STORMWATER MANAGEMENT REPORT

for

CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS

BLOCK No. 174, LOT No. 1.01
TOWNSHIP OF WEST ORANGE, ESSEX COUNTY, NEW JERSEY

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EXECUTIVE SUMMARY

The proposed stormwater management and conveyance systems for the proposed Crestmont Country Club & Eagle Rock Ave Improvements project have been designed in accordance with the New Jersey Department of Environmental Protection stormwater rules (NJAC 7:8), and the Township of West Orange stormwater regulations.

The proposed development includes the construction of:

- Installation of a new traffic signal at Eagle Rock Avenue & Oval Road intersection;
- Widening along Eagle Rock Avenue to support the new lane geometry required at the new signal;
- Re-alignment of the Crestmont egress driveway to connect into the new intersection; and,
- Onsite improvements to both increase the number of parking spaces and re-design the parking around the new egress driveway.

The proposed development 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 bioretention basins; and,
- 1 porous asphalt pavement system.

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 Township of West Orange 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 proposed improvements within Eagle Rock Avenue and Crestmont Country Club in West Orange, 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, last revised July 2017; and,
- Township of West Orange Code of Ordinances Chapter 240: Stormwater Management.

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2.0 PROJECT DESCRIPTION

2.1 Existing Site Description

The project site is comprised of Block No. 174, Lot No. 1.01 in the Township of West Orange, Essex County, New Jersey. The 146.76± acre tract is the location of Crestmont Country Club and predominantly covered by the grassed golf course, along with some wooded areas. The site is bound by Laurel Avenue and Eagle Rock Avenue to the north, undeveloped wooded area to the east and south, and a continuation of the Crestmont Country Club golf course to the west; refer to Figure 1 – Site Location Map. The proposed work will only impact 3.93± acres of the site, located along Eagle Rock Avenue and Laurel Avenue in the north side of the property. The disturbed site topography generally slopes from south to north, with existing grades across the disturbed site ranging from approximately EL. 570 to EL. 532.

2.2 Subsurface Conditions

According to the United States Department of Agriculture (USDA) Natural Resources Conservation Service Soil Survey Map for Essex County, New Jersey, there are 4 predominant soils within the area of redevelopment. A brief description of each soil type is provided below.

- *Boonton – Urban land, Boonton substratum complex (BouB*): The natural soil typically consists of loam to silt loam to gravelly fine sandy loam to fine sandy loam loamy sand. The soil mapping unit is reported to be Hydrologic Soil Group C.
- *Udorthents, Haledon substratum (UdhalB):* The natural soil typically consists of loam to gravelly fine sandy loam. The soil mapping unit is reported to be Hydrologic Soil Group D.
- *Boonton loam, 0 to 8 percent slopes, extremely stony (BogBc*): These areas are typically covered with slightly decomposed plant material to highly decomposed plant material. The natural soil typically consists of loam to silt loam to gravelly fine sandy loam to fine sandy loam to loamy sand. The soil mapping unit is reported to be Hydrologic Soil Group C.
- *Haledon silt loam (HanBc*): These areas are typically covered with moderately decomposed plant material. The natural soil typically consists of silt loam to loam to gravelly fine sandy loam. The soil mapping unit is reported to be Hydrologic Soil Group C.

A geotechnical investigation was performed in the area of redevelopment in April 2024; refer to Appendix F for the supporting geotechnical memorandum. As part of this investigation, soil samples were collected at 19 test pit locations for laboratory permeability tests. The purpose of this testing was to confirm the hydrologic soil group classification of the in-situ soils within the proposed limit of disturbance area, which is approximately 3.93± acres. Soil type UdhalB is already classified as Hydrologic Soil Group D; therefore, not reclassification testing was performed within this soil. The number and location of these test pits is based upon the regulations set forth in Chapter 12 of the New Jersey Stormwater BMP Manual. A summary of the required and proposed geotechnical testing is summarized in Table 1 below:

Table 1 – Hydrologic Soil Group Reclassification Summary

Soil Mapping Unit	Approximate Area of Disturbance Within Soil Mapping Unit (AC)	Required Number of Test Pits / Permeability Tests	Number of Test Pits / Permeability Tests Performed	Test Pit IDs
BouB	1.20	5	5	TP-9, TP-14, TP-15, TP-16, TP-17
HanBc	0.27	2	2	TP-11, TP-12
BogBc	2.37	8	12	TP-1, TP-4, TP-5, TP-6, TP-8, TP-7, TP-10, TP-13, TP-18, TP-19, TP-20, TP-21

Notes:

1. *Chapter 12 of the BMP Manual requires that soil profile test pits and soil borings be performed as part of the HSG reclassification. In accordance with Chapter 12 Subsection 1C, soil profiles test pits may be conducted in place of a required soil boring in all testing instances.*
2. *Refer to the Test Pit Location Plan, Figure 10, for BMP and test pit locations. Refer to Appendix F for supporting geotechnical investigation information including test pit and boring logs.*

The full geotechnical analysis and supporting laboratory data is contained in Appendix F of this report. In summary, the laboratory permeability testing at all 19 test pit locations supports the reclassification of soils within the project area's limit of disturbance to HSG D in accordance with the New Jersey Stormwater Best Practices Manual and the NRCS National Engineering Handbook, Part 630 – Hydrology, Chapter 7 Hydrologic Soil Groups, Table 7-1: Criteria for Assignment of Hydrologic Soil Group.

For the purpose of the stormwater management calculations in this report, all underlying soil within the project area's limit of disturbance is assumed to be HSG D. All soil outside the limit of disturbance is assumed to retain its respective NRCS Web Soil Survey hydrologic soil group classification.

It should be noted that the project site is located in an area of the state containing known karst

formations. A geotechnical investigation is proposed in order to confirm the presence of any underlying karst formations within the portion of the property subject to development.

2.3 Flood Hazard Area

Based on a review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for Essex County, Map #34013C0084F, #34013C0091F, and #34013C0092F, dated effective June 4, 2007, the proposed area of redevelopment and improvements within the Eagle Rock Avenue right-of-way are not located within a flood hazard area; refer to Figure 2 – FEMA Flood Insurance Rate Map. According to NJDEP mapping, there are unnamed tributaries to Canoe Brook located on the subject property but south of the proposed redevelopment area. The proposed redevelopment is located outside of the watershed to the unnamed tributary and no improvements are proposed within the flood hazard area.

2.4 Proposed Development

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

- Installation of a new traffic signal at Eagle Rock Avenue & Oval Road intersection;
- Widening along Eagle Rock Avenue to support the new lane geometry required at the new signal;
- Re-alignment of the Crestmont egress driveway to connect into the new intersection;
- Onsite improvements to both increase the number of parking spaces and re-design the parking around the new egress driveway.
- Associated driveways, sidewalks, parking areas, stormwater and utility infrastructure, and landscaping; and,
- 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 bioretention basins; and,
    - 1 porous asphalt pavement system.

3.0 STORMWATER MANAGEMENT

The proposed redevelopment disturbs over 1 acre of land and generates more than one-quarter acre of new regulated motor vehicle surface; 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.

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. 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 West Orange, New Jersey, accessed on March 20, 2024, for the 2-, 10-, 25-, and 100-year return periods. The table below summarizes the rainfall event totals.

Table 2 – 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	6.46	8.72

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 Essex County.

Table 3 – Current Precipitation Adjustment Factors for Essex 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 4 – Current Precipitation Summary for 24-Hour Storm Events			
2-yr (in)	**10-yr (in)**	**25-yr (in)**	**100-yr (in)**
3.46	5.38	6.72	9.24

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 Essex County.

Table 5 – Future Precipitation Adjustment Factors for Essex County			
2-yr	**10-yr**	**25-yr**	**100-yr**
1.19	1.22	1.26	1.33

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 6 – Future Precipitation Summary for 24-Hour Storm Events			
2-yr (in)	**10-yr (in)**	**25-yr (in)**	**100-yr (in)**
4.08	6.37	8.13	11.60

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 area of redevelopment ultimately discharges to the existing conveyance networks located within the Eagle Rock Avenue right-of-way, but leaves the subject tract via the points of analysis described below:

Point of Analysis 1 (POA-1) refers to an existing manhole within Eagle Rock Avenue, to the northwest of the subject property. Runoff from this point is ultimately conveyed to xx via the existing conveyance network.

Point of Analysis 2 (POA-2) refers to an existing catch basin within Eagle Rock Avenue, to the northeast of the subject property. Runoff from this point is ultimately conveyed to xx via the existing conveyance network.

3.1.4 Existing Watersheds

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

Watershed EX-1-DISTURBED is approximately 1.52± acres and consists of predominantly wooded areas, open space areas, and portions of the existing parking lot that are proposed to be disturbed in the post-construction condition. This watershed is conveyed via overland flow to the existing conveyance network within Laurel Avenue and Eagle Rock Avenue. From there it is conveyed to the existing manhole in Eagle Rock Avenue, Point of Analysis 1 (POA-1).

Watershed EX-1-UNDISTURBED is approximately 5.00± acres and consists of portions of the existing building, parking area, driveway, Laurel Avenue, Eagle Rock Avenue, and pervious grass and wooded areas that are proposed to remain undisturbed in the post-construction condition. This watershed is conveyed via overland flow and the existing onsite conveyance network to the existing conveyance network within Laurel Avenue and Eagle Rock Avenue. From there it is conveyed to the existing manhole in Eagle Rock Avenue, Point of Analysis 1 (POA-1).

Watershed EX-2-DISTURBED is approximately 2.41± acres and consists of portions of the existing parking area, driveway, and pervious wooded and grass areas that are proposed to be disturbed in the post-construction condition. This watershed is conveyed via overland flow and the existing onsite conveyance network to the existing conveyance network within Eagle Rock Avenue. From there it is conveyed to the existing catch basin in Eagle Rock Avenue, Point of Analysis 2 (POA-2).

Watershed EX-2-UNDISTURBED is approximately 2.92± acres and consists of prtions of the existing parking area, buildings, Eagle Rock Avenue, and pervious wooded and grass areas that are proposed to remain undisturbed in the post-construction condition. This watershed is conveyed via overland flow and the existing onsite conveyance network to the existing conveyance network within Eagle Rock Avenue. From there it is conveyed to the existing catch basin in Eagle Rock Avenue, Point of Analysis 2 (POA-2).

Refer to Appendix A for weighted curve number (CN) calculation worksheets and supporting hydrologic calculations for the determination of peak runoff rates.

3.1.5 Allowable Peak Discharges

The proposed development 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.

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 development 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 7 – POA-1 Allowable Peak Discharges (Current)

Design Storm Event	Existing Peak Discharge (CFS)	Allowable Peak Discharge (CFS)
2-Year	13.48	12.57
10-Year	23.47	22.52
100-Year	44.56	42.92

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 8 – POA-1 Allowable Peak Discharges (Future)		
Design Storm Event	**Existing Peak Discharge (CFS)**	**Allowable Peak Discharge (CFS)**
2-Year	16.83	15.52
10-Year	29.21	27.85
100-Year	58.39	56.05

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 9 – POA-2 Allowable Peak Discharges (Current)		
Design Storm Event	**Existing Peak Discharge (CFS)**	**Allowable Peak Discharge (CFS)**
2-Year	9.63	7.23
10-Year	17.05	14.95
100-Year	32.74	29.56

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 10 – POA-2 Allowable Peak Discharges (Future)		
Design Storm Event	**Existing Peak Discharge (CFS)**	**Allowable Peak Discharge (CFS)**
2-Year	11.97	9.00
10-Year	21.02	18.44
100-Year	42.47	38.36

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-DISTURBED is approximately 0.65± acres and consists of proposed parking and pervious landscape areas. Stormwater runoff is conveyed via overland flow and the proposed conveyance network to Small-Scale Bioretention Basin 1 (SSBB-1). From this point, runoff is conveyed via a proposed conveyance network and the existing conveyance network within Laurel Ave and Eagle Rock Ave to POA-1.

Watershed PR-1A-UNDISTURBED is approximately 0.91± acres and consists predominately of existing parking areas, rooftop, and pervious wooded and grass areas. Stormwater runoff is conveyed via overland flow and the proposed conveyance network to Small-Scale Bioretention Basin 1 (SSBB-1). From this point, runoff is conveyed via a proposed conveyance network and the existing conveyance network within Laurel Ave and Eagle Rock Ave to POA-1.

Watershed PR-1B-DISTURBED is approximately 0.35± acres and consists predominately of pervious landscape areas. Stormwater runoff is conveyed via overland flow to the proposed Swale 1. The watershed is then conveyed via a proposed conveyance network and the existing conveyance network within Eagle Rock Ave to POA-1.

Watershed PR-1B-UNDISTURBED is approximately 2.09± acres and consists predominately of existing parking areas and pervious wooded and grass areas. Stormwater runoff is conveyed via overland flow to the proposed Swale 1. The watershed is then conveyed via a proposed conveyance network and the existing conveyance network within Eagle Rock Ave to POA-1.

Watershed PR-1C-DISTURBED is approximately 0.42± acres and consists predominately of pervious landscape areas and portions of Eagle Rock Avenue. Stormwater runoff is conveyed via overland flow to the conveyance network in Laurel Ave and Eagle Rock Ave. From this point, water is conveyed to the existing manhole POA-1.

Watershed PR-1C-UNDISTURBED is approximately 1.85± acres and consists of portions of Laurel Ave, Eagle Rock Ave, the existing driveway, parking areas, and pervious wooded and grass areas. Stormwater runoff is conveyed via overland flow to the conveyance network in Laurel Ave and Eagle Rock Ave. From this point, water is conveyed to the existing manhole POA-1.

Watershed PR-2A-DISTURBED is approximately 1.22± acres and consists of portions of the proposed driveway, parking areas, and pervious landscape areas. Stormwater runoff is conveyed via overland flow and the proposed conveyance network to Small-Scale Bioretention Basin 2 (SSBB-2). From this point, runoff is conveyed via a proposed conveyance network and the

existing conveyance network within Eagle Rock Ave to POA-2.

Watershed PR-2A-UNDISTURBED is approximately 1.04± acres and consists predominately of existing parking areas and pervious wooded and grass areas. Stormwater runoff is conveyed via overland flow and the proposed conveyance network to Small-Scale Bioretention Basin 2 (SSBB-2). From this point, runoff is conveyed via a proposed conveyance network and the existing conveyance network within Eagle Rock Ave to POA-2.

Watershed PR-2B-DISTURBED is approximately 0.40± acres and consists predominately of proposed parking and pervious landscape areas. Stormwater runoff is conveyed via overland flow to Porous Asphalt Pavement System 1 (PAPS-1). From this point, the watershed is conveyed via a proposed conveyance network and the existing conveyance network within Eagle Rock Ave to POA-2.

Watershed PR-2B-UNDISTURBED is approximately 0.04± acres and consists of existing parking areas and pervious landscape areas. Stormwater runoff is conveyed via overland flow to Porous Asphalt Pavement System 1 (PAPS-1). From this point, the watershed is conveyed via a proposed conveyance network and the existing conveyance network within Eagle Rock Ave to POA-2.

Watershed PR-2C-DISTURBED is approximately 0.87± acres and consists of portions of the proposed driveway, Eagle Rock Avenue, sidewalk, and pervious landscape areas. Stormwater runoff is conveyed via overland flow to the proposed onsite conveyance network and conveyance network within Eagle Rock Ave. From this point, the watershed is conveyed to the existing catch basin in Eagle Rock Ave, POA-2.

Watershed PR-2C-UNDISTURBED is approximately 2.01± acres and consists of portions of existing parking areas, Eagle Rock Avenue, rooftop, and pervious wooded and grass areas. Stormwater runoff is conveyed via overland flow to the proposed onsite conveyance network and the conveyance network within Eagle Rock Ave, where it is then conveyed to POA-2.

Refer to Appendix B for weighted curve number (CN) calculation worksheets and supporting hydrologic calculations for the determination of peak runoff rates.

3.1.7 Proposed Detention Routing

Two (2) small-scale bioretention basins and one (1) porous asphalt pavement system are proposed in order to meet the stormwater quantity control requirements. According to N.J.A.C. 7:8-5.2.(f), small-scale bioretention basins 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 rates for the identified points of analysis can then be calculated by adding together the peak outflow from the proposed small-scale bioretention basins and porous asphalt pavement systems, along with the peak discharges from the undetained and undisturbed watersheds.

Table 11 – Total Current Storm Event Proposed Peak Discharges (CFS)				
Point of Analysis	**2-Year Storm**	**10-Year Storm**	**25-Year Storm**	**100-Year Storm**
POA-1	11.32	19.76	26.22	38.87
POA-2	5.67	10.31	15.04	23.96

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 12 – Total Future Storm Event Proposed Peak Discharges (CFS)				
Point of Analysis	**2-Year Storm**	**10-Year Storm**	**25-Year Storm**	**100-Year Storm**
POA-1	14.07	24.77	33.09	53.61
POA-2	7.27	14.02	20.85	31.63

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 under-drained bioretention basins, 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:

- 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

Table 13 – Small-Scale Bioretention Basin Design Summary

BMP	Contributory Drainage Area[1] (AC)	WQDS Water Depth (FT)	Test Pits[2]	Bottom of BMP EL.[3]	Groundwater or Mottling EL.	Highest Bedrock EL.[4]
SSBB-1	1.41	0.52	TP-1, TP-2	530.50	529.0[5]	534.00[6]
SSBB-2	1.91	0.39	TP-3, TP-4, TP-11, TP-12	533.50	N/E	540.5[7]

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 plans, drawing CG103 & CG104, for BMP locations. Refer to Appendix F for supporting geotechnical investigation information including test pit logs.*
3. *The bottom of BMP elevation is the bottom of the underdrain gravel layer for an under-drained bioretention basin.*
4. *If groundwater and soil mottling were not encountered, the limiting design feature is bedrock. In this case, rock will be excavated to be a minimum of one foot below the bottom BMP elevation.*
5. *Within SSBB-1, the following test pits were performed and indicated the following elevations of groundwater or mottling: TP-1 did not encounter groundwater, and TP-2 encountered groundwater at el. 529.0.*
6. *Within SSBB-1, the following test pits were performed and indicated the following elevations of bedrock: TP-1 encountered bedrock at el. 524.0, and TP-2 encountered bedrock at el. 528.0.*
7. *Within SSBB-2, the following test pits were performed and indicated the following elevations of bedrock: TP-3 encountered bedrock at el. 534.0, TP-4 encountered bedrock at el. 533.0, TP-11 encountered bedrock at el. 536.0, and TP-12 encountered bedrock at el. 540.5.*

A porous asphalt pavement system is 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 14 – Porous Asphalt Pavement System Design Summary					
BMP	**Ratio of Additional Inflow Area[1]**	**Test Pits[2]**	**Bottom of BMP EL.[3]**	**Groundwater or Mottling EL.**	**Highest Bedrock EL.[4]**
PAPS-1	1.89	TP-9, TP-13, TP-14	553.00	548.0[5]	557.25[6]

Notes:

1. *The ratio of additional inflow area is the contributing watershed area to a porous pavement system in relationship to the surface area of the porous pavement.*
2. *Refer to the drainage plans, drawings CG103 & CG104, for BMP locations. Refer to Appendix F for supporting geotechnical investigation information including test pit logs.*
3. *The bottom of BMP elevation is the bottom of the stone storage layer for a porous asphalt pavement system.*
4. *If groundwater and soil mottling were not encountered, the limiting design feature is bedrock. In this case, rock will be excavated to be a minimum of one foot below the bottom BMP elevation.*
5. *Within PAPS-1, the following test pits were performed and indicated the following elevations of groundwater or mottling: TP-9 did not encounter groundwater, TP-14 did not encounter groundwater, and TP-13 encountered groundwater at el. 548.0.*
6. *Within PAPS-1, the following test pits were performed and indicated the following elevations of bedrock: TP-9 encountered bedrock at el. 545.0, TP-13 encountered bedrock at el. 542.5, and TP-14 encountered bedrock at el. 557.25.*

Refer to Figure 10 – Test Pit Location Plan, for a map showing the locations of the test pits with respect to the proposed BMP footprints.

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 15 – 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	13.48	12.57	11.32
10-Year	23.47	22.52	19.76
100-Year	44.56	42.92	38.87

Table 16 – 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	16.83	15.52	14.07
10-Year	29.21	27.85	24.77
100-Year	58.39	56.05	53.61

Table 17 – 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	9.63	7.23	5.67
10-Year	17.05	14.95	10.31
100-Year	32.74	29.56	23.96

Table 18 – 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	11.97	9.00	7.27
10-Year	21.02	18.44	14.02
100-Year	42.47	38.36	31.63

3.2 Stormwater Quality Design

3.2.1 Design Criteria

The project site is subject to water quality treatment requirements as the redevelopment results in an increase 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. The proposed redevelopment results in approximately 0.85± acres of new regulated motor vehicle surface within the limit of disturbance. Refer to Figure 8 – Required Water Quality Treatment Map for the total area of regulated motor vehicle surface that is subject to treatment

requirements.

3.2.2 Design Methodology

The proposed stormwater quality BMPs that have been chosen for the project design consist of small-scale bioretention basins and a porous asphalt pavement system.

Small-Scale Bioretention Basin 2 (SSBB-2) has been designed in accordance with Chapter 9.7 of the BMP Manual to achieve 80% TSS removal, meaning that it has been designed with a 24-inch deep soil bed planted site-tolerant meadow mix grasses, and can store the entire water quality design storm event runoff volume below the first orifice opening of the outlet control structure with the water surface elevations not exceeding 12 inches. Small-Scale Bioretention Basin 1 (SSBB-1) has been designed to achieve 90% TSS removal, meaning that it has been designed with a 24-inch deep soil bed planted with a terrestrial forested community, and can store the entire water quality design storm event runoff volume below the first orifice opening of the outlet control structure with the water surface elevations not exceeding 12 inches. Both bioretention basins have been design with underdrains due to the relatively poor-draining in-situ soils, as well as to minimize any potential infiltration in areas of potential karst formations. Refer to the supporting calculations in Appendix E of this report.

The proposed porous pavement system (PAPS-1) has been designed to achieve 80% TSS removal. The system consists 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 system meets all the design criteria set forth in Chapter 9.6 of the BMP Manual. Refer to the supporting calculations in Appendix E of this report.

3.2.3 Design Summary

Approximately 1.09± acres of the total 1.48± acres of proposed regulated motor vehicle surface in the area of redevelopment will be treated by a combination of small-scale bioretention basins and the porous asphalt pavement system. As part of the proposed stormwater management design, approximately 0.77± acres of existing regulated motor vehicle surface, located outside of the proposed limit of disturbance area, will be captured and conveyed to the proposed BMPs for water quality treatment. The proposed TSS removal rate for the project has been calculated to be 68.2%, which is greater than the 67.2% that is required. Refer to Figure 9 – Proposed Water Quality Treatment Map for a map indicating which portions of regulated motor vehicle surface are being treated at what TSS removal rate based upon the proposed BMPs that are

treating those respective areas.

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

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.

A geotechnical investigation was performed, with laboratory permeability testing results indicating that site soils within the proposed development area can be reclassified to HSG D. Hydrologic soil group D soils result in zero annual groundwater recharge. Therefore, there is no groundwater recharge occurring on the project site within the proposed redevelopment area.

3.3.2 Design Methodology

The groundwater recharge volume analysis is 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 zero due to all underlying soils within the proposed disturbance area being reclassified to HSG D.

3.3.3 BMP Design

All proposed BMP's have been designed to be under-drained due to poorly draining in-situ soils, and to minimize the potential for infiltration within potential underlying karst features.

3.3.4 Design Summary

No groundwater recharge is proposed in the post-construction condition, which mirrors existing conditions in the area of redevelopment due to the presence of HSG D soils.

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.

Retaining walls are proposed within the redevelopment area in order to maximize the protection of existing steep slopes, trees, and underlying vegetation. Drainage swales are provided as a vegetated conveyance system in order to minimize the decrease in time of concentration. Native and drought tolerant plant species are proposed to the maximum extent feasible in order to provide low maintenance vegetation and stabilization. Areas susceptible to erosion are proposed to be lined with vegetated turf reinforcement matting, and outfalls are proposed to be stabilized with riprap aprons. Soil compaction within proposed vegetated areas will be minimized by providing decompaction measures as required by the soil conservation district.

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 proposed drainage swales were also analyzed for capacity and stability. The proposed drainage swale design is governed by the standards outlined within the NJDOT Roadway Design Manual and the Standards for Soil Erosion and Sediment Control in New Jersey. The NJDOT

channel design standards require utilizing the 10-year design storm and providing a minimum of 1 foot of freeboard, while the Soil Erosion standards require utilizing the 25-year design storm and providing a minimum of 0.3 feet of freeboard. Both storm events and freeboard requirements were calculated in order to determine which standard governs.

The proposed off-site subsurface collection and conveyance system within the County Route 611 right-of-way is designed to convey the 25-year design storm event. Inlet spread calculations must be performed for all inlets which may have an effect on the County Road right-of-way. The inlet spread calculations analyze the spread of flow across roadways and driveways for the 10-year design storm event utilizing the minimum 10-minute duration rainfall intensity. The inlet spread calculations are performed utilizing the criteria set forth within the NJDOT Roadway Design Manual.

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 inlet is 10 minutes per Section 10.3.5.C.1.e of the NJDOT Roadway Design Manual. 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 corresponding design storm event for the respective BMP that each conveyance network discharges into.

The outflow from the proposed detention BMPs is inputted as a known discharge rate from the outlet control structure for the purpose of analyzing the capacity of the proposed conveyance system. In order to account for the time difference between the peak flow discharged from the detention BMPs and the peak flow discharged from the undetained areas of the site, the quantity control analysis performed within the Hydrology Studio software was analyzed to determine the time difference. The outflow from the detention BMP that corresponded to the time of the peak flow from the undetained watersheds was utilized as the known discharge rate for the outlet

control structures within the conveyance system analysis.

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 meet the required peak rate reductions for the 2-, 10-, and 100-year design storm events for each point of analysis. The proposed small-scale bioretention basins and porous asphalt pavement system 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% or 90% TSS removal for water quality treatment. 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 Township of West Orange Code of Ordinances, NJDOT, and the NJDEP stormwater rules.

7.0 REFERENCES

1. Hydrology Studio. Hydrology Studio 2026 v 3.0.0.39.
2. Hydrology Studio. Stormwater Studio 2026 v 3.0.0.40.
3. Hydrology Studio. Studio Express 2026 v 1.0.0.20.

4. Urban Hydrology for Small Watersheds, Technical Release No. 55, USDA Soil Conservation Service Publication, June 1986.

5. New Jersey Stormwater Best Management Practices Manual, New Jersey Department of Environmental Protection, Division of Watershed Management, April 2004, last revised March 2024.

6. New Jersey Stormwater Management Rules N.J.A.C. 7:8, last amended July 17, 2023.

7. New Jersey Flood Hazard Area Control Act Rules N.J.A.C. 7:13, last amended July 17, 2023.

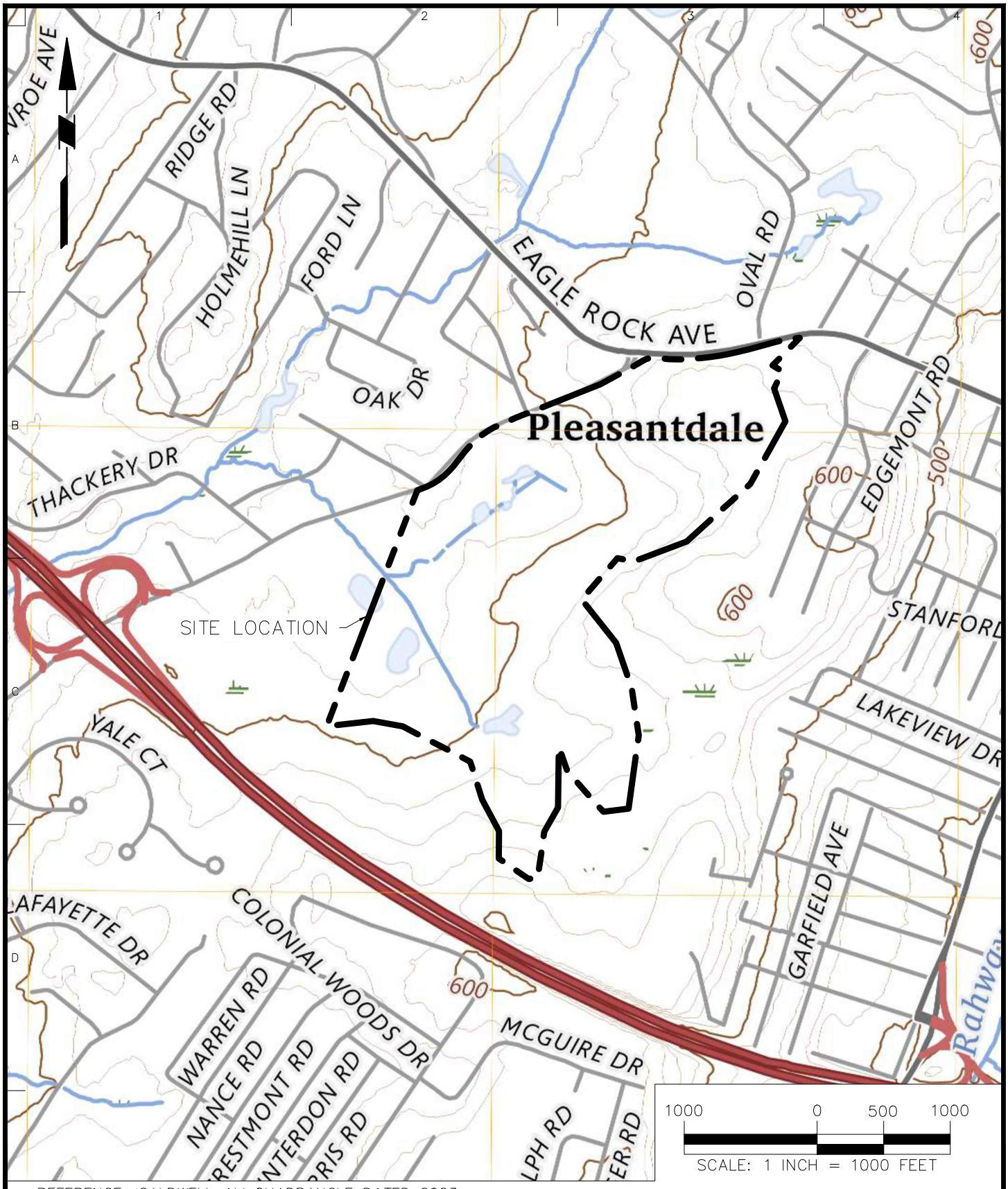
8. Township of West Orange Code of Ordinances Chapter 25-29 –Stormwater Control.

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

10. New Jersey Department of Transportation 2015 Roadway Design Manual, last revised December 2023.

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FIGURES



REFERENCE: CALDWELL, NJ QUADRANGLE DATED 2023

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Project
CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS
BLOCK No. 174, LOT No. 1.01
TOWNSHIP OF WEST ORANGE
ESSEX COUNTY NEW JERSEY

Drawing Title
SITE LOCATION MAP

Project No.	101049802
Date	10/24/2025
Drawn By	JS
Checked By	MJV

Figure
FG01
Sheet 1 of 1

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Project No. 101049802

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REFERENCE: FEMA FLOOD INSURANCE RATE MAP OF ESSEX COUNTY, NEW JERSEY, MAP NUMBERS 34013C0092F, 34013C0091F, 34013C0084F DATED JUNE 4, 2007, AND 34013C0083G DATED APRIL 3, 2020.

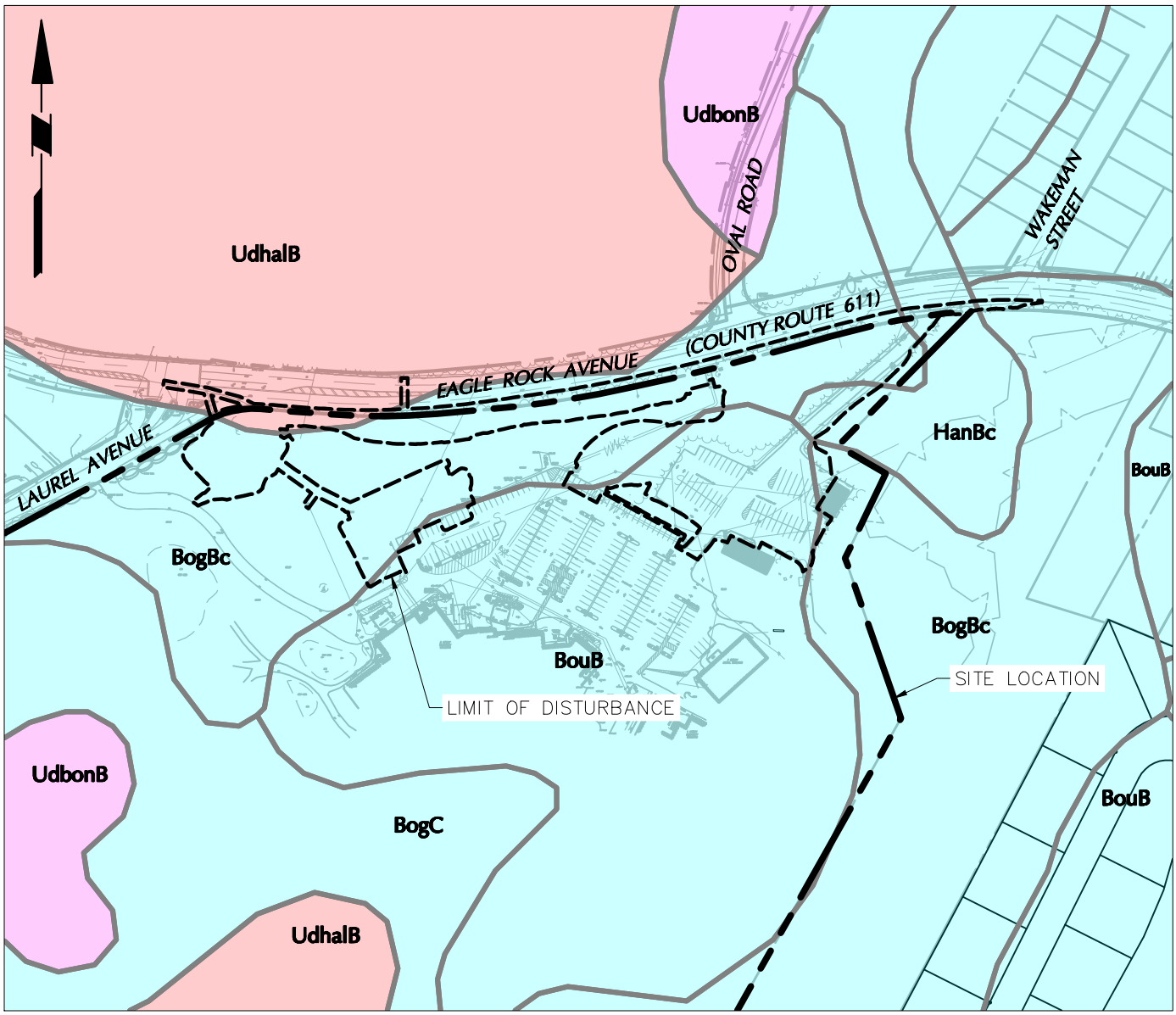
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Project	CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS BLOCK No. 174, LOT No. 1.01 TOWNSHIP OF WEST ORANGE ESSEX COUNTY NEW JERSEY
Drawing Title	FEMA FLOOD INSURANCE RATE MAP
Project No.	101049802
Date	10/24/2025
Drawn By	JS
Checked By	MJV
Figure	FG02
Sheet	1 of 1

LANGAN

Project No. 101049802

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HYDROLOGIC SOIL GROUP RATING LEGEND:

- HYDROLOGIC SOIL GROUP A
- HYDROLOGIC SOIL GROUP C
- HYDROLOGIC SOIL GROUP D

SOIL TYPE LEGEND:

BouB	–	BOONTON LOAM
BogBc	–	BOONTON LOAM
BogC	–	BOONTON LOAM
HanBc	–	HALEDON SILT LOAM
UdhalB	–	UDORTHENTS – HALEDON
UdbonB	–	UDORTHENTS

REFERENCE: SOILS REFERENCED FROM THE USDA NATURAL RESOURCES CONSERVATION SERVICE (NRCS) CUSTOM SOIL RESOURCE REPORT FOR ESSEX COUNTY, NEW JERSEY, ACCESSED SEPTEMBER 3, 2024.

250 0 125 250

SCALE: 1 INCH = 250 FEET

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CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS
BLOCK No. 174, LOT No. 1.01
TOWNSHIP OF WEST ORANGE
ESSEX COUNTY NEW JERSEY

Drawing Title
SOILS MAP

Project No. 101049802
Date 10/24/2025
Drawn By JS
Checked By MJV

Figure FG03
Sheet 1 of 1

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LEGEND

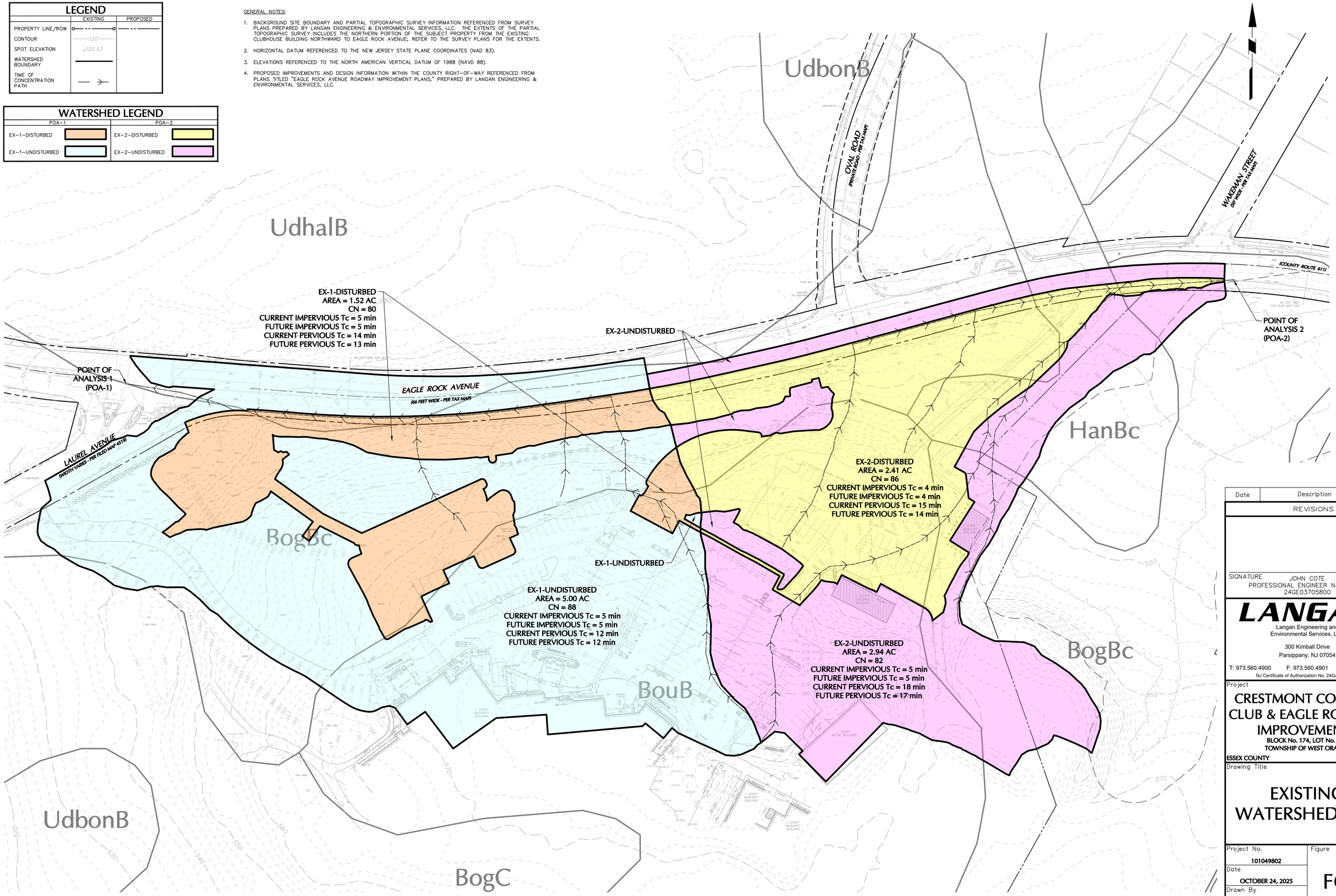
	EXISTING	PROPOSED
PROPERTY LINE/ROW	○——○	——
CONTOUR	120	
SPOT ELEVATION	×122.53	
WATERSHED BOUNDARY	——	
TIME OF CONCENTRATION PATH	—→—	

WATERSHED LEGEND

POA-1		POA-2	
EX-1-DISTURBED		EX-2-DISTURBED	
EX-1-UNDISTURBED		EX-2-UNDISTURBED	

GENERAL NOTES:

1. BACKGROUND SITE BOUNDARY AND PARTIAL TOPOGRAPHIC SURVEY INFORMATION REFERENCED FROM SURVEY PLANS PREPARED BY LANGAN ENGINEERING & ENVIRONMENTAL SERVICES, LLC. THE EXTENTS OF THE PARTIAL TOPOGRAPHIC SURVEY INCLUDES THE NORTHERN PORTION OF THE SUBJECT PROPERTY FROM THE EXISTING CLUBHOUSE BUILDING NORTHWARD TO EAGLE ROCK AVENUE; REFER TO THE SURVEY PLANS FOR THE EXTENTS.
2. HORIZONTAL DATUM REFERENCED TO THE NEW JERSEY STATE PLANE COORDINATES (NAD 83).
3. ELEVATIONS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
4. PROPOSED IMPROVEMENTS AND DESIGN INFORMATION WITHIN THE COUNTY RIGHT-OF-WAY REFERENCED FROM PLANS TITLED "EAGLE ROCK AVENUE ROADWAY IMPROVEMENT PLANS," PREPARED BY LANGAN ENGINEERING & ENVIRONMENTAL SERVICES, LLC.



Date	Description	No.
REVISIONS		

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

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BLOCK No. 174, LOT No. 1.01
TOWNSHIP OF WEST ORANGE
ESSEX COUNTY NEW JERSEY

Drawing Title
EXISTING WATERSHED MAP

Project No.	Figure
101049802	FG04
Date: OCTOBER 24, 2025	
Drawn By: YA	
Checked By: MJV	Sheet 1 of 1

LANGAN
Project No. 101049802

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Date: 10/23/2025 Time: 12:39 User: tgreen Style Table: Langan.stb Layout: FG04 Document Code: FG04-101049802-0202-CG101-0101

WATERSHED LEGEND

POA–1		POA–2	
PR–1A–DISTURBED		PR–2A–DISTURBED	
PR–1A–UNDISTURBED		PR–2A–UNDISTURBED	
PR–1B–DISTURBED		PR–2B–DISTURBED	
PR–1B–UNDISTURBED		PR–2B–UNDISTURBED	
PR–1C–DISTURBED		PR–2C–DISTURBED	
PR–1C–UNDISTURBED		PR–2C–UNDISTURBED	

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 SITE BOUNDARY AND PARTIAL TOPOGRAPHIC SURVEY INFORMATION REFERENCED FROM SURVEY PLANS TITLED "RIGHT OF WAY & PARTIAL SITE SURVEY," PREPARED BY LANGAN ENGINEERING & ENVIRONMENTAL SERVICES, LLC, DATED FEBRUARY 11, 2026. THE EXTENTS OF THE PARTIAL TOPOGRAPHIC SURVEY INCLUDES THE NORTHERN PORTION OF THE SUBJECT PROPERTY FROM THE EXISTING CLUBHOUSE BUILDING NORTHWARD TO EAGLE ROCK AVENUE; REFER TO THE SURVEY PLANS FOR THE EXTENTS.
2. HORIZONTAL DATUM REFERENCED TO THE NEW JERSEY STATE PLANE COORDINATES (NAD 83).
3. ELEVATIONS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
4. PROPOSED IMPROVEMENTS AND DESIGN INFORMATION WITHIN THE COUNTY RIGHT–OF–WAY REFERENCED FROM PLANS TITLED "EAGLE ROCK AVENUE ROADWAY IMPROVEMENT PLANS," PREPARED BY LANGAN ENGINEERING & ENVIRONMENTAL SERVICES, LLC.

UdbonB

UdhalB

OVAL ROAD (PRIVATE ROAD - PER TAX MAP)

WAKEMAN STREET (60' WIDE - PER TAX MAP)

(COUNTY ROUTE 611)

EAGLE ROCK AVENUE (66 FEET WIDE - PER TAX MAP)

LAUREL AVENUE (WIDTH VARIES - PER FILED MAP 4519)

PR-1C-DISTURBED
AREA = 0.42 AC
CN = 85
CURRENT IMPERVIOUS Tc = 2 min
FUTURE IMPERVIOUS Tc = 2 min
CURRENT PERVIOUS Tc = 3 min
FUTURE PERVIOUS Tc = 3 min

PR-1B-DISTURBED
AREA = 0.35 AC
CN = 80
CURRENT PERVIOUS Tc = 6 min
FUTURE PERVIOUS Tc = 6 min

PR-2C-DISTURBED
AREA = 0.87 AC
CN = 86
CURRENT IMPERVIOUS Tc = 3 min
FUTURE IMPERVIOUS Tc = 3 min
CURRENT PERVIOUS Tc = 3 min
FUTURE PERVIOUS Tc = 3 min

POINT OF ANALYSIS 1 (POA-1)

PR-1B-UNDISTURBED

PR-2C-UNDISTURBED

POINT OF ANALYSIS 2 (POA-2)

SMALL–SCALE BIORETENTION BASIN 2

PR-2C-UNDISTURBED

HanBc

PR-2A-DISTURBED
AREA = 1.22 AC
CN = 86
CUR. IMPERVIOUS Tc = 2 min
FUT. IMPERVIOUS Tc = 2 min
CUR. PERVIOUS Tc = 6 min
FUT. PERVIOUS Tc = 6 min

POROUS ASPHALT PAVEMENT SYSTEM 1

PR-2B-DISTURBED
AREA = 0.40 AC
CN = 96
CURRENT IMPERVIOUS Tc = 2 min
FUTURE IMPERVIOUS Tc = 2 min
CURRENT PERVIOUS Tc = 4 min
FUTURE PERVIOUS Tc = 4 min

PR-1C-UNDISTURBED
AREA = 1.85 AC
CN = 89
CURRENT IMPERVIOUS Tc = 4 min
FUTURE IMPERVIOUS Tc = 4 min
CURRENT PERVIOUS Tc = 10 min
FUTURE PERVIOUS Tc = 9 min

SMALL–SCALE BIORETENTION BASIN 1

PR-2A-UNDISTURBED

PR-2C-DISTURBED

HugBc

PR-1B-UNDISTURBED
AREA = 2.09 AC
CN = 86
CURRENT IMPERVIOUS Tc = 7 min
FUTURE IMPERVIOUS Tc = 7 min
CURRENT PERVIOUS Tc = 14 min
FUTURE PERVIOUS Tc = 13 min

PR-2C-UNDISTURBED
AREA = 2.01 AC
CN = 79
CURRENT IMPERVIOUS Tc = 2 min
FUTURE IMPERVIOUS Tc = 2 min
CURRENT PERVIOUS Tc = 16 min
FUTURE PERVIOUS Tc = 15 min

BogBc

PR-1A-DISTURBED
AREA = 0.65 AC
CN = 89
CURRENT IMPERVIOUS Tc = 2 min
FUTURE IMPERVIOUS Tc = 2 min
CURRENT PERVIOUS Tc = 8 min
FUTURE PERVIOUS Tc = 7 min

BouB

PR-1A-UNDISTURBED
AREA = 0.91 AC
CN = 87
CURRENT IMPERVIOUS Tc = 2 min
FUTURE IMPERVIOUS Tc = 2 min
CURRENT PERVIOUS Tc = 11 min
FUTURE PERVIOUS Tc = 11 min

PR-2A-UNDISTURBED
AREA = 1.04 AC
CN = 89
CURRENT IMPERVIOUS Tc = 3 min
FUTURE IMPERVIOUS Tc = 2 min
CURRENT PERVIOUS Tc = 17 min
FUTURE PERVIOUS Tc = 15 min

PR-2B-UNDISTURBED
AREA = 0.04 AC
CN = 93
CURRENT IMPERVIOUS Tc = 2 min
FUTURE IMPERVIOUS Tc = 2 min
CURRENT PERVIOUS Tc = 3 min
FUTURE PERVIOUS Tc = 3 min

UdbonB

BogC

50 0 25 50
SCALE IN FEET

Date	Description	No.
REVISIONS		

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

LANGAN
Langan Engineering and Environmental Services, LLC
300 Kimball Drive
Parsippany, NJ 07054
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NJ Certificate of Authorization No. 24GA27996400

Project
CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS
BLOCK No. 174, LOT No. 1.01
TOWNSHIP OF WEST ORANGE
ESSEX COUNTY NEW JERSEY

Drawing Title
PROPOSED WATERSHED MAP

Project No. 101049802	Figure FG05
Date OCTOBER 24, 2025	
Drawn By YA	
Checked By MJV	Sheet 1 of 1

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Date: 3/5/2026 Time: 10:02 User: tgreen Style Table: Langan.stb Layout: FG05 Document Code: FG05-101049802-0202-CG101-0101

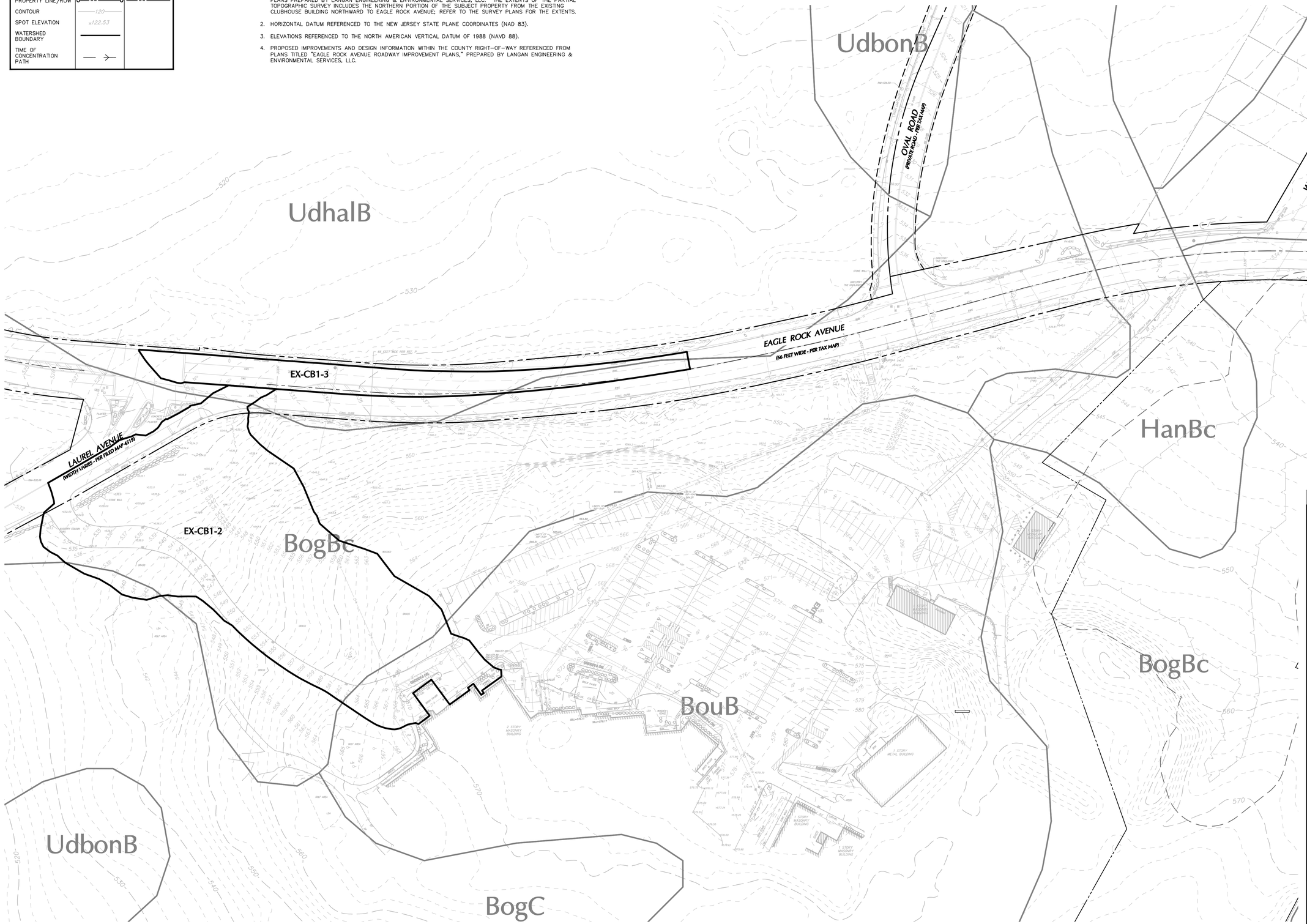
LANGAN Project No. 101049802

LEGEND

	EXISTING	PROPOSED
PROPERTY LINE/ROW	○———	———
CONTOUR	120	
SPOT ELEVATION	×122.53	
WATERSHED BOUNDARY		
TIME OF CONCENTRATION PATH	—→	

GENERAL NOTES:

1. BACKGROUND SITE BOUNDARY AND PARTIAL TOPOGRAPHIC SURVEY INFORMATION REFERENCED FROM SURVEY PLANS PREPARED BY LANGAN ENGINEERING & ENVIRONMENTAL SERVICES, LLC. THE EXTENTS OF THE PARTIAL TOPOGRAPHIC SURVEY INCLUDES THE NORTHERN PORTION OF THE SUBJECT PROPERTY FROM THE EXISTING CLUBHOUSE BUILDING NORTHWARD TO EAGLE ROCK AVENUE; REFER TO THE SURVEY PLANS FOR THE EXTENTS.
2. HORIZONTAL DATUM REFERENCED TO THE NEW JERSEY STATE PLANE COORDINATES (NAD 83).
3. ELEVATIONS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
4. PROPOSED IMPROVEMENTS AND DESIGN INFORMATION WITHIN THE COUNTY RIGHT-OF-WAY REFERENCED FROM PLANS TITLED "EAGLE ROCK AVENUE ROADWAY IMPROVEMENT PLANS," PREPARED BY LANGAN ENGINEERING & ENVIRONMENTAL SERVICES, LLC.



Date	Description	No.
REVISIONS		

SIGNATURE JOHN COTE DATE SIGNED
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Project
CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS
BLOCK No. 174, LOT No. 1.01
TOWNSHIP OF WEST ORANGE
ESSEX COUNTY **NEW JERSEY**

Drawing Title
EXISTING DRAINAGE SUBAREA MAP

Project No.	Figure
101049802	FG06
Date: OCTOBER 24, 2025	
Drawn By: TEG	
Checked By: MJV	Sheet 1 of 1

LANGAN
Project No. 101049802

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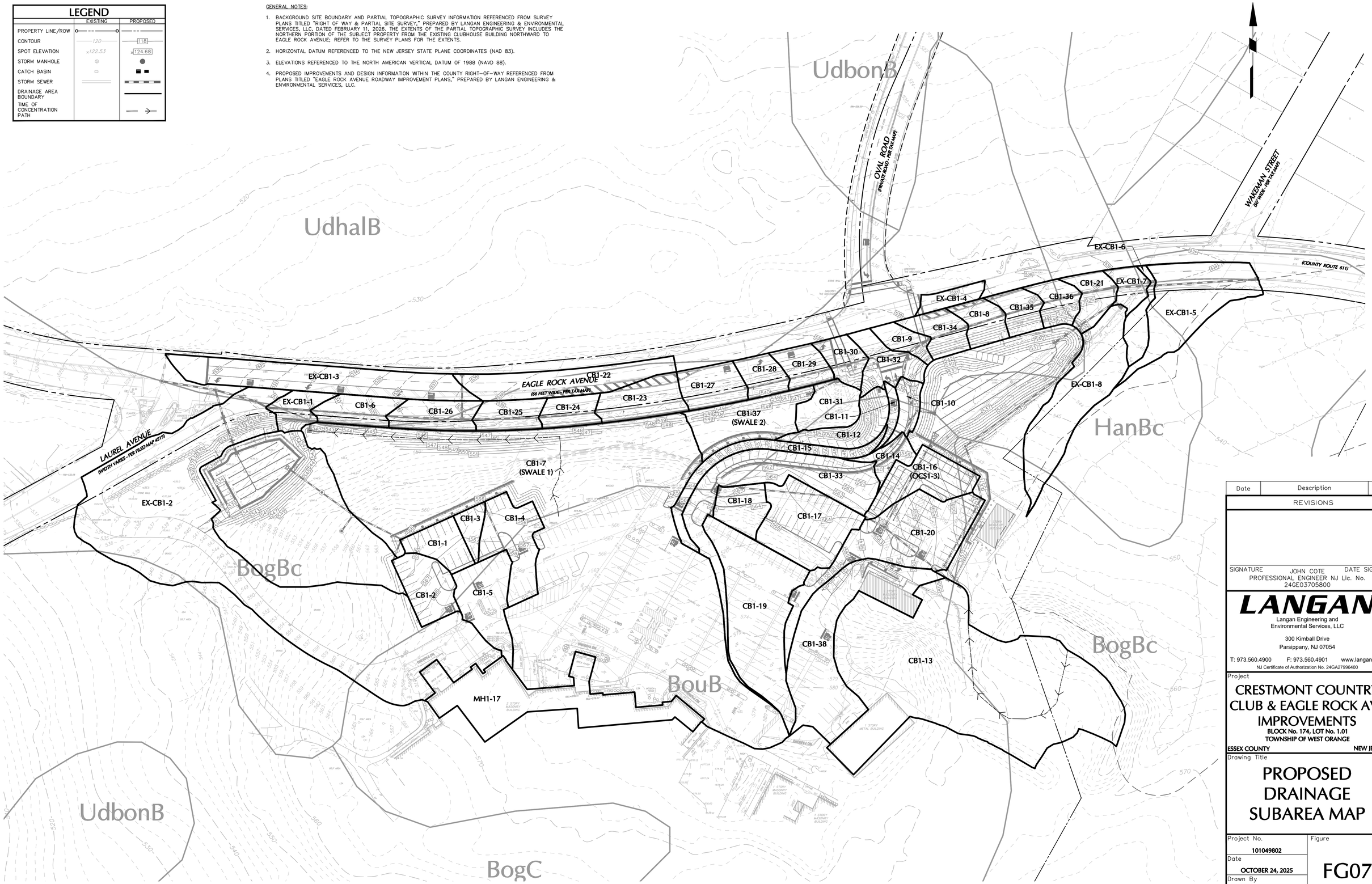
Date: 10/23/2025 Time: 13:22 User: tgreen Style Table: Langan.stb Layout: FG04 Document Code: FG06-101049802-0202-CG101-0101

LEGEND

	EXISTING	PROPOSED
PROPERTY LINE/ROW		
CONTOUR	120	118
SPOT ELEVATION	x122.53	x124.68
STORM MANHOLE		
CATCH BASIN		
STORM SEWER		
DRAINAGE AREA BOUNDARY		
TIME OF CONCENTRATION PATH		

GENERAL NOTES:

1. BACKGROUND SITE BOUNDARY AND PARTIAL TOPOGRAPHIC SURVEY INFORMATION REFERENCED FROM SURVEY PLANS TITLED "RIGHT OF WAY & PARTIAL SITE SURVEY," PREPARED BY LANGAN ENGINEERING & ENVIRONMENTAL SERVICES, LLC, DATED FEBRUARY 11, 2026. THE EXTENTS OF THE PARTIAL TOPOGRAPHIC SURVEY INCLUDES THE NORTHERN PORTION OF THE SUBJECT PROPERTY FROM THE EXISTING CLUBHOUSE BUILDING NORTHWARD TO EAGLE ROCK AVENUE; REFER TO THE SURVEY PLANS FOR THE EXTENTS.
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SCALE IN FEET

Date	Description	No.
REVISIONS		

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

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Project
CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS
BLOCK No. 174, LOT No. 1.01
TOWNSHIP OF WEST ORANGE
ESSEX COUNTY NEW JERSEY

Drawing Title
PROPOSED DRAINAGE SUBAREA MAP

Project No.	Figure
101049802	FG07
Date: OCTOBER 24, 2025	
Drawn By: TEG	
Checked By: MJV	Sheet 1 of 1

Project No. 101049802

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Required Water Quality Treatment Areas		
	Condition	**AC**
	Existing Motor Vehicle Surface to Proposed Motor Vehicle Surface (50% TSS Removal)	0.63
	Existing Non-Motor Vehicle Surface to Proposed Motor Vehicle Surface (80% TSS Removal)	0.85

GENERAL NOTES:

1. BACKGROUND SITE BOUNDARY AND PARTIAL TOPOGRAPHIC SURVEY INFORMATION REFERENCED FROM SURVEY PLANS TITLED "RIGHT OF WAY & PARTIAL SITE SURVEY," PREPARED BY LANGAN ENGINEERING & ENVIRONMENTAL SERVICES, LLC, DATED FEBRUARY 11, 2026. THE EXTENTS OF THE PARTIAL TOPOGRAPHIC SURVEY INCLUDES THE NORTHERN PORTION OF THE SUBJECT PROPERTY FROM THE EXISTING CLUBHOUSE BUILDING NORTHWARD TO EAGLE ROCK AVENUE; REFER TO THE SURVEY PLANS FOR THE EXTENTS.
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EAGLE ROCK AVENUE
(66 FEET WIDE; PER TAX MAP)

LAUREL AVENUE
(WIDTH VARIES - PER FILED MAP 4519)

OVAL ROAD
(PRIVATE ROAD - PER TAX MAP)

WAKEMAN STREET
(60' WIDE - PER TAX MAP)

(COUNTY ROUTE 611)

LIMIT OF DISTURBANCE (TYP.)

UdbonB
UdhalB
HanBc
BogBc
BouB
BogC

SCALE IN FEET
50 0 25 50

Date	Description	No.
REVISIONS		

SIGNATURE JOHN COTE DATE SIGNED
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Project
CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS
BLOCK No. 174, LOT No. 1.01
TOWNSHIP OF WEST ORANGE
ESSEX COUNTY NEW JERSEY

Drawing Title
REQUIRED WATER QUALITY TREATMENT MAP

Project No.	Figure
101049802	FG08
Date: OCTOBER 24, 2025	
Drawn By: TEG	
Checked By: MJV	Sheet 1 of 1

LANGAN
Project No. 101049802

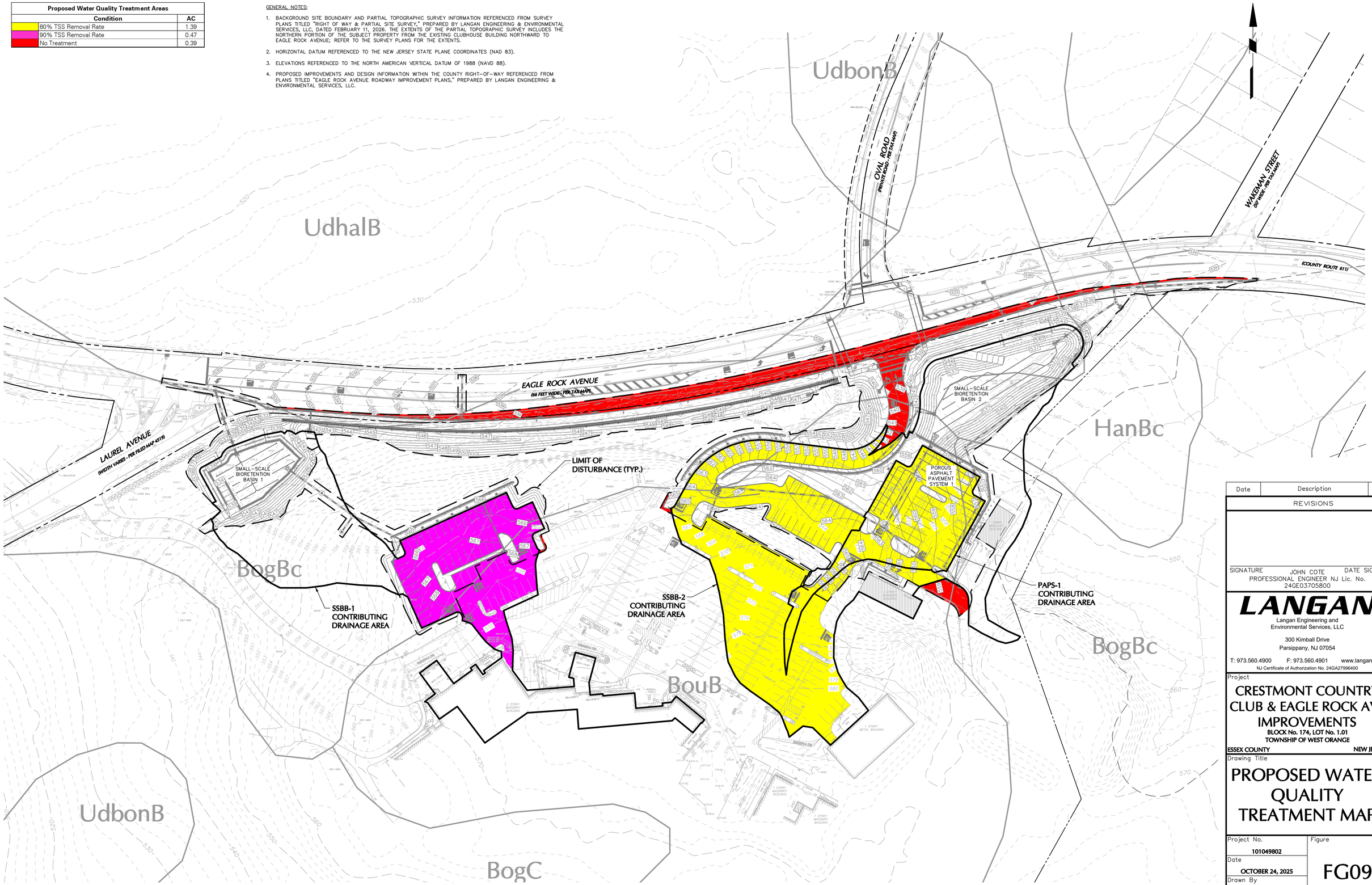
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Proposed Water Quality Treatment Areas	
Condition	**AC**
80% TSS Removal Rate	1.39
90% TSS Removal Rate	0.47
No Treatment	0.39

GENERAL NOTES:

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Date	Description	No.
REVISIONS		

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Project
CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS
BLOCK No. 174, LOT No. 1.01
TOWNSHIP OF WEST ORANGE
ESSEX COUNTY NEW JERSEY

Drawing Title
PROPOSED WATER QUALITY TREATMENT MAP

Project No.	Figure
101049802	FG09
Date: OCTOBER 24, 2025	
Drawn By: TEG	
Checked By: MJV	Sheet 1 of 1

LANGAN
Project No. 101049802

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Date: 3/5/2026 Time: 10:22 User: tgreen Style Table: Langan.stb Layout: FG09 Document Code: FG09-101049802-0202-CG101-0101

LEGEND

TP-1	APPROXIMATE LOCATION OF PROFILE TEST PIT WITH TUBE PERMEAMETER TESTING WITHIN THE UPPER 40 INCHES
TP-2	APPROXIMATE LOCATION OF PROFILE TEST PIT

GENERAL NOTES:

1. BACKGROUND SITE BOUNDARY AND PARTIAL TOPOGRAPHIC SURVEY INFORMATION REFERENCED FROM SURVEY PLANS TITLED "RIGHT OF WAY & PARTIAL SITE SURVEY," PREPARED BY LANGAN ENGINEERING & ENVIRONMENTAL SERVICES, LLC, DATED FEBRUARY 11, 2026. THE EXTENTS OF THE PARTIAL TOPOGRAPHIC SURVEY INCLUDES THE NORTHERN PORTION OF THE SUBJECT PROPERTY FROM THE EXISTING CLUBHOUSE BUILDING NORTHWARD TO EAGLE ROCK AVENUE; REFER TO THE SURVEY PLANS FOR THE EXTENTS.
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EAGLE ROCK AVENUE
(66 FEET WIDE; PER TAX MAP)

LAUREL AVENUE
(WIDTH VARIES - PER FILED MAP 4519)

OVAL ROAD
(PRIVATE ROAD - PER TAX MAP)

WAKEMAN STREET
(60' WIDE - PER TAX MAP)

(COUNTY ROUTE 611)

LIMIT OF DISTURBANCE (TYP.)

SMALL-SCALE BIORETENTION BASIN 1

SMALL-SCALE BIORETENTION BASIN 2

POROUS ASPHALT PAVEMENT SYSTEM 1

UdbonB
UdhalB
BogBc
BouB
HanBc
BogC

TP-1 TP-2 TP-3 TP-4 TP-5 TP-6 TP-7 TP-8 TP-9 TP-10 TP-11 TP-12 TP-13 TP-14 TP-15 TP-16 TP-17 TP-18 TP-19 TP-20 TP-21

50 0 25 50
SCALE IN FEET

Date	Description	No.
REVISIONS		

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

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Project
CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS
BLOCK No. 174, LOT No. 1.01
TOWNSHIP OF WEST ORANGE
ESSEX COUNTY NEW JERSEY

Drawing Title
TEST PIT LOCATION PLAN

Project No. 101049802	Figure FG10
Date OCTOBER 24, 2025	
Drawn By TEG	
Checked By MJV	Sheet 1 of 1

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Date: 3/5/2026 Time: 10:29 User: tgreen Style Table: Langan.stb Layout: FG10 Document Code: FG10-101049802-0202-CG101-0101

LANGAN Project No. 101049802

DRAWINGS

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.

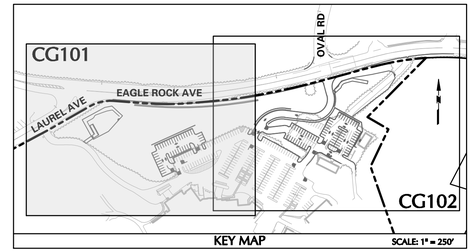
15. SITE GRADING SHALL NOT PROCEED UNTIL ALL EROSION CONTROL MEASURES HAVE BEEN INSTALLED.

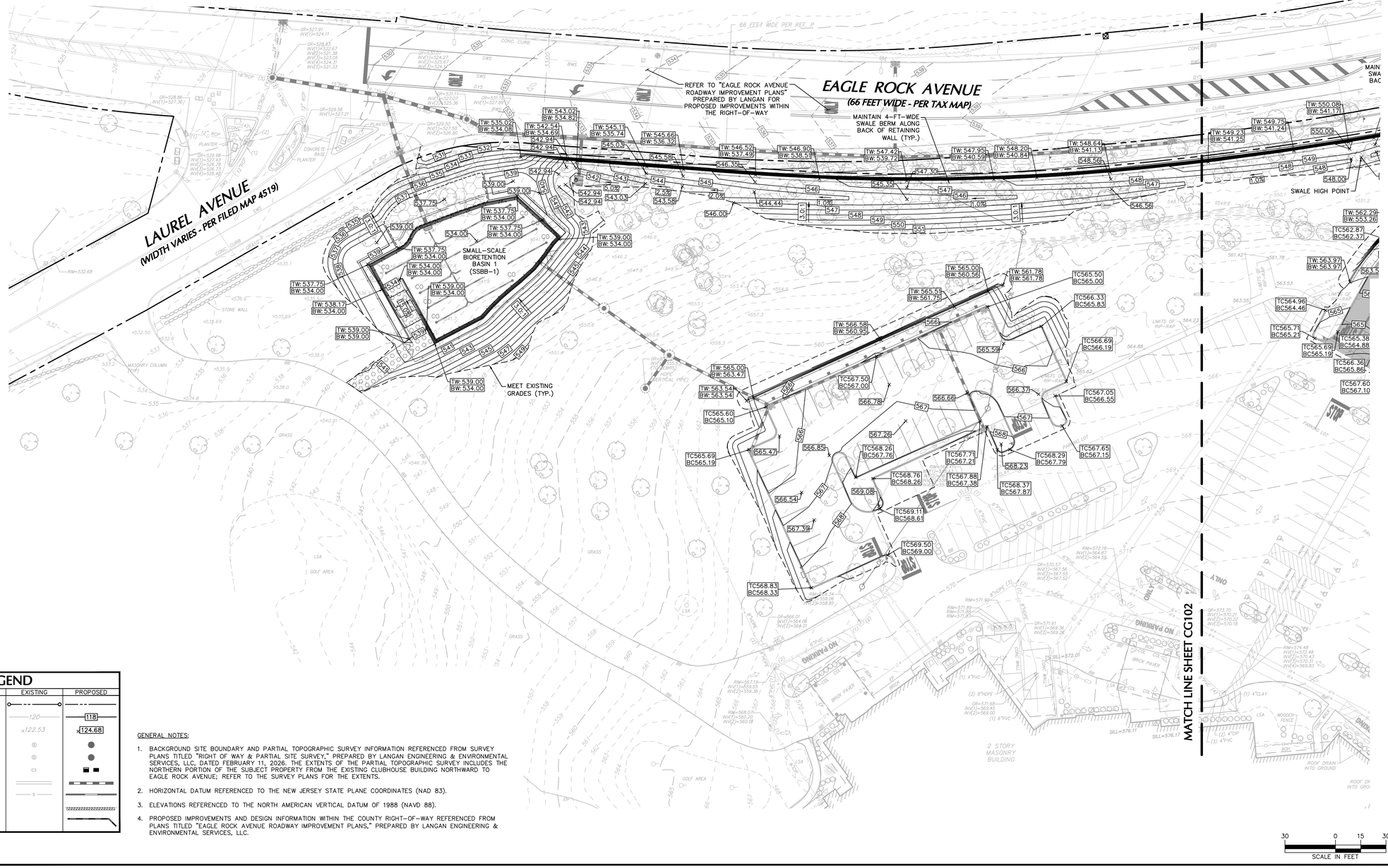
16. CONTRACTOR SHALL PROVIDE WRITTEN REQUESTS FOR INFORMATION TO THE OWNER AND OWNER'S ENGINEER PRIOR TO THE CONSTRUCTION OF ANY SPECIFIC SITEWORK ITEM IF ANY SPECIFIC SITEWORK ITEM DEPICTED ON THE PLANS WARRANTS ADDITIONAL INFORMATION REQUIRED FOR CONSTRUCTION AND IS NOT RELATED TO MEANS AND METHODS 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%.

18. PROPOSED RCP PIPE IS TO BE CLASS V PIPE.

19. ALL PIPE WITH A BURIAL DEPTH OF 20 FEET OR GREATER SHALL BE SMOOTH INTERIOR CORRUGATED METAL PIPE.





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–	–	–
–	–	–
Date	Description	No.

REVISIONS

STATE OF NEW JERSEY JOHN C. COTE NO. 24GE03705800

SIGNATURE JOHN COTE DATE SIGNED 2/12/2026

PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800

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NJ Certificate of Authorization No. 24GA27996400

Project

CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS

BLOCK No. 174, LOT No. 1.01

TOWNSHIP OF WEST ORANGE

ESSEX COUNTY NEW JERSEY

Drawing Title

PARTIAL GRADING PLAN

Project No. 101049802	Drawing No. CG101
Date FEBRUARY 12, 2026	
Drawn By TEG	
Checked By MJV	Sheet 12 of 36

LEGEND

	EXISTING	PROPOSED
PROPERTY LINE/ROW		
CONTOUR	120	118
SPOT ELEVATION	x122.53	124.68
STORM MANHOLE		
SANITARY MANHOLE		
CATCH BASIN		
STORM SEWER		
SANITARY SEWER	S	
RETAINING WALL		
ROOF DRAIN/ UNDERDRAIN		

GENERAL NOTES:

1. BACKGROUND SITE BOUNDARY AND PARTIAL TOPOGRAPHIC SURVEY INFORMATION REFERENCED FROM SURVEY PLANS TITLED "RIGHT OF WAY & PARTIAL SITE SURVEY," PREPARED BY LANGAN ENGINEERING & ENVIRONMENTAL SERVICES, LLC, DATED FEBRUARY 11, 2026. THE EXTENTS OF THE PARTIAL TOPOGRAPHIC SURVEY INCLUDES THE NORTHERN PORTION OF THE SUBJECT PROPERTY FROM THE EXISTING CLUBHOUSE BUILDING NORTHWARD TO EAGLE ROCK AVENUE; REFER TO THE SURVEY PLANS FOR THE EXTENTS.

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3. ELEVATIONS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

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SCALE IN FEET

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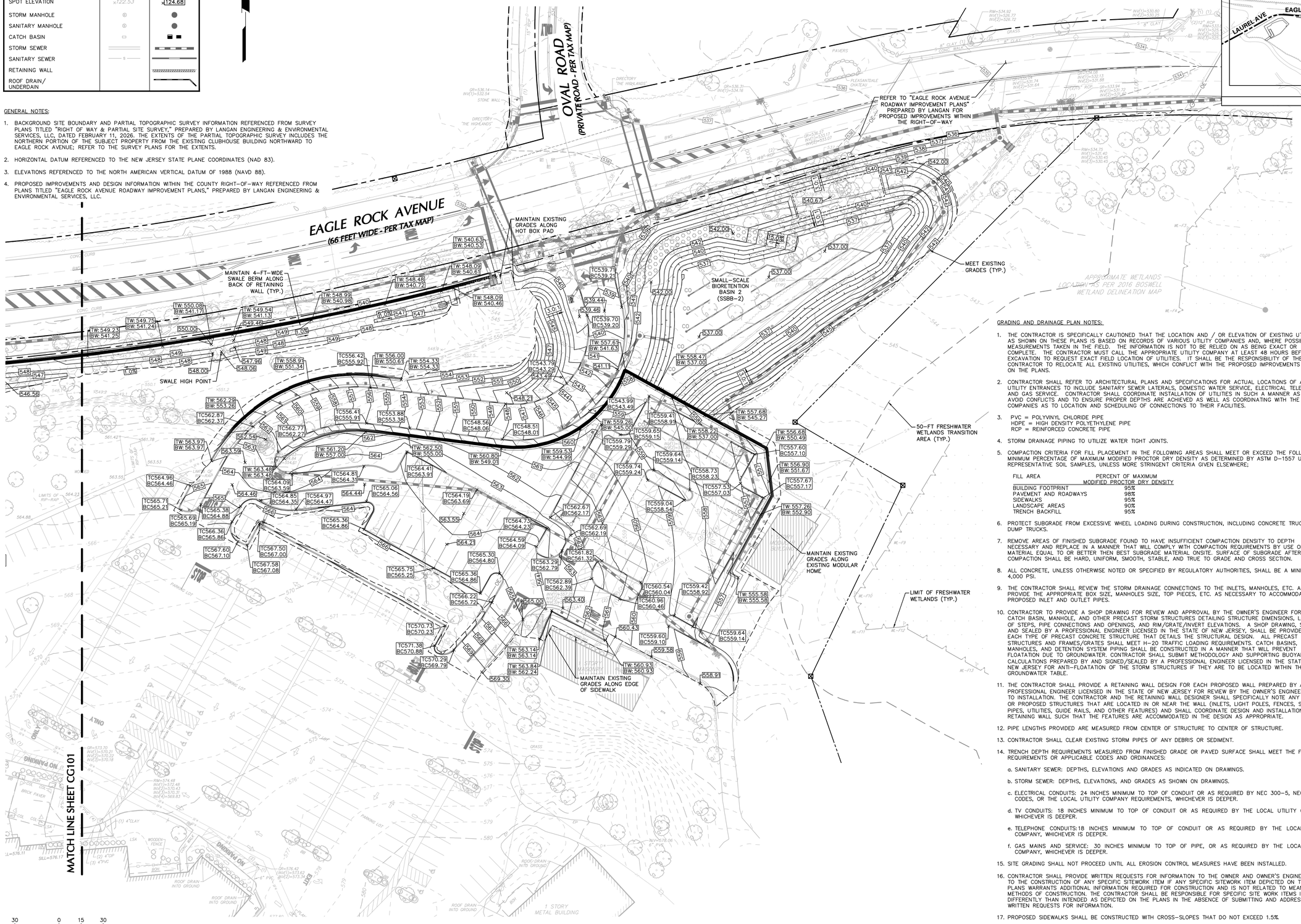
LANGAN Project No. 101049802

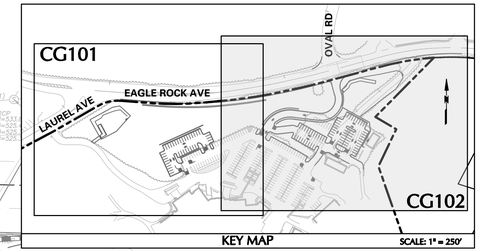
LEGEND

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

GENERAL NOTES:

1. BACKGROUND SITE BOUNDARY AND PARTIAL TOPOGRAPHIC SURVEY INFORMATION REFERENCED FROM SURVEY PLANS TITLED "RIGHT OF WAY & PARTIAL SITE SURVEY," PREPARED BY LANGAN ENGINEERING & ENVIRONMENTAL SERVICES, LLC, DATED FEBRUARY 11, 2026. THE EXTENTS OF THE PARTIAL TOPOGRAPHIC SURVEY INCLUDES THE NORTHERN PORTION OF THE SUBJECT PROPERTY FROM THE EXISTING CLUBHOUSE BUILDING NORTHWARD TO EAGLE ROCK AVENUE; REFER TO THE SURVEY PLANS FOR THE EXTENTS.
2. HORIZONTAL DATUM REFERENCED TO THE NEW JERSEY STATE PLANE COORDINATES (NAD 83).
3. ELEVATIONS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
4. PROPOSED IMPROVEMENTS AND DESIGN INFORMATION WITHIN THE COUNTY RIGHT-OF-WAY REFERENCED FROM PLANS TITLED "EAGLE ROCK AVENUE ROADWAY IMPROVEMENT PLANS," PREPARED BY LANGAN ENGINEERING & ENVIRONMENTAL SERVICES, LLC.





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.
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Date	Description	No.

REVISIONS

STATE OF NEW JERSEY JOHN G. COTE Lic. 37058

SIGNATURE — JOHN COTE, PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800 — DATE SIGNED 2/12/2026

LANGAN
Langan Engineering and Environmental Services, LLC
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ Certificate of Authorization No. 24GA27996400

Project
CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS
BLOCK No. 174, LOT No. 1.01
TOWNSHIP OF WEST ORANGE
ESSEX COUNTY NEW JERSEY

Drawing Title
PARTIAL GRADING PLAN

Project No. 101049802	Drawing No. CG102
Date FEBRUARY 12, 2026	
Drawn By TEG	
Checked By MJV	Sheet 13 of 36

LANGAN
Project No. 101049802
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GRADING AND DRAINAGE PLAN NOTES:

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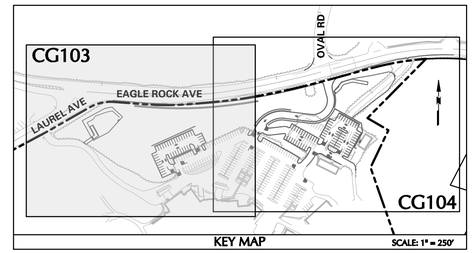
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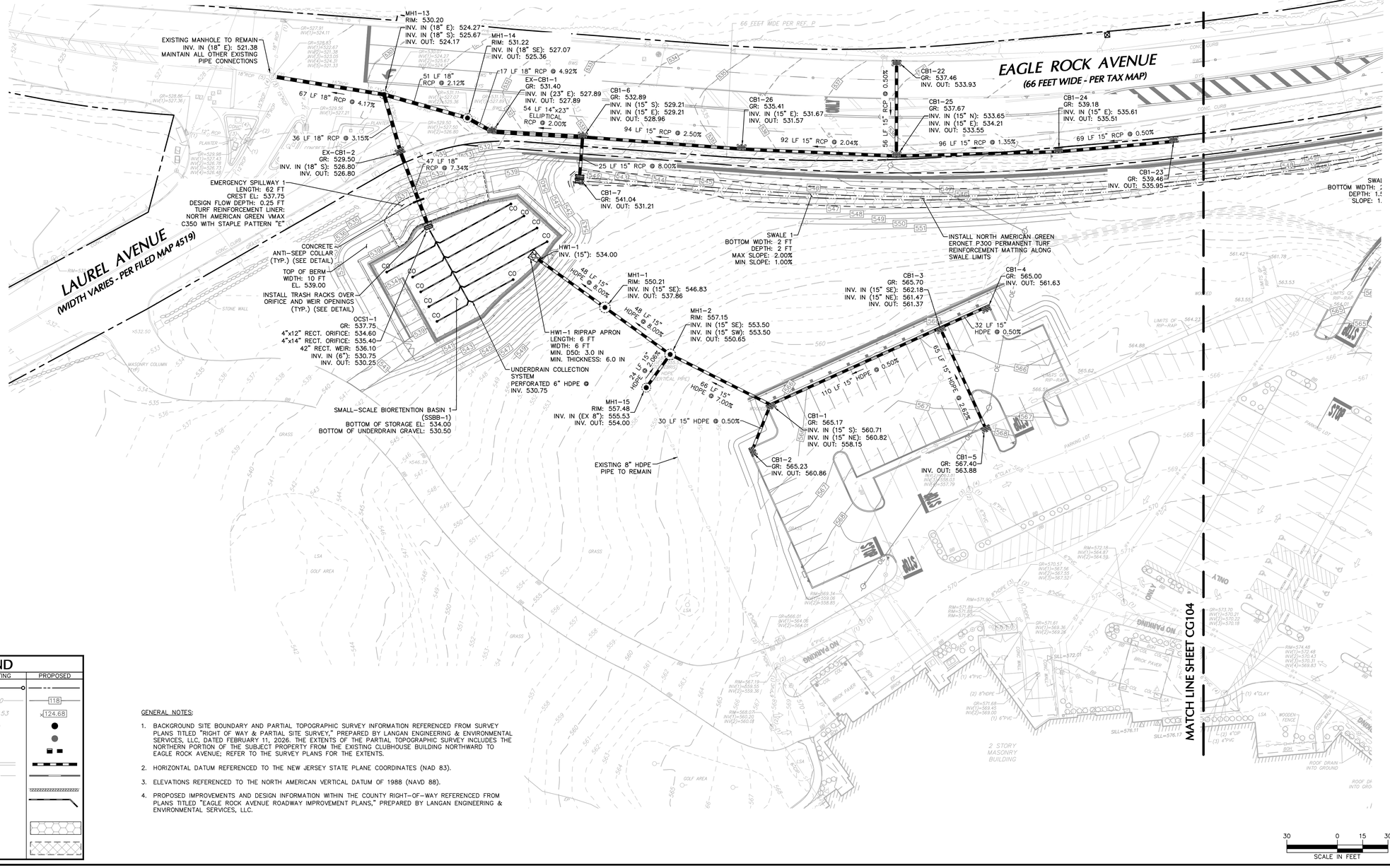
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LEGEND

	EXISTING	PROPOSED
PROPERTY LINE/ROW		
CONTOUR	120	118
SPOT ELEVATION	x122.53	x124.68
STORM MANHOLE		
SANITARY MANHOLE		
CATCH BASIN		
STORM SEWER		
SANITARY SEWER		
RETAINING WALL		
ROOF DRAIN/ UNDERDRAIN		
TURF REINFORCEMENT LINER		
POROUS ASPHALT PAVEMENT		

GENERAL NOTES:

1. BACKGROUND SITE BOUNDARY AND PARTIAL TOPOGRAPHIC SURVEY INFORMATION REFERENCED FROM SURVEY PLANS TITLED "RIGHT OF WAY & PARTIAL SITE SURVEY," PREPARED BY LANGAN ENGINEERING & ENVIRONMENTAL SERVICES, LLC, DATED FEBRUARY 11, 2026. THE EXTENTS OF THE PARTIAL TOPOGRAPHIC SURVEY INCLUDES THE NORTHERN PORTION OF THE SUBJECT PROPERTY FROM THE EXISTING CLUBHOUSE BUILDING NORTHWARD TO EAGLE ROCK AVENUE; REFER TO THE SURVEY PLANS FOR THE EXTENTS.

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No.	Description	Date

REVISIONS

STATE OF NEW JERSEY JOHN P. COTE 37056

SIGNATURE 2/12/2026 DATE SIGNED

JOHN COTE, PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800

LANGAN
Langan Engineering and Environmental Services, LLC
300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ Certificate of Authorization No. 24GA27996400

Project

CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS
BLOCK No. 174, LOT No. 1.01
TOWNSHIP OF WEST ORANGE
ESSEX COUNTY NEW JERSEY

Drawing Title

PARTIAL DRAINAGE PLAN

Project No. 101049802	Drawing No. CG103
Date FEBRUARY 12, 2026	
Drawn By TEG	
Checked By MJV	Sheet 14 of 36

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Project No. 101049802

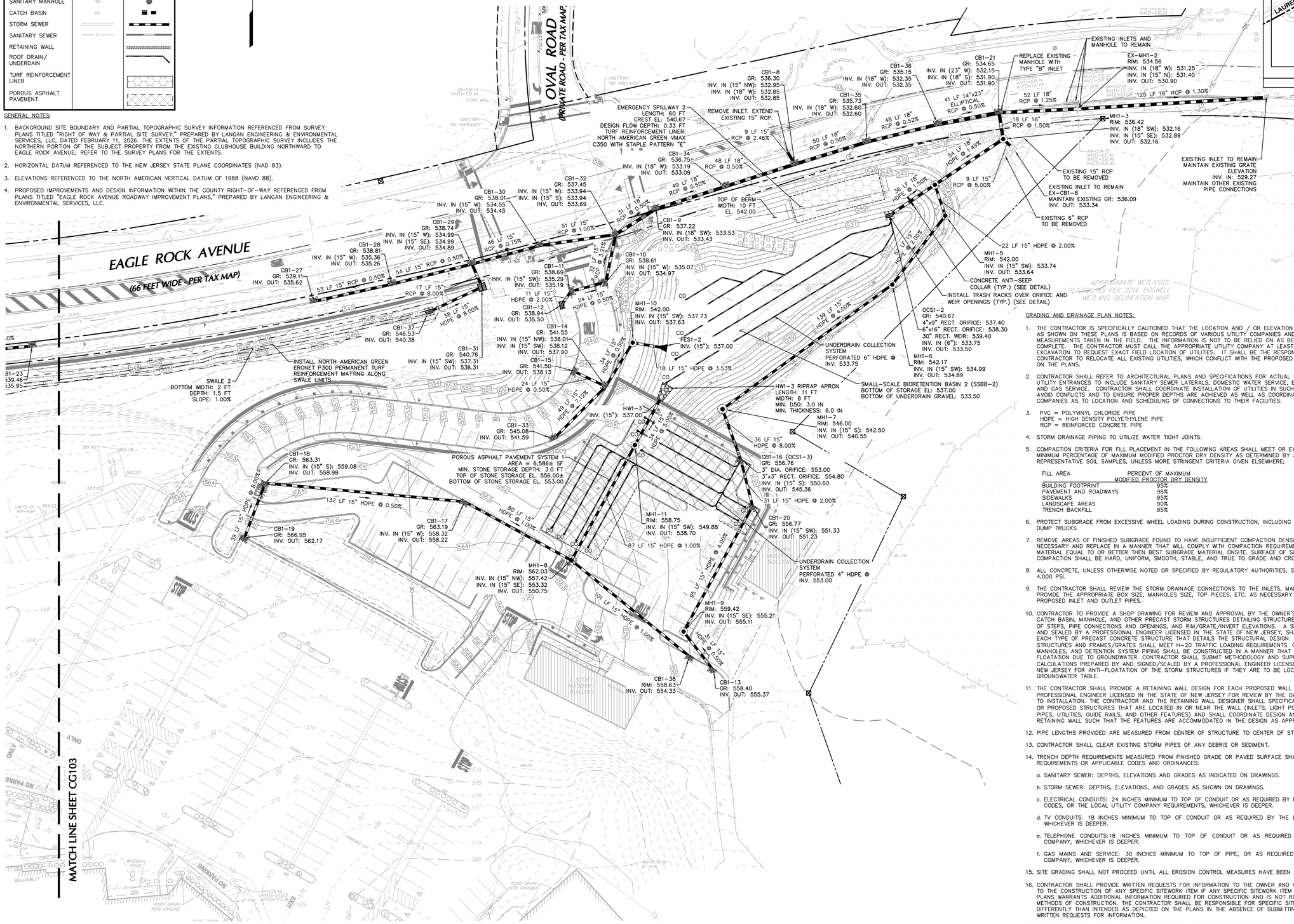
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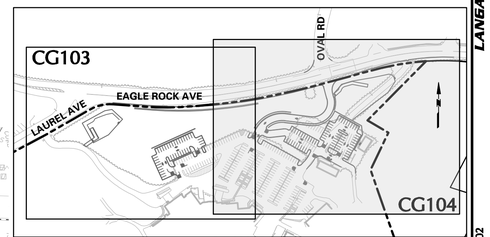
LEGEND

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    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%
18. PROPOSED RCP PIPE IS TO BE CLASS V PIPE.
19. ALL PIPE WITH A BURIAL DEPTH OF 20 FEET OR GREATER SHALL BE SMOOTH INTERIOR CORRUGATED METAL PIPE.

No.	Description	Date
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REVISIONS

STATE OF NEW JERSEY JOHN G. COTE 37058

SIGNATURE JOHN COTE DATE SIGNED 2/12/2026
PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800

LANGAN
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NJ Certificate of Authorization No. 24GA27996400

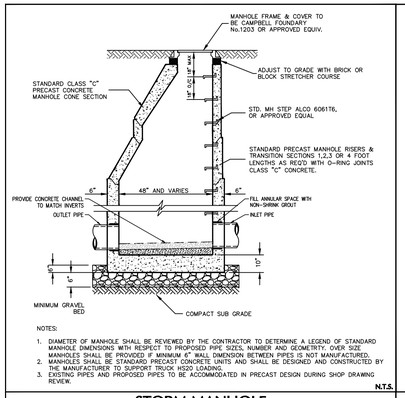
Project
CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS
BLOCK No. 174, LOT No. 1.01
TOWNSHIP OF WEST ORANGE
ESSEX COUNTY NEW JERSEY

Drawing Title
PARTIAL DRAINAGE PLAN

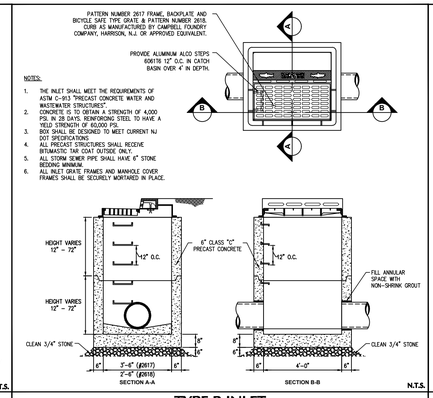
Project No. 101049802	Drawing No. CG104
Date FEBRUARY 12, 2026	
Drawn By TEG	
Checked By MJV	Sheet 15 of 36

Project No. 101049802

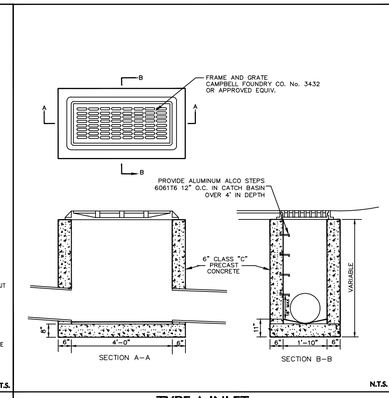
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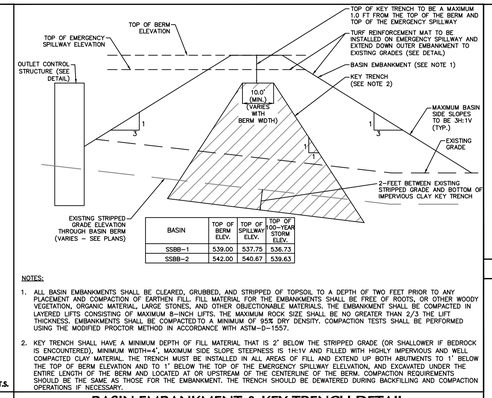
STORM MANHOLE



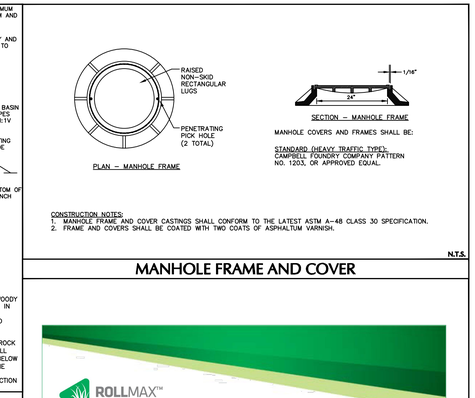
TYPE B INLET



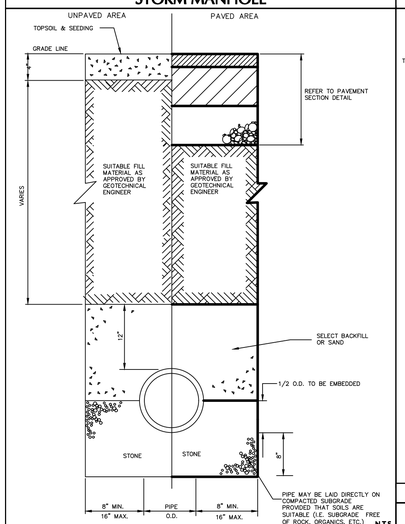
TYPE A INLET



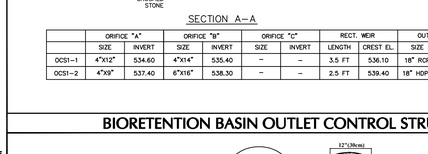
BASIN EMBANKMENT & KEY TRENCH DETAIL



MANHOLE FRAME AND COVER



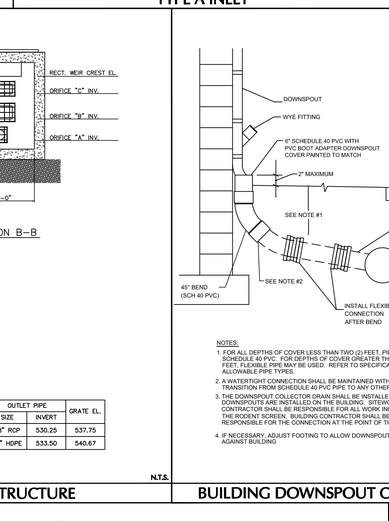
STORM SEWER TRENCH AND BEDDING



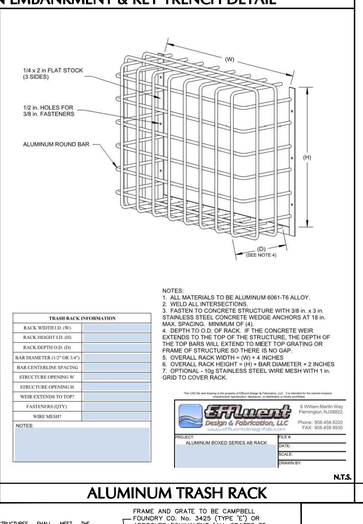
	ORIFICE "A"		ORIFICE "B"		ORIFICE "C"		RECT. WEIR		OUTLET PIPE		GRATE EL.
	SIZE	INVERT	SIZE	INVERT	SIZE	INVERT	LENGTH	CREST EL.	SIZE	INVERT	
OCS1-1	4"X12"	534.60	4"X14"	535.40	–	–	3.5 FT	536.10	18" RCP	530.25	537.75
OCS1-2	4"X9"	537.40	6"X16"	538.30	–	–	2.5 FT	539.40	18" HDPE	533.50	540.67

N.T.S.

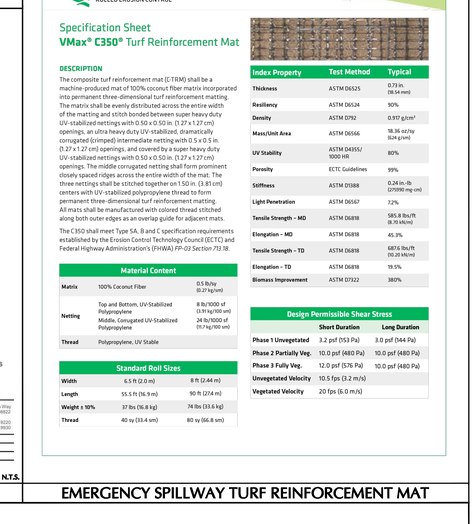
BIORETENTION BASIN OUTLET CONTROL STRUCTURE



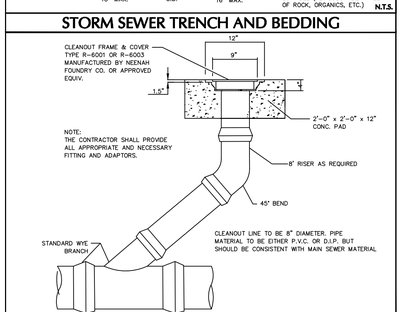
BUILDING DOWNSPOUT CONNECTION



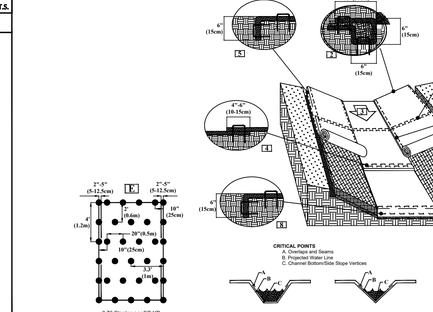
ALUMINUM TRASH RACK



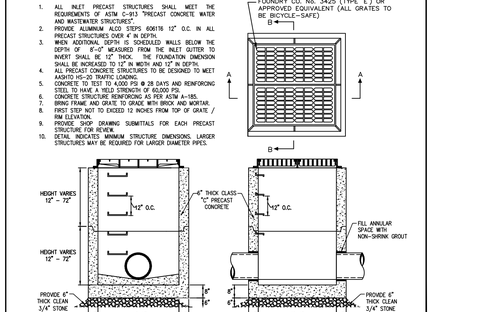
EMERGENCY SPILLWAY TURF REINFORCEMENT MAT



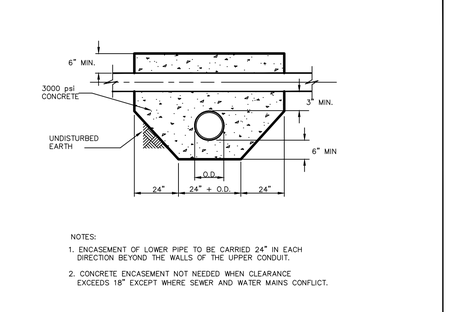
STORM CLEANOUT



TURF REINFORCEMENT MAT INSTALLATION DETAIL



TYPE E INLET



UTILITY CROSSING

No.	Description	Date
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REVISIONS

STATE OF NEW JERSEY JOHN E. COTE 24GE03705800

SIGNATURE JOHN COTE DATE SIGNED 2/12/2026

PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800

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NJ Certificate of Authorization No. 24GA27996400

Project
CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS
BLOCK No. 174, LOT No. 1.01
TOWNSHIP of WEST ORANGE
ESSEX COUNTY NEW JERSEY

Drawing Title
DRAINAGE DETAILS

Project No.	101049802
Date	FEBRUARY 12, 2026
Drawn By	JS
Checked By	MJV

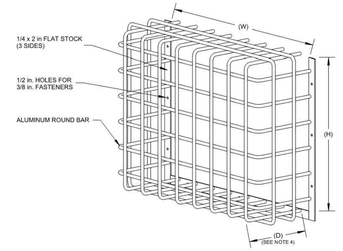
Drawing No. CG501

Sheet 21 of 36

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Project No. 101049802



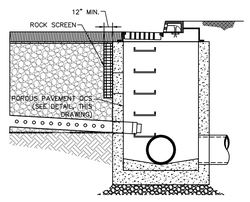
TRASH RACK INFORMATION	
RACK WIDTH (W)	
RACK HEIGHT I.D. (H)	
RACK DEPTH O.D. (D)	
BAR DIAMETER (1/2" OR 3/4")	
BAR CENTERLINE SPACING	
STRUCTURE OPENING W	
STRUCTURE OPENING H	
WEIR EXTENDS TO TOP?	
FASTENERS (QTY)	
WIRE MESH?	
NOTES:	

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.

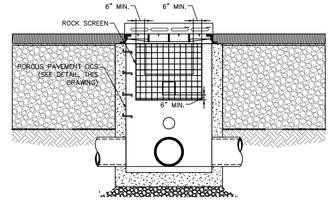
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Effluent Design & Fabrication, LLC
Innovative Solutions for Wastewater Treatment
6 William Martin Way
Flemington, NJ 08822
Phone: 908.458.9220
FAX: 908.458.9930

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



SECTION A–A

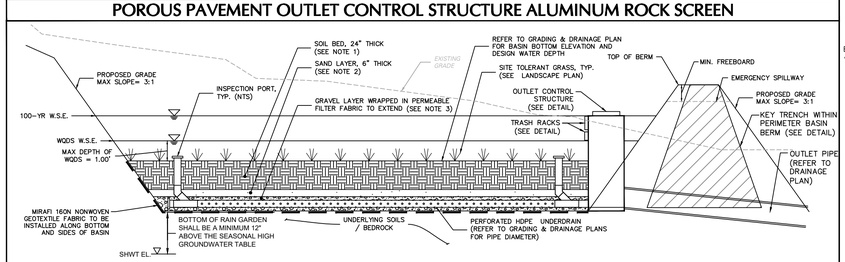


SECTION B–B

NOTES:
1. MAX OPENING BETWEEN PARALLEL BARS TO BE 2"
2. ROCK SCREEN TO EXTEND MIN. 6" 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.

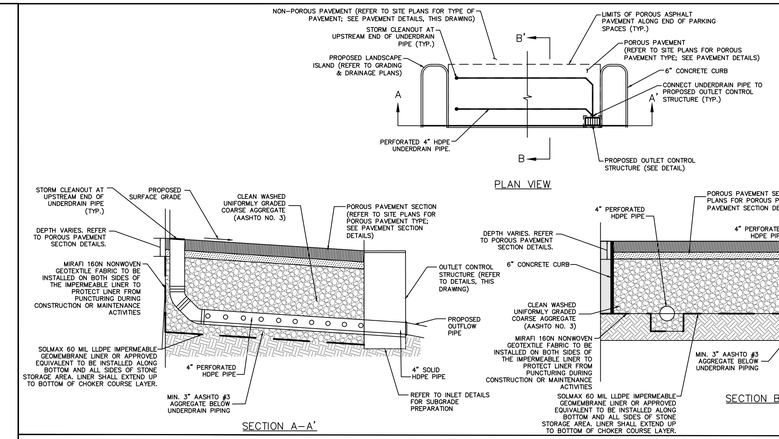
POROUS PAVEMENT OUTLET CONTROL STRUCTURE ALUMINUM ROCK SCREEN



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.
   1.5. THE MIXED SOIL MEDIA SHALL HAVE A MINIMUM FIELD-MEASURED INFILTRATION RATE OF 3 IN/HR AND MAXIMUM FIELD-MEASURED INFILTRATION RATE OF 6 IN/HR
2. SAND LAYER SPECIFICATIONS
   2.1. THE SAND LAYER MUST BE AT LEAST 6 INCHES IN DEPTH AND MUST 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. FLEXIBLE CORRUGATED PERFORATED PLASTIC DRAIN PIPE SHOULD NOT BE USED AS UNDERDRAIN PIPE.
5. REFER TO THE GRADING & DRAINAGE PLANS FOR BIORETENTION BASIN ELEVATIONS, PIPE INVERTS, AND GRATE ELEVATIONS.
6. REFER TO THE OUTLET CONTROL STRUCTURE DETAIL FOR SPECIFICATIONS.
7. REFER TO LANDSCAPING PLANS AND DETAILS FOR PROPOSED PLANTINGS WITHIN BIORETENTION BASIN AND FOR PLANTING SOIL DETAILS AND SPECIFICATIONS.
8. ALL INLET AND OUTLET PIPE PENETRATIONS INTO THE EMBANKMENT SLOPES OF THE BASIN SHALL INCLUDE A PRECAST CONCRETE ANTI-SEEP COLLAR OR APPROVED EQUIVALENT BY THE PROJECT GEOTECHNICAL ENGINEER IN ORDER TO REDUCE POTENTIAL MIGRATION OF WATER OUTSIDE OF THE BASIN.

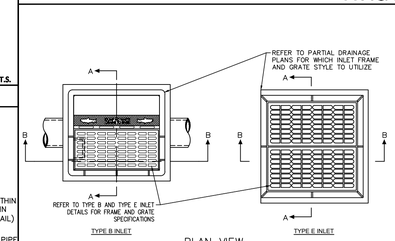
N.T.S.

UNDERDRAINED BIORETENTION BASIN TYPICAL CROSS SECTION

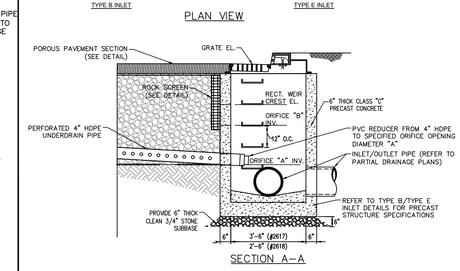


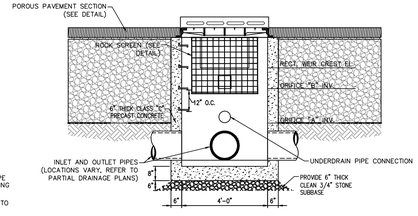
N.T.S.

TYPICAL POROUS PAVEMENT CROSS SECTION DETAIL

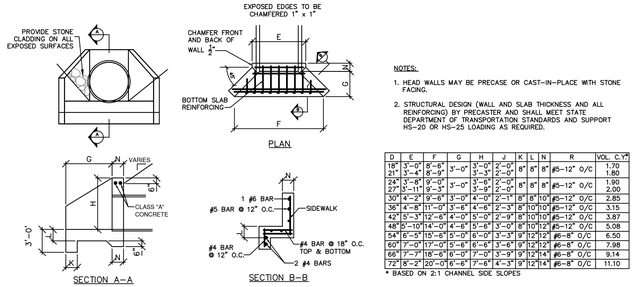


	ORIFICE "A"		ORIFICE "B"		RECT. WEIR		INLET PIPE		OUTLET PIPE		GRATE EL.
	SIZE	INVERT	SIZE	INVERT	LENGTH	CREST EL.	SIZE	INVERT	SIZE	INVERT	
OCS1-3	3.0" DIA.	553.00	3"x3"	554.80	–	–	15" HDPE	550.62	15" HDPE	545.36	556.76





POROUS PAVEMENT SYSTEM OUTLET CONTROL STRUCTURE



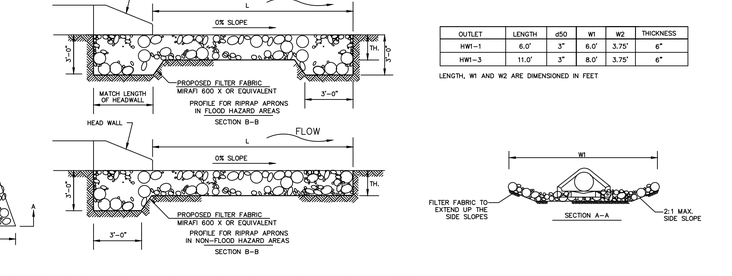
NOTES:
1. HEAD WALLS MAY BE PRECASE OR CAST-IN-PLACE WITH STONE FACING.
2. STRUCTURAL DESIGN (WALL AND SLAB THICKNESS AND ALL REINFORCING) BY PRECASTER AND SHALL MEET STATE DEPARTMENT OF TRANSPORTATION STANDARDS AND SUPPORT HS-20 OR HS-25 LOADING AS REQUIRED.

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"	8"	#5-12" O/C	1.70
21"	3'-4"	8'-9"	3'-0"	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'-0"	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'-3"	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



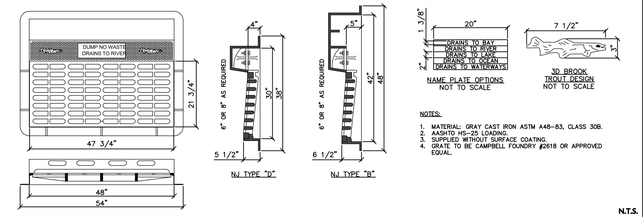
OUTLET	LENGTH	d50	W1	W2	THICKNESS
HW1-1	6.0'	3"	6.0'	3.75'	6"
HW1-3	11.0'	3"	8.0'	3.75'	6"

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.

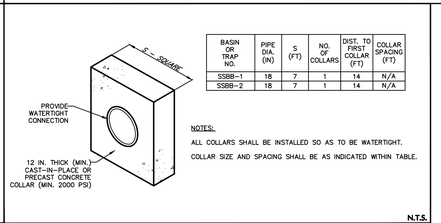
RIPRAP APRON



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

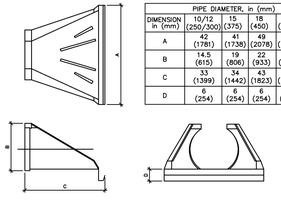


BASIN OR TRAP NO.	PIPE DIA. (IN)	S (FT)	NO. OF COLLARS	DIST. TO FIRST COLLAR (FT)	COLLAR SPACING (FT)
SSBB-1	18	7	1	14	N/A
SSBB-2	18	7	1	14	N/A

NOTES:
ALL COLLARS SHALL BE INSTALLED SO AS TO BE WATERTIGHT.
COLLAR SIZE AND SPACING SHALL BE AS INDICATED WITHIN TABLE.

N.T.S.

CONCRETE ANTI-SEEP COLLAR



PIPE DIAMETER, in (mm)						
DIMENSION in (mm)	10/12 (250/300)	15 (375)	18 (450)	24 (600)	30 (750)	36 (900)
A	42 (1781)	41 (1738)	49 (2078)	59.5 (2523)	88 (3731)	88 (3731)
B	14.5 (615)	19 (806)	22 (933)	28 (1187)	36 (1526)	43 (1823)
C	33 (1399)	34 (1442)	43 (1823)	48 (2035)	63.5 (2692)	66.5 (2820)
D	6 (254)	6 (254)	6 (254)	6 (254)	6 (254)	6 (254)

SCOPE:

THIS SPECIFICATION DESCRIBES 10-THROUGH 36-INCH (250 TO 900 mm) HI-Q FLARED END SECTIONS FOR USE IN CULVERT AND DRAINAGE OUTLET APPLICATIONS.

REQUIREMENTS:

THE INVERT OF THE PIPE AND THE END SECTION SHALL BE AT THE SAME ELEVATION. HI-Q FLARED END SECTION SHALL BE HIGH DENSITY POLYETHYLENE MEETING ASTM D3350 MINIMUM CELL CLASSIFICATION 213320C. EACH END SECTION SHALL HAVE A CARBON BLACK ADDITIVE FOR UV PROTECTION. THE METAL THREADED FASTENER SHALL BE STAINLESS STEEL.

INSTALLATION:

INSTALLATION SHALL BE IN ACCORDANCE WITH HANCOR INSTALLATION INSTRUCTIONS AND WITH THOSE ISSUED BY STATE OR LOCAL AUTHORITIES.

N.T.S.

HDPE FLARED END SECTION

–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
–	–	–
Date	Description	No.

REVISIONS

STATE OF NEW JERSEY · JOHN C. COTE · No. 37058

SIGNATURE — JOHN C. COTE, PROFESSIONAL ENGINEER NJ Lic. No. 24GE03705800 — DATE SIGNED 2/12/2026

LANGAN
Langan Engineering and Environmental Services, LLC
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Parsippany, NJ 07054
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NJ Certificate of Authorization No. 24GA27996400

Project
CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS
BLOCK No. 174, LOT No. 1.01
TOWNSHIP OF WEST ORANGE
ESSEX COUNTY NEW JERSEY

Drawing Title
DRAINAGE DETAILS

Project No.	Drawing No.
101049802	CG502
Date: FEBRUARY 12, 2026	
Drawn By: JS	
Checked By: MJV	Sheet 22 of 36

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LANGAN Project No. 101049802

Date: 3/4/2026 Time: 18:16 User: tgreen Style Table: Langan.stb Layout: CG502 Document Code: 101049802-0102-CG501-0102

APPENDIX A

Existing Stormwater Discharge Calculations

APPENDIX A
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NOAA RAINFALL PRECIPITATION DATA

NOAA REGION D RAINFALL DISTRIBUTION

EXISTING RUNOFF CURVE NUMBER CALCULATIONS

CURRENT HYDROGRAPH CALCULATIONS

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

- **EX-1-DISTURBED WATERSHED ALLOWABLE PEAK DISCHARGE**
  - **2 Year Design Storm Event**
  - **10 Year Design Storm Event**
  - **100 Year Design Storm Event**

- **EX-1-UNDISTURBED 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-1**
  - **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-2-DISTURBED WATERSHED**
  - **Time of Concentration Calculation**
  - **2 Year Design Storm Event**
  - **10 Year Design Storm Event**
  - **100 Year Design Storm Event**

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

EX-2-UNDISTURBED 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

SUMMARY OF EXISTING PEAK DISCHARGES

FUTURE HYDROGRAPH CALCULATIONS

EX-1-DISTURBED WATERSHED
Time of Concentration Calculation
2 Year Design Storm Event
10 Year Design Storm Event
100 Year Design Storm Event

EX-1-DISTURBED WATERSHED ALLOWABLE PEAK DISCHARGE
2 Year Design Storm Event
10 Year Design Storm Event
100 Year Design Storm Event

EX-1-UNDISTURBED 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-1
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-2-DISTURBED WATERSHED
- **Time of Concentration Calculation**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **100 Year Design Storm Event**

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

EX-2-UNDISTURBED 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**

SUMMARY OF EXISTING PEAK DISCHARGES

NOAA RAINFALL PRECIPITATION DATA

NOAA Atlas 14, Volume 2, Version 3
Location name: West Orange, New Jersey, USA*
Latitude: 40.8124°, Longitude: -74.2707°
Elevation: 539 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)	**0.401** (0.367-0.440)	**0.474** (0.433-0.521)	**0.529** (0.481-0.580)	**0.594** (0.539-0.651)	**0.639** (0.578-0.700)	**0.684** (0.615-0.749)	**0.728** (0.650-0.797)	**0.778** (0.689-0.854)	**0.815** (0.716-0.897)
10-min	**0.535** (0.489-0.588)	**0.640** (0.585-0.702)	**0.757** (0.691-0.831)	**0.840** (0.764-0.921)	**0.940** (0.852-1.03)	**1.01** (0.913-1.11)	**1.08** (0.970-1.18)	**1.14** (1.02-1.25)	**1.22** (1.08-1.34)	**1.27** (1.12-1.40)
15-min	**0.667** (0.609-0.732)	**0.801** (0.732-0.879)	**0.954** (0.870-1.05)	**1.06** (0.964-1.16)	**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)	**1.59** (1.40-1.75)
30-min	**0.910** (0.831-0.999)	**1.10** (1.01-1.21)	**1.35** (1.23-1.48)	**1.52** (1.39-1.67)	**1.75** (1.59-1.92)	**1.91** (1.73-2.09)	**2.07** (1.86-2.27)	**2.22** (1.98-2.43)	**2.41** (2.13-2.65)	**2.55** (2.24-2.80)
60-min	**1.13** (1.03-1.24)	**1.38** (1.26-1.51)	**1.72** (1.57-1.89)	**1.98** (1.80-2.17)	**2.32** (2.10-2.54)	**2.58** (2.33-2.82)	**2.84** (2.55-3.11)	**3.10** (2.77-3.39)	**3.44** (3.05-3.78)	**3.70** (3.26-4.08)
2-hr	**1.39** (1.27-1.52)	**1.69** (1.54-1.86)	**2.14** (1.95-2.35)	**2.49** (2.27-2.74)	**2.98** (2.69-3.26)	**3.38** (3.03-3.70)	**3.79** (3.38-4.14)	**4.22** (3.73-4.62)	**4.82** (4.21-5.28)	**5.29** (4.58-5.81)
3-hr	**1.55** (1.42-1.70)	**1.89** (1.73-2.08)	**2.40** (2.19-2.63)	**2.79** (2.54-3.06)	**3.34** (3.02-3.66)	**3.79** (3.41-4.14)	**4.24** (3.80-4.64)	**4.73** (4.19-5.17)	**5.39** (4.73-5.90)	**5.93** (5.15-6.49)
6-hr	**2.00** (1.84-2.20)	**2.44** (2.23-2.66)	**3.08** (2.82-3.36)	**3.61** (3.29-3.93)	**4.36** (3.94-4.74)	**4.98** (4.47-5.41)	**5.65** (5.03-6.13)	**6.36** (5.61-6.90)	**7.40** (6.43-8.04)	**8.25** (7.09-8.97)
12-hr	**2.50** (2.29-2.76)	**3.04** (2.78-3.34)	**3.87** (3.53-4.25)	**4.56** (4.15-5.00)	**5.58** (5.02-6.09)	**6.46** (5.76-7.03)	**7.41** (6.54-8.05)	**8.46** (7.38-9.20)	**10.0** (8.57-10.9)	**11.3** (9.55-12.3)
24-hr	**2.84** (2.63-3.08)	**3.43** (3.18-3.73)	**4.40** (4.06-4.78)	**5.22** (4.81-5.67)	**6.46** (5.90-7.00)	**7.53** (6.84-8.16)	**8.72** (7.83-9.45)	**10.1** (8.92-10.9)	**12.0** (10.5-13.1)	**13.8** (11.8-15.0)
2-day	**3.35** (3.10-3.64)	**4.06** (3.75-4.41)	**5.18** (4.78-5.63)	**6.12** (5.63-6.64)	**7.49** (6.85-8.13)	**8.65** (7.87-9.40)	**9.92** (8.95-10.8)	**11.3** (10.1-12.3)	**13.4** (11.7-14.7)	**15.1** (13.1-16.6)
3-day	**3.52** (3.26-3.82)	**4.26** (3.95-4.62)	**5.42** (5.01-5.88)	**6.38** (5.88-6.91)	**7.76** (7.12-8.41)	**8.93** (8.14-9.68)	**10.2** (9.22-11.1)	**11.6** (10.4-12.6)	**13.6** (12.0-14.8)	**15.3** (13.3-16.8)
4-day	**3.70** (3.43-4.00)	**4.47** (4.15-4.84)	**5.66** (5.24-6.12)	**6.64** (6.13-7.18)	**8.04** (7.39-8.68)	**9.21** (8.41-9.96)	**10.5** (9.49-11.3)	**11.8** (10.6-12.8)	**13.8** (12.2-15.0)	**15.4** (13.5-16.9)
7-day	**4.37** (4.07-4.72)	**5.25** (4.89-5.66)	**6.52** (6.07-7.03)	**7.57** (7.03-8.15)	**9.08** (8.37-9.77)	**10.3** (9.46-11.1)	**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** (4.70-5.39)	**6.00** (5.61-6.44)	**7.34** (6.86-7.88)	**8.44** (7.86-9.05)	**9.99** (9.26-10.7)	**11.3** (10.4-12.1)	**12.6** (11.5-13.6)	**14.0** (12.7-15.1)	**16.0** (14.3-17.4)	**17.6** (15.6-19.2)
20-day	**6.79** (6.38-7.23)	**8.06** (7.57-8.58)	**9.62** (9.03-10.2)	**10.8** (10.2-11.5)	**12.5** (11.7-13.3)	**13.8** (12.8-14.7)	**15.1** (14.0-16.1)	**16.4** (15.1-17.6)	**18.2** (16.6-19.6)	**19.6** (17.7-21.1)
30-day	**8.46** (8.00-8.94)	**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** (14.9-16.9)	**17.2** (16.1-18.2)	**18.4** (17.1-19.5)	**19.9** (18.4-21.3)	**21.1** (19.4-22.6)
45-day	**10.7** (10.2-11.3)	**12.6** (12.0-13.3)	**14.6** (13.8-15.3)	**16.0** (15.2-16.9)	**17.9** (16.9-18.9)	**19.3** (18.2-20.4)	**20.7** (19.4-21.8)	**21.9** (20.6-23.2)	**23.6** (22.0-25.0)	**24.8** (23.0-26.4)
60-day	**12.9** (12.2-13.6)	**15.1** (14.4-15.9)	**17.3** (16.4-18.2)	**18.9** (17.9-19.8)	**20.9** (19.8-22.0)	**22.3** (21.1-23.5)	**23.7** (22.4-25.0)	**25.0** (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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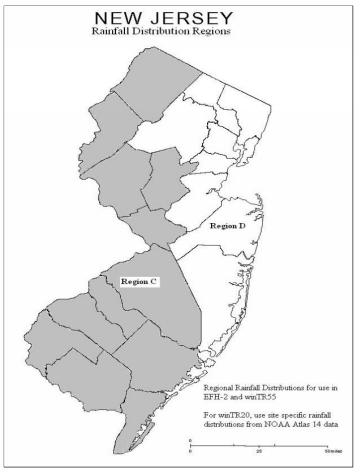
PF graphical

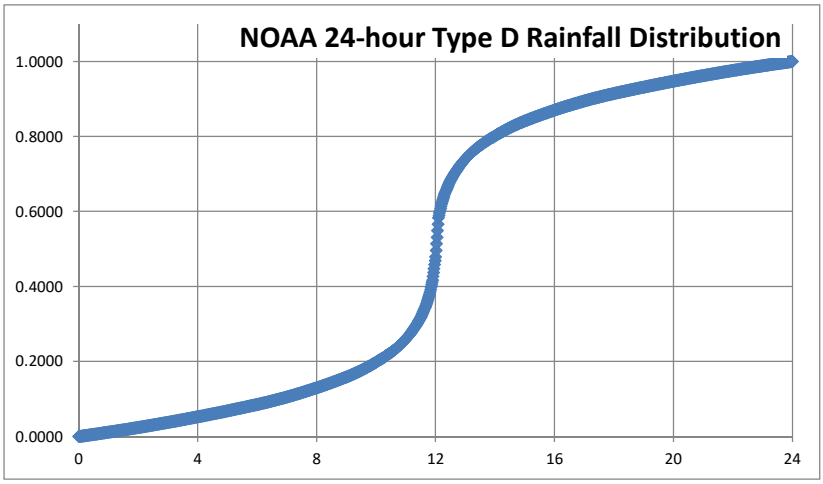
Frequency of Storms	NOAA NWS PFDS 24-Hour Rainfall Depth (inches)	Current Precipitation Adjustment Factor for Essex County	Current Rainfall Depth (inches)	Future Precipitation Adjustment Factor for Essex County	Future Rainfall Depth (inches)
2-Year	3.43	1.01	3.46	1.19	4.08
10-Year	5.22	1.03	5.38	1.22	6.37
25-Year[1]	6.46	1.04	6.72	1.26	8.13
100-Year	8.72	1.06	9.24	1.33	11.60

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

EXISTING RUNOFF CURVE NUMBER CALCULATIONS

EXISTING RUNOFF CURVE NUMBER CALCULATIONS
CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS
LANGAN PROJECT #101049802

EXISTING CONDITIONS

EXISTING	OPEN SPACE	OPEN SPACE	WOODS	WOODS	GRAVEL	GRAVEL	OPEN SPACE	OPEN SPACE	WOODS	WOODS	GRAVEL	GRAVEL	IMPERVIOUS	IMPERVIOUS	TOTAL	TOTAL	CURVE
WATERSHED	HSGC C	HSGC C	HSGC C	HSGC C	HSGC C	HSGC C	HSGC D	HSGC D	HSGC D	HSGC D	HSGC D	HSGC D	AREA	AREA	AREA	AREA	NUMBER
AREAS	CN = 74	CN = 74	CN = 70	CN = 70	CN = 89	CN = 89	CN = 80	CN = 80	CN = 77	CN = 77	CN = 91	CN = 91	CN = 98	CN = 98			CN
	(SF)	(AC)	(SF)	(AC)	(SF)	(AC)	(SF)	(AC)	(SF)	(AC)	(SF)	(AC)	(SF)	(AC)	(SF)	(AC)	(Weighted)
POA-1																	
EX-1-DISTURBED	0	0.00	0	0.00	0	0.00	28,385	0.65	33,979	0.78	0	0.00	3,969	0.09	66,333	1.52	80
EX-1-UNDISTURBED	59,295	1.36	30,440	0.70	0	0.00	0	0.00	0	0.00	0	0.00	128,036	2.94	217,771	5.00	88
POA-2																	
EX-2-DISTURBED	0	0.00	0	0.00	0	0.00	17,805	0.41	44,242	1.02	2,900	0.07	39,818	0.91	104,765	2.41	86
EX-2-UNDISTURBED	37,228	0.86	41,197	0.95	3,700	0.08	0	0.00	0	0.00	0	0.00	45,766	1.05	127,891	2.94	82

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 Lands. Pervious areas are assumed to be in good hydrologic condition.

