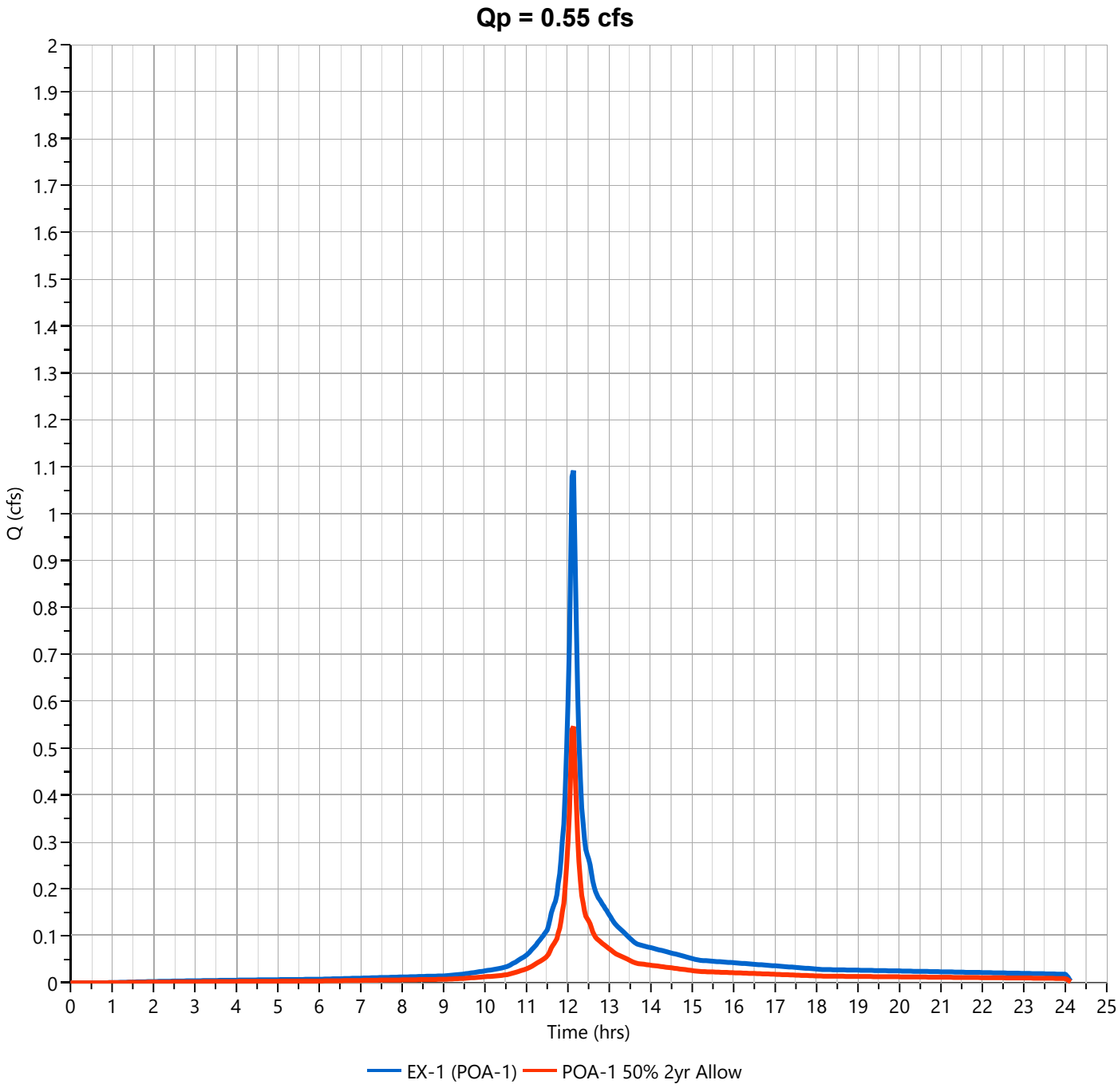
Hydrology Studio v 3.0.0.29

11-29-2023

POA-1 50% 2yr Allow

Hyd. No. 5

Hydrograph Type	= Diversion	Peak Flow	= 0.546 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 1,972 cuft
Inflow Hydrograph	= 4 - EX-1 (POA-1)	Diversion Method	= Flow Ratio
Companion Hyd	= 6 - <name>	Flow Ratio	= 0.5



Hydrograph Report

Project Name:

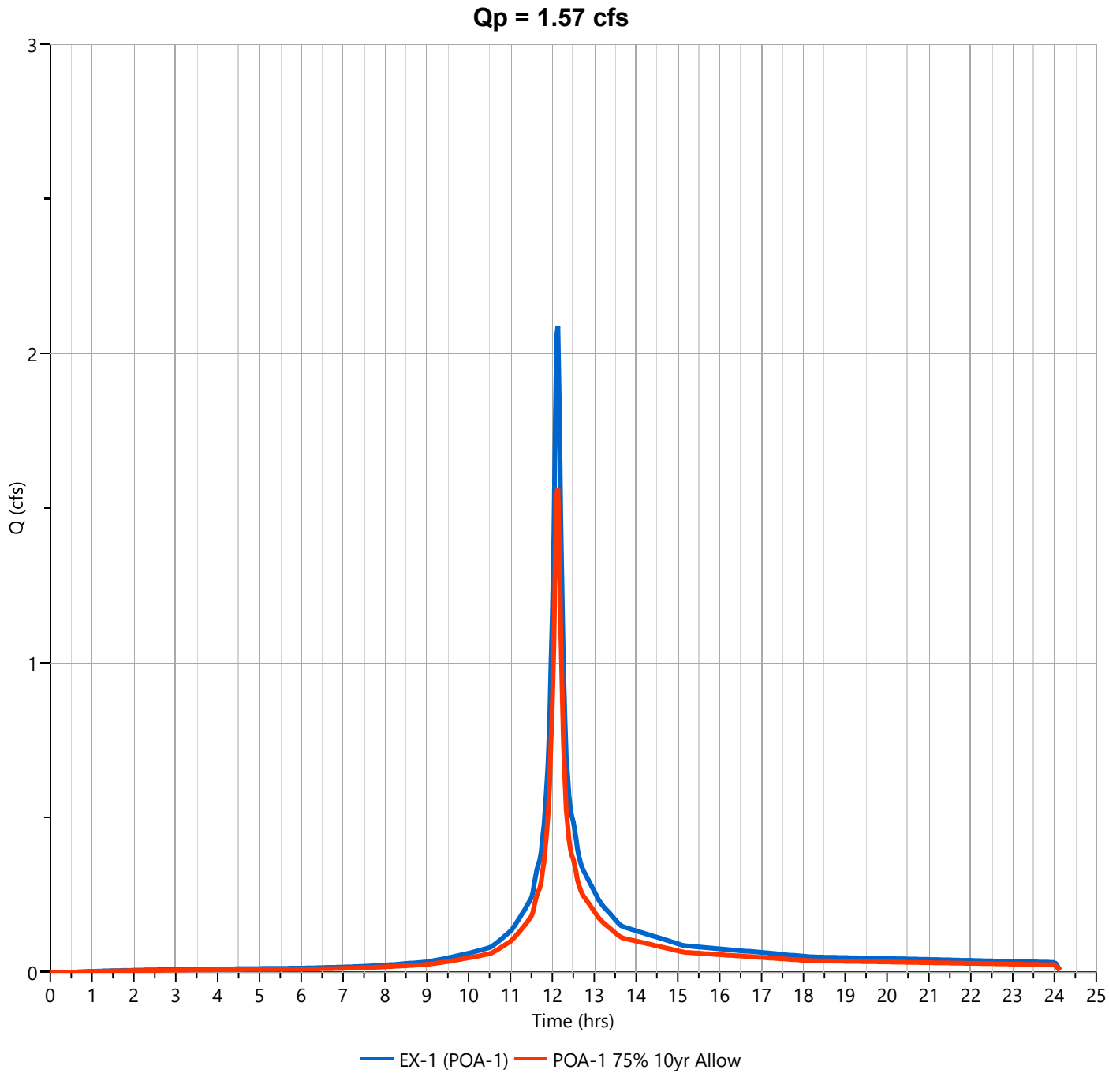
Hydrology Studio v 3.0.0.29

11-29-2023

POA-1 75% 10yr Allow

Hyd. No. 7

Hydrograph Type	= Diversion	Peak Flow	= 1.566 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 5,606 cuft
Inflow Hydrograph	= 4 - EX-1 (POA-1)	Diversion Method	= Flow Ratio
Companion Hyd	= 8 - <name>	Flow Ratio	= 0.75



Hydrograph Report

Project Name:

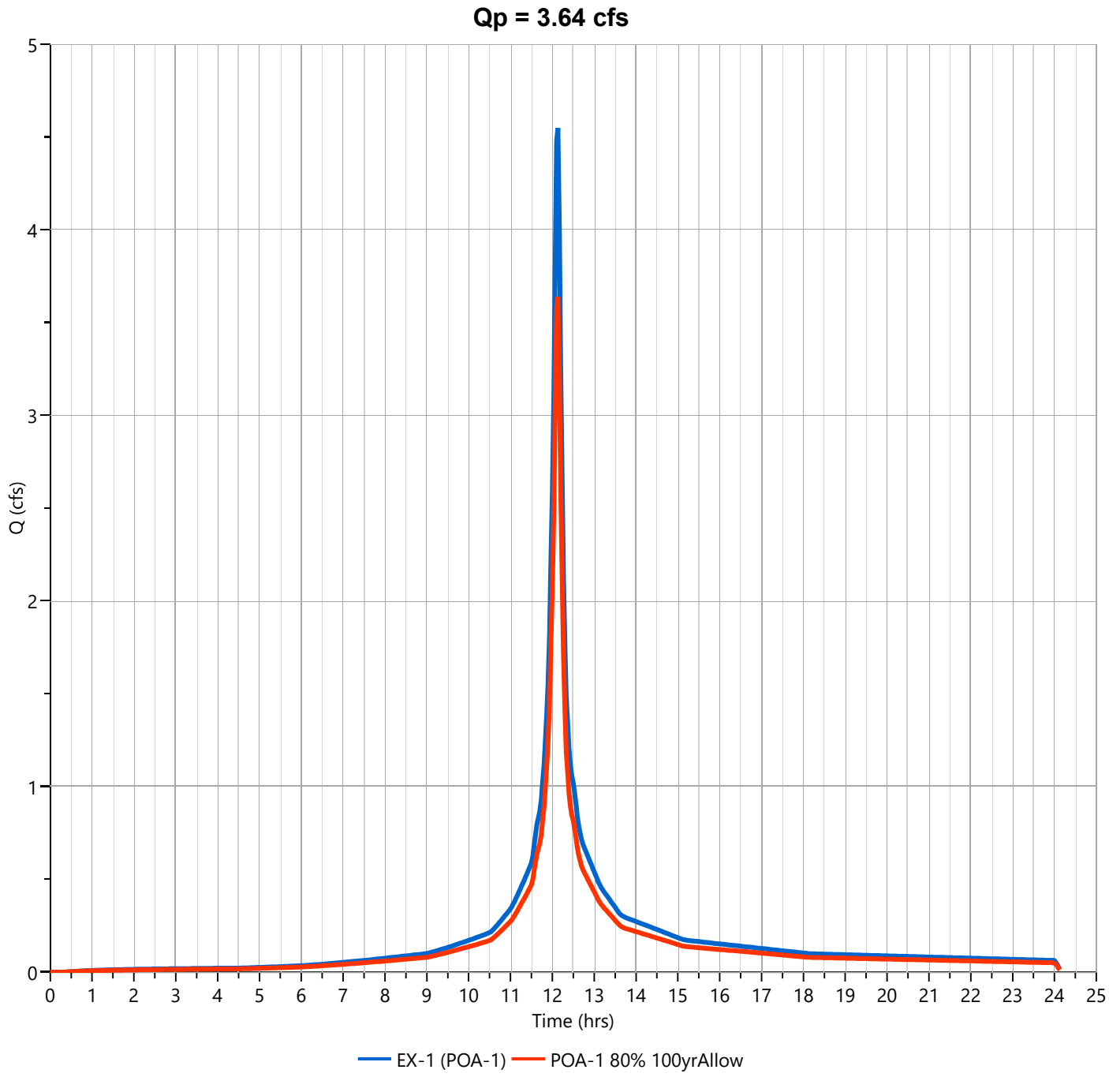
Hydrology Studio v 3.0.0.29

11-29-2023

POA-1 80% 100yrAllow

Hyd. No. 9

Hydrograph Type	= Diversion	Peak Flow	= 3.638 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 13,228 cuft
Inflow Hydrograph	= 4 - EX-1 (POA-1)	Diversion Method	= Flow Ratio
Companion Hyd	= 10 - <name>	Flow Ratio	= 0.8



EX-2A WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**SM**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: (**Present**) Developed — **Future Existing Watershed EX-2A Impervious**

Circle One: (**T_c**) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

	Segment ID		**1**					
1.	Surface Description (NEH table 15-1)		**Smooth Surfaces**					
2.	Manning's Roughness Coeff., n (NEH table 15-1)		**0.011**					
3.	Flow Length, L (total L < 100 ft)	ft	**100**					
4.	Two-year 24-hr rainfall, P_2	in	**4.12**					
5.	Land Slope, s	ft/ft	**0.028**					
6.	Compute T_t $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	**0.015**	+		+		
					Sheet Flow Sub-Total		**0.015 hours**	

Shallow Concentrated Flow

	Segment ID		**2**		**3**		**4**	
7.	Surface Description		**Pavement**		**Grassed Waterways**		**Woodlands**	
8.	Flow Length, L	ft	**35**		**60**		**49**	
9.	Watercourse Slope, s	ft/ft	**0.016**		**0.003**		**0.003**	
10.	Average Velocity, V (NEH table 15-3)	ft/s	**2.55**		**0.83**		**0.26**	
11.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr	**0.004**	+	**0.020**	+	**0.053**	
					Shallow Conc. Flow Sub-Total		**0.076 hours**	

Channel Flow

	Segment ID							
12.	Flow Length, L	ft						
13.	Cross Sectional flow area, a	ft^2						
14.	Wetted Perimeter, P_w	ft						
15.	Hydraulic Radius, r $r = a / P_w$	ft						
16.	Channel Slope, s	ft/ft						
17.	Manning's Roughness Coeff., n							
18.	Velocity, V $V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s						
19.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr		+		+		
					Channel Flow Sub-Total		**0.000 hours**	

Watershed or subarea T_c or T_t	Total Tc (hours) =	**0.092 hours**
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	**6 minutes**

Project:	**Beacon Unitarian Universalist Church**	**By:**	**SM**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: (**Present**) Developed — **Future Existing Watershed EX-2A Pervious**

Circle One: (**T_c**) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

			Segment ID	1		2		
1.	Surface Description (NEH table 15-1)			Woods Light Underbrush		Smooth Surfaces		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.40		0.011		
3.	Flow Length, L (total L < 100 ft)		ft	48		52		
4.	Two-year 24-hr rainfall, P_2		in	4.12		4.12		
5.	Land Slope, s		ft/ft	0.026		0.020		
6.	Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.158	+	0.011	+	

Sheet Flow Sub-Total **0.168 hours**

Shallow Concentrated Flow

			Segment ID	3		4		5
7.	Surface Description			Pavement		Grassed Waterways		Woodlands
8.	Flow Length, L		ft	109		60		49
9.	Watercourse Slope, s		ft/ft	0.022		0.003		0.003
10.	Average Velocity, V (NEH table 15-3)		ft/s	2.99		0.83		0.26
11.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.010	+	0.020	+	0.053

Shallow Conc. Flow Sub-Total **0.083 hours**

Channel Flow

			Segment ID					
12.	Flow Length, L		ft					
13.	Cross Sectional flow area, a		ft^2					
14.	Wetted Perimeter, P_w		ft					
15.	Hydraulic Radius, r	$r = a / P_w$	ft					
16.	Channel Slope, s		ft/ft					
17.	Manning's Roughness Coeff., n							
18.	Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s					
19.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr		+		+	

Channel Flow Sub-Total **0.000 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) =	**0.251 hours**
Total Tc (minutes) =	**15 minutes**

Hydrograph Report

Project Name:

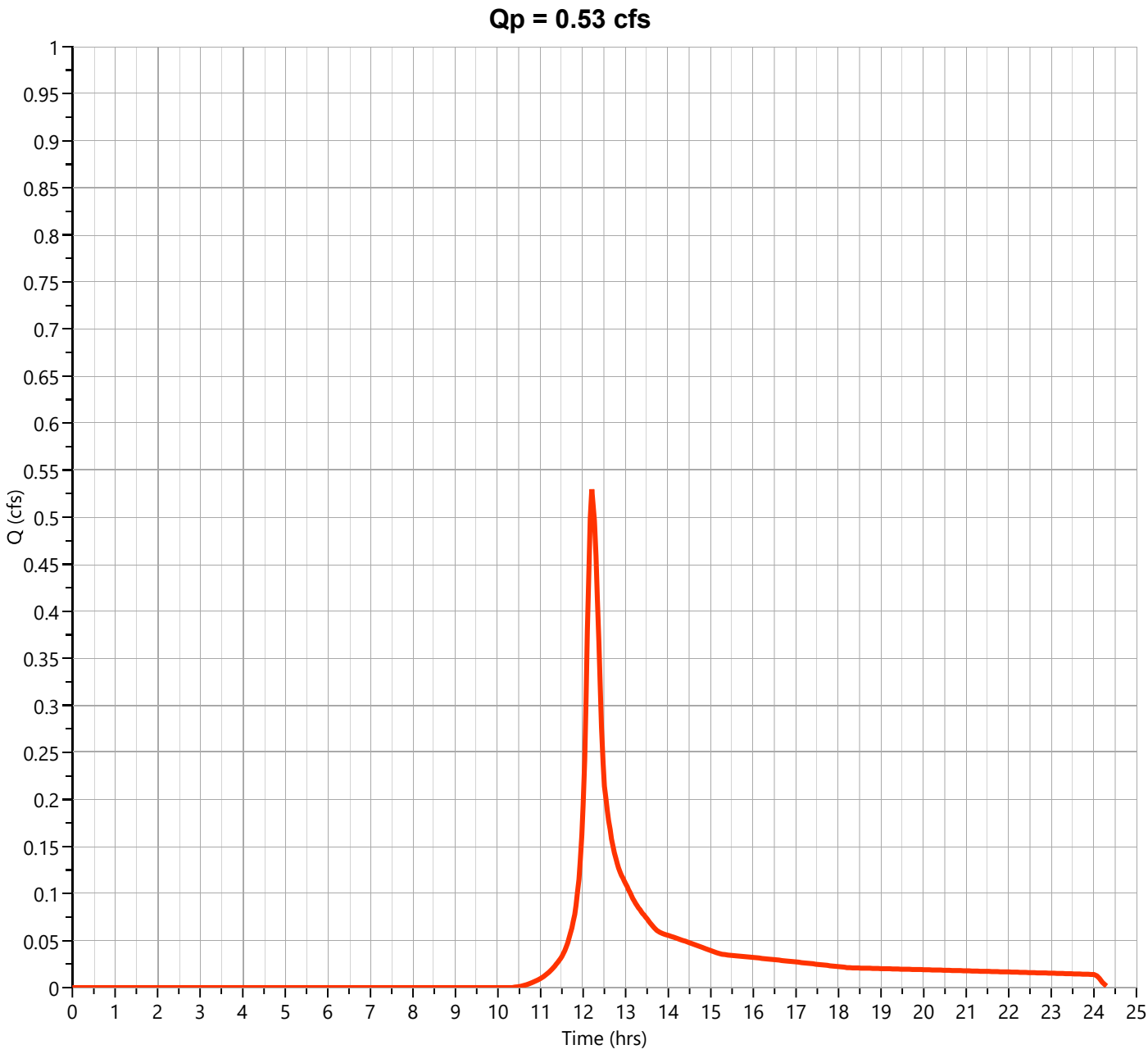
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A Woods C

Hyd. No. 12

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.529 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 2,296 cuft
Drainage Area	= 0.46 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

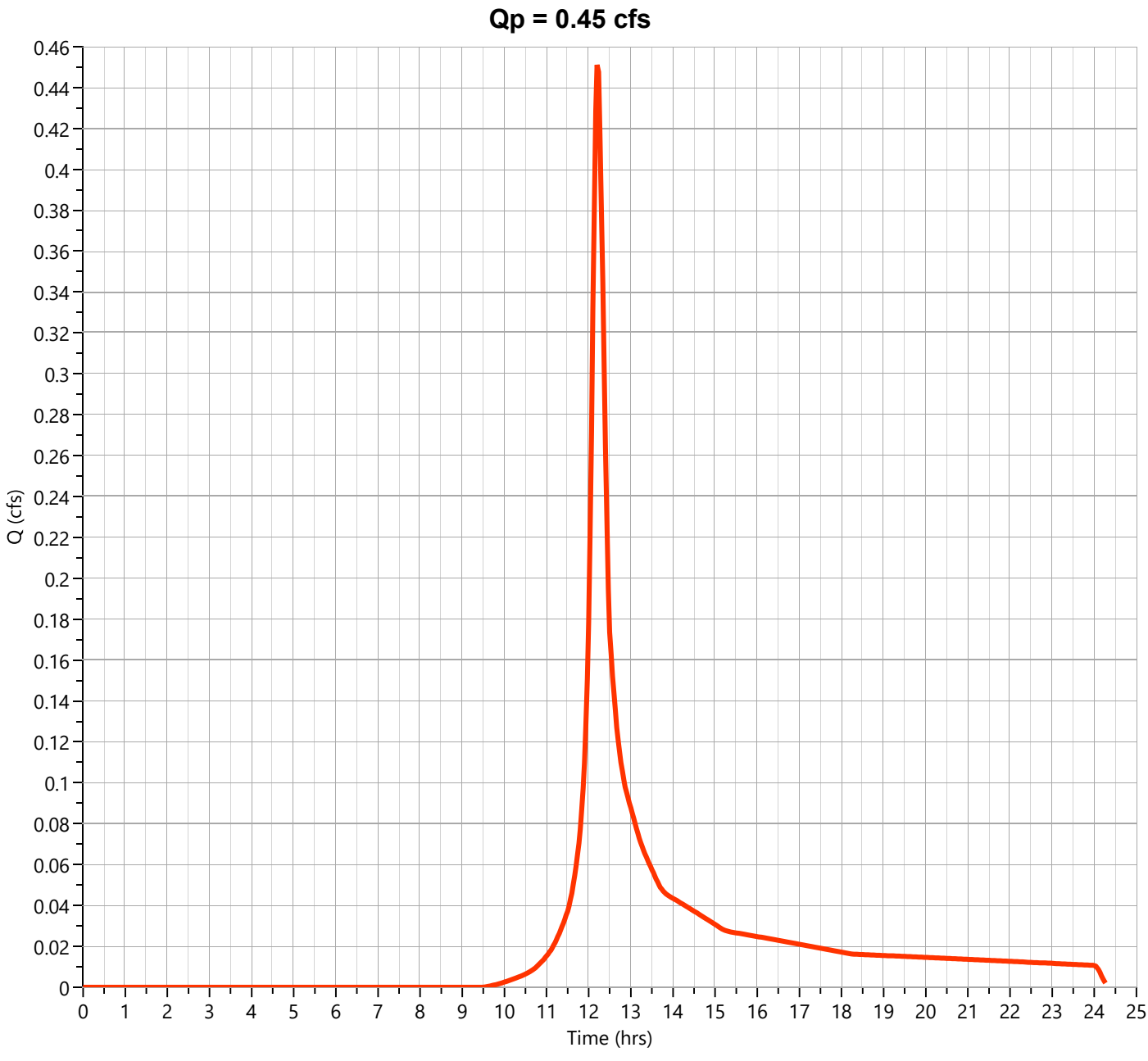
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A Grass C

Hyd. No. 13

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.451 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 1,908 cuft
Drainage Area	= 0.32 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

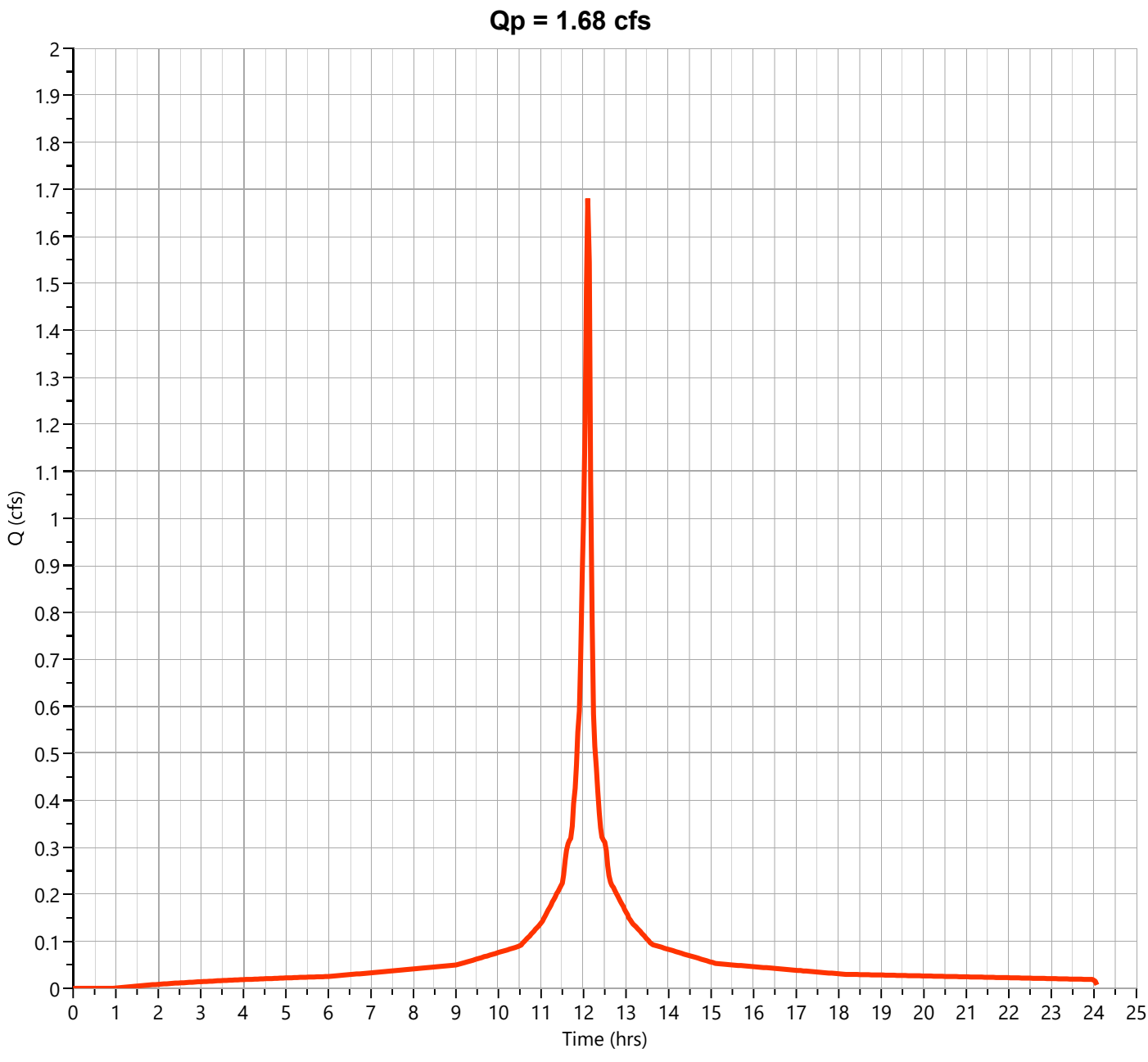
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A Impervious

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.680 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 5,817 cuft
Drainage Area	= 0.44 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

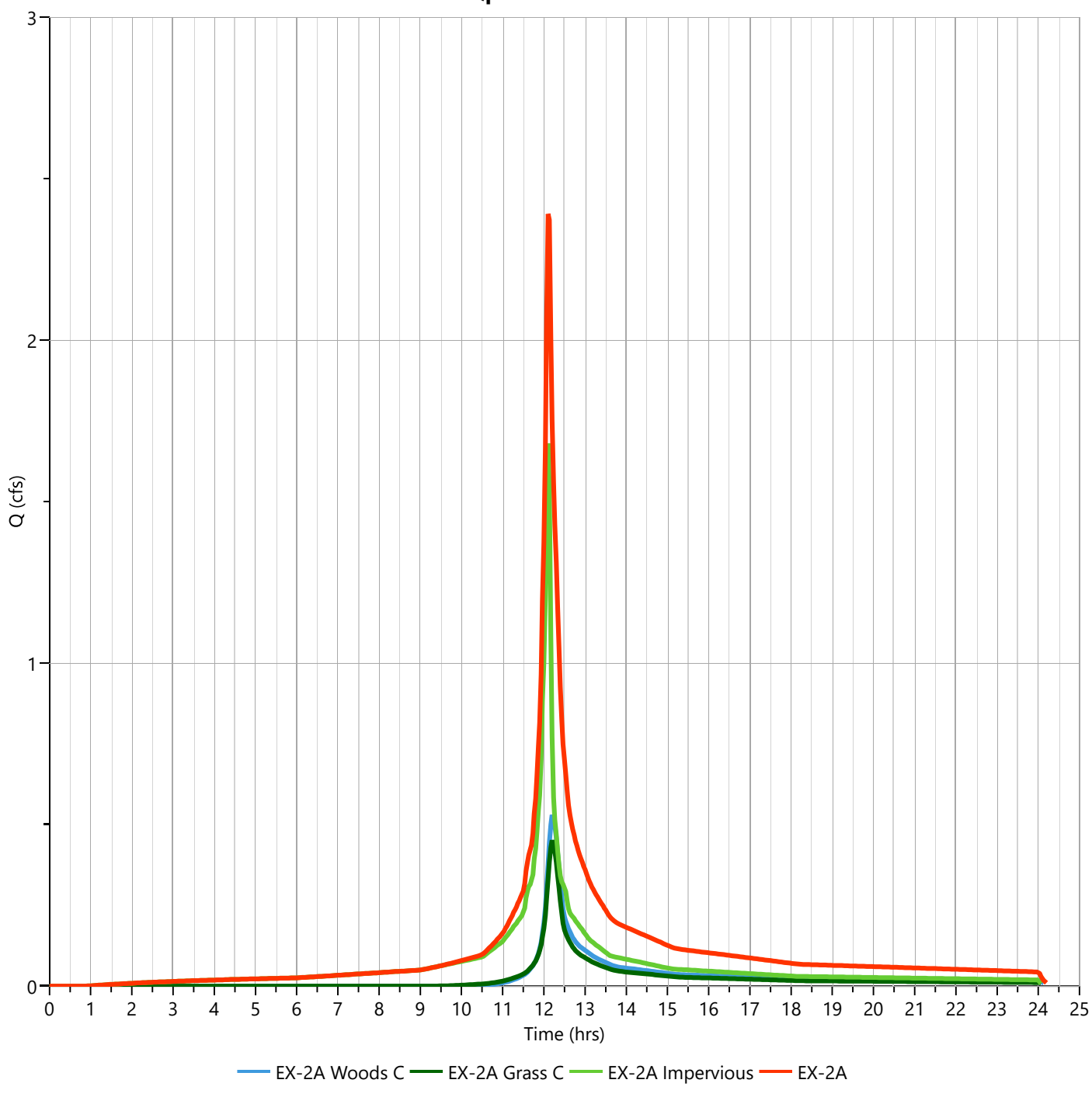
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A

Hyd. No. 15

Hydrograph Type	= Junction	Peak Flow	= 2.390 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 10,021 cuft
Inflow Hydrographs	= 12, 13, 14	Total Contrib. Area	= 1.22 ac



Hydrograph Report

Project Name:

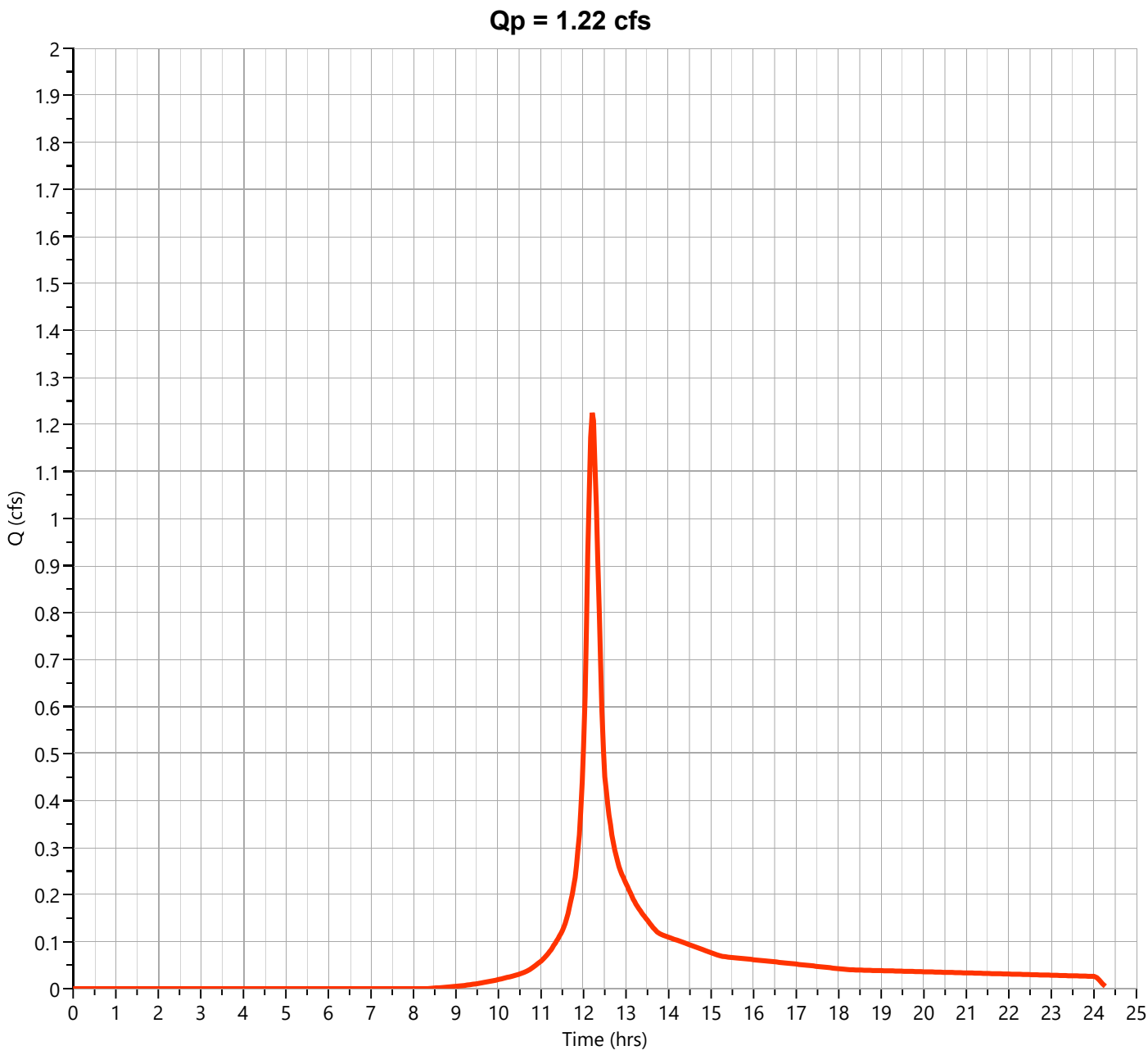
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A Woods C

Hyd. No. 12

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.225 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 5,116 cuft
Drainage Area	= 0.46 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

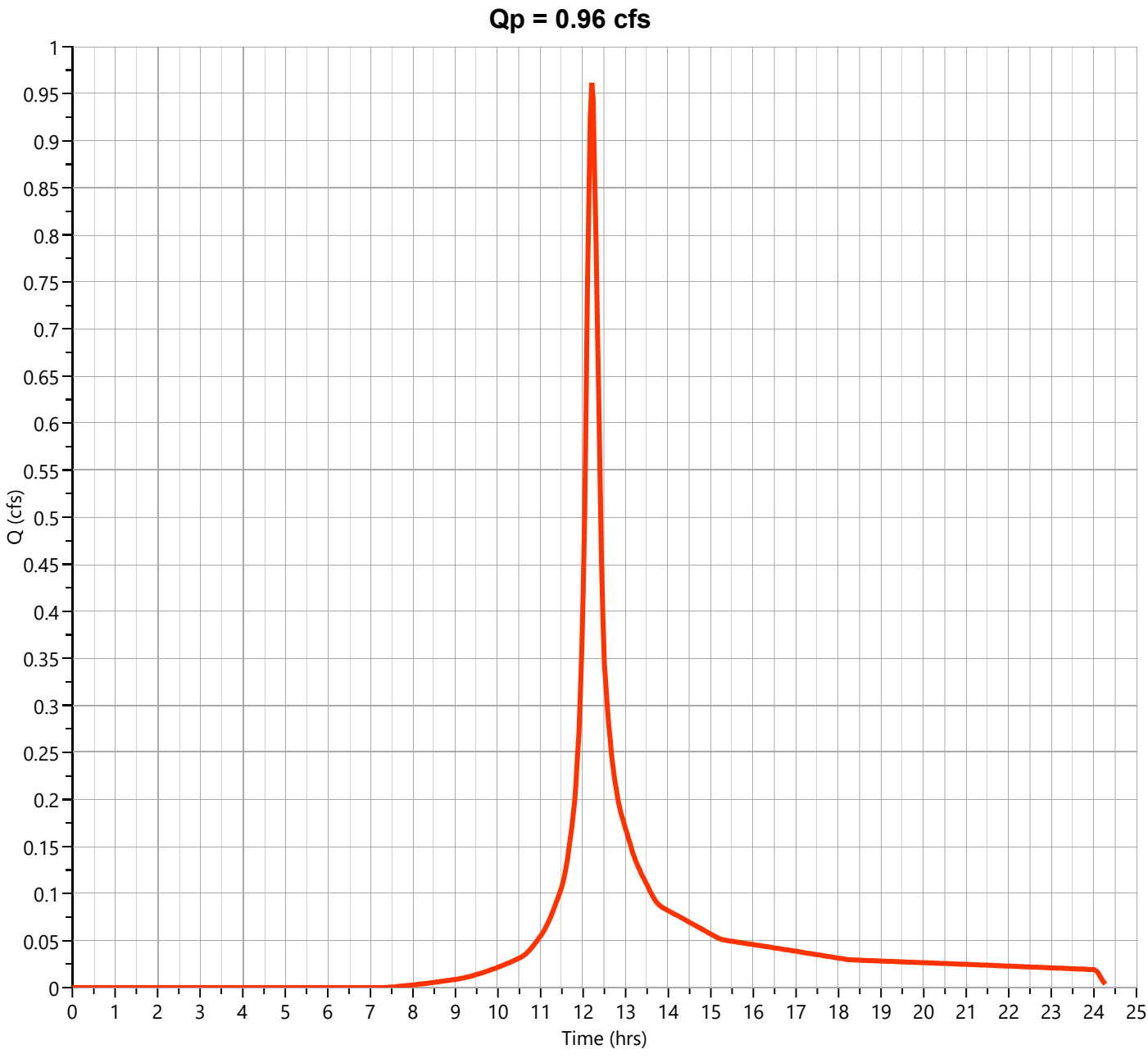
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A Grass C

Hyd. No. 13

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.962 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 4,011 cuft
Drainage Area	= 0.32 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

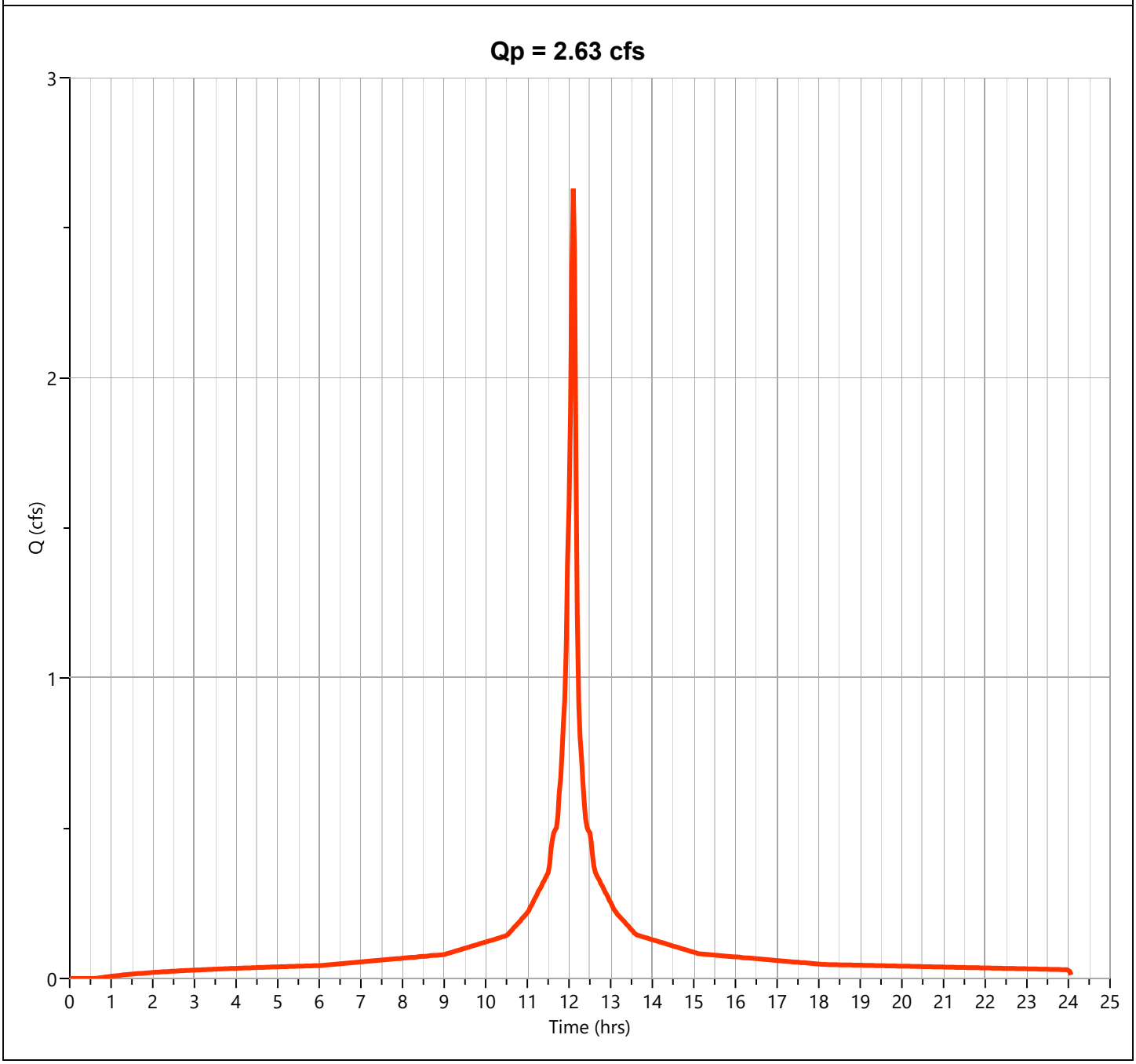
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A Impervious

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.629 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 9,256 cuft
Drainage Area	= 0.44 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

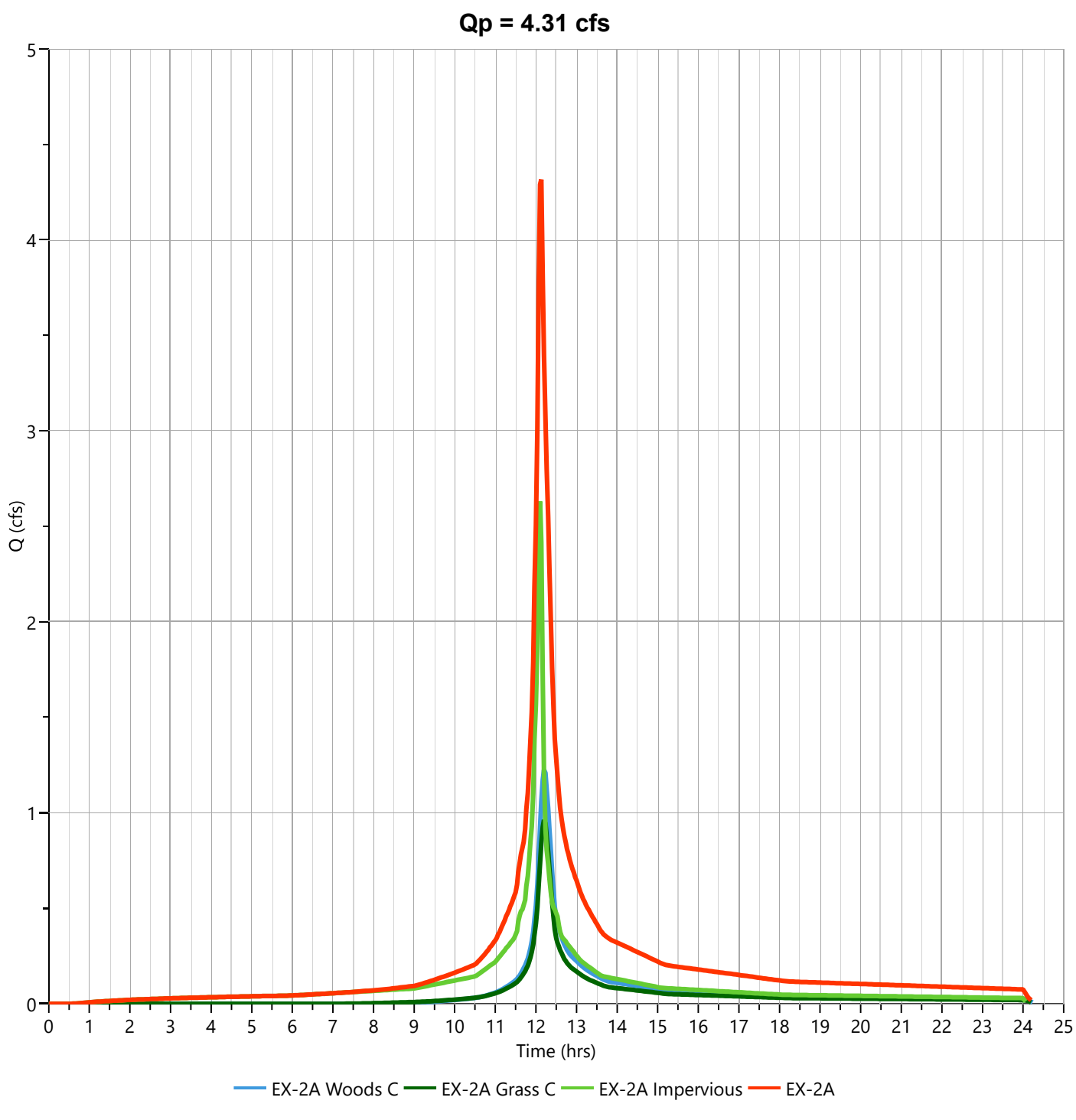
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A

Hyd. No. 15

Hydrograph Type	= Junction	Peak Flow	= 4.315 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 18,382 cuft
Inflow Hydrographs	= 12, 13, 14	Total Contrib. Area	= 1.22 ac



Hydrograph Report

Project Name:

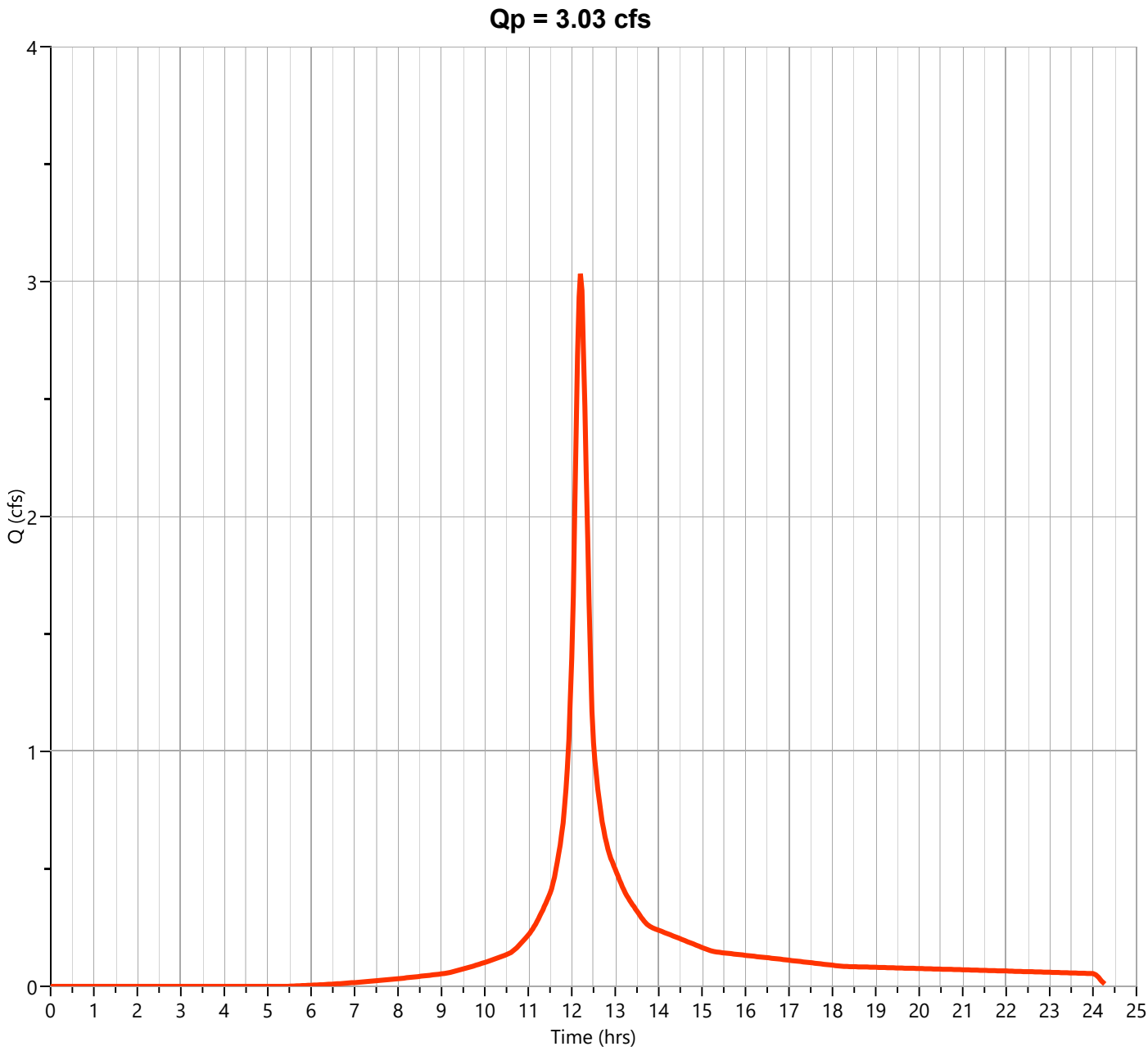
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A Woods C

Hyd. No. 12

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.032 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 12,802 cuft
Drainage Area	= 0.46 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

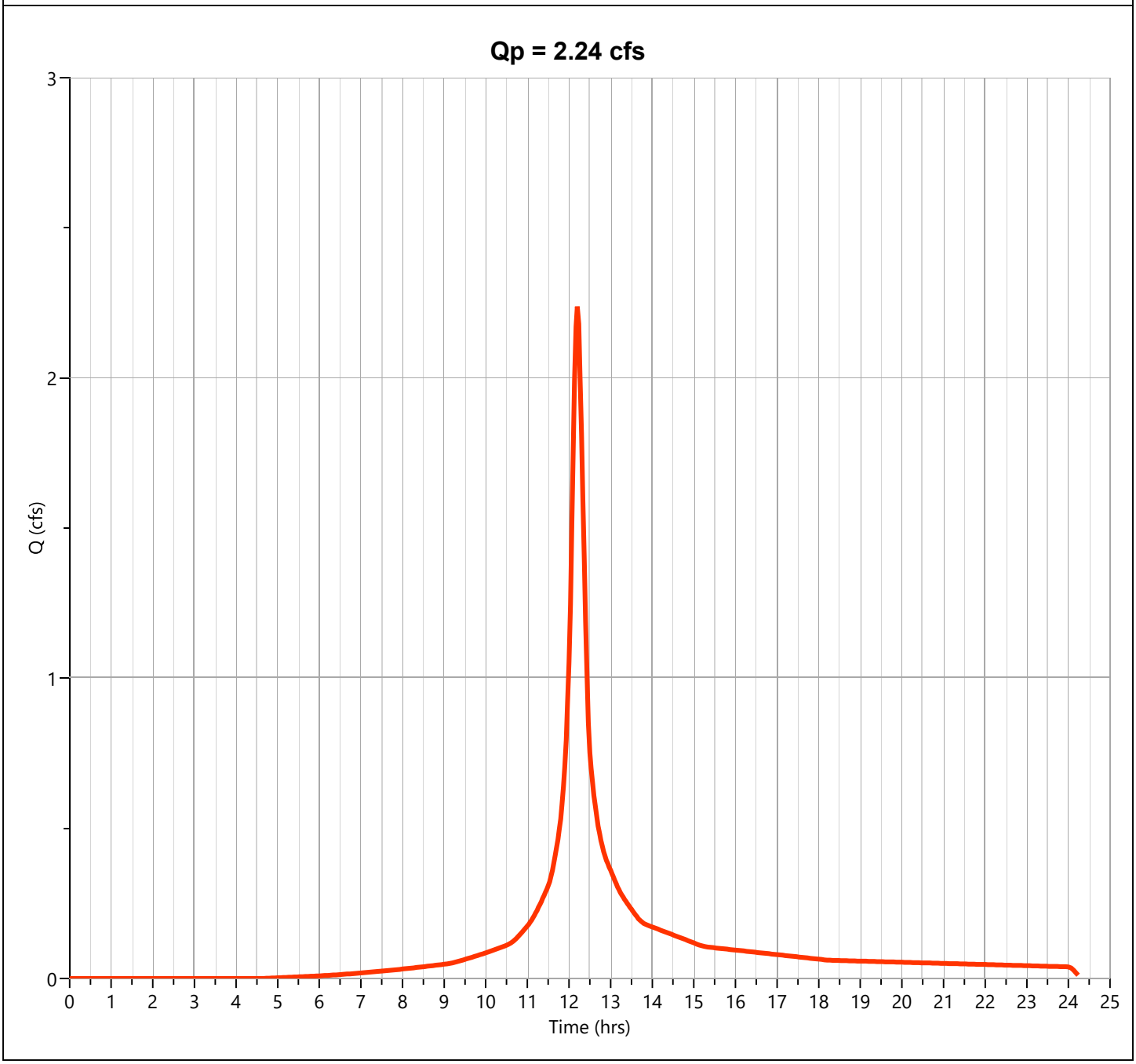
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A Grass C

Hyd. No. 13

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.237 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 9,546 cuft
Drainage Area	= 0.32 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

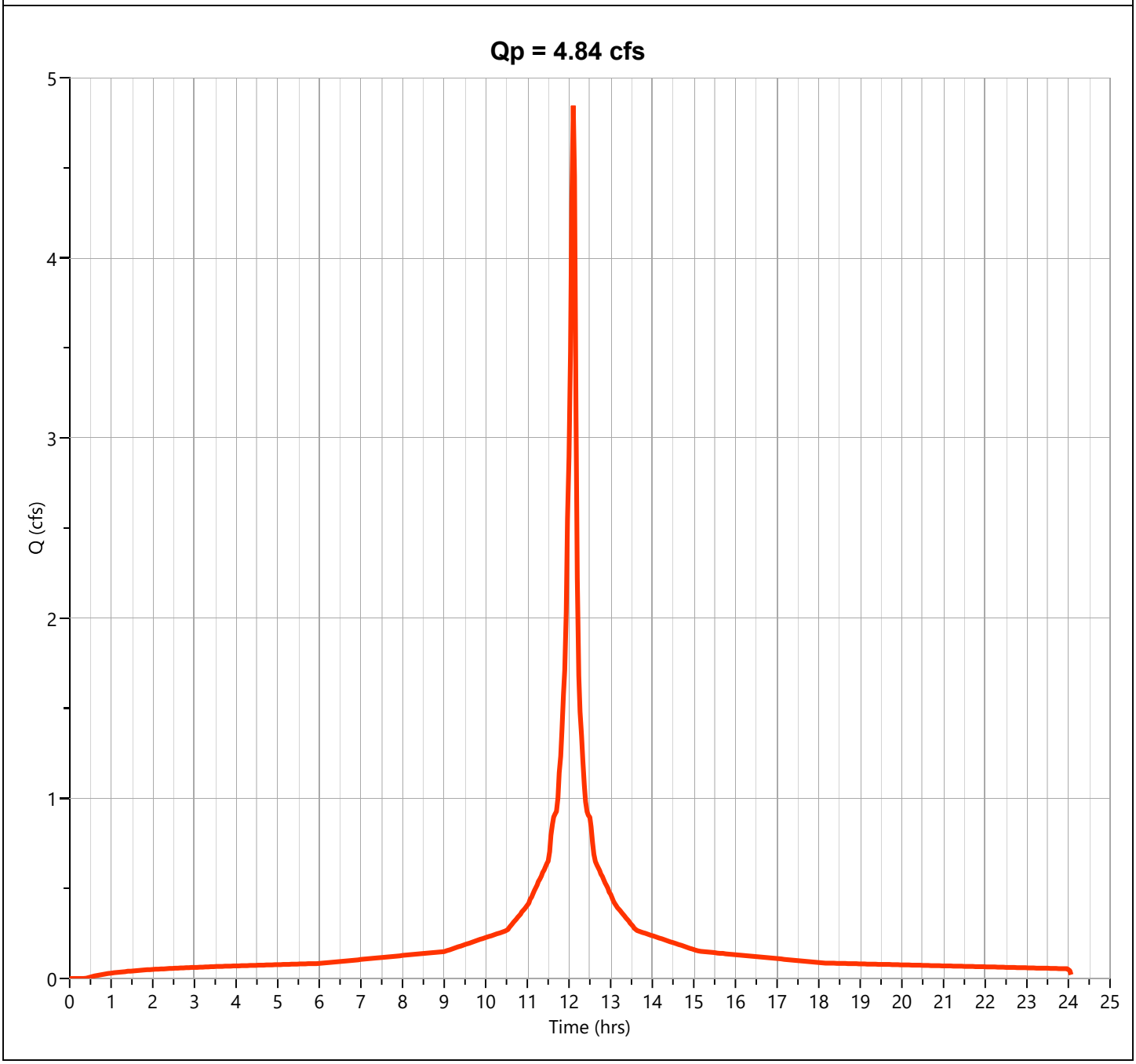
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A Impervious

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.844 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Runoff Volume	= 17,308 cuft
Drainage Area	= 0.44 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

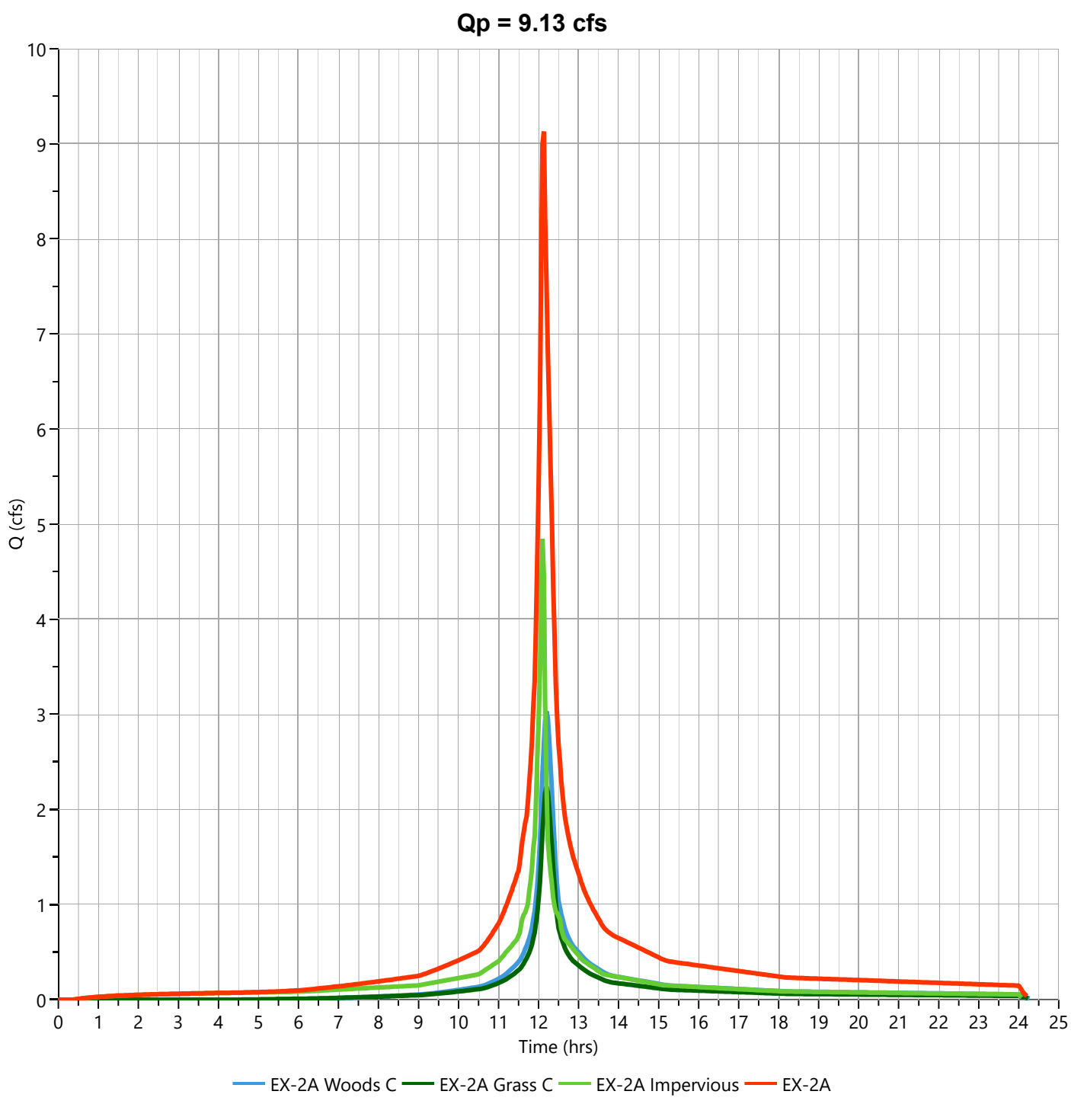
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A

Hyd. No. 15

Hydrograph Type	= Junction	Peak Flow	= 9.128 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 39,655 cuft
Inflow Hydrographs	= 12, 13, 14	Total Contrib. Area	= 1.22 ac



EX-2A WATERSHED ALLOWABLE PEAK DISCHARGE

Hydrograph Report

Project Name:

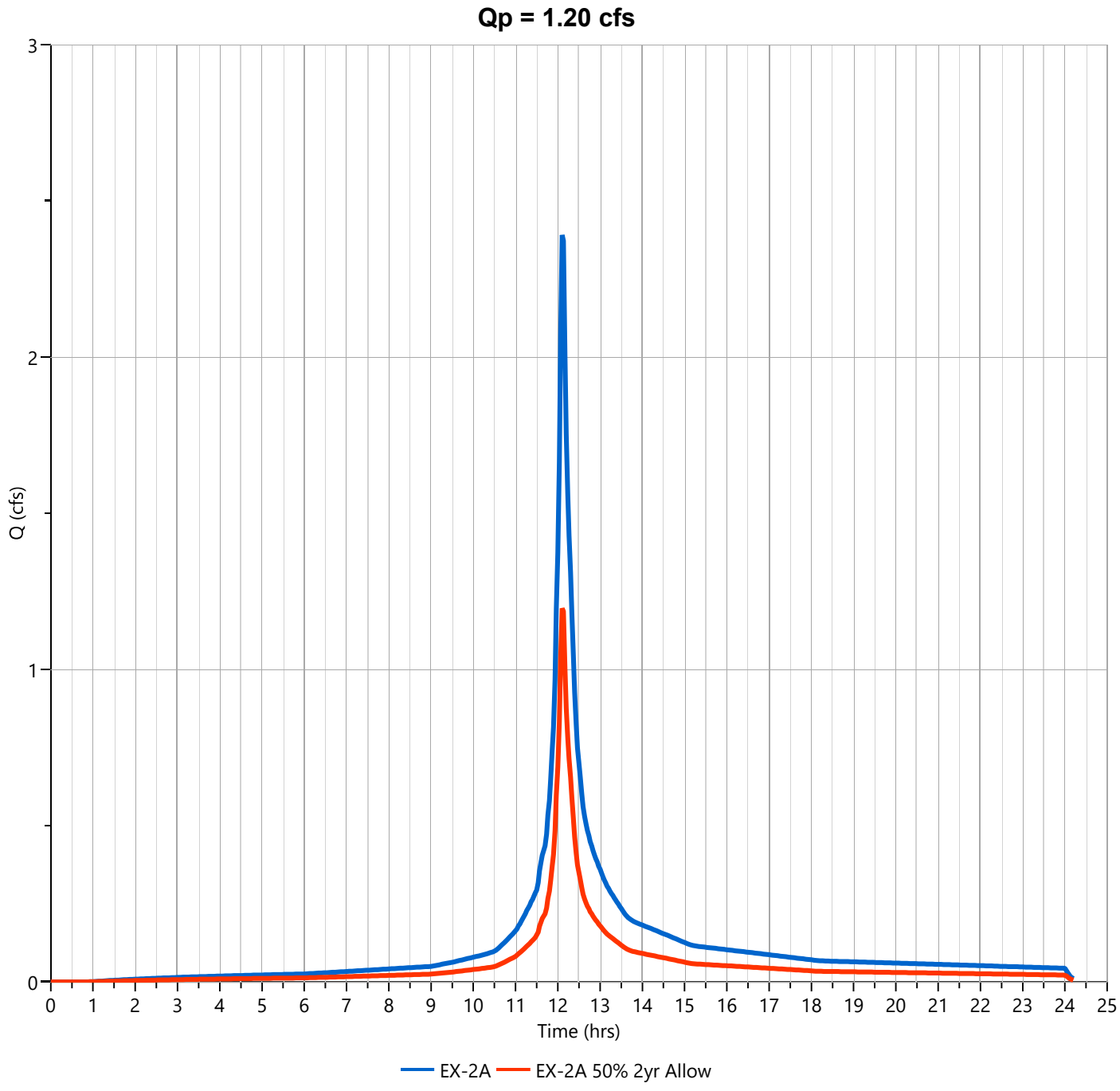
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A 50% 2yr Allow

Hyd. No. 16

Hydrograph Type	= Diversion	Peak Flow	= 1.195 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 2 min	Hydrograph Volume	= 5,011 cuft
Inflow Hydrograph	= 15 - EX-2A	Diversion Method	= Flow Ratio
Companion Hyd	= 17 - <name>	Flow Ratio	= 0.5



Hydrograph Report

Project Name:

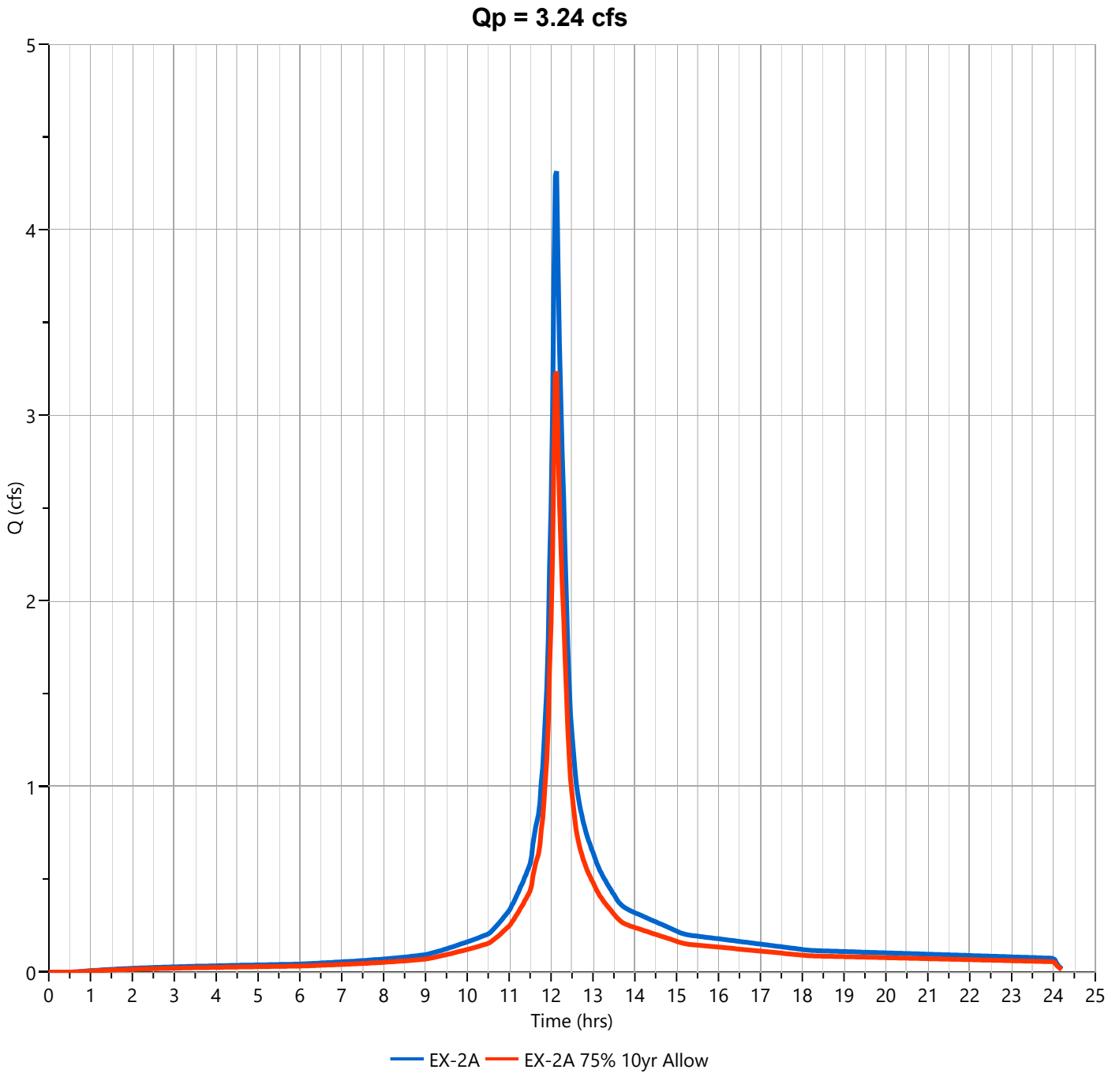
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A 75% 10yr Allow

Hyd. No. 18

Hydrograph Type	= Diversion	Peak Flow	= 3.236 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 13,786 cuft
Inflow Hydrograph	= 15 - EX-2A	Diversion Method	= Flow Ratio
Companion Hyd	= 19 - <name>	Flow Ratio	= 0.75



Hydrograph Report

Project Name:

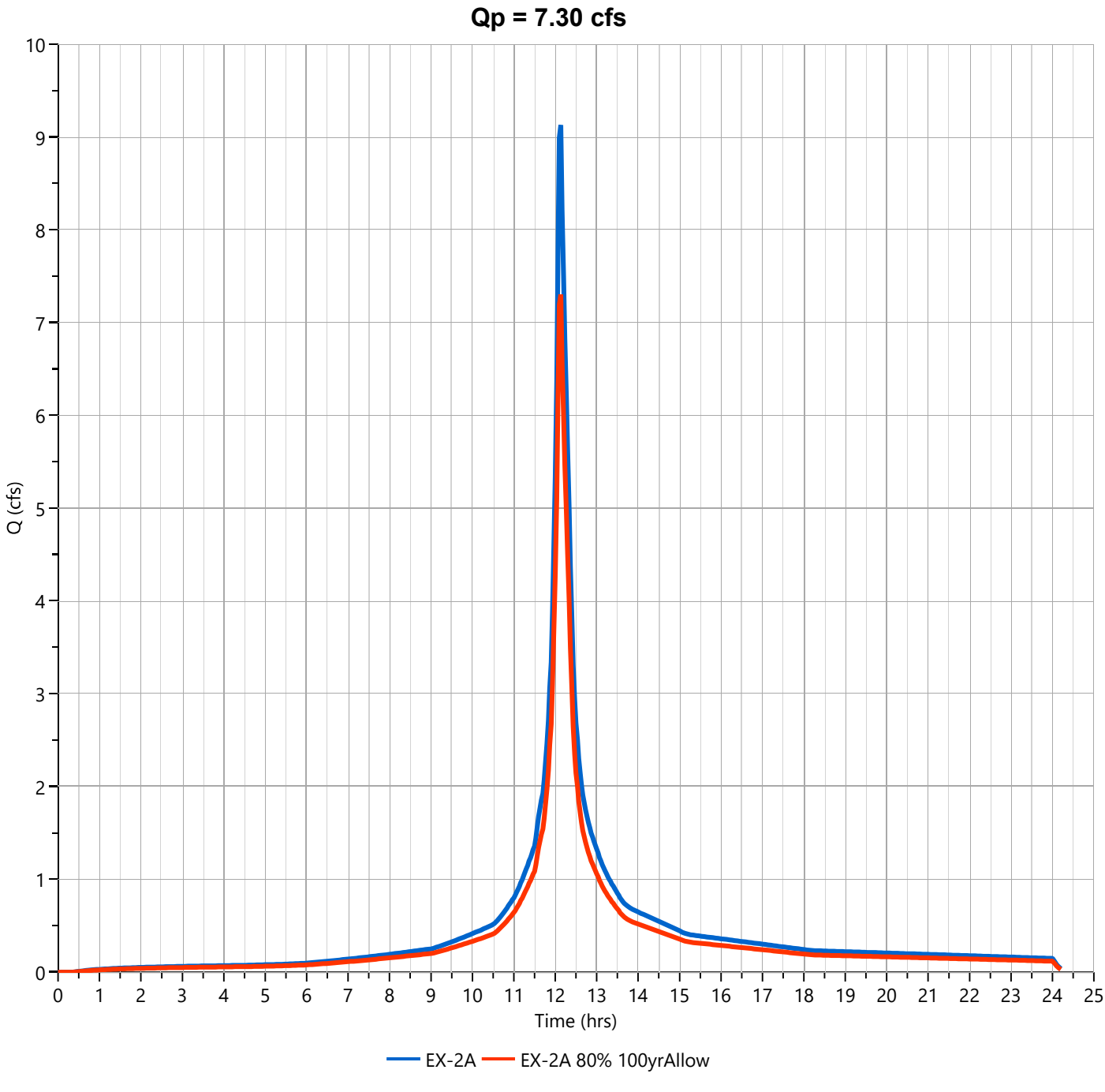
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2A 80% 100yrAllow

Hyd. No. 20

Hydrograph Type	= Diversion	Peak Flow	= 7.302 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 31,724 cuft
Inflow Hydrograph	= 15 - EX-2A	Diversion Method	= Flow Ratio
Companion Hyd	= 21 - <name>	Flow Ratio	= 0.8



EX-2B WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**SM**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: (**Present**) Developed — **Future Existing Watershed EX-2B Impervious**

Circle One: (T_c) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

			Segment ID	1		2		
1.	Surface Description (NEH table 15-1)			Smooth Surfaces		Woods Light Underbrush		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.011		0.40		
3.	Flow Length, L (total L < 100 ft)		ft	6		94		
4.	Two-year 24-hr rainfall, P_2		in	4.12		4.12		
5.	Land Slope, s		ft/ft	0.050		0.046		
6.	Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.001	+	0.216	+	

Sheet Flow Sub-Total **0.217 hours**

Shallow Concentrated Flow

			Segment ID	3		4		
7.	Surface Description			Woodlands		Woodlands		
8.	Flow Length, L		ft	69		126		
9.	Watercourse Slope, s		ft/ft	0.028		0.008		
10.	Average Velocity, V (NEH table 15-3)		ft/s	0.84		0.46		
11.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.023	+	0.076	+	

Shallow Conc. Flow Sub-Total **0.099 hours**

Channel Flow

			Segment ID					
12.	Flow Length, L		ft					
13.	Cross Sectional flow area, a		ft^2					
14.	Wetted Perimeter, P_w		ft					
15.	Hydraulic Radius, r	$r = a / P_w$	ft					
16.	Channel Slope, s		ft/ft					
17.	Manning's Roughness Coeff., n							
18.	Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s					
19.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr		+		+	

Channel Flow Sub-Total **0.000 hours**

Watershed or subarea T_c or T_t	Total Tc (hours) =	**0.316 hours**
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	**19 minutes**

Project:	**Beacon Unitarian Universalist Church**	**By:**	**SM**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: (**Present**) Developed — **Future Existing Watershed EX-2B Pervious**

Circle One: (**T_c**) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

			Segment ID	1		2		
1.	Surface Description (NEH table 15-1)			Dense Grasses		Woods Light Underbrush		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.24		0.40		
3.	Flow Length, L (total L < 100 ft)		ft	37		63		
4.	Two-year 24-hr rainfall, P_2		in	4.12		4.12		
5.	Land Slope, s		ft/ft	0.065		0.025		
6.	Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.059	+	0.198	+	
						Sheet Flow Sub-Total		0.257 hours

Shallow Concentrated Flow

			Segment ID	3		4		
7.	Surface Description			Woodlands		Woodlands		
8.	Flow Length, L		ft	69		126		
9.	Watercourse Slope, s		ft/ft	0.028		0.008		
10.	Average Velocity, V (NEH table 15-3)		ft/s	0.84		0.46		
11.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.023	+	0.076	+	
						Shallow Conc. Flow Sub-Total		0.099 hours

Channel Flow

			Segment ID					
12.	Flow Length, L		ft					
13.	Cross Sectional flow area, a		ft^2					
14.	Wetted Perimeter, P_w		ft					
15.	Hydraulic Radius, r	$r = a / P_w$	ft					
16.	Channel Slope, s		ft/ft					
17.	Manning's Roughness Coeff., n							
18.	Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s					
19.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr		+		+	
						Channel Flow Sub-Total		0.000 hours

Watershed or subarea T_c or T_t		
(Add Sub-Total T_t from prior steps)	Total Tc (hours) =	**0.356 hours**
	Total Tc (minutes) =	**21 minutes**

Hydrograph Report

Project Name:

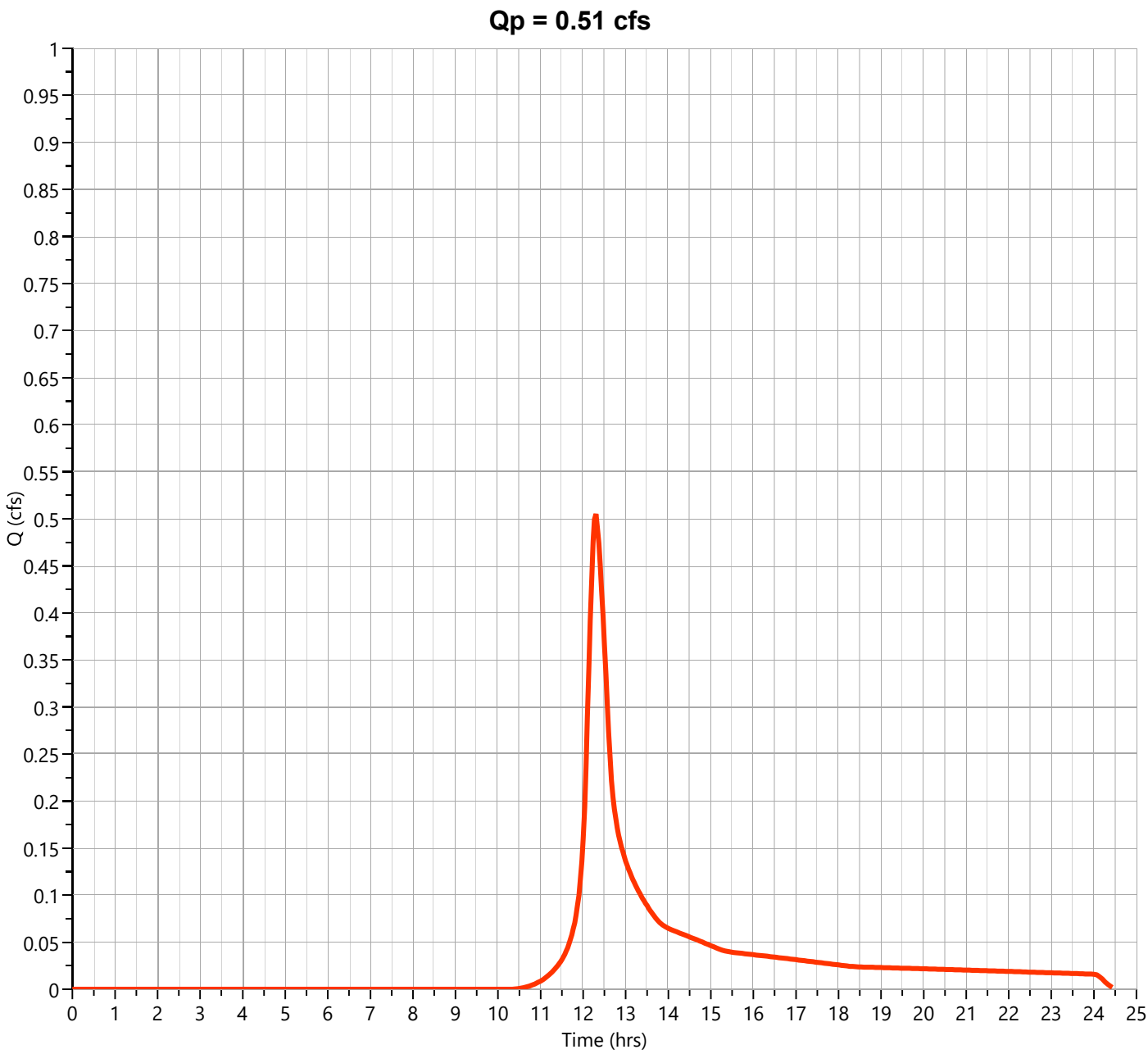
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2B Woods C

Hyd. No. 23

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.505 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.30 hrs
Time Interval	= 2 min	Runoff Volume	= 2,606 cuft
Drainage Area	= 0.5 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 21.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

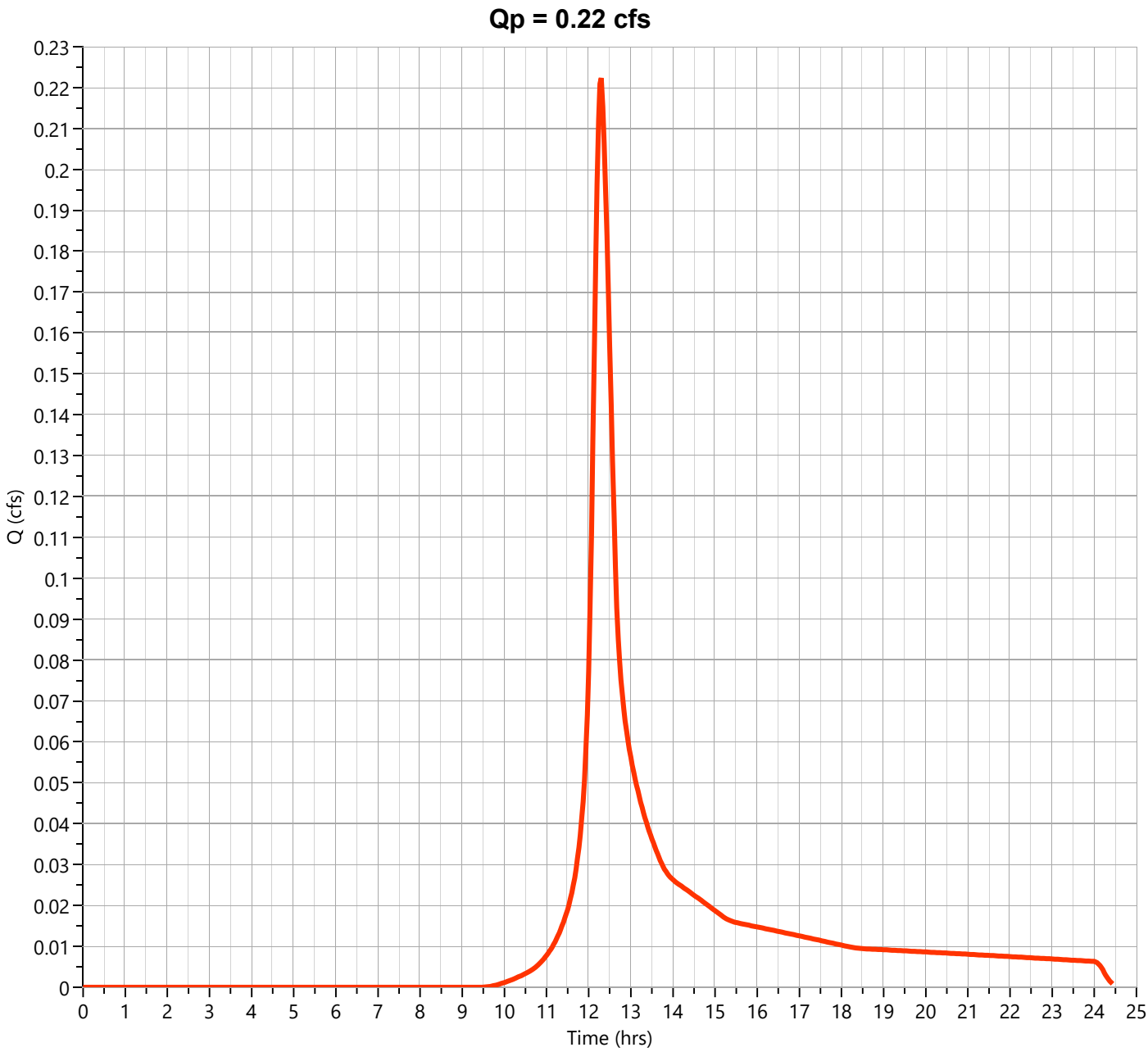
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2B Grass C

Hyd. No. 24

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.222 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.30 hrs
Time Interval	= 2 min	Runoff Volume	= 1,121 cuft
Drainage Area	= 0.18 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 21.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

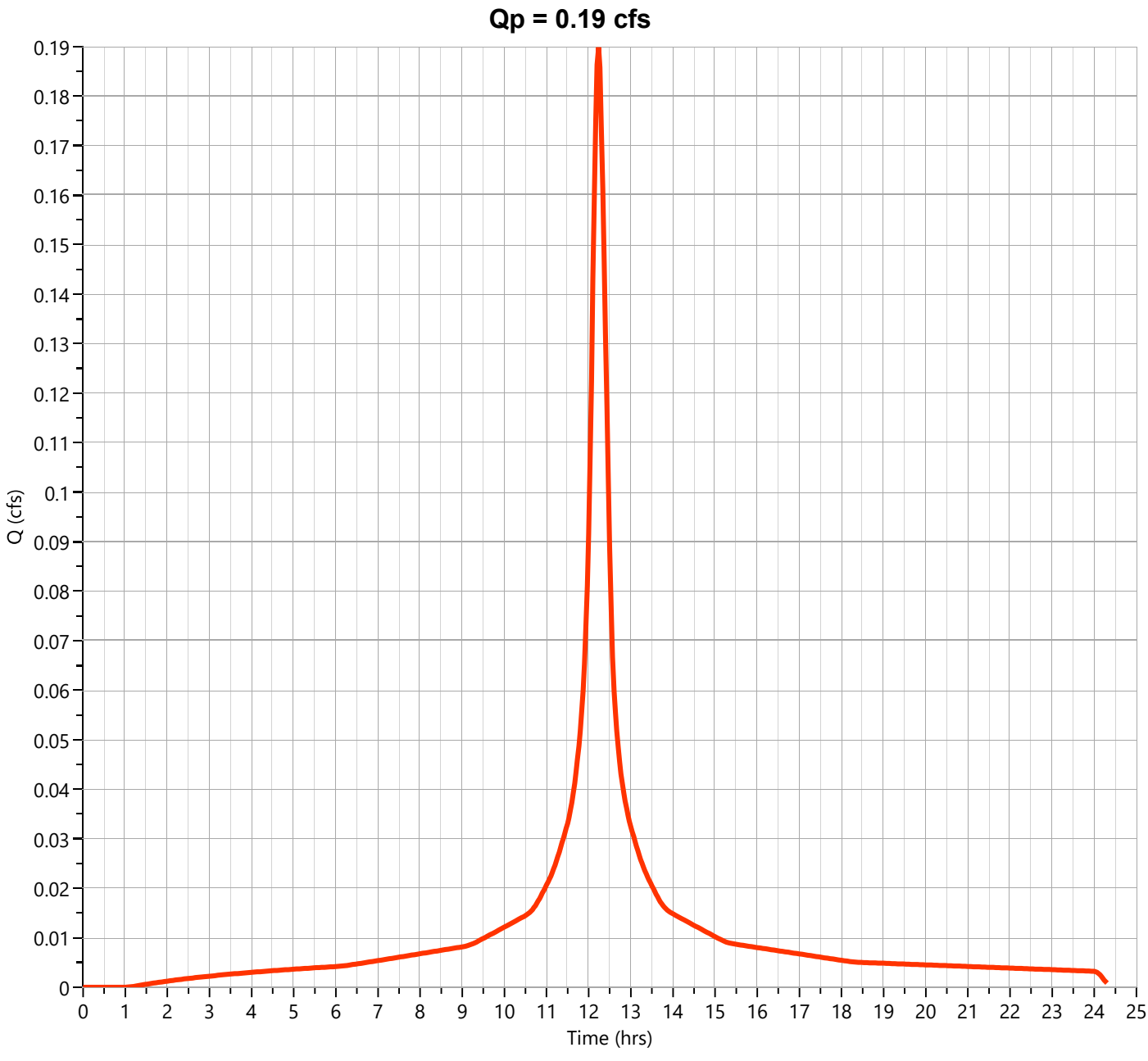
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2B Impervious

Hyd. No. 25

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.190 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 987 cuft
Drainage Area	= 0.07 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 19.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

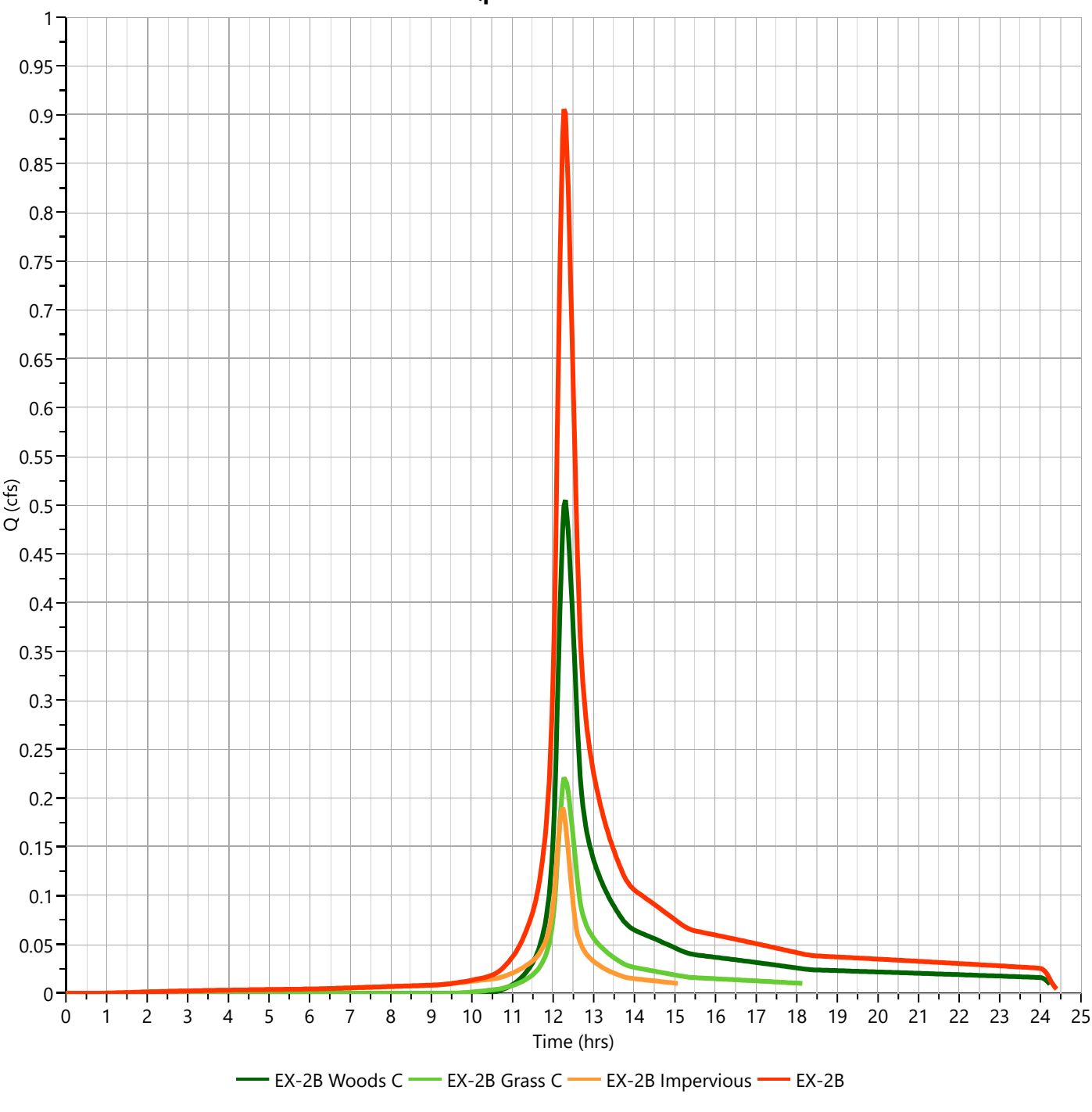
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2B

Hyd. No. 26

Hydrograph Type	= Junction	Peak Flow	= 0.906 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Hydrograph Volume	= 4,713 cuft
Inflow Hydrographs	= 23, 24, 25	Total Contrib. Area	= 0.75 ac



Hydrograph Report

Project Name:

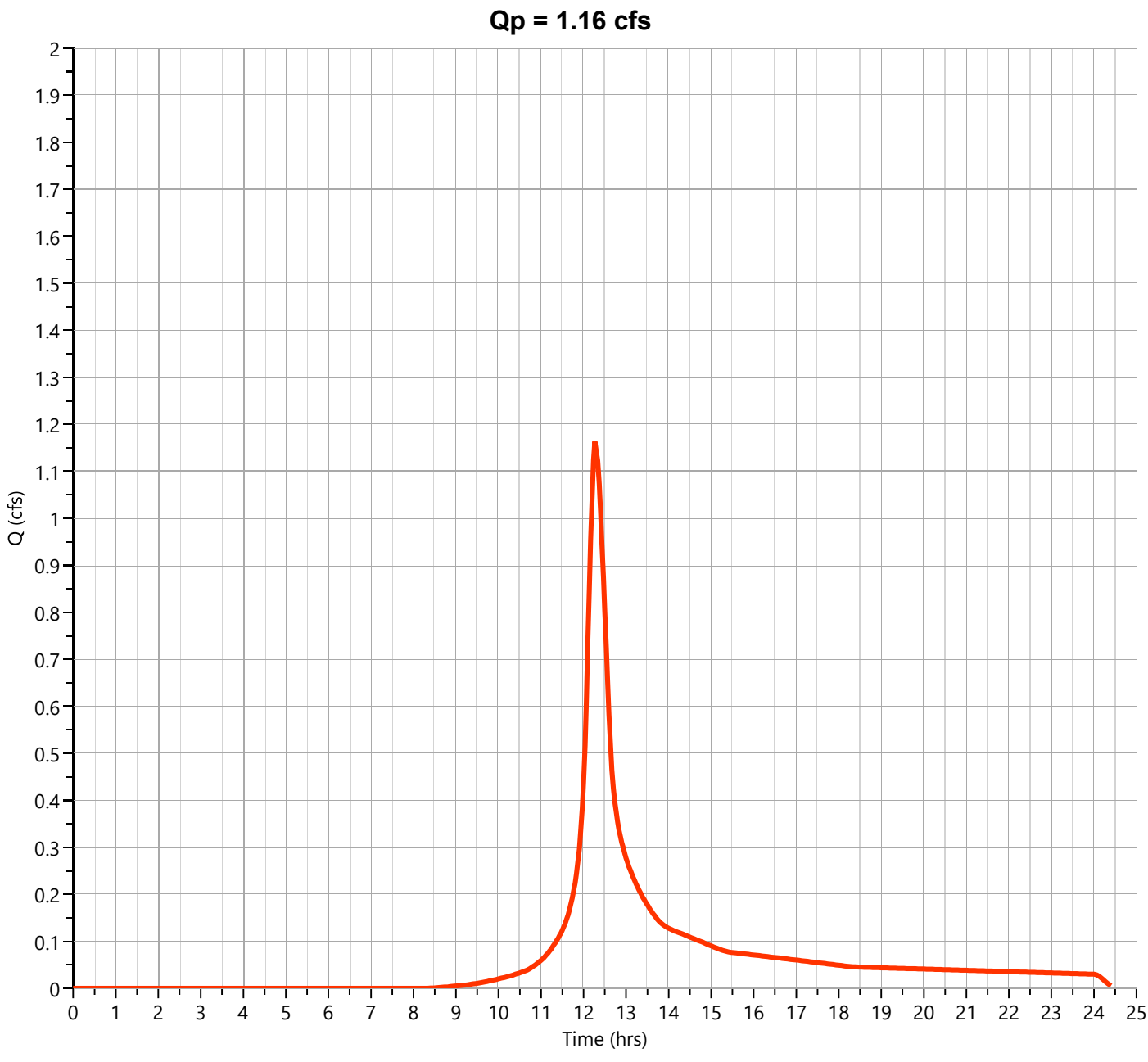
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2B Woods C

Hyd. No. 23

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.165 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.30 hrs
Time Interval	= 2 min	Runoff Volume	= 5,805 cuft
Drainage Area	= 0.5 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 21.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

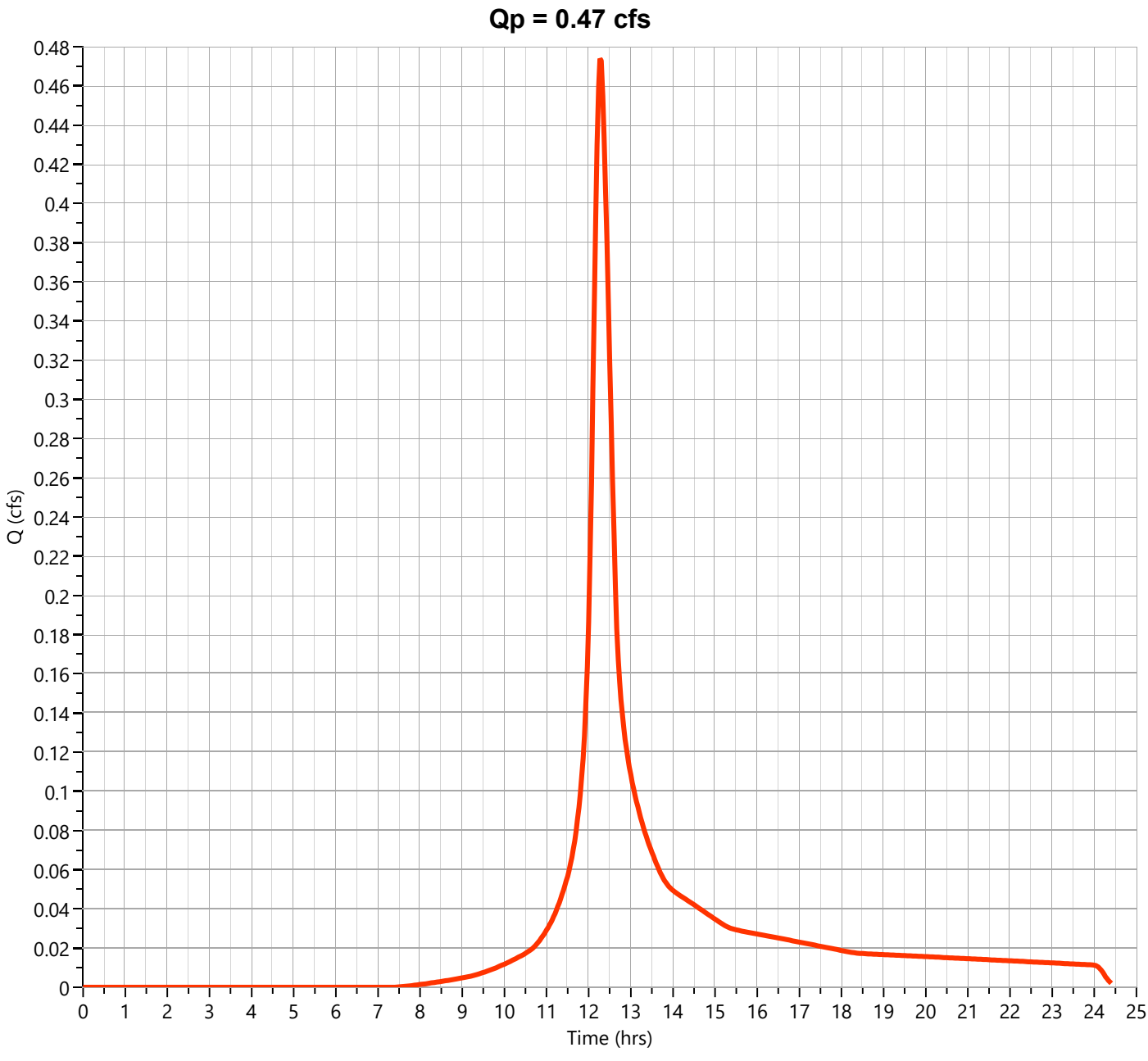
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2B Grass C

Hyd. No. 24

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.474 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Runoff Volume	= 2,355 cuft
Drainage Area	= 0.18 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 21.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

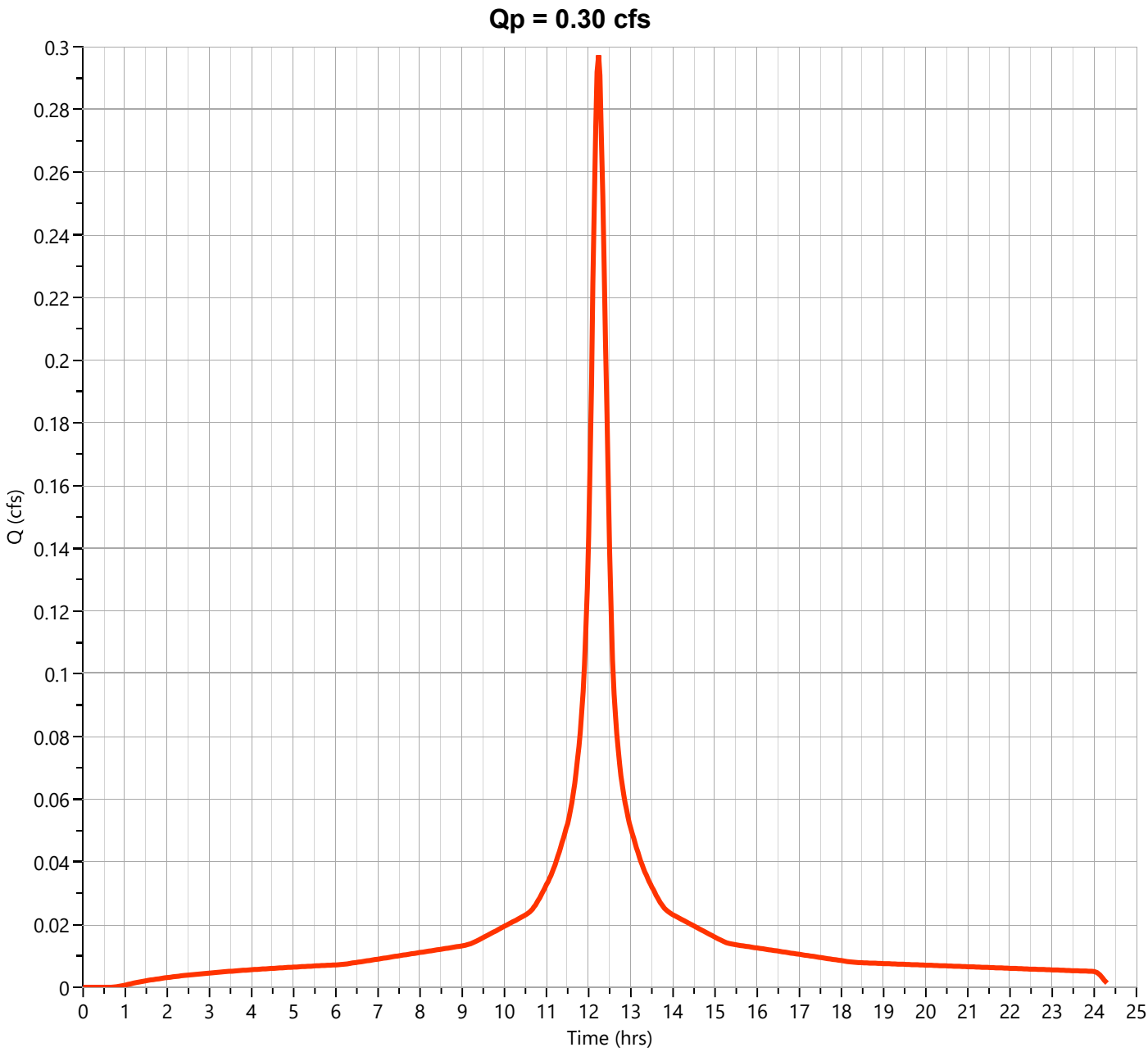
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2B Impervious

Hyd. No. 25

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.297 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 1,571 cuft
Drainage Area	= 0.07 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 19.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

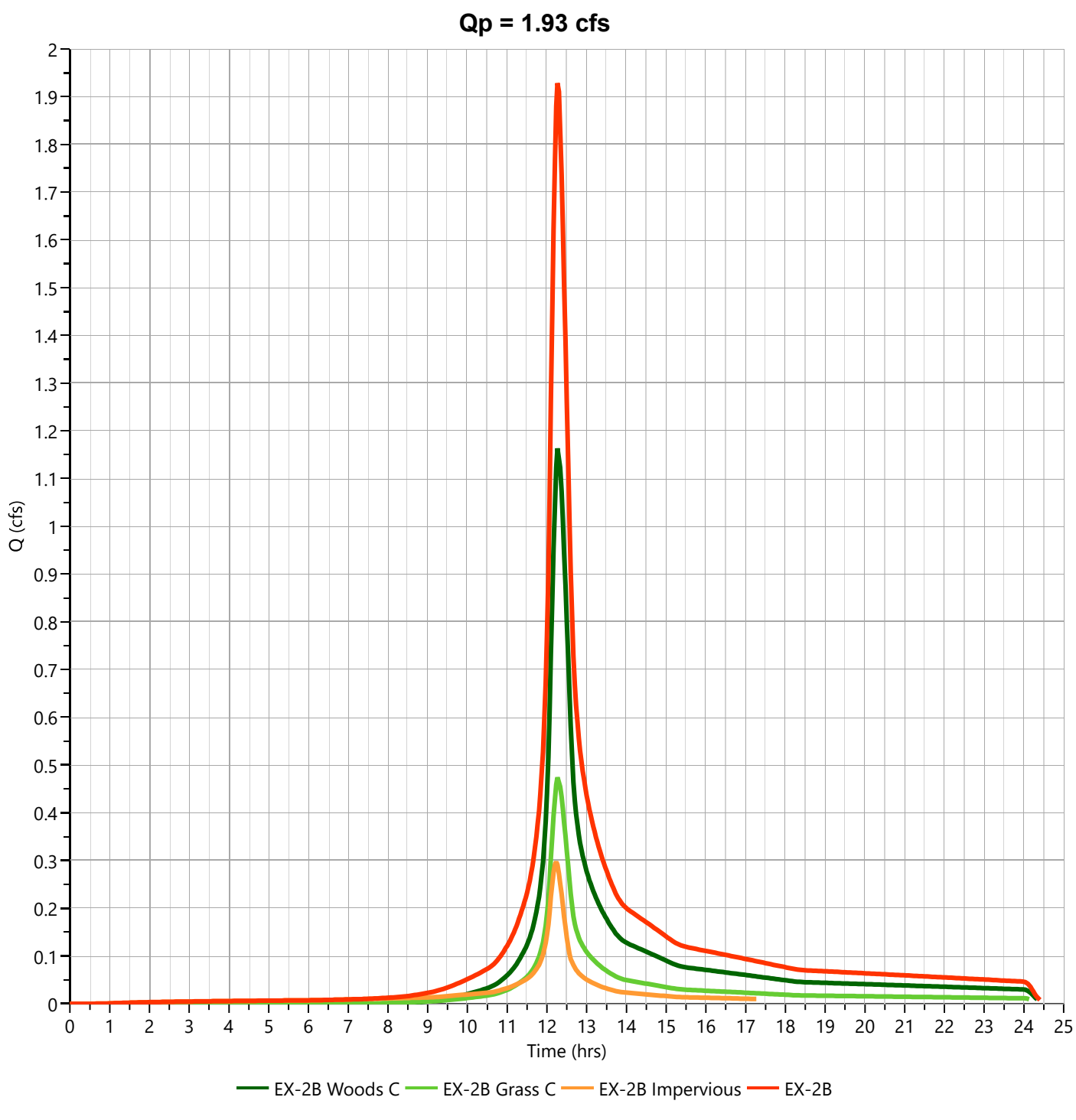
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2B

Hyd. No. 26

Hydrograph Type	= Junction	Peak Flow	= 1.928 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Hydrograph Volume	= 9,731 cuft
Inflow Hydrographs	= 23, 24, 25	Total Contrib. Area	= 0.75 ac



Hydrograph Report

Project Name:

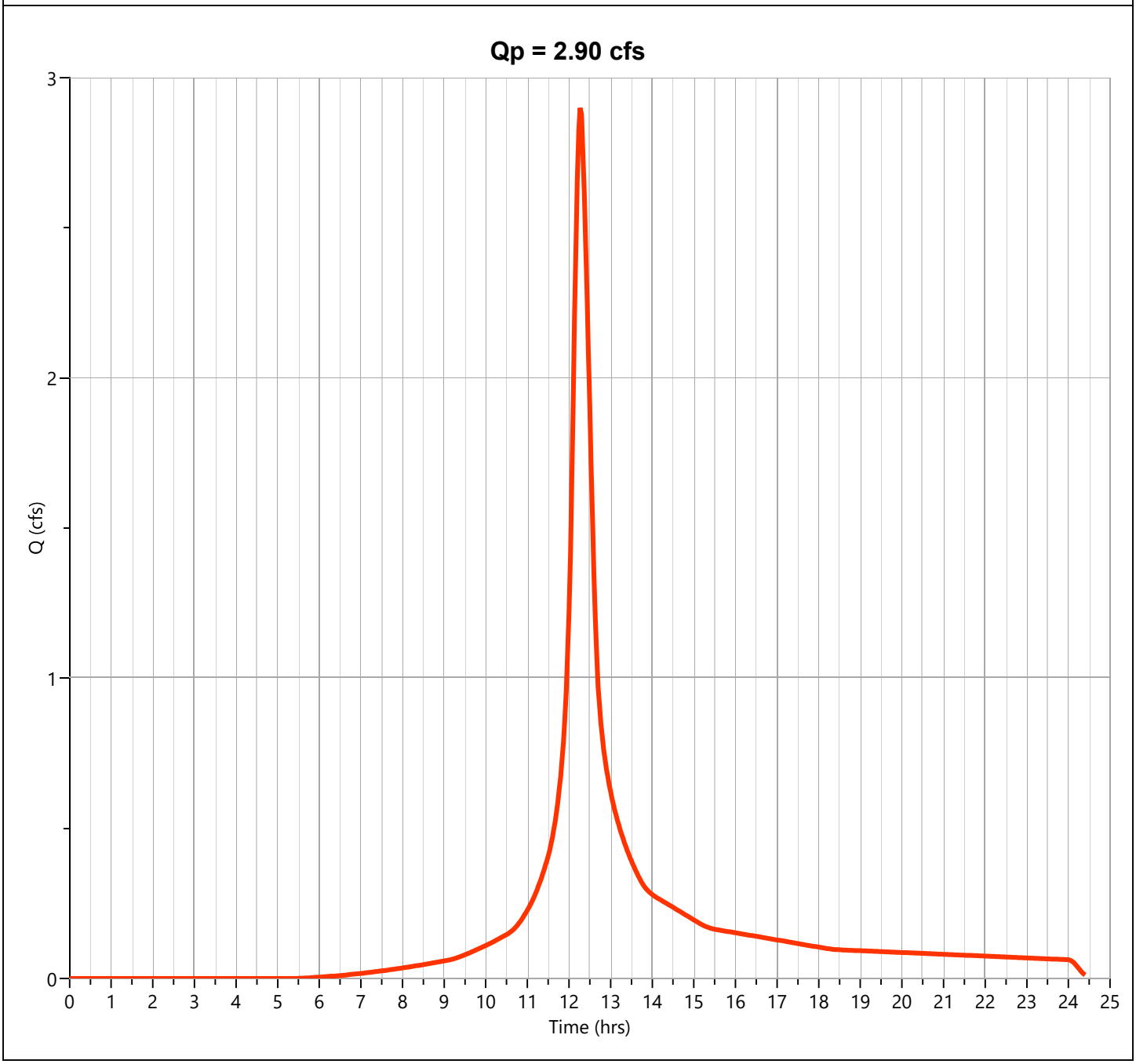
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2B Woods C

Hyd. No. 23

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.898 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Runoff Volume	= 14,527 cuft
Drainage Area	= 0.5 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 21.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

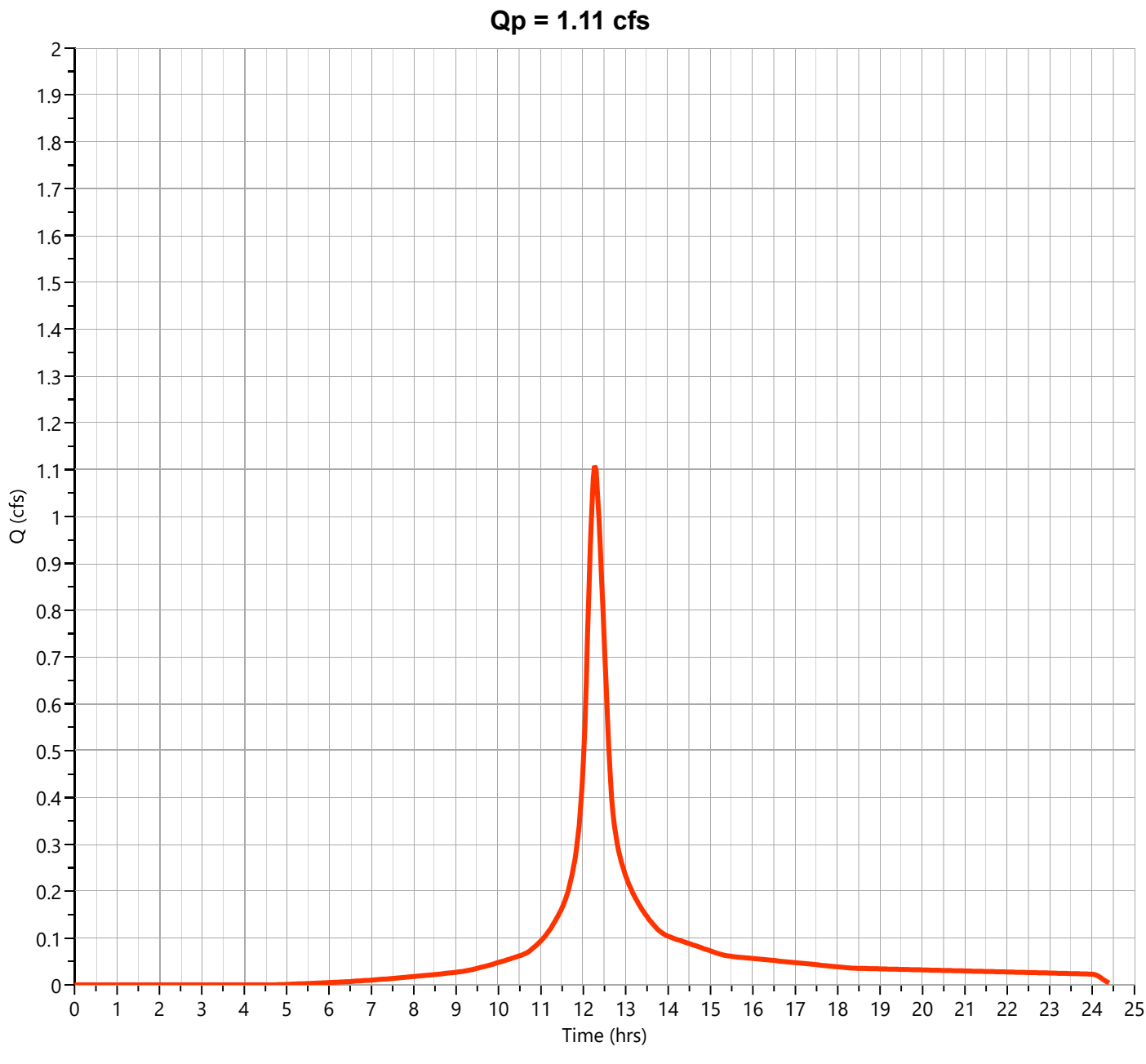
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2B Grass C

Hyd. No. 24

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.108 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Runoff Volume	= 5,606 cuft
Drainage Area	= 0.18 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 21.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

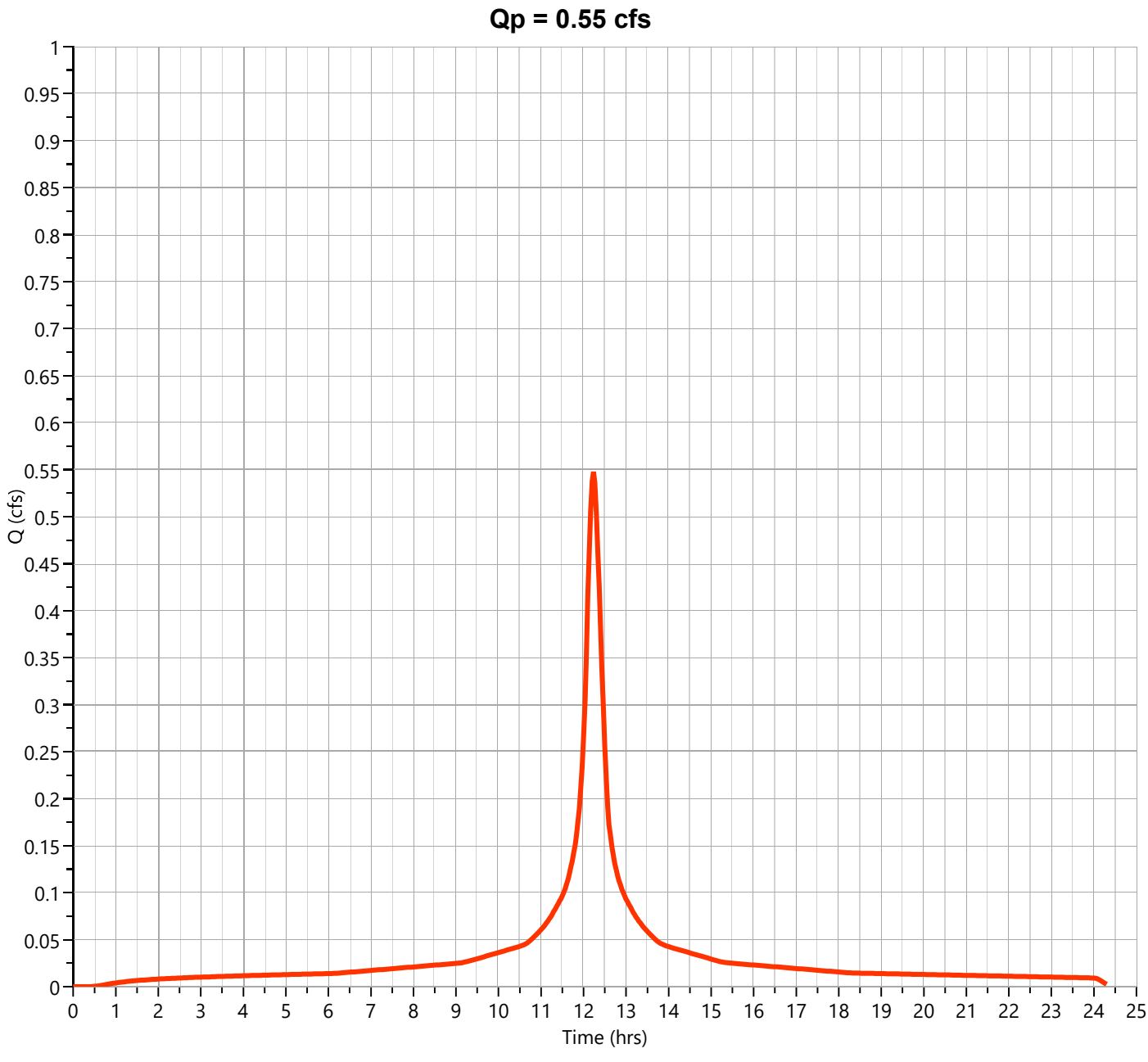
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2B Impervious

Hyd. No. 25

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.548 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
Time Interval	= 2 min	Runoff Volume	= 2,937 cuft
Drainage Area	= 0.07 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 19.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

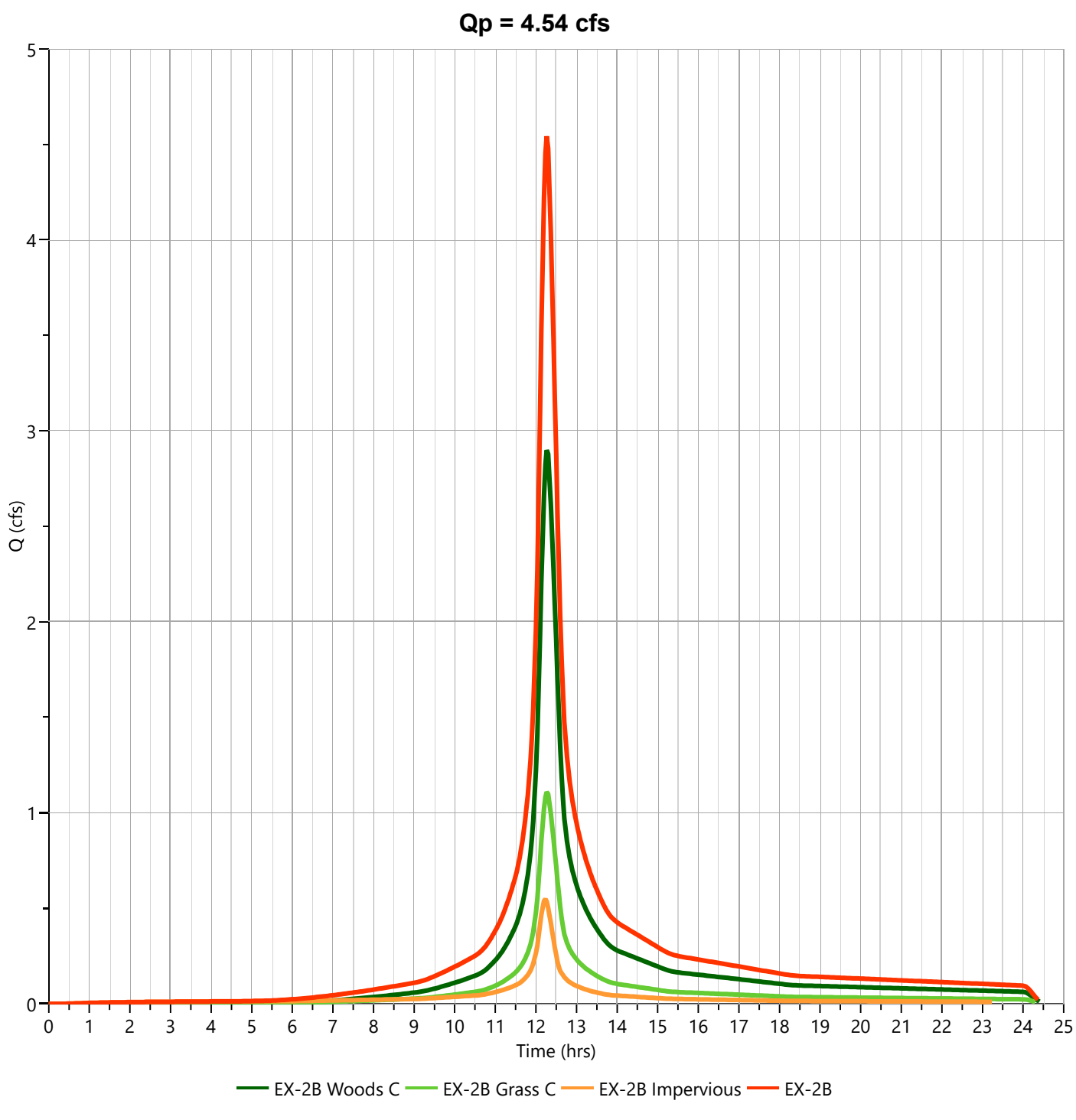
Hydrology Studio v 3.0.0.29

11-29-2023

EX-2B

Hyd. No. 26

Hydrograph Type	= Junction	Peak Flow	= 4.542 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.27 hrs
Time Interval	= 2 min	Hydrograph Volume	= 23,069 cuft
Inflow Hydrographs	= 23, 24, 25	Total Contrib. Area	= 0.75 ac



TOTAL EXISTING FLOW TO POA-2

Hydrograph Report

Project Name:

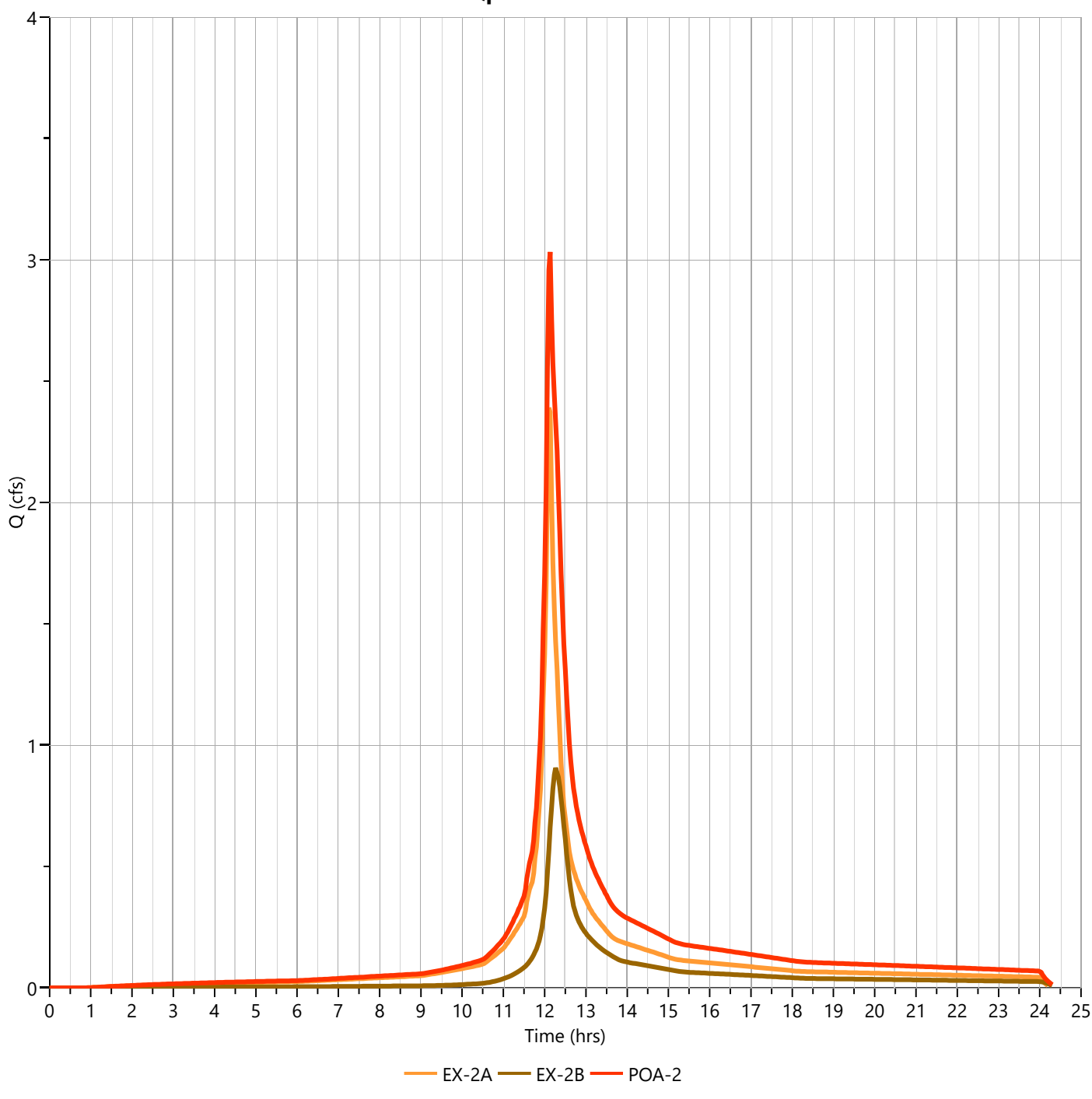
Hydrology Studio v 3.0.0.29

11-29-2023

POA-2

Hyd. No. 28

Hydrograph Type	= Junction	Peak Flow	= 3.032 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 14,735 cuft
Inflow Hydrographs	= 15, 26	Total Contrib. Area	= 1.97 ac



Hydrograph Report

Project Name:

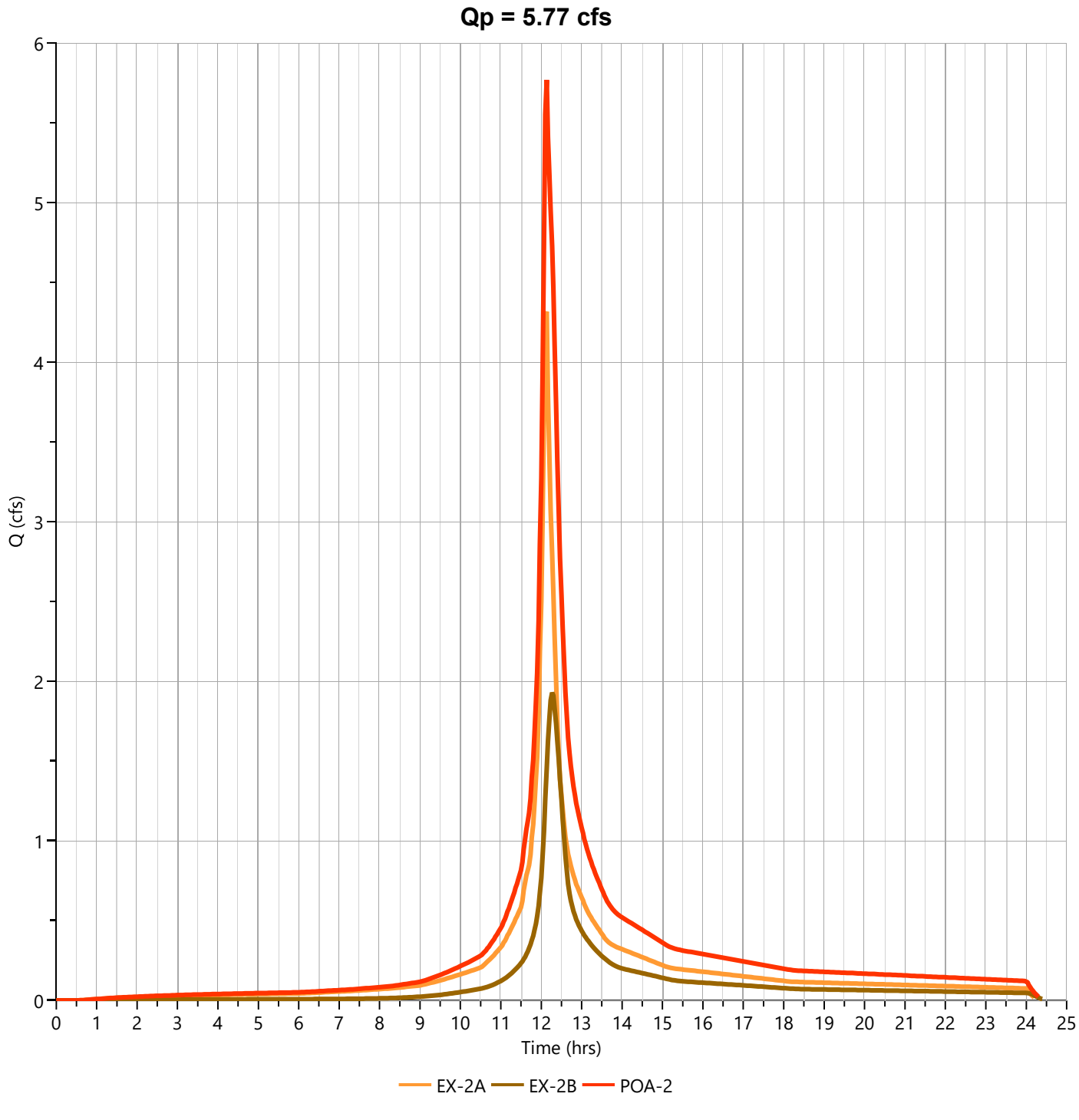
Hydrology Studio v 3.0.0.29

11-29-2023

POA-2

Hyd. No. 28

Hydrograph Type	= Junction	Peak Flow	= 5.768 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 28,113 cuft
Inflow Hydrographs	= 15, 26	Total Contrib. Area	= 1.97 ac



Hydrograph Report

Project Name:

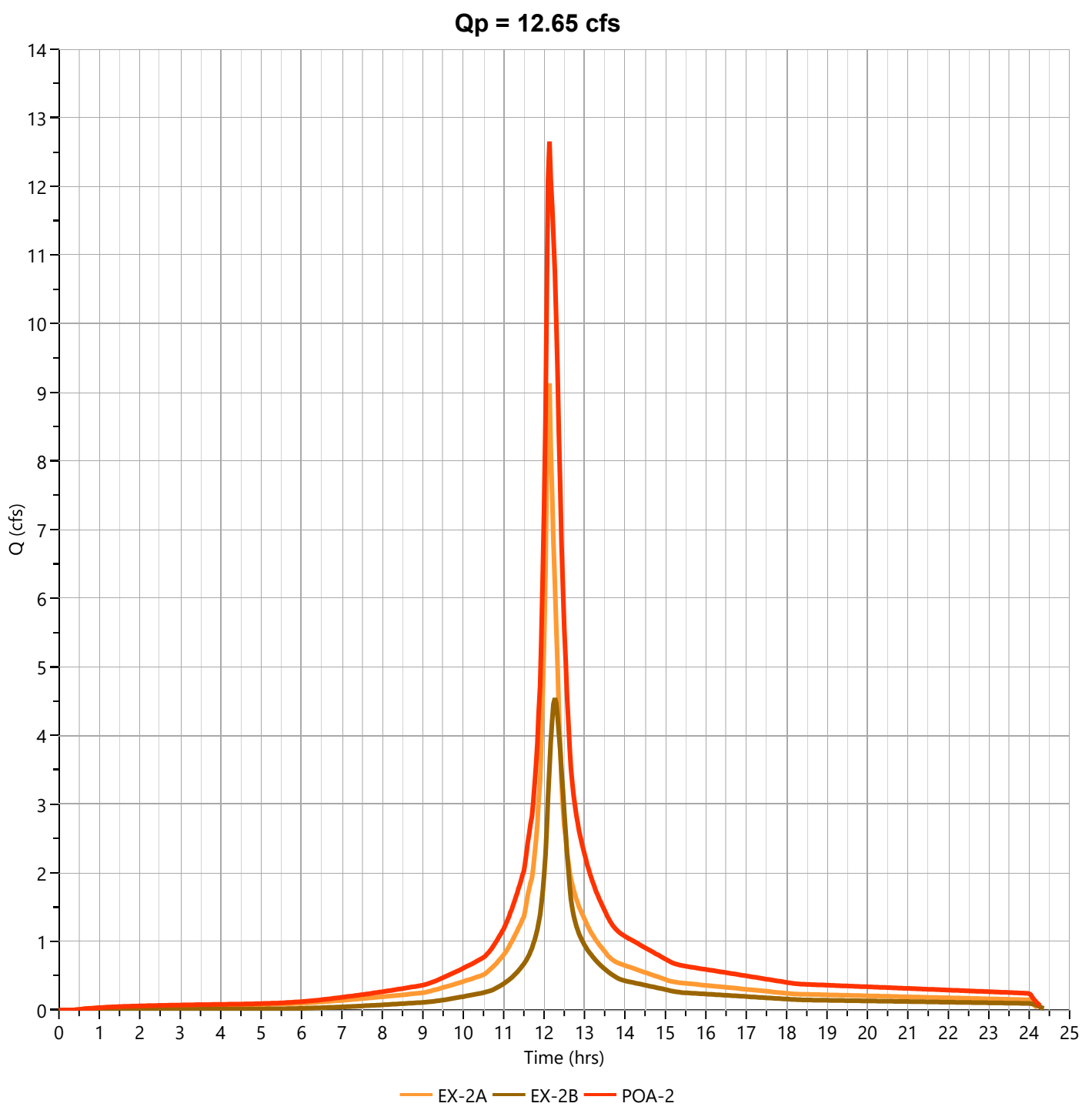
Hydrology Studio v 3.0.0.29

11-29-2023

POA-2

Hyd. No. 28

Hydrograph Type	= Junction	Peak Flow	= 12.65 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 62,725 cuft
Inflow Hydrographs	= 15, 26	Total Contrib. Area	= 1.97 ac



TOTAL ALLOWABLE FLOW TO POA-2

Hydrograph Report

Project Name:

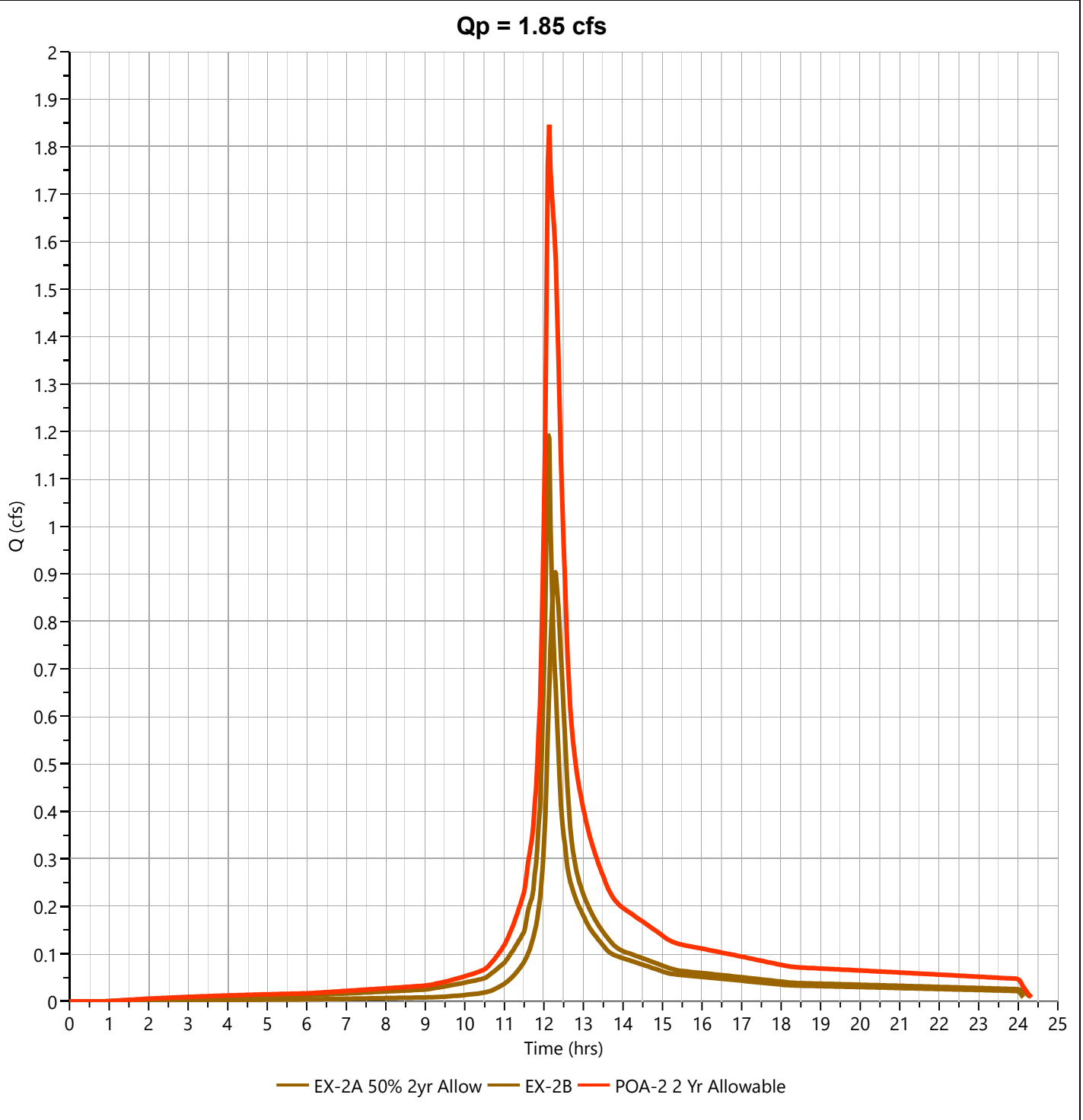
Hydrology Studio v 3.0.0.29

11-29-2023

POA-2 2 Yr Allowable

Hyd. No. 29

Hydrograph Type	= Junction	Peak Flow	= 1.846 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 9,724 cuft
Inflow Hydrographs	= 16, 26	Total Contrib. Area	= 0.75 ac



Hydrograph Report

Project Name:

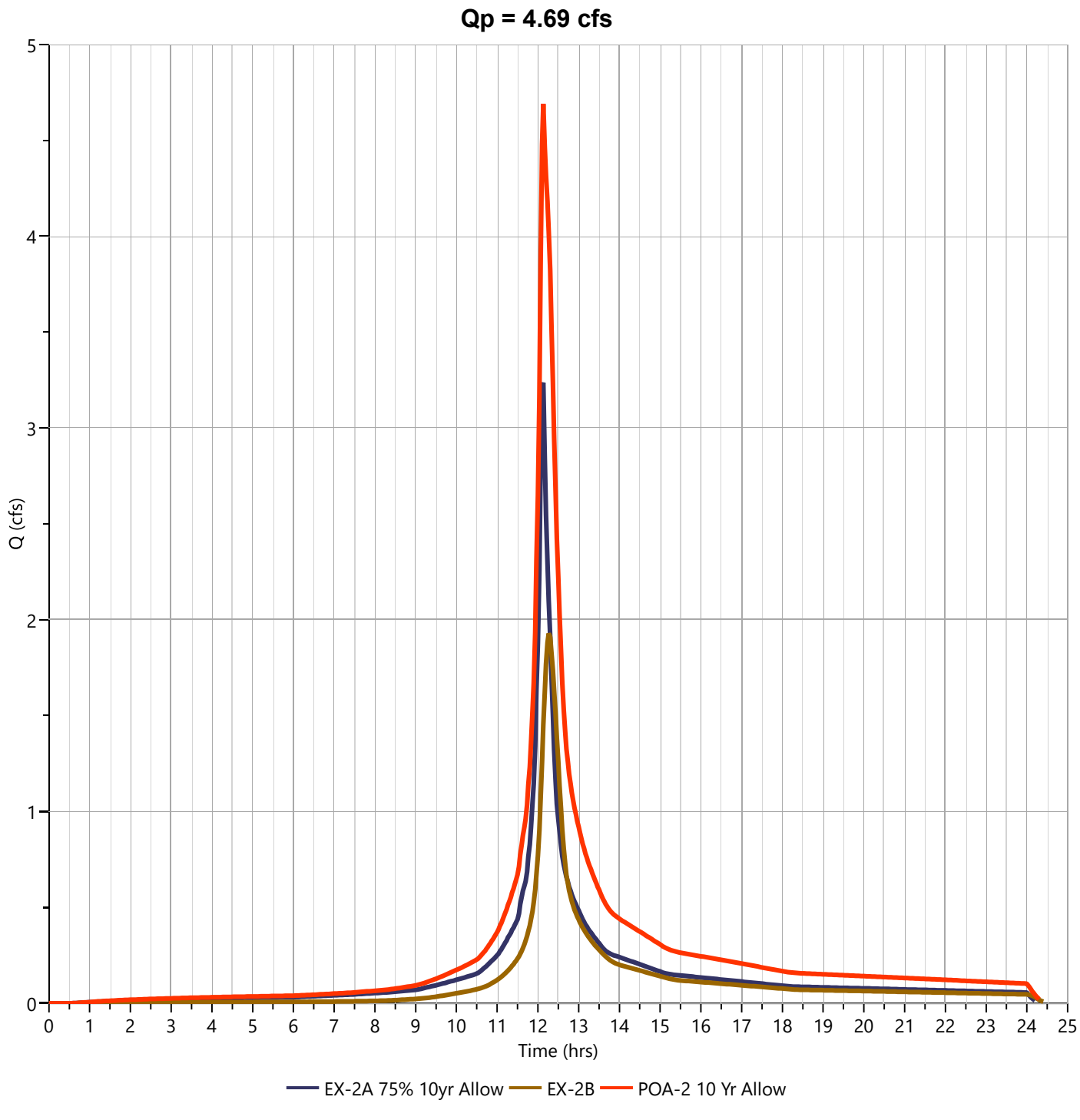
Hydrology Studio v 3.0.0.29

11-29-2023

POA-2 10 Yr Allow

Hyd. No. 30

Hydrograph Type	= Junction	Peak Flow	= 4.689 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 23,517 cuft
Inflow Hydrographs	= 18, 26	Total Contrib. Area	= 0.75 ac



Hydrograph Report

Project Name:

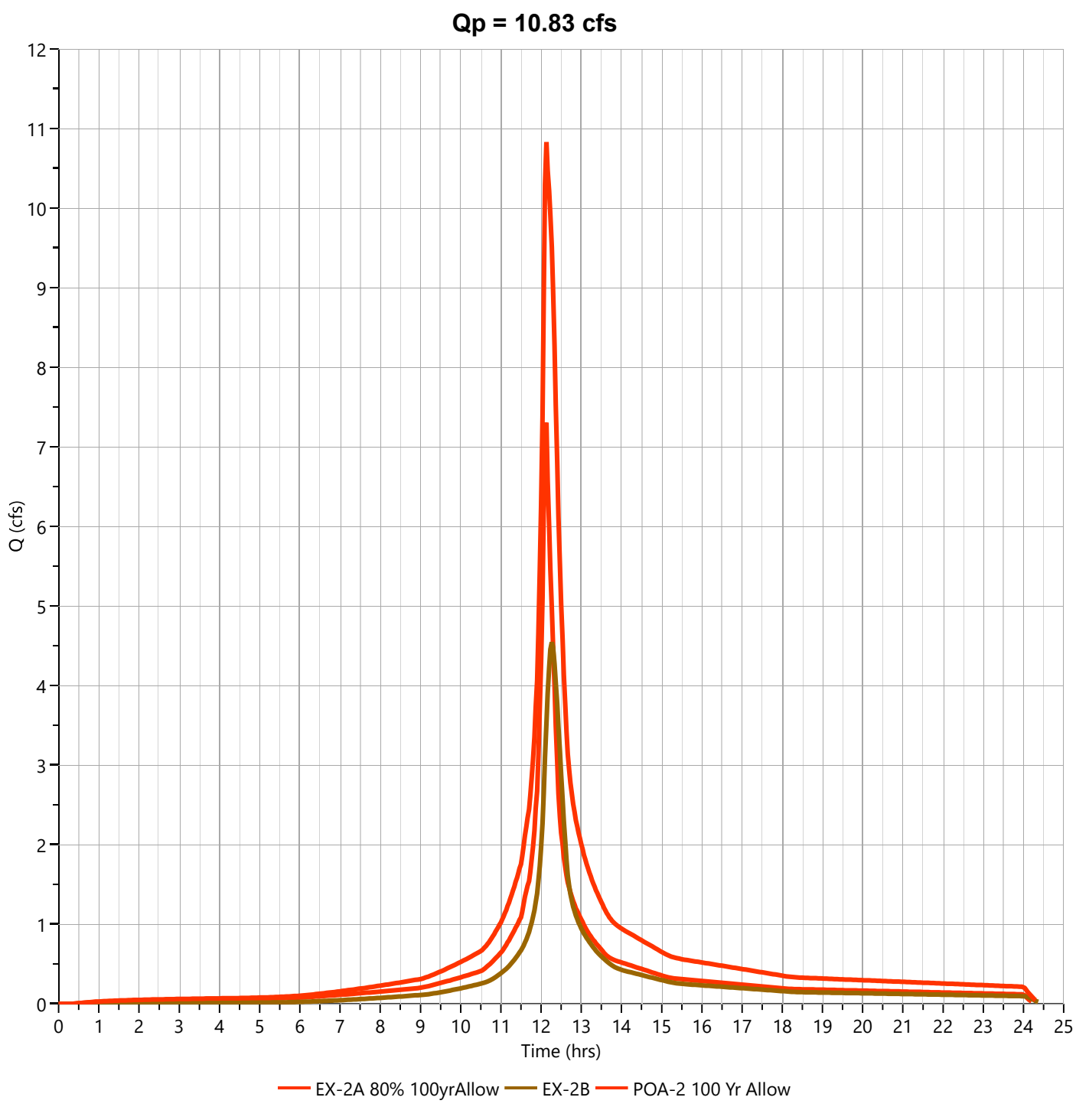
Hydrology Studio v 3.0.0.29

11-29-2023

POA-2 100 Yr Allow

Hyd. No. 31

Hydrograph Type	= Junction	Peak Flow	= 10.83 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 2 min	Hydrograph Volume	= 54,794 cuft
Inflow Hydrographs	= 20, 26	Total Contrib. Area	= 0.75 ac



EX-3 WATERSHED (TOTAL EXISTING FLOW TO POA-3)

Project:	**Beacon Unitarian Universalist Church**	**By:**	**SM**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: (**Present**) Developed — **Future Existing Watershed EX-3 Pervious**

Circle One: (**T_c**) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

	Segment ID		**1**					
1.	Surface Description (NEH table 15-1)		**Woods Dense Underbrush**					
2.	Manning's Roughness Coeff., n (NEH table 15-1)		**0.40**					
3.	Flow Length, L (total L < 100 ft)	ft	**100**					
4.	Two-year 24-hr rainfall, P_2	in	**4.12**					
5.	Land Slope, s	ft/ft	**0.077**					
6.	Compute T_t $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	**0.184**	+		+		
					Sheet Flow Sub-Total		**0.184 hours**	

Shallow Concentrated Flow

	Segment ID		**2**		**3**			
7.	Surface Description		**Woodlands**		**Pavement**			
8.	Flow Length, L	ft	**29**		**217**			
9.	Watercourse Slope, s	ft/ft	**0.241**		**0.059**			
10.	Average Velocity, V (NEH table 15-3)	ft/s	**2.47**		**4.95**			
11.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr	**0.003**	+	**0.012**	+		
					Shallow Conc. Flow Sub-Total		**0.015 hours**	

Channel Flow

	Segment ID							
12.	Flow Length, L	ft						
13.	Cross Sectional flow area, a	ft^2						
14.	Wetted Perimeter, P_w	ft						
15.	Hydraulic Radius, r $r = a / P_w$	ft						
16.	Channel Slope, s	ft/ft						
17.	Manning's Roughness Coeff., n							
18.	Velocity, V $V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s						
19.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr		+		+		
					Channel Flow Sub-Total		**0.000 hours**	

Watershed or subarea T_c or T_t	Total Tc (hours) =	**0.200 hours**
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	**12 minutes**

Hydrograph Report

Project Name:

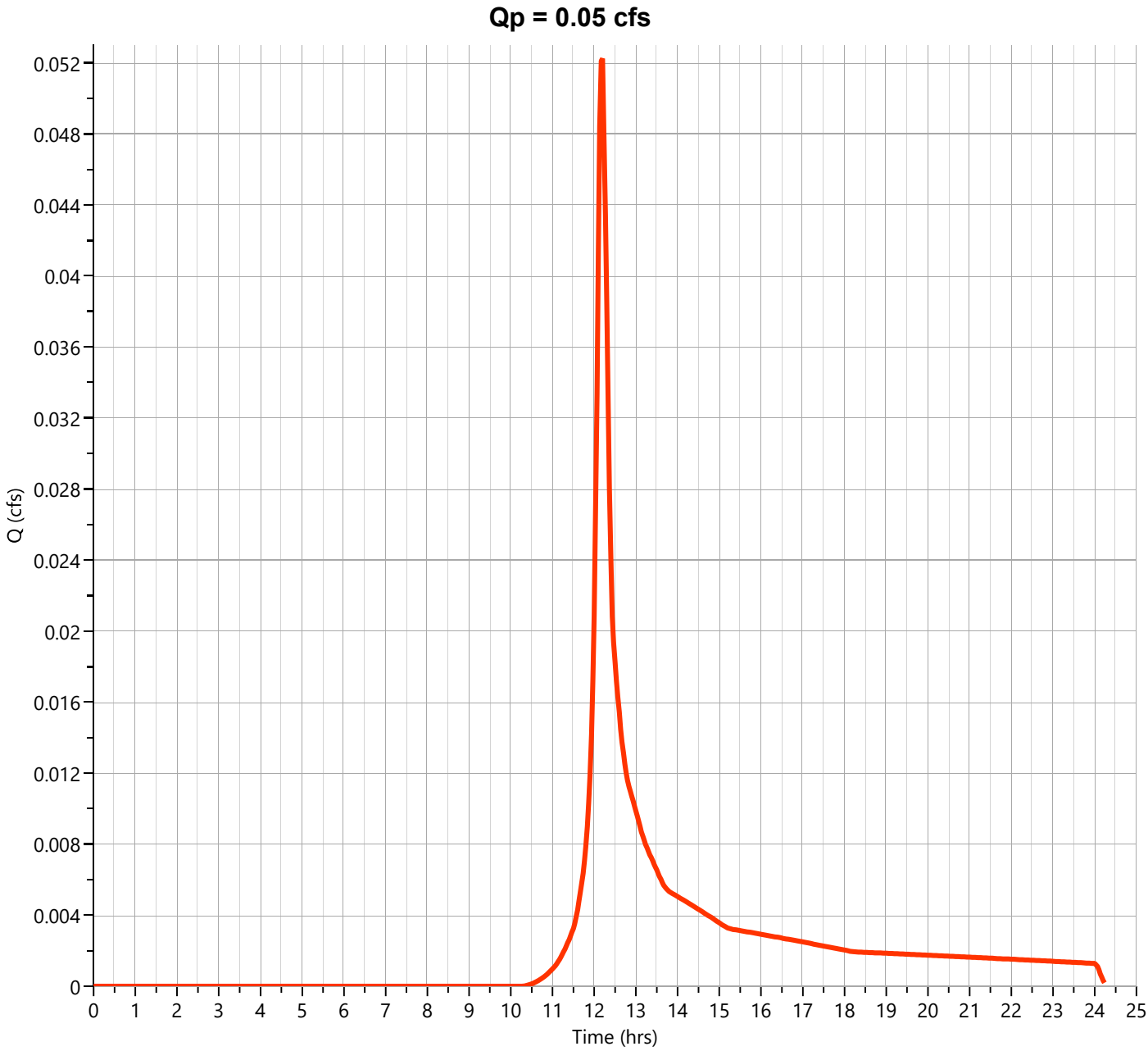
Hydrology Studio v 3.0.0.29

11-29-2023

EX-3 Woods C

Hyd. No. 33

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.052 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Runoff Volume	= 211 cuft
Drainage Area	= 0.04 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 12.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

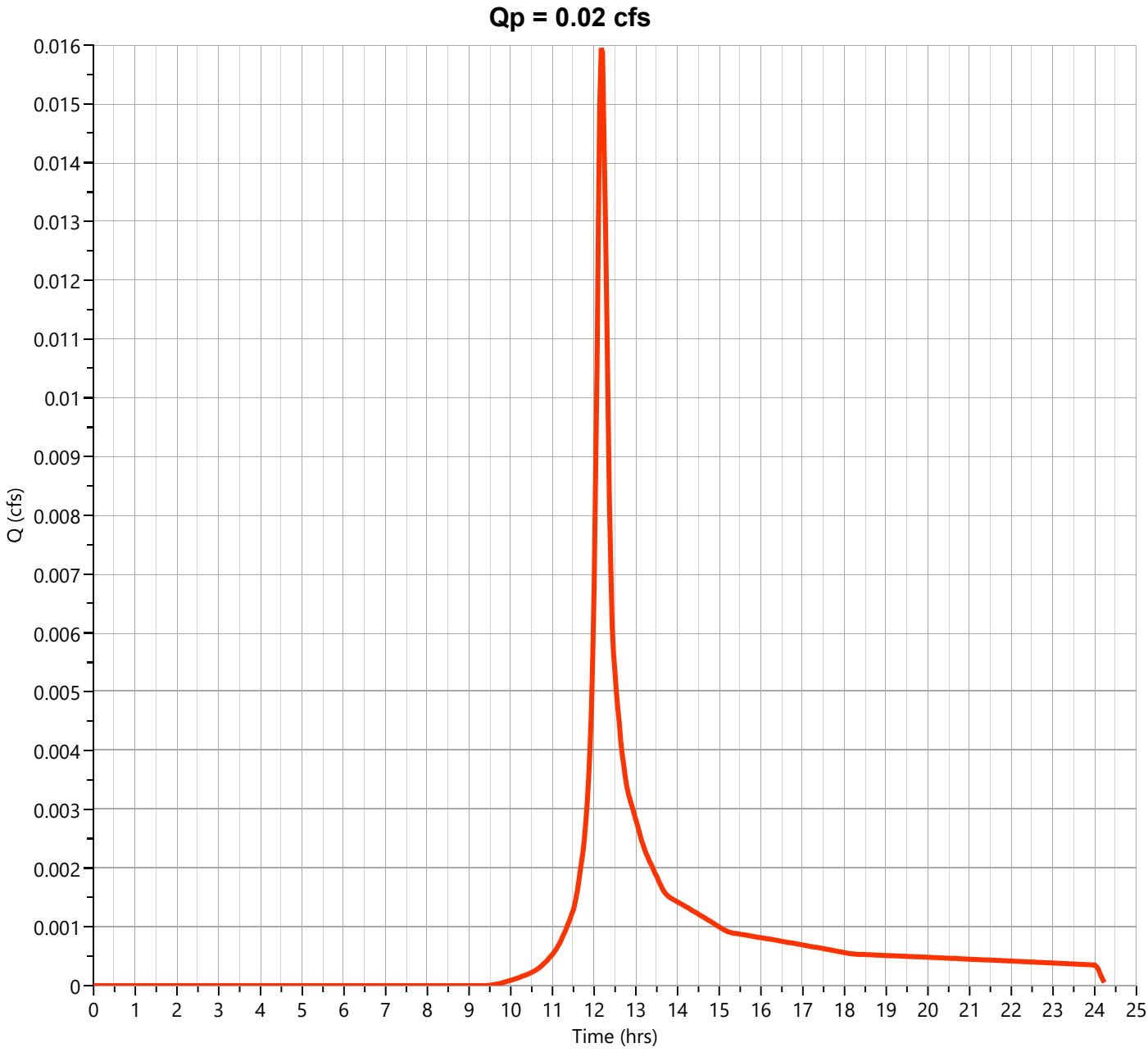
Hydrology Studio v 3.0.0.29

11-29-2023

EX-3 Grass C

Hyd. No. 34

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.016 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 63.1 cuft
Drainage Area	= 0.01 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 12.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

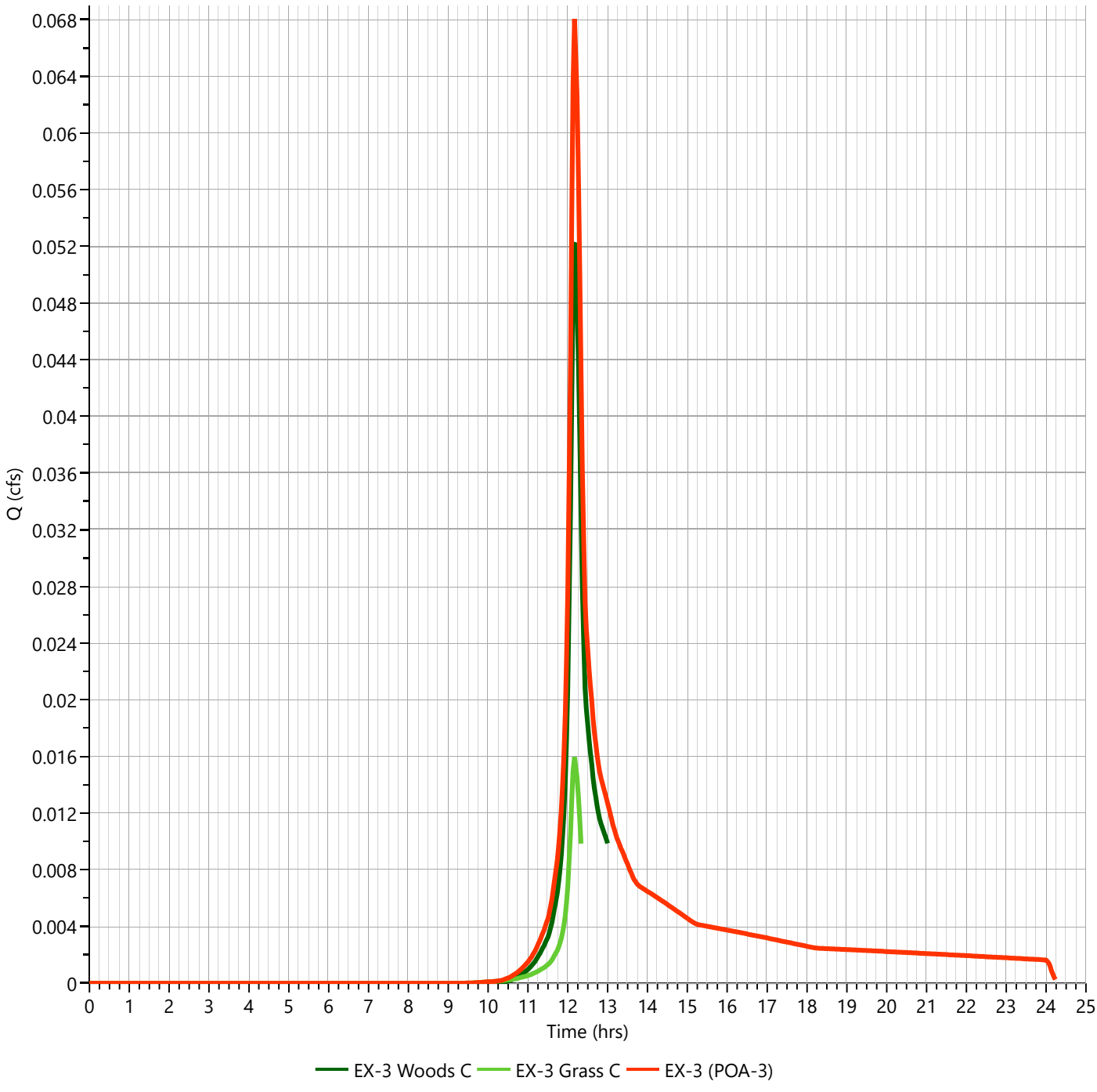
Hydrology Studio v 3.0.0.29

11-29-2023

EX-3 (POA-3)

Hyd. No. 35

Hydrograph Type	= Junction	Peak Flow	= 0.068 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 2 min	Hydrograph Volume	= 274 cuft
Inflow Hydrographs	= 33, 34	Total Contrib. Area	= 0.05 ac



Hydrograph Report

Project Name:

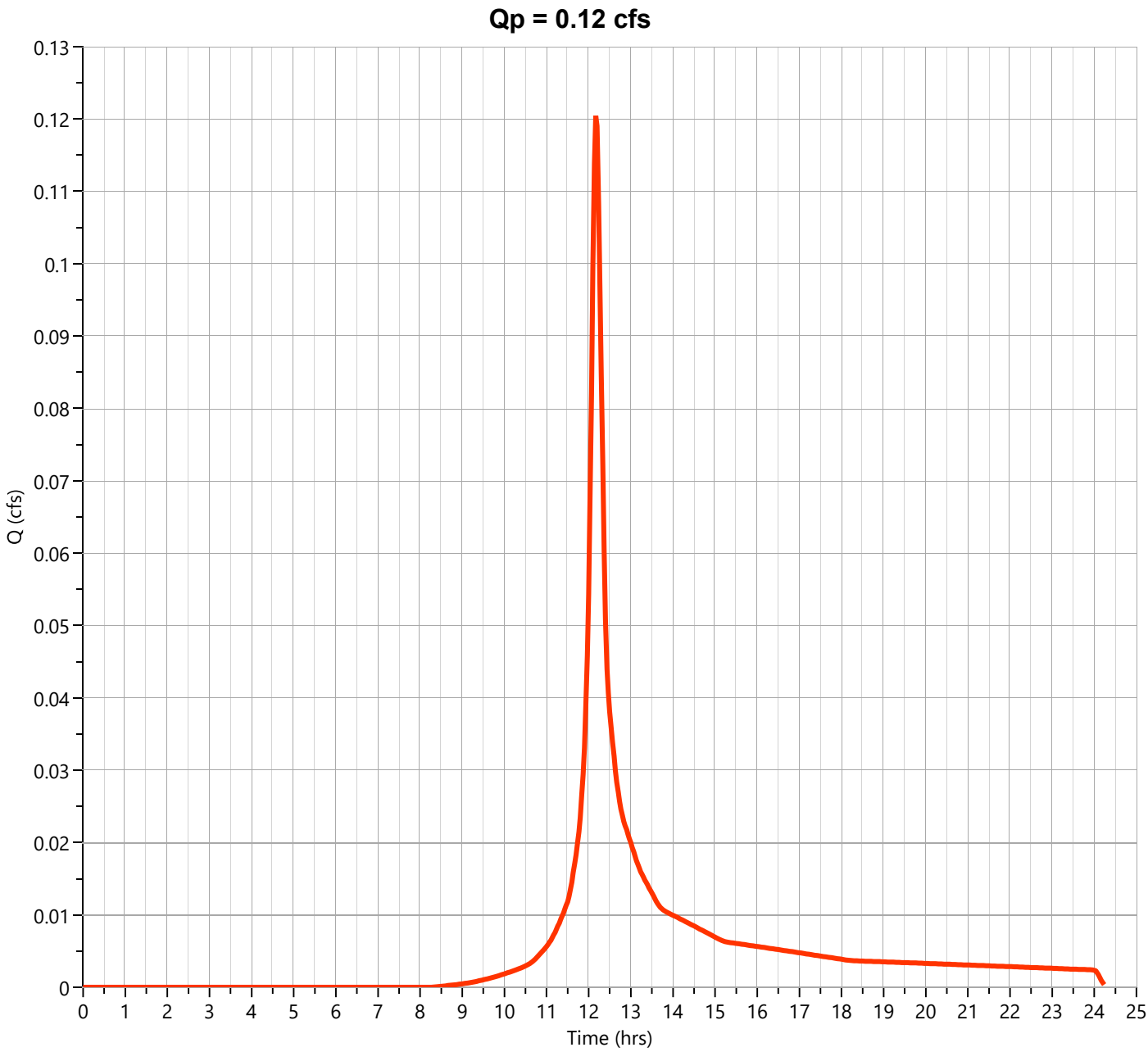
Hydrology Studio v 3.0.0.29

11-29-2023

EX-3 Woods C

Hyd. No. 33

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.120 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 470 cuft
Drainage Area	= 0.04 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 12.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

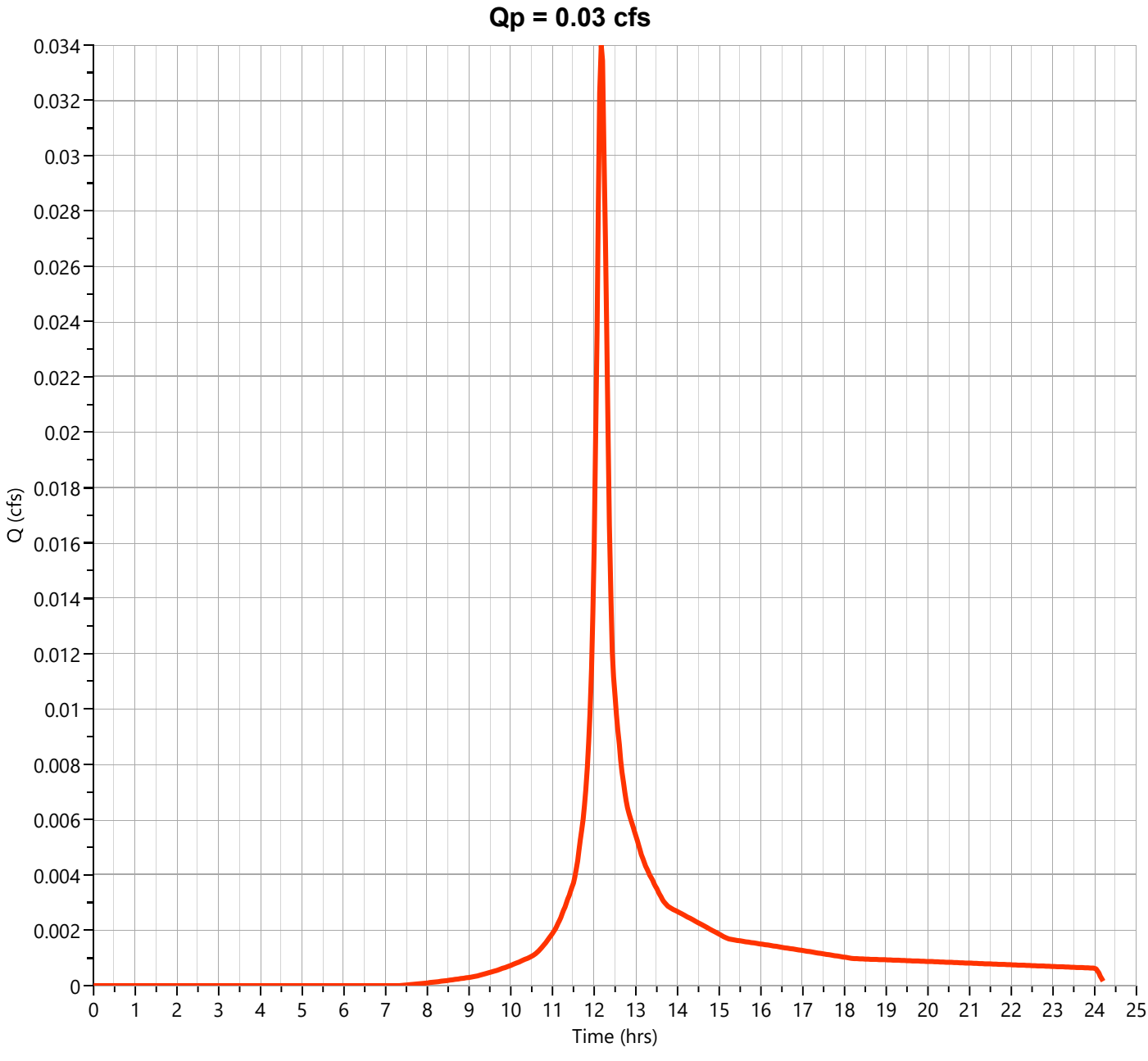
Hydrology Studio v 3.0.0.29

11-29-2023

EX-3 Grass C

Hyd. No. 34

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.034 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 133 cuft
Drainage Area	= 0.01 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 12.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

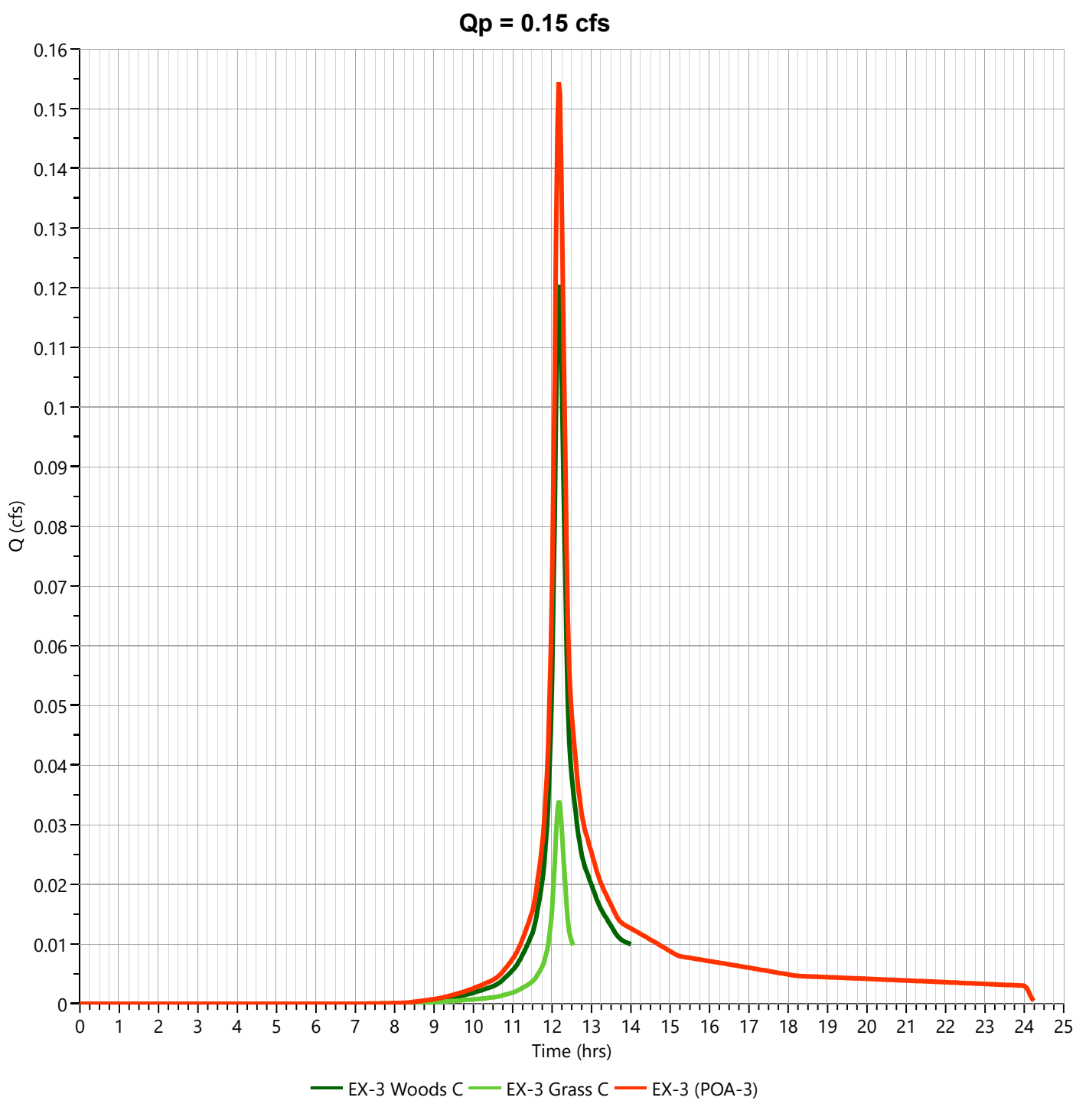
Hydrology Studio v 3.0.0.29

11-29-2023

EX-3 (POA-3)

Hyd. No. 35

Hydrograph Type	= Junction	Peak Flow	= 0.154 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 603 cuft
Inflow Hydrographs	= 33, 34	Total Contrib. Area	= 0.05 ac



Hydrograph Report

Project Name:

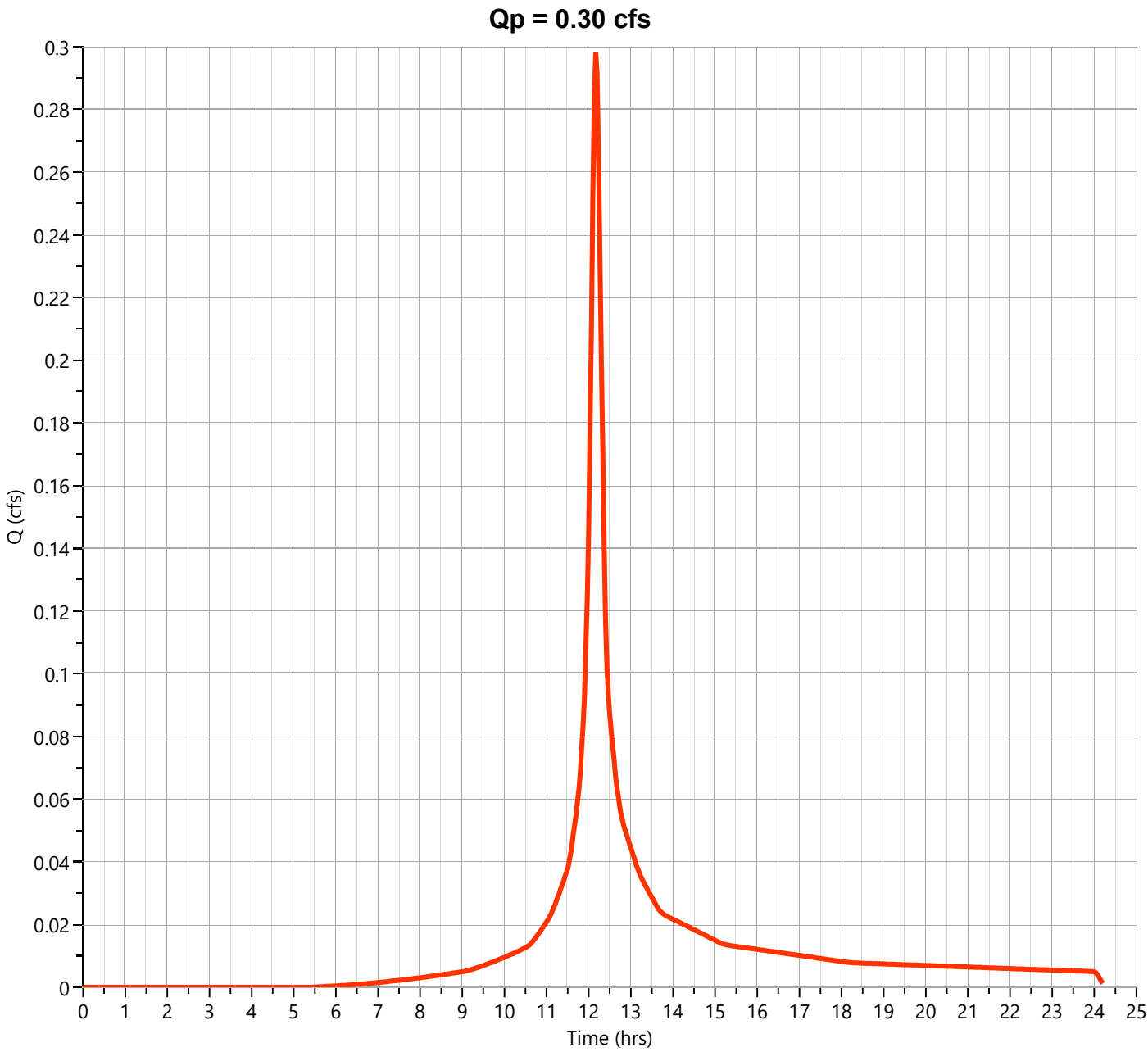
Hydrology Studio v 3.0.0.29

11-29-2023

EX-3 Woods C

Hyd. No. 33

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.298 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 1,177 cuft
Drainage Area	= 0.04 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 12.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

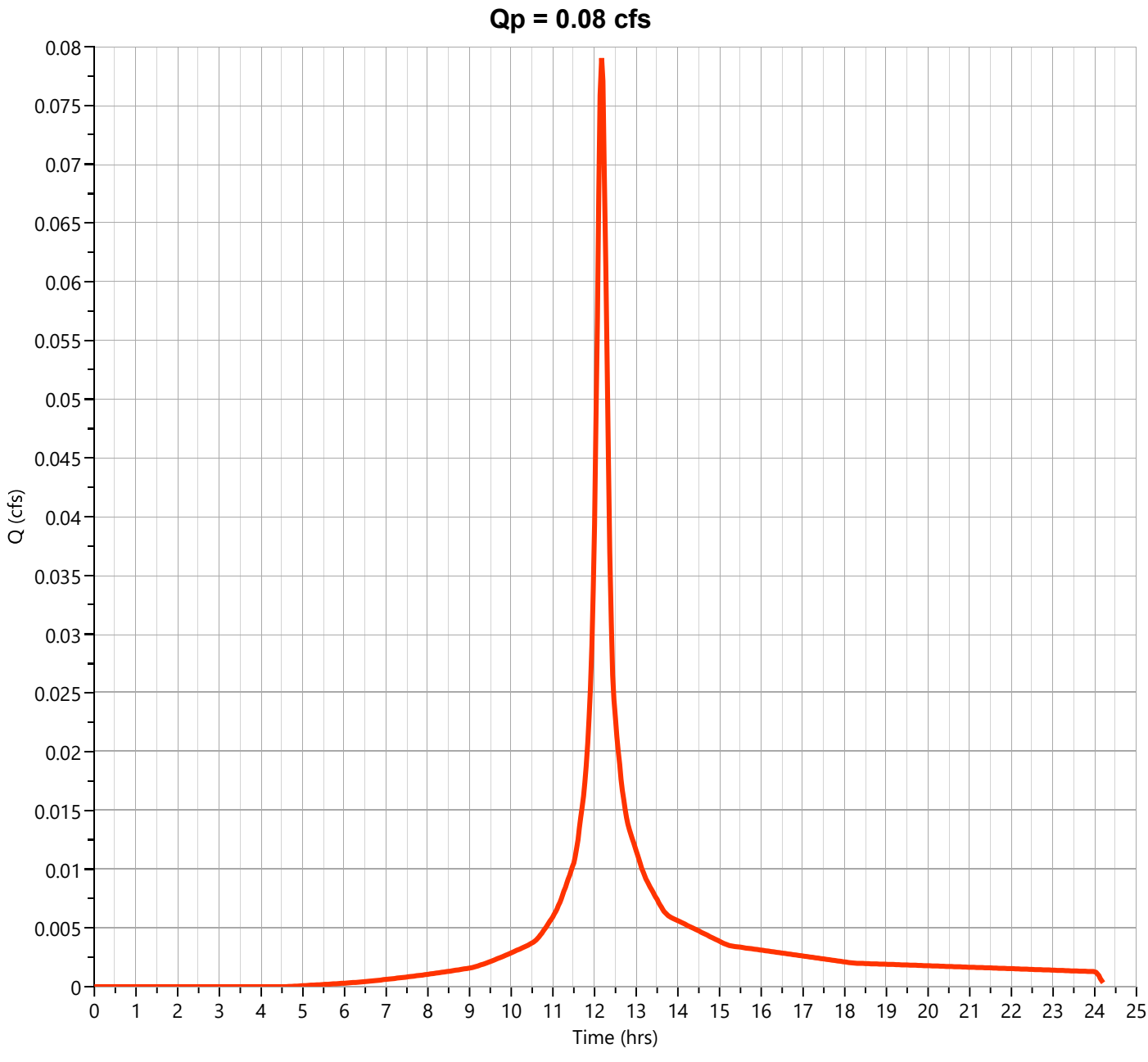
Hydrology Studio v 3.0.0.29

11-29-2023

EX-3 Grass C

Hyd. No. 34

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.079 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Runoff Volume	= 316 cuft
Drainage Area	= 0.01 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 12.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

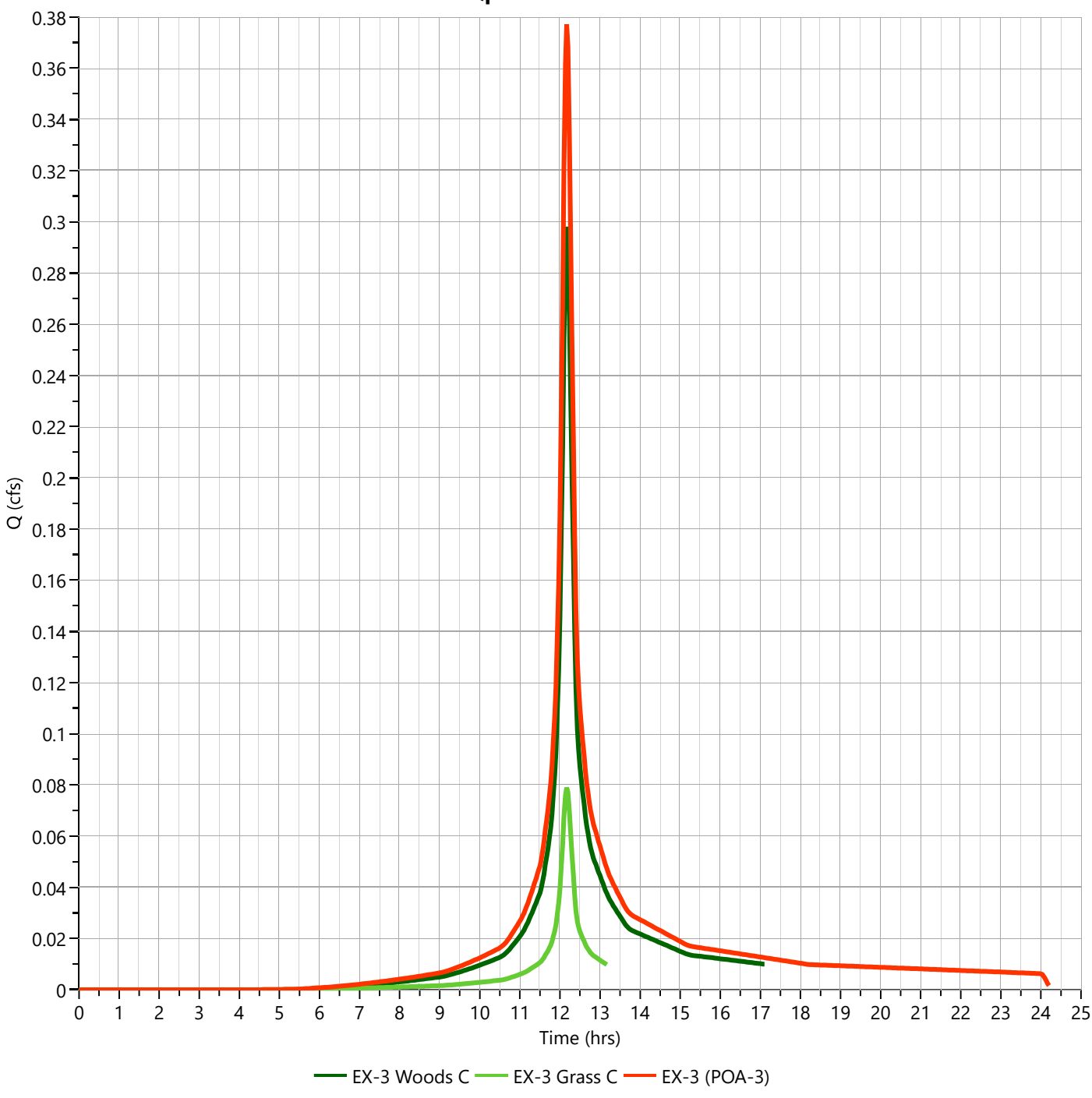
Hydrology Studio v 3.0.0.29

11-29-2023

EX-3 (POA-3)

Hyd. No. 35

Hydrograph Type	= Junction	Peak Flow	= 0.377 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 2 min	Hydrograph Volume	= 1,493 cuft
Inflow Hydrographs	= 33, 34	Total Contrib. Area	= 0.05 ac



SUMMARY OF EXISTING PEAK DISCHARGES

Hydrograph 2-yr Summary

Project Name:

11-29-2023

Hydrology Studio v 3.0.0.29

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	EX-1 Woods C	0.144	12.13	512	----		
2	NRCS Runoff	EX-1 Grass C	0.492	12.13	1,713	----		
3	NRCS Runoff	EX-1 Impervious	0.496	12.10	1,719	----		
4	Junction	EX-1 (POA-1)	1.092	12.13	3,943	1, 2, 3		
5	Diversion1	POA-1 50% 2yr Allow	0.546	12.13	1,972	4		
6	Diversion2	<name>	0.546	12.13	1,972	4		
7	Diversion1	POA-1 75% 10yr Allow	0.819	12.13	2,957	4		
8	Diversion2	<name>	0.273	12.13	986	4		
9	Diversion1	POA-1 80% 100yrAllow	0.874	12.13	3,155	4		
10	Diversion2	<name>	0.218	12.13	789	4		
12	NRCS Runoff	EX-2A Woods C	0.529	12.20	2,296	----		
13	NRCS Runoff	EX-2A Grass C	0.451	12.20	1,908	----		
14	NRCS Runoff	EX-2A Impervious	1.680	12.10	5,817	----		
15	Junction	EX-2A	2.390	12.10	10,021	12, 13, 14		
16	Diversion1	EX-2A 50% 2yr Allow	1.195	12.10	5,011	15		
17	Diversion2	<name>	1.195	12.10	5,011	15		
18	Diversion1	EX-2A 75% 10yr Allow	1.793	12.10	7,516	15		
19	Diversion2	<name>	0.598	12.10	2,505	15		
20	Diversion1	EX-2A 80% 100yrAllow	1.912	12.10	8,017	15		
21	Diversion2	<name>	0.478	12.10	2,004	15		
23	NRCS Runoff	EX-2B Woods C	0.505	12.30	2,606	----		
24	NRCS Runoff	EX-2B Grass C	0.222	12.30	1,121	----		
25	NRCS Runoff	EX-2B Impervious	0.190	12.23	987	----		
26	Junction	EX-2B	0.906	12.27	4,713	23, 24, 25		
28	Junction	POA-2	3.032	12.13	14,735	15, 26		
29	Junction	POA-2 2 Yr Allowable	1.846	12.13	9,724	16, 26		
30	Junction	POA-2 10 Yr Allow	2.439	12.13	12,229	18, 26		
31	Junction	POA-2 100 Yr Allow	2.558	12.13	12,730	20, 26		
33	NRCS Runoff	EX-3 Woods C	0.052	12.20	211	----		
34	NRCS Runoff	EX-3 Grass C	0.016	12.17	63.1	----		
35	Junction	EX-3 (POA-3)	0.068	12.20	274	33, 34		

Hydrograph 10-yr Summary

Project Name:

11-29-2023

Hydrology Studio v 3.0.0.29

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	EX-1 Woods C	0.331	12.13	1,141	----		
2	NRCS Runoff	EX-1 Grass C	1.043	12.13	3,599	----		
3	NRCS Runoff	EX-1 Impervious	0.777	12.10	2,735	----		
4	Junction	EX-1 (POA-1)	2.088	12.13	7,474	1, 2, 3		
5	Diversion1	POA-1 50% 2yr Allow	1.044	12.13	3,737	4		
6	Diversion2	<name>	1.044	12.13	3,737	4		
7	Diversion1	POA-1 75% 10yr Allow	1.566	12.13	5,606	4		
8	Diversion2	<name>	0.522	12.13	1,869	4		
9	Diversion1	POA-1 80% 100yrAllow	1.670	12.13	5,980	4		
10	Diversion2	<name>	0.418	12.13	1,495	4		
12	NRCS Runoff	EX-2A Woods C	1.225	12.20	5,116	----		
13	NRCS Runoff	EX-2A Grass C	0.962	12.20	4,011	----		
14	NRCS Runoff	EX-2A Impervious	2.629	12.10	9,256	----		
15	Junction	EX-2A	4.315	12.13	18,382	12, 13, 14		
16	Diversion1	EX-2A 50% 2yr Allow	2.157	12.13	9,191	15		
17	Diversion2	<name>	2.157	12.13	9,191	15		
18	Diversion1	EX-2A 75% 10yr Allow	3.236	12.13	13,786	15		
19	Diversion2	<name>	1.079	12.13	4,596	15		
20	Diversion1	EX-2A 80% 100yrAllow	3.452	12.13	14,706	15		
21	Diversion2	<name>	0.863	12.13	3,676	15		
23	NRCS Runoff	EX-2B Woods C	1.165	12.30	5,805	----		
24	NRCS Runoff	EX-2B Grass C	0.474	12.27	2,355	----		
25	NRCS Runoff	EX-2B Impervious	0.297	12.23	1,571	----		
26	Junction	EX-2B	1.928	12.27	9,731	23, 24, 25		
28	Junction	POA-2	5.768	12.13	28,113	15, 26		
29	Junction	POA-2 2 Yr Allowable	3.610	12.13	18,922	16, 26		
30	Junction	POA-2 10 Yr Allow	4.689	12.13	23,517	18, 26		
31	Junction	POA-2 100 Yr Allow	4.905	12.13	24,436	20, 26		
33	NRCS Runoff	EX-3 Woods C	0.120	12.17	470	----		
34	NRCS Runoff	EX-3 Grass C	0.034	12.17	133	----		
35	Junction	EX-3 (POA-3)	0.154	12.17	603	33, 34		

Hydrograph 100-yr Summary

Project Name:

11-29-2023

Hydrology Studio v 3.0.0.29

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	EX-1 Woods C	0.815	12.13	2,854	----		
2	NRCS Runoff	EX-1 Grass C	2.417	12.13	8,567	----		
3	NRCS Runoff	EX-1 Impervious	1.431	12.10	5,114	----		
4	Junction	EX-1 (POA-1)	4.547	12.13	16,535	1, 2, 3		
5	Diversion1	POA-1 50% 2yr Allow	2.274	12.13	8,267	4		
6	Diversion2	<name>	2.274	12.13	8,267	4		
7	Diversion1	POA-1 75% 10yr Allow	3.410	12.13	12,401	4		
8	Diversion2	<name>	1.137	12.13	4,134	4		
9	Diversion1	POA-1 80% 100yrAllow	3.638	12.13	13,228	4		
10	Diversion2	<name>	0.909	12.13	3,307	4		
12	NRCS Runoff	EX-2A Woods C	3.032	12.20	12,802	----		
13	NRCS Runoff	EX-2A Grass C	2.237	12.20	9,546	----		
14	NRCS Runoff	EX-2A Impervious	4.844	12.10	17,308	----		
15	Junction	EX-2A	9.128	12.13	39,655	12, 13, 14		
16	Diversion1	EX-2A 50% 2yr Allow	4.564	12.13	19,828	15		
17	Diversion2	<name>	4.564	12.13	19,828	15		
18	Diversion1	EX-2A 75% 10yr Allow	6.846	12.13	29,741	15		
19	Diversion2	<name>	2.282	12.13	9,914	15		
20	Diversion1	EX-2A 80% 100yrAllow	7.302	12.13	31,724	15		
21	Diversion2	<name>	1.826	12.13	7,931	15		
23	NRCS Runoff	EX-2B Woods C	2.898	12.27	14,527	----		
24	NRCS Runoff	EX-2B Grass C	1.108	12.27	5,606	----		
25	NRCS Runoff	EX-2B Impervious	0.548	12.23	2,937	----		
26	Junction	EX-2B	4.542	12.27	23,069	23, 24, 25		
28	Junction	POA-2	12.65	12.13	62,725	15, 26		
29	Junction	POA-2 2 Yr Allowable	8.088	12.13	42,897	16, 26		
30	Junction	POA-2 10 Yr Allow	10.37	12.13	52,811	18, 26		
31	Junction	POA-2 100 Yr Allow	10.83	12.13	54,794	20, 26		
33	NRCS Runoff	EX-3 Woods C	0.298	12.17	1,177	----		
34	NRCS Runoff	EX-3 Grass C	0.079	12.17	316	----		
35	Junction	EX-3 (POA-3)	0.377	12.17	1,493	33, 34		

APPENDIX B

Proposed Stormwater Discharge Calculations

APPENDIX B
TABLE OF CONTENTS

NOAA RAINFALL PRECIPITATION DATA

NOAA REGION D RAINFALL DISTRIBUTION

PROPOSED RUNOFF CURVE NUMBER CALCULATIONS

CURRENT HYDROGRAPH CALCULATIONS

- **PR-1A WATERSHED**
  - **Time of Concentration Calculation**
  - **2 Year Design Storm Event**
  - **10 Year Design Storm Event**
  - **25 Year Design Storm Event**
  - **100 Year Design Storm Event**
- **PR-1B WATERSHED**
  - **Time of Concentration Calculation**
  - **2 Year Design Storm Event**
  - **10 Year Design Storm Event**
  - **25 Year Design Storm Event**
  - **100 Year Design Storm Event**
- **PR-1C WATERSHED**
  - **Time of Concentration Calculation**
  - **2 Year Design Storm Event**
  - **10 Year Design Storm Event**
  - **25 Year Design Storm Event**
  - **100 Year Design Storm Event**
- **PR-1D WATERSHED**
  - **Time of Concentration Calculation**
  - **2 Year Design Storm Event**
  - **10 Year Design Storm Event**
  - **25 Year Design Storm Event**
  - **100 Year Design Storm Event**
- **COMBINED PROPOSED FLOW TO UDG-INF1-2**
  - **2 Year Design Storm Event**
  - **10 Year Design Storm Event**
  - **25 Year Design Storm Event**
  - **100 Year Design Storm Event**
- **PR-1E WATERSHED**
  - **Time of Concentration Calculation**
  - **2 Year Design Storm Event**
  - **10 Year Design Storm Event**
  - **25 Year Design Storm Event**
  - **100 Year Design Storm Event**

COMBINED PROPOSED FLOW TO POA-1

- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

PR-2A WATERSHED

- **Time of Concentration Calculation**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

PR-2B WATERSHED

- **Time of Concentration Calculation**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

PR-2C WATERSHED

- **Time of Concentration Calculation**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

PR-2D WATERSHED

- **Time of Concentration Calculation**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

PR-2E WATERSHED

- **Time of Concentration Calculation**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

PR-2F WATERSHED

- **Time of Concentration Calculation**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

PR-2G WATERSHED

Time of Concentration Calculation
2 Year Design Storm Event
10 Year Design Storm Event
25 Year Design Storm Event
100 Year Design Storm Event

PR-2H WATERSHED

Time of Concentration Calculation
2 Year Design Storm Event
10 Year Design Storm Event
25 Year Design Storm Event
100 Year Design Storm Event

COMBINED PR-2B + PR-2H WATERSHED

2 Year Design Storm Event
10 Year Design Storm Event
25 Year Design Storm Event
100 Year Design Storm Event

COMBINED PROPOSED FLOW TO POA-2

2 Year Design Storm Event
10 Year Design Storm Event
25 Year Design Storm Event
100 Year Design Storm Event

PR-3 WATERSHED (TOTAL PROPOSED FLOW TO POA-3)

Time of Concentration Calculation
2 Year Design Storm Event
10 Year Design Storm Event
25 Year Design Storm Event
100 Year Design Storm Event

SUMMARY OF PROPOSED PEAK DISCHARGES

FUTURE HYDROGRAPH CALCULATIONS

PR-1A WATERSHED

Time of Concentration Calculation
2 Year Design Storm Event
10 Year Design Storm Event
25 Year Design Storm Event
100 Year Design Storm Event

PR-1B WATERSHED

Time of Concentration Calculation
2 Year Design Storm Event
10 Year Design Storm Event
25 Year Design Storm Event
100 Year Design Storm Event

PR-1C WATERSHED

- **Time of Concentration Calculation**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

PR-1D WATERSHED

- **Time of Concentration Calculation**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

COMBINED PROPOSED FLOW TO UDG-INF1-2

- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

PR-1E WATERSHED

- **Time of Concentration Calculation**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

COMBINED PROPOSED FLOW TO POA-1

- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

PR-2A WATERSHED

- **Time of Concentration Calculation**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

PR-2B WATERSHED

- **Time of Concentration Calculation**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

PR-2C WATERSHED

- **Time of Concentration Calculation**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

PR-2D WATERSHED

- **Time of Concentration Calculation**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

PR-2E WATERSHED

- **Time of Concentration Calculation**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

PR-2F WATERSHED

- **Time of Concentration Calculation**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

PR-2G WATERSHED

- **Time of Concentration Calculation**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

PR-2H WATERSHED

- **Time of Concentration Calculation**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

COMBINED PR-2B + PR-2H WATERSHED

- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

COMBINED PROPOSED FLOW TO POA-2

- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

PR-3 WATERSHED (TOTAL PROPOSED FLOW TO POA-3)

- **Time of Concentration Calculation**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

SUMMARY OF PROPOSED PEAK DISCHARGES

NOAA RAINFALL PRECIPITATION DATA

NOAA Atlas 14, Volume 2, Version 3
Location name: Summit, New Jersey, USA*
Latitude: 40.7128°, Longitude: -74.3766°
Elevation: 357 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.336** (0.307-0.369)	**0.400** (0.366-0.439)	**0.473** (0.431-0.520)	**0.525** (0.478-0.577)	**0.590** (0.535-0.647)	**0.634** (0.573-0.695)	**0.679** (0.609-0.743)	**0.718** (0.641-0.787)	**0.770** (0.681-0.846)	**0.806** (0.708-0.887)
10-min	**0.536** (0.490-0.589)	**0.639** (0.585-0.702)	**0.757** (0.690-0.831)	**0.839** (0.764-0.922)	**0.938** (0.851-1.03)	**1.01** (0.911-1.11)	**1.08** (0.967-1.18)	**1.14** (1.01-1.24)	**1.21** (1.07-1.33)	**1.26** (1.11-1.39)
15-min	**0.669** (0.612-0.735)	**0.803** (0.735-0.882)	**0.957** (0.872-1.05)	**1.06** (0.966-1.17)	**1.19** (1.08-1.30)	**1.28** (1.15-1.40)	**1.36** (1.22-1.49)	**1.44** (1.28-1.57)	**1.53** (1.35-1.68)	**1.58** (1.39-1.74)
30-min	**0.917** (0.838-1.01)	**1.11** (1.01-1.22)	**1.36** (1.24-1.49)	**1.54** (1.40-1.69)	**1.76** (1.60-1.93)	**1.92** (1.73-2.11)	**2.08** (1.87-2.28)	**2.23** (1.99-2.44)	**2.42** (2.14-2.66)	**2.56** (2.25-2.82)
60-min	**1.14** (1.04-1.26)	**1.39** (1.27-1.53)	**1.74** (1.59-1.91)	**2.00** (1.82-2.20)	**2.34** (2.12-2.57)	**2.60** (2.35-2.85)	**2.86** (2.57-3.14)	**3.12** (2.79-3.42)	**3.47** (3.07-3.81)	**3.73** (3.28-4.11)
2-hr	**1.40** (1.27-1.54)	**1.70** (1.55-1.88)	**2.16** (1.96-2.39)	**2.51** (2.27-2.78)	**3.00** (2.70-3.31)	**3.41** (3.05-3.76)	**3.82** (3.39-4.21)	**4.26** (3.75-4.69)	**4.86** (4.23-5.36)	**5.34** (4.61-5.90)
3-hr	**1.56** (1.42-1.73)	**1.90** (1.74-2.11)	**2.42** (2.20-2.68)	**2.82** (2.55-3.11)	**3.37** (3.04-3.72)	**3.82** (3.42-4.21)	**4.28** (3.81-4.72)	**4.77** (4.21-5.26)	**5.44** (4.75-6.01)	**5.98** (5.17-6.62)
6-hr	**2.01** (1.83-2.23)	**2.44** (2.23-2.70)	**3.10** (2.81-3.41)	**3.63** (3.28-3.98)	**4.38** (3.93-4.81)	**5.02** (4.47-5.49)	**5.69** (5.03-6.23)	**6.42** (5.62-7.02)	**7.46** (6.44-8.17)	**8.33** (7.10-9.12)
12-hr	**2.51** (2.29-2.77)	**3.05** (2.78-3.37)	**3.88** (3.54-4.28)	**4.59** (4.16-5.04)	**5.62** (5.05-6.15)	**6.51** (5.80-7.11)	**7.48** (6.58-8.15)	**8.55** (7.43-9.32)	**10.1** (8.64-11.0)	**11.5** (9.65-12.5)
24-hr	**2.84** (2.62-3.08)	**3.43** (3.18-3.74)	**4.40** (4.07-4.79)	**5.22** (4.81-5.68)	**6.47** (5.91-7.02)	**7.55** (6.85-8.18)	**8.74** (7.86-9.48)	**10.1** (8.95-11.0)	**12.1** (10.6-13.2)	**13.8** (11.9-15.1)
2-day	**3.35** (3.08-3.65)	**4.05** (3.73-4.42)	**5.17** (4.76-5.64)	**6.11** (5.60-6.66)	**7.48** (6.82-8.15)	**8.65** (7.84-9.42)	**9.93** (8.92-10.8)	**11.3** (10.1-12.4)	**13.4** (11.7-14.7)	**15.1** (13.0-16.7)
3-day	**3.52** (3.25-3.84)	**4.26** (3.93-4.64)	**5.42** (4.99-5.90)	**6.38** (5.86-6.94)	**7.77** (7.10-8.44)	**8.94** (8.12-9.72)	**10.2** (9.19-11.1)	**11.6** (10.3-12.6)	**13.6** (11.9-14.9)	**15.3** (13.2-16.8)
4-day	**3.70** (3.42-4.02)	**4.48** (4.14-4.86)	**5.66** (5.23-6.16)	**6.64** (6.11-7.22)	**8.05** (7.37-8.73)	**9.23** (8.40-10.0)	**10.5** (9.47-11.4)	**11.8** (10.6-12.9)	**13.8** (12.2-15.1)	**15.4** (13.5-17.0)
7-day	**4.38** (4.06-4.74)	**5.25** (4.88-5.69)	**6.52** (6.05-7.06)	**7.58** (7.00-8.19)	**9.08** (8.34-9.83)	**10.3** (9.43-11.2)	**11.7** (10.6-12.6)	**13.1** (11.8-14.2)	**15.1** (13.4-16.5)	**16.8** (14.7-18.4)
10-day	**5.02** (4.68-5.42)	**6.00** (5.59-6.47)	**7.34** (6.83-7.91)	**8.44** (7.83-9.10)	**10.0** (9.23-10.8)	**11.3** (10.4-12.2)	**12.6** (11.5-13.6)	**14.0** (12.7-15.2)	**16.0** (14.3-17.4)	**17.6** (15.6-19.3)
20-day	**6.79** (6.37-7.26)	**8.06** (7.56-8.62)	**9.62** (9.01-10.3)	**10.8** (10.1-11.6)	**12.5** (11.6-13.4)	**13.8** (12.8-14.8)	**15.1** (14.0-16.2)	**16.4** (15.1-17.6)	**18.2** (16.6-19.6)	**19.6** (17.7-21.2)
30-day	**8.46** (8.00-8.95)	**9.98** (9.44-10.6)	**11.7** (11.0-12.3)	**13.0** (12.2-13.7)	**14.6** (13.8-15.5)	**15.9** (14.9-16.8)	**17.2** (16.1-18.2)	**18.4** (17.1-19.5)	**19.9** (18.4-21.2)	**21.1** (19.4-22.5)
45-day	**10.7** (10.2-11.3)	**12.6** (12.0-13.3)	**14.6** (13.8-15.4)	**16.0** (15.2-16.9)	**17.9** (16.9-18.9)	**19.3** (18.2-20.4)	**20.7** (19.4-21.8)	**22.0** (20.6-23.2)	**23.6** (22.0-25.0)	**24.8** (23.0-26.4)
60-day	**12.9** (12.3-13.5)	**15.1** (14.4-15.9)	**17.3** (16.4-18.1)	**18.9** (17.9-19.8)	**20.9** (19.8-22.0)	**22.3** (21.1-23.5)	**23.7** (22.4-25.0)	**24.9** (23.5-26.4)	**26.5** (24.9-28.1)	**27.6** (25.8-29.3)

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

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

Please refer to NOAA Atlas 14 document for more information.

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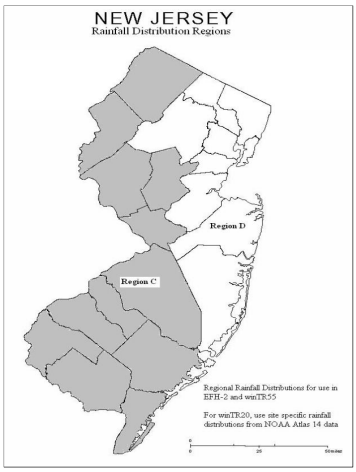
PF graphical

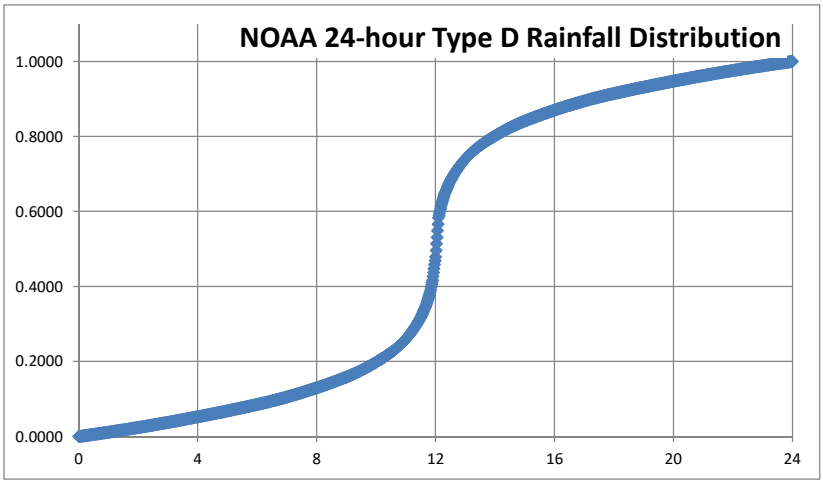
Frequency of Storms	NOAA NWS PFDS 24-Hour Rainfall Depth (inches)	Current Precipitation Adjustment Factor for Union County	Current Rainfall Depth (inches)	Future Precipitation Adjustment Factor for Union County	Future Rainfall Depth (inches)
2-Year	3.43	1.01	3.46	1.20	4.12
10-Year	5.22	1.03	5.38	1.23	6.42
25-Year[1]	6.47	1.04	6.73	1.27	8.23
100-Year	8.74	1.06	9.26	1.35	11.80

Notes:

1. The adjustment factors for the current and future 25-year storms was found using a weighted average of the 10- and 100-year adjustment factors.

NOAA REGION D RAINFALL DISTRIBUTION





Time (hrs)	Cumulative Rainfall (%)	Time (hrs)	Cumulative Rainfall (%)	Time (hrs)	Cumulative Rainfall (%)	Time (hrs)	Cumulative Rainfall (%)	Time (hrs)	Cumulative Rainfall (%)	Time (hrs)	Cumulative Rainfall (%)
0	0.0000	4	0.0489	8	0.1198	12	0.4766	16	0.8802	20	0.9511
0.1	0.0013	4.1	0.0504	8.1	0.1222	12.1	0.5933	16.1	0.8826	20.1	0.9525
0.2	0.0023	4.2	0.0518	8.2	0.1247	12.2	0.6338	16.2	0.885	20.2	0.9539
0.3	0.0033	4.3	0.0532	8.3	0.1273	12.3	0.663	16.3	0.8873	20.3	0.9553
0.4	0.0044	4.4	0.0547	8.4	0.1298	12.4	0.6843	16.4	0.8896	20.4	0.9566
0.5	0.0055	4.5	0.0562	8.5	0.1324	12.5	0.7045	16.5	0.8918	20.5	0.958
0.6	0.0065	4.6	0.0576	8.6	0.1351	12.6	0.7175	16.6	0.894	20.6	0.9594
0.7	0.0076	4.7	0.0591	8.7	0.1378	12.7	0.7298	16.7	0.8962	20.7	0.9607
0.8	0.0087	4.8	0.0606	8.8	0.1405	12.8	0.7409	16.8	0.8983	20.8	0.9621
0.9	0.0098	4.9	0.0621	8.9	0.1432	12.9	0.751	16.9	0.9004	20.9	0.9634
1	0.0109	5	0.0636	9	0.1461	13	0.76	17	0.9025	21	0.9647
1.1	0.0121	5.1	0.0651	9.1	0.149	13.1	0.7679	17.1	0.9045	21.1	0.966
1.2	0.0132	5.2	0.0667	9.2	0.1521	13.2	0.7753	17.2	0.9064	21.2	0.9673
1.3	0.0143	5.3	0.0682	9.3	0.1554	13.3	0.7821	17.3	0.9084	21.3	0.9686
1.4	0.0155	5.4	0.0697	9.4	0.1588	13.4	0.7883	17.4	0.9103	21.4	0.9699
1.5	0.0167	5.5	0.0713	9.5	0.1623	13.5	0.7939	17.5	0.9121	21.5	0.9712
1.6	0.0178	5.6	0.0729	9.6	0.166	13.6	0.799	17.6	0.9139	21.6	0.9724
1.7	0.019	5.7	0.0745	9.7	0.1699	13.7	0.8039	17.7	0.9157	21.7	0.9737
1.8	0.0202	5.8	0.076	9.8	0.1739	13.8	0.8086	17.8	0.9174	21.8	0.9749
1.9	0.0214	5.9	0.0776	9.9	0.178	13.9	0.8132	17.9	0.9191	21.9	0.9762
2	0.0226	6	0.0793	10	0.1823	14	0.8177	18	0.9208	22	0.9774
2.1	0.0238	6.1	0.0809	10.1	0.1868	14.1	0.822	18.1	0.9224	22.1	0.9786
2.2	0.0251	6.2	0.0826	10.2	0.1914	14.2	0.8261	18.2	0.924	22.2	0.9798
2.3	0.0263	6.3	0.0843	10.3	0.1961	14.3	0.8301	18.3	0.9255	22.3	0.981
2.4	0.0276	6.4	0.0861	10.4	0.201	14.4	0.834	18.4	0.9271	22.4	0.9822
2.5	0.0288	6.5	0.0879	10.5	0.2061	14.5	0.8377	18.5	0.9287	22.5	0.9833
2.6	0.0301	6.6	0.0897	10.6	0.2117	14.6	0.8412	18.6	0.9303	22.6	0.9845
2.7	0.0314	6.7	0.0916	10.7	0.2179	14.7	0.8446	18.7	0.9318	22.7	0.9857
2.8	0.0327	6.8	0.0936	10.8	0.2247	14.8	0.8479	18.8	0.9334	22.8	0.9868
2.9	0.034	6.9	0.0955	10.9	0.2321	14.9	0.851	18.9	0.9349	22.9	0.9879
3	0.0353	7	0.0975	11	0.24	15	0.854	19	0.9364	23	0.9891
3.1	0.0366	7.1	0.0996	11.1	0.249	15.1	0.8568	19.1	0.9379	23.1	0.9902
3.2	0.0379	7.2	0.1017	11.2	0.2591	15.2	0.8595	19.2	0.9394	23.2	0.9913
3.3	0.0393	7.3	0.1038	11.3	0.2702	15.3	0.8622	19.3	0.9409	23.3	0.9924
3.4	0.0406	7.4	0.106	11.4	0.2824	15.4	0.8649	19.4	0.9424	23.4	0.9935
3.5	0.042	7.5	0.1082	11.5	0.2955	15.5	0.8676	19.5	0.9438	23.5	0.9945
3.6	0.0434	7.6	0.1104	11.6	0.3157	15.6	0.8702	19.6	0.9453	23.6	0.9956
3.7	0.0447	7.7	0.1127	11.7	0.337	15.7	0.8727	19.7	0.9468	23.7	0.9966
3.8	0.0461	7.8	0.115	11.8	0.3662	15.8	0.8753	19.8	0.9482	23.8	0.9977
3.9	0.0475	7.9	0.1174	11.9	0.4067	15.9	0.8777	19.9	0.9496	23.9	0.9987
										24	1.0000

Reference: USDA Natural Resources Conservation Service New Jersey, Engineering Guidelines

PROPOSED RUNOFF CURVE NUMBER CALCULATIONS

PROPOSED RUNOFF CURVE NUMBER CALCULATIONS
BEACON UNITARIAN UNIVERSALIST CHURCH
LANGAN PROJECT #101007201

PROPOSED CONDITIONS

PROPOSED WATERSHED AREAS	OPEN SPACE HSGC C CN = 74 (SF)	OPEN SPACE HSGC C CN = 74 (AC)	WOODS HSGC C CN = 70 (SF)	WOODS HSGC C CN = 70 (AC)	IMPERVIOUS AREA CN = 98 (SF)	IMPERVIOUS AREA CN = 98 (AC)	TOTAL AREA (SF)	TOTAL AREA (AC)	CURVE NUMBER CN (Weighted)
POA-1									
PR-1A	4	0.00	0	0.00	10,321	0.24	10,325	0.24	98
PR-1B	3,572	0.08	0	0.00	5,865	0.14	9,437	0.22	89
PR-1C	1,269	0.03	0	0.00	1,034	0.02	2,303	0.05	85
PR-1D	2,586	0.06	0	0.00	5,018	0.11	7,604	0.17	90
PR-1E	6,704	0.15	0	0.00	1,721	0.04	8,425	0.19	79
POA-2									
PR-2A	460	0.01	0	0.00	8,875	0.20	9,334	0.21	97
PR-2B	3,345	0.07	0	0.00	2,073	0.05	5,418	0.12	83
PR-2C	1,579	0.04	0	0.00	2,771	0.06	4,350	0.10	89
PR-2D	7,585	0.17	19,084	0.44	2,121	0.05	28,790	0.66	73
PR-2E	4,646	0.11	0	0.00	1,271	0.03	5,917	0.14	79
PR-2F	0	0.00	2,547	0.06	1,143	0.02	3,690	0.08	79
PR-2G	5,285	0.12	3,901	0.09	119	0.00	9,304	0.21	73
PR-2H	783	0.02	0	0.00	2,765	0.06	3,548	0.08	93
POA-3									
PR-3	1,127	0.03	0	0.00	142	0.00	1,269	0.03	77

NOTES:

1. Runoff curve numbers referenced from Technical Release 55 (TR-55) Table 2-2a: Runoff Curve Numbers for Urban Areas and Table 2-2c: Runoff Curve Numbers for Other Agricultural

CURRENT HYDROGRAPH CALCULATIONS

PR-1A WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: Present **Developed** — **Current Proposed Watershed PR-1A - Impervious**

Circle One: **T_c** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		
1. Surface Description (NEH table 15-1)			Smooth Surfaces		
2. Manning's Roughness Coeff., n (NEH table 15-1)			0.011		
3. Design Flow Length, L_{des} (Total L_{des} < 100 ft)		ft	64		
4. Two-year 24-hr rainfall, P_2		in	3.46		
5. Land Slope, s		ft/ft	0.020		
6. McCuen-Spiess Limit, L_{mcs} (max. 100 ft)	$L_{mcs} = (100\ s^{0.5})/n$	ft	100		
7. Compute T_t	$T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.014	+	+
				Sheet Flow Sub-Total	0.014 hours

Shallow Concentrated Flow		Segment ID			
8. Surface Description					
9. Flow Length, L		ft			
10. Watercourse Slope, s		ft/ft			
11. Average Velocity, V (NEH table 15-3)		ft/s			
12. Compute T_t	$T_t = \frac{L}{3600\ V}$	hr		+	+
				Shallow Conc. Flow Sub-Total	0.000 hours

Channel Flow		Segment ID	2		
13. Flow Length, L		ft	56		
14. Cross Sectional flow area, a		ft^2	0.17		
15. Wetted Perimeter, P_w		ft	1.00		
16. Hydraulic Radius, r	$r = a / P_w$	ft	0.17		
17. Channel Slope, s		ft/ft	0.020		
18. Manning's Roughness Coeff., n			0.012		
19. Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	5.39		
20. Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.003	+	+
				Channel Flow Sub-Total	0.003 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.016 hours
(Add Sub-Total T_t from prior steps)	Software Limitations Require Minimum Tc =	2 minutes

Hydrograph Report

Project Name:

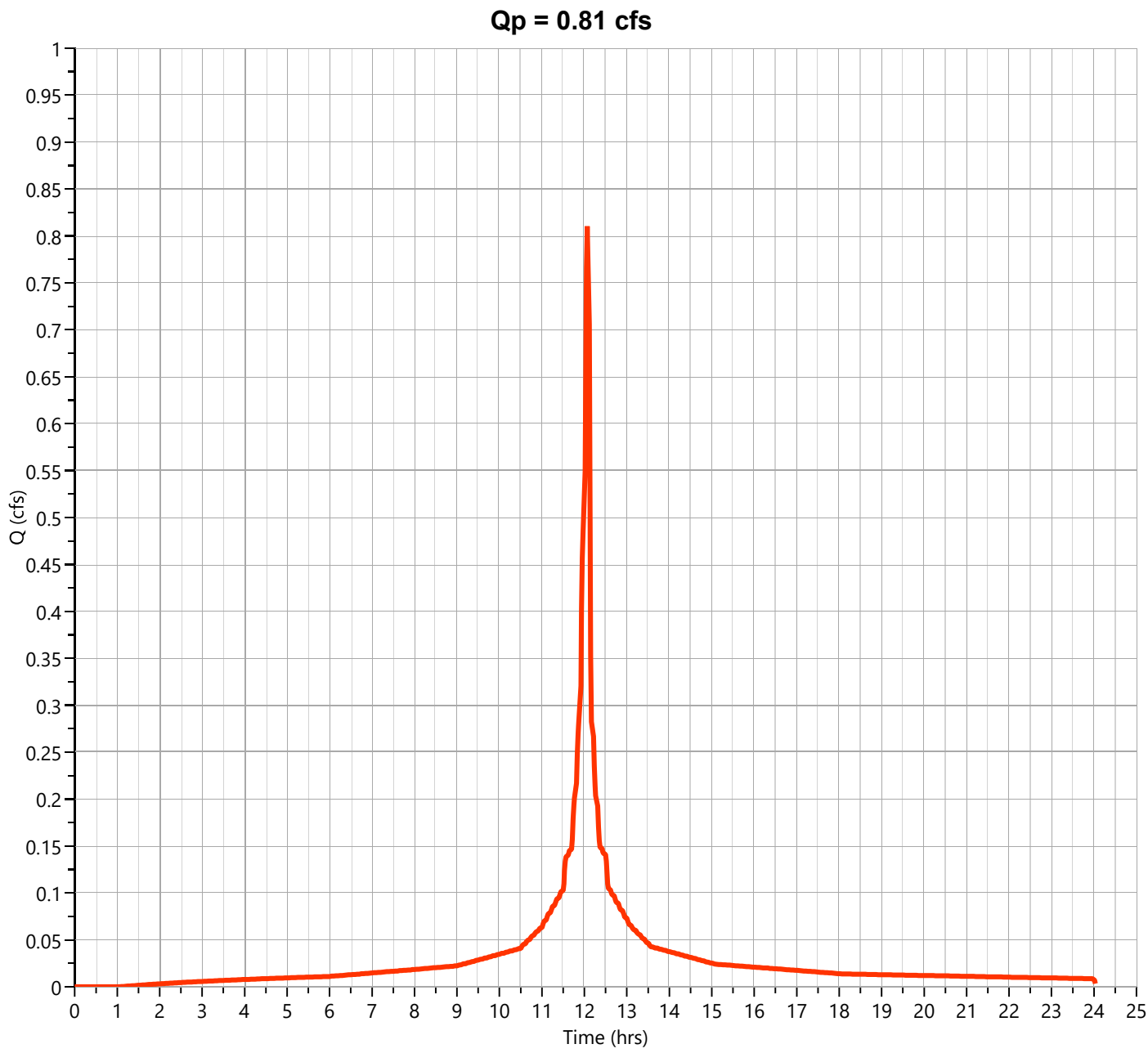
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1A

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.811 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 2,635 cuft
Drainage Area	= 0.24 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

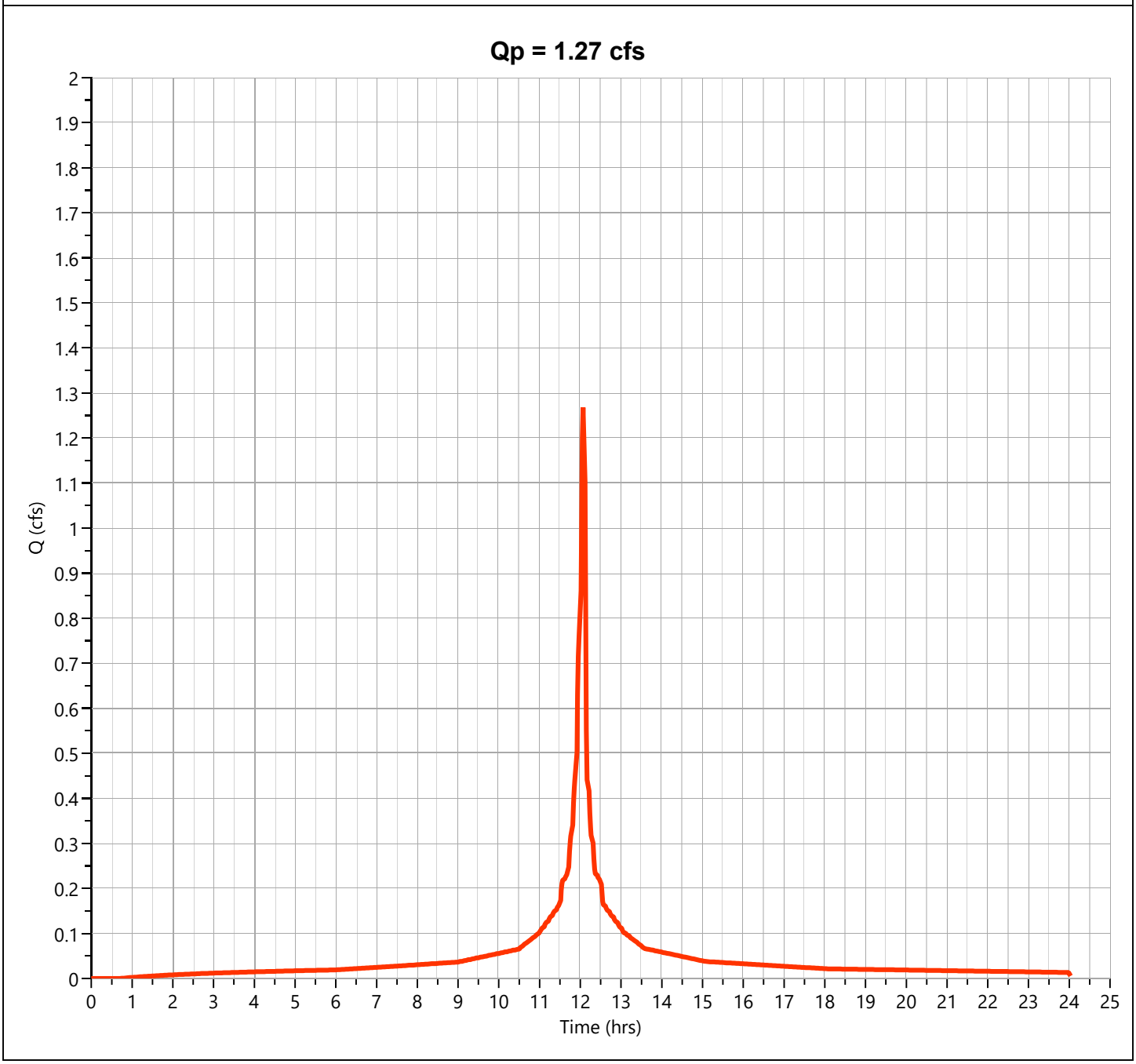
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1A

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.269 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 4,200 cuft
Drainage Area	= 0.24 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

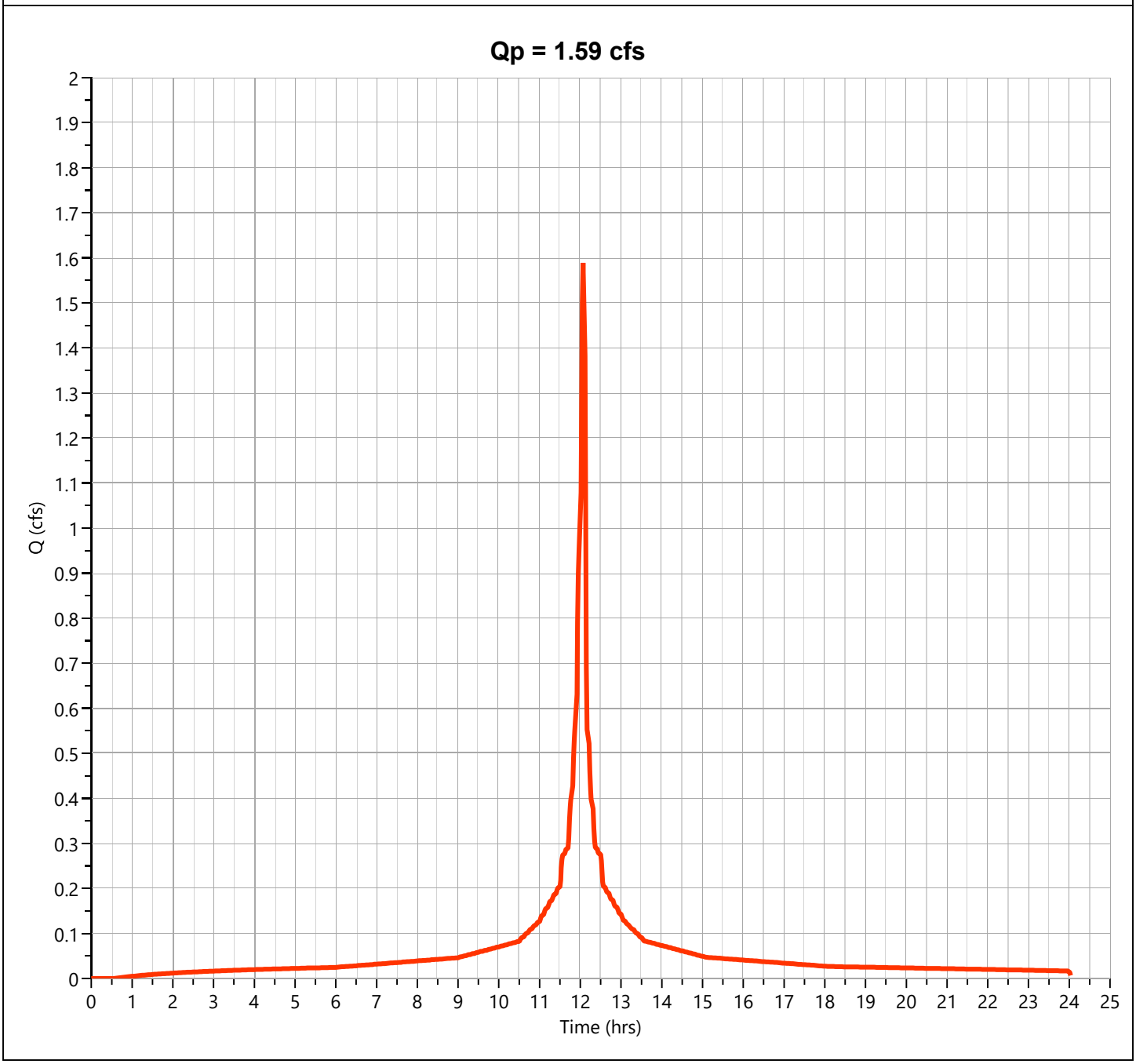
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1A

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.589 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 5,302 cuft
Drainage Area	= 0.24 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

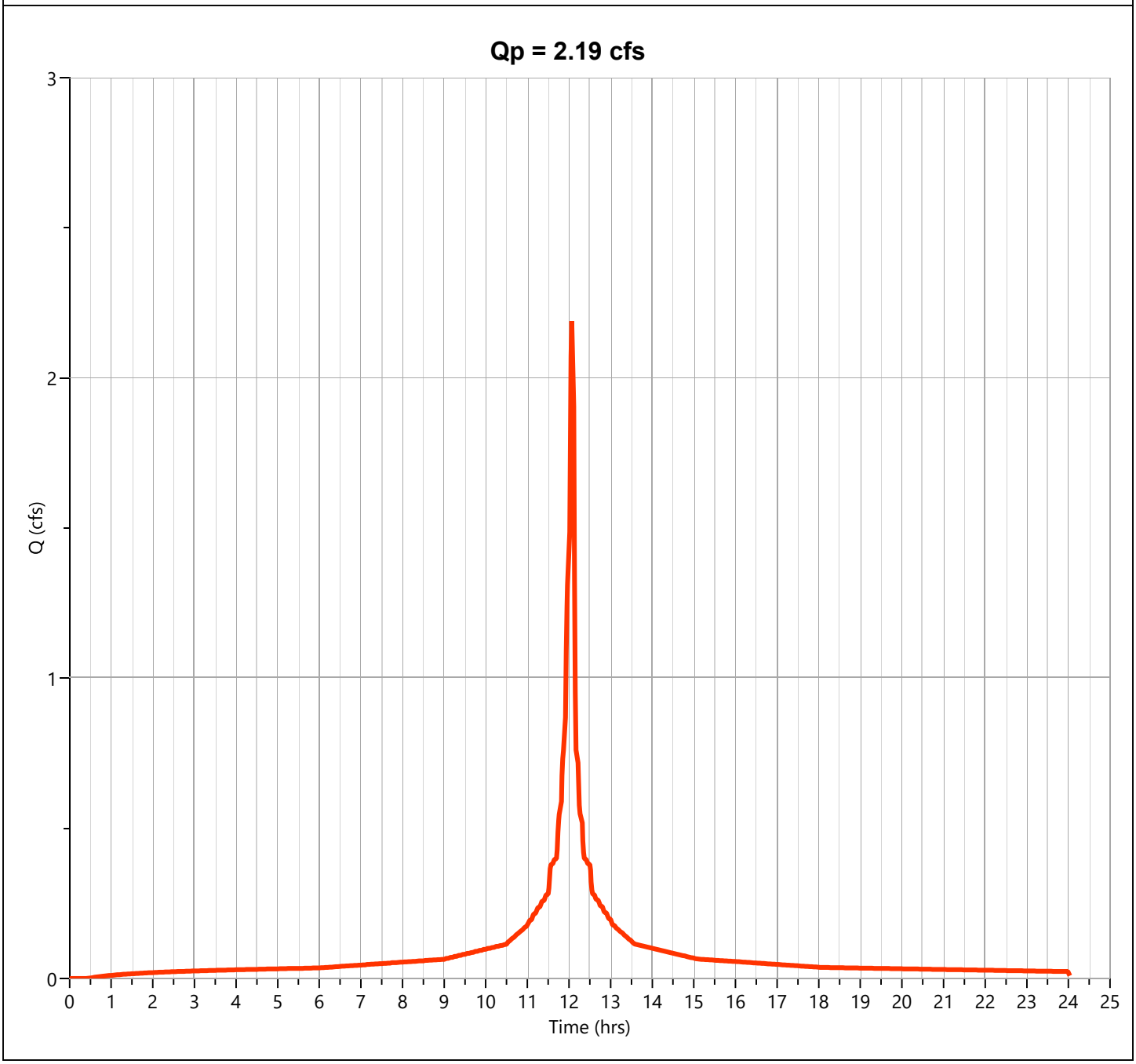
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1A

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.189 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 7,367 cuft
Drainage Area	= 0.24 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



PR-1B WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: Present **Developed** — **Current Proposed Watershed PR-1B - Impervious**

Circle One: **T_c** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		2		3
1.	Surface Description (NEH table 15-1)		Smooth Surfaces		Dense Grasses		Dense Grasses
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011		0.24		0.24
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	24		7		11
4.	Two-year 24-hr rainfall, P_2	in	3.46		3.46		3.46
5.	Land Slope, s	ft/ft	0.014		0.334		0.010
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	100		100		42
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.007	+	0.009	+	0.052
					Sheet Flow Sub-Total		0.067 hours

Shallow Concentrated Flow		Segment ID					
8.	Surface Description						
9.	Flow Length, L	ft					
10.	Watercourse Slope, s	ft/ft					
11.	Average Velocity, V (NEH table 15-3)	ft/s					
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+		+	
					Shallow Conc. Flow Sub-Total		0.000 hours

Channel Flow		Segment ID	4				
13.	Flow Length, L	ft	69				
14.	Cross Sectional flow area, a	ft^2	0.39				
15.	Wetted Perimeter, P_w	ft	1.60				
16.	Hydraulic Radius, r $r = a / P_w$	ft	0.24				
17.	Channel Slope, s	ft/ft	0.010				
18.	Manning's Roughness Coeff., n		0.012				
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	4.85				
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.004	+		+	
					Channel Flow Sub-Total		0.004 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.071 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	4 minutes

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: Present **(Developed)** — **Current Proposed Watershed PR-1B - Pervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		
1. Surface Description (NEH table 15-1)			Woods Dense Underbrush		
2. Manning's Roughness Coeff., n (NEH table 15-1)			0.40		
3. Design Flow Length, L_{des} (Total L_{des} < 100 ft)		ft	42		
4. Two-year 24-hr rainfall, P_2		in	3.46		
5. Land Slope, s		ft/ft	0.029		
6. McCuen-Spiess Limit, L_{mcs} (max. 100 ft)	$L_{mcs} = (100\ s^{0.5})/n$	ft	42		
7. Compute T_t	$T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.149	+	+
				Sheet Flow Sub-Total	0.149 hours

Shallow Concentrated Flow	Segment ID	2	3	4
8. Surface Description		Grassed Waterways	Pavement	Grassed Waterways
9. Flow Length, L	ft	4	5	6
10. Watercourse Slope, s	ft/ft	0.037	0.018	0.275
11. Average Velocity, V (NEH table 15-3)	ft/s	3.10	2.73	8.45
12. Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.000	+ 0.001	+ 0.000
			Shallow Conc. Flow Sub-Total	0.001 hours

Channel Flow		Segment ID	5		
13. Flow Length, L		ft	69		
14. Cross Sectional flow area, a		ft^2	0.39		
15. Wetted Perimeter, P_w		ft	1.60		
16. Hydraulic Radius, r	$r = a / P_w$	ft	0.24		
17. Channel Slope, s		ft/ft	0.010		
18. Manning's Roughness Coeff., n			0.012		
19. Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	4.85		
20. Compute T_t $T_t = \frac{L}{3600\ V}$		hr	0.004	+	+
				Channel Flow Sub-Total	0.004 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.154 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	9 minutes

Hydrograph Report

Project Name:

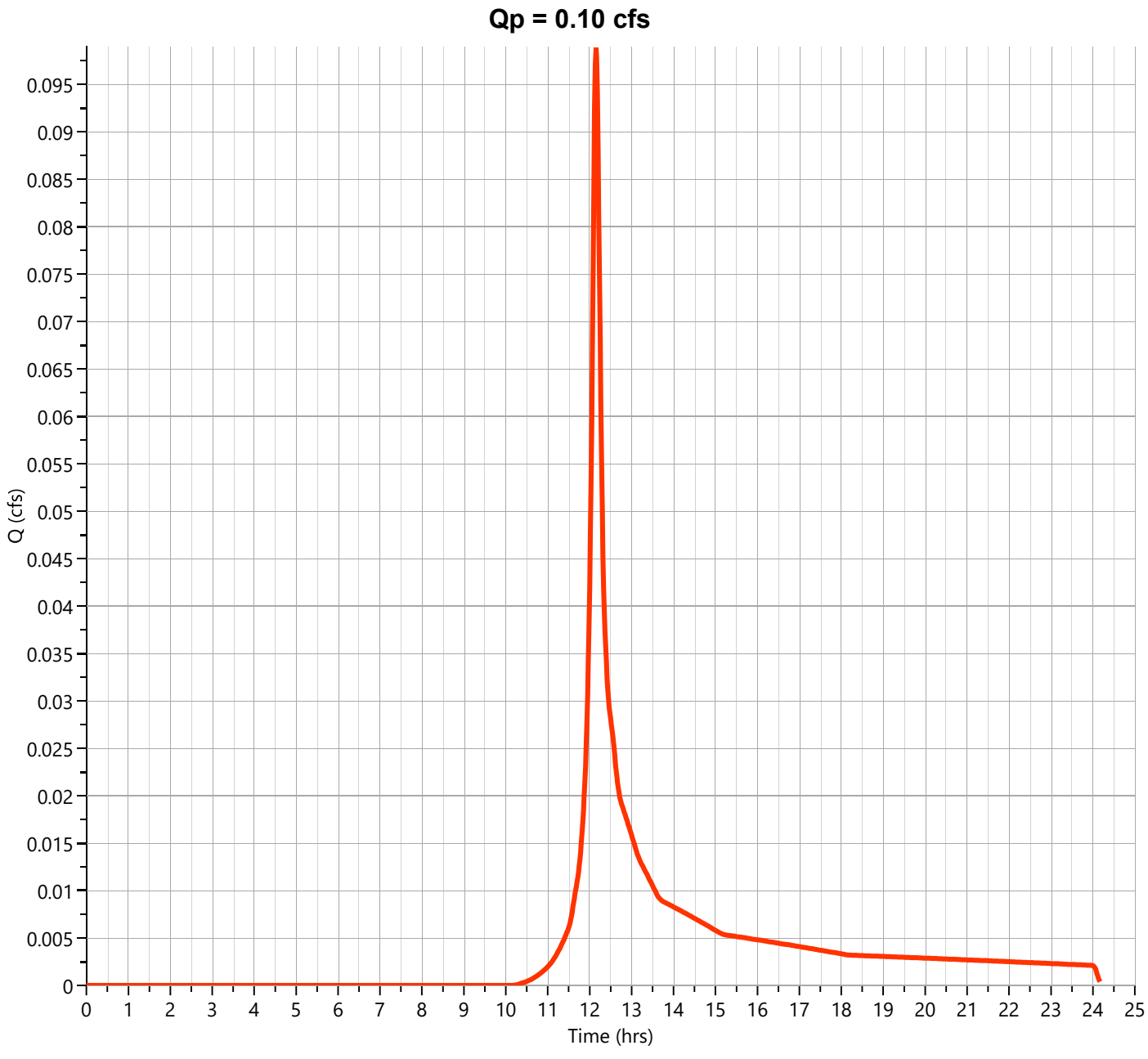
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1B Grass HSGC C

Hyd. No. 4

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.099 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Runoff Volume	= 352 cuft
Drainage Area	= 0.08 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 9.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

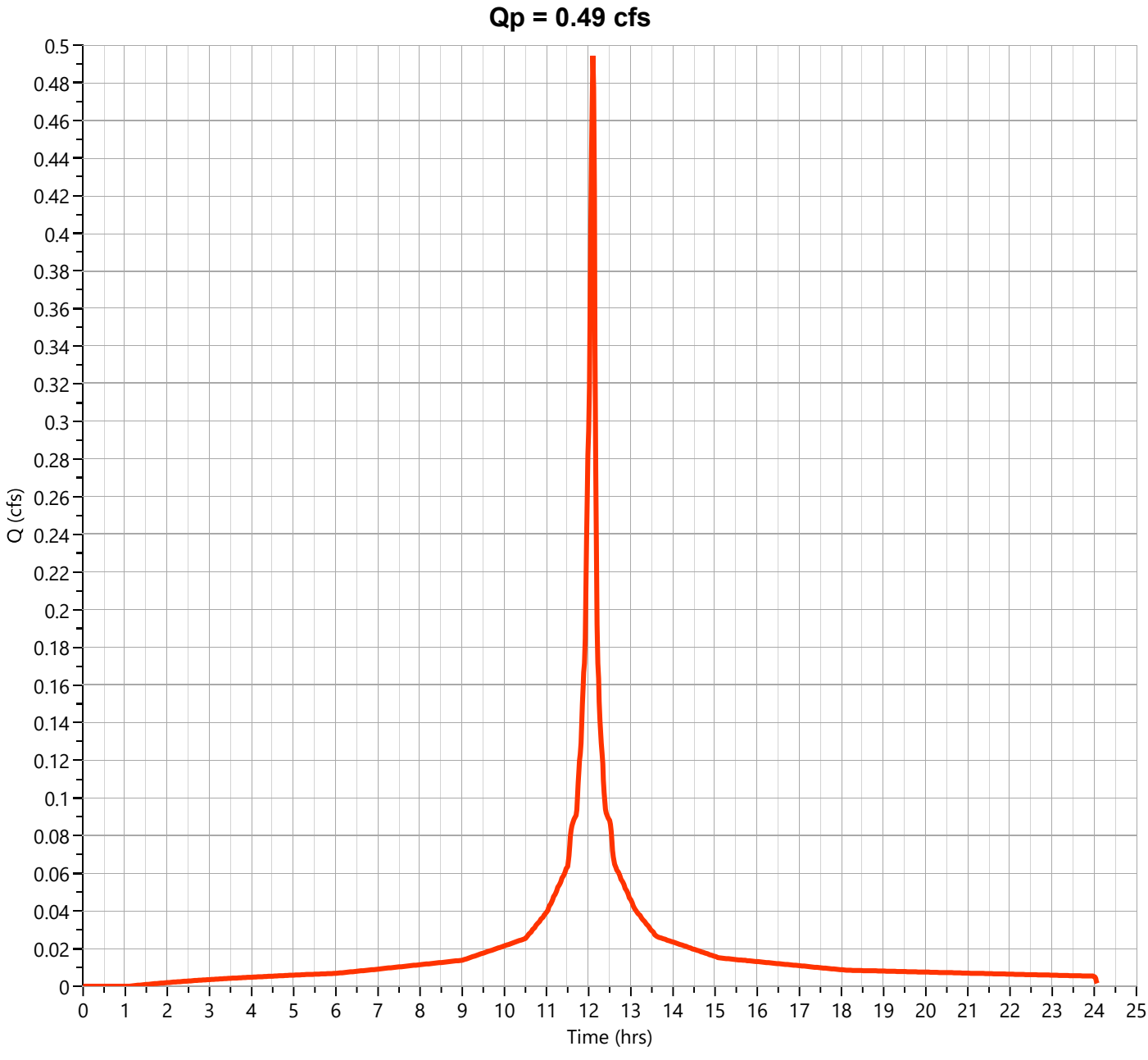
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1B Impervious

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.494 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,640 cuft
Drainage Area	= 0.14 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

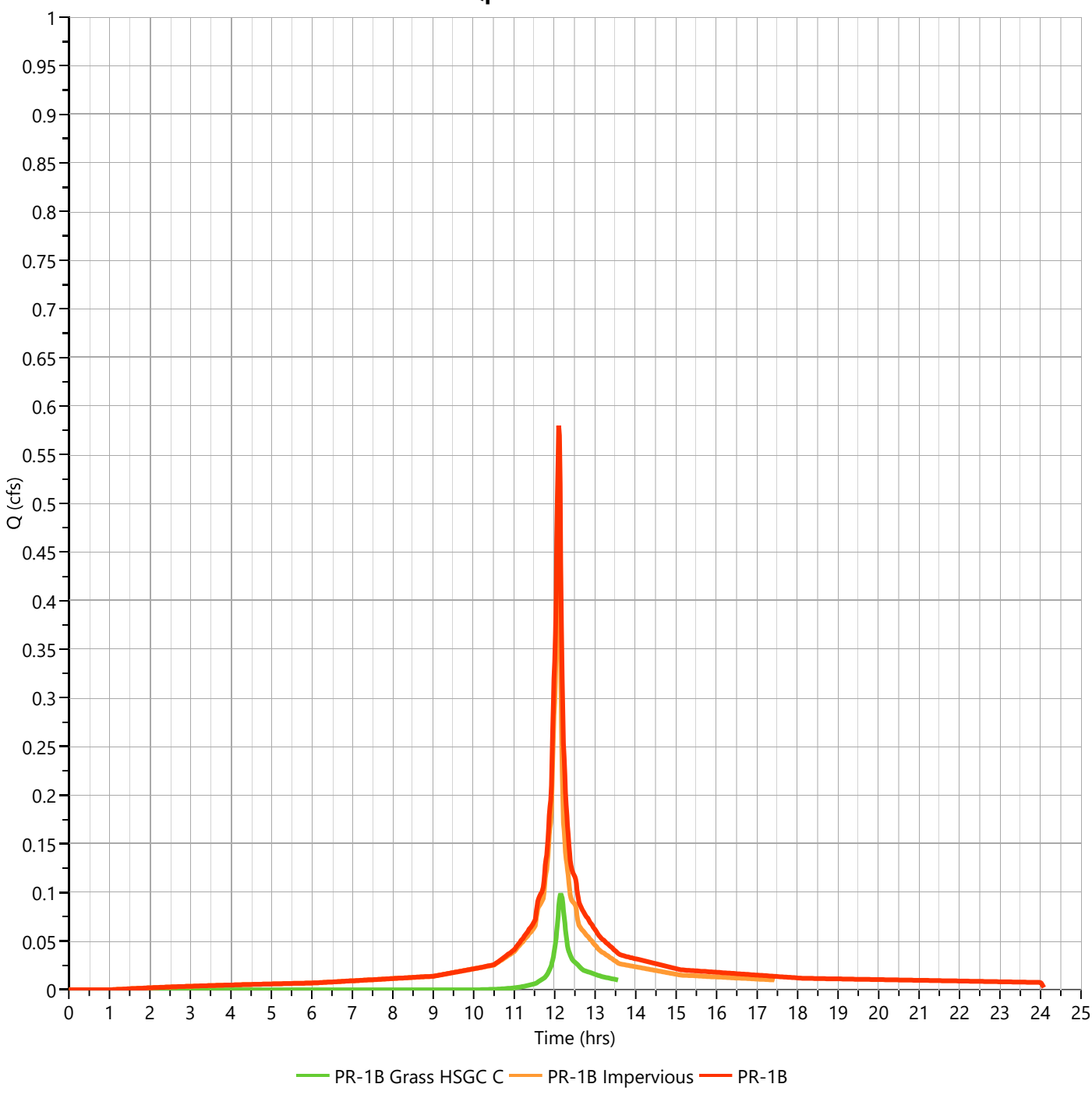
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1B

Hyd. No. 6

Hydrograph Type	= Junction	Peak Flow	= 0.580 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,992 cuft
Inflow Hydrographs	= 4, 5	Total Contrib. Area	= 0.22 ac



Hydrograph Report

Project Name:

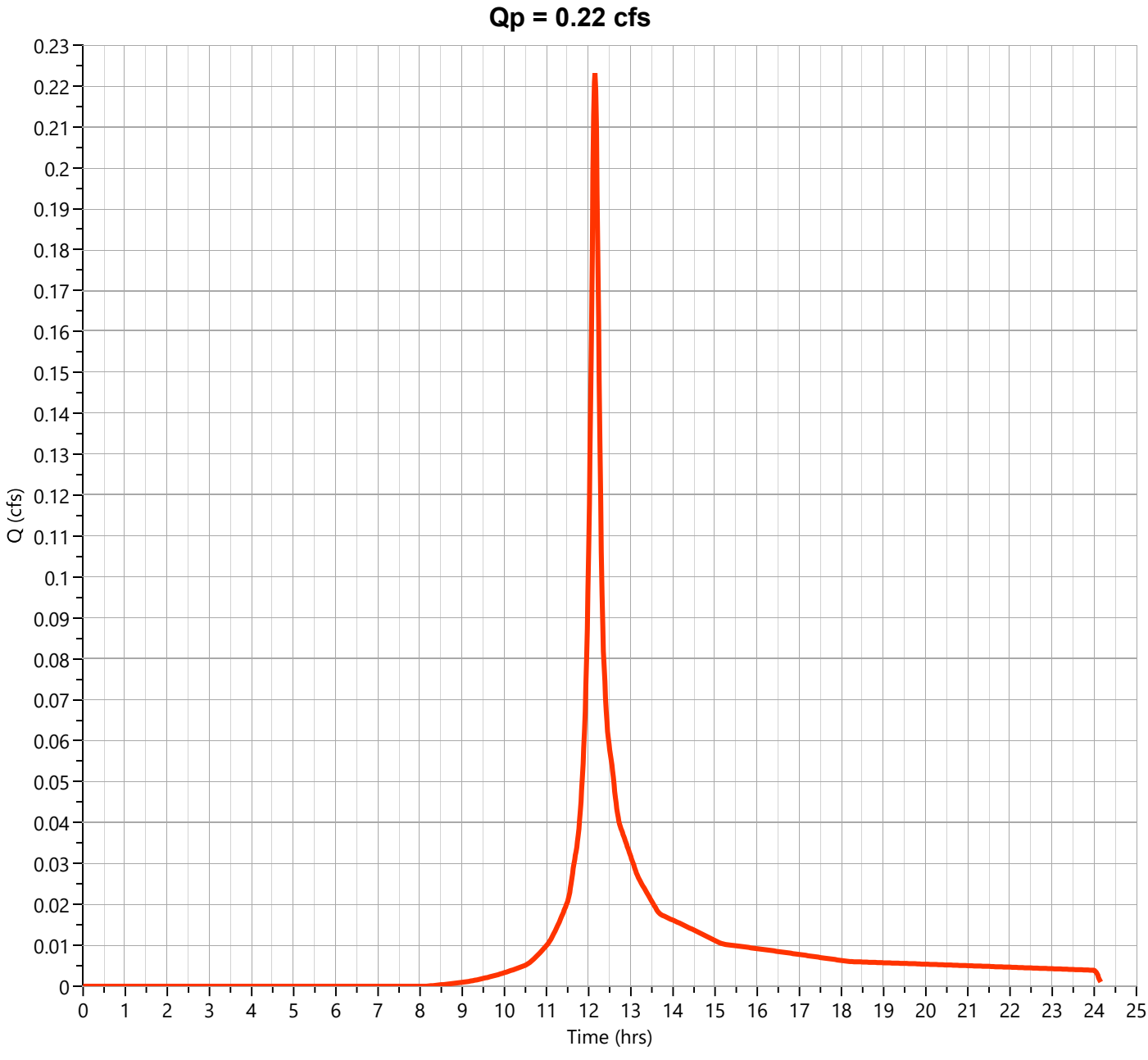
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1B Grass HSGC C

Hyd. No. 4

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.223 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Runoff Volume	= 776 cuft
Drainage Area	= 0.08 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 9.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

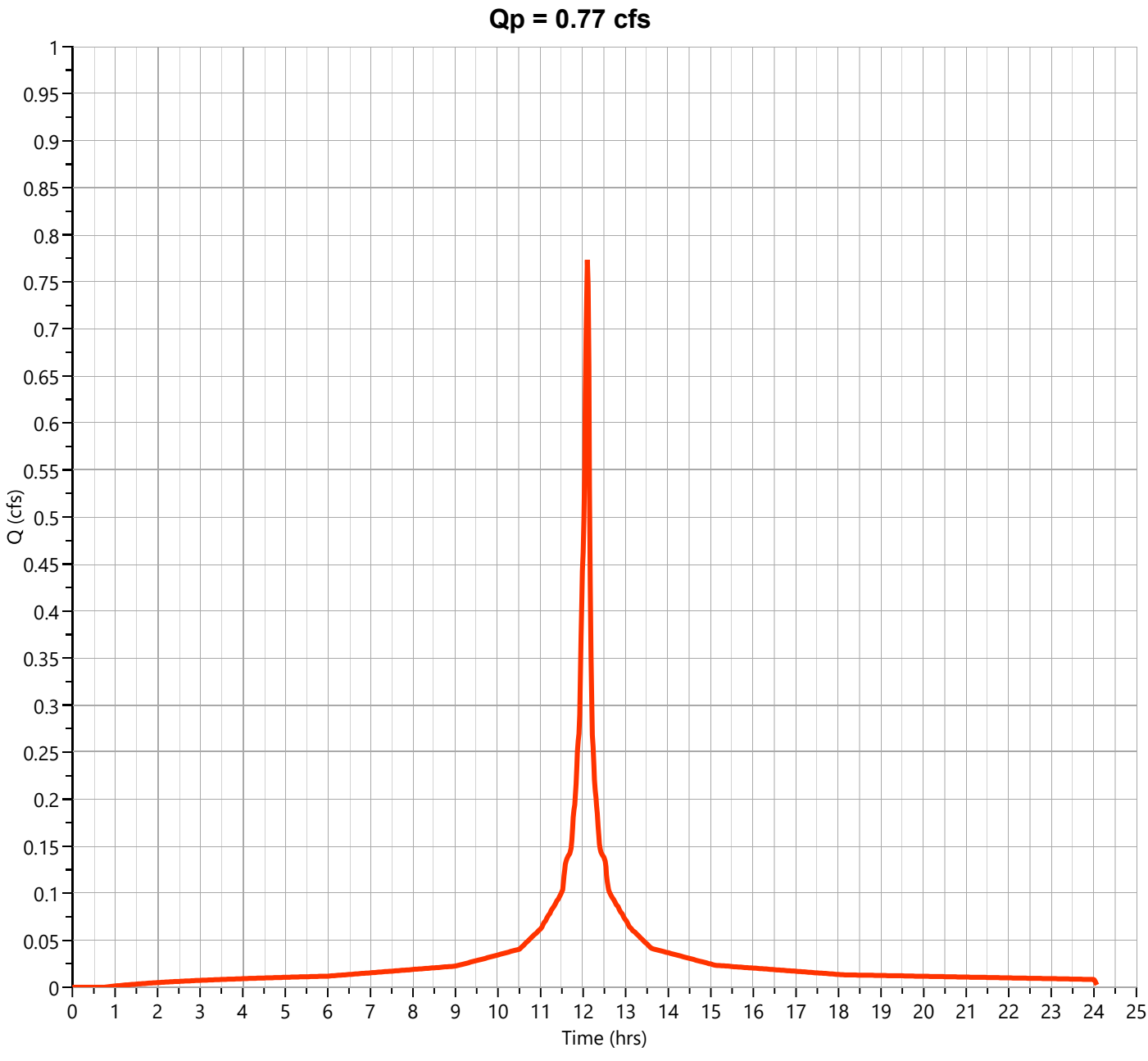
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1B Impervious

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.773 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 2,613 cuft
Drainage Area	= 0.14 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

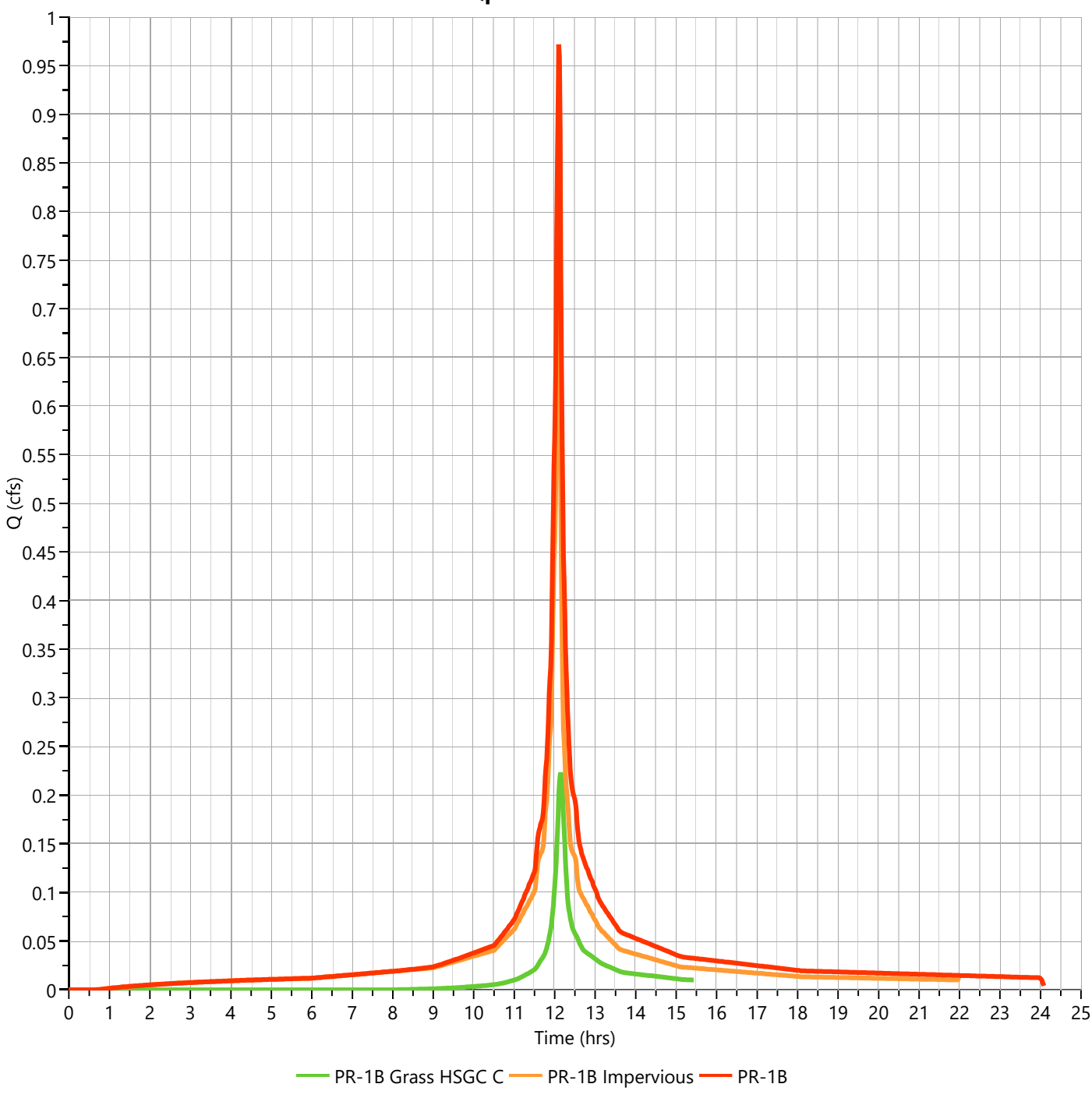
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1B

Hyd. No. 6

Hydrograph Type	= Junction	Peak Flow	= 0.972 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 3,389 cuft
Inflow Hydrographs	= 4, 5	Total Contrib. Area	= 0.22 ac



Hydrograph Report

Project Name:

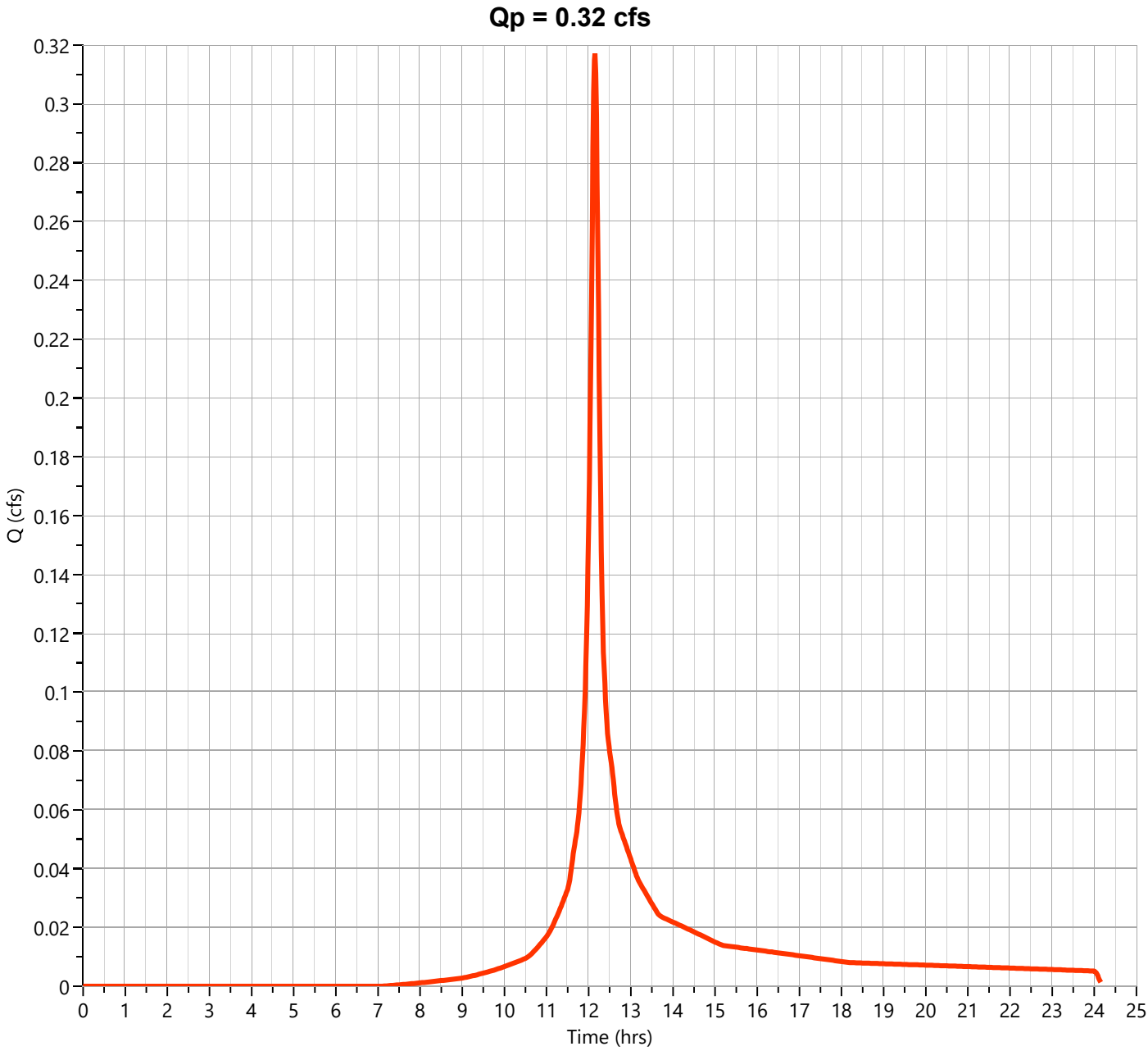
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1B Grass HSGC C

Hyd. No. 4

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.317 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Runoff Volume	= 1,106 cuft
Drainage Area	= 0.08 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 9.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

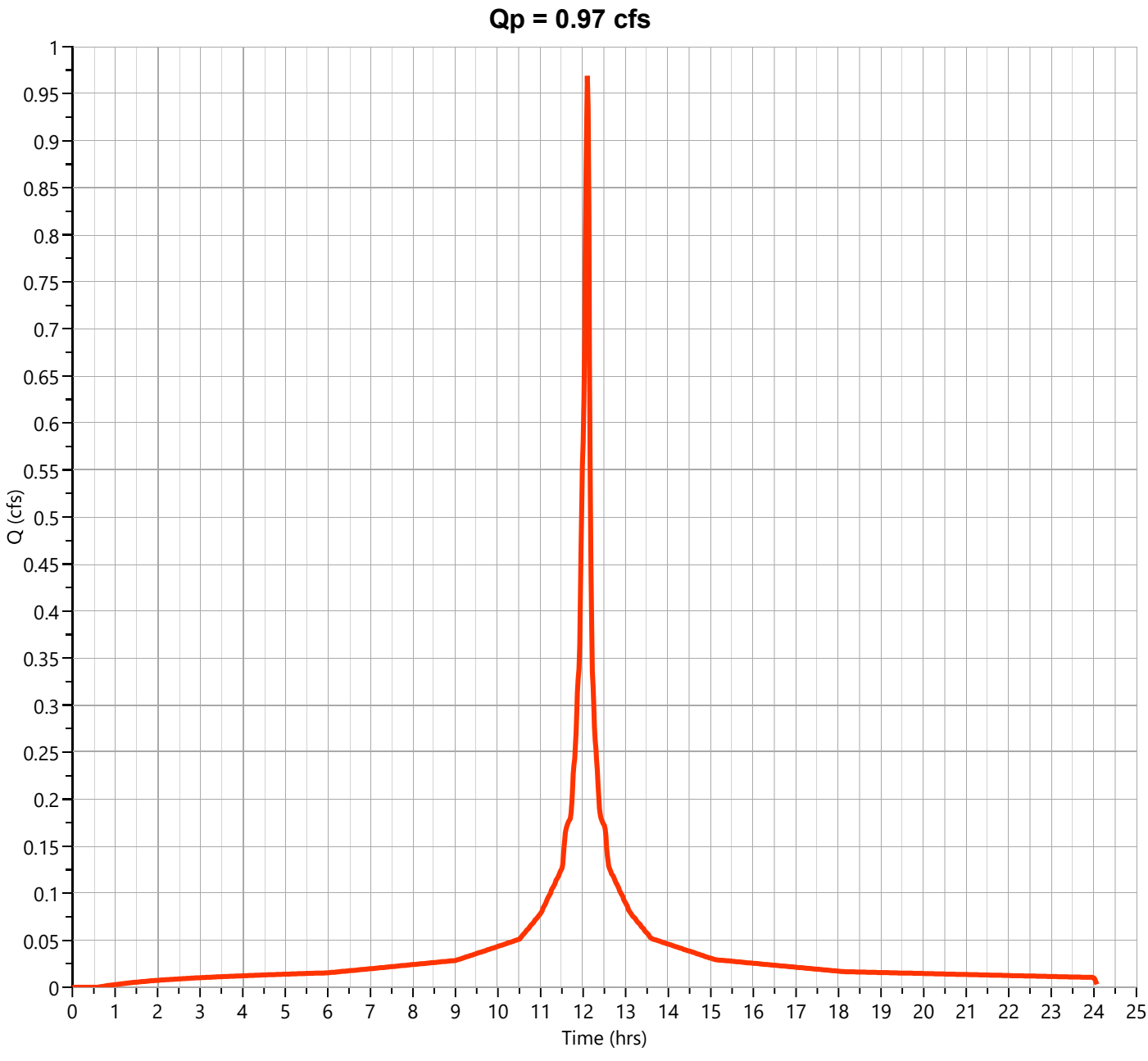
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1B Impervious

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.969 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 3,299 cuft
Drainage Area	= 0.14 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

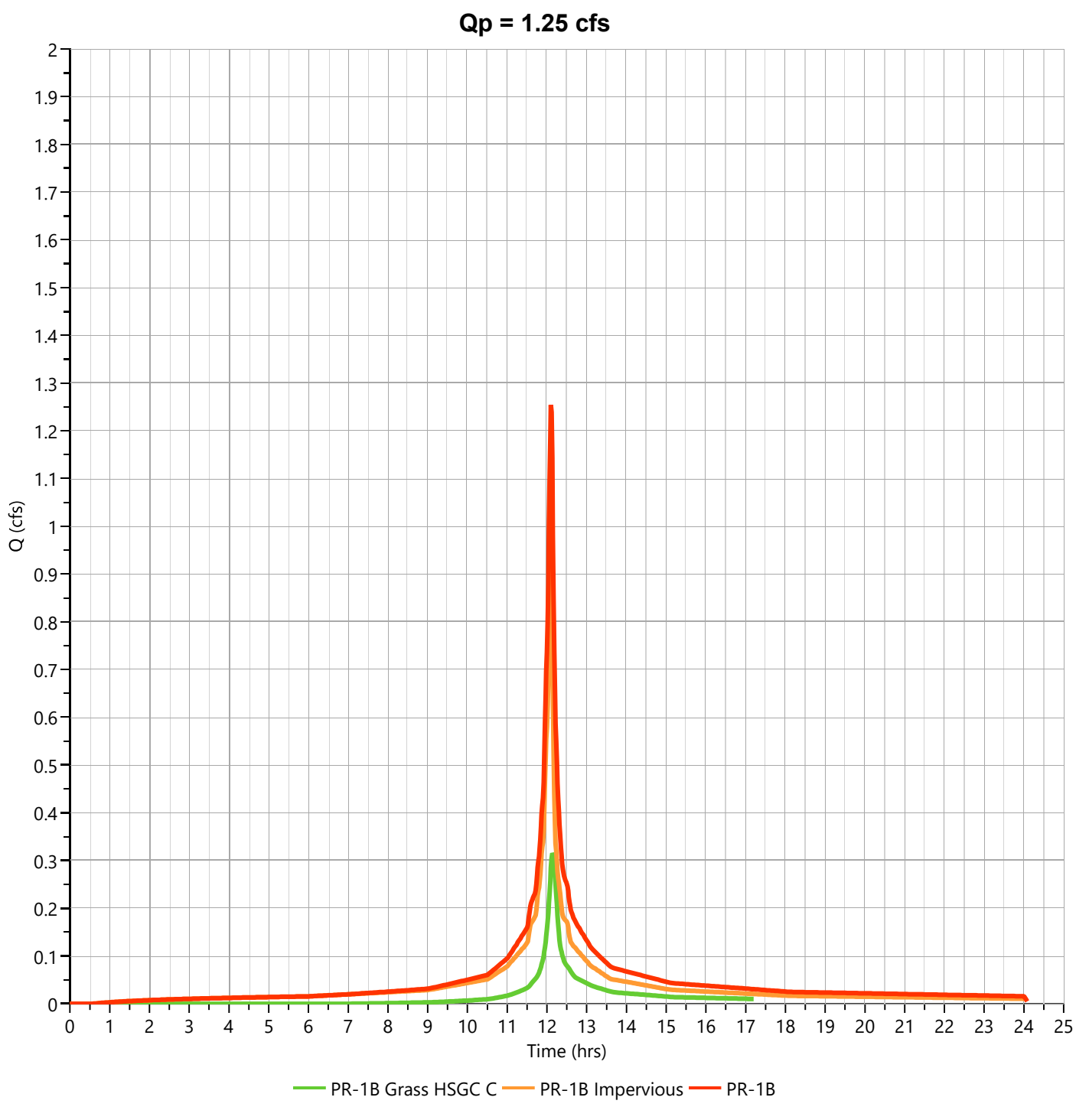
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1B

Hyd. No. 6

Hydrograph Type	= Junction	Peak Flow	= 1.254 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 4,405 cuft
Inflow Hydrographs	= 4, 5	Total Contrib. Area	= 0.22 ac



Hydrograph Report

Project Name:

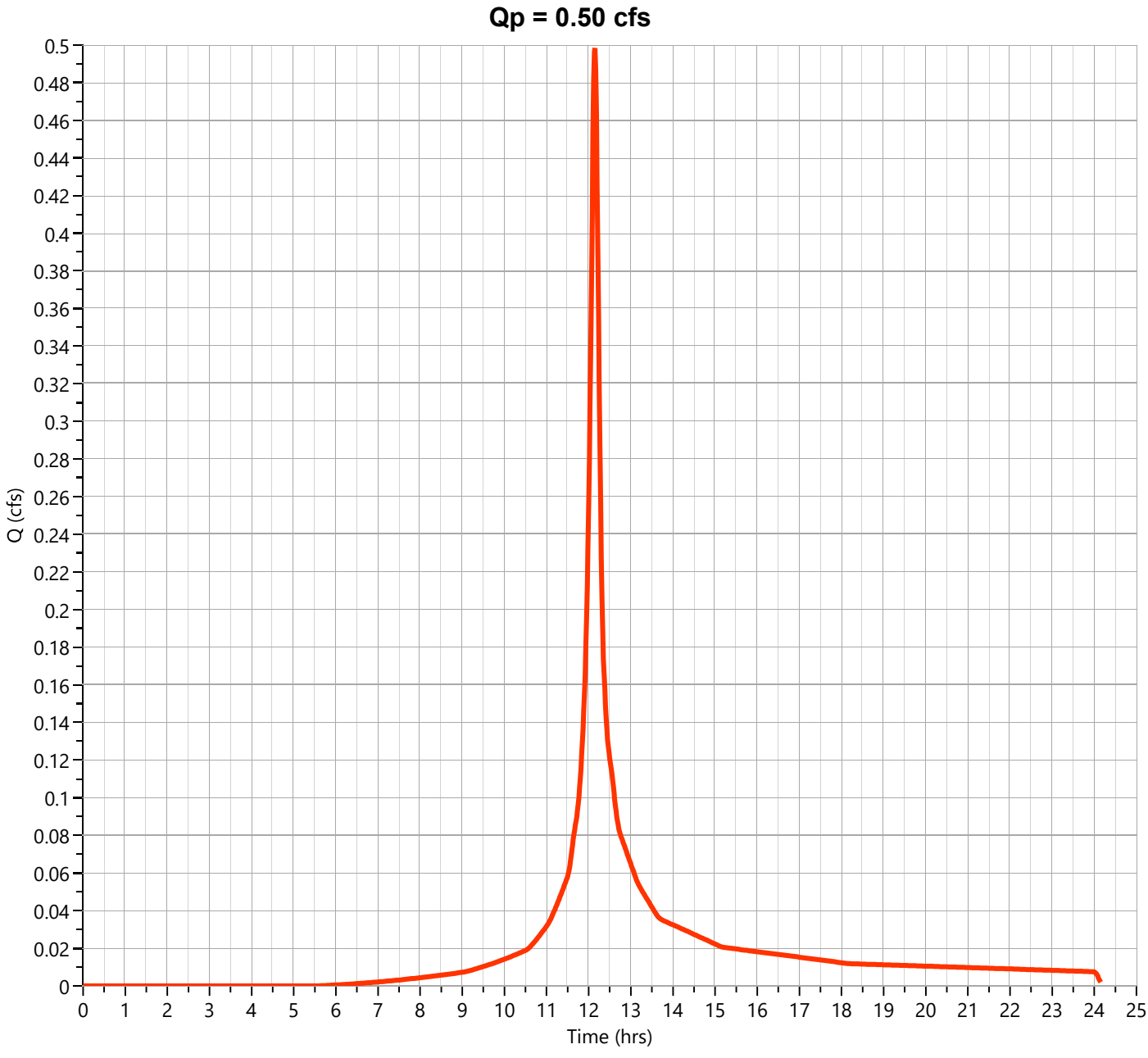
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1B Grass HSGC C

Hyd. No. 4

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.498 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Runoff Volume	= 1,762 cuft
Drainage Area	= 0.08 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 9.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

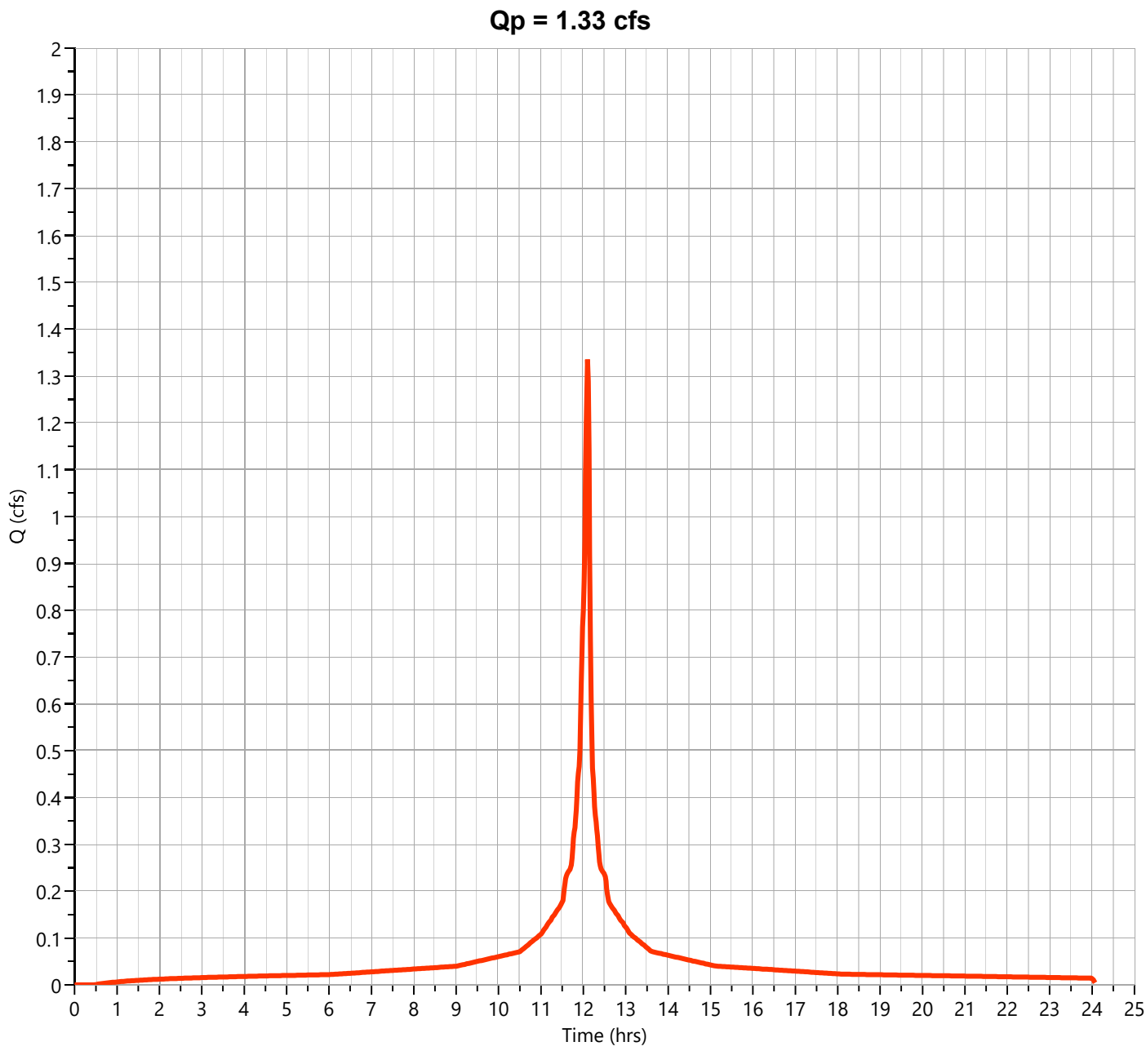
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1B Impervious

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.335 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 4,584 cuft
Drainage Area	= 0.14 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

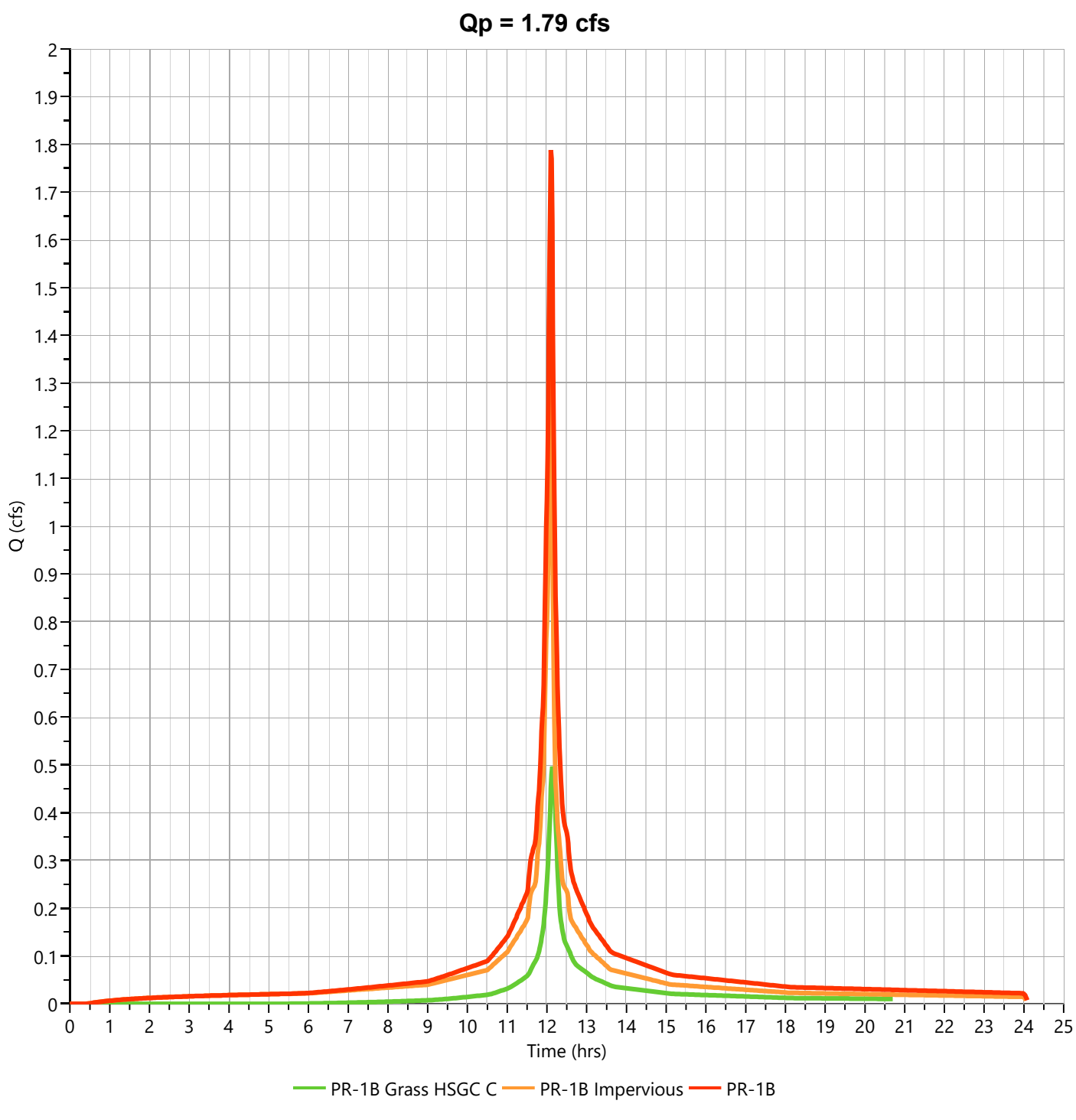
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1B

Hyd. No. 6

Hydrograph Type	= Junction	Peak Flow	= 1.788 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 6,345 cuft
Inflow Hydrographs	= 4, 5	Total Contrib. Area	= 0.22 ac



PR-1C WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: Present **Developed** — **Current Proposed Watershed PR-1C - Impervious**

Circle One: **T_c** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		2		
1.	Surface Description (NEH table 15-1)		Smooth Surfaces		Dense Grasses		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011		0.24		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	39		17		
4.	Two-year 24-hr rainfall, P_2	in	3.46		3.46		
5.	Land Slope, s	ft/ft	0.021		0.062		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	100		100		
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.009	+	0.035	+	
					Sheet Flow Sub-Total		0.044 hours

Shallow Concentrated Flow		Segment ID					
8.	Surface Description						
9.	Flow Length, L	ft					
10.	Watercourse Slope, s	ft/ft					
11.	Average Velocity, V (NEH table 15-3)	ft/s					
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+		+	
					Shallow Conc. Flow Sub-Total		0.000 hours

Channel Flow		Segment ID					
13.	Flow Length, L	ft					
14.	Cross Sectional flow area, a	ft^2					
15.	Wetted Perimeter, P_w	ft					
16.	Hydraulic Radius, r $r = a / P_w$	ft					
17.	Channel Slope, s	ft/ft					
18.	Manning's Roughness Coeff., n						
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s					
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+		+	
					Channel Flow Sub-Total		0.000 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.044 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	3 minutes

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: Present **(Developed)** — **Current Proposed Watershed PR-1C - Pervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		
1.	Surface Description (NEH table 15-1)		Dense Grasses		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.24		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	27		
4.	Two-year 24-hr rainfall, P_2	in	3.46		
5.	Land Slope, s	ft/ft	0.047		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	91		
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.058	+	+
				Sheet Flow Sub-Total	0.058 hours

Shallow Concentrated Flow		Segment ID			
8.	Surface Description				
9.	Flow Length, L	ft			
10.	Watercourse Slope, s	ft/ft			
11.	Average Velocity, V (NEH table 15-3)	ft/s			
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+	+
				Shallow Conc. Flow Sub-Total	0.000 hours

Channel Flow		Segment ID			
13.	Flow Length, L	ft			
14.	Cross Sectional flow area, a	ft^2			
15.	Wetted Perimeter, P_w	ft			
16.	Hydraulic Radius, r $r = a / P_w$	ft			
17.	Channel Slope, s	ft/ft			
18.	Manning's Roughness Coeff., n				
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s			
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+	+
				Channel Flow Sub-Total	0.000 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.058 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	3 minutes

Hydrograph Report

Project Name:

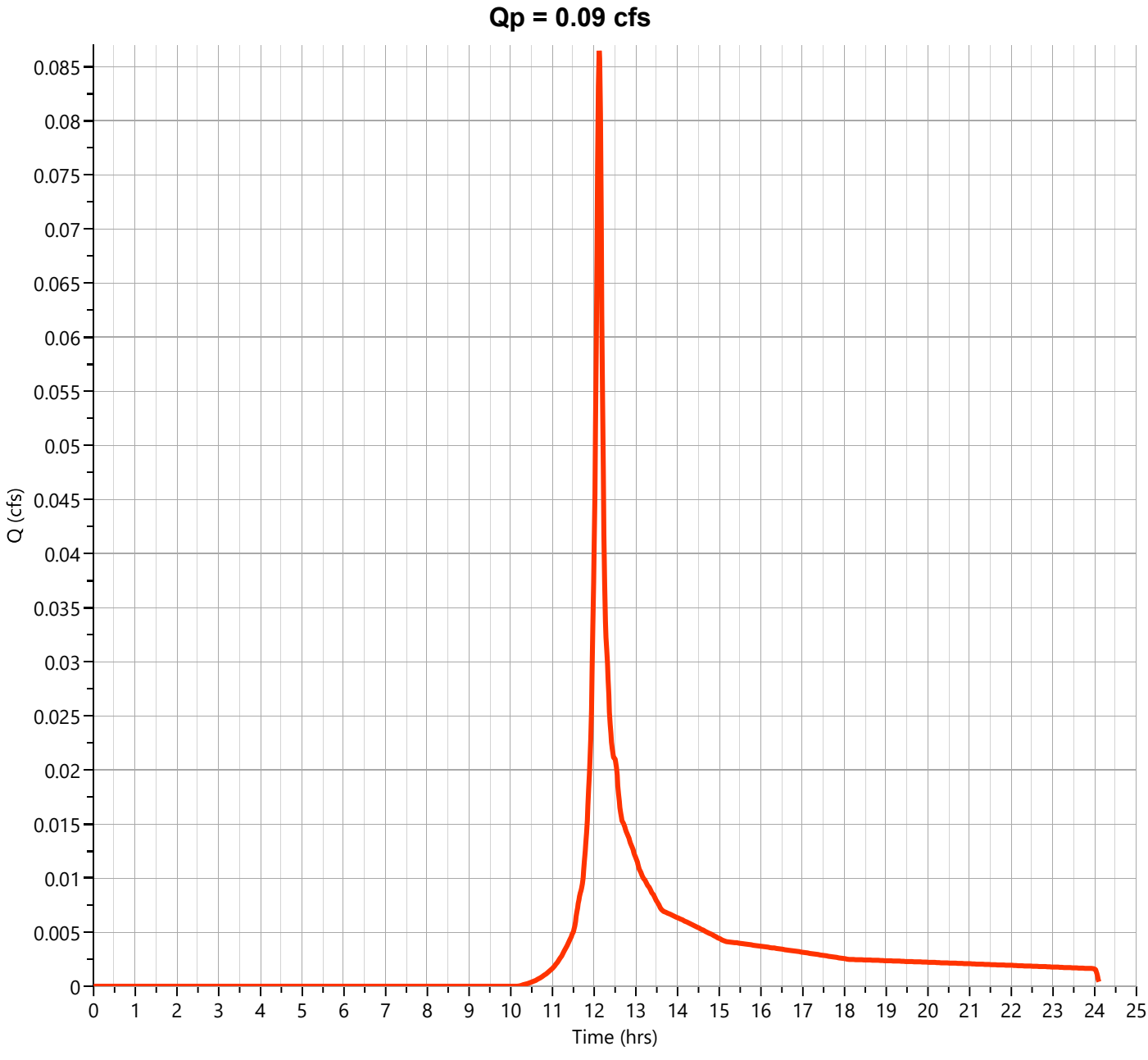
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D Grass HSGC C

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.086 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 272 cuft
Drainage Area	= 0.06 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