CURRENT HYDROGRAPH CALCULATIONS

EX-1-DISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/20/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/20/2025**

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

$$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$$

	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	**85**					
4.	Two-year 24-hr rainfall, P_2	in	**3.46**					
5.	Land Slope, s	ft/ft	**0.043**					
6.	Compute T_t	hr	**0.013**	+		+		
					Sheet Flow Sub-Total		**0.013 hours**	

Shallow Concentrated Flow

$$T_t = \frac{L}{3600\,V}$$

	Segment ID		**2**		**3**			
7.	Surface Description		**Woodlands**		**Pavement**			
8.	Flow Length, L	ft	**117**		**465**			
9.	Watercourse Slope, s	ft/ft	**0.207**		**0.018**			
10.	Average Velocity, V (NEH table 15-3)	ft/s	**2.29**		**2.75**			
11.	Compute T_t	hr	**0.014**	+	**0.047**	+		
					Shallow Conc. Flow Sub-Total		**0.061 hours**	

Channel Flow

$$r = a / P_w$$

$$V = (1.49\, r^{2/3} s^{1/2}) / n$$

$$T_t = \frac{L}{3600\,V}$$

	Segment ID		**4**		**5**			
12.	Flow Length, L	ft	**15**		**51**			
13.	Cross Sectional flow area, a	ft^2	**0.61**		**0.61**			
14.	Wetted Perimeter, P_w	ft	**2.00**		**2.00**			
15.	Hydraulic Radius, r	ft	**0.31**		**0.31**			
16.	Channel Slope, s	ft/ft	**0.055**		**0.021**			
17.	Manning's Roughness Coeff., n		**0.013**		**0.013**			
18.	Velocity, V	ft/s	**12.14**		**7.59**			
19.	Compute T_t	hr	**0.000**	+	**0.002**	+		
					Channel Flow Sub-Total		**0.002 hours**	

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

Total Tc (hours) =	**0.076 hours**
Total Tc (minutes) =	**5 minutes**

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/20/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/20/2025**

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

$$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$$

			Segment ID	1		2		
1.	Surface Description (NEH table 15-1)			Woods Dense Underbrush		Woods Dense Underbrush		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.40		0.40		
3.	Flow Length, L (total L < 100 ft)		ft	72		28		
4.	Two-year 24-hr rainfall, P_2		in	3.46		3.46		
5.	Land Slope, s		ft/ft	0.070		0.281		
6.	Compute T_t		hr	0.160	+	0.044	+	
						Sheet Flow Sub-Total		0.203 hours

Shallow Concentrated Flow

$$T_t = \frac{L}{3600\,V}$$

			Segment ID	3		4		
7.	Surface Description			Woodlands		Pavement		
8.	Flow Length, L		ft	58		222		
9.	Watercourse Slope, s		ft/ft	0.272		0.027		
10.	Average Velocity, V (NEH table 15-3)		ft/s	2.63		3.31		
11.	Compute T_t		hr	0.006	+	0.019	+	
						Shallow Conc. Flow Sub-Total		0.025 hours

Channel Flow

$$r = a / P_w$$

$$V = (1.49\, r^{2/3} s^{1/2}) / n$$

$$T_t = \frac{L}{3600\,V}$$

			Segment ID	5		6		
12.	Flow Length, L		ft	15		51		
13.	Cross Sectional flow area, a		ft^2	0.61		0.61		
14.	Wetted Perimeter, P_w		ft	2.00		2.00		
15.	Hydraulic Radius, r		ft	0.31		0.31		
16.	Channel Slope, s		ft/ft	0.055		0.021		
17.	Manning's Roughness Coeff., n			0.013		0.013		
18.	Velocity, V		ft/s	12.14		7.59		
19.	Compute T_t		hr	0.000	+	0.002	+	
						Channel Flow Sub-Total		0.002 hours

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

Total Tc (hours) =	**0.230 hours**
Total Tc (minutes) =	**14 minutes**

Hydrograph Report

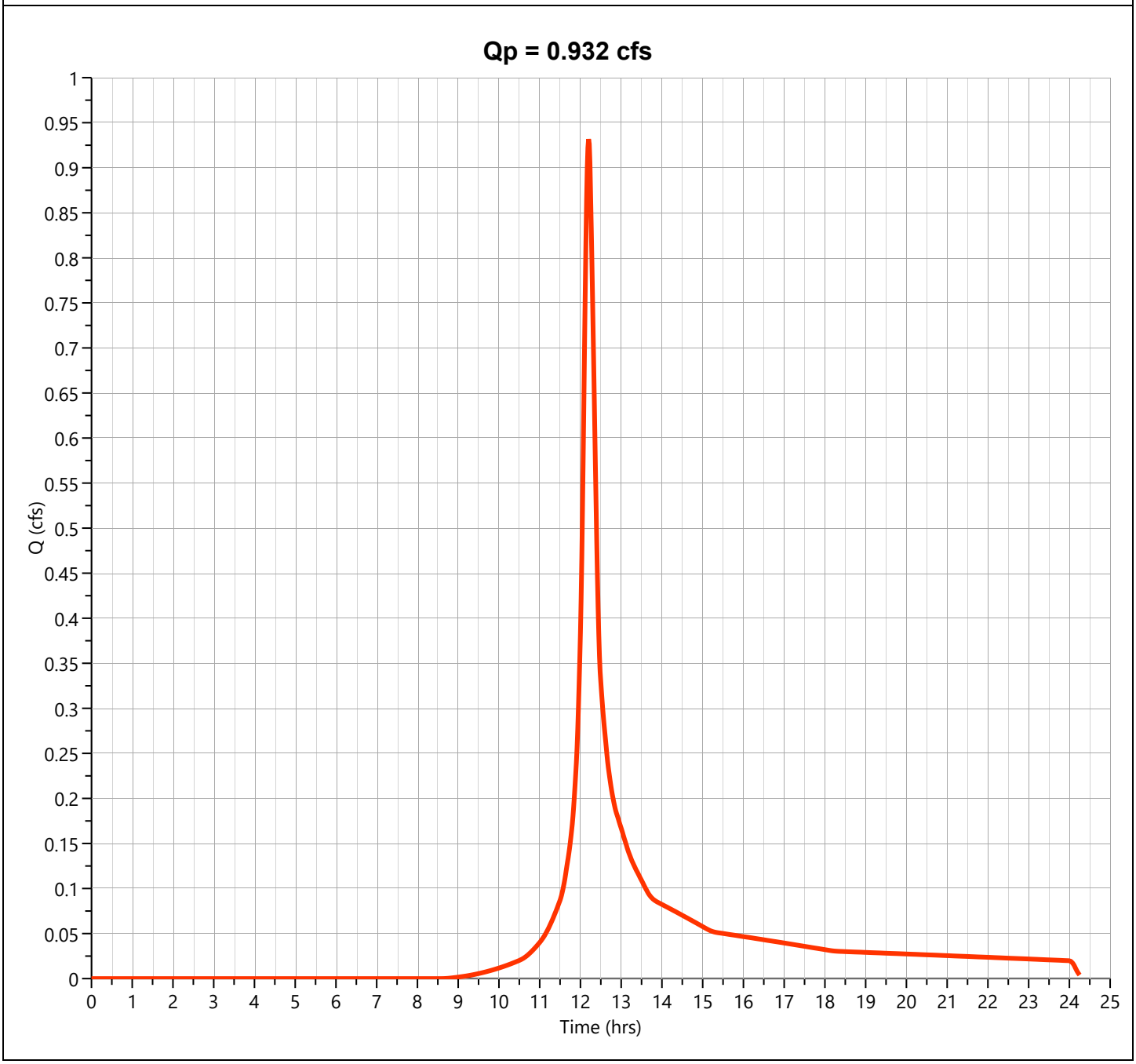
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-D Open Space D

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.932 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 3,786 cuft
Drainage Area	= 0.65 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

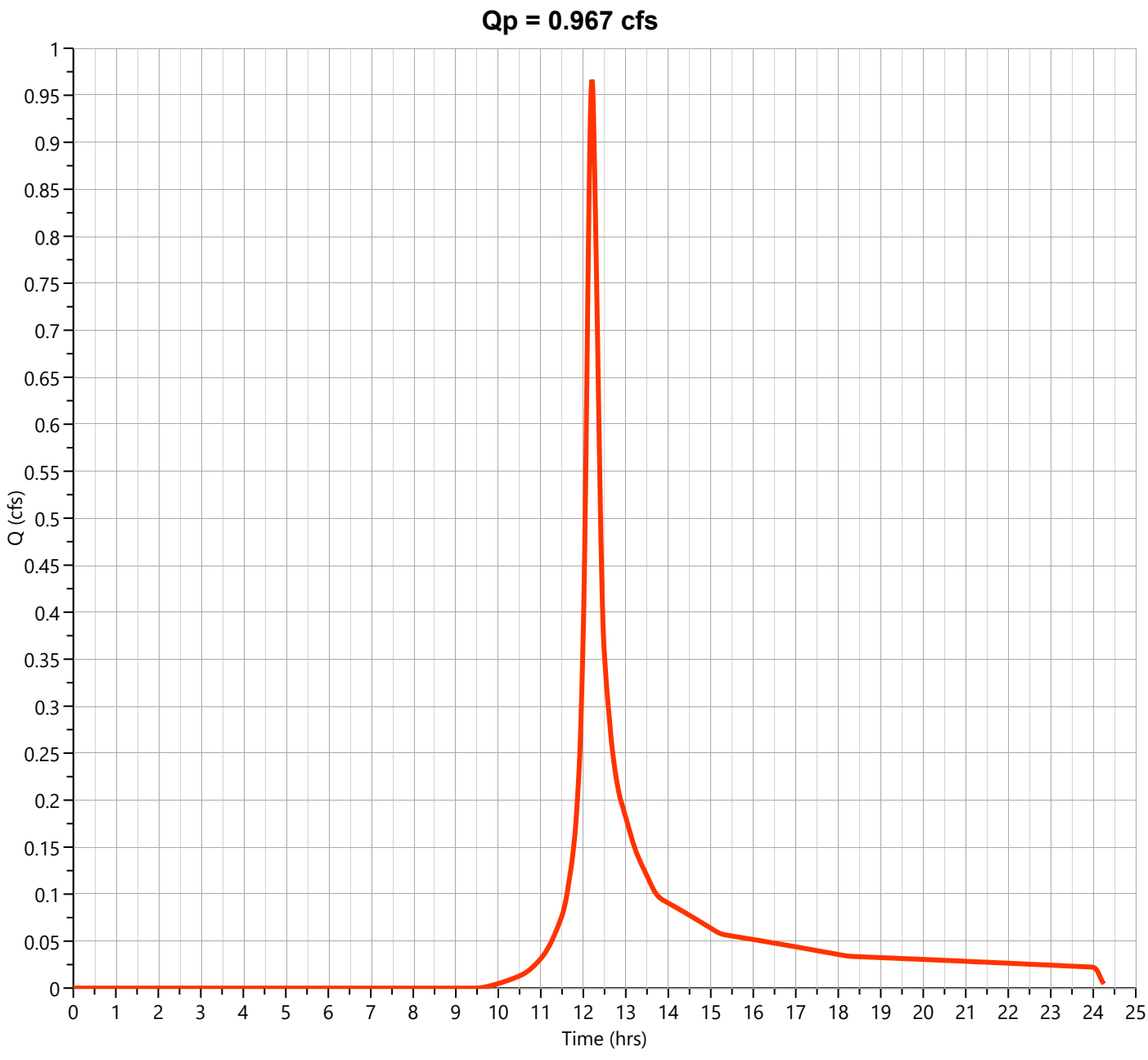
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-D Woods D

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.967 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 3,966 cuft
Drainage Area	= 0.78 ac	Curve Number	= 77.00
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

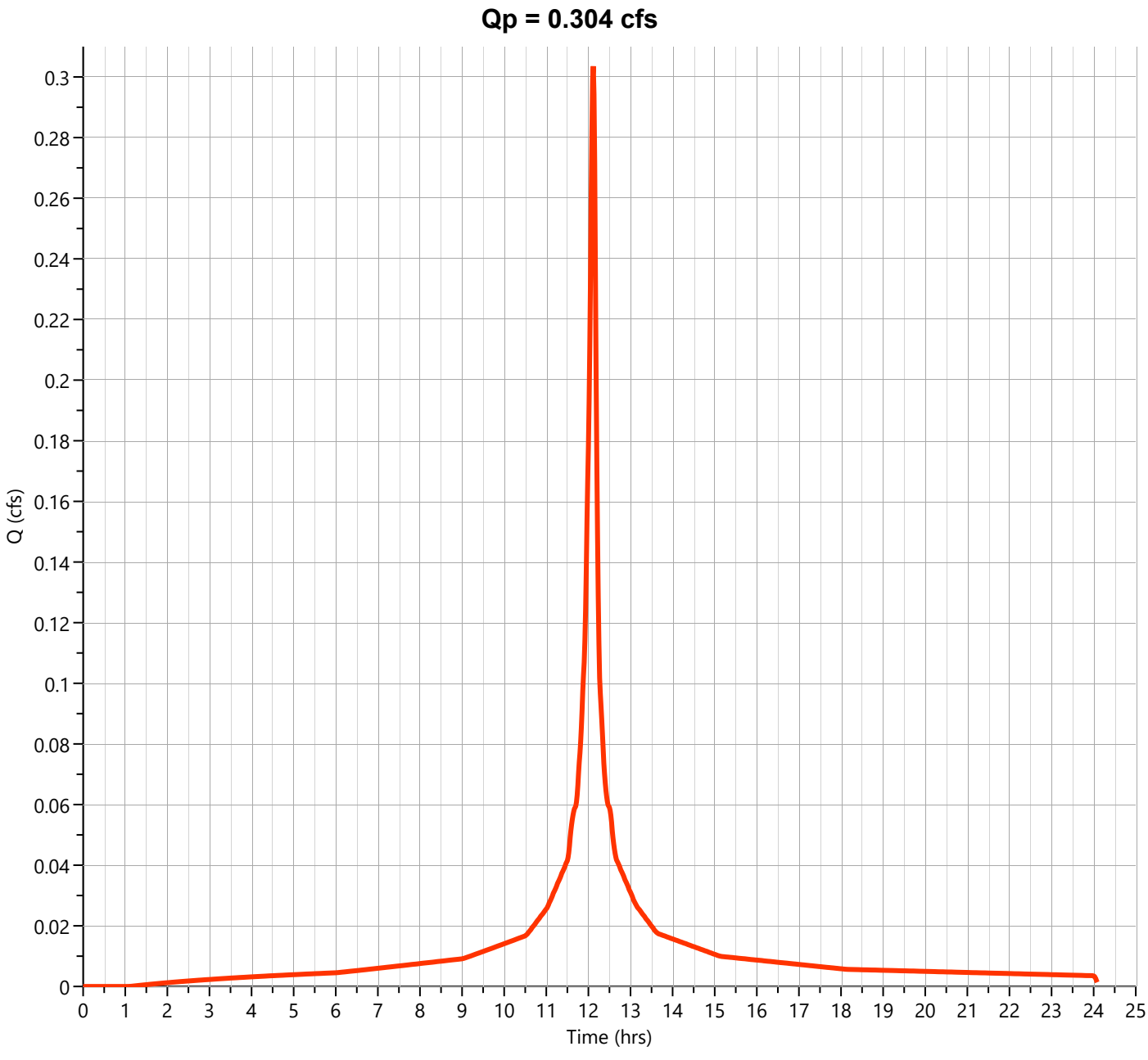
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-D Impervious

Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.304 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 1,087 cuft
Drainage Area	= 0.09 ac	Curve Number	= 98.00
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

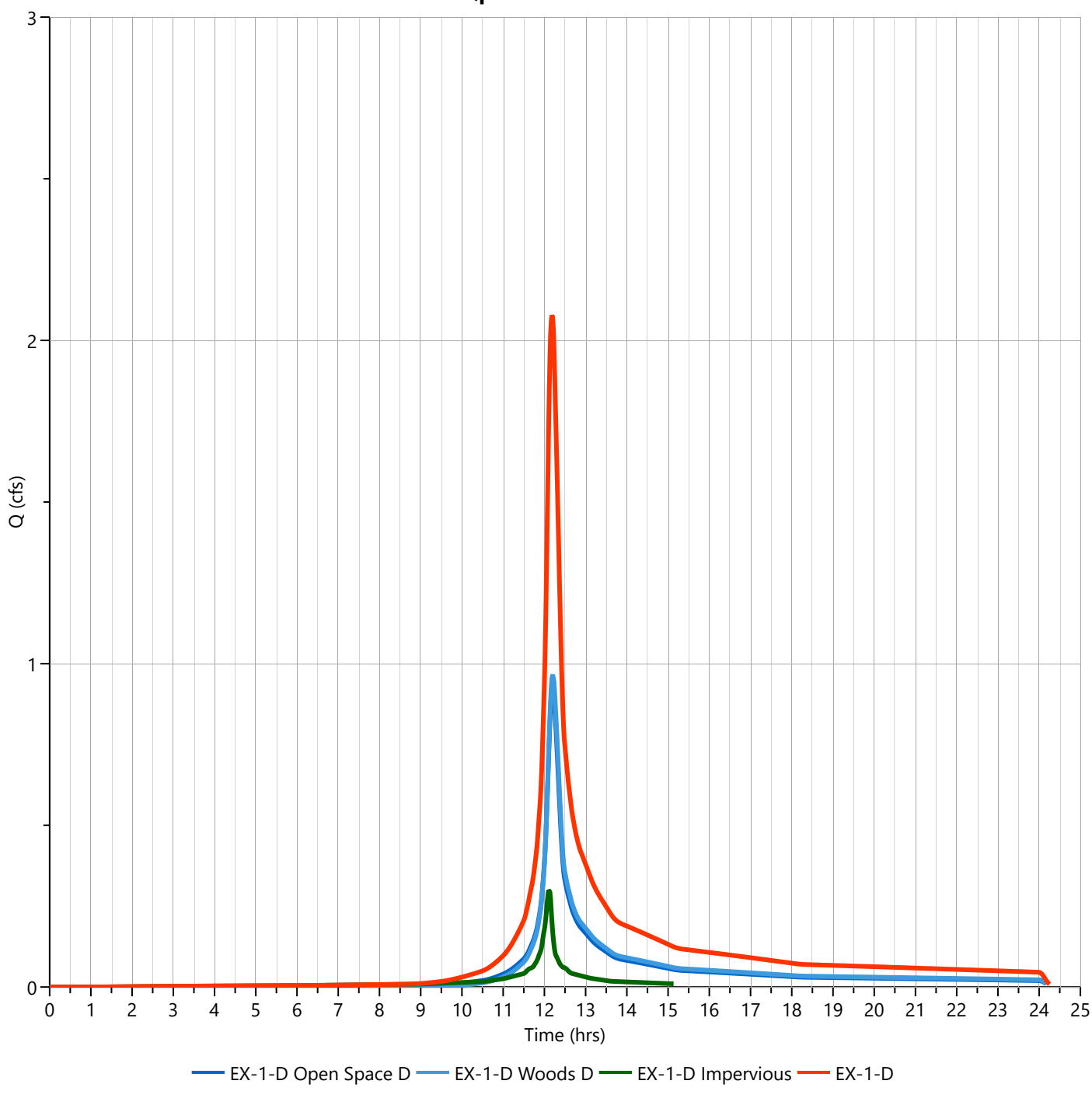
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-D

Hyd. No. 4

Hydrograph Type	= Junction	Peak Flow	= 2.078 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Hydrograph Volume	= 8,840 cuft
Inflow Hydrographs	= 1, 2, 3	Total Contrib. Area	= 1.52 ac



Hydrograph Report

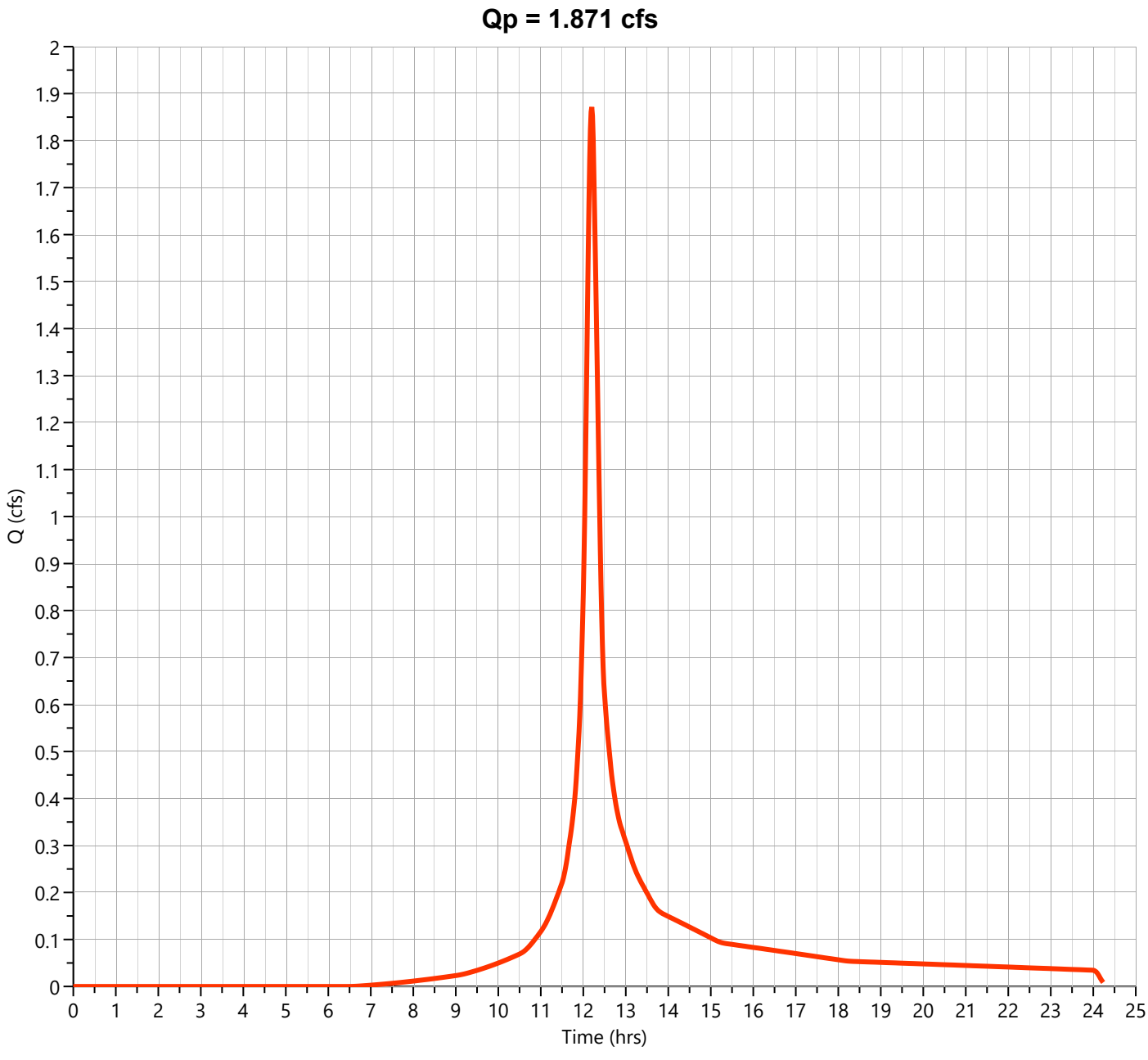
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-D Open Space D

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.871 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 7,614 cuft
Drainage Area	= 0.65 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

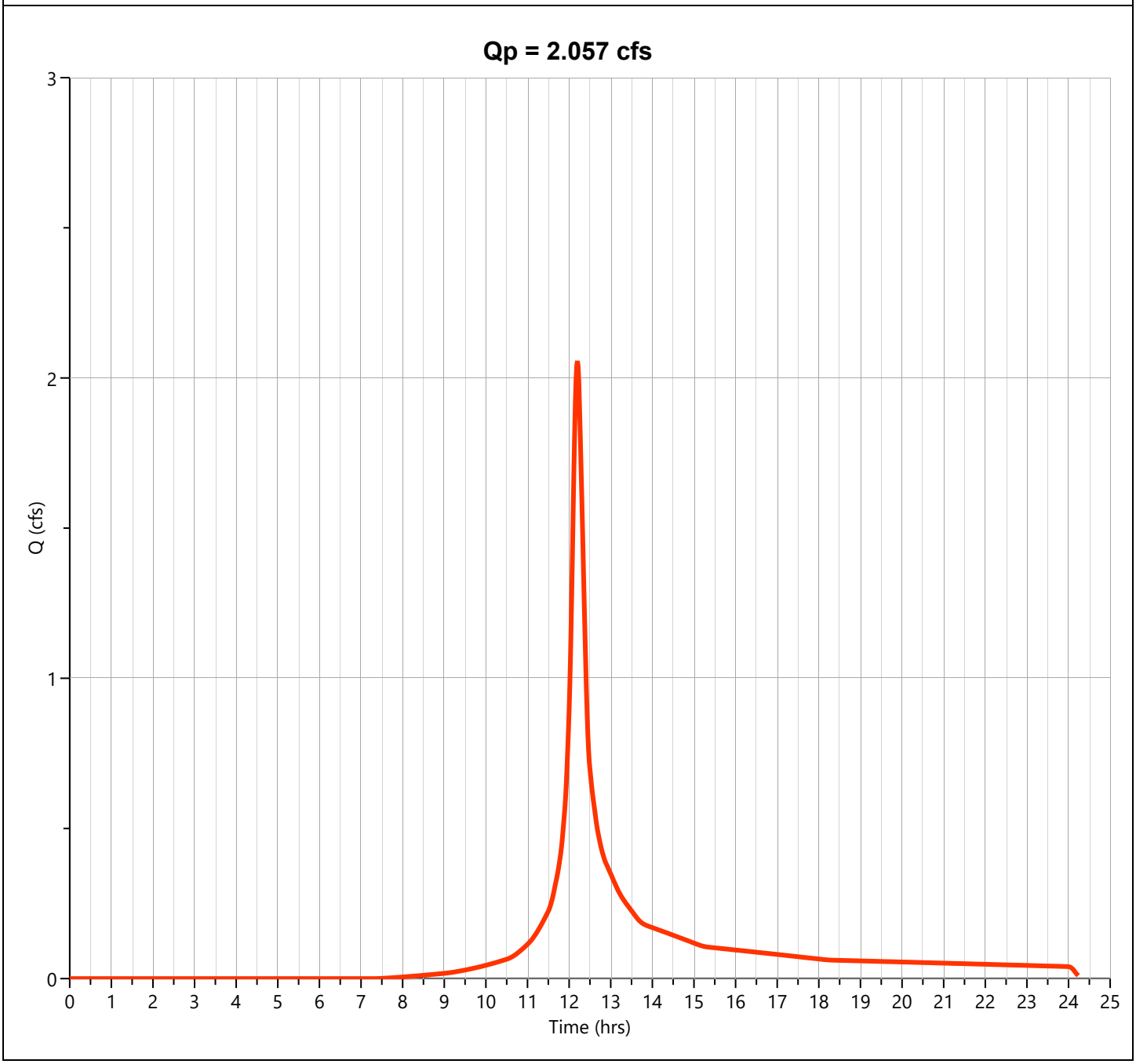
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-D Woods D

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.057 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 8,335 cuft
Drainage Area	= 0.78 ac	Curve Number	= 77.00
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

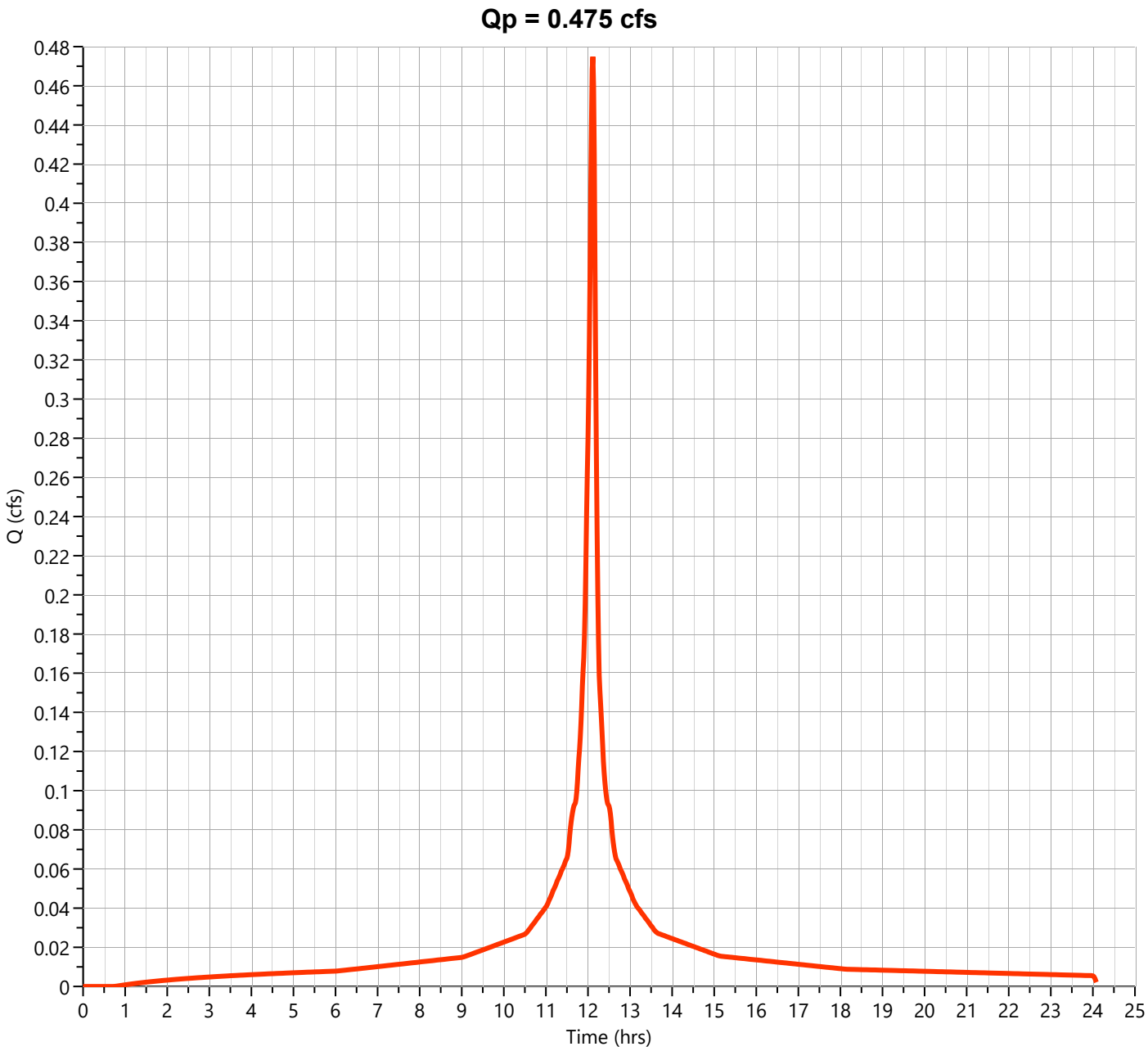
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-D Impervious

Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.475 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 1,733 cuft
Drainage Area	= 0.09 ac	Curve Number	= 98.00
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

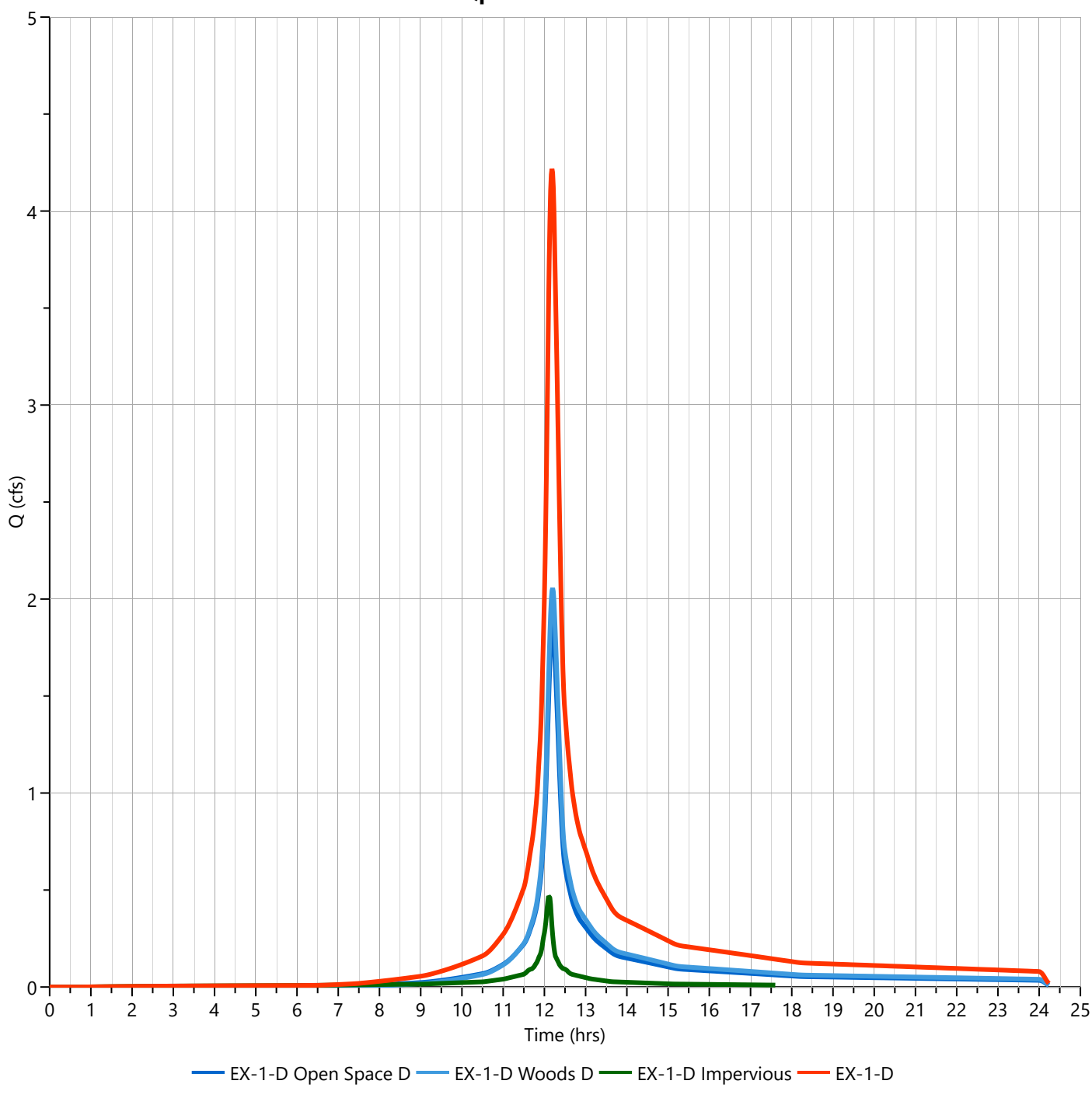
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-D

Hyd. No. 4

Hydrograph Type	= Junction	Peak Flow	= 4.218 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Hydrograph Volume	= 17,682 cuft
Inflow Hydrographs	= 1, 2, 3	Total Contrib. Area	= 1.52 ac



Hydrograph Report

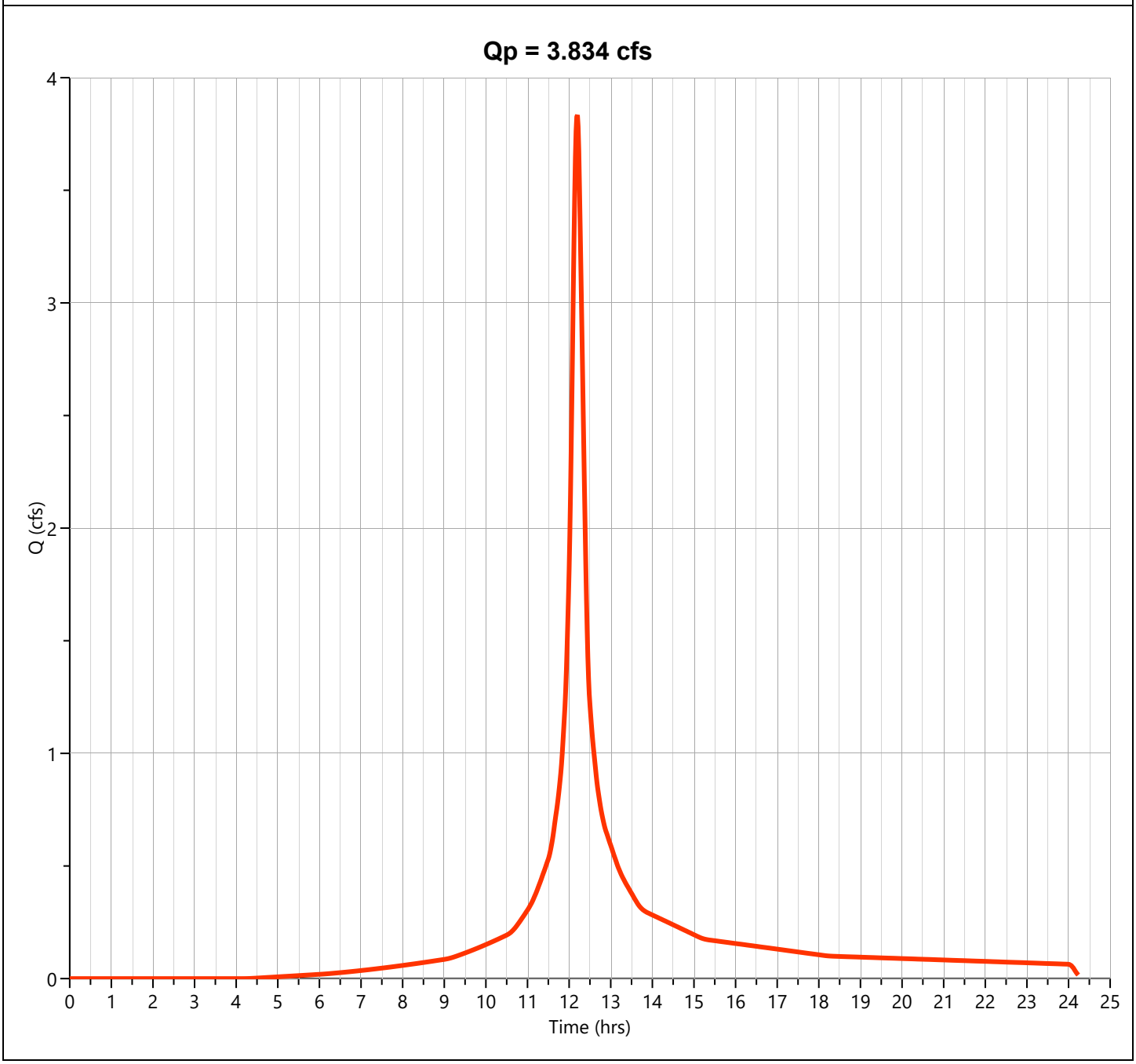
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-D Open Space D

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.834 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 16,035 cuft
Drainage Area	= 0.65 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

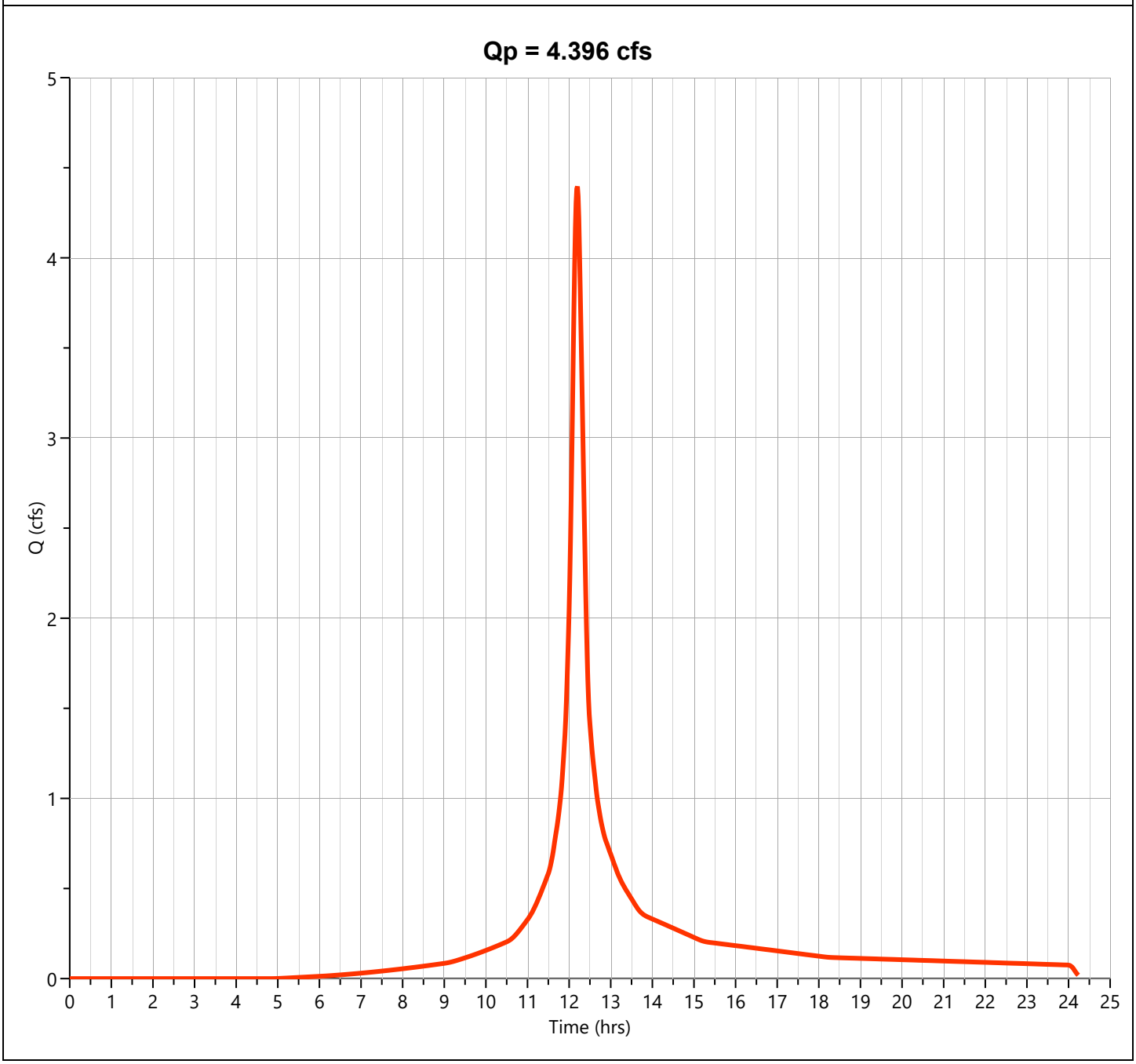
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-D Woods D

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.396 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 18,185 cuft
Drainage Area	= 0.78 ac	Curve Number	= 77.00
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

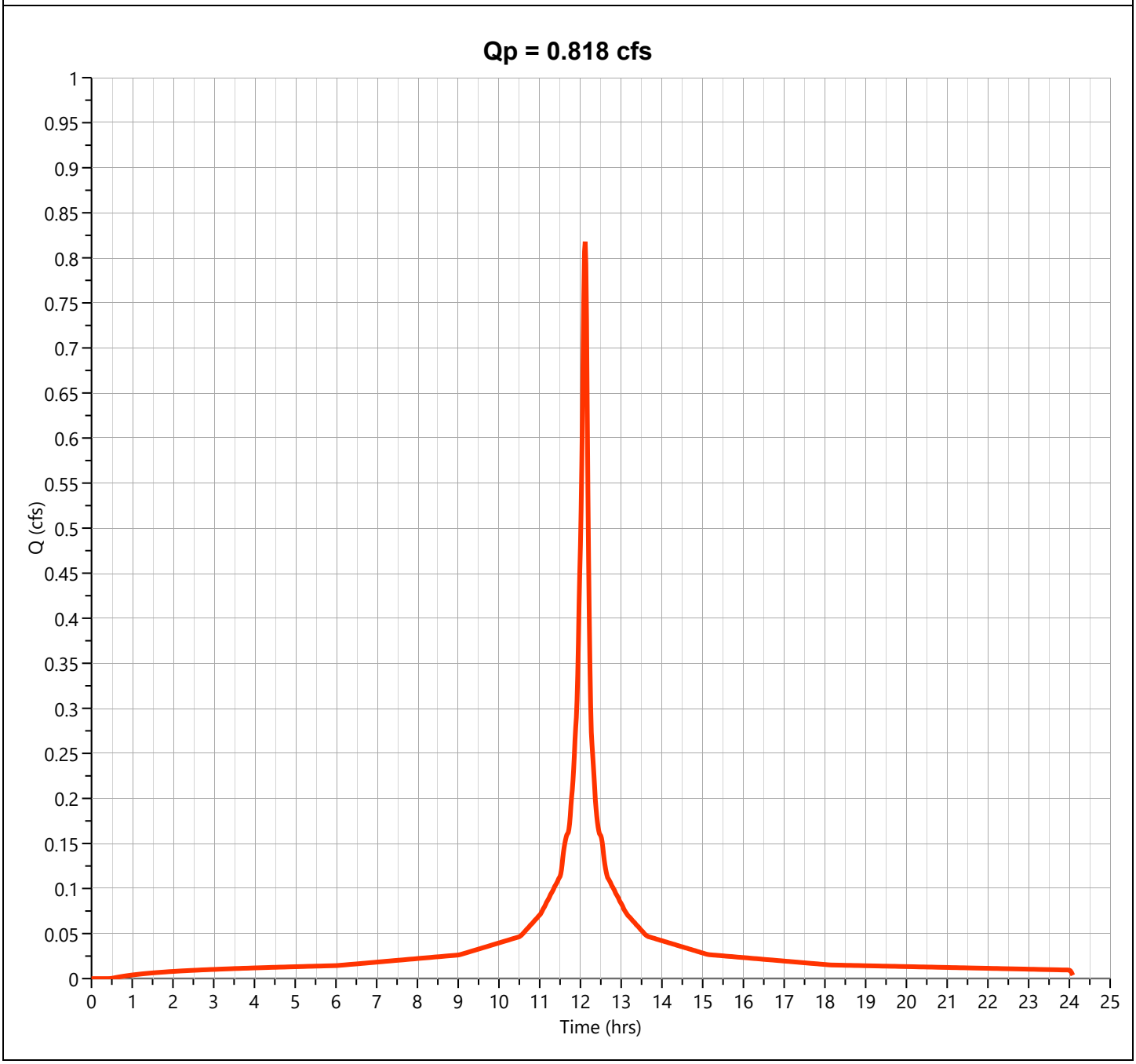
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-D Impervious

Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.818 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 3,032 cuft
Drainage Area	= 0.09 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

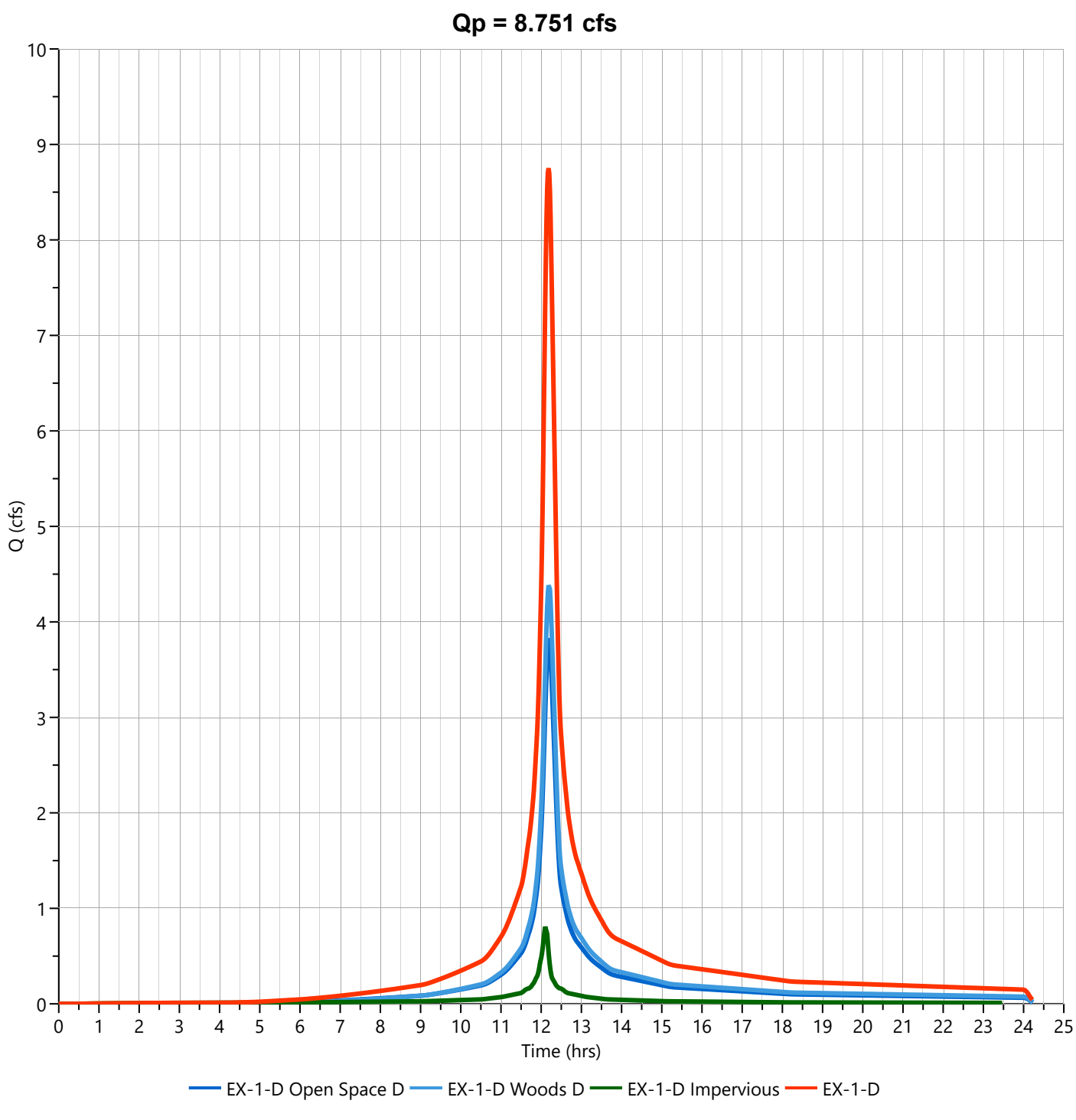
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-D

Hyd. No. 4

Hydrograph Type	= Junction	Peak Flow	= 8.751 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Hydrograph Volume	= 37,253 cuft
Inflow Hydrographs	= 1, 2, 3	Total Contrib. Area	= 1.52 ac



EX-1-DISTURBED WATERSHED ALLOWABLE PEAK DISCHARGE

Hydrograph Report

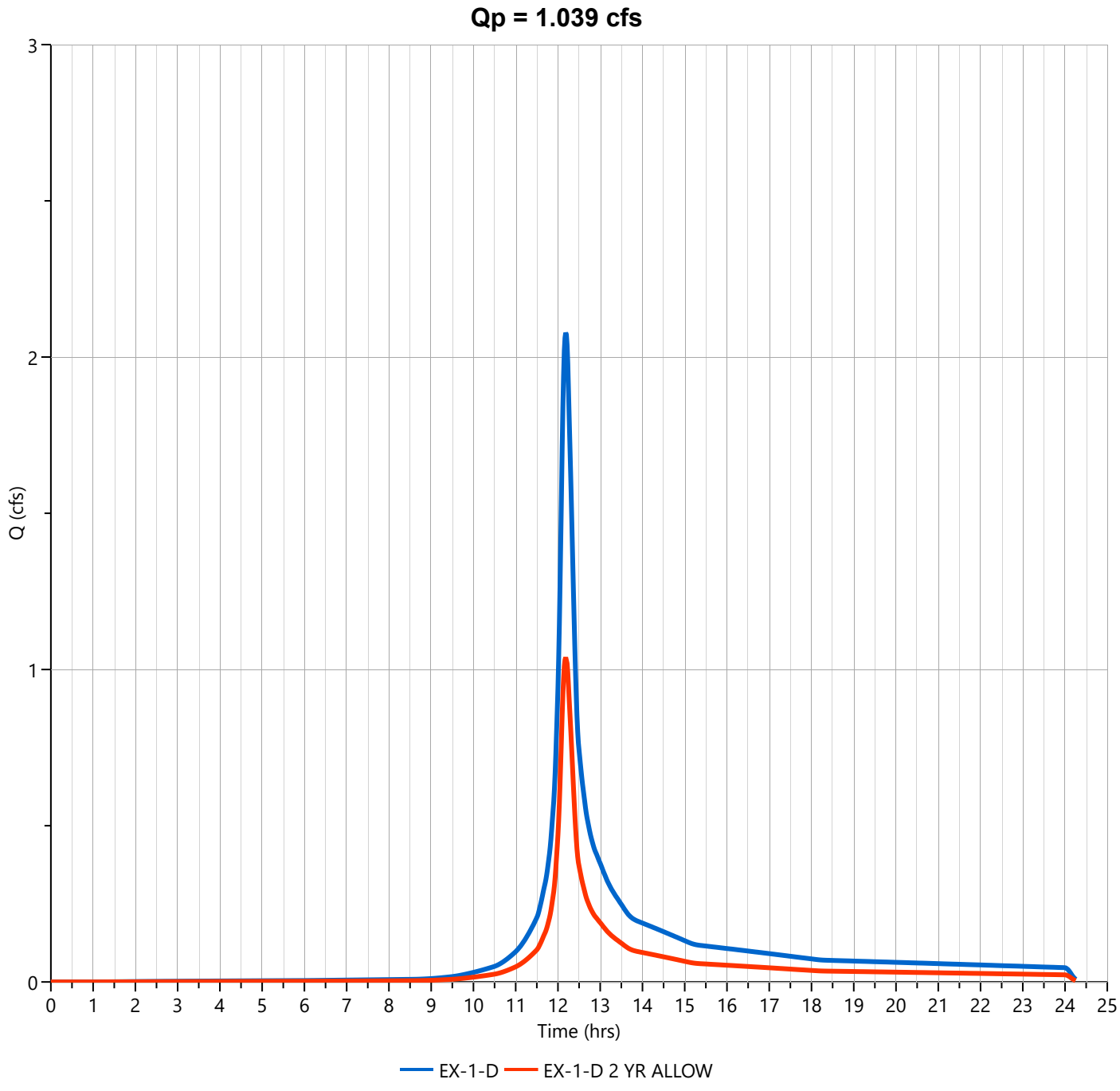
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-D 2 YR ALLOW

Hyd. No. 6

Hydrograph Type	= Diversion	Peak Flow	= 1.039 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Hydrograph Volume	= 4,420 cuft
Inflow Hydrograph	= 4 - EX-1-D	Diversion Method	= Flow Ratio
Companion Hyd	= 7 - <name>	Flow Ratio	= 0.5



Hydrograph Report

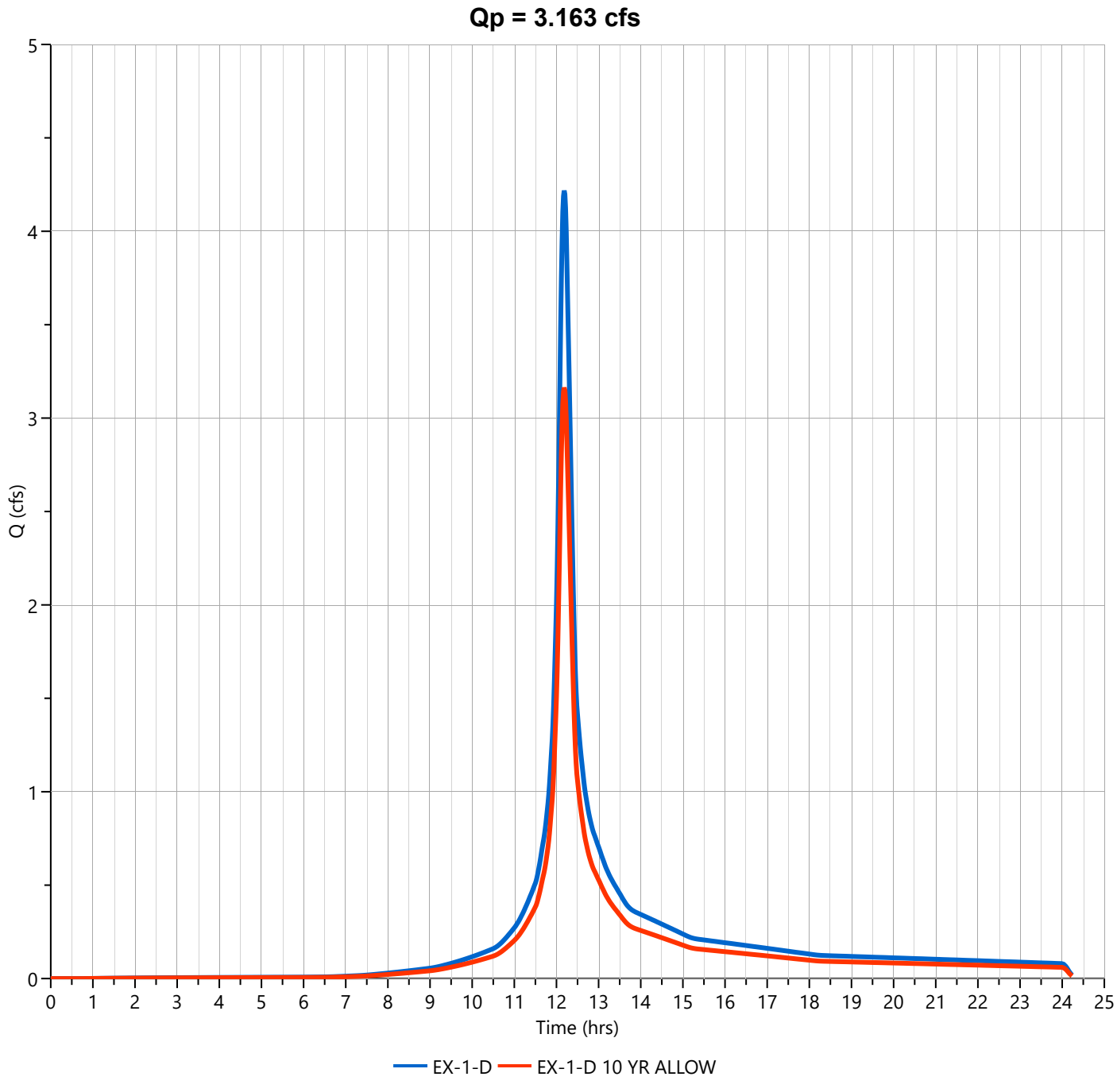
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-D 10 YR ALLOW

Hyd. No. 8

Hydrograph Type	= Diversion	Peak Flow	= 3.163 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Hydrograph Volume	= 13,261 cuft
Inflow Hydrograph	= 4 - EX-1-D	Diversion Method	= Flow Ratio
Companion Hyd	= 9 - <name>	Flow Ratio	= 0.75



Hydrograph Report

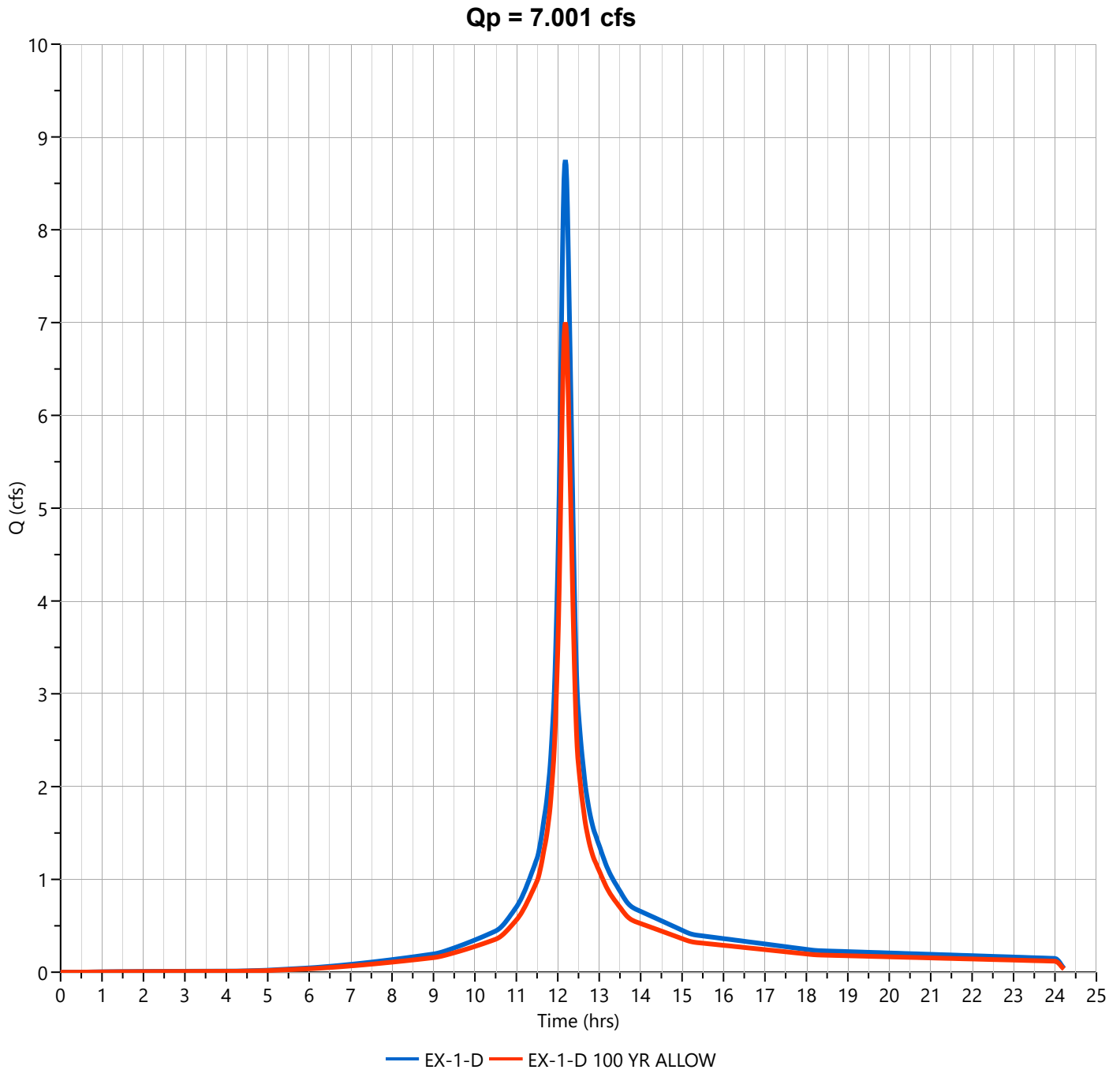
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-D 100 YR ALLOW

Hyd. No. 10

Hydrograph Type	= Diversion	Peak Flow	= 7.001 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Hydrograph Volume	= 29,802 cuft
Inflow Hydrograph	= 4 - EX-1-D	Diversion Method	= Flow Ratio
Companion Hyd	= 11 - <name>	Flow Ratio	= 0.8



EX-1-UNDISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/20/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/20/2025**

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

$$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$$

	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	**0.051**					
6.	Compute T_t	hr	**0.013**	+		+		
					Sheet Flow Sub-Total		**0.013 hours**	

Shallow Concentrated Flow

$$T_t = \frac{L}{3600\,V}$$

	Segment ID		**2**		**3**		**4**	
7.	Surface Description		**Pavement**		**Woodlands**		**Pavement**	
8.	Flow Length, L	ft	**239**		**117**		**463**	
9.	Watercourse Slope, s	ft/ft	**0.048**		**0.207**		**0.018**	
10.	Average Velocity, V (NEH table 15-3)	ft/s	**4.48**		**2.29**		**2.75**	
11.	Compute T_t	hr	**0.015**	+	**0.014**	+	**0.047**	
					Shallow Conc. Flow Sub-Total		**0.076 hours**	

Channel Flow

$$r = a / P_w$$

$$V = (1.49\, r^{2/3} s^{1/2}) / n$$

$$T_t = \frac{L}{3600\,V}$$

	Segment ID		**5**		**6**			
12.	Flow Length, L	ft	**15**		**51**			
13.	Cross Sectional flow area, a	ft^2	**0.61**		**0.61**			
14.	Wetted Perimeter, P_w	ft	**2.00**		**2.00**			
15.	Hydraulic Radius, r	ft	**0.31**		**0.31**			
16.	Channel Slope, s	ft/ft	**0.055**		**0.021**			
17.	Manning's Roughness Coeff., n		**0.013**		**0.013**			
18.	Velocity, V	ft/s	**12.14**		**7.59**			
19.	Compute T_t	hr	**0.000**	+	**0.002**	+		
					Channel Flow Sub-Total		**0.002 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**

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/20/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/20/2025**

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

$$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$$

			Segment ID	1		2		
1.	Surface Description (NEH table 15-1)			Woods Dense Underbrush		Woods Dense Underbrush		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.40		0.40		
3.	Flow Length, L (total L < 100 ft)		ft	40		60		
4.	Two-year 24-hr rainfall, P_2		in	3.46		3.46		
5.	Land Slope, s		ft/ft	0.094		0.305		
6.	Compute T_t		hr	0.089	+	0.077	+	
						Sheet Flow Sub-Total		0.166 hours

Shallow Concentrated Flow

$$T_t = \frac{L}{3600\,V}$$

			Segment ID	3		4		
7.	Surface Description			Grassed Waterways		Pavement		
8.	Flow Length, L		ft	13		406		
9.	Watercourse Slope, s		ft/ft	0.182		0.020		
10.	Average Velocity, V (NEH table 15-3)		ft/s	6.89		2.87		
11.	Compute T_t		hr	0.001	+	0.039	+	
						Shallow Conc. Flow Sub-Total		0.040 hours

Channel Flow

$$r = a / P_w$$

$$V = (1.49\, r^{2/3} s^{1/2}) / n$$

$$T_t = \frac{L}{3600\,V}$$

			Segment ID	5		6		
12.	Flow Length, L		ft	15		51		
13.	Cross Sectional flow area, a		ft^2	0.61		0.61		
14.	Wetted Perimeter, P_w		ft	2.00		2.00		
15.	Hydraulic Radius, r		ft	0.31		0.31		
16.	Channel Slope, s		ft/ft	0.055		0.021		
17.	Manning's Roughness Coeff., n			0.013		0.013		
18.	Velocity, V		ft/s	12.14		7.59		
19.	Compute T_t		hr	0.000	+	0.002	+	
						Channel Flow Sub-Total		0.002 hours

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

Total Tc (hours) =	**0.208 hours**
Total Tc (minutes) =	**12 minutes**

Hydrograph Report

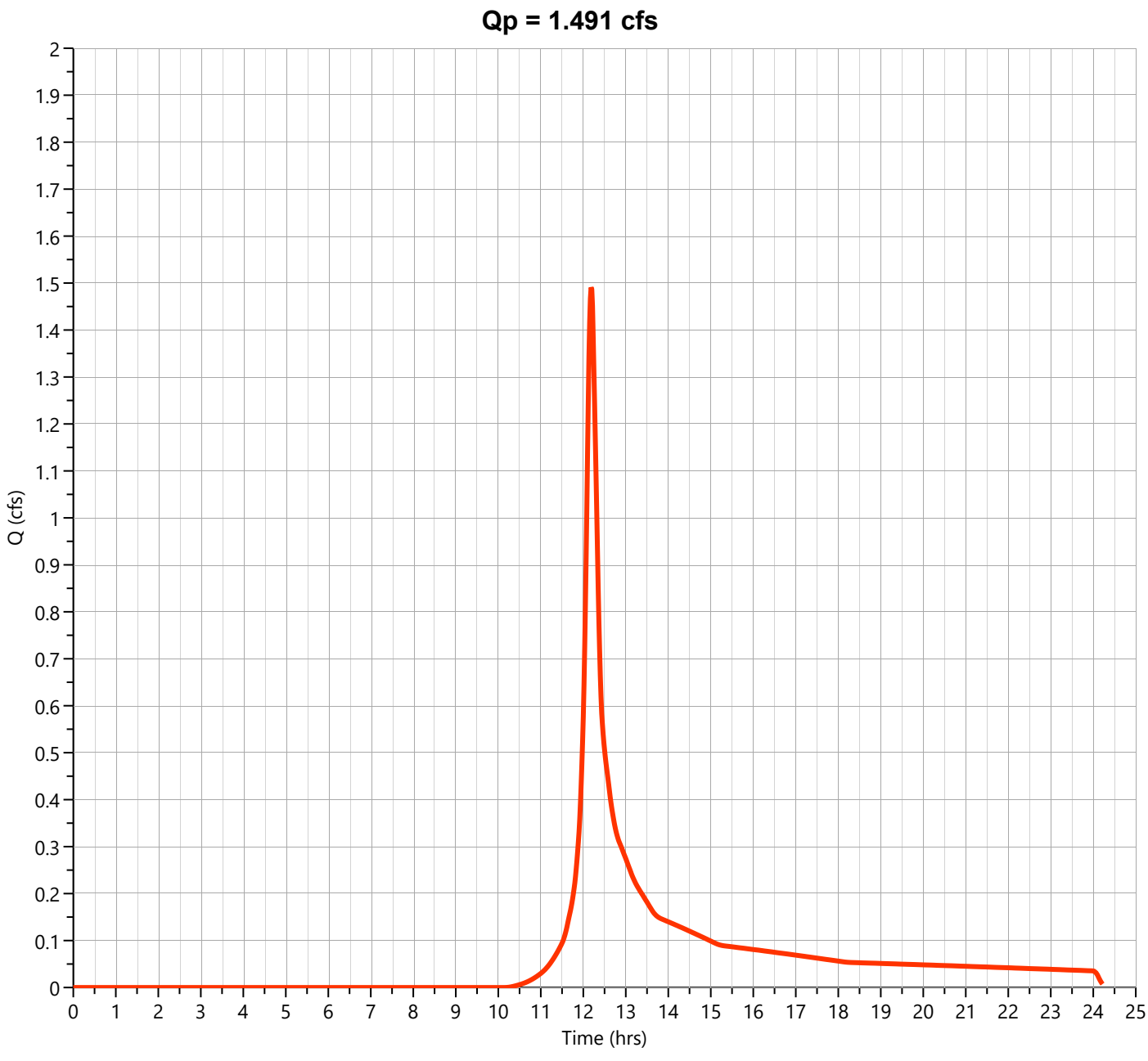
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-U Open Space C

Hyd. No. 13

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.491 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 5,892 cuft
Drainage Area	= 1.36 ac	Curve Number	= 74.00
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

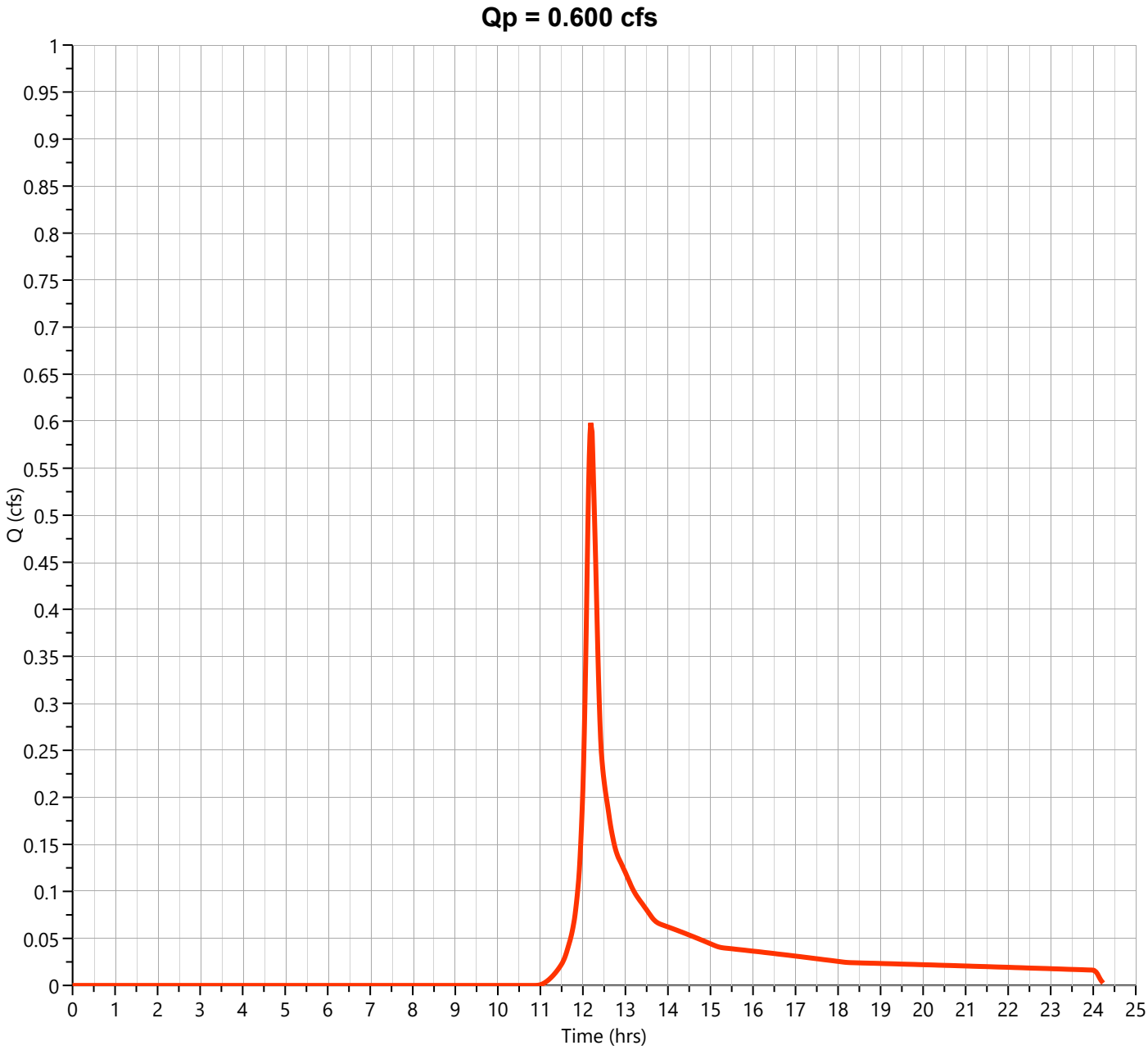
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-U Woods C

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.600 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 2,460 cuft
Drainage Area	= 0.7 ac	Curve Number	= 70.00
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

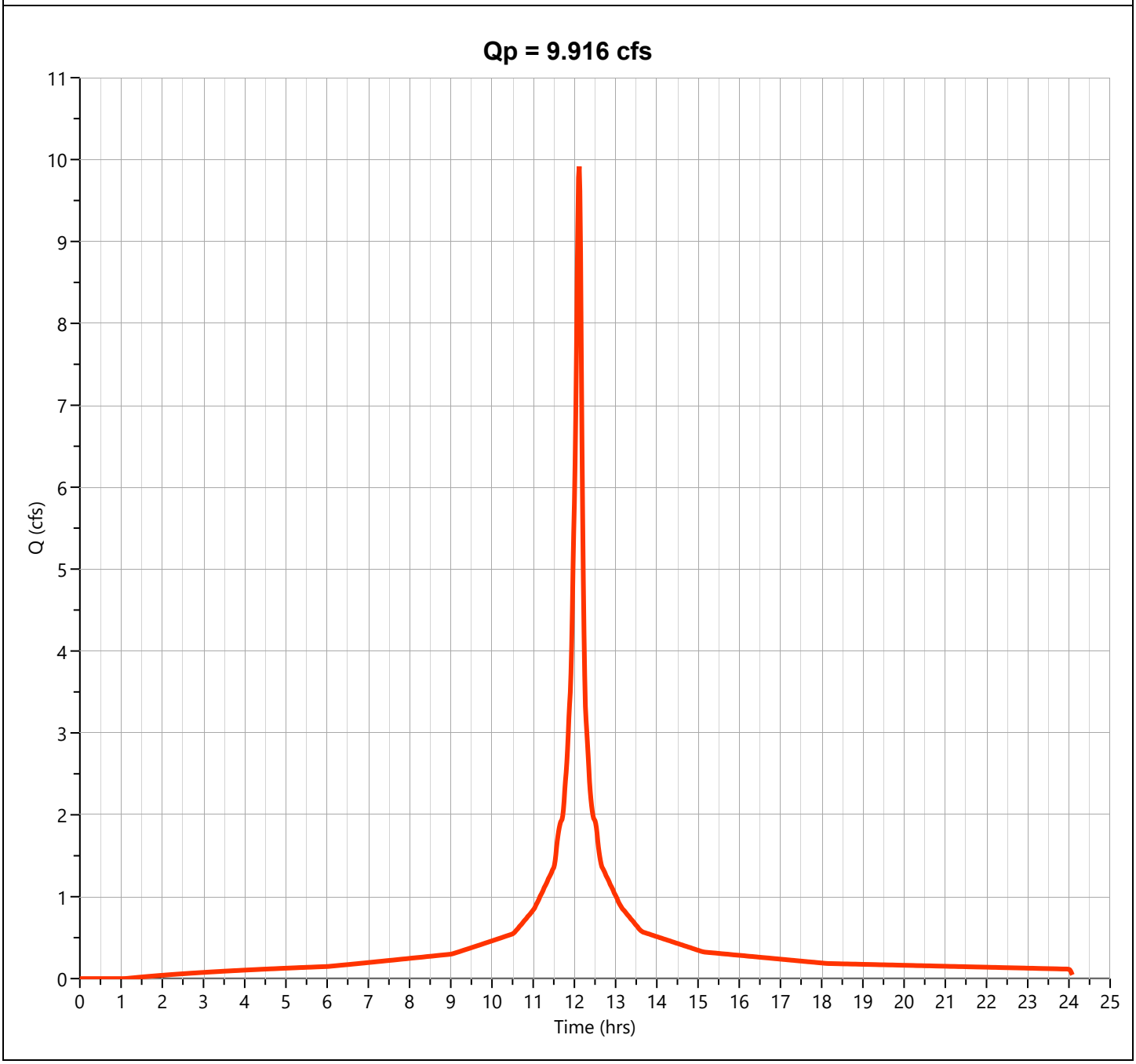
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-U Impervious

Hyd. No. 15

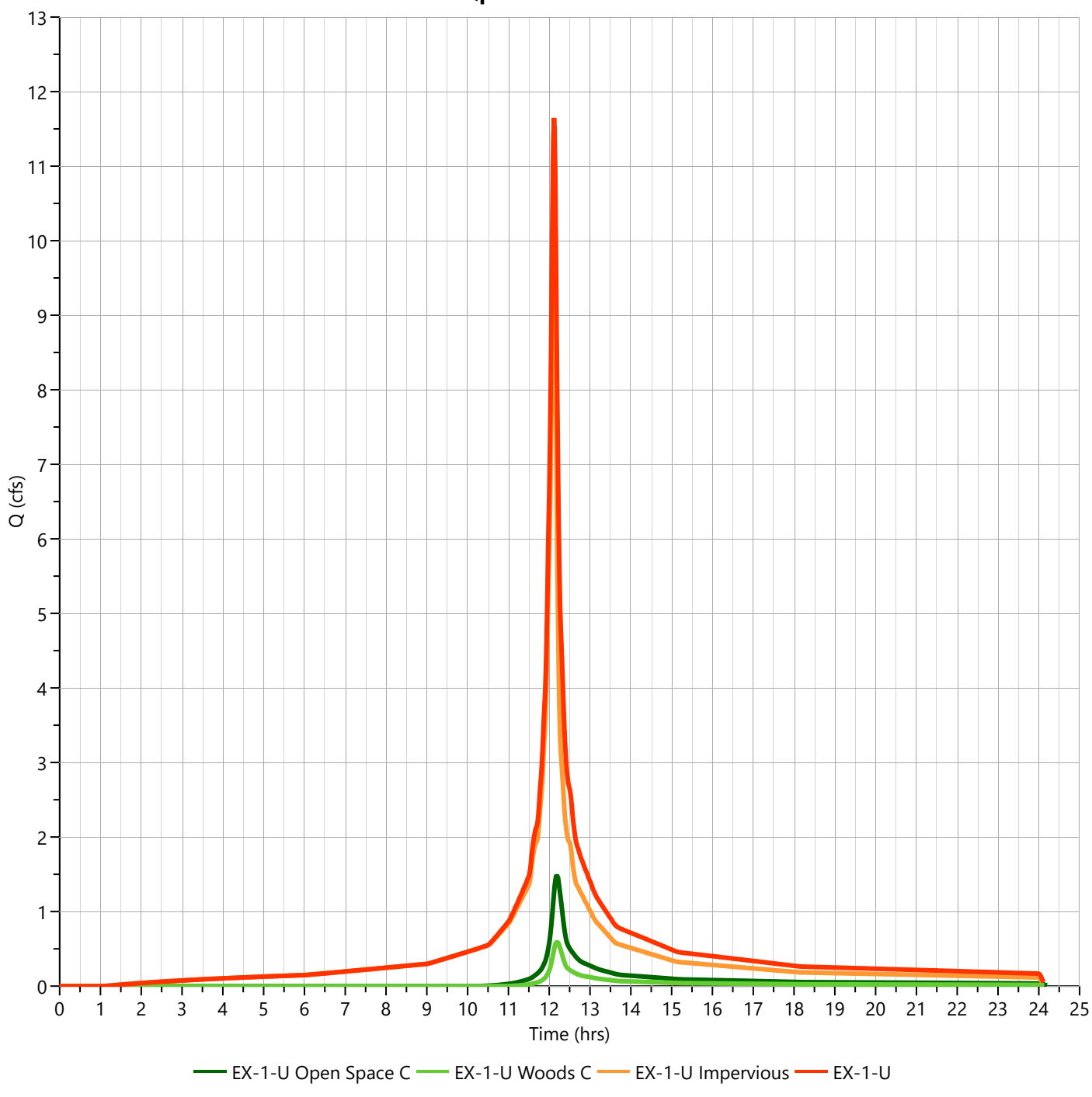
Hydrograph Type	= NRCS Runoff	Peak Flow	= 9.916 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 35,511 cuft
Drainage Area	= 2.94 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



EX-1-U

Hyd. No. 16

Hydrograph Type	= Junction	Peak Flow	= 11.65 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 43,863 cuft
Inflow Hydrographs	= 13, 14, 15	Total Contrib. Area	= 5.0 ac



Hydrograph Report

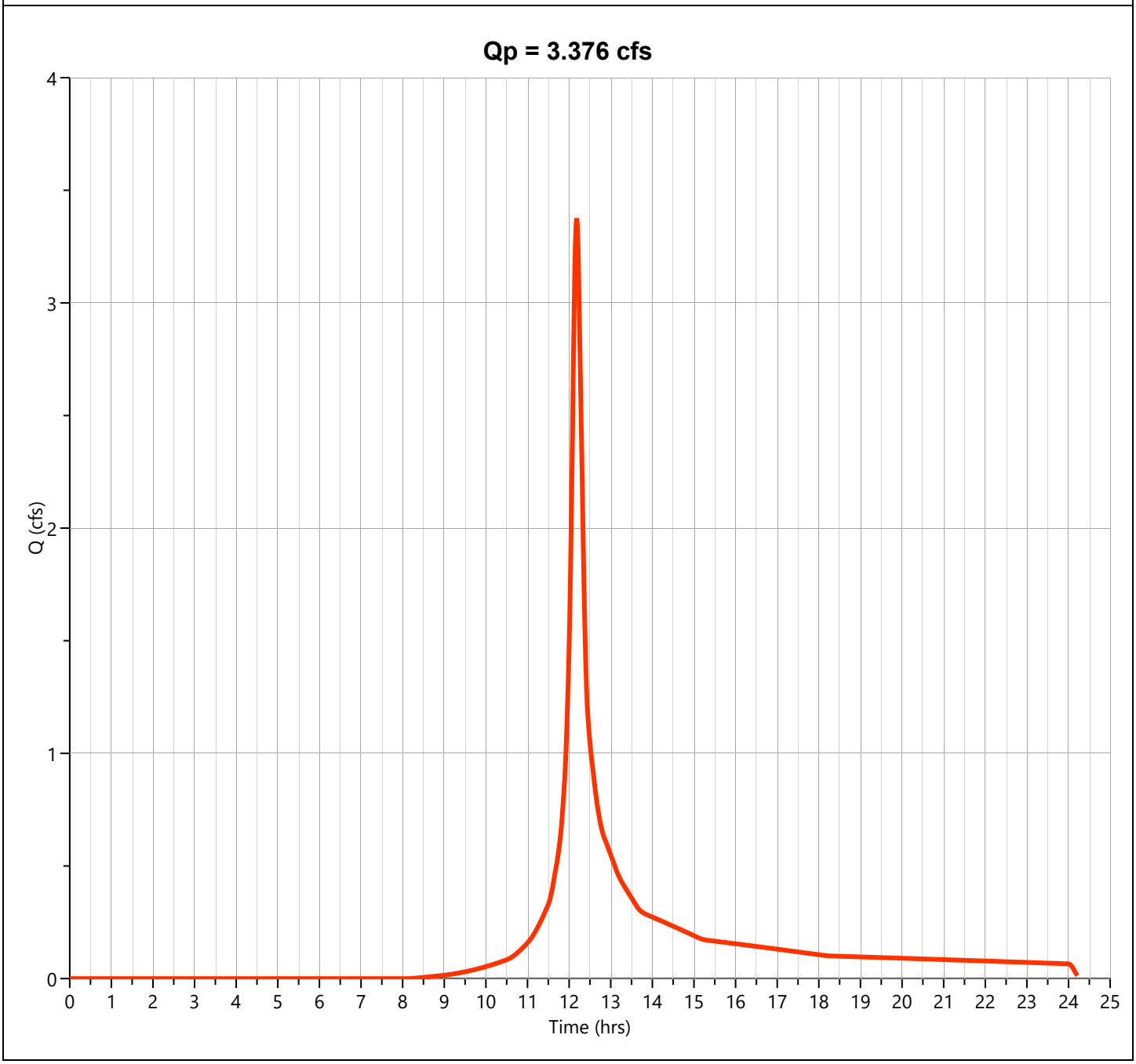
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-U Open Space C

Hyd. No. 13

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.376 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 12,980 cuft
Drainage Area	= 1.36 ac	Curve Number	= 74.00
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

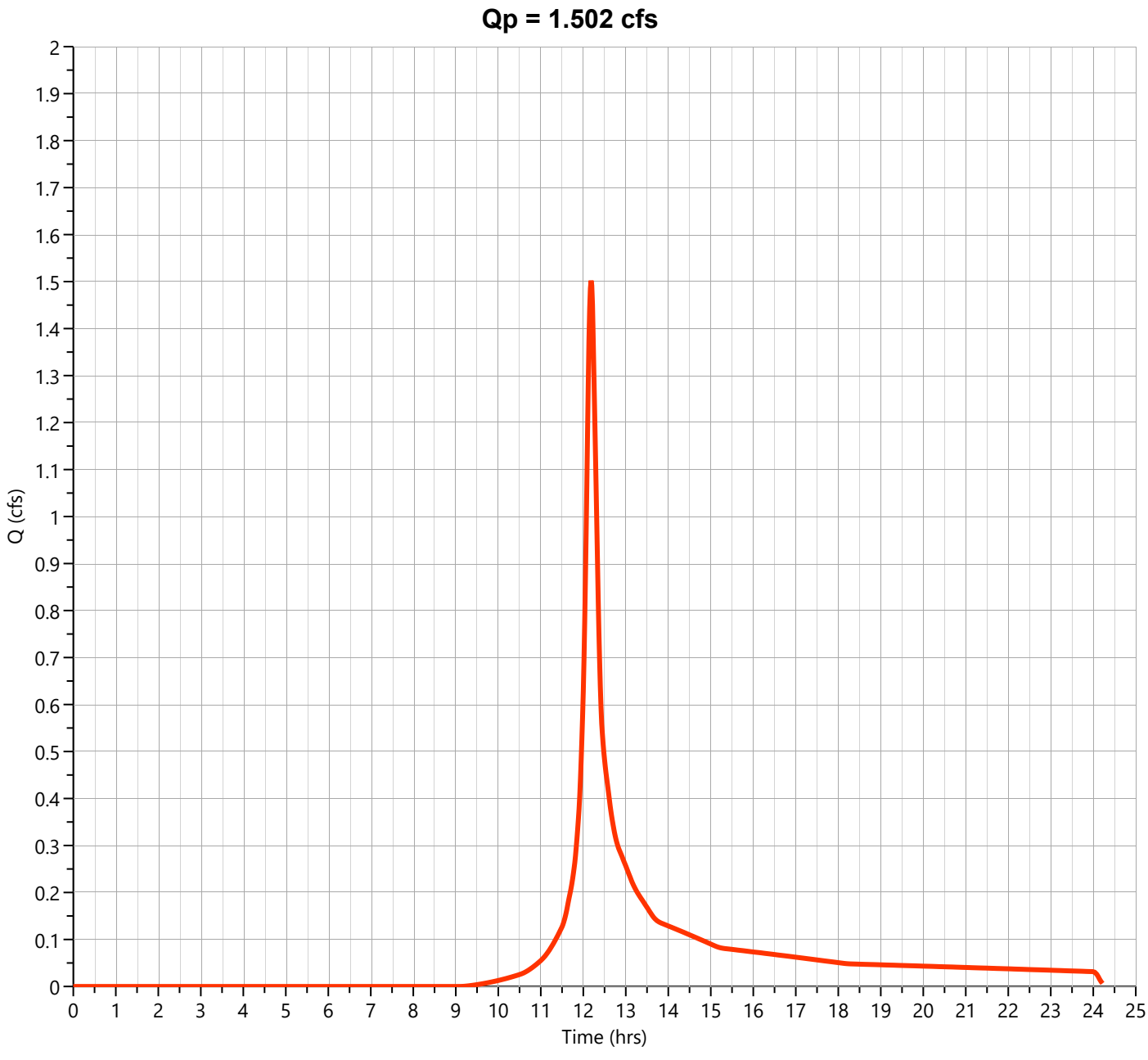
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-U Woods C

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.502 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 5,809 cuft
Drainage Area	= 0.7 ac	Curve Number	= 70.00
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

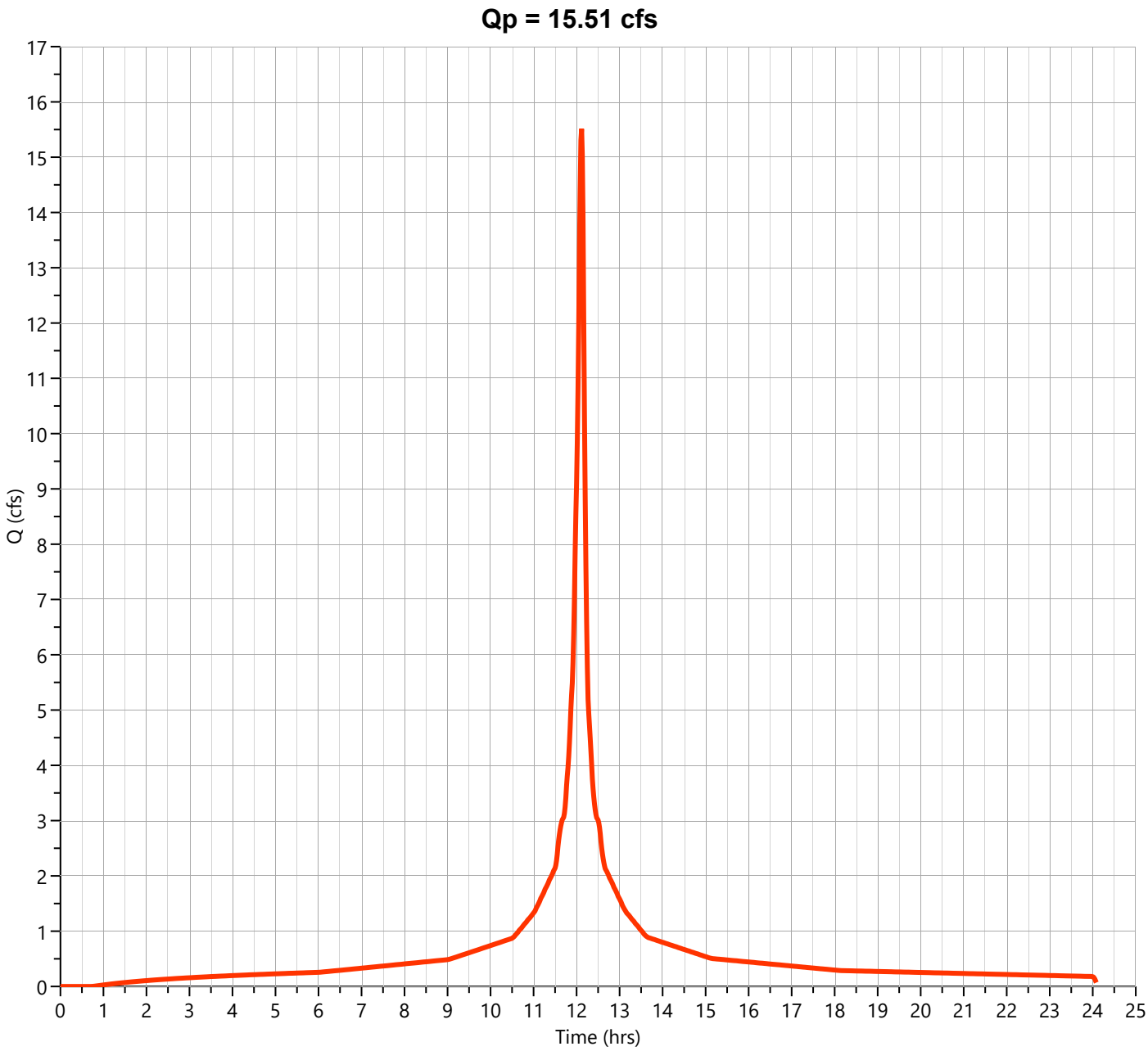
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-U Impervious

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 15.51 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 56,598 cuft
Drainage Area	= 2.94 ac	Curve Number	= 98.00
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

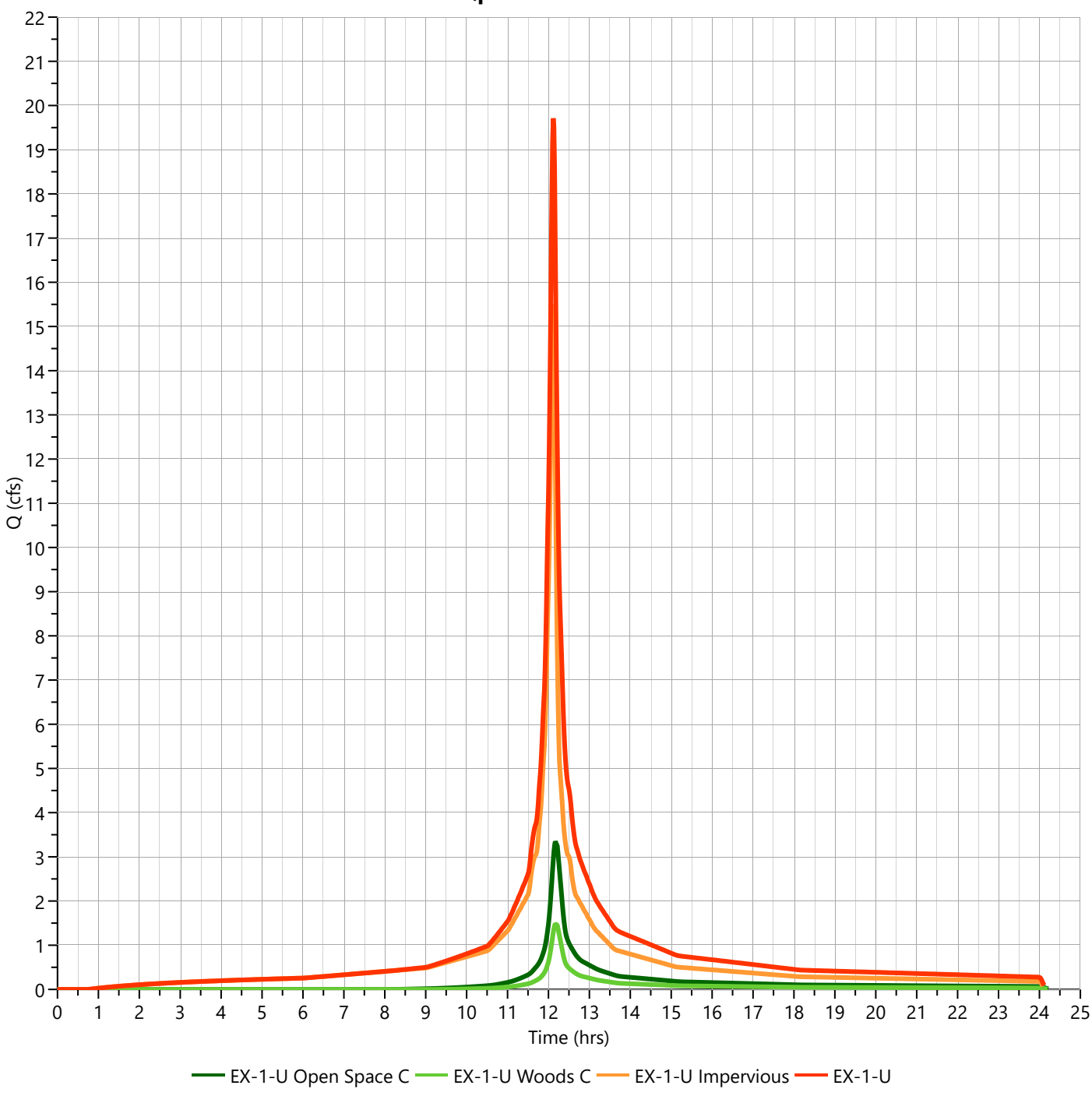
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-U

Hyd. No. 16

Hydrograph Type	= Junction	Peak Flow	= 19.71 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 75,387 cuft
Inflow Hydrographs	= 13, 14, 15	Total Contrib. Area	= 5.0 ac



Hydrograph Report

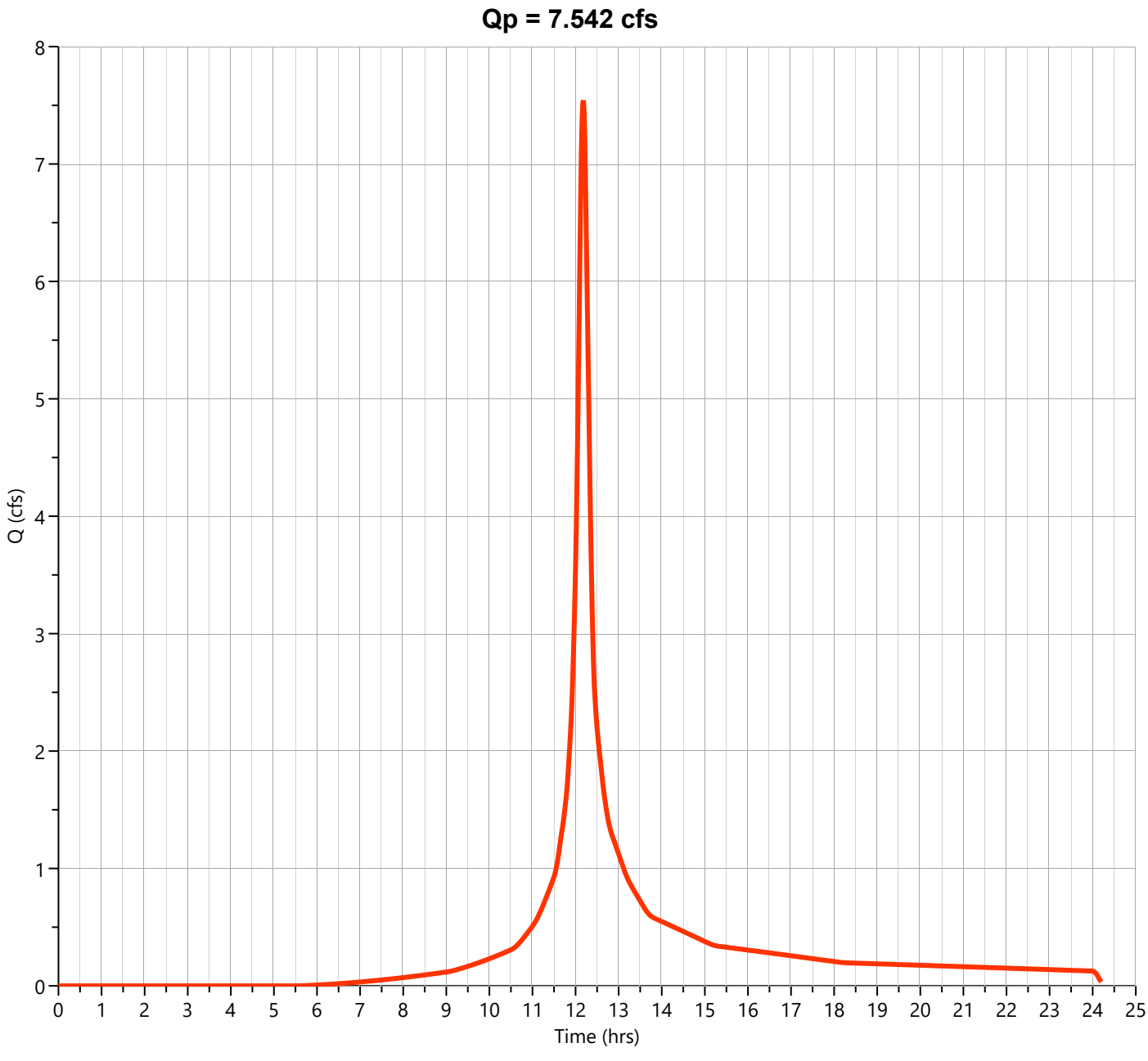
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-U Open Space C

Hyd. No. 13

Hydrograph Type	= NRCS Runoff	Peak Flow	= 7.542 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 29,392 cuft
Drainage Area	= 1.36 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 12.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

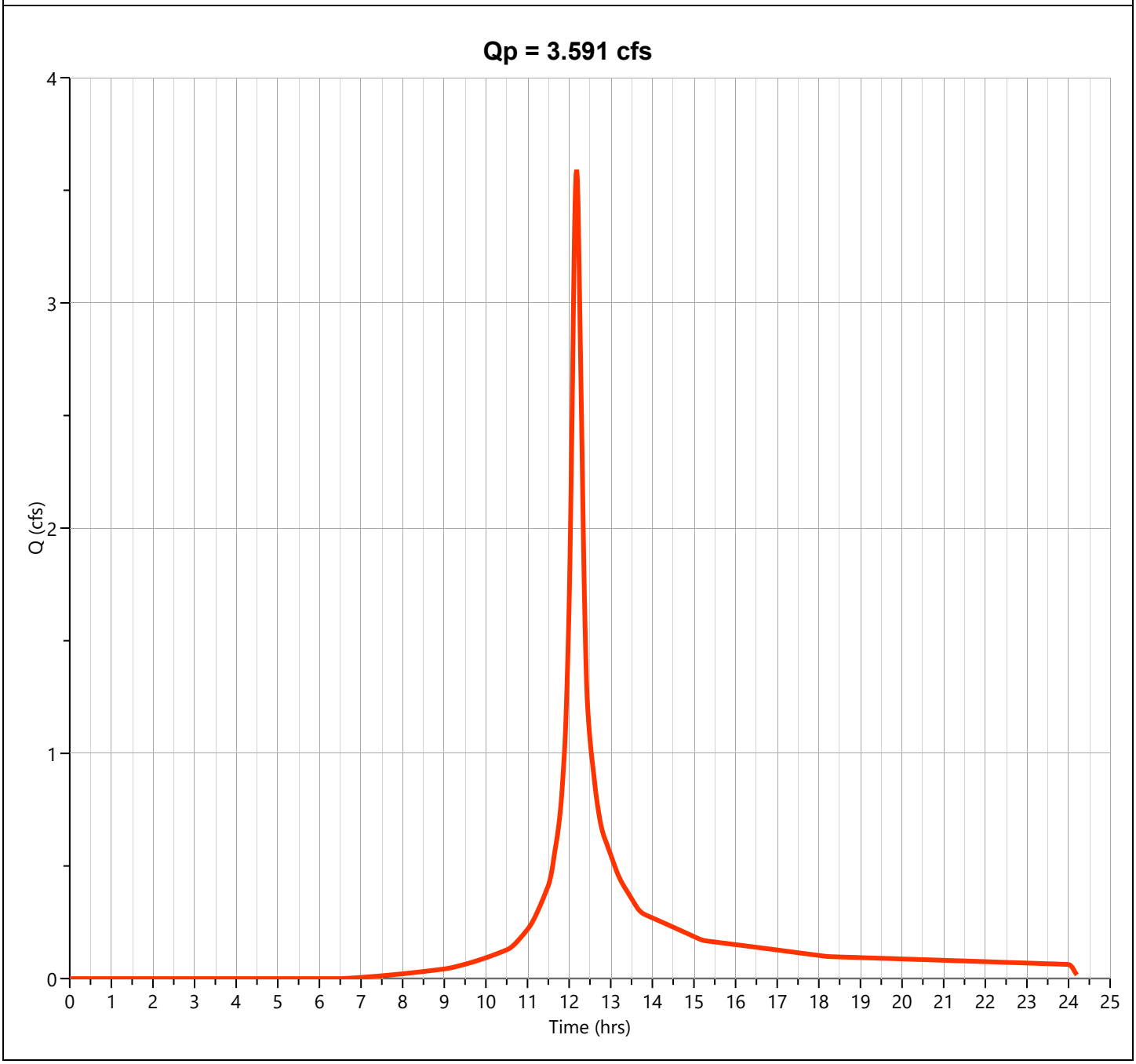
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-U Woods C

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.591 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 13,875 cuft
Drainage Area	= 0.7 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 12.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

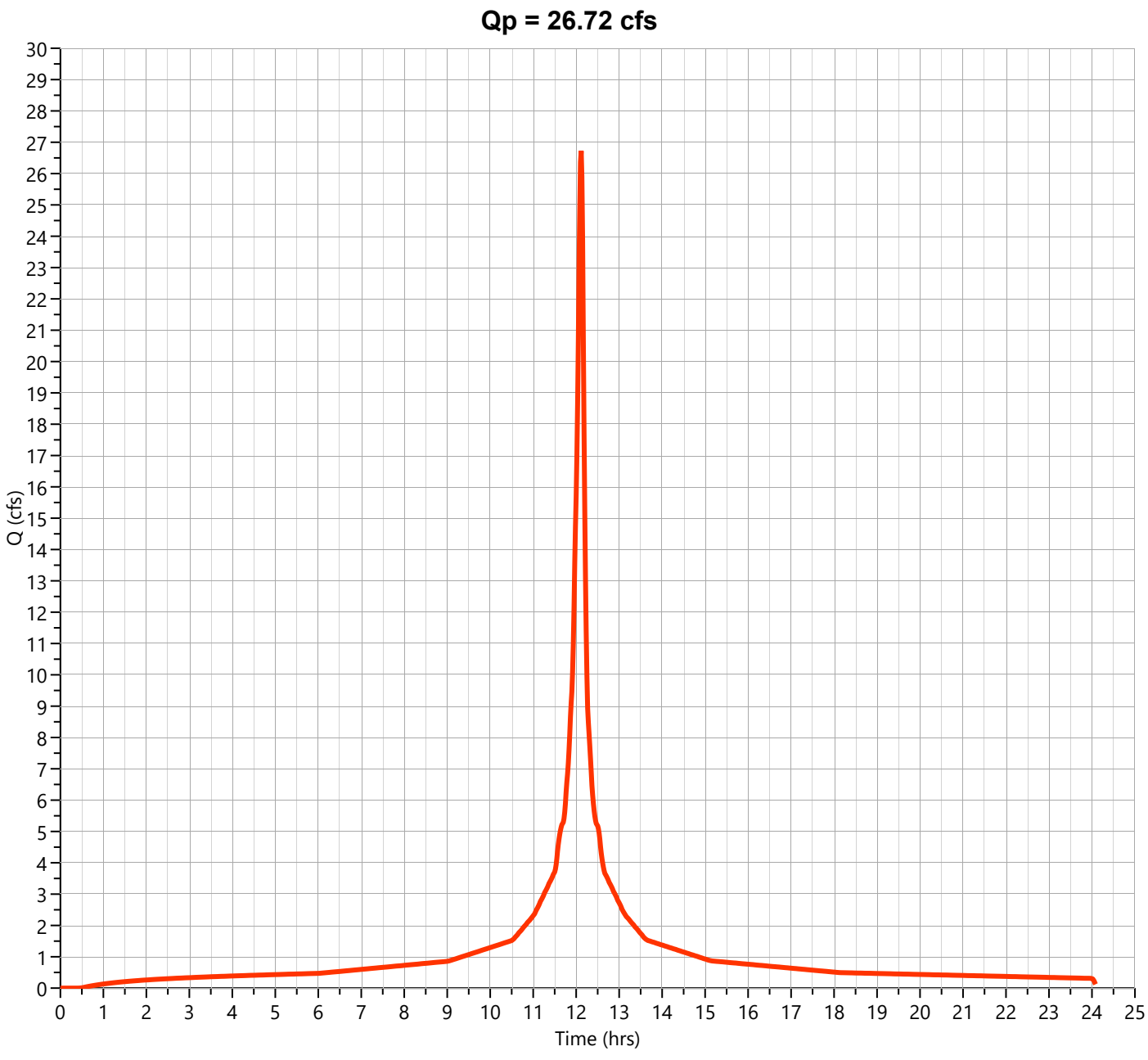
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-U Impervious

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 26.72 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 99,046 cuft
Drainage Area	= 2.94 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

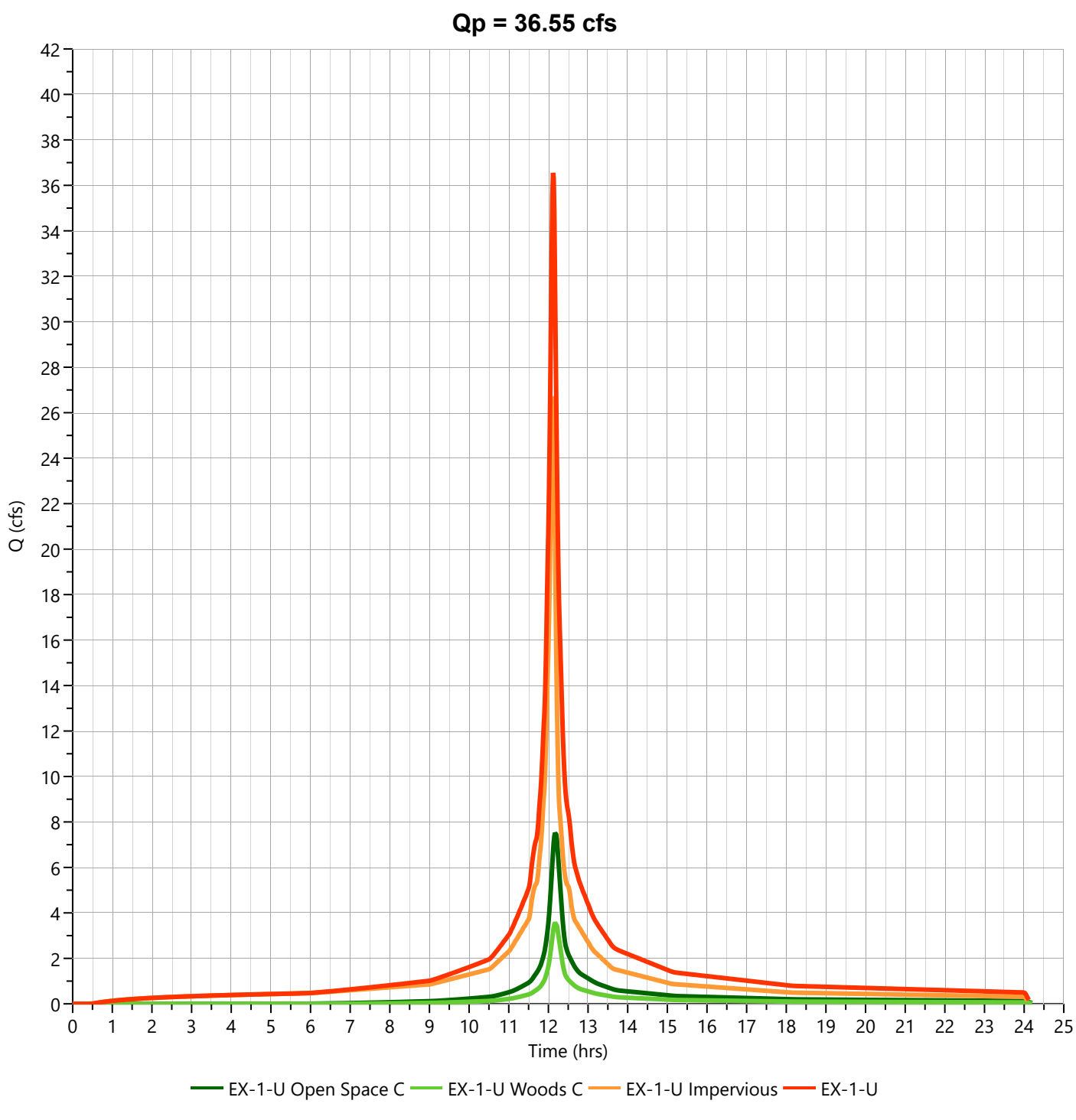
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-1-U

Hyd. No. 16

Hydrograph Type	= Junction	Peak Flow	= 36.55 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 142,313 cuft
Inflow Hydrographs	= 13, 14, 15	Total Contrib. Area	= 5.0 ac



TOTAL EXISTING FLOW TO POA-1

Hydrograph Report

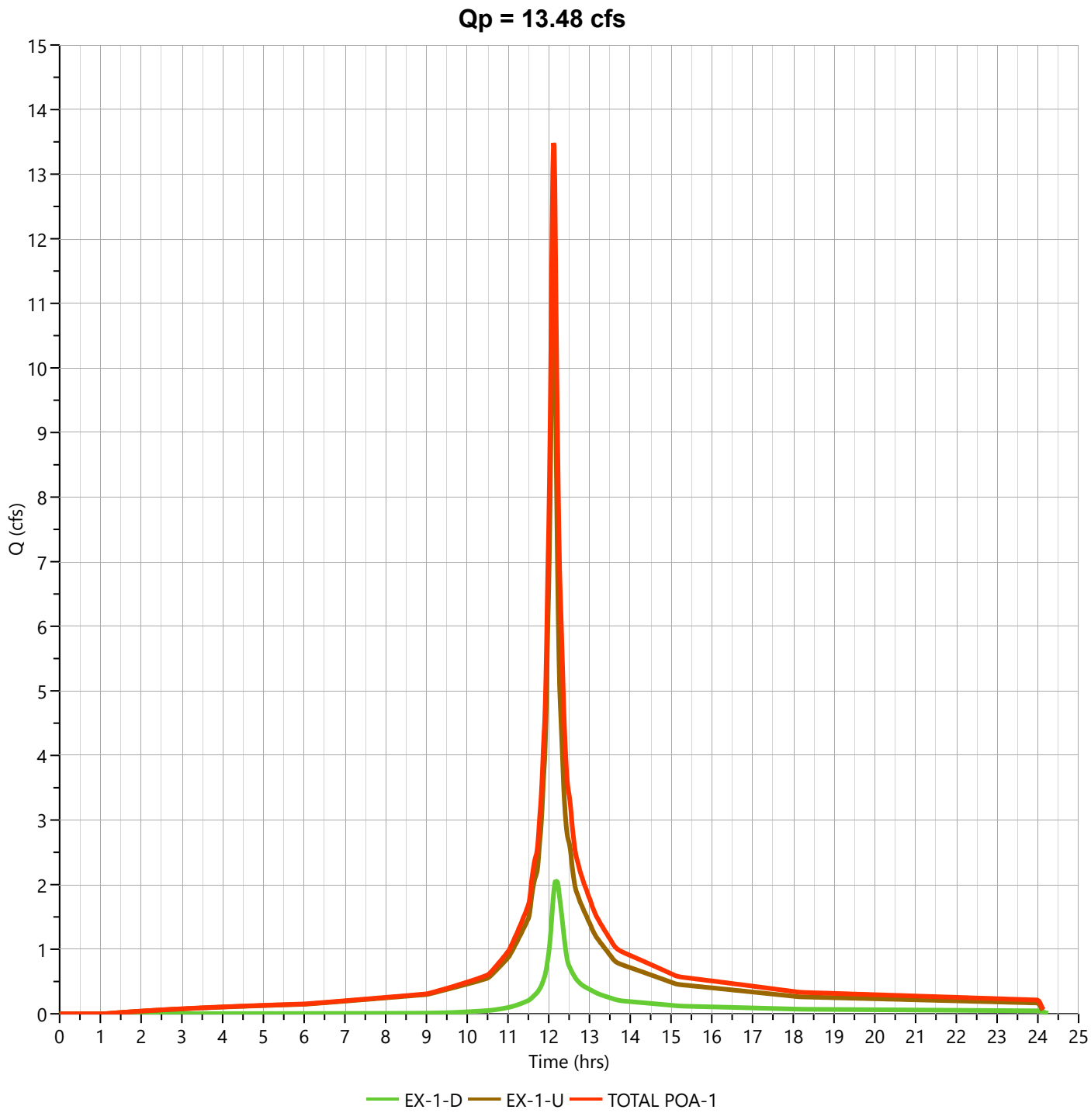
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

TOTAL POA-1

Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 13.48 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 52,703 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

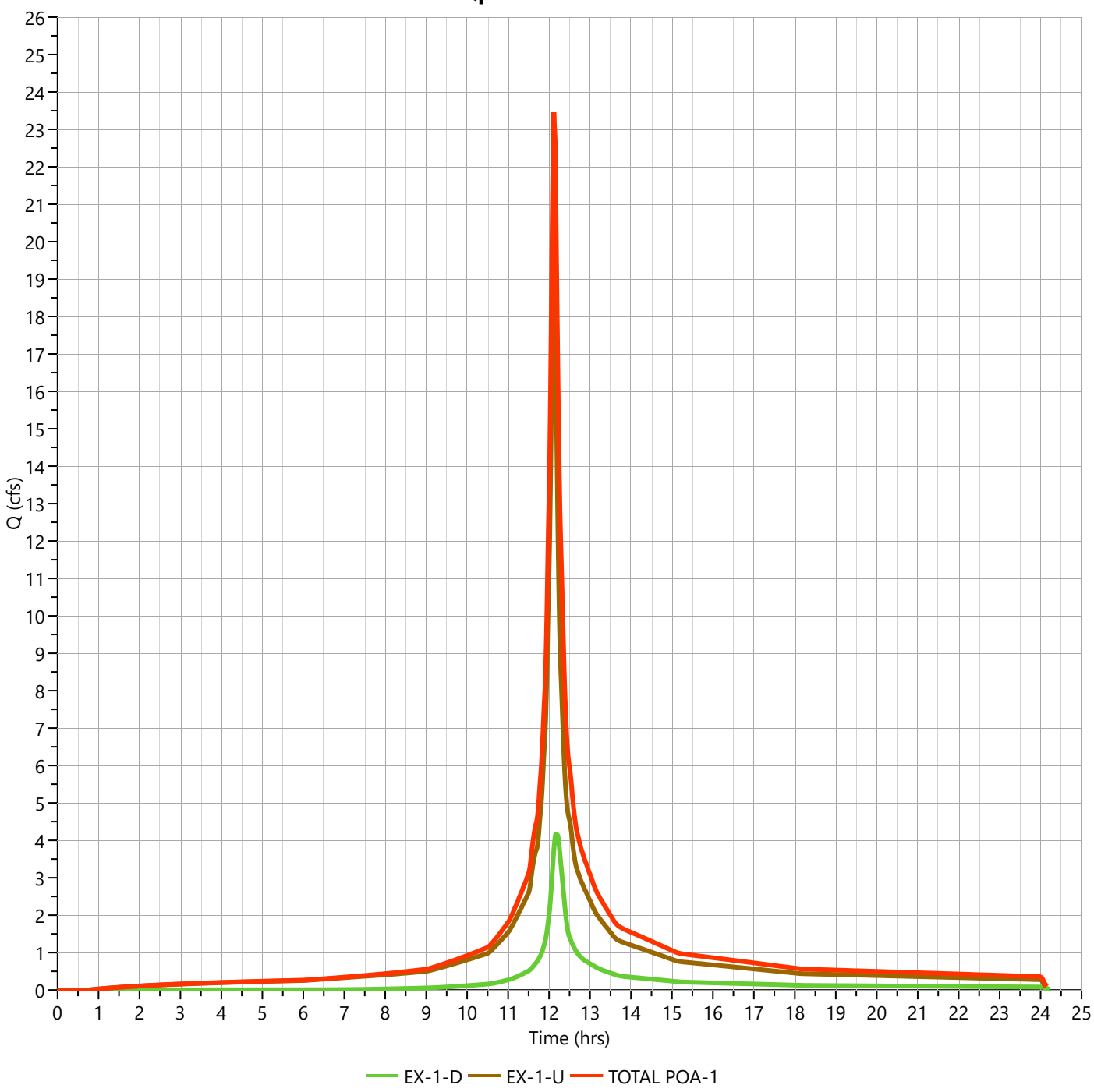
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

TOTAL POA-1

Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 23.47 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 93,069 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

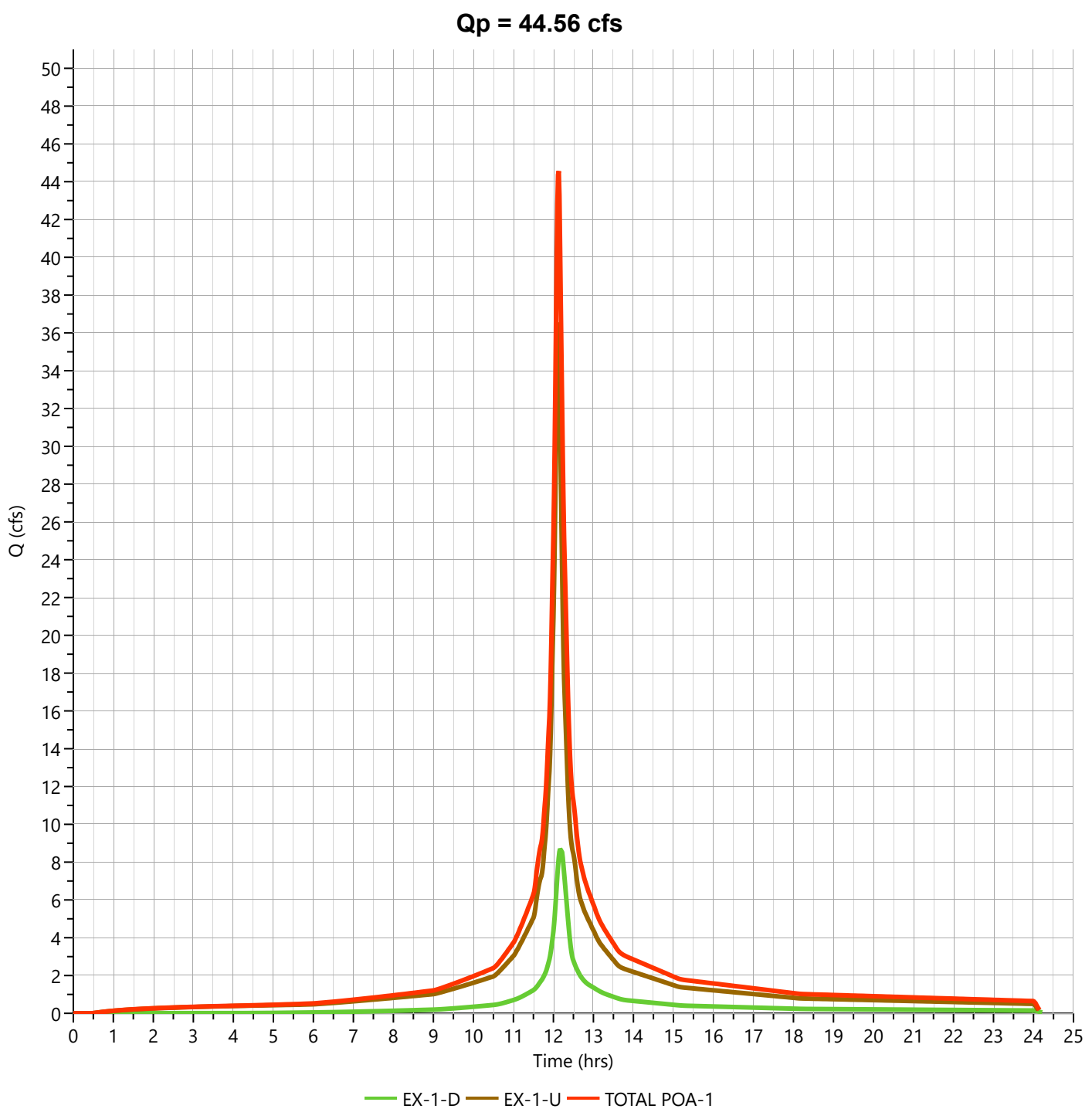
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

TOTAL POA-1

Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 44.56 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 179,566 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



TOTAL ALLOWABLE FLOW TO POA-1

Hydrograph Report

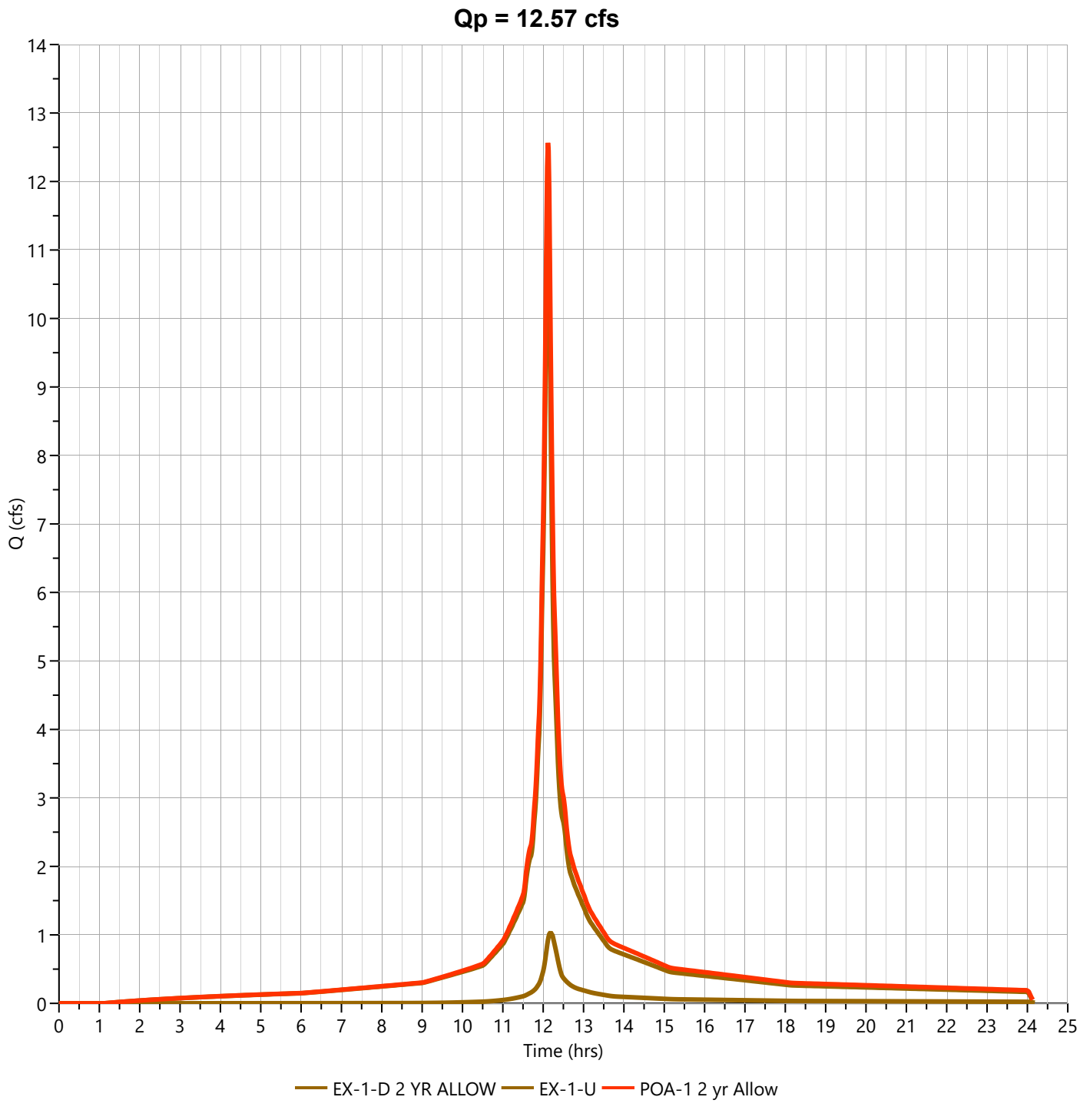
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

POA-1 2 yr Allow

Hyd. No. 19

Hydrograph Type	= Junction	Peak Flow	= 12.57 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 48,283 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

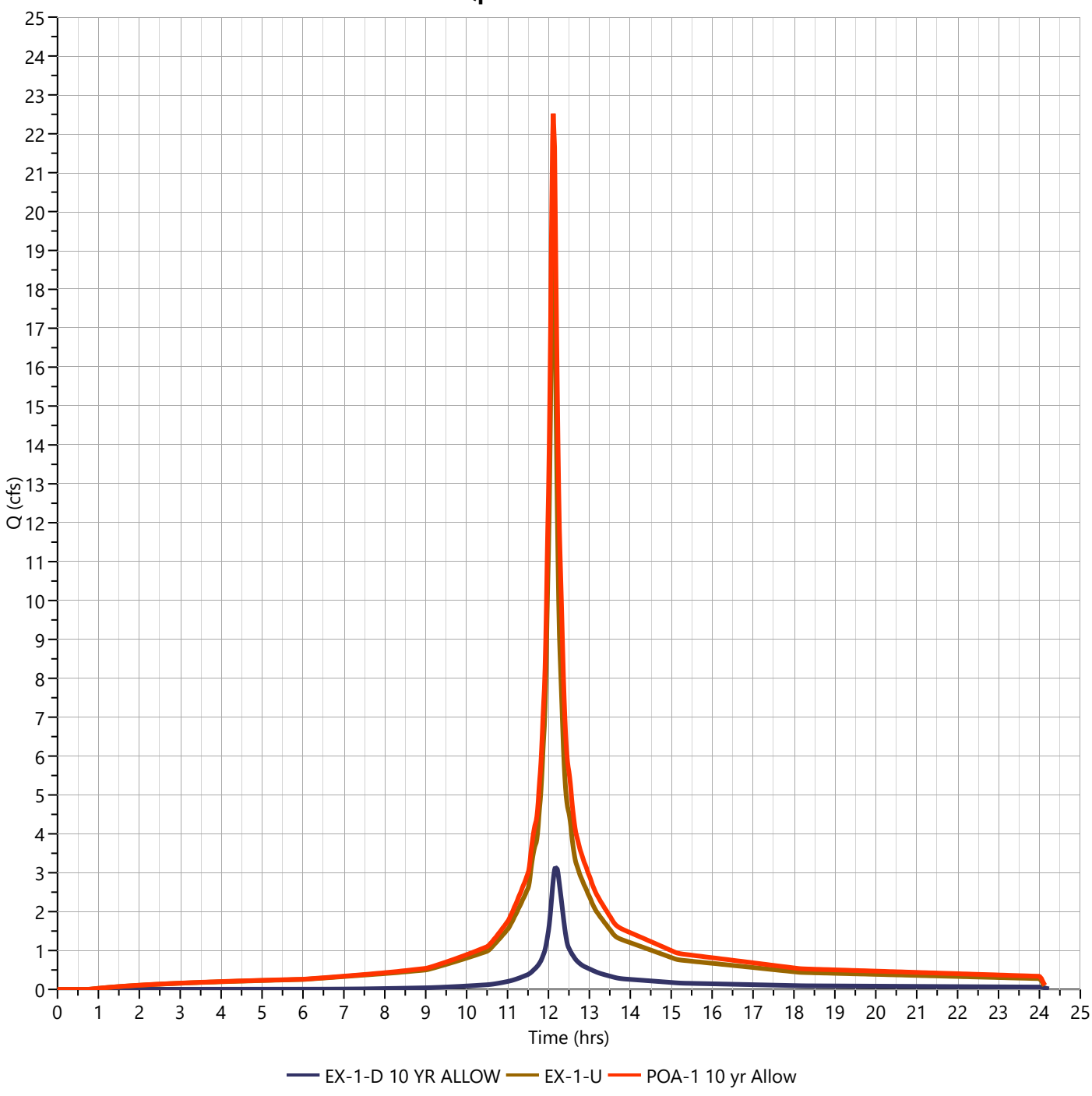
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

POA-1 10 yr Allow

Hyd. No. 20

Hydrograph Type	= Junction	Peak Flow	= 22.52 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 88,648 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

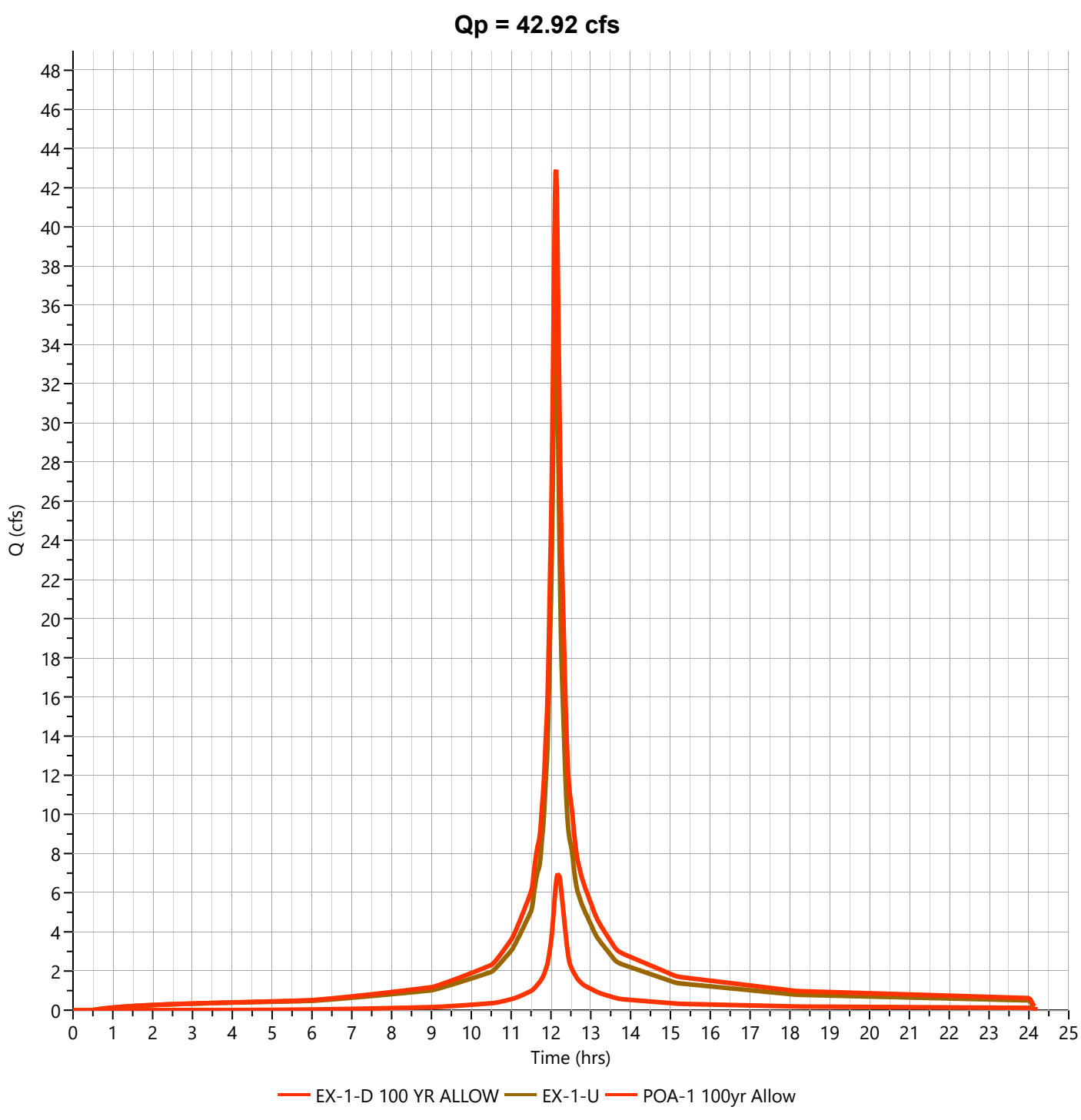
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

POA-1 100yr Allow

Hyd. No. 21

Hydrograph Type	= Junction	Peak Flow	= 42.92 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 172,115 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



EX-2-DISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/20/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/20/2025**

Circle One: (**Present**) Developed — **Current Existing Watershed EX-2-D 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.	Surface Description (NEH table 15-1)		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	**0.056**					
6.	Compute T_t	hr	**0.013**	+		+		

$$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$$

Sheet Flow Sub-Total **0.013 hours**

Shallow Concentrated Flow

			Segment ID					
7.	Surface Description		2		3		4	
			Grassed Waterways		**Woodlands**		**Pavement**	
8.	Flow Length, L	ft	**23**		**140**		**155**	
9.	Watercourse Slope, s	ft/ft	**0.039**		**0.147**		**0.014**	
10.	Average Velocity, V (NEH table 15-3)	ft/s	**3.19**		**1.93**		**2.39**	
11.	Compute T_t	hr	**0.002**	+	**0.020**	+	**0.018**	

$$T_t = \frac{L}{3600\,V}$$

Shallow Conc. Flow Sub-Total **0.040 hours**

Channel Flow

			Segment ID					
12.	Flow Length, L	ft	**5**		**6**			
			191		**125**			
13.	Cross Sectional flow area, a	ft^2	**0.61**		**0.61**			
14.	Wetted Perimeter, P_w	ft	**1.96**		**1.96**			
15.	Hydraulic Radius, r	ft	**0.31**		**0.31**			
16.	Channel Slope, s	ft/ft	**0.014**		**0.009**			
17.	Manning's Roughness Coeff., n		**0.013**		**0.013**			
18.	Velocity, V	ft/s	**6.14**		**5.13**			
19.	Compute T_t	hr	**0.009**	+	**0.007**	+		

$$r = a / P_w$$

$$V = (1.49\, r^{2/3} s^{1/2}) / n$$

$$T_t = \frac{L}{3600\,V}$$

Channel Flow Sub-Total **0.015 hours**

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

Total Tc (hours) =	**0.068 hours**
Total Tc (minutes) =	**4 minutes**

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/20/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/20/2025**

Circle One: (**Present**) Developed — **Current Existing Watershed EX-2-D 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	**0.066**					
6.	Compute T_t $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	**0.213**	+		+		
					Sheet Flow Sub-Total		**0.213 hours**	

Shallow Concentrated Flow

			Segment ID					
			2					
7.	Surface Description		**Woodlands**					
8.	Flow Length, L	ft	**100**					
9.	Watercourse Slope, s	ft/ft	**0.081**					
10.	Average Velocity, V (NEH table 15-3)	ft/s	**1.43**					
11.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr	**0.019**	+		+		
					Shallow Conc. Flow Sub-Total		**0.019 hours**	

Channel Flow

			Segment ID		**3**		**4**		
12.	Flow Length, L	ft			**191**		**125**		
13.	Cross Sectional flow area, a	ft^2			**0.61**		**0.61**		
14.	Wetted Perimeter, P_w	ft			**1.96**		**1.96**		
15.	Hydraulic Radius, r $r = a / P_w$	ft			**0.31**		**0.31**		
16.	Channel Slope, s	ft/ft			**0.013**		**0.009**		
17.	Manning's Roughness Coeff., n				**0.013**		**0.013**		
18.	Velocity, V $V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s			**6.14**		**5.13**		
19.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr			**0.009**	+	**0.007**	+	
							Channel Flow Sub-Total		**0.015 hours**

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

Total Tc (hours) =		**0.248 hours**
Total Tc (minutes) =		**15 minutes**

Hydrograph Report

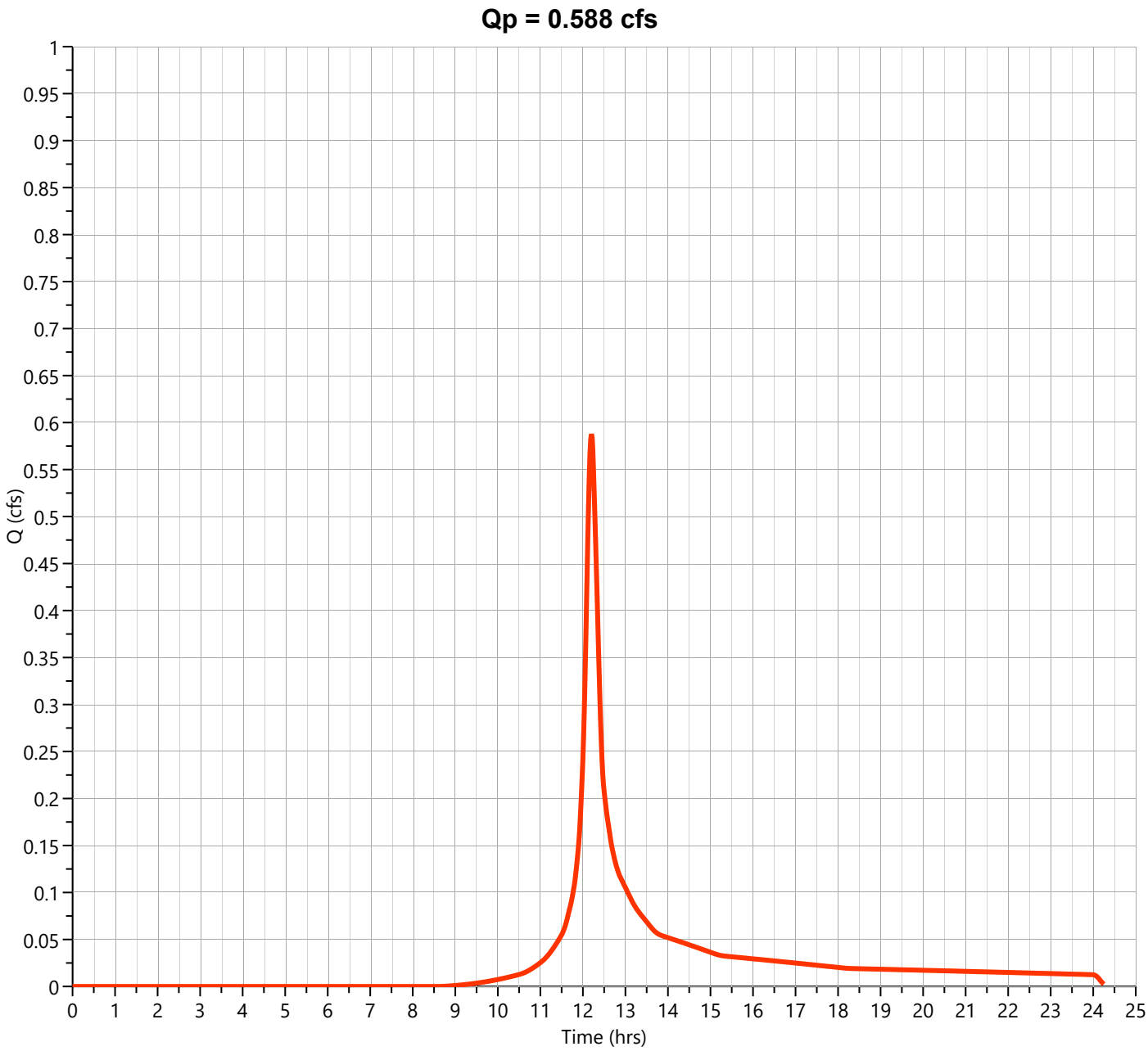
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-D Open Space D

Hyd. No. 25

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.588 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 2,388 cuft
Drainage Area	= 0.41 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

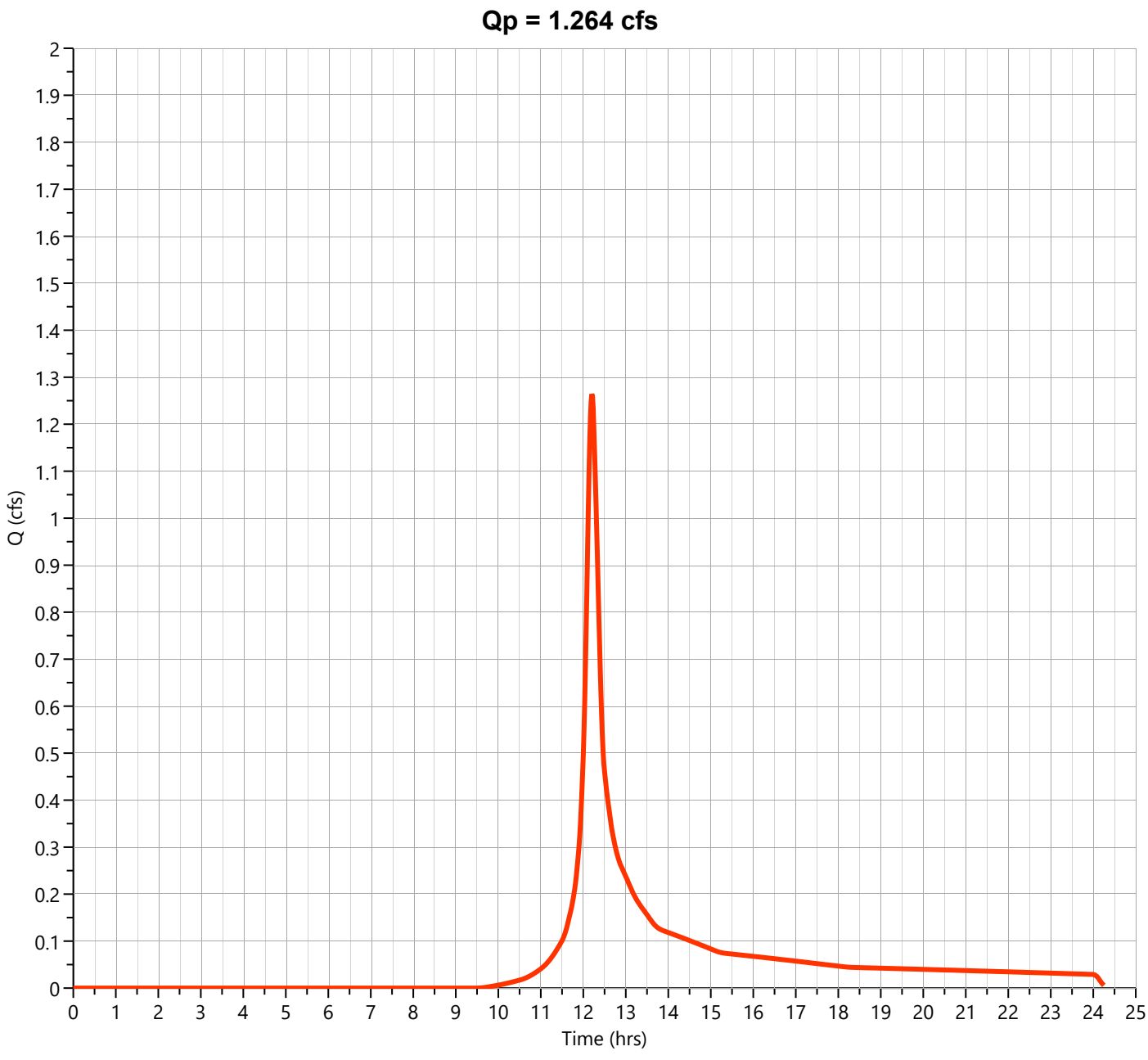
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-D Woods D

Hyd. No. 26

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.264 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 5,187 cuft
Drainage Area	= 1.02 ac	Curve Number	= 77.00
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

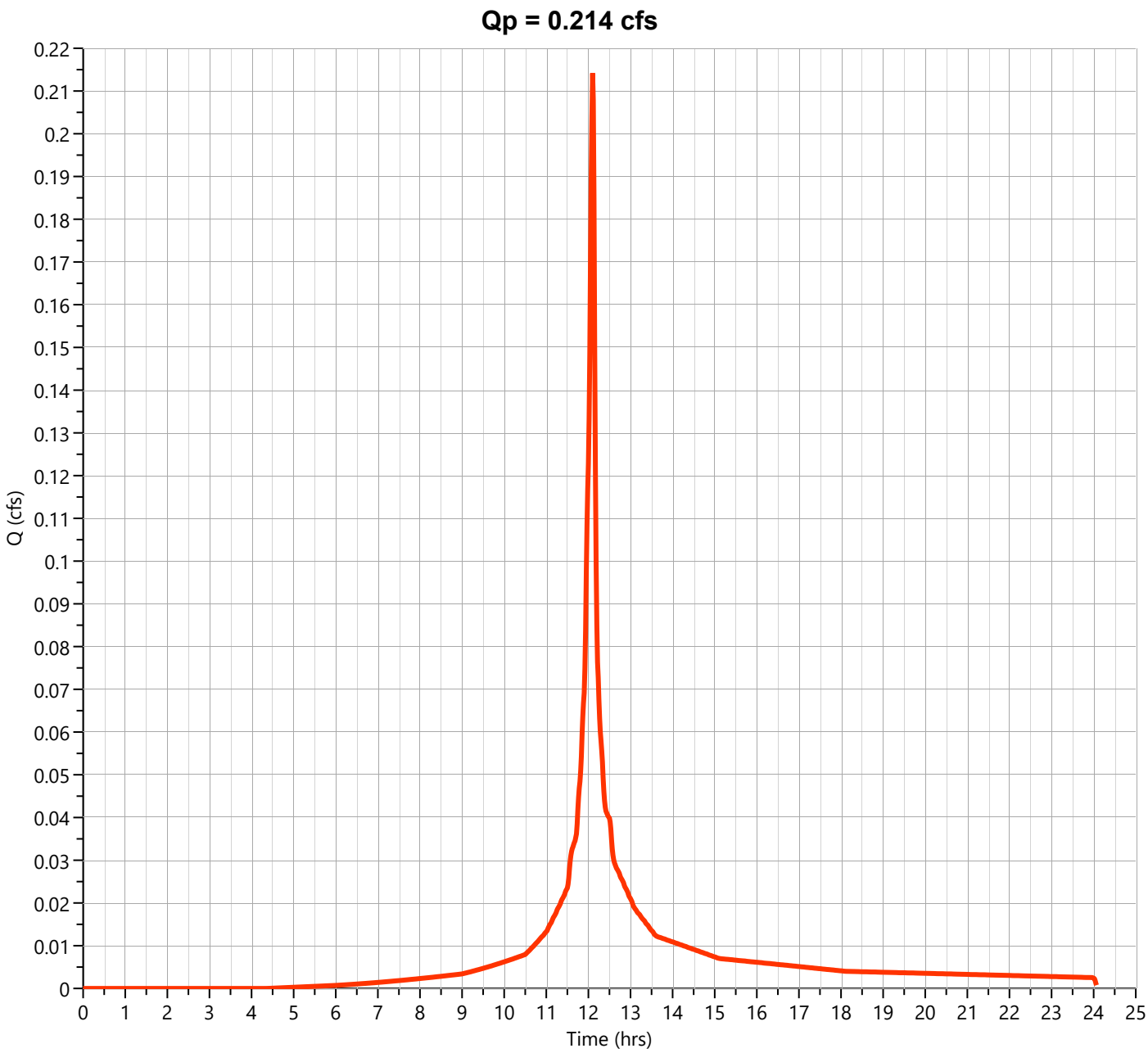
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-D Gravel D

Hyd. No. 27

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.214 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 636 cuft
Drainage Area	= 0.07 ac	Curve Number	= 91.00
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

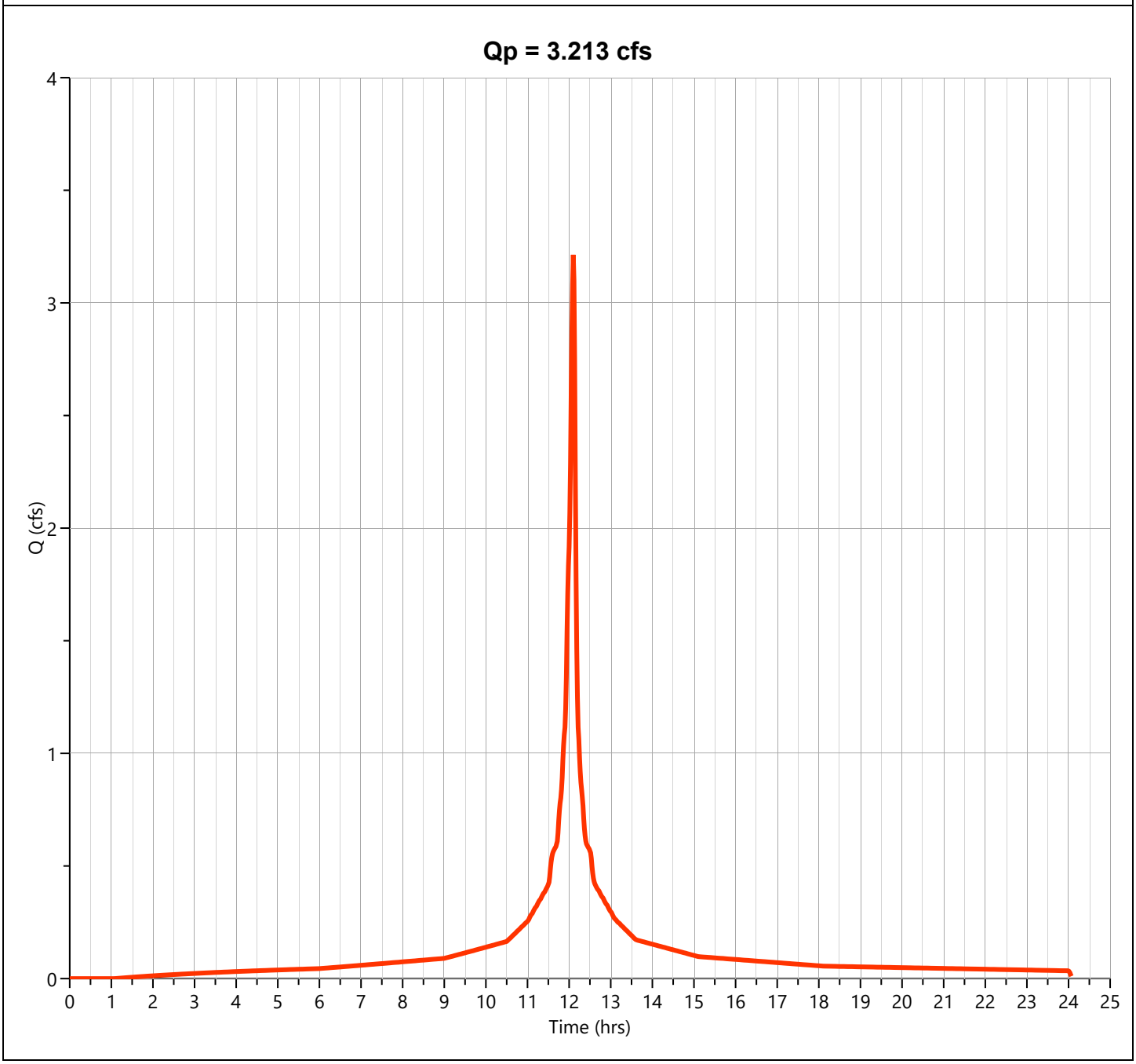
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-D Impervious

Hyd. No. 28

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.213 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 10,658 cuft
Drainage Area	= 0.91 ac	Curve Number	= 98.00
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

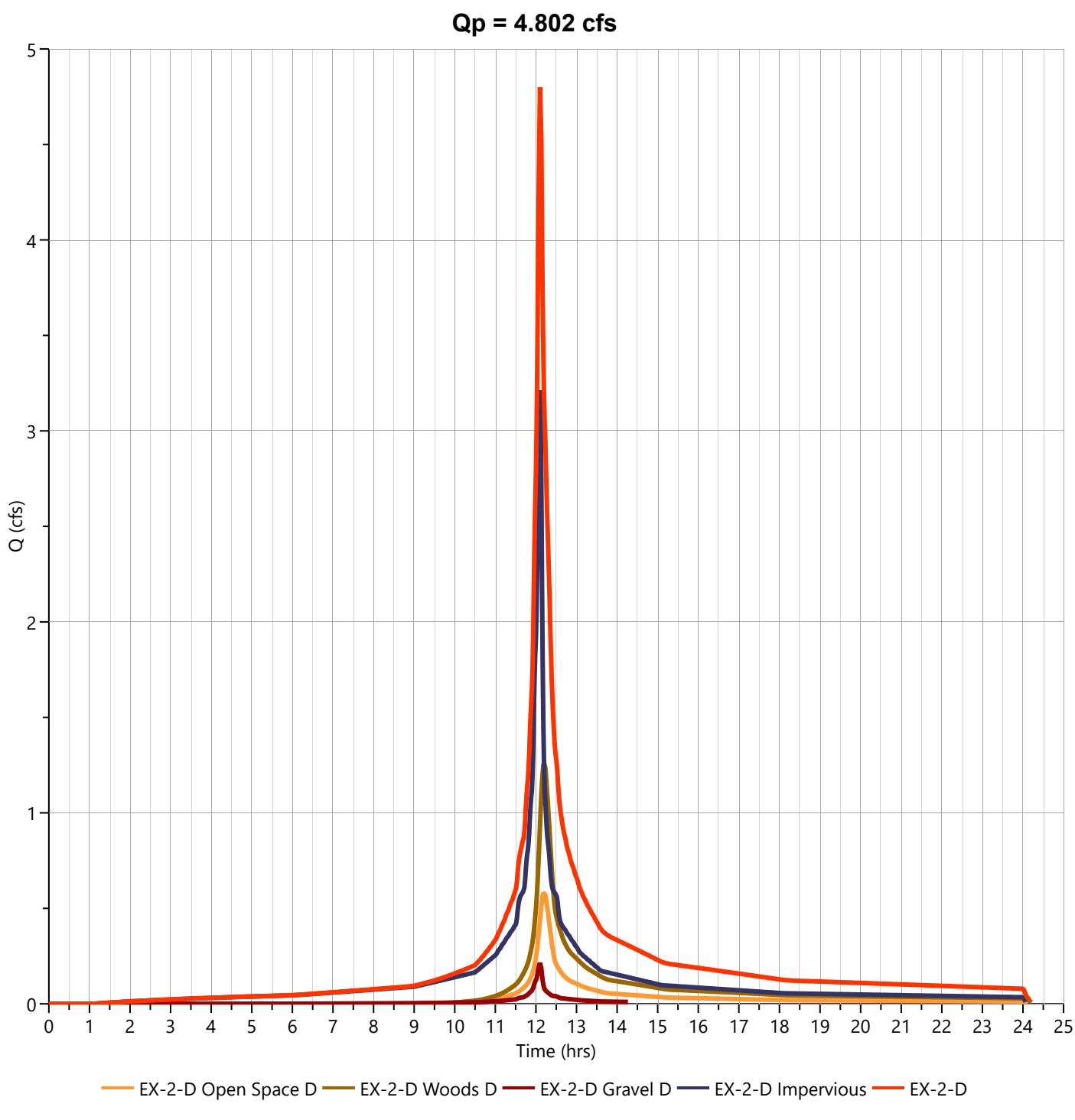
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-D

Hyd. No. 30

Hydrograph Type	= Junction	Peak Flow	= 4.802 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 18,870 cuft
Inflow Hydrographs	= 25, 26, 27, 28	Total Contrib. Area	= 2.41 ac



Hydrograph Report

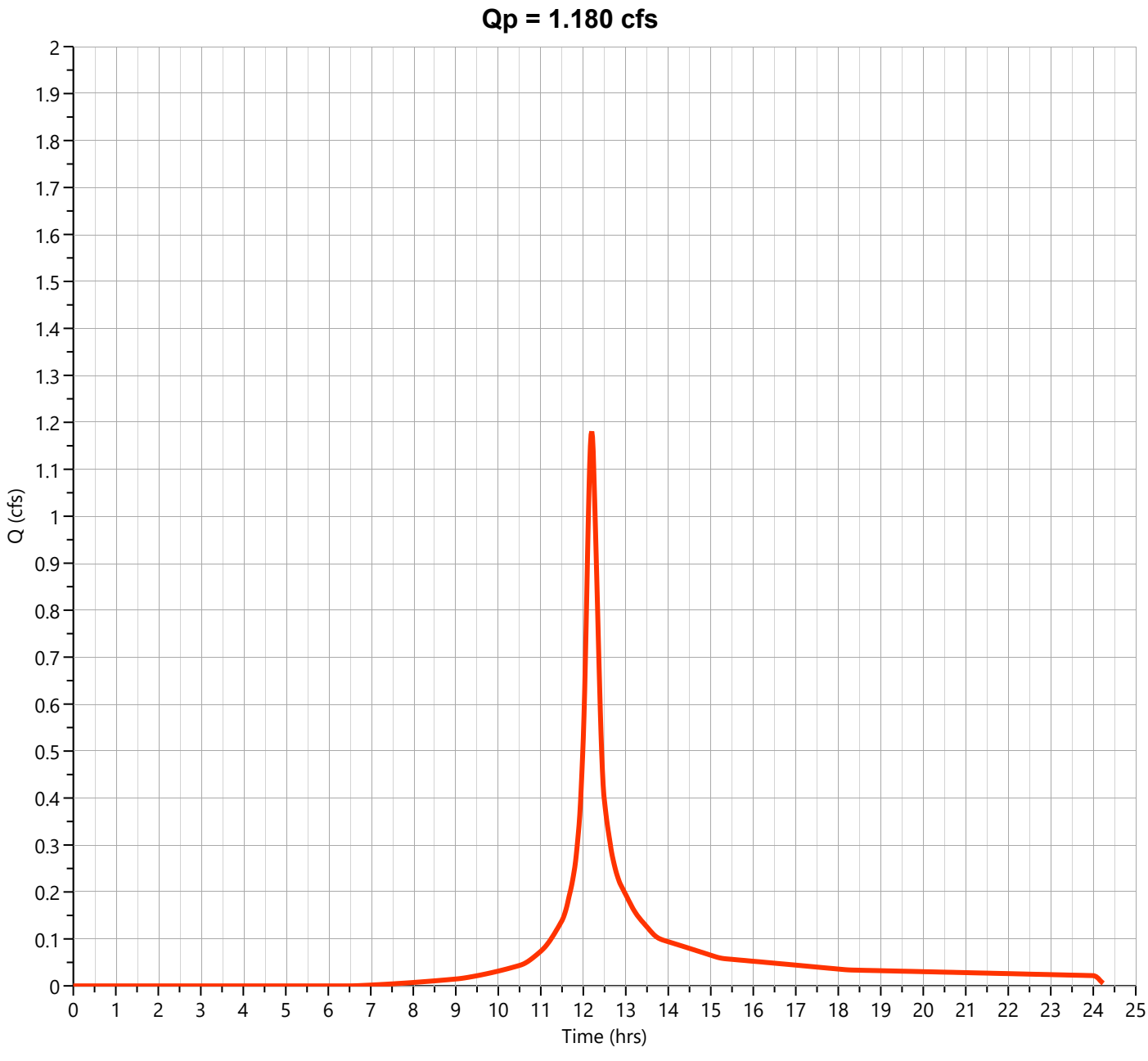
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-D Open Space D

Hyd. No. 25

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.180 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 4,803 cuft
Drainage Area	= 0.41 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

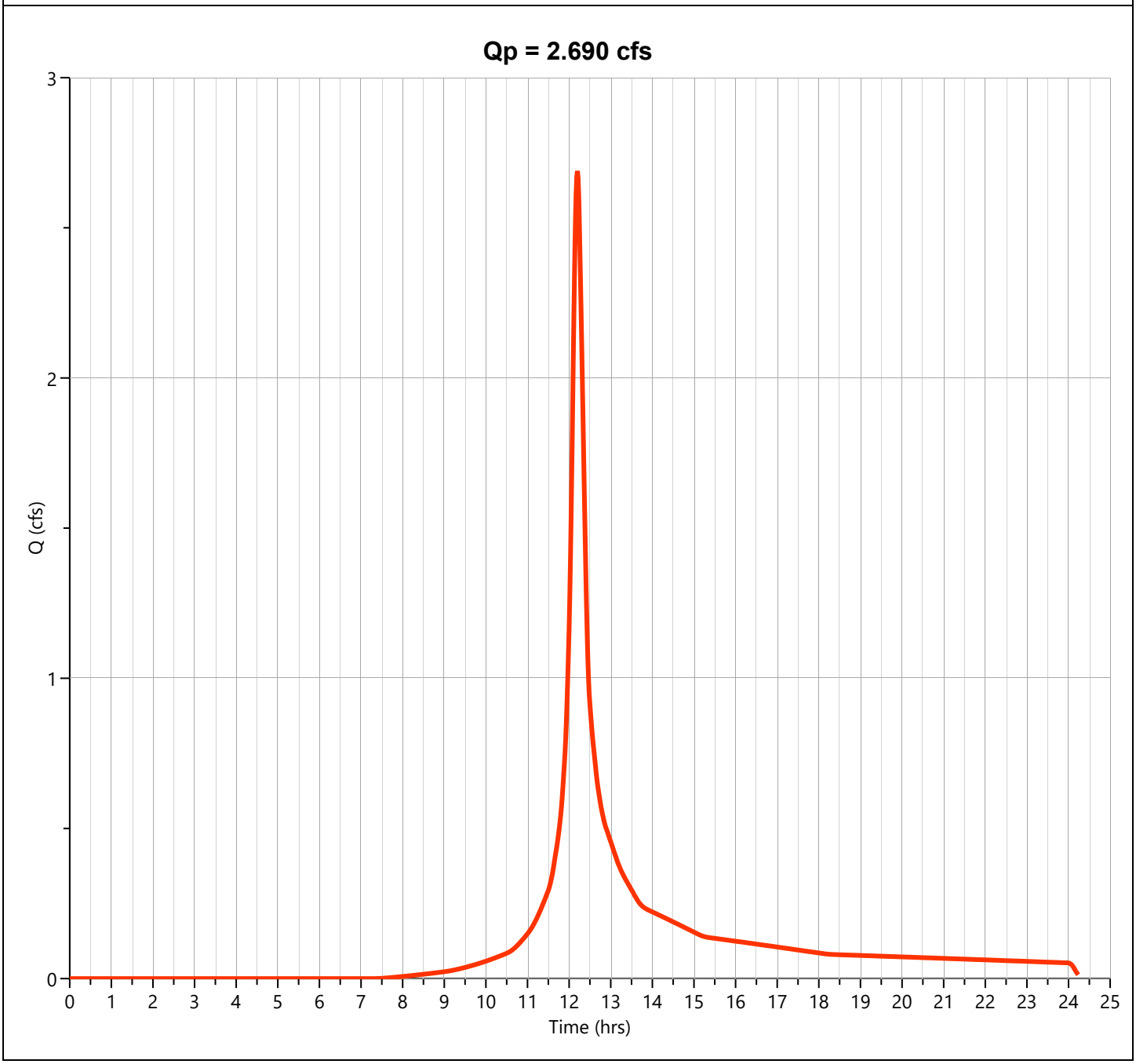
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-D Woods D

Hyd. No. 26

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.690 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 10,900 cuft
Drainage Area	= 1.02 ac	Curve Number	= 77.00
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

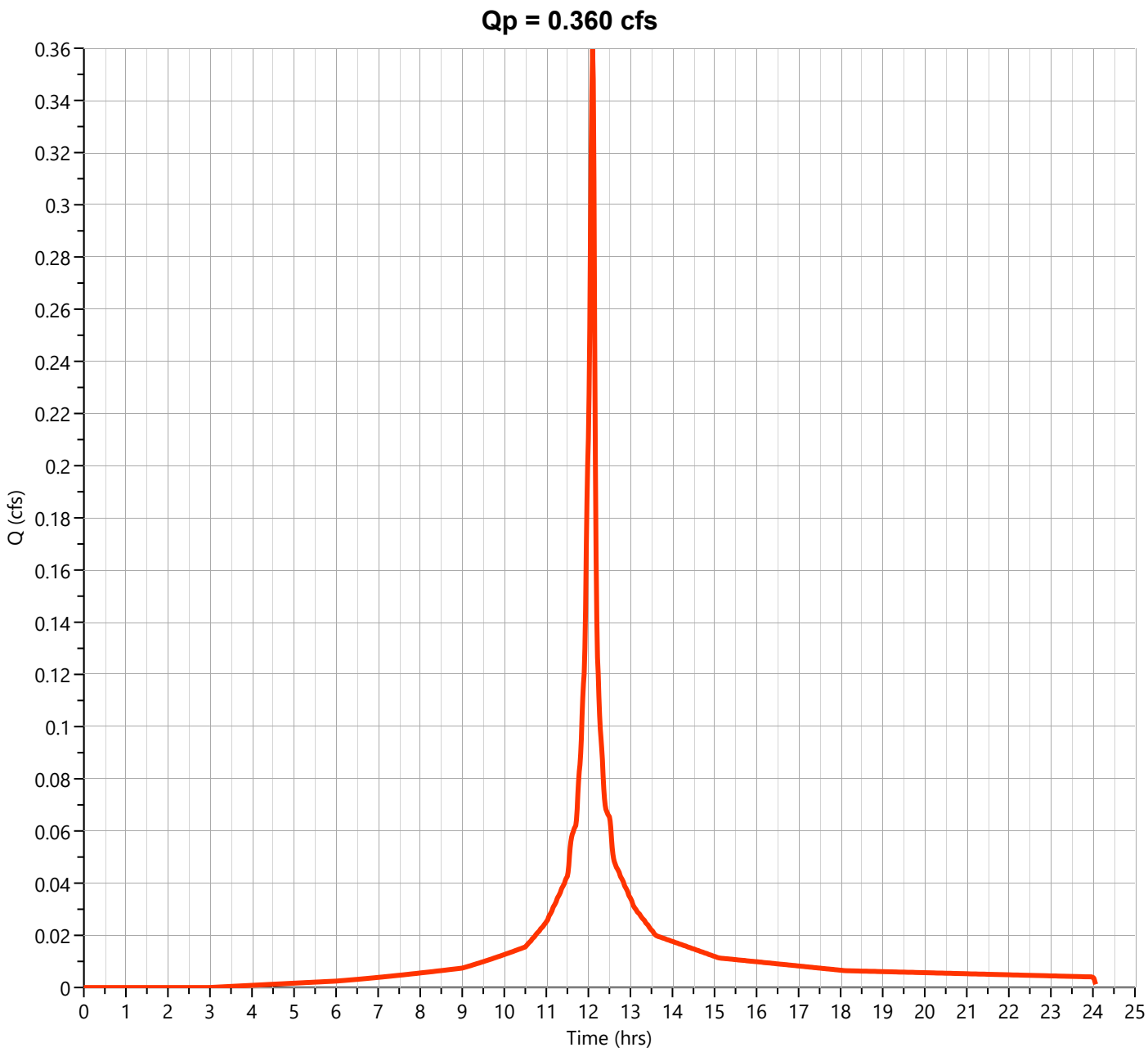
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-D Gravel D

Hyd. No. 27

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.360 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,106 cuft
Drainage Area	= 0.07 ac	Curve Number	= 91.00
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

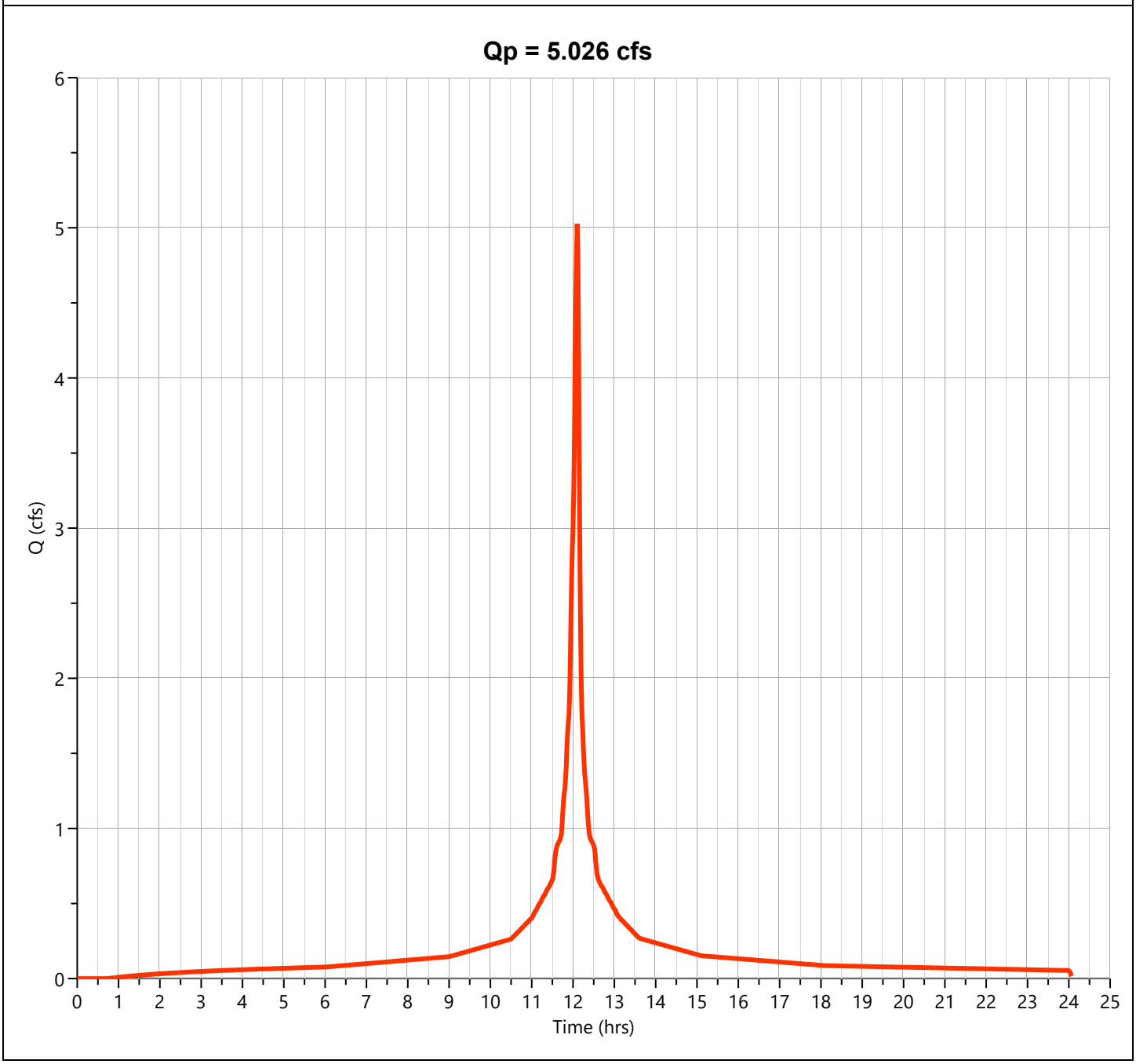
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-D Impervious

Hyd. No. 28

Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.026 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 16,988 cuft
Drainage Area	= 0.91 ac	Curve Number	= 98.00
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

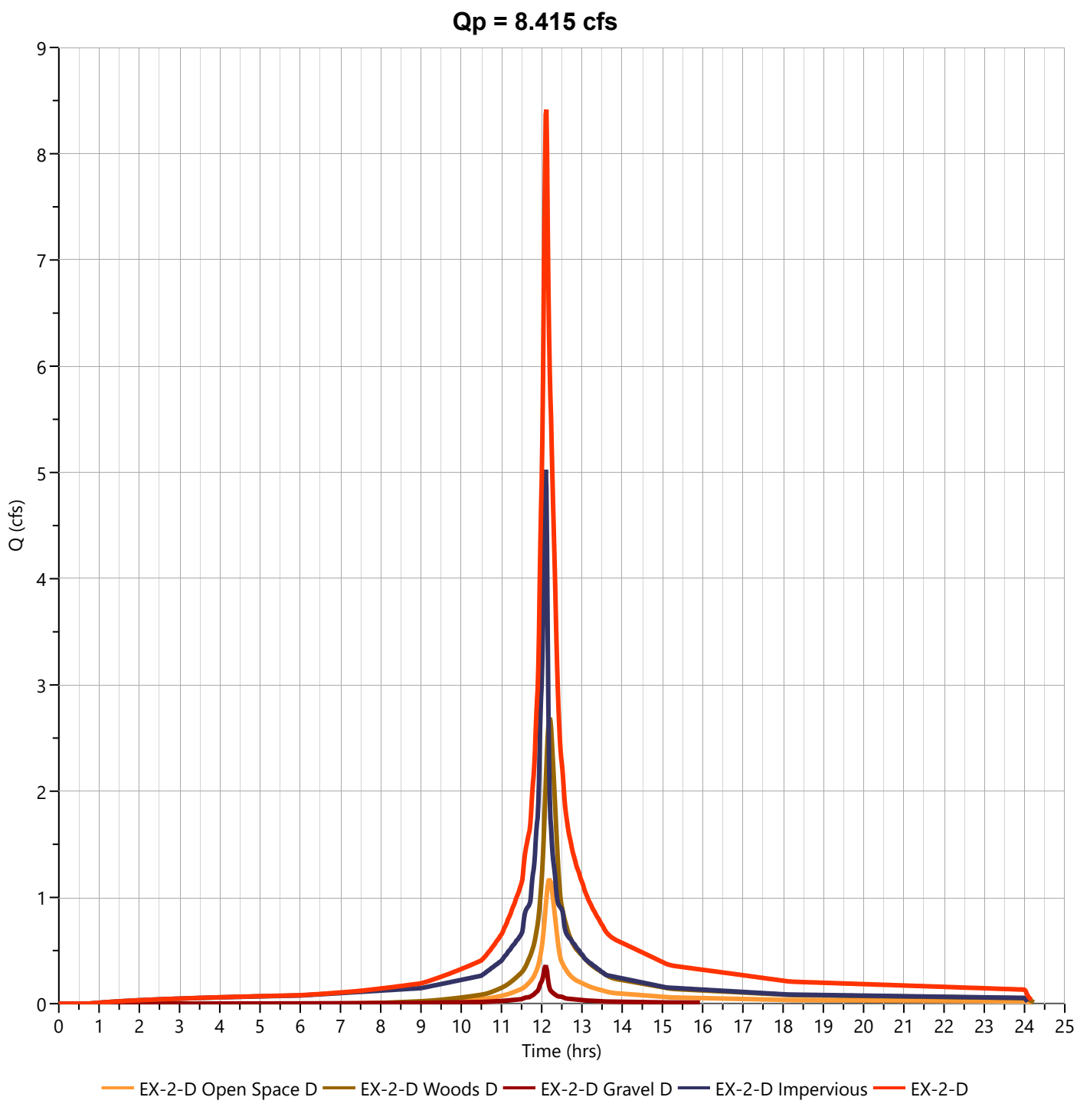
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-D

Hyd. No. 30

Hydrograph Type	= Junction	Peak Flow	= 8.415 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 33,796 cuft
Inflow Hydrographs	= 25, 26, 27, 28	Total Contrib. Area	= 2.41 ac



Hydrograph Report

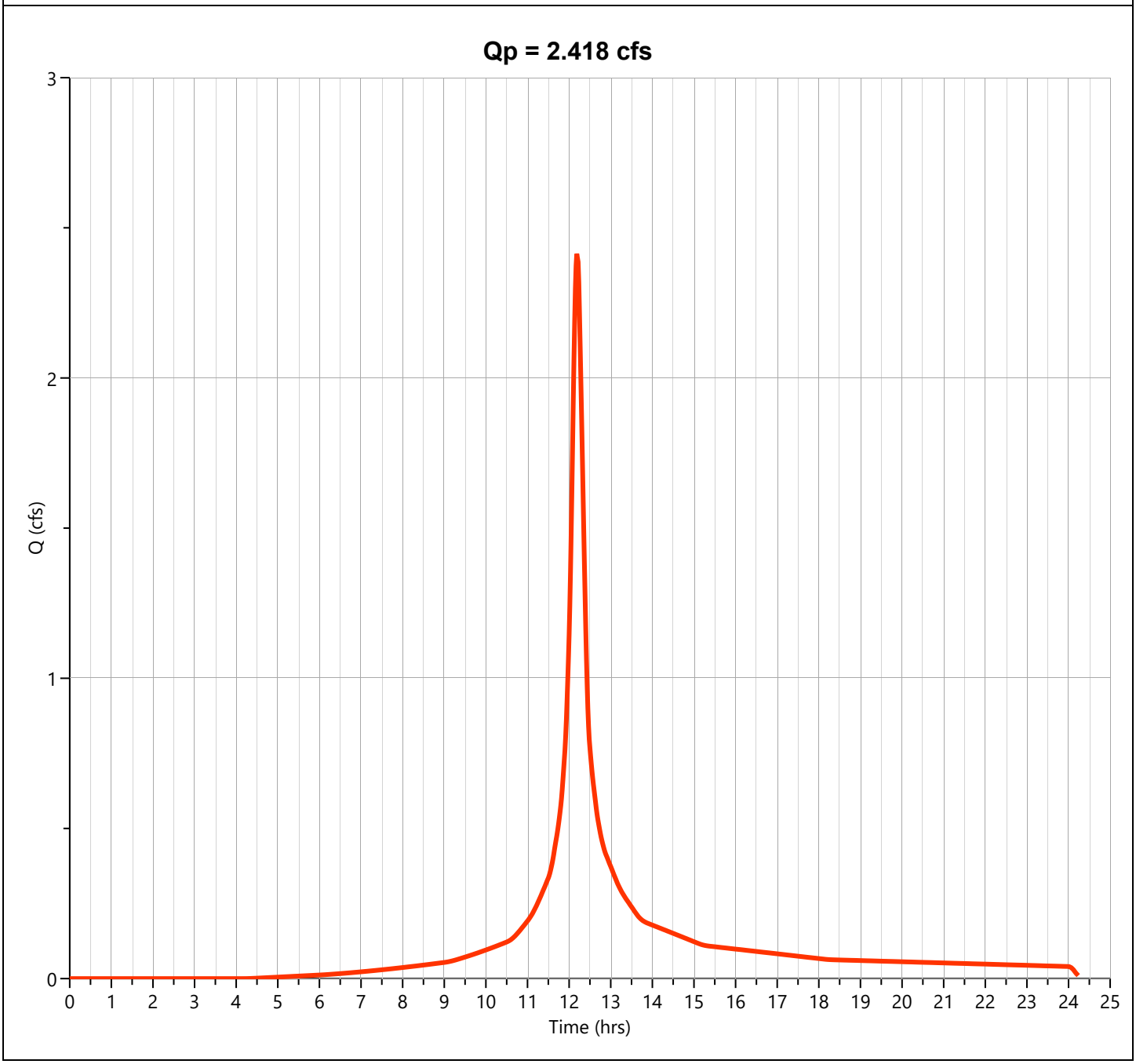
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-D Open Space D

Hyd. No. 25

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.418 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 10,115 cuft
Drainage Area	= 0.41 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

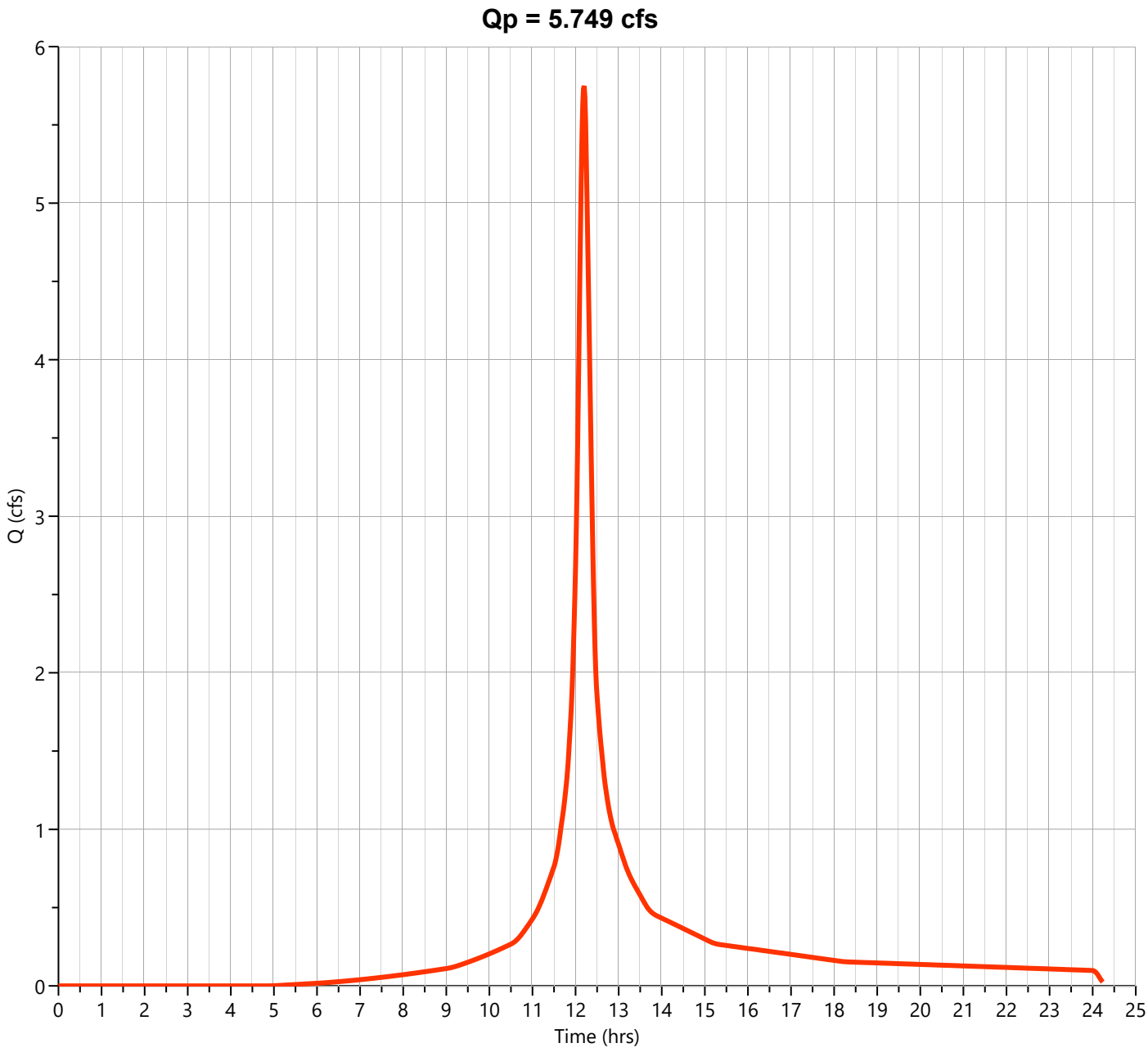
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-D Woods D

Hyd. No. 26

Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.749 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 23,781 cuft
Drainage Area	= 1.02 ac	Curve Number	= 77.00
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

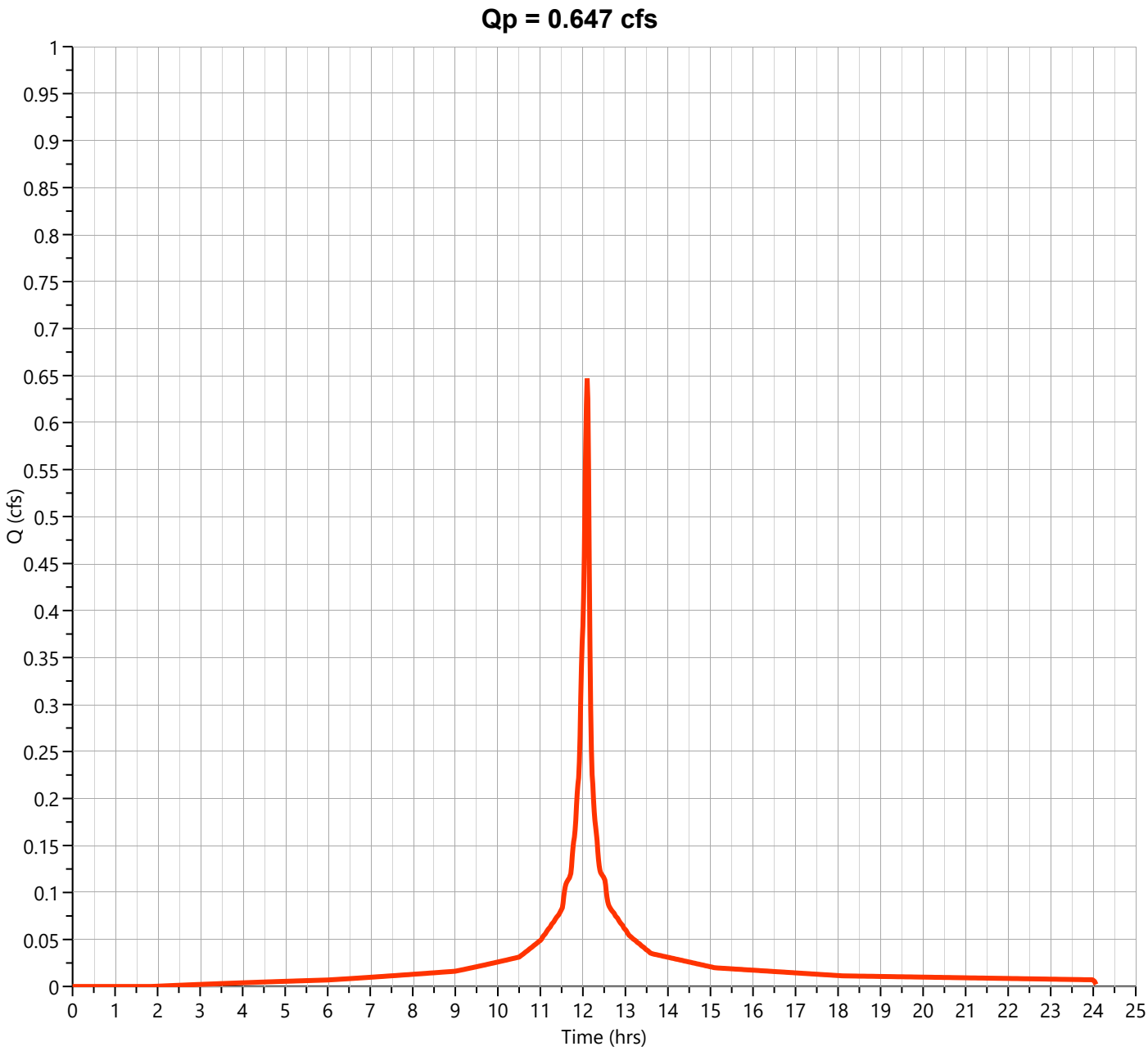
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-D Gravel D

Hyd. No. 27

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.647 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 2,071 cuft
Drainage Area	= 0.07 ac	Curve Number	= 91.00
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

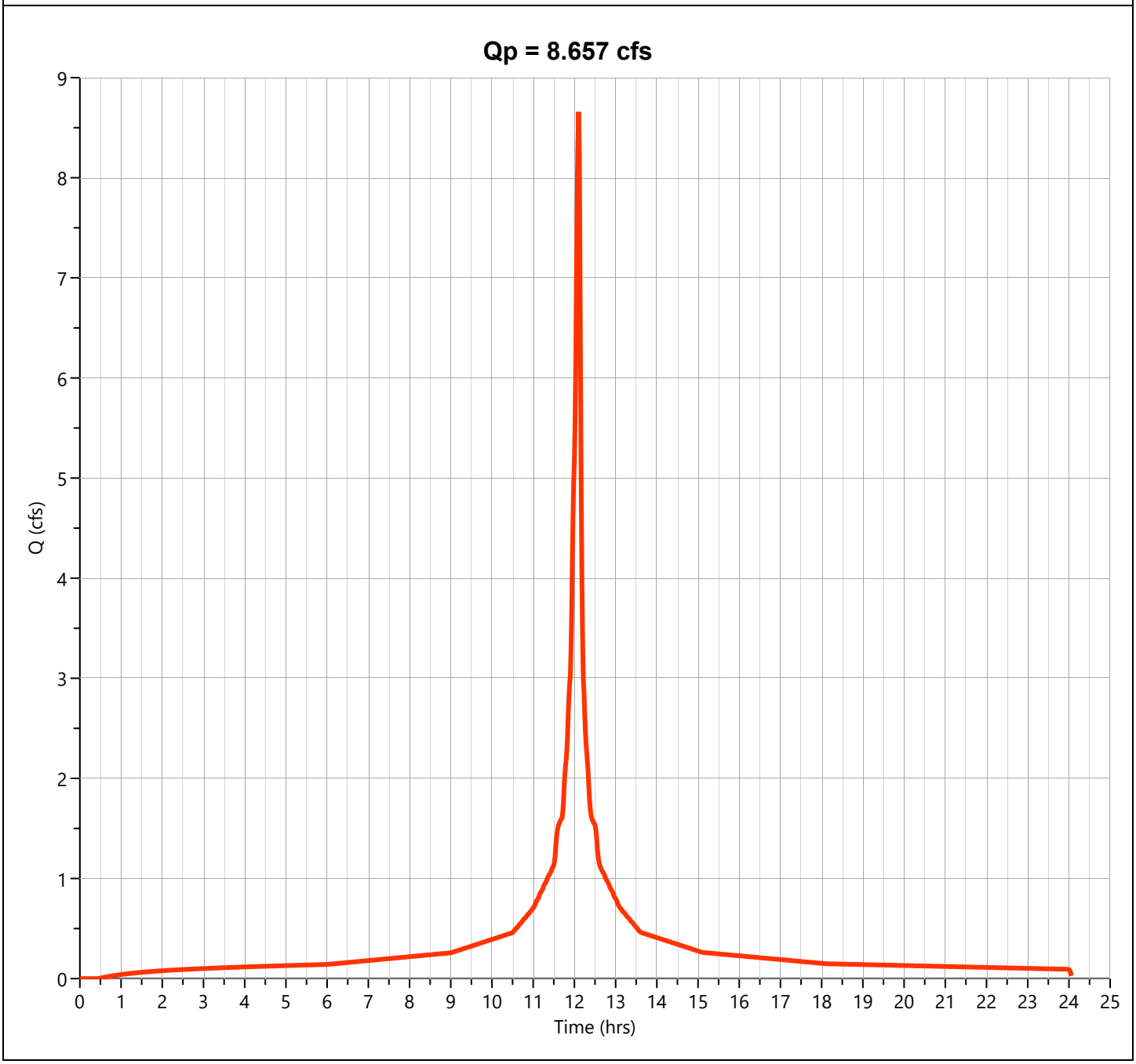
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-D Impervious

Hyd. No. 28

Hydrograph Type	= NRCS Runoff	Peak Flow	= 8.657 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 29,728 cuft
Drainage Area	= 0.91 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

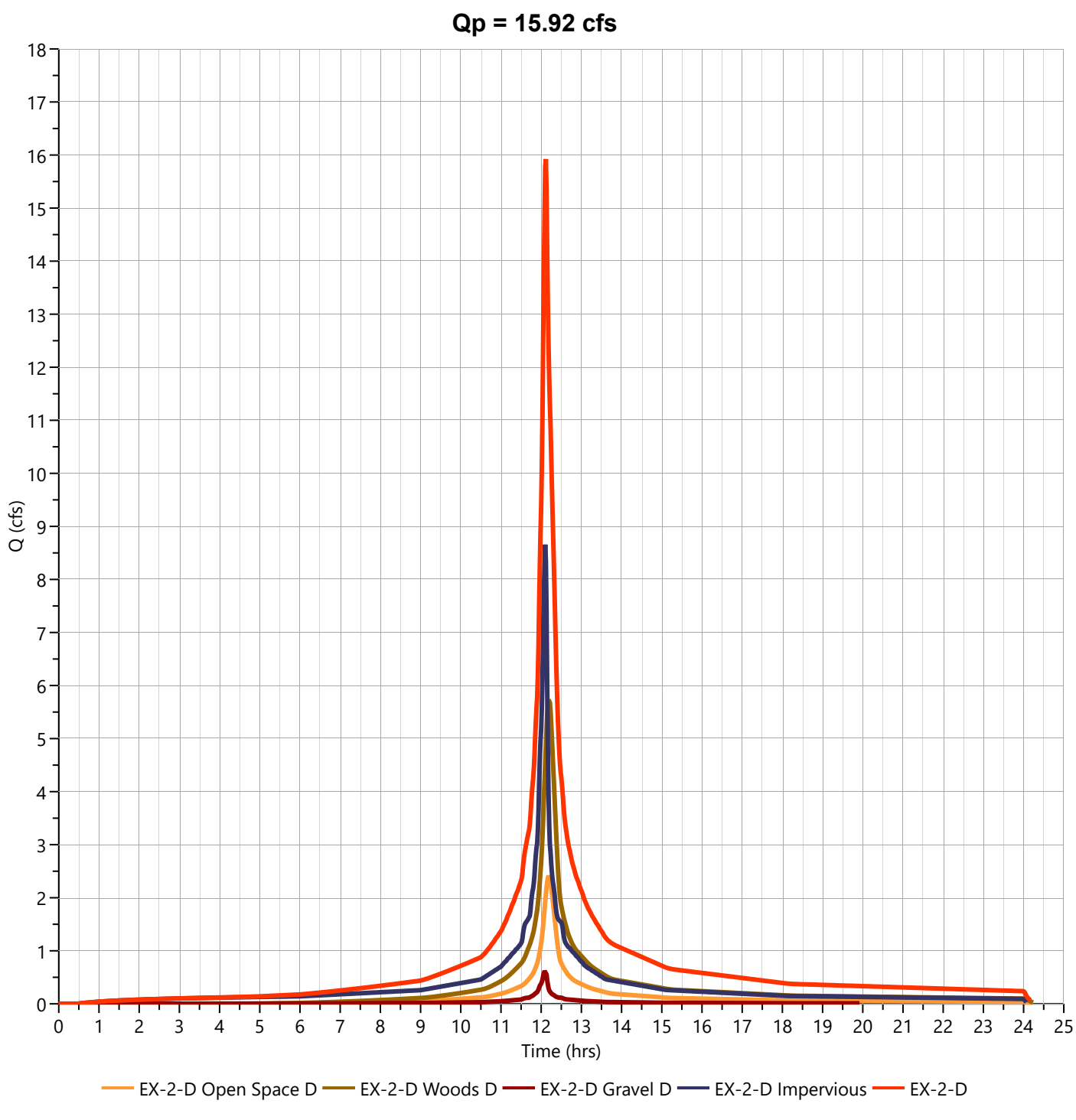
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-D

Hyd. No. 30

Hydrograph Type	= Junction	Peak Flow	= 15.92 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 65,695 cuft
Inflow Hydrographs	= 25, 26, 27, 28	Total Contrib. Area	= 2.41 ac



EX-2-DISTURBED WATERSHED ALLOWABLE PEAK DISCHARGE

Hydrograph Report

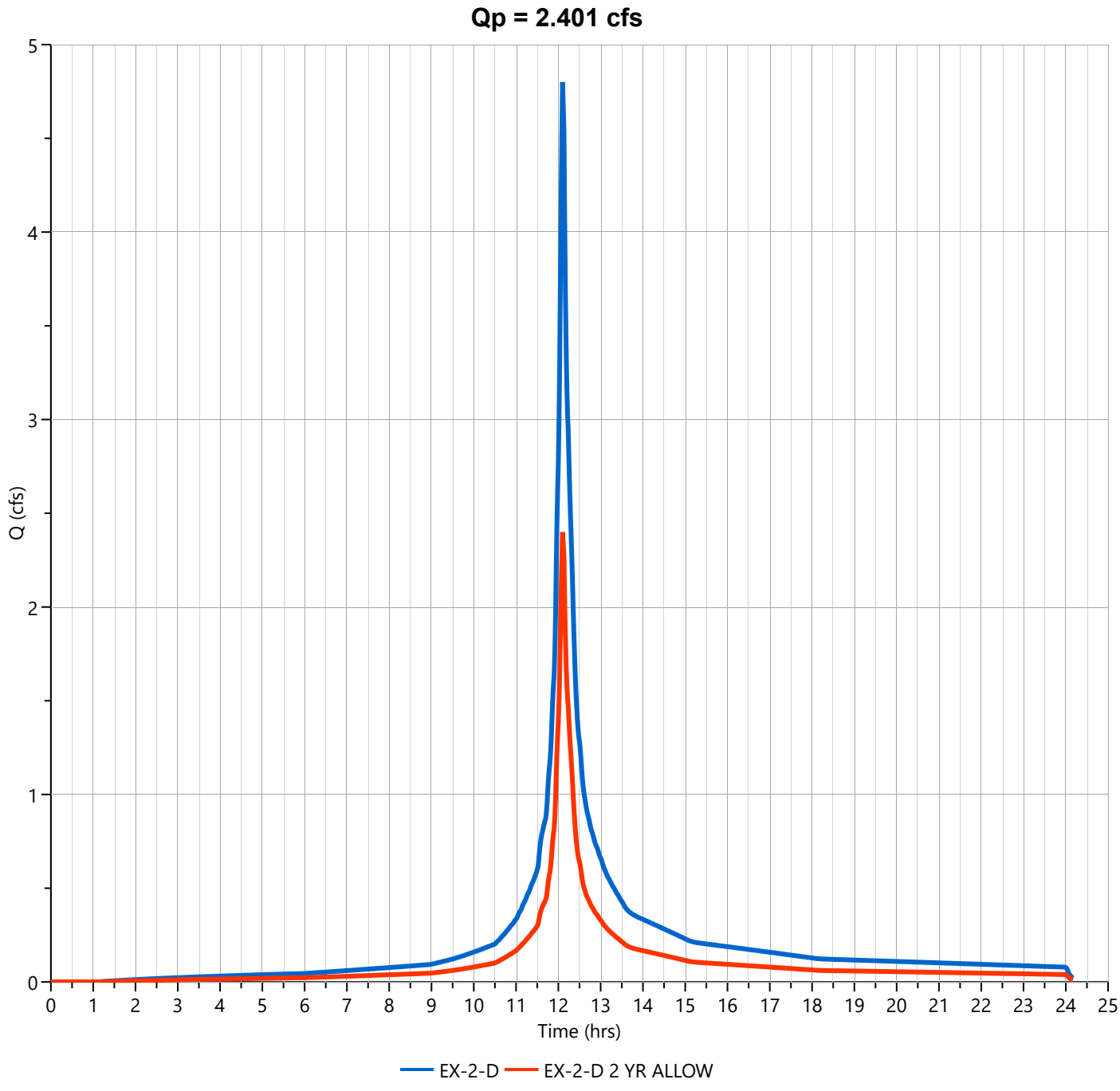
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-D 2 YR ALLOW

Hyd. No. 31

Hydrograph Type	= Diversion	Peak Flow	= 2.401 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 9,435 cuft
Inflow Hydrograph	= 30 - EX-2-D	Diversion Method	= Flow Ratio
Companion Hyd	= 32 - <name>	Flow Ratio	= 0.5



Hydrograph Report

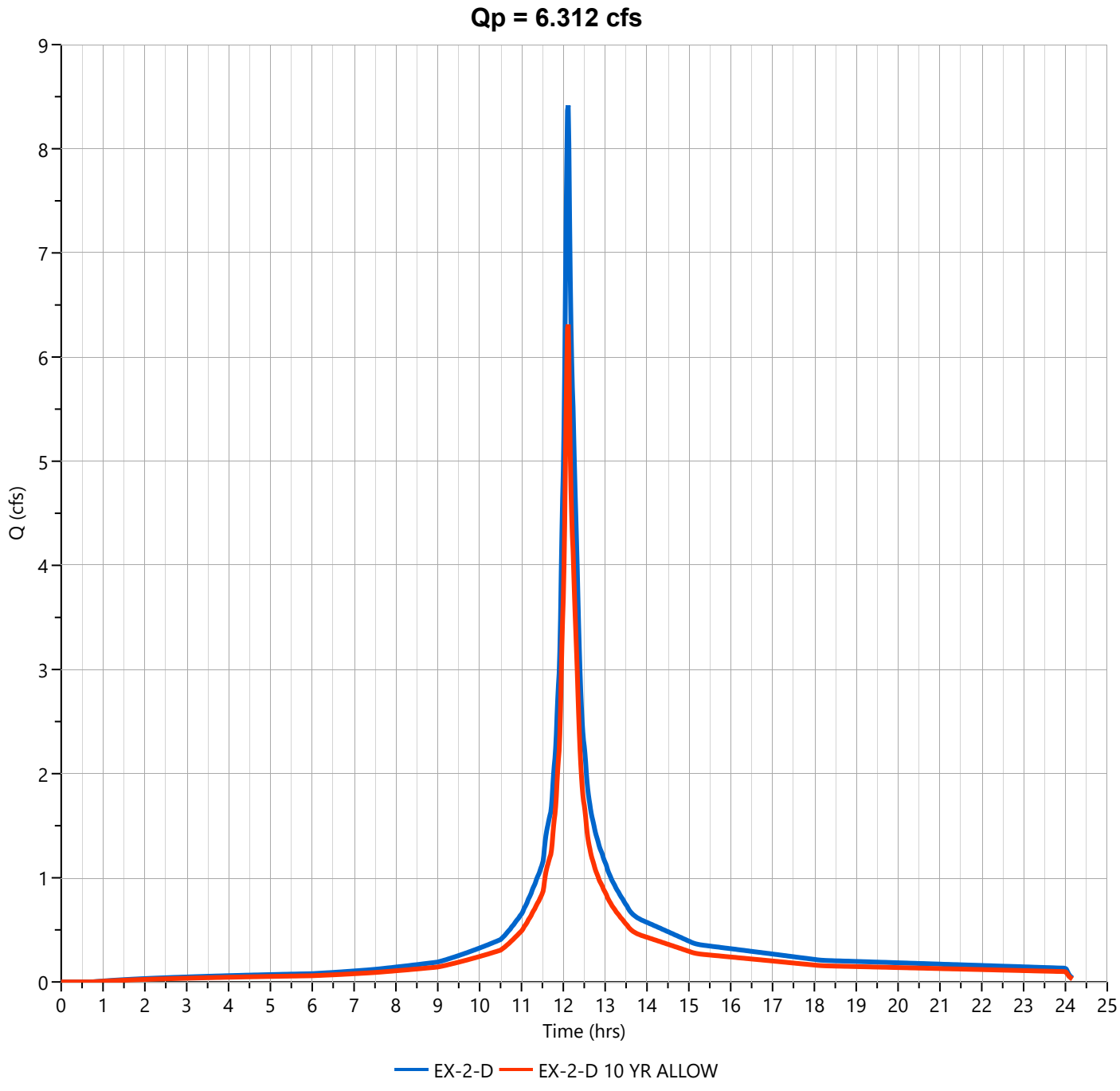
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-D 10 YR ALLOW

Hyd. No. 33

Hydrograph Type	= Diversion	Peak Flow	= 6.312 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 25,347 cuft
Inflow Hydrograph	= 30 - EX-2-D	Diversion Method	= Flow Ratio
Companion Hyd	= 34 - <name>	Flow Ratio	= 0.75



Hydrograph Report

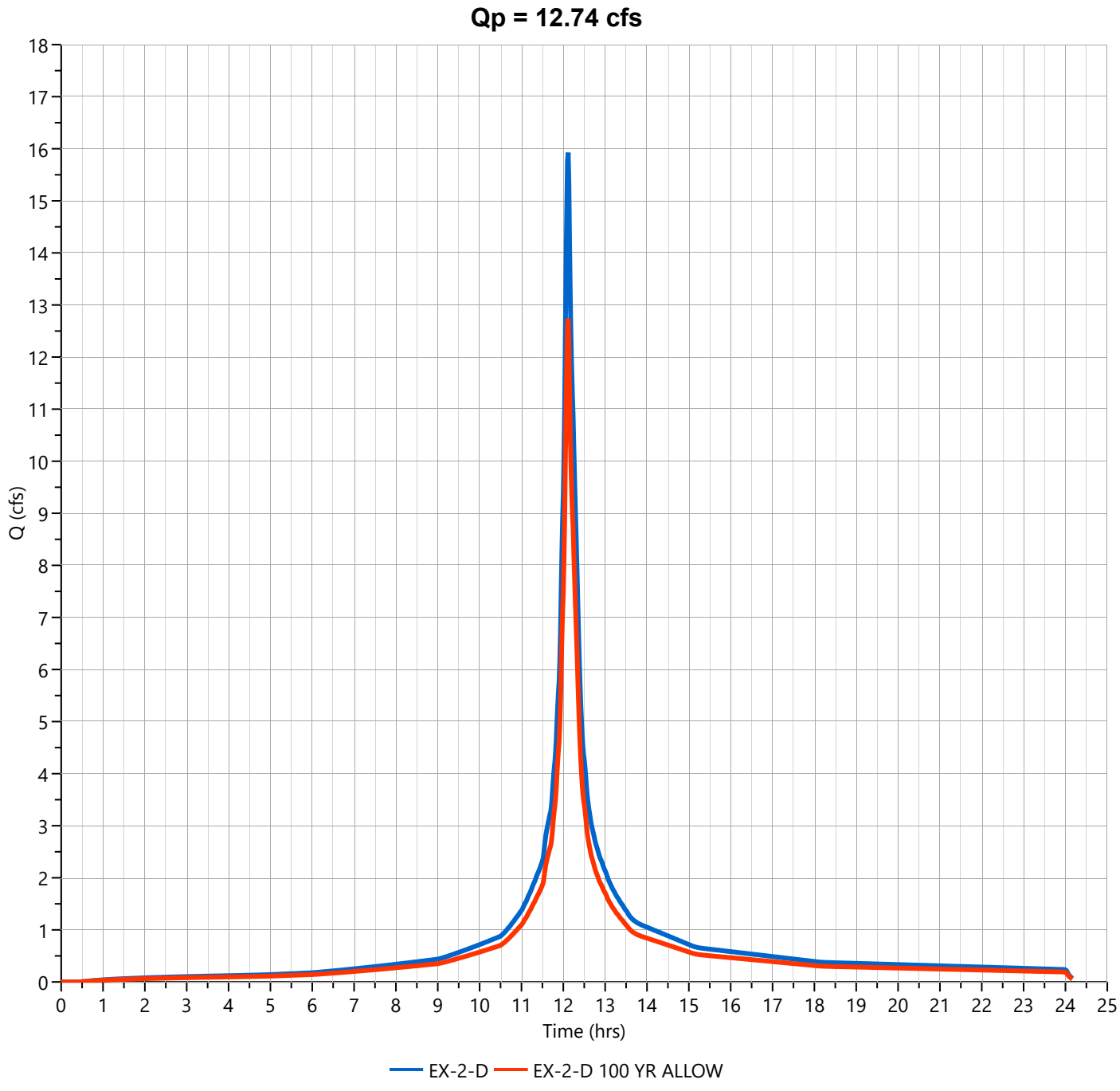
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-D 100 YR ALLOW

Hyd. No. 35

Hydrograph Type	= Diversion	Peak Flow	= 12.74 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 52,556 cuft
Inflow Hydrograph	= 30 - EX-2-D	Diversion Method	= Flow Ratio
Companion Hyd	= 36 - <name>	Flow Ratio	= 0.8



EX-2-UNDISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/20/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/20/2025**

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

$$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,s^{0.4}}$$

			Segment ID					
1.	Surface Description (NEH table 15-1)		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		0.043				
6.	Compute T_t	hr		0.014	+		+	
						Sheet Flow Sub-Total		0.014 hours

Shallow Concentrated Flow

$$T_t = \frac{L}{3600\,V}$$

			Segment ID					
7.	Surface Description		2	Pavement	3	Woodlands	4	Pavement
8.	Flow Length, L	ft		340		109		187
9.	Watercourse Slope, s	ft/ft		0.074		0.058		0.048
10.	Average Velocity, V (NEH table 15-3)	ft/s		5.54		1.21		4.47
11.	Compute T_t	hr		0.017	+	0.025	+	0.012
						Shallow Conc. Flow Sub-Total		0.054 hours

Channel Flow

$$r = a / P_w$$

$$V = (1.49\, r^{2/3} s^{1/2}) / n$$

$$T_t = \frac{L}{3600\,V}$$

			Segment ID					
12.	Flow Length, L	ft		5		6		
13.	Cross Sectional flow area, a	ft^2		56		125		
14.	Wetted Perimeter, P_w	ft		0.61		0.61		
15.	Hydraulic Radius, r	ft		1.96		1.96		
16.	Channel Slope, s	ft/ft		0.31		0.31		
17.	Manning's Roughness Coeff., n			0.027		0.009		
18.	Velocity, V	ft/s		0.013		0.013		
19.	Compute T_t	hr		8.67		5.13		
				0.002	+	0.007	+	
						Channel Flow Sub-Total		0.009 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**

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/20/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/20/2025**

Circle One: (**Present**) Developed — **Current Existing Watershed EX-2-U 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.	Surface Description (NEH table 15-1)		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			0.058			
6.	Compute T_t $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr			0.224	+		+
							Sheet Flow Sub-Total	0.224 hours

Shallow Concentrated Flow

			Segment ID		2		3	
7.	Surface Description				Woodlands		Pavement	
8.	Flow Length, L	ft			228		117	
9.	Watercourse Slope, s	ft/ft			0.051		0.055	
10.	Average Velocity, V (NEH table 15-3)	ft/s			1.13		4.76	
11.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr			0.056	+	0.007	+
							Shallow Conc. Flow Sub-Total	0.063 hours

Channel Flow

			Segment ID		4		5	
12.	Flow Length, L	ft			56		125	
13.	Cross Sectional flow area, a	ft^2			0.61		0.61	
14.	Wetted Perimeter, P_w	ft			1.96		1.96	
15.	Hydraulic Radius, r $r = a / P_w$	ft			0.31		0.31	
16.	Channel Slope, s	ft/ft			0.027		0.009	
17.	Manning's Roughness Coeff., n				0.013		0.013	
18.	Velocity, V $V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s			8.67		5.13	
19.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr			0.002	+	0.007	+
							Channel Flow Sub-Total	0.009 hours

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

Total Tc (hours) =	**0.295 hours**
Total Tc (minutes) =	**18 minutes**

Hydrograph Report

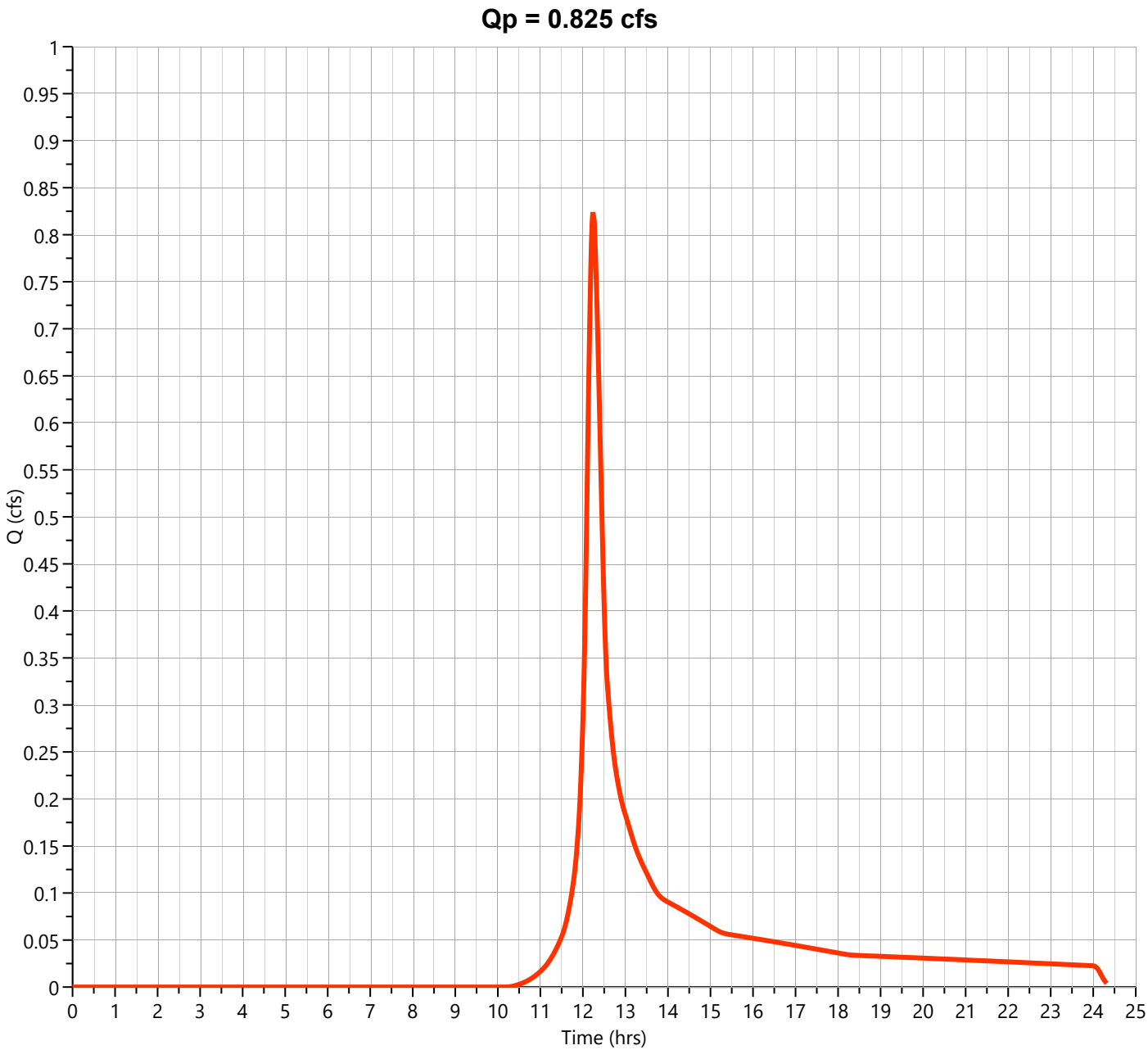
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-U Open Space C

Hyd. No. 38

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.825 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.25 hrs
Time Interval	= 1 min	Runoff Volume	= 3,742 cuft
Drainage Area	= 0.86 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 18.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

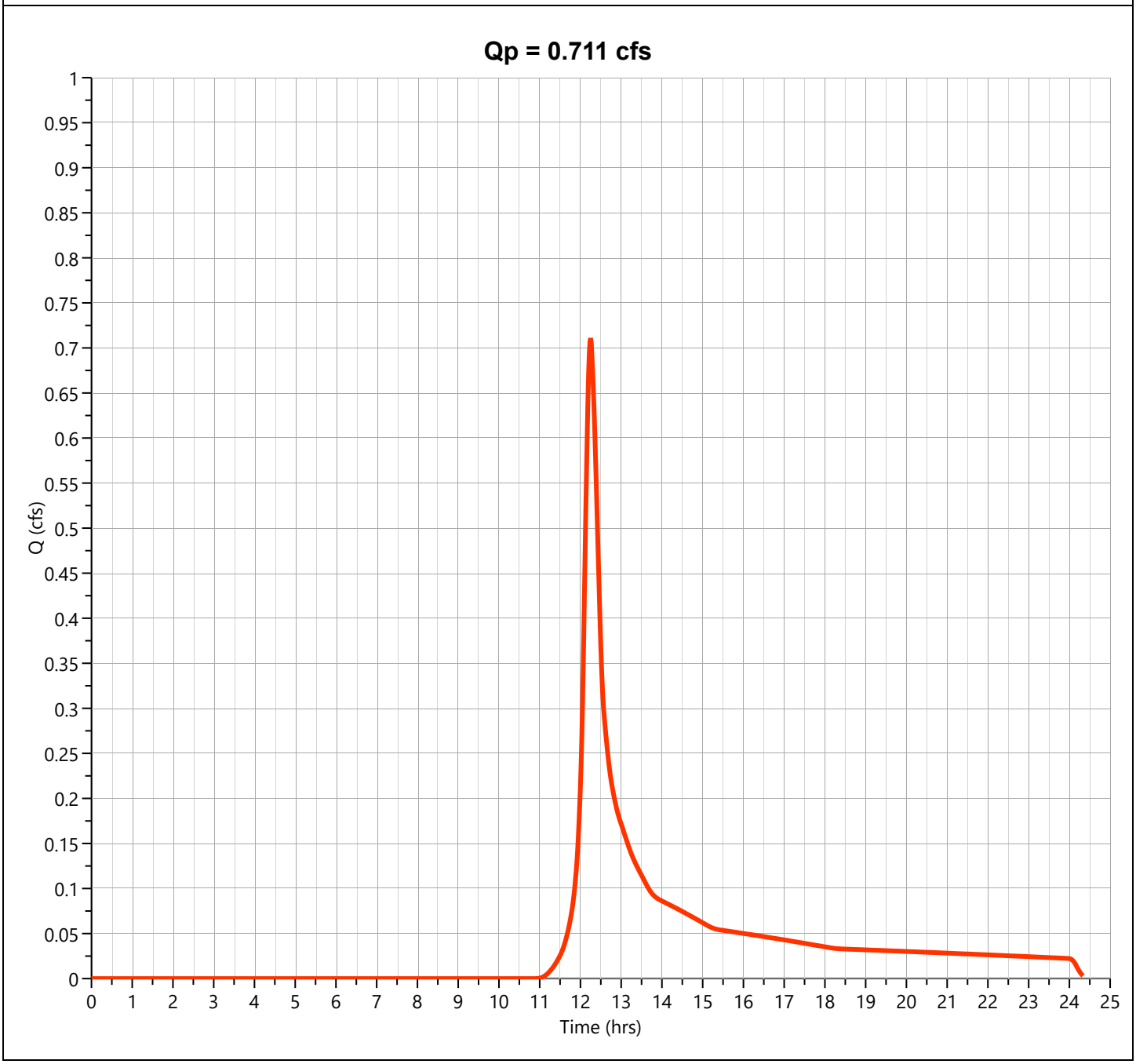
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-U Woods C

Hyd. No. 39

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.711 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.25 hrs
Time Interval	= 1 min	Runoff Volume	= 3,353 cuft
Drainage Area	= 0.95 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 18.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

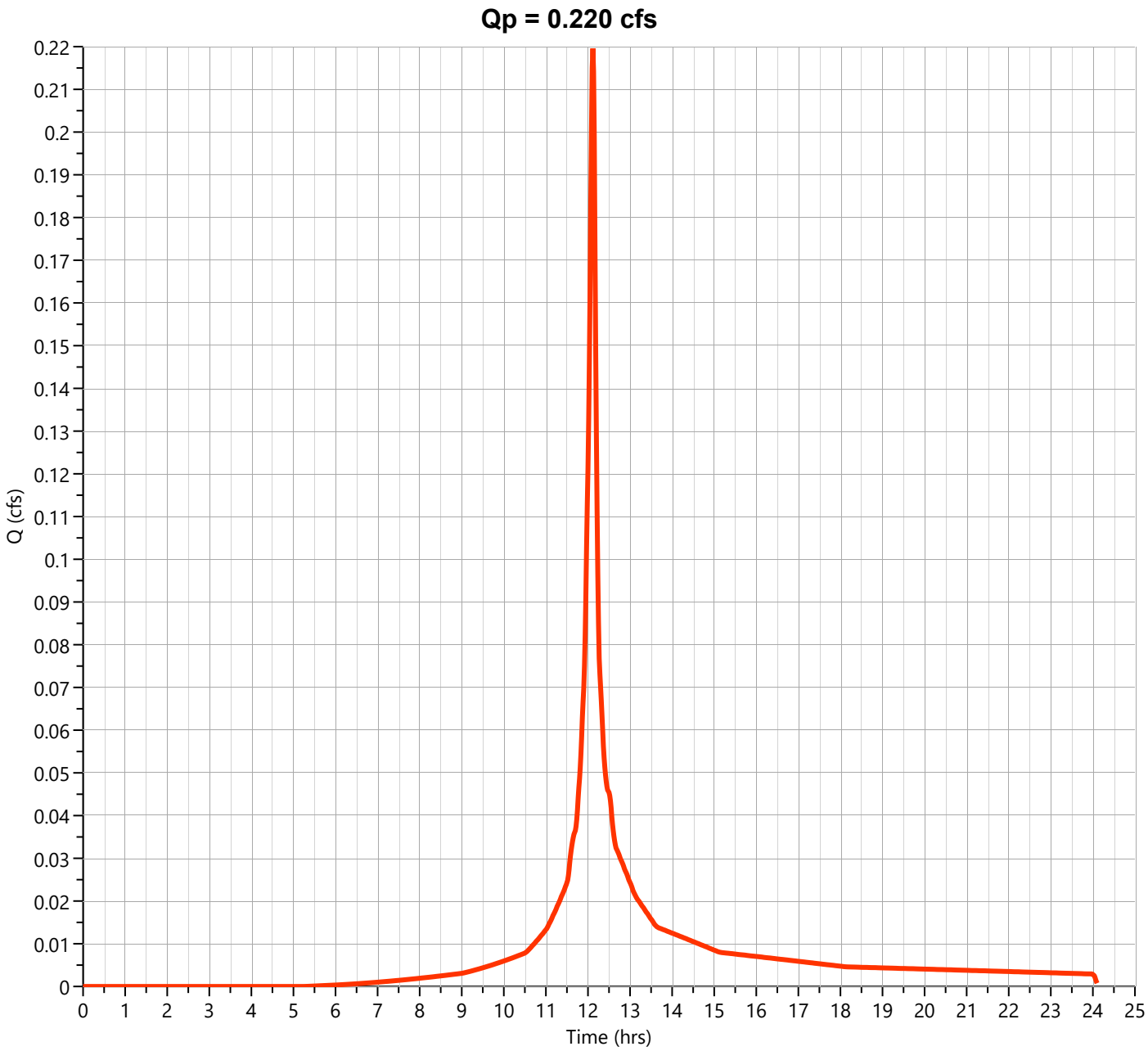
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-U Gravel C

Hyd. No. 40

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.220 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 695 cuft
Drainage Area	= 0.08 ac	Curve Number	= 89.00
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

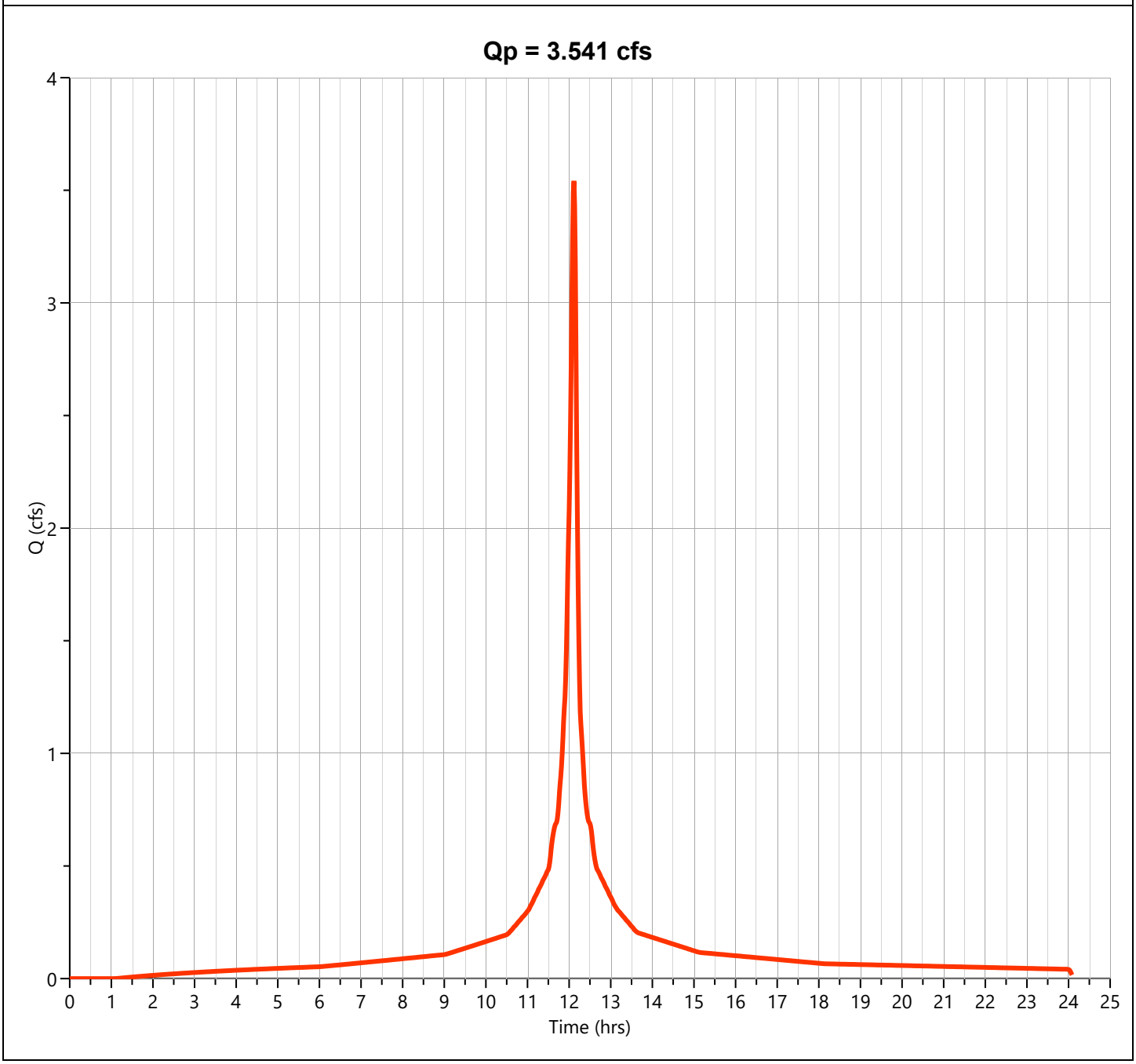
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-U Impervious

Hyd. No. 41

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.541 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 12,682 cuft
Drainage Area	= 1.05 ac	Curve Number	= 98.00
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

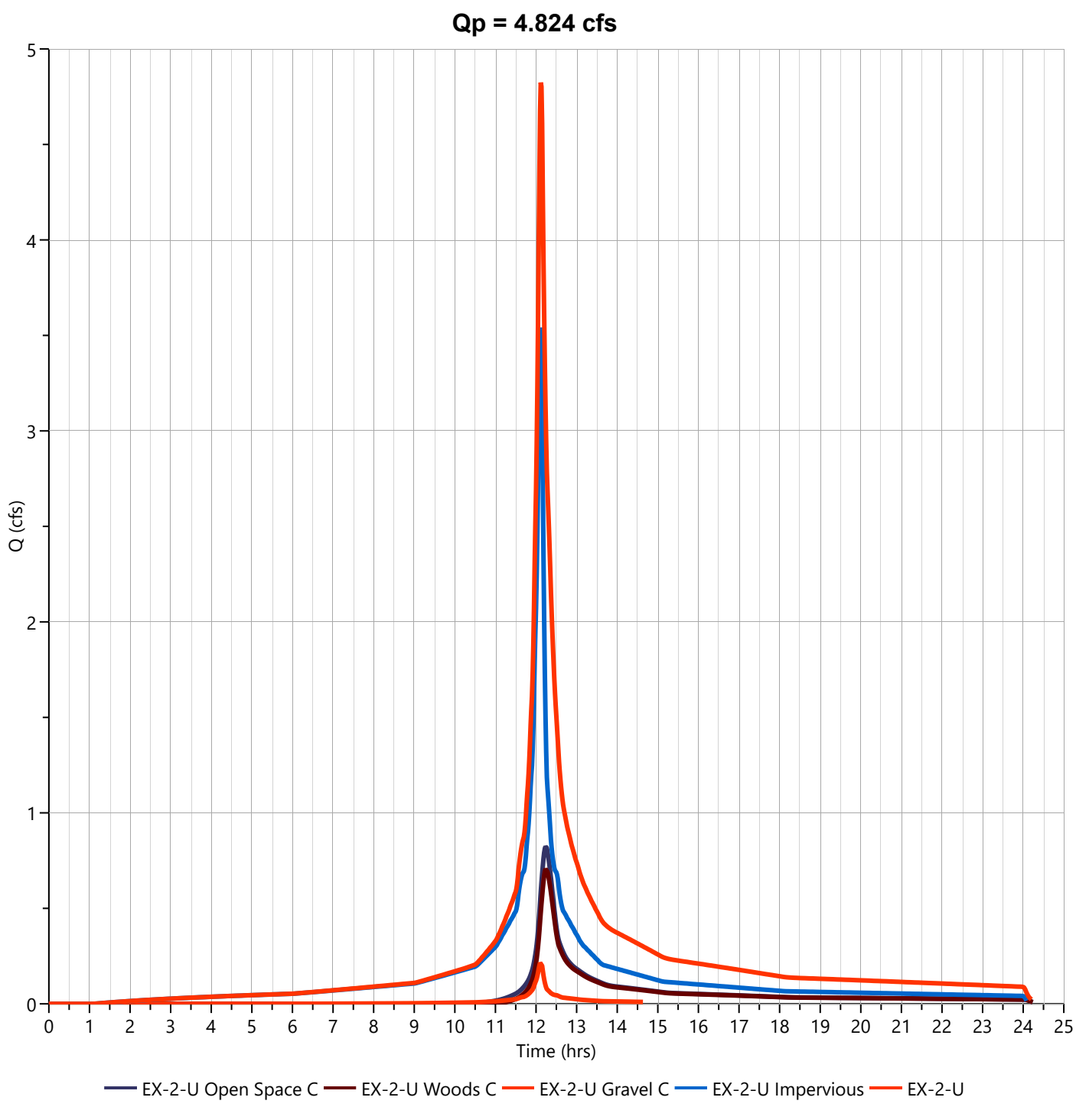
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-U

Hyd. No. 42

Hydrograph Type	= Junction	Peak Flow	= 4.824 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 20,472 cuft
Inflow Hydrographs	= 38, 39, 40, 41	Total Contrib. Area	= 2.94 ac



Hydrograph Report

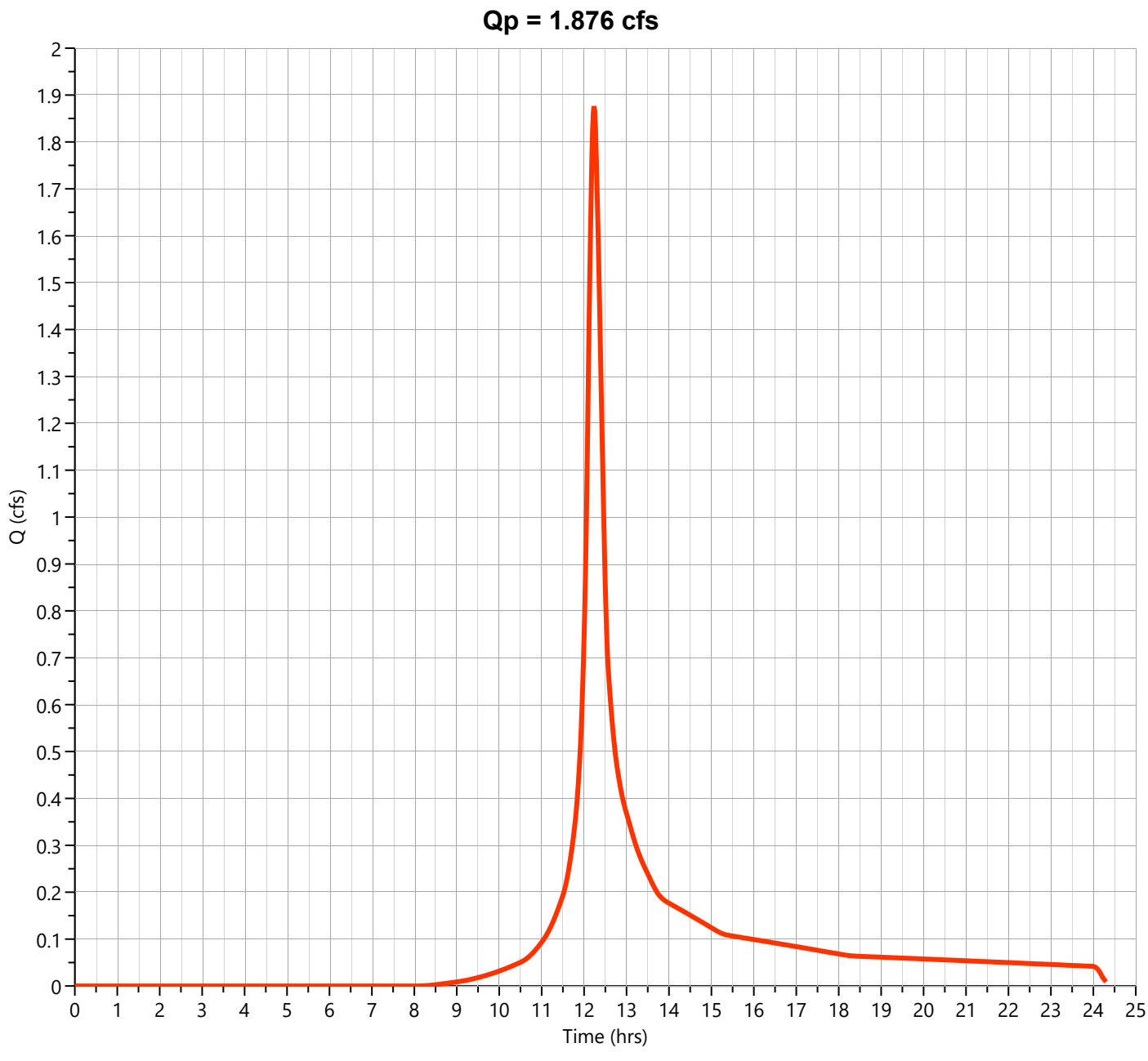
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-U Open Space C

Hyd. No. 38

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.876 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Runoff Volume	= 8,243 cuft
Drainage Area	= 0.86 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 18.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

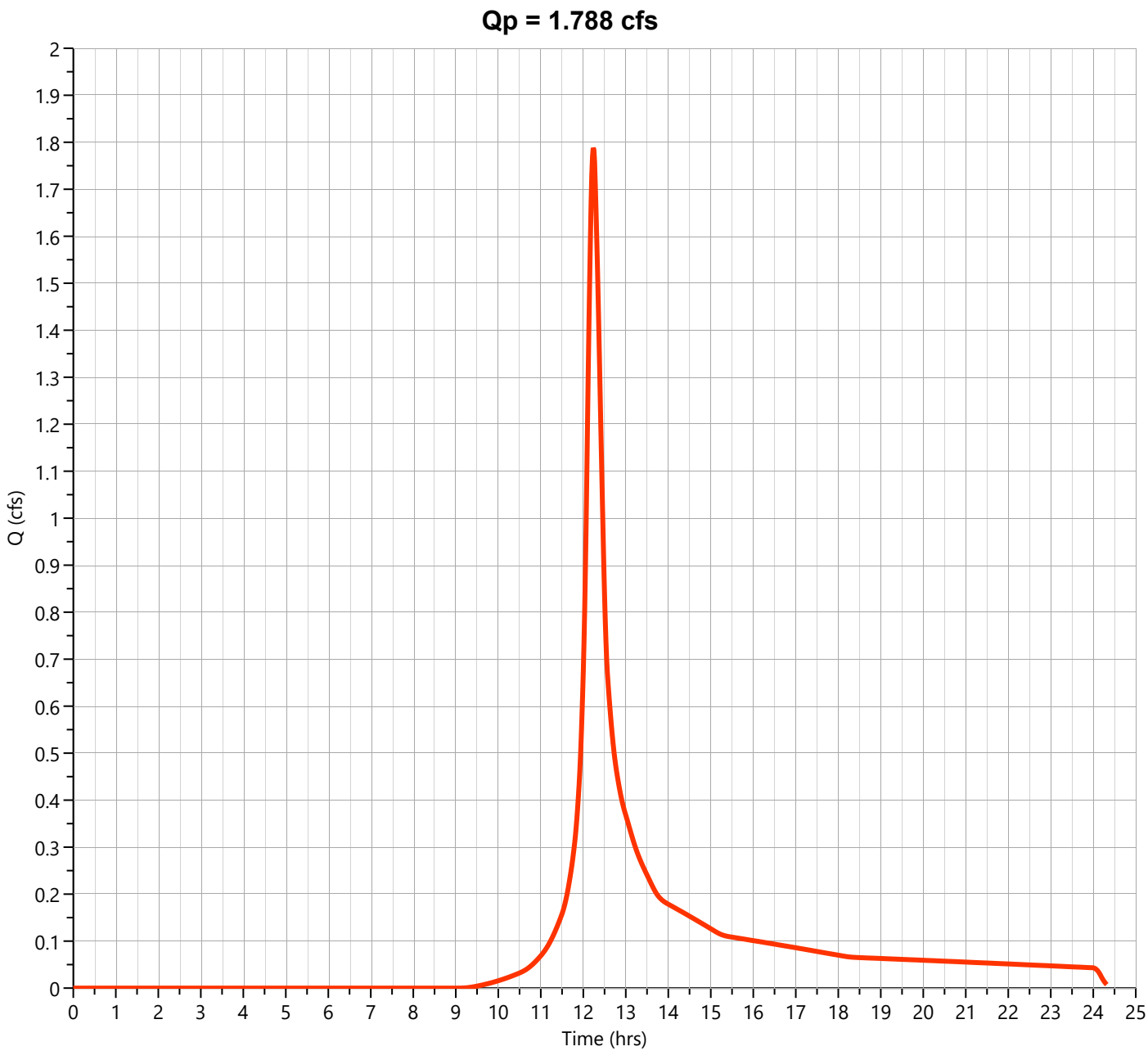
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-U Woods C