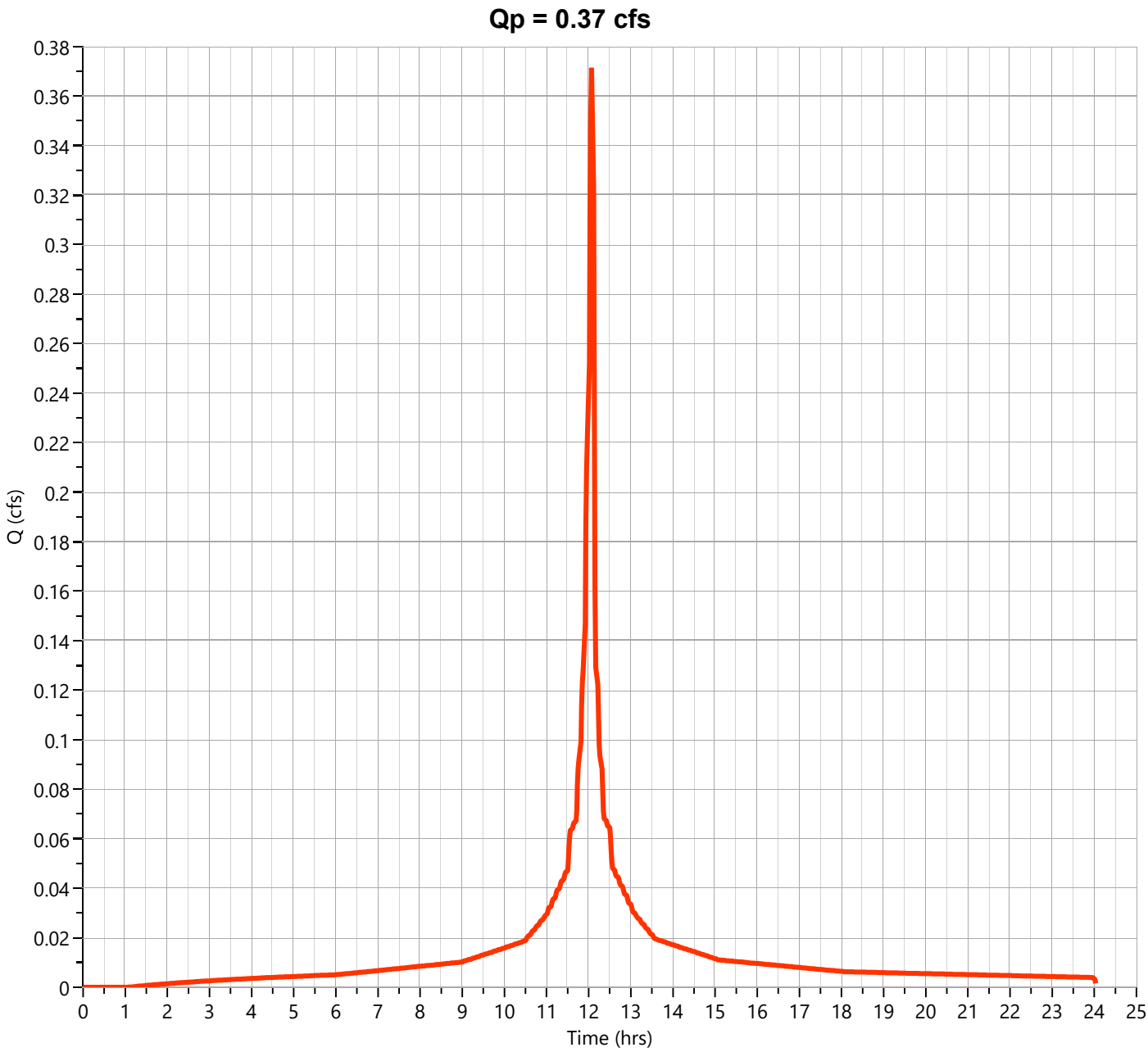
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D Impervious

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.372 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,208 cuft
Drainage Area	= 0.11 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

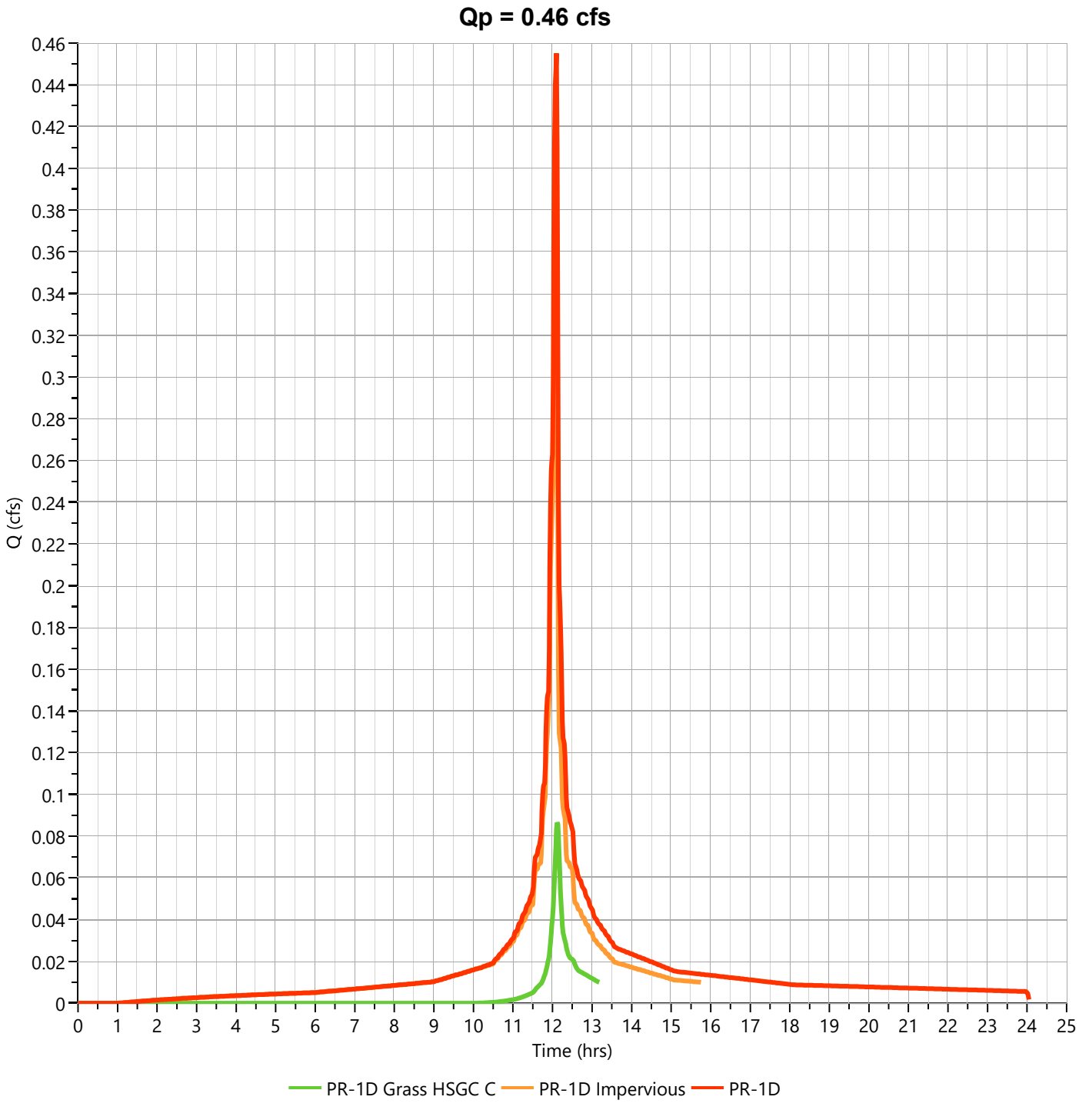
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D

Hyd. No. 16

Hydrograph Type	= Junction	Peak Flow	= 0.455 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,480 cuft
Inflow Hydrographs	= 14, 15	Total Contrib. Area	= 0.17 ac



Hydrograph Report

Project Name:

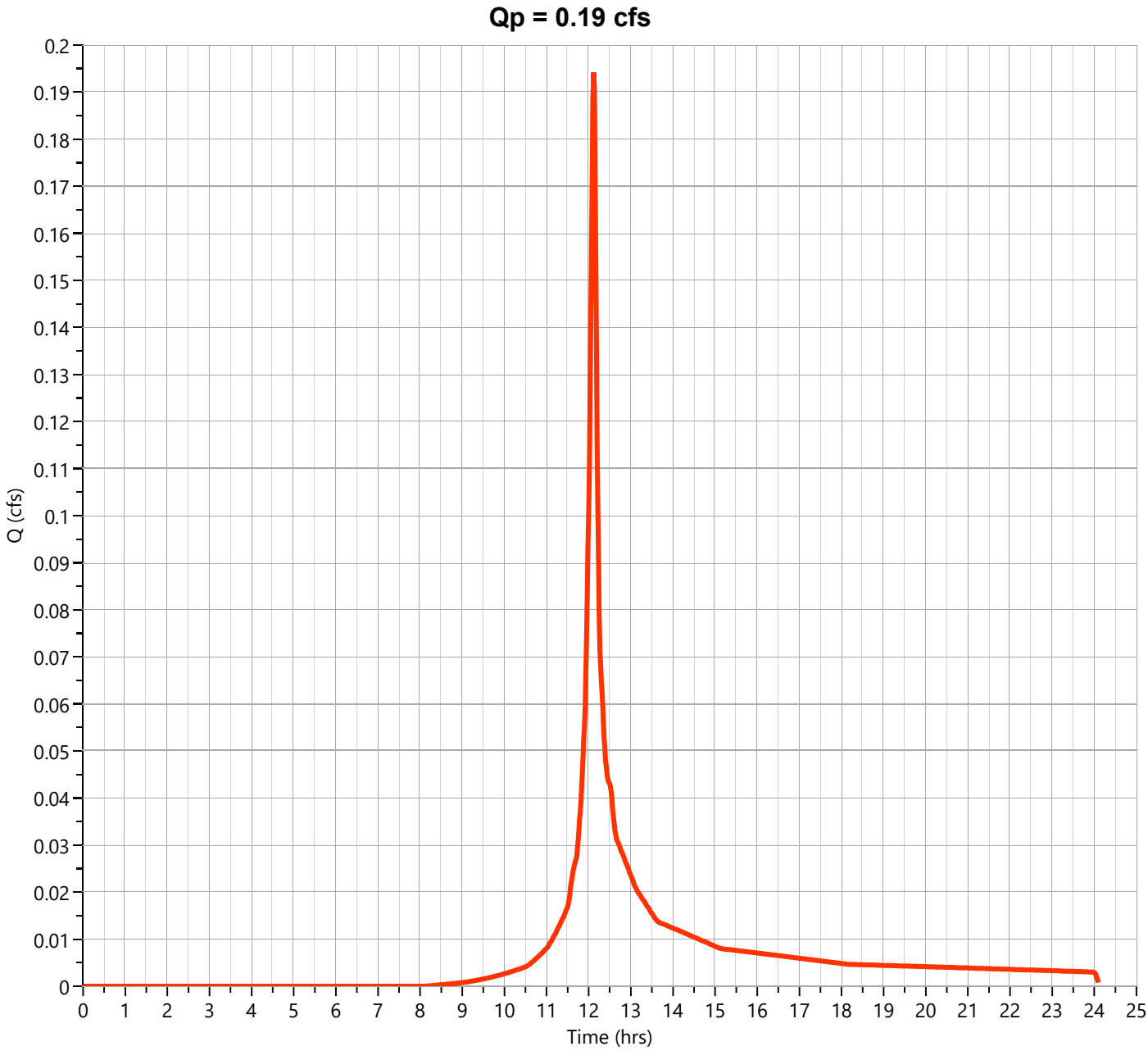
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D Grass HSGC C

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.194 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 600 cuft
Drainage Area	= 0.06 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

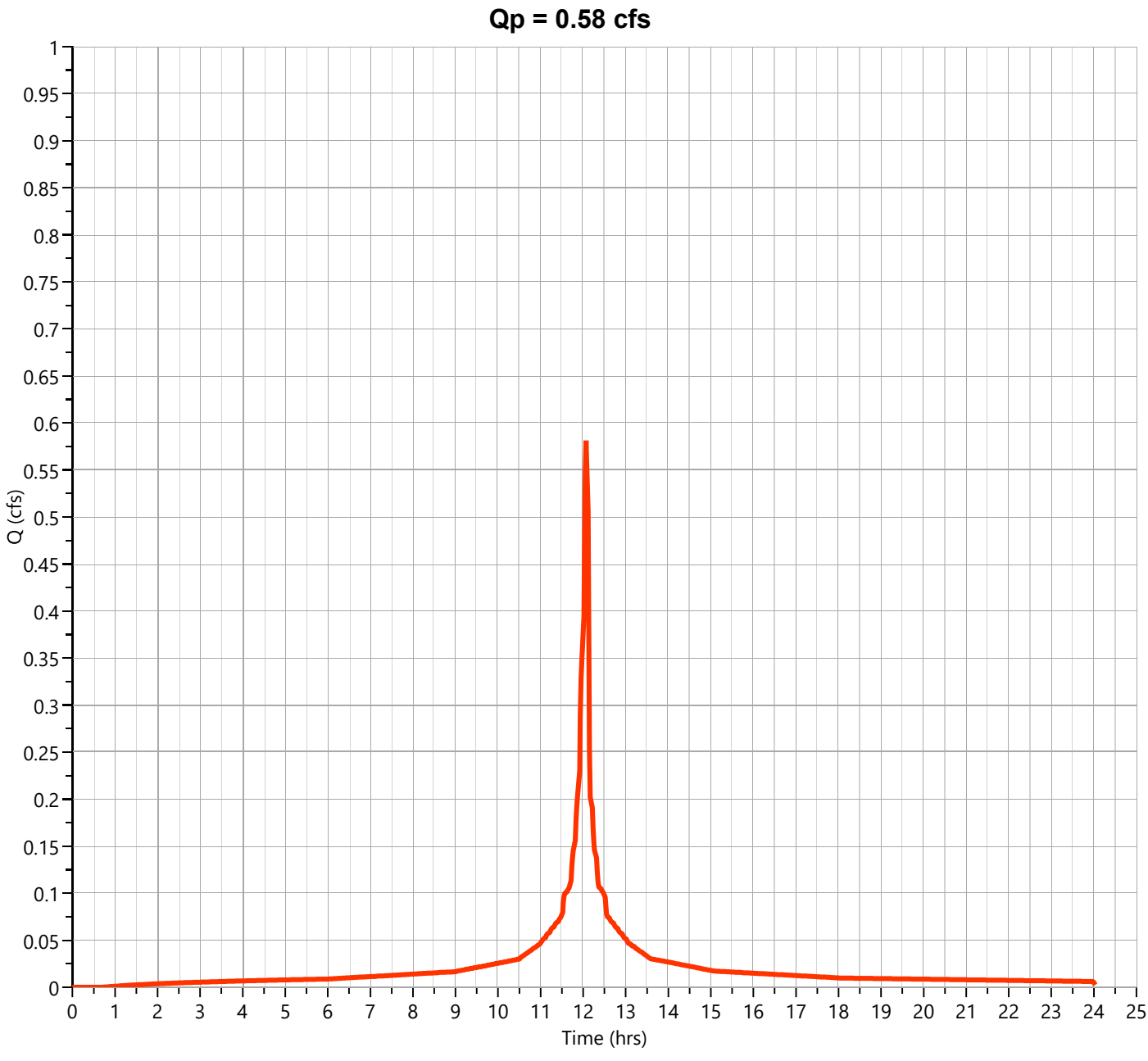
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D Impervious

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.581 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,925 cuft
Drainage Area	= 0.11 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

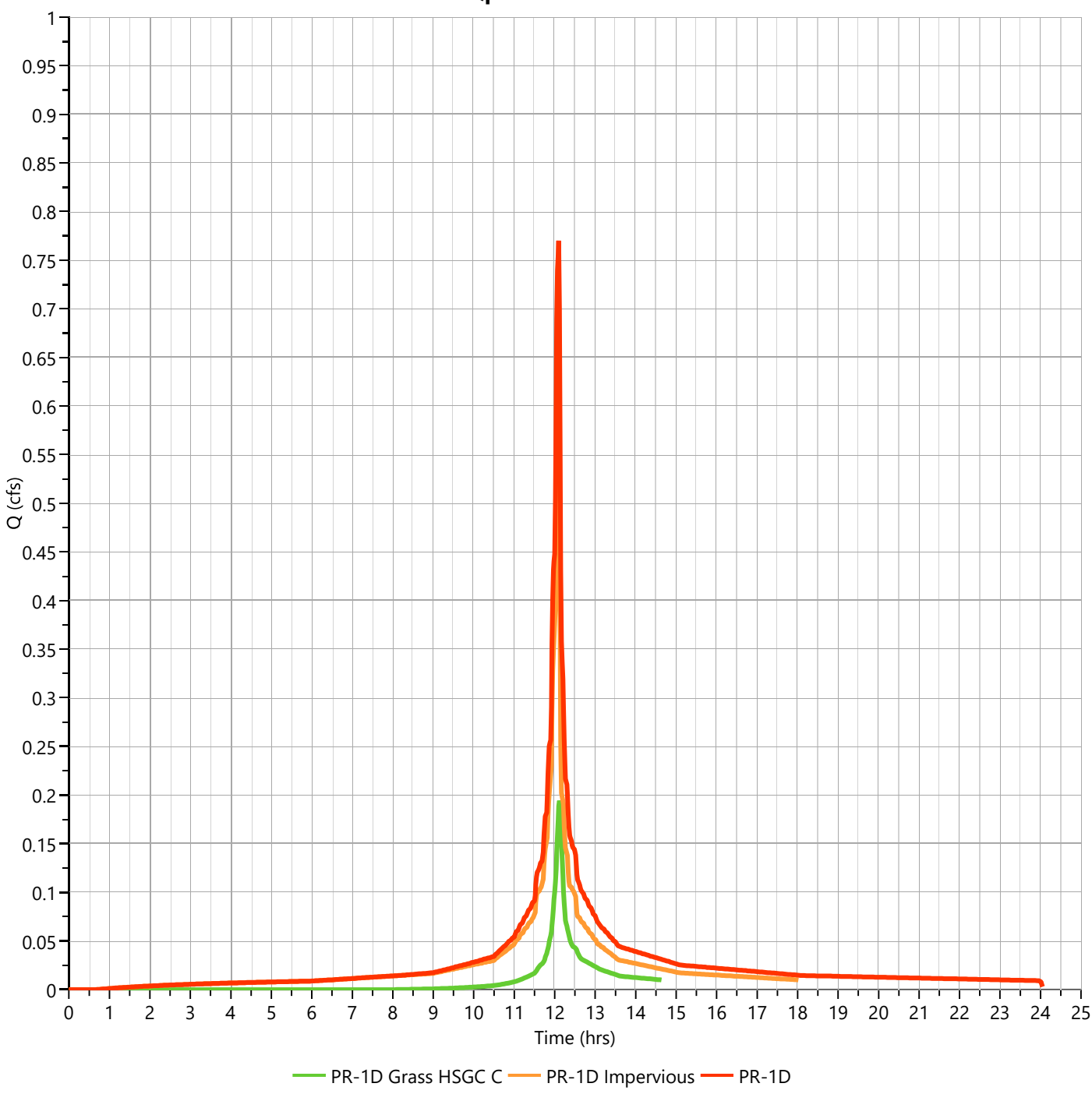
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D

Hyd. No. 16

Hydrograph Type	= Junction	Peak Flow	= 0.770 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,525 cuft
Inflow Hydrographs	= 14, 15	Total Contrib. Area	= 0.17 ac



Hydrograph Report

Project Name:

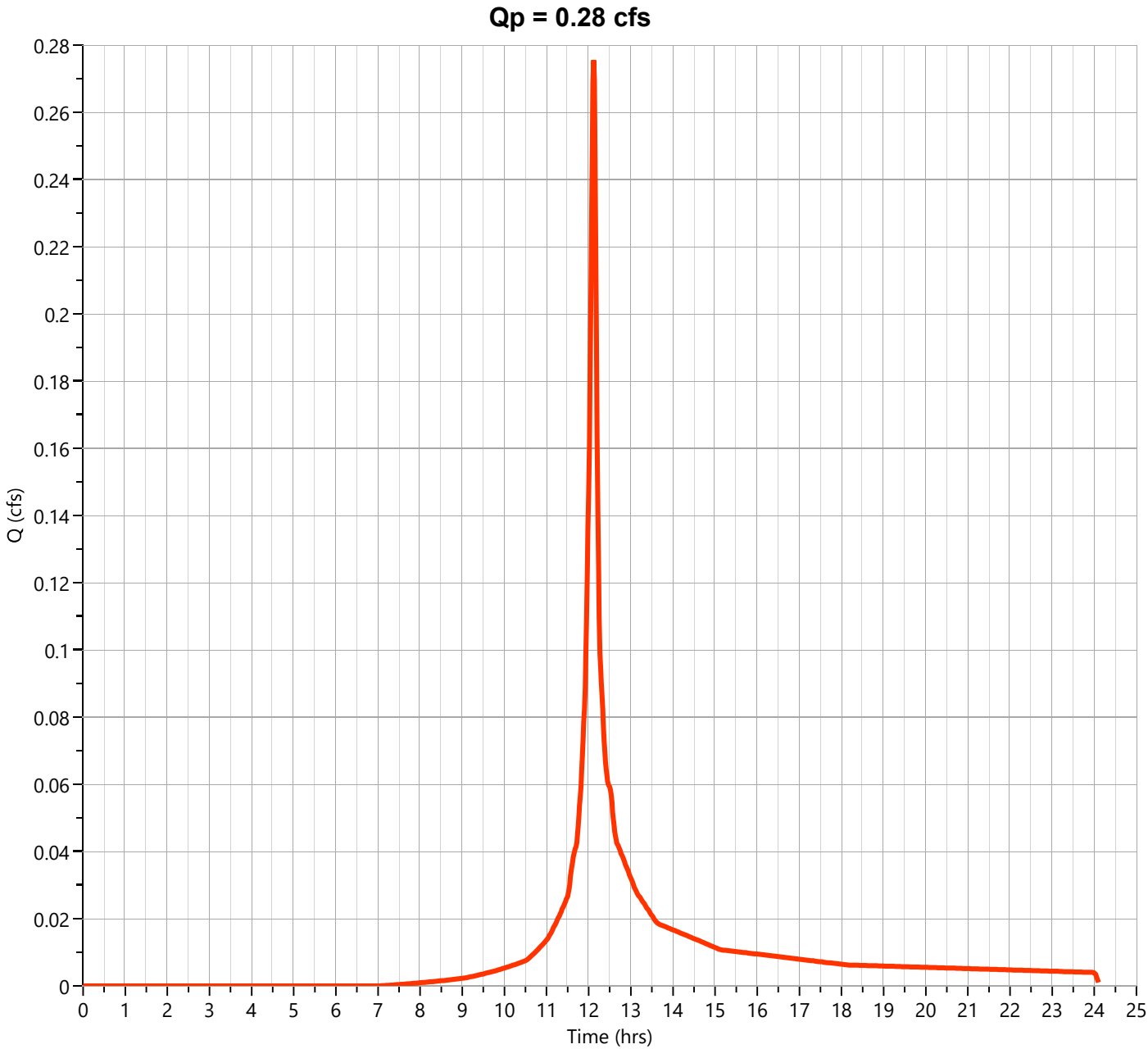
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D Grass HSGC C

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.275 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 855 cuft
Drainage Area	= 0.06 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

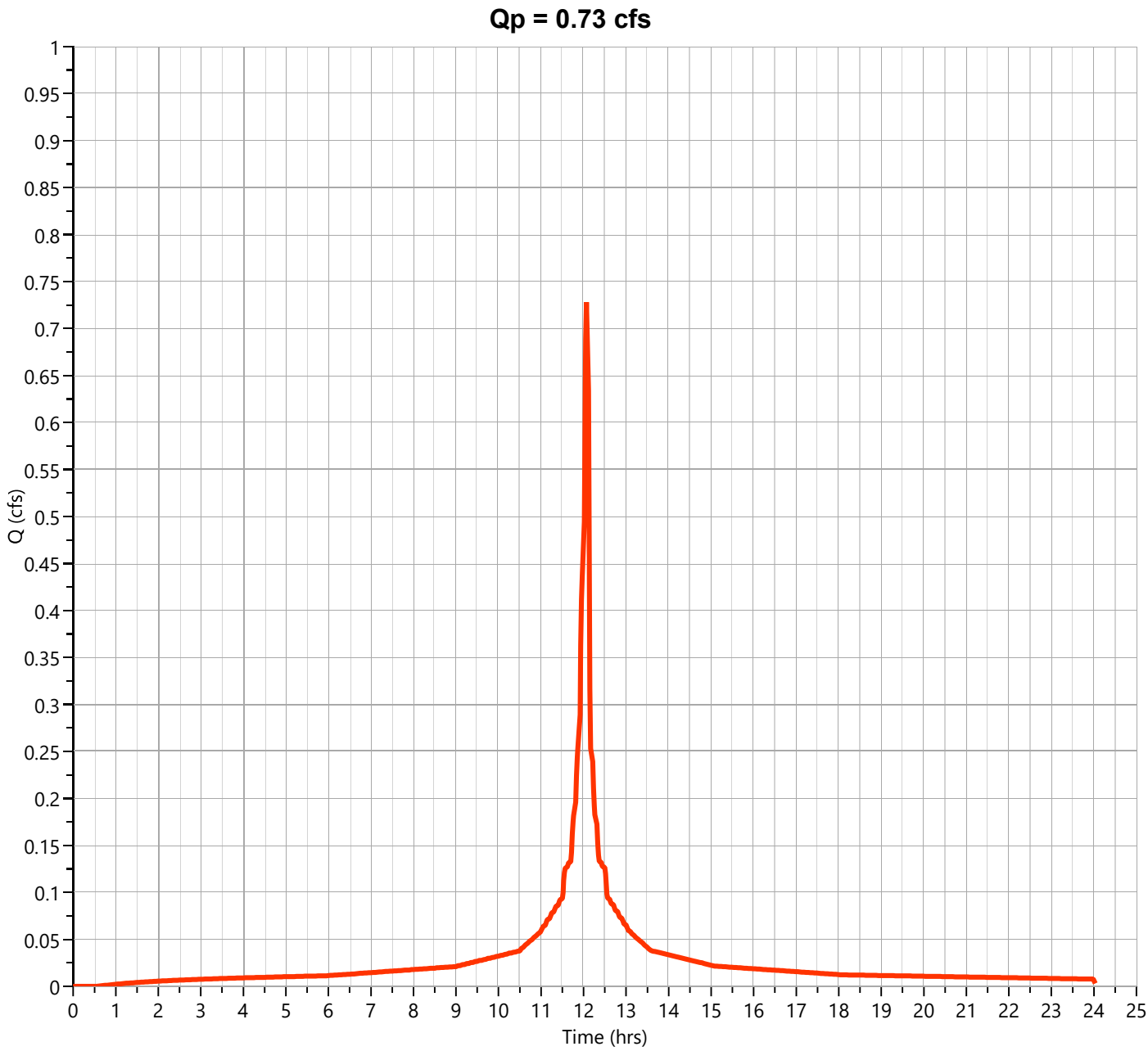
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D Impervious

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.728 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 2,430 cuft
Drainage Area	= 0.11 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

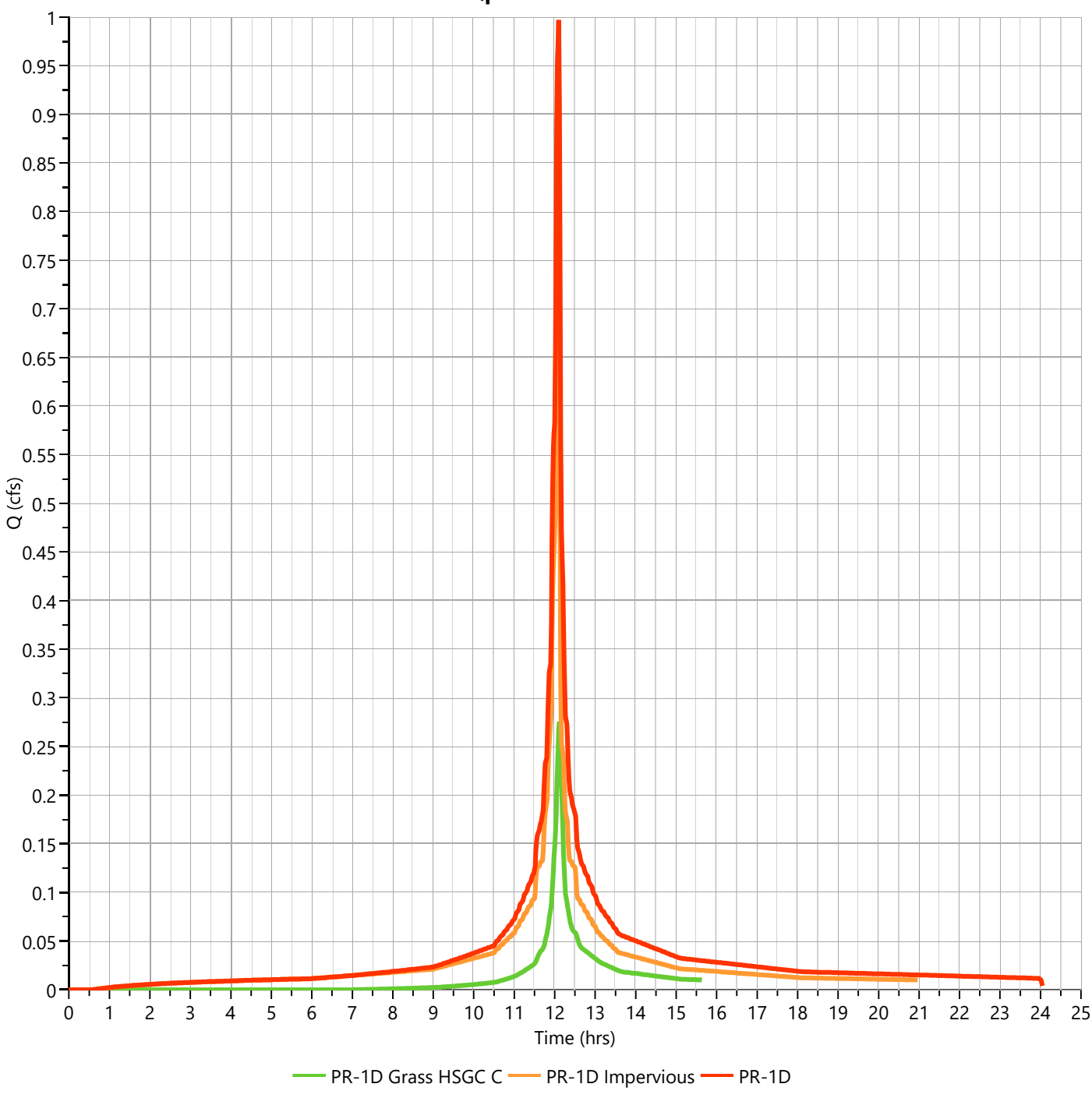
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D

Hyd. No. 16

Hydrograph Type	= Junction	Peak Flow	= 0.997 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 3,285 cuft
Inflow Hydrographs	= 14, 15	Total Contrib. Area	= 0.17 ac



Hydrograph Report

Project Name:

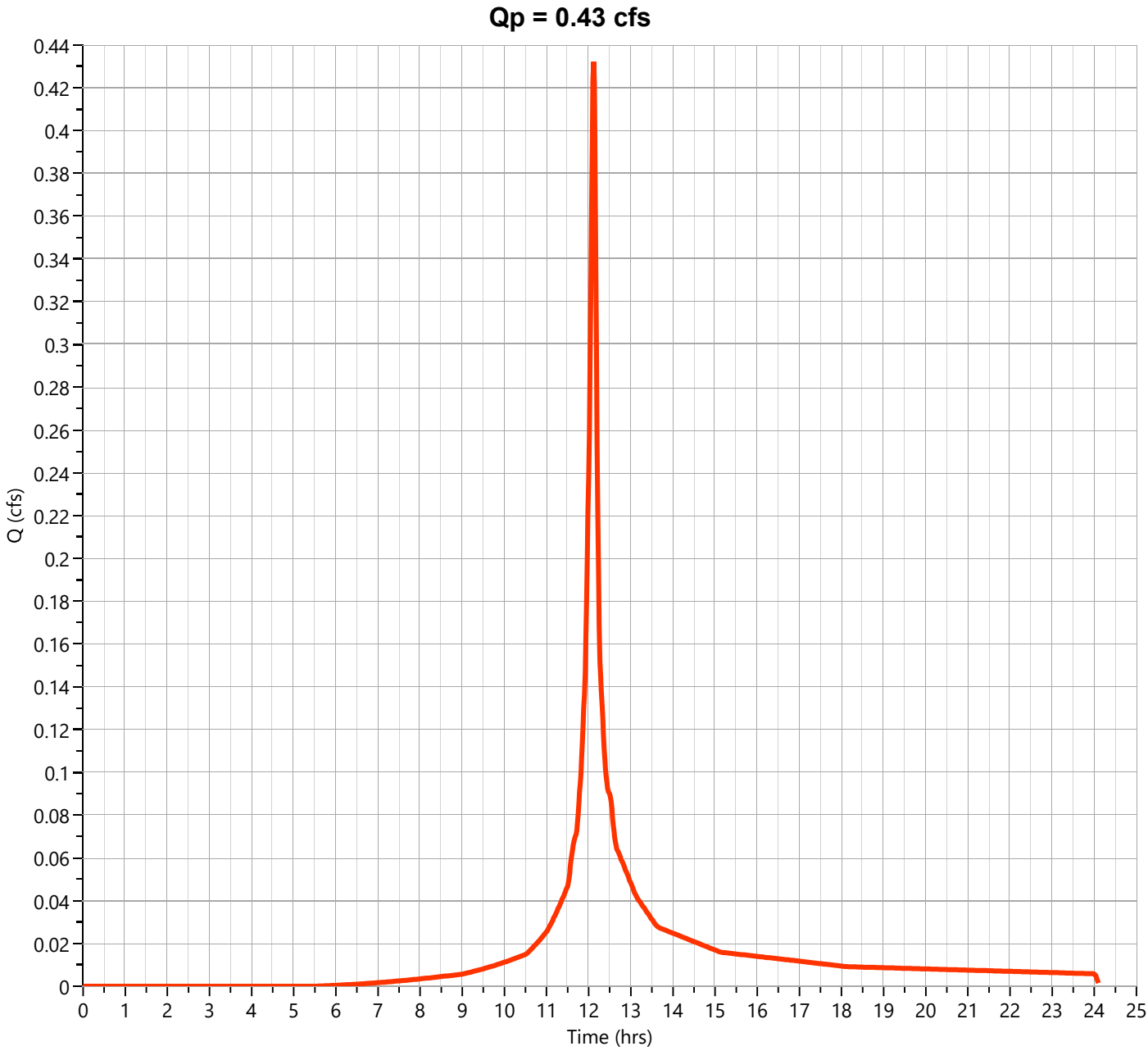
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D Grass HSGC C

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.432 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 1,363 cuft
Drainage Area	= 0.06 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

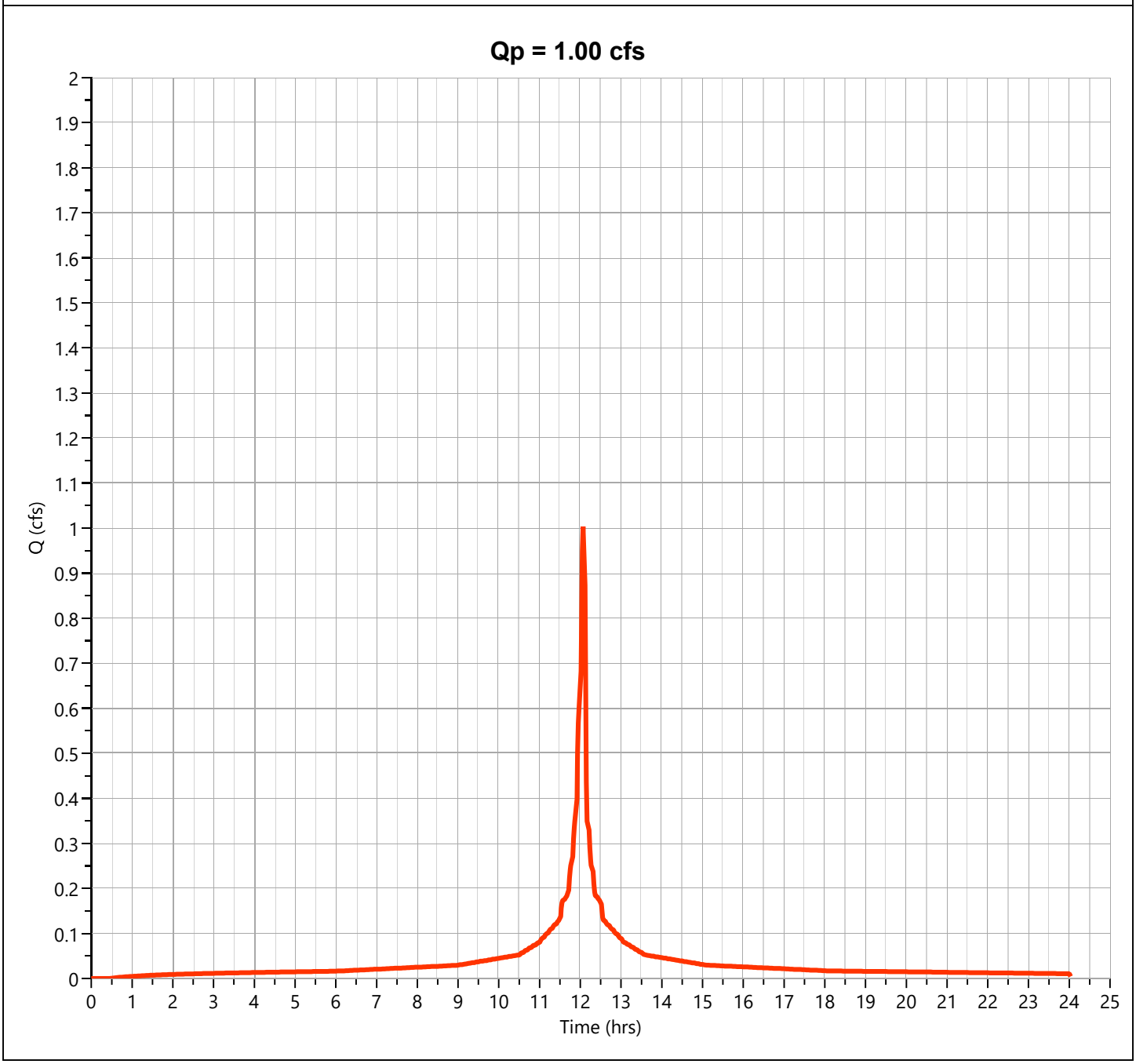
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D Impervious

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.003 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 3,376 cuft
Drainage Area	= 0.11 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

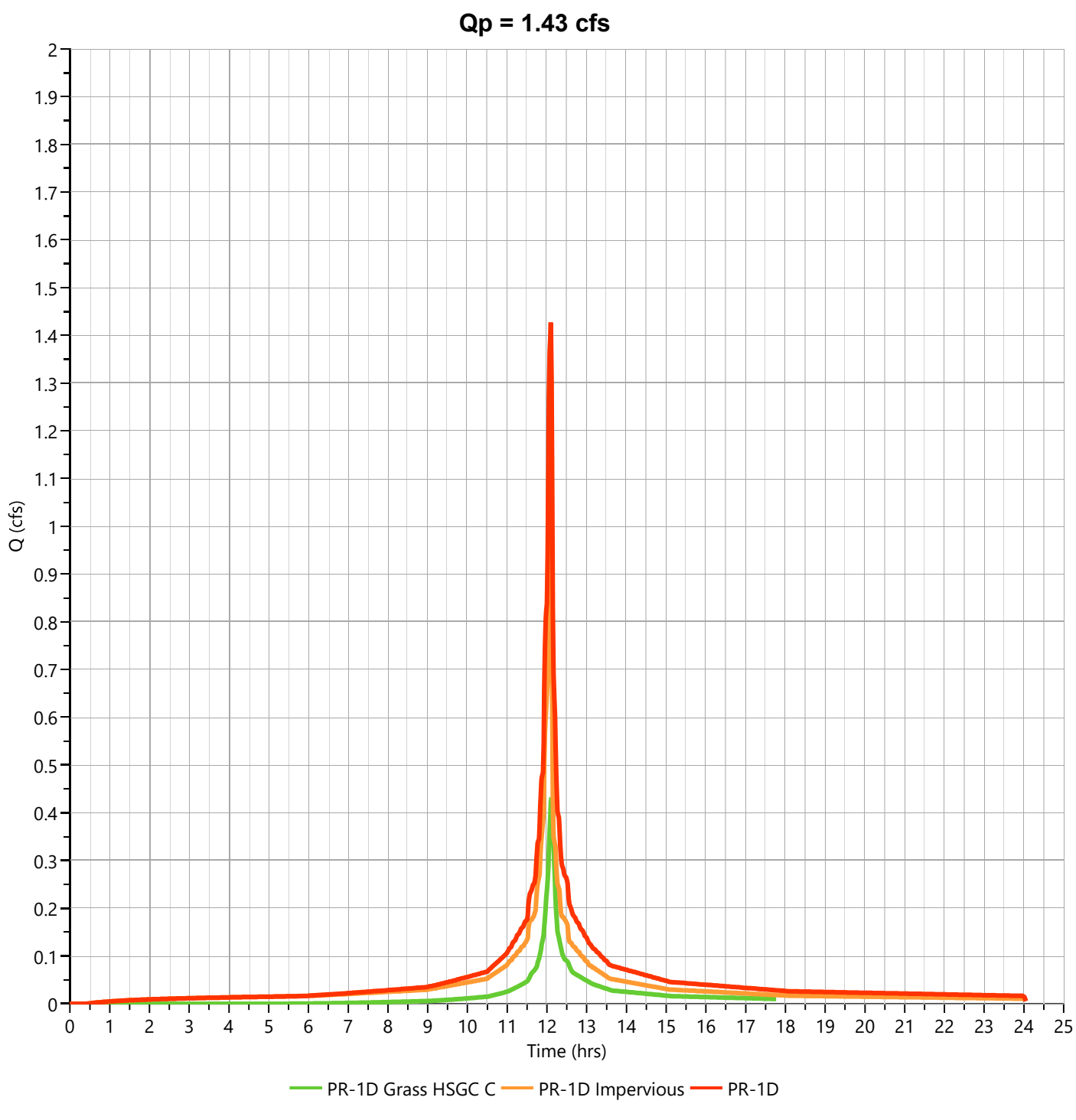
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D

Hyd. No. 16

Hydrograph Type	= Junction	Peak Flow	= 1.426 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 4,739 cuft
Inflow Hydrographs	= 14, 15	Total Contrib. Area	= 0.17 ac



PR-1D WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/6/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/6/2024**

Circle One: Present **(Developed)** — **Current Proposed Watershed PR-1D - Impervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		
1.	Surface Description (NEH table 15-1)		Smooth Surfaces		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	88		
4.	Two-year 24-hr rainfall, P_2	in	3.46		
5.	Land Slope, s	ft/ft	0.026		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	100		
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.016	+	+
				Sheet Flow Sub-Total	0.016 hours

Shallow Concentrated Flow		Segment ID	2		
8.	Surface Description		Pavement		
9.	Flow Length, L	ft	68		
10.	Watercourse Slope, s	ft/ft	0.064		
11.	Average Velocity, V (NEH table 15-3)	ft/s	5.15		
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.004	+	+
				Shallow Conc. Flow Sub-Total	0.004 hours

Channel Flow		Segment ID	3		
13.	Flow Length, L	ft	22		
14.	Cross Sectional flow area, a	ft^2	0.88		
15.	Wetted Perimeter, P_w	ft	2.40		
16.	Hydraulic Radius, r $r = a / P_w$	ft	0.37		
17.	Channel Slope, s	ft/ft	0.005		
18.	Manning's Roughness Coeff., n		0.012		
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	4.50		
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.001	+	+
				Channel Flow Sub-Total	0.001 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.021 hours
(Add Sub-Total T_t from prior steps)	Software Limitations Require Minimum Tc =	2 minutes

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/6/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/6/2024**

Circle One: Present **(Developed)** — **Current Proposed Watershed PR-1D - Pervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

			Segment ID	1		2		
1.	Surface Description (NEH table 15-1)			Dense Grasses		Smooth Surfaces		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.24		0.011		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)		ft	33		55		
4.	Two-year 24-hr rainfall, P_2		in	3.46		3.46		
5.	Land Slope, s		ft/ft	0.032		0.043		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft)	$L_{mcs} = (100\ s^{0.5})/n$	ft	74		100		
7.	Compute T_t	$T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.078	+	0.009	+	

Sheet Flow Sub-Total **0.087 hours**

Shallow Concentrated Flow

			Segment ID	3		4		5
8.	Surface Description			Pavement		Pavement		Pavement
9.	Flow Length, L		ft	17		30		10
10.	Watercourse Slope, s		ft/ft	0.058		0.083		0.040
11.	Average Velocity, V (NEH table 15-3)		ft/s	4.91		5.87		4.07
12.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.001	+	0.001	+	0.001

Shallow Conc. Flow Sub-Total **0.003 hours**

Channel Flow

			Segment ID	6				
13.	Flow Length, L		ft	22				
14.	Cross Sectional flow area, a		ft^2	0.88				
15.	Wetted Perimeter, P_w		ft	2.40				
16.	Hydraulic Radius, r	$r = a / P_w$	ft	0.37				
17.	Channel Slope, s		ft/ft	0.005				
18.	Manning's Roughness Coeff., n			0.012				
19.	Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	4.55				
20.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.001	+		+	

Channel Flow Sub-Total **0.001 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) = **0.091 hours**

Total Tc (minutes) = **5 minutes**

Hydrograph Report

Project Name:

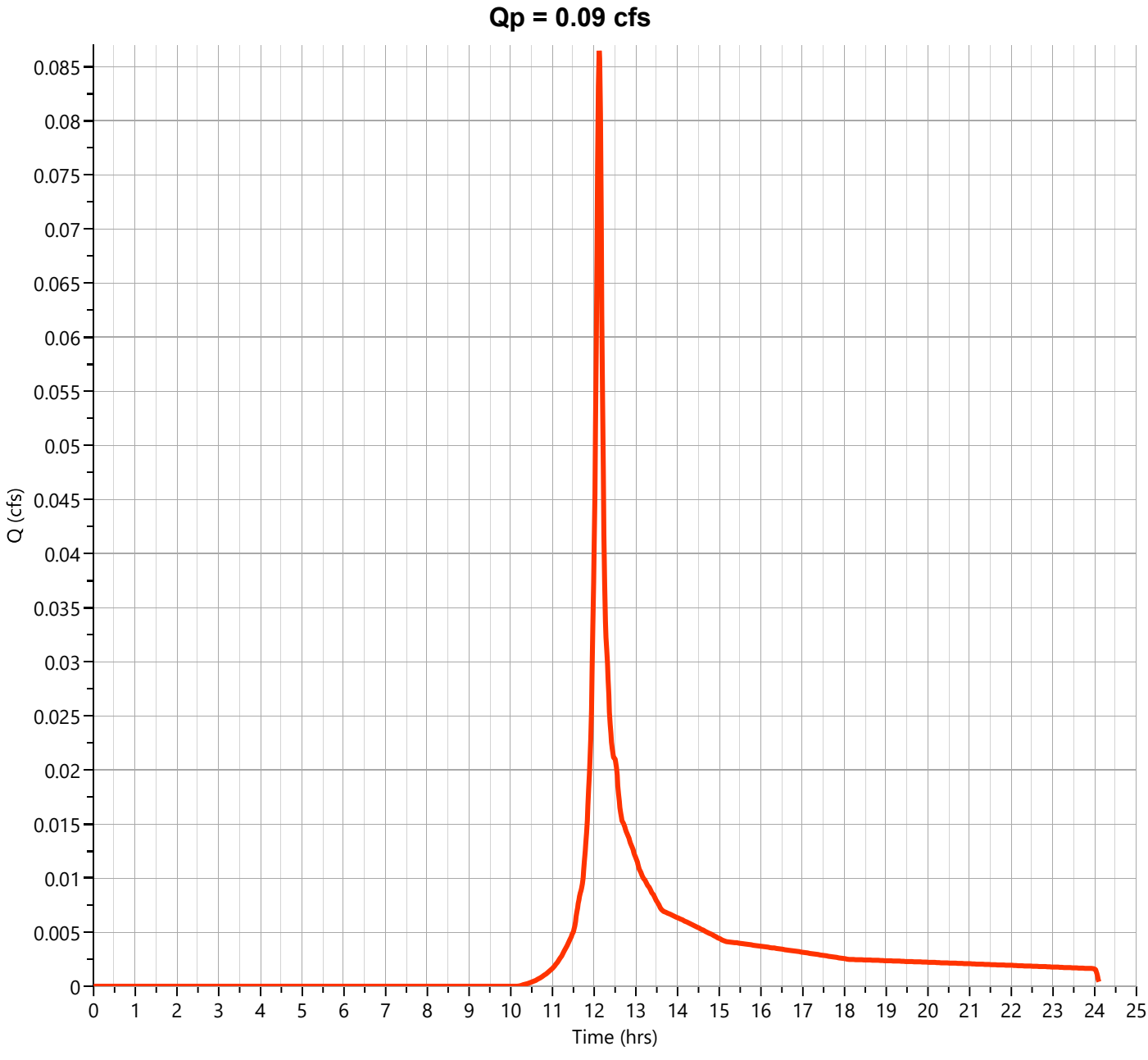
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D Grass HSGC C

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.086 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 272 cuft
Drainage Area	= 0.06 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

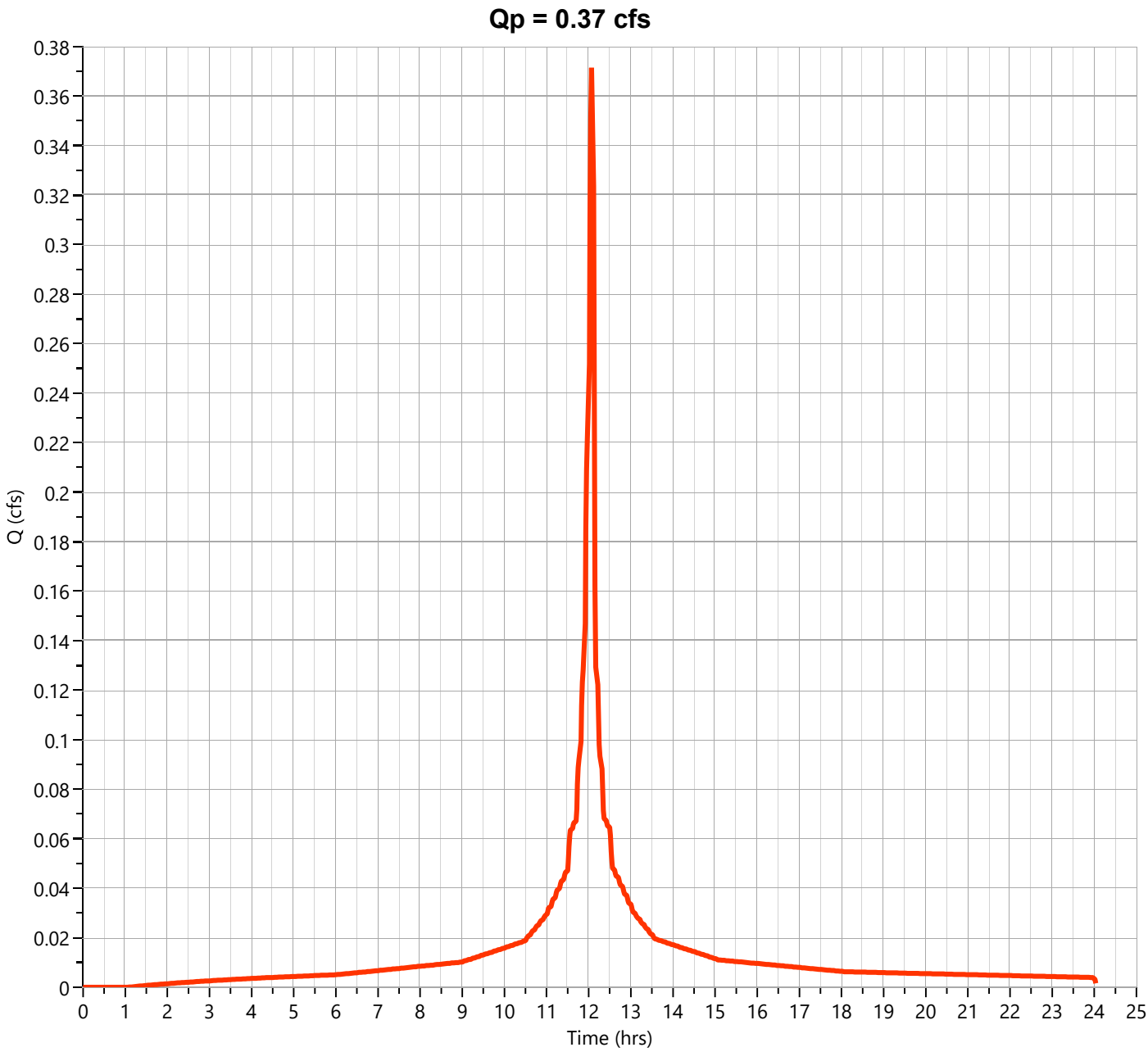
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D Impervious

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.372 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,208 cuft
Drainage Area	= 0.11 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

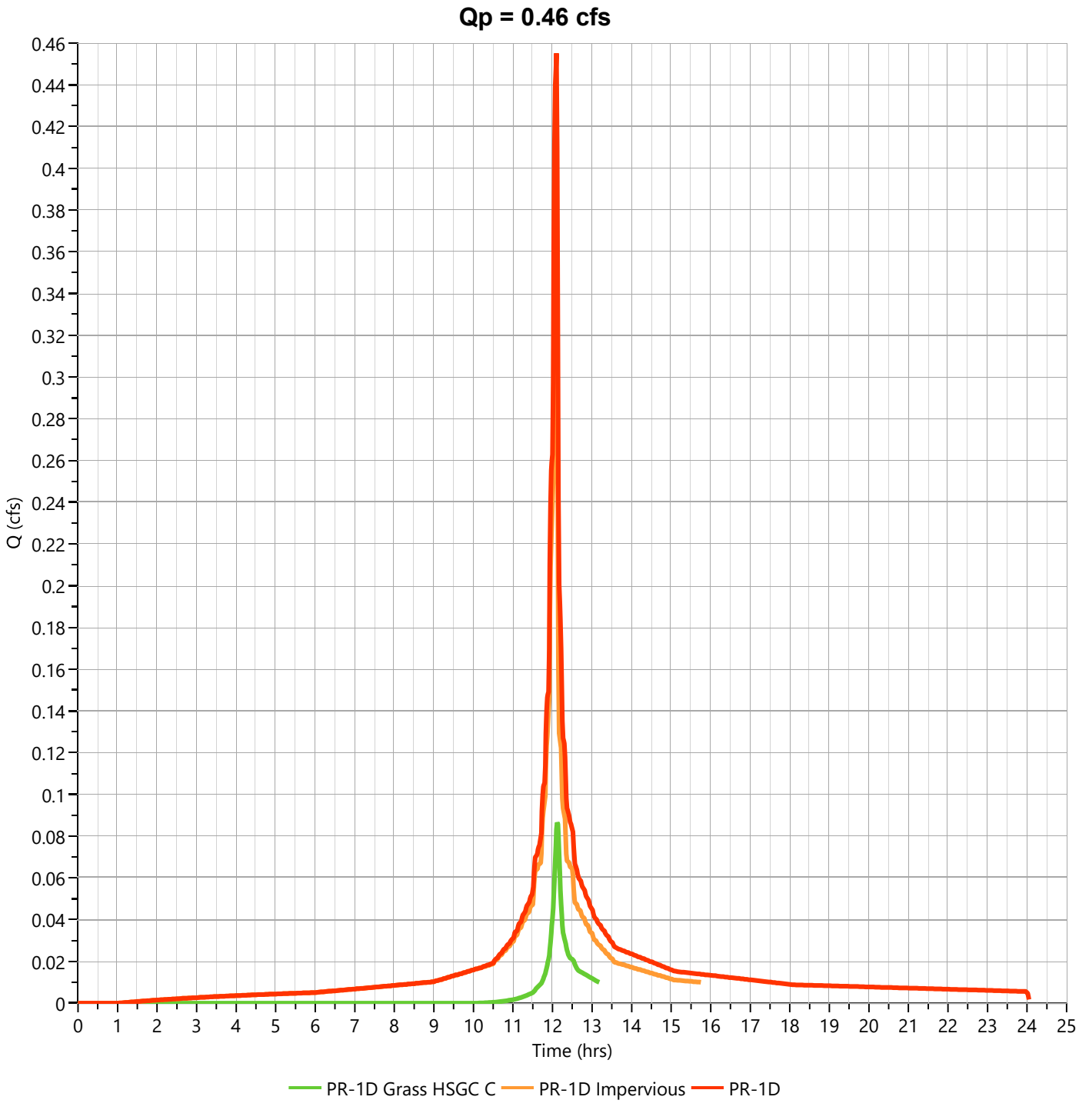
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D

Hyd. No. 16

Hydrograph Type	= Junction	Peak Flow	= 0.455 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,480 cuft
Inflow Hydrographs	= 14, 15	Total Contrib. Area	= 0.17 ac



Hydrograph Report

Project Name:

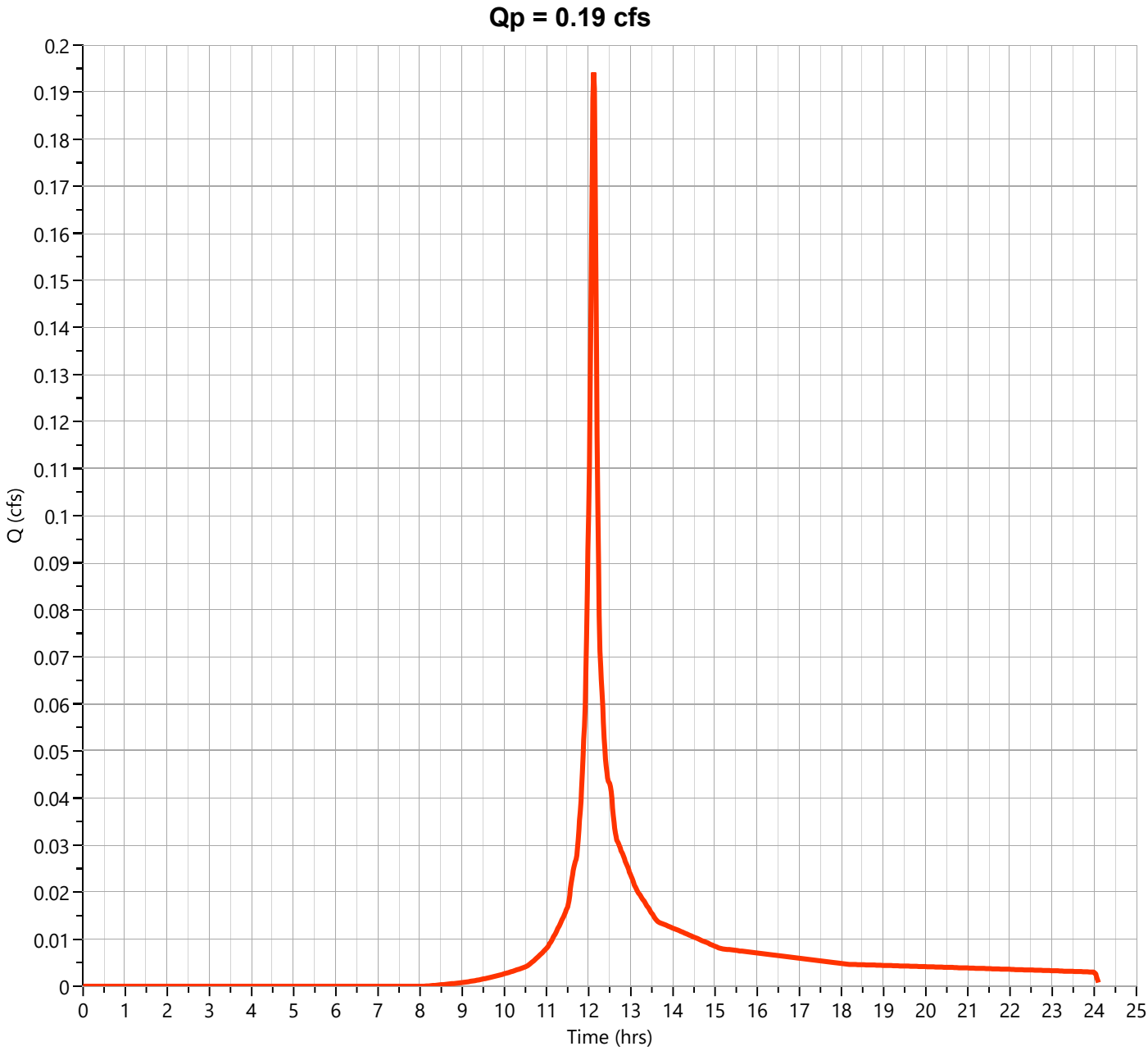
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D Grass HSGC C

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.194 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 600 cuft
Drainage Area	= 0.06 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

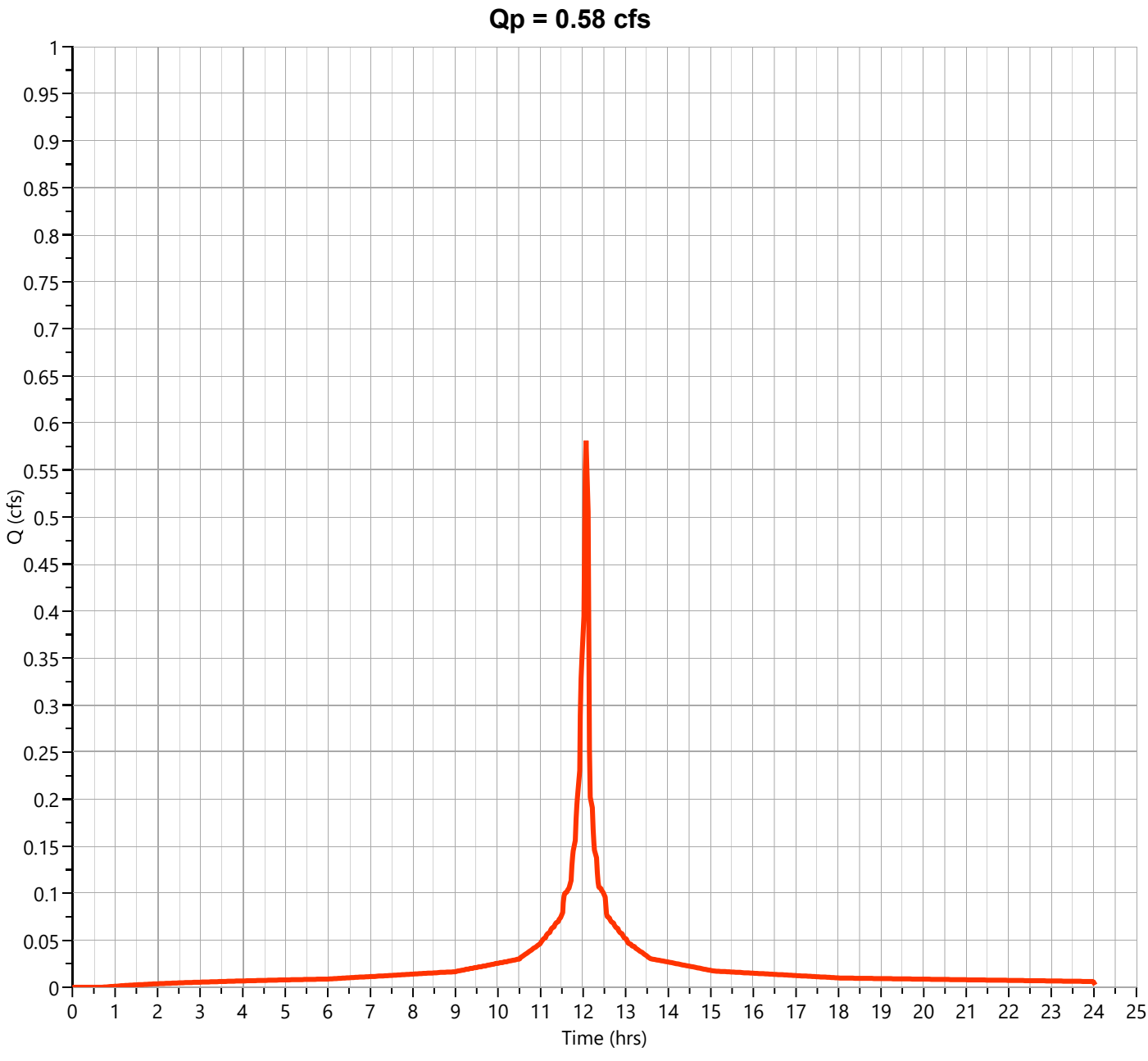
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D Impervious

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.581 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,925 cuft
Drainage Area	= 0.11 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

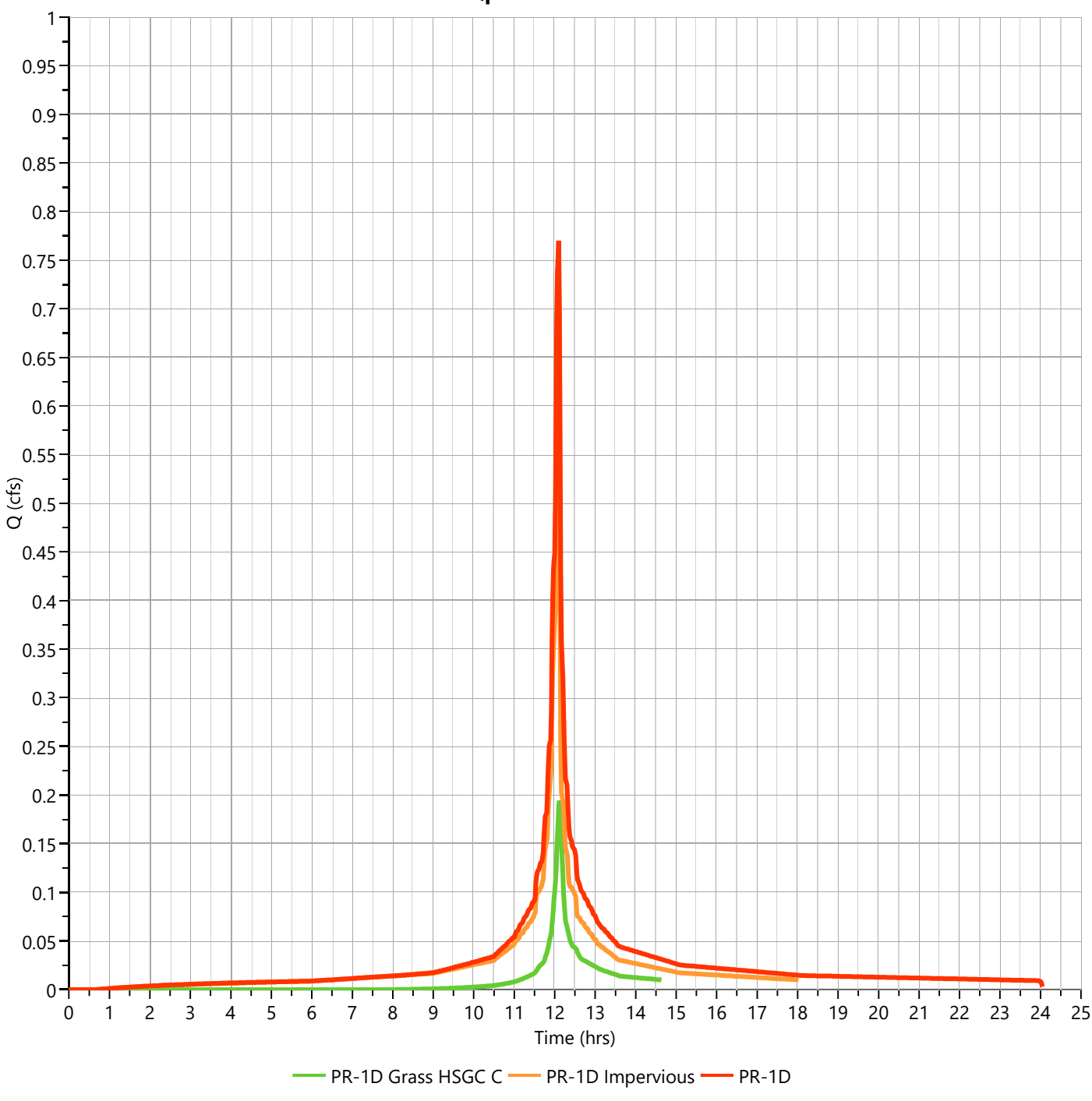
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D

Hyd. No. 16

Hydrograph Type	= Junction	Peak Flow	= 0.770 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,525 cuft
Inflow Hydrographs	= 14, 15	Total Contrib. Area	= 0.17 ac



Hydrograph Report

Project Name:

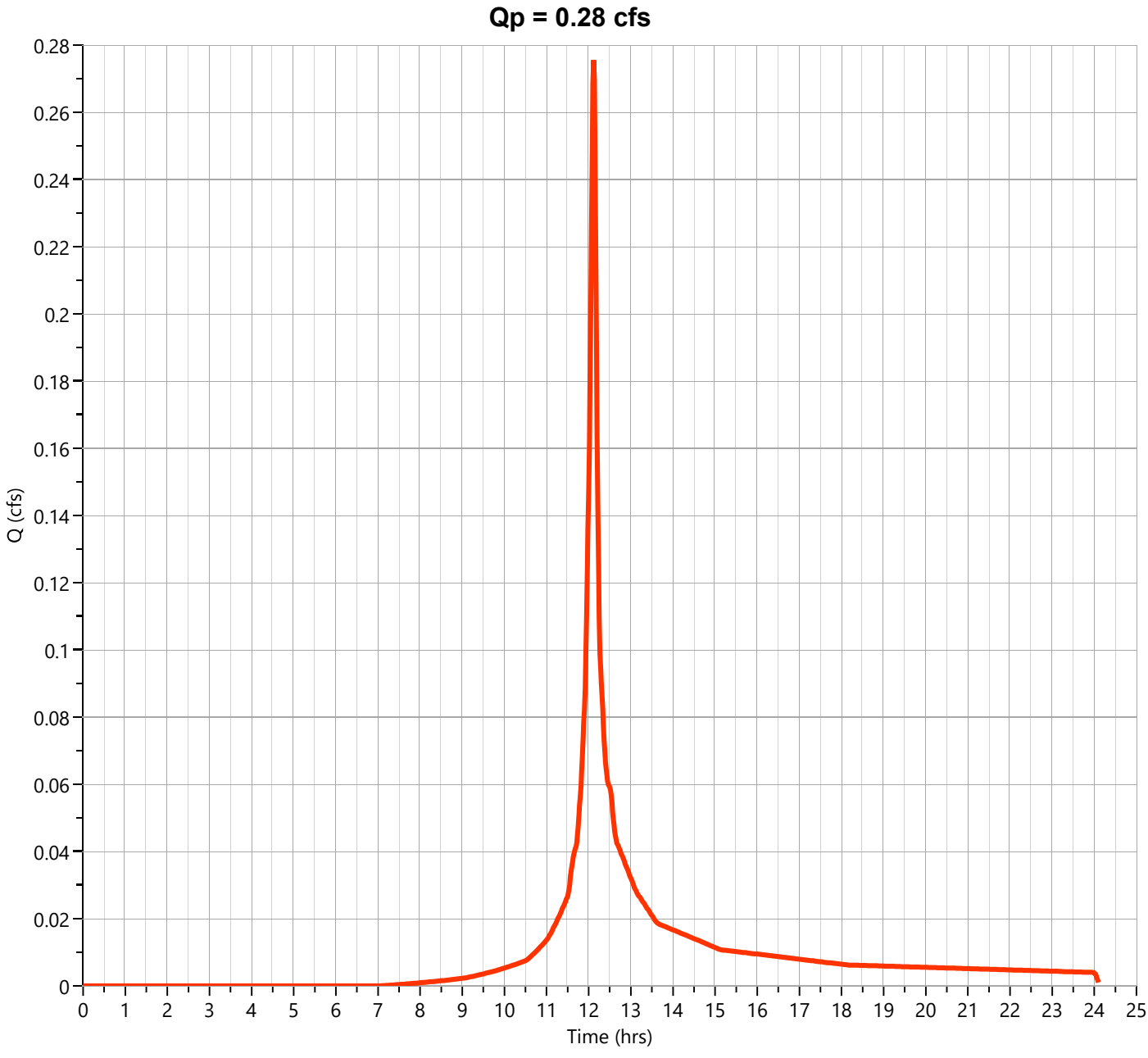
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D Grass HSGC C

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.275 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 855 cuft
Drainage Area	= 0.06 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

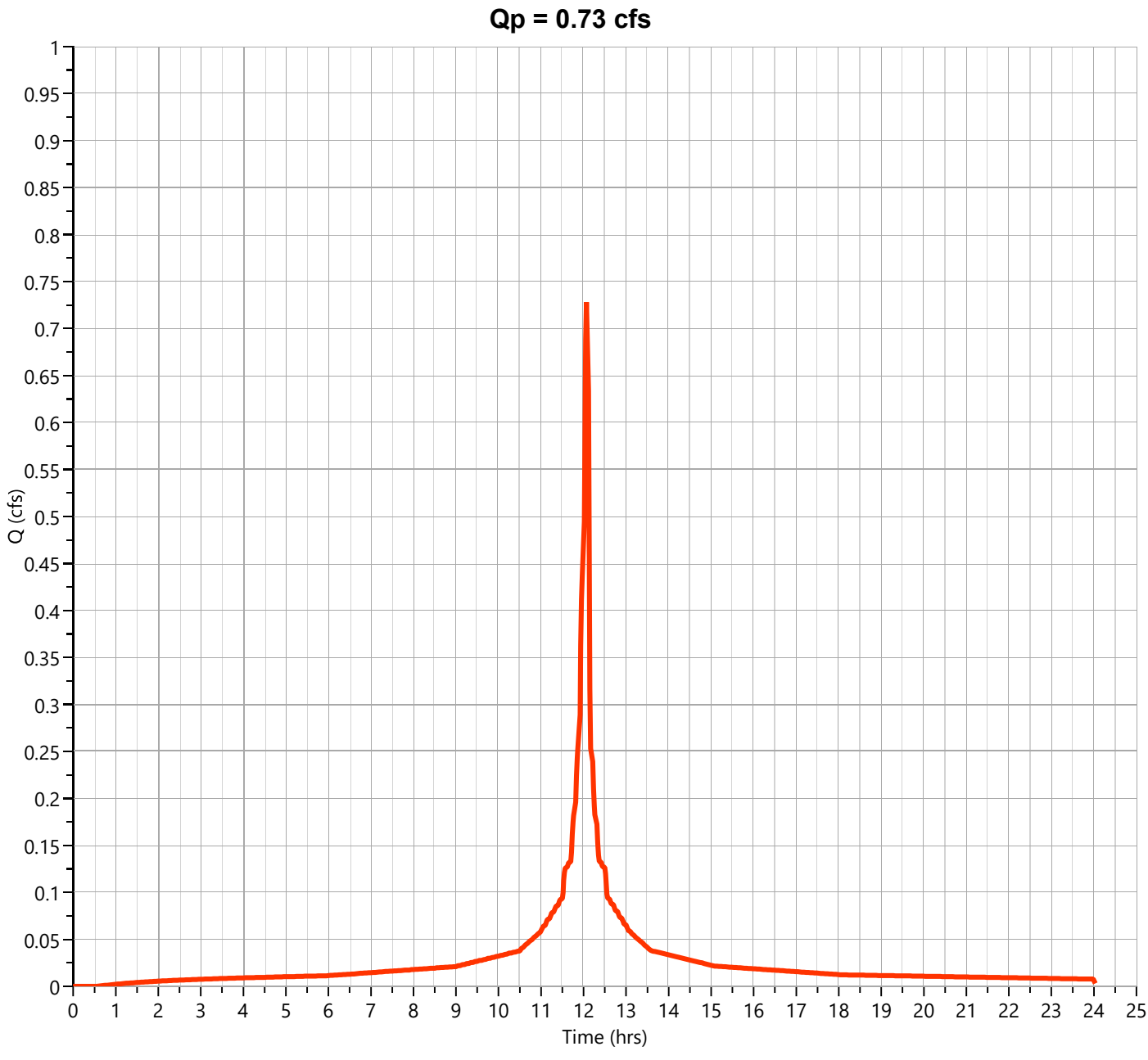
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D Impervious

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.728 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 2,430 cuft
Drainage Area	= 0.11 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

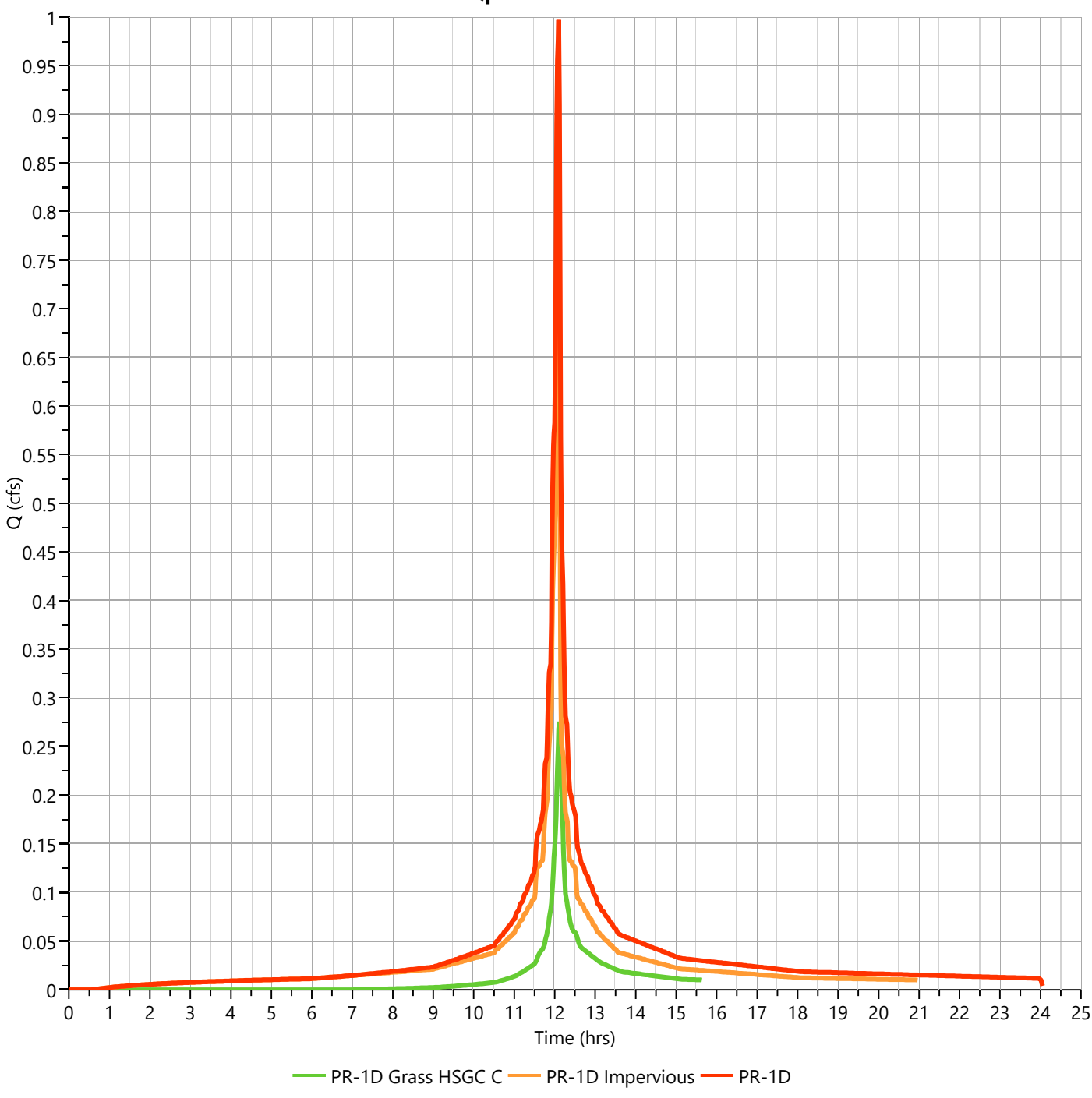
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D

Hyd. No. 16

Hydrograph Type	= Junction	Peak Flow	= 0.997 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 3,285 cuft
Inflow Hydrographs	= 14, 15	Total Contrib. Area	= 0.17 ac



Hydrograph Report

Project Name:

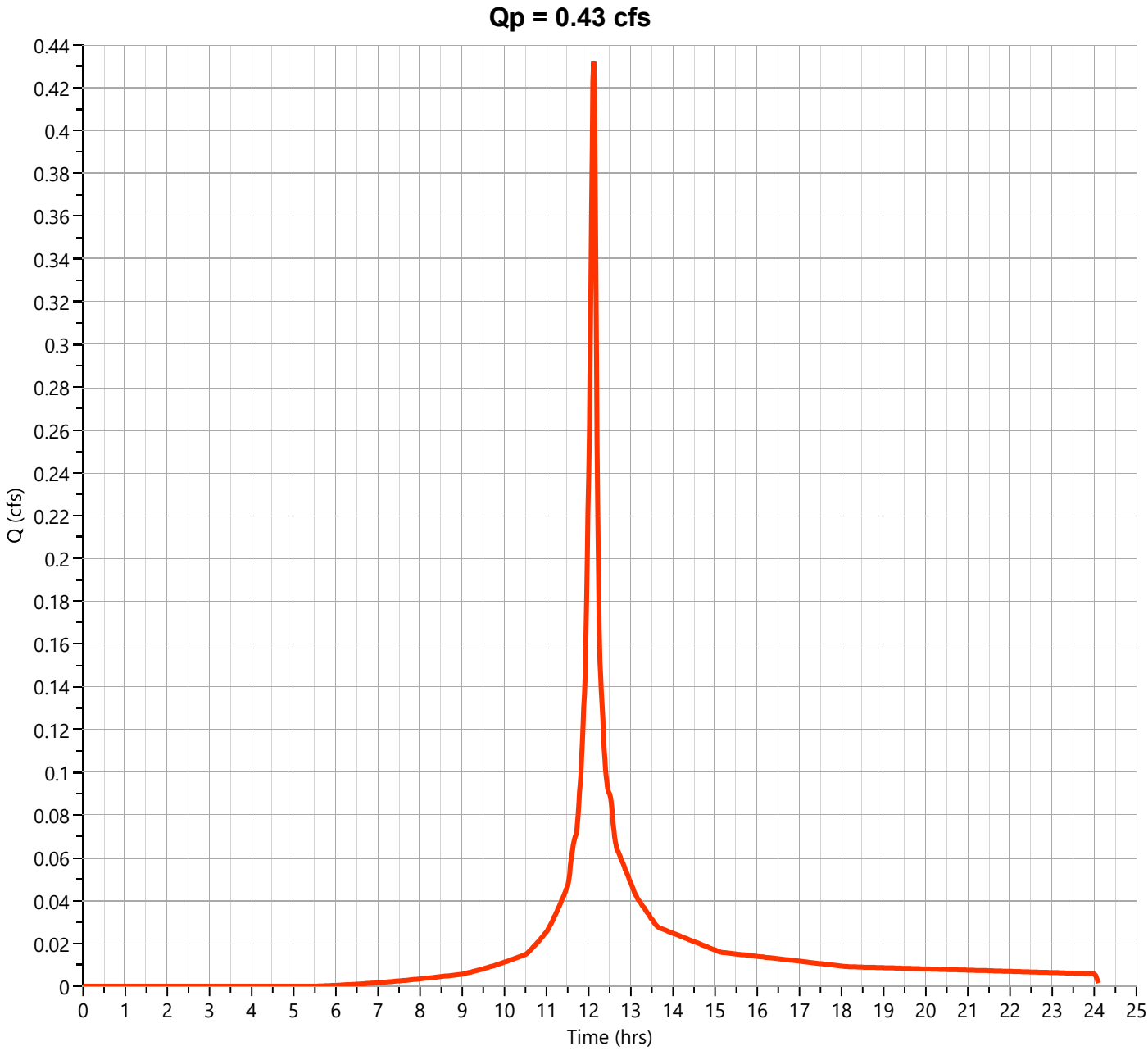
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D Grass HSGC C

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.432 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 1,363 cuft
Drainage Area	= 0.06 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

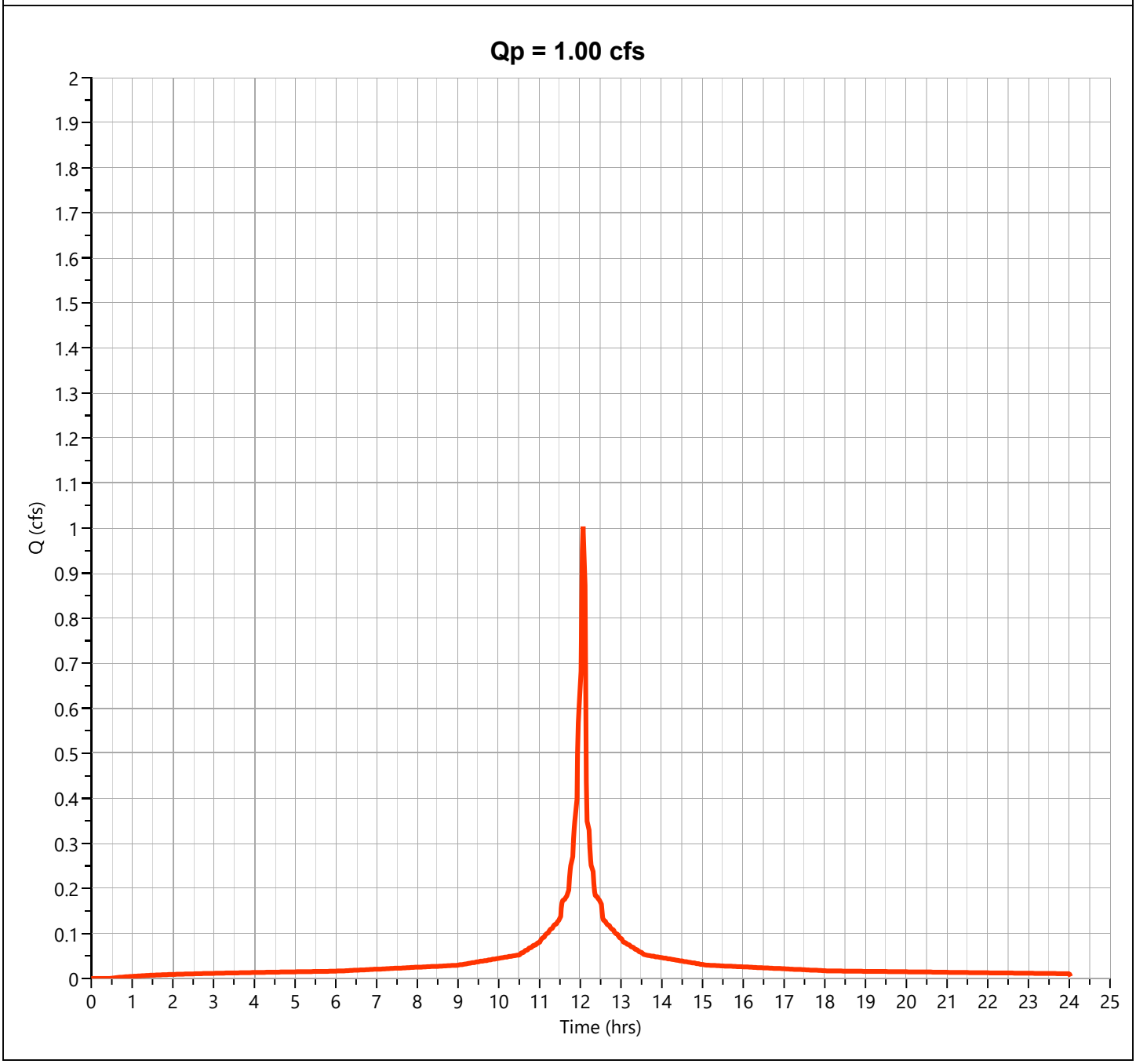
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D Impervious

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.003 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 3,376 cuft
Drainage Area	= 0.11 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

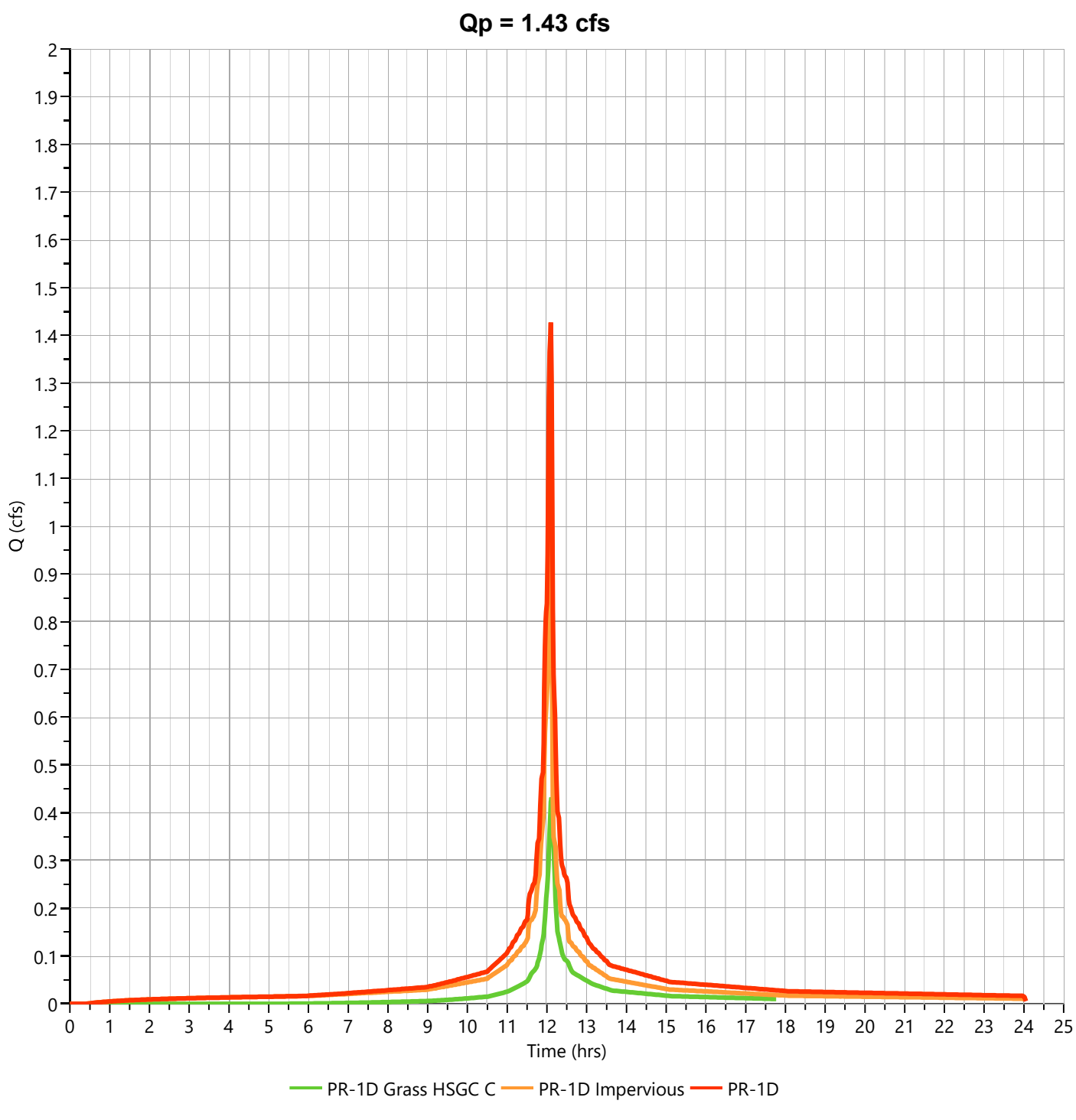
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D

Hyd. No. 16

Hydrograph Type	= Junction	Peak Flow	= 1.426 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 4,739 cuft
Inflow Hydrographs	= 14, 15	Total Contrib. Area	= 0.17 ac



COMBINED PROPOSED FLOW TO UDG-INF1-2 WATERSHED

Hydrograph Report

Project Name:

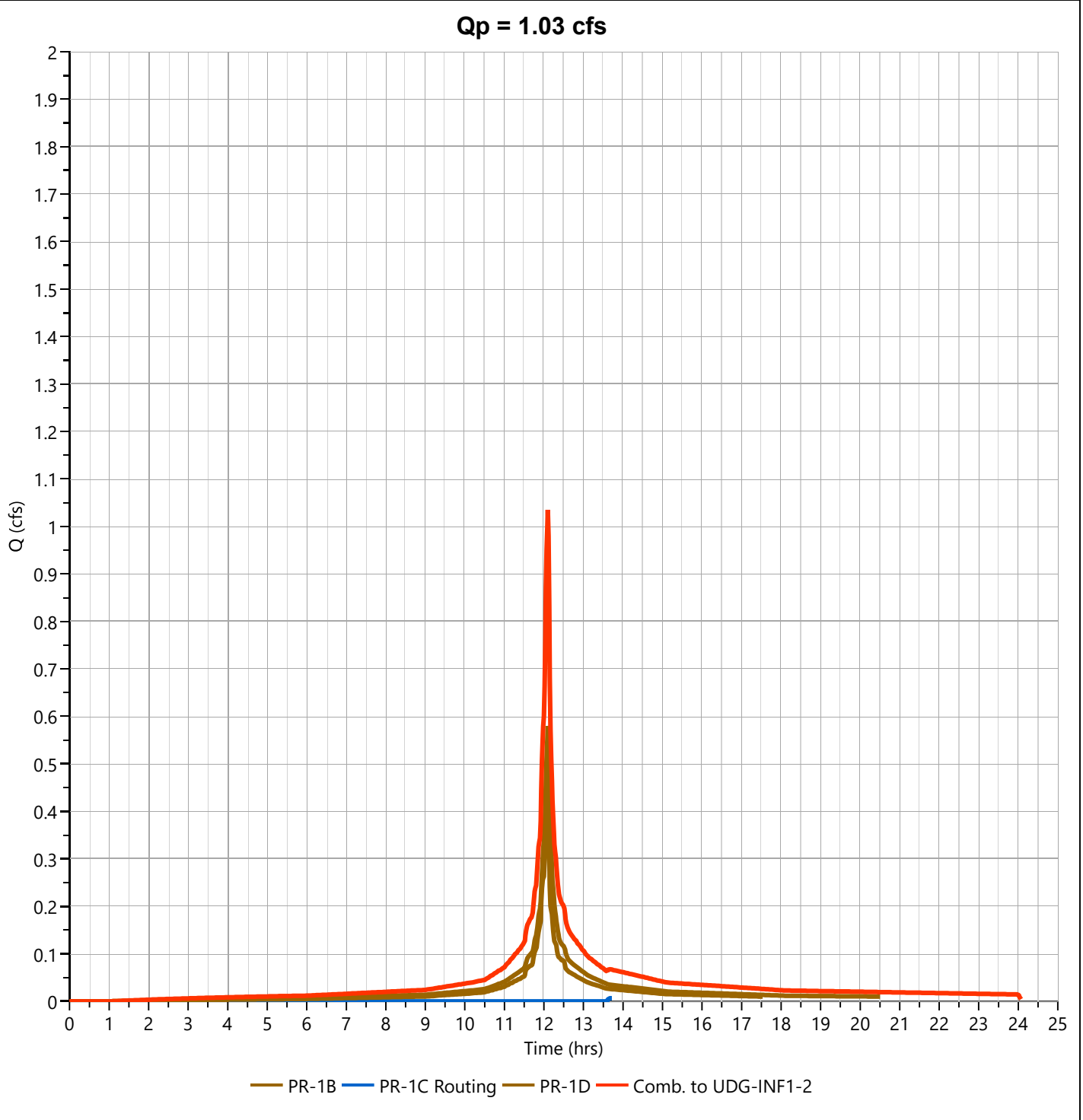
Hydrology Studio v 3.0.0.31

02-08-2024

Comb. to UDG-INF1-2

Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 1.035 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 3,574 cuft
Inflow Hydrographs	= 6, 11, 16	Total Contrib. Area	= 0.39 ac



Hydrograph Report

Project Name:

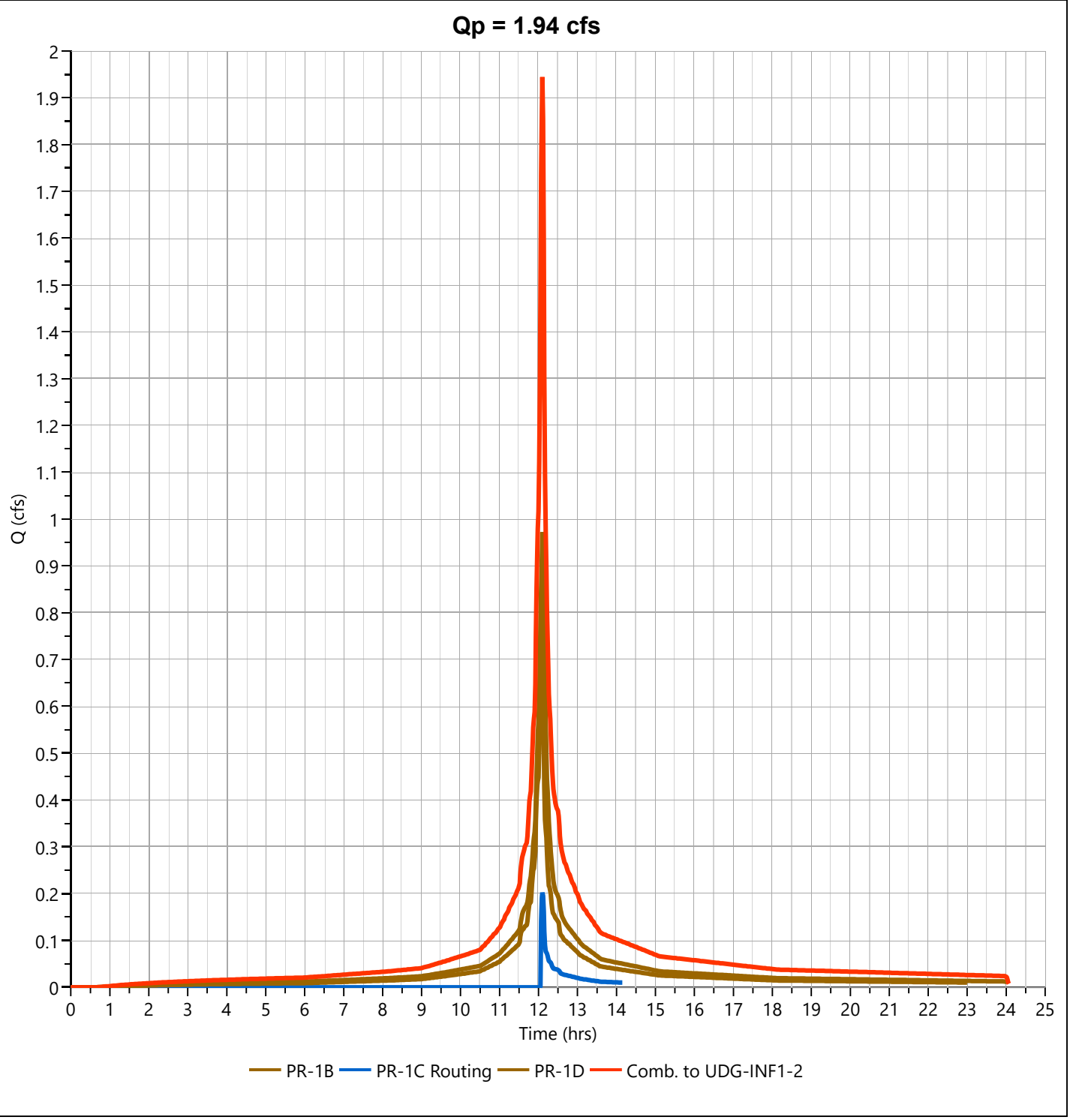
Hydrology Studio v 3.0.0.31

02-08-2024

Comb. to UDG-INF1-2

Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 1.944 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 6,295 cuft
Inflow Hydrographs	= 6, 11, 16	Total Contrib. Area	= 0.39 ac



Hydrograph Report

Project Name:

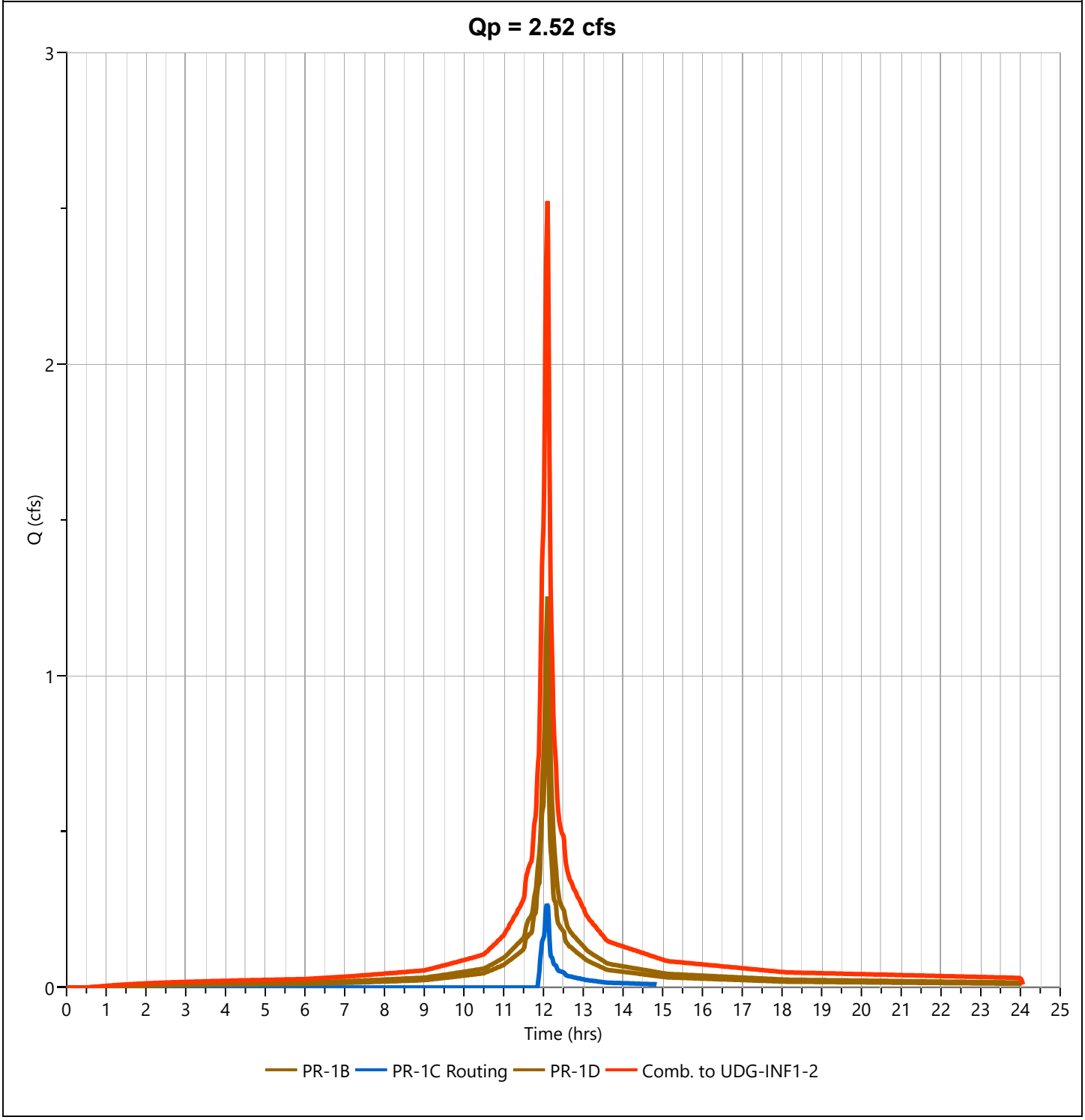
Hydrology Studio v 3.0.0.31

02-08-2024

Comb. to UDG-INF1-2

Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 2.522 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 8,278 cuft
Inflow Hydrographs	= 6, 11, 16	Total Contrib. Area	= 0.39 ac



Hydrograph Report

Project Name:

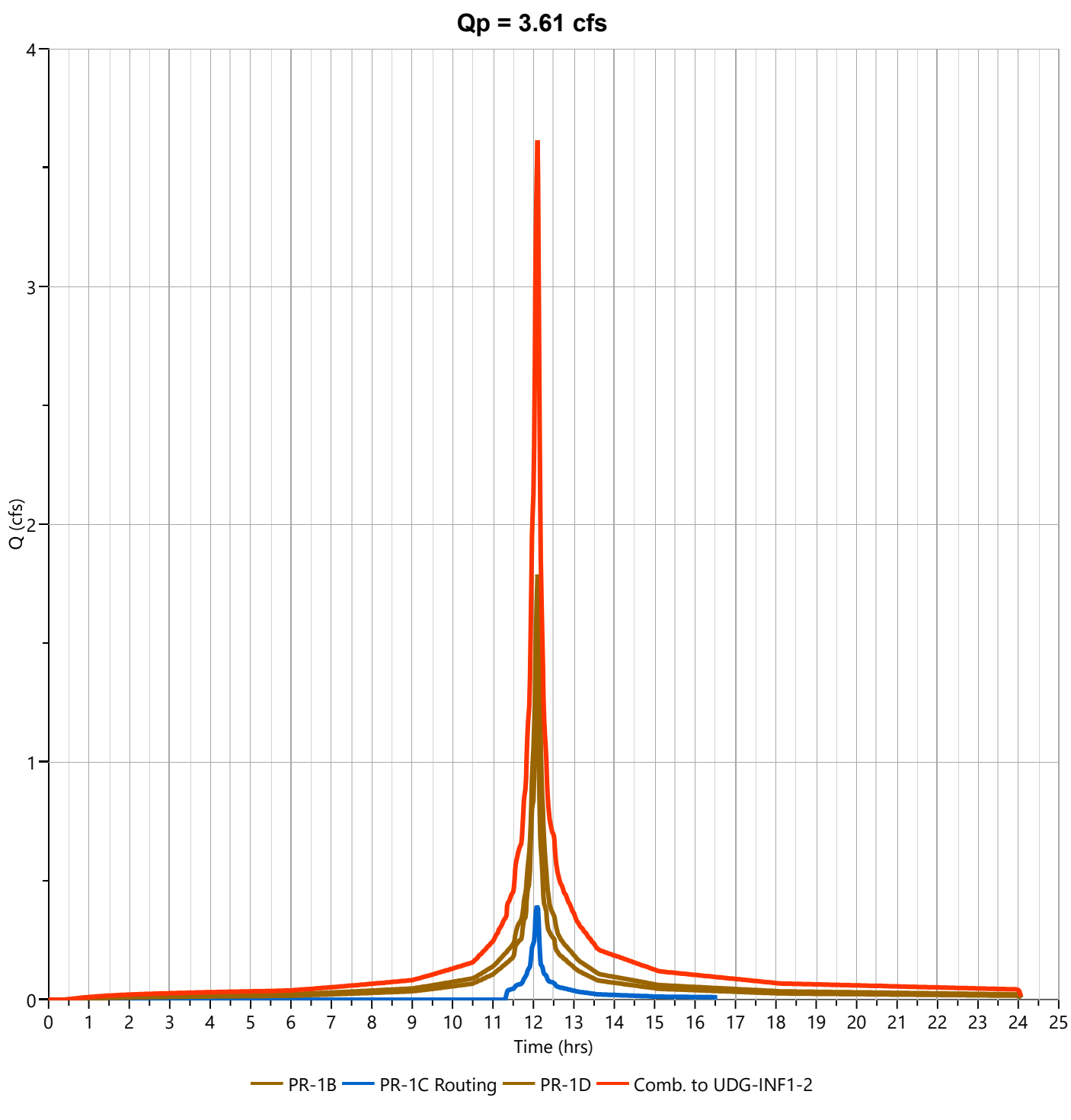
Hydrology Studio v 3.0.0.31

02-08-2024

Comb. to UDG-INF1-2

Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 3.614 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 12,076 cuft
Inflow Hydrographs	= 6, 11, 16	Total Contrib. Area	= 0.39 ac



PR-1E WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/6/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/6/2024**

Circle One: Present **(Developed)** — **Current Proposed Watershed PR-1E - Impervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		2		3
1.	Surface Description (NEH table 15-1)		Smooth Surfaces		Dense Grasses		Smooth Surfaces
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011		0.24		0.011
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	18		29		47
4.	Two-year 24-hr rainfall, P_2	in	3.46		3.46		3.46
5.	Land Slope, s	ft/ft	0.049		0.114		0.073
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	100		100		100
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.003	+	0.042	+	0.006
					Sheet Flow Sub-Total		0.051 hours

Shallow Concentrated Flow		Segment ID	4				
8.	Surface Description		Pavement				
9.	Flow Length, L	ft	187				
10.	Watercourse Slope, s	ft/ft	0.053				
11.	Average Velocity, V (NEH table 15-3)	ft/s	4.67				
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.011	+		+	
					Shallow Conc. Flow Sub-Total		0.011 hours

Channel Flow		Segment ID					
13.	Flow Length, L	ft					
14.	Cross Sectional flow area, a	ft^2					
15.	Wetted Perimeter, P_w	ft					
16.	Hydraulic Radius, r $r = a / P_w$	ft					
17.	Channel Slope, s	ft/ft					
18.	Manning's Roughness Coeff., n						
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s					
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+		+	
					Channel Flow Sub-Total		0.000 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.063 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	4 minutes

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: Present **Developed** — **Current Proposed Watershed PR-1E - Pervious**

Circle One: **T_c** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		2		3
1.	Surface Description (NEH table 15-1)		Dense Grasses		Smooth Surfaces		Dense Grasses
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.24		0.011		0.24
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	19		10		35
4.	Two-year 24-hr rainfall, P_2	in	3.46		3.46		3.46
5.	Land Slope, s	ft/ft	0.053		0.026		0.217
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	96		100		100
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.041	+	0.003	+	0.038
					Sheet Flow Sub-Total		0.082 hours

Shallow Concentrated Flow		Segment ID	4				
8.	Surface Description		Pavement				
9.	Flow Length, L	ft	110				
10.	Watercourse Slope, s	ft/ft	0.058				
11.	Average Velocity, V (NEH table 15-3)	ft/s	4.90				
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.006	+		+	
					Shallow Conc. Flow Sub-Total		0.006 hours

Channel Flow		Segment ID					
13.	Flow Length, L	ft					
14.	Cross Sectional flow area, a	ft^2					
15.	Wetted Perimeter, P_w	ft					
16.	Hydraulic Radius, r $r = a / P_w$	ft					
17.	Channel Slope, s	ft/ft					
18.	Manning's Roughness Coeff., n						
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s					
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+		+	
					Channel Flow Sub-Total		0.000 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.088 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	5 minutes

Hydrograph Report

Project Name:

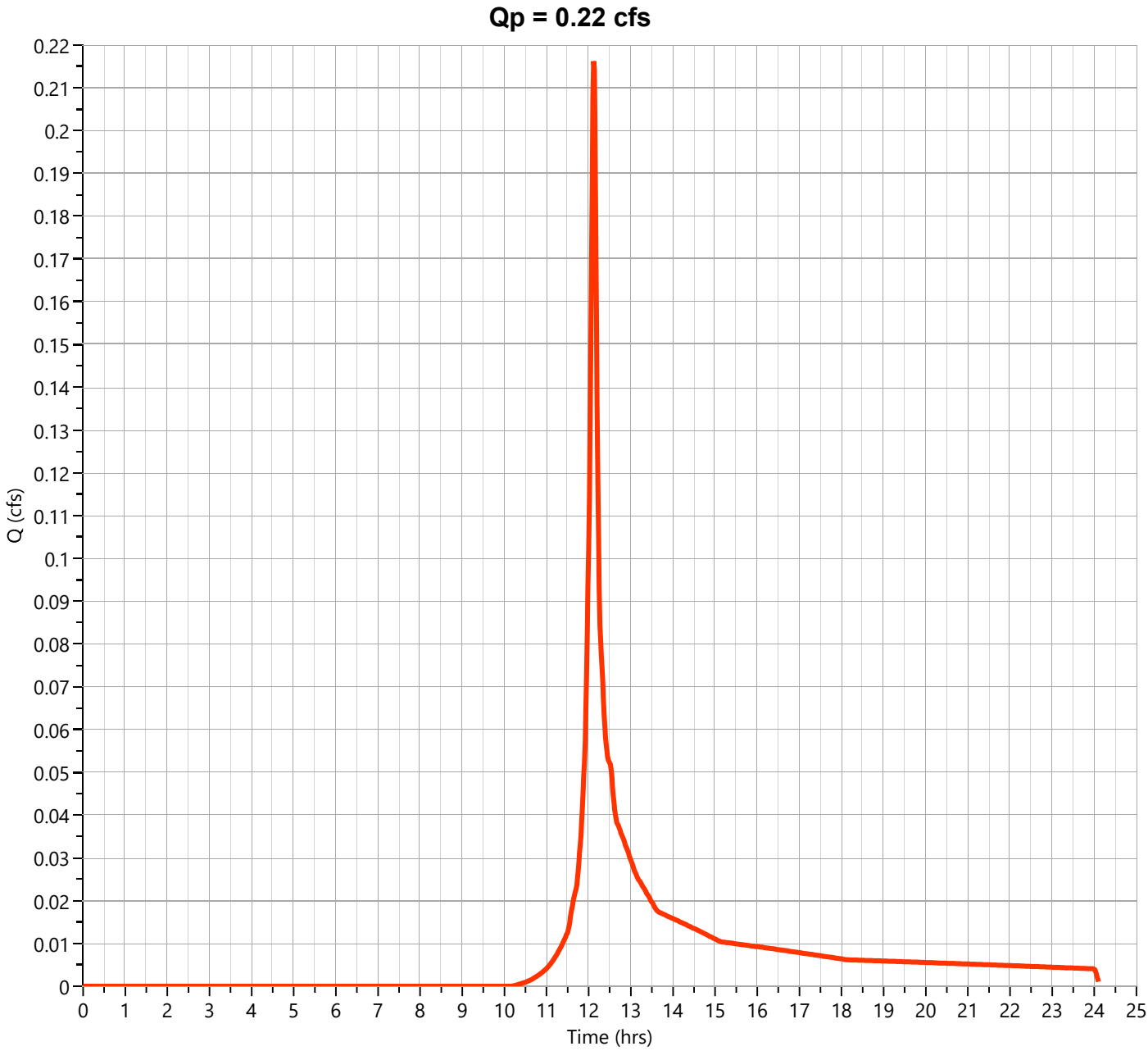
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1E Grass HSGC C

Hyd. No. 22

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.216 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 681 cuft
Drainage Area	= 0.15 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

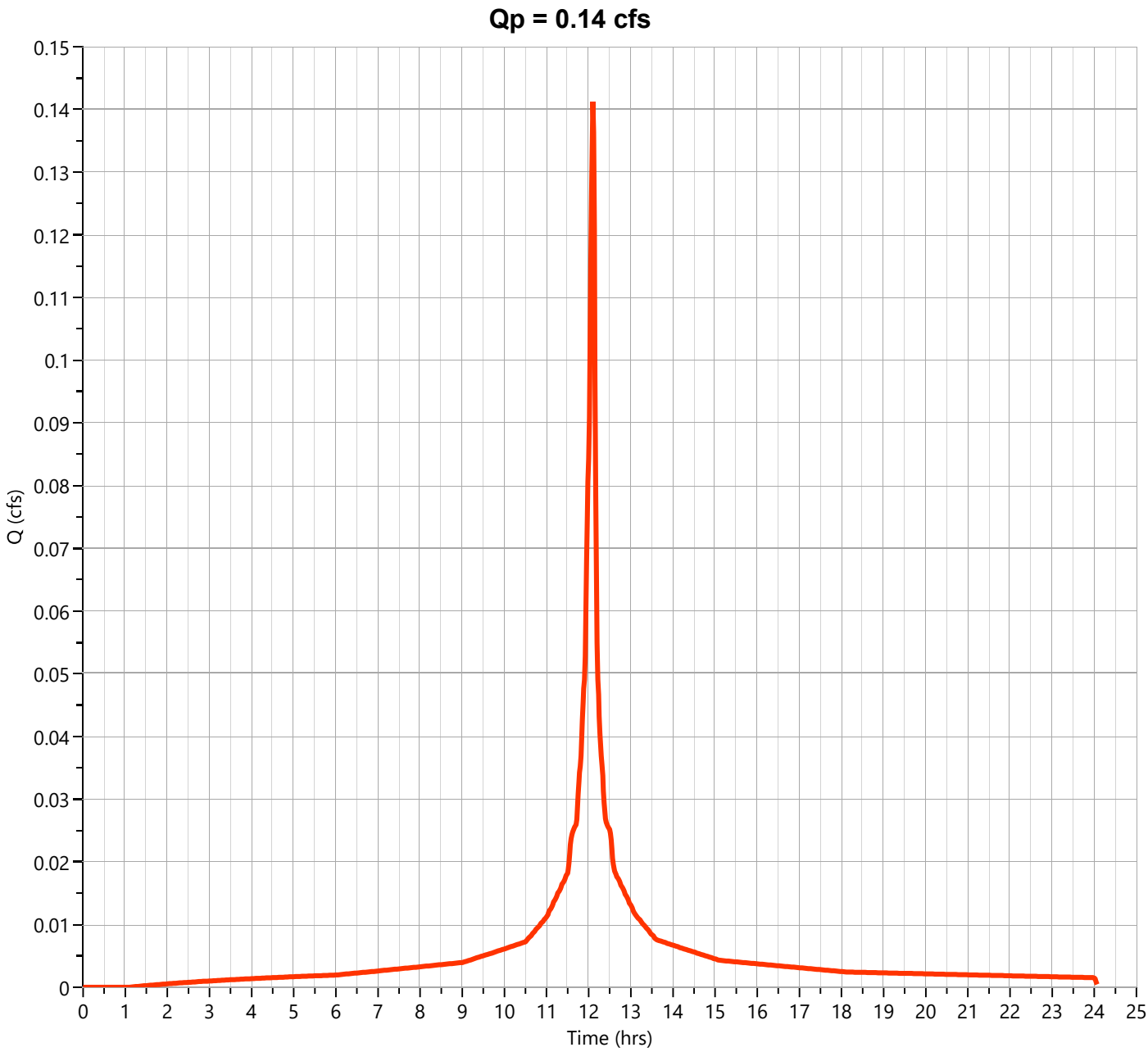
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1E Impervious

Hyd. No. 23

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.141 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 469 cuft
Drainage Area	= 0.04 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

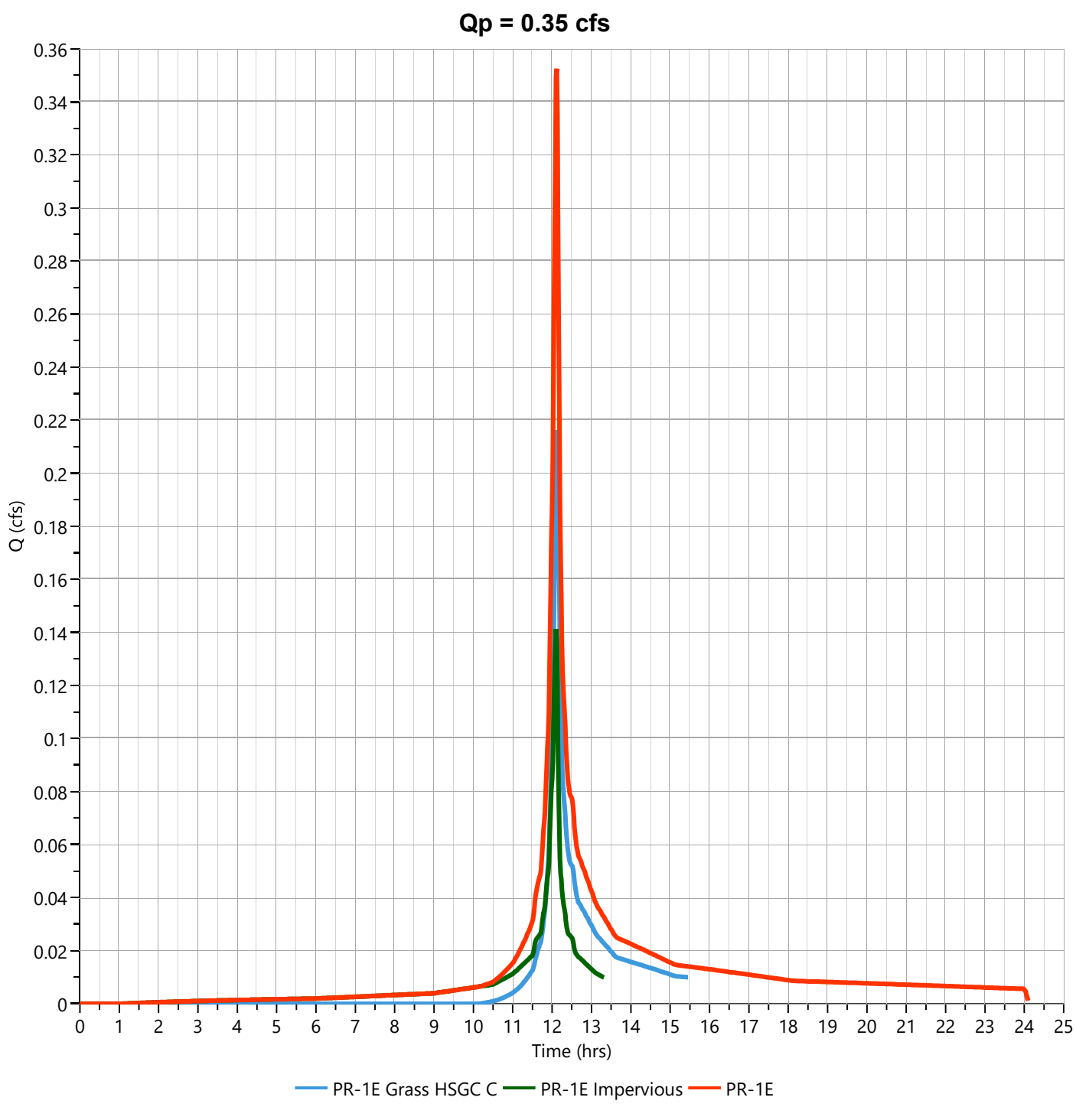
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1E

Hyd. No. 24

Hydrograph Type	= Junction	Peak Flow	= 0.353 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,149 cuft
Inflow Hydrographs	= 22, 23	Total Contrib. Area	= 0.19 ac



Hydrograph Report

Project Name:

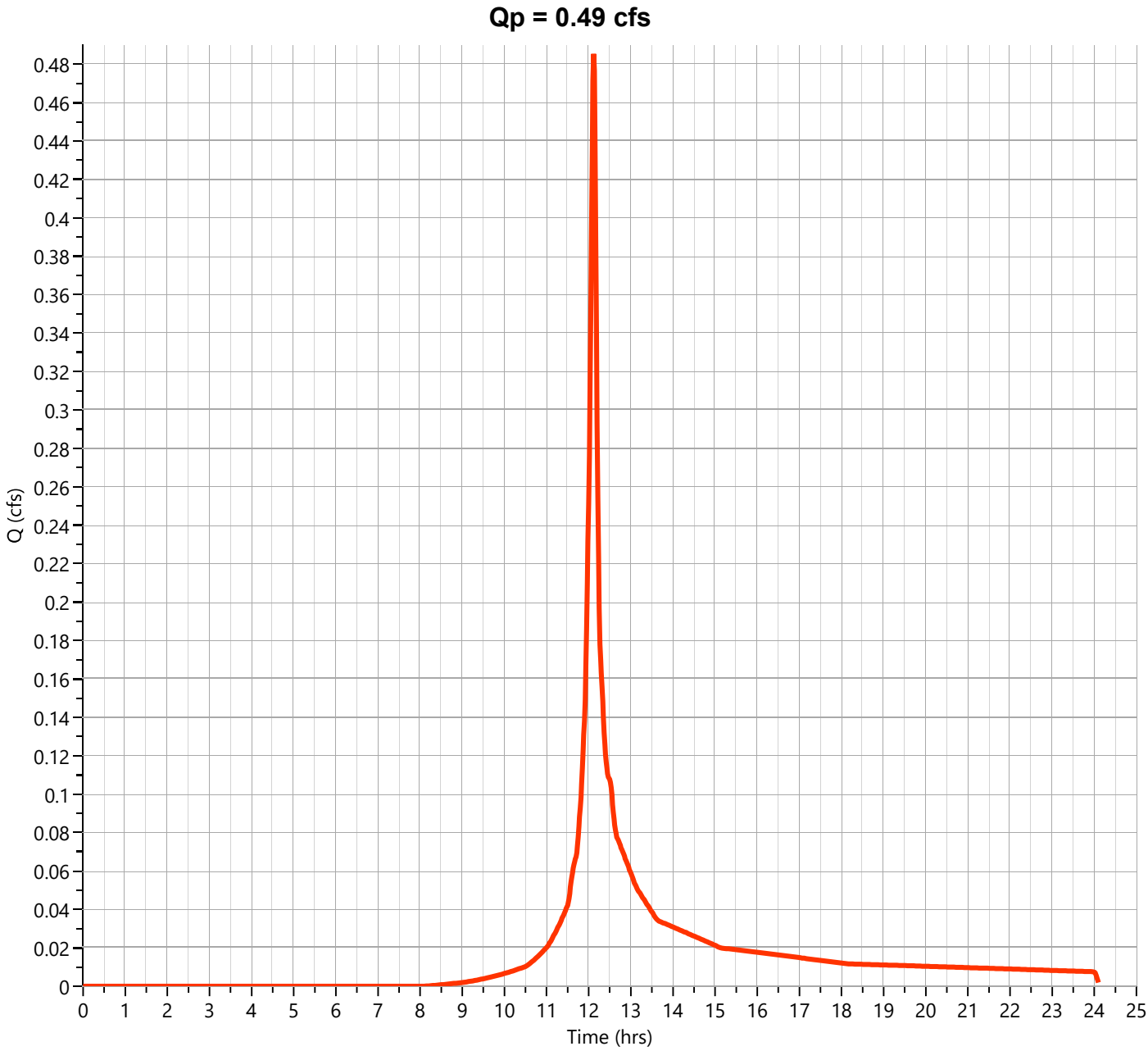
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1E Grass HSGC C

Hyd. No. 22

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.485 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 1,500 cuft
Drainage Area	= 0.15 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

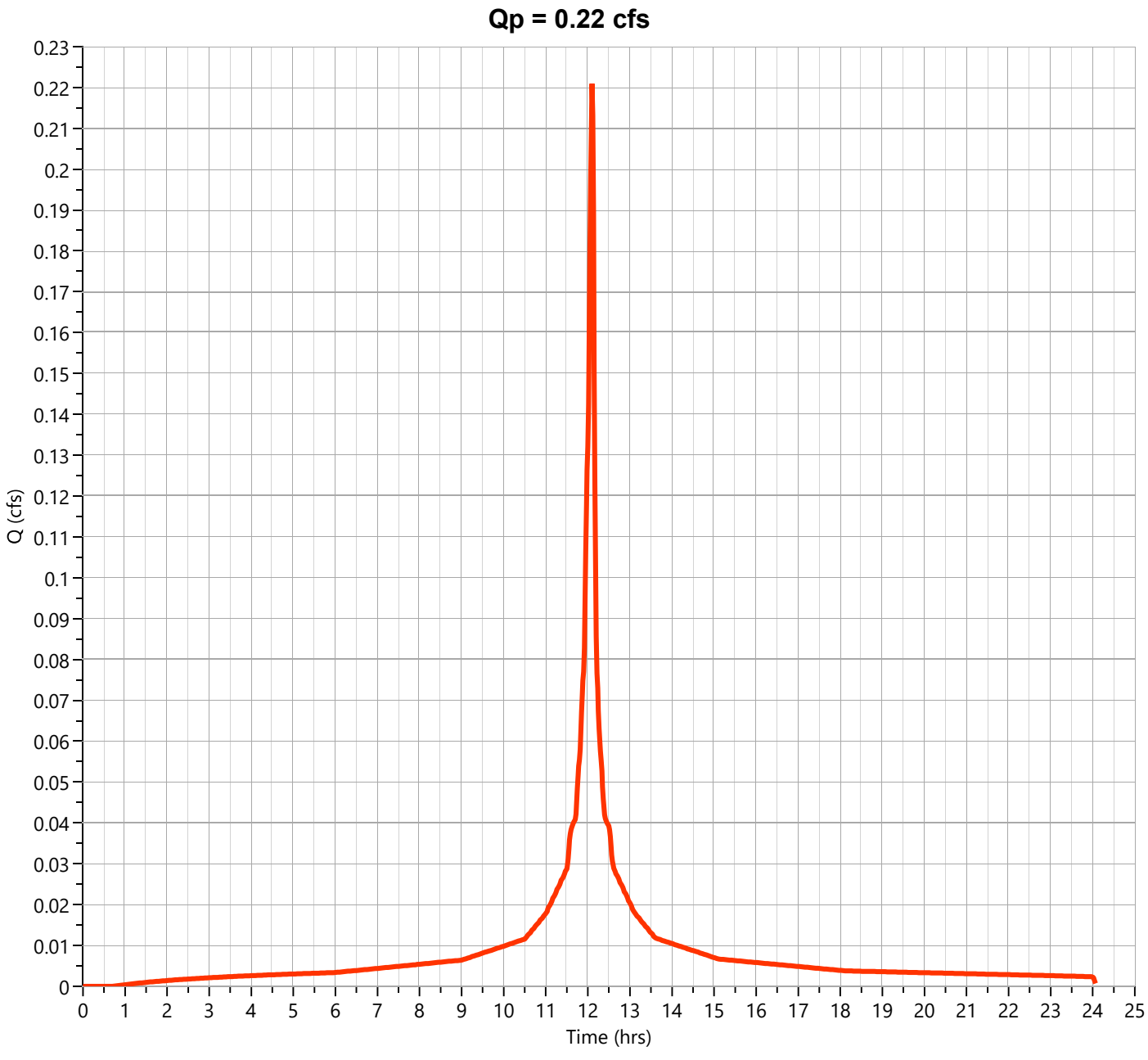
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1E Impervious

Hyd. No. 23

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.221 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 747 cuft
Drainage Area	= 0.04 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

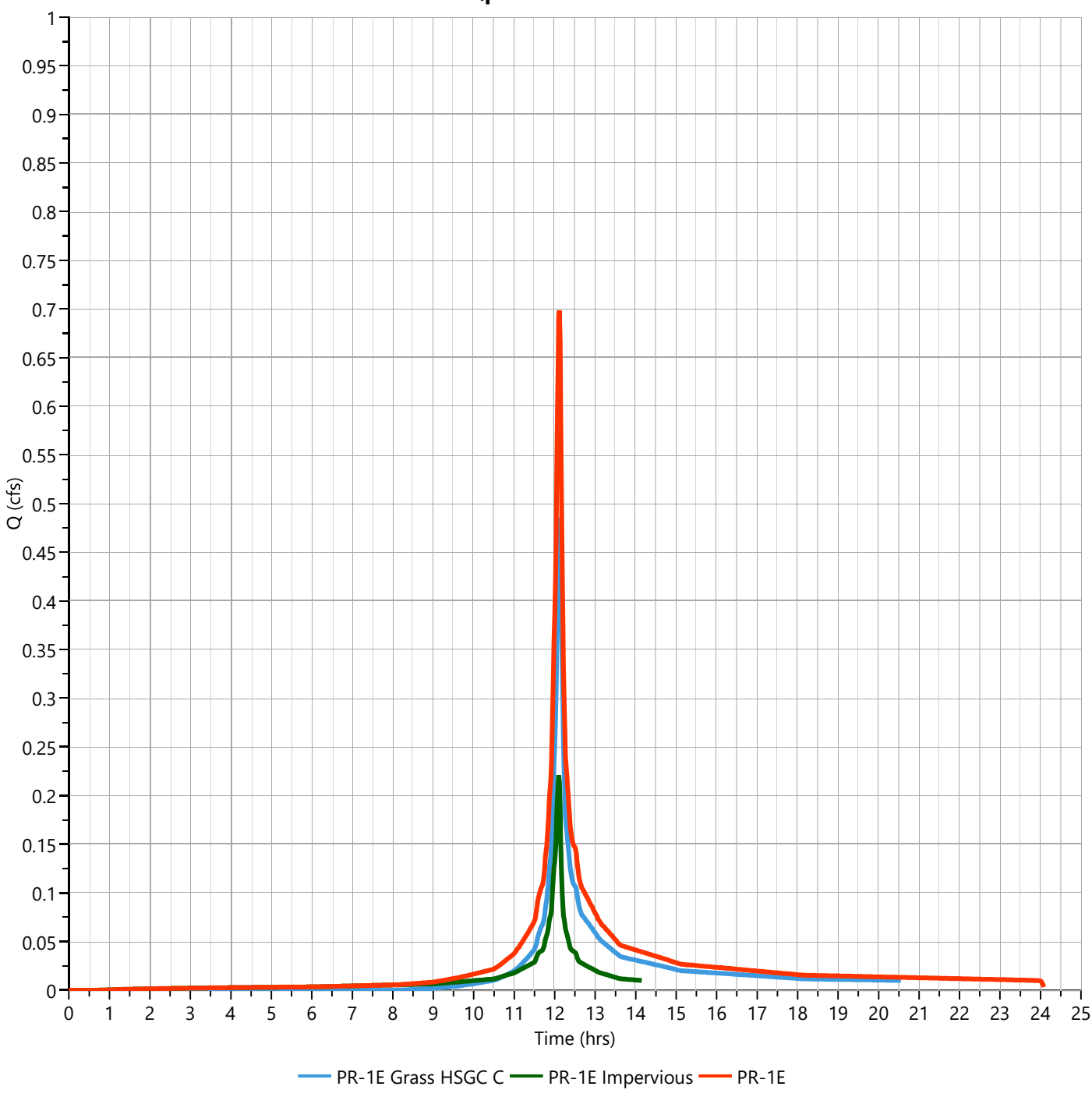
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1E

Hyd. No. 24

Hydrograph Type	= Junction	Peak Flow	= 0.699 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,246 cuft
Inflow Hydrographs	= 22, 23	Total Contrib. Area	= 0.19 ac



Hydrograph Report

Project Name:

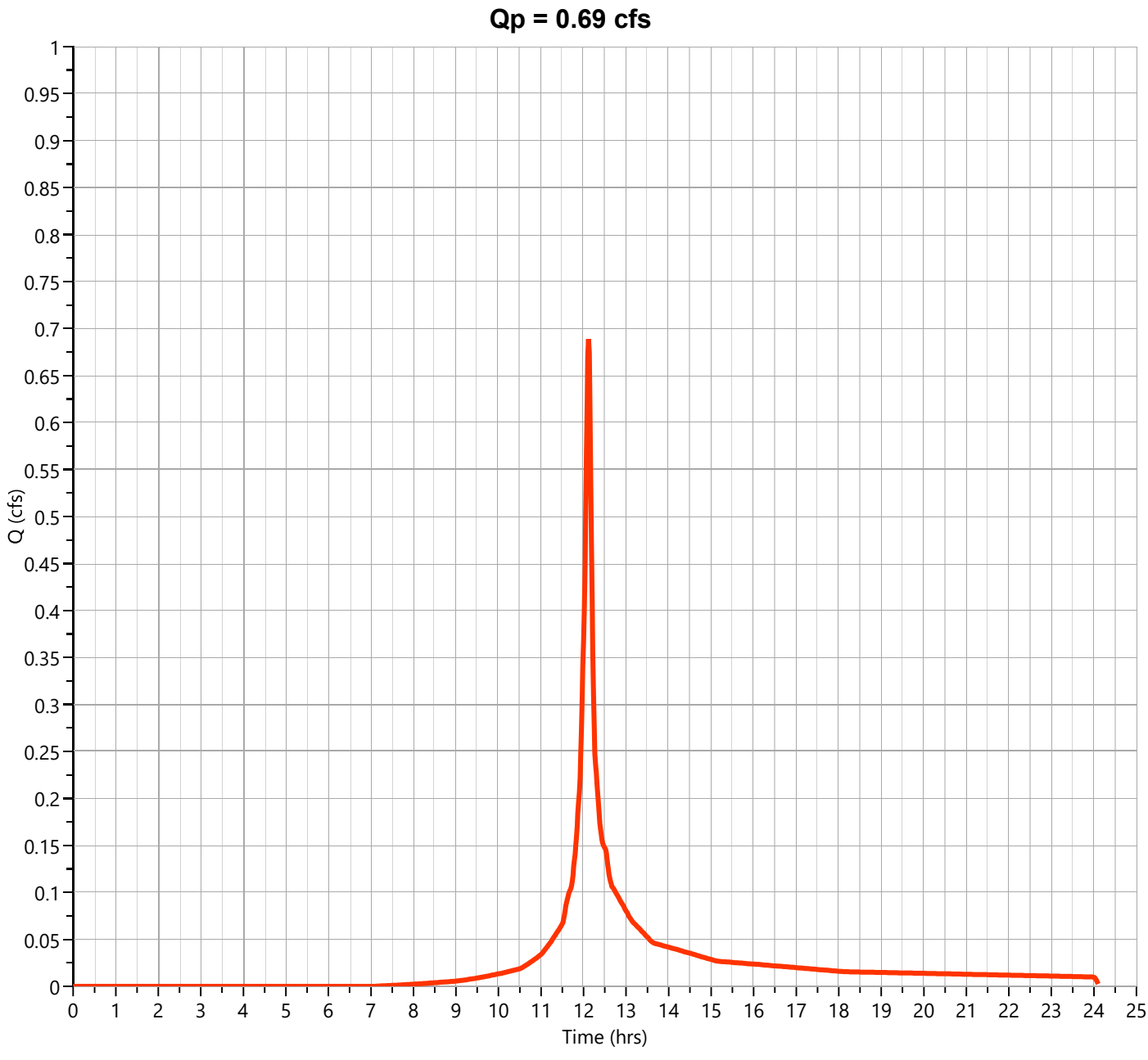
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1E Grass HSGC C

Hyd. No. 22

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.689 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 2,138 cuft
Drainage Area	= 0.15 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

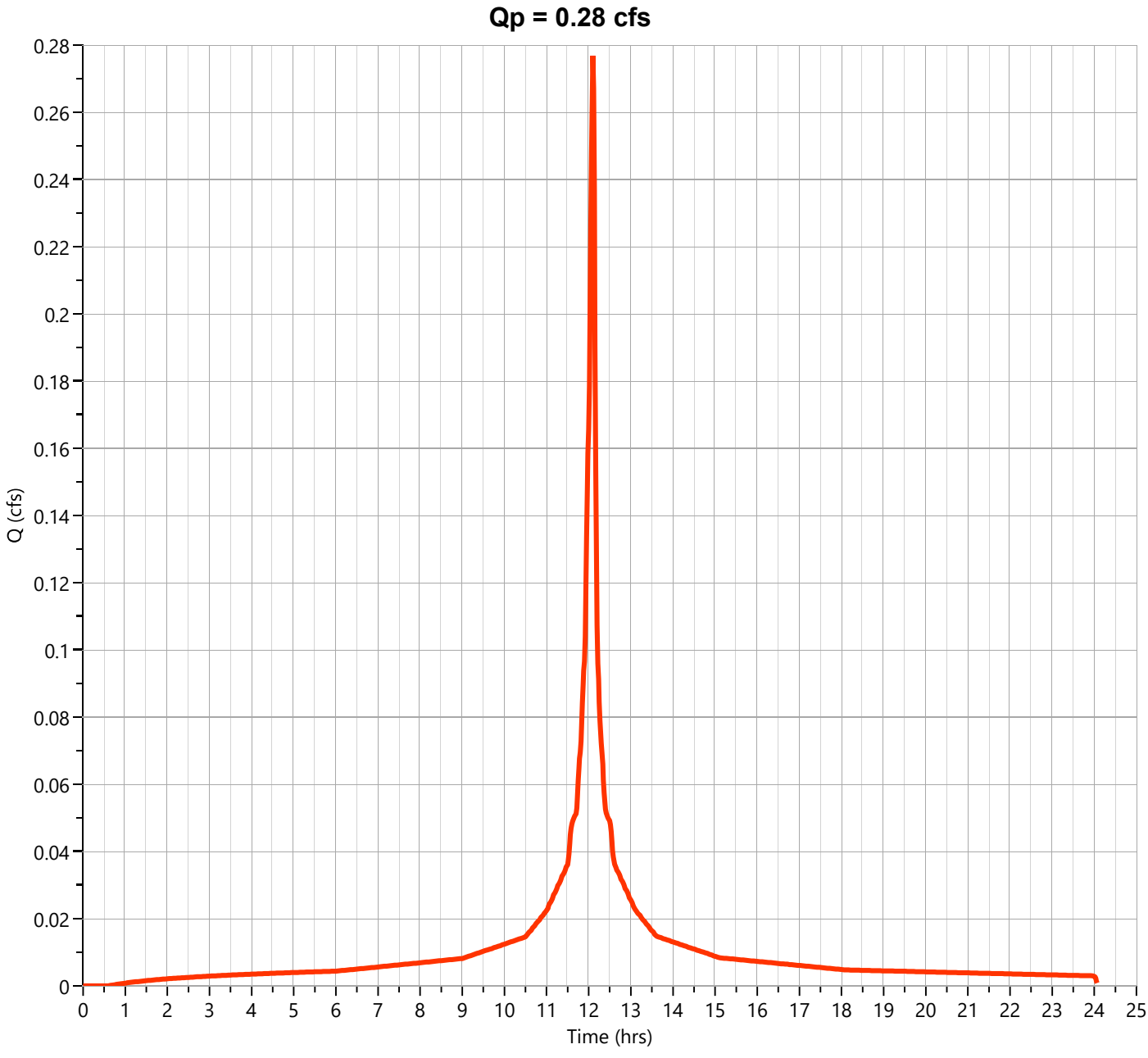
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1E Impervious

Hyd. No. 23

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.277 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 943 cuft
Drainage Area	= 0.04 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

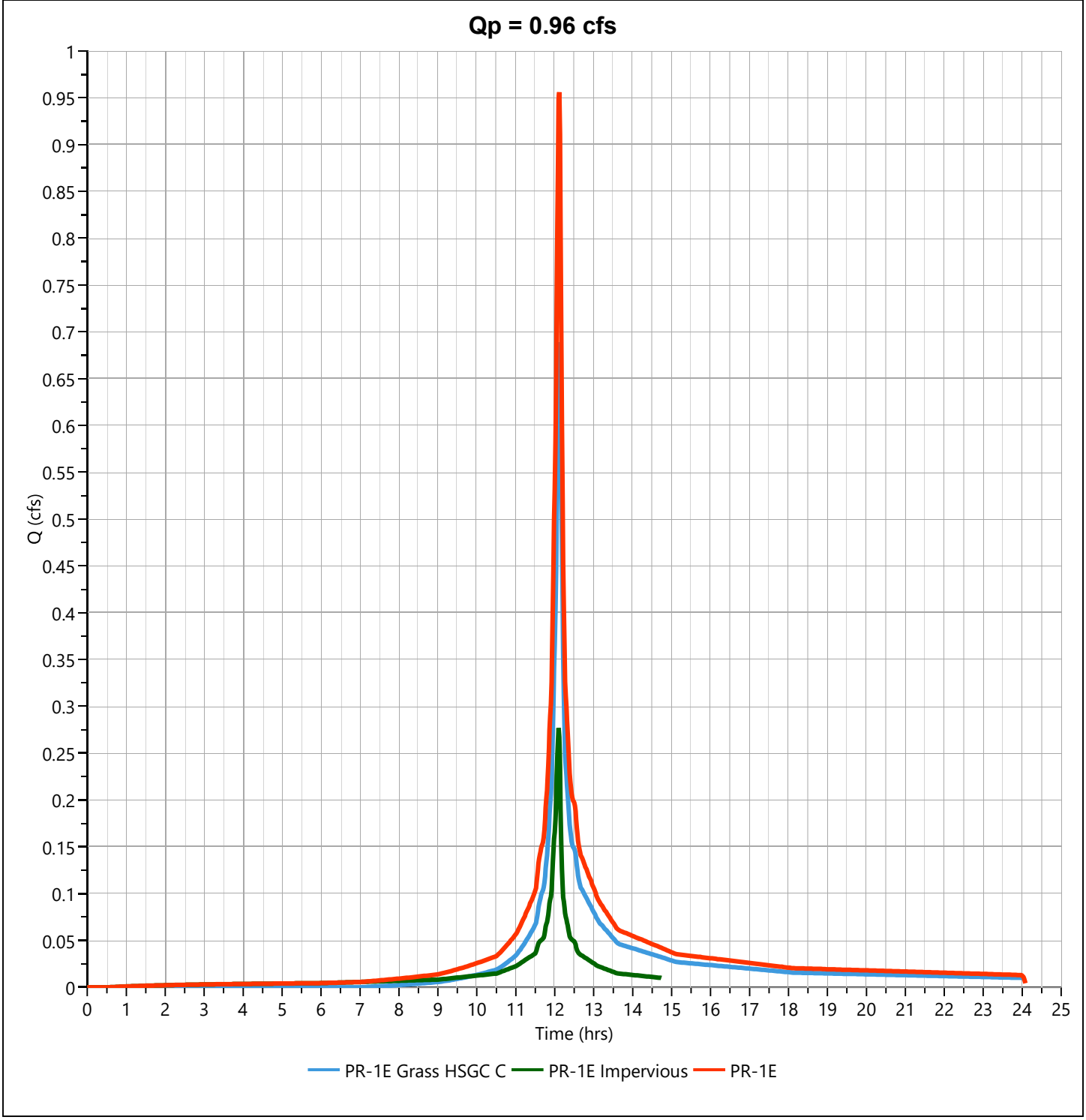
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1E

Hyd. No. 24

Hydrograph Type	= Junction	Peak Flow	= 0.956 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 3,081 cuft
Inflow Hydrographs	= 22, 23	Total Contrib. Area	= 0.19 ac



Hydrograph Report

Project Name:

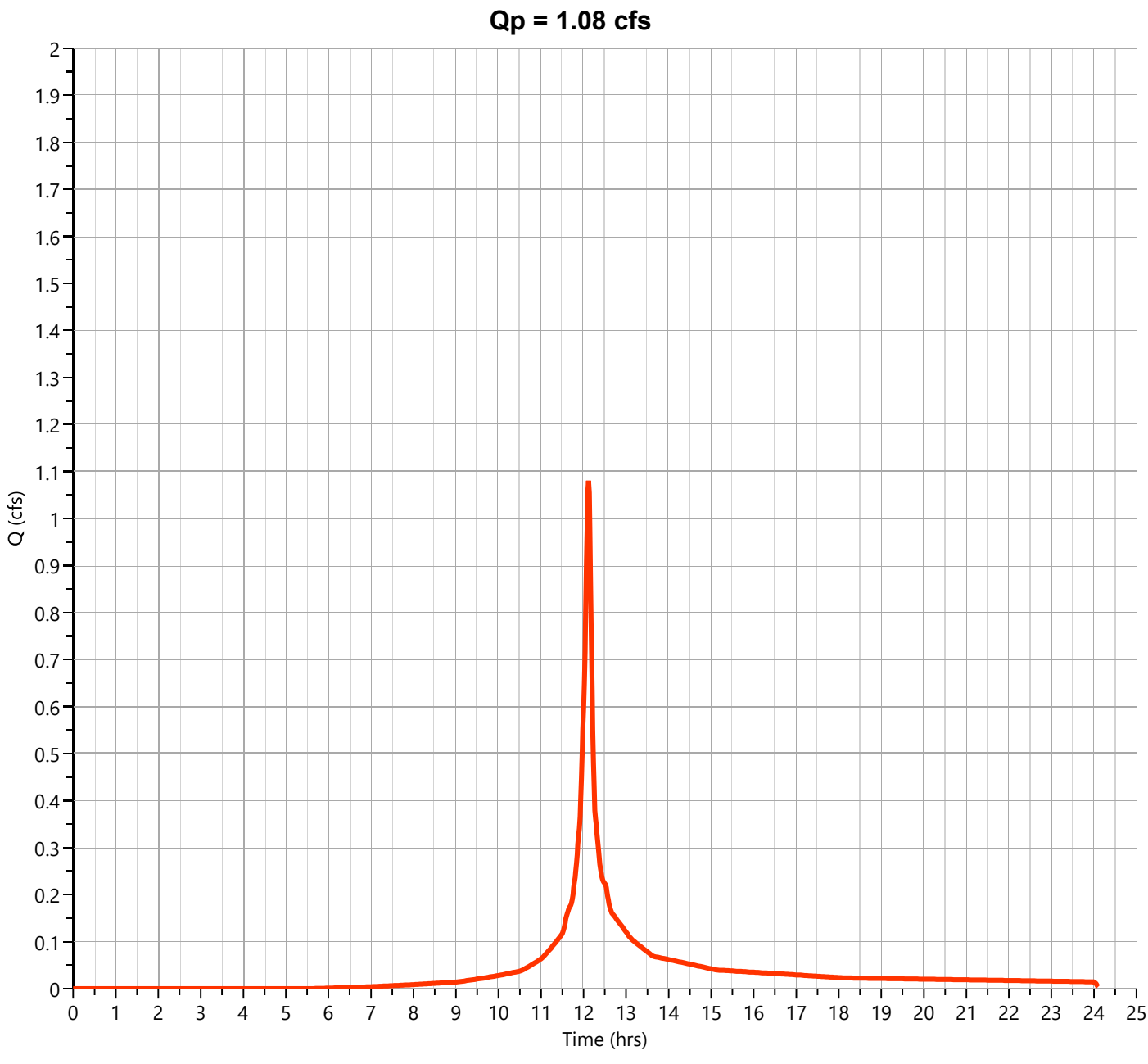
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1E Grass HSGC C

Hyd. No. 22

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.080 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 3,406 cuft
Drainage Area	= 0.15 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

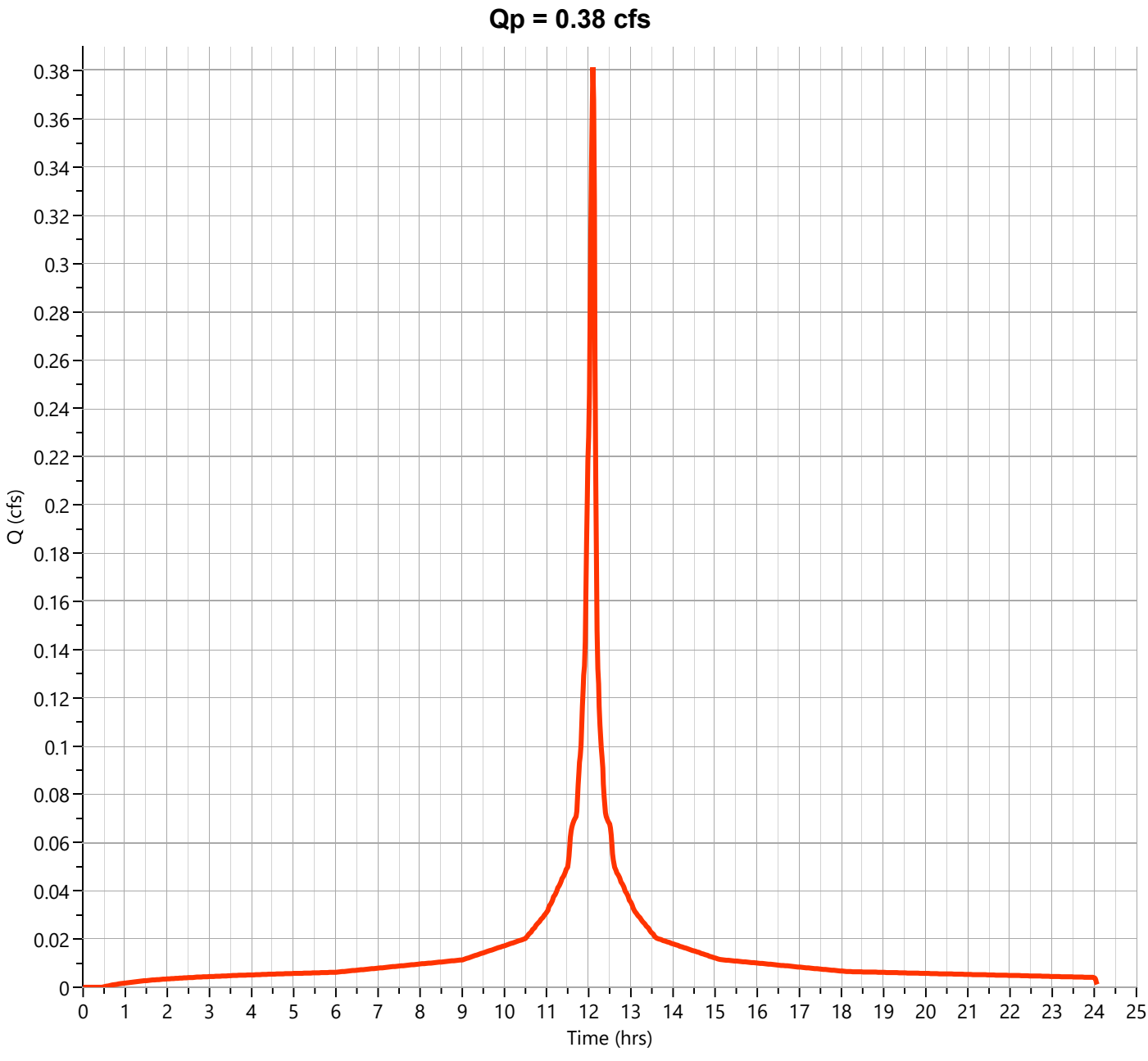
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1E Impervious

Hyd. No. 23

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.381 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,310 cuft
Drainage Area	= 0.04 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

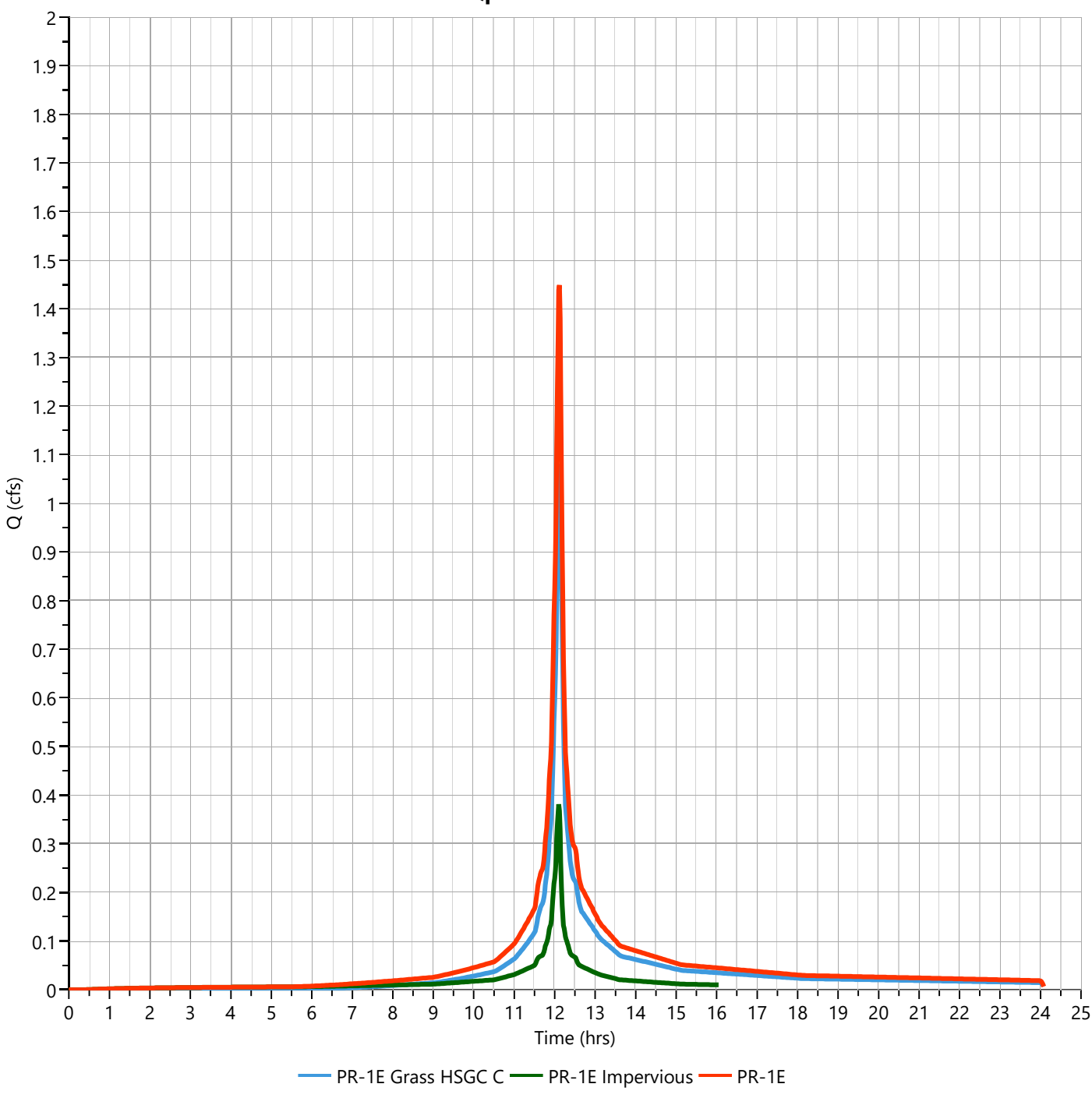
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1E

Hyd. No. 24

Hydrograph Type	= Junction	Peak Flow	= 1.449 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 4,716 cuft
Inflow Hydrographs	= 22, 23	Total Contrib. Area	= 0.19 ac



COMBINED PROPOSED FLOW TO POA-1

Hydrograph Report

Project Name:

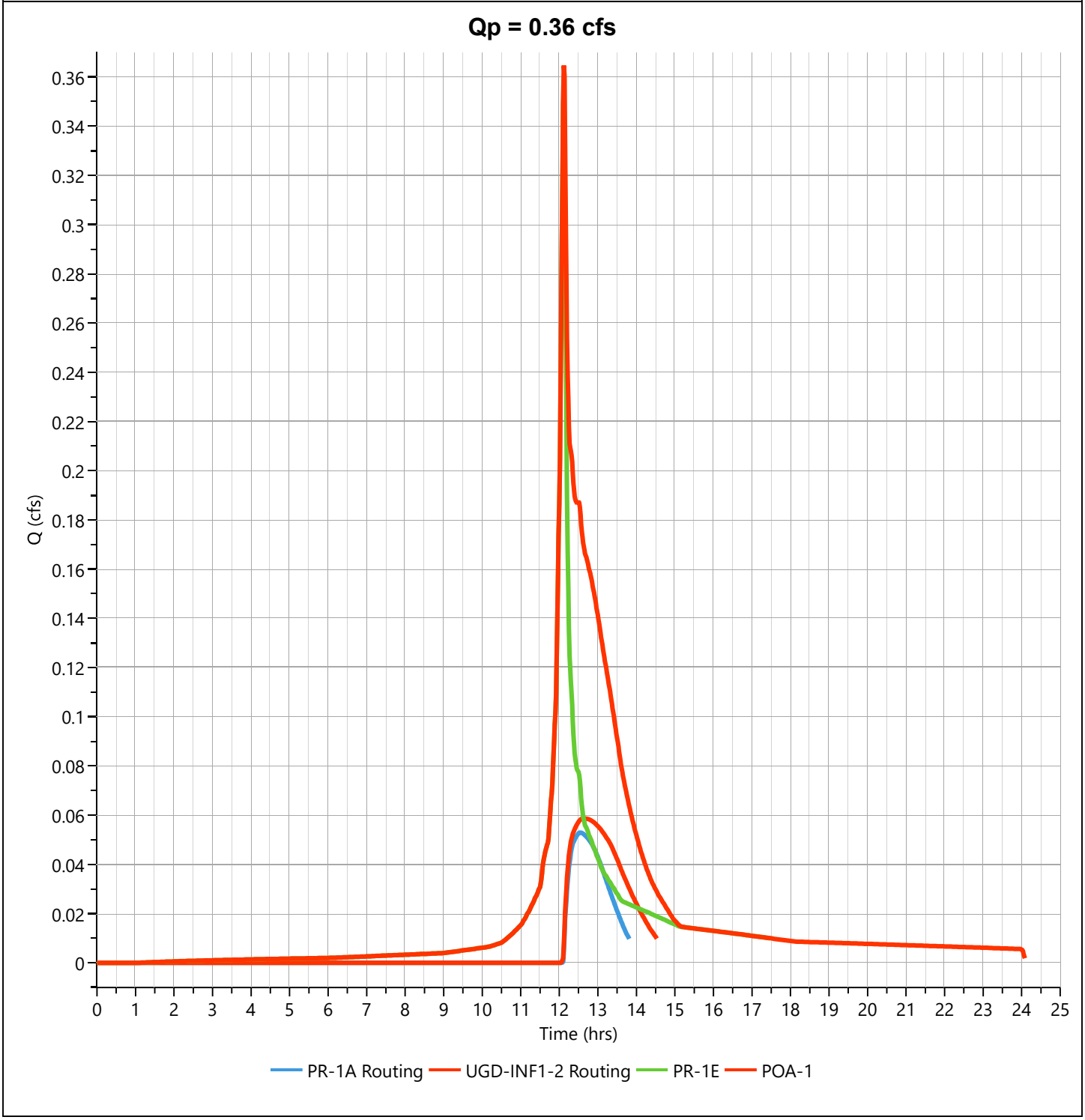
Hydrology Studio v 3.0.0.31

02-08-2024

POA-1

Hyd. No. 26

Hydrograph Type	= Junction	Peak Flow	= 0.365 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,732 cuft
Inflow Hydrographs	= 2, 20, 24	Total Contrib. Area	= 0.19 ac



Hydrograph Report

Project Name:

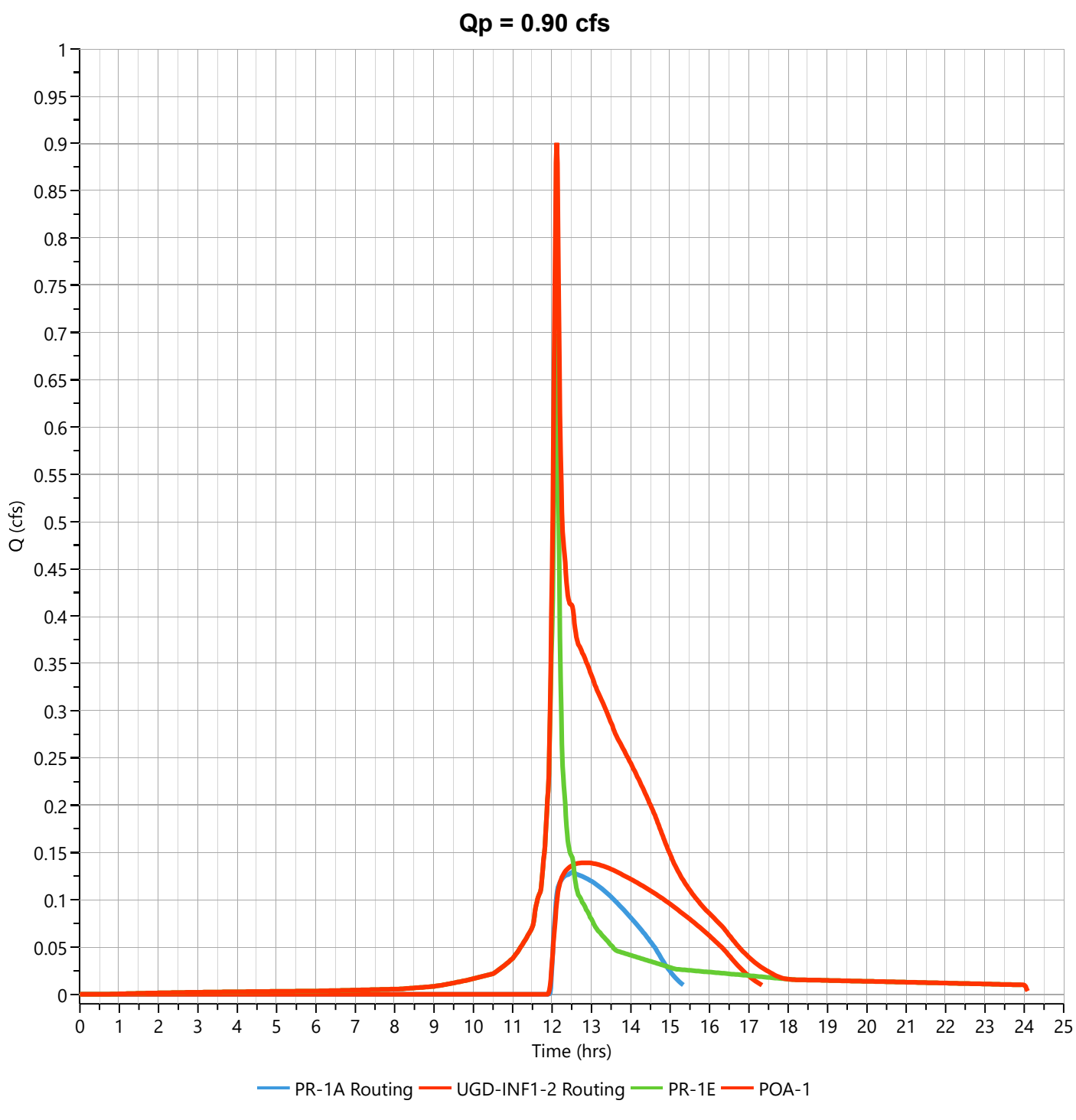
Hydrology Studio v 3.0.0.31

02-08-2024

POA-1

Hyd. No. 26

Hydrograph Type	= Junction	Peak Flow	= 0.901 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 5,041 cuft
Inflow Hydrographs	= 2, 20, 24	Total Contrib. Area	= 0.19 ac



Hydrograph Report

Project Name:

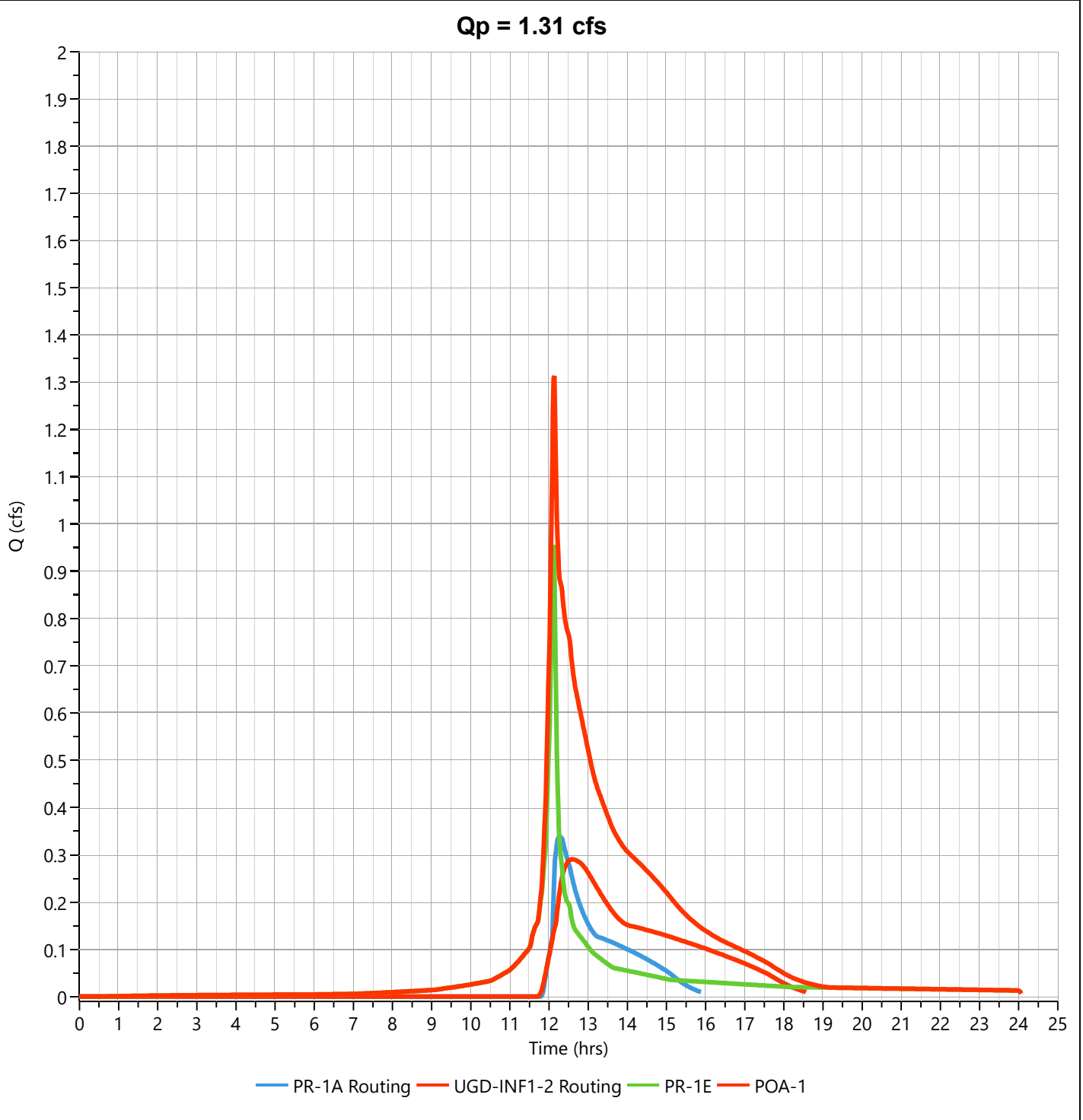
Hydrology Studio v 3.0.0.31

02-08-2024

POA-1

Hyd. No. 26

Hydrograph Type	= Junction	Peak Flow	= 1.313 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 7,859 cuft
Inflow Hydrographs	= 2, 20, 24	Total Contrib. Area	= 0.19 ac



Hydrograph Report

Project Name:

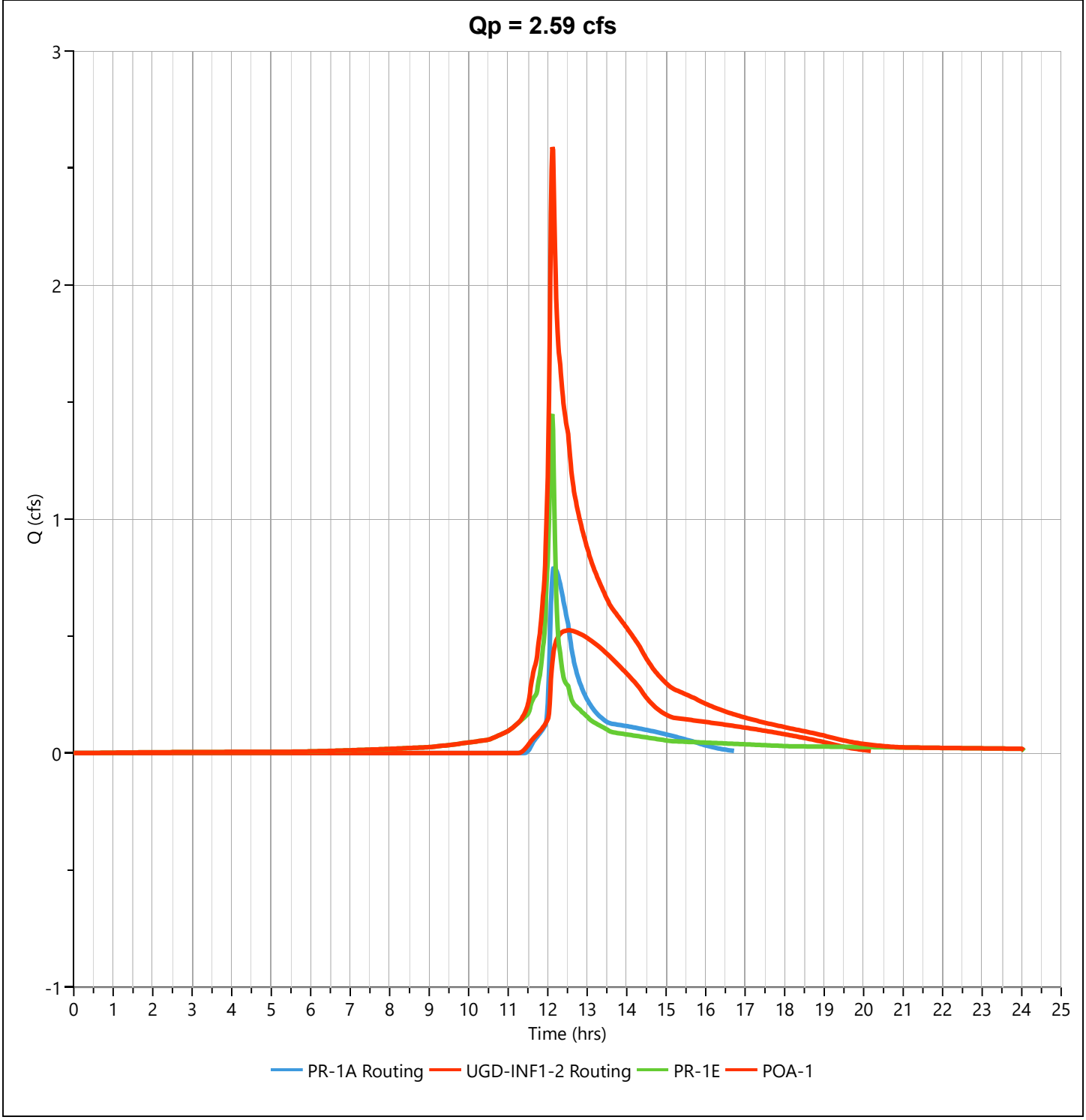
Hydrology Studio v 3.0.0.31

02-08-2024

POA-1

Hyd. No. 26

Hydrograph Type	= Junction	Peak Flow	= 2.588 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 13,762 cuft
Inflow Hydrographs	= 2, 20, 24	Total Contrib. Area	= 0.19 ac



PR-2A WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/6/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/6/2024**

Circle One: Present (**Developed**) — **Current Proposed Watershed PR-2A - Impervious**

Circle One: (**T_c**) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		
1.	Surface Description (NEH table 15-1)		Smooth Surfaces		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	30		
4.	Two-year 24-hr rainfall, P_2	in	3.46		
5.	Land Slope, s	ft/ft	0.026		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	100		
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.007	+	+
				Sheet Flow Sub-Total	0.007 hours

Shallow Concentrated Flow		Segment ID			
8.	Surface Description				
9.	Flow Length, L	ft			
10.	Watercourse Slope, s	ft/ft			
11.	Average Velocity, V (NEH table 15-3)	ft/s			
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+	+
				Shallow Conc. Flow Sub-Total	0.000 hours

Channel Flow		Segment ID			
13.	Flow Length, L	ft			
14.	Cross Sectional flow area, a	ft^2			
15.	Wetted Perimeter, P_w	ft			
16.	Hydraulic Radius, r $r = a / P_w$	ft			
17.	Channel Slope, s	ft/ft			
18.	Manning's Roughness Coeff., n				
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s			
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+	+
				Channel Flow Sub-Total	0.000 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.007 hours
(Add Sub-Total T_t from prior steps)	Software Limitations Require Minimum Tc =	2 minutes

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/6/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/6/2024**

Circle One: Present **(Developed)** — **Current Proposed Watershed PR-2A - Pervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		2		
1.	Surface Description (NEH table 15-1)		Dense Grasses		Smooth Surfaces		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.24		0.011		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	19		31		
4.	Two-year 24-hr rainfall, P_2	in	3.46		3.46		
5.	Land Slope, s	ft/ft	0.022		0.028		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	61		100		
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.060	+	0.007	+	
					Sheet Flow Sub-Total		0.067 hours

Shallow Concentrated Flow		Segment ID					
8.	Surface Description						
9.	Flow Length, L	ft					
10.	Watercourse Slope, s	ft/ft					
11.	Average Velocity, V (NEH table 15-3)	ft/s					
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+		+	
					Shallow Conc. Flow Sub-Total		0.000 hours

Channel Flow		Segment ID					
13.	Flow Length, L	ft					
14.	Cross Sectional flow area, a	ft^2					
15.	Wetted Perimeter, P_w	ft					
16.	Hydraulic Radius, r $r = a / P_w$	ft					
17.	Channel Slope, s	ft/ft					
18.	Manning's Roughness Coeff., n						
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s					
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+		+	
					Channel Flow Sub-Total		0.000 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.067 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	4 minutes

Hydrograph Report

Project Name:

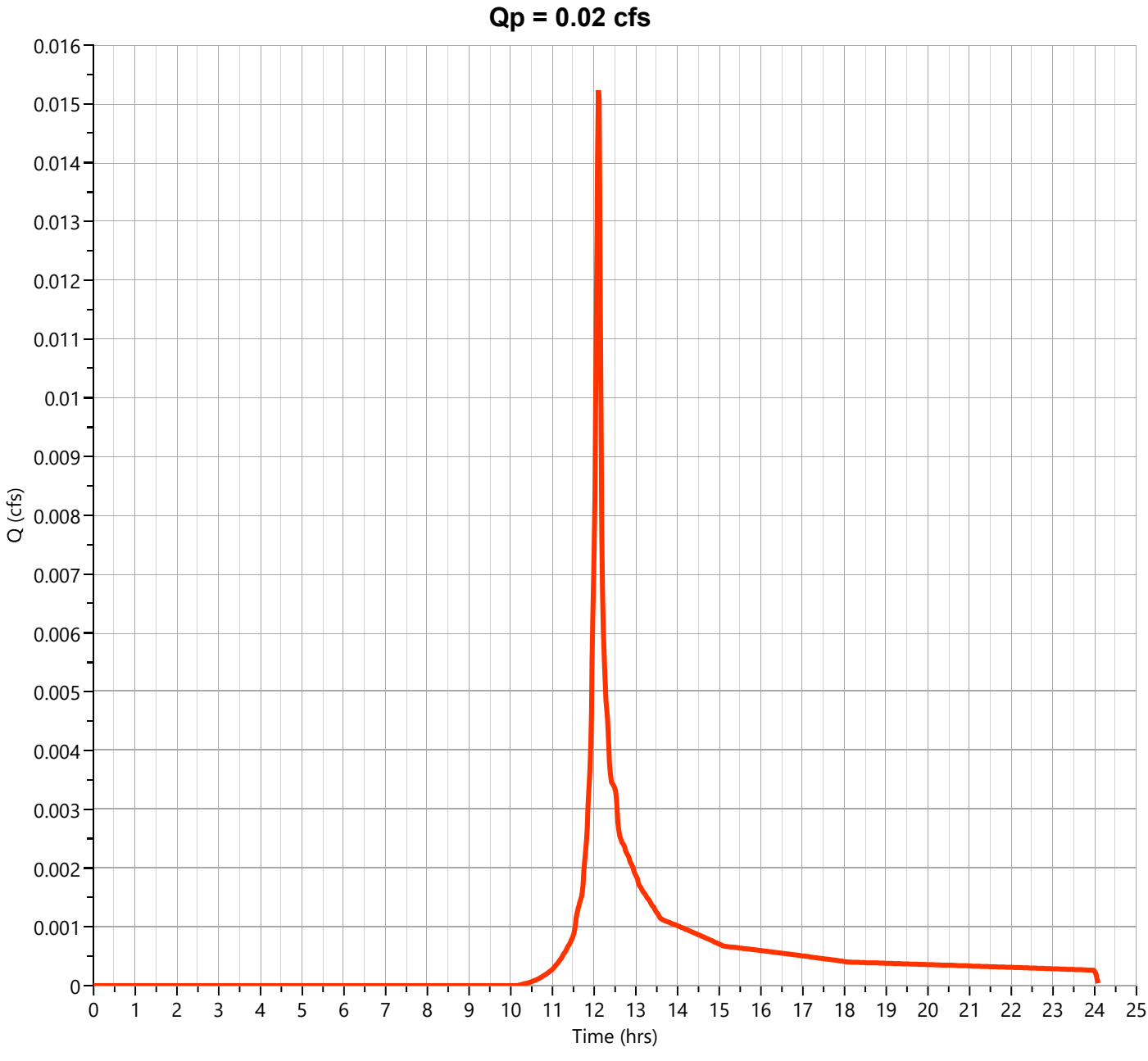
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2A Grass HSGC C

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.015 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 44.0 cuft
Drainage Area	= 0.01 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

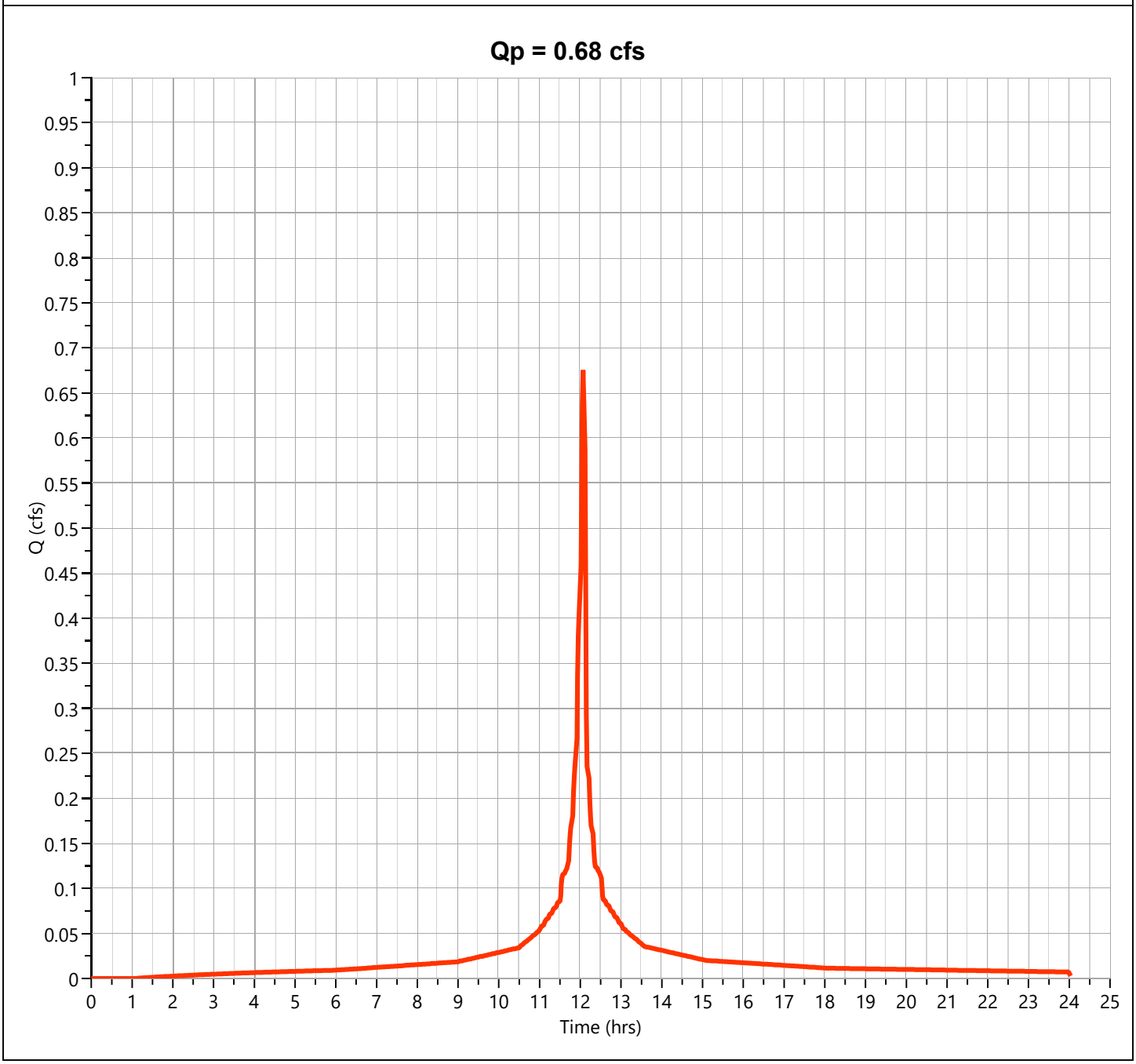
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2A Impervious

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.676 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 2,196 cuft
Drainage Area	= 0.2 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

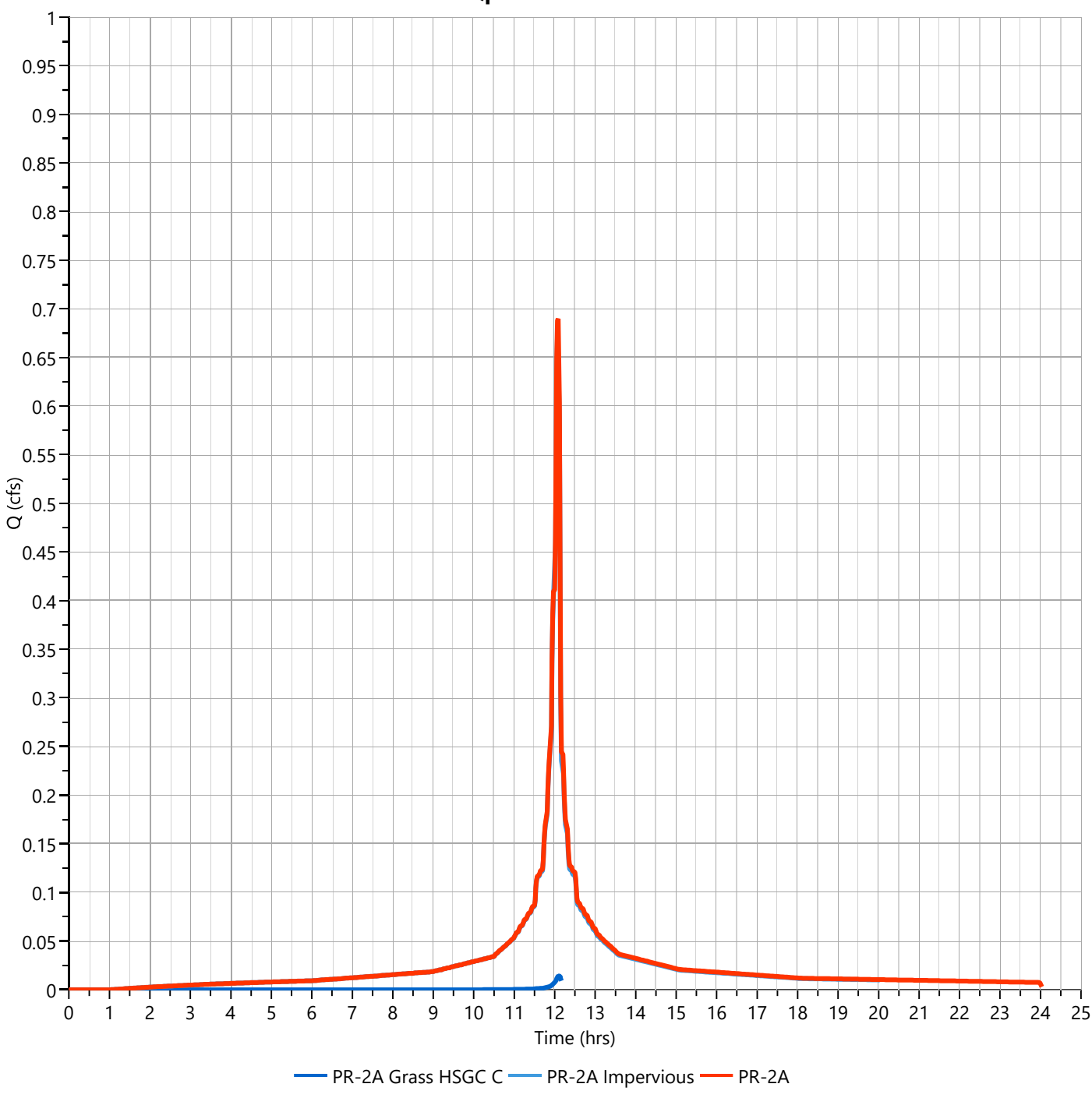
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2A

Hyd. No. 3

Hydrograph Type	= Junction	Peak Flow	= 0.691 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,240 cuft
Inflow Hydrographs	= 1, 2	Total Contrib. Area	= 0.21 ac



Hydrograph Report

Project Name:

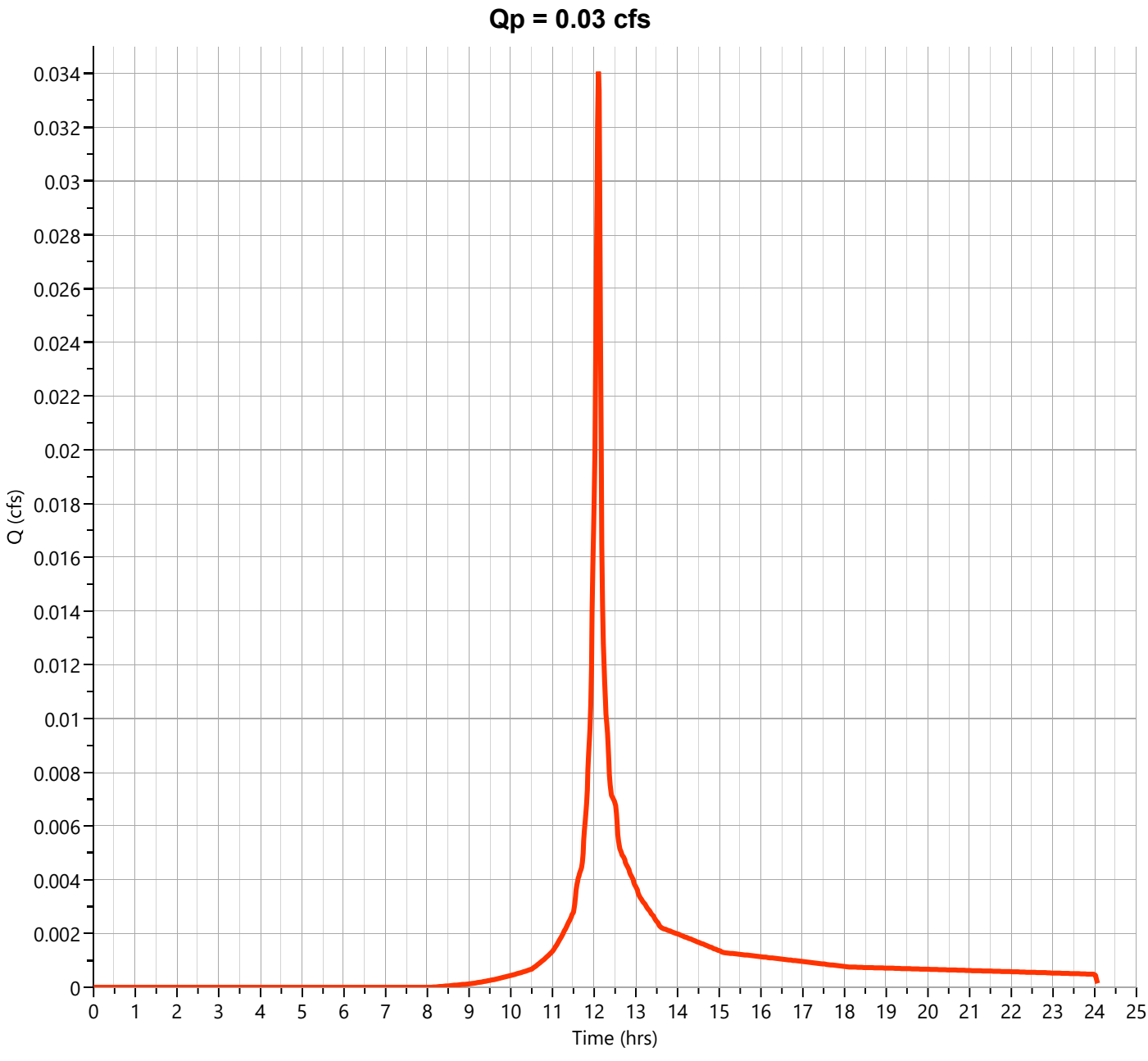
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2A Grass HSGC C

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.034 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 97.0 cuft
Drainage Area	= 0.01 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

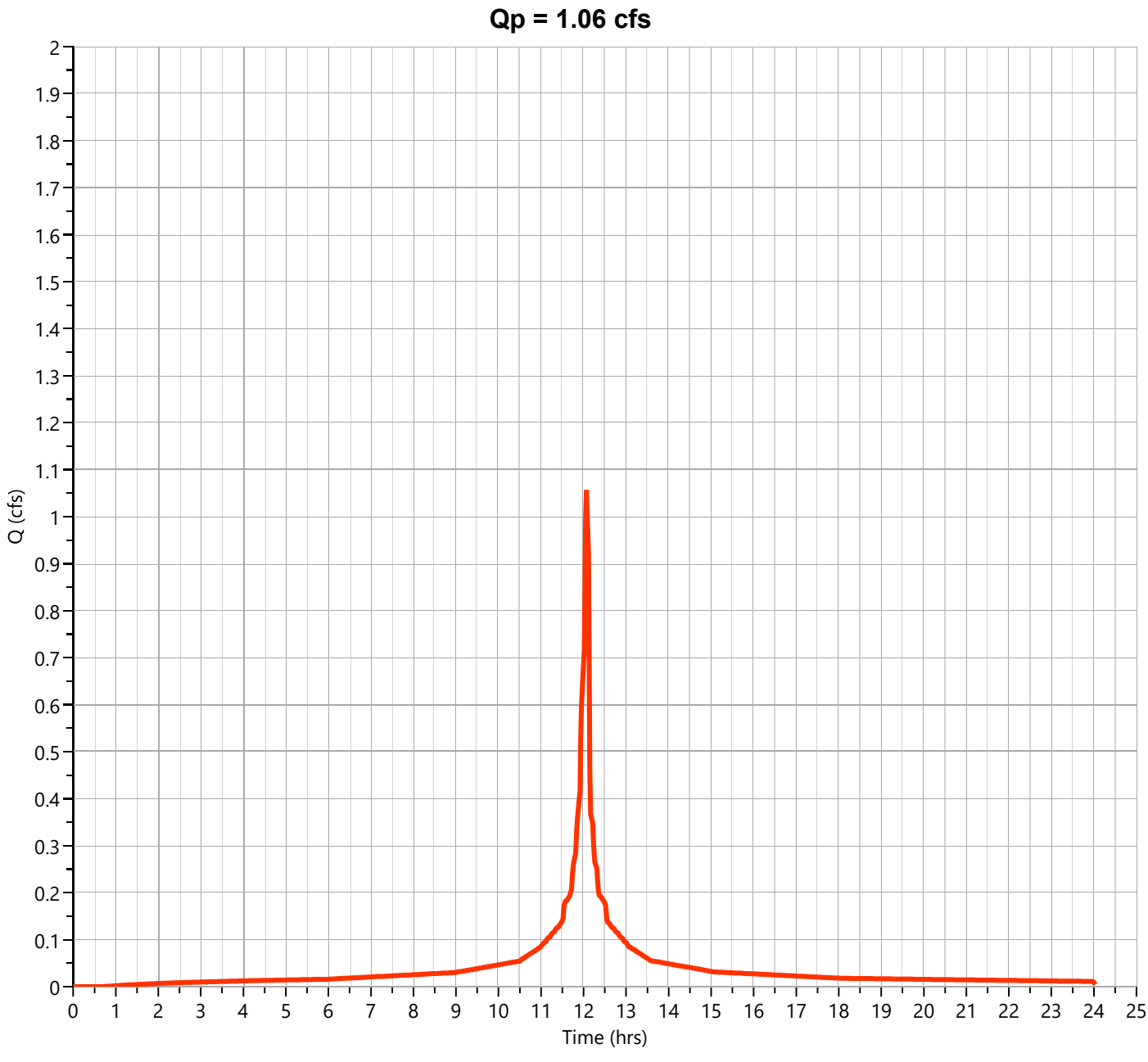
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2A Impervious

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.057 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 3,500 cuft
Drainage Area	= 0.2 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

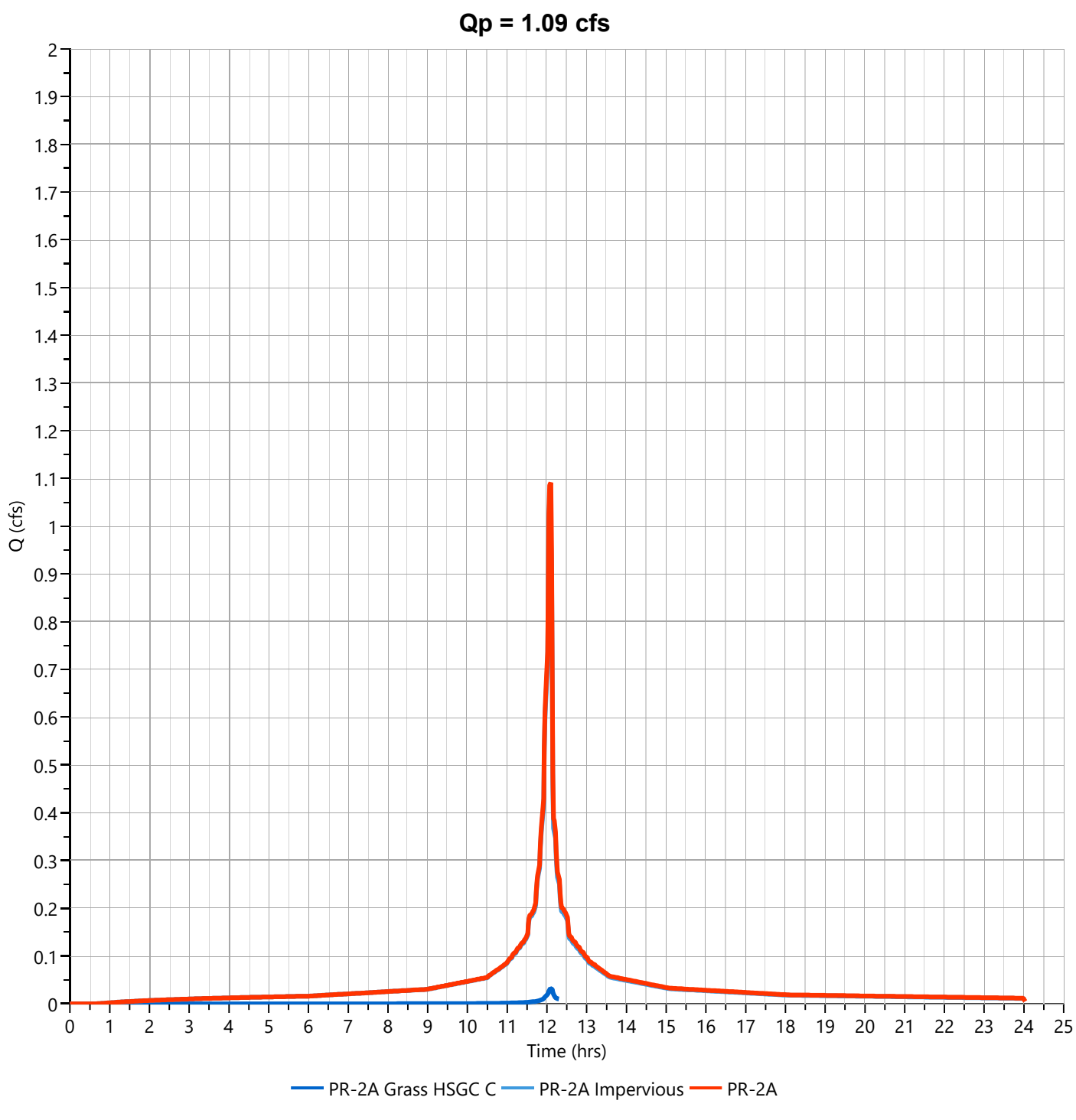
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2A

Hyd. No. 3

Hydrograph Type	= Junction	Peak Flow	= 1.091 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 3,597 cuft
Inflow Hydrographs	= 1, 2	Total Contrib. Area	= 0.21 ac



Hydrograph Report

Project Name:

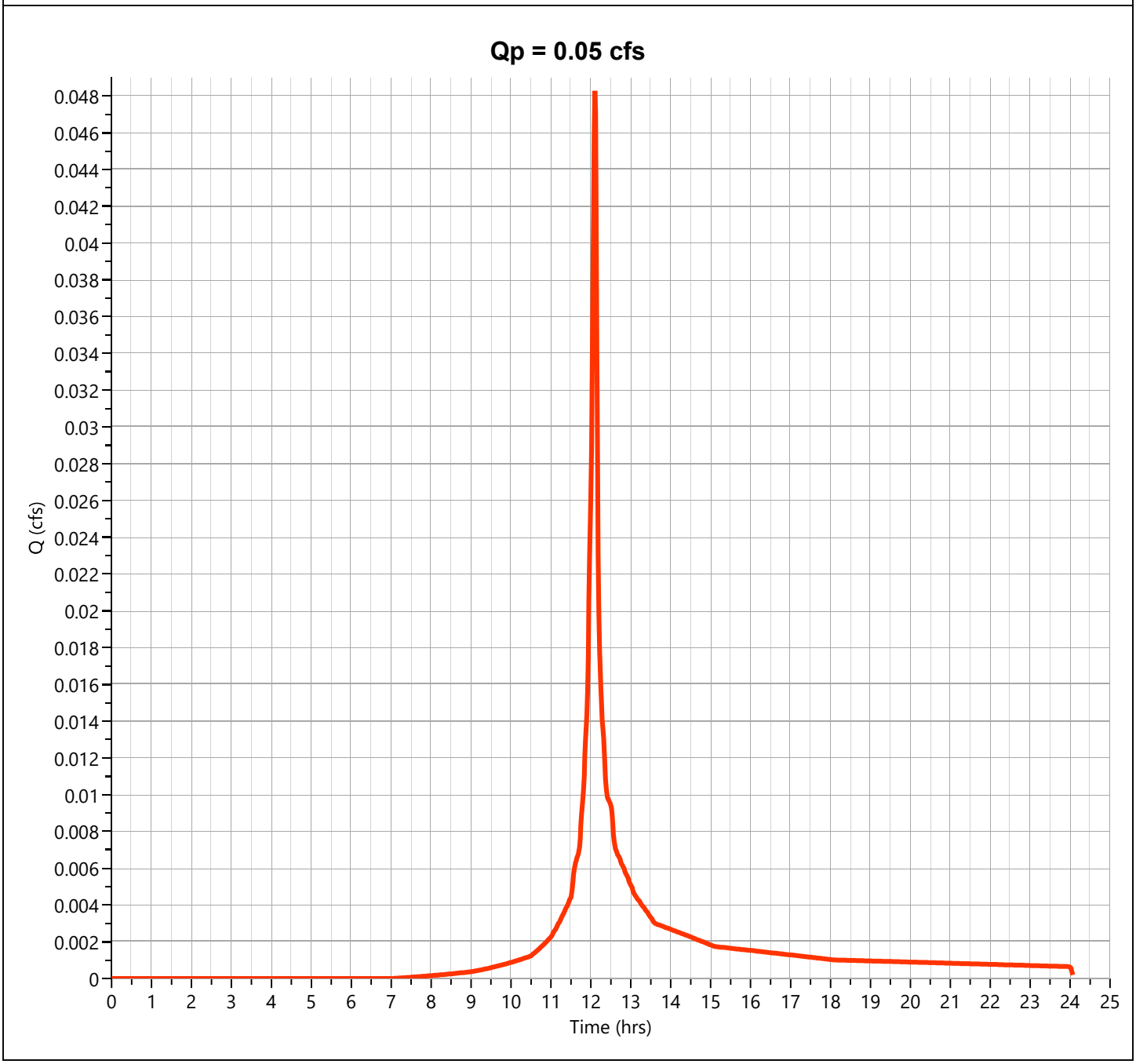
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2A Grass HSGC C

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.048 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 138 cuft
Drainage Area	= 0.01 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

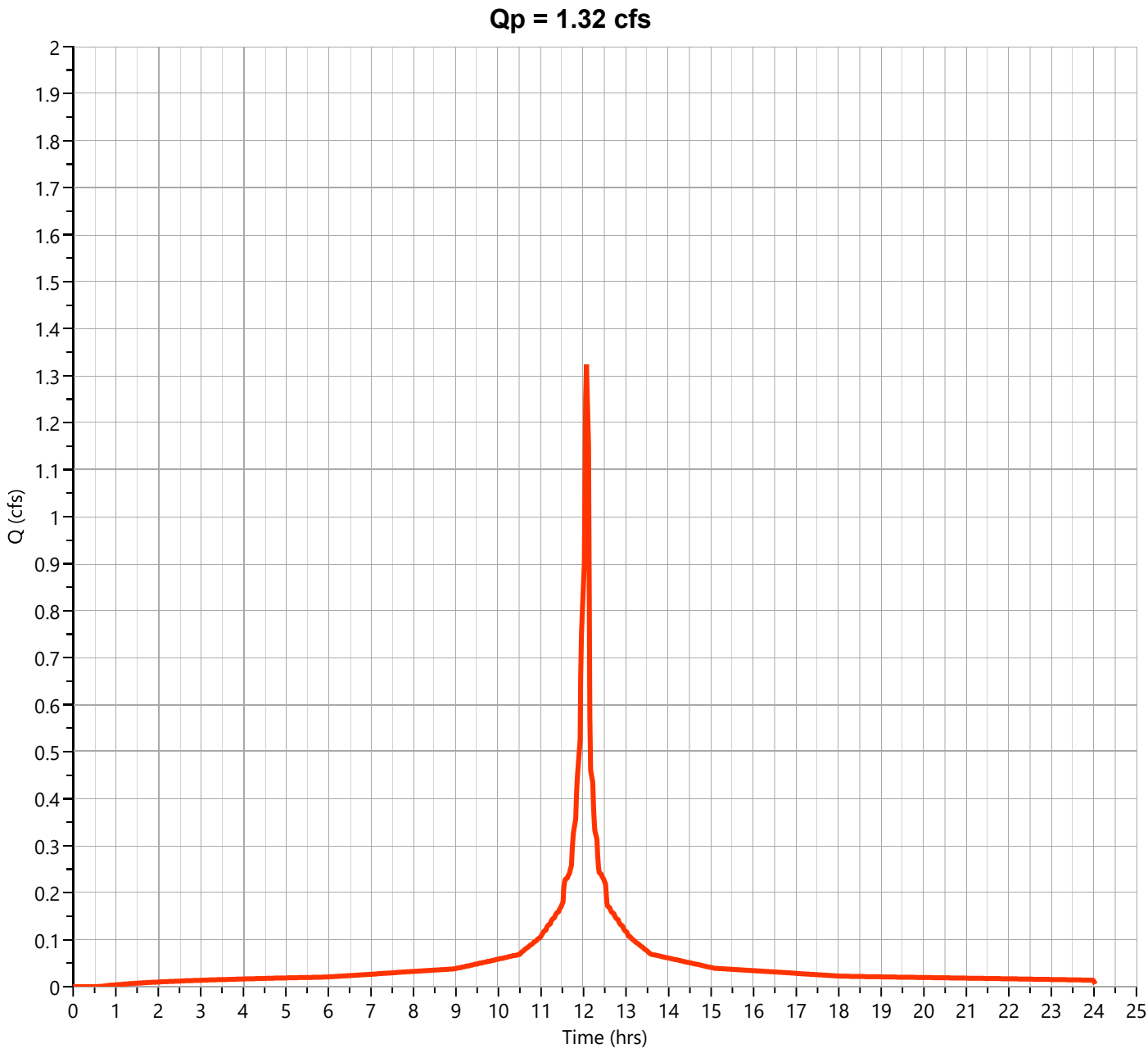
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2A Impervious

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.324 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 4,418 cuft
Drainage Area	= 0.2 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

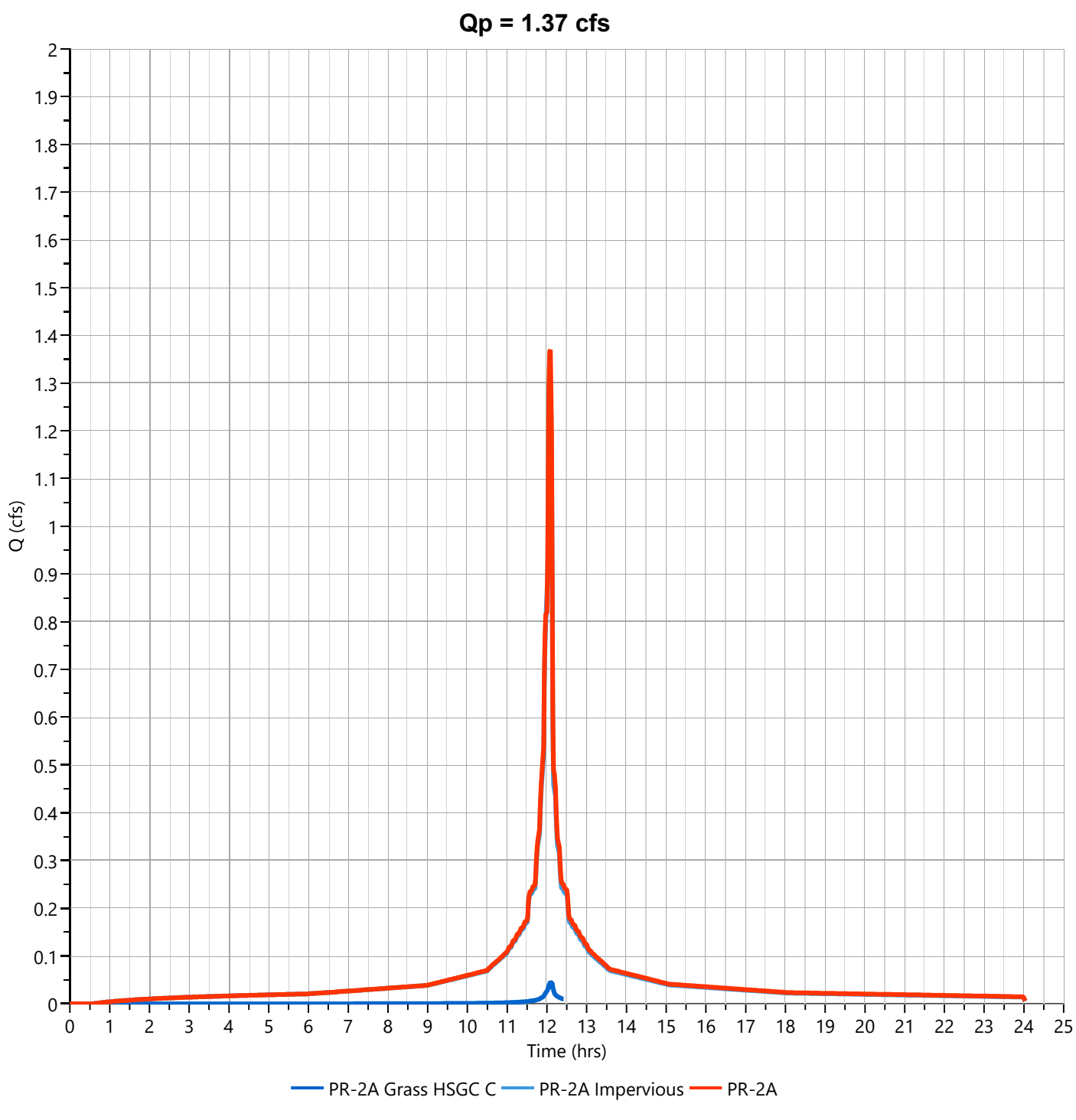
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2A

Hyd. No. 3

Hydrograph Type	= Junction	Peak Flow	= 1.373 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 4,556 cuft
Inflow Hydrographs	= 1, 2	Total Contrib. Area	= 0.21 ac



Hydrograph Report

Project Name:

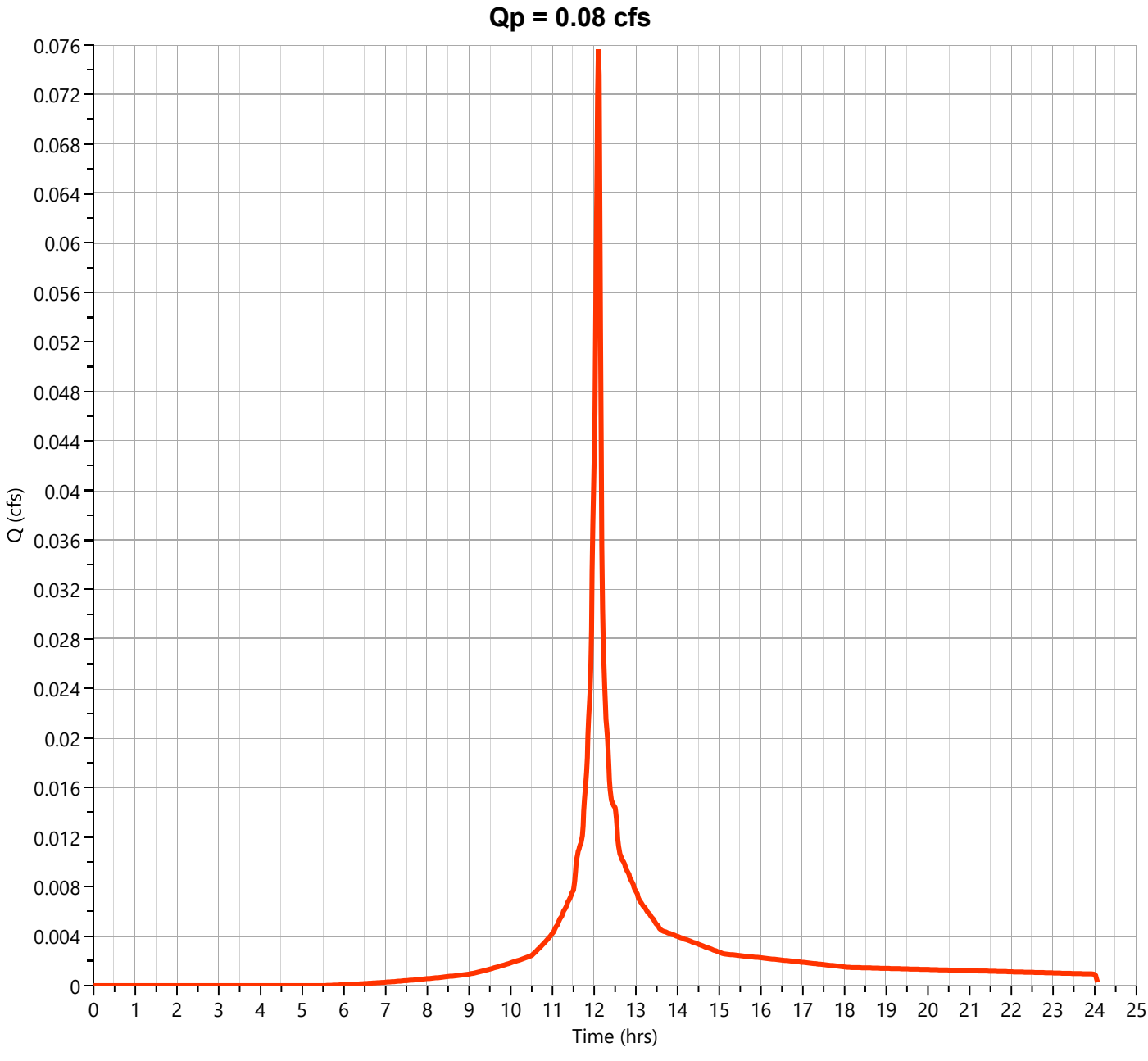
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2A Grass HSGC C

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.076 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 220 cuft
Drainage Area	= 0.01 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

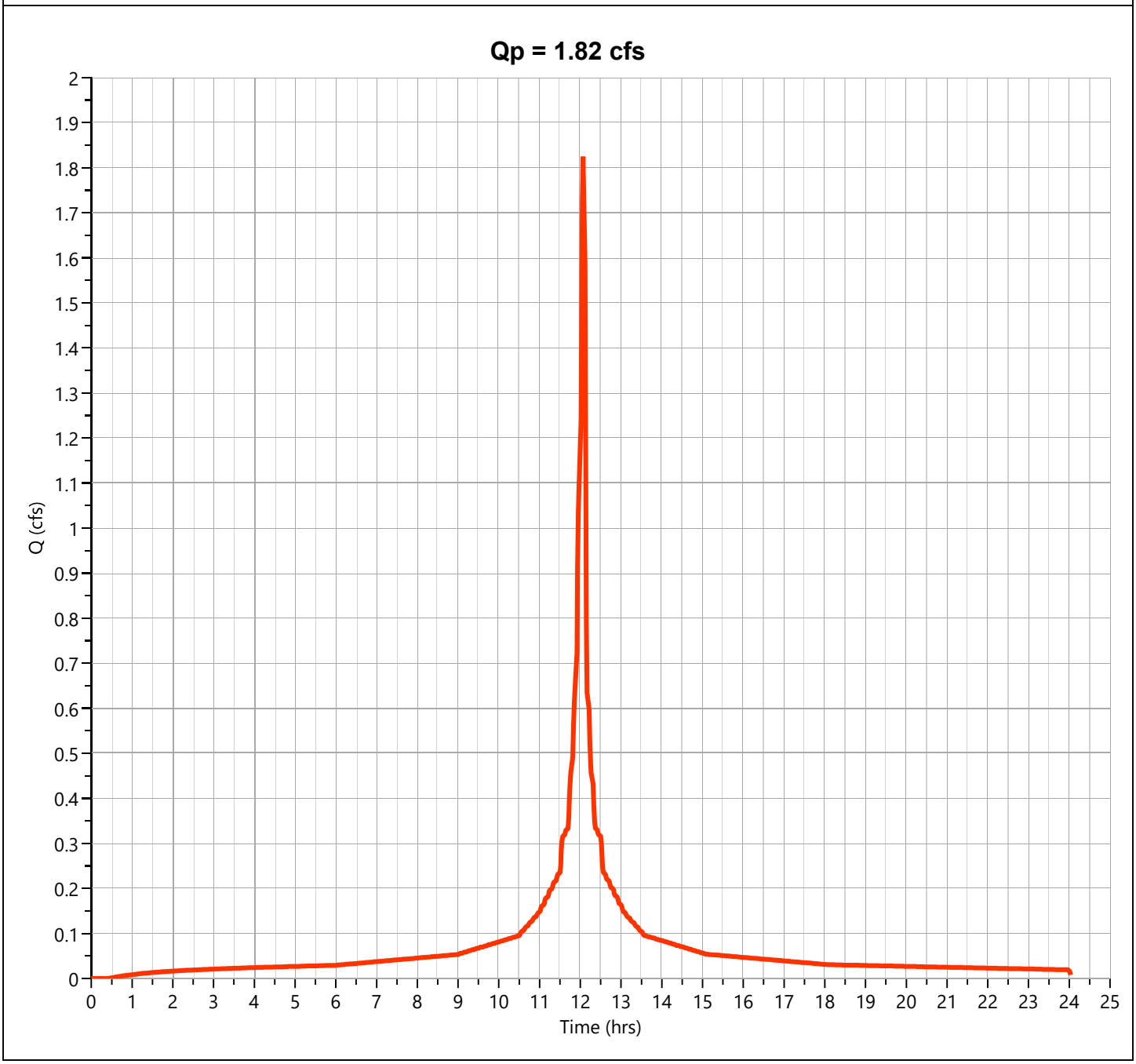
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2A Impervious

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.824 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 6,139 cuft
Drainage Area	= 0.2 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

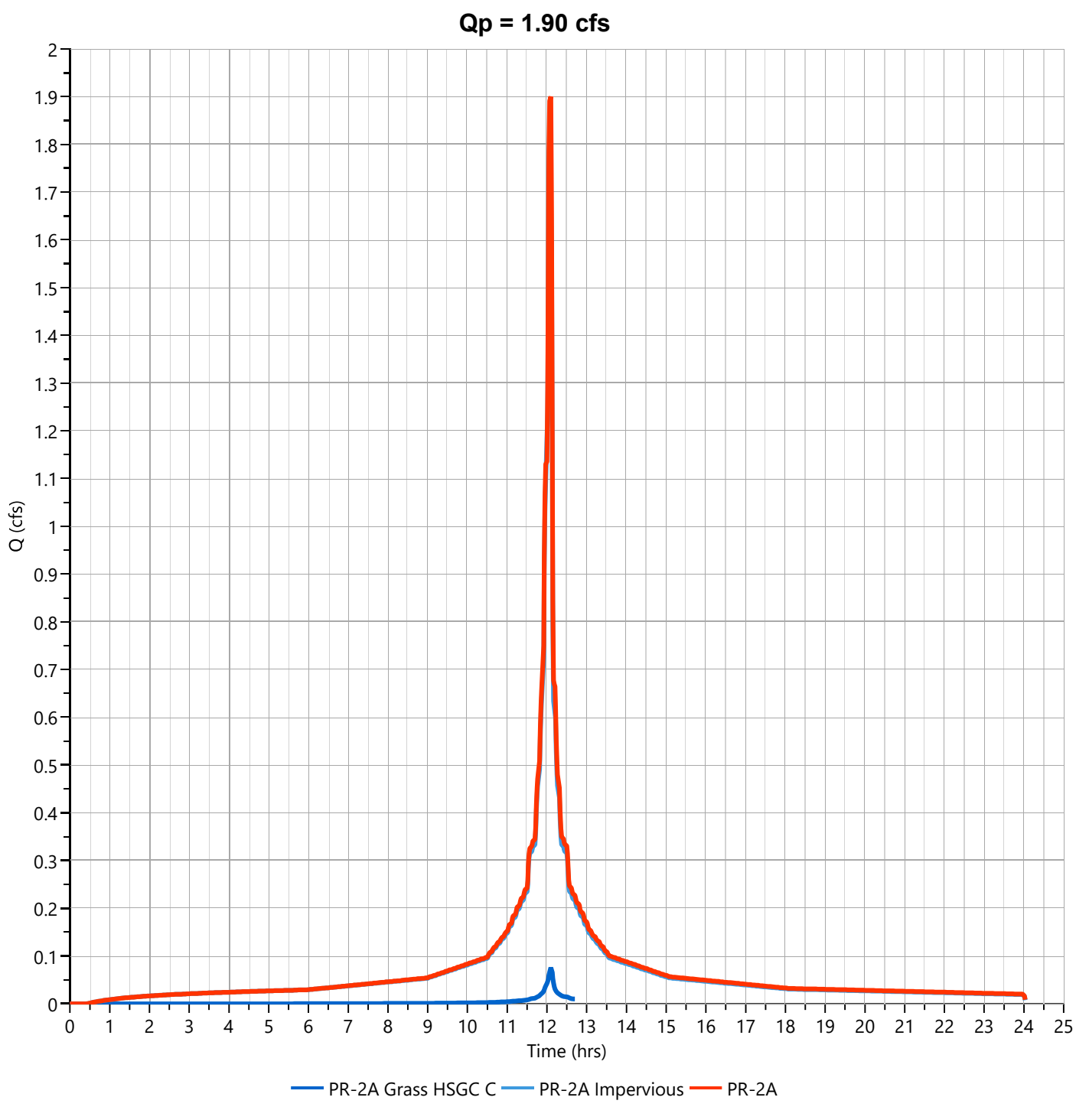
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2A

Hyd. No. 3

Hydrograph Type	= Junction	Peak Flow	= 1.900 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 6,359 cuft
Inflow Hydrographs	= 1, 2	Total Contrib. Area	= 0.21 ac



PR-2B WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/6/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/6/2024**

Circle One: Present **(Developed)** — **Current Proposed Watershed PR-2B - Impervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		
1.	Surface Description (NEH table 15-1)		Smooth Surfaces		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	44		
4.	Two-year 24-hr rainfall, P_2	in	3.46		
5.	Land Slope, s	ft/ft	0.010		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	100		
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.013	+	+
				Sheet Flow Sub-Total	0.013 hours

Shallow Concentrated Flow		Segment ID	2		
8.	Surface Description		Grassed Waterways		
9.	Flow Length, L	ft	53		
10.	Watercourse Slope, s	ft/ft	0.010		
11.	Average Velocity, V (NEH table 15-3)	ft/s	1.61		
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.009	+	+
				Shallow Conc. Flow Sub-Total	0.009 hours

Channel Flow		Segment ID	3		
13.	Flow Length, L	ft	40		
14.	Cross Sectional flow area, a	ft^2	0.61		
15.	Wetted Perimeter, P_w	ft	2.00		
16.	Hydraulic Radius, r $r = a / P_w$	ft	0.31		
17.	Channel Slope, s	ft/ft	0.005		
18.	Manning's Roughness Coeff., n		0.012		
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	3.98		
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.003	+	+
				Channel Flow Sub-Total	0.003 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.025 hours
(Add Sub-Total T_t from prior steps)	Software Limitations Require Minimum Tc =	2 minutes

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/6/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/6/2024**

Circle One: Present **(Developed)** — **Current Proposed Watershed PR-2B - Pervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		2		3
1.	Surface Description (NEH table 15-1)		Dense Grasses		Smooth Surfaces		Dense Grasses
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.24		0.011		0.24
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	14		17		23
4.	Two-year 24-hr rainfall, P_2	in	3.46		3.46		3.46
5.	Land Slope, s	ft/ft	0.019		0.011		0.010
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	58		100		41
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.048	+	0.006	+	0.095
					Sheet Flow Sub-Total		0.149 hours

Shallow Concentrated Flow		Segment ID	4				
8.	Surface Description		Grassed Waterways				
9.	Flow Length, L	ft	30				
10.	Watercourse Slope, s	ft/ft	0.010				
11.	Average Velocity, V (NEH table 15-3)	ft/s	1.64				
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.005	+		+	
					Shallow Conc. Flow Sub-Total		0.005 hours

Channel Flow		Segment ID	5				
13.	Flow Length, L	ft	40				
14.	Cross Sectional flow area, a	ft^2	0.61				
15.	Wetted Perimeter, P_w	ft	2.00				
16.	Hydraulic Radius, r $r = a / P_w$	ft	0.31				
17.	Channel Slope, s	ft/ft	0.005				
18.	Manning's Roughness Coeff., n		0.012				
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	3.98				
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.003	+		+	
					Channel Flow Sub-Total		0.003 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.157 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	9 minutes

Hydrograph Report

Project Name:

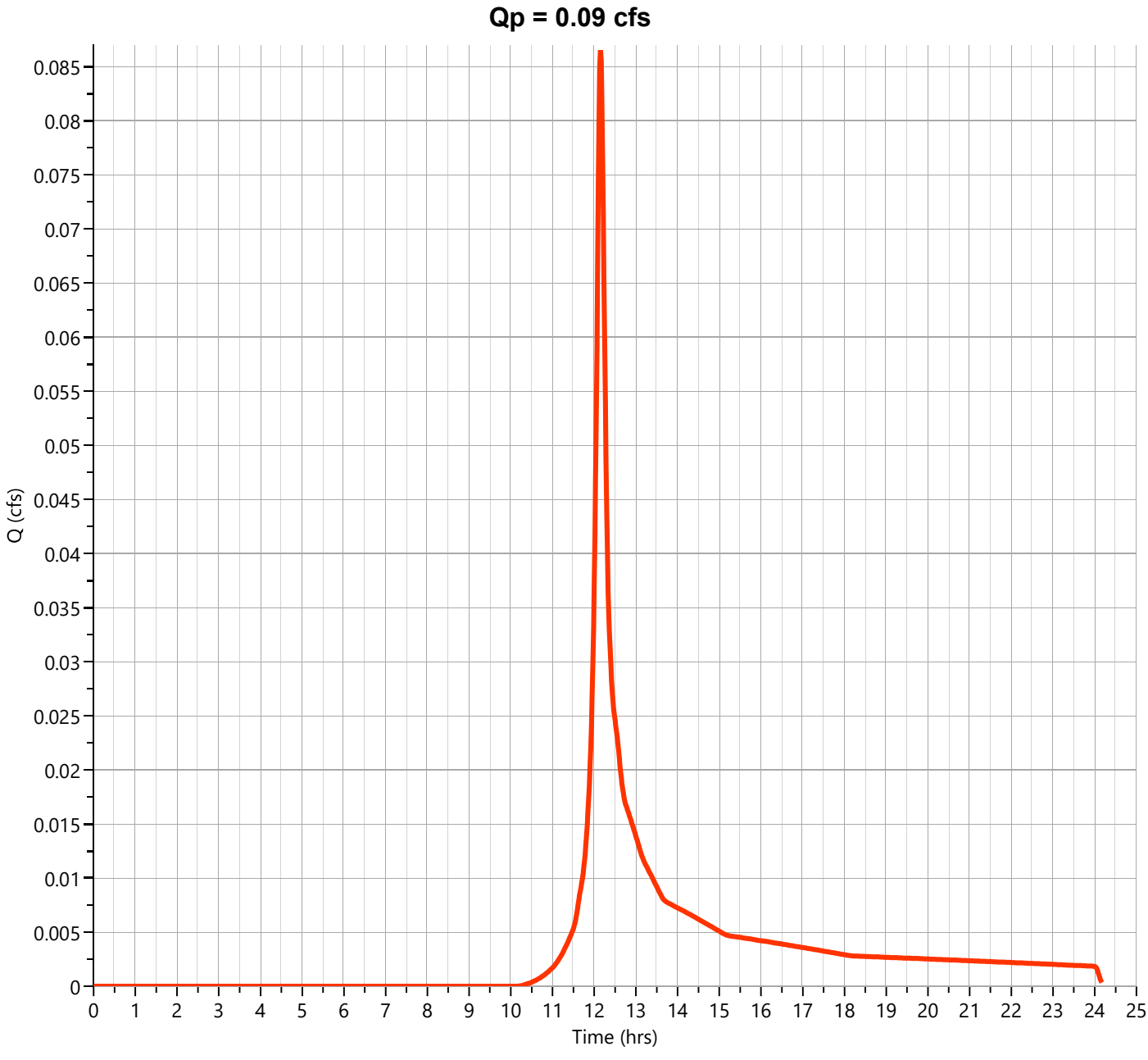
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B Grass HSGC C

Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.087 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Runoff Volume	= 308 cuft
Drainage Area	= 0.07 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 9.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

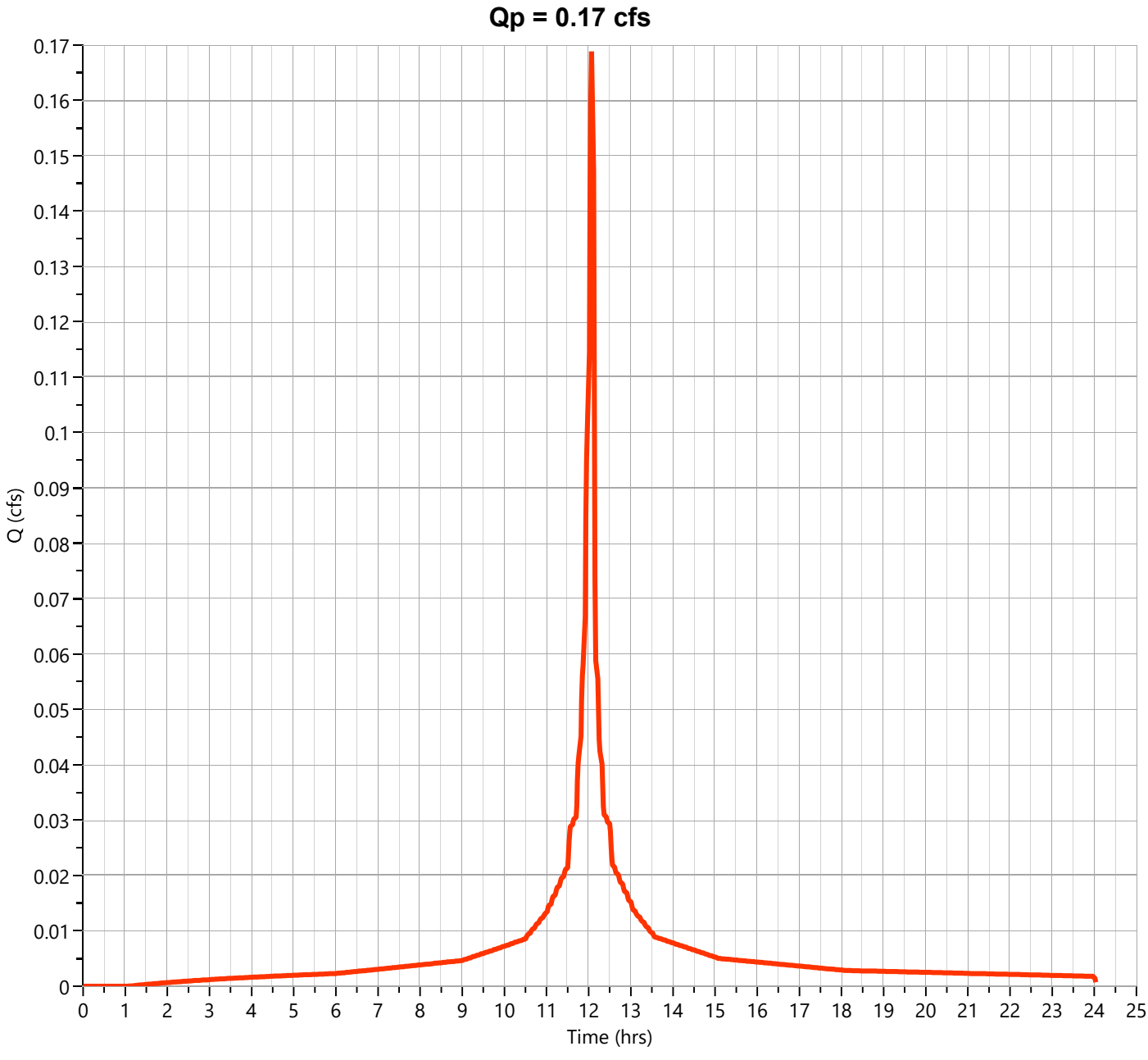
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B Impervious

Hyd. No. 7

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.169 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 549 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

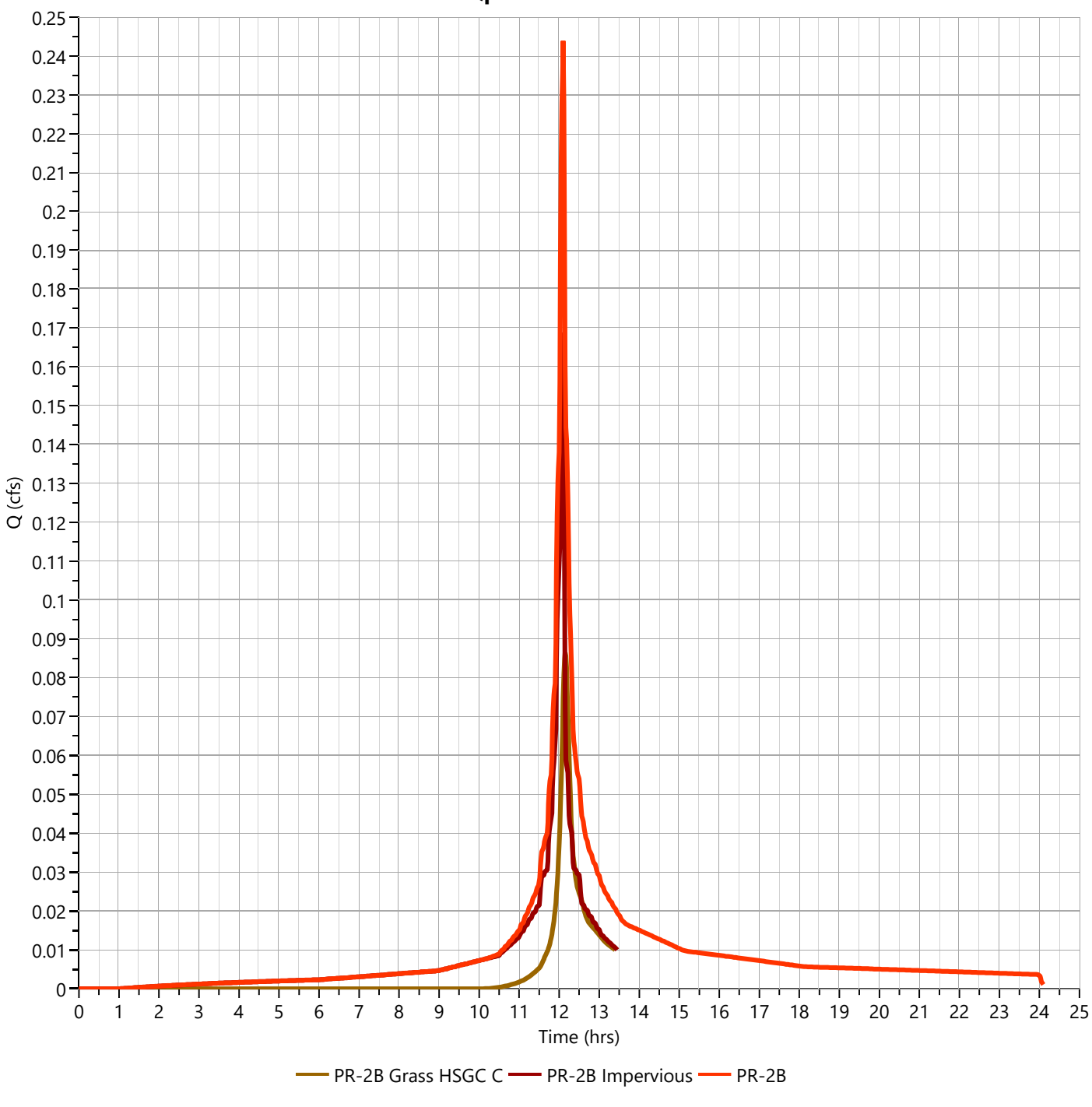
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B

Hyd. No. 8

Hydrograph Type	= Junction	Peak Flow	= 0.244 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 857 cuft
Inflow Hydrographs	= 6, 7	Total Contrib. Area	= 0.12 ac



Hydrograph Report

Project Name:

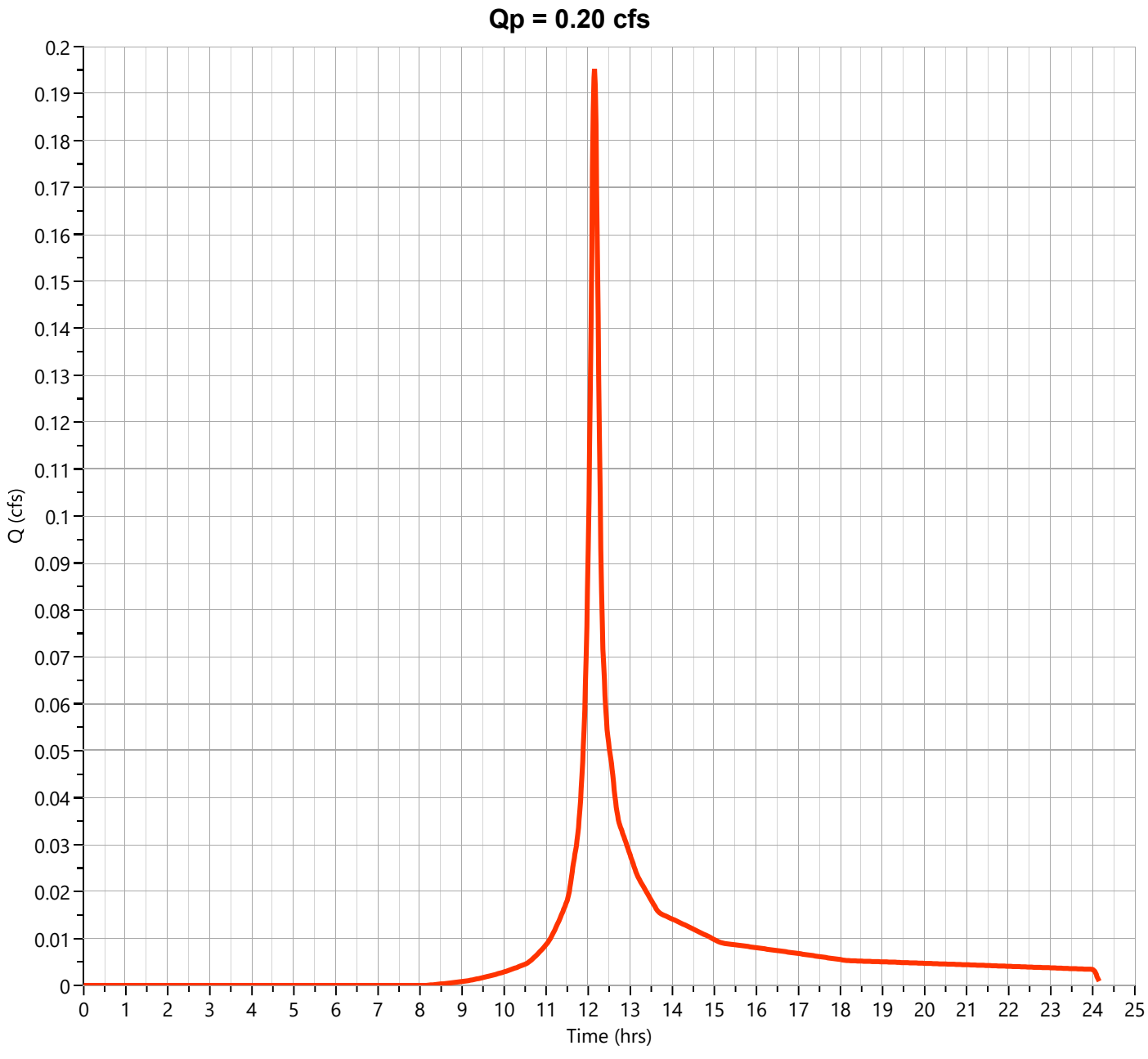
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B Grass HSGC C

Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.195 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Runoff Volume	= 679 cuft
Drainage Area	= 0.07 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 9.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

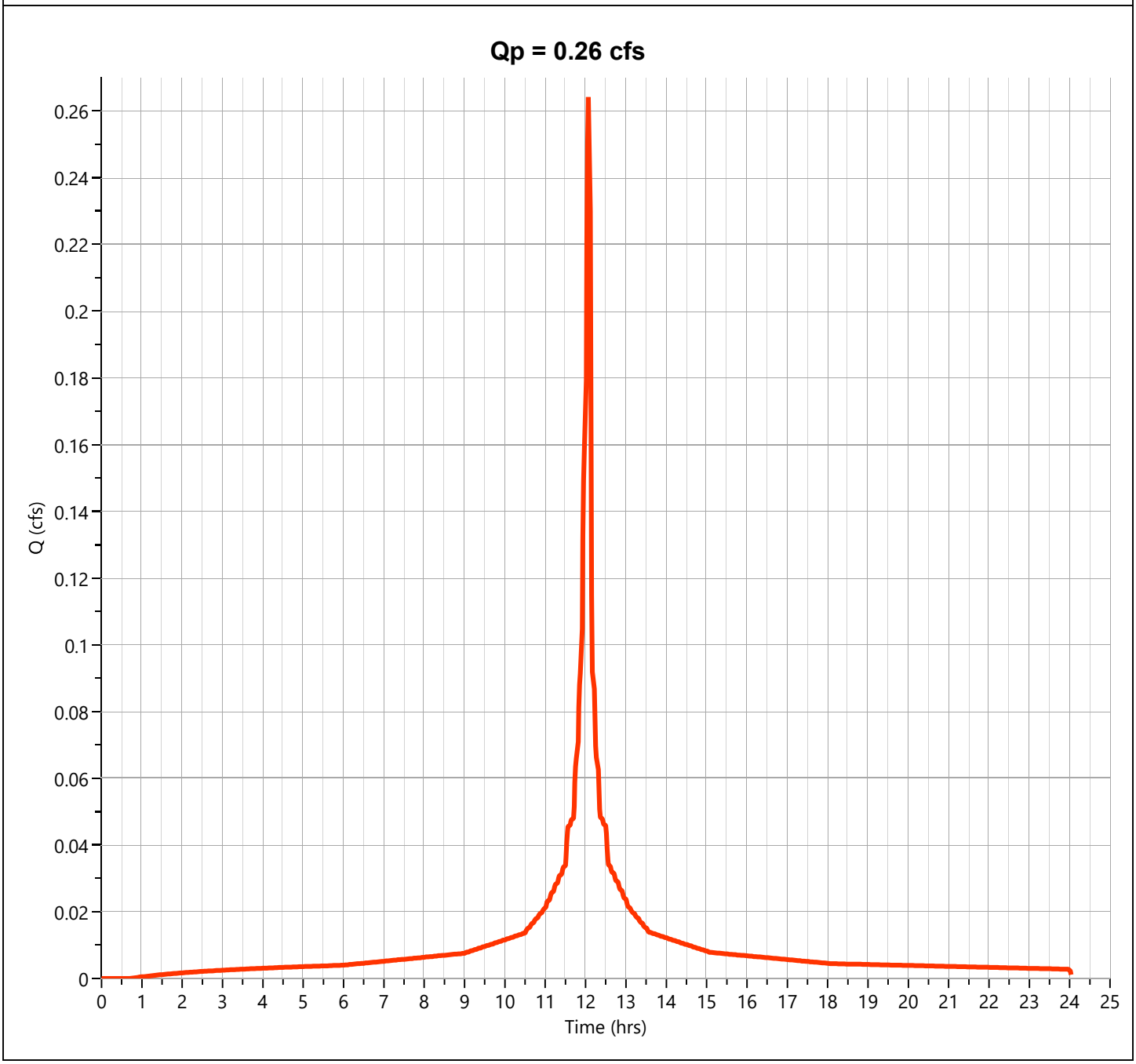
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B Impervious

Hyd. No. 7

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.264 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 875 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

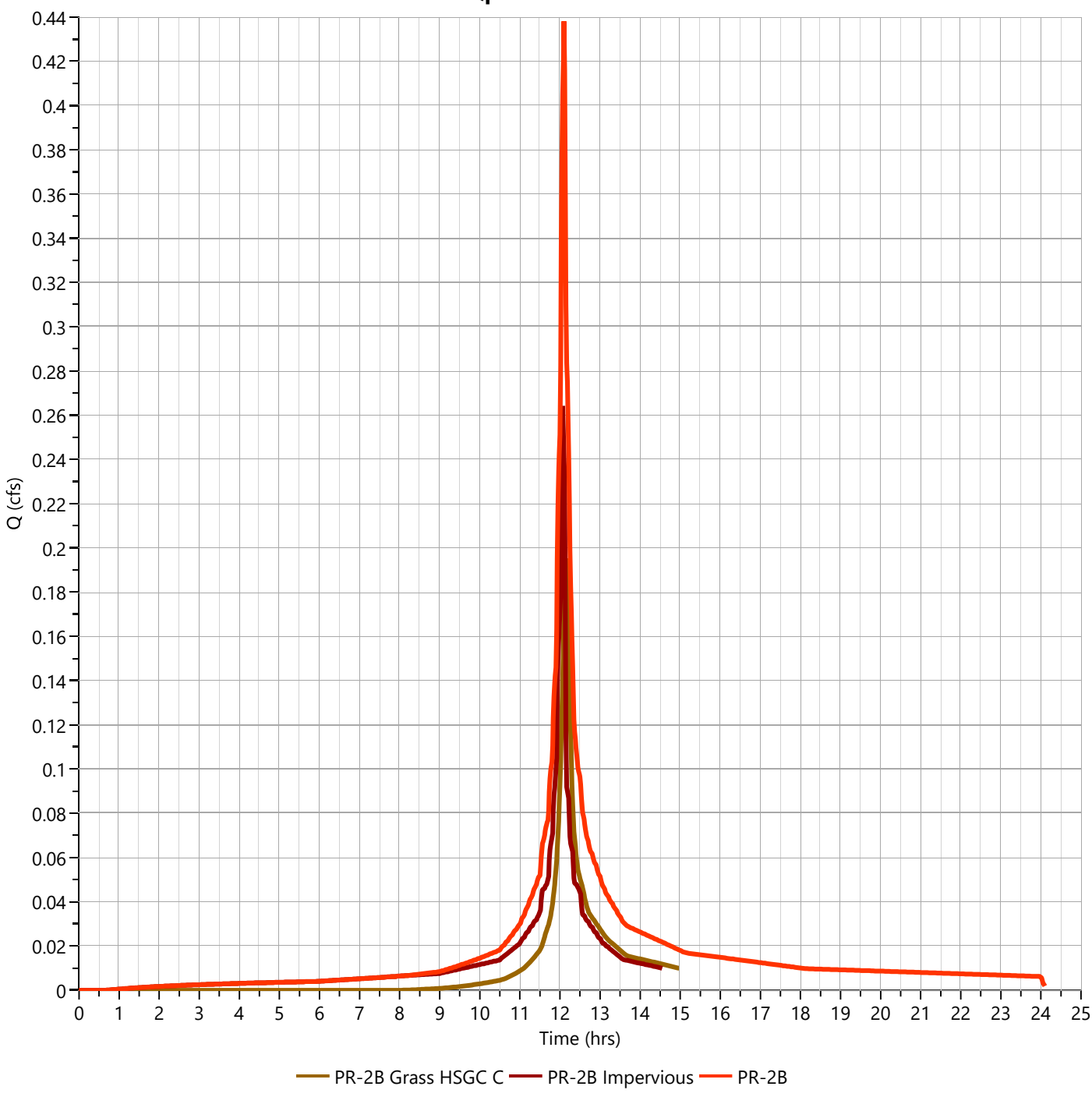
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B

Hyd. No. 8

Hydrograph Type	= Junction	Peak Flow	= 0.438 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,554 cuft
Inflow Hydrographs	= 6, 7	Total Contrib. Area	= 0.12 ac



Hydrograph Report

Project Name:

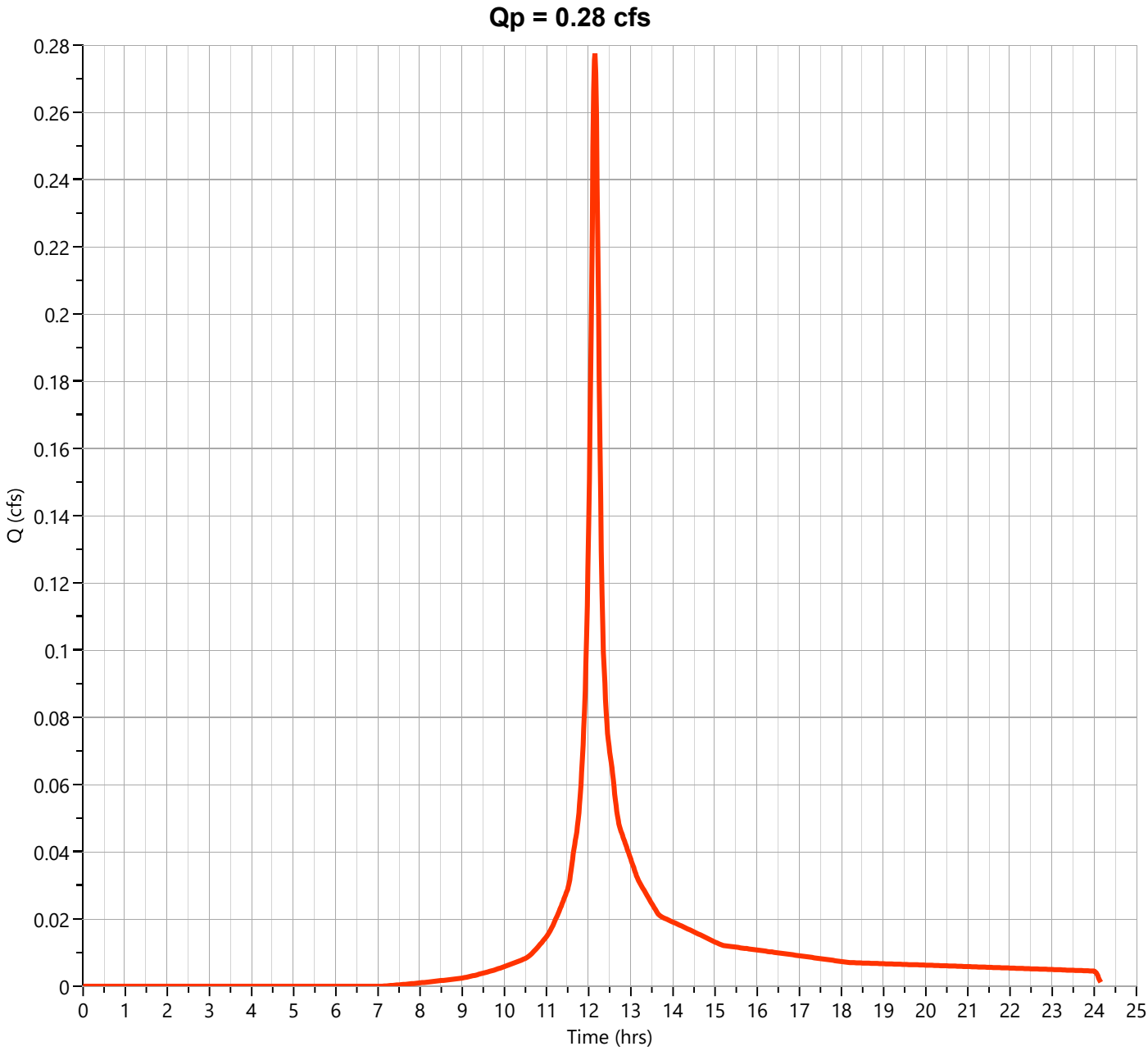
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B Grass HSGC C

Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.277 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Runoff Volume	= 968 cuft
Drainage Area	= 0.07 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 9.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

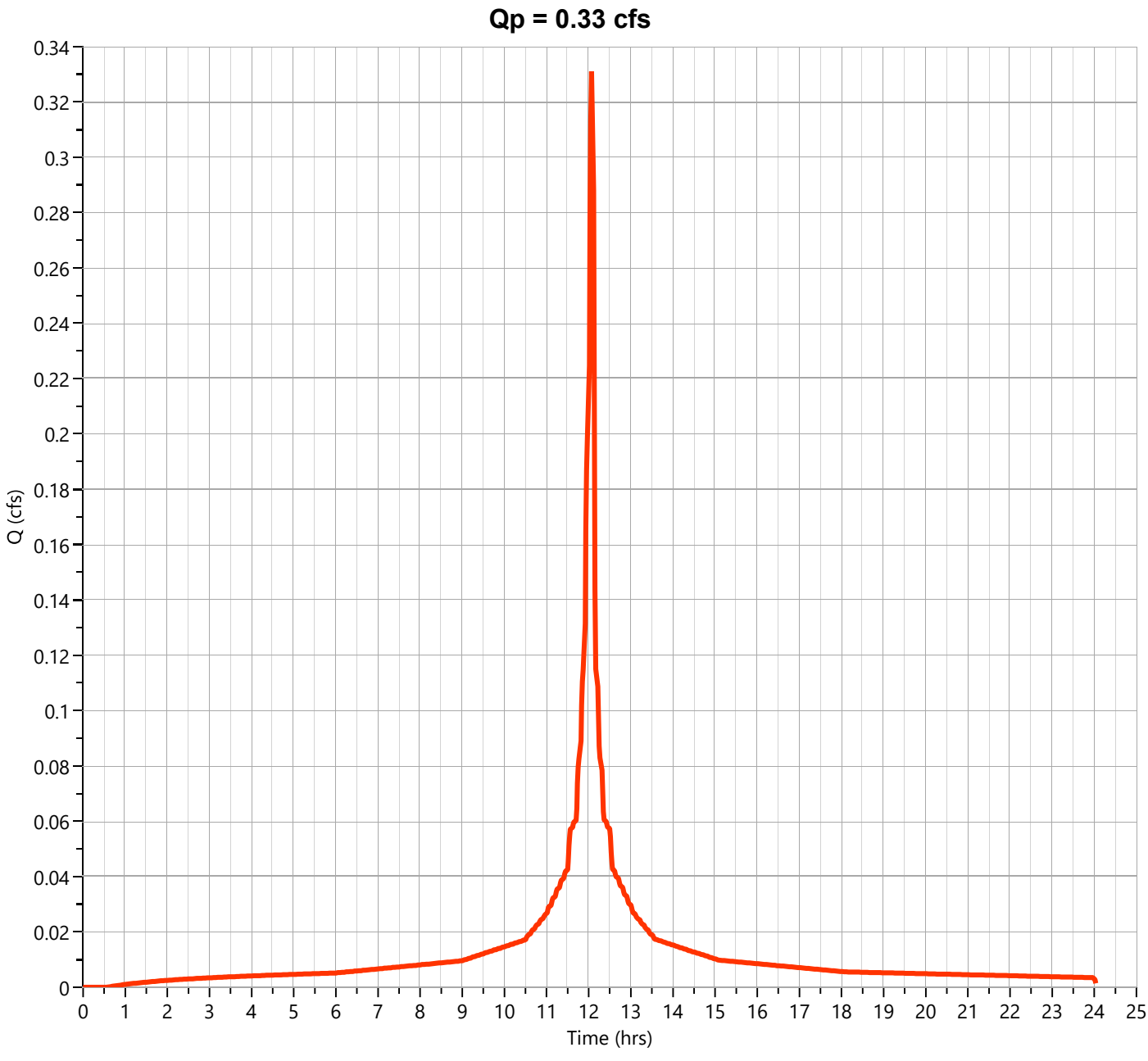
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B Impervious

Hyd. No. 7

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.331 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,105 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

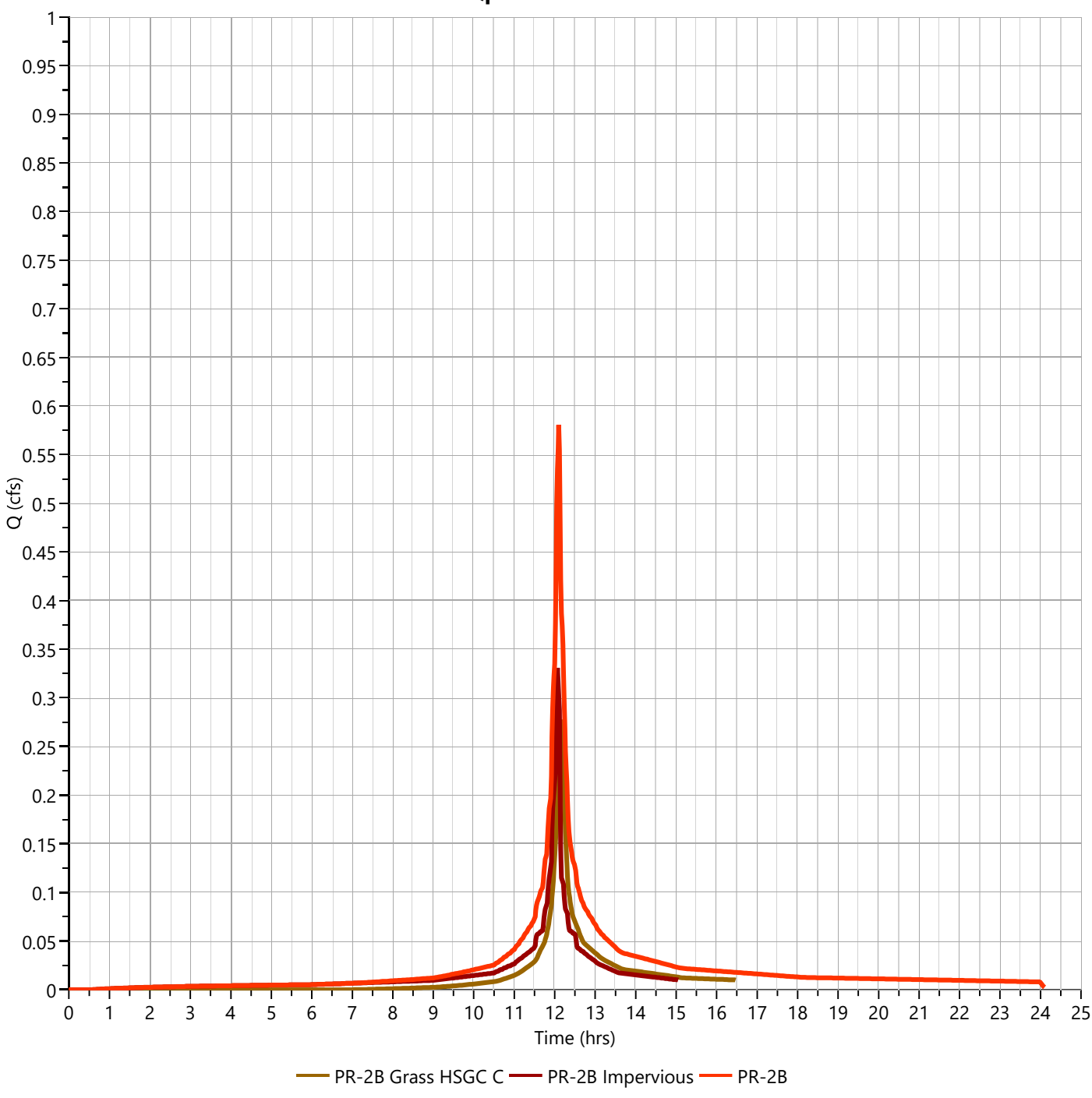
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B

Hyd. No. 8

Hydrograph Type	= Junction	Peak Flow	= 0.581 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,072 cuft
Inflow Hydrographs	= 6, 7	Total Contrib. Area	= 0.12 ac



Hydrograph Report

Project Name:

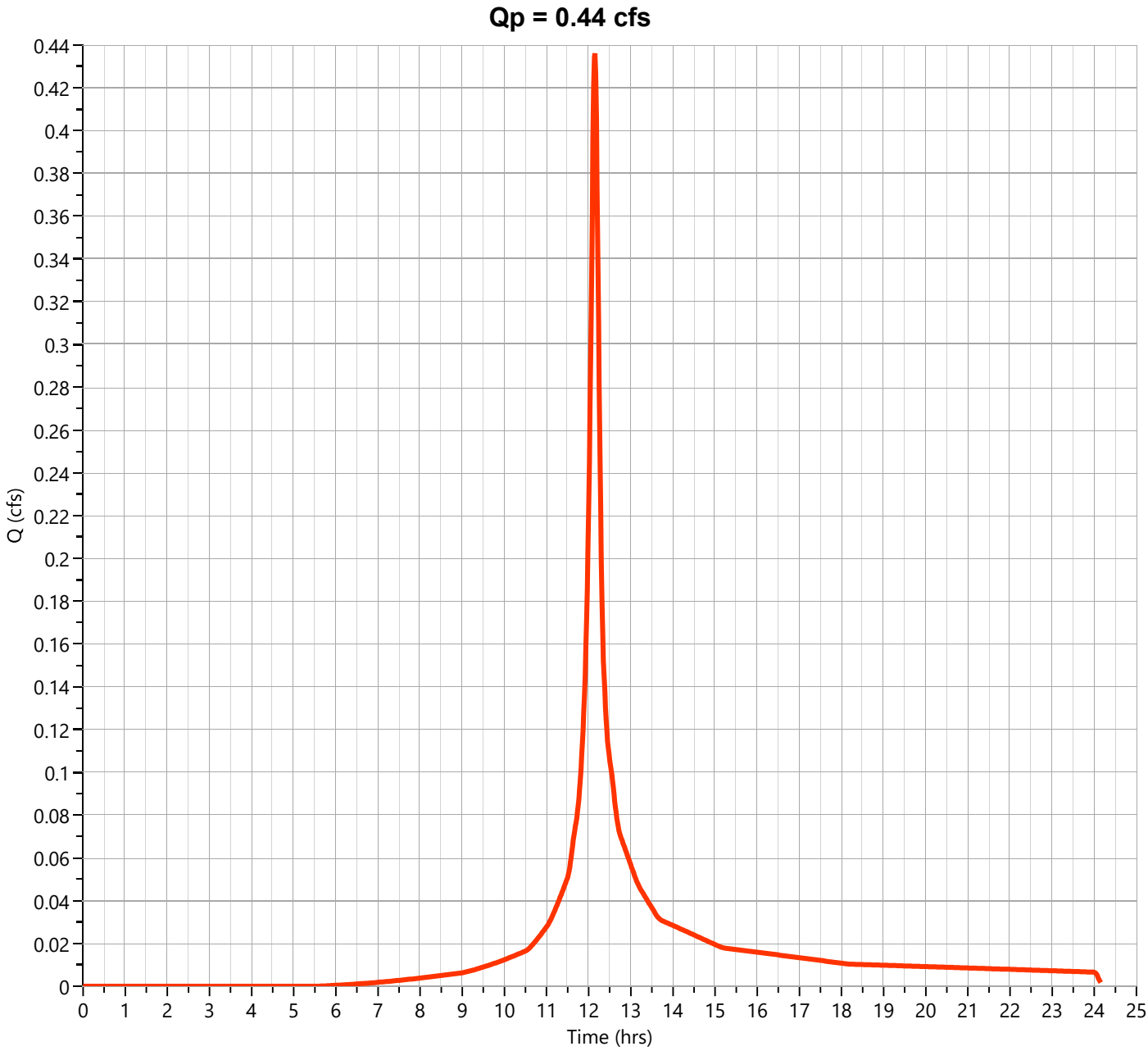
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B Grass HSGC C

Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.436 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Runoff Volume	= 1,541 cuft
Drainage Area	= 0.07 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 9.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

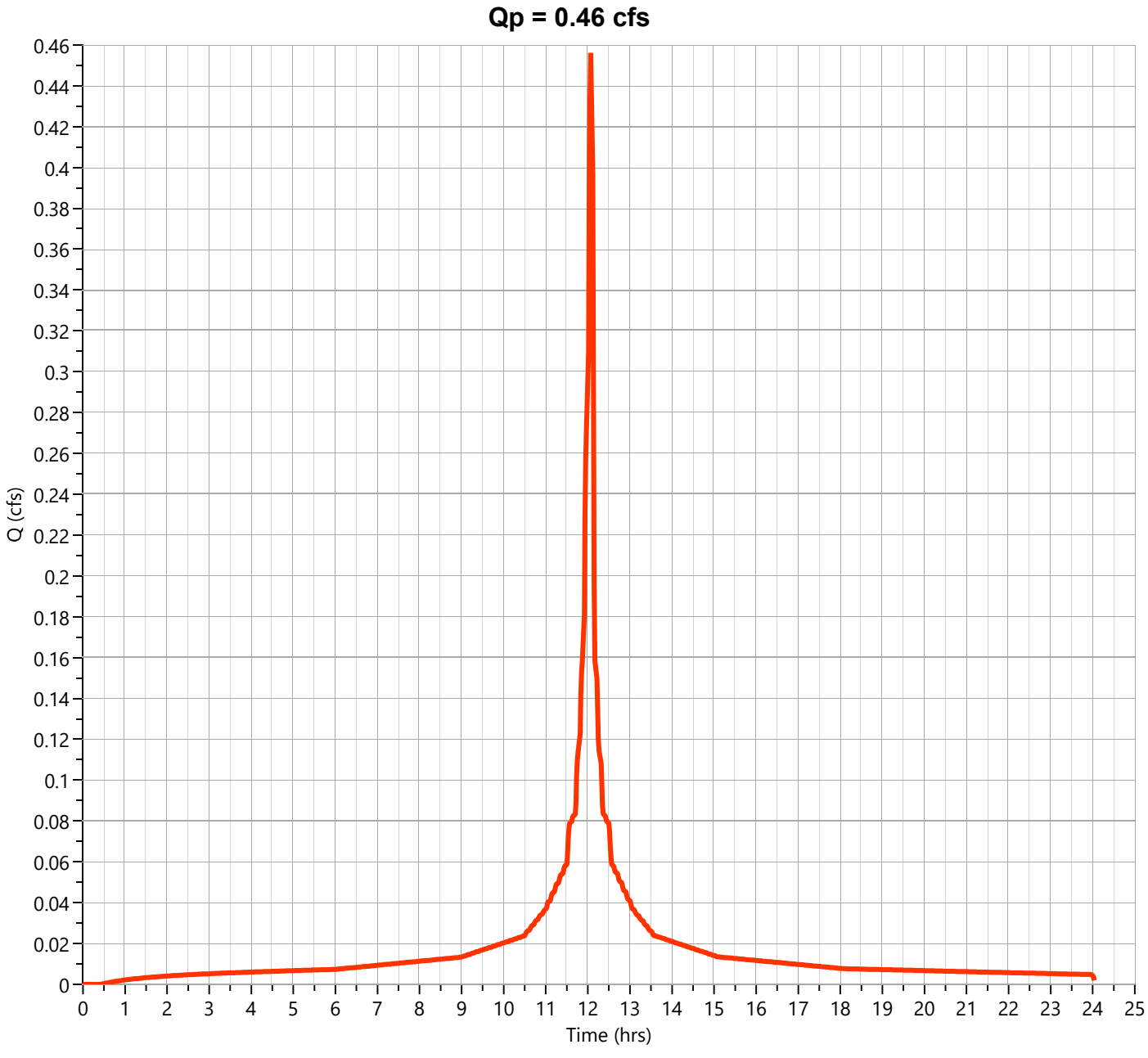
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B Impervious

Hyd. No. 7

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.456 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,535 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

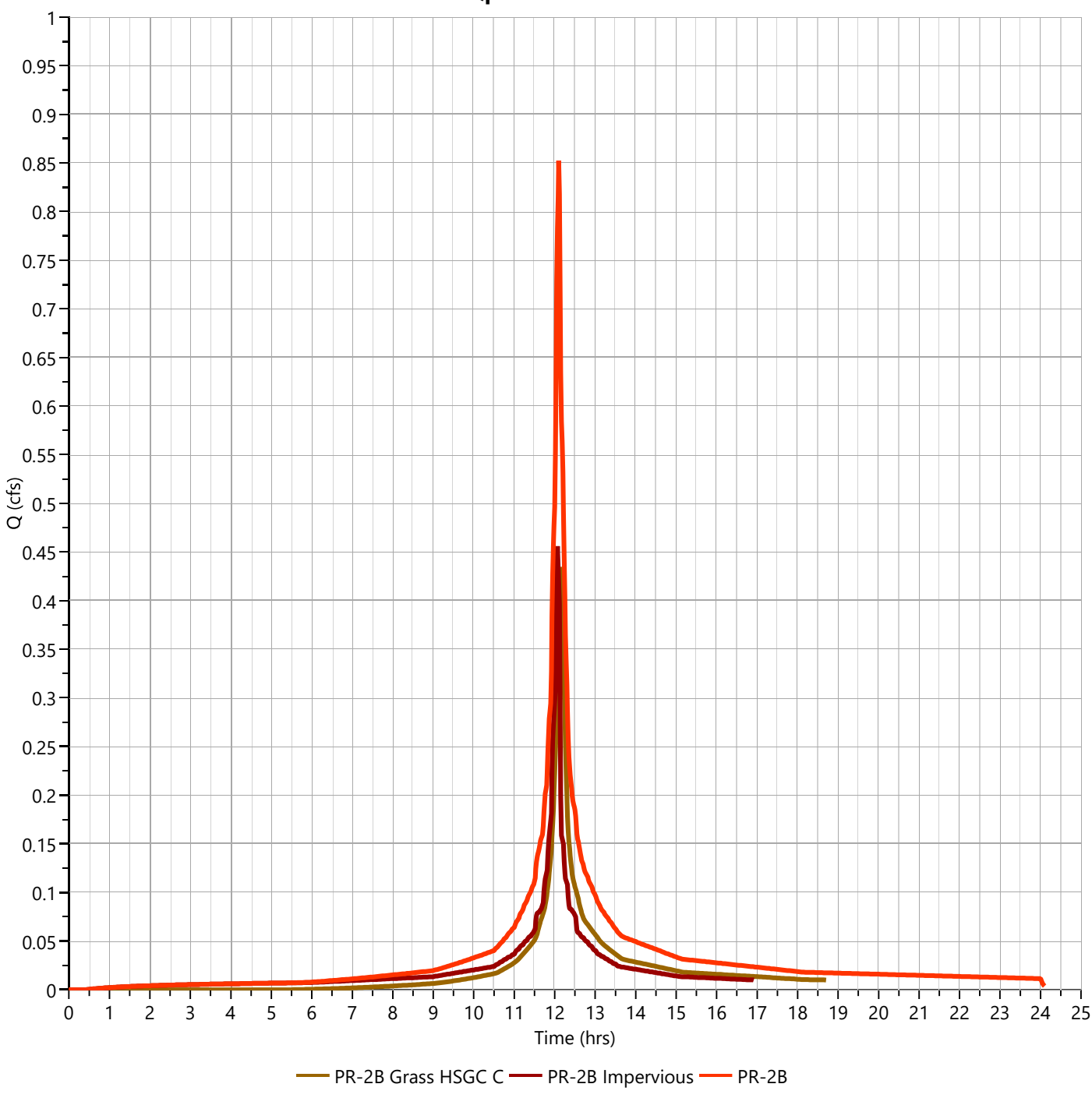
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B

Hyd. No. 8

Hydrograph Type	= Junction	Peak Flow	= 0.852 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 3,076 cuft
Inflow Hydrographs	= 6, 7	Total Contrib. Area	= 0.12 ac



PR-2C WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/6/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/6/2024**

Circle One: Present **(Developed)** — **Current Proposed Watershed PR-2C - Impervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1	2	
1.	Surface Description (NEH table 15-1)		Smooth Surfaces	Dense Grasses	
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011	0.24	
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	19	13	
4.	Two-year 24-hr rainfall, P_2	in	3.46	3.46	
5.	Land Slope, s	ft/ft	0.012	0.010	
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	100	42	
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.006	+ 0.056	+
				Sheet Flow Sub-Total	0.063 hours

Shallow Concentrated Flow		Segment ID			
8.	Surface Description				
9.	Flow Length, L	ft			
10.	Watercourse Slope, s	ft/ft			
11.	Average Velocity, V (NEH table 15-3)	ft/s			
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+	+
				Shallow Conc. Flow Sub-Total	0.000 hours

Channel Flow		Segment ID			
13.	Flow Length, L	ft			
14.	Cross Sectional flow area, a	ft^2			
15.	Wetted Perimeter, P_w	ft			
16.	Hydraulic Radius, r $r = a / P_w$	ft			
17.	Channel Slope, s	ft/ft			
18.	Manning's Roughness Coeff., n				
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s			
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+	+
				Channel Flow Sub-Total	0.000 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.063 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	4 minutes

Project:	**Beacon Unitarian Universalist Church**		**By:**	**TEG**	**Date:** **2/6/2024**
Location:	**Summit, NJ**		**Checked By:**	**MJV**	**Date Checked:** **2/6/2024**

Circle One: Present (**Developed**) — **Current Proposed Watershed PR-2C - Pervious**

Circle One: (**T_c**) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		
1.	Surface Description (NEH table 15-1)		Dense Grasses		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.24		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	28		
4.	Two-year 24-hr rainfall, P_2	in	3.46		
5.	Land Slope, s	ft/ft	0.012		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	46		
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.101	+	+
			Sheet Flow Sub-Total		0.101 hours

Shallow Concentrated Flow		Segment ID			
8.	Surface Description				
9.	Flow Length, L	ft			
10.	Watercourse Slope, s	ft/ft			
11.	Average Velocity, V (NEH table 15-3)	ft/s			
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+	+
			Shallow Conc. Flow Sub-Total		0.000 hours

Channel Flow		Segment ID			
13.	Flow Length, L	ft			
14.	Cross Sectional flow area, a	ft^2			
15.	Wetted Perimeter, P_w	ft			
16.	Hydraulic Radius, r $r = a / P_w$	ft			
17.	Channel Slope, s	ft/ft			
18.	Manning's Roughness Coeff., n				
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s			
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+	+
			Channel Flow Sub-Total		0.000 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	**0.101 hours**
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	**6 minutes**

Hydrograph Report

Project Name:

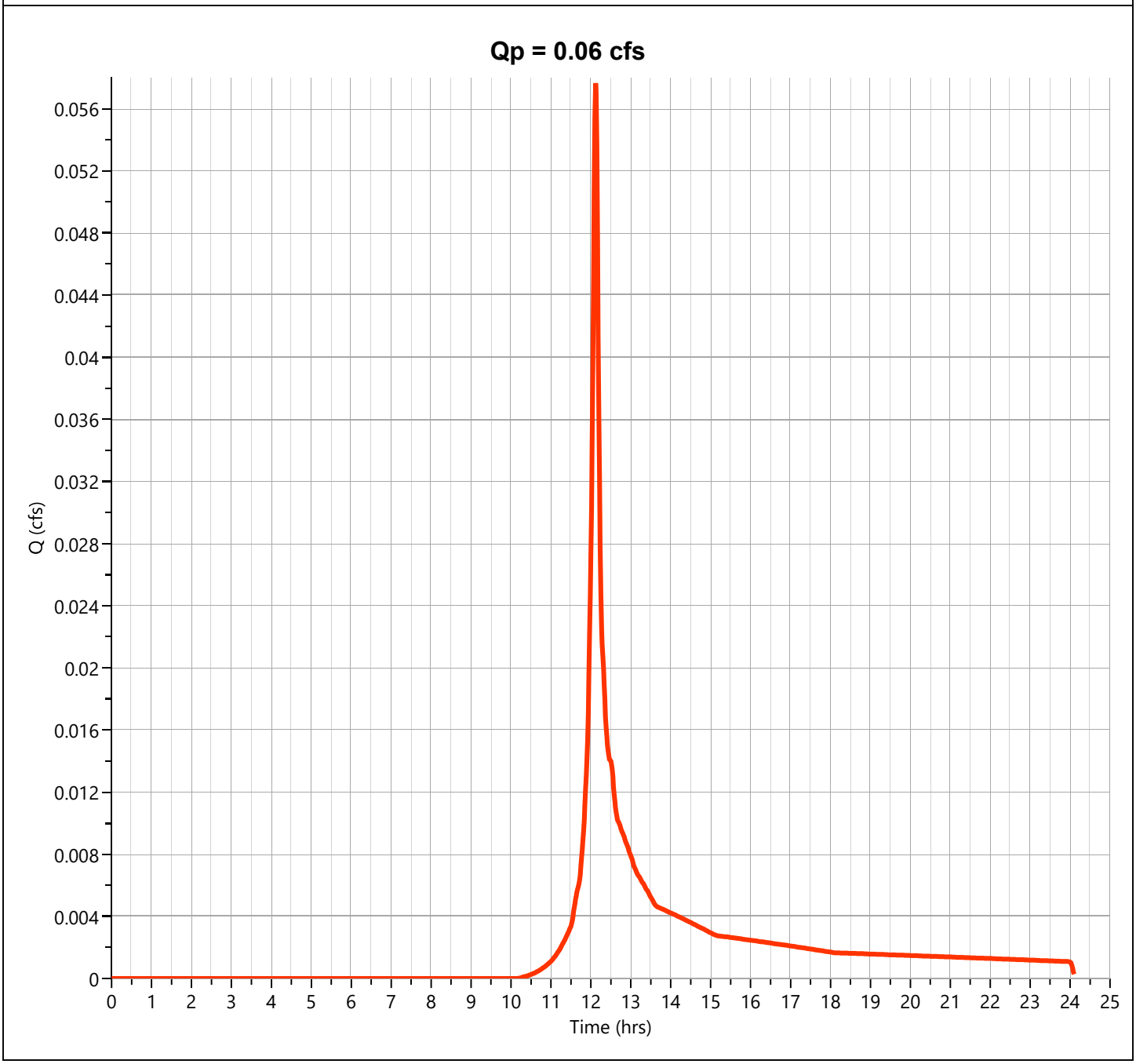
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2C Grass HSGC C

Hyd. No. 11

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.058 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 182 cuft
Drainage Area	= 0.04 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

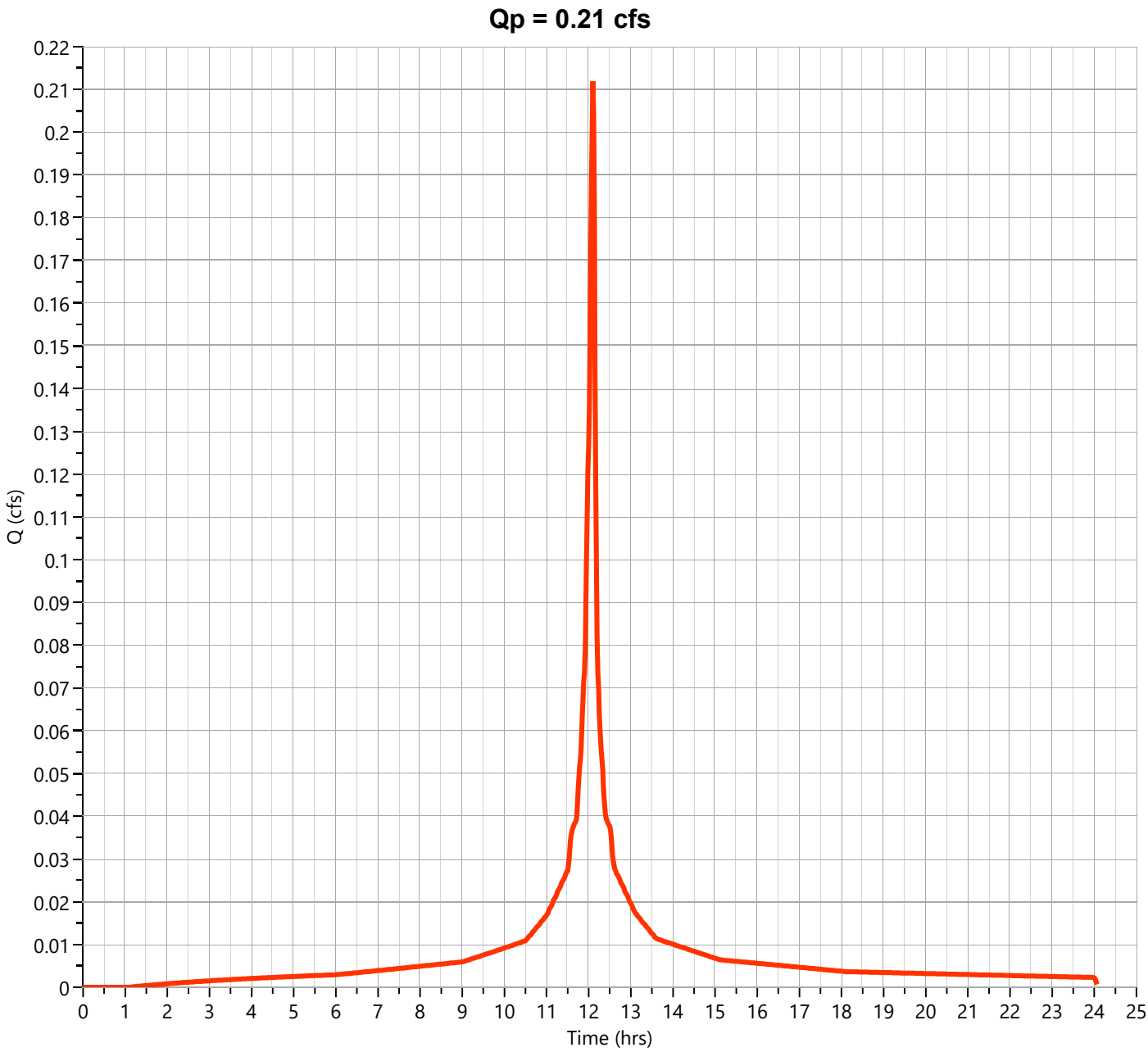
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2C Impervious

Hyd. No. 12

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.212 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 703 cuft
Drainage Area	= 0.06 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

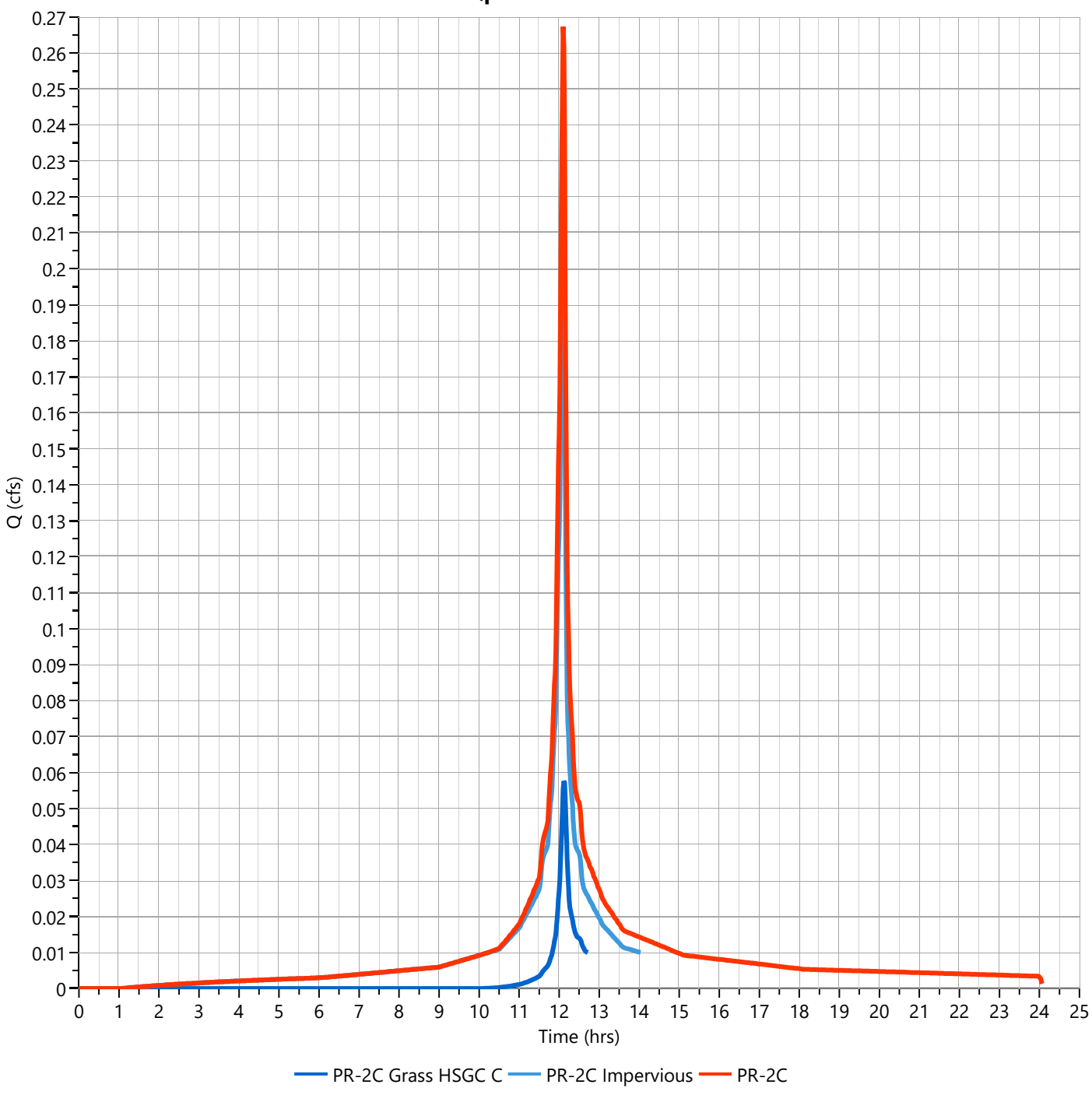
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2C

Hyd. No. 13

Hydrograph Type	= Junction	Peak Flow	= 0.267 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 884 cuft
Inflow Hydrographs	= 11, 12	Total Contrib. Area	= 0.1 ac



Hydrograph Report

Project Name:

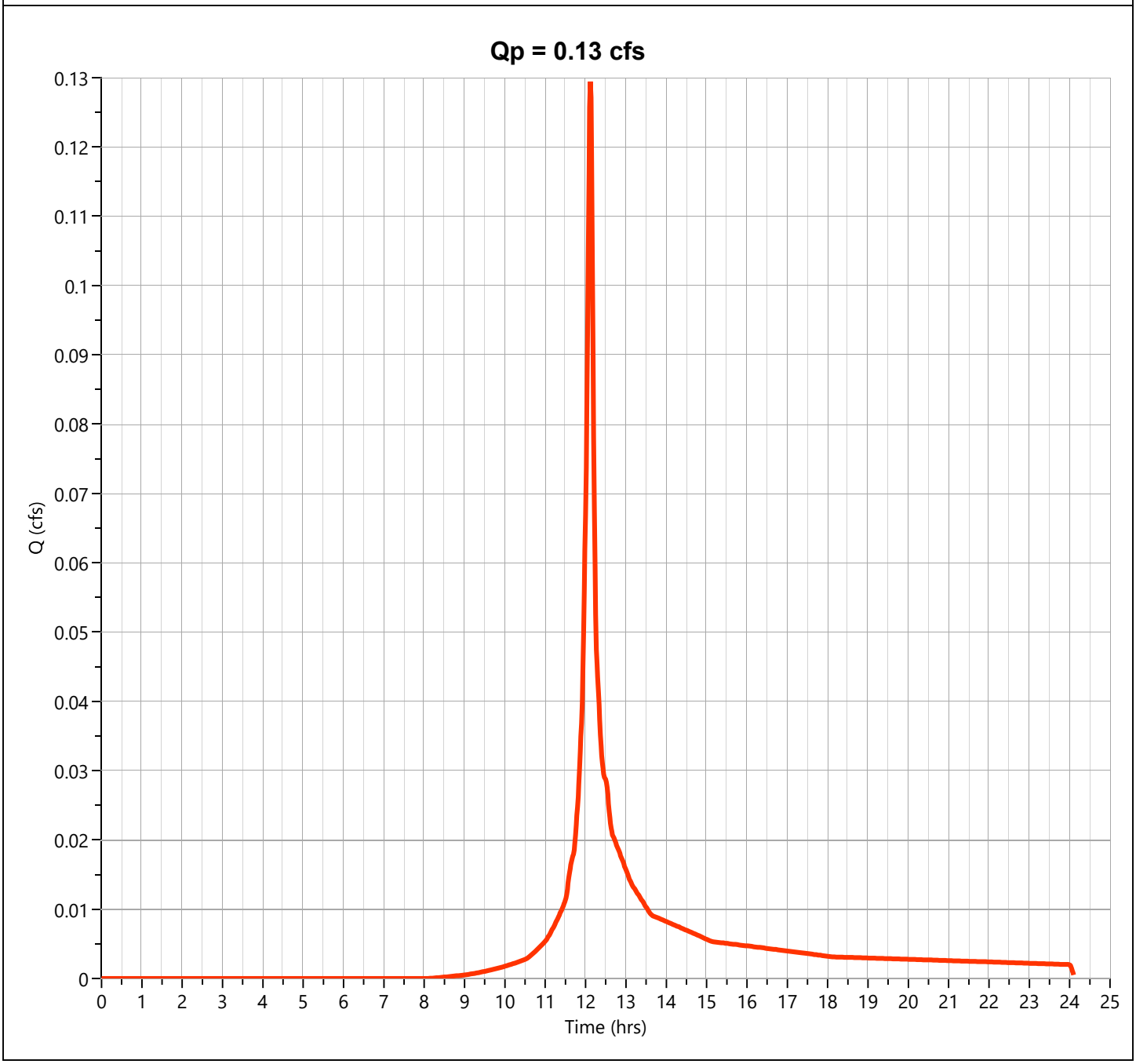
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2C Grass HSGC C

Hyd. No. 11

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.129 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 400 cuft
Drainage Area	= 0.04 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

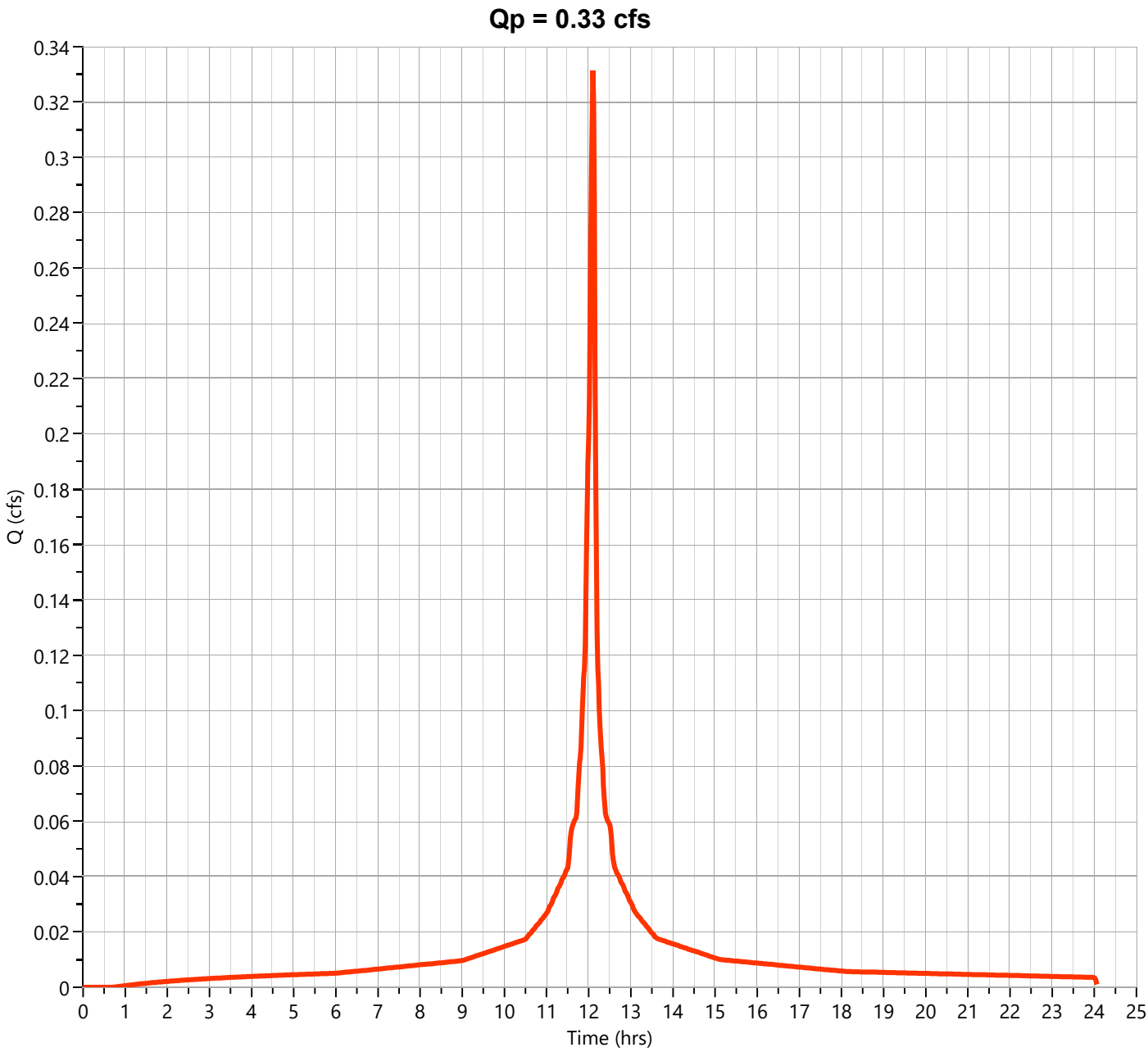
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2C Impervious