Hyd. No. 39

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.788 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Runoff Volume	= 7,917 cuft
Drainage Area	= 0.95 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 18.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

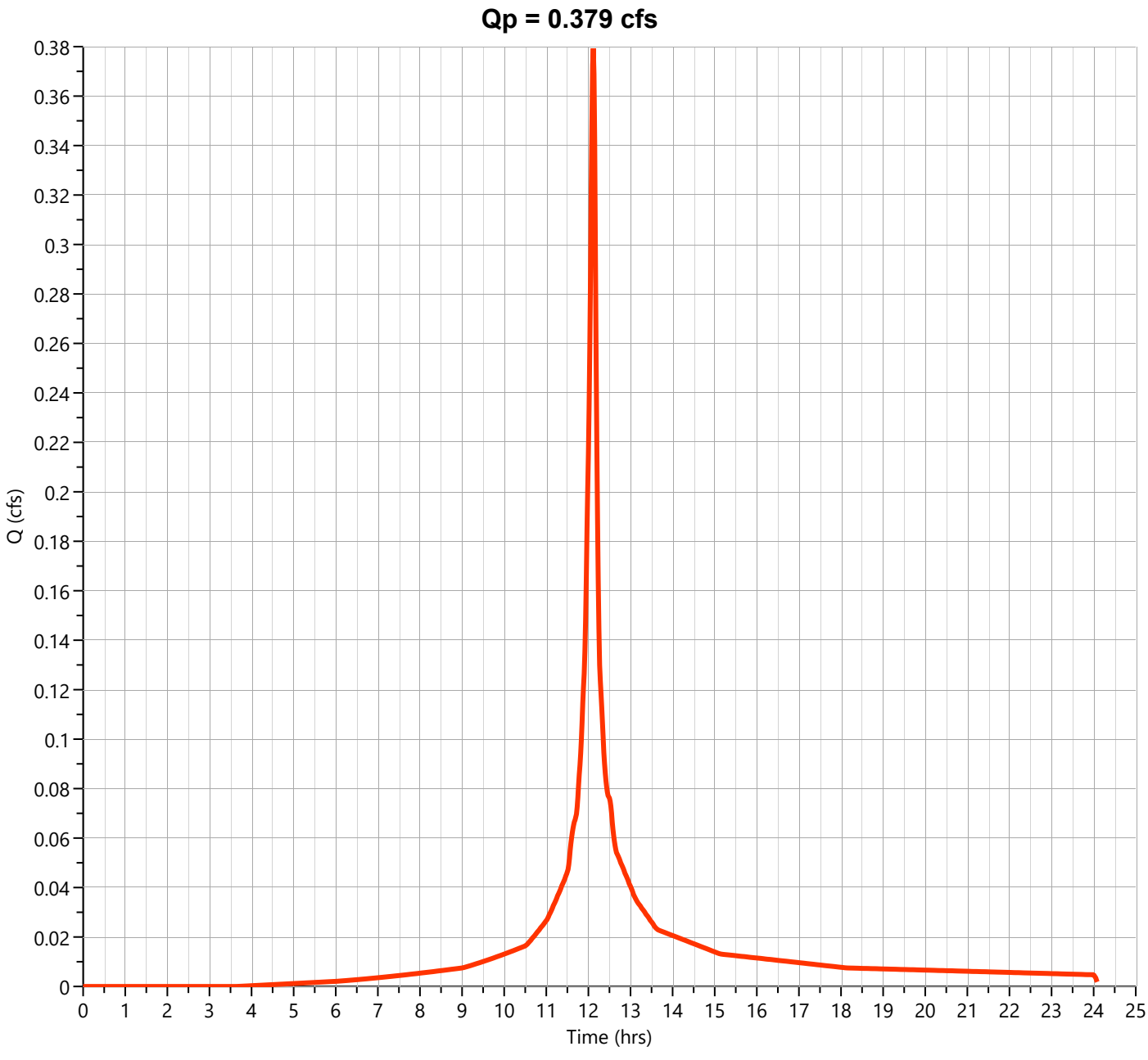
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-U Gravel C

Hyd. No. 40

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.379 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 1,239 cuft
Drainage Area	= 0.08 ac	Curve Number	= 89.00
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

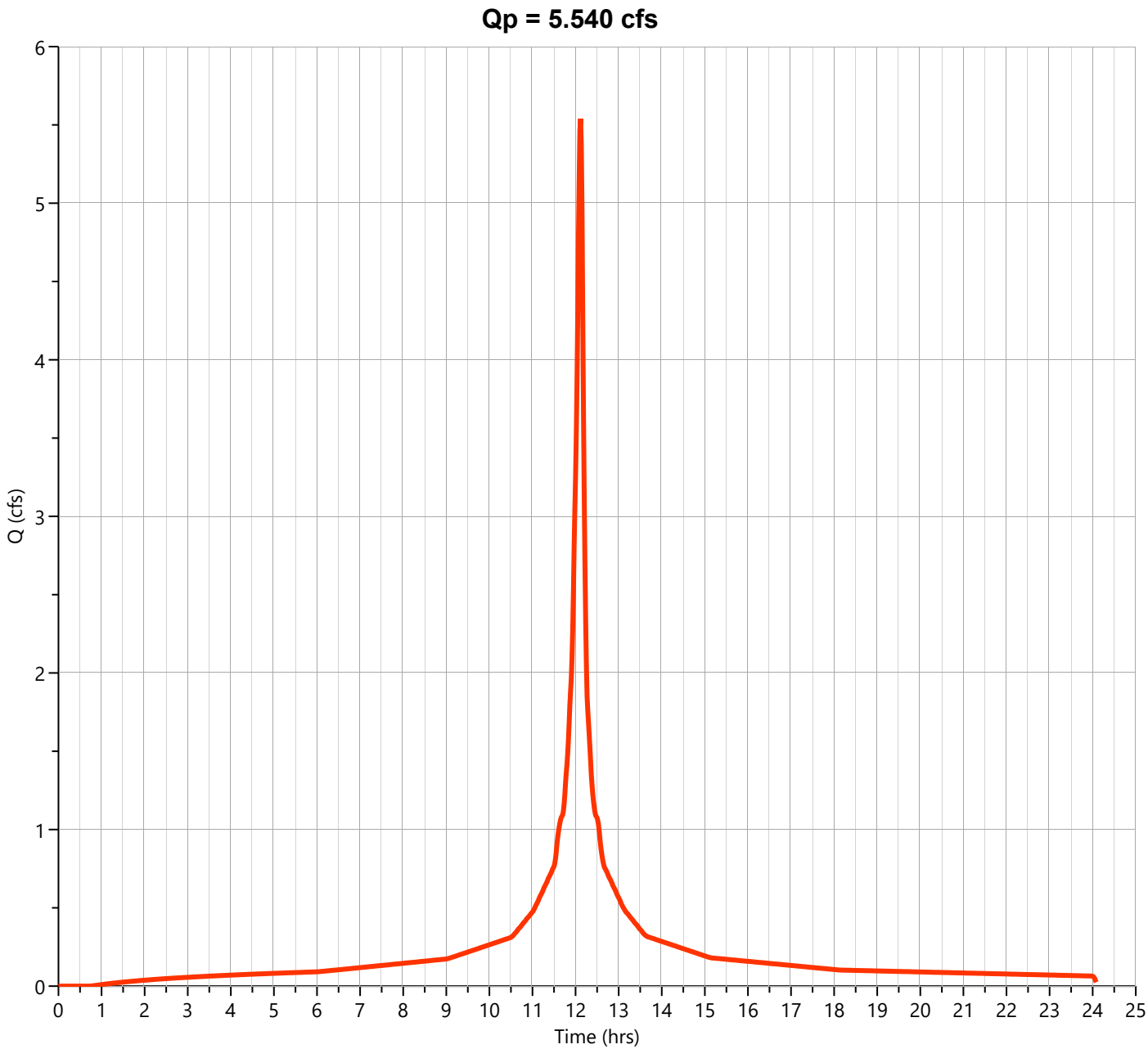
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-U Impervious

Hyd. No. 41

Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.540 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 20,214 cuft
Drainage Area	= 1.05 ac	Curve Number	= 98.00
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

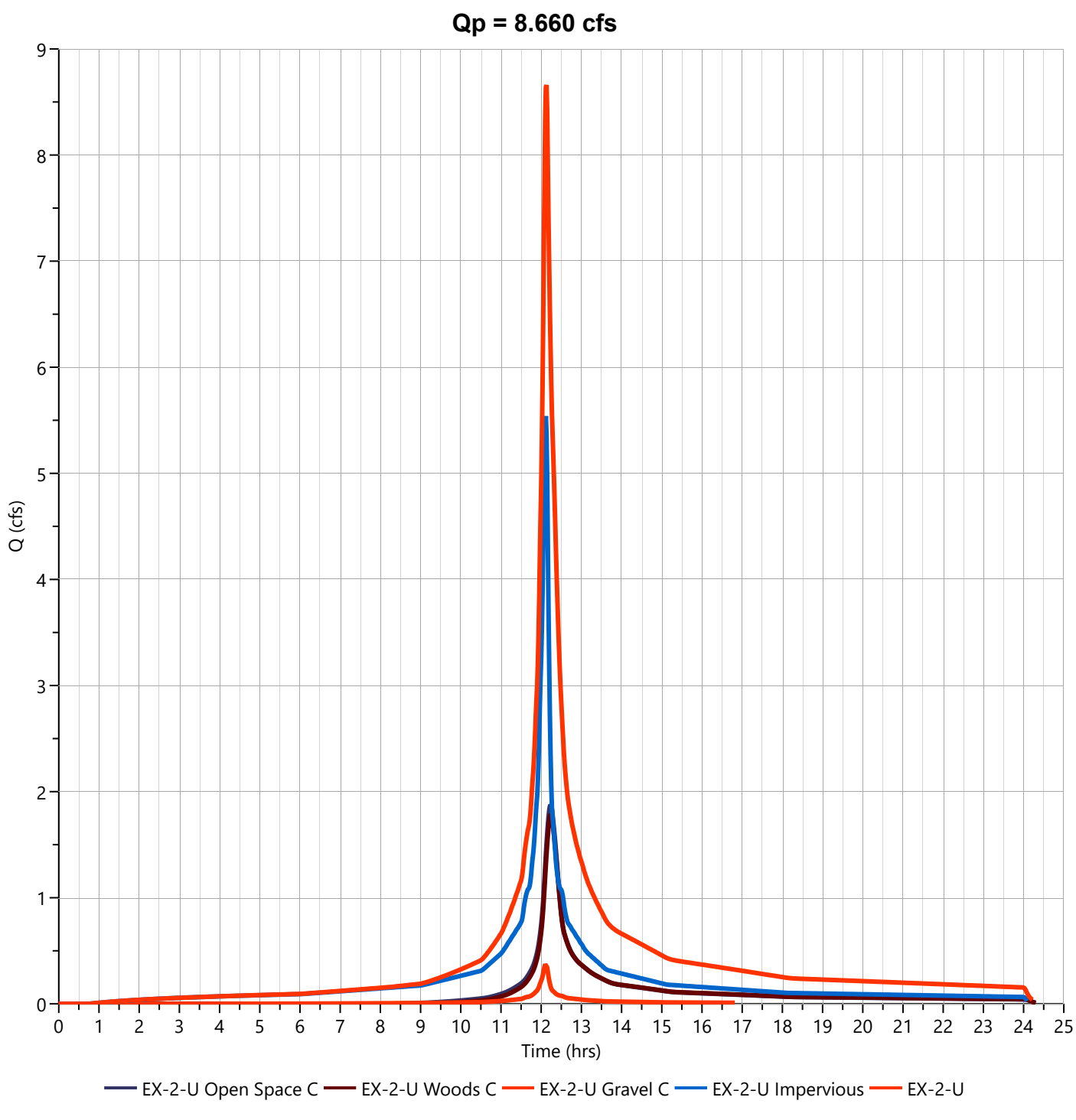
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-U

Hyd. No. 42

Hydrograph Type	= Junction	Peak Flow	= 8.660 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 37,613 cuft
Inflow Hydrographs	= 38, 39, 40, 41	Total Contrib. Area	= 2.94 ac



Hydrograph Report

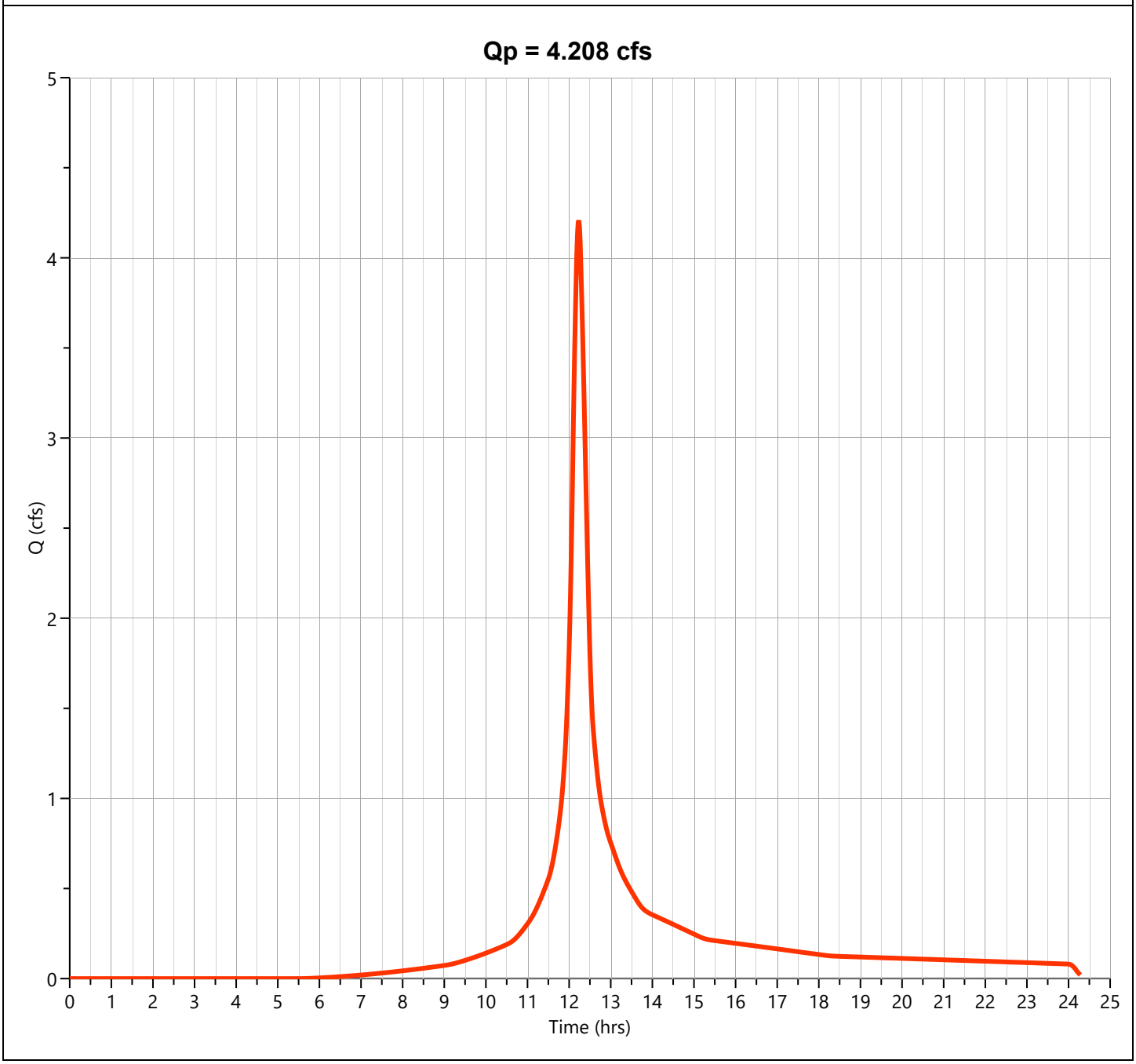
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-U Open Space C

Hyd. No. 38

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.208 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Runoff Volume	= 18,667 cuft
Drainage Area	= 0.86 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 18.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

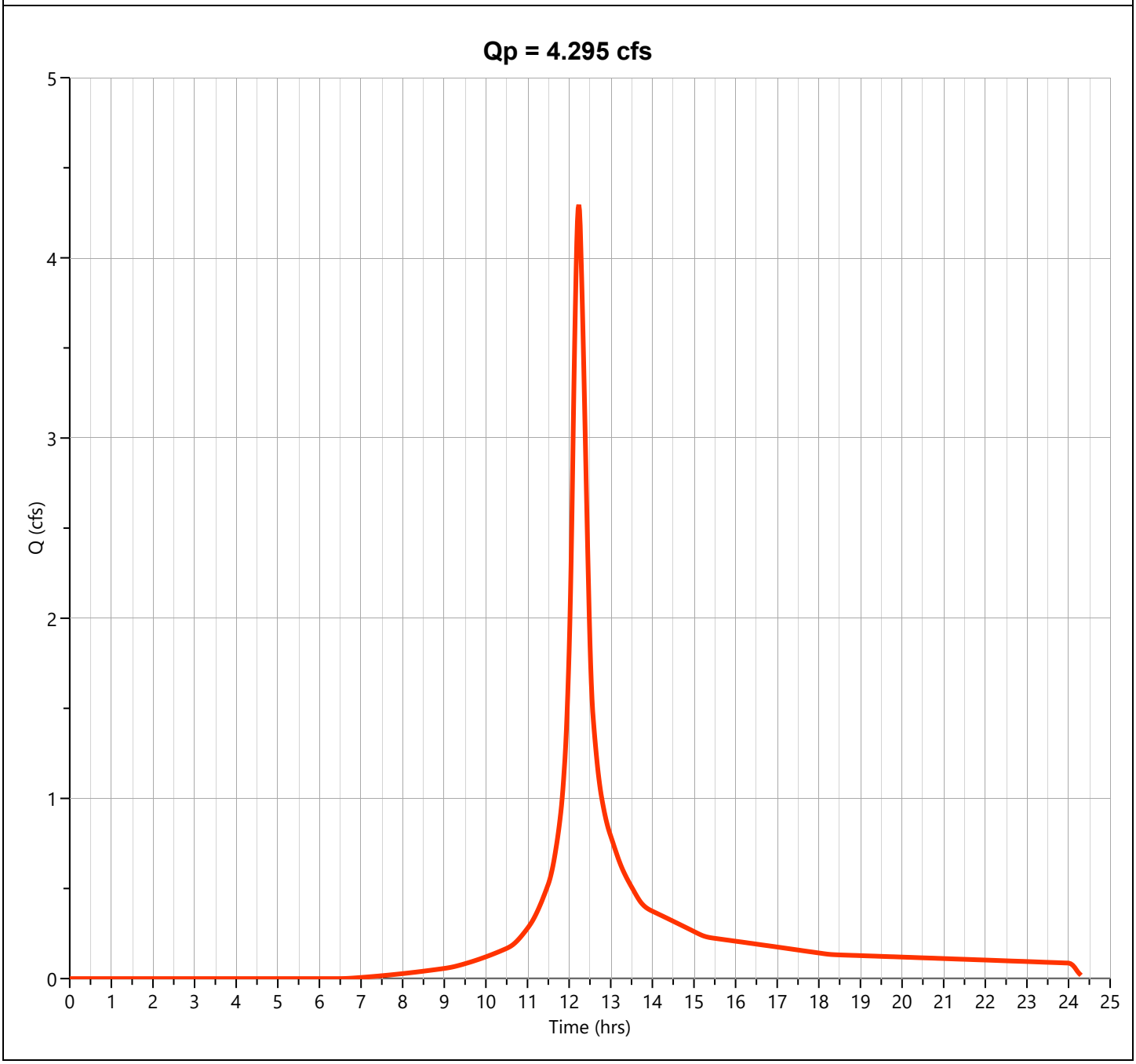
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-U Woods C

Hyd. No. 39

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.295 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Runoff Volume	= 18,911 cuft
Drainage Area	= 0.95 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 18.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

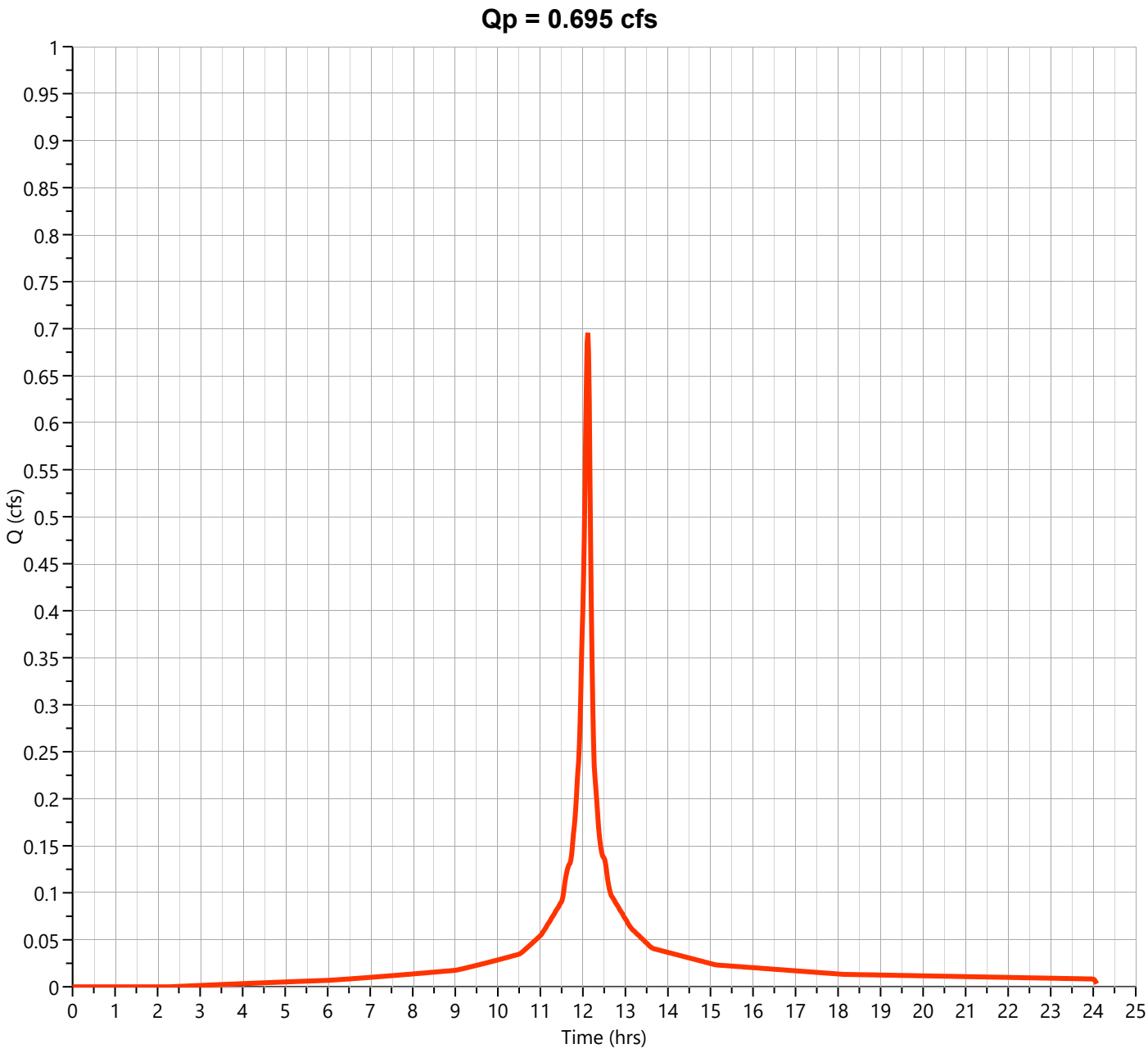
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-U Gravel C

Hyd. No. 40

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.695 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 2,368 cuft
Drainage Area	= 0.08 ac	Curve Number	= 89.00
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

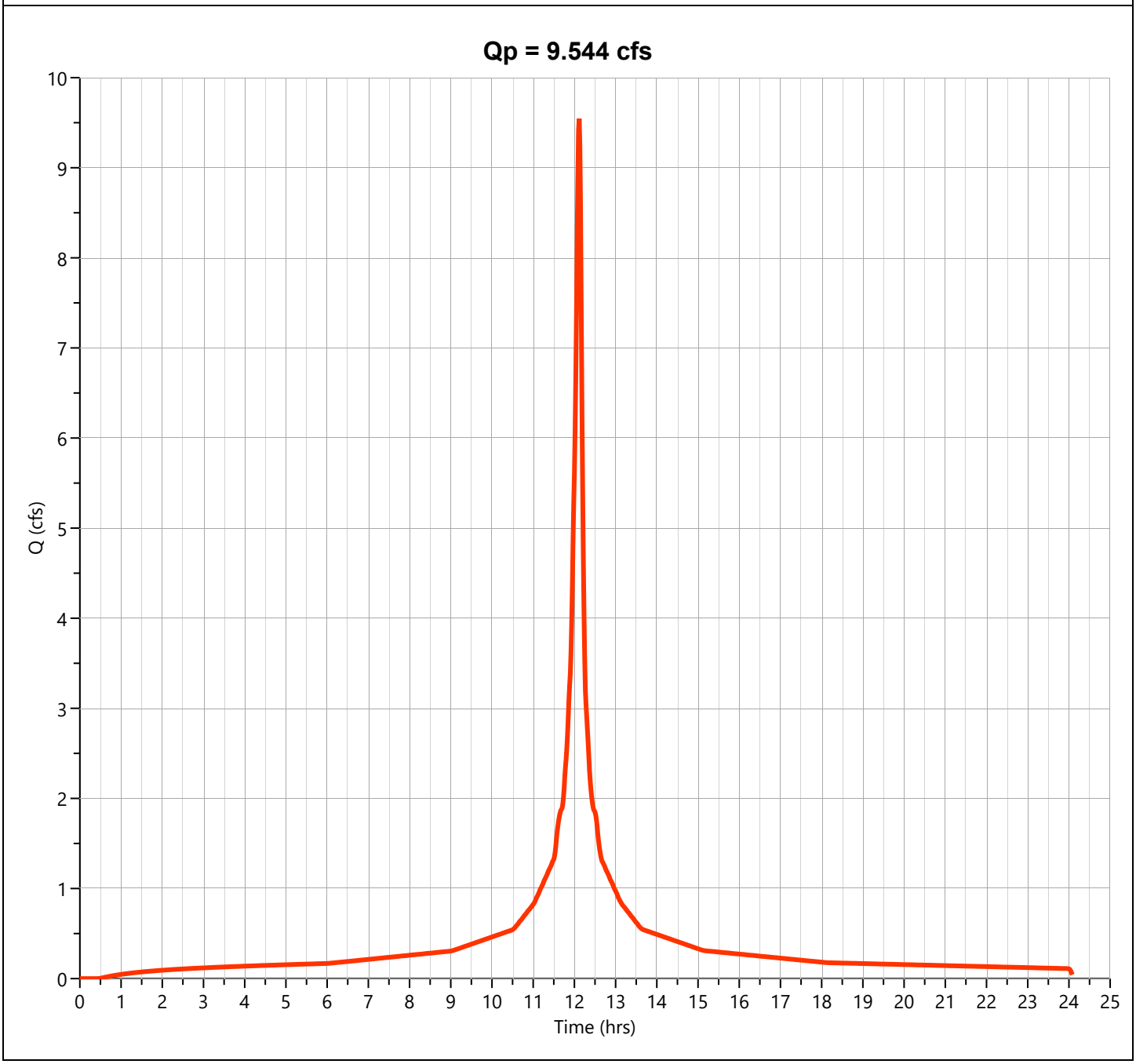
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-U Impervious

Hyd. No. 41

Hydrograph Type	= NRCS Runoff	Peak Flow	= 9.544 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 35,374 cuft
Drainage Area	= 1.05 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

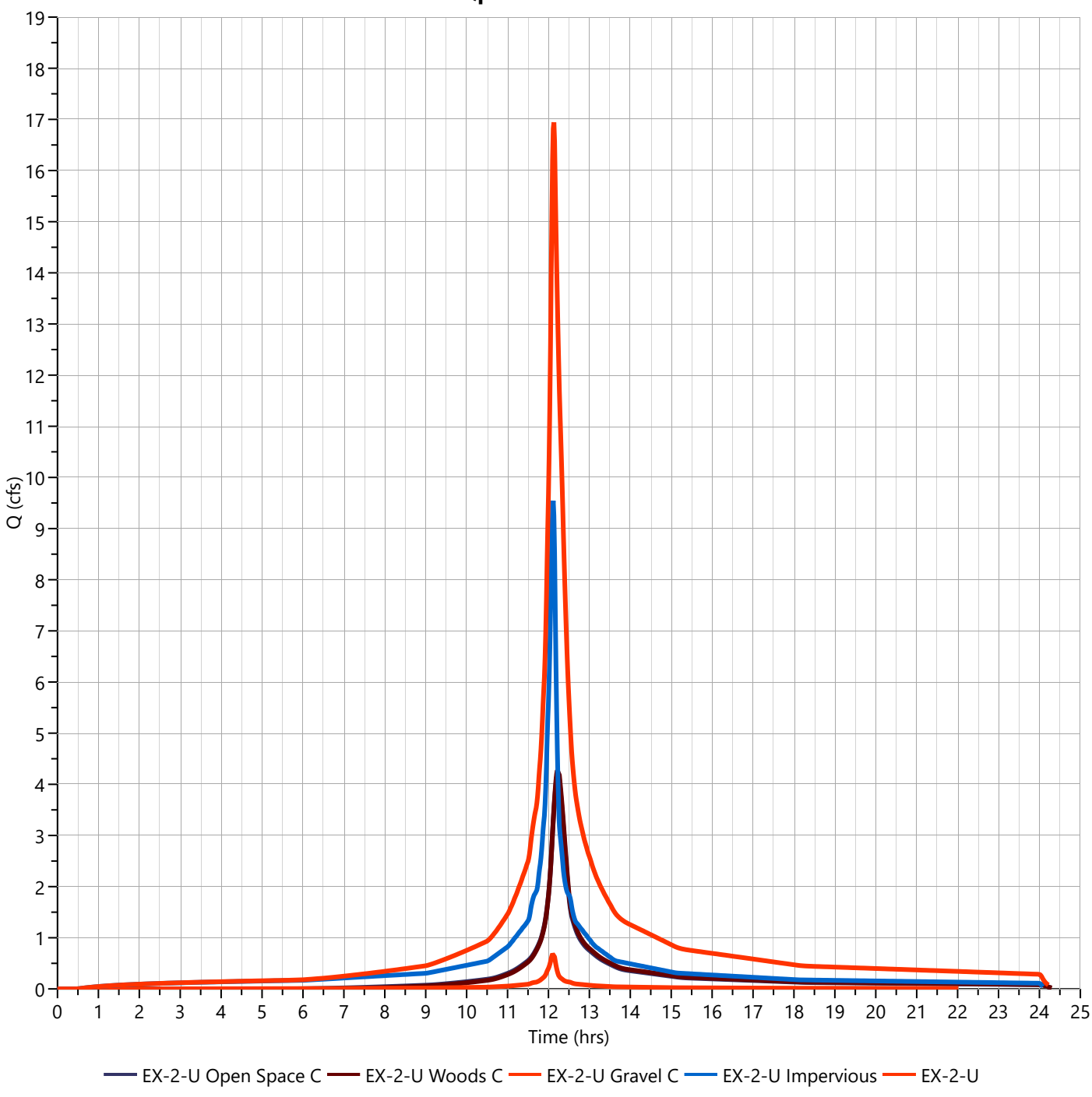
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

EX-2-U

Hyd. No. 42

Hydrograph Type	= Junction	Peak Flow	= 16.94 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 75,319 cuft
Inflow Hydrographs	= 38, 39, 40, 41	Total Contrib. Area	= 2.94 ac



TOTAL EXISTING FLOW TO POA-2

Hydrograph Report

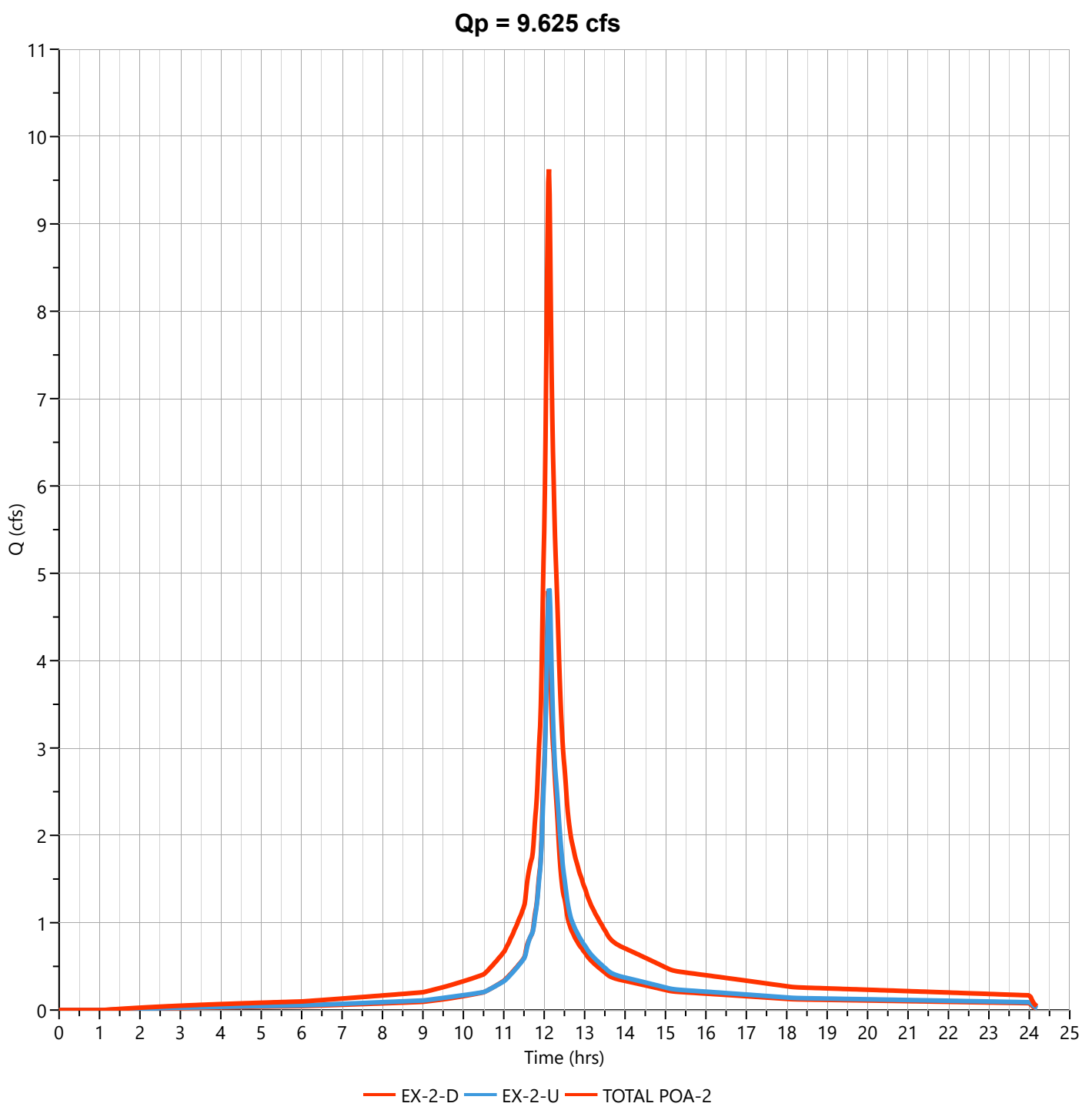
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

TOTAL POA-2

Hyd. No. 44

Hydrograph Type	= Junction	Peak Flow	= 9.625 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 39,342 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

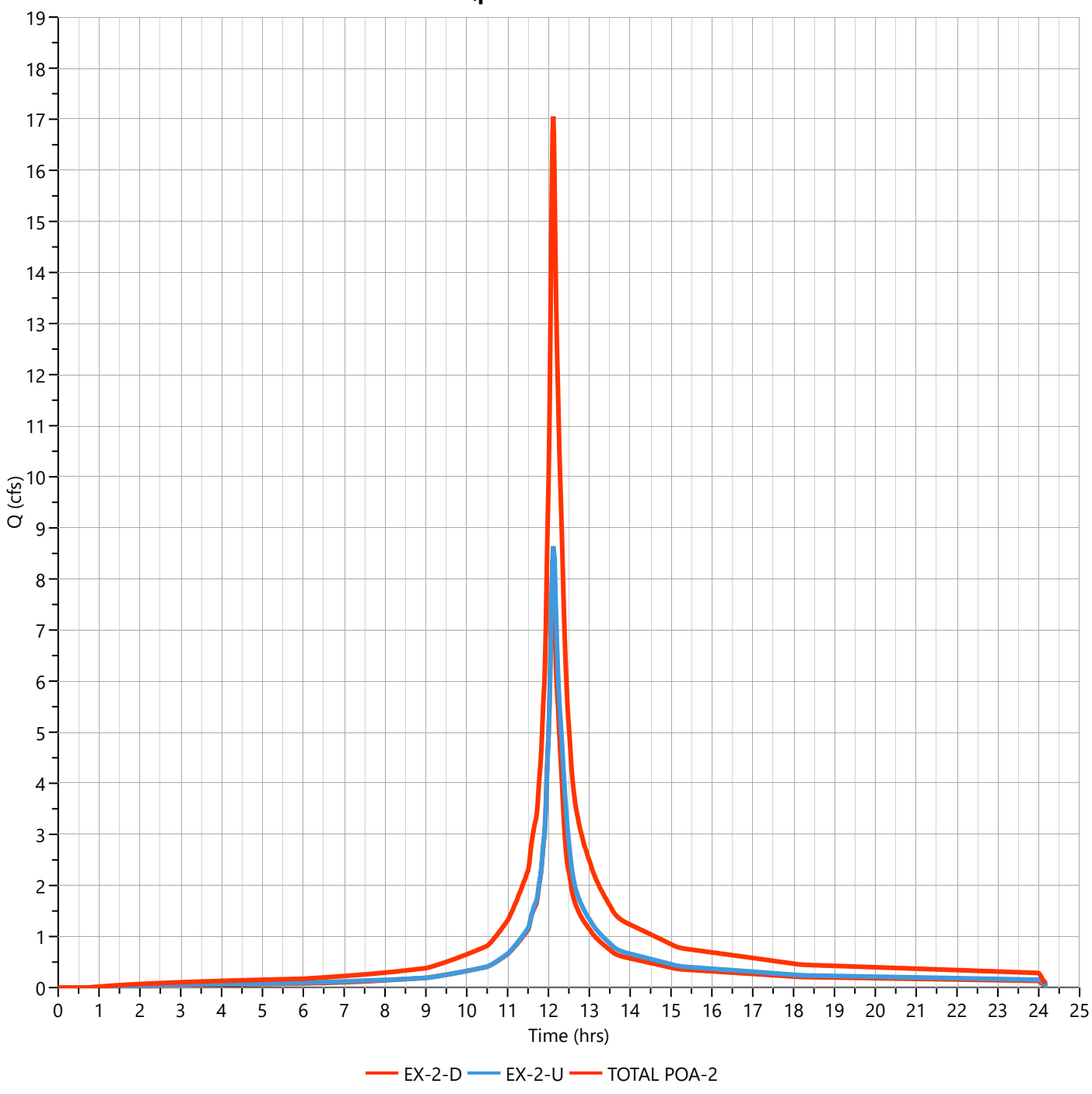
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

TOTAL POA-2

Hyd. No. 44

Hydrograph Type	= Junction	Peak Flow	= 17.05 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 71,409 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

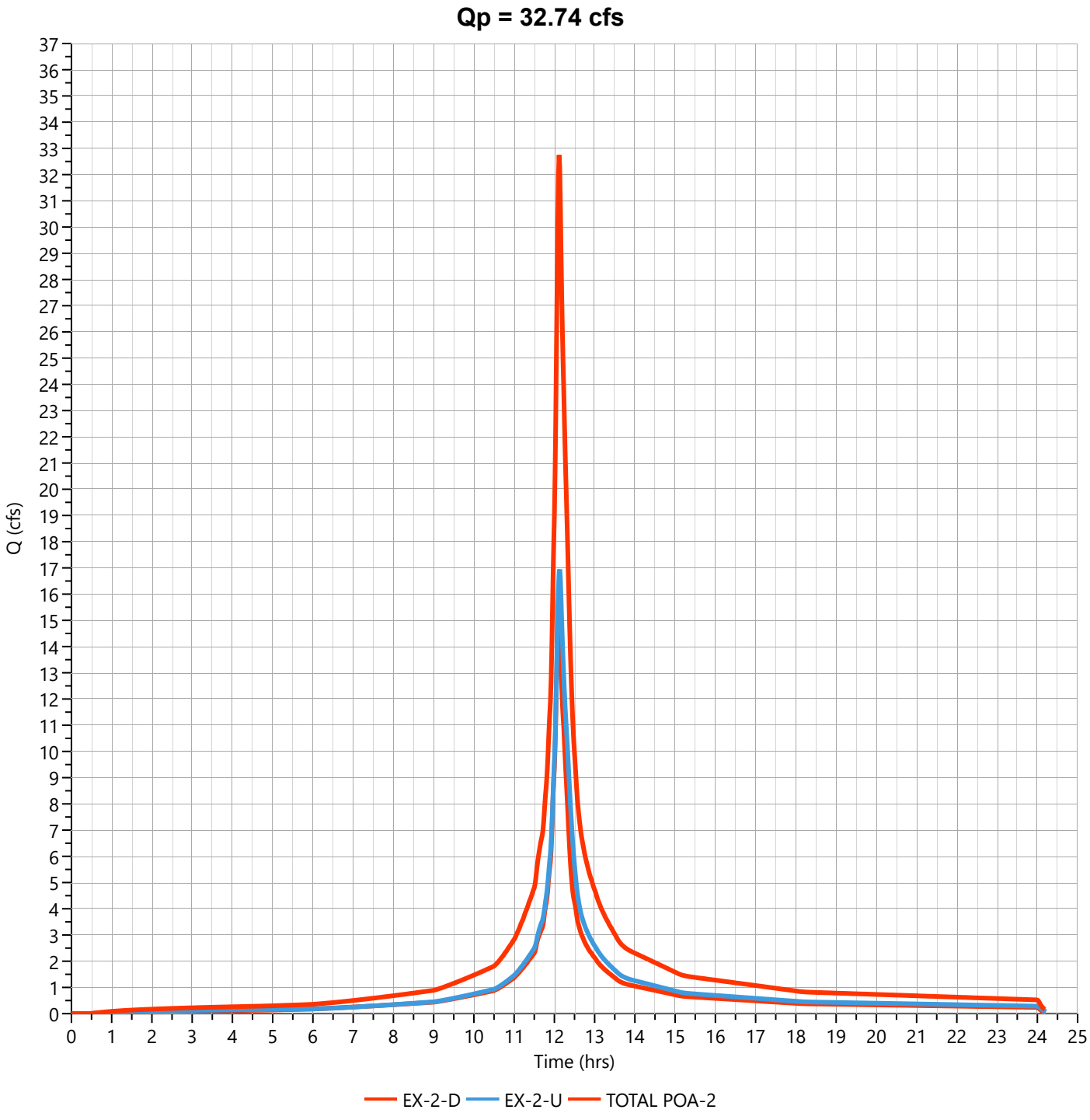
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

TOTAL POA-2

Hyd. No. 44

Hydrograph Type	= Junction	Peak Flow	= 32.74 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 141,014 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



TOTAL ALLOWABLE FLOW TO POA-2

Hydrograph Report

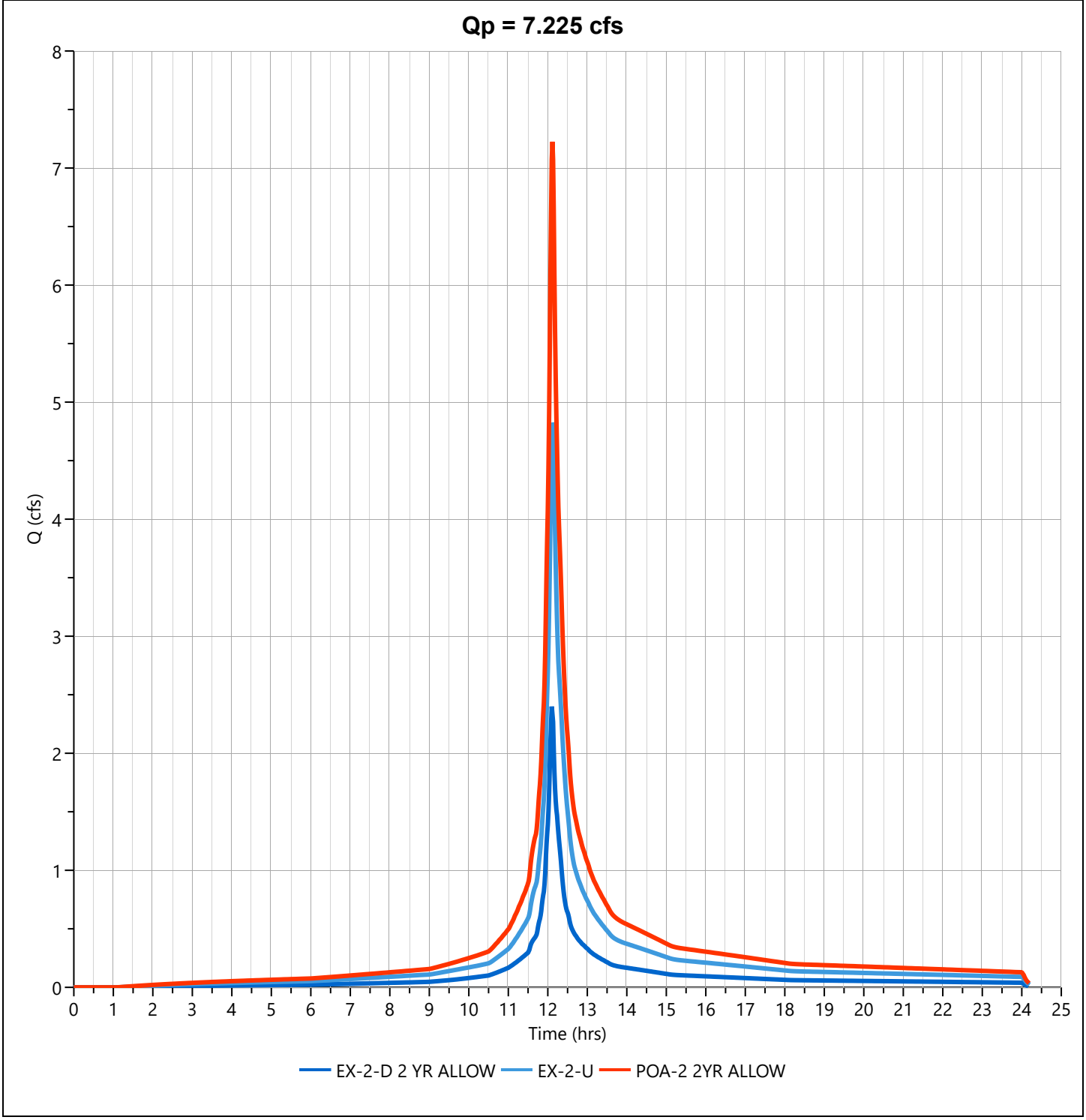
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

POA-2 2YR ALLOW

Hyd. No. 45

Hydrograph Type	= Junction	Peak Flow	= 7.225 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 29,907 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

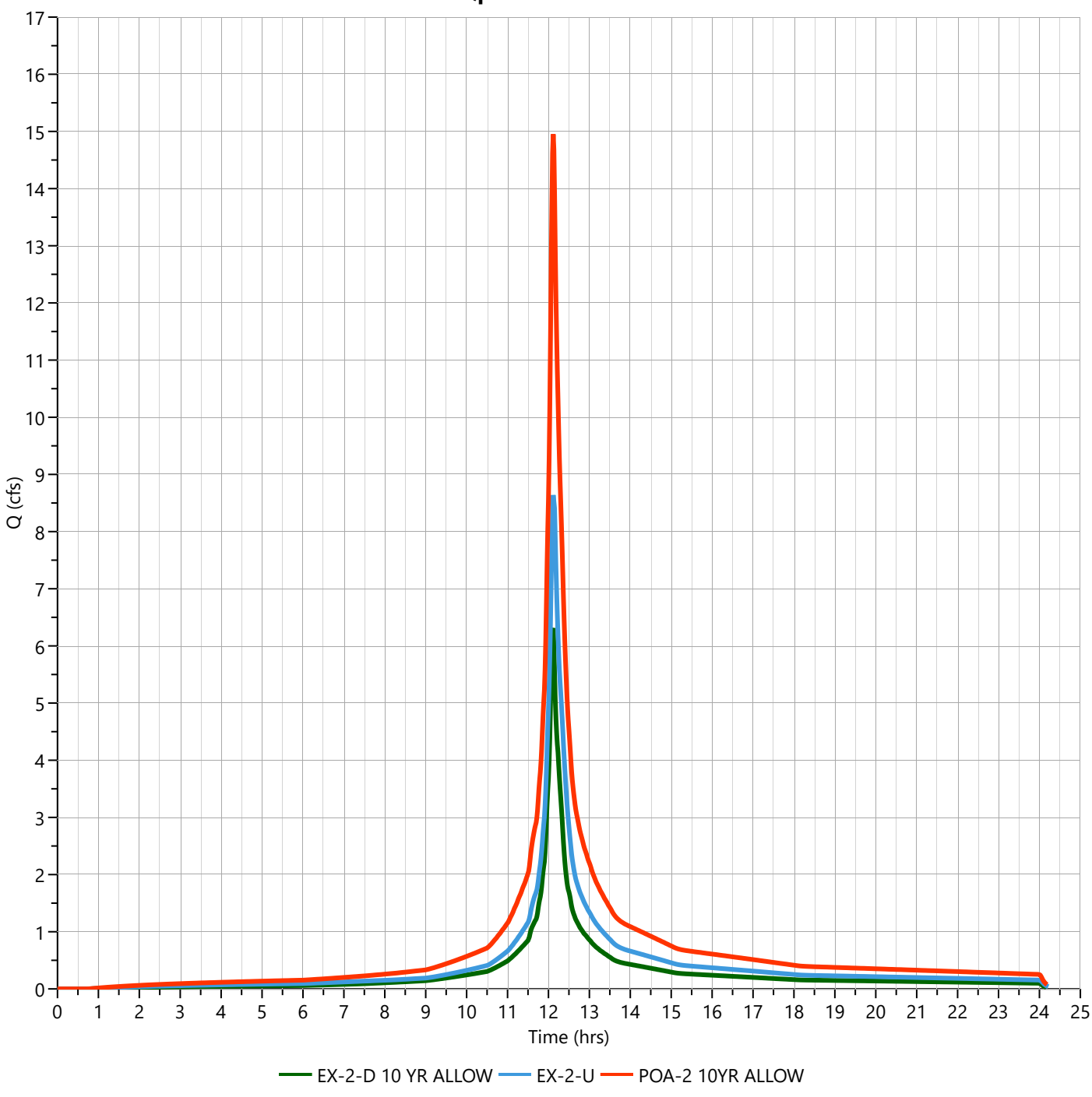
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

POA-2 10YR ALLOW

Hyd. No. 46

Hydrograph Type	= Junction	Peak Flow	= 14.95 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 62,960 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

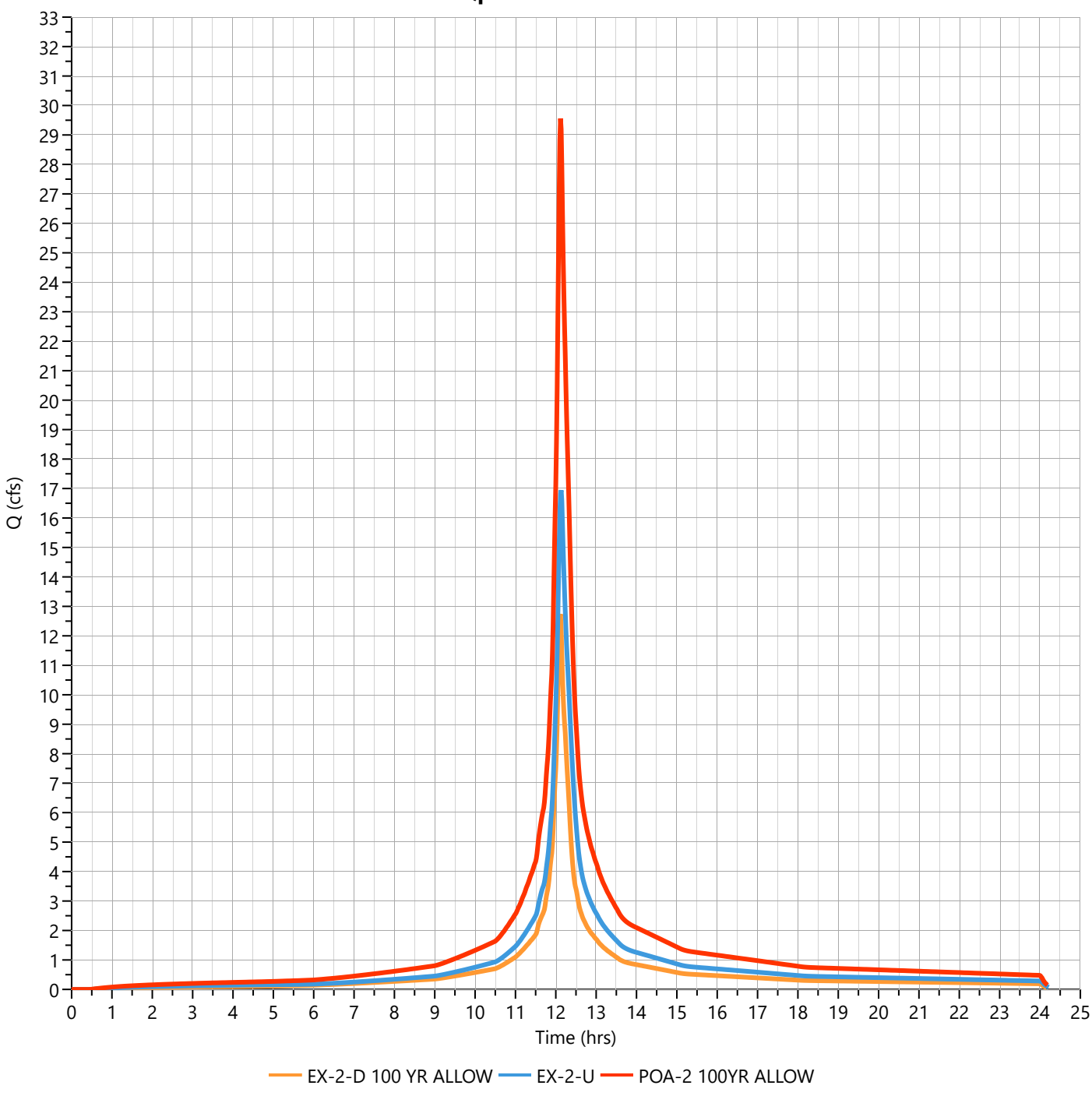
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys
10-21-2025

POA-2 100YR ALLOW

Hyd. No. 47

Hydrograph Type	= Junction	Peak Flow	= 29.56 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 127,875 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



SUMMARY OF EXISTING PEAK DISCHARGES

Hydrograph 2-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys

10-21-2025

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-D Open Space D	0.932	12.20	3,786	----		
2	NRCS Runoff	EX-1-D Woods D	0.967	12.20	3,966	----		
3	NRCS Runoff	EX-1-D Impervious	0.304	12.12	1,087	----		
4	Junction	EX-1-D	2.078	12.18	8,840	1, 2, 3		
6	Diversion1	EX-1-D 2 YR ALLOW	1.039	12.18	4,420	4		
7	Diversion2	<name>	1.039	12.18	4,420	4		
8	Diversion1	EX-1-D 10 YR ALLOW	1.558	12.18	6,630	4		
9	Diversion2	<name>	0.519	12.18	2,210	4		
10	Diversion1	EX-1-D 100 YR ALLOW	1.662	12.18	7,072	4		
11	Diversion2	<name>	0.416	12.18	1,768	4		
13	NRCS Runoff	EX-1-U Open Space C	1.491	12.18	5,892	----		
14	NRCS Runoff	EX-1-U Woods C	0.600	12.20	2,460	----		
15	NRCS Runoff	EX-1-U Impervious	9.916	12.12	35,511	----		
16	Junction	EX-1-U	11.65	12.12	43,863	13, 14, 15		
18	Junction	TOTAL POA-1	13.48	12.12	52,703	4, 16		
19	Junction	POA-1 2 yr Allow	12.57	12.12	48,283	6, 16		
20	Junction	POA-1 10 yr Allow	13.02	12.12	50,493	8, 16		
21	Junction	POA-1 100yr Allow	13.12	12.12	50,935	10, 16		
25	NRCS Runoff	EX-2-D Open Space D	0.588	12.20	2,388	----		
26	NRCS Runoff	EX-2-D Woods D	1.264	12.20	5,187	----		
27	NRCS Runoff	EX-2-D Gravel D	0.214	12.10	636	----		
28	NRCS Runoff	EX-2-D Impervious	3.213	12.10	10,658	----		
30	Junction	EX-2-D	4.802	12.12	18,870	25, 26, 27, 28		
31	Diversion1	EX-2-D 2 YR ALLOW	2.401	12.12	9,435	30		
32	Diversion2	<name>	2.401	12.12	9,435	30		
33	Diversion1	EX-2-D 10 YR ALLOW	3.601	12.12	14,152	30		
34	Diversion2	<name>	1.200	12.12	4,717	30		
35	Diversion1	EX-2-D 100 YR ALLOW	3.841	12.12	15,096	30		
36	Diversion2	<name>	0.960	12.12	3,774	30		

Hydrograph 2-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys

10-21-2025

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	NRCS Runoff	EX-2-U Open Space C	0.825	12.25	3,742	----		
39	NRCS Runoff	EX-2-U Woods C	0.711	12.25	3,353	----		
40	NRCS Runoff	EX-2-U Gravel C	0.220	12.12	695	----		
41	NRCS Runoff	EX-2-U Impervious	3.541	12.12	12,682	----		
42	Junction	EX-2-U	4.824	12.12	20,472	38, 39, 40, 41		
44	Junction	TOTAL POA-2	9.625	12.12	39,342	30, 42		
45	Junction	POA-2 2YR ALLOW	7.225	12.12	29,907	31, 42		
46	Junction	POA-2 10YR ALLOW	8.425	12.12	34,624	33, 42		
47	Junction	POA-2 100YR ALLOW	8.665	12.12	35,568	35, 42		

Hydrograph 10-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys

10-21-2025

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-D Open Space D	1.871	12.20	7,614	----		
2	NRCS Runoff	EX-1-D Woods D	2.057	12.20	8,335	----		
3	NRCS Runoff	EX-1-D Impervious	0.475	12.12	1,733	----		
4	Junction	EX-1-D	4.218	12.18	17,682	1, 2, 3		
6	Diversion1	EX-1-D 2 YR ALLOW	2.109	12.18	8,841	4		
7	Diversion2	<name>	2.109	12.18	8,841	4		
8	Diversion1	EX-1-D 10 YR ALLOW	3.163	12.18	13,261	4		
9	Diversion2	<name>	1.054	12.18	4,420	4		
10	Diversion1	EX-1-D 100 YR ALLOW	3.374	12.18	14,146	4		
11	Diversion2	<name>	0.844	12.18	3,536	4		
13	NRCS Runoff	EX-1-U Open Space C	3.376	12.18	12,980	----		
14	NRCS Runoff	EX-1-U Woods C	1.502	12.18	5,809	----		
15	NRCS Runoff	EX-1-U Impervious	15.51	12.12	56,598	----		
16	Junction	EX-1-U	19.71	12.12	75,387	13, 14, 15		
18	Junction	TOTAL POA-1	23.47	12.13	93,069	4, 16		
19	Junction	POA-1 2 yr Allow	21.58	12.12	84,228	6, 16		
20	Junction	POA-1 10 yr Allow	22.52	12.12	88,648	8, 16		
21	Junction	POA-1 100yr Allow	22.71	12.12	89,532	10, 16		
25	NRCS Runoff	EX-2-D Open Space D	1.180	12.20	4,803	----		
26	NRCS Runoff	EX-2-D Woods D	2.690	12.20	10,900	----		
27	NRCS Runoff	EX-2-D Gravel D	0.360	12.10	1,106	----		
28	NRCS Runoff	EX-2-D Impervious	5.026	12.10	16,988	----		
30	Junction	EX-2-D	8.415	12.12	33,796	25, 26, 27, 28		
31	Diversion1	EX-2-D 2 YR ALLOW	4.208	12.12	16,898	30		
32	Diversion2	<name>	4.208	12.12	16,898	30		
33	Diversion1	EX-2-D 10 YR ALLOW	6.312	12.12	25,347	30		
34	Diversion2	<name>	2.104	12.12	8,449	30		
35	Diversion1	EX-2-D 100 YR ALLOW	6.732	12.12	27,037	30		
36	Diversion2	<name>	1.683	12.12	6,759	30		

Hydrograph 10-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys

10-21-2025

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	NRCS Runoff	EX-2-U Open Space C	1.876	12.23	8,243	----		
39	NRCS Runoff	EX-2-U Woods C	1.788	12.23	7,917	----		
40	NRCS Runoff	EX-2-U Gravel C	0.379	12.12	1,239	----		
41	NRCS Runoff	EX-2-U Impervious	5.540	12.12	20,214	----		
42	Junction	EX-2-U	8.660	12.13	37,613	38, 39, 40, 41		
44	Junction	TOTAL POA-2	17.05	12.12	71,409	30, 42		
45	Junction	POA-2 2YR ALLOW	12.85	12.12	54,511	31, 42		
46	Junction	POA-2 10YR ALLOW	14.95	12.12	62,960	33, 42		
47	Junction	POA-2 100YR ALLOW	15.37	12.12	64,650	35, 42		

Hydrograph 100-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys

10-21-2025

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-D Open Space D	3.834	12.20	16,035	----		
2	NRCS Runoff	EX-1-D Woods D	4.396	12.20	18,185	----		
3	NRCS Runoff	EX-1-D Impervious	0.818	12.12	3,032	----		
4	Junction	EX-1-D	8.751	12.18	37,253	1, 2, 3		
6	Diversion1	EX-1-D 2 YR ALLOW	4.376	12.18	18,626	4		
7	Diversion2	<name>	4.376	12.18	18,626	4		
8	Diversion1	EX-1-D 10 YR ALLOW	6.563	12.18	27,940	4		
9	Diversion2	<name>	2.188	12.18	9,313	4		
10	Diversion1	EX-1-D 100 YR ALLOW	7.001	12.18	29,802	4		
11	Diversion2	<name>	1.750	12.18	7,451	4		
13	NRCS Runoff	EX-1-U Open Space C	7.542	12.18	29,392	----		
14	NRCS Runoff	EX-1-U Woods C	3.591	12.18	13,875	----		
15	NRCS Runoff	EX-1-U Impervious	26.72	12.12	99,046	----		
16	Junction	EX-1-U	36.55	12.12	142,313	13, 14, 15		
18	Junction	TOTAL POA-1	44.56	12.13	179,566	4, 16		
19	Junction	POA-1 2 yr Allow	40.46	12.12	160,939	6, 16		
20	Junction	POA-1 10 yr Allow	42.50	12.13	170,253	8, 16		
21	Junction	POA-1 100yr Allow	42.92	12.13	172,115	10, 16		
25	NRCS Runoff	EX-2-D Open Space D	2.418	12.20	10,115	----		
26	NRCS Runoff	EX-2-D Woods D	5.749	12.20	23,781	----		
27	NRCS Runoff	EX-2-D Gravel D	0.647	12.10	2,071	----		
28	NRCS Runoff	EX-2-D Impervious	8.657	12.10	29,728	----		
30	Junction	EX-2-D	15.92	12.12	65,695	25, 26, 27, 28		
31	Diversion1	EX-2-D 2 YR ALLOW	7.962	12.12	32,847	30		
32	Diversion2	<name>	7.962	12.12	32,847	30		
33	Diversion1	EX-2-D 10 YR ALLOW	11.94	12.12	49,271	30		
34	Diversion2	<name>	3.981	12.12	16,424	30		
35	Diversion1	EX-2-D 100 YR ALLOW	12.74	12.12	52,556	30		
36	Diversion2	<name>	3.185	12.12	13,139	30		

Hydrograph 100-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Current).hys

10-21-2025

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	NRCS Runoff	EX-2-U Open Space C	4.208	12.23	18,667	----		
39	NRCS Runoff	EX-2-U Woods C	4.295	12.23	18,911	----		
40	NRCS Runoff	EX-2-U Gravel C	0.695	12.12	2,368	----		
41	NRCS Runoff	EX-2-U Impervious	9.544	12.12	35,374	----		
42	Junction	EX-2-U	16.94	12.13	75,319	38, 39, 40, 41		
44	Junction	TOTAL POA-2	32.74	12.12	141,014	30, 42		
45	Junction	POA-2 2YR ALLOW	24.78	12.12	108,167	31, 42		
46	Junction	POA-2 10YR ALLOW	28.76	12.12	124,590	33, 42		
47	Junction	POA-2 100YR ALLOW	29.56	12.12	127,875	35, 42		

FUTURE HYDROGRAPH CALCULATIONS

EX-1-DISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/20/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/20/2025**

Circle One: (**Present**) Developed — **Future Existing Watershed EX-1-D 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.	Surface Description (NEH table 15-1)		1		Smooth Surfaces			
2.	Manning's Roughness Coeff., n (NEH table 15-1)				0.011			
3.	Flow Length, L (total L < 100 ft)	ft			85			
4.	Two-year 24-hr rainfall, P_2	in			4.08			
5.	Land Slope, s	ft/ft			0.043			
6.	Compute T_t $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr			0.012	+		+
							Sheet Flow Sub-Total	0.012 hours

Shallow Concentrated Flow

			Segment ID		2		3		
7.	Surface Description				Woodlands		Pavement		
8.	Flow Length, L	ft			117		465		
9.	Watercourse Slope, s	ft/ft			0.207		0.018		
10.	Average Velocity, V (NEH table 15-3)	ft/s			2.29		2.75		
11.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr			0.014	+	0.047	+	
							Shallow Conc. Flow Sub-Total		0.061 hours

Channel Flow

			Segment ID		4		5		
12.	Flow Length, L	ft			15		51		
13.	Cross Sectional flow area, a	ft^2			0.61		0.61		
14.	Wetted Perimeter, P_w	ft			2.00		2.00		
15.	Hydraulic Radius, r $r = a / P_w$	ft			0.31		0.31		
16.	Channel Slope, s	ft/ft			0.055		0.021		
17.	Manning's Roughness Coeff., n				0.013		0.013		
18.	Velocity, V $V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s			12.14		7.59		
19.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr			0.000	+	0.002	+	
							Channel Flow Sub-Total		0.002 hours

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

Total Tc (hours)	=	**0.075 hours**
Total Tc (minutes)	=	**5 minutes**

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/20/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/20/2025**

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

$$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$$

			Segment ID	1		2		
1.	Surface Description (NEH table 15-1)			Woods Dense Underbrush		Woods Dense Underbrush		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.40		0.40		
3.	Flow Length, L (total L < 100 ft)		ft	72		28		
4.	Two-year 24-hr rainfall, P_2		in	4.08		4.08		
5.	Land Slope, s		ft/ft	0.070		0.281		
6.	Compute T_t		hr	0.147	+	0.040	+	
						Sheet Flow Sub-Total		0.187 hours

Shallow Concentrated Flow

$$T_t = \frac{L}{3600\,V}$$

			Segment ID	3		4		
7.	Surface Description			Woodlands		Pavement		
8.	Flow Length, L		ft	58		222		
9.	Watercourse Slope, s		ft/ft	0.272		0.027		
10.	Average Velocity, V (NEH table 15-3)		ft/s	2.63		3.31		
11.	Compute T_t		hr	0.006	+	0.019	+	
						Shallow Conc. Flow Sub-Total		0.025 hours

Channel Flow

$$r = a / P_w$$

$$V = (1.49\, r^{2/3} s^{1/2}) / n$$

$$T_t = \frac{L}{3600\,V}$$

			Segment ID	5		6		
12.	Flow Length, L		ft	15		51		
13.	Cross Sectional flow area, a		ft^2	0.61		0.61		
14.	Wetted Perimeter, P_w		ft	2.00		2.00		
15.	Hydraulic Radius, r		ft	0.31		0.31		
16.	Channel Slope, s		ft/ft	0.055		0.021		
17.	Manning's Roughness Coeff., n			0.013		0.013		
18.	Velocity, V		ft/s	12.14		7.59		
19.	Compute T_t		hr	0.000	+	0.002	+	
						Channel Flow Sub-Total		0.002 hours

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

Total Tc (hours) =	**0.214 hours**
Total Tc (minutes) =	**13 minutes**

Hydrograph Report

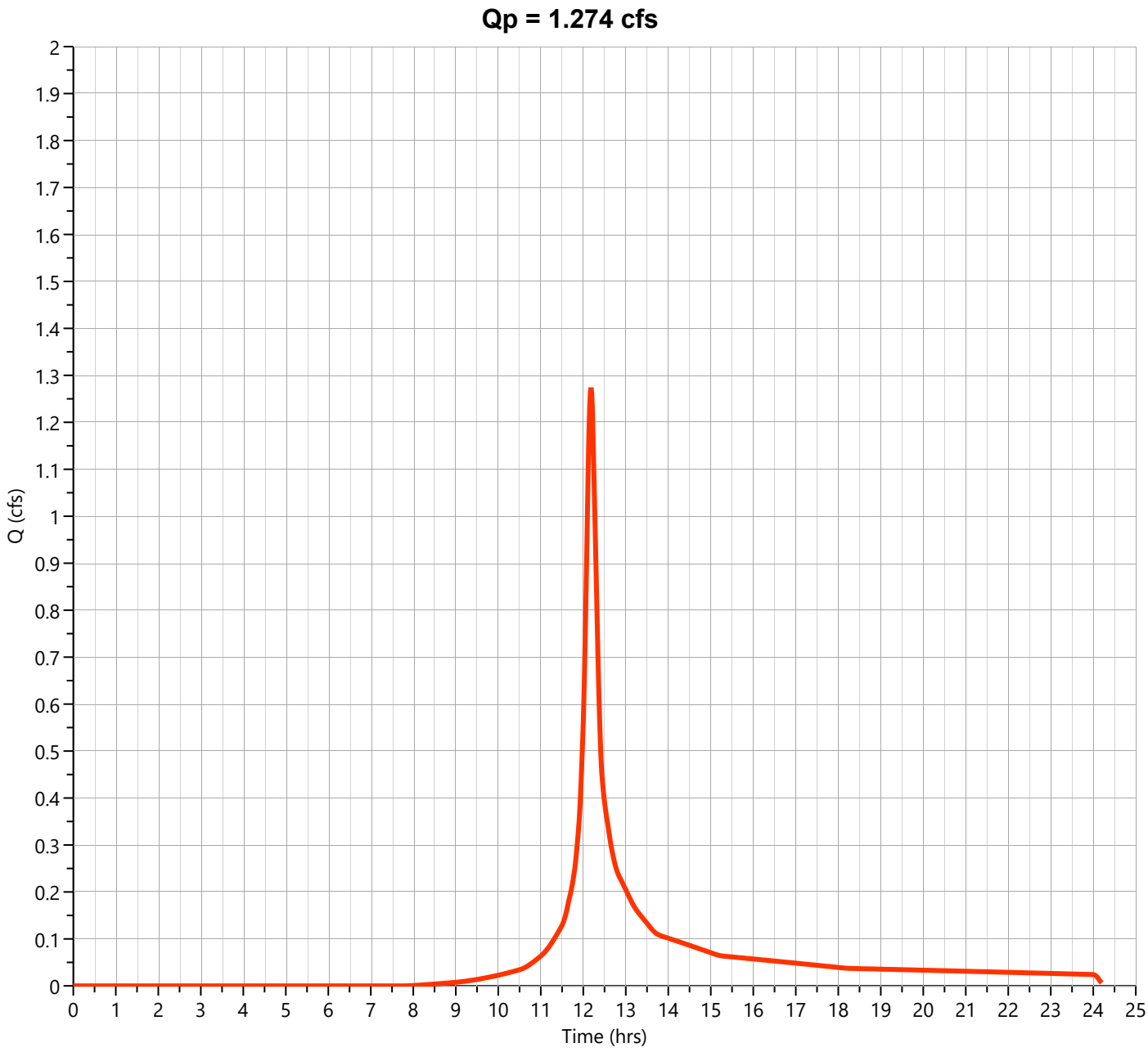
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File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-D Open Space D

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.274 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 4,896 cuft
Drainage Area	= 0.65 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 13.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

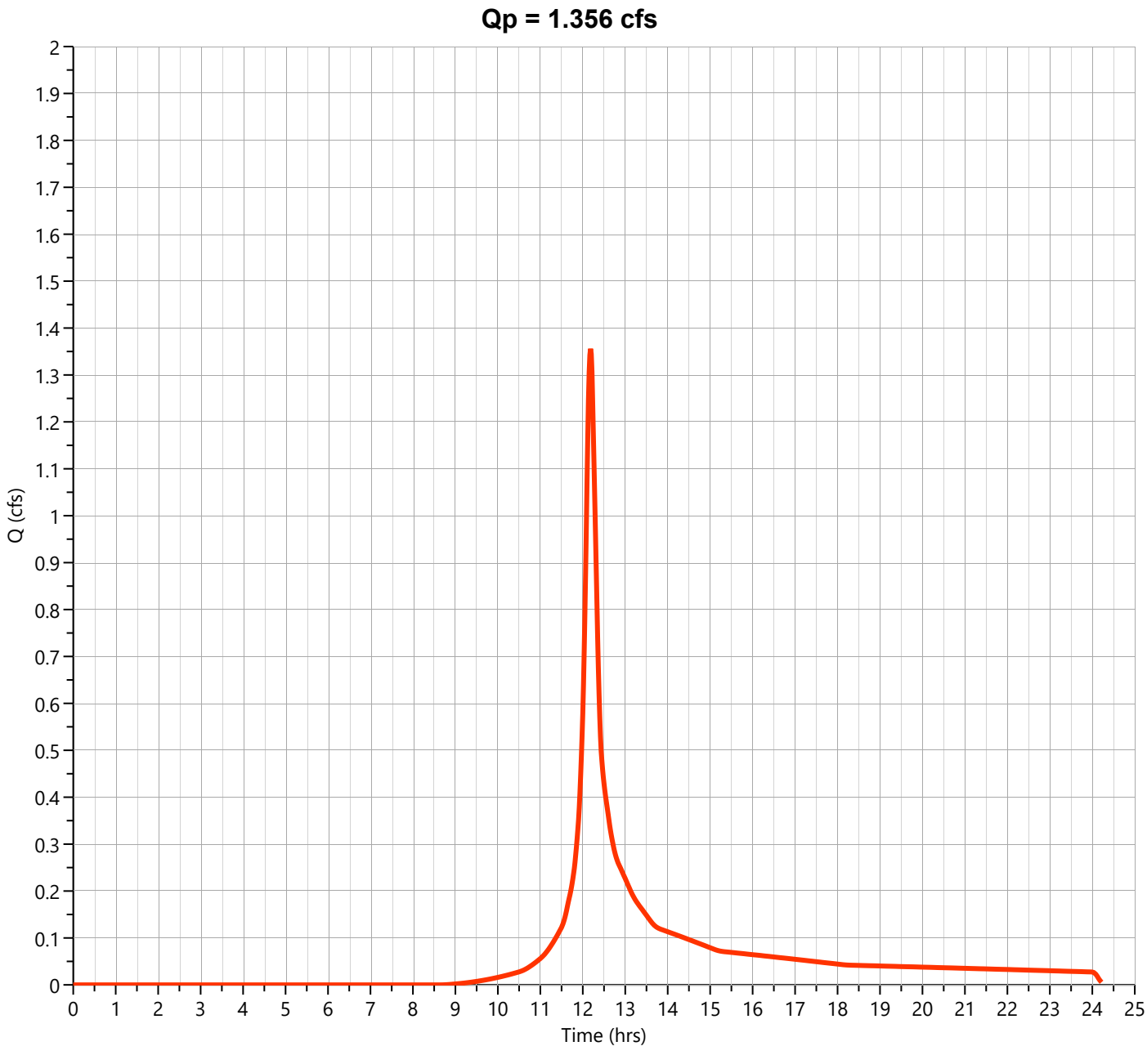
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File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-D Woods D

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.356 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 5,225 cuft
Drainage Area	= 0.78 ac	Curve Number	= 77.00
Tc Method	= User	Time of Conc. (Tc)	= 13.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

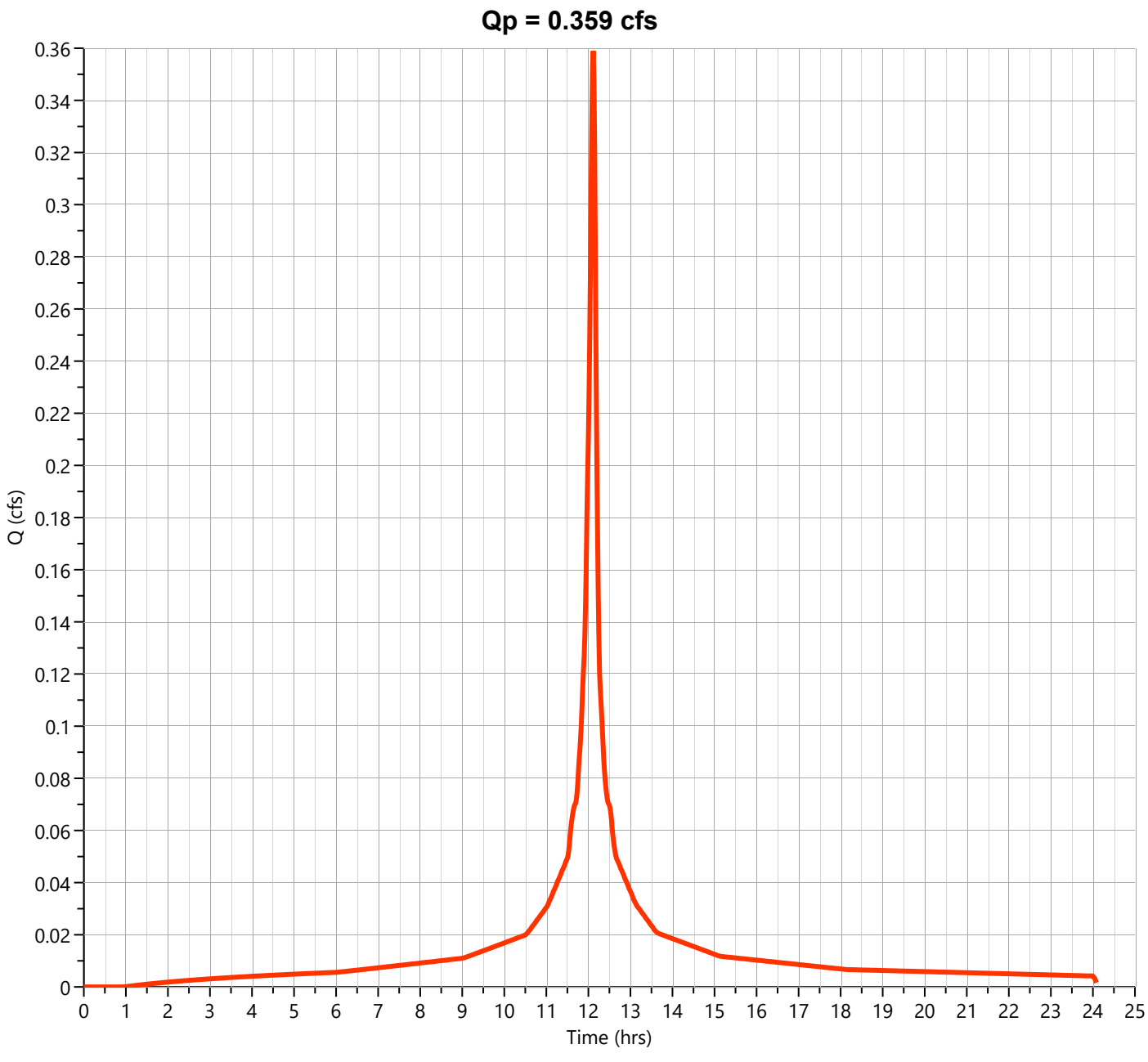
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-D Impervious

Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.359 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 1,295 cuft
Drainage Area	= 0.09 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

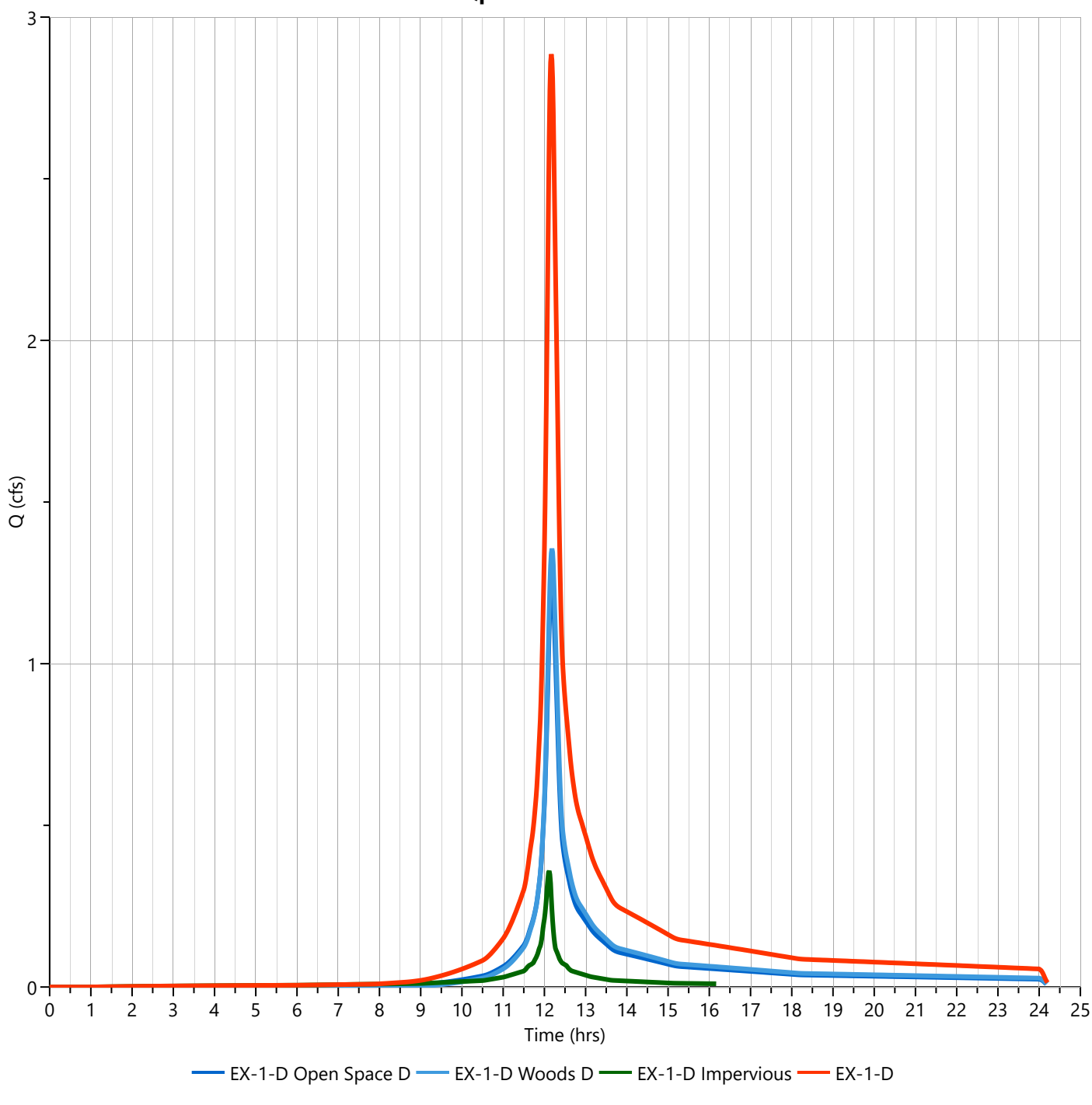
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File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-D

Hyd. No. 4

Hydrograph Type	= Junction	Peak Flow	= 2.885 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Hydrograph Volume	= 11,416 cuft
Inflow Hydrographs	= 1, 2, 3	Total Contrib. Area	= 1.52 ac



Hydrograph Report

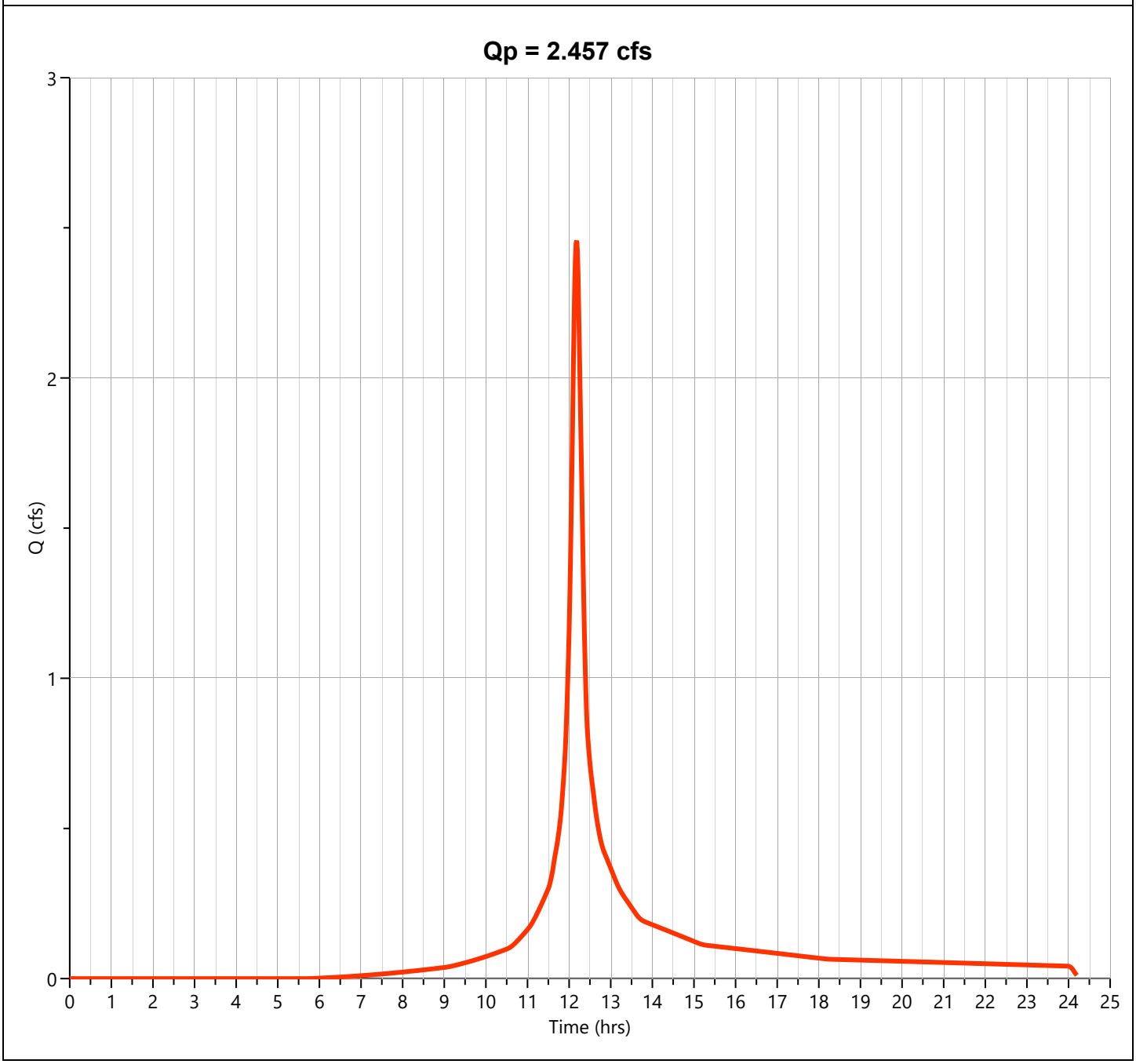
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File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-D Open Space D

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.457 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 9,562 cuft
Drainage Area	= 0.65 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 13.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

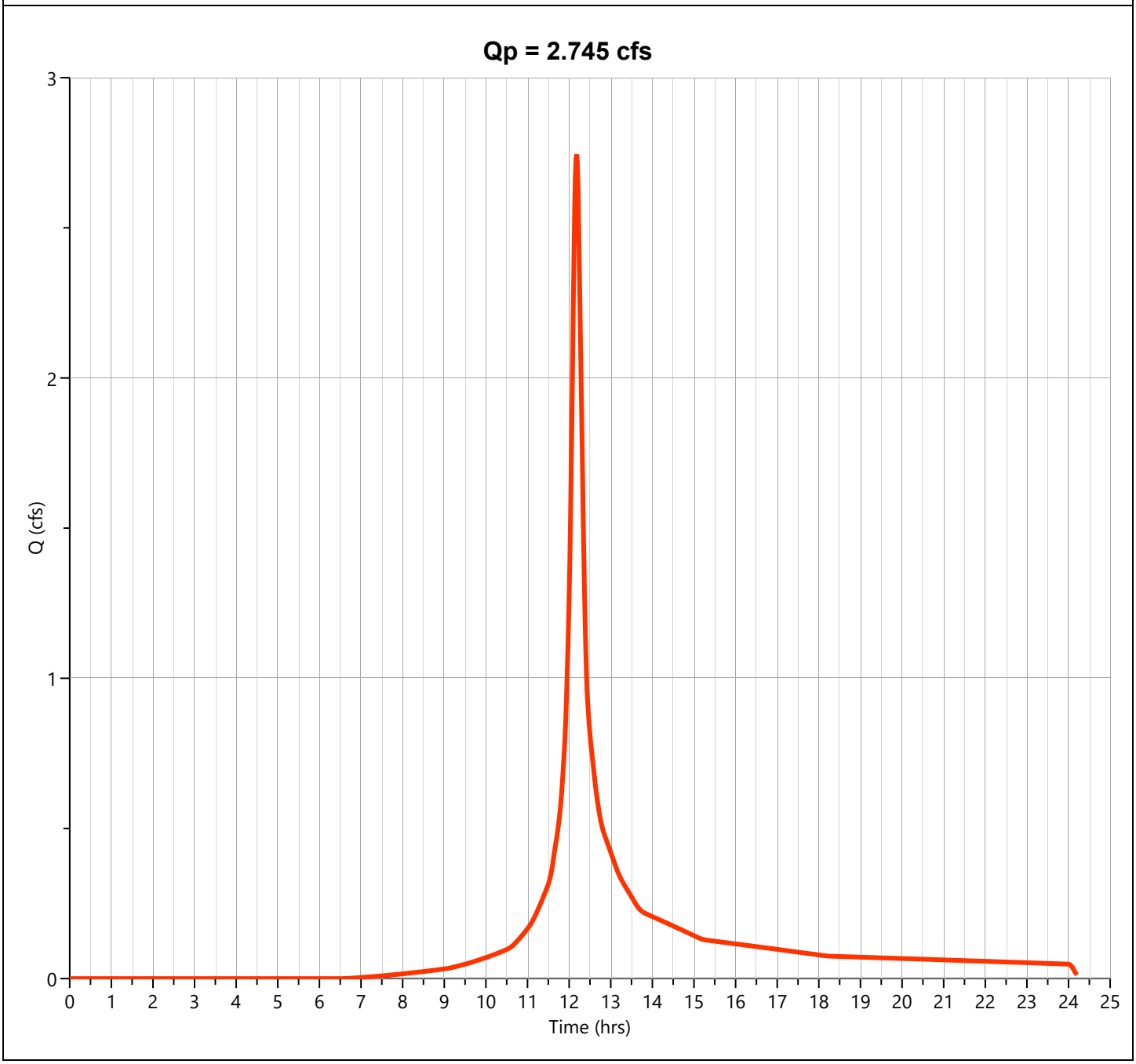
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File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-D Woods D

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.745 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 10,603 cuft
Drainage Area	= 0.78 ac	Curve Number	= 77.00
Tc Method	= User	Time of Conc. (Tc)	= 13.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

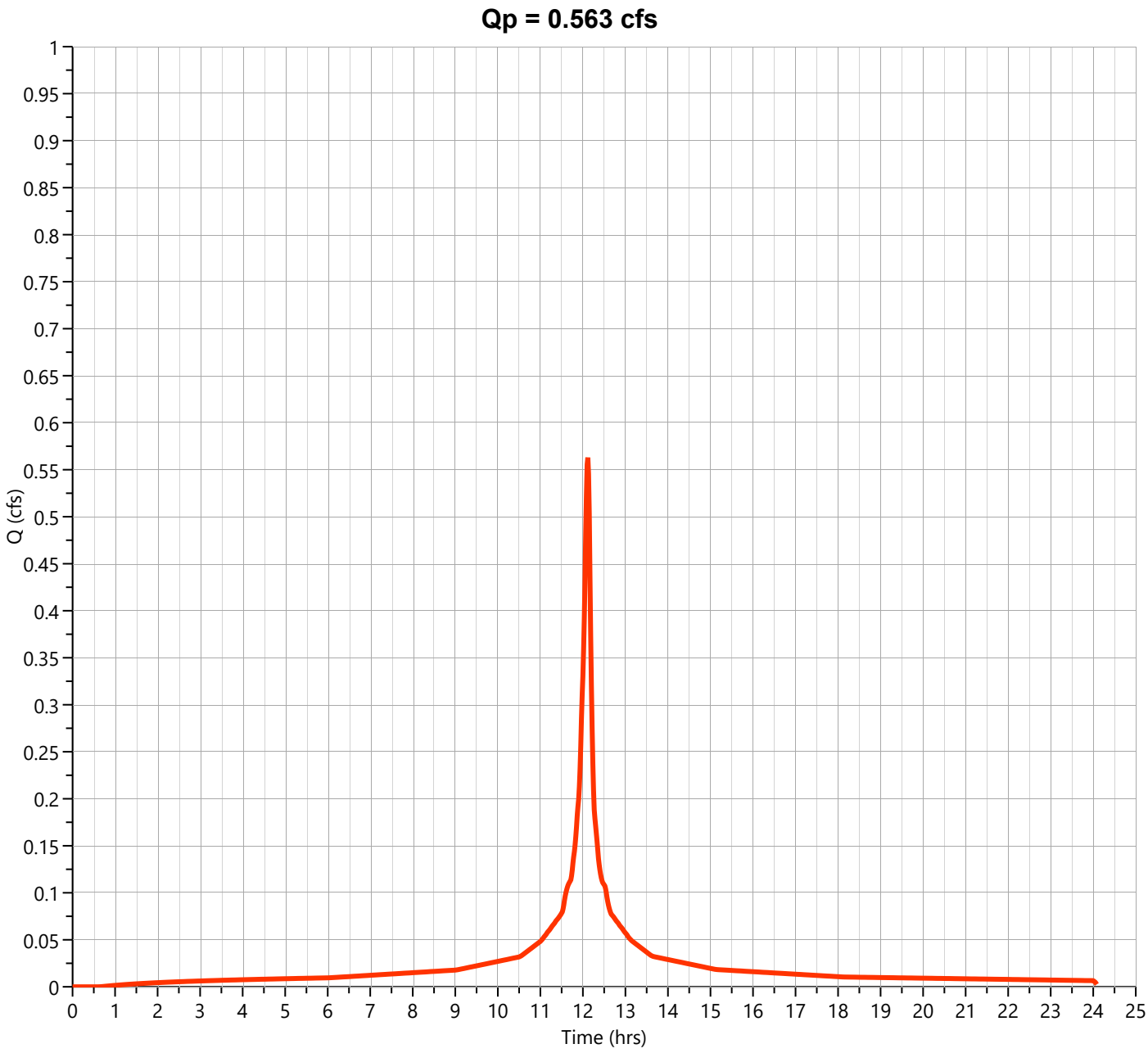
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-D Impervious

Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.563 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 2,066 cuft
Drainage Area	= 0.09 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

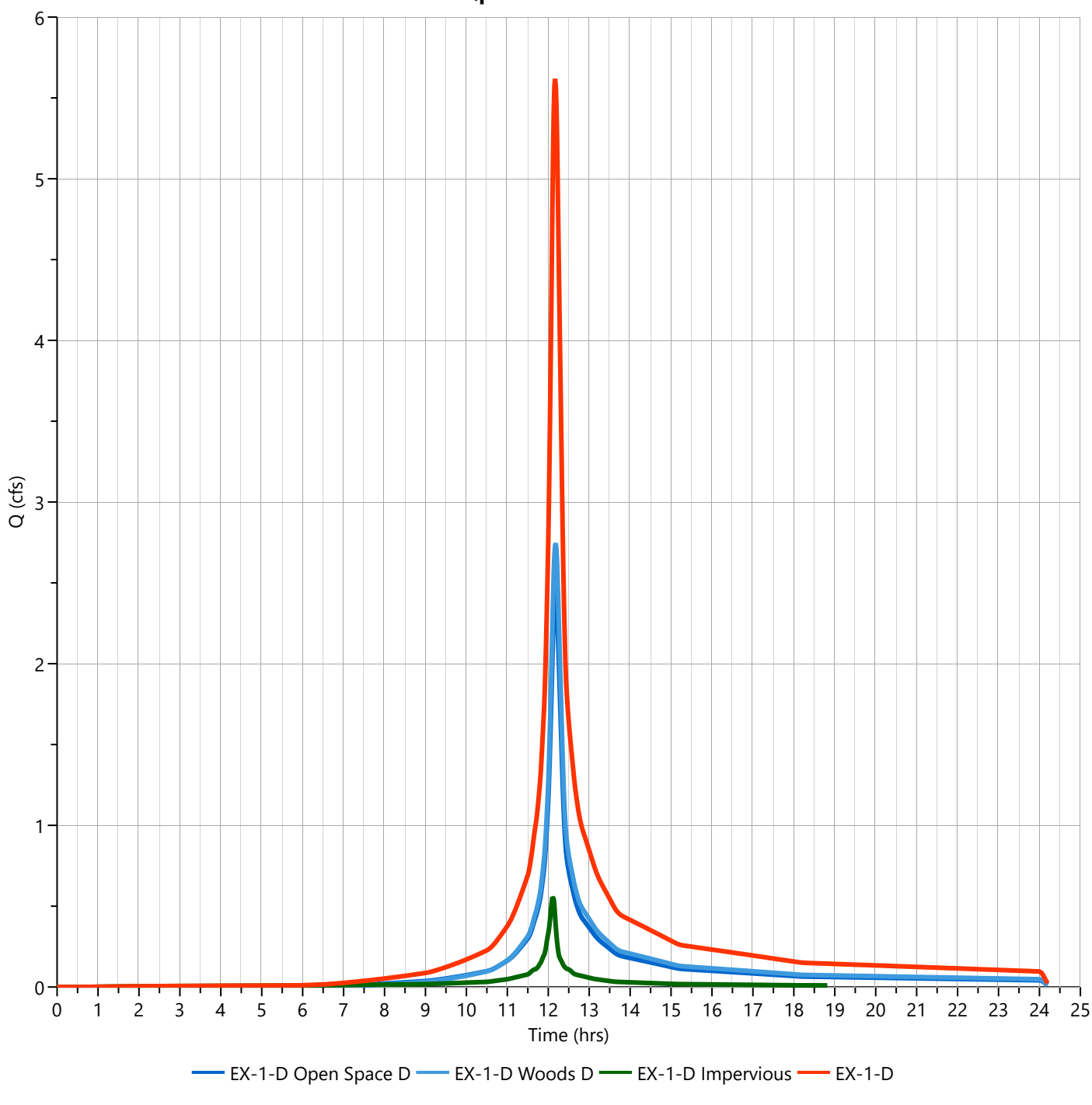
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-D

Hyd. No. 4

Hydrograph Type	= Junction	Peak Flow	= 5.617 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Hydrograph Volume	= 22,230 cuft
Inflow Hydrographs	= 1, 2, 3	Total Contrib. Area	= 1.52 ac



Hydrograph Report

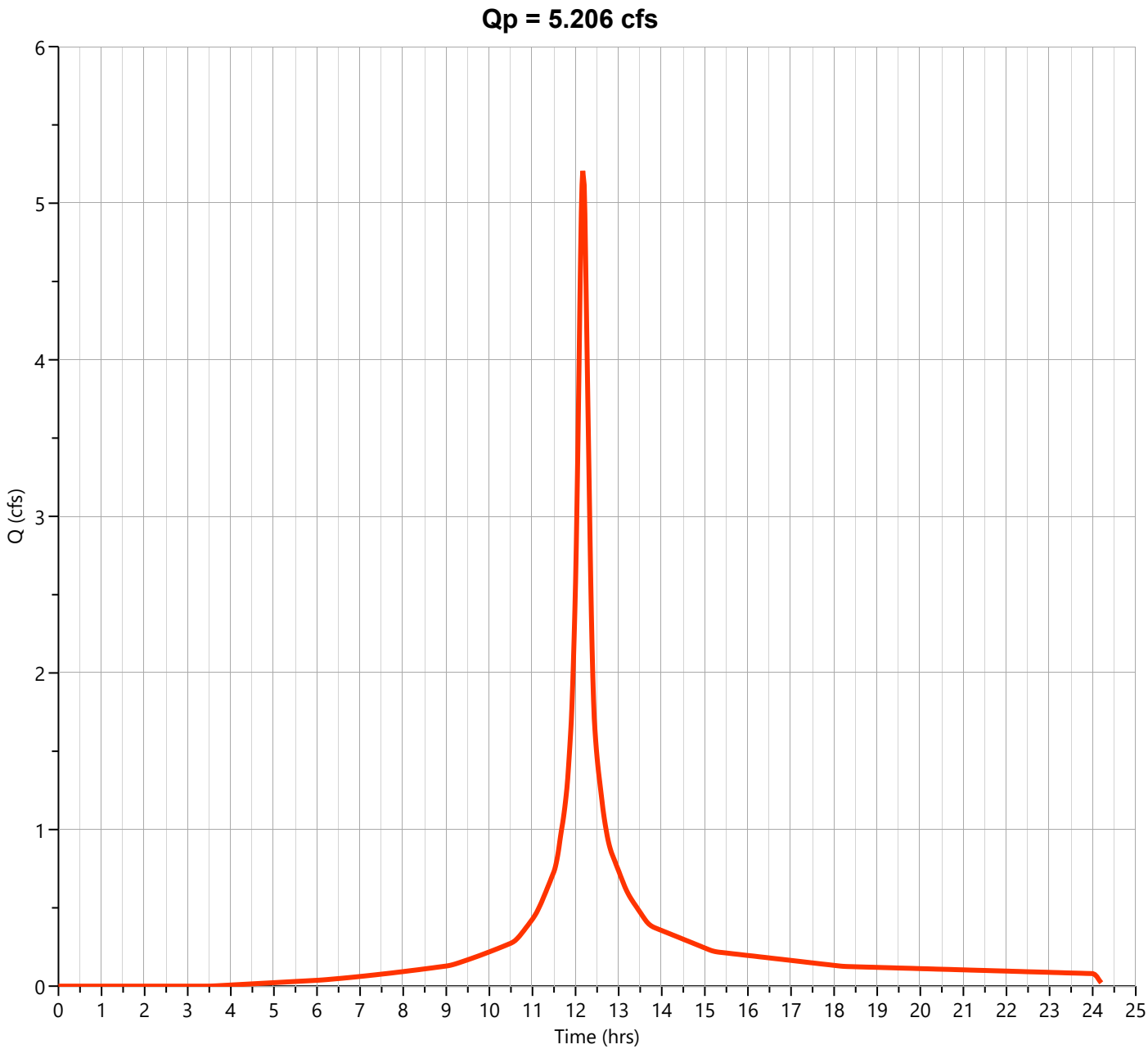
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-D Open Space D

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.206 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Runoff Volume	= 21,042 cuft
Drainage Area	= 0.65 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 13.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

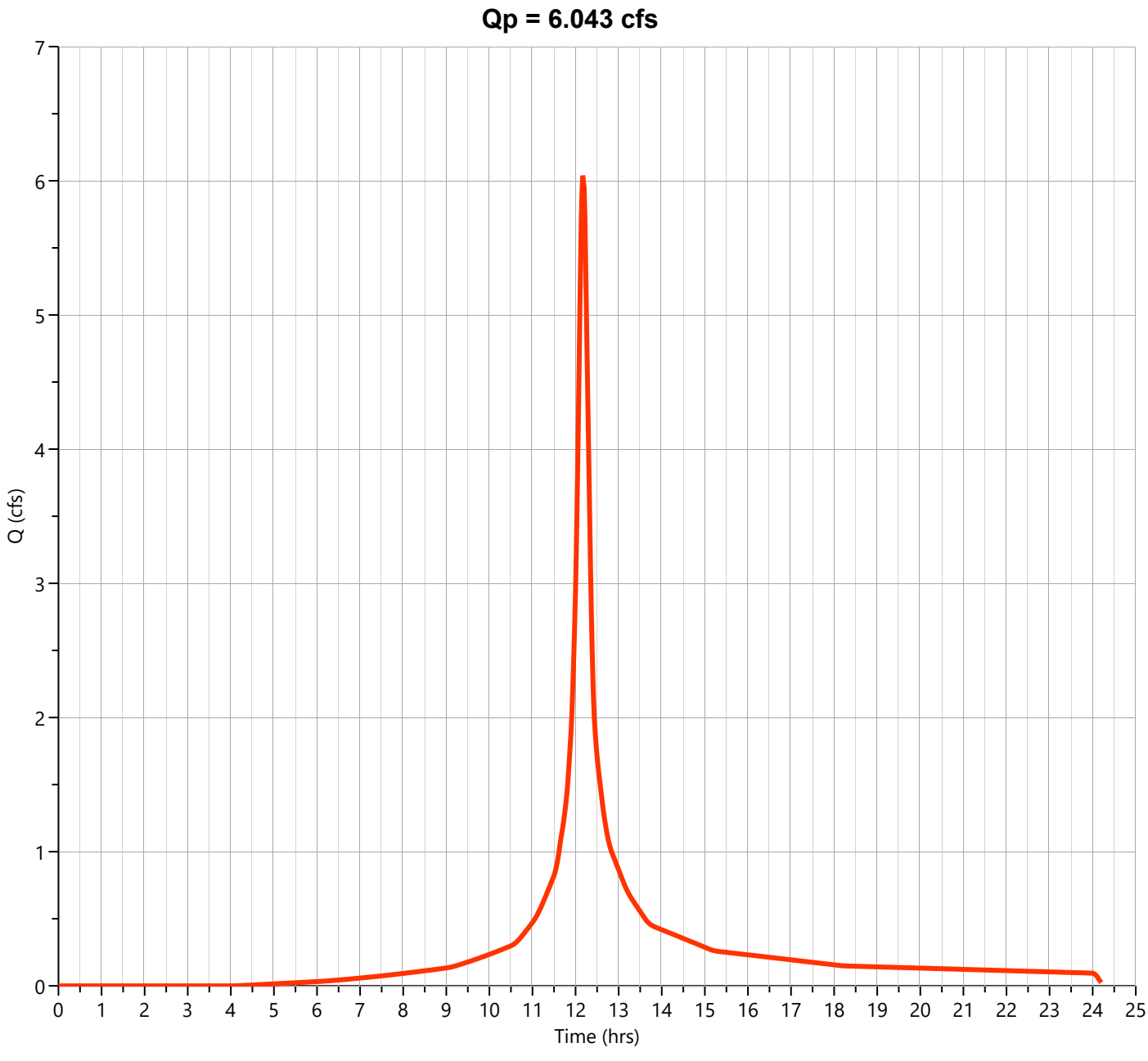
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-D Woods D

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.043 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 24,118 cuft
Drainage Area	= 0.78 ac	Curve Number	= 77.00
Tc Method	= User	Time of Conc. (Tc)	= 13.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

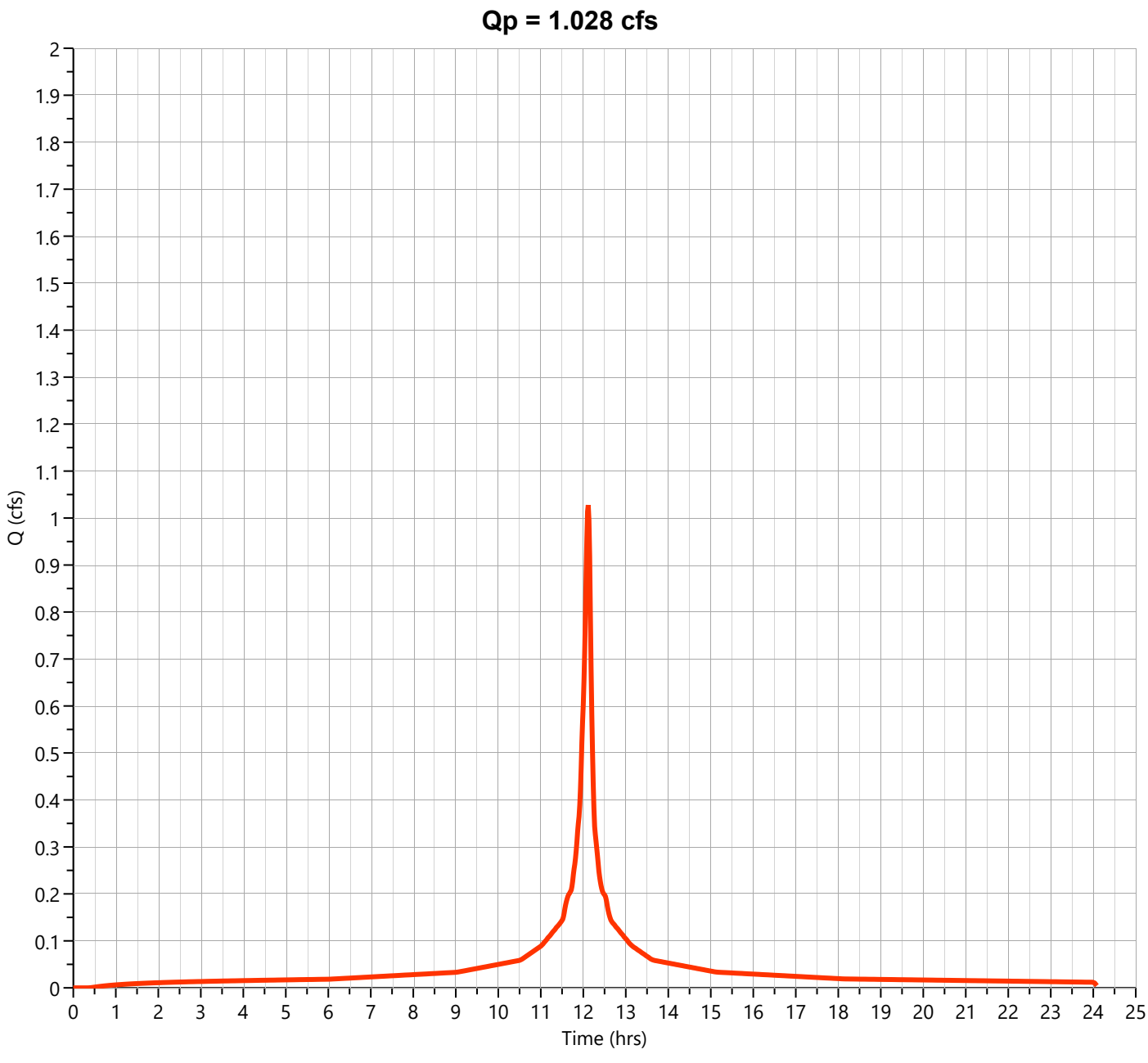
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-D Impervious

Hyd. No. 3

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.028 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 3,827 cuft
Drainage Area	= 0.09 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

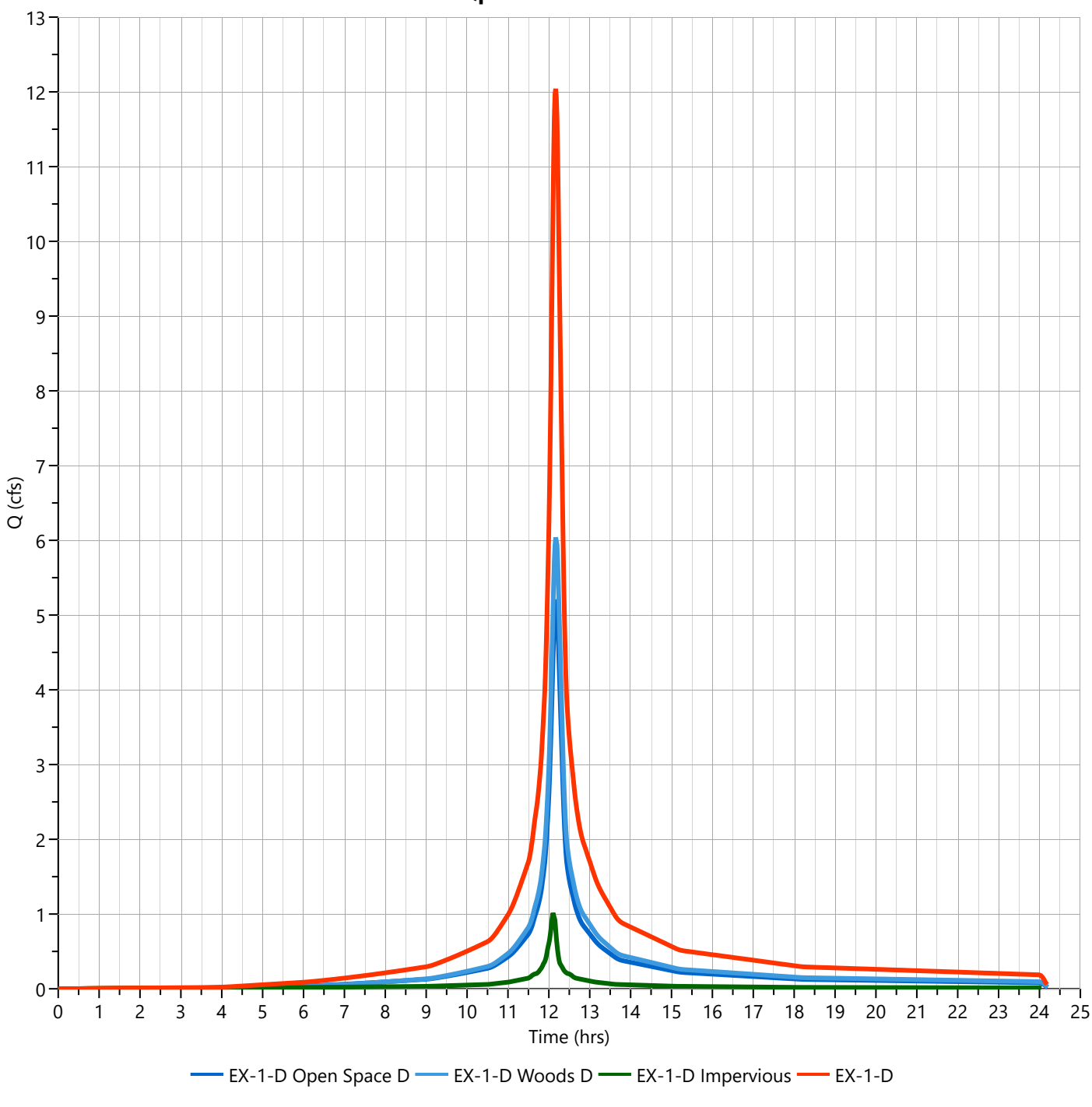
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-D

Hyd. No. 4

Hydrograph Type	= Junction	Peak Flow	= 12.04 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Hydrograph Volume	= 48,987 cuft
Inflow Hydrographs	= 1, 2, 3	Total Contrib. Area	= 1.52 ac



EX-1-DISTURBED WATERSHED ALLOWABLE PEAK DISCHARGE

Hydrograph Report

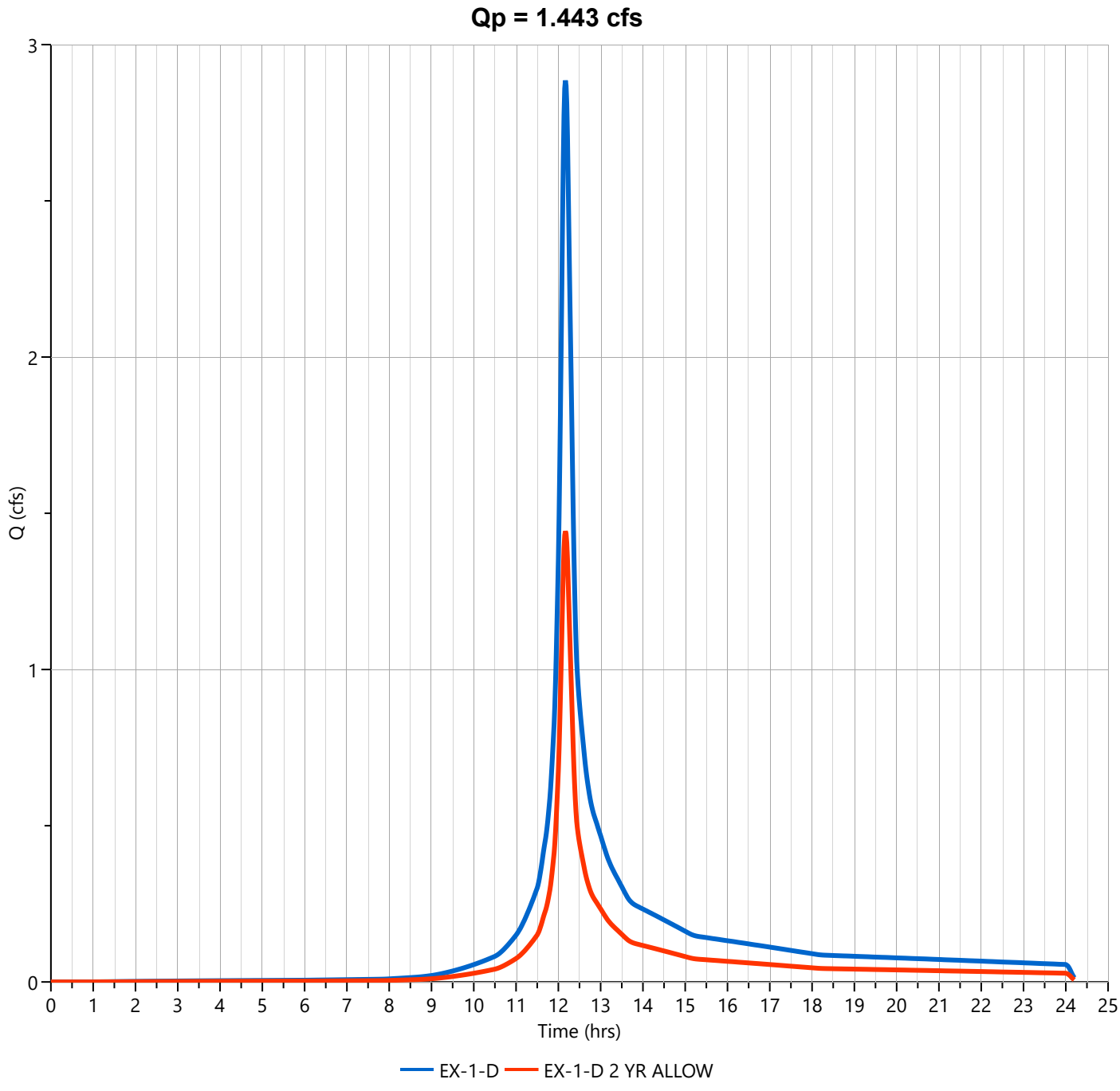
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-D 2 YR ALLOW

Hyd. No. 6

Hydrograph Type	= Diversion	Peak Flow	= 1.443 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Hydrograph Volume	= 5,708 cuft
Inflow Hydrograph	= 4 - EX-1-D	Diversion Method	= Flow Ratio
Companion Hyd	= 7 - <name>	Flow Ratio	= 0.5



Hydrograph Report

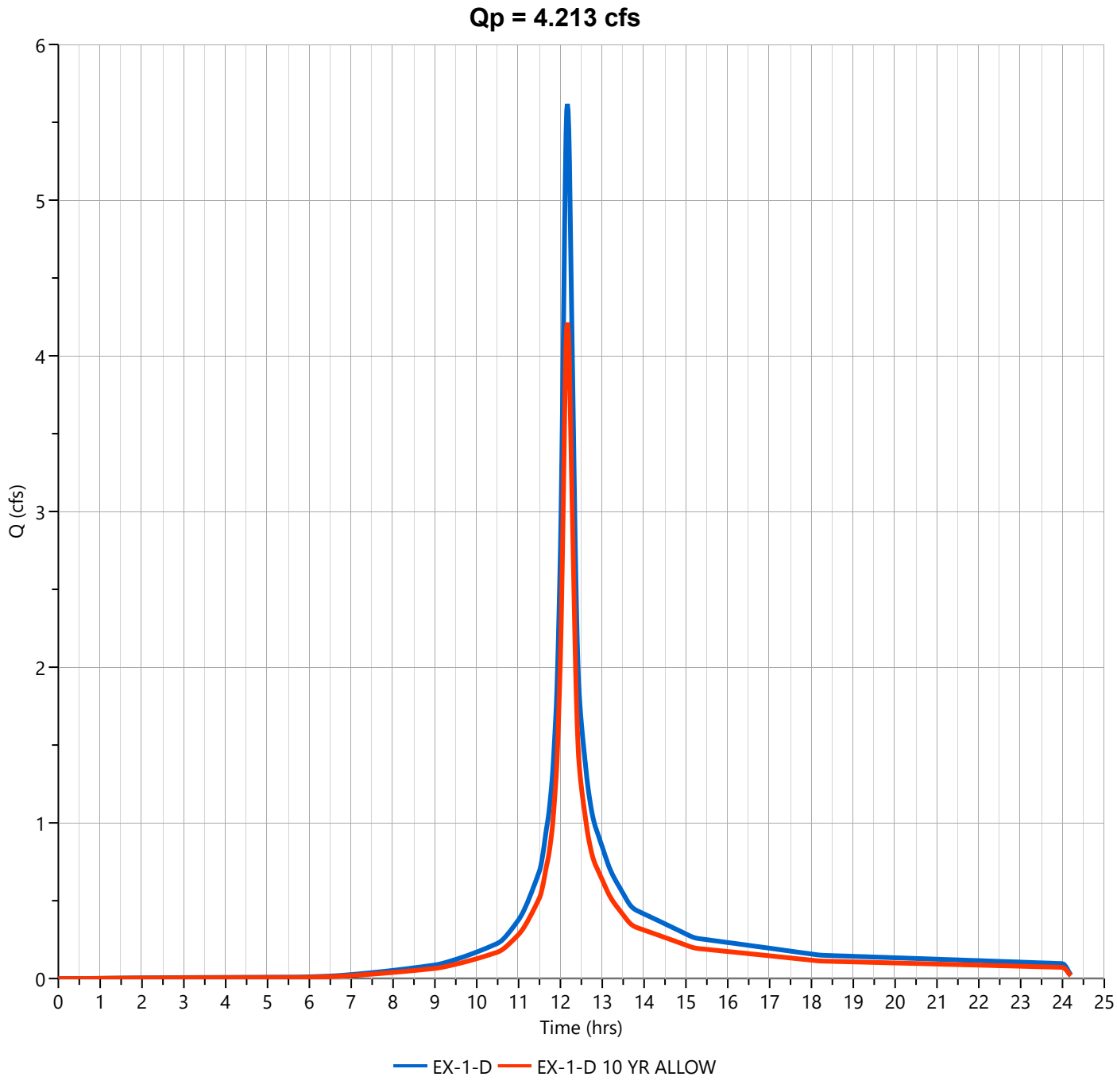
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-D 10 YR ALLOW

Hyd. No. 8

Hydrograph Type	= Diversion	Peak Flow	= 4.213 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Hydrograph Volume	= 16,673 cuft
Inflow Hydrograph	= 4 - EX-1-D	Diversion Method	= Flow Ratio
Companion Hyd	= 9 - <name>	Flow Ratio	= 0.75



Hydrograph Report

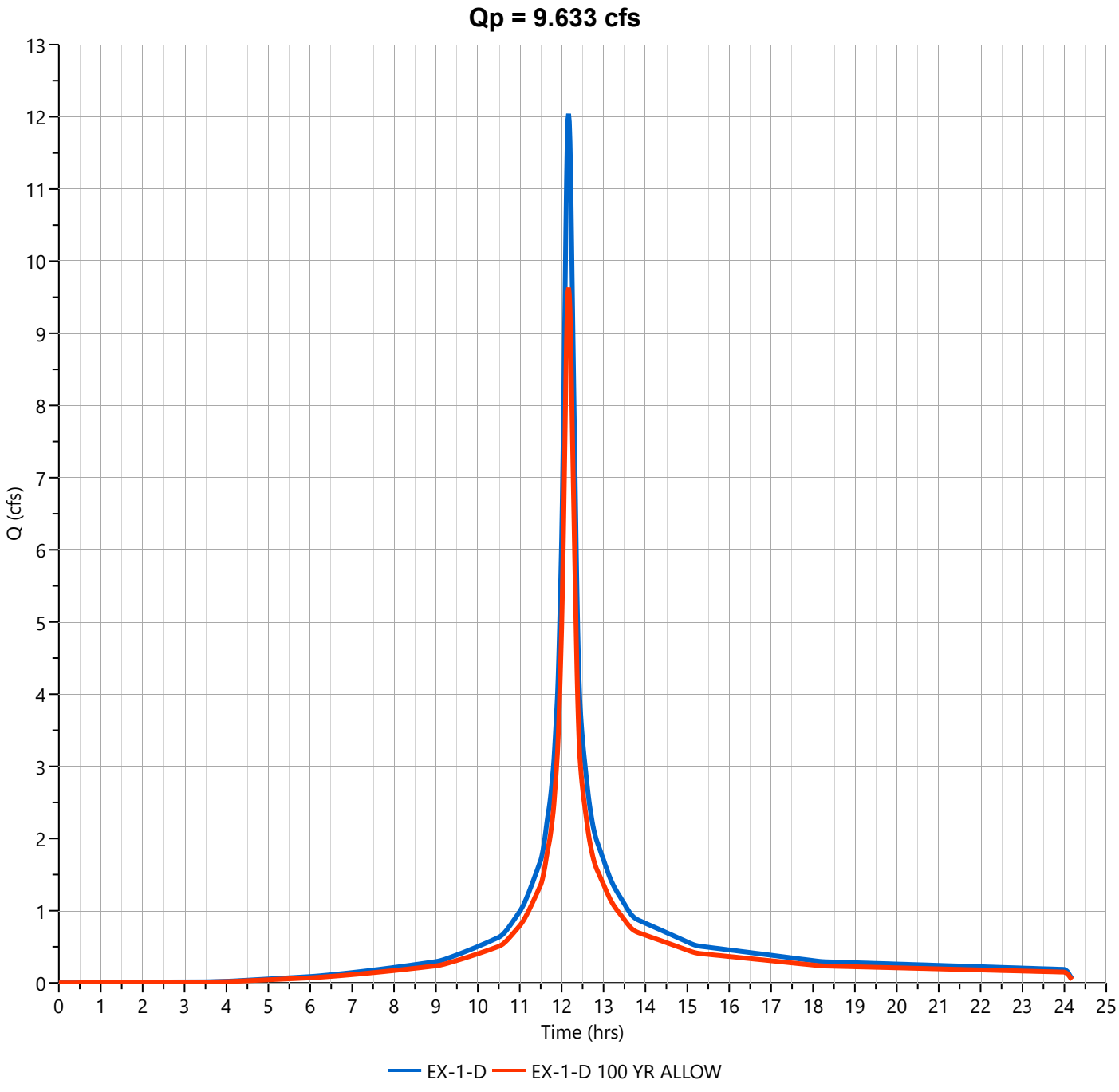
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-D 100 YR ALLOW

Hyd. No. 10

Hydrograph Type	= Diversion	Peak Flow	= 9.633 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Hydrograph Volume	= 39,190 cuft
Inflow Hydrograph	= 4 - EX-1-D	Diversion Method	= Flow Ratio
Companion Hyd	= 11 - <name>	Flow Ratio	= 0.8



EX-1-UNDISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/20/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/20/2025**

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

$$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$$

			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	4.08		
5.	Land Slope, s		ft/ft	0.051		
6.	Compute T_t		hr	0.012	+	+
					Sheet Flow Sub-Total	0.012 hours

Shallow Concentrated Flow

$$T_t = \frac{L}{3600\,V}$$

			Segment ID	2	3	4
7.	Surface Description			Pavement	Woodlands	Pavement
8.	Flow Length, L		ft	239	117	463
9.	Watercourse Slope, s		ft/ft	0.048	0.207	0.018
10.	Average Velocity, V (NEH table 15-3)		ft/s	4.48	2.29	2.75
11.	Compute T_t		hr	0.015	+ 0.014	+ 0.047
					Shallow Conc. Flow Sub-Total	0.076 hours

Channel Flow

$$r = a / P_w$$

$$V = (1.49\, r^{2/3} s^{1/2}) / n$$

$$T_t = \frac{L}{3600\,V}$$

			Segment ID	5	6	
12.	Flow Length, L		ft	15	51	
13.	Cross Sectional flow area, a		ft^2	0.61	0.61	
14.	Wetted Perimeter, P_w		ft	2.00	2.00	
15.	Hydraulic Radius, r		ft	0.31	0.31	
16.	Channel Slope, s		ft/ft	0.055	0.021	
17.	Manning's Roughness Coeff., n			0.013	0.013	
18.	Velocity, V		ft/s	12.14	7.59	
19.	Compute T_t		hr	0.000	+ 0.002	+
					Channel Flow Sub-Total	0.002 hours

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

Total Tc (hours) =	**0.090 hours**
Total Tc (minutes) =	**5 minutes**

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/20/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/20/2025**

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

$$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$$

			Segment ID	1		2		
1.	Surface Description (NEH table 15-1)			Woods Dense Underbrush		Woods Dense Underbrush		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.40		0.40		
3.	Flow Length, L (total L < 100 ft)		ft	40		60		
4.	Two-year 24-hr rainfall, P_2		in	4.08		4.08		
5.	Land Slope, s		ft/ft	0.094		0.305		
6.	Compute T_t		hr	0.082	+	0.071	+	
						Sheet Flow Sub-Total		0.153 hours

Shallow Concentrated Flow

$$T_t = \frac{L}{3600\,V}$$

			Segment ID	3		4		
7.	Surface Description			Grassed Waterways		Pavement		
8.	Flow Length, L		ft	13		406		
9.	Watercourse Slope, s		ft/ft	0.182		0.020		
10.	Average Velocity, V (NEH table 15-3)		ft/s	6.89		2.87		
11.	Compute T_t		hr	0.001	+	0.039	+	
						Shallow Conc. Flow Sub-Total		0.040 hours

Channel Flow

$$r = a / P_w$$

$$V = (1.49\, r^{2/3} s^{1/2}) / n$$

$$T_t = \frac{L}{3600\,V}$$

			Segment ID	5		6		
12.	Flow Length, L		ft	15		51		
13.	Cross Sectional flow area, a		ft^2	0.61		0.61		
14.	Wetted Perimeter, P_w		ft	2.00		2.00		
15.	Hydraulic Radius, r		ft	0.31		0.31		
16.	Channel Slope, s		ft/ft	0.055		0.021		
17.	Manning's Roughness Coeff., n			0.013		0.013		
18.	Velocity, V		ft/s	12.14		7.59		
19.	Compute T_t		hr	0.000	+	0.002	+	
						Channel Flow Sub-Total		0.002 hours

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

Total Tc (hours) =	**0.195 hours**
Total Tc (minutes) =	**12 minutes**

Hydrograph Report

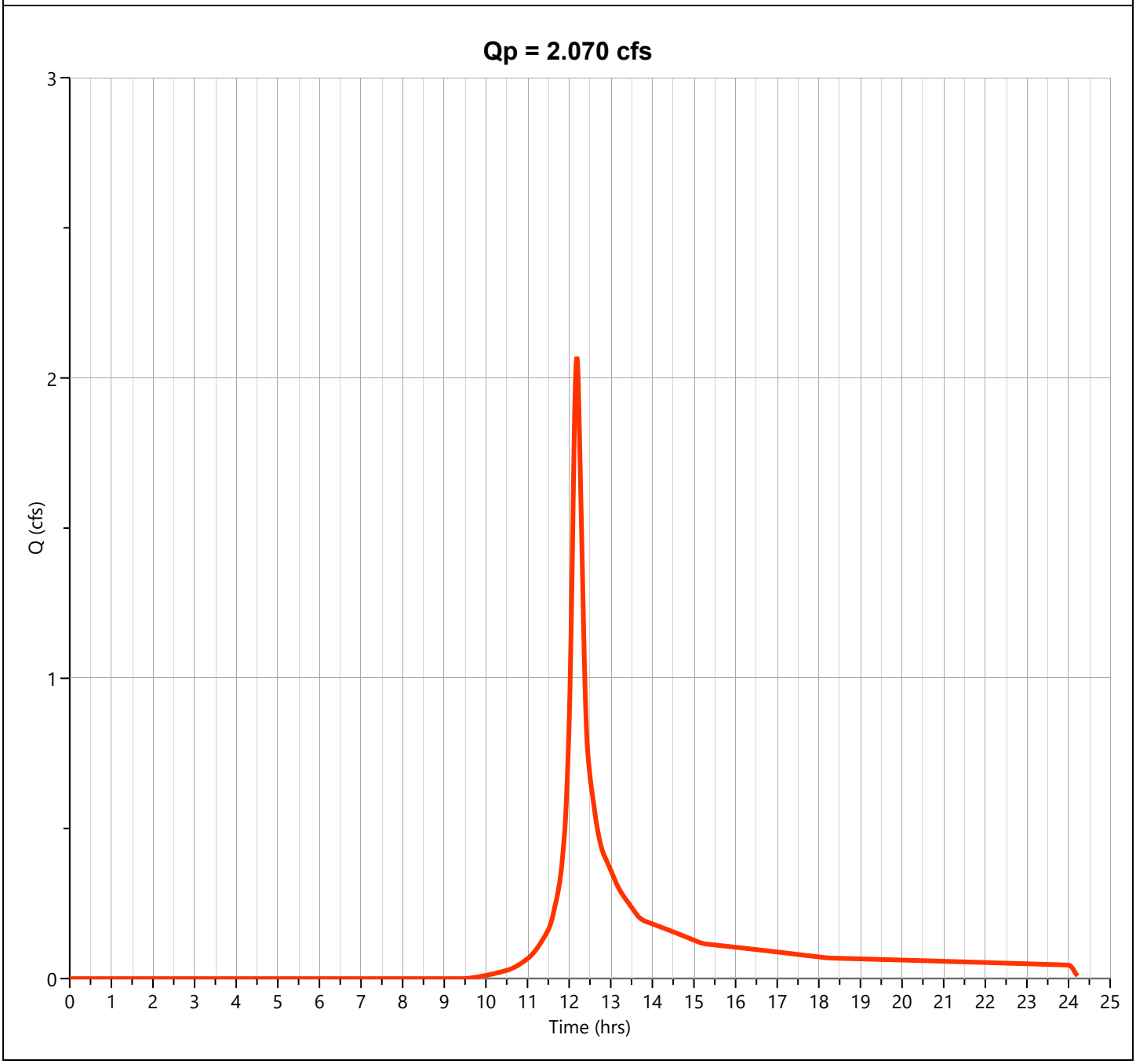
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-U Open Space C

Hyd. No. 13

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.070 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 8,044 cuft
Drainage Area	= 1.36 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 12.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

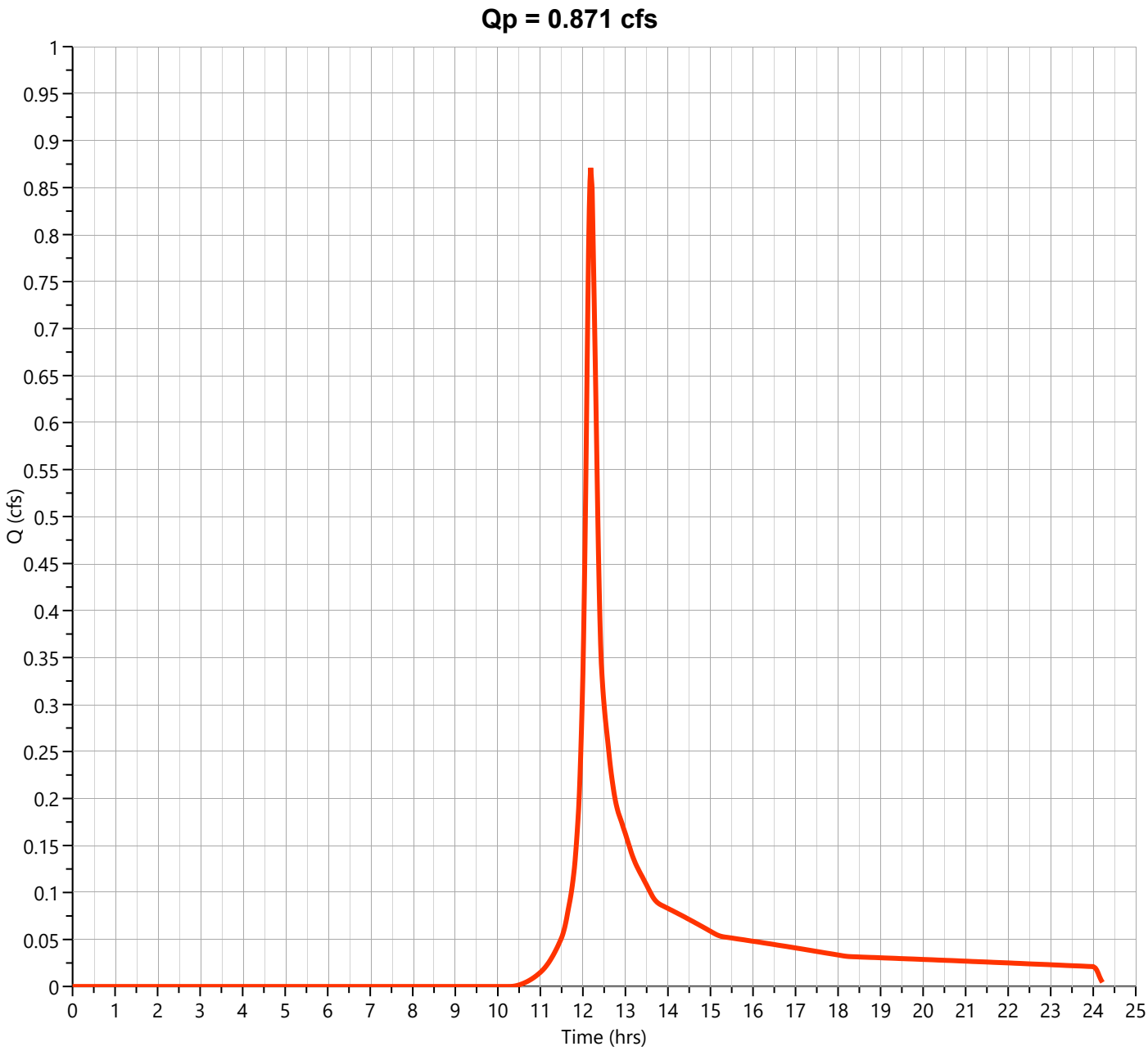
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-U Woods C

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.871 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 3,460 cuft
Drainage Area	= 0.7 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 12.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

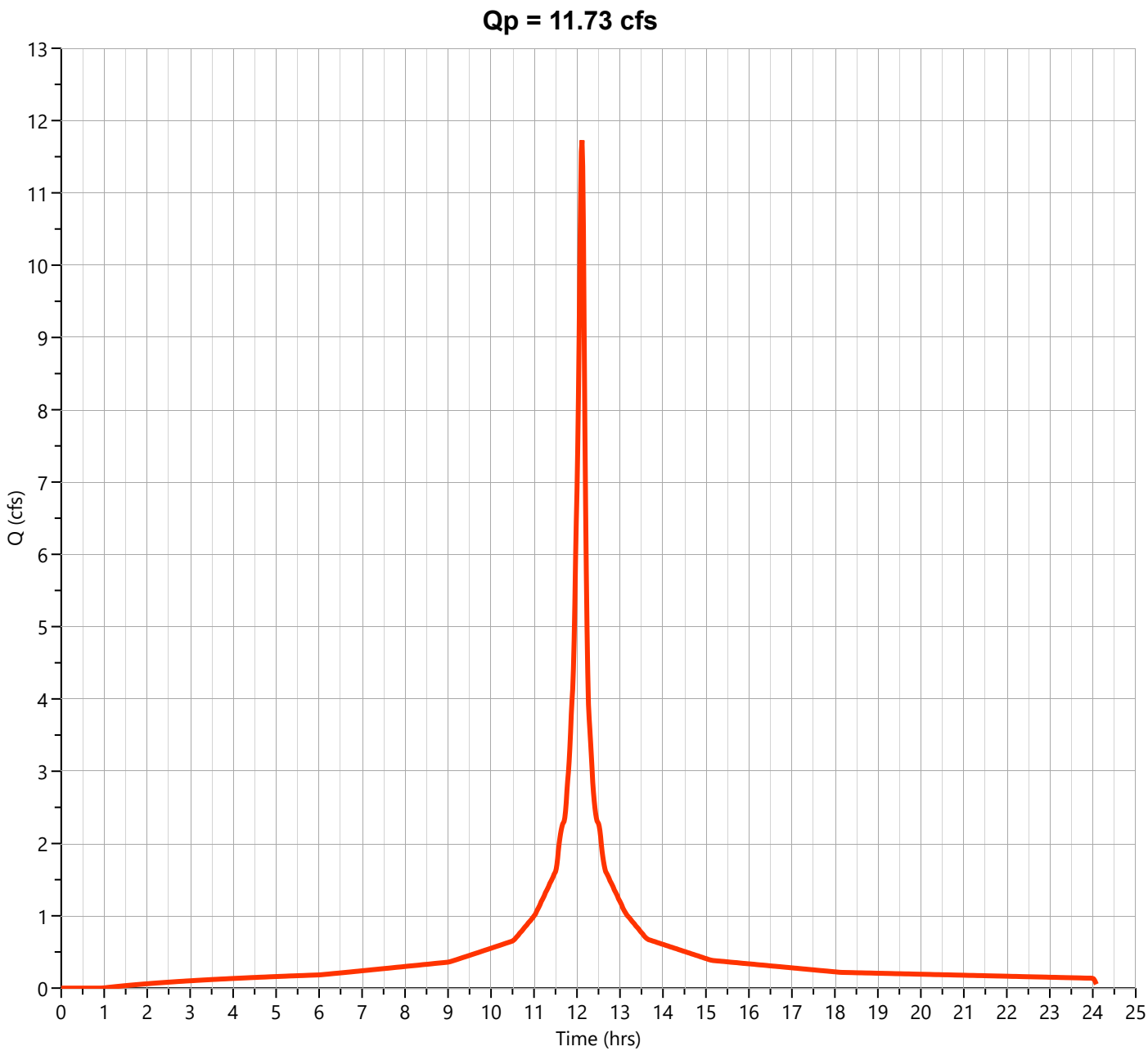
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-U Impervious

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 11.73 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 42,316 cuft
Drainage Area	= 2.94 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

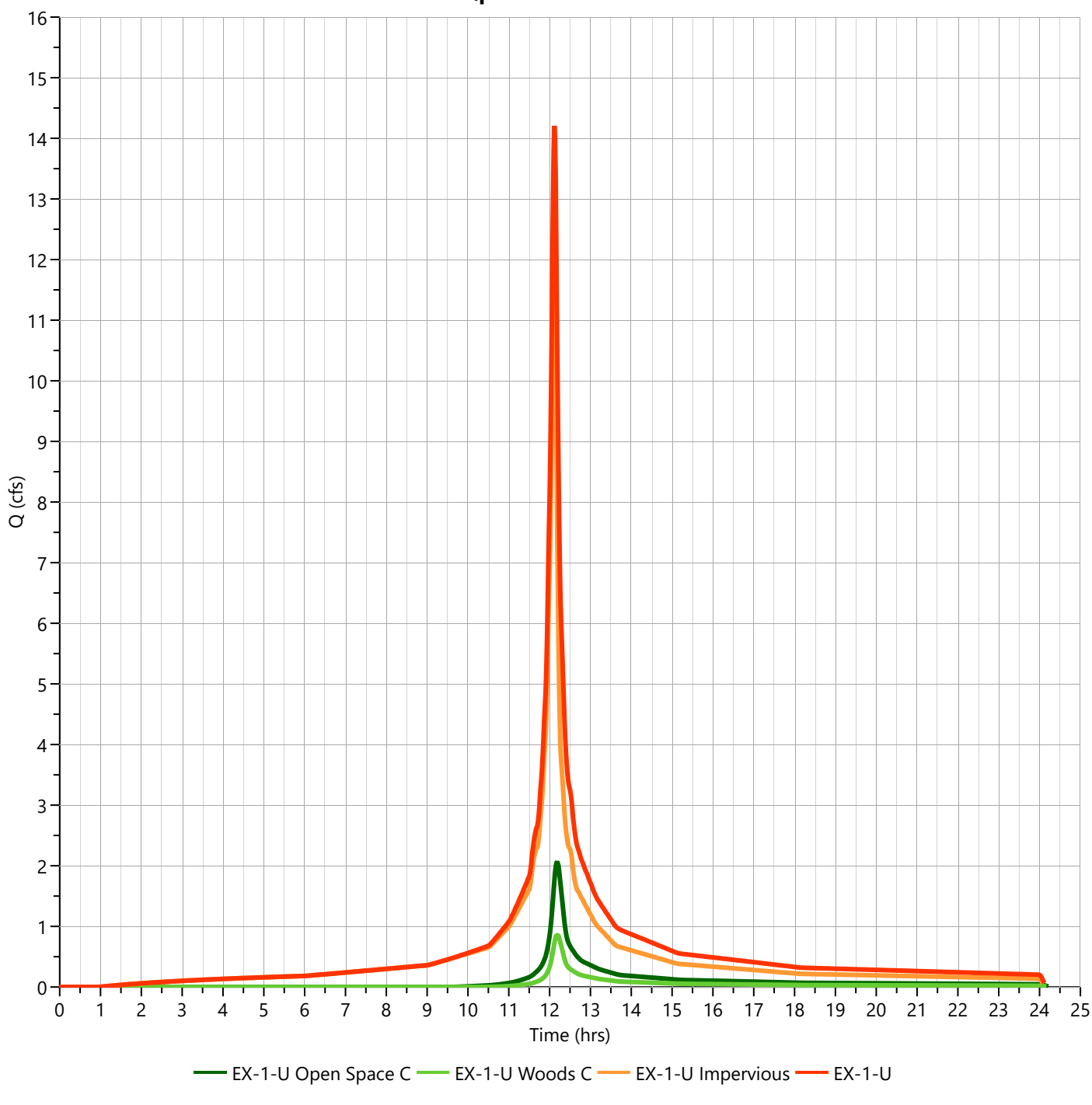
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-U

Hyd. No. 16

Hydrograph Type	= Junction	Peak Flow	= 14.21 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 53,820 cuft
Inflow Hydrographs	= 13, 14, 15	Total Contrib. Area	= 5.0 ac



Hydrograph Report

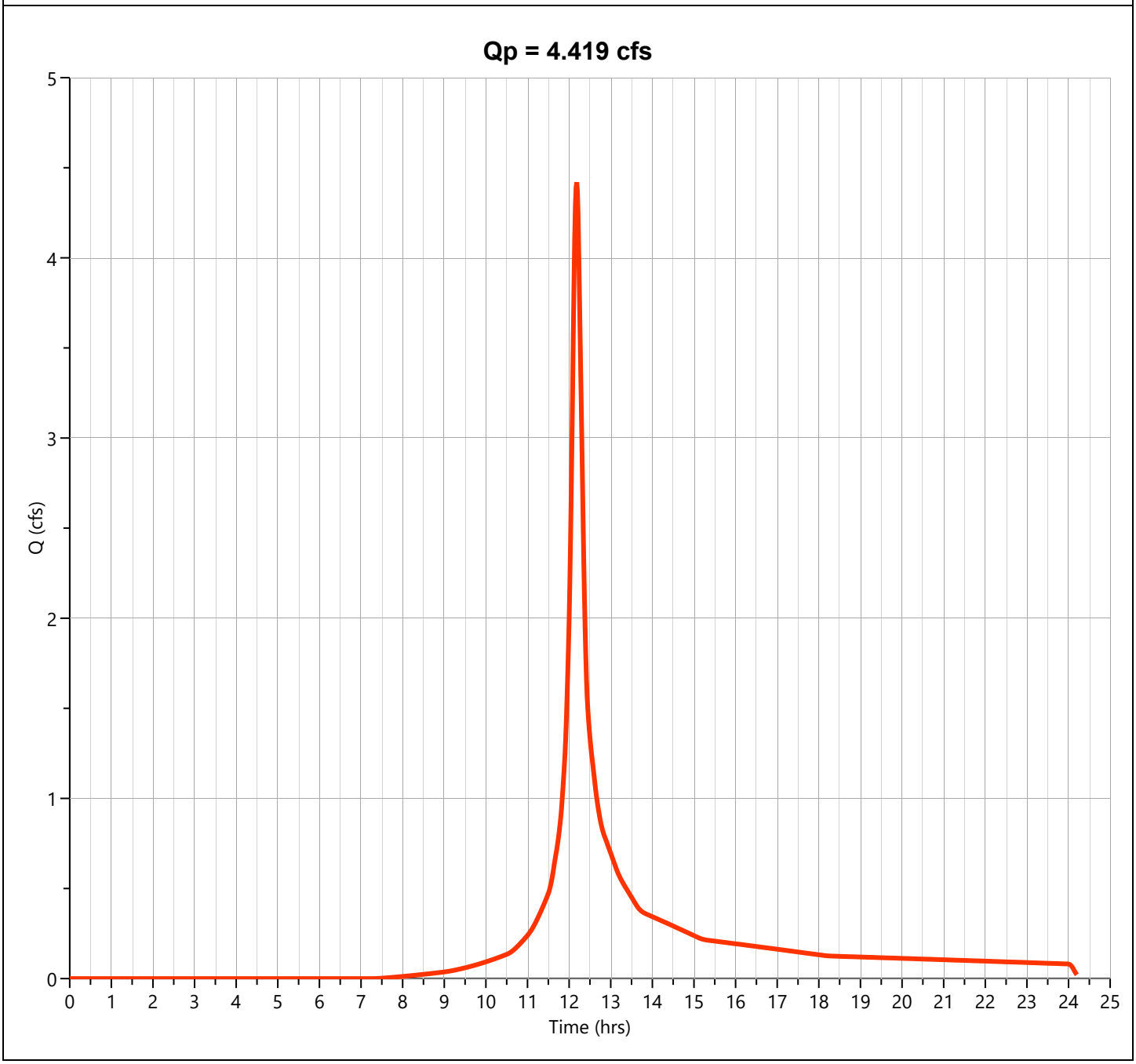
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-U Open Space C

Hyd. No. 13

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.419 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 17,001 cuft
Drainage Area	= 1.36 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 12.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

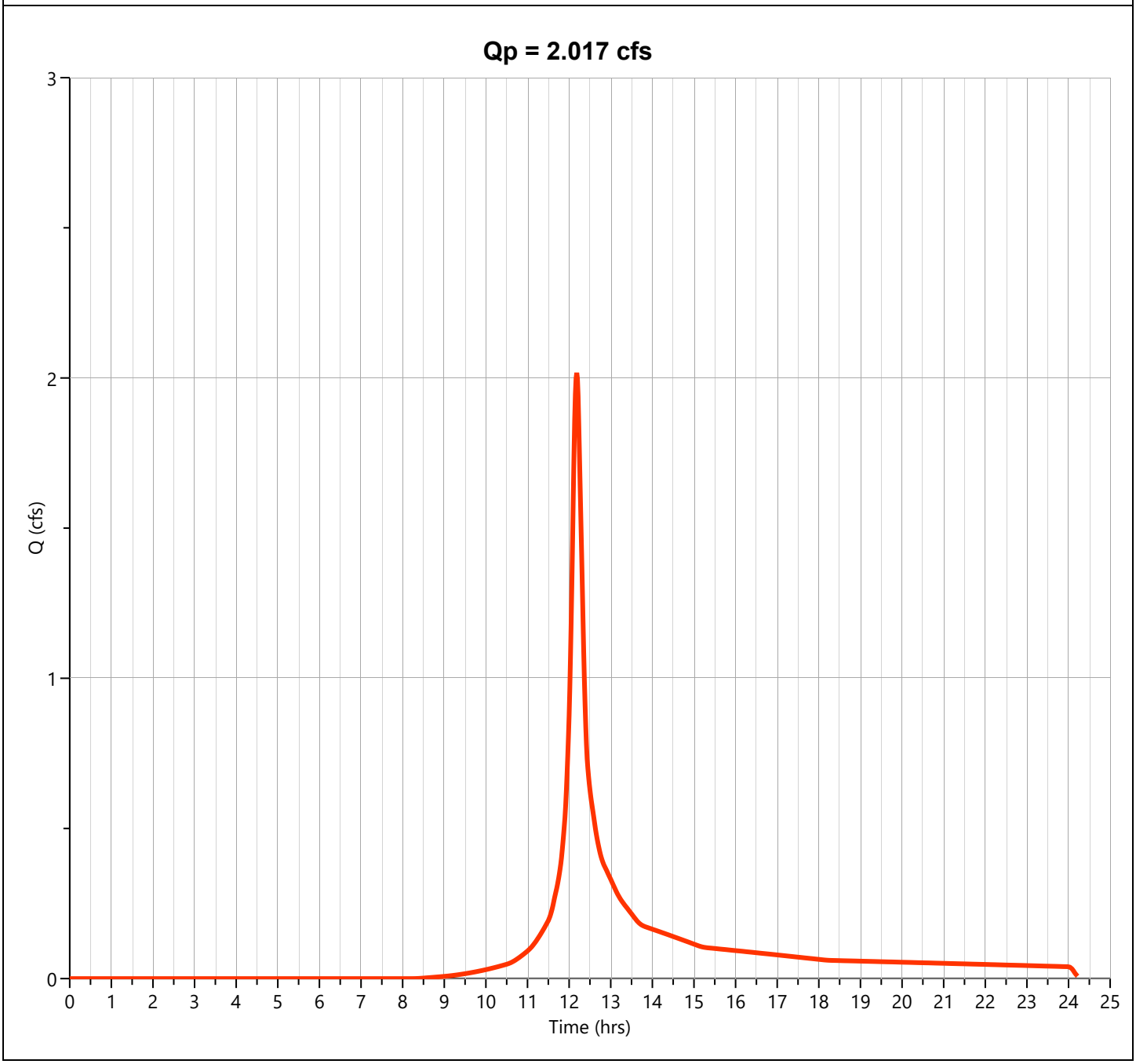
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-U Woods C

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.017 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 7,758 cuft
Drainage Area	= 0.7 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 12.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

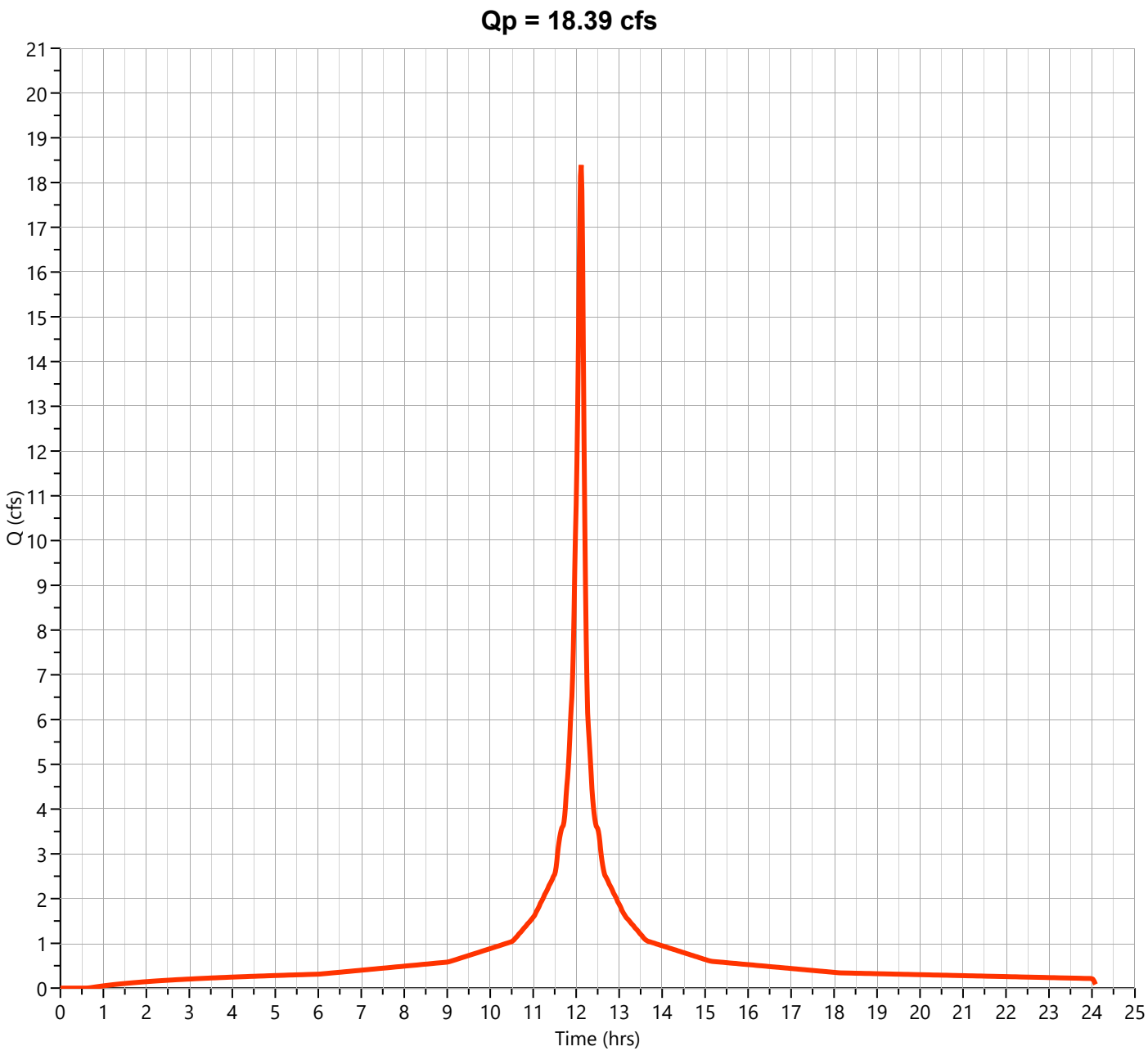
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-U Impervious

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 18.39 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 67,481 cuft
Drainage Area	= 2.94 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

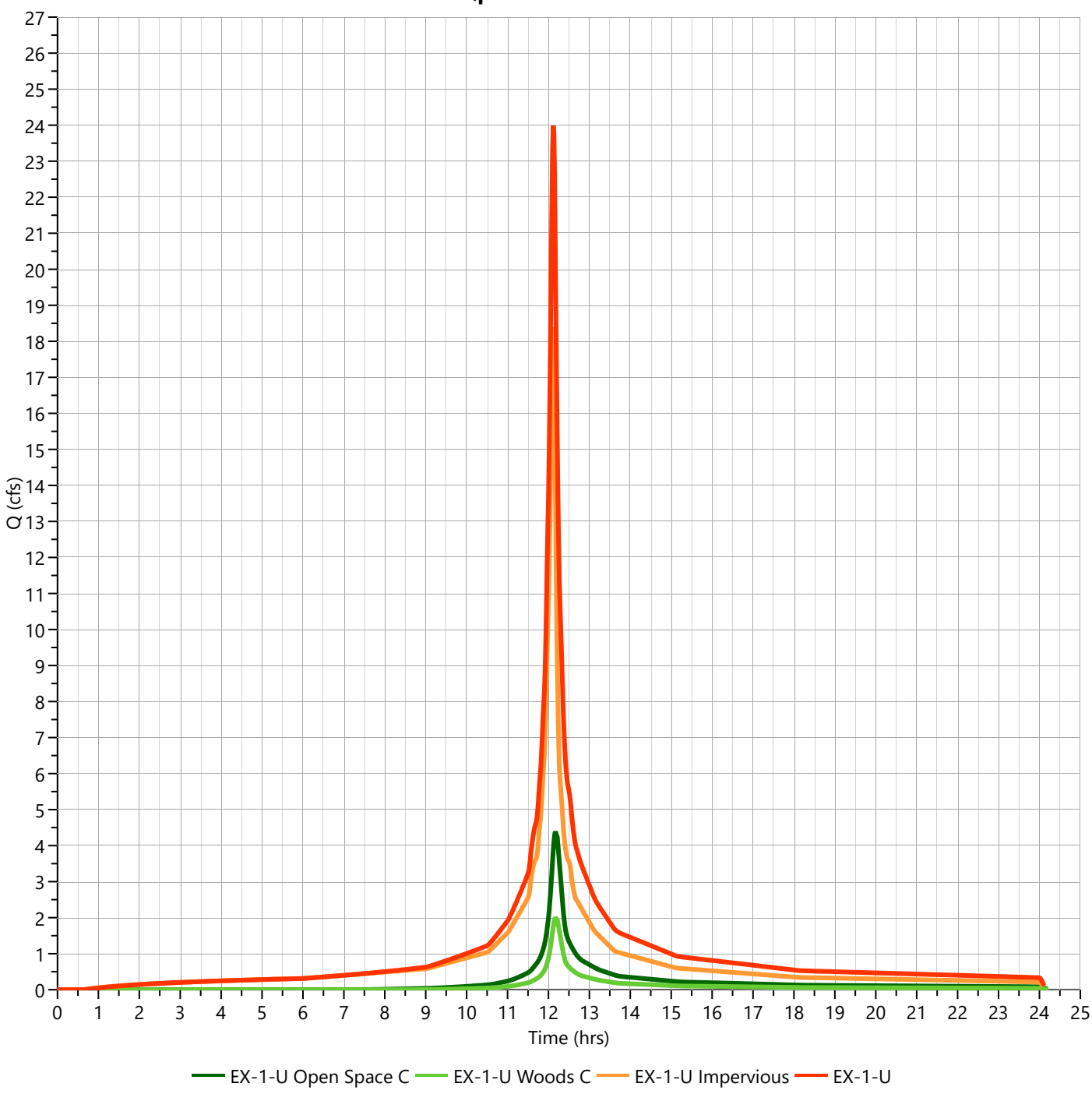
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-U

Hyd. No. 16

Hydrograph Type	= Junction	Peak Flow	= 23.98 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 92,240 cuft
Inflow Hydrographs	= 13, 14, 15	Total Contrib. Area	= 5.0 ac



Hydrograph Report

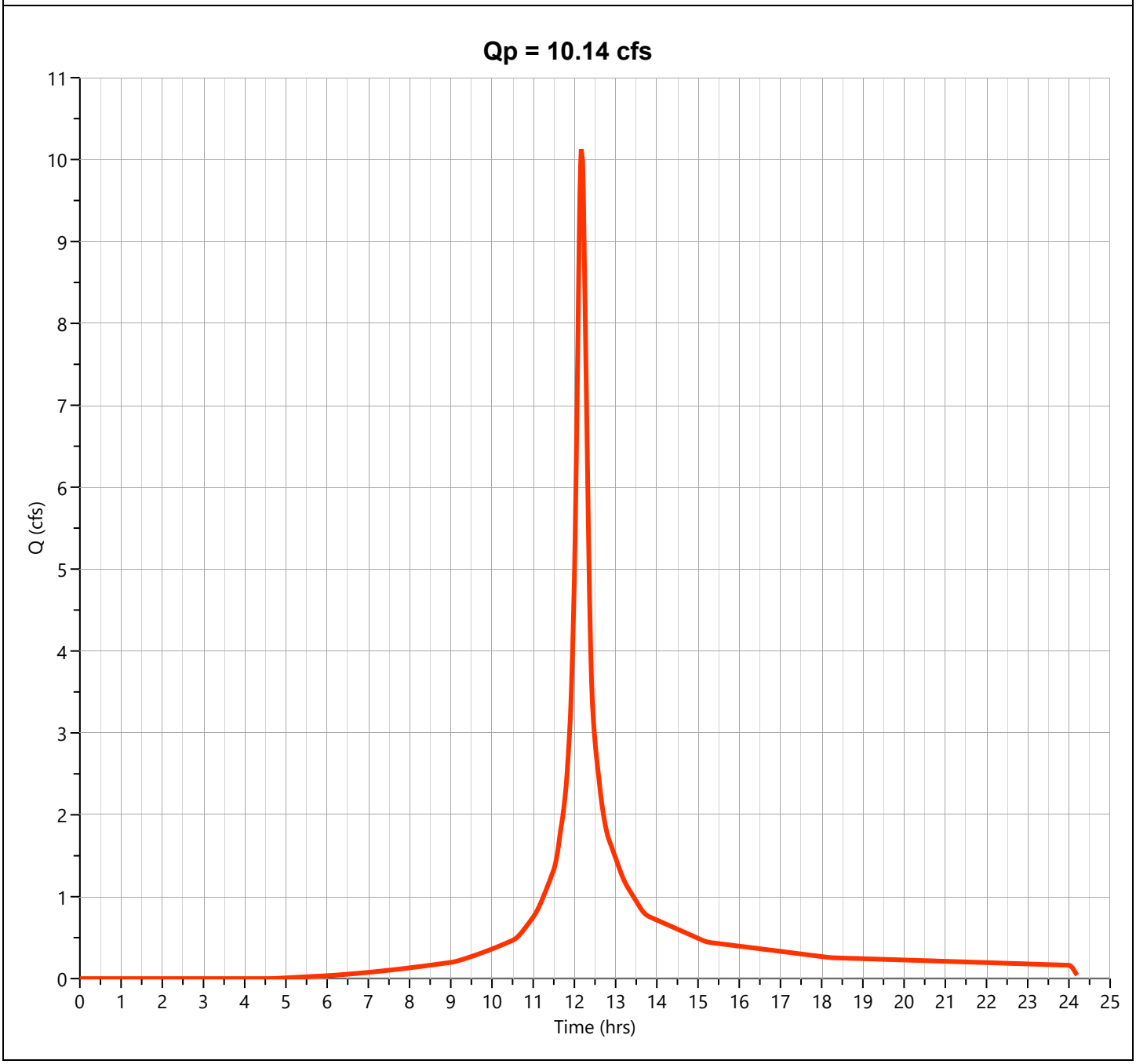
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-U Open Space C

Hyd. No. 13

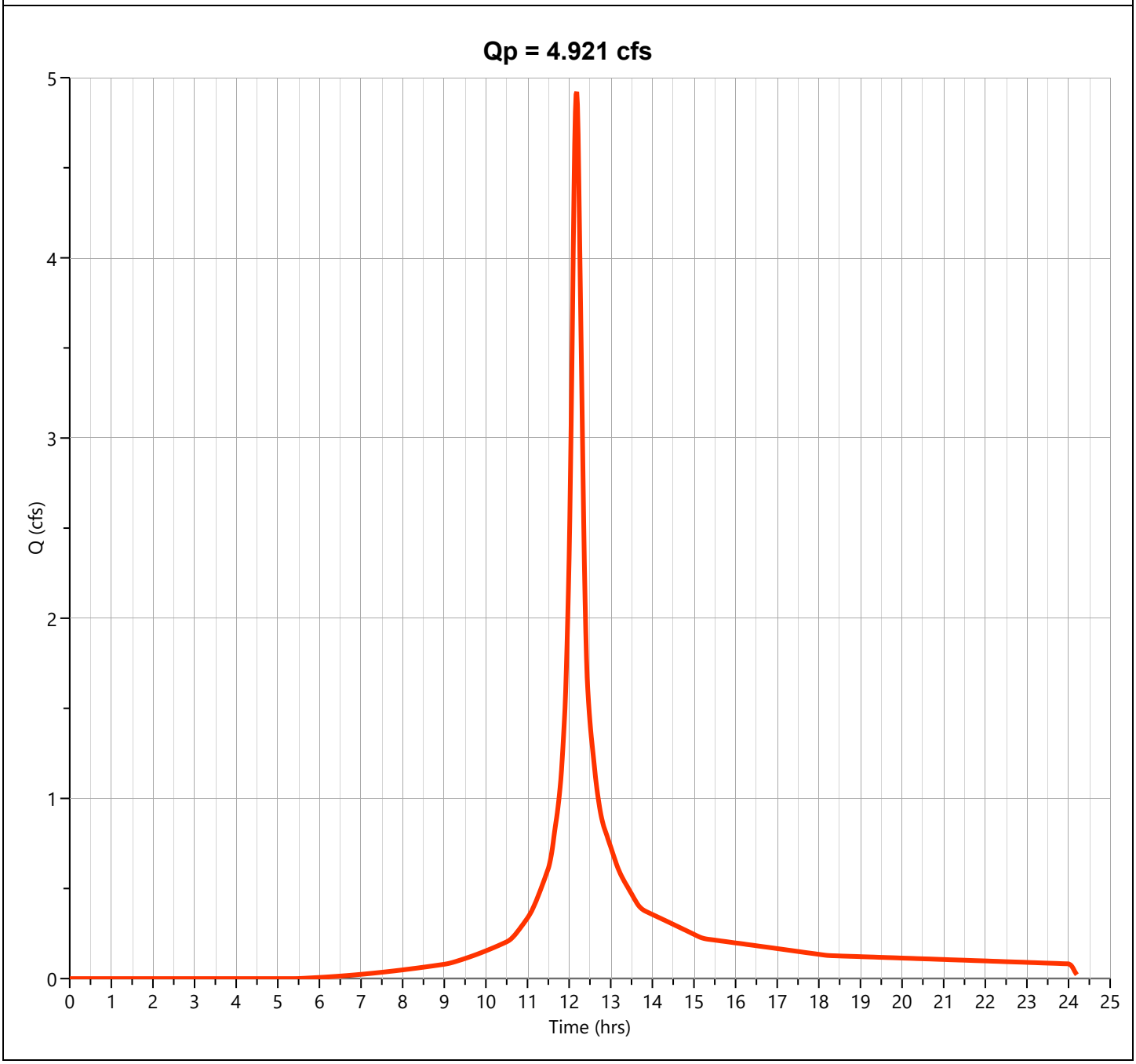
Hydrograph Type	= NRCS Runoff	Peak Flow	= 10.14 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 40,046 cuft
Drainage Area	= 1.36 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 12.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



EX-1-U Woods C

Hyd. No. 14

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.921 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 19,208 cuft
Drainage Area	= 0.7 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 12.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

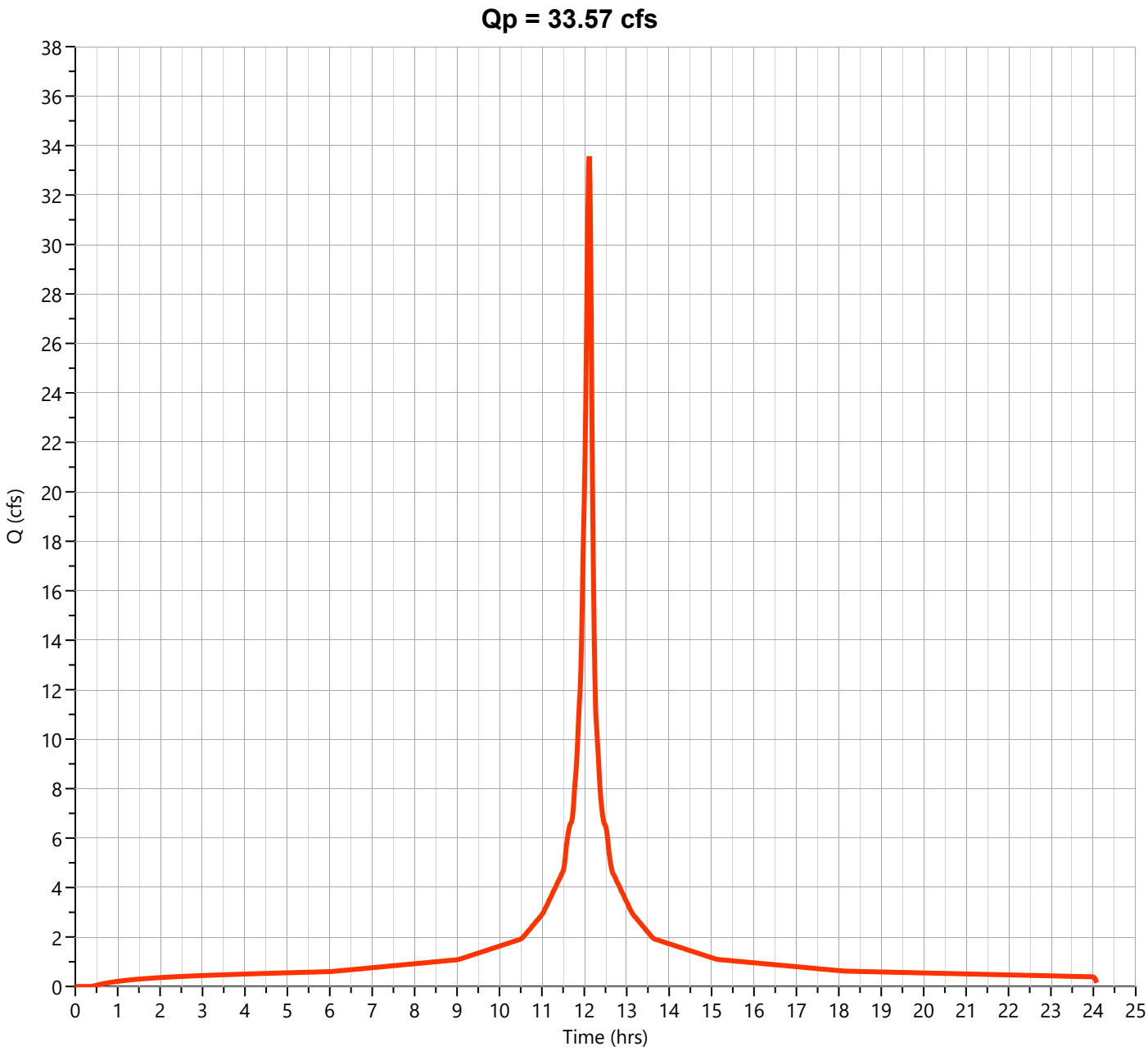
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-U Impervious

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 33.57 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 125,010 cuft
Drainage Area	= 2.94 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

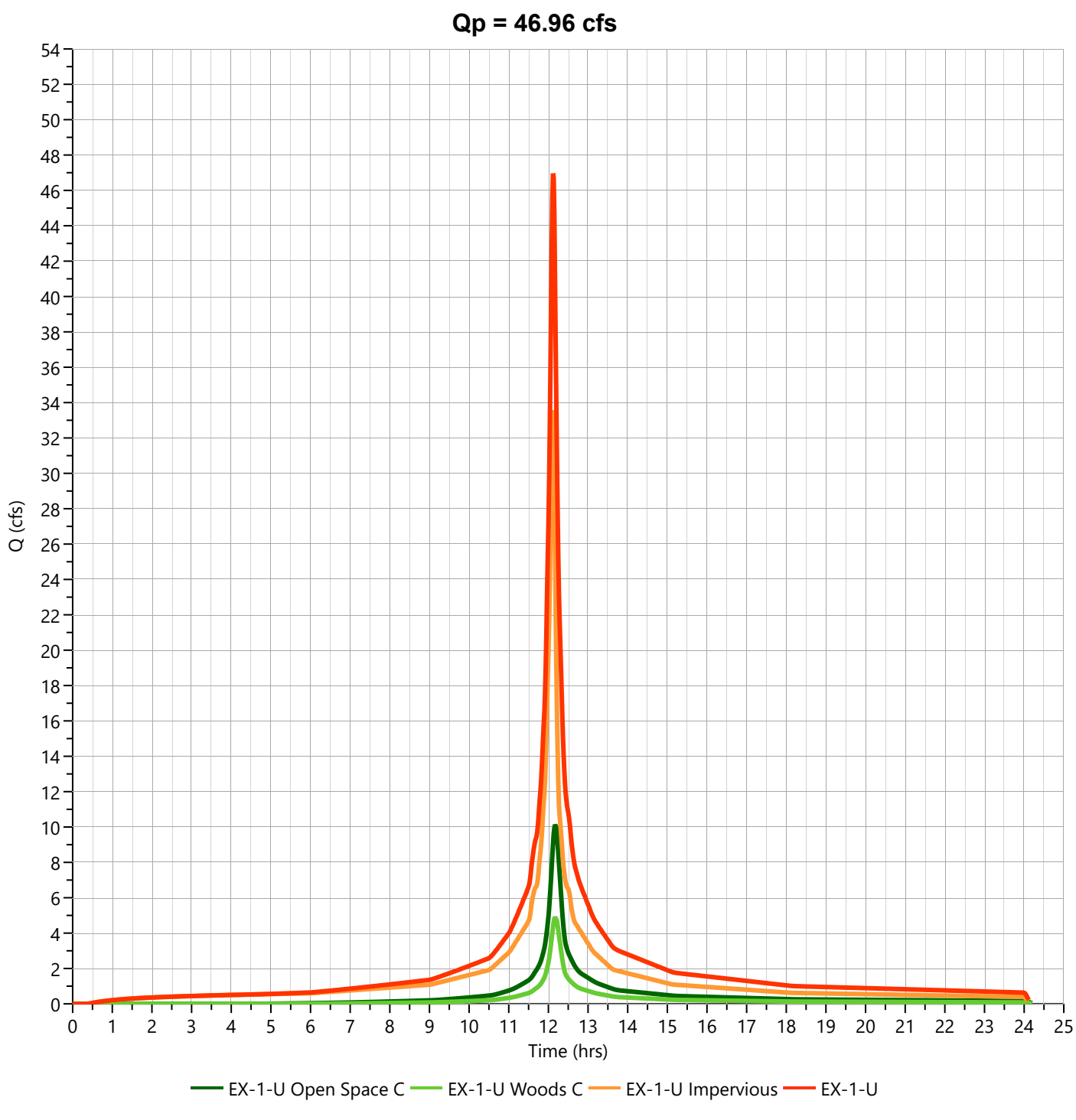
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-1-U

Hyd. No. 16

Hydrograph Type	= Junction	Peak Flow	= 46.96 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 184,264 cuft
Inflow Hydrographs	= 13, 14, 15	Total Contrib. Area	= 5.0 ac



TOTAL EXISTING FLOW TO POA-1

Hydrograph Report

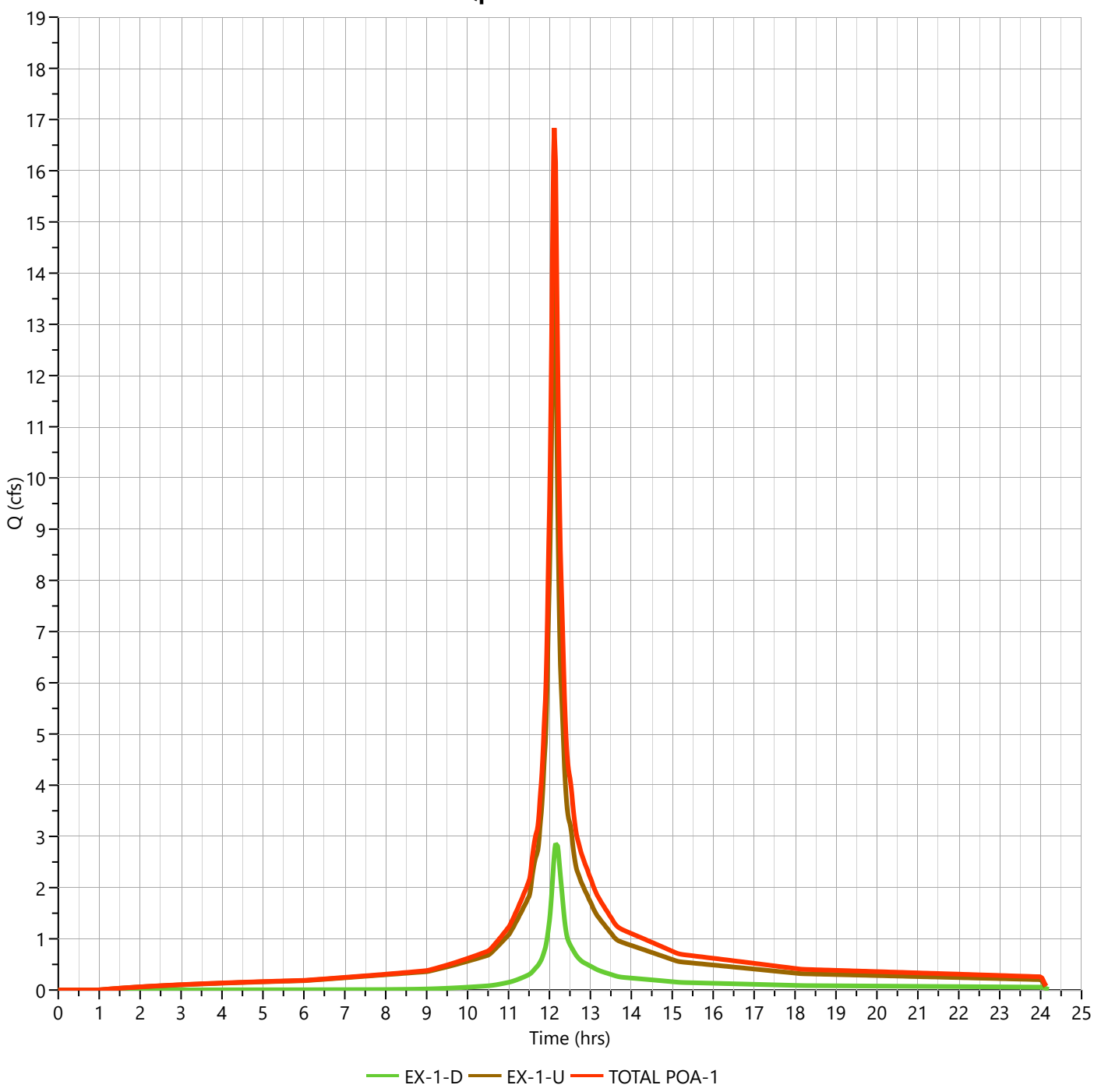
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

TOTAL POA-1

Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 16.83 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 65,237 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

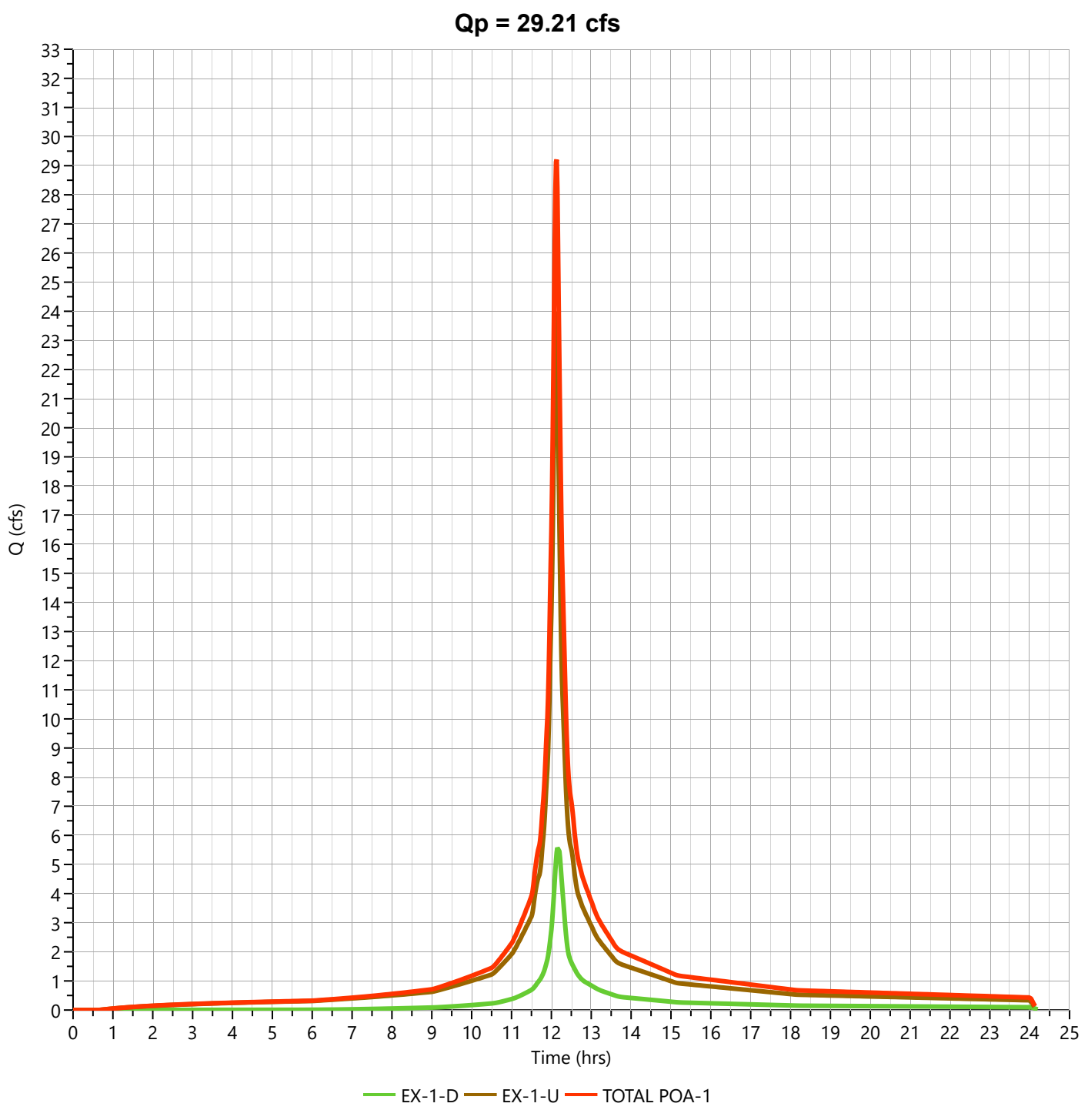
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

TOTAL POA-1

Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 29.21 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 114,471 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

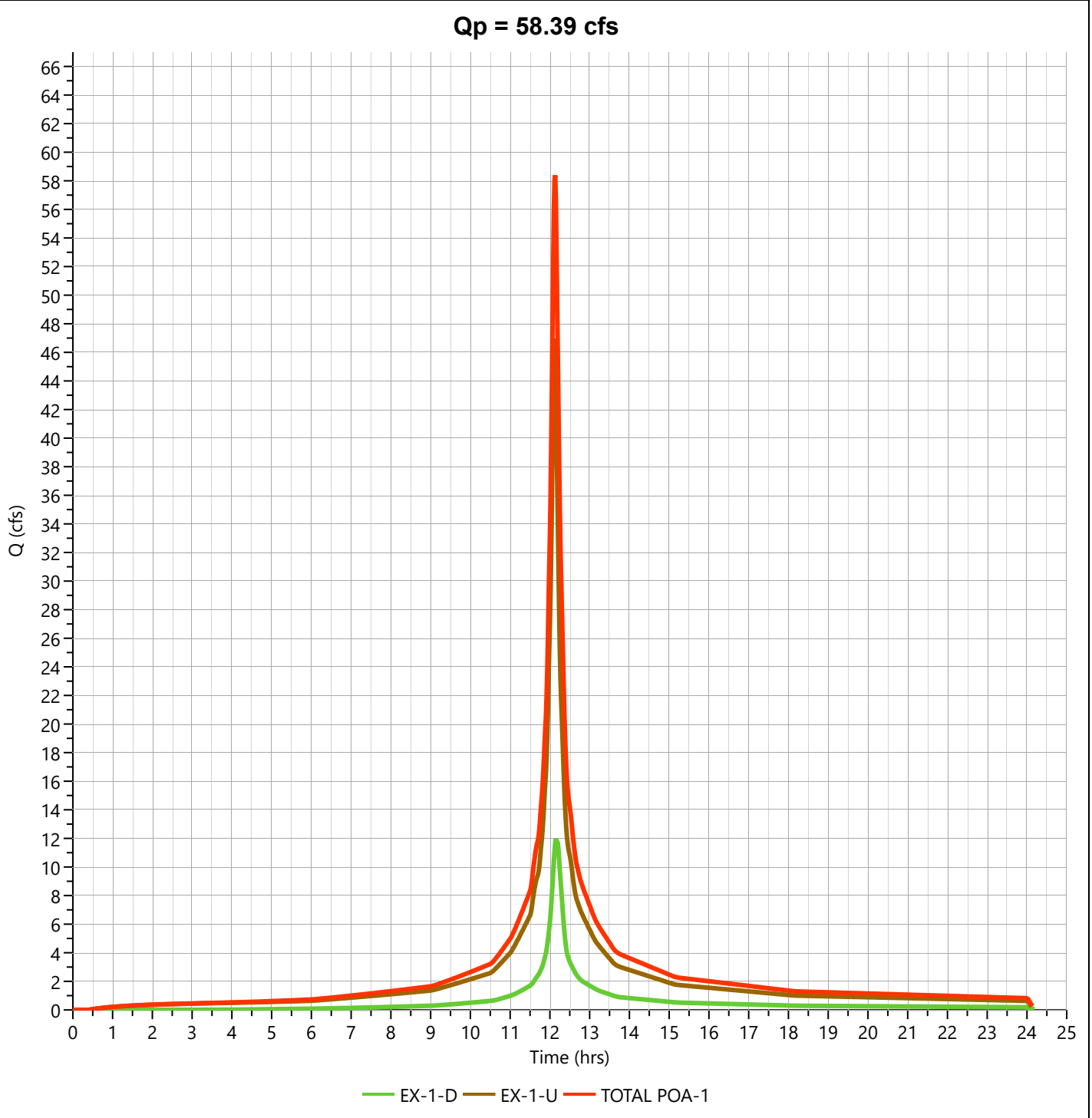
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

TOTAL POA-1

Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 58.39 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 233,251 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



TOTAL ALLOWABLE FLOW TO POA-1

Hydrograph Report

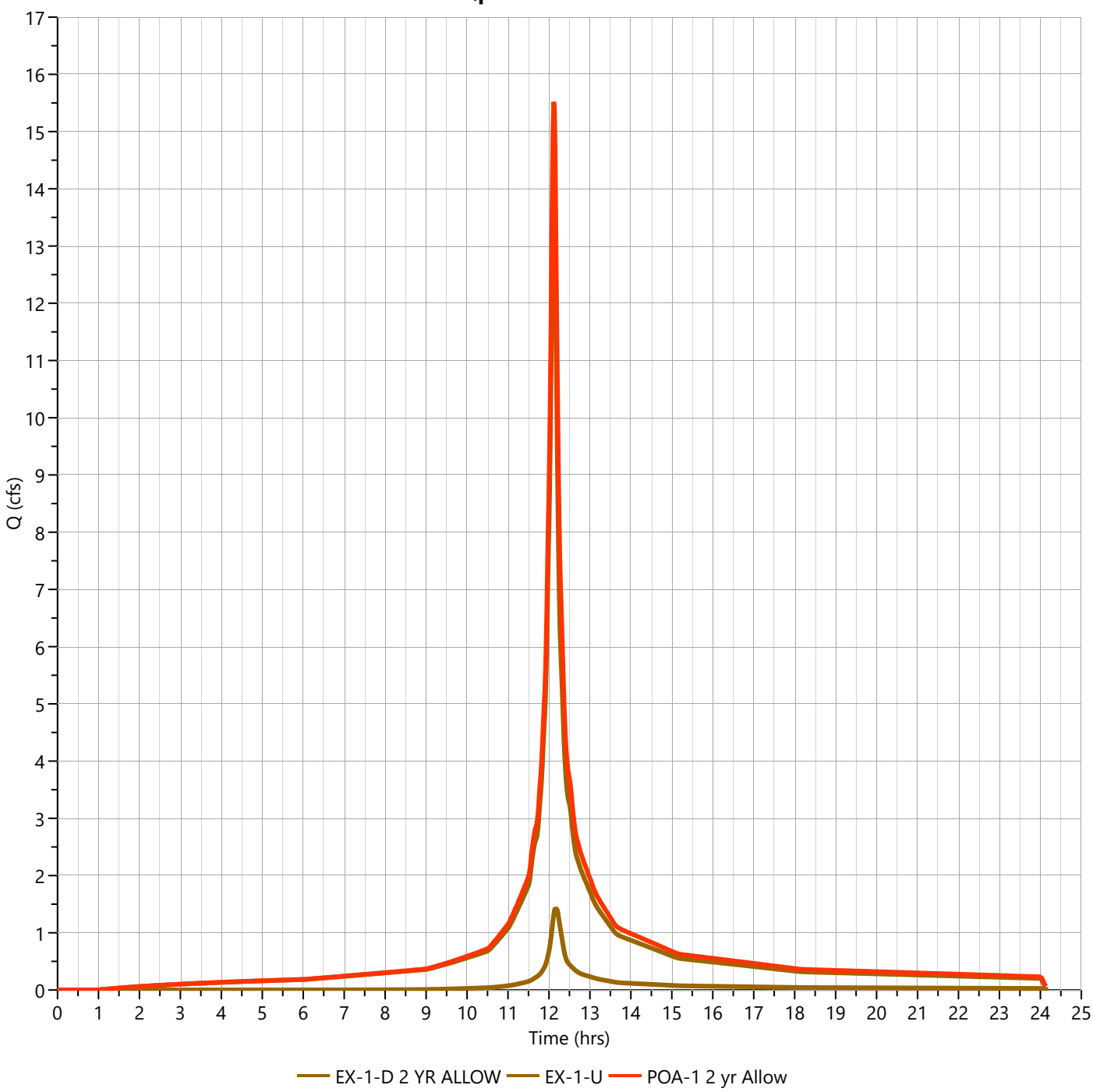
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

POA-1 2 yr Allow

Hyd. No. 19

Hydrograph Type	= Junction	Peak Flow	= 15.52 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 59,528 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

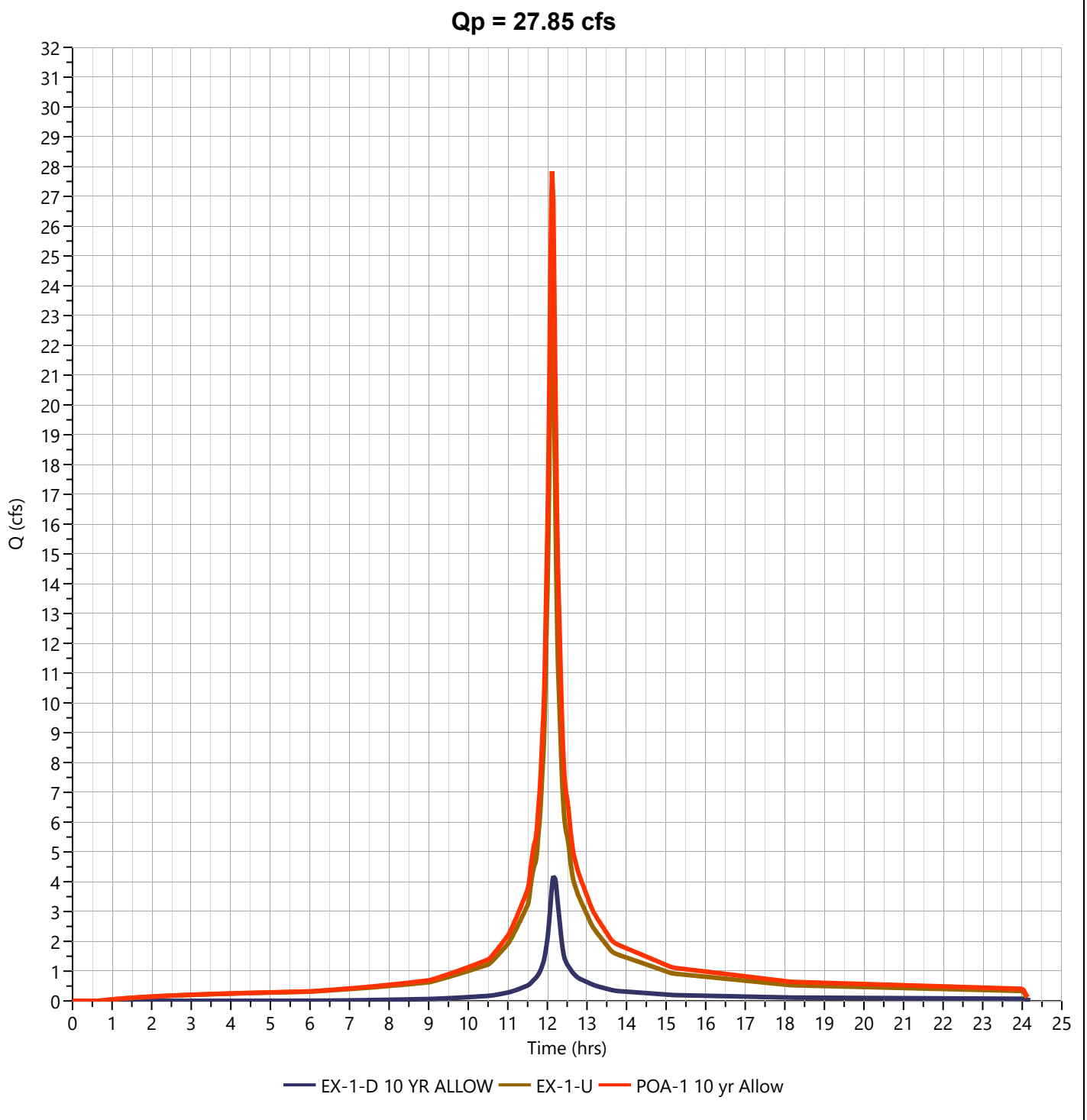
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

POA-1 10 yr Allow

Hyd. No. 20

Hydrograph Type	= Junction	Peak Flow	= 27.85 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 108,913 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

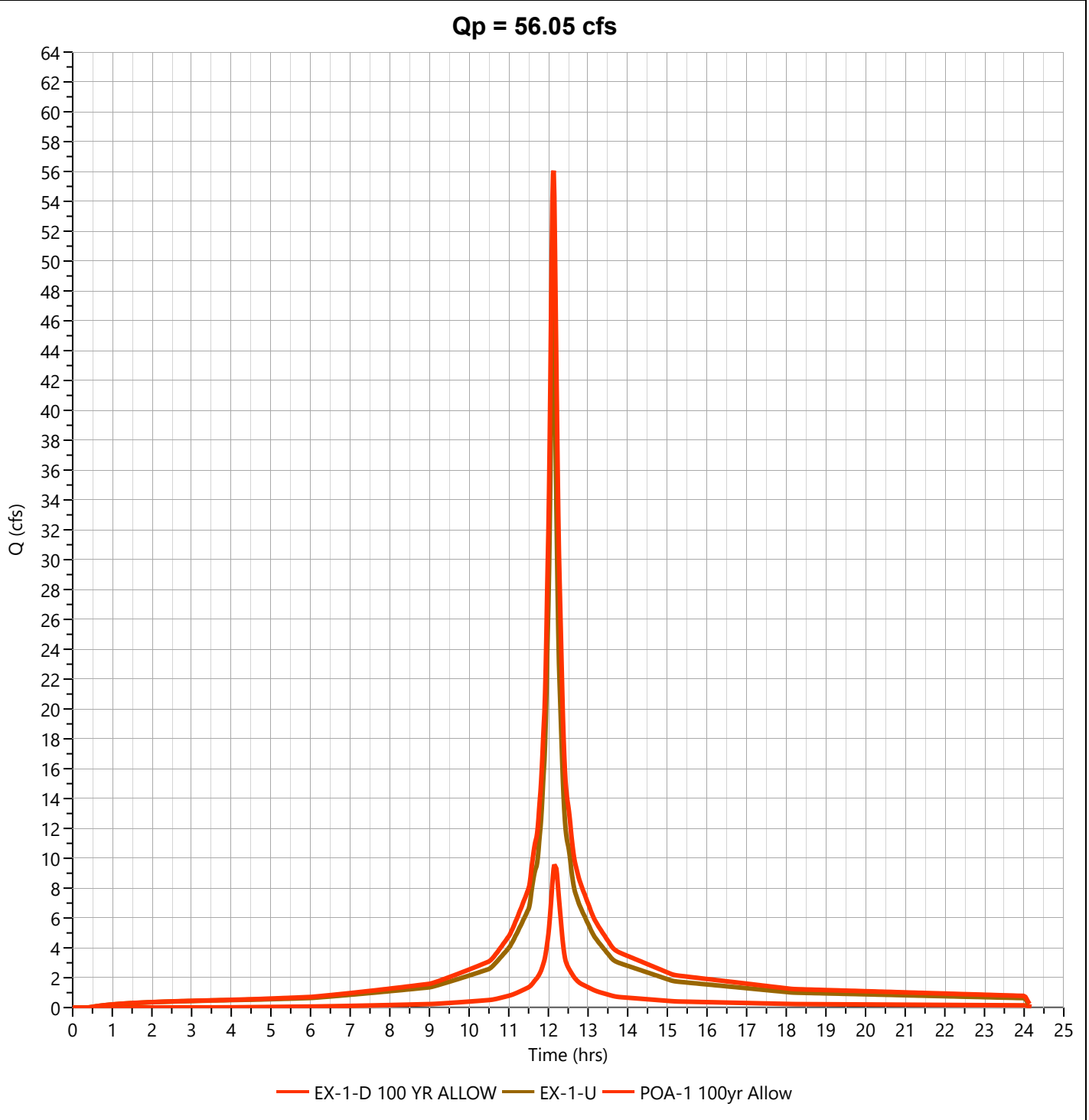
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

POA-1 100yr Allow

Hyd. No. 21

Hydrograph Type	= Junction	Peak Flow	= 56.05 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 223,454 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



EX-2-DISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/20/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/20/2025**

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

$$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$$

			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	**4.08**					
5.	Land Slope, s	ft/ft	**0.056**					
6.	Compute T_t	hr	**0.012**	+		+		
					Sheet Flow Sub-Total		**0.012 hours**	

Shallow Concentrated Flow

$$T_t = \frac{L}{3600\,V}$$

			Segment ID					
			2		**3**		**4**	
7.	Surface Description		**Grassed Waterways**		**Woodlands**		**Pavement**	
8.	Flow Length, L	ft	**23**		**140**		**155**	
9.	Watercourse Slope, s	ft/ft	**0.039**		**0.147**		**0.014**	
10.	Average Velocity, V (NEH table 15-3)	ft/s	**3.19**		**1.93**		**2.39**	
11.	Compute T_t	hr	**0.002**	+	**0.020**	+	**0.018**	
					Shallow Conc. Flow Sub-Total		**0.040 hours**	

Channel Flow

$$r = a / P_w$$

$$V = (1.49\, r^{2/3} s^{1/2}) / n$$

$$T_t = \frac{L}{3600\,V}$$

			Segment ID					
			5		**6**			
12.	Flow Length, L	ft	**191**		**125**			
13.	Cross Sectional flow area, a	ft^2	**0.61**		**0.61**			
14.	Wetted Perimeter, P_w	ft	**1.96**		**1.96**			
15.	Hydraulic Radius, r	ft	**0.31**		**0.31**			
16.	Channel Slope, s	ft/ft	**0.014**		**0.009**			
17.	Manning's Roughness Coeff., n		**0.013**		**0.013**			
18.	Velocity, V	ft/s	**6.14**		**5.13**			
19.	Compute T_t	hr	**0.009**	+	**0.007**	+		
					Channel Flow Sub-Total		**0.015 hours**	

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

Total Tc (hours)	=	**0.067 hours**
Total Tc (minutes)	=	**4 minutes**

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/20/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/20/2025**

Circle One: (**Present**) Developed — **Future Existing Watershed EX-2-D 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.	Surface Description (NEH table 15-1)		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	4.08					
5.	Land Slope, s	ft/ft	0.066					
6.	Compute T_t $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.197	+		+		
					Sheet Flow Sub-Total		0.197 hours	

Shallow Concentrated Flow

			Segment ID					
7.	Surface Description		2					
			Woodlands					
8.	Flow Length, L	ft	100					
9.	Watercourse Slope, s	ft/ft	0.081					
10.	Average Velocity, V (NEH table 15-3)	ft/s	1.43					
11.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr	0.019	+		+		
					Shallow Conc. Flow Sub-Total		0.019 hours	

Channel Flow

			Segment ID		3		4	
12.	Flow Length, L		ft		191		125	
13.	Cross Sectional flow area, a		ft^2		0.61		0.61	
14.	Wetted Perimeter, P_w		ft		1.96		1.96	
15.	Hydraulic Radius, r	$r = a / P_w$	ft		0.31		0.31	
16.	Channel Slope, s		ft/ft		0.013		0.009	
17.	Manning's Roughness Coeff., n				0.013		0.013	
18.	Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s		6.14		5.13	
19.	Compute T_t $T_t = \frac{L}{3600\,V}$		hr		0.009	+	0.007	+
						Channel Flow Sub-Total		0.015 hours

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

Total Tc (hours)	=	**0.231 hours**
Total Tc (minutes)	=	**14 minutes**

Hydrograph Report

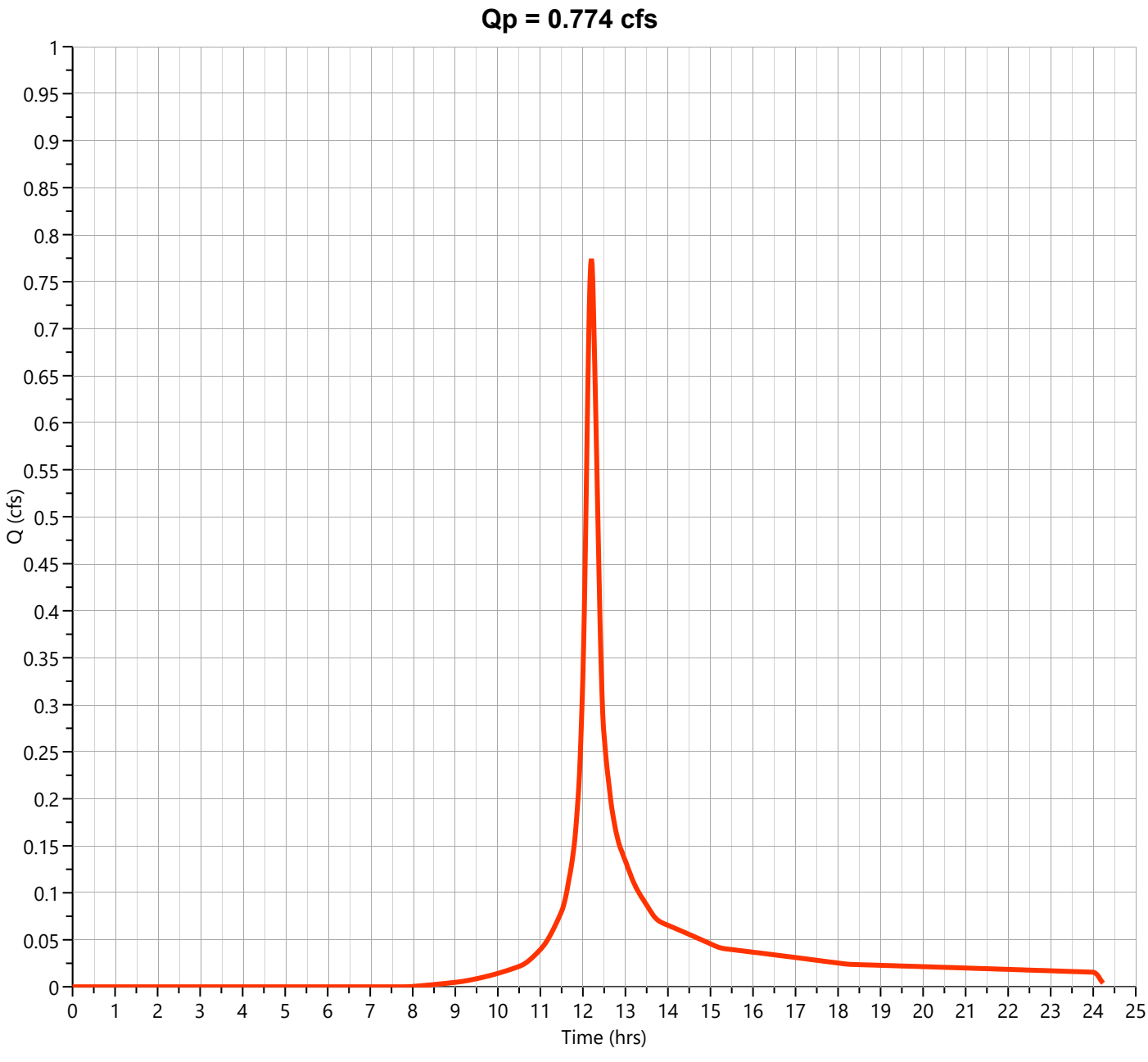
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-D Open Space D

Hyd. No. 25

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.774 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 3,137 cuft
Drainage Area	= 0.41 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

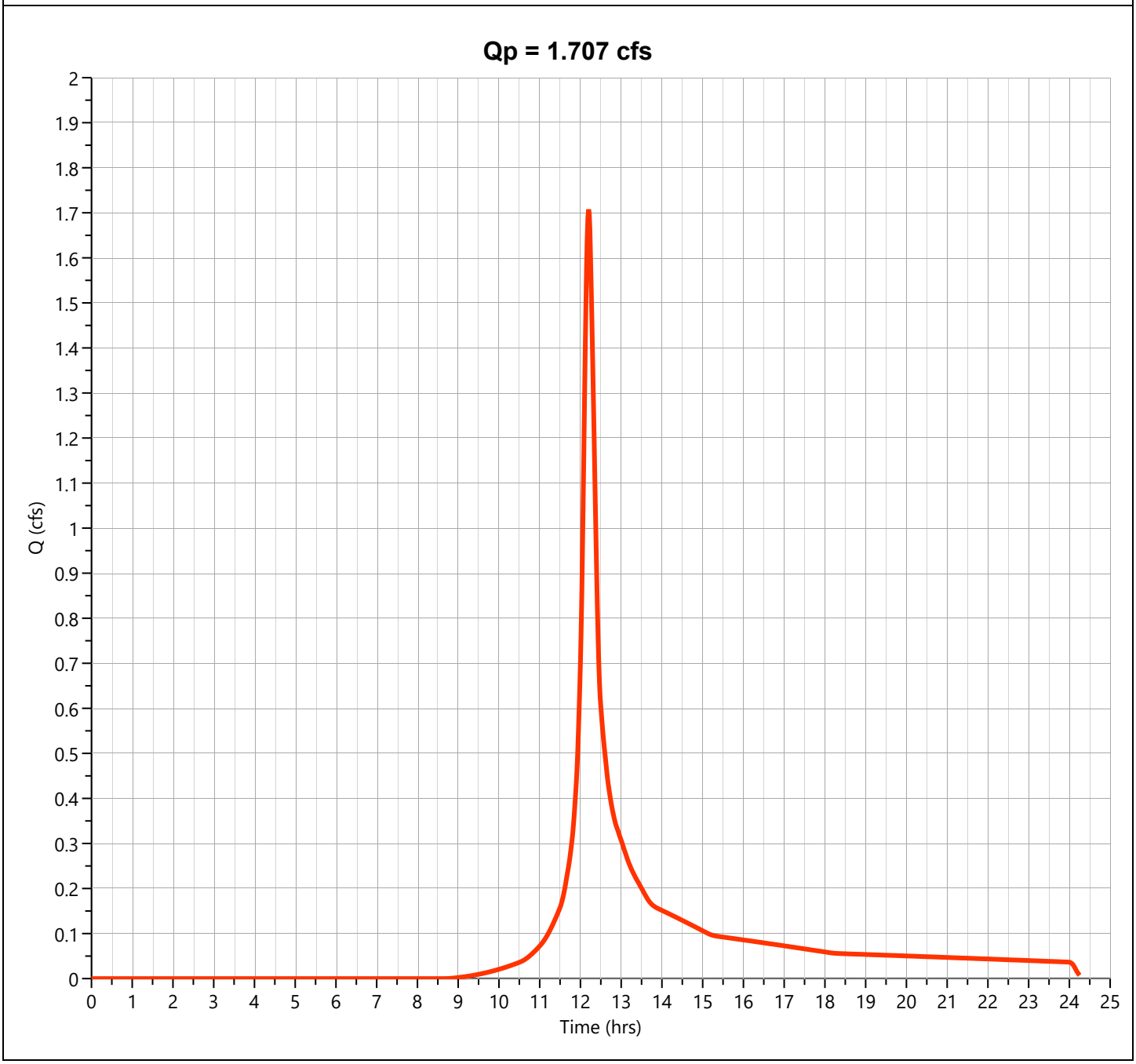
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-D Woods D

Hyd. No. 26

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.707 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 6,941 cuft
Drainage Area	= 1.02 ac	Curve Number	= 77.00
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

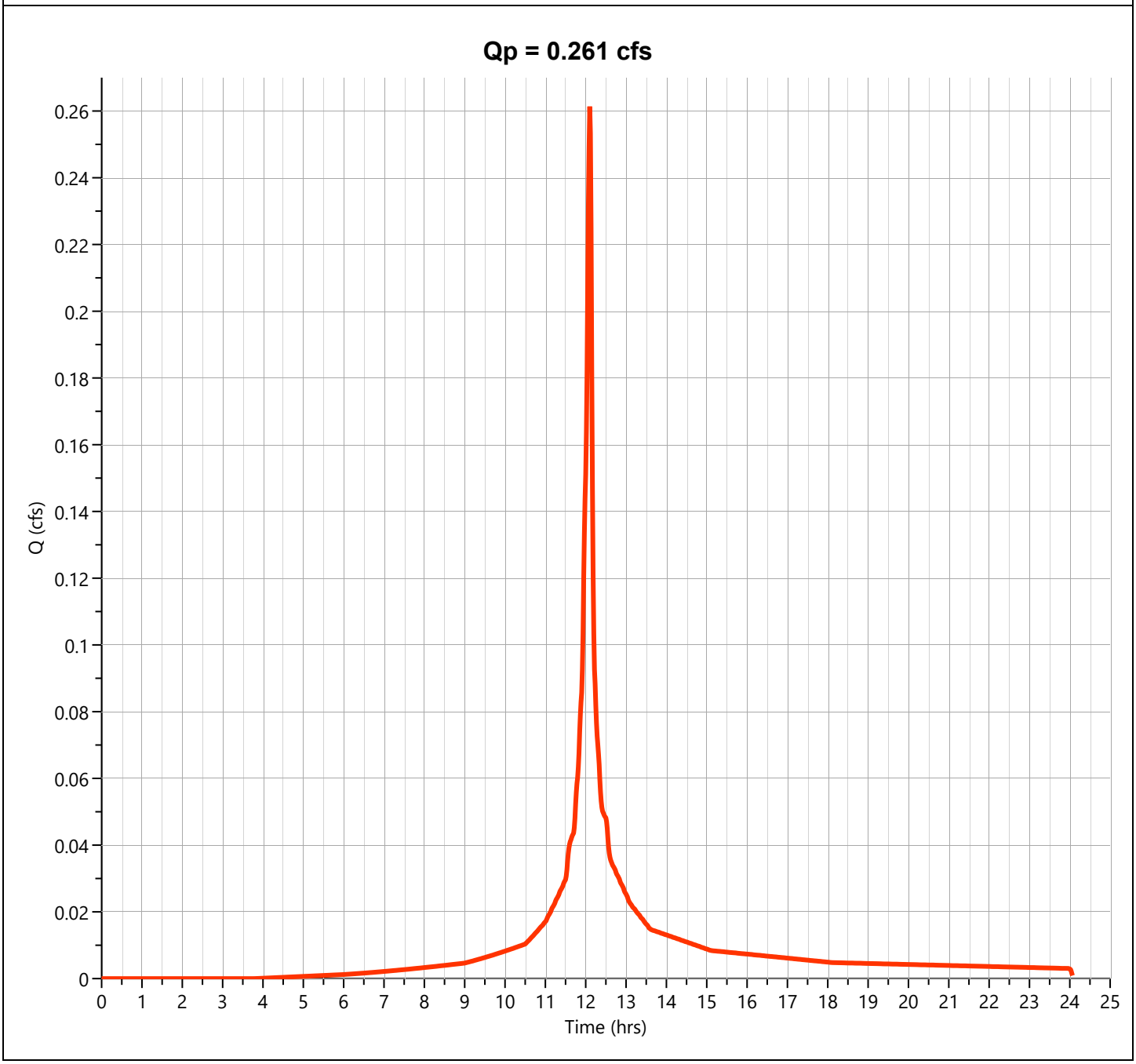
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-D Gravel D

Hyd. No. 27

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.261 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 786 cuft
Drainage Area	= 0.07 ac	Curve Number	= 91.00
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

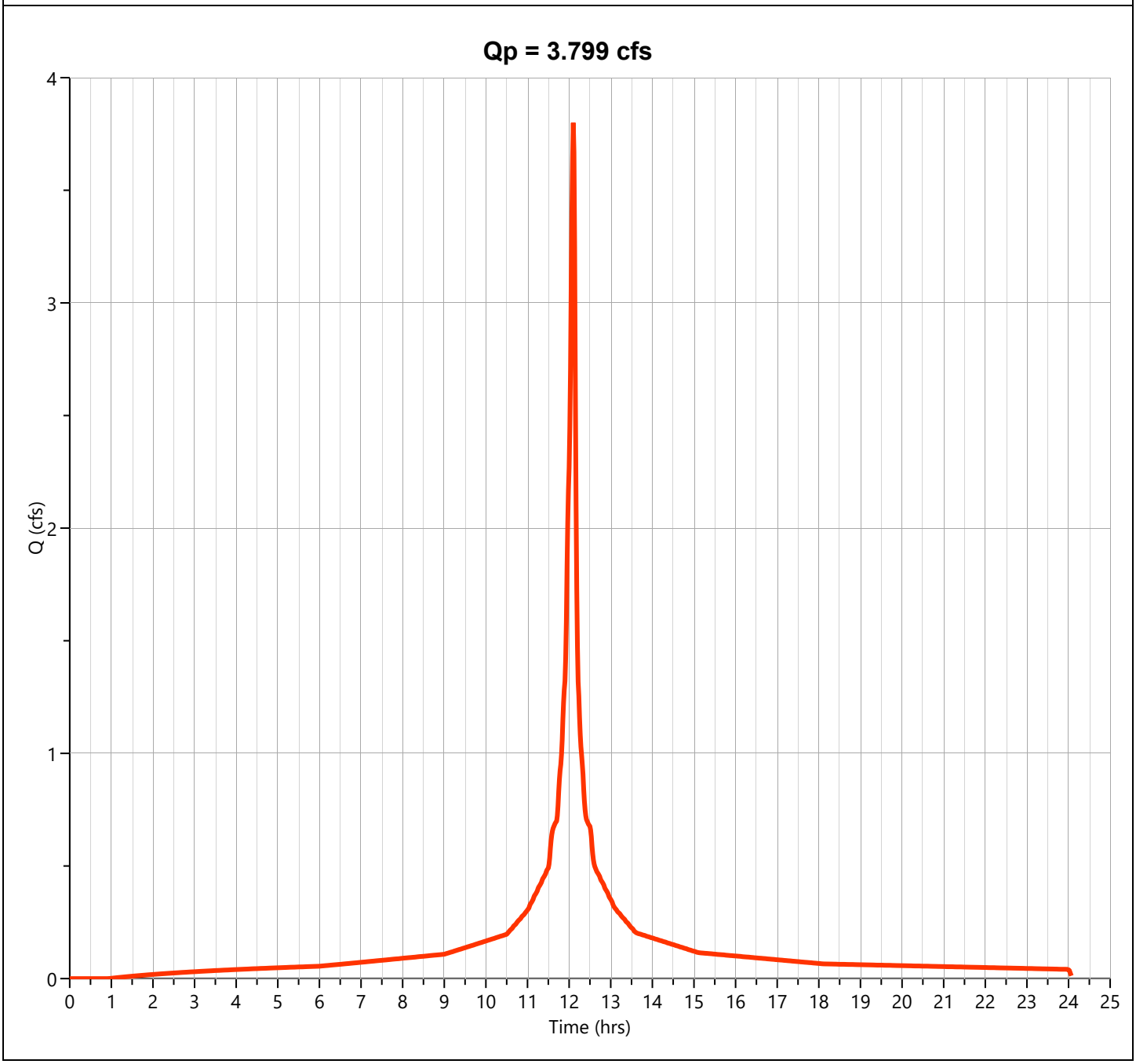
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-D Impervious

Hyd. No. 28

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.799 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 12,701 cuft
Drainage Area	= 0.91 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

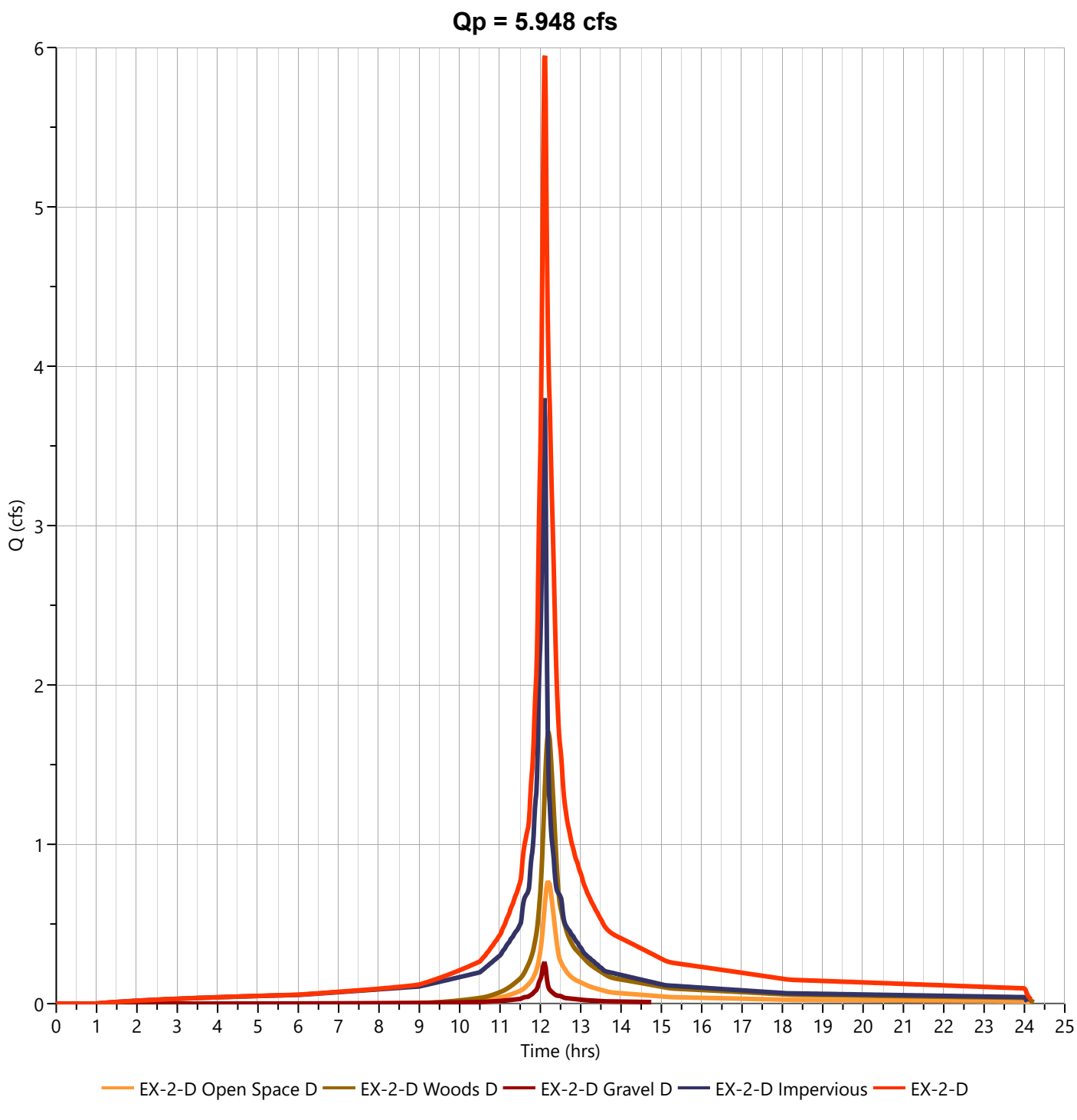
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-D

Hyd. No. 30

Hydrograph Type	= Junction	Peak Flow	= 5.948 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 23,566 cuft
Inflow Hydrographs	= 25, 26, 27, 28	Total Contrib. Area	= 2.41 ac



Hydrograph Report

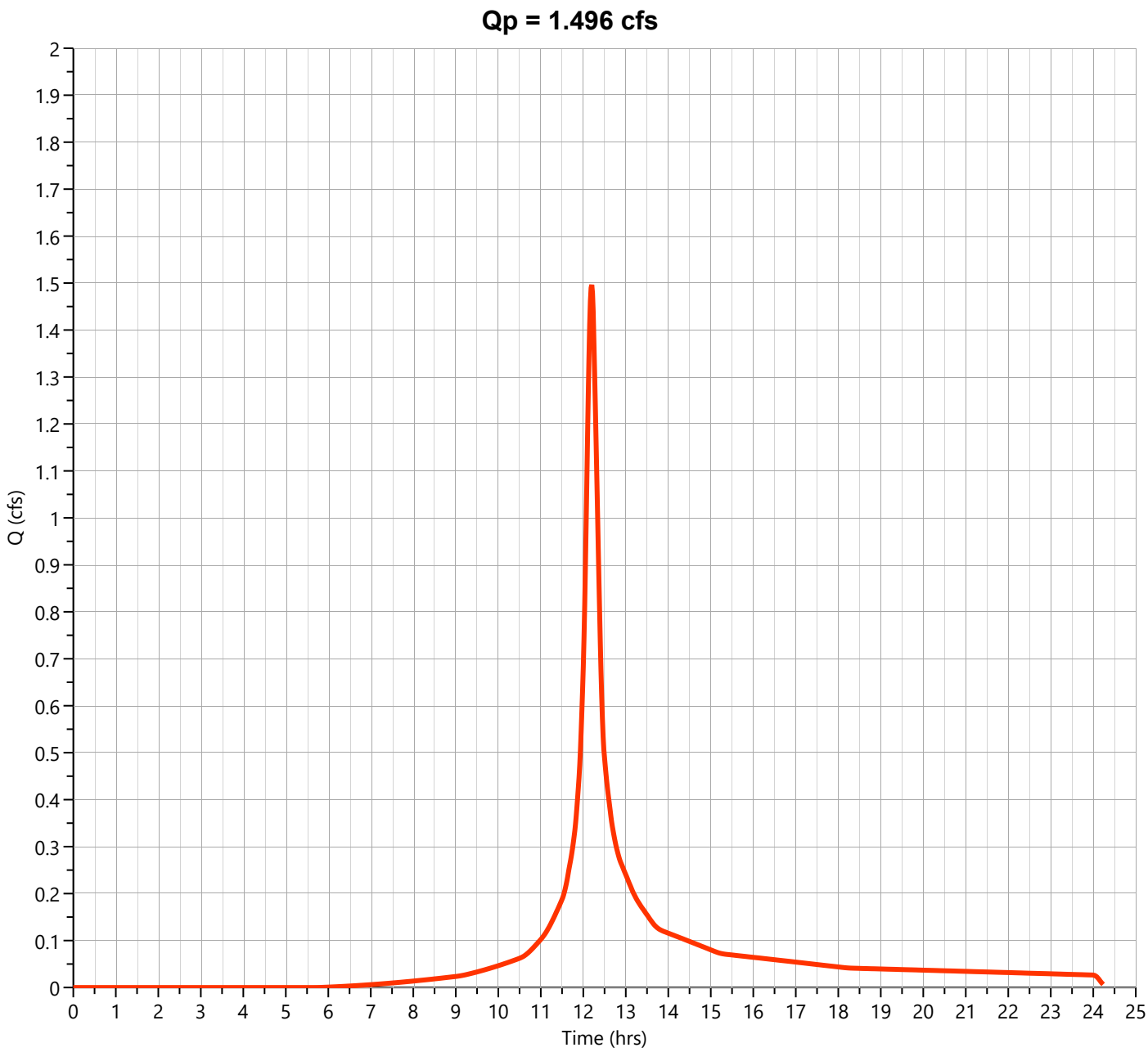
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-D Open Space D

Hyd. No. 25

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.496 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 6,127 cuft
Drainage Area	= 0.41 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

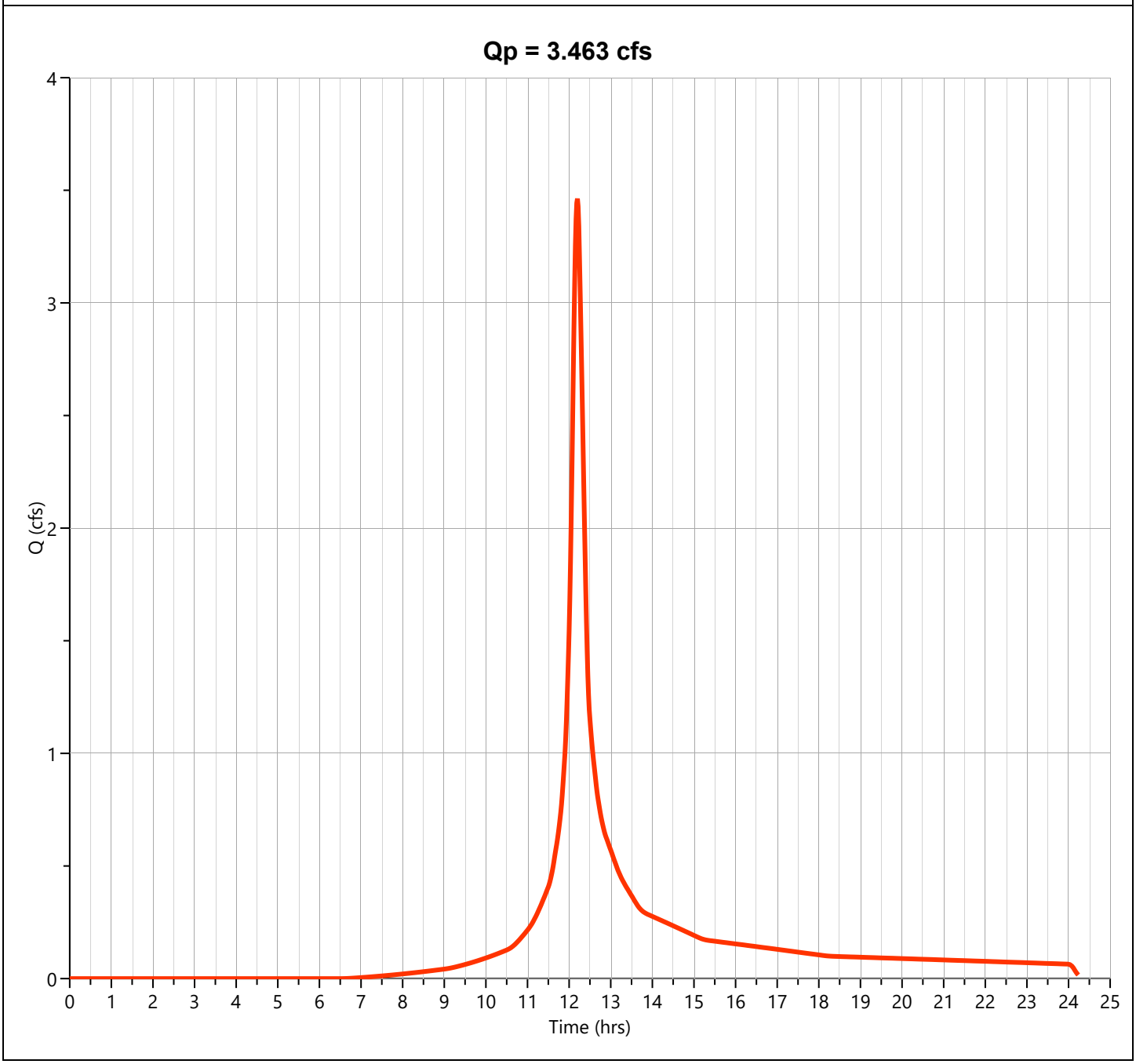
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-D Woods D

Hyd. No. 26

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.463 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 14,085 cuft
Drainage Area	= 1.02 ac	Curve Number	= 77.00
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

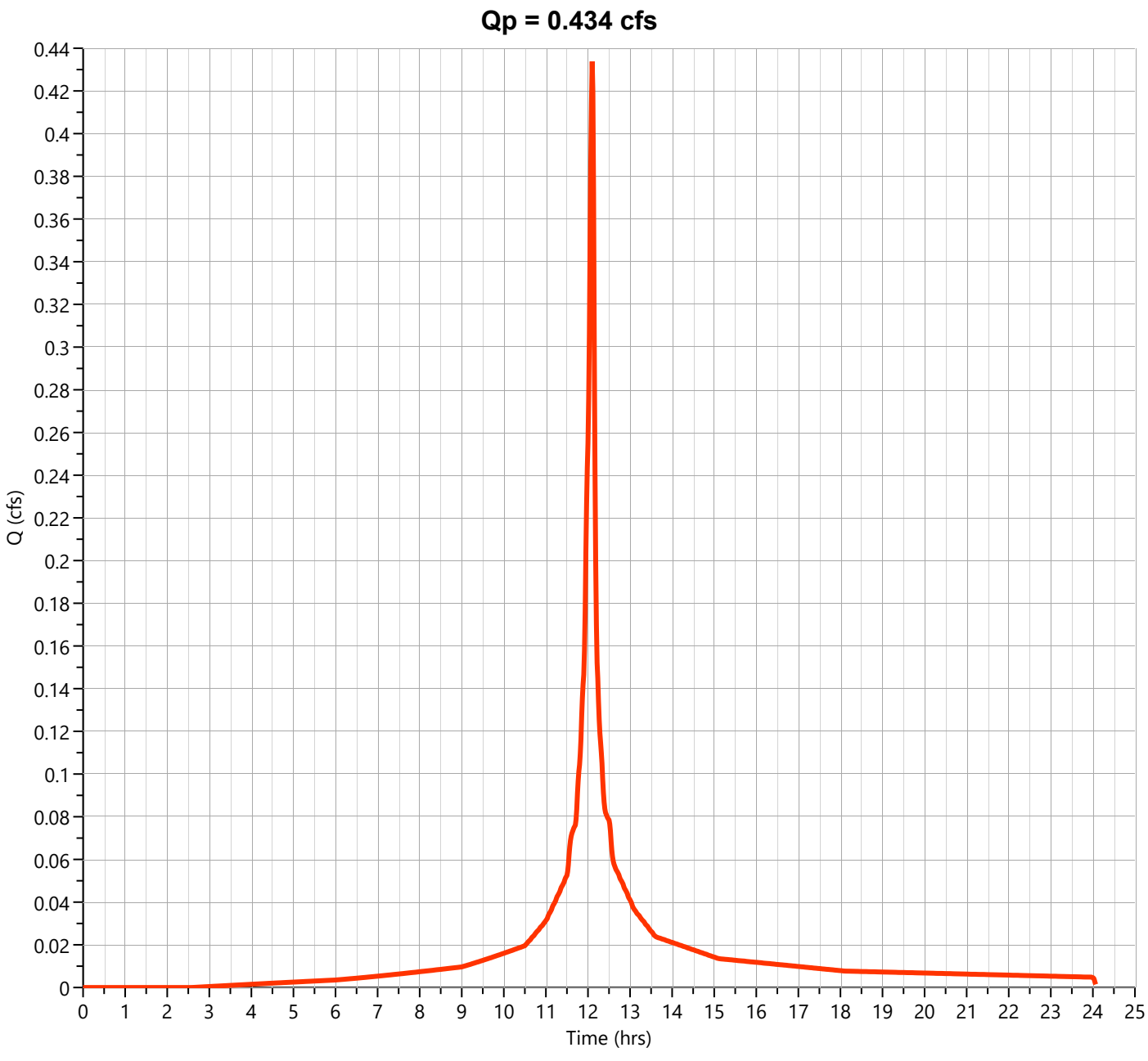
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-D Gravel D

Hyd. No. 27

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.434 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,352 cuft
Drainage Area	= 0.07 ac	Curve Number	= 91.00
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

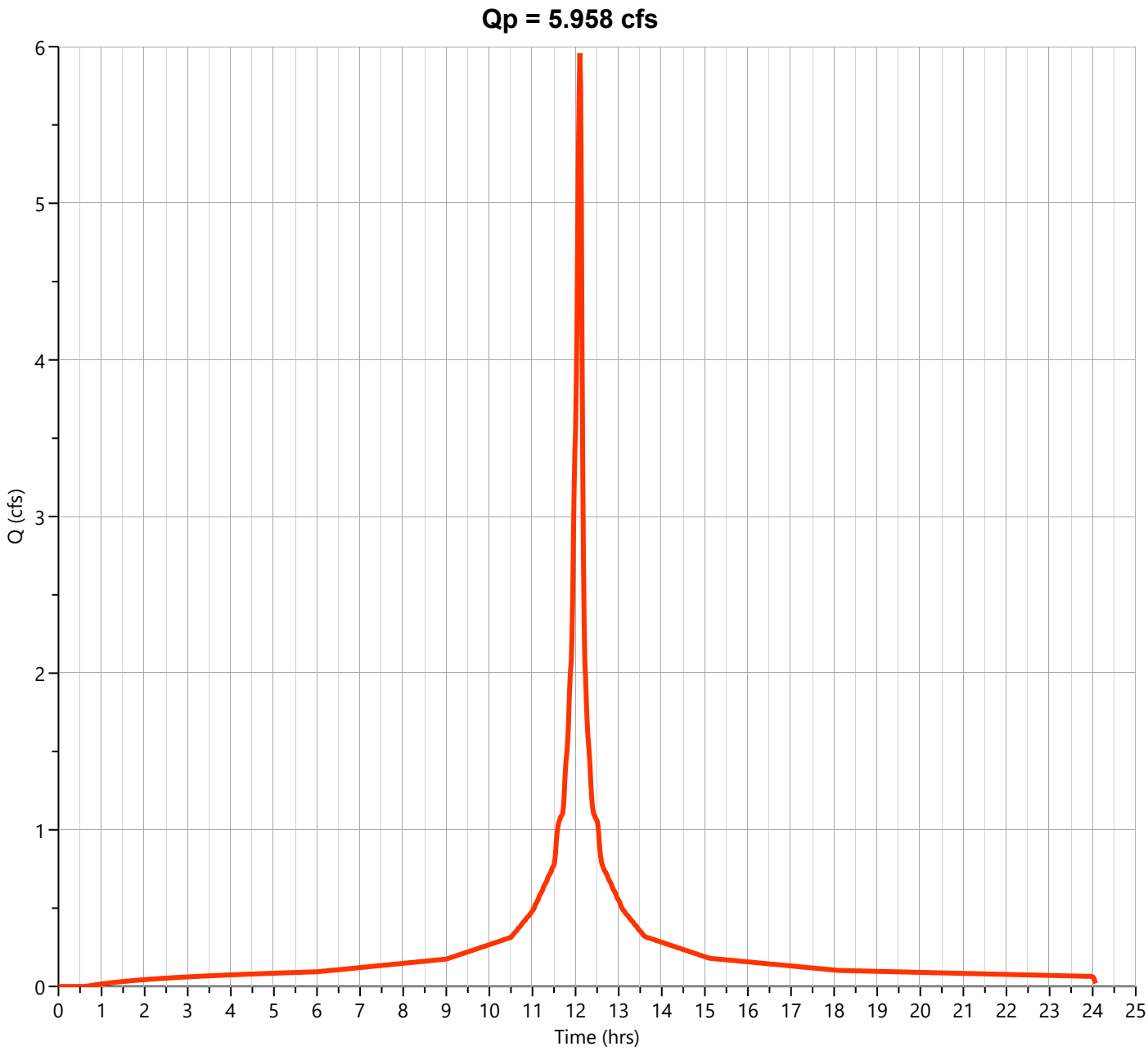
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-D Impervious

Hyd. No. 28

Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.958 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 20,254 cuft
Drainage Area	= 0.91 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

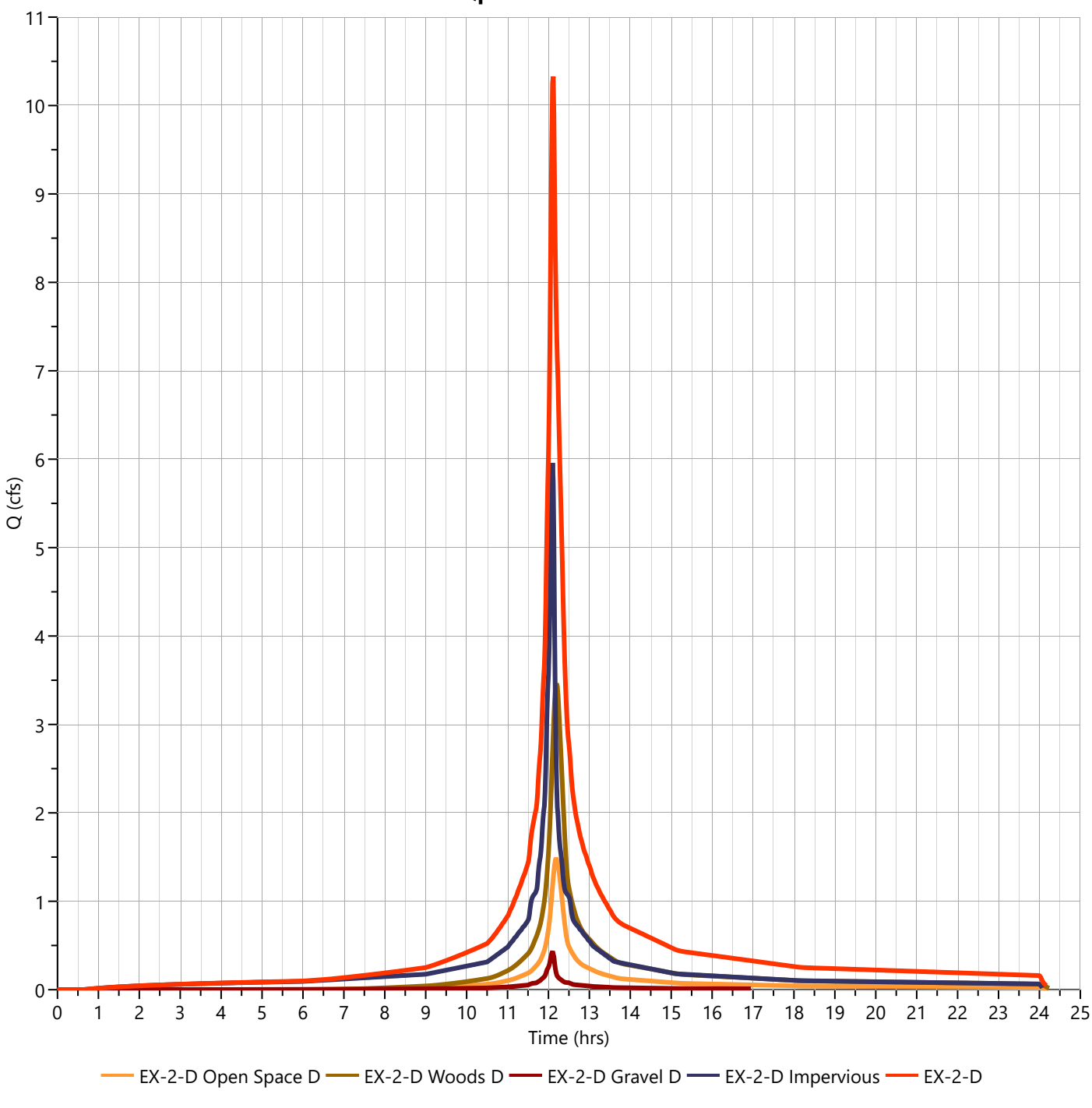
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-D

Hyd. No. 30

Hydrograph Type	= Junction	Peak Flow	= 10.33 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 41,818 cuft
Inflow Hydrographs	= 25, 26, 27, 28	Total Contrib. Area	= 2.41 ac



Hydrograph Report

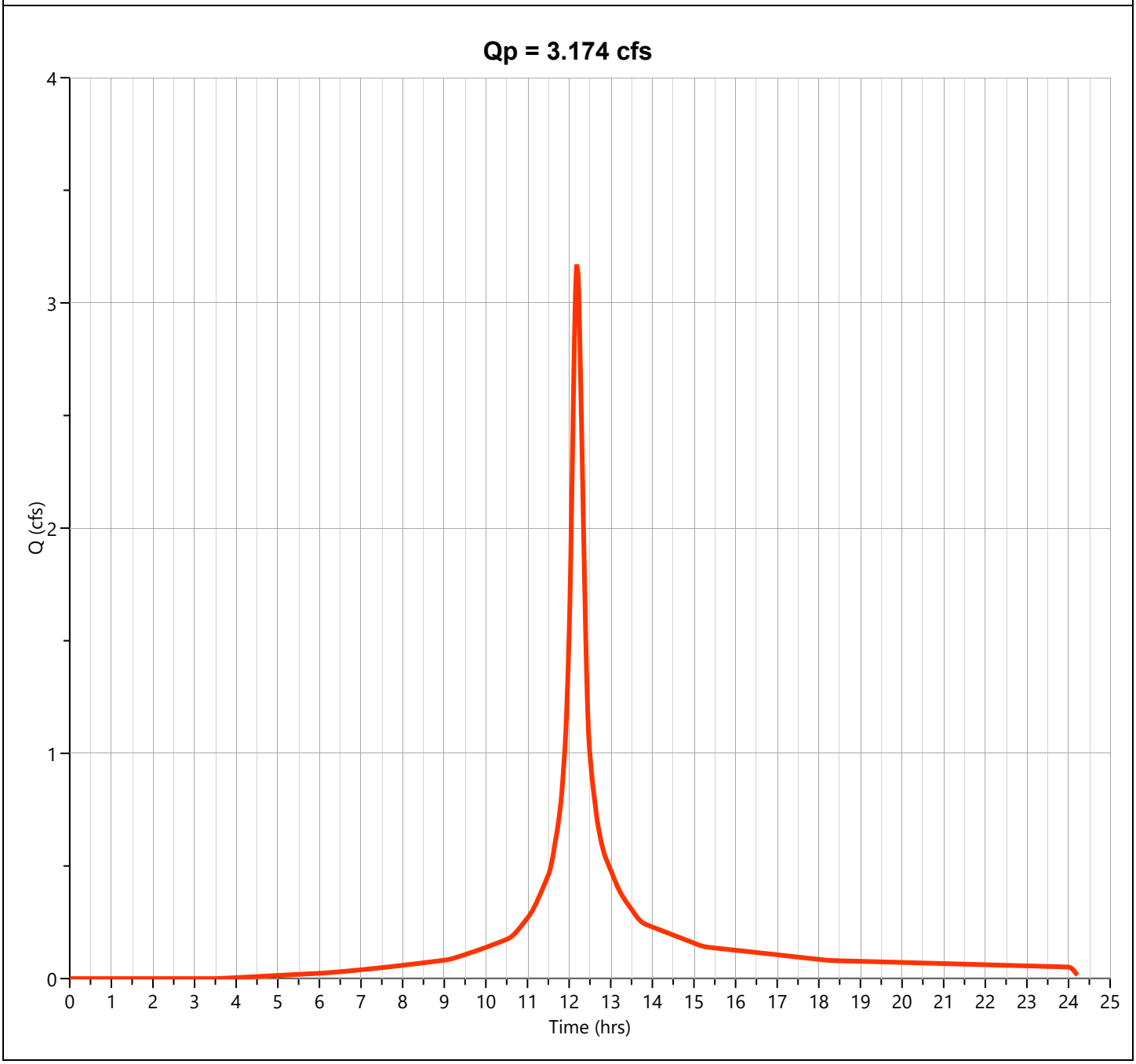
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-D Open Space D