Hyd. No. 12

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.331 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,120 cuft
Drainage Area	= 0.06 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

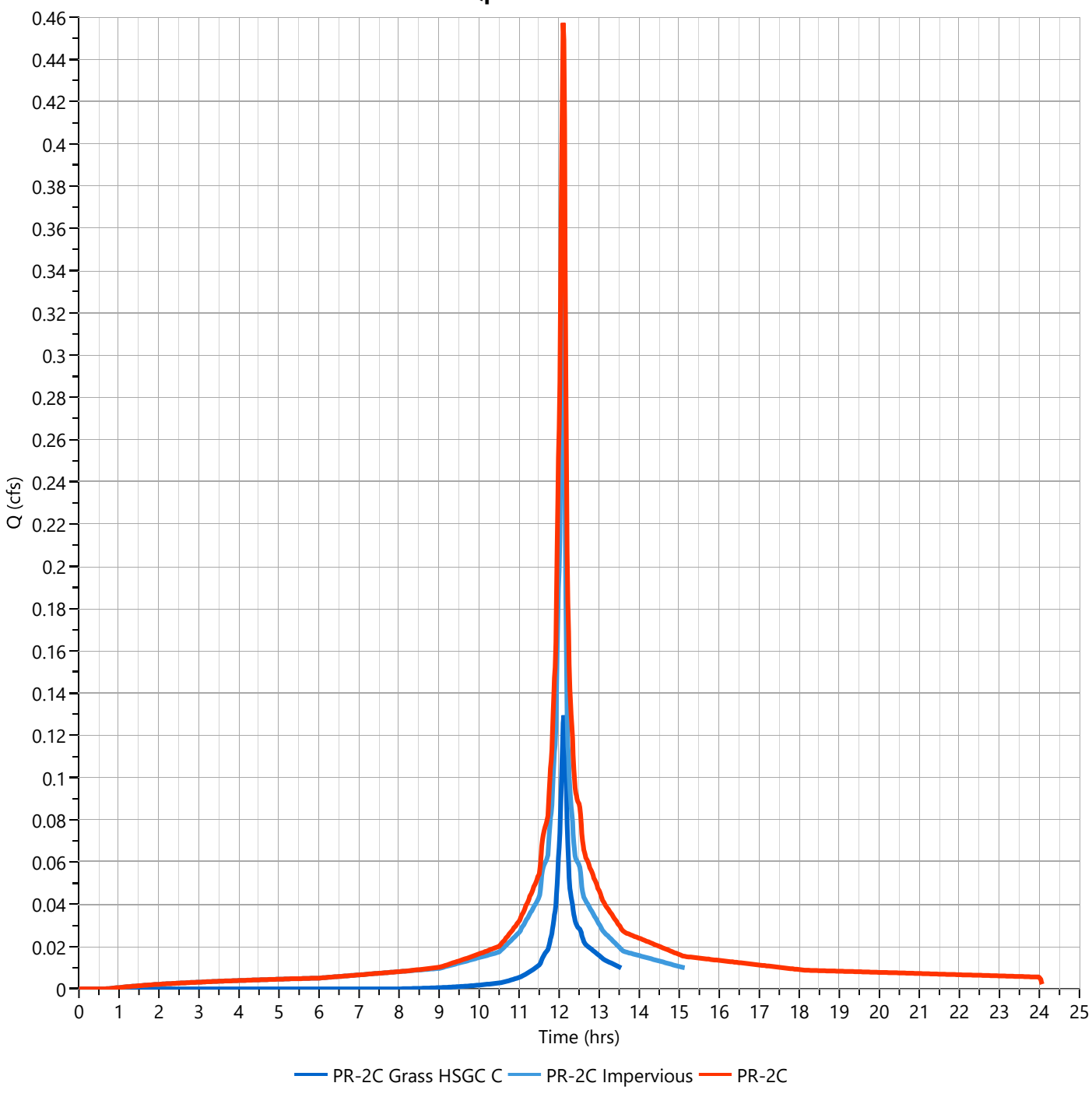
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2C

Hyd. No. 13

Hydrograph Type	= Junction	Peak Flow	= 0.457 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,520 cuft
Inflow Hydrographs	= 11, 12	Total Contrib. Area	= 0.1 ac



Hydrograph Report

Project Name:

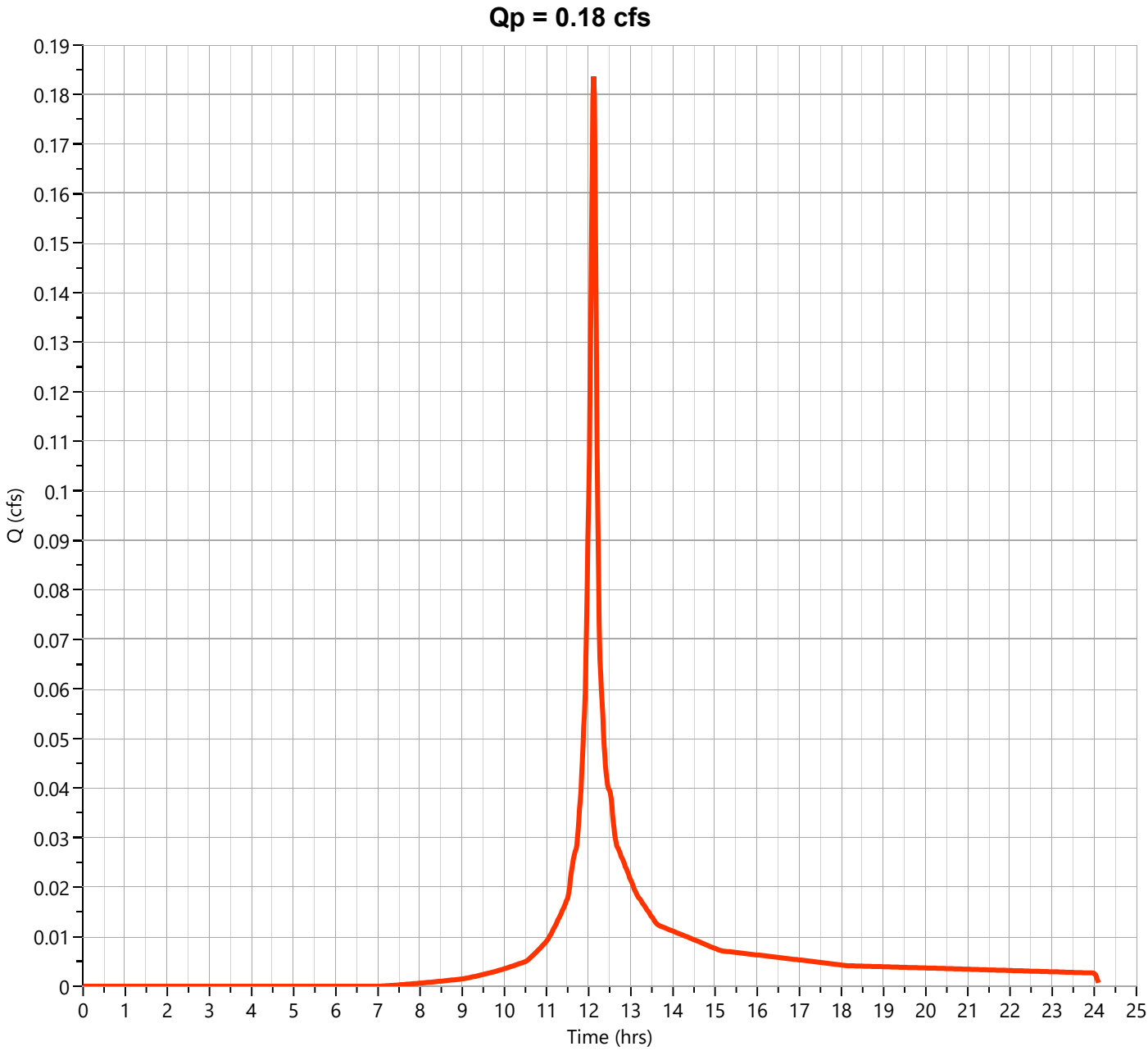
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2C Grass HSGC C

Hyd. No. 11

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.184 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 570 cuft
Drainage Area	= 0.04 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

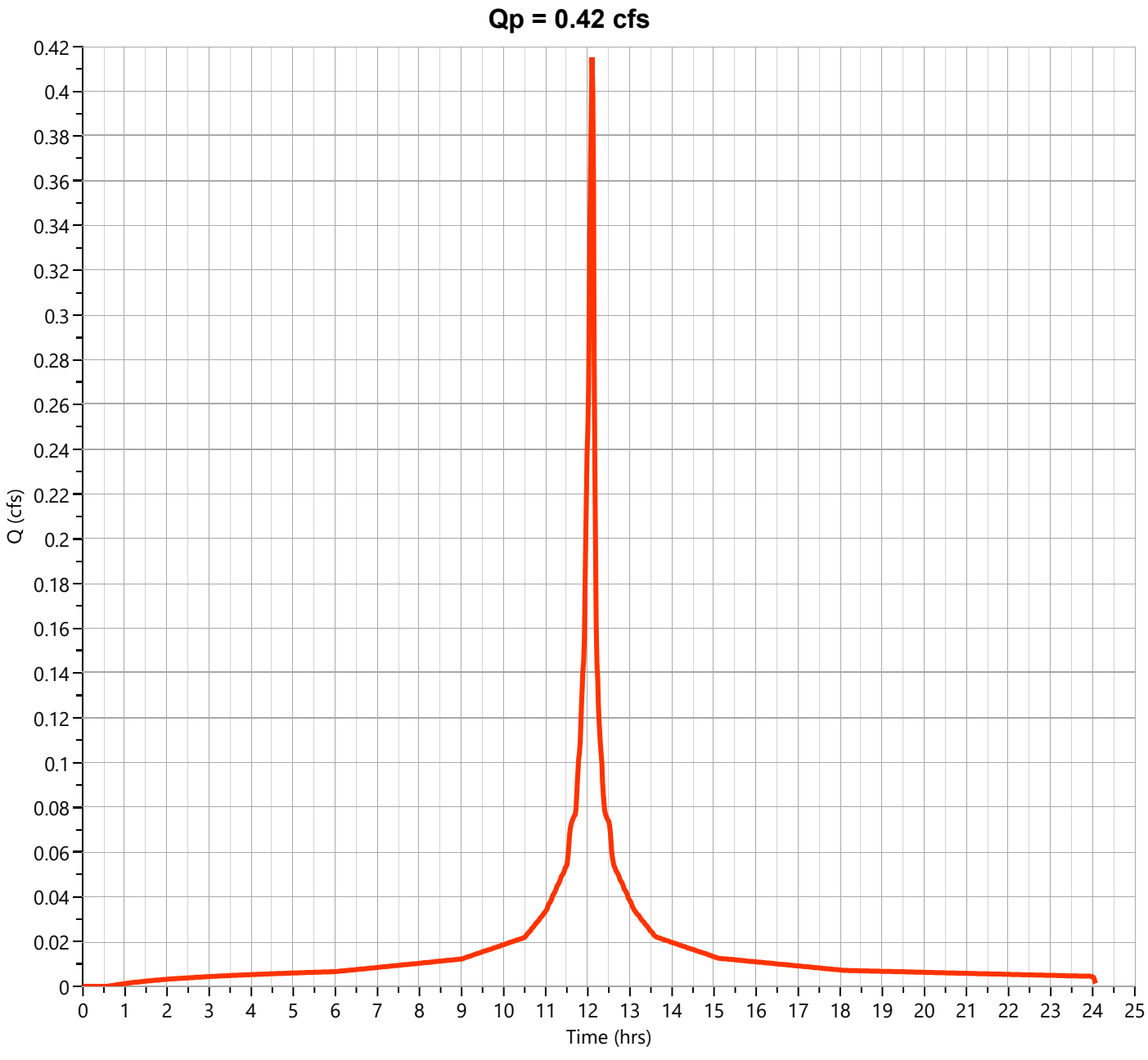
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2C Impervious

Hyd. No. 12

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.415 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,414 cuft
Drainage Area	= 0.06 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

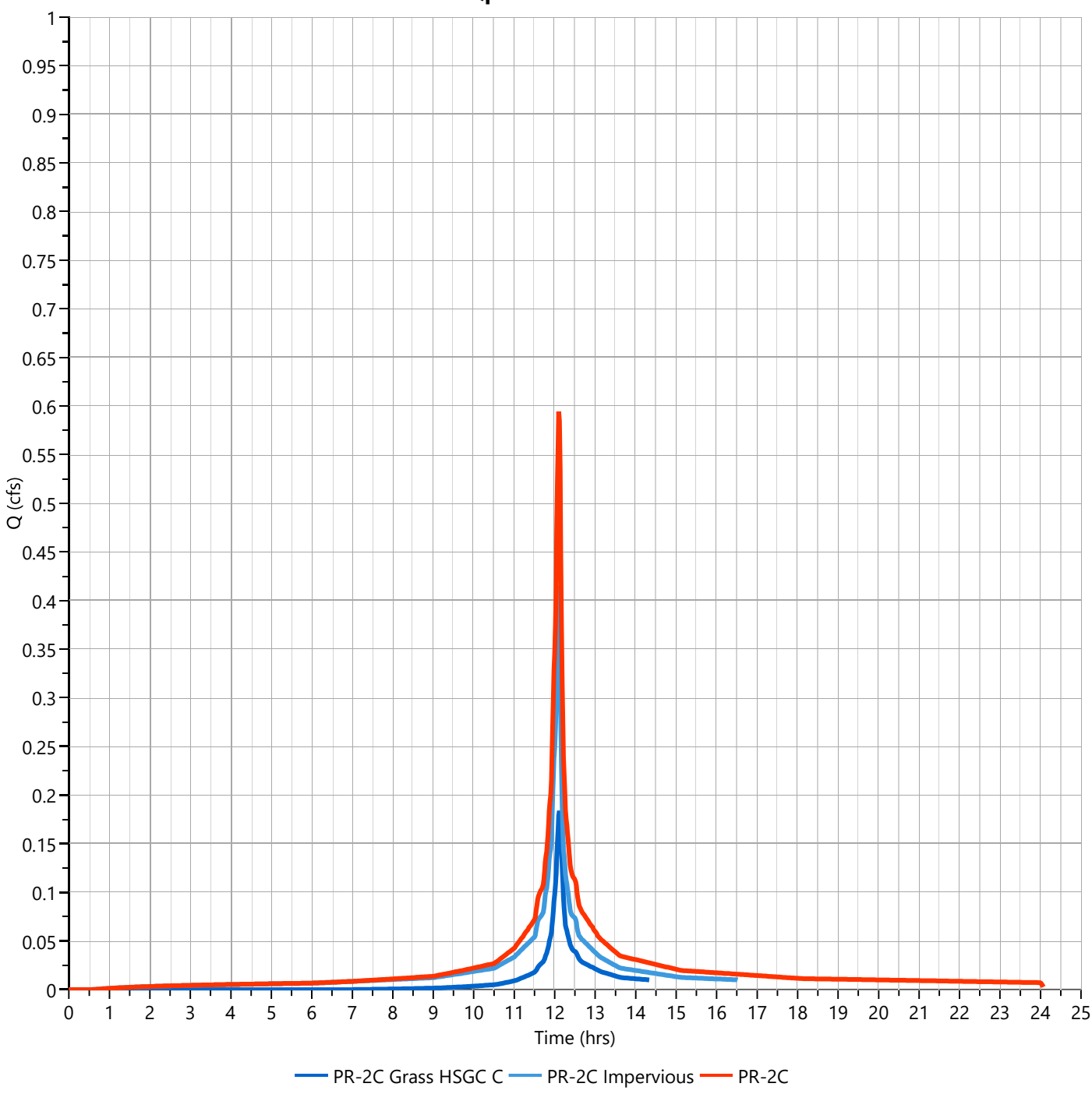
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2C

Hyd. No. 13

Hydrograph Type	= Junction	Peak Flow	= 0.594 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,984 cuft
Inflow Hydrographs	= 11, 12	Total Contrib. Area	= 0.1 ac



Hydrograph Report

Project Name:

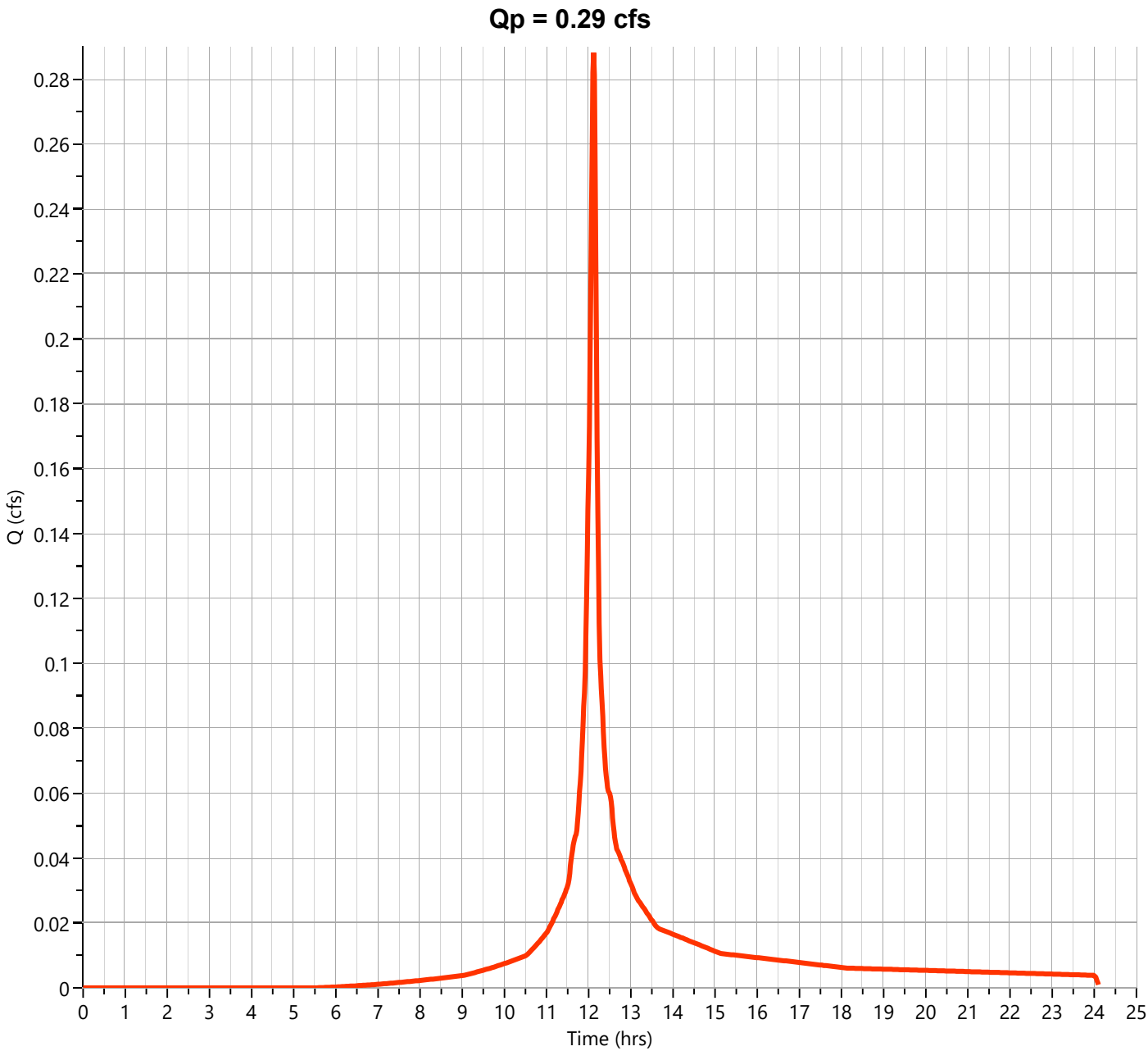
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2C Grass HSGC C

Hyd. No. 11

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.288 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 908 cuft
Drainage Area	= 0.04 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

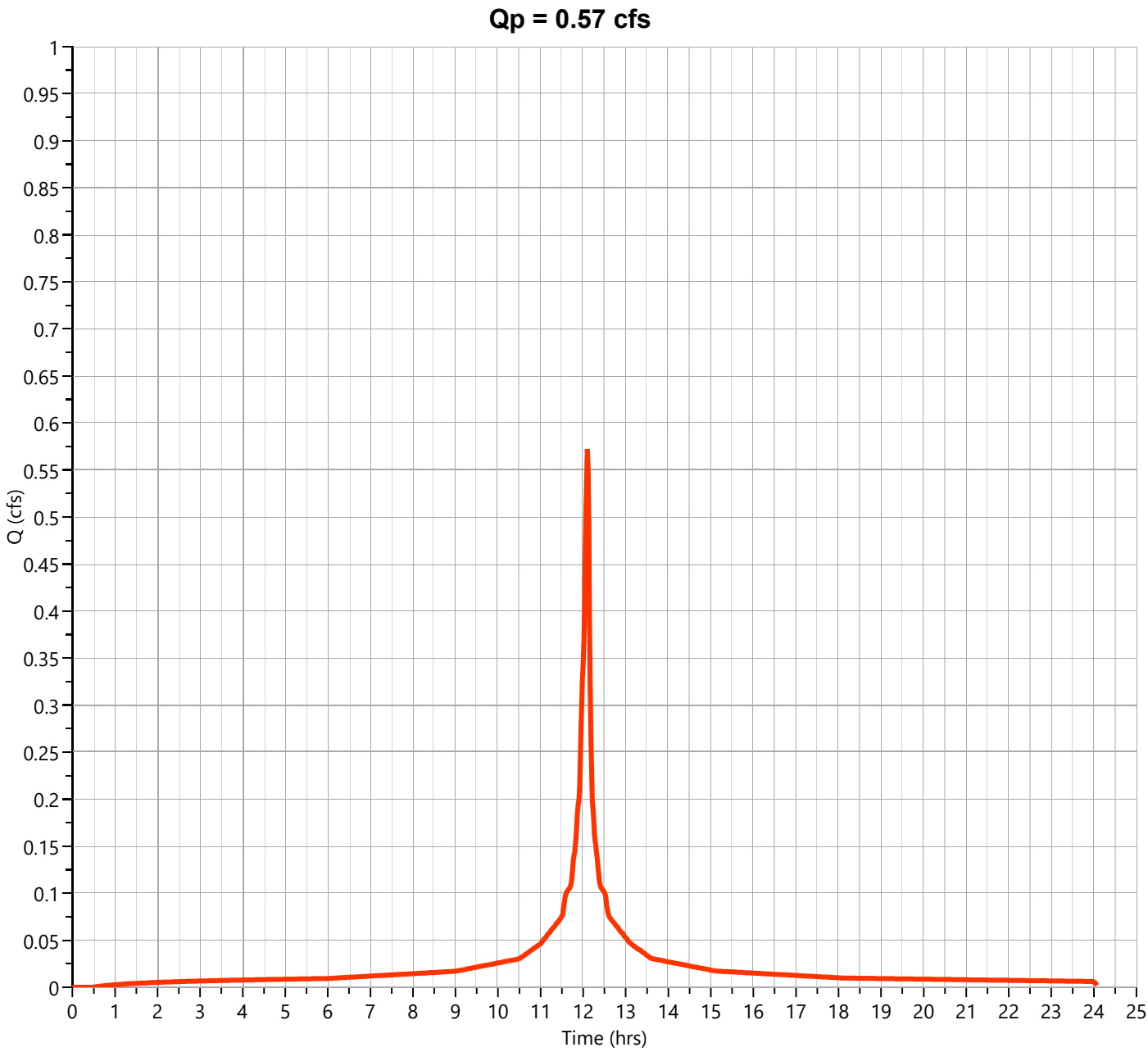
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2C Impervious

Hyd. No. 12

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.572 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,964 cuft
Drainage Area	= 0.06 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

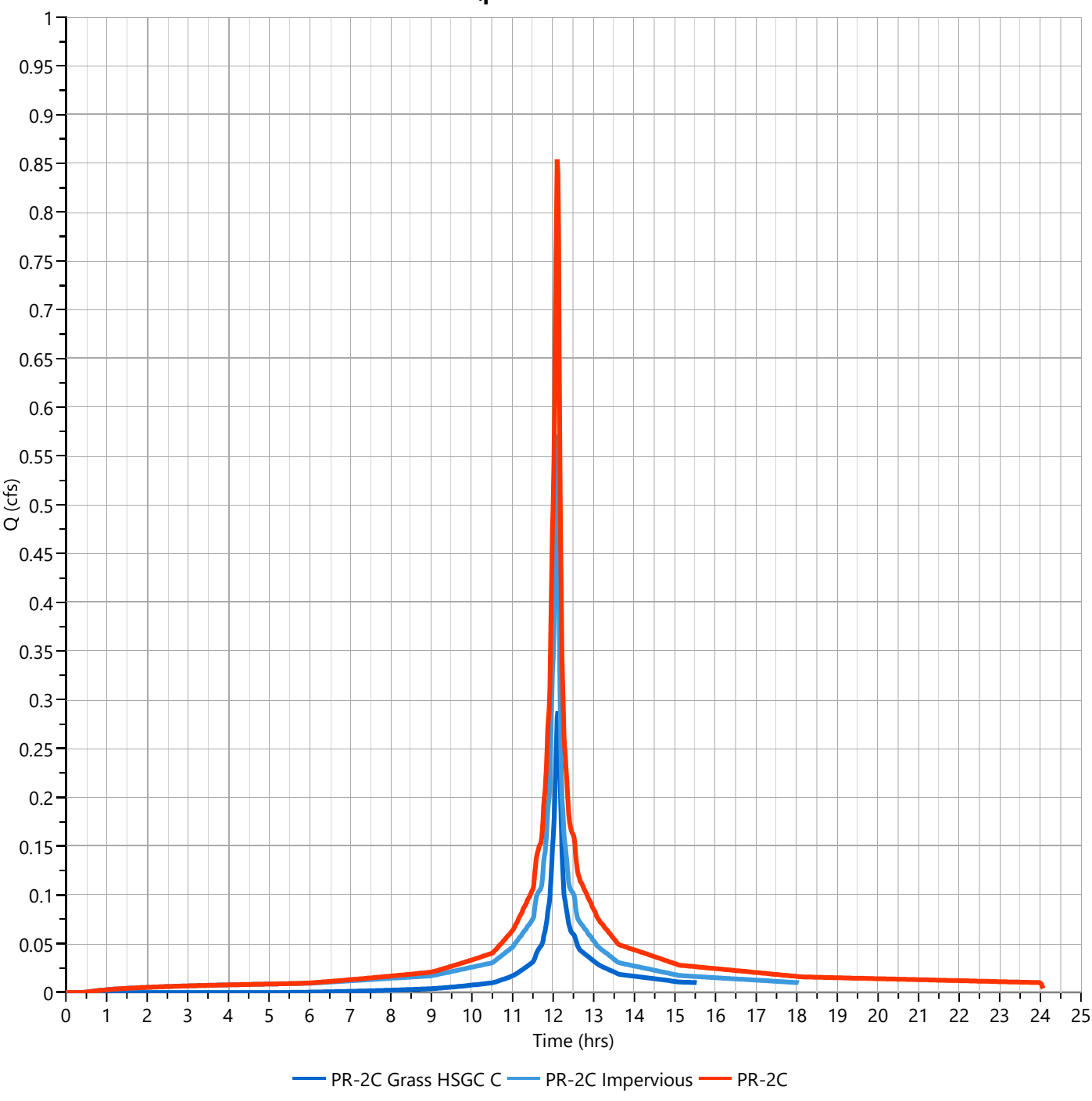
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2C

Hyd. No. 13

Hydrograph Type	= Junction	Peak Flow	= 0.854 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,873 cuft
Inflow Hydrographs	= 11, 12	Total Contrib. Area	= 0.1 ac



PR-2D WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**SM**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: (**Present**) Developed — **Current Proposed Watershed PR-2D Impervious**

Circle One: (**T_c**) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

			Segment ID	1		2		
1.	Surface Description (NEH table 15-1)			Smooth Surfaces		Woods Light Underbrush		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.011		0.40		
3.	Flow Length, L (total L < 100 ft)		ft	6		94		
4.	Two-year 24-hr rainfall, P_2		in	3.46		3.46		
5.	Land Slope, s		ft/ft	0.050		0.046		
6.	Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.001	+	0.235	+	

Sheet Flow Sub-Total **0.237 hours**

Shallow Concentrated Flow

			Segment ID	3		4		
7.	Surface Description			Woodlands		Grassed Waterways		
8.	Flow Length, L		ft	56		140		
9.	Watercourse Slope, s		ft/ft	0.025		0.011		
10.	Average Velocity, V (NEH table 15-3)		ft/s	0.80		1.72		
11.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.019	+	0.023	+	

Shallow Conc. Flow Sub-Total **0.042 hours**

Channel Flow

			Segment ID					
12.	Flow Length, L		ft					
13.	Cross Sectional flow area, a		ft^2					
14.	Wetted Perimeter, P_w		ft					
15.	Hydraulic Radius, r	$r = a / P_w$	ft					
16.	Channel Slope, s		ft/ft					
17.	Manning's Roughness Coeff., n							
18.	Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s					
19.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr		+		+	

Channel Flow Sub-Total **0.000 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) =	**0.279 hours**
Total Tc (minutes) =	**17 minutes**

Project:	**Beacon Unitarian Universalist Church**	**By:**	**SM**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: (**Present**) Developed — **Current Proposed Watershed PR-2D Pervious**

Circle One: (**T_c**) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

			Segment ID	1		2		
1.	Surface Description (NEH table 15-1)			Dense Grasses		Woods Light Underbrush		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.24		0.40		
3.	Flow Length, L (total L < 100 ft)		ft	37		63		
4.	Two-year 24-hr rainfall, P_2		in	3.46		3.46		
5.	Land Slope, s		ft/ft	0.065		0.025		
6.	Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.064	+	0.216	+	

Sheet Flow Sub-Total **0.281 hours**

Shallow Concentrated Flow

			Segment ID	3		4		
7.	Surface Description			Woodlands		Grassed Waterways		
8.	Flow Length, L		ft	56		140		
9.	Watercourse Slope, s		ft/ft	0.025		0.011		
10.	Average Velocity, V (NEH table 15-3)		ft/s	0.80		1.72		
11.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.020	+	0.023	+	

Shallow Conc. Flow Sub-Total **0.042 hours**

Channel Flow

			Segment ID					
12.	Flow Length, L		ft					
13.	Cross Sectional flow area, a		ft^2					
14.	Wetted Perimeter, P_w		ft					
15.	Hydraulic Radius, r	$r = a / P_w$	ft					
16.	Channel Slope, s		ft/ft					
17.	Manning's Roughness Coeff., n							
18.	Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s					
19.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr		+		+	

Channel Flow Sub-Total **0.000 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) =	**0.323 hours**
Total Tc (minutes) =	**19 minutes**

Hydrograph Report

Project Name:

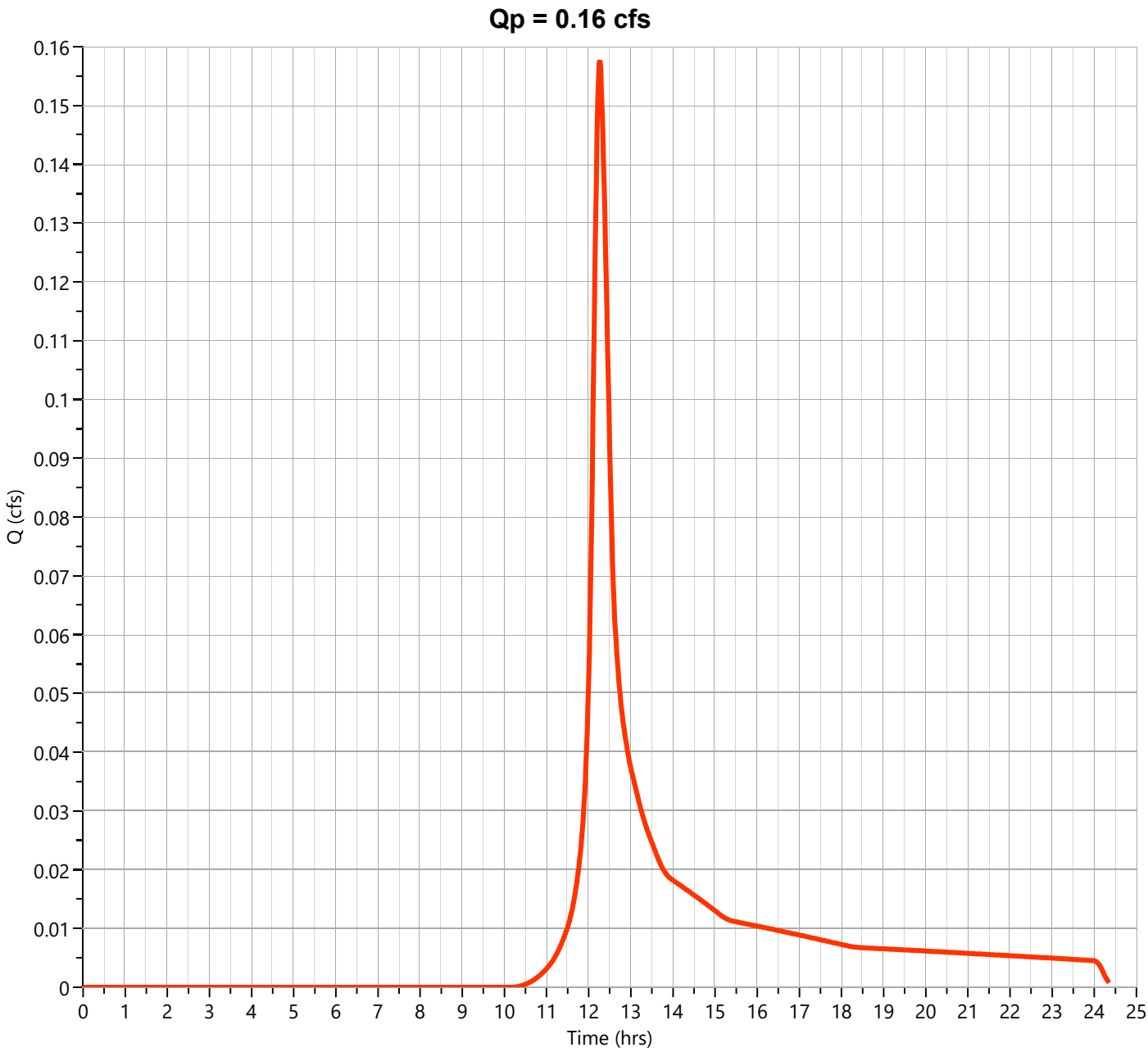
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D Grass HSGC C

Hyd. No. 21

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.158 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.27 hrs
Time Interval	= 1 min	Runoff Volume	= 748 cuft
Drainage Area	= 0.17 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 19.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

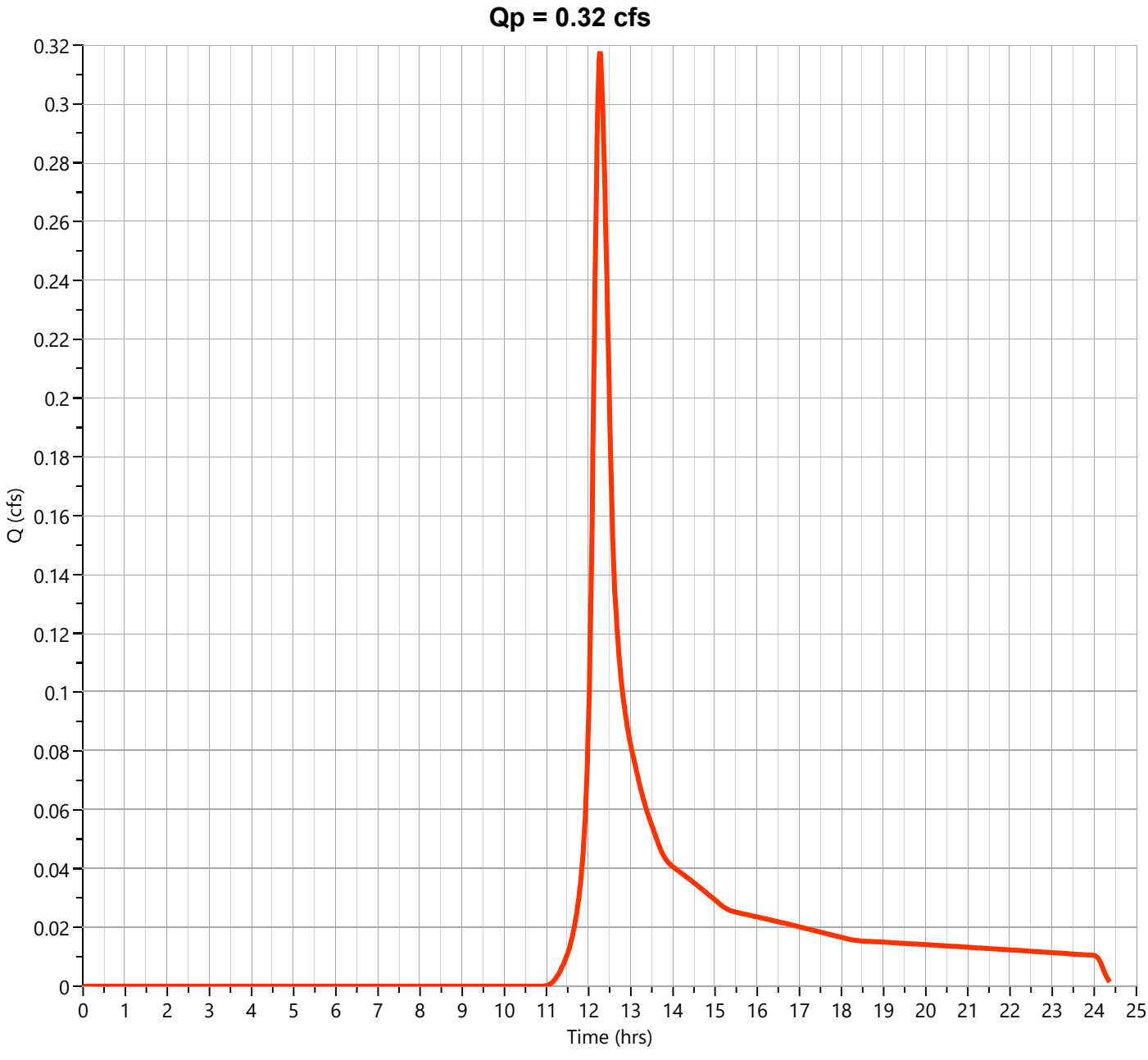
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D Woods HSGC C

Hyd. No. 22

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.318 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.27 hrs
Time Interval	= 1 min	Runoff Volume	= 1,571 cuft
Drainage Area	= 0.44 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 19.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

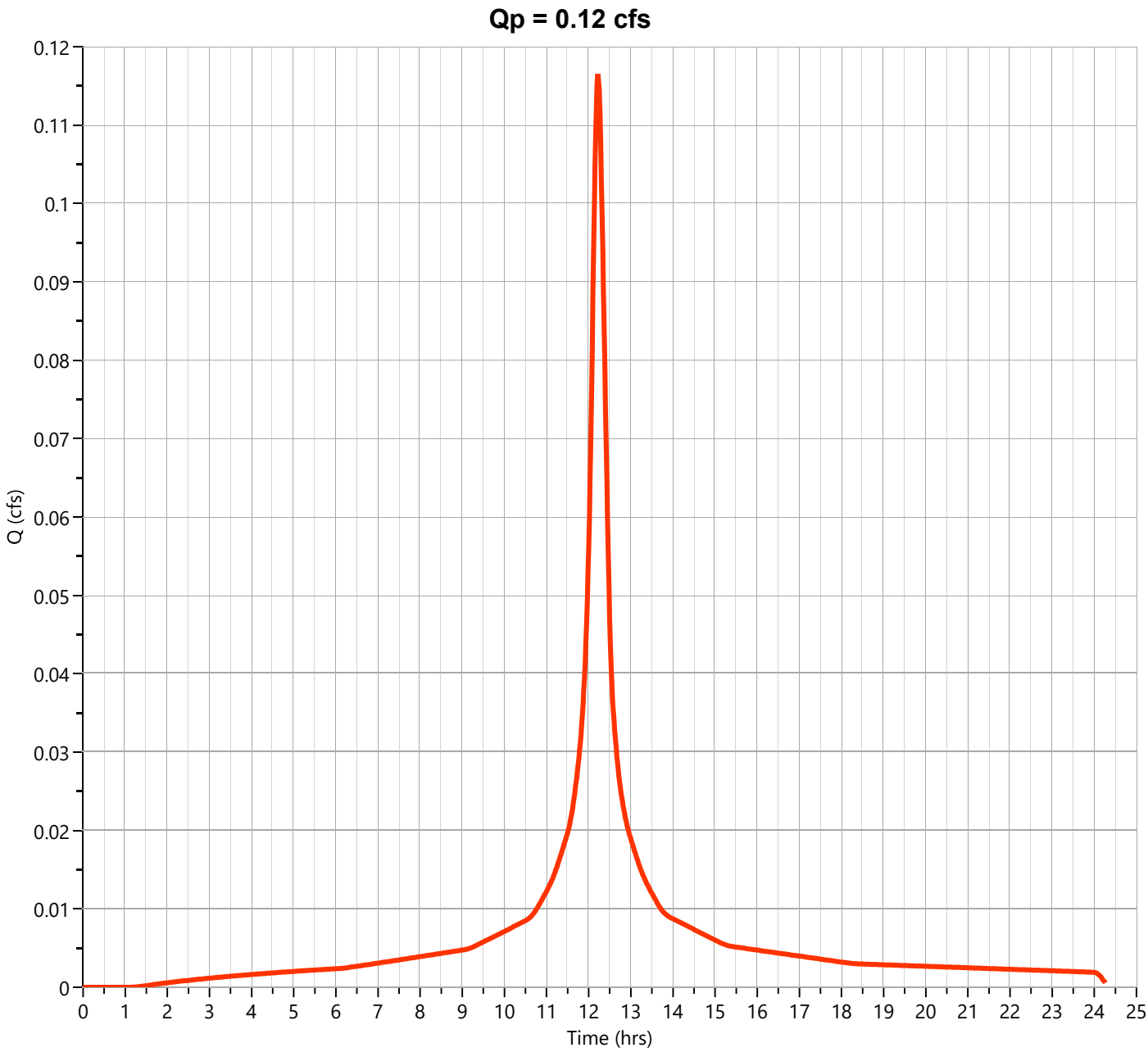
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D Impervious

Hyd. No. 23

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.116 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.22 hrs
Time Interval	= 1 min	Runoff Volume	= 579 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 17.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

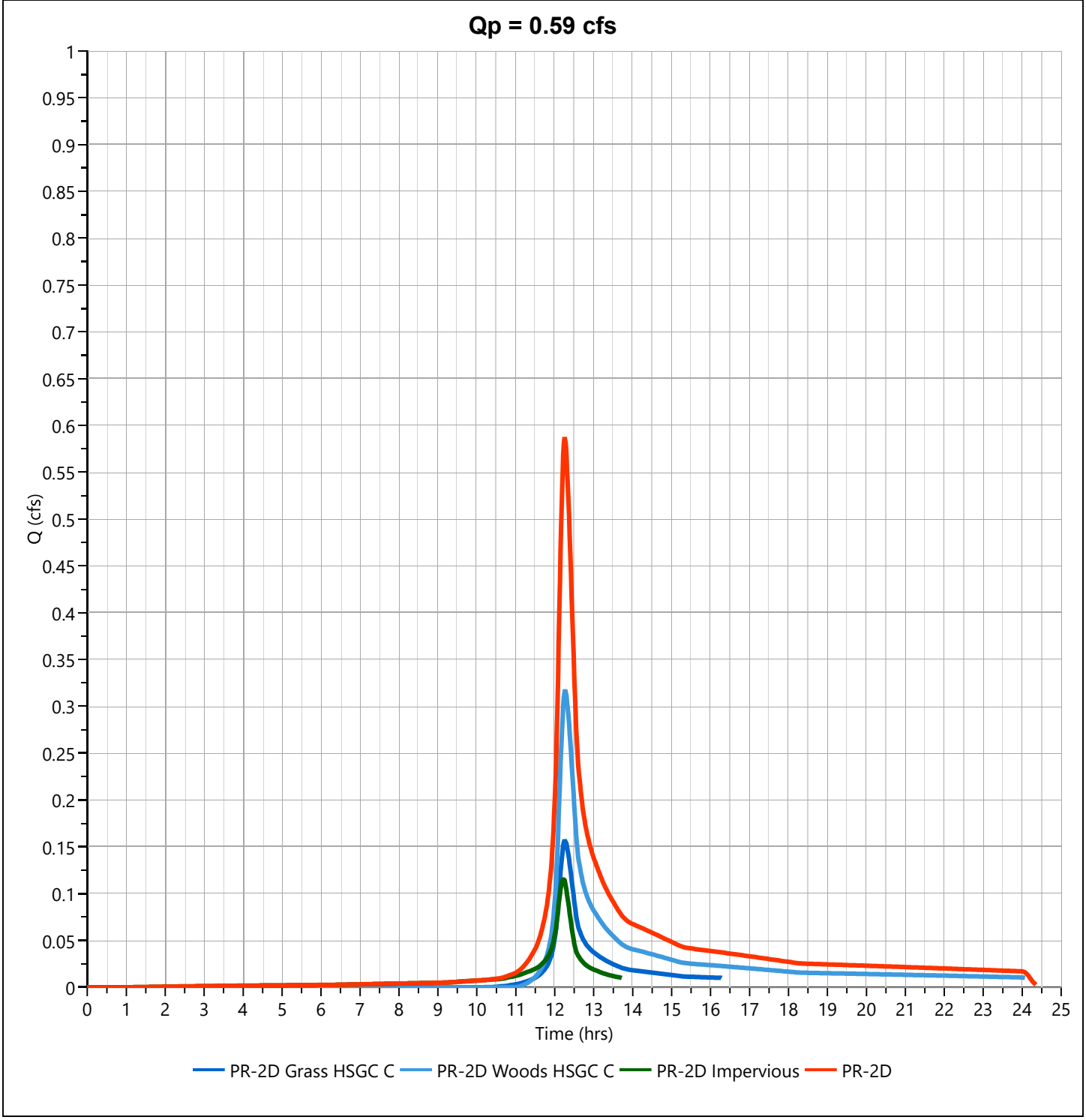
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D

Hyd. No. 24

Hydrograph Type	= Junction	Peak Flow	= 0.587 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.25 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,898 cuft
Inflow Hydrographs	= 21, 22, 23	Total Contrib. Area	= 0.66 ac



Hydrograph Report

Project Name:

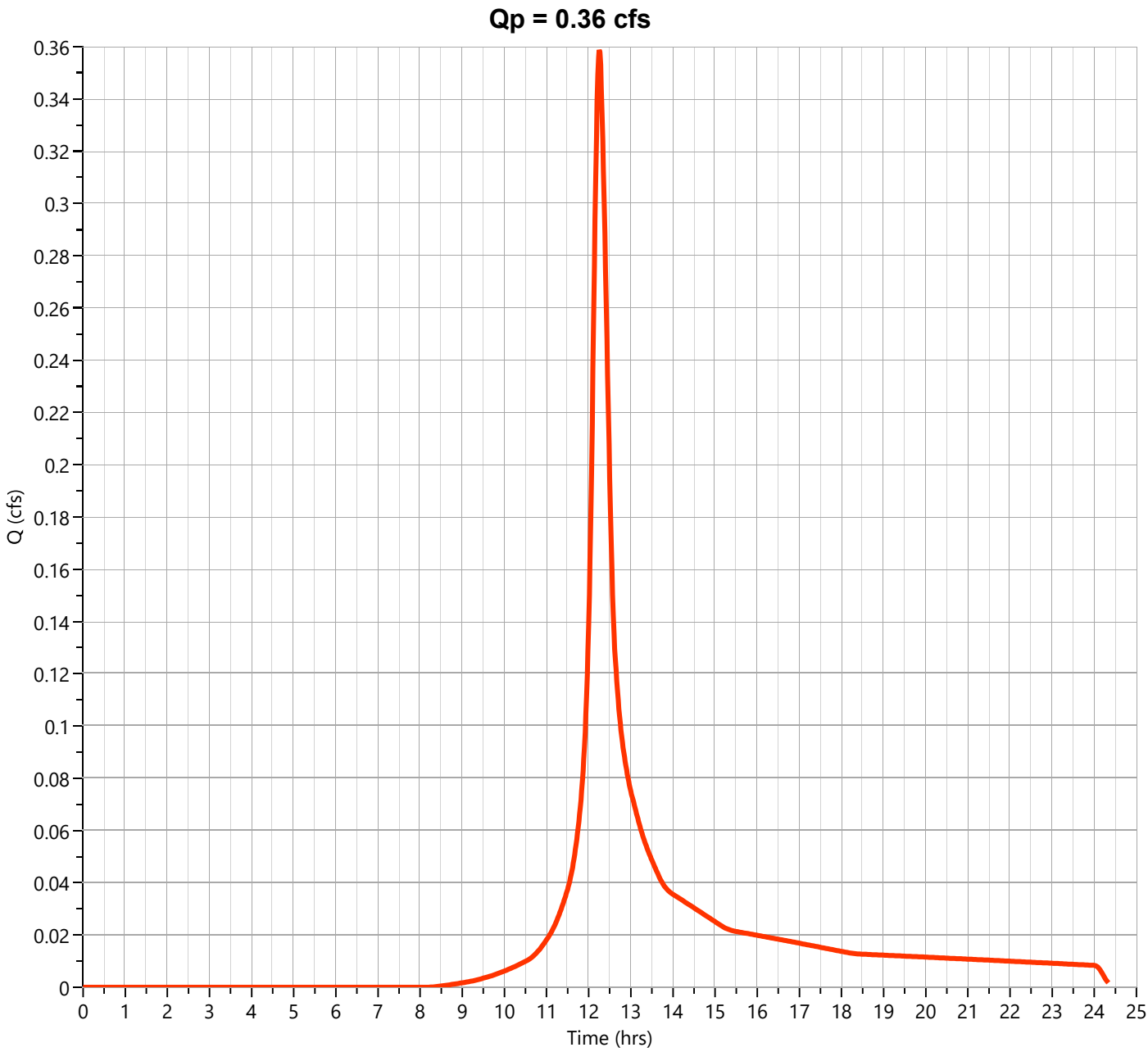
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D Grass HSGC C

Hyd. No. 21

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.359 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.25 hrs
Time Interval	= 1 min	Runoff Volume	= 1,648 cuft
Drainage Area	= 0.17 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 19.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

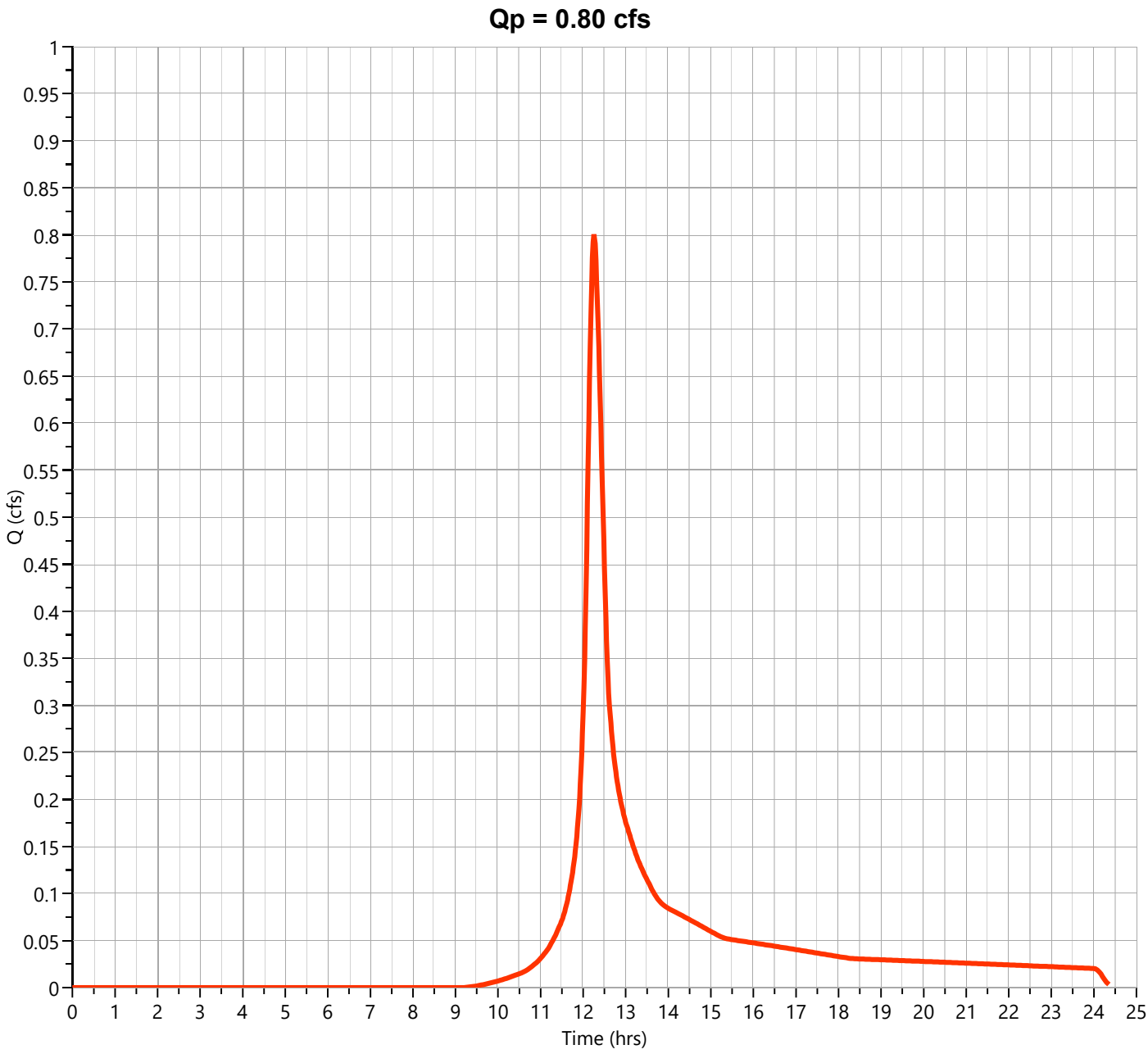
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D Woods HSGC C

Hyd. No. 22

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.800 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.25 hrs
Time Interval	= 1 min	Runoff Volume	= 3,709 cuft
Drainage Area	= 0.44 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 19.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

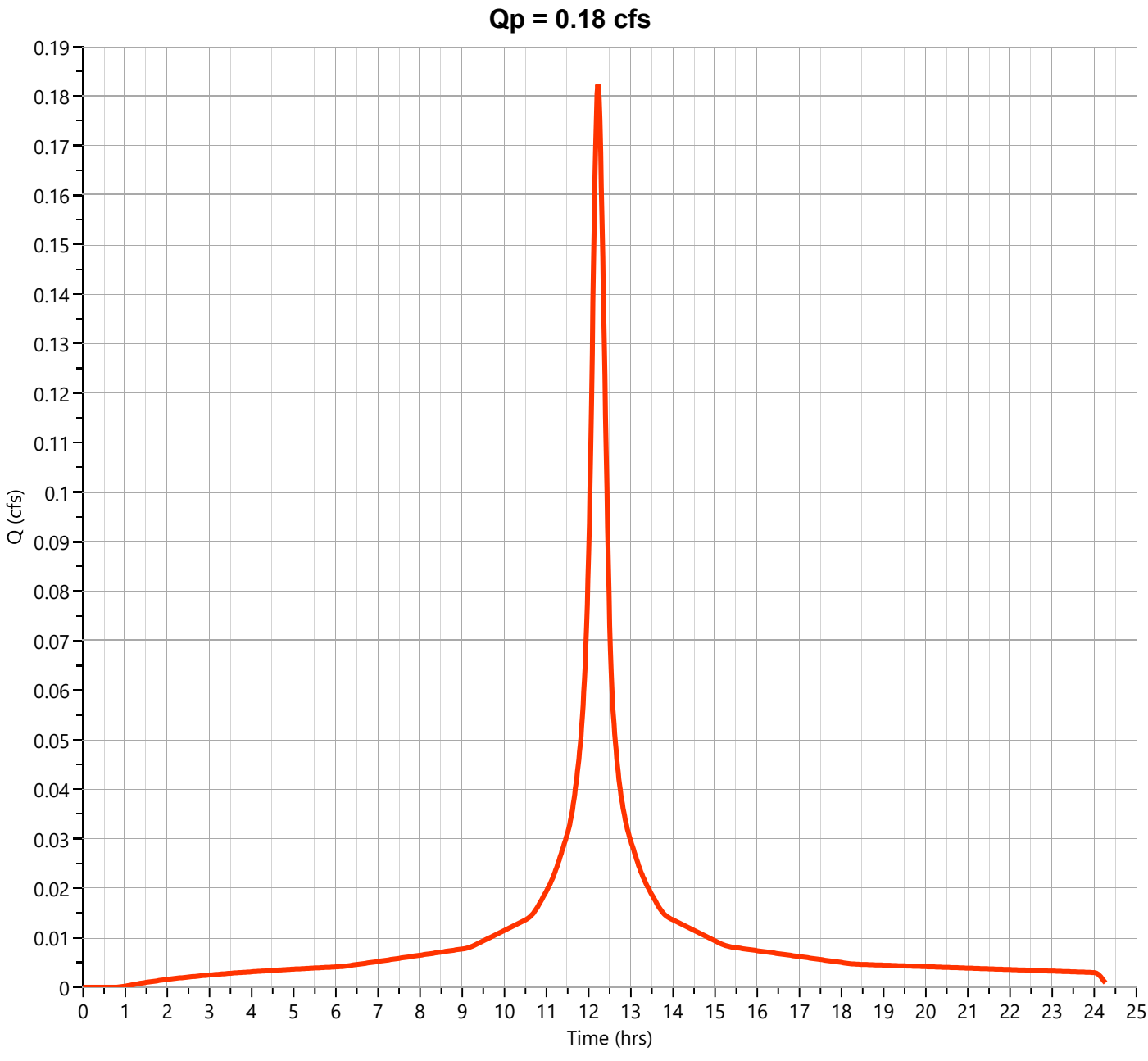
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D Impervious

Hyd. No. 23

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.182 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.22 hrs
Time Interval	= 1 min	Runoff Volume	= 923 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 17.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

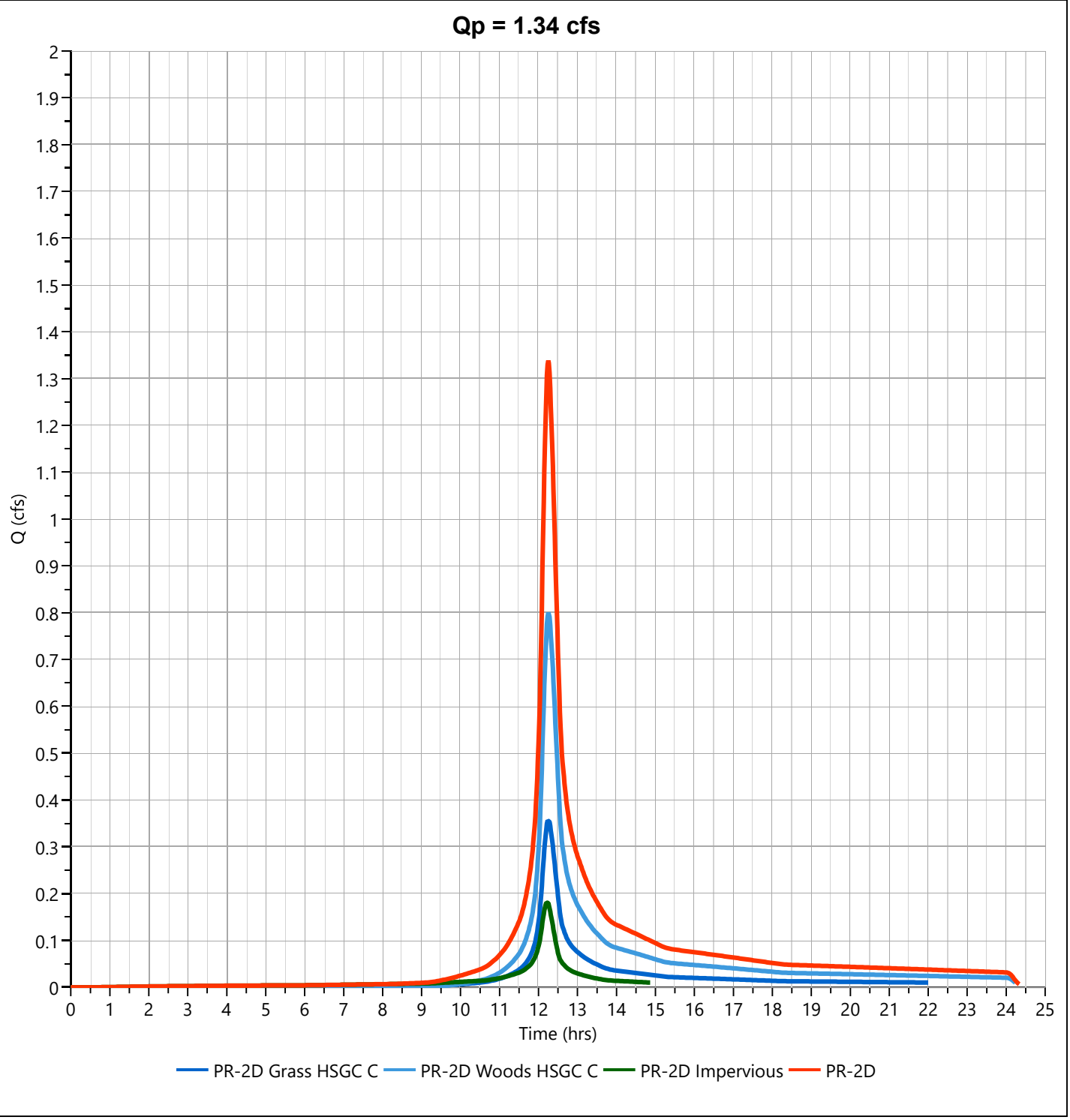
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D

Hyd. No. 24

Hydrograph Type	= Junction	Peak Flow	= 1.339 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.25 hrs
Time Interval	= 1 min	Hydrograph Volume	= 6,280 cuft
Inflow Hydrographs	= 21, 22, 23	Total Contrib. Area	= 0.66 ac



Hydrograph Report

Project Name:

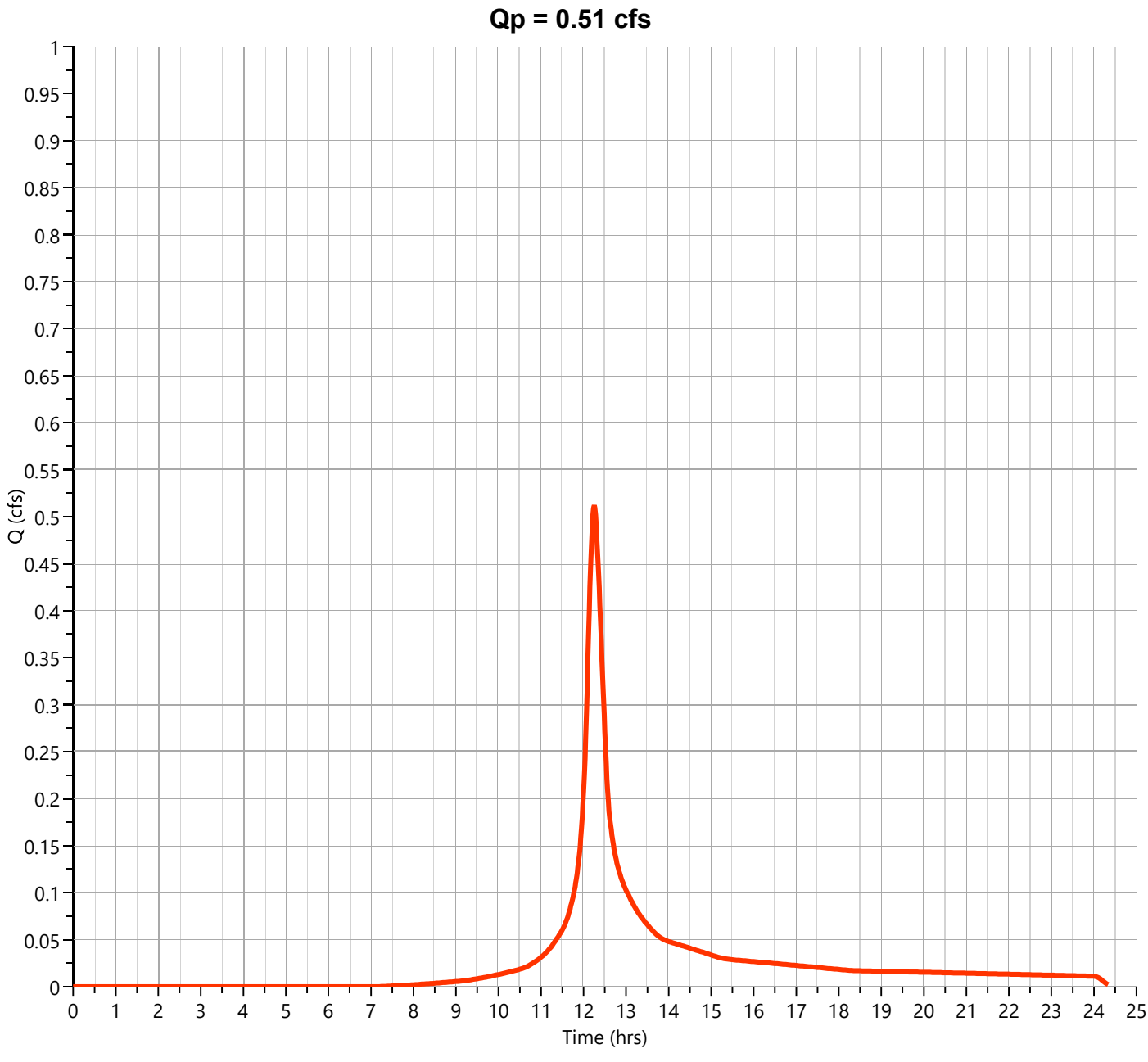
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D Grass HSGC C

Hyd. No. 21

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.512 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.25 hrs
Time Interval	= 1 min	Runoff Volume	= 2,350 cuft
Drainage Area	= 0.17 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 19.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

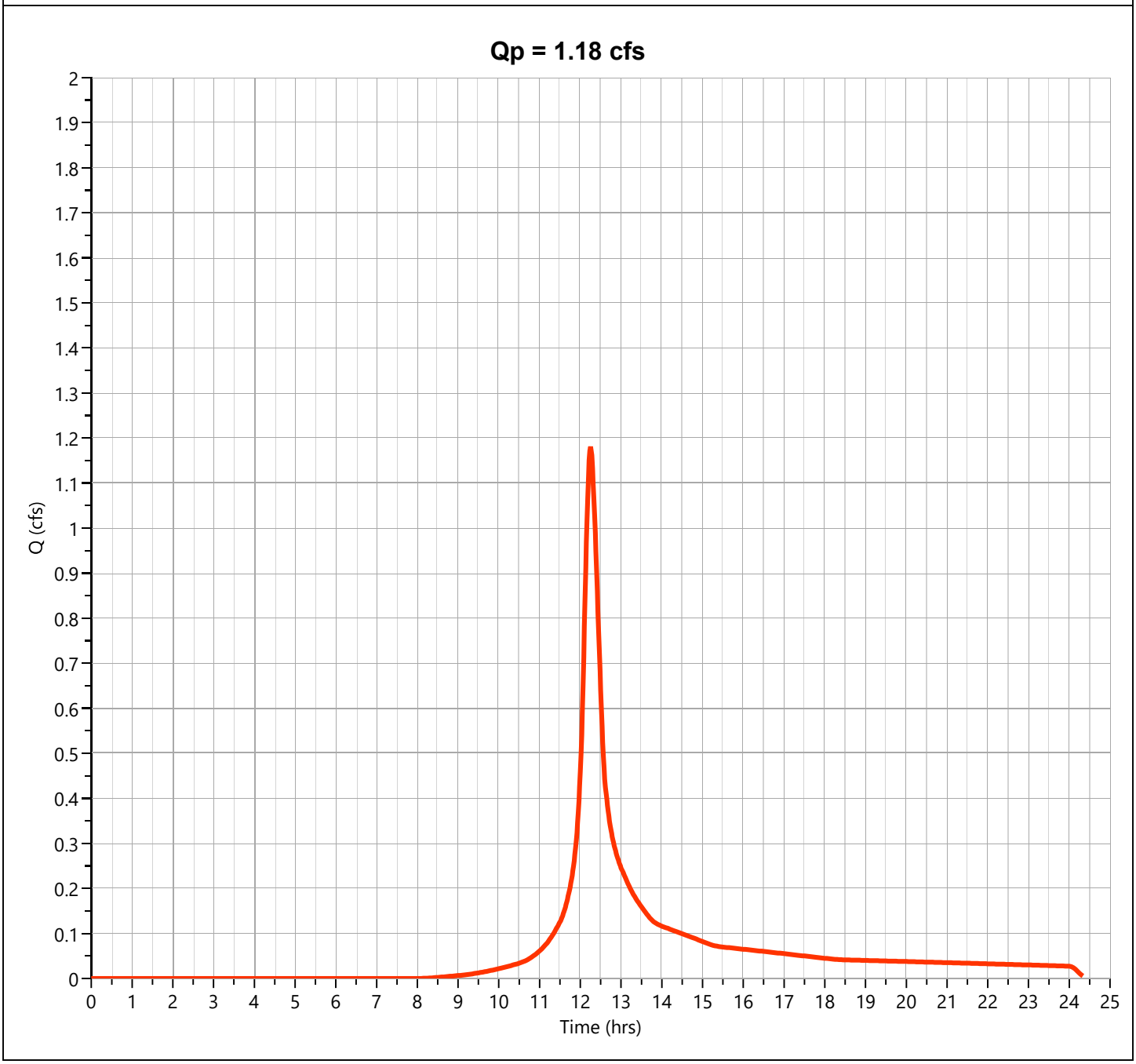
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D Woods HSGC C

Hyd. No. 22

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.181 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.25 hrs
Time Interval	= 1 min	Runoff Volume	= 5,423 cuft
Drainage Area	= 0.44 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 19.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

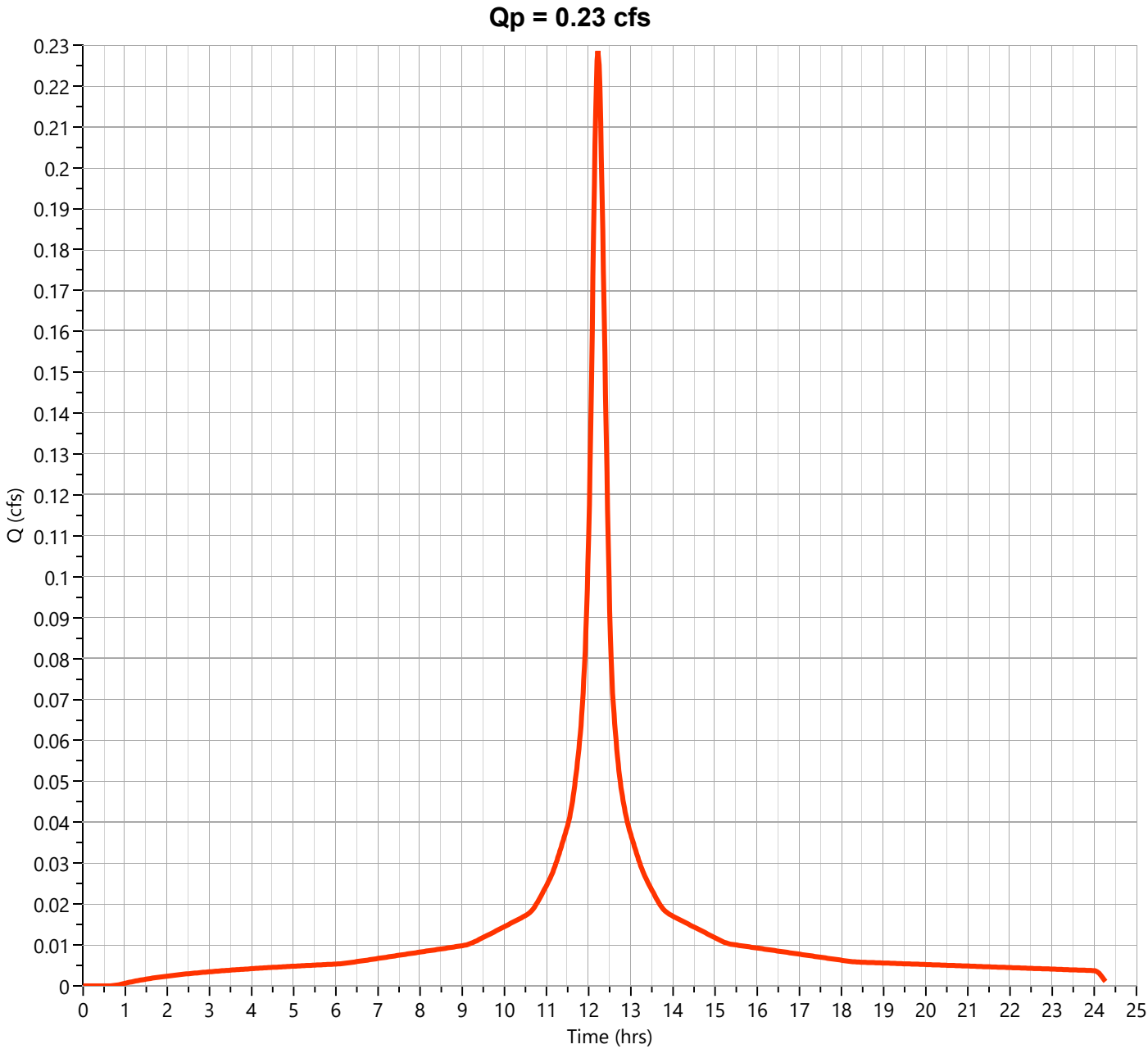
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D Impervious

Hyd. No. 23

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.229 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.22 hrs
Time Interval	= 1 min	Runoff Volume	= 1,165 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 17.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

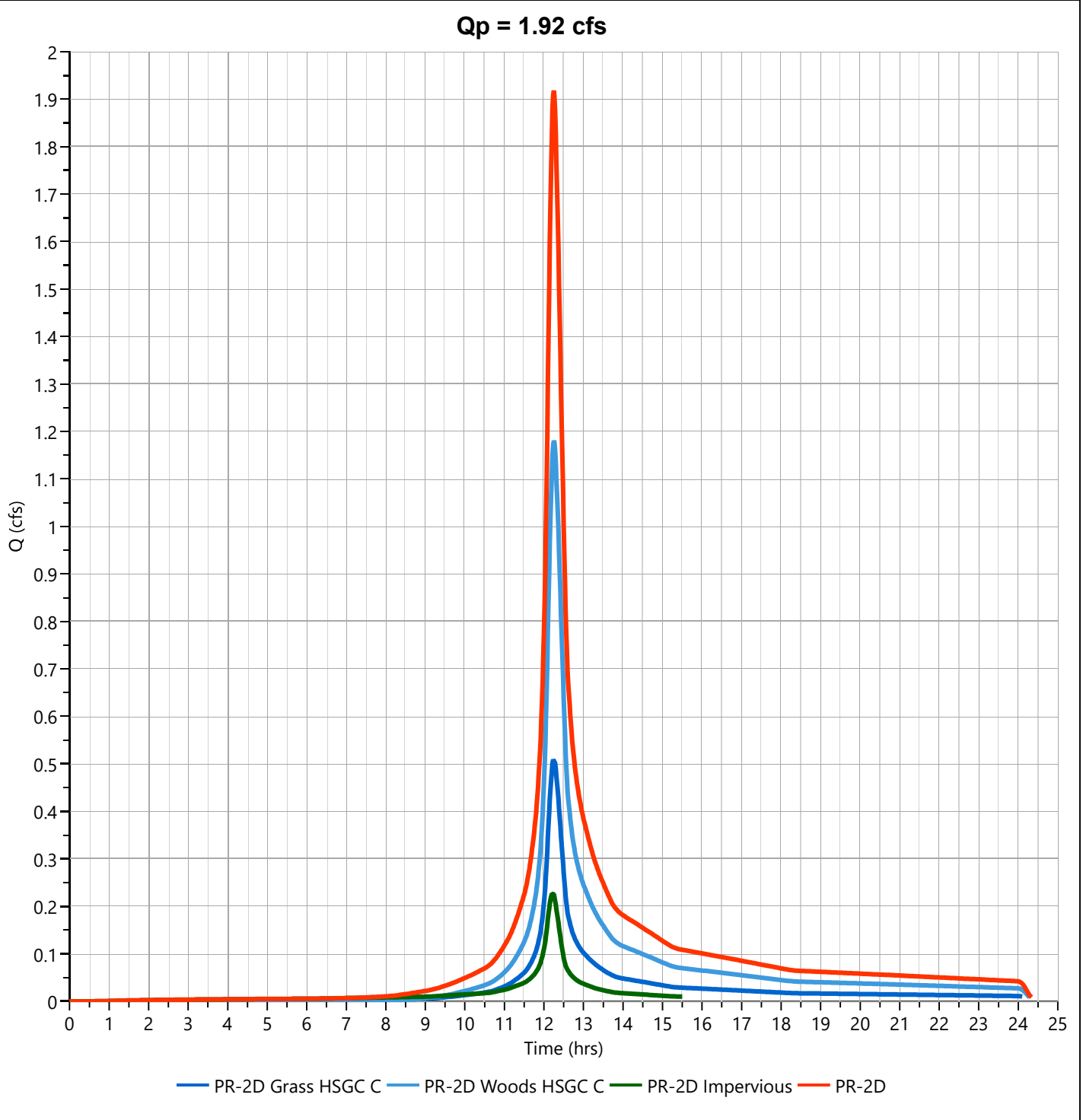
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D

Hyd. No. 24

Hydrograph Type	= Junction	Peak Flow	= 1.918 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.25 hrs
Time Interval	= 1 min	Hydrograph Volume	= 8,937 cuft
Inflow Hydrographs	= 21, 22, 23	Total Contrib. Area	= 0.66 ac



Hydrograph Report

Project Name:

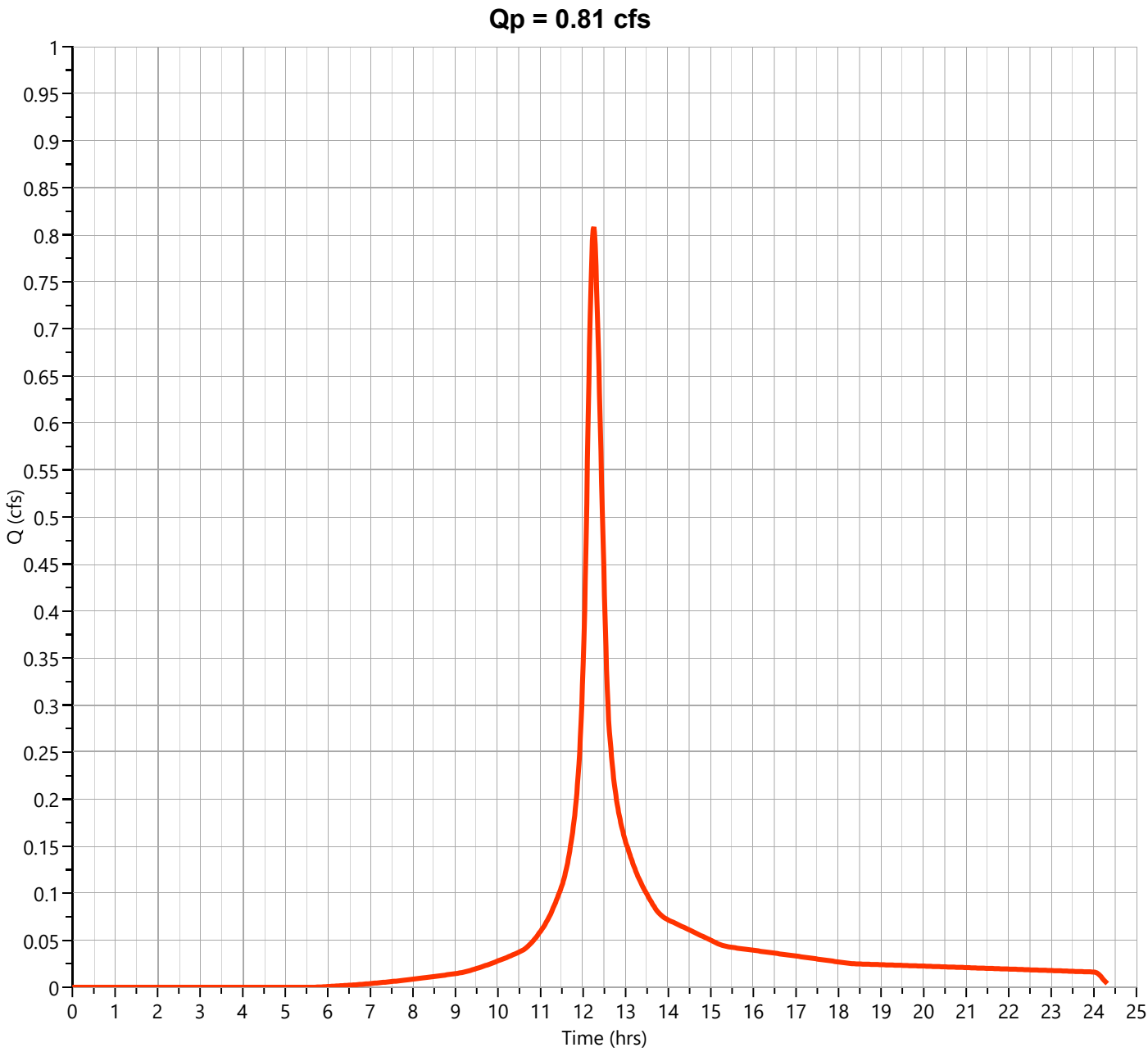
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D Grass HSGC C

Hyd. No. 21

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.808 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.25 hrs
Time Interval	= 1 min	Runoff Volume	= 3,744 cuft
Drainage Area	= 0.17 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 19.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

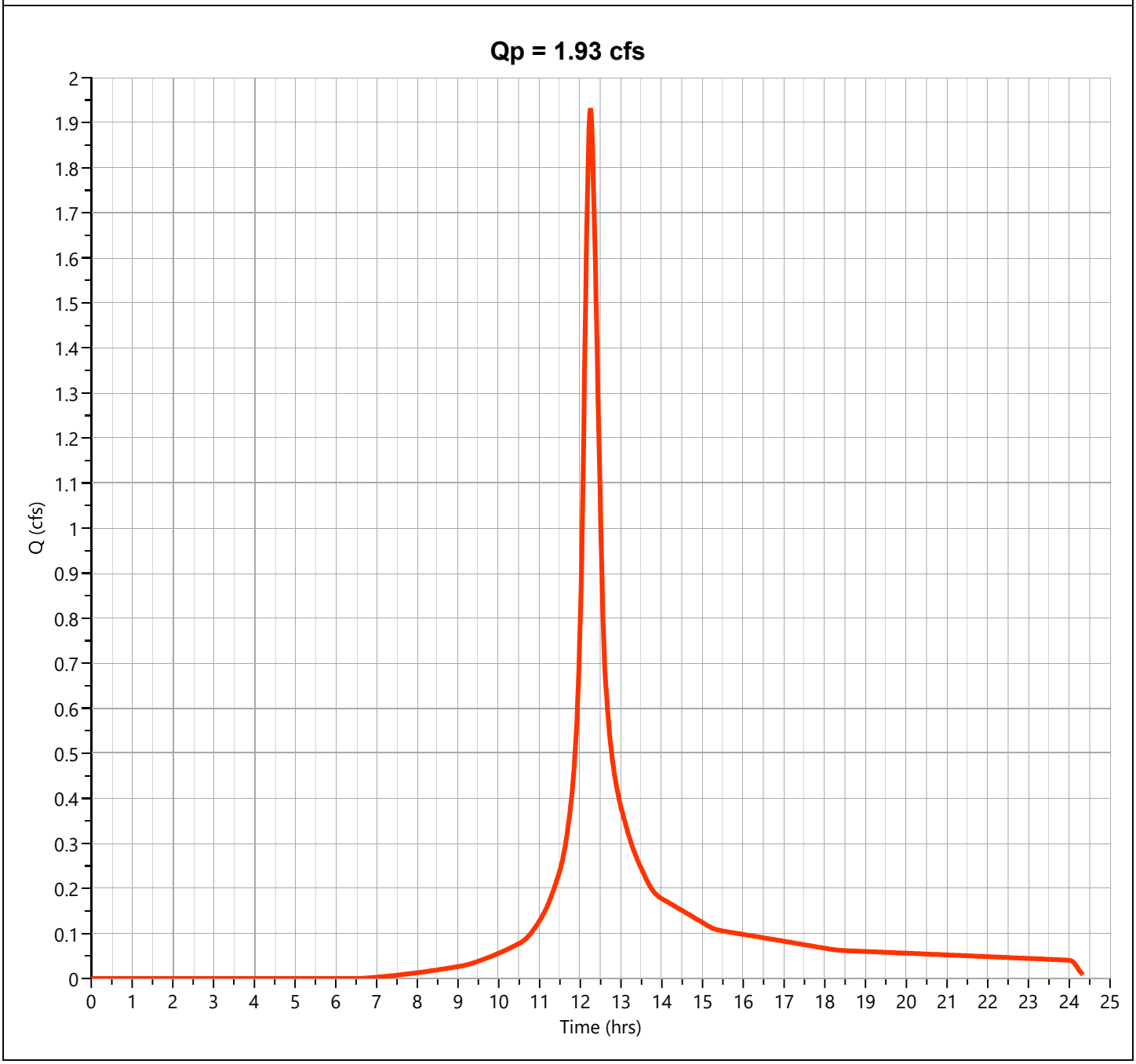
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D Woods HSGC C

Hyd. No. 22

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.932 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.25 hrs
Time Interval	= 1 min	Runoff Volume	= 8,888 cuft
Drainage Area	= 0.44 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 19.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

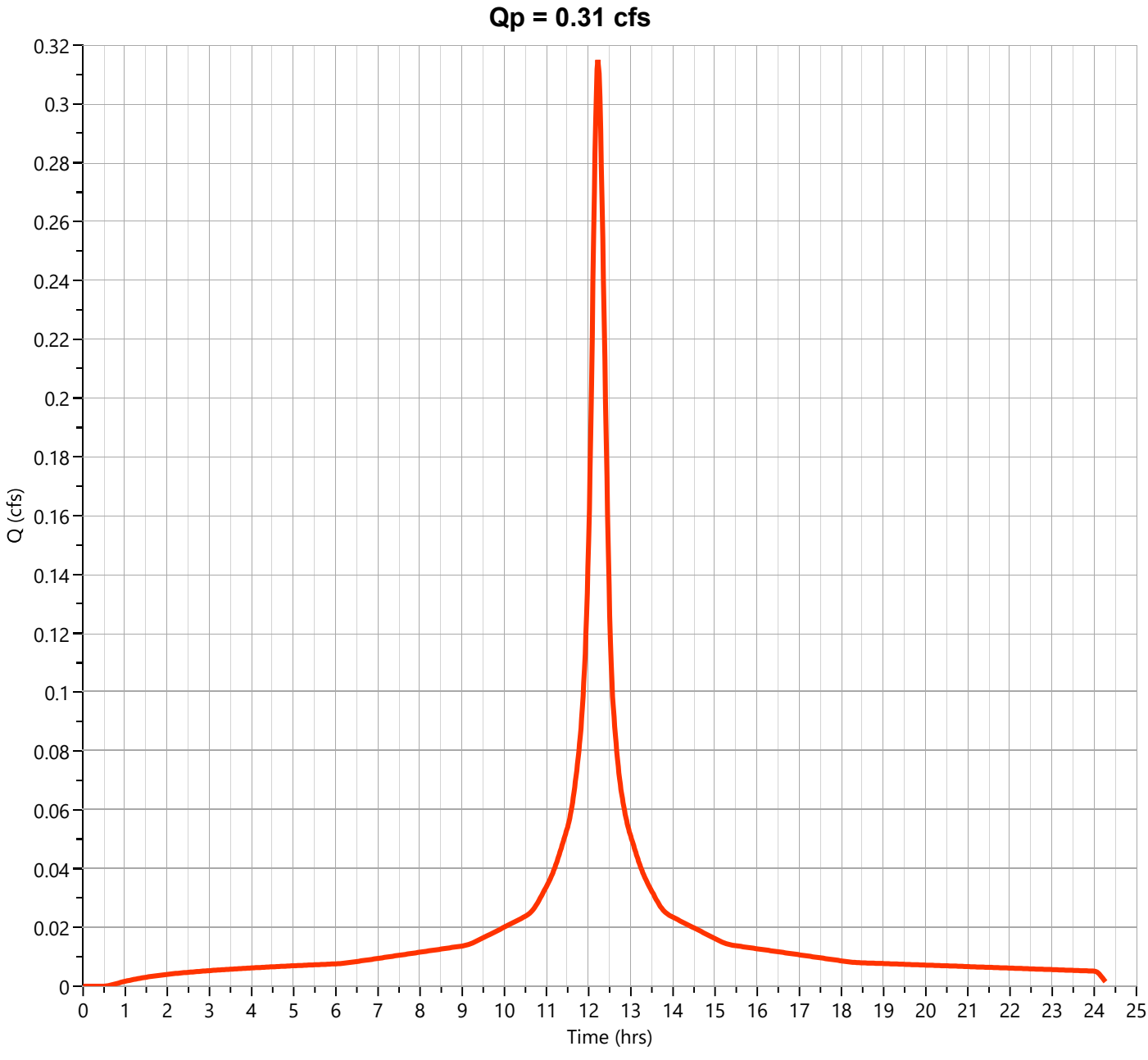
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D Impervious

Hyd. No. 23

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.315 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.22 hrs
Time Interval	= 1 min	Runoff Volume	= 1,618 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 17.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

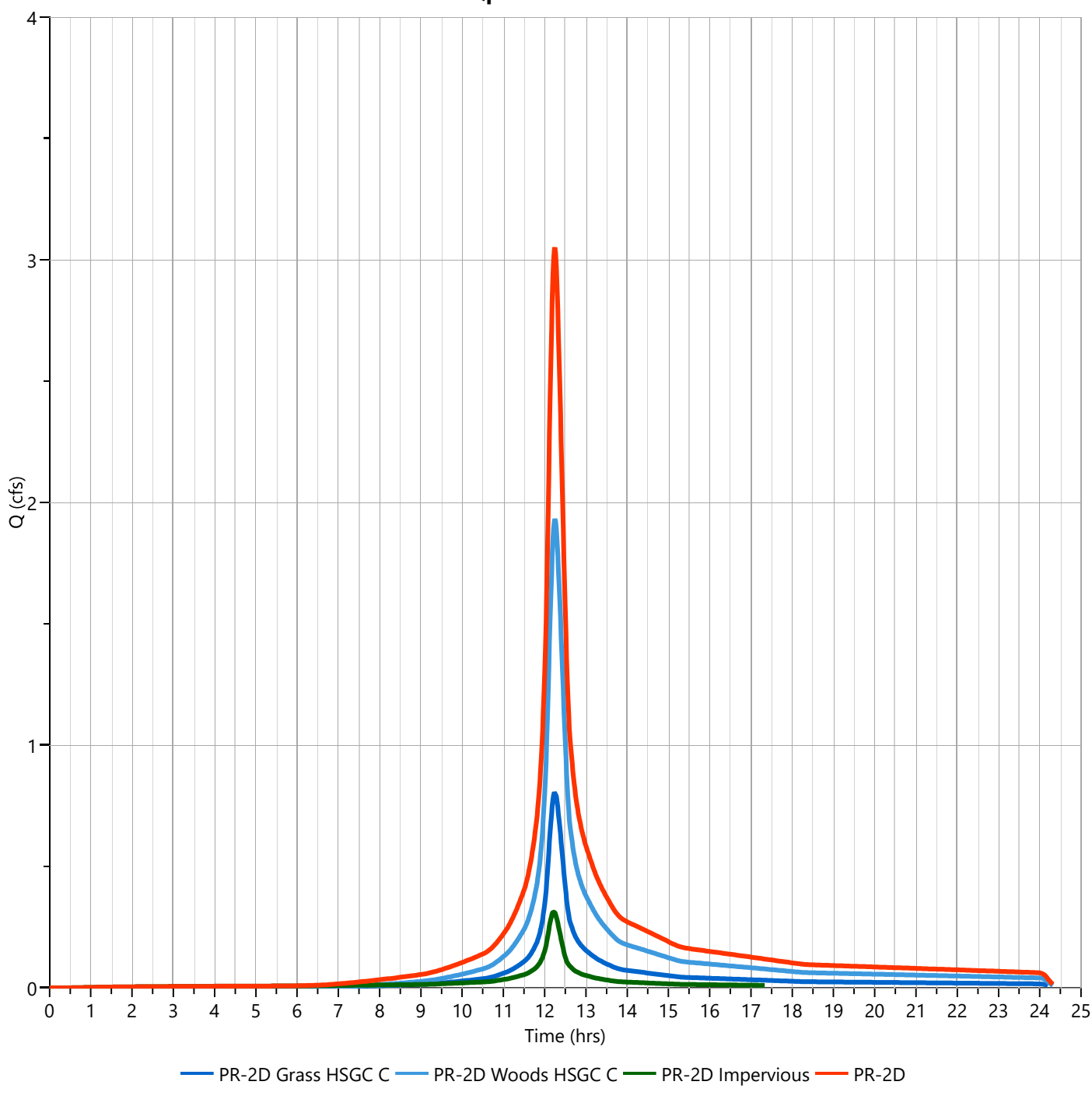
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D

Hyd. No. 24

Hydrograph Type	= Junction	Peak Flow	= 3.050 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.25 hrs
Time Interval	= 1 min	Hydrograph Volume	= 14,250 cuft
Inflow Hydrographs	= 21, 22, 23	Total Contrib. Area	= 0.66 ac



PR-2E WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/6/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/6/2024**

Circle One: Present **(Developed)** — **Current Proposed Watershed PR-2E - Impervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		2		3
1.	Surface Description (NEH table 15-1)		Smooth Surfaces		Dense Grasses		Dense Grasses
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011		0.24		0.24
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	8		11		32
4.	Two-year 24-hr rainfall, P_2	in	3.46		3.46		3.46
5.	Land Slope, s	ft/ft	0.023		0.238		0.010
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	100		100		42
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.002	+	0.014	+	0.120
					Sheet Flow Sub-Total		0.136 hours

Shallow Concentrated Flow		Segment ID	4		5		
8.	Surface Description		Grassed Waterways		Grassed Waterways		
9.	Flow Length, L	ft	26		25		
10.	Watercourse Slope, s	ft/ft	0.013		0.027		
11.	Average Velocity, V (NEH table 15-3)	ft/s	1.85		2.66		
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.004	+	0.003	+	
					Shallow Conc. Flow Sub-Total		0.007 hours

Channel Flow		Segment ID	6				
13.	Flow Length, L	ft	291				
14.	Cross Sectional flow area, a	ft^2	0.61				
15.	Wetted Perimeter, P_w	ft	2.00				
16.	Hydraulic Radius, r $r = a / P_w$	ft	0.31				
17.	Channel Slope, s	ft/ft	0.005				
18.	Manning's Roughness Coeff., n		0.012				
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	3.97				
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.020	+		+	
					Channel Flow Sub-Total		0.020 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.163 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	10 minutes

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/6/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/6/2024**

Circle One: Present **(Developed)** — **Current Proposed Watershed PR-2E - Pervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		2		
1.	Surface Description (NEH table 15-1)		Dense Grasses		Dense Grasses		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.24		0.24		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	16		34		
4.	Two-year 24-hr rainfall, P_2	in	3.46		3.46		
5.	Land Slope, s	ft/ft	0.054		0.010		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	97		41		
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.036	+	0.129	+	
					Sheet Flow Sub-Total		0.164 hours

Shallow Concentrated Flow		Segment ID	3		4		
8.	Surface Description		Grassed Waterways		Grassed Waterways		
9.	Flow Length, L	ft	26		25		
10.	Watercourse Slope, s	ft/ft	0.009		0.027		
11.	Average Velocity, V (NEH table 15-3)	ft/s	1.50		2.64		
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.005	+	0.003	+	
					Shallow Conc. Flow Sub-Total		0.008 hours

Channel Flow		Segment ID	5				
13.	Flow Length, L	ft	291				
14.	Cross Sectional flow area, a	ft^2	0.61				
15.	Wetted Perimeter, P_w	ft	2.00				
16.	Hydraulic Radius, r $r = a / P_w$	ft	0.31				
17.	Channel Slope, s	ft/ft	0.005				
18.	Manning's Roughness Coeff., n		0.012				
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	3.97				
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.020	+		+	
					Channel Flow Sub-Total		0.020 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.192 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	12 minutes

Hydrograph Report

Project Name:

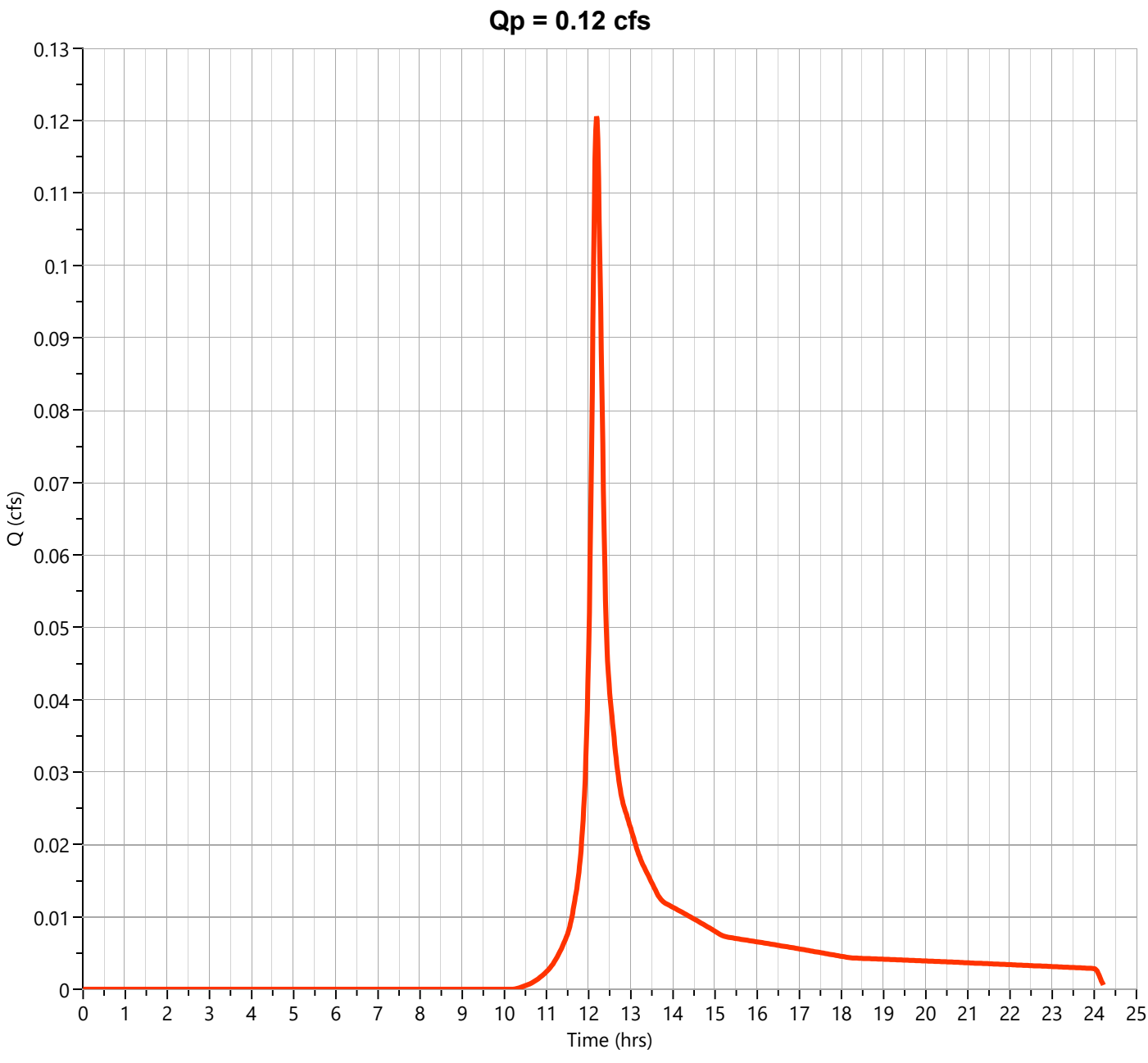
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2E Grass HSGC C

Hyd. No. 26

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.121 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 477 cuft
Drainage Area	= 0.11 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 12.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

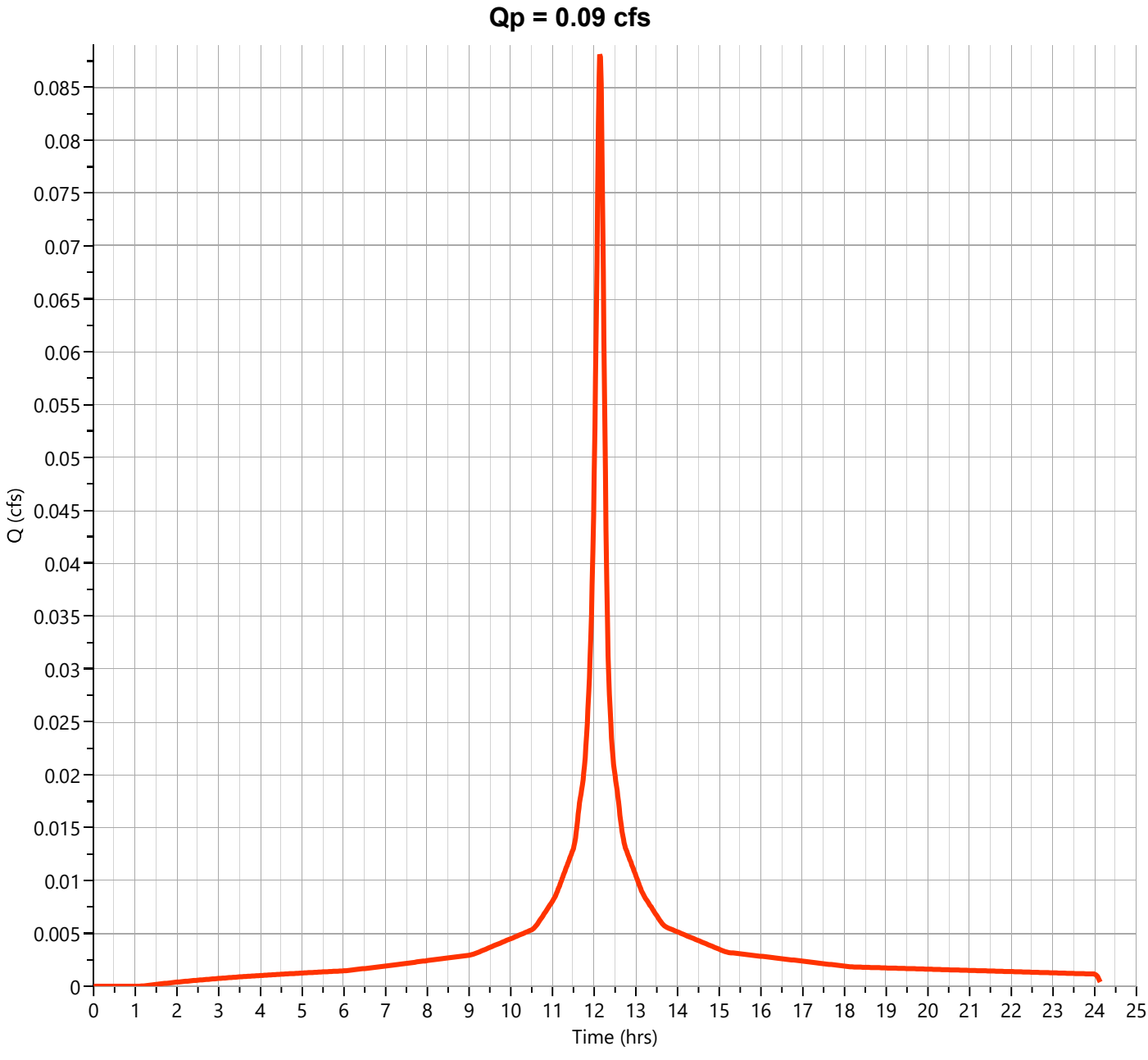
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2E Impervious

Hyd. No. 27

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.088 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 351 cuft
Drainage Area	= 0.03 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

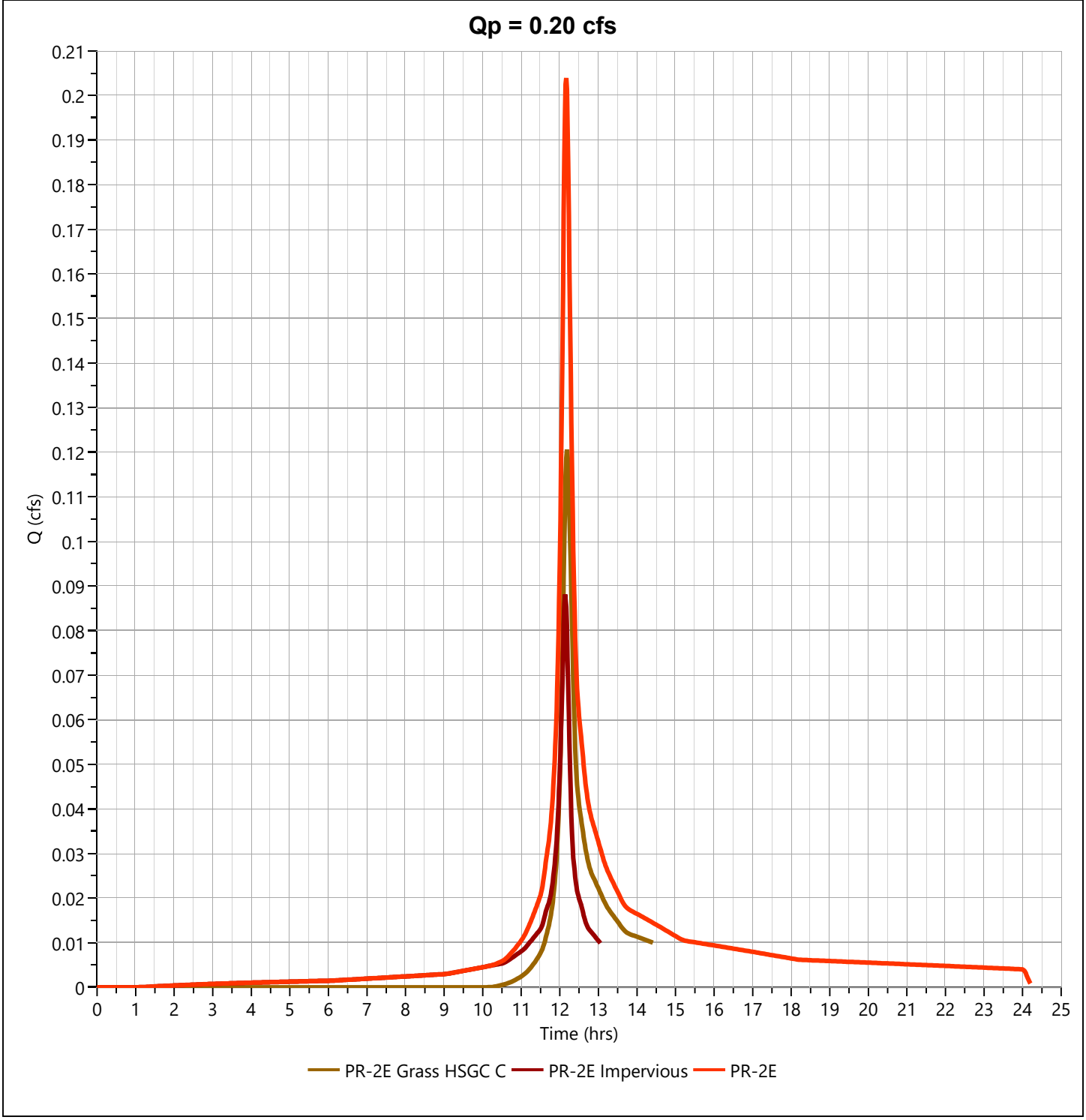
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2E

Hyd. No. 28

Hydrograph Type	= Junction	Peak Flow	= 0.204 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Hydrograph Volume	= 828 cuft
Inflow Hydrographs	= 26, 27	Total Contrib. Area	= 0.14 ac



Hydrograph Report

Project Name:

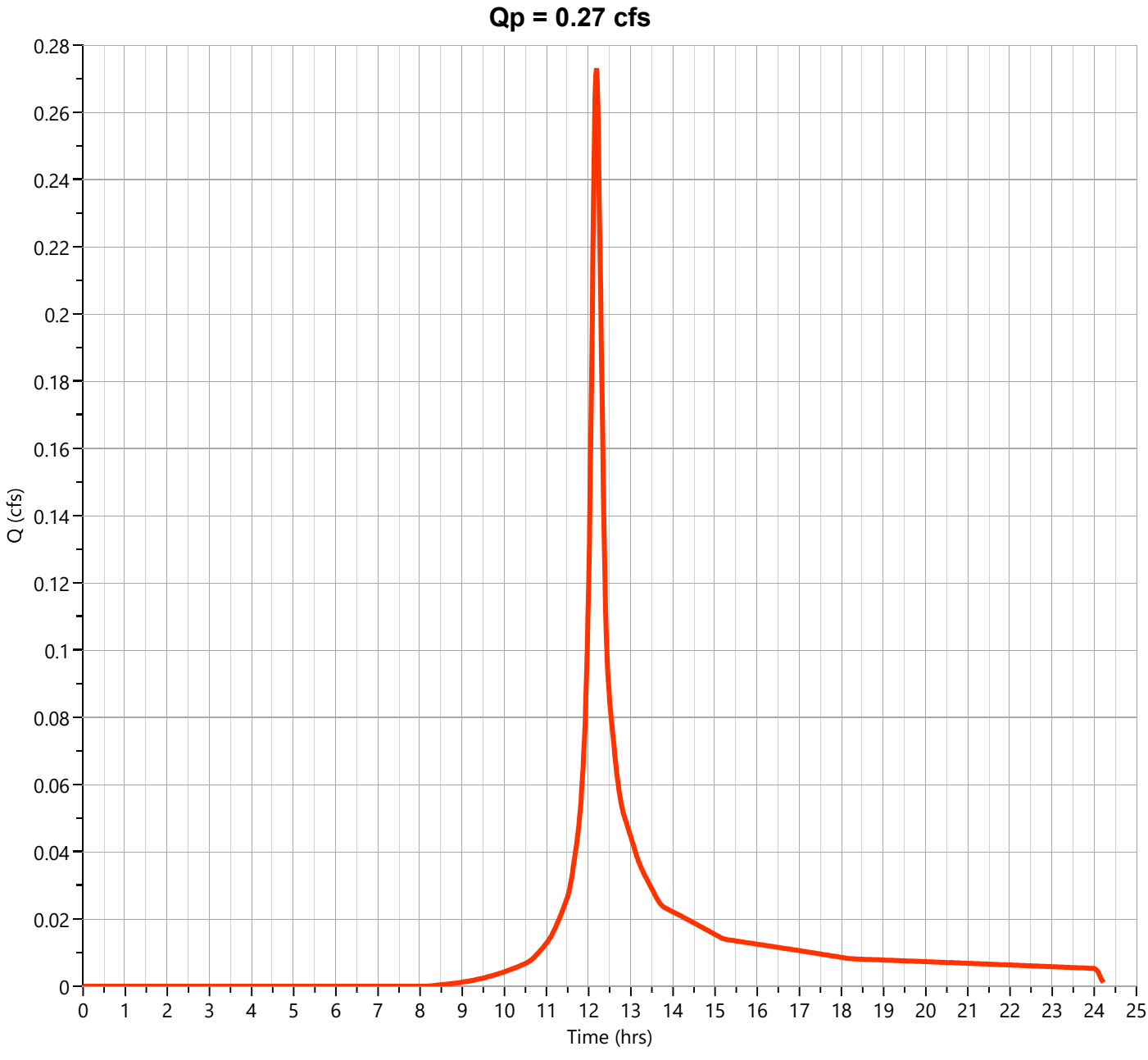
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2E Grass HSGC C

Hyd. No. 26

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.273 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 1,050 cuft
Drainage Area	= 0.11 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 12.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

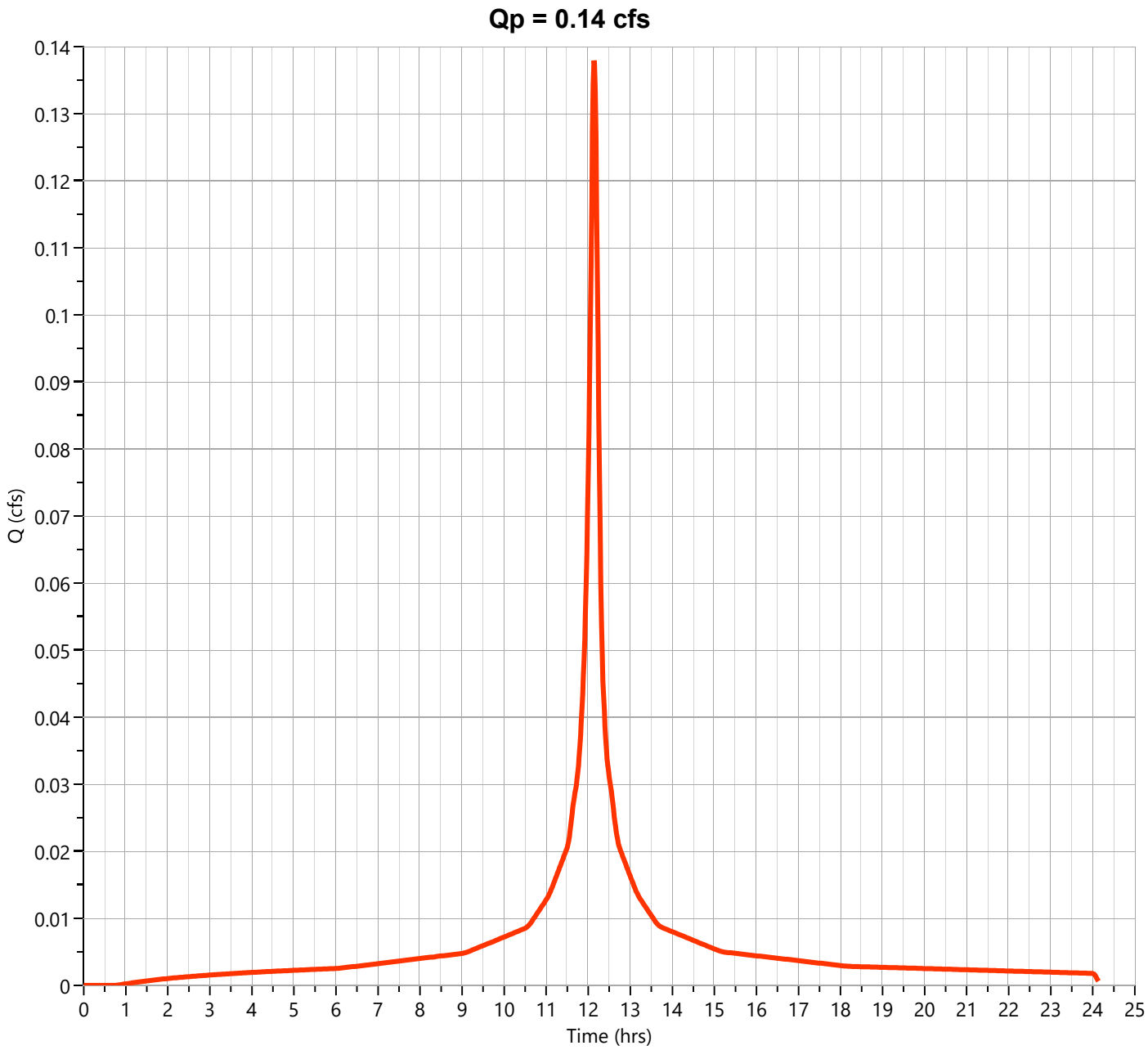
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2E Impervious

Hyd. No. 27

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.138 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 560 cuft
Drainage Area	= 0.03 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

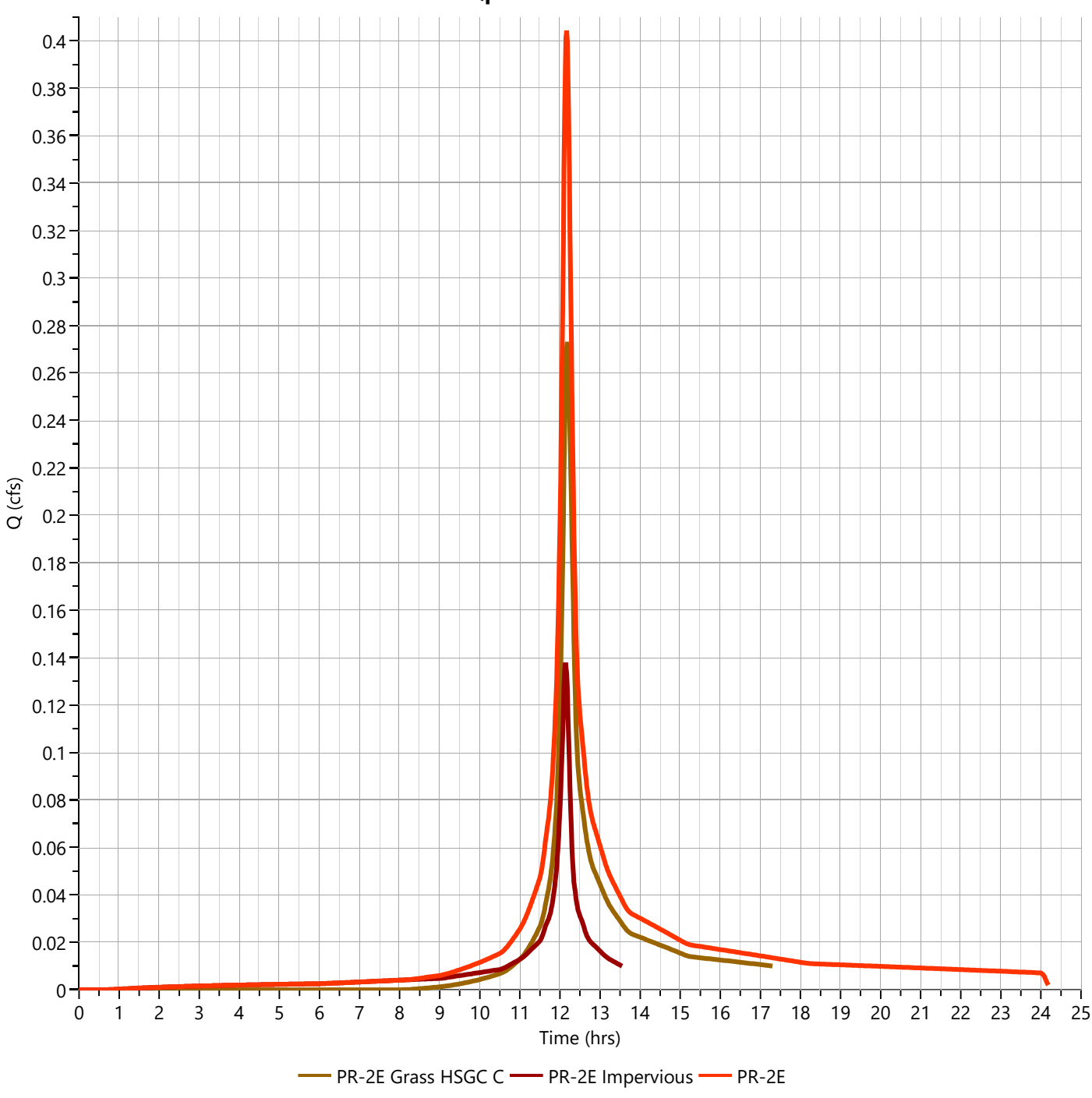
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2E

Hyd. No. 28

Hydrograph Type	= Junction	Peak Flow	= 0.404 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,610 cuft
Inflow Hydrographs	= 26, 27	Total Contrib. Area	= 0.14 ac



Hydrograph Report

Project Name:

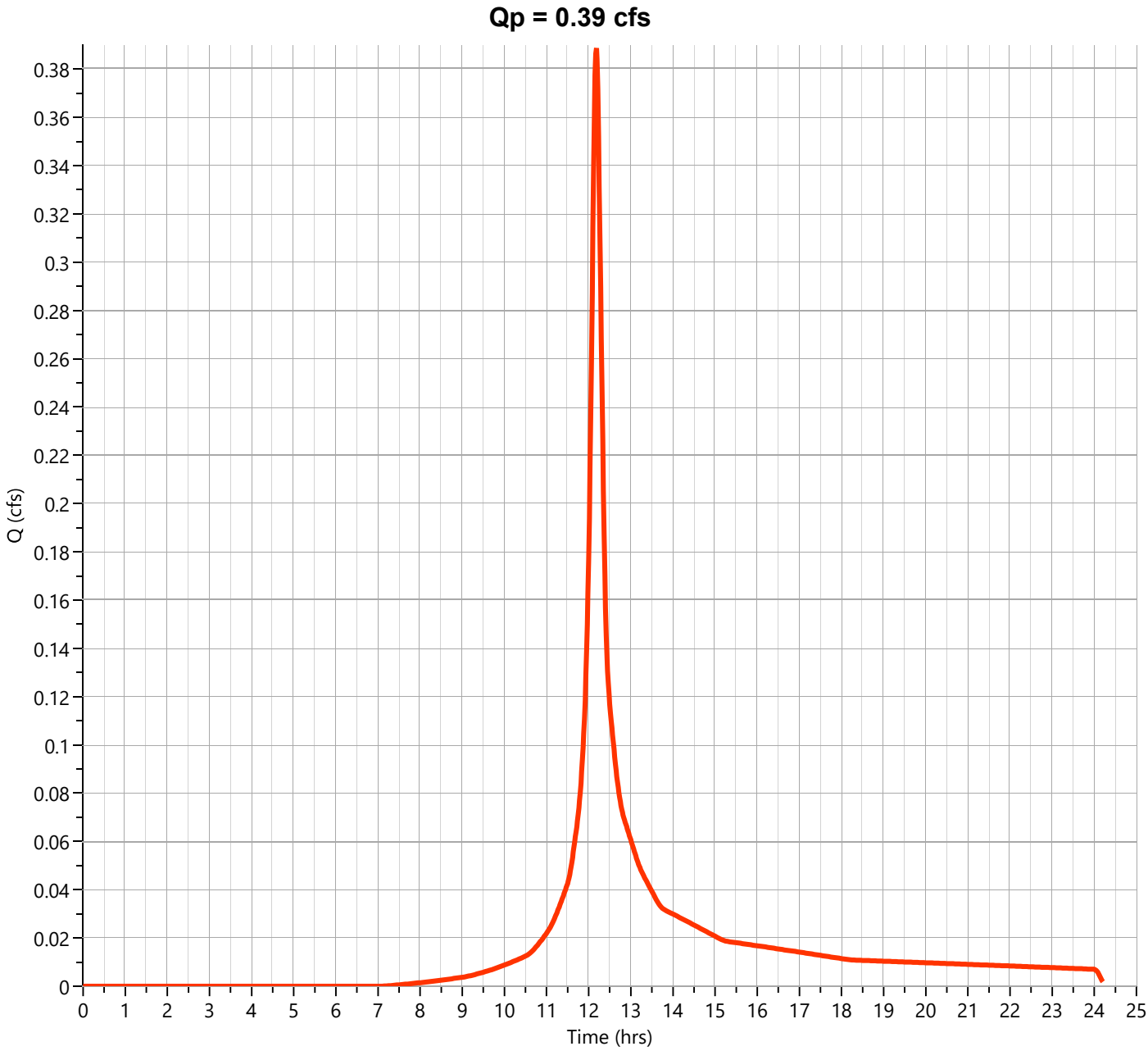
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2E Grass HSGC C

Hyd. No. 26

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.389 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 1,497 cuft
Drainage Area	= 0.11 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 12.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

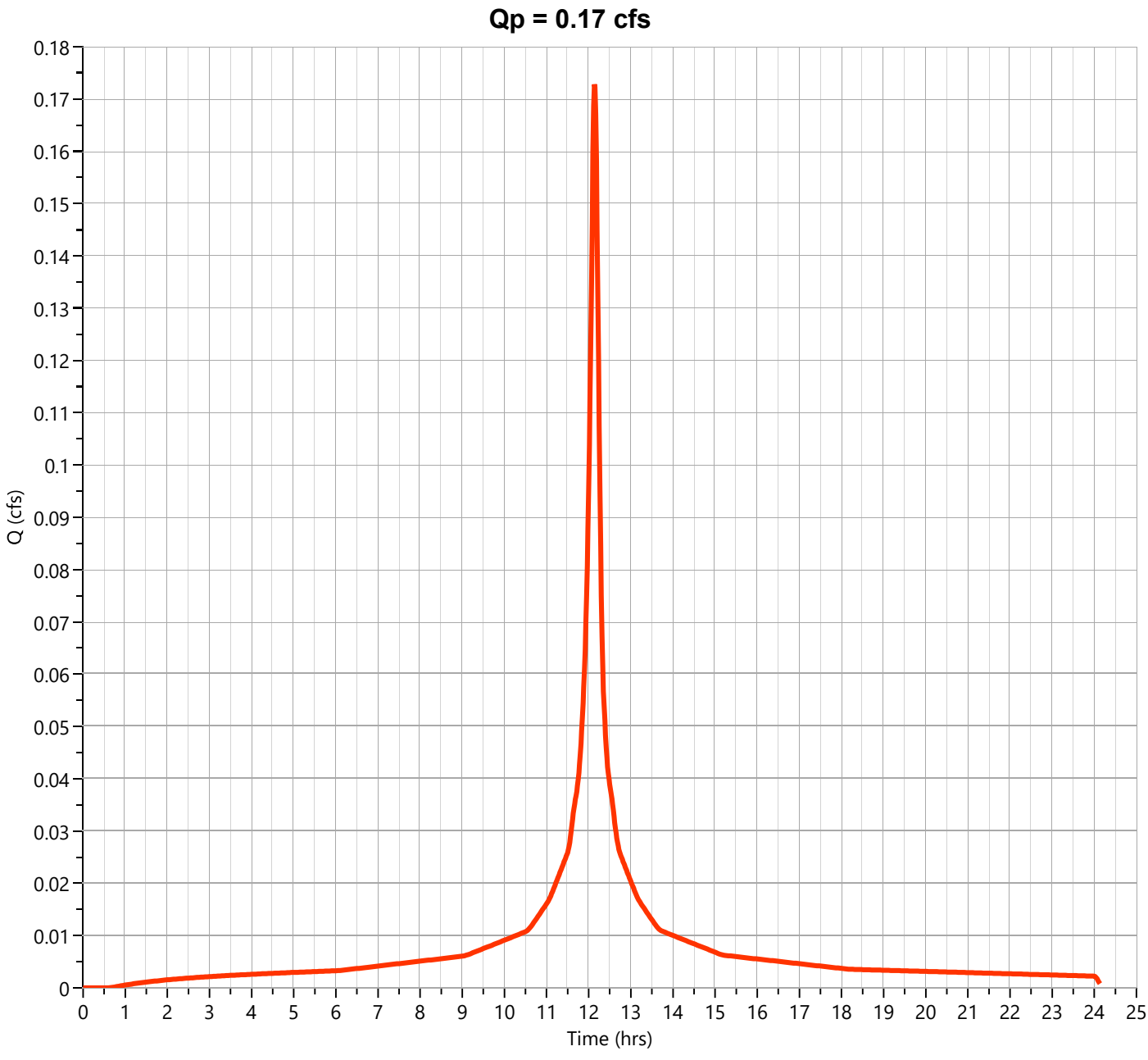
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2E Impervious

Hyd. No. 27

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.173 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 707 cuft
Drainage Area	= 0.03 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

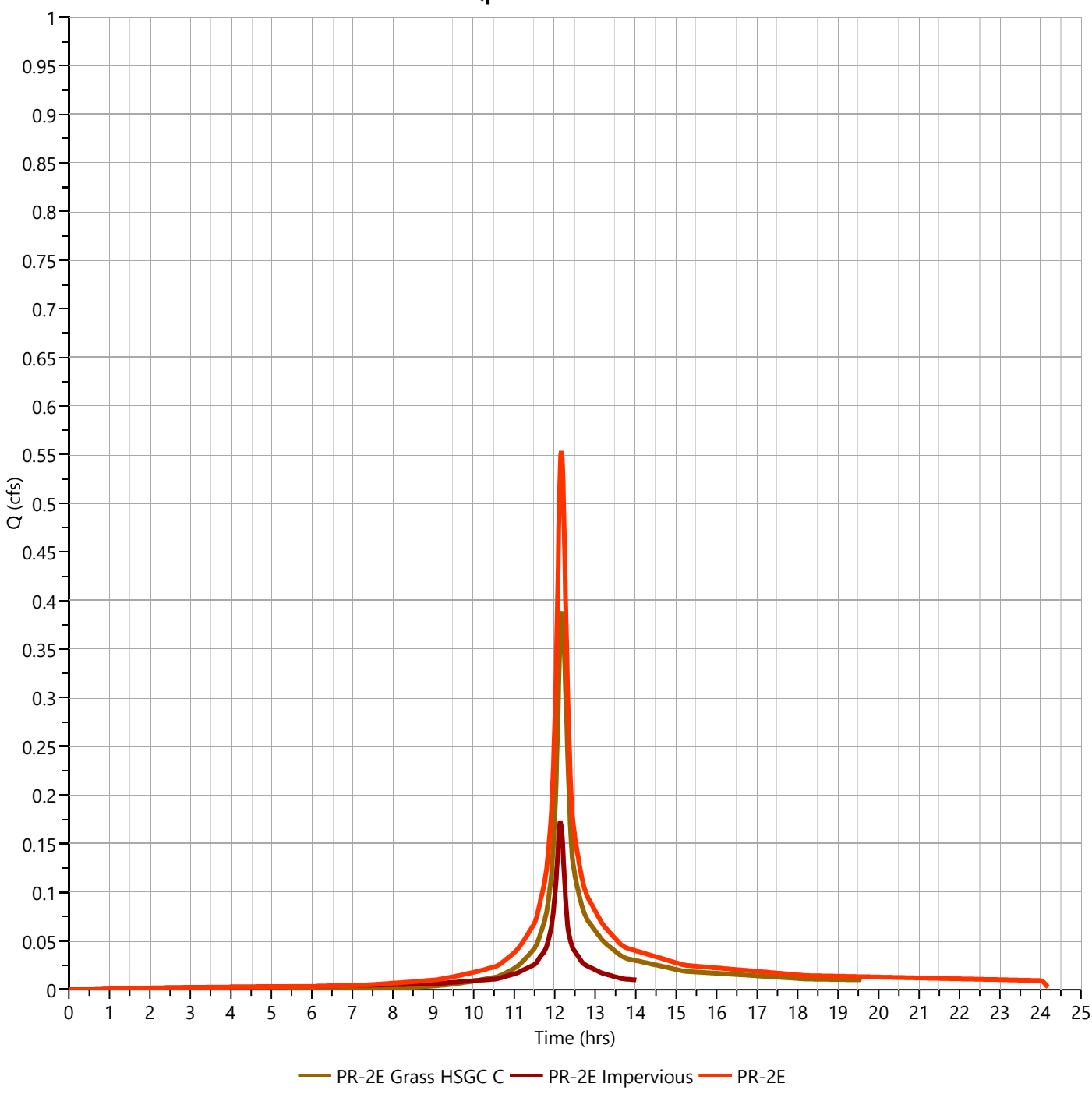
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2E

Hyd. No. 28

Hydrograph Type	= Junction	Peak Flow	= 0.554 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,204 cuft
Inflow Hydrographs	= 26, 27	Total Contrib. Area	= 0.14 ac



Hydrograph Report

Project Name:

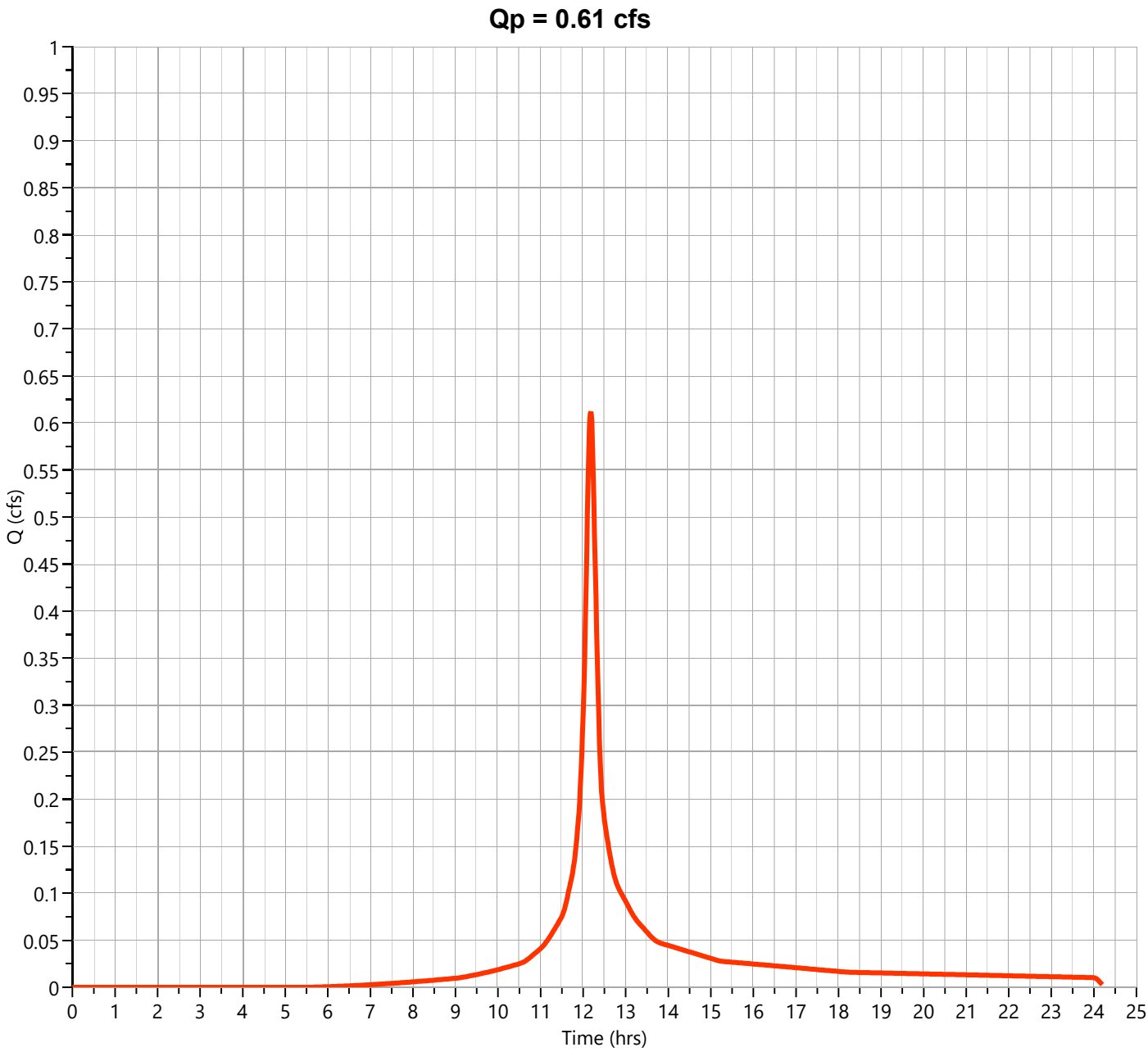
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2E Grass HSGC C

Hyd. No. 26

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.612 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 2,384 cuft
Drainage Area	= 0.11 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 12.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

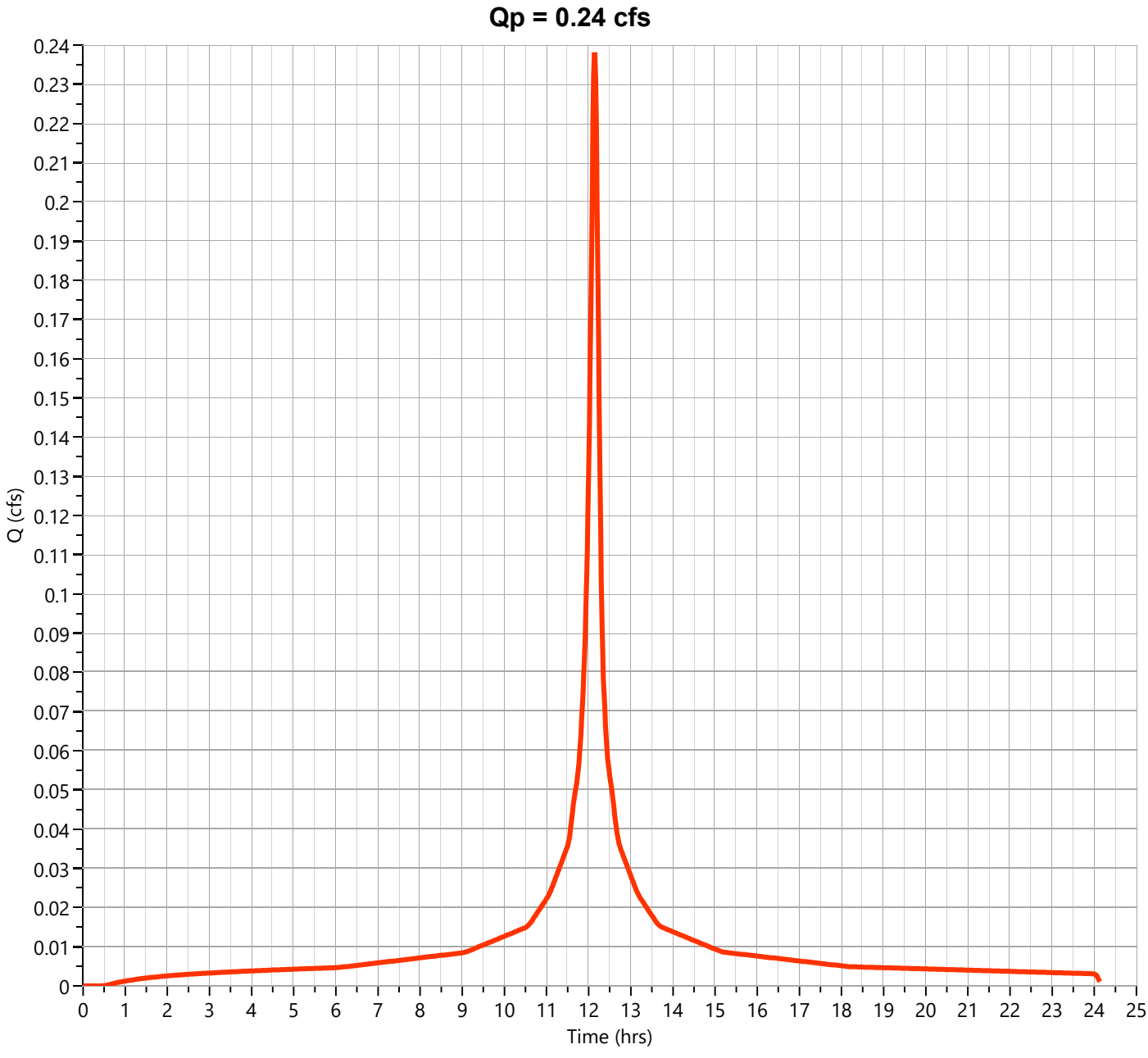
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2E Impervious

Hyd. No. 27

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.238 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 982 cuft
Drainage Area	= 0.03 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

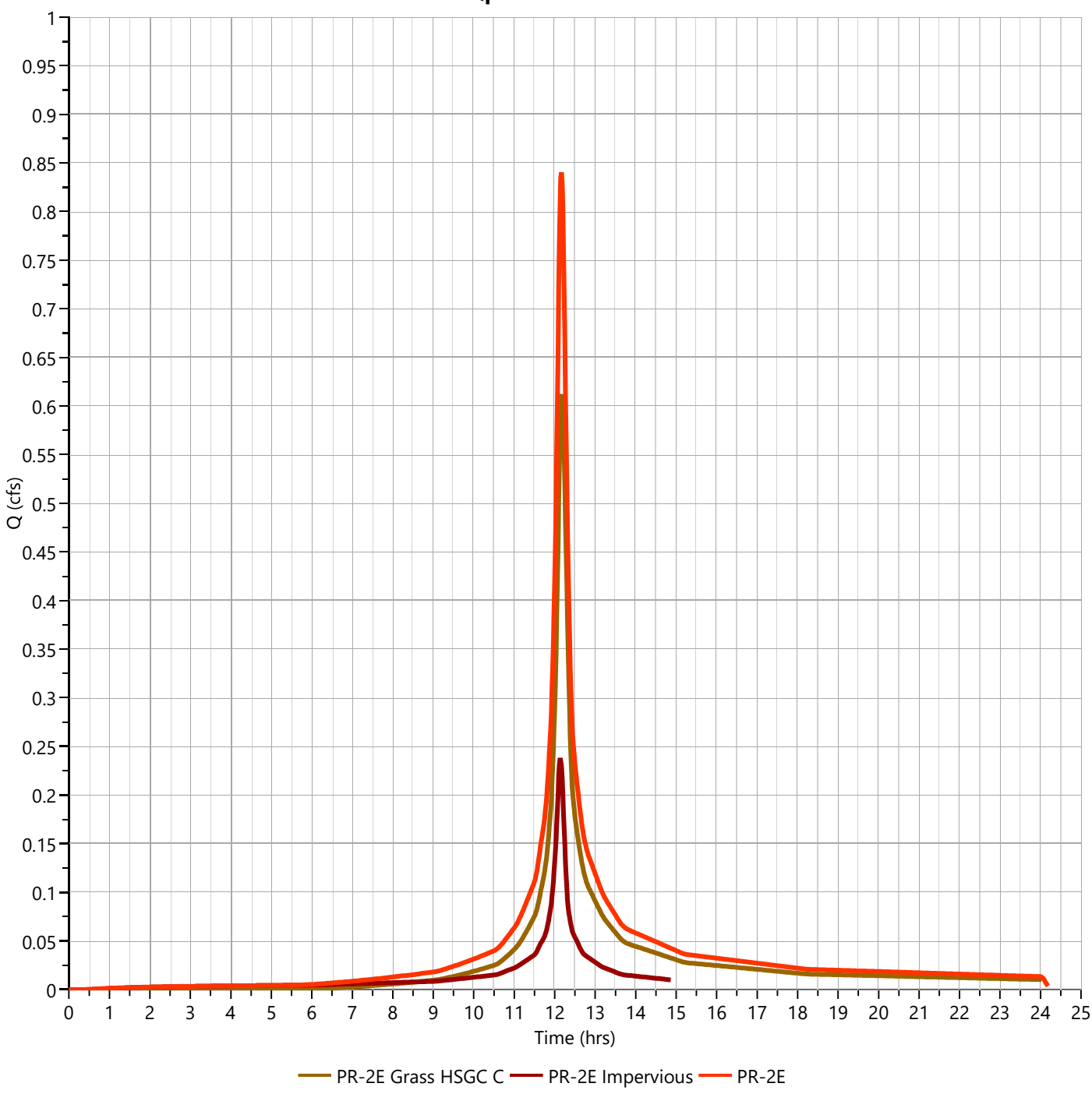
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2E

Hyd. No. 28

Hydrograph Type	= Junction	Peak Flow	= 0.840 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Hydrograph Volume	= 3,367 cuft
Inflow Hydrographs	= 26, 27	Total Contrib. Area	= 0.14 ac



PR-2F WATERSHED

Project: Beacon Unitarian Universalist Church | **By:** TEG | **Date:** 2/6/2024

Location: Summit, NJ | **Checked By:** MJV | **Date Checked:** 2/6/2024

Circle One: Present (**Developed**) — **Current Proposed Watershed PR-2F - Impervious**

Circle One: (**T_c**) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

			Segment ID	1		2		
1.	Surface Description (NEH table 15-1)			Smooth Surfaces		Woods Light Underbrush		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.011		0.40		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)		ft	14		51		
4.	Two-year 24-hr rainfall, P_2		in	3.46		3.46		
5.	Land Slope, s		ft/ft	0.021		0.057		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft)	$L_{mcs} = (100\ s^{0.5})/n$	ft	100		60		
7.	Compute T_t	$T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.004	+	0.132	+	

Sheet Flow Sub-Total **0.136 hours**

Shallow Concentrated Flow

			Segment ID	3		4		5
8.	Surface Description			Grassed Waterways		Grassed Waterways		Grassed Waterways
9.	Flow Length, L		ft	19		54		25
10.	Watercourse Slope, s		ft/ft	0.091		0.010		0.027
11.	Average Velocity, V (NEH table 15-3)		ft/s	4.85		1.63		2.66
12.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.001	+	0.009	+	0.003

Shallow Conc. Flow Sub-Total **0.013 hours**

Channel Flow

			Segment ID	6				
13.	Flow Length, L		ft	291				
14.	Cross Sectional flow area, a		ft^2	0.61				
15.	Wetted Perimeter, P_w		ft	2.00				
16.	Hydraulic Radius, r	$r = a / P_w$	ft	0.31				
17.	Channel Slope, s		ft/ft	0.005				
18.	Manning's Roughness Coeff., n			0.012				
19.	Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	3.97				
20.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.020	+		+	

Channel Flow Sub-Total **0.020 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) = **0.170 hours**

Total Tc (minutes) = **10 minutes**

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/6/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/6/2024**

Circle One: Present **(Developed)** — **Current Proposed Watershed PR-2F - Pervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

			Segment ID	1		2		
1.	Surface Description (NEH table 15-1)			Woods Light Underbrush		Dense Grasses		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.40		0.24		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)		ft	41		16		
4.	Two-year 24-hr rainfall, P_2		in	3.46		3.46		
5.	Land Slope, s		ft/ft	0.087		0.008		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft)	$L_{mcs} = (100\ s^{0.5})/n$	ft	74		37		
7.	Compute T_t	$T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.094	+	0.075	+	

Sheet Flow Sub-Total **0.169 hours**

Shallow Concentrated Flow

			Segment ID	3		4		
8.	Surface Description			Grassed Waterways		Grassed Waterways		
9.	Flow Length, L		ft	54		25		
10.	Watercourse Slope, s		ft/ft	0.010		0.027		
11.	Average Velocity, V (NEH table 15-3)		ft/s	1.63		2.66		
12.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.009	+	0.003	+	

Shallow Conc. Flow Sub-Total **0.012 hours**

Channel Flow

			Segment ID	5				
13.	Flow Length, L		ft	291				
14.	Cross Sectional flow area, a		ft^2	0.61				
15.	Wetted Perimeter, P_w		ft	2.00				
16.	Hydraulic Radius, r	$r = a / P_w$	ft	0.31				
17.	Channel Slope, s		ft/ft	0.005				
18.	Manning's Roughness Coeff., n			0.012				
19.	Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	3.97				
20.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.020	+		+	

Channel Flow Sub-Total **0.020 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) = **0.201 hours**

Total Tc (minutes) = **12 minutes**

Hydrograph Report

Project Name:

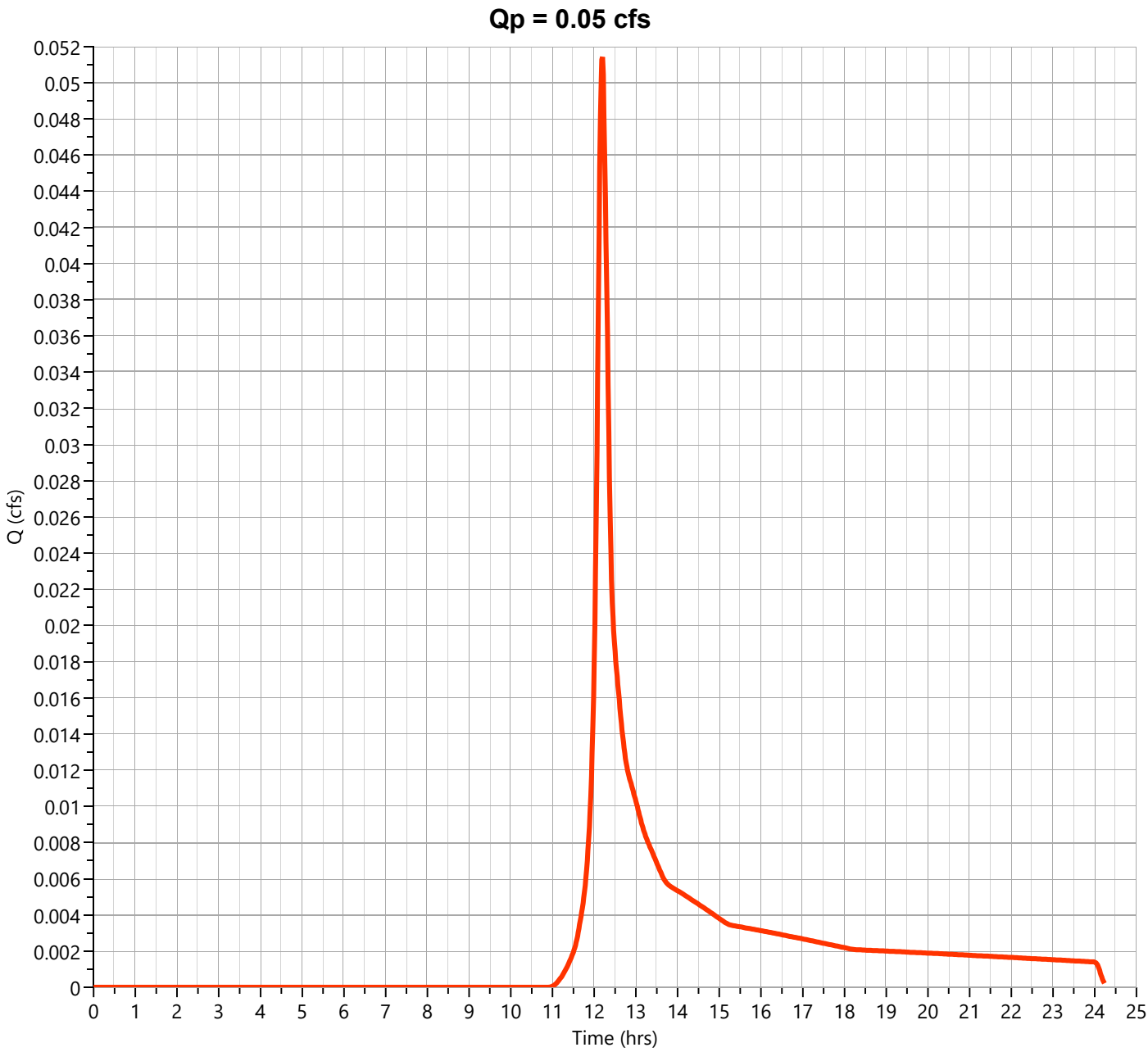
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2F Woods HSGC C

Hyd. No. 30

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.051 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 211 cuft
Drainage Area	= 0.06 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 12.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

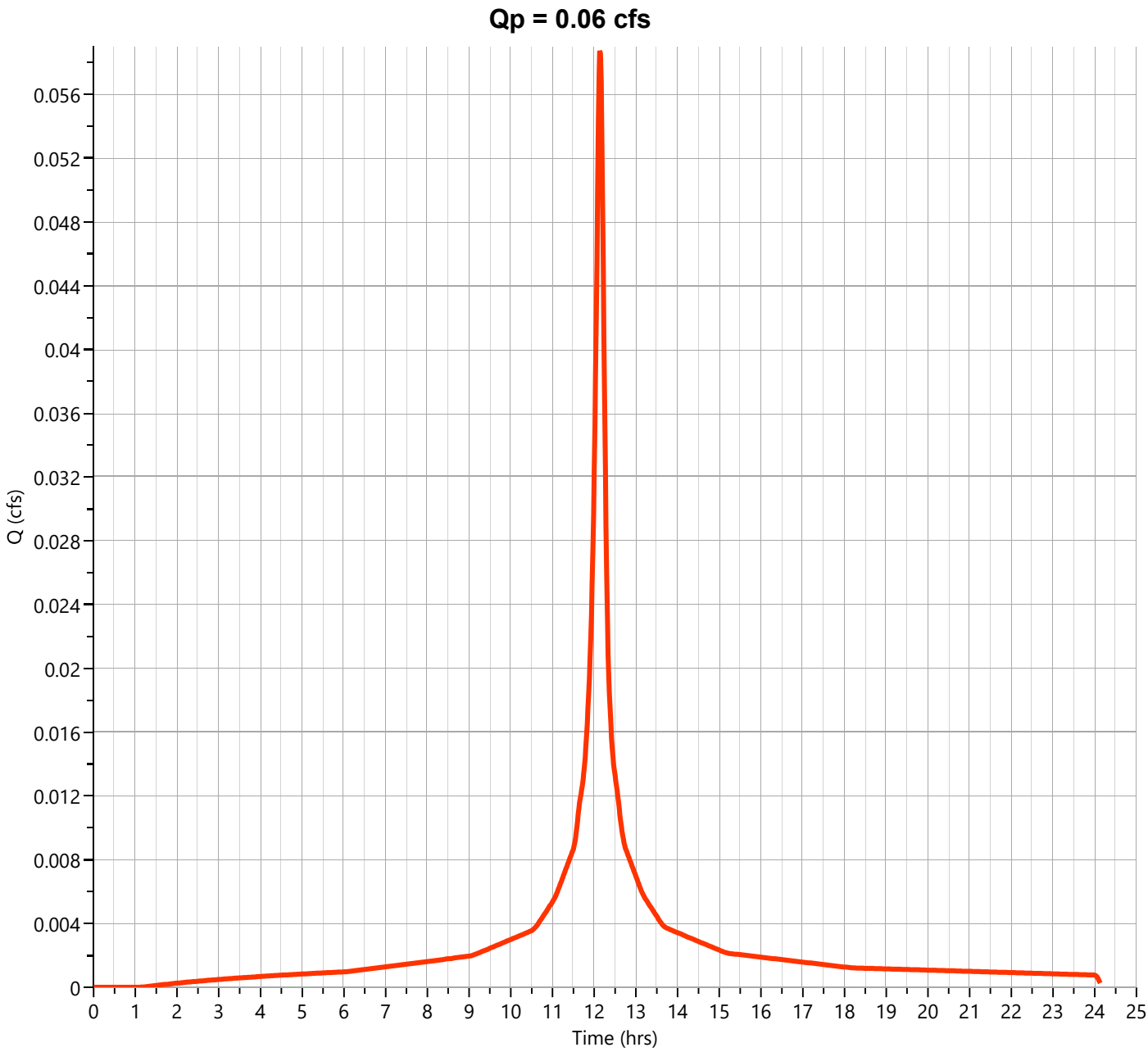
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2F Impervious

Hyd. No. 31

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.059 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 234 cuft
Drainage Area	= 0.02 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

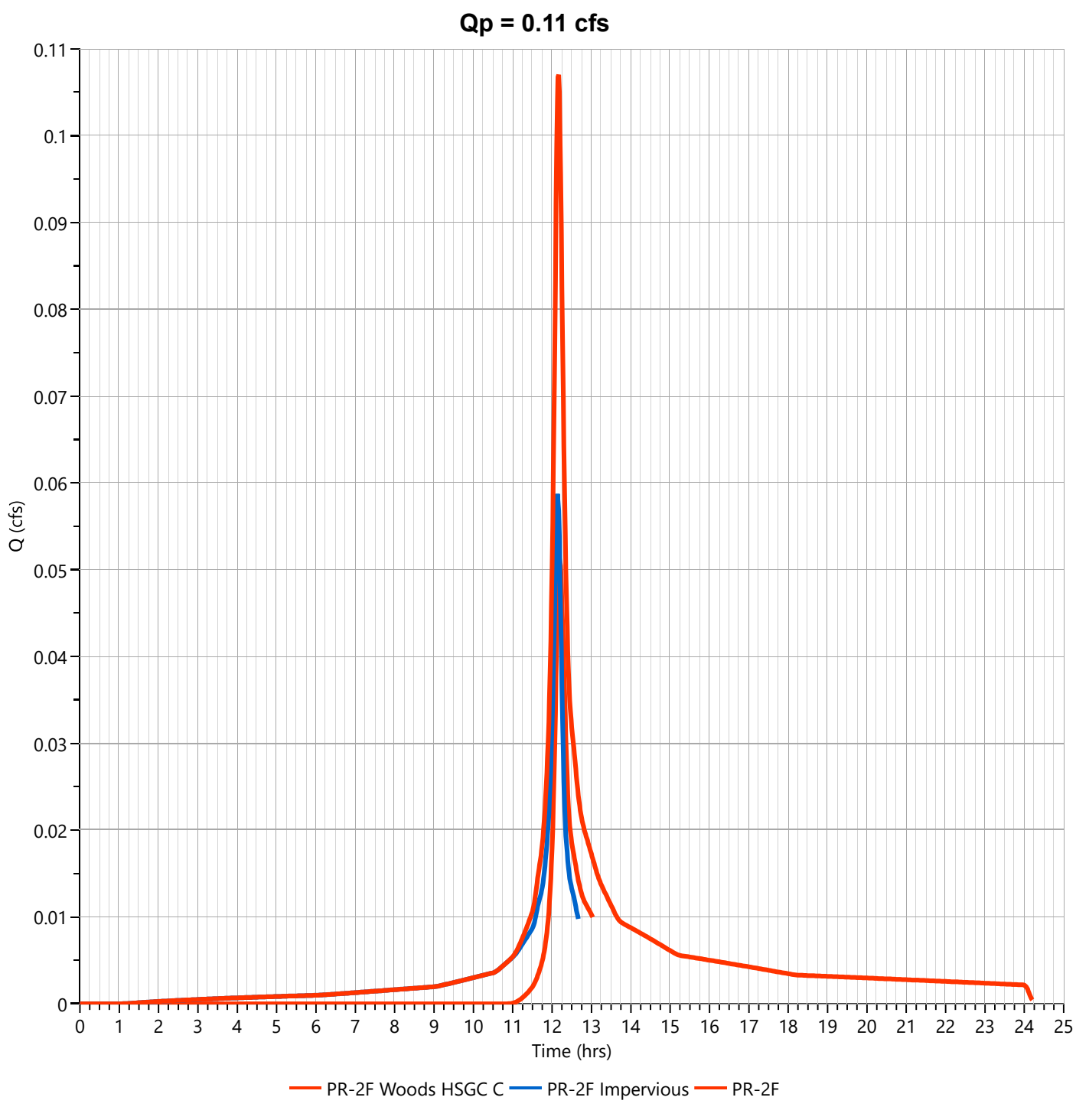
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2F

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 0.107 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Hydrograph Volume	= 445 cuft
Inflow Hydrographs	= 30, 31	Total Contrib. Area	= 0.08 ac



Hydrograph Report

Project Name:

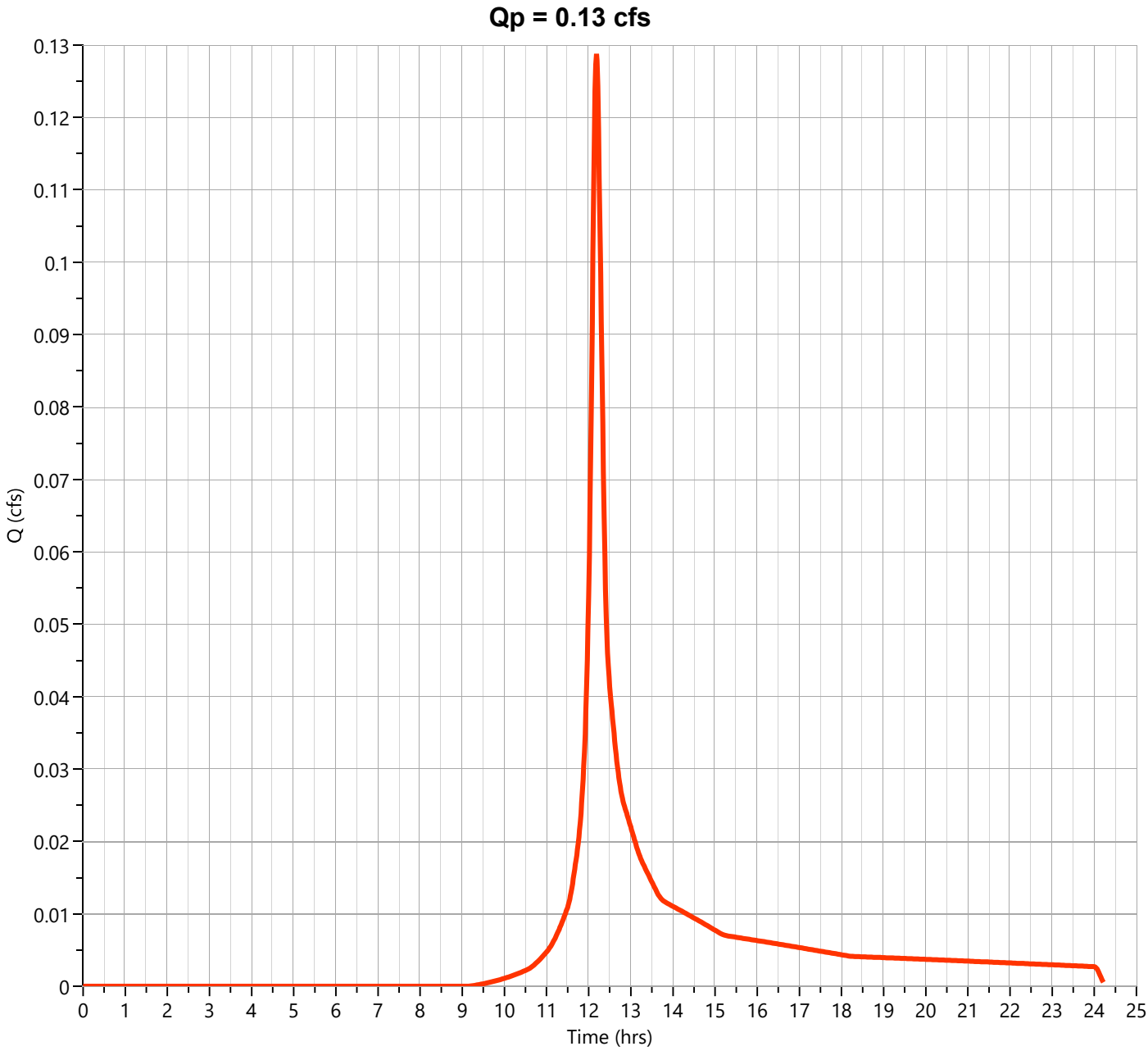
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2F Woods HSGC C

Hyd. No. 30

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.129 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 498 cuft
Drainage Area	= 0.06 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 12.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

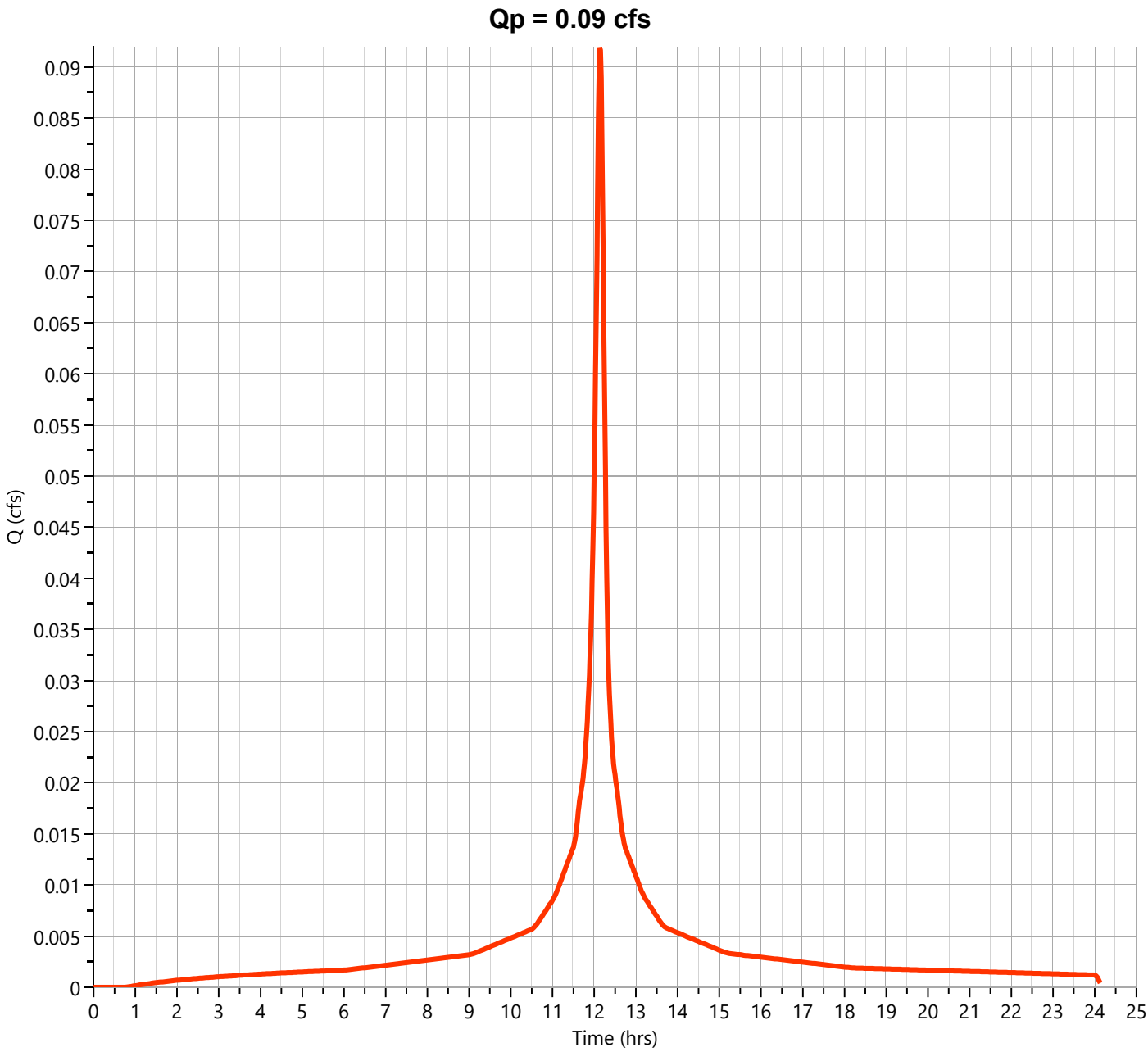
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2F Impervious

Hyd. No. 31

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.092 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 373 cuft
Drainage Area	= 0.02 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

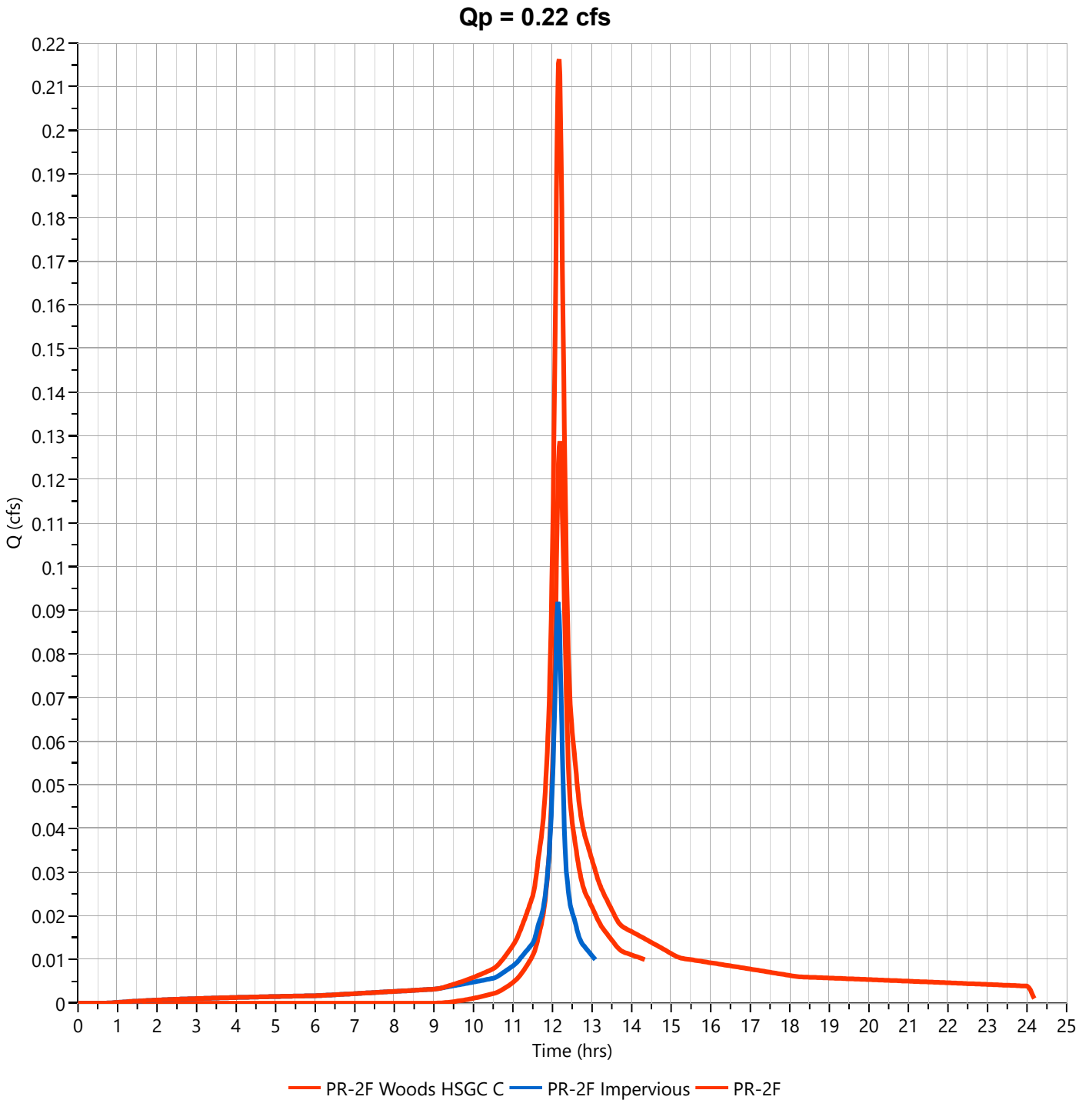
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2F

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 0.216 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Hydrograph Volume	= 871 cuft
Inflow Hydrographs	= 30, 31	Total Contrib. Area	= 0.08 ac



Hydrograph Report

Project Name:

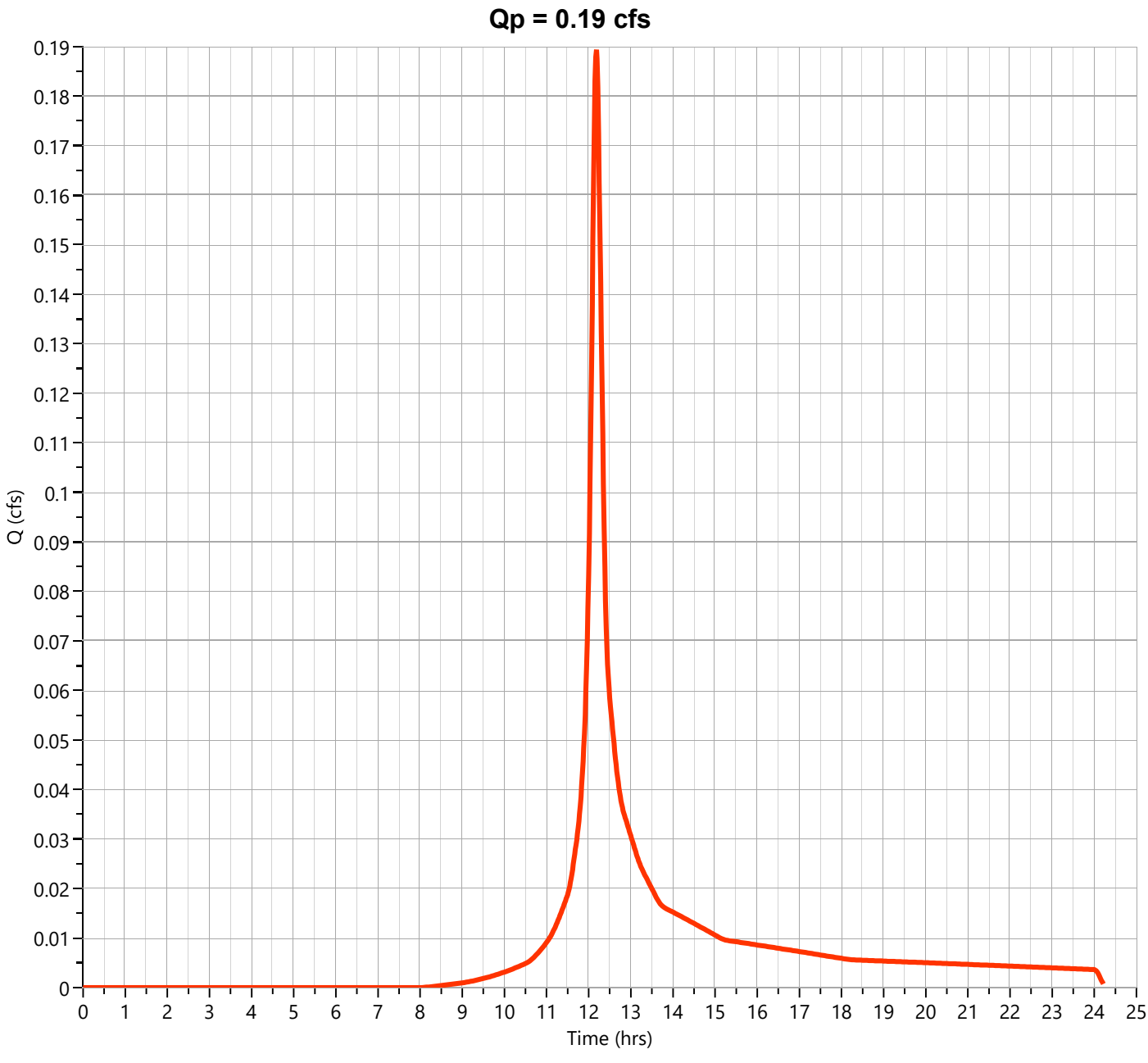
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2F Woods HSGC C

Hyd. No. 30

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.189 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 728 cuft
Drainage Area	= 0.06 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 12.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

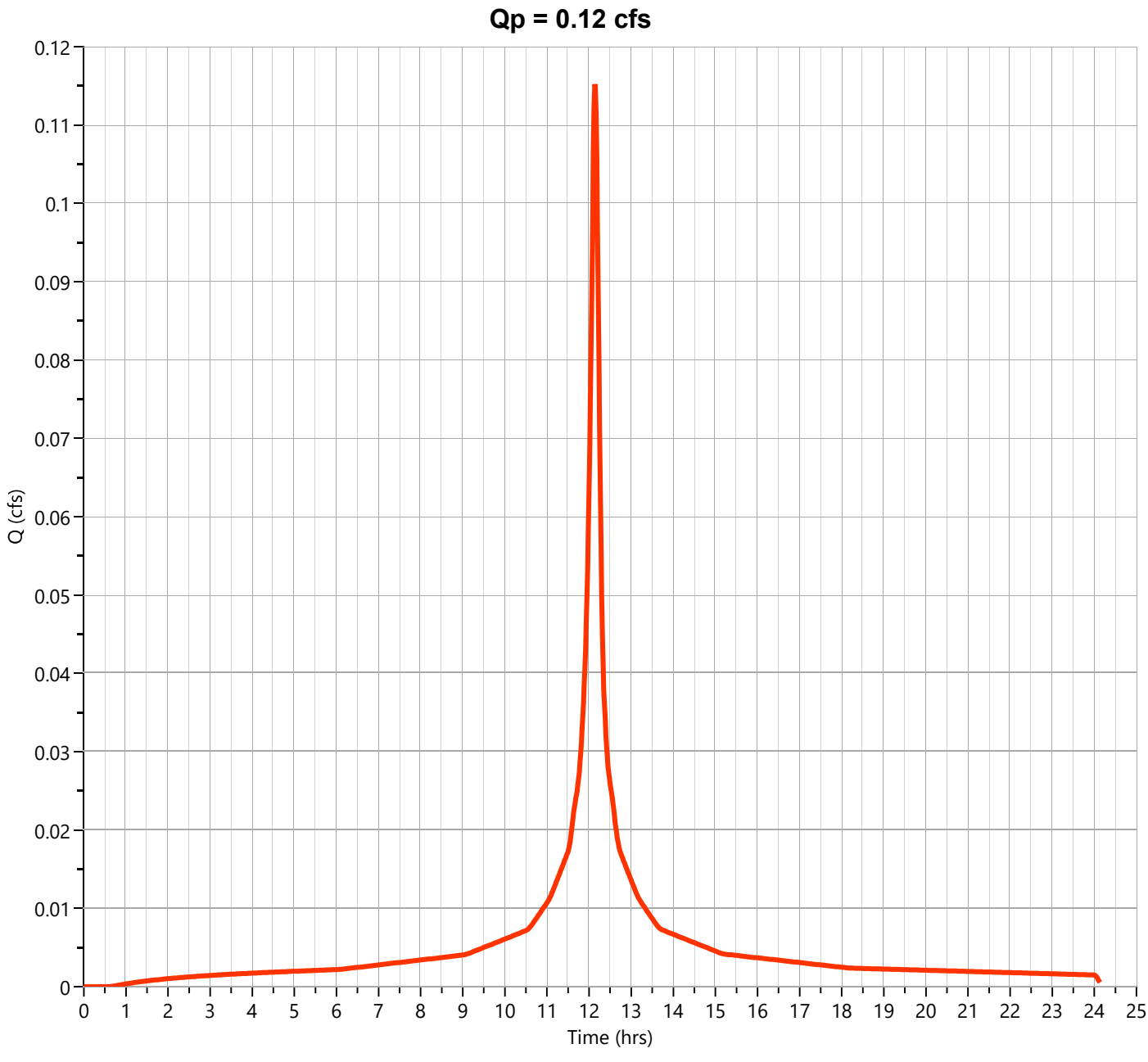
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2F Impervious

Hyd. No. 31

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.115 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 471 cuft
Drainage Area	= 0.02 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

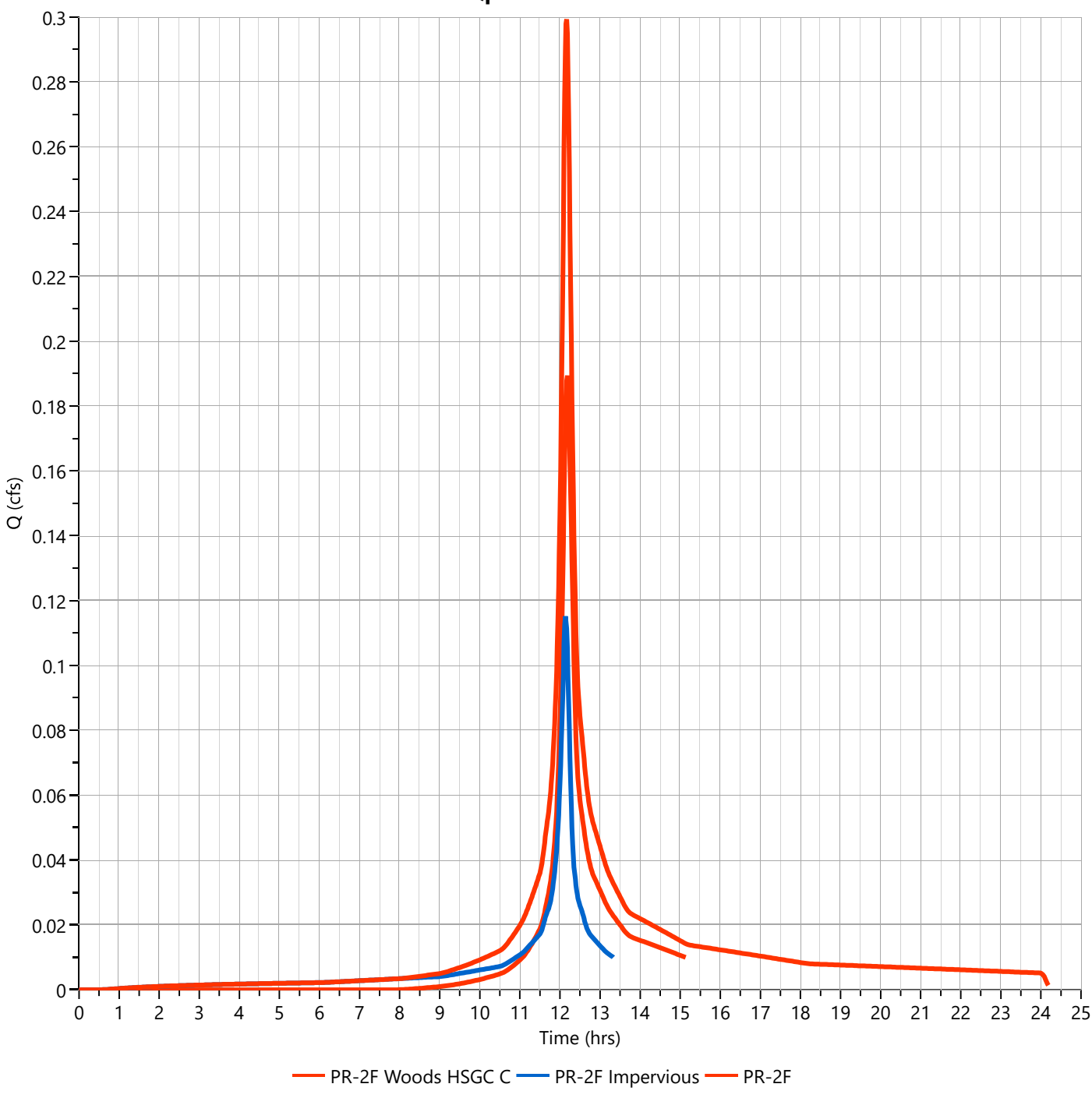
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2F

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 0.299 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,199 cuft
Inflow Hydrographs	= 30, 31	Total Contrib. Area	= 0.08 ac



Hydrograph Report

Project Name:

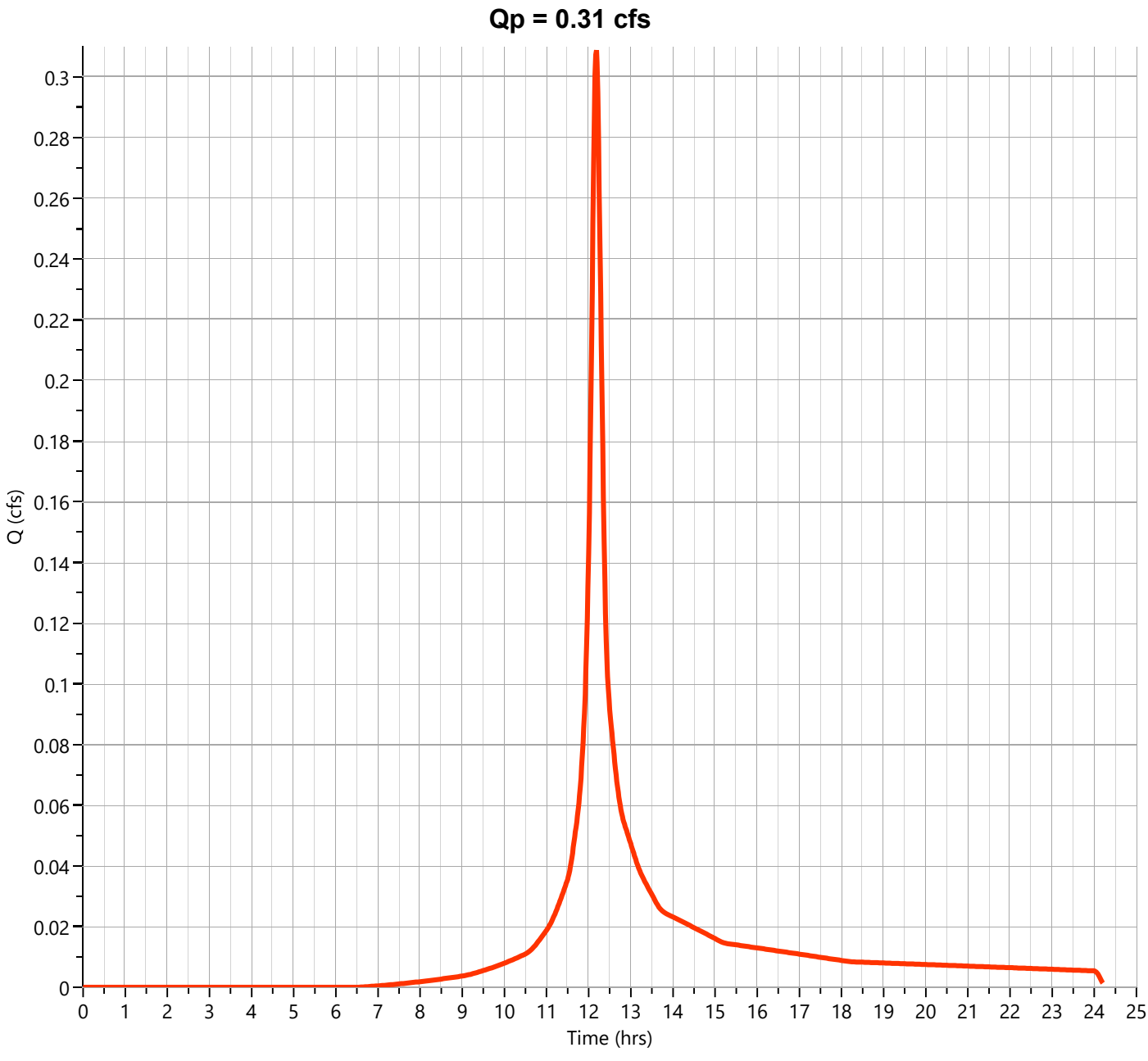
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2F Woods HSGC C

Hyd. No. 30

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.309 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 1,193 cuft
Drainage Area	= 0.06 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 12.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

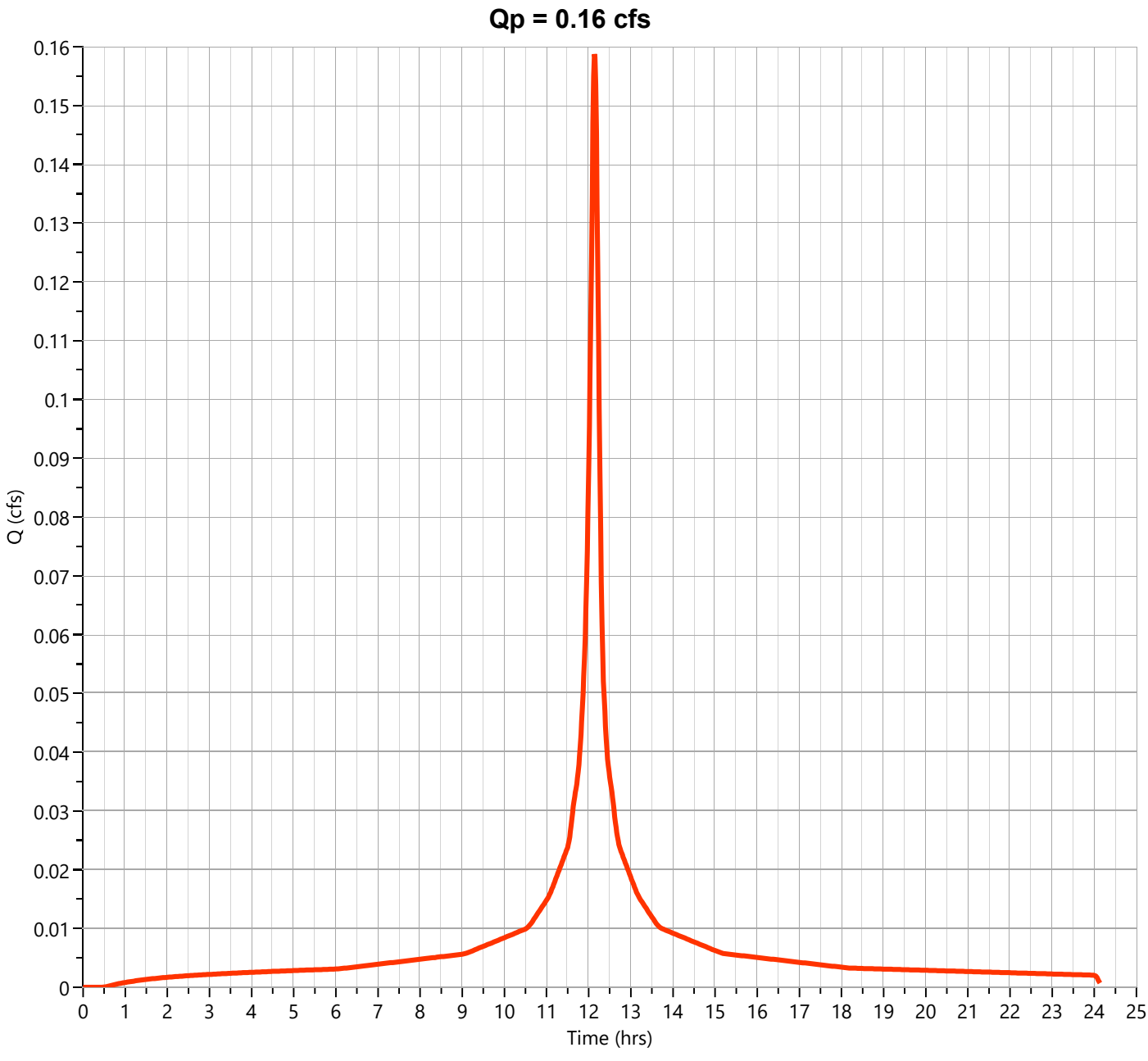
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2F Impervious

Hyd. No. 31

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.159 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 655 cuft
Drainage Area	= 0.02 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

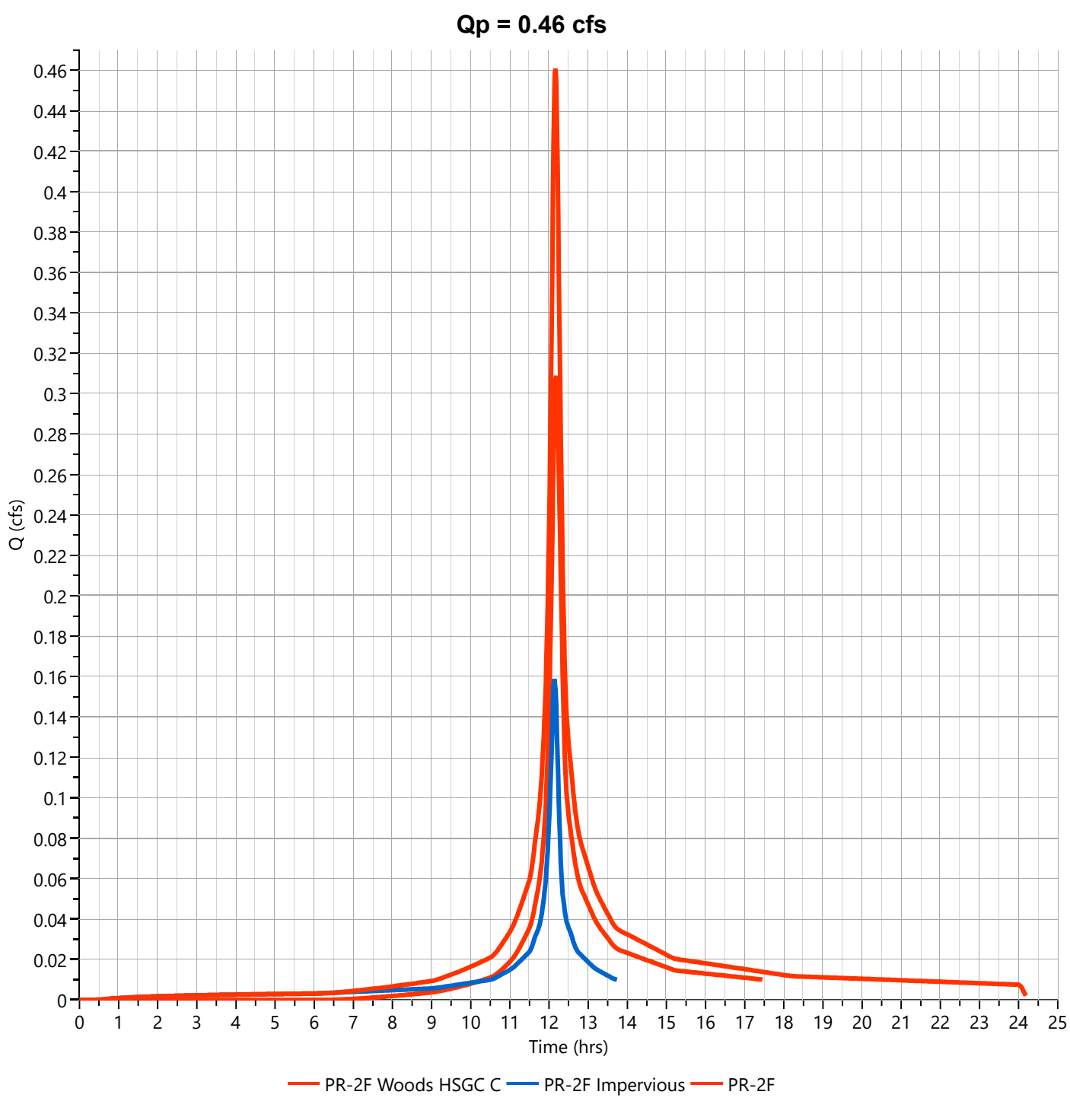
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2F

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 0.461 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,848 cuft
Inflow Hydrographs	= 30, 31	Total Contrib. Area	= 0.08 ac



PR-2G WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: Present **(Developed)** — **Current Proposed Watershed PR-2G - Pervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		
1.	Surface Description (NEH table 15-1)		Dense Grasses		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.24		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	29		
4.	Two-year 24-hr rainfall, P_2	in	3.46		
5.	Land Slope, s	ft/ft	0.045		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	88		
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} S^{0.4}}$	hr	0.062	+	+
				Sheet Flow Sub-Total	0.062 hours

Shallow Concentrated Flow		Segment ID	2	3	
8.	Surface Description		Grassed Waterways	Grassed Waterways	
9.	Flow Length, L	ft	73	140	
10.	Watercourse Slope, s	ft/ft	0.030	0.011	
11.	Average Velocity, V (NEH table 15-3)	ft/s	2.80	1.72	
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.007	+ 0.023	+
				Shallow Conc. Flow Sub-Total	0.030 hours

Channel Flow		Segment ID			
13.	Flow Length, L	ft			
14.	Cross Sectional flow area, a	ft^2			
15.	Wetted Perimeter, P_w	ft			
16.	Hydraulic Radius, r $r = a / P_w$	ft			
17.	Channel Slope, s	ft/ft			
18.	Manning's Roughness Coeff., n				
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s			
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	+	+	+
				Channel Flow Sub-Total	0.000 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.091 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	5 minutes

Hydrograph Report

Project Name:

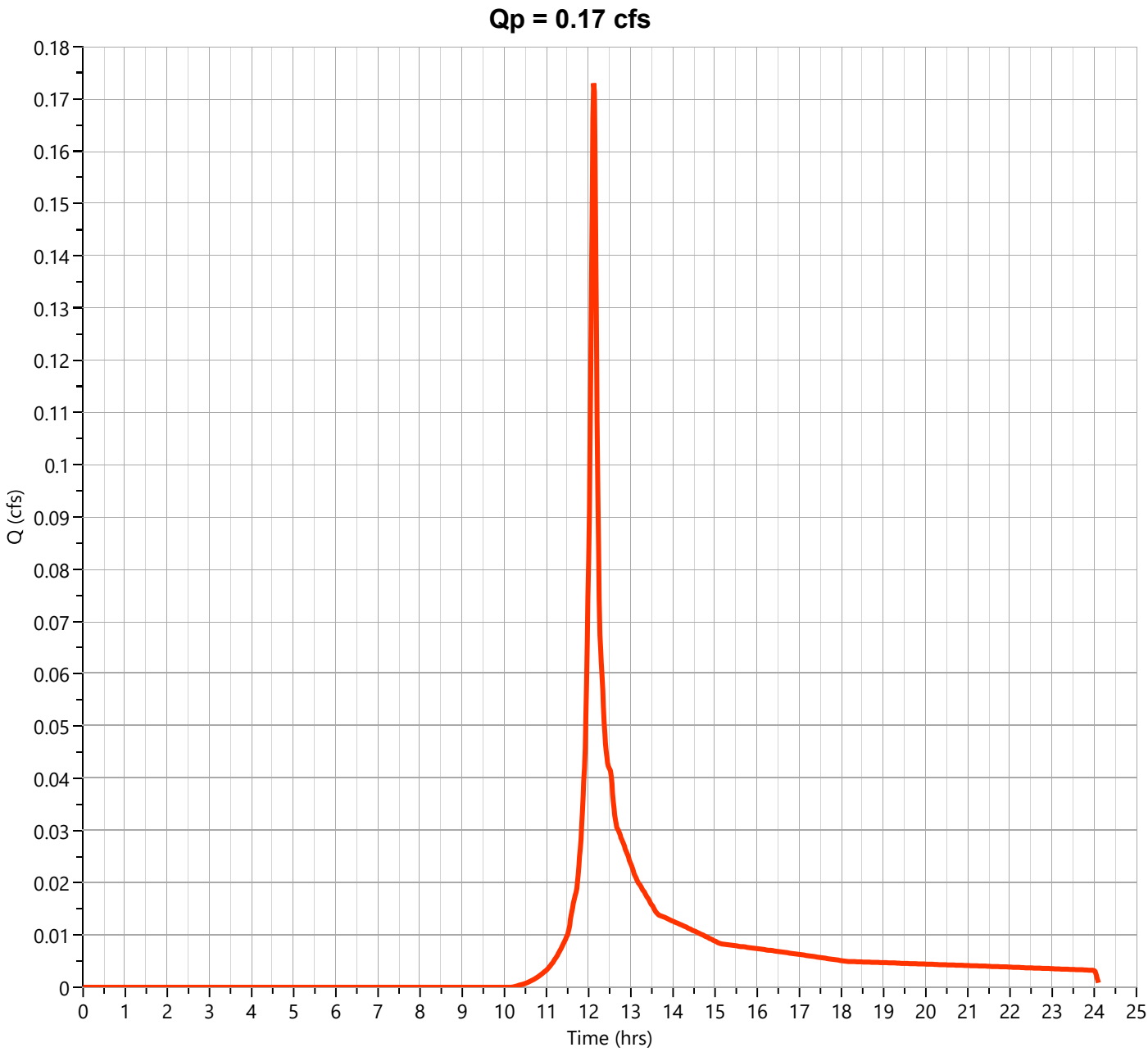
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2G Grass HSGC C

Hyd. No. 17

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.173 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 545 cuft
Drainage Area	= 0.12 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

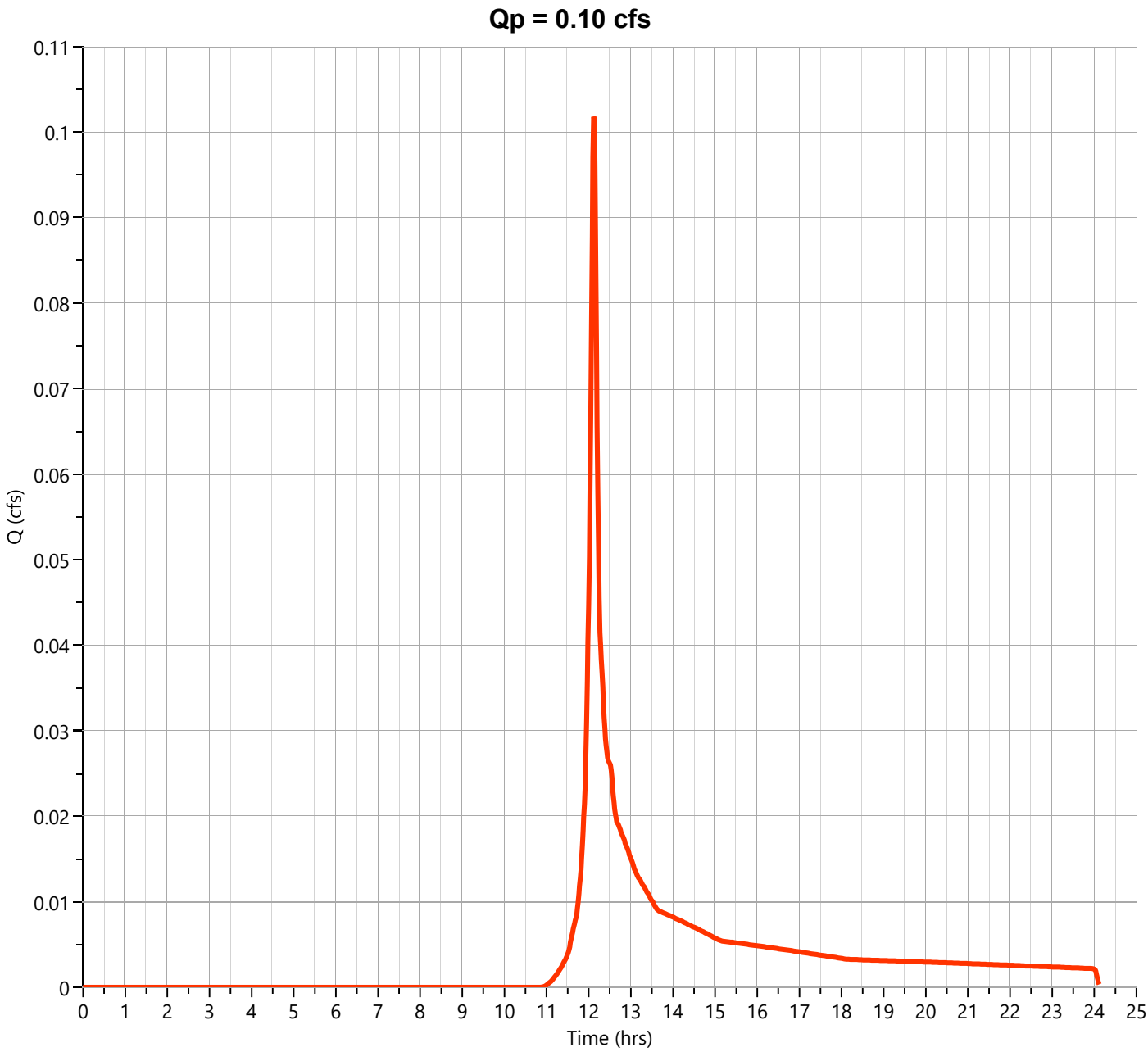
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2G Woods HSGC C

Hyd. No. 18

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.102 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 331 cuft
Drainage Area	= 0.09 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

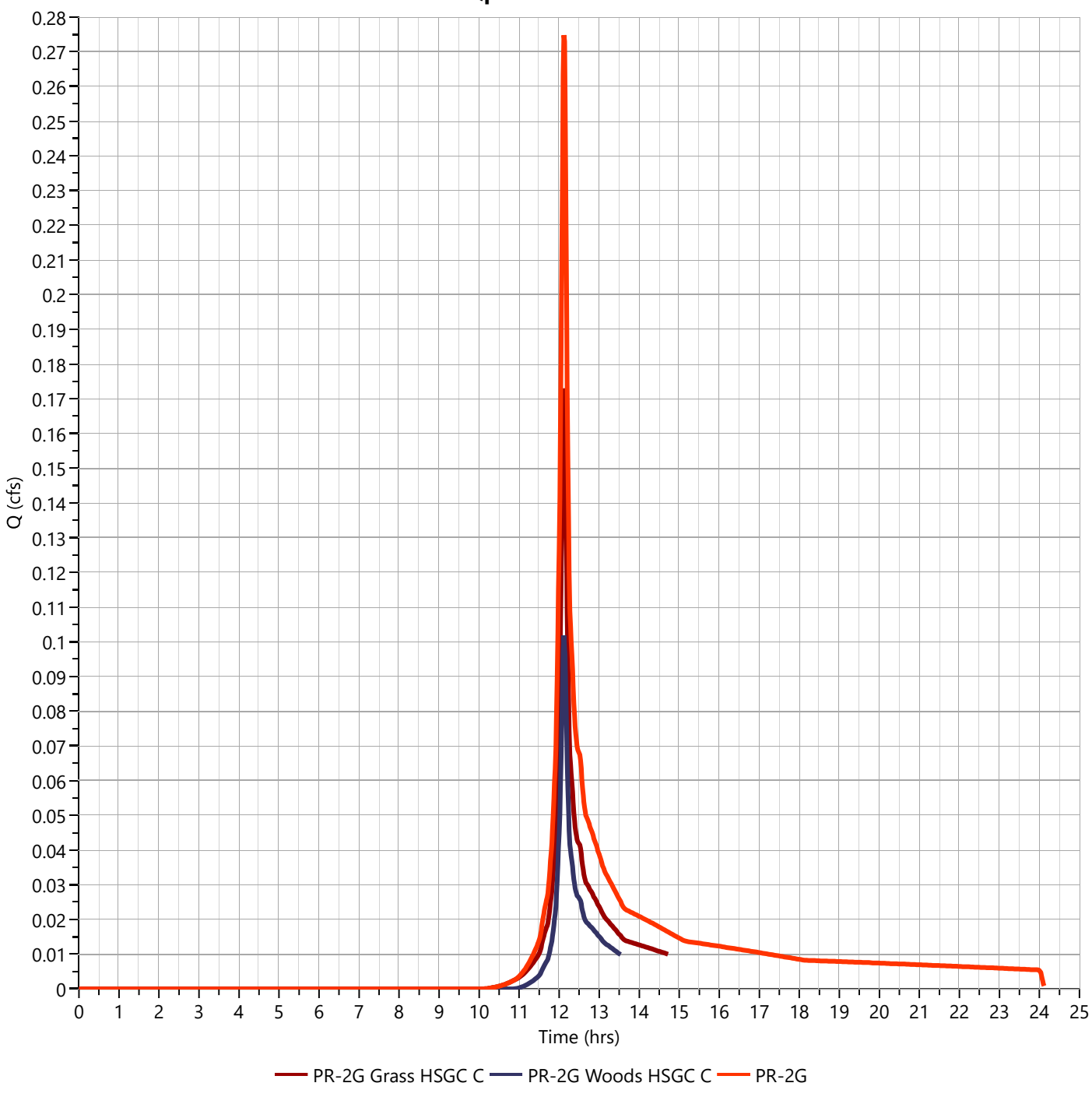
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2G

Hyd. No. 19

Hydrograph Type	= Junction	Peak Flow	= 0.275 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 876 cuft
Inflow Hydrographs	= 17, 18	Total Contrib. Area	= 0.21 ac



Hydrograph Report

Project Name:

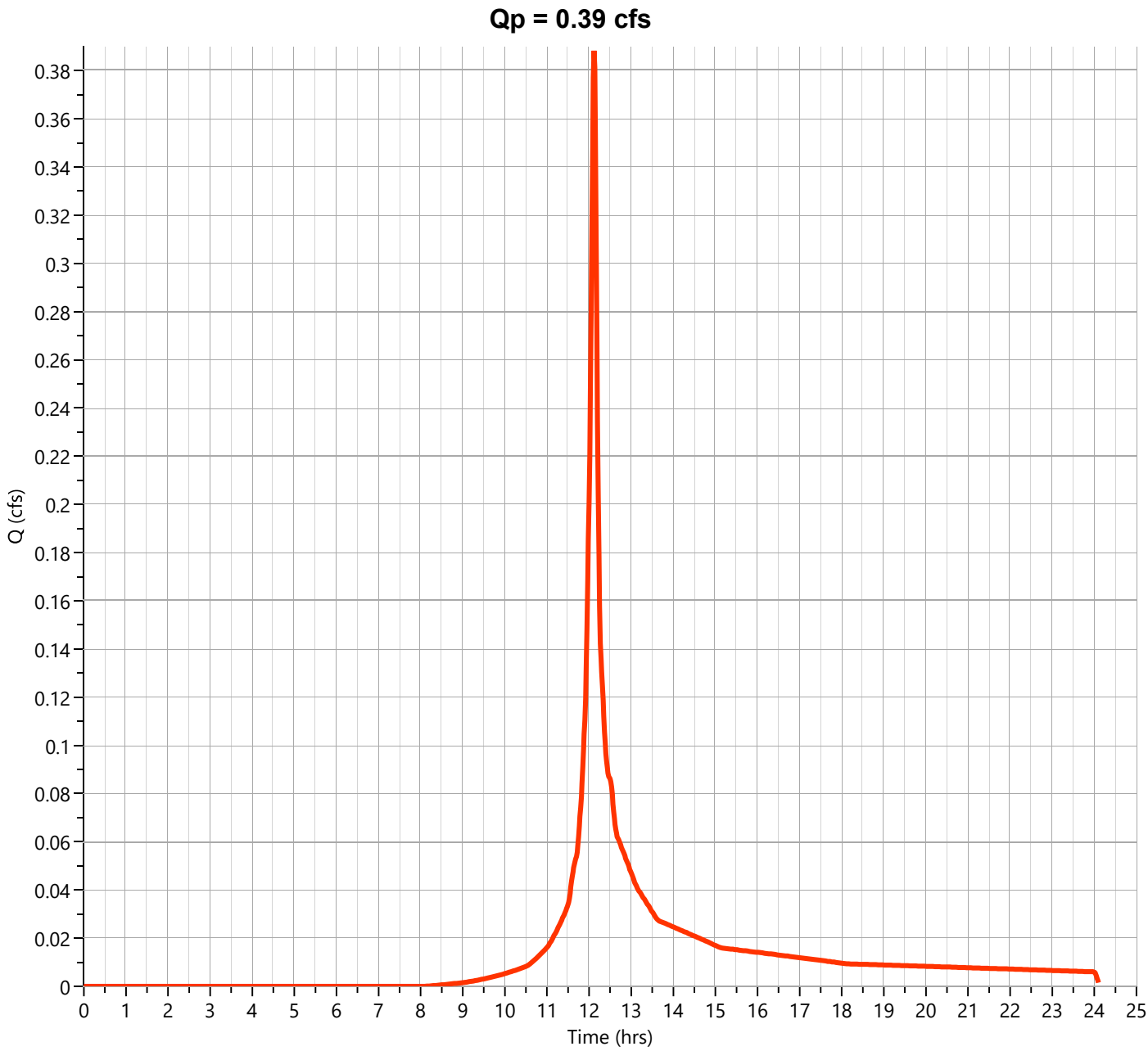
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2G Grass HSGC C

Hyd. No. 17

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.388 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 1,200 cuft
Drainage Area	= 0.12 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

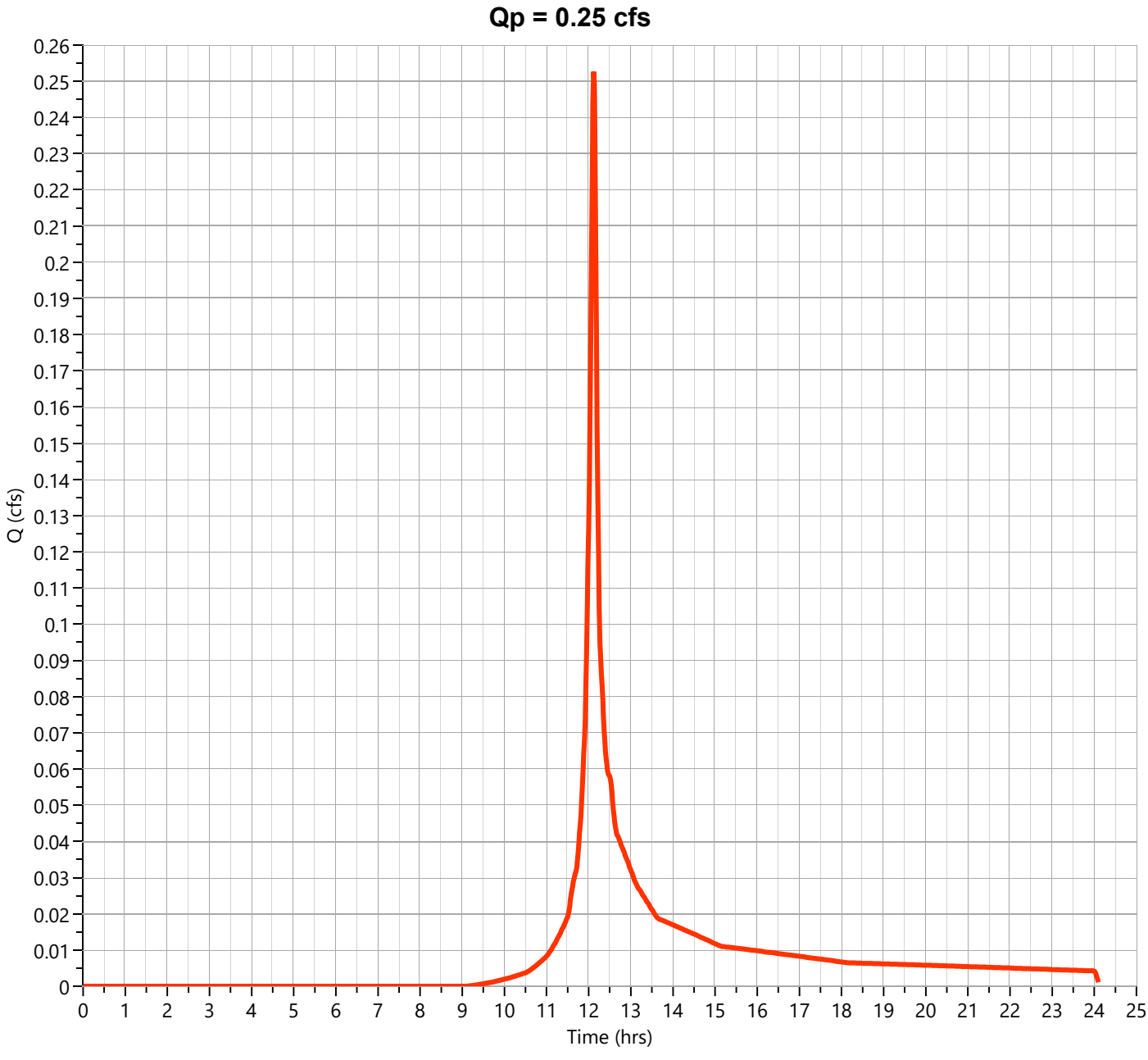
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2G Woods HSGC C

Hyd. No. 18

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.253 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 782 cuft
Drainage Area	= 0.09 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

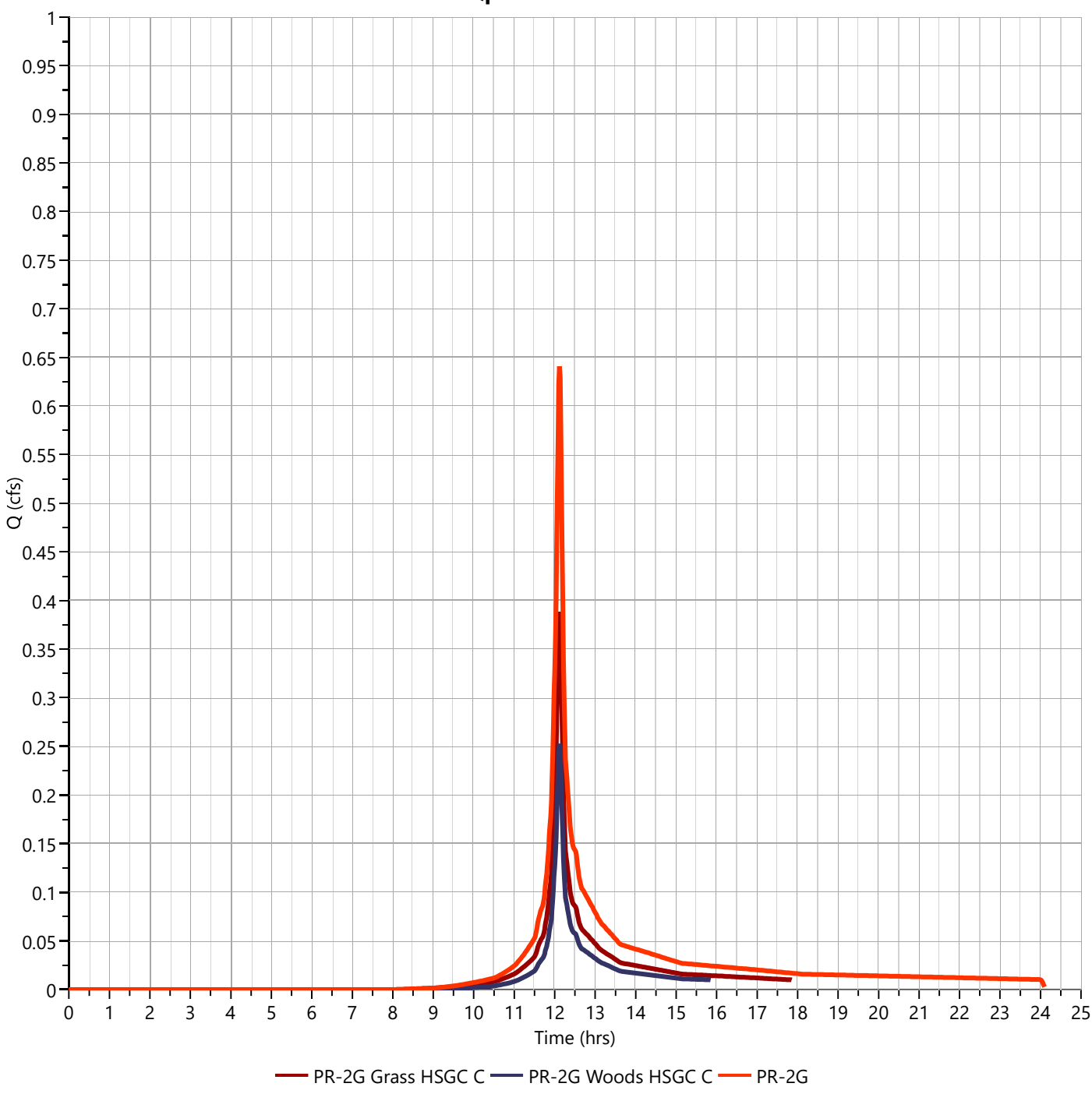
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2G

Hyd. No. 19

Hydrograph Type	= Junction	Peak Flow	= 0.641 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,982 cuft
Inflow Hydrographs	= 17, 18	Total Contrib. Area	= 0.21 ac



Hydrograph Report

Project Name:

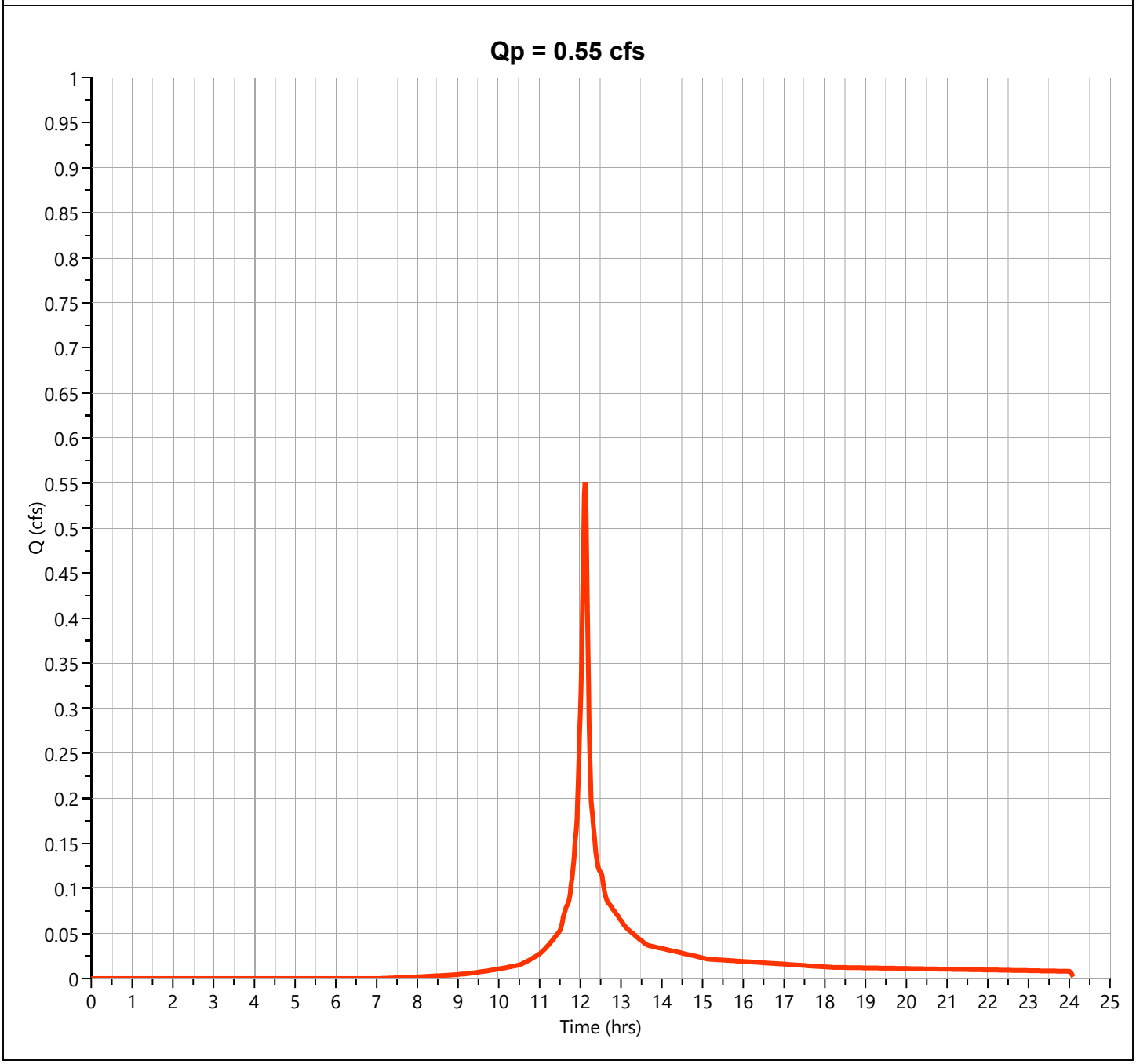
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2G Grass HSGC C

Hyd. No. 17

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.551 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 1,710 cuft
Drainage Area	= 0.12 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

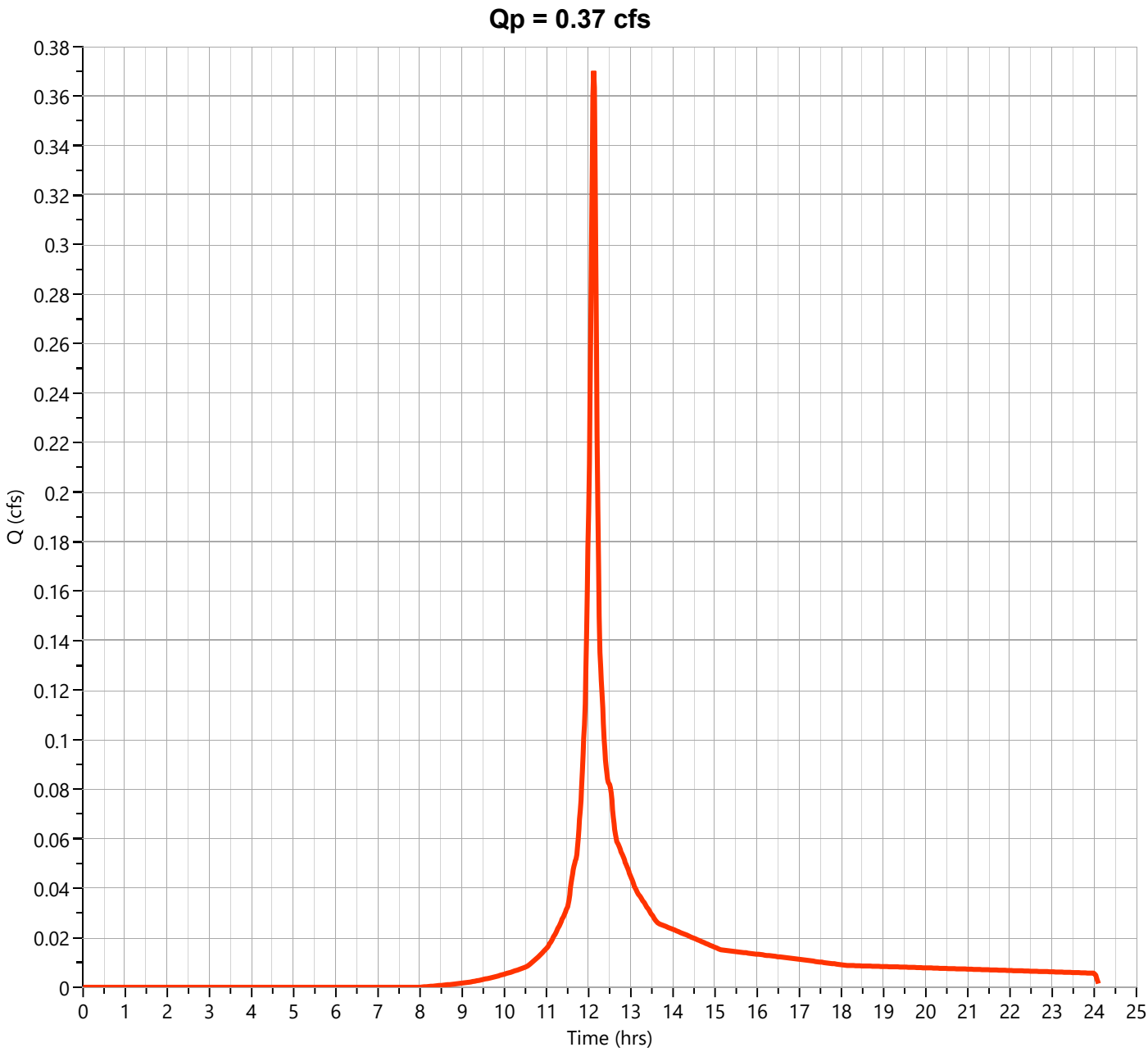
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2G Woods HSGC C

Hyd. No. 18

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.370 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 1,144 cuft
Drainage Area	= 0.09 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

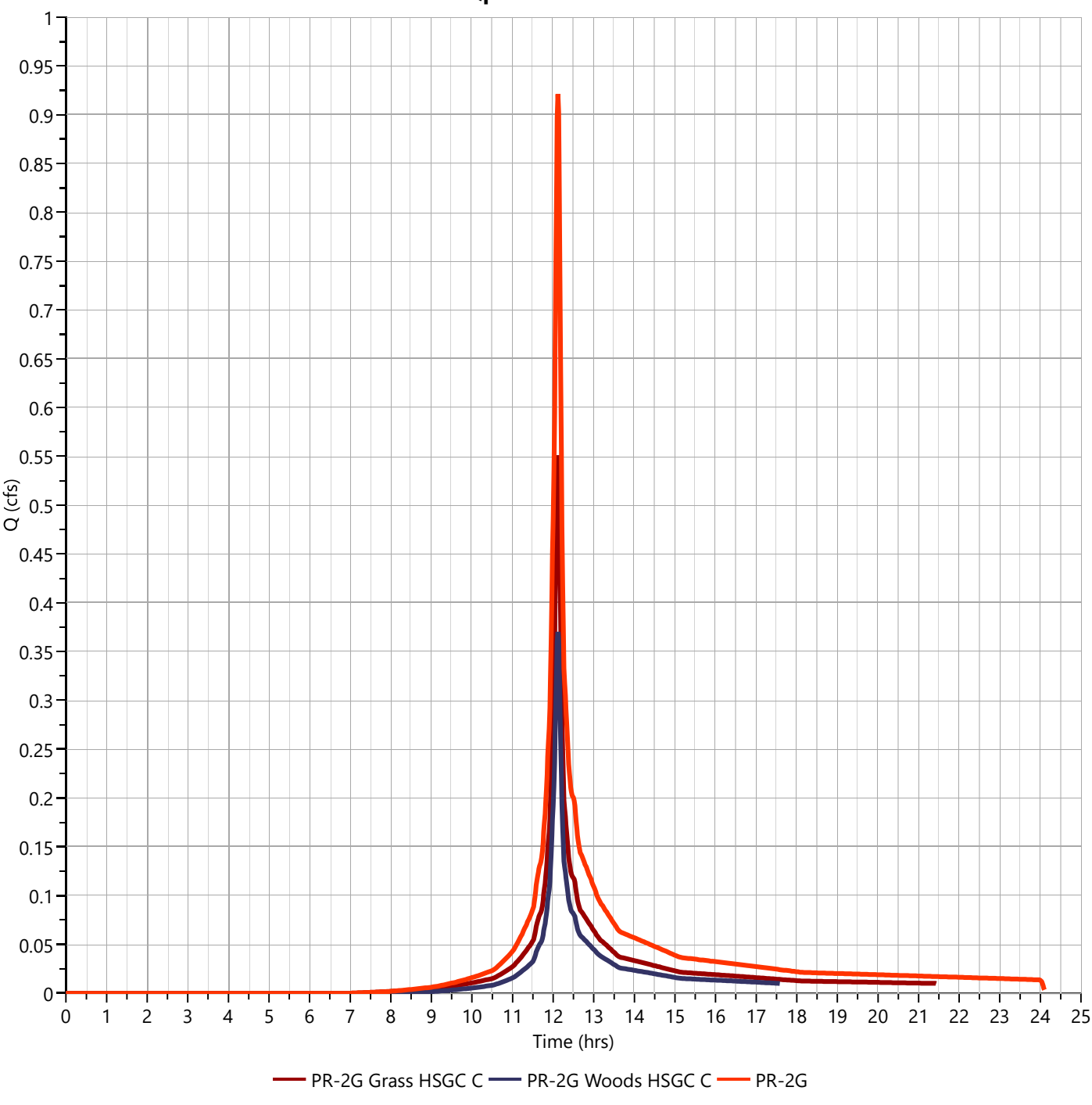
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2G

Hyd. No. 19

Hydrograph Type	= Junction	Peak Flow	= 0.921 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,854 cuft
Inflow Hydrographs	= 17, 18	Total Contrib. Area	= 0.21 ac



Hydrograph Report

Project Name:

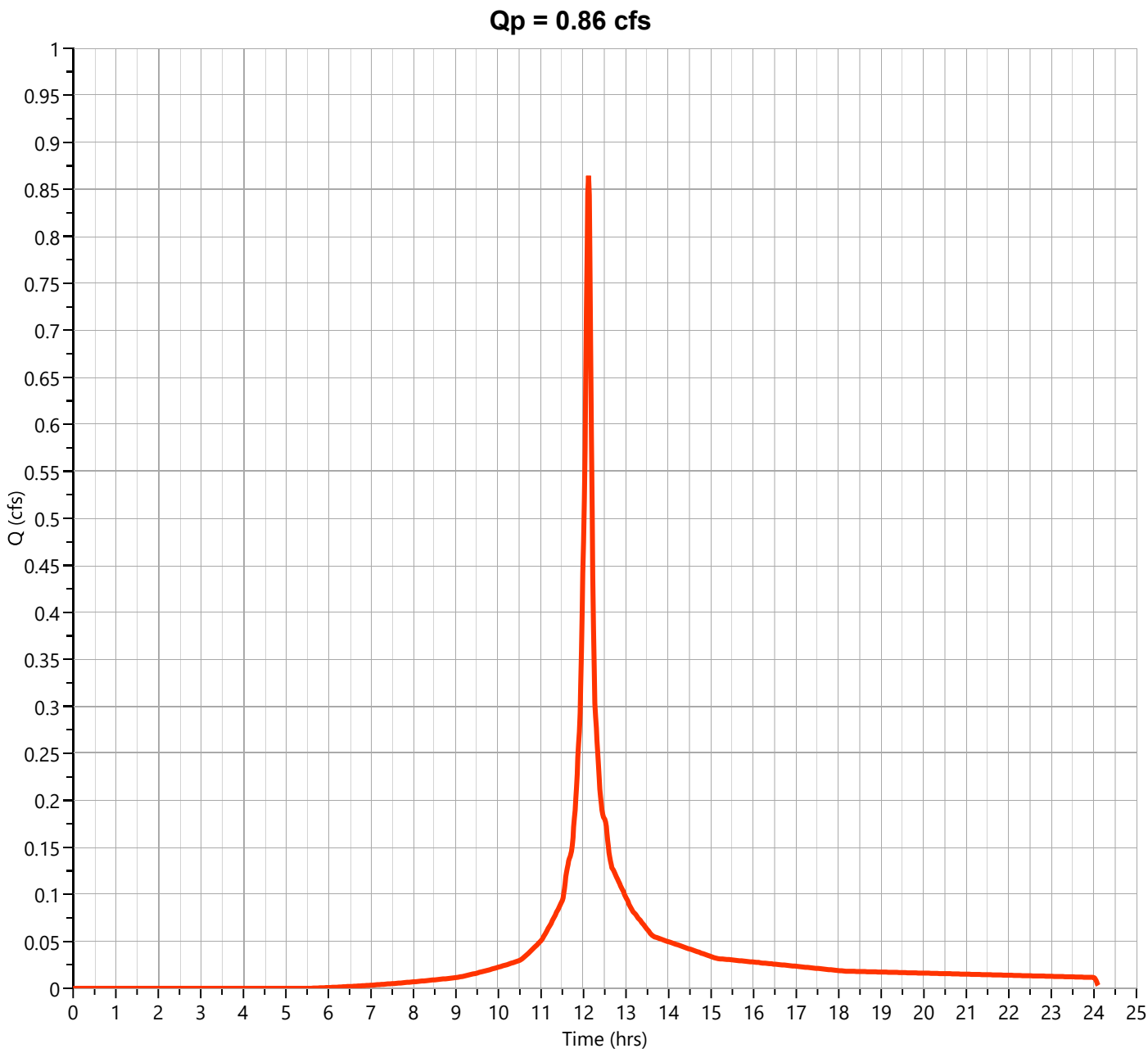
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2G Grass HSGC C

Hyd. No. 17

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.864 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 2,725 cuft
Drainage Area	= 0.12 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

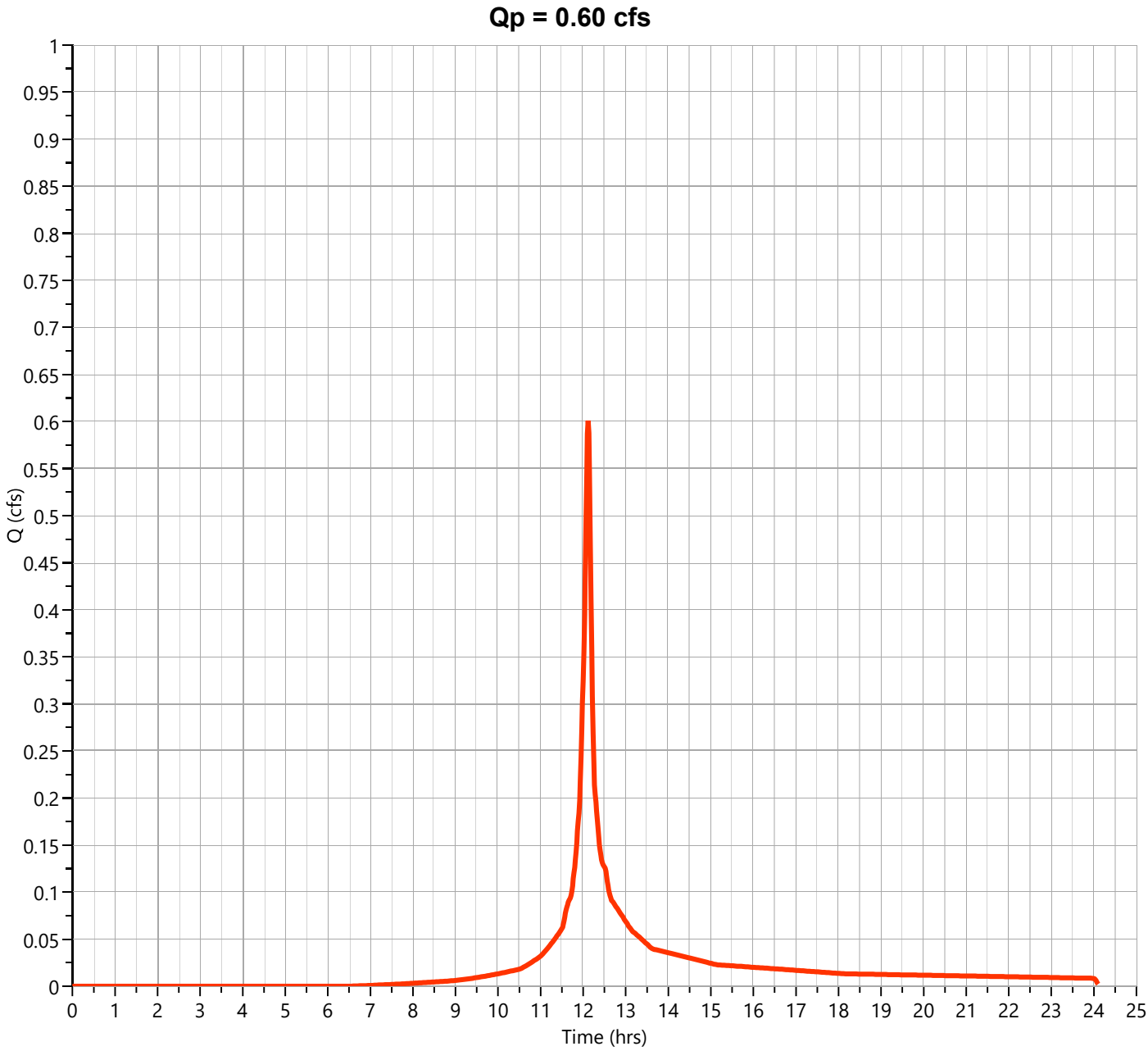
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2G Woods HSGC C

Hyd. No. 18

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.601 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 1,875 cuft
Drainage Area	= 0.09 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

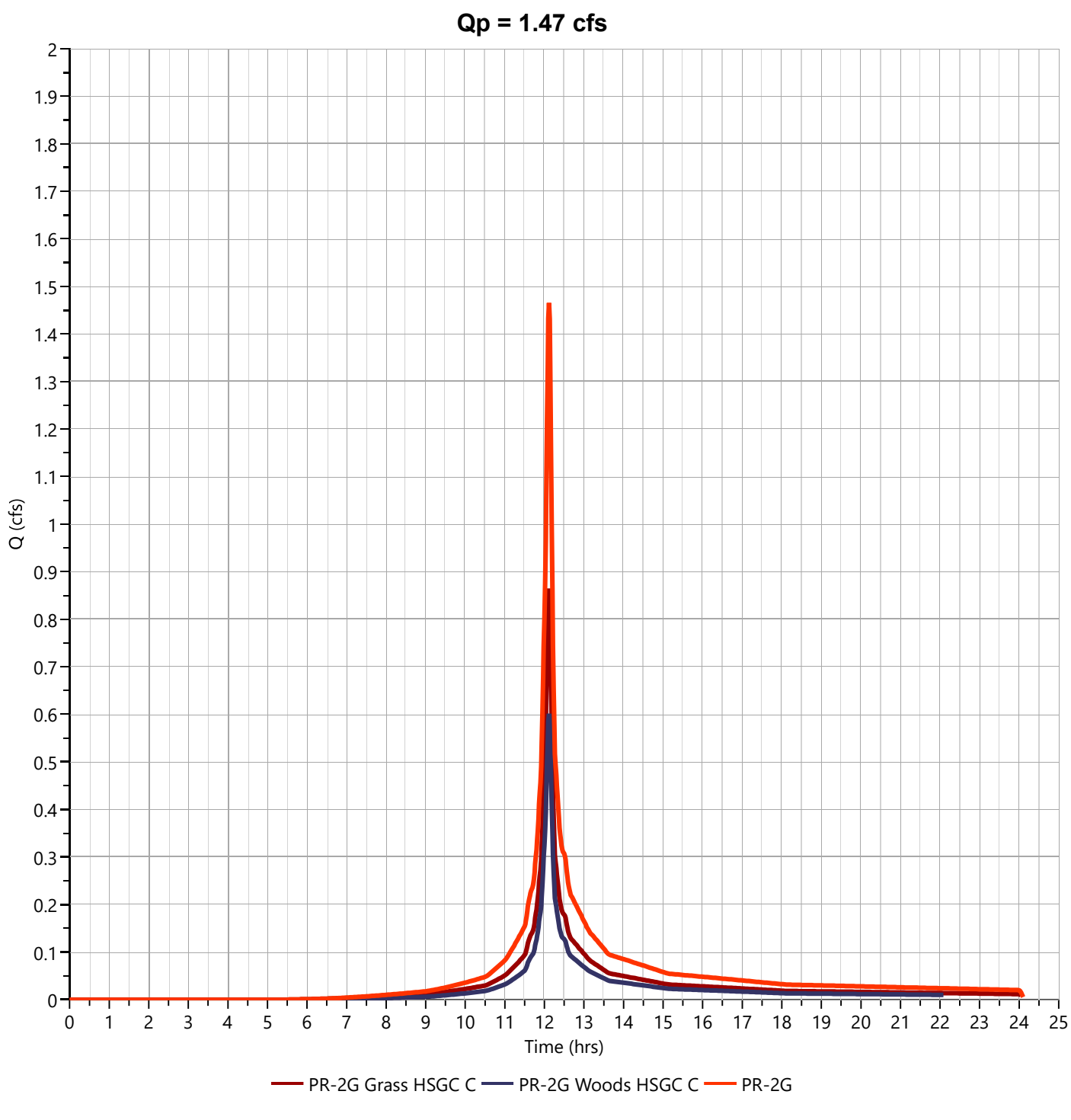
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2G

Hyd. No. 19

Hydrograph Type	= Junction	Peak Flow	= 1.465 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 4,600 cuft
Inflow Hydrographs	= 17, 18	Total Contrib. Area	= 0.21 ac



PR-2H WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/7/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/7/2024**

Circle One: Present **Developed** — **Current Proposed Watershed PR-2H - Impervious**

Circle One: **T_c** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		
1.	Surface Description (NEH table 15-1)		Smooth Surfaces		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011		
3.	Design Flow Length, L_{des} (L_{des} < 100 ft)	ft	23		
4.	Two-year 24-hr rainfall, P_2	in	3.46		
5.	Land Slope, s	ft/ft	0.021		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	100		
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.006	+	+
				Sheet Flow Sub-Total	0.006 hours

Shallow Concentrated Flow		Segment ID			
8.	Surface Description				
9.	Flow Length, L	ft			
10.	Watercourse Slope, s	ft/ft			
11.	Average Velocity, V (NEH table 15-3)	ft/s			
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+	+
				Shallow Conc. Flow Sub-Total	0.000 hours

Channel Flow		Segment ID			
13.	Flow Length, L	ft			
14.	Cross Sectional flow area, a	ft^2			
15.	Wetted Perimeter, P_w	ft			
16.	Hydraulic Radius, r $r = a / P_w$	ft			
17.	Channel Slope, s	ft/ft			
18.	Manning's Roughness Coeff., n				
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s			
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+	+
				Channel Flow Sub-Total	0.000 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.006 hours
(Add Sub-Total T_t from prior steps)	Software Limitations Require Minimum Tc =	2 minutes

Project:	**Beacon Unitarian Universalist Church**		**By:**	**TEG**	**Date:** **2/7/2024**
Location:	**Summit, NJ**		**Checked By:**	**MJV**	**Date Checked:** **2/7/2024**

Circle One: Present **(Developed)** — **Current Proposed Watershed PR-2H - Pervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		
1.	Surface Description (NEH table 15-1)		Dense Grasses		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.24		
3.	Design Flow Length, L_{des} (L_{des} < 100 ft)	ft	31		
4.	Two-year 24-hr rainfall, P_2	in	3.46		
5.	Land Slope, s	ft/ft	0.016		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	53		
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} S^{0.4}}$	hr	0.097	+	+
				Sheet Flow Sub-Total	0.097 hours

Shallow Concentrated Flow		Segment ID			
8.	Surface Description				
9.	Flow Length, L	ft			
10.	Watercourse Slope, s	ft/ft			
11.	Average Velocity, V (NEH table 15-3)	ft/s			
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+	+
				Shallow Conc. Flow Sub-Total	0.000 hours

Channel Flow		Segment ID			
13.	Flow Length, L	ft			
14.	Cross Sectional flow area, a	ft^2			
15.	Wetted Perimeter, P_w	ft			
16.	Hydraulic Radius, r $r = a / P_w$	ft			
17.	Channel Slope, s	ft/ft			
18.	Manning's Roughness Coeff., n				
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s			
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+	+
				Channel Flow Sub-Total	0.000 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.097 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	6 minutes

Hydrograph Report

Project Name:

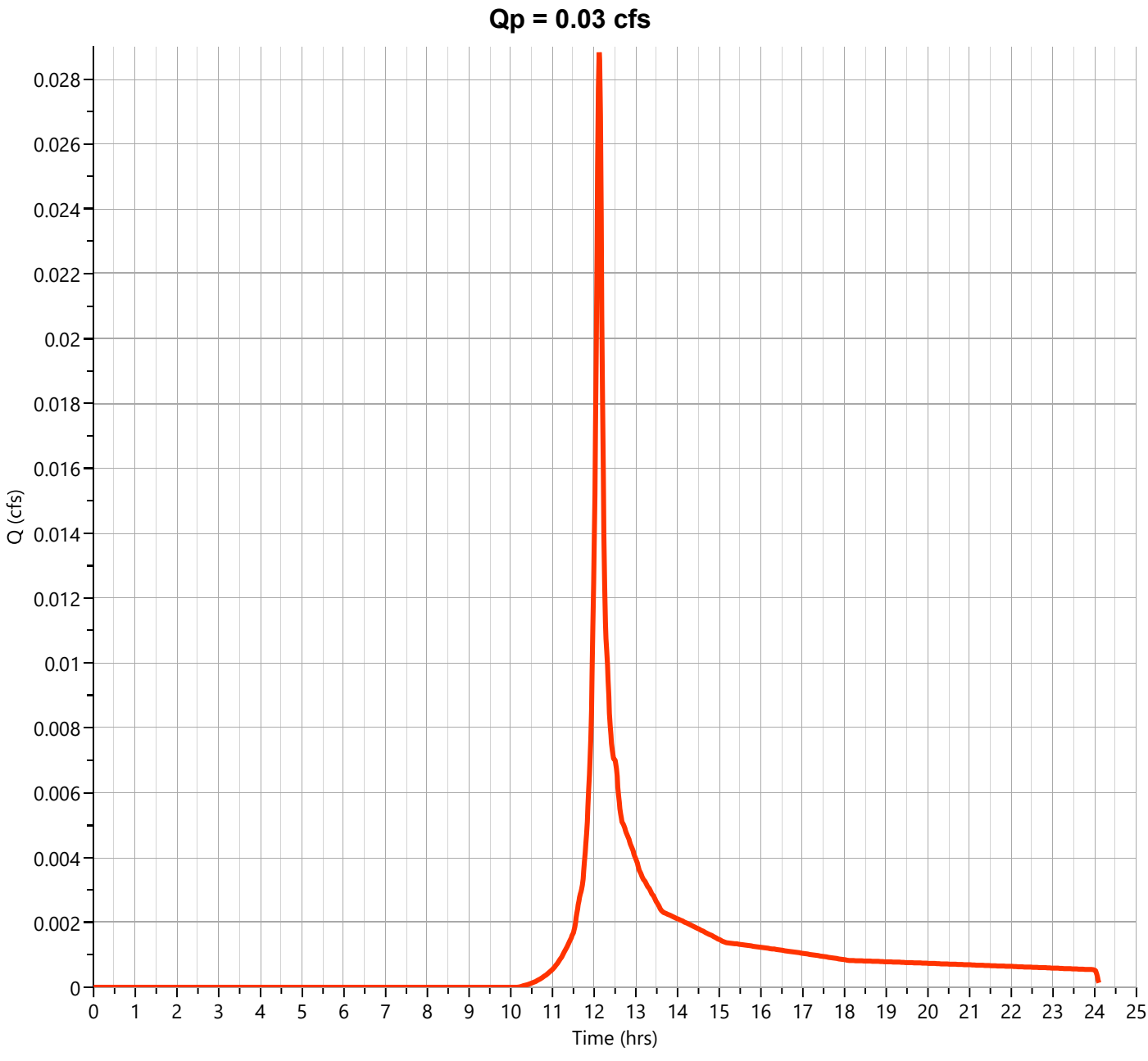
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2H Grass HSGC C

Hyd. No. 34

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.029 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 90.8 cuft
Drainage Area	= 0.02 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

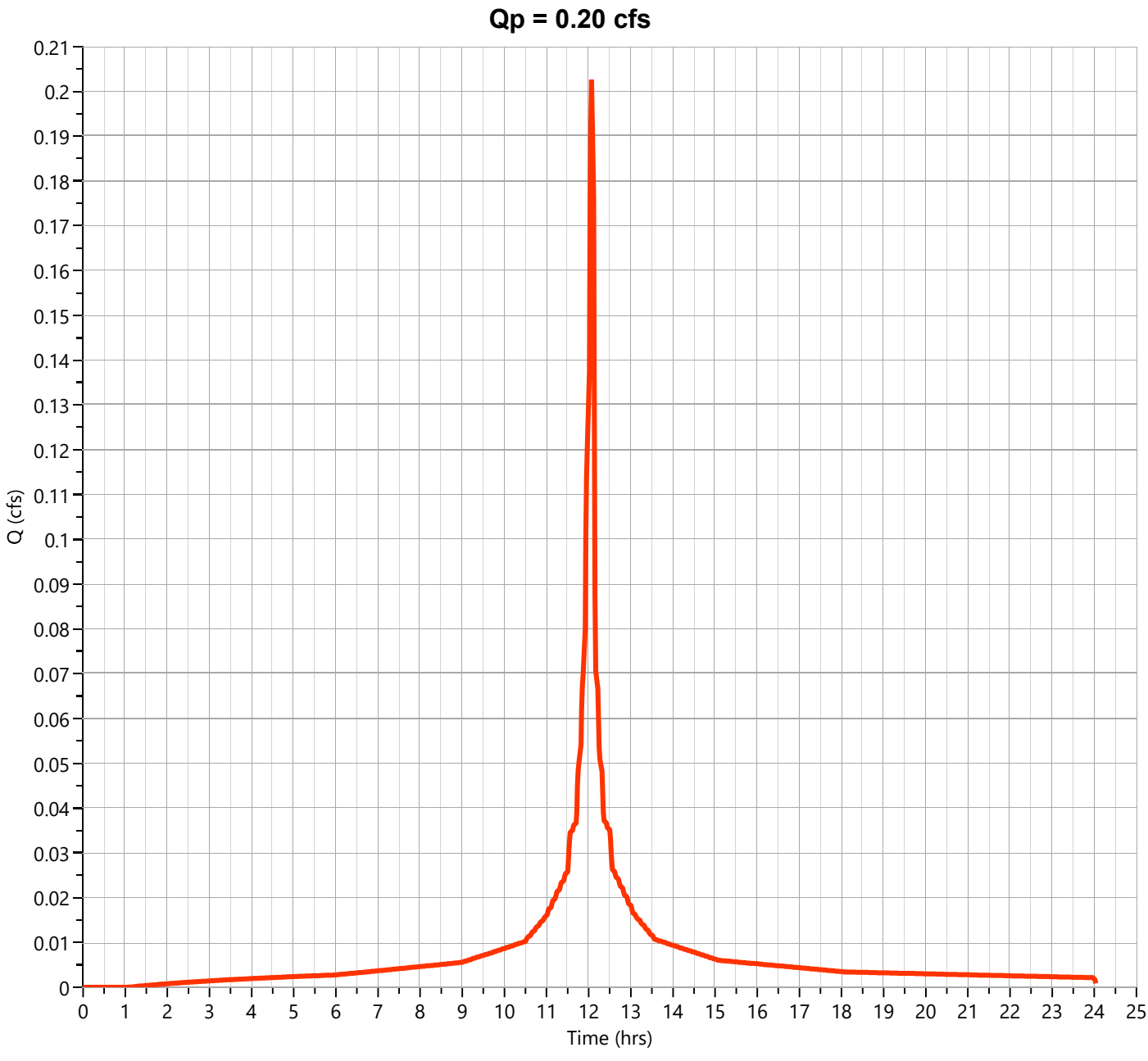
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2H Impervious

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.203 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 659 cuft
Drainage Area	= 0.06 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

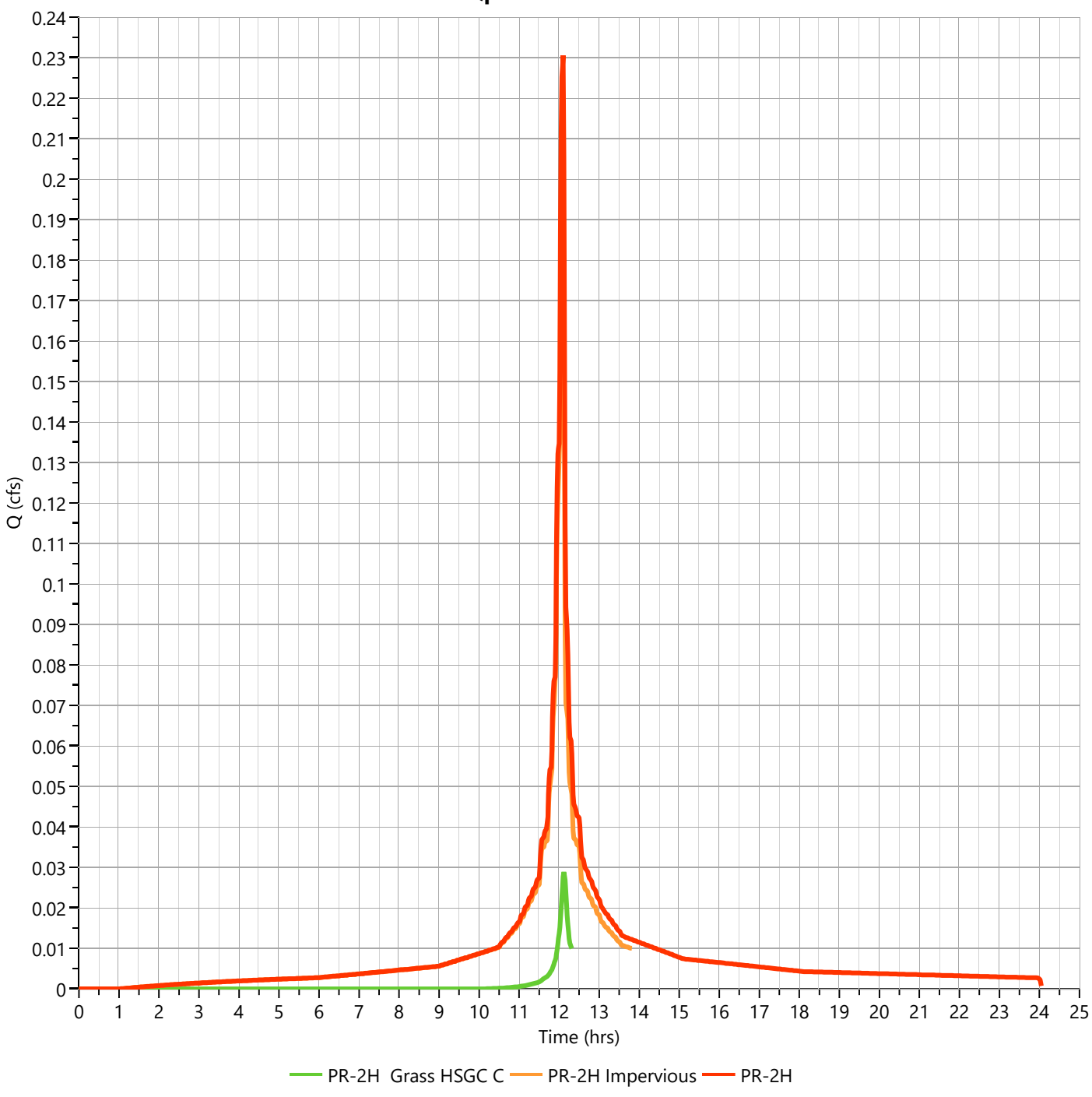
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2H

Hyd. No. 36

Hydrograph Type	= Junction	Peak Flow	= 0.231 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 750 cuft
Inflow Hydrographs	= 34, 35	Total Contrib. Area	= 0.08 ac



Hydrograph Report

Project Name:

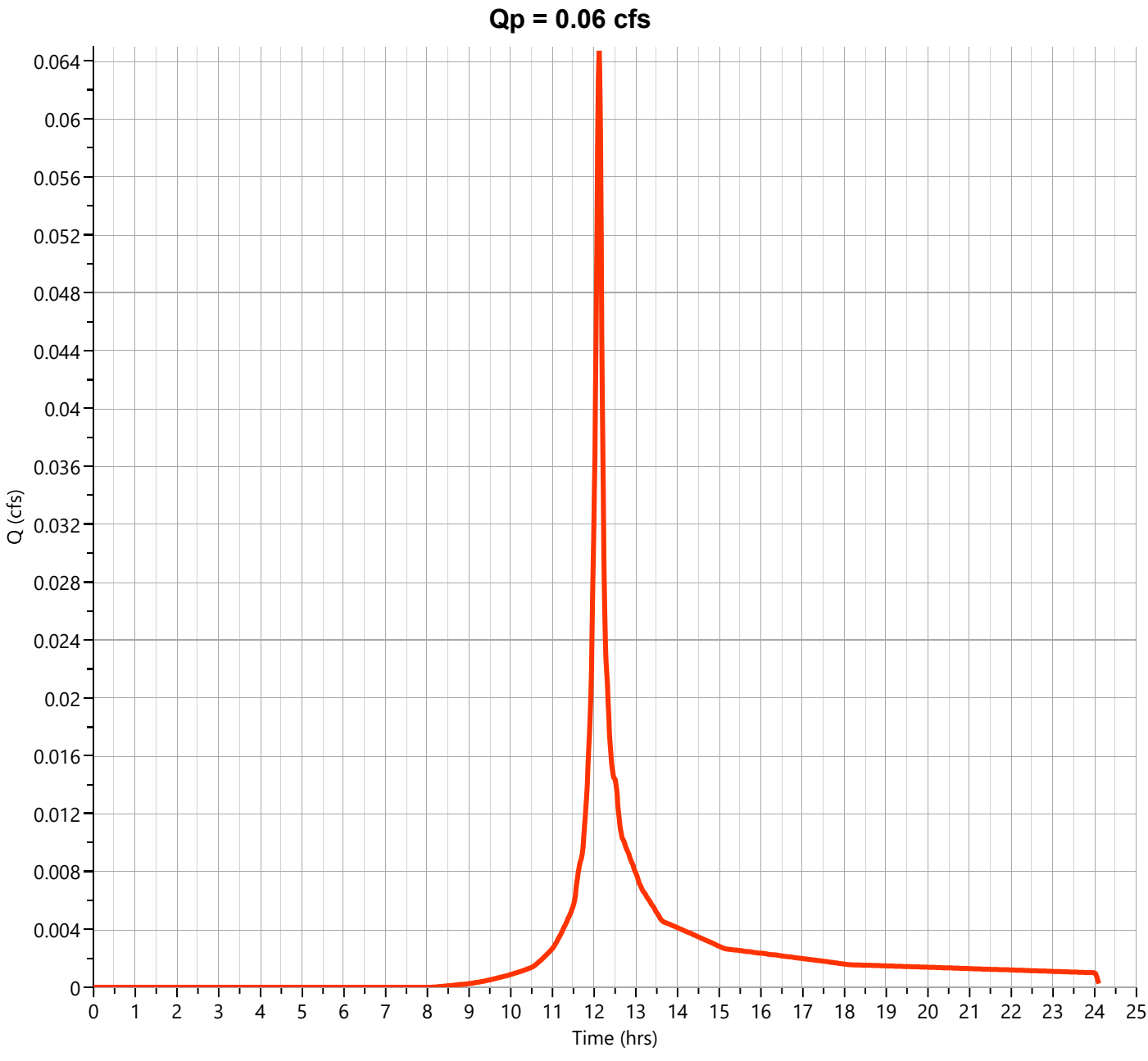
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2H Grass HSGC C

Hyd. No. 34

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.065 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 200 cuft
Drainage Area	= 0.02 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

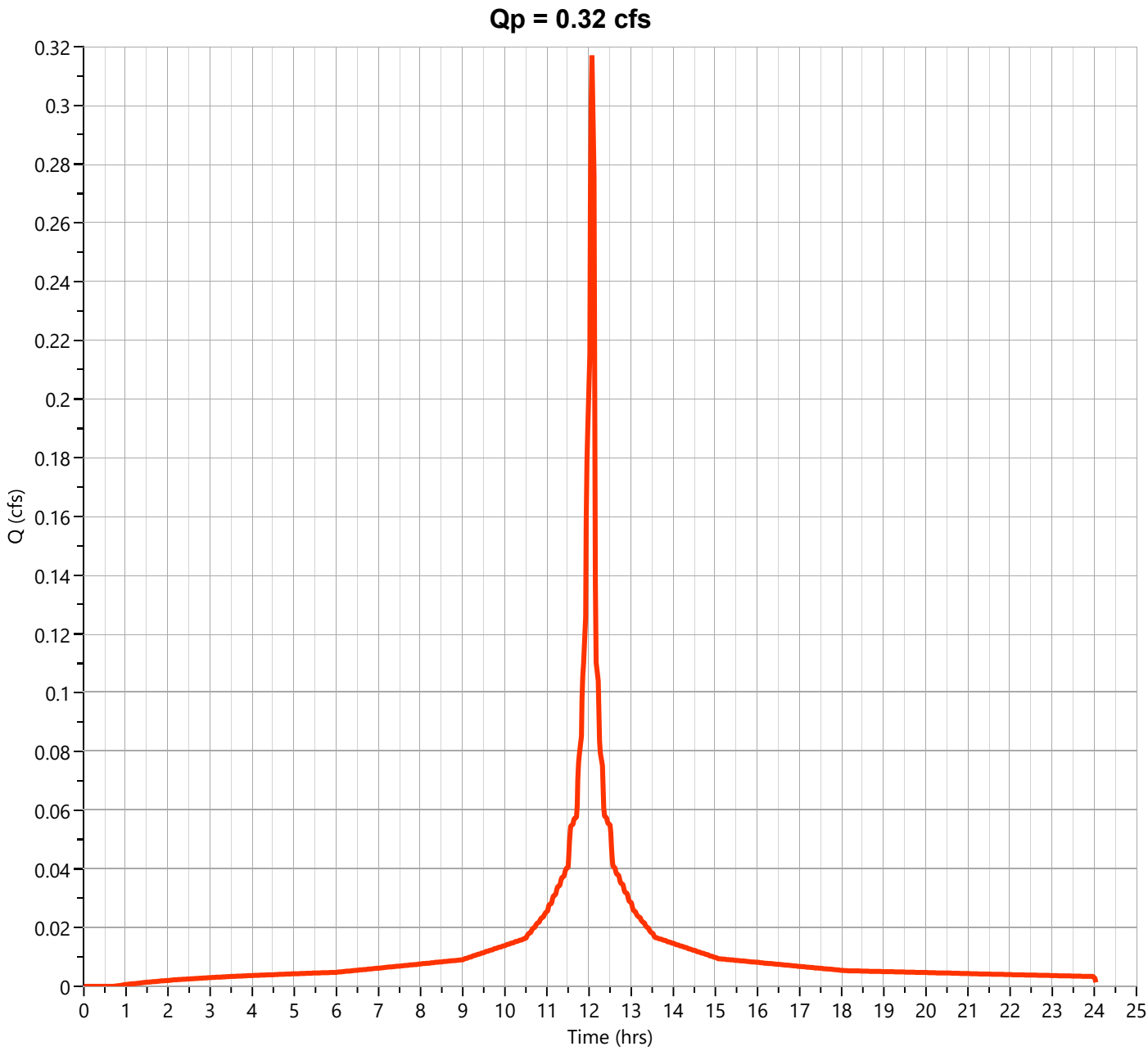
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2H Impervious

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.317 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,050 cuft
Drainage Area	= 0.06 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

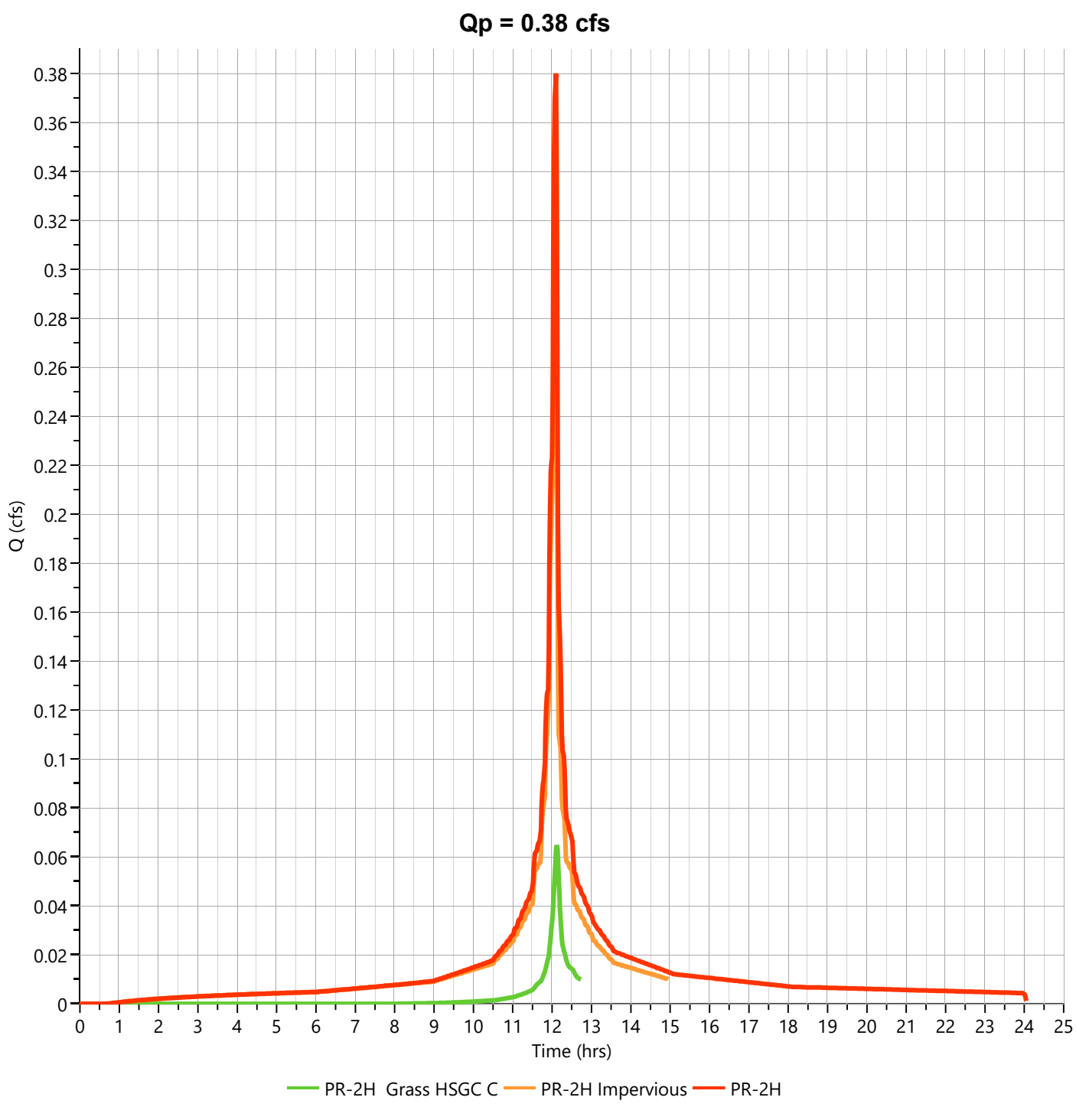
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2H

Hyd. No. 36

Hydrograph Type	= Junction	Peak Flow	= 0.380 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,250 cuft
Inflow Hydrographs	= 34, 35	Total Contrib. Area	= 0.08 ac



Hydrograph Report

Project Name:

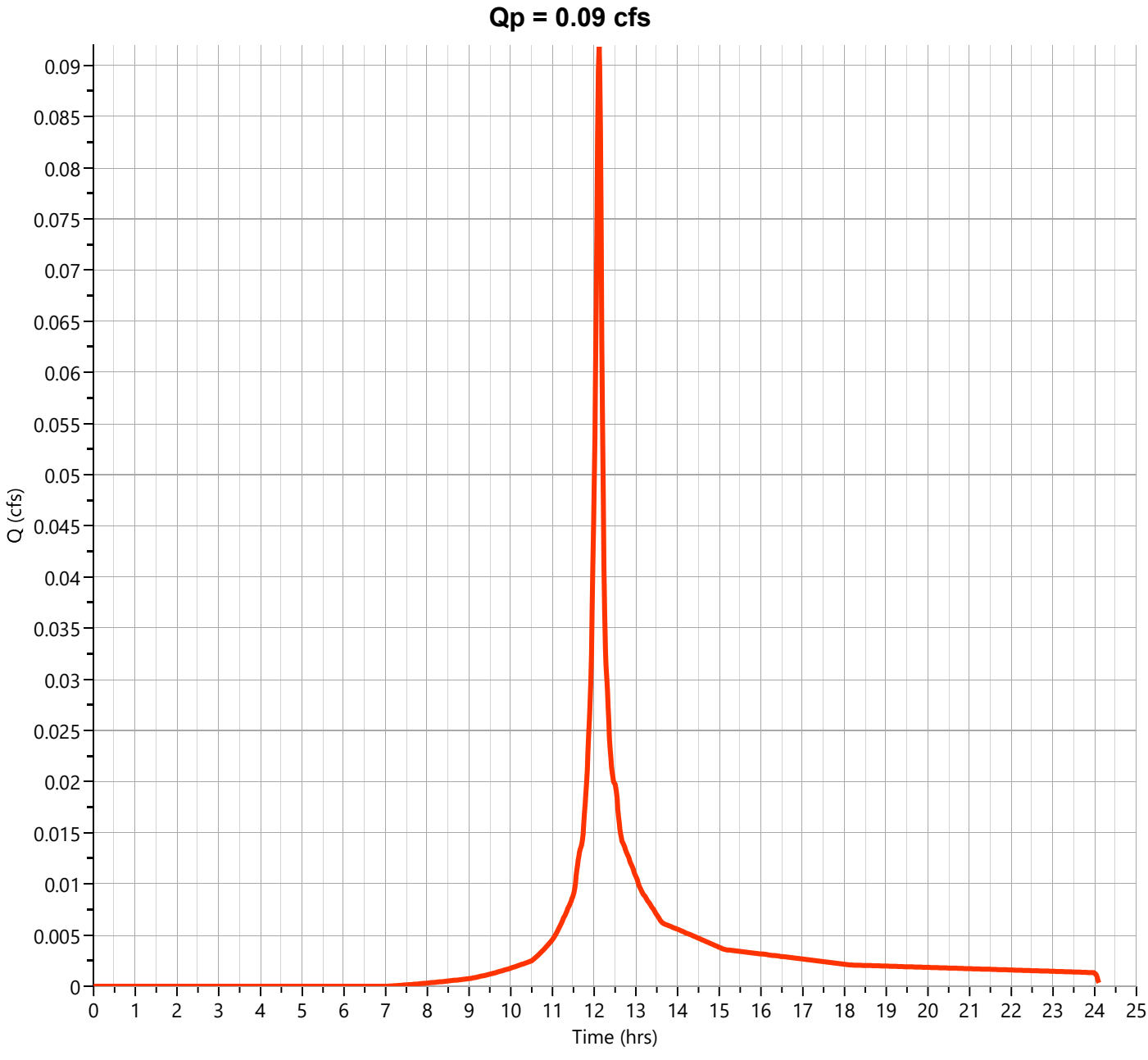
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2H Grass HSGC C

Hyd. No. 34

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.092 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 285 cuft
Drainage Area	= 0.02 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

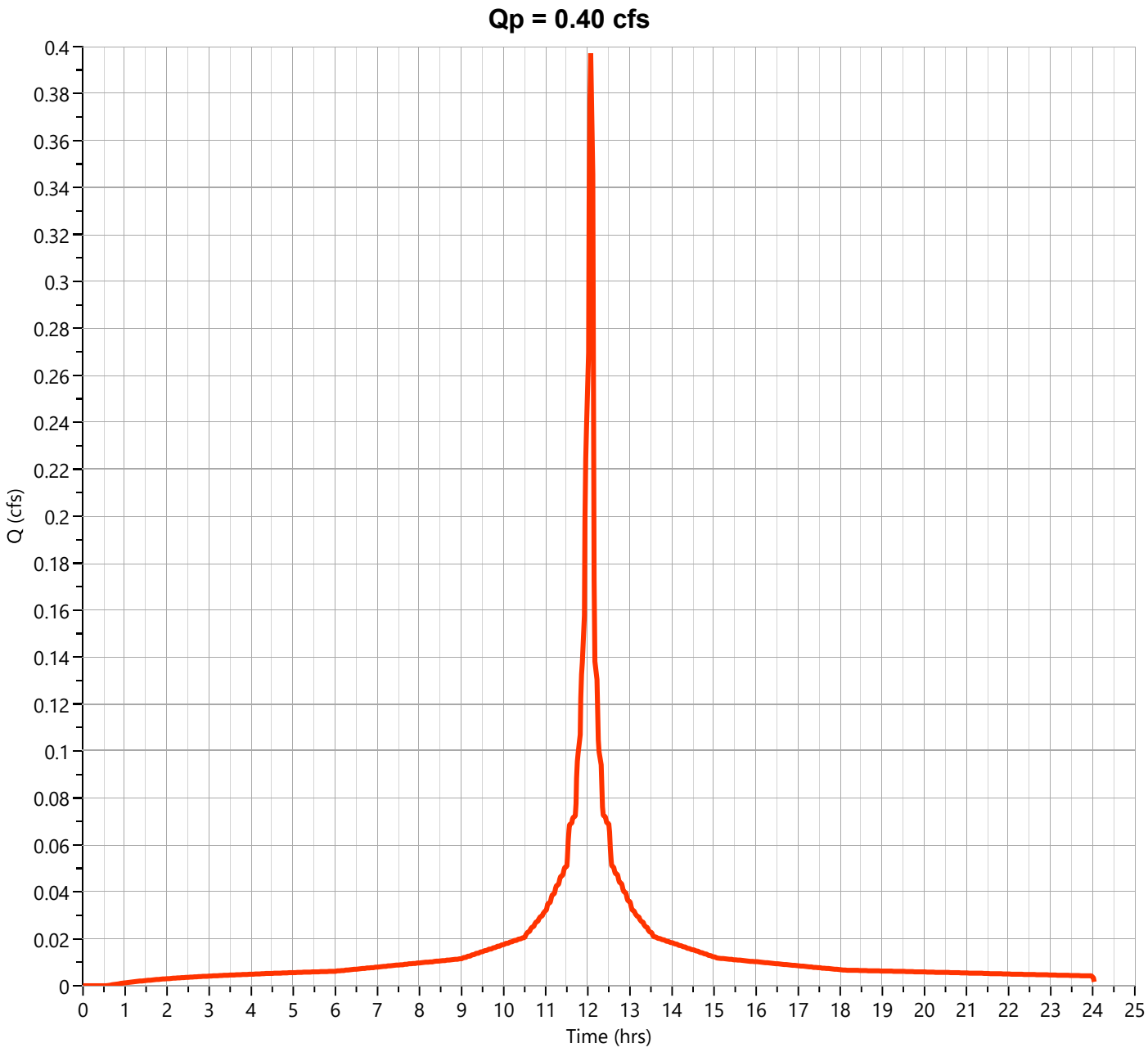
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2H Impervious

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.397 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,325 cuft
Drainage Area	= 0.06 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

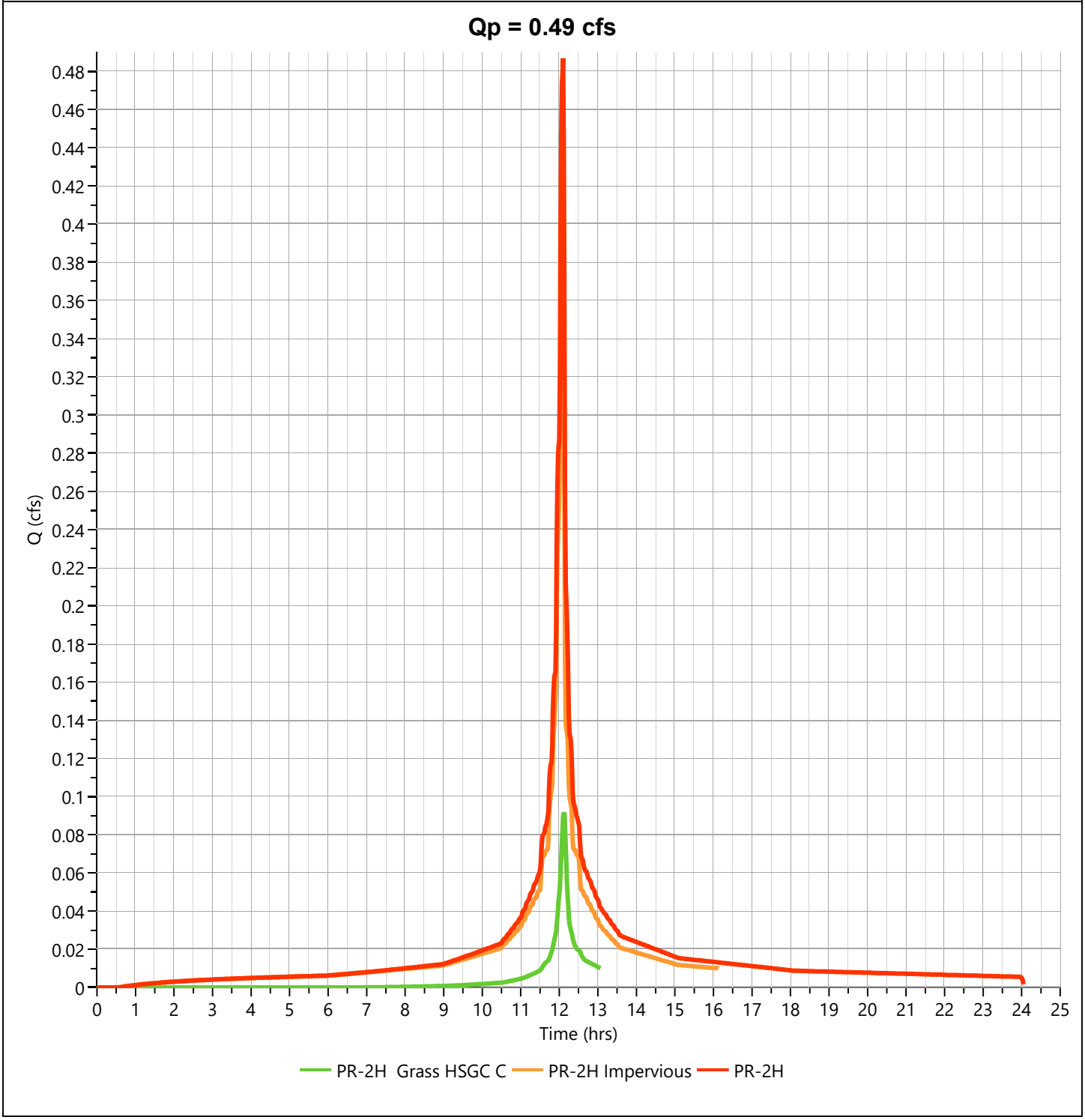
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2H

Hyd. No. 36

Hydrograph Type	= Junction	Peak Flow	= 0.487 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,610 cuft
Inflow Hydrographs	= 34, 35	Total Contrib. Area	= 0.08 ac



Hydrograph Report

Project Name:

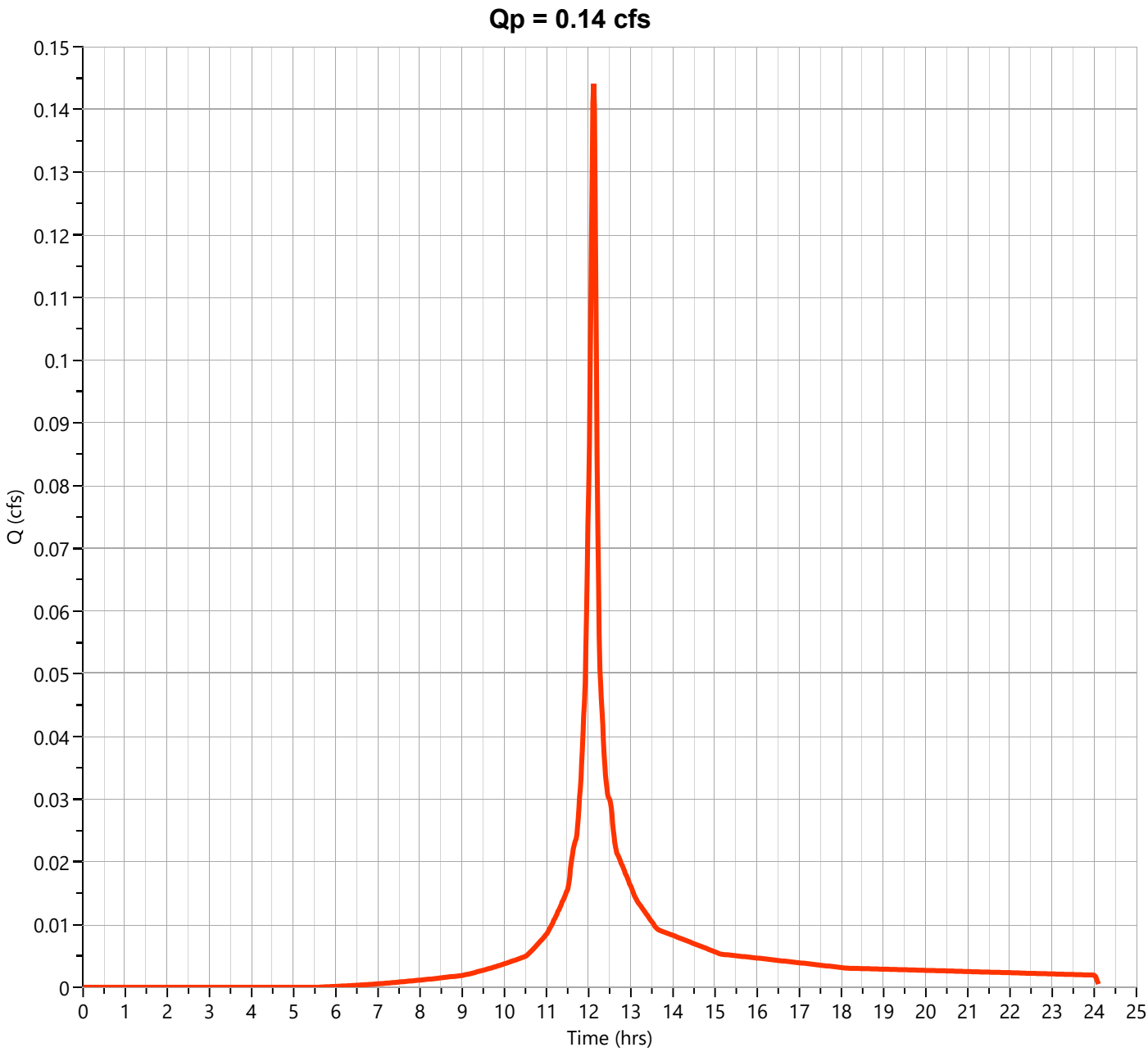
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2H Grass HSGC C

Hyd. No. 34

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.144 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 454 cuft
Drainage Area	= 0.02 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

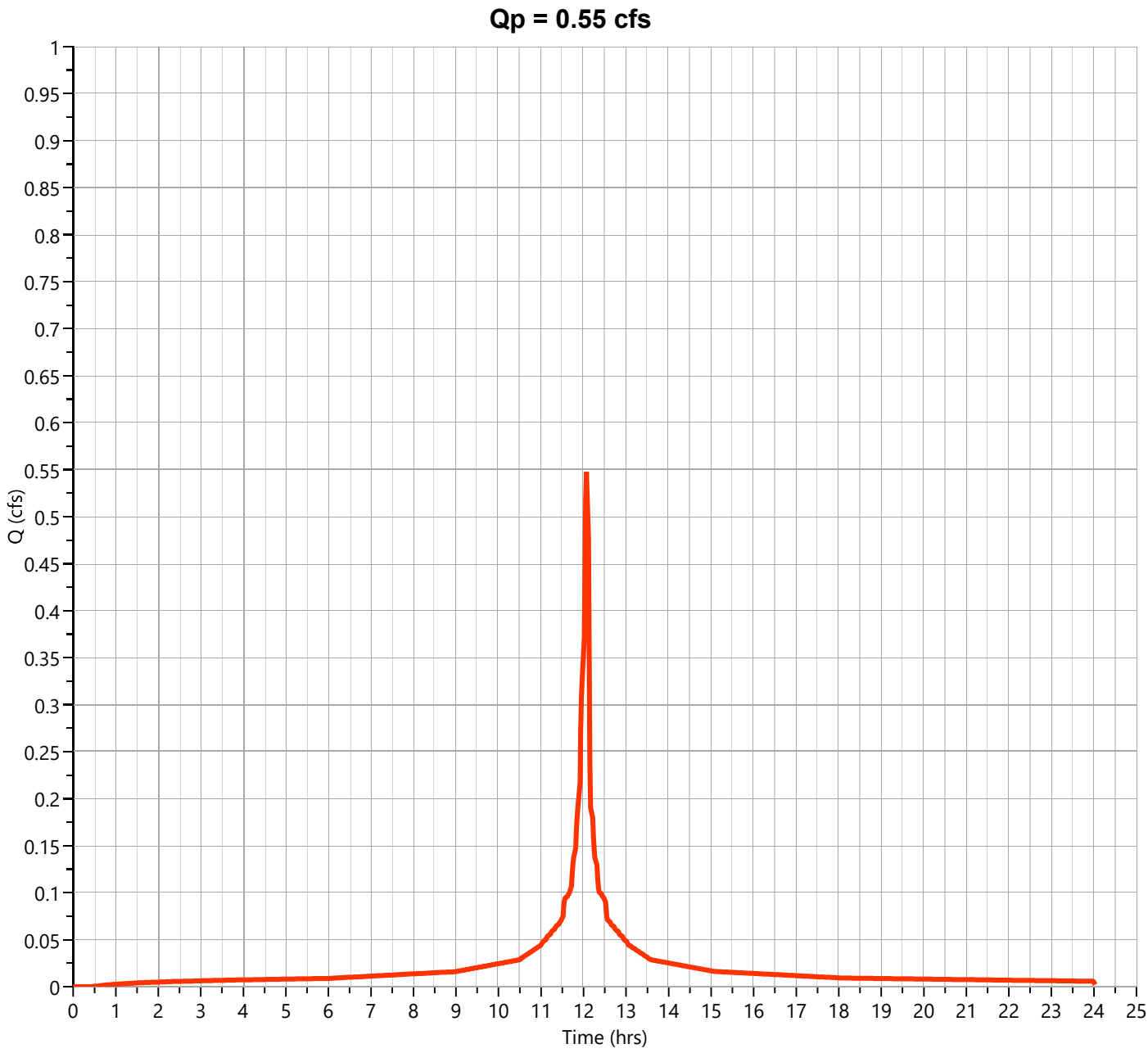
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2H Impervious

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.547 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,842 cuft
Drainage Area	= 0.06 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

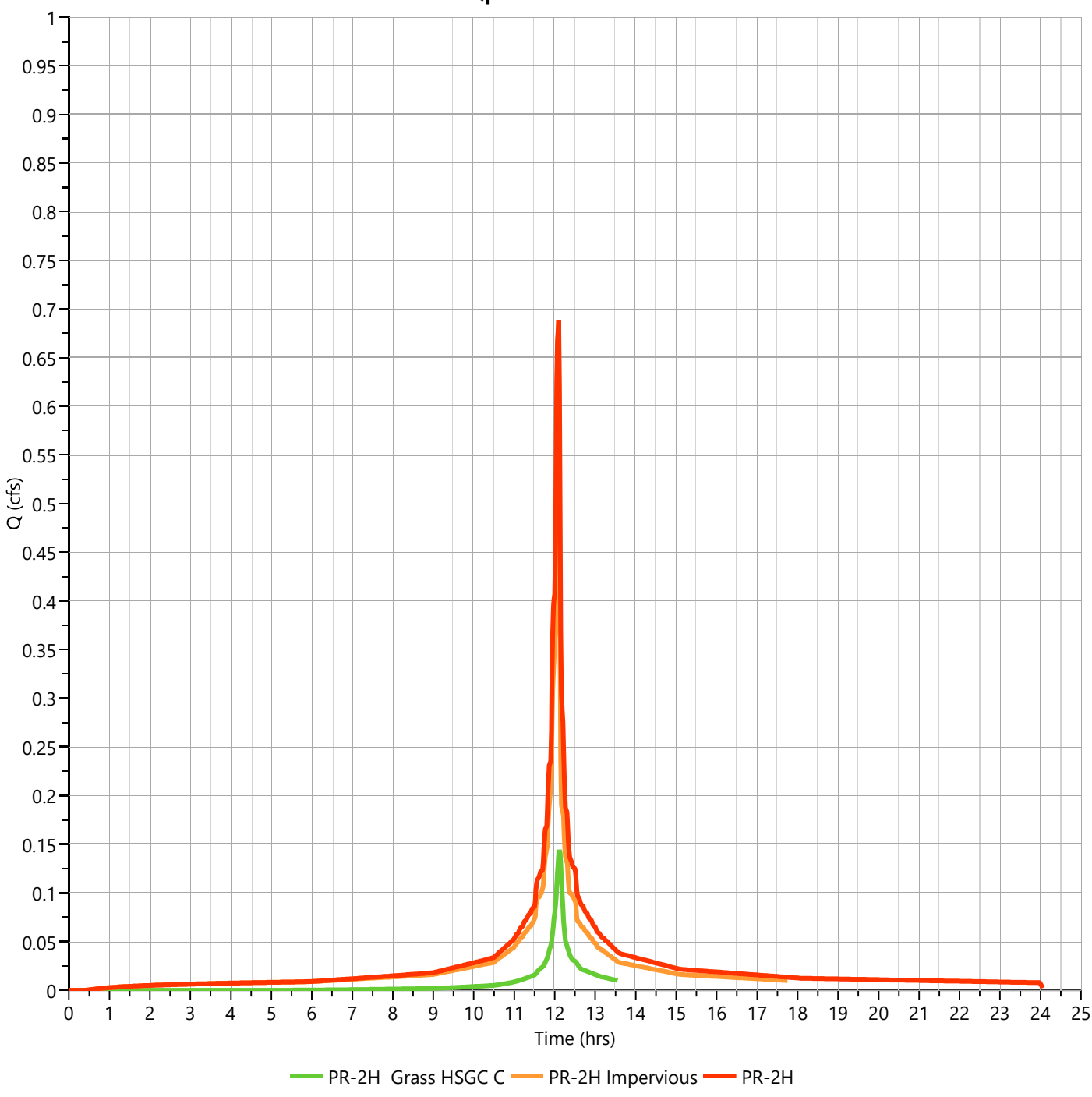
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2H

Hyd. No. 36

Hydrograph Type	= Junction	Peak Flow	= 0.688 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,296 cuft
Inflow Hydrographs	= 34, 35	Total Contrib. Area	= 0.08 ac



COMBINED PR-2B + PR-2H WATERSHED

Hydrograph Report

Project Name:

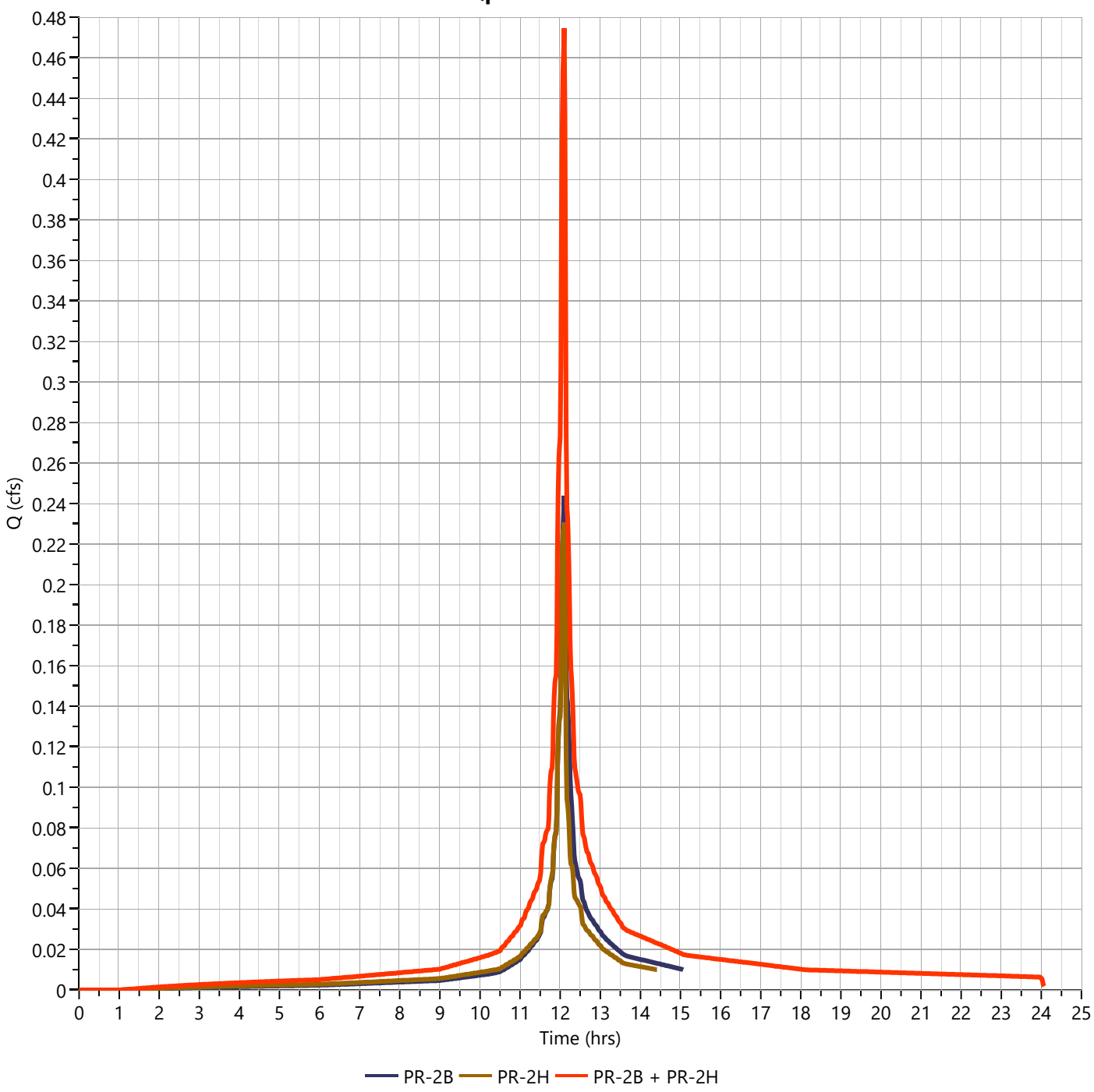
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B + PR-2H

Hyd. No. 38

Hydrograph Type	= Junction	Peak Flow	= 0.474 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,607 cuft
Inflow Hydrographs	= 8, 36	Total Contrib. Area	= 0.2 ac



Hydrograph Report

Project Name:

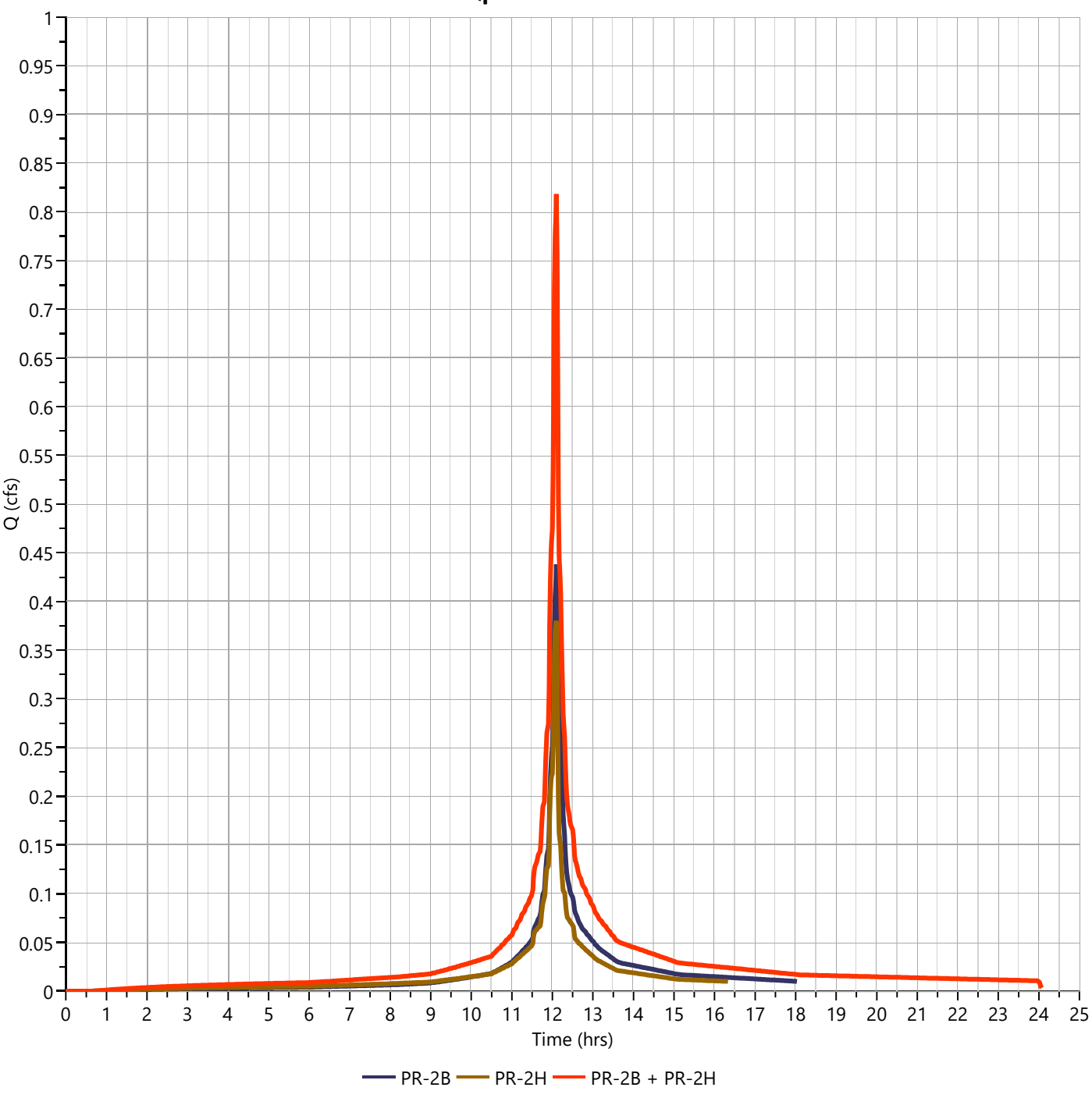
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B + PR-2H

Hyd. No. 38

Hydrograph Type	= Junction	Peak Flow	= 0.818 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,804 cuft
Inflow Hydrographs	= 8, 36	Total Contrib. Area	= 0.2 ac



Hydrograph Report

Project Name:

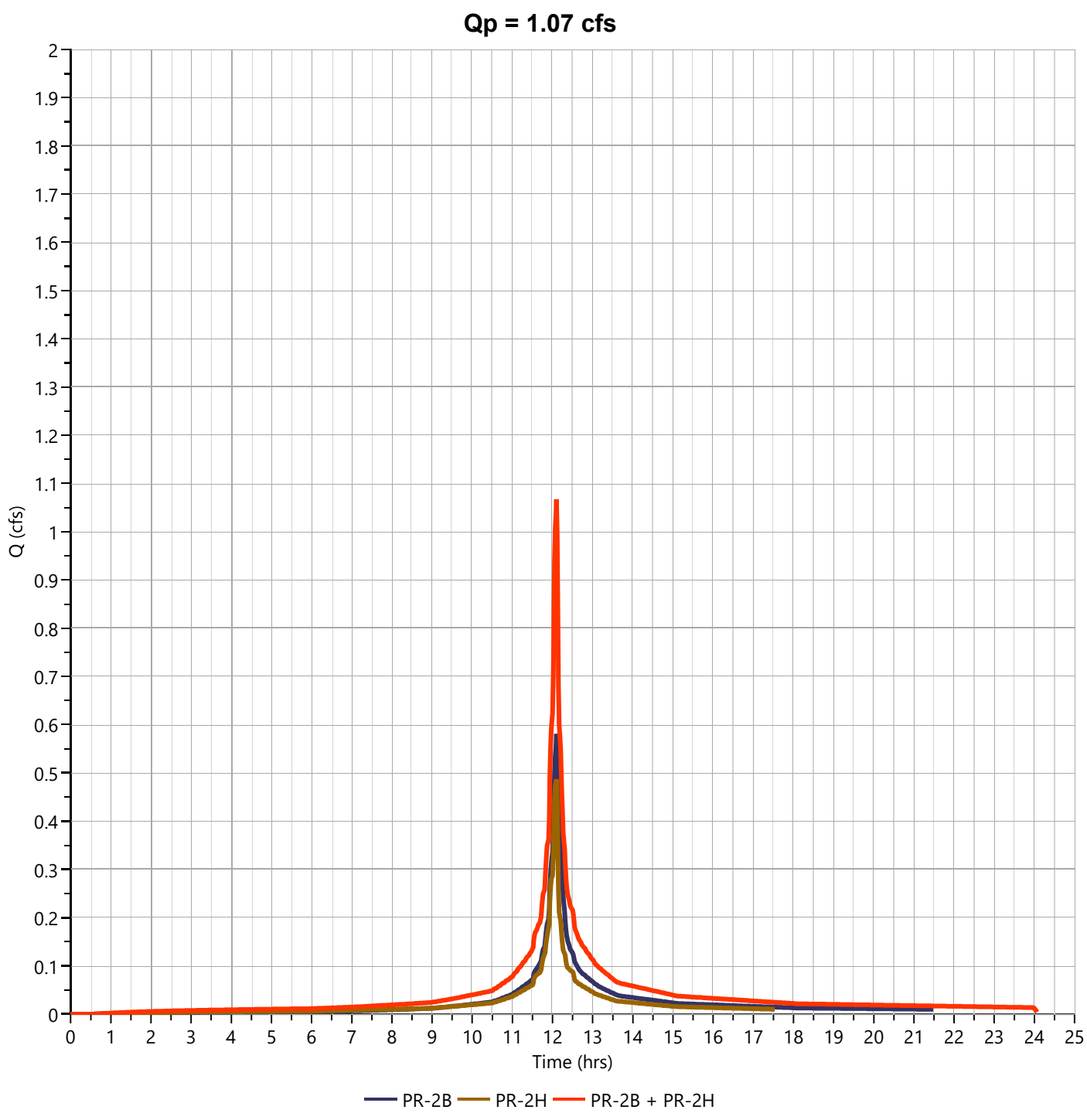
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B + PR-2H

Hyd. No. 38

Hydrograph Type	= Junction	Peak Flow	= 1.067 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 3,683 cuft
Inflow Hydrographs	= 8, 36	Total Contrib. Area	= 0.2 ac



Hydrograph Report

Project Name:

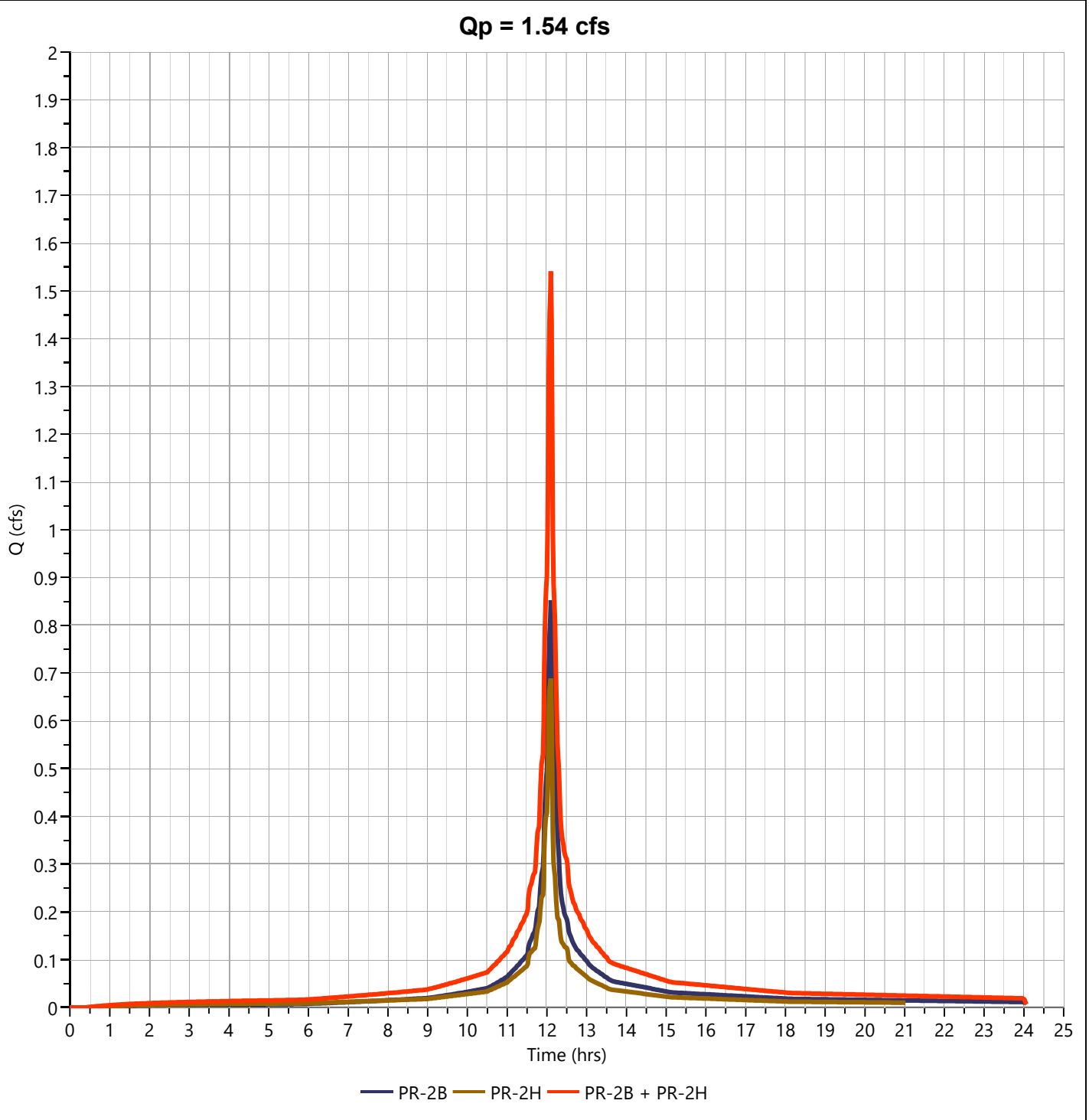
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B + PR-2H

Hyd. No. 38

Hydrograph Type	= Junction	Peak Flow	= 1.541 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 5,372 cuft
Inflow Hydrographs	= 8, 36	Total Contrib. Area	= 0.2 ac



COMBINED PROPOSED FLOW TO POA-2

Hydrograph Report

Project Name:

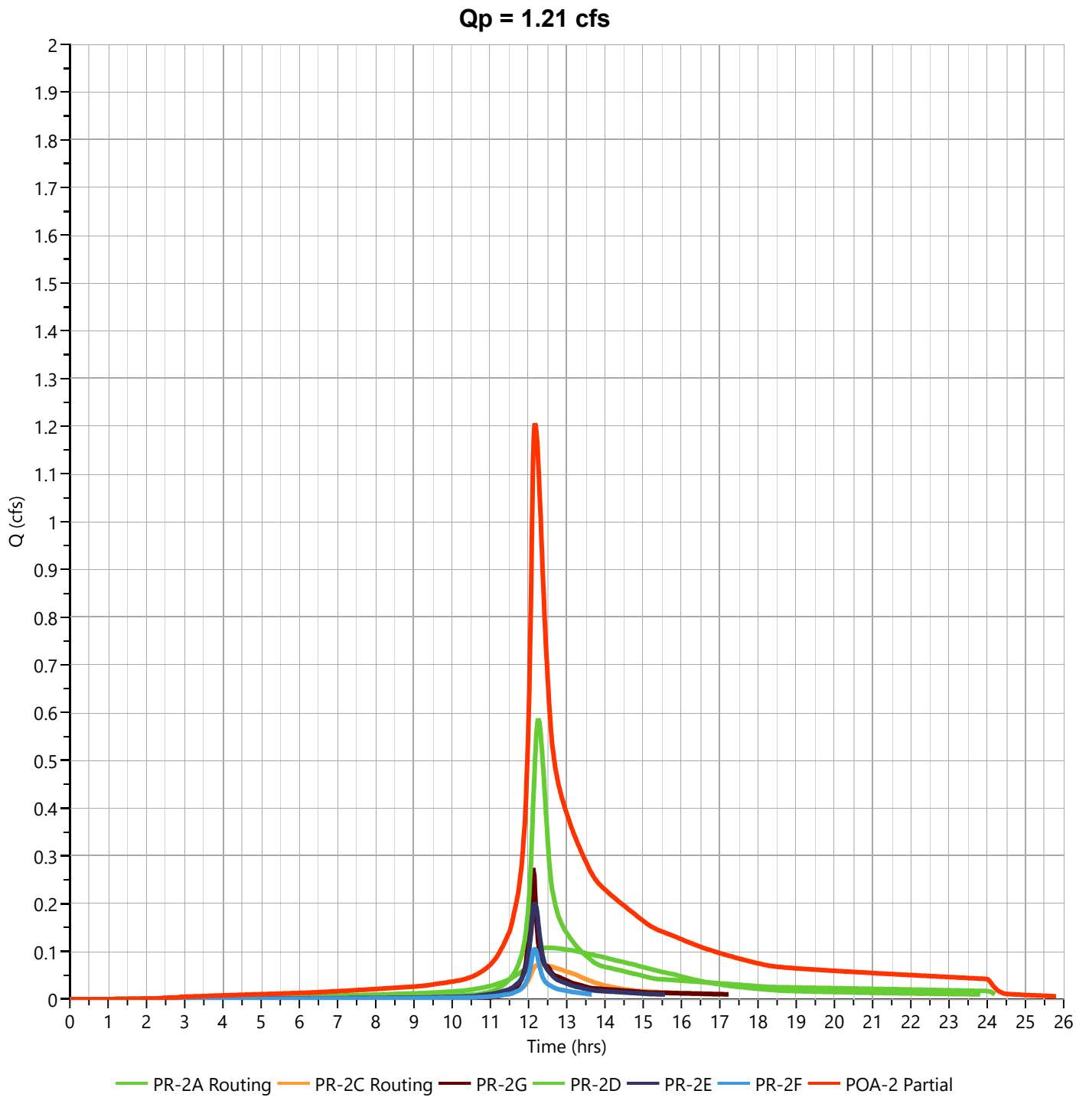
Hydrology Studio v 3.0.0.31

02-08-2024

POA-2 Partial

Hyd. No. 41

Hydrograph Type	= Junction	Peak Flow	= 1.205 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Hydrograph Volume	= 8,157 cuft
Inflow Hydrographs	= 4, 15, 19, 24, 28, 32	Total Contrib. Area	= 1.09 ac



Hydrograph Report

Project Name:

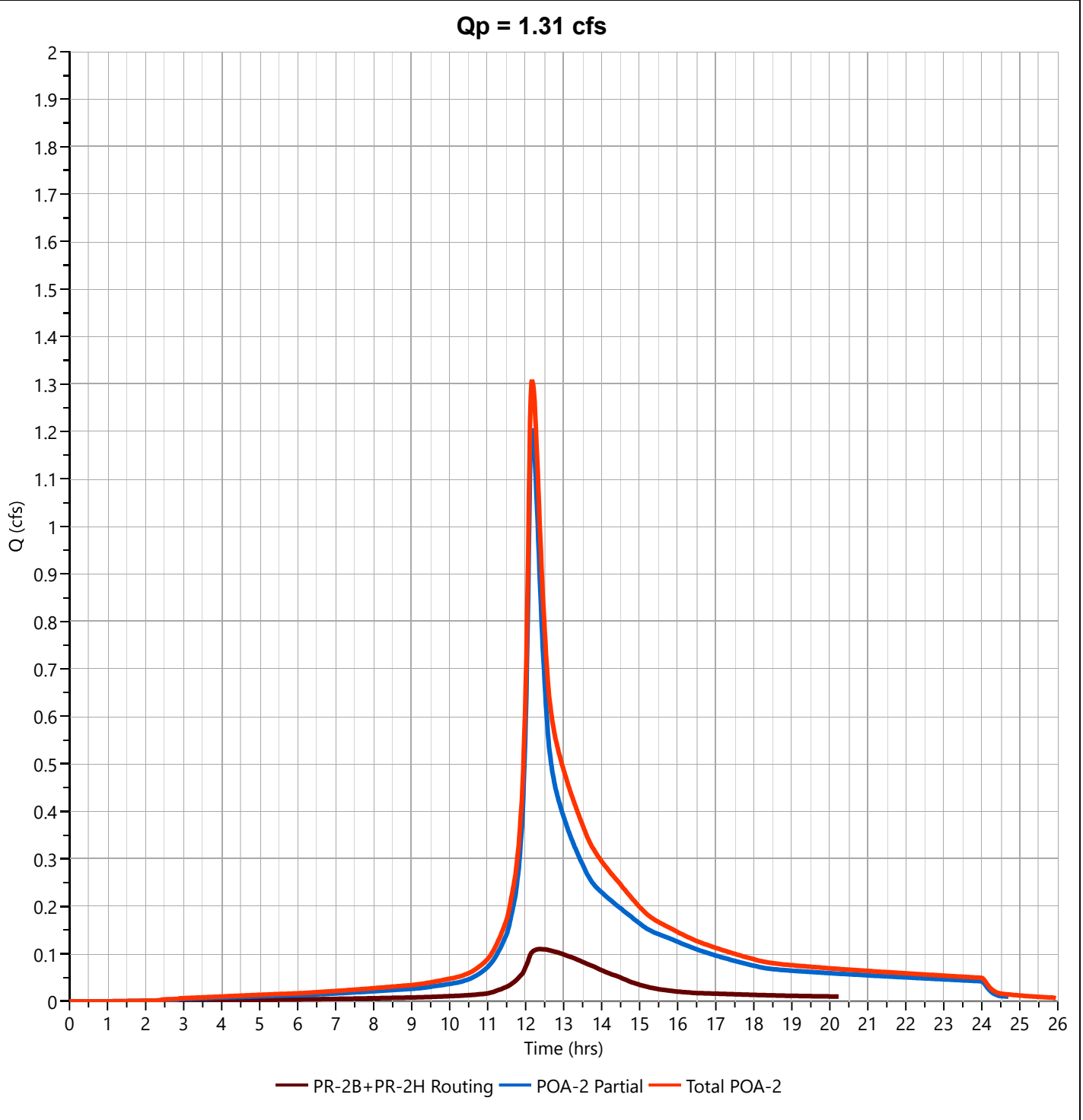
Hydrology Studio v 3.0.0.31

02-08-2024

Total POA-2

Hyd. No. 42

Hydrograph Type	= Junction	Peak Flow	= 1.309 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Hydrograph Volume	= 9,759 cuft
Inflow Hydrographs	= 39, 41	Total Contrib. Area	= 1.09 ac



Hydrograph Report

Project Name:

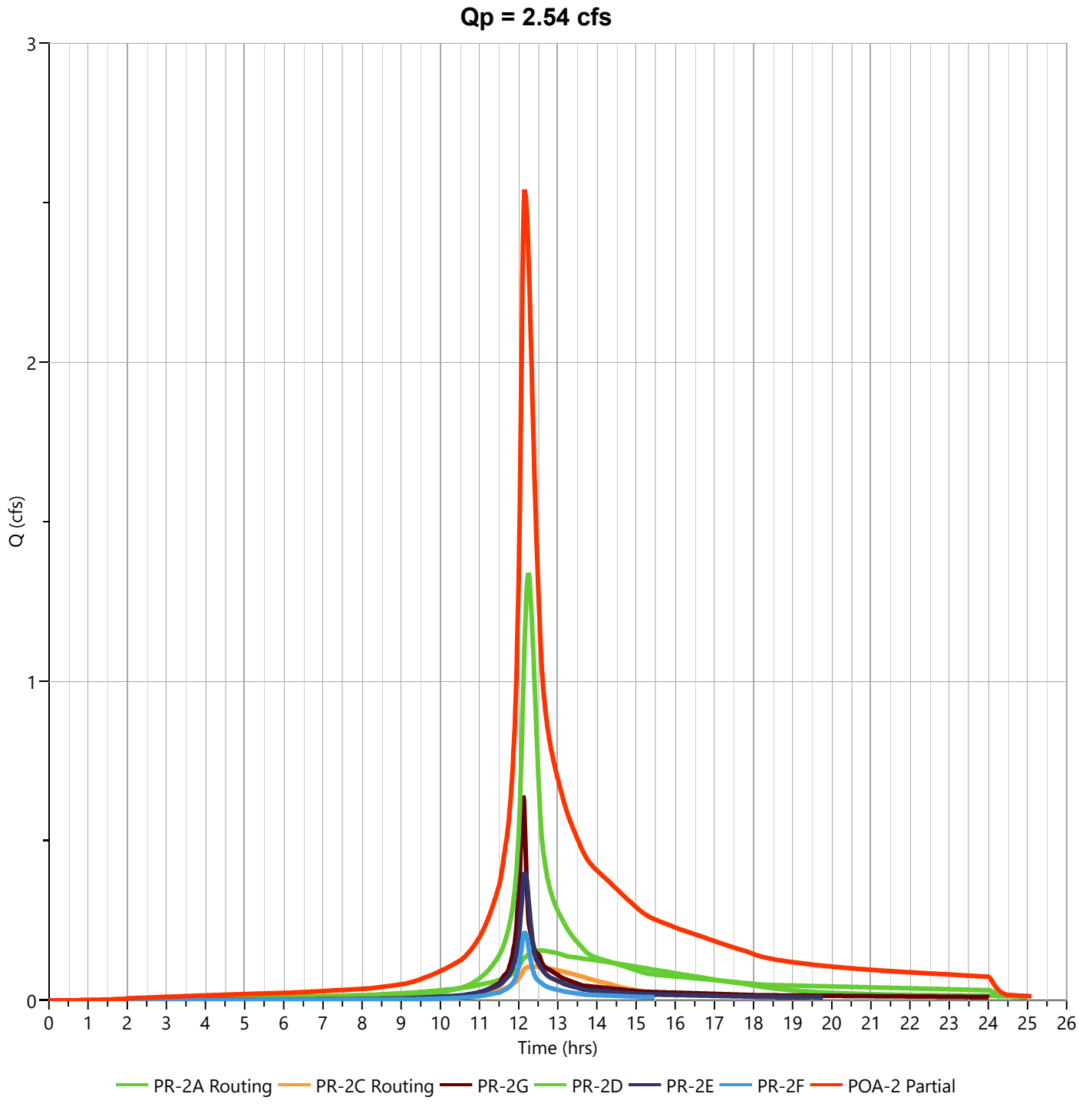
Hydrology Studio v 3.0.0.31

02-08-2024

POA-2 Partial

Hyd. No. 41

Hydrograph Type	= Junction	Peak Flow	= 2.540 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Hydrograph Volume	= 15,846 cuft
Inflow Hydrographs	= 4, 15, 19, 24, 28, 32	Total Contrib. Area	= 1.09 ac



Hydrograph Report

Project Name:

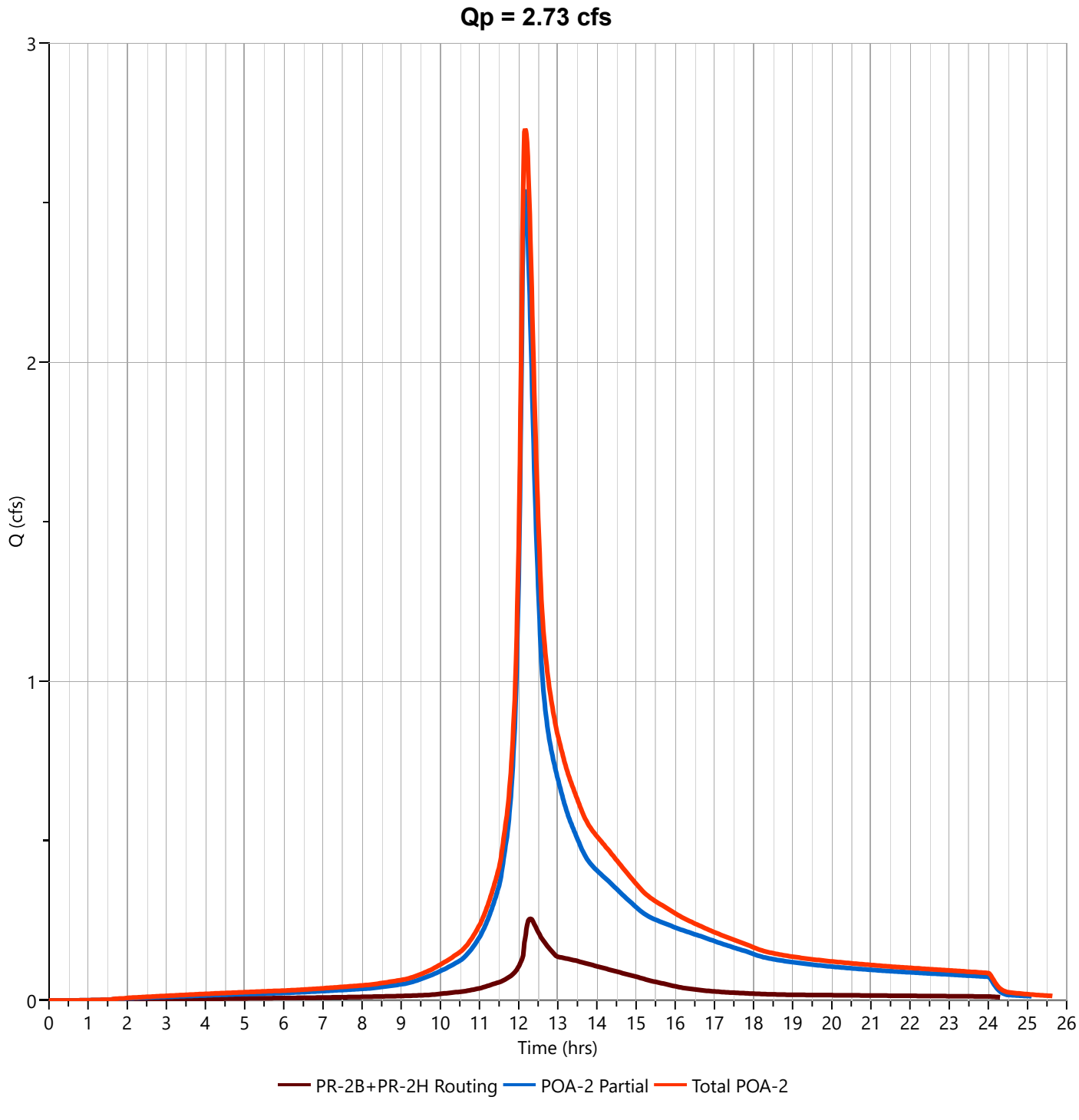
Hydrology Studio v 3.0.0.31

02-08-2024

Total POA-2

Hyd. No. 42

Hydrograph Type	= Junction	Peak Flow	= 2.730 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Hydrograph Volume	= 18,645 cuft
Inflow Hydrographs	= 39, 41	Total Contrib. Area	= 1.09 ac



Hydrograph Report

Project Name:

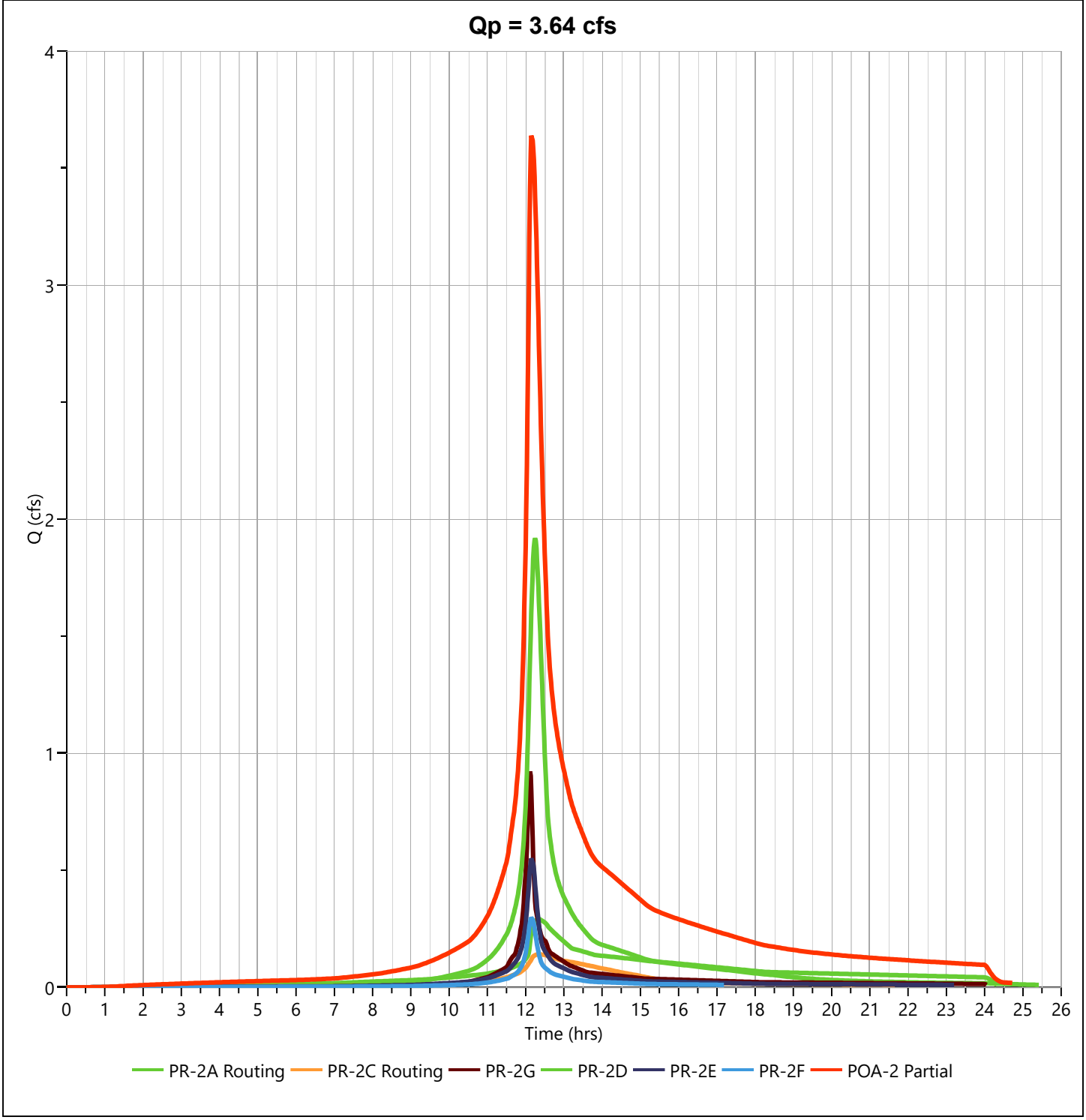
Hydrology Studio v 3.0.0.31

02-08-2024

POA-2 Partial

Hyd. No. 41

Hydrograph Type	= Junction	Peak Flow	= 3.639 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Hydrograph Volume	= 21,720 cuft
Inflow Hydrographs	= 4, 15, 19, 24, 28, 32	Total Contrib. Area	= 1.09 ac



Hydrograph Report

Project Name:

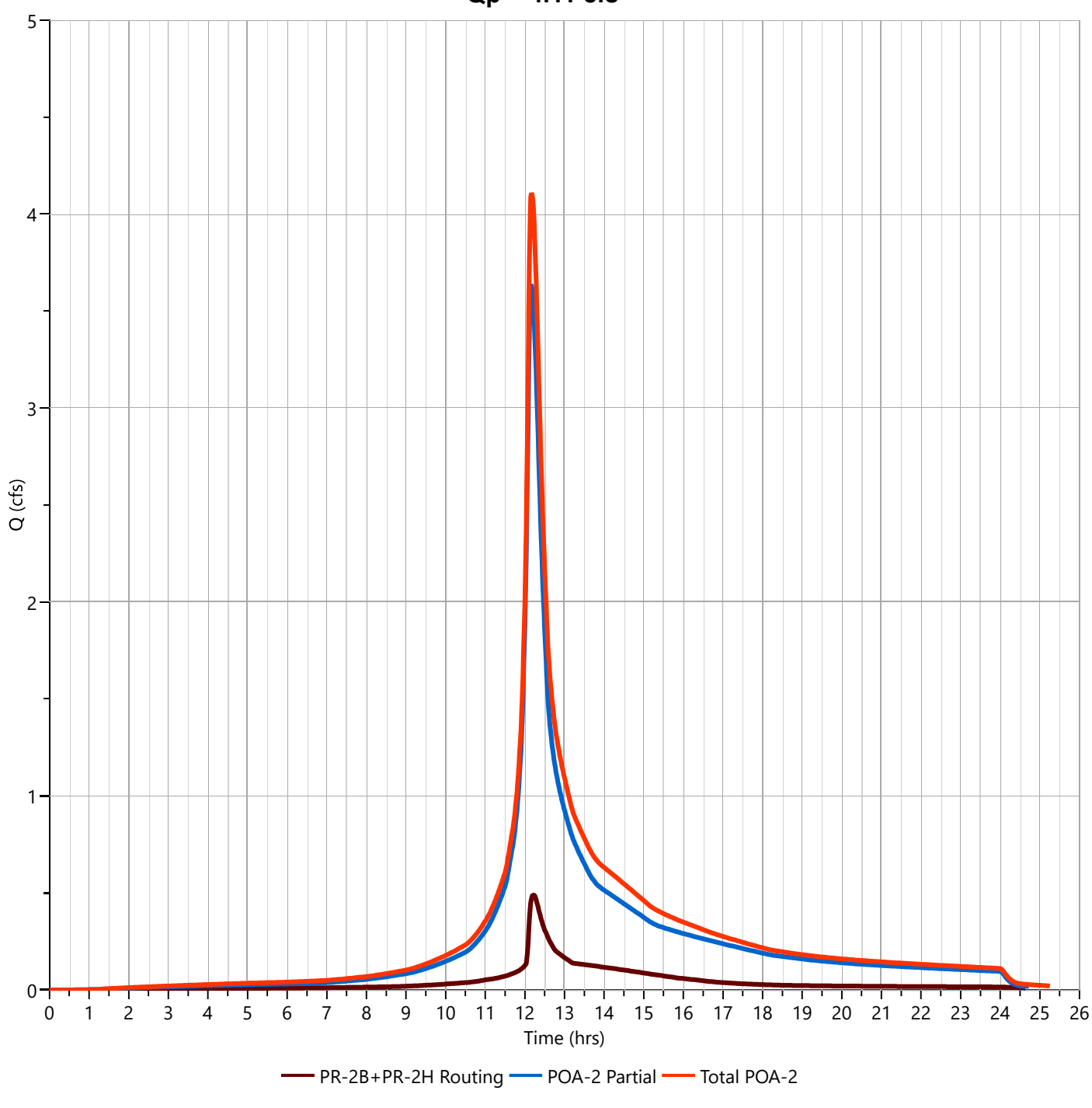
Hydrology Studio v 3.0.0.31

02-08-2024

Total POA-2

Hyd. No. 42

Hydrograph Type	= Junction	Peak Flow	= 4.108 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Hydrograph Volume	= 25,398 cuft
Inflow Hydrographs	= 39, 41	Total Contrib. Area	= 1.09 ac



Hydrograph Report

Project Name:

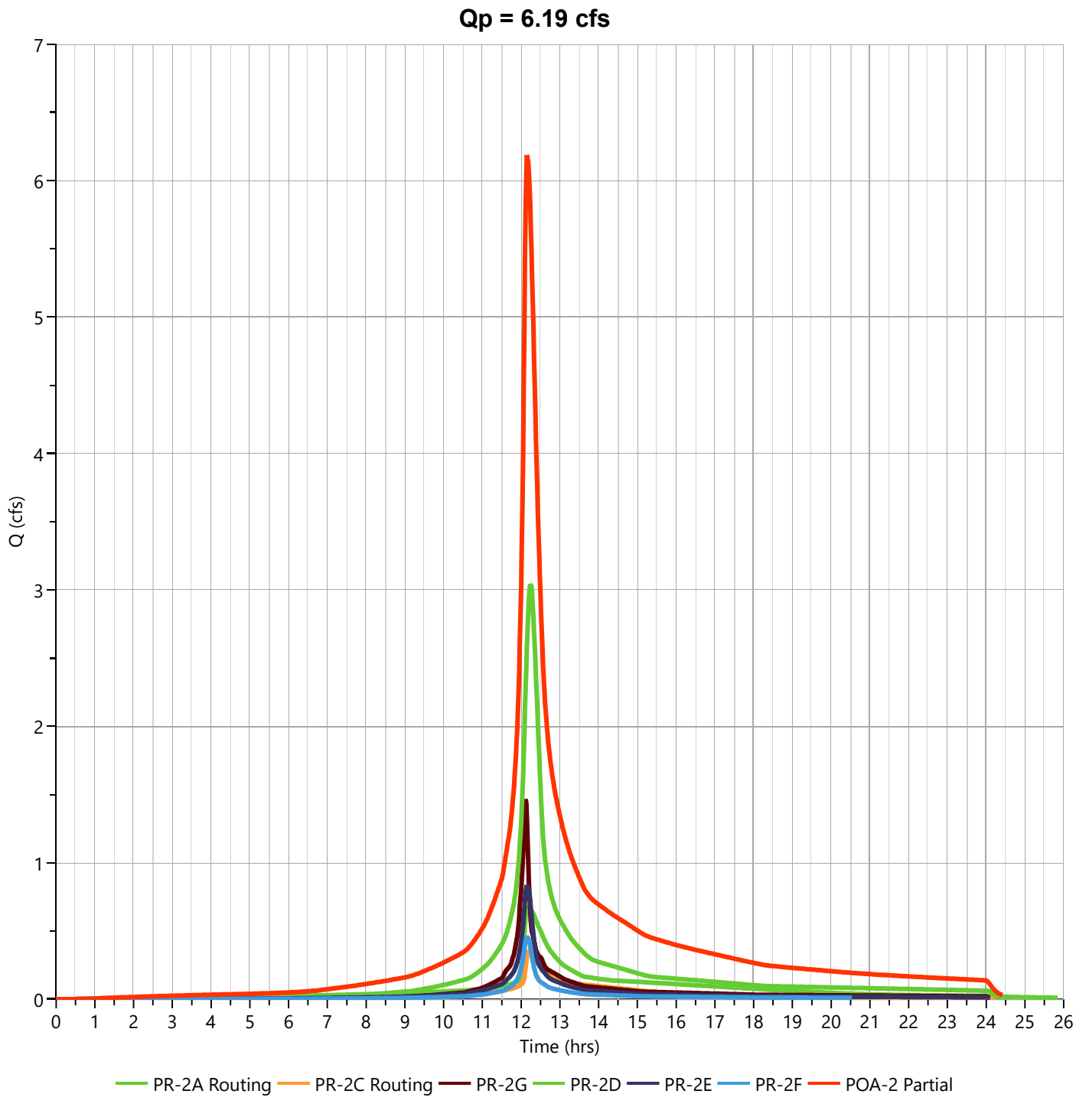
Hydrology Studio v 3.0.0.31

02-08-2024

POA-2 Partial

Hyd. No. 41

Hydrograph Type	= Junction	Peak Flow	= 6.186 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Hydrograph Volume	= 33,282 cuft
Inflow Hydrographs	= 4, 15, 19, 24, 28, 32	Total Contrib. Area	= 1.09 ac



Hydrograph Report

Project Name:

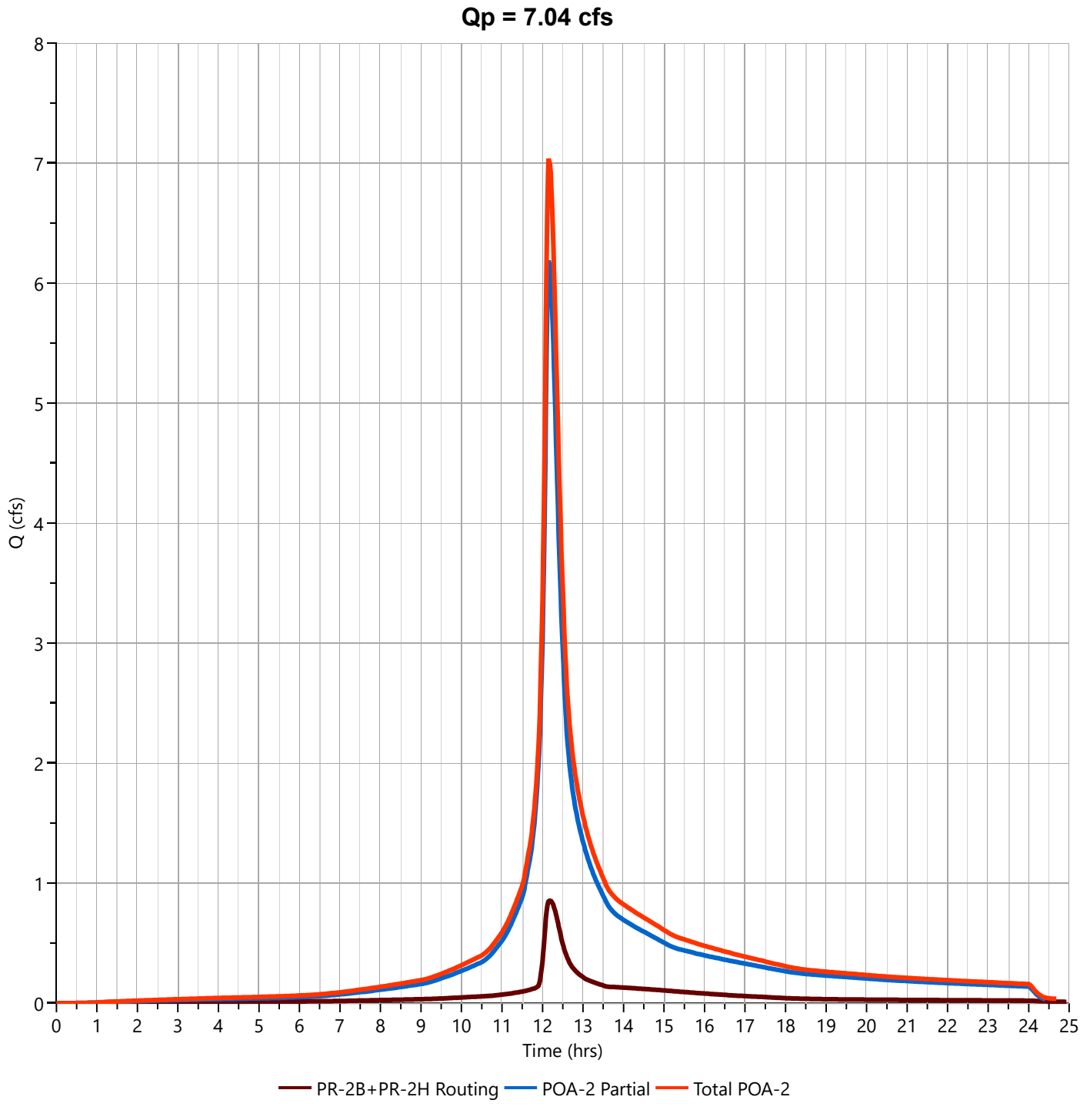
Hydrology Studio v 3.0.0.31

02-08-2024

Total POA-2

Hyd. No. 42

Hydrograph Type	= Junction	Peak Flow	= 7.037 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Hydrograph Volume	= 38,649 cuft
Inflow Hydrographs	= 39, 41	Total Contrib. Area	= 1.09 ac



PR-3 WATERSHED (TOTAL PROPOSED FLOW TO POA-3)

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: Present **(Developed)** — **Current Proposed Watershed PR-3 - Pervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		
1.	Surface Description (NEH table 15-1)		Dense Grasses		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.24		
3.	Design Flow Length, L_{des} (L_{des} < 100 ft)	ft	72		
4.	Two-year 24-hr rainfall, P_2	in	3.46		
5.	Land Slope, s	ft/ft	0.198		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	100		
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.070	+	+
				Sheet Flow Sub-Total	0.070 hours

Shallow Concentrated Flow		Segment ID	2		
8.	Surface Description		Pavement		
9.	Flow Length, L	ft	217		
10.	Watercourse Slope, s	ft/ft	0.059		
11.	Average Velocity, V (NEH table 15-3)	ft/s	4.95		
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.012	+	+
				Shallow Conc. Flow Sub-Total	0.012 hours

Channel Flow		Segment ID			
13.	Flow Length, L	ft			
14.	Cross Sectional flow area, a	ft^2			
15.	Wetted Perimeter, P_w	ft			
16.	Hydraulic Radius, r $r = a / P_w$	ft			
17.	Channel Slope, s	ft/ft			
18.	Manning's Roughness Coeff., n				
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s			
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+	+
				Channel Flow Sub-Total	0.000 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.083 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	5 minutes

Hydrograph Report

Project Name:

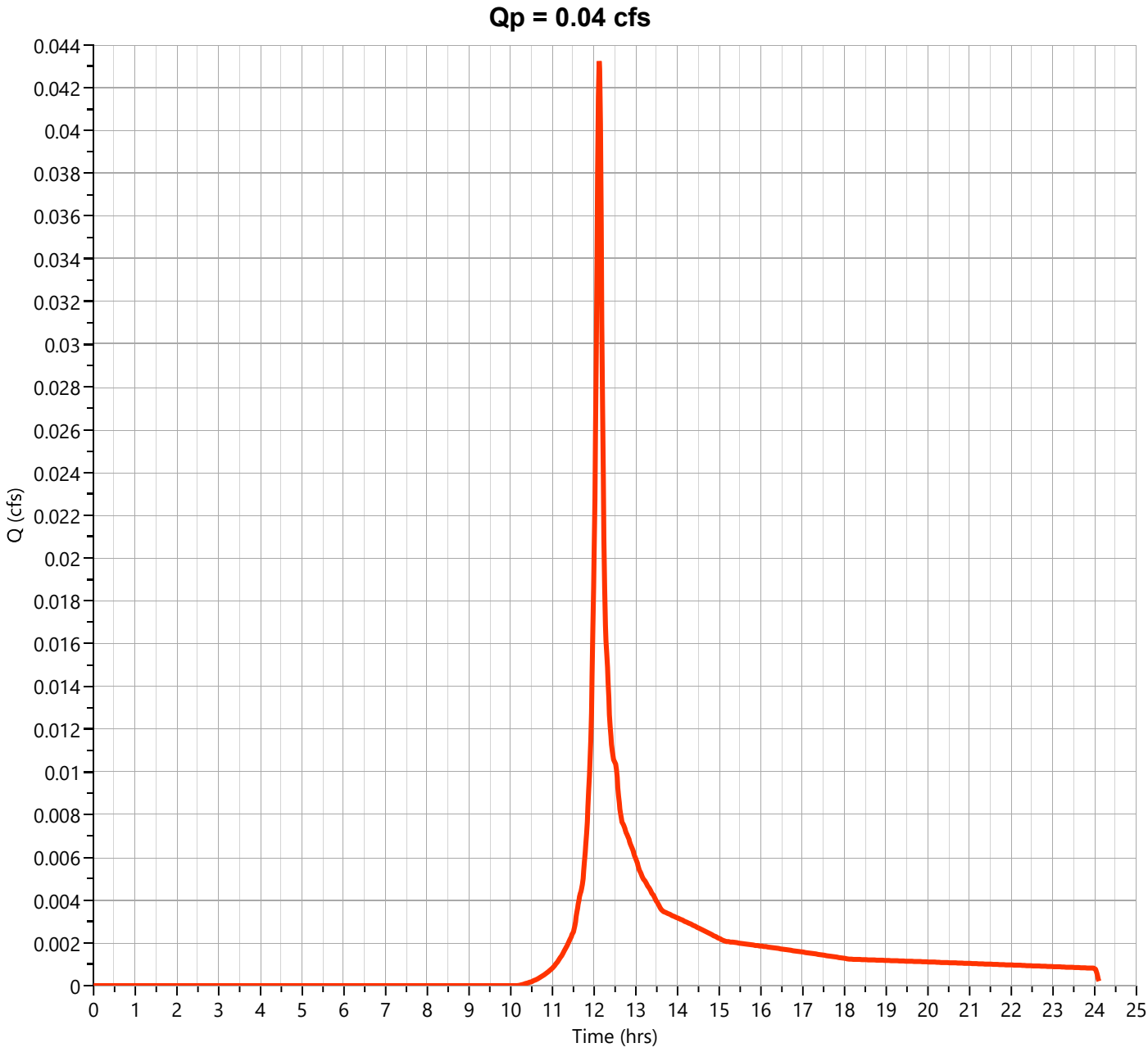
Hydrology Studio v 3.0.0.29

11-29-2023

PR-3 (POA-3)

Hyd. No. 28

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.043 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 136 cuft
Drainage Area	= 0.03 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

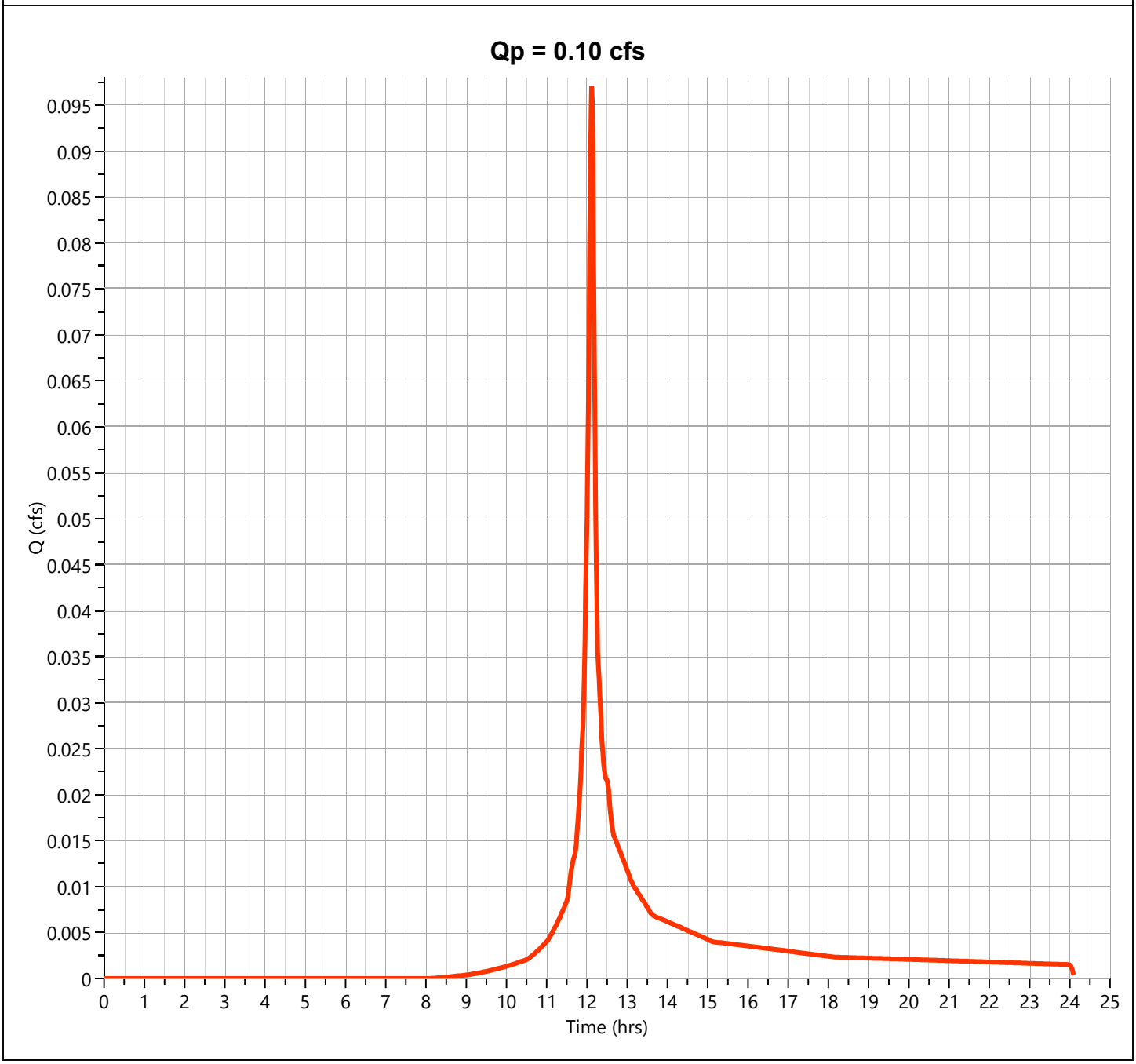
Hydrology Studio v 3.0.0.29

11-29-2023

PR-3 (POA-3)

Hyd. No. 28

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.097 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 300 cuft
Drainage Area	= 0.03 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

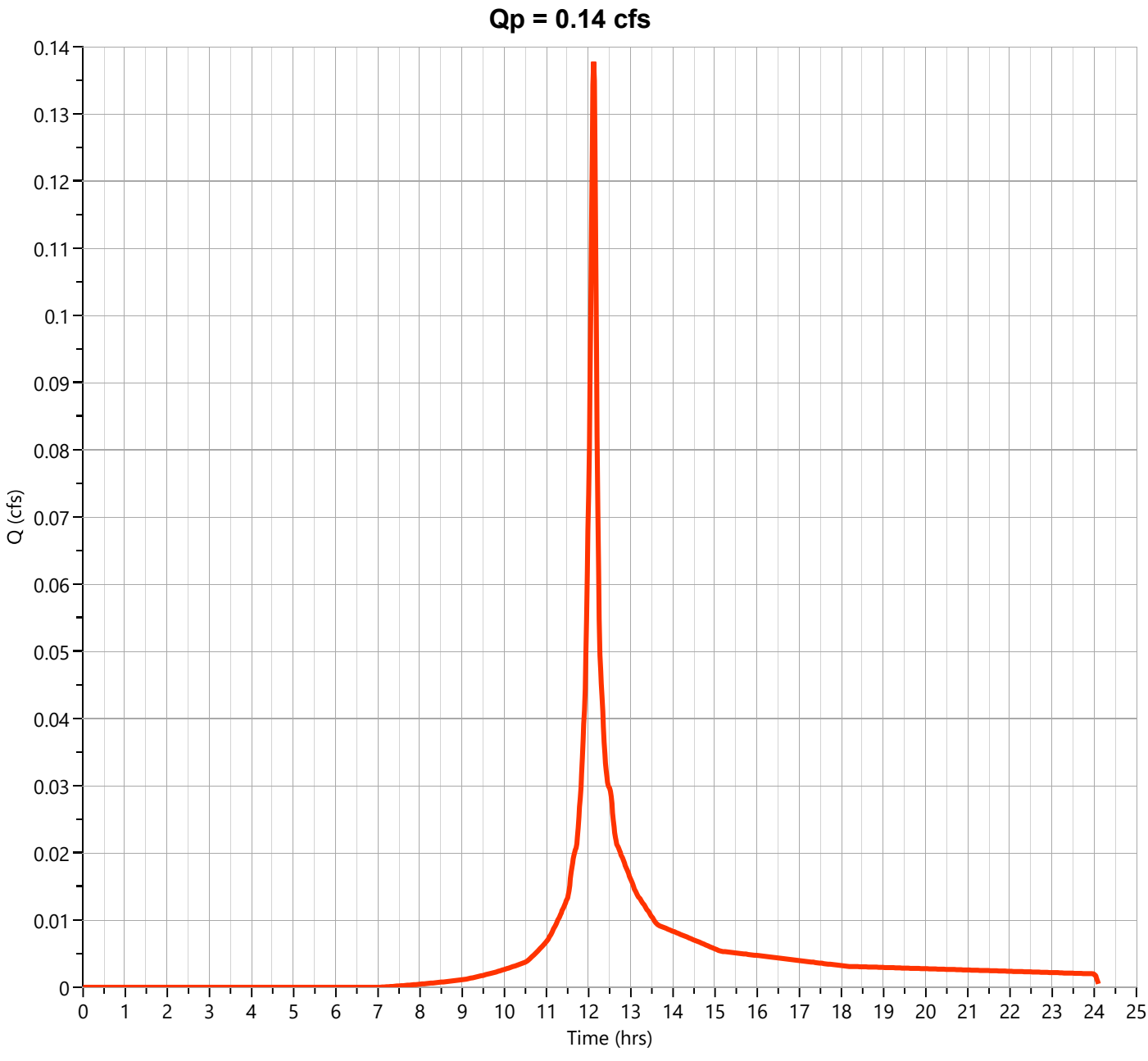
Hydrology Studio v 3.0.0.29

11-29-2023

PR-3 (POA-3)

Hyd. No. 28

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.138 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 428 cuft
Drainage Area	= 0.03 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 6.73 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

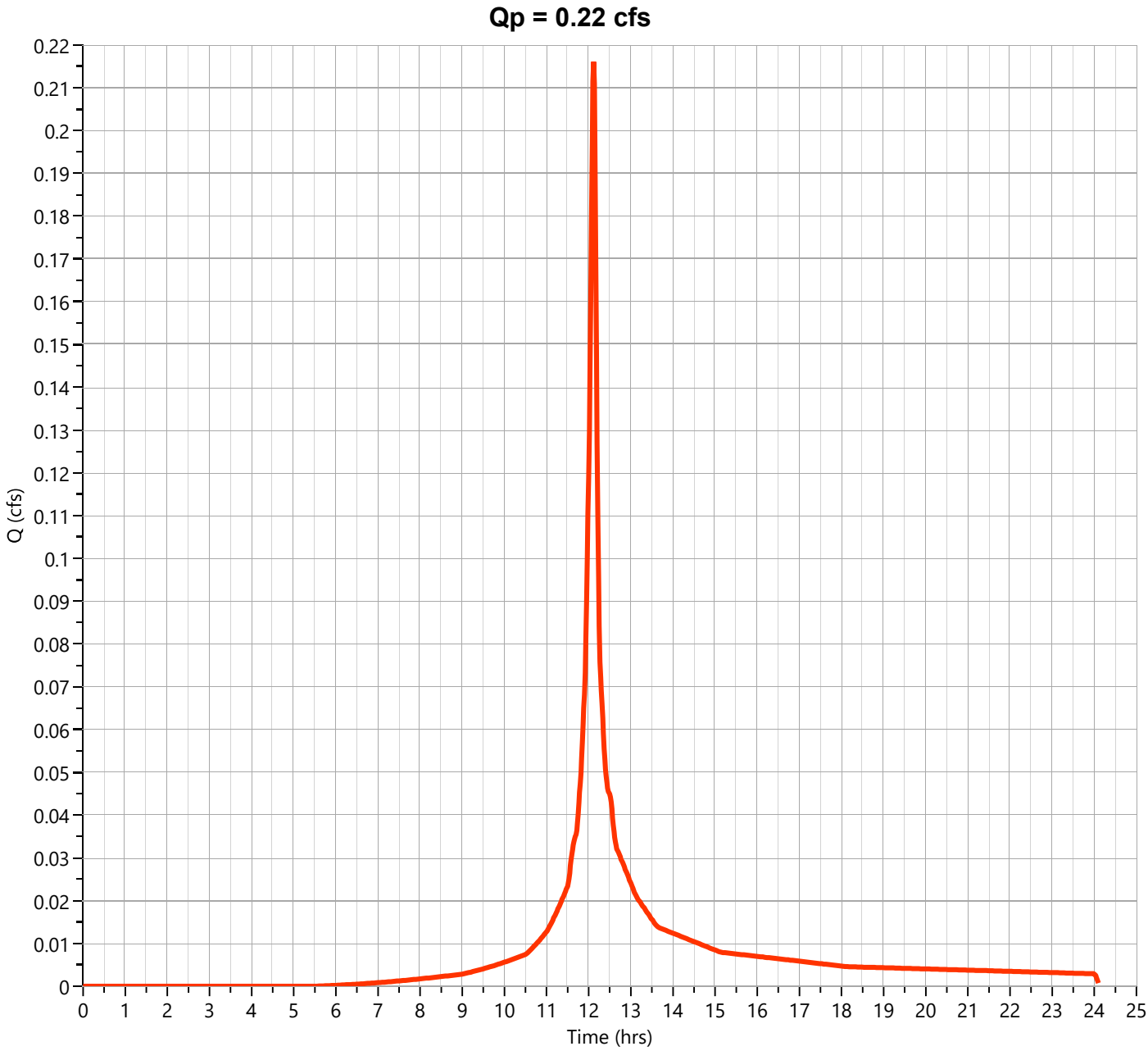
Hydrology Studio v 3.0.0.29

11-29-2023

PR-3 (POA-3)

Hyd. No. 28

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.216 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 681 cuft
Drainage Area	= 0.03 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 9.26 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



SUMMARY OF PROPOSED PEAK DISCHARGES

Hydrograph 2-yr Summary

Project Name:

02-08-2024

Hydrology Studio v 3.0.0.31

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	PR-1A	0.811	12.10	2,635	----		
2	Pond Route	PR-1A Routing	0.053	12.53	228	1	349.01	809
4	NRCS Runoff	PR-1B Grass HSGC C	0.099	12.15	352	----		
5	NRCS Runoff	PR-1B Impervious	0.494	12.10	1,640	----		
6	Junction	PR-1B	0.580	12.10	1,992	4, 5		
8	NRCS Runoff	PR-1C Grass HSGC C	0.046	12.10	124	----		
9	NRCS Runoff	PR-1C Impervious	0.068	12.10	220	----		
10	Junction	PR-1C	0.113	12.10	343	8, 9		
11	Pond Route	PR-1C Routing	0.007	13.70	102	10	356.00	242
14	NRCS Runoff	PR-1D Grass HSGC C	0.086	12.12	272	----		
15	NRCS Runoff	PR-1D Impervious	0.372	12.10	1,208	----		
16	Junction	PR-1D	0.455	12.10	1,480	14, 15		
18	Junction	Comb. to UDG-INF1-2	1.035	12.10	3,574	6, 11, 16		
20	Pond Route	UGD-INF1-2 Routing	0.059	12.65	355	18	344.78	1,023
22	NRCS Runoff	PR-1E Grass HSGC C	0.216	12.12	681	----		
23	NRCS Runoff	PR-1E Impervious	0.141	12.10	469	----		
24	Junction	PR-1E	0.353	12.12	1,149	22, 23		
26	Junction	POA-1	0.365	12.12	1,732	2, 20, 24		
28	NRCS Runoff	PR-3 (POA-3)	0.043	12.12	136	----		

Hydrograph 2-yr Summary

Project Name:

02-08-2024

Hydrology Studio v 3.0.0.31

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	PR-2A Grass HSGC C	0.015	12.10	44.0	----		
2	NRCS Runoff	PR-2A Impervious	0.676	12.10	2,196	----		
3	Junction	PR-2A	0.691	12.10	2,240	1, 2		
4	Pond Route	PR-2A Routing	0.108	12.53	2,231	3	354.64	859
6	NRCS Runoff	PR-2B Grass HSGC C	0.087	12.15	308	----		
7	NRCS Runoff	PR-2B Impervious	0.169	12.10	549	----		
8	Junction	PR-2B	0.244	12.10	857	6, 7		
11	NRCS Runoff	PR-2C Grass HSGC C	0.058	12.12	182	----		
12	NRCS Runoff	PR-2C Impervious	0.212	12.10	703	----		
13	Junction	PR-2C	0.267	12.10	884	11, 12		
15	Pond Route	PR-2C Routing	0.072	12.32	879	13	355.40	262
17	NRCS Runoff	PR-2G Grass HSGC C	0.173	12.12	545	----		
18	NRCS Runoff	PR-2G Woods HSGC C	0.102	12.12	331	----		
19	Junction	PR-2G	0.275	12.12	876	17, 18		
21	NRCS Runoff	PR-2D Grass HSGC C	0.158	12.27	748	----		
22	NRCS Runoff	PR-2D Woods HSGC C	0.318	12.27	1,571	----		
23	NRCS Runoff	PR-2D Impervious	0.116	12.22	579	----		
24	Junction	PR-2D	0.587	12.25	2,898	21, 22, 23		
26	NRCS Runoff	PR-2E Grass HSGC C	0.121	12.18	477	----		
27	NRCS Runoff	PR-2E Impervious	0.088	12.13	351	----		
28	Junction	PR-2E	0.204	12.17	828	26, 27		
30	NRCS Runoff	PR-2F Woods HSGC C	0.051	12.20	211	----		
31	NRCS Runoff	PR-2F Impervious	0.059	12.13	234	----		
32	Junction	PR-2F	0.107	12.17	445	30, 31		
34	NRCS Runoff	PR-2H Grass HSGC C	0.029	12.12	90.8	----		
35	NRCS Runoff	PR-2H Impervious	0.203	12.10	659	----		
36	Junction	PR-2H	0.231	12.10	750	34, 35		

Hydrograph 2-yr Summary

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

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)
38	Junction	PR-2B + PR-2H	0.474	12.10	1,607	8, 36		
39	Pond Route	PR-2B+PR-2H Routing	0.110	12.37	1,602	38	354.65	474
41	Junction	POA-2 Partial	1.205	12.17	8,157	4, 15, 19, 24, 28, 32		
42	Junction	Total POA-2	1.309	12.17	9,759	39, 41		

Hydrograph 10-yr Summary

Project Name:

02-08-2024

Hydrology Studio v 3.0.0.31

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	PR-1A	1.269	12.10	4,200	----		
2	Pond Route	PR-1A Routing	0.129	12.53	1,017	1	349.51	1,370
4	NRCS Runoff	PR-1B Grass HSGC C	0.223	12.15	776	----		
5	NRCS Runoff	PR-1B Impervious	0.773	12.10	2,613	----		
6	Junction	PR-1B	0.972	12.10	3,389	4, 5		
8	NRCS Runoff	PR-1C Grass HSGC C	0.100	12.10	273	----		
9	NRCS Runoff	PR-1C Impervious	0.106	12.10	350	----		
10	Junction	PR-1C	0.206	12.10	623	8, 9		
11	Pond Route	PR-1C Routing	0.202	12.10	381	10	356.02	251
14	NRCS Runoff	PR-1D Grass HSGC C	0.194	12.12	600	----		
15	NRCS Runoff	PR-1D Impervious	0.581	12.10	1,925	----		
16	Junction	PR-1D	0.770	12.10	2,525	14, 15		
18	Junction	Comb. to UDG-INF1-2	1.944	12.10	6,295	6, 11, 16		
20	Pond Route	UGD-INF1-2 Routing	0.139	12.83	1,778	18	345.37	2,155
22	NRCS Runoff	PR-1E Grass HSGC C	0.485	12.12	1,500	----		
23	NRCS Runoff	PR-1E Impervious	0.221	12.10	747	----		
24	Junction	PR-1E	0.699	12.12	2,246	22, 23		
26	Junction	POA-1	0.901	12.12	5,041	2, 20, 24		
28	NRCS Runoff	PR-3 (POA-3)	0.097	12.12	300	----		

Hydrograph 10-yr Summary

Project Name:

02-08-2024

Hydrology Studio v 3.0.0.31

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	PR-2A Grass HSGC C	0.034	12.10	97.0	----		
2	NRCS Runoff	PR-2A Impervious	1.057	12.10	3,500	----		
3	Junction	PR-2A	1.091	12.10	3,597	1, 2		
4	Pond Route	PR-2A Routing	0.156	12.53	3,588	3	354.97	1,389
6	NRCS Runoff	PR-2B Grass HSGC C	0.195	12.15	679	----		
7	NRCS Runoff	PR-2B Impervious	0.264	12.10	875	----		
8	Junction	PR-2B	0.438	12.10	1,554	6, 7		
11	NRCS Runoff	PR-2C Grass HSGC C	0.129	12.12	400	----		
12	NRCS Runoff	PR-2C Impervious	0.331	12.10	1,120	----		
13	Junction	PR-2C	0.457	12.10	1,520	11, 12		
15	Pond Route	PR-2C Routing	0.106	12.37	1,515	13	355.62	459
17	NRCS Runoff	PR-2G Grass HSGC C	0.388	12.12	1,200	----		
18	NRCS Runoff	PR-2G Woods HSGC C	0.253	12.12	782	----		
19	Junction	PR-2G	0.641	12.12	1,982	17, 18		
21	NRCS Runoff	PR-2D Grass HSGC C	0.359	12.25	1,648	----		
22	NRCS Runoff	PR-2D Woods HSGC C	0.800	12.25	3,709	----		
23	NRCS Runoff	PR-2D Impervious	0.182	12.22	923	----		
24	Junction	PR-2D	1.339	12.25	6,280	21, 22, 23		
26	NRCS Runoff	PR-2E Grass HSGC C	0.273	12.18	1,050	----		
27	NRCS Runoff	PR-2E Impervious	0.138	12.13	560	----		
28	Junction	PR-2E	0.404	12.17	1,610	26, 27		
30	NRCS Runoff	PR-2F Woods HSGC C	0.129	12.18	498	----		
31	NRCS Runoff	PR-2F Impervious	0.092	12.13	373	----		
32	Junction	PR-2F	0.216	12.17	871	30, 31		
34	NRCS Runoff	PR-2H Grass HSGC C	0.065	12.12	200	----		
35	NRCS Runoff	PR-2H Impervious	0.317	12.10	1,050	----		
36	Junction	PR-2H	0.380	12.10	1,250	34, 35		

Hydrograph 10-yr Summary

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

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)
38	Junction	PR-2B + PR-2H	0.818	12.10	2,804	8, 36		
39	Pond Route	PR-2B+PR-2H Routing	0.256	12.30	2,799	38	355.05	815
41	Junction	POA-2 Partial	2.540	12.15	15,846	4, 15, 19, 24, 28, 32		
42	Junction	Total POA-2	2.730	12.17	18,645	39, 41		

Hydrograph 25-yr Summary

Project Name:

02-08-2024

Hydrology Studio v 3.0.0.31

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	PR-1A	1.589	12.10	5,302	----		
2	Pond Route	PR-1A Routing	0.339	12.27	1,702	1	349.76	1,654
4	NRCS Runoff	PR-1B Grass HSGC C	0.317	12.15	1,106	----		
5	NRCS Runoff	PR-1B Impervious	0.969	12.10	3,299	----		
6	Junction	PR-1B	1.254	12.10	4,405	4, 5		
8	NRCS Runoff	PR-1C Grass HSGC C	0.141	12.10	389	----		
9	NRCS Runoff	PR-1C Impervious	0.132	12.10	442	----		
10	Junction	PR-1C	0.274	12.10	831	8, 9		
11	Pond Route	PR-1C Routing	0.272	12.10	589	10	356.03	254
14	NRCS Runoff	PR-1D Grass HSGC C	0.275	12.12	855	----		
15	NRCS Runoff	PR-1D Impervious	0.728	12.10	2,430	----		
16	Junction	PR-1D	0.997	12.10	3,285	14, 15		
18	Junction	Comb. to UDG-INF1-2	2.522	12.10	8,278	6, 11, 16		
20	Pond Route	UGD-INF1-2 Routing	0.291	12.58	3,077	18	345.78	2,909
22	NRCS Runoff	PR-1E Grass HSGC C	0.689	12.12	2,138	----		
23	NRCS Runoff	PR-1E Impervious	0.277	12.10	943	----		
24	Junction	PR-1E	0.956	12.12	3,081	22, 23		
26	Junction	POA-1	1.313	12.13	7,859	2, 20, 24		
28	NRCS Runoff	PR-3 (POA-3)	0.138	12.12	428	----		

Hydrograph 25-yr Summary

Project Name:

02-08-2024

Hydrology Studio v 3.0.0.31

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	PR-2A Grass HSGC C	0.048	12.10	138	----		
2	NRCS Runoff	PR-2A Impervious	1.324	12.10	4,418	----		
3	Junction	PR-2A	1.373	12.10	4,556	1, 2		
4	Pond Route	PR-2A Routing	0.293	12.33	4,547	3	355.13	1,653
6	NRCS Runoff	PR-2B Grass HSGC C	0.277	12.15	968	----		
7	NRCS Runoff	PR-2B Impervious	0.331	12.10	1,105	----		
8	Junction	PR-2B	0.581	12.10	2,072	6, 7		
11	NRCS Runoff	PR-2C Grass HSGC C	0.184	12.12	570	----		
12	NRCS Runoff	PR-2C Impervious	0.415	12.10	1,414	----		
13	Junction	PR-2C	0.594	12.10	1,984	11, 12		
15	Pond Route	PR-2C Routing	0.141	12.35	1,979	13	355.78	602
17	NRCS Runoff	PR-2G Grass HSGC C	0.551	12.12	1,710	----		
18	NRCS Runoff	PR-2G Woods HSGC C	0.370	12.12	1,144	----		
19	Junction	PR-2G	0.921	12.12	2,854	17, 18		
21	NRCS Runoff	PR-2D Grass HSGC C	0.512	12.25	2,350	----		
22	NRCS Runoff	PR-2D Woods HSGC C	1.181	12.25	5,423	----		
23	NRCS Runoff	PR-2D Impervious	0.229	12.22	1,165	----		
24	Junction	PR-2D	1.918	12.25	8,937	21, 22, 23		
26	NRCS Runoff	PR-2E Grass HSGC C	0.389	12.18	1,497	----		
27	NRCS Runoff	PR-2E Impervious	0.173	12.13	707	----		
28	Junction	PR-2E	0.554	12.17	2,204	26, 27		
30	NRCS Runoff	PR-2F Woods HSGC C	0.189	12.18	728	----		
31	NRCS Runoff	PR-2F Impervious	0.115	12.13	471	----		
32	Junction	PR-2F	0.299	12.17	1,199	30, 31		
34	NRCS Runoff	PR-2H Grass HSGC C	0.092	12.12	285	----		
35	NRCS Runoff	PR-2H Impervious	0.397	12.10	1,325	----		
36	Junction	PR-2H	0.487	12.10	1,610	34, 35		

Hydrograph 25-yr Summary

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

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)
38	Junction	PR-2B + PR-2H	1.067	12.10	3,683	8, 36		
39	Pond Route	PR-2B+PR-2H Routing	0.494	12.22	3,678	38	355.23	968
41	Junction	POA-2 Partial	3.639	12.17	21,720	4, 15, 19, 24, 28, 32		
42	Junction	Total POA-2	4.108	12.17	25,398	39, 41		

Hydrograph 100-yr Summary

Project Name:

02-08-2024

Hydrology Studio v 3.0.0.31

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	PR-1A	2.189	12.10	7,367	----		
2	Pond Route	PR-1A Routing	0.795	12.15	3,121	1	350.23	2,160
4	NRCS Runoff	PR-1B Grass HSGC C	0.498	12.15	1,762	----		
5	NRCS Runoff	PR-1B Impervious	1.335	12.10	4,584	----		
6	Junction	PR-1B	1.788	12.10	6,345	4, 5		
8	NRCS Runoff	PR-1C Grass HSGC C	0.220	12.10	619	----		
9	NRCS Runoff	PR-1C Impervious	0.182	12.10	614	----		
10	Junction	PR-1C	0.403	12.10	1,233	8, 9		
11	Pond Route	PR-1C Routing	0.400	12.10	991	10	356.04	260
14	NRCS Runoff	PR-1D Grass HSGC C	0.432	12.12	1,363	----		
15	NRCS Runoff	PR-1D Impervious	1.003	12.10	3,376	----		
16	Junction	PR-1D	1.426	12.10	4,739	14, 15		
18	Junction	Comb. to UDG-INF1-2	3.614	12.10	12,076	6, 11, 16		
20	Pond Route	UGD-INF1-2 Routing	0.525	12.53	5,925	18	346.60	4,352
22	NRCS Runoff	PR-1E Grass HSGC C	1.080	12.12	3,406	----		
23	NRCS Runoff	PR-1E Impervious	0.381	12.10	1,310	----		
24	Junction	PR-1E	1.449	12.12	4,716	22, 23		
26	Junction	POA-1	2.588	12.12	13,762	2, 20, 24		
28	NRCS Runoff	PR-3 (POA-3)	0.216	12.12	681	----		

Hydrograph 100-yr Summary

Project Name:

02-08-2024

Hydrology Studio v 3.0.0.31

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	PR-2A Grass HSGC C	0.076	12.10	220	----		
2	NRCS Runoff	PR-2A Impervious	1.824	12.10	6,139	----		
3	Junction	PR-2A	1.900	12.10	6,359	1, 2		
4	Pond Route	PR-2A Routing	0.675	12.17	6,350	3	355.40	2,087
6	NRCS Runoff	PR-2B Grass HSGC C	0.436	12.15	1,541	----		
7	NRCS Runoff	PR-2B Impervious	0.456	12.10	1,535	----		
8	Junction	PR-2B	0.852	12.10	3,076	6, 7		
11	NRCS Runoff	PR-2C Grass HSGC C	0.288	12.12	908	----		
12	NRCS Runoff	PR-2C Impervious	0.572	12.10	1,964	----		
13	Junction	PR-2C	0.854	12.10	2,873	11, 12		
15	Pond Route	PR-2C Routing	0.356	12.22	2,868	13	356.00	789
17	NRCS Runoff	PR-2G Grass HSGC C	0.864	12.12	2,725	----		
18	NRCS Runoff	PR-2G Woods HSGC C	0.601	12.12	1,875	----		
19	Junction	PR-2G	1.465	12.12	4,600	17, 18		
21	NRCS Runoff	PR-2D Grass HSGC C	0.808	12.25	3,744	----		
22	NRCS Runoff	PR-2D Woods HSGC C	1.932	12.25	8,888	----		
23	NRCS Runoff	PR-2D Impervious	0.315	12.22	1,618	----		
24	Junction	PR-2D	3.050	12.25	14,250	21, 22, 23		
26	NRCS Runoff	PR-2E Grass HSGC C	0.612	12.18	2,384	----		
27	NRCS Runoff	PR-2E Impervious	0.238	12.13	982	----		
28	Junction	PR-2E	0.840	12.17	3,367	26, 27		
30	NRCS Runoff	PR-2F Woods HSGC C	0.309	12.18	1,193	----		
31	NRCS Runoff	PR-2F Impervious	0.159	12.13	655	----		
32	Junction	PR-2F	0.461	12.17	1,848	30, 31		
34	NRCS Runoff	PR-2H Grass HSGC C	0.144	12.12	454	----		
35	NRCS Runoff	PR-2H Impervious	0.547	12.10	1,842	----		
36	Junction	PR-2H	0.688	12.10	2,296	34, 35		

Hydrograph 100-yr Summary

Project Name:

02-08-2024

Hydrology Studio v 3.0.0.31

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
38	Junction	PR-2B + PR-2H	1.541	12.10	5,372	8, 36		
39	Pond Route	PR-2B+PR-2H Routing	0.857	12.18	5,367	38	355.55	1,241
41	Junction	POA-2 Partial	6.186	12.15	33,282	4, 15, 19, 24, 28, 32		
42	Junction	Total POA-2	7.037	12.15	38,649	39, 41		

FUTURE HYDROGRAPH CALCULATIONS

PR-1A WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: Present **Developed** — **Future Proposed Watershed PR-1A - Impervious**

Circle One: **T_c** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		
1.	Surface Description (NEH table 15-1)		Smooth Surfaces		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	64		
4.	Two-year 24-hr rainfall, P_2	in	4.12		
5.	Land Slope, s	ft/ft	0.020		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	100		
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} S^{0.4}}$	hr	0.012	+	+
				Sheet Flow Sub-Total	0.012 hours

Shallow Concentrated Flow		Segment ID			
8.	Surface Description				
9.	Flow Length, L	ft			
10.	Watercourse Slope, s	ft/ft			
11.	Average Velocity, V (NEH table 15-3)	ft/s			
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+	+
				Shallow Conc. Flow Sub-Total	0.000 hours

Channel Flow		Segment ID	2		
13.	Flow Length, L	ft	56		
14.	Cross Sectional flow area, a	ft^2	0.17		
15.	Wetted Perimeter, P_w	ft	1.00		
16.	Hydraulic Radius, r $r = a / P_w$	ft	0.17		
17.	Channel Slope, s	ft/ft	0.020		
18.	Manning's Roughness Coeff., n		0.012		
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	5.39		
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.003	+	+
				Channel Flow Sub-Total	0.003 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.015 hours
(Add Sub-Total T_t from prior steps)	Software Limitations Require Minimum Tc =	2 minutes

Hydrograph Report

Project Name:

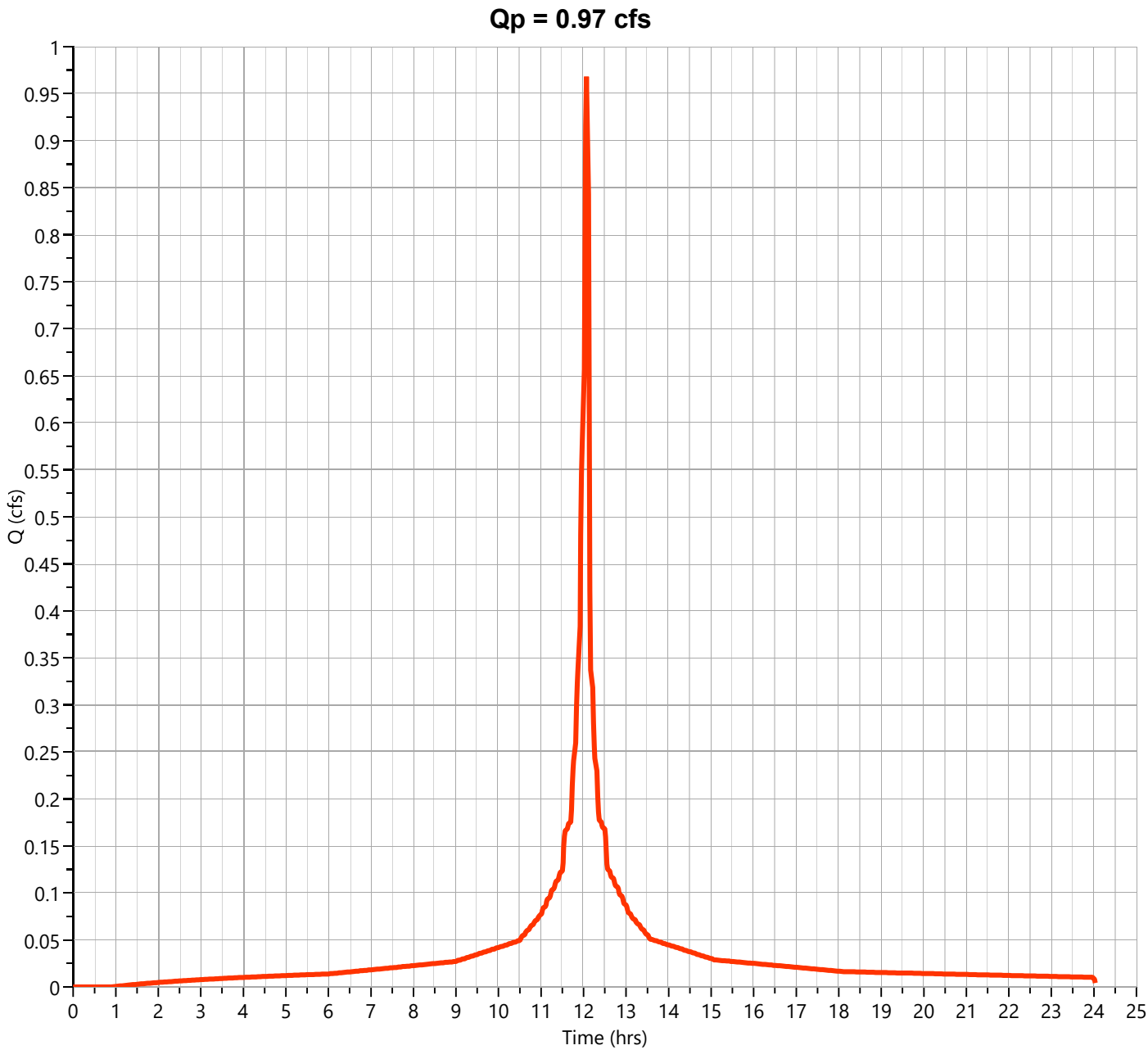
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1A

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.969 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 3,173 cuft
Drainage Area	= 0.24 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

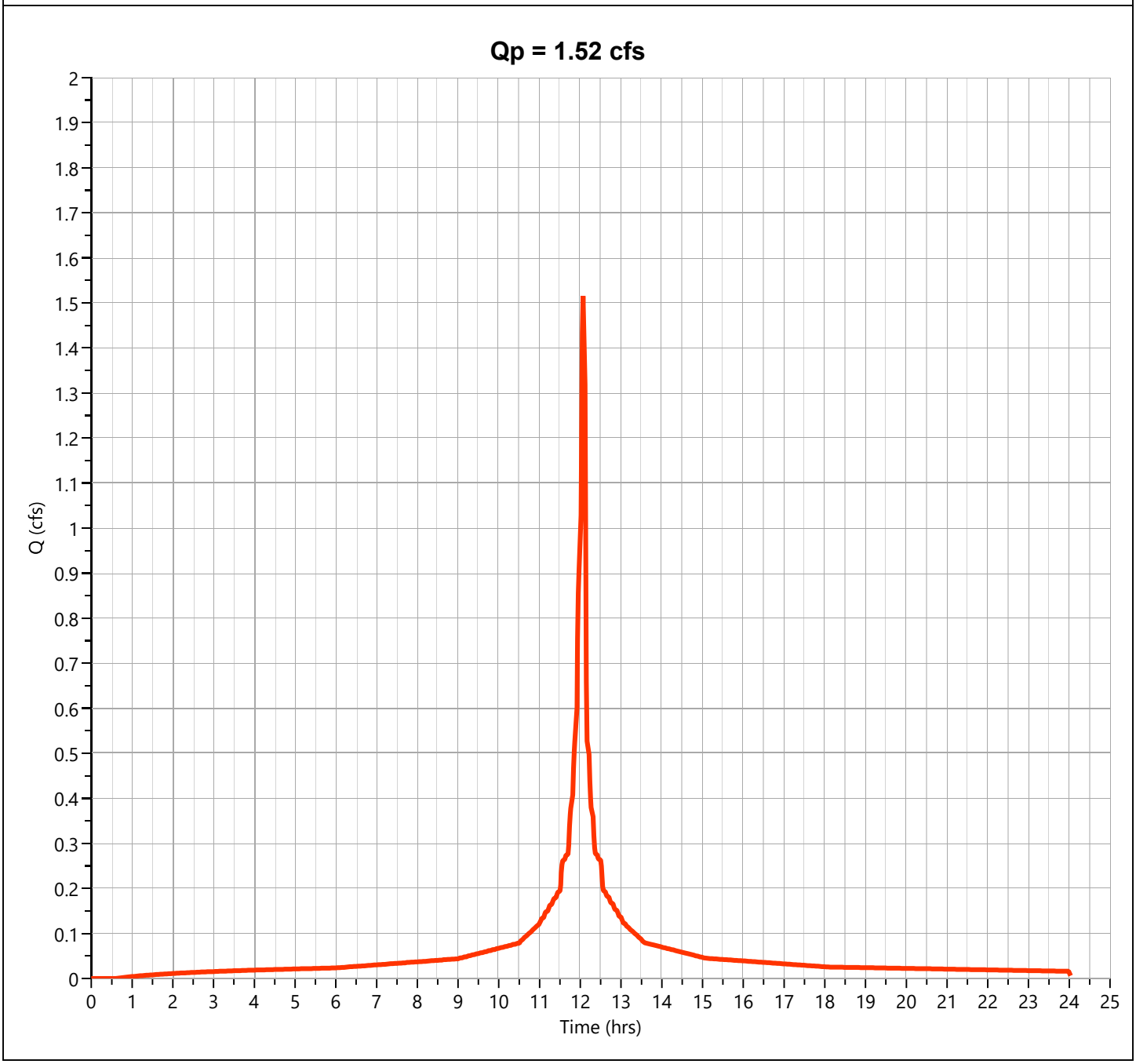
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1A

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.516 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 5,049 cuft
Drainage Area	= 0.24 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

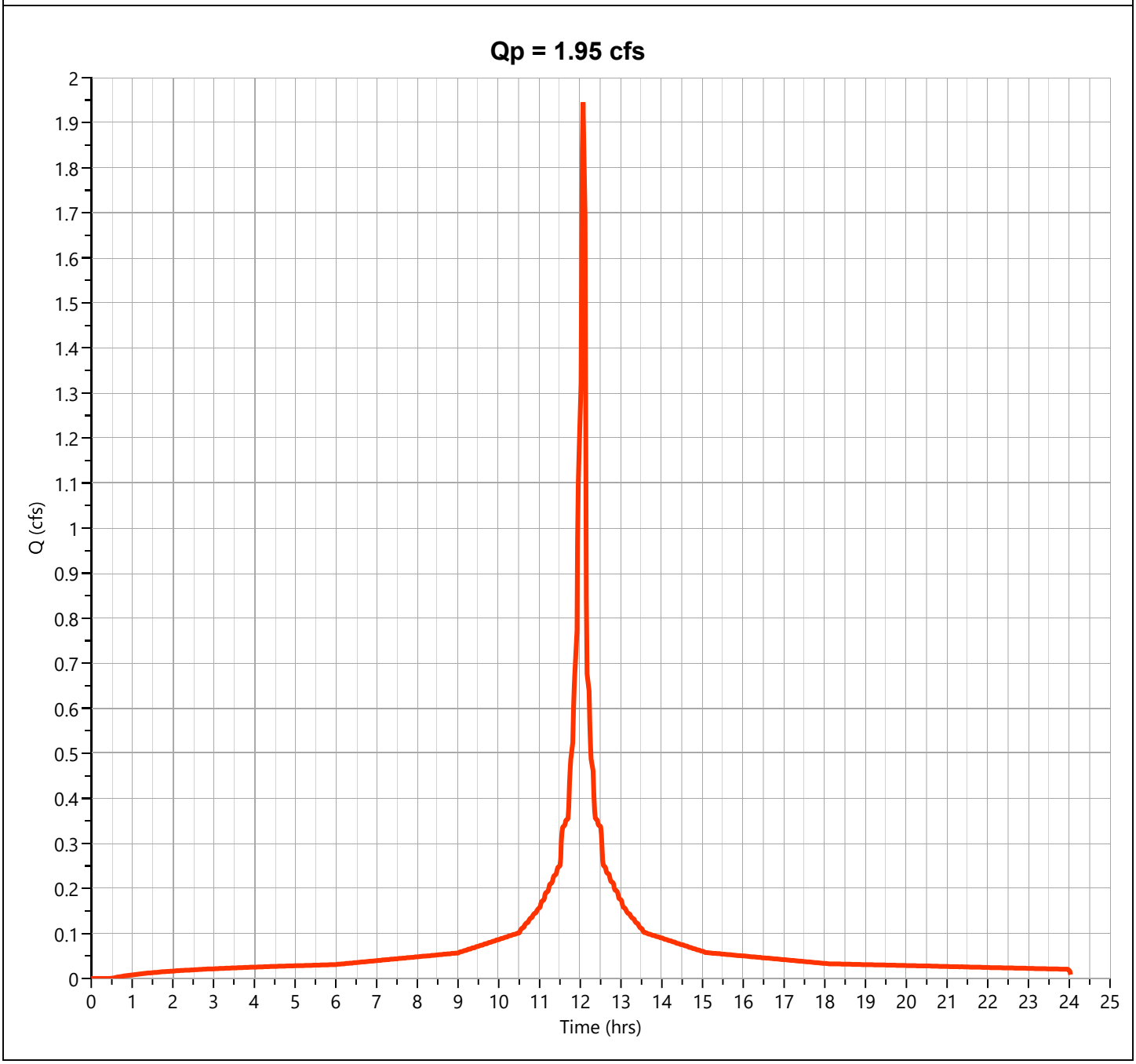
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1A

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.945 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 6,526 cuft
Drainage Area	= 0.24 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

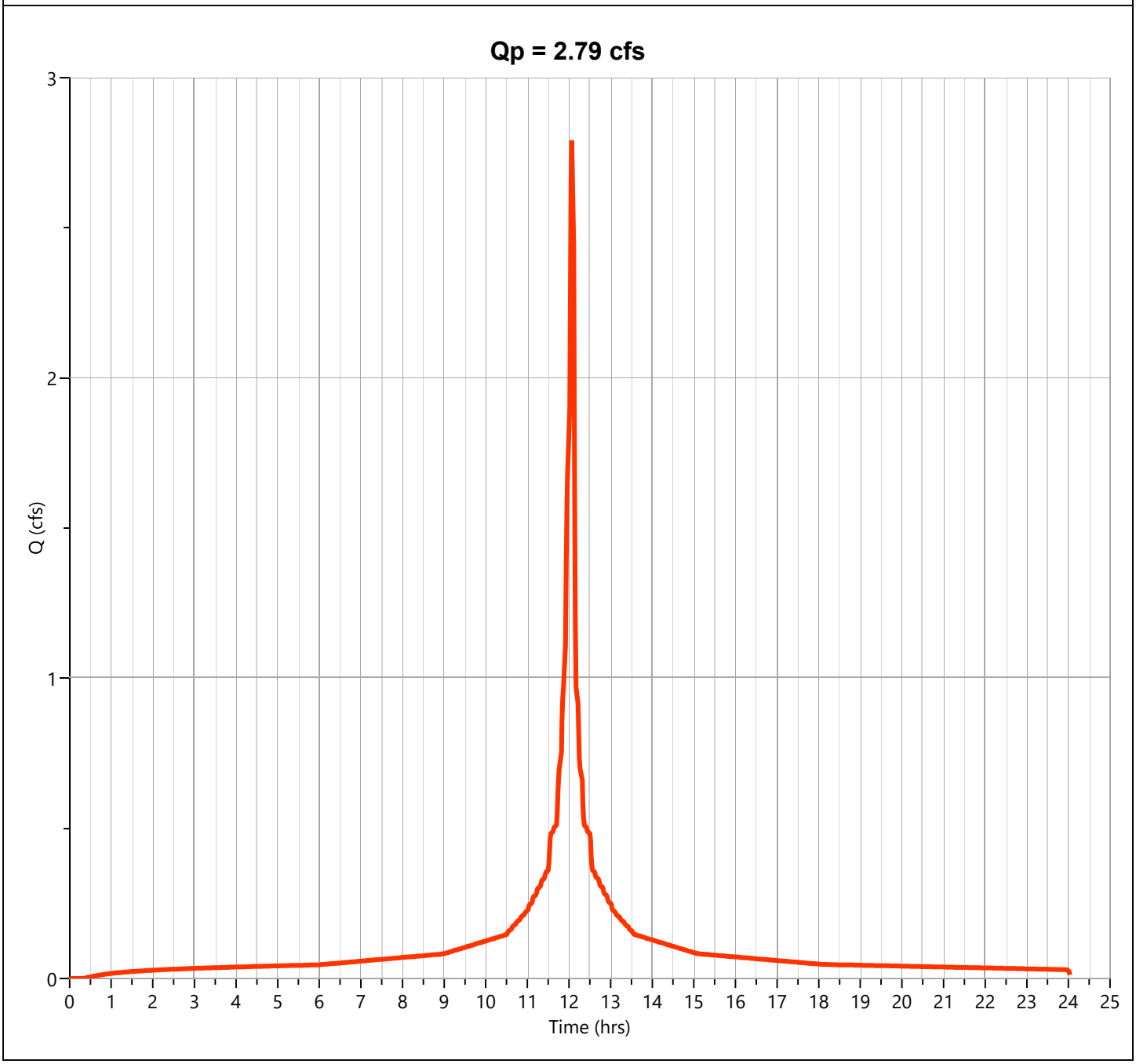
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1A

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.791 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 9,440 cuft
Drainage Area	= 0.24 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



PR-1B WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: Present **(Developed)** — **Future Proposed Watershed PR-1B - Impervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		2		3
1.	Surface Description (NEH table 15-1)		Smooth Surfaces		Dense Grasses		Dense Grasses
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011		0.24		0.24
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	24		7		11
4.	Two-year 24-hr rainfall, P_2	in	4.12		4.12		4.12
5.	Land Slope, s	ft/ft	0.014		0.334		0.010
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	100		100		42
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.007	+	0.008	+	0.047
					Sheet Flow Sub-Total		0.062 hours

Shallow Concentrated Flow		Segment ID					
8.	Surface Description						
9.	Flow Length, L	ft					
10.	Watercourse Slope, s	ft/ft					
11.	Average Velocity, V (NEH table 15-3)	ft/s					
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+		+	
					Shallow Conc. Flow Sub-Total		0.000 hours

Channel Flow		Segment ID	4				
13.	Flow Length, L	ft	69				
14.	Cross Sectional flow area, a	ft^2	0.39				
15.	Wetted Perimeter, P_w	ft	1.60				
16.	Hydraulic Radius, r $r = a / P_w$	ft	0.24				
17.	Channel Slope, s	ft/ft	0.010				
18.	Manning's Roughness Coeff., n		0.012				
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	4.85				
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.004	+		+	
					Channel Flow Sub-Total		0.004 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.066 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	4 minutes

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: Present **(Developed)** — **Future Proposed Watershed PR-1B - Pervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

			Segment ID	1		
1.	Surface Description (NEH table 15-1)			Woods Dense Underbrush		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.40		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)		ft	42		
4.	Two-year 24-hr rainfall, P_2		in	4.12		
5.	Land Slope, s		ft/ft	0.029		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft)	$L_{mcs} = (100\ s^{0.5})/n$	ft	42		
7.	Compute T_t	$T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.137	+	+

Sheet Flow Sub-Total **0.137 hours**

Shallow Concentrated Flow

			Segment ID	2	3	4
8.	Surface Description			Grassed Waterways	Pavement	Grassed Waterways
9.	Flow Length, L		ft	4	5	6
10.	Watercourse Slope, s		ft/ft	0.037	0.018	0.275
11.	Average Velocity, V (NEH table 15-3)		ft/s	3.10	2.73	8.45
12.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.000	+ 0.001	+ 0.000

Shallow Conc. Flow Sub-Total **0.001 hours**

Channel Flow

			Segment ID	5		
13.	Flow Length, L		ft	69		
14.	Cross Sectional flow area, a		ft^2	0.39		
15.	Wetted Perimeter, P_w		ft	1.60		
16.	Hydraulic Radius, r	$r = a / P_w$	ft	0.24		
17.	Channel Slope, s		ft/ft	0.010		
18.	Manning's Roughness Coeff., n			0.012		
19.	Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	4.85		
20.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.004	+	+

Channel Flow Sub-Total **0.004 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) =	**0.142 hours**
Total Tc (minutes) =	**8 minutes**

Hydrograph Report

Project Name:

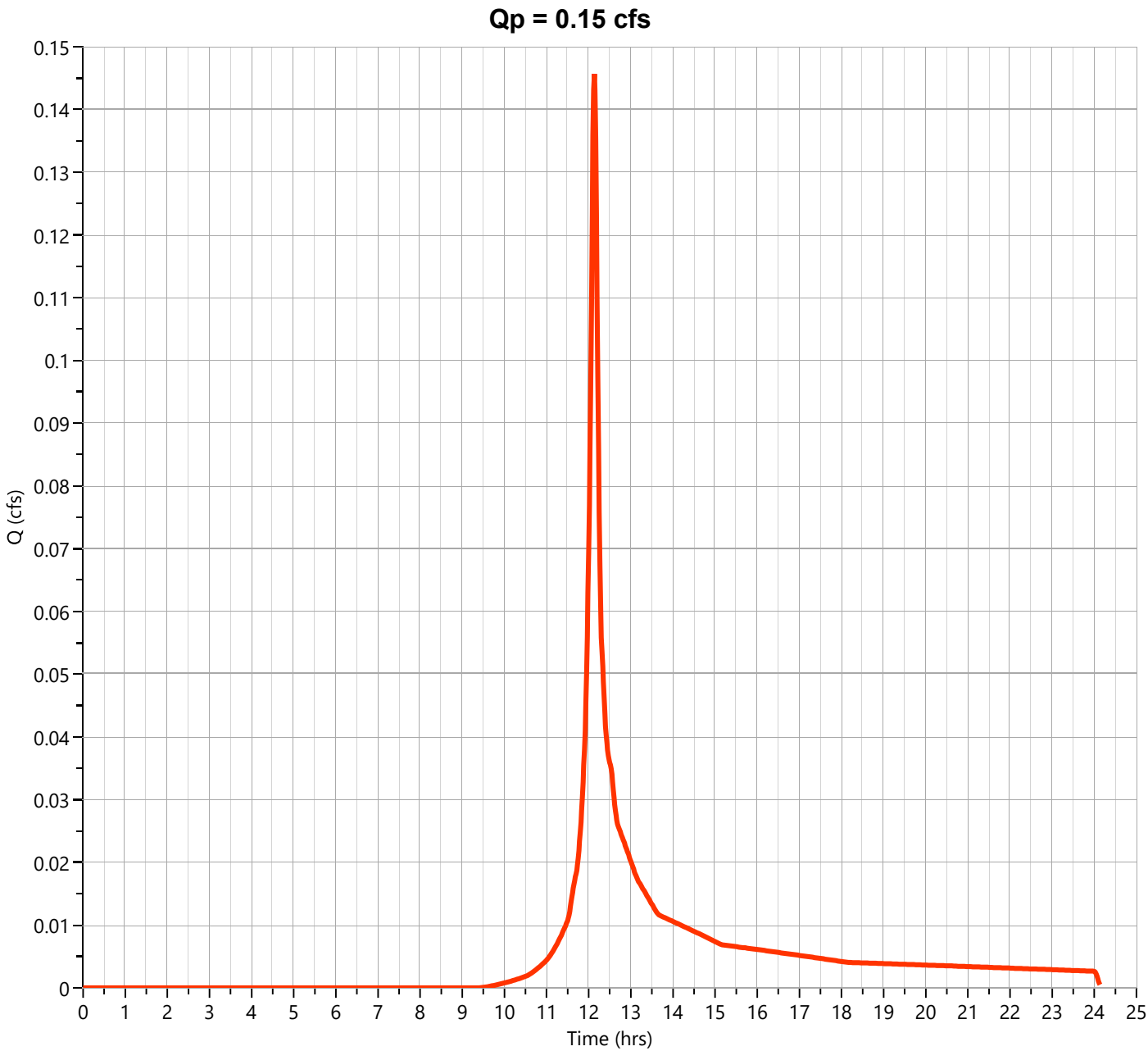
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1B Grass HSGC C

Hyd. No. 4

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.146 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 477 cuft
Drainage Area	= 0.08 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 8.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

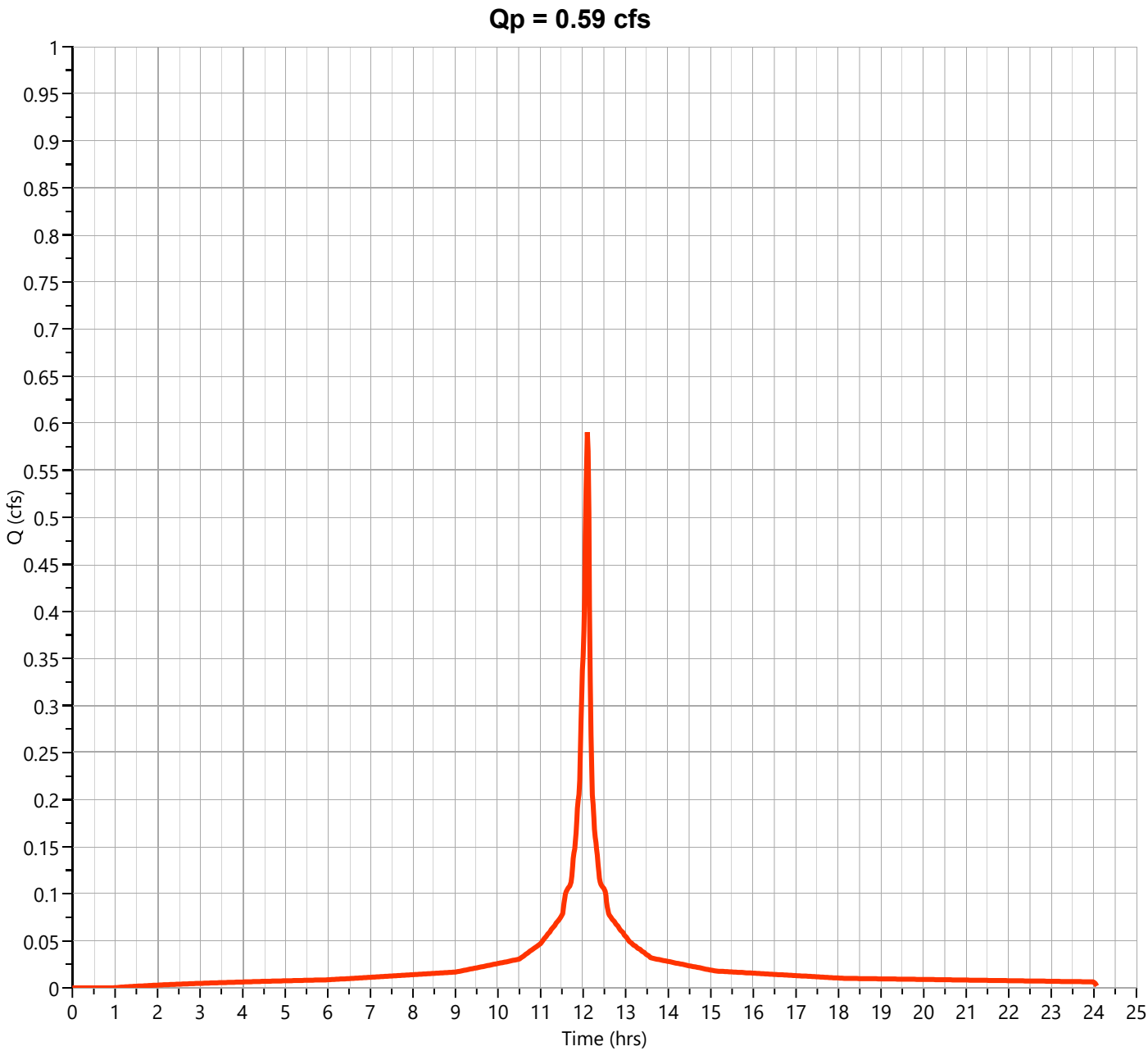
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1B Impervious

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.590 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,974 cuft
Drainage Area	= 0.14 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

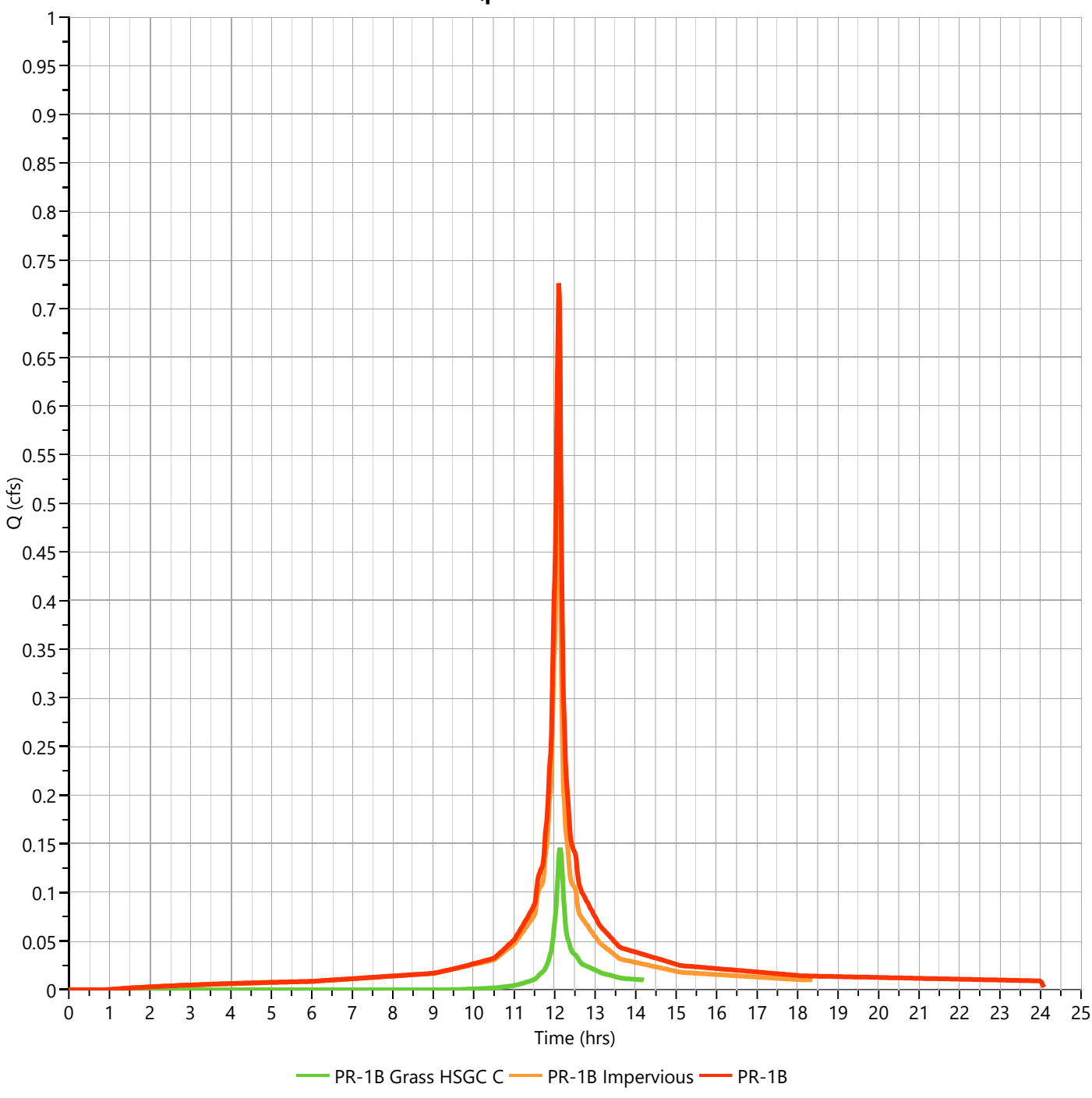
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1B

Hyd. No. 6

Hydrograph Type	= Junction	Peak Flow	= 0.726 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,451 cuft
Inflow Hydrographs	= 4, 5	Total Contrib. Area	= 0.22 ac



Hydrograph Report

Project Name:

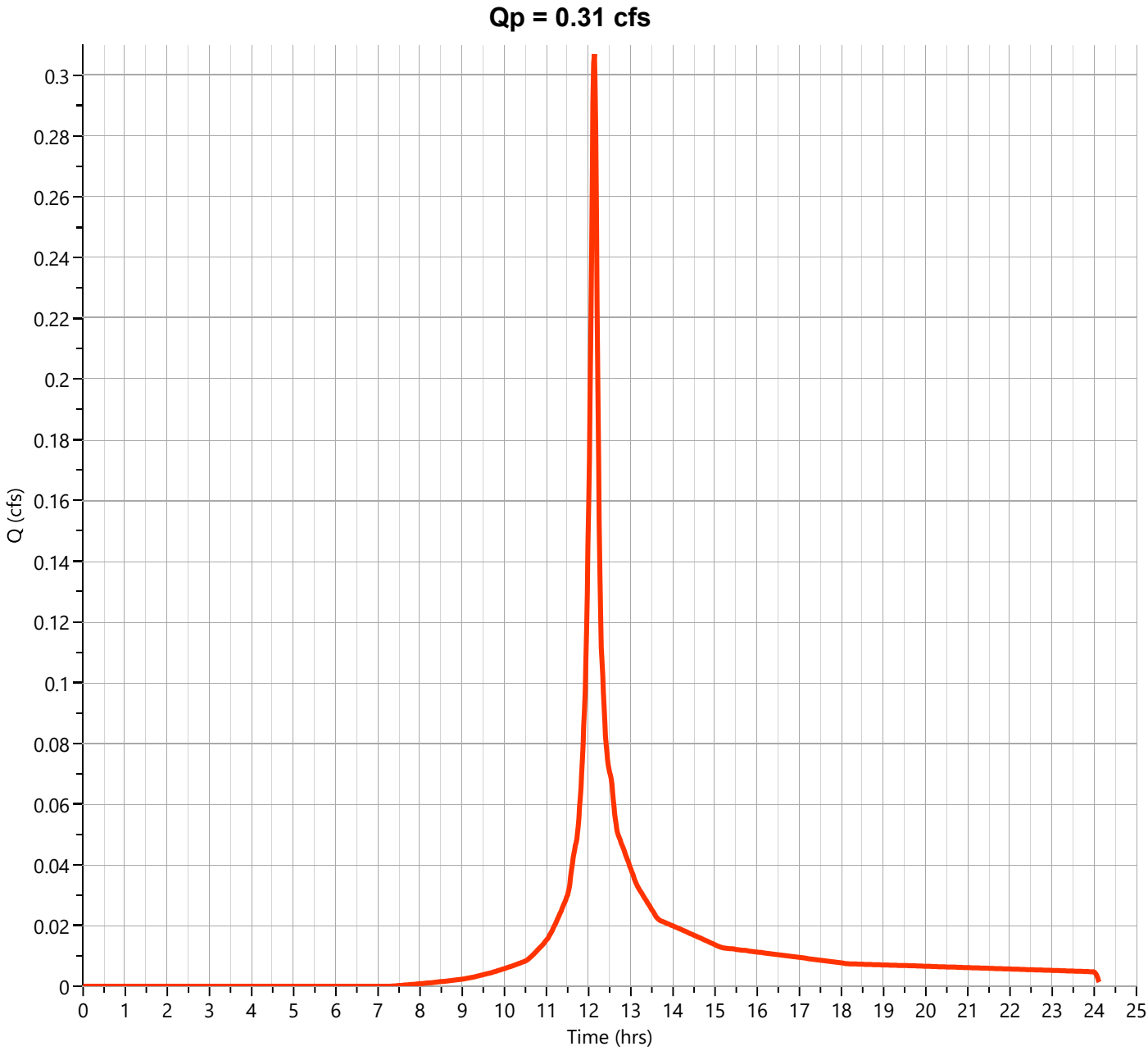
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1B Grass HSGC C

Hyd. No. 4

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.307 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 1,003 cuft
Drainage Area	= 0.08 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 8.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

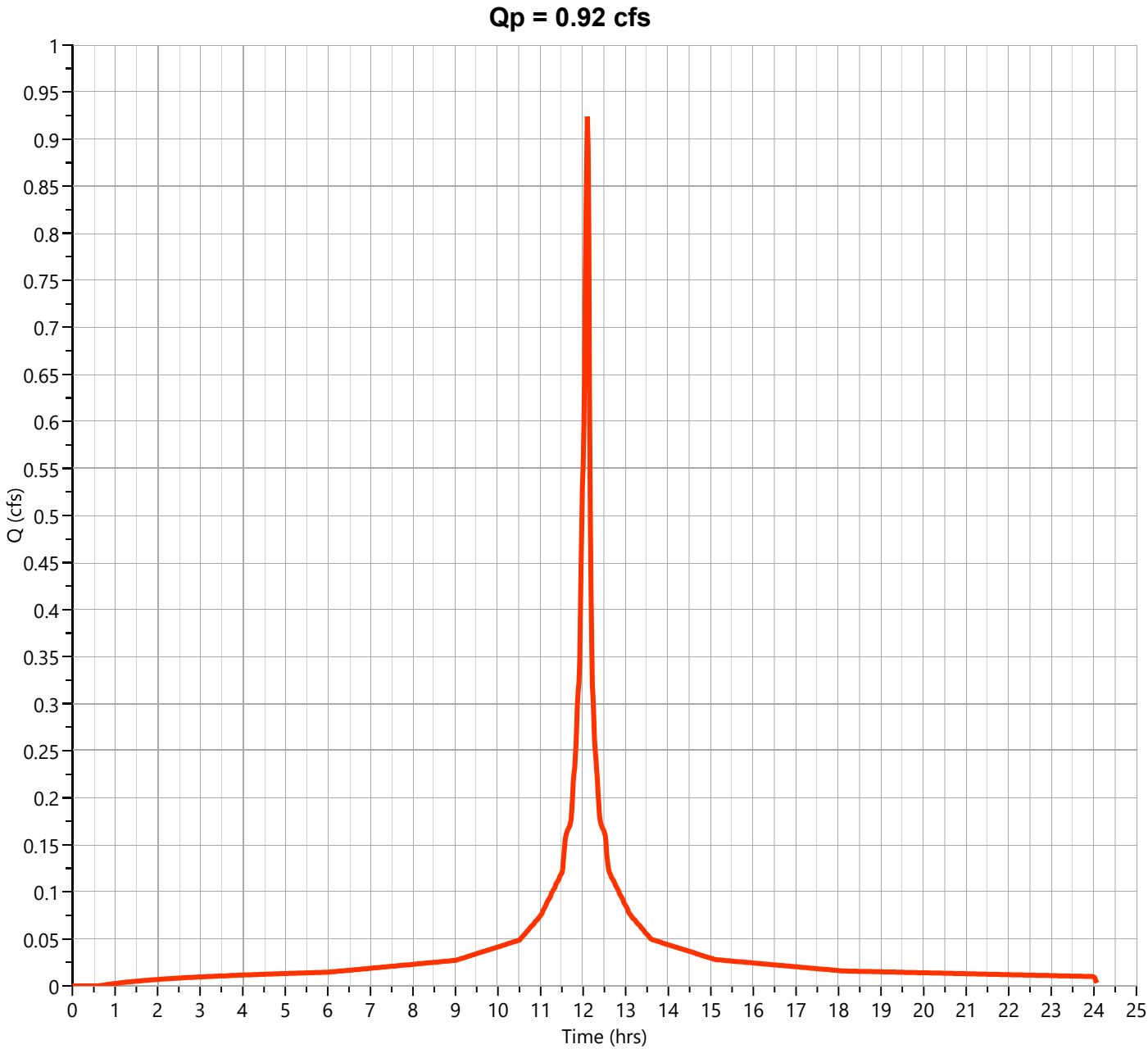
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1B Impervious

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.924 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 3,141 cuft
Drainage Area	= 0.14 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

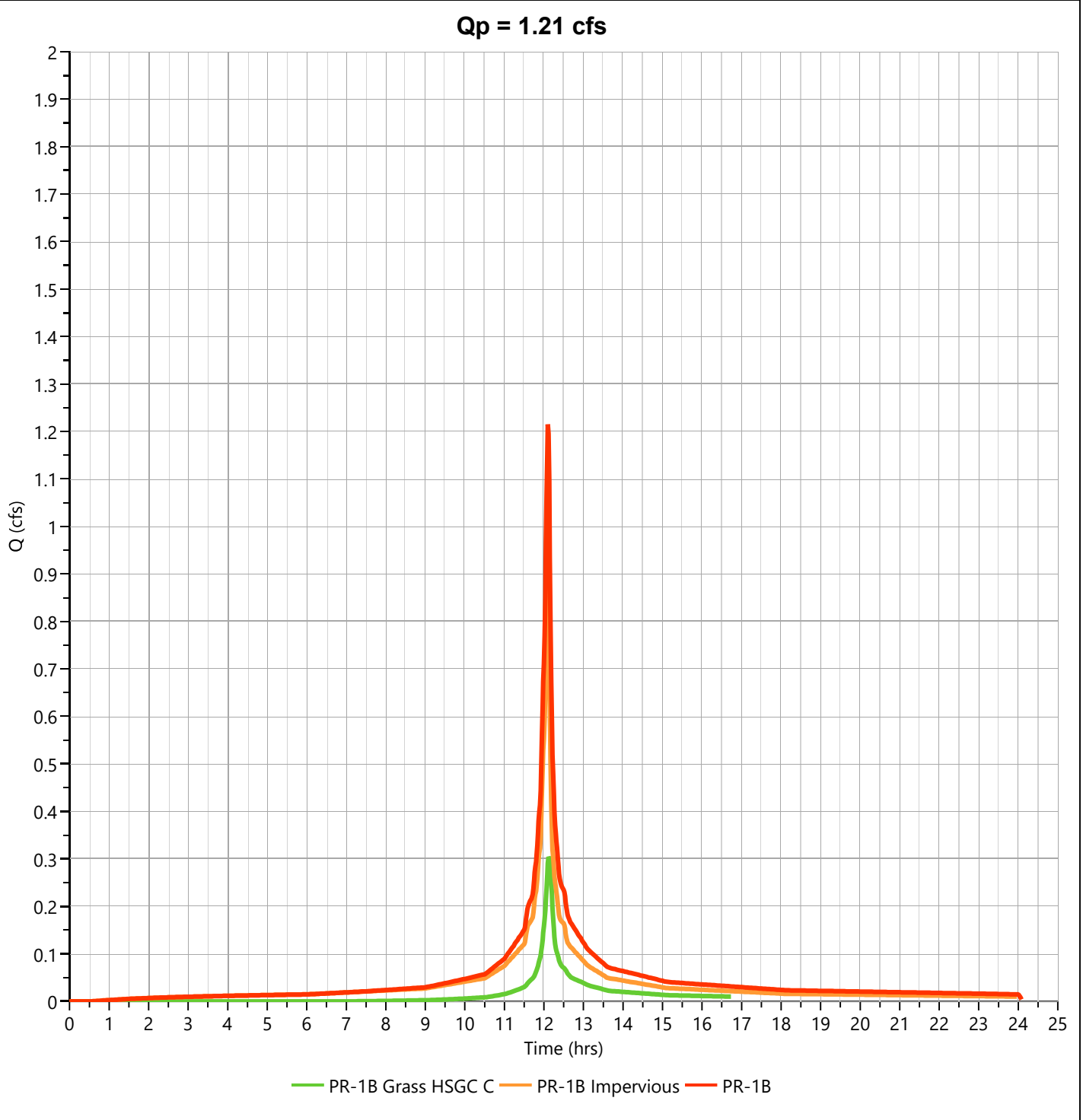
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1B

Hyd. No. 6

Hydrograph Type	= Junction	Peak Flow	= 1.215 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 4,144 cuft
Inflow Hydrographs	= 4, 5	Total Contrib. Area	= 0.22 ac



Hydrograph Report

Project Name:

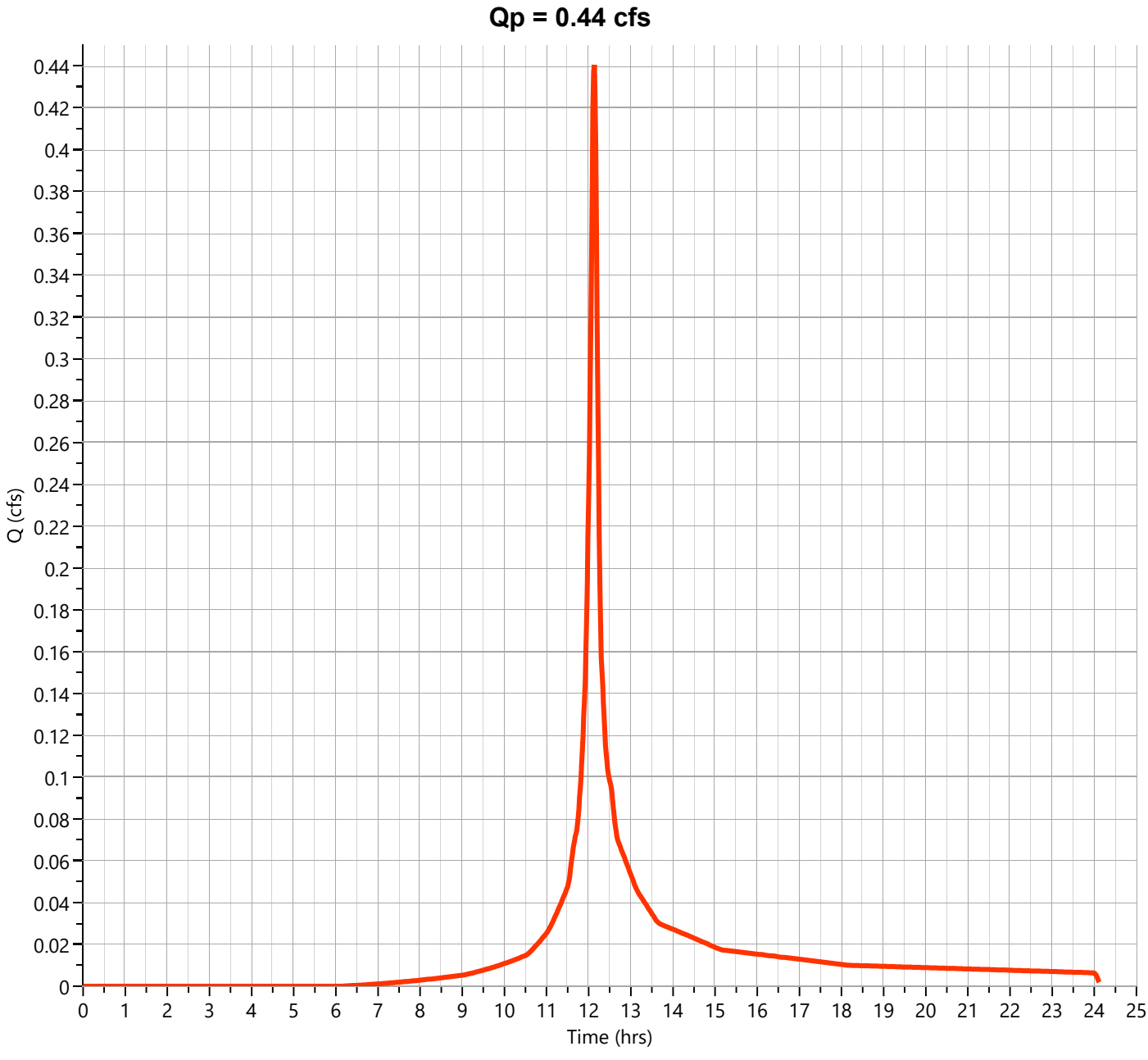
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1B Grass HSGC C

Hyd. No. 4

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.440 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 1,453 cuft
Drainage Area	= 0.08 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 8.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

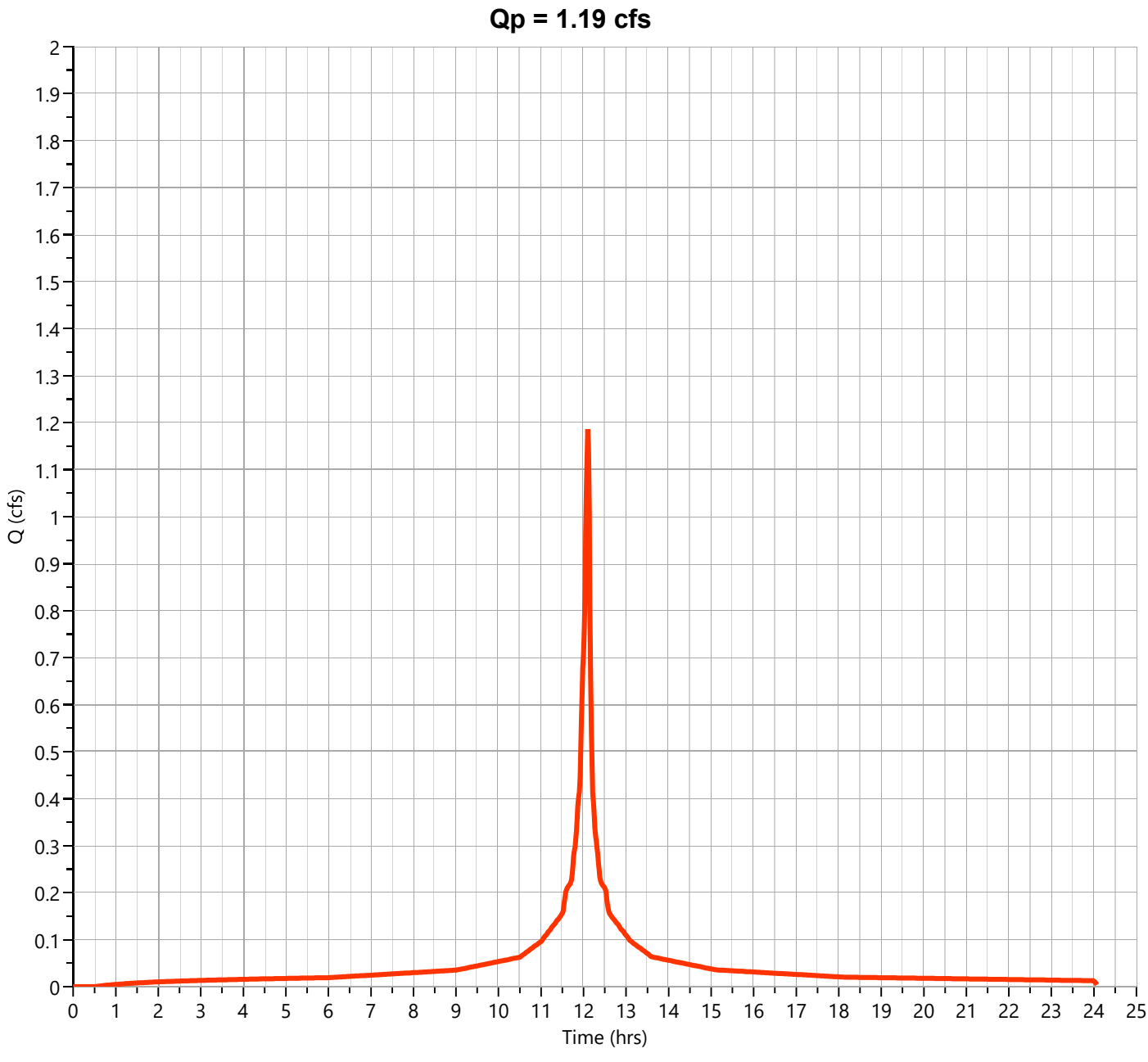
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1B Impervious

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.186 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 4,061 cuft
Drainage Area	= 0.14 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

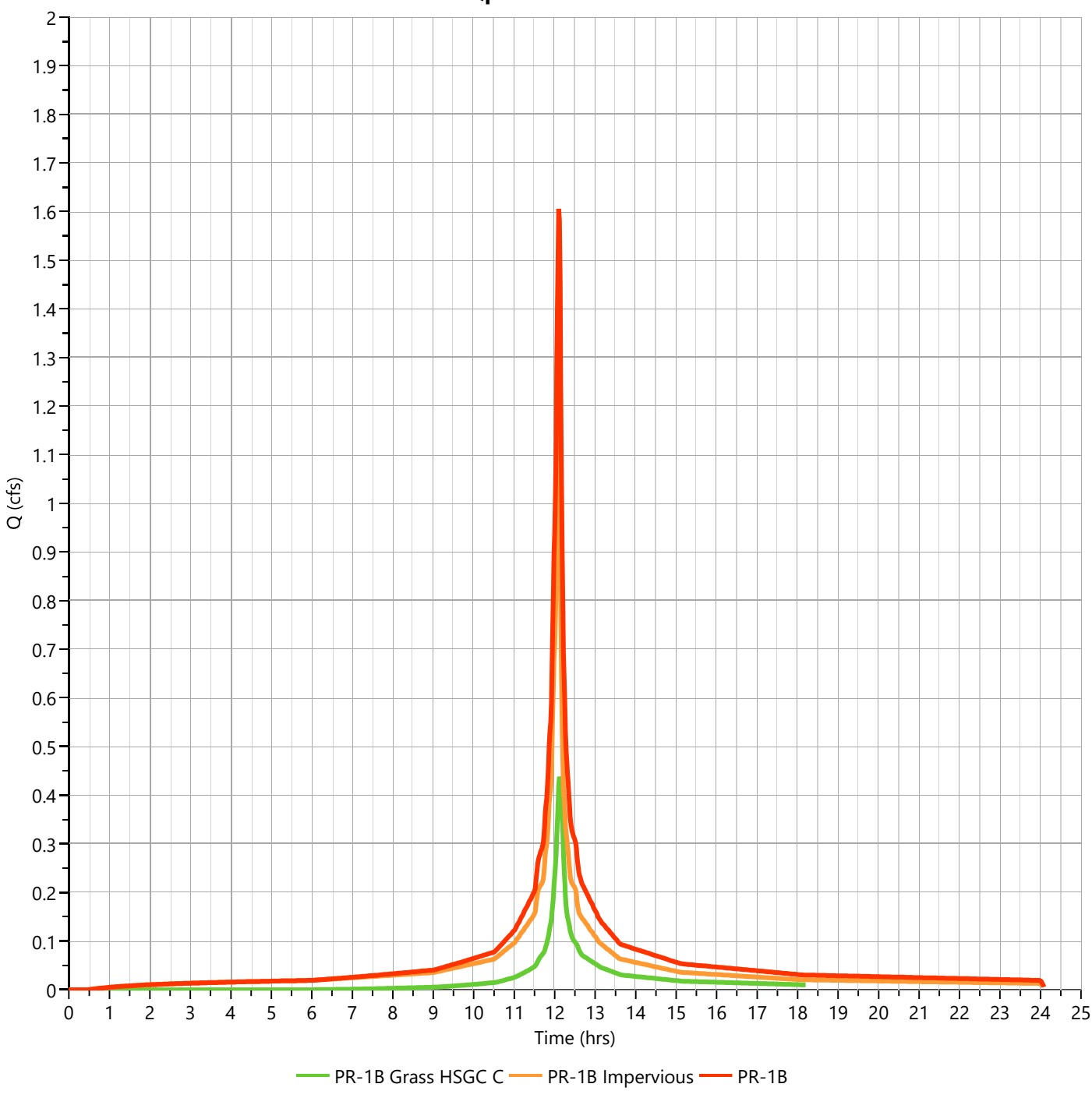
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1B

Hyd. No. 6

Hydrograph Type	= Junction	Peak Flow	= 1.606 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 5,514 cuft
Inflow Hydrographs	= 4, 5	Total Contrib. Area	= 0.22 ac



Hydrograph Report

Project Name:

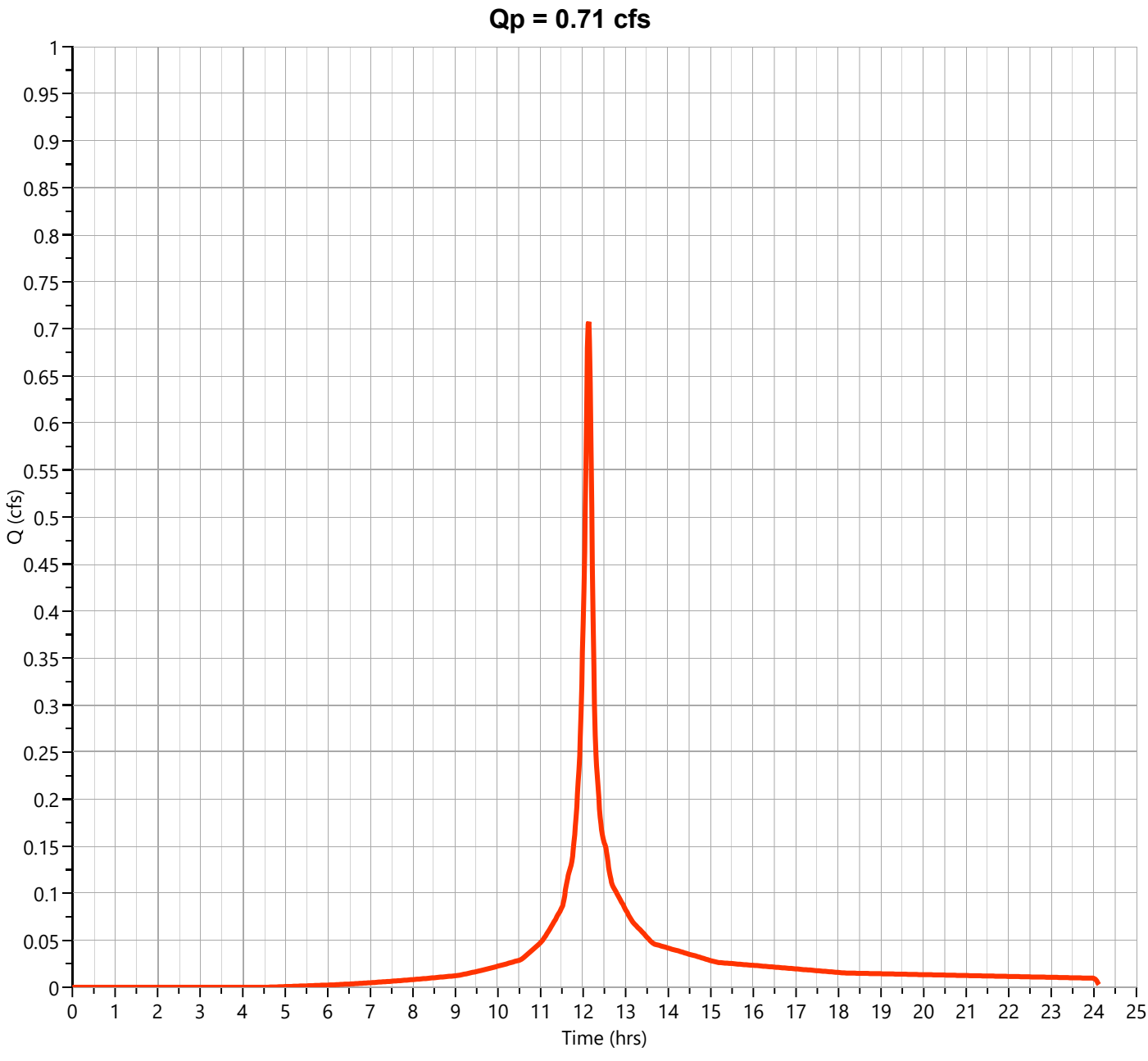
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1B Grass HSGC C

Hyd. No. 4

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.707 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 2,386 cuft
Drainage Area	= 0.08 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 8.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

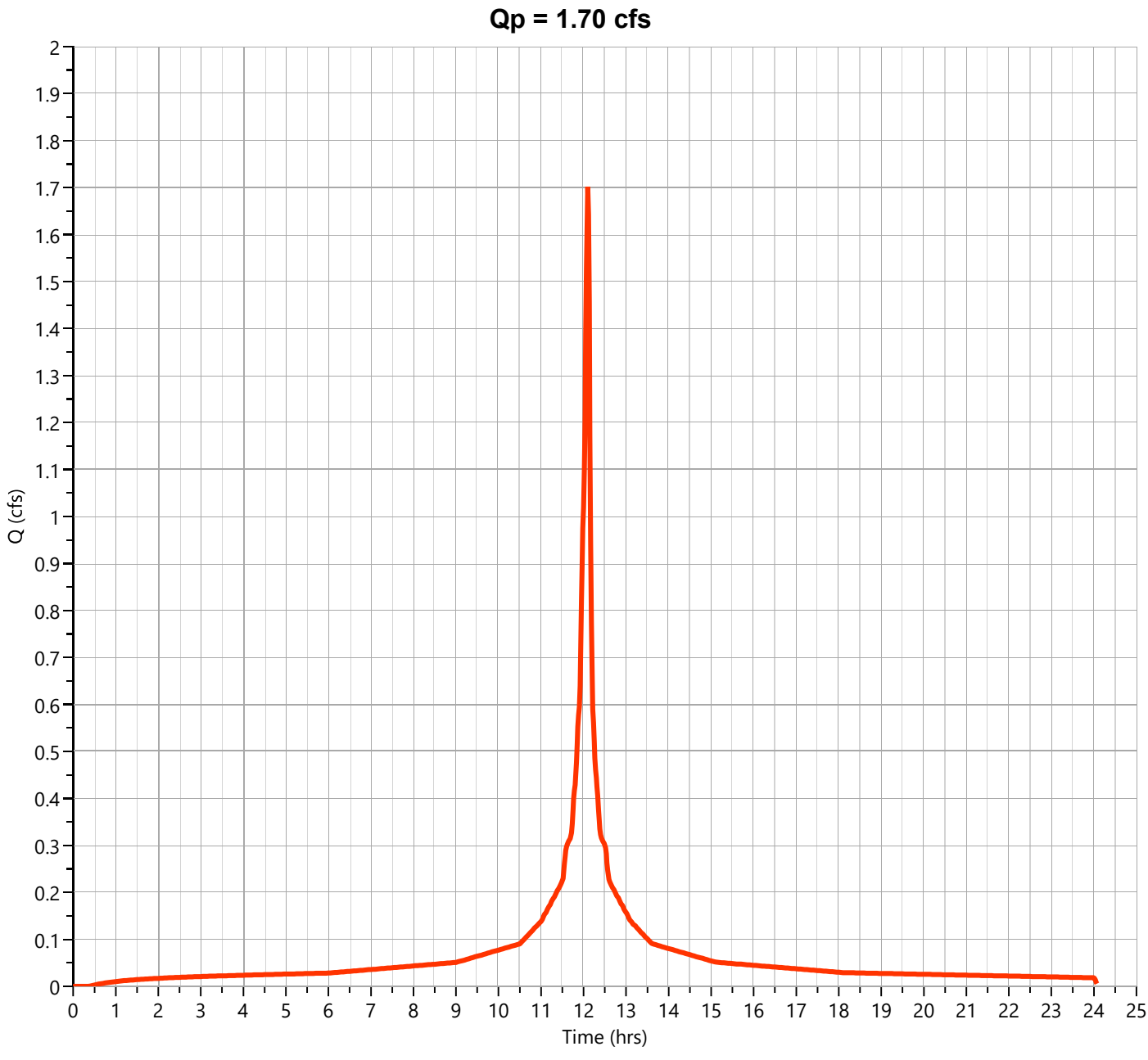
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1B Impervious

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.702 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 5,874 cuft
Drainage Area	= 0.14 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

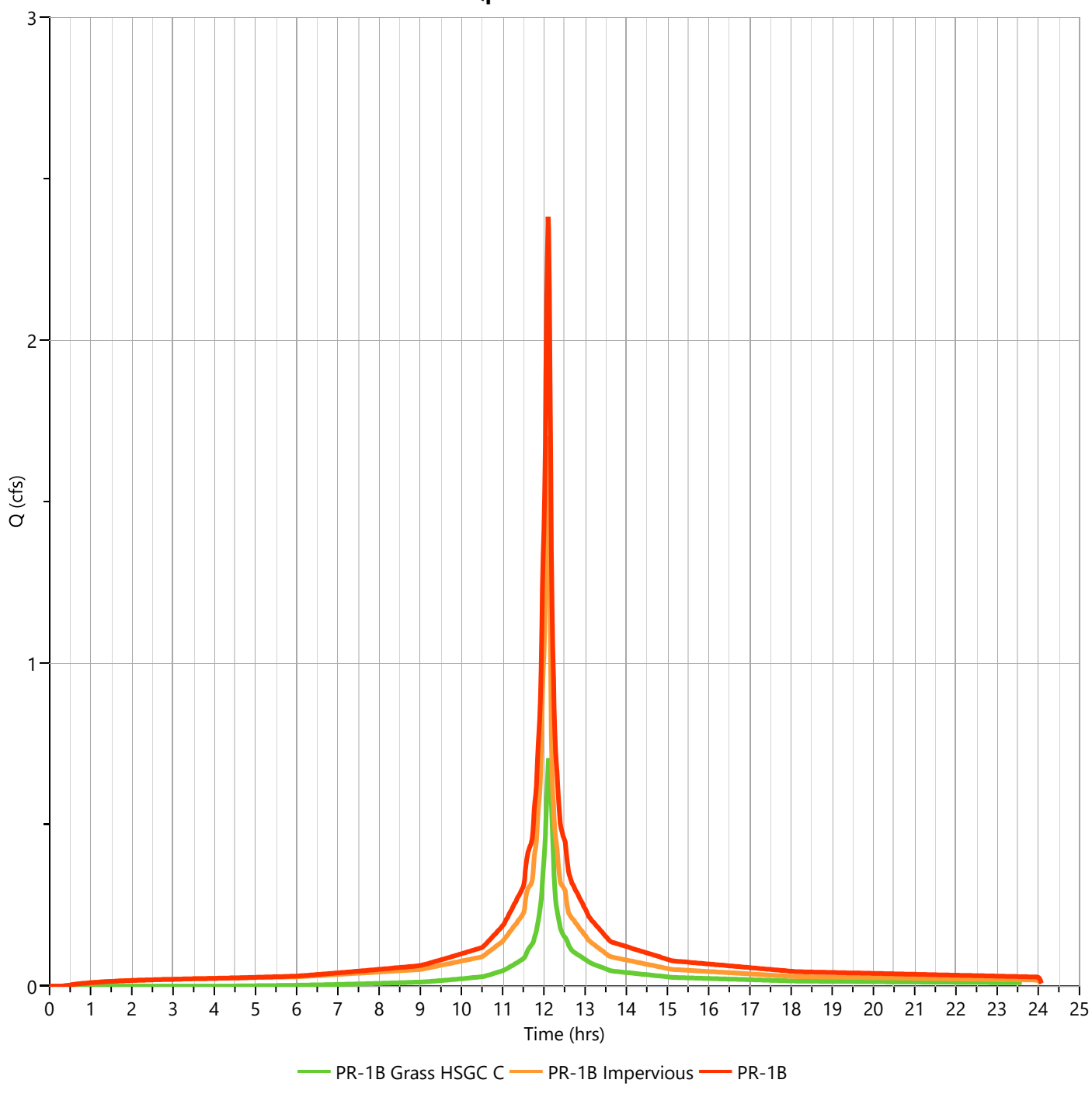
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1B

Hyd. No. 6

Hydrograph Type	= Junction	Peak Flow	= 2.381 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 8,261 cuft
Inflow Hydrographs	= 4, 5	Total Contrib. Area	= 0.22 ac



PR-1C WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: Present **(Developed)** — **Future Proposed Watershed PR-1C - Impervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		2		
1.	Surface Description (NEH table 15-1)		Smooth Surfaces		Dense Grasses		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011		0.24		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	39		17		
4.	Two-year 24-hr rainfall, P_2	in	4.12		4.12		
5.	Land Slope, s	ft/ft	0.021		0.062		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	100		100		
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.008	+	0.032	+	
					Sheet Flow Sub-Total		0.041 hours

Shallow Concentrated Flow		Segment ID					
8.	Surface Description						
9.	Flow Length, L	ft					
10.	Watercourse Slope, s	ft/ft					
11.	Average Velocity, V (NEH table 15-3)	ft/s					
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+		+	
					Shallow Conc. Flow Sub-Total		0.000 hours

Channel Flow		Segment ID					
13.	Flow Length, L	ft					
14.	Cross Sectional flow area, a	ft^2					
15.	Wetted Perimeter, P_w	ft					
16.	Hydraulic Radius, r $r = a / P_w$	ft					
17.	Channel Slope, s	ft/ft					
18.	Manning's Roughness Coeff., n						
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s					
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+		+	
					Channel Flow Sub-Total		0.000 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.041 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	2 minutes

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: Present **(Developed)** — **Future Proposed Watershed PR-1C - Pervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		
1.	Surface Description (NEH table 15-1)		Dense Grasses		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.24		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	27		
4.	Two-year 24-hr rainfall, P_2	in	4.12		
5.	Land Slope, s	ft/ft	0.047		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	91		
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.053	+	+
				Sheet Flow Sub-Total	0.053 hours

Shallow Concentrated Flow		Segment ID			
8.	Surface Description				
9.	Flow Length, L	ft			
10.	Watercourse Slope, s	ft/ft			
11.	Average Velocity, V (NEH table 15-3)	ft/s			
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+	+
				Shallow Conc. Flow Sub-Total	0.000 hours

Channel Flow		Segment ID			
13.	Flow Length, L	ft			
14.	Cross Sectional flow area, a	ft^2			
15.	Wetted Perimeter, P_w	ft			
16.	Hydraulic Radius, r $r = a / P_w$	ft			
17.	Channel Slope, s	ft/ft			
18.	Manning's Roughness Coeff., n				
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s			
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+	+
				Channel Flow Sub-Total	0.000 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.053 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	3 minutes

Hydrograph Report

Project Name:

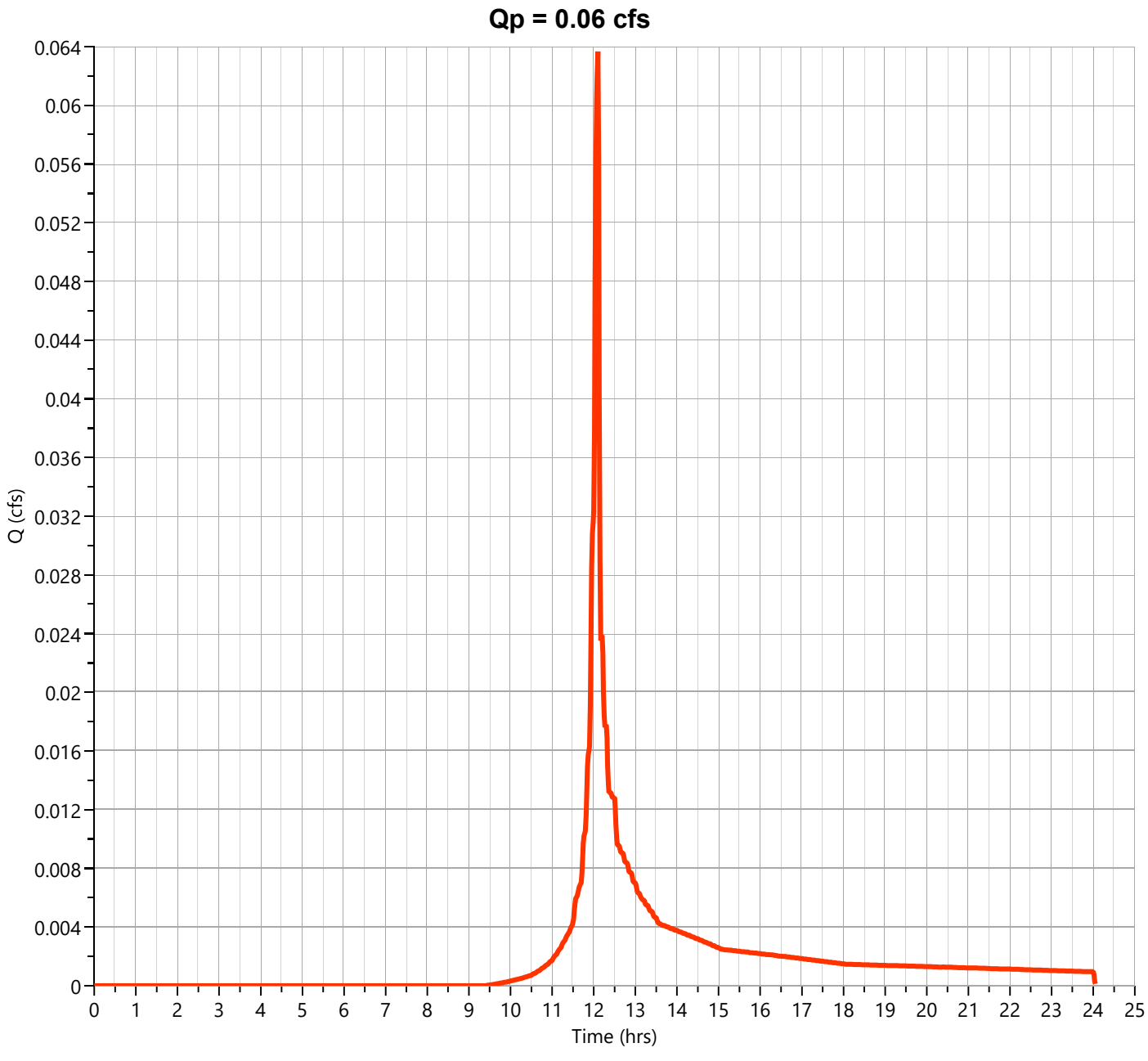
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1C Grass HSGC C

Hyd. No. 8

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.064 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 172 cuft
Drainage Area	= 0.03 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

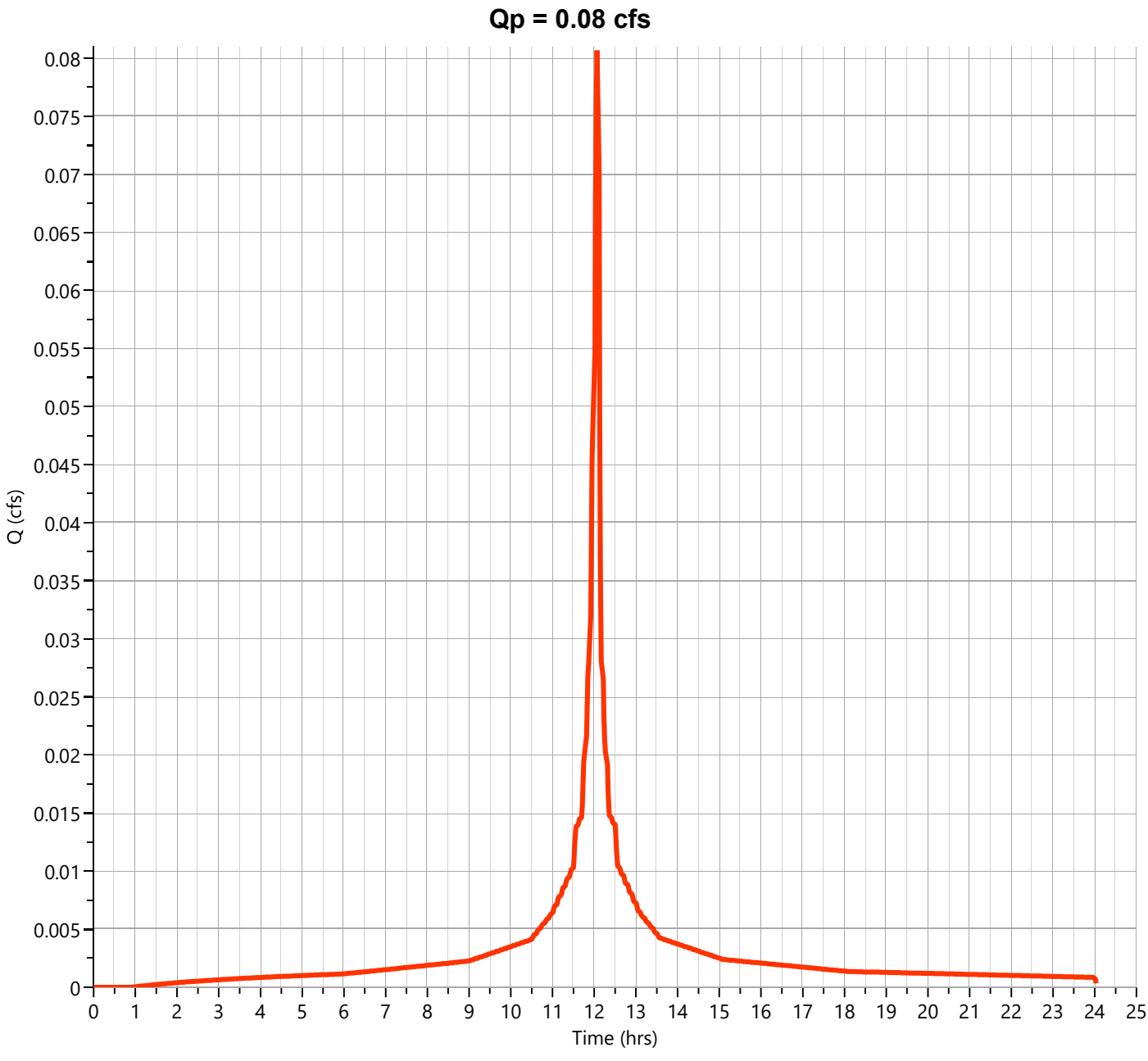
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1C Impervious

Hyd. No. 9

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.081 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 264 cuft
Drainage Area	= 0.02 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

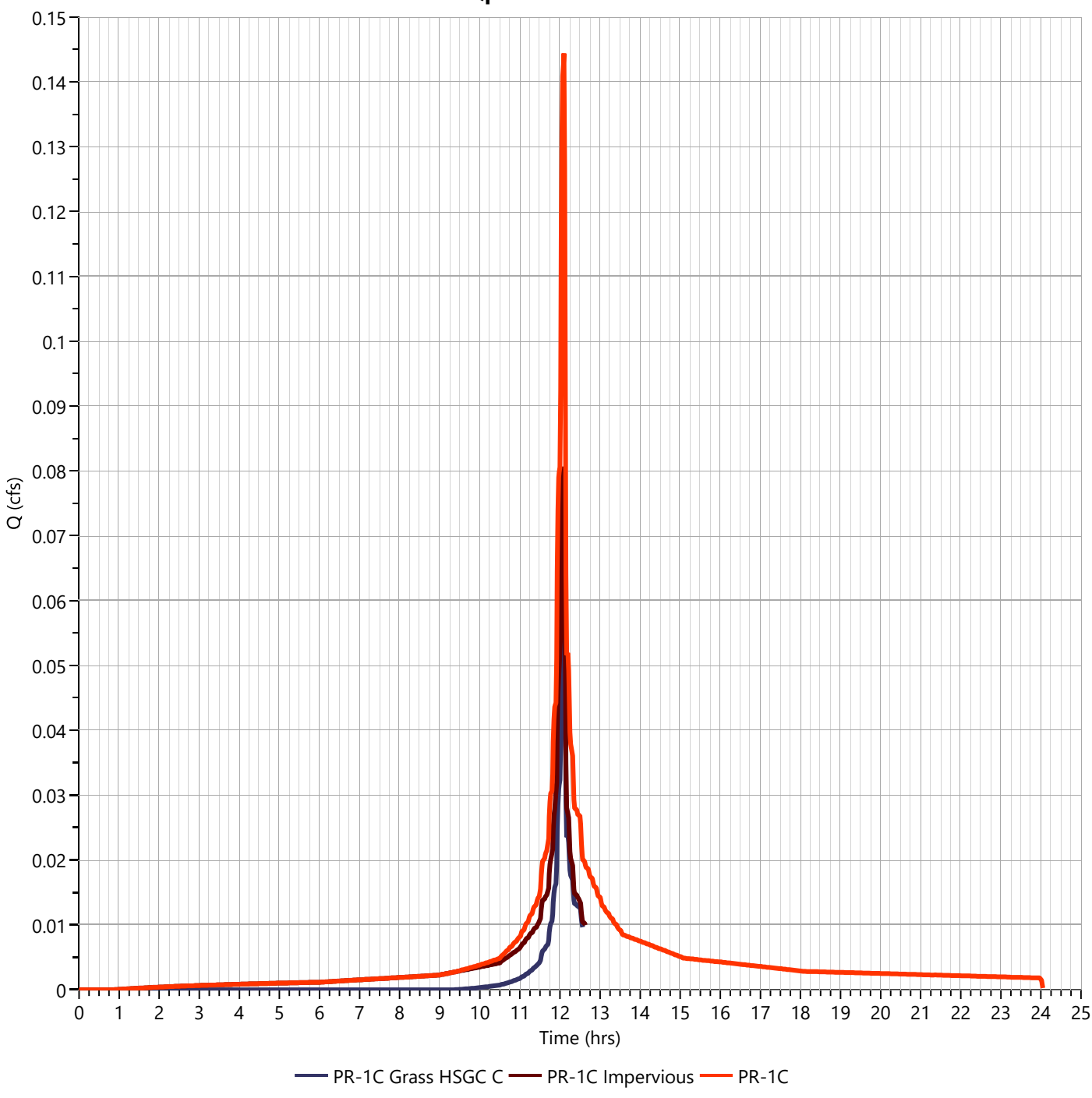
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1C

Hyd. No. 10

Hydrograph Type	= Junction	Peak Flow	= 0.144 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 436 cuft
Inflow Hydrographs	= 8, 9	Total Contrib. Area	= 0.05 ac



Hydrograph Report

Project Name:

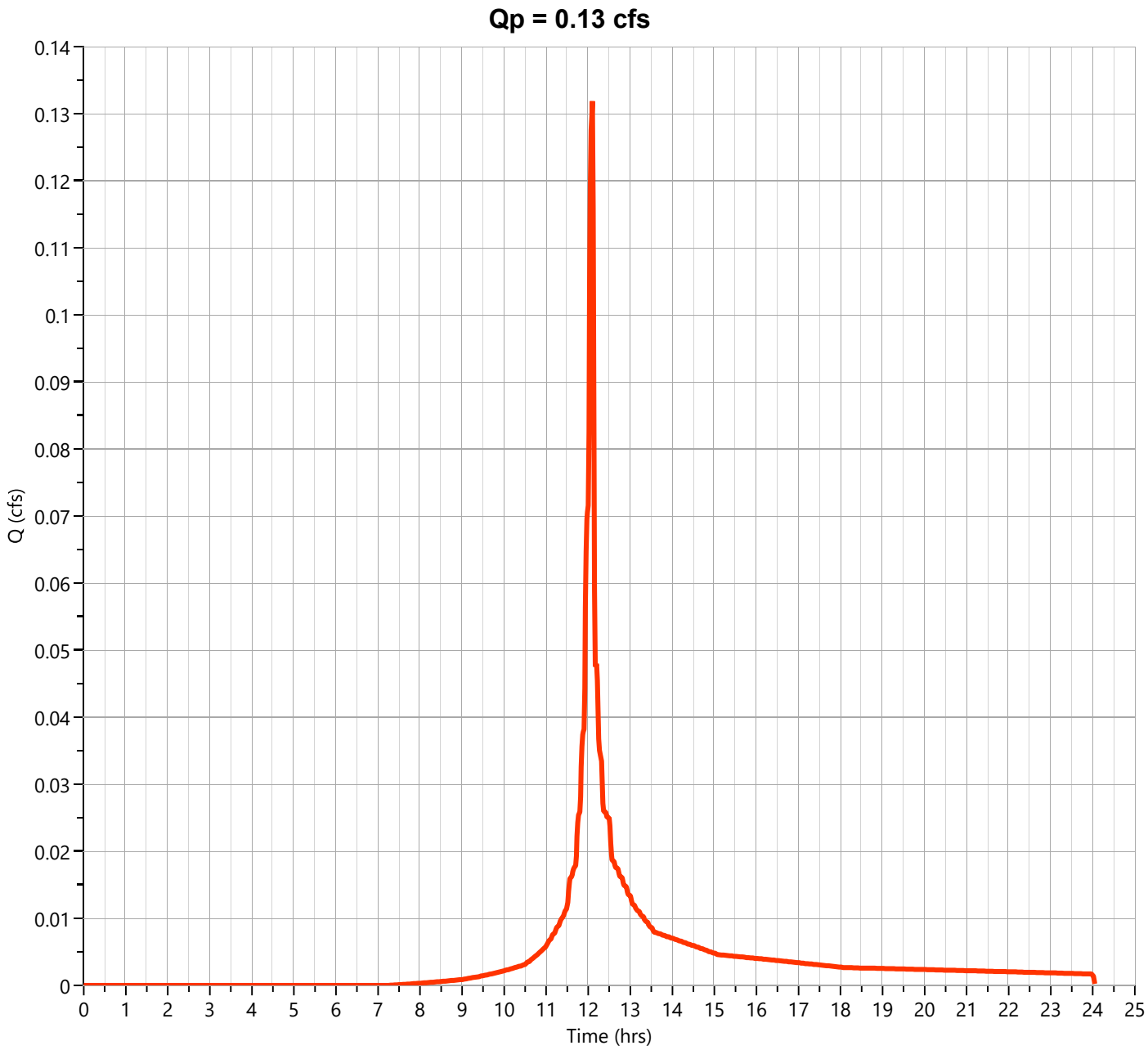
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1C Grass HSGC C

Hyd. No. 8

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.132 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 362 cuft
Drainage Area	= 0.03 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

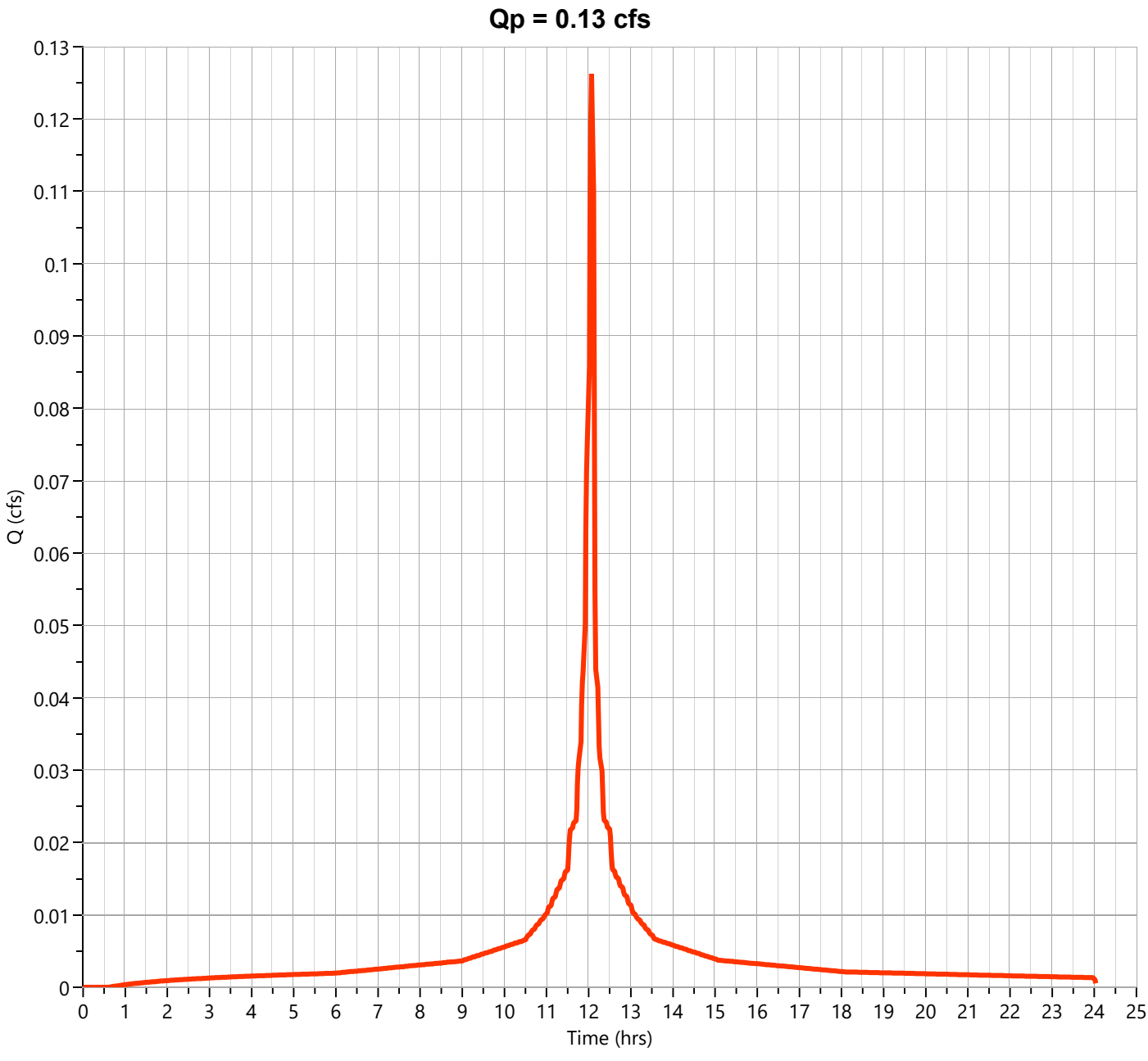
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1C Impervious

Hyd. No. 9

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.126 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 421 cuft
Drainage Area	= 0.02 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

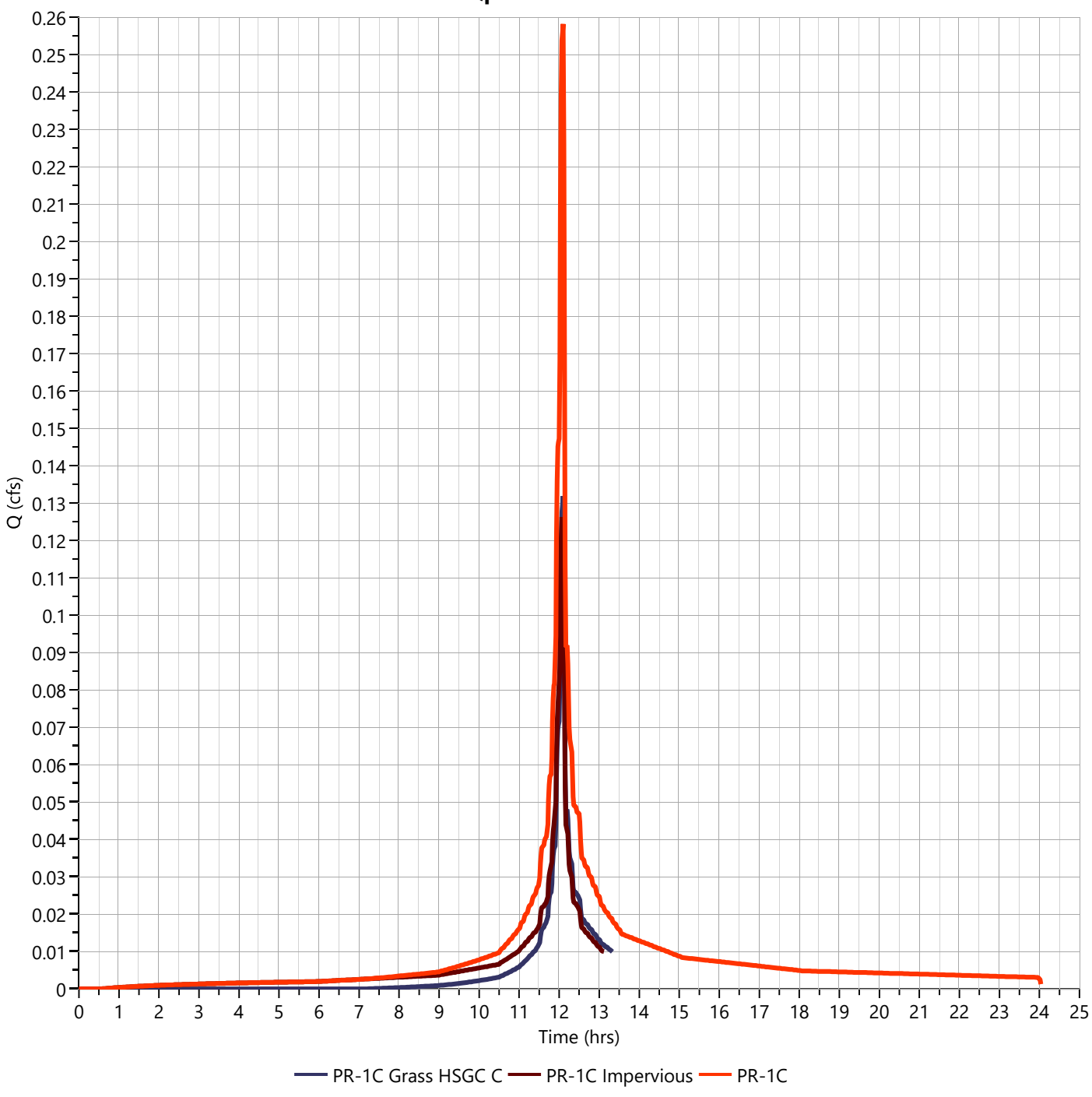
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1C

Hyd. No. 10

Hydrograph Type	= Junction	Peak Flow	= 0.258 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 782 cuft
Inflow Hydrographs	= 8, 9	Total Contrib. Area	= 0.05 ac



Hydrograph Report

Project Name:

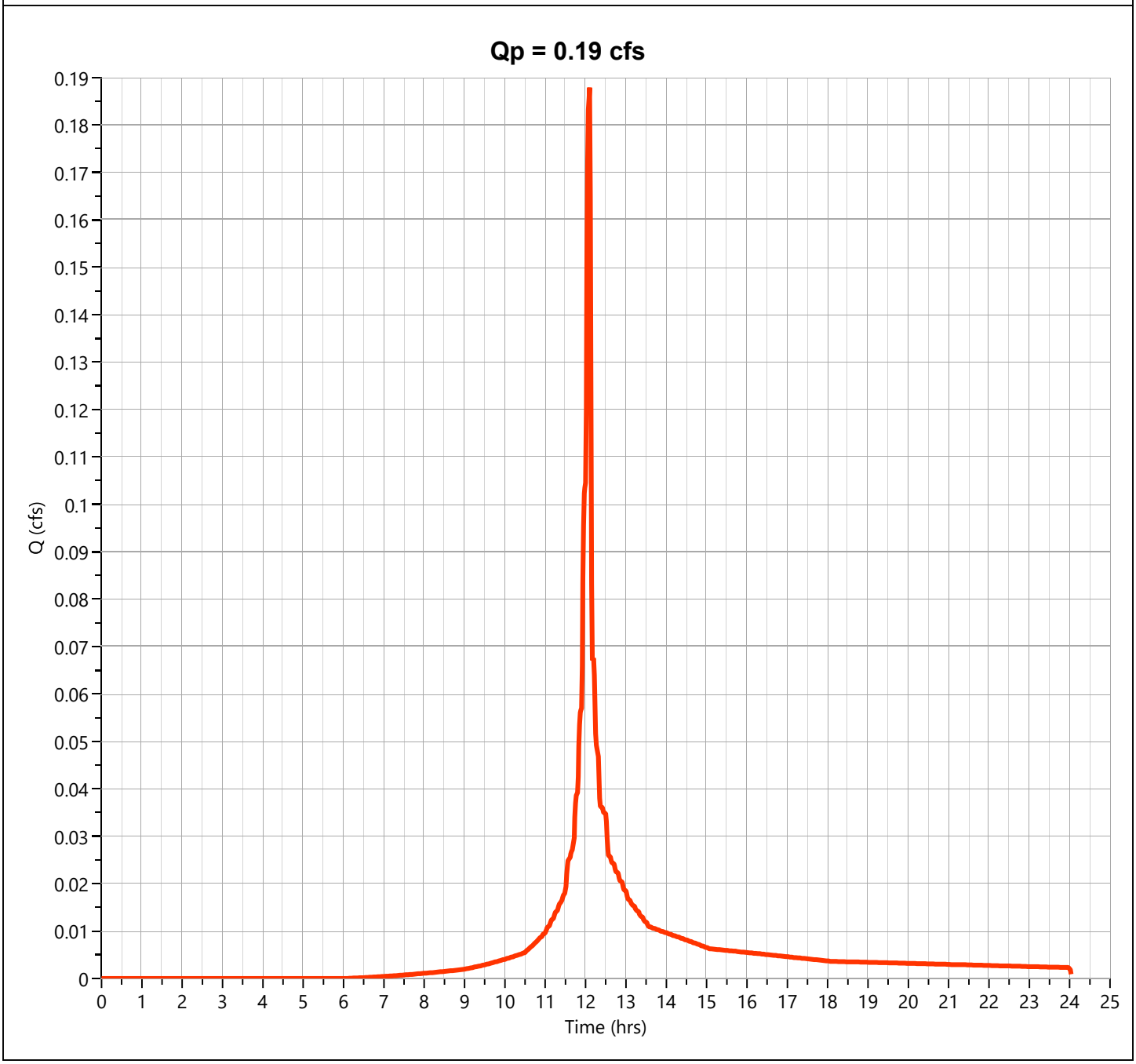
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1C Grass HSGC C

Hyd. No. 8

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.188 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 524 cuft
Drainage Area	= 0.03 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

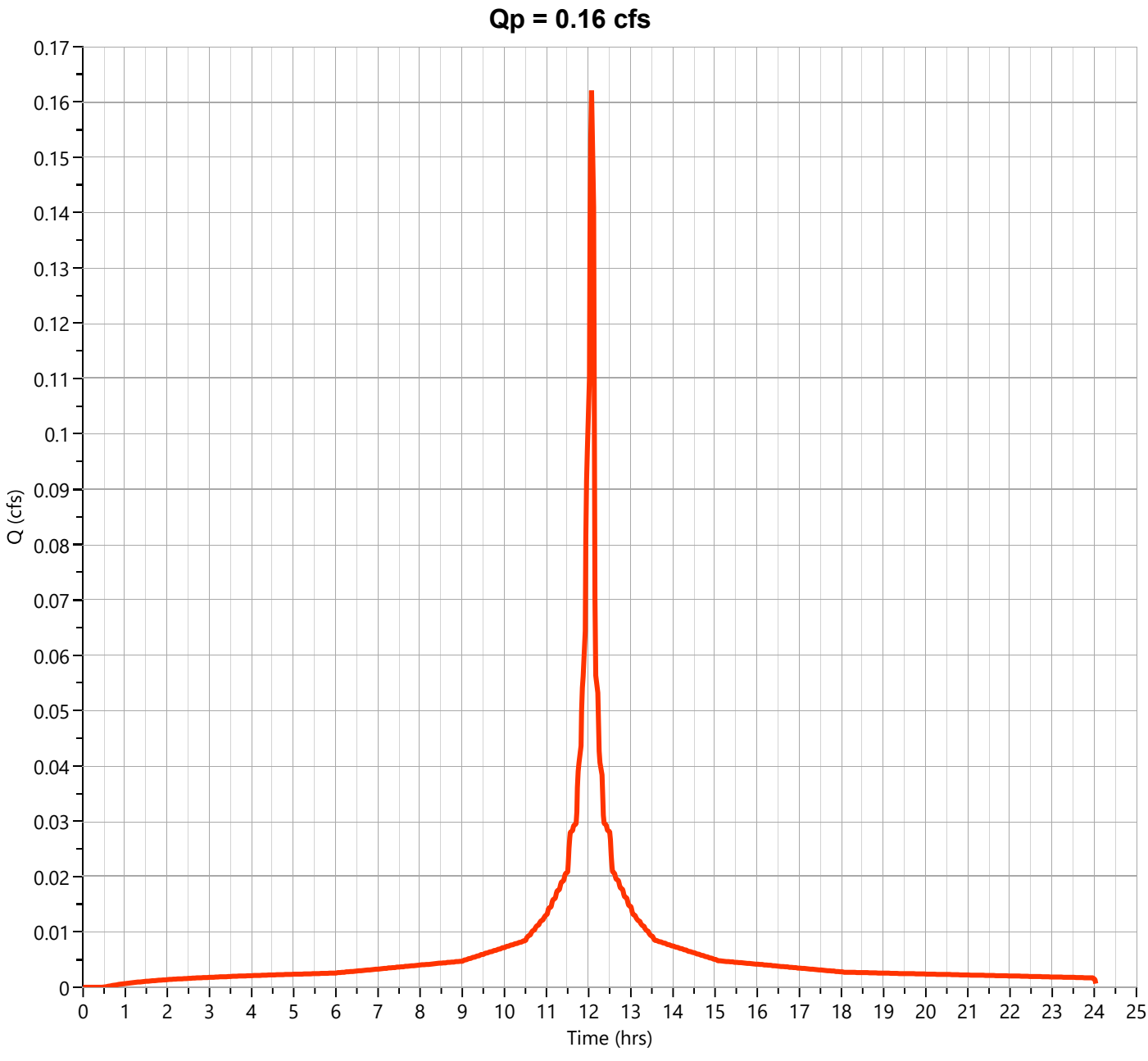
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1C Impervious

Hyd. No. 9

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.162 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 544 cuft
Drainage Area	= 0.02 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

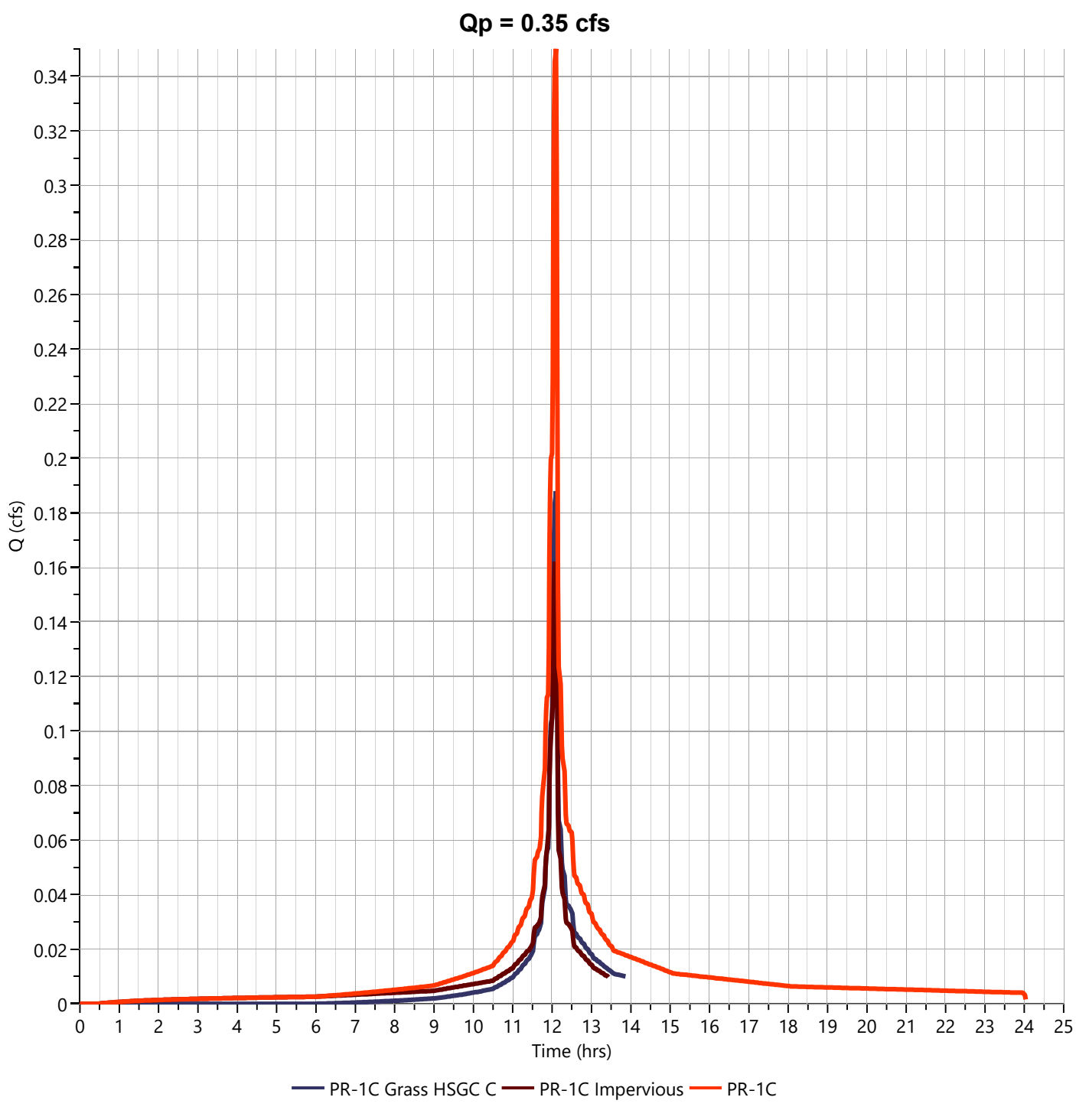
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1C

Hyd. No. 10

Hydrograph Type	= Junction	Peak Flow	= 0.350 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,068 cuft
Inflow Hydrographs	= 8, 9	Total Contrib. Area	= 0.05 ac



Hydrograph Report

Project Name:

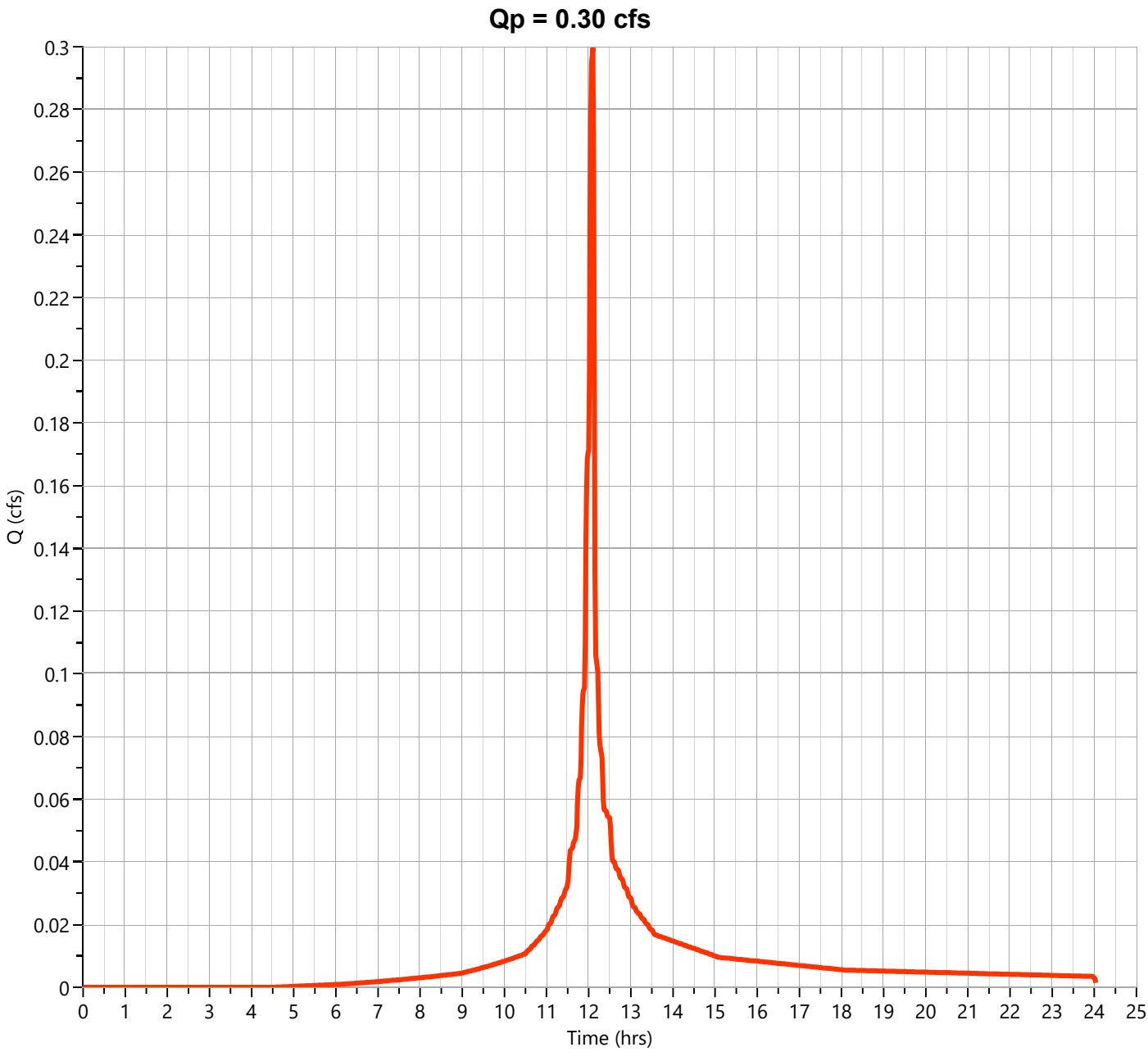
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1C Grass HSGC C

Hyd. No. 8

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.300 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 861 cuft
Drainage Area	= 0.03 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

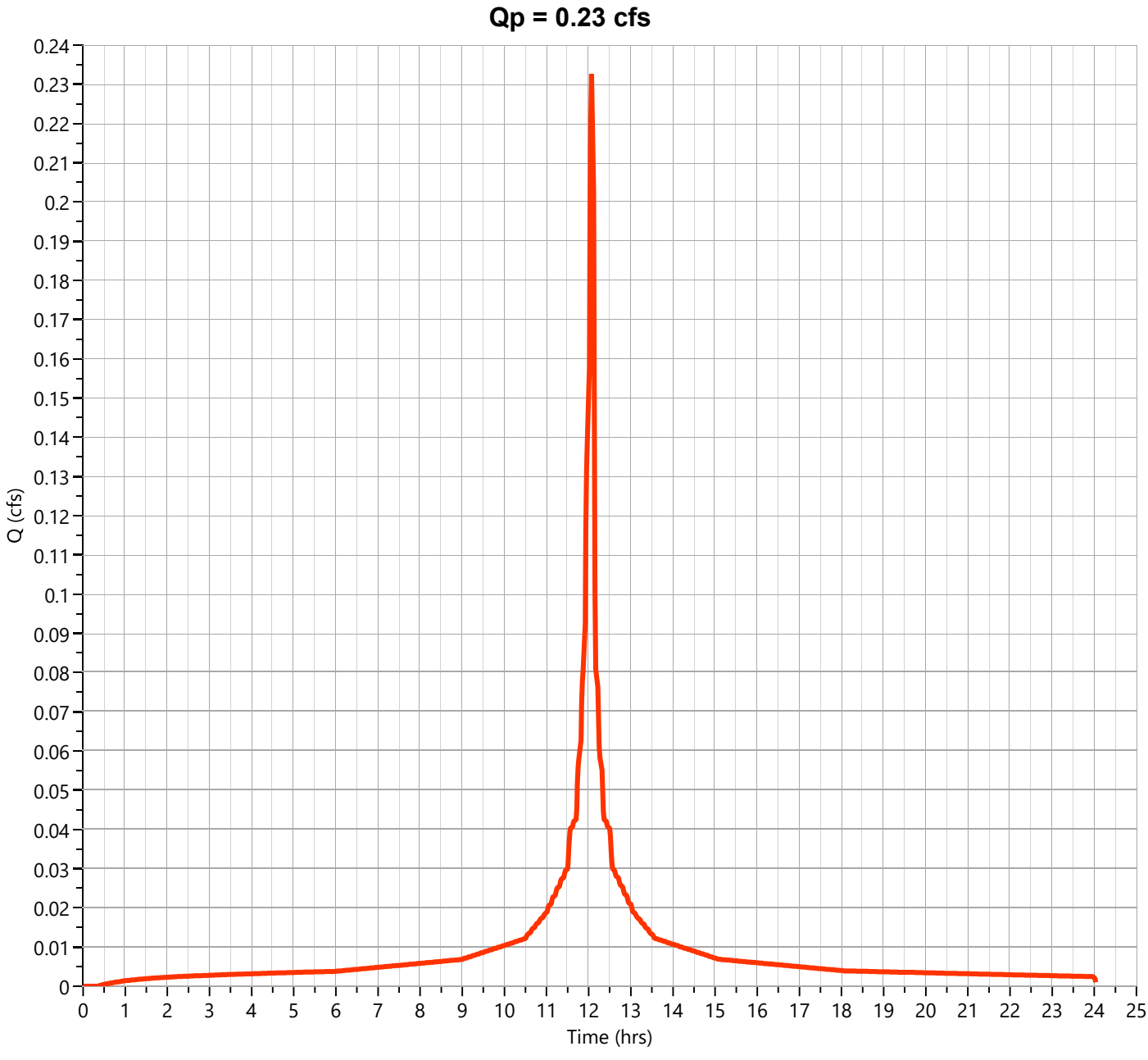
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1C Impervious

Hyd. No. 9

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.233 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 787 cuft
Drainage Area	= 0.02 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

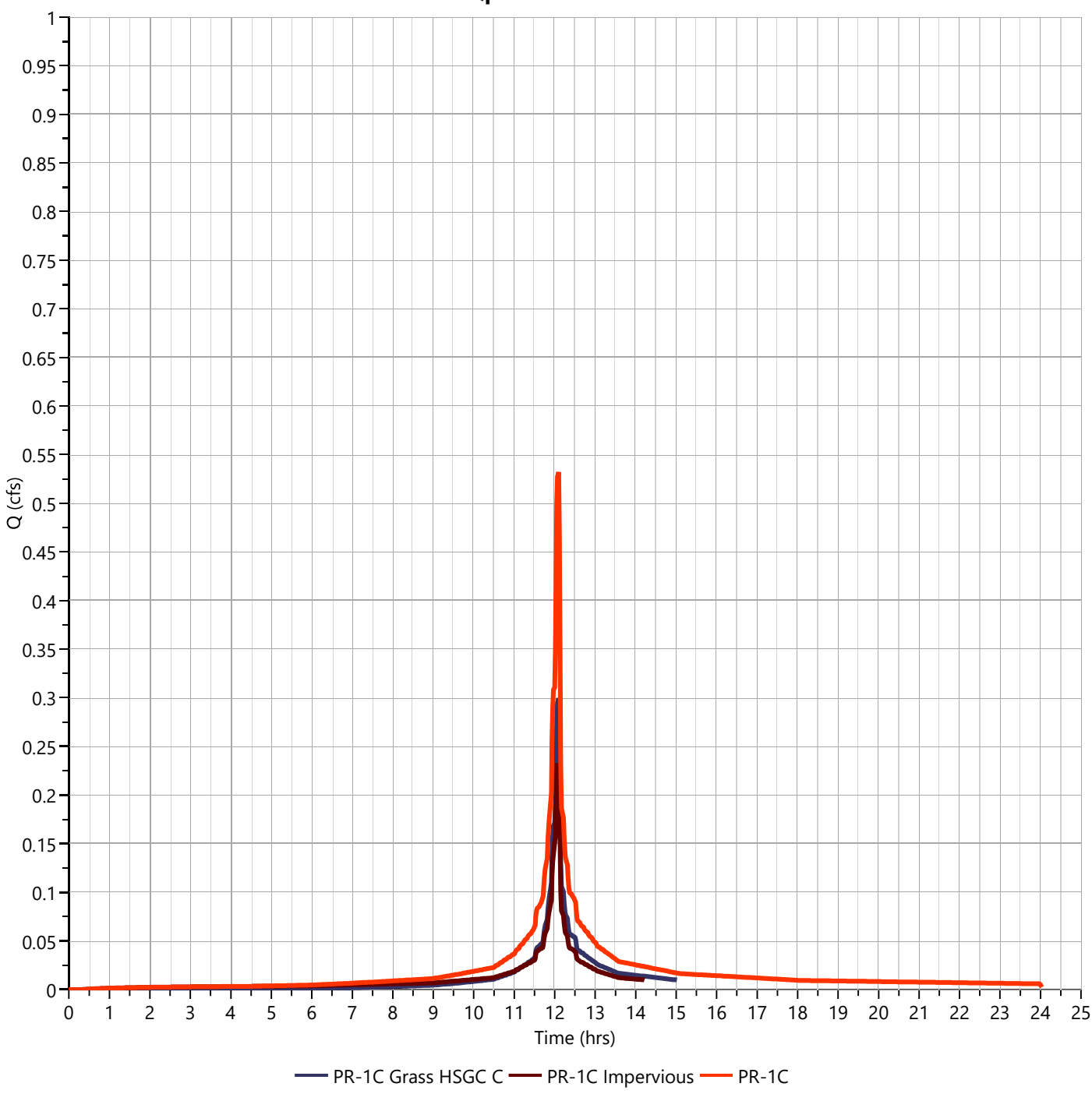
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1C

Hyd. No. 10

Hydrograph Type	= Junction	Peak Flow	= 0.532 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,647 cuft
Inflow Hydrographs	= 8, 9	Total Contrib. Area	= 0.05 ac



PR-1D WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/6/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/6/2024**

Circle One: Present (**Developed**) **Future Proposed Watershed PR-1D - Impervious**

Circle One: (**T_c**) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		
1.	Surface Description (NEH table 15-1)		Smooth Surfaces		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	88		
4.	Two-year 24-hr rainfall, P_2	in	4.12		
5.	Land Slope, s	ft/ft	0.026		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	100		
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} S^{0.4}}$	hr	0.015	+	+
			Sheet Flow Sub-Total		0.015 hours

Shallow Concentrated Flow		Segment ID	2		
8.	Surface Description		Pavement		
9.	Flow Length, L	ft	68		
10.	Watercourse Slope, s	ft/ft	0.064		
11.	Average Velocity, V (NEH table 15-3)	ft/s	5.15		
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.004	+	+
			Shallow Conc. Flow Sub-Total		0.004 hours

Channel Flow		Segment ID	3		
13.	Flow Length, L	ft	22		
14.	Cross Sectional flow area, a	ft^2	0.88		
15.	Wetted Perimeter, P_w	ft	2.40		
16.	Hydraulic Radius, r $r = a / P_w$	ft	0.37		
17.	Channel Slope, s	ft/ft	0.005		
18.	Manning's Roughness Coeff., n		0.012		
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	4.50		
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.001	+	+
			Channel Flow Sub-Total		0.001 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.020 hours
(Add Sub-Total T_t from prior steps)	Software Limitations Require Minimum Tc =	2 minutes

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/6/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/6/2024**

Circle One: Present **(Developed)** — **Future Proposed Watershed PR-1D - Pervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

			Segment ID	1		2		
1.	Surface Description (NEH table 15-1)			Dense Grasses		Smooth Surfaces		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.24		0.011		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)		ft	33		55		
4.	Two-year 24-hr rainfall, P_2		in	4.12		4.12		
5.	Land Slope, s		ft/ft	0.032		0.043		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft)	$L_{mcs} = (100\ s^{0.5})/n$	ft	74		100		
7.	Compute T_t	$T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.073	+	0.008	+	

Sheet Flow Sub-Total **0.081 hours**

Shallow Concentrated Flow

			Segment ID	3		4		5
8.	Surface Description			Pavement		Pavement		Pavement
9.	Flow Length, L		ft	17		30		10
10.	Watercourse Slope, s		ft/ft	0.058		0.083		0.040
11.	Average Velocity, V (NEH table 15-3)		ft/s	4.91		5.87		4.07
12.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.001	+	0.001	+	0.001

Shallow Conc. Flow Sub-Total **0.003 hours**

Channel Flow

			Segment ID	6				
13.	Flow Length, L		ft	22				
14.	Cross Sectional flow area, a		ft^2	0.88				
15.	Wetted Perimeter, P_w		ft	2.40				
16.	Hydraulic Radius, r	$r = a / P_w$	ft	0.37				
17.	Channel Slope, s		ft/ft	0.005				
18.	Manning's Roughness Coeff., n			0.012				
19.	Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	4.50				
20.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.001	+		+	

Channel Flow Sub-Total **0.001 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) = **0.085 hours**

Total Tc (minutes) = **5 minutes**

Hydrograph Report

Project Name:

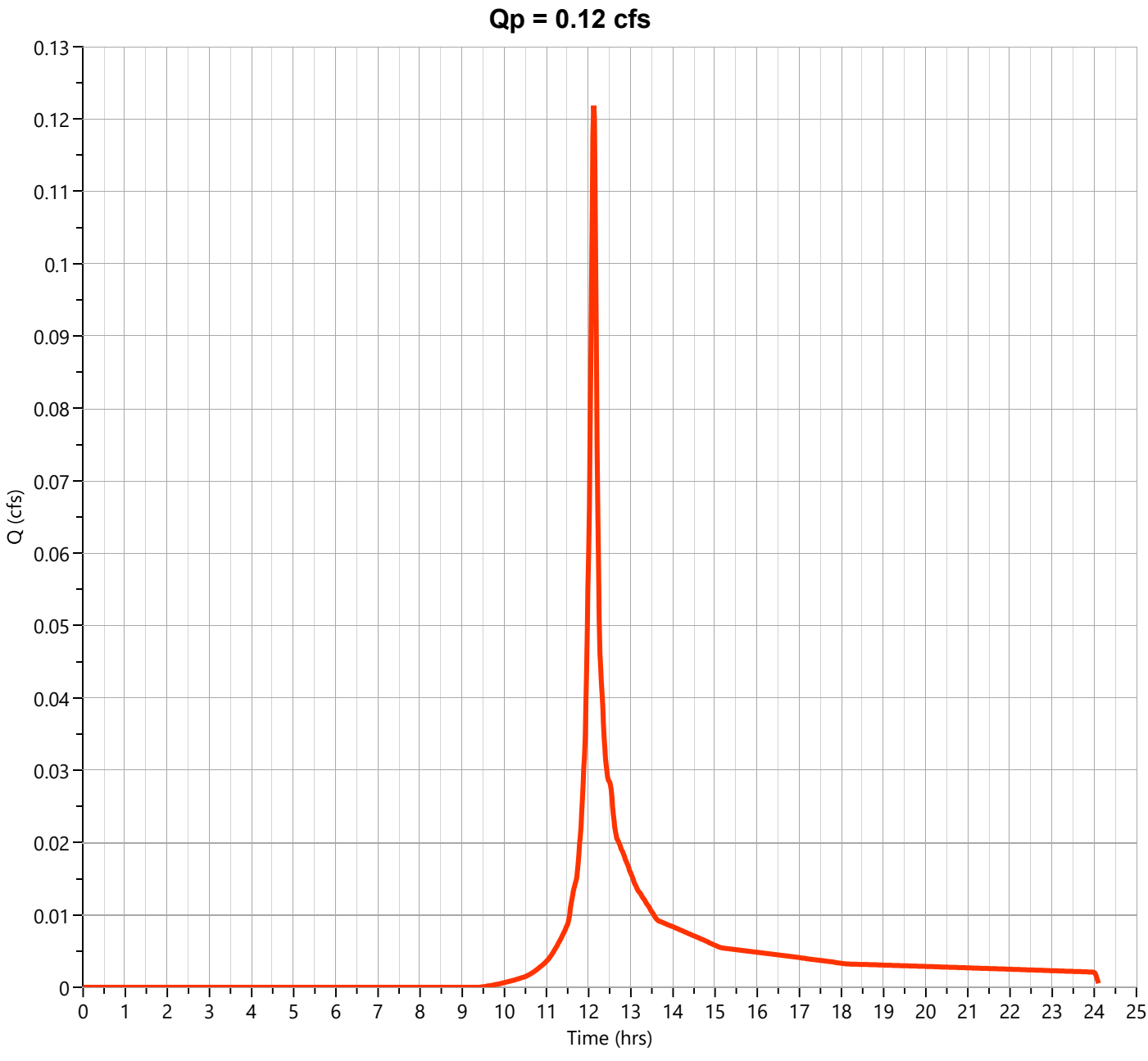
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D Grass HSGC C

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.122 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 378 cuft
Drainage Area	= 0.06 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

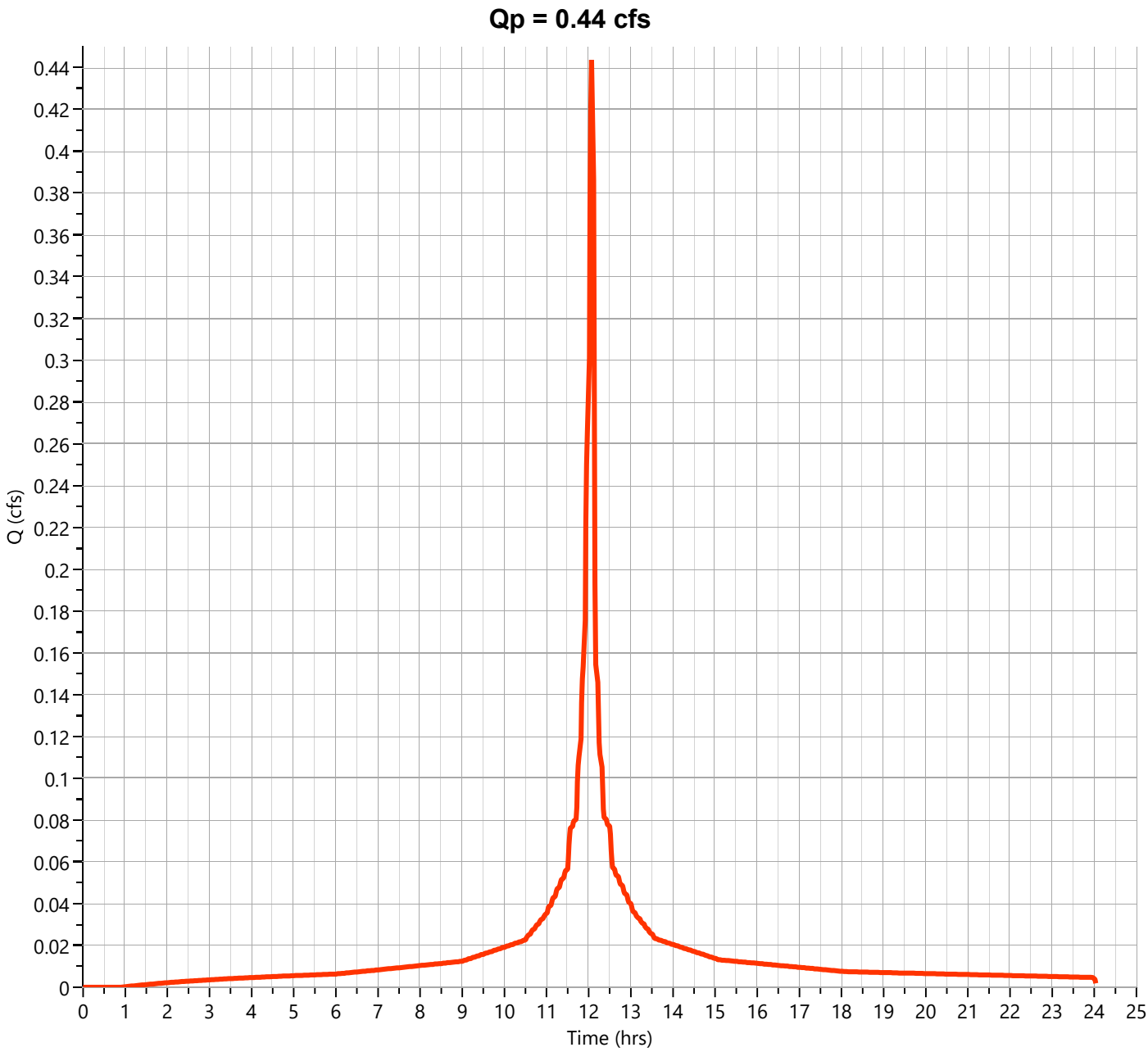
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D Impervious

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.444 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,454 cuft
Drainage Area	= 0.11 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

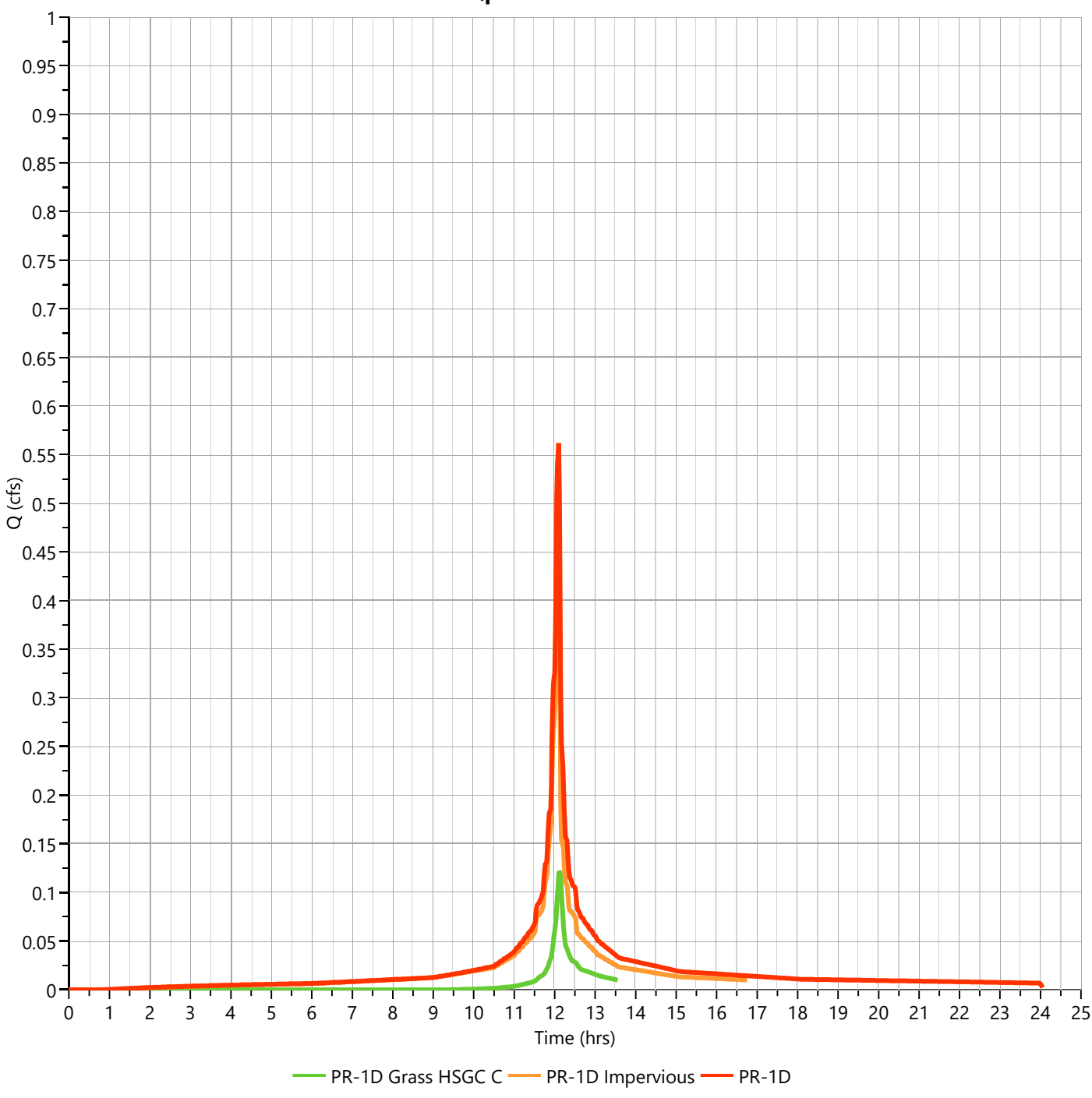
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D

Hyd. No. 16

Hydrograph Type	= Junction	Peak Flow	= 0.562 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,833 cuft
Inflow Hydrographs	= 14, 15	Total Contrib. Area	= 0.17 ac



Hydrograph Report

Project Name:

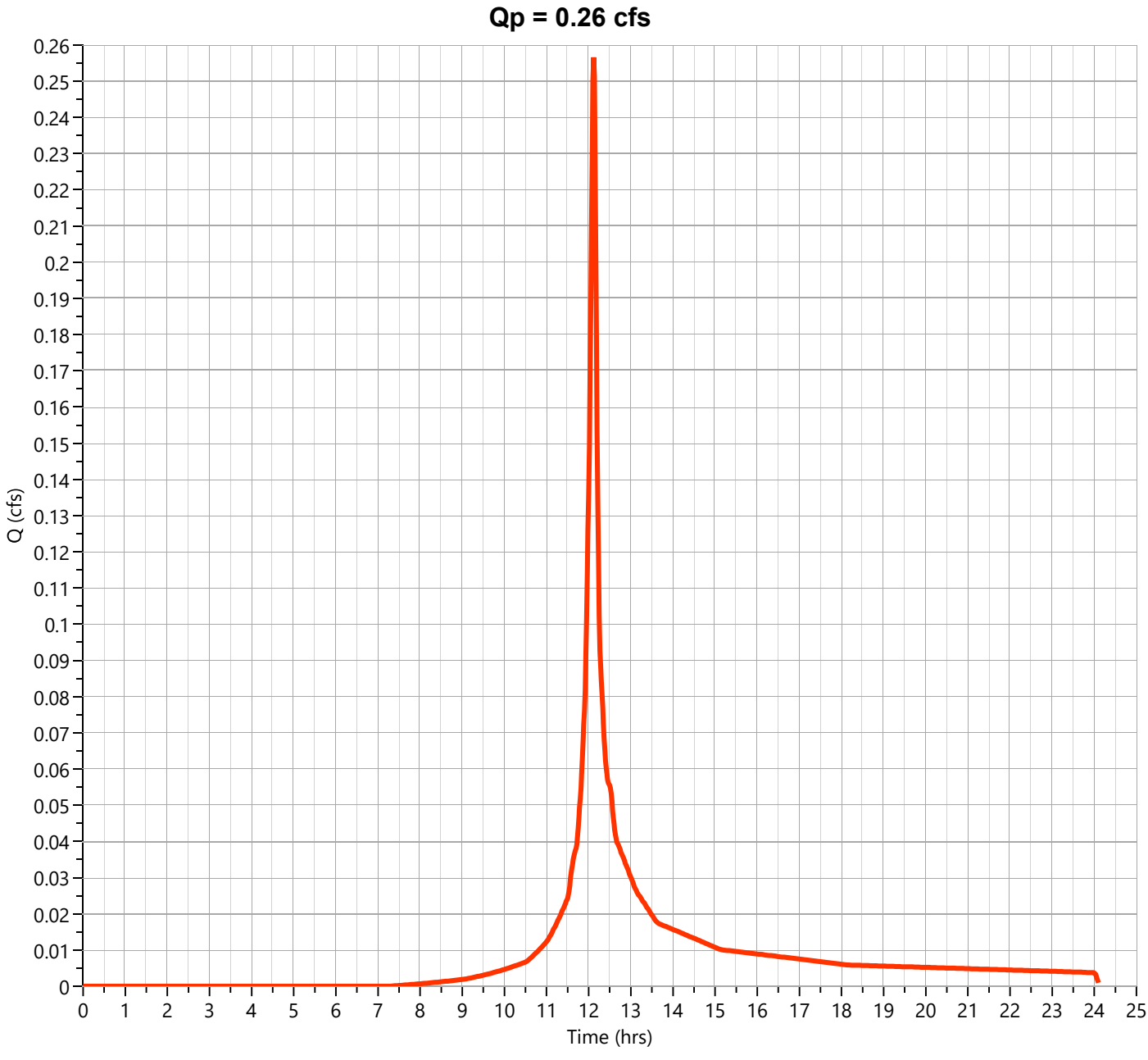
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D Grass HSGC C

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.257 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 795 cuft
Drainage Area	= 0.06 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

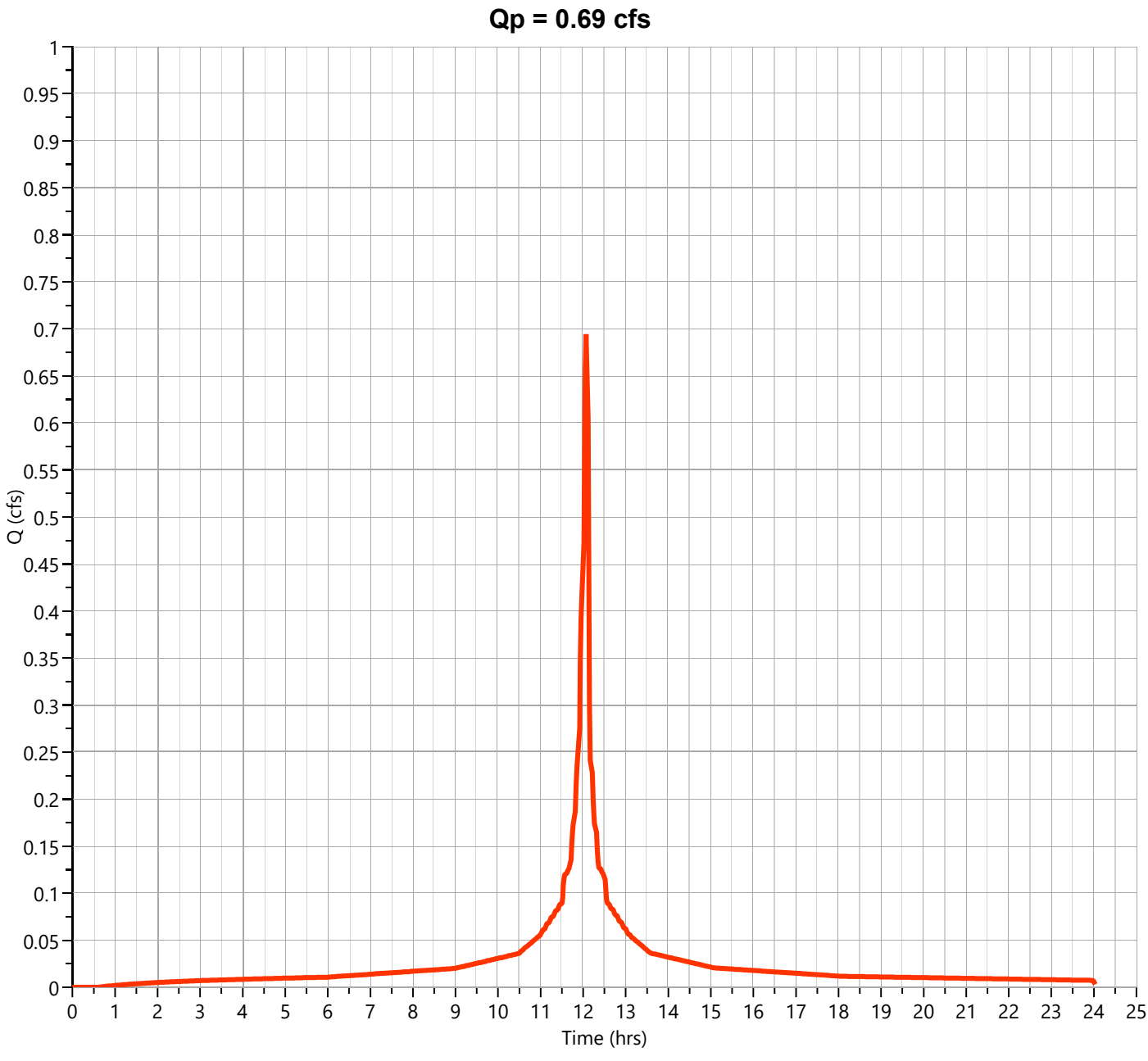
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D Impervious

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.695 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 2,314 cuft
Drainage Area	= 0.11 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

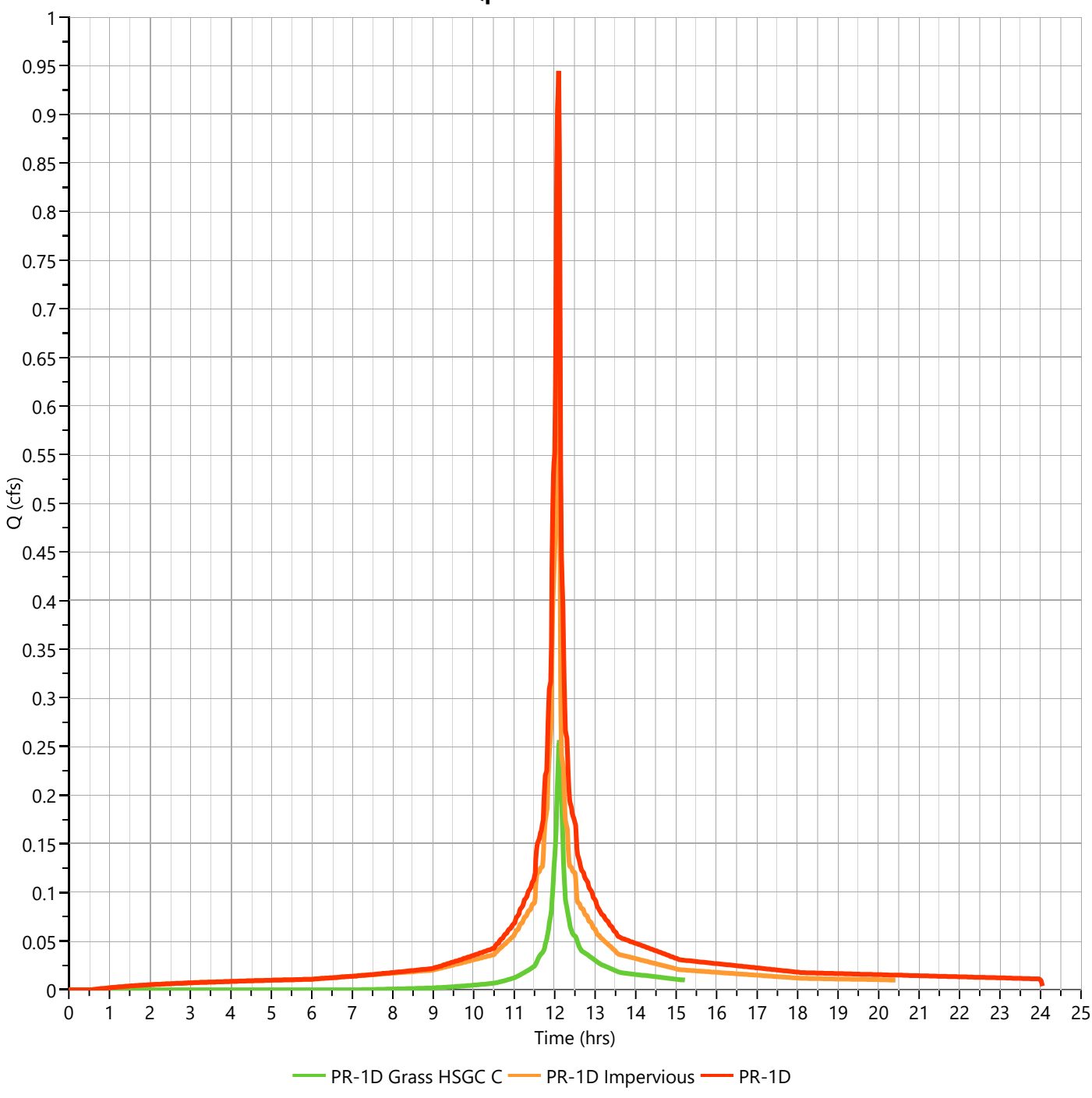
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D

Hyd. No. 16

Hydrograph Type	= Junction	Peak Flow	= 0.945 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 3,109 cuft
Inflow Hydrographs	= 14, 15	Total Contrib. Area	= 0.17 ac



Hydrograph Report

Project Name:

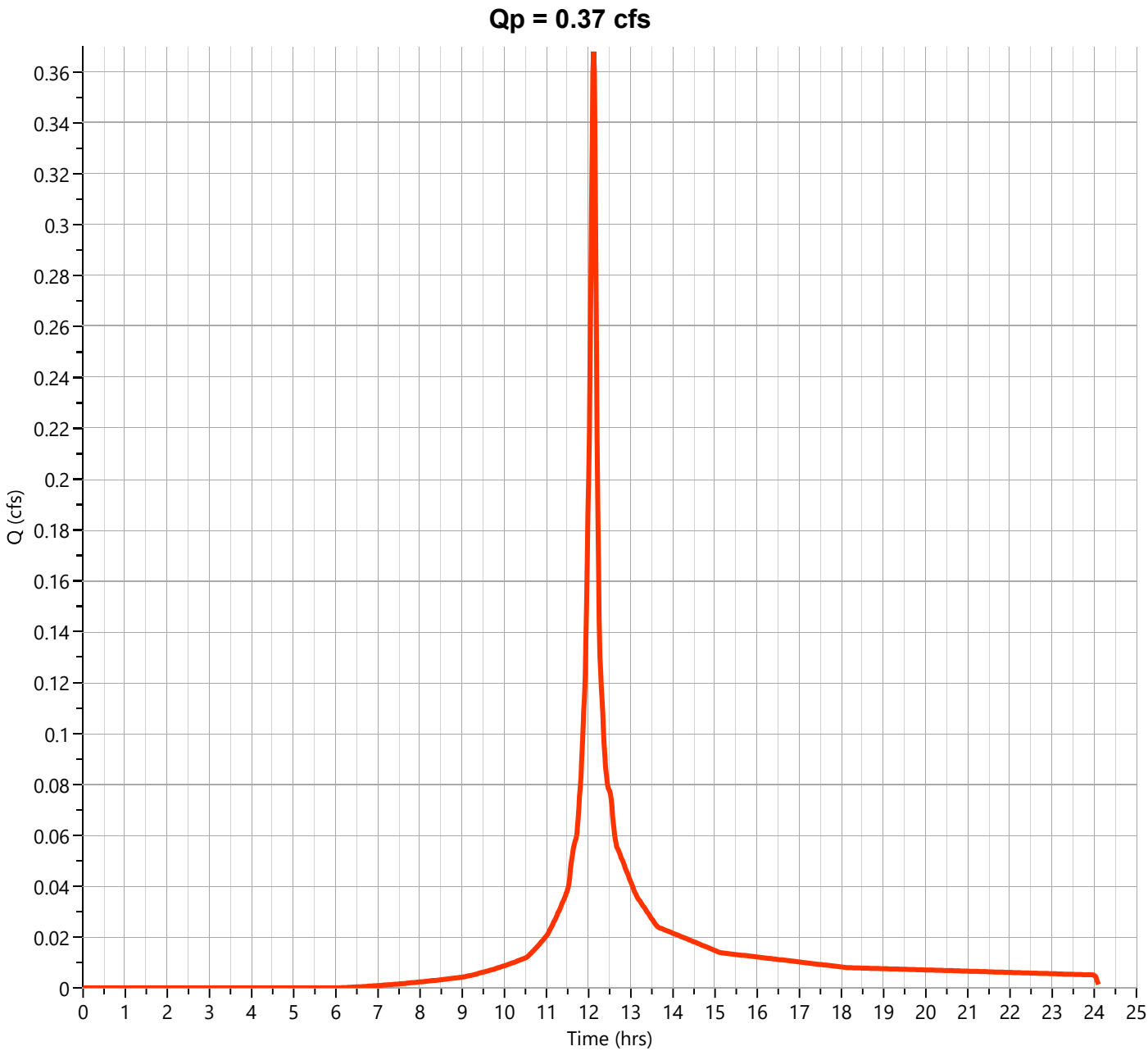
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D Grass HSGC C

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.368 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 1,153 cuft
Drainage Area	= 0.06 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

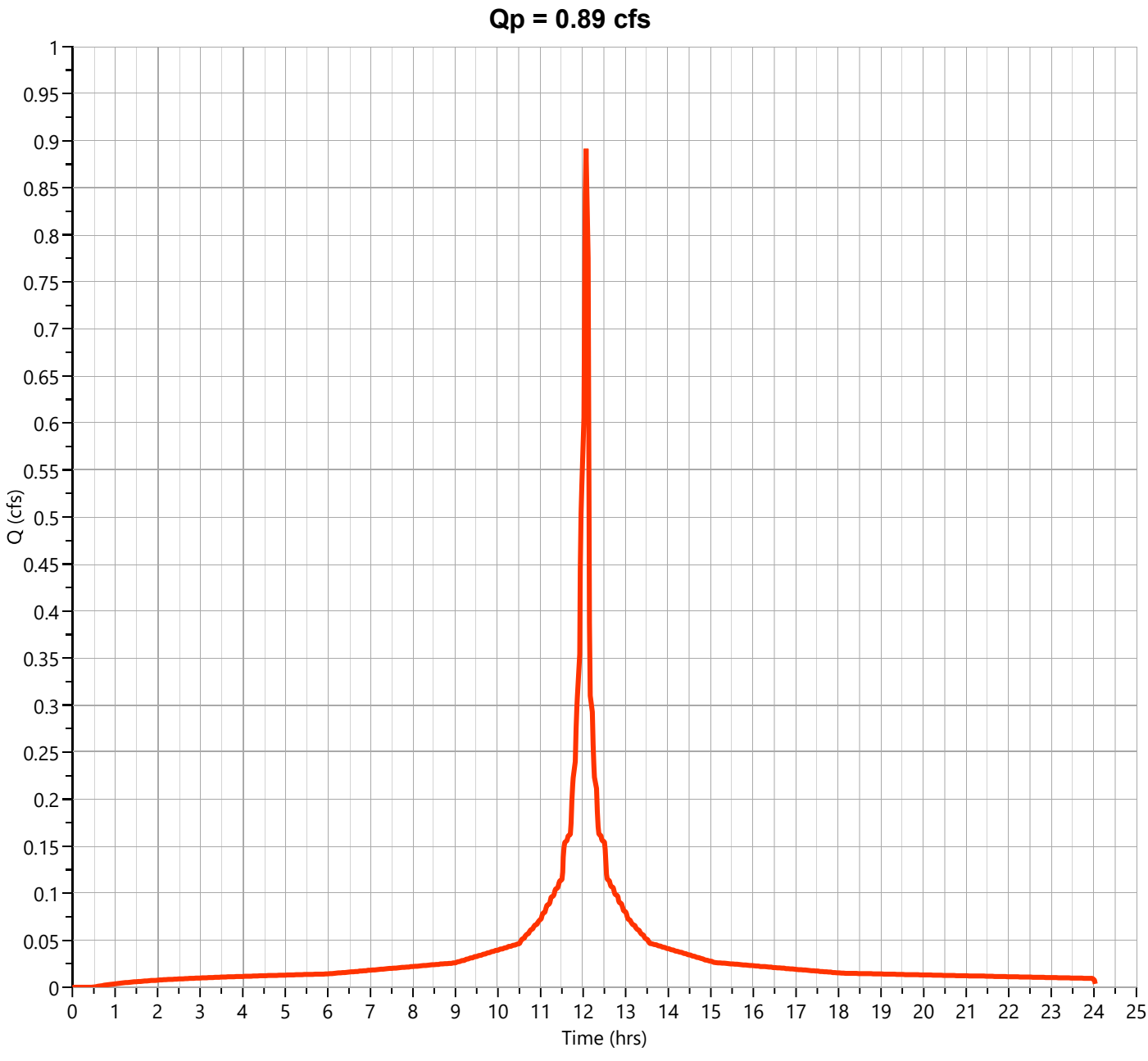
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D Impervious

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.892 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 2,991 cuft
Drainage Area	= 0.11 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

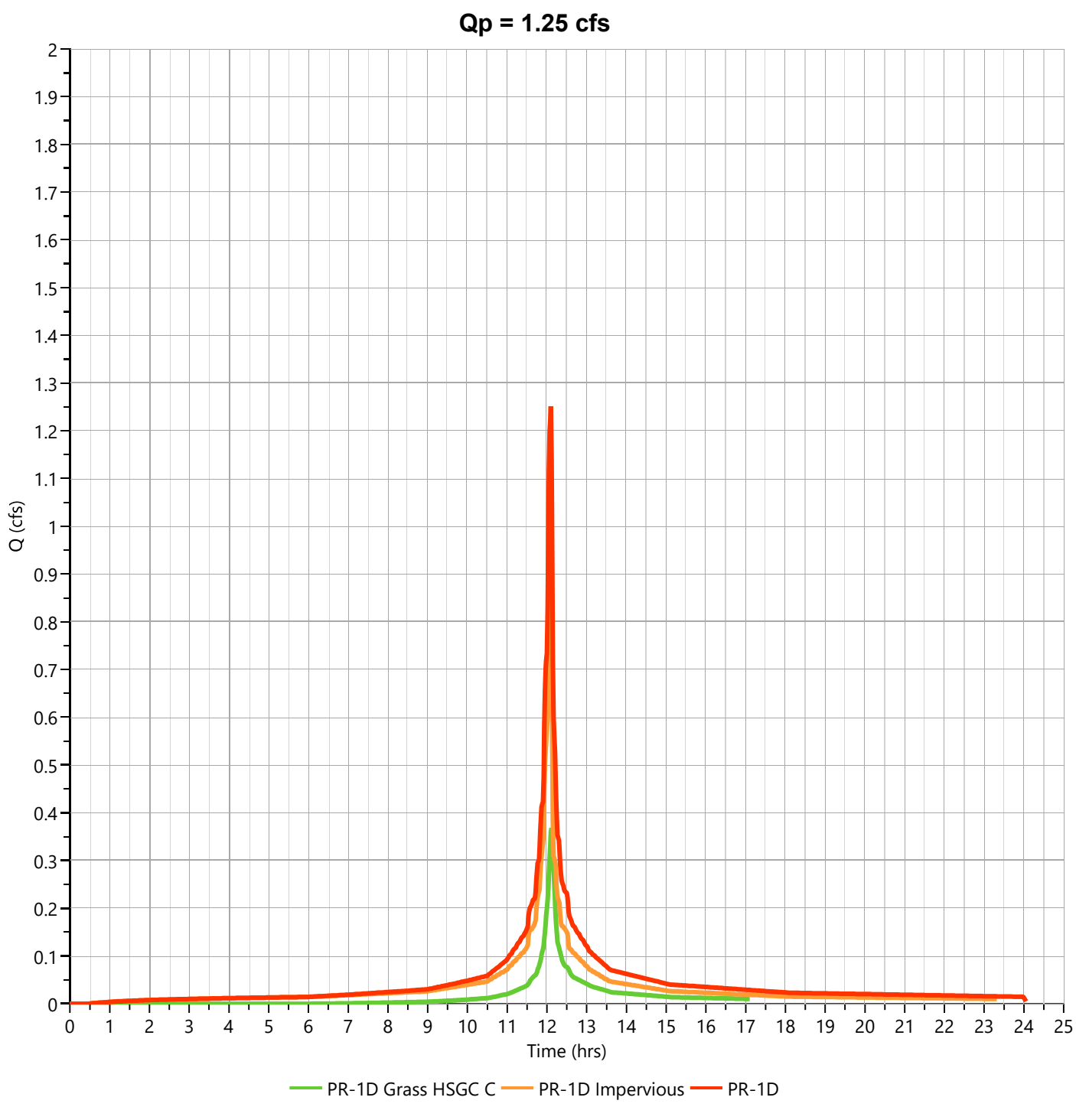
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D

Hyd. No. 16

Hydrograph Type	= Junction	Peak Flow	= 1.251 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 4,144 cuft
Inflow Hydrographs	= 14, 15	Total Contrib. Area	= 0.17 ac



Hydrograph Report

Project Name:

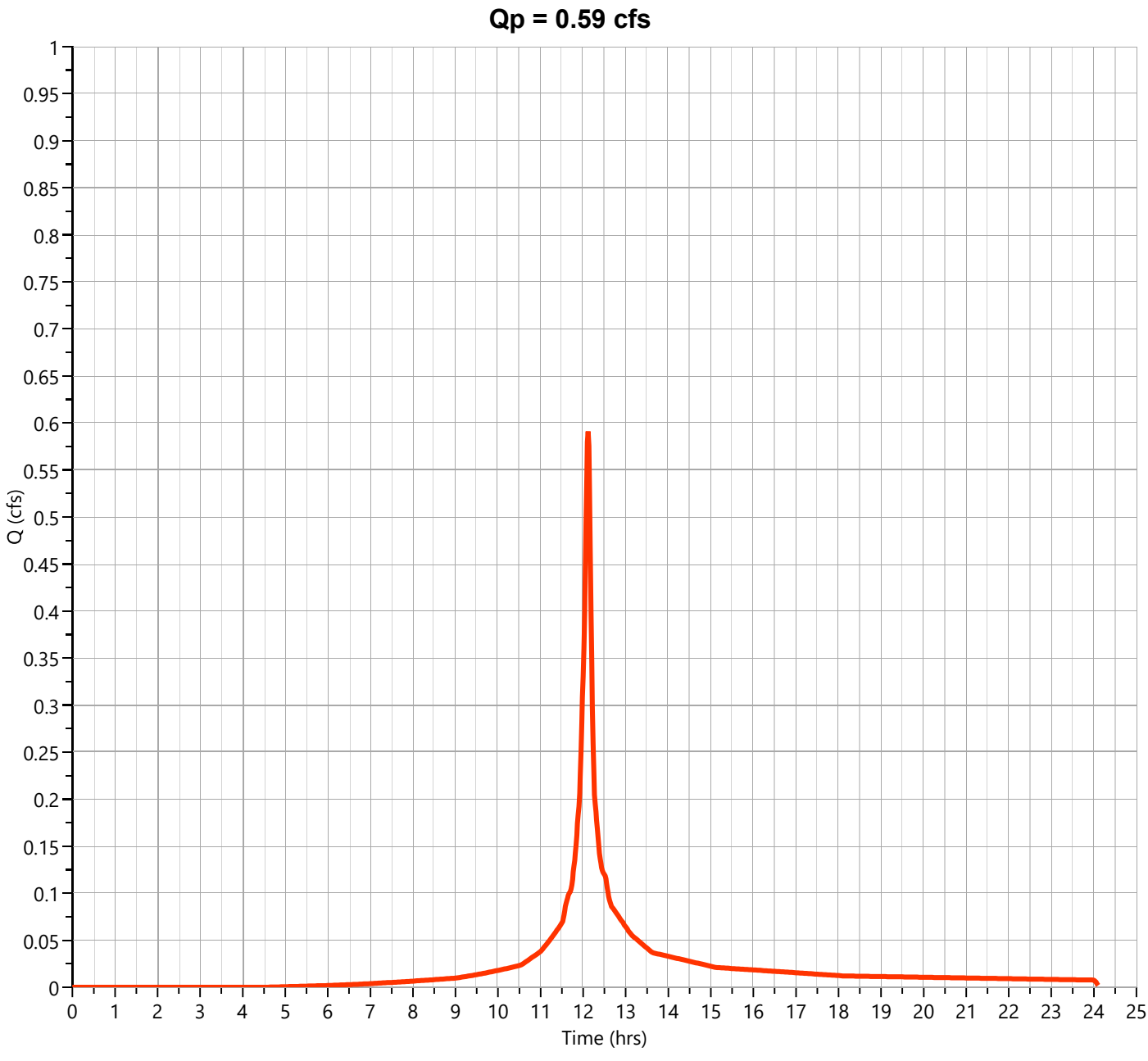
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D Grass HSGC C

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.591 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 1,893 cuft
Drainage Area	= 0.06 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

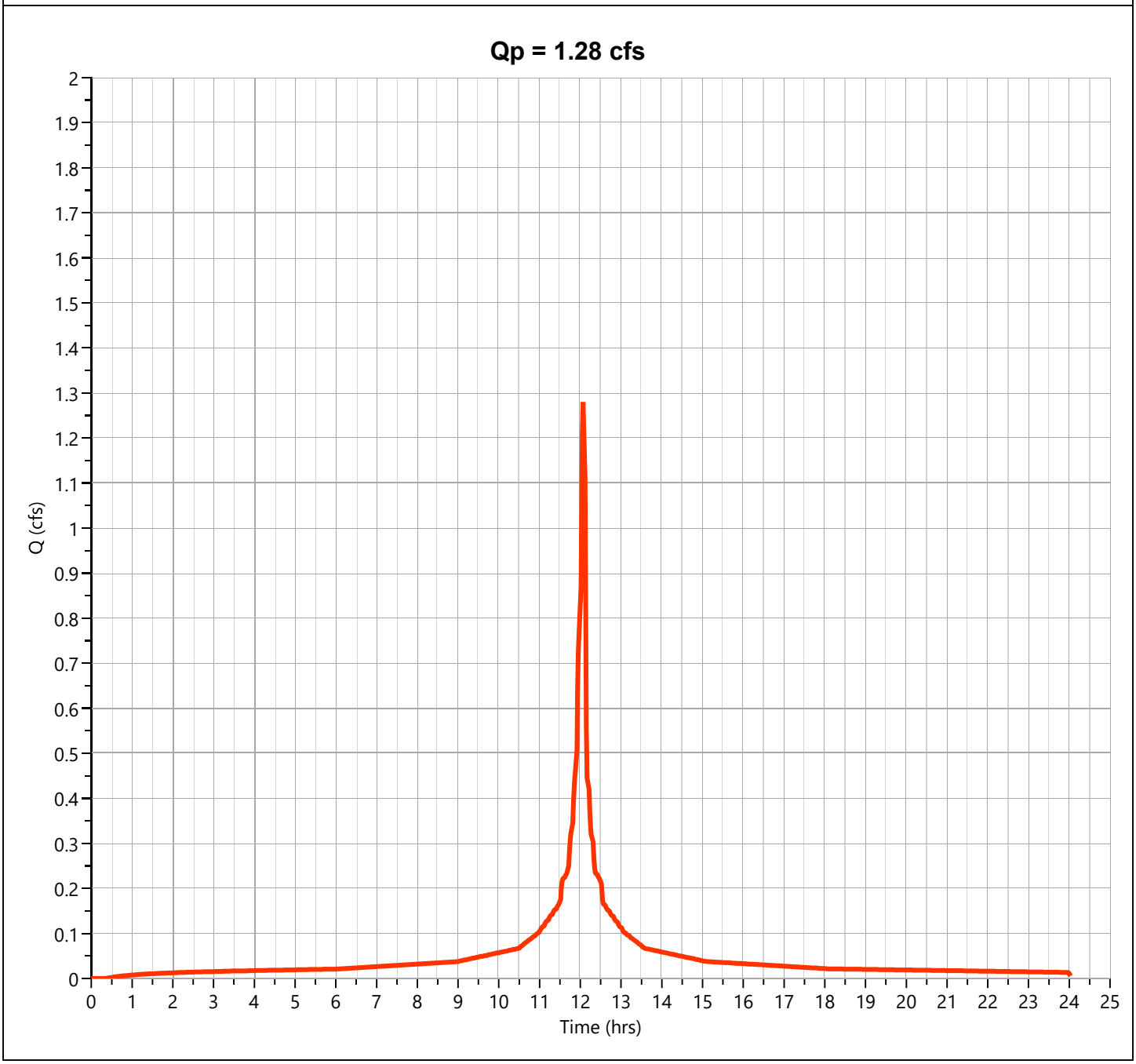
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D Impervious

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.279 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 4,327 cuft
Drainage Area	= 0.11 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

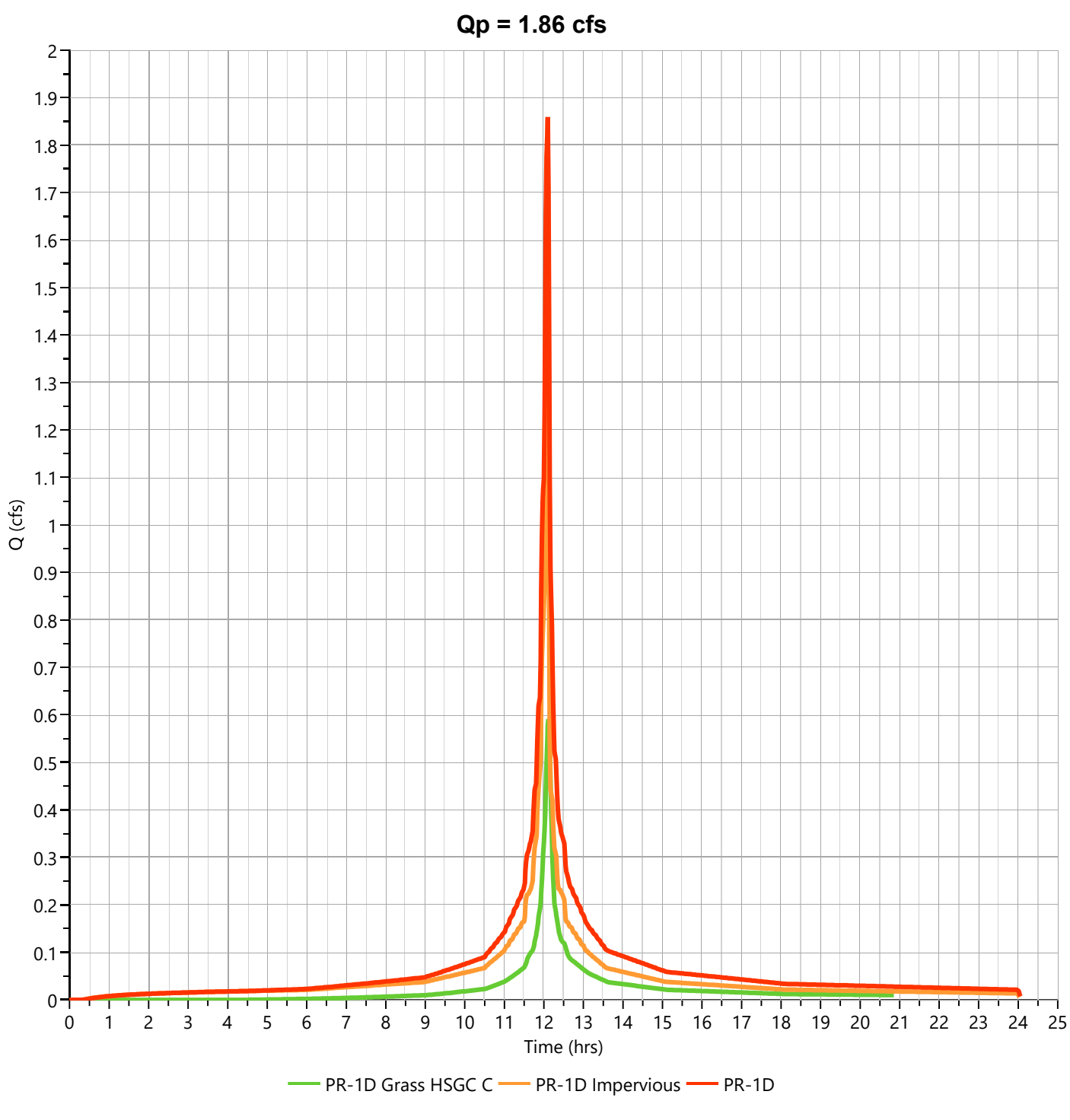
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1D

Hyd. No. 16

Hydrograph Type	= Junction	Peak Flow	= 1.859 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 6,220 cuft
Inflow Hydrographs	= 14, 15	Total Contrib. Area	= 0.17 ac



COMBINED PROPOSED FLOW TO UDG-INF1-2 WATERSHED

Hydrograph Report

Project Name:

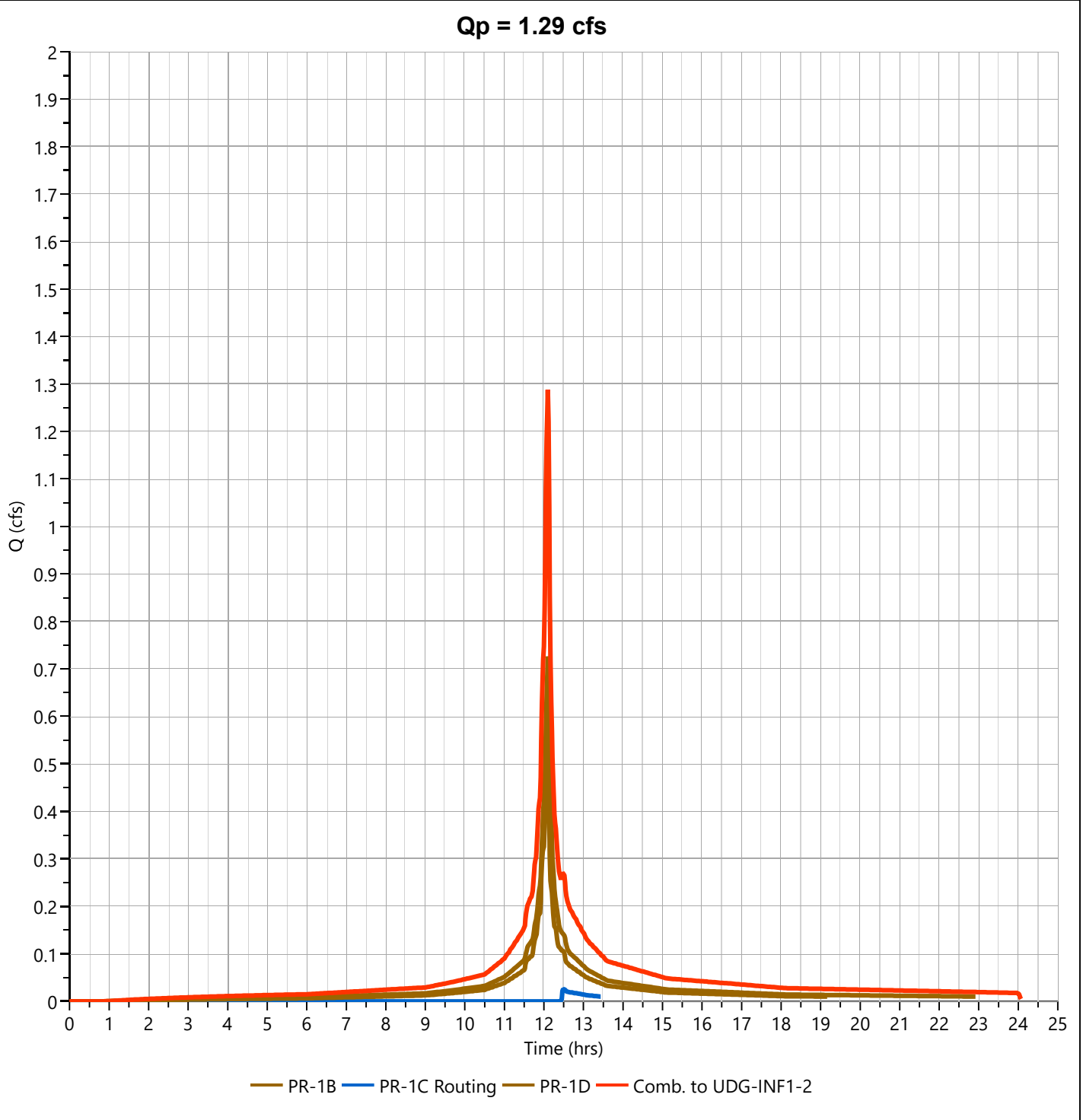
Hydrology Studio v 3.0.0.31

02-08-2024

Comb. to UDG-INF1-2

Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 1.288 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 4,472 cuft
Inflow Hydrographs	= 6, 11, 16	Total Contrib. Area	= 0.39 ac



Hydrograph Report

Project Name:

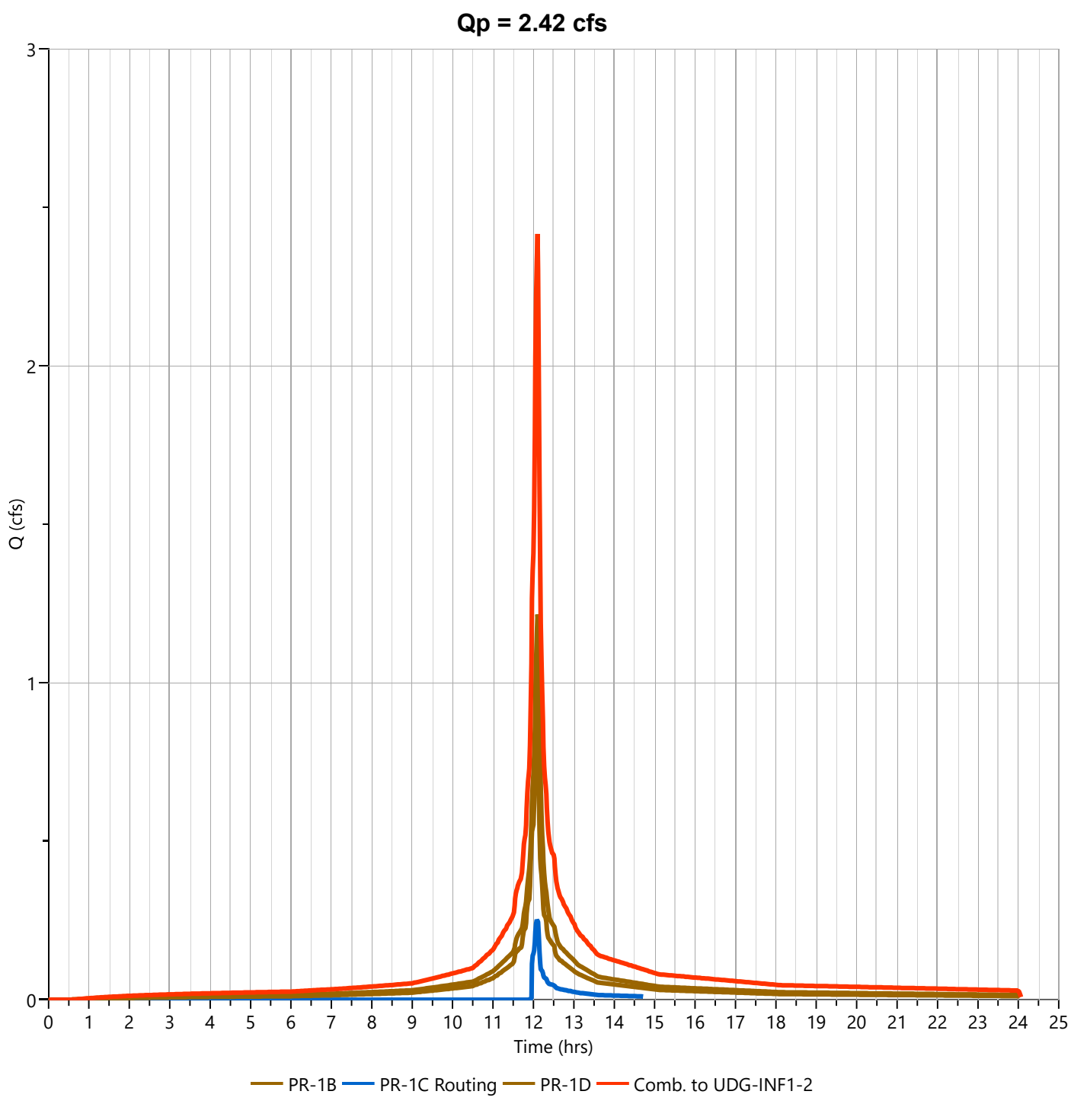
Hydrology Studio v 3.0.0.31

02-08-2024

Comb. to UDG-INF1-2

Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 2.415 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 7,787 cuft
Inflow Hydrographs	= 6, 11, 16	Total Contrib. Area	= 0.39 ac



Hydrograph Report

Project Name:

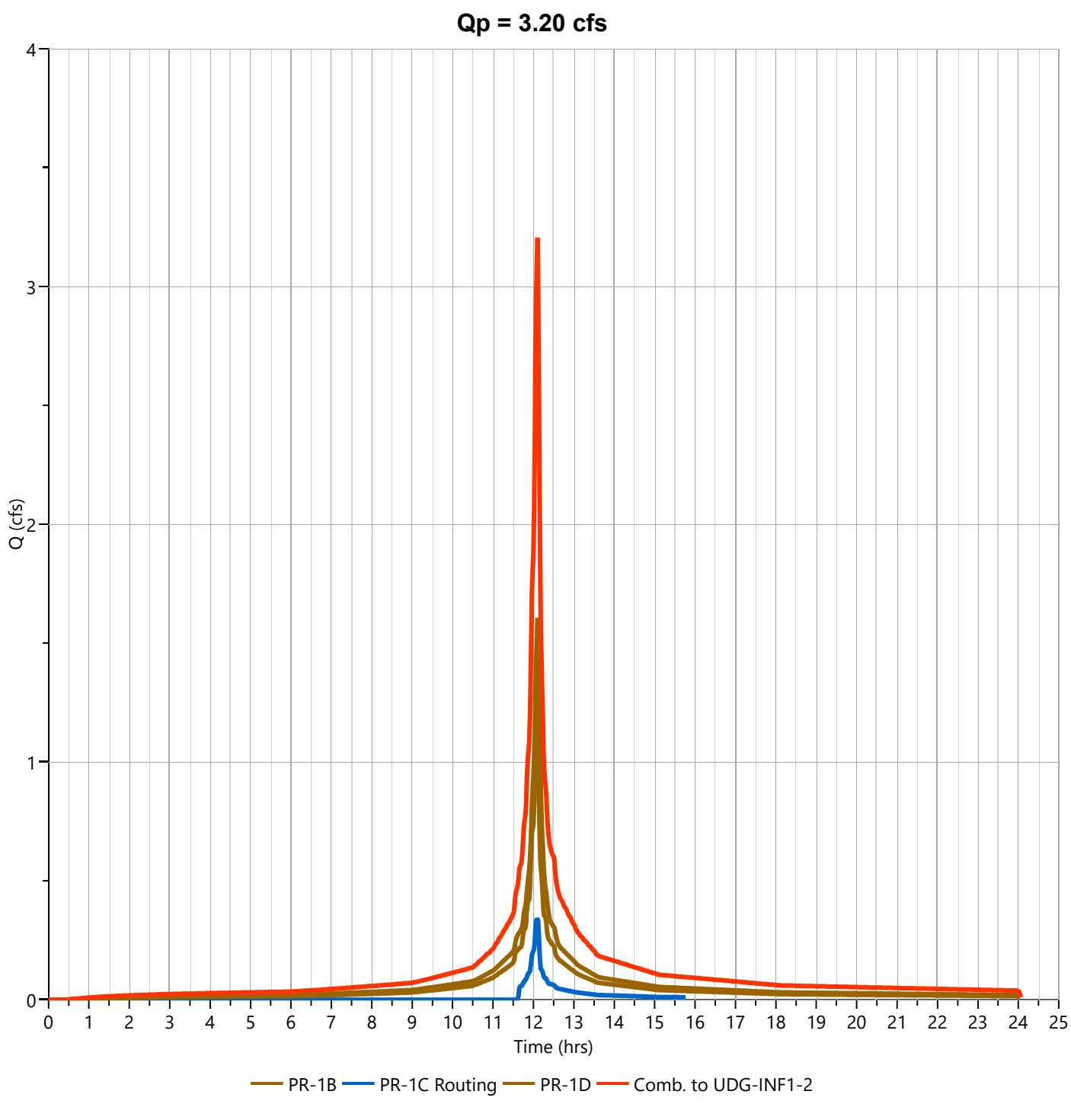
Hydrology Studio v 3.0.0.31

02-08-2024

Comb. to UDG-INF1-2

Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 3.205 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 10,476 cuft
Inflow Hydrographs	= 6, 11, 16	Total Contrib. Area	= 0.39 ac



Hydrograph Report

Project Name:

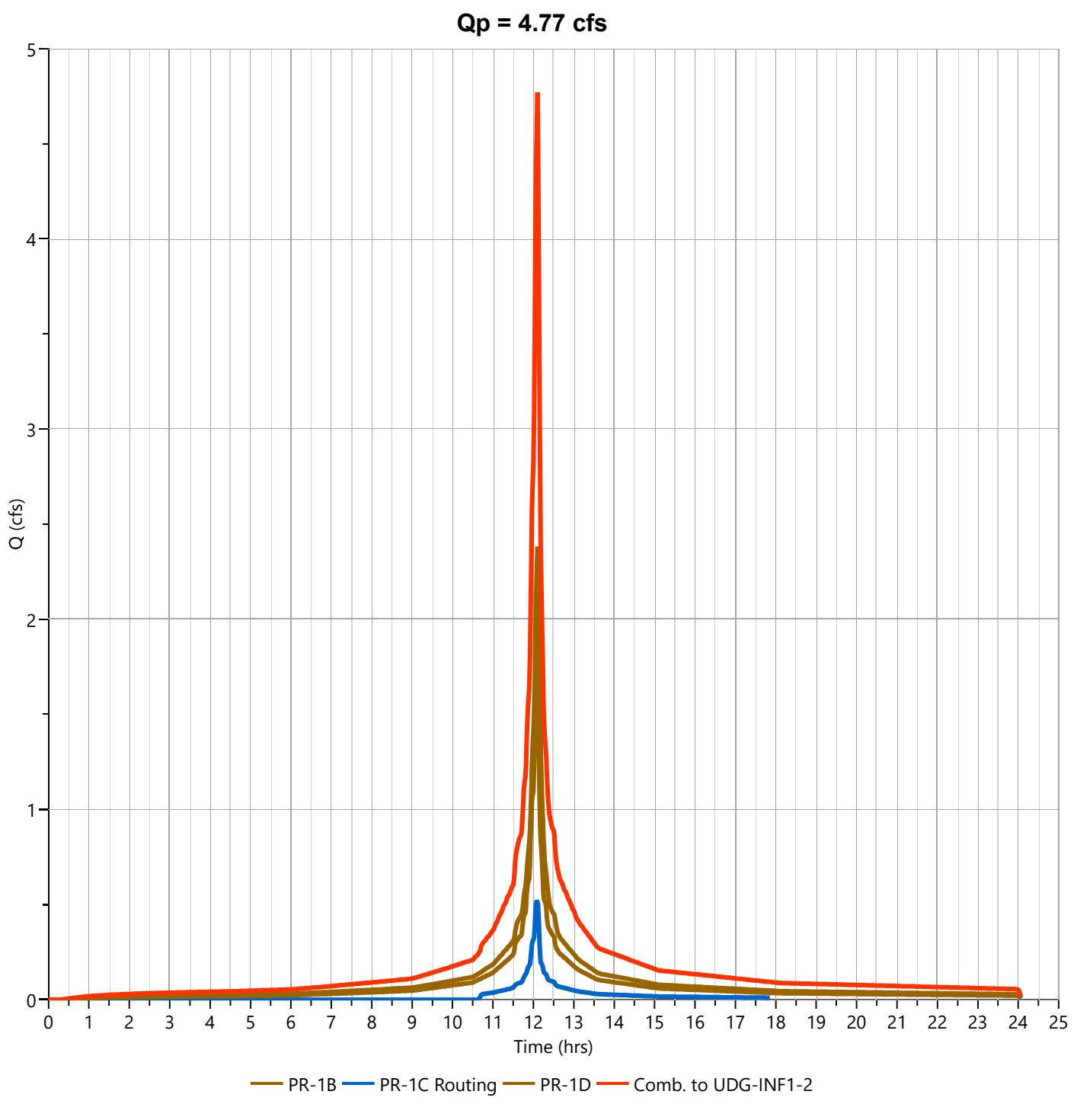
Hydrology Studio v 3.0.0.31

02-08-2024

Comb. to UDG-INF1-2

Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 4.770 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 15,879 cuft
Inflow Hydrographs	= 6, 11, 16	Total Contrib. Area	= 0.39 ac



PR-1E WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/6/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/6/2024**

Circle One: Present (**Developed**) — **Future Proposed Watershed PR-1E - Impervious**

Circle One: (**T_c**) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		2		3
1.	Surface Description (NEH table 15-1)		Smooth Surfaces		Dense Grasses		Smooth Surfaces
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011		0.24		0.011
3.	Design Flow Length, L_{des} (L_{des} < 100 ft)	ft	18		29		47
4.	Two-year 24-hr rainfall, P_2	in	4.12		4.12		4.12
5.	Land Slope, s	ft/ft	0.049		0.114		0.073
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	100		100		100
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.003	+	0.038	+	0.006
					Sheet Flow Sub-Total		0.047 hours

Shallow Concentrated Flow		Segment ID	4				
8.	Surface Description		Pavement				
9.	Flow Length, L	ft	187				
10.	Watercourse Slope, s	ft/ft	0.053				
11.	Average Velocity, V (NEH table 15-3)	ft/s	4.67				
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.011	+		+	
					Shallow Conc. Flow Sub-Total		0.011 hours

Channel Flow		Segment ID					
13.	Flow Length, L	ft					
14.	Cross Sectional flow area, a	ft^2					
15.	Wetted Perimeter, P_w	ft					
16.	Hydraulic Radius, r $r = a / P_w$	ft					
17.	Channel Slope, s	ft/ft					
18.	Manning's Roughness Coeff., n						
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s					
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+		+	
					Channel Flow Sub-Total		0.000 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.058 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	3 minutes

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: Present **(Developed)** — **Future Proposed Watershed PR-1E - Pervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		2		3
1.	Surface Description (NEH table 15-1)		Dense Grasses		Smooth Surfaces		Dense Grasses
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.24		0.011		0.24
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	19		10		35
4.	Two-year 24-hr rainfall, P_2	in	4.12		4.12		4.12
5.	Land Slope, s	ft/ft	0.053		0.026		0.217
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	96		100		100
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.038	+	0.003	+	0.035
					Sheet Flow Sub-Total		0.075 hours

Shallow Concentrated Flow		Segment ID	4				
8.	Surface Description		Pavement				
9.	Flow Length, L	ft	110				
10.	Watercourse Slope, s	ft/ft	0.058				
11.	Average Velocity, V (NEH table 15-3)	ft/s	4.90				
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.006	+		+	
					Shallow Conc. Flow Sub-Total		0.006 hours

Channel Flow		Segment ID					
13.	Flow Length, L	ft					
14.	Cross Sectional flow area, a	ft^2					
15.	Wetted Perimeter, P_w	ft					
16.	Hydraulic Radius, r $r = a / P_w$	ft					
17.	Channel Slope, s	ft/ft					
18.	Manning's Roughness Coeff., n						
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s					
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+		+	
					Channel Flow Sub-Total		0.000 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.081 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	5 minutes

Hydrograph Report

Project Name:

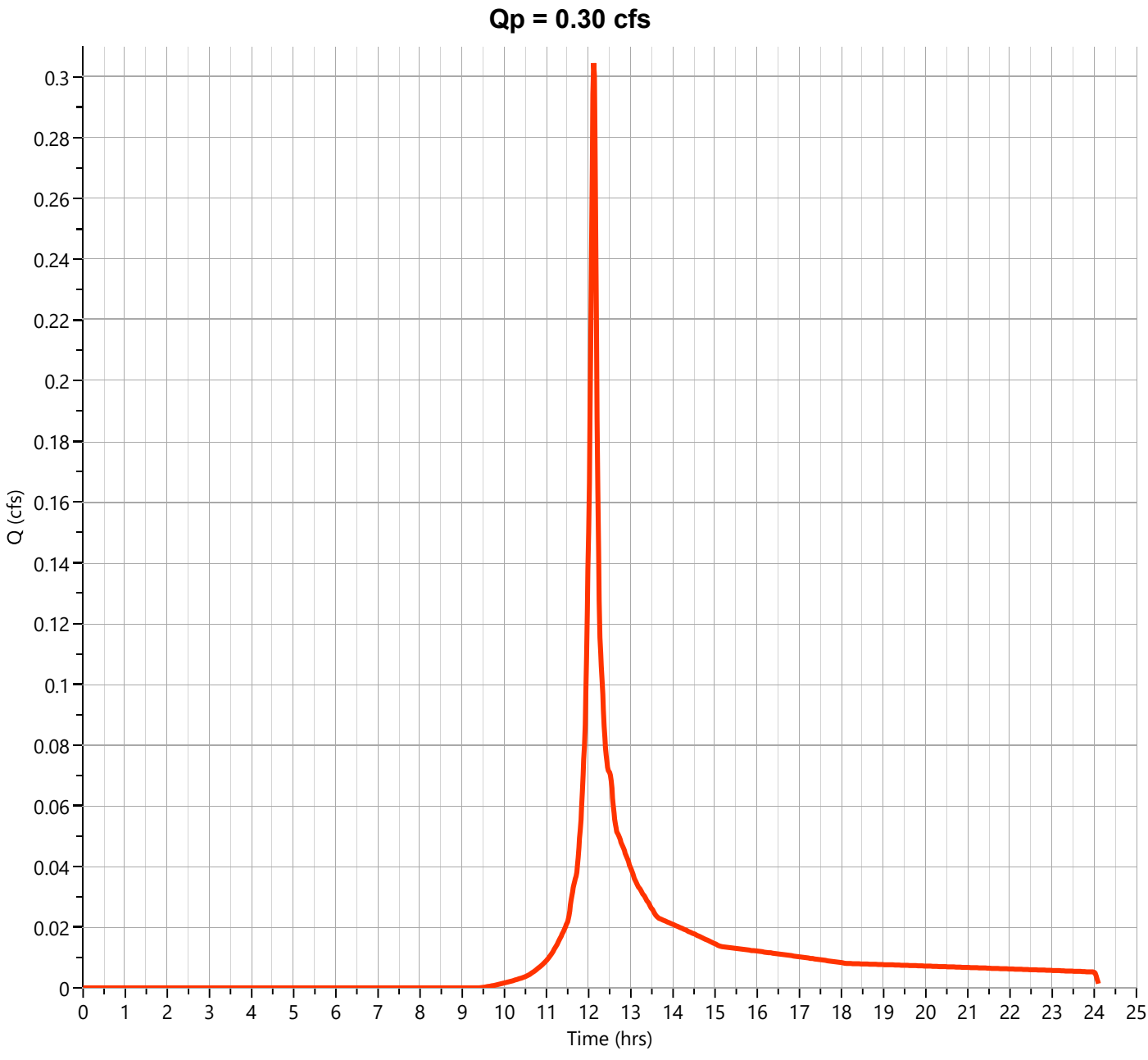
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1E Grass HSGC C

Hyd. No. 22

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.305 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 946 cuft
Drainage Area	= 0.15 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

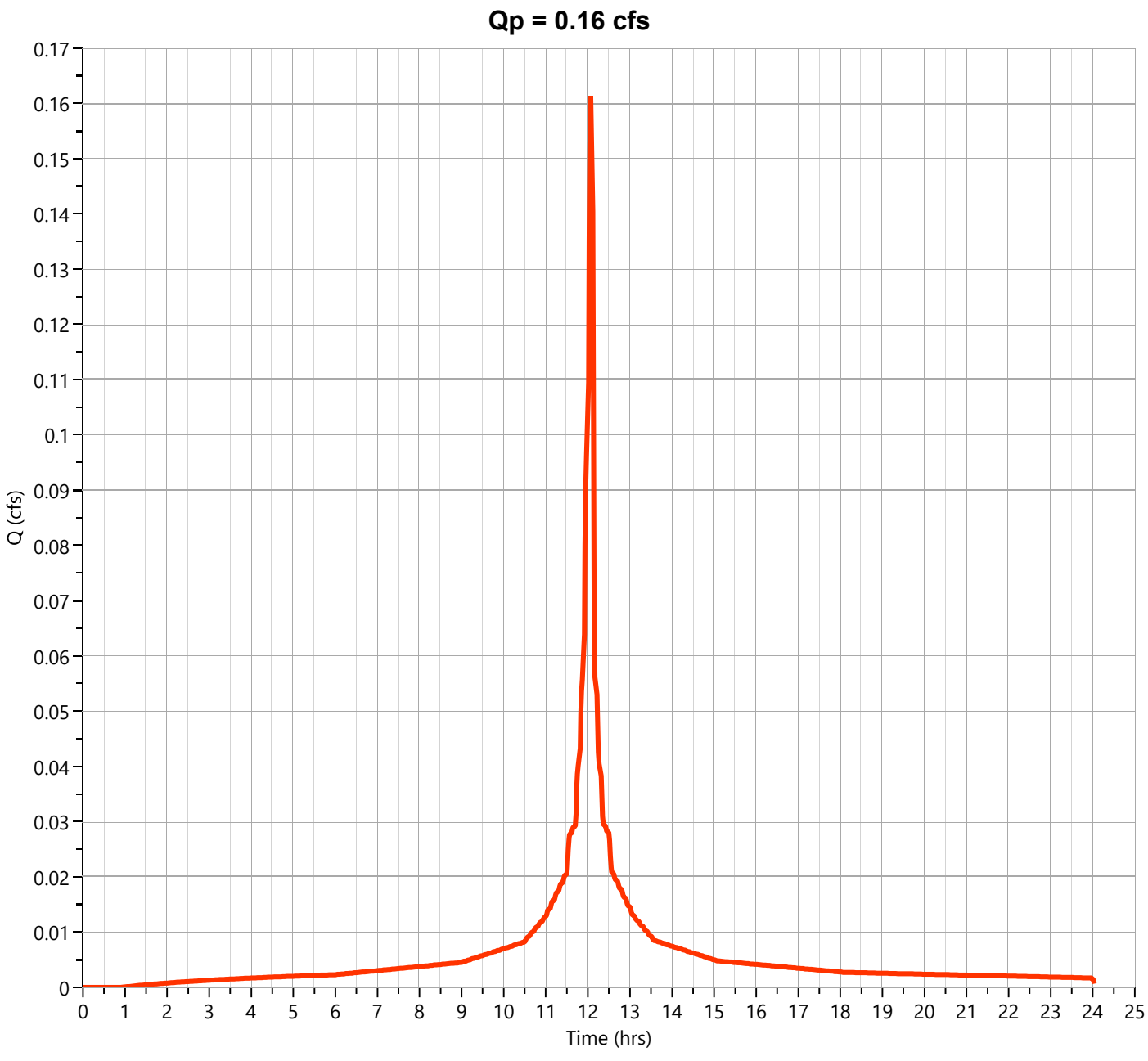
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1E Impervious

Hyd. No. 23

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.161 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 529 cuft
Drainage Area	= 0.04 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

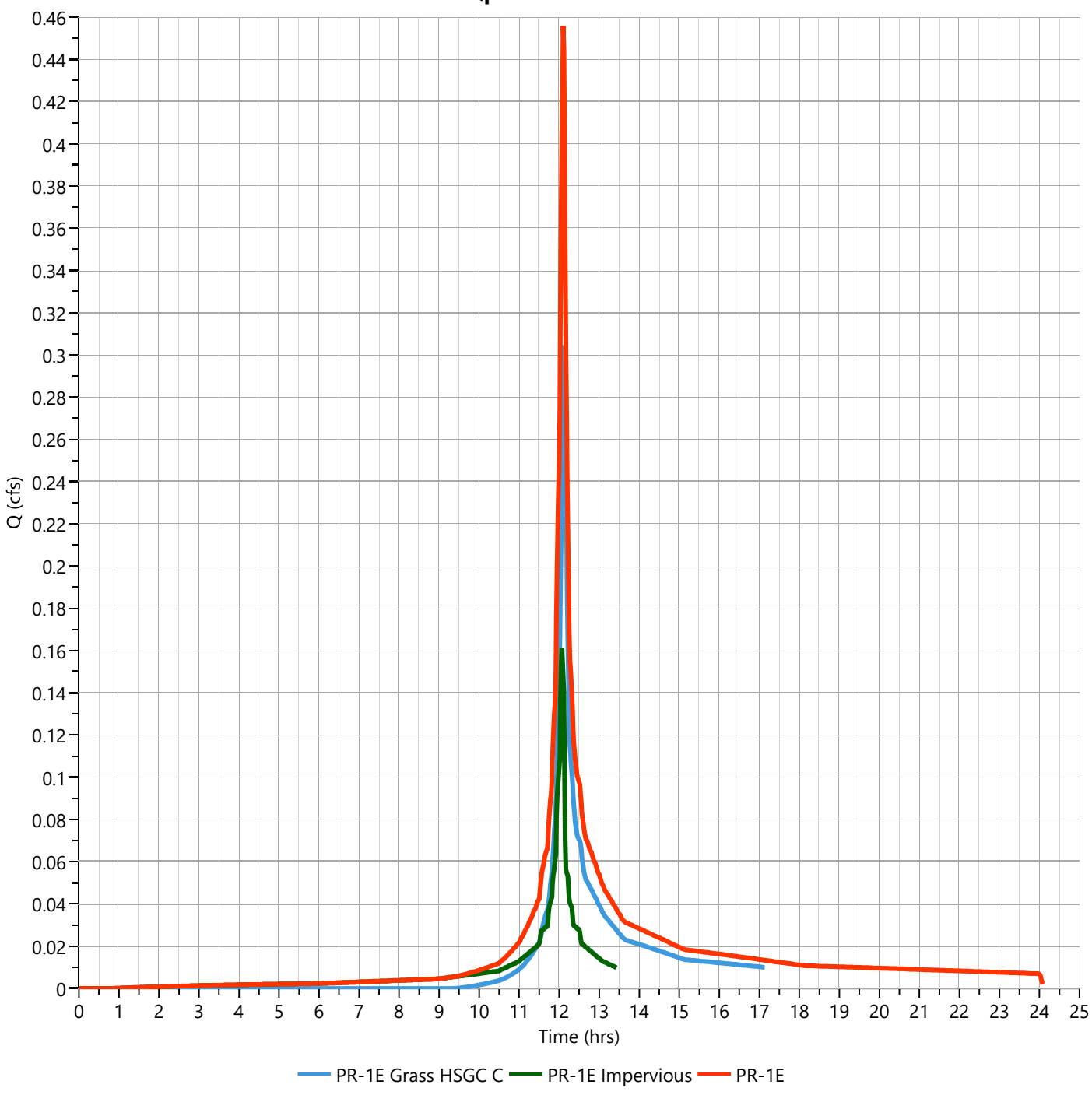
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1E

Hyd. No. 24

Hydrograph Type	= Junction	Peak Flow	= 0.456 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,475 cuft
Inflow Hydrographs	= 22, 23	Total Contrib. Area	= 0.19 ac



Hydrograph Report

Project Name:

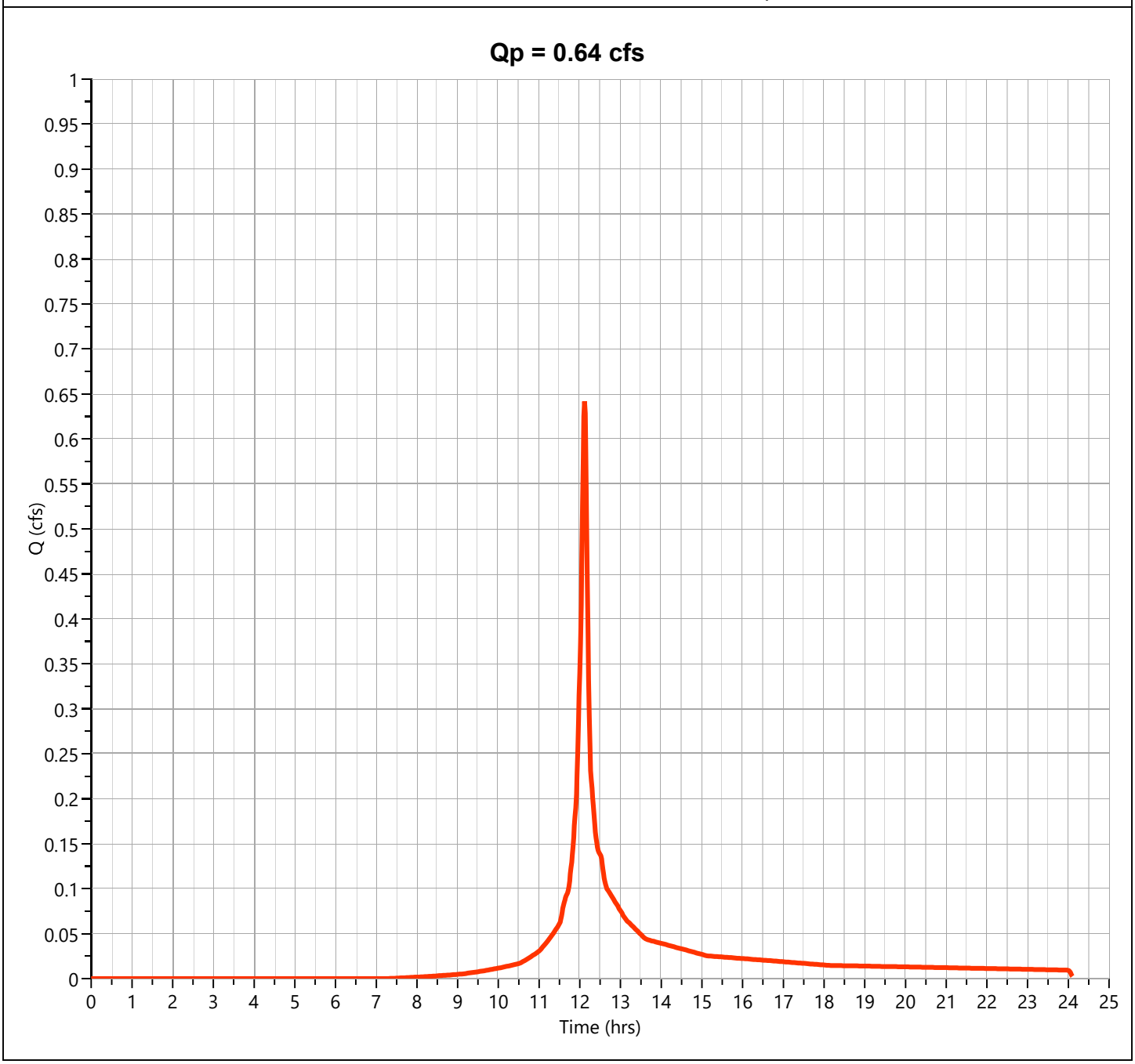
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1E Grass HSGC C

Hyd. No. 22

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.641 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 1,988 cuft
Drainage Area	= 0.15 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

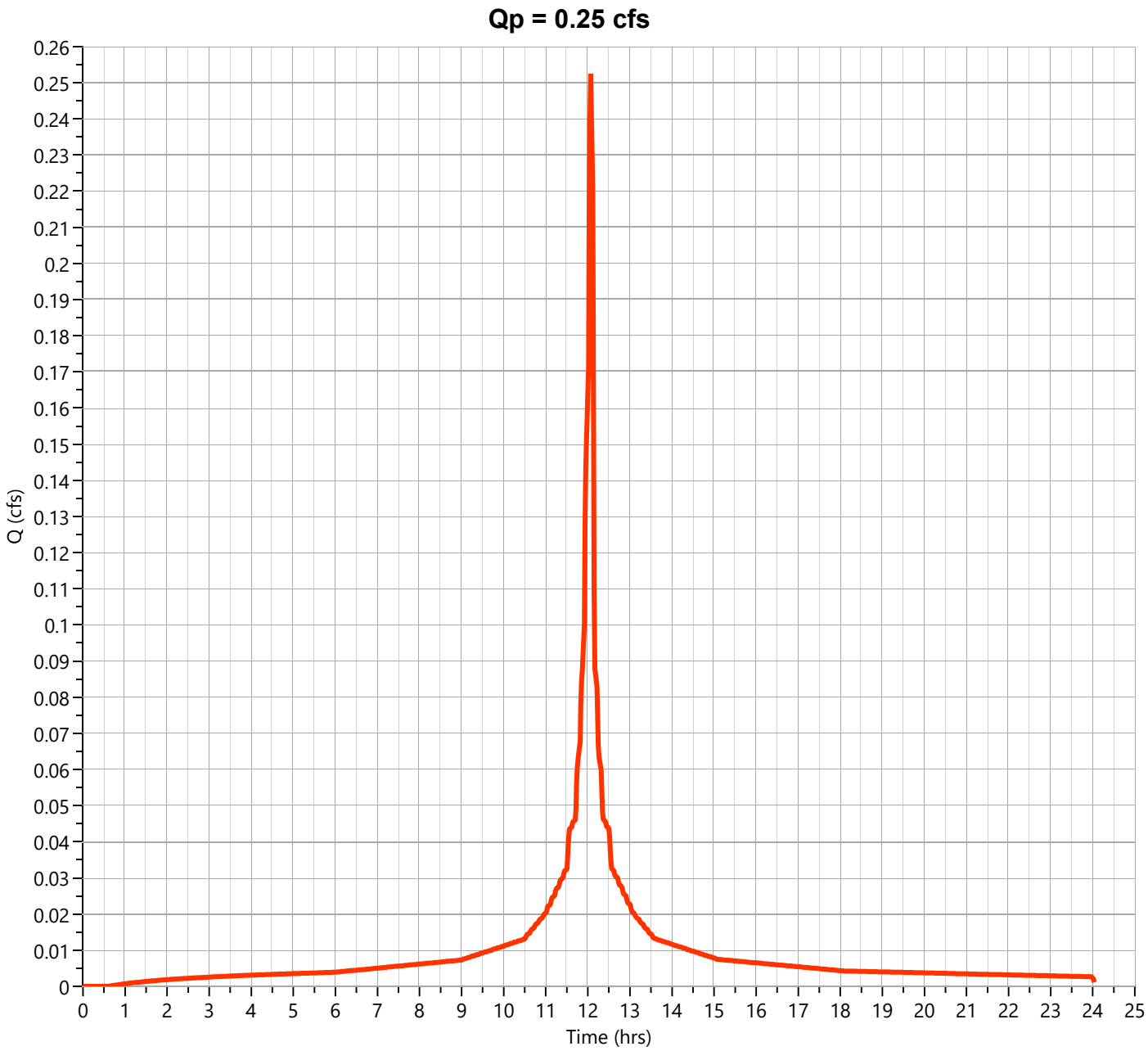
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1E Impervious

Hyd. No. 23

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.253 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 841 cuft
Drainage Area	= 0.04 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

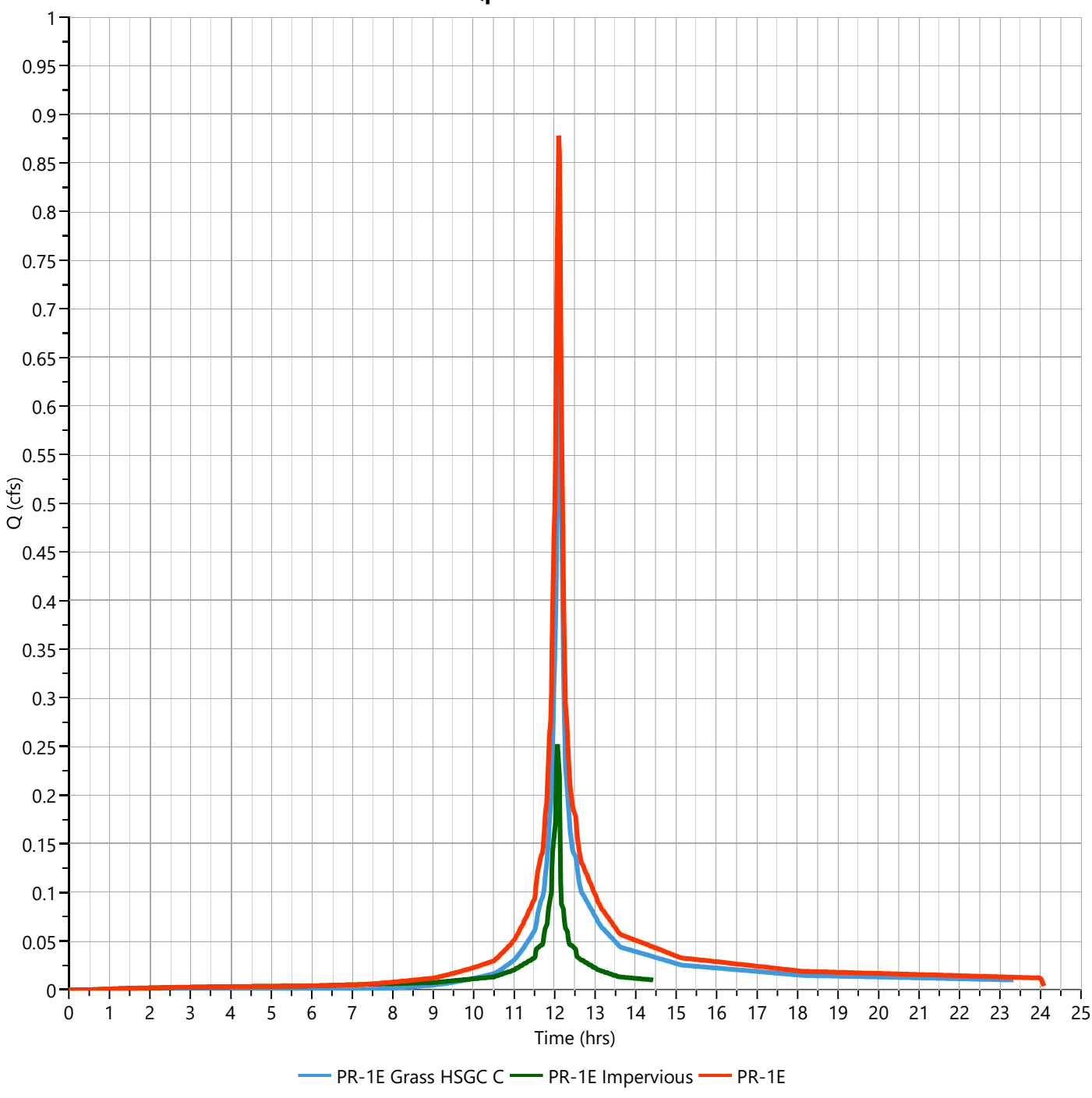
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1E

Hyd. No. 24

Hydrograph Type	= Junction	Peak Flow	= 0.878 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,830 cuft
Inflow Hydrographs	= 22, 23	Total Contrib. Area	= 0.19 ac



Hydrograph Report

Project Name:

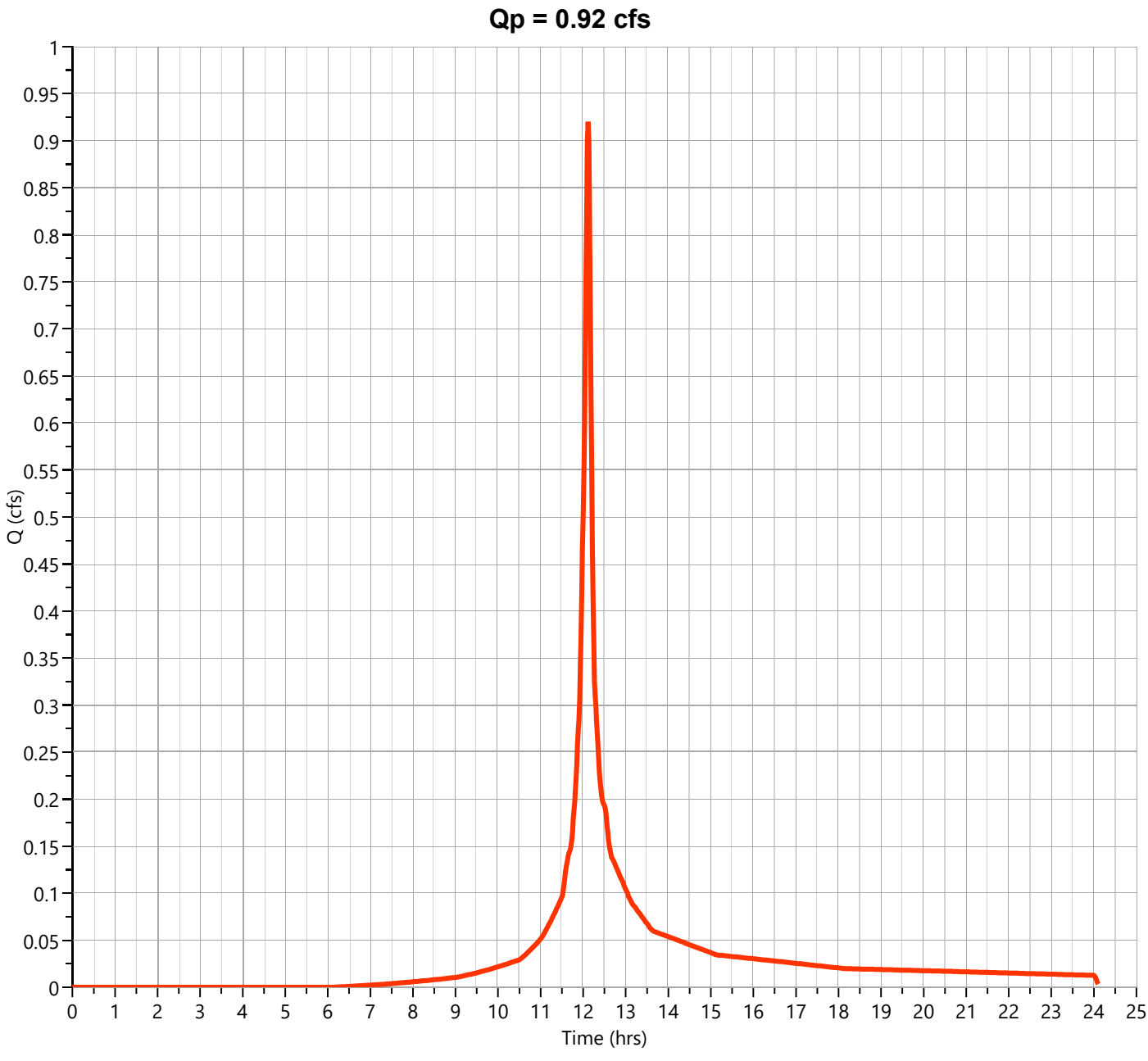
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1E Grass HSGC C

Hyd. No. 22

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.920 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 2,882 cuft
Drainage Area	= 0.15 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

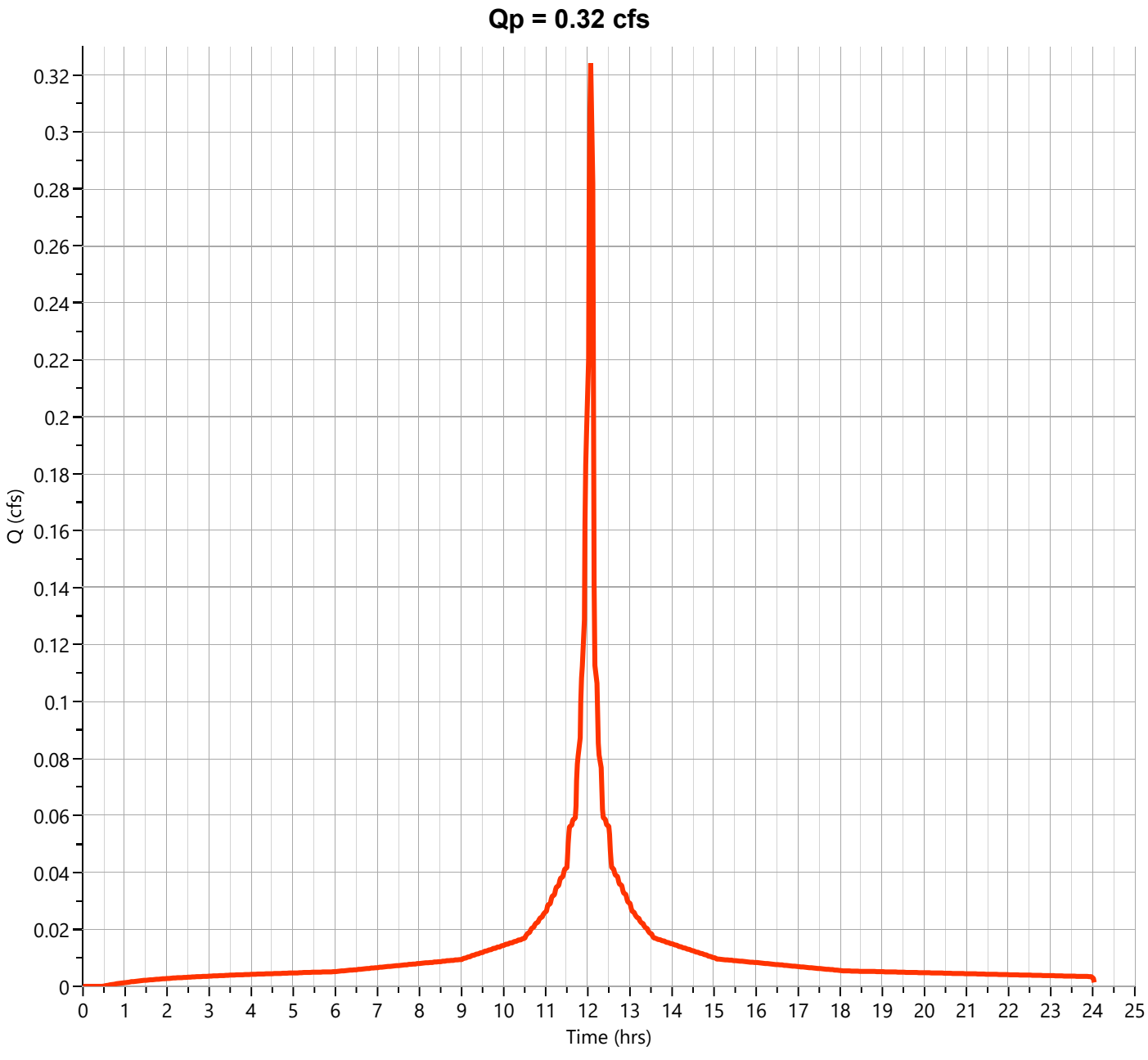
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1E Impervious

Hyd. No. 23

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.324 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,088 cuft
Drainage Area	= 0.04 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

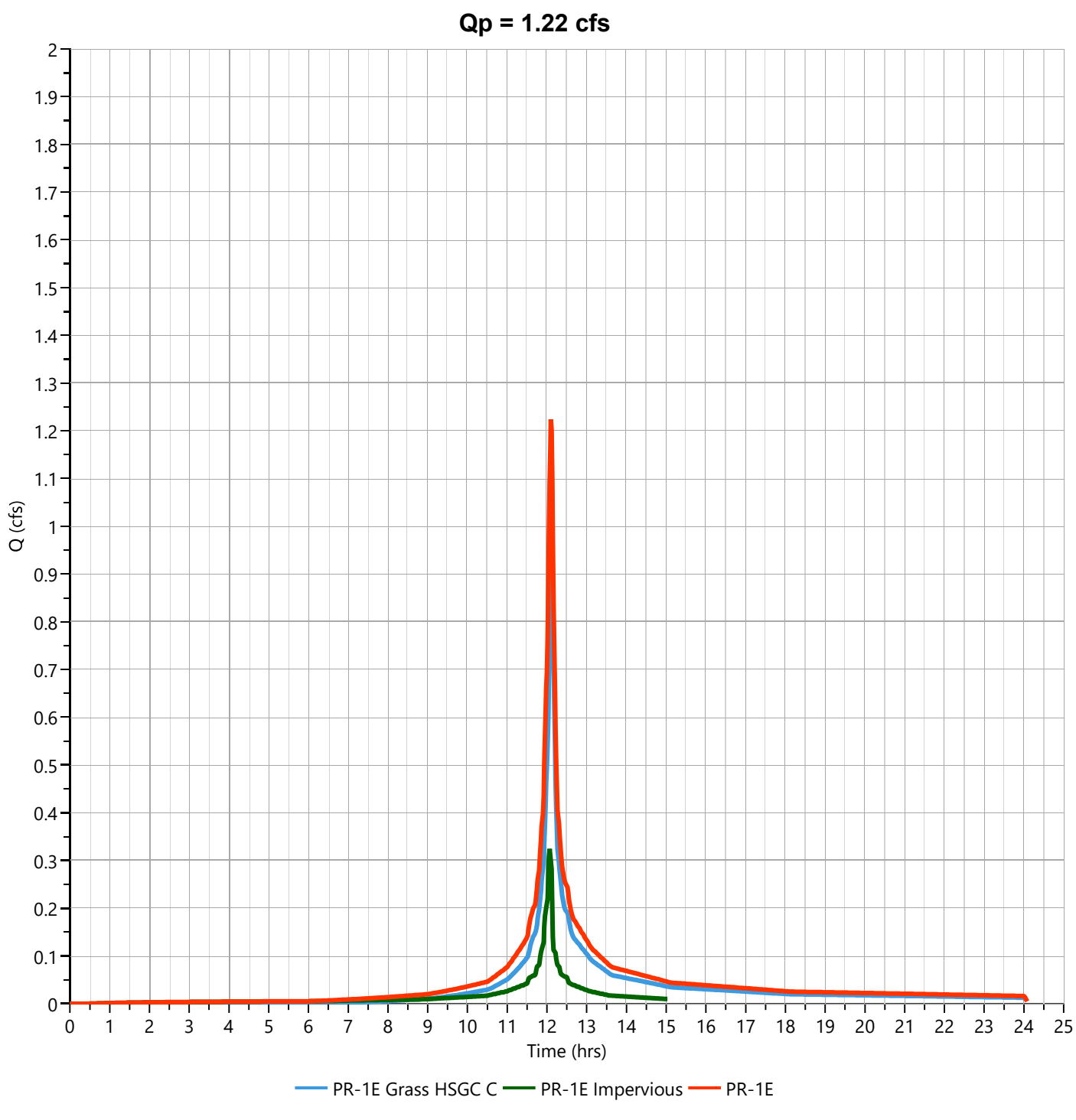
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1E

Hyd. No. 24

Hydrograph Type	= Junction	Peak Flow	= 1.224 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 3,969 cuft
Inflow Hydrographs	= 22, 23	Total Contrib. Area	= 0.19 ac



Hydrograph Report

Project Name:

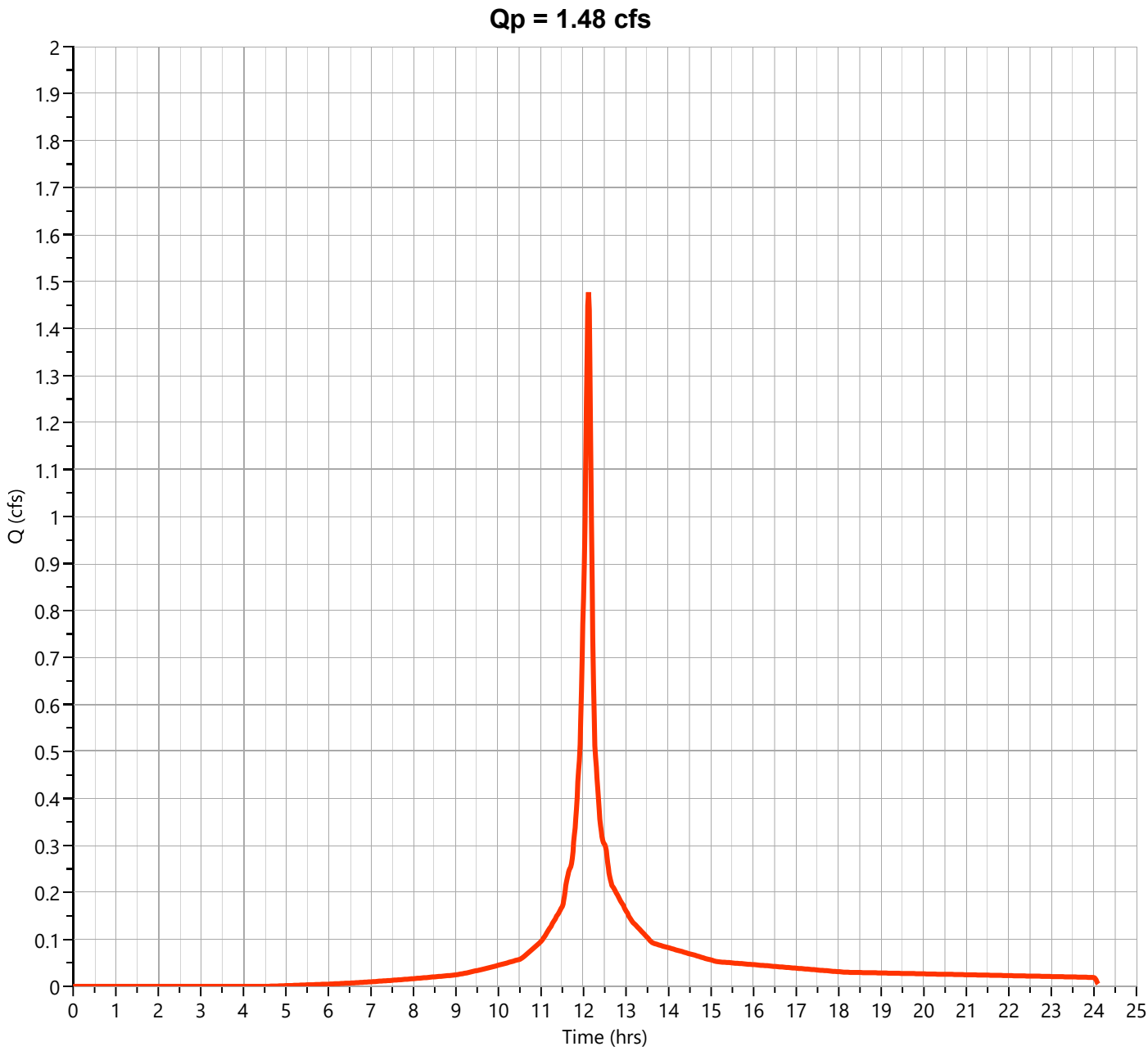
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1E Grass HSGC C

Hyd. No. 22

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.477 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 4,733 cuft
Drainage Area	= 0.15 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

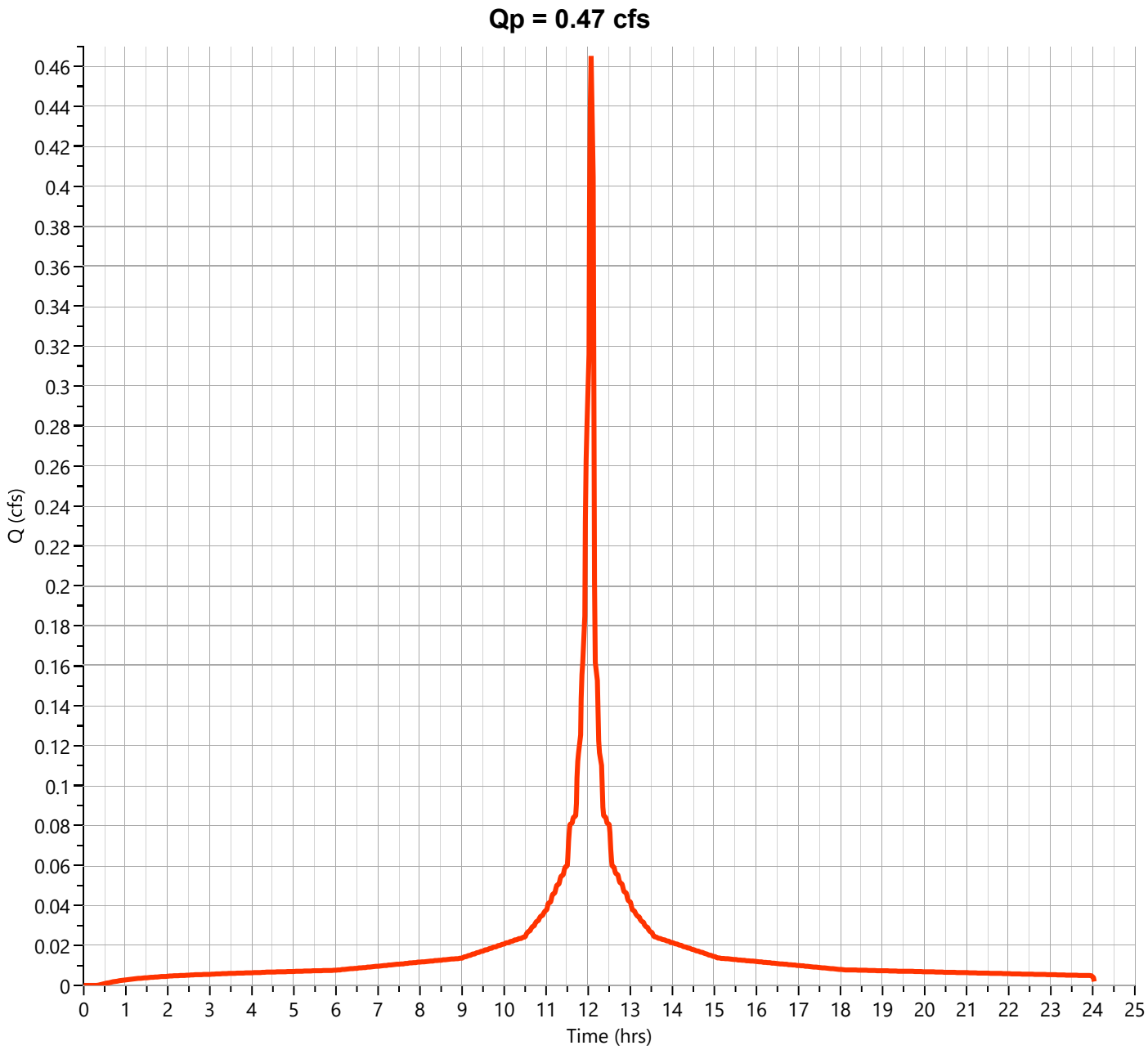
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1E Impervious

Hyd. No. 23

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.465 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,573 cuft
Drainage Area	= 0.04 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

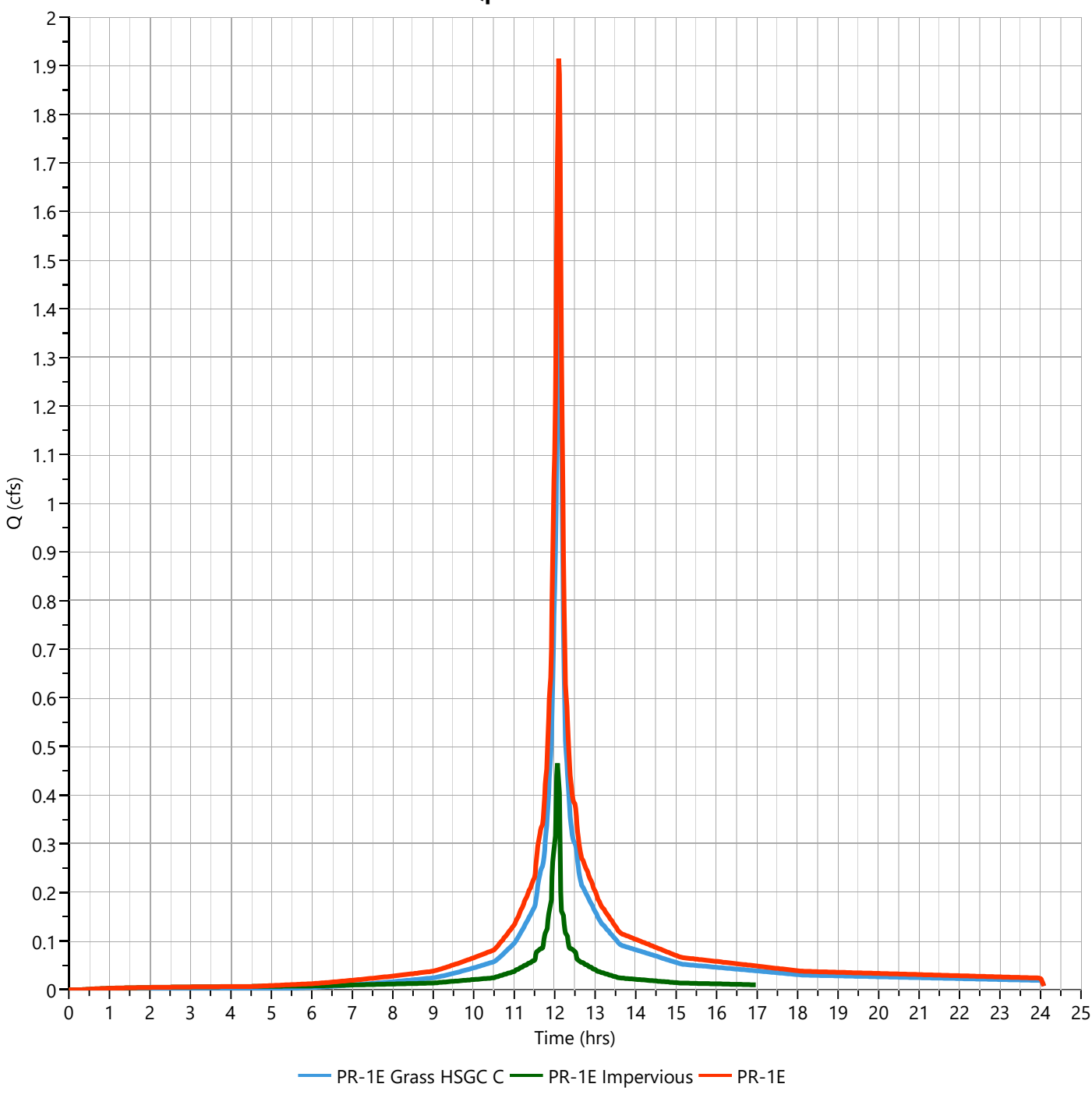
Hydrology Studio v 3.0.0.31

02-08-2024

PR-1E

Hyd. No. 24

Hydrograph Type	= Junction	Peak Flow	= 1.914 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 6,306 cuft
Inflow Hydrographs	= 22, 23	Total Contrib. Area	= 0.19 ac



COMBINED PROPOSED FLOW TO POA-1

Hydrograph Report

Project Name:

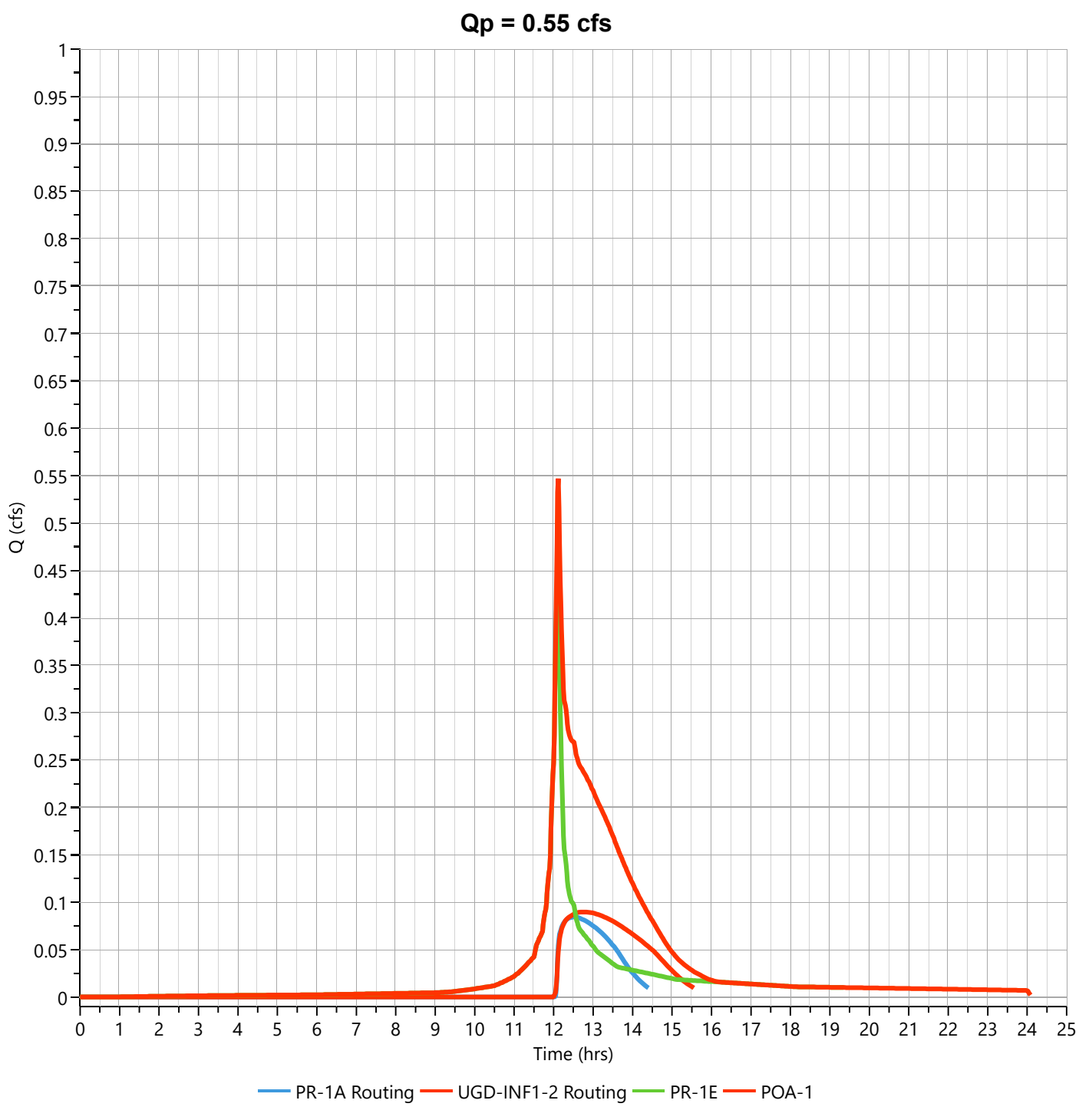
Hydrology Studio v 3.0.0.31

02-08-2024

POA-1

Hyd. No. 26

Hydrograph Type	= Junction	Peak Flow	= 0.547 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,734 cuft
Inflow Hydrographs	= 2, 20, 24	Total Contrib. Area	= 0.19 ac



Hydrograph Report

Project Name:

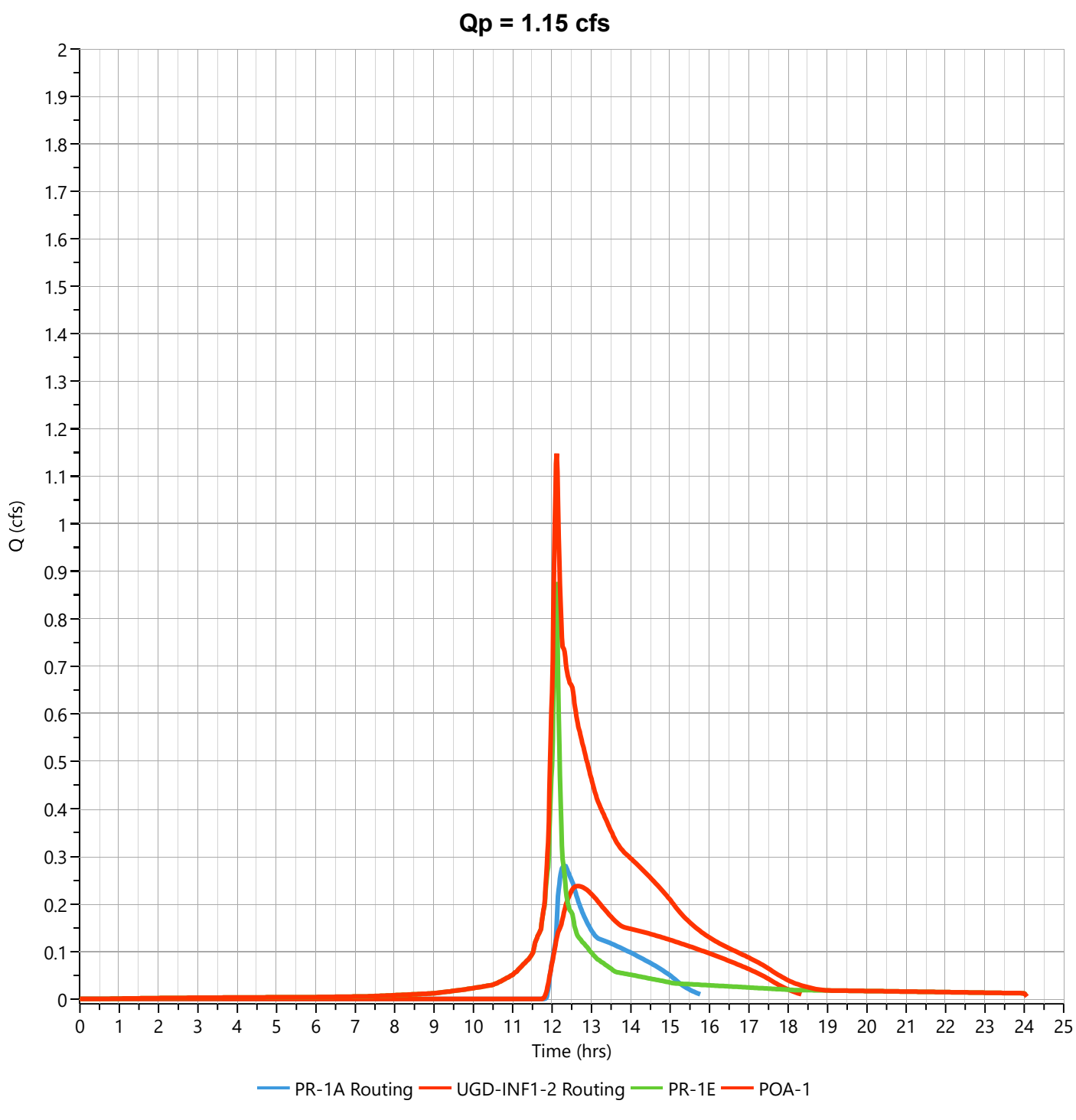
Hydrology Studio v 3.0.0.31

02-08-2024

POA-1

Hyd. No. 26

Hydrograph Type	= Junction	Peak Flow	= 1.148 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 7,095 cuft
Inflow Hydrographs	= 2, 20, 24	Total Contrib. Area	= 0.19 ac



Hydrograph Report

Project Name:

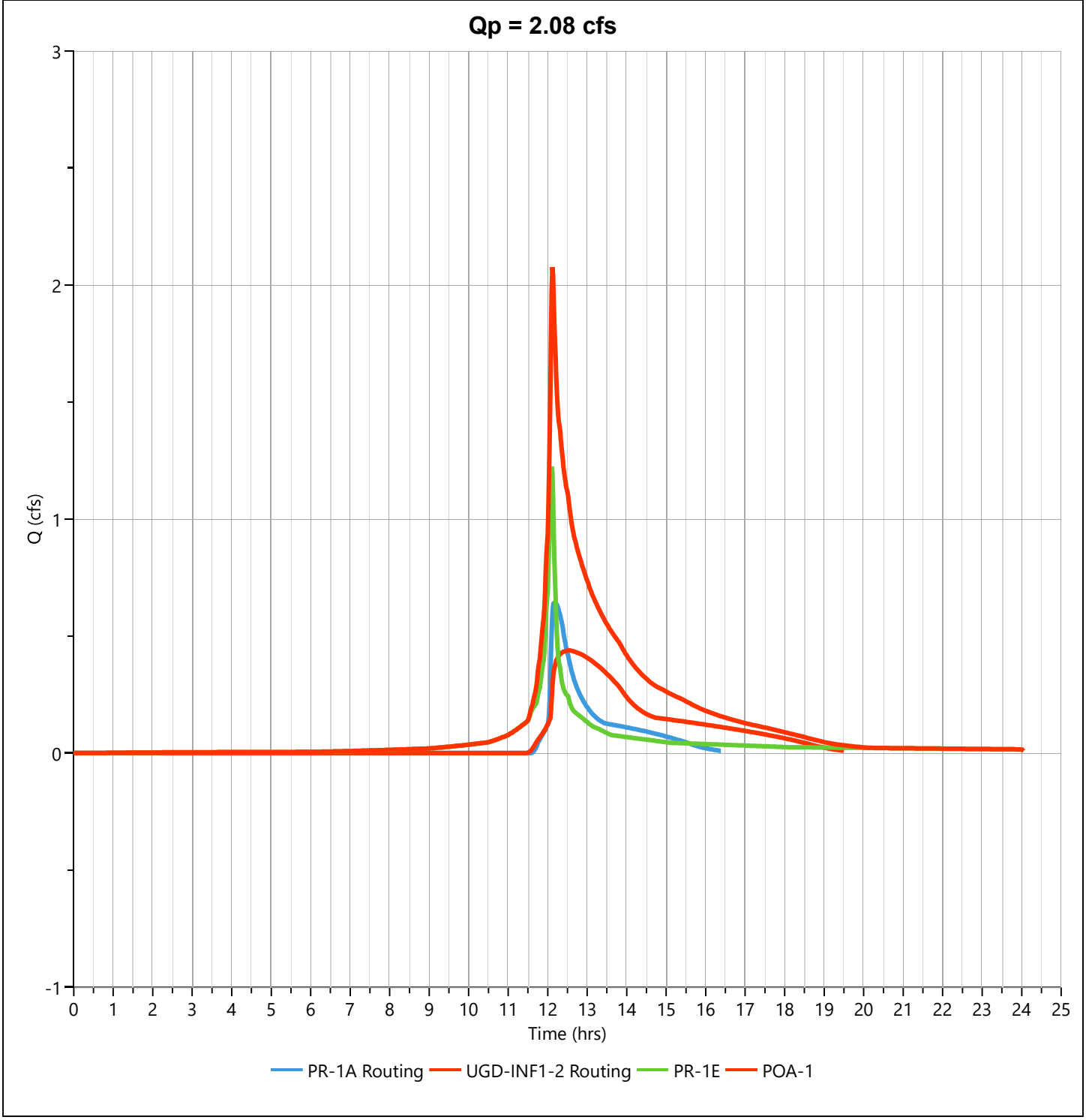
Hydrology Studio v 3.0.0.31

02-08-2024

POA-1

Hyd. No. 26

Hydrograph Type	= Junction	Peak Flow	= 2.076 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 11,188 cuft
Inflow Hydrographs	= 2, 20, 24	Total Contrib. Area	= 0.19 ac



Hydrograph Report

Project Name:

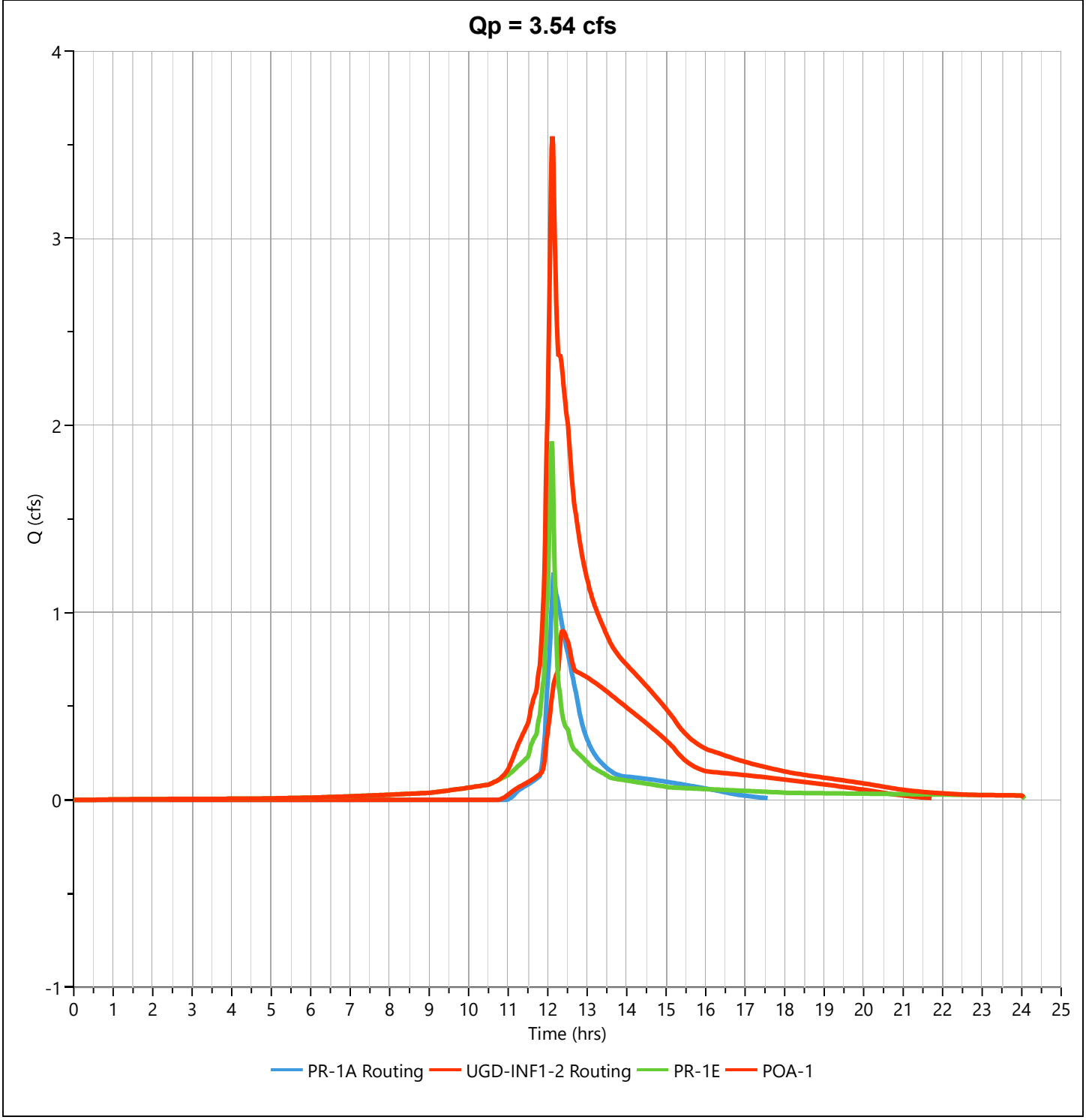
Hydrology Studio v 3.0.0.31

02-08-2024

POA-1

Hyd. No. 26

Hydrograph Type	= Junction	Peak Flow	= 3.544 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 20,000 cuft
Inflow Hydrographs	= 2, 20, 24	Total Contrib. Area	= 0.19 ac



PR-2A WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/6/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/6/2024**

Circle One: Present **Developed** — **Future Proposed Watershed PR-2A - Impervious**

Circle One: **T_c** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		
1.	Surface Description (NEH table 15-1)		Smooth Surfaces		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011		
3.	Design Flow Length, L_{des} (L_{des} < 100 ft)	ft	30		
4.	Two-year 24-hr rainfall, P_2	in	4.12		
5.	Land Slope, s	ft/ft	0.026		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	100		
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.006	+	+
				Sheet Flow Sub-Total	0.006 hours

Shallow Concentrated Flow		Segment ID			
8.	Surface Description				
9.	Flow Length, L	ft			
10.	Watercourse Slope, s	ft/ft			
11.	Average Velocity, V (NEH table 15-3)	ft/s			
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+	+
				Shallow Conc. Flow Sub-Total	0.000 hours

Channel Flow		Segment ID			
13.	Flow Length, L	ft			
14.	Cross Sectional flow area, a	ft^2			
15.	Wetted Perimeter, P_w	ft			
16.	Hydraulic Radius, r $r = a / P_w$	ft			
17.	Channel Slope, s	ft/ft			
18.	Manning's Roughness Coeff., n				
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s			
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+	+
				Channel Flow Sub-Total	0.000 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.006 hours
(Add Sub-Total T_t from prior steps)	Software Limitations Require Minimum Tc =	2 minutes

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/6/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/6/2024**

Circle One: Present **(Developed)** — **Future Proposed Watershed PR-2A - Pervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		2		
1.	Surface Description (NEH table 15-1)		Dense Grasses		Smooth Surfaces		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.24		0.011		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	19		31		
4.	Two-year 24-hr rainfall, P_2	in	4.12		4.12		
5.	Land Slope, s	ft/ft	0.022		0.028		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	61		100		
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.055	+	0.006	+	
					Sheet Flow Sub-Total		0.061 hours

Shallow Concentrated Flow		Segment ID					
8.	Surface Description						
9.	Flow Length, L	ft					
10.	Watercourse Slope, s	ft/ft					
11.	Average Velocity, V (NEH table 15-3)	ft/s					
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+		+	
					Shallow Conc. Flow Sub-Total		0.000 hours

Channel Flow		Segment ID					
13.	Flow Length, L	ft					
14.	Cross Sectional flow area, a	ft^2					
15.	Wetted Perimeter, P_w	ft					
16.	Hydraulic Radius, r $r = a / P_w$	ft					
17.	Channel Slope, s	ft/ft					
18.	Manning's Roughness Coeff., n						
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s					
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+		+	
					Channel Flow Sub-Total		0.000 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.061 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	4 minutes

Hydrograph Report

Project Name:

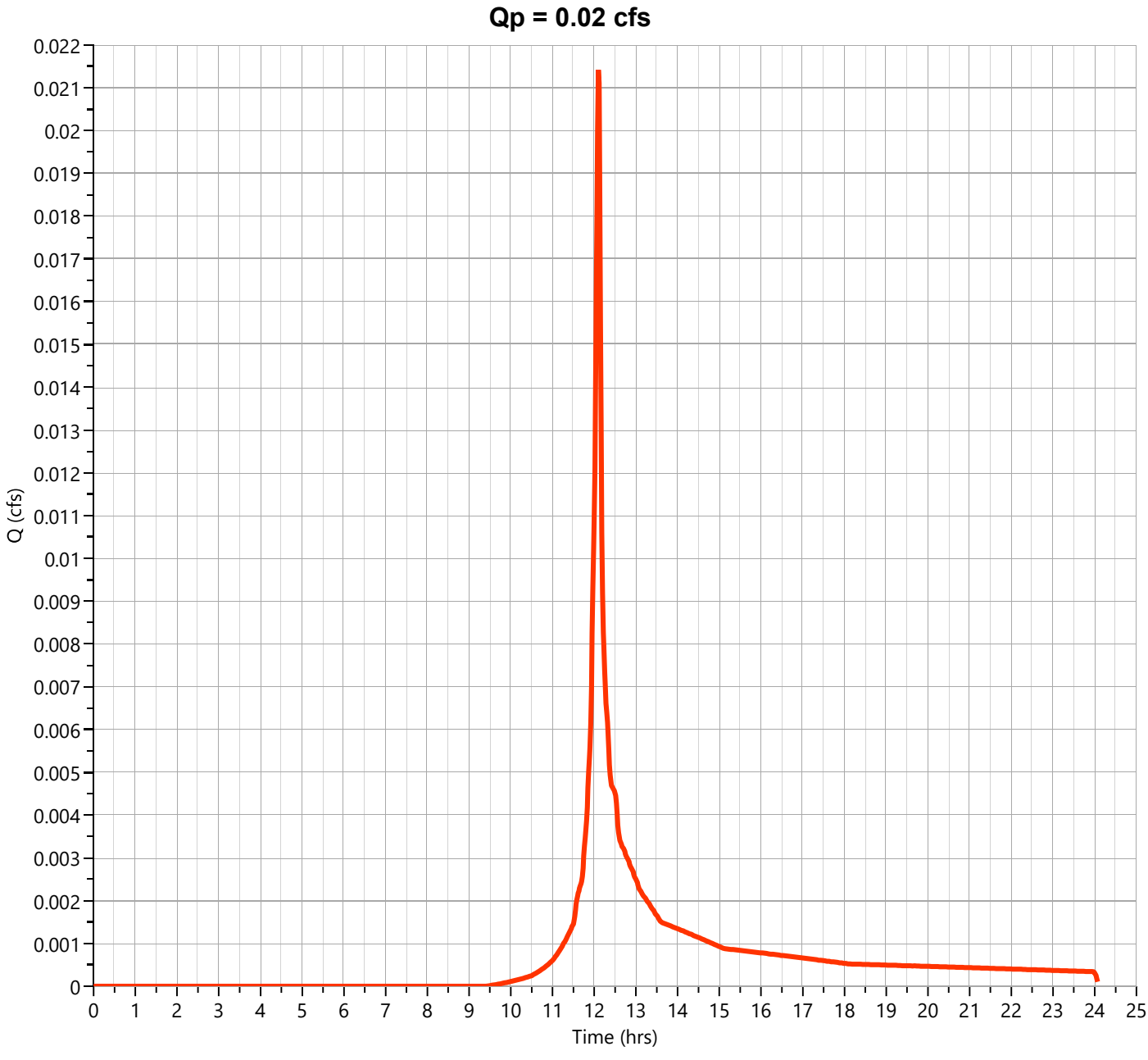
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2A Grass HSGC C

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.021 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 61.2 cuft
Drainage Area	= 0.01 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

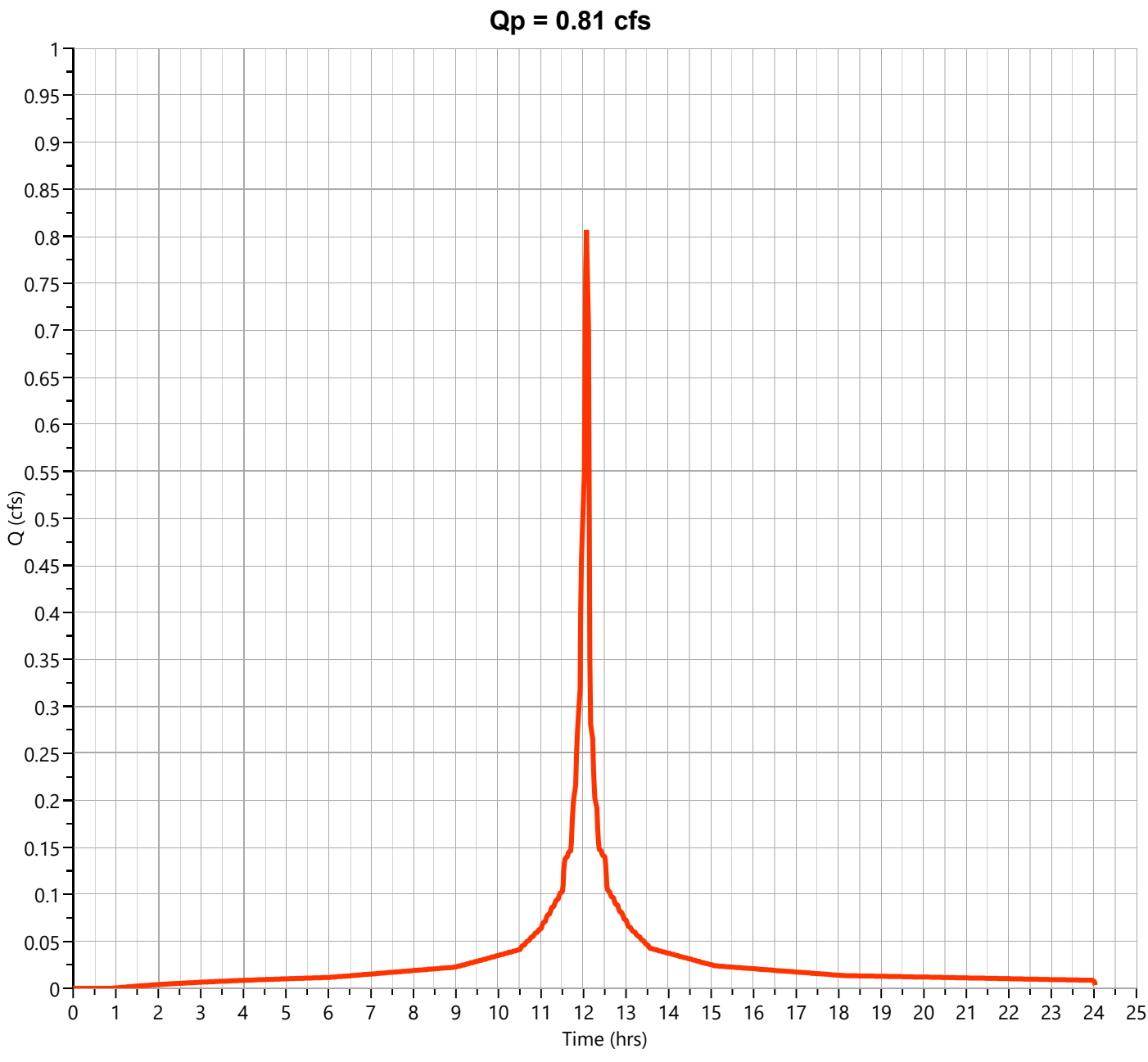
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2A Impervious

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.807 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 2,644 cuft
Drainage Area	= 0.2 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

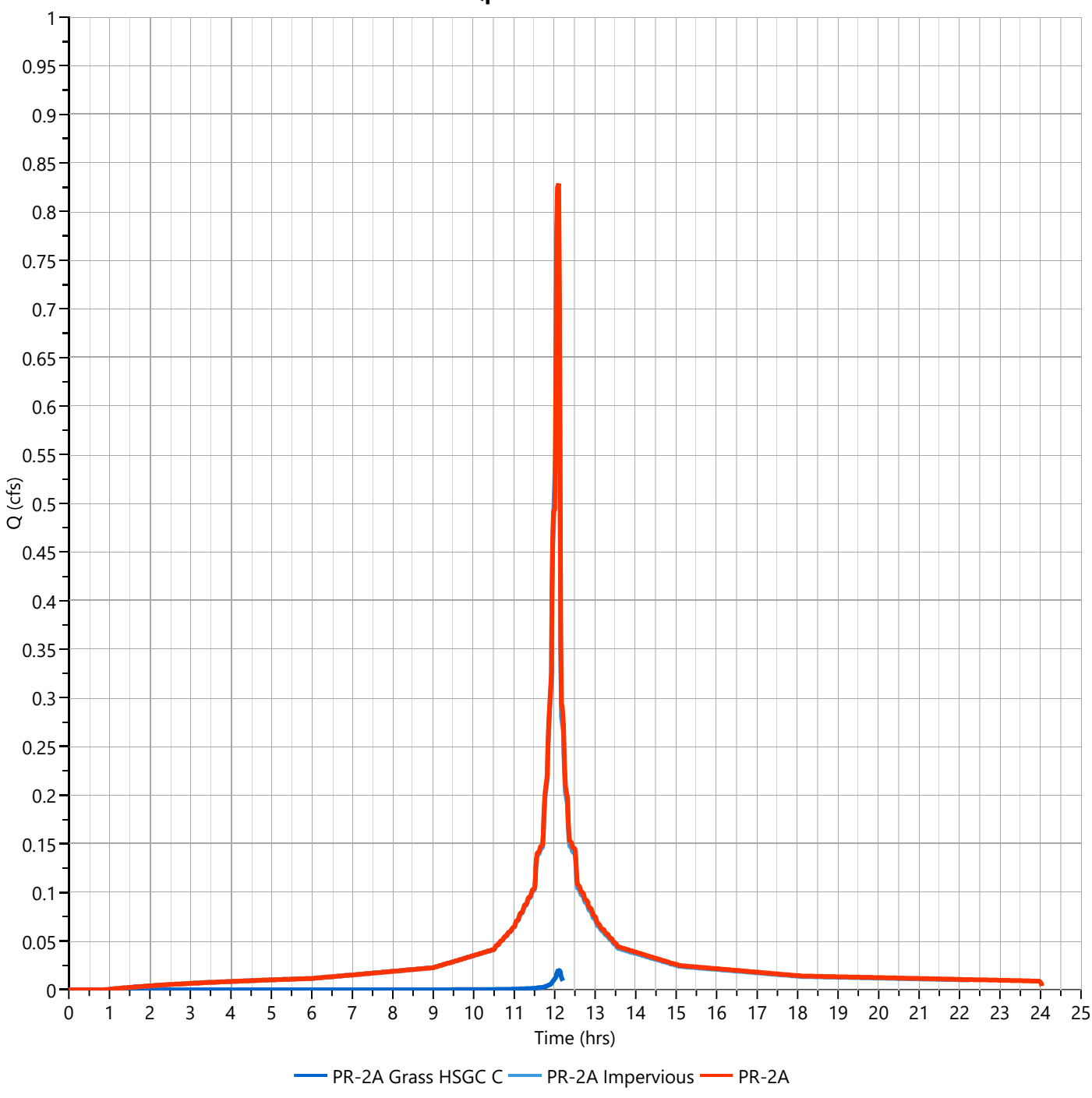
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2A

Hyd. No. 3

Hydrograph Type	= Junction	Peak Flow	= 0.829 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,705 cuft
Inflow Hydrographs	= 1, 2	Total Contrib. Area	= 0.21 ac



Hydrograph Report

Project Name:

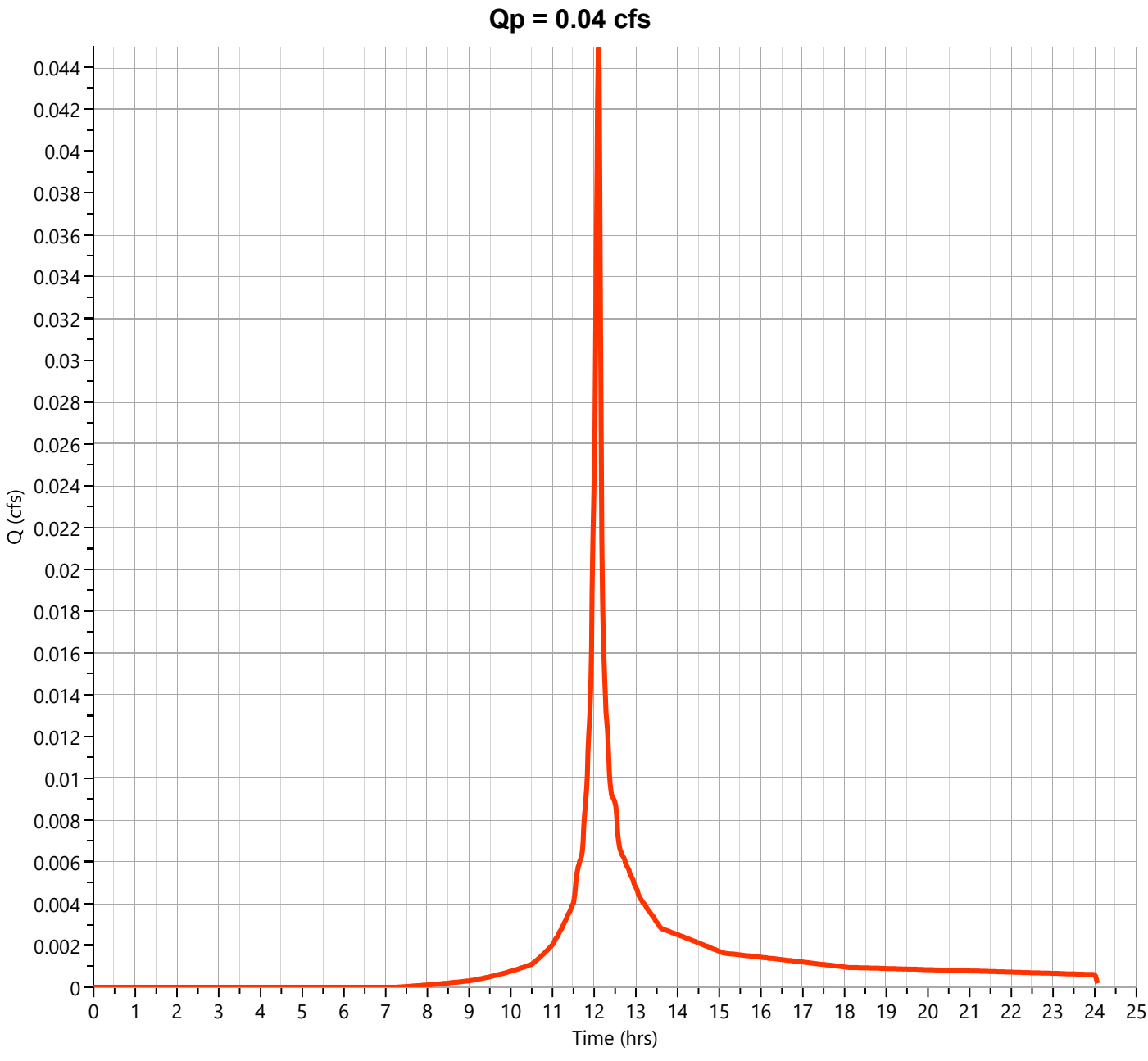
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2A Grass HSGC C

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.045 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 129 cuft
Drainage Area	= 0.01 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

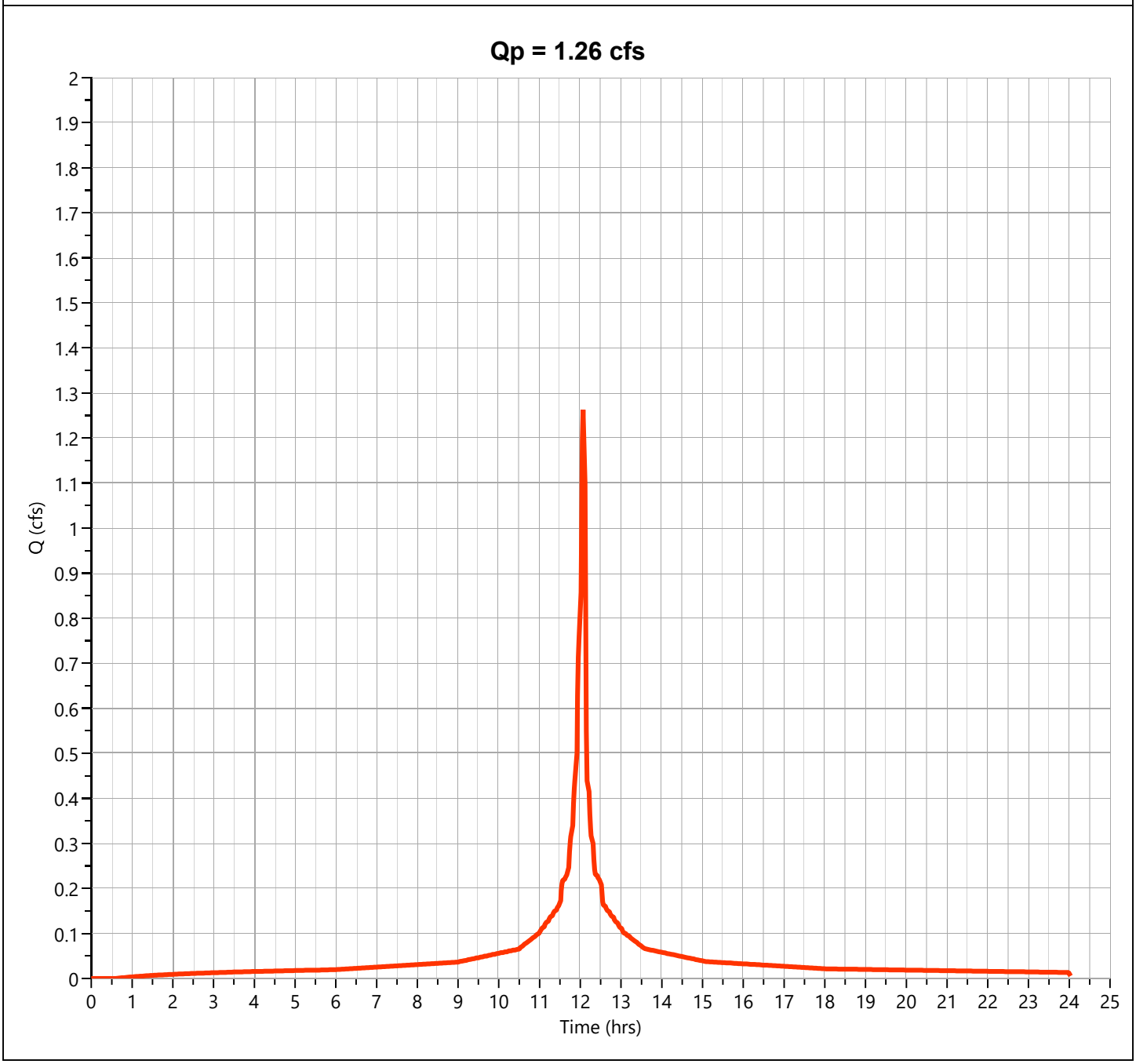
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2A Impervious

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.263 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 4,207 cuft
Drainage Area	= 0.2 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

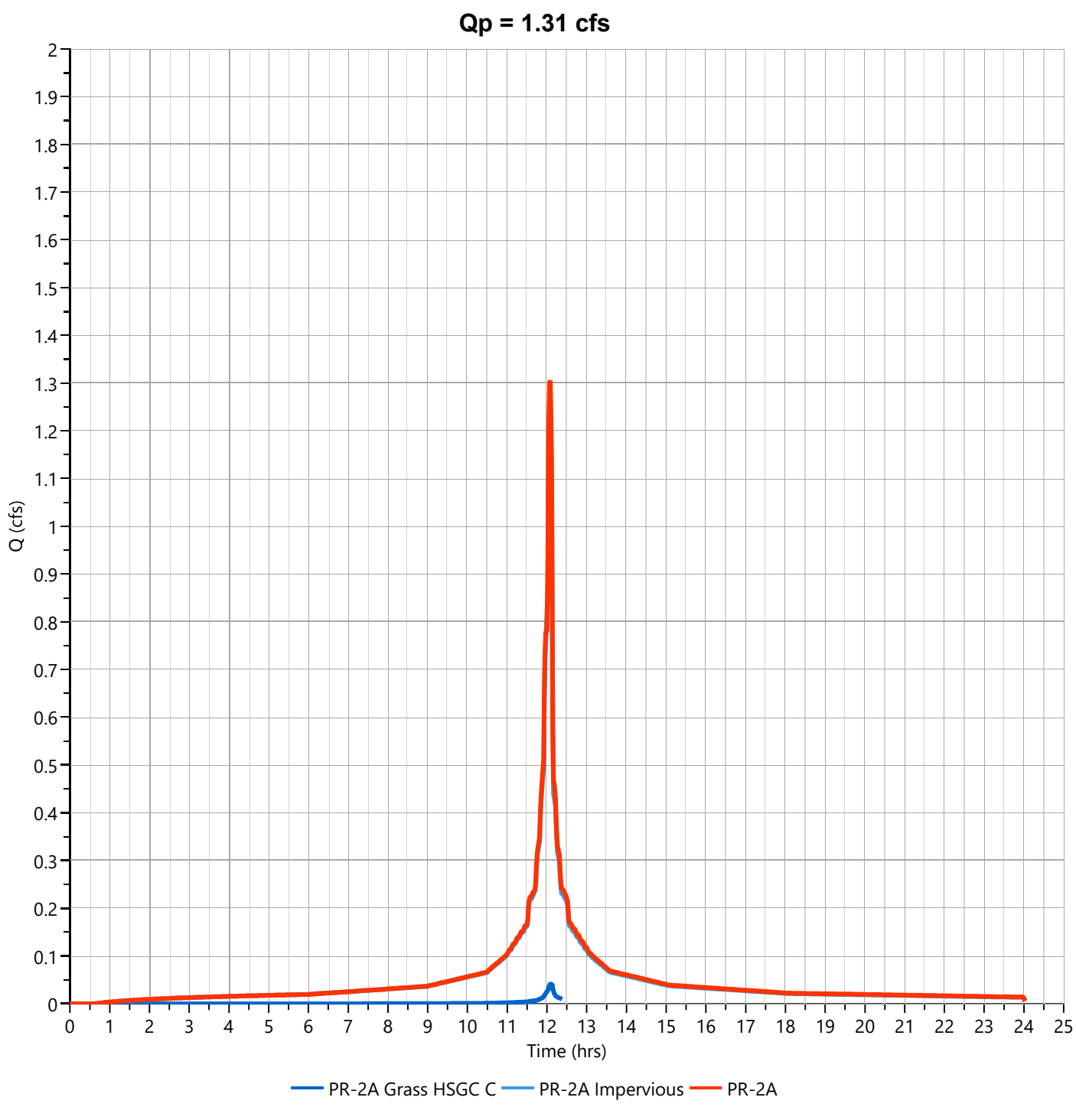
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2A

Hyd. No. 3

Hydrograph Type	= Junction	Peak Flow	= 1.308 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 4,336 cuft
Inflow Hydrographs	= 1, 2	Total Contrib. Area	= 0.21 ac



Hydrograph Report

Project Name:

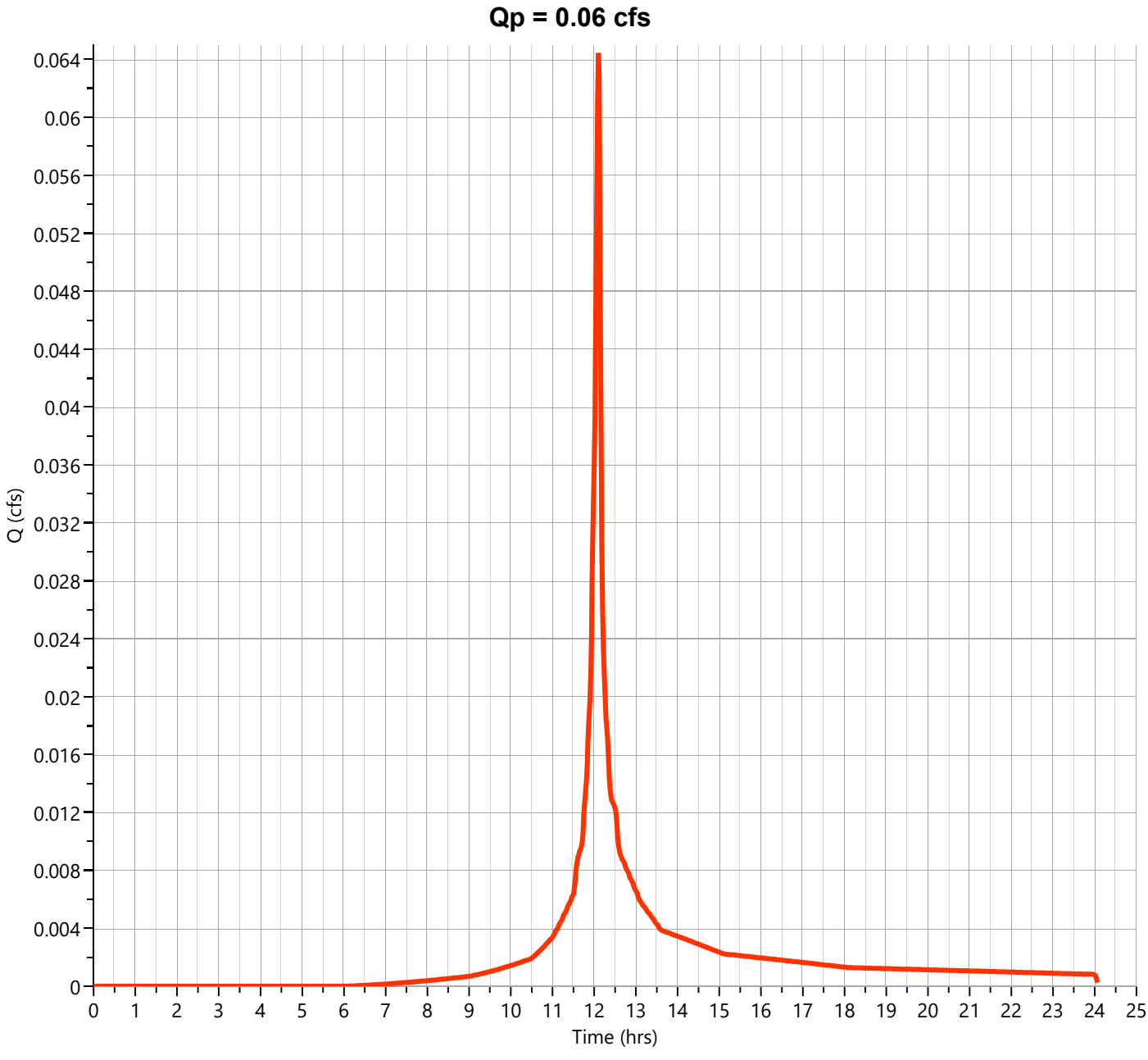
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2A Grass HSGC C

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.064 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 186 cuft
Drainage Area	= 0.01 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

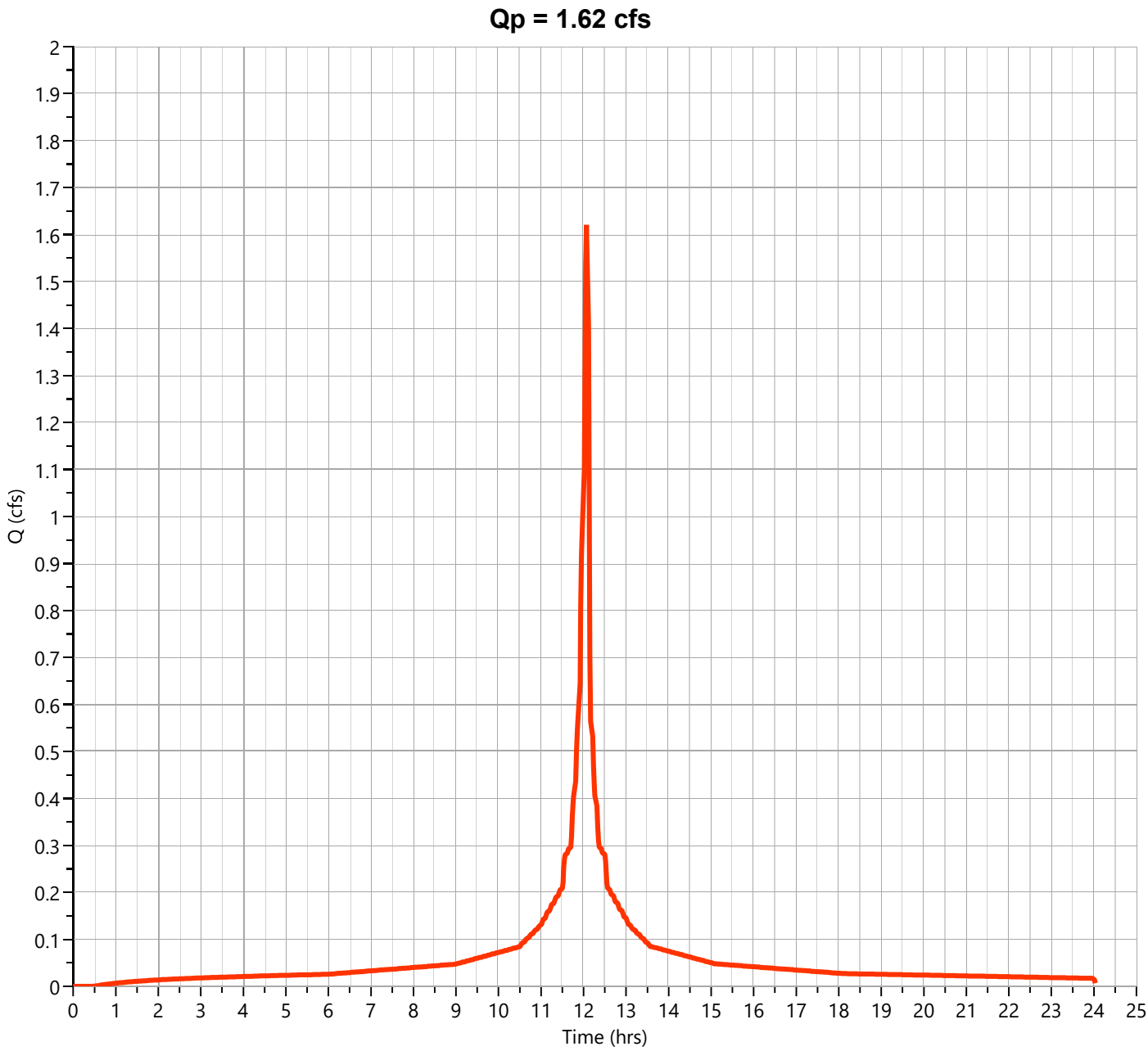
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2A Impervious

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.621 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 5,438 cuft
Drainage Area	= 0.2 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

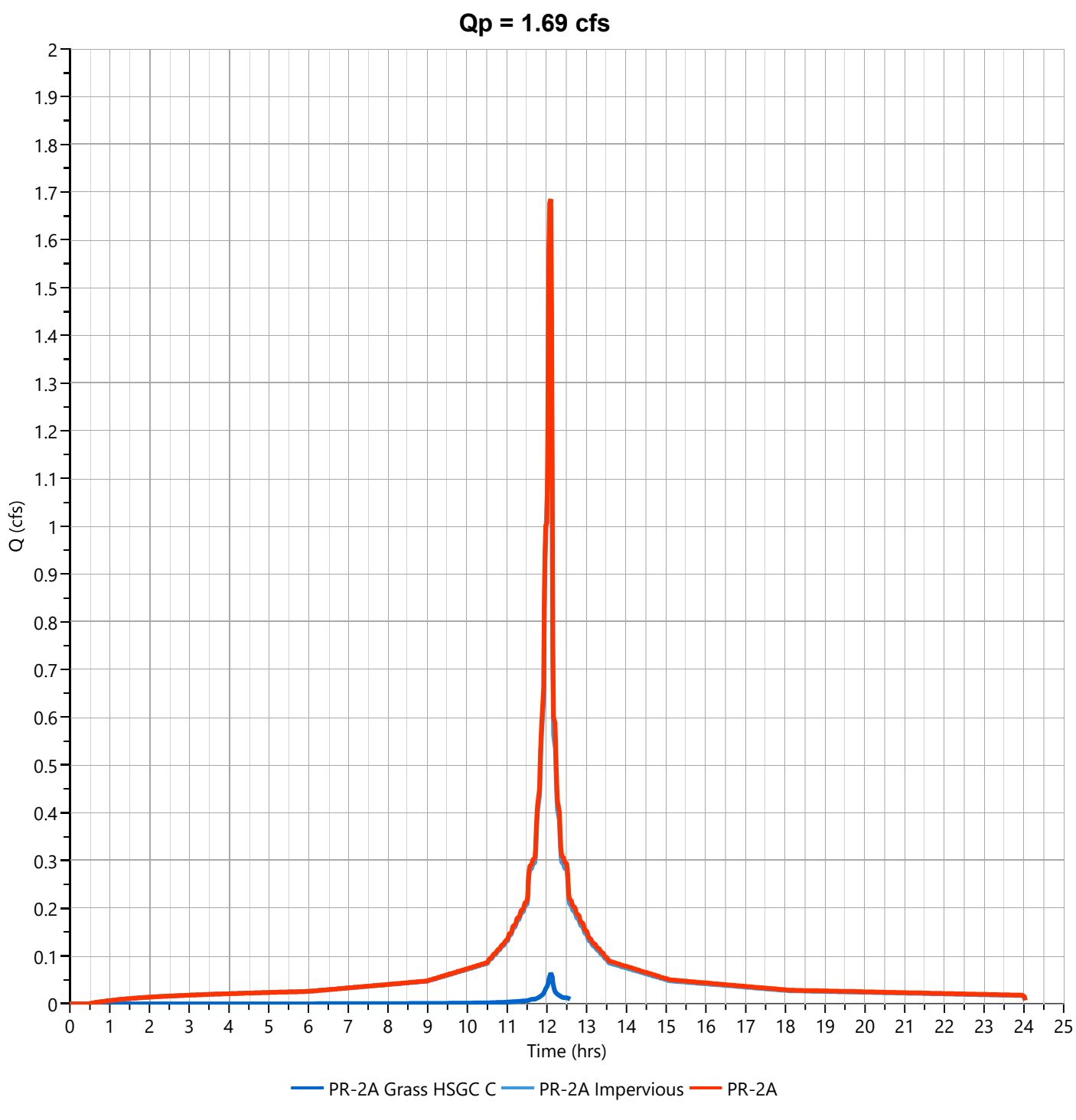
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2A

Hyd. No. 3

Hydrograph Type	= Junction	Peak Flow	= 1.685 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 5,625 cuft
Inflow Hydrographs	= 1, 2	Total Contrib. Area	= 0.21 ac



Hydrograph Report

Project Name:

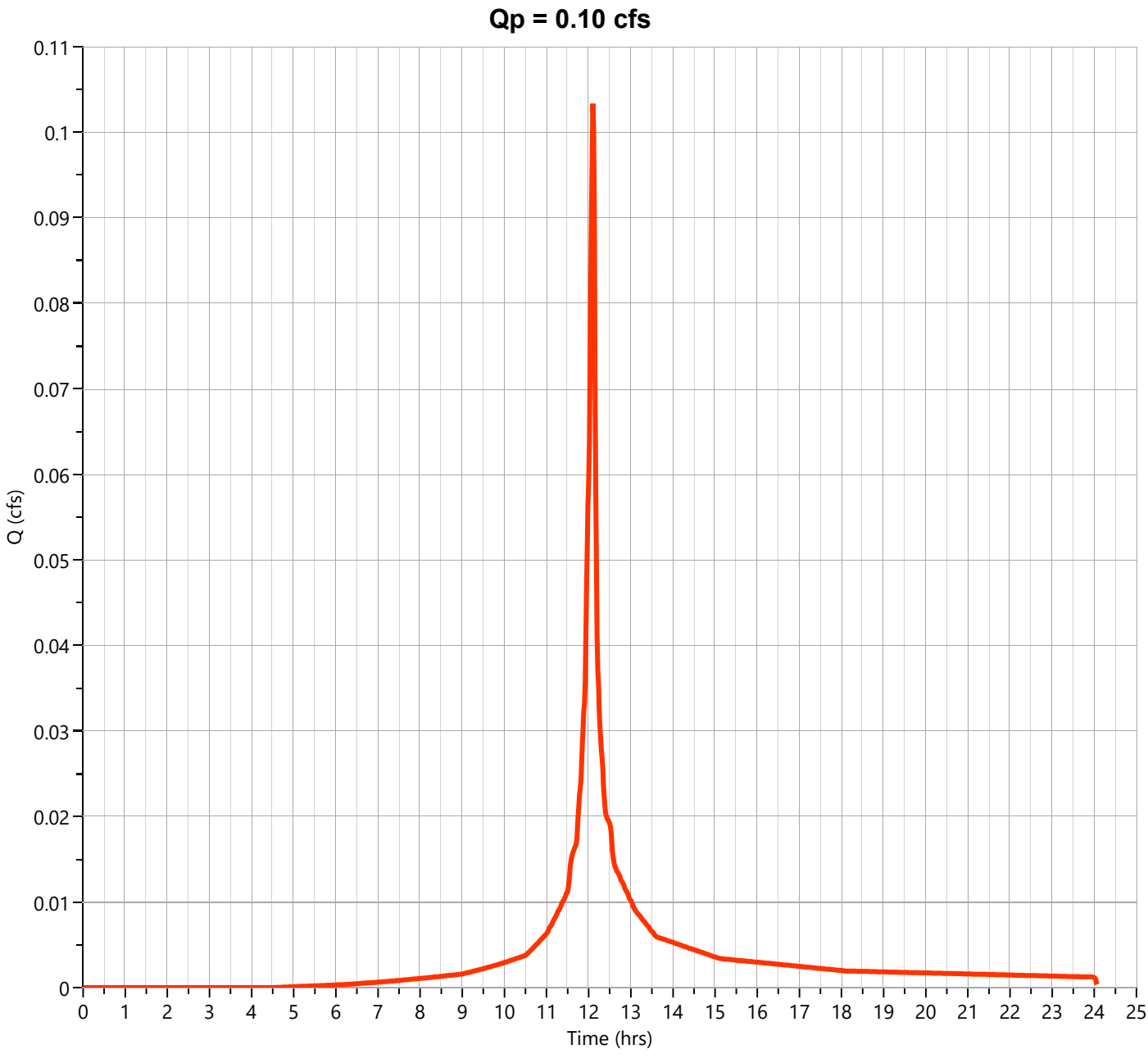
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2A Grass HSGC C

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.103 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 306 cuft
Drainage Area	= 0.01 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

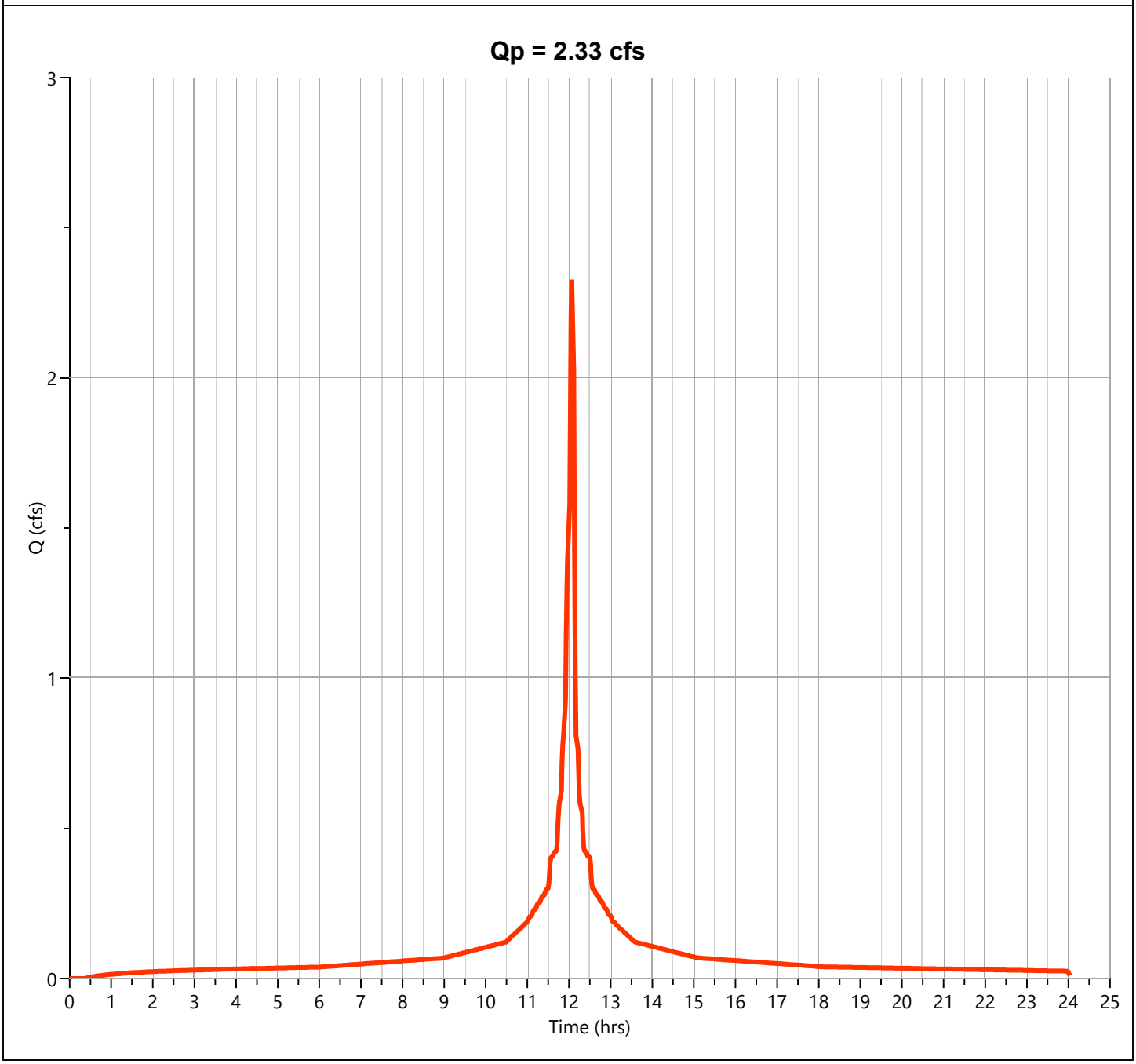
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2A Impervious

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.326 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 7,867 cuft
Drainage Area	= 0.2 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

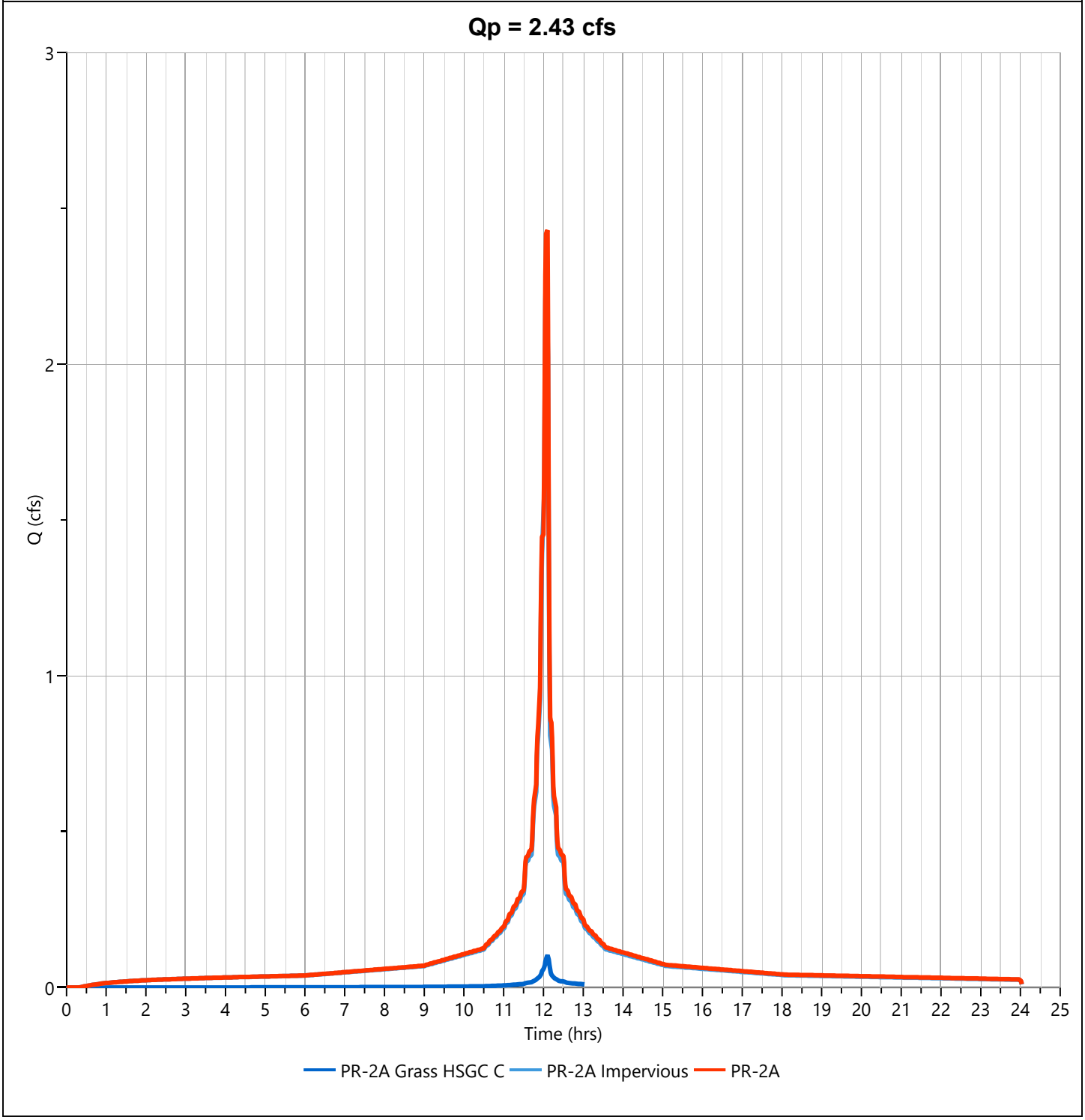
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2A

Hyd. No. 3

Hydrograph Type	= Junction	Peak Flow	= 2.430 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 8,173 cuft
Inflow Hydrographs	= 1, 2	Total Contrib. Area	= 0.21 ac



PR-2B WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/6/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/6/2024**

Circle One: Present **(Developed)** — **Future Proposed Watershed PR-2B - Impervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		
1.	Surface Description (NEH table 15-1)		Smooth Surfaces		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011		
3.	Design Flow Length, L_{des} (L_{des} < 100 ft)	ft	44		
4.	Two-year 24-hr rainfall, P_2	in	4.12		
5.	Land Slope, s	ft/ft	0.010		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	100		
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.012	+	+
				Sheet Flow Sub-Total	0.012 hours

Shallow Concentrated Flow		Segment ID	2		
8.	Surface Description		Grassed Waterways		
9.	Flow Length, L	ft	53		
10.	Watercourse Slope, s	ft/ft	0.010		
11.	Average Velocity, V (NEH table 15-3)	ft/s	1.61		
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.009	+	+
				Shallow Conc. Flow Sub-Total	0.009 hours

Channel Flow		Segment ID	3		
13.	Flow Length, L	ft	40		
14.	Cross Sectional flow area, a	ft^2	0.61		
15.	Wetted Perimeter, P_w	ft	2.00		
16.	Hydraulic Radius, r $r = a / P_w$	ft	0.31		
17.	Channel Slope, s	ft/ft	0.005		
18.	Manning's Roughness Coeff., n		0.012		
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	3.98		
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.003	+	+
				Channel Flow Sub-Total	0.003 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.024 hours
(Add Sub-Total T_t from prior steps)	Software Limitations Require Minimum Tc =	2 minutes

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/6/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/6/2024**

Circle One: Present **(Developed)** — **Future Proposed Watershed PR-2B - Pervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		2		3
1.	Surface Description (NEH table 15-1)		Dense Grasses		Smooth Surfaces		Dense Grasses
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.24		0.011		0.24
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	14		17		23
4.	Two-year 24-hr rainfall, P_2	in	4.12		4.12		4.12
5.	Land Slope, s	ft/ft	0.019		0.011		0.010
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	58		100		41
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.044	+	0.005	+	0.087
					Sheet Flow Sub-Total		0.136 hours

Shallow Concentrated Flow		Segment ID	4				
8.	Surface Description		Grassed Waterways				
9.	Flow Length, L	ft	30				
10.	Watercourse Slope, s	ft/ft	0.010				
11.	Average Velocity, V (NEH table 15-3)	ft/s	1.64				
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.005	+		+	
					Shallow Conc. Flow Sub-Total		0.005 hours

Channel Flow		Segment ID	5				
13.	Flow Length, L	ft	40				
14.	Cross Sectional flow area, a	ft^2	0.61				
15.	Wetted Perimeter, P_w	ft	2.00				
16.	Hydraulic Radius, r $r = a / P_w$	ft	0.31				
17.	Channel Slope, s	ft/ft	0.005				
18.	Manning's Roughness Coeff., n		0.012				
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	3.98				
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.003	+		+	
					Channel Flow Sub-Total		0.003 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.144 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	9 minutes

Hydrograph Report

Project Name:

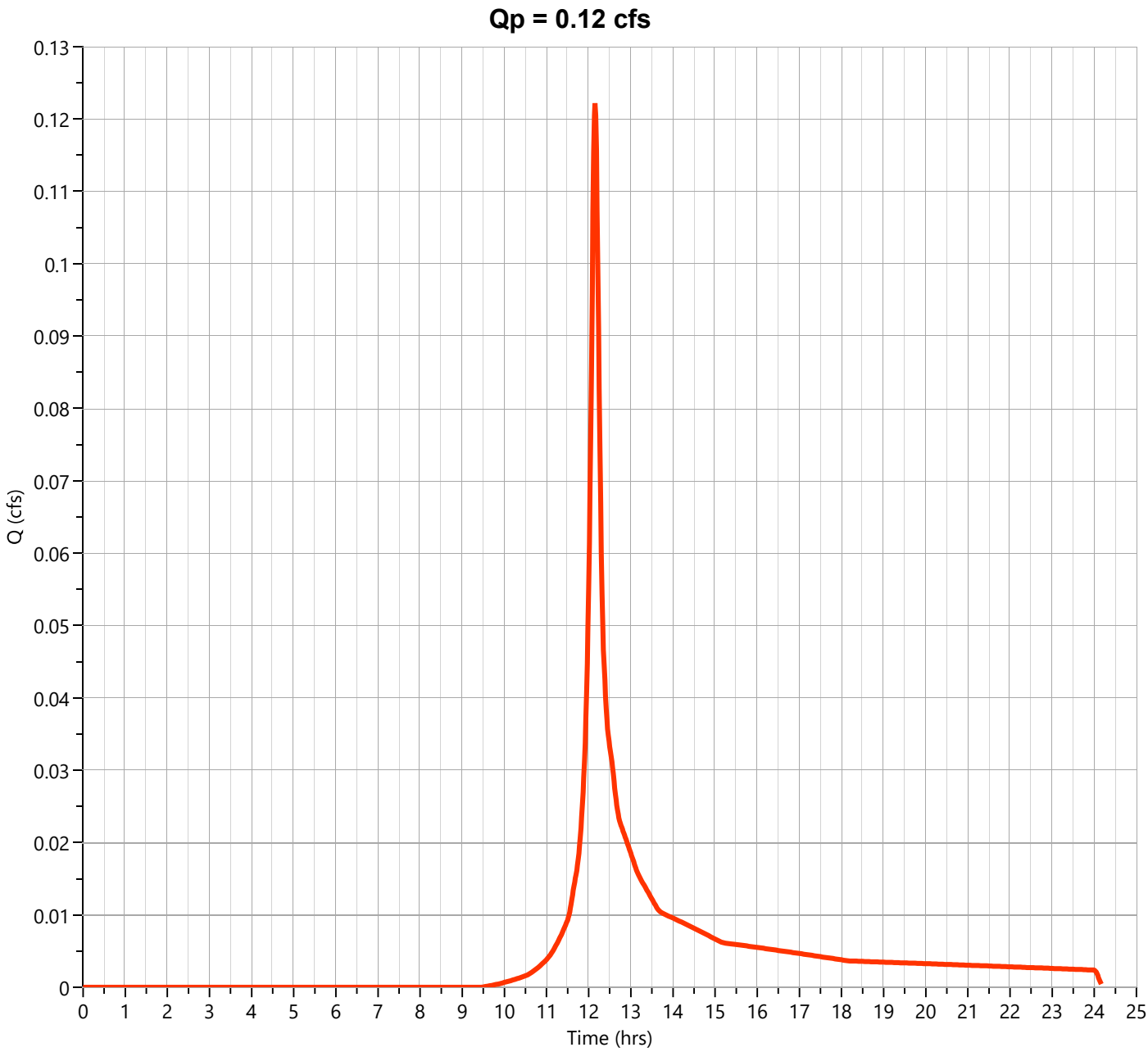
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B Grass HSGC C

Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.122 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Runoff Volume	= 428 cuft
Drainage Area	= 0.07 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 9.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

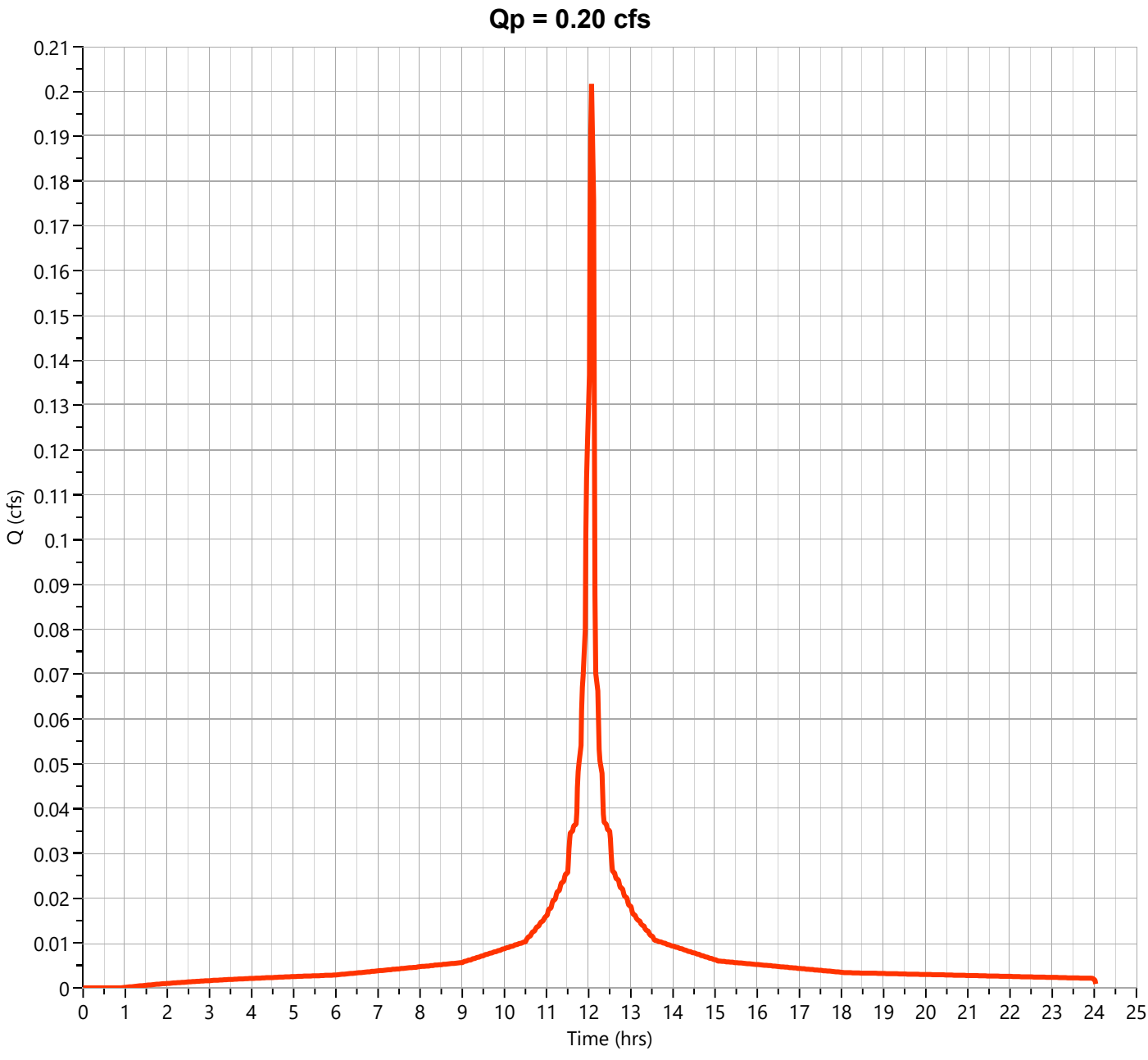
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B Impervious

Hyd. No. 7

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.202 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 661 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

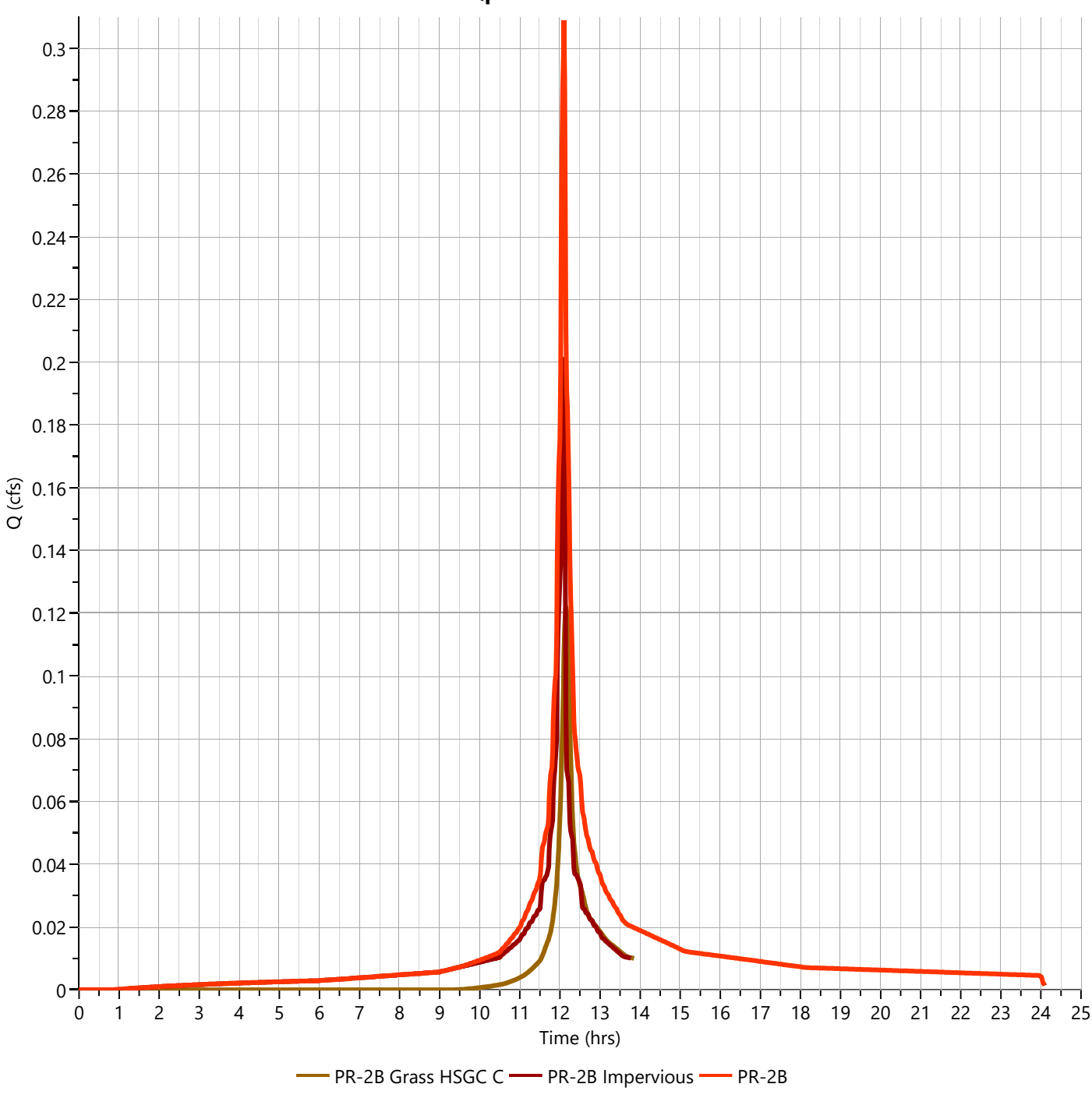
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B

Hyd. No. 8

Hydrograph Type	= Junction	Peak Flow	= 0.309 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,089 cuft
Inflow Hydrographs	= 6, 7	Total Contrib. Area	= 0.12 ac



Hydrograph Report

Project Name:

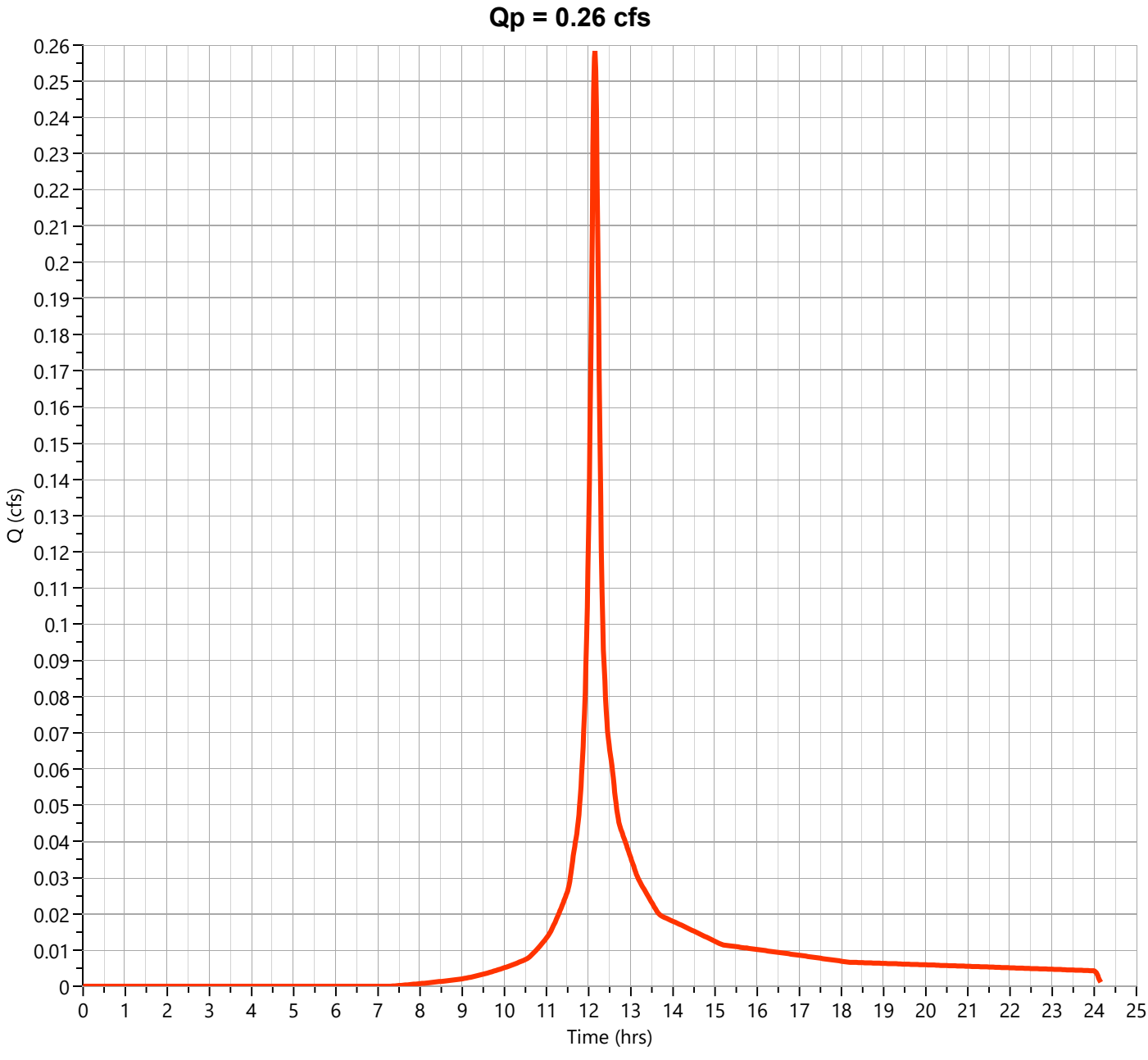
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B Grass HSGC C

Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.258 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Runoff Volume	= 900 cuft
Drainage Area	= 0.07 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 9.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

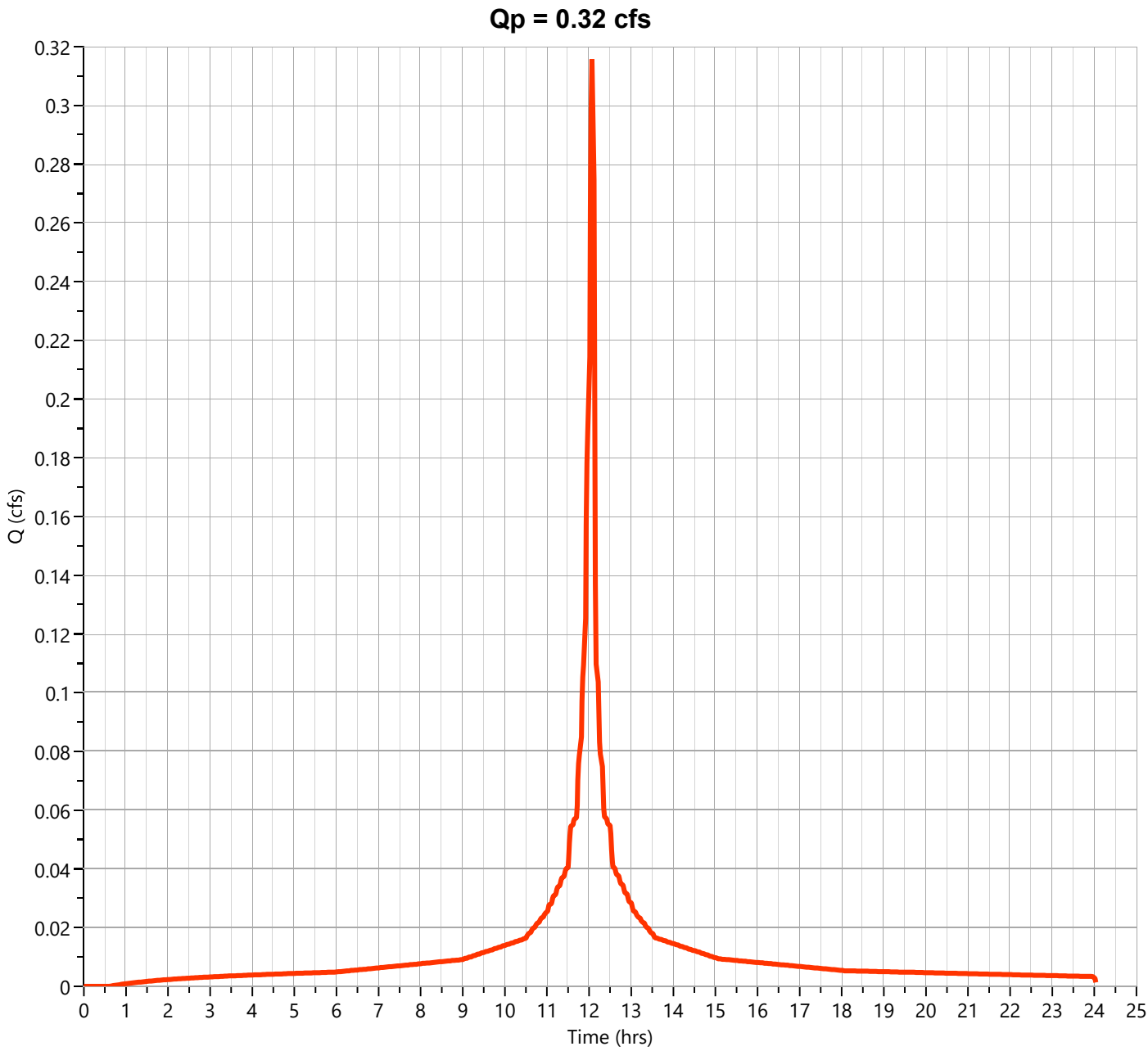
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B Impervious

Hyd. No. 7

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.316 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,052 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

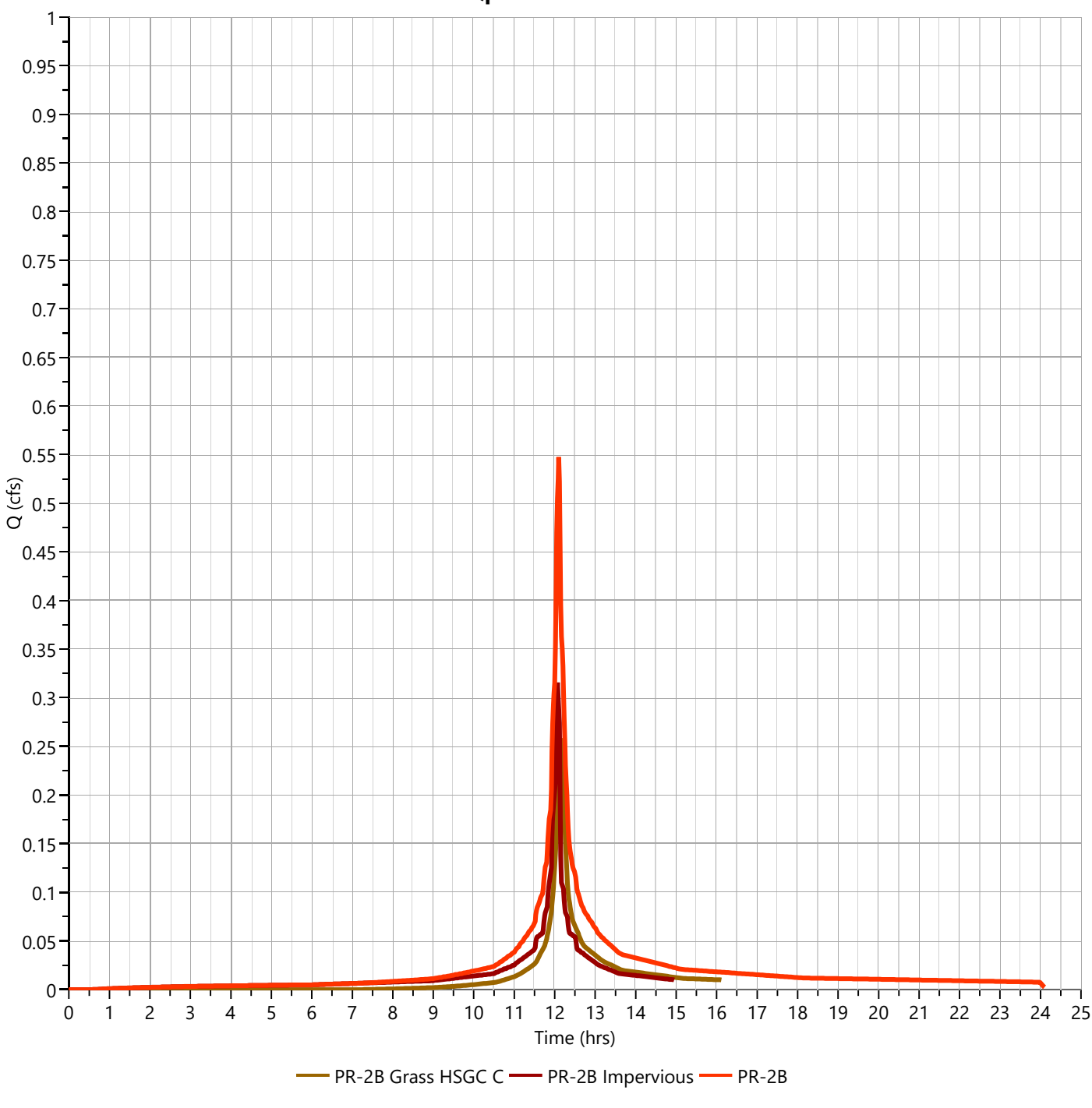
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B

Hyd. No. 8

Hydrograph Type	= Junction	Peak Flow	= 0.548 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,952 cuft
Inflow Hydrographs	= 6, 7	Total Contrib. Area	= 0.12 ac



Hydrograph Report

Project Name:

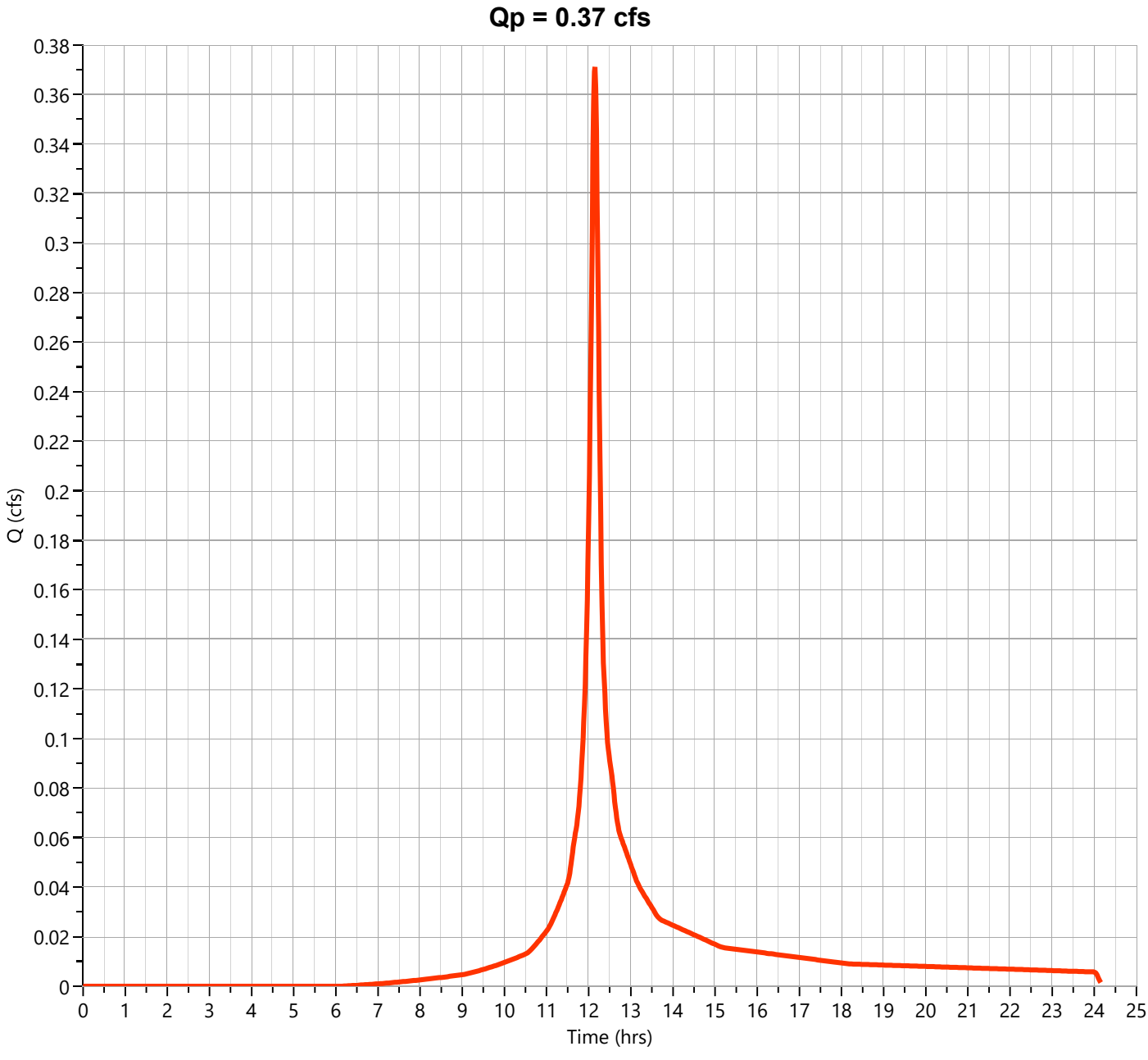
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B Grass HSGC C

Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.371 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Runoff Volume	= 1,304 cuft
Drainage Area	= 0.07 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 9.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

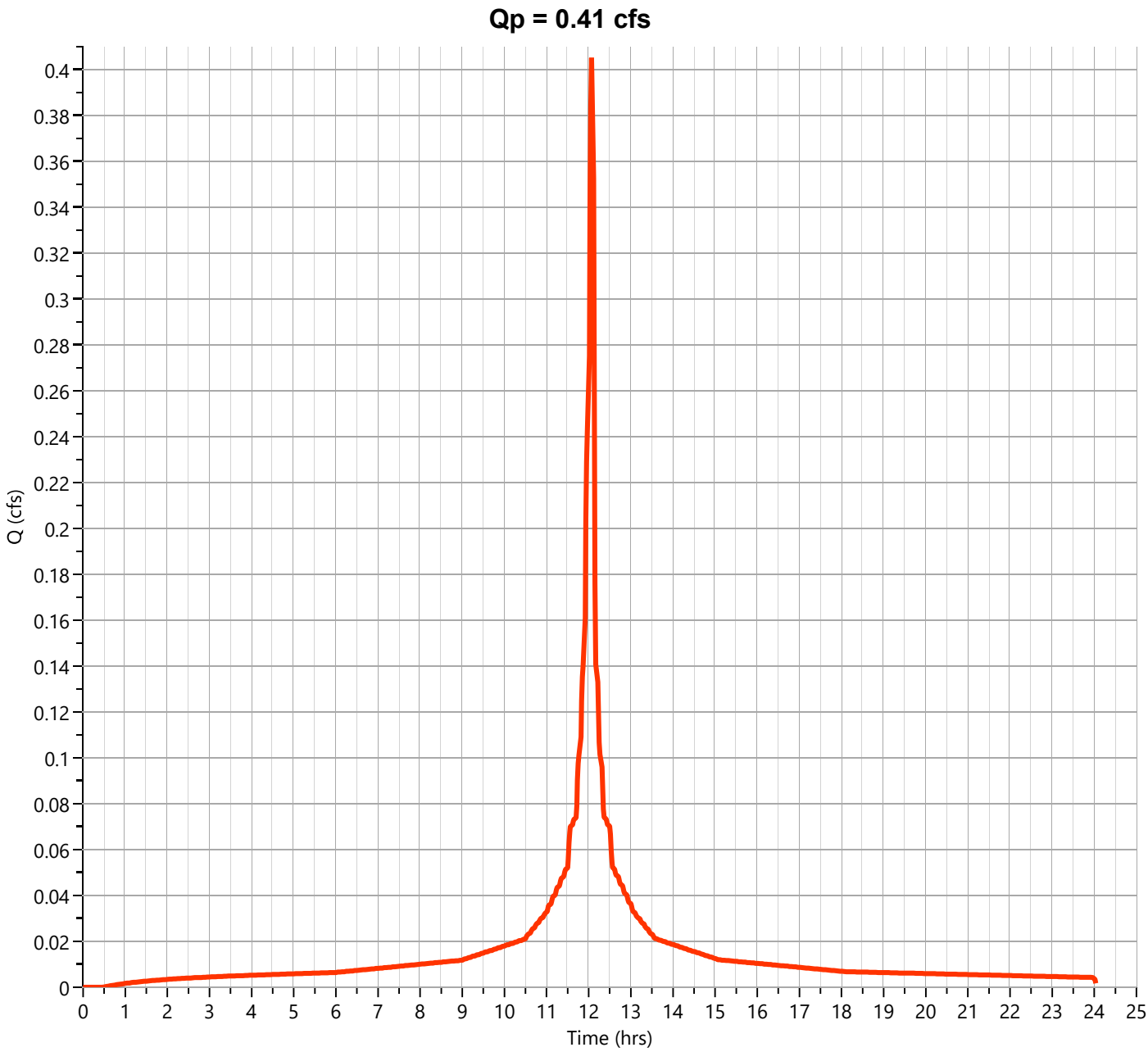
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B Impervious

Hyd. No. 7

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.405 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,360 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

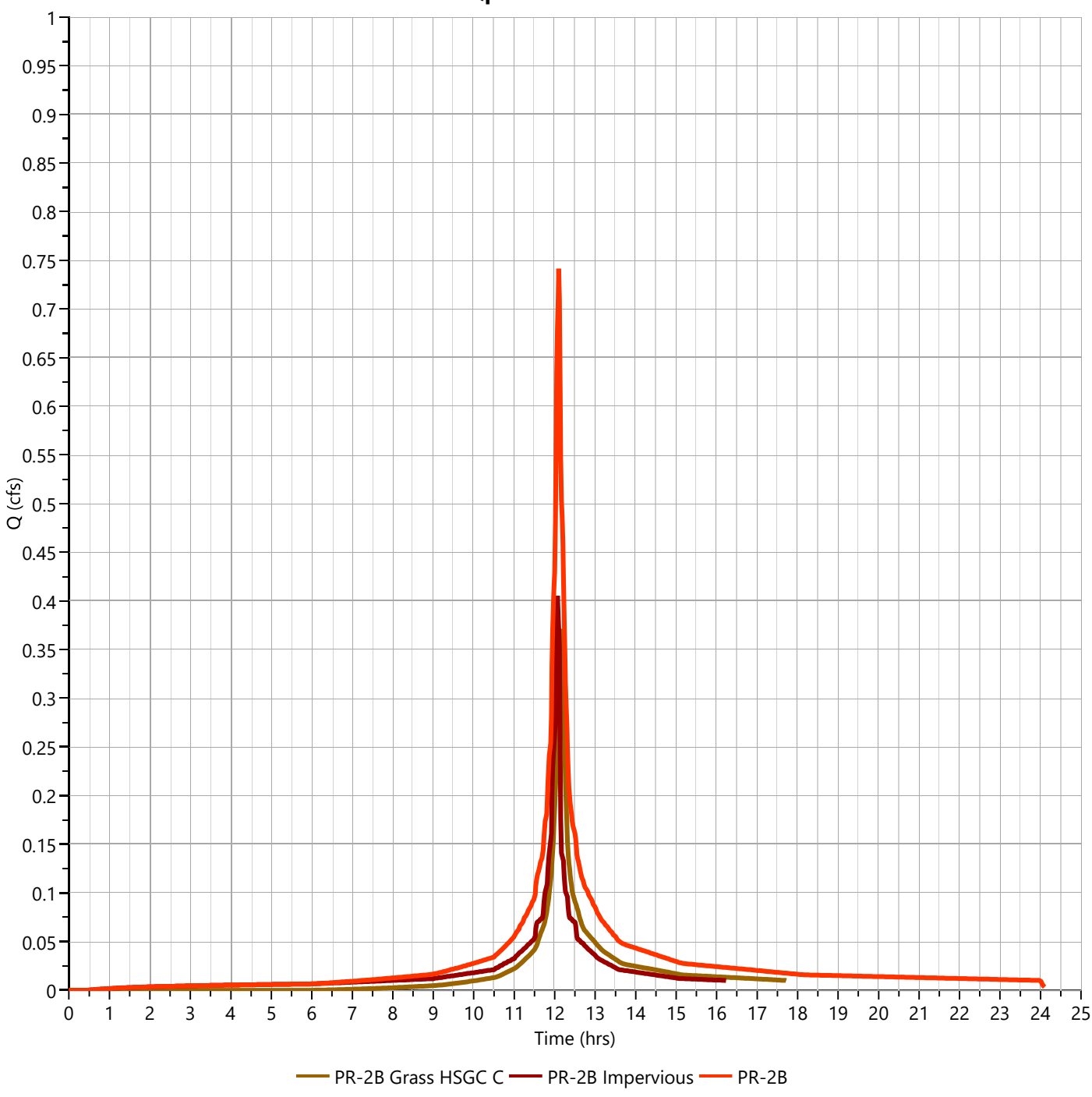
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B

Hyd. No. 8

Hydrograph Type	= Junction	Peak Flow	= 0.741 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,664 cuft
Inflow Hydrographs	= 6, 7	Total Contrib. Area	= 0.12 ac



Hydrograph Report

Project Name:

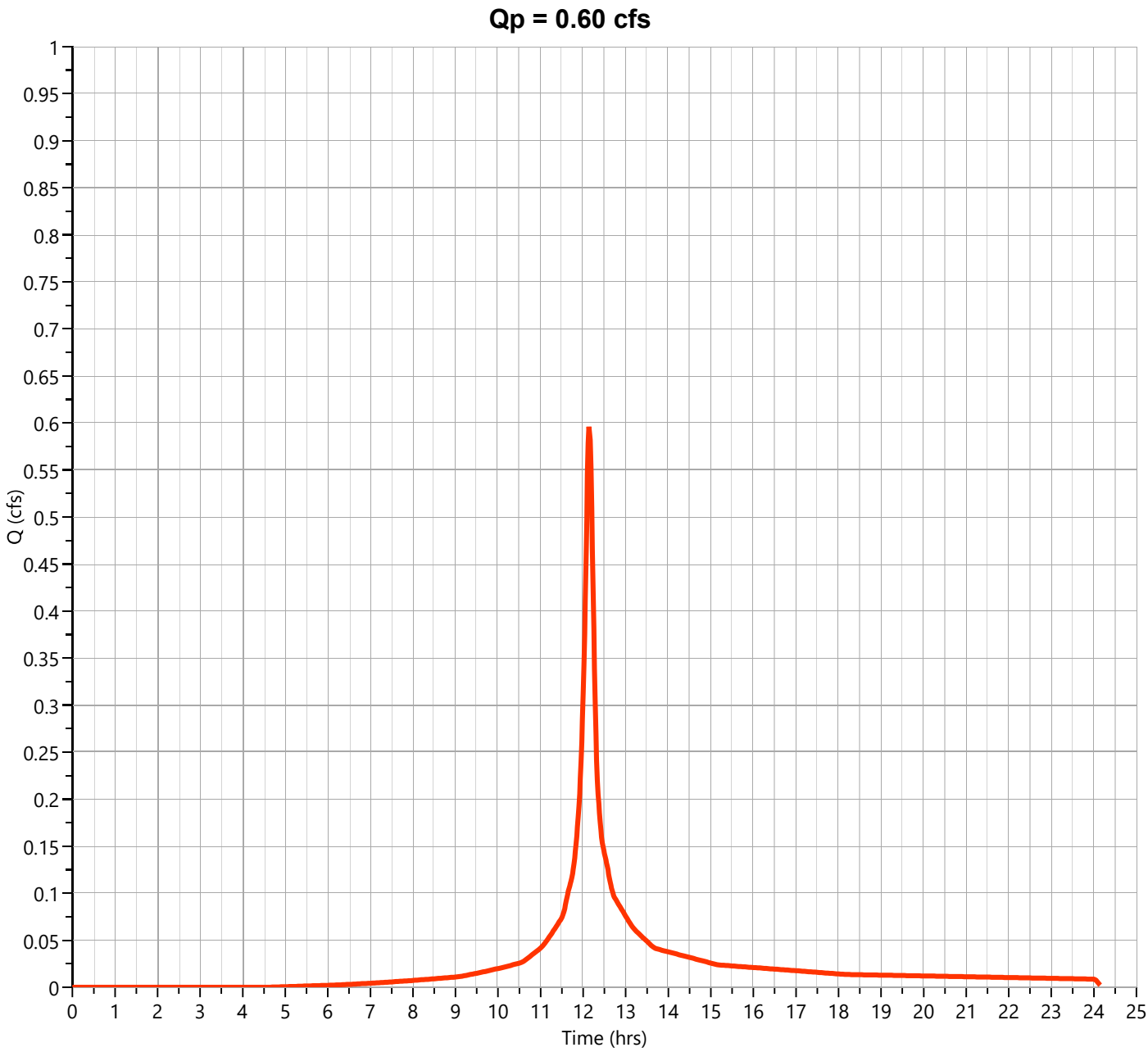
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B Grass HSGC C

Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.597 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Runoff Volume	= 2,142 cuft
Drainage Area	= 0.07 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 9.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

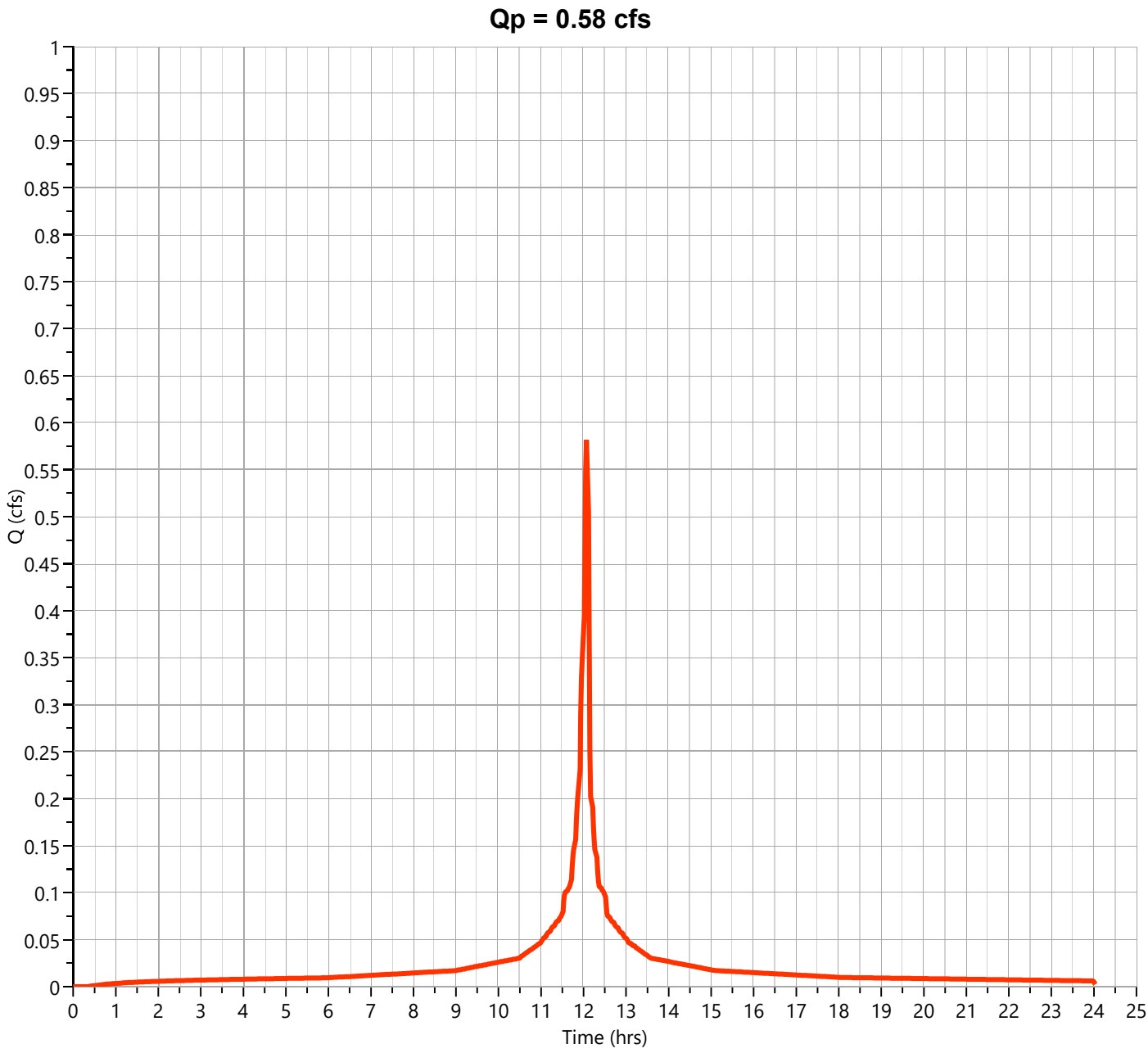
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B Impervious

Hyd. No. 7

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.582 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,967 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

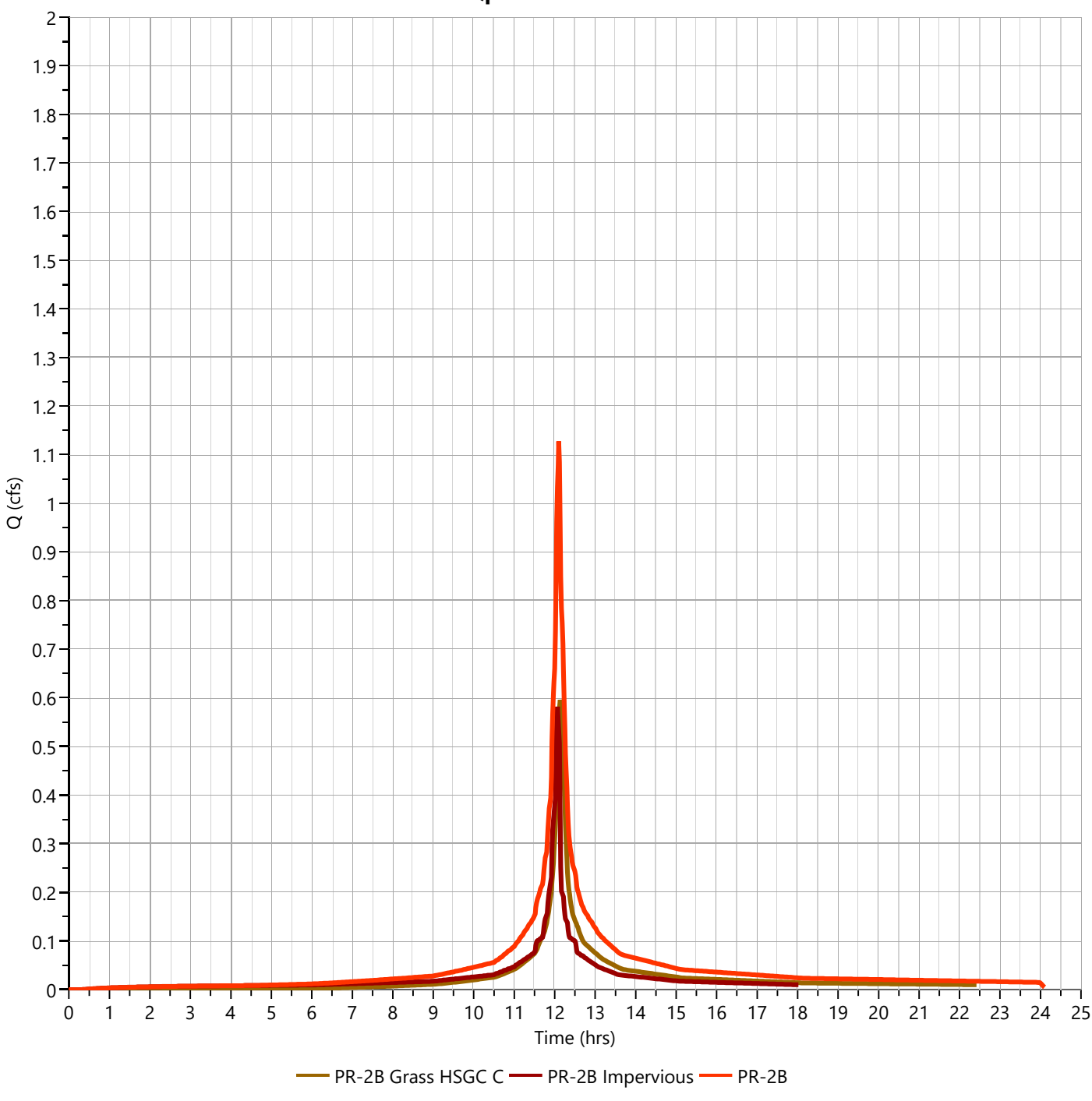
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B

Hyd. No. 8

Hydrograph Type	= Junction	Peak Flow	= 1.127 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 4,108 cuft
Inflow Hydrographs	= 6, 7	Total Contrib. Area	= 0.12 ac



PR-2C WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/6/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/6/2024**

Circle One: Present **(Developed)** — **Future Proposed Watershed PR-2C - Impervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		2		
1.	Surface Description (NEH table 15-1)		Smooth Surfaces		Dense Grasses		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011		0.24		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	19		13		
4.	Two-year 24-hr rainfall, P_2	in	4.12		4.12		
5.	Land Slope, s	ft/ft	0.012		0.010		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	100		42		
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.006	+	0.052	+	
					Sheet Flow Sub-Total		0.057 hours

Shallow Concentrated Flow		Segment ID					
8.	Surface Description						
9.	Flow Length, L	ft					
10.	Watercourse Slope, s	ft/ft					
11.	Average Velocity, V (NEH table 15-3)	ft/s					
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+		+	
					Shallow Conc. Flow Sub-Total		0.000 hours

Channel Flow		Segment ID					
13.	Flow Length, L	ft					
14.	Cross Sectional flow area, a	ft^2					
15.	Wetted Perimeter, P_w	ft					
16.	Hydraulic Radius, r $r = a / P_w$	ft					
17.	Channel Slope, s	ft/ft					
18.	Manning's Roughness Coeff., n						
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s					
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+		+	
					Channel Flow Sub-Total		0.000 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.057 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	3 minutes

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/6/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/6/2024**

Circle One: Present (**Developed**) — **Future Proposed Watershed PR-2C - Pervious**

Circle One: (**T_c**) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		
1.	Surface Description (NEH table 15-1)		Dense Grasses		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.24		
3.	Design Flow Length, L_{des} (L_{des} < 100 ft)	ft	28		
4.	Two-year 24-hr rainfall, P_2	in	4.12		
5.	Land Slope, s	ft/ft	0.012		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	46		
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.092	+	+
				Sheet Flow Sub-Total	0.092 hours

Shallow Concentrated Flow		Segment ID			
8.	Surface Description				
9.	Flow Length, L	ft			
10.	Watercourse Slope, s	ft/ft			
11.	Average Velocity, V (NEH table 15-3)	ft/s			
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+	+
				Shallow Conc. Flow Sub-Total	0.000 hours

Channel Flow		Segment ID			
13.	Flow Length, L	ft			
14.	Cross Sectional flow area, a	ft^2			
15.	Wetted Perimeter, P_w	ft			
16.	Hydraulic Radius, r $r = a / P_w$	ft			
17.	Channel Slope, s	ft/ft			
18.	Manning's Roughness Coeff., n				
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s			
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+	+
				Channel Flow Sub-Total	0.000 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.092 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	6 minutes

Hydrograph Report

Project Name:

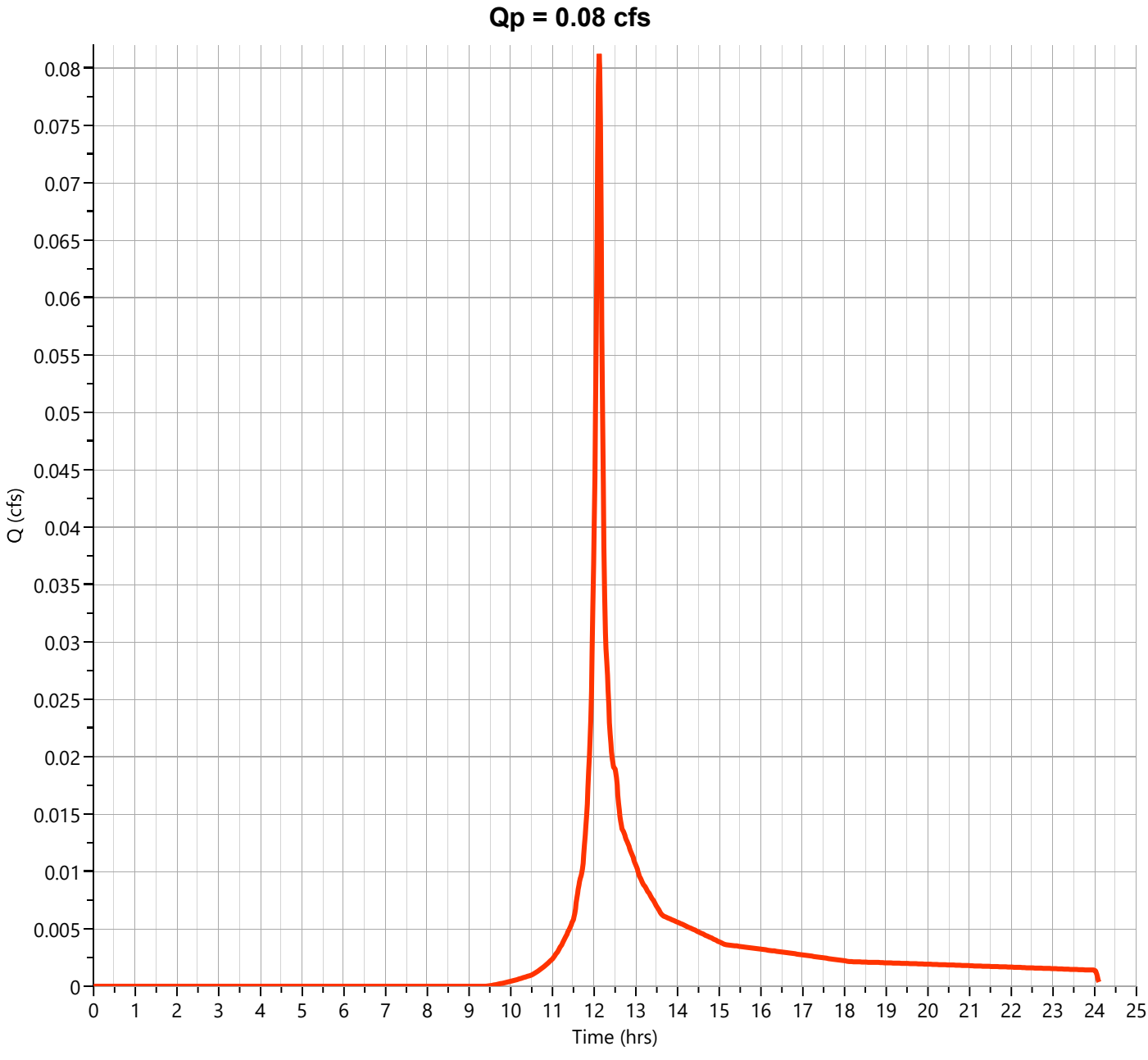
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2C Grass HSGC C

Hyd. No. 11

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.081 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 252 cuft
Drainage Area	= 0.04 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

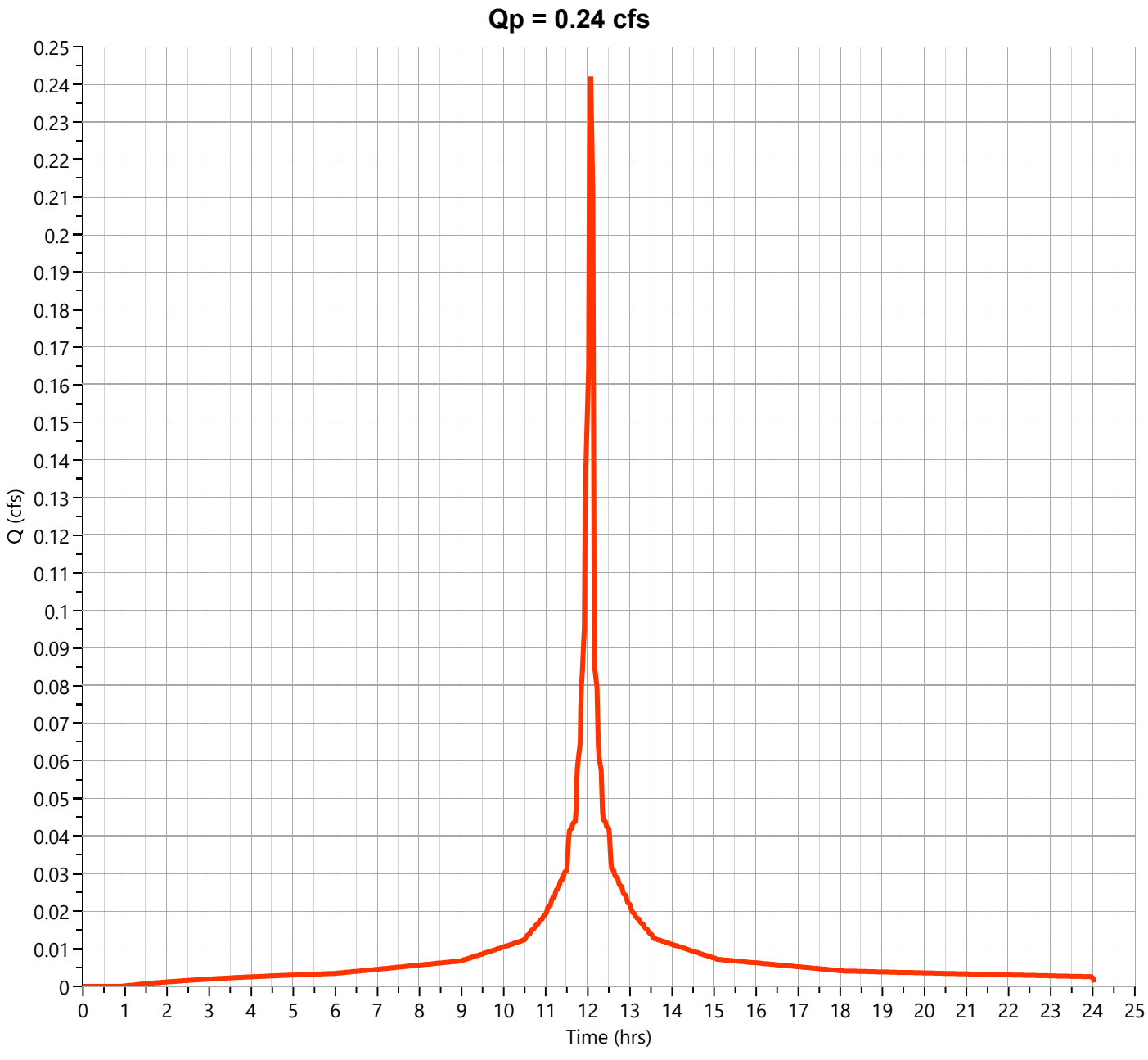
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2C Impervious

Hyd. No. 12

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.242 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 793 cuft
Drainage Area	= 0.06 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

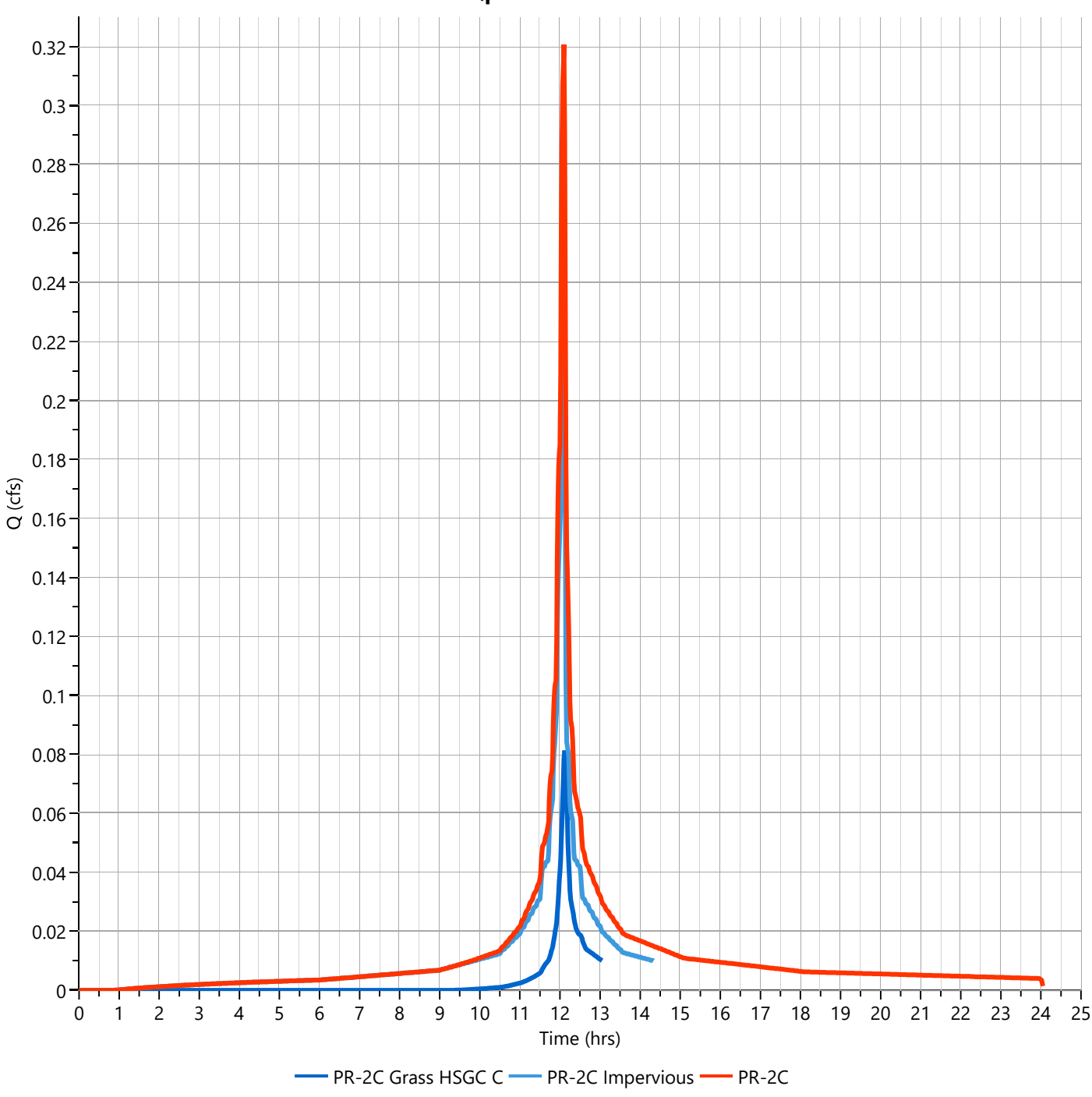
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2C

Hyd. No. 13

Hydrograph Type	= Junction	Peak Flow	= 0.321 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,046 cuft
Inflow Hydrographs	= 11, 12	Total Contrib. Area	= 0.1 ac



Hydrograph Report

Project Name:

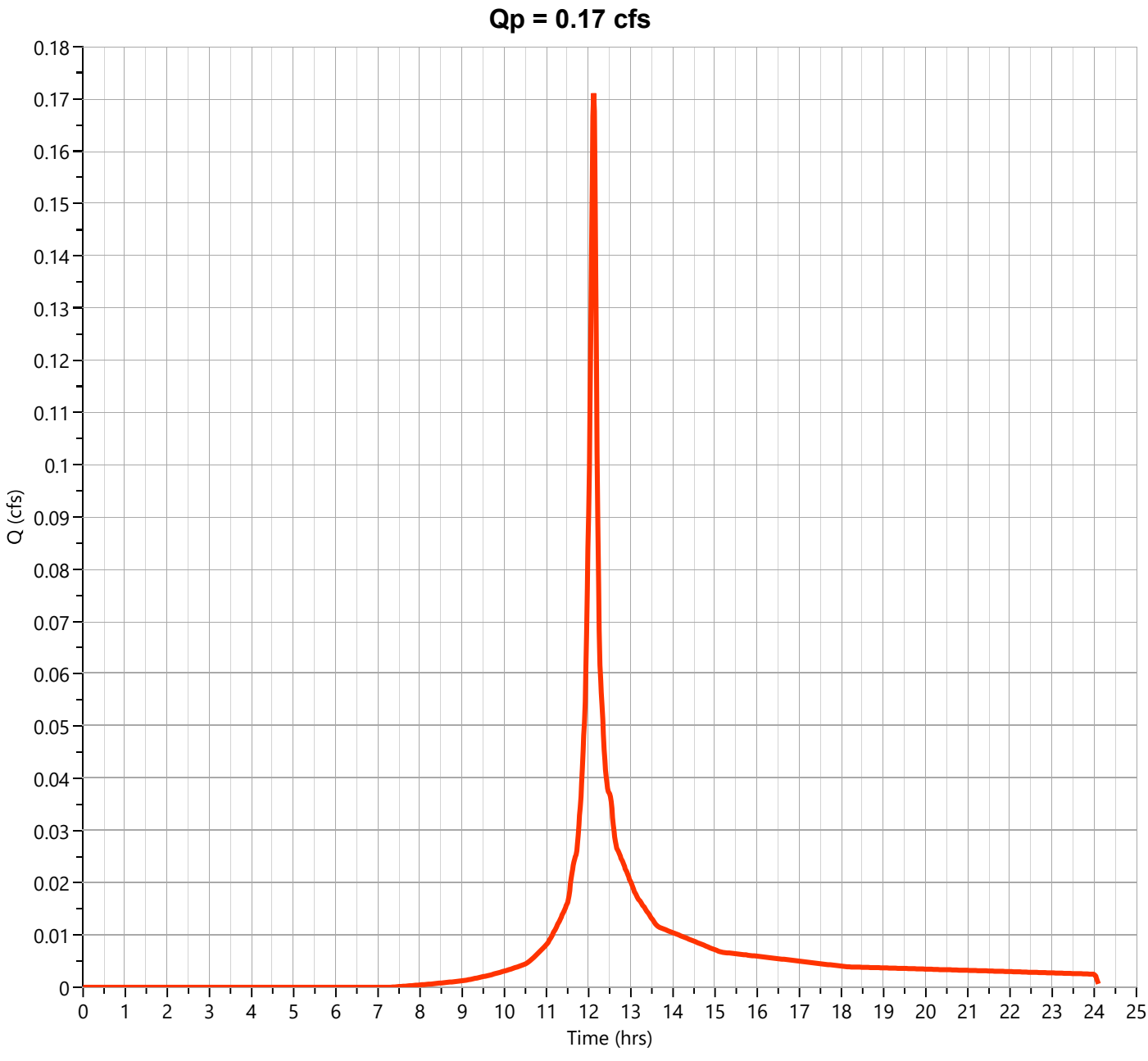
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2C Grass HSGC C

Hyd. No. 11

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.171 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 530 cuft
Drainage Area	= 0.04 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

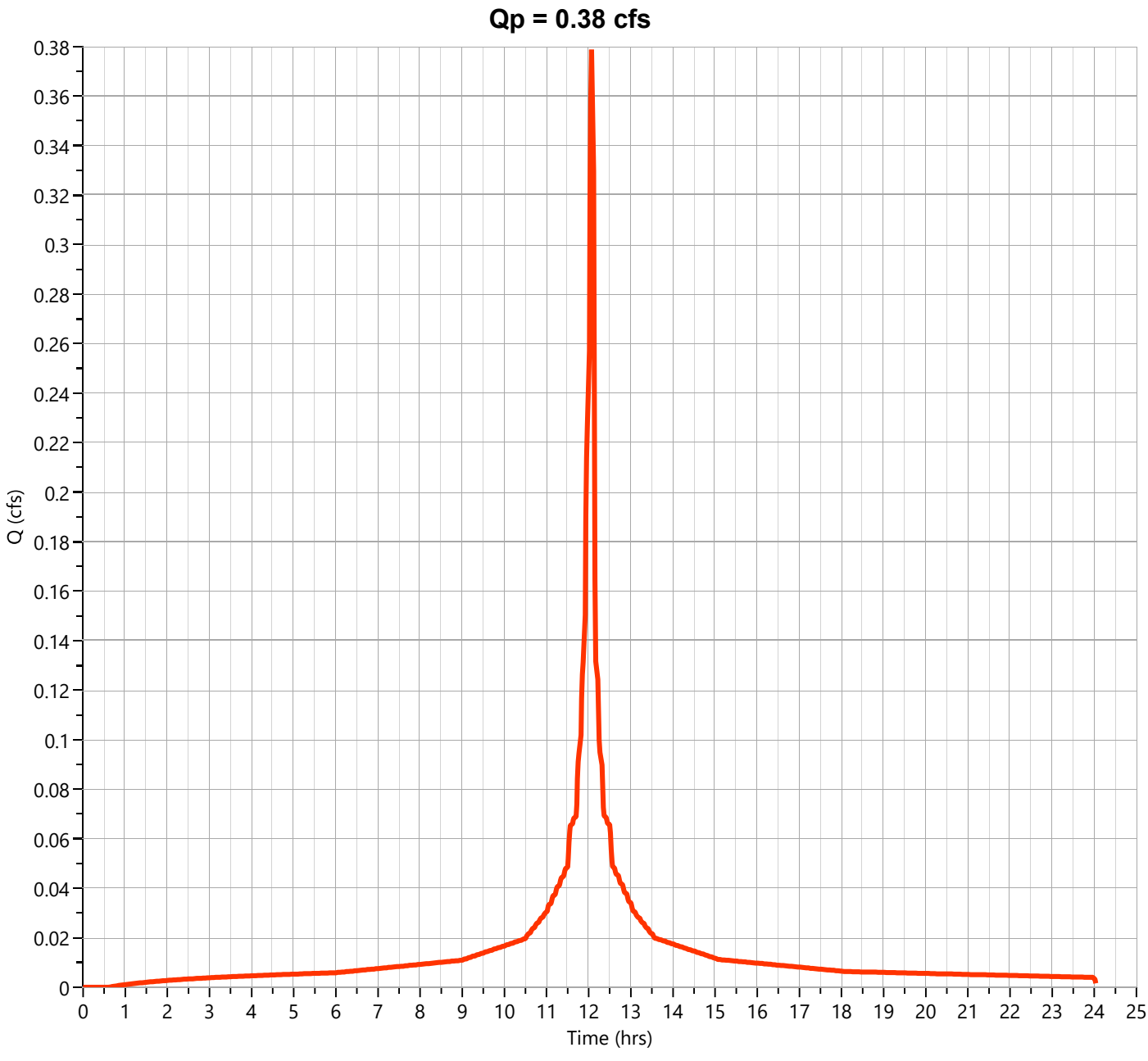
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2C Impervious

Hyd. No. 12

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.379 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,262 cuft
Drainage Area	= 0.06 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

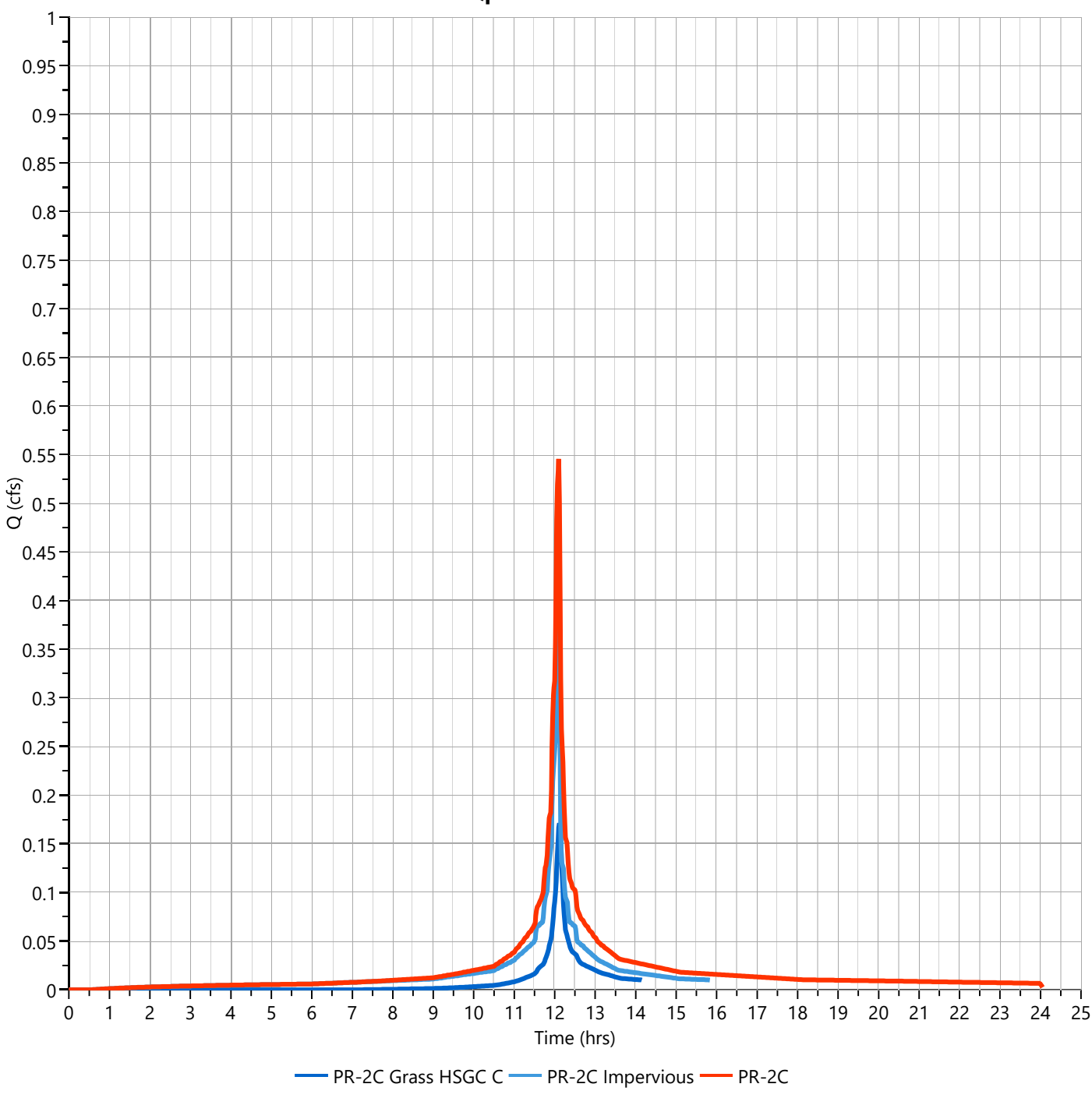
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2C

Hyd. No. 13

Hydrograph Type	= Junction	Peak Flow	= 0.546 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,792 cuft
Inflow Hydrographs	= 11, 12	Total Contrib. Area	= 0.1 ac



Hydrograph Report

Project Name:

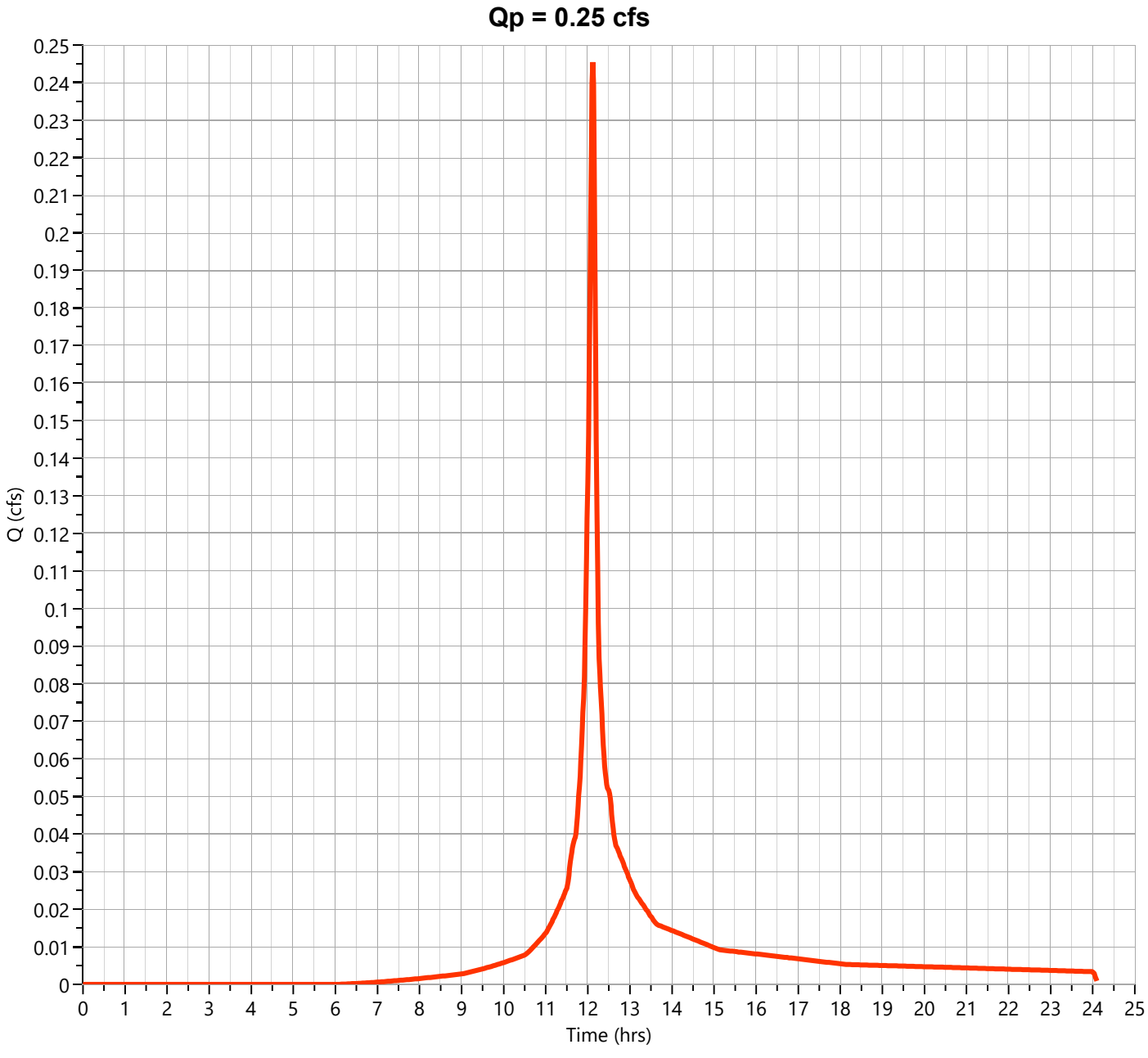
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2C Grass HSGC C

Hyd. No. 11

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.245 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 768 cuft
Drainage Area	= 0.04 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

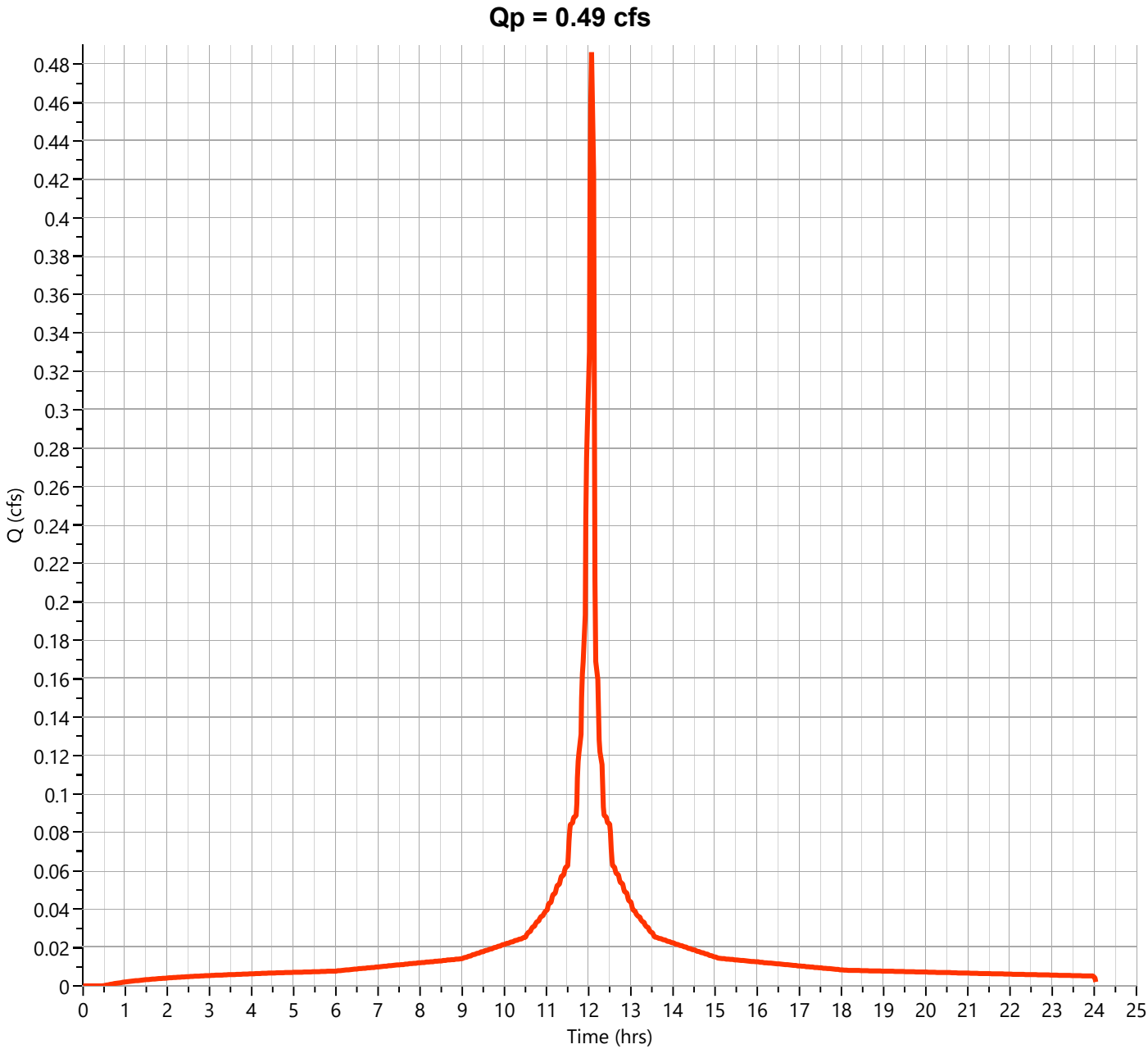
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2C Impervious

Hyd. No. 12

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.486 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,631 cuft
Drainage Area	= 0.06 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

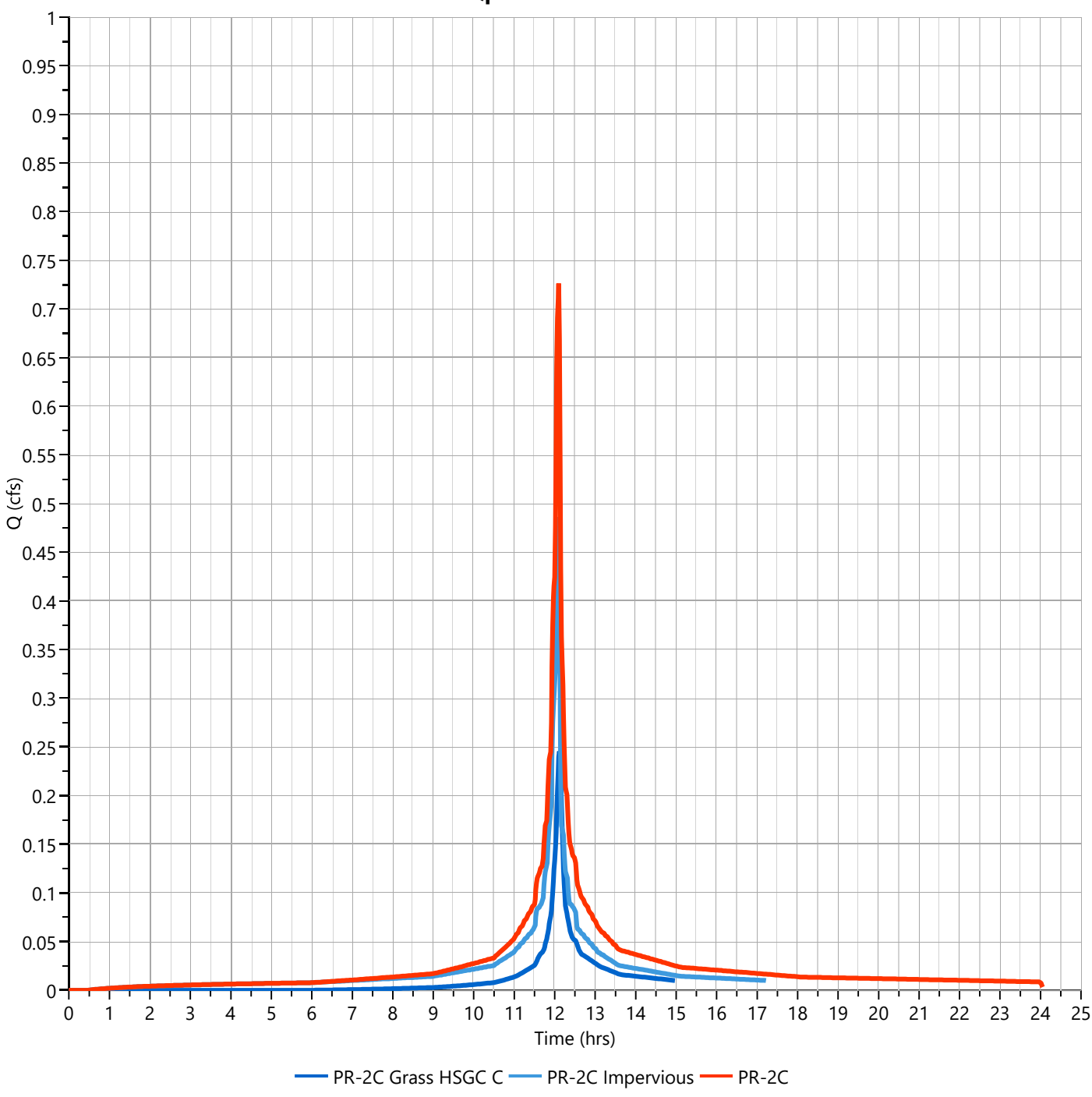
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2C

Hyd. No. 13

Hydrograph Type	= Junction	Peak Flow	= 0.726 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,400 cuft
Inflow Hydrographs	= 11, 12	Total Contrib. Area	= 0.1 ac



Hydrograph Report

Project Name:

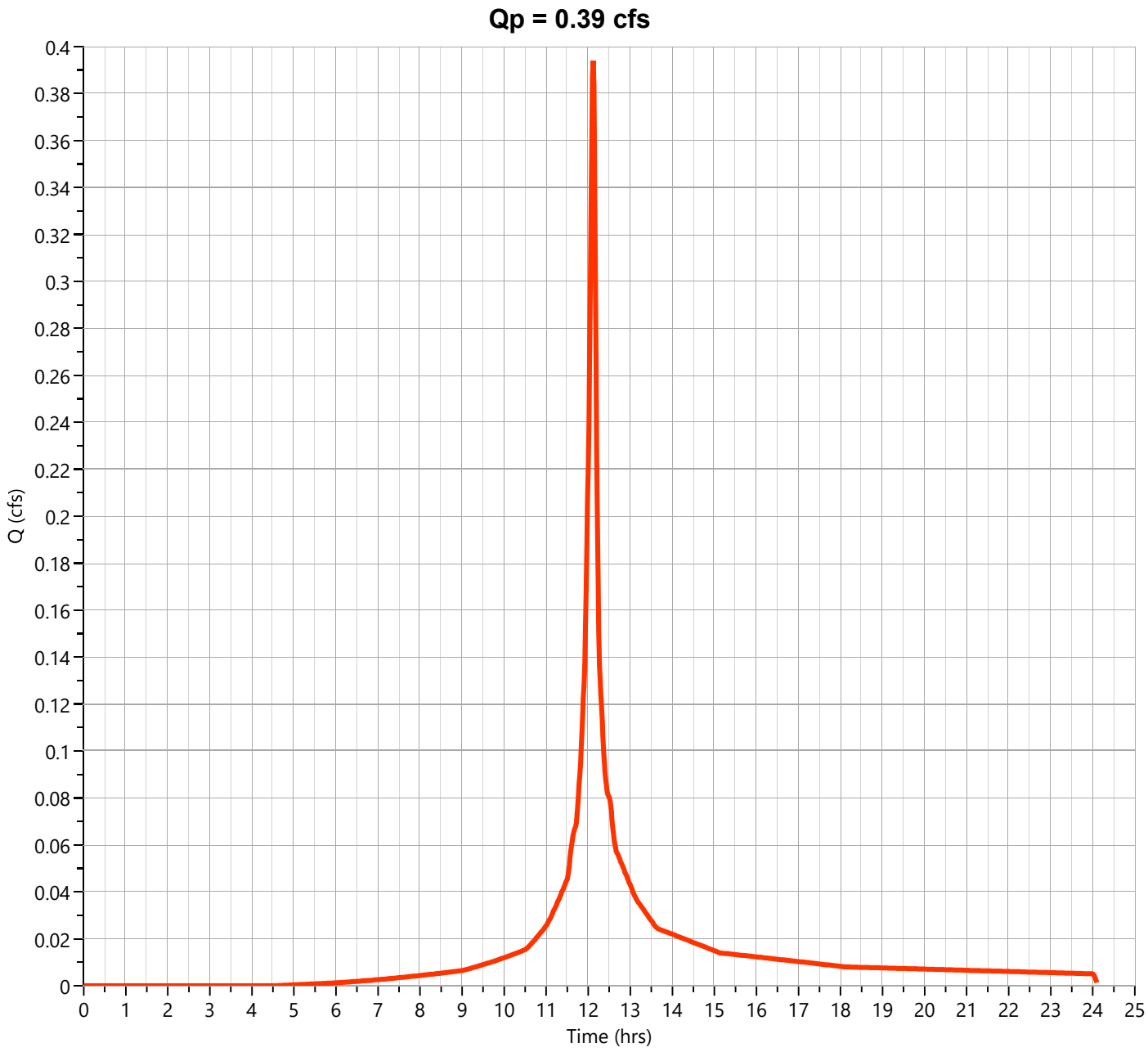
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2C Grass HSGC C

Hyd. No. 11

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.394 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 1,262 cuft
Drainage Area	= 0.04 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

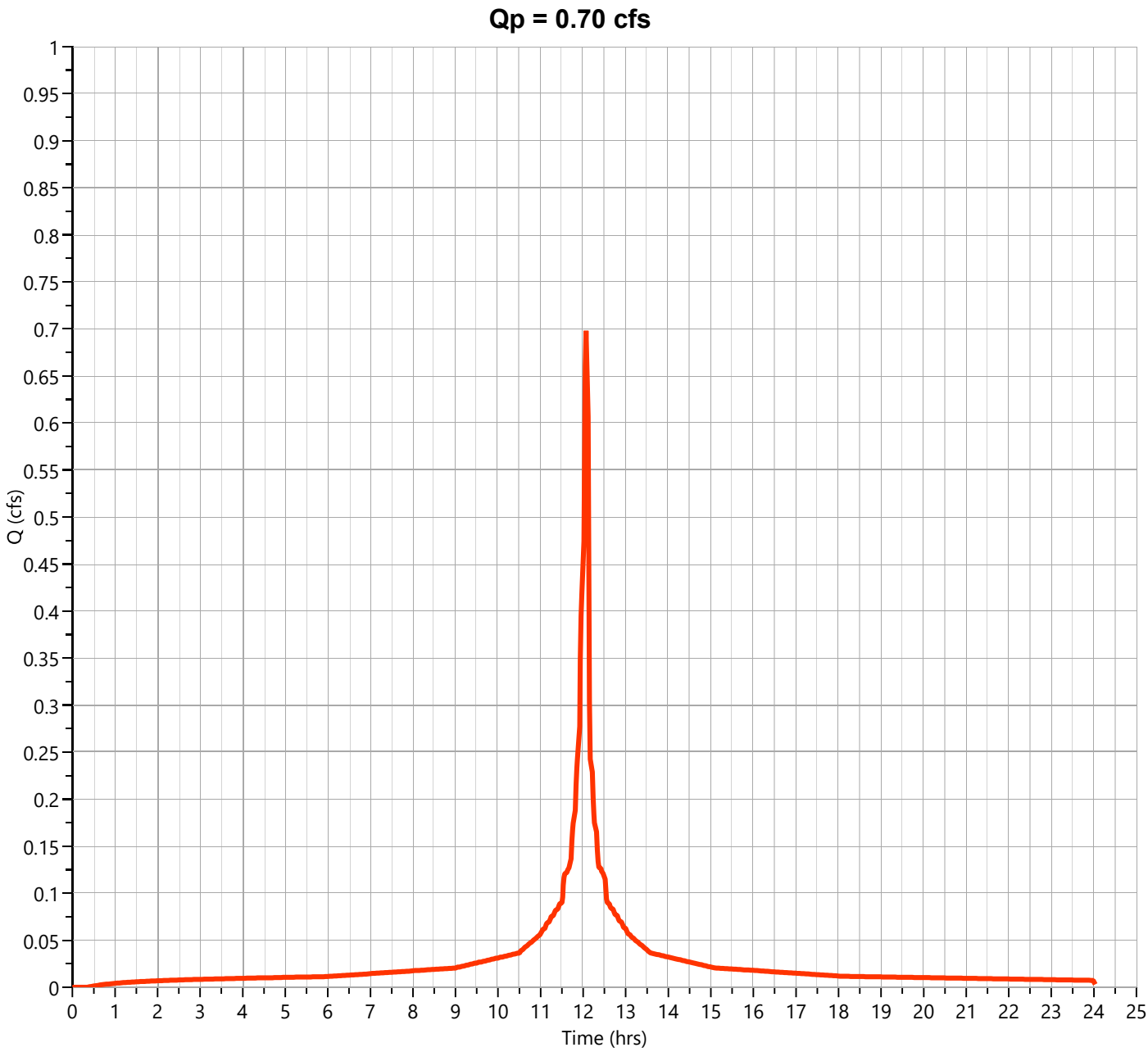
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2C Impervious

Hyd. No. 12

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.698 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 2,360 cuft
Drainage Area	= 0.06 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

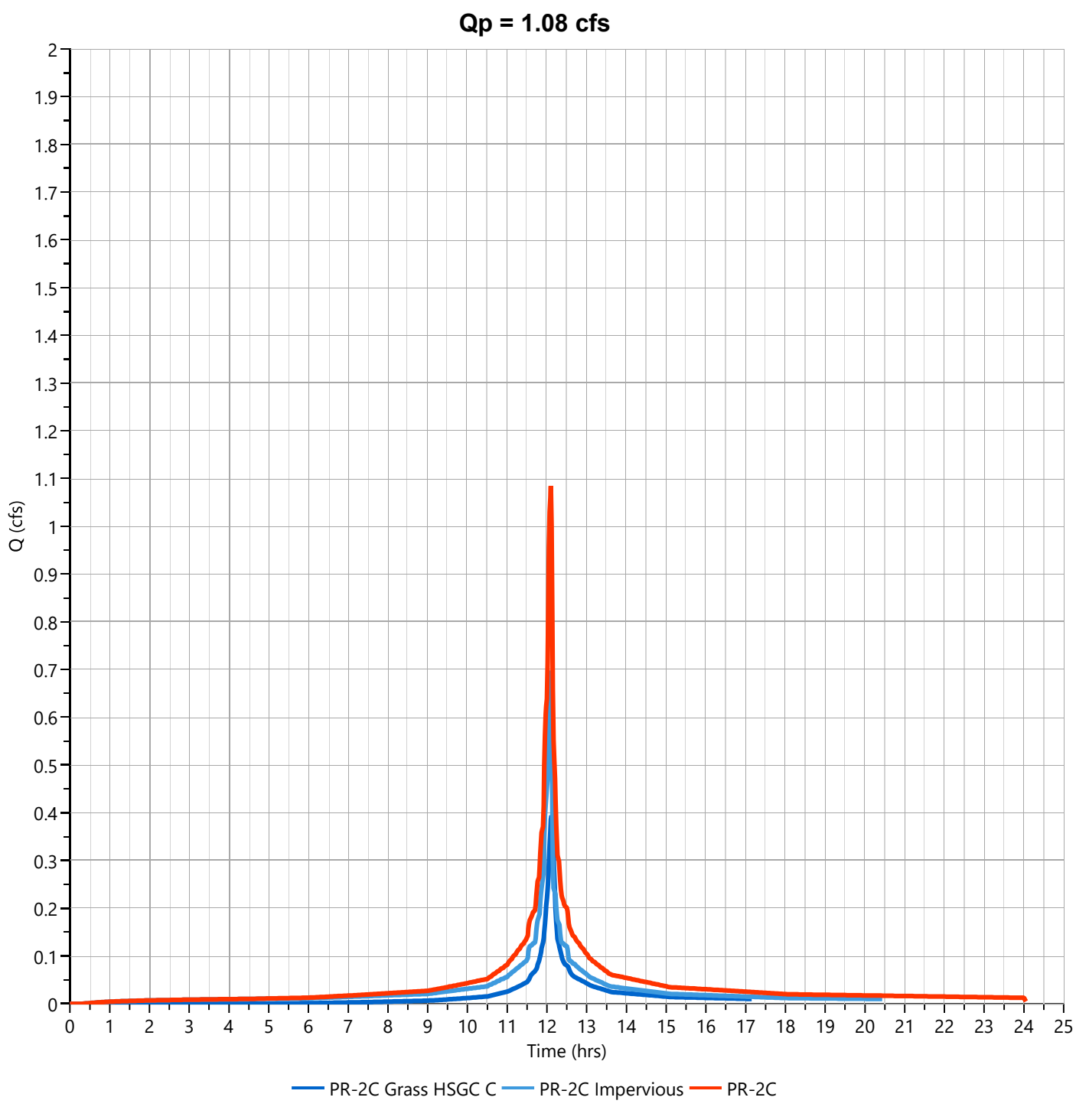
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2C

Hyd. No. 13

Hydrograph Type	= Junction	Peak Flow	= 1.084 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 3,622 cuft
Inflow Hydrographs	= 11, 12	Total Contrib. Area	= 0.1 ac



PR-2D WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**SM**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: (**Present**) Developed — **Future Proposed Watershed PR-2D Impervious**

Circle One: (**T_c**) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

			Segment ID	1		2		
1.	Surface Description (NEH table 15-1)			Smooth Surfaces		Woods Light Underbrush		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.011		0.40		
3.	Flow Length, L (total L < 100 ft)		ft	6		94		
4.	Two-year 24-hr rainfall, P_2		in	4.12		4.12		
5.	Land Slope, s		ft/ft	0.050		0.046		
6.	Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.001	+	0.216	+	

Sheet Flow Sub-Total **0.217 hours**

Shallow Concentrated Flow

			Segment ID	3		4		
7.	Surface Description			Woodlands		Grassed Waterways		
8.	Flow Length, L		ft	56		140		
9.	Watercourse Slope, s		ft/ft	0.025		0.011		
10.	Average Velocity, V (NEH table 15-3)		ft/s	0.80		1.72		
11.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.019	+	0.023	+	

Shallow Conc. Flow Sub-Total **0.042 hours**

Channel Flow

			Segment ID					
12.	Flow Length, L		ft					
13.	Cross Sectional flow area, a		ft^2					
14.	Wetted Perimeter, P_w		ft					
15.	Hydraulic Radius, r	$r = a / P_w$	ft					
16.	Channel Slope, s		ft/ft					
17.	Manning's Roughness Coeff., n							
18.	Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s					
19.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr		+		+	

Channel Flow Sub-Total **0.000 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) =	**0.259 hours**
Total Tc (minutes) =	**16 minutes**

Project:	**Beacon Unitarian Universalist Church**	**By:**	**SM**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: (**Present**) Developed — **Future Proposed Watershed PR-2D Pervious**

Circle One: (**T_c**) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

			Segment ID	1		2		
1.	Surface Description (NEH table 15-1)			Dense Grasses		Woods Light Underbrush		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.24		0.40		
3.	Flow Length, L (total L < 100 ft)		ft	37		63		
4.	Two-year 24-hr rainfall, P_2		in	4.12		4.12		
5.	Land Slope, s		ft/ft	0.065		0.025		
6.	Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.059	+	0.198	+	

Sheet Flow Sub-Total **0.257 hours**

Shallow Concentrated Flow

			Segment ID	3		4		
7.	Surface Description			Woodlands		Grassed Waterways		
8.	Flow Length, L		ft	56		140		
9.	Watercourse Slope, s		ft/ft	0.025		0.011		
10.	Average Velocity, V (NEH table 15-3)		ft/s	0.80		1.72		
11.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.020	+	0.023	+	

Shallow Conc. Flow Sub-Total **0.042 hours**

Channel Flow

			Segment ID					
12.	Flow Length, L		ft					
13.	Cross Sectional flow area, a		ft^2					
14.	Wetted Perimeter, P_w		ft					
15.	Hydraulic Radius, r	$r = a / P_w$	ft					
16.	Channel Slope, s		ft/ft					
17.	Manning's Roughness Coeff., n							
18.	Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s					
19.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr		+		+	

Channel Flow Sub-Total **0.000 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) =	**0.299 hours**
Total Tc (minutes) =	**18 minutes**

Hydrograph Report

Project Name:

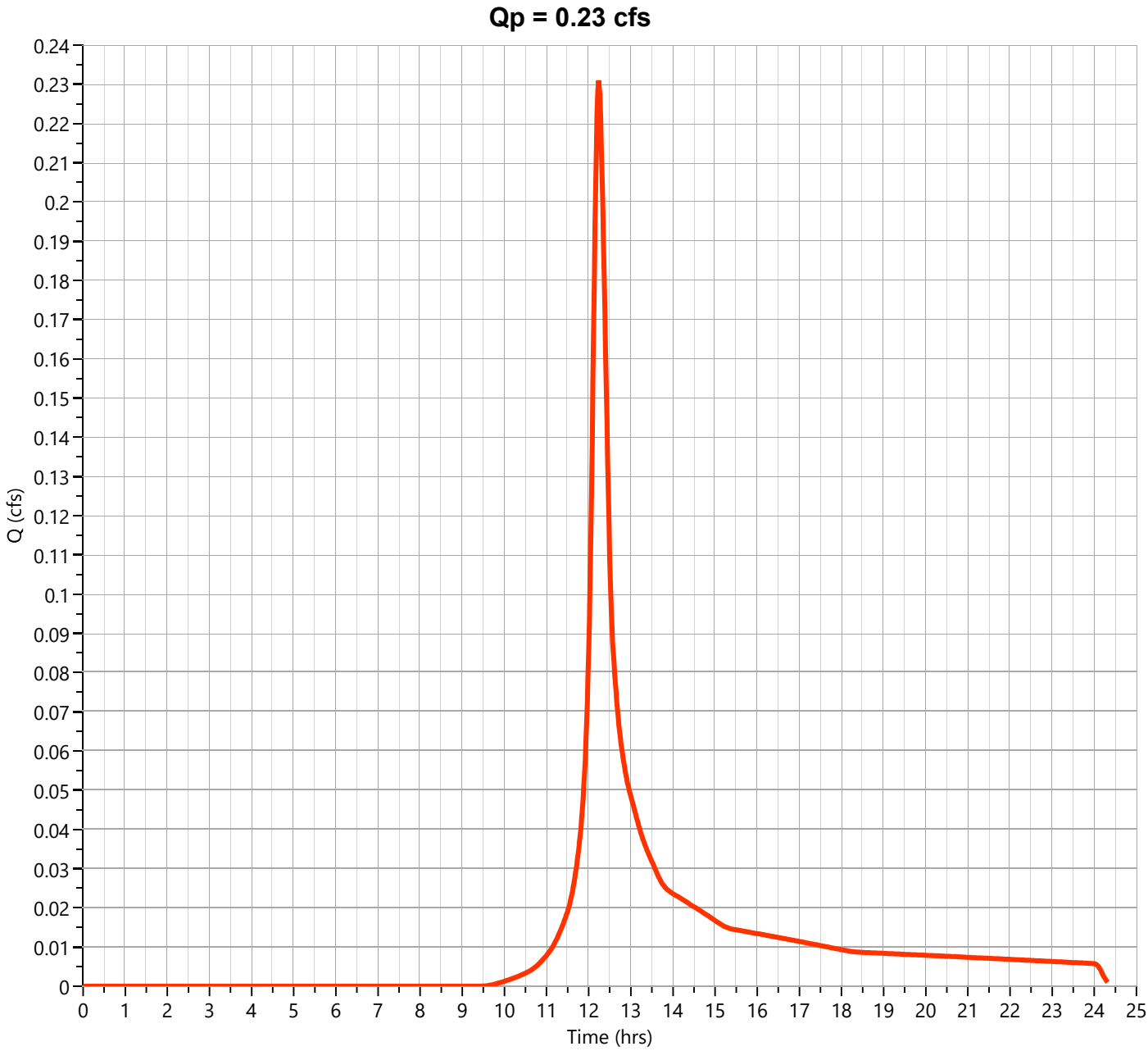
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D Grass HSGC C

Hyd. No. 21

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.231 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Runoff Volume	= 1,028 cuft
Drainage Area	= 0.17 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 18.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

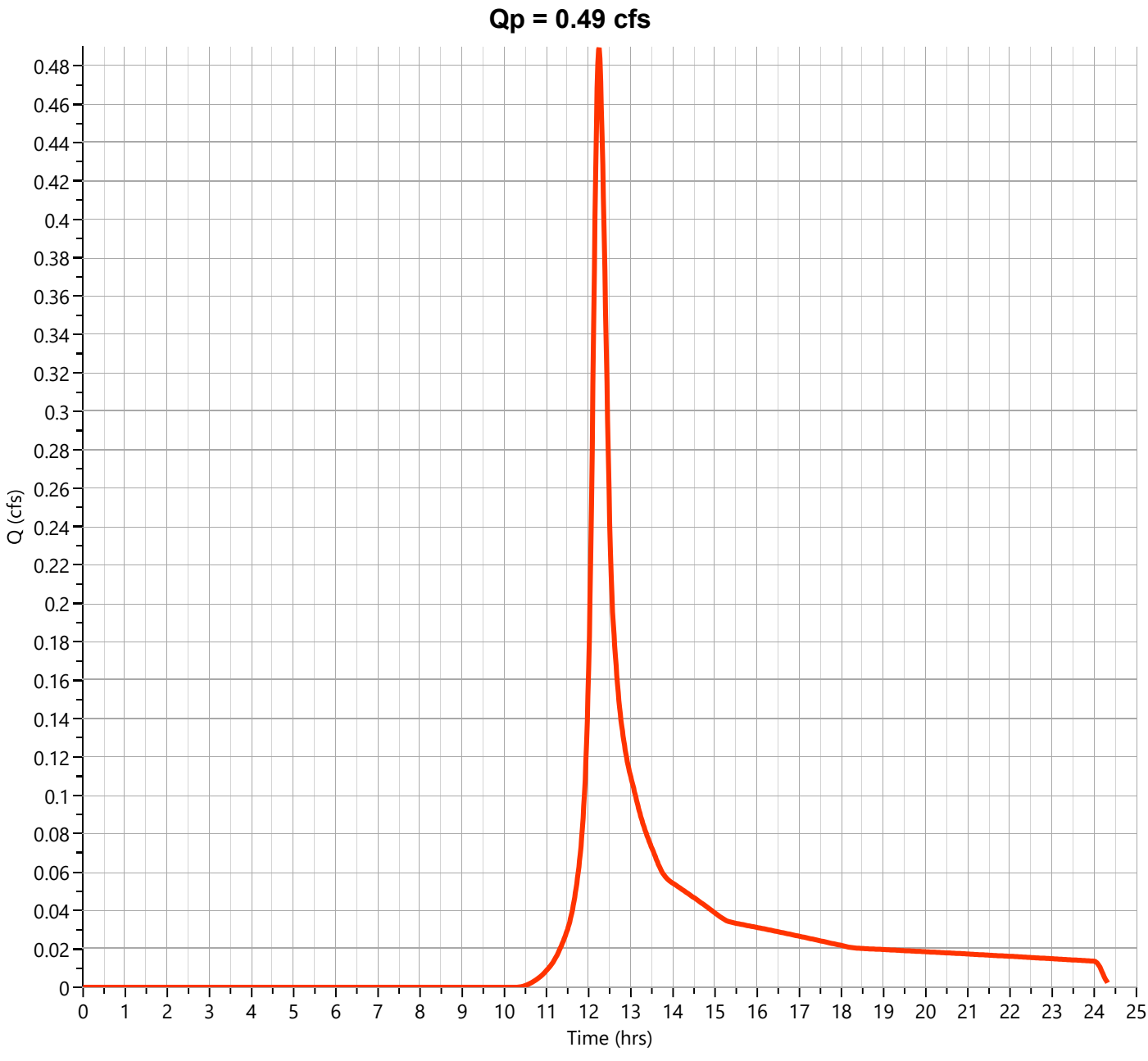
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D Woods HSGC C

Hyd. No. 22

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.489 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.25 hrs
Time Interval	= 1 min	Runoff Volume	= 2,227 cuft
Drainage Area	= 0.44 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 18.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

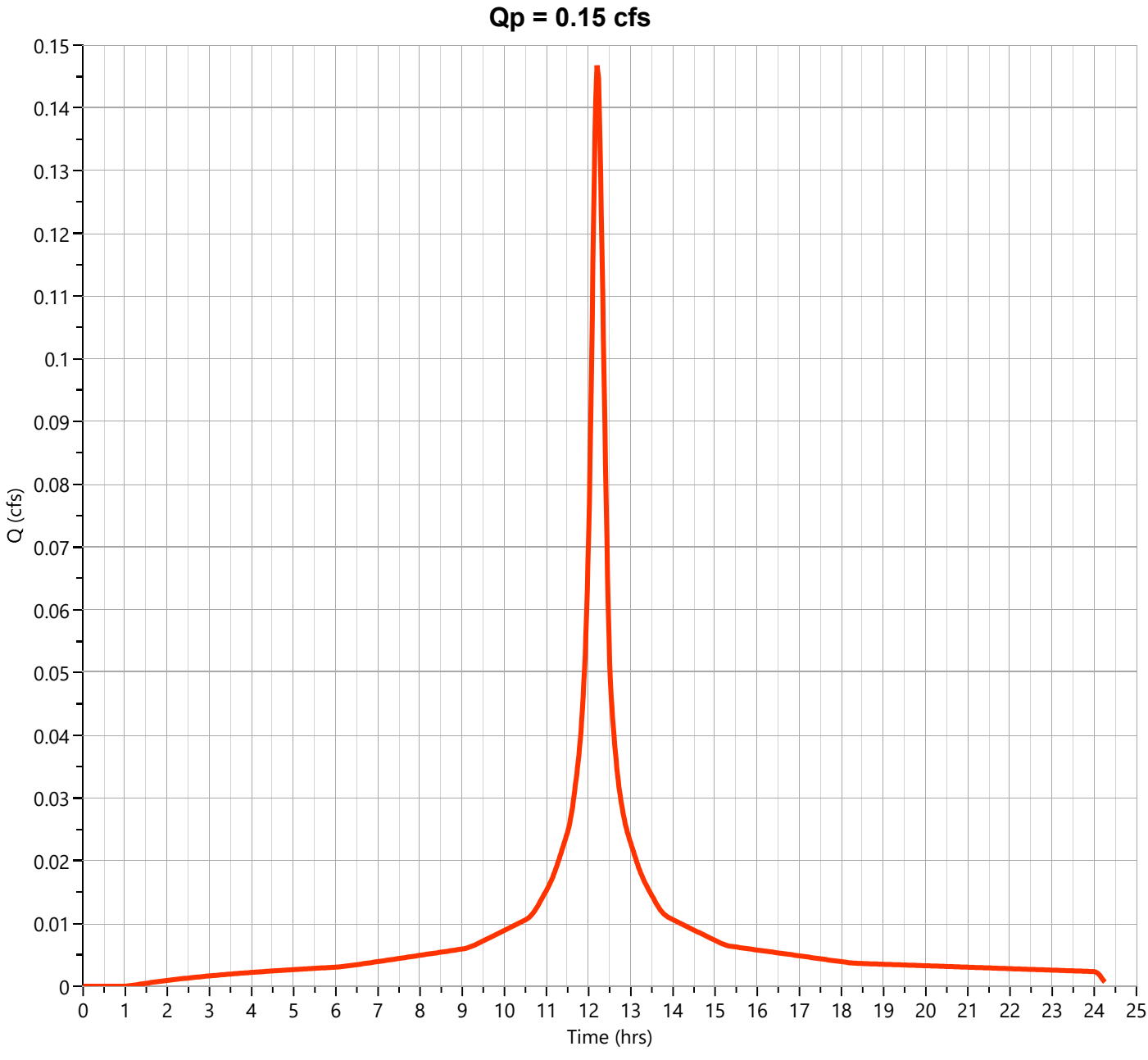
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D Impervious

Hyd. No. 23

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.147 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 714 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 16.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

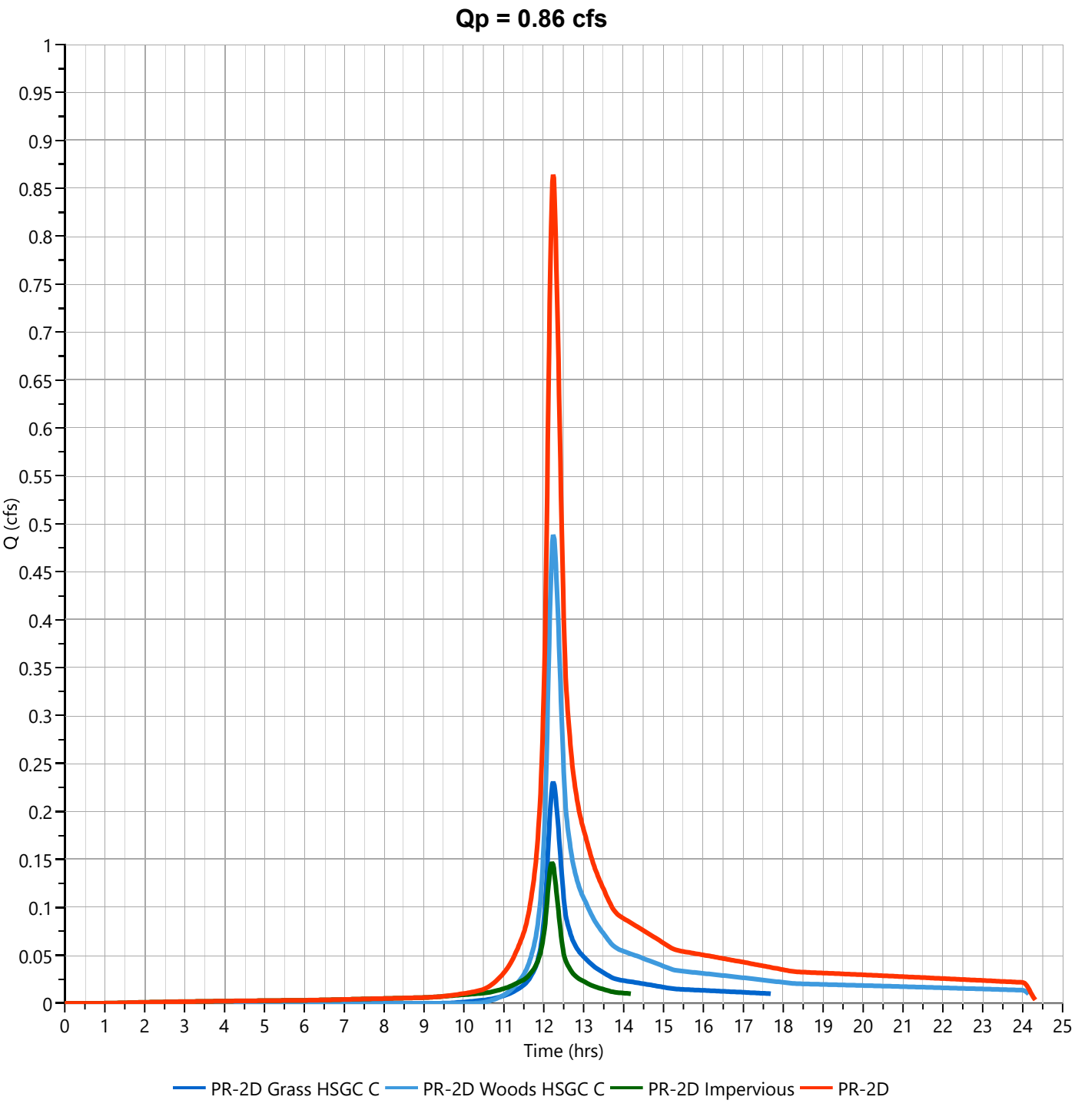
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D

Hyd. No. 24

Hydrograph Type	= Junction	Peak Flow	= 0.864 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Hydrograph Volume	= 3,969 cuft
Inflow Hydrographs	= 21, 22, 23	Total Contrib. Area	= 0.66 ac



Hydrograph Report

Project Name:

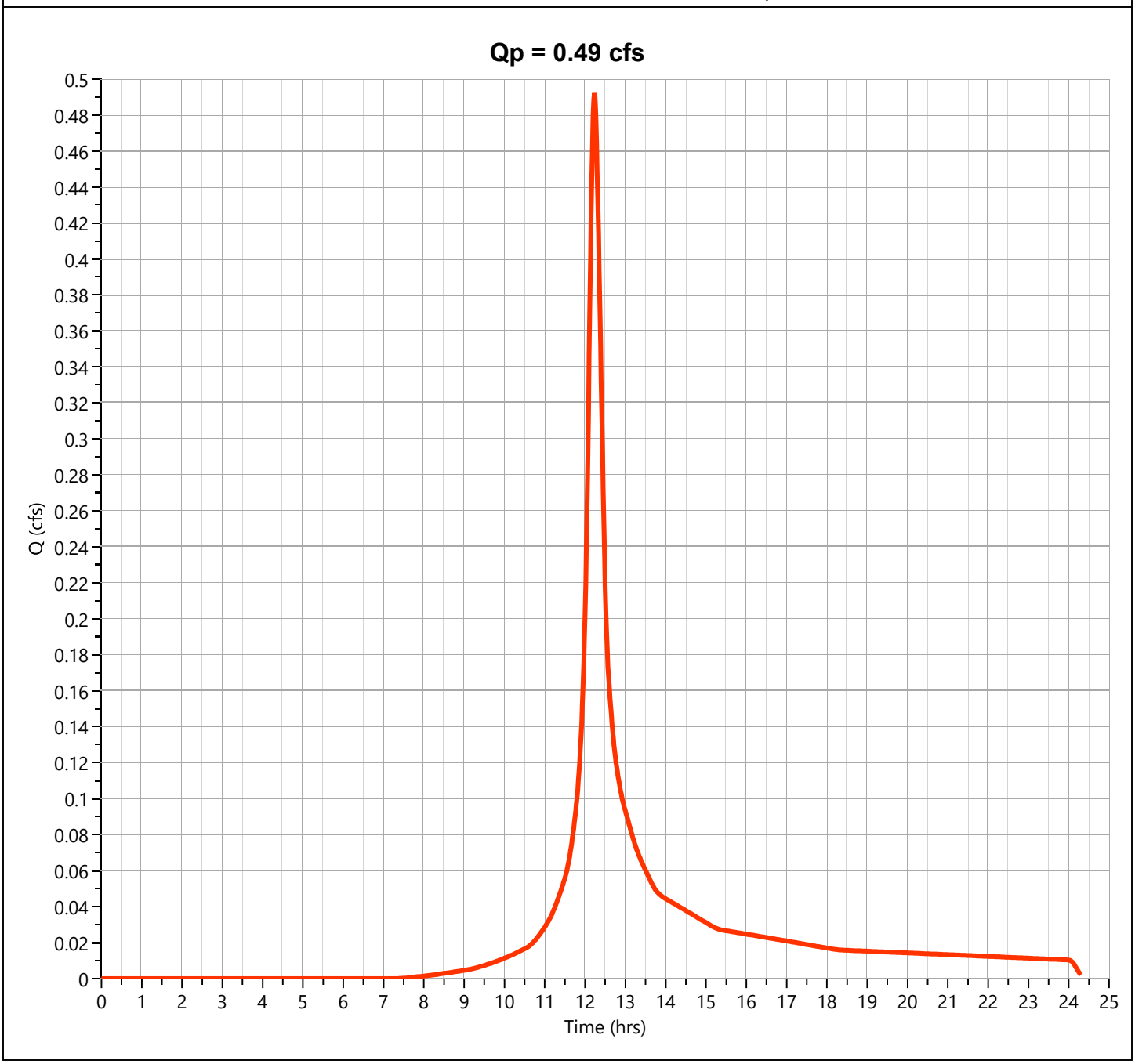
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D Grass HSGC C

Hyd. No. 21

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.492 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Runoff Volume	= 2,160 cuft
Drainage Area	= 0.17 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 18.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

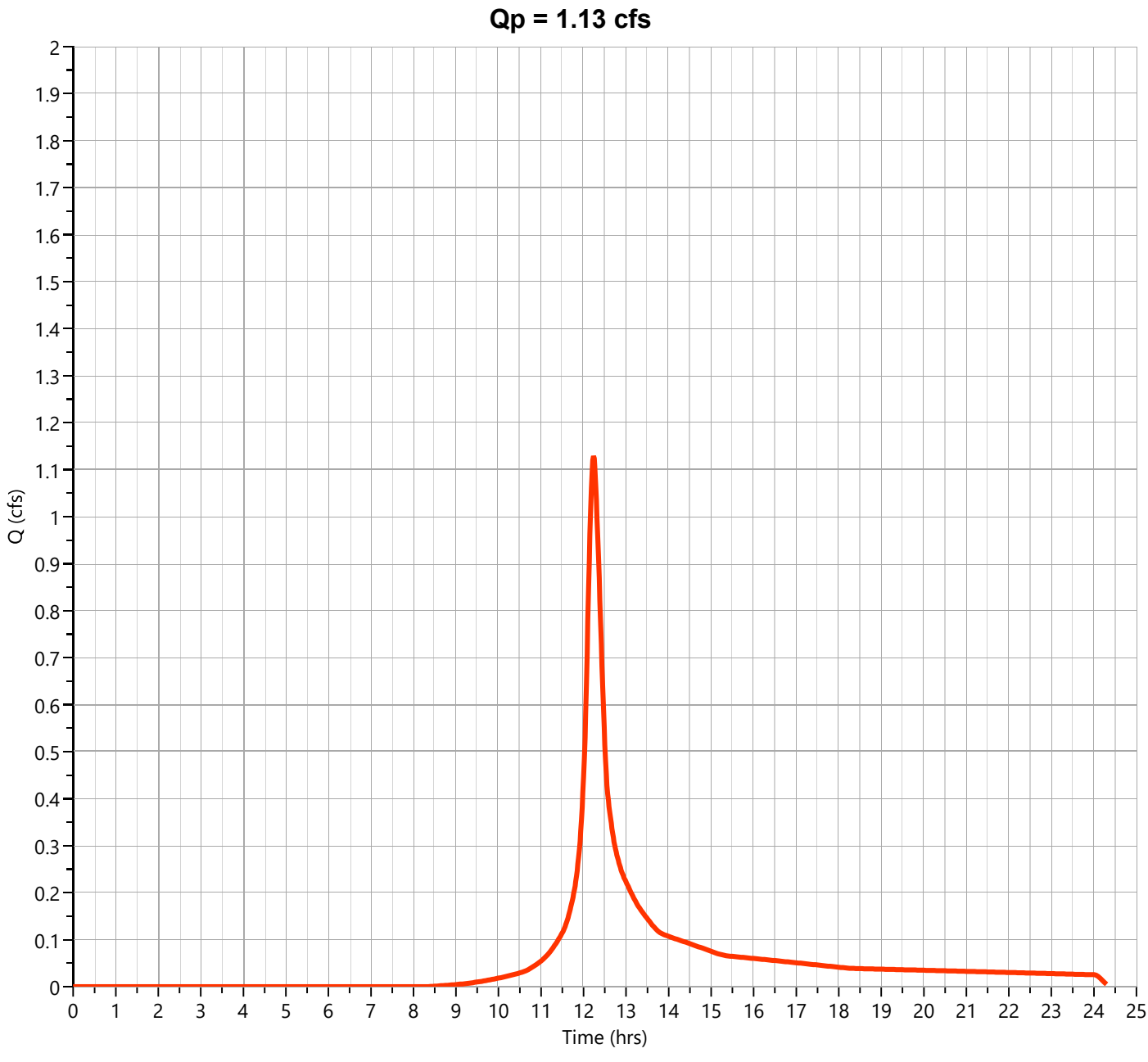
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D Woods HSGC C

Hyd. No. 22

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.129 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Runoff Volume	= 4,962 cuft
Drainage Area	= 0.44 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 18.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

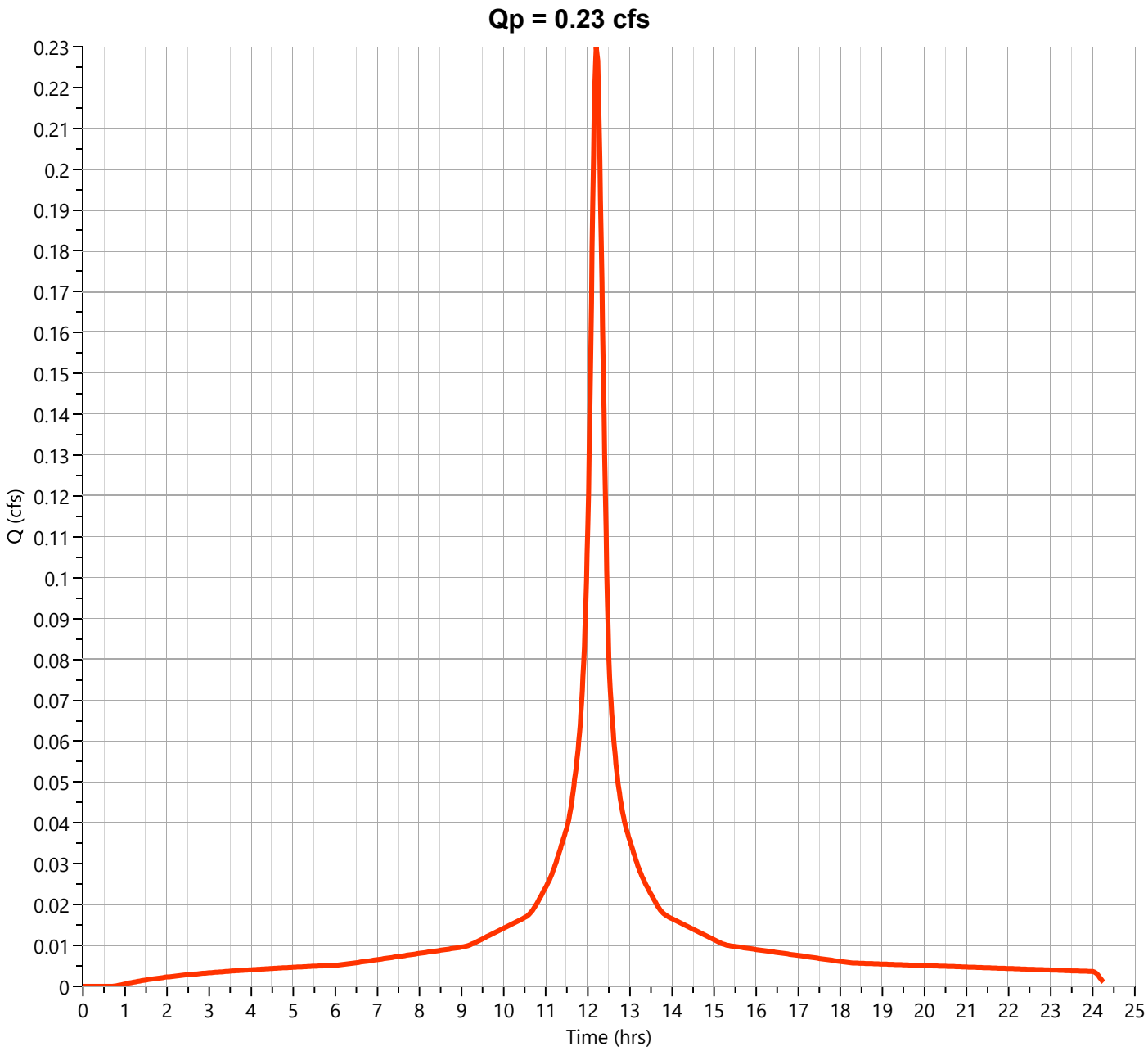
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D Impervious

Hyd. No. 23

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.230 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 1,136 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 16.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

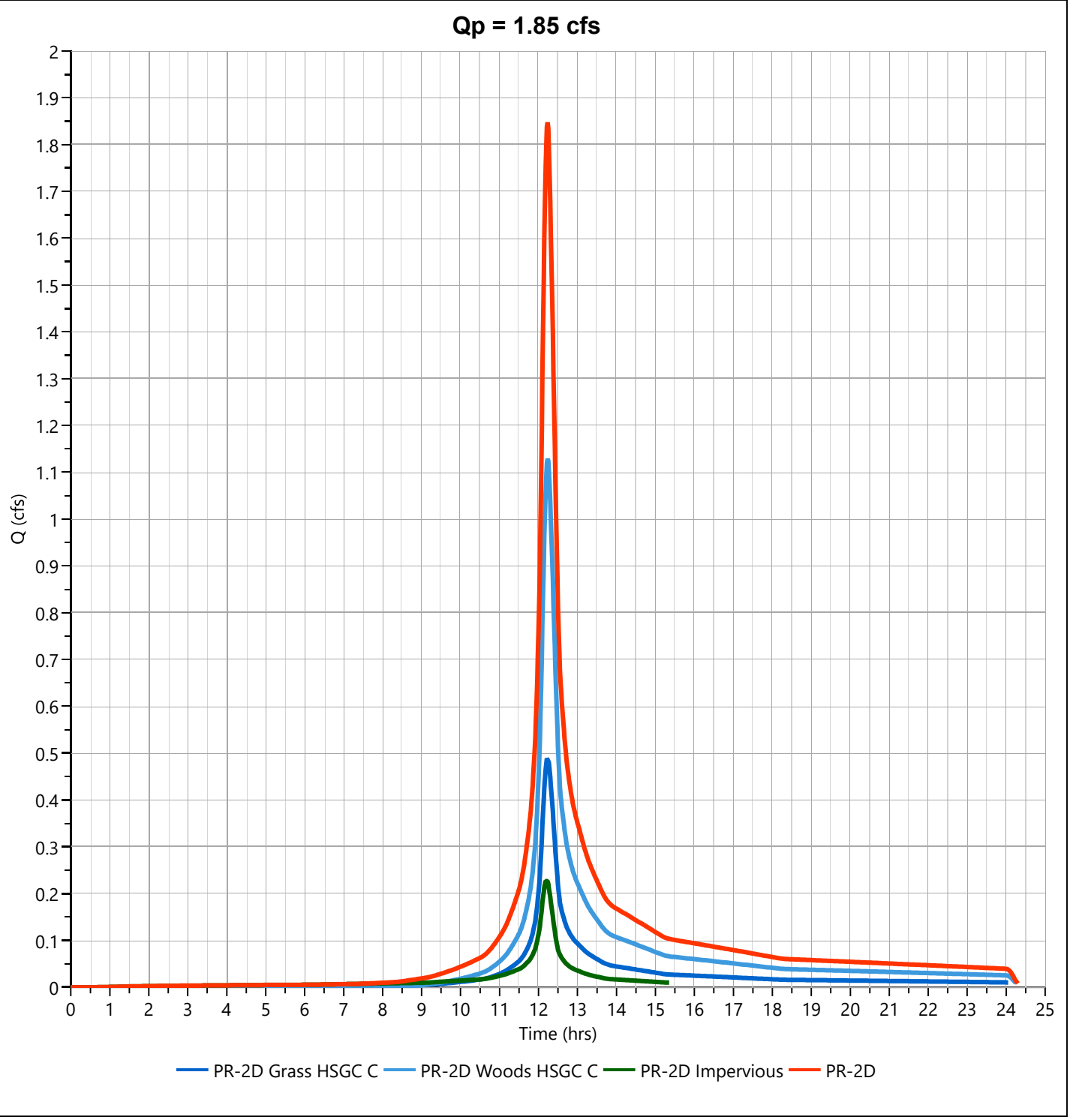
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D

Hyd. No. 24

Hydrograph Type	= Junction	Peak Flow	= 1.847 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Hydrograph Volume	= 8,258 cuft
Inflow Hydrographs	= 21, 22, 23	Total Contrib. Area	= 0.66 ac



Hydrograph Report

Project Name:

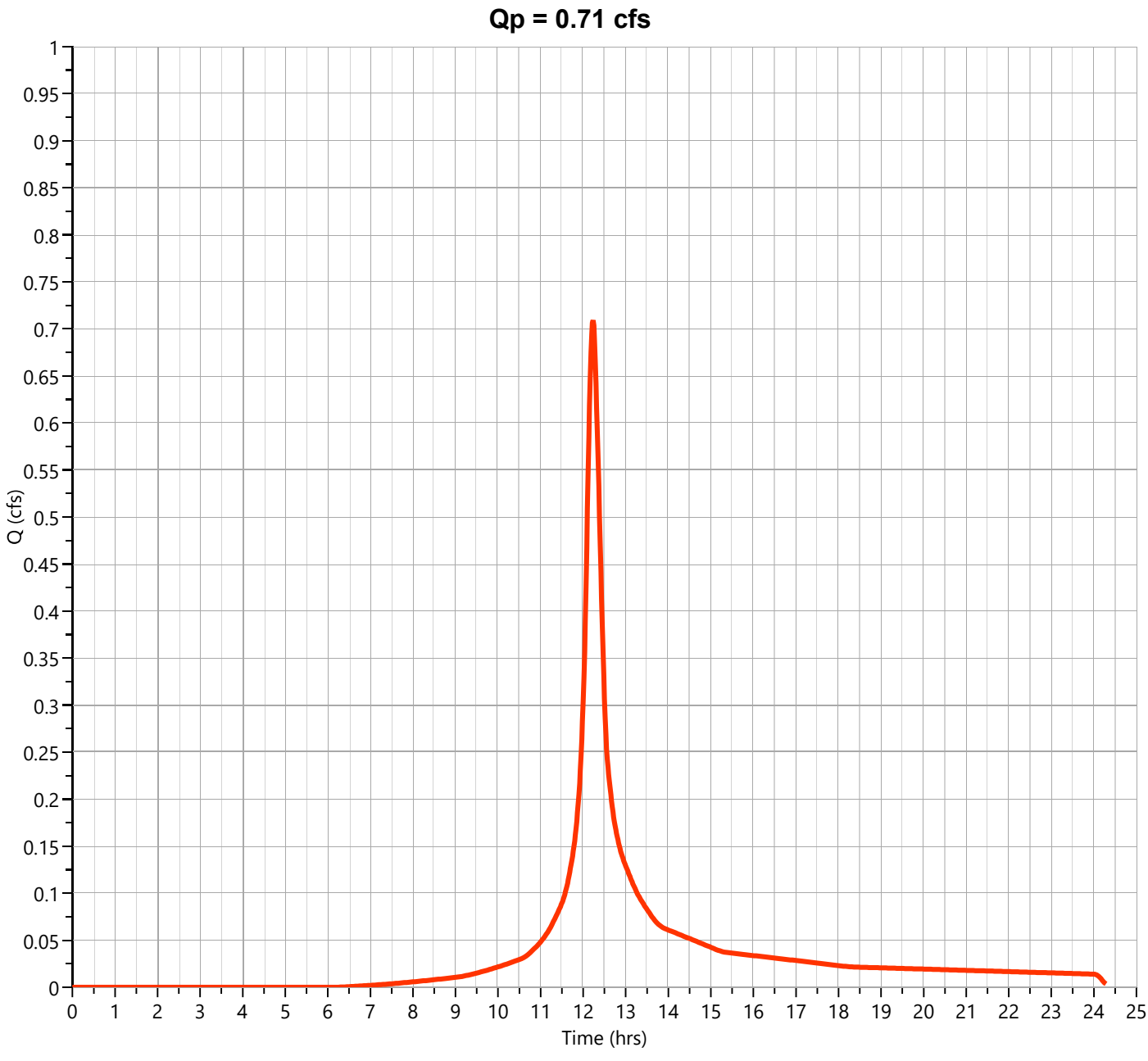
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D Grass HSGC C

Hyd. No. 21

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.709 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Runoff Volume	= 3,131 cuft
Drainage Area	= 0.17 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 18.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

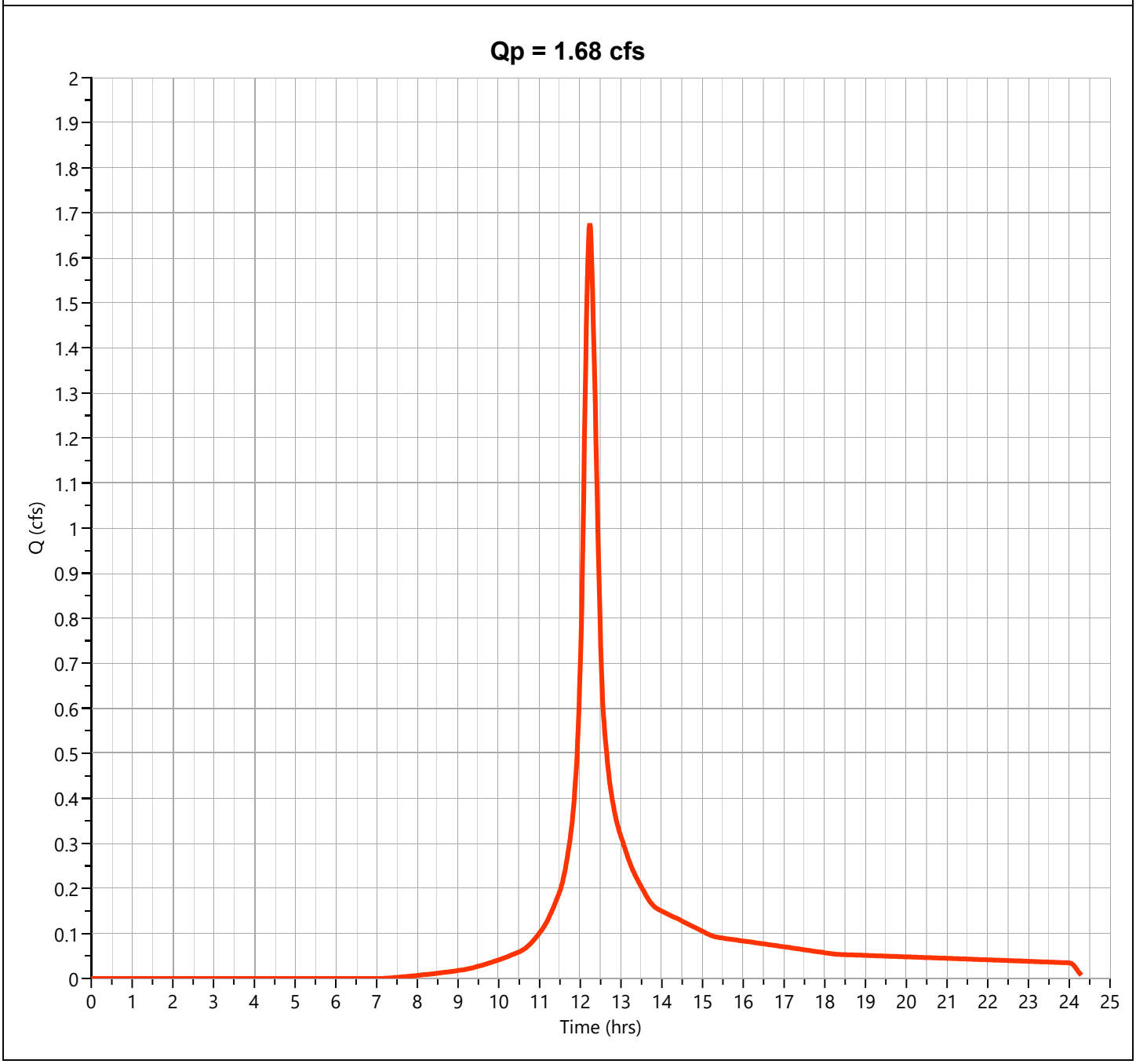
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D Woods HSGC C

Hyd. No. 22

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.676 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Runoff Volume	= 7,362 cuft
Drainage Area	= 0.44 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 18.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

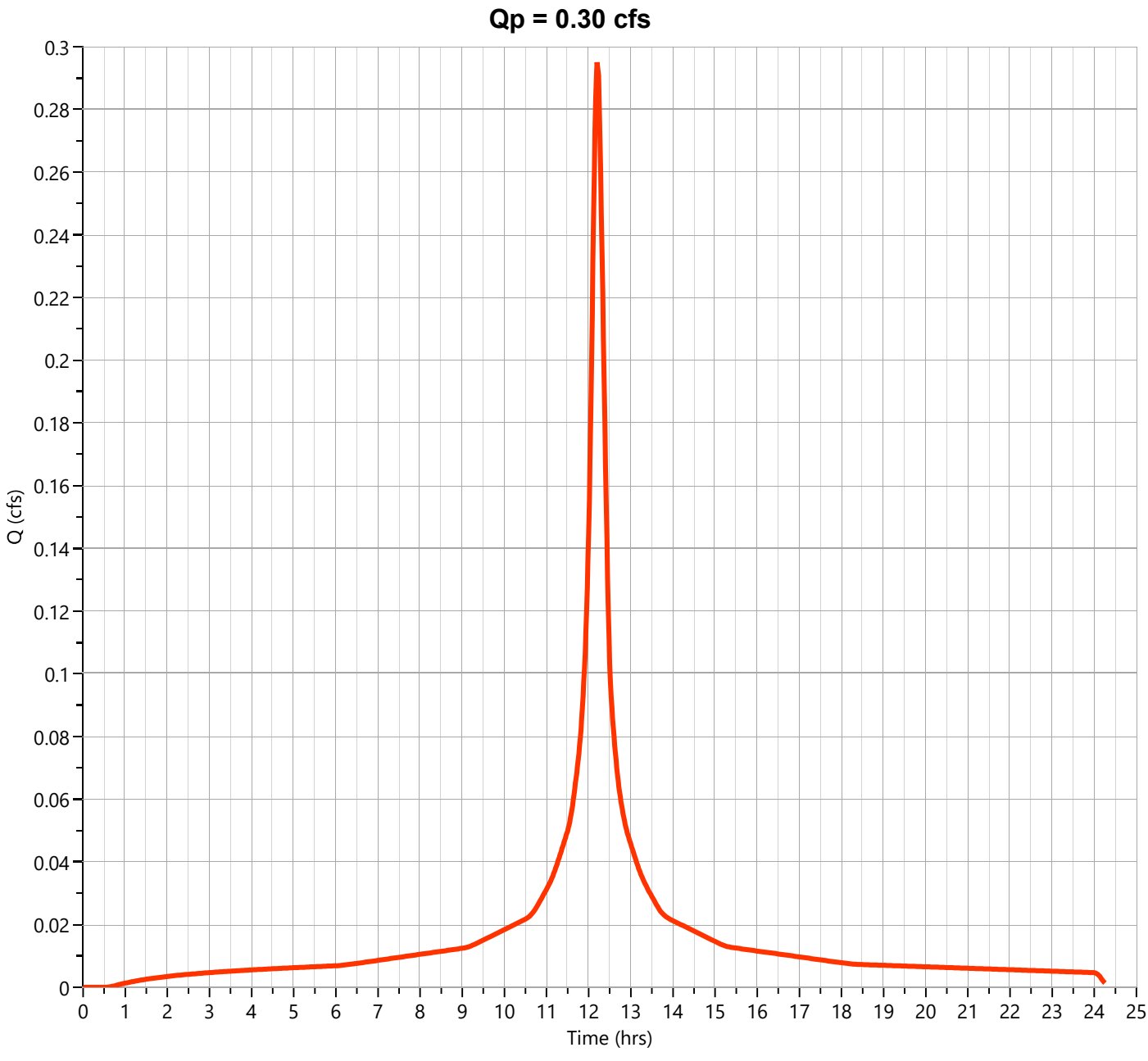
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D Impervious

Hyd. No. 23

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.295 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 1,468 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 16.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

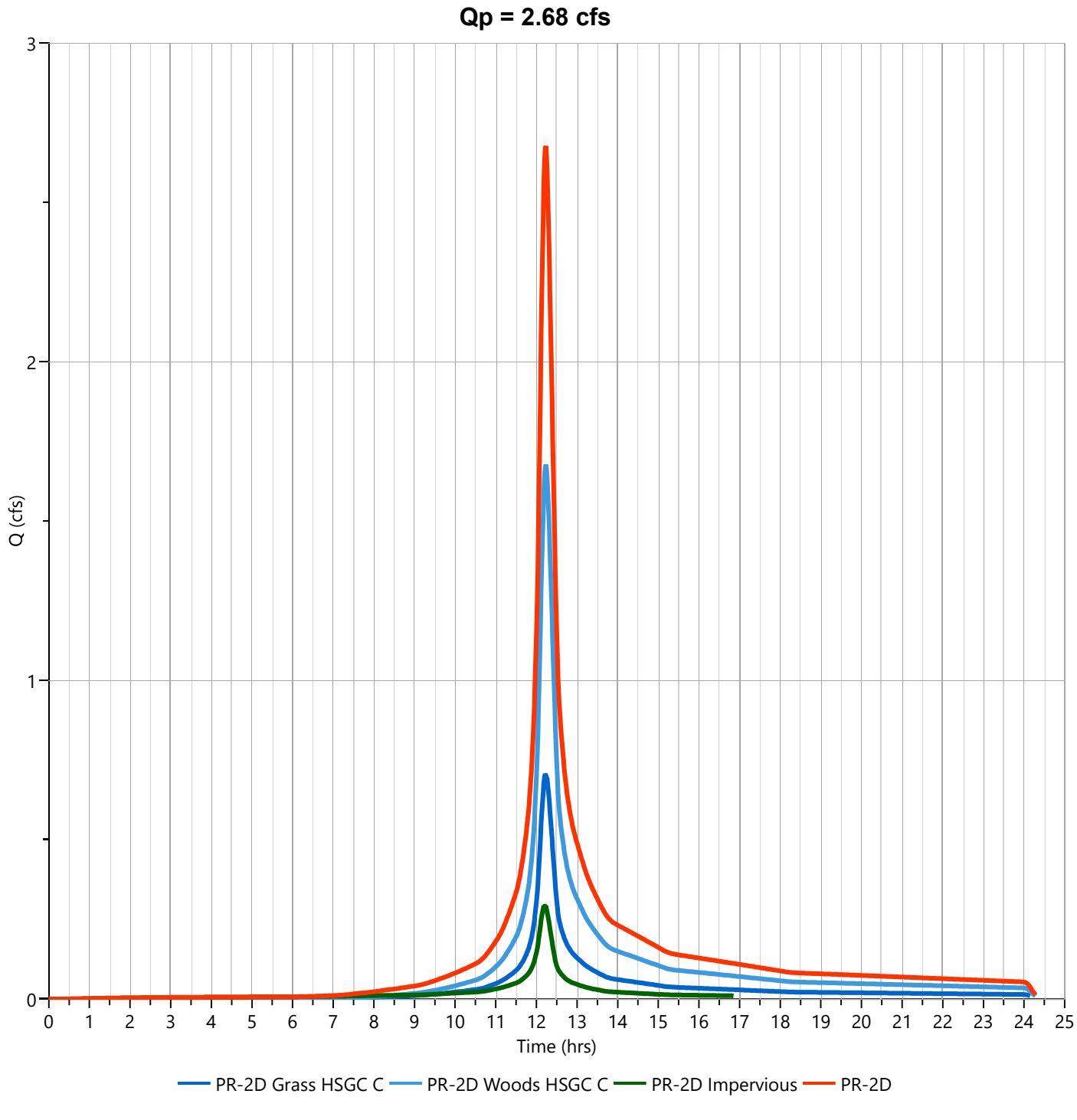
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D

Hyd. No. 24

Hydrograph Type	= Junction	Peak Flow	= 2.676 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Hydrograph Volume	= 11,962 cuft
Inflow Hydrographs	= 21, 22, 23	Total Contrib. Area	= 0.66 ac



Hydrograph Report

Project Name:

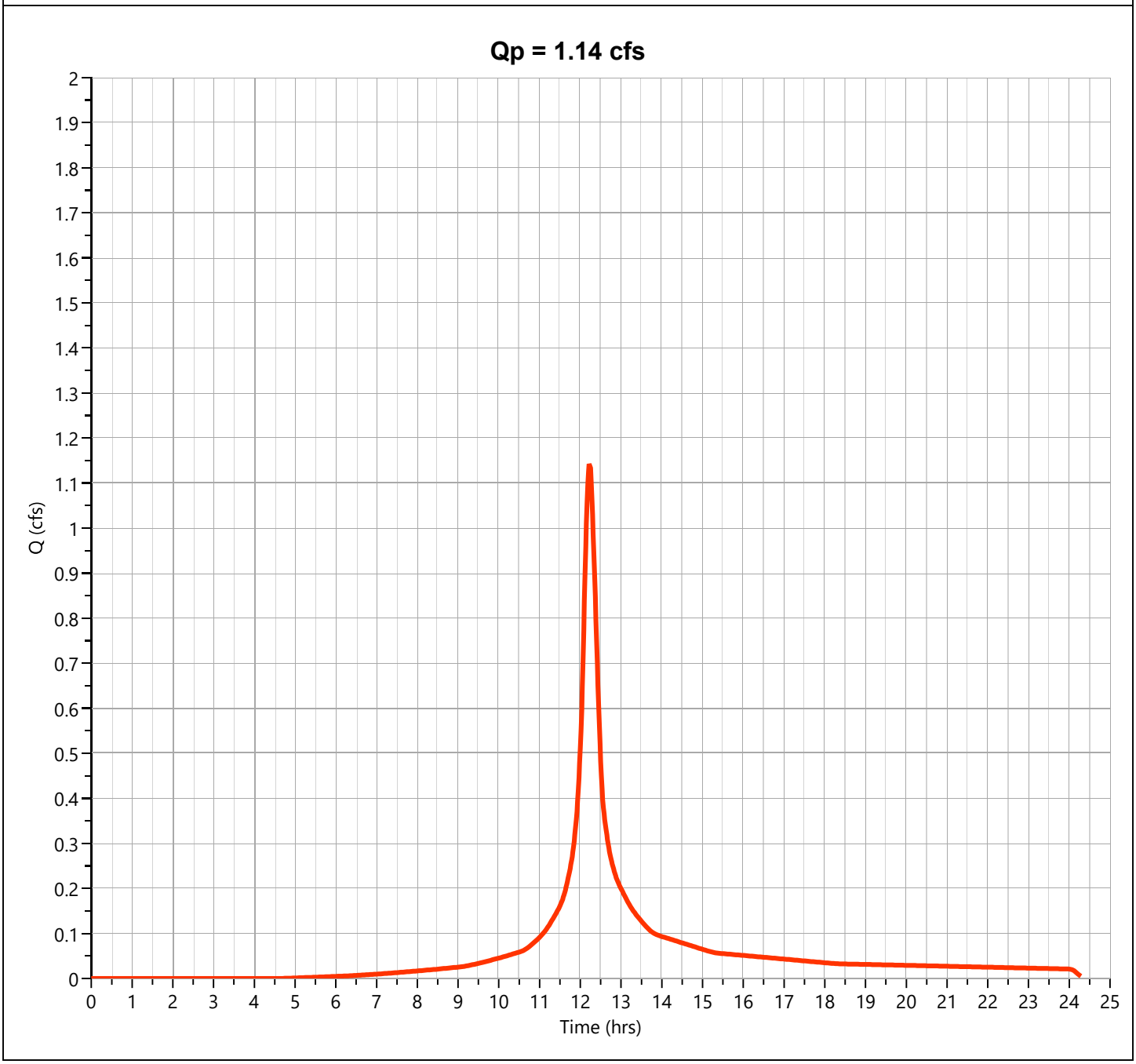
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D Grass HSGC C

Hyd. No. 21

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.144 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Runoff Volume	= 5,142 cuft
Drainage Area	= 0.17 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 18.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

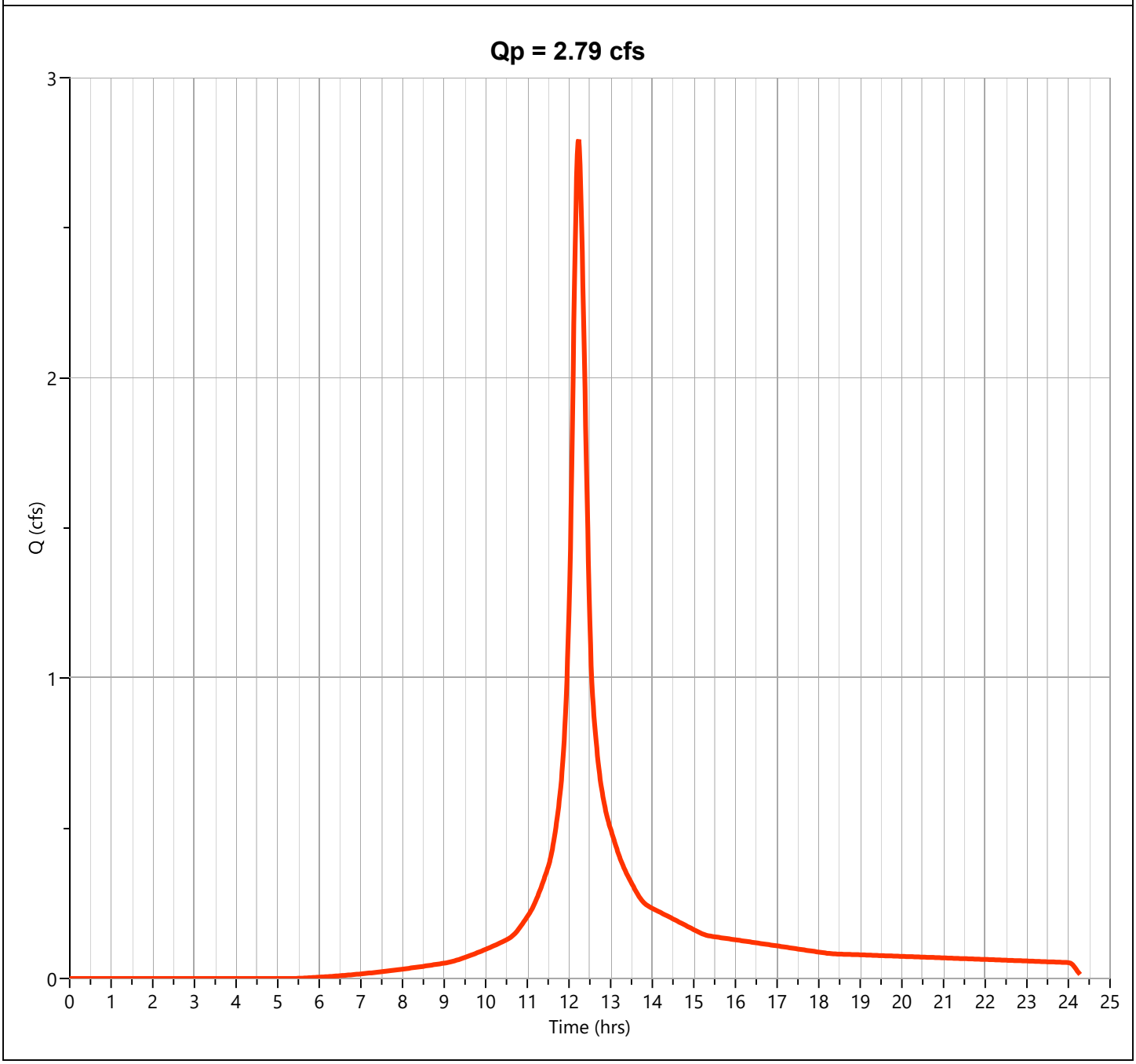
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D Woods HSGC C

Hyd. No. 22

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.793 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Runoff Volume	= 12,416 cuft
Drainage Area	= 0.44 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 18.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

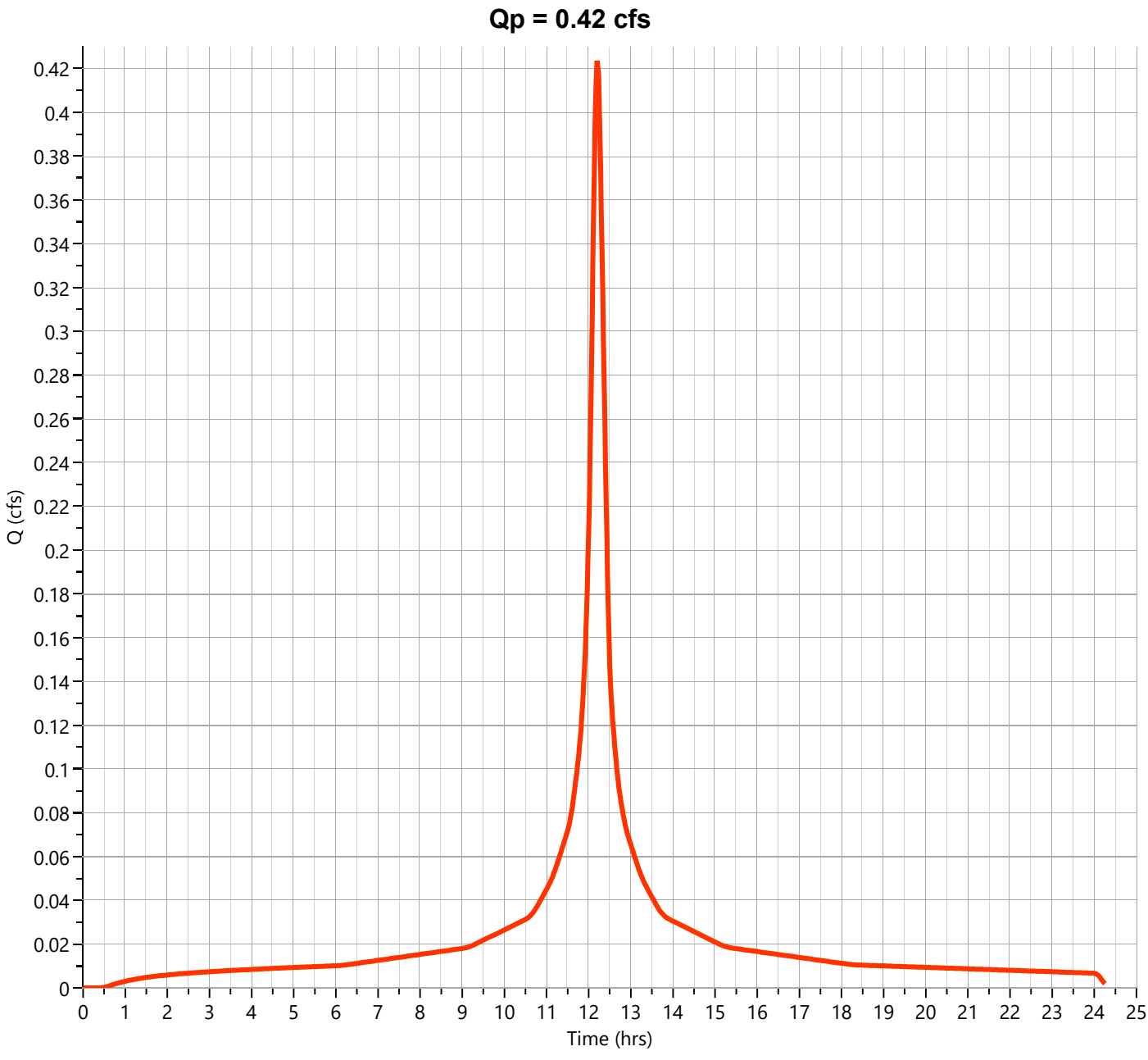
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D Impervious

Hyd. No. 23

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.423 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 2,124 cuft
Drainage Area	= 0.05 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 16.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

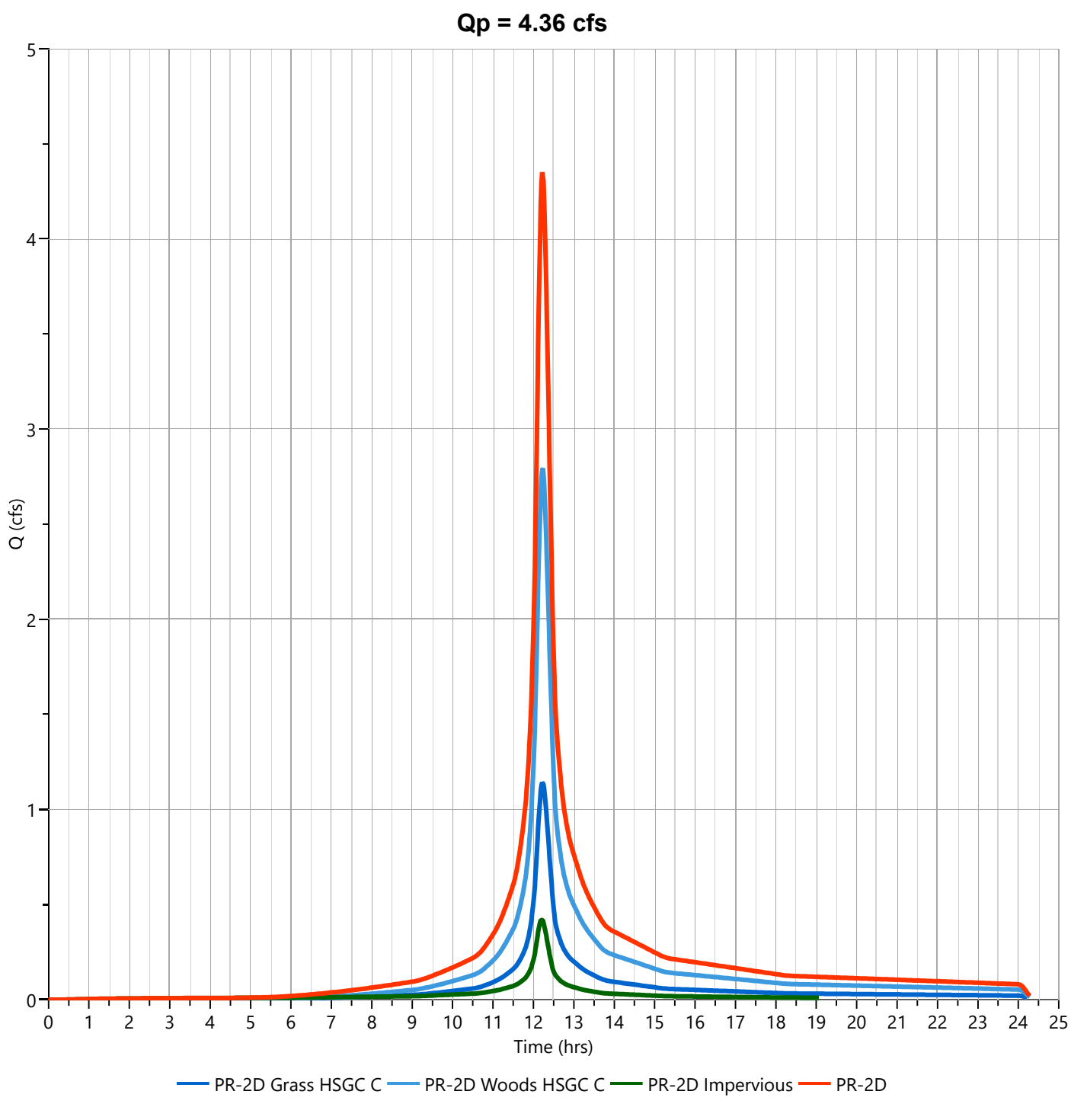
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2D

Hyd. No. 24

Hydrograph Type	= Junction	Peak Flow	= 4.355 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Hydrograph Volume	= 19,683 cuft
Inflow Hydrographs	= 21, 22, 23	Total Contrib. Area	= 0.66 ac



PR-2E WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/6/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/6/2024**

Circle One: Present **(Developed)** — **Future Proposed Watershed PR-2E - Impervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		2		3
1.	Surface Description (NEH table 15-1)		Smooth Surfaces		Dense Grasses		Dense Grasses
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011		0.24		0.24
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	8		11		32
4.	Two-year 24-hr rainfall, P_2	in	4.12		4.12		4.12
5.	Land Slope, s	ft/ft	0.023		0.238		0.010
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	100		100		42
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.002	+	0.013	+	0.110
					Sheet Flow Sub-Total		0.125 hours

Shallow Concentrated Flow		Segment ID	4		5		
8.	Surface Description		Grassed Waterways		Grassed Waterways		
9.	Flow Length, L	ft	26		25		
10.	Watercourse Slope, s	ft/ft	0.013		0.027		
11.	Average Velocity, V (NEH table 15-3)	ft/s	1.85		2.66		
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.004	+	0.003	+	
					Shallow Conc. Flow Sub-Total		0.007 hours

Channel Flow		Segment ID	6				
13.	Flow Length, L	ft	291				
14.	Cross Sectional flow area, a	ft^2	0.61				
15.	Wetted Perimeter, P_w	ft	2.00				
16.	Hydraulic Radius, r $r = a / P_w$	ft	0.31				
17.	Channel Slope, s	ft/ft	0.005				
18.	Manning's Roughness Coeff., n		0.012				
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	3.97				
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.020	+		+	
					Channel Flow Sub-Total		0.020 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.152 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	9 minutes

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/6/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/6/2024**

Circle One: Present **(Developed)** — **Future Proposed Watershed PR-2E - Pervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		2		
1.	Surface Description (NEH table 15-1)		Dense Grasses		Dense Grasses		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.24		0.24		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	16		34		
4.	Two-year 24-hr rainfall, P_2	in	4.12		4.12		
5.	Land Slope, s	ft/ft	0.054		0.010		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	97		41		
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.033	+	0.118	+	
					Sheet Flow Sub-Total		0.151 hours

Shallow Concentrated Flow		Segment ID	3		4		
8.	Surface Description		Grassed Waterways		Grassed Waterways		
9.	Flow Length, L	ft	26		25		
10.	Watercourse Slope, s	ft/ft	0.009		0.027		
11.	Average Velocity, V (NEH table 15-3)	ft/s	1.50		2.64		
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.005	+	0.003	+	
					Shallow Conc. Flow Sub-Total		0.008 hours

Channel Flow		Segment ID	5				
13.	Flow Length, L	ft	291				
14.	Cross Sectional flow area, a	ft^2	0.61				
15.	Wetted Perimeter, P_w	ft	2.00				
16.	Hydraulic Radius, r $r = a / P_w$	ft	0.31				
17.	Channel Slope, s	ft/ft	0.005				
18.	Manning's Roughness Coeff., n		0.012				
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	3.97				
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.020	+		+	
					Channel Flow Sub-Total		0.020 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.179 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	11 minutes

Hydrograph Report

Project Name:

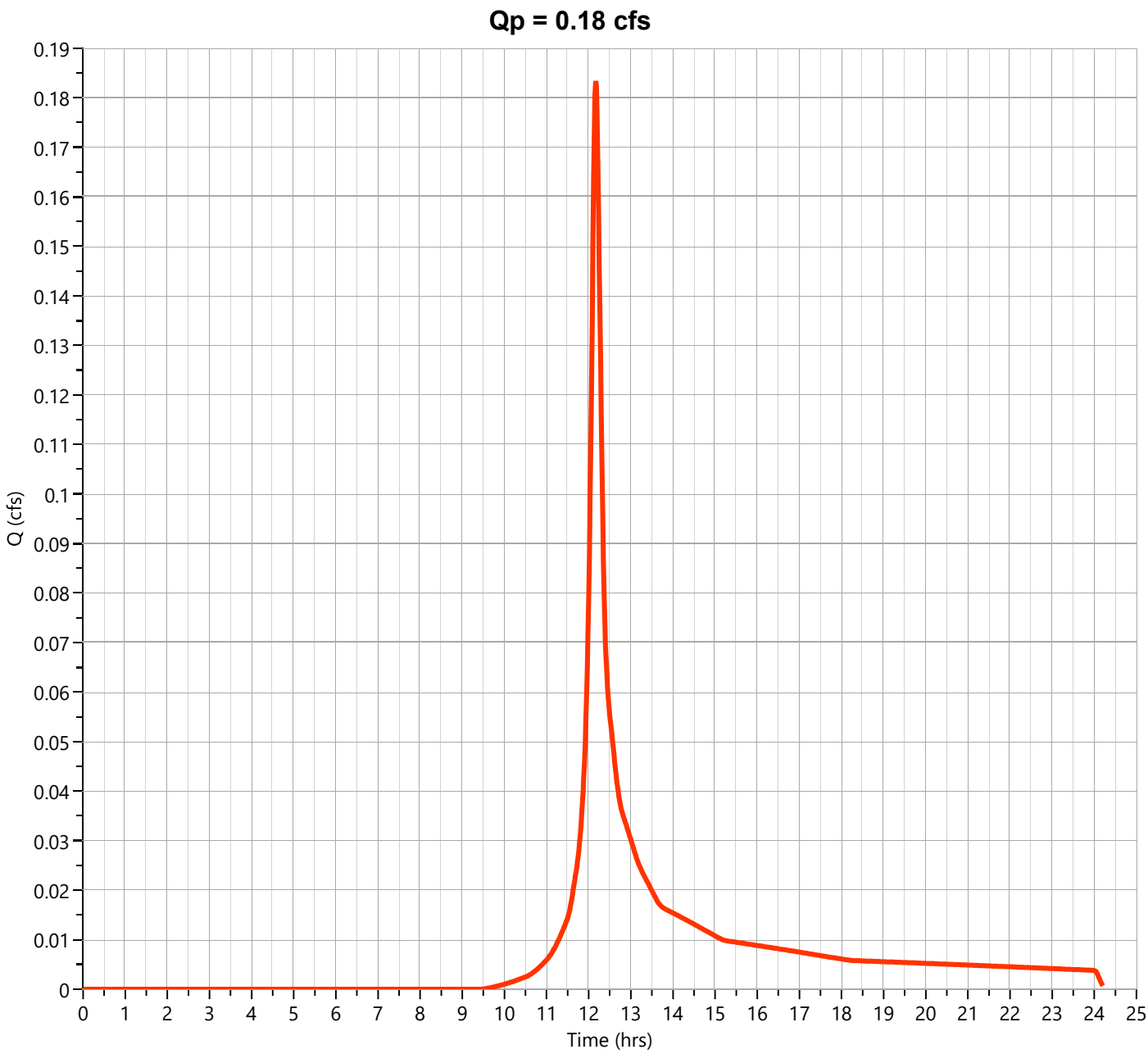
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2E Grass HSGC C

Hyd. No. 26

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.183 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Runoff Volume	= 685 cuft
Drainage Area	= 0.11 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 11.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

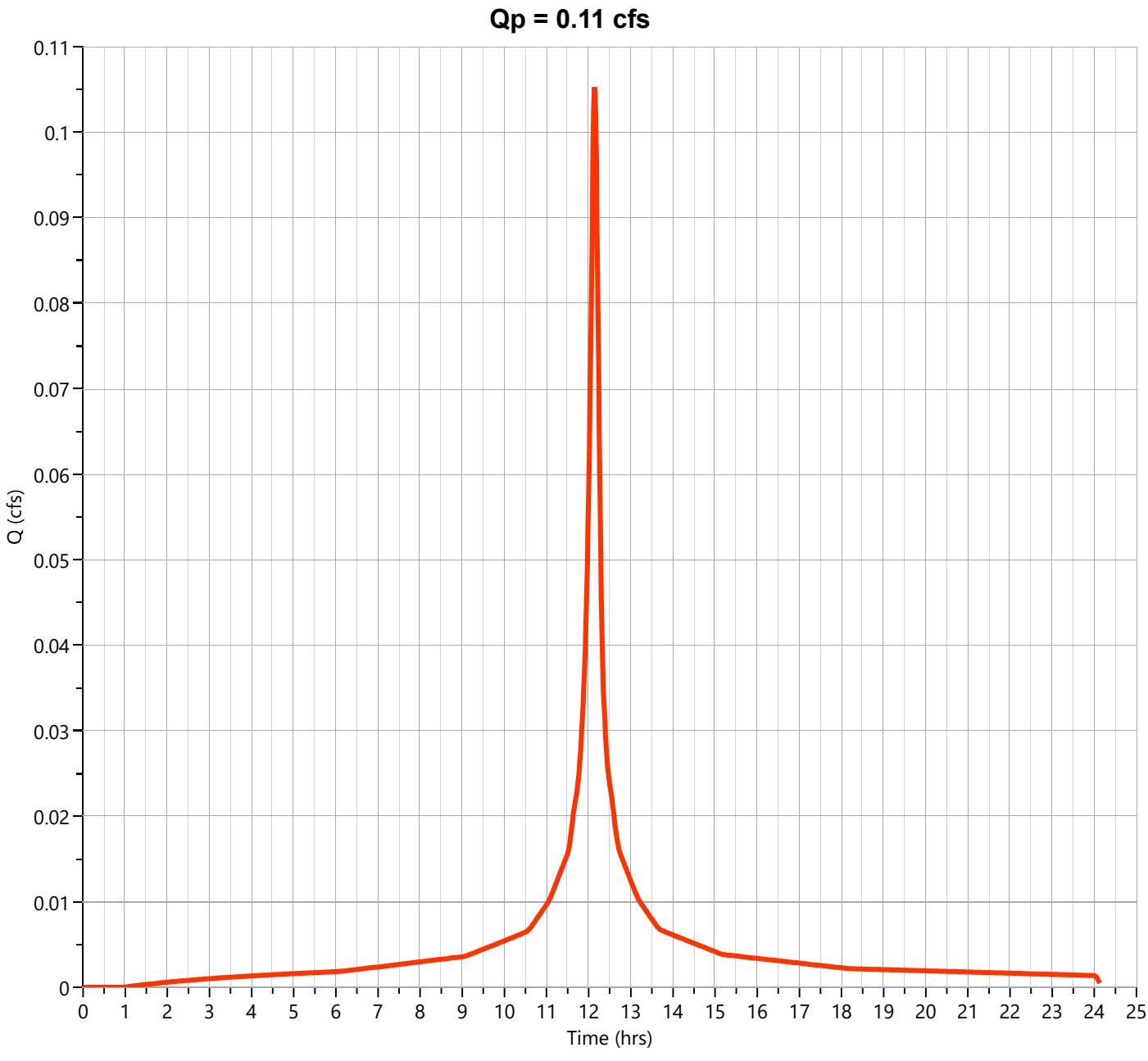
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2E Impervious

Hyd. No. 27

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.105 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 423 cuft
Drainage Area	= 0.03 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 9.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

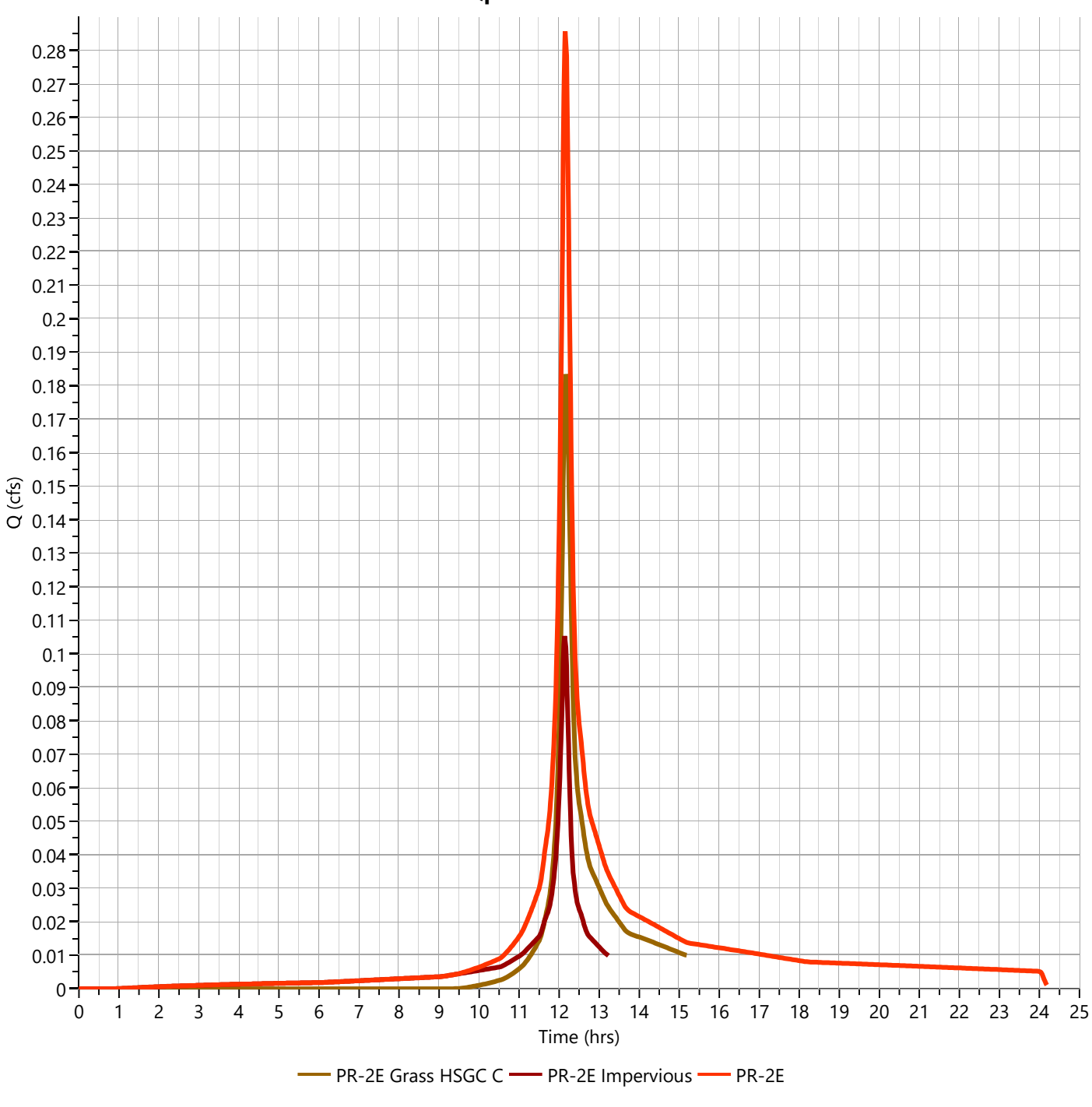
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2E

Hyd. No. 28

Hydrograph Type	= Junction	Peak Flow	= 0.286 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,108 cuft
Inflow Hydrographs	= 26, 27	Total Contrib. Area	= 0.14 ac



Hydrograph Report

Project Name:

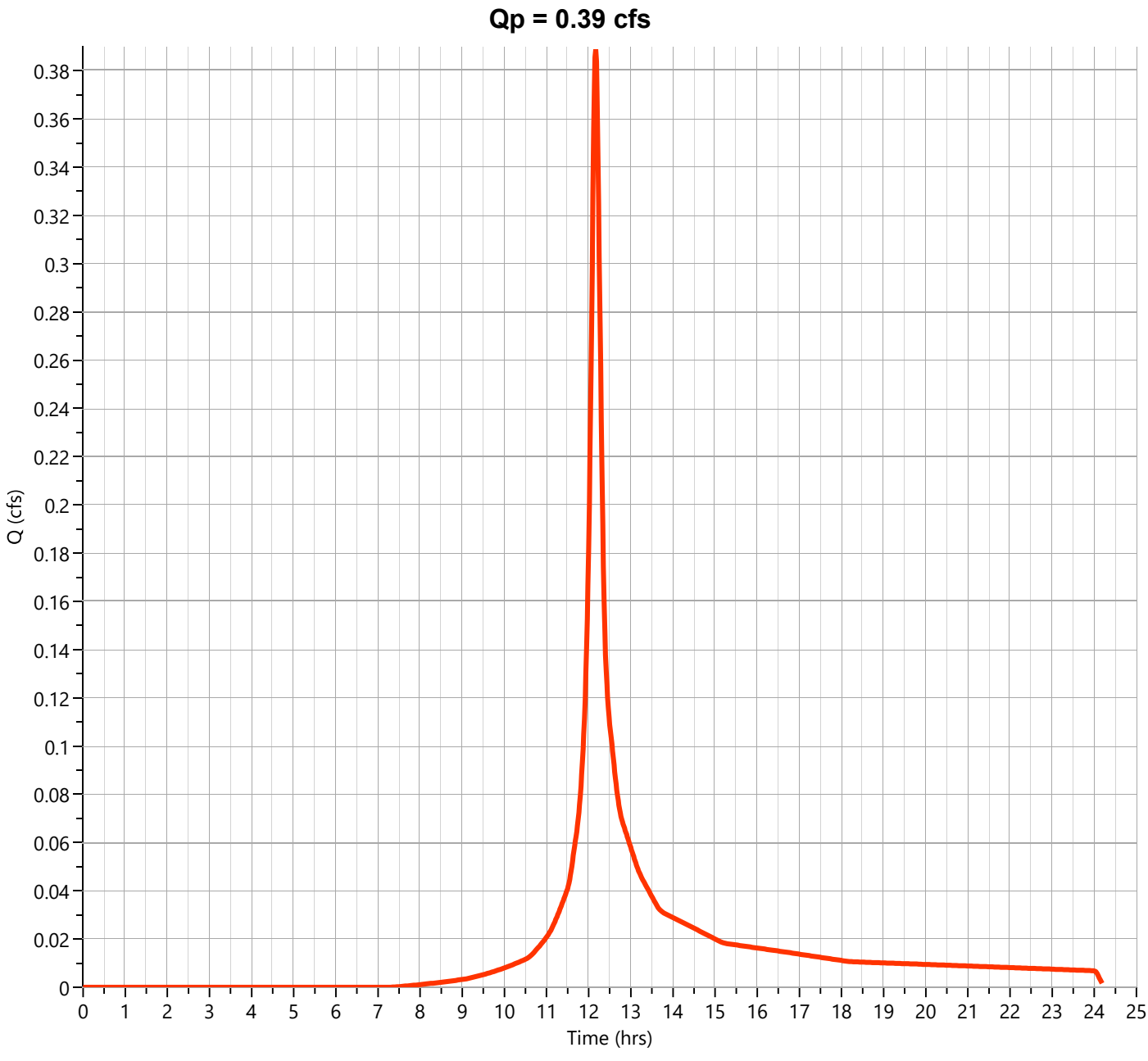
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2E Grass HSGC C

Hyd. No. 26

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.389 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Runoff Volume	= 1,439 cuft
Drainage Area	= 0.11 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 11.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

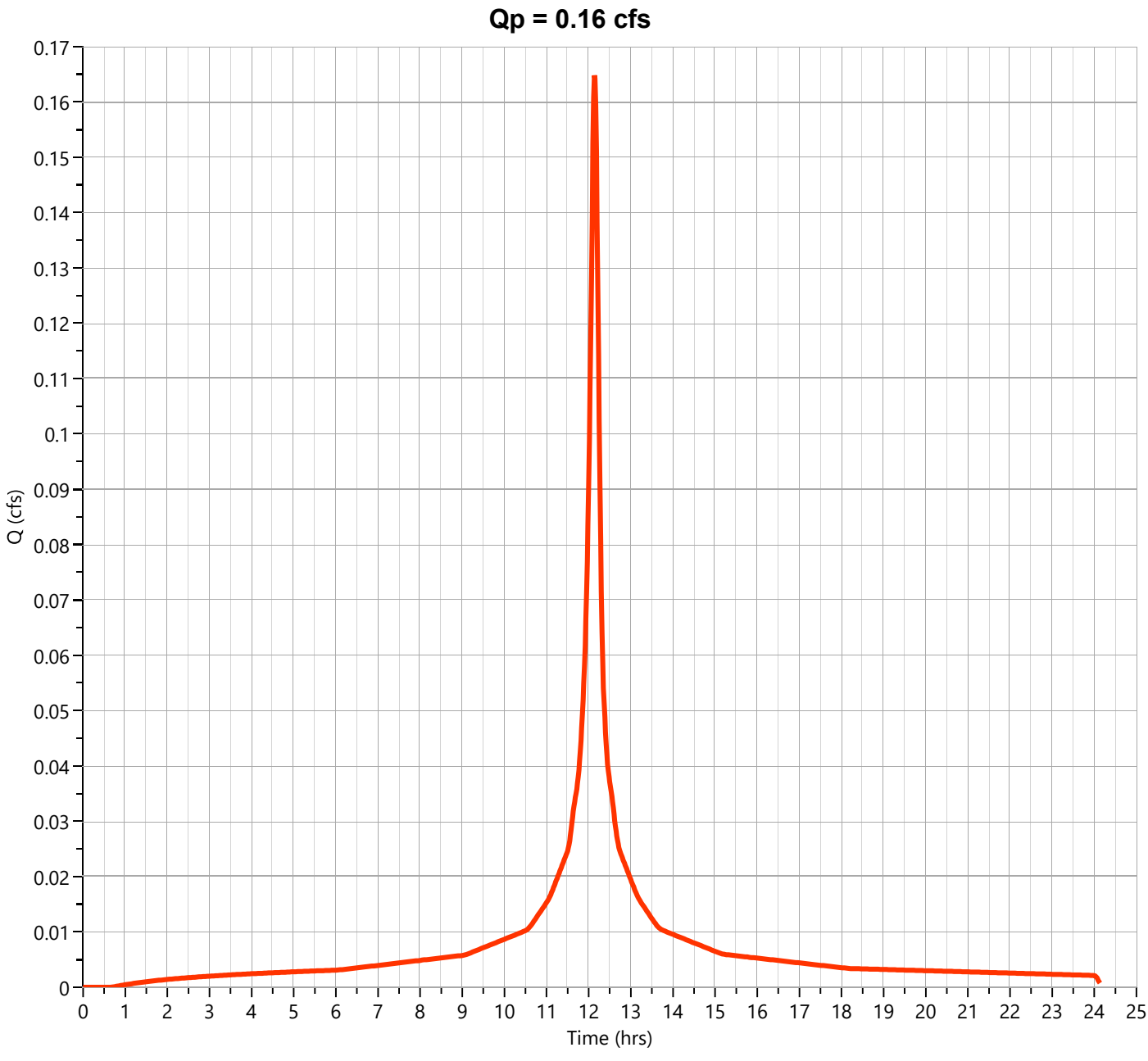
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2E Impervious

Hyd. No. 27

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.165 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 673 cuft
Drainage Area	= 0.03 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 9.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

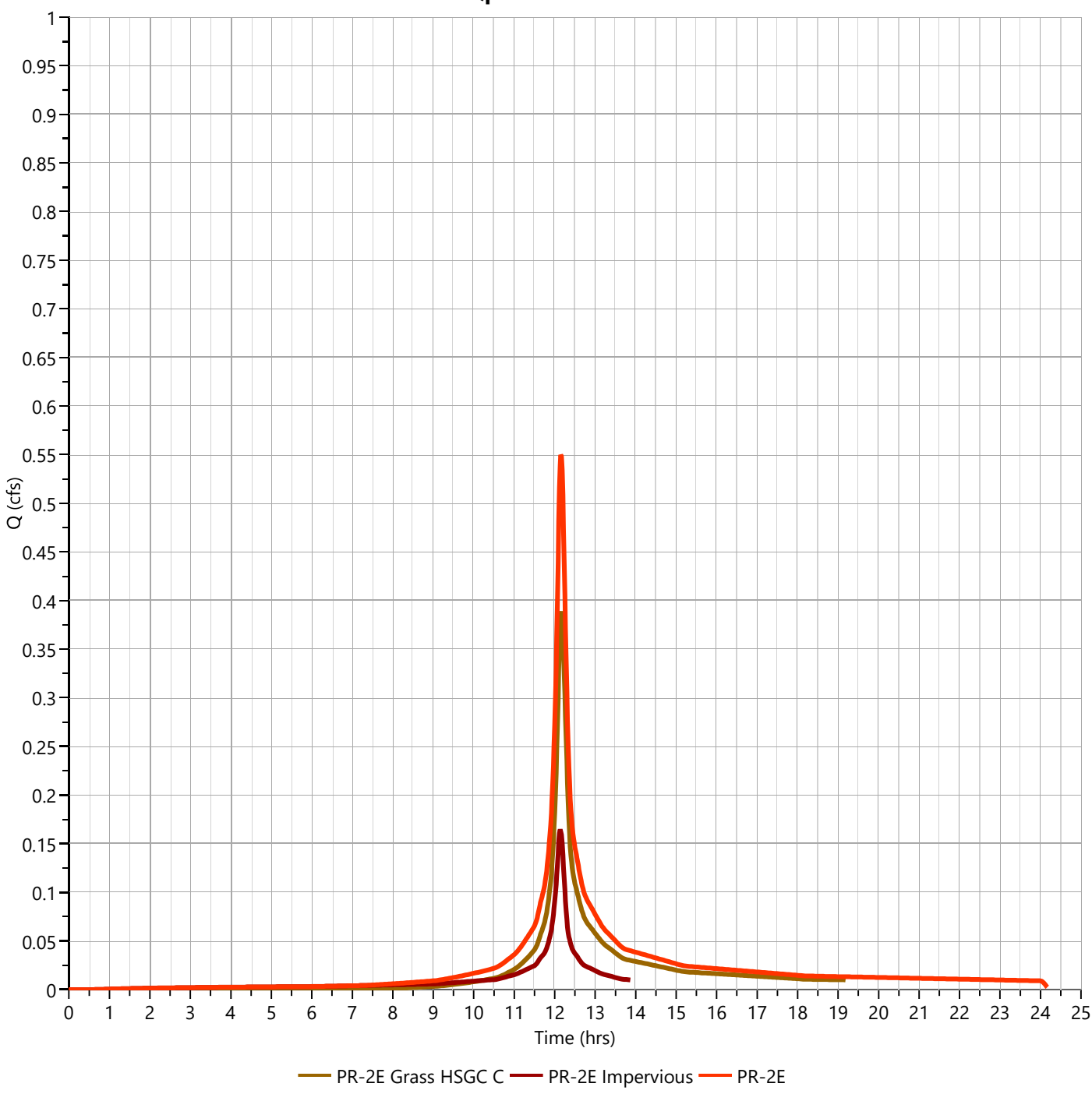
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2E

Hyd. No. 28

Hydrograph Type	= Junction	Peak Flow	= 0.550 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,112 cuft
Inflow Hydrographs	= 26, 27	Total Contrib. Area	= 0.14 ac



Hydrograph Report

Project Name:

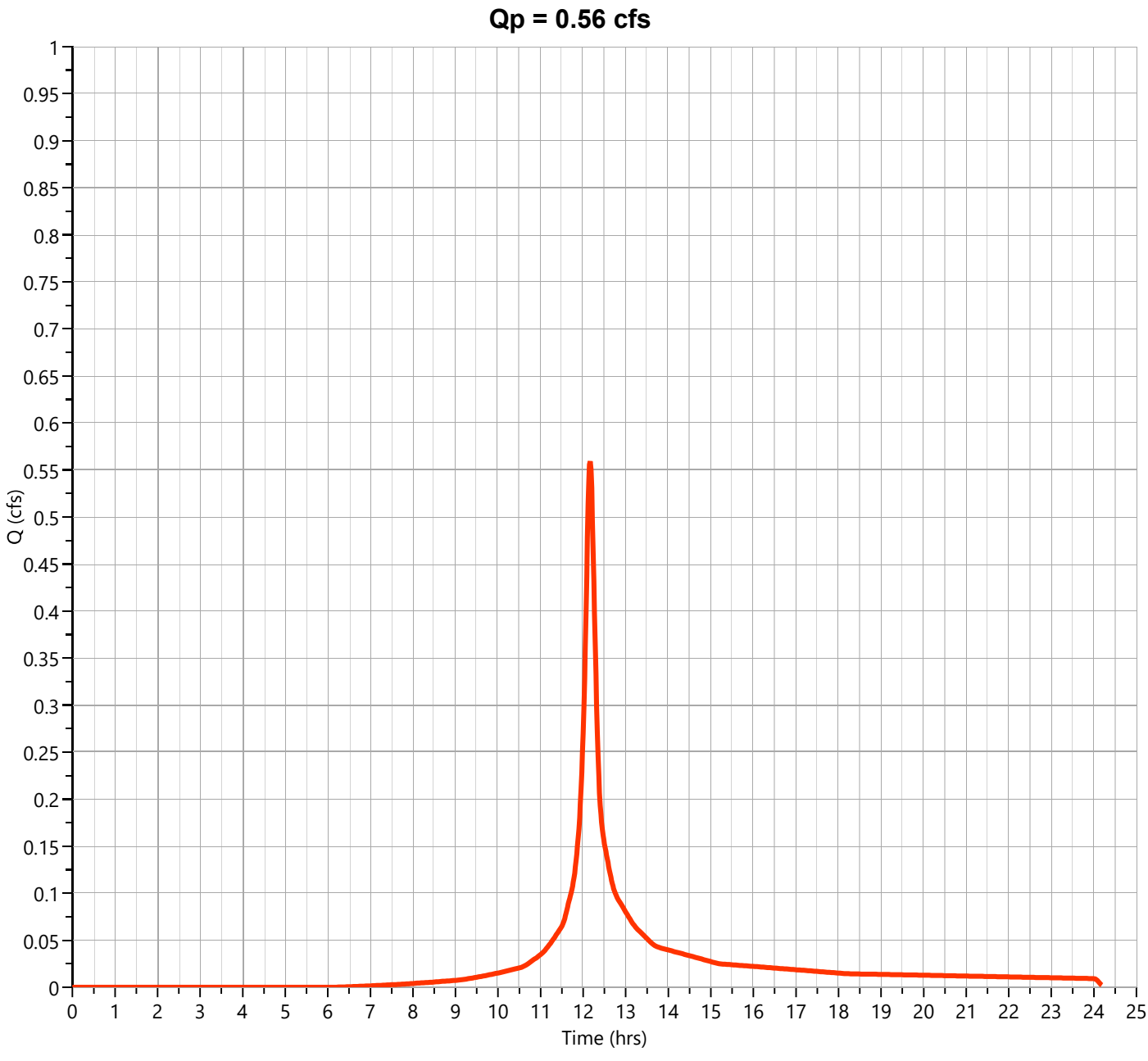
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2E Grass HSGC C

Hyd. No. 26

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.559 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Runoff Volume	= 2,086 cuft
Drainage Area	= 0.11 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 11.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

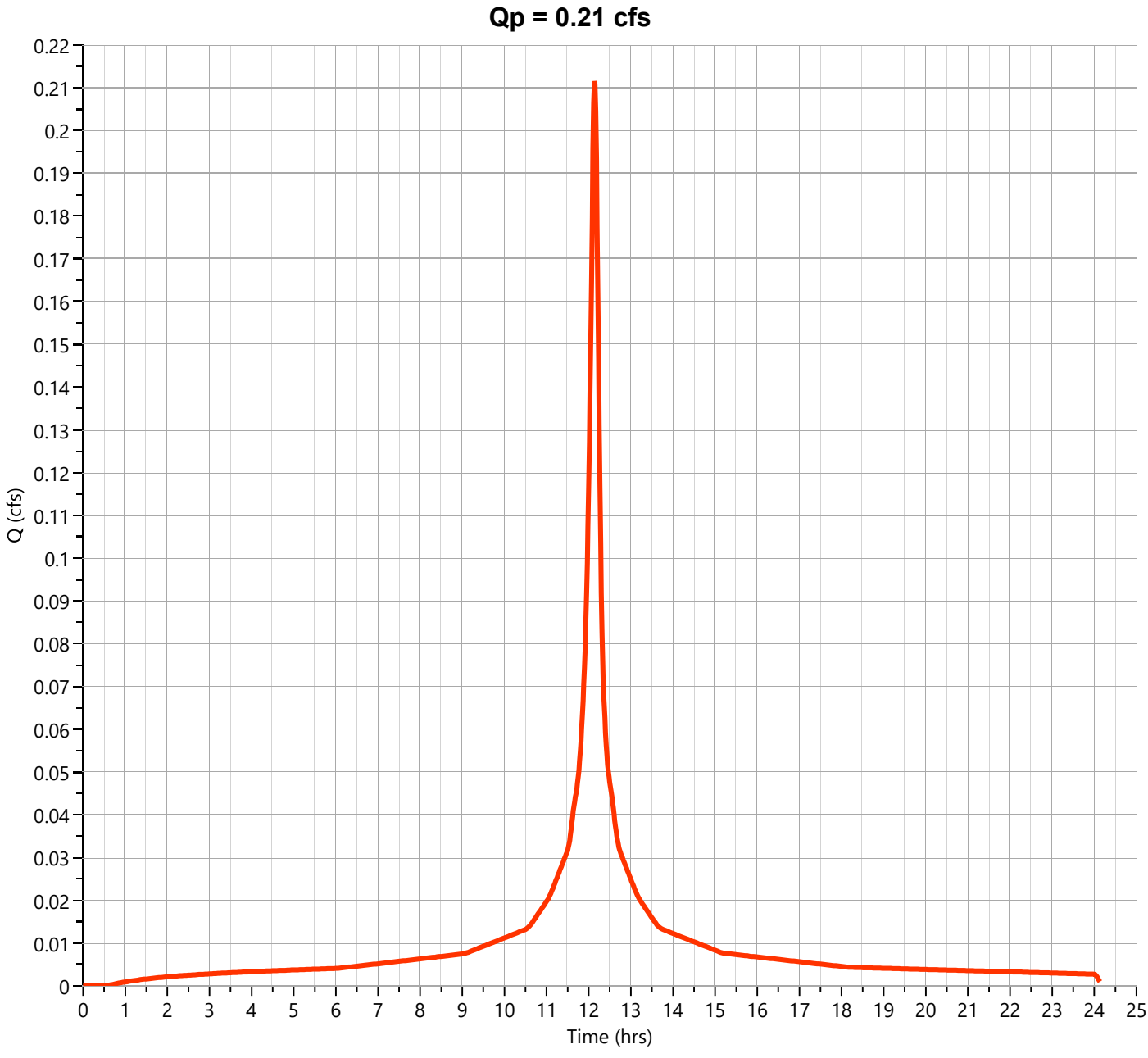
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2E Impervious

Hyd. No. 27

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.212 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 870 cuft
Drainage Area	= 0.03 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 9.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

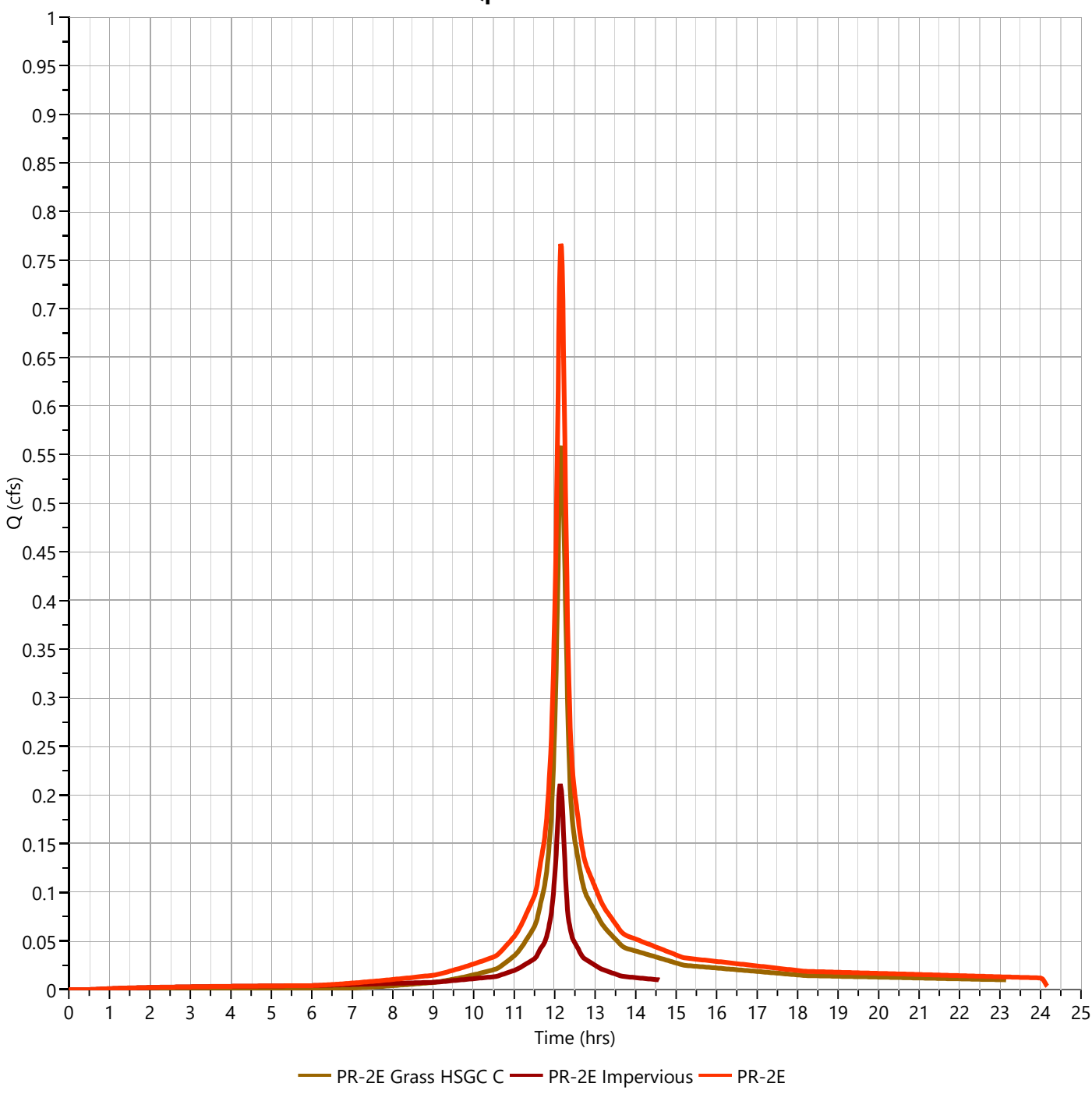
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2E

Hyd. No. 28

Hydrograph Type	= Junction	Peak Flow	= 0.767 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,956 cuft
Inflow Hydrographs	= 26, 27	Total Contrib. Area	= 0.14 ac



Hydrograph Report

Project Name:

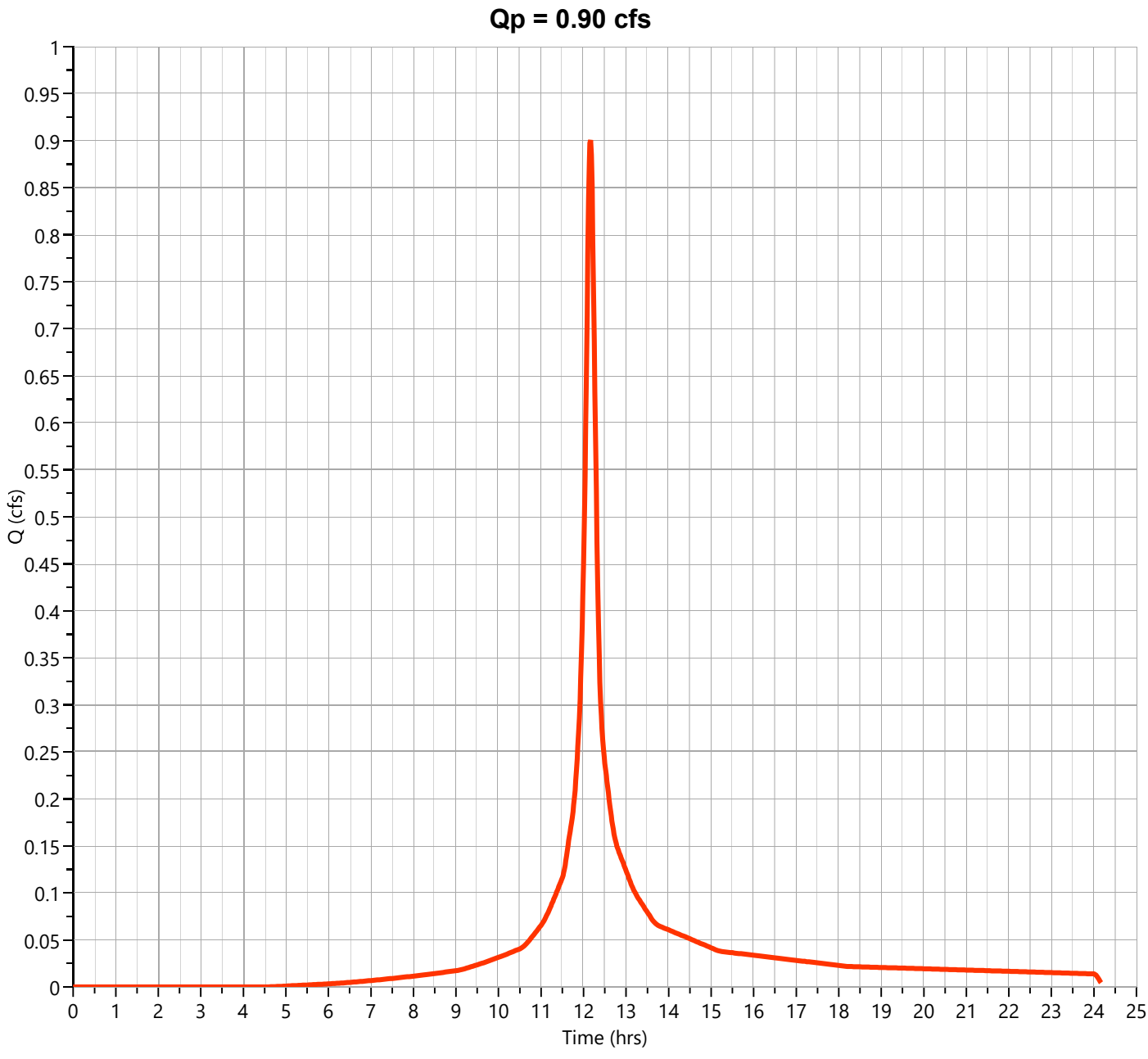
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2E Grass HSGC C