Hyd. No. 25

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.174 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 13,483 cuft
Drainage Area	= 0.41 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

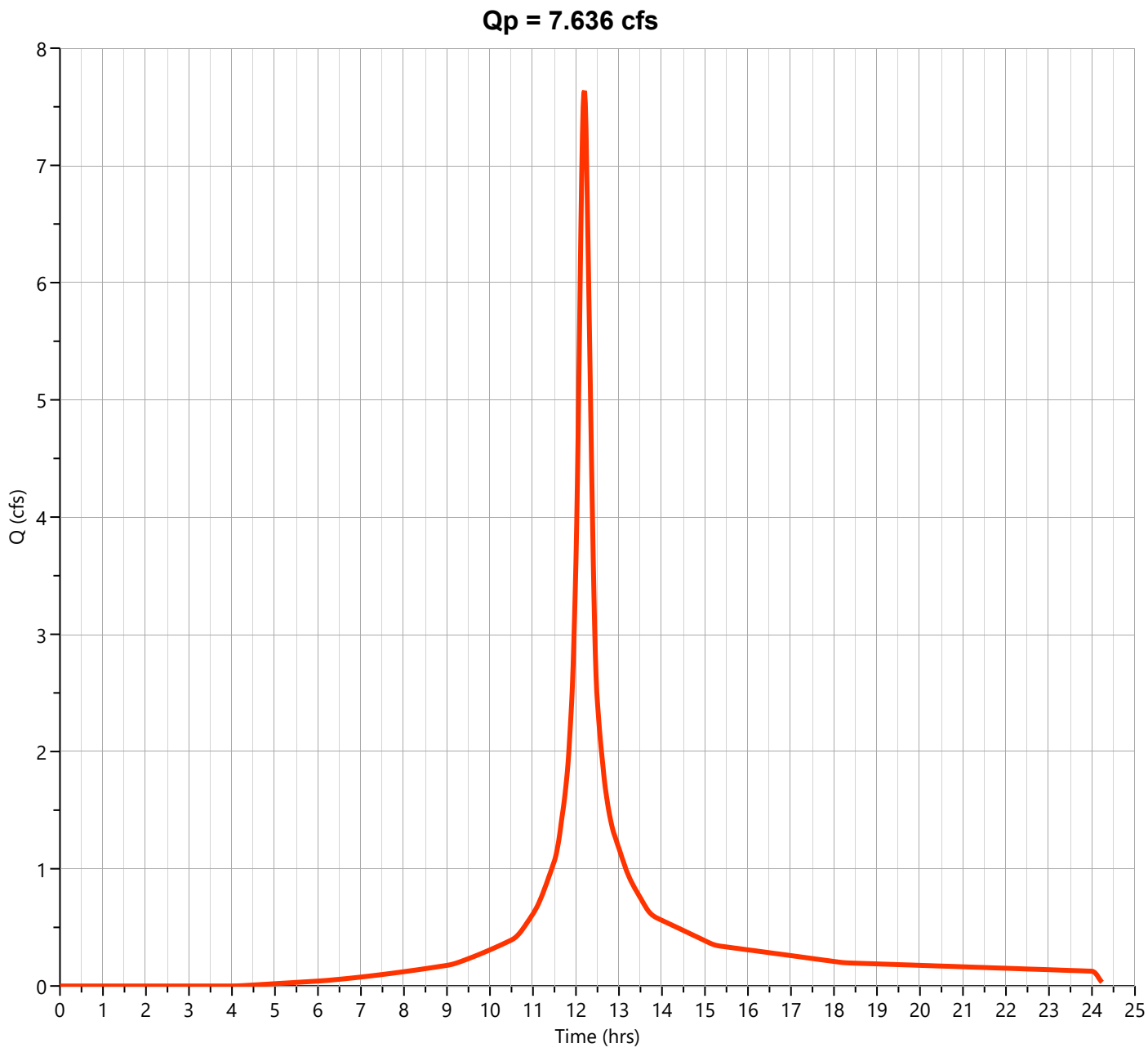
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-D Woods D

Hyd. No. 26

Hydrograph Type	= NRCS Runoff	Peak Flow	= 7.636 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 32,040 cuft
Drainage Area	= 1.02 ac	Curve Number	= 77.00
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

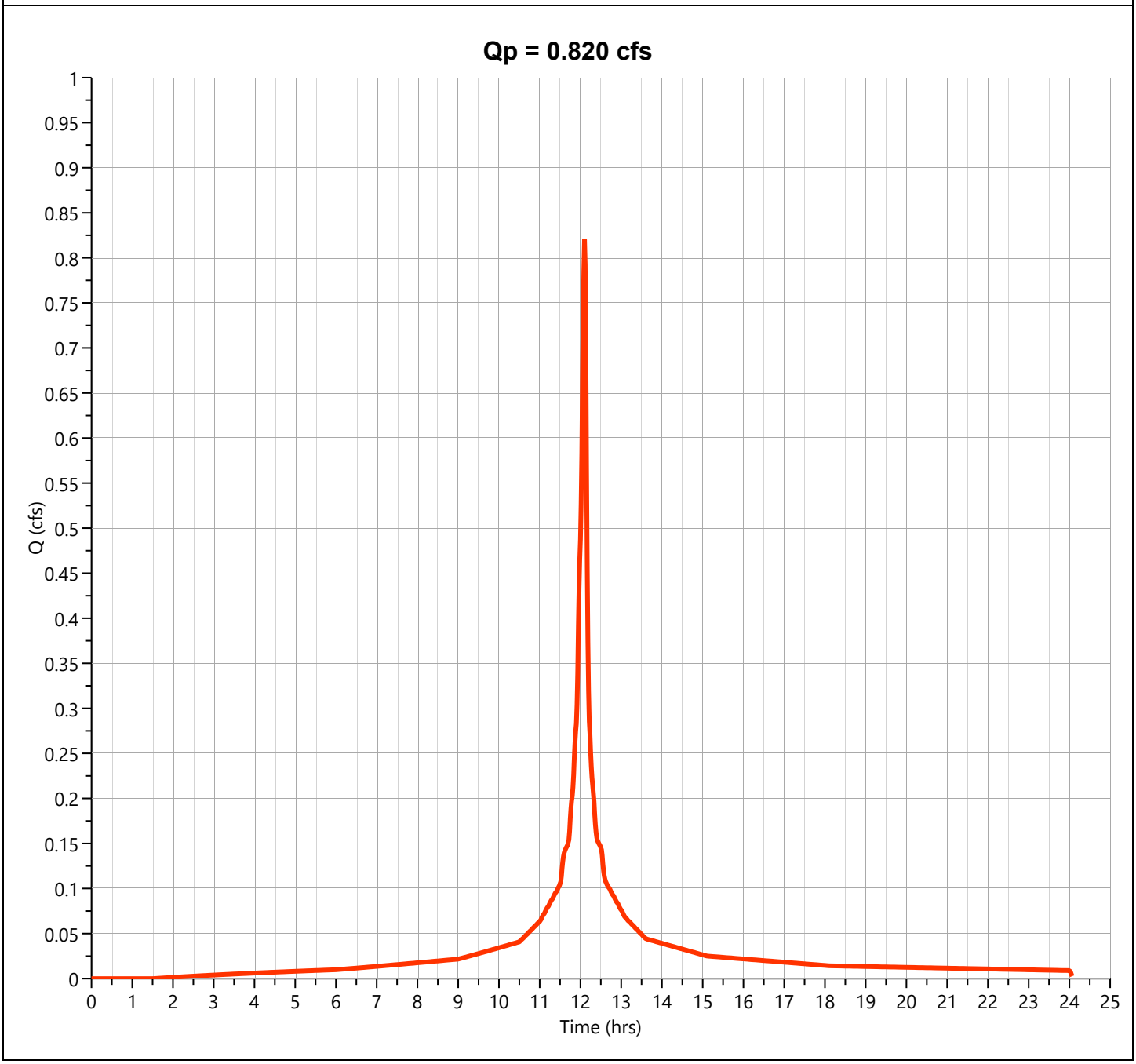
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-D Gravel D

Hyd. No. 27

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.820 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 2,666 cuft
Drainage Area	= 0.07 ac	Curve Number	= 91.00
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

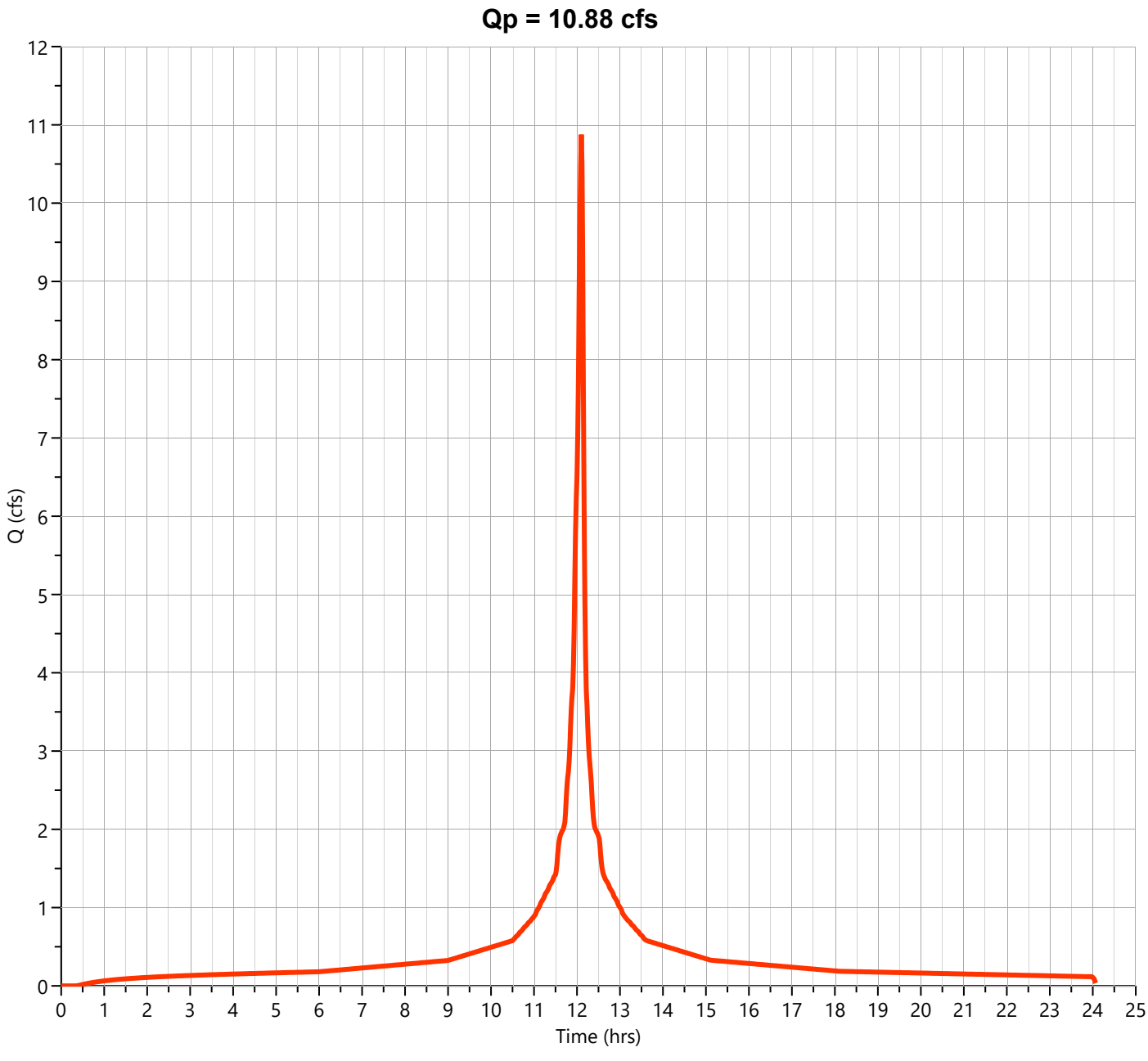
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-D Impervious

Hyd. No. 28

Hydrograph Type	= NRCS Runoff	Peak Flow	= 10.88 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 37,521 cuft
Drainage Area	= 0.91 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

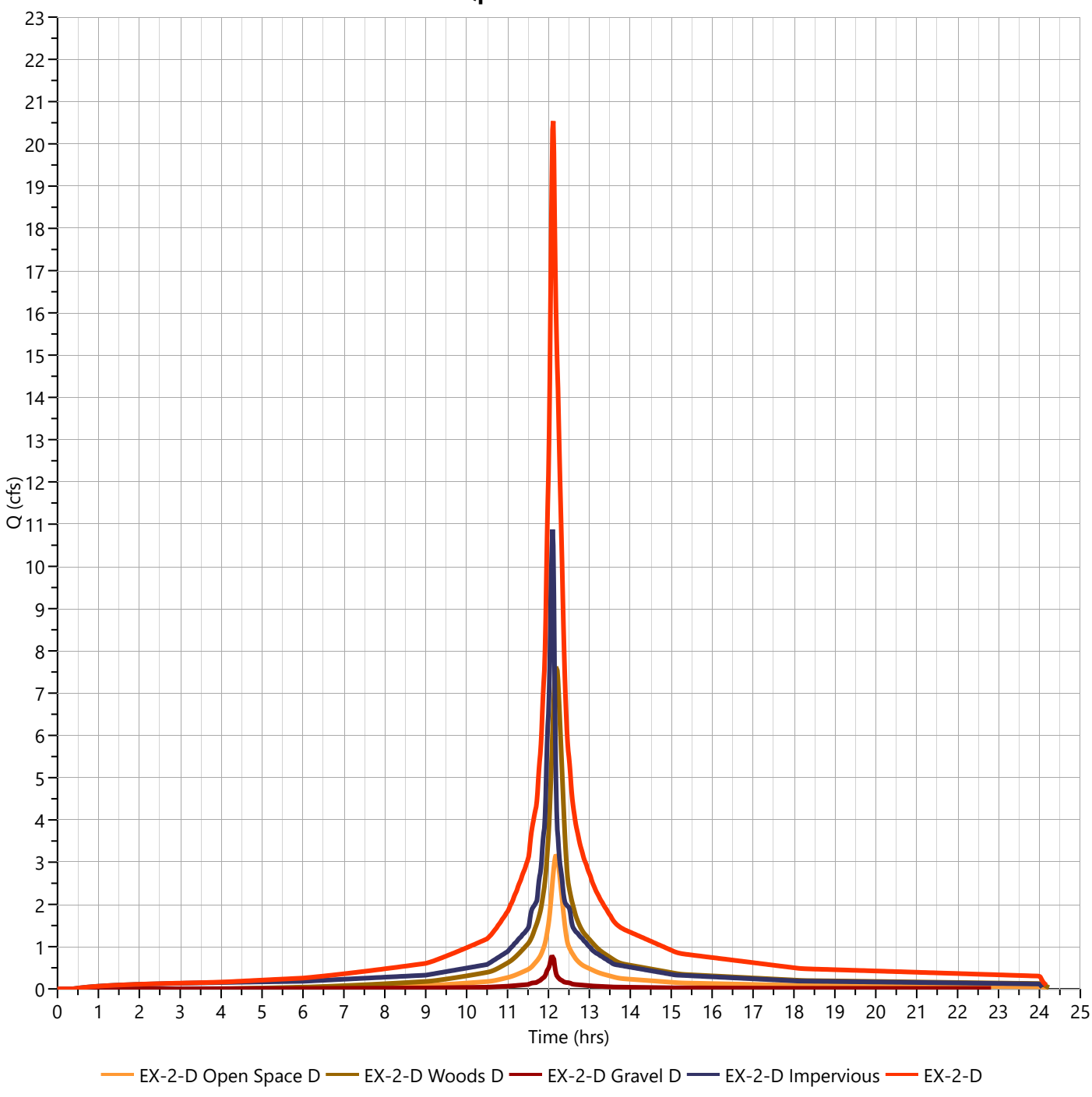
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-D

Hyd. No. 30

Hydrograph Type	= Junction	Peak Flow	= 20.54 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 85,710 cuft
Inflow Hydrographs	= 25, 26, 27, 28	Total Contrib. Area	= 2.41 ac



EX-2-DISTURBED WATERSHED ALLOWABLE PEAK DISCHARGE

Hydrograph Report

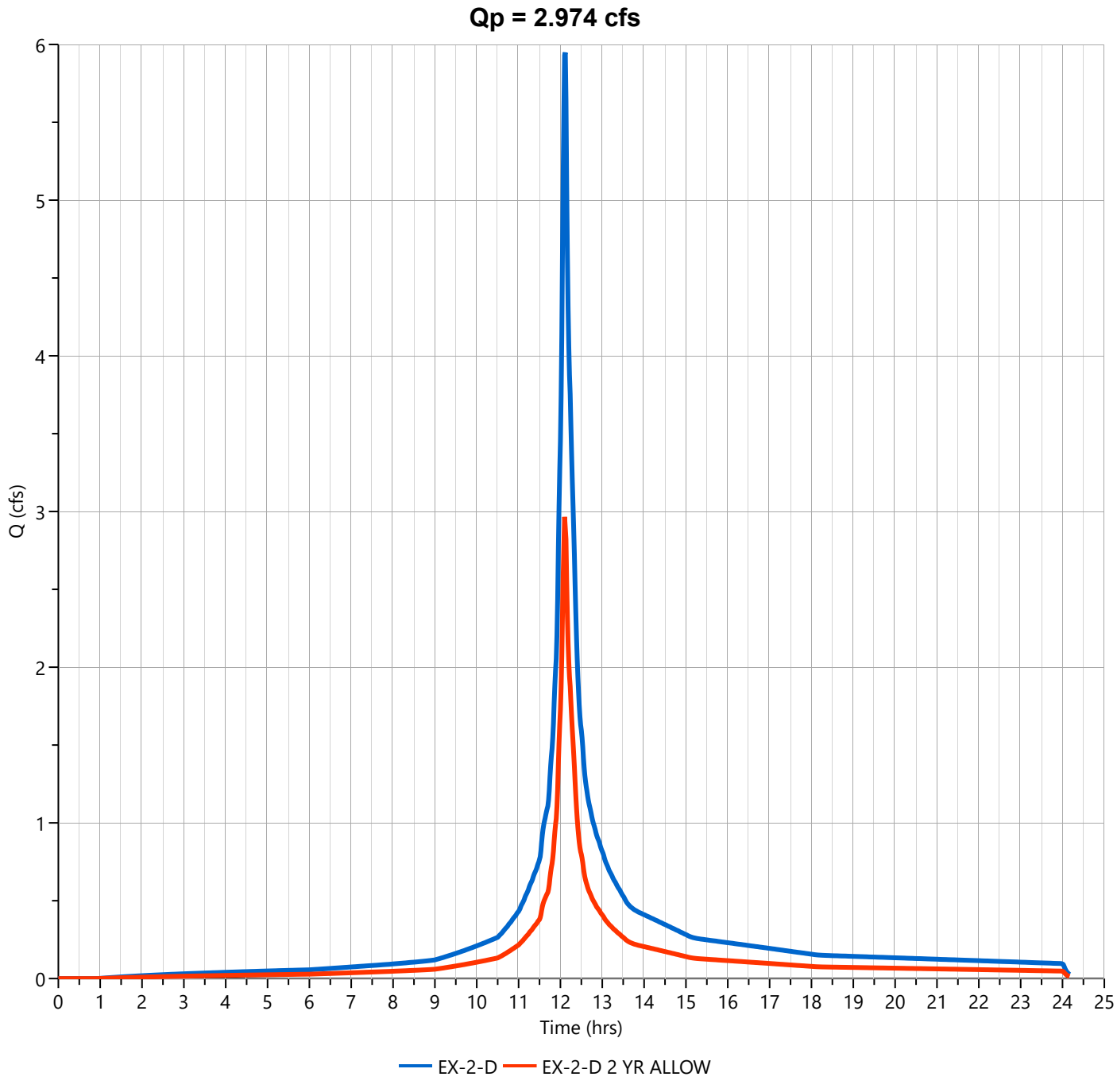
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-D 2 YR ALLOW

Hyd. No. 31

Hydrograph Type	= Diversion	Peak Flow	= 2.974 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 11,783 cuft
Inflow Hydrograph	= 30 - EX-2-D	Diversion Method	= Flow Ratio
Companion Hyd	= 32 - <name>	Flow Ratio	= 0.5



Hydrograph Report

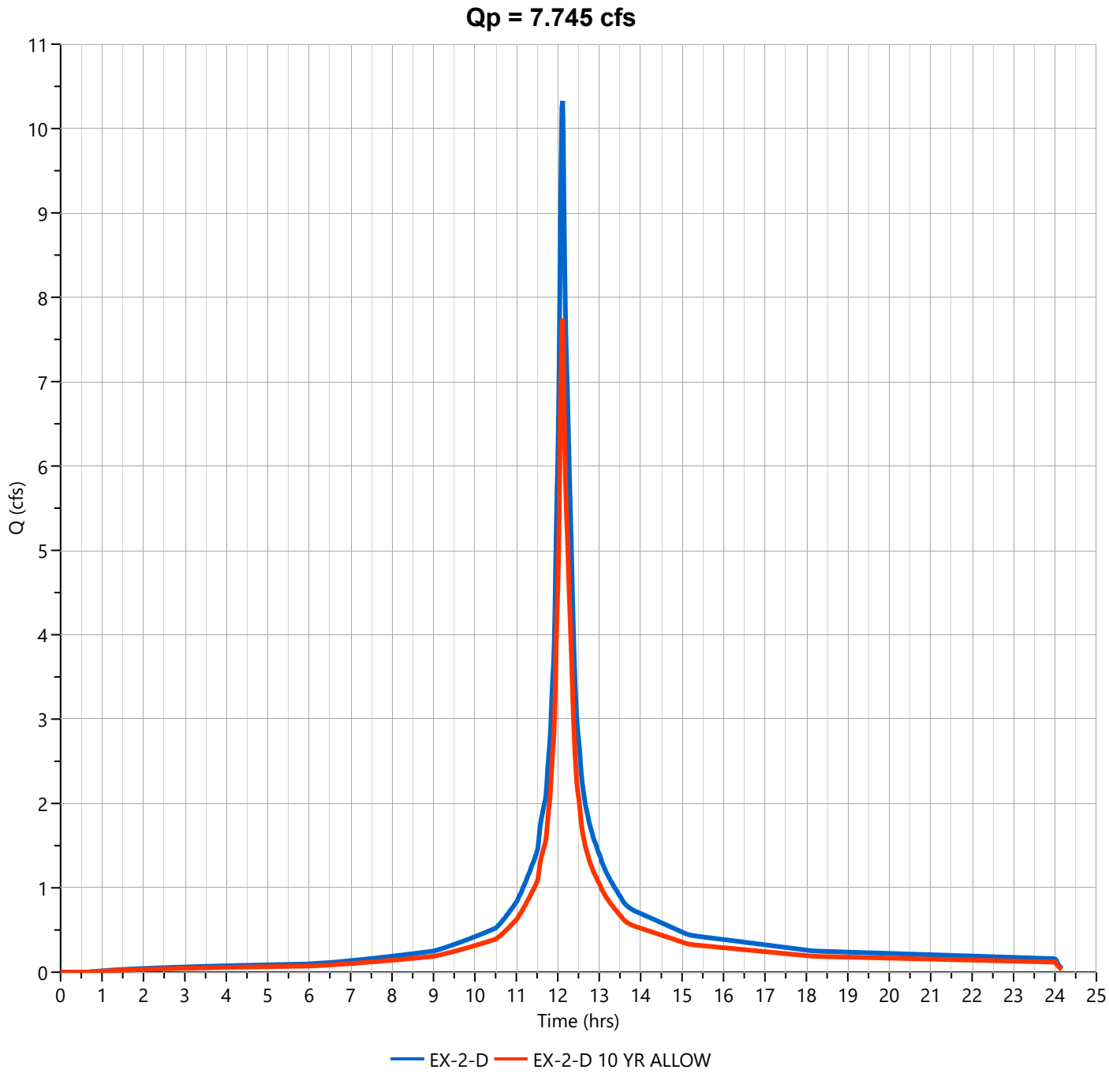
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-D 10 YR ALLOW

Hyd. No. 33

Hydrograph Type	= Diversion	Peak Flow	= 7.745 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 31,364 cuft
Inflow Hydrograph	= 30 - EX-2-D	Diversion Method	= Flow Ratio
Companion Hyd	= 34 - <name>	Flow Ratio	= 0.75



Hydrograph Report

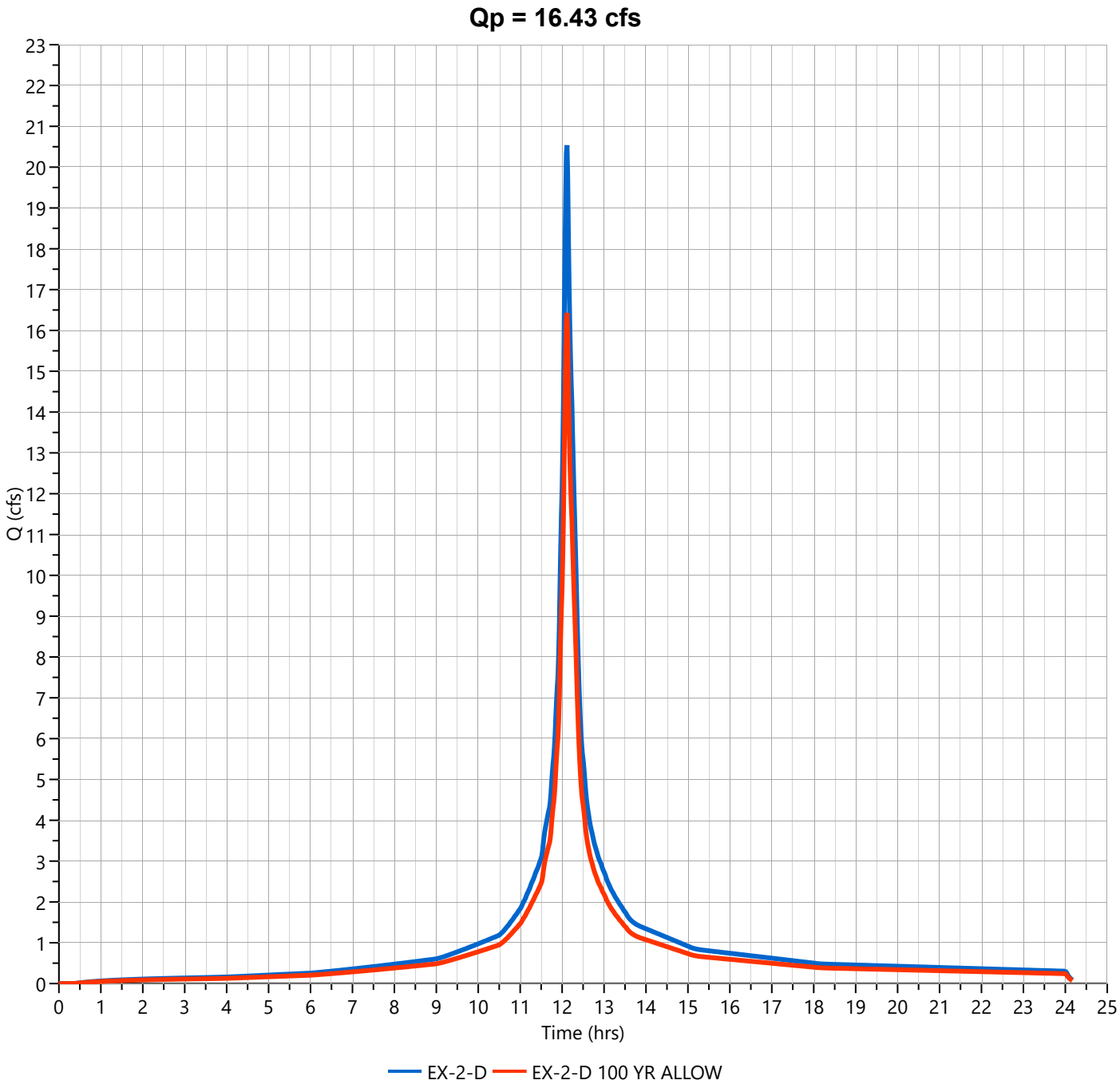
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-D 100 YR ALLOW

Hyd. No. 35

Hydrograph Type	= Diversion	Peak Flow	= 16.43 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 68,568 cuft
Inflow Hydrograph	= 30 - EX-2-D	Diversion Method	= Flow Ratio
Companion Hyd	= 36 - <name>	Flow Ratio	= 0.8



EX-2-UNDISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/20/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/20/2025**

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

$$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$$

			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	**4.08**					
5.	Land Slope, s	ft/ft	**0.043**					
6.	Compute T_t	hr	**0.013**	+		+		
					Sheet Flow Sub-Total		**0.013 hours**	

Shallow Concentrated Flow

$$T_t = \frac{L}{3600\,V}$$

			Segment ID					
			2		**3**		**4**	
7.	Surface Description		**Pavement**		**Woodlands**		**Pavement**	
8.	Flow Length, L	ft	**340**		**109**		**187**	
9.	Watercourse Slope, s	ft/ft	**0.074**		**0.058**		**0.048**	
10.	Average Velocity, V (NEH table 15-3)	ft/s	**5.54**		**1.21**		**4.47**	
11.	Compute T_t	hr	**0.017**	+	**0.025**	+	**0.012**	
					Shallow Conc. Flow Sub-Total		**0.054 hours**	

Channel Flow

$$r = a / P_w$$

$$V = (1.49\, r^{2/3} s^{1/2}) / n$$

$$T_t = \frac{L}{3600\,V}$$

			Segment ID					
			5		**6**			
12.	Flow Length, L	ft	**56**		**125**			
13.	Cross Sectional flow area, a	ft^2	**0.61**		**0.61**			
14.	Wetted Perimeter, P_w	ft	**1.96**		**1.96**			
15.	Hydraulic Radius, r	ft	**0.31**		**0.31**			
16.	Channel Slope, s	ft/ft	**0.027**		**0.009**			
17.	Manning's Roughness Coeff., n		**0.013**		**0.013**			
18.	Velocity, V	ft/s	**8.67**		**5.13**			
19.	Compute T_t	hr	**0.002**	+	**0.007**	+		
					Channel Flow Sub-Total		**0.009 hours**	

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

Total Tc (hours) =	**0.076 hours**
Total Tc (minutes) =	**5 minutes**

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/20/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/20/2025**

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

$$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$$

			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	4.08					
5.	Land Slope, s	ft/ft	0.058					
6.	Compute T_t	hr	0.206	+		+		
					Sheet Flow Sub-Total		0.206 hours	

Shallow Concentrated Flow

$$T_t = \frac{L}{3600\,V}$$

			Segment ID					
			2		3			
7.	Surface Description		Woodlands		Pavement			
8.	Flow Length, L	ft	228		117			
9.	Watercourse Slope, s	ft/ft	0.051		0.055			
10.	Average Velocity, V (NEH table 15-3)	ft/s	1.13		4.76			
11.	Compute T_t	hr	0.056	+	0.007	+		
					Shallow Conc. Flow Sub-Total		0.063 hours	

Channel Flow

$$r = a / P_w$$

$$V = (1.49\, r^{2/3} s^{1/2}) / n$$

$$T_t = \frac{L}{3600\,V}$$

			Segment ID					
			4		5			
12.	Flow Length, L	ft	56		125			
13.	Cross Sectional flow area, a	ft^2	0.61		0.61			
14.	Wetted Perimeter, P_w	ft	1.96		1.96			
15.	Hydraulic Radius, r	ft	0.31		0.31			
16.	Channel Slope, s	ft/ft	0.027		0.009			
17.	Manning's Roughness Coeff., n		0.013		0.013			
18.	Velocity, V	ft/s	8.67		5.13			
19.	Compute T_t	hr	0.002	+	0.007	+		
					Channel Flow Sub-Total		0.009 hours	

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

Total Tc (hours) =	**0.278 hours**
Total Tc (minutes) =	**17 minutes**

Hydrograph Report

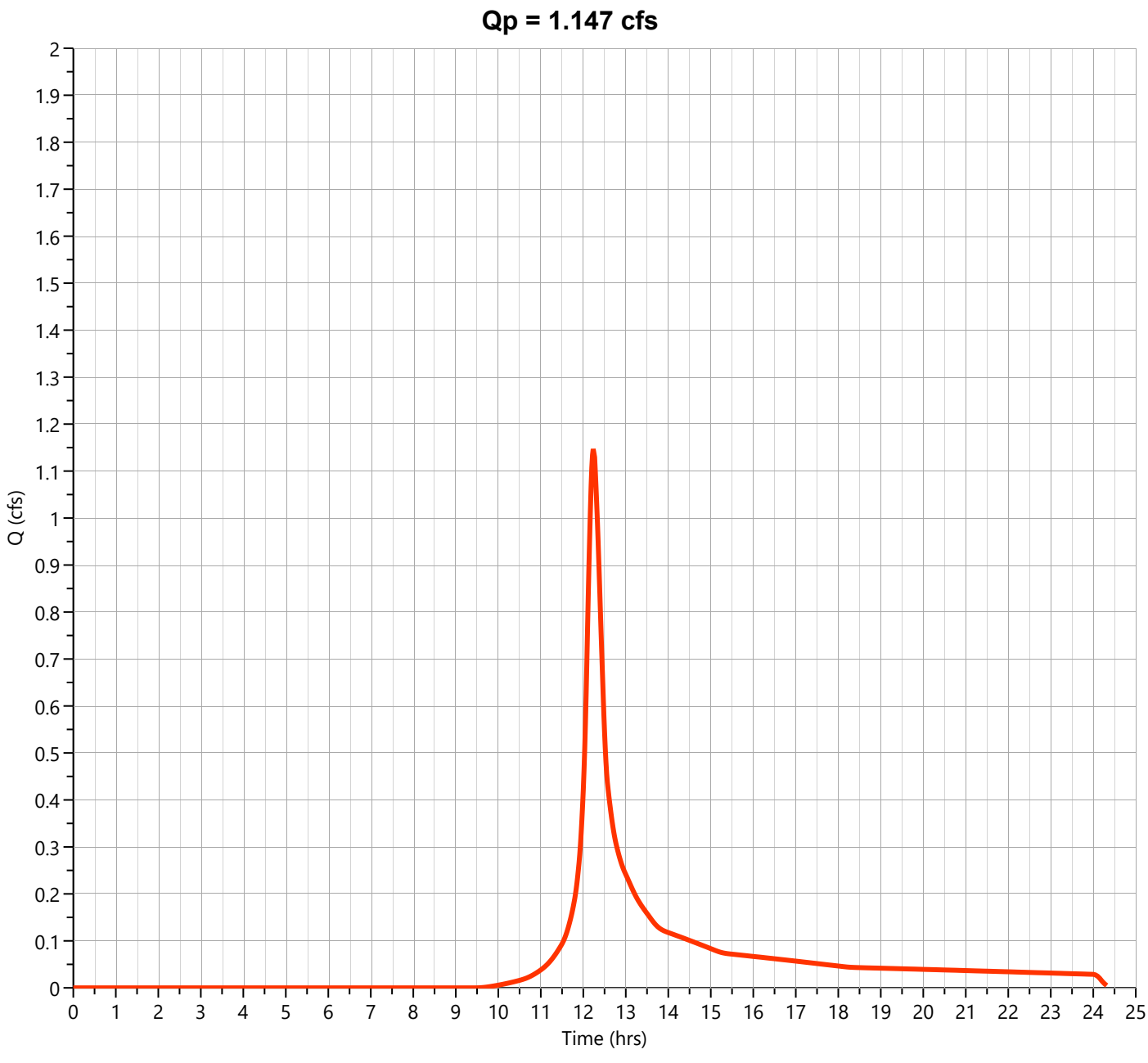
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-U Open Space C

Hyd. No. 38

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.147 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Runoff Volume	= 5,109 cuft
Drainage Area	= 0.86 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 17.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

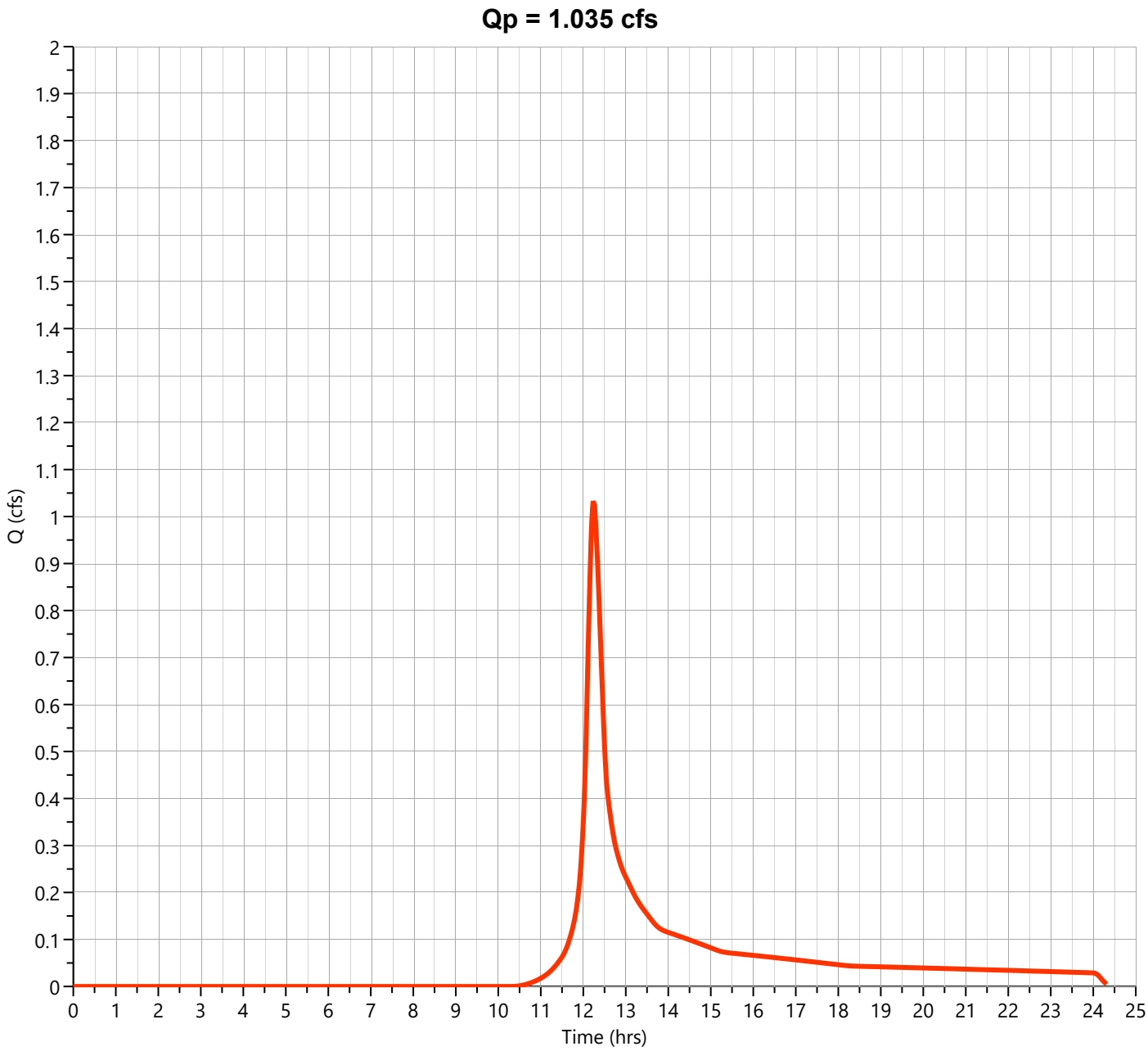
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-U Woods C

Hyd. No. 39

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.035 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.25 hrs
Time Interval	= 1 min	Runoff Volume	= 4,716 cuft
Drainage Area	= 0.95 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 17.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

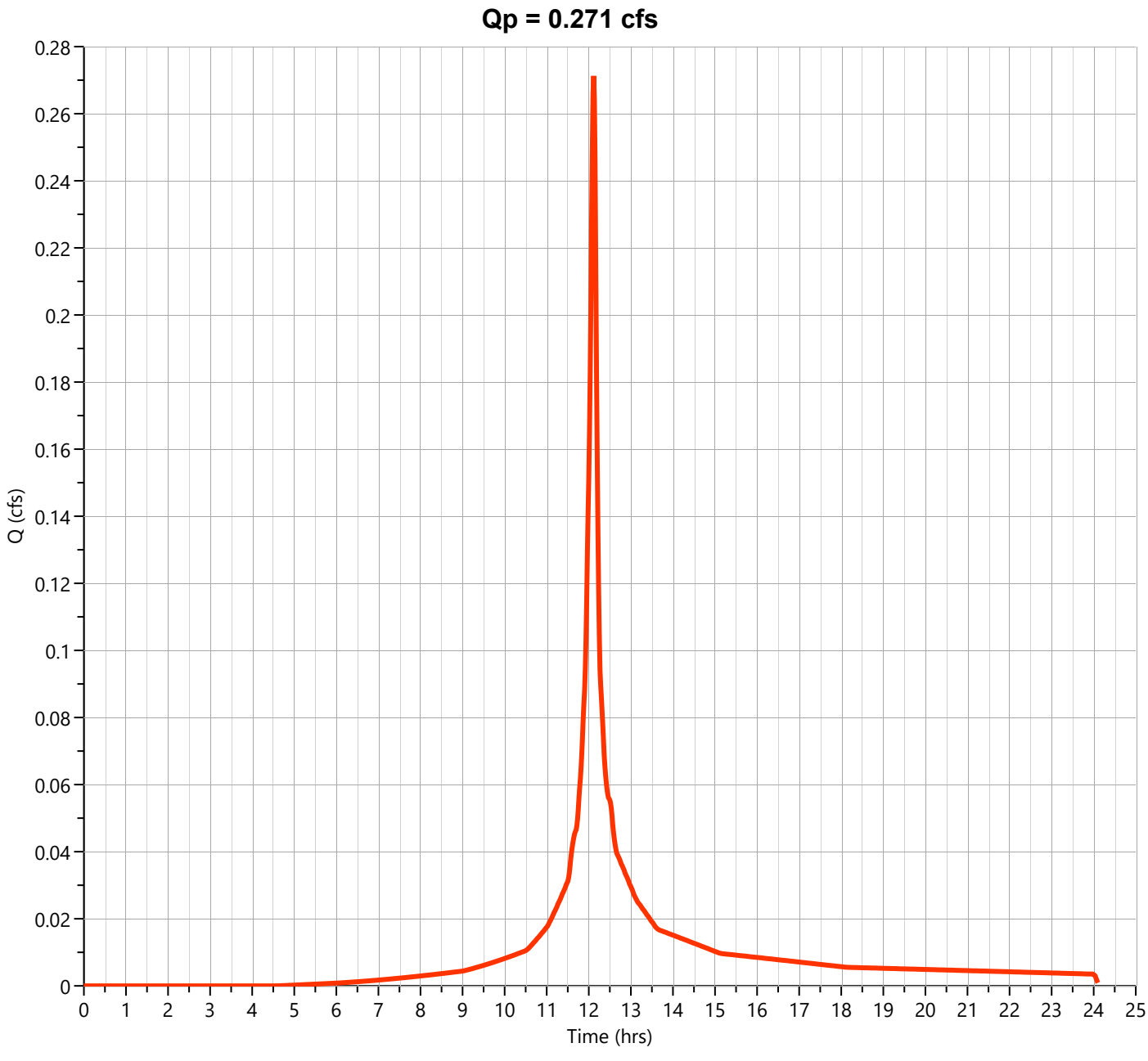
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-U Gravel C

Hyd. No. 40

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.271 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 868 cuft
Drainage Area	= 0.08 ac	Curve Number	= 89.00
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

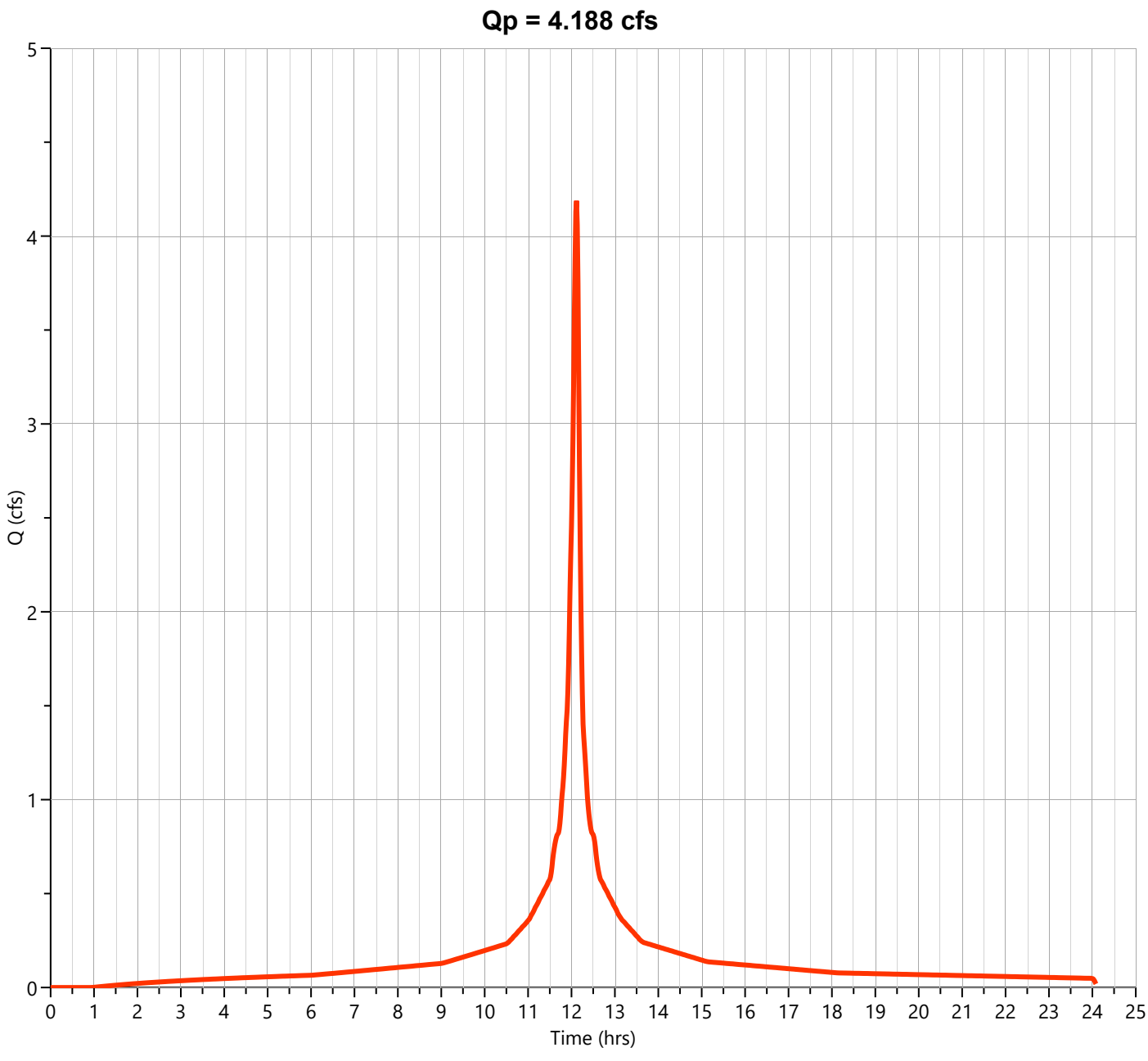
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-U Impervious

Hyd. No. 41

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.188 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 15,113 cuft
Drainage Area	= 1.05 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

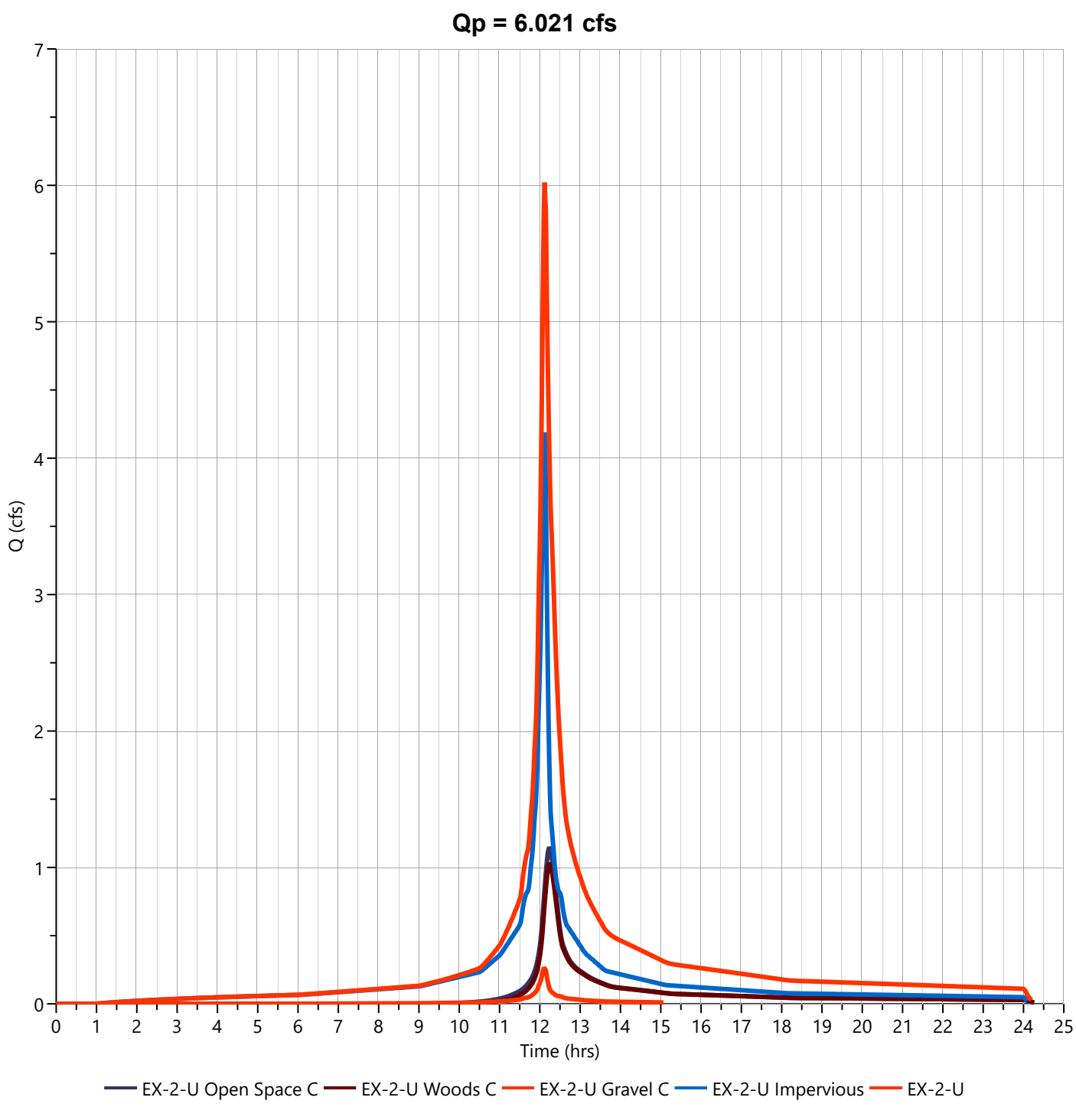
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-U

Hyd. No. 42

Hydrograph Type	= Junction	Peak Flow	= 6.021 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 25,806 cuft
Inflow Hydrographs	= 38, 39, 40, 41	Total Contrib. Area	= 2.94 ac



Hydrograph Report

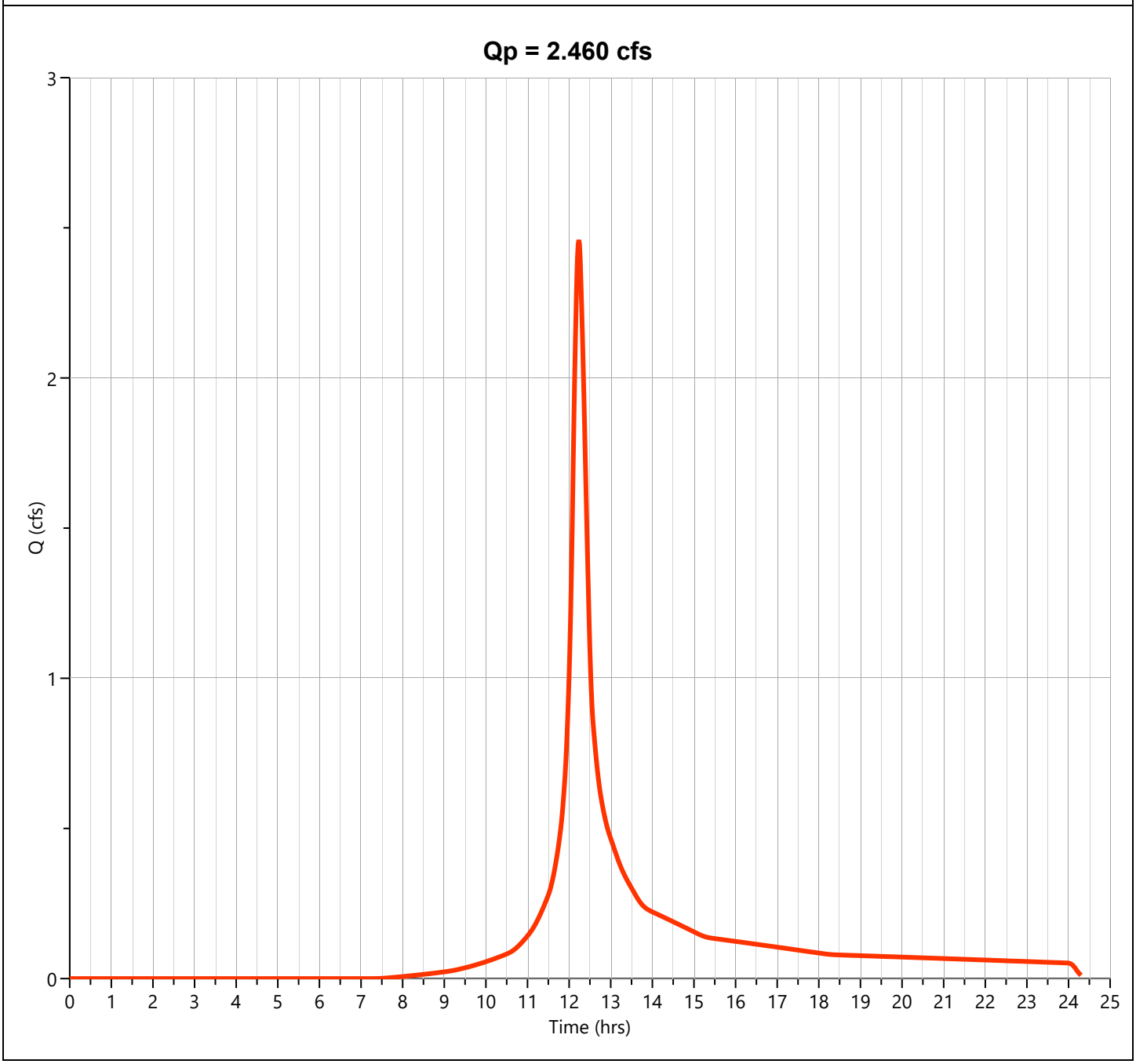
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-U Open Space C

Hyd. No. 38

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.460 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Runoff Volume	= 10,797 cuft
Drainage Area	= 0.86 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 17.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

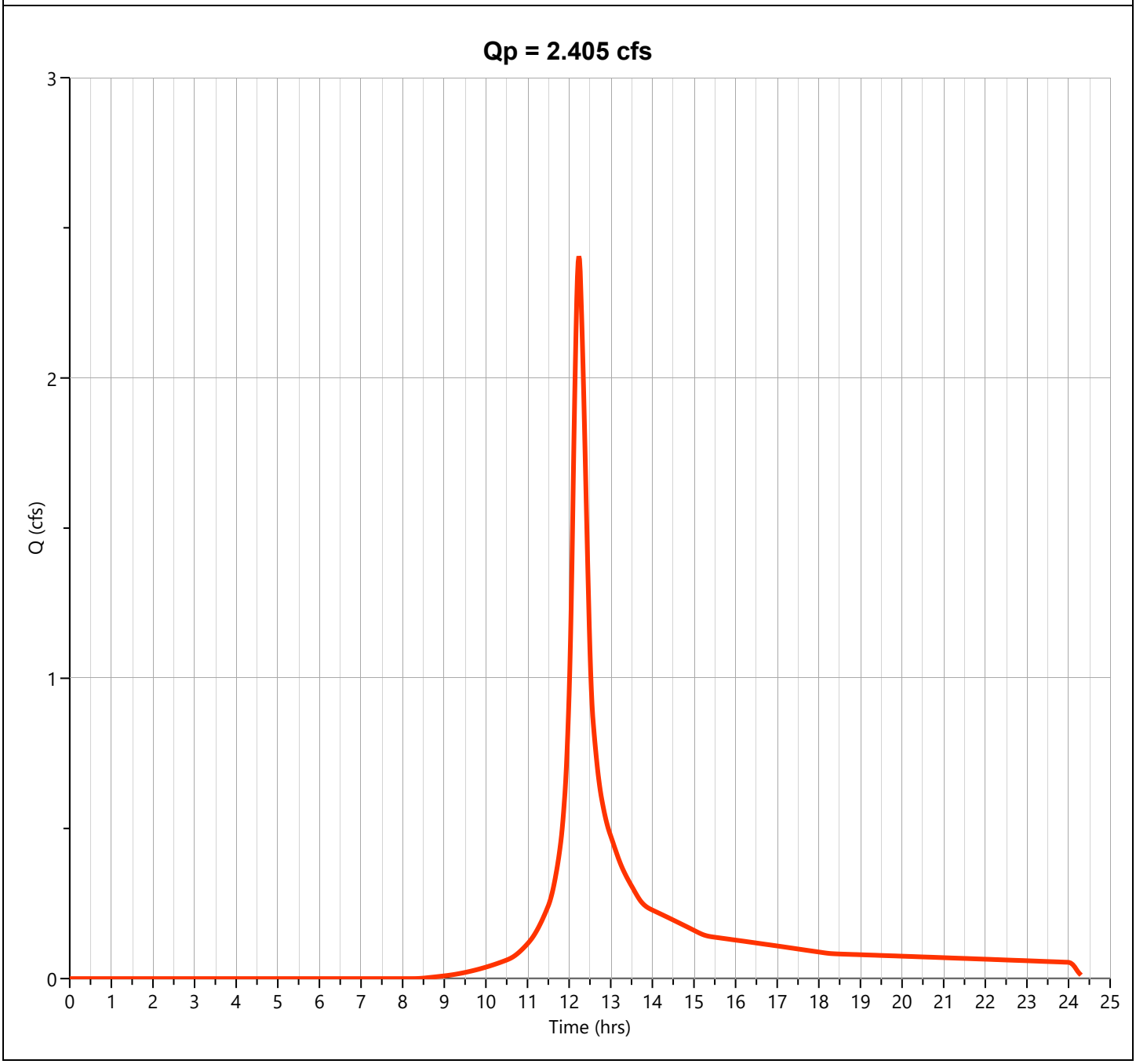
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-U Woods C

Hyd. No. 39

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.405 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Runoff Volume	= 10,574 cuft
Drainage Area	= 0.95 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 17.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

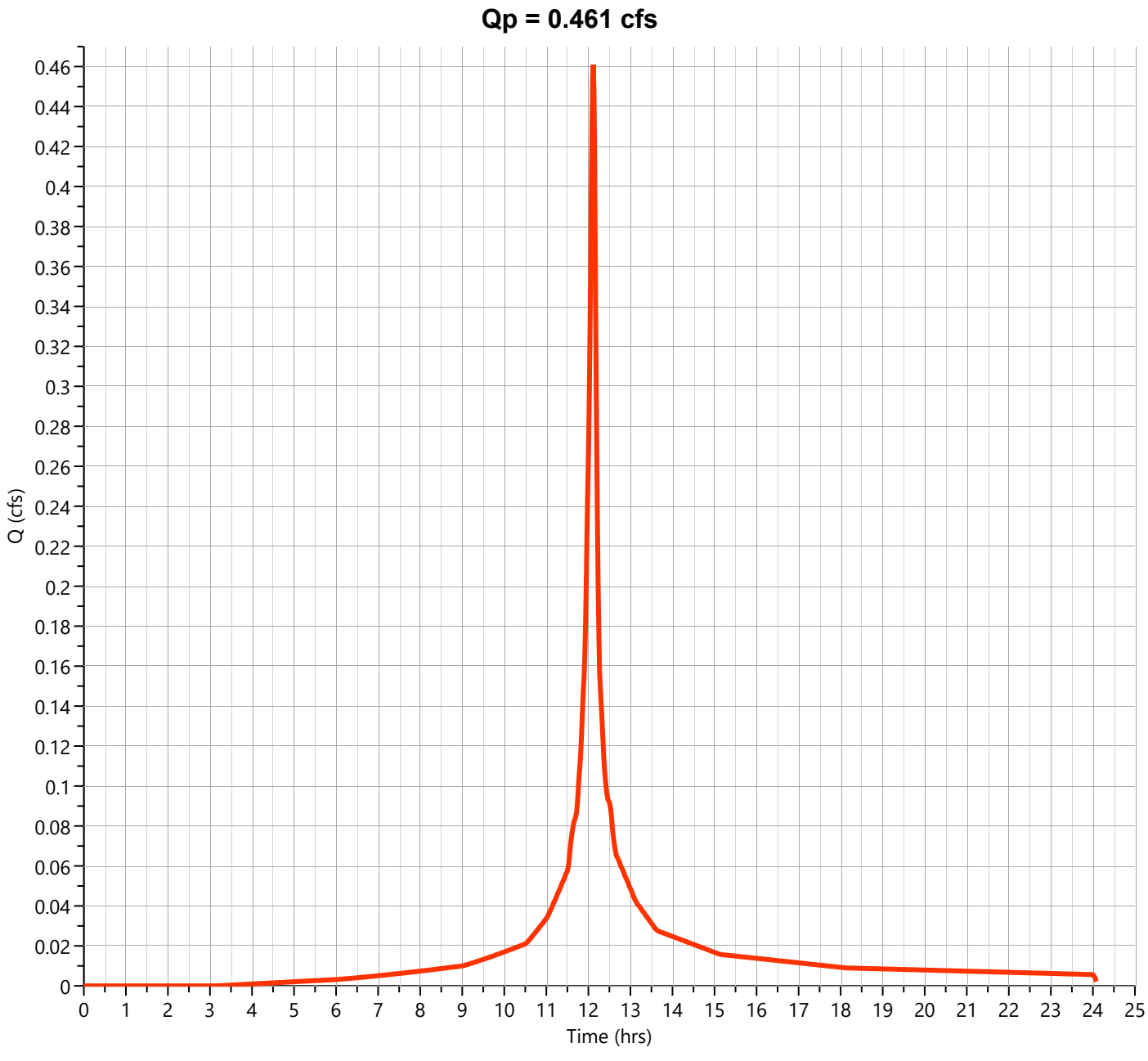
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-U Gravel C

Hyd. No. 40

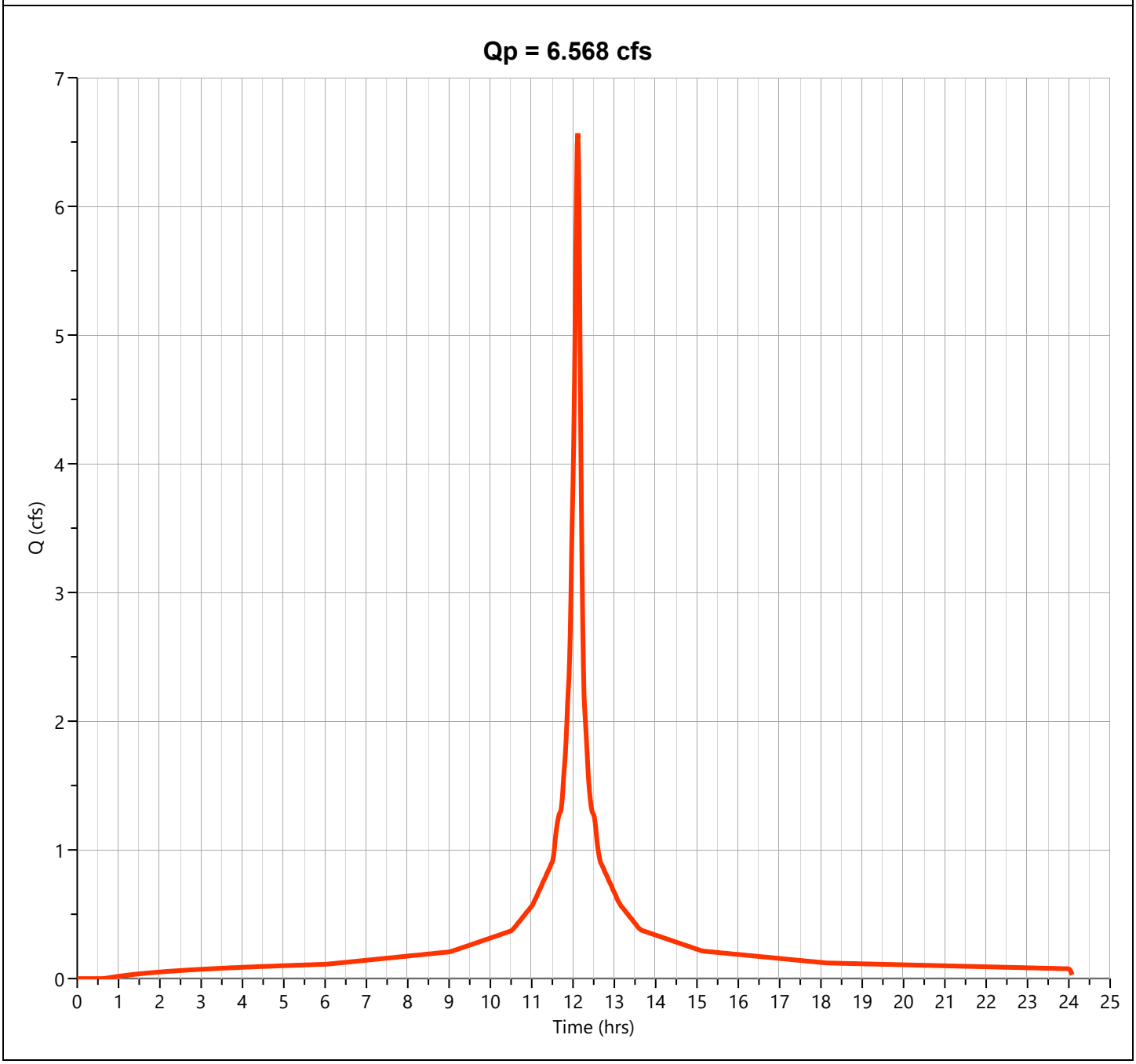
Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.461 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 1,526 cuft
Drainage Area	= 0.08 ac	Curve Number	= 89.00
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



EX-2-U Impervious

Hyd. No. 41

Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.568 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 24,100 cuft
Drainage Area	= 1.05 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

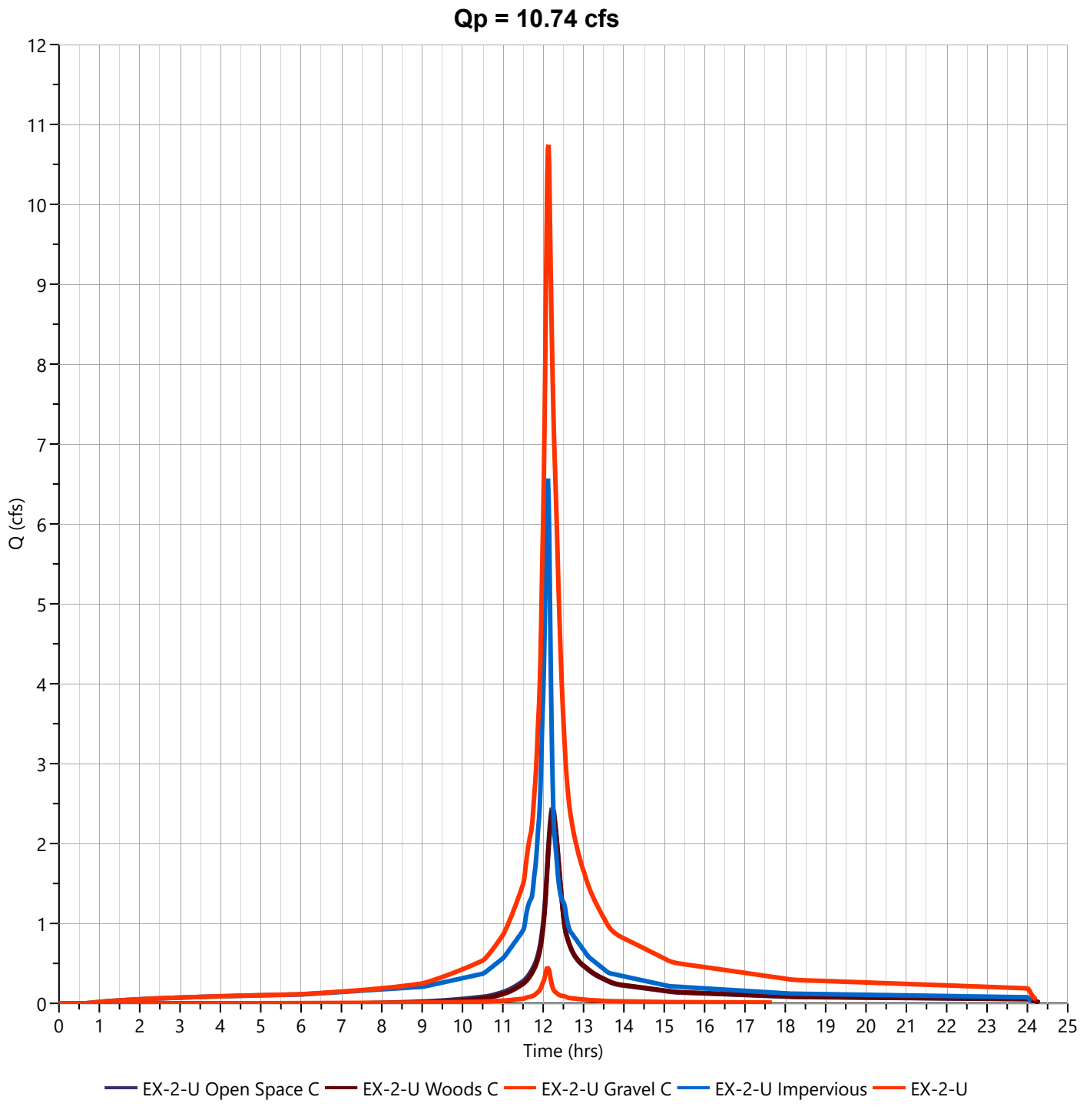
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-U

Hyd. No. 42

Hydrograph Type	= Junction	Peak Flow	= 10.74 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 46,998 cuft
Inflow Hydrographs	= 38, 39, 40, 41	Total Contrib. Area	= 2.94 ac



Hydrograph Report

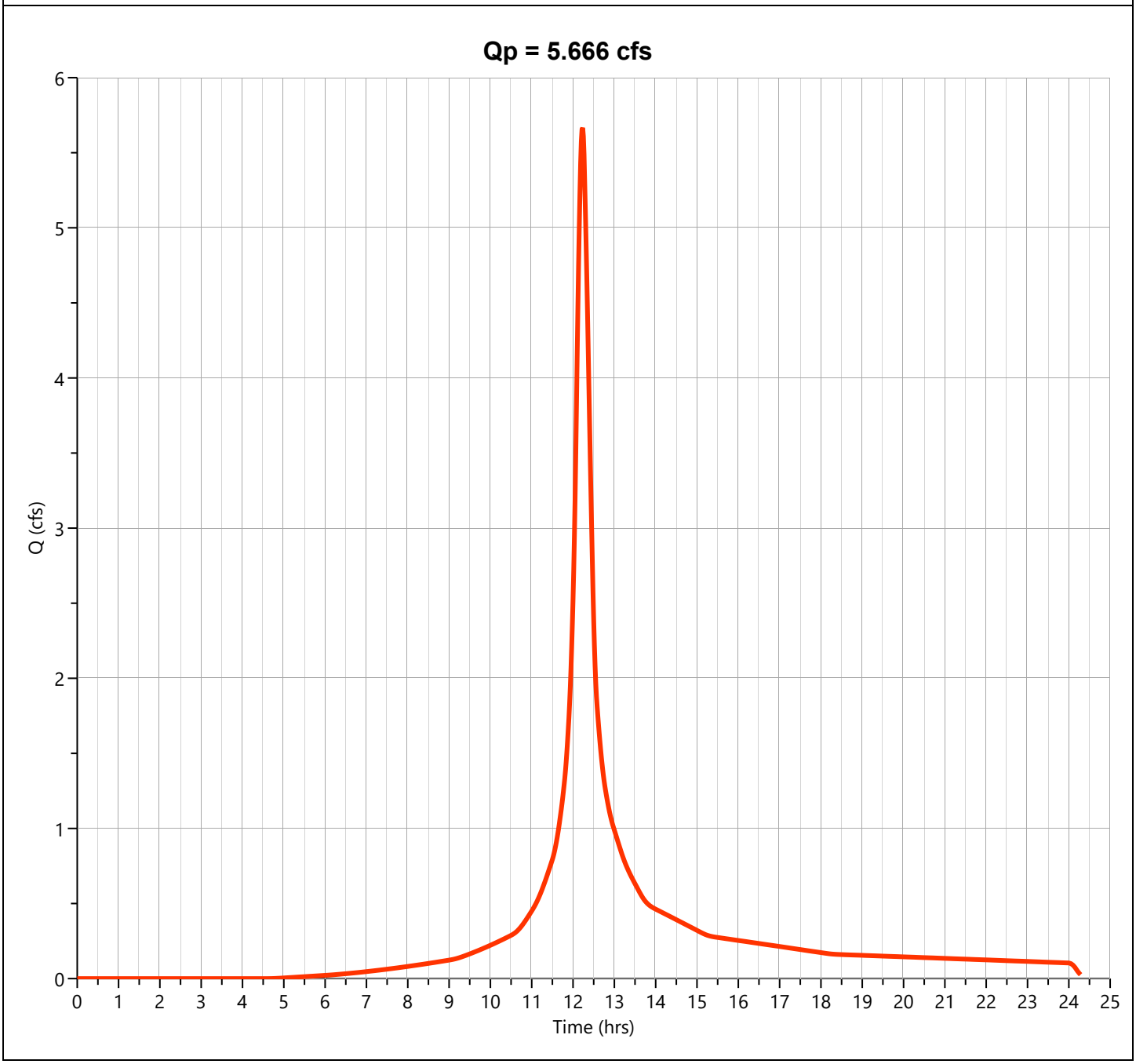
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-U Open Space C

Hyd. No. 38

Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.666 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Runoff Volume	= 25,433 cuft
Drainage Area	= 0.86 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 17.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

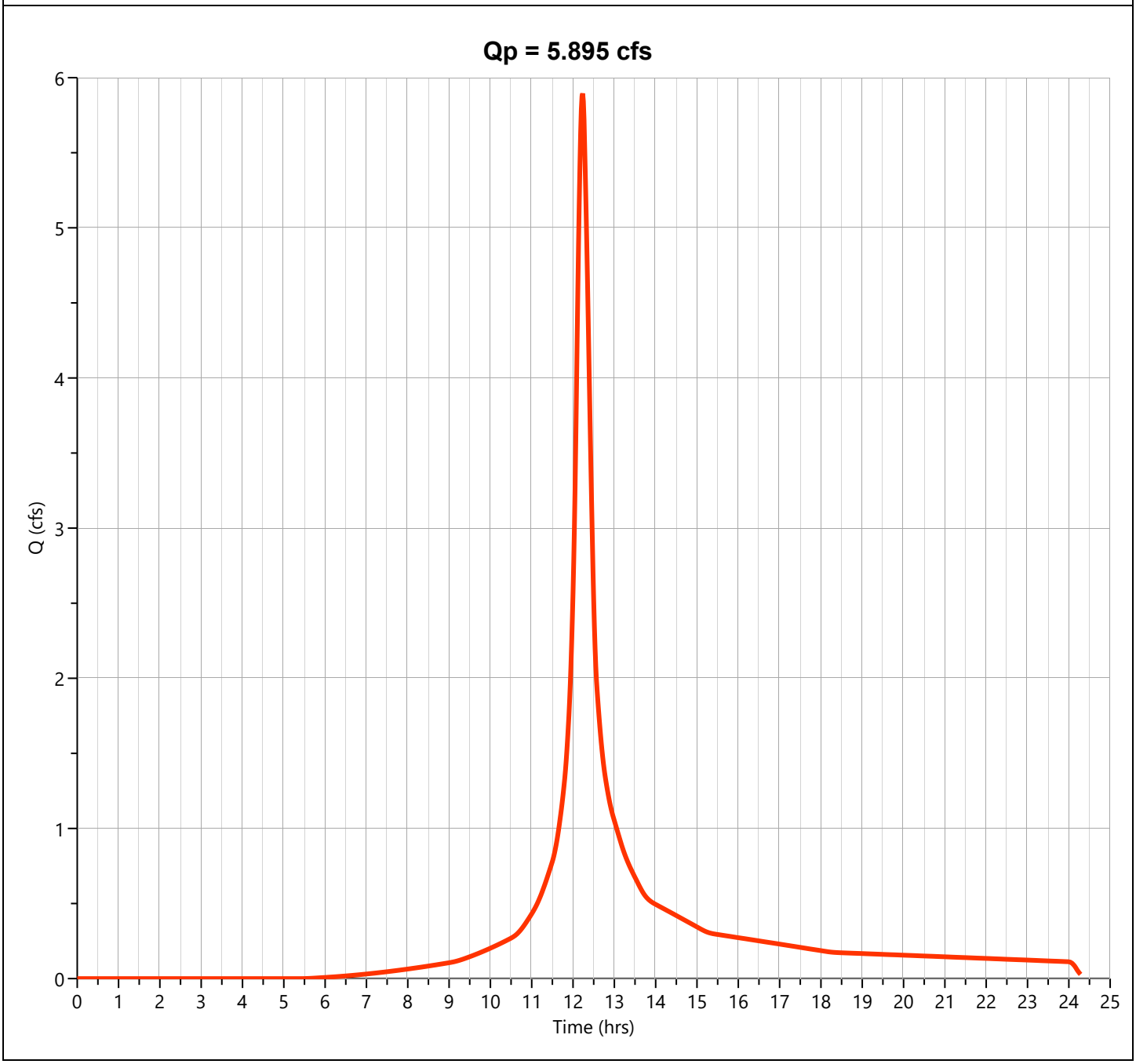
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-U Woods C

Hyd. No. 39

Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.895 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Runoff Volume	= 26,181 cuft
Drainage Area	= 0.95 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 17.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

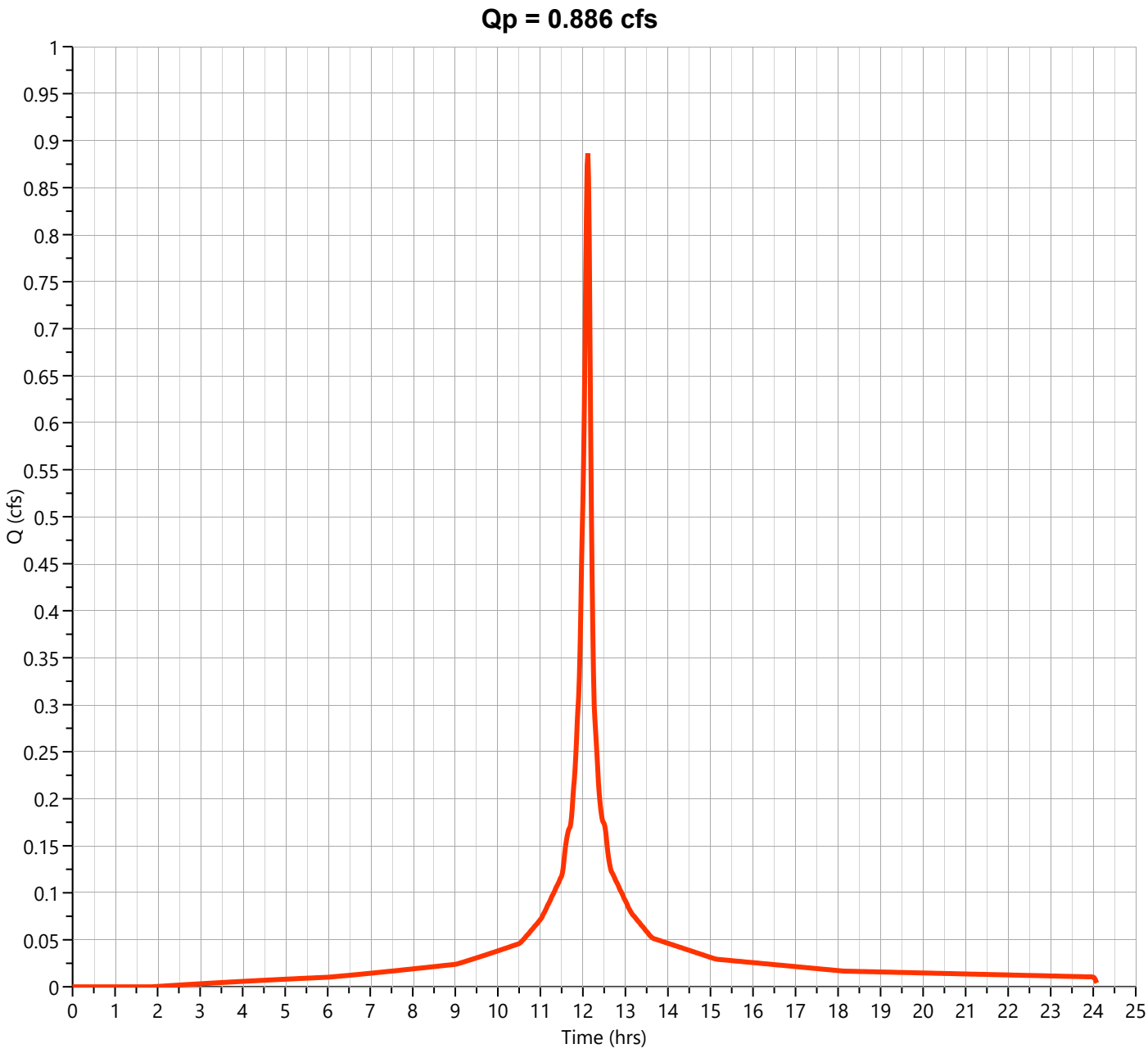
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-U Gravel C

Hyd. No. 40

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.886 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 3,066 cuft
Drainage Area	= 0.08 ac	Curve Number	= 89.00
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

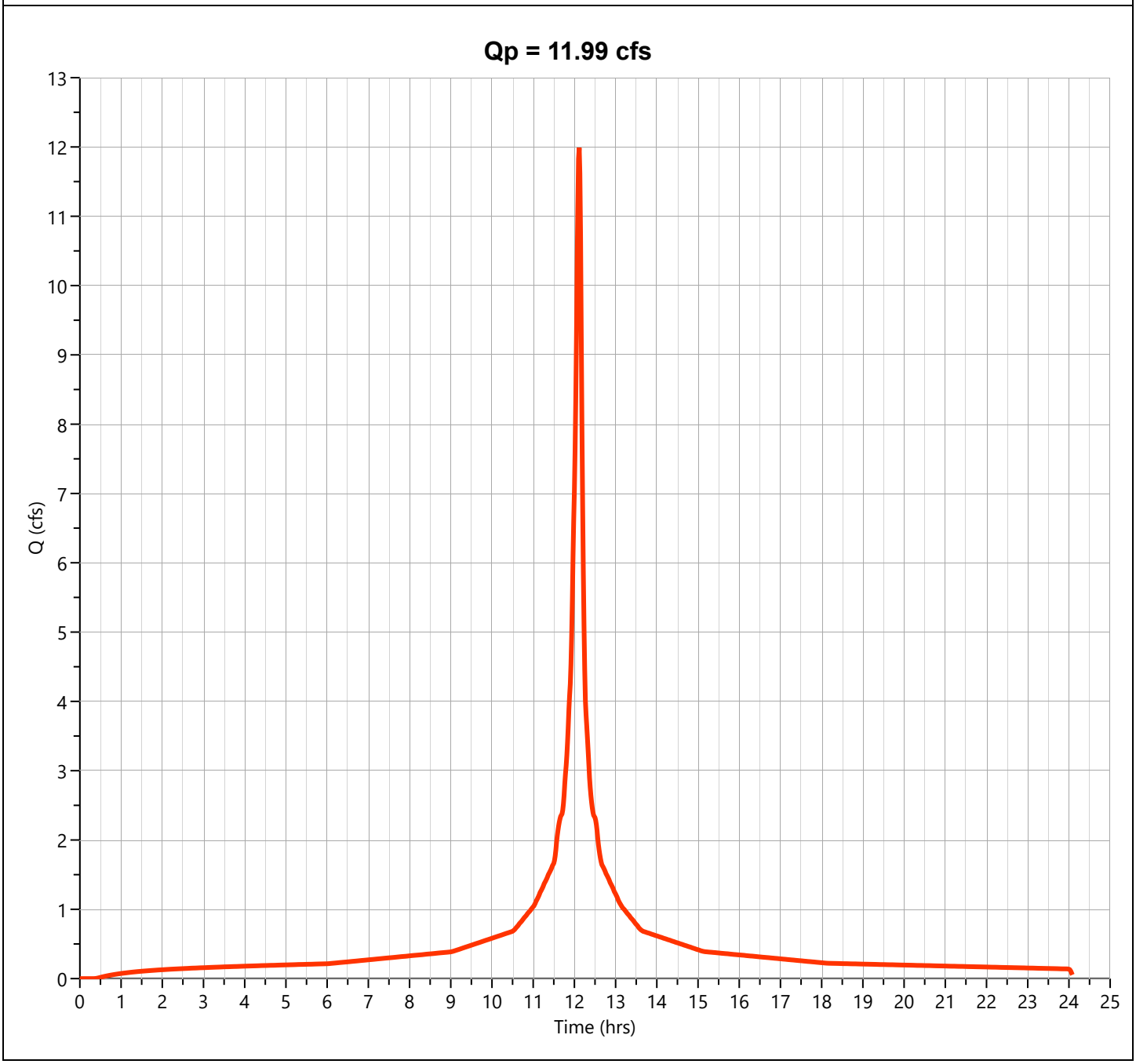
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-U Impervious

Hyd. No. 41

Hydrograph Type	= NRCS Runoff	Peak Flow	= 11.99 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 44,646 cuft
Drainage Area	= 1.05 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 5.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

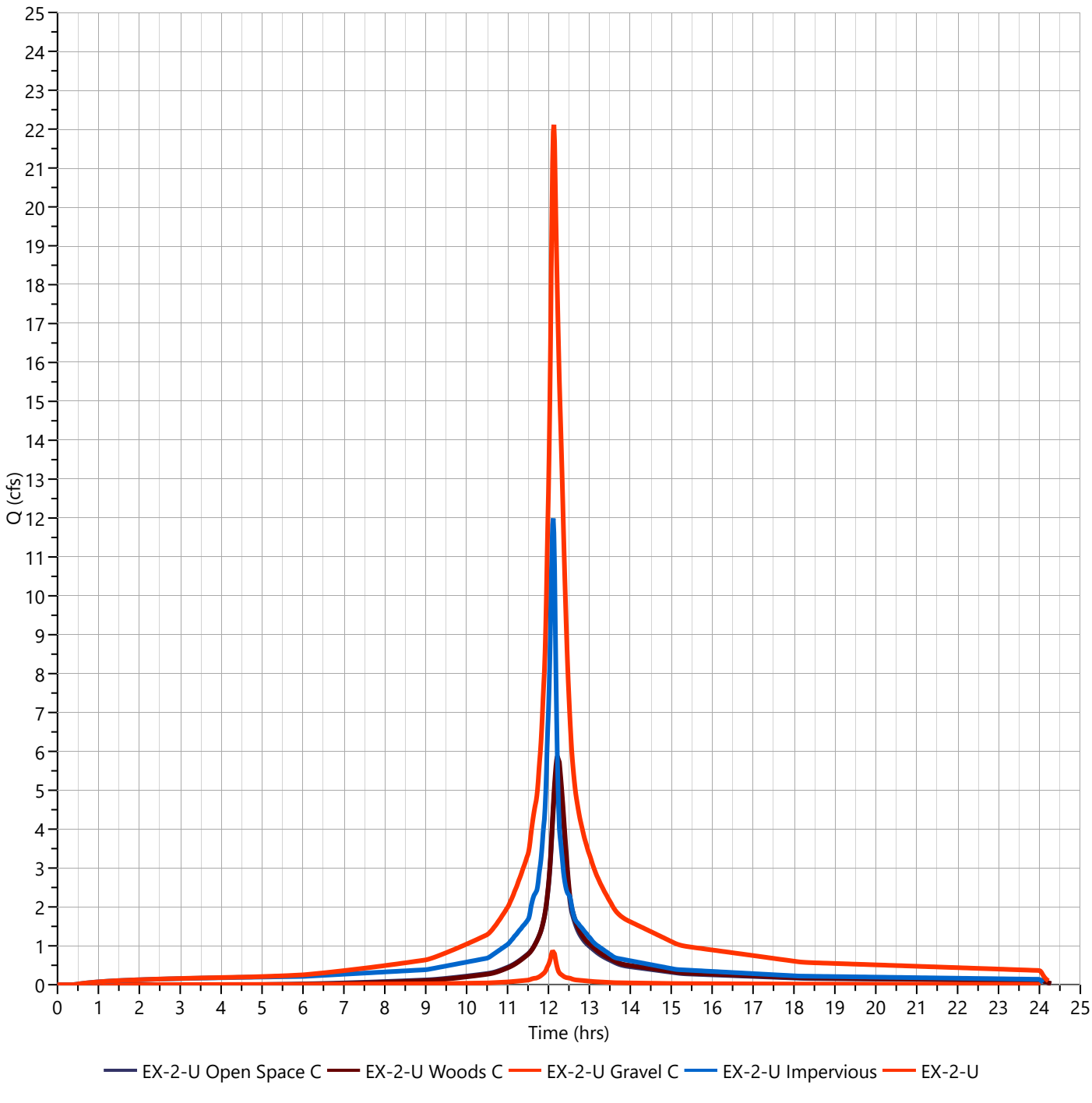
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

EX-2-U

Hyd. No. 42

Hydrograph Type	= Junction	Peak Flow	= 22.11 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 99,326 cuft
Inflow Hydrographs	= 38, 39, 40, 41	Total Contrib. Area	= 2.94 ac



TOTAL EXISTING FLOW TO POA-2

Hydrograph Report

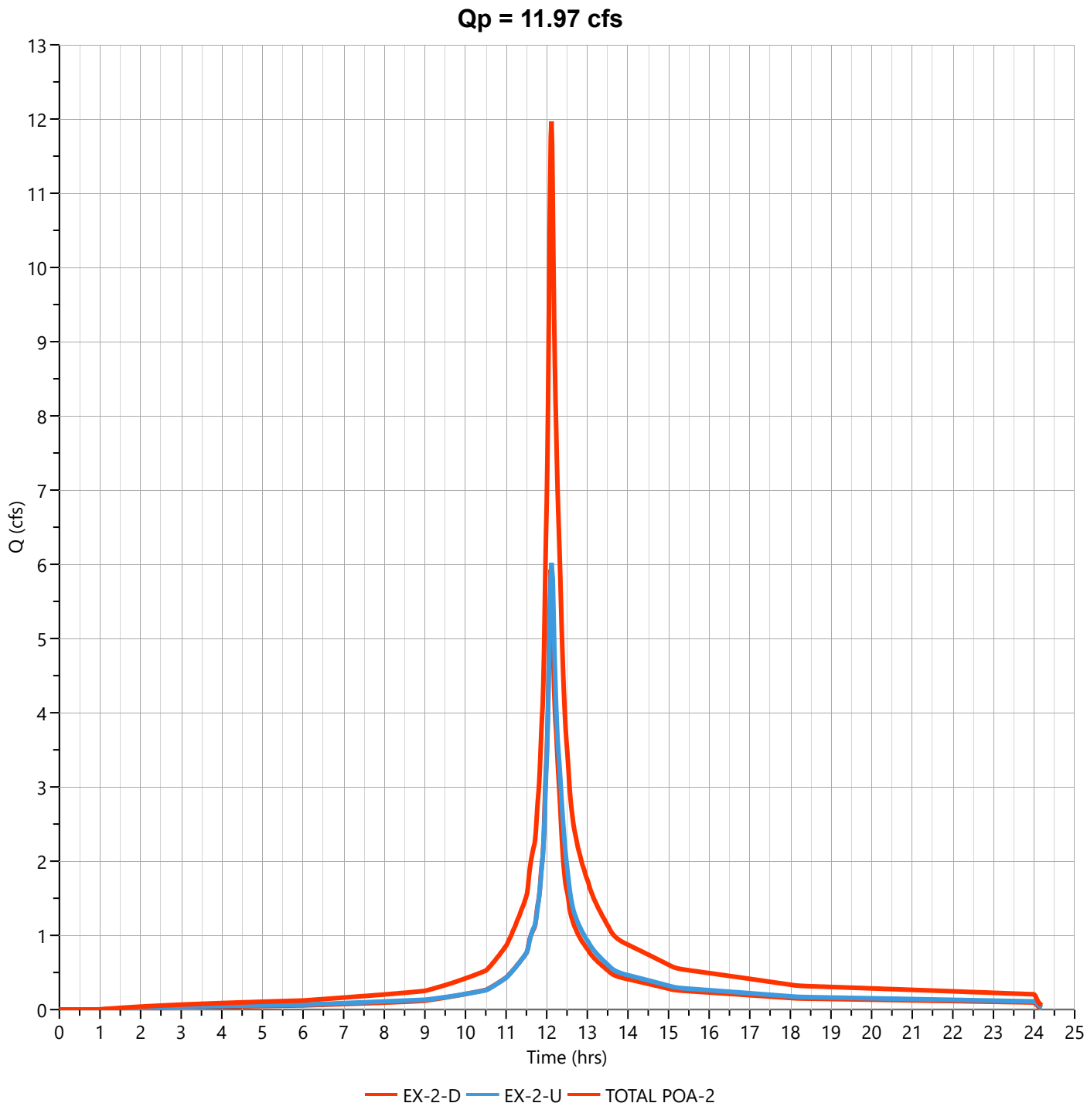
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

TOTAL POA-2

Hyd. No. 44

Hydrograph Type	= Junction	Peak Flow	= 11.97 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 49,371 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

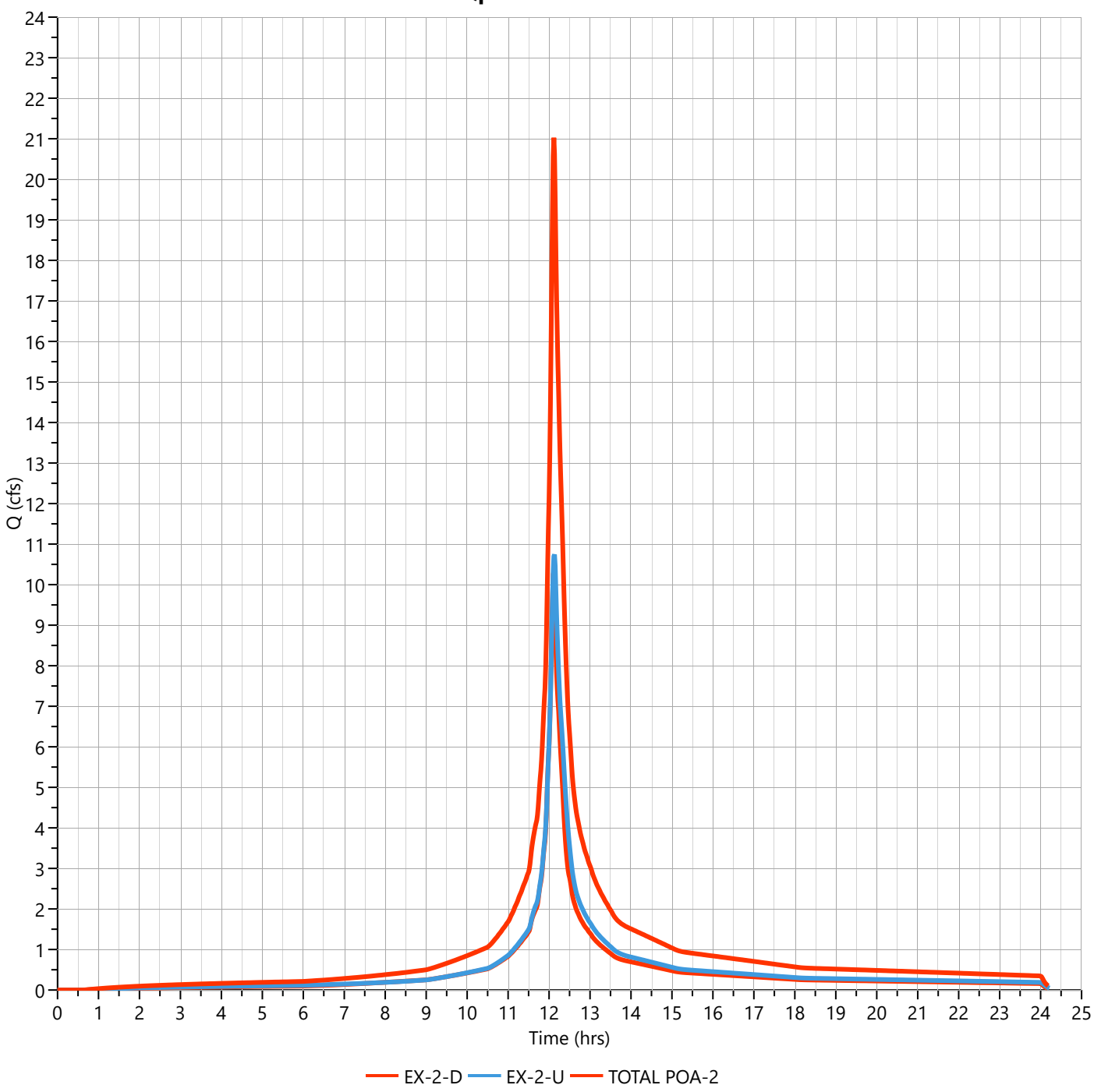
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

TOTAL POA-2

Hyd. No. 44

Hydrograph Type	= Junction	Peak Flow	= 21.02 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 88,816 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

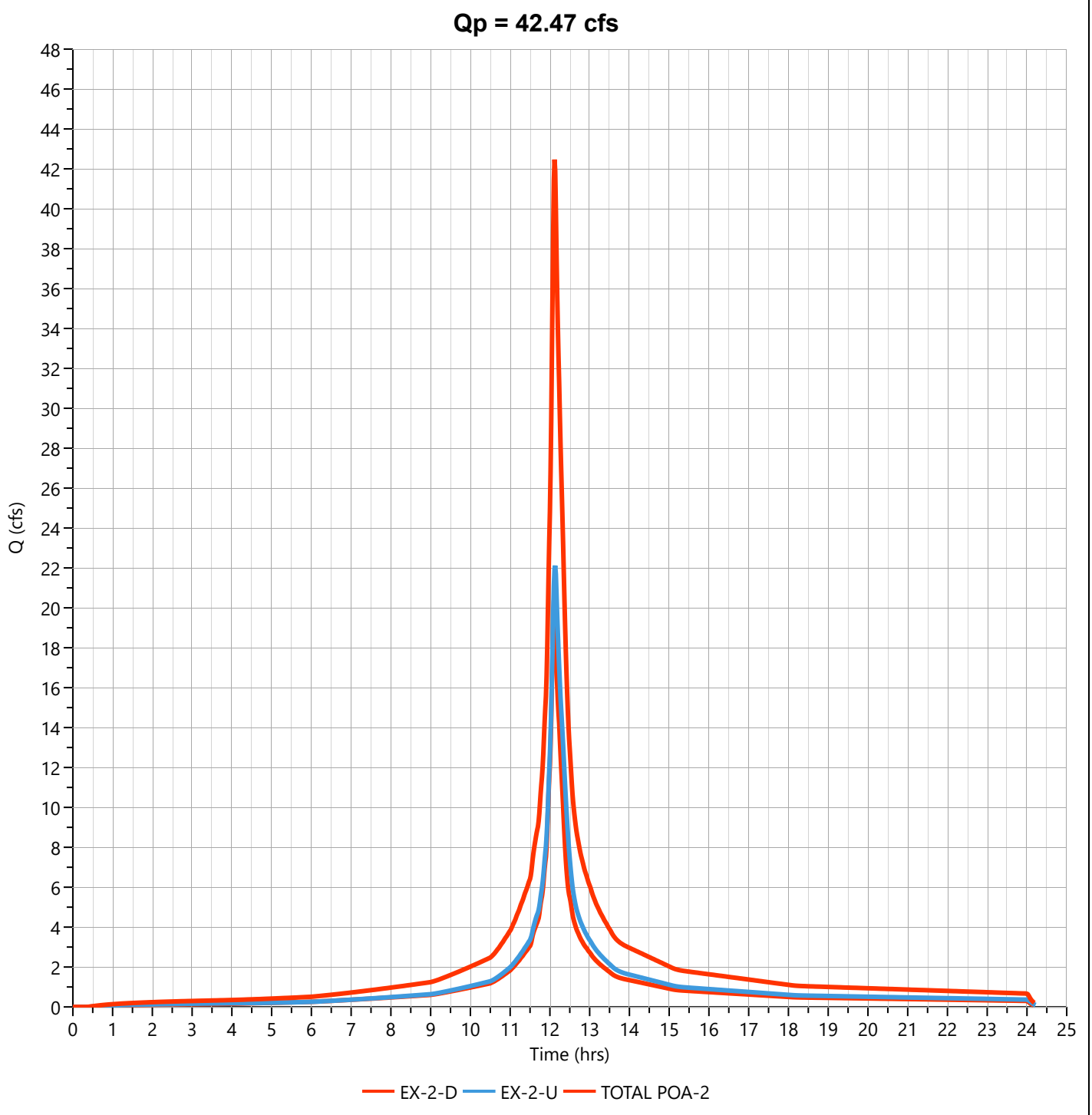
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

TOTAL POA-2

Hyd. No. 44

Hydrograph Type	= Junction	Peak Flow	= 42.47 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 185,037 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



TOTAL ALLOWABLE FLOW TO POA-2

Hydrograph Report

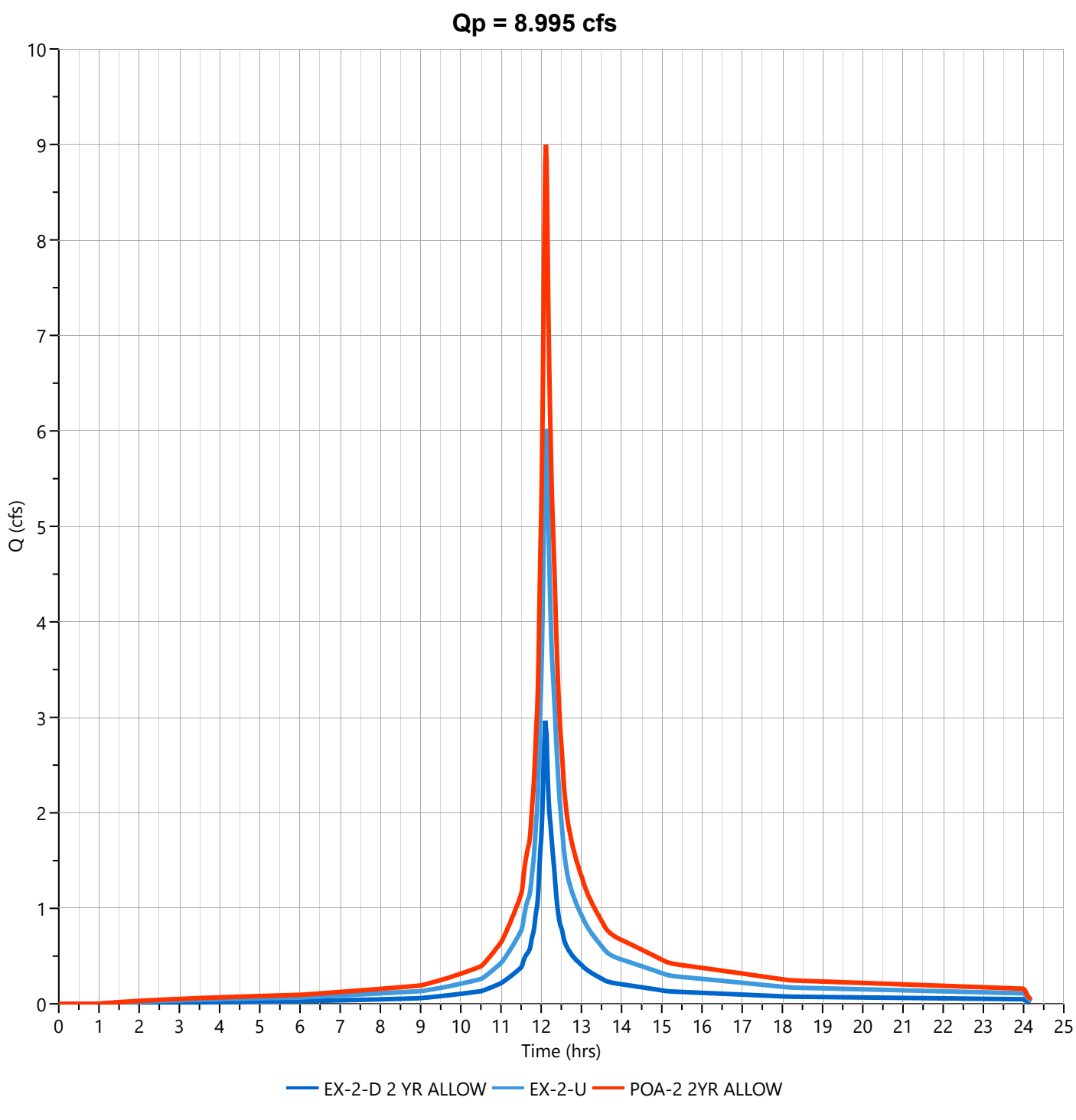
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

POA-2 2YR ALLOW

Hyd. No. 45

Hydrograph Type	= Junction	Peak Flow	= 8.995 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 37,589 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

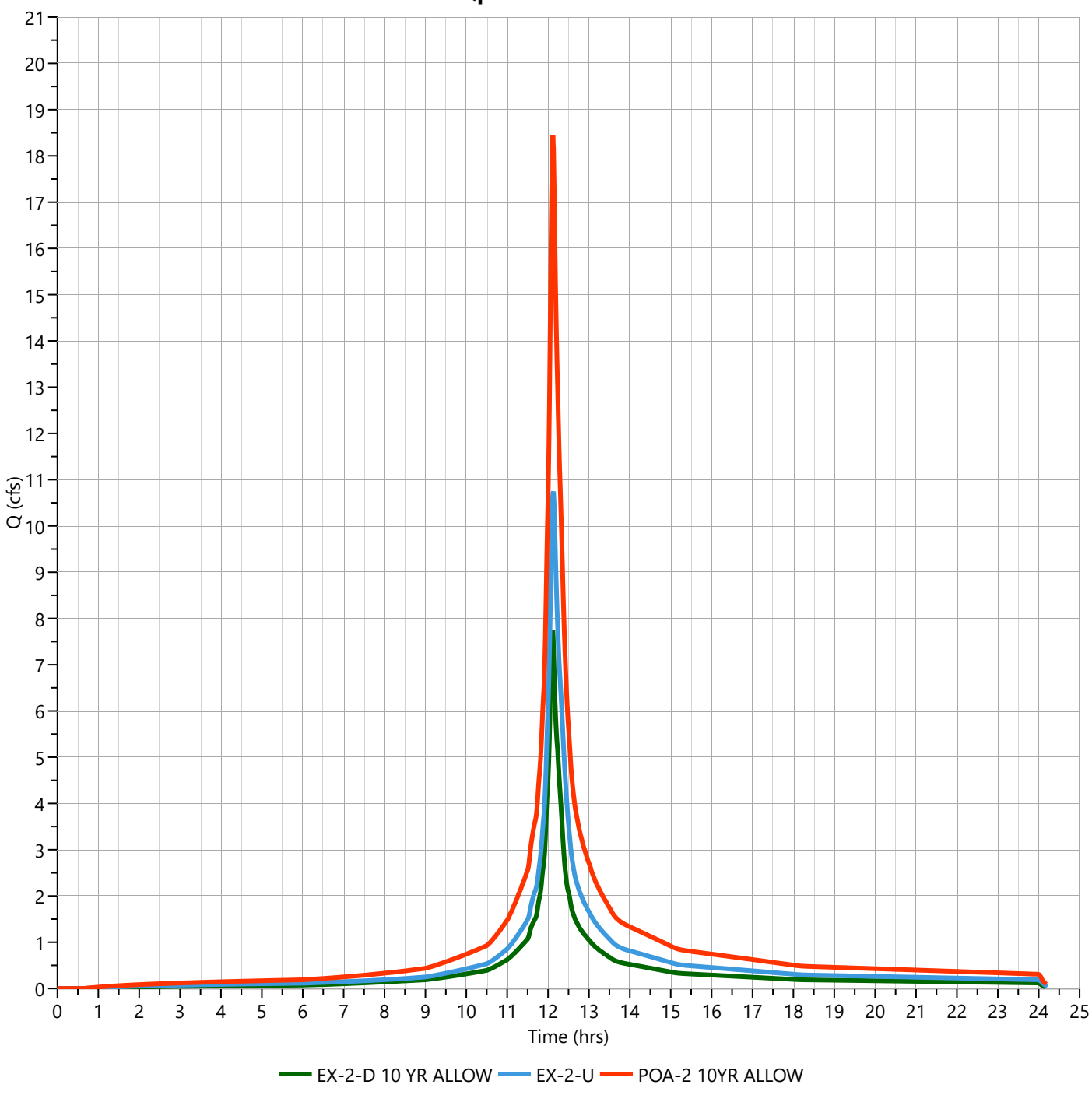
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

POA-2 10YR ALLOW

Hyd. No. 46

Hydrograph Type	= Junction	Peak Flow	= 18.44 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 78,361 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

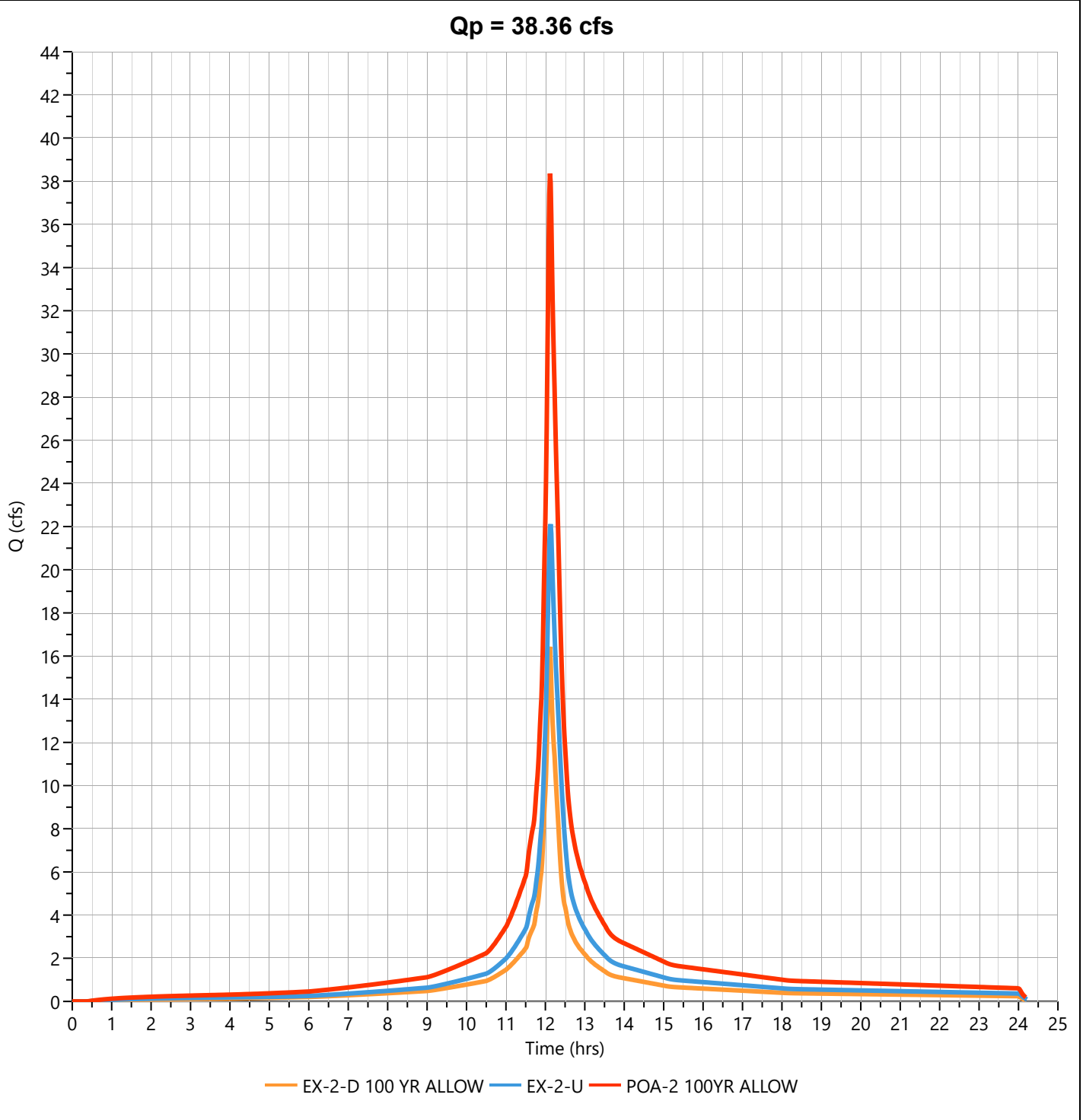
Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

POA-2 100YR ALLOW

Hyd. No. 47

Hydrograph Type	= Junction	Peak Flow	= 38.36 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 167,894 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



SUMMARY OF EXISTING PEAK DISCHARGES

Hydrograph 2-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys

10-21-2025

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-D Open Space D	1.274	12.18	4,896	----		
2	NRCS Runoff	EX-1-D Woods D	1.356	12.18	5,225	----		
3	NRCS Runoff	EX-1-D Impervious	0.359	12.12	1,295	----		
4	Junction	EX-1-D	2.885	12.17	11,416	1, 2, 3		
6	Diversion1	EX-1-D 2 YR ALLOW	1.443	12.17	5,708	4		
7	Diversion2	<name>	1.443	12.17	5,708	4		
8	Diversion1	EX-1-D 10 YR ALLOW	2.164	12.17	8,562	4		
9	Diversion2	<name>	0.721	12.17	2,854	4		
10	Diversion1	EX-1-D 100 YR ALLOW	2.308	12.17	9,133	4		
11	Diversion2	<name>	0.577	12.17	2,283	4		
13	NRCS Runoff	EX-1-U Open Space C	2.070	12.18	8,044	----		
14	NRCS Runoff	EX-1-U Woods C	0.871	12.18	3,460	----		
15	NRCS Runoff	EX-1-U Impervious	11.73	12.12	42,316	----		
16	Junction	EX-1-U	14.21	12.12	53,820	13, 14, 15		
18	Junction	TOTAL POA-1	16.83	12.12	65,237	4, 16		
19	Junction	POA-1 2 yr Allow	15.52	12.12	59,528	6, 16		
20	Junction	POA-1 10 yr Allow	16.18	12.12	62,383	8, 16		
21	Junction	POA-1 100yr Allow	16.31	12.12	62,953	10, 16		
25	NRCS Runoff	EX-2-D Open Space D	0.774	12.20	3,137	----		
26	NRCS Runoff	EX-2-D Woods D	1.707	12.20	6,941	----		
27	NRCS Runoff	EX-2-D Gravel D	0.261	12.10	786	----		
28	NRCS Runoff	EX-2-D Impervious	3.799	12.10	12,701	----		
30	Junction	EX-2-D	5.948	12.12	23,566	25, 26, 27, 28		
31	Diversion1	EX-2-D 2 YR ALLOW	2.974	12.12	11,783	30		
32	Diversion2	<name>	2.974	12.12	11,783	30		
33	Diversion1	EX-2-D 10 YR ALLOW	4.461	12.12	17,674	30		
34	Diversion2	<name>	1.487	12.12	5,891	30		
35	Diversion1	EX-2-D 100 YR ALLOW	4.758	12.12	18,852	30		
36	Diversion2	<name>	1.190	12.12	4,713	30		

Hydrograph 2-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

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	NRCS Runoff	EX-2-U Open Space C	1.147	12.23	5,109	----		
39	NRCS Runoff	EX-2-U Woods C	1.035	12.25	4,716	----		
40	NRCS Runoff	EX-2-U Gravel C	0.271	12.12	868	----		
41	NRCS Runoff	EX-2-U Impervious	4.188	12.12	15,113	----		
42	Junction	EX-2-U	6.021	12.12	25,806	38, 39, 40, 41		
44	Junction	TOTAL POA-2	11.97	12.12	49,371	30, 42		
45	Junction	POA-2 2YR ALLOW	8.995	12.12	37,589	31, 42		
46	Junction	POA-2 10YR ALLOW	10.48	12.12	43,480	33, 42		
47	Junction	POA-2 100YR ALLOW	10.78	12.12	44,658	35, 42		

Hydrograph 10-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys

10-21-2025

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-D Open Space D	2.457	12.18	9,562	----		
2	NRCS Runoff	EX-1-D Woods D	2.745	12.18	10,603	----		
3	NRCS Runoff	EX-1-D Impervious	0.563	12.12	2,066	----		
4	Junction	EX-1-D	5.617	12.17	22,230	1, 2, 3		
6	Diversion1	EX-1-D 2 YR ALLOW	2.809	12.17	11,115	4		
7	Diversion2	<name>	2.809	12.17	11,115	4		
8	Diversion1	EX-1-D 10 YR ALLOW	4.213	12.17	16,673	4		
9	Diversion2	<name>	1.404	12.17	5,558	4		
10	Diversion1	EX-1-D 100 YR ALLOW	4.494	12.17	17,784	4		
11	Diversion2	<name>	1.123	12.17	4,446	4		
13	NRCS Runoff	EX-1-U Open Space C	4.419	12.18	17,001	----		
14	NRCS Runoff	EX-1-U Woods C	2.017	12.18	7,758	----		
15	NRCS Runoff	EX-1-U Impervious	18.39	12.12	67,481	----		
16	Junction	EX-1-U	23.98	12.12	92,240	13, 14, 15		
18	Junction	TOTAL POA-1	29.21	12.13	114,471	4, 16		
19	Junction	POA-1 2 yr Allow	26.56	12.12	103,356	6, 16		
20	Junction	POA-1 10 yr Allow	27.85	12.13	108,913	8, 16		
21	Junction	POA-1 100yr Allow	28.13	12.13	110,025	10, 16		
25	NRCS Runoff	EX-2-D Open Space D	1.496	12.20	6,127	----		
26	NRCS Runoff	EX-2-D Woods D	3.463	12.20	14,085	----		
27	NRCS Runoff	EX-2-D Gravel D	0.434	12.10	1,352	----		
28	NRCS Runoff	EX-2-D Impervious	5.958	12.10	20,254	----		
30	Junction	EX-2-D	10.33	12.12	41,818	25, 26, 27, 28		
31	Diversion1	EX-2-D 2 YR ALLOW	5.163	12.12	20,909	30		
32	Diversion2	<name>	5.163	12.12	20,909	30		
33	Diversion1	EX-2-D 10 YR ALLOW	7.745	12.12	31,364	30		
34	Diversion2	<name>	2.582	12.12	10,454	30		
35	Diversion1	EX-2-D 100 YR ALLOW	8.262	12.12	33,454	30		
36	Diversion2	<name>	2.065	12.12	8,364	30		

Hydrograph 10-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

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	NRCS Runoff	EX-2-U Open Space C	2.460	12.23	10,797	----		
39	NRCS Runoff	EX-2-U Woods C	2.405	12.23	10,574	----		
40	NRCS Runoff	EX-2-U Gravel C	0.461	12.12	1,526	----		
41	NRCS Runoff	EX-2-U Impervious	6.568	12.12	24,100	----		
42	Junction	EX-2-U	10.74	12.13	46,998	38, 39, 40, 41		
44	Junction	TOTAL POA-2	21.02	12.12	88,816	30, 42		
45	Junction	POA-2 2YR ALLOW	15.86	12.12	67,907	31, 42		
46	Junction	POA-2 10YR ALLOW	18.44	12.12	78,361	33, 42		
47	Junction	POA-2 100YR ALLOW	18.96	12.12	80,452	35, 42		

Hydrograph 100-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys

10-21-2025

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-D Open Space D	5.206	12.17	21,042	----		
2	NRCS Runoff	EX-1-D Woods D	6.043	12.18	24,118	----		
3	NRCS Runoff	EX-1-D Impervious	1.028	12.12	3,827	----		
4	Junction	EX-1-D	12.04	12.17	48,987	1, 2, 3		
6	Diversion1	EX-1-D 2 YR ALLOW	6.021	12.17	24,494	4		
7	Diversion2	<name>	6.021	12.17	24,494	4		
8	Diversion1	EX-1-D 10 YR ALLOW	9.031	12.17	36,740	4		
9	Diversion2	<name>	3.010	12.17	12,247	4		
10	Diversion1	EX-1-D 100 YR ALLOW	9.633	12.17	39,190	4		
11	Diversion2	<name>	2.408	12.17	9,797	4		
13	NRCS Runoff	EX-1-U Open Space C	10.14	12.18	40,046	----		
14	NRCS Runoff	EX-1-U Woods C	4.921	12.18	19,208	----		
15	NRCS Runoff	EX-1-U Impervious	33.57	12.12	125,010	----		
16	Junction	EX-1-U	46.96	12.12	184,264	13, 14, 15		
18	Junction	TOTAL POA-1	58.39	12.13	233,251	4, 16		
19	Junction	POA-1 2 yr Allow	52.56	12.13	208,758	6, 16		
20	Junction	POA-1 10 yr Allow	55.47	12.13	221,004	8, 16		
21	Junction	POA-1 100yr Allow	56.05	12.13	223,454	10, 16		
25	NRCS Runoff	EX-2-D Open Space D	3.174	12.20	13,483	----		
26	NRCS Runoff	EX-2-D Woods D	7.636	12.20	32,040	----		
27	NRCS Runoff	EX-2-D Gravel D	0.820	12.10	2,666	----		
28	NRCS Runoff	EX-2-D Impervious	10.88	12.10	37,521	----		
30	Junction	EX-2-D	20.54	12.12	85,710	25, 26, 27, 28		
31	Diversion1	EX-2-D 2 YR ALLOW	10.27	12.12	42,855	30		
32	Diversion2	<name>	10.27	12.12	42,855	30		
33	Diversion1	EX-2-D 10 YR ALLOW	15.40	12.12	64,283	30		
34	Diversion2	<name>	5.134	12.12	21,428	30		
35	Diversion1	EX-2-D 100 YR ALLOW	16.43	12.12	68,568	30		
36	Diversion2	<name>	4.107	12.12	17,142	30		

Hydrograph 100-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Existing (Future).hys
10-21-2025

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	NRCS Runoff	EX-2-U Open Space C	5.666	12.23	25,433	----		
39	NRCS Runoff	EX-2-U Woods C	5.895	12.23	26,181	----		
40	NRCS Runoff	EX-2-U Gravel C	0.886	12.12	3,066	----		
41	NRCS Runoff	EX-2-U Impervious	11.99	12.12	44,646	----		
42	Junction	EX-2-U	22.11	12.13	99,326	38, 39, 40, 41		
44	Junction	TOTAL POA-2	42.47	12.12	185,037	30, 42		
45	Junction	POA-2 2YR ALLOW	32.20	12.12	142,182	31, 42		
46	Junction	POA-2 10YR ALLOW	37.33	12.12	163,609	33, 42		
47	Junction	POA-2 100YR ALLOW	38.36	12.12	167,894	35, 42		

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-DISTURBED 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-1A-UNDISTURBED 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-1A WATERSHED (COMBINED PROPOSED FLOW TO SSBB-1)**
  - **2 Year Design Storm Event**
  - **10 Year Design Storm Event**
  - **25 Year Design Storm Event**
  - **100 Year Design Storm Event**
- **PR-1B-DISTURBED 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-UNDISTURBED 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 (COMBINED PROPOSED FLOW TO SWALE 1)**
  - **2 Year Design Storm Event**
  - **10 Year Design Storm Event**
  - **25 Year Design Storm Event**
  - **100 Year Design Storm Event**

PR-1C-DISTURBED 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-UNDISTURBED 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**

TOTAL 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-DISTURBED 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-2A-UNDISTURBED 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-2A WATERSHED (COMBINED PROPOSED FLOW TO SSBB-2)

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

PR-2B-DISTURBED 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-UNDISTURBED 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 (COMBINED PROPOSED FLOW TO PAPS-1)
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

PR-2C-DISTURBED 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-UNDISTURBED 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**

TOTAL 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**

SUMMARY OF PROPOSED PEAK DISCHARGES

FUTURE HYDROGRAPH CALCULATIONS

PR-1A-DISTURBED 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-1A-UNDISTURBED 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-1A WATERSHED (COMBINED PROPOSED FLOW TO SSBB-1)

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

PR-1B-DISTURBED 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-UNDISTURBED 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 (COMBINED PROPOSED FLOW TO SWALE 1)

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

PR-1C-DISTURBED 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-UNDISTURBED 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**

TOTAL 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-DISTURBED 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-2A-UNDISTURBED 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-2A WATERSHED (COMBINED PROPOSED FLOW TO SSBB-2)

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

PR-2B-DISTURBED 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-UNDISTURBED 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 (COMBINED PROPOSED FLOW TO PAPS-1)

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

PR-2C-DISTURBED 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-UNDISTURBED 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**

TOTAL 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**

SUMMARY OF PROPOSED PEAK DISCHARGES

NOAA RAINFALL PRECIPITATION DATA

NOAA Atlas 14, Volume 2, Version 3
Location name: West Orange, New Jersey, USA*
Latitude: 40.8124°, Longitude: -74.2707°
Elevation: 539 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)	**0.401** (0.367-0.440)	**0.474** (0.433-0.521)	**0.529** (0.481-0.580)	**0.594** (0.539-0.651)	**0.639** (0.578-0.700)	**0.684** (0.615-0.749)	**0.728** (0.650-0.797)	**0.778** (0.689-0.854)	**0.815** (0.716-0.897)
10-min	**0.535** (0.489-0.588)	**0.640** (0.585-0.702)	**0.757** (0.691-0.831)	**0.840** (0.764-0.921)	**0.940** (0.852-1.03)	**1.01** (0.913-1.11)	**1.08** (0.970-1.18)	**1.14** (1.02-1.25)	**1.22** (1.08-1.34)	**1.27** (1.12-1.40)
15-min	**0.667** (0.609-0.732)	**0.801** (0.732-0.879)	**0.954** (0.870-1.05)	**1.06** (0.964-1.16)	**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)	**1.59** (1.40-1.75)
30-min	**0.910** (0.831-0.999)	**1.10** (1.01-1.21)	**1.35** (1.23-1.48)	**1.52** (1.39-1.67)	**1.75** (1.59-1.92)	**1.91** (1.73-2.09)	**2.07** (1.86-2.27)	**2.22** (1.98-2.43)	**2.41** (2.13-2.65)	**2.55** (2.24-2.80)
60-min	**1.13** (1.03-1.24)	**1.38** (1.26-1.51)	**1.72** (1.57-1.89)	**1.98** (1.80-2.17)	**2.32** (2.10-2.54)	**2.58** (2.33-2.82)	**2.84** (2.55-3.11)	**3.10** (2.77-3.39)	**3.44** (3.05-3.78)	**3.70** (3.26-4.08)
2-hr	**1.39** (1.27-1.52)	**1.69** (1.54-1.86)	**2.14** (1.95-2.35)	**2.49** (2.27-2.74)	**2.98** (2.69-3.26)	**3.38** (3.03-3.70)	**3.79** (3.38-4.14)	**4.22** (3.73-4.62)	**4.82** (4.21-5.28)	**5.29** (4.58-5.81)
3-hr	**1.55** (1.42-1.70)	**1.89** (1.73-2.08)	**2.40** (2.19-2.63)	**2.79** (2.54-3.06)	**3.34** (3.02-3.66)	**3.79** (3.41-4.14)	**4.24** (3.80-4.64)	**4.73** (4.19-5.17)	**5.39** (4.73-5.90)	**5.93** (5.15-6.49)
6-hr	**2.00** (1.84-2.20)	**2.44** (2.23-2.66)	**3.08** (2.82-3.36)	**3.61** (3.29-3.93)	**4.36** (3.94-4.74)	**4.98** (4.47-5.41)	**5.65** (5.03-6.13)	**6.36** (5.61-6.90)	**7.40** (6.43-8.04)	**8.25** (7.09-8.97)
12-hr	**2.50** (2.29-2.76)	**3.04** (2.78-3.34)	**3.87** (3.53-4.25)	**4.56** (4.15-5.00)	**5.58** (5.02-6.09)	**6.46** (5.76-7.03)	**7.41** (6.54-8.05)	**8.46** (7.38-9.20)	**10.0** (8.57-10.9)	**11.3** (9.55-12.3)
24-hr	**2.84** (2.63-3.08)	**3.43** (3.18-3.73)	**4.40** (4.06-4.78)	**5.22** (4.81-5.67)	**6.46** (5.90-7.00)	**7.53** (6.84-8.16)	**8.72** (7.83-9.45)	**10.1** (8.92-10.9)	**12.0** (10.5-13.1)	**13.8** (11.8-15.0)
2-day	**3.35** (3.10-3.64)	**4.06** (3.75-4.41)	**5.18** (4.78-5.63)	**6.12** (5.63-6.64)	**7.49** (6.85-8.13)	**8.65** (7.87-9.40)	**9.92** (8.95-10.8)	**11.3** (10.1-12.3)	**13.4** (11.7-14.7)	**15.1** (13.1-16.6)
3-day	**3.52** (3.26-3.82)	**4.26** (3.95-4.62)	**5.42** (5.01-5.88)	**6.38** (5.88-6.91)	**7.76** (7.12-8.41)	**8.93** (8.14-9.68)	**10.2** (9.22-11.1)	**11.6** (10.4-12.6)	**13.6** (12.0-14.8)	**15.3** (13.3-16.8)
4-day	**3.70** (3.43-4.00)	**4.47** (4.15-4.84)	**5.66** (5.24-6.12)	**6.64** (6.13-7.18)	**8.04** (7.39-8.68)	**9.21** (8.41-9.96)	**10.5** (9.49-11.3)	**11.8** (10.6-12.8)	**13.8** (12.2-15.0)	**15.4** (13.5-16.9)
7-day	**4.37** (4.07-4.72)	**5.25** (4.89-5.66)	**6.52** (6.07-7.03)	**7.57** (7.03-8.15)	**9.08** (8.37-9.77)	**10.3** (9.46-11.1)	**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** (4.70-5.39)	**6.00** (5.61-6.44)	**7.34** (6.86-7.88)	**8.44** (7.86-9.05)	**9.99** (9.26-10.7)	**11.3** (10.4-12.1)	**12.6** (11.5-13.6)	**14.0** (12.7-15.1)	**16.0** (14.3-17.4)	**17.6** (15.6-19.2)
20-day	**6.79** (6.38-7.23)	**8.06** (7.57-8.58)	**9.62** (9.03-10.2)	**10.8** (10.2-11.5)	**12.5** (11.7-13.3)	**13.8** (12.8-14.7)	**15.1** (14.0-16.1)	**16.4** (15.1-17.6)	**18.2** (16.6-19.6)	**19.6** (17.7-21.1)
30-day	**8.46** (8.00-8.94)	**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** (14.9-16.9)	**17.2** (16.1-18.2)	**18.4** (17.1-19.5)	**19.9** (18.4-21.3)	**21.1** (19.4-22.6)
45-day	**10.7** (10.2-11.3)	**12.6** (12.0-13.3)	**14.6** (13.8-15.3)	**16.0** (15.2-16.9)	**17.9** (16.9-18.9)	**19.3** (18.2-20.4)	**20.7** (19.4-21.8)	**21.9** (20.6-23.2)	**23.6** (22.0-25.0)	**24.8** (23.0-26.4)
60-day	**12.9** (12.2-13.6)	**15.1** (14.4-15.9)	**17.3** (16.4-18.2)	**18.9** (17.9-19.8)	**20.9** (19.8-22.0)	**22.3** (21.1-23.5)	**23.7** (22.4-25.0)	**25.0** (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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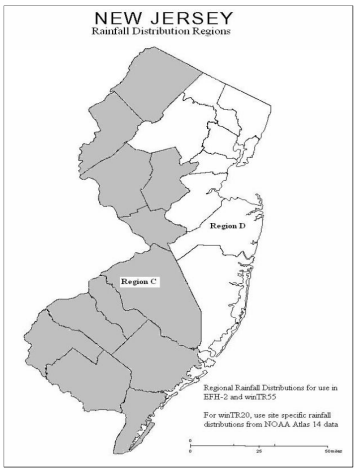
PF graphical

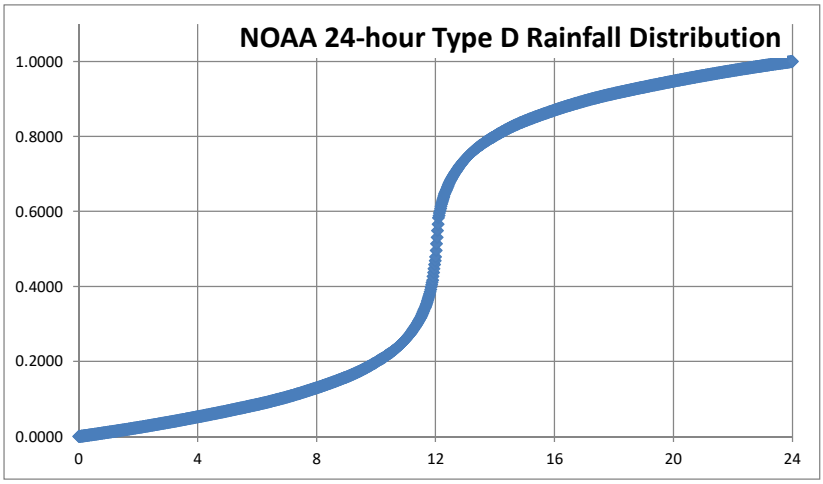
Frequency of Storms	NOAA NWS PFDS 24-Hour Rainfall Depth (inches)	Current Precipitation Adjustment Factor for Essex County	Current Rainfall Depth (inches)	Future Precipitation Adjustment Factor for Essex County	Future Rainfall Depth (inches)
2-Year	3.43	1.01	3.46	1.19	4.08
10-Year	5.22	1.03	5.38	1.22	6.37
25-Year[1]	6.46	1.04	6.72	1.26	8.13
100-Year	8.72	1.06	9.24	1.33	11.60

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

PROPOSED RUNOFF CURVE NUMBER CALCULATIONS

PROPOSED RUNOFF CURVE NUMBER CALCULATIONS
CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS
LANGAN PROJECT #101049802

PROPOSED CONDITIONS

PROPOSED CONDITIONS	OPEN SPACE	OPEN SPACE	WOODS	WOODS	GRAVEL	GRAVEL	OPEN SPACE	OPEN SPACE	WOODS	WOODS	IMPERVIOUS	IMPERVIOUS	TOTAL	TOTAL	CURVE
WATERSHED	HSGC C	HSGC C	HSGC C	HSGC C	HSGC C	HSGC C	HSGC D	HSGC D	HSGC D	HSGC D	AREA	AREA	AREA	AREA	NUMBER
AREAS	CN = 74	CN = 74	CN = 70	CN = 70	CN = 89	CN = 89	CN = 80	CN = 80	CN = 77	CN = 77	CN = 98	CN = 98			CN
	(SF)	(AC)	(SF)	(AC)	(SF)	(AC)	(SF)	(AC)	(SF)	(AC)	(SF)	(AC)	(SF)	(AC)	(Weighted)
POA-1															
PR-1A-DISTURBED	0	0.00	0	0.00	0	0.00	14,616	0.33	0	0.00	13,749	0.32	28,365	0.65	89
PR-1A-UNDISTURBED	14,197	0.33	3,545	0.08	0	0.00	0	0.00	0	0.00	21,867	0.50	39,609	0.91	87
PR-1B-DISTURBED	0	0.00	0	0.00	0	0.00	14,998	0.35	0	0.00	146	0.00	15,144	0.35	80
PR-1B-UNDISTURBED	12,719	0.29	26,663	0.62	0	0.00	0	0.00	0	0.00	51,618	1.18	91,000	2.09	86
PR-1C-DISTURBED	0	0.00	0	0.00	0	0.00	14,133	0.32	0	0.00	4,828	0.11	18,961	0.44	85
PR-1C-UNDISTURBED	31,706	0.73	0	0.00	0	0.00	0	0.00	0	0.00	48,875	1.12	80,582	1.85	89
POA-2															
PR-2A-DISTURBED	0	0.00	0	0.00	0	0.00	34,997	0.80	0	0.00	18,381	0.42	53,378	1.22	86
PR-2A-UNDISTURBED	7,960	0.18	7,646	0.18	0	0.00	0	0.00	0	0.00	29,520	0.68	45,126	1.04	89
PR-2B-DISTURBED	0	0.00	0	0.00	0	0.00	1,485	0.03	0	0.00	16,015	0.37	17,500	0.40	96
PR-2B-UNDISTURBED	305	0.01	0	0.00	0	0.00	0	0.00	0	0.00	1,247	0.03	1,552	0.04	93
PR-2C-DISTURBED	0	0.00	0	0.00	0	0.00	25,256	0.58	0	0.00	12,494	0.29	37,749	0.87	86
PR-2C-UNDISTURBED	29,536	0.68	33,782	0.77	3,700	0.08	0	0.00	0	0.00	20,774	0.48	87,792	2.01	79

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 Lands. Pervious areas are assumed to be in good hydrologic condition.

CURRENT HYDROGRAPH CALCULATIONS

PR-1A-DISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: Present **(Developed)** — **Current Proposed Watershed PR-1A-D - 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	85		
4.	Two-year 24-hr rainfall, P_2		in	3.46		
5.	Land Slope, s		ft/ft	0.034		
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	2		
8.	Surface Description			Pavement		
9.	Flow Length, L		ft	105		
10.	Watercourse Slope, s		ft/ft	0.008		
11.	Average Velocity, V (NEH table 15-3)		ft/s	1.86		
12.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.016	+	+

Shallow Conc. Flow Sub-Total: **0.016 hours**

Channel Flow

			Segment ID	3	4	5
13.	Flow Length, L		ft	30	66	96
14.	Cross Sectional flow area, a		ft^2	0.61	0.61	0.61
15.	Wetted Perimeter, P_w		ft	2.00	2.00	2.00
16.	Hydraulic Radius, r	$r = a / P_w$	ft	0.31	0.31	0.31
17.	Channel Slope, s		ft/ft	0.005	0.070	0.080
18.	Manning's Roughness Coeff., n			0.012	0.012	0.012
19.	Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	3.98	14.89	15.91
20.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.002	+ 0.001	+ 0.002

Channel Flow Sub-Total: **0.005 hours**

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

Total Tc (hours) =	**0.034 hours**
Total Tc (minutes) =	**2 minutes**

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: Present **(Developed)** — **Current Proposed Watershed PR-1A-D - 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	100		
4.	Two-year 24-hr rainfall, P_2	in	3.46		
5.	Land Slope, s	ft/ft	0.095		
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	0.123	+	+
				Sheet Flow Sub-Total	0.123 hours

Shallow Concentrated Flow		Segment ID	2		
8.	Surface Description		Grassed Waterways		
9.	Flow Length, L	ft	105		
10.	Watercourse Slope, s	ft/ft	0.213		
11.	Average Velocity, V (NEH table 15-3)	ft/s	7.45		
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			
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) =	**0.127 hours**
	Total Tc (minutes) =	**8 minutes**

Hydrograph Report

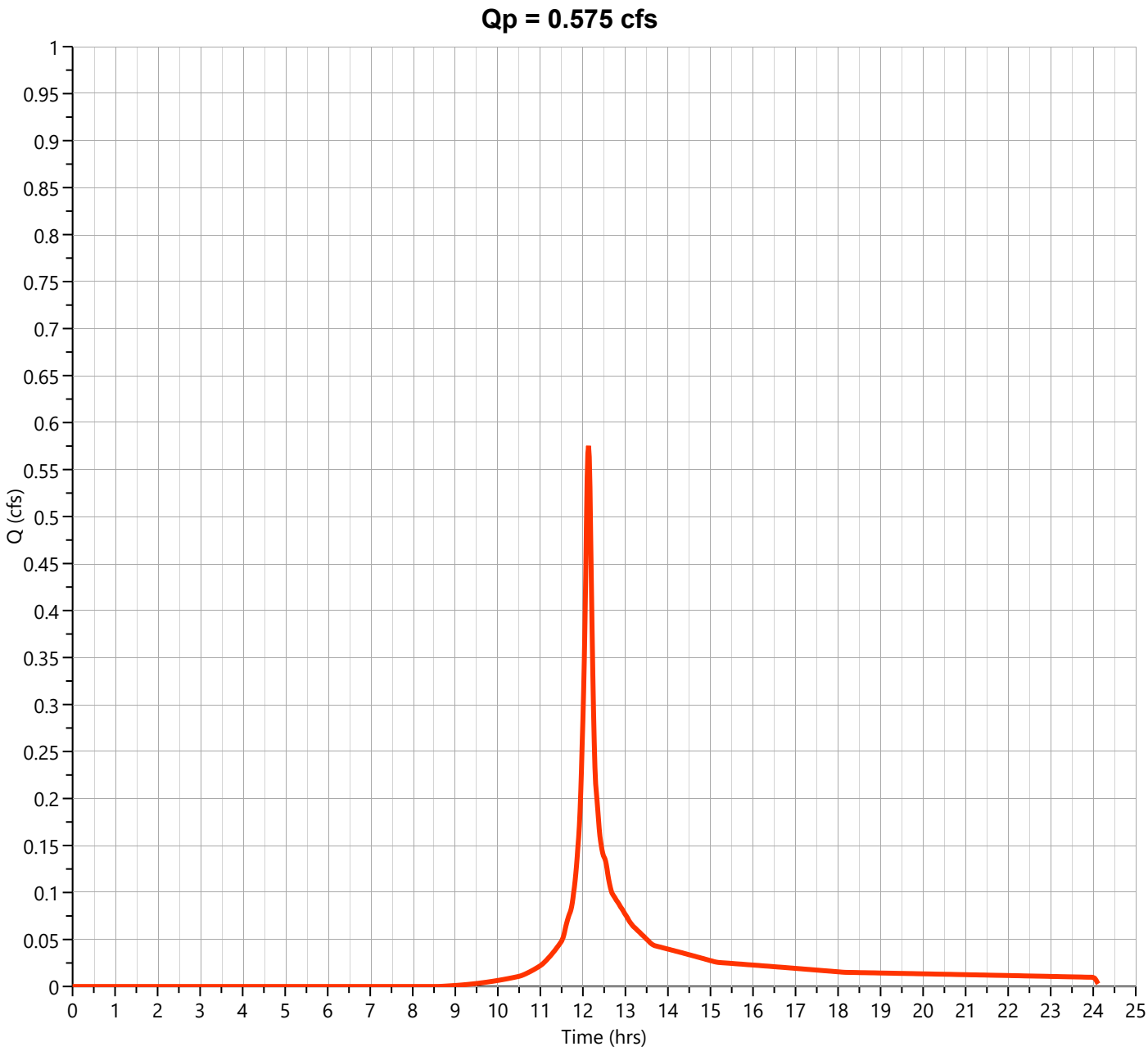
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-D Grass D

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.575 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 1,874 cuft
Drainage Area	= 0.33 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 8.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

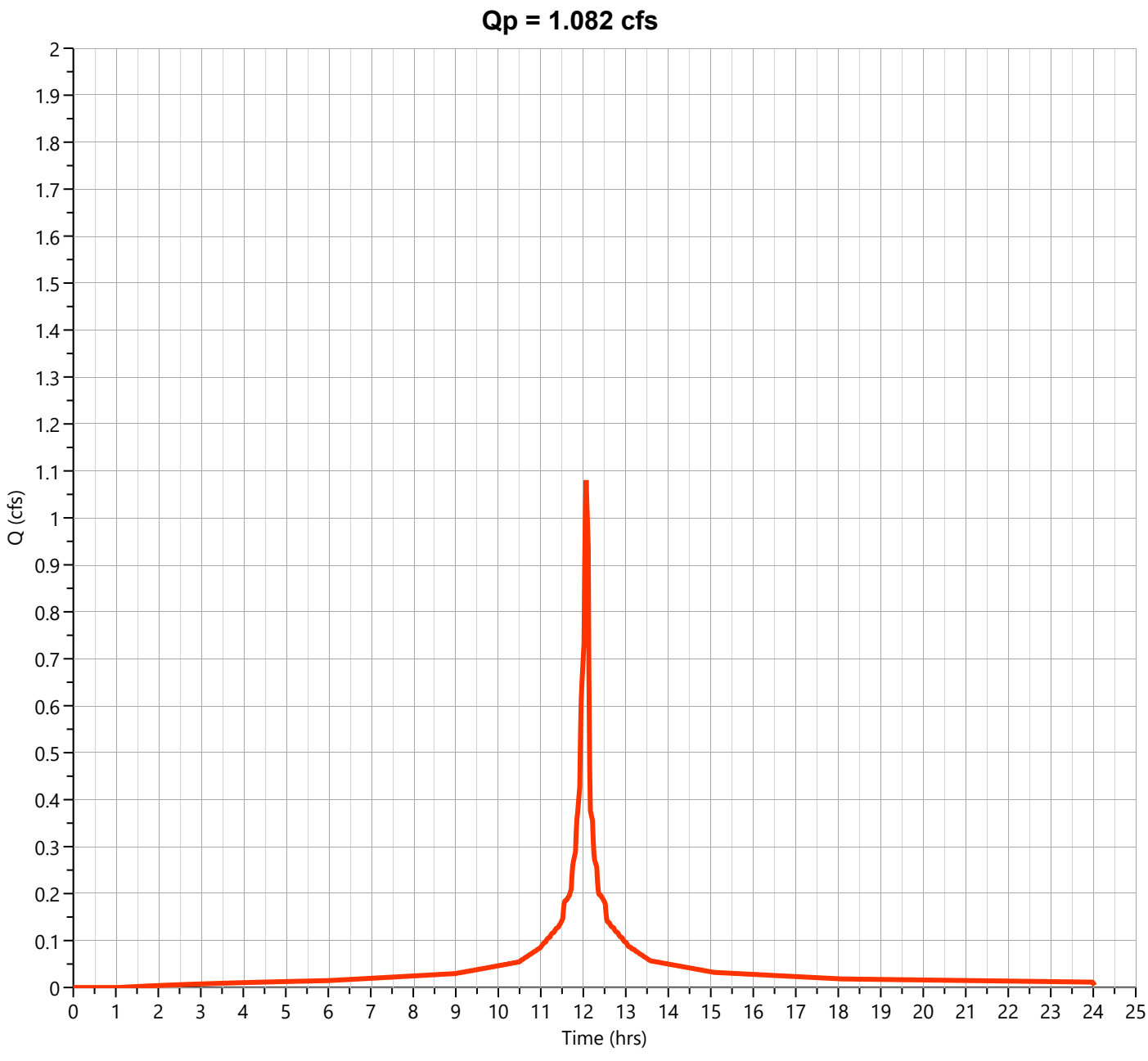
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-D Imp

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.082 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 3,514 cuft
Drainage Area	= 0.32 ac	Curve Number	= 98.00
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

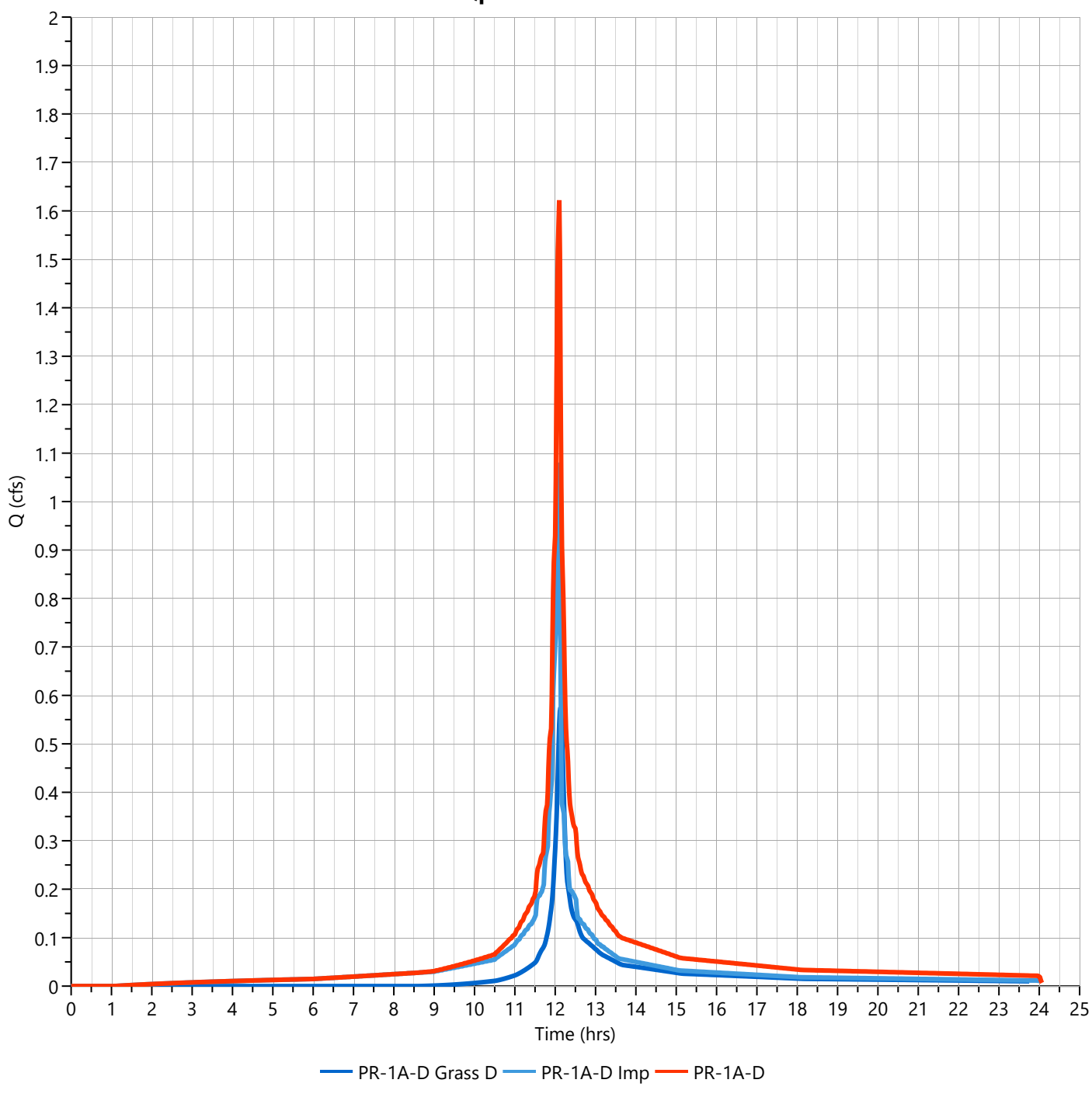
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-D

Hyd. No. 3

Hydrograph Type	= Junction	Peak Flow	= 1.622 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 5,388 cuft
Inflow Hydrographs	= 1, 2	Total Contrib. Area	= 0.65 ac



Hydrograph Report

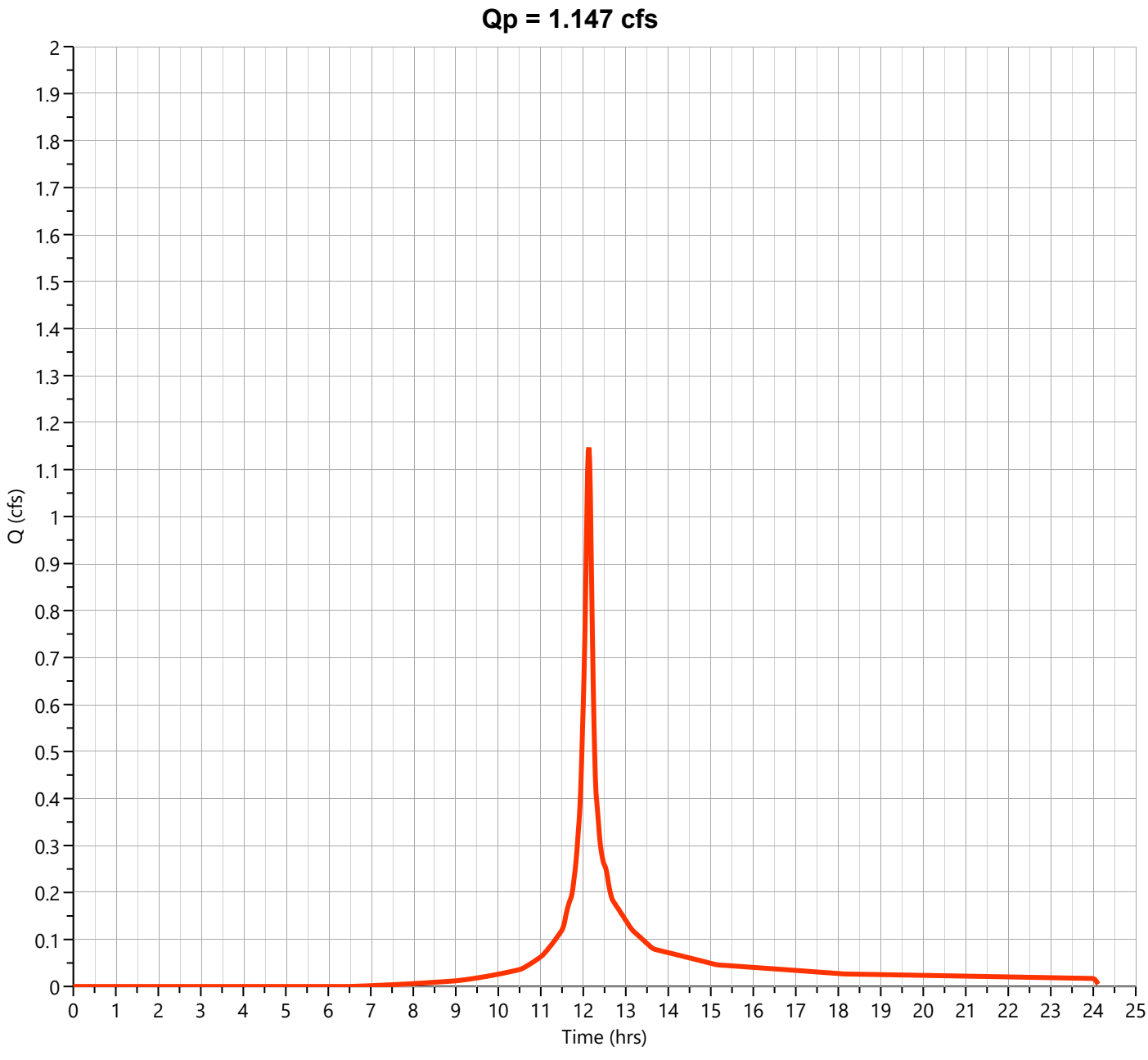
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-D Grass D

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.147 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 3,769 cuft
Drainage Area	= 0.33 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 8.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

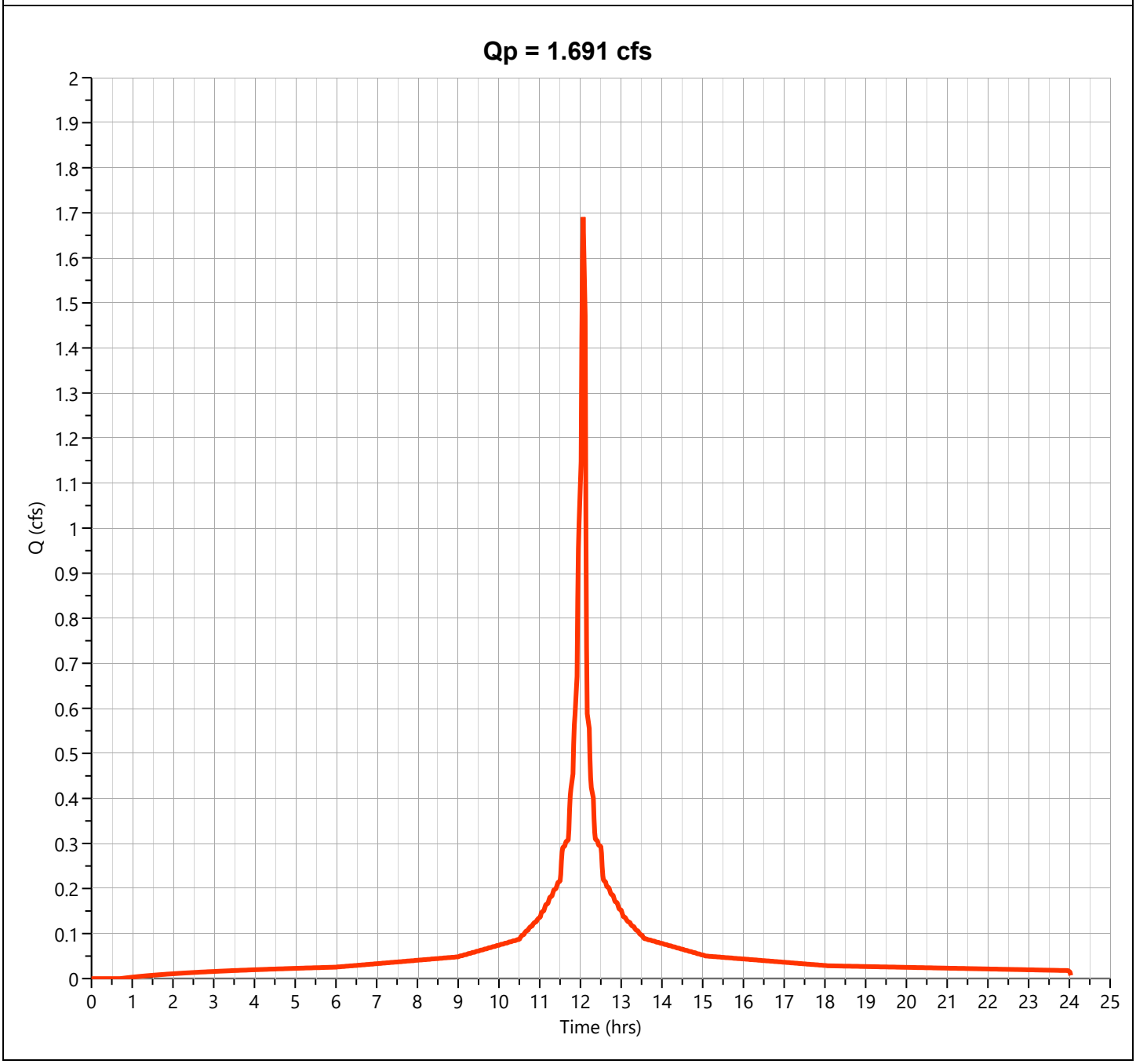
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-D Imp

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.691 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 5,600 cuft
Drainage Area	= 0.32 ac	Curve Number	= 98.00
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

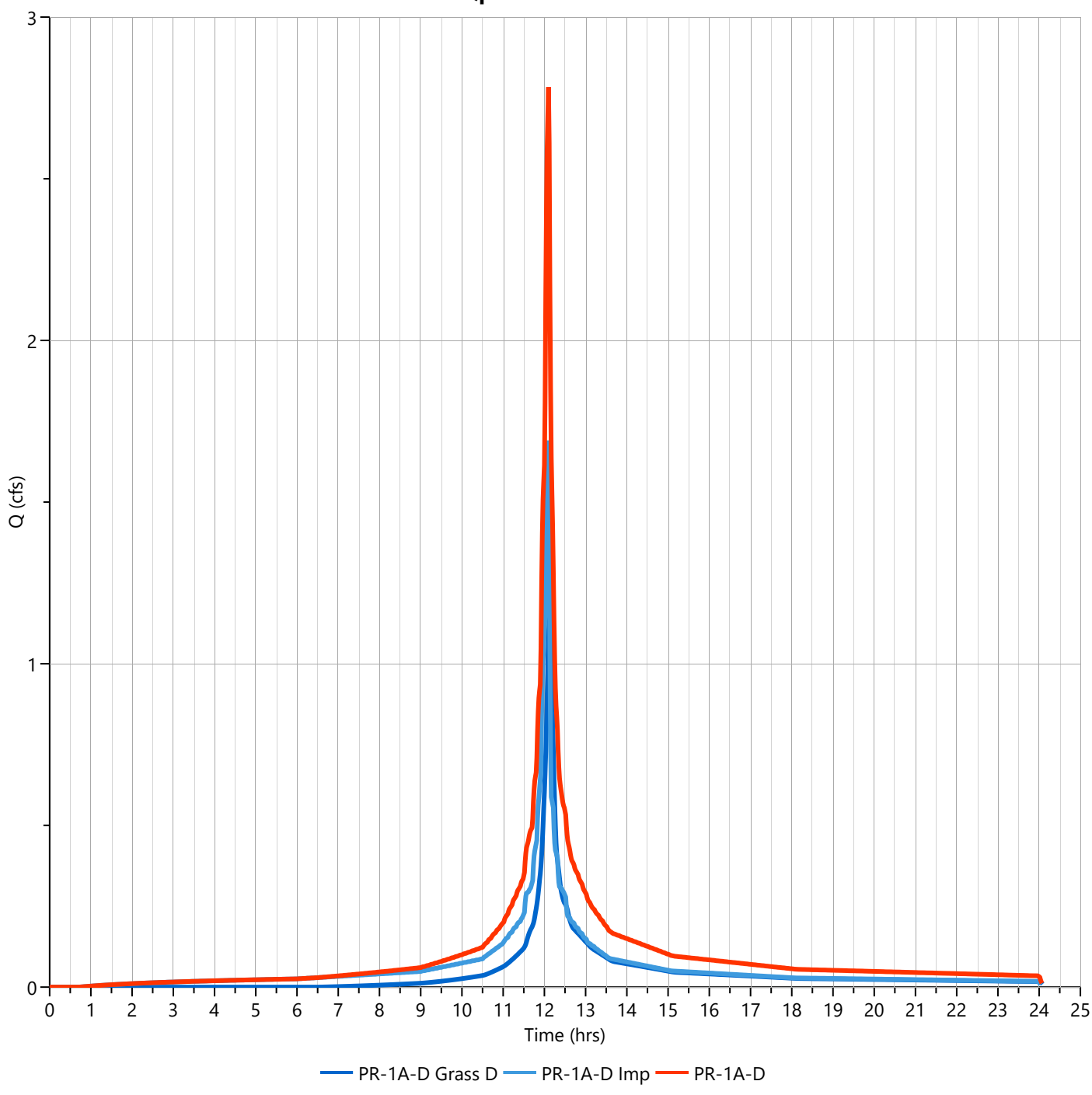
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-D

Hyd. No. 3

Hydrograph Type	= Junction	Peak Flow	= 2.783 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 9,369 cuft
Inflow Hydrographs	= 1, 2	Total Contrib. Area	= 0.65 ac



Hydrograph Report

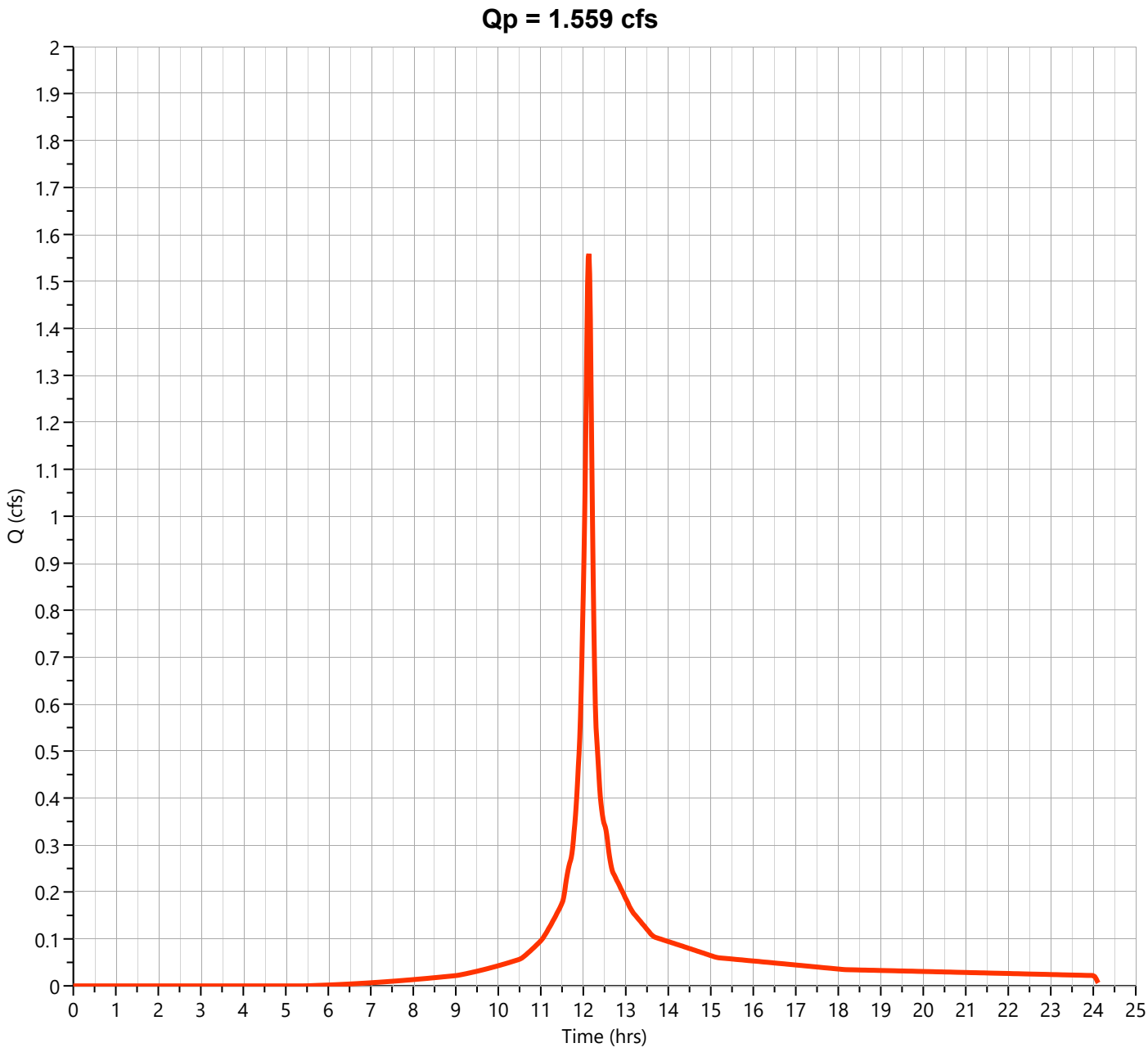
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-D Grass D

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.559 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 5,182 cuft
Drainage Area	= 0.33 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 8.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

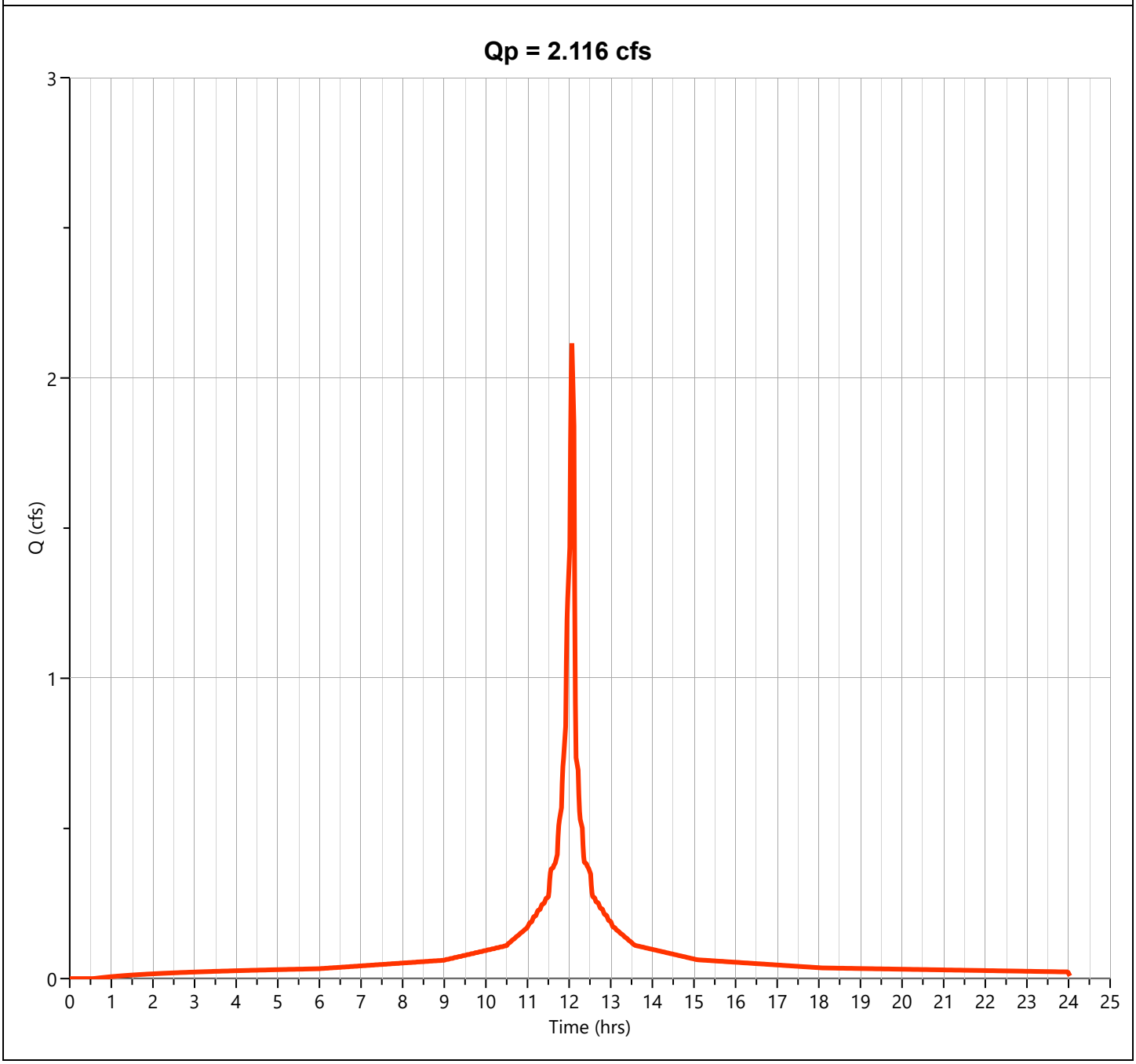
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-D Imp

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.116 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 7,058 cuft
Drainage Area	= 0.32 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

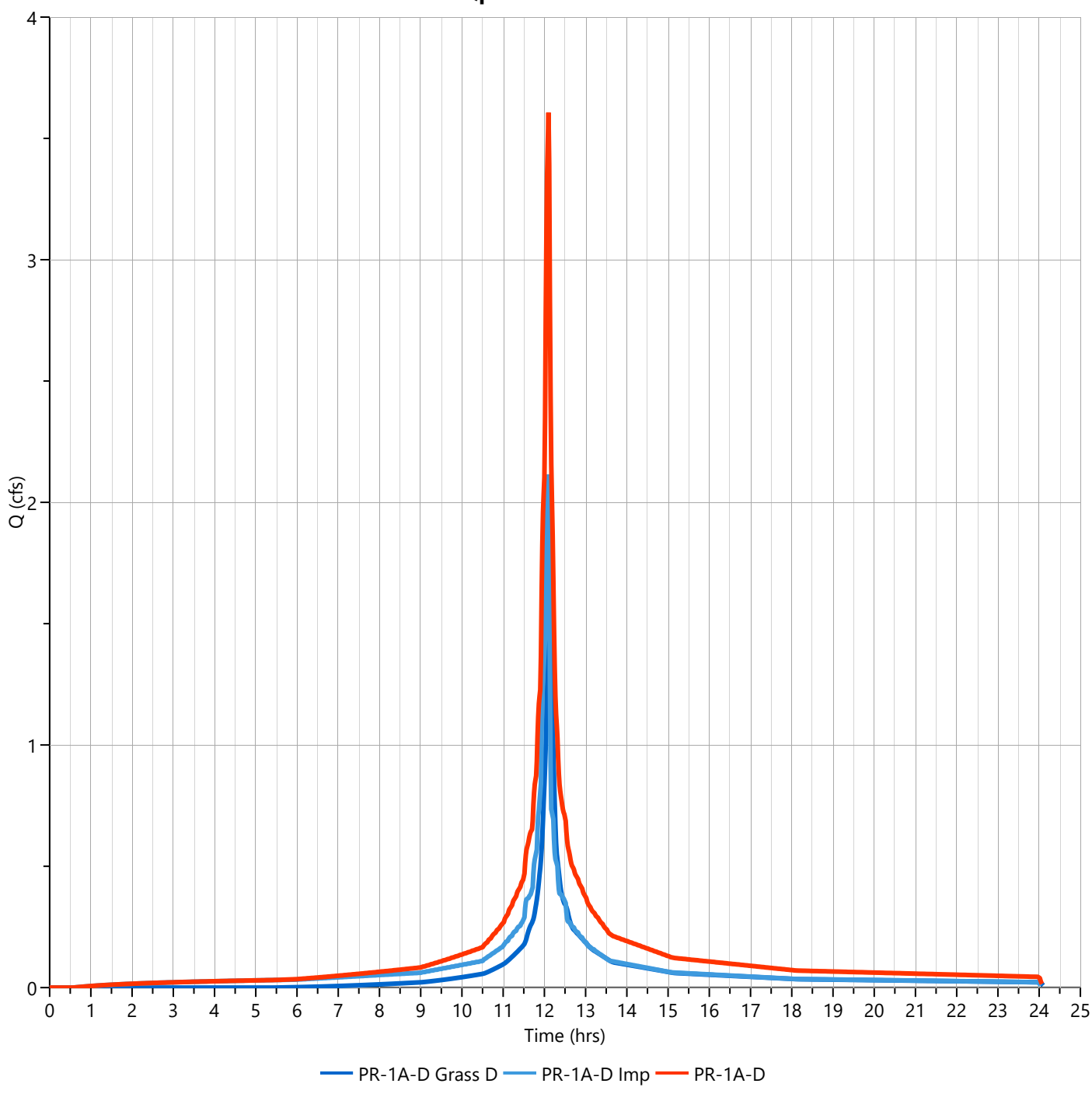
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-D

Hyd. No. 3

Hydrograph Type	= Junction	Peak Flow	= 3.607 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 12,240 cuft
Inflow Hydrographs	= 1, 2	Total Contrib. Area	= 0.65 ac



Hydrograph Report

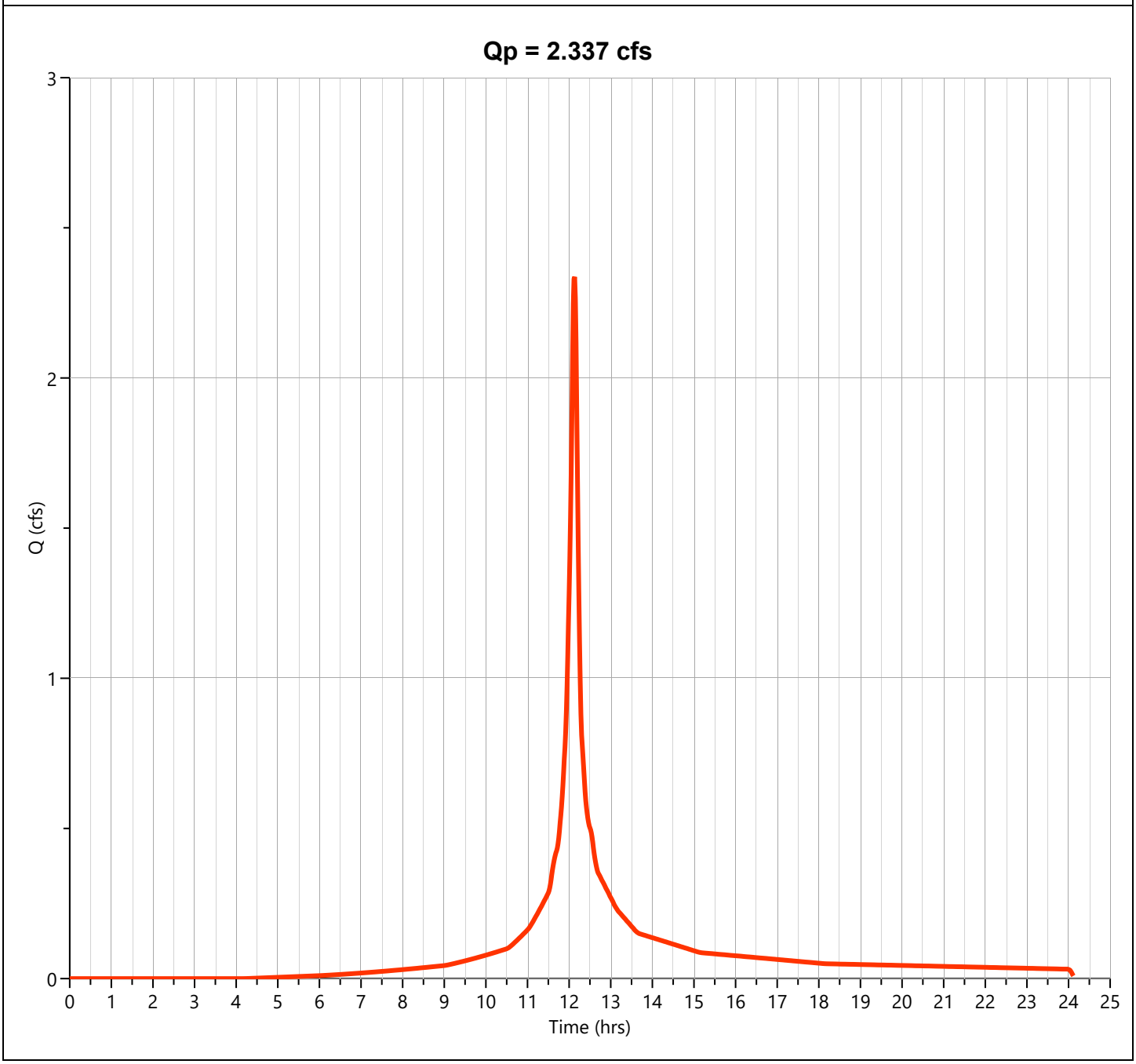
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-D Grass D

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.337 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 7,937 cuft
Drainage Area	= 0.33 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 8.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

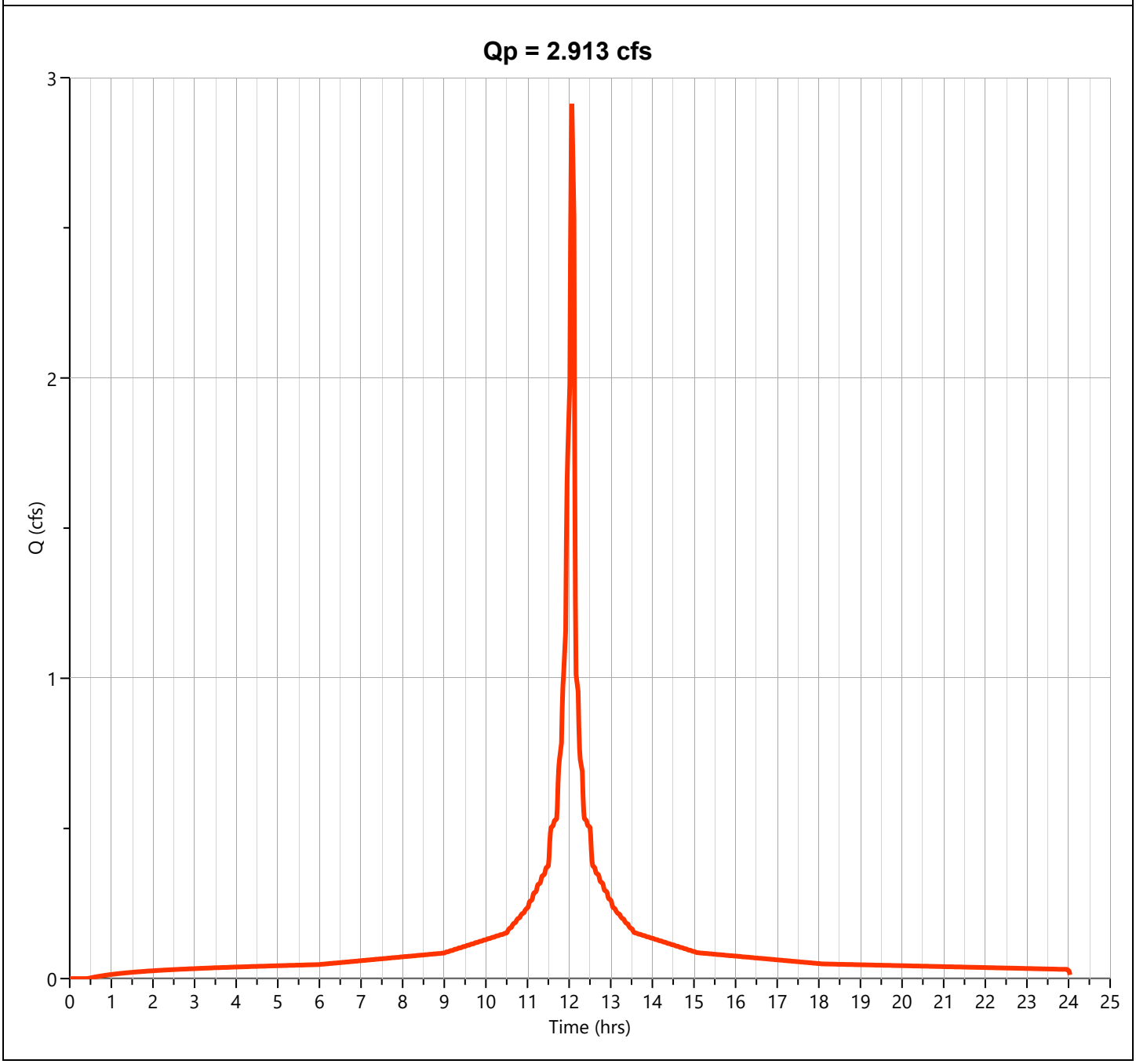
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-D Imp

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.913 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 9,800 cuft
Drainage Area	= 0.32 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

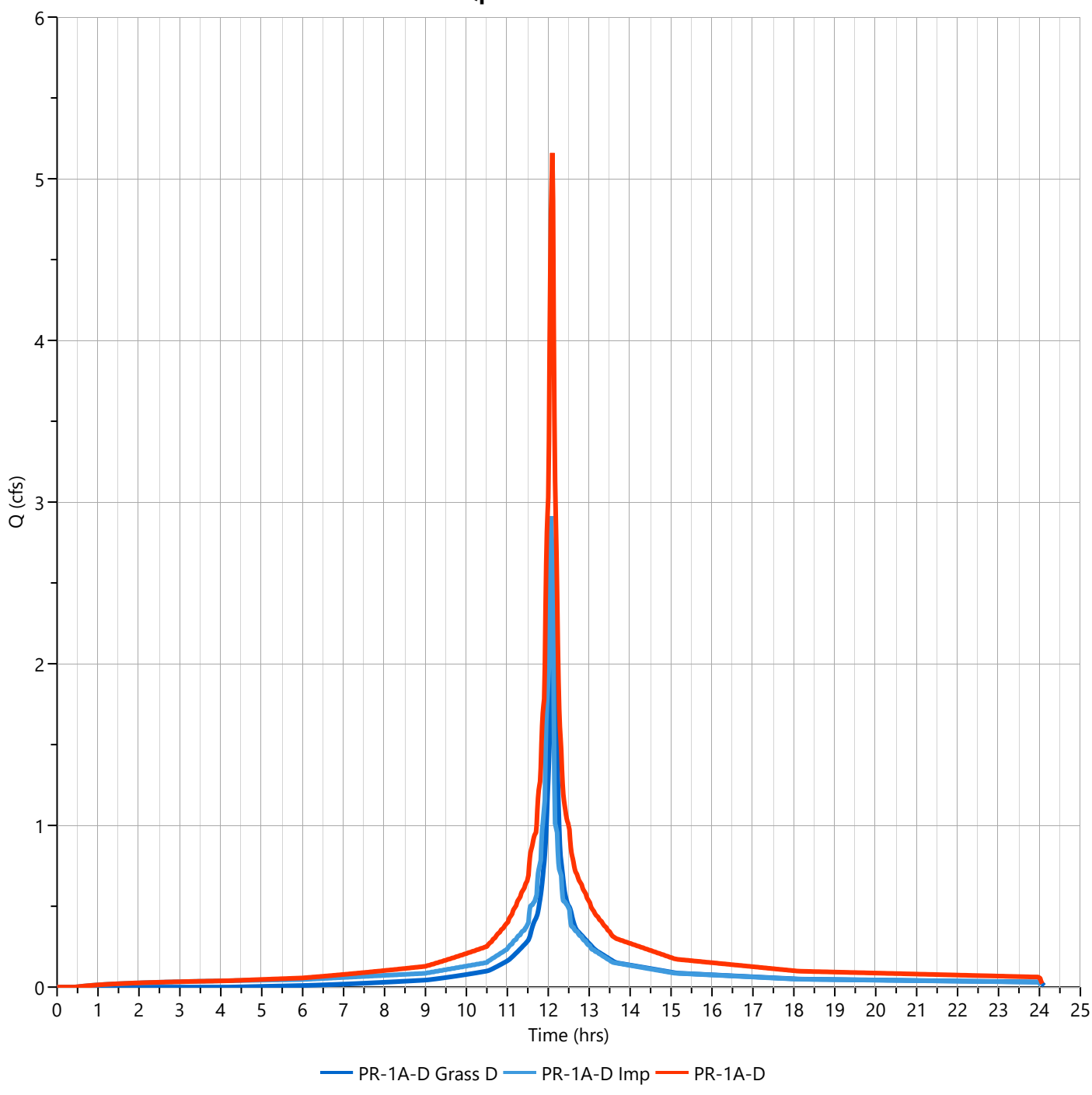
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-D

Hyd. No. 3

Hydrograph Type	= Junction	Peak Flow	= 5.159 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 17,738 cuft
Inflow Hydrographs	= 1, 2	Total Contrib. Area	= 0.65 ac



PR-1A-UNDISTURBED WATERSHED

Project: Eagle Rock Avenue | **By:** TEG | **Date:** 10/21/2025

Location: West Orange, NJ | **Checked By:** MJV | **Date Checked:** 10/21/2025

Circle One: (Present) Developed — **Current Proposed Watershed PR-1A-U 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	0.034		
6.	Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.016	+	+
					Sheet Flow Sub-Total	0.016 hours

Shallow Concentrated Flow

			Segment ID	2		
7.	Surface Description			Pavement		
8.	Flow Length, L		ft	48		
9.	Watercourse Slope, s		ft/ft	0.024		
10.	Average Velocity, V (NEH table 15-3)		ft/s	3.16		
11.	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	4	5
12.	Flow Length, L		ft	65	110	66
13.	Cross Sectional flow area, a		ft^2	0.61	0.61	0.61
14.	Wetted Perimeter, P_w		ft	2.00	2.00	2.00
15.	Hydraulic Radius, r	$r = a / P_w$	ft	0.31	0.31	0.31
16.	Channel Slope, s		ft/ft	0.026	0.005	0.070
17.	Manning's Roughness Coeff., n			0.012	0.012	0.012
18.	Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s	9.11	3.98	14.89
19.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.002	+ 0.008	+ 0.001
					Channel Flow Sub-Total	0.011 hours

Channel Flow

			Segment ID	6		
20.	Flow Length, L		ft	96		
21.	Cross Sectional flow area, a		ft^2	0.61		
22.	Wetted Perimeter, P_w		ft	2.00		
23.	Hydraulic Radius, r	$r = a / P_w$	ft	0.31		
24.	Channel Slope, s		ft/ft	0.080		
25.	Manning's Roughness Coeff., n			0.012		
26.	Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s	15.91		
27.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.002	+	+
					Channel Flow Sub-Total	0.002 hours

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

Total Tc (hours)	=	0.032 hours
Software Limitations Require Minimum Tc	=	2 minutes

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: (**Present**) Developed — **Current Proposed Watershed PR-1A-U 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	73		27		
4.	Two-year 24-hr rainfall, P_2		in	3.46		3.46		
5.	Land Slope, s		ft/ft	0.080		0.068		
6.	Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.102	+	0.074	+	
						Sheet Flow Sub-Total		0.176 hours

Shallow Concentrated Flow

			Segment ID	3		4		
7.	Surface Description			Woodlands		Grassed Waterways		
8.	Flow Length, L		ft	21		198		
9.	Watercourse Slope, s		ft/ft	0.090		0.110		
10.	Average Velocity, V (NEH table 15-3)		ft/s	1.51		5.34		
11.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.004	+	0.010	+	
						Shallow Conc. Flow Sub-Total		0.014 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) =	**0.190 hours**
Total Tc (minutes) =	**11 minutes**

Hydrograph Report

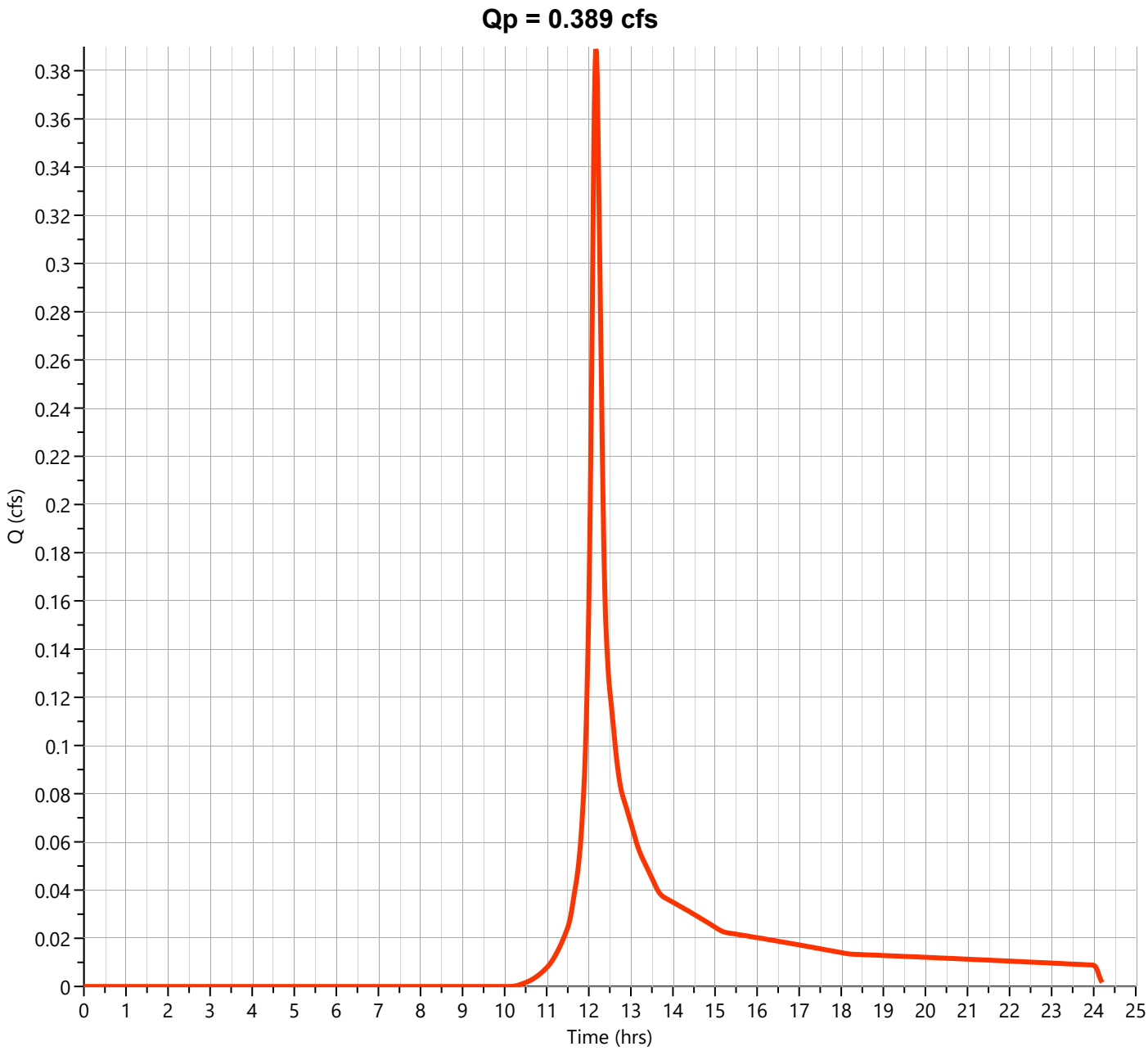
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-U Open Space C

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.389 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Runoff Volume	= 1,478 cuft
Drainage Area	= 0.33 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 11.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

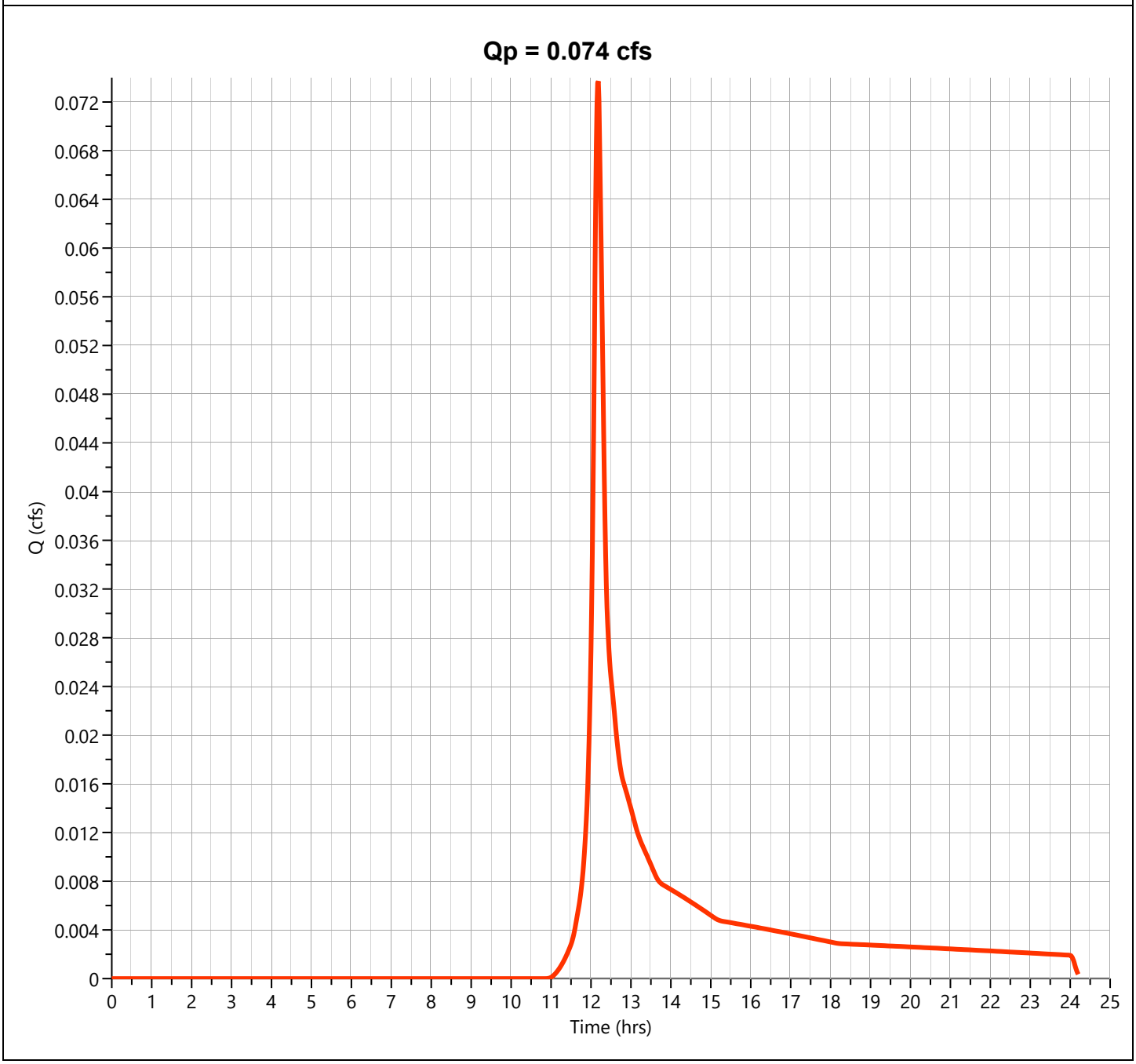
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-U Woods C

Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.074 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 291 cuft
Drainage Area	= 0.08 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 11.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

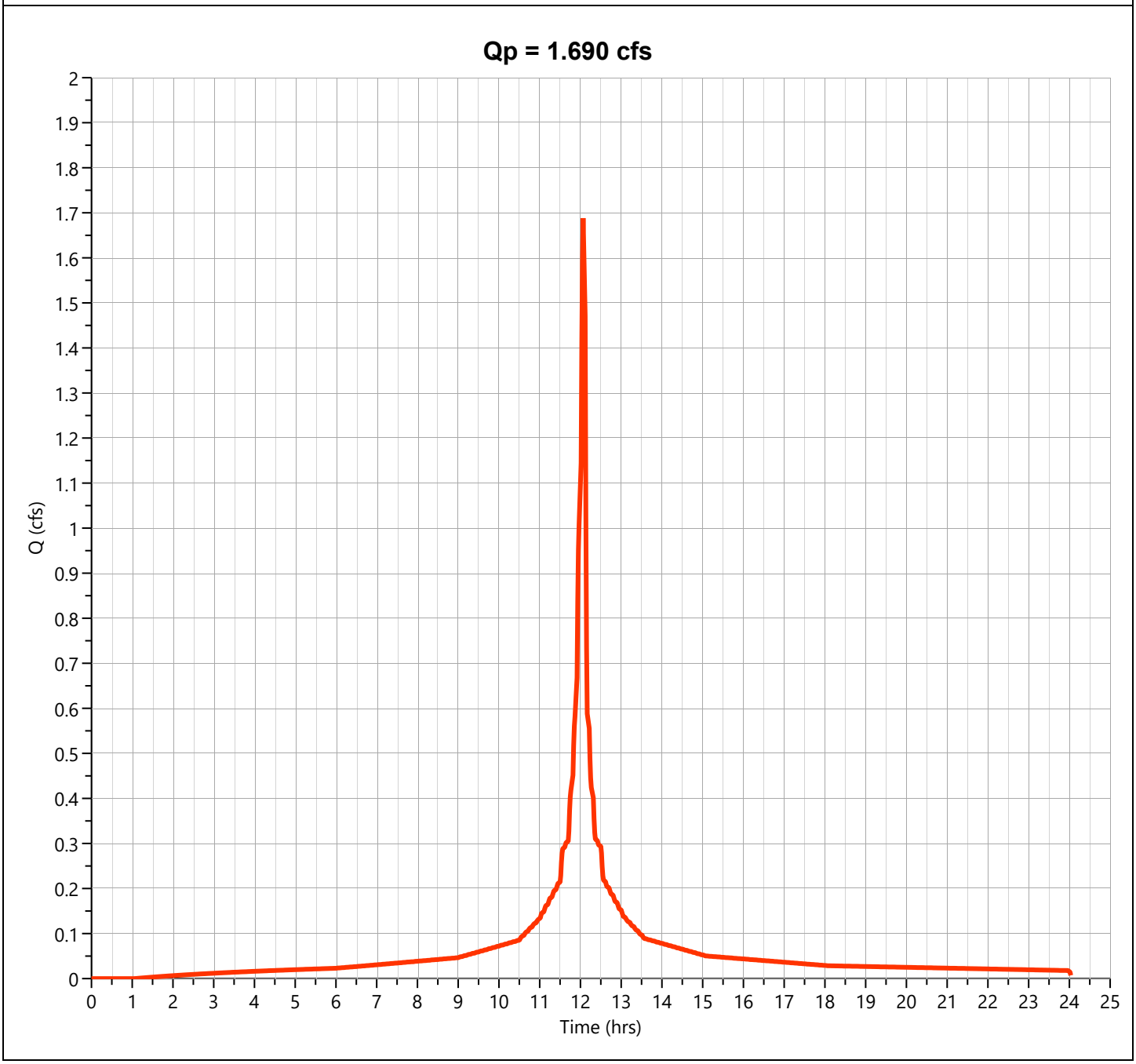
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-U Imp

Hyd. No. 7

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.690 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 5,490 cuft
Drainage Area	= 0.5 ac	Curve Number	= 98.00
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

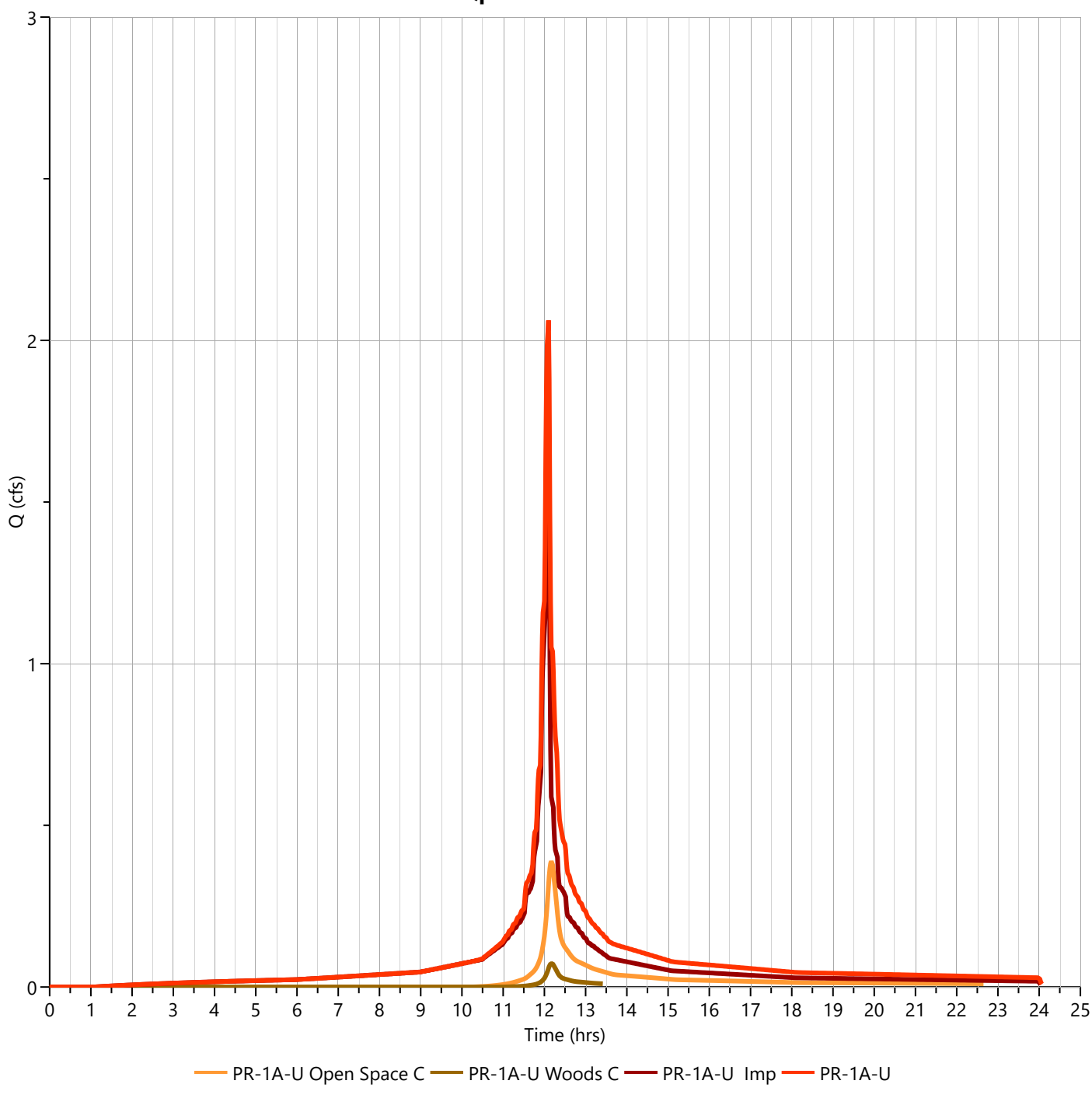
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-U

Hyd. No. 8

Hydrograph Type	= Junction	Peak Flow	= 2.062 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 7,259 cuft
Inflow Hydrographs	= 5, 6, 7	Total Contrib. Area	= 0.91 ac



Hydrograph Report

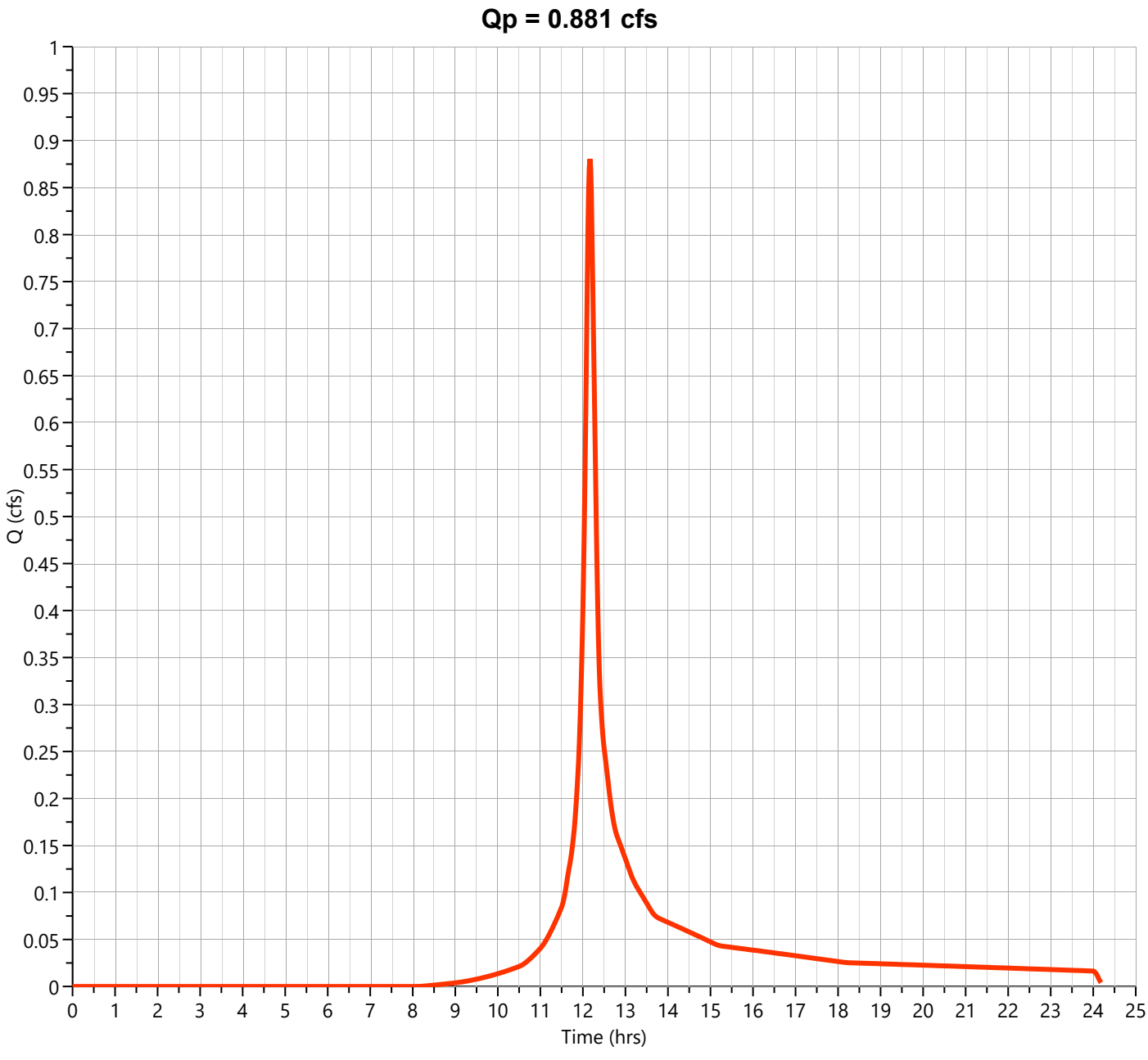
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-U Open Space C

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.881 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Runoff Volume	= 3,257 cuft
Drainage Area	= 0.33 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 11.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

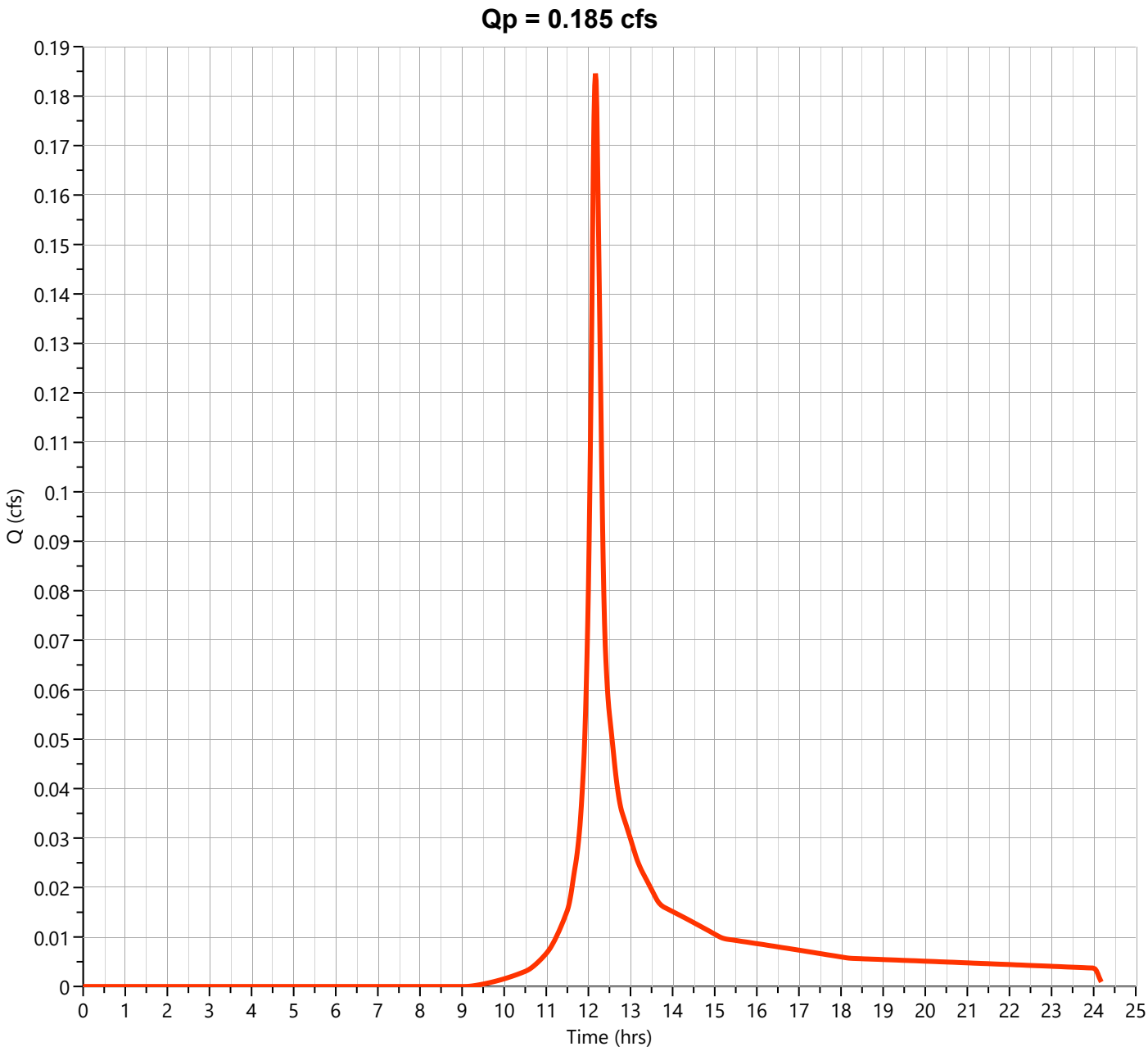
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-U Woods C

Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.185 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Runoff Volume	= 686 cuft
Drainage Area	= 0.08 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 11.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

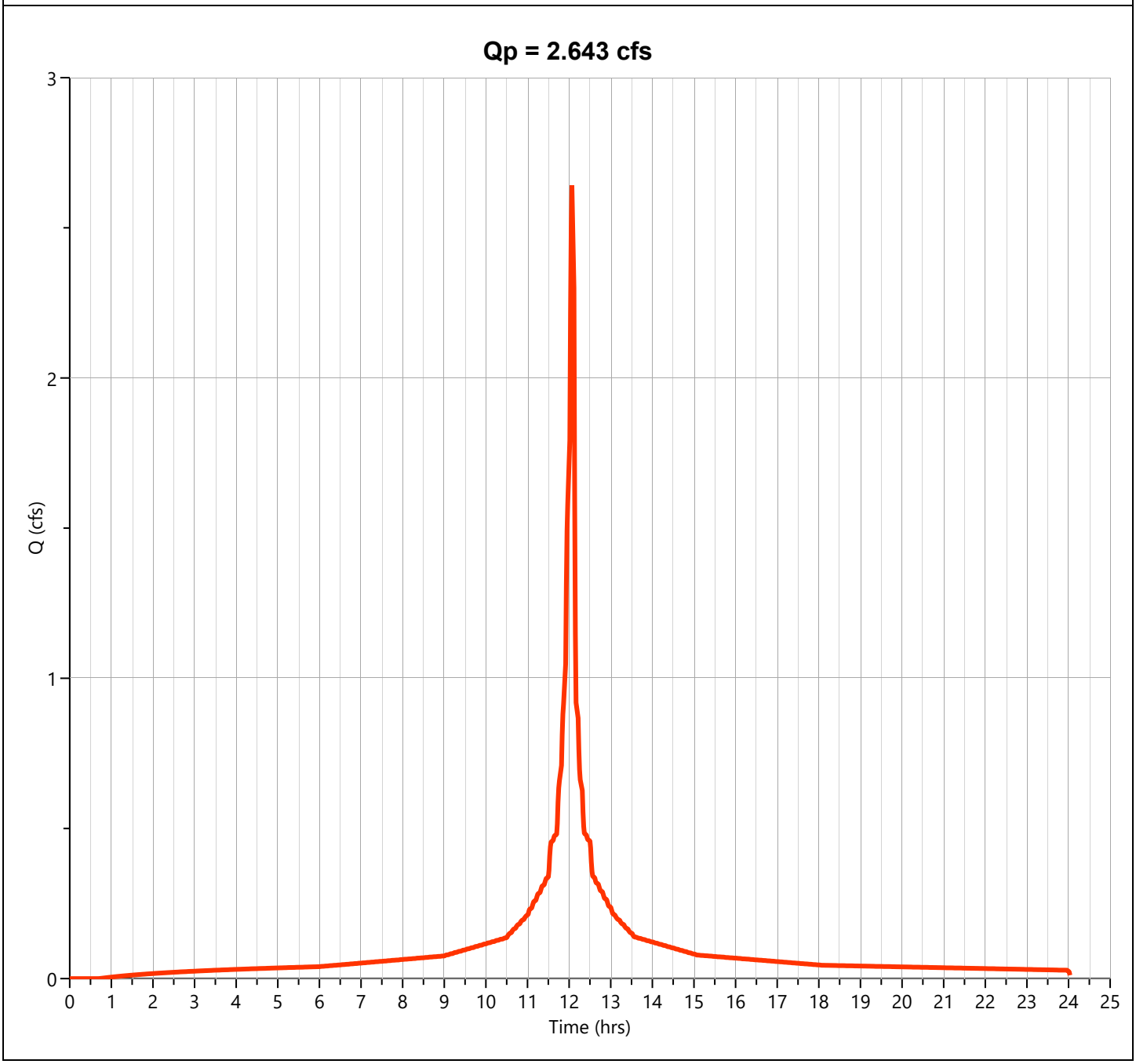
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File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-U Imp

Hyd. No. 7

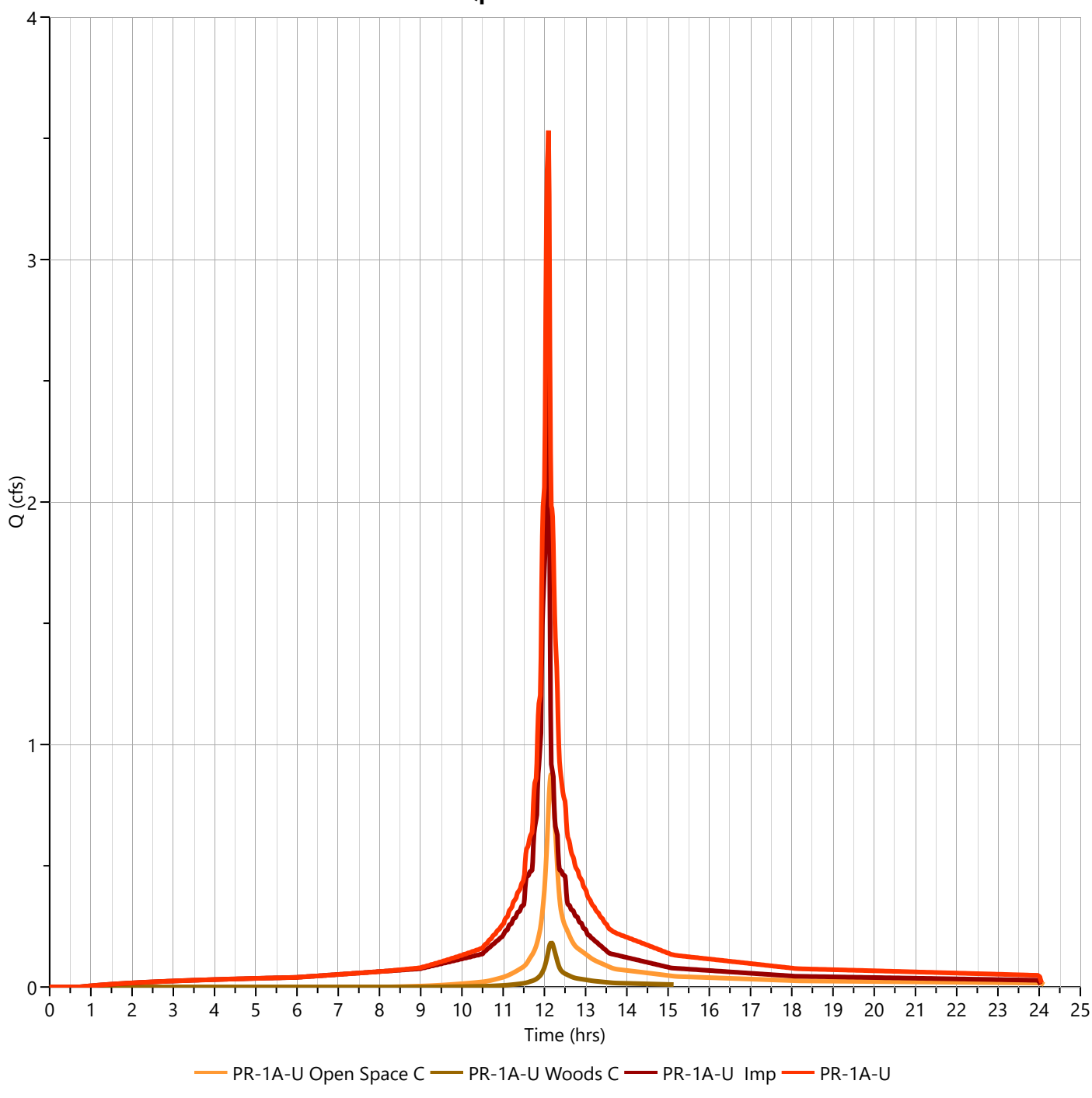
Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.643 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 8,750 cuft
Drainage Area	= 0.5 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



PR-1A-U

Hyd. No. 8

Hydrograph Type	= Junction	Peak Flow	= 3.532 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 12,694 cuft
Inflow Hydrographs	= 5, 6, 7	Total Contrib. Area	= 0.91 ac



Hydrograph Report

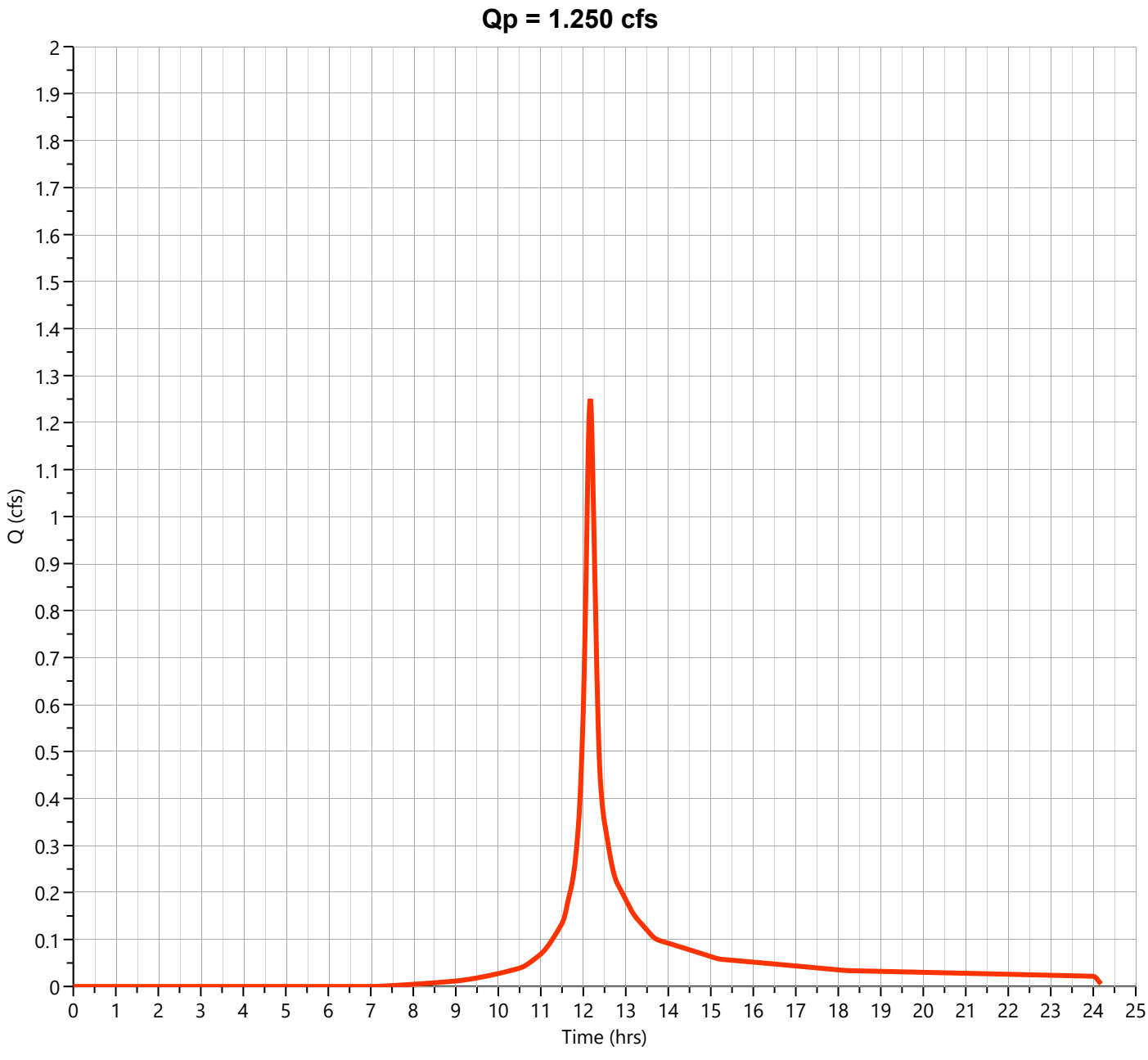
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-U Open Space C

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.250 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Runoff Volume	= 4,632 cuft
Drainage Area	= 0.33 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 11.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

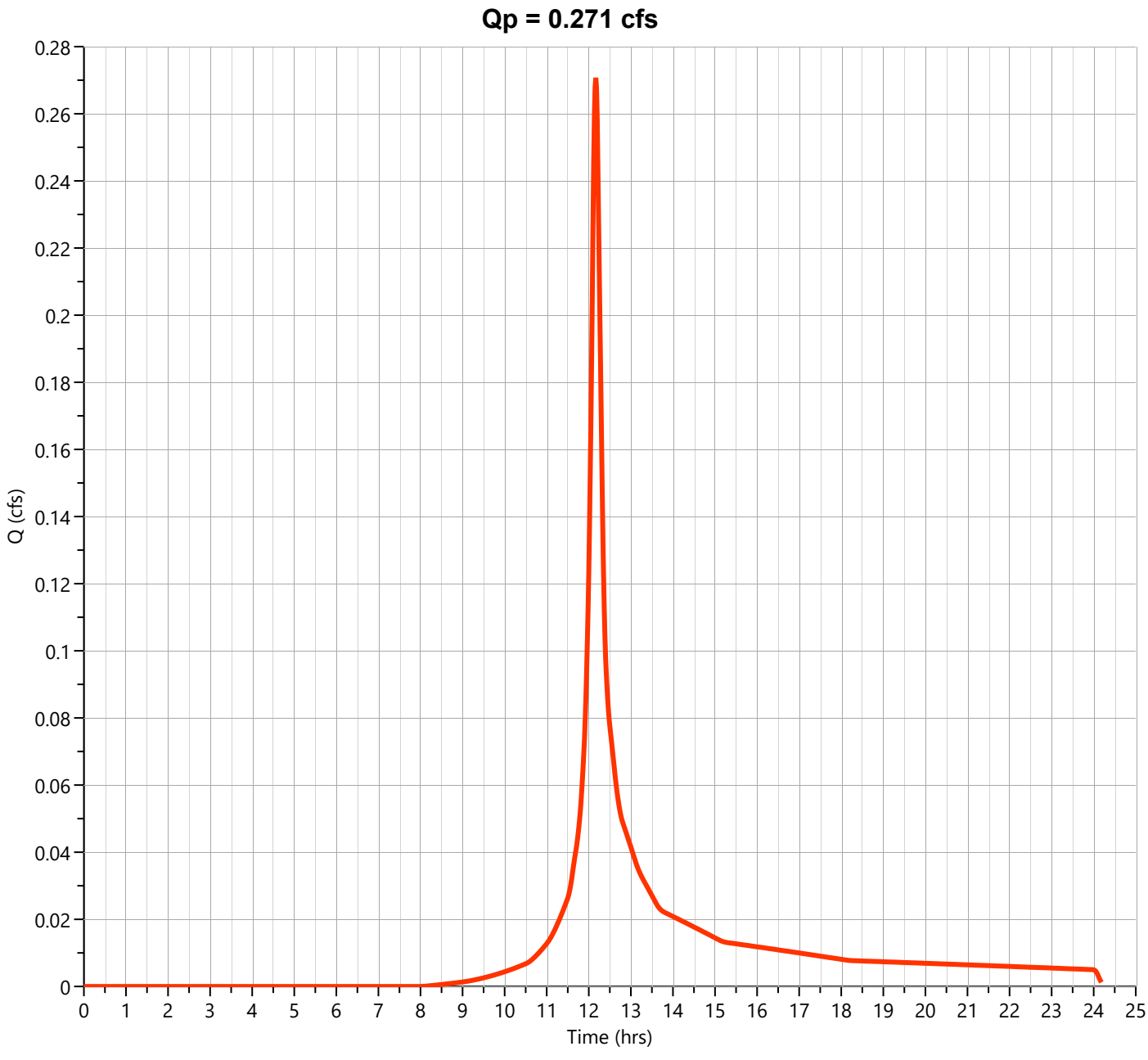
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-U Woods C

Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.271 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Runoff Volume	= 1,001 cuft
Drainage Area	= 0.08 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 11.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

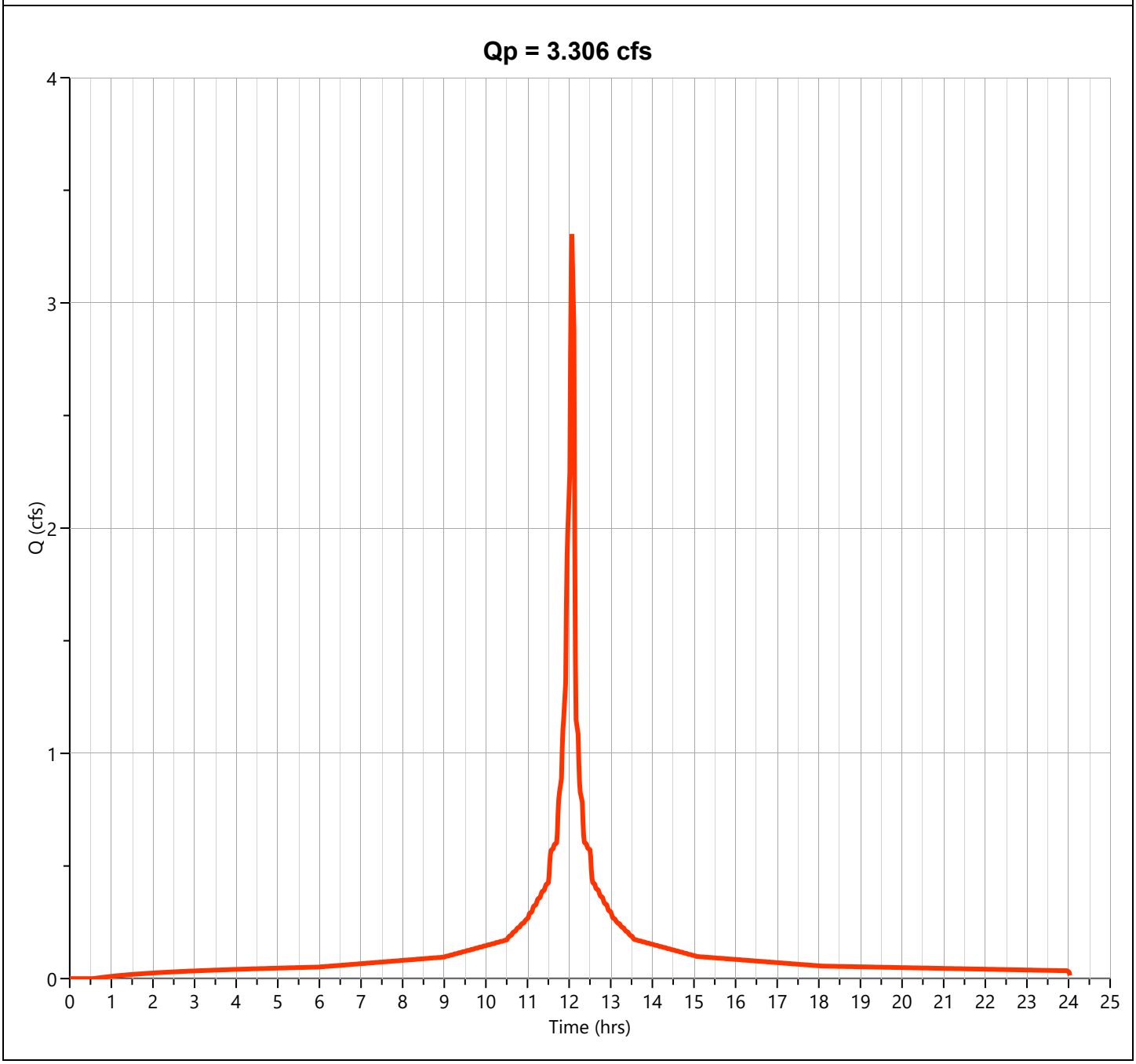
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-U Imp

Hyd. No. 7

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.306 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 11,028 cuft
Drainage Area	= 0.5 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

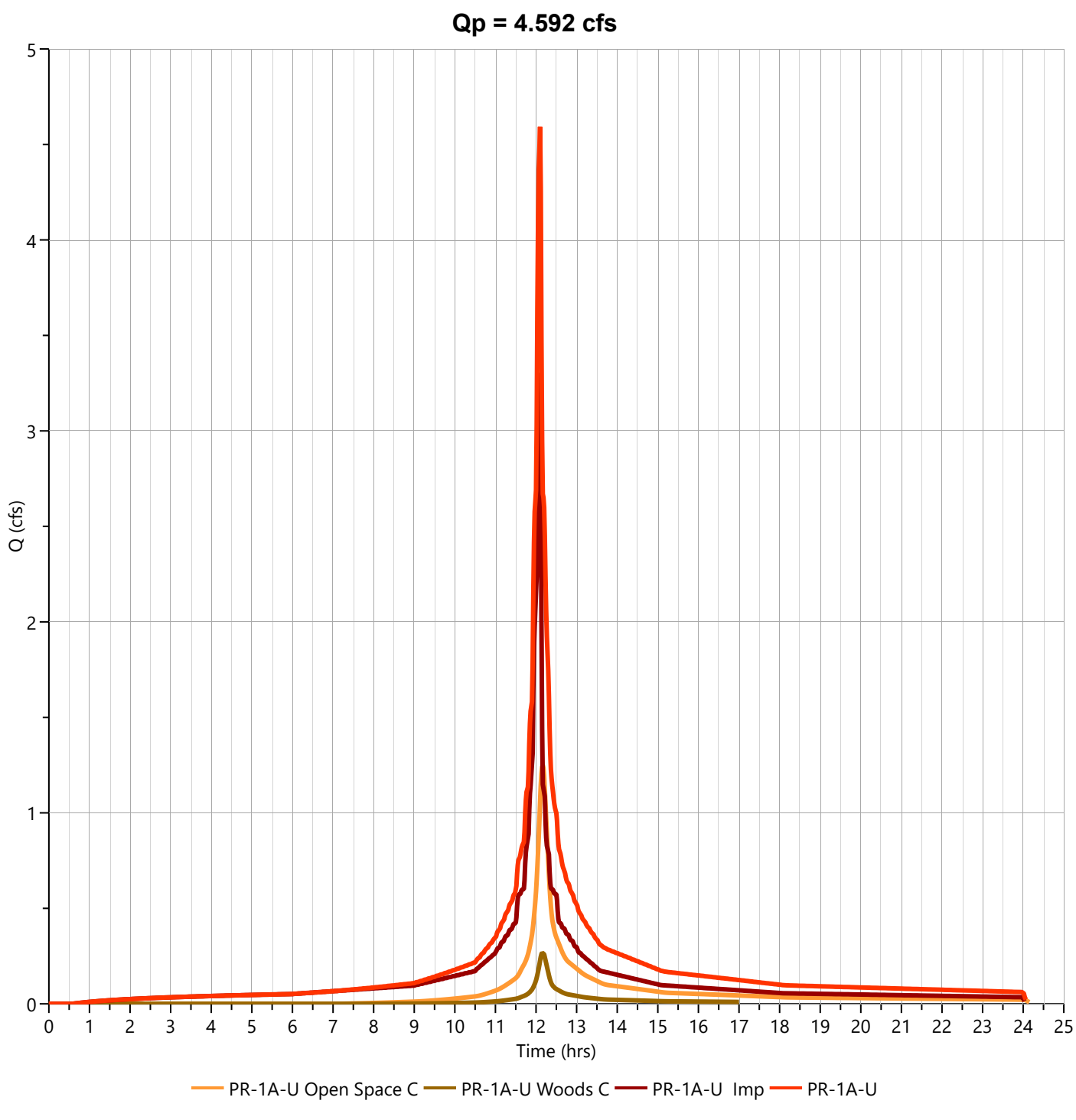
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-U

Hyd. No. 8

Hydrograph Type	= Junction	Peak Flow	= 4.592 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 16,661 cuft
Inflow Hydrographs	= 5, 6, 7	Total Contrib. Area	= 0.91 ac



Hydrograph Report

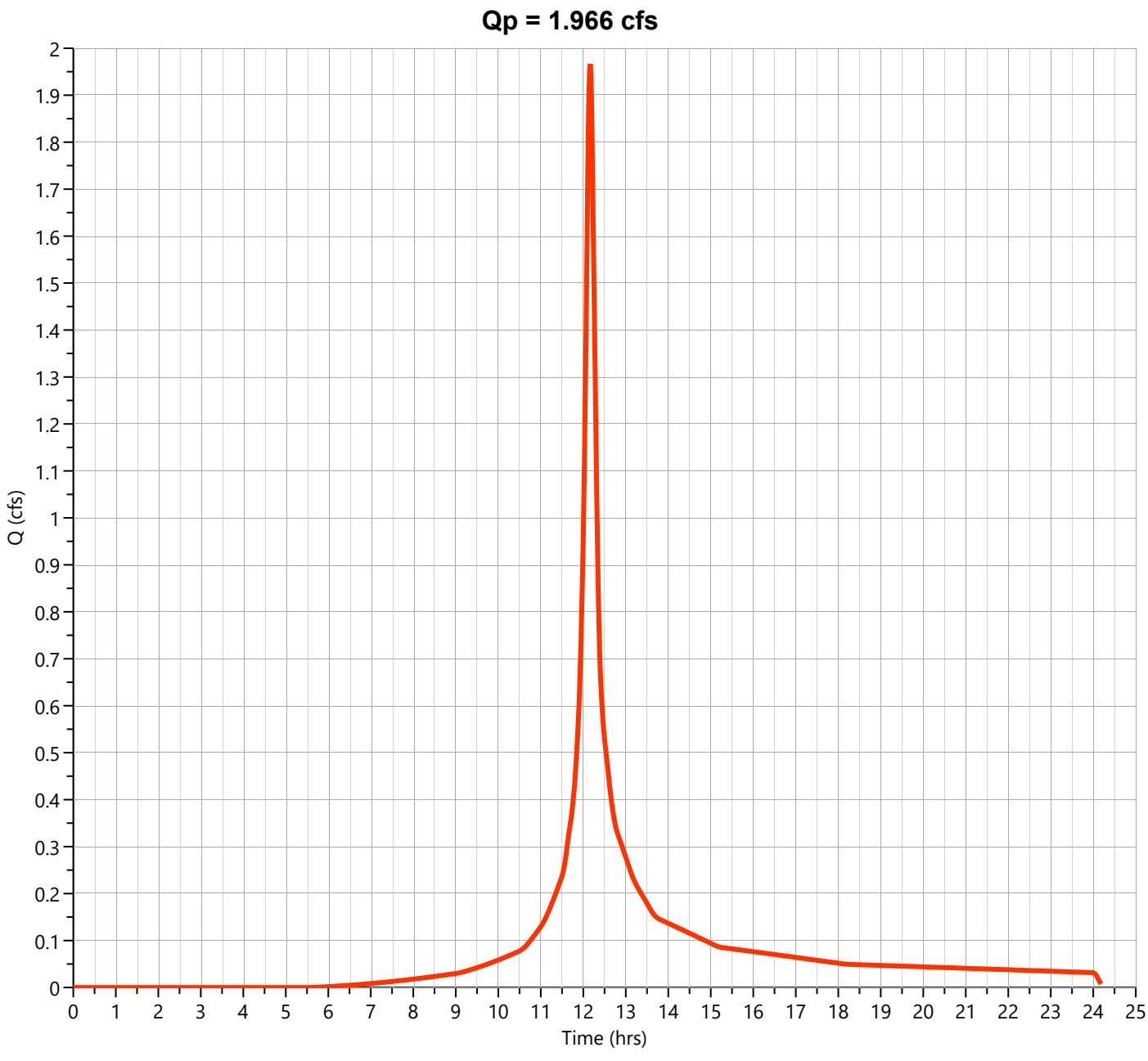
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-U Open Space C

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.966 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Runoff Volume	= 7,374 cuft
Drainage Area	= 0.33 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 11.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

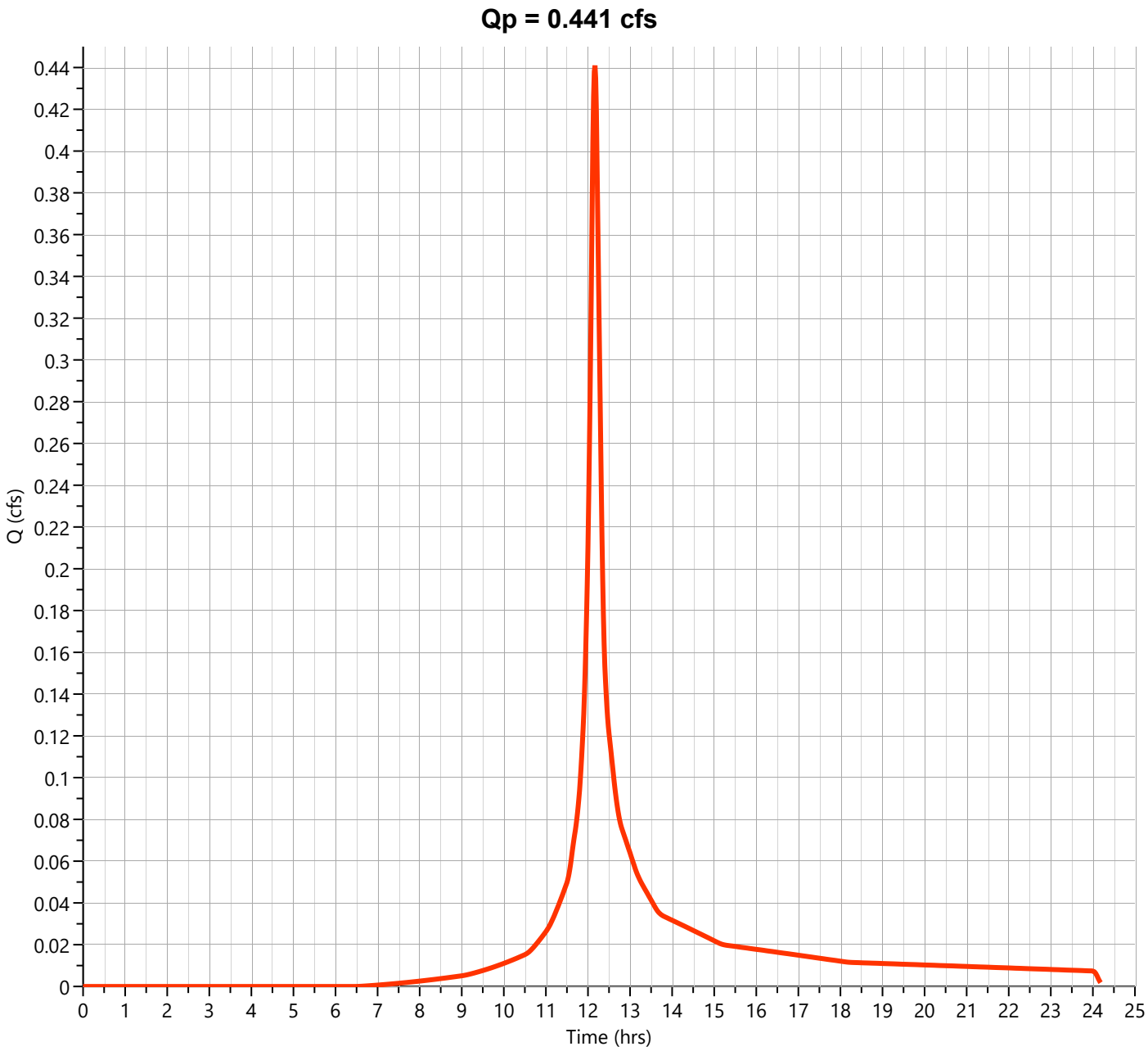
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-U Woods C

Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.441 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Runoff Volume	= 1,640 cuft
Drainage Area	= 0.08 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 11.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