Hyd. No. 26

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.900 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Runoff Volume	= 3,426 cuft
Drainage Area	= 0.11 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 11.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

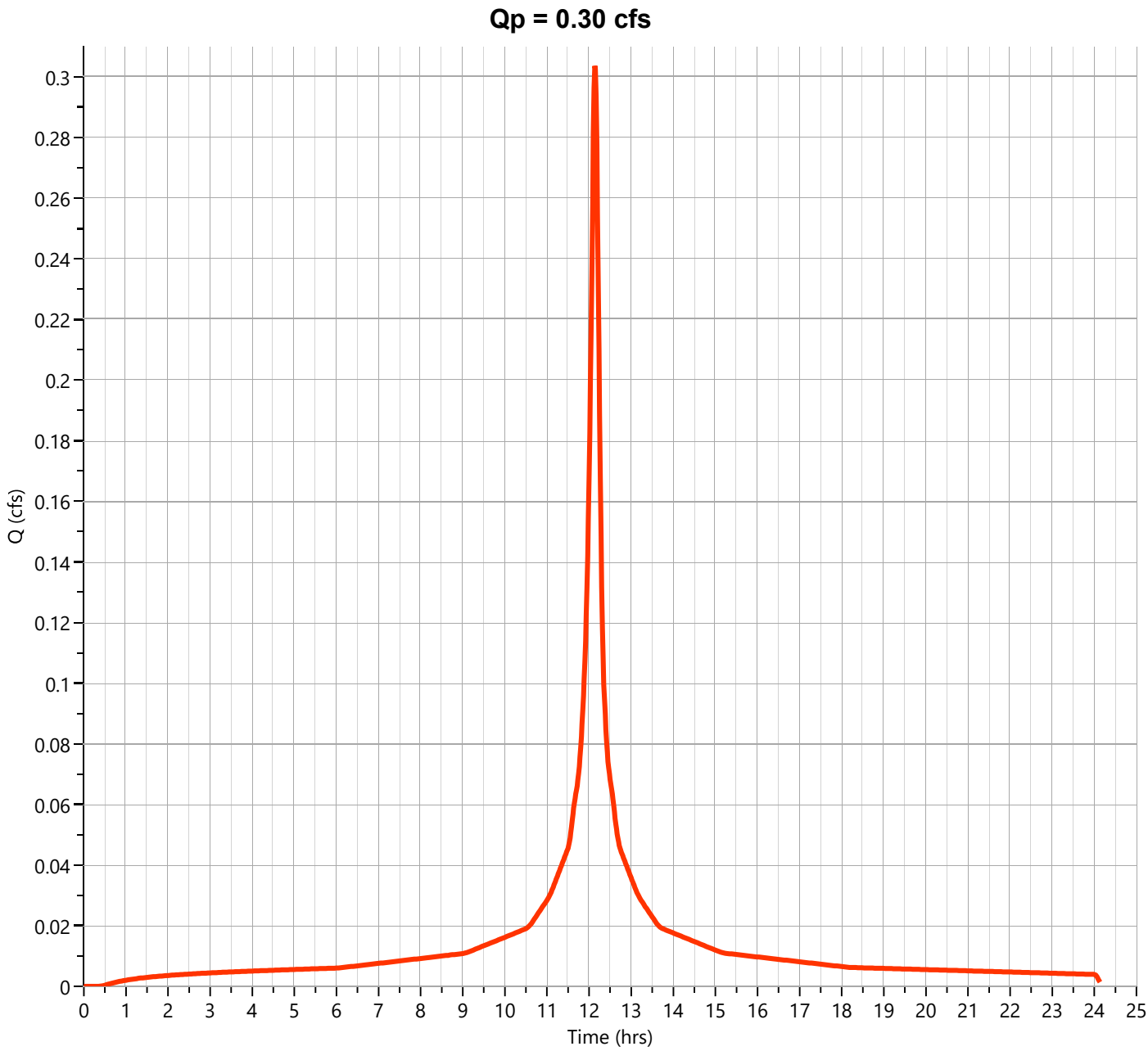
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2E Impervious

Hyd. No. 27

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.304 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 1,259 cuft
Drainage Area	= 0.03 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 9.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

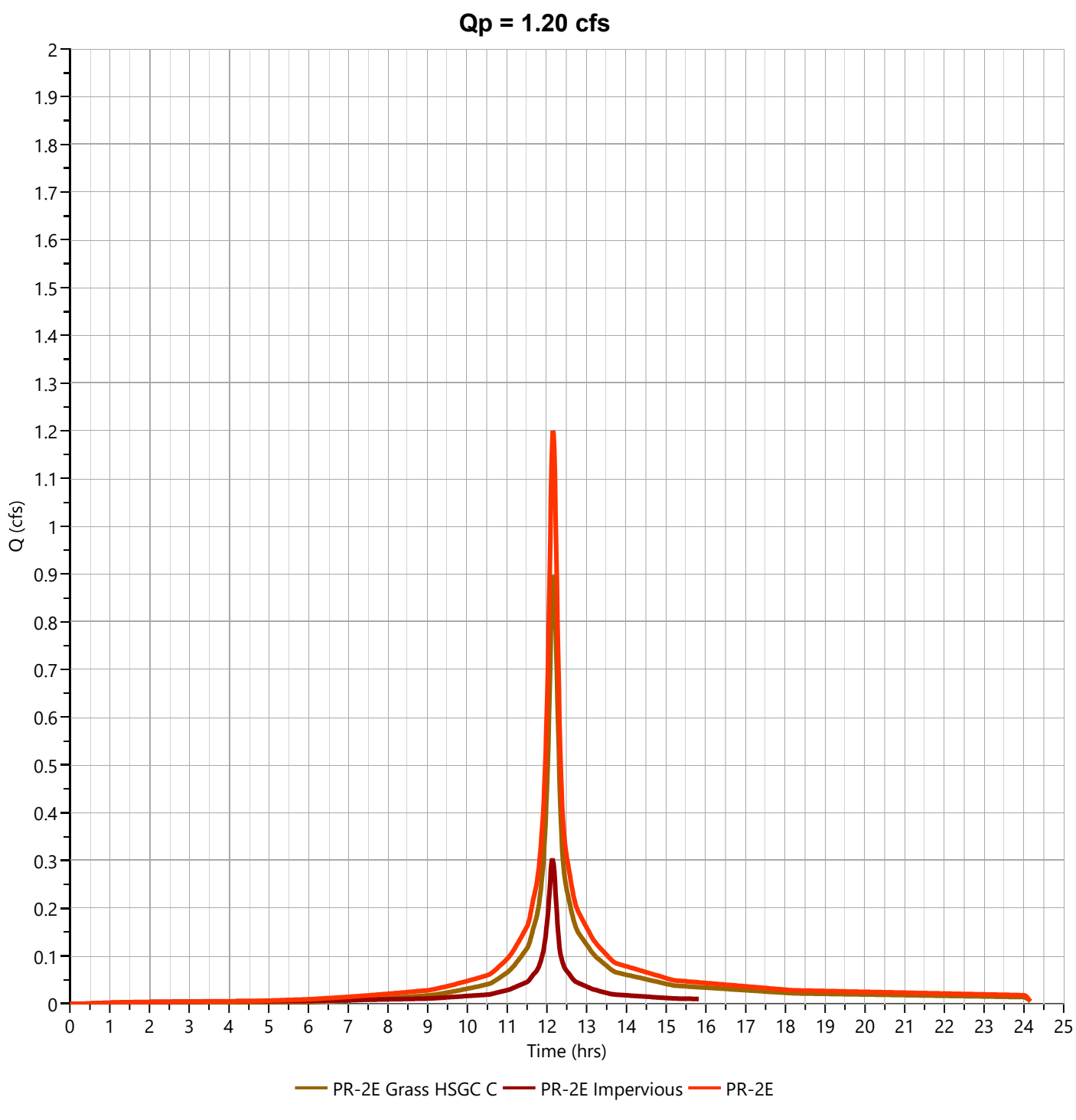
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2E

Hyd. No. 28

Hydrograph Type	= Junction	Peak Flow	= 1.200 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Hydrograph Volume	= 4,684 cuft
Inflow Hydrographs	= 26, 27	Total Contrib. Area	= 0.14 ac



PR-2F WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/6/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/6/2024**

Circle One: Present (**Developed**) — **Future Proposed Watershed PR-2F - Impervious**

Circle One: (**T_c**) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

			Segment ID	1		2		
1.	Surface Description (NEH table 15-1)			Smooth Surfaces		Woods Light Underbrush		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.011		0.40		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)		ft	14		51		
4.	Two-year 24-hr rainfall, P_2		in	4.12		4.12		
5.	Land Slope, s		ft/ft	0.021		0.057		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft)	$L_{mcs} = (100\ s^{0.5})/n$	ft	100		60		
7.	Compute T_t	$T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.004	+	0.121	+	

Sheet Flow Sub-Total **0.125 hours**

Shallow Concentrated Flow

			Segment ID	3		4		5
8.	Surface Description			Grassed Waterways		Grassed Waterways		Grassed Waterways
9.	Flow Length, L		ft	19		54		25
10.	Watercourse Slope, s		ft/ft	0.091		0.010		0.027
11.	Average Velocity, V (NEH table 15-3)		ft/s	4.85		1.63		2.66
12.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.001	+	0.009	+	0.003

Shallow Conc. Flow Sub-Total **0.013 hours**

Channel Flow

			Segment ID	6				
13.	Flow Length, L		ft	291				
14.	Cross Sectional flow area, a		ft^2	0.61				
15.	Wetted Perimeter, P_w		ft	2.00				
16.	Hydraulic Radius, r	$r = a / P_w$	ft	0.31				
17.	Channel Slope, s		ft/ft	0.005				
18.	Manning's Roughness Coeff., n			0.012				
19.	Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	3.97				
20.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.020	+		+	

Channel Flow Sub-Total **0.020 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) =	**0.158 hours**
Total Tc (minutes) =	**9 minutes**

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/6/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/6/2024**

Circle One: Present **Developed** — **Future Proposed Watershed PR-2F - Pervious**

Circle One: **T_c** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		2		
1.	Surface Description (NEH table 15-1)		Woods Light Underbrush		Dense Grasses		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.40		0.24		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	41		16		
4.	Two-year 24-hr rainfall, P_2	in	4.12		4.12		
5.	Land Slope, s	ft/ft	0.087		0.008		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	74		37		
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.086	+	0.069	+	
					Sheet Flow Sub-Total		0.155 hours

Shallow Concentrated Flow		Segment ID	3		4		
8.	Surface Description		Grassed Waterways		Grassed Waterways		
9.	Flow Length, L	ft	54		25		
10.	Watercourse Slope, s	ft/ft	0.010		0.027		
11.	Average Velocity, V (NEH table 15-3)	ft/s	1.63		2.66		
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.009	+	0.003	+	
					Shallow Conc. Flow Sub-Total		0.012 hours

Channel Flow		Segment ID	5				
13.	Flow Length, L	ft	291				
14.	Cross Sectional flow area, a	ft^2	0.61				
15.	Wetted Perimeter, P_w	ft	2.00				
16.	Hydraulic Radius, r $r = a / P_w$	ft	0.31				
17.	Channel Slope, s	ft/ft	0.005				
18.	Manning's Roughness Coeff., n		0.012				
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	3.97				
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.020	+		+	
					Channel Flow Sub-Total		0.020 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.187 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	11 minutes

Hydrograph Report

Project Name:

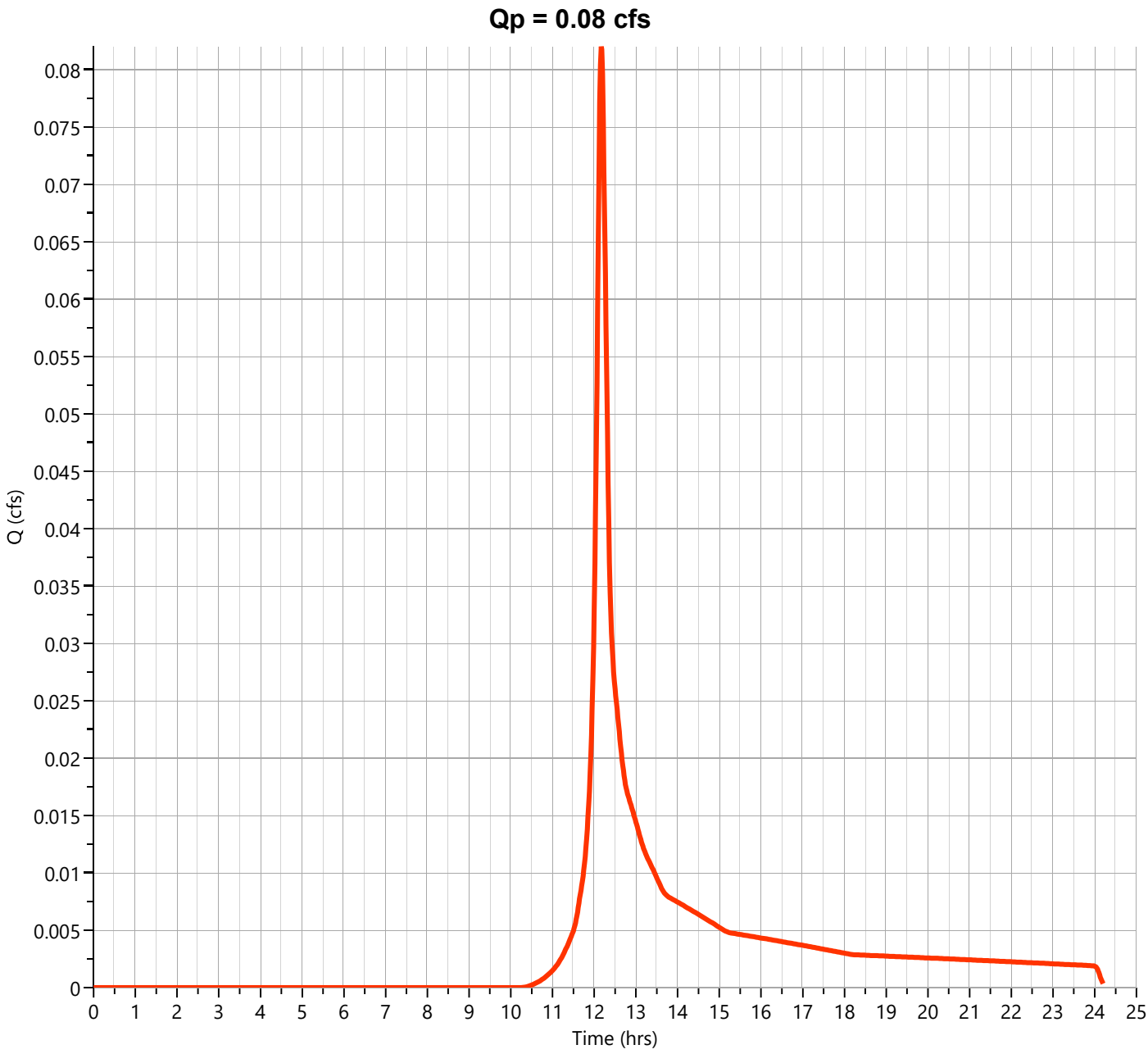
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2F Woods HSGC C

Hyd. No. 30

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.082 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Runoff Volume	= 313 cuft
Drainage Area	= 0.06 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 11.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

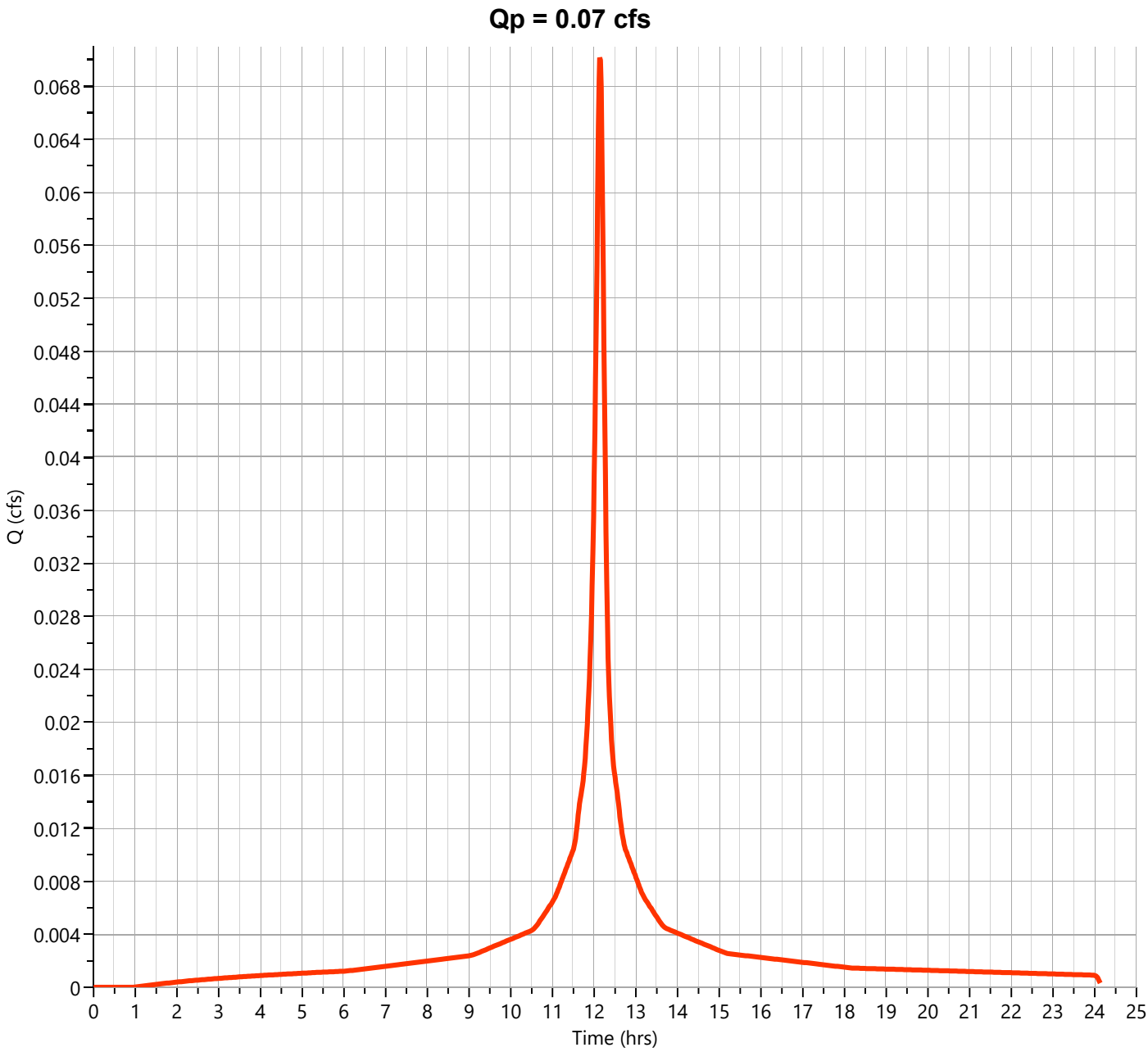
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2F Impervious

Hyd. No. 31

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.070 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 282 cuft
Drainage Area	= 0.02 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 9.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

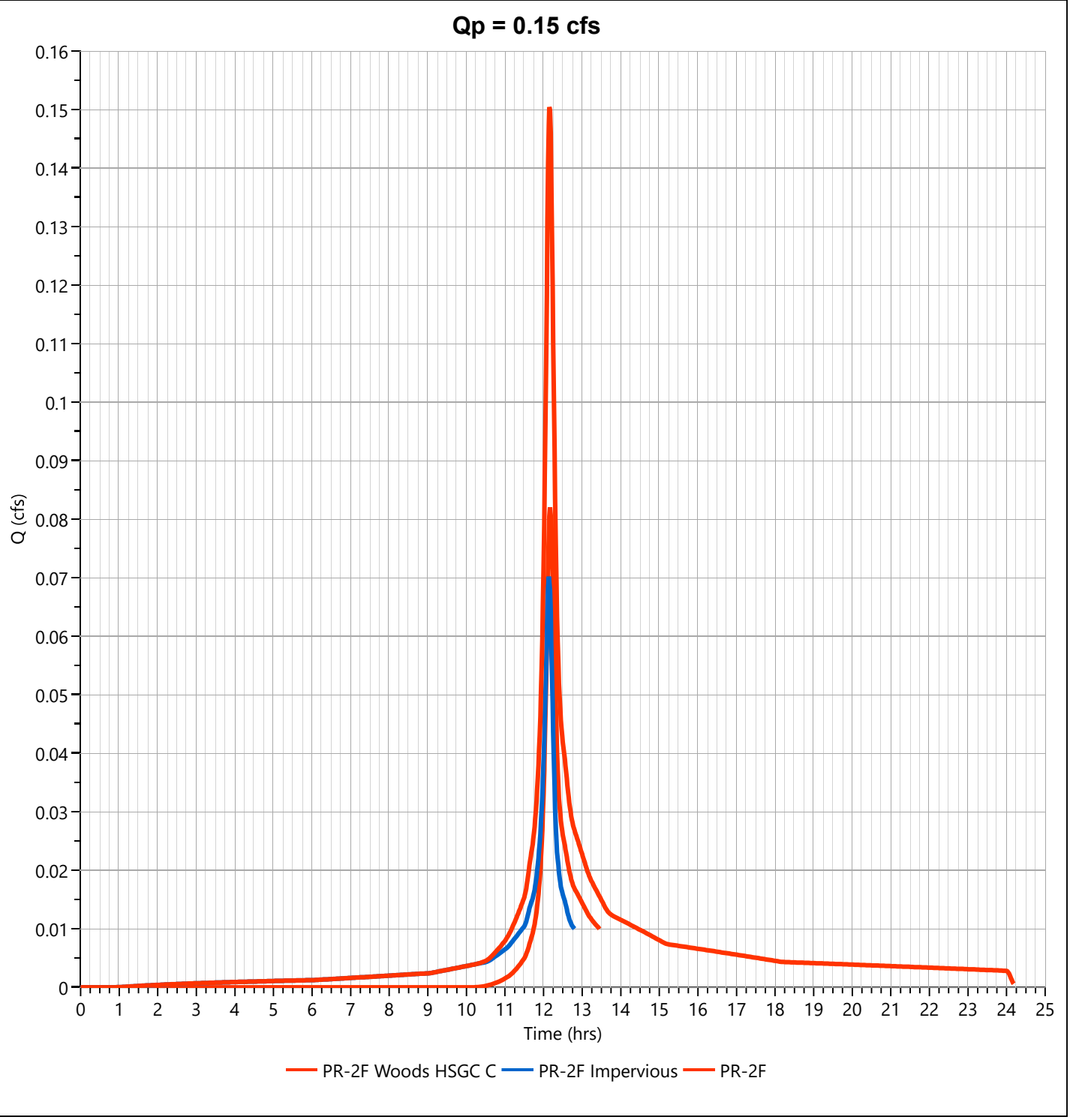
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2F

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 0.150 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Hydrograph Volume	= 595 cuft
Inflow Hydrographs	= 30, 31	Total Contrib. Area	= 0.08 ac



Hydrograph Report

Project Name:

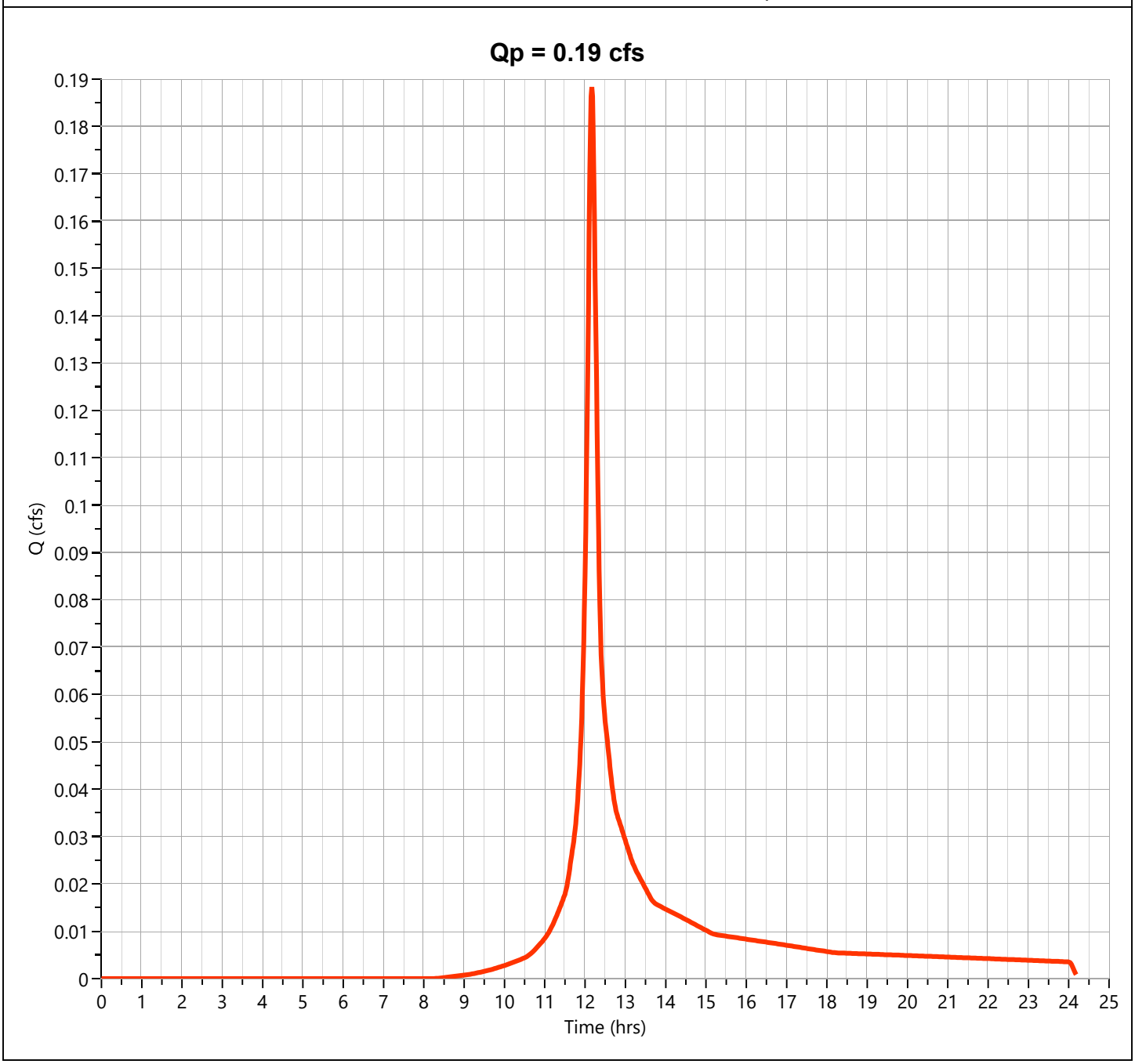
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2F Woods HSGC C

Hyd. No. 30

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.188 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Runoff Volume	= 697 cuft
Drainage Area	= 0.06 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 11.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

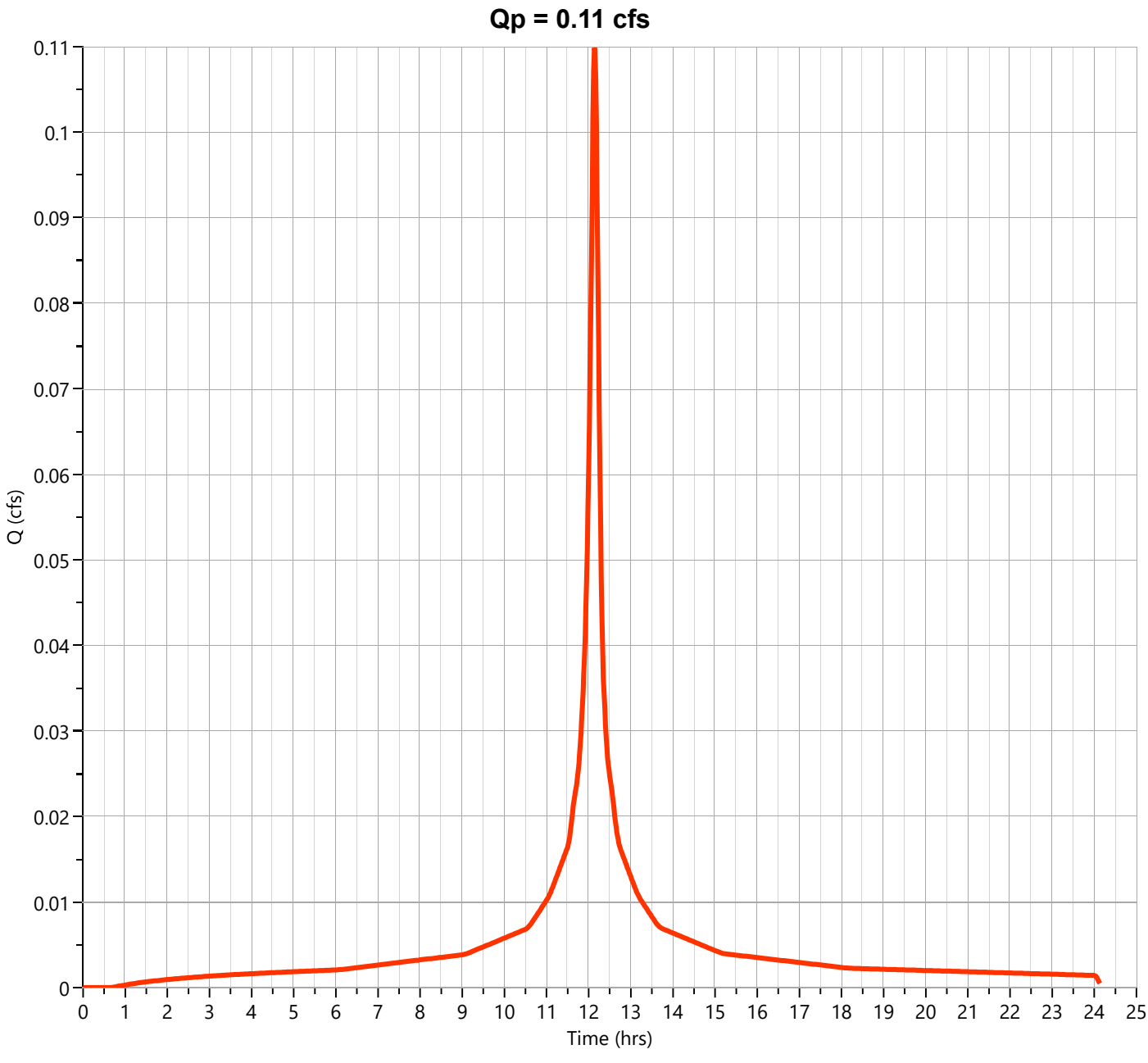
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2F Impervious

Hyd. No. 31

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.110 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 449 cuft
Drainage Area	= 0.02 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 9.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

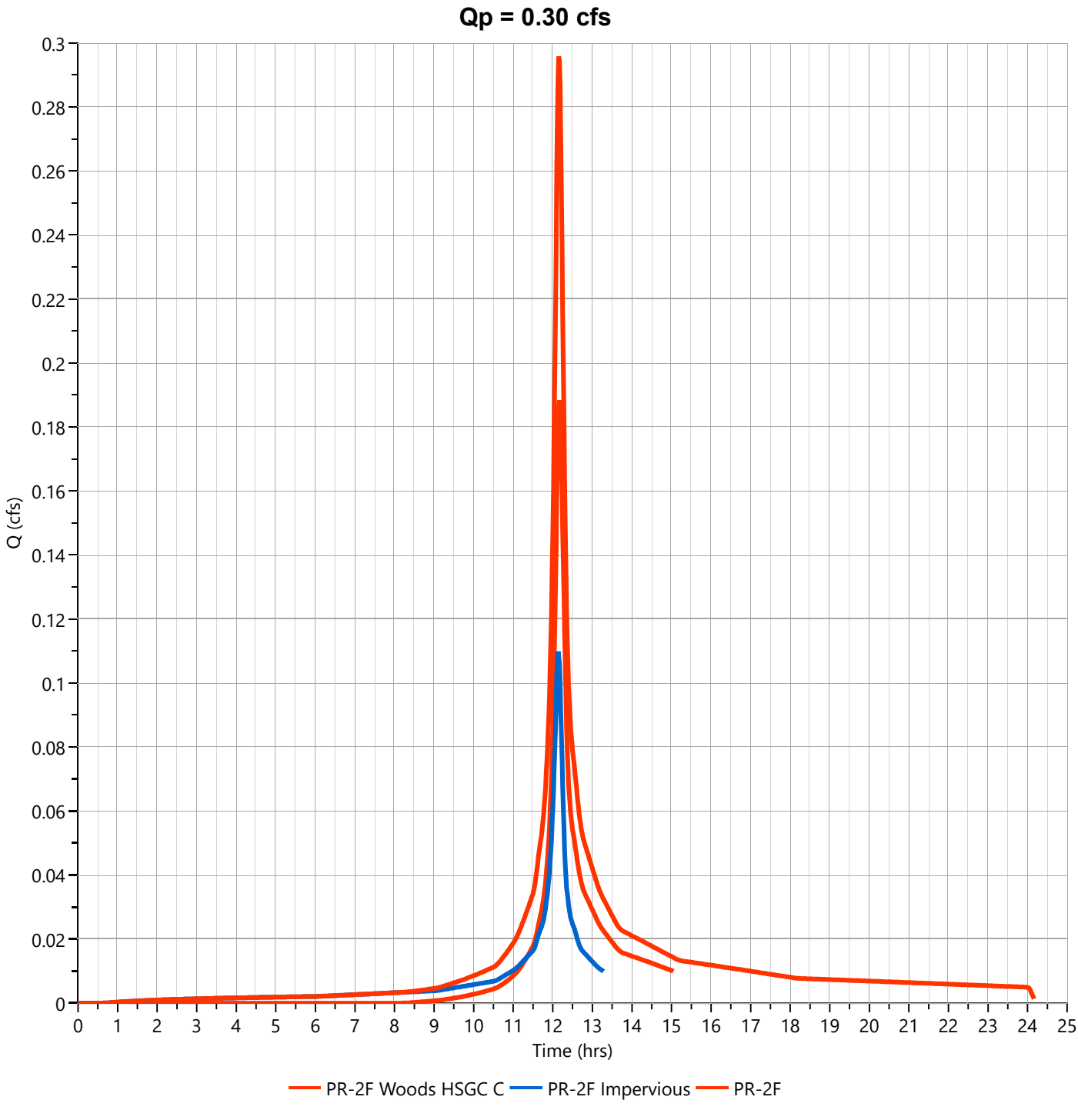
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2F

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 0.296 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,145 cuft
Inflow Hydrographs	= 30, 31	Total Contrib. Area	= 0.08 ac



Hydrograph Report

Project Name:

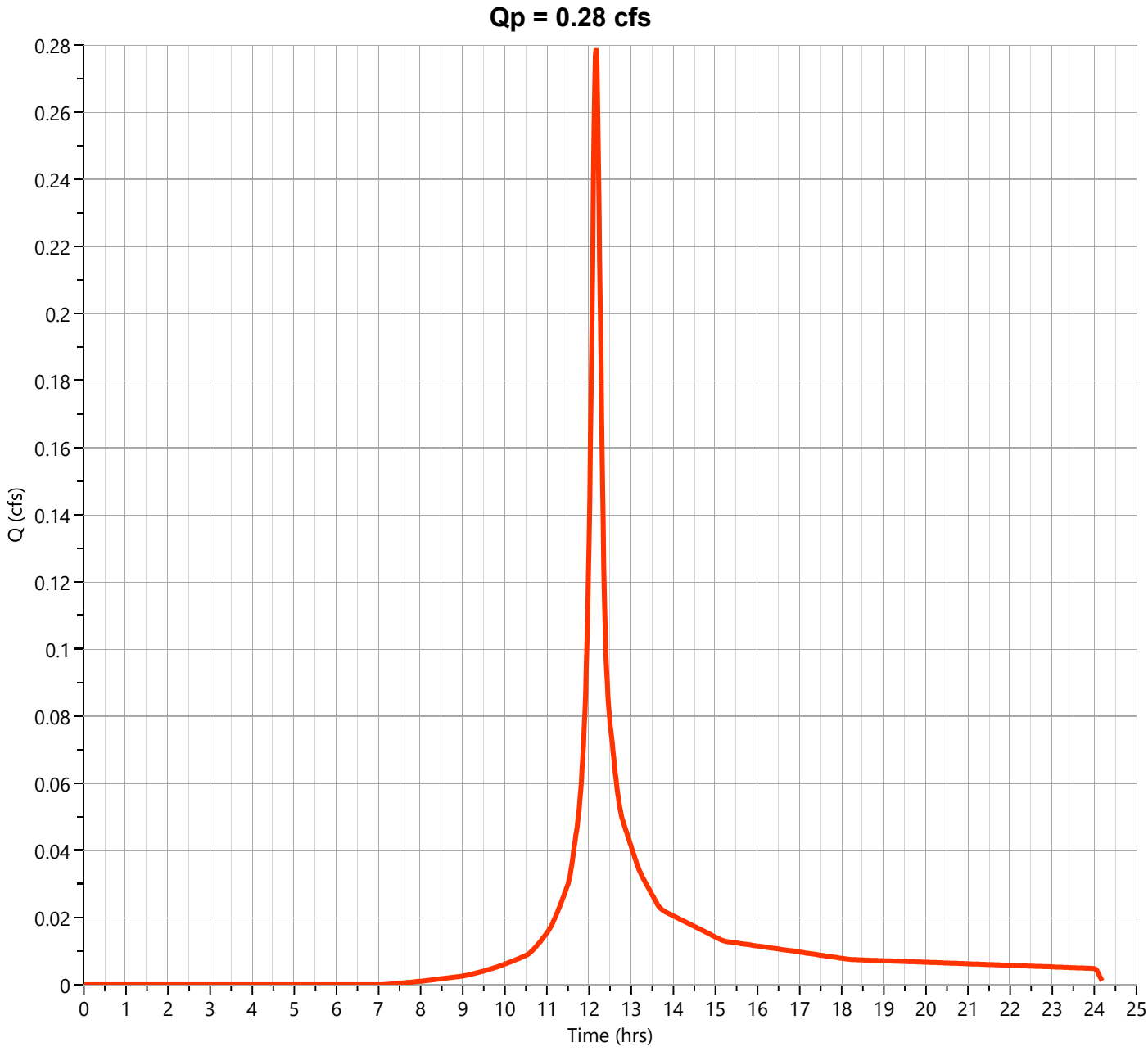
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2F Woods HSGC C

Hyd. No. 30

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.279 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Runoff Volume	= 1,034 cuft
Drainage Area	= 0.06 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 11.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

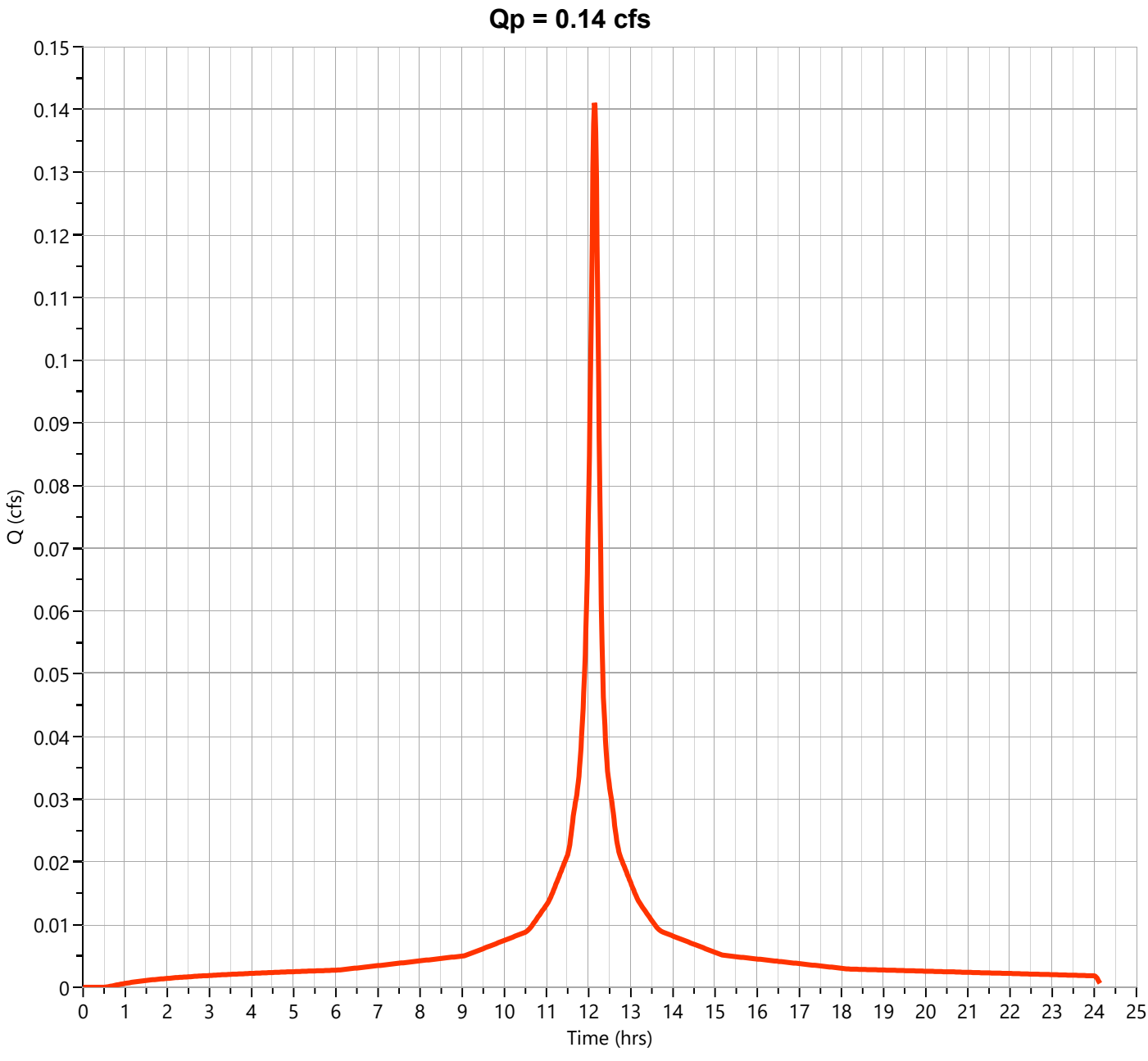
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2F Impervious

Hyd. No. 31

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.141 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 580 cuft
Drainage Area	= 0.02 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 9.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

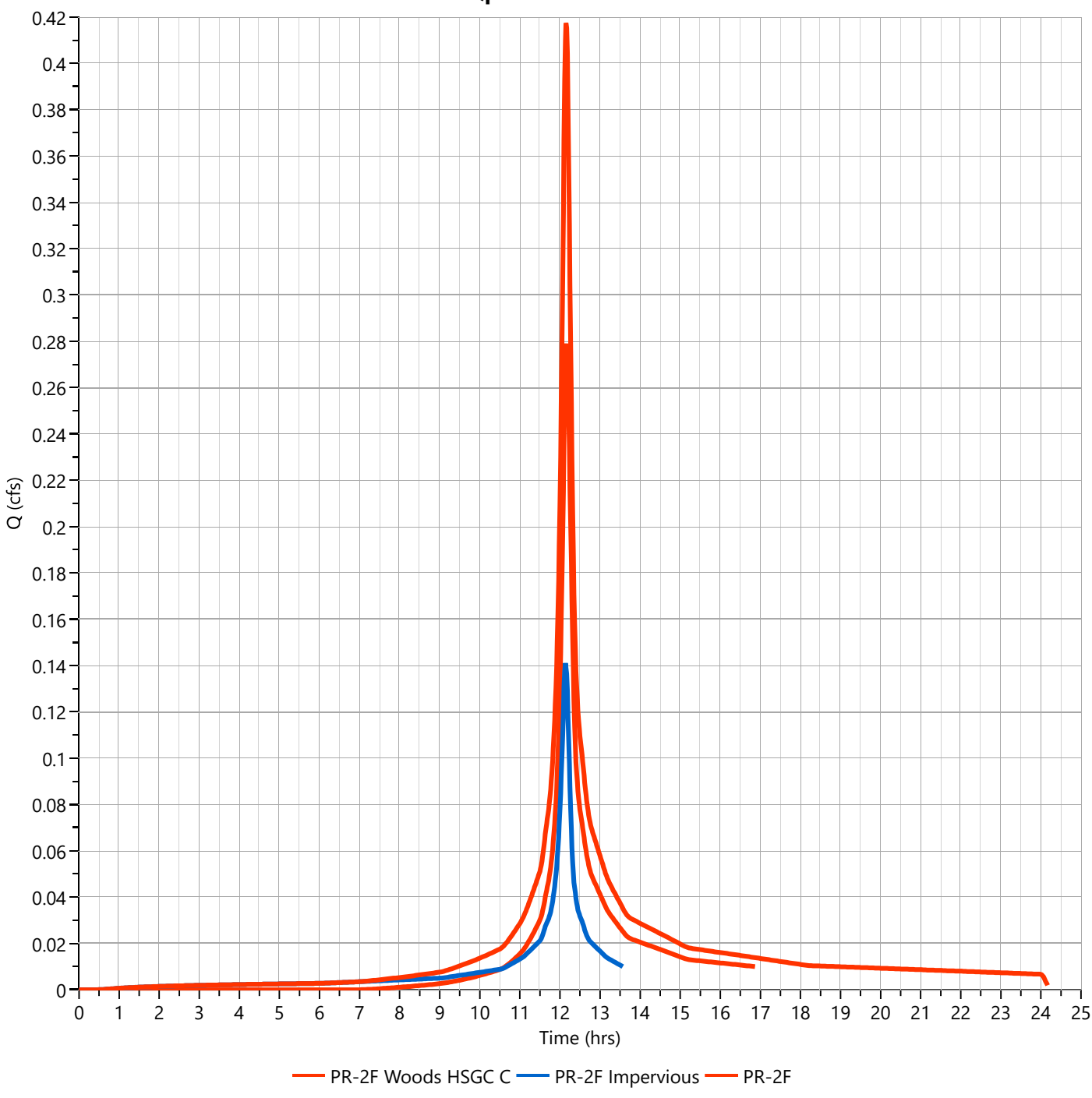
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2F

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 0.417 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,614 cuft
Inflow Hydrographs	= 30, 31	Total Contrib. Area	= 0.08 ac



Hydrograph Report

Project Name:

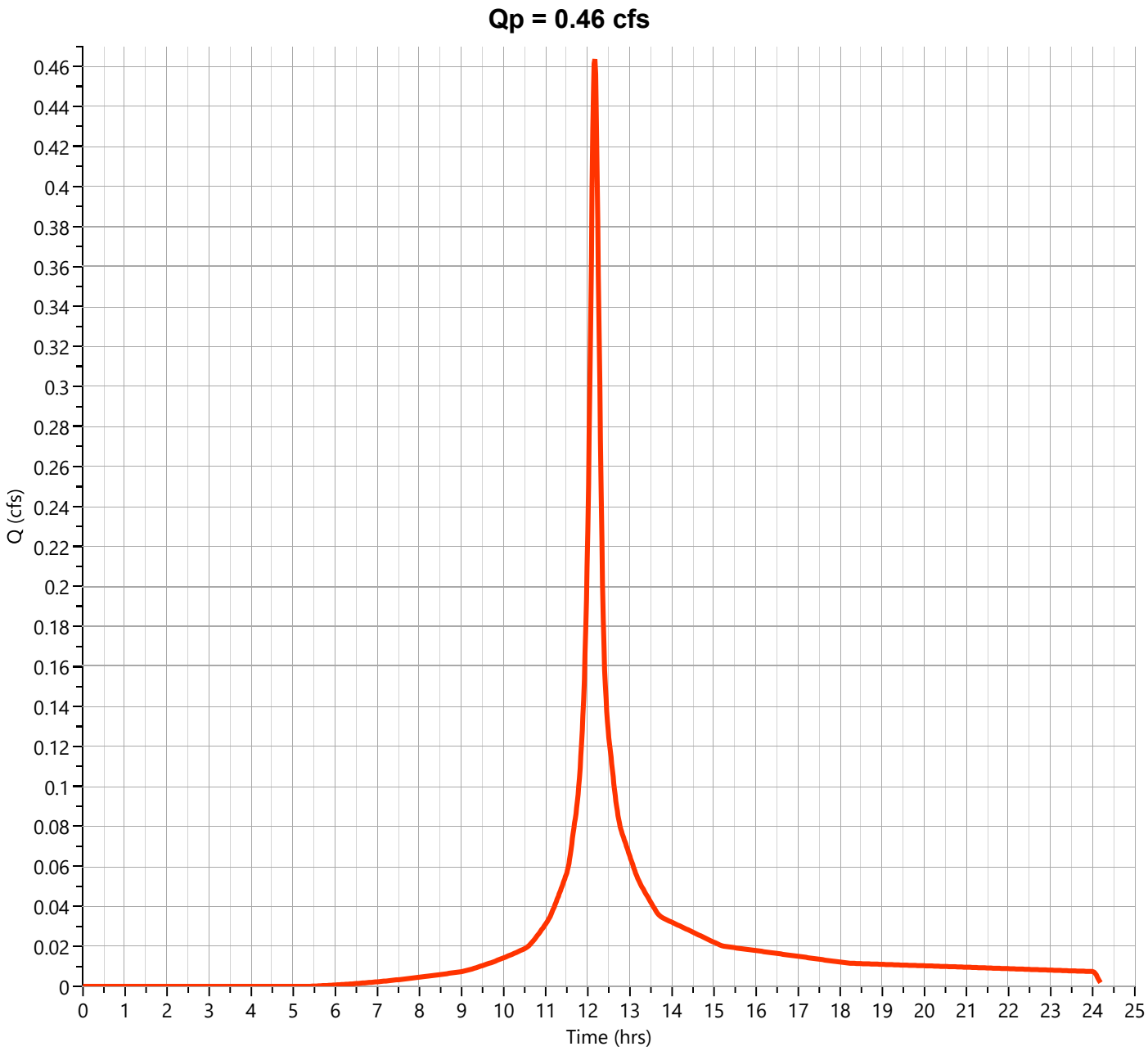
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2F Woods HSGC C

Hyd. No. 30

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.464 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Runoff Volume	= 1,743 cuft
Drainage Area	= 0.06 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 11.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

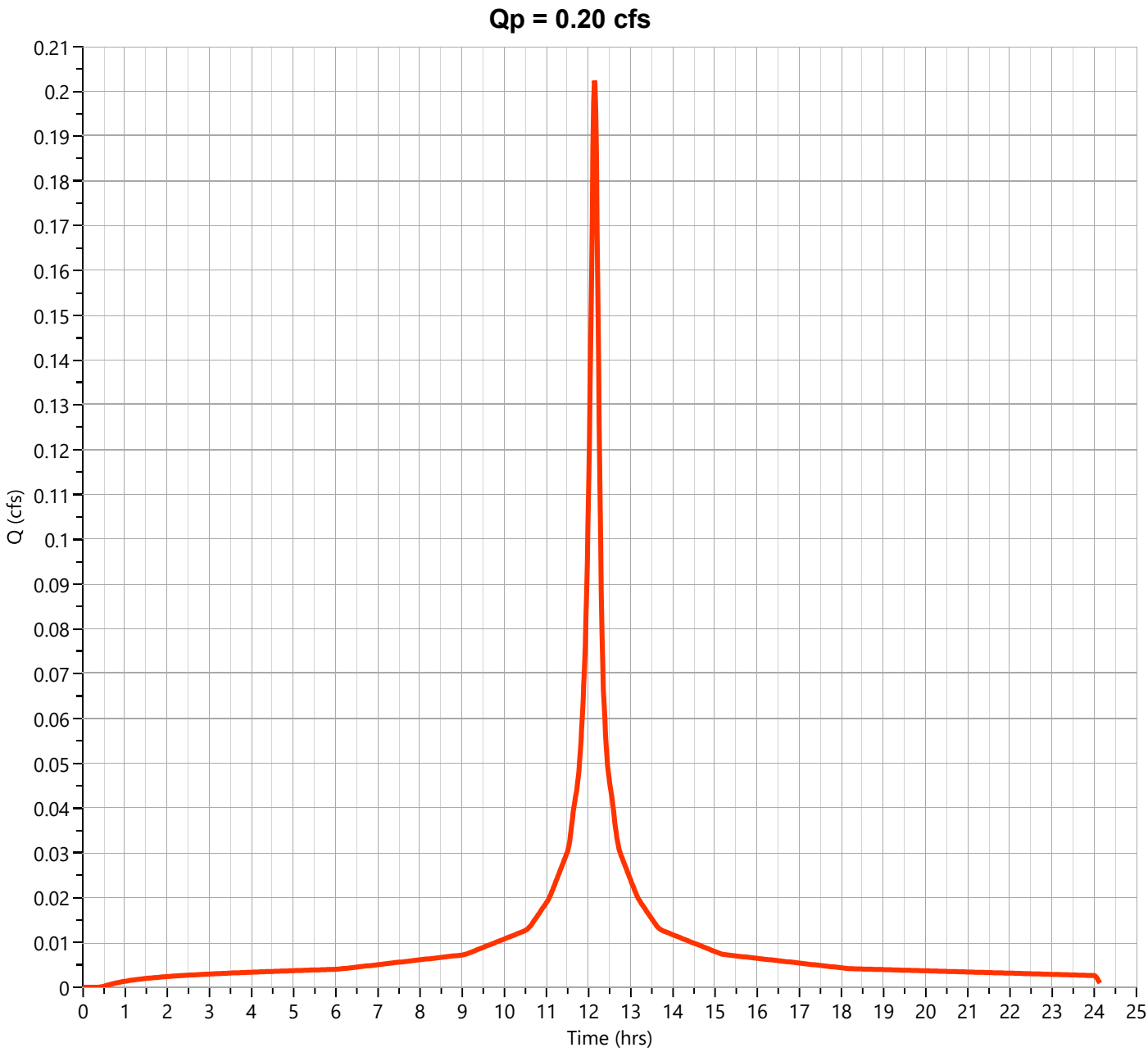
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2F Impervious

Hyd. No. 31

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.202 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 839 cuft
Drainage Area	= 0.02 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 9.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

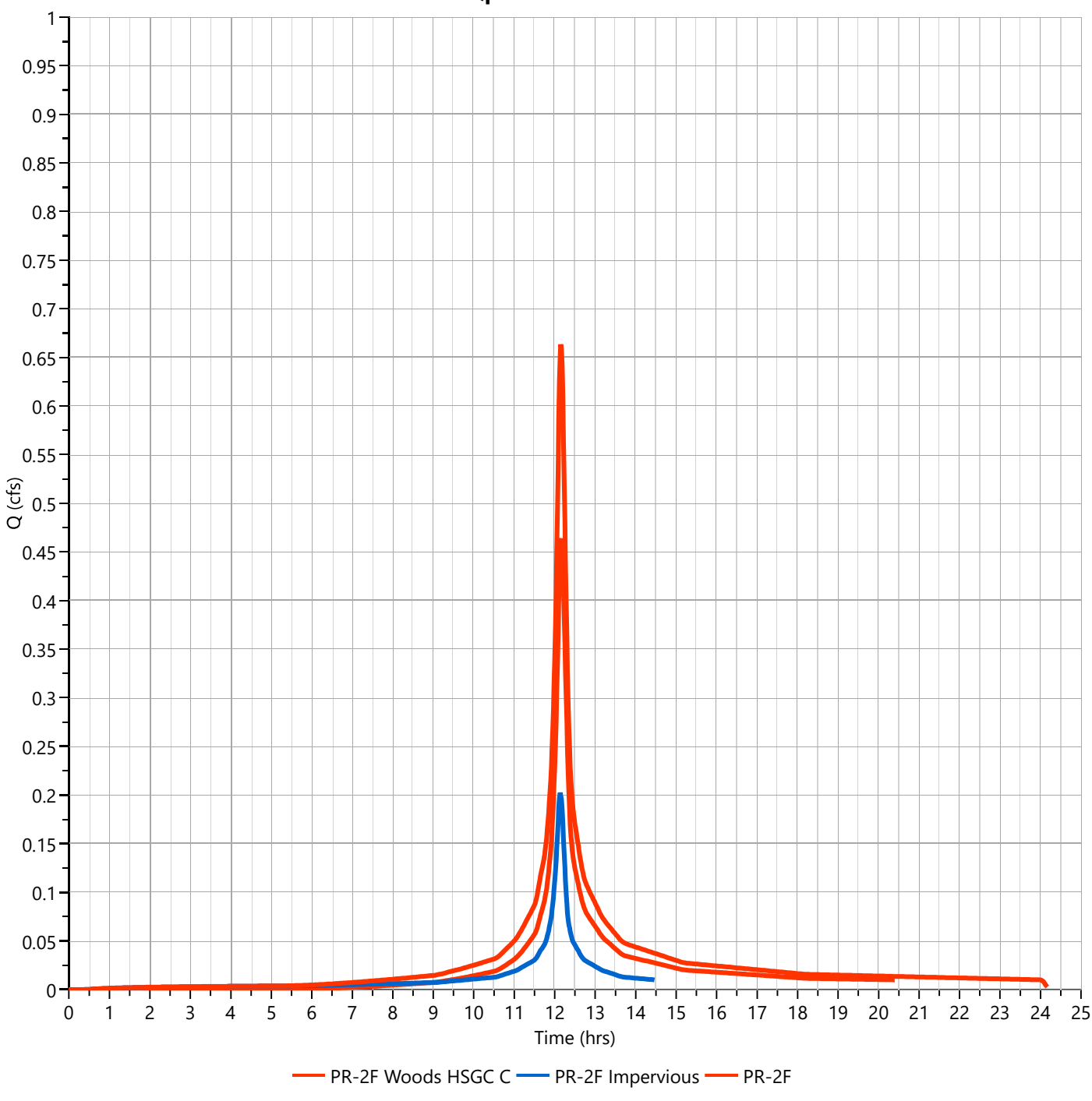
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2F

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 0.663 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,582 cuft
Inflow Hydrographs	= 30, 31	Total Contrib. Area	= 0.08 ac



PR-2G WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: Present **(Developed)** — **Future Proposed Watershed PR-2G - Pervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

			Segment ID	1		
1.	Surface Description (NEH table 15-1)			Dense Grasses		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.24		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)		ft	29		
4.	Two-year 24-hr rainfall, P_2		in	4.12		
5.	Land Slope, s		ft/ft	0.045		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft)	$L_{mcs} = (100\ s^{0.5})/n$	ft	88		
7.	Compute T_t	$T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.056	+	+

Sheet Flow Sub-Total **0.056 hours**

Shallow Concentrated Flow

			Segment ID	2	3	
8.	Surface Description			Grassed Waterways	Grassed Waterways	
9.	Flow Length, L		ft	73	140	
10.	Watercourse Slope, s		ft/ft	0.030	0.011	
11.	Average Velocity, V (NEH table 15-3)		ft/s	2.80	1.72	
12.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.007	+ 0.023	+

Shallow Conc. Flow Sub-Total **0.030 hours**

Channel Flow

			Segment ID			
13.	Flow Length, L		ft			
14.	Cross Sectional flow area, a		ft^2			
15.	Wetted Perimeter, P_w		ft			
16.	Hydraulic Radius, r	$r = a / P_w$	ft			
17.	Channel Slope, s		ft/ft			
18.	Manning's Roughness Coeff., n					
19.	Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s			
20.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr		+	+

Channel Flow Sub-Total **0.000 hours**

Watershed or subarea T_c or T_t	Total Tc (hours) =	**0.086 hours**
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	**5 minutes**

Hydrograph Report

Project Name:

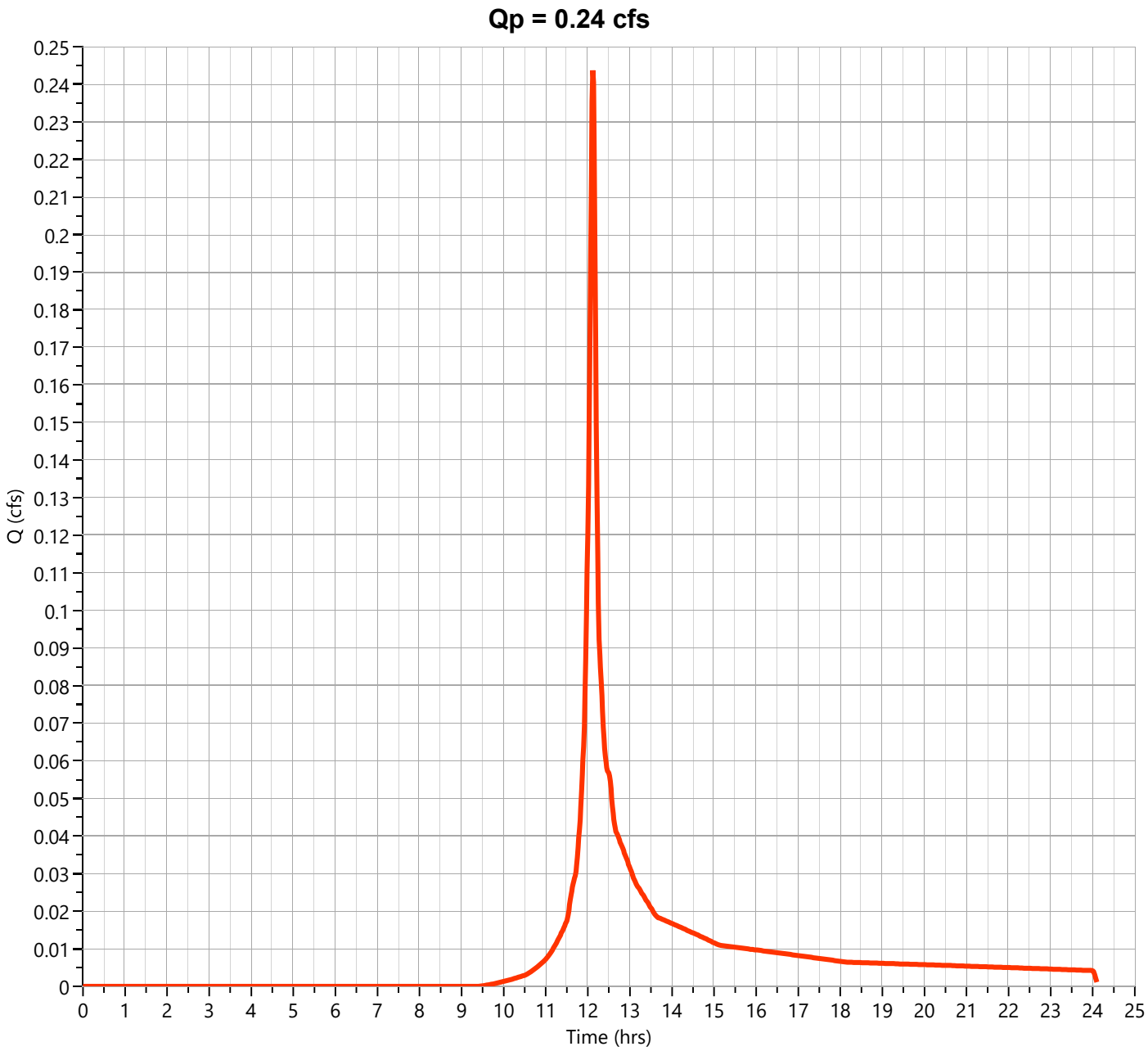
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2G Grass HSGC C

Hyd. No. 17

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.244 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 757 cuft
Drainage Area	= 0.12 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

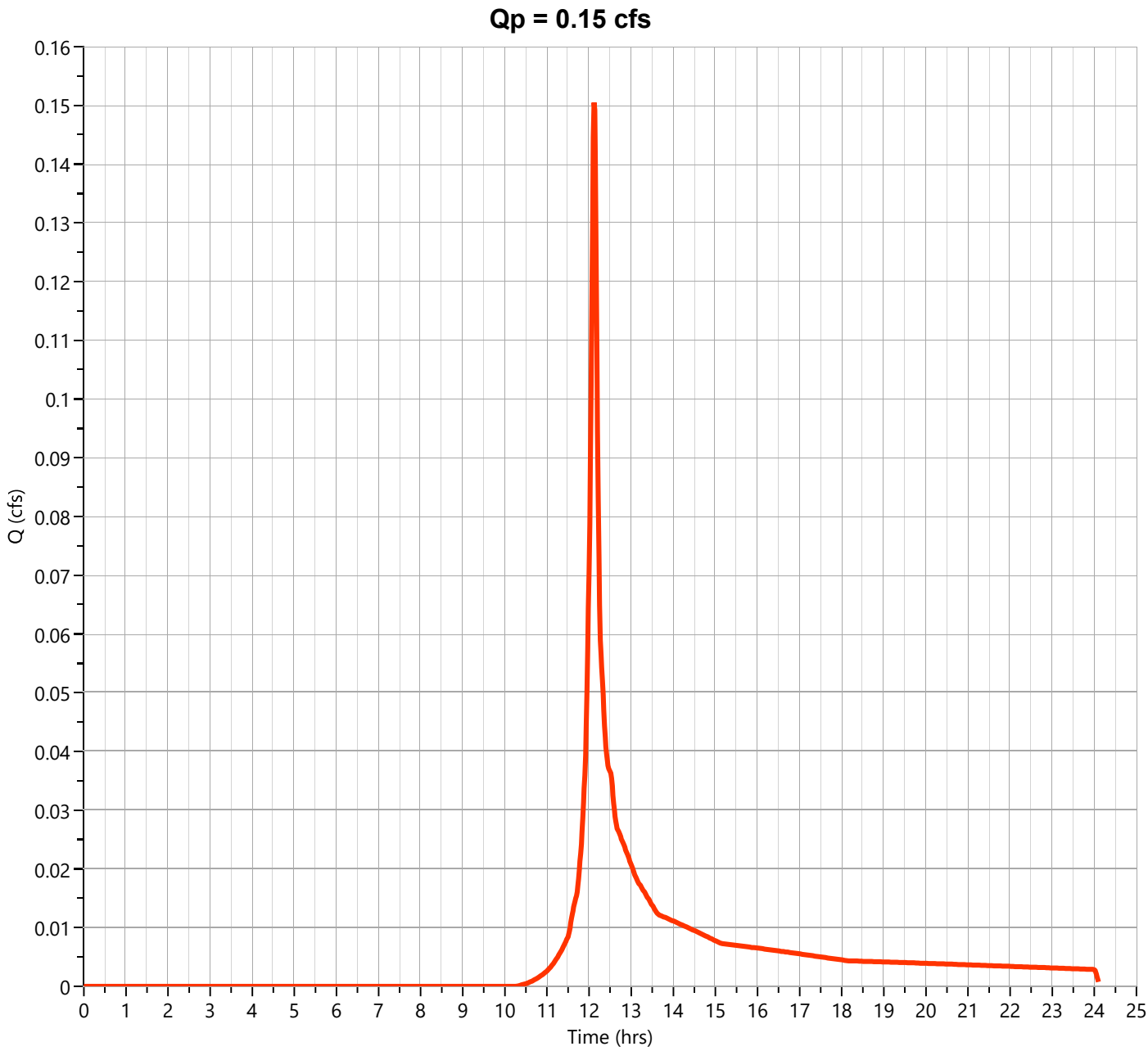
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2G Woods HSGC C

Hyd. No. 18

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.150 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 475 cuft
Drainage Area	= 0.09 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

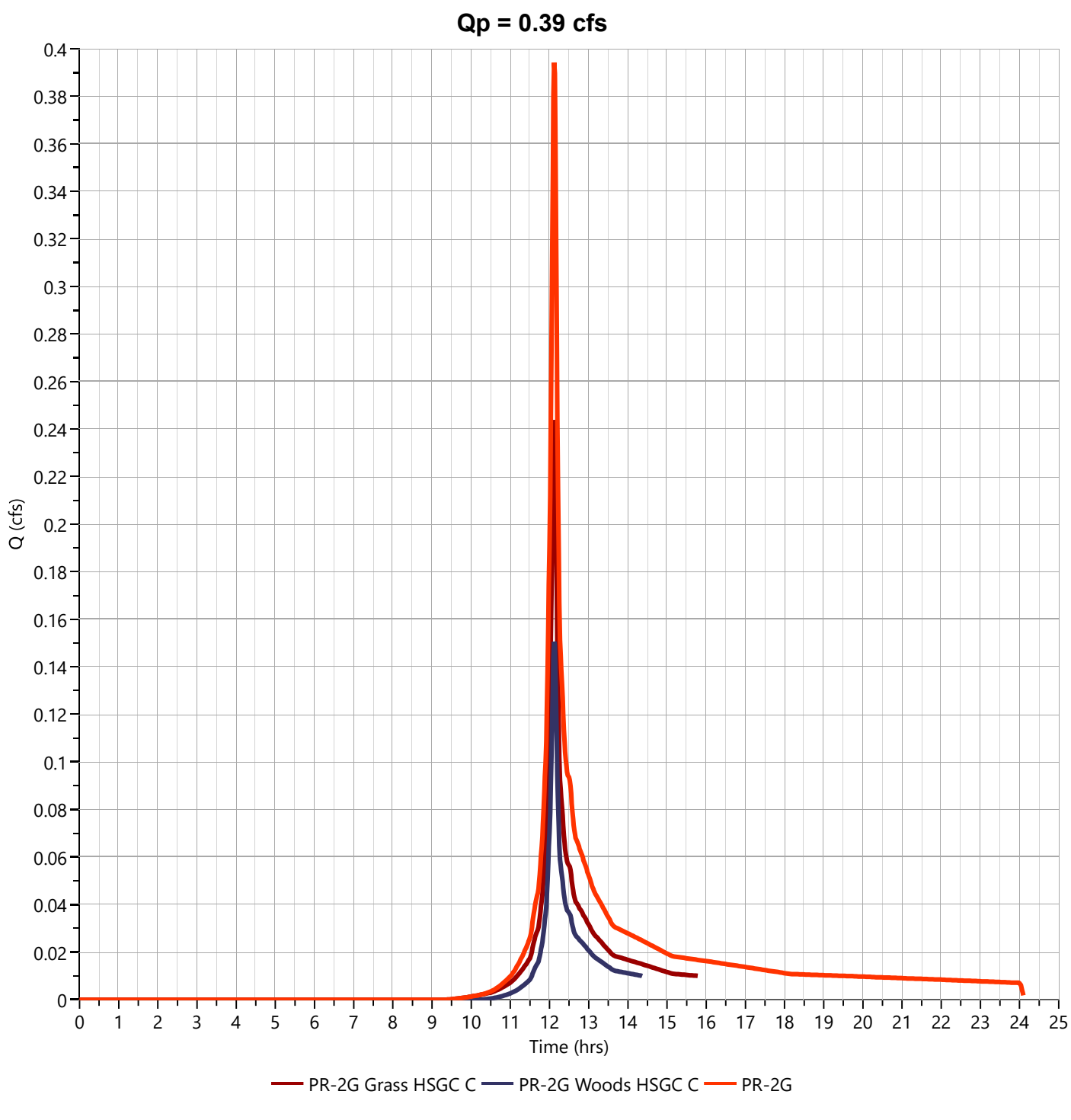
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2G

Hyd. No. 19

Hydrograph Type	= Junction	Peak Flow	= 0.394 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,232 cuft
Inflow Hydrographs	= 17, 18	Total Contrib. Area	= 0.21 ac



Hydrograph Report

Project Name:

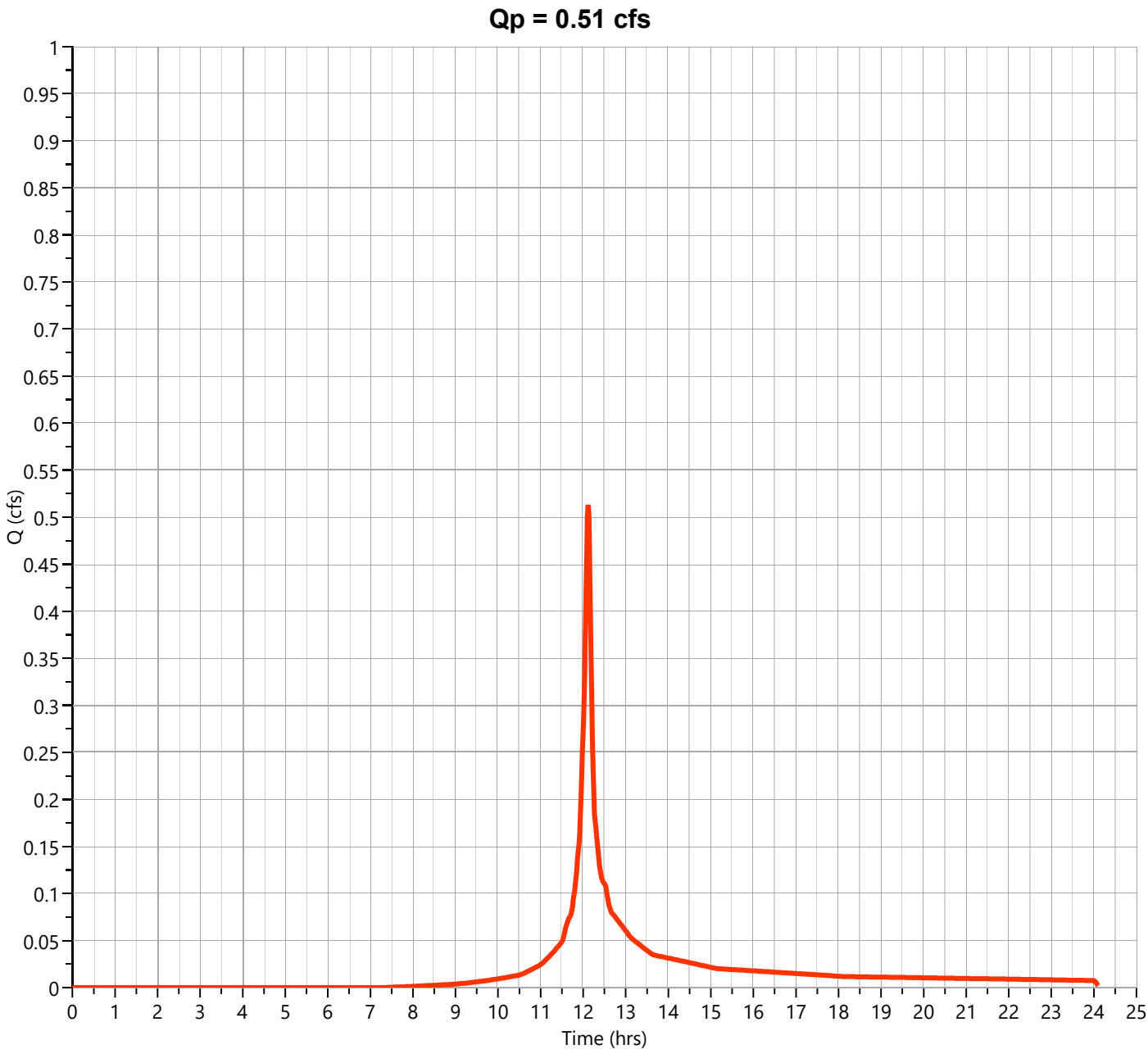
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2G Grass HSGC C

Hyd. No. 17

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.513 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 1,591 cuft
Drainage Area	= 0.12 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

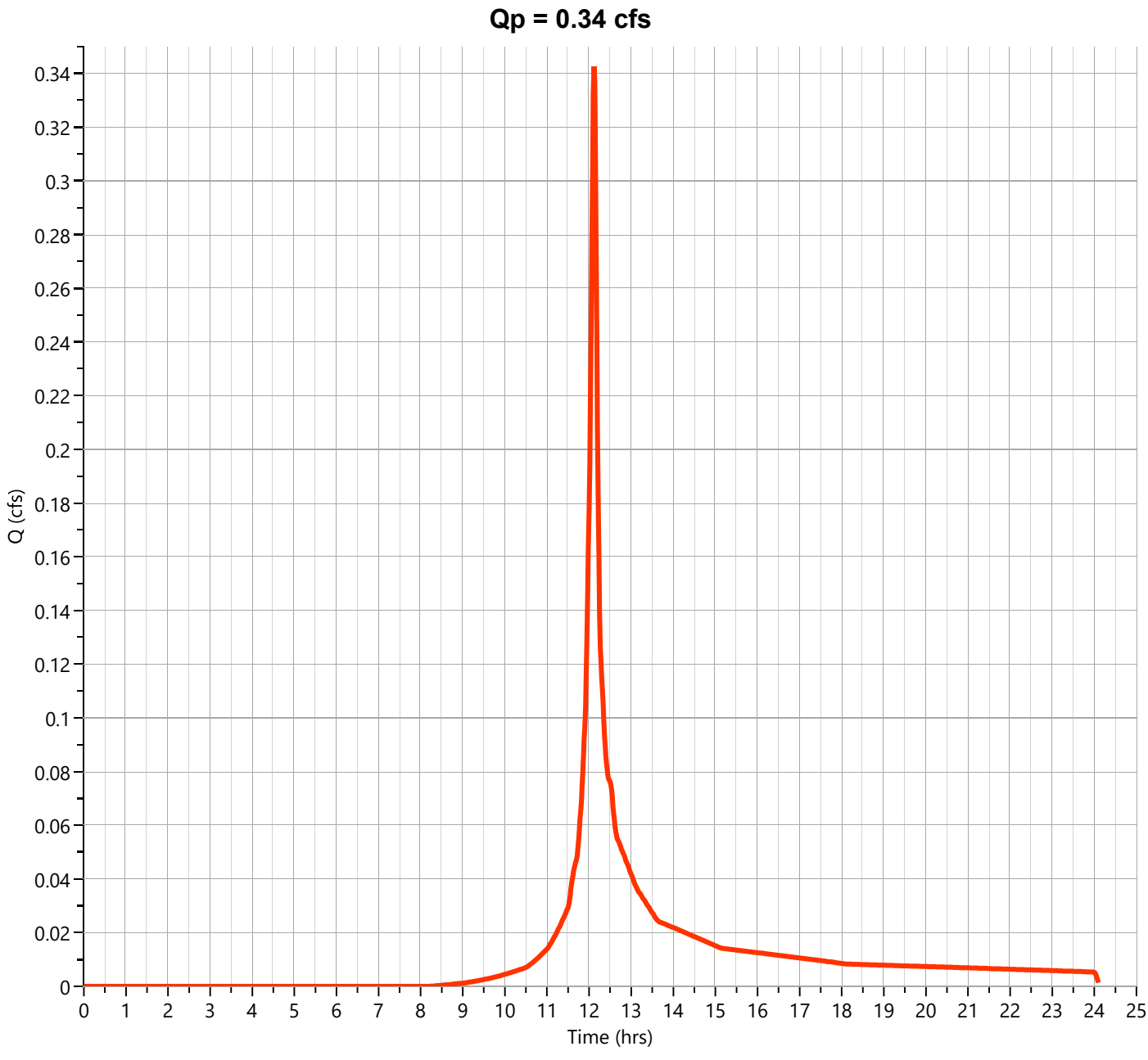
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2G Woods HSGC C

Hyd. No. 18

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.343 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 1,059 cuft
Drainage Area	= 0.09 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

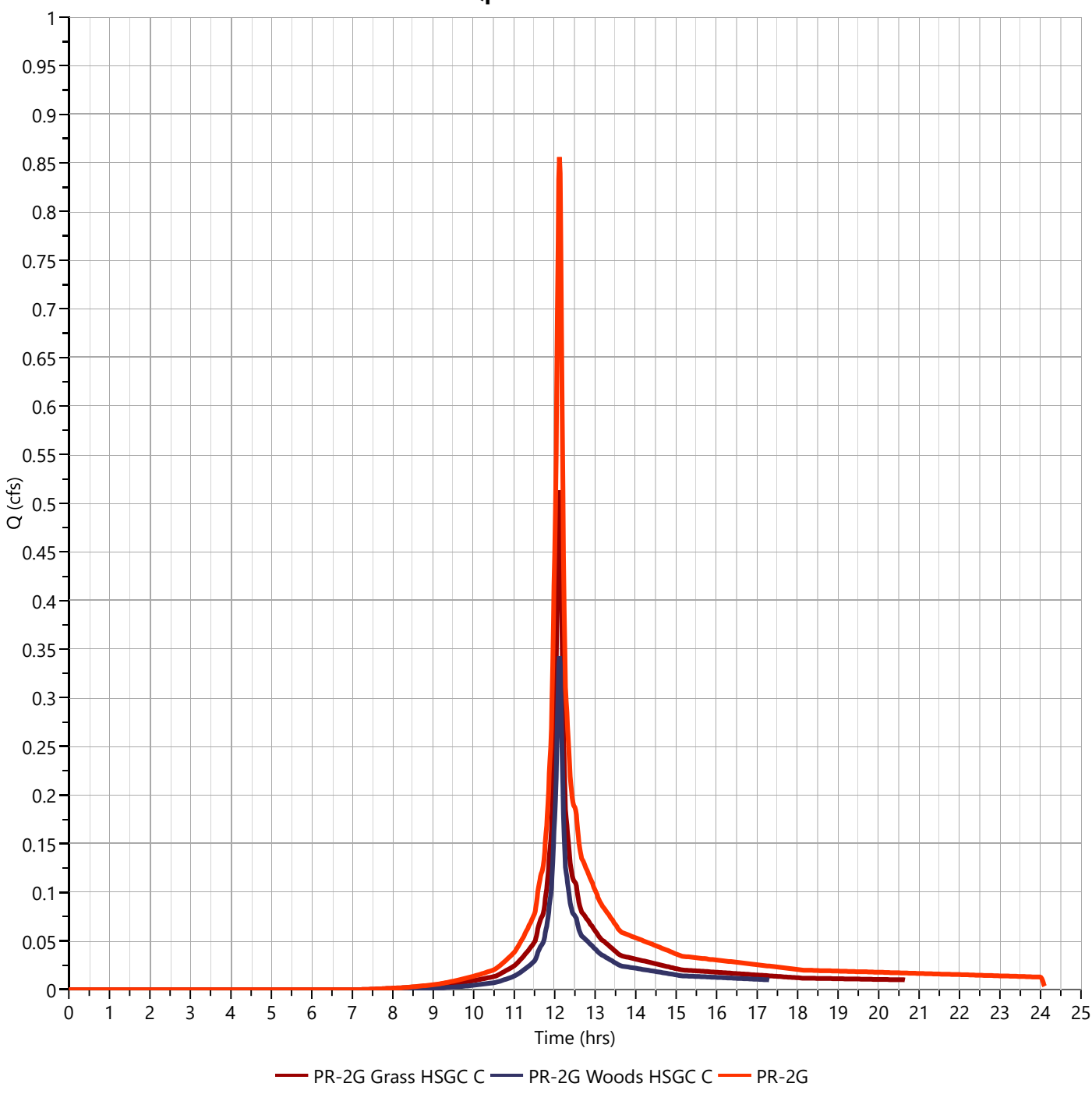
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2G

Hyd. No. 19

Hydrograph Type	= Junction	Peak Flow	= 0.856 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,649 cuft
Inflow Hydrographs	= 17, 18	Total Contrib. Area	= 0.21 ac



Hydrograph Report

Project Name:

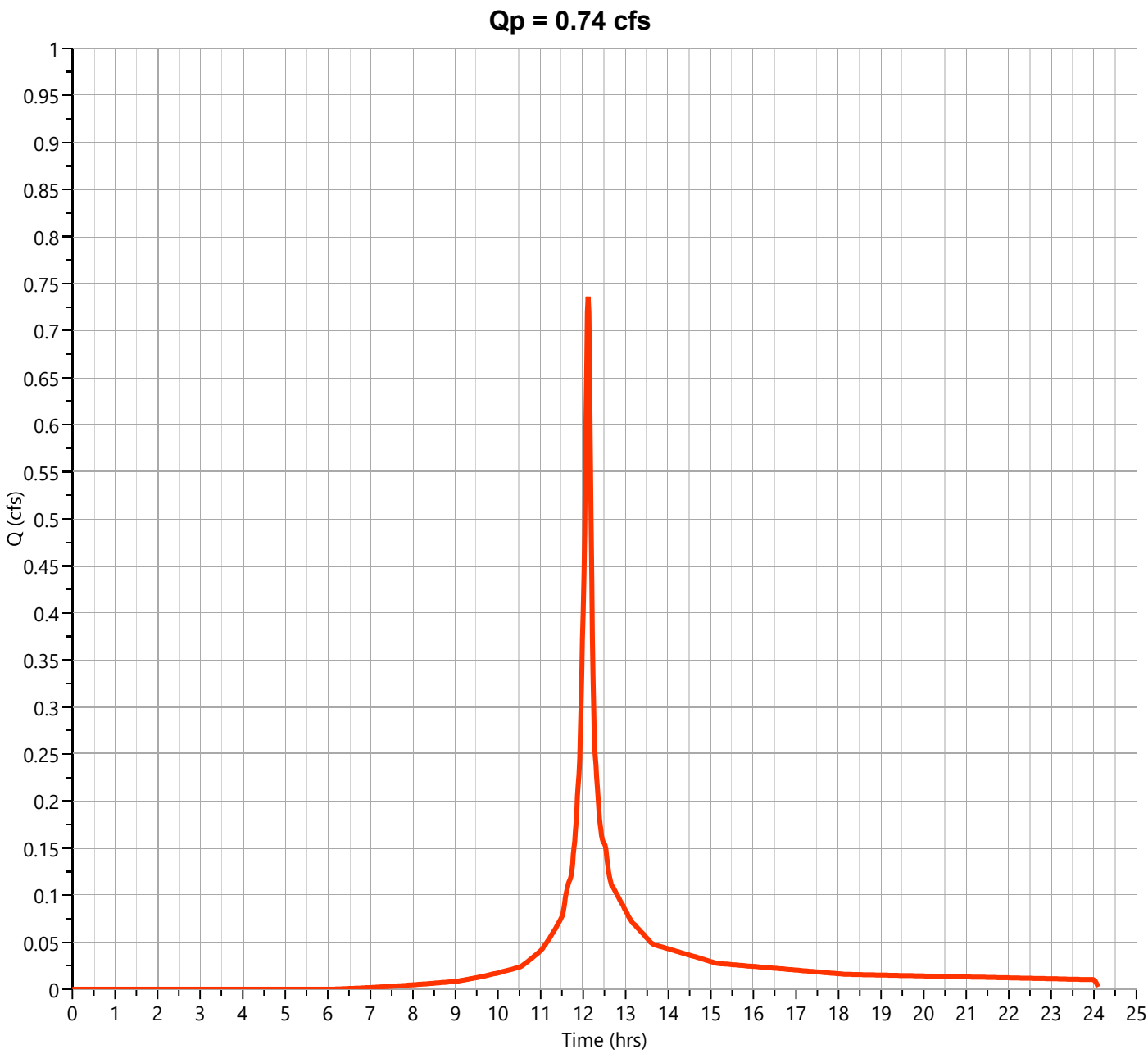
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2G Grass HSGC C

Hyd. No. 17

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.736 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 2,305 cuft
Drainage Area	= 0.12 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

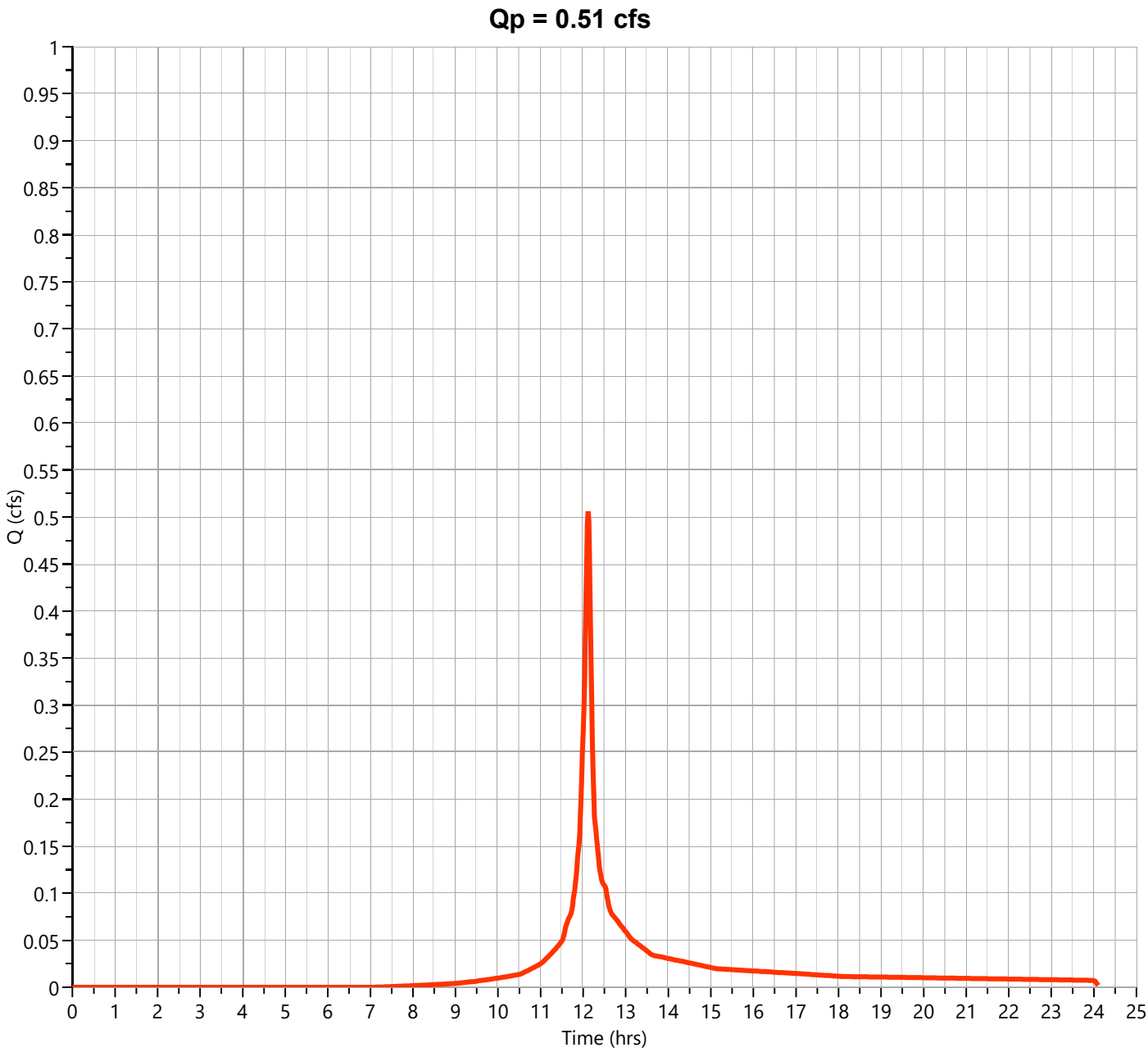
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2G Woods HSGC C

Hyd. No. 18

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.506 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 1,571 cuft
Drainage Area	= 0.09 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

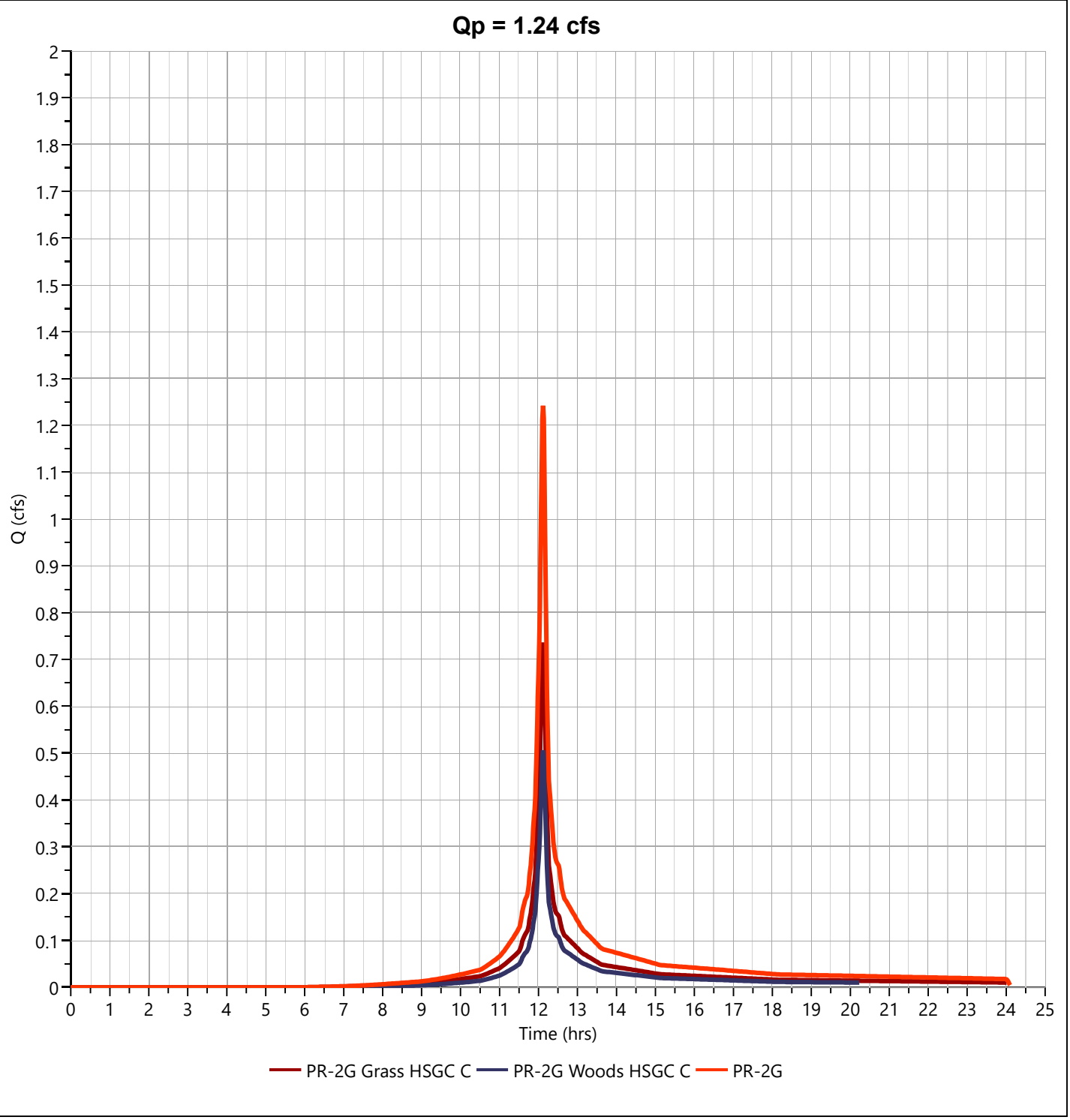
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2G

Hyd. No. 19

Hydrograph Type	= Junction	Peak Flow	= 1.242 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 3,876 cuft
Inflow Hydrographs	= 17, 18	Total Contrib. Area	= 0.21 ac



Hydrograph Report

Project Name:

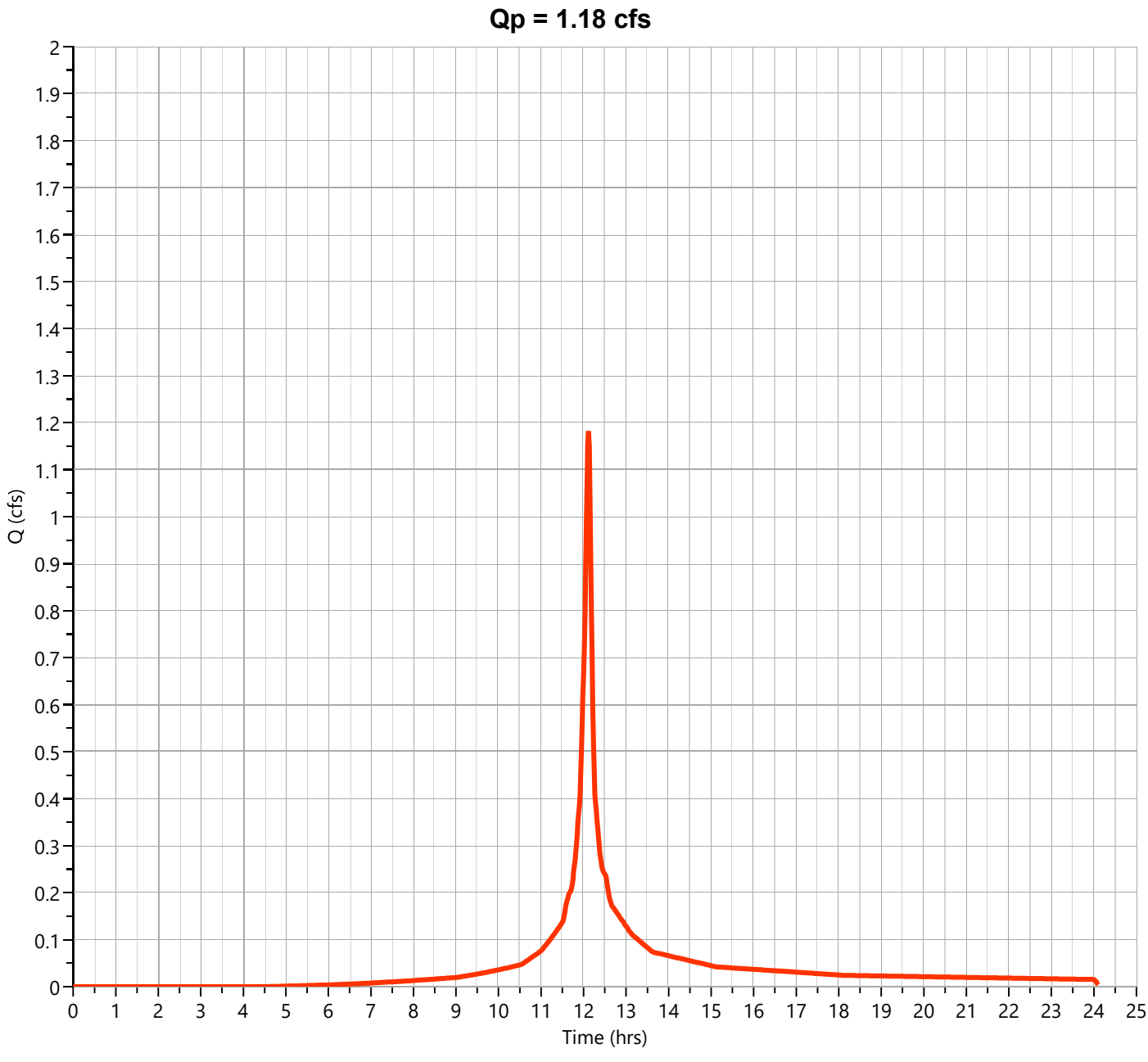
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2G Grass HSGC C

Hyd. No. 17

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.182 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 3,786 cuft
Drainage Area	= 0.12 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

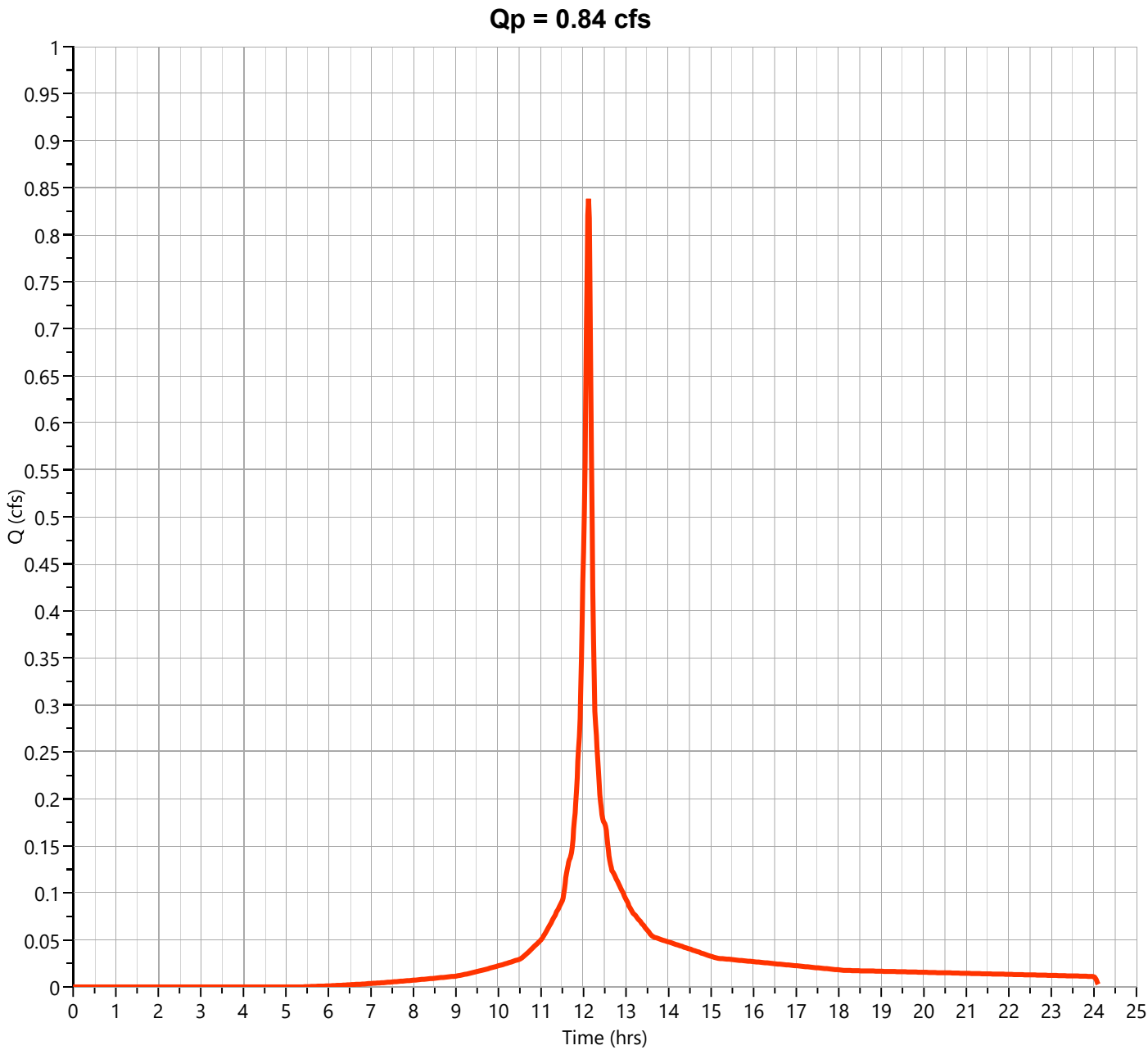
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2G Woods HSGC C

Hyd. No. 18

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.838 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 2,649 cuft
Drainage Area	= 0.09 ac	Curve Number	= 70
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

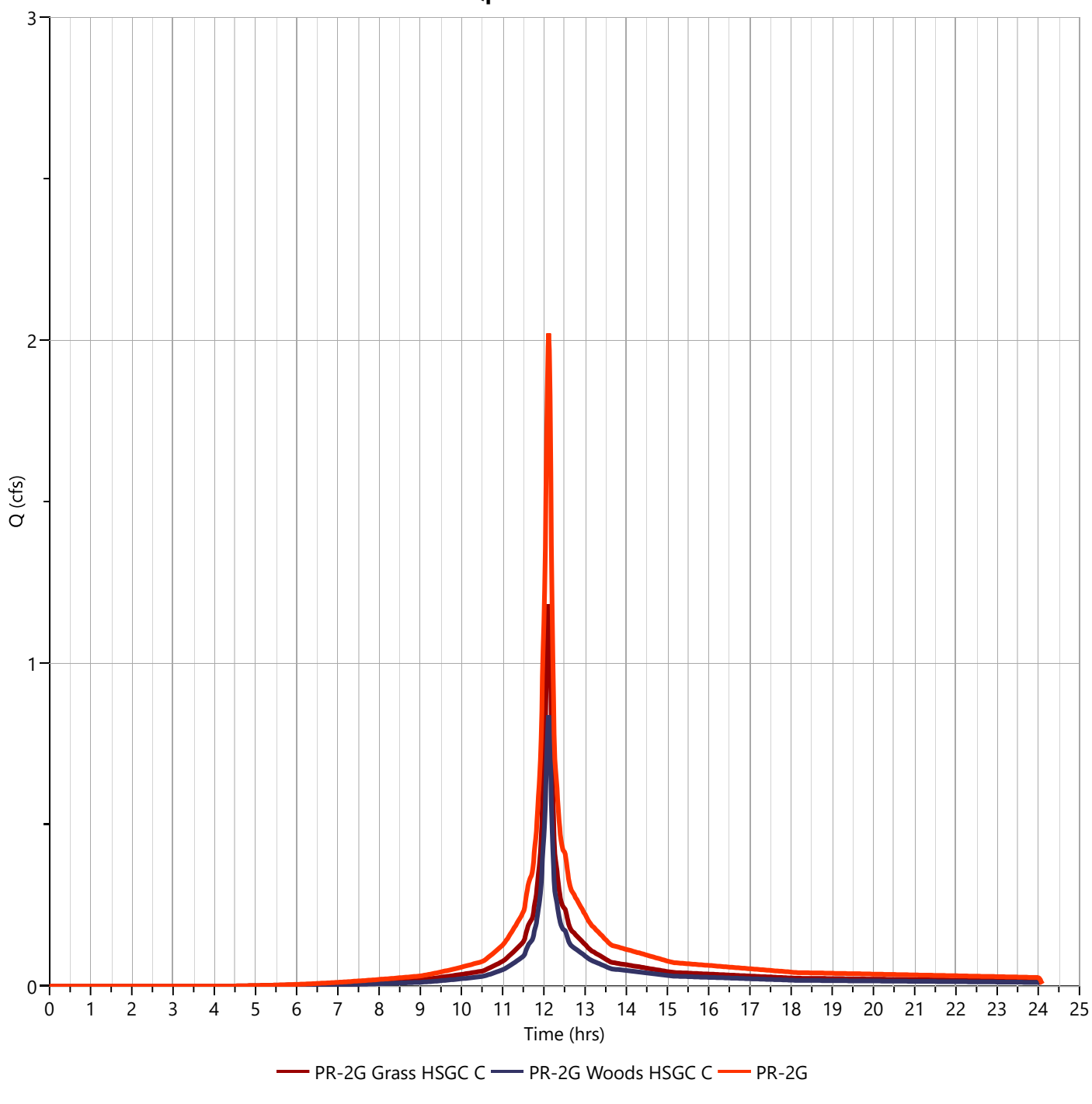
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2G

Hyd. No. 19

Hydrograph Type	= Junction	Peak Flow	= 2.020 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 6,435 cuft
Inflow Hydrographs	= 17, 18	Total Contrib. Area	= 0.21 ac



PR-2H WATERSHED

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/7/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/7/2024**

Circle One: Present **Developed** — **Future Proposed Watershed PR-2H - Impervious**

Circle One: **T_c** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		
1.	Surface Description (NEH table 15-1)		Smooth Surfaces		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)	ft	23		
4.	Two-year 24-hr rainfall, P_2	in	4.12		
5.	Land Slope, s	ft/ft	0.021		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	100		
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.005	+	+
				Sheet Flow Sub-Total	0.005 hours

Shallow Concentrated Flow		Segment ID			
8.	Surface Description				
9.	Flow Length, L	ft			
10.	Watercourse Slope, s	ft/ft			
11.	Average Velocity, V (NEH table 15-3)	ft/s			
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+	+
				Shallow Conc. Flow Sub-Total	0.000 hours

Channel Flow		Segment ID			
13.	Flow Length, L	ft			
14.	Cross Sectional flow area, a	ft^2			
15.	Wetted Perimeter, P_w	ft			
16.	Hydraulic Radius, r $r = a / P_w$	ft			
17.	Channel Slope, s	ft/ft			
18.	Manning's Roughness Coeff., n				
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s			
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+	+
				Channel Flow Sub-Total	0.000 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.005 hours
(Add Sub-Total T_t from prior steps)	Software Limitations Require Minimum Tc =	2 minutes

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**2/7/2024**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**2/7/2024**

Circle One: Present (**Developed**) — **Future Proposed Watershed PR-2H - Pervious**

Circle One: (**T_c**) T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)		Segment ID	1		
1.	Surface Description (NEH table 15-1)		Dense Grasses		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.24		
3.	Design Flow Length, L_{des} (L_{des} < 100 ft)	ft	31		
4.	Two-year 24-hr rainfall, P_2	in	4.12		
5.	Land Slope, s	ft/ft	0.017		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft) $L_{mcs} = (100\ s^{0.5})/n$	ft	54		
7.	Compute T_t $T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.087	+	+
				Sheet Flow Sub-Total	0.087 hours

Shallow Concentrated Flow		Segment ID			
8.	Surface Description				
9.	Flow Length, L	ft			
10.	Watercourse Slope, s	ft/ft			
11.	Average Velocity, V (NEH table 15-3)	ft/s			
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+	+
				Shallow Conc. Flow Sub-Total	0.000 hours

Channel Flow		Segment ID			
13.	Flow Length, L	ft			
14.	Cross Sectional flow area, a	ft^2			
15.	Wetted Perimeter, P_w	ft			
16.	Hydraulic Radius, r $r = a / P_w$	ft			
17.	Channel Slope, s	ft/ft			
18.	Manning's Roughness Coeff., n				
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s			
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr		+	+
				Channel Flow Sub-Total	0.000 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	0.087 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	5 minutes

Hydrograph Report

Project Name:

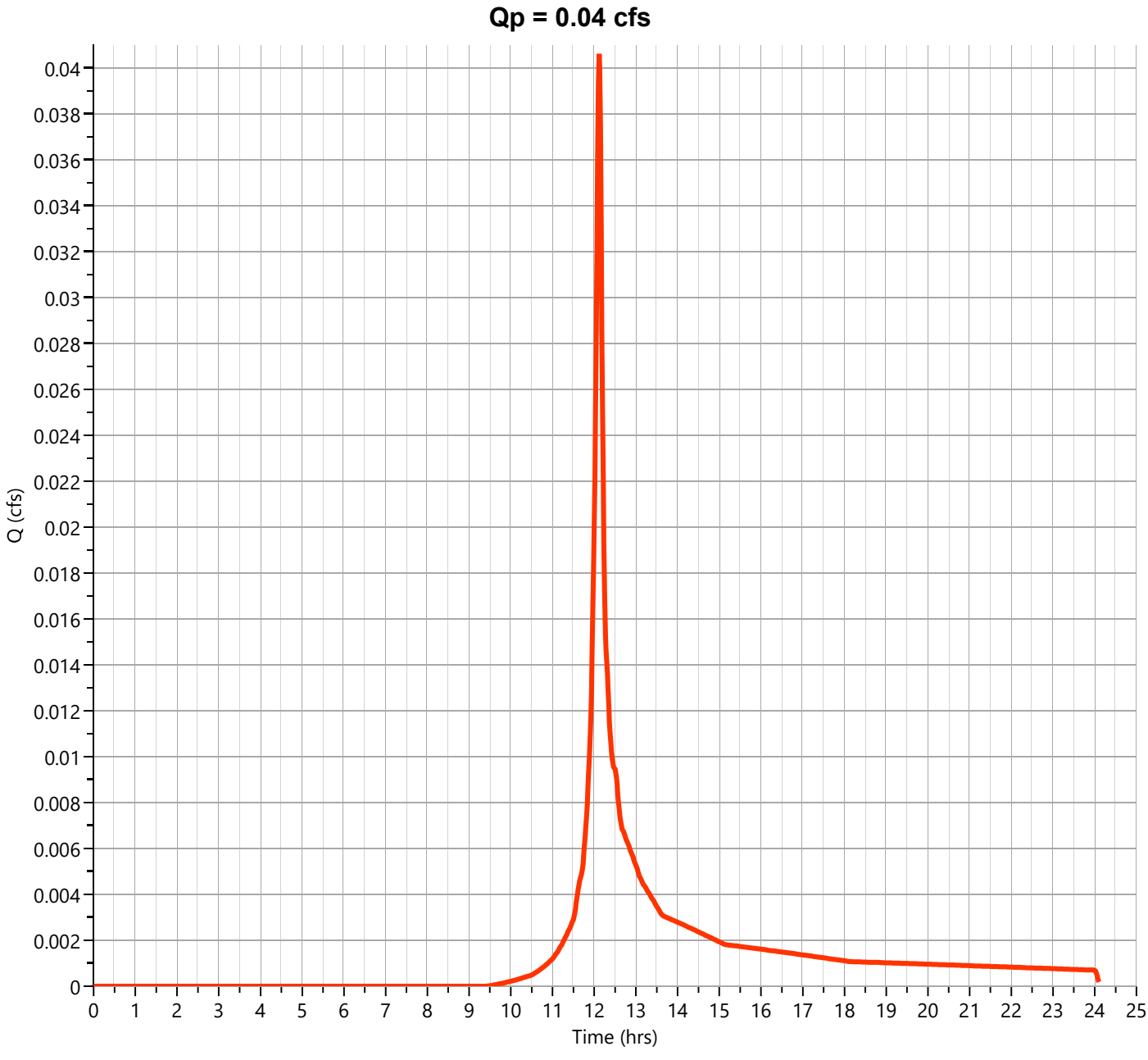
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2H Grass HSGC C

Hyd. No. 34

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.041 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 126 cuft
Drainage Area	= 0.02 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

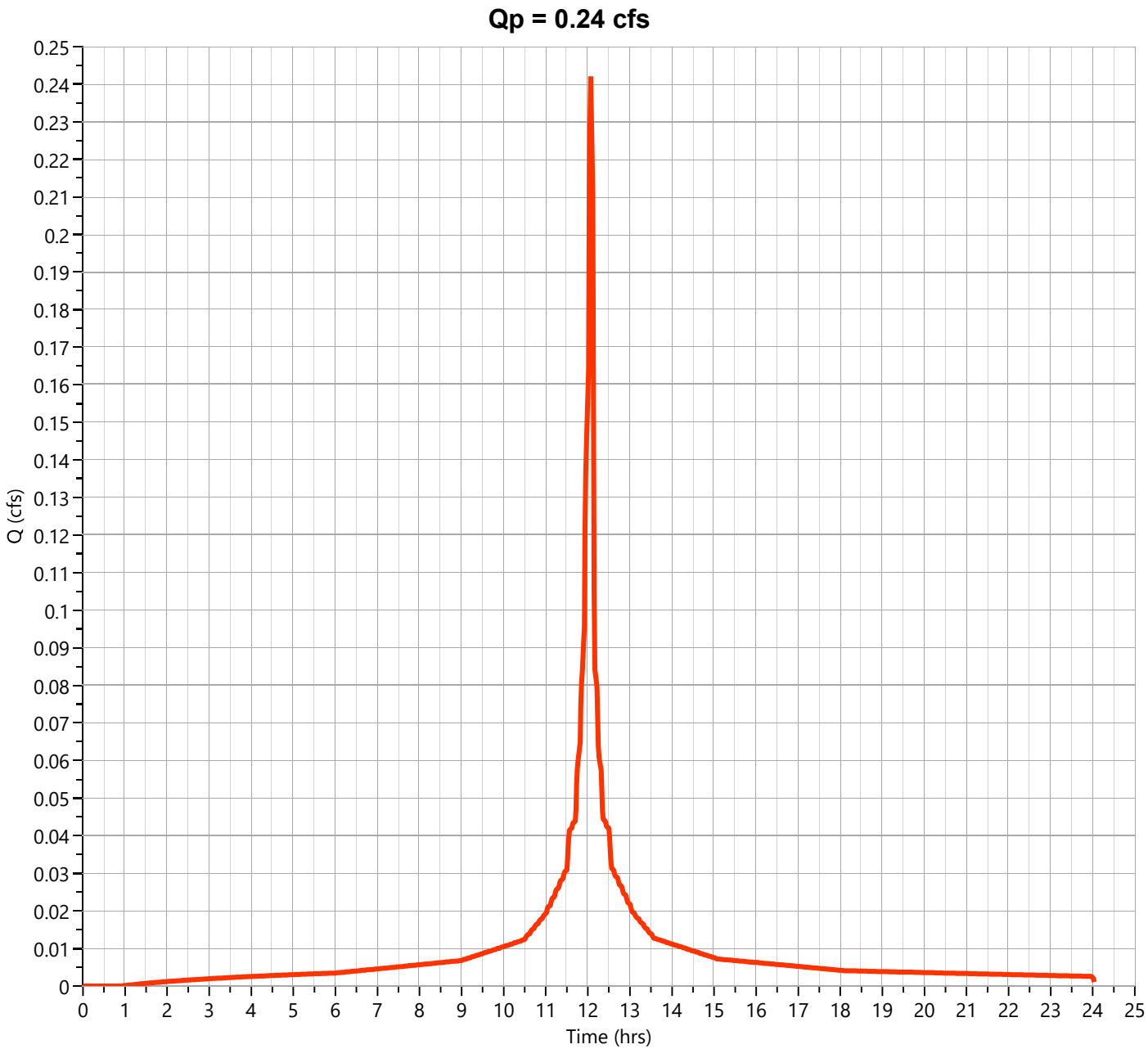
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2H Impervious

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.242 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 793 cuft
Drainage Area	= 0.06 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

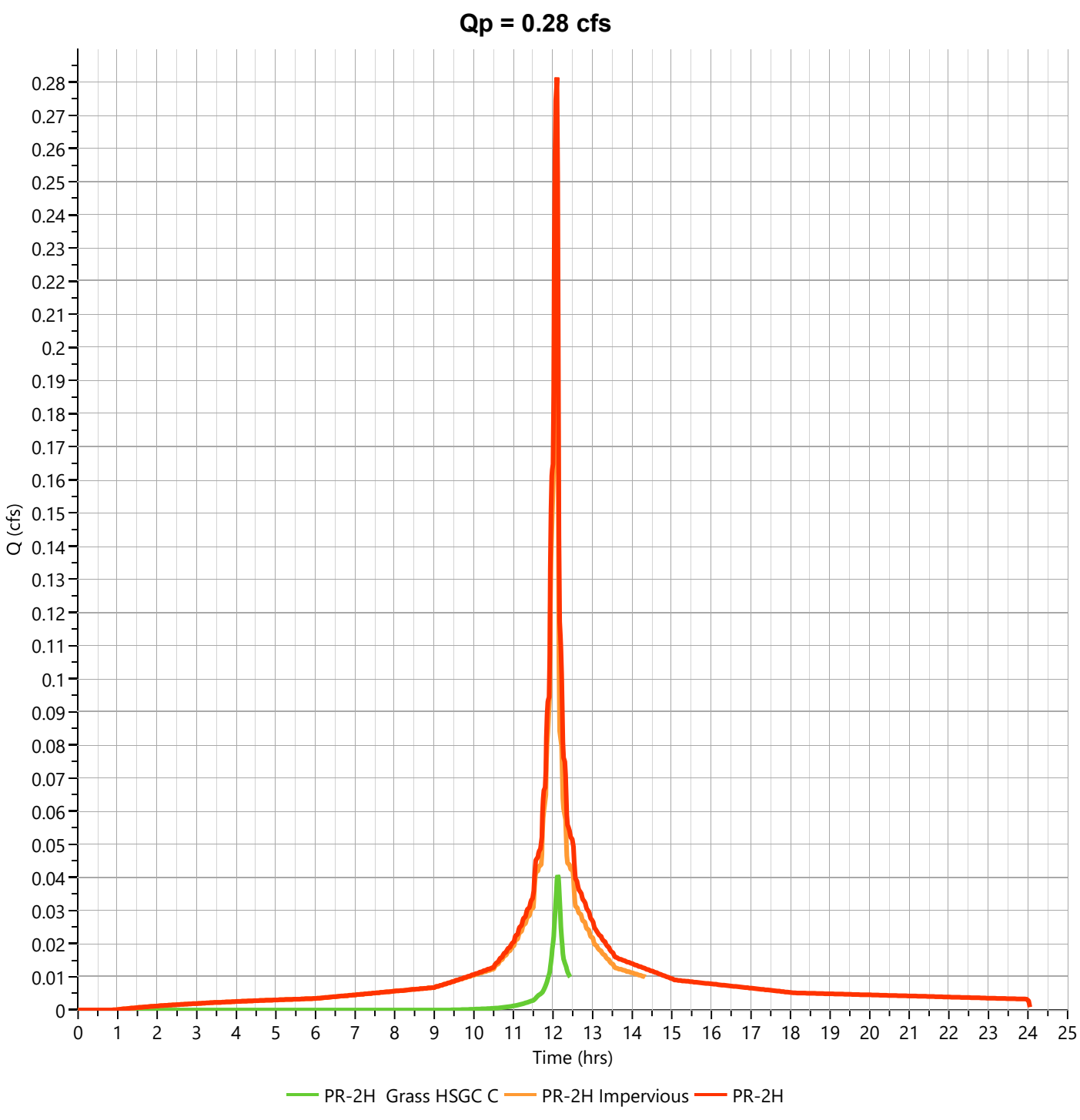
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2H

Hyd. No. 36

Hydrograph Type	= Junction	Peak Flow	= 0.281 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 919 cuft
Inflow Hydrographs	= 34, 35	Total Contrib. Area	= 0.08 ac



Hydrograph Report

Project Name:

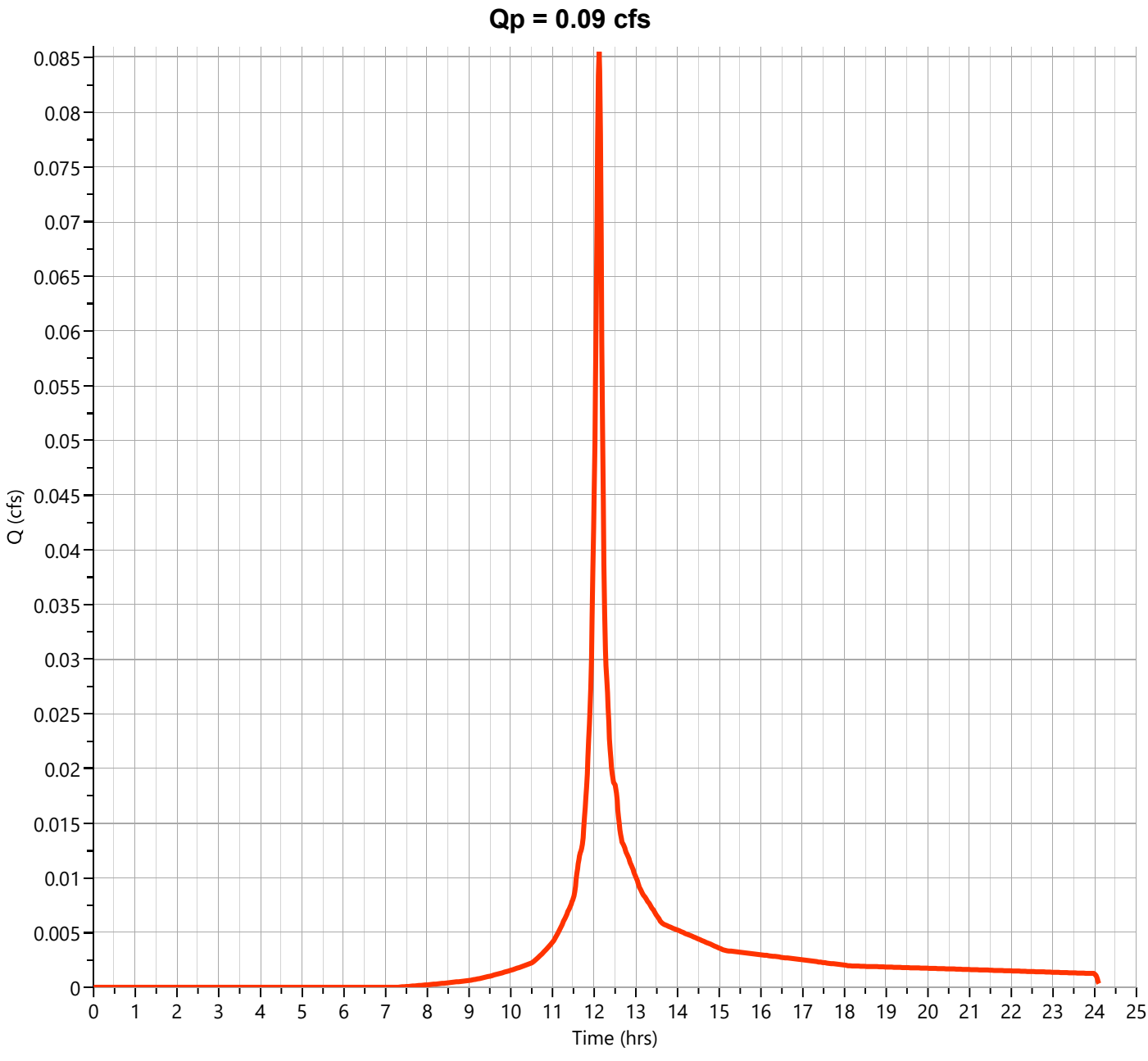
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2H Grass HSGC C

Hyd. No. 34

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.086 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 265 cuft
Drainage Area	= 0.02 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

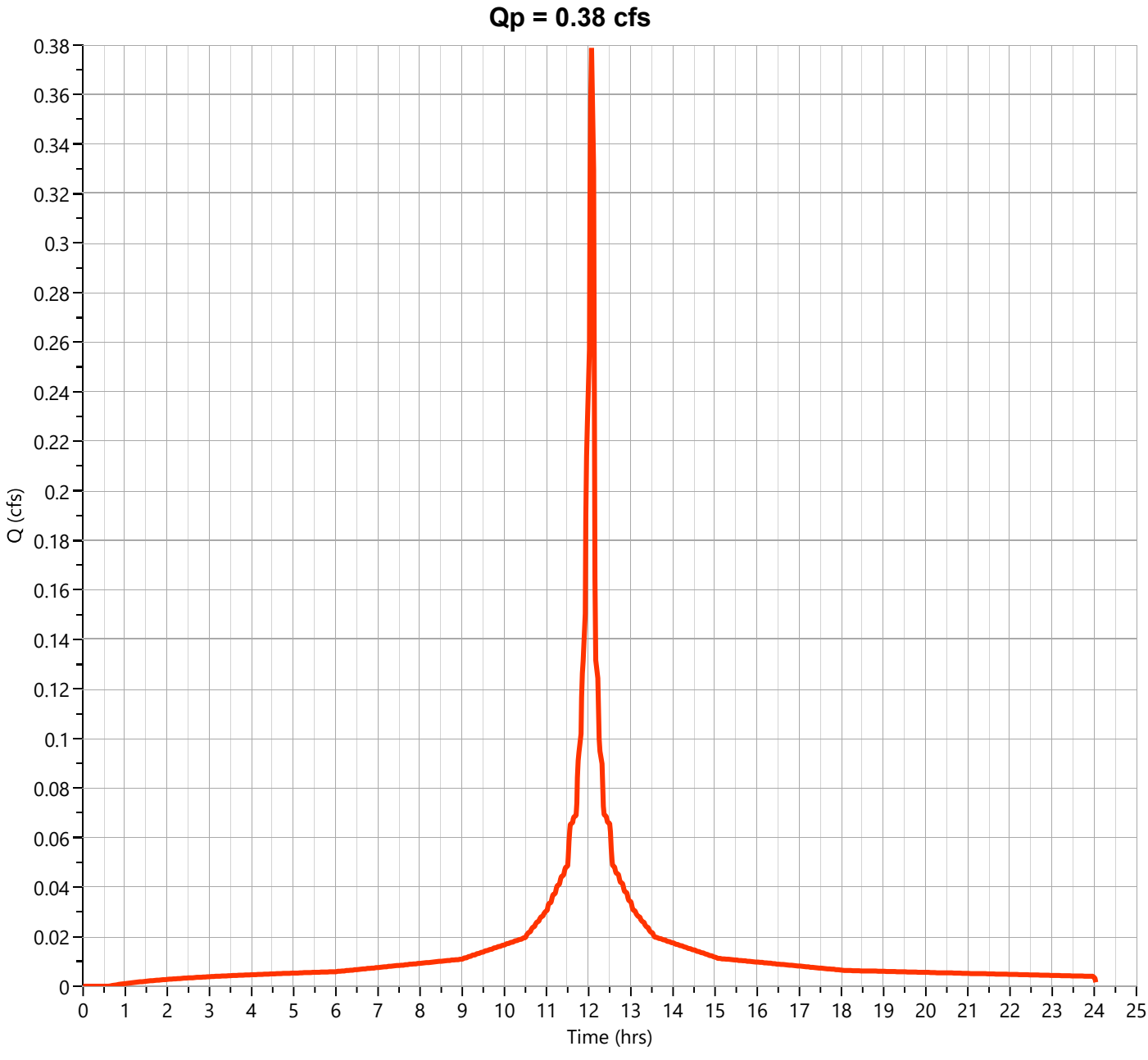
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2H Impervious

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.379 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,262 cuft
Drainage Area	= 0.06 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

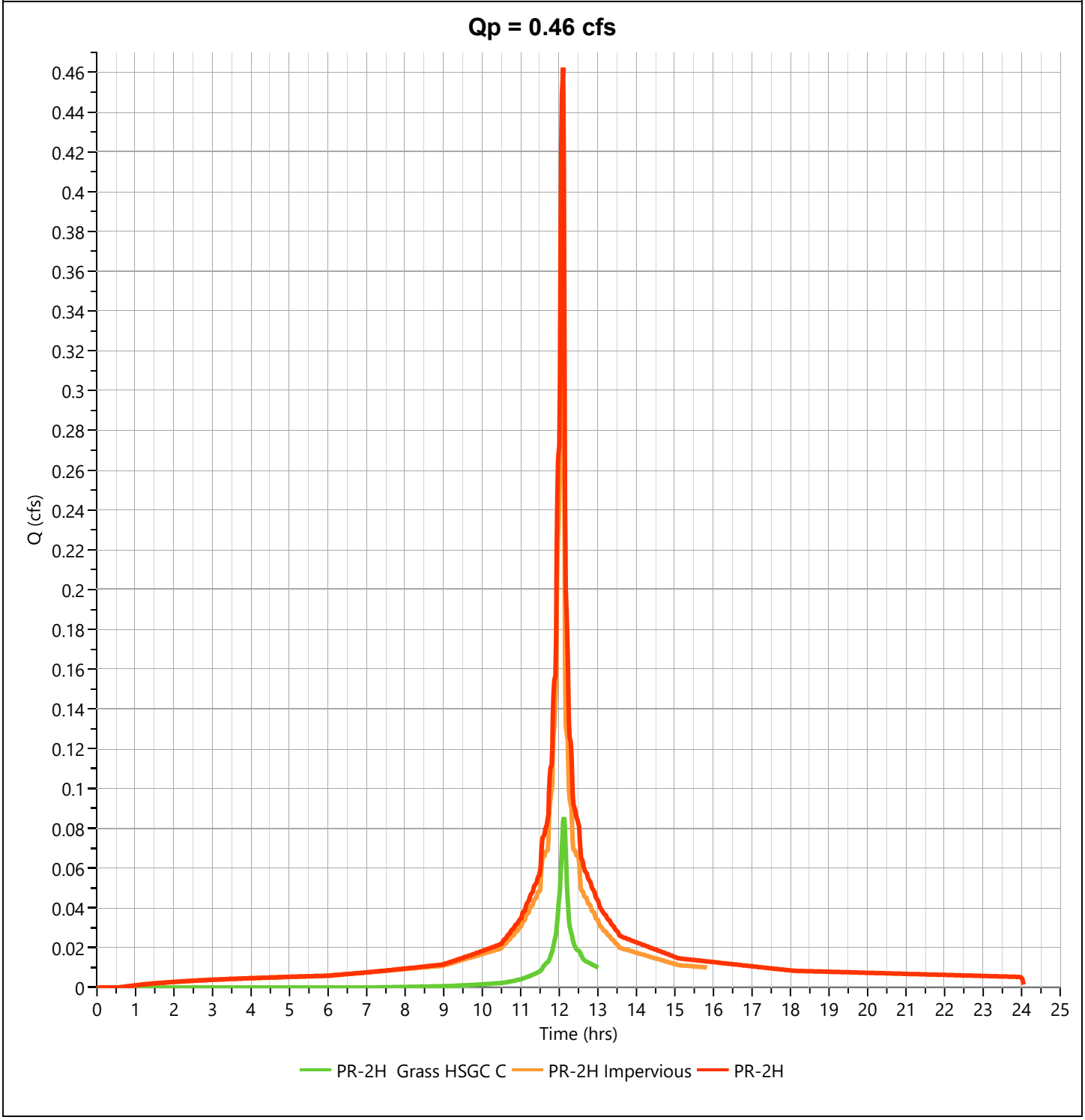
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2H

Hyd. No. 36

Hydrograph Type	= Junction	Peak Flow	= 0.462 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,527 cuft
Inflow Hydrographs	= 34, 35	Total Contrib. Area	= 0.08 ac



Hydrograph Report

Project Name:

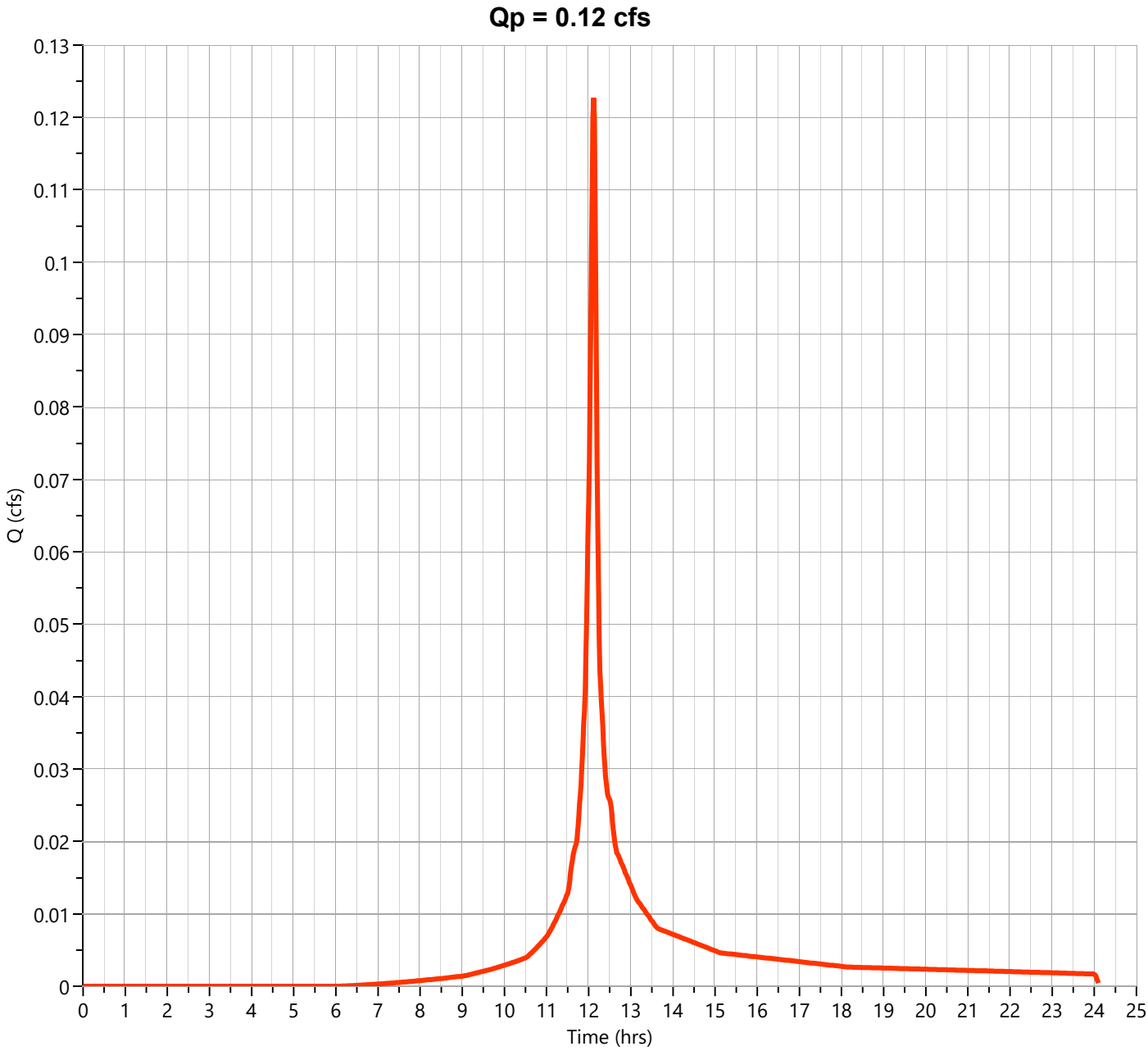
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2H Grass HSGC C

Hyd. No. 34

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.123 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 384 cuft
Drainage Area	= 0.02 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

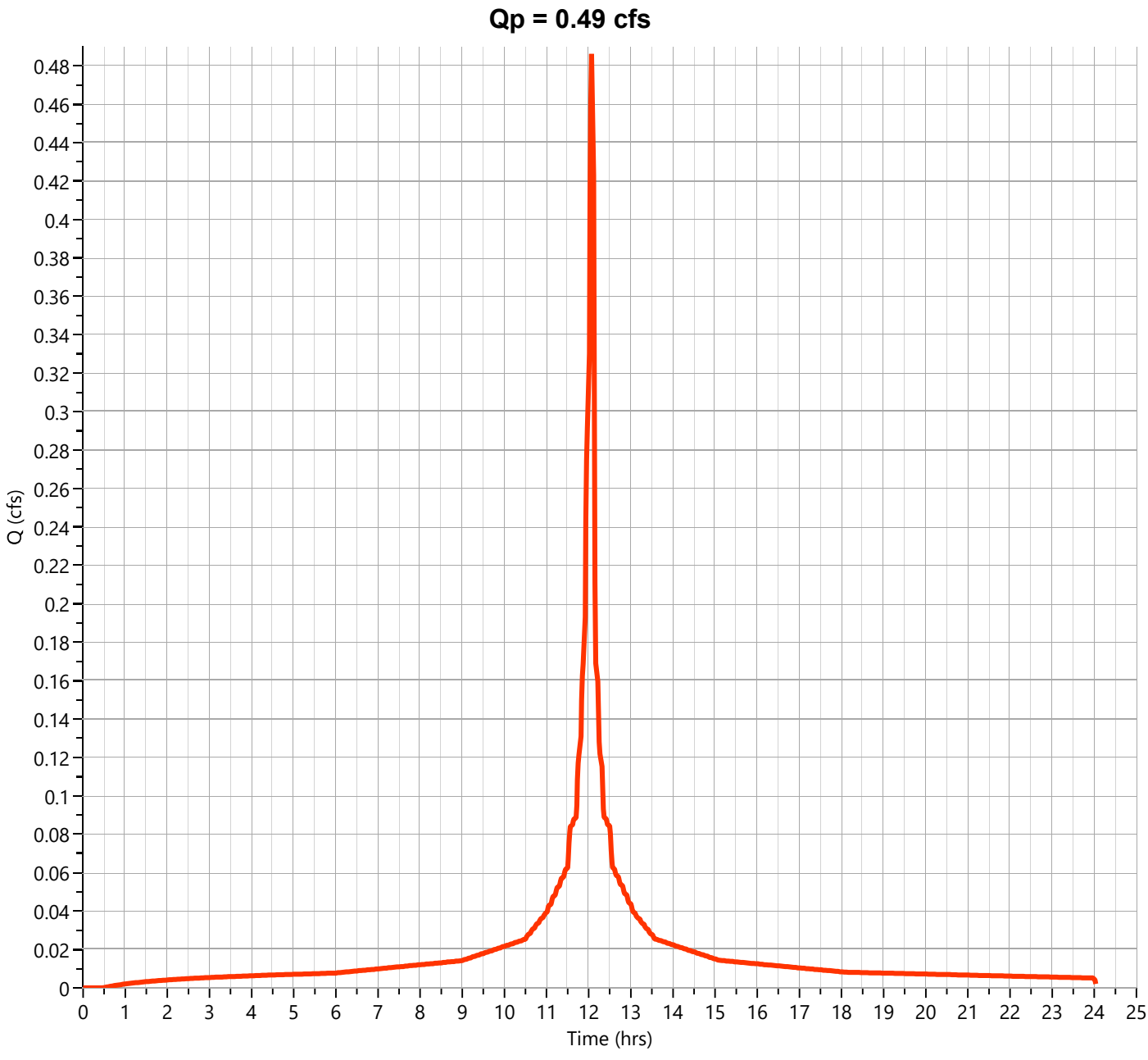
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2H Impervious

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.486 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,631 cuft
Drainage Area	= 0.06 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

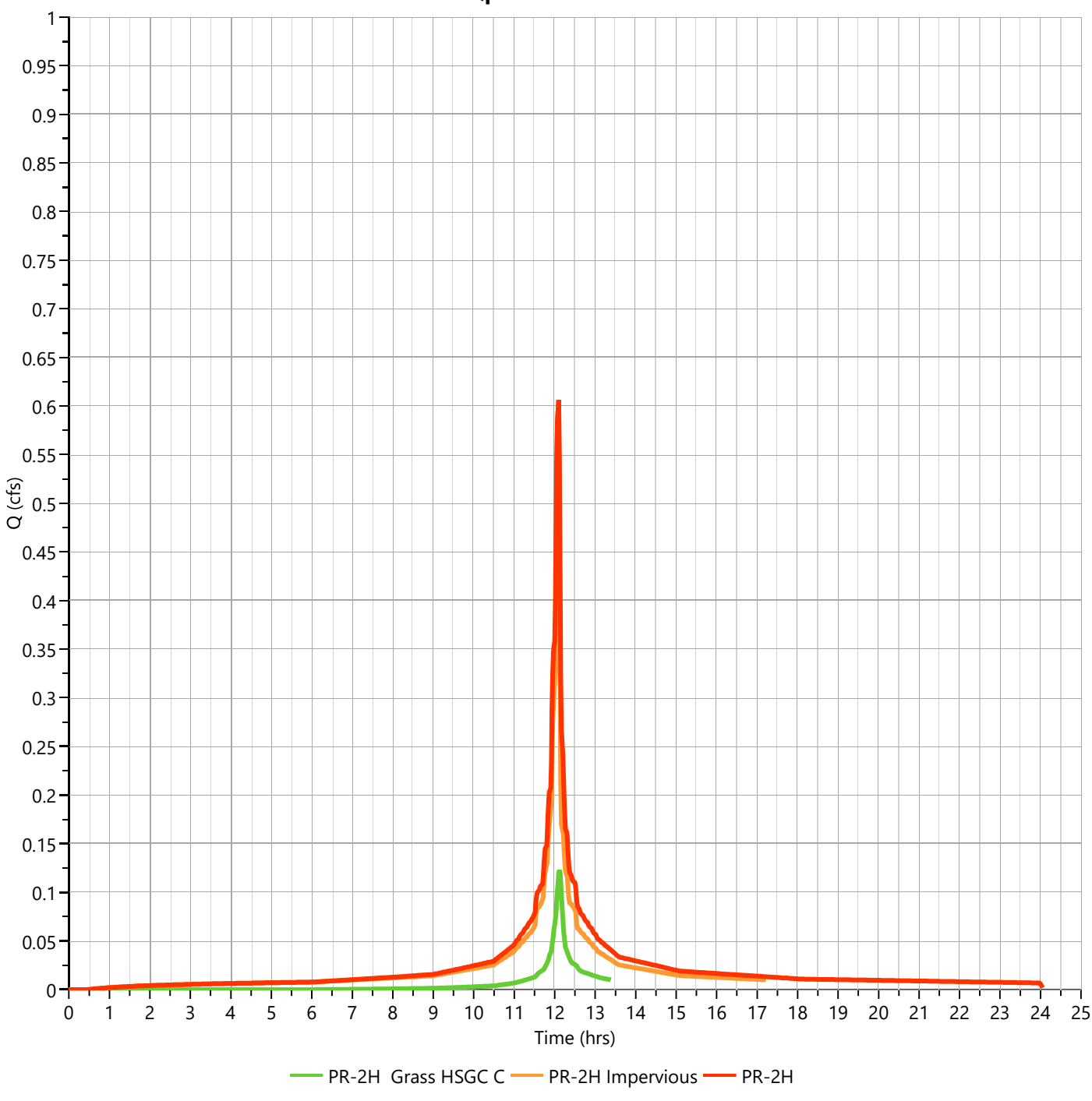
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2H

Hyd. No. 36

Hydrograph Type	= Junction	Peak Flow	= 0.606 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,016 cuft
Inflow Hydrographs	= 34, 35	Total Contrib. Area	= 0.08 ac



Hydrograph Report

Project Name:

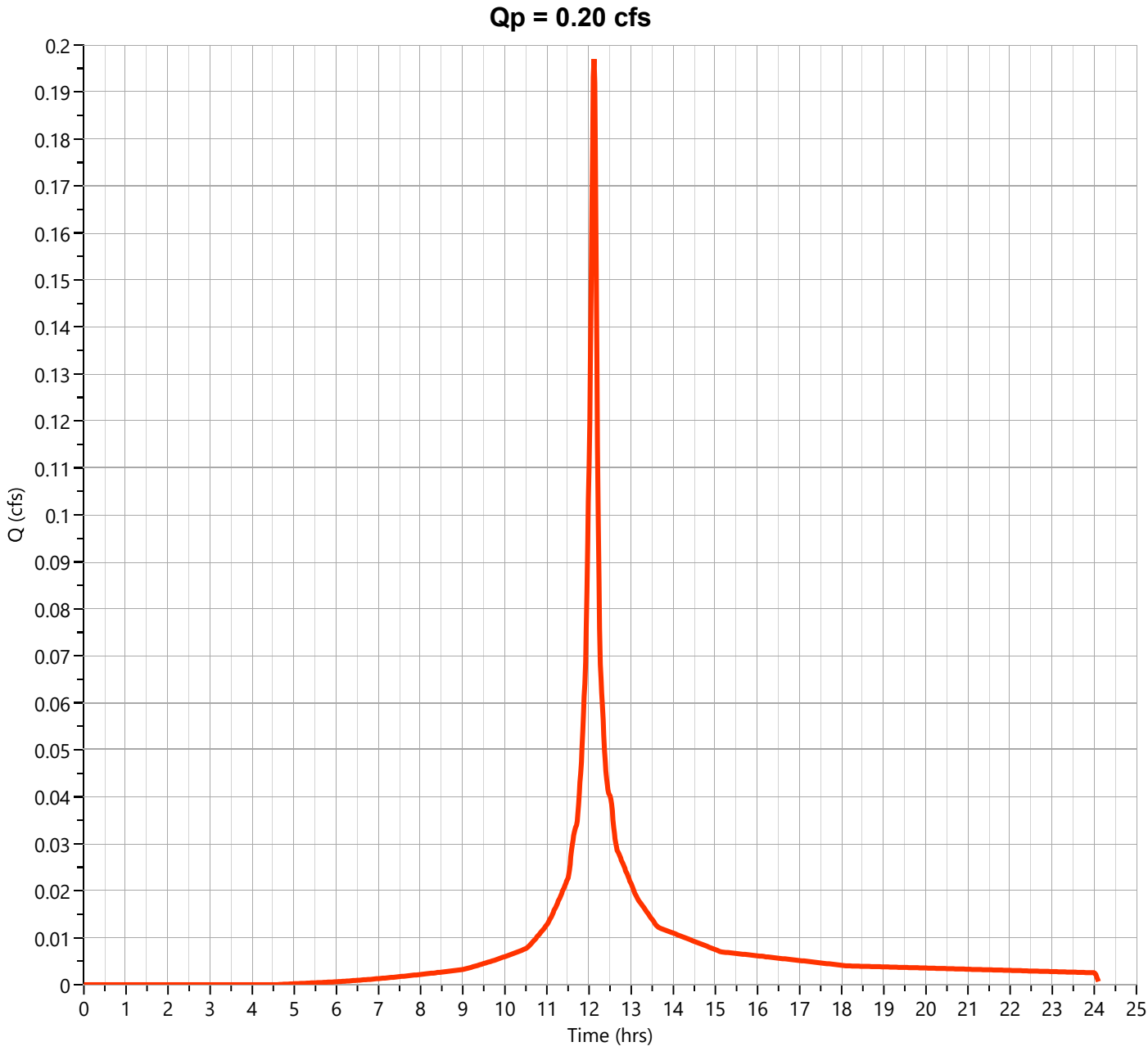
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2H Grass HSGC C

Hyd. No. 34

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.197 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 631 cuft
Drainage Area	= 0.02 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

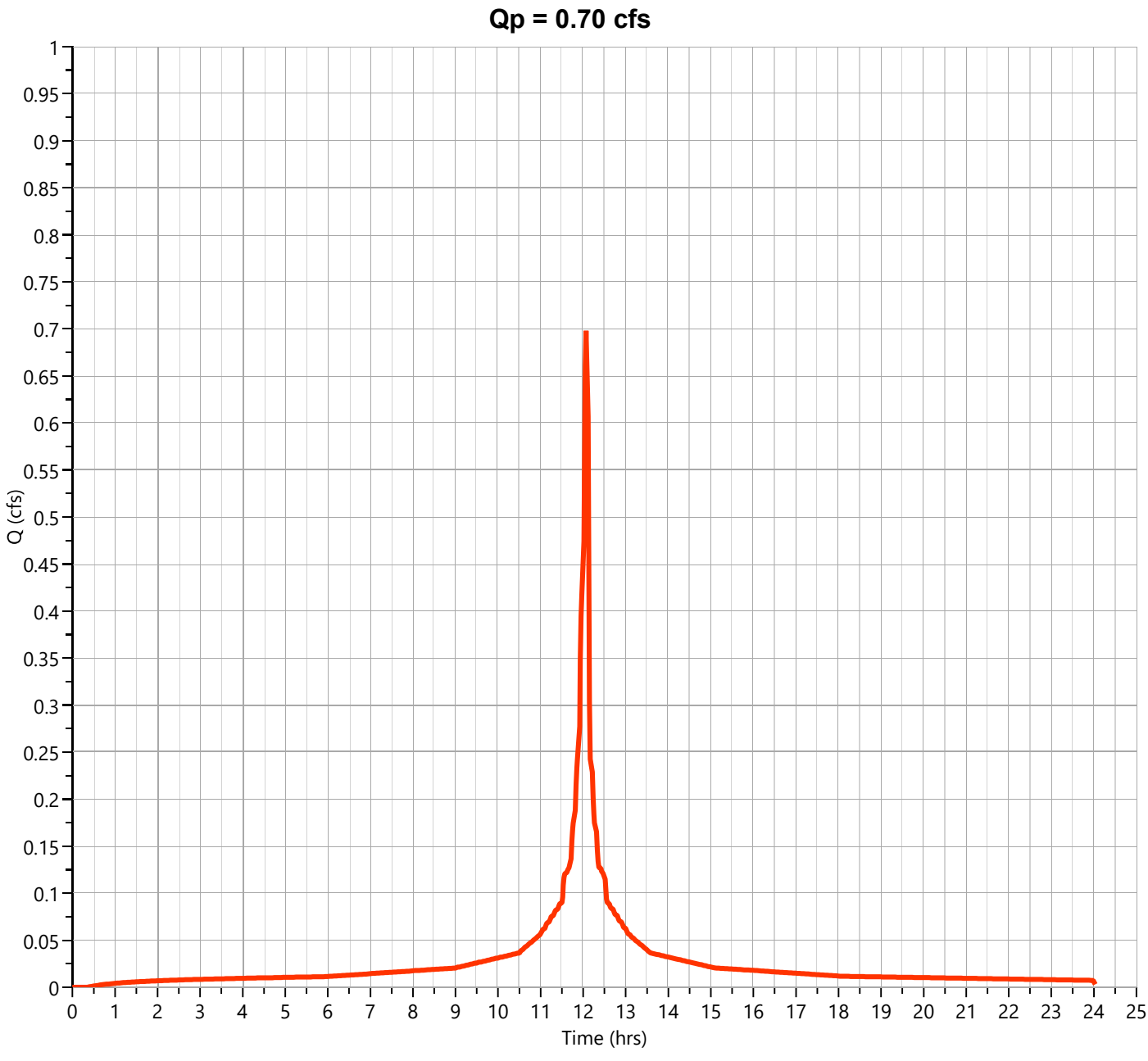
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2H Impervious

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.698 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 2,360 cuft
Drainage Area	= 0.06 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

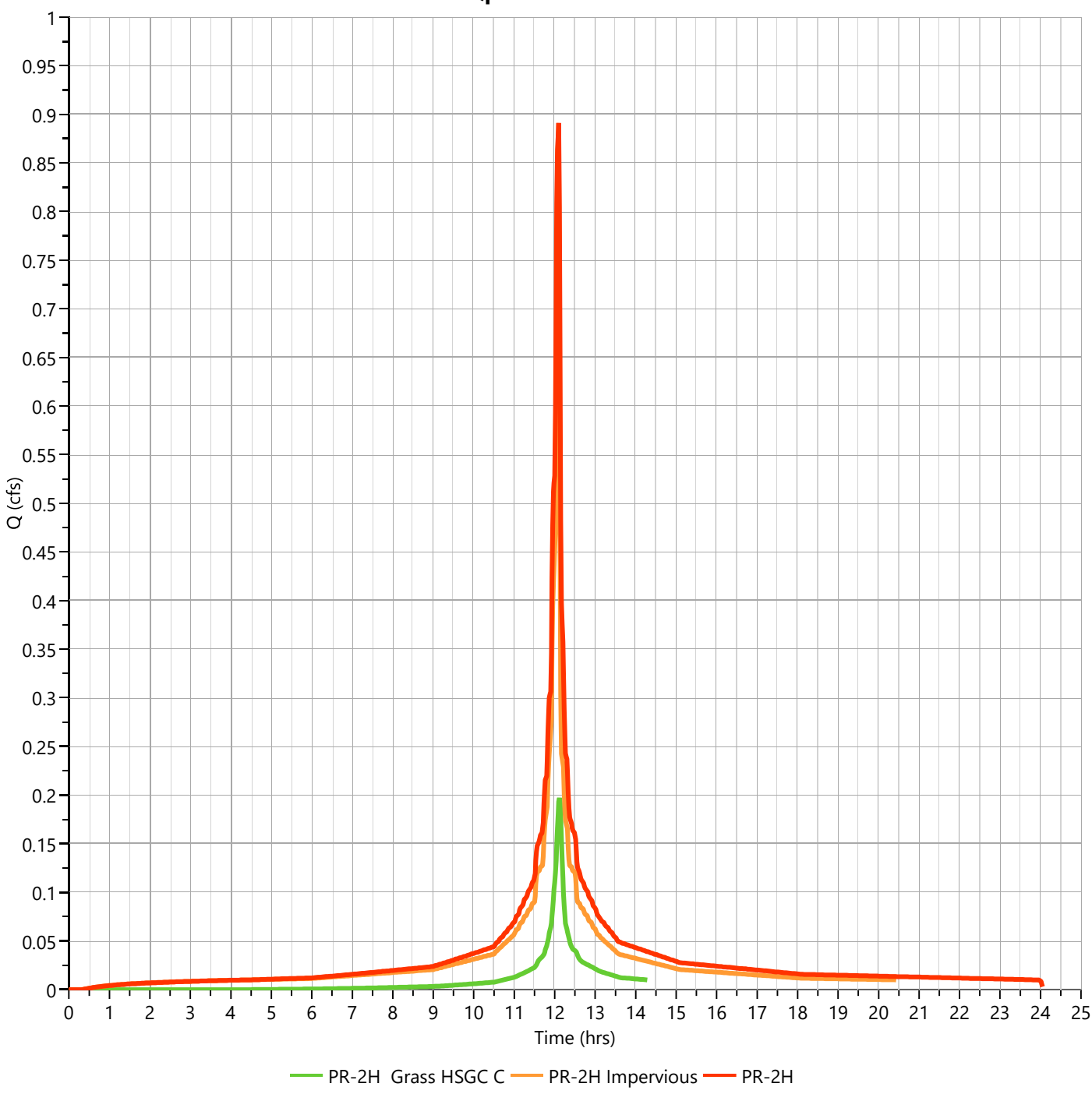
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2H

Hyd. No. 36

Hydrograph Type	= Junction	Peak Flow	= 0.891 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,991 cuft
Inflow Hydrographs	= 34, 35	Total Contrib. Area	= 0.08 ac



COMBINED PR-2B + PR-2H WATERSHED

Hydrograph Report

Project Name:

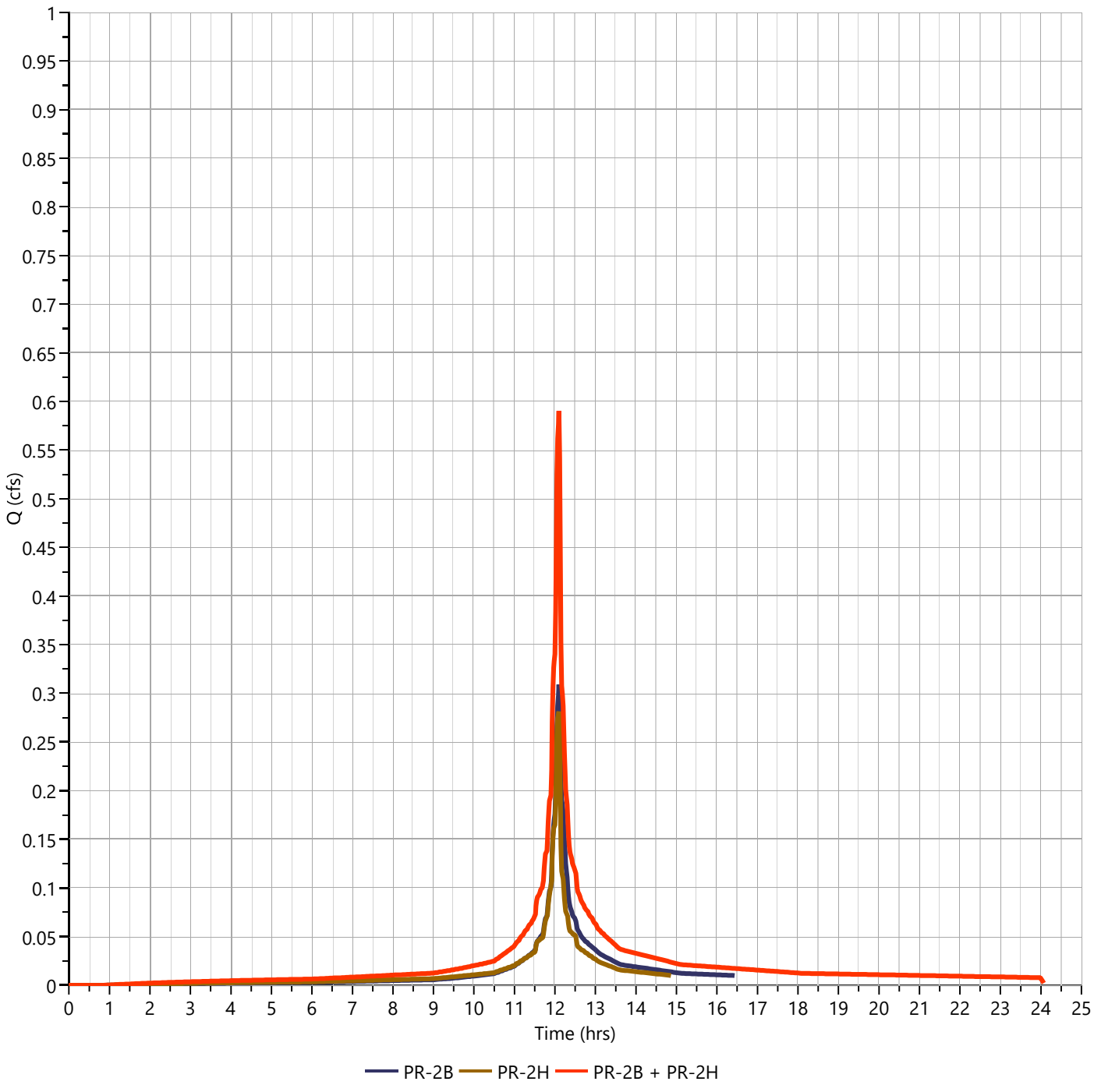
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B + PR-2H

Hyd. No. 38

Hydrograph Type	= Junction	Peak Flow	= 0.590 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,009 cuft
Inflow Hydrographs	= 8, 36	Total Contrib. Area	= 0.2 ac



Hydrograph Report

Project Name:

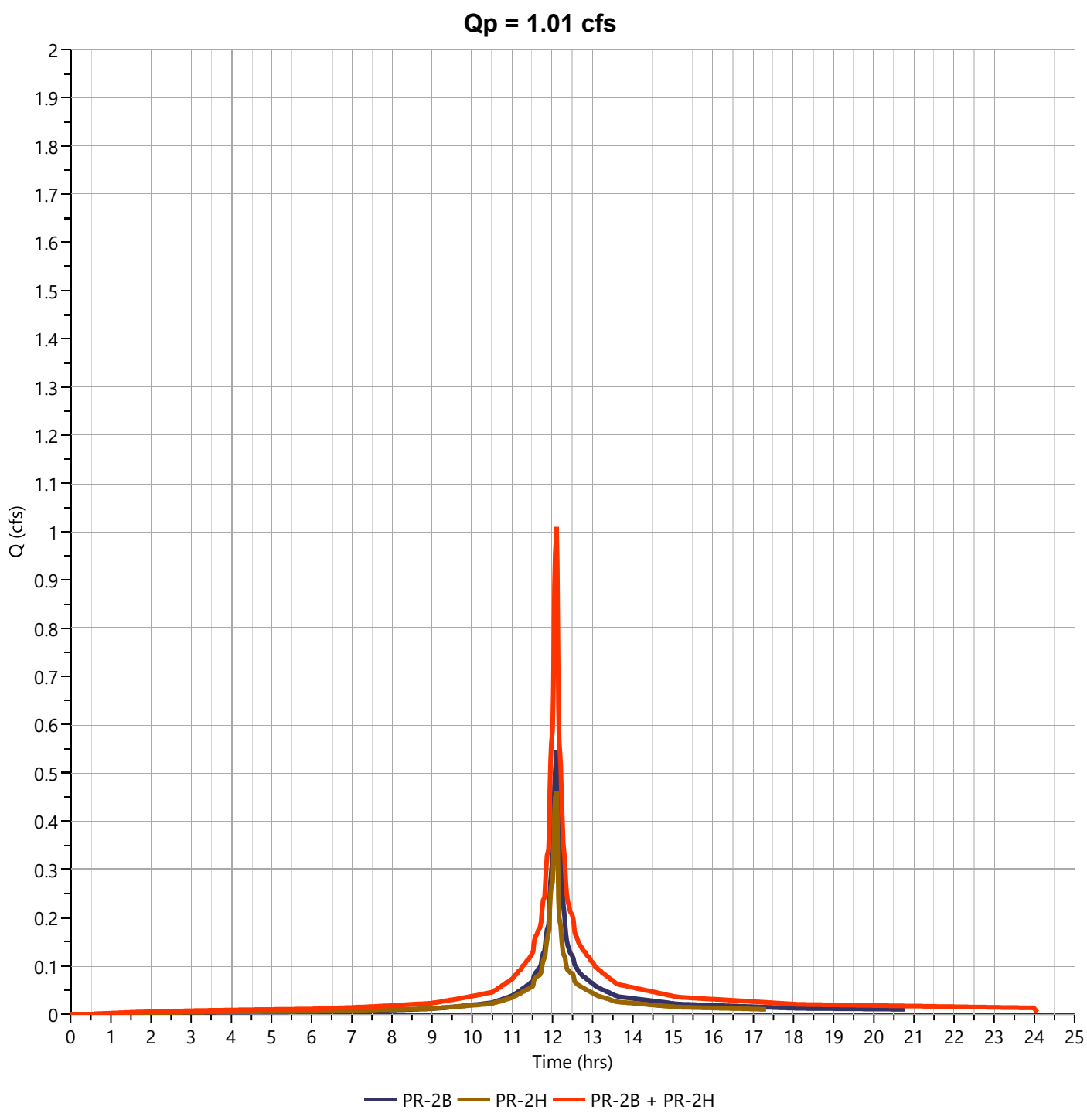
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B + PR-2H

Hyd. No. 38

Hydrograph Type	= Junction	Peak Flow	= 1.010 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 3,479 cuft
Inflow Hydrographs	= 8, 36	Total Contrib. Area	= 0.2 ac



Hydrograph Report

Project Name:

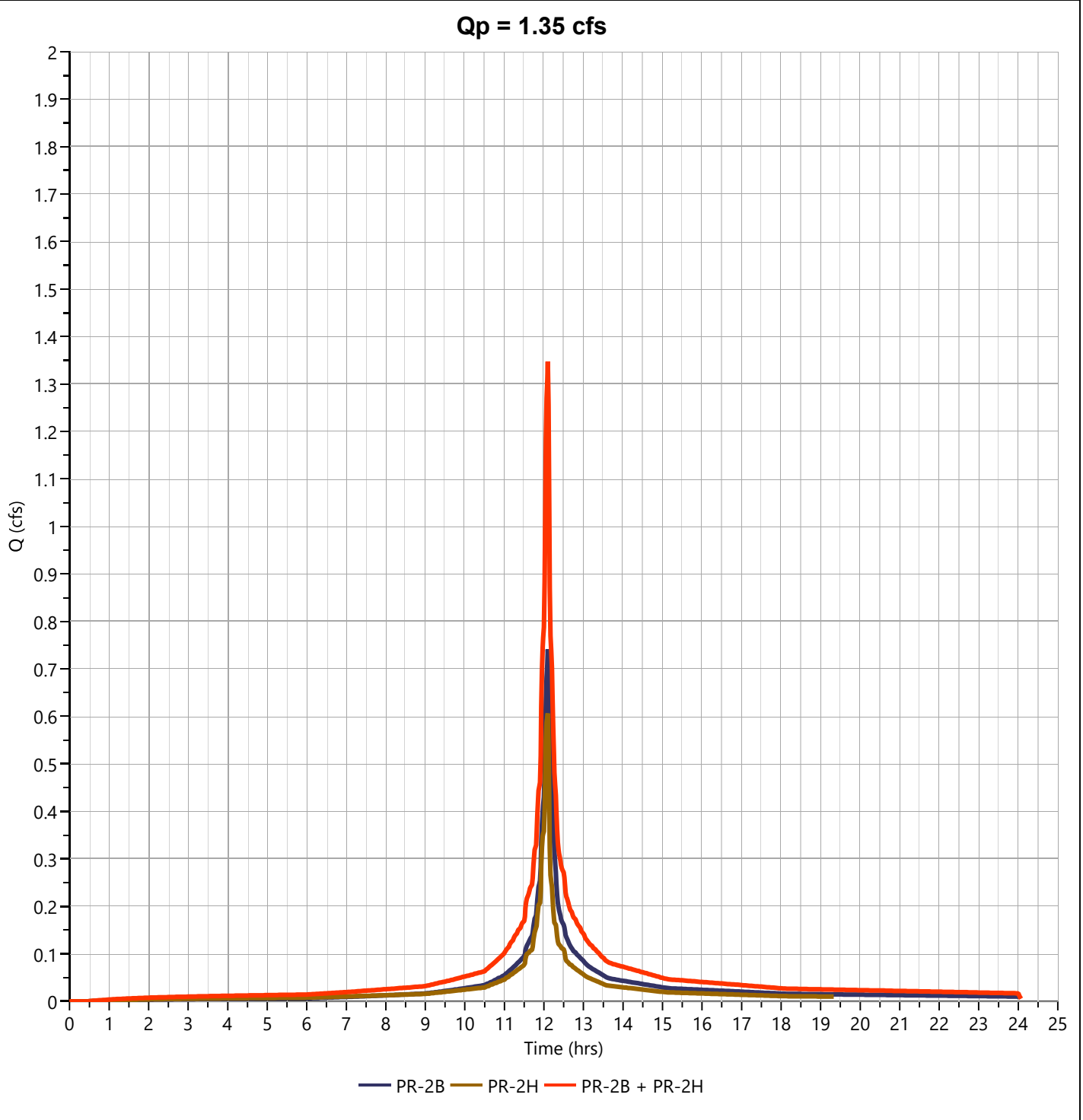
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B + PR-2H

Hyd. No. 38

Hydrograph Type	= Junction	Peak Flow	= 1.347 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 4,679 cuft
Inflow Hydrographs	= 8, 36	Total Contrib. Area	= 0.2 ac



Hydrograph Report

Project Name:

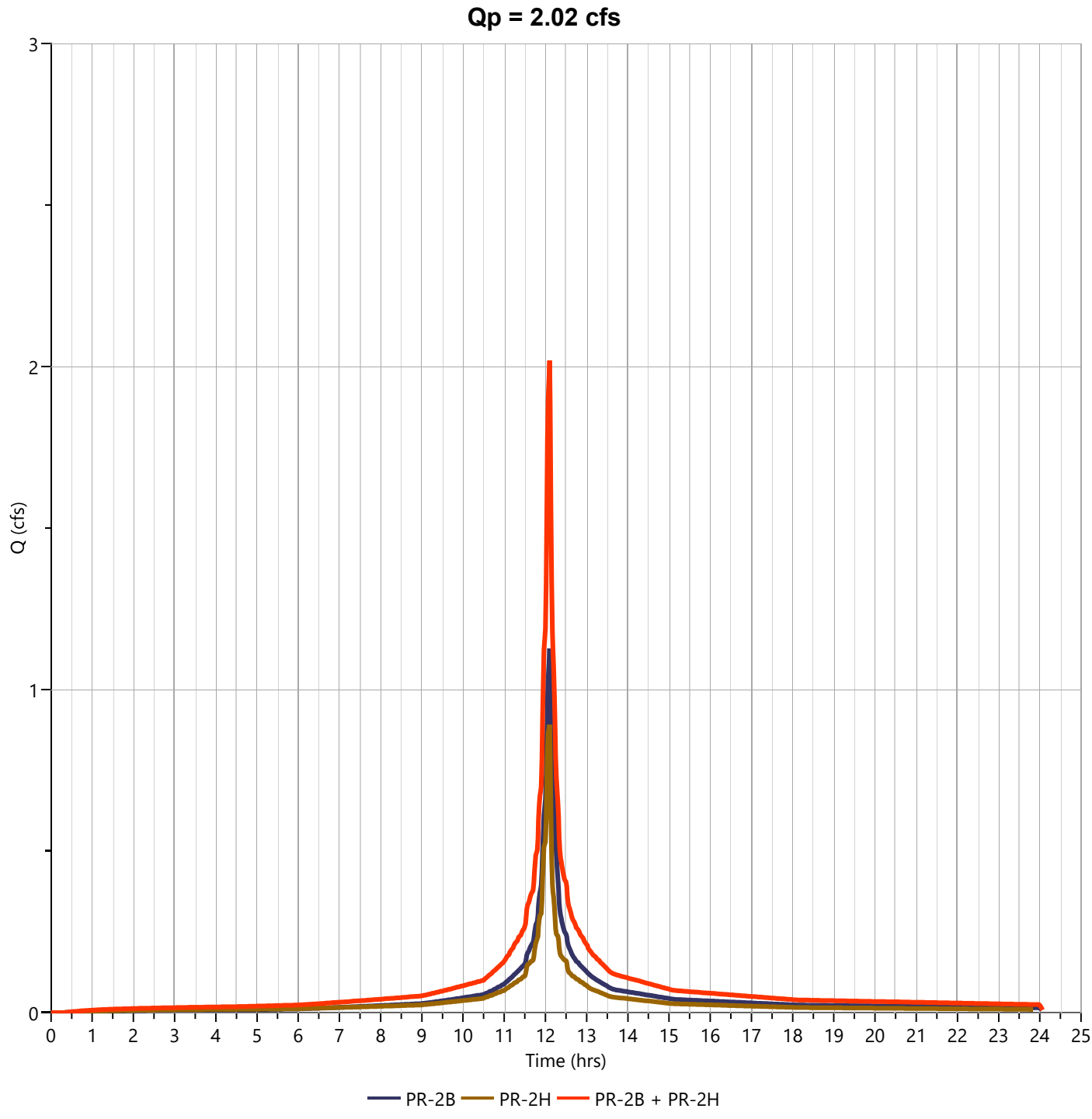
Hydrology Studio v 3.0.0.31

02-08-2024

PR-2B + PR-2H

Hyd. No. 38

Hydrograph Type	= Junction	Peak Flow	= 2.018 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 7,100 cuft
Inflow Hydrographs	= 8, 36	Total Contrib. Area	= 0.2 ac



COMBINED PROPOSED FLOW TO POA-2

Hydrograph Report

Project Name:

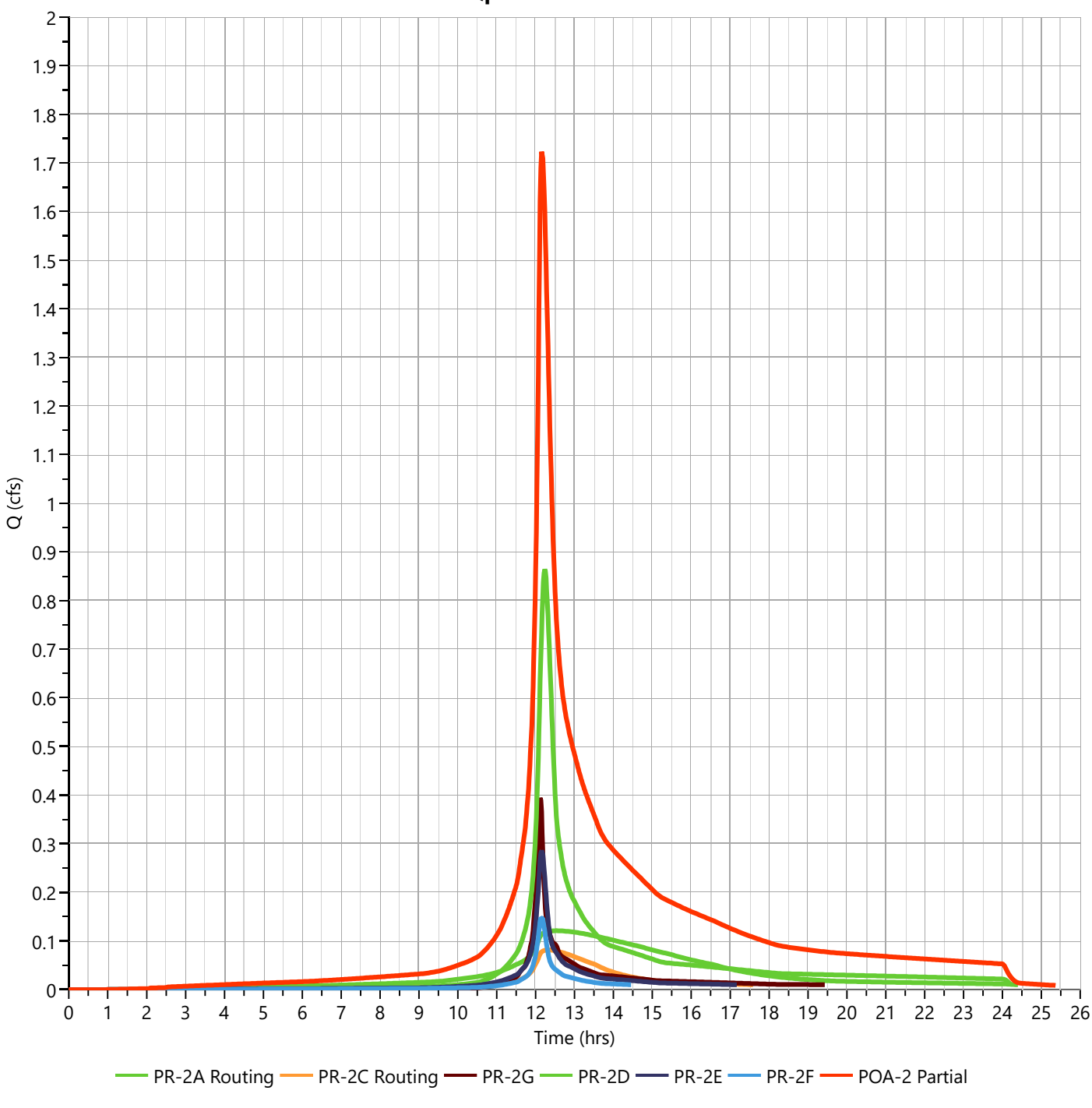
Hydrology Studio v 3.0.0.31

02-08-2024

POA-2 Partial

Hyd. No. 41

Hydrograph Type	= Junction	Peak Flow	= 1.723 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Hydrograph Volume	= 10,640 cuft
Inflow Hydrographs	= 4, 15, 19, 24, 28, 32	Total Contrib. Area	= 1.09 ac



Hydrograph Report

Project Name:

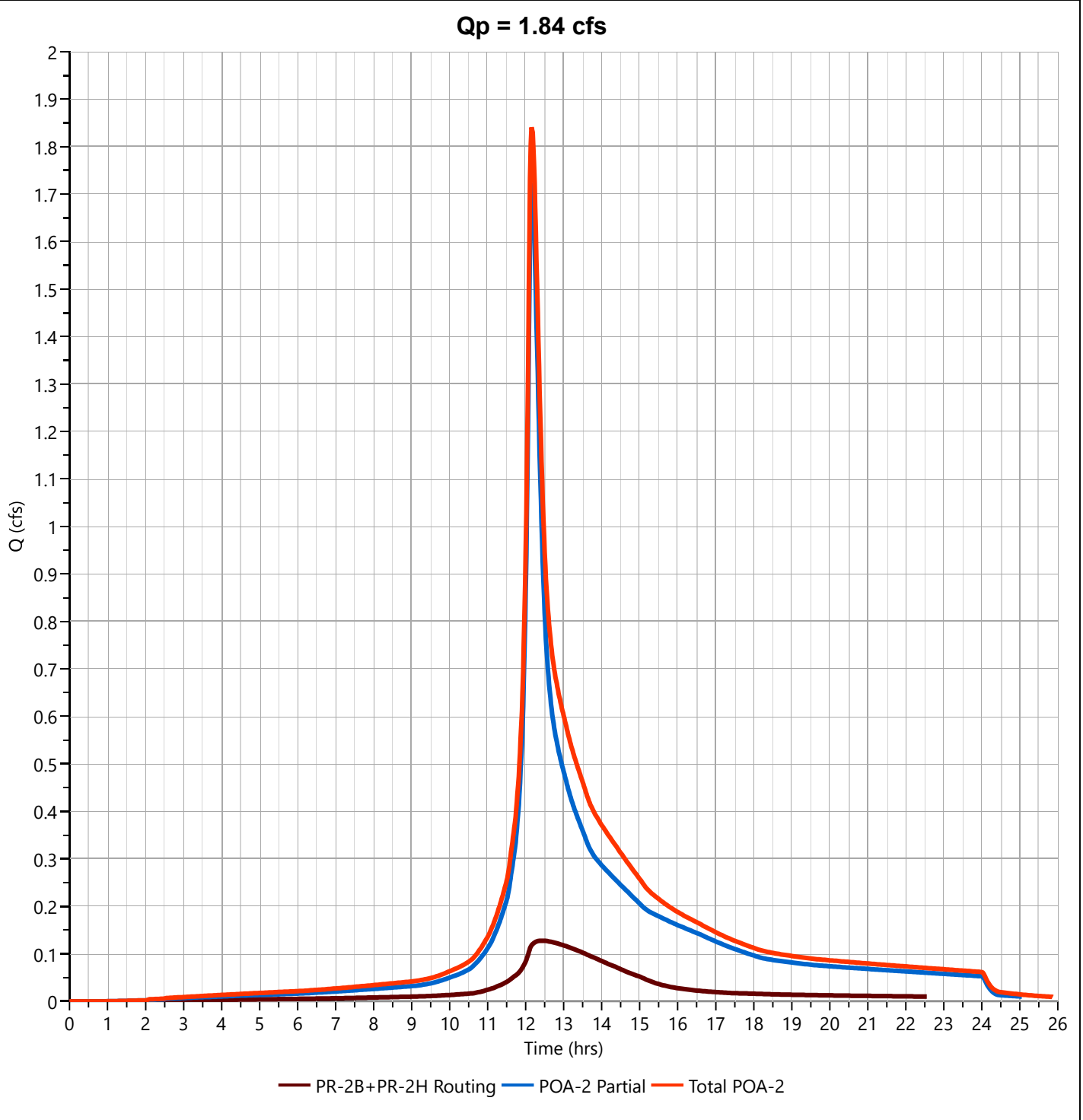
Hydrology Studio v 3.0.0.31

02-08-2024

Total POA-2

Hyd. No. 42

Hydrograph Type	= Junction	Peak Flow	= 1.842 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Hydrograph Volume	= 12,644 cuft
Inflow Hydrographs	= 39, 41	Total Contrib. Area	= 1.09 ac



Hydrograph Report

Project Name:

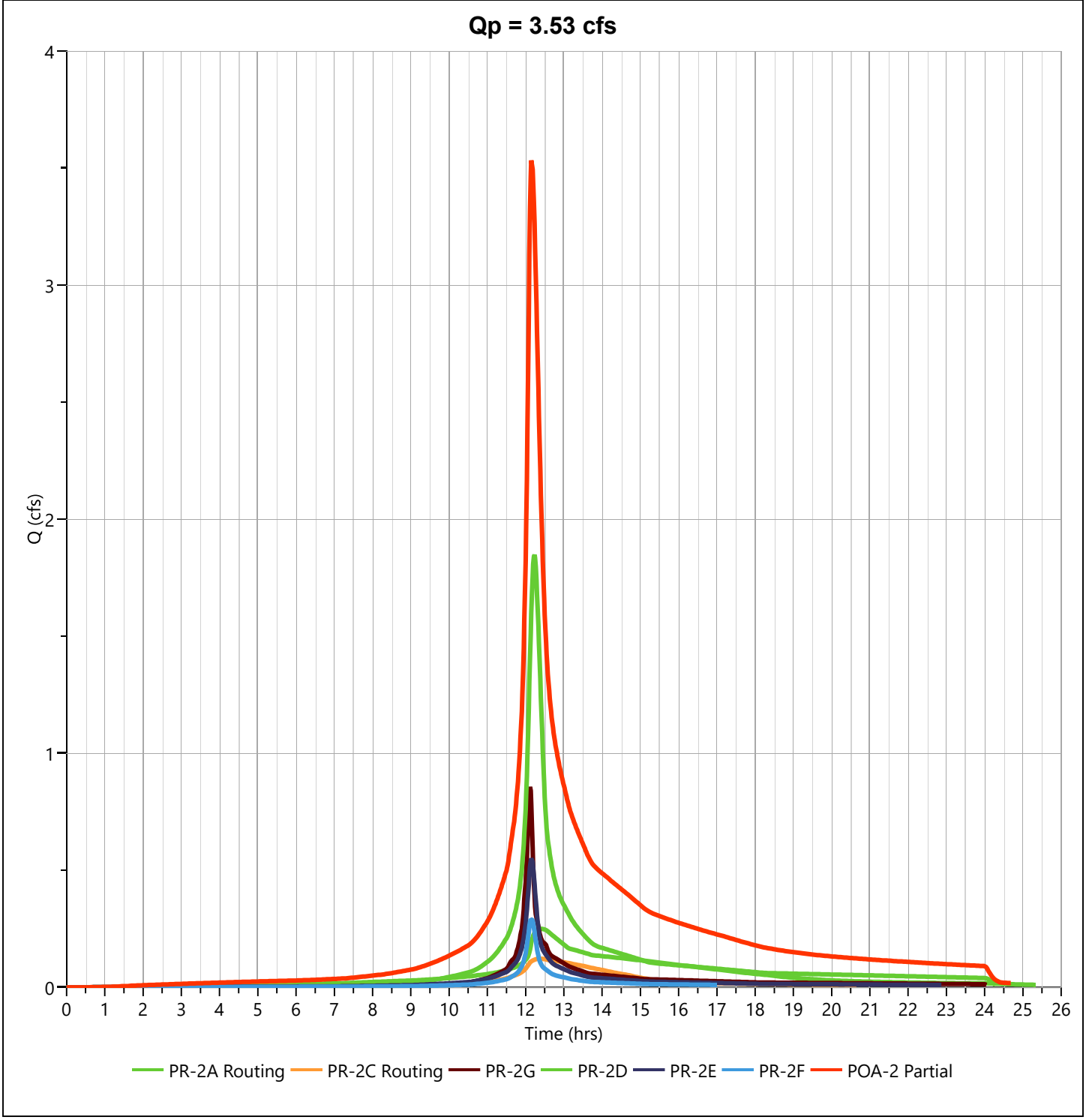
Hydrology Studio v 3.0.0.31

02-08-2024

POA-2 Partial

Hyd. No. 41

Hydrograph Type	= Junction	Peak Flow	= 3.532 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Hydrograph Volume	= 20,279 cuft
Inflow Hydrographs	= 4, 15, 19, 24, 28, 32	Total Contrib. Area	= 1.09 ac



Hydrograph Report

Project Name:

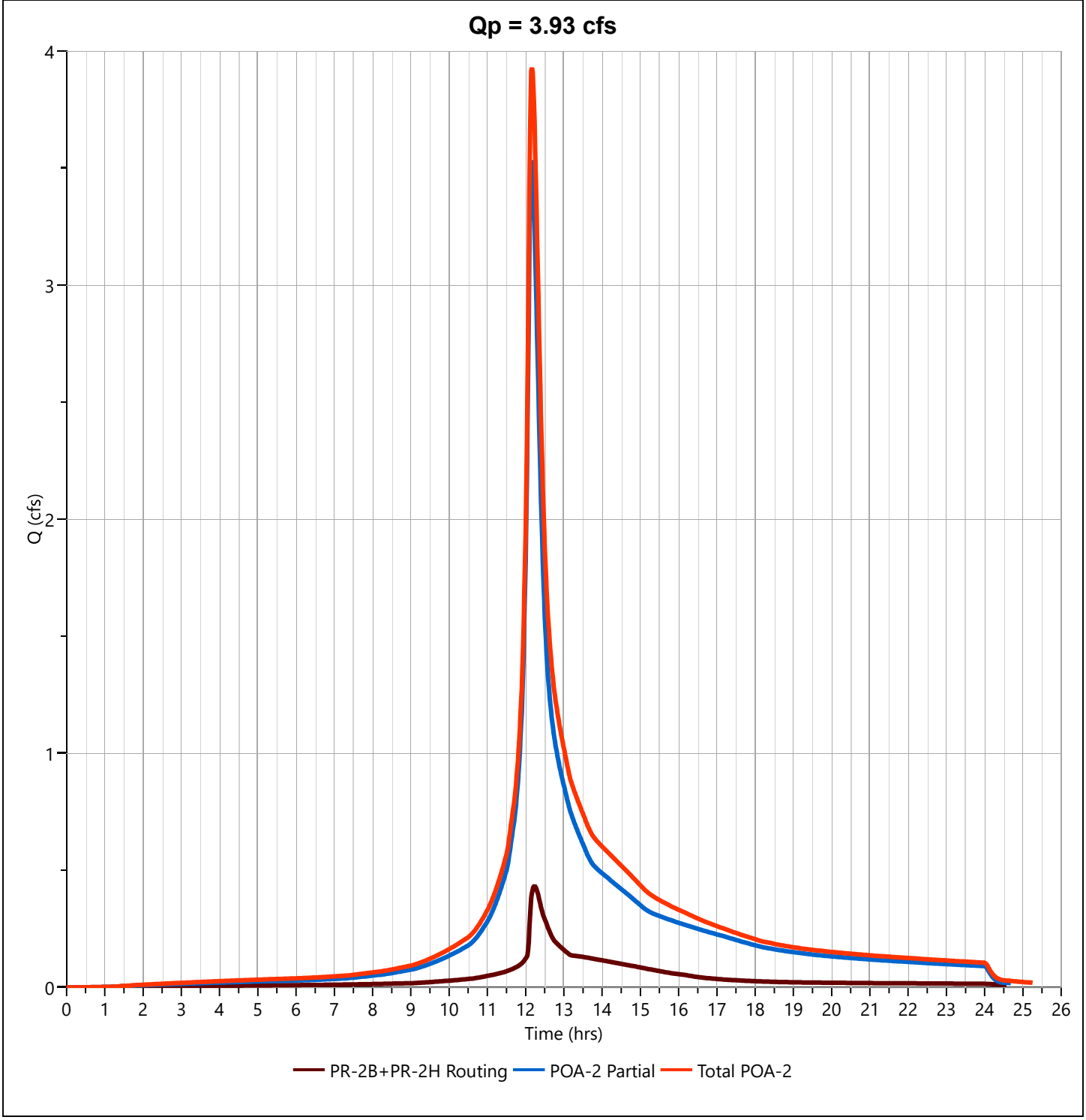
Hydrology Studio v 3.0.0.31

02-08-2024

Total POA-2

Hyd. No. 42

Hydrograph Type	= Junction	Peak Flow	= 3.928 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Hydrograph Volume	= 23,753 cuft
Inflow Hydrographs	= 39, 41	Total Contrib. Area	= 1.09 ac



Hydrograph Report

Project Name:

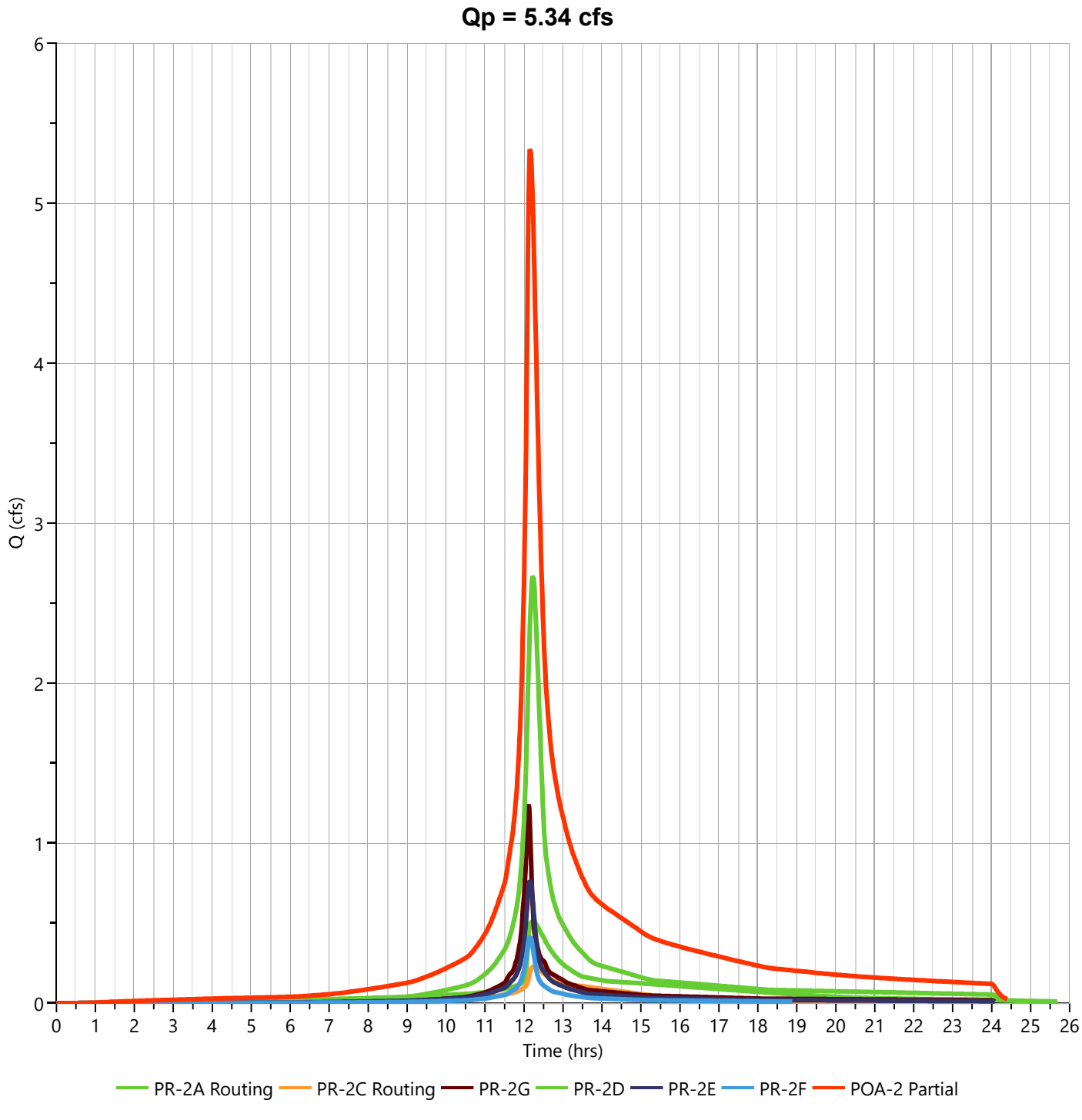
Hydrology Studio v 3.0.0.31

02-08-2024

POA-2 Partial

Hyd. No. 41

Hydrograph Type	= Junction	Peak Flow	= 5.336 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Hydrograph Volume	= 28,418 cuft
Inflow Hydrographs	= 4, 15, 19, 24, 28, 32	Total Contrib. Area	= 1.09 ac



Hydrograph Report

Project Name:

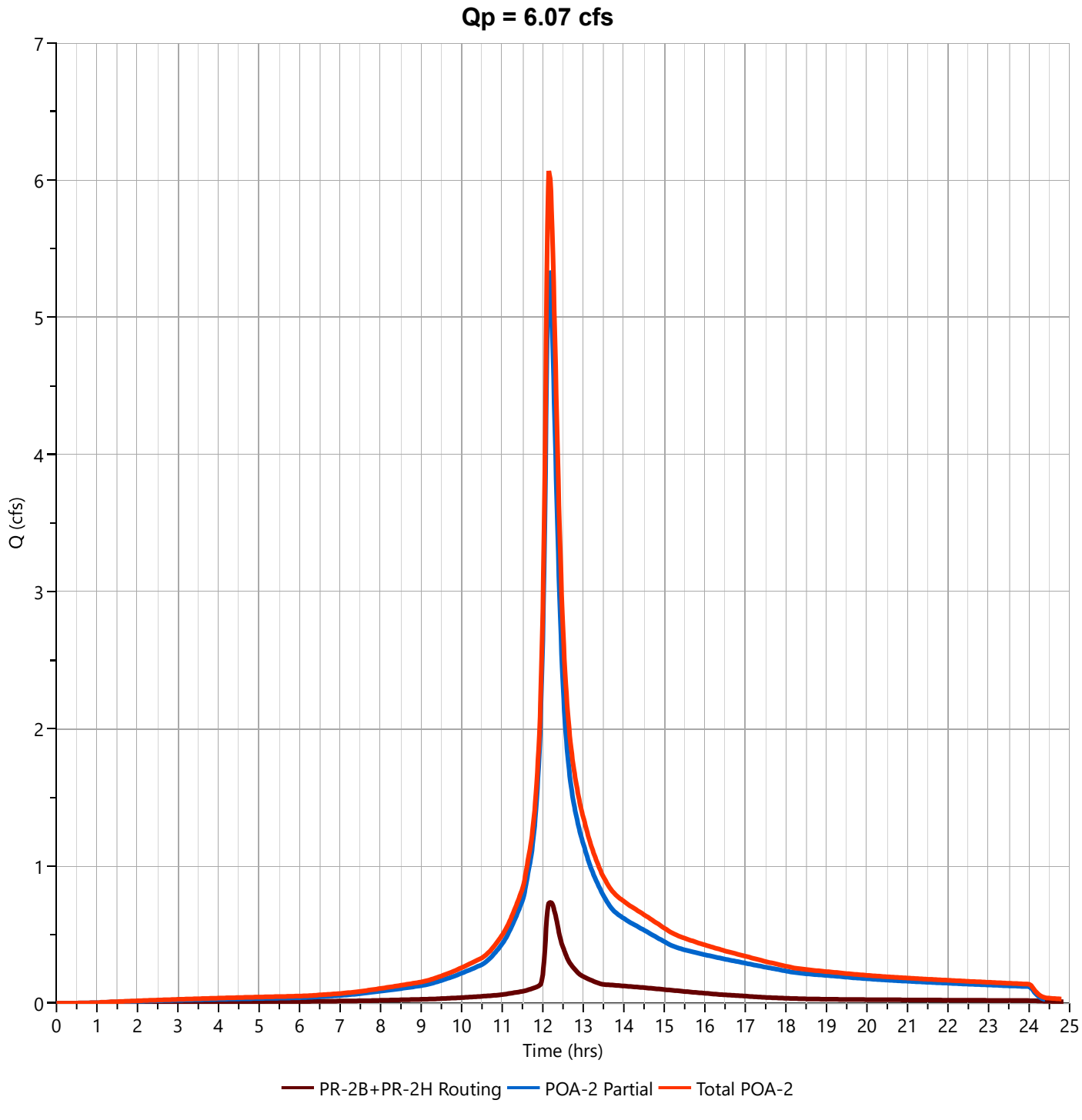
Hydrology Studio v 3.0.0.31

02-08-2024

Total POA-2

Hyd. No. 42

Hydrograph Type	= Junction	Peak Flow	= 6.066 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Hydrograph Volume	= 33,092 cuft
Inflow Hydrographs	= 39, 41	Total Contrib. Area	= 1.09 ac



Hydrograph Report

Project Name:

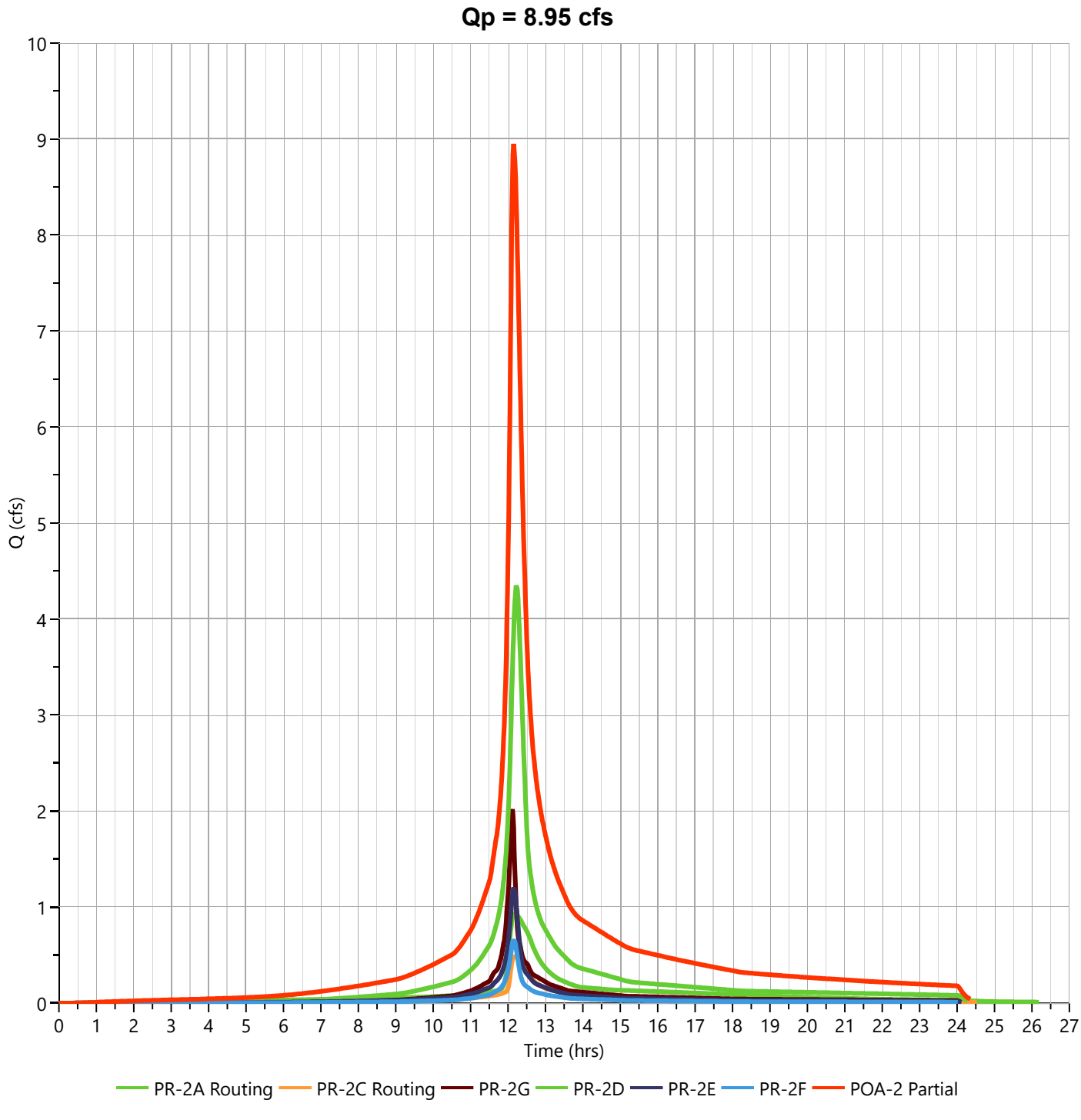
Hydrology Studio v 3.0.0.31

02-08-2024

POA-2 Partial

Hyd. No. 41

Hydrograph Type	= Junction	Peak Flow	= 8.949 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Hydrograph Volume	= 45,166 cuft
Inflow Hydrographs	= 4, 15, 19, 24, 28, 32	Total Contrib. Area	= 1.09 ac



Hydrograph Report

Project Name:

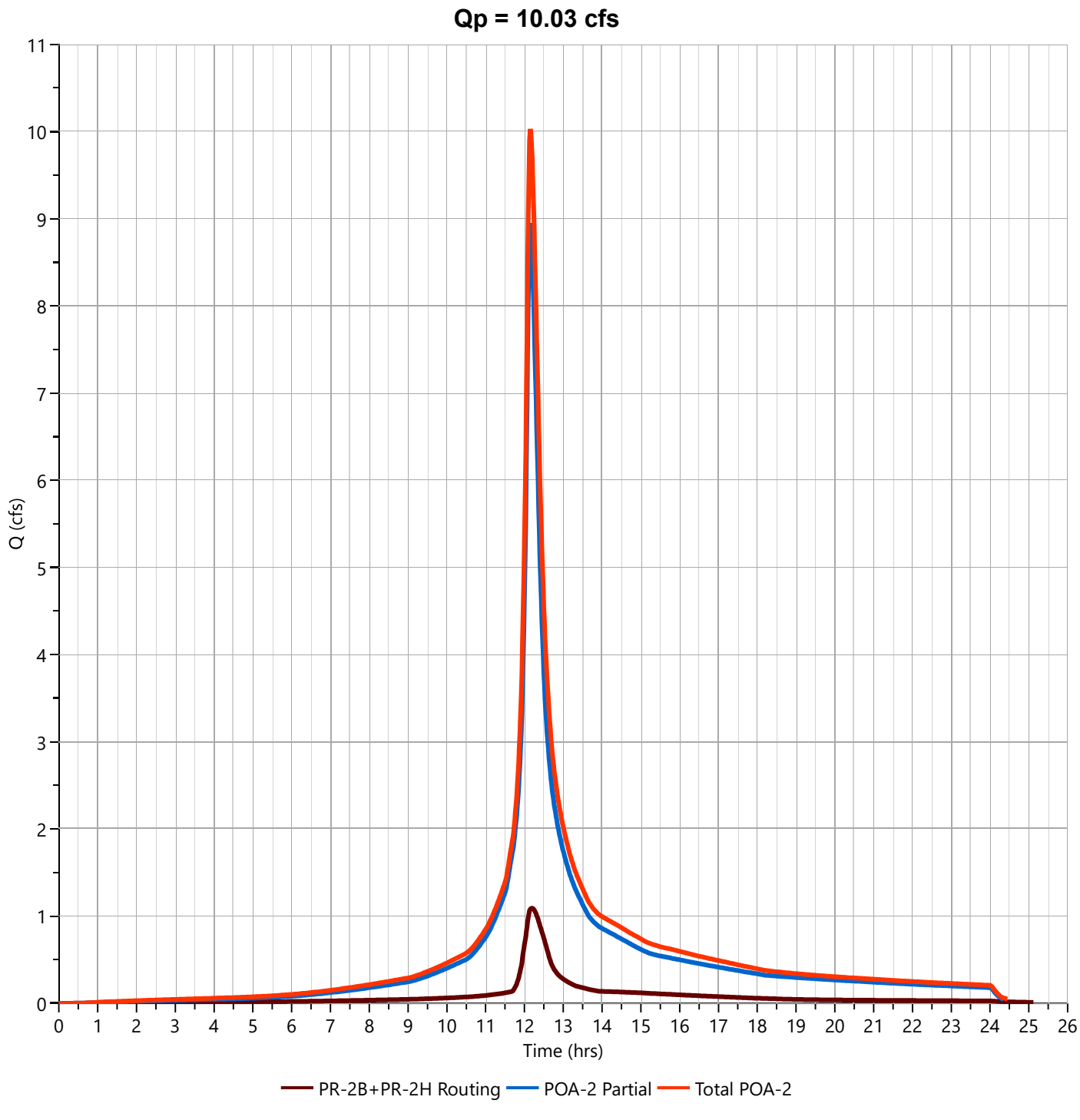
Hydrology Studio v 3.0.0.31

02-08-2024

Total POA-2

Hyd. No. 42

Hydrograph Type	= Junction	Peak Flow	= 10.03 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Hydrograph Volume	= 52,261 cuft
Inflow Hydrographs	= 39, 41	Total Contrib. Area	= 1.09 ac



PR-3 WATERSHED (TOTAL PROPOSED FLOW TO POA-3)

Project:	**Beacon Unitarian Universalist Church**	**By:**	**TEG**	**Date:**	**11/29/2023**
Location:	**Summit, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**11/29/2023**

Circle One: Present **(Developed)** — **Future Proposed Watershed PR-3 - Pervious**

Circle One: **(T_c)** T_t **through subarea**

Include a map, schematic, or description of flow segments.

Sheet Flow (Applicable to T_c Only)

			Segment ID	1		
1.	Surface Description (NEH table 15-1)			Dense Grasses		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.24		
3.	Design Flow Length, L_{des} (Total L_{des} < 100 ft)		ft	72		
4.	Two-year 24-hr rainfall, P_2		in	4.12		
5.	Land Slope, s		ft/ft	0.198		
6.	McCuen-Spiess Limit, L_{mcs} (max. 100 ft)	$L_{mcs} = (100\ s^{0.5})/n$	ft	100		
7.	Compute T_t	$T_t = \frac{0.007\ (nL_{des})^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.064	+	+

Sheet Flow Sub-Total **0.064 hours**

Shallow Concentrated Flow

			Segment ID	2		
8.	Surface Description			Pavement		
9.	Flow Length, L		ft	217		
10.	Watercourse Slope, s		ft/ft	0.059		
11.	Average Velocity, V (NEH table 15-3)		ft/s	4.95		
12.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.012	+	+

Shallow Conc. Flow Sub-Total **0.012 hours**

Channel Flow

			Segment ID			
13.	Flow Length, L		ft			
14.	Cross Sectional flow area, a		ft^2			
15.	Wetted Perimeter, P_w		ft			
16.	Hydraulic Radius, r	$r = a / P_w$	ft			
17.	Channel Slope, s		ft/ft			
18.	Manning's Roughness Coeff., n					
19.	Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s			
20.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr		+	+

Channel Flow Sub-Total **0.000 hours**

Watershed or subarea T_c or T_t
(Add Sub-Total T_t from prior steps)

Total Tc (hours) = **0.077 hours**

Total Tc (minutes) = **5 minutes**

Hydrograph Report

Project Name:

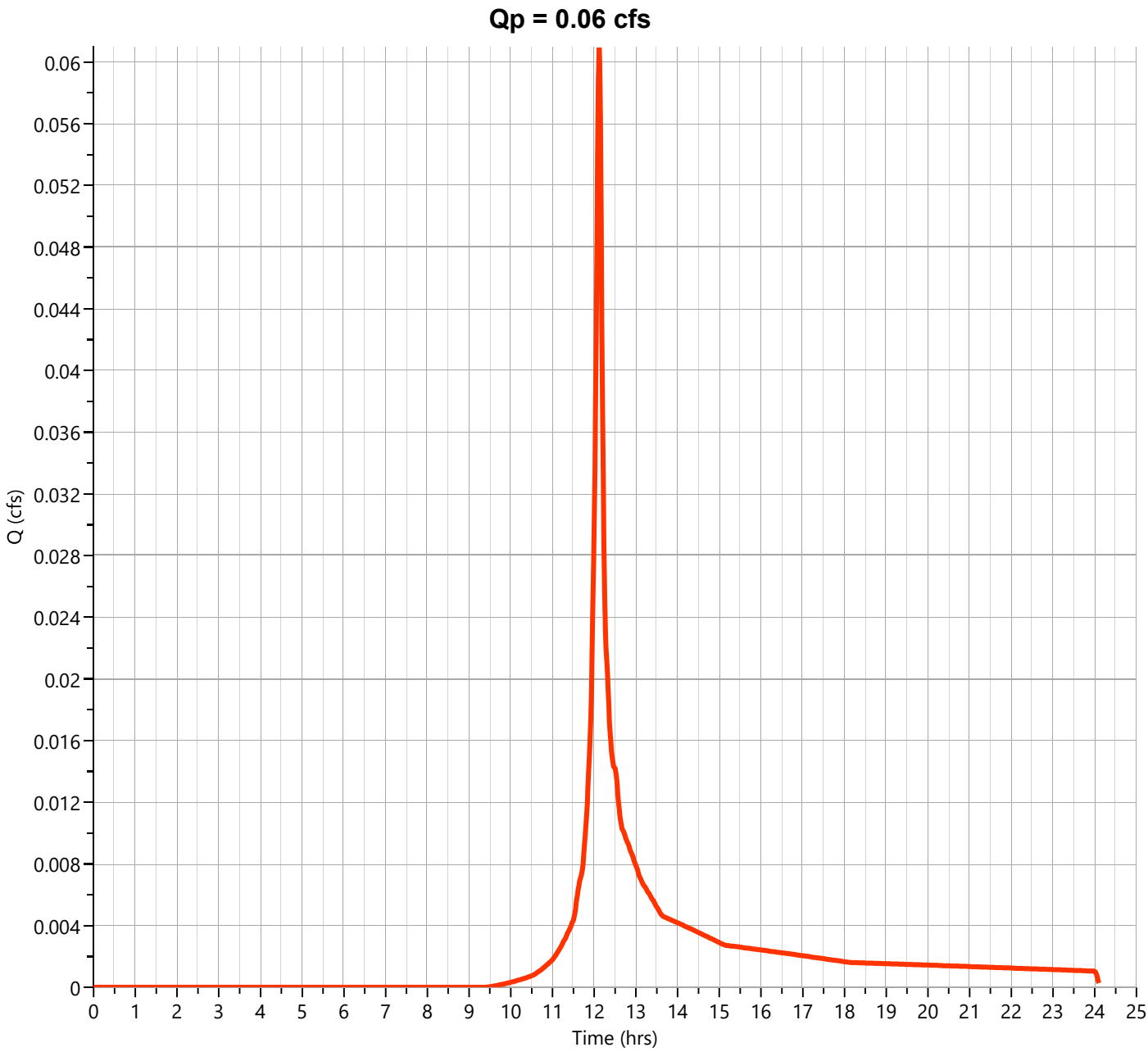
Hydrology Studio v 3.0.0.29

11-29-2023

PR-3 (POA-3)

Hyd. No. 28

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.061 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 189 cuft
Drainage Area	= 0.03 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 4.12 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

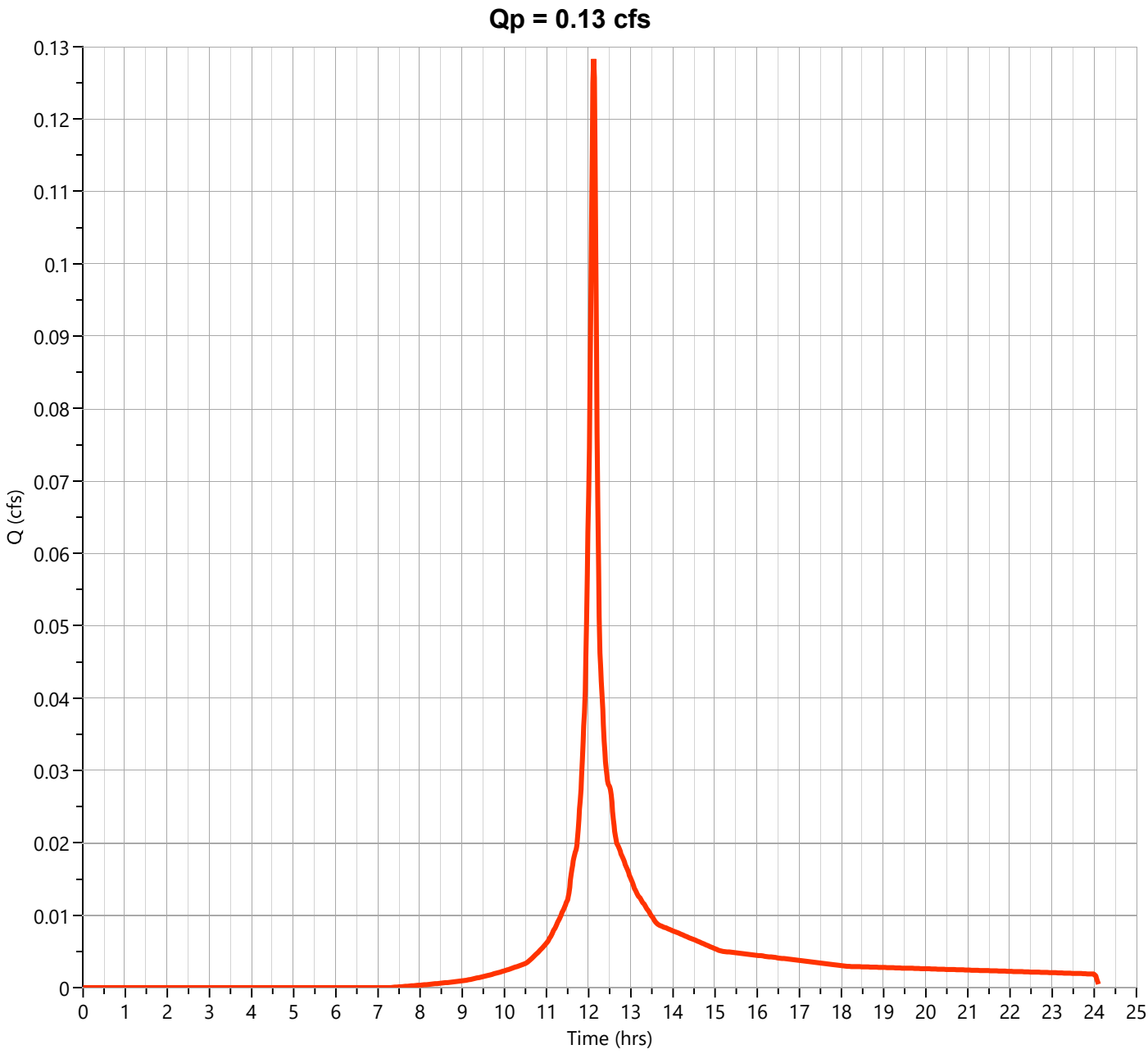
Hydrology Studio v 3.0.0.29

11-29-2023

PR-3 (POA-3)

Hyd. No. 28

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.128 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 398 cuft
Drainage Area	= 0.03 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 6.42 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

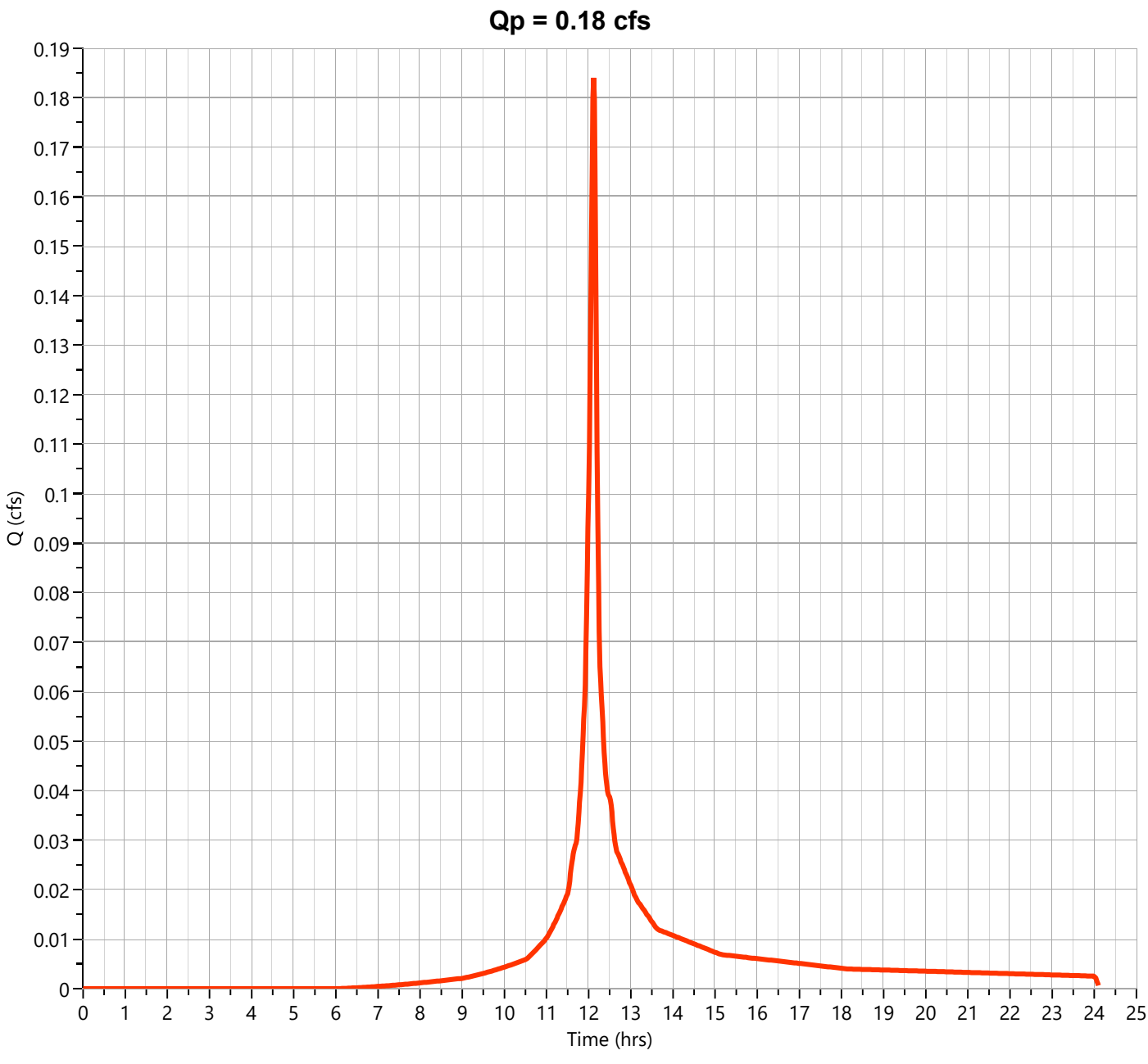
Hydrology Studio v 3.0.0.29

11-29-2023

PR-3 (POA-3)

Hyd. No. 28

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.184 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 576 cuft
Drainage Area	= 0.03 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 8.23 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

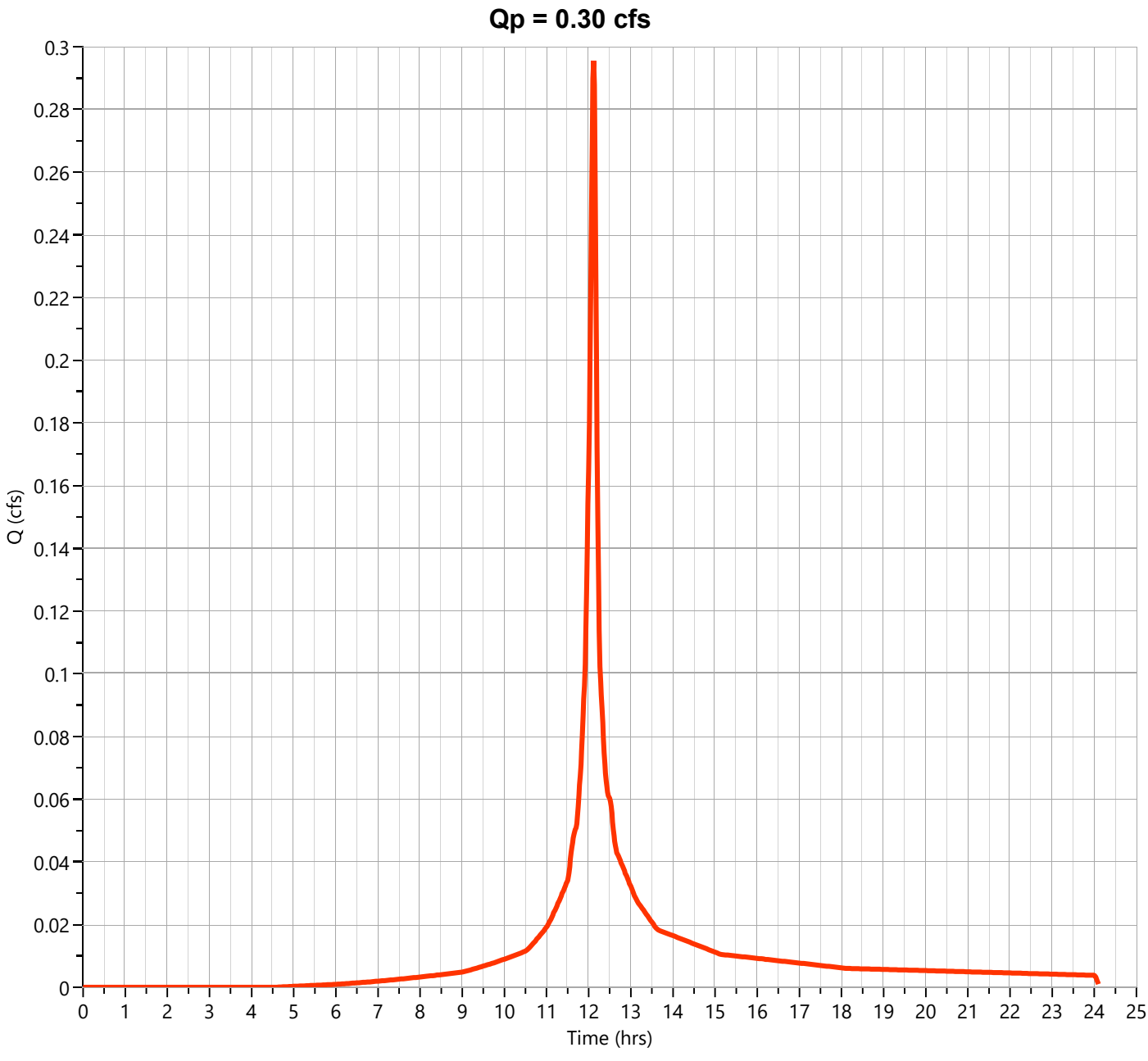
Hydrology Studio v 3.0.0.29

11-29-2023

PR-3 (POA-3)

Hyd. No. 28

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.295 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 947 cuft
Drainage Area	= 0.03 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 11.80 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



SUMMARY OF PROPOSED PEAK DISCHARGES

Hydrograph 2-yr Summary

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

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	PR-1A	0.969	12.10	3,173	----		
2	Pond Route	PR-1A Routing	0.085	12.53	482	1	349.17	987
4	NRCS Runoff	PR-1B Grass HSGC C	0.146	12.13	477	----		
5	NRCS Runoff	PR-1B Impervious	0.590	12.10	1,974	----		
6	Junction	PR-1B	0.726	12.10	2,451	4, 5		
8	NRCS Runoff	PR-1C Grass HSGC C	0.064	12.10	172	----		
9	NRCS Runoff	PR-1C Impervious	0.081	12.10	264	----		
10	Junction	PR-1C	0.144	12.10	436	8, 9		
11	Pond Route	PR-1C Routing	0.027	12.50	188	10	356.00	250
14	NRCS Runoff	PR-1D Grass HSGC C	0.122	12.12	378	----		
15	NRCS Runoff	PR-1D Impervious	0.444	12.10	1,454	----		
16	Junction	PR-1D	0.562	12.10	1,833	14, 15		
18	Junction	Comb. to UDG-INF1-2	1.288	12.10	4,472	6, 11, 16		
20	Pond Route	UGD-INF1-2 Routing	0.090	12.77	777	18	344.95	1,352
22	NRCS Runoff	PR-1E Grass HSGC C	0.305	12.12	946	----		
23	NRCS Runoff	PR-1E Impervious	0.161	12.10	529	----		
24	Junction	PR-1E	0.456	12.10	1,475	22, 23		
26	Junction	POA-1	0.547	12.12	2,734	2, 20, 24		
28	NRCS Runoff	PR-3 (POA-3)	0.061	12.12	189	----		

Hydrograph 2-yr Summary

Project Name:

02-08-2024

Hydrology Studio v 3.0.0.31

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	PR-2A Grass HSGC C	0.021	12.10	61.2	----		
2	NRCS Runoff	PR-2A Impervious	0.807	12.10	2,644	----		
3	Junction	PR-2A	0.829	12.10	2,705	1, 2		
4	Pond Route	PR-2A Routing	0.121	12.53	2,696	3	354.75	1,041
6	NRCS Runoff	PR-2B Grass HSGC C	0.122	12.15	428	----		
7	NRCS Runoff	PR-2B Impervious	0.202	12.10	661	----		
8	Junction	PR-2B	0.309	12.10	1,089	6, 7		
11	NRCS Runoff	PR-2C Grass HSGC C	0.081	12.12	252	----		
12	NRCS Runoff	PR-2C Impervious	0.242	12.10	793	----		
13	Junction	PR-2C	0.321	12.10	1,046	11, 12		
15	Pond Route	PR-2C Routing	0.082	12.32	1,040	13	355.45	311
17	NRCS Runoff	PR-2G Grass HSGC C	0.244	12.12	757	----		
18	NRCS Runoff	PR-2G Woods HSGC C	0.150	12.12	475	----		
19	Junction	PR-2G	0.394	12.12	1,232	17, 18		
21	NRCS Runoff	PR-2D Grass HSGC C	0.231	12.23	1,028	----		
22	NRCS Runoff	PR-2D Woods HSGC C	0.489	12.25	2,227	----		
23	NRCS Runoff	PR-2D Impervious	0.147	12.20	714	----		
24	Junction	PR-2D	0.864	12.23	3,969	21, 22, 23		
26	NRCS Runoff	PR-2E Grass HSGC C	0.183	12.17	685	----		
27	NRCS Runoff	PR-2E Impervious	0.105	12.13	423	----		
28	Junction	PR-2E	0.286	12.15	1,108	26, 27		
30	NRCS Runoff	PR-2F Woods HSGC C	0.082	12.17	313	----		
31	NRCS Runoff	PR-2F Impervious	0.070	12.13	282	----		
32	Junction	PR-2F	0.150	12.15	595	30, 31		
34	NRCS Runoff	PR-2H Grass HSGC C	0.041	12.12	126	----		
35	NRCS Runoff	PR-2H Impervious	0.242	12.10	793	----		
36	Junction	PR-2H	0.281	12.10	919	34, 35		

Hydrograph 2-yr Summary

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

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)
38	Junction	PR-2B + PR-2H	0.590	12.10	2,009	8, 36		
39	Pond Route	PR-2B+PR-2H Routing	0.128	12.42	2,004	38	354.81	607
41	Junction	POA-2 Partial	1.723	12.15	10,640	4, 15, 19, 24, 28, 32		
42	Junction	Total POA-2	1.842	12.17	12,644	39, 41		

Hydrograph 10-yr Summary

Project Name:

02-08-2024

Hydrology Studio v 3.0.0.31

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	PR-1A	1.516	12.10	5,049	----		
2	Pond Route	PR-1A Routing	0.282	12.32	1,538	1	349.71	1,596
4	NRCS Runoff	PR-1B Grass HSGC C	0.307	12.13	1,003	----		
5	NRCS Runoff	PR-1B Impervious	0.924	12.10	3,141	----		
6	Junction	PR-1B	1.215	12.10	4,144	4, 5		
8	NRCS Runoff	PR-1C Grass HSGC C	0.132	12.10	362	----		
9	NRCS Runoff	PR-1C Impervious	0.126	12.10	421	----		
10	Junction	PR-1C	0.258	12.10	782	8, 9		
11	Pond Route	PR-1C Routing	0.256	12.10	534	10	356.02	260
14	NRCS Runoff	PR-1D Grass HSGC C	0.257	12.12	795	----		
15	NRCS Runoff	PR-1D Impervious	0.695	12.10	2,314	----		
16	Junction	PR-1D	0.945	12.10	3,109	14, 15		
18	Junction	Comb. to UDG-INF1-2	2.415	12.10	7,787	6, 11, 16		
20	Pond Route	UGD-INF1-2 Routing	0.238	12.65	2,727	18	345.69	2,750
22	NRCS Runoff	PR-1E Grass HSGC C	0.641	12.12	1,988	----		
23	NRCS Runoff	PR-1E Impervious	0.253	12.10	841	----		
24	Junction	PR-1E	0.878	12.10	2,830	22, 23		
26	Junction	POA-1	1.148	12.12	7,095	2, 20, 24		
28	NRCS Runoff	PR-3 (POA-3)	0.128	12.12	398	----		

Hydrograph 10-yr Summary

Project Name:

02-08-2024

Hydrology Studio v 3.0.0.31

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	PR-2A Grass HSGC C	0.045	12.10	129	----		
2	NRCS Runoff	PR-2A Impervious	1.263	12.10	4,207	----		
3	Junction	PR-2A	1.308	12.10	4,336	1, 2		
4	Pond Route	PR-2A Routing	0.251	12.35	4,327	3	355.10	1,596
6	NRCS Runoff	PR-2B Grass HSGC C	0.258	12.15	900	----		
7	NRCS Runoff	PR-2B Impervious	0.316	12.10	1,052	----		
8	Junction	PR-2B	0.548	12.10	1,952	6, 7		
11	NRCS Runoff	PR-2C Grass HSGC C	0.171	12.12	530	----		
12	NRCS Runoff	PR-2C Impervious	0.379	12.10	1,262	----		
13	Junction	PR-2C	0.546	12.10	1,792	11, 12		
15	Pond Route	PR-2C Routing	0.122	12.35	1,787	13	355.72	546
17	NRCS Runoff	PR-2G Grass HSGC C	0.513	12.12	1,591	----		
18	NRCS Runoff	PR-2G Woods HSGC C	0.343	12.12	1,059	----		
19	Junction	PR-2G	0.856	12.12	2,649	17, 18		
21	NRCS Runoff	PR-2D Grass HSGC C	0.492	12.23	2,160	----		
22	NRCS Runoff	PR-2D Woods HSGC C	1.129	12.23	4,962	----		
23	NRCS Runoff	PR-2D Impervious	0.230	12.20	1,136	----		
24	Junction	PR-2D	1.847	12.23	8,258	21, 22, 23		
26	NRCS Runoff	PR-2E Grass HSGC C	0.389	12.17	1,439	----		
27	NRCS Runoff	PR-2E Impervious	0.165	12.13	673	----		
28	Junction	PR-2E	0.550	12.15	2,112	26, 27		
30	NRCS Runoff	PR-2F Woods HSGC C	0.188	12.17	697	----		
31	NRCS Runoff	PR-2F Impervious	0.110	12.13	449	----		
32	Junction	PR-2F	0.296	12.15	1,145	30, 31		
34	NRCS Runoff	PR-2H Grass HSGC C	0.086	12.12	265	----		
35	NRCS Runoff	PR-2H Impervious	0.379	12.10	1,262	----		
36	Junction	PR-2H	0.462	12.10	1,527	34, 35		

Hydrograph 10-yr Summary

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

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)
38	Junction	PR-2B + PR-2H	1.010	12.10	3,479	8, 36		
39	Pond Route	PR-2B+PR-2H Routing	0.435	12.23	3,474	38	355.19	936
41	Junction	POA-2 Partial	3.532	12.15	20,279	4, 15, 19, 24, 28, 32		
42	Junction	Total POA-2	3.928	12.17	23,753	39, 41		

Hydrograph 25-yr Summary

Project Name:

02-08-2024

Hydrology Studio v 3.0.0.31

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	PR-1A	1.945	12.10	6,526	----		
2	Pond Route	PR-1A Routing	0.644	12.17	2,527	1	350.03	1,946
4	NRCS Runoff	PR-1B Grass HSGC C	0.440	12.13	1,453	----		
5	NRCS Runoff	PR-1B Impervious	1.186	12.10	4,061	----		
6	Junction	PR-1B	1.606	12.10	5,514	4, 5		
8	NRCS Runoff	PR-1C Grass HSGC C	0.188	12.10	524	----		
9	NRCS Runoff	PR-1C Impervious	0.162	12.10	544	----		
10	Junction	PR-1C	0.350	12.10	1,068	8, 9		
11	Pond Route	PR-1C Routing	0.348	12.10	819	10	356.03	264
14	NRCS Runoff	PR-1D Grass HSGC C	0.368	12.12	1,153	----		
15	NRCS Runoff	PR-1D Impervious	0.892	12.10	2,991	----		
16	Junction	PR-1D	1.251	12.10	4,144	14, 15		
18	Junction	Comb. to UDG-INF1-2	3.205	12.10	10,476	6, 11, 16		
20	Pond Route	UGD-INF1-2 Routing	0.439	12.55	4,692	18	346.23	3,719
22	NRCS Runoff	PR-1E Grass HSGC C	0.920	12.12	2,882	----		
23	NRCS Runoff	PR-1E Impervious	0.324	12.10	1,088	----		
24	Junction	PR-1E	1.224	12.10	3,969	22, 23		
26	Junction	POA-1	2.076	12.12	11,188	2, 20, 24		
28	NRCS Runoff	PR-3 (POA-3)	0.184	12.12	576	----		

Hydrograph 25-yr Summary

Project Name:

02-08-2024

Hydrology Studio v 3.0.0.31

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	PR-2A Grass HSGC C	0.064	12.10	186	----		
2	NRCS Runoff	PR-2A Impervious	1.621	12.10	5,438	----		
3	Junction	PR-2A	1.685	12.10	5,625	1, 2		
4	Pond Route	PR-2A Routing	0.513	12.23	5,615	3	355.29	1,911
6	NRCS Runoff	PR-2B Grass HSGC C	0.371	12.15	1,304	----		
7	NRCS Runoff	PR-2B Impervious	0.405	12.10	1,360	----		
8	Junction	PR-2B	0.741	12.10	2,664	6, 7		
11	NRCS Runoff	PR-2C Grass HSGC C	0.245	12.12	768	----		
12	NRCS Runoff	PR-2C Impervious	0.486	12.10	1,631	----		
13	Junction	PR-2C	0.726	12.10	2,400	11, 12		
15	Pond Route	PR-2C Routing	0.228	12.25	2,395	13	355.89	696
17	NRCS Runoff	PR-2G Grass HSGC C	0.736	12.12	2,305	----		
18	NRCS Runoff	PR-2G Woods HSGC C	0.506	12.12	1,571	----		
19	Junction	PR-2G	1.242	12.12	3,876	17, 18		
21	NRCS Runoff	PR-2D Grass HSGC C	0.709	12.23	3,131	----		
22	NRCS Runoff	PR-2D Woods HSGC C	1.676	12.23	7,362	----		
23	NRCS Runoff	PR-2D Impervious	0.295	12.20	1,468	----		
24	Junction	PR-2D	2.676	12.23	11,962	21, 22, 23		
26	NRCS Runoff	PR-2E Grass HSGC C	0.559	12.17	2,086	----		
27	NRCS Runoff	PR-2E Impervious	0.212	12.13	870	----		
28	Junction	PR-2E	0.767	12.15	2,956	26, 27		
30	NRCS Runoff	PR-2F Woods HSGC C	0.279	12.17	1,034	----		
31	NRCS Runoff	PR-2F Impervious	0.141	12.13	580	----		
32	Junction	PR-2F	0.417	12.15	1,614	30, 31		
34	NRCS Runoff	PR-2H Grass HSGC C	0.123	12.12	384	----		
35	NRCS Runoff	PR-2H Impervious	0.486	12.10	1,631	----		
36	Junction	PR-2H	0.606	12.10	2,016	34, 35		

Hydrograph 25-yr Summary

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

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)
38	Junction	PR-2B + PR-2H	1.347	12.10	4,679	8, 36		
39	Pond Route	PR-2B+PR-2H Routing	0.737	12.18	4,674	38	355.42	1,127
41	Junction	POA-2 Partial	5.336	12.15	28,418	4, 15, 19, 24, 28, 32		
42	Junction	Total POA-2	6.066	12.15	33,092	39, 41		

Hydrograph 100-yr Summary

Project Name:

02-08-2024

Hydrology Studio v 3.0.0.31

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	PR-1A	2.791	12.10	9,440	----		
2	Pond Route	PR-1A Routing	1.214	12.15	4,677	1	350.88	2,643
4	NRCS Runoff	PR-1B Grass HSGC C	0.707	12.13	2,386	----		
5	NRCS Runoff	PR-1B Impervious	1.702	12.10	5,874	----		
6	Junction	PR-1B	2.381	12.10	8,261	4, 5		
8	NRCS Runoff	PR-1C Grass HSGC C	0.300	12.10	861	----		
9	NRCS Runoff	PR-1C Impervious	0.233	12.10	787	----		
10	Junction	PR-1C	0.532	12.10	1,647	8, 9		
11	Pond Route	PR-1C Routing	0.529	12.10	1,398	10	356.05	273
14	NRCS Runoff	PR-1D Grass HSGC C	0.591	12.12	1,893	----		
15	NRCS Runoff	PR-1D Impervious	1.279	12.10	4,327	----		
16	Junction	PR-1D	1.859	12.10	6,220	14, 15		
18	Junction	Comb. to UDG-INF1-2	4.770	12.10	15,879	6, 11, 16		
20	Pond Route	UGD-INF1-2 Routing	0.907	12.38	9,016	18	347.62	5,782
22	NRCS Runoff	PR-1E Grass HSGC C	1.477	12.12	4,733	----		
23	NRCS Runoff	PR-1E Impervious	0.465	12.10	1,573	----		
24	Junction	PR-1E	1.914	12.10	6,306	22, 23		
26	Junction	POA-1	3.544	12.12	20,000	2, 20, 24		
28	NRCS Runoff	PR-3 (POA-3)	0.295	12.12	947	----		

Hydrograph 100-yr Summary

Project Name:

02-08-2024

Hydrology Studio v 3.0.0.31

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	PR-2A Grass HSGC C	0.103	12.10	306	----		
2	NRCS Runoff	PR-2A Impervious	2.326	12.10	7,867	----		
3	Junction	PR-2A	2.430	12.10	8,173	1, 2		
4	Pond Route	PR-2A Routing	0.931	12.17	8,164	3	355.69	2,547
6	NRCS Runoff	PR-2B Grass HSGC C	0.597	12.15	2,142	----		
7	NRCS Runoff	PR-2B Impervious	0.582	12.10	1,967	----		
8	Junction	PR-2B	1.127	12.10	4,108	6, 7		
11	NRCS Runoff	PR-2C Grass HSGC C	0.394	12.12	1,262	----		
12	NRCS Runoff	PR-2C Impervious	0.698	12.10	2,360	----		
13	Junction	PR-2C	1.084	12.10	3,622	11, 12		
15	Pond Route	PR-2C Routing	0.487	12.20	3,617	13	356.17	940
17	NRCS Runoff	PR-2G Grass HSGC C	1.182	12.12	3,786	----		
18	NRCS Runoff	PR-2G Woods HSGC C	0.838	12.12	2,649	----		
19	Junction	PR-2G	2.020	12.12	6,435	17, 18		
21	NRCS Runoff	PR-2D Grass HSGC C	1.144	12.23	5,142	----		
22	NRCS Runoff	PR-2D Woods HSGC C	2.793	12.23	12,416	----		
23	NRCS Runoff	PR-2D Impervious	0.423	12.20	2,124	----		
24	Junction	PR-2D	4.355	12.23	19,683	21, 22, 23		
26	NRCS Runoff	PR-2E Grass HSGC C	0.900	12.17	3,426	----		
27	NRCS Runoff	PR-2E Impervious	0.304	12.13	1,259	----		
28	Junction	PR-2E	1.200	12.15	4,684	26, 27		
30	NRCS Runoff	PR-2F Woods HSGC C	0.464	12.17	1,743	----		
31	NRCS Runoff	PR-2F Impervious	0.202	12.13	839	----		
32	Junction	PR-2F	0.663	12.15	2,582	30, 31		
34	NRCS Runoff	PR-2H Grass HSGC C	0.197	12.12	631	----		
35	NRCS Runoff	PR-2H Impervious	0.698	12.10	2,360	----		
36	Junction	PR-2H	0.891	12.10	2,991	34, 35		

Hydrograph 100-yr Summary

Project Name:

02-08-2024

Hydrology Studio v 3.0.0.31

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
38	Junction	PR-2B + PR-2H	2.018	12.10	7,100	8, 36		
39	Pond Route	PR-2B+PR-2H Routing	1.093	12.20	7,095	38	355.88	1,522
41	Junction	POA-2 Partial	8.949	12.15	45,166	4, 15, 19, 24, 28, 32		
42	Junction	Total POA-2	10.03	12.15	52,261	39, 41		

APPENDIX C

Pond Routing Calculations

APPENDIX C
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- 2 Year Design Storm Event
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- 25 Year Design Storm Event
- 100 Year Design Storm Event

CURRENT POND ROUTING CALCULATIONS

PR-1A WATERSHED POND ROUTING

Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

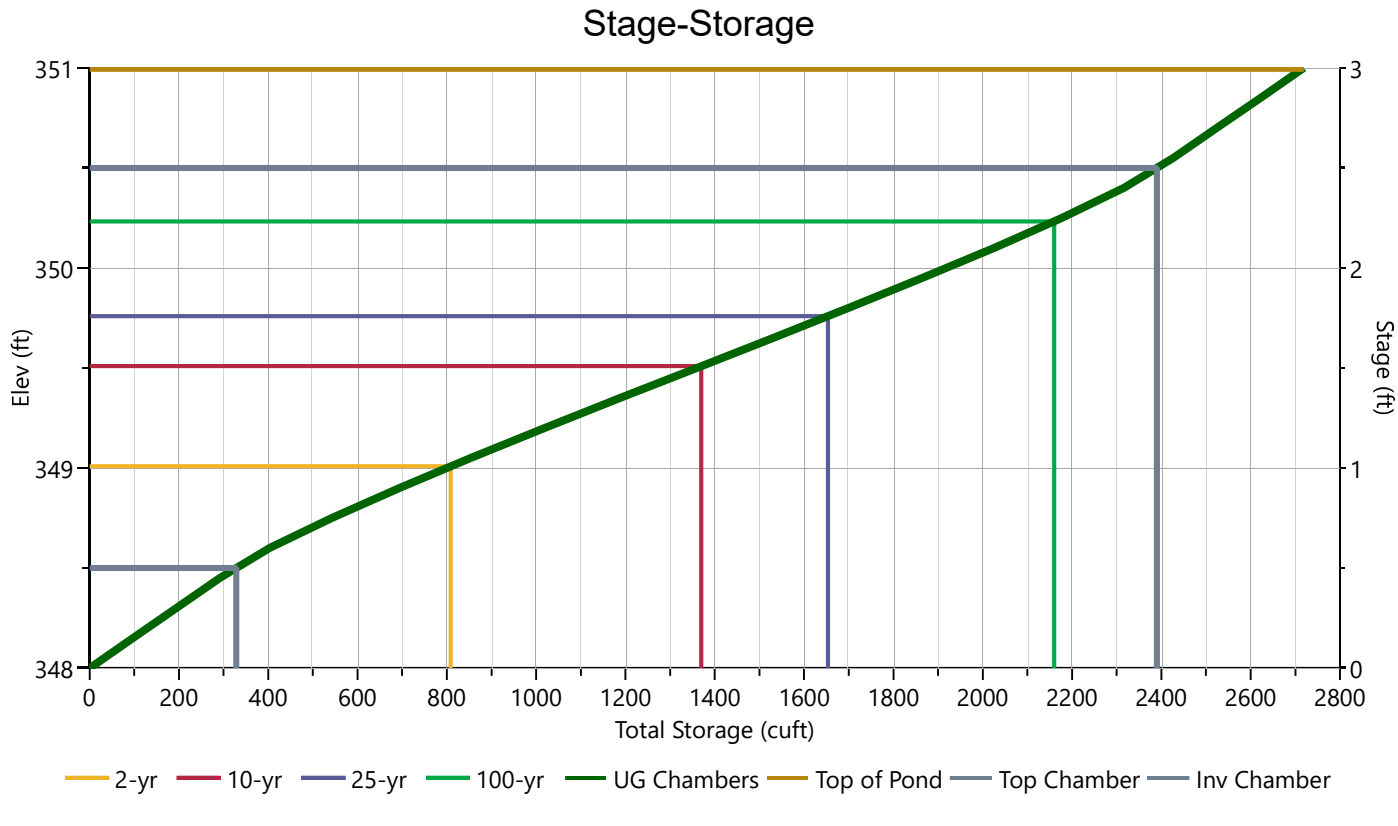
UGD-INF1-1

Stage-Storage

Underground Chambers	
Description	**Input**
Invert Elev Down, ft	348.50
Chamber Rise, ft	2.00
Chamber Shape	Circular
Chamber Span, ft	2.00
Barrel Length, ft	75.00
No. Barrels	5
Barrel Slope, %	0.00
Headers, y/n	Yes
Stone Encasement, y/n	Yes
Encasement Bottom Elevation, ft	348.00
Encasement Width per Chamber, ft	4.00
Encasement Depth, ft	3.00
Encasement Voids, %	40.00

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	348.00	1,620	0.000	0.000
0.15	348.15	1,620	97.2	97.2
0.30	348.30	1,620	97.2	194
0.45	348.45	1,620	97.2	292
0.60	348.60	1,620	112	403
0.75	348.75	1,620	139	542
0.90	348.90	1,620	152	694
1.05	349.05	1,620	160	854
1.20	349.20	1,620	166	1,020
1.35	349.35	1,620	169	1,189
1.50	349.50	1,620	171	1,360
1.65	349.65	1,620	171	1,531
1.80	349.80	1,620	169	1,700
1.95	349.95	1,620	166	1,866
2.10	350.10	1,620	160	2,026
2.25	350.25	1,620	152	2,177
2.40	350.40	1,620	139	2,316
2.55	350.55	1,620	112	2,428
2.70	350.70	1,620	97.2	2,525
2.85	350.85	1,620	97.2	2,622
3.00	351.00	1,620	97.2	2,719



Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

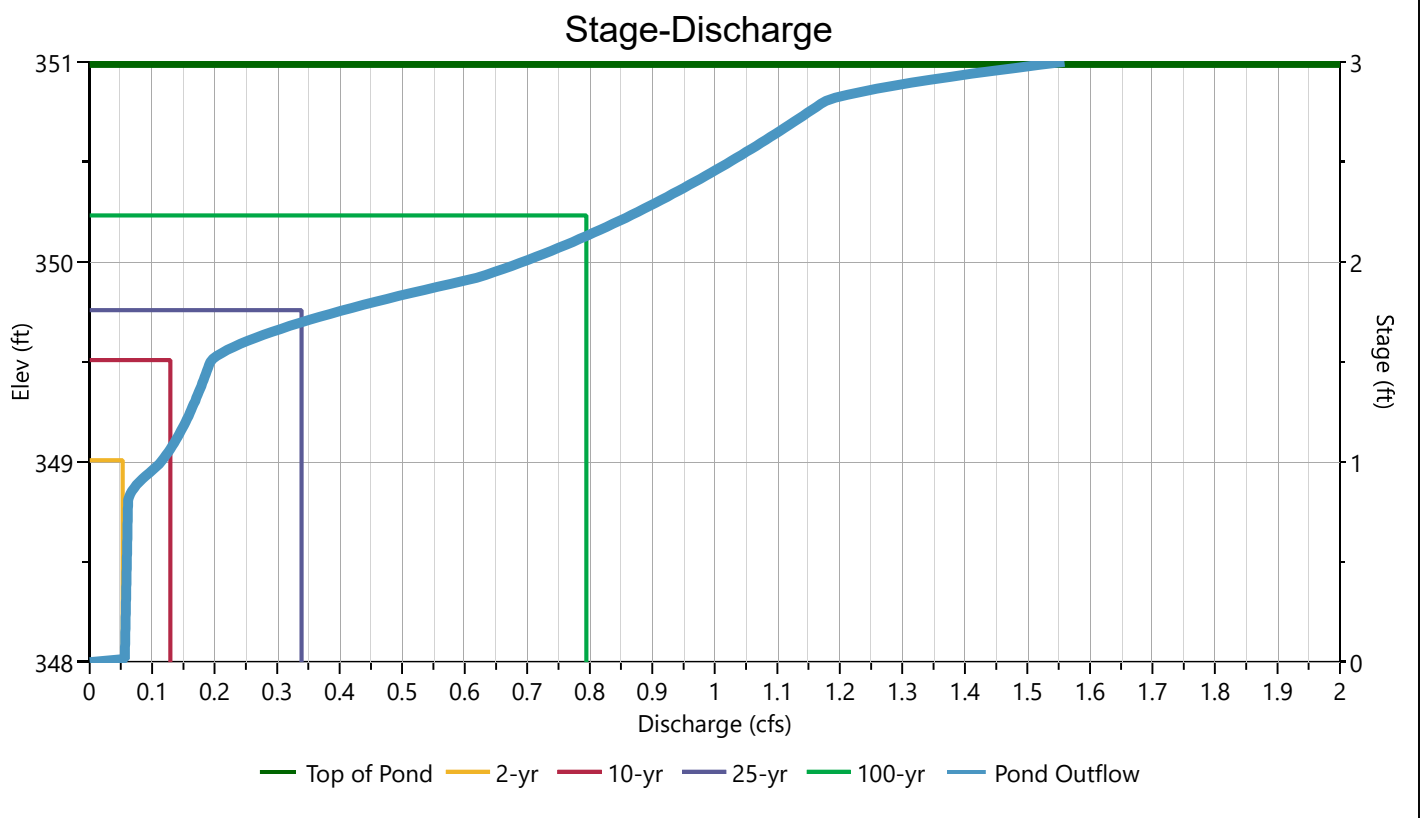
UGD-INF1-1

Stage-Discharge

Culvert / Orifices	Culvert	Orifices			Perforated Riser	
		1	2	3		
Rise, in		2.5	5		Hole Diameter, in	
Span, in		2.5	5		No. holes	
No. Barrels		1	1		Invert Elevation, ft	
Invert Elevation, ft		348.80	349.50		Height, ft	
Orifice Coefficient, Co		0.60	0.60		Orifice Coefficient, Co	
Length, ft						
Barrel Slope, %						
N-Value, n	0.000					

Weirs	Riser*	Weirs			Ancillary	
		1	2	3		
Shape / Type		Rectangular			Exfiltration, in/hr	1.50**
Crest Elevation, ft		350.8				
Crest Length, ft		1				
Angle, deg						
Weir Coefficient, Cw		3.3				

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



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

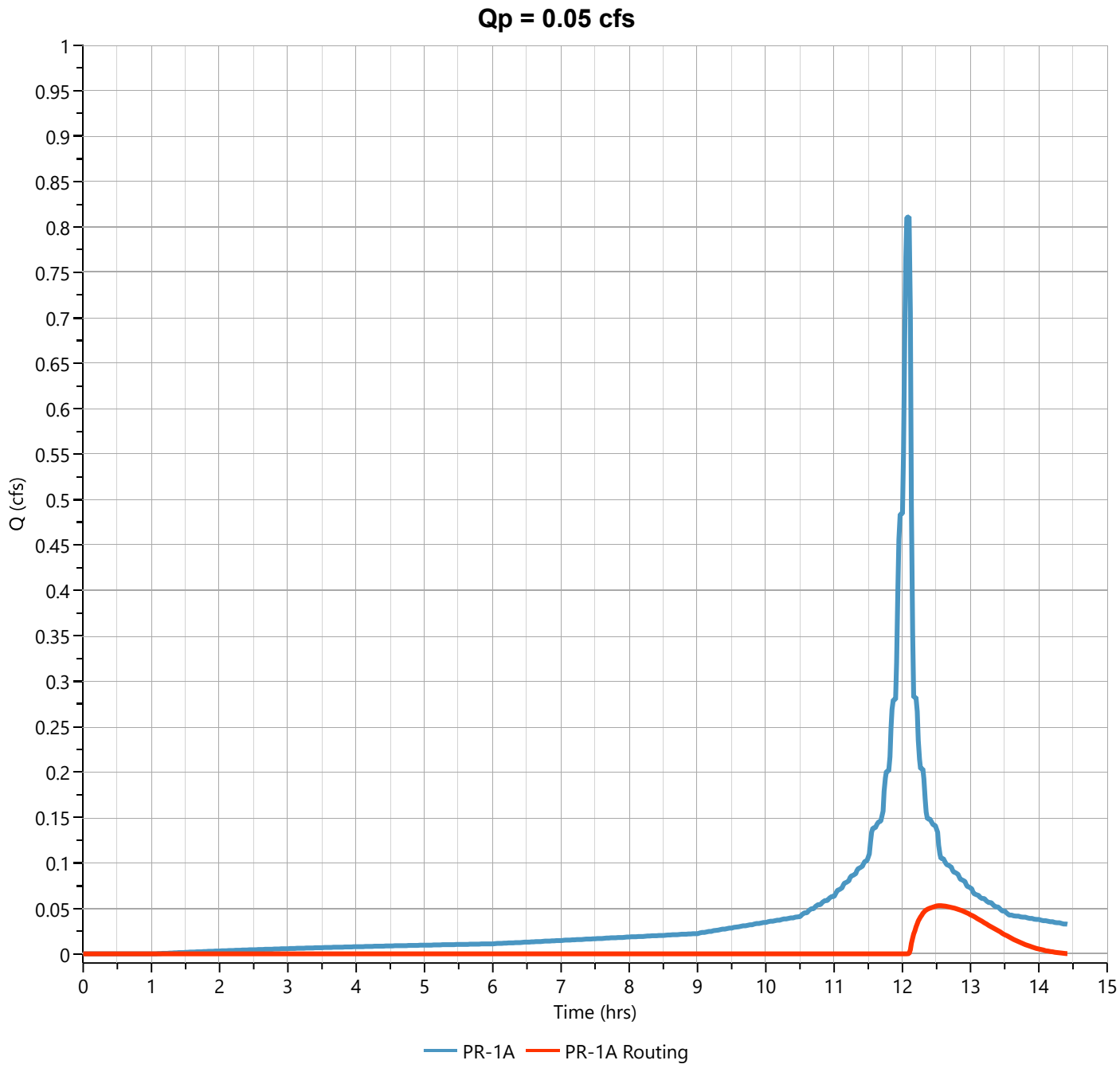
PR-1A Routing

Hyd. No. 2

Hydrograph Type	= Pond Route	Peak Flow	= 0.053 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.53 hrs
Time Interval	= 1 min	Hydrograph Volume	= 228 cuft
Inflow Hydrograph	= 1 - PR-1A	Max. Elevation	= 349.01 ft
Pond Name	= UGD-INF1-1	Max. Storage	= 809 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 20 min



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

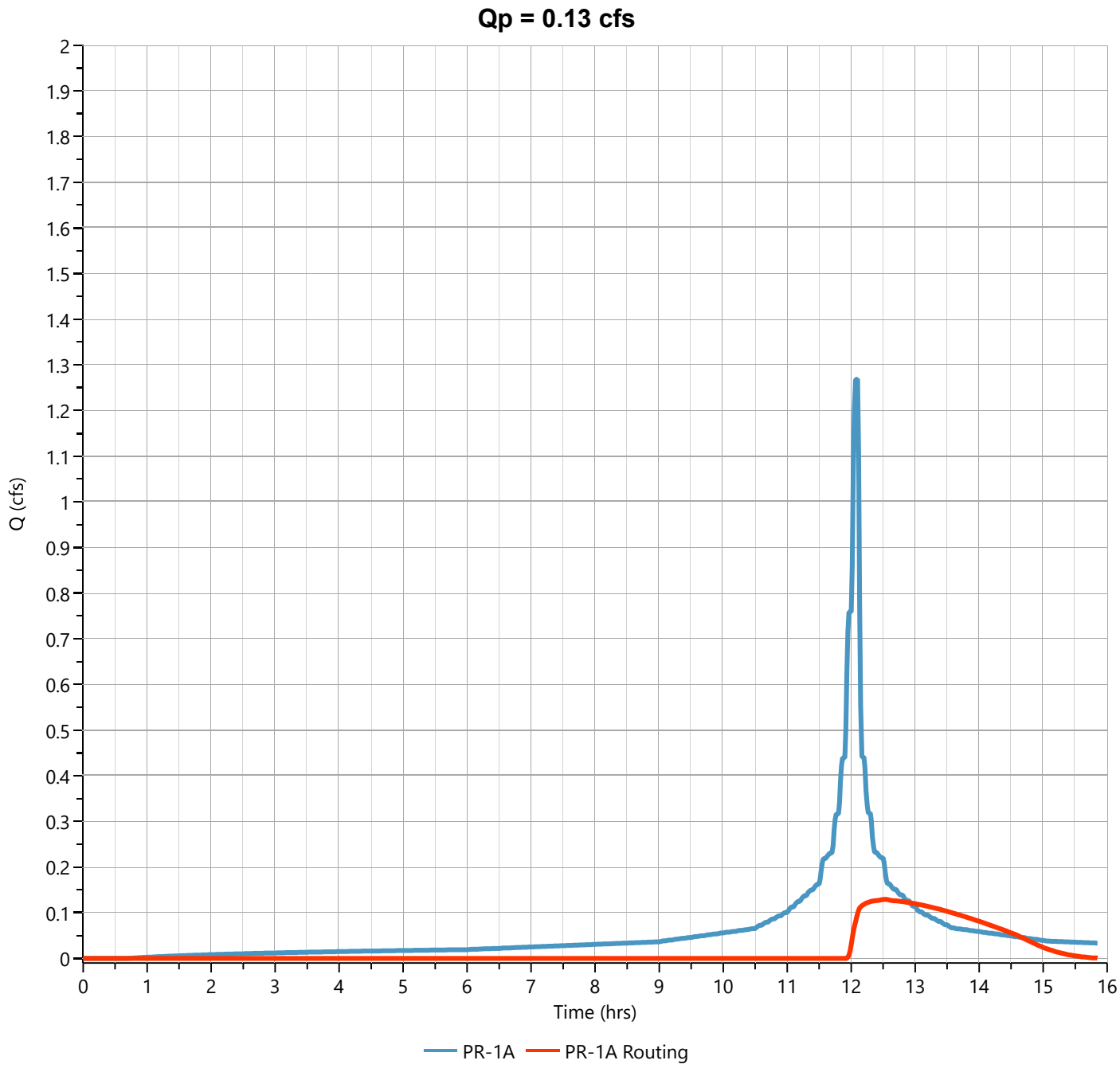
PR-1A Routing

Hyd. No. 2

Hydrograph Type	= Pond Route	Peak Flow	= 0.129 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.53 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,017 cuft
Inflow Hydrograph	= 1 - PR-1A	Max. Elevation	= 349.51 ft
Pond Name	= UGD-INF1-1	Max. Storage	= 1,370 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 54 min



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

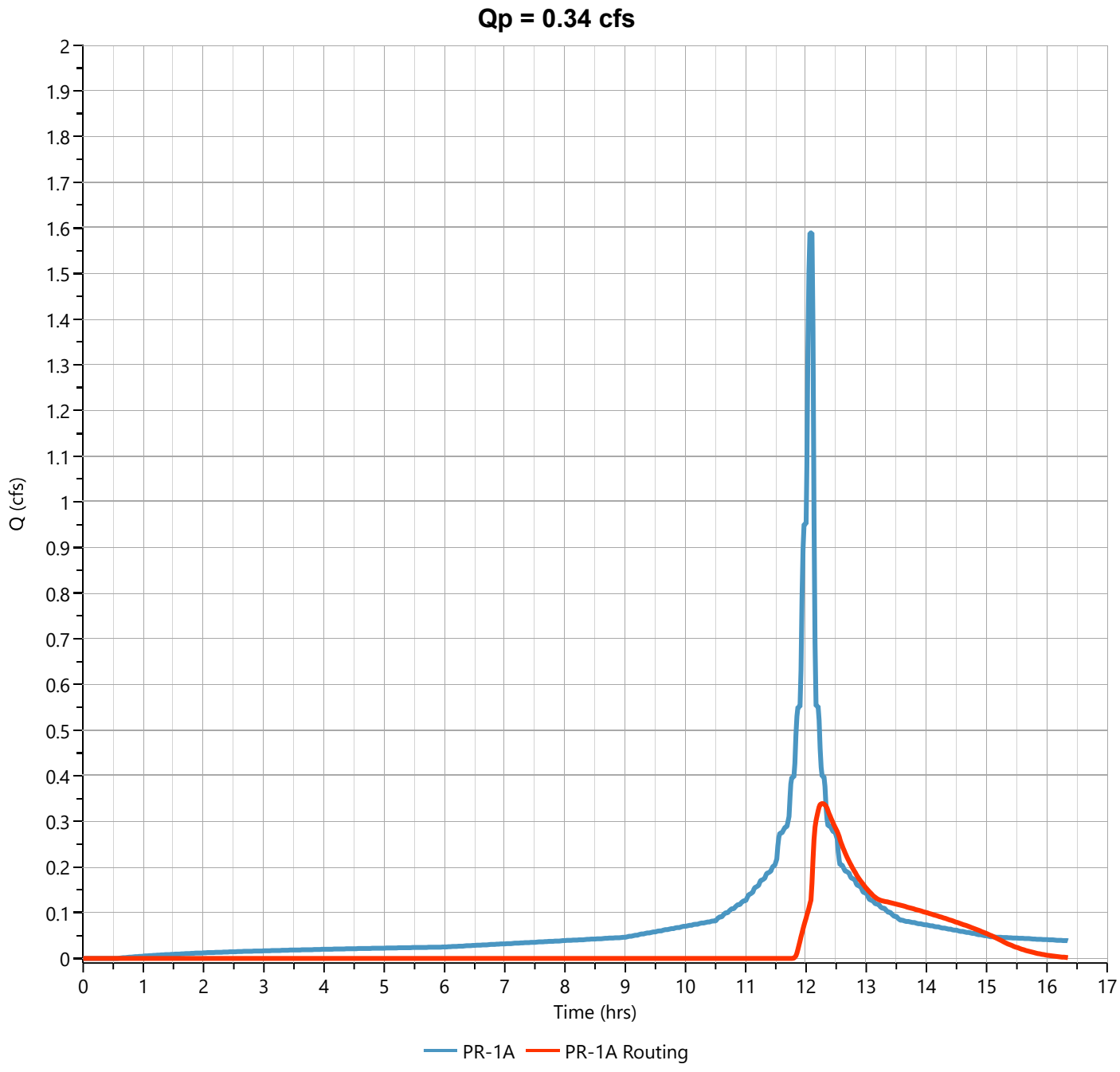
PR-1A Routing

Hyd. No. 2

Hydrograph Type	= Pond Route	Peak Flow	= 0.339 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.27 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,702 cuft
Inflow Hydrograph	= 1 - PR-1A	Max. Elevation	= 349.76 ft
Pond Name	= UGD-INF1-1	Max. Storage	= 1,654 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 52 min



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

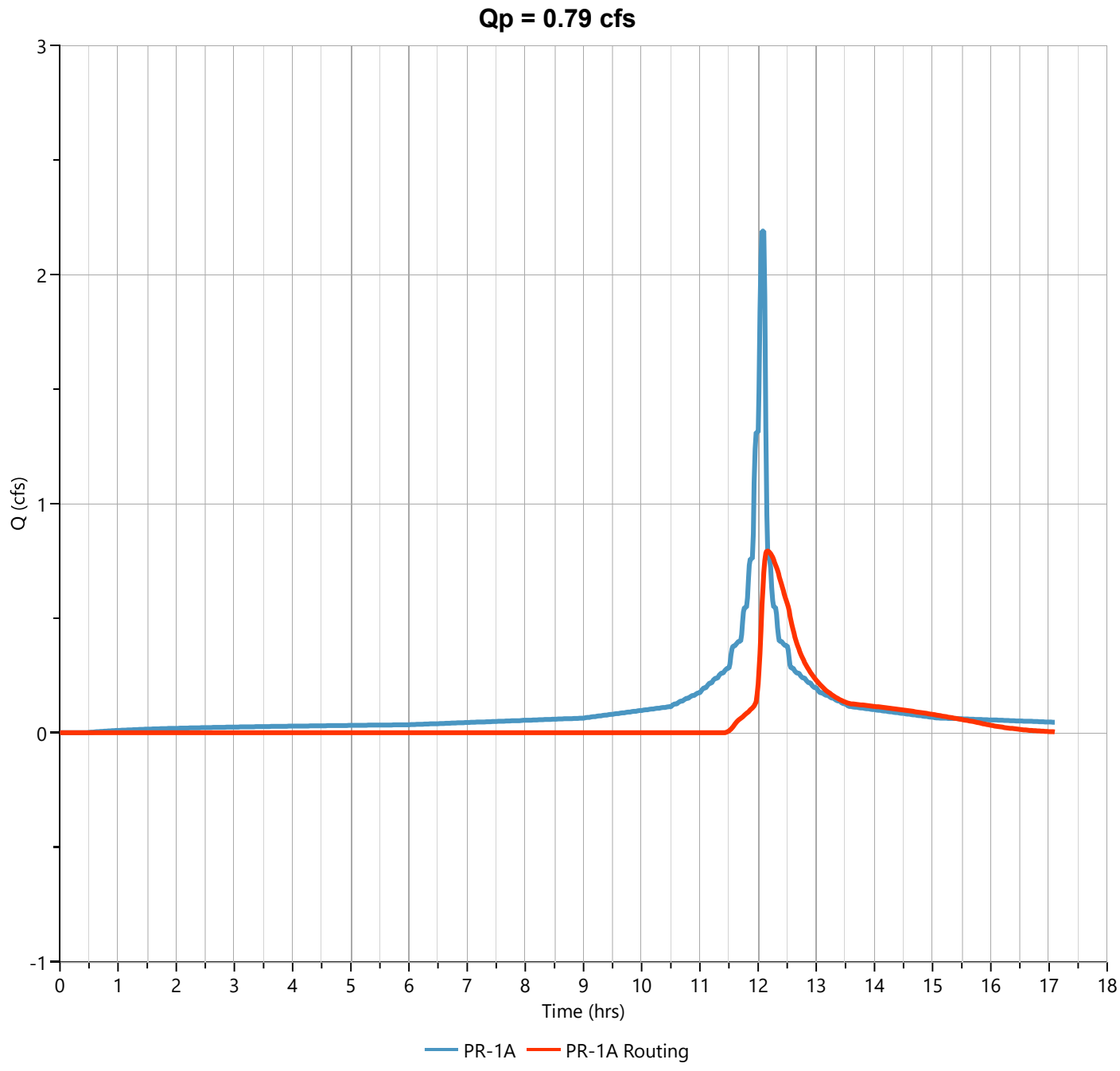
PR-1A Routing

Hyd. No. 2

Hydrograph Type	= Pond Route	Peak Flow	= 0.795 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Hydrograph Volume	= 3,121 cuft
Inflow Hydrograph	= 1 - PR-1A	Max. Elevation	= 350.23 ft
Pond Name	= UGD-INF1-1	Max. Storage	= 2,160 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 48 min



PR-1C WATERSHED POND ROUTING

Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

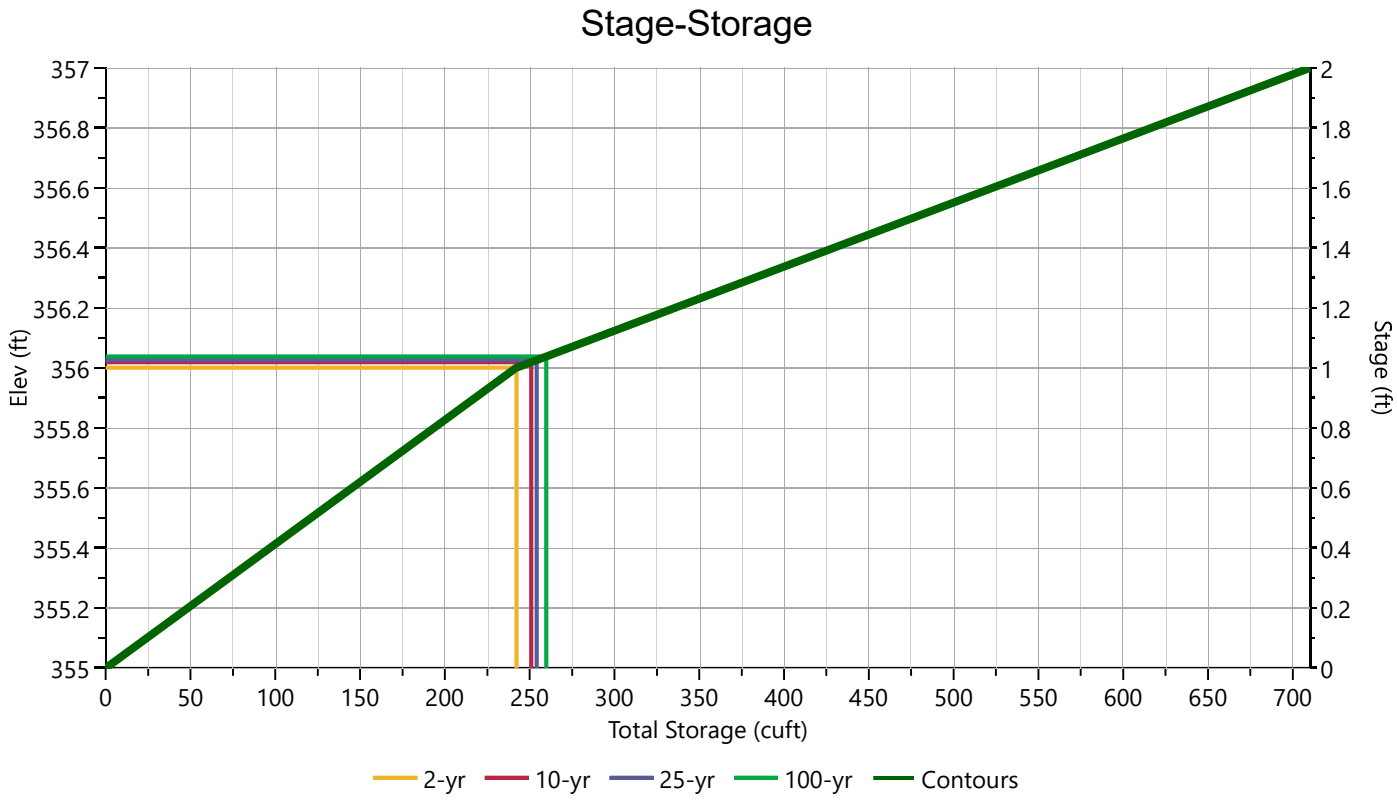
Rain Garden

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	355.00
Voids (%)	100.00
Volume Calc	Conic

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	355.00	150	0.000	0.000
1.00	356.00	347	242	242
2.00	357.00	601	468	710



Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

Rain Garden

Stage-Discharge

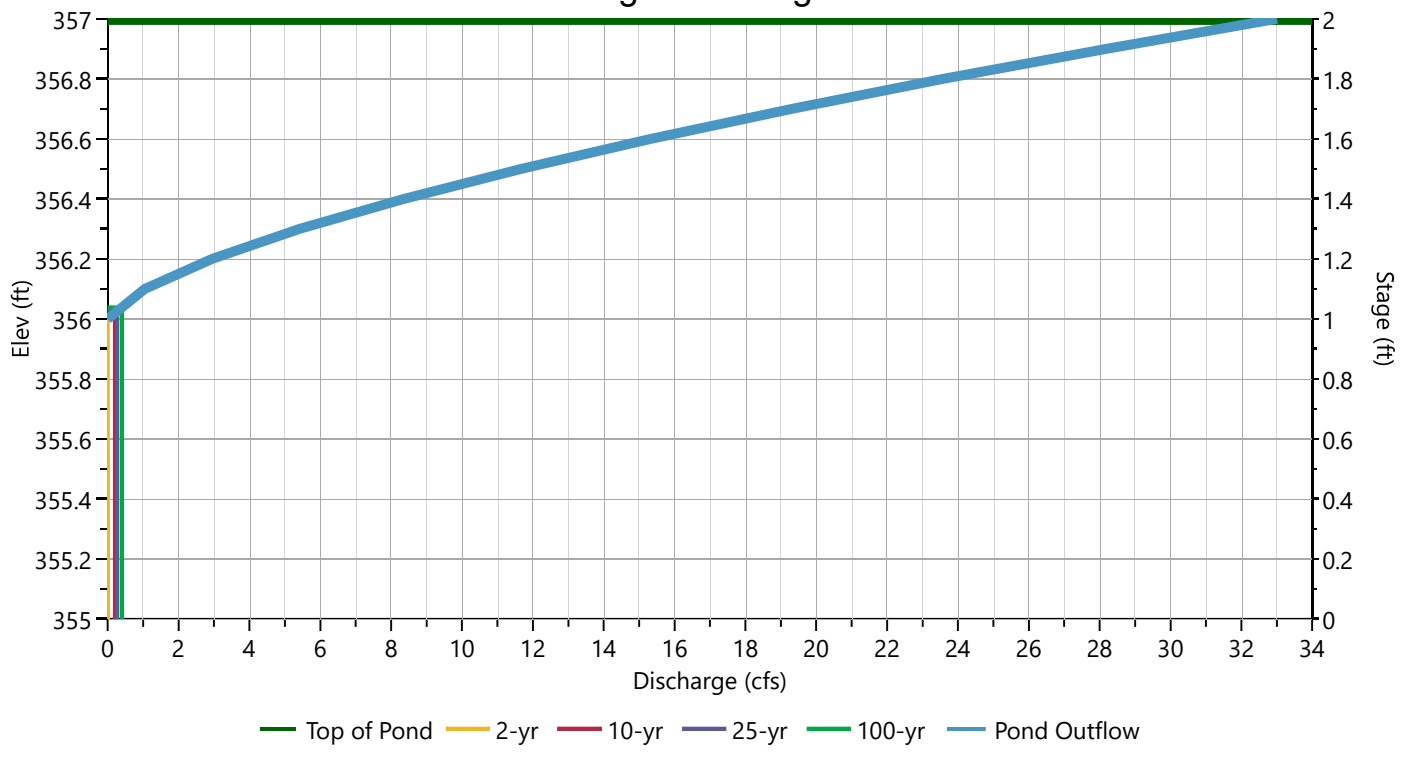
Culvert / Orifices	Culvert	Orifices		
		1	2	3
Rise, in				
Span, in				
No. Barrels				
Invert Elevation, ft				
Orifice Coefficient, Co				
Length, ft				
Barrel Slope, %				
N-Value, n	0.000			

Perforated Riser	
Hole Diameter, in	
No. holes	
Invert Elevation, ft	
Height, ft	
Orifice Coefficient, Co	

Weirs	Riser*	Weirs		
		1	2	3
Shape / Type		Broad Crested		
Crest Elevation, ft		356		
Crest Length, ft		10		
Angle, deg				
Weir Coefficient, Cw		3.3		

Ancillary	
Exfiltration, in/hr	

**Routes through Culvert.*



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

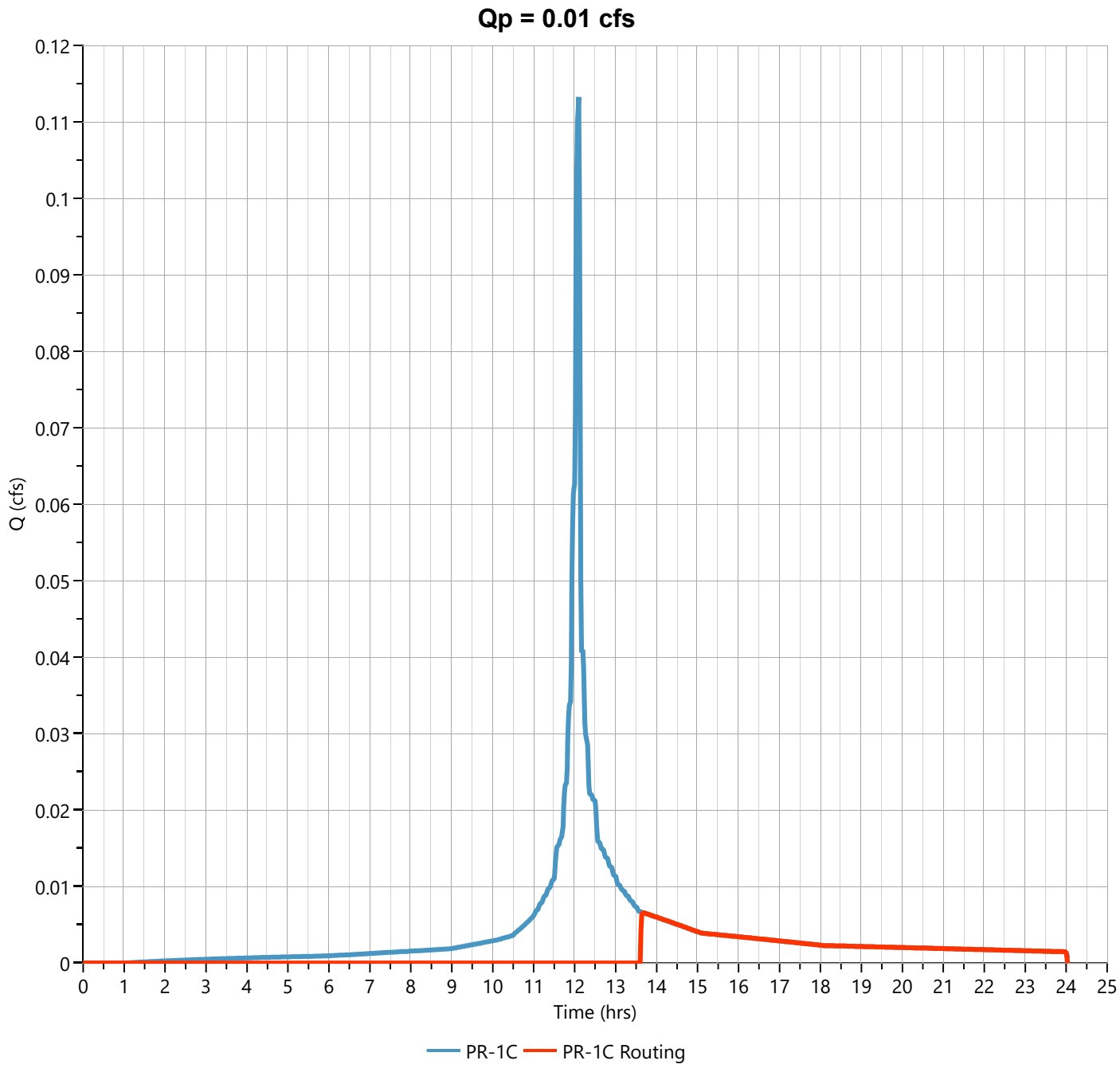
PR-1C Routing

Hyd. No. 11

Hydrograph Type	= Pond Route	Peak Flow	= 0.007 cfs
Storm Frequency	= 2-yr	Time to Peak	= 13.70 hrs
Time Interval	= 1 min	Hydrograph Volume	= 102 cuft
Inflow Hydrograph	= 10 - PR-1C	Max. Elevation	= 356.00 ft
Pond Name	= Rain Garden	Max. Storage	= 242 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 4.35 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

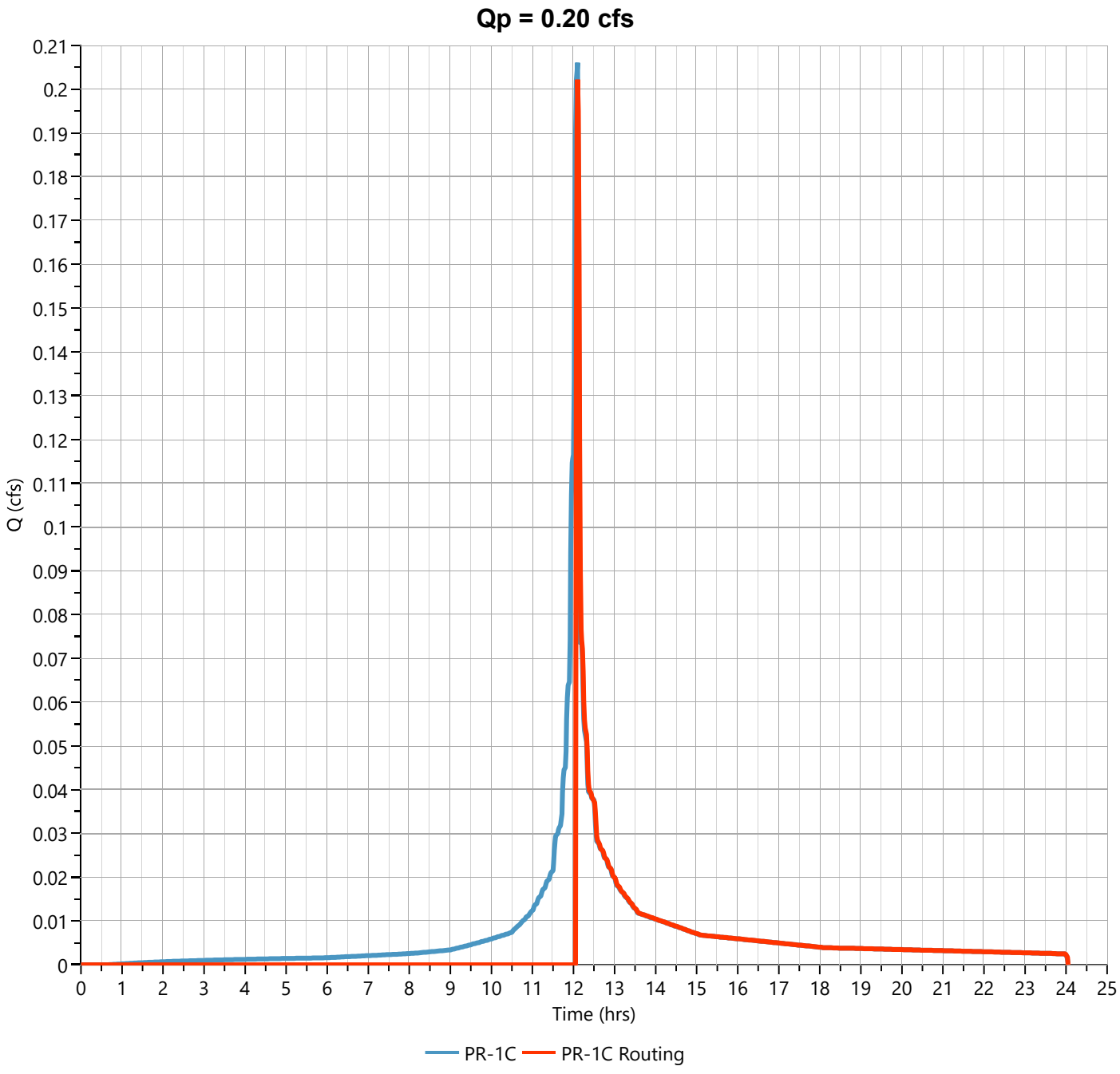
PR-1C Routing

Hyd. No. 11

Hydrograph Type	= Pond Route	Peak Flow	= 0.202 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 381 cuft
Inflow Hydrograph	= 10 - PR-1C	Max. Elevation	= 356.02 ft
Pond Name	= Rain Garden	Max. Storage	= 251 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.72 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

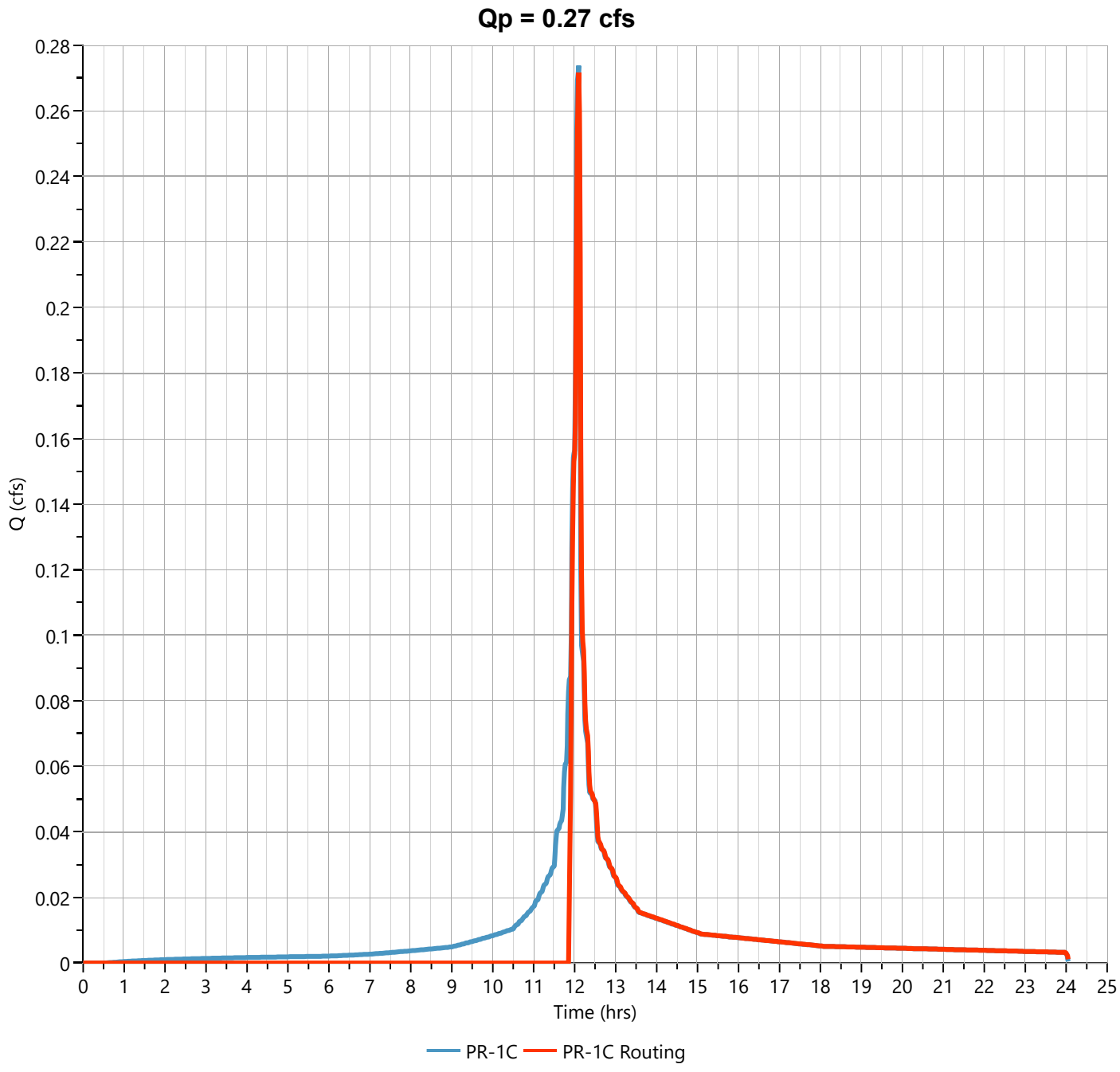
PR-1C Routing

Hyd. No. 11

Hydrograph Type	= Pond Route	Peak Flow	= 0.272 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 589 cuft
Inflow Hydrograph	= 10 - PR-1C	Max. Elevation	= 356.03 ft
Pond Name	= Rain Garden	Max. Storage	= 254 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.34 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

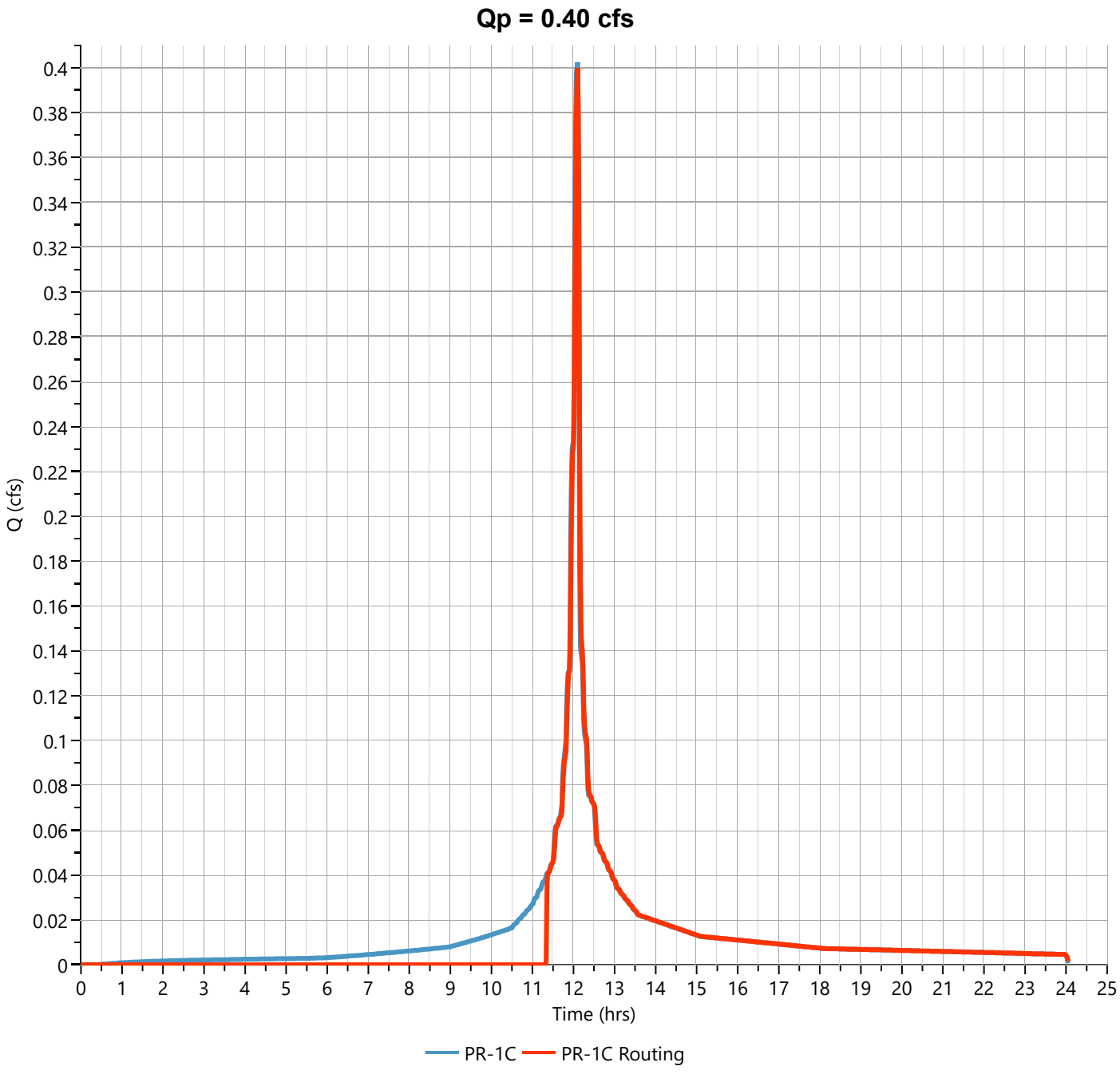
PR-1C Routing

Hyd. No. 11

Hydrograph Type	= Pond Route	Peak Flow	= 0.400 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 991 cuft
Inflow Hydrograph	= 10 - PR-1C	Max. Elevation	= 356.04 ft
Pond Name	= Rain Garden	Max. Storage	= 260 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.04 hrs



COMBINED TO UNDERGROUND INFILTRATION BASIN 1-2
POND ROUTING

Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

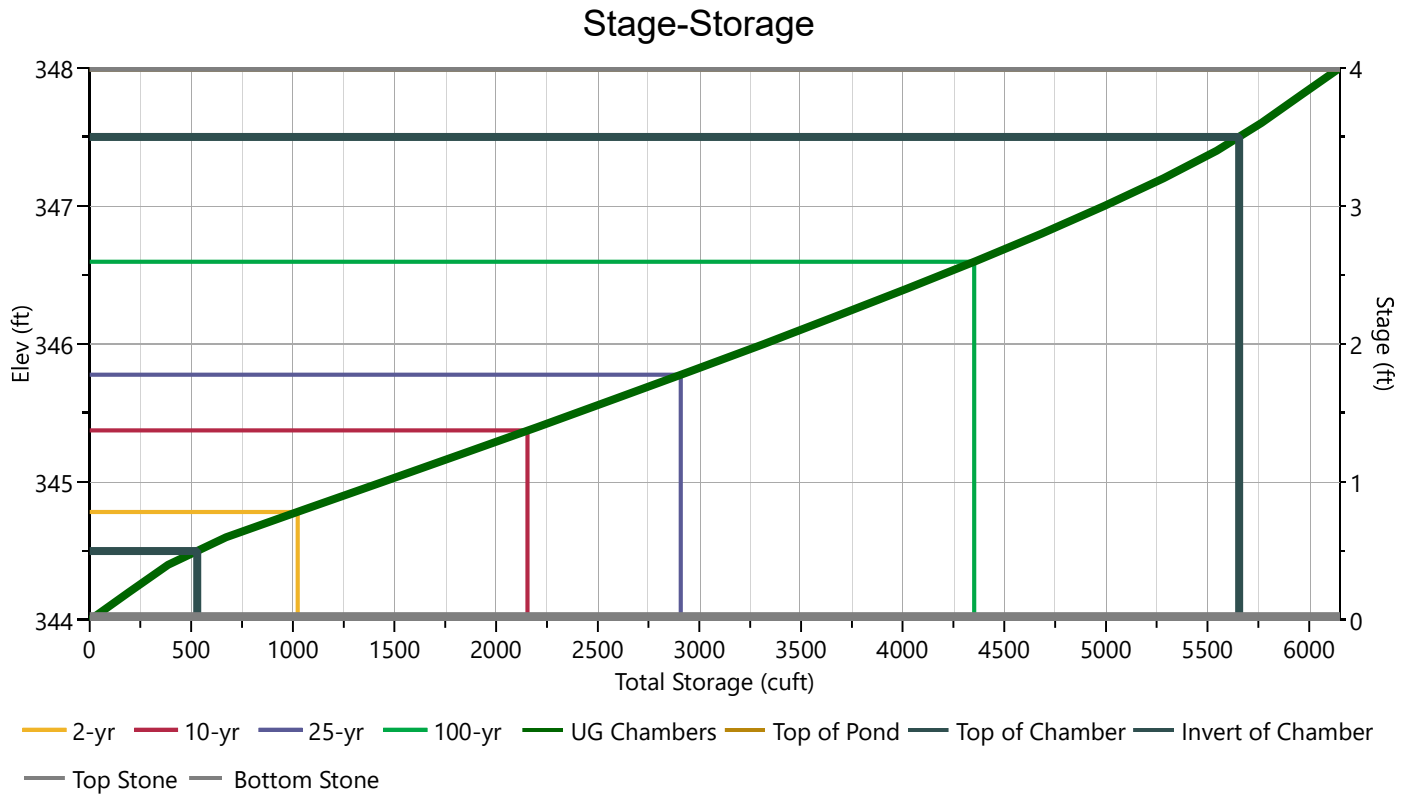
UGD-INF1-2

Stage-Storage

Cultec Recharger® 360HD Chamber	
Description	**Input**
Chamber Height, in	36
Chamber Shape	Arch
Chamber Width, in	60
Installed Length, ft	3.67
No. Chambers	103
Bare Chamber Stor, cuft	3,776
No. Rows	3
Space Between Rows, in	9
Stone Above, in	6
Stone Below, in	6
Stone Sides, in	12
Stone Ends, in	12
Encasement Voids, %	40.00
Encasement Bottom Elevation, ft	344.00

Stage / Storage Table

Stage (in)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.0	344.00	2,414	0.000	0.000
2.4	344.20	2,414	193	193
4.8	344.40	2,414	193	386
7.2	344.60	2,414	285	671
9.6	344.80	2,414	387	1,058
12.0	345.00	2,414	385	1,443
14.4	345.20	2,414	383	1,826
16.8	345.40	2,414	380	2,206
19.2	345.60	2,414	376	2,582
21.6	345.80	2,414	371	2,953
24.0	346.00	2,414	365	3,317
26.4	346.20	2,414	357	3,674
28.8	346.40	2,414	348	4,022
31.2	346.60	2,414	338	4,360
33.6	346.80	2,414	325	4,685
36.0	347.00	2,414	309	4,994
38.4	347.20	2,414	290	5,284
40.8	347.40	2,414	262	5,545
43.2	347.60	2,414	220	5,765
45.6	347.80	2,414	193	5,959
48.0	348.00	2,414	193	6,152



Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

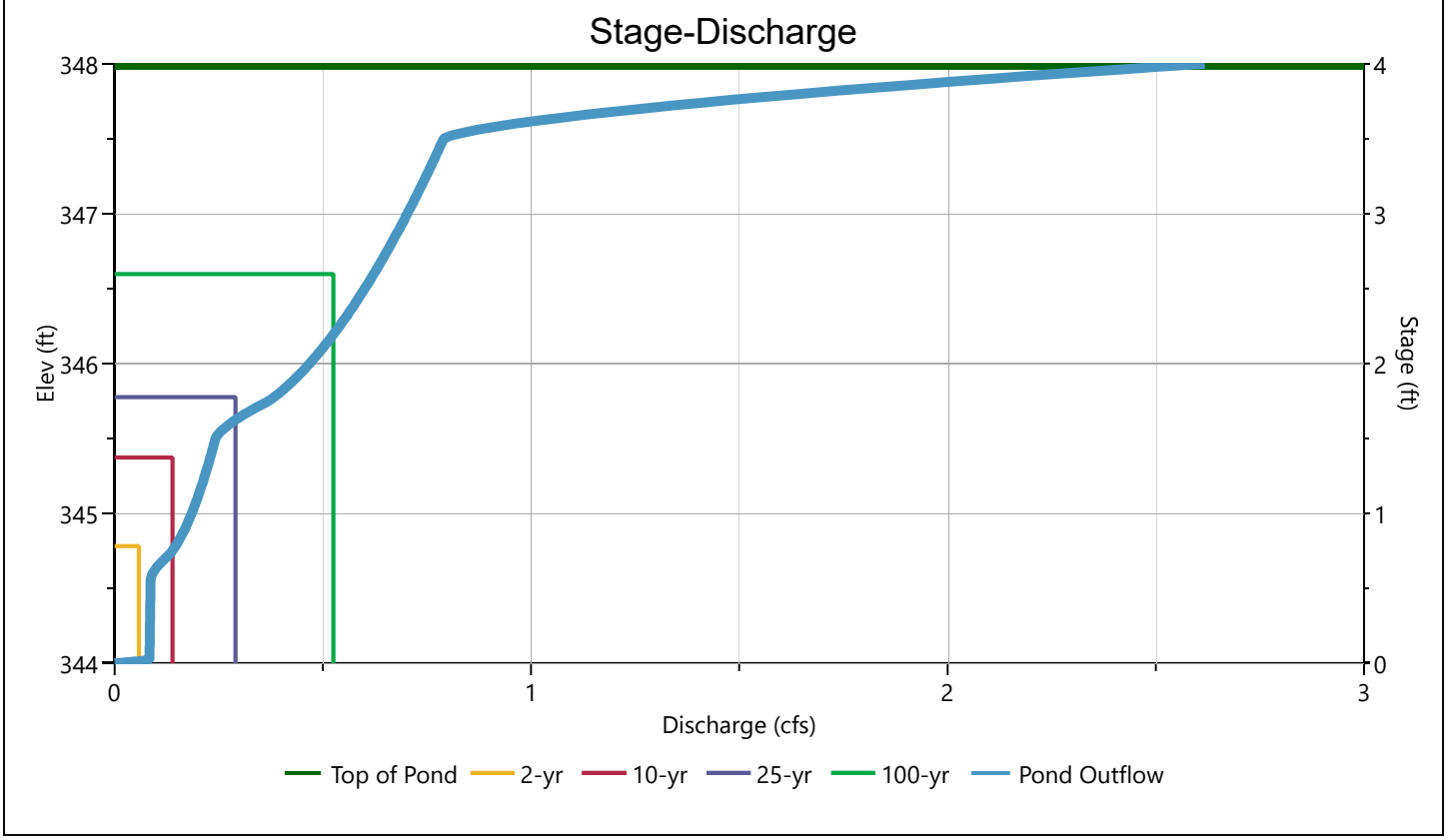
UGD-INF1-2

Stage-Discharge

Culvert / Orifices	Culvert	Orifices			Perforated Riser	
		1	2	3		
Rise, in		2.5	3		Hole Diameter, in	
Span, in		2.5	3		No. holes	
No. Barrels		1	1		Invert Elevation, ft	
Invert Elevation, ft		344.55	345.50		Height, ft	
Orifice Coefficient, Co		0.60	0.60		Orifice Coefficient, Co	
Length, ft						
Barrel Slope, %						
N-Value, n	0.000					

Weirs	Riser*	Weirs			Ancillary	
		1	2	3		
Shape / Type		Rectangular			Exfiltration, in/hr	1.50**
Crest Elevation, ft		347.5				
Crest Length, ft		1.5				
Angle, deg						
Weir Coefficient, Cw		3.3				

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



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

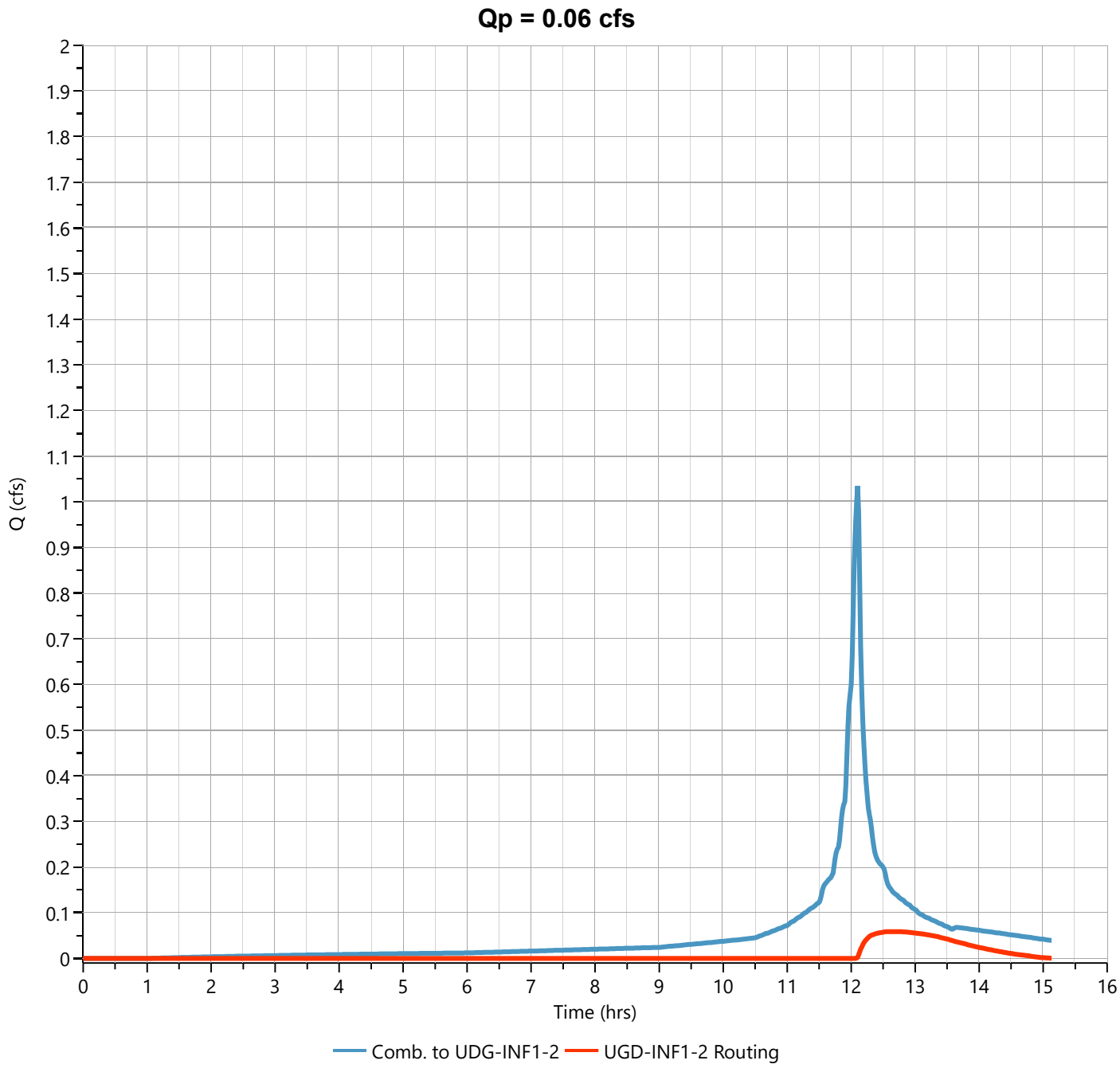
UGD-INF1-2 Routing

Hyd. No. 20

Hydrograph Type	= Pond Route	Peak Flow	= 0.059 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.65 hrs
Time Interval	= 1 min	Hydrograph Volume	= 355 cuft
Inflow Hydrograph	= 18 - Comb. to UDG-INF1-2	Max. Elevation	= 344.78 ft
Pond Name	= UGD-INF1-2	Max. Storage	= 1,023 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 7 min



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

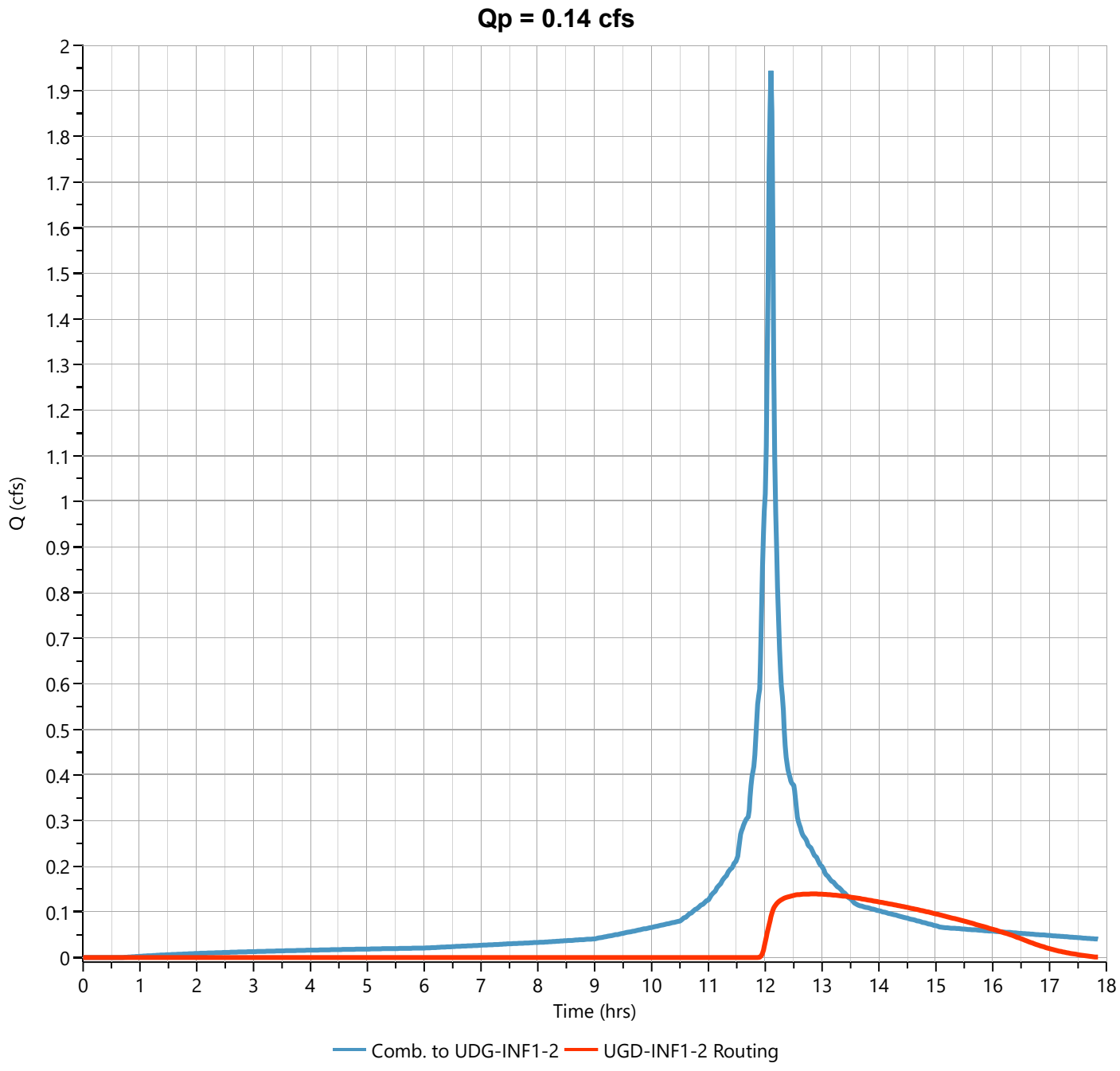
UGD-INF1-2 Routing

Hyd. No. 20

Hydrograph Type	= Pond Route	Peak Flow	= 0.139 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.83 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,778 cuft
Inflow Hydrograph	= 18 - Comb. to UDG-INF1-2	Max. Elevation	= 345.37 ft
Pond Name	= UGD-INF1-2	Max. Storage	= 2,155 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.16 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

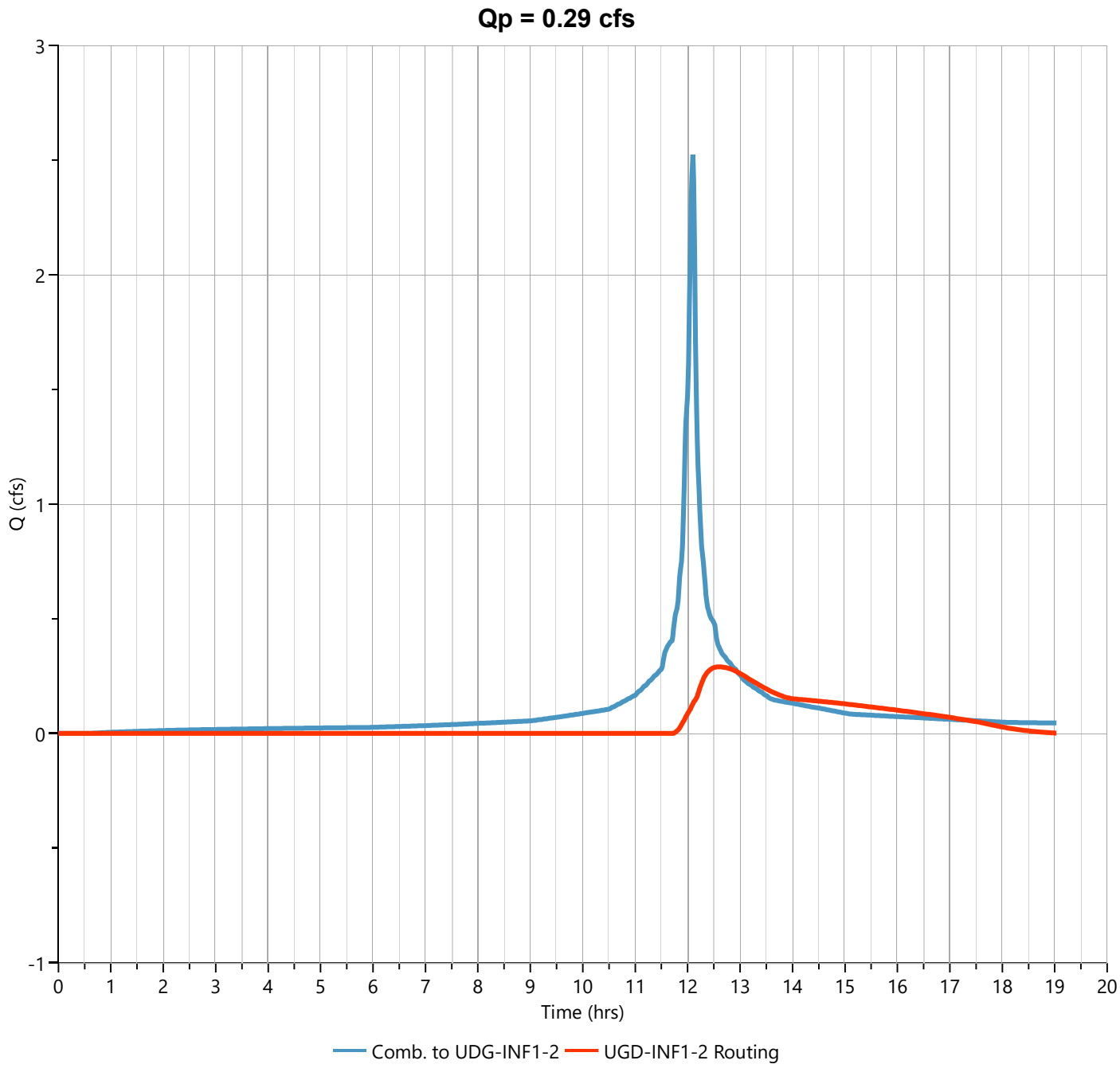
UGD-INF1-2 Routing

Hyd. No. 20

Hydrograph Type	= Pond Route	Peak Flow	= 0.291 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.58 hrs
Time Interval	= 1 min	Hydrograph Volume	= 3,077 cuft
Inflow Hydrograph	= 18 - Comb. to UDG-INF1-2	Max. Elevation	= 345.78 ft
Pond Name	= UGD-INF1-2	Max. Storage	= 2,909 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.38 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

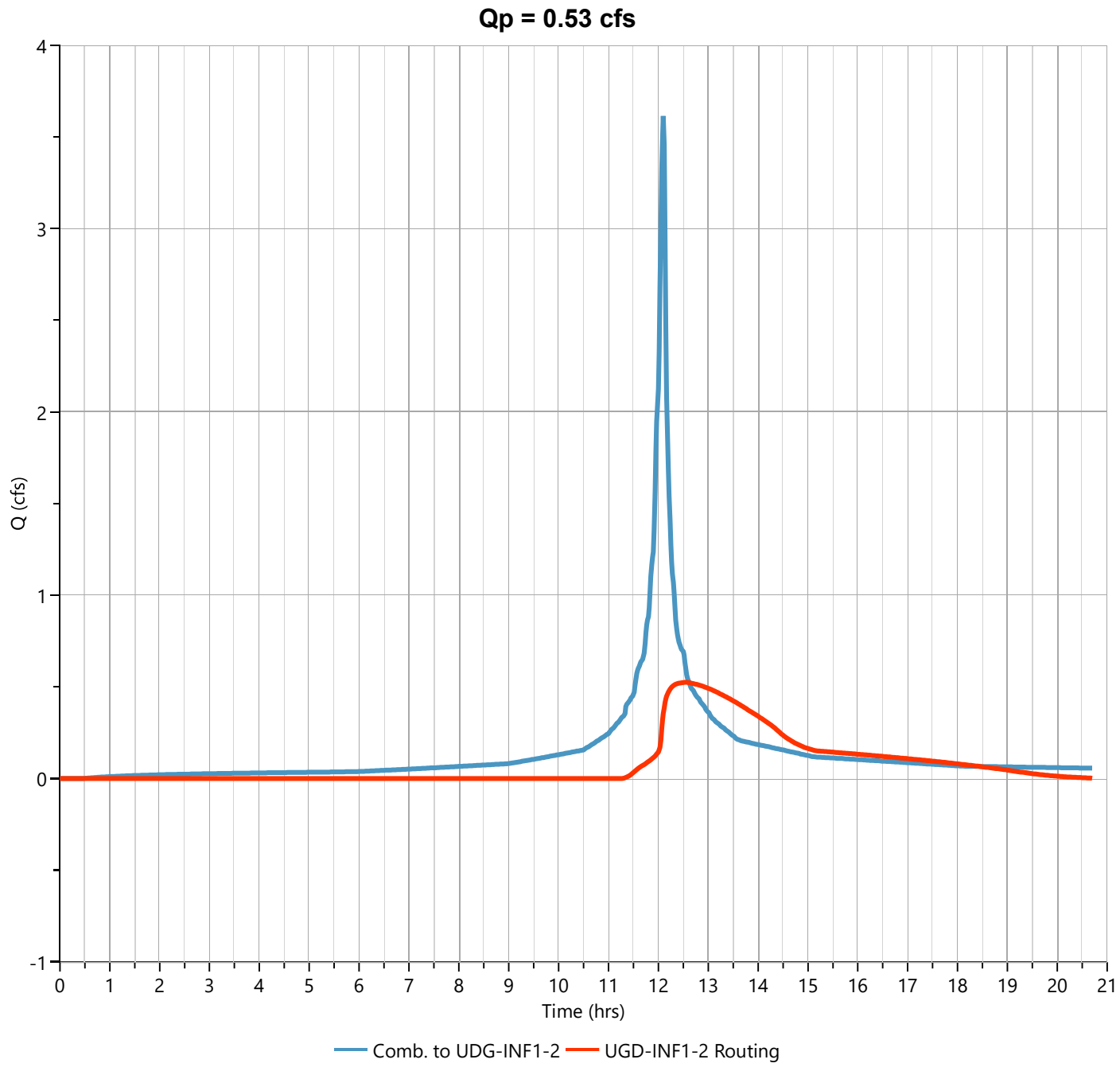
UGD-INF1-2 Routing

Hyd. No. 20

Hydrograph Type	= Pond Route	Peak Flow	= 0.525 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.53 hrs
Time Interval	= 1 min	Hydrograph Volume	= 5,925 cuft
Inflow Hydrograph	= 18 - Comb. to UDG-INF1-2	Max. Elevation	= 346.60 ft
Pond Name	= UGD-INF1-2	Max. Storage	= 4,352 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.47 hrs



PR-2A WATERSHED POND ROUTING

Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

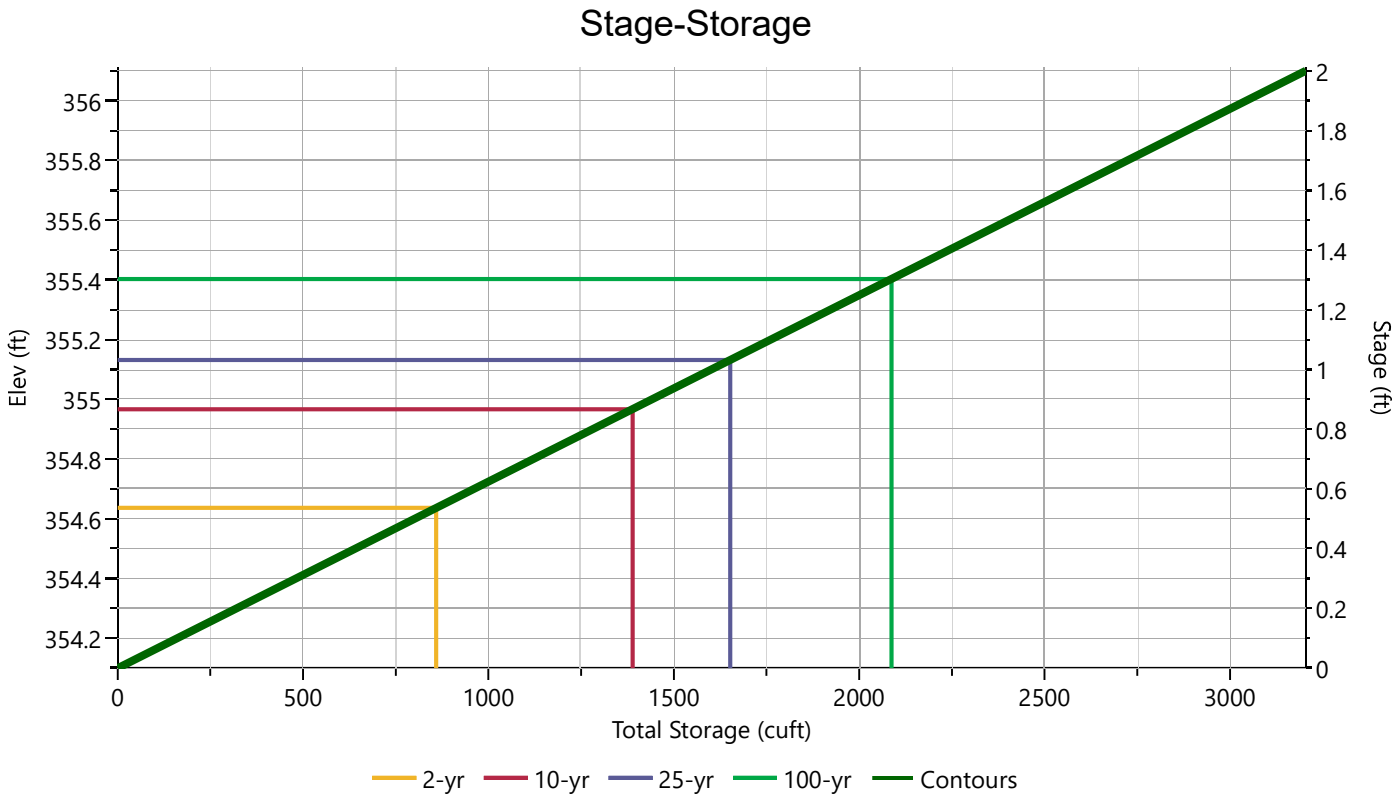
Porous Pavement System 1

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	354.10
Voids (%)	40.00
Volume Calc	Ave End Area

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	354.10	4,006	0.000	0.000
1.00	355.10	4,006	1,602	1,602
2.00	356.10	4,006	1,602	3,205



Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

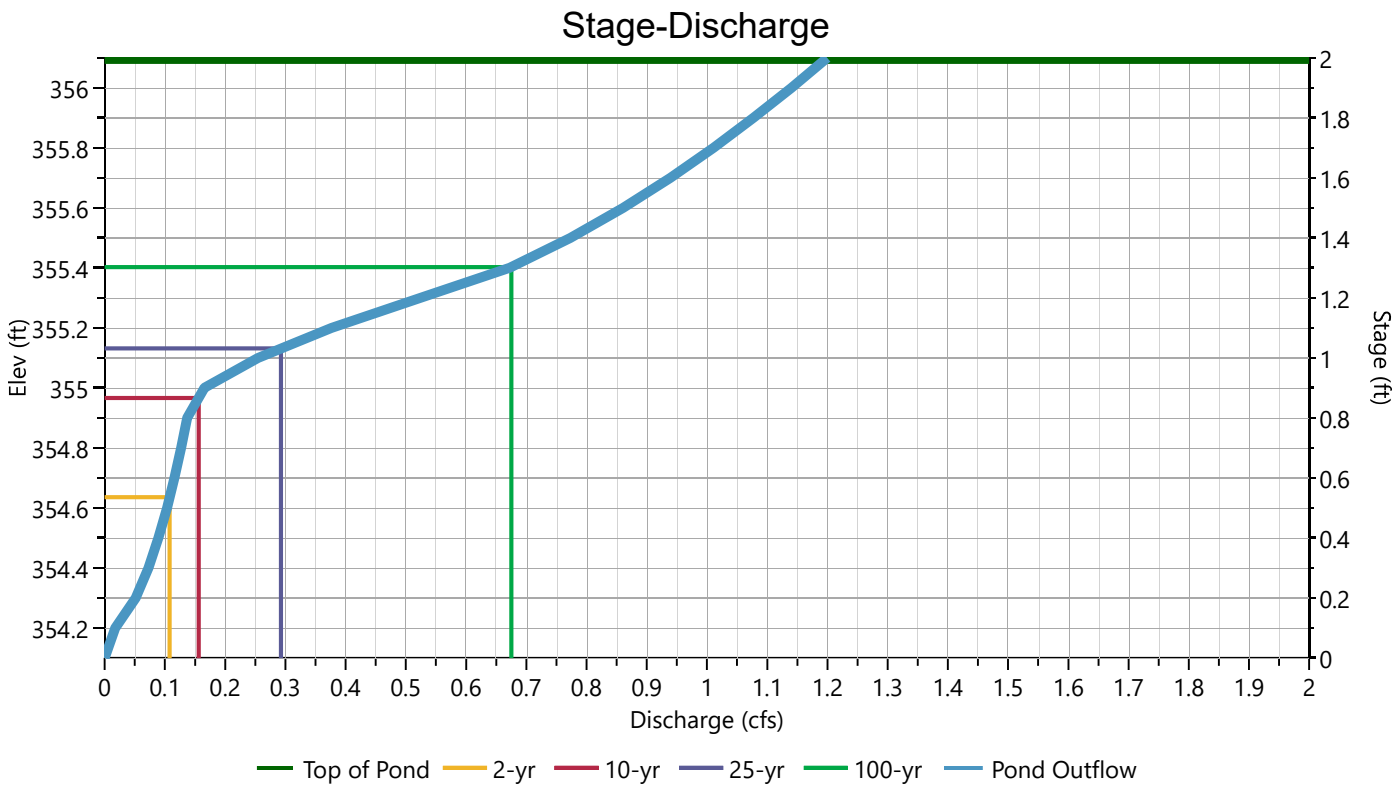
Porous Pavement System 1

Stage-Discharge

Culvert / Orifices	Culvert	Orifices			Perforated Riser	
		1	2	3		
Rise, in		2.5	5		Hole Diameter, in	
Span, in		2.5	6		No. holes	
No. Barrels		1	1		Invert Elevation, ft	
Invert Elevation, ft		354.10	354.95		Height, ft	
Orifice Coefficient, Co		0.60	0.60		Orifice Coefficient, Co	
Length, ft						
Barrel Slope, %						
N-Value, n	0.000					

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

*Routes through Culvert.



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

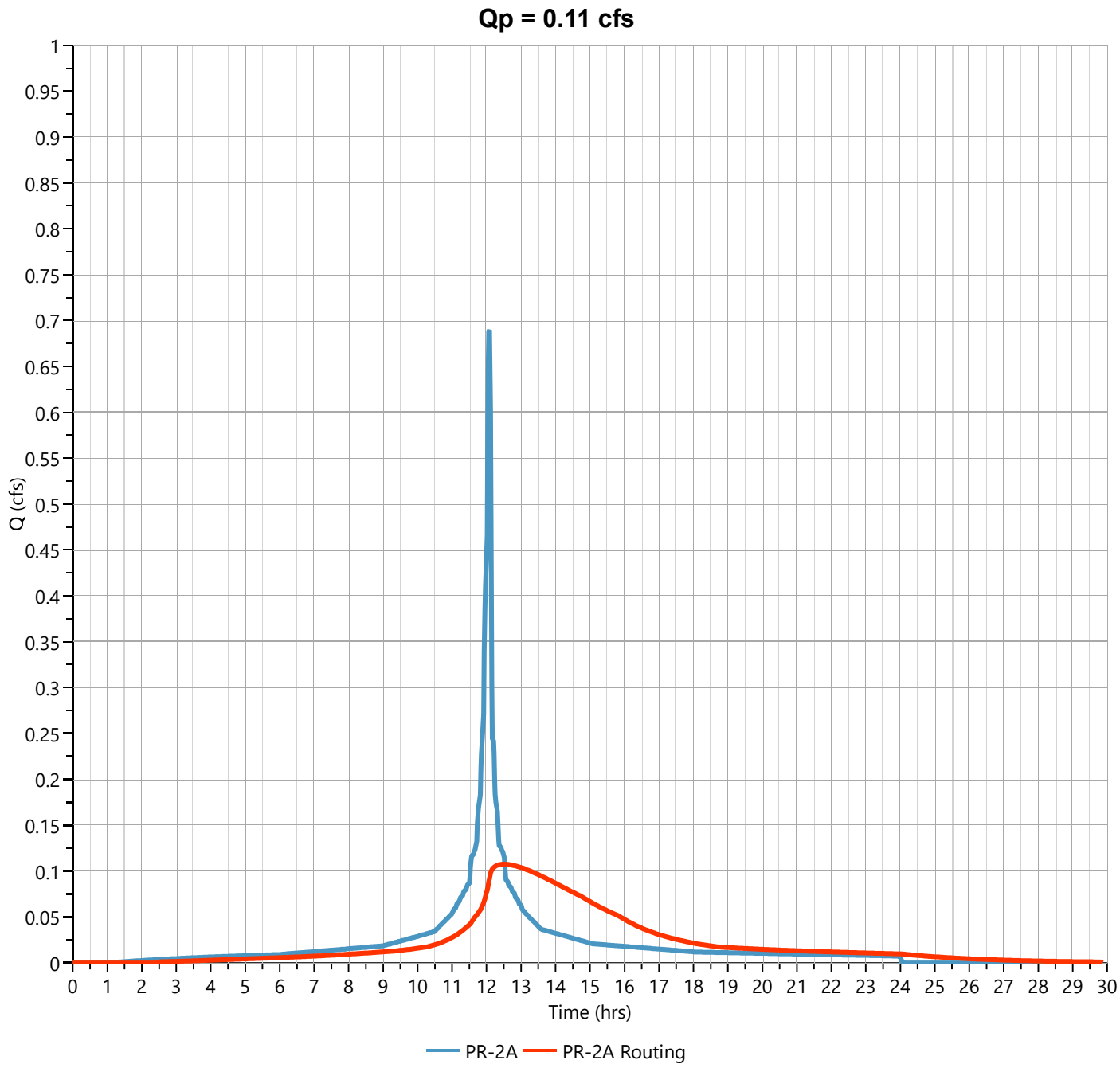
PR-2A Routing

Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 0.108 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.53 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,231 cuft
Inflow Hydrograph	= 3 - PR-2A	Max. Elevation	= 354.64 ft
Pond Name	= Porous Pavement System 1	Max. Storage	= 859 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.07 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

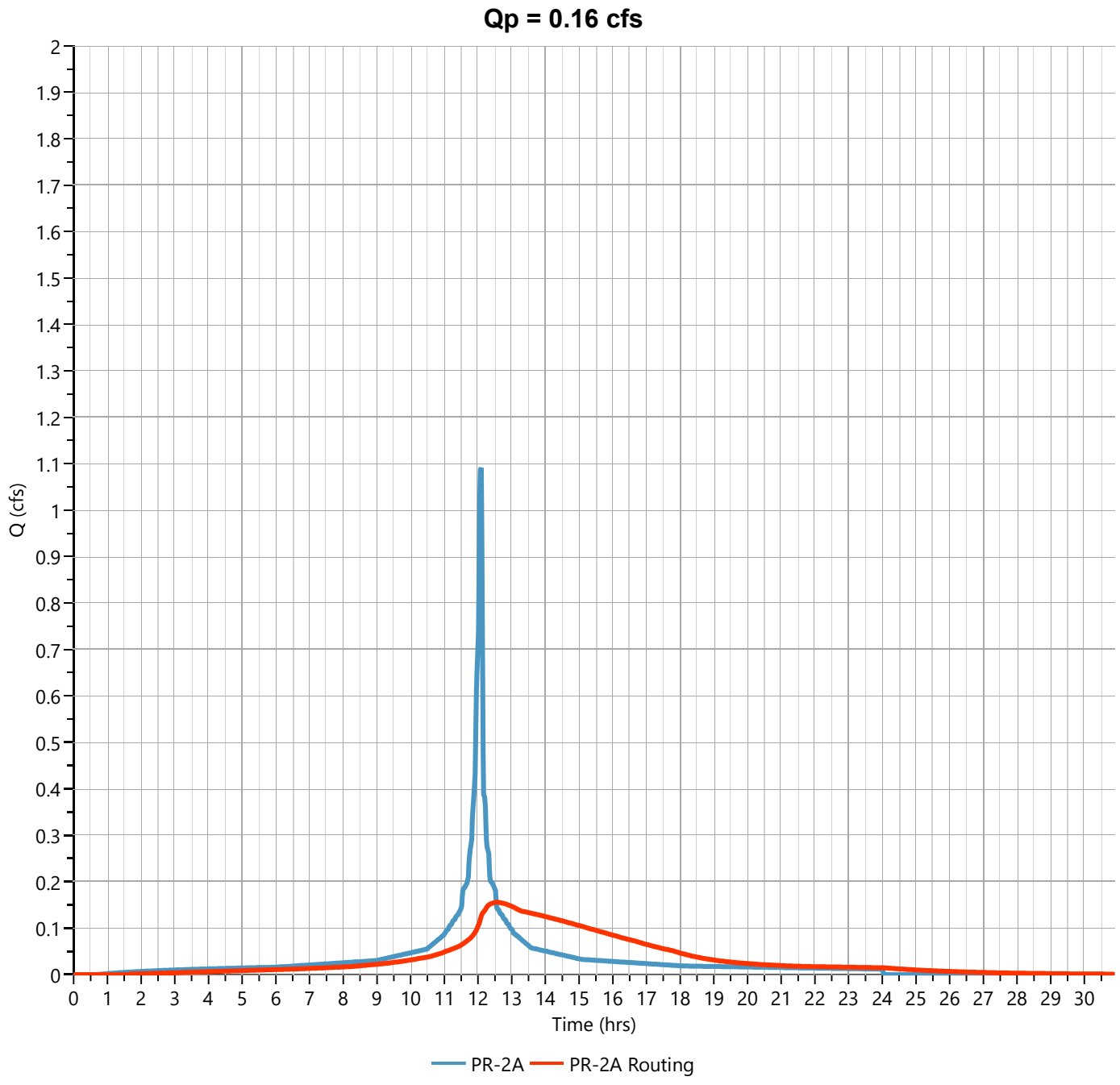
PR-2A Routing

Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 0.156 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.53 hrs
Time Interval	= 1 min	Hydrograph Volume	= 3,588 cuft
Inflow Hydrograph	= 3 - PR-2A	Max. Elevation	= 354.97 ft
Pond Name	= Porous Pavement System 1	Max. Storage	= 1,389 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.18 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

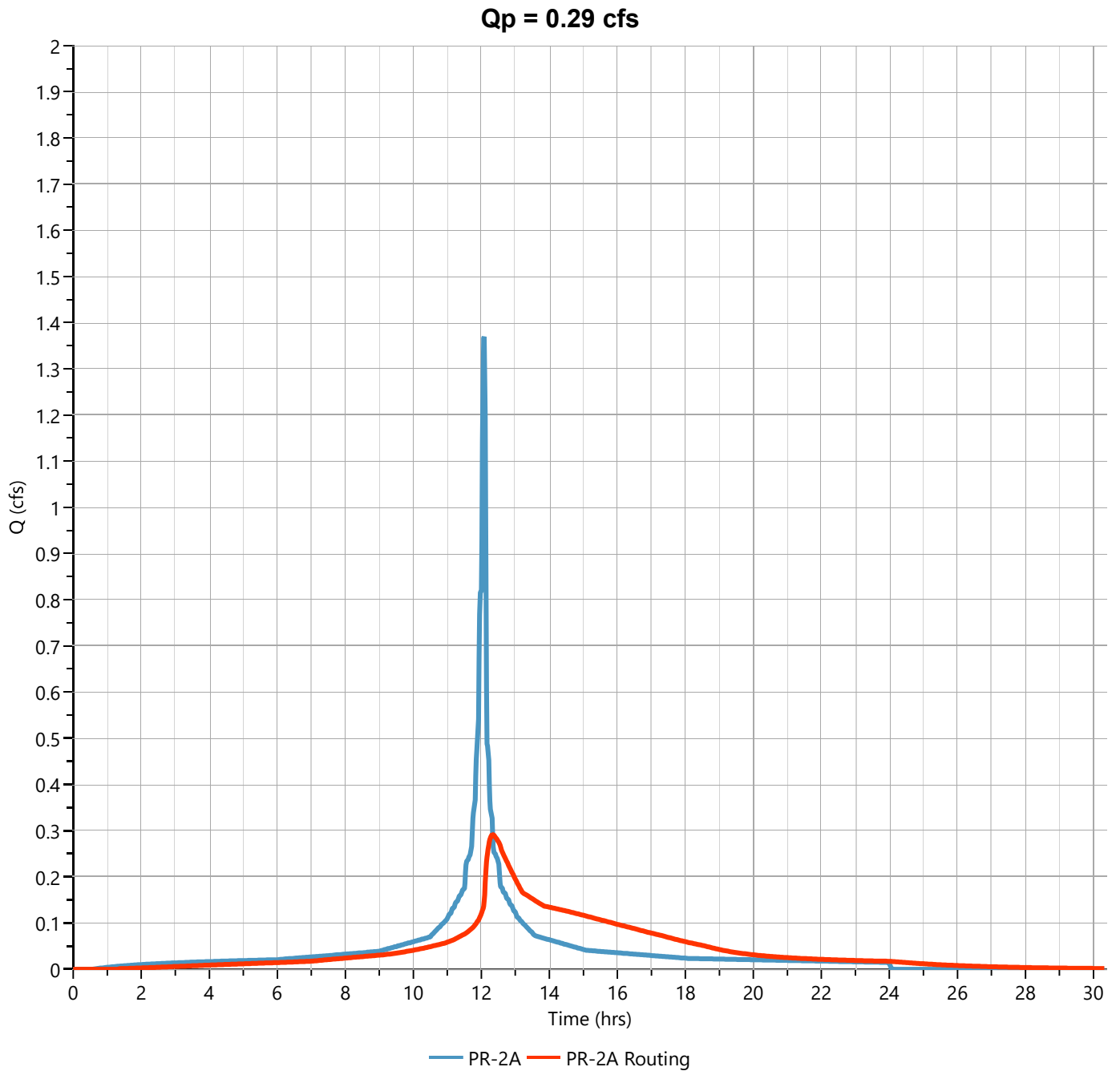
PR-2A Routing

Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 0.293 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.33 hrs
Time Interval	= 1 min	Hydrograph Volume	= 4,547 cuft
Inflow Hydrograph	= 3 - PR-2A	Max. Elevation	= 355.13 ft
Pond Name	= Porous Pavement System 1	Max. Storage	= 1,653 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.02 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

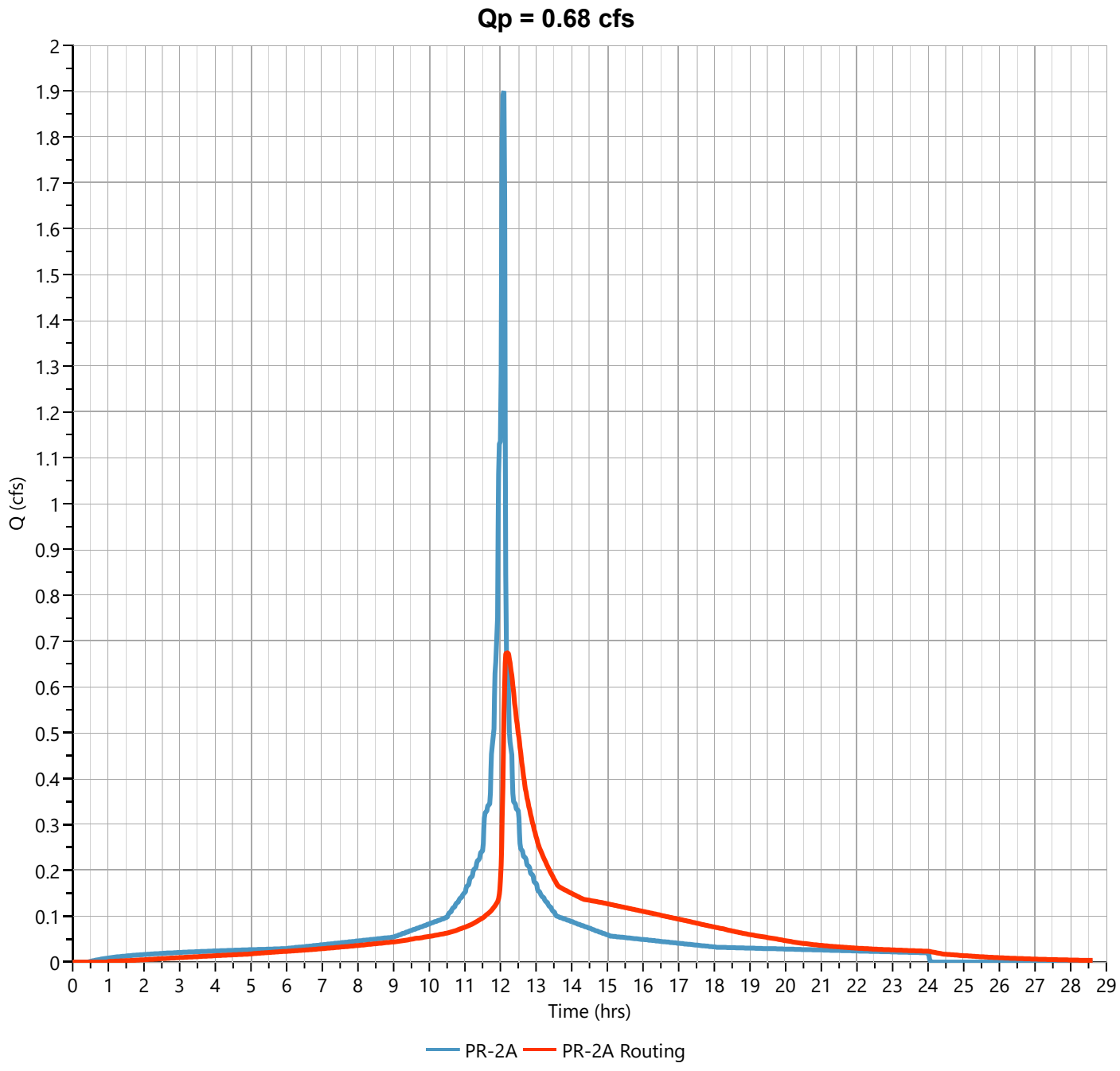
PR-2A Routing

Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 0.675 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Hydrograph Volume	= 6,350 cuft
Inflow Hydrograph	= 3 - PR-2A	Max. Elevation	= 355.40 ft
Pond Name	= Porous Pavement System 1	Max. Storage	= 2,087 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.72 hrs



PR-2C WATERSHED POND ROUTING

Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

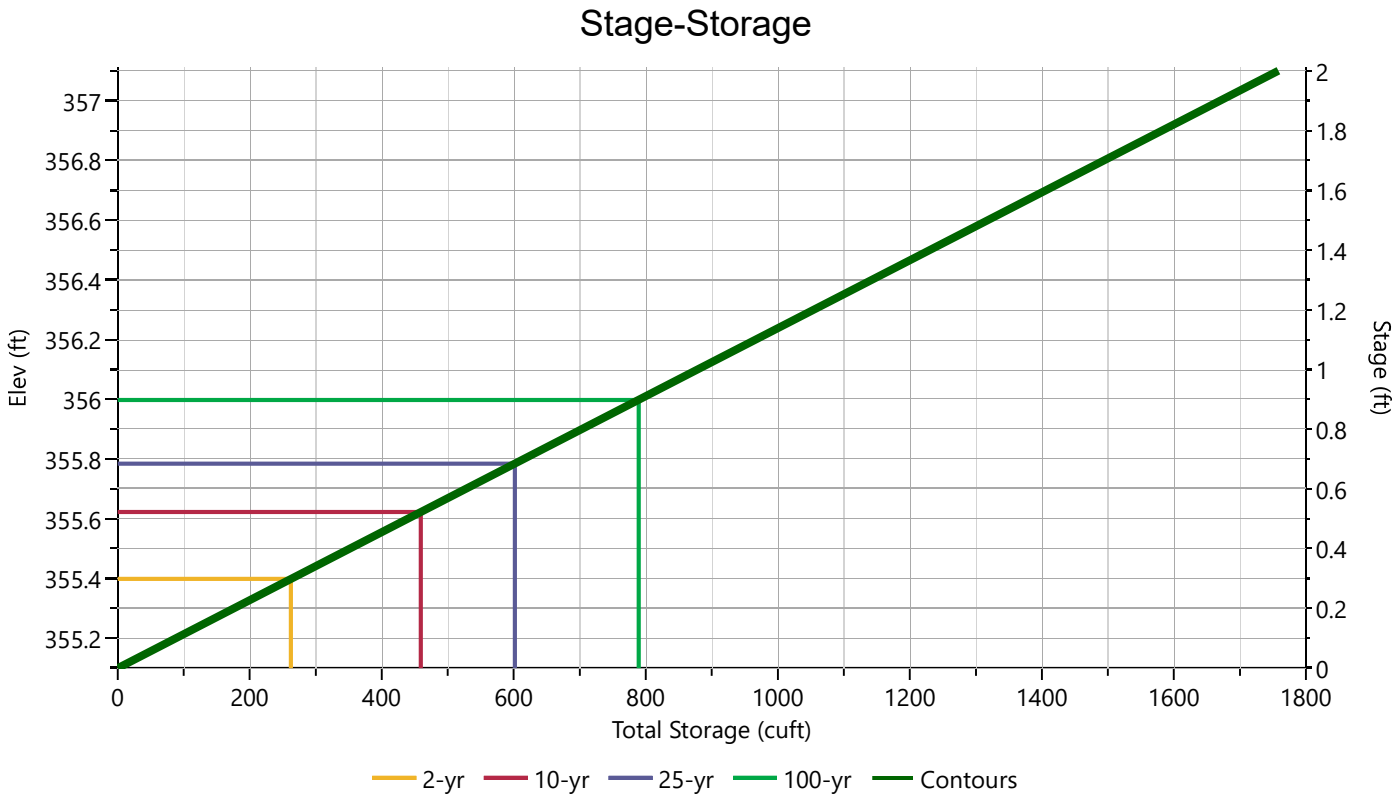
Porous Pavement System 2

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	355.10
Voids (%)	40.00
Volume Calc	Ave End Area

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	355.10	2,198	0.000	0.000
1.00	356.10	2,198	879	879
2.00	357.10	2,198	879	1,758



Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

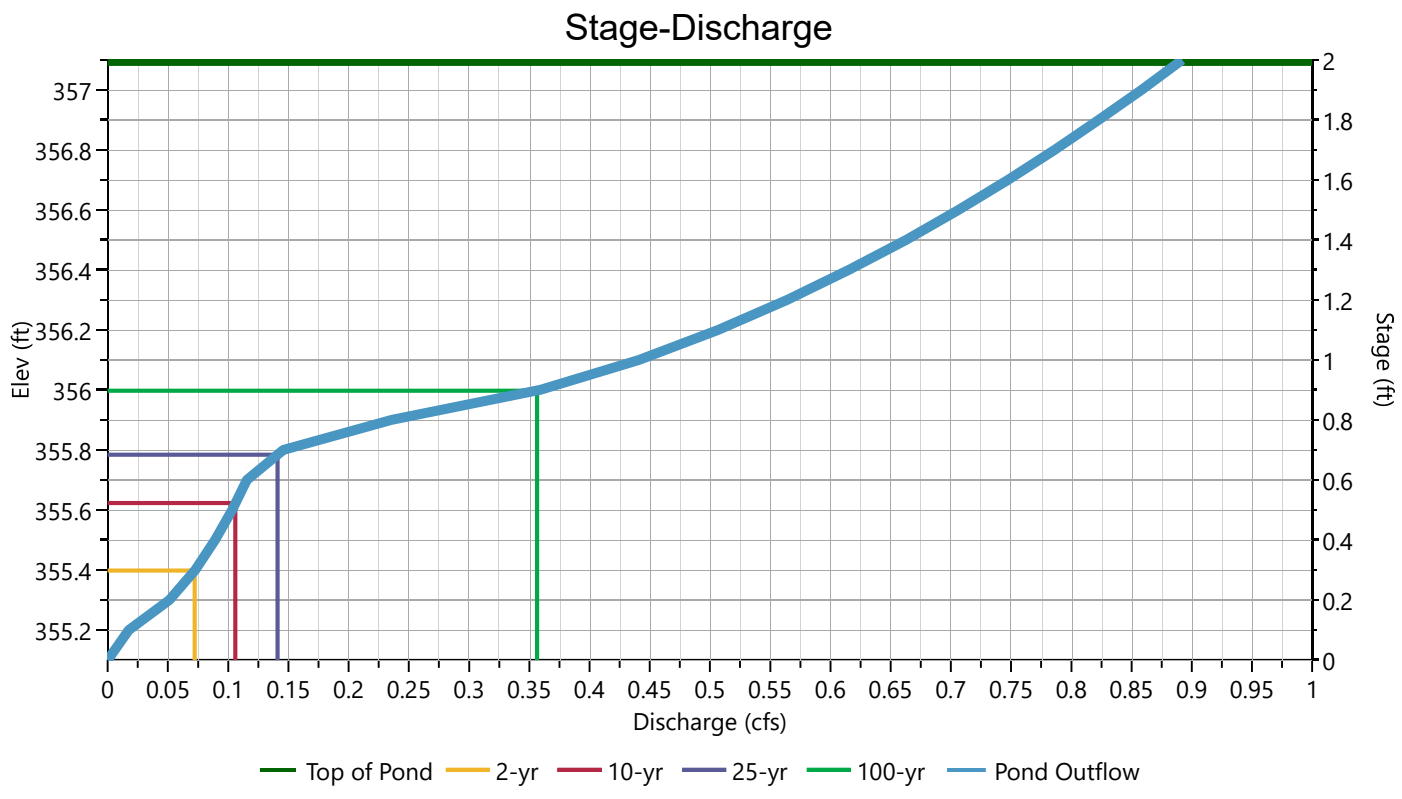
02-08-2024

Porous Pavement System 2

Stage-Discharge

Culvert / Orifices	Culvert	Orifices			Perforated Riser	
		1	2	3		
Rise, in		2.5	3		Hole Diameter, in	
Span, in		2.5	6		No. holes	
No. Barrels		1	1		Invert Elevation, ft	
Invert Elevation, ft		355.10	355.75		Height, ft	
Orifice Coefficient, Co		0.60	0.60		Orifice Coefficient, Co	
Length, ft						
Barrel Slope, %						
N-Value, n	0.000					
Weirs	**Riser***	**Weirs**			**Ancillary**	
		1	2	3		
Shape / Type					Exfiltration, in/hr	
Crest Elevation, ft						
Crest Length, ft						
Angle, deg						
Weir Coefficient, Cw						

**Routes through Culvert.*



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

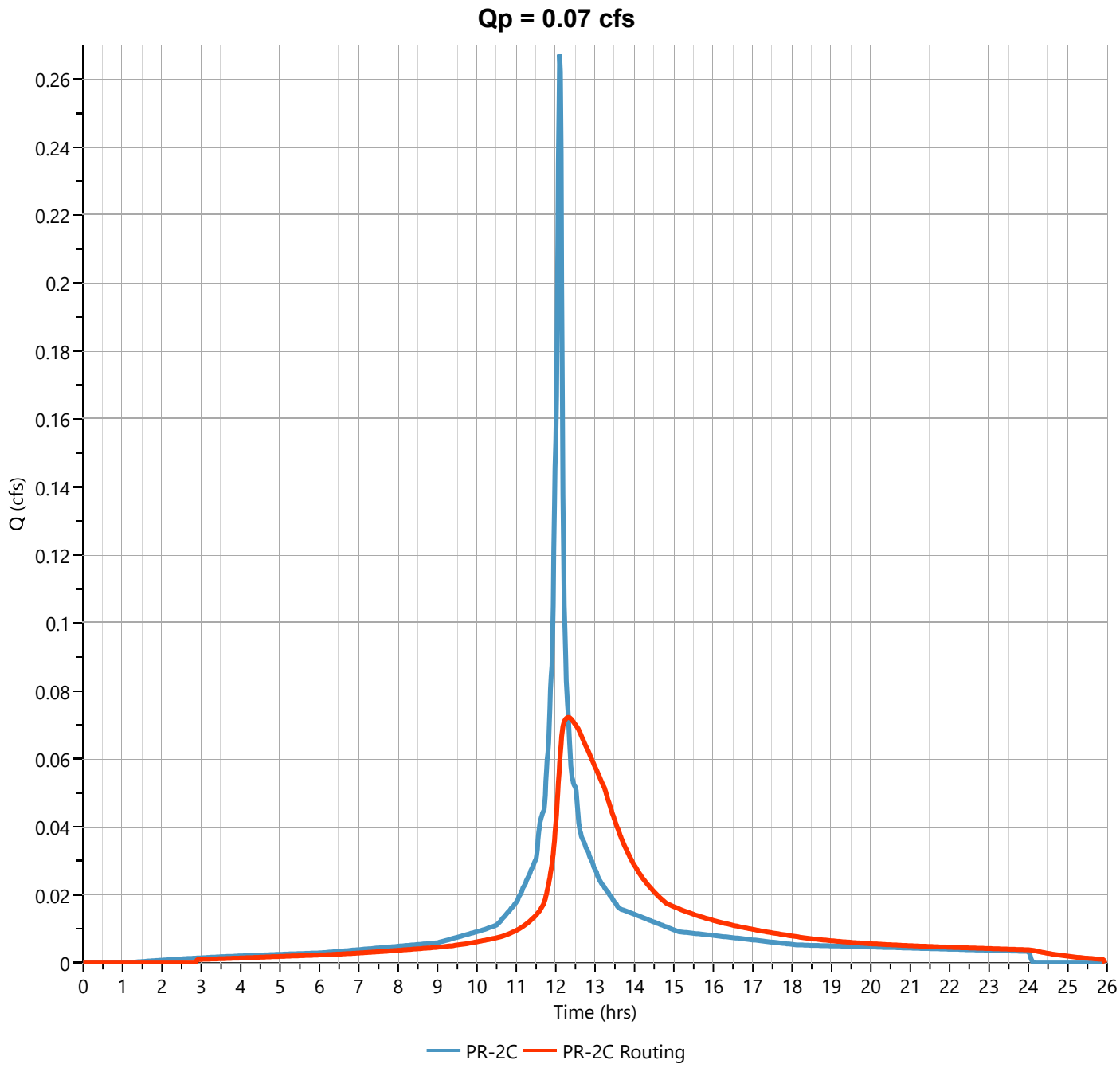
PR-2C Routing

Hyd. No. 15

Hydrograph Type	= Pond Route	Peak Flow	= 0.072 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.32 hrs
Time Interval	= 1 min	Hydrograph Volume	= 879 cuft
Inflow Hydrograph	= 13 - PR-2C	Max. Elevation	= 355.40 ft
Pond Name	= Porous Pavement System 2	Max. Storage	= 262 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.14 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

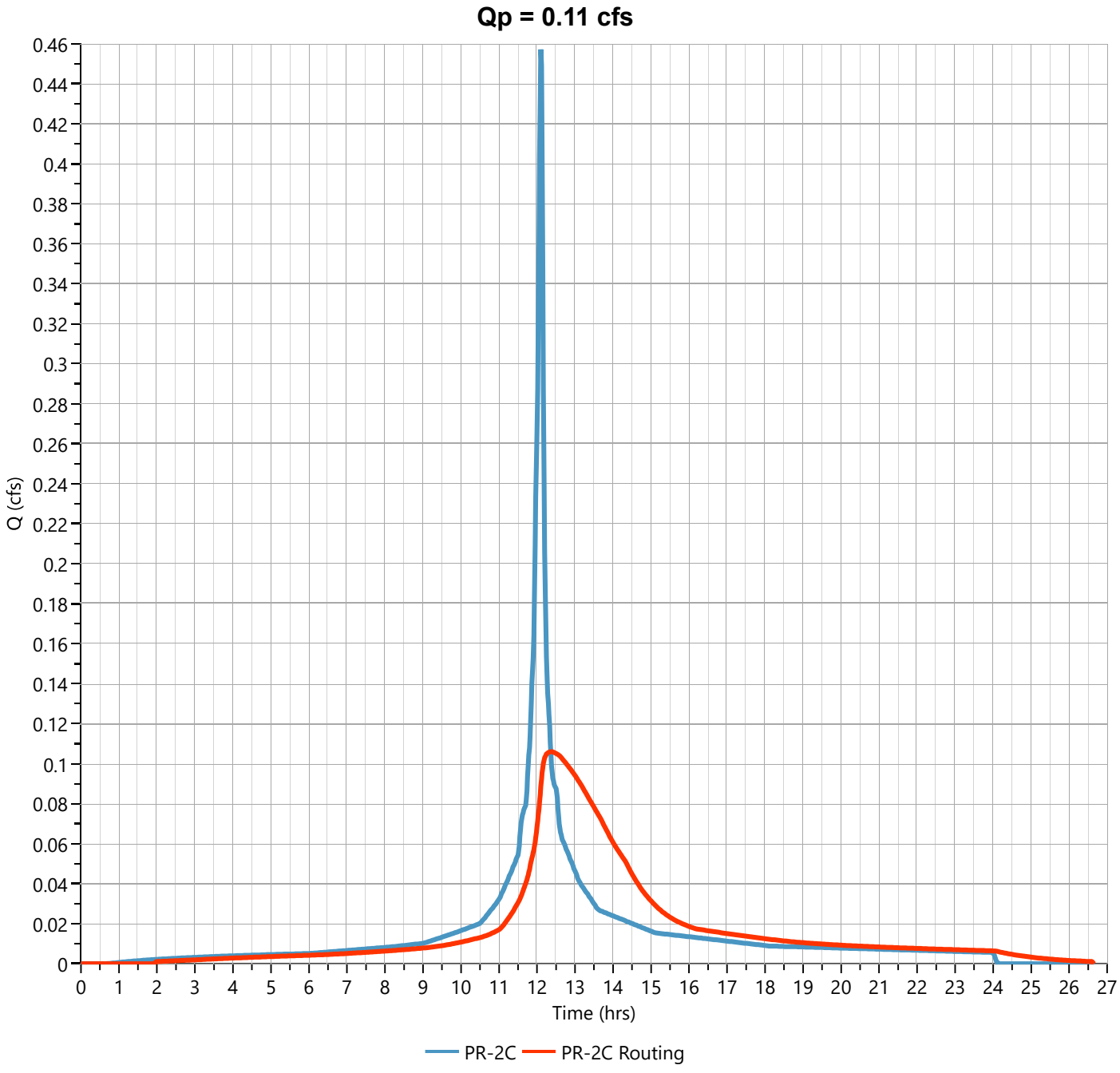
PR-2C Routing

Hyd. No. 15

Hydrograph Type	= Pond Route	Peak Flow	= 0.106 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.37 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,515 cuft
Inflow Hydrograph	= 13 - PR-2C	Max. Elevation	= 355.62 ft
Pond Name	= Porous Pavement System 2	Max. Storage	= 459 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.16 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

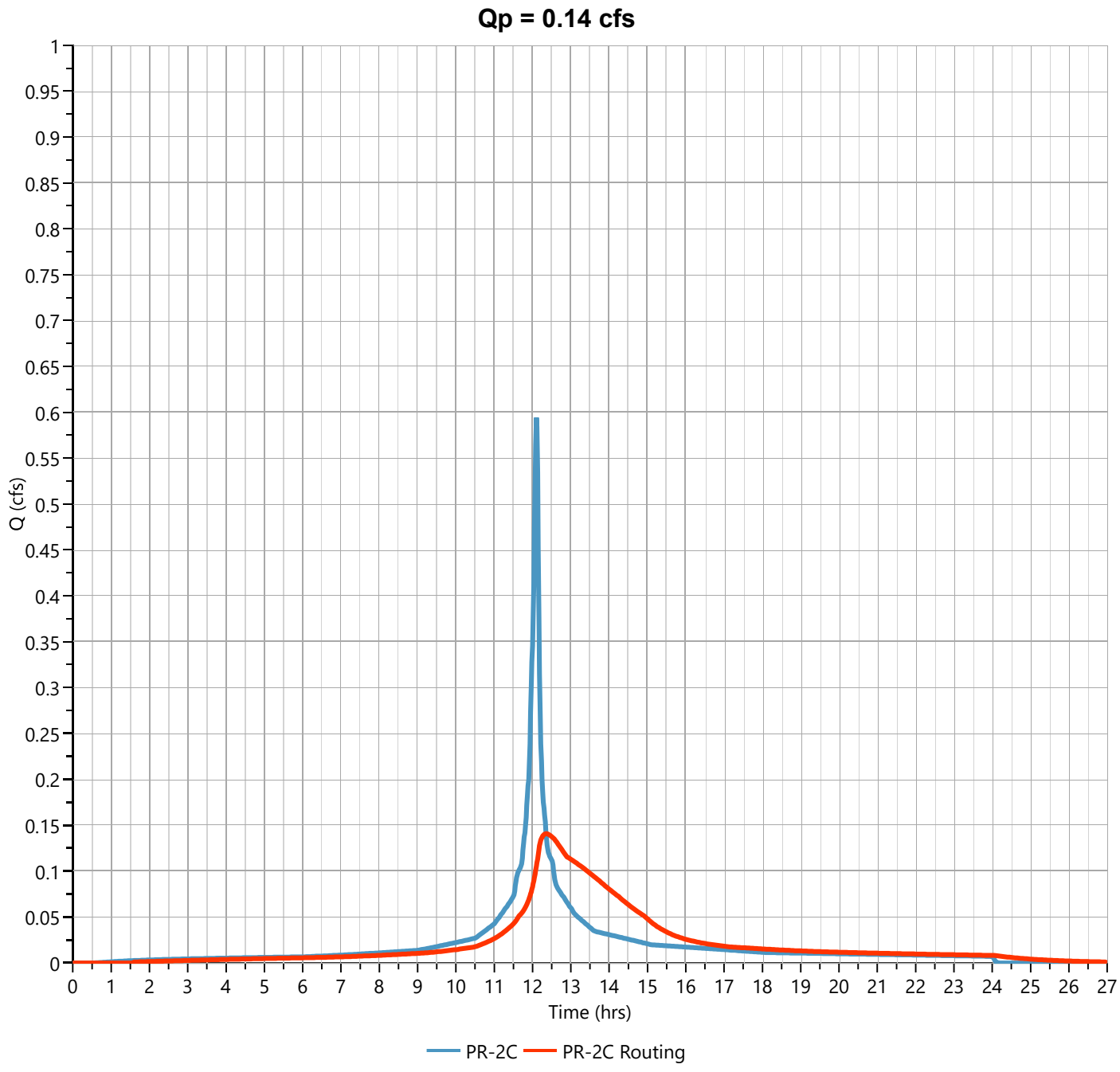
PR-2C Routing

Hyd. No. 15

Hydrograph Type	= Pond Route	Peak Flow	= 0.141 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.35 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,979 cuft
Inflow Hydrograph	= 13 - PR-2C	Max. Elevation	= 355.78 ft
Pond Name	= Porous Pavement System 2	Max. Storage	= 602 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.16 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

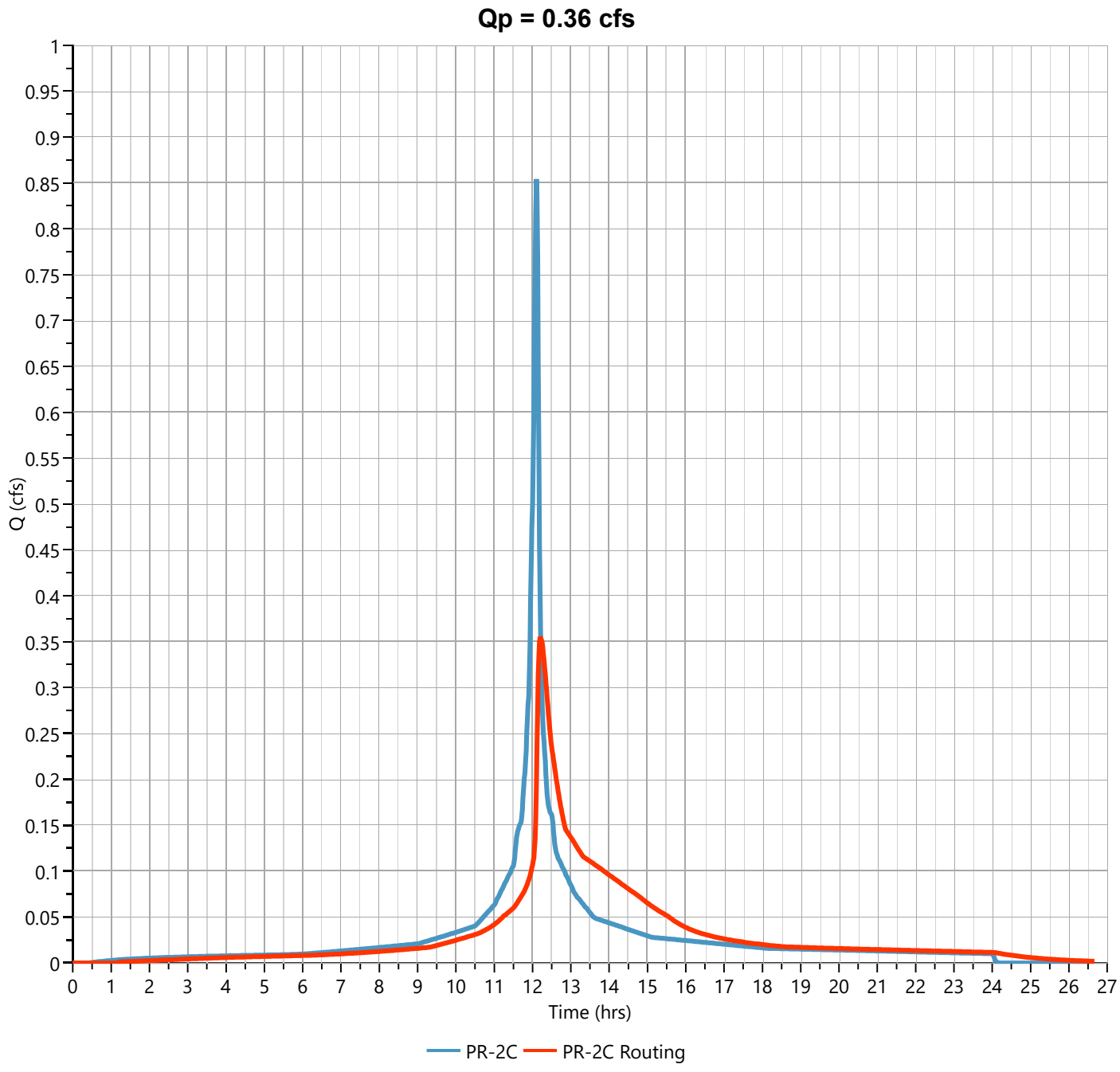
PR-2C Routing

Hyd. No. 15

Hydrograph Type	= Pond Route	Peak Flow	= 0.356 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.22 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,868 cuft
Inflow Hydrograph	= 13 - PR-2C	Max. Elevation	= 356.00 ft
Pond Name	= Porous Pavement System 2	Max. Storage	= 789 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.02 hrs



PR-2B + PR-2H WATERSHED POND ROUTING

Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

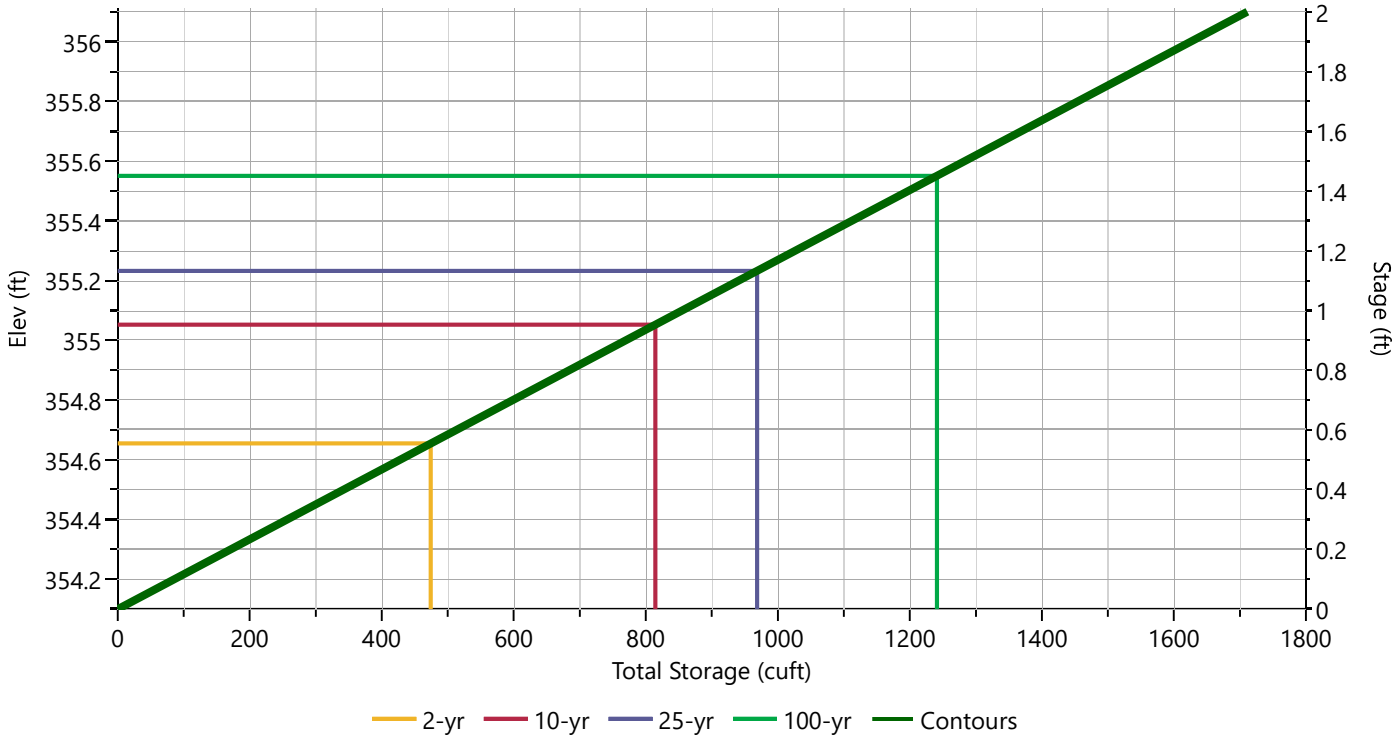
Porous Pavement System 3

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	354.10
Voids (%)	40.00
Volume Calc	Ave End Area

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	354.10	2,139	0.000	0.000
1.00	355.10	2,139	856	856
2.00	356.10	2,139	856	1,711



Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

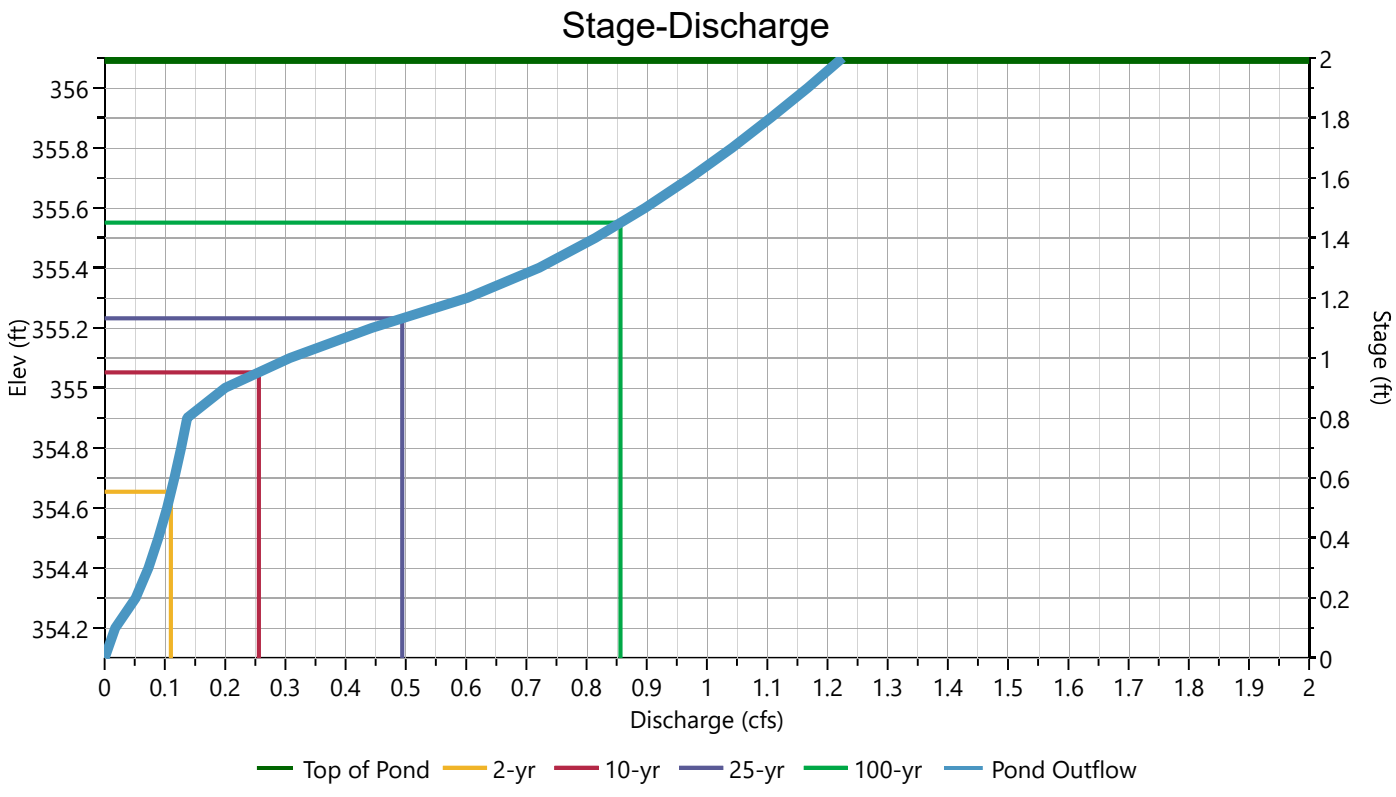
Porous Pavement System 3

Stage-Discharge

Culvert / Orifices	Culvert	Orifices			Perforated Riser	
		1	2	3		
Rise, in		2.5	5		Hole Diameter, in	
Span, in		2.5	6		No. holes	
No. Barrels		1	1		Invert Elevation, ft	
Invert Elevation, ft		354.10	354.90		Height, ft	
Orifice Coefficient, Co		0.60	0.60		Orifice Coefficient, Co	
Length, ft						
Barrel Slope, %						
N-Value, n	0.000					

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

**Routes through Culvert.*



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

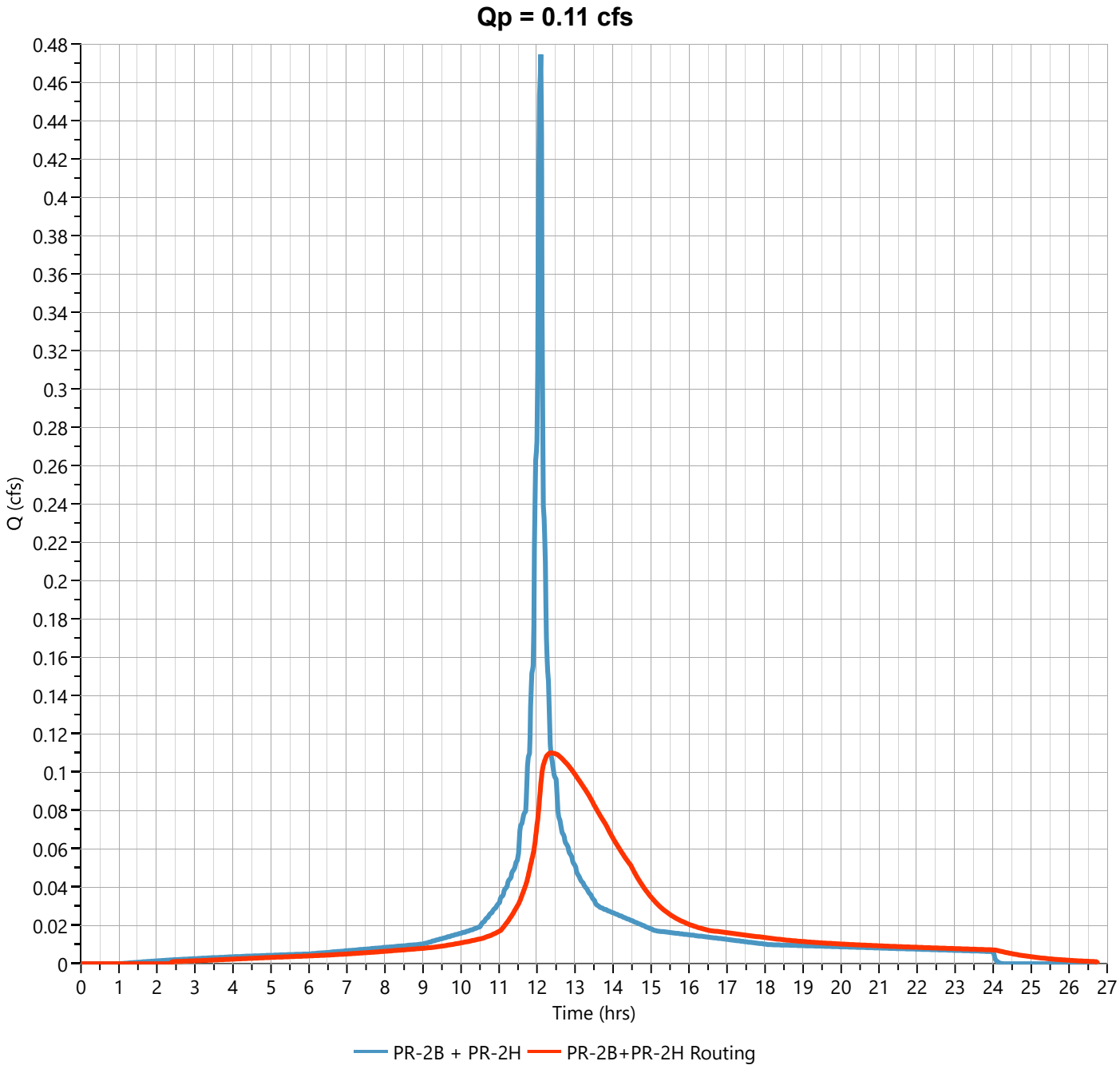
PR-2B+PR-2H Routing

Hyd. No. 39

Hydrograph Type	= Pond Route	Peak Flow	= 0.110 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.37 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,602 cuft
Inflow Hydrograph	= 38 - PR-2B + PR-2H	Max. Elevation	= 354.65 ft
Pond Name	= Porous Pavement System 3	Max. Storage	= 474 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.13 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

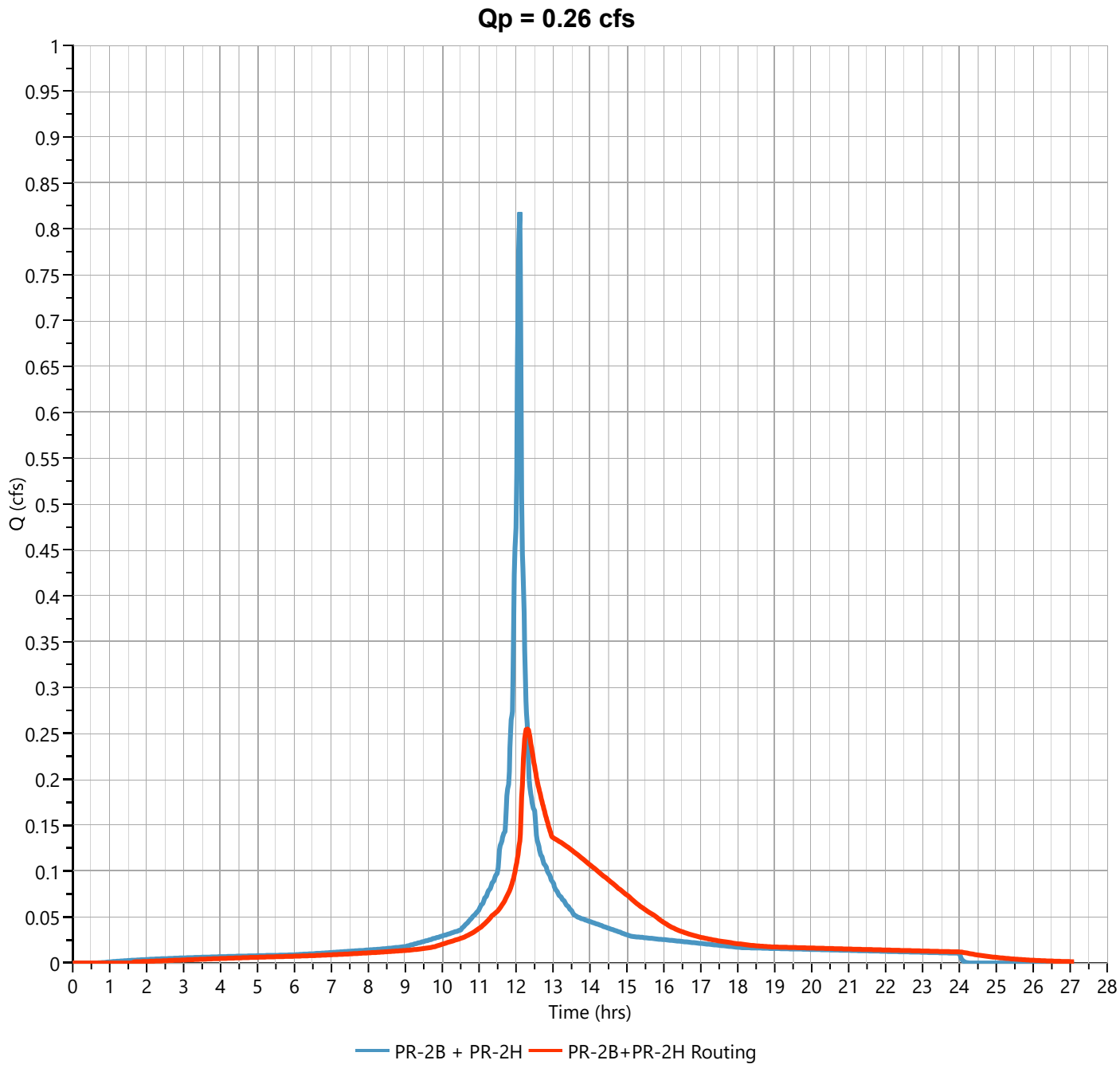
PR-2B+PR-2H Routing

Hyd. No. 39

Hydrograph Type	= Pond Route	Peak Flow	= 0.256 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.30 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,799 cuft
Inflow Hydrograph	= 38 - PR-2B + PR-2H	Max. Elevation	= 355.05 ft
Pond Name	= Porous Pavement System 3	Max. Storage	= 815 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.11 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

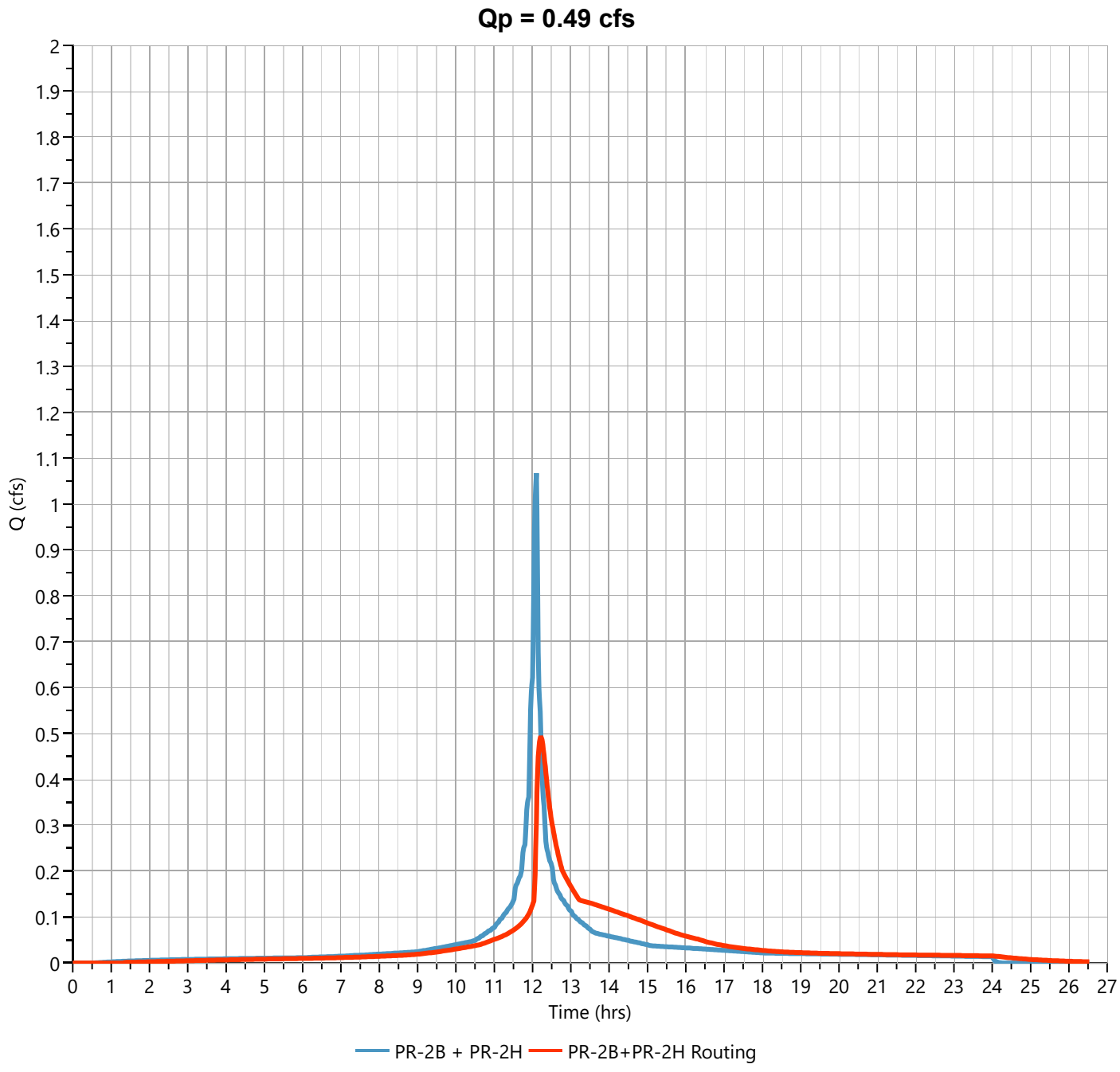
PR-2B+PR-2H Routing

Hyd. No. 39

Hydrograph Type	= Pond Route	Peak Flow	= 0.494 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.22 hrs
Time Interval	= 1 min	Hydrograph Volume	= 3,678 cuft
Inflow Hydrograph	= 38 - PR-2B + PR-2H	Max. Elevation	= 355.23 ft
Pond Name	= Porous Pavement System 3	Max. Storage	= 968 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 59 min



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

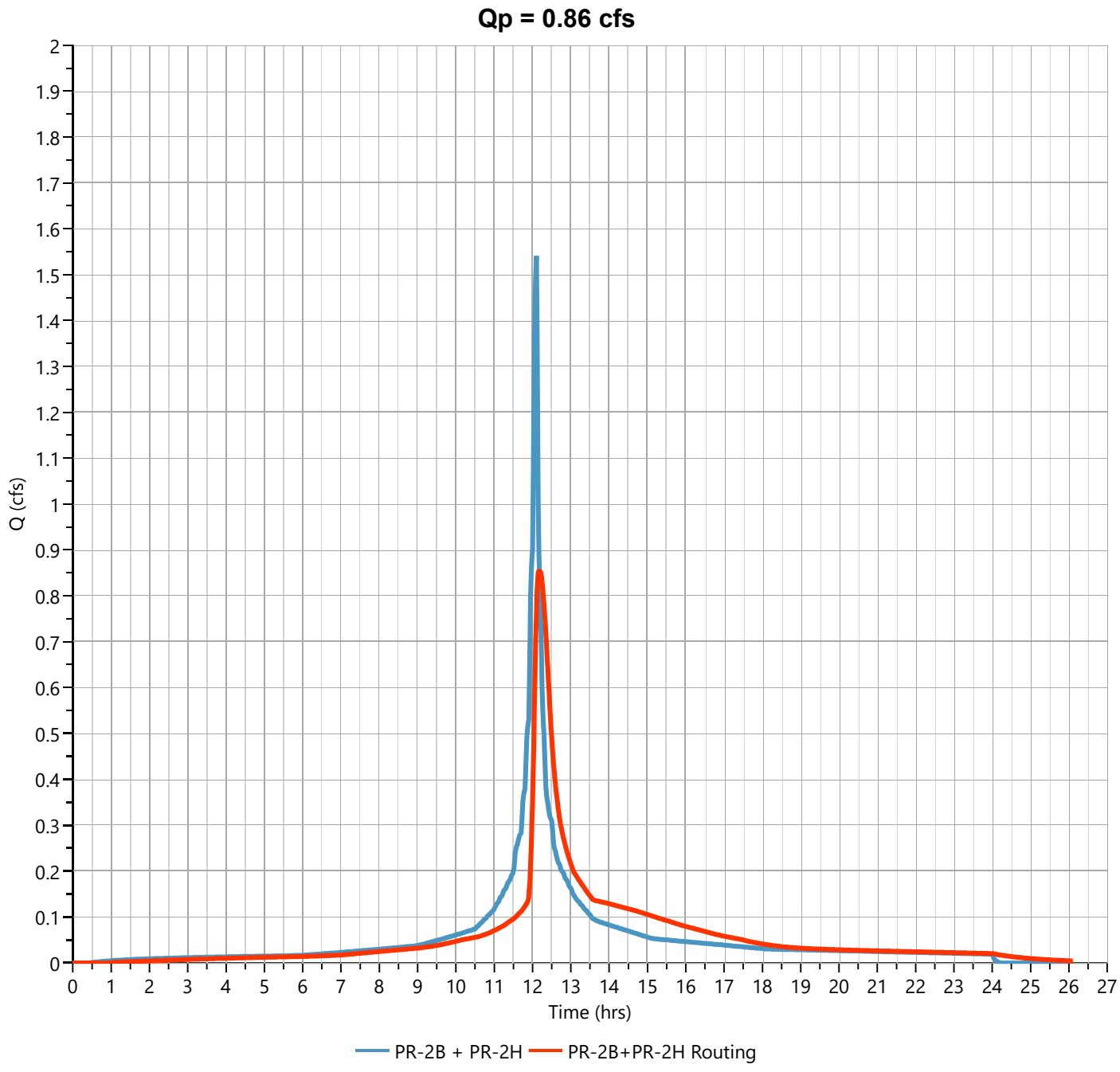
PR-2B+PR-2H Routing

Hyd. No. 39

Hydrograph Type	= Pond Route	Peak Flow	= 0.857 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Hydrograph Volume	= 5,367 cuft
Inflow Hydrograph	= 38 - PR-2B + PR-2H	Max. Elevation	= 355.55 ft
Pond Name	= Porous Pavement System 3	Max. Storage	= 1,241 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 51 min



FUTURE POND ROUTING CALCULATIONS

PR-1A WATERSHED POND ROUTING

Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

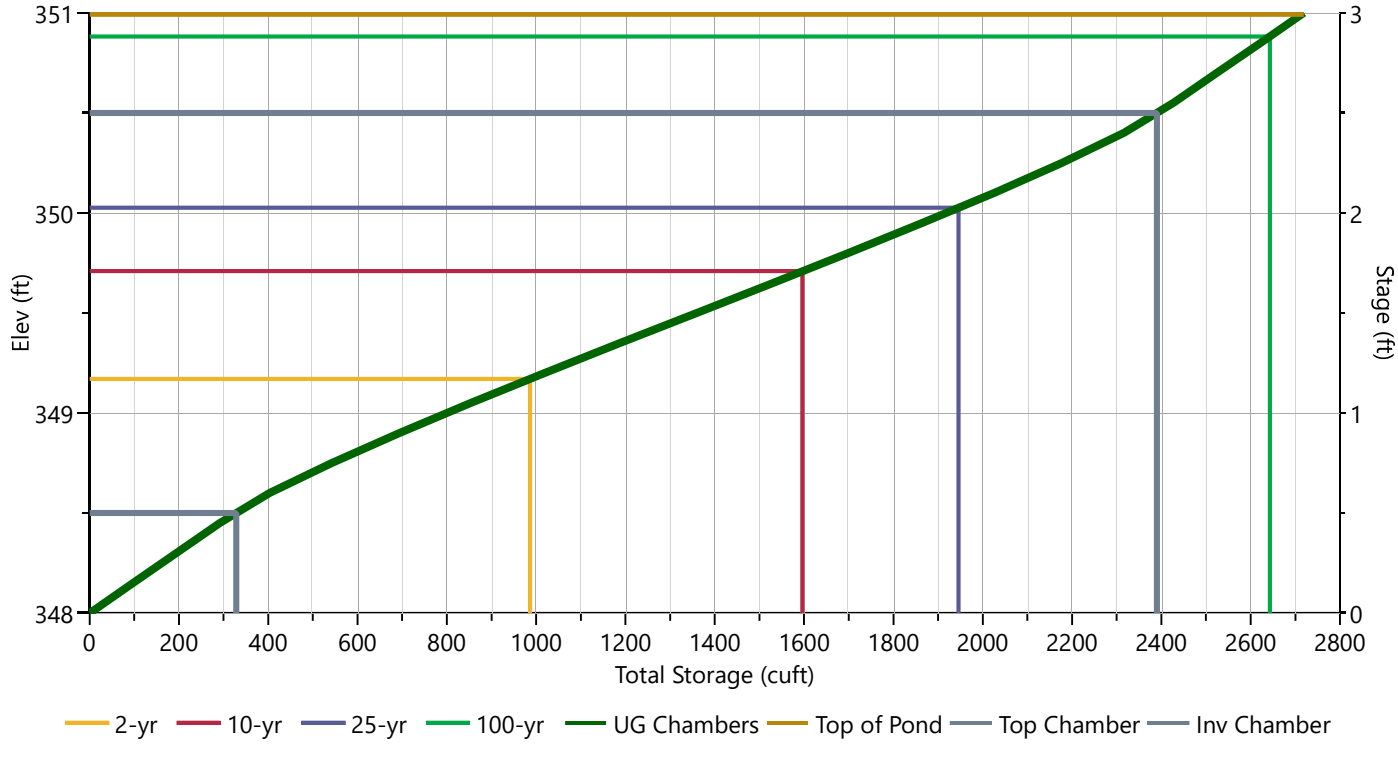
UGD-INF1-1

Stage-Storage

Underground Chambers	
Description	**Input**
Invert Elev Down, ft	348.50
Chamber Rise, ft	2.00
Chamber Shape	Circular
Chamber Span, ft	2.00
Barrel Length, ft	75.00
No. Barrels	5
Barrel Slope, %	0.00
Headers, y/n	Yes
Stone Encasement, y/n	Yes
Encasement Bottom Elevation, ft	348.00
Encasement Width per Chamber, ft	4.00
Encasement Depth, ft	3.00
Encasement Voids, %	40.00

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	348.00	1,620	0.000	0.000
0.15	348.15	1,620	97.2	97.2
0.30	348.30	1,620	97.2	194
0.45	348.45	1,620	97.2	292
0.60	348.60	1,620	112	403
0.75	348.75	1,620	139	542
0.90	348.90	1,620	152	694
1.05	349.05	1,620	160	854
1.20	349.20	1,620	166	1,020
1.35	349.35	1,620	169	1,189
1.50	349.50	1,620	171	1,360
1.65	349.65	1,620	171	1,531
1.80	349.80	1,620	169	1,700
1.95	349.95	1,620	166	1,866
2.10	350.10	1,620	160	2,026
2.25	350.25	1,620	152	2,177
2.40	350.40	1,620	139	2,316
2.55	350.55	1,620	112	2,428
2.70	350.70	1,620	97.2	2,525
2.85	350.85	1,620	97.2	2,622
3.00	351.00	1,620	97.2	2,719



Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

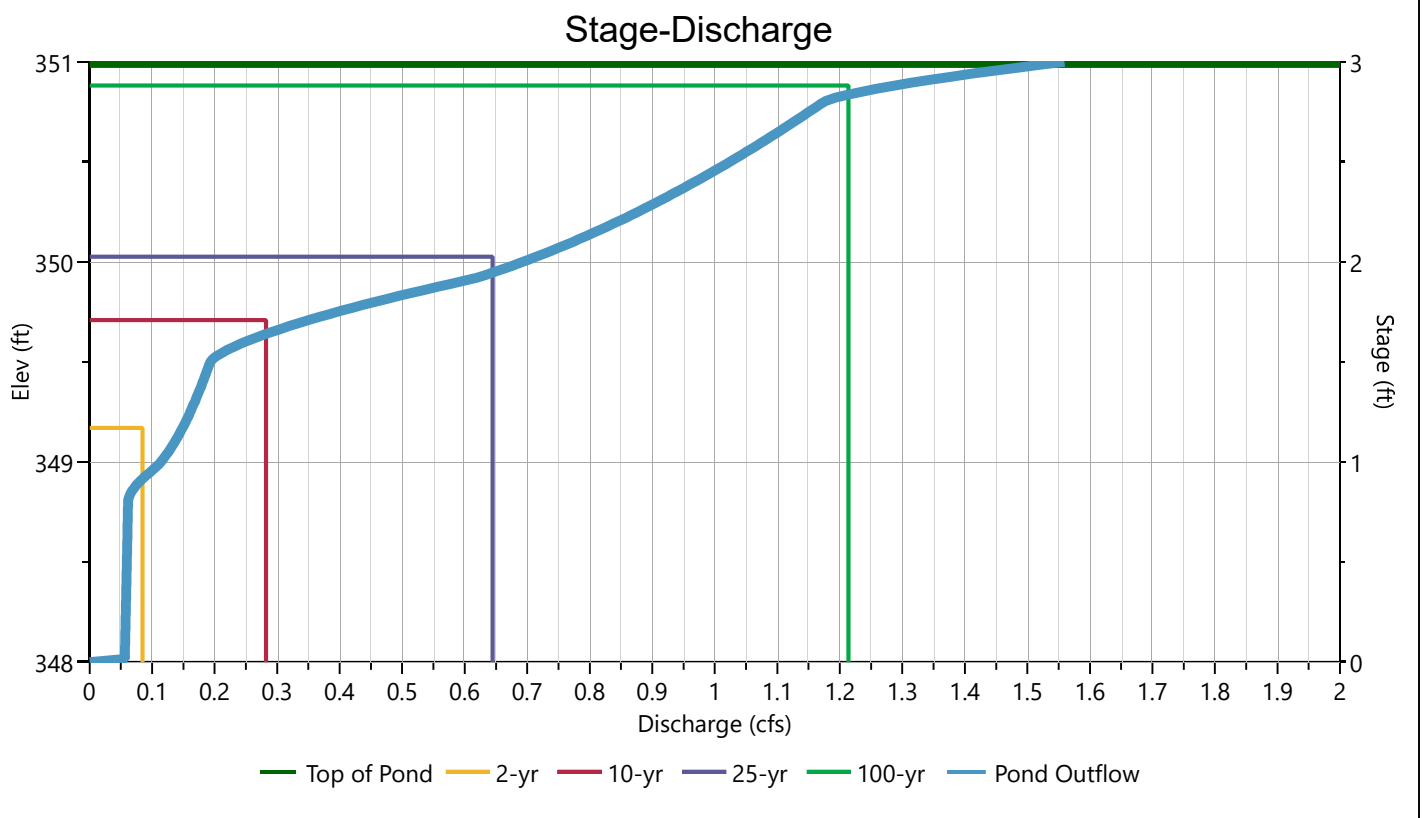
UGD-INF1-1

Stage-Discharge

Culvert / Orifices	Culvert	Orifices			Perforated Riser	
		1	2	3		
Rise, in		2.5	5		Hole Diameter, in	
Span, in		2.5	5		No. holes	
No. Barrels		1	1		Invert Elevation, ft	
Invert Elevation, ft		348.80	349.50		Height, ft	
Orifice Coefficient, Co		0.60	0.60		Orifice Coefficient, Co	
Length, ft						
Barrel Slope, %						
N-Value, n	0.000					

Weirs	Riser*	Weirs			Ancillary	
		1	2	3		
Shape / Type		Rectangular			Exfiltration, in/hr	1.50**
Crest Elevation, ft		350.8				
Crest Length, ft		1				
Angle, deg						
Weir Coefficient, Cw		3.3				

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



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

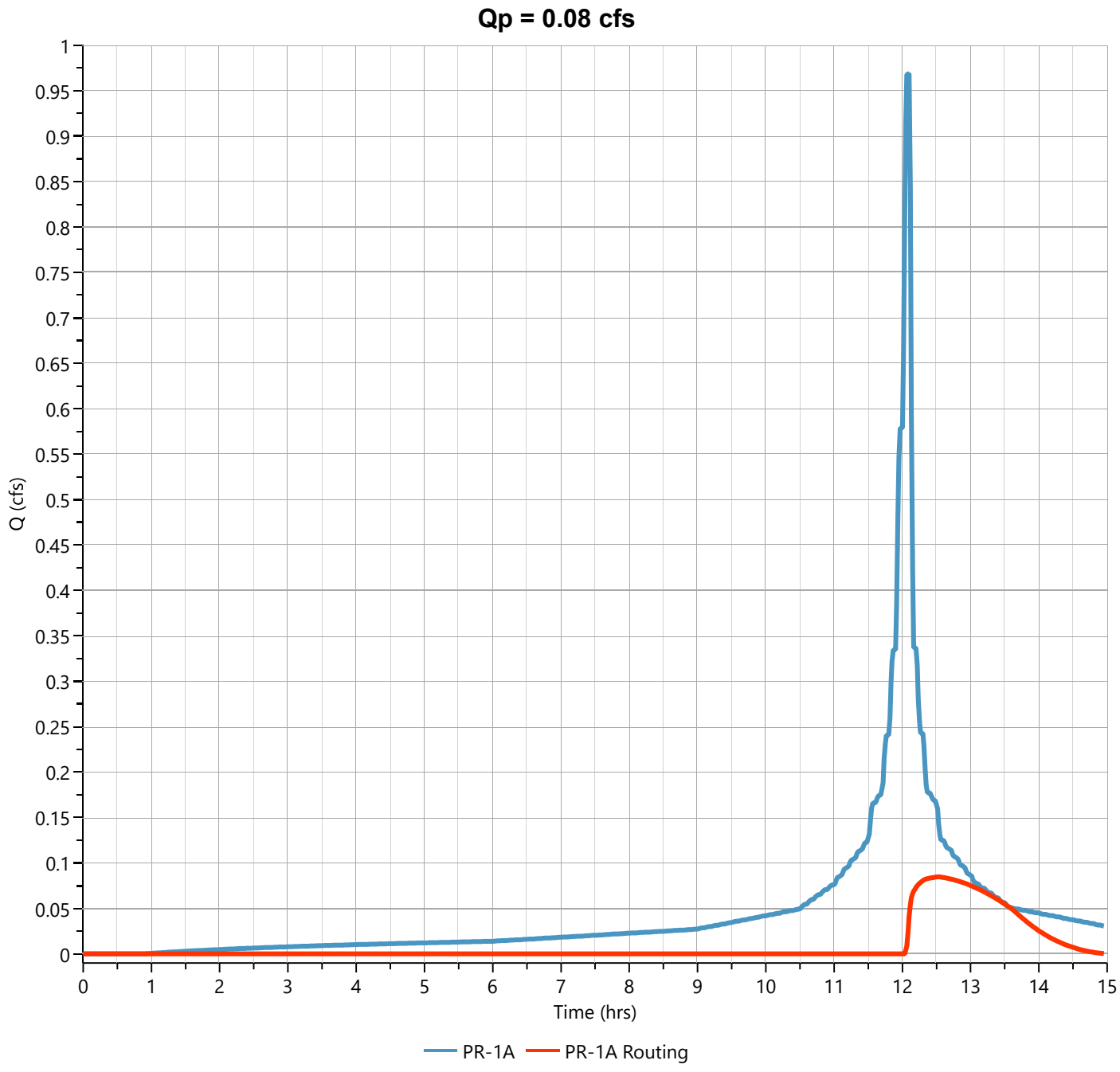
PR-1A Routing

Hyd. No. 2

Hydrograph Type	= Pond Route	Peak Flow	= 0.085 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.53 hrs
Time Interval	= 1 min	Hydrograph Volume	= 482 cuft
Inflow Hydrograph	= 1 - PR-1A	Max. Elevation	= 349.17 ft
Pond Name	= UGD-INF1-1	Max. Storage	= 987 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 31 min



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

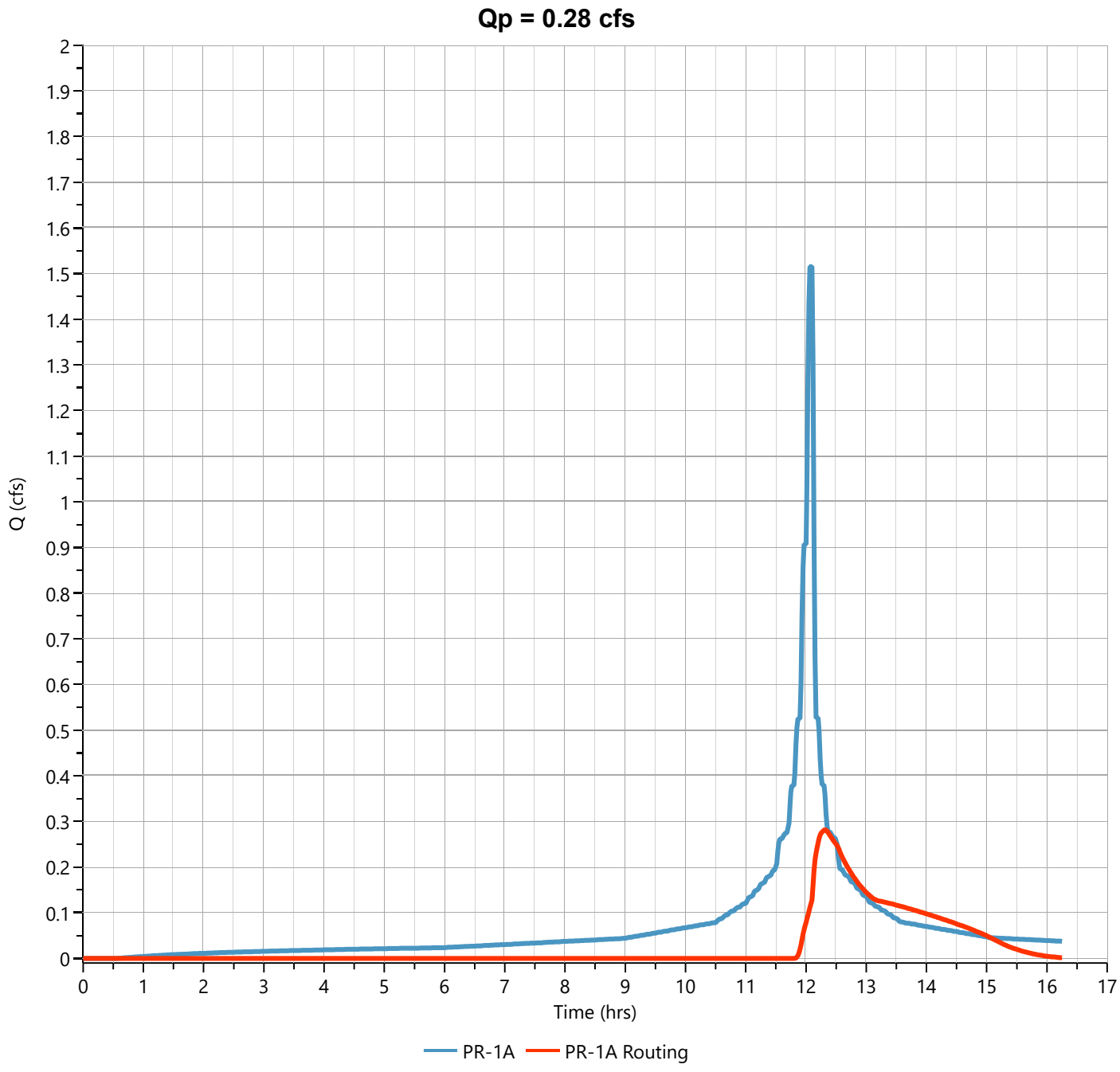
PR-1A Routing

Hyd. No. 2

Hydrograph Type	= Pond Route	Peak Flow	= 0.282 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.32 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,538 cuft
Inflow Hydrograph	= 1 - PR-1A	Max. Elevation	= 349.71 ft
Pond Name	= UGD-INF1-1	Max. Storage	= 1,596 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 54 min



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

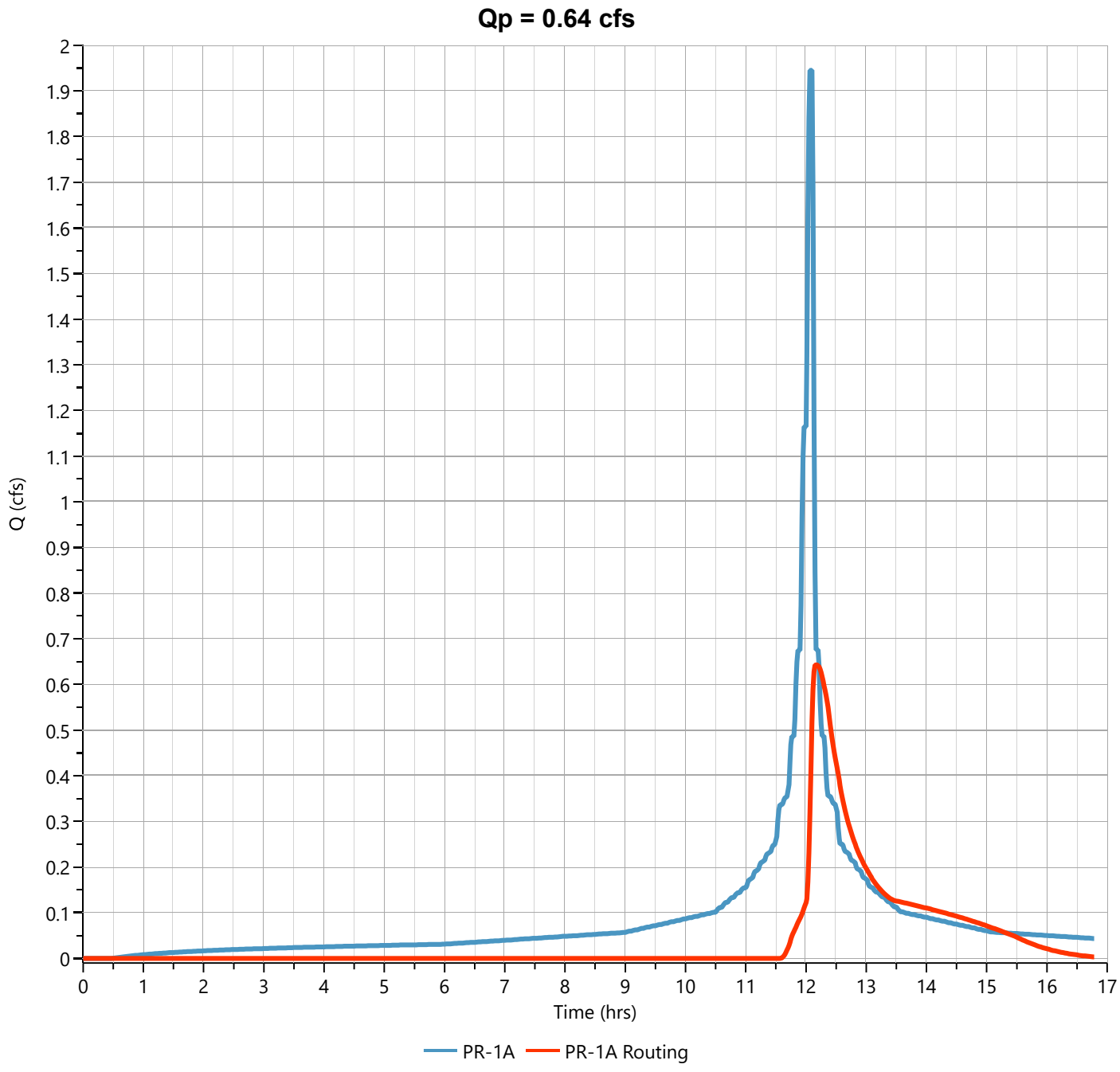
PR-1A Routing

Hyd. No. 2

Hydrograph Type	= Pond Route	Peak Flow	= 0.644 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,527 cuft
Inflow Hydrograph	= 1 - PR-1A	Max. Elevation	= 350.03 ft
Pond Name	= UGD-INF1-1	Max. Storage	= 1,946 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 49 min



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

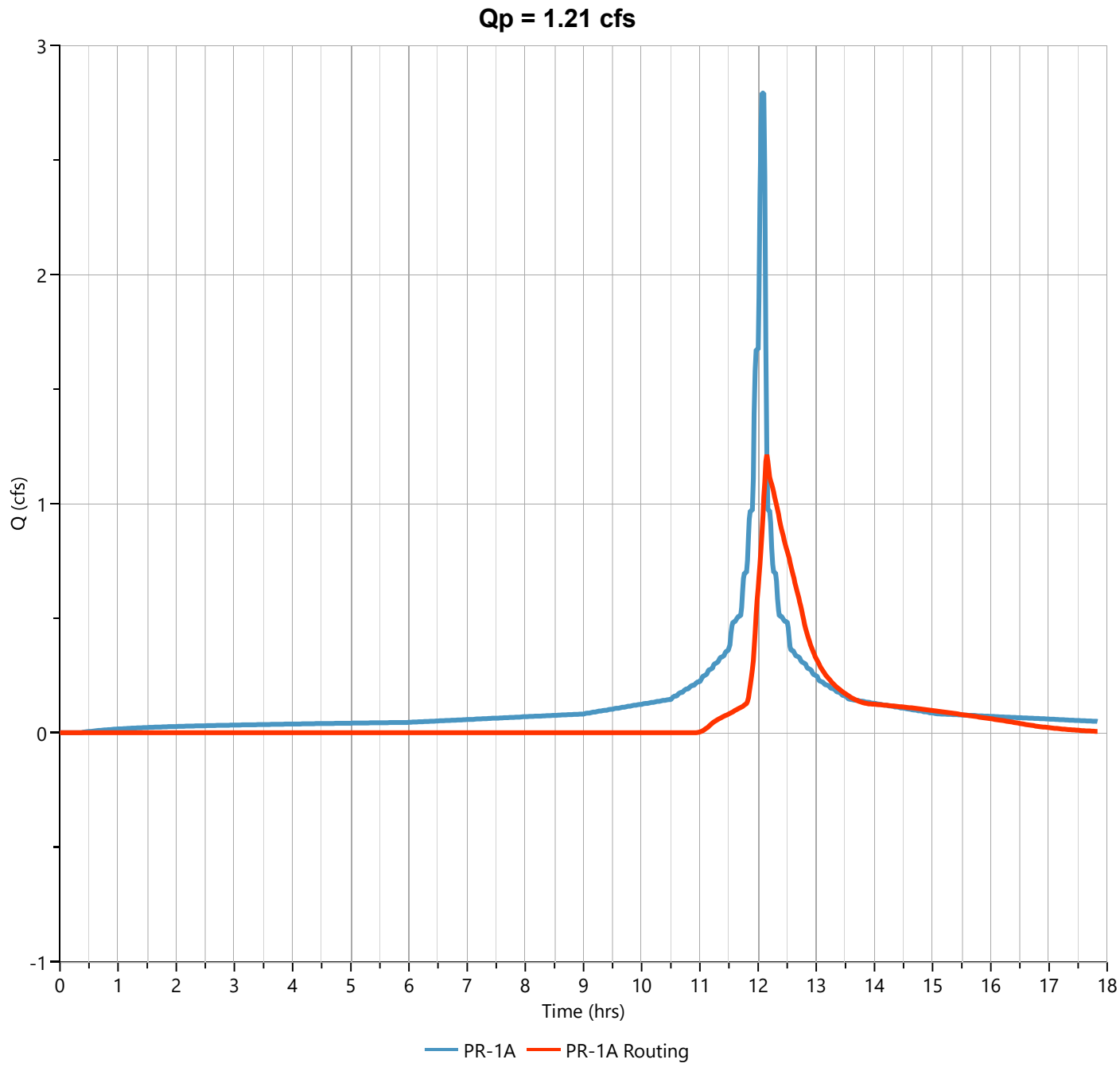
PR-1A Routing

Hyd. No. 2

Hydrograph Type	= Pond Route	Peak Flow	= 1.214 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Hydrograph Volume	= 4,677 cuft
Inflow Hydrograph	= 1 - PR-1A	Max. Elevation	= 350.88 ft
Pond Name	= UGD-INF1-1	Max. Storage	= 2,643 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 47 min



PR-1C WATERSHED POND ROUTING

Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

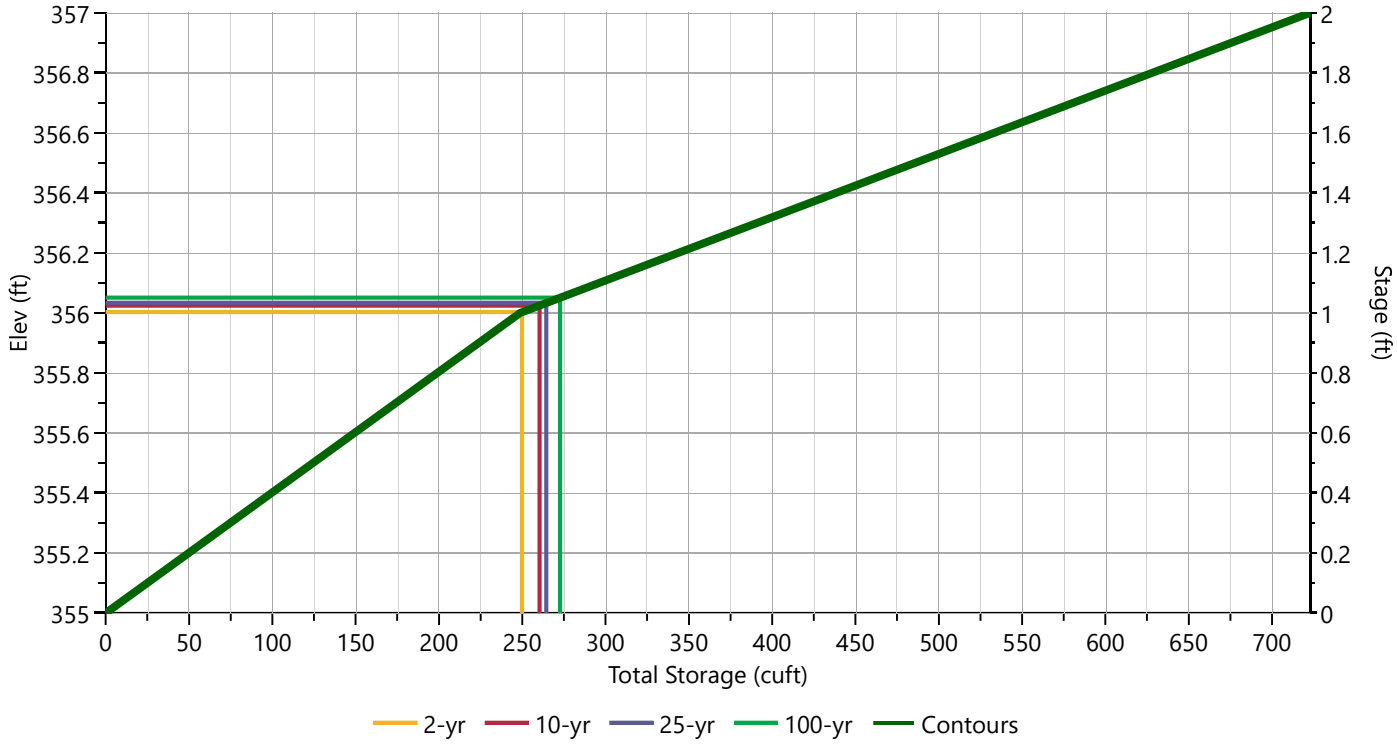
Rain Garden

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	355.00
Voids (%)	100.00
Volume Calc	Broad Crested

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	355.00	150	0.000	0.000
1.00	356.00	347	249	249
2.00	357.00	601	474	723



Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

Rain Garden

Stage-Discharge

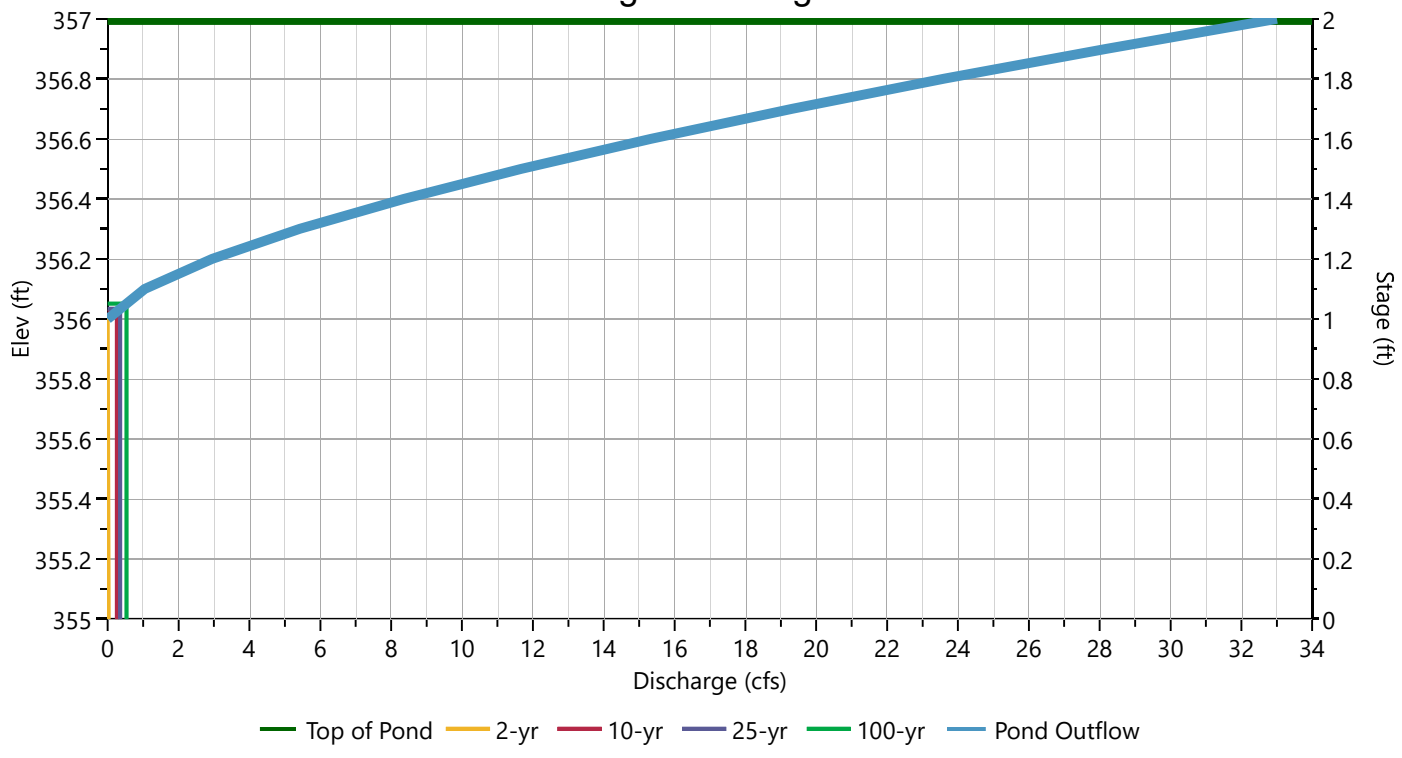
Culvert / Orifices	Culvert	Orifices		
		1	2	3
Rise, in				
Span, in				
No. Barrels				
Invert Elevation, ft				
Orifice Coefficient, Co				
Length, ft				
Barrel Slope, %				
N-Value, n	0.000			

Perforated Riser	
Hole Diameter, in	
No. holes	
Invert Elevation, ft	
Height, ft	
Orifice Coefficient, Co	

Weirs	Riser*	Weirs		
		1	2	3
Shape / Type		Broad Crested		
Crest Elevation, ft		356		
Crest Length, ft		10		
Angle, deg				
Weir Coefficient, Cw		3.3		

Ancillary	
Exfiltration, in/hr	

**Routes through Culvert.*



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

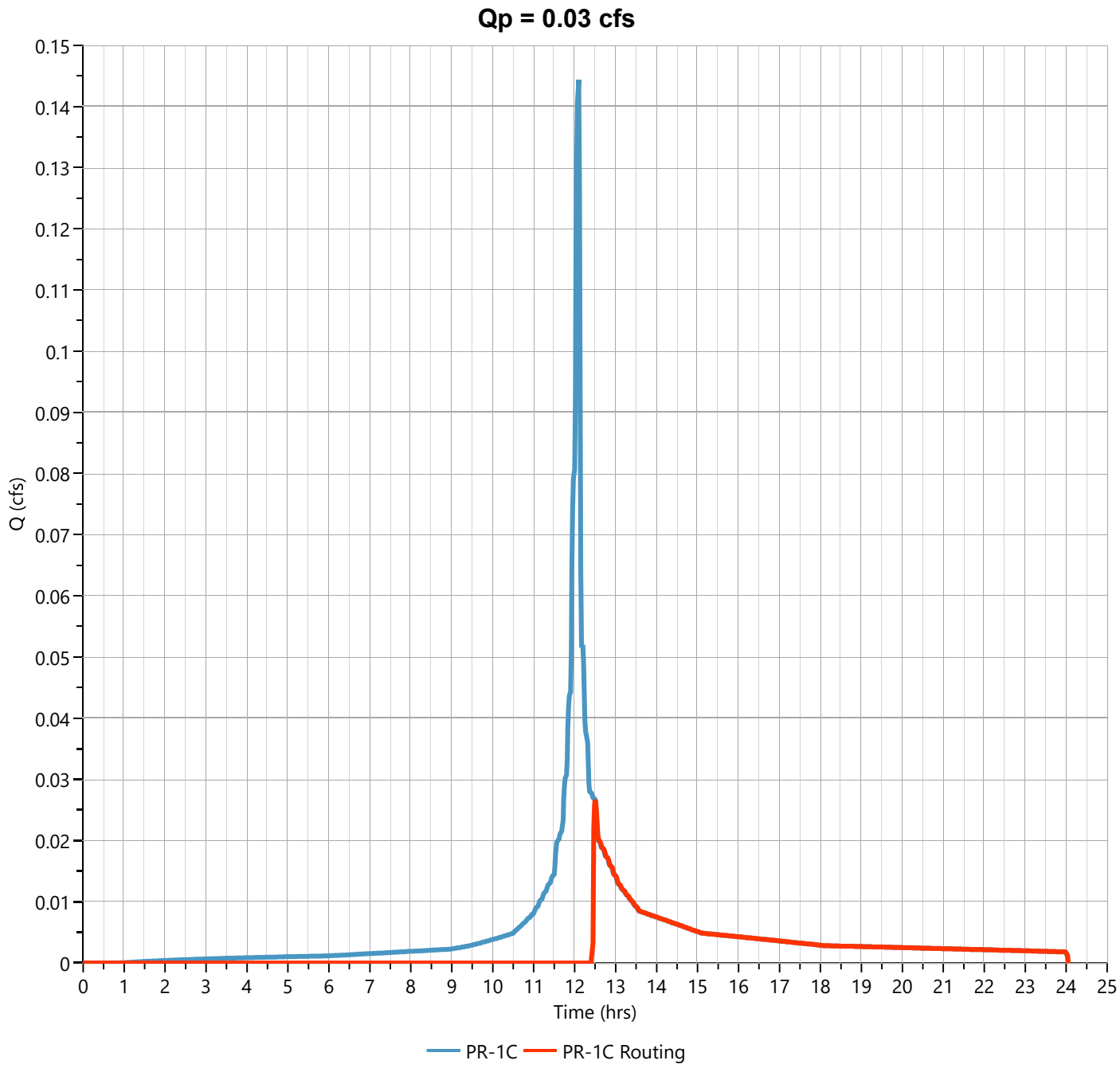
PR-1C Routing

Hyd. No. 11

Hydrograph Type	= Pond Route	Peak Flow	= 0.027 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.50 hrs
Time Interval	= 1 min	Hydrograph Volume	= 188 cuft
Inflow Hydrograph	= 10 - PR-1C	Max. Elevation	= 356.00 ft
Pond Name	= Rain Garden	Max. Storage	= 250 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.88 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

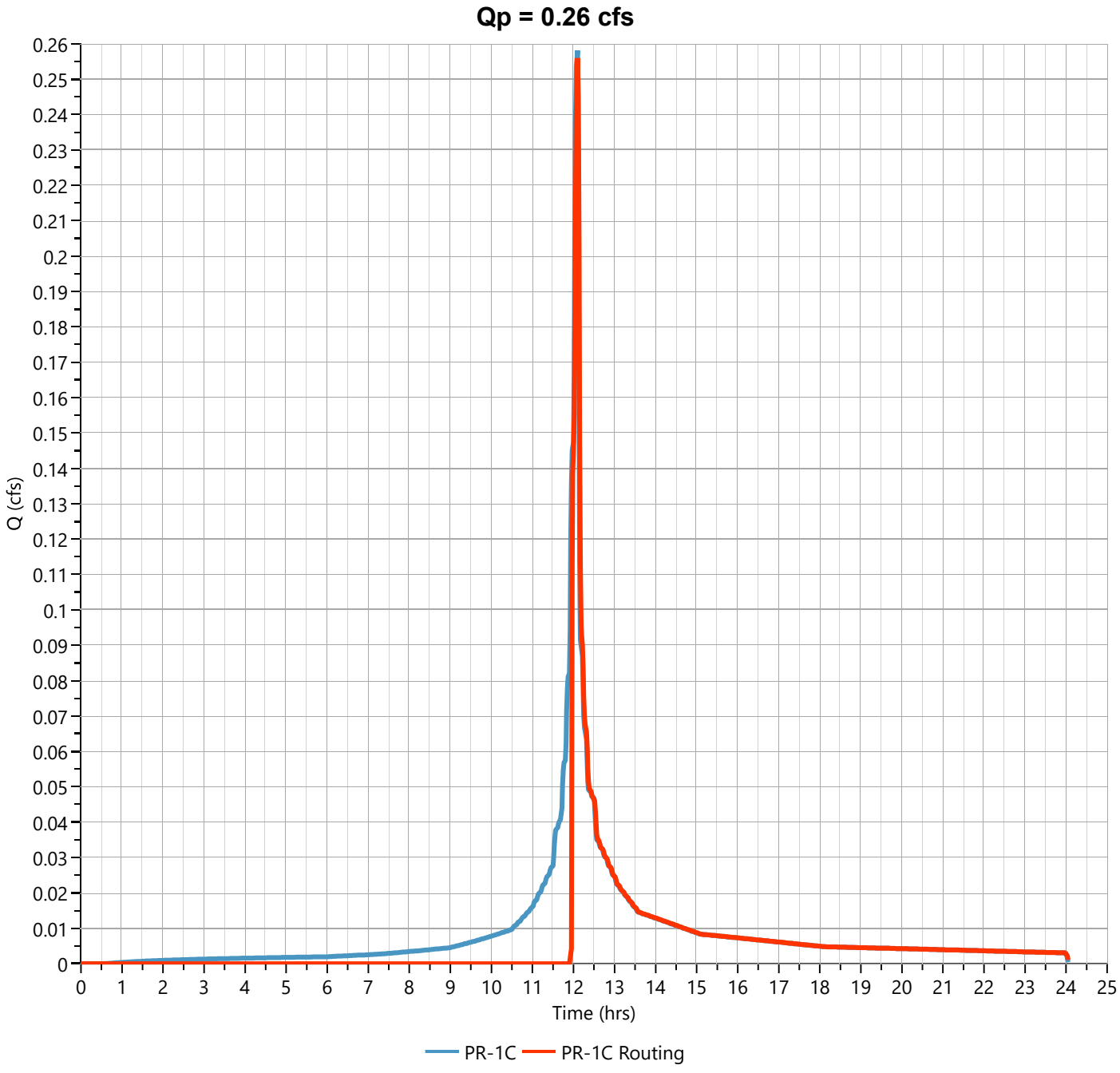
PR-1C Routing

Hyd. No. 11

Hydrograph Type	= Pond Route	Peak Flow	= 0.256 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 534 cuft
Inflow Hydrograph	= 10 - PR-1C	Max. Elevation	= 356.02 ft
Pond Name	= Rain Garden	Max. Storage	= 260 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.43 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

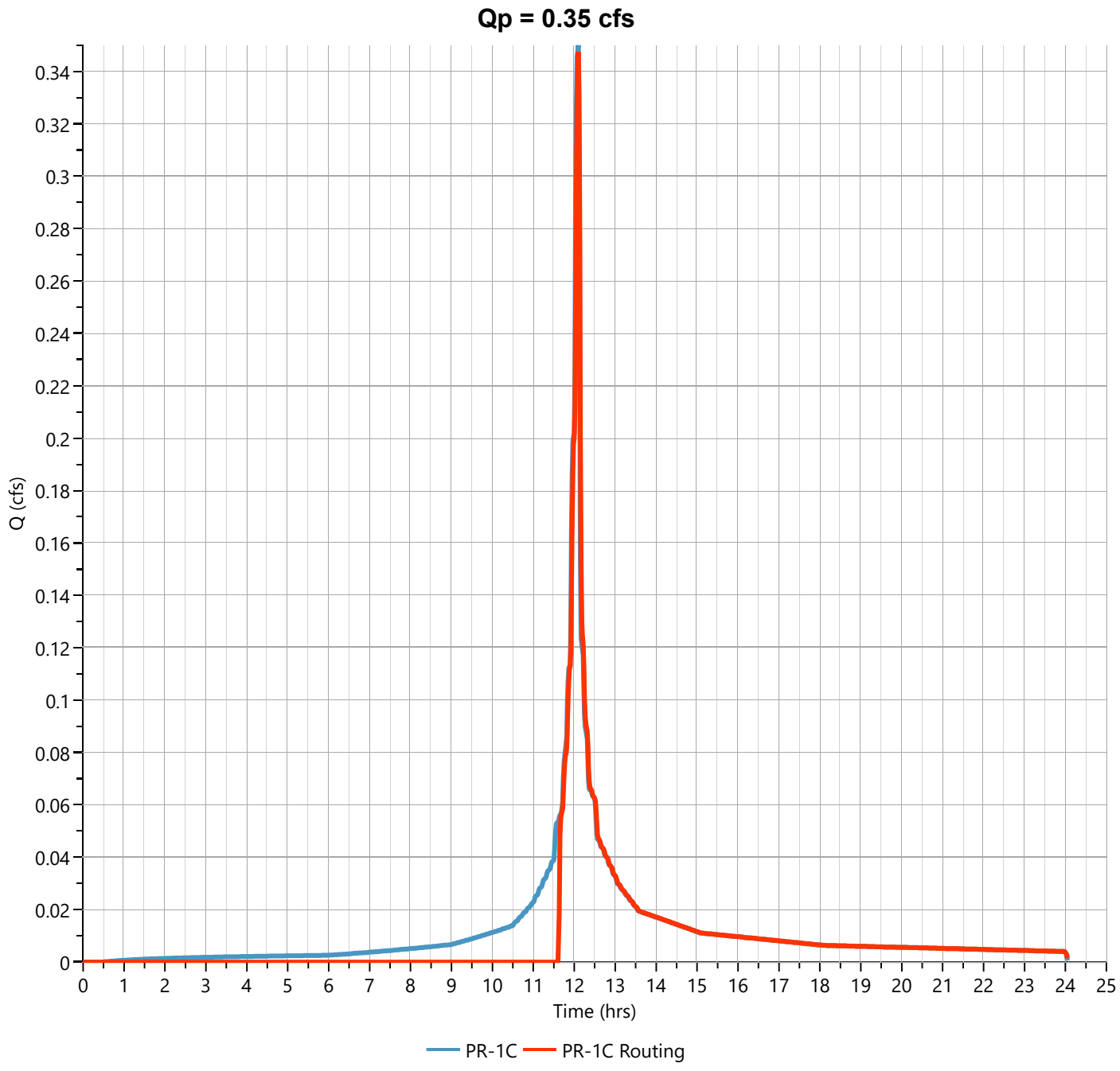
PR-1C Routing

Hyd. No. 11

Hydrograph Type	= Pond Route	Peak Flow	= 0.348 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 819 cuft
Inflow Hydrograph	= 10 - PR-1C	Max. Elevation	= 356.03 ft
Pond Name	= Rain Garden	Max. Storage	= 264 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.15 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

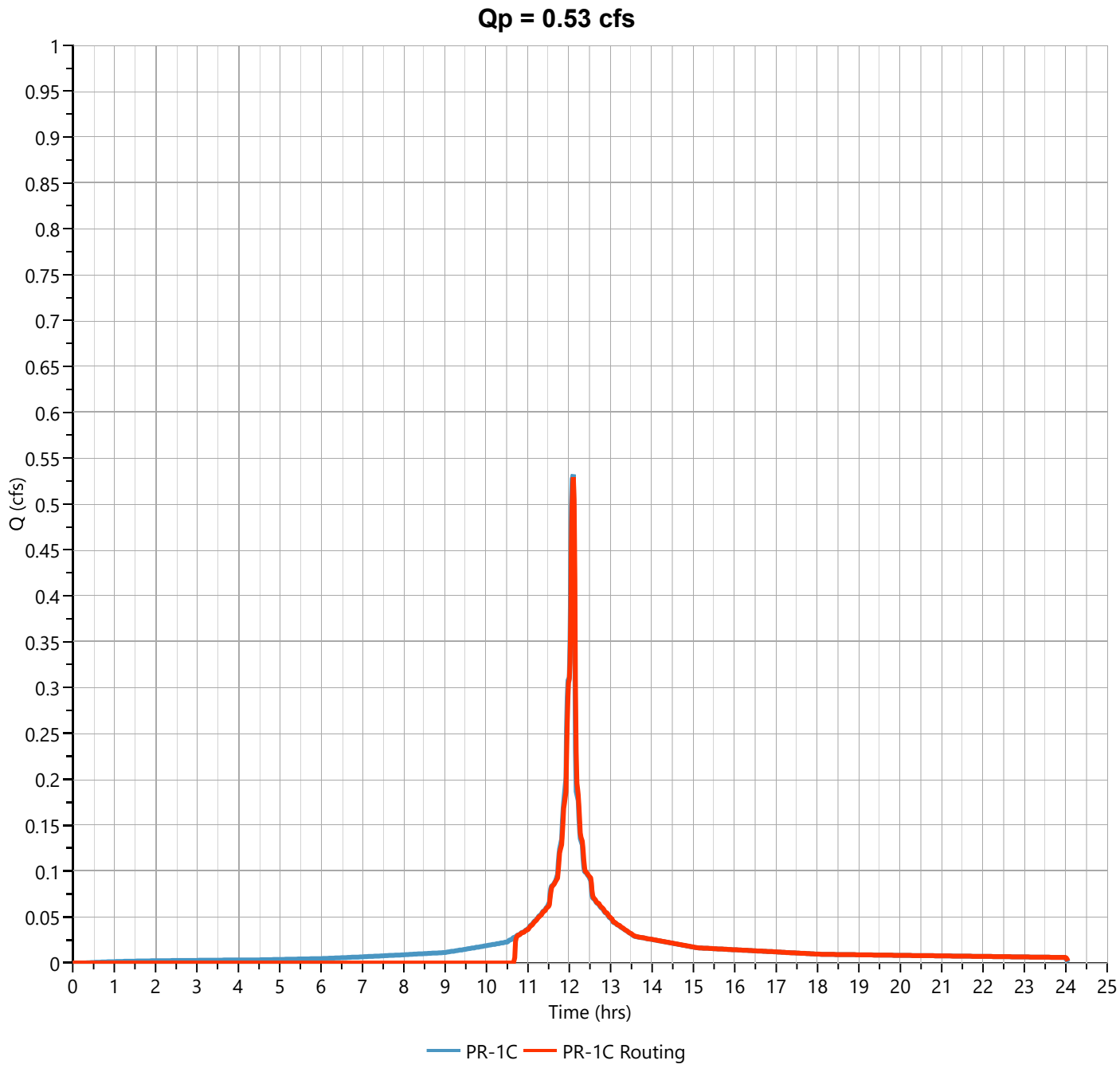
PR-1C Routing

Hyd. No. 11

Hydrograph Type	= Pond Route	Peak Flow	= 0.529 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,398 cuft
Inflow Hydrograph	= 10 - PR-1C	Max. Elevation	= 356.05 ft
Pond Name	= Rain Garden	Max. Storage	= 273 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 55 min



COMBINED TO UNDERGROUND INFILTRATION BASIN 1-2
POND ROUTING

Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

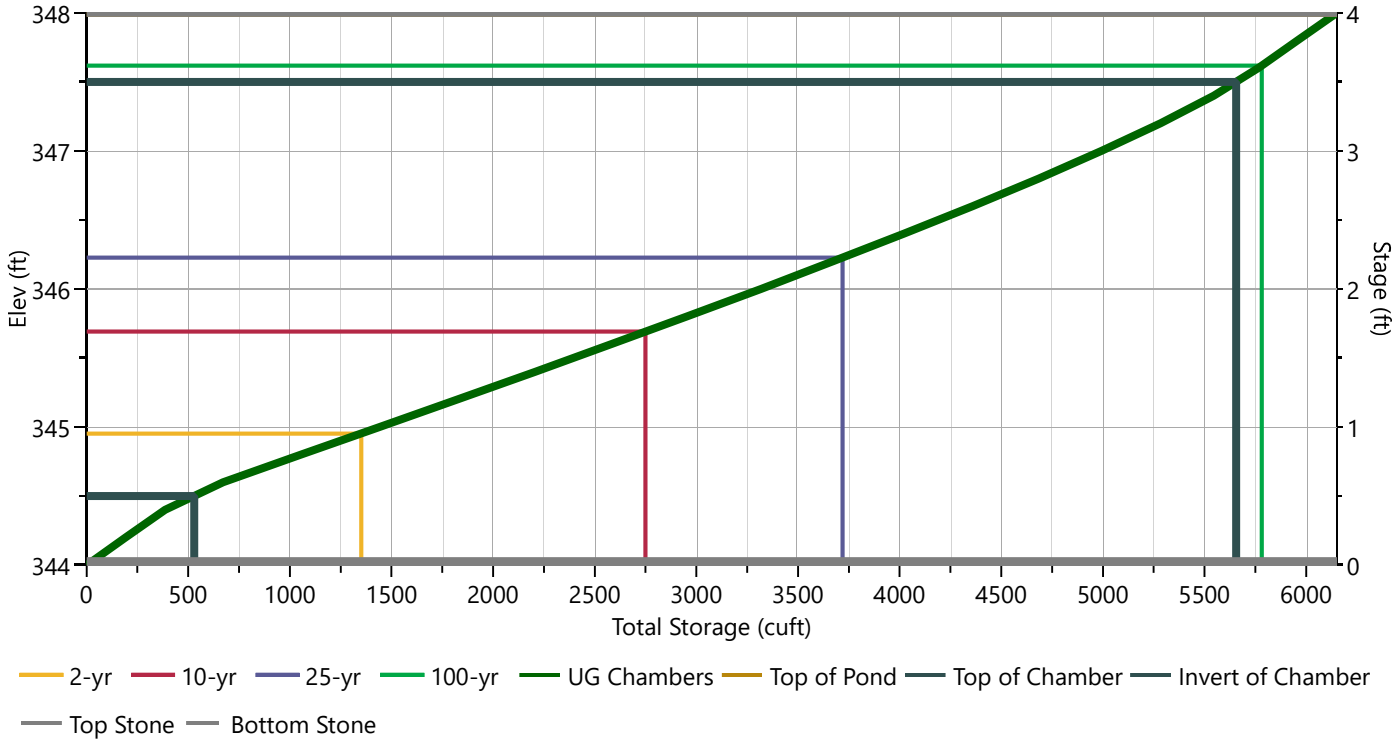
UGD-INF1-2

Stage-Storage

Cultec Recharger® 360HD Chamber	
Description	**Input**
Chamber Height, in	36
Chamber Shape	Arch
Chamber Width, in	60
Installed Length, ft	3.67
No. Chambers	103
Bare Chamber Stor, cuft	3,776
No. Rows	3
Space Between Rows, in	9
Stone Above, in	6
Stone Below, in	6
Stone Sides, in	12
Stone Ends, in	12
Encasement Voids, %	40.00
Encasement Bottom Elevation, ft	344.00

Stage / Storage Table

Stage (in)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.0	344.00	2,414	0.000	0.000
2.4	344.20	2,414	193	193
4.8	344.40	2,414	193	386
7.2	344.60	2,414	285	671
9.6	344.80	2,414	387	1,058
12.0	345.00	2,414	385	1,443
14.4	345.20	2,414	383	1,826
16.8	345.40	2,414	380	2,206
19.2	345.60	2,414	376	2,582
21.6	345.80	2,414	371	2,953
24.0	346.00	2,414	365	3,317
26.4	346.20	2,414	357	3,674
28.8	346.40	2,414	348	4,022
31.2	346.60	2,414	338	4,360
33.6	346.80	2,414	325	4,685
36.0	347.00	2,414	309	4,994
38.4	347.20	2,414	290	5,284
40.8	347.40	2,414	262	5,545
43.2	347.60	2,414	220	5,765
45.6	347.80	2,414	193	5,959
48.0	348.00	2,414	193	6,152



Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

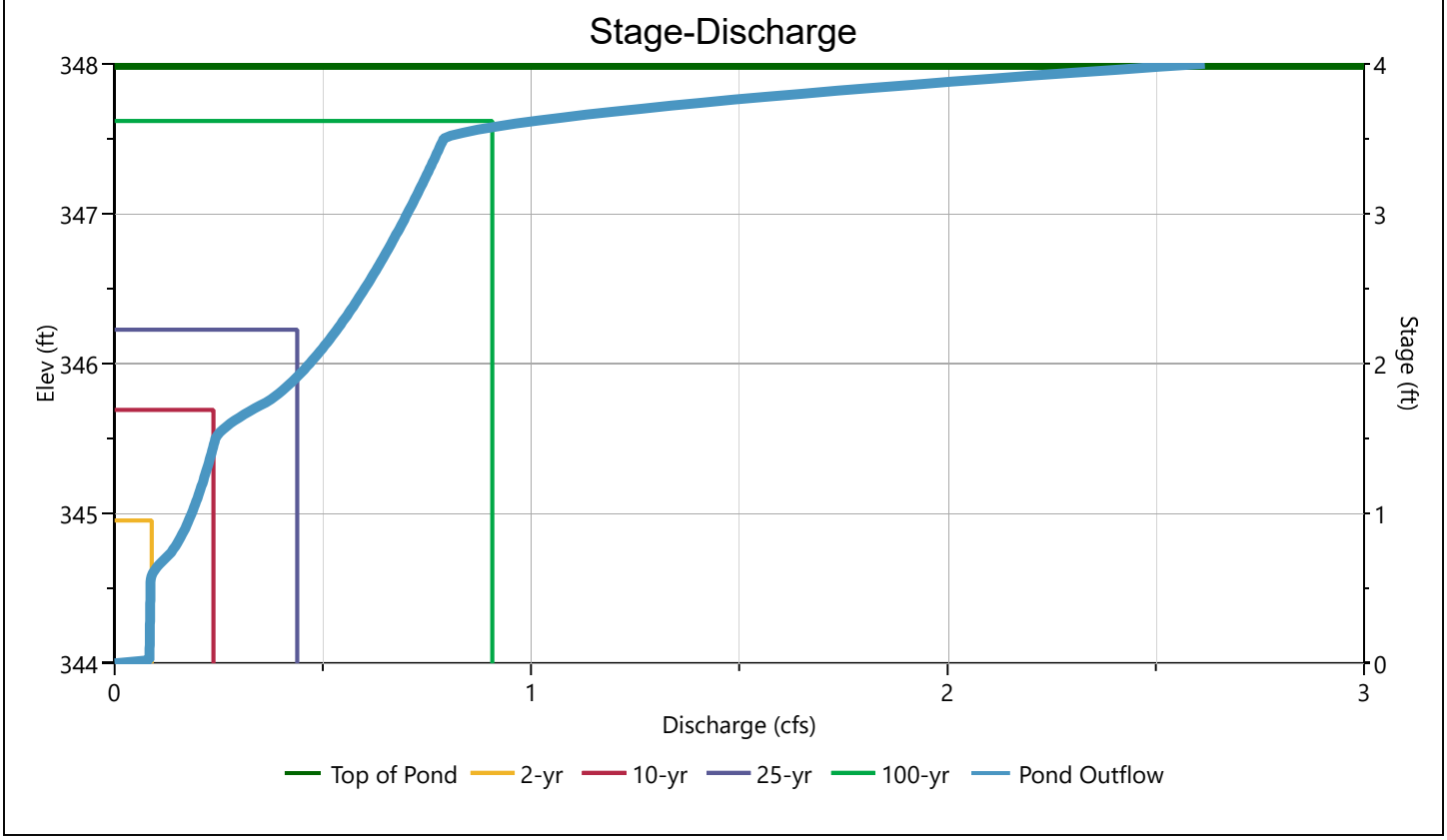
UGD-INF1-2

Stage-Discharge

Culvert / Orifices	Culvert	Orifices			Perforated Riser	
		1	2	3		
Rise, in		2.5	3		Hole Diameter, in	
Span, in		2.5	3		No. holes	
No. Barrels		1	1		Invert Elevation, ft	
Invert Elevation, ft		344.55	345.50		Height, ft	
Orifice Coefficient, Co		0.60	0.60		Orifice Coefficient, Co	
Length, ft						
Barrel Slope, %						
N-Value, n	0.000					

Weirs	Riser*	Weirs			Ancillary	
		1	2	3		
Shape / Type		Rectangular			Exfiltration, in/hr	1.50**
Crest Elevation, ft		347.5				
Crest Length, ft		1.5				
Angle, deg						
Weir Coefficient, Cw		3.3				

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



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

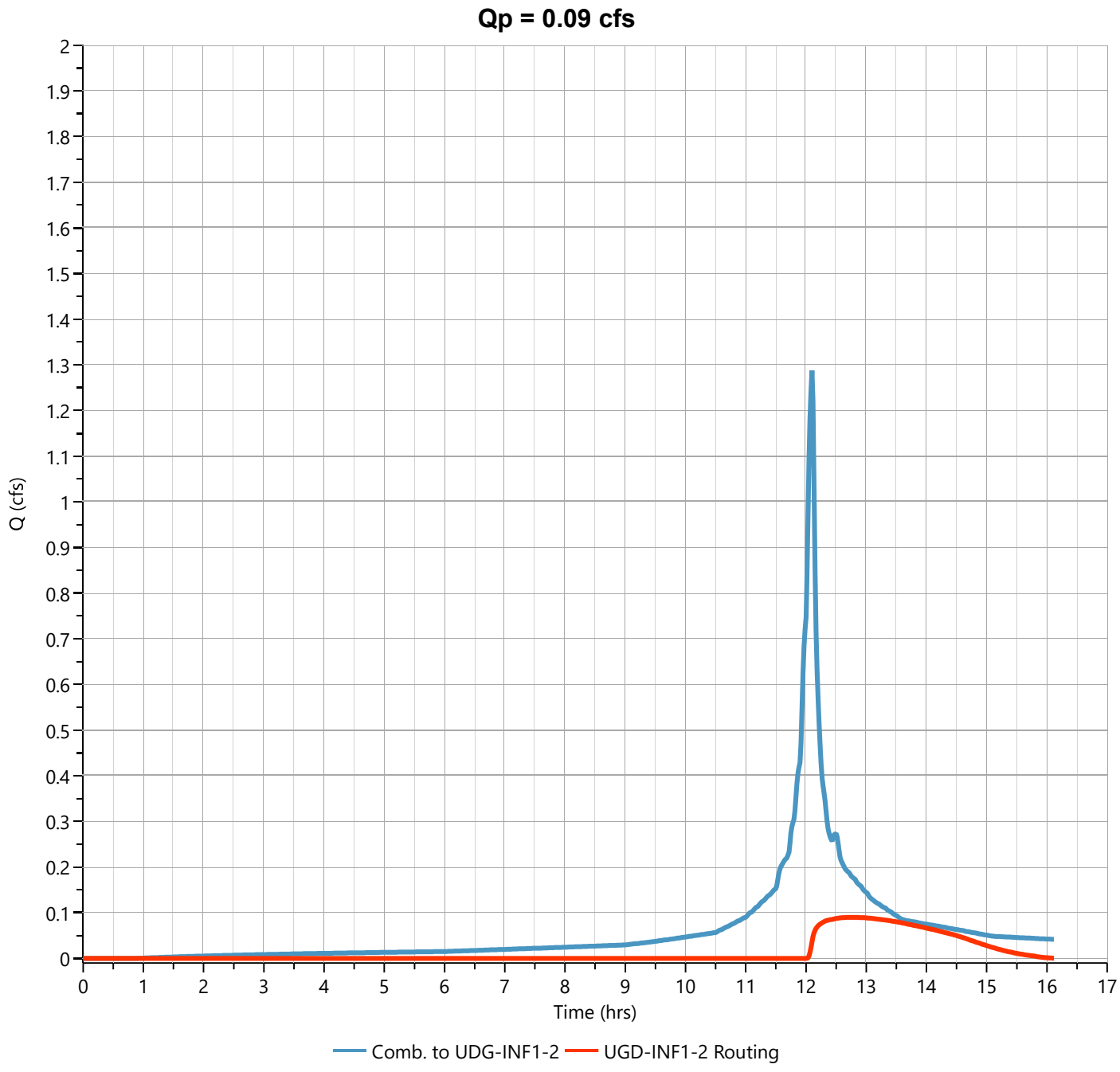
UGD-INF1-2 Routing

Hyd. No. 20

Hydrograph Type	= Pond Route	Peak Flow	= 0.090 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.77 hrs
Time Interval	= 1 min	Hydrograph Volume	= 777 cuft
Inflow Hydrograph	= 18 - Comb. to UDG-INF1-2	Max. Elevation	= 344.95 ft
Pond Name	= UGD-INF1-2	Max. Storage	= 1,352 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 29 min



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

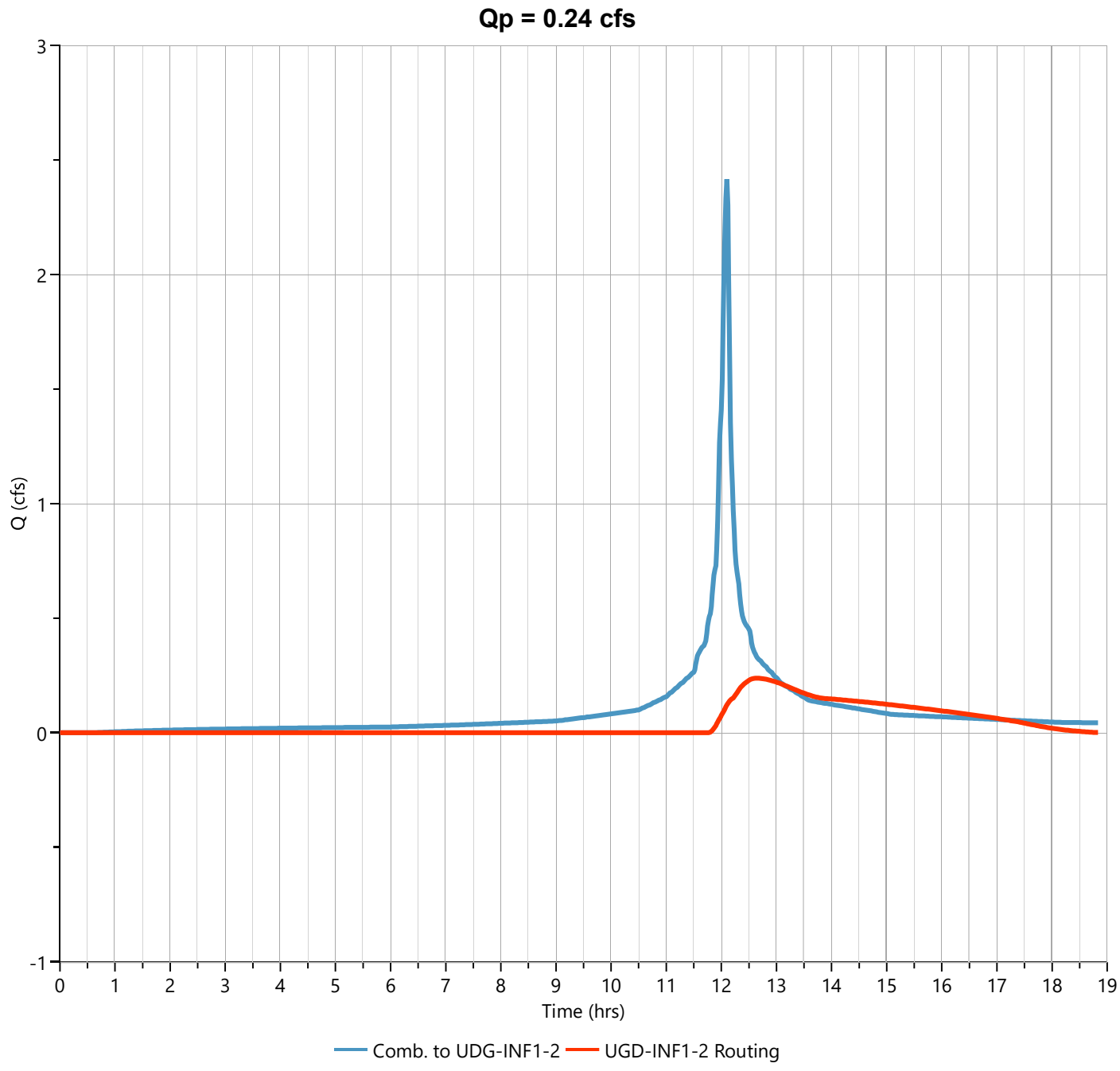
UGD-INF1-2 Routing

Hyd. No. 20

Hydrograph Type	= Pond Route	Peak Flow	= 0.238 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.65 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,727 cuft
Inflow Hydrograph	= 18 - Comb. to UDG-INF1-2	Max. Elevation	= 345.69 ft
Pond Name	= UGD-INF1-2	Max. Storage	= 2,750 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.40 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

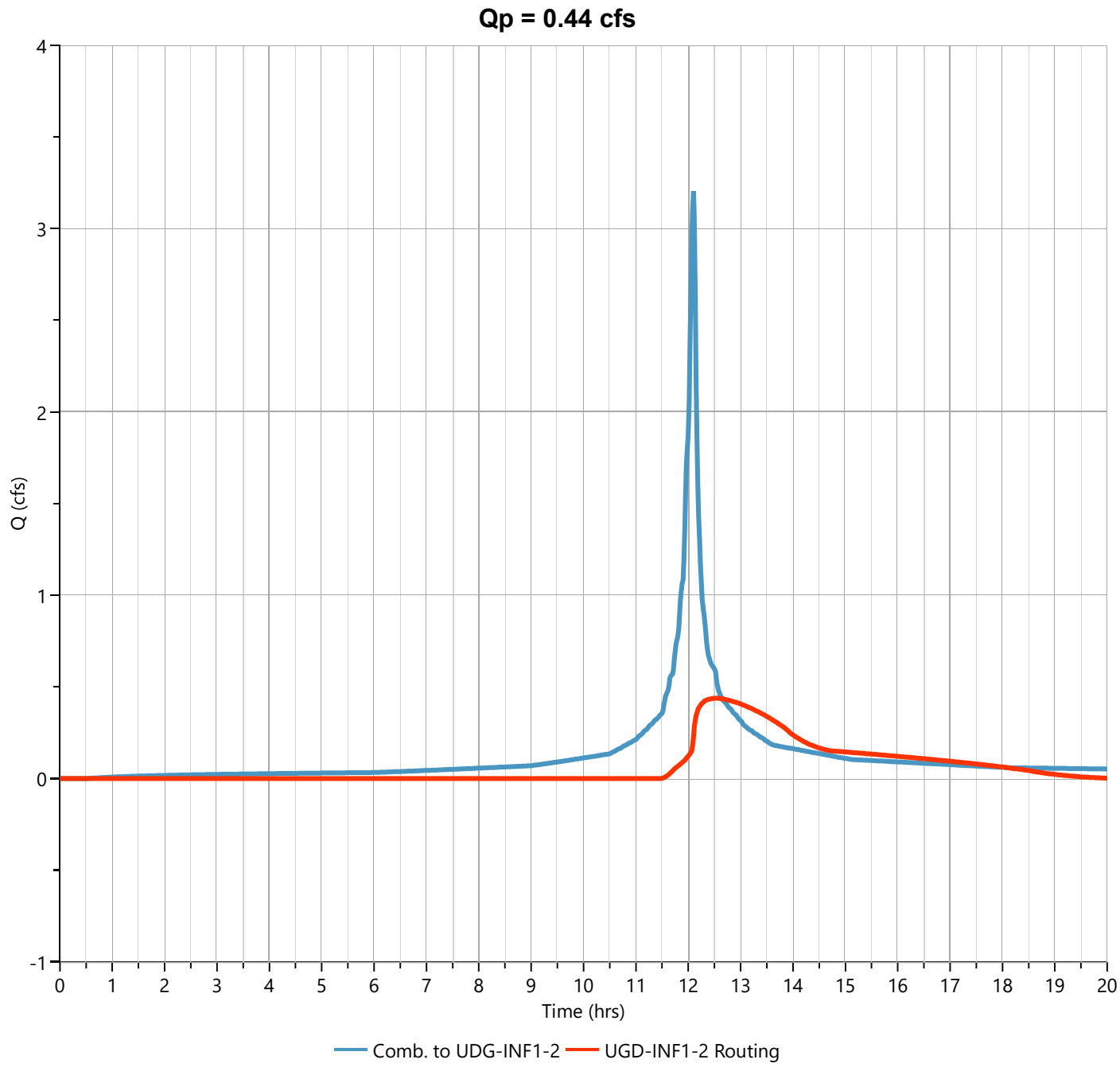
UGD-INF1-2 Routing

Hyd. No. 20

Hydrograph Type	= Pond Route	Peak Flow	= 0.439 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.55 hrs
Time Interval	= 1 min	Hydrograph Volume	= 4,692 cuft
Inflow Hydrograph	= 18 - Comb. to UDG-INF1-2	Max. Elevation	= 346.23 ft
Pond Name	= UGD-INF1-2	Max. Storage	= 3,719 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.40 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

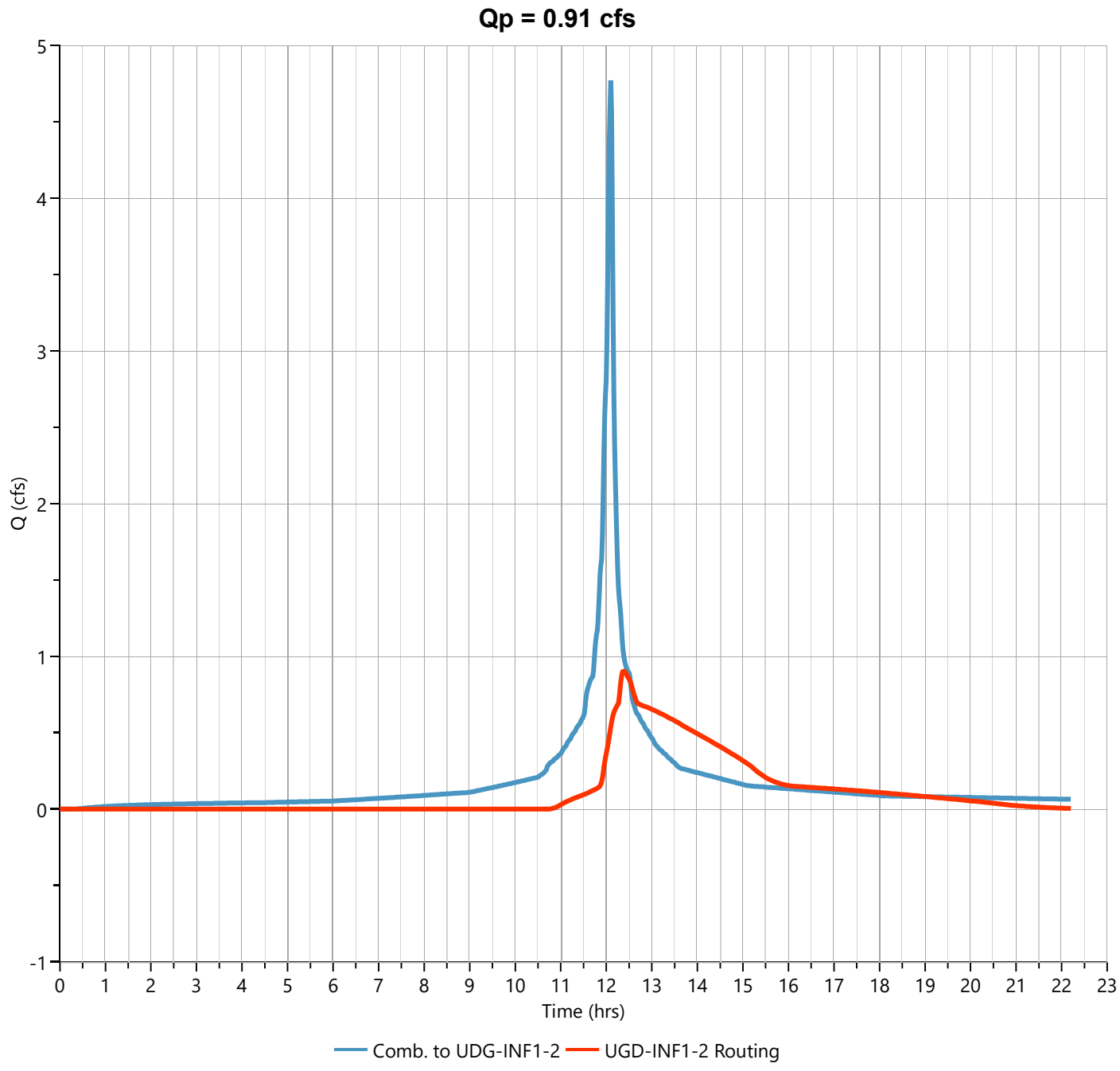
UGD-INF1-2 Routing

Hyd. No. 20

Hydrograph Type	= Pond Route	Peak Flow	= 0.907 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.38 hrs
Time Interval	= 1 min	Hydrograph Volume	= 9,016 cuft
Inflow Hydrograph	= 18 - Comb. to UDG-INF1-2	Max. Elevation	= 347.62 ft
Pond Name	= UGD-INF1-2	Max. Storage	= 5,782 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.63 hrs



PR-2A WATERSHED POND ROUTING

Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

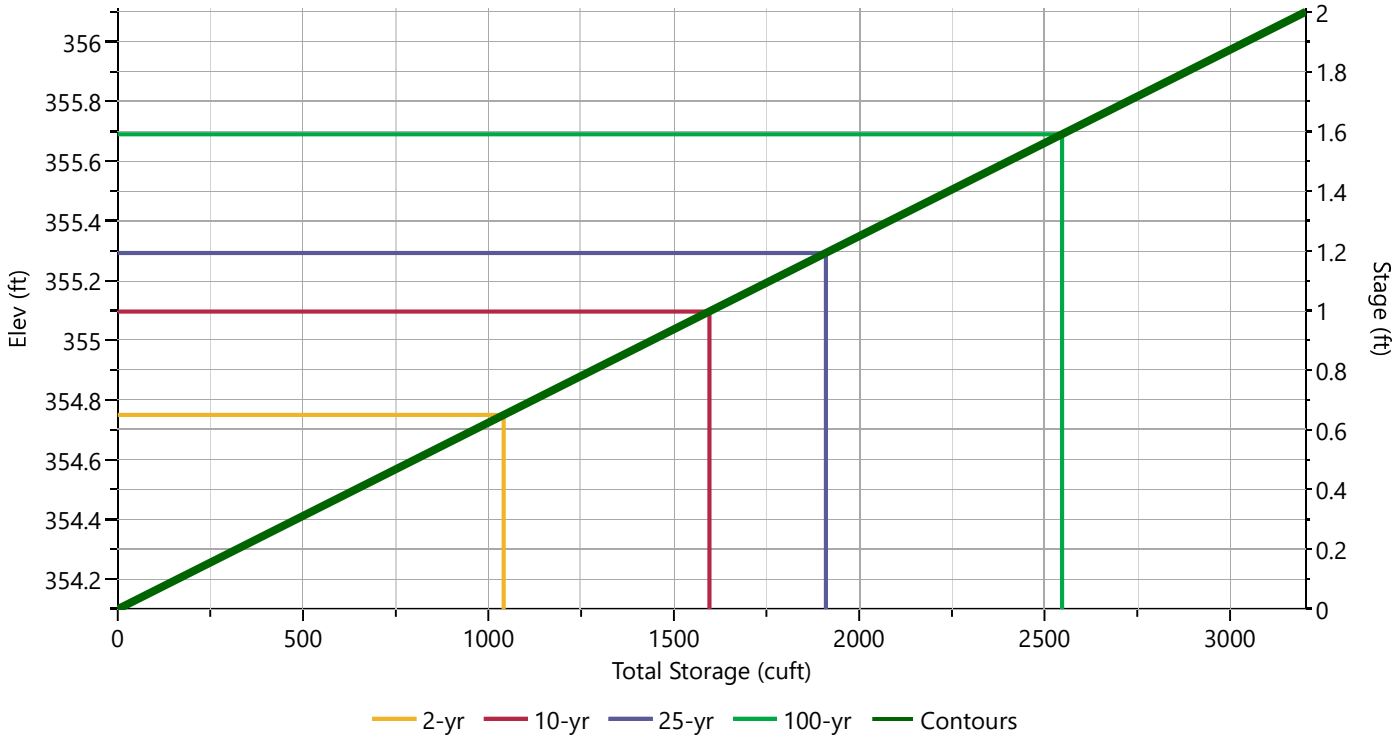
Porous Pavement System 1

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	354.10
Voids (%)	40.00
Volume Calc	Ave End Area

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	354.10	4,006	0.000	0.000
1.00	355.10	4,006	1,602	1,602
2.00	356.10	4,006	1,602	3,205



Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

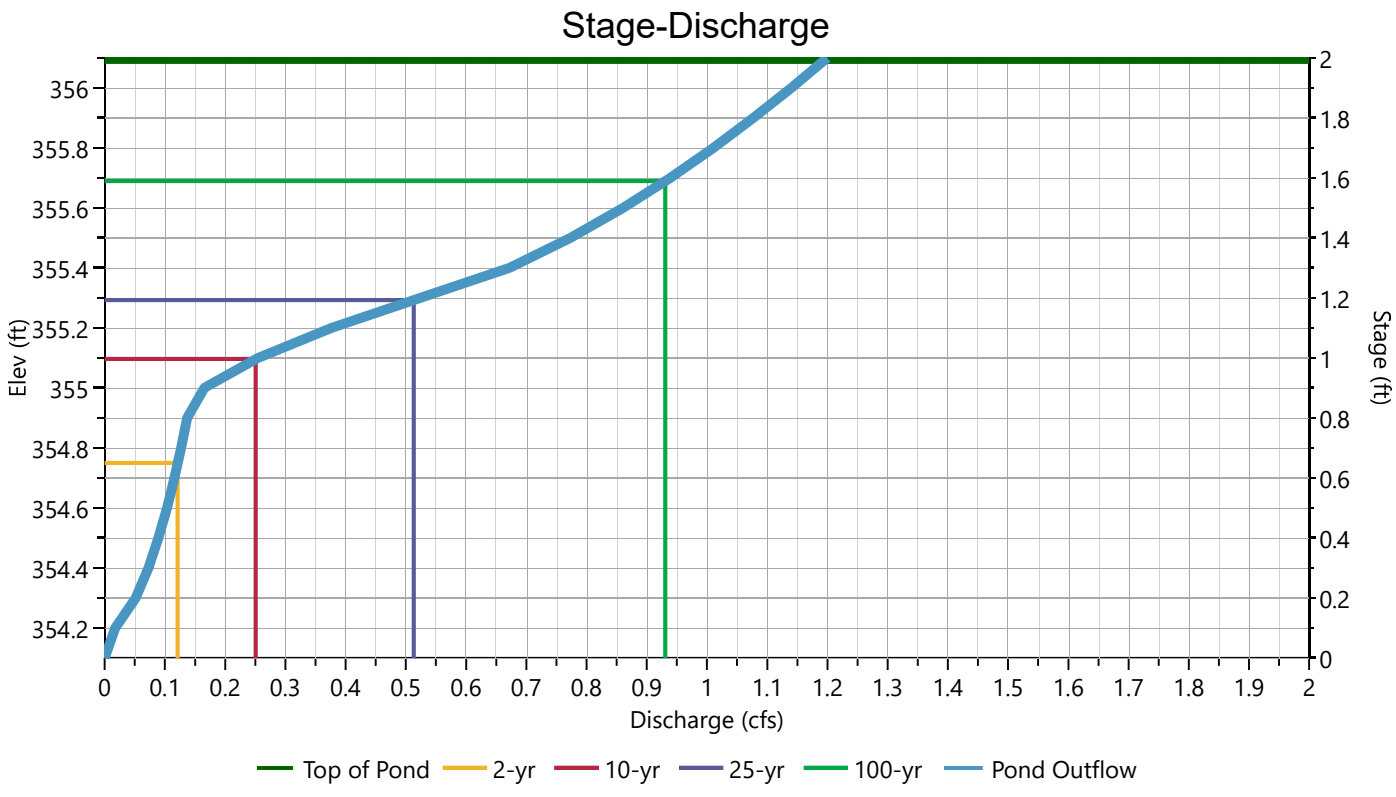
Porous Pavement System 1

Stage-Discharge

Culvert / Orifices	Culvert	Orifices			Perforated Riser	
		1	2	3		
Rise, in		2.5	5		Hole Diameter, in	
Span, in		2.5	6		No. holes	
No. Barrels		1	1		Invert Elevation, ft	
Invert Elevation, ft		354.10	354.95		Height, ft	
Orifice Coefficient, Co		0.60	0.60		Orifice Coefficient, Co	
Length, ft						
Barrel Slope, %						
N-Value, n	0.000					

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

**Routes through Culvert.*



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

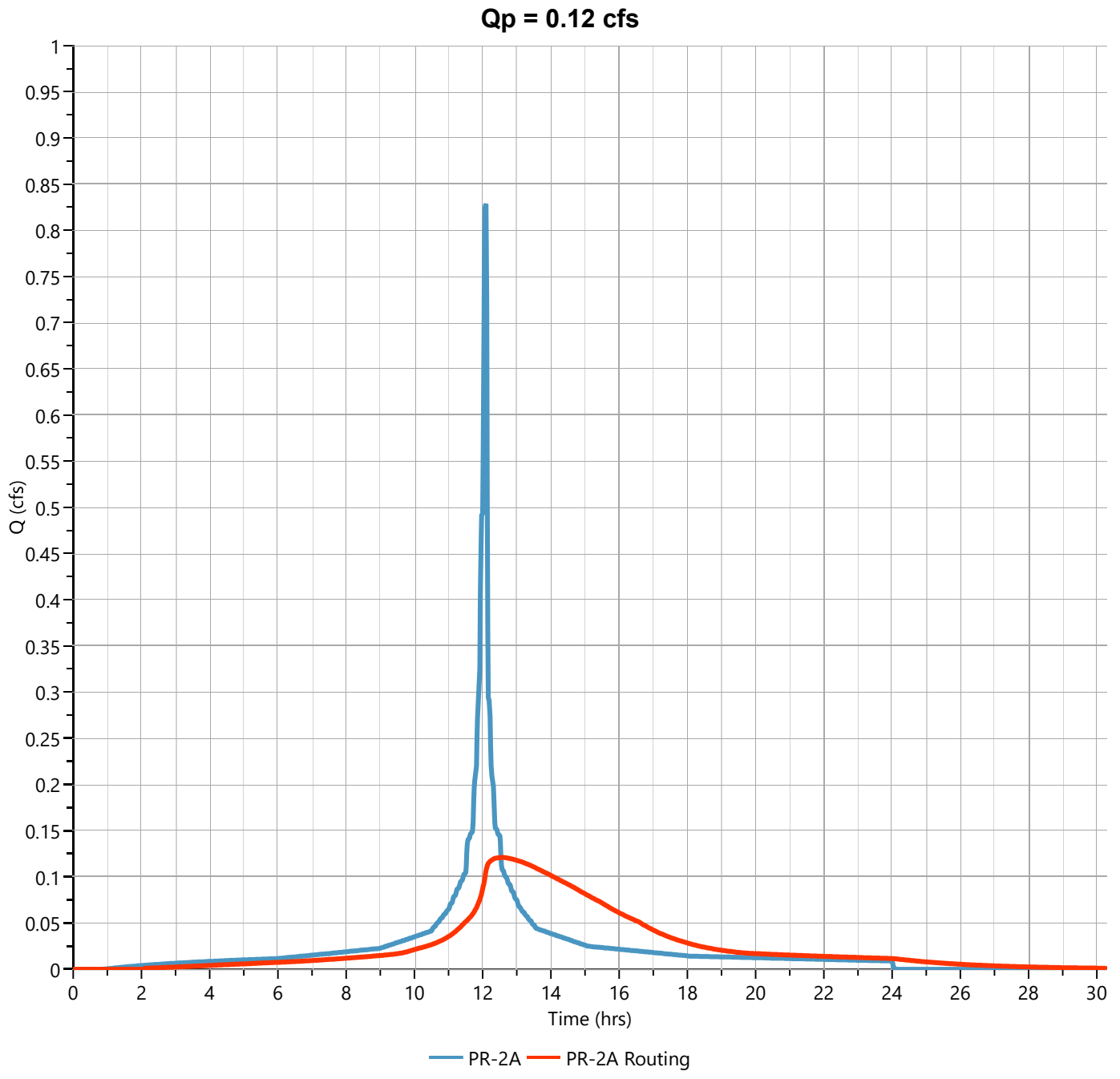
PR-2A Routing

Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 0.121 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.53 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,696 cuft
Inflow Hydrograph	= 3 - PR-2A	Max. Elevation	= 354.75 ft
Pond Name	= Porous Pavement System 1	Max. Storage	= 1,041 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.11 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

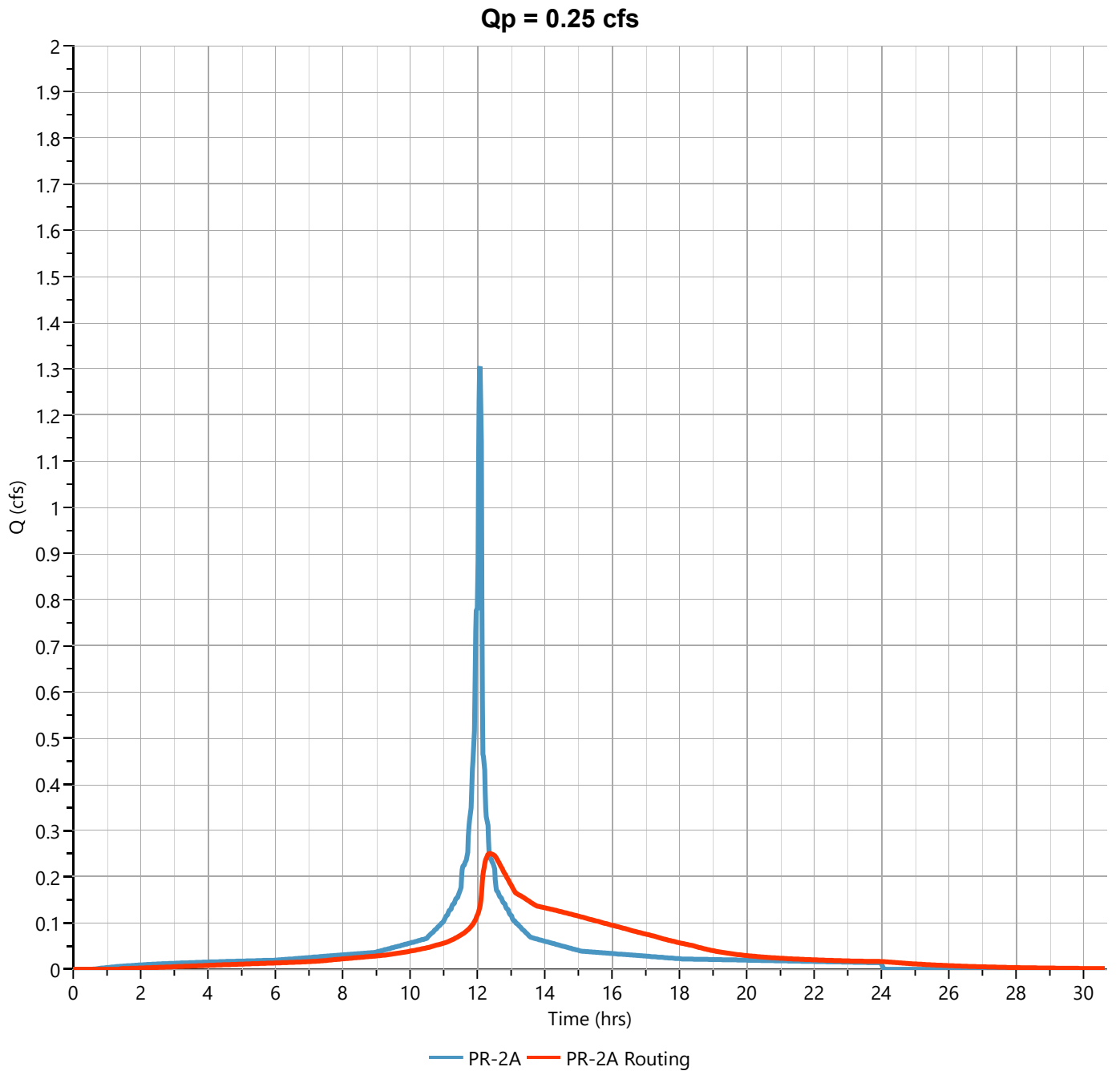
PR-2A Routing

Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 0.251 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.35 hrs
Time Interval	= 1 min	Hydrograph Volume	= 4,327 cuft
Inflow Hydrograph	= 3 - PR-2A	Max. Elevation	= 355.10 ft
Pond Name	= Porous Pavement System 1	Max. Storage	= 1,596 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.07 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

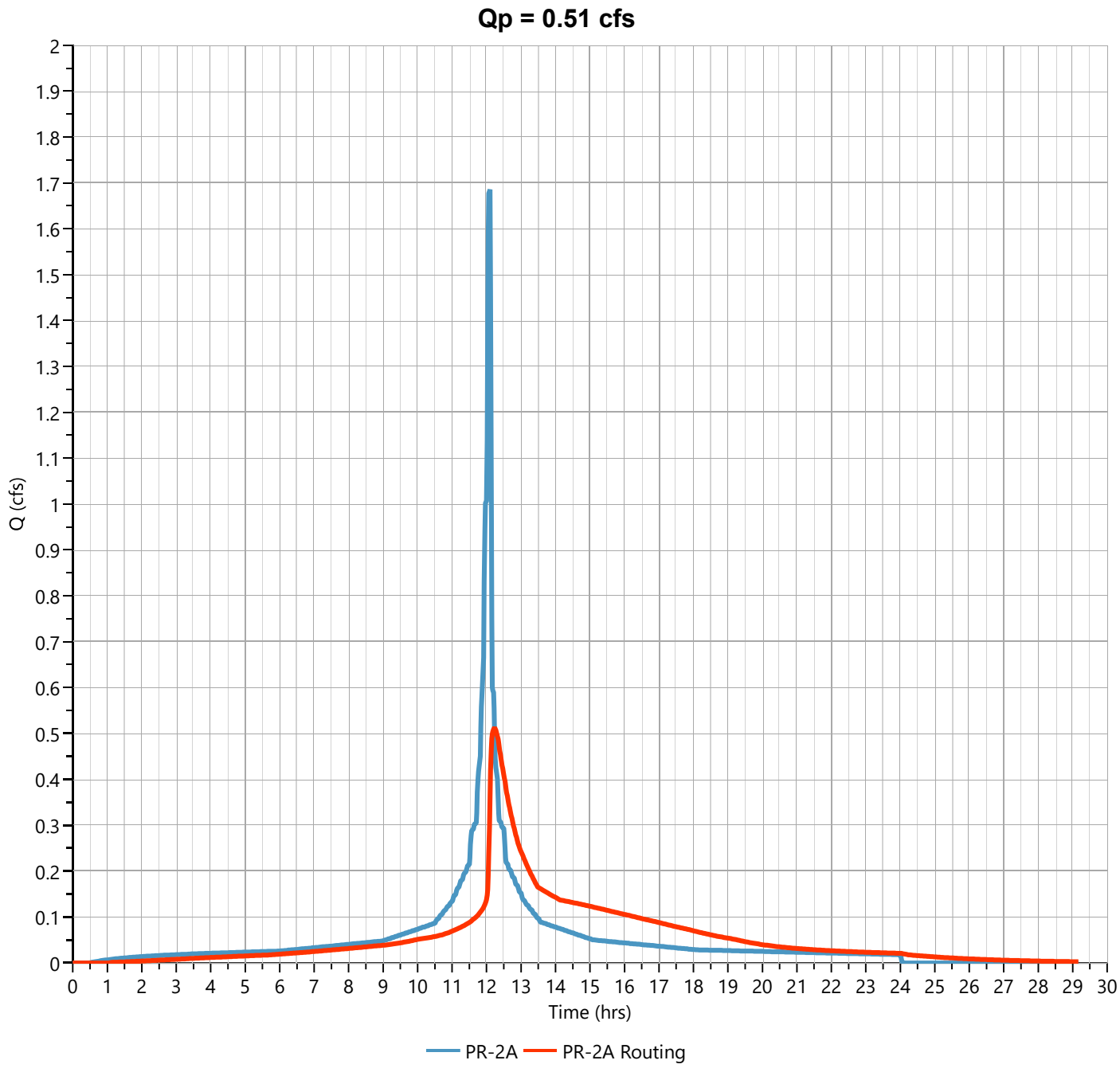
PR-2A Routing

Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 0.513 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Hydrograph Volume	= 5,615 cuft
Inflow Hydrograph	= 3 - PR-2A	Max. Elevation	= 355.29 ft
Pond Name	= Porous Pavement System 1	Max. Storage	= 1,911 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.83 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

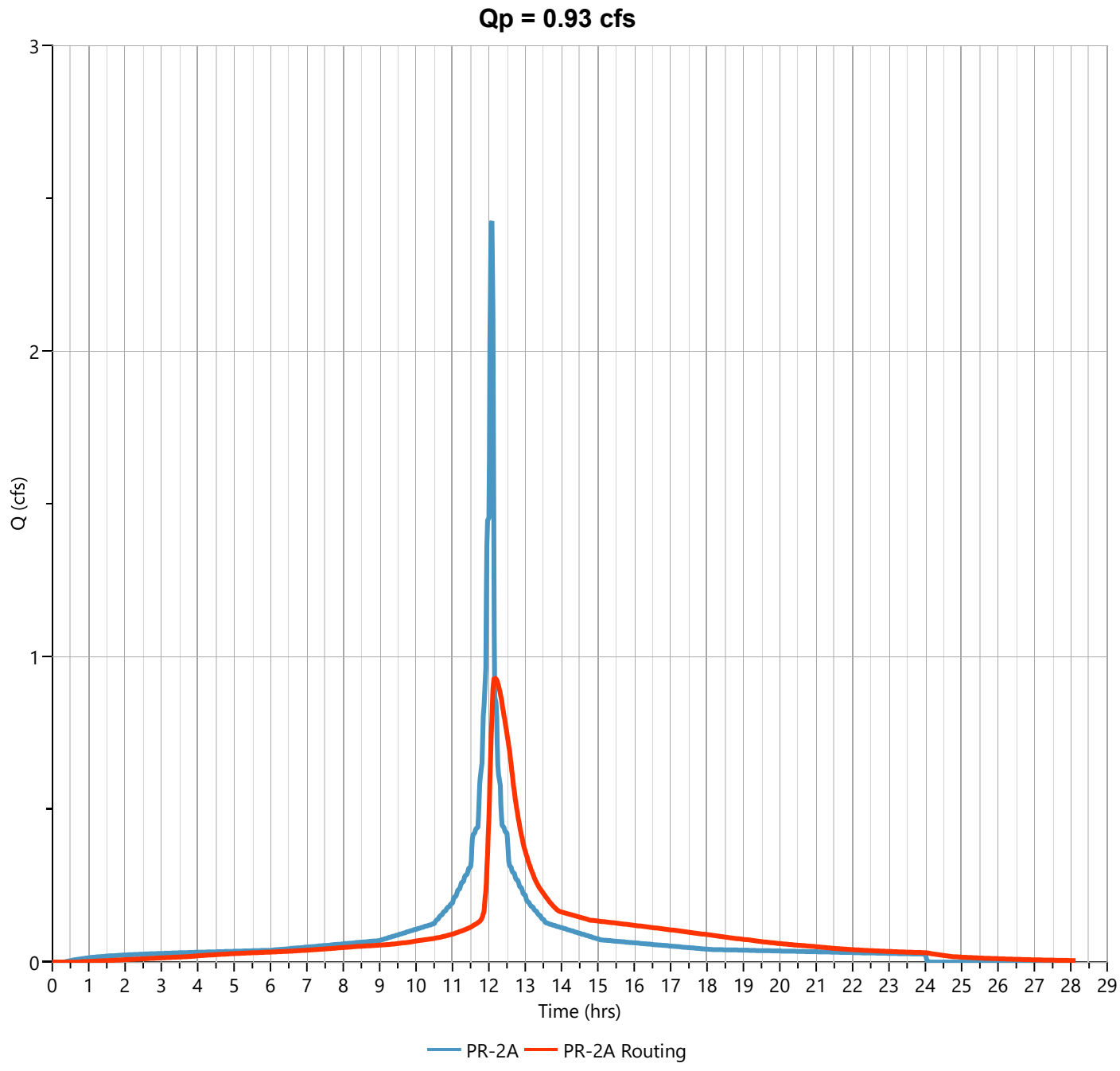
PR-2A Routing

Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 0.931 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Hydrograph Volume	= 8,164 cuft
Inflow Hydrograph	= 3 - PR-2A	Max. Elevation	= 355.69 ft
Pond Name	= Porous Pavement System 1	Max. Storage	= 2,547 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.56 hrs



PR-2C WATERSHED POND ROUTING

Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

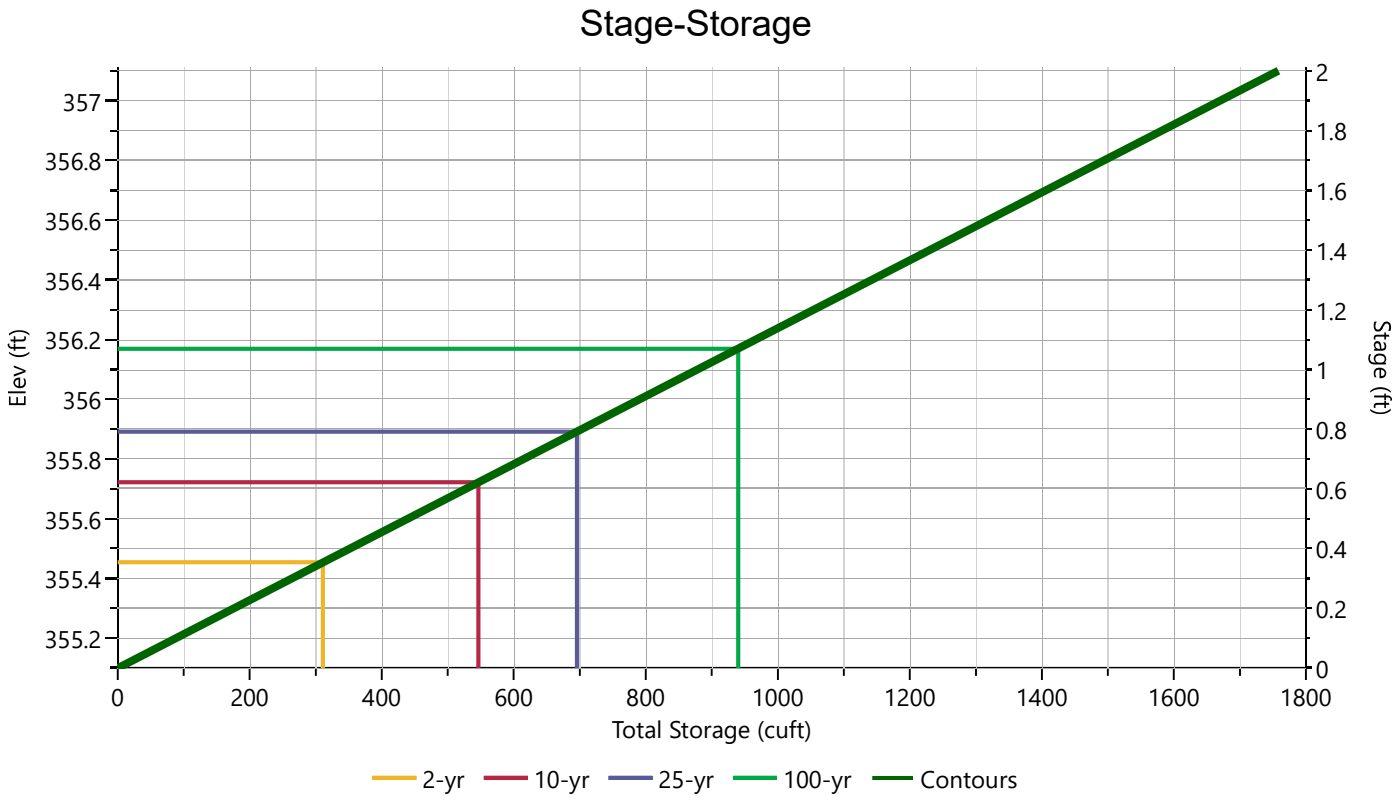
Porous Pavement System 2

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	355.10
Voids (%)	40.00
Volume Calc	Ave End Area

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	355.10	2,198	0.000	0.000
1.00	356.10	2,198	879	879
2.00	357.10	2,198	879	1,758



Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

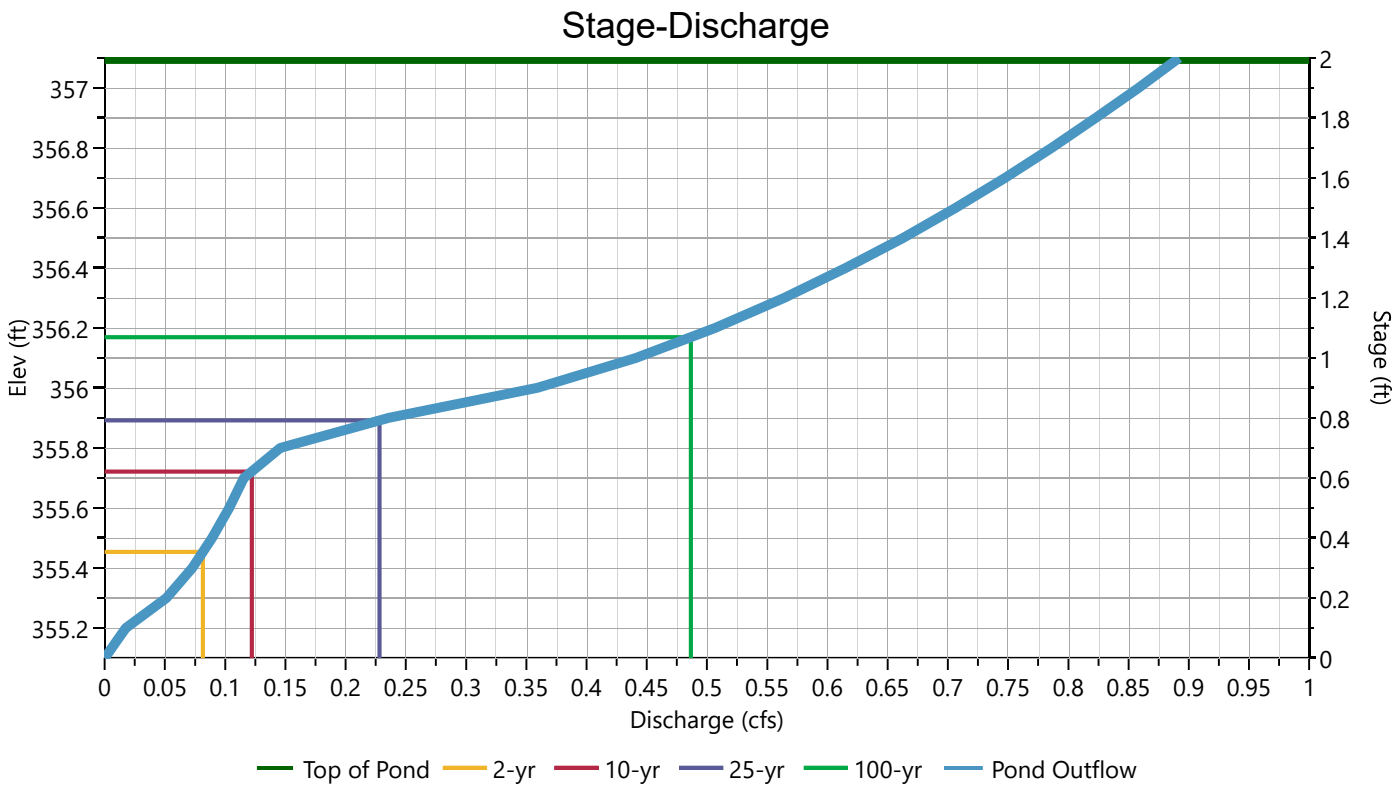
02-08-2024

Porous Pavement System 2

Stage-Discharge

Culvert / Orifices	Culvert	Orifices			Perforated Riser	
		1	2	3		
Rise, in		2.5	3		Hole Diameter, in	
Span, in		2.5	6		No. holes	
No. Barrels		1	1		Invert Elevation, ft	
Invert Elevation, ft		355.10	355.75		Height, ft	
Orifice Coefficient, Co		0.60	0.60		Orifice Coefficient, Co	
Length, ft						
Barrel Slope, %						
N-Value, n	0.000					
Weirs	**Riser***	**Weirs**			**Ancillary**	
		1	2	3		
Shape / Type					Exfiltration, in/hr	
Crest Elevation, ft						
Crest Length, ft						
Angle, deg						
Weir Coefficient, Cw						

**Routes through Culvert.*



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

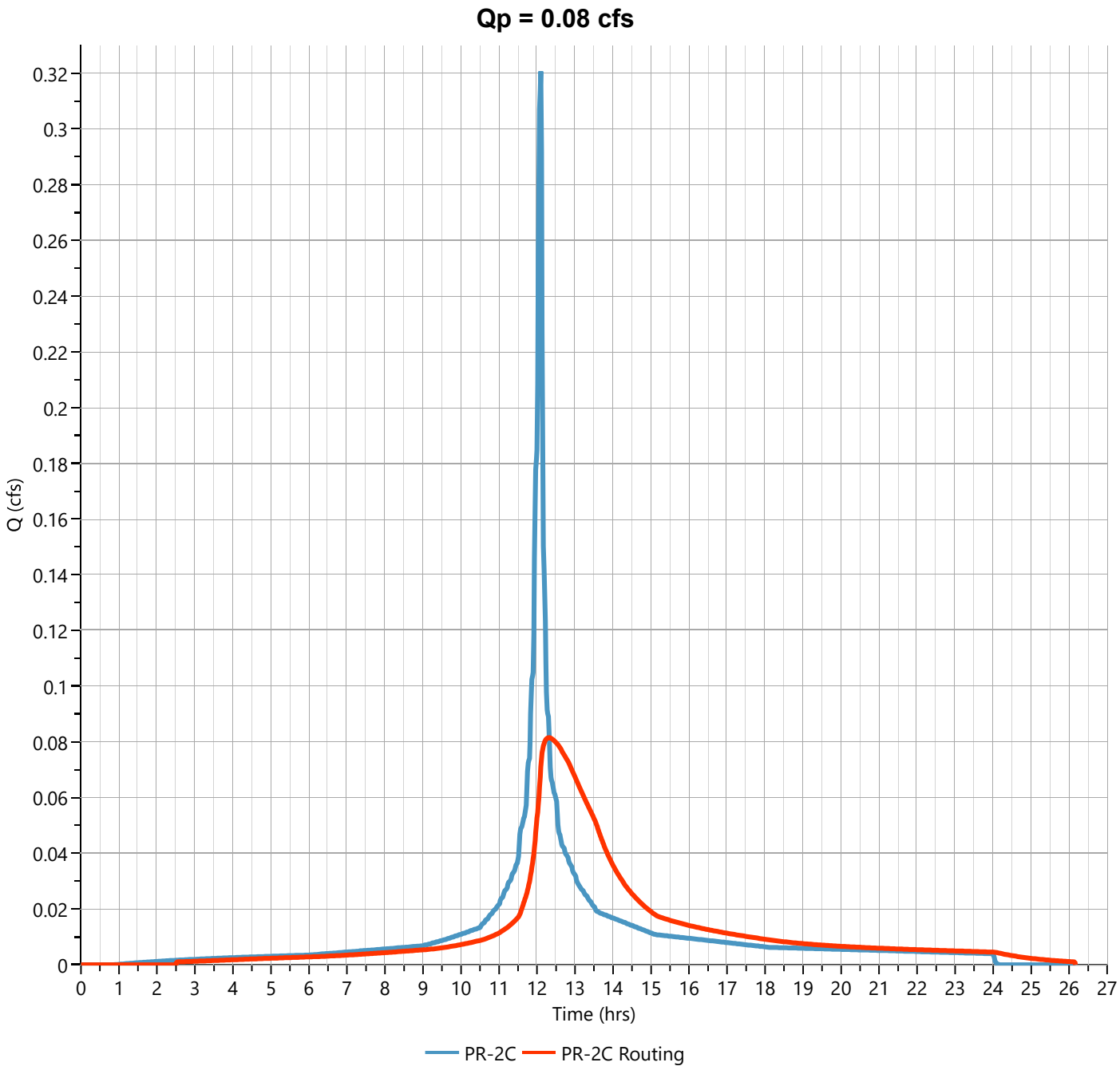
PR-2C Routing

Hyd. No. 15

Hydrograph Type	= Pond Route	Peak Flow	= 0.082 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.32 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,040 cuft
Inflow Hydrograph	= 13 - PR-2C	Max. Elevation	= 355.45 ft
Pond Name	= Porous Pavement System 2	Max. Storage	= 311 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.14 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

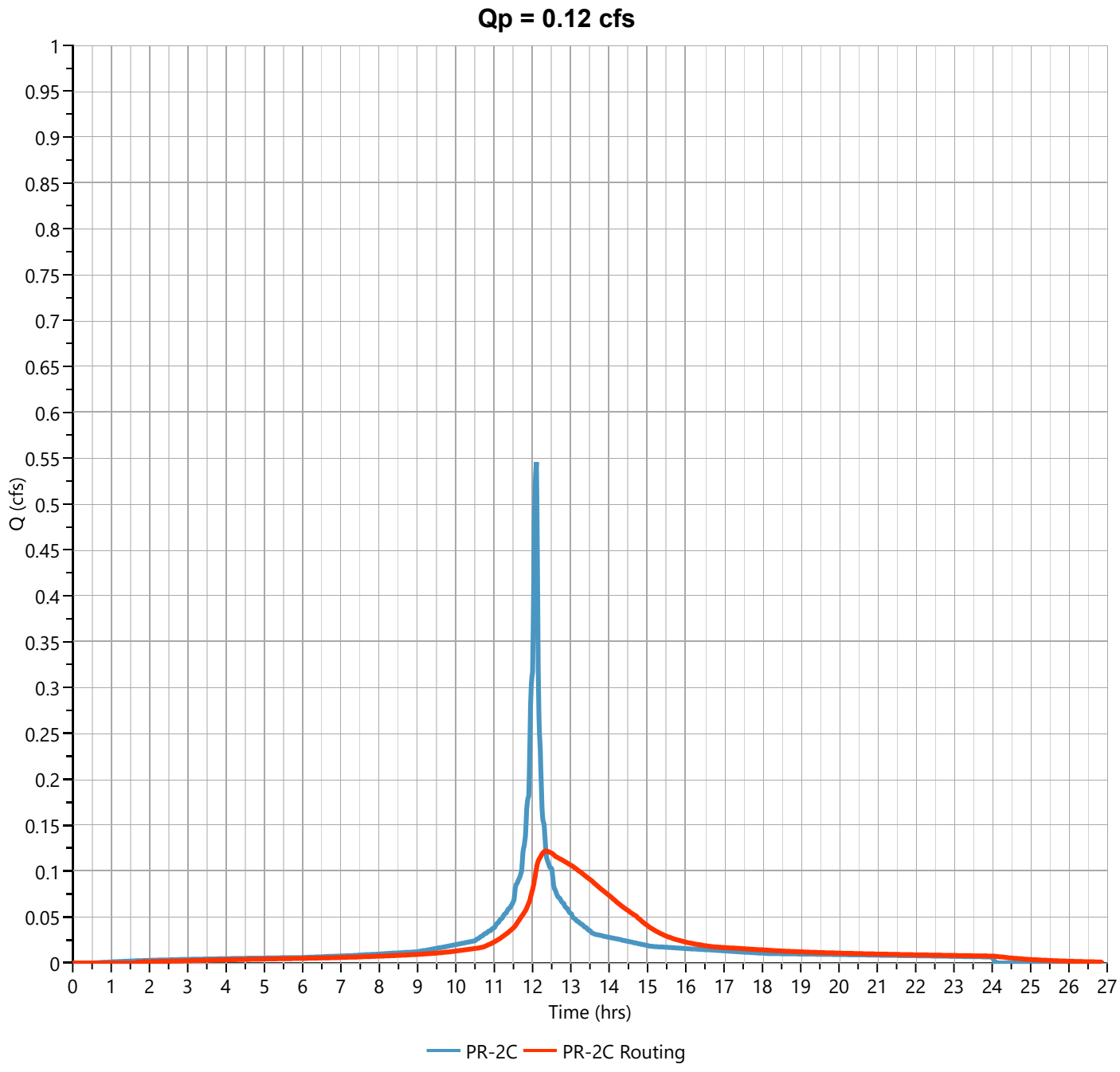
PR-2C Routing

Hyd. No. 15

Hydrograph Type	= Pond Route	Peak Flow	= 0.122 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.35 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,787 cuft
Inflow Hydrograph	= 13 - PR-2C	Max. Elevation	= 355.72 ft
Pond Name	= Porous Pavement System 2	Max. Storage	= 546 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.17 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

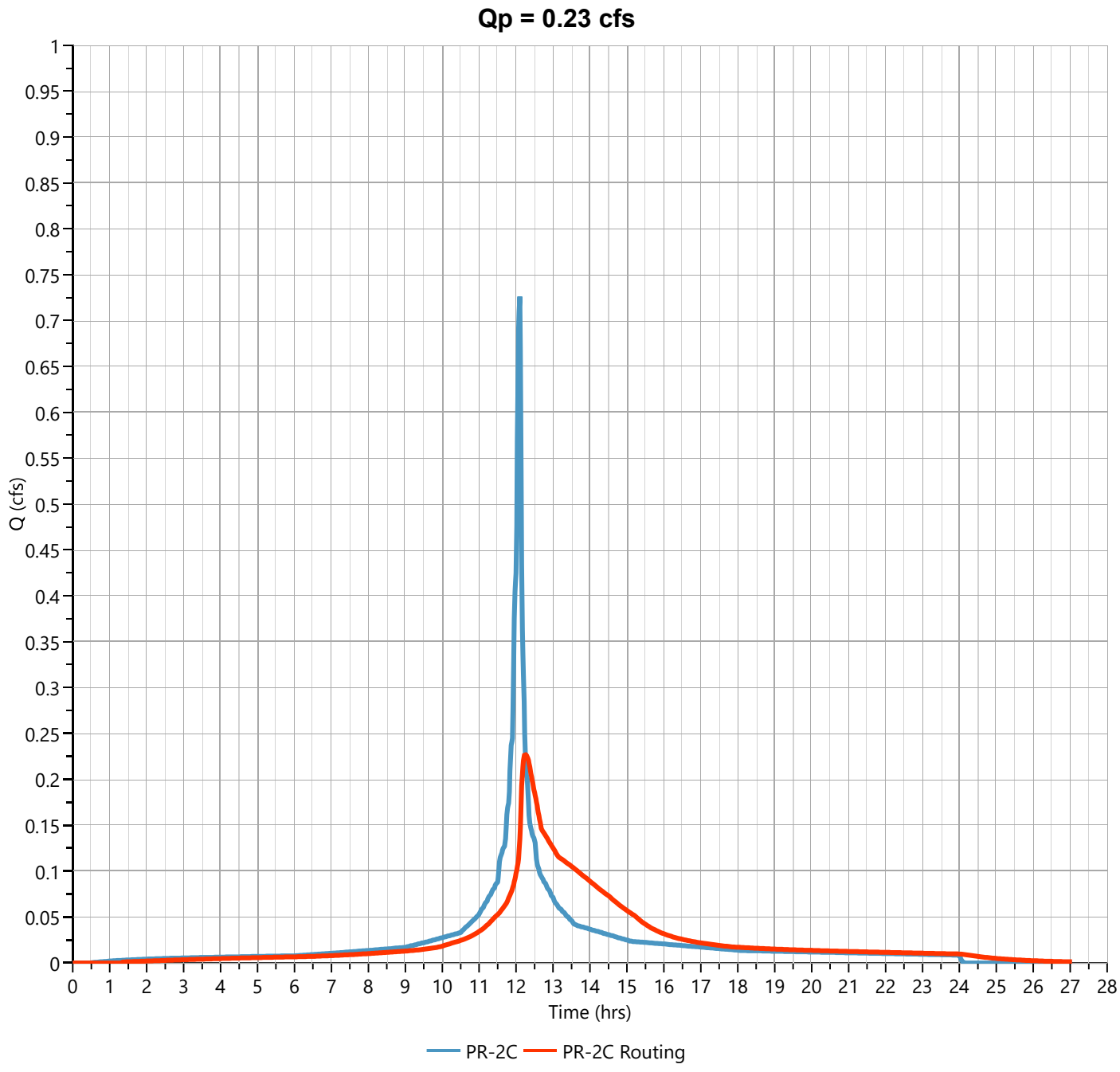
PR-2C Routing

Hyd. No. 15

Hydrograph Type	= Pond Route	Peak Flow	= 0.228 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.25 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,395 cuft
Inflow Hydrograph	= 13 - PR-2C	Max. Elevation	= 355.89 ft
Pond Name	= Porous Pavement System 2	Max. Storage	= 696 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.10 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

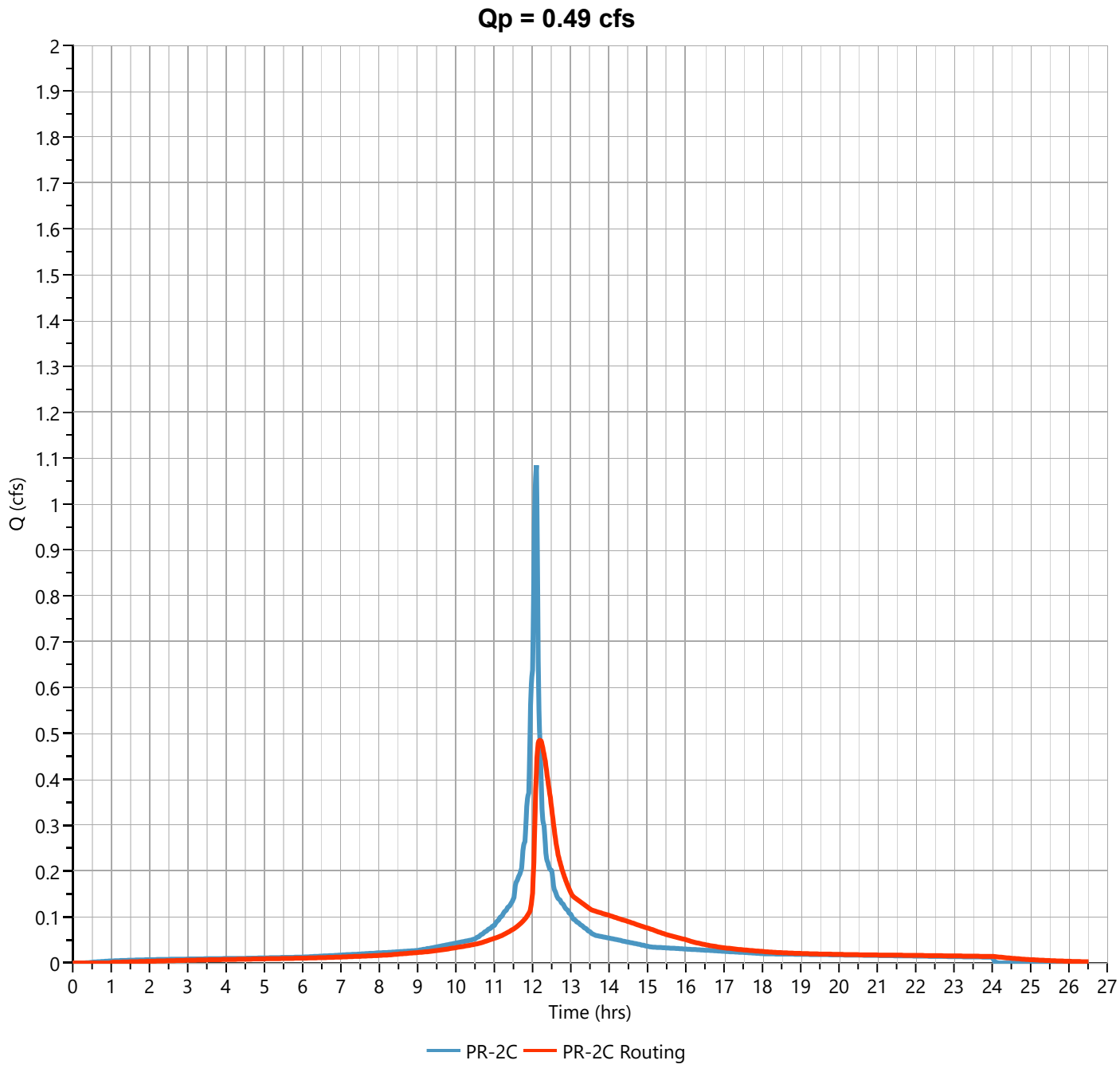
PR-2C Routing

Hyd. No. 15

Hydrograph Type	= Pond Route	Peak Flow	= 0.487 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Hydrograph Volume	= 3,617 cuft
Inflow Hydrograph	= 13 - PR-2C	Max. Elevation	= 356.17 ft
Pond Name	= Porous Pavement System 2	Max. Storage	= 940 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 57 min



PR-2B + PR-2H WATERSHED POND ROUTING

Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

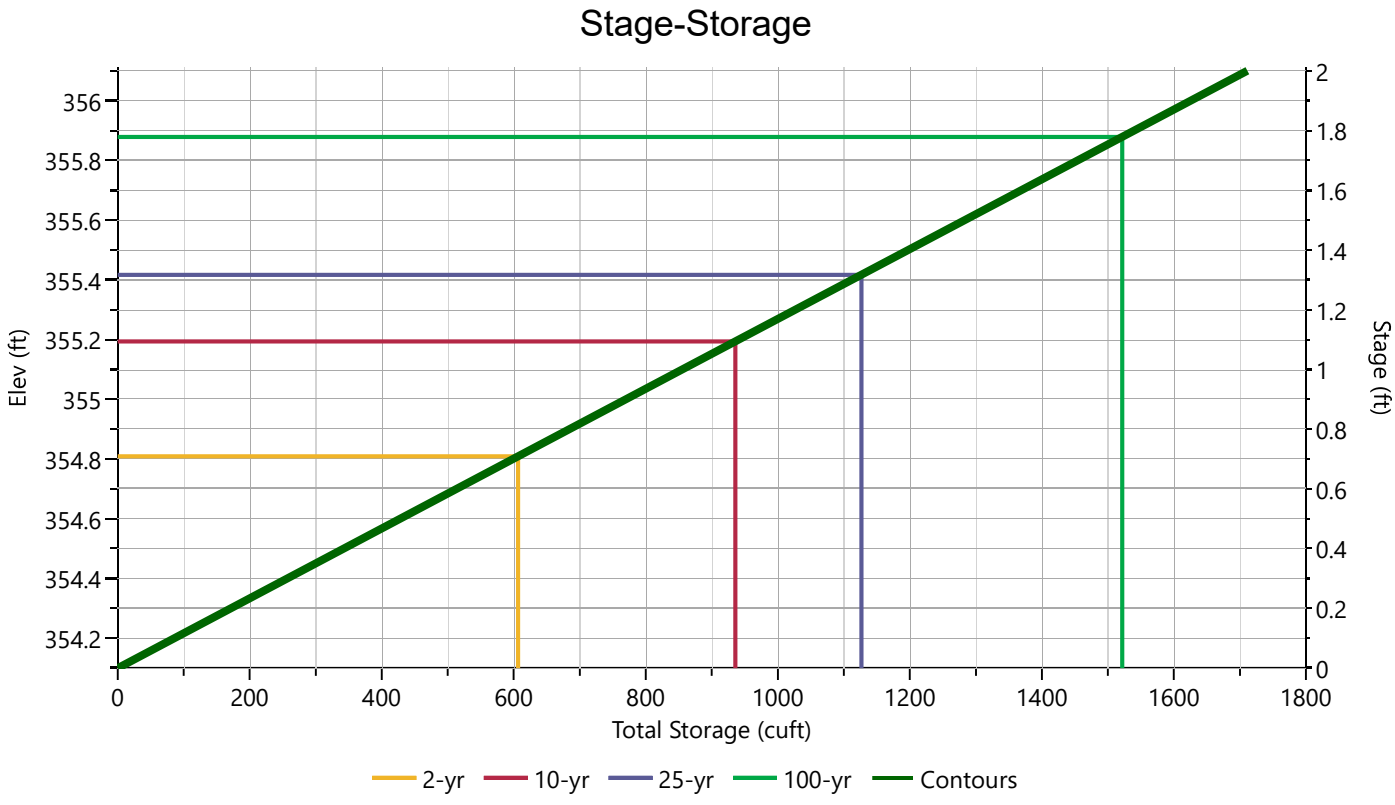
Porous Pavement System 3

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	354.10
Voids (%)	40.00
Volume Calc	Ave End Area

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	354.10	2,139	0.000	0.000
1.00	355.10	2,139	856	856
2.00	356.10	2,139	856	1,711



Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

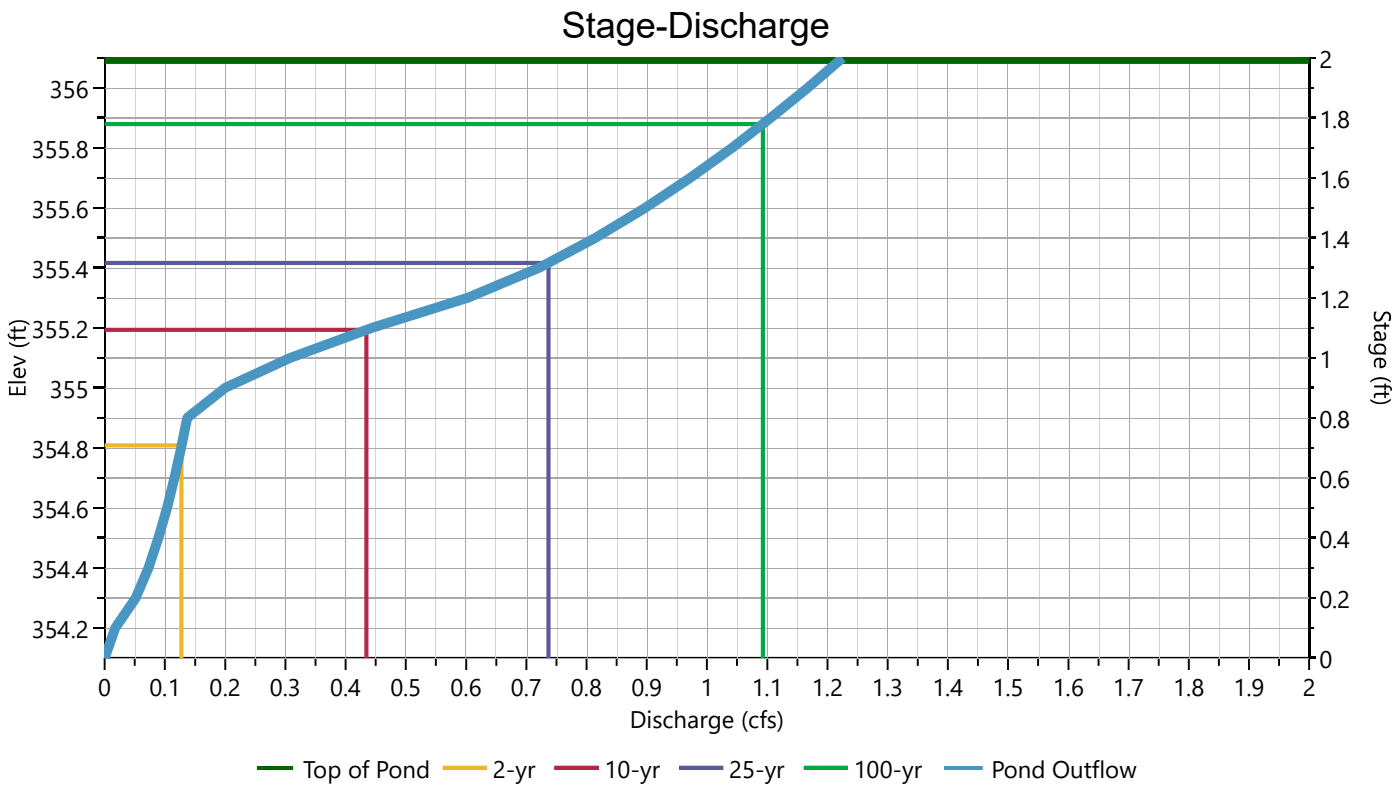
Porous Pavement System 3

Stage-Discharge

Culvert / Orifices	Culvert	Orifices			Perforated Riser	
		1	2	3		
Rise, in		2.5	5		Hole Diameter, in	
Span, in		2.5	6		No. holes	
No. Barrels		1	1		Invert Elevation, ft	
Invert Elevation, ft		354.10	354.90		Height, ft	
Orifice Coefficient, Co		0.60	0.60		Orifice Coefficient, Co	
Length, ft						
Barrel Slope, %						
N-Value, n	0.000					

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

**Routes through Culvert.*



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

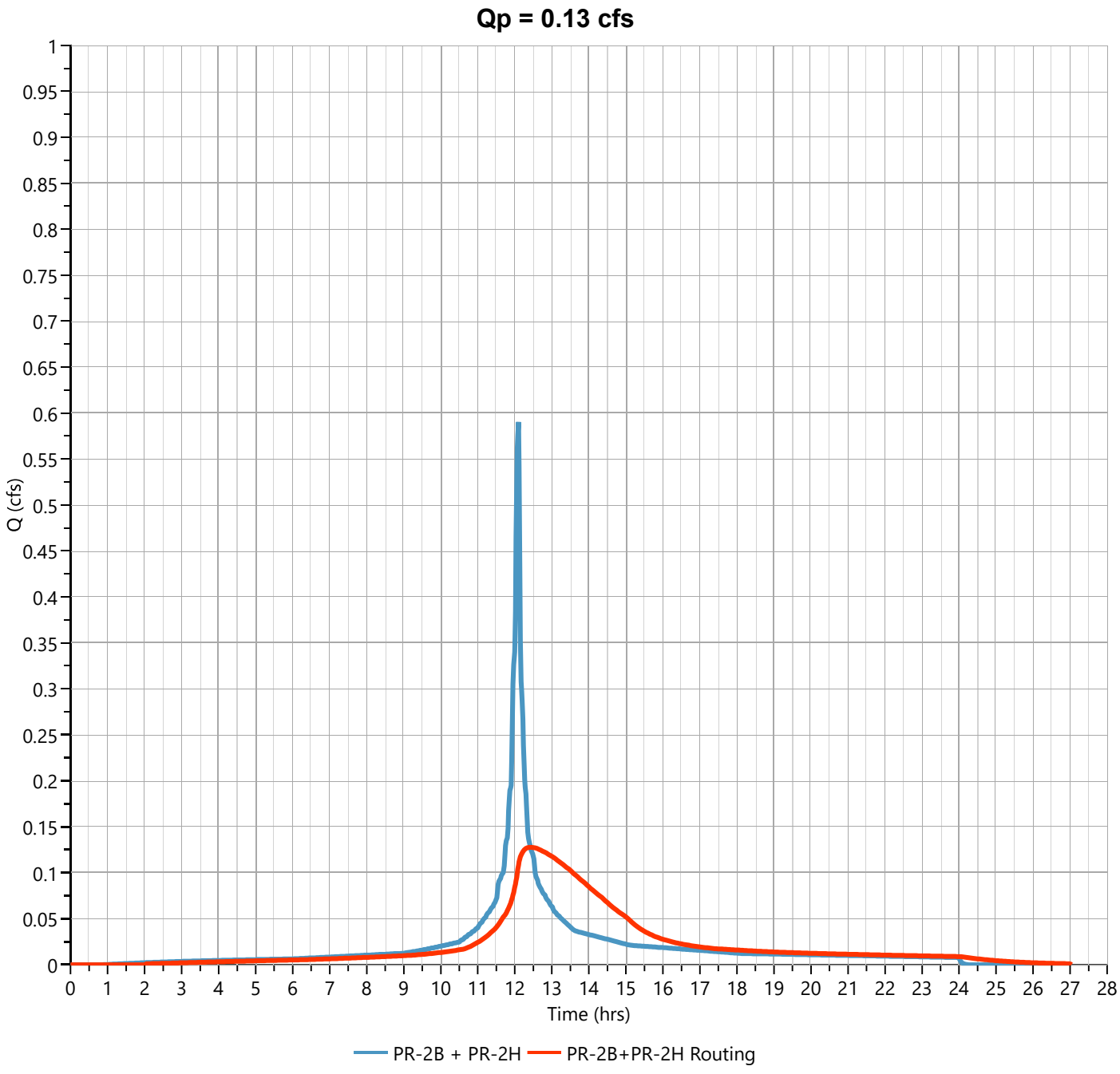
PR-2B+PR-2H Routing

Hyd. No. 39

Hydrograph Type	= Pond Route	Peak Flow	= 0.128 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.42 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,004 cuft
Inflow Hydrograph	= 38 - PR-2B + PR-2H	Max. Elevation	= 354.81 ft
Pond Name	= Porous Pavement System 3	Max. Storage	= 607 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.16 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

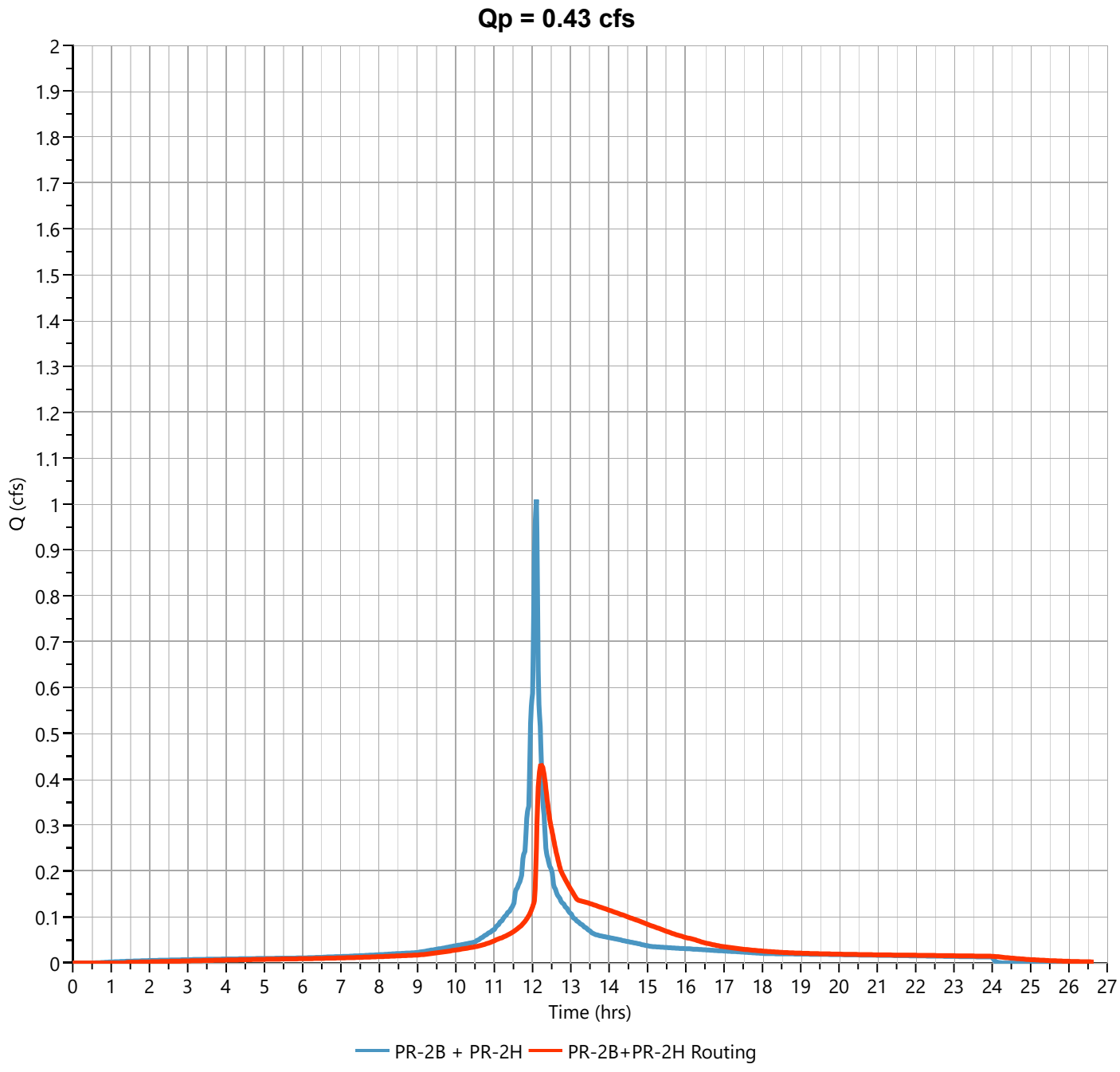
PR-2B+PR-2H Routing

Hyd. No. 39

Hydrograph Type	= Pond Route	Peak Flow	= 0.435 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Hydrograph Volume	= 3,474 cuft
Inflow Hydrograph	= 38 - PR-2B + PR-2H	Max. Elevation	= 355.19 ft
Pond Name	= Porous Pavement System 3	Max. Storage	= 936 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.01 hrs



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

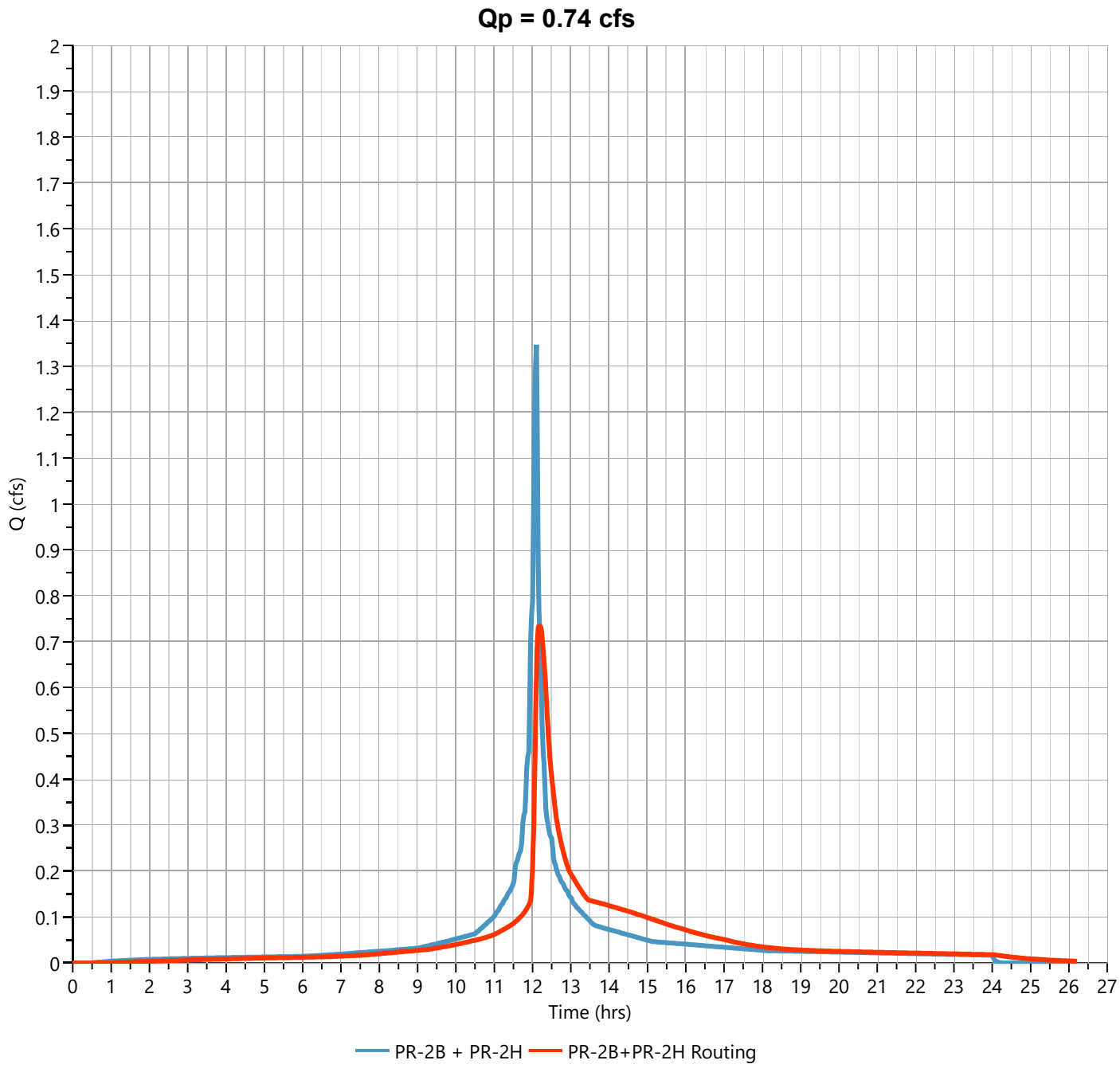
PR-2B+PR-2H Routing

Hyd. No. 39

Hydrograph Type	= Pond Route	Peak Flow	= 0.737 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Hydrograph Volume	= 4,674 cuft
Inflow Hydrograph	= 38 - PR-2B + PR-2H	Max. Elevation	= 355.42 ft
Pond Name	= Porous Pavement System 3	Max. Storage	= 1,127 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 53 min



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-08-2024

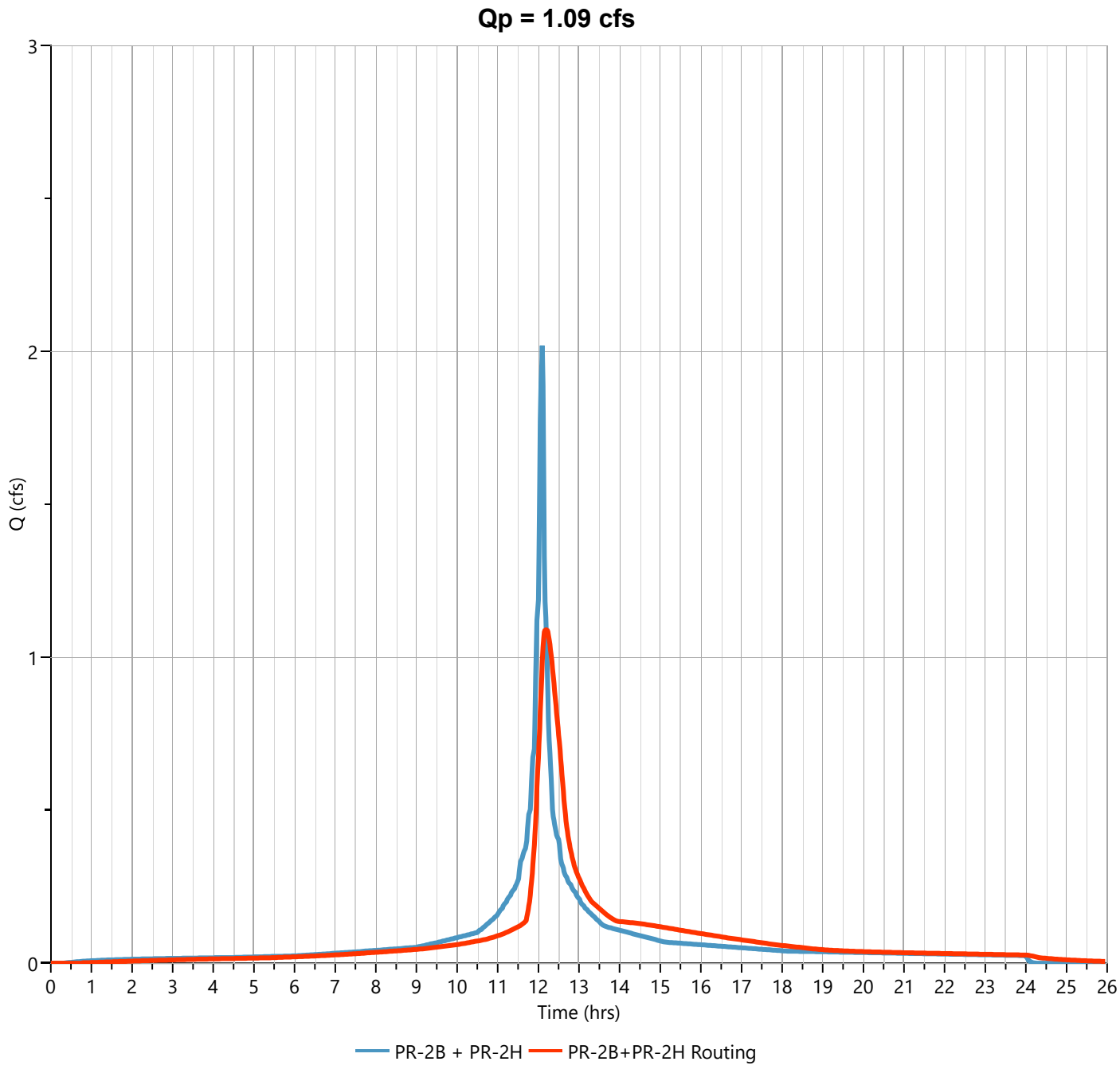
PR-2B+PR-2H Routing

Hyd. No. 39

Hydrograph Type	= Pond Route	Peak Flow	= 1.093 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Hydrograph Volume	= 7,095 cuft
Inflow Hydrograph	= 38 - PR-2B + PR-2H	Max. Elevation	= 355.88 ft
Pond Name	= Porous Pavement System 3	Max. Storage	= 1,522 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 47 min



APPENDIX D

Stormwater Conveyance Calculations

APPENDIX D
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IDF CURVE RAINFALL INTENSITY DATA

ON-SITE CONVEYANCE SYSTEM DESIGN

- **SUBSURFACE CONVEYANCE NETWORK 1**
  - **WEIGHTED RUNOFF COEFFICIENT CALCULATIONS**
  - **HYDRAULIC REPORTS**
    - **25-YEAR DESIGN STORM EVENT**
    - **100-YEAR DESIGN STORM EVENT**
- **SUBSURFACE CONVEYANCE NETWORK 2**
  - **WEIGHTED RUNOFF COEFFICIENT CALCULATIONS**
  - **HYDRAULIC REPORTS**
    - **25-YEAR DESIGN STORM EVENT**
    - **100-YEAR DESIGN STORM EVENT**
  - **RIPRAP APRON CALCULATIONS**
    - **HW2-1**

IDF CURVE RAINFALL INTENSITY DATA

NOAA Atlas 14, Volume 2, Version 3
Location name: Summit, New Jersey, USA*
Latitude: 40.7128°, Longitude: -74.3766°
Elevation: 357 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**4.03** (3.68-4.43)	**4.80** (4.39-5.27)	**5.68** (5.17-6.24)	**6.30** (5.74-6.92)	**7.08** (6.42-7.76)	**7.61** (6.88-8.34)	**8.15** (7.31-8.92)	**8.62** (7.69-9.44)	**9.24** (8.17-10.2)	**9.67** (8.50-10.6)
10-min	**3.22** (2.94-3.53)	**3.83** (3.51-4.21)	**4.54** (4.14-4.99)	**5.03** (4.58-5.53)	**5.63** (5.11-6.17)	**6.05** (5.47-6.64)	**6.46** (5.80-7.08)	**6.82** (6.08-7.47)	**7.26** (6.43-7.98)	**7.57** (6.65-8.33)
15-min	**2.68** (2.45-2.94)	**3.21** (2.94-3.53)	**3.83** (3.49-4.20)	**4.24** (3.86-4.66)	**4.76** (4.31-5.22)	**5.11** (4.61-5.60)	**5.45** (4.90-5.97)	**5.74** (5.13-6.30)	**6.10** (5.40-6.70)	**6.34** (5.58-6.98)
30-min	**1.83** (1.68-2.02)	**2.22** (2.03-2.44)	**2.72** (2.48-2.98)	**3.07** (2.80-3.38)	**3.52** (3.19-3.86)	**3.84** (3.47-4.21)	**4.16** (3.74-4.56)	**4.46** (3.98-4.89)	**4.84** (4.28-5.32)	**5.12** (4.50-5.63)
60-min	**1.14** (1.04-1.26)	**1.39** (1.27-1.53)	**1.74** (1.59-1.91)	**2.00** (1.82-2.20)	**2.34** (2.12-2.57)	**2.60** (2.35-2.85)	**2.86** (2.57-3.14)	**3.12** (2.79-3.42)	**3.47** (3.07-3.81)	**3.73** (3.28-4.11)
2-hr	**0.698** (0.634-0.771)	**0.851** (0.774-0.940)	**1.08** (0.978-1.19)	**1.26** (1.14-1.39)	**1.50** (1.35-1.66)	**1.70** (1.52-1.88)	**1.91** (1.70-2.10)	**2.13** (1.88-2.34)	**2.43** (2.12-2.68)	**2.67** (2.30-2.95)
3-hr	**0.520** (0.474-0.576)	**0.633** (0.578-0.702)	**0.804** (0.731-0.891)	**0.937** (0.850-1.04)	**1.12** (1.01-1.24)	**1.27** (1.14-1.40)	**1.43** (1.27-1.57)	**1.59** (1.40-1.75)	**1.81** (1.58-2.00)	**1.99** (1.72-2.20)
6-hr	**0.335** (0.306-0.371)	**0.408** (0.372-0.450)	**0.517** (0.469-0.569)	**0.605** (0.548-0.665)	**0.731** (0.656-0.802)	**0.837** (0.746-0.916)	**0.950** (0.839-1.04)	**1.07** (0.938-1.17)	**1.25** (1.08-1.36)	**1.39** (1.19-1.52)
12-hr	**0.208** (0.190-0.230)	**0.253** (0.231-0.279)	**0.322** (0.293-0.355)	**0.380** (0.345-0.418)	**0.466** (0.418-0.510)	**0.540** (0.481-0.589)	**0.620** (0.546-0.676)	**0.709** (0.616-0.773)	**0.841** (0.717-0.916)	**0.953** (0.800-1.04)
24-hr	**0.118** (0.109-0.128)	**0.142** (0.132-0.155)	**0.183** (0.169-0.199)	**0.217** (0.200-0.236)	**0.269** (0.246-0.292)	**0.314** (0.285-0.340)	**0.364** (0.327-0.395)	**0.419** (0.372-0.456)	**0.503** (0.439-0.549)	**0.575** (0.495-0.629)
2-day	**0.069** (0.064-0.076)	**0.084** (0.077-0.092)	**0.107** (0.099-0.117)	**0.127** (0.116-0.138)	**0.155** (0.142-0.169)	**0.180** (0.163-0.196)	**0.206** (0.185-0.225)	**0.235** (0.209-0.258)	**0.278** (0.243-0.306)	**0.314** (0.271-0.347)
3-day	**0.048** (0.045-0.053)	**0.059** (0.054-0.064)	**0.075** (0.069-0.081)	**0.088** (0.081-0.096)	**0.107** (0.098-0.117)	**0.124** (0.112-0.134)	**0.141** (0.127-0.154)	**0.160** (0.143-0.175)	**0.188** (0.165-0.207)	**0.212** (0.183-0.234)
4-day	**0.038** (0.035-0.041)	**0.046** (0.043-0.050)	**0.059** (0.054-0.064)	**0.069** (0.063-0.075)	**0.083** (0.076-0.090)	**0.096** (0.087-0.104)	**0.109** (0.098-0.118)	**0.123** (0.110-0.134)	**0.143** (0.126-0.157)	**0.160** (0.140-0.177)
7-day	**0.026** (0.024-0.028)	**0.031** (0.029-0.033)	**0.038** (0.035-0.042)	**0.045** (0.041-0.048)	**0.054** (0.049-0.058)	**0.061** (0.056-0.066)	**0.069** (0.062-0.075)	**0.077** (0.069-0.084)	**0.089** (0.079-0.098)	**0.099** (0.087-0.109)
10-day	**0.020** (0.019-0.022)	**0.025** (0.023-0.026)	**0.030** (0.028-0.032)	**0.035** (0.032-0.037)	**0.041** (0.038-0.044)	**0.046** (0.043-0.050)	**0.052** (0.047-0.056)	**0.058** (0.052-0.063)	**0.066** (0.059-0.072)	**0.073** (0.064-0.080)
20-day	**0.014** (0.013-0.015)	**0.016** (0.015-0.017)	**0.020** (0.018-0.021)	**0.022** (0.021-0.024)	**0.026** (0.024-0.027)	**0.028** (0.026-0.030)	**0.031** (0.029-0.033)	**0.034** (0.031-0.036)	**0.037** (0.034-0.040)	**0.040** (0.036-0.044)
30-day	**0.011** (0.011-0.012)	**0.013** (0.013-0.014)	**0.016** (0.015-0.017)	**0.017** (0.016-0.019)	**0.020** (0.019-0.021)	**0.022** (0.020-0.023)	**0.023** (0.022-0.025)	**0.025** (0.023-0.027)	**0.027** (0.025-0.029)	**0.029** (0.026-0.031)
45-day	**0.009** (0.009-0.010)	**0.011** (0.011-0.012)	**0.013** (0.012-0.014)	**0.014** (0.014-0.015)	**0.016** (0.015-0.017)	**0.017** (0.016-0.018)	**0.019** (0.017-0.020)	**0.020** (0.019-0.021)	**0.021** (0.020-0.023)	**0.022** (0.021-0.024)
60-day	**0.008** (0.008-0.009)	**0.010** (0.009-0.011)	**0.011** (0.011-0.012)	**0.013** (0.012-0.013)	**0.014** (0.013-0.015)	**0.015** (0.014-0.016)	**0.016** (0.015-0.017)	**0.017** (0.016-0.018)	**0.018** (0.017-0.019)	**0.019** (0.017-0.020)

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

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

Please refer to NOAA Atlas 14 document for more information.

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PF graphical

ON-SITE CONVEYANCE SYSTEM DESIGN

SUBSURFACE CONVEYANCE NETWORK 1

WEIGHTED RUNOFF COEFFICIENT CALCULATIONS

DRAINAGE SUBAREA RUNOFF COEFFICIENT CALCULATIONS
STORMWATER CONVEYANCE DESIGN
BEACON UNITARIAN UNIVERSALIST CHURCH
LANGAN PROJECT #101007201

PROPOSED CONVEYANCE SYSTEM

SUB-DRAINAGE AREA	PERVIOUS AREA C = 0.51 (SF)	IMPERVIOUS AREA C = 0.99 (SF)	TOTAL AREA (SF)	TOTAL AREA (AC)	RUNOFF COEFFICIENT C (Weighted)	STRUCTURE TYPE
NETWORK 1						
CB1-1	4	1,417	1,421	0.03	0.99	GRATE INLET
CB1-2	1,201	5,103	6,304	0.14	0.90	GRATE INLET
CB1-3	1,300	0	1,300	0.03	0.51	GRATE INLET
RD1-1	0	2,003	2,003	0.05	0.99	ROOF DRAIN
RD1-2	0	2,540	2,540	0.06	0.99	ROOF DRAIN
RD1-3	0	4,361	4,361	0.10	0.99	ROOF DRAIN
RD1-4	0	1,227	1,227	0.03	0.99	ROOF DRAIN
RD1-5	0	1,939	1,939	0.04	0.99	ROOF DRAIN
RD1-6	0	1,032	1,032	0.02	0.99	ROOF DRAIN
RD1-7	0	812	812	0.02	0.99	ROOF DRAIN
WQ1-3	1,442	234	1,676	0.04	0.58	TREATMENT DEVICE
YD1-1	882	0	882	0.02	0.51	YARD INLET
YD1-2	1,252	410	1,662	0.04	0.63	YARD INLET
YD1-3	0	211	211	0.00	0.99	YARD INLET

NOTES:

1. Runoff coefficients are referenced from Table 10.3-B: Recommended Coefficient of Runoff Values for Various Selected Land Uses from Section 10 of the 2015 New Jersey Department of Transportation (NJDOT) Roadway Design Manual.
2. Pervious land cover is assumed to be in good hydrologic condition with good cover. The hydrologic soil group classification of the native soils in the area of the proposed redevelopment is predominantly Group A according to the NRCS Web Soil Survey. NJDOT Roadway Design Manual Table 10.3-B does not specify a runoff coefficient for Group A open spaces areas; therefore, a runoff coefficient of 0.25 was chosen as a conservative measure, which is the runoff coefficient for Group B open space areas.

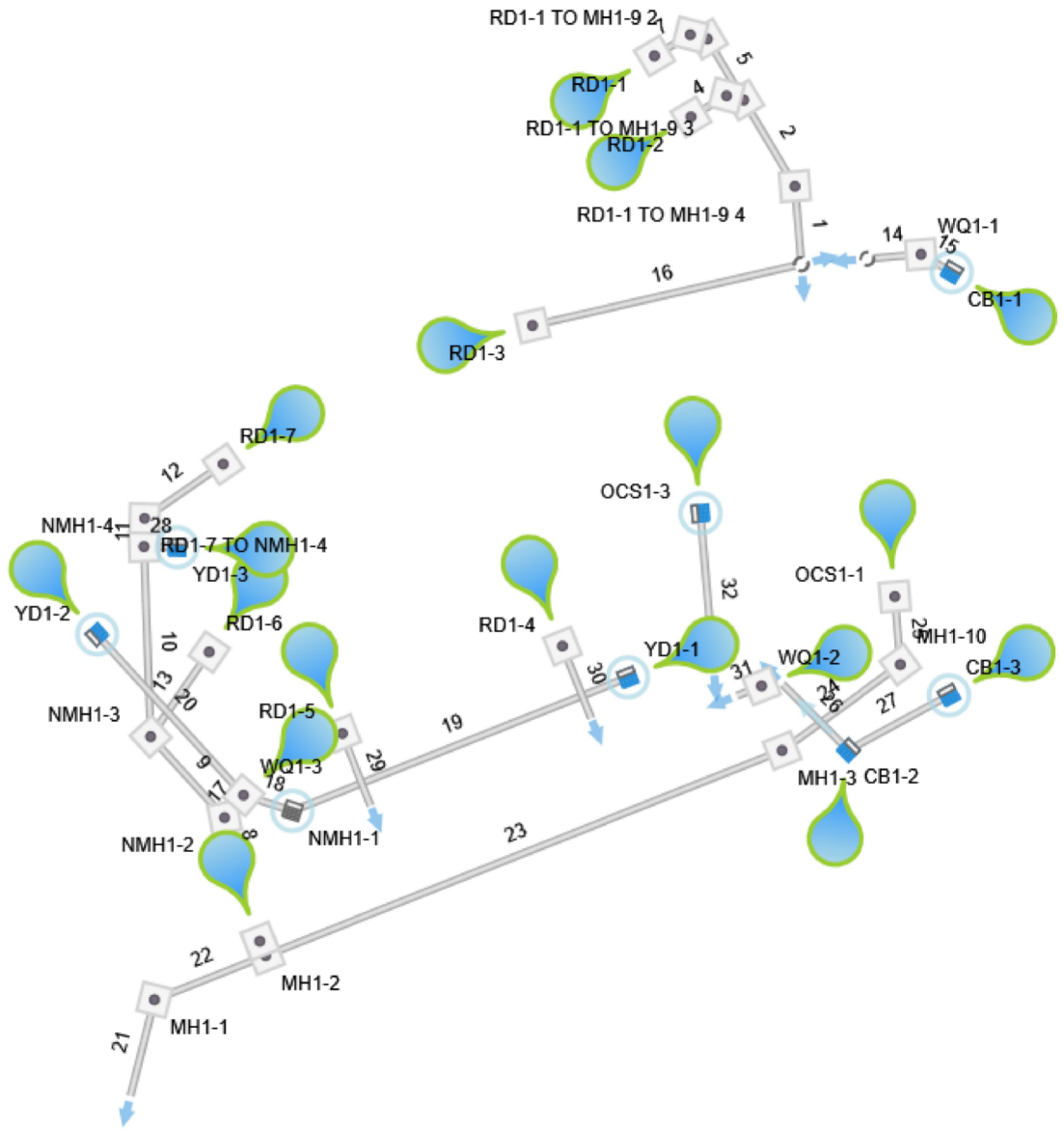
HYDRAULIC REPORTS
25-YEAR STORM EVENT

Plan View

Stormwater Studio 2024 v 3.0.0.33

Project Name: NST0101

02-08-2024



Storm Sewer Tabulation

Project Name: NST0101

Stormwater Studio 2024 v 3.0.0.33

02-08-2024

Line ID	Length	Drng Area		Rational	C x A		Tc		Intensity	Total Q	Capacity	Velocity	Line		Invert Elev		HGL Elev		Surface Elev		Line No
		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
	(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
RD1-1 TO MH1-9 5	18.80	0.000	0.104	0.00	0.00	0.10	0.0	5.26	6.99	0.72	2.45	4.23	8	3.50	354.76	354.10	355.16	354.38	357.73	357.65	1
RD1-1 TO MH1-9 4	24.09	0.000	0.104	0.00	0.00	0.10	0.0	5.19	7.02	0.72	2.07	4.04	8	2.50	355.36	354.76	355.76	355.06	358.55	357.73	2
RD1-2 TO MH1-9 2	4.24	0.000	0.058	0.00	0.00	0.06	0.0	5.04	7.06	0.41	4.12	1.99	8	9.90	355.78	355.36	356.08	355.91	358.60	358.55	3
RD1-2 TO MH1-9 1	9.94	0.058	0.058	0.99	0.06	0.06	5.0	5.00	7.08	0.41	1.85	3.07	8	2.00	355.98	355.78	356.28	356.03	359.00	358.60	4
RD1-1 TO MH1-9 3	17.08	0.000	0.046	0.00	0.00	0.05	0.0	5.11	7.04	0.32	1.85	1.74	8	2.00	355.70	355.36	355.97	355.92	358.69	358.55	5
RD1-1 TO MH1-9 2	4.24	0.000	0.046	0.00	0.00	0.05	0.0	5.10	7.04	0.32	1.85	2.26	8	2.00	355.78	355.70	356.05	356.00	358.76	358.69	6
RD1-1 TO MH1-9 1	9.98	0.046	0.046	0.99	0.05	0.05	5.0	5.00	7.08	0.32	0.59	1.71	8	0.20	356.00	355.98	356.35	356.33	359.00	358.76	7
NHM1-2 TO UGD-INF1-2	10.20	0.000	0.144	0.00	0.00	0.10	0.0	6.05	6.75	0.70	8.63	0.89	12	5.00	345.01	344.50	346.23	346.23	354.49	355.52	8
NMH1-3 TO NMH1-2	26.34	0.000	0.048	0.00	0.00	0.05	0.0	5.52	6.91	0.33	1.70	2.37	10	0.51	346.89	346.76	347.15	347.00	357.01	354.49	9
NMH1-4 TO NMH1-3	45.71	0.000	0.024	0.00	0.00	0.02	0.0	5.14	7.03	0.17	0.92	1.13	8	0.50	347.12	346.89	347.35	347.32	357.50	357.01	10
RD1-7 TO NMH1-4 2	6.80	0.000	0.019	0.00	0.00	0.02	0.0	5.11	7.04	0.13	2.27	2.31	8	3.00	354.71	354.51	354.88	354.64	357.43	357.50	11
RD1-7 TO NMH1-4 1	22.93	0.019	0.019	0.99	0.02	0.02	5.0	5.00	7.08	0.13	2.27	2.55	8	3.01	355.40	354.71	355.57	354.83	359.00	357.43	12
RD1-6 TO NMH1-3	24.72	0.024	0.024	0.99	0.02	0.02	5.0	5.00	7.08	0.17	1.84	2.50	8	1.99	353.91	353.42	354.10	353.56	357.50	357.01	13
WQ1-1 TO MH1-7	13.00	0.000	0.033	0.00	0.00	0.03	0.0	5.07	7.05	0.23	4.95	1.98	15	0.50	350.61	350.54	350.80	350.72	357.20	357.33	14
CB1-1 TO WQ1-1	8.53	0.033	0.033	0.99	0.03	0.03	5.0	5.00	7.08	0.23	5.21	1.99	15	0.55	353.70	353.65	353.90	353.84	357.07	357.20	15
RD1-3 TO MH1-9	66.32	0.100	0.100	0.99	0.10	0.10	5.0	5.00	7.08	0.70	2.45	4.47	8	3.49	356.03	353.71	356.42	353.97	359.00	357.65	16
WQ1-3 TO NMH1-2	7.06	0.038	0.096	0.58	0.02	0.06	5.0	6.02	6.76	0.38	1.85	2.95	8	2.00	349.17	349.03	349.46	349.27	352.45	354.49	17
NMH1-1 TO WQ1-3	12.31	0.000	0.020	0.00	0.00	0.01	0.0	5.92	6.79	0.07	1.31	1.70	8	1.00	351.70	351.58	351.83	351.69	353.84	352.45	18
YD1-1 TO NMH1-1	86.93	0.020	0.020	0.51	0.01	0.01	5.0	5.00	7.08	0.07	0.93	1.59	8	0.50	352.13	351.70	352.26	351.82	355.03	353.84	19
YD1-2 TO WQ1-3	52.30	0.038	0.038	0.63	0.02	0.02	5.0	5.00	7.08	0.17	1.31	2.25	8	1.00	352.10	351.58	352.30	351.75	354.95	352.45	20
MH1-1 TO EX-CB1-1	23.42	0.000	0.000	0.00	0.00	0.00	0.0	0.93	7.08	1.08	15.64	1.95	15	5.00	337.99	336.82	338.41	338.07	345.82	340.77	21
MH1-2 TO MH1-1	28.70	0.000	0.000	0.00	0.00	0.00	0.0	0.87	7.08	1.08	15.64	4.50	15	5.00	343.24	341.81	343.66	342.06	347.53	345.82	22

Notes: IDF File = Summit.IDF, Return Period = 25-yrs.

Project File: NST0101 25-Yr.sws

Storm Sewer Tabulation

Project Name: NST0101

Stormwater Studio 2024 v 3.0.0.33

02-08-2024

Line ID	Length	Drng Area		Rational	C x A		Tc		Intensity	Total Q	Capacity	Velocity	Line		Invert Elev		HGL Elev		Surface Elev		Line No
		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
	(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
MH1-3 TO MH1-2	133.70	0.000	0.000	0.00	0.00	0.00	0.0	0.24	7.08	0.64	7.00	2.18	15	1.00	344.68	343.34	345.00	343.76	351.79	347.53	23
MH1-10 TO MH1-3	35.24	0.000	0.000	0.00	0.00	0.00	0.0	0.08	7.08	0.64	7.00	2.91	15	1.00	345.13	344.78	345.45	345.05	352.68	351.79	24
OCS1-1 TO MH1-10	16.41	0.000	0.000	0.00	0.00	0.00	0.0	0.00	7.08	0.64	7.00	2.82	15	1.00	348.50	348.34	348.82	348.62	354.00	352.68	25
CB1-2 TO WQ1-2	22.04	0.145	0.175	0.90	0.13	0.15	5.0	5.13	7.03	1.03	4.94	0.85	15	0.50	347.51	347.40	348.65	348.65	351.19	353.30	26
CB1-3 TO CB1-2	27.70	0.030	0.030	0.51	0.02	0.02	5.0	5.00	7.08	0.11	15.50	0.83	15	4.91	348.97	347.61	349.10	348.67	352.57	351.19	27
YD1-3 TO NMH1-4	7.96	0.005	0.005	0.99	0.00	0.00	5.0	5.00	7.08	0.04	0.86	0.41	6	2.00	347.28	347.12	347.46	347.46	348.99	357.50	28
RD1-5 TO UGD-INF1-2	18.36	0.045	0.045	0.99	0.04	0.04	5.0	5.00	7.08	0.32	4.14	4.20	8	10.02	348.59	346.75	348.85	346.89	356.00	354.37	29
RD1-4 TO UGD-INF1-2	18.36	0.028	0.028	0.99	0.03	0.03	5.0	5.00	7.08	0.20	4.14	3.67	8	10.02	348.59	346.75	348.80	346.86	356.00	355.30	30
WQ1-2 TO MH1-6	6.00	0.000	0.000	0.00	0.00	0.00	0.0	0.00	7.08	0.96	22.12	0.80	15	10.00	345.10	344.50	346.23	346.23	353.93	354.41	31
OCS1-3 TO UGD-INF1-2	37.34	0.000	0.000	0.00	0.00	0.00	0.0	0.00	7.08	0.35	19.79	1.23	15	8.00	347.49	344.50	347.72	346.23	355.00	355.78	32
OCS1-2 TO MH1-2	3.75	0.000	0.000	0.00	0.00	0.00	0.0	0.00	7.08	0.44	13.99	2.72	15	4.00	344.50	344.35	344.77	344.56	349.00	347.53	33

Notes: IDF File = Summit.IDF, Return Period = 25-yrs.

Project File: NST0101 25-Yr.sws

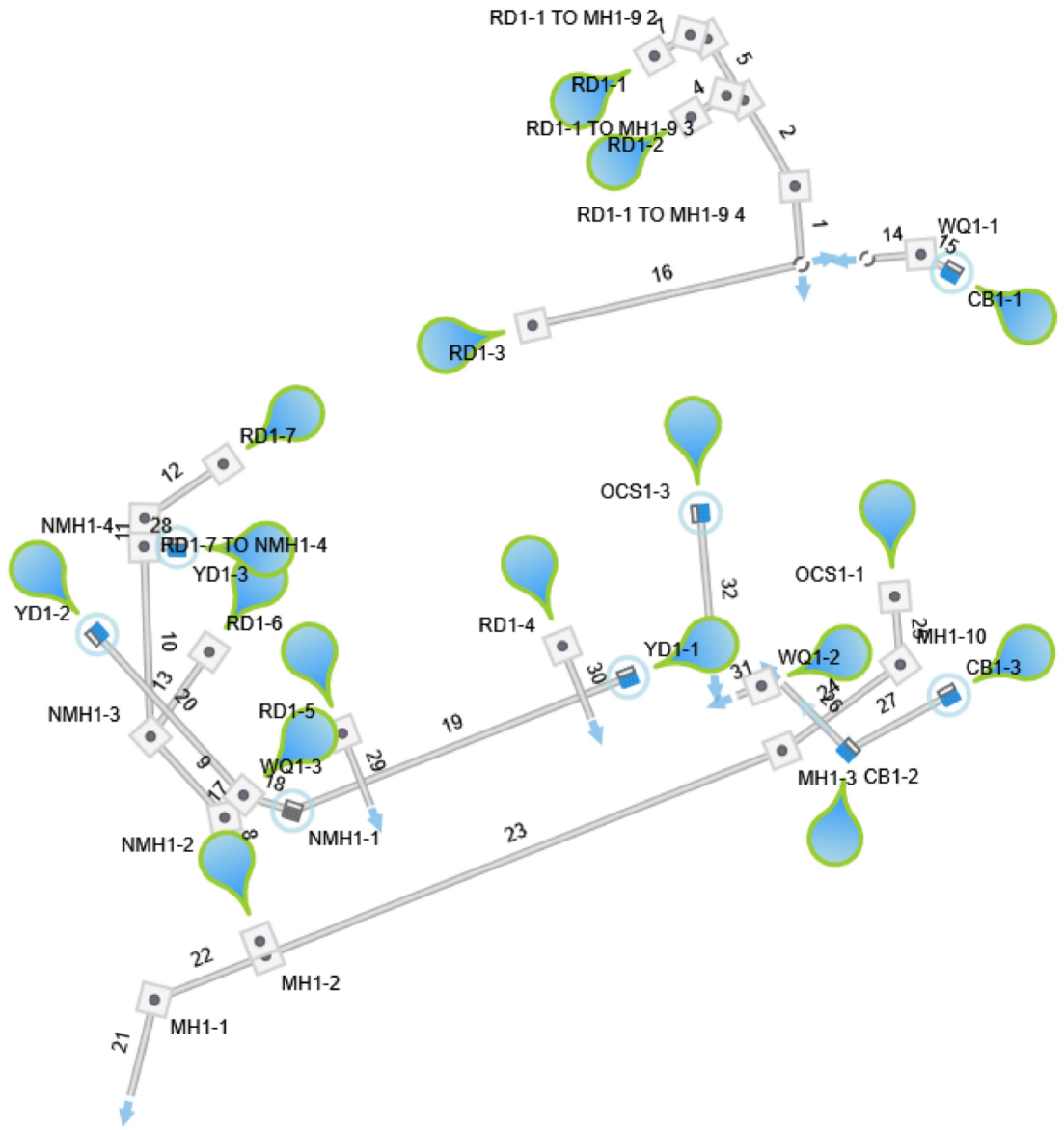
HYDRAULIC REPORTS
100-YEAR STORM EVENT

Plan View

Stormwater Studio 2024 v 3.0.0.33

Project Name: NST0101

02-08-2024



Storm Sewer Tabulation

Project Name: NST0101

Stormwater Studio 2024 v 3.0.0.33

02-08-2024

Line ID	Length	Drng Area		Rational	C x A		Tc		Intensity	Total Q	Capacity	Velocity	Line		Invert Elev		HGL Elev		Surface Elev		Line No
		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
	(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
RD1-1 TO MH1-9 5	18.80	0.000	0.104	0.00	0.00	0.10	0.0	5.25	8.04	0.83	2.45	4.45	8	3.50	354.76	354.10	355.19	354.40	357.73	357.65	1
RD1-1 TO MH1-9 4	24.09	0.000	0.104	0.00	0.00	0.10	0.0	5.18	8.07	0.83	2.07	4.24	8	2.50	355.36	354.76	355.79	355.08	358.55	357.73	2
RD1-2 TO MH1-9 2	4.24	0.000	0.058	0.00	0.00	0.06	0.0	5.04	8.12	0.47	4.12	2.10	8	9.90	355.78	355.36	356.10	355.96	358.60	358.55	3
RD1-2 TO MH1-9 1	9.94	0.058	0.058	0.99	0.06	0.06	5.0	5.00	8.14	0.47	1.85	3.20	8	2.00	355.98	355.78	356.30	356.05	359.00	358.60	4
RD1-1 TO MH1-9 3	17.08	0.000	0.046	0.00	0.00	0.05	0.0	5.11	8.10	0.37	1.85	1.84	8	2.00	355.70	355.36	355.99	355.97	358.69	358.55	5
RD1-1 TO MH1-9 2	4.24	0.000	0.046	0.00	0.00	0.05	0.0	5.09	8.10	0.37	1.85	2.38	8	2.00	355.78	355.70	356.07	356.02	358.76	358.69	6
RD1-1 TO MH1-9 1	9.98	0.046	0.046	0.99	0.05	0.05	5.0	5.00	8.14	0.37	0.59	1.77	8	0.20	356.00	355.98	356.38	356.37	359.00	358.76	7
NHM1-2 TO UGD-INF1-2	10.20	0.000	0.144	0.00	0.00	0.10	0.0	6.01	7.78	0.81	8.63	1.03	12	5.00	345.01	344.50	347.62	347.62	354.49	355.52	8
NMH1-3 TO NMH1-2	26.34	0.000	0.048	0.00	0.00	0.05	0.0	5.50	7.95	0.38	1.70	0.71	10	0.51	346.89	346.76	347.65	347.64	357.01	354.49	9
NMH1-4 TO NMH1-3	45.71	0.000	0.024	0.00	0.00	0.02	0.0	5.13	8.09	0.19	0.92	0.59	8	0.50	347.12	346.89	347.67	347.66	357.50	357.01	10
RD1-7 TO NMH1-4 2	6.80	0.000	0.019	0.00	0.00	0.02	0.0	5.10	8.10	0.15	2.27	2.39	8	3.00	354.71	354.51	354.90	354.65	357.43	357.50	11
RD1-7 TO NMH1-4 1	22.93	0.019	0.019	0.99	0.02	0.02	5.0	5.00	8.14	0.15	2.27	2.64	8	3.01	355.40	354.71	355.58	354.84	359.00	357.43	12
RD1-6 TO NMH1-3	24.72	0.024	0.024	0.99	0.02	0.02	5.0	5.00	8.14	0.19	1.84	2.60	8	1.99	353.91	353.42	354.12	353.58	357.50	357.01	13
WQ1-1 TO MH1-7	13.00	0.000	0.033	0.00	0.00	0.03	0.0	5.06	8.11	0.27	4.95	1.15	15	0.50	350.61	350.54	350.88	350.88	357.20	357.33	14
CB1-1 TO WQ1-1	8.53	0.033	0.033	0.99	0.03	0.03	5.0	5.00	8.14	0.27	5.21	2.08	15	0.55	353.70	353.65	353.91	353.85	357.07	357.20	15
RD1-3 TO MH1-9	66.32	0.100	0.100	0.99	0.10	0.10	5.0	5.00	8.14	0.81	2.45	4.69	8	3.49	356.03	353.71	356.45	353.99	359.00	357.65	16
WQ1-3 TO NMH1-2	7.06	0.038	0.096	0.58	0.02	0.06	5.0	5.98	7.79	0.44	1.85	3.08	8	2.00	349.17	349.03	349.48	349.29	352.45	354.49	17
NMH1-1 TO WQ1-3	12.31	0.000	0.020	0.00	0.00	0.01	0.0	5.88	7.82	0.08	1.31	1.77	8	1.00	351.70	351.58	351.84	351.70	353.84	352.45	18
YD1-1 TO NMH1-1	86.93	0.020	0.020	0.51	0.01	0.01	5.0	5.00	8.14	0.08	0.93	1.65	8	0.50	352.13	351.70	352.27	351.83	355.03	353.84	19
YD1-2 TO WQ1-3	52.30	0.038	0.038	0.63	0.02	0.02	5.0	5.00	8.14	0.19	1.31	2.35	8	1.00	352.10	351.58	352.31	351.76	354.95	352.45	20
MH1-1 TO EX-CB1-1	23.42	0.000	0.000	0.00	0.00	0.00	0.0	0.78	8.14	2.12	15.64	2.75	15	5.00	337.99	336.82	338.57	338.07	345.82	340.77	21
MH1-2 TO MH1-1	28.70	0.000	0.000	0.00	0.00	0.00	0.0	0.72	8.14	2.12	15.64	5.42	15	5.00	343.24	341.81	343.82	342.17	347.53	345.82	22

Notes: IDF File = Summit.IDF, Return Period = 100-yrs.

Project File: NST0101 100-Yr.sws

Storm Sewer Tabulation

Project Name: NST0101

Stormwater Studio 2024 v 3.0.0.33

02-08-2024

Line ID	Length	Drng Area		Rational	C x A		Tc		Intensity	Total Q	Capacity	Velocity	Line		Invert Elev		HGL Elev		Surface Elev		Line No
		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
	(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
MH1-3 TO MH1-2	133.70	0.000	0.000	0.00	0.00	0.00	0.0	0.20	8.14	1.21	7.00	2.48	15	1.00	344.68	343.34	345.12	344.01	351.79	347.53	23
MH1-10 TO MH1-3	35.24	0.000	0.000	0.00	0.00	0.00	0.0	0.06	8.14	1.21	7.00	3.49	15	1.00	345.13	344.78	345.57	345.16	352.68	351.79	24
OCS1-1 TO MH1-10	16.41	0.000	0.000	0.00	0.00	0.00	0.0	0.00	8.14	1.21	7.00	3.39	15	1.00	348.50	348.34	348.94	348.73	354.00	352.68	25
CB1-2 TO WQ1-2	22.04	0.145	0.175	0.90	0.13	0.15	5.0	5.12	8.09	1.18	4.94	0.98	15	0.50	347.51	347.40	348.65	348.65	351.19	353.30	26
CB1-3 TO CB1-2	27.70	0.030	0.030	0.51	0.02	0.02	5.0	5.00	8.14	0.12	15.50	0.87	15	4.91	348.97	347.61	349.11	348.68	352.57	351.19	27
YD1-3 TO NMH1-4	7.96	0.005	0.005	0.99	0.00	0.00	5.0	5.00	8.14	0.04	0.86	0.22	6	2.00	347.28	347.12	347.69	347.69	348.99	357.50	28
RD1-5 TO UGD-INF1-2	18.36	0.045	0.045	0.99	0.04	0.04	5.0	5.00	8.14	0.36	4.14	1.80	8	10.02	348.59	346.75	348.87	347.62	356.00	354.37	29
RD1-4 TO UGD-INF1-2	18.36	0.028	0.028	0.99	0.03	0.03	5.0	5.00	8.14	0.23	4.14	1.42	8	10.02	348.59	346.75	348.81	347.62	356.00	355.30	30
WQ1-2 TO MH1-6	6.00	0.000	0.000	0.00	0.00	0.00	0.0	0.00	8.14	0.96	22.12	0.78	15	10.00	345.10	344.50	347.62	347.62	353.93	354.41	31
OCS1-3 TO UGD-INF1-2	37.34	0.000	0.000	0.00	0.00	0.00	0.0	0.00	8.14	0.53	19.79	1.43	15	8.00	347.49	344.50	347.78	347.62	355.00	355.78	32
OCS1-2 TO MH1-2	3.75	0.000	0.000	0.00	0.00	0.00	0.0	0.00	8.14	0.91	13.99	3.29	15	4.00	344.50	344.35	344.88	344.67	349.00	347.53	33

Notes: IDF File = Summit.IDF, Return Period = 100-yrs.

Project File: NST0101 100-Yr.sws

SUBSURFACE CONVEYANCE NETWORK 2

WEIGHTED RUNOFF COEFFICIENT CALCULATIONS

DRAINAGE SUBAREA RUNOFF COEFFICIENT CALCULATIONS
STORMWATER CONVEYANCE DESIGN
BEACON UNITARIAN UNIVERSALIST CHURCH
LANGAN PROJECT #101007201

PROPOSED CONVEYANCE SYSTEM

SUB-DRAINAGE AREA	PERVIOUS AREA C = 0.51 (SF)	IMPERVIOUS AREA C = 0.99 (SF)	TOTAL AREA (SF)	TOTAL AREA (AC)	RUNOFF COEFFICIENT C (Weighted)	STRUCTURE TYPE
NETWORK 2						
CB2-1	1,436	8,451	9,887	0.23	0.92	GRATE INLET
CB2-2	1,076	4,658	5,734	0.13	0.90	GRATE INLET
CB2-4	502	1,110	1,612	0.04	0.84	GRATE INLET
FES2-1	7,192	2,414	9,606	0.22	0.63	FLARED END STRUCTURE
YD2-1	3,198	1,876	5,074	0.116	0.69	YARD INLET
YD2-2	147	197	344	0.008	0.78	YARD INLET

NOTES:

1. Runoff coefficients are referenced from Table 10.3-B: Recommended Coefficient of Runoff Values for Various Selected Land Uses from Section 10 of the 2015 New Jersey Department of Transportation (NJDOT) Roadway Design Manual.
2. Pervious land cover is assumed to be in good hydrologic condition with good cover. The hydrologic soil group classification of the native soils in the area of the proposed redevelopment is predominantly Group A according to the NRCS Web Soil Survey. NJDOT Roadway Design Manual Table 10.3-B does not specify a runoff coefficient for Group A open spaces areas; therefore, a runoff coefficient of 0.25 was chosen as a conservative measure, which is the runoff coefficient for Group B open space areas.

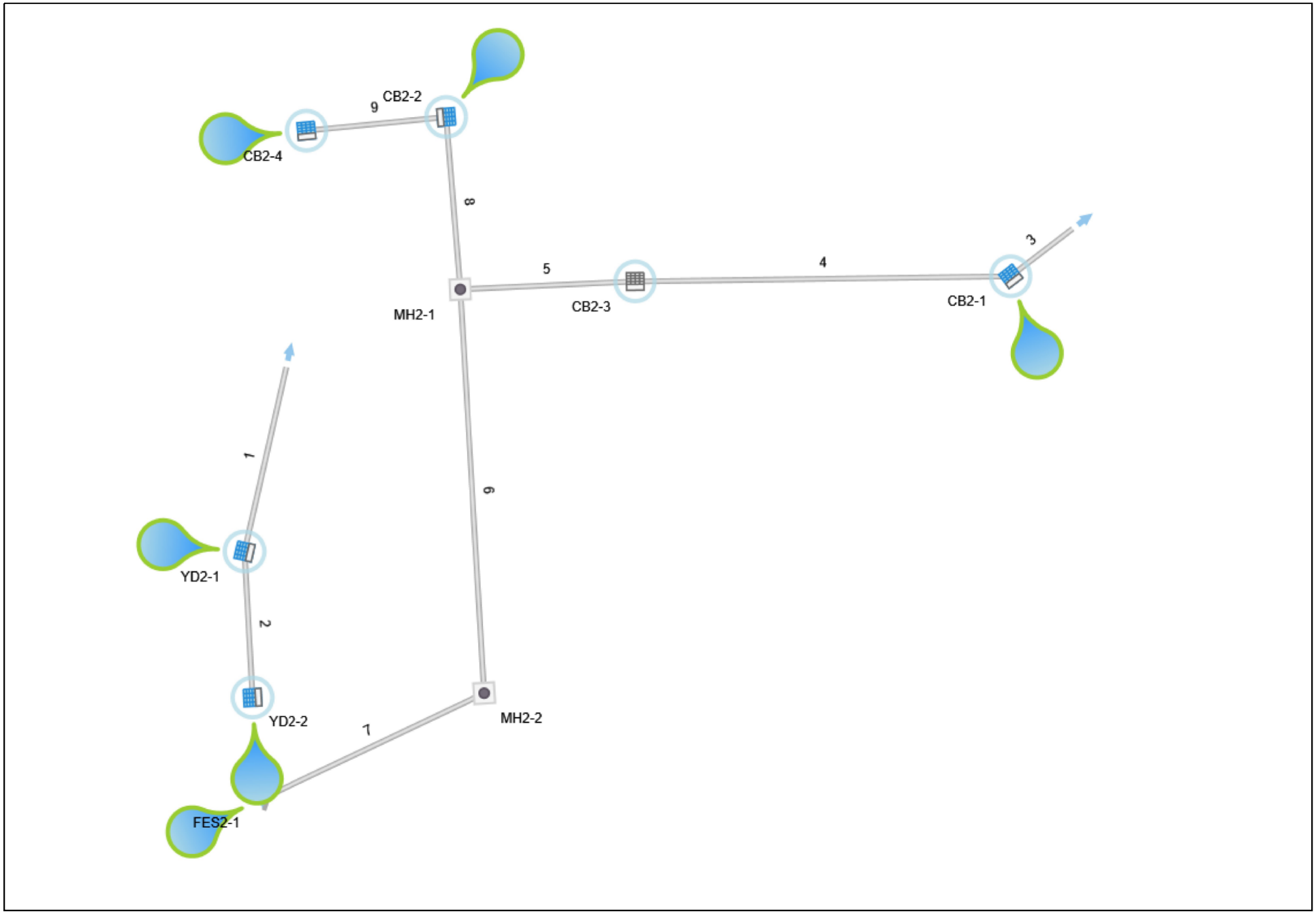
HYDRAULIC REPORTS
25-YEAR STORM EVENT

Plan View

Stormwater Studio 2024 v 3.0.0.33

Project Name: NST0102

02-08-2024



Storm Sewer Tabulation

Project Name: NST0102

Stormwater Studio 2024 v 3.0.0.33

02-08-2024

Line ID	Length	Drng Area		Rational	C x A		Tc		Intensity	Total Q	Capacity	Velocity	Line		Invert Elev		HGL Elev		Surface Elev		Line No
		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
	(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
YD2-1 TO PAPS-3	42.96	0.116	0.124	0.69	0.08	0.09	5.0	5.42	6.94	0.60	4.95	0.59	15	0.50	354.55	354.33	355.42	355.42	358.02	358.16	1
YD2-2 TO YD2-1	33.45	0.008	0.008	0.78	0.01	0.01	5.0	5.00	7.08	0.04	5.37	0.07	15	0.59	354.84	354.65	355.43	355.43	358.22	358.02	2
CB2-1 TO HW2-1	17.63	0.227	0.616	0.92	0.21	0.50	5.0	6.34	6.67	3.31	6.06	2.76	15	0.75	353.05	352.92	354.20	354.17	356.60	355.11	3
CB2-3 TO CB2-1	85.99	0.000	0.389	0.00	0.00	0.29	0.0	5.96	6.78	1.95	4.95	1.82	15	0.50	353.48	353.05	354.39	354.34	358.10	356.60	4
MH2-1 TO CB2-3	40.08	0.000	0.389	0.00	0.00	0.29	0.0	5.79	6.83	1.97	4.95	2.24	15	0.50	353.68	353.48	354.44	354.43	357.69	358.10	5
MH2-2 TO MH2-1	92.49	0.000	0.221	0.00	0.00	0.14	0.0	5.29	6.98	0.97	4.95	1.95	15	0.50	354.27	353.81	354.69	354.61	358.75	357.69	6
FES2-1 TO MH2-2	55.32	0.221	0.221	0.63	0.14	0.14	5.0	5.00	7.08	0.98	4.95	3.04	15	0.50	354.65	354.37	355.05	354.75	356.38	358.75	7
CB2-2 TO MH2-1	39.54	0.132	0.169	0.90	0.12	0.15	5.0	5.26	6.99	1.05	4.95	1.22	15	0.50	353.88	353.68	354.62	354.61	357.22	357.69	8
CB2-4 TO CB2-2	32.08	0.037	0.037	0.84	0.03	0.03	5.0	5.00	7.08	0.22	4.95	0.32	15	0.50	354.04	353.88	354.66	354.66	357.31	357.22	9

Notes: IDF File = Summit.IDF, Return Period = 25-yrs.

Project File: NST0102 25-Yr.sws

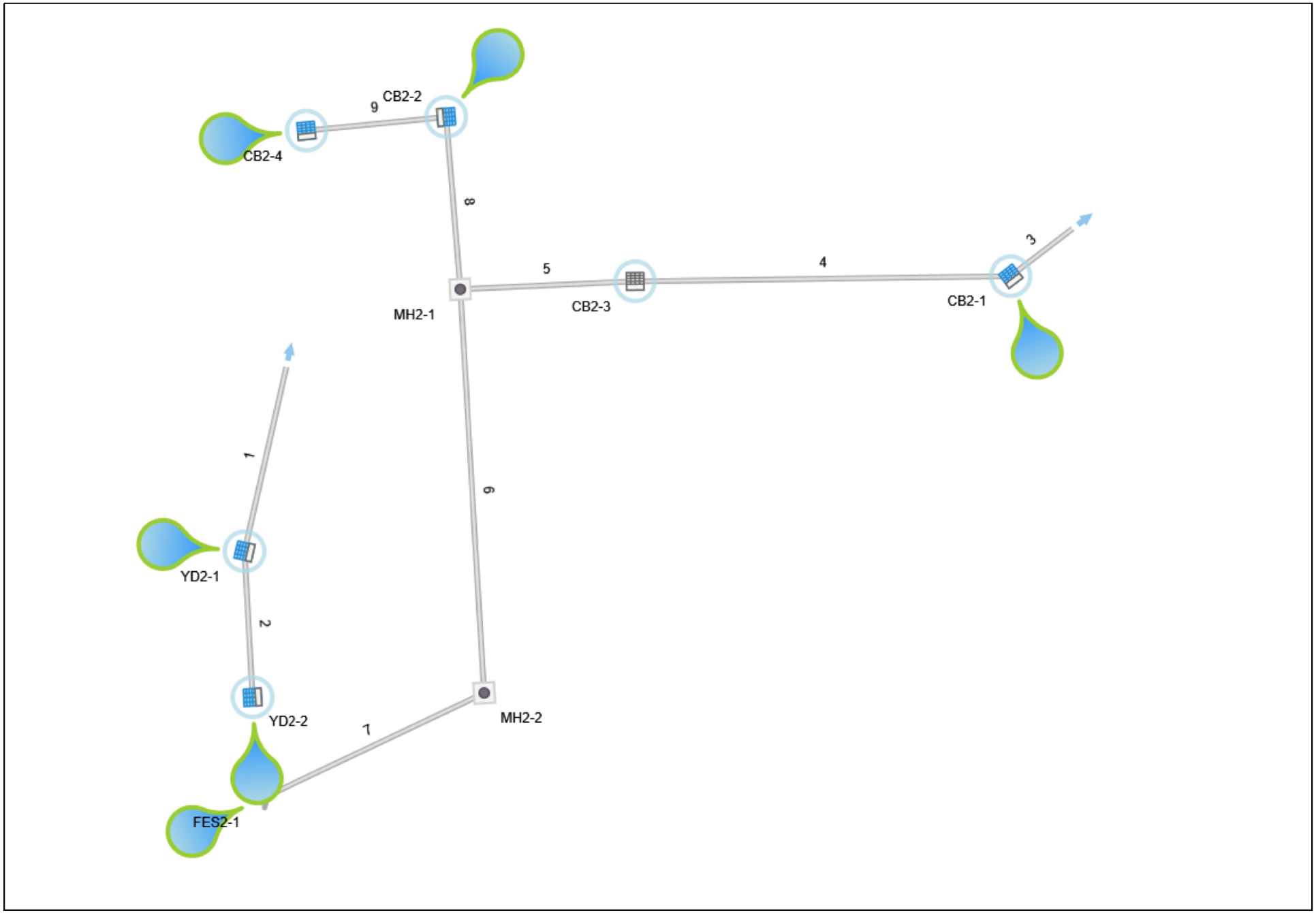
HYDRAULIC REPORTS
100-YEAR STORM EVENT

Plan View

Stormwater Studio 2024 v 3.0.0.33

Project Name: NST0102

02-08-2024



Storm Sewer Tabulation

Project Name: NST0102

Stormwater Studio 2024 v 3.0.0.33

02-08-2024

Line ID	Length	Drng Area		Rational	C x A		Tc		Intensity	Total Q	Capacity	Velocity	Line		Invert Elev		HGL Elev		Surface Elev		Line No
		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Up	Dn	Up	Dn	Up	Dn	
	(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
YD2-1 TO PAPS-3	42.96	0.116	0.124	0.69	0.08	0.09	5.0	5.41	7.99	0.69	4.95	0.56	15	0.50	354.55	354.33	355.88	355.88	358.02	358.16	1
YD2-2 TO YD2-1	33.45	0.008	0.008	0.78	0.01	0.01	5.0	5.00	8.14	0.05	5.37	0.04	15	0.59	354.84	354.65	355.89	355.89	358.22	358.02	2
CB2-1 TO HW2-1	17.63	0.227	0.616	0.92	0.21	0.50	5.0	6.29	7.68	3.82	6.06	3.17	15	0.75	353.05	352.92	354.21	354.17	356.60	355.11	3
CB2-3 TO CB2-1	85.99	0.000	0.389	0.00	0.00	0.29	0.0	5.93	7.81	2.25	4.95	2.00	15	0.50	353.48	353.05	354.47	354.40	358.10	356.60	4
MH2-1 TO CB2-3	40.08	0.000	0.389	0.00	0.00	0.29	0.0	5.76	7.86	2.27	4.95	2.33	15	0.50	353.68	353.48	354.53	354.51	357.69	358.10	5
MH2-2 TO MH2-1	92.49	0.000	0.221	0.00	0.00	0.14	0.0	5.28	8.03	1.12	4.95	1.87	15	0.50	354.27	353.81	354.76	354.70	358.75	357.69	6
FES2-1 TO MH2-2	55.32	0.221	0.221	0.63	0.14	0.14	5.0	5.00	8.14	1.13	4.95	2.97	15	0.50	354.65	354.37	355.08	354.82	356.38	358.75	7
CB2-2 TO MH2-1	39.54	0.132	0.169	0.90	0.12	0.15	5.0	5.25	8.04	1.20	4.95	1.25	15	0.50	353.88	353.68	354.71	354.70	357.22	357.69	8
CB2-4 TO CB2-2	32.08	0.037	0.037	0.84	0.03	0.03	5.0	5.00	8.14	0.25	4.95	0.31	15	0.50	354.04	353.88	354.75	354.75	357.31	357.22	9

Notes: IDF File = Summit.IDF, Return Period = 100-yrs.

Project File: NST0102 100-Yr.sws

RIPRAP APRON CALCULATIONS

HW2-1

Based on "Standards for Soil Erosion and Sediment Control in New Jersey," dated 2017

TABLE 12-1 ALLOWABLE VELOCITIES FOR VARIOUS SOILS

SOIL TEXTURE	ALLOWABLE VELOCITY (ft./sec.)
1. Sand	1.8
2. Sandy Loam	2.5
3. Silt loam (also high lime clay), loam	3.0
4. Sandy clay loam	3.5
5. Clay loam	4.0
6. Clay, fine gravel, gradded loam to gravel	5.0
7. Cobbles	5.5
8. Shale (non-weathered)	6.0

Soil type where outfall is located = 2 (Note: Select number designating soil texture above)
allowable velocity = 2.5 ft/sec
v (velocity) = 2.76 ft/sec
Rip Rap Apron required? 1 (1 = yes, 0 = no)

Given:

D_o (max inside height) = 1.25 feet
W_o (max inside width) = 1.25 feet
Q (discharge) = 3.31 cfs (25 year storm)
*q (unit discharge, = Q/W_o) = 2.7 cfs / foot
** T_w (tail water) = 0.25 feet

* for the conduit design storm or the 25 year storm, whichever is greater

** for areas where T_w cannot be computed, use $T_w = 0.2\ D_o$. For discharge into detention basins, Tw shall equal the 2 year storm elevation in the basin.

Riprap Apron Dimensions

I. The length of the apron, L (in feet), shall be determined from the formula:

$$L_a = (1.8\frac{q}{D_o^{1/2}}) + 7D_o$$

$T_w < ½\ D_o$ **L_a = 13 feet**

$$L_a = 3\frac{q}{D_o^{1/2}}$$

$T_w > ½\ D_o$ L_a = 0 feet

II. Where there is no well-defined channel immediately downstream of the apron, the width, W, of the outlet end of the apron shall be as follows:

For tailwater elevation greater than or equal to the elevation of the center of the pipe,

$$W = 3W_o + 0.4L_a$$

W = 0 feet

For tailwater elevation less than the elevation of the center of the pipe,

$$W = 3W_o + L_a$$

W = 17 feet

Where L_a is the length of the apron determined from the formula and W_o is the culvert width.

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NJ Certificate of Authorization No: 24GA27996400

Project: **HW2-1 RIP RAP APRON DESIGN**
SUMMIT **NEW JERSEY**

Project No.	Date:	By:	Ckd:	Sheet. No.
101007201	2/8/2024	TEG	MJV	1 of 2

Riprap Median Stone Diameter

The median stone diameter, D_{50}, in feet, shall be determined from the formula:

For Horizontal Apron: $$D_{50} = \frac{0.016}{T_w} q^{1.33}$$ Where $q = Q/D_o$

D_{50} = 0.24 ft *OR* D_{50} = 2.9 inches

Use Min. D_{50} = 3.0 inches

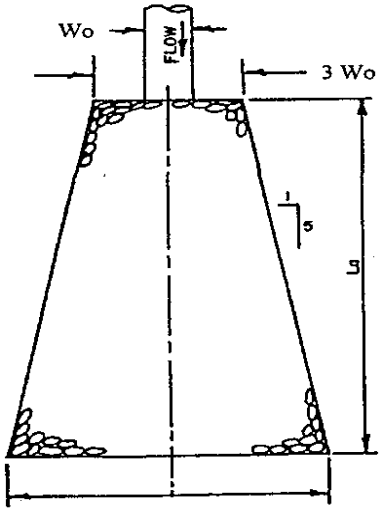
Note: For discharge into Detention Basins, analyze the hydraulic characteristics of the basin for the design storm to determine the combination of conduit discharge and tailwater that results in the largest required D50 stone size.

Riprap Lining Thickness

The thickness of riprap lining shall meet at least one of the following criteria:

1. A thickness of at least three times the D_{50} size if a filter layer is not used. t = 8.6 inches
2. A thickness of at least two times the D_{50} size if a filter layer is used. t = 5.8 inches

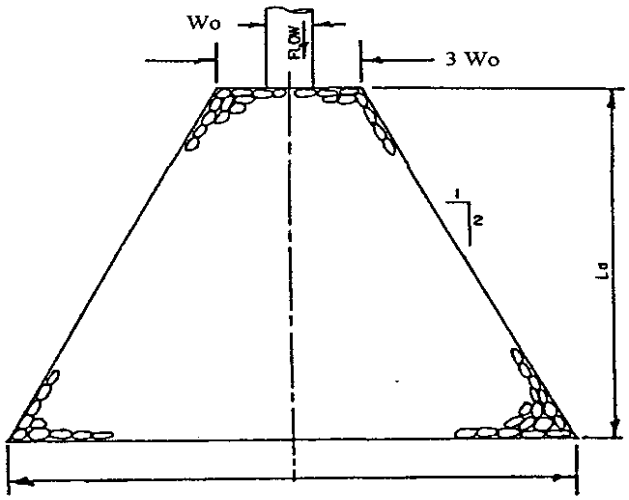
*Minimum required thickness is 6 inches. **Use Min. t = 6.0 inches**



For tailwater elevation greater than or equal to the elevation of the center of the pipe

L_a = 0

W = 0



For tailwater elevation less than the elevation of the center of the pipe

L_a = 13

W= 17

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NJ Certificate of Authorization No: 24GA27996400

Project:

HW2-1

RIP RAP APRON DESIGN

SUMMIT **NEW JERSEY**

Project No.	Date:	By:	Ckd:	Sheet. No.
101007201	2/8/2024	TEG	MJV	2 of 2

APPENDIX E

Stormwater Quality & Groundwater Recharge Calculations

APPENDIX E
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UGD-INF1-1

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100-YEAR STORM EVENT

WATER QUALITY STORM

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100-YEAR STORM EVENT

WATER QUALITY STORM

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2-YEAR STORM EVENT

10-YEAR STORM EVENT

100-YEAR STORM EVENT

WATER QUALITY STORM

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POROUS ASPHALT PAVEMENT DESIGN CALCULATIONS

WATER QUALITY CALCULATIONS

NJDEP WATER QUALITY DESIGN STORM ROUTINGS

UGD-INF1-1

Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-07-2024

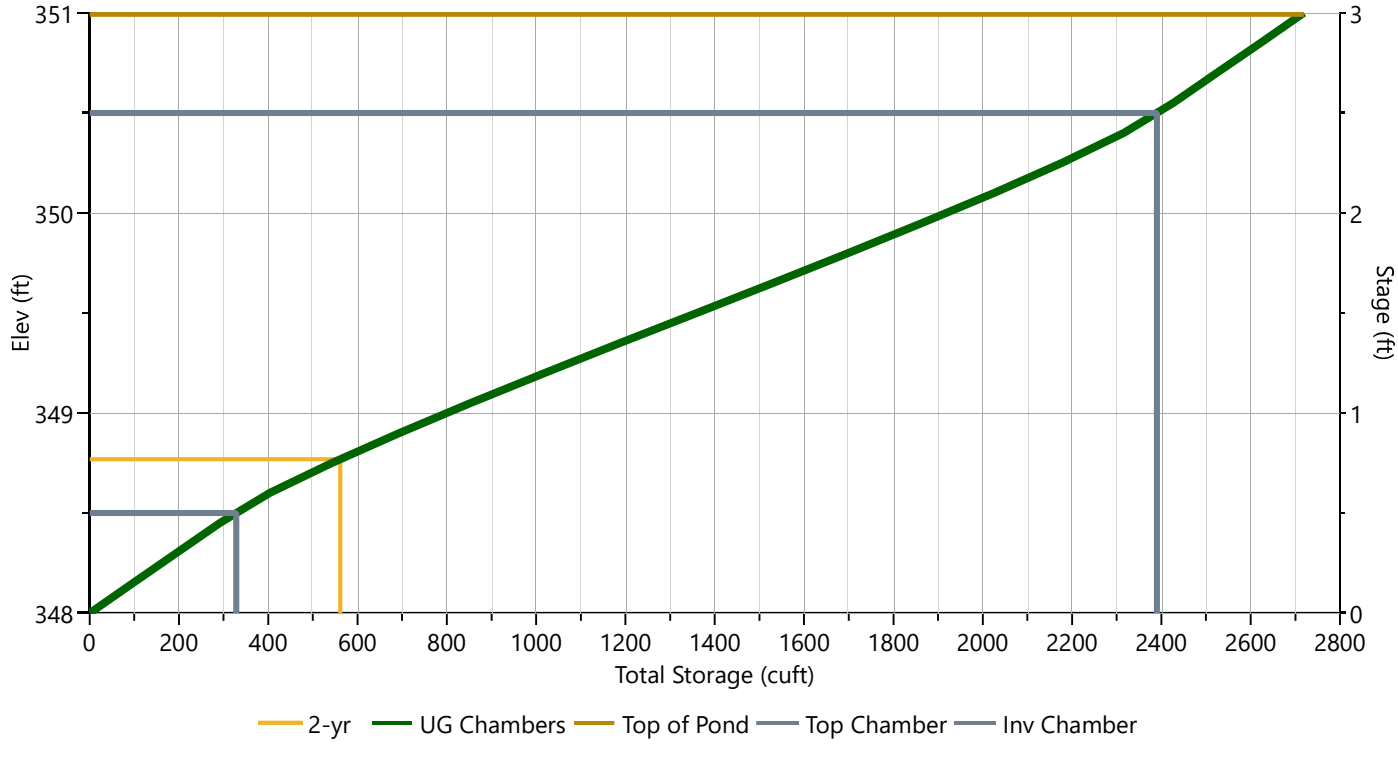
UGD-INF1-1

Stage-Storage

Underground Chambers	
Description	**Input**
Invert Elev Down, ft	348.50
Chamber Rise, ft	2.00
Chamber Shape	Circular
Chamber Span, ft	2.00
Barrel Length, ft	75.00
No. Barrels	5
Barrel Slope, %	0.00
Headers, y/n	Yes
Stone Encasement, y/n	Yes
Encasement Bottom Elevation, ft	348.00
Encasement Width per Chamber, ft	4.00
Encasement Depth, ft	3.00
Encasement Voids, %	40.00

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	348.00	1,620	0.000	0.000
0.15	348.15	1,620	97.2	97.2
0.30	348.30	1,620	97.2	194
0.45	348.45	1,620	97.2	292
0.60	348.60	1,620	112	403
0.75	348.75	1,620	139	542
0.90	348.90	1,620	152	694
1.05	349.05	1,620	160	854
1.20	349.20	1,620	166	1,020
1.35	349.35	1,620	169	1,189
1.50	349.50	1,620	171	1,360
1.65	349.65	1,620	171	1,531
1.80	349.80	1,620	169	1,700
1.95	349.95	1,620	166	1,866
2.10	350.10	1,620	160	2,026
2.25	350.25	1,620	152	2,177
2.40	350.40	1,620	139	2,316
2.55	350.55	1,620	112	2,428
2.70	350.70	1,620	97.2	2,525
2.85	350.85	1,620	97.2	2,622
3.00	351.00	1,620	97.2	2,719



Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-07-2024

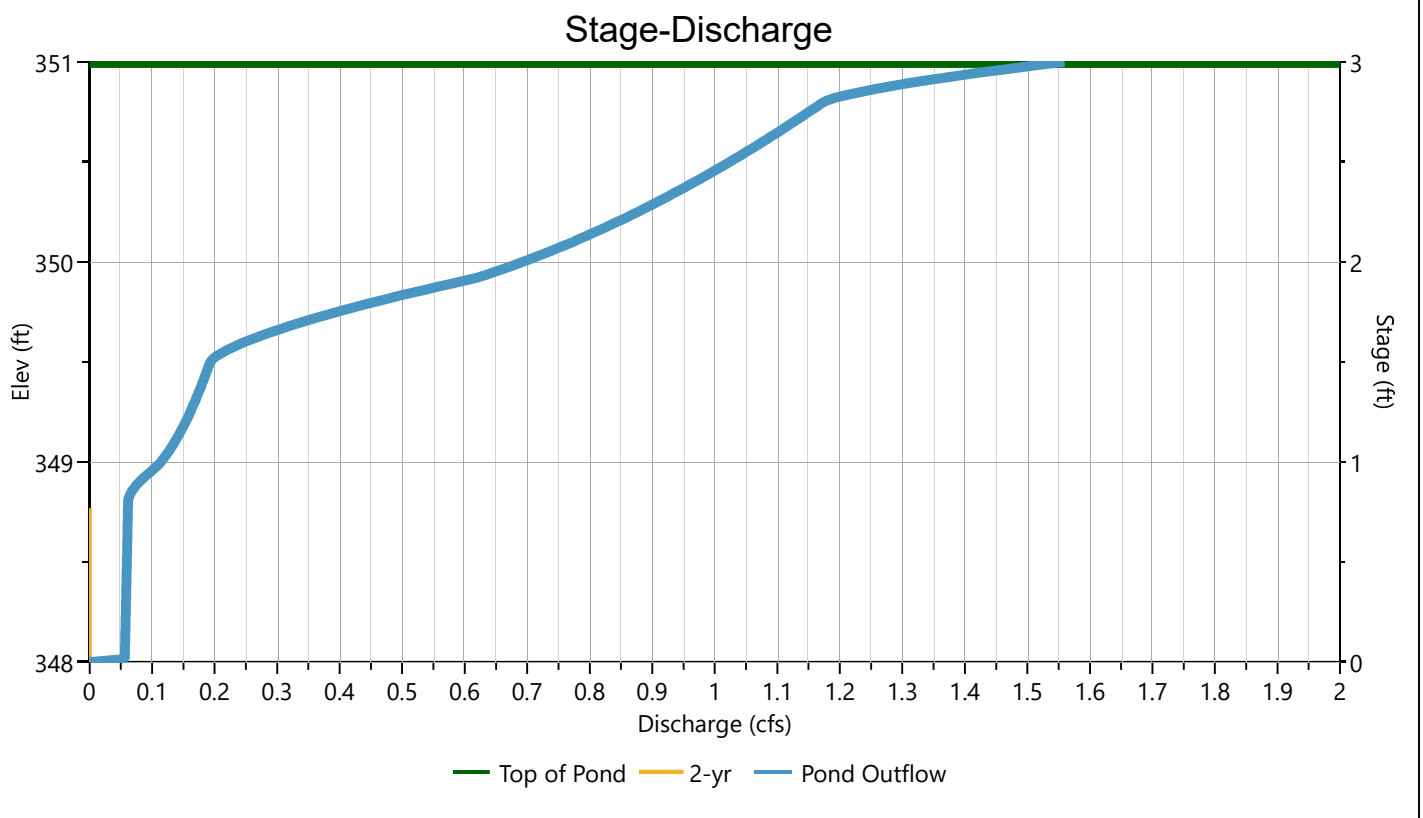
UGD-INF1-1

Stage-Discharge

Culvert / Orifices	Culvert	Orifices			Perforated Riser	
		1	2	3		
Rise, in		2.5	5		Hole Diameter, in	
Span, in		2.5	5		No. holes	
No. Barrels		1	1		Invert Elevation, ft	
Invert Elevation, ft		348.80	349.50		Height, ft	
Orifice Coefficient, Co		0.60	0.60		Orifice Coefficient, Co	
Length, ft						
Barrel Slope, %						
N-Value, n	0.000					

Weirs	Riser*	Weirs			Ancillary	
		1	2	3		
Shape / Type		Rectangular			Exfiltration, in/hr	1.50**
Crest Elevation, ft		350.8				
Crest Length, ft		1				
Angle, deg						
Weir Coefficient, Cw		3.3				

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



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

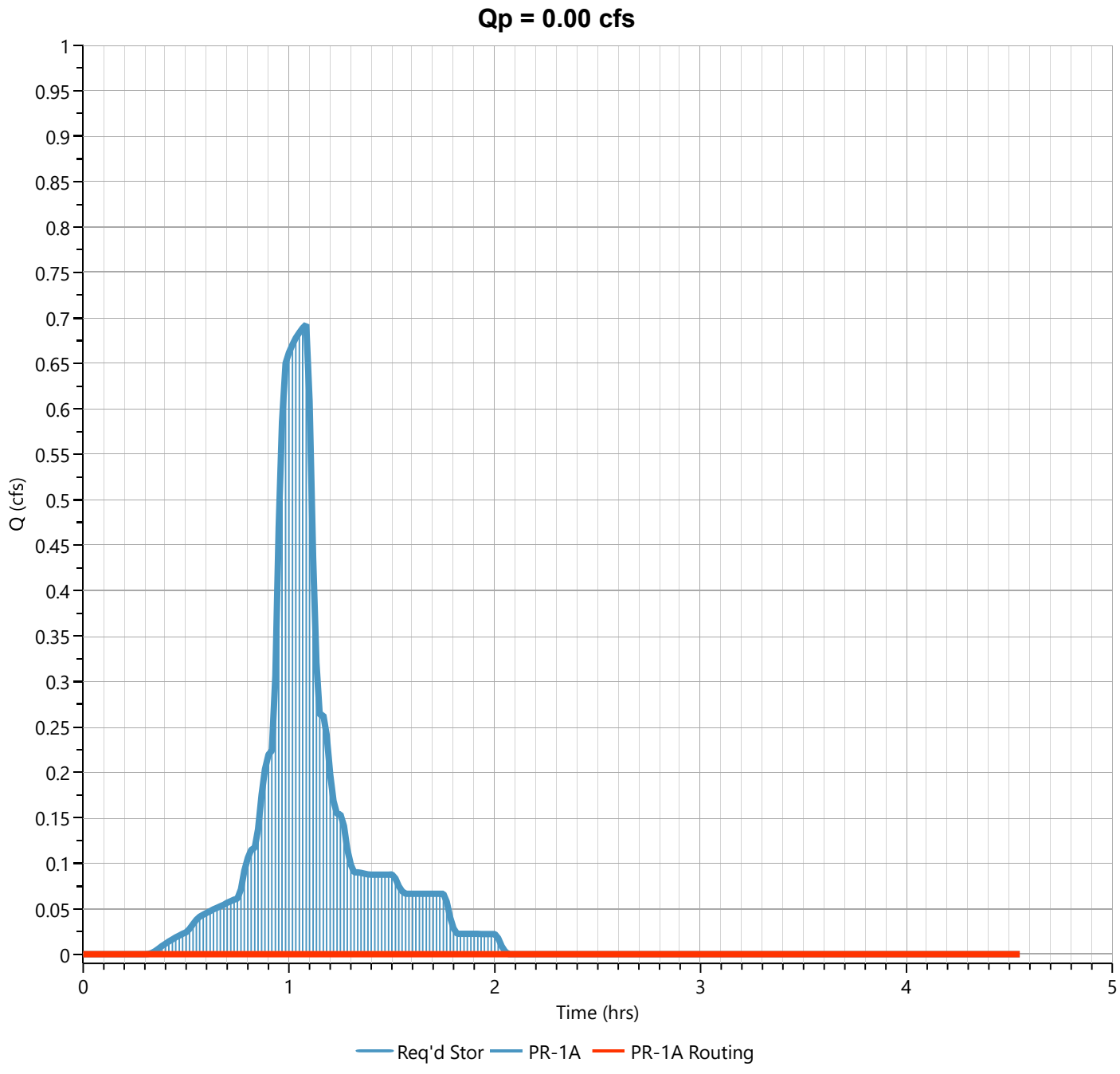
02-07-2024

PR-1A Routing

Hyd. No. 2

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 272 min
Time Interval	= 1 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 1 - PR-1A	Max. Elevation	= 348.77 ft
Pond Name	= UGD-INF1-1	Max. Storage	= 562 cuft

Pond Routing by Storage Indication Method



UGD-INF1-2

Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-07-2024

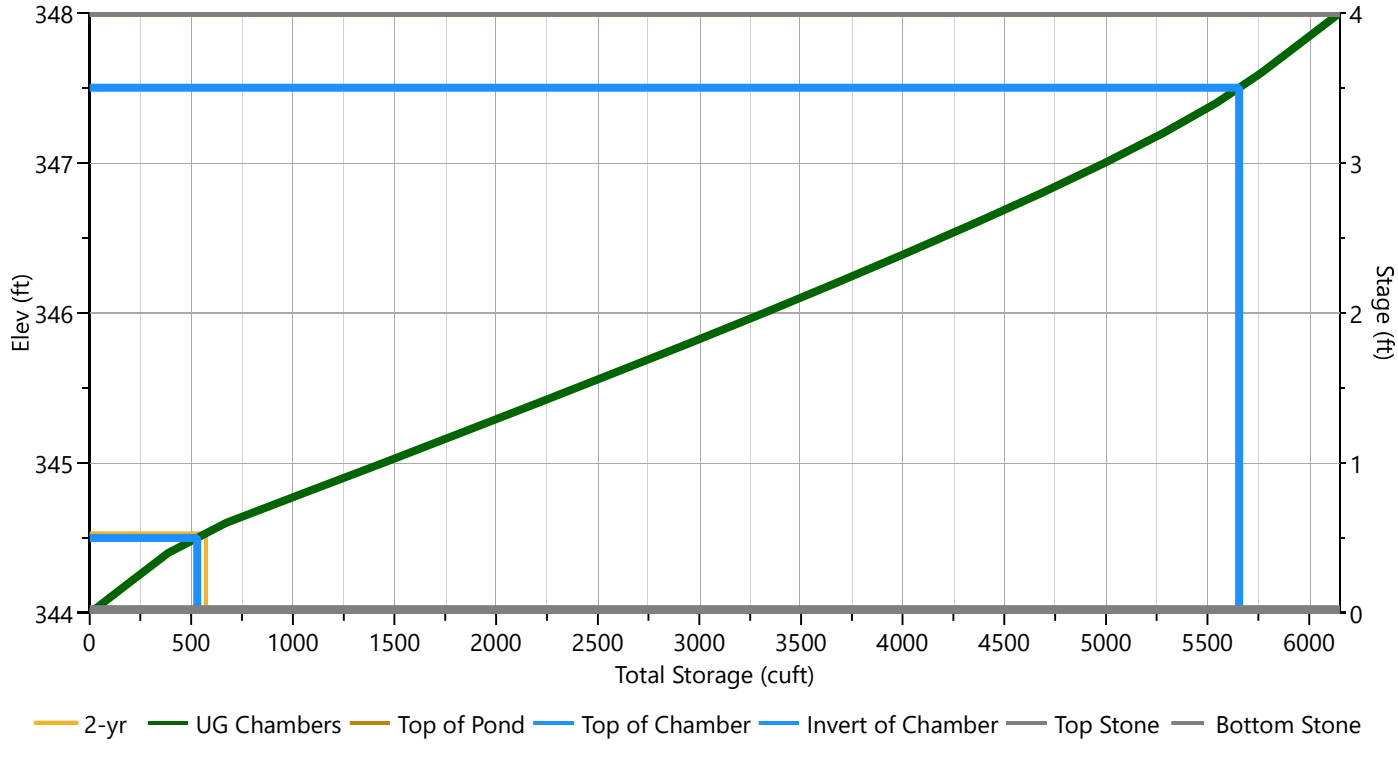
UGD-INF1-2

Stage-Storage

Cultec Recharger® 360HD Chamber	
Description	**Input**
Chamber Height, in	36
Chamber Shape	Arch
Chamber Width, in	60
Installed Length, ft	3.67
No. Chambers	103
Bare Chamber Stor, cuft	3,776
No. Rows	3
Space Between Rows, in	9
Stone Above, in	6
Stone Below, in	6
Stone Sides, in	12
Stone Ends, in	12
Encasement Voids, %	40.00
Encasement Bottom Elevation, ft	344.00

Stage / Storage Table

Stage (in)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.0	344.00	2,414	0.000	0.000
2.4	344.20	2,414	193	193
4.8	344.40	2,414	193	386
7.2	344.60	2,414	285	671
9.6	344.80	2,414	387	1,058
12.0	345.00	2,414	385	1,443
14.4	345.20	2,414	383	1,826
16.8	345.40	2,414	380	2,206
19.2	345.60	2,414	376	2,582
21.6	345.80	2,414	371	2,953
24.0	346.00	2,414	365	3,317
26.4	346.20	2,414	357	3,674
28.8	346.40	2,414	348	4,022
31.2	346.60	2,414	338	4,360
33.6	346.80	2,414	325	4,685
36.0	347.00	2,414	309	4,994
38.4	347.20	2,414	290	5,284
40.8	347.40	2,414	262	5,545
43.2	347.60	2,414	220	5,765
45.6	347.80	2,414	193	5,959
48.0	348.00	2,414	193	6,152



Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-07-2024

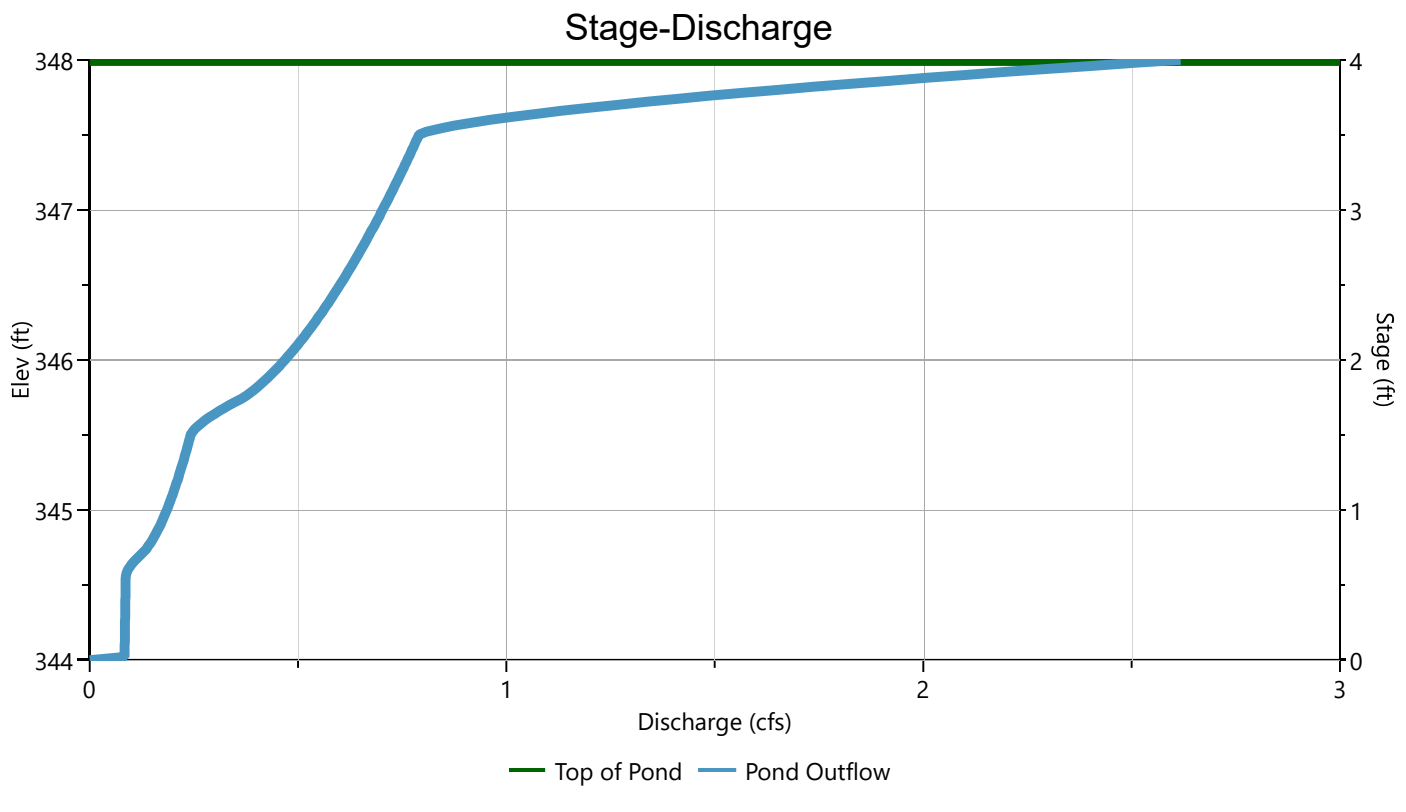
UGD-INF1-2

Stage-Discharge

Culvert / Orifices	Culvert	Orifices			Perforated Riser	
		1	2	3		
Rise, in		2.5	3		Hole Diameter, in	
Span, in		2.5	3		No. holes	
No. Barrels		1	1		Invert Elevation, ft	
Invert Elevation, ft		344.55	345.50		Height, ft	
Orifice Coefficient, Co		0.60	0.60		Orifice Coefficient, Co	
Length, ft						
Barrel Slope, %						
N-Value, n	0.000					

Weirs	Riser*	Weirs			Ancillary	
		1	2	3		
Shape / Type		Rectangular			Exfiltration, in/hr	1.50**
Crest Elevation, ft		347.5				
Crest Length, ft		1.5				
Angle, deg						
Weir Coefficient, Cw		3.3				

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



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-07-2024

UGD-INF1-2 Routing

Hyd. No. 20

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0 min
Time Interval	= 1 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 18 - Comb. to UDG-INF1-2	Max. Elevation	= 344.53 ft
Pond Name	= UGD-INF1-2	Max. Storage	= 572 cuft

Pond Routing by Storage Indication Method

Qp = 0.00 cfs

RAIN GARDEN

Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-07-2024

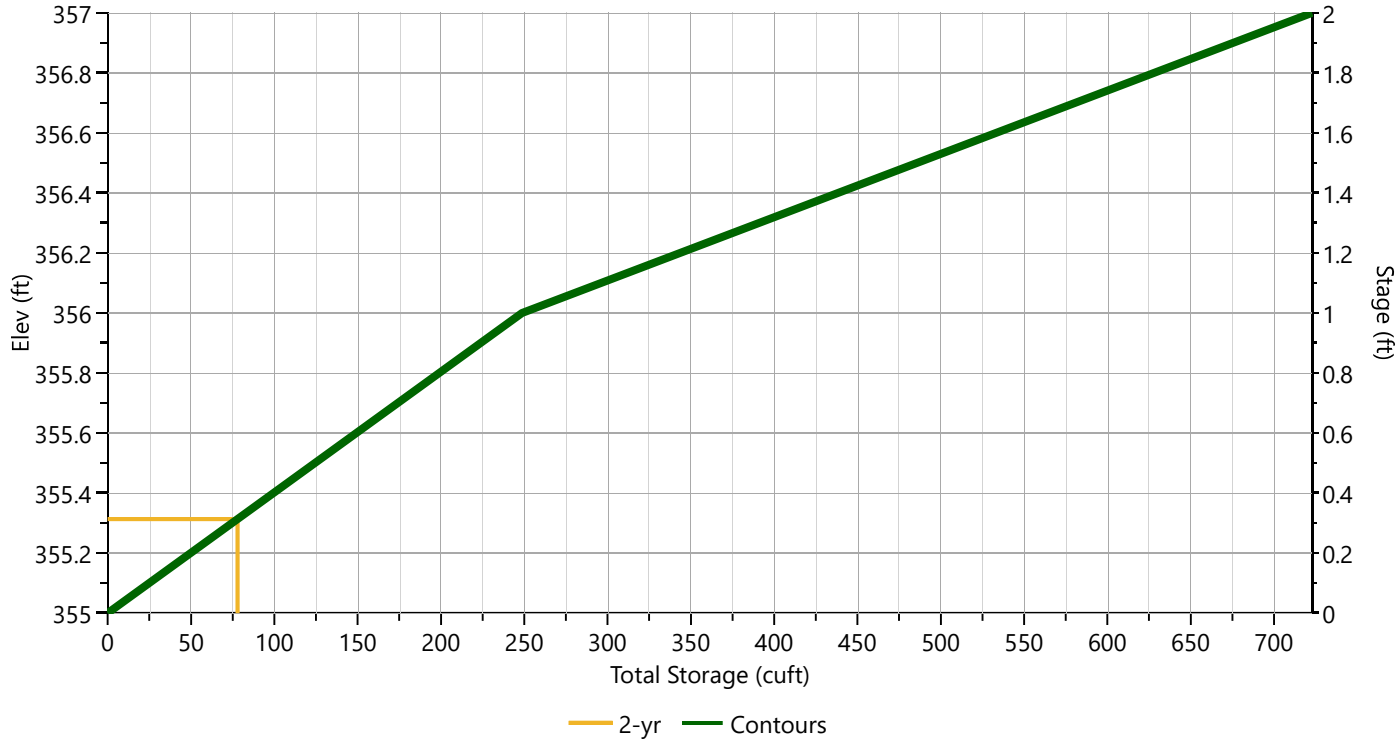
Rain Garden

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	355.00
Voids (%)	100.00
Volume Calc	Broad Crested

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	355.00	150	0.000	0.000
1.00	356.00	347	249	249
2.00	357.00	601	474	723



Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-07-2024

Rain Garden

Stage-Discharge

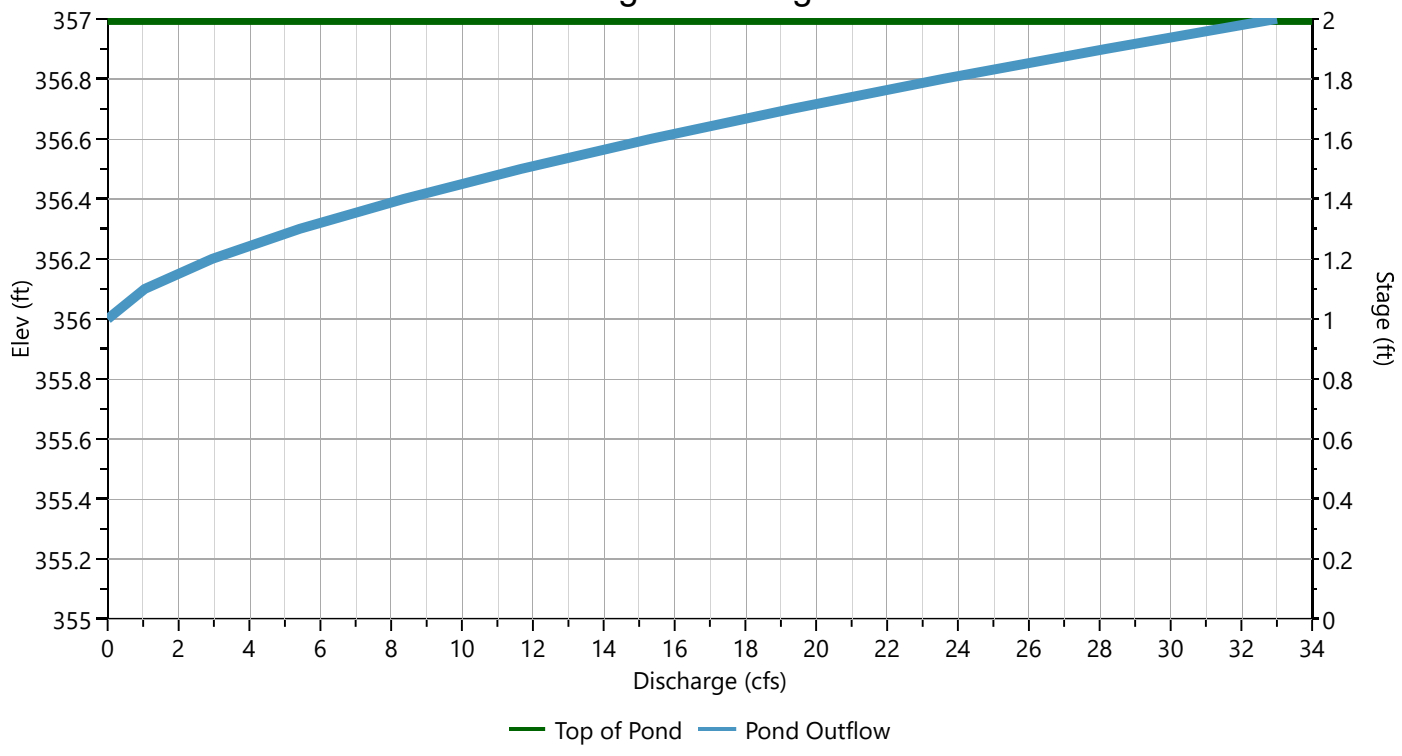
Culvert / Orifices	Culvert	Orifices		
		1	2	3
Rise, in				
Span, in				
No. Barrels				
Invert Elevation, ft				
Orifice Coefficient, Co				
Length, ft				
Barrel Slope, %				
N-Value, n	0.000			

Perforated Riser	
Hole Diameter, in	
No. holes	
Invert Elevation, ft	
Height, ft	
Orifice Coefficient, Co	

Weirs	Riser*	Weirs		
		1	2	3
Shape / Type		Broad Crested		
Crest Elevation, ft		356		
Crest Length, ft		10		
Angle, deg				
Weir Coefficient, Cw		3.3		

Ancillary	
Exfiltration, in/hr	

**Routes through Culvert.*



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-07-2024

PR-1C Routing

Hyd. No. 11

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0 min
Time Interval	= 1 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 10 - PR-1C	Max. Elevation	= 355.31 ft
Pond Name	= Rain Garden	Max. Storage	= 77.9 cuft

Pond Routing by Storage Indication Method

Qp = 0.00 cfs

POROUS PAVEMENT SYSTEM 1

Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-07-2024

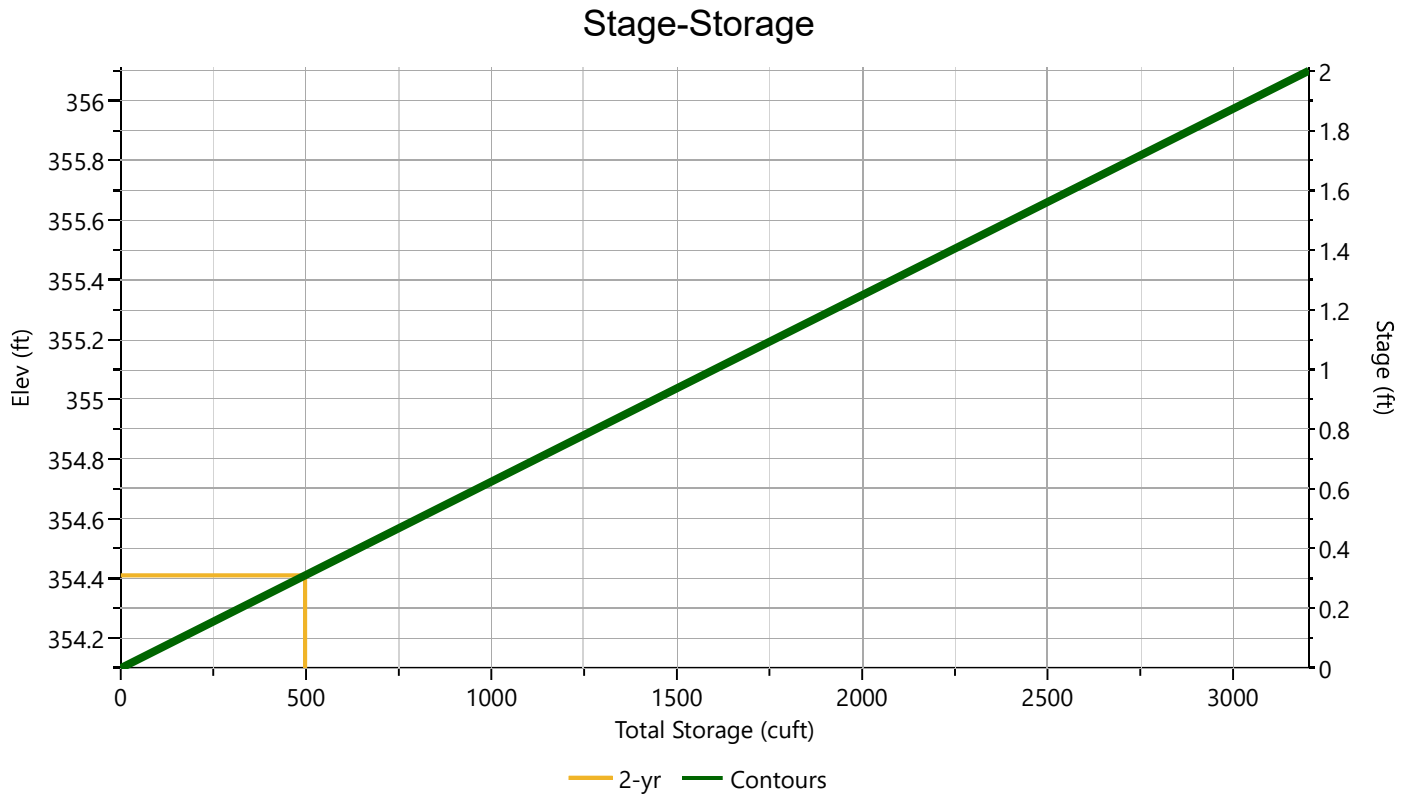
Porous Pavement System 1

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	354.10
Voids (%)	40.00
Volume Calc	Ave End Area

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	354.10	4,006	0.000	0.000
1.00	355.10	4,006	1,602	1,602
2.00	356.10	4,006	1,602	3,205



Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-07-2024

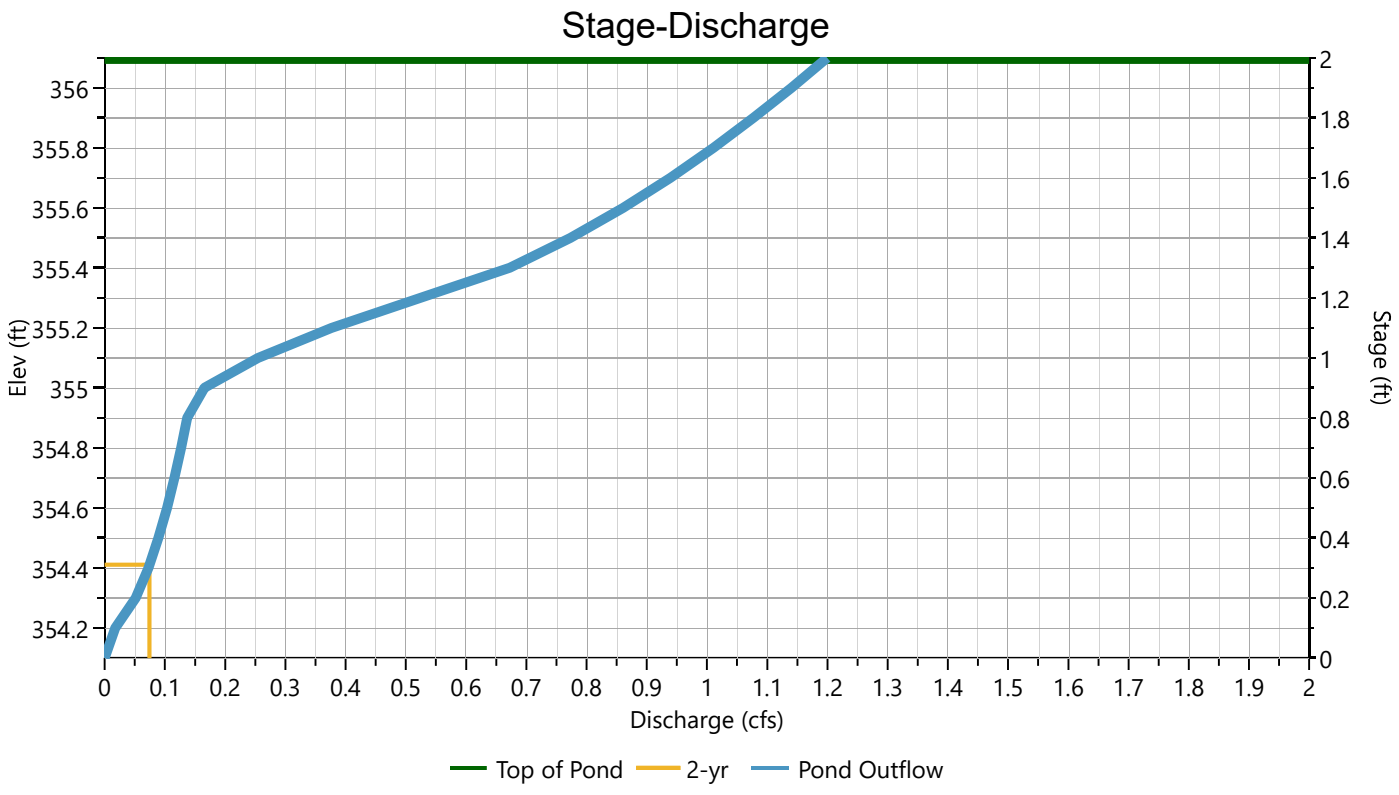
Porous Pavement System 1

Stage-Discharge

Culvert / Orifices	Culvert	Orifices			Perforated Riser	
		1	2	3		
Rise, in		2.5	5		Hole Diameter, in	
Span, in		2.5	6		No. holes	
No. Barrels		1	1		Invert Elevation, ft	
Invert Elevation, ft		354.10	354.95		Height, ft	
Orifice Coefficient, Co		0.60	0.60		Orifice Coefficient, Co	
Length, ft						
Barrel Slope, %						
N-Value, n	0.000					

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

**Routes through Culvert.*



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-07-2024

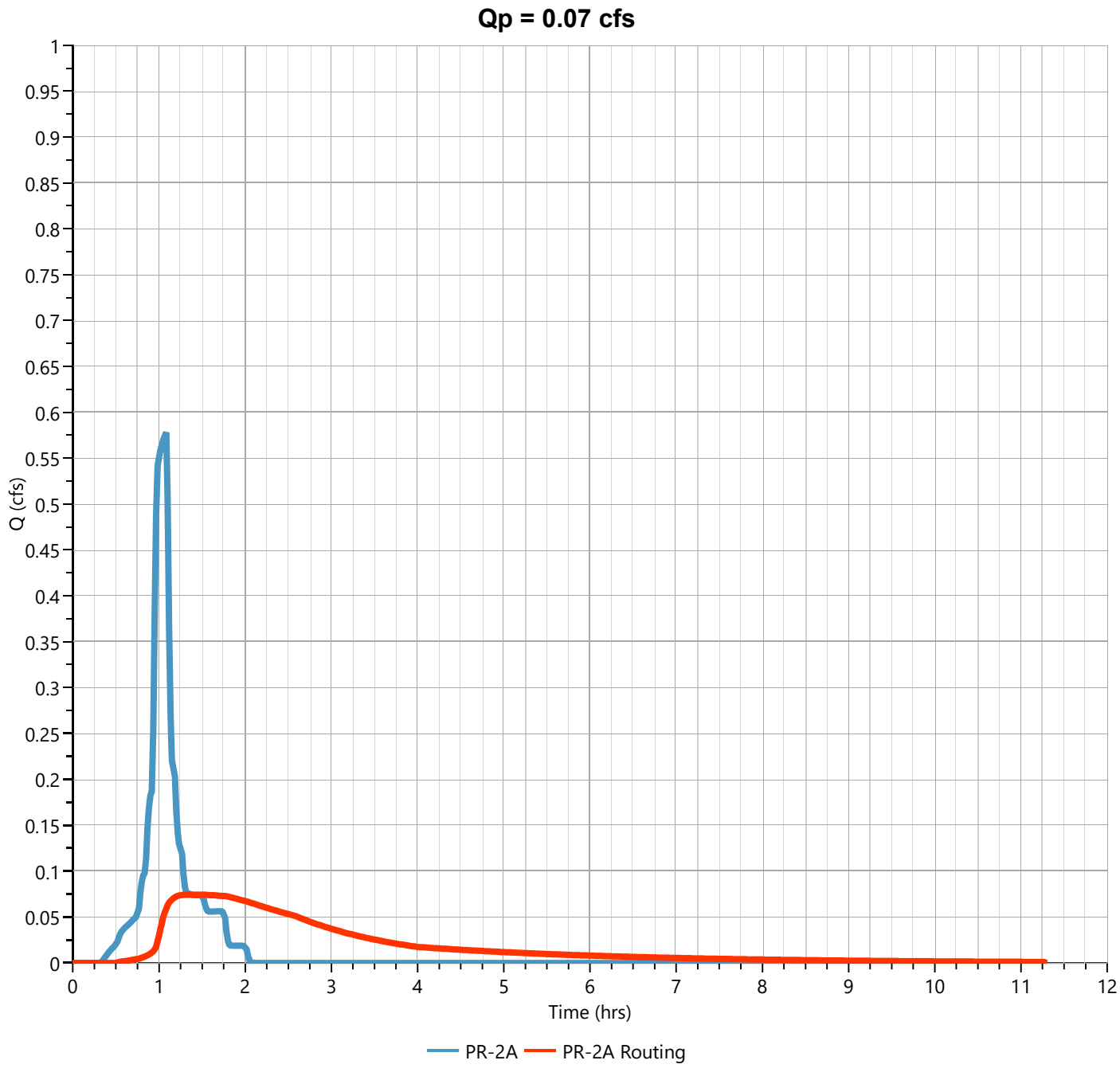
PR-2A Routing

Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 0.074 cfs
Storm Frequency	= 2-yr	Time to Peak	= 82 min
Time Interval	= 1 min	Hydrograph Volume	= 698 cuft
Inflow Hydrograph	= 3 - PR-2A	Max. Elevation	= 354.41 ft
Pond Name	= Porous Pavement System 1	Max. Storage	= 498 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.90 hrs



POROUS PAVEMENT SYSTEM 2

Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-07-2024

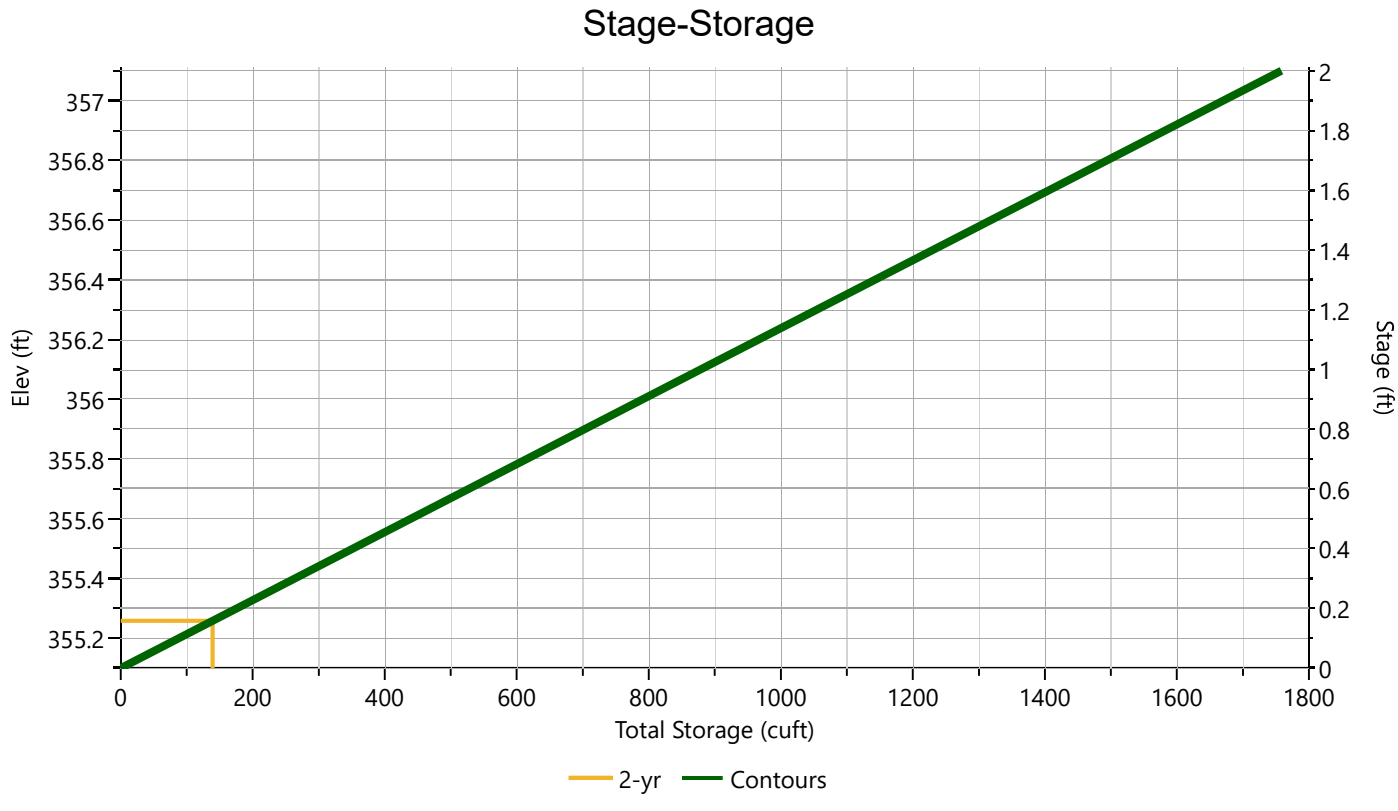
Porous Pavement System 2

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	355.10
Voids (%)	40.00
Volume Calc	Ave End Area

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	355.10	2,198	0.000	0.000
1.00	356.10	2,198	879	879
2.00	357.10	2,198	879	1,758



Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

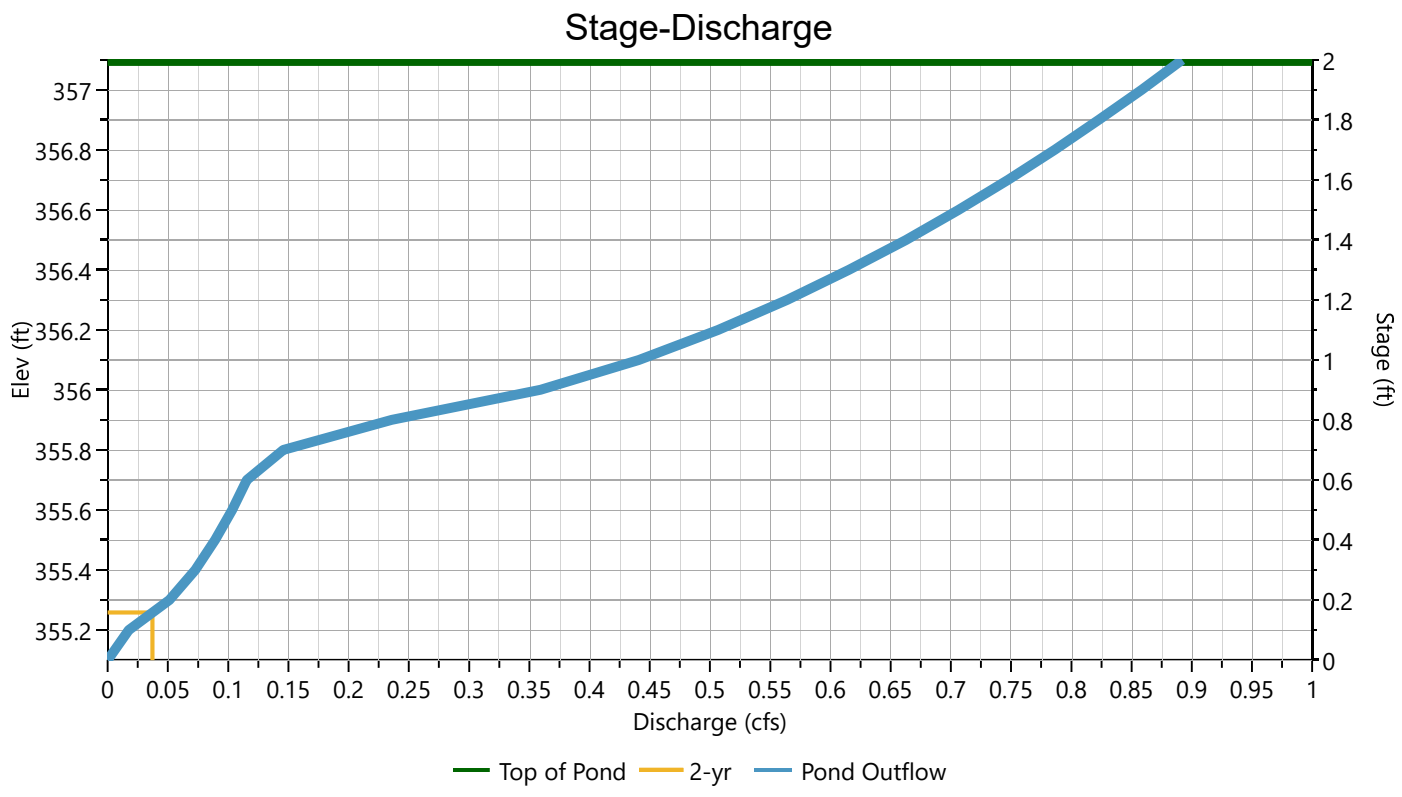
02-07-2024

Porous Pavement System 2

Stage-Discharge

Culvert / Orifices	Culvert	Orifices			Perforated Riser	
		1	2	3		
Rise, in		2.5	3		Hole Diameter, in	
Span, in		2.5	6		No. holes	
No. Barrels		1	1		Invert Elevation, ft	
Invert Elevation, ft		355.10	355.75		Height, ft	
Orifice Coefficient, Co		0.60	0.60		Orifice Coefficient, Co	
Length, ft						
Barrel Slope, %						
N-Value, n	0.000					
Weirs	**Riser***	**Weirs**			**Ancillary**	
		1	2	3		
Shape / Type					Exfiltration, in/hr	
Crest Elevation, ft						
Crest Length, ft						
Angle, deg						
Weir Coefficient, Cw						

**Routes through Culvert.*



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-07-2024

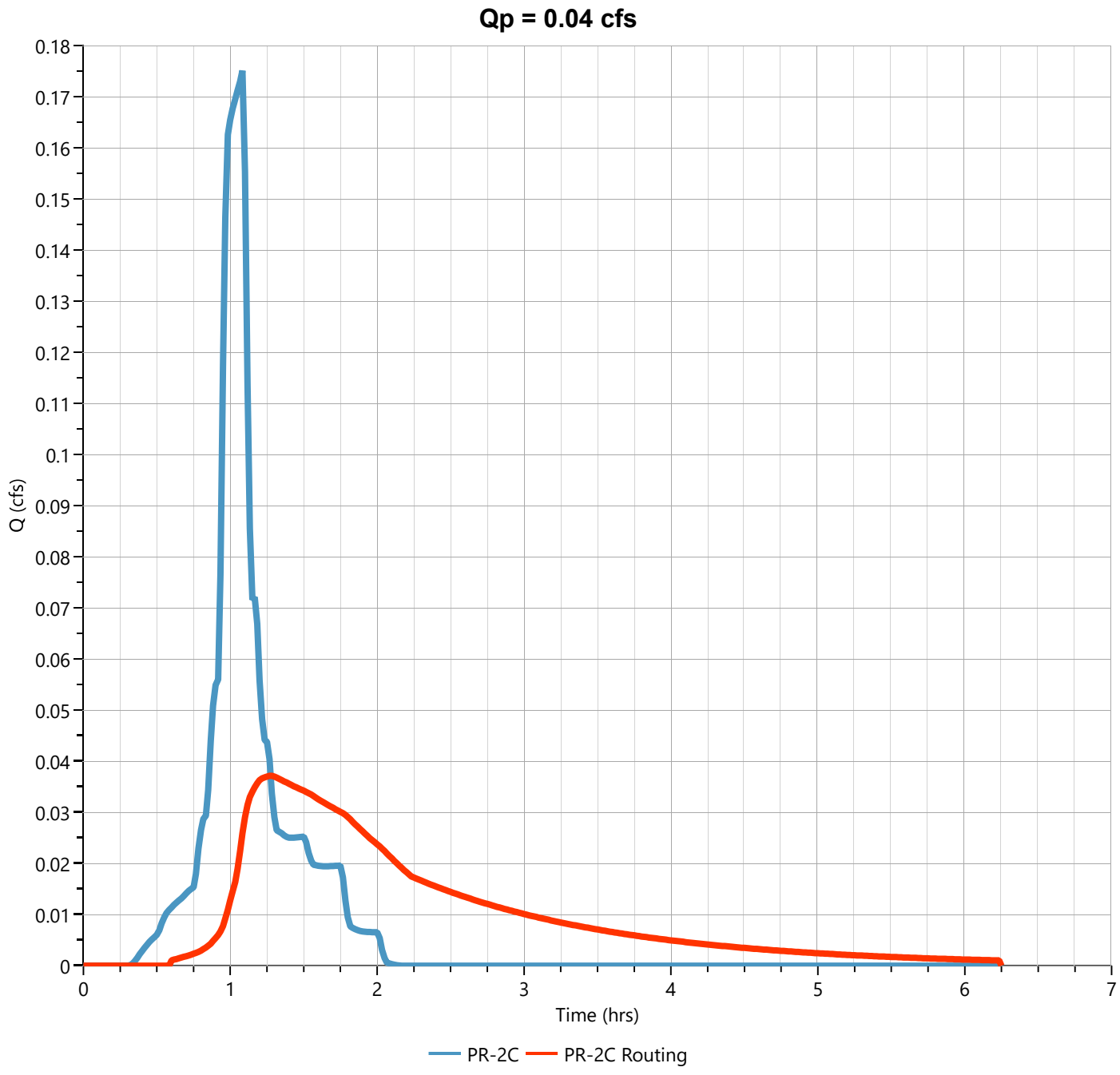
PR-2C Routing

Hyd. No. 15

Hydrograph Type	= Pond Route	Peak Flow	= 0.037 cfs
Storm Frequency	= 2-yr	Time to Peak	= 76 min
Time Interval	= 1 min	Hydrograph Volume	= 217 cuft
Inflow Hydrograph	= 13 - PR-2C	Max. Elevation	= 355.26 ft
Pond Name	= Porous Pavement System 2	Max. Storage	= 139 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.12 hrs



POROUS PAVEMENT SYSTEM 3

Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-07-2024

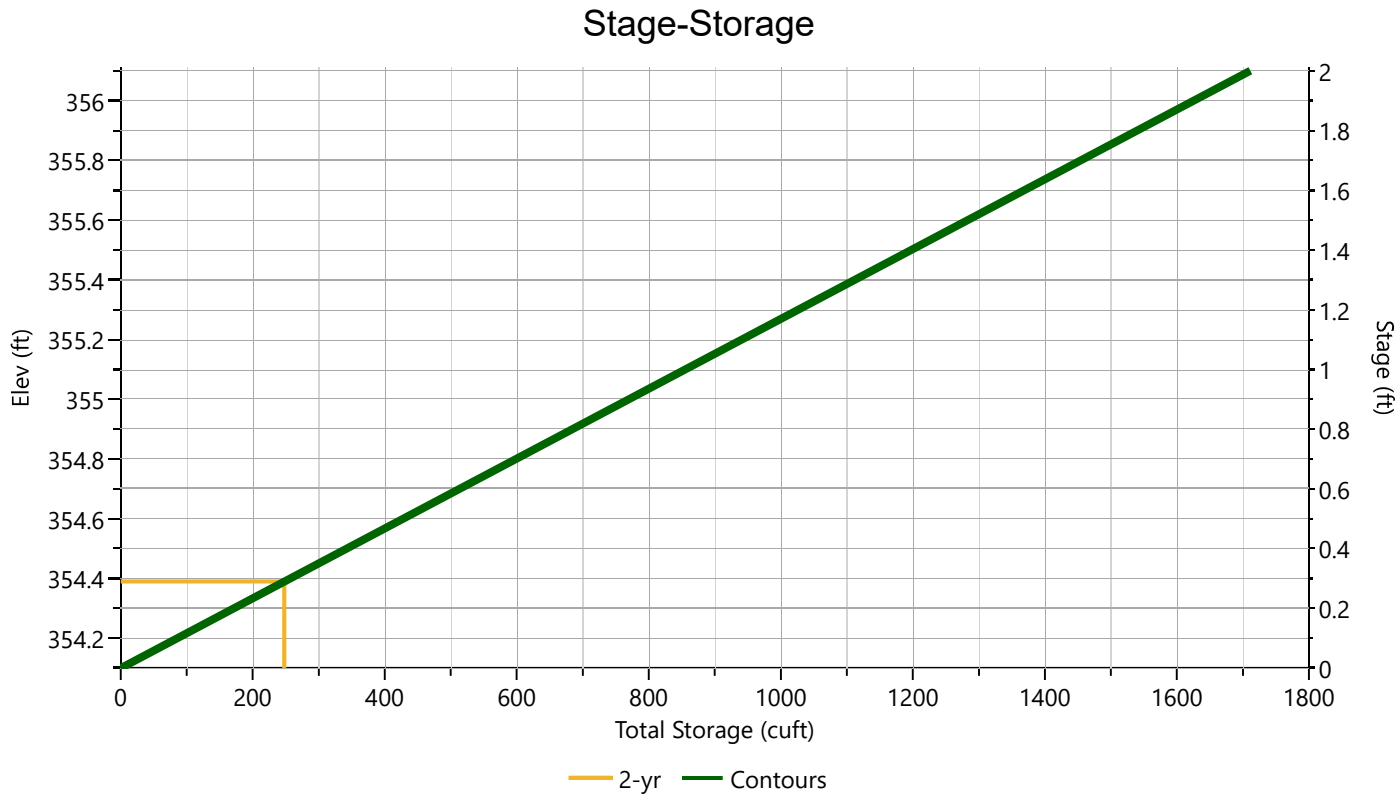
Porous Pavement System 3

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	354.10
Voids (%)	40.00
Volume Calc	Ave End Area

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	354.10	2,139	0.000	0.000
1.00	355.10	2,139	856	856
2.00	356.10	2,139	856	1,711



Pond Report

Project Name:

Hydrology Studio v 3.0.0.31

02-07-2024

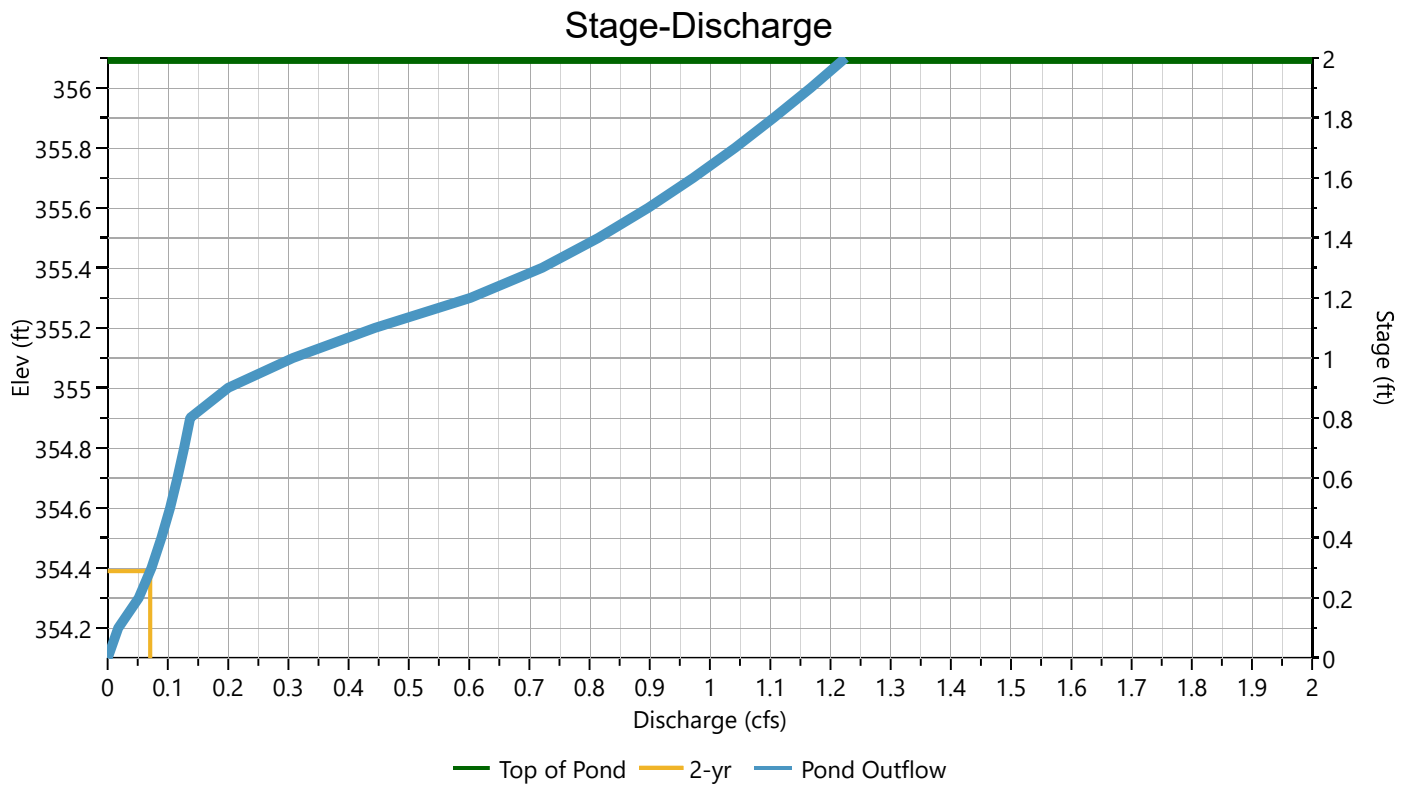
Porous Pavement System 3

Stage-Discharge

Culvert / Orifices	Culvert	Orifices			Perforated Riser	
		1	2	3		
Rise, in		2.5	5		Hole Diameter, in	
Span, in		2.5	6		No. holes	
No. Barrels		1	1		Invert Elevation, ft	
Invert Elevation, ft		354.10	354.90		Height, ft	
Orifice Coefficient, Co		0.60	0.60		Orifice Coefficient, Co	
Length, ft						
Barrel Slope, %						
N-Value, n	0.000					

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

**Routes through Culvert.*



Hydrograph Report

Project Name:

Hydrology Studio v 3.0.0.31

02-07-2024

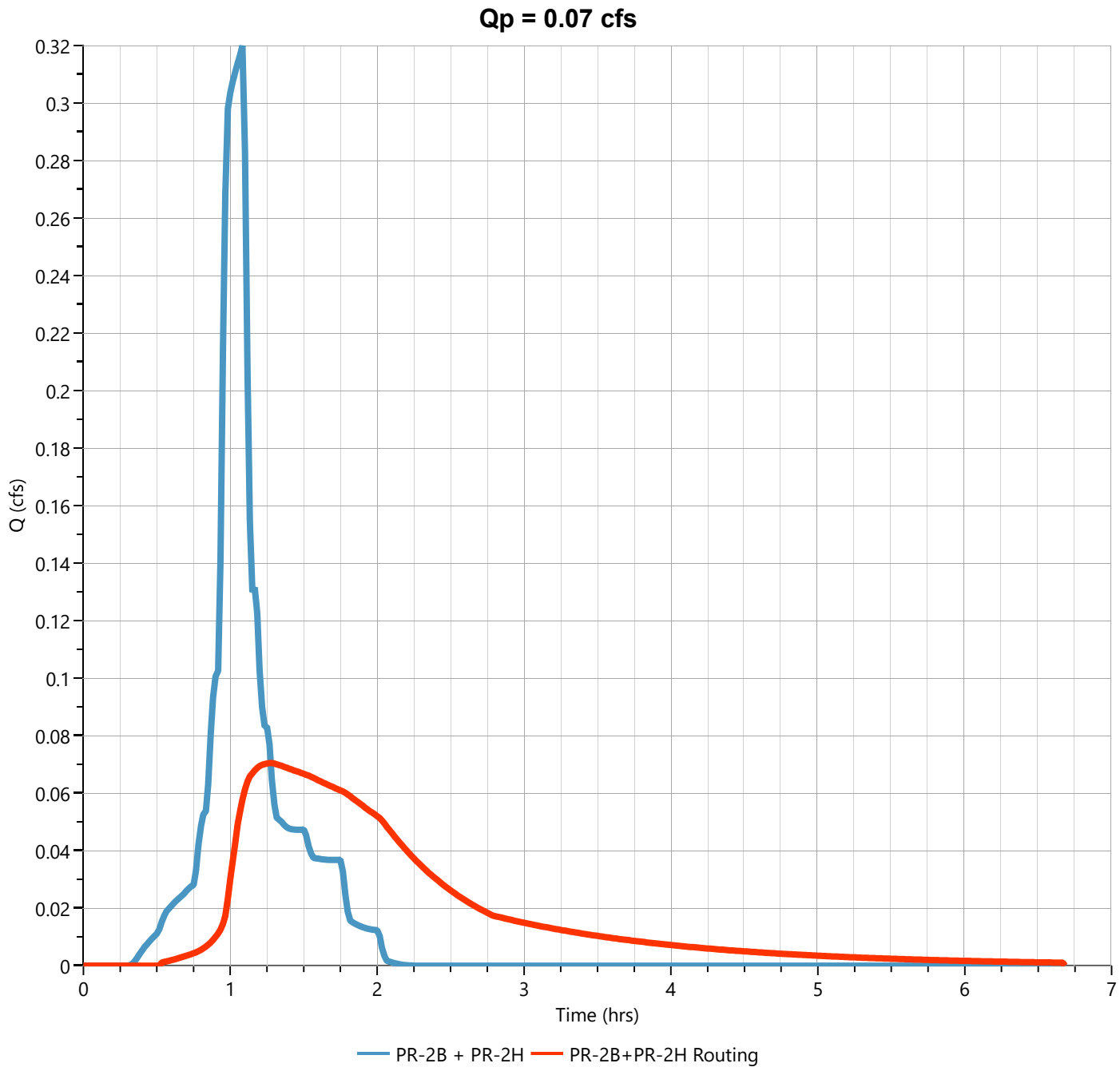
PR-2B+PR-2H Routing

Hyd. No. 39

Hydrograph Type	= Pond Route	Peak Flow	= 0.070 cfs
Storm Frequency	= 2-yr	Time to Peak	= 77 min
Time Interval	= 1 min	Hydrograph Volume	= 407 cuft
Inflow Hydrograph	= 38 - PR-2B + PR-2H	Max. Elevation	= 354.39 ft
Pond Name	= Porous Pavement System 3	Max. Storage	= 248 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.01 hrs



SUMMARY

Hydrograph 2-yr Summary

Project Name:

02-07-2024

Hydrology Studio v 3.0.0.31

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (min)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	PR-1A	0.693	65	845	----		
2	Pond Route	PR-1A Routing	0.000	272	0.000	1	348.77	562
4	NRCS Runoff	PR-1B Grass HSGC C	0.012	73	20.8	----		
5	NRCS Runoff	PR-1B Impervious	0.427	65	526	----		
6	Junction	PR-1B	0.430	65	547	4, 5		
8	NRCS Runoff	PR-1C Grass HSGC C	0.006	66	7.51	----		
9	NRCS Runoff	PR-1C Impervious	0.058	65	70.4	----		
10	Junction	PR-1C	0.062	65	77.9	8, 9		
11	Pond Route	PR-1C Routing	0.000	0	0.000	10	355.31	77.9
14	NRCS Runoff	PR-1D Grass HSGC C	0.010	71	16.5	----		
15	NRCS Runoff	PR-1D Impervious	0.318	65	387	----		
16	Junction	PR-1D	0.320	65	404	14, 15		
18	Junction	Comb. to UDG-INF1-2	0.750	65	950	6, 11, 16		
20	Pond Route	UGD-INF1-2 Routing	0.000	0	0.000	18	344.53	572
22	NRCS Runoff	PR-1E Grass HSGC C	0.024	71	41.3	----		
23	NRCS Runoff	PR-1E Impervious	0.115	65	141	----		
24	Junction	PR-1E	0.122	65	182	22, 23		
26	Junction	POA-1	0.122	65	182	2, 20, 24		
28	NRCS Runoff	PR-3 (POA-3)	0.005	71	8.26	----		

Hydrograph 2-yr Summary

Project Name:

02-07-2024

Hydrology Studio v 3.0.0.31

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (min)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	PR-2A Grass HSGC C	0.002	69	2.67	----		
2	NRCS Runoff	PR-2A Impervious	0.577	65	704	----		
3	Junction	PR-2A	0.578	65	707	1, 2		
4	Pond Route	PR-2A Routing	0.074	82	698	3	354.41	498
6	NRCS Runoff	PR-2B Grass HSGC C	0.010	75	18.7	----		
7	NRCS Runoff	PR-2B Impervious	0.144	65	176	----		
8	Junction	PR-2B	0.146	65	195	6, 7		
11	NRCS Runoff	PR-2C Grass HSGC C	0.006	71	11.0	----		
12	NRCS Runoff	PR-2C Impervious	0.173	65	211	----		
13	Junction	PR-2C	0.175	65	222	11, 12		
15	Pond Route	PR-2C Routing	0.037	76	217	13	355.26	139
17	NRCS Runoff	PR-2G Grass HSGC C	0.019	71	33.1	----		
18	NRCS Runoff	PR-2G Woods HSGC C	0.005	76	11.1	----		
19	Junction	PR-2G	0.023	72	44.1	17, 18		
21	NRCS Runoff	PR-2D Grass HSGC C	0.018	83	44.9	----		
22	NRCS Runoff	PR-2D Woods HSGC C	0.019	93	52.0	----		
23	NRCS Runoff	PR-2D Impervious	0.111	71	190	----		
24	Junction	PR-2D	0.125	73	287	21, 22, 23		
26	NRCS Runoff	PR-2E Grass HSGC C	0.015	76	29.9	----		
27	NRCS Runoff	PR-2E Impervious	0.082	67	113	----		
28	Junction	PR-2E	0.087	68	143	26, 27		
30	NRCS Runoff	PR-2F Woods HSGC C	0.003	81	7.29	----		
31	NRCS Runoff	PR-2F Impervious	0.055	67	75.1	----		
32	Junction	PR-2F	0.055	67	82.4	30, 31		
34	NRCS Runoff	PR-2H Grass HSGC C	0.003	71	5.51	----		
35	NRCS Runoff	PR-2H Impervious	0.173	65	211	----		
36	Junction	PR-2H	0.174	65	217	34, 35		

Hydrograph 2-yr Summary

Project Name:

Hydrology Studio v 3.0.0.31

02-07-2024

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (min)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
38	Junction	PR-2B + PR-2H	0.320	65	411	8, 36		
39	Pond Route	PR-2B+PR-2H Routing	0.070	77	407	38	354.39	248
41	Junction	POA-2 Partial	0.377	70	1,471	4, 15, 19, 24, 28, 32		
42	Junction	Total POA-2	0.445	70	1,878	39, 41		

MANUFACTURED TREATMENT DEVICE SIZING CALCULATIONS

SUMMARY TABLES

MANUFACTURED TREATMENT DEVICE WATERSHED CALCULATIONS BEACON UNITARIAN UNIVERSALIST CHURCH LANGAN PROJECT #101007201							
Proposed Watershed	**Open Space HSGC C (CN = 74)**	**Open Space HSGC C (CN = 74)**	**Impervious (CN = 98) (SF)**	**Impervious (CN = 98) (AC)**	**Total Area (SF)**	**Total Area (AC)**	**Weighted CN**
WQ1-1	4	0.00	1,417	0.03	1,421	0.03	98
WQ1-2	2,586	0.06	5,018	0.11	7,604	0.17	90
WQ1-3	3,576	0.08	644	0.02	4,220	0.10	78

CONTECH STORMFILTER SIZING CALCULATIONS
BEACON UNITARIAN UNIVERSALIST CHURCH
LANGAN PROJECT #101007201

Proposed Device	Inflow Area (AC)	Peak Flow (CFS)	Peak Flow (GPM)	Stormfilter Cartridge Height	MTFR Per Cartridge (GPM)	Proposed # of Cartridges	Proposed Flow Capacity (GPM)	Proposed StormFilter Size
WQ1-1	0.03	0.078	35.0	27"	22.5	2	45	48" Manhole
WQ1-2	0.17	0.327	146.8	18"	15.0	10	150	6' x 12'

NJDEP WATER QUALITY STORM HYDROGRAPHS

Hydrograph 2-yr Summary

Project Name:

Hydrology Studio v 3.0.0.31

02-07-2024

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (min)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	NRCS Runoff	WQ1-1	0.078	65	87.8	----		
3	NRCS Runoff	WQ1-2 Open Space C	0.011	66	15.0	----		
4	NRCS Runoff	WQ1-2 Impervious	0.318	65	387	----		
5	Junction	WQ1-2	0.327	65	402	2, 3, 4		
7	NRCS Runoff	WQ1-3 Open Space C	0.015	66	20.0	----		
8	NRCS Runoff	WQ1-3 Impervious	0.058	65	70.4	----		
9	Junction	WQ1-3	0.070	65	90.5	2, 7, 8		

Hydrograph Report

Project Name:

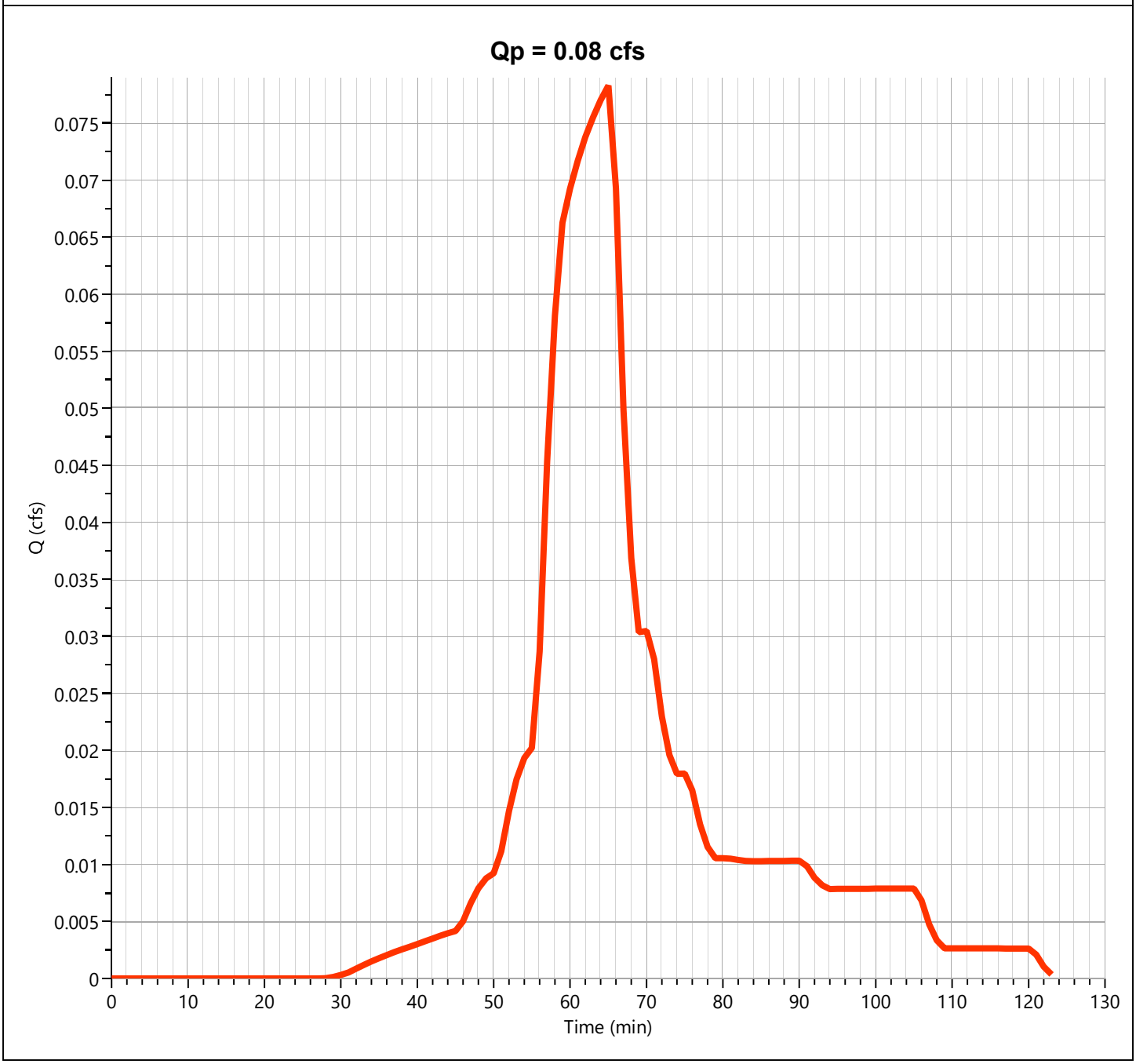
Hydrology Studio v 3.0.0.31

02-07-2024

WQ1-1

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.078 cfs
Storm Frequency	= 2-yr	Time to Peak	= 65 min
Time Interval	= 1 min	Runoff Volume	= 87.8 cuft
Drainage Area	= 0.03 ac	Curve Number	= 96
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 1.25 in	Design Storm	= NJ WQ Storm
Storm Duration	= 2 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

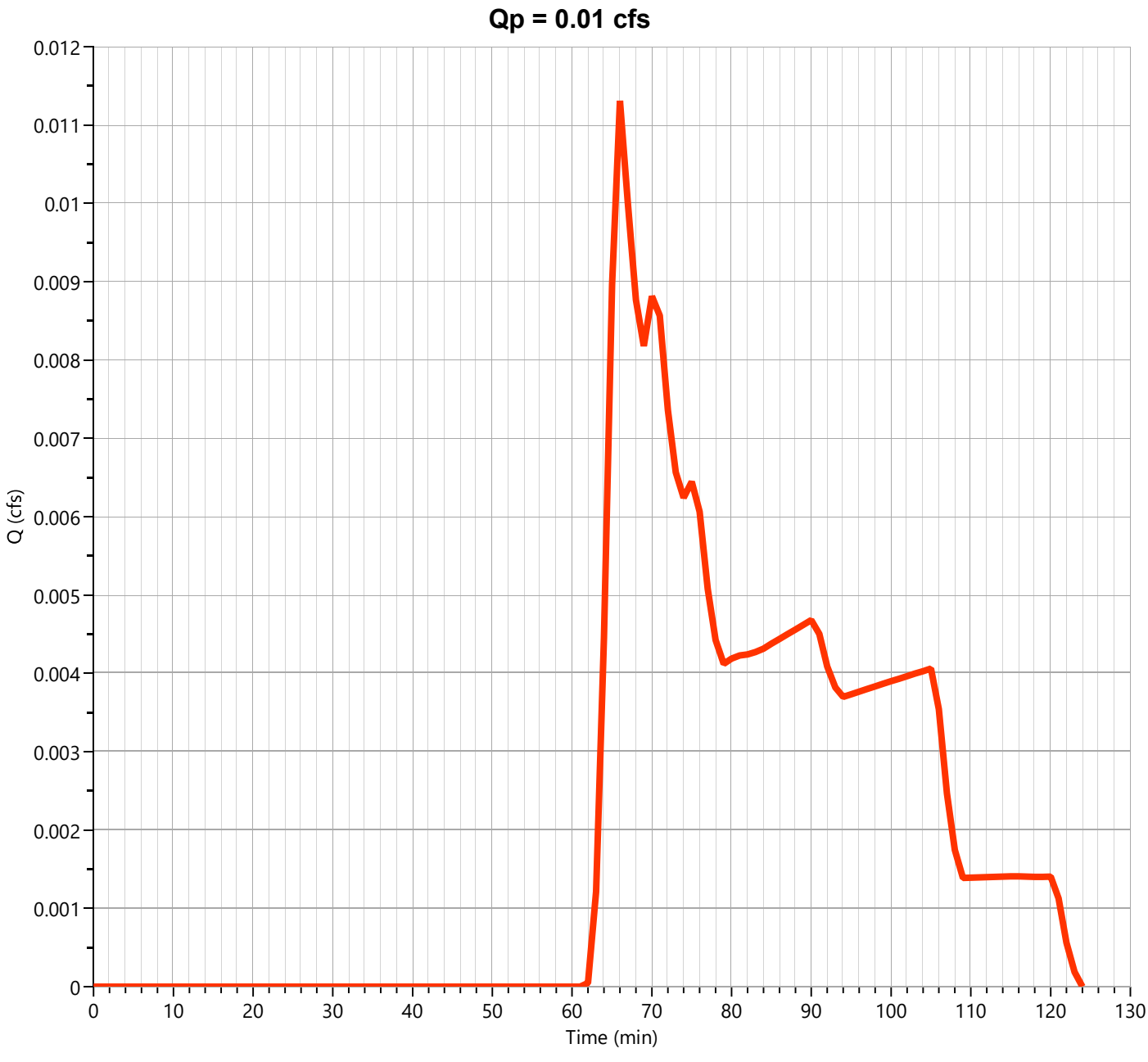
Hydrology Studio v 3.0.0.31

02-07-2024

WQ1-2 Open Space C

Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.011 cfs
Storm Frequency	= 2-yr	Time to Peak	= 66 min
Time Interval	= 1 min	Runoff Volume	= 15.0 cuft
Drainage Area	= 0.06 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 1.25 in	Design Storm	= NJ WQ Storm
Storm Duration	= 2 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

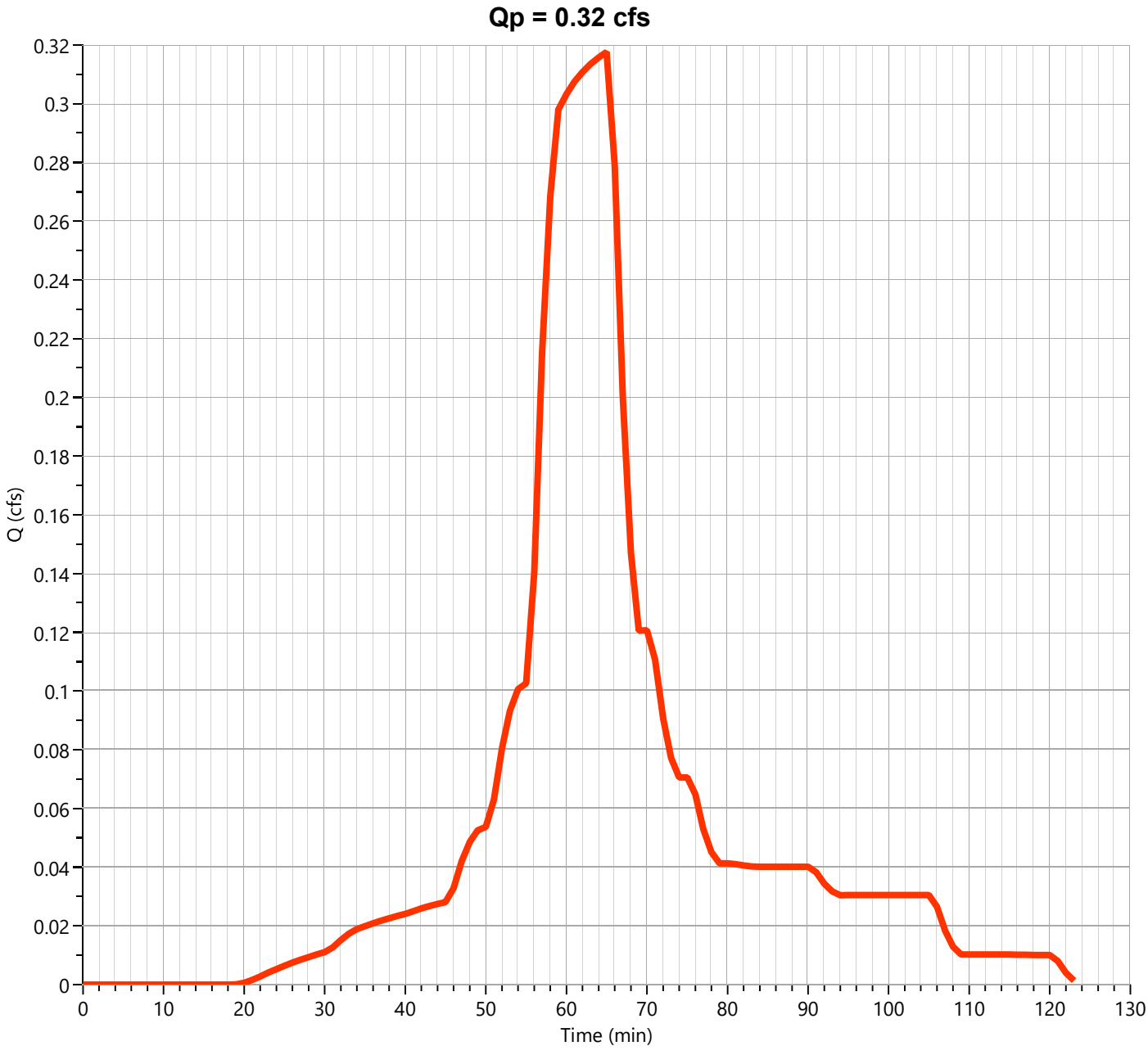
Hydrology Studio v 3.0.0.31

02-07-2024

WQ1-2 Impervious

Hyd. No. 4

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.318 cfs
Storm Frequency	= 2-yr	Time to Peak	= 65 min
Time Interval	= 1 min	Runoff Volume	= 387 cuft
Drainage Area	= 0.11 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 1.25 in	Design Storm	= NJ WQ Storm
Storm Duration	= 2 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

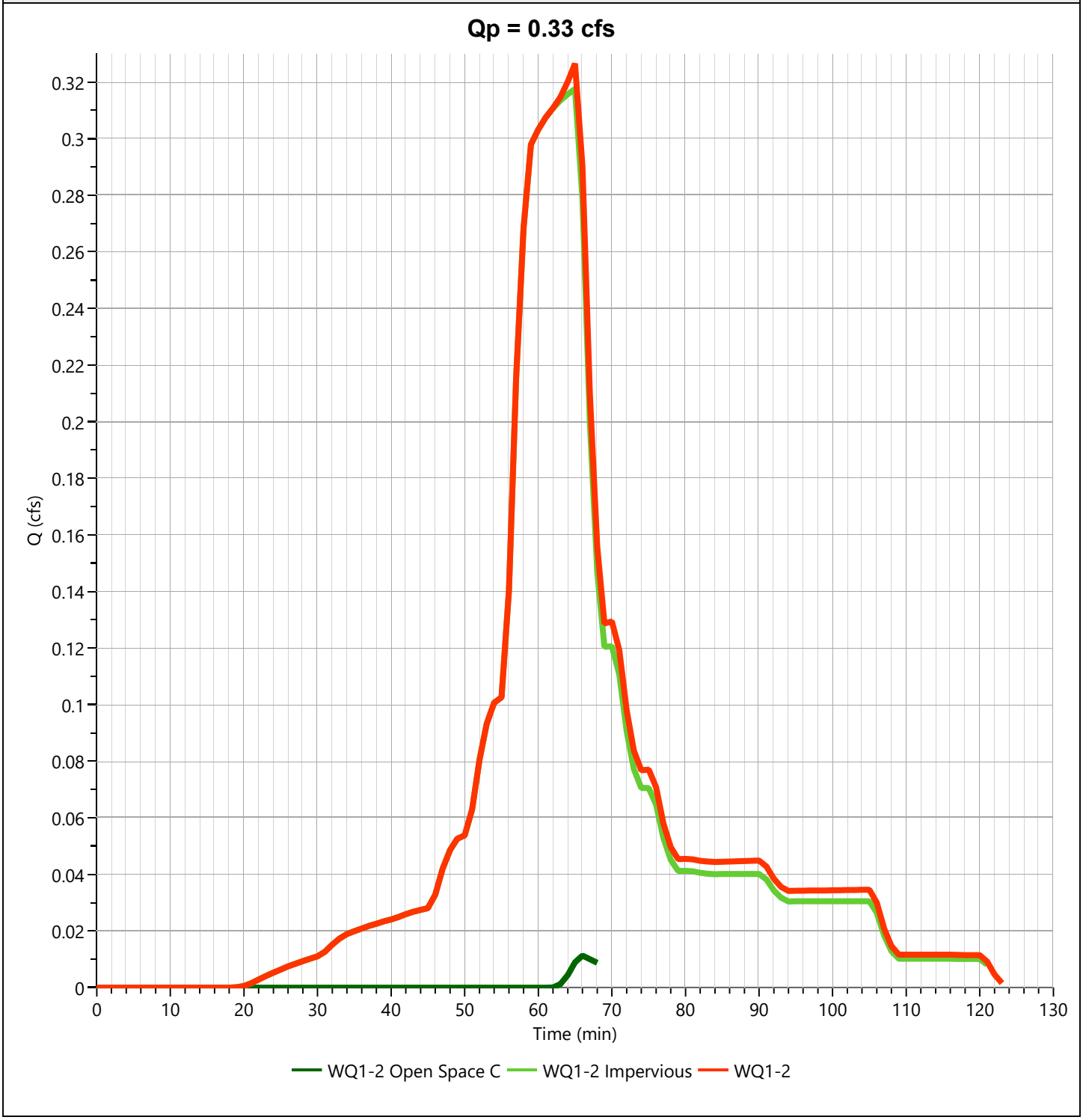
Hydrology Studio v 3.0.0.31

02-07-2024

WQ1-2

Hyd. No. 5

Hydrograph Type	= Junction	Peak Flow	= 0.327 cfs
Storm Frequency	= 2-yr	Time to Peak	= 65 min
Time Interval	= 1 min	Hydrograph Volume	= 402 cuft
Inflow Hydrographs	= 2, 3, 4	Total Contrib. Area	= 0.17 ac



Hydrograph Report

Project Name:

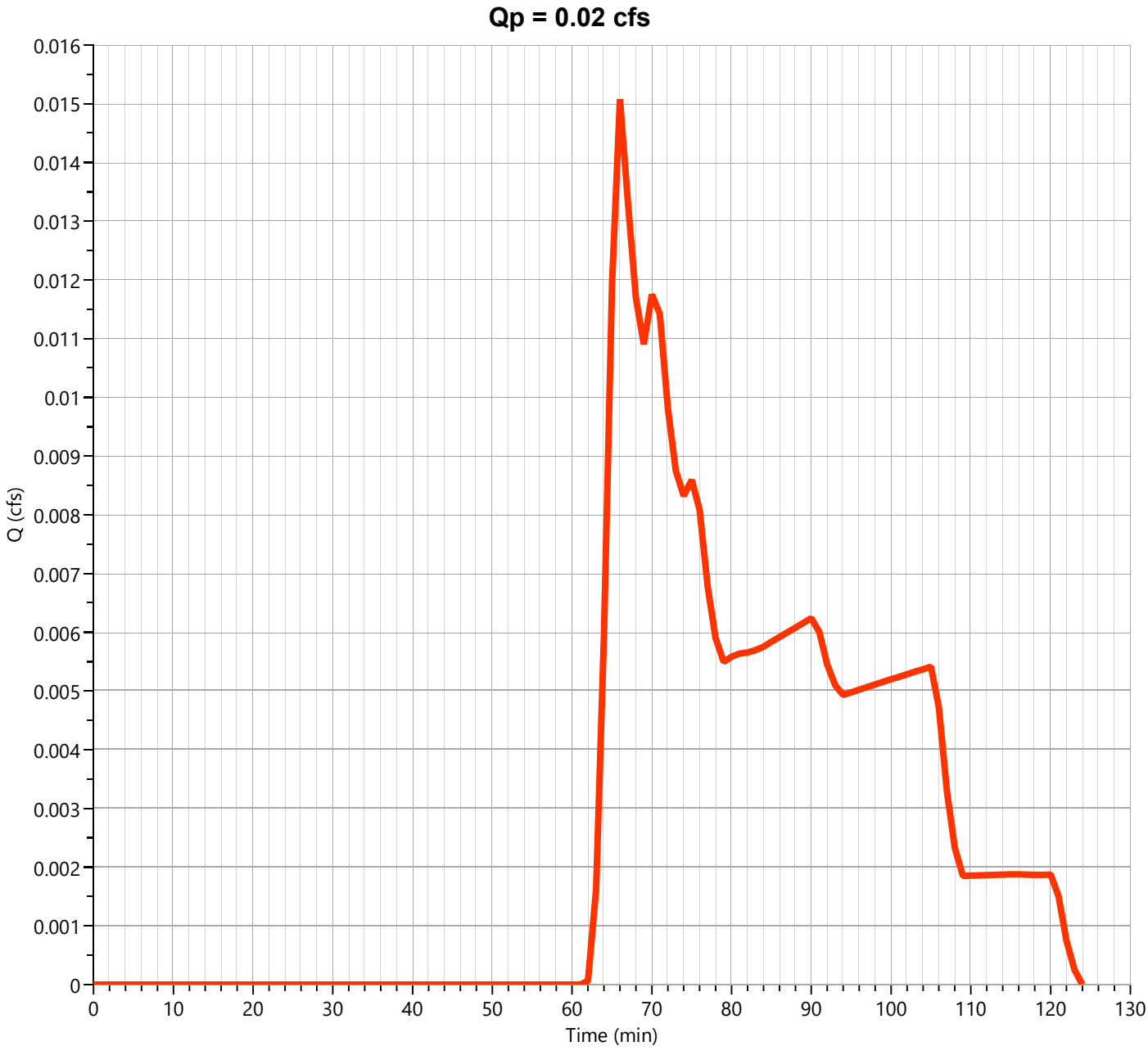
Hydrology Studio v 3.0.0.31

02-07-2024

WQ1-3 Open Space C

Hyd. No. 7

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.015 cfs
Storm Frequency	= 2-yr	Time to Peak	= 66 min
Time Interval	= 1 min	Runoff Volume	= 20.0 cuft
Drainage Area	= 0.08 ac	Curve Number	= 74
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 1.25 in	Design Storm	= NJ WQ Storm
Storm Duration	= 2 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

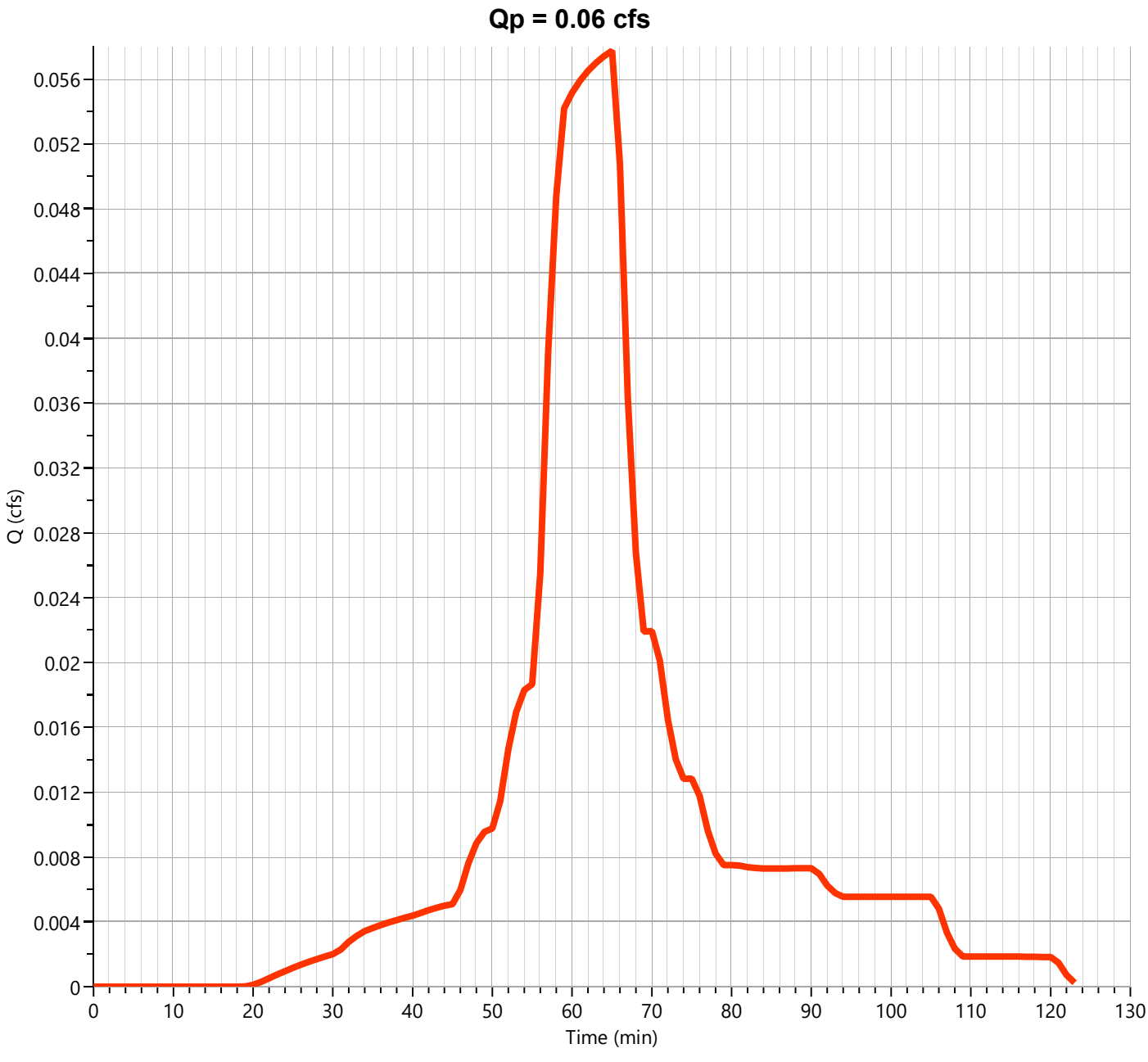
Hydrology Studio v 3.0.0.31

02-07-2024

WQ1-3 Impervious

Hyd. No. 8

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.058 cfs
Storm Frequency	= 2-yr	Time to Peak	= 65 min
Time Interval	= 1 min	Runoff Volume	= 70.4 cuft
Drainage Area	= 0.02 ac	Curve Number	= 98
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 1.25 in	Design Storm	= NJ WQ Storm
Storm Duration	= 2 hrs	Shape Factor	= 484



Hydrograph Report

Project Name:

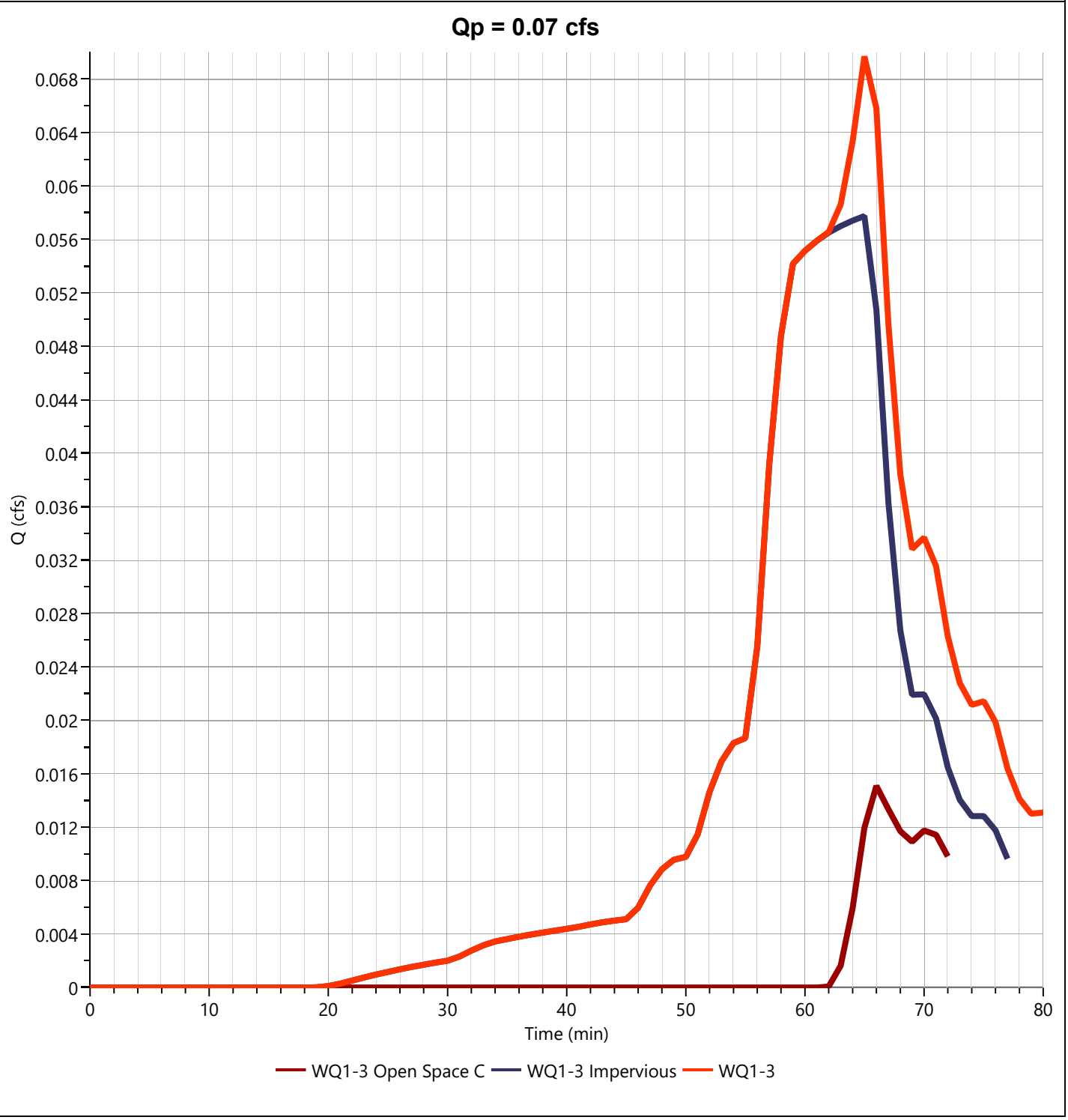
Hydrology Studio v 3.0.0.31

02-07-2024

WQ1-3

Hyd. No. 9

Hydrograph Type	= Junction	Peak Flow	= 0.070 cfs
Storm Frequency	= 2-yr	Time to Peak	= 65 min
Time Interval	= 1 min	Hydrograph Volume	= 90.5 cuft
Inflow Hydrographs	= 2, 7, 8	Total Contrib. Area	= 0.1 ac



GROUNDWATER RECHARGE CALCULATIONS

NJGRS SPREADSHEET

SMALL-SCALE UNDERGROUND INFILTRATION BASIN 1-1

New Jersey Groundwater Recharge Spreadsheet Version 2.0 November 2003

Annual Groundwater Recharge Analysis (based on GSR-32)

Select Township ↓	Average Annual P (in)	Climatic Factor
UNION CO., SUMMIT CITY	49.2	1.69

Project Name:	Beacon Unitarian Universalist Ch
Description:	101007201
Analysis Date:	02/02/24

Pre-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.58	Impervious areas	Boonton	0.0	-
2	0.6	Woods	Boonton	15.9	34,726
3	0.59	Open space	Boonton	15.2	32,590
4					
5					
6					
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	1.8			Total Annual Recharge (in)	Total Annual Recharge (cu-ft)
				10.5	67,315

Post-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.96	Impervious areas	Boonton	0.0	-
2	0.72	Open space	Boonton	15.2	39,770
3	0.09	Woods	Boonton	15.9	5,209
4					
5					
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	1.8			Total Annual Recharge (in)	Total Annual Recharge (cu.ft)
				7.0	44,979

Annual Recharge Requirements Calculation ↓

% of Pre-Developed Annual Recharge to Preserve =	100%	Total Impervious Area (sq.ft)
		41,818
Post-Development Annual Recharge Deficit=	*22,336*	(cubic feet)

Recharge Efficiency Parameters Calculations (area averages)

RWC=	3.49	(in)	DRWC=	0.00	(in)
ERWC =	0.54	(in)	EDRWC=	0.00	(in)

Procedure to fill the Pre-Development and Post-Development Conditions Tables

For each land segment, first enter the area, then select TR-55 Land Cover, then select Soil. Start from the top of the table and proceed downward. Don't leave blank rows (with A=0) in between your segment entries. Rows with A=0 will not be displayed or used in calculations. For impervious areas outside of standard lots select "Impervious Areas" as the Land Cover. Soil type for impervious areas are only required if an infiltration facility will be built within these areas.

Project Name	Description	Analysis Date	BMP or LID Type
Beacon Unitarian Universa	101007201	02/02/24	Small-Scale Underground Infiltration Basin 1-1

Recharge BMP Input Parameters

Parameter	Symbol	Value	Unit
BMP Area	ABMP	1620.0	sq.ft
BMP Effective Depth, this is the design variable	dBMP	4.5	in
Upper level of the BMP surface (negative if above ground)	dBMPu	34.8	in
Depth of lower surface of BMP, must be>=dBMPu	dEXC	70.8	in
Post-development Land Segment Location of BMP , Input Zero if Location is distributed or undetermined	SegBMP	1	unitless

Root Zone Water capacity Calculated Parameters

Parameter	Symbol	Value	Unit
Empty Portion of RWC under Post-D Natural Recharge	ERWC	0.52	in
ERWC Modified to consider dEXC	EDRWC	0.00	in
Empty Portion of RWC under Infilt. BMP	RERWC	0.00	in

Recharge Design Parameters

Parameter	Symbol	Value	Unit
Inches of Runoff to capture	Qdesign	0.73	in
Inches of Rainfall to capture	Pdesign	0.89	in
Recharge Provided Avg. over Imp. Area		28.9	in
Runoff Captured Avg. over imp. Area		28.9	in

BMP Calculated Size Parameters

ABMP/Aimp	Aratio	0.16	unitless
BMP Volume	VBMP	608	cu.ft

CALCULATION CHECK MESSAGES

Volume Balance-> Solve Problem to satisfy Annual Recharge
dBMP Check---> OK
dEXC Check---> OK
BMP Location---> OK

Parameters from Annual Recharge Worksheet

Post-D Deficit Recharge (or desired recharge volume)	Vdef	22,336	cu.ft
Post-D Impervious Area (or target Impervious Area)	Aimp	10,321	sq.ft
Root Zone Water Capacity	RWC	3.33	in
RWC Modified to consider dEXC	DRWC	0.00	in
Climatic Factor	C-factor	1.69	no units
Average Annual P	Pavg	49.2	in
Recharge Requirement over Imp. Area	dr	6.4	in

System Performance Calculated Parameters

Annual BMP Recharge Volume		24,860	cu.ft
Avg BMP Recharge Efficiency		100.0%	Represents % Infiltration Recharged
%Rainfall became Runoff		78.5%	%
%Runoff Infiltrated		74.8%	%
%Runoff Recharged		18.5%	%
%Rainfall Recharged		14.5%	%

OTHER NOTES

Pdesign is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensetive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.

How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement assuming the runoff from entire impervious area is available to the BMP.
To solve for a smaller BMP or a LID-IMP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration clik the "Default Vdef & Aimp" button.

SMALL-SCALE UNDERGROUND INFILTRATION BASIN 1-2

New Jersey Groundwater Recharge Spreadsheet Version 2.0 November 2003

Annual Groundwater Recharge Analysis (based on GSR-32)

Select Township ↓	Average Annual P (in)	Climatic Factor
UNION CO., SUMMIT CITY	49.2	1.69

Project Name:	Beacon Unitarian Universalist Ch
Description:	101007201
Analysis Date:	02/02/24

Pre-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.58	Impervious areas	Boonton	0.0	-
2	0.6	Woods	Boonton	15.9	34,726
3	0.59	Open space	Boonton	15.2	32,590
4					
5					
6					
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	1.8			Total Annual Recharge (in)	Total Annual Recharge (cu-ft)
				10.5	67,315

Post-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.96	Impervious areas	Boonton	0.0	-
2	0.72	Open space	Boonton	15.2	39,770
3	0.09	Woods	Boonton	15.9	5,209
4					
5					
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	1.8			Total Annual Recharge (in)	Total Annual Recharge (cu.ft)
				7.0	44,979

Annual Recharge Requirements Calculation ↓

% of Pre-Developed Annual Recharge to Preserve =	100%	Total Impervious Area (sq.ft) 41,818
Post-Development Annual Recharge Deficit=	*22,336*	(cubic feet)

Recharge Efficiency Parameters Calculations (area averages)

RWC=	3.49	(in)	DRWC=	0.00	(in)
ERWC =	0.54	(in)	EDRWC=	0.00	(in)

Procedure to fill the Pre-Development and Post-Development Conditions Tables

For each land segment, first enter the area, then select TR-55 Land Cover, then select Soil. Start from the top of the table and proceed downward. Don't leave blank rows (with A=0) in between your segment entries. Rows with A=0 will not be displayed or used in calculations. For impervious areas outside of standard lots select "Impervious Areas" as the Land Cover. Soil type for impervious areas are only required if an infiltration facility will be built within these areas.

Project Name	Description	Analysis Date	BMP or LID Type
Beacon Unitarian Universa	101007201	02/02/24	Small-Scale Underground Infiltration Basin 1-2

Recharge BMP Input Parameters

Parameter	Symbol	Value	Unit
BMP Area	ABMP	2457.4	sq.ft
BMP Effective Depth, this is the design variable	dBMP	4.3	in
Upper level of the BMP surface (negative if above ground)	dBMPu	20.6	in
Depth of lower surface of BMP, must be>=dBMPu	dEXC	68.6	in
Post-development Land Segment Location of BMP , Input Zero if Location is distributed or undetermined	SegBMP	2	unitless

Root Zone Water capacity Calculated Parameters

Parameter	Symbol	Value	Unit
Empty Portion of RWC under Post-D Natural Recharge	ERWC	0.57	in
ERWC Modified to consider dEXC	EDRWC	0.00	in
Empty Portion of RWC under Infilt. BMP	RERWC	0.00	in

Recharge Design Parameters

Parameter	Symbol	Value	Unit
Inches of Runoff to capture	Qdesign	0.90	in
Inches of Rainfall to capture	Pdesign	1.10	in
Recharge Provided Avg. over Imp. Area		31.5	in
Runoff Captured Avg. over imp. Area		31.5	in

BMP Calculated Size Parameters

ABMP/Aimp	Aratio	0.21	unitless
BMP Volume	VBMP	881	cu.ft

CALCULATION CHECK MESSAGES

Volume Balance-> Solve Problem to satisfy Annual Recharge
dBMP Check---> OK
dEXC Check---> OK
BMP Location---> OK

Parameters from Annual Recharge Worksheet

Post-D Deficit Recharge (or desired recharge volume)	Vdef	22,336	cu.ft
Post-D Impervious Area (or target Impervious Area)	Aimp	11,917	sq.ft
Root Zone Water Capacity	RWC	3.69	in
RWC Modified to consider dEXC	DRWC	0.00	in
Climatic Factor	C-factor	1.69	no units
Average Annual P	Pavg	49.2	in
Recharge Requirement over Imp. Area	dr	6.4	in

System Performance Calculated Parameters

Annual BMP Recharge Volume		31,281	cu.ft
Avg BMP Recharge Efficiency		100.0%	Represents % Infiltration Recharged
%Rainfall became Runoff		78.5%	%
%Runoff Infiltrated		81.5%	%
%Runoff Recharged		23.2%	%
%Rainfall Recharged		18.2%	%

OTHER NOTES

Pdesign is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensetive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.

How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement assuming the runoff from entire impervious area is available to the BMP.
To solve for a smaller BMP or a LID-IMP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration clik the "Default Vdef & Aimp" button.

CURRENT GROUNDWATER MOUNDING ANALYSIS

UNDERGROUND INFILTRATION BASIN 1-1

2-YEAR STORM EVENT

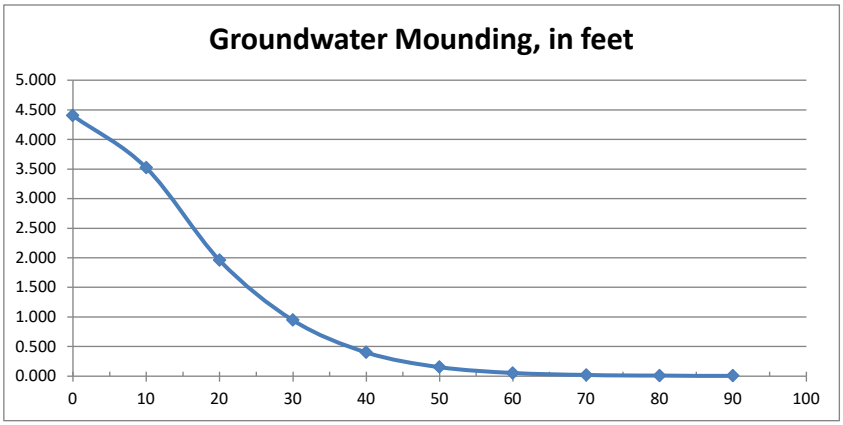
Input Values

1.50	*R*	Recharge rate (permeability rate) (in/hr)
0.150	Sy	Specific yield, Sy (dimensionless) default value is 0.15; max value is 0.2 provided that a lab test data is submitted
4.70	Kh	Horizontal hydraulic conductivity (in/hr) Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
10.000	x	1/2 length of basin (x direction, in feet)
40.500	y	1/2 width of basin (y direction, in feet)
11.89	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)

14.402	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
4.402	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
4.402	0
3.521	10
1.957	20
0.946	30
0.401	40
0.151	50
0.052	60
0.017	70
0.007	80
0.004	90

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

10-YEAR STORM EVENT

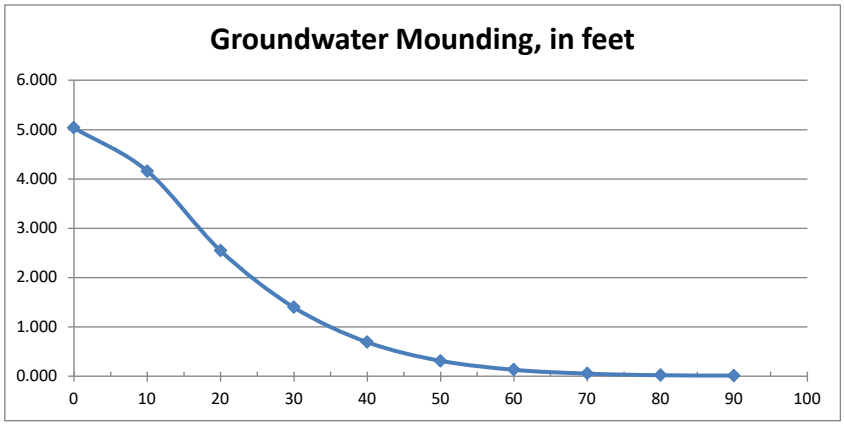
Input Values

1.50	R	Recharge rate (permeability rate) (in/hr)
0.150	Sy	Specific yield, Sy (dimensionless) default value is 0.15; max value is 0.2 provided that a lab test data is submitted
4.70	Kh	Horizontal hydraulic conductivity (in/hr) Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
10.000	x	1/2 length of basin (x direction, in feet)
40.500	y	1/2 width of basin (y direction, in feet)
15.72	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)

15.038	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
5.038	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
5.038	0
4.156	10
2.543	20
1.394	30
0.688	40
0.309	50
0.128	60
0.050	70
0.020	80
0.009	90

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

100-YEAR STORM EVENT

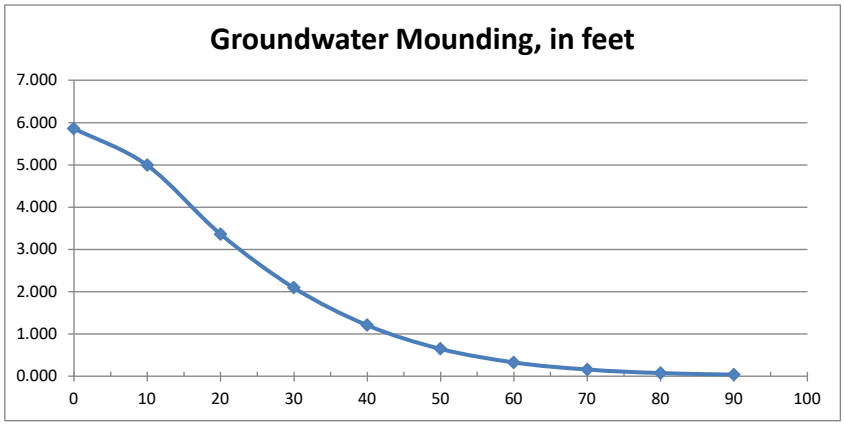
Input Values

1.50	*R*	Recharge rate (permeability rate) (in/hr)
		Specific yield, Sy (dimensionless)
0.150	Sy	default value is 0.15; max value is 0.2 provided that a lab test data is submitted
		Horizontal hydraulic conductivity (in/hr)
4.70	Kh	Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
10.000	x	1/2 length of basin (x direction, in feet)
40.500	y	1/2 width of basin (y direction, in feet)
22.30	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)

15.858	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
5.858	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
5.858	0
4.989	10
3.356	20
2.088	30
1.201	40
0.643	50
0.323	60
0.153	70
0.070	80
0.032	90

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

WATER QUALITY STORM

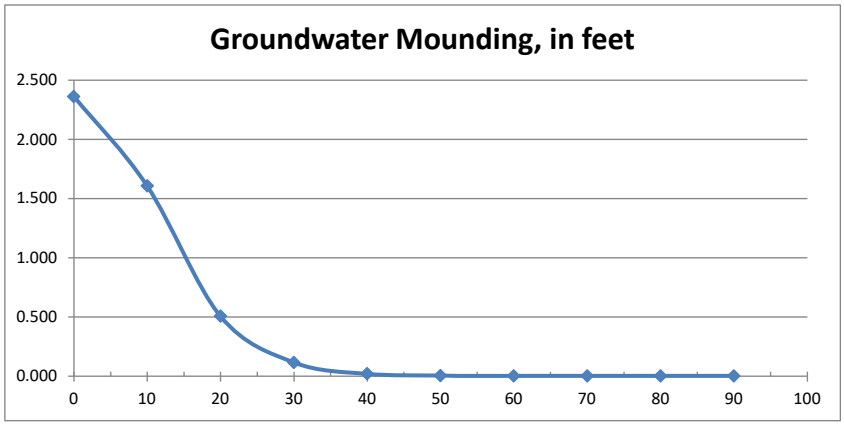
Input Values

1.50	*R*	Recharge rate (permeability rate) (in/hr)
		Specific yield, Sy (dimensionless)
0.150	Sy	default value is 0.15; max value is 0.2 provided that a lab test data is submitted
		Horizontal hydraulic conductivity (in/hr)
4.70	Kh	Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
10.000	x	1/2 length of basin (x direction, in feet)
40.500	y	1/2 width of basin (y direction, in feet)
4.17	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)

12.362	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
2.362	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
2.362	0
1.606	10
0.505	20
0.114	30
0.019	40
0.003	50
0.001	60
0.001	70
0.001	80
0.001	90

Re-Calculate Now



Disclaimer

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UNDERGROUND INFILTRATION BASIN 1-2

2-YEAR STORM EVENT

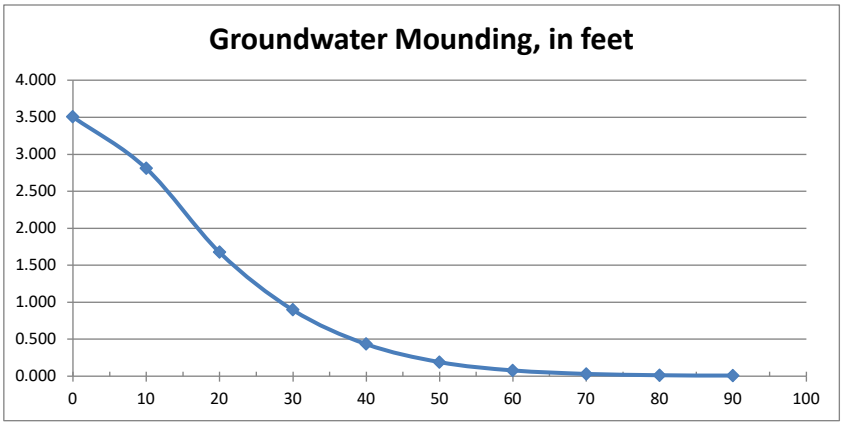
Input Values

1.50	*R*	Recharge rate (permeability rate) (in/hr)
0.150	Sy	Specific yield, Sy (dimensionless) default value is 0.15; max value is 0.2 provided that a lab test data is submitted
6.65	Kh	Horizontal hydraulic conductivity (in/hr) Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
9.250	x	1/2 length of basin (x direction, in feet)
66.420	y	1/2 width of basin (y direction, in feet)
10.48	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)

13.504	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
3.504	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
3.504	0
2.808	10
1.674	20
0.895	30
0.431	40
0.189	50
0.076	60
0.029	70
0.011	80
0.005	90

Re-Calculate Now



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10-YEAR STORM EVENT

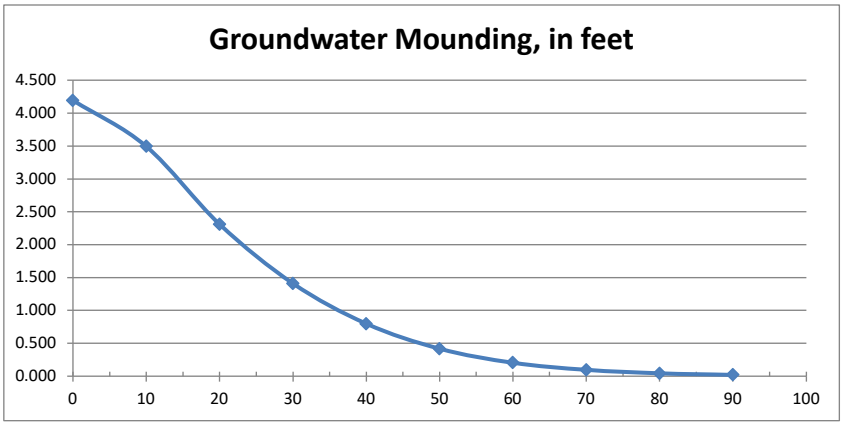
Input Values

1.50	R	Recharge rate (permeability rate) (in/hr)
0.150	Sy	Specific yield, Sy (dimensionless) default value is 0.15; max value is 0.2 provided that a lab test data is submitted
6.65	Kh	Horizontal hydraulic conductivity (in/hr) Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
9.250	x	1/2 length of basin (x direction, in feet)
66.420	y	1/2 width of basin (y direction, in feet)
14.70	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)

14.193	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
4.193	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
4.193	0
3.495	10
2.309	20
1.409	30
0.794	40
0.415	50
0.203	60
0.094	70
0.042	80
0.019	90

Re-Calculate Now



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100-YEAR STORM EVENT

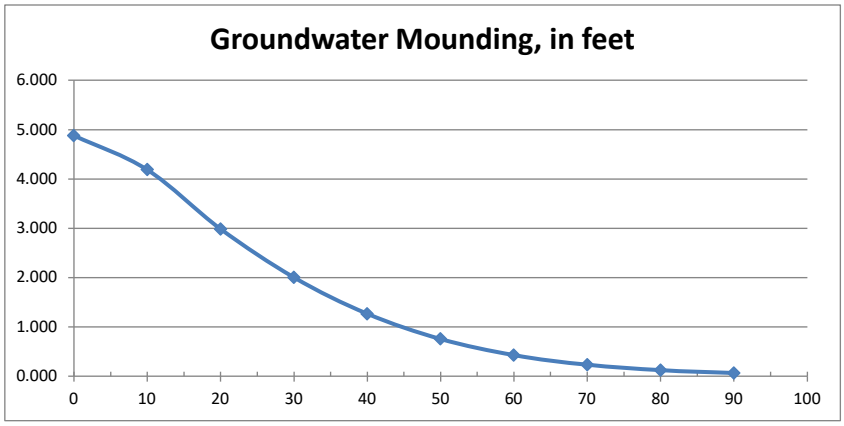
Input Values

1.50	*R*	Recharge rate (permeability rate) (in/hr)
		Specific yield, Sy (dimensionless)
0.150	Sy	default value is 0.15; max value is 0.2 provided that a lab test data is submitted
		Horizontal hydraulic conductivity (in/hr)
6.65	Kh	Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
9.250	x	1/2 length of basin (x direction, in feet)
66.420	y	1/2 width of basin (y direction, in feet)
20.02	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)

14.876	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
4.876	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
4.876	0
4.187	10
2.981	20
2.001	30
1.263	40
0.752	50
0.424	60
0.228	70
0.118	80
0.059	90

Re-Calculate Now



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WATER QUALITY STORM

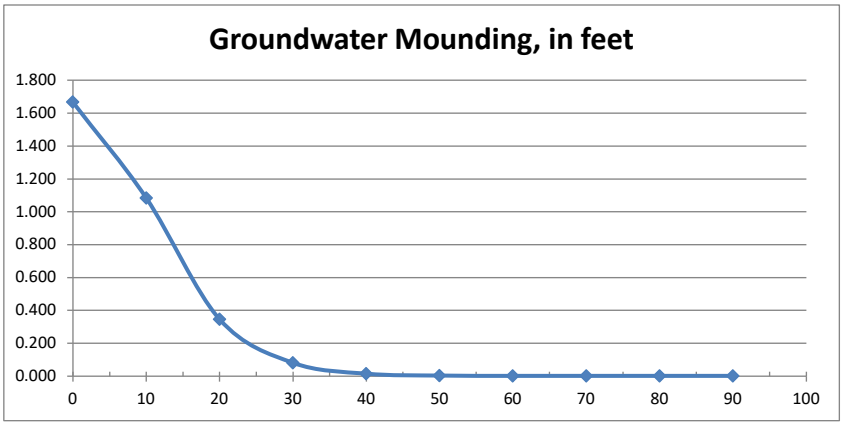
Input Values

1.50	*R*	Recharge rate (permeability rate) (in/hr)
0.150	Sy	Specific yield, Sy (dimensionless) default value is 0.15; max value is 0.2 provided that a lab test data is submitted
6.65	Kh	Horizontal hydraulic conductivity (in/hr) Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
9.250	x	1/2 length of basin (x direction, in feet)
66.420	y	1/2 width of basin (y direction, in feet)
3.10	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)

11.667	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
1.667	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
1.667	0
1.083	10
0.345	20
0.081	30
0.014	40
0.002	50
0.001	60
0.001	70
0.001	80
0.001	90

Re-Calculate Now



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FUTURE GROUNDWATER MOUNDING ANALYSIS

UNDERGROUND INFILTRATION BASIN 1-1

2-YEAR STORM EVENT

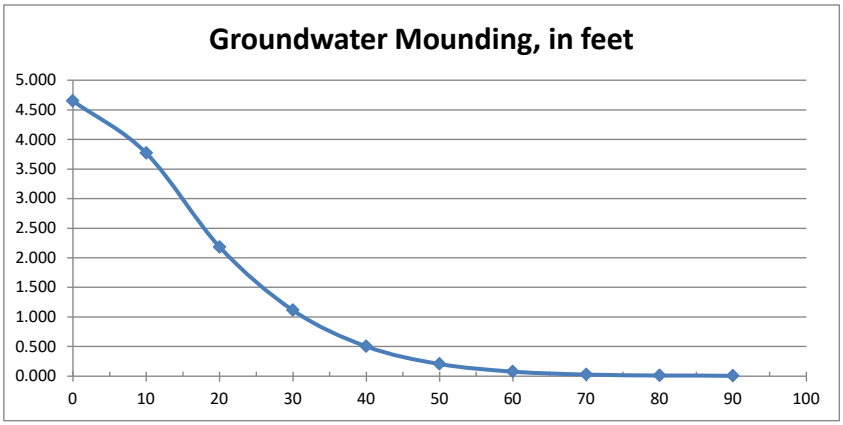
Input Values

1.50	R	Recharge rate (permeability rate) (in/hr)
		Specific yield, Sy (dimensionless)
0.150	Sy	default value is 0.15; max value is 0.2 provided that a lab test data is submitted
		Horizontal hydraulic conductivity (in/hr)
4.70	Kh	Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
10.000	x	1/2 length of basin (x direction, in feet)
40.500	y	1/2 width of basin (y direction, in feet)
13.29	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)

14.652	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
4.652	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
4.652	0
3.770	10
2.182	20
1.112	30
0.503	40
0.204	50
0.076	60
0.027	70
0.010	80
0.005	90

Re-Calculate Now



Disclaimer

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10-YEAR STORM EVENT

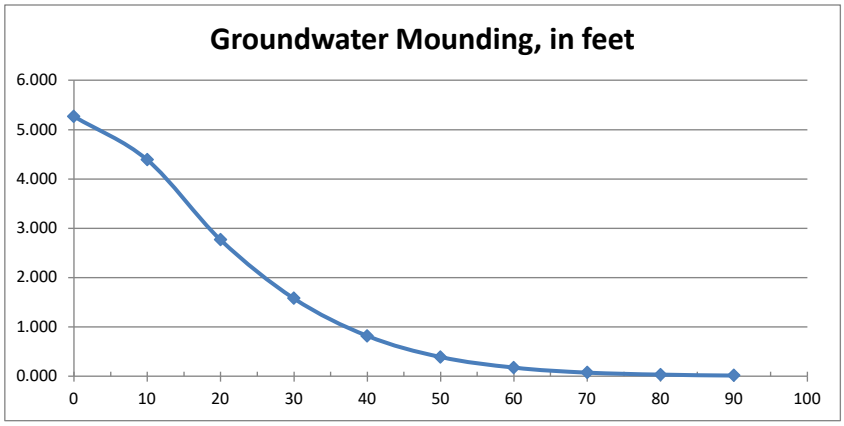
Input Values

1.50	*R*	Recharge rate (permeability rate) (in/hr)
0.150	Sy	Specific yield, Sy (dimensionless) default value is 0.15; max value is 0.2 provided that a lab test data is submitted
4.70	Kh	Horizontal hydraulic conductivity (in/hr) Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
10.000	x	1/2 length of basin (x direction, in feet)
40.500	y	1/2 width of basin (y direction, in feet)
17.34	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)

15.266	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
5.266	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
5.266	0
4.387	10
2.763	20
1.575	30
0.815	40
0.386	50
0.169	60
0.070	70
0.029	80
0.013	90

Re-Calculate Now



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100-YEAR STORM EVENT

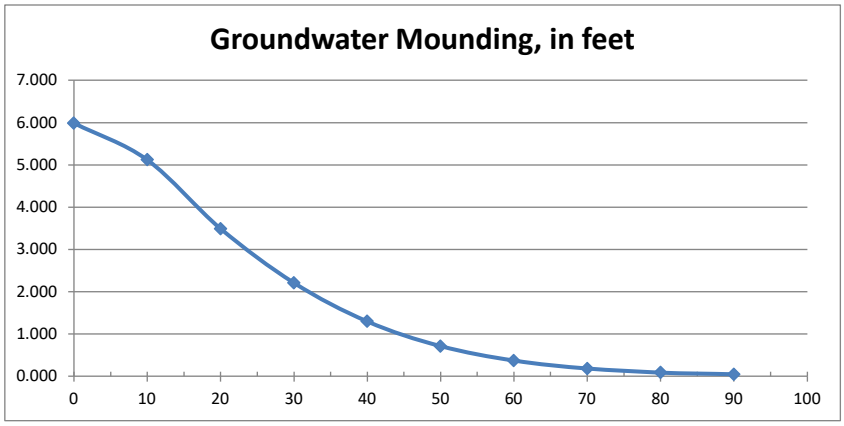
Input Values

1.50	R	Recharge rate (permeability rate) (in/hr)
		Specific yield, Sy (dimensionless)
0.150	Sy	default value is 0.15; max value is 0.2 provided that a lab test data is submitted
		Horizontal hydraulic conductivity (in/hr)
4.70	Kh	Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
10.000	x	1/2 length of basin (x direction, in feet)
40.500	y	1/2 width of basin (y direction, in feet)
23.52	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)

15.984	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
5.984	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
5.984	0
5.119	10
3.486	20
2.205	30
1.294	40
0.709	50
0.365	60
0.178	70
0.084	80
0.039	90

Re-Calculate Now



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WATER QUALITY STORM

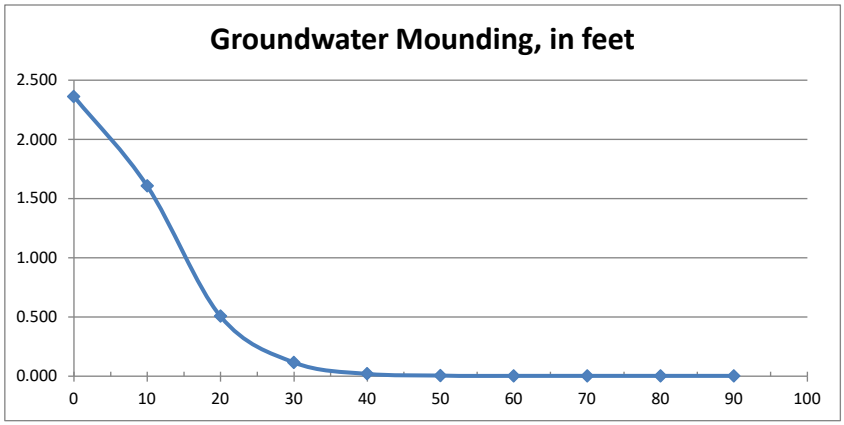
Input Values

1.50	*R*	Recharge rate (permeability rate) (in/hr)
		Specific yield, Sy (dimensionless)
0.150	Sy	default value is 0.15; max value is 0.2 provided that a lab test data is submitted
		Horizontal hydraulic conductivity (in/hr)
4.70	Kh	Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
10.000	x	1/2 length of basin (x direction, in feet)
40.500	y	1/2 width of basin (y direction, in feet)
4.17	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)

12.362	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
2.362	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
2.362	0
1.606	10
0.505	20
0.114	30
0.019	40
0.003	50
0.001	60
0.001	70
0.001	80
0.001	90

Re-Calculate Now



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UNDERGROUND INFILTRATION BASIN 1-2

2-YEAR STORM EVENT

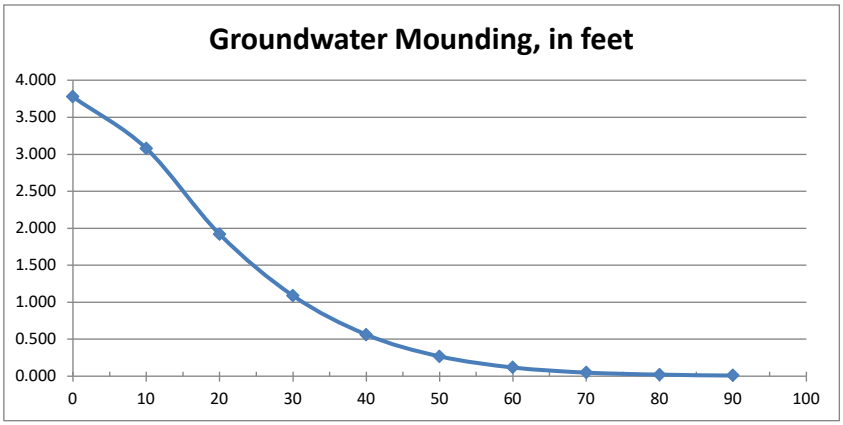
Input Values

1.50	*R*	Recharge rate (permeability rate) (in/hr)
0.150	Sy	Specific yield, Sy (dimensionless) default value is 0.15; max value is 0.2 provided that a lab test data is submitted
6.65	Kh	Horizontal hydraulic conductivity (in/hr) Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
9.250	x	1/2 length of basin (x direction, in feet)
66.420	y	1/2 width of basin (y direction, in feet)
12.03	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)

13.776	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
3.776	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
3.776	0
3.078	10
1.919	20
1.087	30
0.561	40
0.265	50
0.116	60
0.048	70
0.019	80
0.009	90

Re-Calculate Now



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10-YEAR STORM EVENT

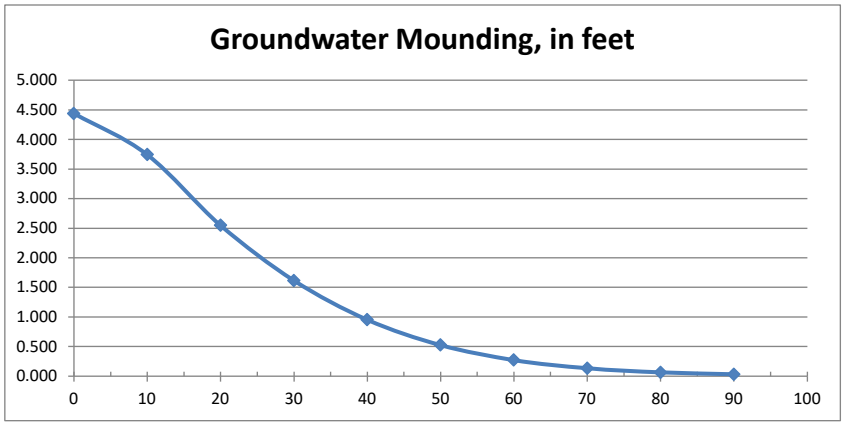
Input Values

1.50	*R*	Recharge rate (permeability rate) (in/hr)
		Specific yield, Sy (dimensionless)
0.150	Sy	default value is 0.15; max value is 0.2 provided that a lab test data is submitted
		Horizontal hydraulic conductivity (in/hr)
6.65	Kh	Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
9.250	x	1/2 length of basin (x direction, in feet)
66.420	y	1/2 width of basin (y direction, in feet)
16.47	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)

14.439	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
4.439	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
4.439	0
3.743	10
2.547	20
1.614	30
0.951	40
0.524	50
0.271	60
0.133	70
0.062	80
0.029	90

Re-Calculate Now



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100-YEAR STORM EVENT

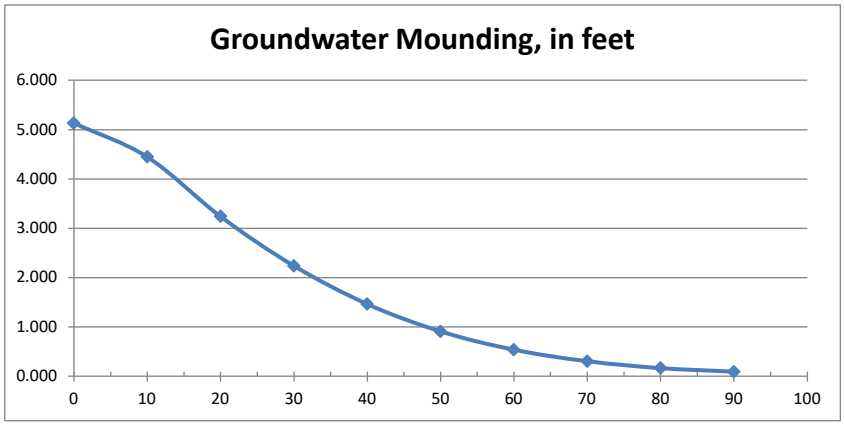
Input Values

1.50	*R*	Recharge rate (permeability rate) (in/hr)
		Specific yield, Sy (dimensionless)
0.150	Sy	default value is 0.15; max value is 0.2 provided that a lab test data is submitted
		Horizontal hydraulic conductivity (in/hr)
6.65	Kh	Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
9.250	x	1/2 length of basin (x direction, in feet)
66.420	y	1/2 width of basin (y direction, in feet)
22.34	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)

15.129	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
5.129	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
5.129	0
4.445	10
3.238	20
2.236	30
1.461	40
0.905	50
0.533	60
0.300	70
0.163	80
0.086	90

Re-Calculate Now



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WATER QUALITY STORM

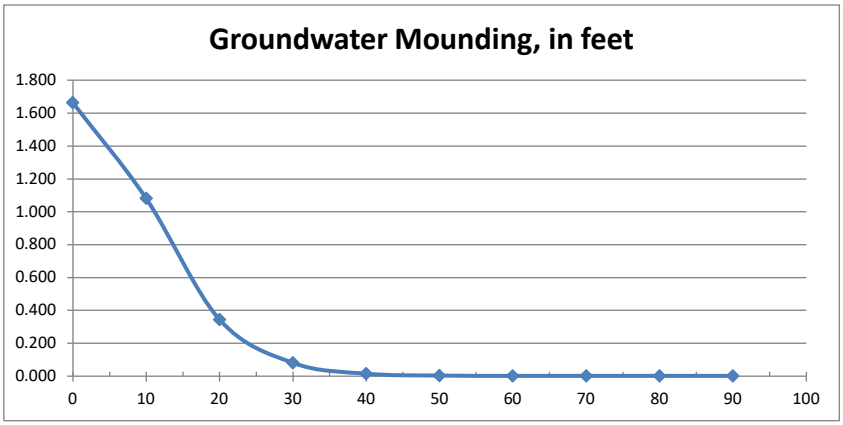
Input Values

1.50	*R*	Recharge rate (permeability rate) (in/hr)
0.150	Sy	Specific yield, Sy (dimensionless) default value is 0.15; max value is 0.2 provided that a lab test data is submitted
6.65	Kh	Horizontal hydraulic conductivity (in/hr) Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
9.250	x	1/2 length of basin (x direction, in feet)
66.420	y	1/2 width of basin (y direction, in feet)
3.09	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)

11.663	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
1.663	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
1.663	0
1.080	10
0.344	20
0.080	30
0.014	40
0.002	50
0.001	60
0.001	70
0.001	80
0.001	90

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

INFILTRATION BASIN DESIGN SUMMARY

INFILTRATION PERIOD AND EXFILTRATION RATE CALCULATIONS FOR GROUNDWATER MOUNDING ANALYSIS					
SMALL-SCALE INFILTRATION BASIN					
BMP	**CHAMBER STORAGE (CF) PER LINEAR FOOT OF INSTALLATION**	**TOTAL STORAGE (CF) PER LINEAR FOOT OF INSTALLATION**	**EFFECTIVE DEPTH RATIO**	**DESIGN DEPTH FROM BOTTOM OF BMP TO FIRST ORIFICE (IN)**	**EFFECTIVE DEPTH (IN)**
UGD-INF1-1	3.14	6.68	0.47	9.6	4.5
UGD-INF1-2	10.00	15.20	0.66	6.6	4.3

NOTES:
1. Chamber Storage and total storage per linear foot of installation referenced from Cultec Recharger 360HD Stormwater Chamber submittal information provided by the manufacturer.

INFILTRATION PERIOD AND EXFILTRATION RATE CALCULATIONS FOR GROUNDWATER MOUNDING ANALYSIS

CURRENT STORM EVENTS

SMALL-SCALE UNDERGROUND INFILTRATION BASIN 1-1

DESIGN STORM EVENT	DISCARDED VOLUME VIA EXFILTRATION (CF)	INFILTRATION AREA (SF)	EXFILTRATION RATE (IN/HR)	INFILTRATION PERIOD (HR)	MAX. GROUNDWATER MOUNDING HEIGHT (FT)	GROUNDWATER ELEVATION	MAX. GROUNDWATER MOUNDING ELEVATION
WQ Design Storm	845	1,620	1.50	4.17	2.36	342.00	344.36
2-year	2,407	1,620	1.50	11.89	4.40	342.00	346.40
10-year	3,183	1,620	1.50	15.72	5.04	342.00	347.04
100-year	4,516	1,620	1.50	22.30	5.86	342.00	347.86

NOTES:

1. **When exfiltration is used, the duration of infiltration is calculated as stated below and continued on the following page:**

   - If the exfiltration volume and the exfiltration rate are known:

   Duration of infiltration period, t $(hr) = \frac{Discarded\ Volume\ via\ Exfiltration\ (cf)\ x\ 12\ in/ft}{Infiltration\ area\ (sf)\ x\ Exfiltration\ rate\ (in/hr)}$

2. The discarded volume via exfiltration is referenced from Hydraflow Hydographs and is calculated as the difference in runoff volume between the inflow hydrograph and the outflow hydrograph from the pond routing calculations.

3. The exfiltration rate has been calculated through an interative process which results in the maximum exfiltration rate while maintaining a maximum groundwater mounding height that remains below the bottom of the BMP for the future 100-year design storm event. This exfiltration rate has then been applied to the 2- and 10-year design storm events, and the infiltration periods subsequently calculated.

INFILTRATION PERIOD AND EXFILTRATION RATE CALCULATIONS FOR GROUNDWATER MOUNDING ANALYSIS

CURRENT STORM EVENTS

SMALL-SCALE UNDERGROUND INFILTRATION BASIN 1-2

DESIGN STORM EVENT	DISCARDED VOLUME VIA EXFILTRATION (CF)	INFILTRATION AREA (SF)	EXFILTRATION RATE (IN/HR)	INFILTRATION PERIOD (HR)	MAX. GROUNDWATER MOUNDING HEIGHT (FT)	GROUNDWATER ELEVATION	MAX. GROUNDWATER MOUNDING ELEVATION
WQ Design Storm	951	2,457	1.50	3.10	1.67	338.00	339.67
2-year	3,219	2,457	1.50	10.48	3.50	338.00	341.50
10-year	4,517	2,457	1.50	14.70	4.19	338.00	342.19
100-year	6,151	2,457	1.50	20.02	4.88	338.00	342.88

NOTES:

1. **When exfiltration is used, the duration of infiltration is calculated as stated below and continued on the following page:**

   - If the exfiltration volume and the exfiltration rate are known:

   $$\text{Duration of infiltration period, t } (hr) = \frac{Discarded\ Volume\ via\ Exfiltration\ (cf)\ x\ 12\ in/ft}{Infiltration\ area\ (sf)\ x\ Exfiltration\ rate\ (in/hr)}$$

2. The discarded volume via exfiltration is referenced from Hydraflow Hydographs and is calculated as the difference in runoff volume between the inflow hydrograph and the outflow hydrograph from the pond routing calculations.

3. The exfiltration rate has been calculated through an interative process which results in the maximum exfiltration rate while maintaining a maximum groundwater mounding height that remains below the bottom of the BMP for the future 100-year design storm event. This exfiltration rate has then been applied to the 2- and 10-year design storm events, and the infiltration periods subsequently calculated.

INFILTRATION PERIOD AND EXFILTRATION RATE CALCULATIONS FOR GROUNDWATER MOUNDING ANALYSIS

FUTURE STORM EVENTS

SMALL-SCALE UNDERGROUND INFILTRATION BASIN 1-1

DESIGN STORM EVENT	DISCARDED VOLUME VIA EXFILTRATION (CF)	INFILTRATION AREA (SF)	EXFILTRATION RATE (IN/HR)	INFILTRATION PERIOD (HR)	MAX. GROUNDWATER MOUNDING HEIGHT (FT)	GROUNDWATER ELEVATION	MAX. GROUNDWATER MOUNDING ELEVATION
WQ Design Storm	845	1,620	1.50	4.17	2.36	342.00	344.36
2-year	2,691	1,620	1.50	13.29	4.65	342.00	346.65
10-year	3,511	1,620	1.50	17.34	5.27	342.00	347.27
100-year	4,763	1,620	1.50	23.52	5.98	342.00	347.98

NOTES:

1. **When exfiltration is used, the duration of infiltration is calculated as stated below and continued on the following page:**

   - If the exfiltration volume and the exfiltration rate are known:

   $$\text{Duration of infiltration period, t } (hr) = \frac{Discarded\ Volume\ via\ Exfiltration\ (cf)\ x\ 12\ in/ft}{Infiltration\ area\ (sf)\ x\ Exfiltration\ rate\ (in/hr)}$$

2. The discarded volume via exfiltration is referenced from Hydraflow Hydographs and is calculated as the difference in runoff volume between the inflow hydrograph and the outflow hydrograph from the pond routing calculations.

3. The exfiltration rate has been calculated through an interative process which results in the maximum exfiltration rate while maintaining a maximum groundwater mounding height that remains below the bottom of the BMP for the future 100-year design storm event. This exfiltration rate has then been applied to the 2- and 10-year design storm events, and the infiltration periods subsequently calculated.

INFILTRATION PERIOD AND EXFILTRATION RATE CALCULATIONS FOR GROUNDWATER MOUNDING ANALYSIS

FUTURE STORM EVENTS

SMALL-SCALE UNDERGROUND INFILTRATION BASIN 1-2

DESIGN STORM EVENT	DISCARDED VOLUME VIA EXFILTRATION (CF)	INFILTRATION AREA (SF)	EXFILTRATION RATE (IN/HR)	INFILTRATION PERIOD (HR)	MAX. GROUNDWATER MOUNDING HEIGHT (FT)	GROUNDWATER ELEVATION	MAX. GROUNDWATER MOUNDING ELEVATION
WQ Design Storm	950	2,457	1.50	3.09	1.66	338.00	339.66
2-year	3,695	2,457	1.50	12.03	3.78	338.00	341.78
10-year	5,060	2,457	1.50	16.47	4.44	338.00	342.44
100-year	6,863	2,457	1.50	22.34	5.13	338.00	343.13

NOTES:

1. **When exfiltration is used, the duration of infiltration is calculated as stated below and continued on the following page:**

   - If the exfiltration volume and the exfiltration rate are known:

   $$\text{Duration of infiltration period, t } (hr) = \frac{Discarded\ Volume\ via\ Exfiltration\ (cf)\ x\ 12\ in/ft}{Infiltration\ area\ (sf)\ x\ Exfiltration\ rate\ (in/hr)}$$

2. The discarded volume via exfiltration is referenced from Hydraflow Hydographs and is calculated as the difference in runoff volume between the inflow hydrograph and the outflow hydrograph from the pond routing calculations.

3. The exfiltration rate has been calculated through an interative process which results in the maximum exfiltration rate while maintaining a maximum groundwater mounding height that remains below the bottom of the BMP for the future 100-year design storm event. This exfiltration rate has then been applied to the 2- and 10-year design storm events, and the infiltration periods subsequently calculated.

POROUS ASPHALT PAVEMENT DESIGN CALCULATIONS

POROUS PAVEMENT SYSTEM DESIGN CALCULATIONS

Design Notes and Standards:

1. The NJDEP water quality design storm event is 1.25 inches over a period of 2 hours.
2. The maximum ratio of additional inflow drainage area to surface area of the porous pavement system is 3:1.
3. The storage bed of the porous pavement system must drain within 72 hours.
4. The void space of the stone storage bed is assumed to be 40%.
5. The seasonal high water table or bedrock must be a minimum of 1 foot below the bottom of the storage bed.
6. The proposed porous pavement system has been designed to allow for additional storage capacity for quanitity control measures for the larger storm events. An outlet control structure has been designed which will control the rate of discharge; the underdrain system has been provided to promote complete drainage of the system.

POROUS PAVEMENT SYSTEM AREA	BED AREA (SF)	BED DEPTH (IN)	STORAGE VOLUME (CF)	WQ STORM RUNOFF VOLUME (CF)	MIN. UNDERDRAIN PIPE DIA. (IN)	MIN. UNDERDRAIN PIPE SLOPE (FT/FT)	UNDERDRAIN CAPACITY (CFS)
1	4,006	24	3,205	768	4	0.005	0.15
2	2,198	24	1,759	249	4	0.005	0.15
3	2,139	24	1,711	243	4	0.005	0.15

Pavement Area	Cover Type	Soil Type	Area (ac)	Area (sf)	CN	S	Q Runoff (in)	Runoff Volume (CF)
1	Open Space/Grass	C	0.01	460	74	3.51	0.07	3
	Impervious	-	0.20	8,875	98	0.20	1.03	765
TOTAL:			0.21	9,334				768

ADDITIONAL INFLOW DRAINAGE AREA RATIO (X:1) 1.33 **ADDITIONAL INFLOW IMPERVIOUS AREA RATIO (X:1) 1.22**

Pavement Area	Cover Type	Soil Type	Area (ac)	Area (sf)	CN	S	Q Runoff (in)	Runoff Volume (CF)
2	Open Space/Grass	C	0.04	1,579	74	3.51	0.07	10
	Impervious	-	0.06	2,771	98	0.20	1.03	239
TOTAL:			0.10	4,350				249

ADDITIONAL INFLOW DRAINAGE AREA RATIO (X:1) 0.98 **ADDITIONAL INFLOW IMPERVIOUS AREA RATIO (X:1) 0.26**

Pavement Area	Cover Type	Soil Type	Area (ac)	Area (sf)	CN	S	Q Runoff (in)	Runoff Volume (CF)
3	Open Space/Grass	C	0.02	783	74	3.51	0.07	5
	Impervious	-	0.06	2,765	98	0.20	1.03	238
TOTAL:			0.08	3,548				243

ADDITIONAL INFLOW DRAINAGE AREA RATIO (X:1) 0.66 **ADDITIONAL INFLOW IMPERVIOUS AREA RATIO (X:1) 0.29**

APPENDIX F

LOW IMPACT DEVELOPMENT CHECKLIST

New Jersey Stormwater Best Management Practices Manual

February 2004

http://www.state.nj.us/dep/watershedmgt/bmpmanualfeb2004.htm

A P P E N D I X A

Low Impact Development Checklist

A checklist for identifying nonstructural stormwater management strategies incorporated into proposed land development

According to the NJDEP Stormwater Management Rules at N.J.A.C. 7:8, the groundwater recharge, stormwater quality, and stormwater quantity standards established by the Rules for major land development projects must be met by incorporating nine specific nonstructural stormwater management strategies into the project's design to the maximum extent practicable.

To accomplish this, the Rules require an applicant seeking land development approval from a regulatory board or agency to identify those nonstructural strategies that have been incorporated into the project's design. In addition, if an applicant contends that it is not feasible to incorporate any of the specific strategies into the project's design, particularly for engineering, environmental, or safety reasons, the Rules further require that the applicant provide a basis for that contention.

This checklist has been prepared to assist applicants, site designers, and regulatory boards and agencies in ensuring that the nonstructural stormwater management requirements of the Rules are met. It provides an applicant with a means to identify both the nonstructural strategies incorporated into the development's design and the specific low impact development BMPs (LID-BMPs) that have been used to do so. It can also help an applicant explain the engineering, environmental, and/or safety reasons that a specific nonstructural strategy could not be incorporated into the development's design.

The checklist can also assist municipalities and other land development review agencies in the development of specific requirements for both nonstructural strategies and LID-BMPs in zoning and/or land use ordinances and regulations. As such, where requirements consistent with the Rules have been adopted, they may supersede this checklist.

Finally, the checklist can be used during a pre-design meeting between an applicant and pertinent review personnel to discuss local nonstructural strategies and LID-BMPs requirements in order to optimize the development's nonstructural stormwater management design.

Since this checklist is intended to promote the use of nonstructural stormwater management strategies and provide guidance in their incorporation in land development projects, municipalities are permitted to revise it as necessary to meet the goals and objectives of their specific stormwater management program and plan within the limits of N.J.A.C. 7:8.

Low Impact Development Checklist

A checklist for identifying nonstructural stormwater management strategies incorporated into proposed land development

Municipality: *Summit*

County: *Union County* Date: *February 9, 2024*

Review board or agency: *Summit Planning Board*

Proposed land development name: *Beacon Unitarian Universalist Church*

Lot(s): *47* Block(s): *1702*

Project or application number: 101007201

Applicant's name: *Beacon Unitarian Universalist Congregation*

Applicant's address: *4 Waldron Avenue, Summit, NJ 07901*

Telephone: Fax:

Email address:

Designer's name: *Langan Engineering and Environmental Services (Contact: John Cote)*

Designer's address: *300 Kimball Drive, Parsippany, NJ 07054*

Telephone: *973-560-4900* Fax:

Email address: *jcote@langan.com*

Part 1: Description of Nonstructural Approach to Site Design

In narrative form, provide an overall description of the nonstructural stormwater management approach and strategies incorporated into the proposed site's design. Attach additional pages as necessary. Details of each nonstructural strategy are provided in Part 3 below.

In accordance with the NJDEP stormwater rules outlined in N.J.A.C. 7:8, the project meets the requirements for stormwater quantity control, water quality treatment, and groundwater recharge.

The proposed development of the project site has been designed to maintain as many existing trees as possible. Trash racks and rock screens on outlet control structures will be used to prevent accumulation of trash and debris in stormwater drainage systems.

Part 2: Review of Local Stormwater Management Regulations

Title and date of stormwater management regulations used in development design:

Summit – Chapter 26 Stormwater Management Regulations and Chapter 35 Development Regulations.

Do regulations include nonstructural requirements?
Yes: *x* No: _____

If yes, briefly describe: *Nonstructural stormwater management strategies.*

List LID-BMPs prohibited by local regulations: *None*

Pre-design meeting held? Yes: _____ Date: _____ No: X

Meeting held with:_____

Pre-design site walk held? Yes: _____ Date: _____ No: *x*

Site walk held with: _____

Other agencies with stormwater review jurisdiction:

Name: *Union County*

Required approval: *Somerset-Union Soil Conservation District, Union County Planning Board*

Name:

Required approval:

Name:

Required approval:

Name:

Required approval:

Part 3: Nonstructural Strategies and LID-BMPs in Design

3.1 Vegetation and Landscaping

Effective management of both existing and proposed site vegetation can reduce a development's adverse impacts on groundwater recharges and runoff quality and quantity. This section of the checklist helps identify the vegetation and landscaping strategies and nonstructural LID-BMPs that have been incorporated into the proposed development's design to help maintain existing recharge rates and/or minimize or prevent increases in runoff quantity and pollutant loading.

A. Has an inventory of existing site vegetation been performed? Yes: *x* No:

If yes, was this inventory a factor in the site's layout and design? Yes: *x* No:

B. Does the site design utilize any of the following nonstructural LID-BMPs?

Preservation of natural areas? Yes: x No:
If yes, specify 5% of site: %

Native ground cover? Yes: No: *x*
If yes, specify % of site %

Vegetated buffers? Yes: No: x
If yes, specify % of site: %

C. Do the land development regulations require these nonstructural LID-BMPs?

Preservation of natural areas? Yes: _____ No: *x*
If yes, specify % of site: _____

Native ground cover? Yes: _____ No: *x*
If yes, specify % of site: _____

Vegetated buffers? Yes: _____ No: *x*
If yes, specify % of site: _____

D. If vegetated filter strips or buffers are utilized, specify their functions:

Reduce runoff volume increases through lower runoff coefficient:
Yes: _____ No: *x*

Reduce runoff pollutant loads through runoff treatment:
Yes: _____ No: *x*

Maintain groundwater recharge by preserving natural areas:
Yes: _____ No: *x*

3.2 Minimize Land Disturbance

Minimizing land disturbance is a nonstructural LID-BMP that can be applied during both the development's construction and post-construction phases. This section of the checklist helps identify those land disturbance strategies and nonstructural LID-BMPs that have been incorporated into the proposed development's design to minimize land disturbance and the resultant change in the site's hydrologic character.

A. Have inventories of existing site soils and slopes been performed?
Yes: x No:

If yes, were these inventories factors in the site's layout and design? Yes: x No:

B. Does the development's design utilize any of the following nonstructural LID-BMPs?

Restrict permanent site disturbance by land owners?
Yes: No: x

If yes, how:

Restrict temporary site disturbance during construction?
Yes: No: x

If yes, how:

Consider soils and slopes in selecting disturbance limits?
Yes: x No:

C. Specify percentage of site to be cleared: *95.0%* Regraded: *95.0%*

D. Specify percentage of cleared areas done so for buildings: *16.4%*

For driveways and parking: 24.8% For roadways: *0.0%*

E. What design criteria and/or site changes would be required to reduce the percentages in C and D above? *N.A.*

F. Specify site's hydrologic soil group (HSG) percentages:

HSG A: 0% HSG B: 0% HSG C: 100% HSG D: 0%

G. Specify percentage of each HSG that will be permanently disturbed:

HSG A: *0%* HSG B: 0% HSG C: *95.0%* HSG D: 0%

H. Locating site disturbance within areas with less permeable soils (HSG C and D) and minimizing disturbance within areas with greater permeable soils (HSG A and B) can help maintain groundwater recharge rates and reduce runoff volume increases. In light of the HSG percentages in F and G above, what other practical measures if any can be taken to achieve this?

The entire project site is located within HSGC C soil type.

I. Does the site include Karst topography? Yes: _____ No: *x*

If yes, discuss measures taken to limit Karst impacts:

_____

3.3 Impervious Area Management

New impervious surfaces at a development site can have the greatest adverse effect on groundwater recharge and stormwater quality and quantity. This section of the checklist helps identify those nonstructural strategies and LID-BMPs that have been incorporated into a proposed development's design to comprehensively manage the extent and impacts of new impervious surfaces.

A. Specify impervious cover at site: Existing: *30.1%* Proposed: *39.9%*

B. Specify maximum site impervious coverage allowed by regulations: *35% Impervious Coverage*

C. Compare proposed street cartway widths with those required by regulations:

Type of Street	Proposed Cartway Width (feet)	Required Cartway Width (feet)
Residential access – low intensity		
Residential access – medium intensity		
Residential access – high intensity with parking		
Residential access – high intensity without parking		
Neighborhood		
Minor collector – low intensity without parking		
Minor collector – with one parking lane		
Minor collector – with two parking lanes		
Minor collector – without parking		
Major collector		

D. Compare proposed parking space dimensions with those required by regulations:

Proposed: *9 FT x 18 FT* Regulations: *9 FT x 18 FT*

E. Compare proposed number of parking spaces with those required by regulations:

Proposed: *42* Regulations: 100

F. Specify percentage of total site impervious cover created by buildings: *39.0%*

By driveways and parking: *61.0%* By roadways: *0.0%*

G. What design criteria and/or site changes would be required to reduce the percentages in F above?

N.A.

H. Specify percentage of total impervious area that will be unconnected:

Total site: *0%* Buildings: *0%* Driveways and parking: *0%* Roads: *0%*

I. Specify percentage of total impervious area that will be porous:

Total site: *0%* Buildings: *0%* Driveways and parking: *24.1%* Roads: *0%*

J. Specify percentage of total building roof area that will be vegetated: *0%*

K. Specify percentage of total parking area located beneath buildings: *0%*

L. Specify percentage of total parking located within multi-level parking deck: *0%*

3.4 Time of Concentration Modifications

Decreasing a site's time of concentration (Tc) can lead directly to increased site runoff rates which, in turn, can create new and/or aggravate existing erosion and flooding problems downstream. This section of the checklist helps identify those nonstructural strategies and LID-BMPs that have been incorporated into the proposed development's design to effectively minimize such Tc decreases.

When reviewing Tc modification strategies, it is important to remember that a drainage area's Tc should reflect the general conditions throughout the area. As a result, Tc modifications must generally be applied throughout a drainage area, not just along a specific Tc route.

A. Specify percentage of site's total stormwater conveyance system length that will be:

Storm sewer: *90%* Vegetated swale: *0%* Natural channel: *0%*

Stormwater management facility: *10%* Other:

Note: the total length of the stormwater conveyance system should be measured from the site's downstream property line to the downstream limit of sheet flow at the system's headwaters.

B. What design criteria and/or site changes would be required to reduce the storm sewer percentages and increase the vegetated swale and natural channel percentages in A above?

N.A.

C. In conveyance system subareas that have overland or sheet flow over impervious surfaces or turf grass, what practical and effective site changes can be made to: *N.A.*

Decrease overland flow slope: _____

Increase overland flow roughness: _____

3.5 Preventative Source Controls

The most effective way to address water quality concerns is by pollution prevention. This section of the checklist helps identify those nonstructural strategies and LID-BMPs that have been incorporated into the proposed development's design to reduce the exposure of pollutants to prevent their release into the stormwater runoff.

A. Trash Receptacles

Specify the number of trash receptacles provided: *0*

Specify the spacing between the trash receptacles: *0*

Compare trash receptacles proposed with those required by regulations:

Proposed: *0* Regulations: *0*

B. Pet Waste Stations

Specify the number of pet waste stations provided: *0*

Specify the spacing between the pet waste stations: *0*

Compare pet waste stations proposed with those required by regulations:

Proposed: *0* Regulations: *0*

C. Inlets, Trash Racks, and Other Devices that Prevent Discharge of Large Trash and Debris

Specify percentage of total inlets that comply with the NJPDES storm drain inlet criteria: *100%*

D. Maintenance

Specify the frequency of the following maintenance activities:

Street sweeping: Proposed: *0* Regulations: *0*

Litter collection: Proposed: *0* Regulations: *0*

Identify other stormwater management measures on the site that prevent discharge of large trash and debris: Trash Racks on outlet control structure, water quality treatment devices.

E. Prevention and Containment of Spills

Identify locations where pollutants are located on the site, and the features that prevent these pollutants from being exposed to stormwater runoff:

Pollutant: _____Location:

Feature utilized to prevent pollutant exposure, harmful accumulation, or contain spills:

Pollutant: _____ Location: _____

Feature utilized to prevent pollutant exposure, harmful accumulation, or contain spills:

Pollutant: _____ Location: _____

Feature utilized to prevent pollutant exposure, harmful accumulation, or contain spills:

Pollutant: _____ Location: _____

Feature utilized to prevent pollutant exposure, harmful accumulation, or contain spills:

Pollutant: _____ Location: _____

Part 4: Compliance with Nonstructural Requirements of NJDEP Stormwater Management Rules

1. Based upon the checklist responses above, indicate which nonstructural strategies have been incorporated into the proposed development's design in accordance with N.J.A.C. 7:8-5.3(b):

No.	Nonstructural Strategy	Yes	No
1.	Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss.	*x*	
2.	Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces.		*x*
3.	Maximize the protection of natural drainage features and vegetation.	*x*	
4.	Minimize the decrease in the pre-construction time of concentration.		*x*
5.	Minimize land disturbance including clearing and grading.		*x*
6.	Minimize soil compaction.		*x*
7.	Provide low maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers, and pesticides.		*x*
8.	Provide vegetated open-channel conveyance systems discharge into and through stable vegetated areas.		*x*
9.	Provide preventative source controls.		x

2. For those strategies that have not been incorporated into the proposed development's design, provide engineering, environmental, and/or safety reasons. Attached additional pages as necessary.

The other non-structural stormwater management strategies are not practicable based upon the existing site conditions and nature of the proposed project. The development of the site maintains the perimeter existing wooded areas to the maximum extent feasible.

APPENDIX G

GEOTECHNICAL INVESTIGATION INFORMATION

LANGAN

Memorandum

300 Kimball Drive Parsippany, NJ 07054 T: 973.560.4900 F: 973.560.4901

25To: Louis Cherry / Louis Cherry Architecture

From: Arthur Roesler, P.E.
Matthew Koch

Info: John Cote, Ted Herbert, Gregg Woodruff / Langan

Date: 11 August 2023

Re: Stormwater Management Investigation Report
Beacon Unitarian Universalist Redevelopment Project
695 Springfield Avenue
Summit, New Jersey
Langan Project No.: 101007201

This memorandum provides a summary of the findings from our Stormwater Management Investigation for the proposed Beacon Unitarian Universalist Church project located at 695 Springfield Avenue, Summit, New Jersey.

The purposes of this study were to: 1) review available information; 2) obtain subsurface information by performing test pits; 3) perform in-situ infiltration testing; and 4) perform laboratory testing.

All elevations given in this report are referenced to the North American Vertical Datum of 1988 (NAVD 88), unless otherwise noted. No environmental investigations or sampling were performed as part of this work.

EXISTING CONDITIONS

The approximate 1.74-acre project site is located at 695 Springfield Avenue in Summit, Union County, New Jersey (designated as Block 1702, Lot 47); see Figures 1 and 2. The site is bounded by the following:

- Wilson Primary School and a baseball field to the north.
- Springfield Avenue to the south.
- A playground, basketball court, and tennis courts to the west.
- Grass and wooded areas to the east,

The project site is currently occupied by a two-story office building and a detached 2-story garage.

An asphalt pavement car parking lot exists between the office building and garage. Areas within the eastern portion of the site are covered mostly by grass with some trees and vegetation.

According to the 8 December 2022 Boundary and Topographic Survey prepared by Langan, existing grades at the site generally range from approximate el 350 to el 356.

PROPOSED CONSTRUCTION

Based on the 22 June 2023 Site Plans prepared by our firm, we understand that the current development plan will consist of the following:

- Demolition of existing structures and associated site features.
- Construction of a two-story building with an approximate 11,800 SF building footprint.
- Construction of an asphalt parking lot and driveway; porous pavement will be utilized along the northern row of parking spaces.
- Construction of 2 underground stormwater management basins having bottom of basin elevations of approximate el 344 and el 348.

REVIEW OF AVAILABLE INFORMATION

We reviewed available soil survey data, regional geologic information, and the FEMA Flood Maps for the site vicinity. Pertinent information obtained from our review of available information is summarized in the following paragraphs.

Soil Survey Data

We reviewed the United States Department of Agriculture (USDA) Natural Resources Conservation Service Soil Survey Map for Essex County, New Jersey; see Figure 3. A brief description of the soil types found at the site and surrounding areas is provided below.

- *Boonton-Urban Land-Haledon Complex (NovB):* These areas are typically covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material. The natural soil typically consists of loam to gravelly fine sandy loam to silt loam to sandy loam to gravelly loam. When not covered by pavement, concrete, buildings, and other structures, the soil mapping unit is reported to be Hydrologic Soil Group C.
- *Dunellen-Urban land Complex (DuuD):* These areas are typically covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material. The natural soil typically consists of loam to stratified gravelly sand to sand to loamy sand. When not covered by pavement, concrete, buildings, and other structures, the soil mapping unit is reported to be Hydrologic Soil Group A.

Regional Geology

We reviewed the 2007 New Jersey Geological Survey Open File Map 69 (OFM 69) entitled "Surficial Geology of the Chatham Quadrangle, Morris, Union, and Somerset Counties, New Jersey" and geologic data provided by the New Jersey Department of Environmental Protection (NJDEP); see Figure 4. A brief description of the surficial soils at the site and surrounding areas is provided below.

- Deltaic Deposits (Qpmd): These areas generally consist of fine to coarse sand and pebble to cobble gravel, with minor silt and very fine sand.
- Rahway Till (Qtmr): These areas generally consist of reddish brown to reddish yellow to yellowish brown silty sand to clayey sandy silt, locally clayey silt, containing some to many subrounded and subangular pebbles and cobbles and few subrounded boulders.

Flood Map

We reviewed the current Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panel Number 34039C0008F dated 20 September 2006; see Figure 5. According to this map, the project site lies outside the 100-year and 500-year floodplain.

LANGAN GEOTECHNICAL INVESTIGATION FOR STORMWATER DESIGN

Langan performed a preliminary geotechnical investigation at the site consisting of the following:

- Excavating 8 test pits, identified as TP-1 through TP-8.
- Performing 9 single ring infiltration tests at the test pit locations.

Refer to Figure 2 for location of work. The test pits were performed in areas that were accessible at the time of our investigation.

The test pits and infiltration tests were completed under the full-time observation of a field engineer from our office acting under the direct supervision of our project Professional Engineer. Our field engineer laid out the test pit locations, maintained logs of the explorations, classified soil encountered, and obtained representative material samples. Surface elevations at the test pit locations were collected using survey-grade GPS equipment.

The attached Table 1 presents the findings from our investigation and the proposed bottom of basin elevations.

Test Pits

The preliminary stormwater investigation test pits were excavated by Clear Ground Development, Inc. on 25 and 26 April 2023 using a Kubota KX 057-5 Mini Excavator.

The test pits were excavated to depths ranging from approximately 12 to 15 feet below existing grades. The test pits were backfilled with excavated material and lightly compacted with a bucket of the excavator upon completion.

Individual test pit logs are provided in Appendix A.

In-Situ Infiltration Testing

Single Ring Infiltration Tests

In-situ single ring infiltration testing was performed during the preliminary investigation at depths ranging from approximately 1 to 7 feet below existing grades, corresponding to approximate el 345 to el 352. The single ring infiltration testing was performed in accordance with the latest NJ Stormwater BMP Manual.

The results of the single ring infiltration testing are provided in Table 2 and Appendix B.

Laboratory Testing

Soil samples from the geotechnical investigation were visually examined in the field and classifications were confirmed by re-examination in our Parsippany, New Jersey office. Select soil samples were sent to a specialty testing laboratory where the following tests were performed:

- Grain Size Distributions

The results of the geotechnical laboratory testing are provided in Appendix C.

SUBSURFACE CONDITIONS

Based on the results of the test pits performed for this study, the site subsurface conditions generally consisted of surficial material overlying successive strata of fill and sand. The following sections provide a detailed description of the encountered subsurface strata and groundwater conditions.

For this study, all test pits were performed within the existing landscape areas.

Topsoil

Topsoil typically consisting of dark brown silt with varying amounts of sand, gravel, clay, and roots was encountered at the surface of all test pits. The topsoil was found to be approximately 6 to 11 inches thick.

Fill

A layer of fill typically consisting of brown, black, gray, orangish-brown, and reddish-brown silty sand with varying amounts of gravel, clay, cobbles, roots, and miscellaneous debris (i.e., terracotta fragments, metal, ceramic, glass, brick, plastic) was encountered beneath the topsoil in most test pits and extended to depths ranging from approximately 2 to 7.5 feet below existing grades, corresponding to approximate el 344.5 to el 353.3.

Laboratory testing of select samples from the fill layer resulted in fines contents ranging from approximately 26.8% to 43.9%.

The fill layer was found to be approximately 2 to 7 feet thick.

Sand

A layer of brown to reddish brown fine to coarse sand with varying amounts of gravel, silt, clay, and cobbles was encountered beneath the fill or topsoil in all test pits. The sand layer was first encountered at depths ranging from approximately 0.5 to 6.5 feet below existing grades, corresponding to approximate el 344.5 to el 355.

Laboratory testing of select samples from the estuarine deposits resulted in fines contents ranging from approximately 2.7% to 45.2%.

All test pits were terminated in this stratum.

Groundwater

Groundwater was only encountered in test pit TP-7 at a depth of approximately 7 feet below existing grades, corresponding to approximate el 346.

Trapped groundwater seepage was encountered in test pits TP-7 and TP-8 at depths ranging from approximately 3.3 to 4.7 feet below existing grades. The seepage stopped or significantly slowed down prior to backfilling these test pits.

The groundwater level is expected to fluctuate based on weather, seasonal conditions, and construction activity.

INFILTRATION TESTING

As part of this study, in-situ single ring infiltration tests were performed within the existing fill soils and the sand layer.

In-Situ Infiltration Tests

Single Ring Infiltration Tests

In-situ single ring infiltration tests were performed within all 8 of the excavated test pits during the preliminary investigation. Field hydraulic conductivities ranging from less than 1 inch per hour to 15.1 inches per hour were recorded.

A summary of the single ring infiltration test results is provided in Table 2 and Appendix B.

CLOSURE

Our Stormwater Management Investigation was performed to assist our Site/Civil Engineers with the design of the proposed stormwater management system associated with the redevelopment project located at 695 Springfield Avenue in Summit, New Jersey.

ATTACHMENTS:

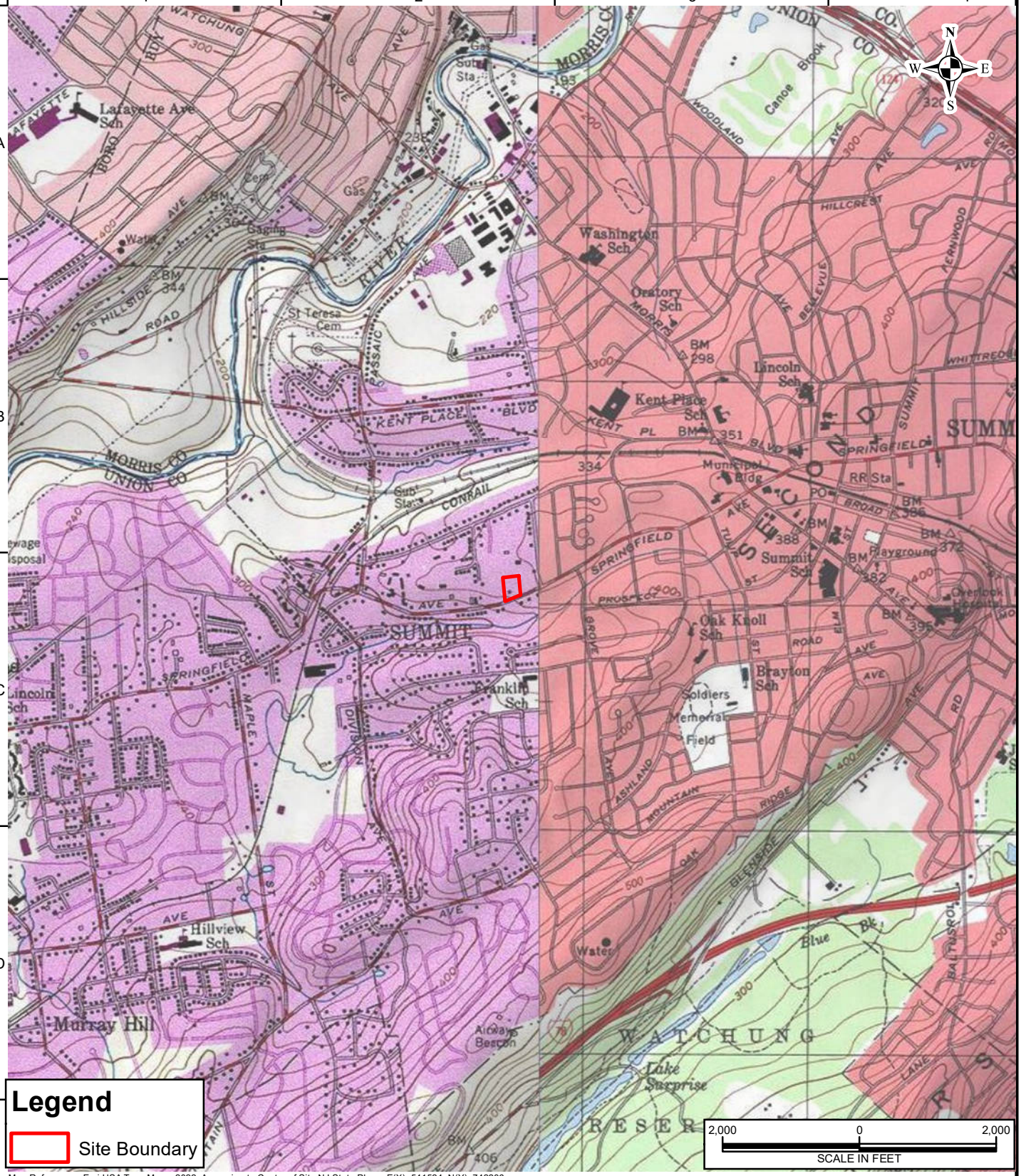
- Figure 1 – Site Location Map
- Figure 2 – Location Plan
- Figure 3 – Soil Survey Map
- Figure 4 – Surficial Geology Map
- Figure 5 – FEMA Flood Map

- Table 1 – Basin Groundwater and Soil Mottling Summary
- Table 2 – Single Ring Infiltration Testing Summary

- Appendix A – Test Pit Logs
- Appendix B – Single Ring Infiltration Test Results
- Appendix C – Laboratory Testing Results

FIGURES

Figure 1	**Site Location Map**
Figure 2	**Location Plan**
Figure 3	**Soil Survey Map**
Figure 4	**Surficial Geology Map**
Figure 5	**FEMA Flood Map**



Map References: Esri USA Topo Maps, 2022; Approximate Center of Site NJ State Plane: E(X): 541524, N(Y): 742236

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Langan International LLC
Collectively known as Langan

NJ CERTIFICATE OF AUTHORIZATION No. 24GA27996400

Project

BEACON UNIVERSALIST CHURCH - SUMMIT

SUMMIT

UNION COUNTY NEW JERSEY

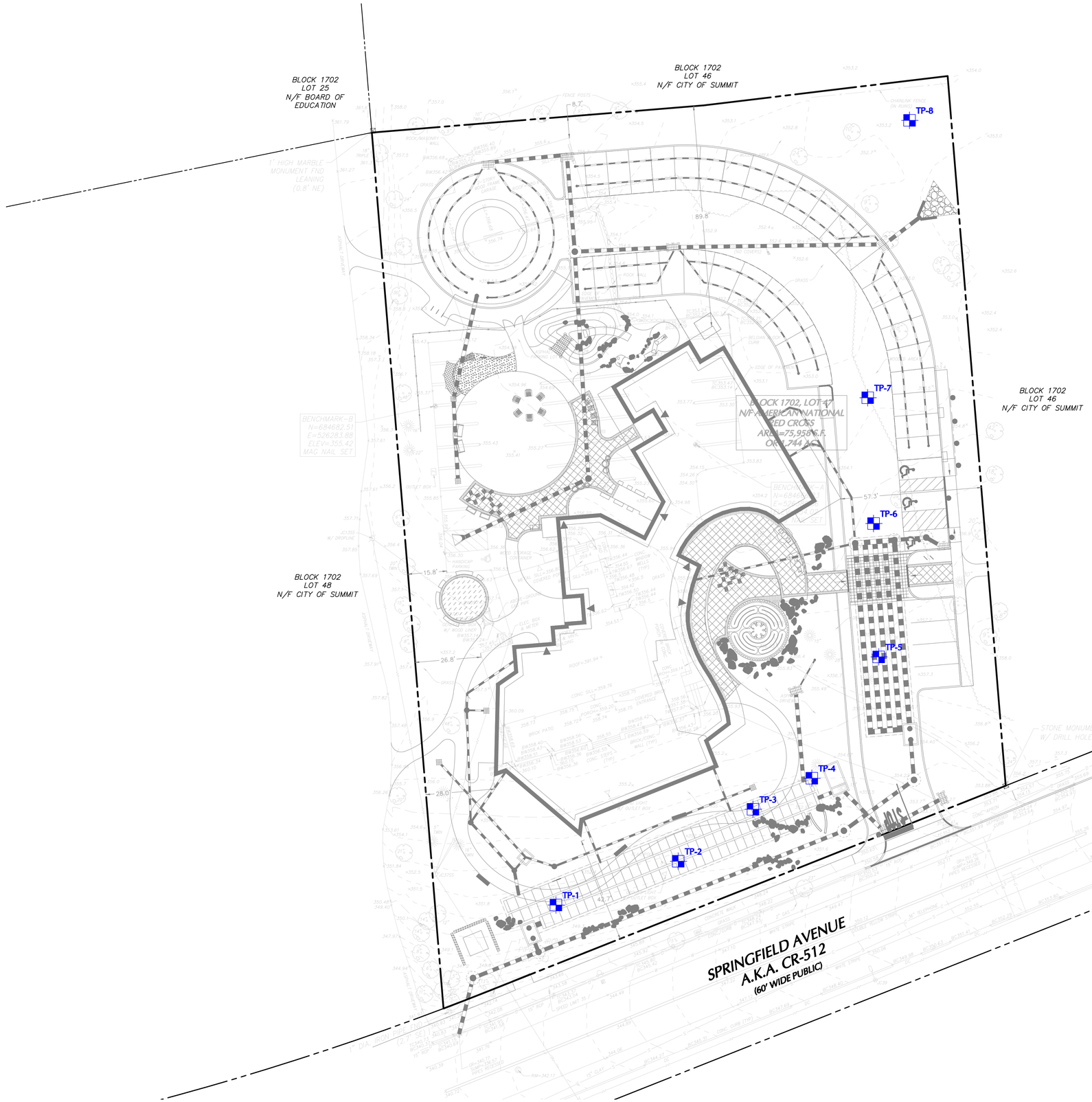
Drawing Title

SITE LOCATION MAP

Project No. 101007201	Figure 1
Date 8/11/2023	
Scale 1" = 2000'	
Drawn By IHB	

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Path: \\langan.com\data\PAR\data2\101007201\Project Data\ArcGIS\MXD\Geotech_Figures\Figure 1 - USGS Site Location Map.mxd



LEGEND:

TP-1 LANGAN TEST PIT LOCATION

NOTES:

1. BACKGROUND BOUNDARY AND TOPOGRAPHIC SURVEY INFORMATION BASED ON 8 DECEMBER 2022 "BOUNDARY TOPOGRAPHIC & UTILITY SURVEY" PREPARED BY LANGAN.
2. BACKGROUND BASED ON 22 JUNE 2023 SITE PLAN PREPARED BY LANGAN.
3. ALL TEST PIT LOCATIONS ARE APPROXIMATE.
4. TEST PITS TP-1 THROUGH TP-8 WERE PERFORMED ON 25 AND 26 APRIL 2023 UNDER THE DIRECT SUPERVISION OF LANGAN.
5. SEE APPENDIX A FOR TEST PIT LOGS.

20 0 5 10 20
SCALE: 1 INCH = 20 FEET

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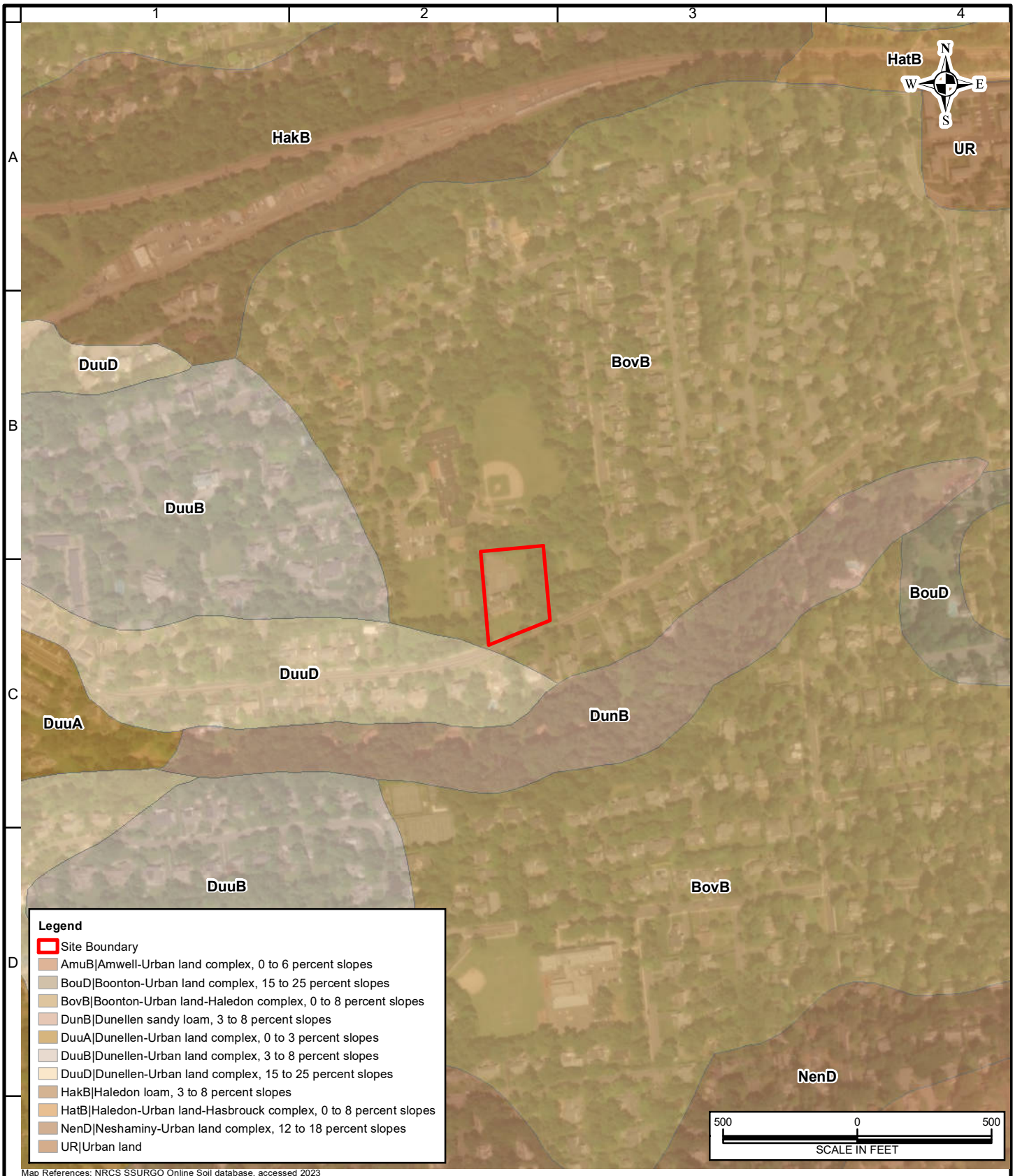
Project
BEACON UNIVERSALIST CHURCH - SUMMIT
695 SPRINGFIELD AVENUE
BLOCK No. 1702, LOT No. 47
CITY OF SUMMIT
UNION COUNTY NEW JERSEY

LOCATION PLAN

Project No.	Drawing No.
101007201	2
Date: JUNE 28, 2023	
Drawn By: AC	
Checked By: MK	

LANGAN Project No. 101007201

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Map References: NRCS SSURGO Online Soil database, accessed 2023

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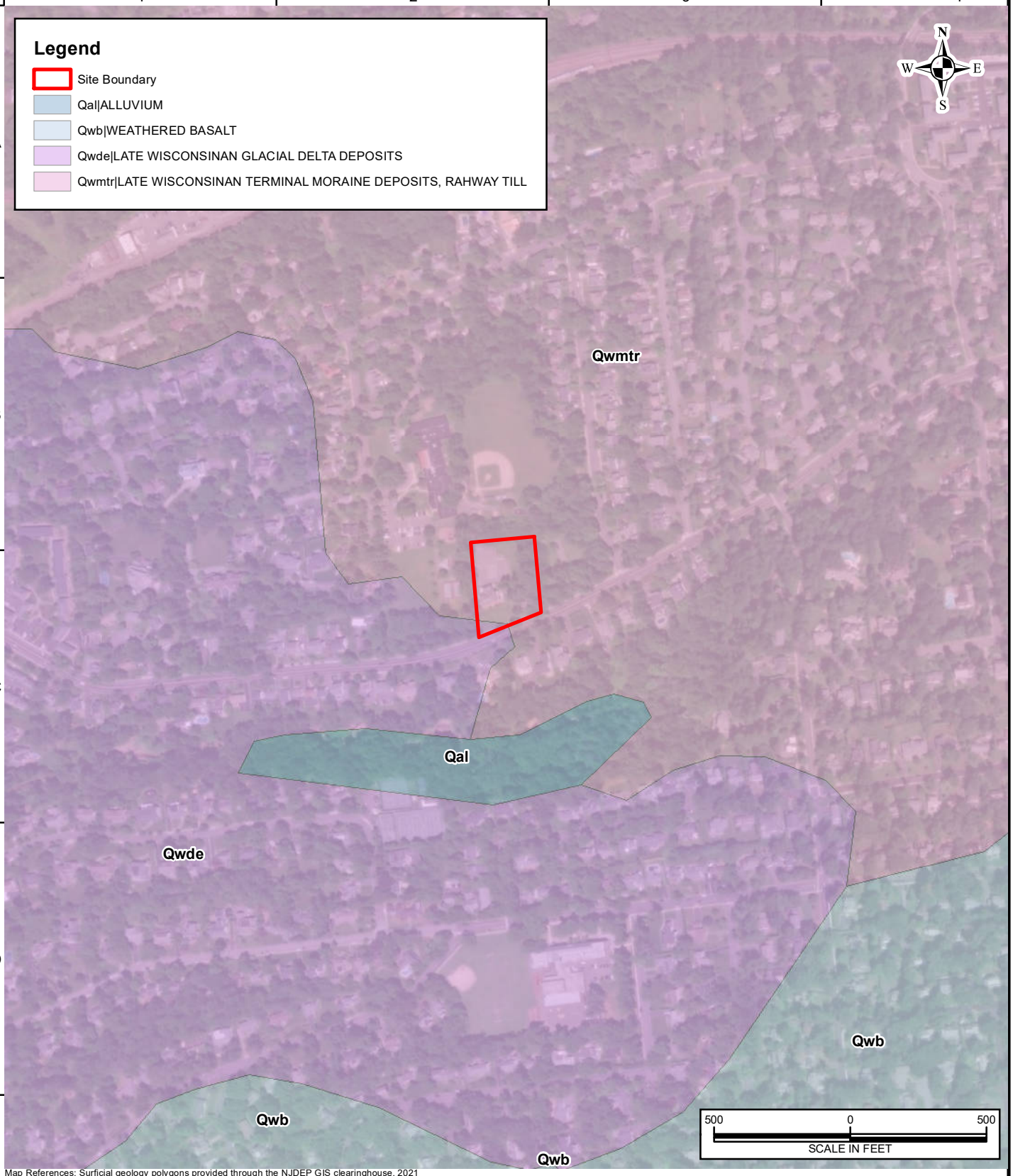
Project
BEACON UNIVERSALIST CHURCH - SUMMIT
SUMMIT
UNION COUNTY NEW JERSEY

Drawing Title
SOIL SURVEY MAP

Project No.	101007201
Date	8/11/2023
Scale	1" = 500'
Drawn By	IHB
Figure	3

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Path: \\langan.com\data\PAR\data2\101007201\Project Data\ArcGIS\MXD\Geotech_Figures\Figure 3 - Soil Survey Map.mxd



Map References: Surficial geology polygons provided through the NJDEP GIS clearinghouse, 2021

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Project
BEACON UNIVERSALIST CHURCH - SUMMIT
SUMMIT
UNION COUNTY NEW JERSEY

Drawing Title
SURFICIAL GEOLOGY MAP

Project No.	101007201
Date	8/11/2023
Scale	1" = 500'
Drawn By	IHB
Figure	4

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Map References: FEMA National Food Hazard Layer

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Project

BEACON UNIVERSALIST CHURCH - SUMMIT

SUMMIT

UNION COUNTY NEW JERSEY

Drawing Title

FEMA FLOOD MAP

Project No.	101007201
Date	8/11/2023
Scale	1" = 1000'
Drawn By	IHB

Figure 5

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Path: \\langan.com\data\PAR\data2\101007201\Project Data\ArcGIS\MXD\Geotech_Figures\Figure 5 - FEMA Flood Map.mxd

Tables

Table 1 Basin Groundwater and Soil Mottling Summary

Table 2 Single Ring Infiltration Testing Summary

Table 1 - Groundwater and Soil Mottling Summary

Test Pit Location	Basin Type	Existing Elevation	Bottom of Basin Elevation	Design SHGW Elevation	Observed Groundwater (April 2023)		Observed Mottling		Bottom of Test Pit	
					Depth	Elevation	Depth	Elevation	Depth	Elevation
TP-1	Underground Retention	351	344	N.E.	N.E.	-	N.E.	-	15	336
TP-2		352		N.E.	N.E.	-	N.E.	-	15	337
TP-3		352		N.E.	N.E.	-	N.E.	-	15	337
TP-4		353		N.E.	N.E.	-	N.E.	-	15	338
TP-5	Underground Retention	357	348	N.E.	N.E.	-	N.E.	-	15	342
TP-6		355.5		N.E.	N.E.	-	N.E.	-	15	340.5
TP-7		353		346	7	346	N.E.	-	12	341
TP-8	Infiltration	351	351	N.E.	N.E.	-	N.E.	-	14	337

TABLE 2: SINGLE RING INFILTRATION TEST RESULTS

Location	Surface Elevation (feet)	Test Depth (feet)	Test Elevation (feet)	Soil Description	Field Measured Hydraulic Conductivity, K (inches/hour)
TP-1	351	6	345	f-c SAND, trace f-c gravel, trace silt, trace cobbles	15.1
TP-2	352	7	345	Gravelly f-m SAND, trace silt, trace cobbles, trace boulders	13.3
TP-3	352	1	351	FILL: Silty f-c SAND, some f-c gravel, trace clay, trace cobbles	1.2
TP-4	353	1	352	FILL: Silty f-c SAND, trace clay, trace f-c gravel, trace cobbles	0.4
TP-5	357	7	350	Gravelly f-c SAND, trace silt, trace cobbles	9.4
TP-6	355.5	5.5	350	Silty f-c SAND, some f-c gravel, trace cobbles	< 1
TP-7	353	3	350	fine SAND, trace silt	0.8
TP-8	351	3	348	fine SAND, trace silt	< 1
TP-8	351	4.5	346.5	fine SAND, some silt	< 1

APPENDIX A

Test Pit Logs

LOG OF TEST PIT TP-1

PROJECT NAME	PROJECT NUMBER	DATE
Beacon Unitarian Universalist Church Redevelopment	101007201	4/25/2023
LOCATION	**ELEVATION**	
Summit, New Jersey	Approx. el 351 (NAVD88)	
EXCAVATION CONTRACTOR	**DEPTH**	**WATER LEVEL - First** / **WATER LEVEL - Completion**
Clear Ground Development, Inc.	15 ft	N.E. ▽ / - ▼
EQUIPMENT	**FOREMAN**	**LANGAN PERSONNEL**
Bobcat E88 Excavator	John Briessie	Emmanuel Carreno Guzman

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+351.0	Dark brown SILT, some f-c sand, trace roots, trace wood (moist) [TOPSOIL - approx. 8" thick]	0	S-1	GRAB	Started excavating at 8:15 AM on 4/25/2023. Fine roots extend to 8'. Large roots extend to 4'.
	+350.3	Light brown Silty f-c SAND, trace f-c gravel, trace clay, trace roots (moist) [FILL]	1	S-2	GRAB	Wood pieces up to 2" in size, encountered from 1' to 2'.
	+348.3	Reddish brown Silty f-c SAND, trace f-c gravel, trace clay, trace roots (moist)	3	S-3	GRAB	Silty SAND extends from 2.7' to 5' on the western test pit sidewall. Silty SAND extends from 2.7' to 7' on the eastern test pit sidewall.
	+346.0	Brown f-c SAND, trace f-c gravel, trace silt, trace cobbles (moist)	5	S-4	GRAB	Cobbles encountered from 5' to 15'. Sidewall collapses starting at 5'.
	+342.0	Brown Gravelly f-c SAND, trace silt, trace cobbles (moist)	9	S-5	GRAB	Multiple sidewall collapses from 11' to 15'.
	+337.5	Brown f-c SAND, trace f-c gravel, trace cobbles (moist)	14	S-6	GRAB	
	+336.0	End of Test Pit at 15'.	15			Finished excavating at 8:57 AM on 4/25/2023. Backfilled test pit with excavated material upon completion.

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LOG OF TEST PIT TP-2

PROJECT NAME	PROJECT NUMBER	DATE
Beacon Unitarian Universalist Church Redevelopment	101007201	4/25/2023
LOCATION	**ELEVATION**	
Summit, New Jersey	Approx. el 352 (NAVD88)	
EXCAVATION CONTRACTOR	**DEPTH**	**WATER LEVEL - First** / **WATER LEVEL - Completion**
Clear Ground Development, Inc.	15 ft	N.E. ▽ / - ▼
EQUIPMENT	**FOREMAN**	**LANGAN PERSONNEL**
Bobcat E88 Excavator	John Briessie	Emmanuel Carreno Guzman

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+352.0	Dark brown SILT, some f-c sand, trace fine gravel, trace roots (moist) [TOPSOIL - approx. 7" thick]	0	S-1	GRAB	Started excavating at 9:10 AM on 4/25/2023.
	+351.4	Light brown Silty f-c SAND, some f-c gravel, trace clay, trace roots (moist) [FILL]	1			Fine roots extend to 7'.
				S-2	GRAB	Large roots up to 0.25" in diameter extend to 2.5'.
	+349.9	Reddish brown Silty f-c SAND, some f-c gravel, trace clay, trace roots (moist)	2			
			3	S-3	GRAB	
			4			
			5			Sidewall collapses starting at 5'.
	+346.8	Brown f-c SAND, some f-c gravel, trace silt, trace cobbles, trace boulders, trace roots (moist)	6	S-4	GRAB	Cobbles encountered from 5.5' to 15'.
			7			Boulder up to approximately 1.75' in diameter encountered at 5.5'.
	+344.0	Brown f-c SAND, trace f-c gravel, trace cobbles (moist)	8			
			9	S-5	GRAB	
			10			
			11			
		Brown f-c SAND, trace f-c gravel, trace cobbles (moist)	12			
			13	S-6	GRAB	
			14			
	+337.0		15			
		End of Test Pit at 15'.	16			Finished excavating at 9:46 AM on 4/25/2023. Backfilled with excavated material upon completion.
			17			

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LOG OF TEST PIT TP-3

PROJECT NAME	PROJECT NUMBER	DATE
Beacon Unitarian Universalist Church Redevelopment	101007201	4/25/2023
LOCATION	**ELEVATION**	
Summit, New Jersey	Approx. el 352 (NAVD88)	
EXCAVATION CONTRACTOR	**DEPTH**	**WATER LEVEL - First** / **WATER LEVEL - Completion**
Clear Ground Development, Inc.	15 ft	N.E. ▽ / - ▼
EQUIPMENT	**FOREMAN**	**LANGAN PERSONNEL**
Bobcat E88 Excavator	John Briessie	Emmanuel Carreno Guzman

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+352.0	Dark brown SILT, some f-c sand, trace clay, trace fine gravel, trace roots (moist) [TOPSOIL - approx. 6" thick]	0	S-1	GRAB	Started excavating at 10:11 AM on 4/25/2023.
	+351.5	Light brown f-c SAND, some silt, some f-c gravel, some roots, trace clay, trace cobbles (moist) [FILL]	1			Fine roots extend to 10'. Large roots up to 2" in diameter extend to 3'. Tree stump encountered at the eastern sidewall at 0.5'.
			2	S-2	GRAB	Cobbles encountered from 2' to 15'.
	+349.4	Reddish brown Silty f-c SAND, some f-c gravel, trace clay, trace cobbles, trace roots, trace terracotta fragments (moist) [FILL]	3			
			4			
			5			
			6	S-3	GRAB	Old abandoned 6" diameter terracotta pipe clogged with soil extending northeast to southwest encountered at 6'.
			7			
	+344.5	Brown f-c SAND, some f-c gravel, some silt, trace cobbles, trace roots (moist)	8	S-4	GRAB	
			9			
			10			
	+341.5	Brown f-c SAND, trace f-c gravel, trace silt, trace cobbles (moist)	11	S-5	GRAB	Sidewall collapses starting at 10.5'.
			12			
			13			
			14			
	+337.0	End of Test Pit at 15'.	15			Finished excavating at 10:53 AM on 4/25/2023. Backfilled with excavated material upon completion.
			16			
			17			

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LOG OF TEST PIT TP-4

PROJECT NAME	PROJECT NUMBER	DATE
Beacon Unitarian Universalist Church Redevelopment	101007201	4/25/2023
LOCATION	**ELEVATION**	
Summit, New Jersey	Approx. el 353 (NAVD88)	
EXCAVATION CONTRACTOR	**DEPTH**	**WATER LEVEL - First / Completion**
Clear Ground Development, Inc.	15 ft	N.E. ▽ / - ▼
EQUIPMENT	**FOREMAN**	**LANGAN PERSONNEL**
Bobcat E88 Excavator	John Briessie	Emmanuel Carreno Guzman

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+353.0	Dark brown SILT, some f-c sand, trace roots (moist) [TOPSOIL - approx. 11" thick]	0	S-1	GRAB	Started excavating at 11:06 AM on 4/25/2023. Fine roots extend to 8'. Large roots up to 2" in diameter extend to 5.5'. Cobbles encountered from 11" to 15'.
	+352.1	Light brown Silty f-c SAND, trace clay, trace f-c gravel, trace cobbles, trace roots, trace ceramic (moist) [FILL]	1	S-2	GRAB	
			2			Ceramic fragments encountered at 2'.
	+350.4	Reddish brown Silty f-c SAND, trace clay, trace f-c gravel, trace cobbles, trace roots, trace metal, trace ceramic, trace glass, trace brick (moist) [FILL]	3			
			4	S-3	GRAB	Fragments of old rusty metal cans encountered from 4' to 5'. Ceramic and glass fragments encountered from 4' to 5.5'. Bricks encountered from 4' to 5.5'.
			5			
	+347.5	Reddish brown Silty f-c SAND, some f-c gravel, some cobbles, trace boulders, trace clay, trace roots (moist)	6	S-4	GRAB	
			7			Sidewall collapses starting from 7' to 15'.
			8			
	+344.5	Reddish brown f-c SAND, some f-c gravel, trace silt, trace cobbles (moist)	9	S-5	GRAB	
			10			
	+342.0	Reddish brown f-c SAND, trace silt, trace f-c gravel (moist)	11	S-6	GRAB	
			12			
			13			
			14			
	+338.0	End of Test Pit at 15'.	15			Finished excavating at 11:52 AM on 4/25/2023. Backfilled with excavated material upon completion.
			16			
			17			

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LOG OF TEST PIT TP-5

PROJECT NAME	PROJECT NUMBER	DATE
Beacon Unitarian Universalist Church Redevelopment	101007201	4/25/2023
LOCATION	**ELEVATION**	
Summit, New Jersey	Approx. el 357 (NAVD88)	
EXCAVATION CONTRACTOR	**DEPTH**	**WATER LEVEL - First** / **WATER LEVEL - Completion**
Clear Ground Development, Inc.	15 ft	N.E. ▽ / - ▼
EQUIPMENT	**FOREMAN**	**LANGAN PERSONNEL**
Bobcat E88 Excavator	John Briessie	Emmanuel Carreno Guzman

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+357.0	Dark brown Sandy SILT, trace f-c gravel, trace clay, trace roots (moist) [TOPSOIL - approx. 8" thick]	0	S-1	GRAB	Started excavating at 12:00 PM on 4/25/2023. Fine roots extend to 6'.
	+356.3	Reddish brown Silty f-c SAND, some f-c gravel, trace clay, trace cobbles, trace roots (moist) [FILL]	1			Large roots up to 4" in diameter extend to 1'.
			2	S-2	GRAB	Cobbles encountered from 8" to 15'.
			3			
	+353.3	Dark reddish brown Silty f-c SAND, some f-c gravel, trace clay, trace cobbles, trace roots (moist)	4	S-3	GRAB	
			5			
			6			
	+350.0	Brown f-c GRAVEL, some f-c sand, trace silt, trace cobbles (moist)	7	S-4	GRAB	Sidewall collapses starting at 7'.
			8			
			9			
			10			
	+346.0	Brown Gravelly f-c SAND, trace silt, trace cobbles, trace boulders (moist)	11	S-5	GRAB	Boulder up to approximately 1.5' in diameter encountered at 11'.
			12			
			13			
			14			
	+342.0		15			
		End of Test Pit at 15'.	16			Finished excavating at 12:30 PM on 4/25/2023. Backfilled with excavated material upon completion.
			17			

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LOG OF TEST PIT TP-6

PROJECT NAME	PROJECT NUMBER	DATE
Beacon Unitarian Universalist Church Redevelopment	101007201	4/25/2023
LOCATION	**ELEVATION**	
Summit, New Jersey	Approx. el 355.5 (NAVD88)	
EXCAVATION CONTRACTOR	**DEPTH**	**WATER LEVEL - First** / **WATER LEVEL - Completion**
Clear Ground Development, Inc.	15 ft	N.E. ▽ / - ▼
EQUIPMENT	**FOREMAN**	**LANGAN PERSONNEL**
Bobcat E88 Excavator	John Briessie	Emmanuel Carreno Guzman

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+355.5	Dark brown Sandy SILT, trace clay, trace f-c gravel , trace roots (moist) [TOPSOIL - 7" thick]	0	S-1	GRAB	Started excavating at 12:46 PM on 4/25/2023.
	+354.9	Light orangish brown Silty f-c SAND, trace f-c gravel, trace cobbles, trace roots (moist)	1			Fine roots extend to 5'. Large roots up to 4" in diameter extend to 1'. Cobbles encountered from 7" to 15'.
			2	S-2	GRAB	
	+352.5	Reddish brown Sandy f-c GRAVEL, some silt, trace cobbles, trace roots (moist)	3	S-3	GRAB	
			4			
			5			
	+349.5	Reddish brown Gravelly f-c SAND, some silt, trace clay, trace cobbles (moist)	6	S-4	GRAB	
			7			
			8			
			9			
	+346.0	Brown f-c SAND, some f-c gravel, trace silt, trace cobbles, trace boulders (moist)	10	S-5	GRAB	Sidewall collapses starting at 9.5'.
			11			
			12			Boulder approximately 1.5' in diameter encountered at 12'.
		Brown f-c SAND, some f-c gravel, trace silt, trace cobbles, trace boulders (moist)	13	S-6	GRAB	
			14			
	+340.5	End of Test Pit at 15'.	15			Finished excavating at 1:25 PM on 4/25/2023. Backfilled with excavated material upon completion.
			16			
			17			

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LOG OF TEST PIT TP-7

PROJECT NAME	PROJECT NUMBER	DATE
Beacon Unitarian Universalist Church Redevelopment	101007201	4/25/2023
LOCATION	**ELEVATION**	
Summit, New Jersey	Approx. el 353 (NAVD88)	
EXCAVATION CONTRACTOR	**DEPTH**	**WATER LEVEL - First** / **WATER LEVEL - Completion**
Clear Ground Development, Inc.	12 ft	7 ft ▽ / - ▼
EQUIPMENT	**FOREMAN**	**LANGAN PERSONNEL**
Bobcat E88 Excavator	John Briessie	Emmanuel Carreno Guzman

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+353.0	Dark brown Sandy SILT, trace clay, trace f-c gravel, trace cobbles, trace roots (moist) [TOPSOIL - approx. 11" thick]	0	S-1	GRAB	Started excavating at 1:28 PM on 4/25/2023. Fine roots extend to 3'. Large roots up to 4" in diameter extend to 1'.
	+352.1	Light yellowish brown fine SAND, trace silt, trace roots (moist)	1	S-2	GRAB	
	+350.7	Light brown f-m SAND, some silt, trace roots (moist)	2	S-3	GRAB	
	+349.4	Light orangish brown fine SAND, trace silt, trace roots (moist to wet)	3			Sidewall collapses starting at 3'.
			4	S-4	GRAB	
			5			Slow trapped groundwater seepage observed from all sides at 4.7'. Stopped prior to backfill.
			6			
		Light orangish brown fine SAND, trace silt, trace roots (wet) ▽	7	S-5	GRAB	Groundwater seepage observed from all sides at 7'.
	+345.0	Light brown f-c SAND, some f-c gravel, trace cobbles, trace boulders (wet)	8	S-6	GRAB	Cobbles encountered from 8' to 12'. Boulders up to 1.5' in diameter encountered from 8' to 12'. Difficult digging from 8' to 12'. Multiple sidewall collapses starting at 12'.
			9			
			10			
			11			
	+341.0	End of Test Pit at 12'.	12			Finished excavating at 2:01 PM on 4/25/2023. Backfilled with excavated material upon completion.
			13			
			14			
			15			

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LOG OF TEST PIT TP-8

PROJECT NAME	PROJECT NUMBER	DATE
Beacon Unitarian Universalist Church Redevelopment	101007201	4/25/2023
LOCATION	**ELEVATION**	
Summit, New Jersey	Approx. el 351 (NAVD88)	
EXCAVATION CONTRACTOR	**DEPTH**	**WATER LEVEL - First** / **WATER LEVEL - Completion**
Clear Ground Development, Inc.	14 ft	N.E. ▽ / - ▼
EQUIPMENT	**FOREMAN**	**LANGAN PERSONNEL**
Bobcat E88 Excavator	John Briessie	Emmanuel Carreno Guzman

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+351.0	Dark brown Sandy SILT, trace f-c gravel, trace clay, trace roots (moist) [TOPSOIL - approx. 6" thick]	0	S-1	GRAB	Started excavating at 2:05 PM on 4/25/2023.
	+350.5	Brown f-c SAND, some debris (concrete, metal, brick, plastic), trace silt, trace clay, trace roots (moist) [FILL]	1	S-2	GRAB	Fine roots extend to 4.5'. Large roots extend to 2'.
	+349.7	Dark reddish brown Silty f-c SAND, trace clay, trace f-c gravel, trace plastic, trace brick (moist) [FILL]	2	S-3	GRAB	Demo debris (concrete rubble up to 2" in size, metal pieces) encountered from 6" to 16". Plastic and bricks encountered from 6" to 2.4'.
	+348.6	Light brown Silty f-m SAND, trace roots (moist to wet)	3			
			4	S-4	GRAB	Slow trapped groundwater seepage observed from all sides at 3.3'. Southeast seepage stopped prior to backfill.
	+346.8	Light orangish brown Silty f-m SAND, some silt, trace roots (moist to wet)	5	S-5	GRAB	Very slow seepage observed from northeast and west sidewalls prior to backfill. Multiple sidewall collapses starting from 4' to 14'.
			6			
	+344.0	Reddish brown Silty f-c SAND, some f-c gravel, trace cobbles (moist)	7	S-6	GRAB	
			8			
			9			
			10			
			11			
	+339.0	Dark reddish brown Gravelly f-c SAND, trace cobbles, trace silt (moist)	12	S-7	GRAB	
			13			
	+337.0	End of Test Pit at 14'.	14			Finished excavating at 2:46 PM on 4/25/2023. Backfilled with excavated material upon completion.
			15			
			16			

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APPENDIX B

Single Ring Infiltration Test Results

101007201

Beacon Unitarian Universalist Church Redevelopment

Summit, New Jersey

FIELD SINGLE RING INFILTRATION TEST

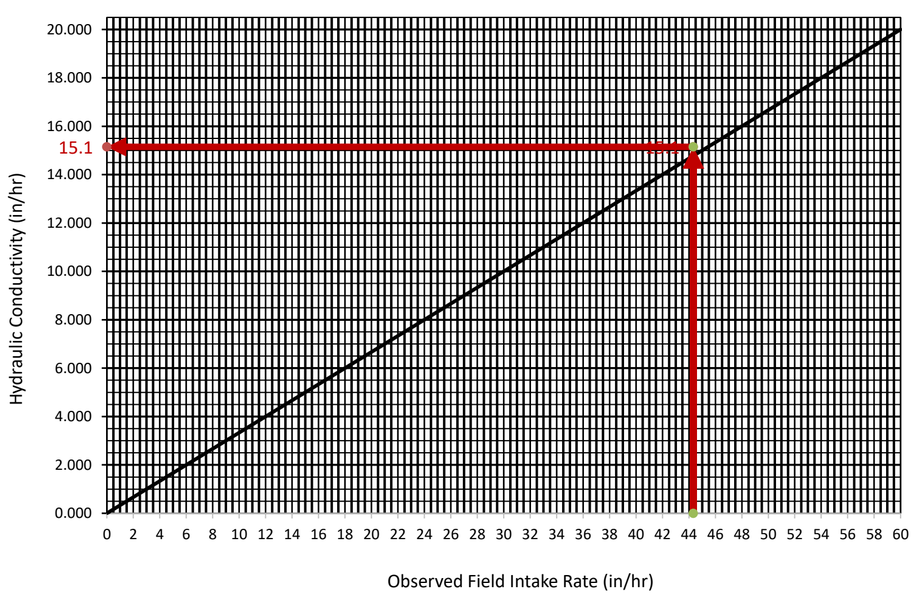
TP-1 at 6 ft

	Water Refill	Start Time	Water Level Reading (inches)	Elaspse Time to Drop 1 inch (hr:min:sec)	Elapse Time To Drop 1 Inch (sec)
PRE-SOAK	Fill	8:17 AM	3	-	-
		8:22 AM	2	0:00:52.7	52.7
		8:30 AM	1	0:00:40.7	40.7
		8:38 AM	0	0:00:42.7	42.7
TEST #1	Refill	8:38 AM	3	-	-
		8:46 AM	2	0:01:05.7	65.7
TEST #2	Refill	8:47 AM	3	-	-
		8:57 AM	2	0:01:28.8	88.8
TEST #3	Refill	8:58 AM	3	-	-
		9:08 AM	2	0:01:14.3	74.3
TEST #4	Refill	9:08 AM	3	-	-
		9:18 AM	2	0:01:19.9	79.9
TEST #5	Refill	9:18 AM	3	-	-
		9:28 AM	2	0:01:19.5	79.5
TEST #6	Refill	9:18 AM	3	-	-
		9:28 AM	2	0:01:21.0	81.0
TEST #7	Refill	9:18 AM	3	-	-
		9:28 AM	2	0:01:21.2	81.2

Final Observed Field Intake Rate (sec/inch)	81.2
Final Observed Field Intake Rate (inch/hr)	44.3
Hydraulic Conductivity (inch/hr)	**15.1** (see graph)

COORESPONDING PROFILE PIT	**TP-1**	
DATE OF INFILTRATION TEST:	**4/26/2023**	
WEATHER DURING INFILTRATION TEST:	**Clear, 60 degrees**	
EXISTING SURFACE ELEVATION (el):	**351.0**	
TEST DEPTH:	**6**	**ft**
TEST ELEVATION (el):	**345.0**	
APPROXIMATE TOP OF RING (el):	**345.3**	
APPROXIMATE TOP OF BOTTOM (el):	**344.8**	

input
output
result



When the observed field intake rate is greater than 60 in/hr, the hydraulic conductivity shall be reported as "greater than 20 in/hr." When the observed field intake rate is less than 1 in/hr, the hydraulic conductivity shall be reported as "less than 1 in/hr."

NOTES:

1 Test performed per Chapter 12, Subsection A5: Single Ring Infiltration Test of the November 2020 NJSBMP Manual

101007201

Beacon Unitarian Universalist Church Redevelopment

Summit, New Jersey

FIELD SINGLE RING INFILTRATION TEST

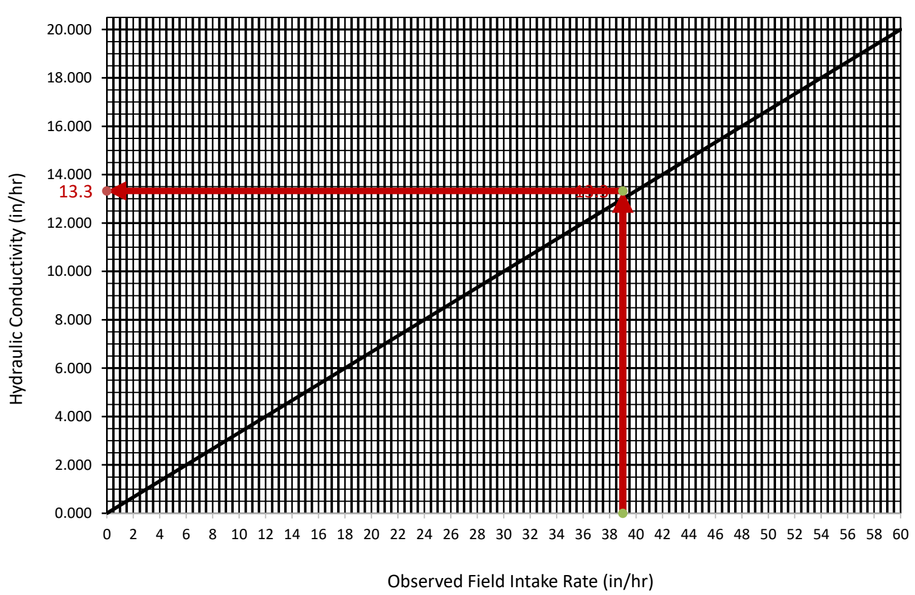
TP-2 at 7 ft

	Water Refill	Start Time	Water Level Reading (inches)	Elaspse Time to Drop 1 inch (hr:min:sec)	Elapse Time To Drop 1 Inch (sec)
PRE-SOAK	Fill	8:00 AM	3	-	-
		8:01 AM	2	0:01:26.8	86.8
		8:03 AM	1	0:01:37.7	97.7
		8:04 AM	0	0:01:36.6	96.6
TEST #1	Refill	8:05 AM	3	-	-
		8:06 AM	2	0:01:37.7	97.7
TEST #2	Refill	8:07 AM	3	-	-
		8:08 AM	2	0:01:36.9	96.9
TEST #3	Refill	8:09 AM	3	-	-
		8:10 AM	2	0:01:34.4	94.4
TEST #4	Refill	8:11 AM	3	-	-
		8:12 AM	2	0:01:32.6	92.6
TEST #5	Refill	8:13 AM	3	-	-
		8:14 AM	2	0:01:32.3	92.3
TEST #6					
TEST #7					

Final Observed Field Intake Rate (sec/inch)	92.3
Final Observed Field Intake Rate (inch/hr)	39.0
Hydraulic Conductivity (inch/hr)	**13.3** (see graph)

COORESPONDING PROFILE PIT	**TP-2**	
DATE OF INFILTRATION TEST:	**4/26/2023**	
WEATHER DURING INFILTRATION TEST:	**Clear, 60 degrees**	
EXISTING SURFACE ELEVATION (el):	**352.0**	
TEST DEPTH:	**7**	**ft**
TEST ELEVATION (el):	**345.0**	
APPROXIMATE TOP OF RING (el):	**345.3**	
APPROXIMATE TOP OF BOTTOM (el):	**344.8**	

input
output
result



When the observed field intake rate is greater than 60 in/hr, the hydraulic conductivity shall be reported as "greater than 20 in/hr." When the observed field intake rate is less than 1 in/hr, the hydraulic conductivity shall be reported as "less than 1 in/hr."

NOTES:

1 Test performed per Chapter 12, Subsection A5: Single Ring Infiltration Test of the November 2020 NJSBMP Manual

101007201

Beacon Unitarian Universalist Church Redevelopment

Summit, New Jersey

FIELD SINGLE RING INFILTRATION TEST

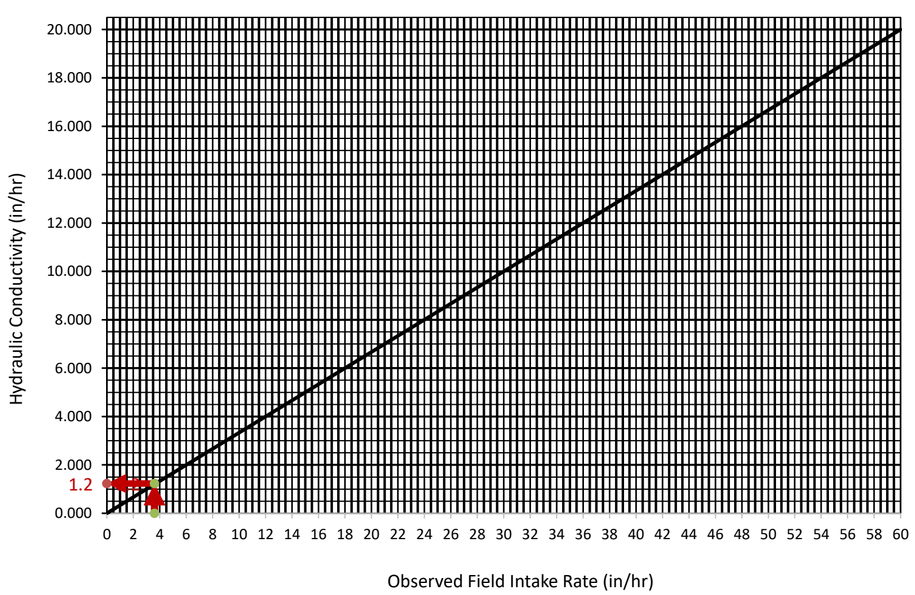
TP-3 at 1 ft

	Water Refill	Start Time	Water Level Reading (inches)	Elaspse Time to Drop 1 inch (hr:min:sec)	Elapse Time To Drop 1 Inch (sec)
PRE-SOAK	Fill	8:30 AM	3	-	-
		8:30 AM	2	0:10:13.2	613.2
		8:30 AM	1	0:12:10.1	730.1
		9:07 AM	0	0:14:46.7	886.7
TEST #1	Refill	9:07 AM	3	-	-
		9:20 AM	2	0:12:43.5	763.5
TEST #2	Refill	9:20 AM	3	-	-
		9:35 AM	2	0:15:11.7	911.7
TEST #3	Refill	9:35 AM	3	-	-
		9:51 AM	2	0:16:39.1	999.1
TEST #4	Refill	9:51 AM	3	-	-
		10:08 AM	2	0:16:39.6	999.6
TEST #5					
TEST #6					
TEST #7					

COORESPONDING PROFILE PIT	TP-3
DATE OF INFILTRATION TEST:	4/26/2023
WEATHER DURING INFILTRATION TEST:	Clear, 60 degrees
EXISTING SURFACE ELEVATION (el):	352.0
TEST DEPTH:	1 ft
TEST ELEVATION (el):	351.0
APPROXIMATE TOP OF RING (el):	351.3
APPROXIMATE TOP OF BOTTOM (el):	350.8

input
output
result

Final Observed Field Intake Rate (sec/inch)	999.6
Final Observed Field Intake Rate (inch/hr)	3.6
Hydraulic Conductivity (inch/hr)	**1.2** (see graph)



When the observed field intake rate is greater than 60 in/hr, the hydraulic conductivity shall be reported as "greater than 20 in/hr." When the observed field intake rate is less than 1 in/hr, the hydraulic conductivity shall be reported as "less than 1 in/hr."

NOTES:

1 Test performed per Chapter 12, Subsection A5: Single Ring Infiltration Test of the November 2020 NJSBMP Manual

101007201

Beacon Unitarian Universalist Church Redevelopment

Summit, New Jersey

FIELD SINGLE RING INFILTRATION TEST

TP-4 at 1 ft

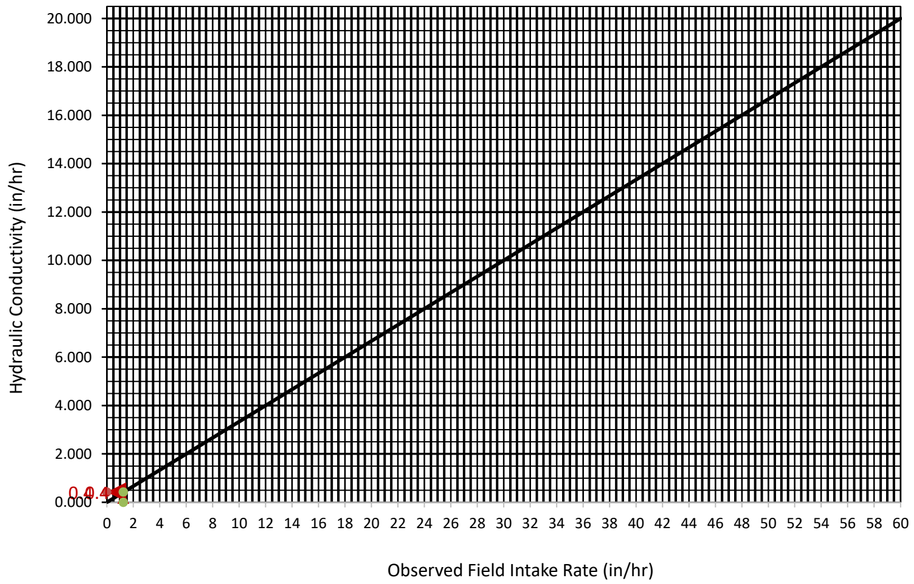
	Water Refill	Start Time	Water Level Reading (inches)	Elaspse Time to Drop 1 inch (hr:min:sec)	Elapse Time To Drop 1 Inch (sec)
PRE-SOAK	Fill	9:10 AM	3	-	-
		9:50 AM	2	0:40:40.3	2440.3
		10:32 AM	1	0:42:30.9	2550.9
		11:14 AM	0	0:44:50.1	2690.1
TEST #1	Refill	11:14 AM	3	-	-
		12:02 PM	2	0:48:24.2	2904.2
TEST #2	Refill	12:02 PM	3	-	-
		12:50 PM	2	0:48:23.7	2903.7
TEST #3	Refill	12:50 PM	3	-	-
		1:38 PM	2	0:48:23.1	2903.1
TEST #4					
TEST #5					
TEST #6					
TEST #7					

COORESPONDING PROFILE PIT	TP-4
DATE OF INFILTRATION TEST:	4/26/2023
WEATHER DURING INFILTRATION TEST:	Clear, 60 degrees
EXISTING SURFACE ELEVATION (el):	353.0
TEST DEPTH:	1 ft
TEST ELEVATION (el):	352.0
APPROXIMATE TOP OF RING (el):	352.3
APPROXIMATE TOP OF BOTTOM (el):	351.8

input
output
result

Final Observed Field Intake Rate (sec/inch)	2903.1
Final Observed Field Intake Rate (inch/hr)	1.2
Hydraulic Conductivity (inch/hr)	**0.4** (see graph)

Single Ring Test Conversion of
Observed Field Intake Rate to Hydraulic Conductivity



When the observed field intake rate is greater than 60 in/hr, the hydraulic conductivity shall be reported as "greater than 20 in/hr." When the observed field intake rate is less than 1 in/hr, the hydraulic conductivity shall be reported as "less than 1 in/hr."

NOTES:

1 Test performed per Chapter 12, Subsection A5: Single Ring Infiltration Test of the November 2020 NJSBMP Manual

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Beacon Unitarian Universalist Church Redevelopment

Summit, New Jersey

FIELD SINGLE RING INFILTRATION TEST

TP-5 at 7 ft

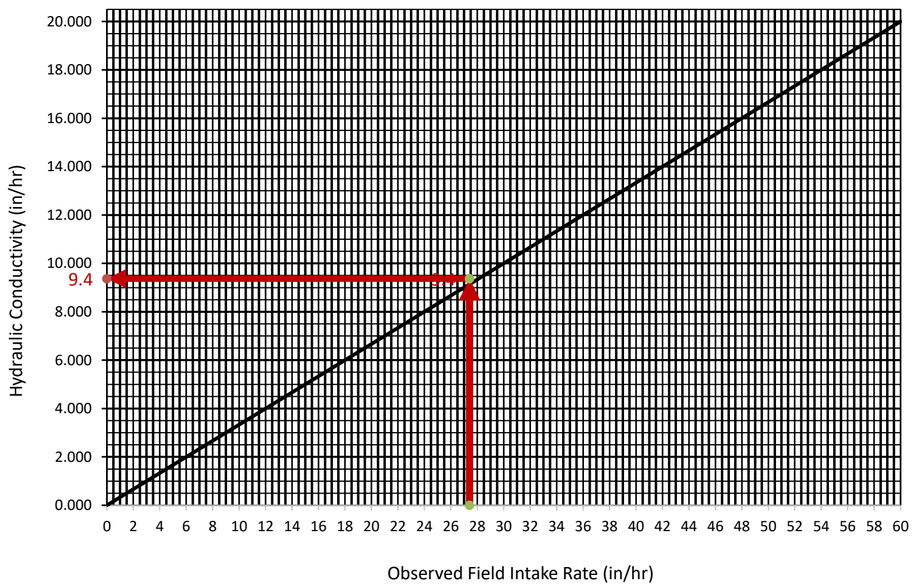
	Water Refill	Start Time	Water Level Reading (inches)	Elaspse Time to Drop 1 inch (hr:min:sec)	Elapse Time To Drop 1 Inch (sec)
PRE-SOAK	Fill	10:30 AM	3	-	-
		10:31 AM	2	0:01:15.0	75.0
		10:33 AM	1	0:01:30.6	90.6
		10:35 AM	0	0:02:04.9	124.9
TEST #1	Refill	10:35 AM	3	-	-
		10:37 AM	2	0:02:01.9	121.9
TEST #2	Refill	10:37 AM	3	-	-
		10:39 AM	2	0:02:10.6	130.6
TEST #3	Refill	10:40 AM	3	-	-
		10:42 AM	2	0:02:11.4	131.4
TEST #4	Refill	10:42 AM	3	-	-
		10:44 AM	2	0:02:11.3	131.3
TEST #5					
TEST #6					
TEST #7					

Final Observed Field Intake Rate (sec/inch)	131.3
Final Observed Field Intake Rate (inch/hr)	27.4
Hydraulic Conductivity (inch/hr)	**9.4** (see graph)

COORESPONDING PROFILE PIT	**TP-5**	
DATE OF INFILTRATION TEST:	**4/26/2023**	
WEATHER DURING INFILTRATION TEST:	**Clear, 60 degrees**	
EXISTING SURFACE ELEVATION (el):	**357.0**	
TEST DEPTH:	**7**	**ft**
TEST ELEVATION (el):	**350.0**	
APPROXIMATE TOP OF RING (el):	**350.3**	
APPROXIMATE TOP OF BOTTOM (el):	**349.8**	

input
output
result

Single Ring Test Conversion of
Observed Field Intake Rate to Hydraulic Conductivity



When the observed field intake rate is greater than 60 in/hr, the hydraulic conductivity shall be reported as "greater than 20 in/hr." When the observed field intake rate is less than 1 in/hr, the hydraulic conductivity shall be reported as "less than 1 in/hr."

NOTES:

1 Test performed per Chapter 12, Subsection A5: Single Ring Infiltration Test of the November 2020 NJSBMP Manual

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Beacon Unitarian Universalist Church Redevelopment

Summit, New Jersey

FIELD SINGLE RING INFILTRATION TEST

TP-6 at 5.5 ft

	Water Refill	Start Time	Water Level Reading (inches)	Elaspse Time to Drop 1 inch (hr:min:sec)	Elapse Time To Drop 1 Inch (sec)
PRE-SOAK	Fill	11:30 AM	3	-	-
		12:30 PM	2.875	1:00:00.0	3600.0
TEST #1	Refill	12:30 PM	3	-	-
		1:30 PM	2.875	1:00:00.0	3600.0
TEST #2	Refill	1:30 PM	3	-	-
		2:30 PM	2.875	1:00:00.0	3600.0
TEST #3					
TEST #4					
TEST #5					
TEST #6					
TEST #7					

Final Observed Field Intake Rate (sec/inch)	N/A
Final Observed Field Intake Rate (inch/hr)	N/A
Hydraulic Conductivity (inch/hr)	**<1.0** (see graph)

COORESPONDING PROFILE PIT	**TP-6**	
DATE OF INFILTRATION TEST:	**4/26/2023**	
WEATHER DURING INFILTRATION TEST:	**Clear, 60 degrees**	
EXISTING SURFACE ELEVATION (el):	**355.5**	
TEST DEPTH:	**5.5**	**ft**
TEST ELEVATION (el):	**350.0**	
APPROXIMATE TOP OF RING (el):	**350.3**	
APPROXIMATE TOP OF BOTTOM (el):	**349.8**	

input
output
result

When the observed field intake rate is greater than 60 in/hr, the hydraulic conductivity shall be reported as "greater than 20 in/hr." When the observed field intake rate is less than 1 in/hr, the hydraulic conductivity shall be reported as "less than 1 in/hr."

NOTES:

1 Test performed per Chapter 12, Subsection A5: Single Ring Infiltration Test of the November 2020 NJSBMP Manual

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Beacon Unitarian Universalist Church Redevelopment

Summit, New Jersey

FIELD SINGLE RING INFILTRATION TEST

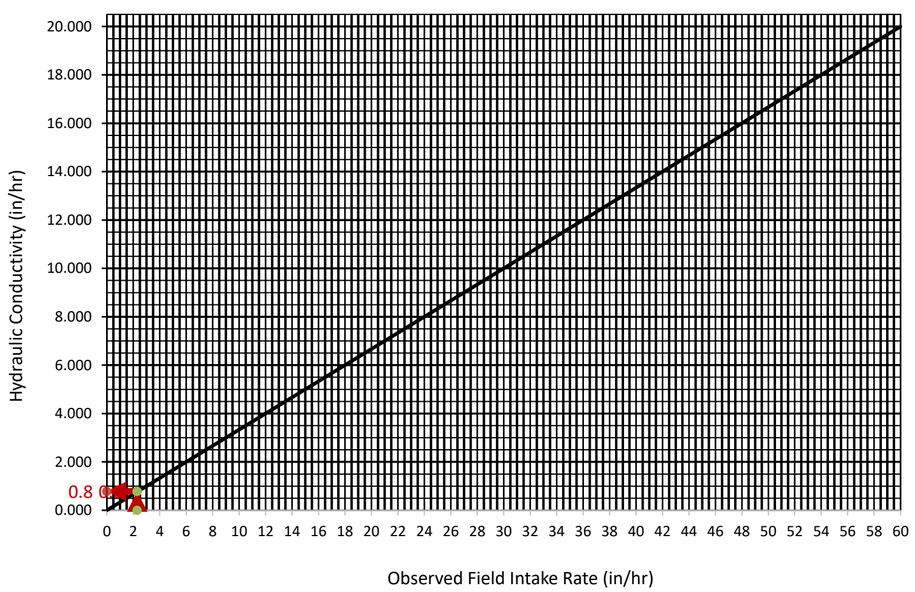
TP-7 at 3 ft

	Water Refill	Start Time	Water Level Reading (inches)	Elaspse Time to Drop 1 inch (hr:min:sec)	Elapse Time To Drop 1 Inch (sec)
PRE-SOAK	Fill	12:00 PM	3	-	-
		12:20 PM	2	0:29:46.1	1786.1
		1:00 PM	1	0:30:42.1	1842.1
		1:30 PM	0	0:30:54.9	1854.9
TEST #1	Refill	1:00 PM	3	-	-
		1:26 PM	2	0:26:05.4	1565.4
TEST #2	Refill	1:26 PM	3	-	-
		1:52 PM	2	0:26:09.2	1569.2
TEST #3	Refill	1:52 PM	3	-	-
		2:18 PM	2	0:26:09.1	1569.1
TEST #4					
TEST #5					
TEST #6					
TEST #7					

Final Observed Field Intake Rate (sec/inch)	1569.1
Final Observed Field Intake Rate (inch/hr)	2.3
Hydraulic Conductivity (inch/hr)	**0.8** (see graph)

COORESPONDING PROFILE PIT	**TP-7**	
DATE OF INFILTRATION TEST:	**4/26/2023**	
WEATHER DURING INFILTRATION TEST:	**Clear, 60 degrees**	
EXISTING SURFACE ELEVATION (el):	**353.0**	
TEST DEPTH:	**3**	**ft**
TEST ELEVATION (el):	**350.0**	
APPROXIMATE TOP OF RING (el):	**350.3**	
APPROXIMATE TOP OF BOTTOM (el):	**349.8**	

input
output
result



When the observed field intake rate is greater than 60 in/hr, the hydraulic conductivity shall be reported as "greater than 20 in/hr." When the observed field intake rate is less than 1 in/hr, the hydraulic conductivity shall be reported as "less than 1 in/hr."

NOTES:

1 Test performed per Chapter 12, Subsection A5: Single Ring Infiltration Test of the November 2020 NJSBMP Manual

101007201

Beacon Unitarian Universalist Church Redevelopment

Summit, New Jersey

FIELD SINGLE RING INFILTRATION TEST

TP-8 at 3 ft

	Water Refill	Start Time	Water Level Reading (inches)	Elaspse Time to Drop 1 inch (hr:min:sec)	Elapse Time To Drop 1 Inch (sec)
PRE-SOAK	Fill	11:45 PM	3	-	-
		12:45 PM	2.25	1:00:00.0	3600.0
TEST #1	Refill	12:45 PM	3	-	-
		1:45 PM	2.25	1:00:00.0	3600.0
TEST #2	Refill	1:45 PM	3	-	-
		2:45 PM	2.25	1:00:00.0	3600.0
TEST #3					
TEST #4					
TEST #5					
TEST #6					
TEST #7					

Final Observed Field Intake Rate (sec/inch)	N/A
Final Observed Field Intake Rate (inch/hr)	N/A
Hydraulic Conductivity (inch/hr)	**<1.0** (see graph)

COORESPONDING PROFILE PIT	**TP-8**	
DATE OF INFILTRATION TEST:	**4/26/2023**	
WEATHER DURING INFILTRATION TEST:	**Clear, 60 degrees**	
EXISTING SURFACE ELEVATION (el):	**351.0**	
TEST DEPTH:	**3**	**ft**
TEST ELEVATION (el):	**348.0**	
APPROXIMATE TOP OF RING (el):	**348.3**	
APPROXIMATE TOP OF BOTTOM (el):	**347.8**	

input
output
result

When the observed field intake rate is greater than 60 in/hr, the hydraulic conductivity shall be reported as "greater than 20 in/hr." When the observed field intake rate is less than 1 in/hr, the hydraulic conductivity shall be reported as "less than 1 in/hr."

NOTES:

1 Test performed per Chapter 12, Subsection A5: Single Ring Infiltration Test of the November 2020 NJSBMP Manual

101007201

Beacon Unitarian Universalist Church Redevelopment

Summit, New Jersey

FIELD SINGLE RING INFILTRATION TEST

TP-8 at 4.5 ft

	Water Refill	Start Time	Water Level Reading (inches)	Elaspse Time to Drop 1 inch (hr:min:sec)	Elapse Time To Drop 1 Inch (sec)
PRE-SOAK	Fill	11:40 AM	3	-	-
		12:40 PM	2.5	1:00:00.0	3600.0
TEST #1	Fill	13:41 PM	3	-	-
		12:41 PM	2.75	1:00:00.0	3600.0
TEST #2					
TEST #3					
TEST #4					
TEST #5					
TEST #6					
TEST #7					

Final Observed Field Intake Rate (sec/inch)	N/A
Final Observed Field Intake Rate (inch/hr)	N/A
Hydraulic Conductivity (inch/hr)	**<1.0** (see graph)

COORESPONDING PROFILE PIT	**TP-8**	
DATE OF INFILTRATION TEST:	**4/26/2023**	
WEATHER DURING INFILTRATION TEST:	**Clear, 60 degrees**	
EXISTING SURFACE ELEVATION (el):	**351.0**	
TEST DEPTH:	**4.5**	**ft**
TEST ELEVATION (el):	**346.5**	
APPROXIMATE TOP OF RING (el):	**346.8**	
APPROXIMATE TOP OF BOTTOM (el):	**346.3**	

input
output
result

When the observed field intake rate is greater than 60 in/hr, the hydraulic conductivity shall be reported as "greater than 20 in/hr." When the observed field intake rate is less than 1 in/hr, the hydraulic conductivity shall be reported as "less than 1 in/hr."

NOTES:

1 Test performed per Chapter 12, Subsection A5: Single Ring Infiltration Test of the November 2020 NJSBMP Manual

APPENDIX C

Laboratory Testing Results

RSA GEOLAB

1017 Greeley Ave N
Union, NJ 07083
908-964-0786
www.RSAGeolab.com

Letter of Transmittal

Date: 7-3-23 Job No.: 869 Lab Log: 23-2713

Attention: Kristen Shetler
Langan Engineering & Environmental Services
300 Kimball Drive, 4th Floor
Parsippany, NJ 07054

CC: Arthur Roesler, J. Villaverde

Re: Beacon Unitarian Universalist Church Redevelopment, Summit, NJ
Proj. No. 101007201

Sample(s) ID: **TP-1 SR-1 thru TP-8 SR-2** (9 samples)

Dear Ms. Shetler,

Please find attached results for the samples referenced above. The following lab testing was performed:

- ASTM D422 Washed Sieve Analysis

Regards,
RSA Geolab, LLC

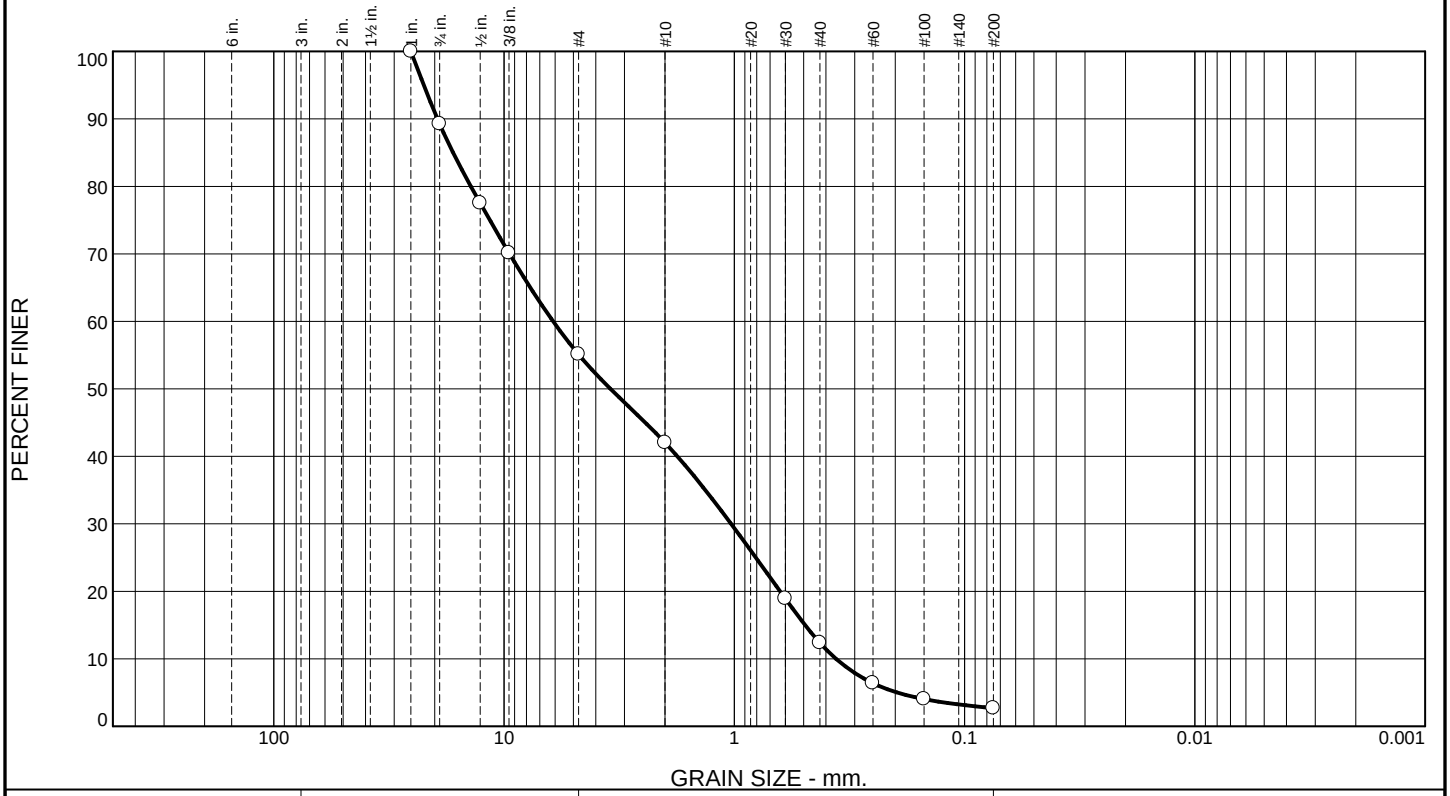
Remarks: If you have any questions, please call 908-964-0786.

Signed: _____

Dr. Raza S. Ahmed
President RSA Geolab, LLC

RSA's Geolab's Geotechnical Laboratory testing was performed and results reported in accordance with ASTM standards and accepted industry standards. No other representations or warranties either express or implied are given. RSA Geolab, LLC neither accepts responsibility for nor makes claim to the final use and purpose of the material tested.
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Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.7	34.2	13.1	29.6	9.7	2.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	89.3		
.5	77.5		
.375	70.1		
#4	55.1		
#10	42.0		
#30	18.9		
#40	12.4		
#60	6.4		
#100	4.0		
#200	2.7		

* (no specification provided)

Material Description

Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 19.4622 D_{85}= 16.6547 D_{60}= 6.1245
D_{50}= 3.4504 D_{30}= 1.0330 D_{15}= 0.4932
D_{10}= 0.3617 C_u= 16.93 C_c= 0.48

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-1 SR-1 6'

Date: 7-3-23

RSA Geolab

Union, New Jersey

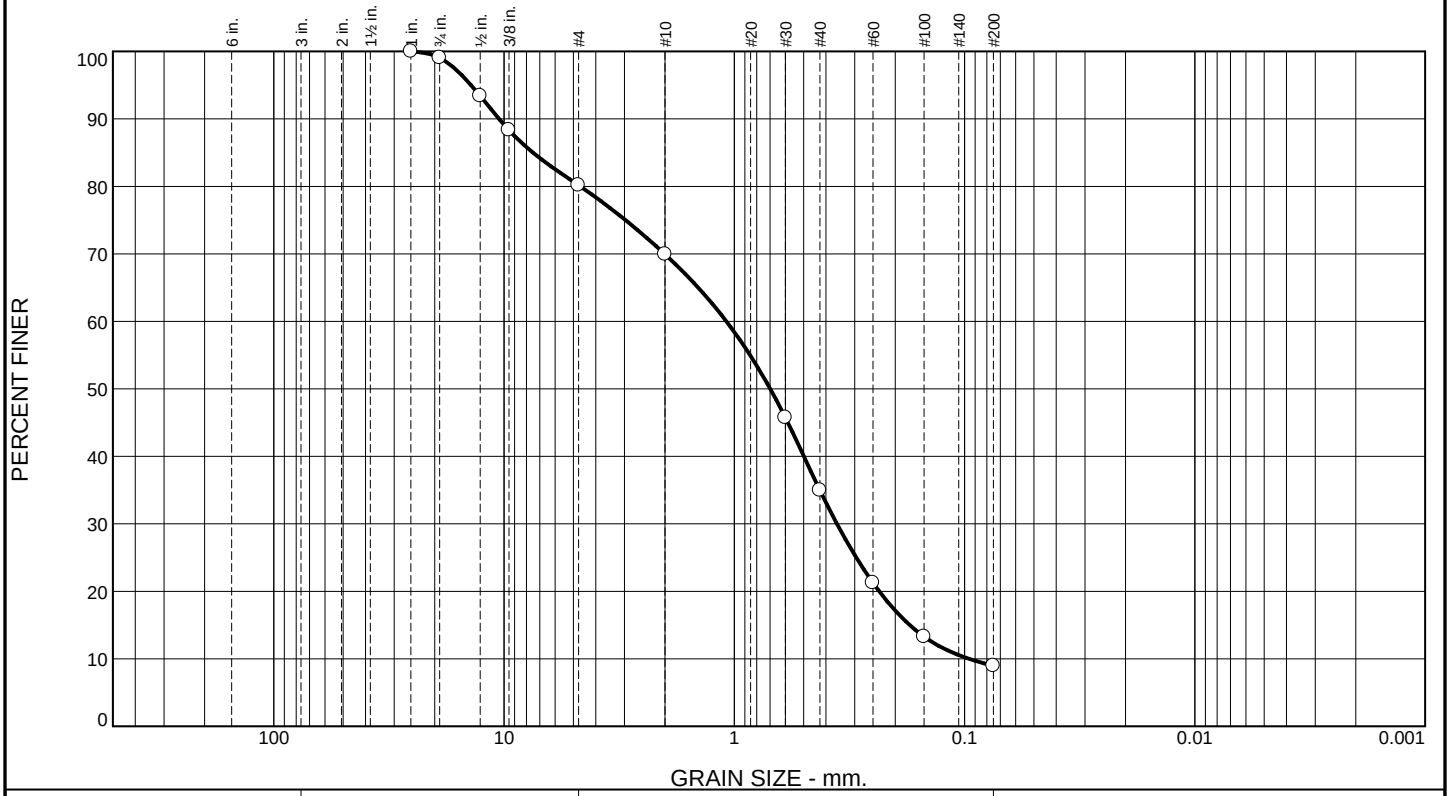
Client: Langan Engineering

Project: Beacon Unitarian Universalist Church Redevelopment, Summit, NJ
Project#101007201

Project No: 869 **Figure**

Tested By: AO **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.9	18.9	10.3	34.9	26.0	9.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	99.1		
.5	93.4		
.375	88.3		
#4	80.2		
#10	69.9		
#30	45.7		
#40	35.0		
#60	21.3		
#100	13.3		
#200	9.0		

* (no specification provided)

Material Description

Strong Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 10.5133 D_{85}= 7.4939 D_{60}= 1.0825
D_{50}= 0.6982 D_{30}= 0.3584 D_{15}= 0.1730
D_{10}= 0.0955 C_u= 11.33 C_c= 1.24

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-2 SR-1 7'

Date: 7-3-23

RSA Geolab

Union, New Jersey

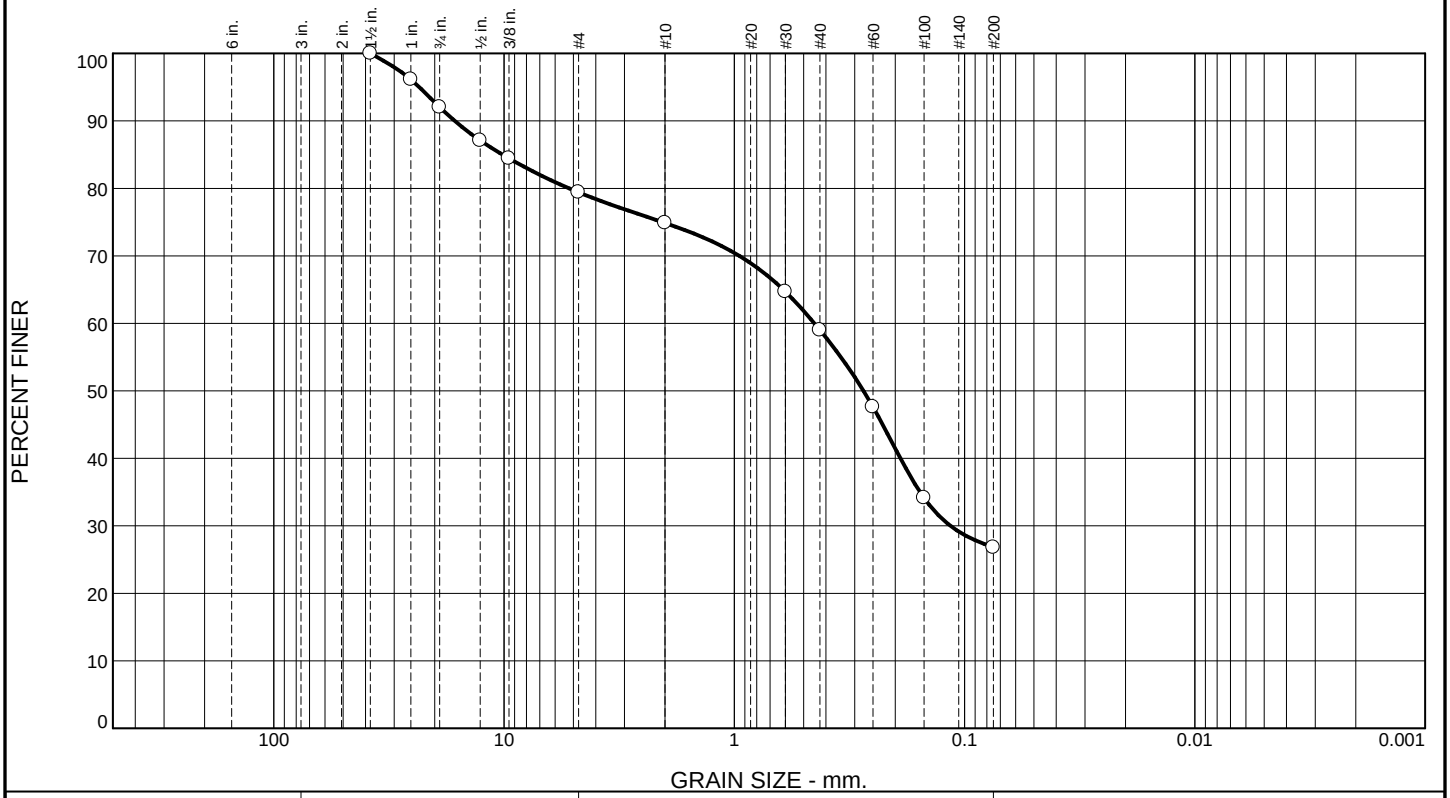
Client: Langan Engineering

Project: Beacon Unitarian Universalist Church Redevelopment, Summit, NJ
Project#101007201

Project No: 869 **Figure**

Tested By: AO **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.0	12.6	4.5	15.9	32.2	26.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	96.1		
.75	92.0		
.5	87.1		
.375	84.4		
#4	79.4		
#10	74.9		
#30	64.7		
#40	59.0		
#60	47.6		
#100	34.1		
#200	26.8		

* (no specification provided)

Material Description

Strong Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 16.3721 D_{85}= 10.1595 D_{60}= 0.4494
D_{50}= 0.2748 D_{30}= 0.1153 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-3 SR-1 1'

Date: 7-3-23

RSA Geolab

Union, New Jersey

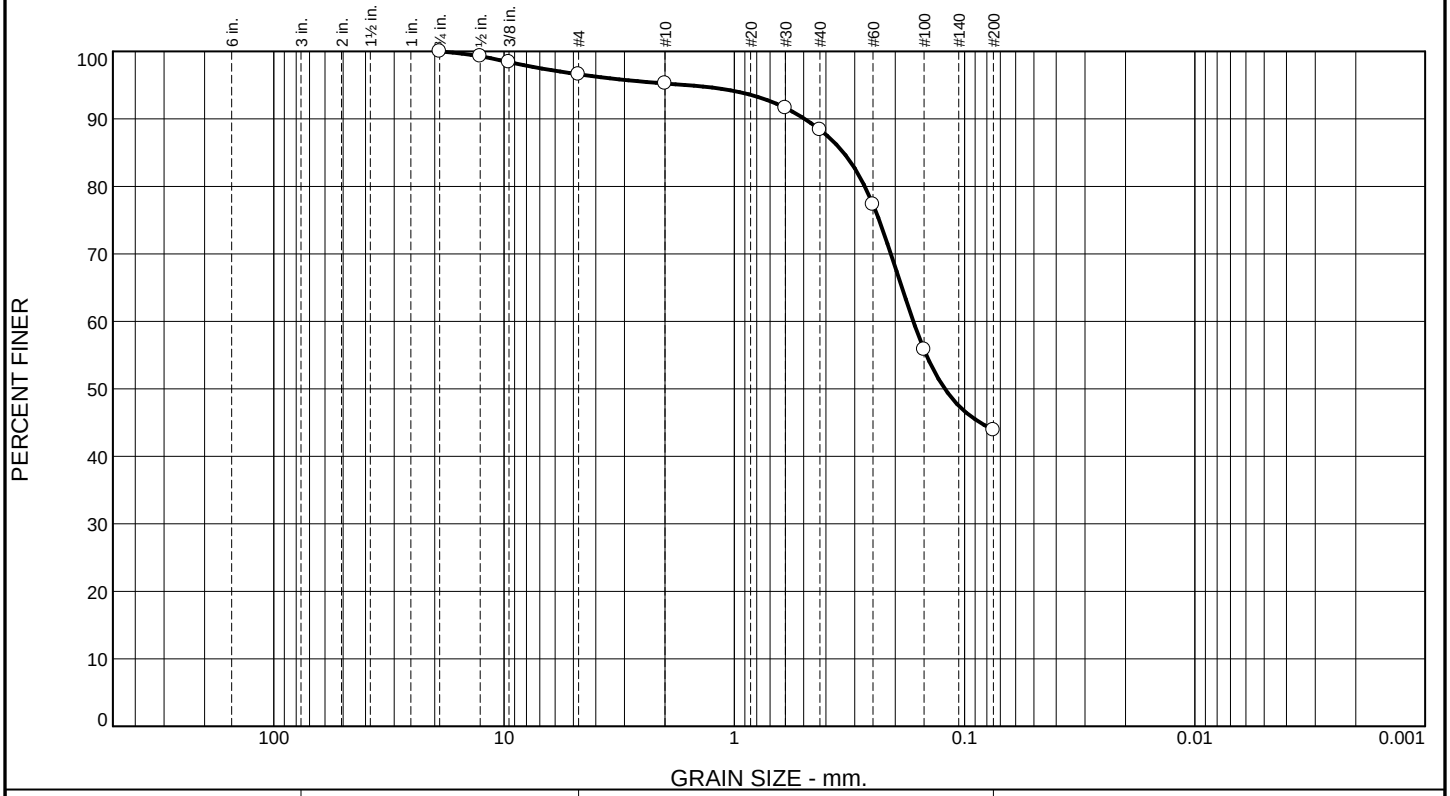
Client: Langan Engineering

Project: Beacon Unitarian Universalist Church Redevelopment, Summit, NJ
Project#101007201

Project No: 869 **Figure**

Tested By: AO **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.4	1.4	6.8	44.5	43.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	99.3		
.375	98.4		
#4	96.6		
#10	95.2		
#30	91.6		
#40	88.4		
#60	77.3		
#100	55.8		
#200	43.9		

* (no specification provided)

Material Description

Strong Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4949 D_{85}= 0.3355 D_{60}= 0.1670
D_{50}= 0.1219 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-4 SR-1 1'

Date: 7-3-23

RSA Geolab

Union, New Jersey

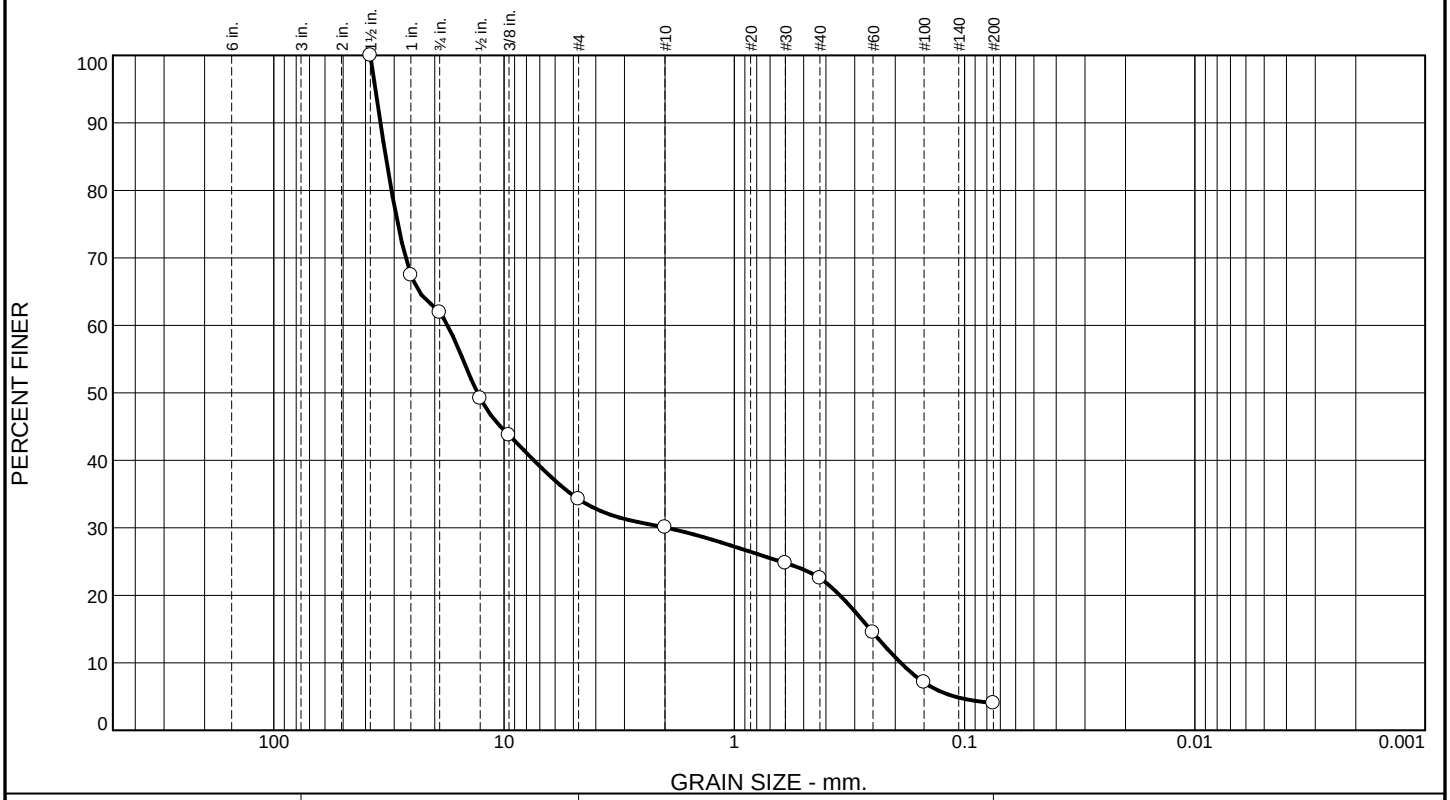
Client: Langan Engineering

Project: Beacon Unitarian Universalist Church Redevelopment, Summit, NJ
Project#101007201

Project No: 869 **Figure**

Tested By: AO **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	38.1	27.7	4.1	7.6	18.5	4.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	67.5		
.75	61.9		
.5	49.2		
.375	43.7		
#4	34.2		
#10	30.1		
#30	24.8		
#40	22.5		
#60	14.5		
#100	7.1		
#200	4.0		

* (no specification provided)

Material Description

Strong Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 34.4351 D_{85}= 32.6536 D_{60}= 17.5800
D_{50}= 13.0603 D_{30}= 1.9656 D_{15}= 0.2575
D_{10}= 0.1894 C_u= 92.83 C_c= 1.16

Classification

USCS= GW AASHTO=

Remarks

Sample Number: TP-5 SR-1 7'

Date: 7-3-23

RSA Geolab

Union, New Jersey

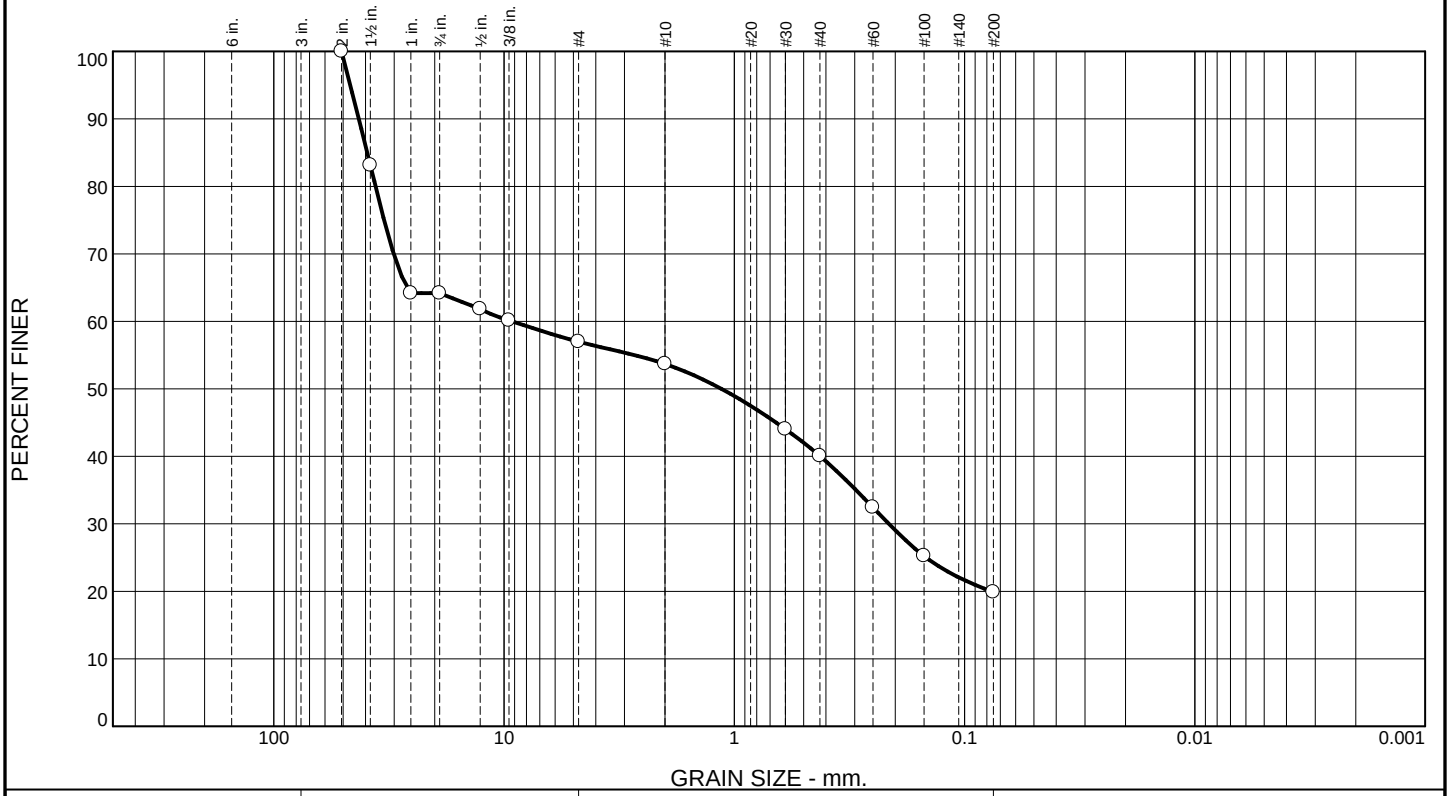
Client: Langan Engineering

Project: Beacon Unitarian Universalist Church Redevelopment, Summit, NJ
Project#101007201

Project No: 869 **Figure**

Tested By: AO **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	35.8	7.2	3.3	13.6	20.2	19.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2	100.0		
1.5	83.1		
1	64.2		
.75	64.2		
.5	61.8		
.375	60.1		
#4	57.0		
#10	53.7		
#30	44.0		
#40	40.1		
#60	32.4		
#100	25.2		
#200	19.9		

* (no specification provided)

Material Description

Strong Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 42.7834 D_{85}= 39.3118 D_{60}= 9.2394
D_{50}= 1.1374 D_{30}= 0.2132 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-6 SR-1 5.5'

Date: 7-3-23

RSA Geolab

Union, New Jersey

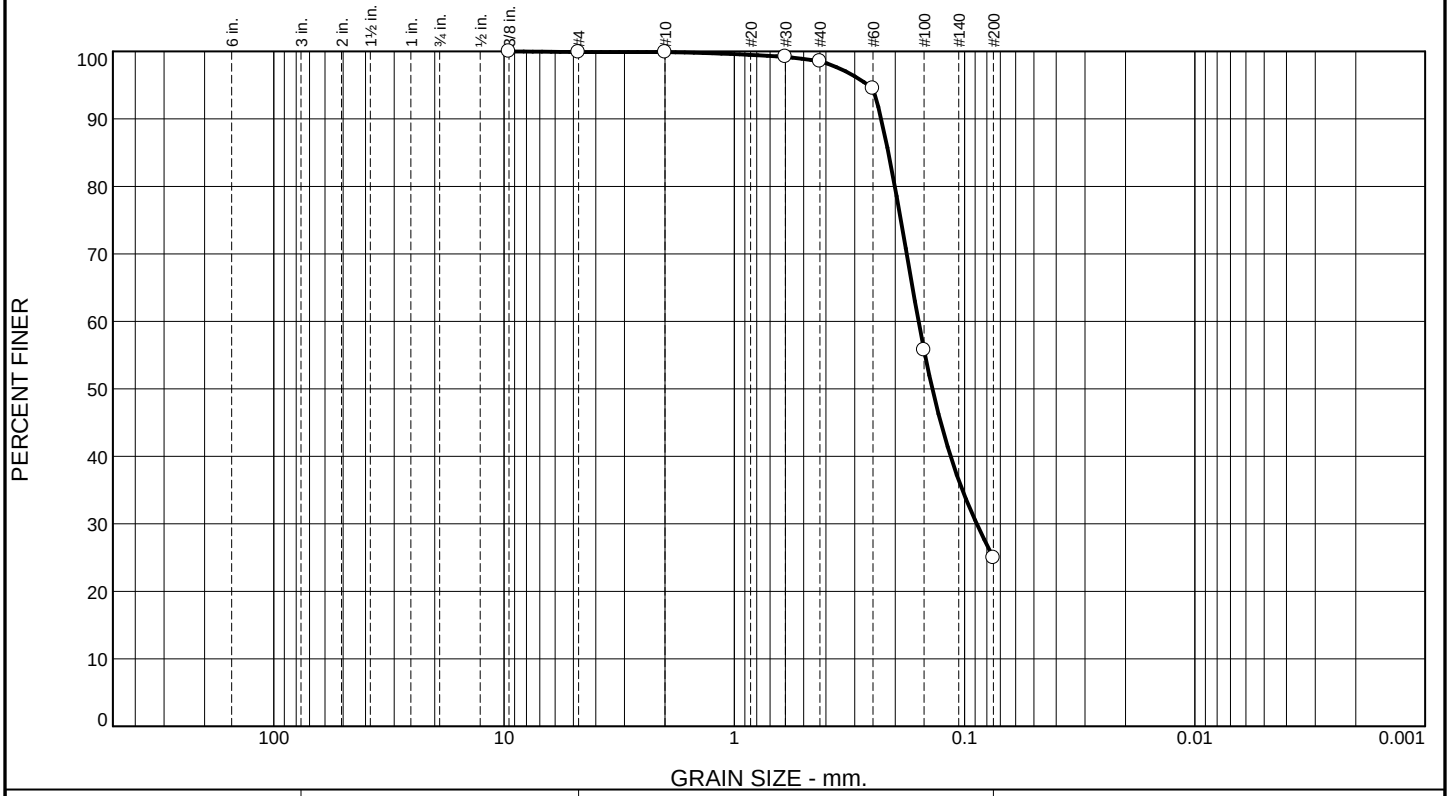
Client: Langan Engineering

Project: Beacon Unitarian Universalist Church Redevelopment, Summit, NJ
Project#101007201

Project No: 869 **Figure**

Tested By: AO **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.0	1.4	73.5	25.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.9		
#10	99.9		
#30	99.2		
#40	98.5		
#60	94.5		
#100	55.7		
#200	25.0		

* (no specification provided)

Material Description

Very Light Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2303 D_{85}= 0.2142 D_{60}= 0.1585
D_{50}= 0.1381 D_{30}= 0.0886 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-7 SR-1 3'

Date: 7-3-23

RSA Geolab

Union, New Jersey

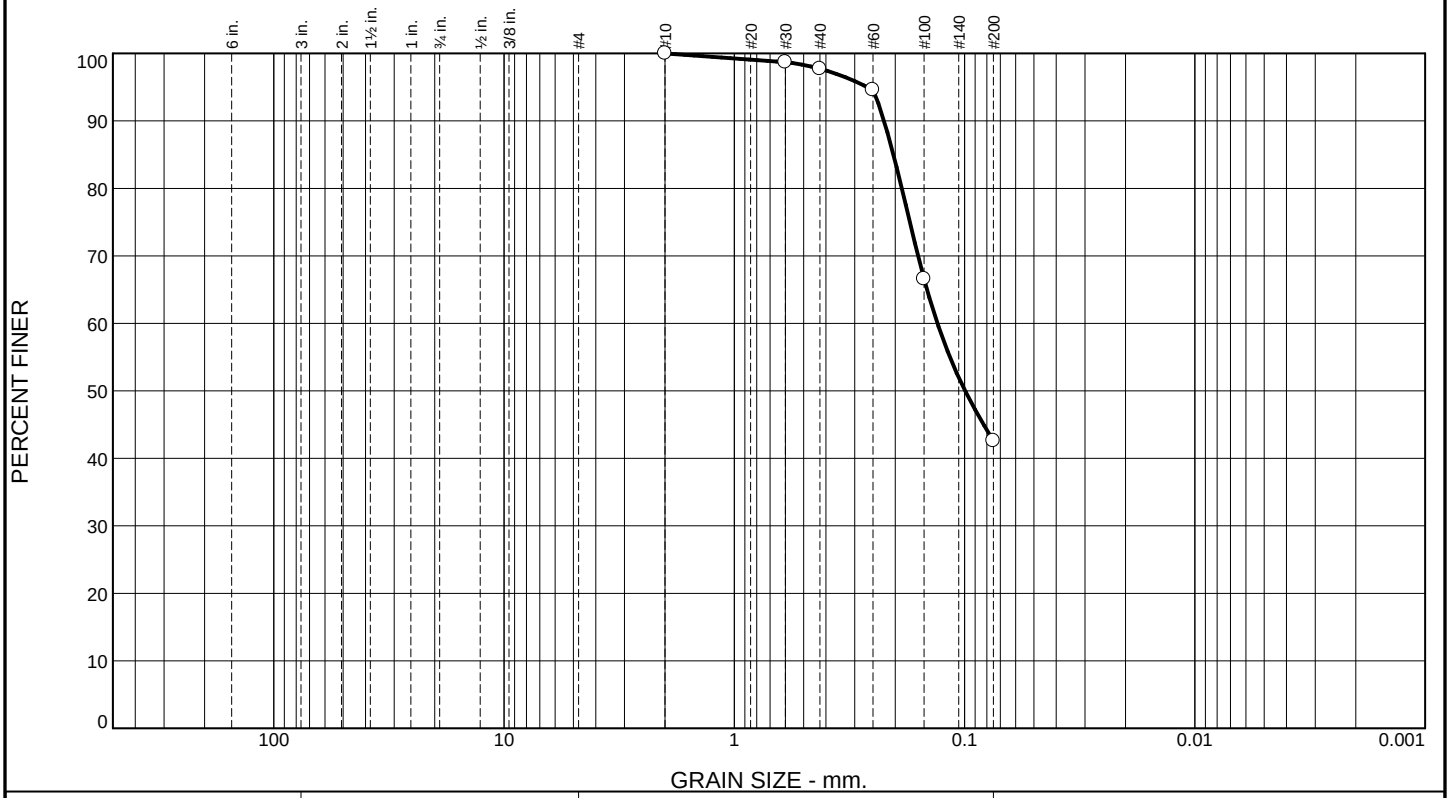
Client: Langan Engineering

Project: Beacon Unitarian Universalist Church Redevelopment, Summit, NJ
Project#101007201

Project No: 869 **Figure**

Tested By: AO **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
				2.3	55.1	42.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#30	98.7		
#40	97.7		
#60	94.6		
#100	66.6		
#200	42.6		

* (no specification provided)

Material Description

Very Light Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2237 D_{85}= 0.2038 D_{60}= 0.1312
D_{50}= 0.0995 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-8 SR-1 3'

Date: 7-3-23

RSA Geolab

Union, New Jersey

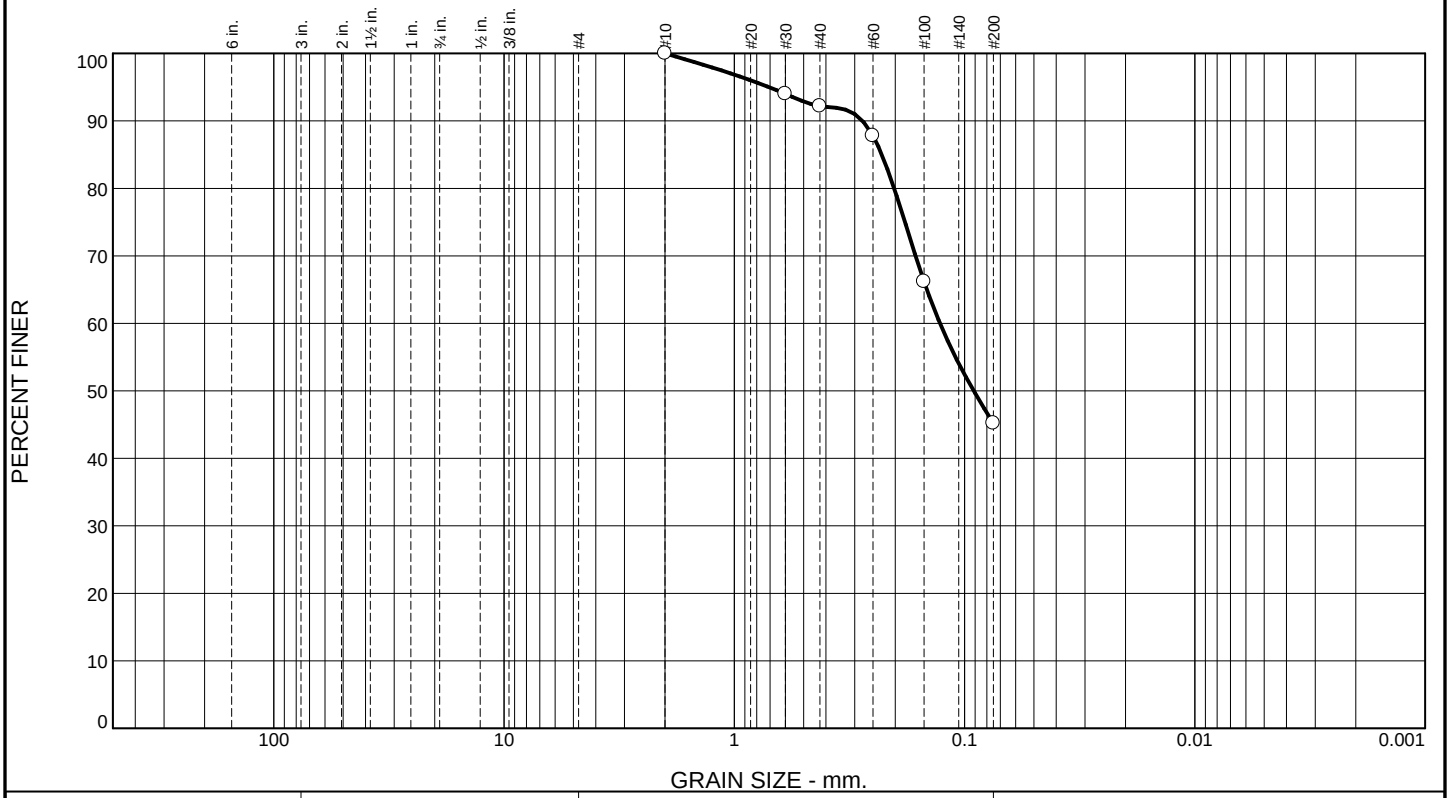
Client: Langan Engineering

Project: Beacon Unitarian Universalist Church Redevelopment, Summit, NJ
Project#101007201

Project No: 869 **Figure**

Tested By: AO **Checked By:** KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
				7.8	47.0	45.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#30	94.0		
#40	92.2		
#60	87.8		
#100	66.2		
#200	45.2		

* (no specification provided)

Material Description

Light Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2773 D_{85}= 0.2288 D_{60}= 0.1279
D_{50}= 0.0913 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-8 SR-2 4.5'

Date: 7-3-23

RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Beacon Unitarian Universalist Church Redevelopment, Summit, NJ
Project#101007201
Project No: 869 **Figure**

Tested By: AO **Checked By:** KP