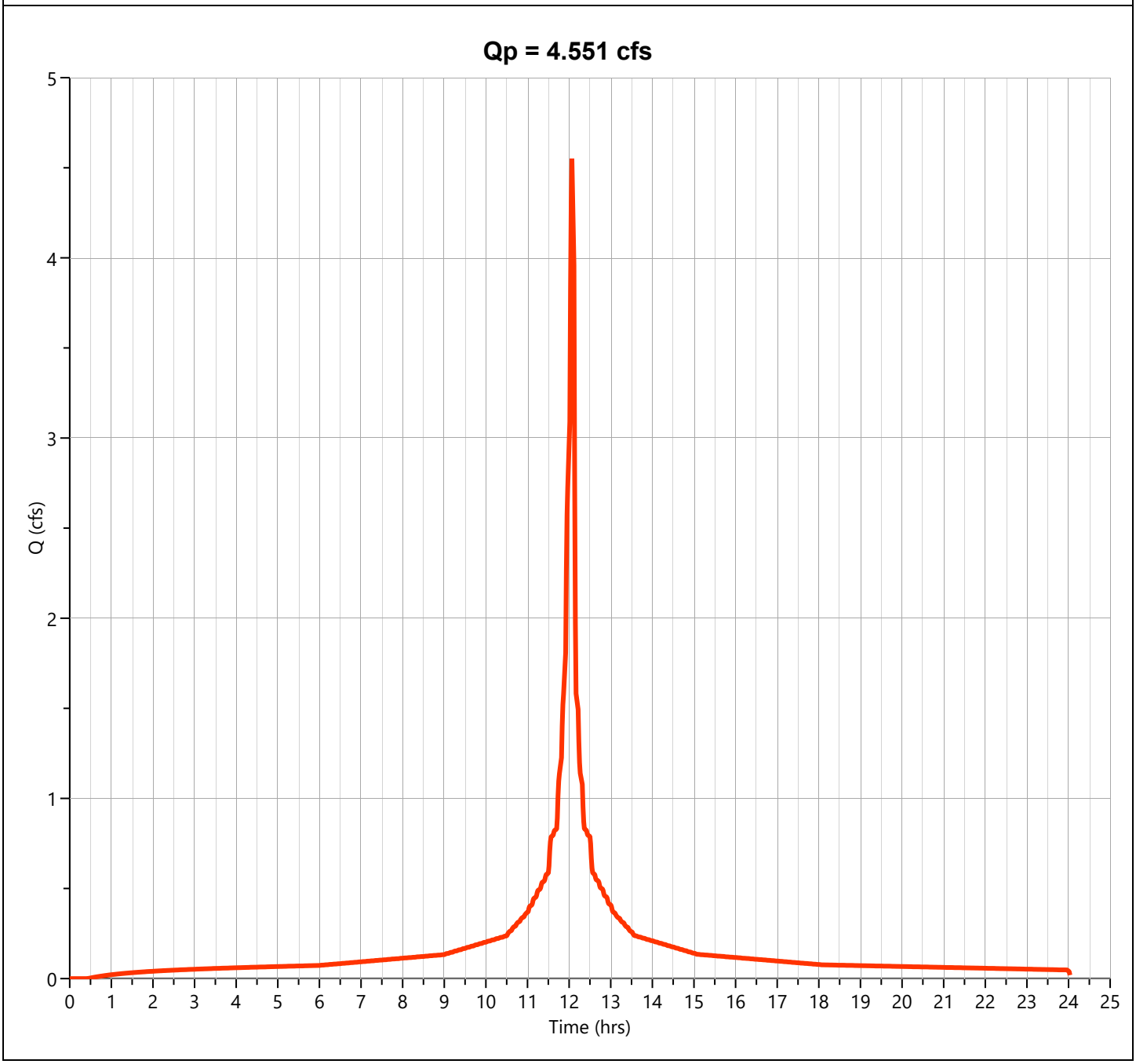
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-U Imp

Hyd. No. 7

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.551 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 15,313 cuft
Drainage Area	= 0.5 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

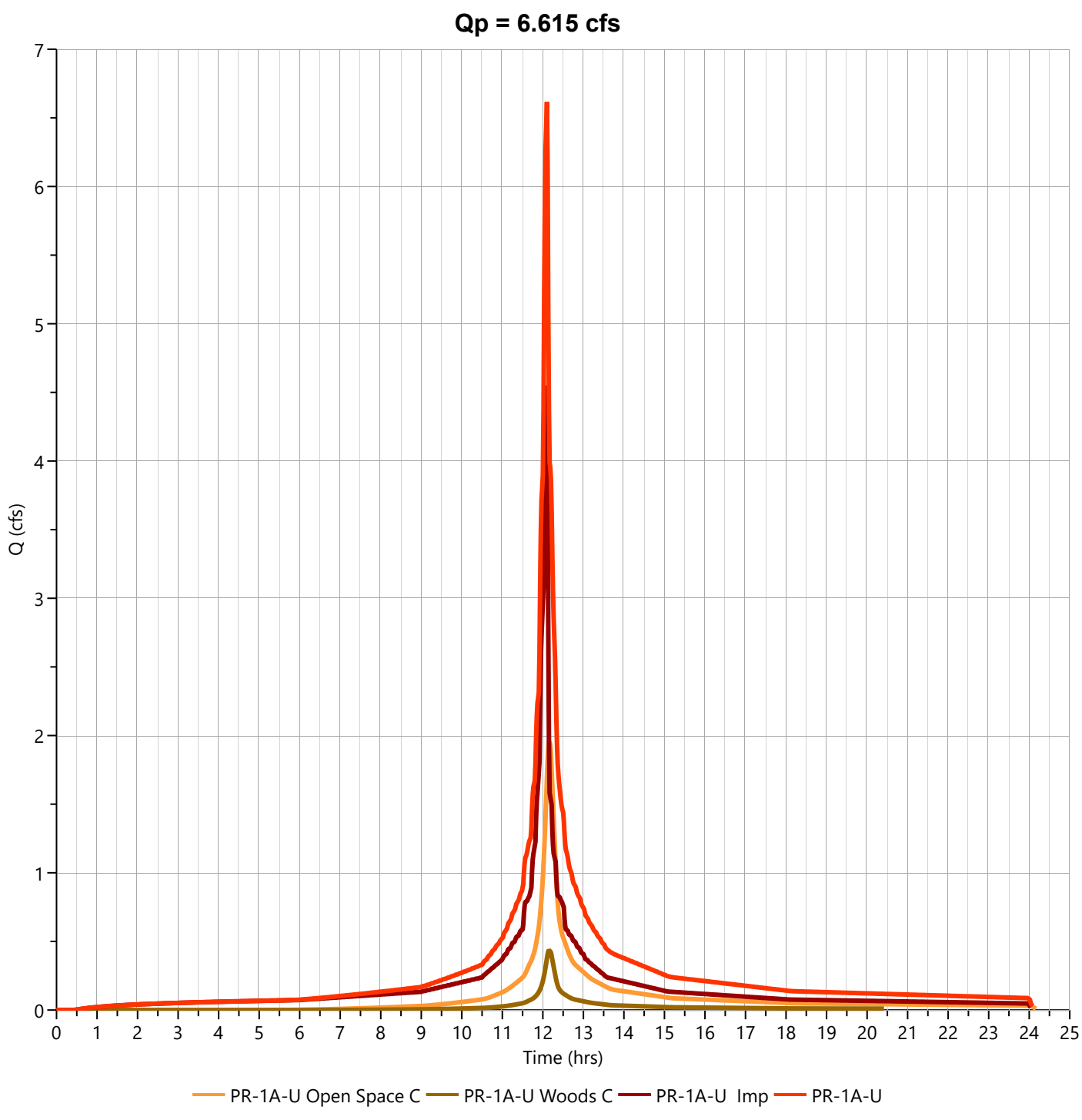
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A-U

Hyd. No. 8

Hydrograph Type	= Junction	Peak Flow	= 6.615 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 24,327 cuft
Inflow Hydrographs	= 5, 6, 7	Total Contrib. Area	= 0.91 ac



PR-1A WATERSHED
(COMBINED PROPOSED FLOW TO SSBB-1)

Hydrograph Report

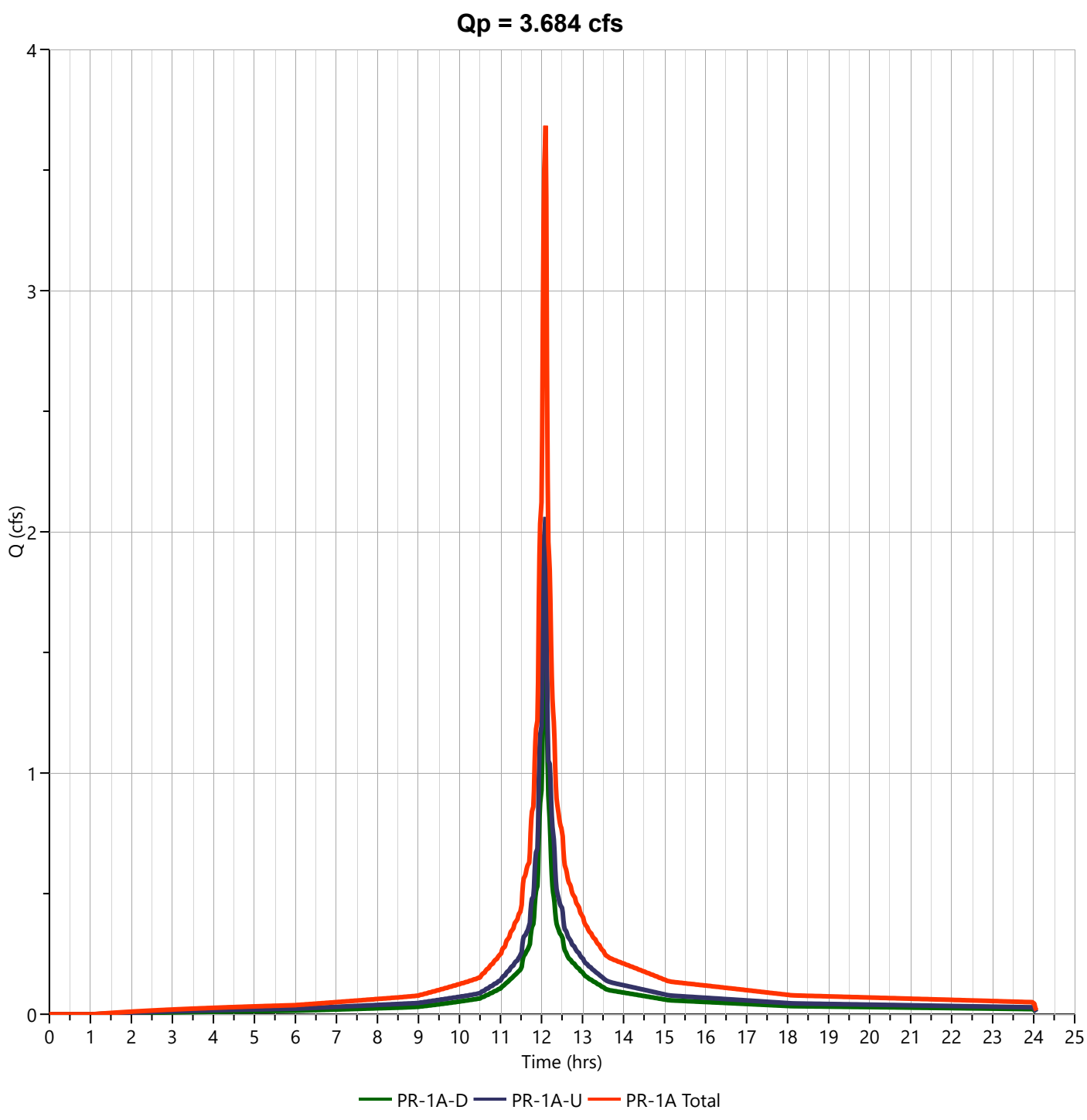
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A Total

Hyd. No. 10

Hydrograph Type	= Junction	Peak Flow	= 3.684 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 12,647 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

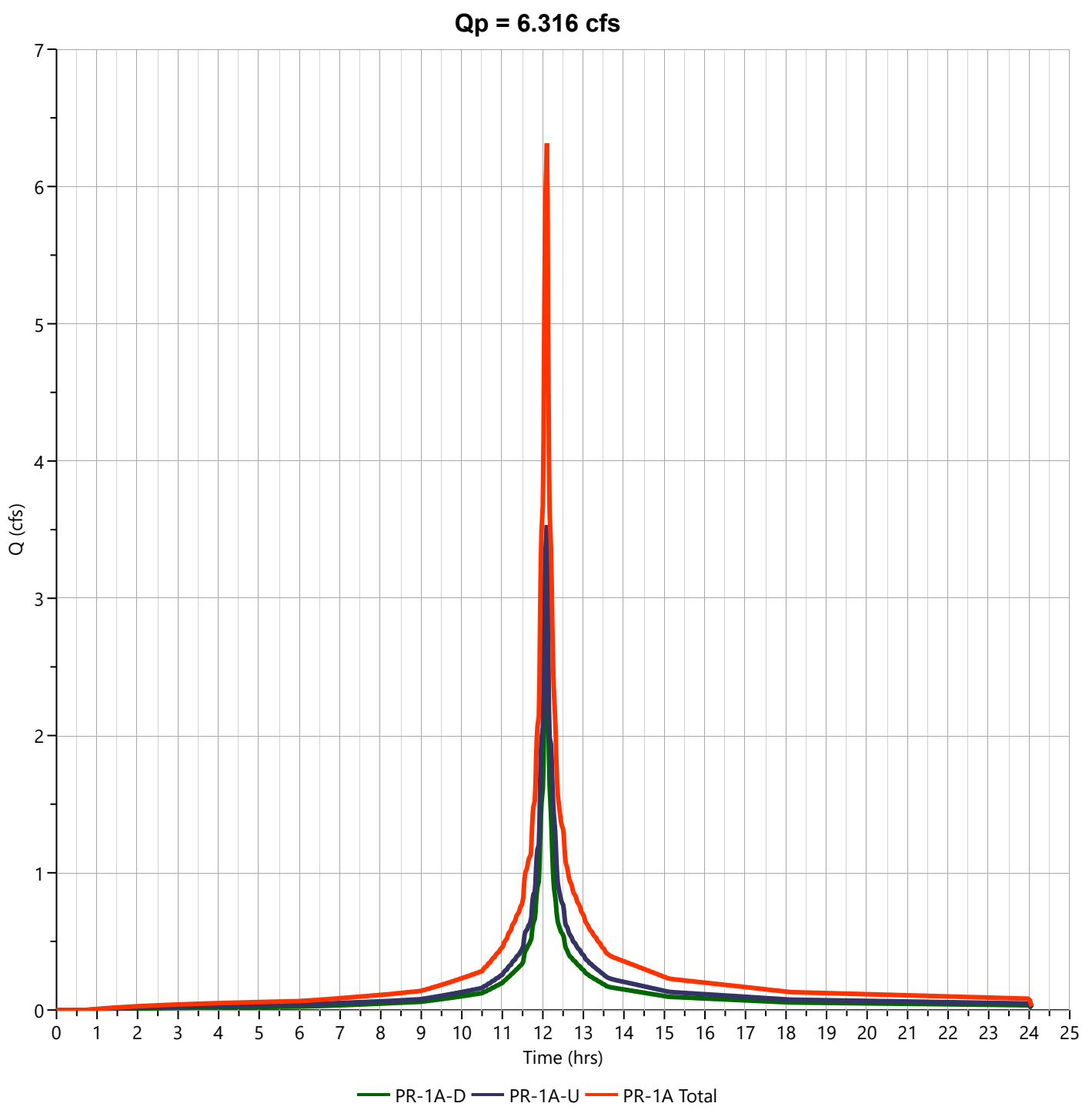
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A Total

Hyd. No. 10

Hydrograph Type	= Junction	Peak Flow	= 6.316 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 22,063 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

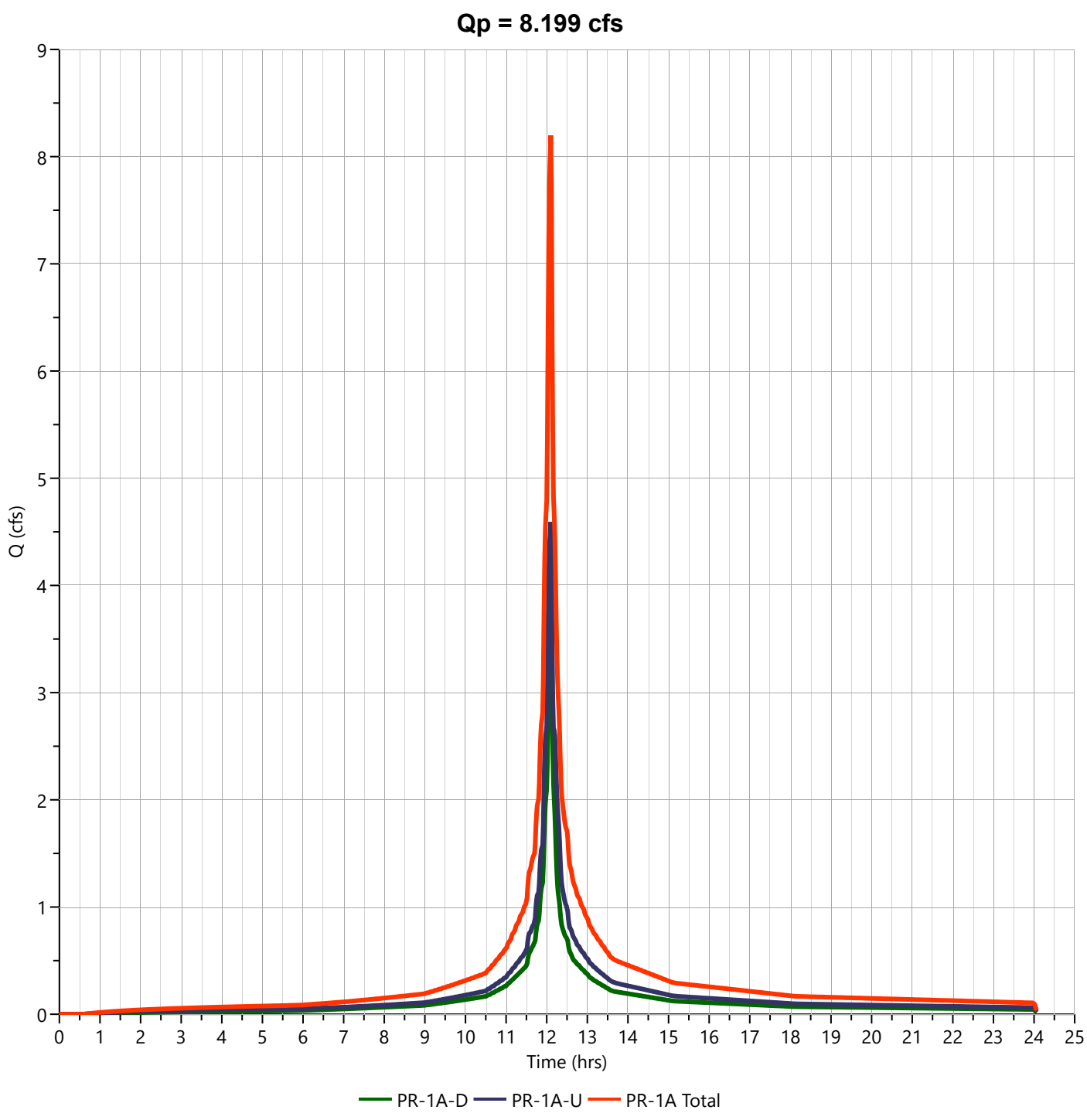
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A Total

Hyd. No. 10

Hydrograph Type	= Junction	Peak Flow	= 8.199 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 28,901 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

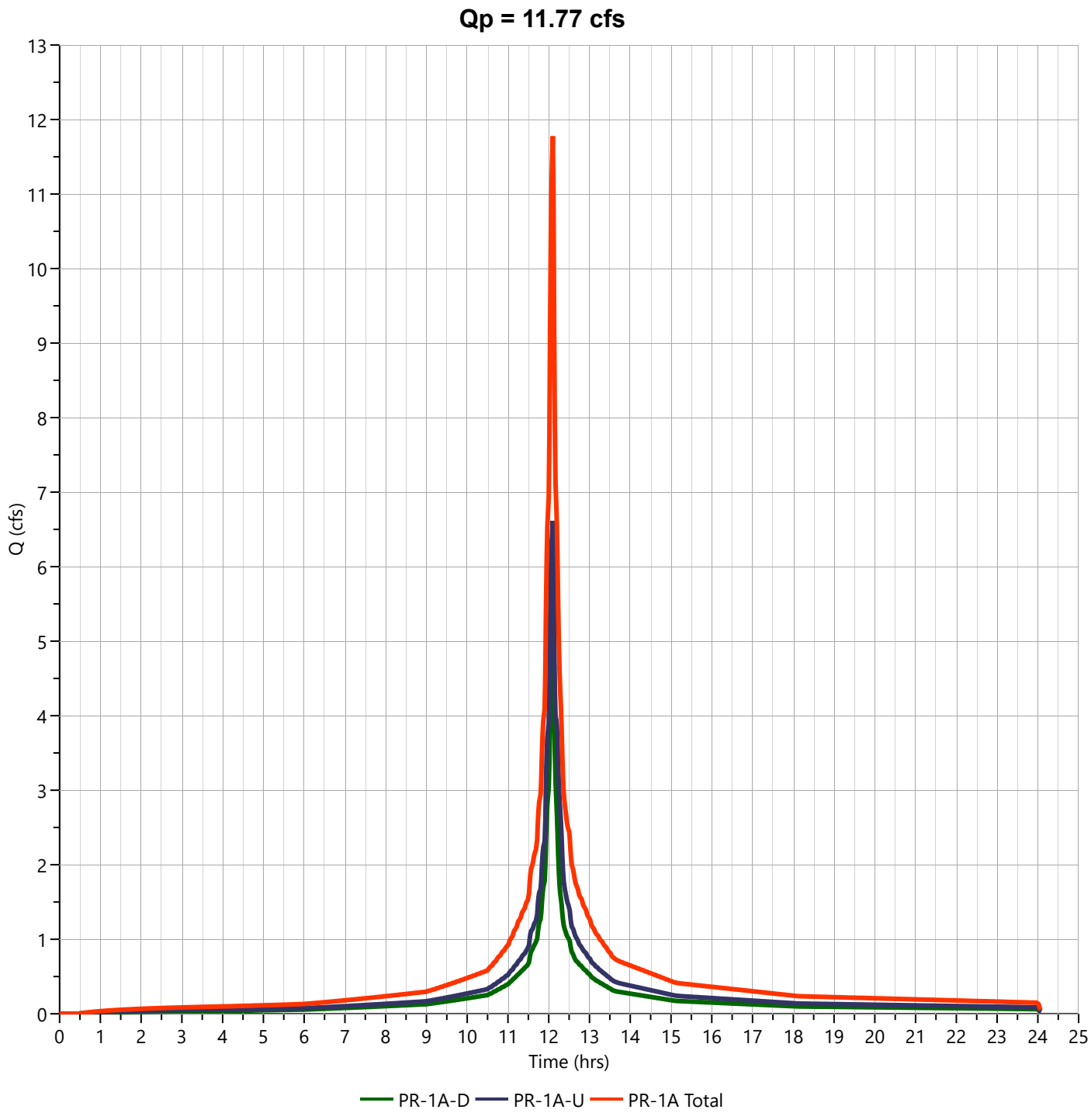
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1A Total

Hyd. No. 10

Hydrograph Type	= Junction	Peak Flow	= 11.77 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 42,065 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



PR-1B-DISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: Present **(Developed)** — **Current Proposed Watershed PR-1B-D - 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.	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	**10**				
4.	Two-year 24-hr rainfall, P_2		in	**3.46**				
5.	Land Slope, s		ft/ft	**0.352**				
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**	**3**	**4**
13.	Flow Length, L		ft	**397**	**25**	**117**
14.	Cross Sectional flow area, a		ft^2	**0.69**	**0.61**	**0.61**
15.	Wetted Perimeter, P_w		ft	**3.58**	**2.00**	**2.00**
16.	Hydraulic Radius, r	$r = a / P_w$	ft	**0.19**	**0.31**	**0.31**
17.	Channel Slope, s		ft/ft	**0.010**	**0.080**	**0.023**
18.	Manning's Roughness Coeff., n			**0.035**	**0.013**	**0.013**
19.	Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	**1.42**	**14.69**	**7.89**
20.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	**0.078**	+ **0.000**	+ **0.004**
					Channel Flow Sub-Total	**0.082 hours**

Channel Flow

			Segment ID	**5**	**6**	
21.	Flow Length, L		ft	**15**	**51**	
22.	Cross Sectional flow area, a		ft^2	**0.61**	**0.61**	
23.	Wetted Perimeter, P_w		ft	**2.00**	**2.00**	
24.	Hydraulic Radius, r	$r = a / P_w$	ft	**0.31**	**0.31**	
25.	Channel Slope, s		ft/ft	**0.055**	**0.021**	
26.	Manning's Roughness Coeff., n			**0.013**	**0.013**	
27.	Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	**12.14**	**7.59**	
28.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	**0.000**	+ **0.002**	+
					Channel Flow Sub-Total	**0.002 hours**

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

Total Tc (hours) =	**0.096 hours**
Total Tc (minutes) =	**6 minutes**

Hydrograph Report

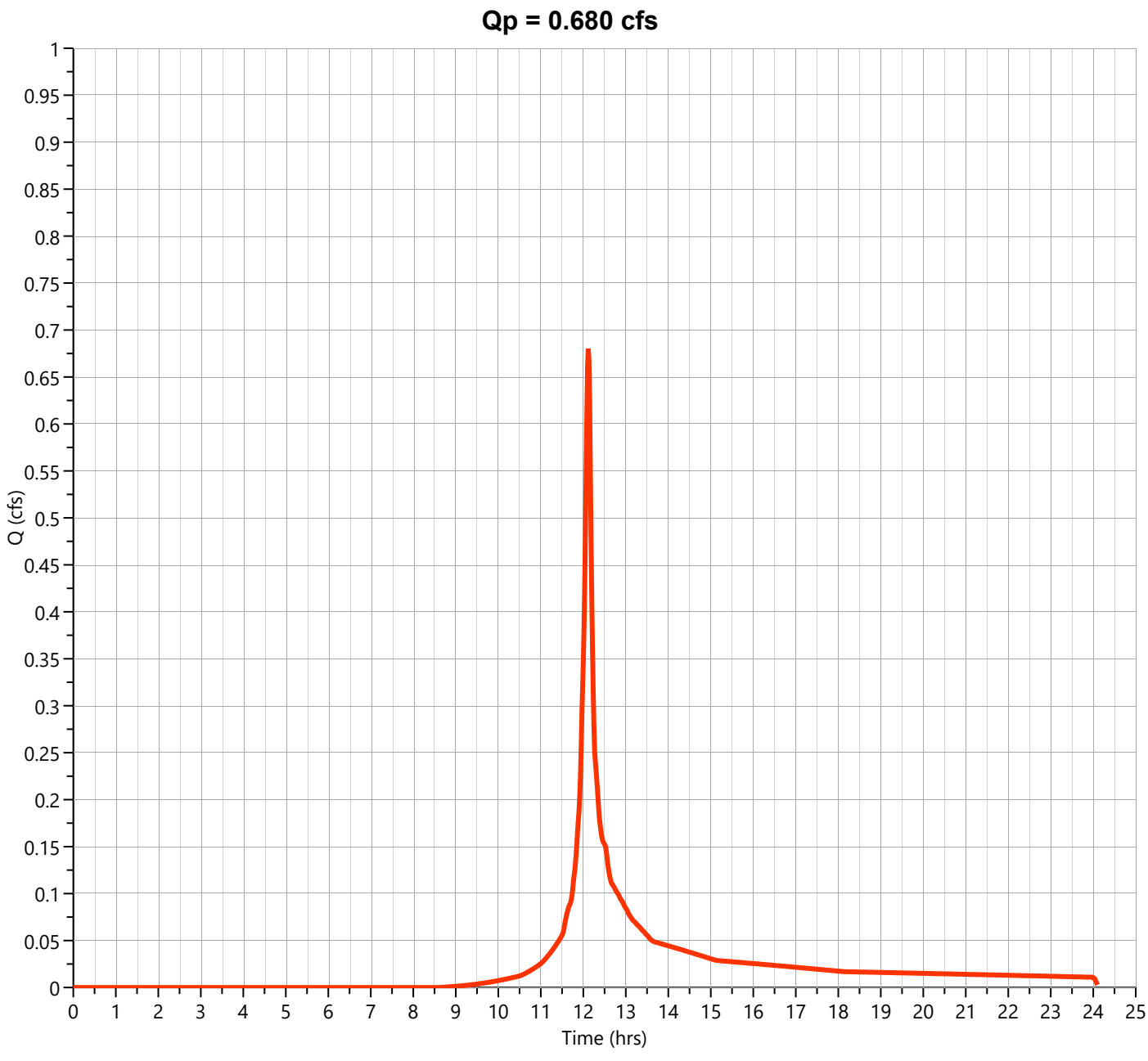
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1B-D

Hyd. No. 13

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.680 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 2,102 cuft
Drainage Area	= 0.35 ac	Curve Number	= 80.00
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

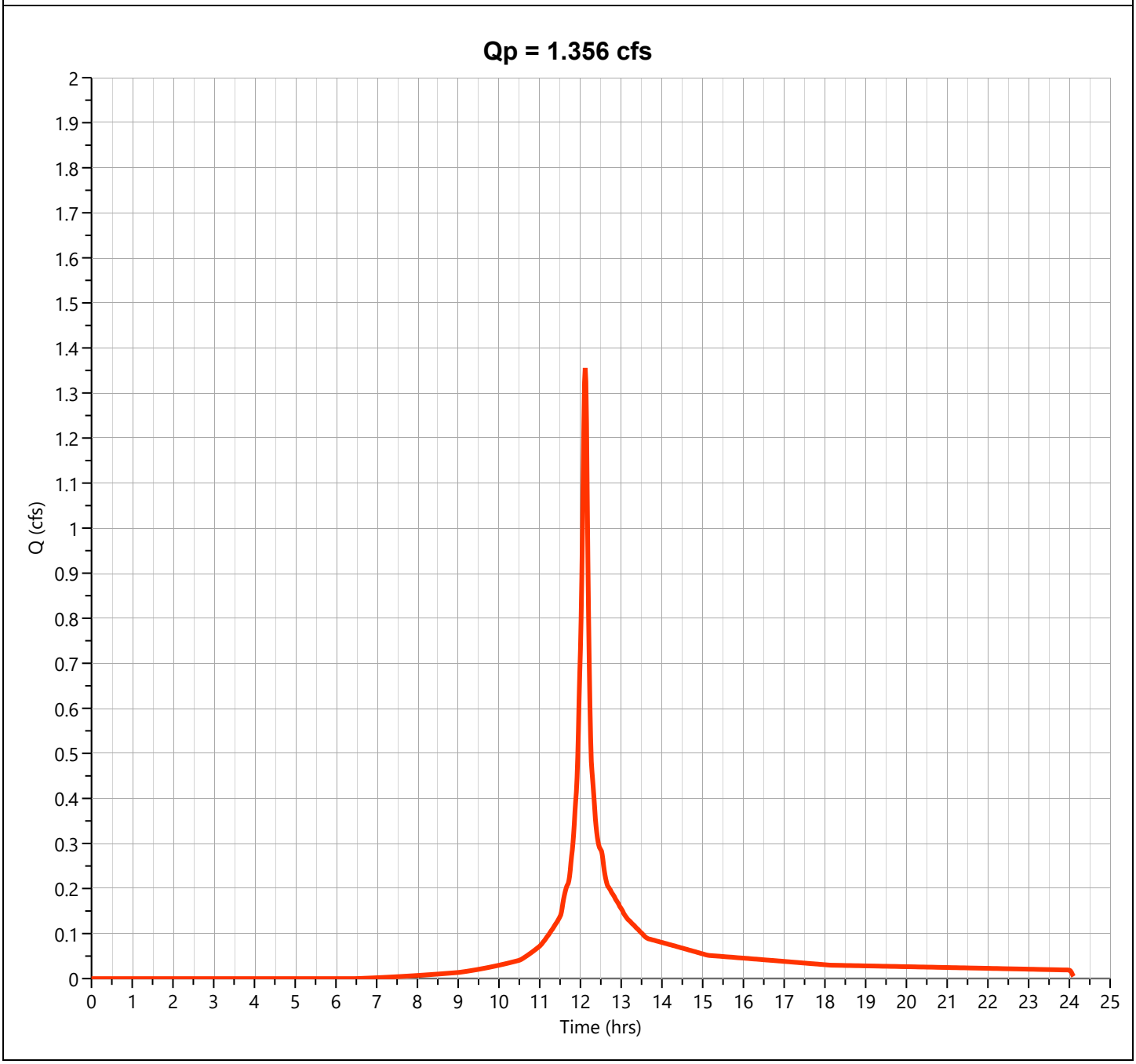
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1B-D

Hyd. No. 13

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.356 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 4,228 cuft
Drainage Area	= 0.35 ac	Curve Number	= 80.00
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

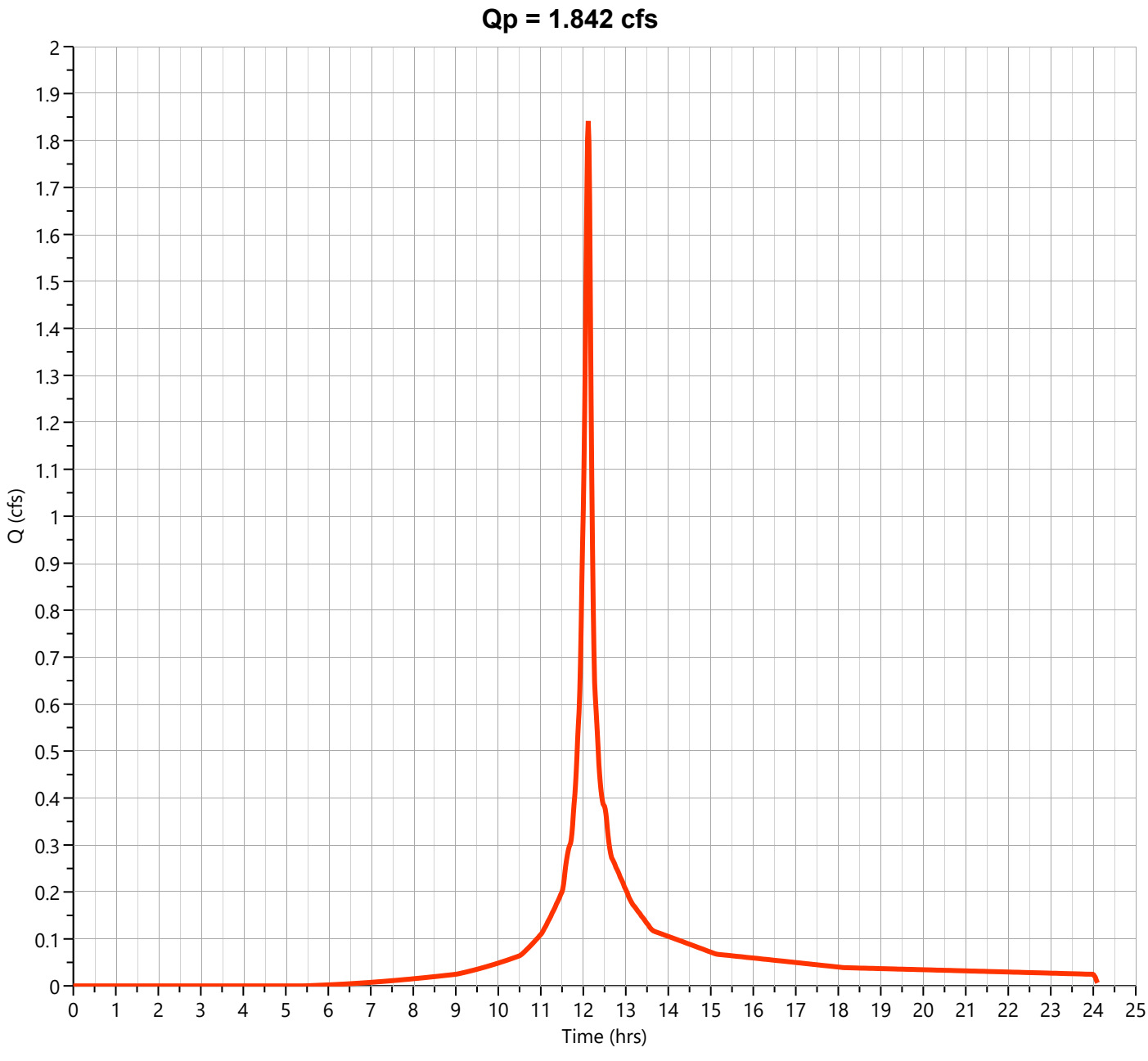
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1B-D

Hyd. No. 13

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.842 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 5,813 cuft
Drainage Area	= 0.35 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

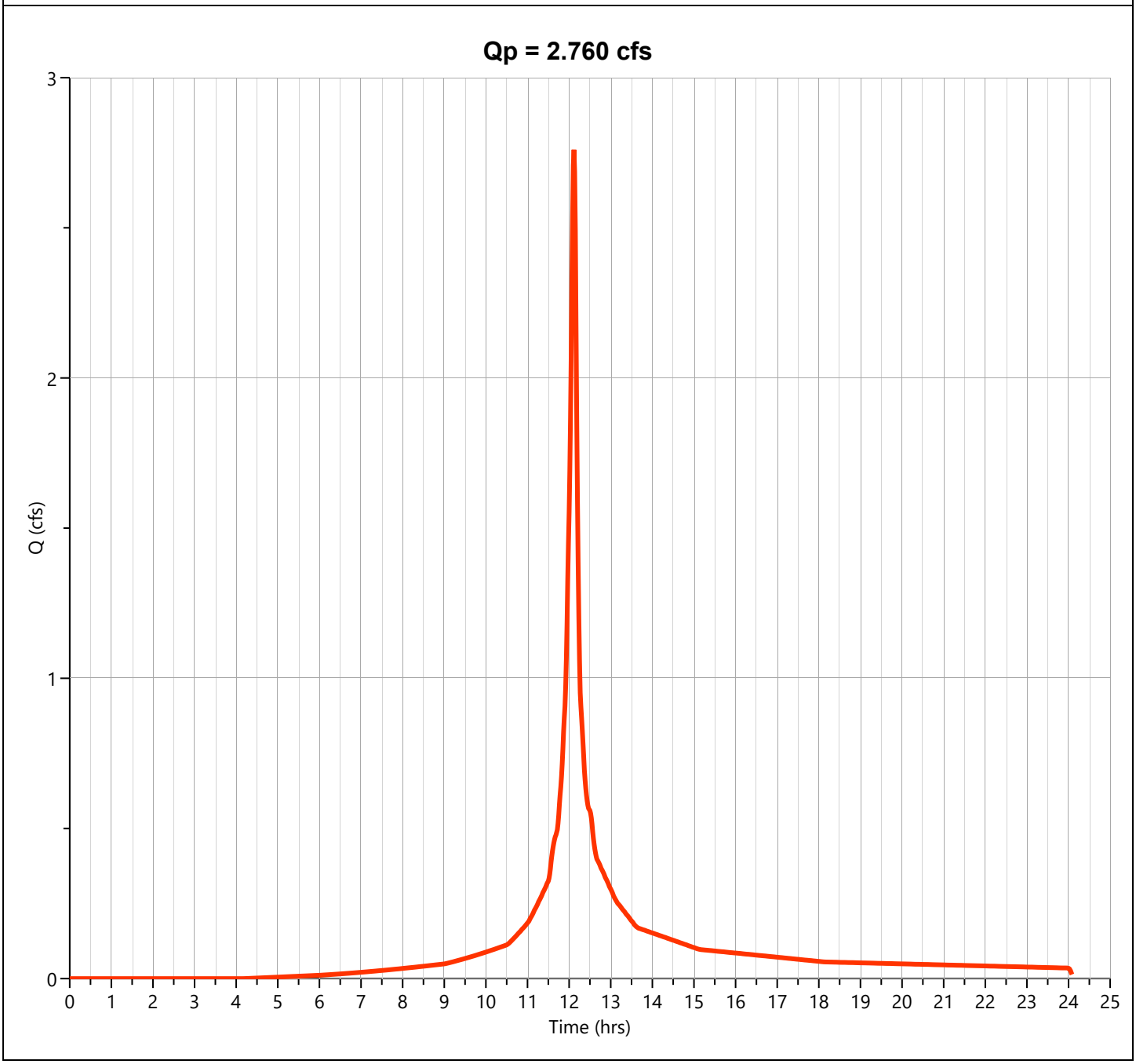
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1B-D

Hyd. No. 13

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.760 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 8,904 cuft
Drainage Area	= 0.35 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



PR-1B-UNDISTURBED WATERSHED

Project: Eagle Rock Avenue | **By:** TEG | **Date:** 10/21/2025

Location: West Orange, NJ | **Checked By:** MJV | **Date Checked:** 10/21/2025

Circle One: (Present) Developed | **Current Proposed Watershed PR-1B-U 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	0.044		
6.	Compute T_t $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.014	+	+

Sheet Flow Sub-Total: **0.014 hours**

Shallow Concentrated Flow

		Segment ID	2	3	4
7.	Surface Description		Pavement	Grassed Waterways	Woodlands
8.	Flow Length, L	ft	369	32	44
9.	Watercourse Slope, s	ft/ft	0.035	0.170	0.290
10.	Average Velocity, V (NEH table 15-3)	ft/s	3.81	6.65	2.71
11.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr	0.027	+ 0.001	+ 0.005

Shallow Conc. Flow Sub-Total: **0.033 hours**

Channel Flow

		Segment ID	5	6	7
12.	Flow Length, L	ft	358	25	117
13.	Cross Sectional flow area, a	ft^2	0.69	0.61	0.61
14.	Wetted Perimeter, P_w	ft	3.58	2.00	2.00
15.	Hydraulic Radius, r $r = a / P_w$	ft	0.19	0.31	0.31
16.	Channel Slope, s	ft/ft	0.010	0.080	0.023
17.	Manning's Roughness Coeff., n		0.035	0.013	0.013
18.	Velocity, V $V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s	1.42	14.69	7.89
19.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr	0.070	+ 0.000	+ 0.004

Channel Flow Sub-Total: **0.075 hours**

Channel Flow

		Segment ID	8	9	
20.	Flow Length, L	ft	15	51	
21.	Cross Sectional flow area, a	ft^2	0.61	0.61	
22.	Wetted Perimeter, P_w	ft	2.00	2.00	
23.	Hydraulic Radius, r $r = a / P_w$	ft	0.31	0.31	
24.	Channel Slope, s	ft/ft	0.055	0.021	
25.	Manning's Roughness Coeff., n		0.013	0.013	
26.	Velocity, V $V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s	12.14	7.59	
27.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr	0.000	+ 0.002	+

Channel Flow Sub-Total: **0.002 hours**

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

Total Tc (hours) = **0.124 hours**

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

Project: Eagle Rock Avenue | **By:** TEG | **Date:** 10/21/2025

Location: West Orange, NJ | **Checked By:** MJV | **Date Checked:** 10/21/2025

Circle One: (Present) Developed | **Current Proposed Watershed PR-1B-U 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		Woods Light Underbrush		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.40		0.40		
3.	Flow Length, L (total L < 100 ft)	ft	67		23		
4.	Two-year 24-hr rainfall, P_2	in	3.46		3.46		
5.	Land Slope, s	ft/ft	0.068		0.505		
6.	Compute T_t $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.153	+	0.029	+	
					Sheet Flow Sub-Total		0.182 hours

Shallow Concentrated Flow

		Segment ID	3				
7.	Surface Description		Grassed Waterways				
8.	Flow Length, L	ft	13				
9.	Watercourse Slope, s	ft/ft	0.372				
10.	Average Velocity, V (NEH table 15-3)	ft/s	9.85				
11.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr	0.000	+		+	
					Shallow Conc. Flow Sub-Total		0.000 hours

Channel Flow

		Segment ID	4		5		6
12.	Flow Length, L	ft	245		25		117
13.	Cross Sectional flow area, a	ft^2	0.69		0.61		0.61
14.	Wetted Perimeter, P_w	ft	3.58		2.00		2.00
15.	Hydraulic Radius, r $r = a / P_w$	ft	0.19		0.31		0.31
16.	Channel Slope, s	ft/ft	0.010		0.080		0.023
17.	Manning's Roughness Coeff., n		0.035		0.013		0.013
18.	Velocity, V $V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s	1.42		14.69		7.89
19.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr	0.048	+	0.000	+	0.004
					Channel Flow Sub-Total		0.053 hours

Channel Flow

		Segment ID	7		8		
20.	Flow Length, L	ft	15		51		
21.	Cross Sectional flow area, a	ft^2	0.61		0.61		
22.	Wetted Perimeter, P_w	ft	2.00		2.00		
23.	Hydraulic Radius, r $r = a / P_w$	ft	0.31		0.31		
24.	Channel Slope, s	ft/ft	0.055		0.021		
25.	Manning's Roughness Coeff., n		0.013		0.013		
26.	Velocity, V $V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s	12.14		7.59		
27.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr	0.000	+	0.002	+	
					Channel Flow Sub-Total		0.002 hours

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

Total Tc (hours) =	0.237 hours
Total Tc (minutes) =	14 minutes

Hydrograph Report

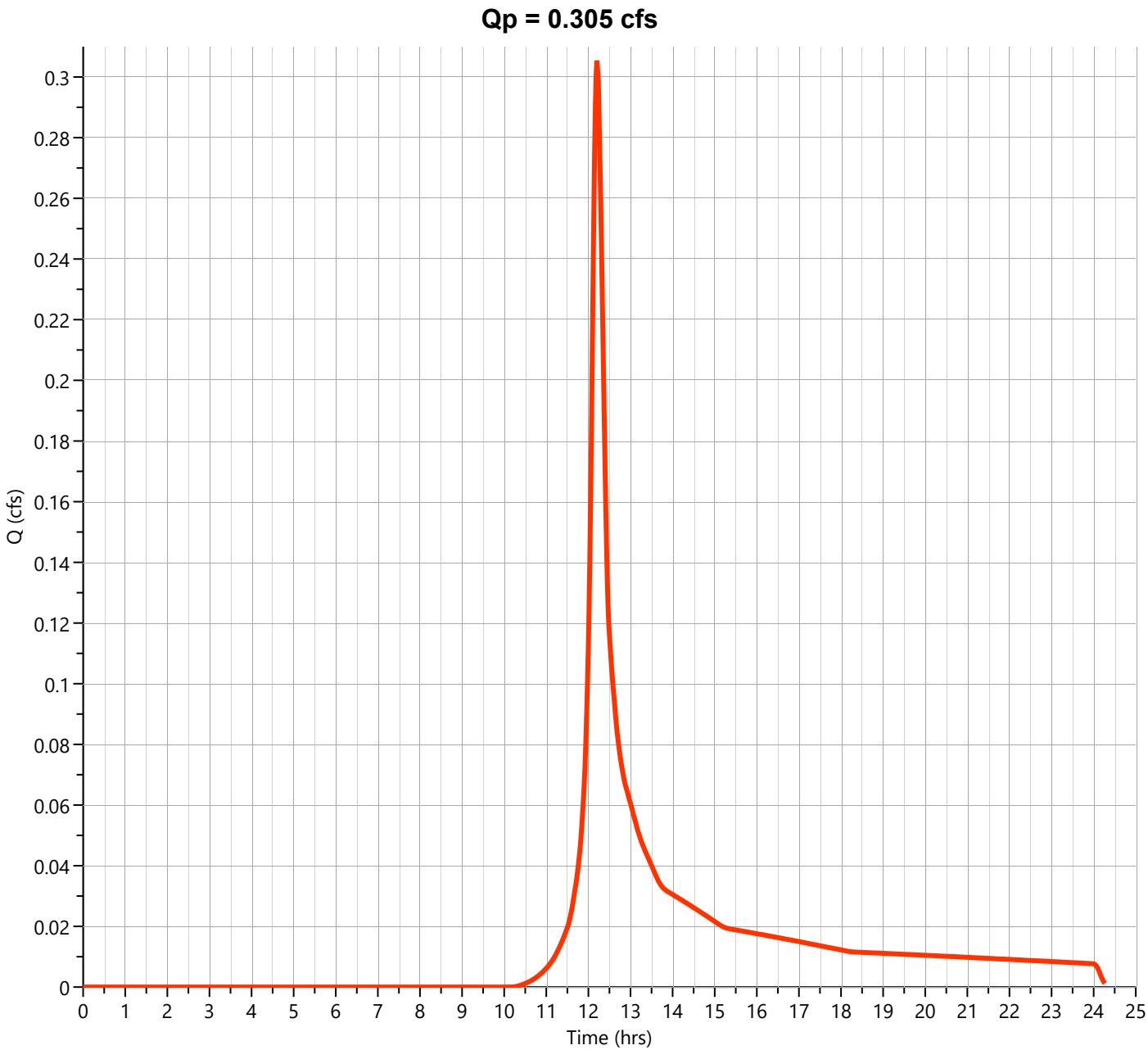
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1B-U Open Space C

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.305 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 1,276 cuft
Drainage Area	= 0.29 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

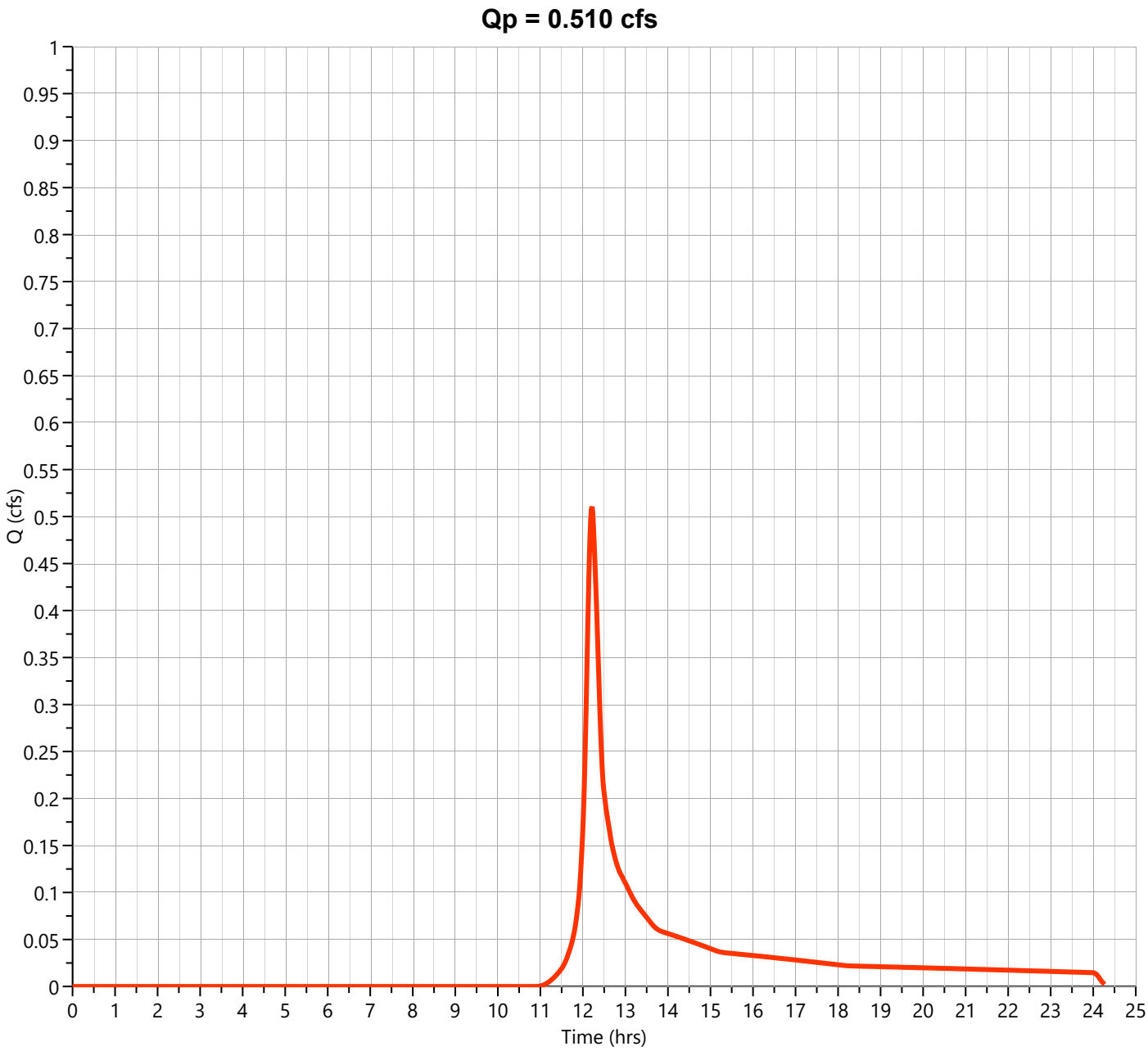
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1B-U Woods C

Hyd. No. 16

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.510 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.22 hrs
Time Interval	= 1 min	Runoff Volume	= 2,213 cuft
Drainage Area	= 0.62 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

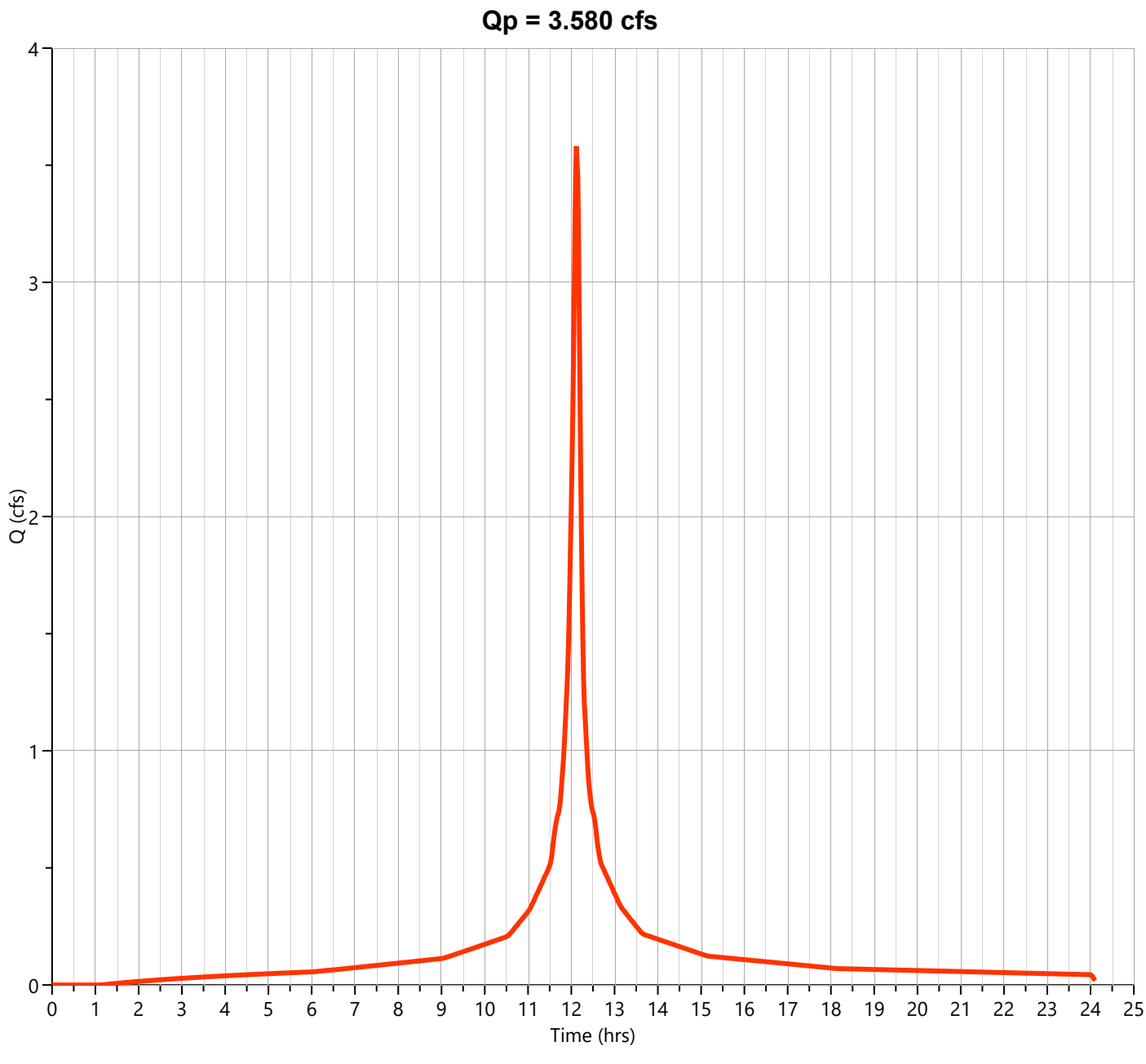
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1B-U Impervious

Hyd. No. 17

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.580 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 13,475 cuft
Drainage Area	= 1.18 ac	Curve Number	= 98.00
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

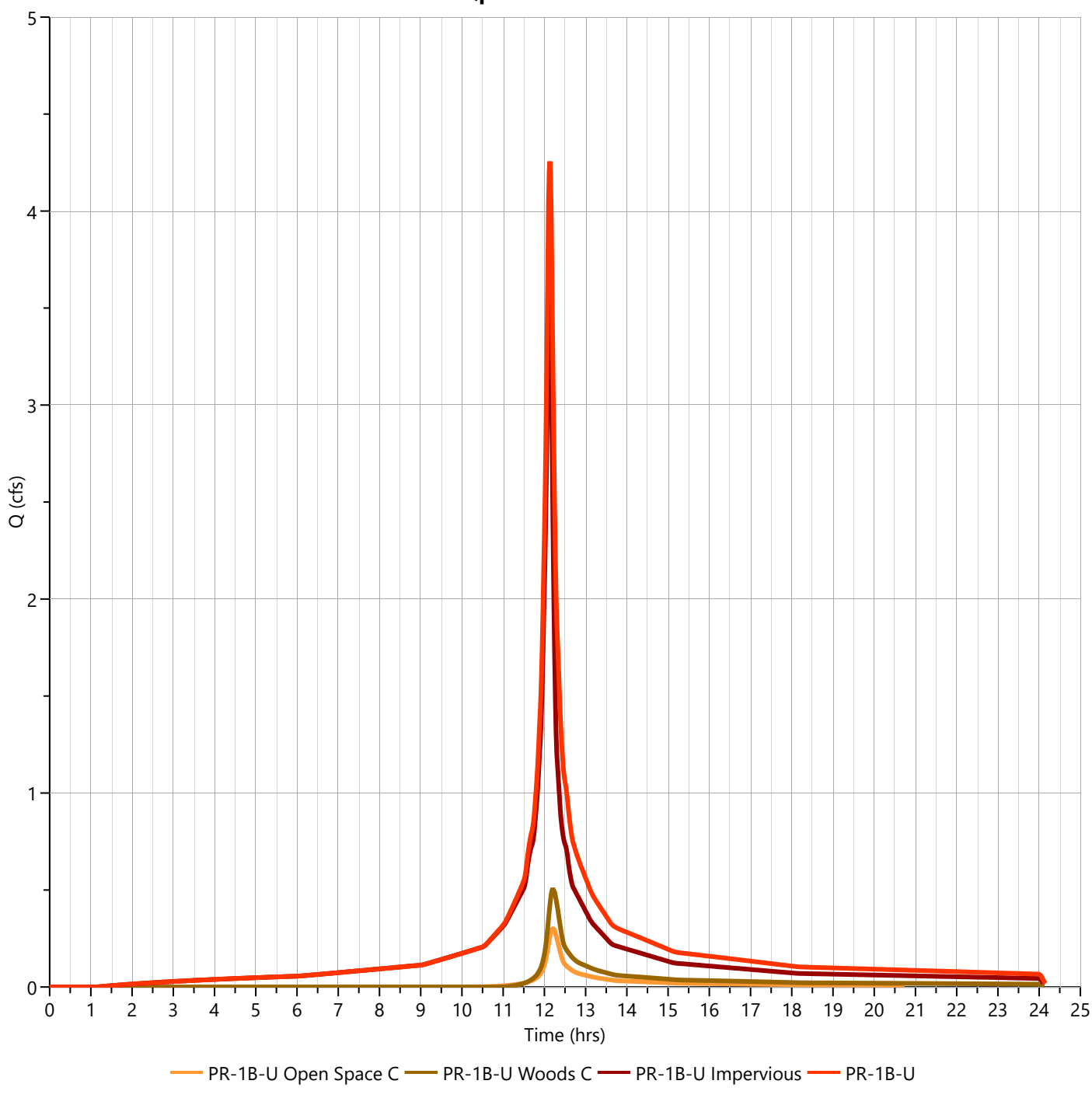
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1B-U

Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 4.256 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 16,965 cuft
Inflow Hydrographs	= 15, 16, 17	Total Contrib. Area	= 2.09 ac



Hydrograph Report

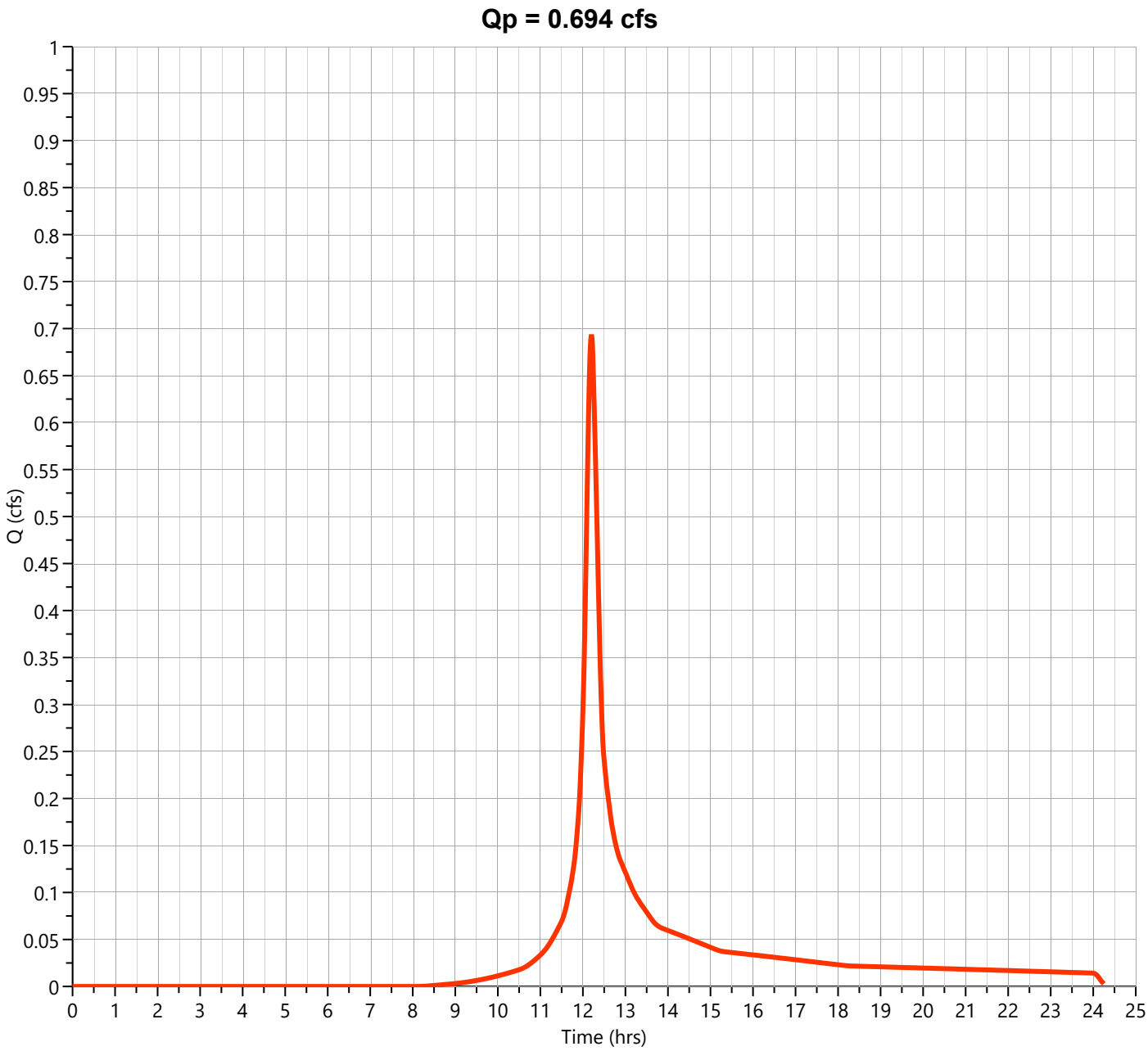
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1B-U Open Space C

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.694 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 2,812 cuft
Drainage Area	= 0.29 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

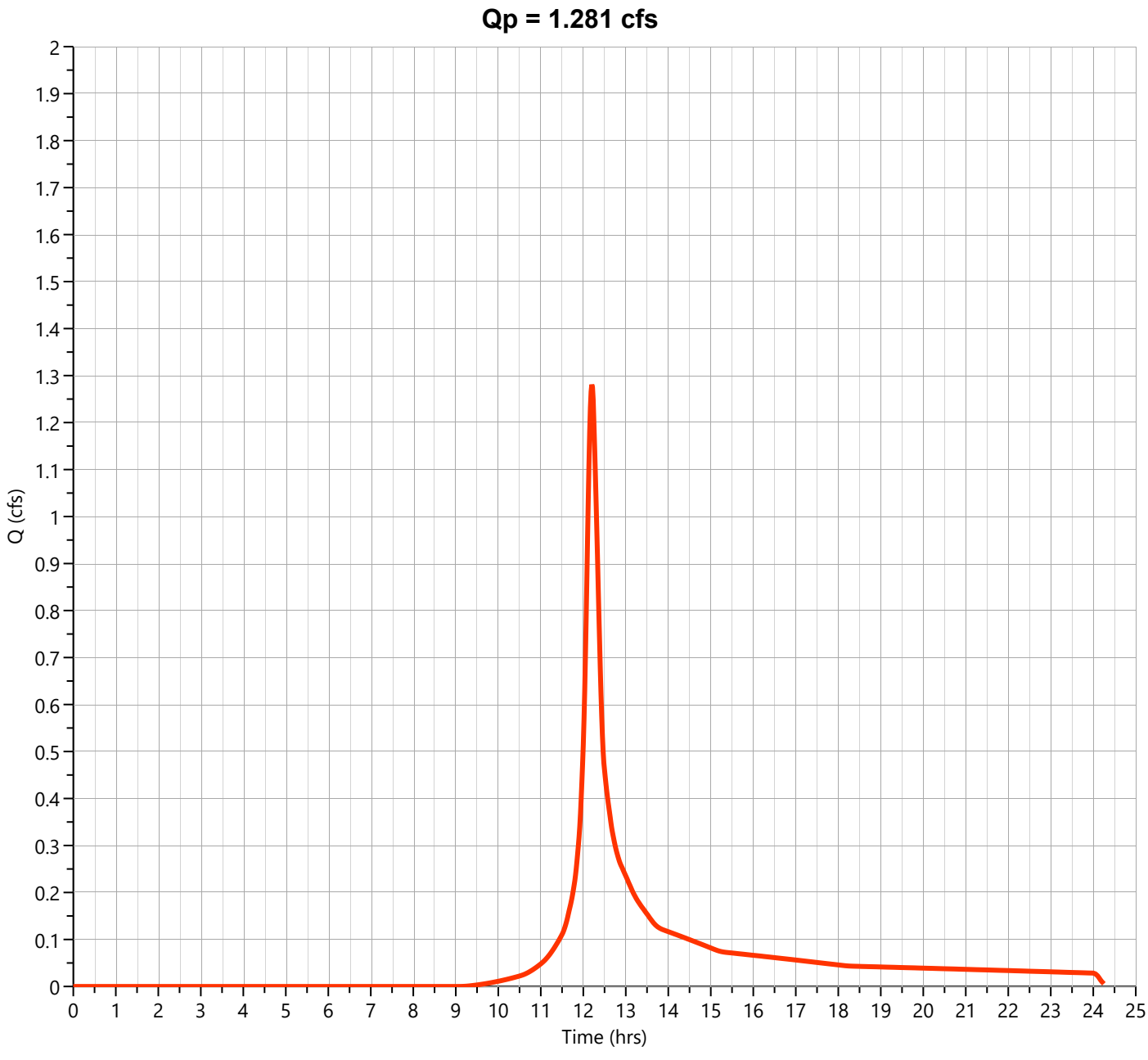
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1B-U Woods C

Hyd. No. 16

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.281 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 5,227 cuft
Drainage Area	= 0.62 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

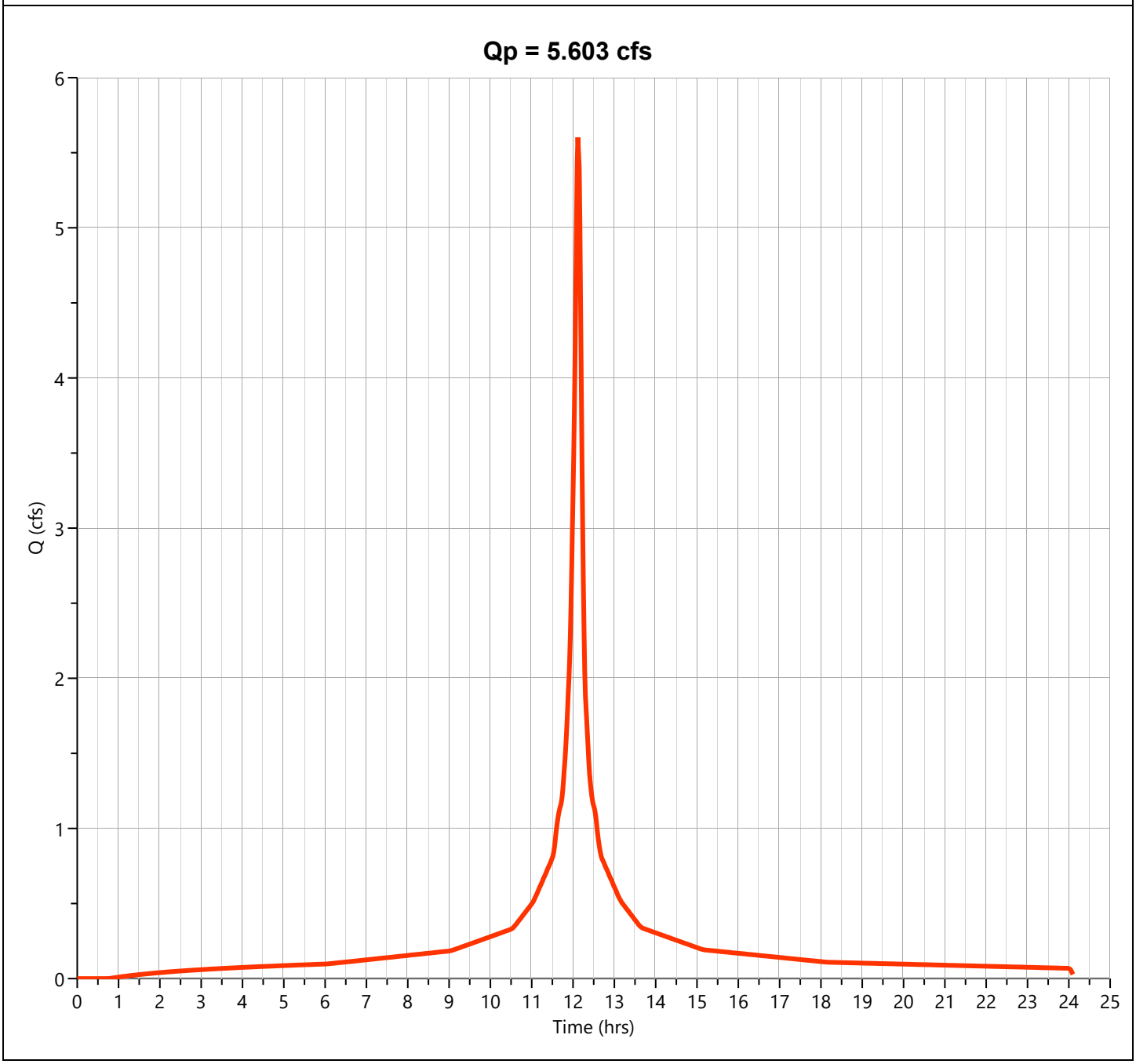
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1B-U Impervious

Hyd. No. 17

Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.603 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 21,477 cuft
Drainage Area	= 1.18 ac	Curve Number	= 98.00
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

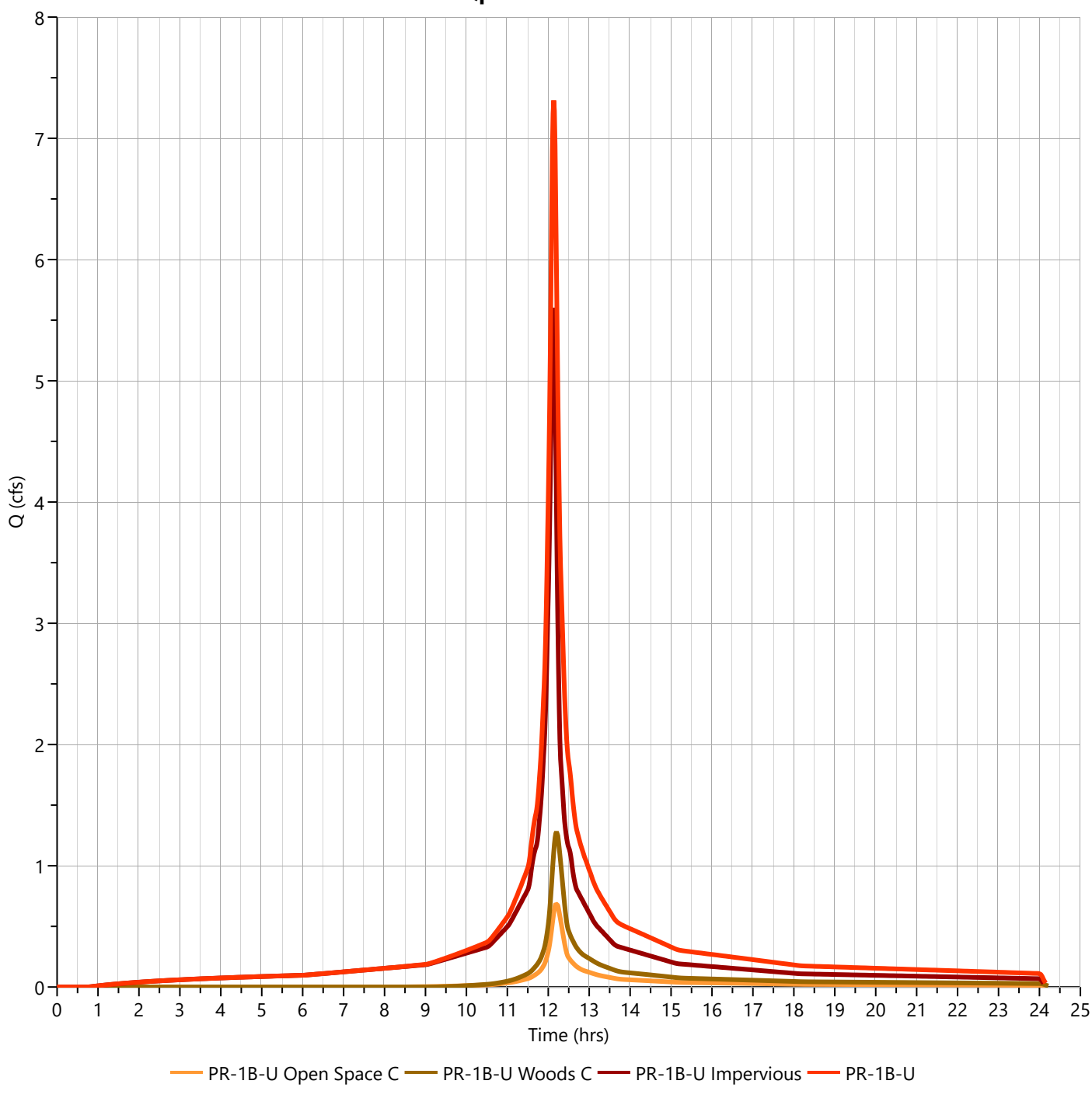
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1B-U

Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 7.312 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 29,515 cuft
Inflow Hydrographs	= 15, 16, 17	Total Contrib. Area	= 2.09 ac



Hydrograph Report

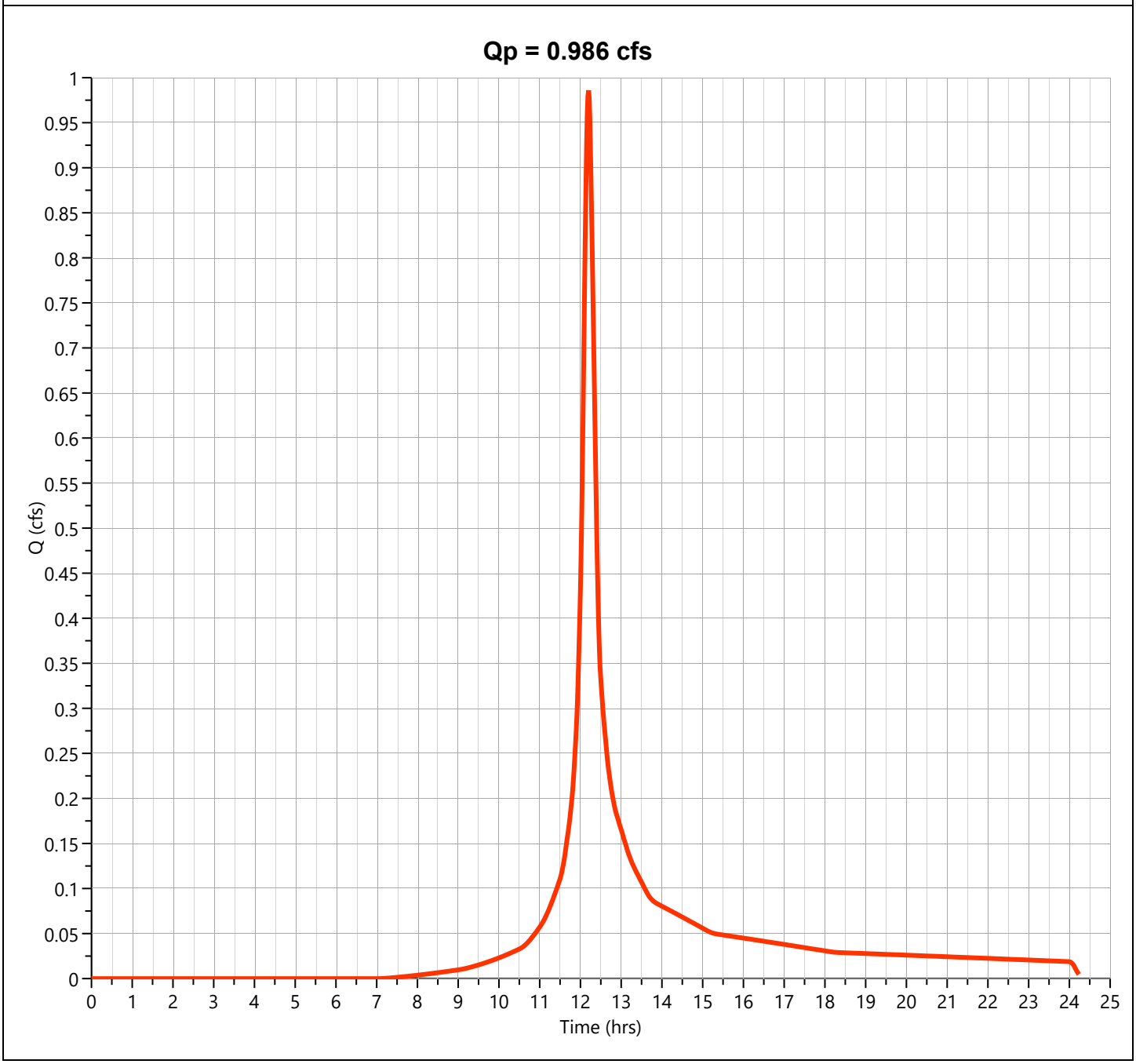
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1B-U Open Space C

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.986 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 3,999 cuft
Drainage Area	= 0.29 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

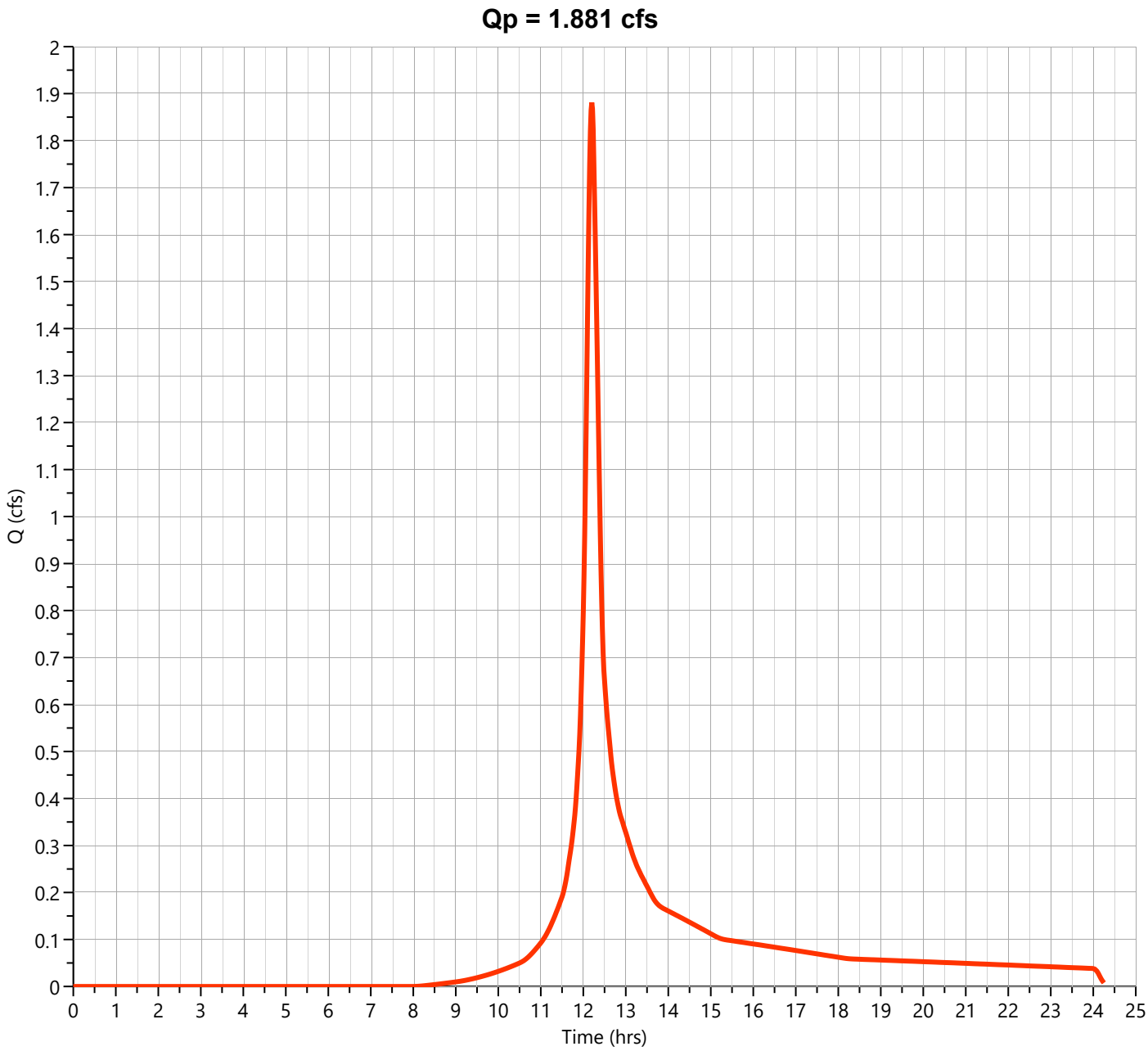
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1B-U Woods C

Hyd. No. 16

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.881 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 7,623 cuft
Drainage Area	= 0.62 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

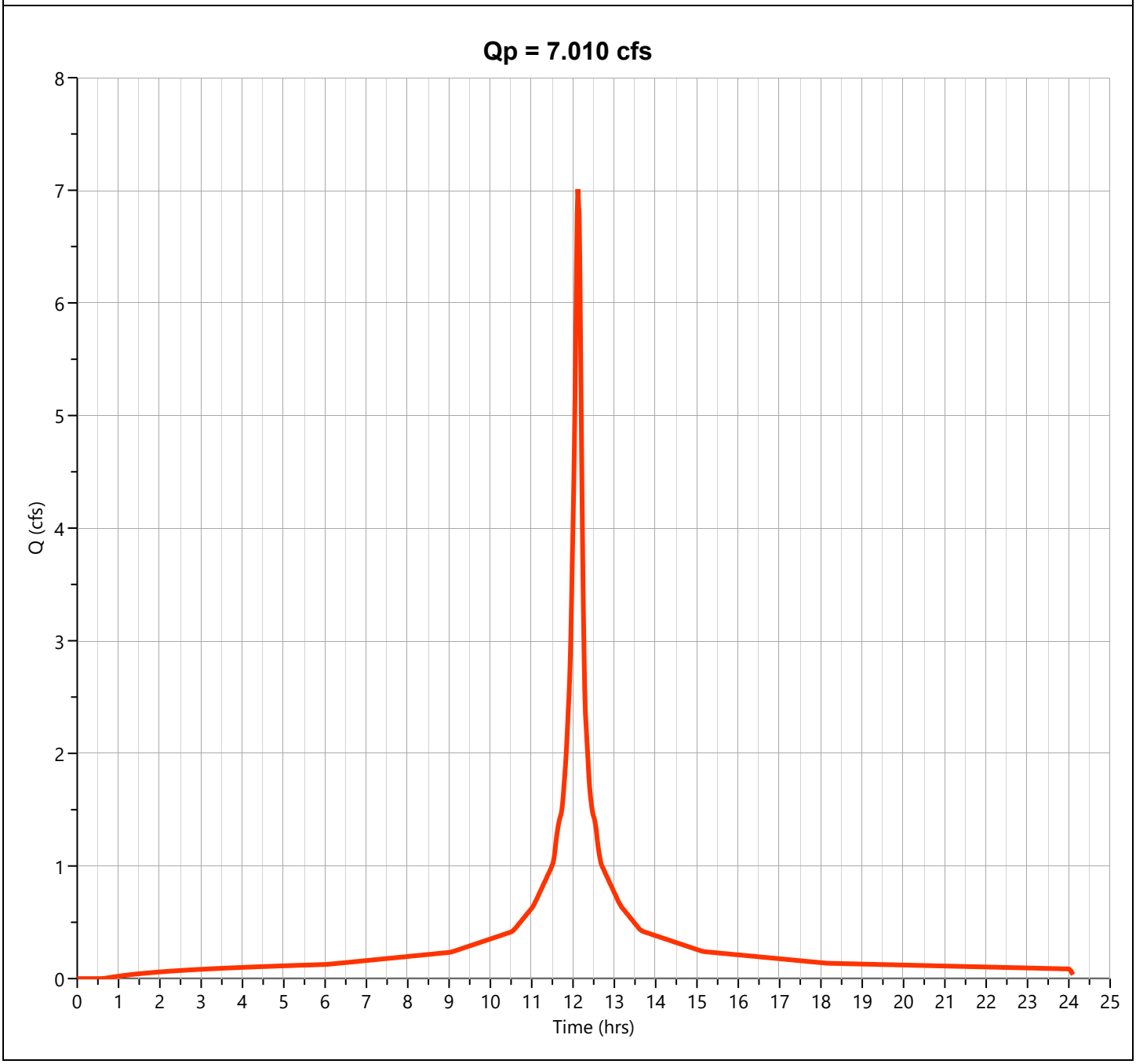
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1B-U Impervious

Hyd. No. 17

Hydrograph Type	= NRCS Runoff	Peak Flow	= 7.010 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 27,067 cuft
Drainage Area	= 1.18 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 7.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

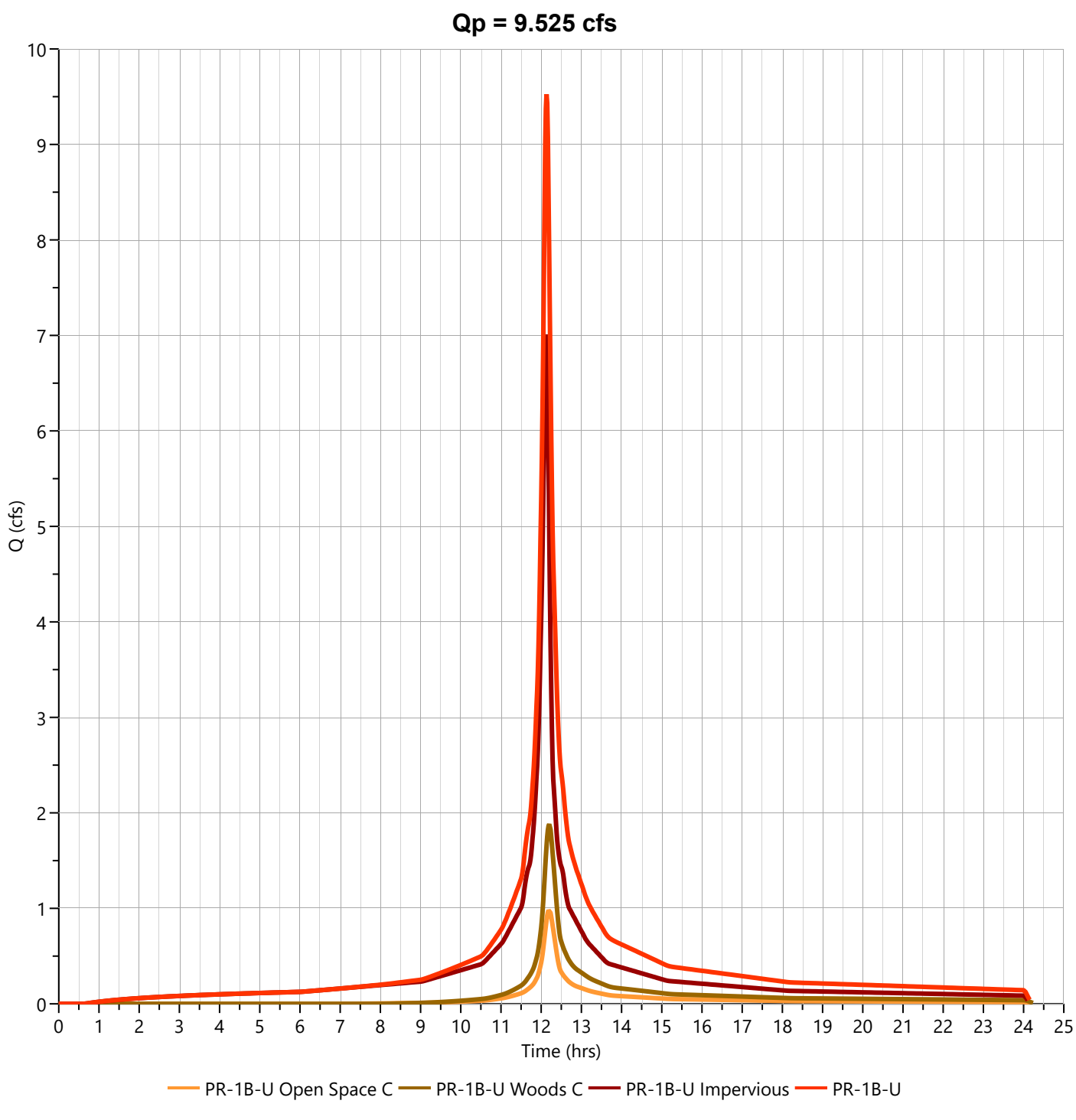
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1B-U

Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 9.525 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 38,689 cuft
Inflow Hydrographs	= 15, 16, 17	Total Contrib. Area	= 2.09 ac



Hydrograph Report

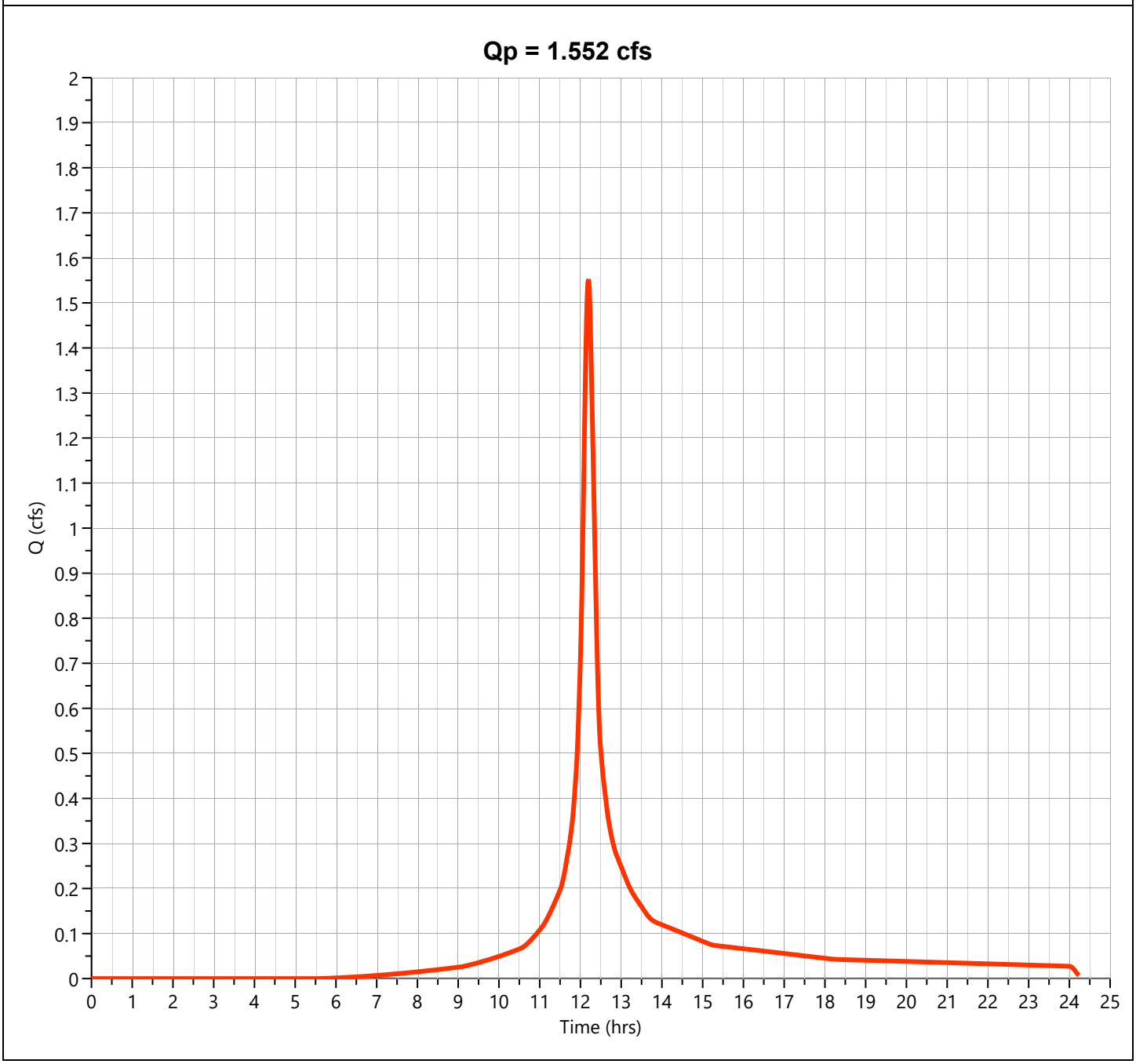
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1B-U Open Space C

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.552 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 6,367 cuft
Drainage Area	= 0.29 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

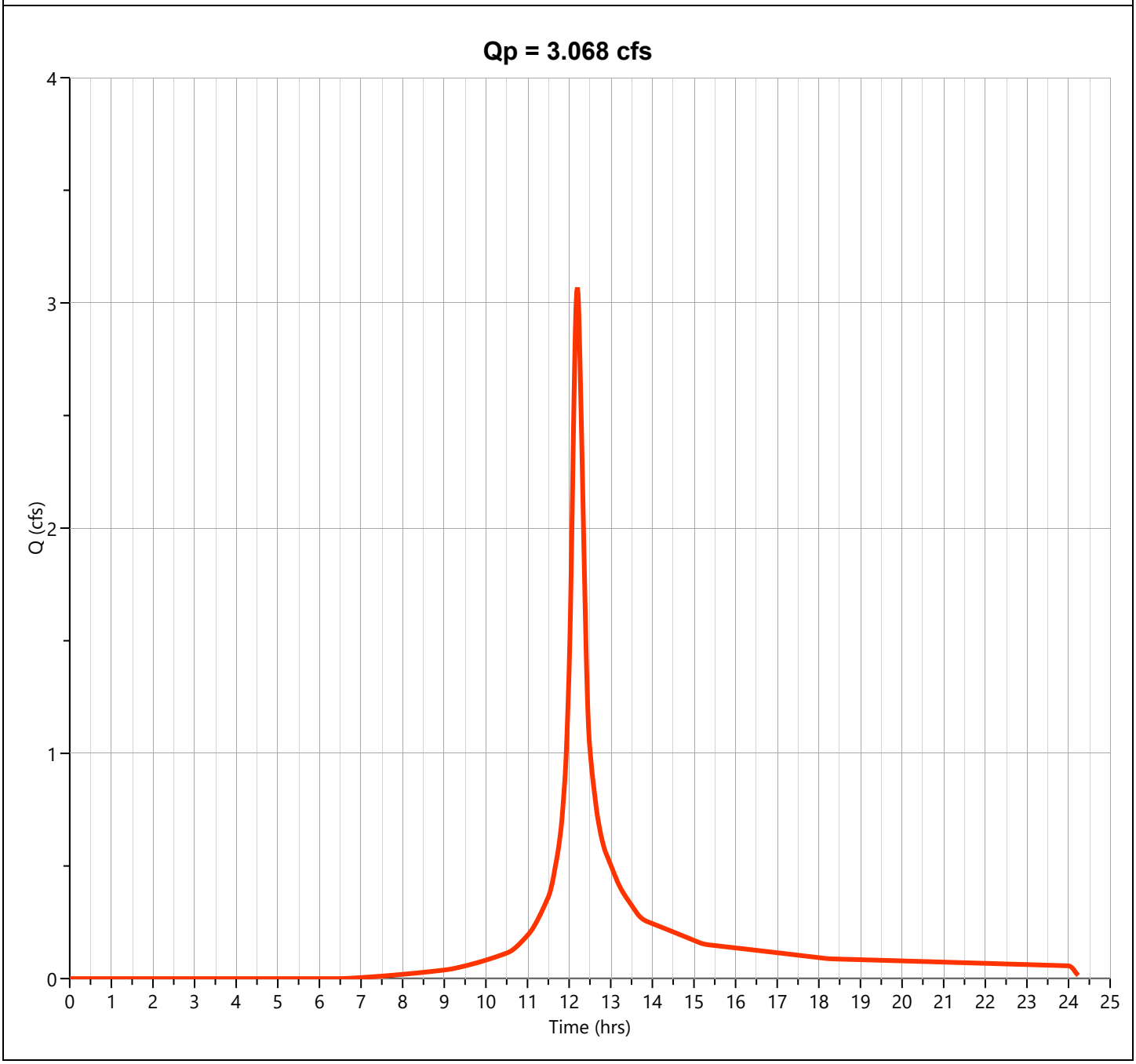
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1B-U Woods C

Hyd. No. 16

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.068 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 12,484 cuft
Drainage Area	= 0.62 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 14.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

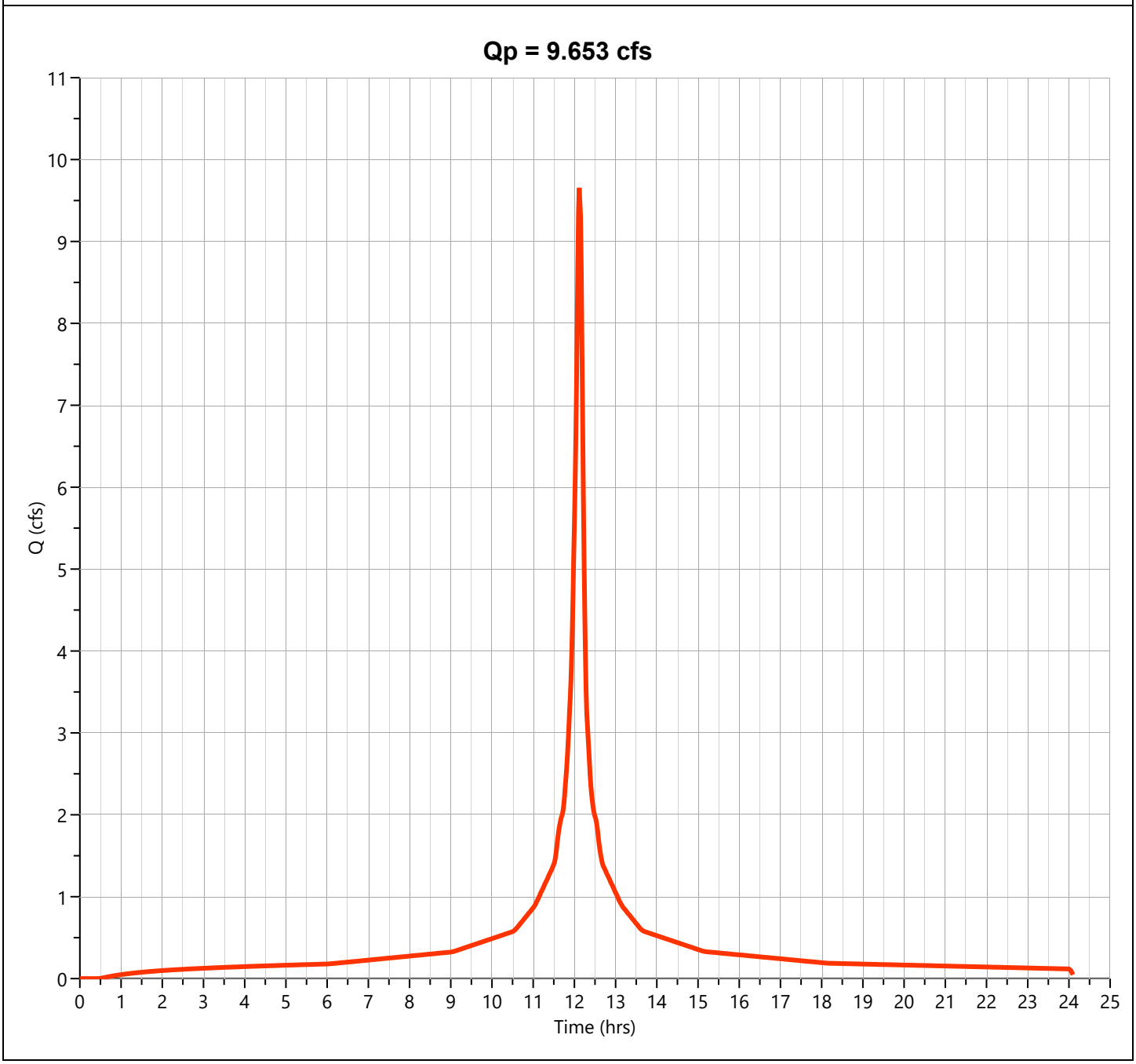
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1B-U Impervious

Hyd. No. 17

Hydrograph Type	= NRCS Runoff	Peak Flow	= 9.653 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 37,585 cuft
Drainage Area	= 1.18 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 7.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

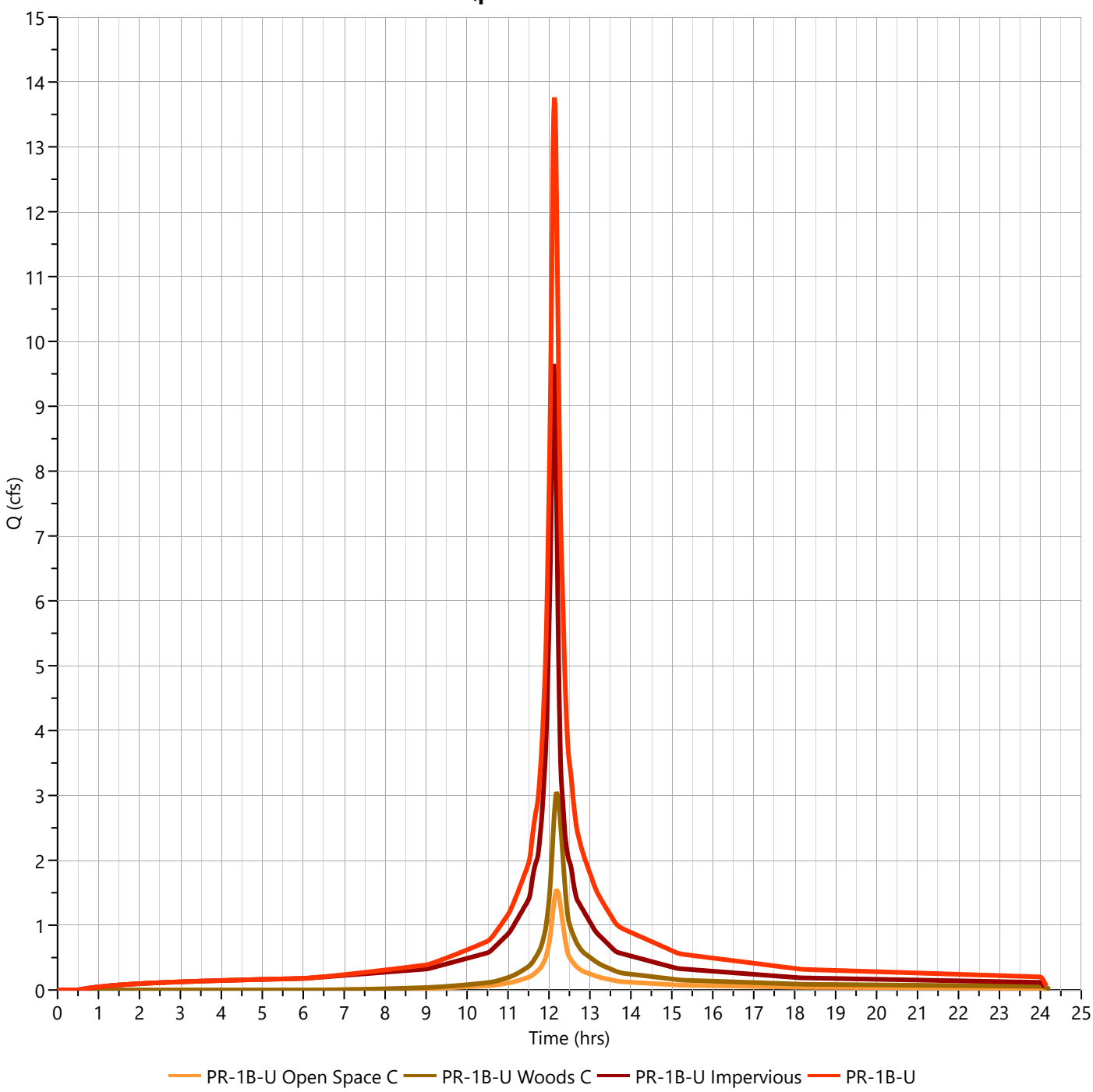
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1B-U

Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 13.76 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 56,436 cuft
Inflow Hydrographs	= 15, 16, 17	Total Contrib. Area	= 2.09 ac



PR-1B WATERSHED
(COMBINED PROPOSED FLOW TO SWALE 1)

Hydrograph Report

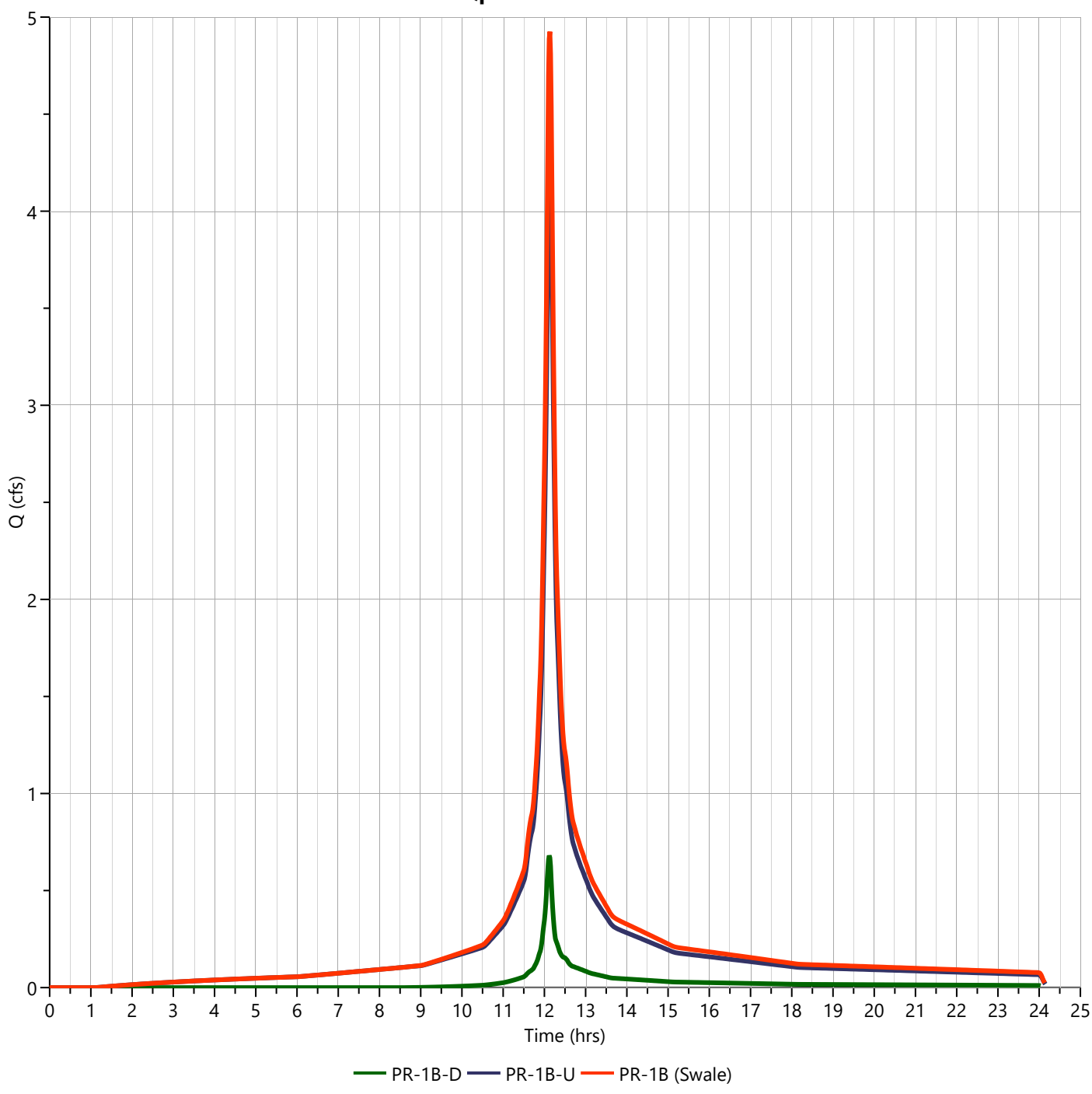
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1B (Swale)

Hyd. No. 21

Hydrograph Type	= Junction	Peak Flow	= 4.925 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 19,068 cuft
Inflow Hydrographs	= 13	Total Contrib. Area	= 0.35 ac



Hydrograph Report

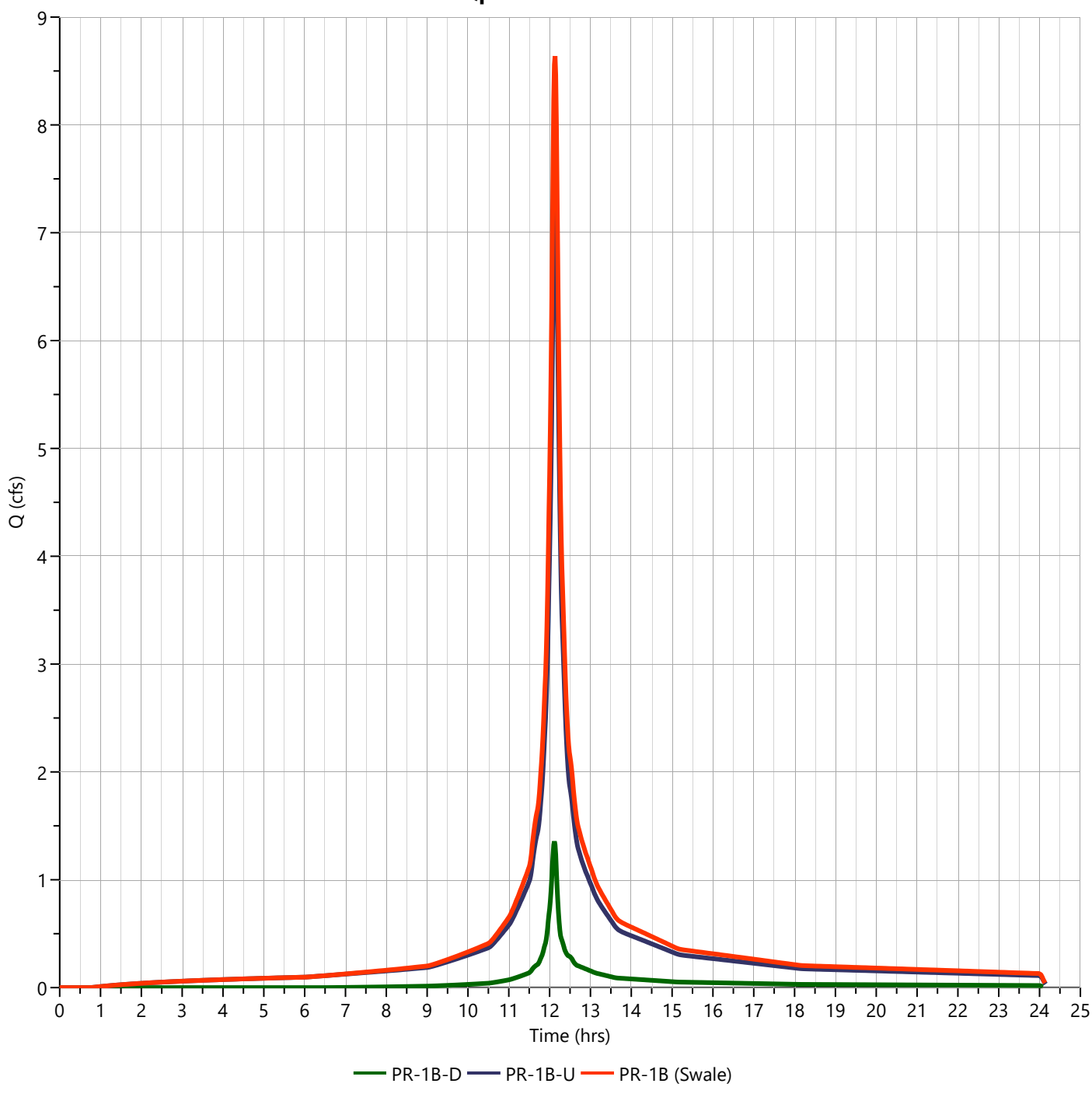
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1B (Swale)

Hyd. No. 21

Hydrograph Type	= Junction	Peak Flow	= 8.638 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 33,743 cuft
Inflow Hydrographs	= 13	Total Contrib. Area	= 0.35 ac



Hydrograph Report

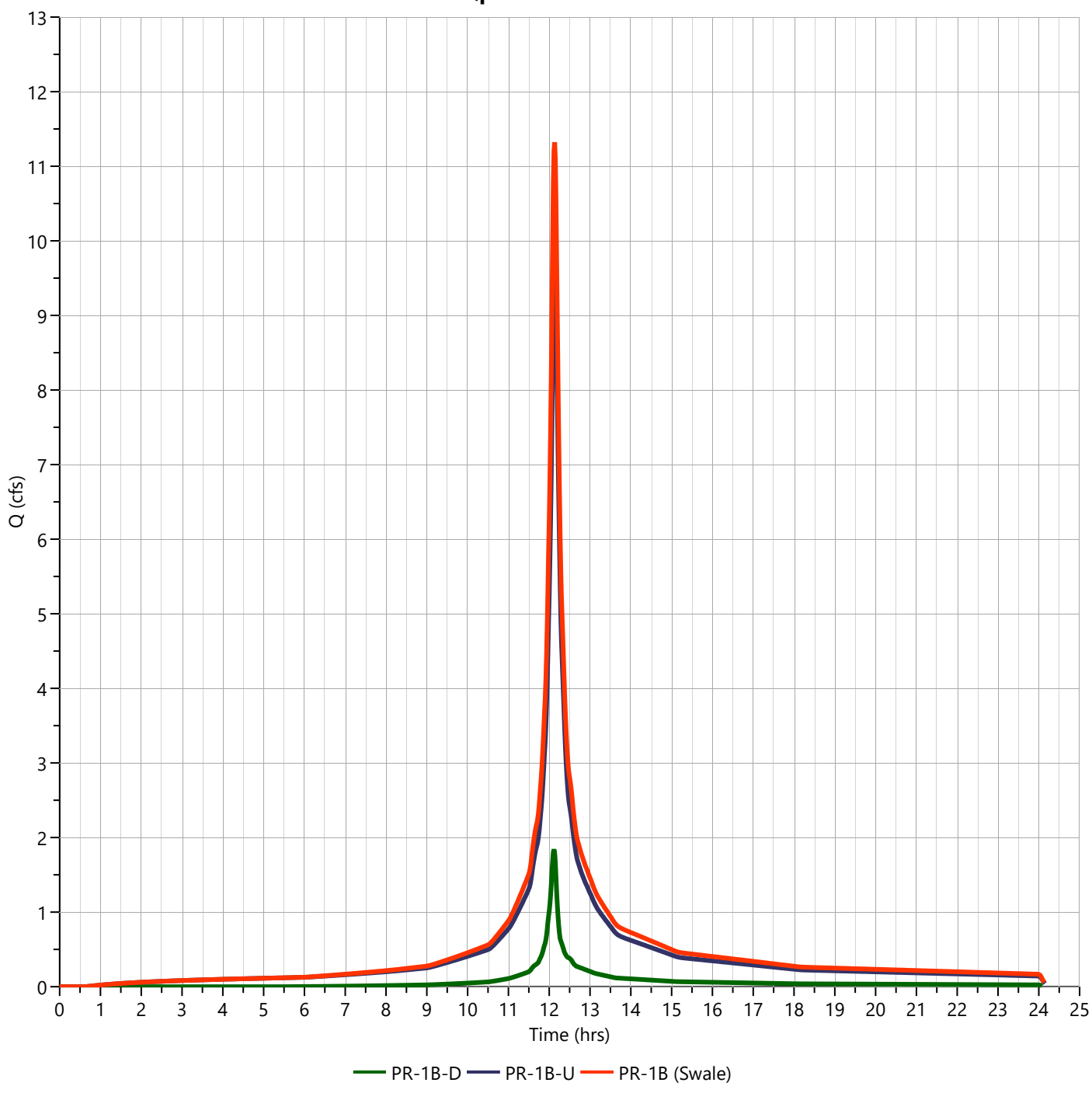
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1B (Swale)

Hyd. No. 21

Hydrograph Type	= Junction	Peak Flow	= 11.32 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 44,502 cuft
Inflow Hydrographs	= 13	Total Contrib. Area	= 0.35 ac



Hydrograph Report

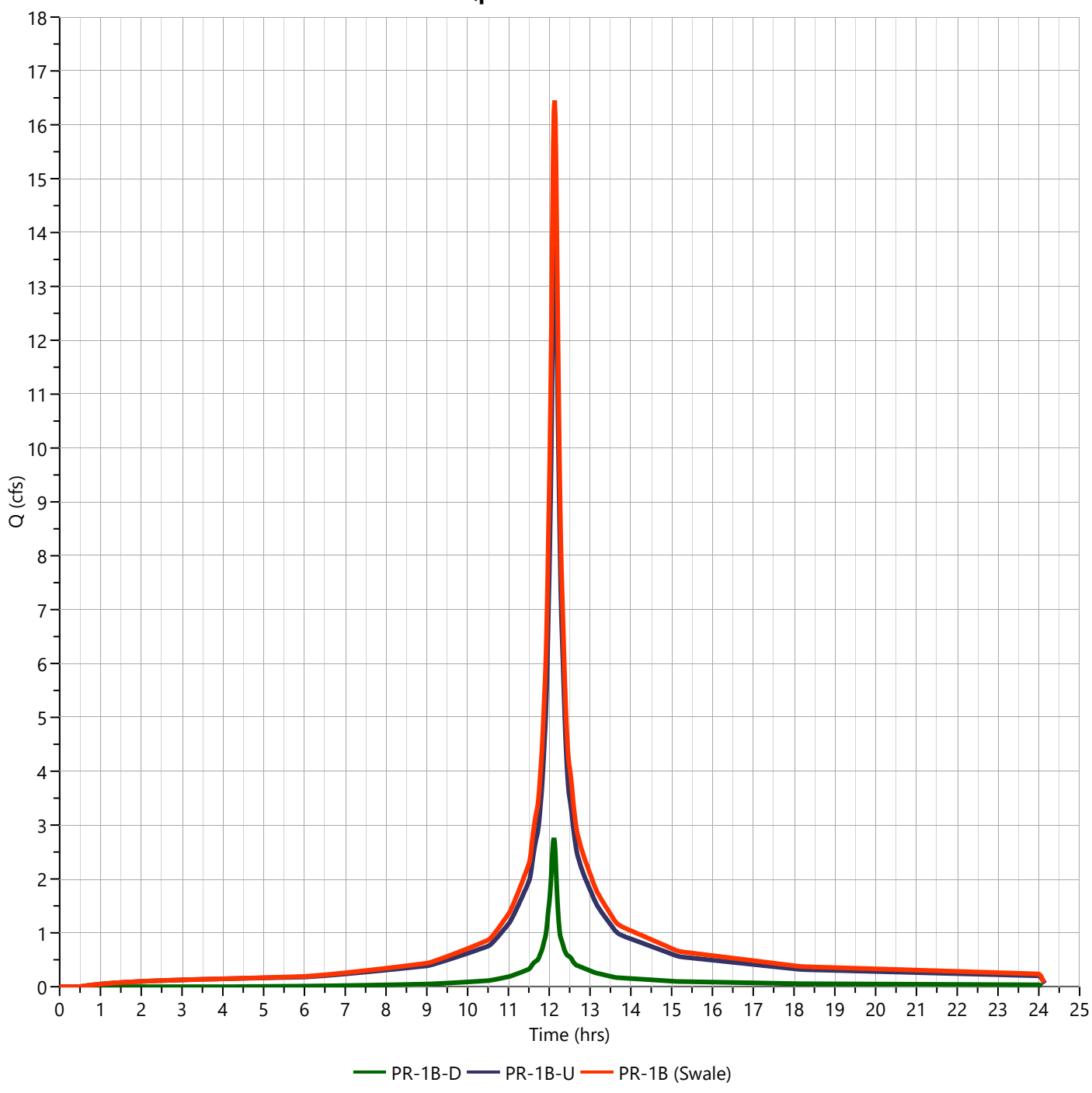
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1B (Swale)

Hyd. No. 21

Hydrograph Type	= Junction	Peak Flow	= 16.45 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 65,340 cuft
Inflow Hydrographs	= 13	Total Contrib. Area	= 0.35 ac



PR-1C-DISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: Present (**Developed**) — **Current Proposed Watershed PR-1C-D - 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.	Surface Description (NEH table 15-1)		**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	**79**			
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	**0.021**	+		+
					Sheet Flow Sub-Total	**0.021 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	**2**	**69**	**3**	**282**	**4**	**54**
14.	Cross Sectional flow area, a	ft^2	**0.61**	**0.61**	**0.61**	**0.61**	**0.88**	**0.88**
15.	Wetted Perimeter, P_w	ft	**2.00**	**2.00**	**2.00**	**2.00**	**2.40**	**2.40**
16.	Hydraulic Radius, r $r = a / P_w$	ft	**0.31**	**0.31**	**0.31**	**0.31**	**0.37**	**0.37**
17.	Channel Slope, s	ft/ft	**0.005**	**0.023**	**0.023**	**0.020**	**0.020**	**0.020**
18.	Manning's Roughness Coeff., n		**0.013**	**0.013**	**0.013**	**0.013**	**0.013**	**0.013**
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	**3.67**	**3.67**	**7.95**	**7.95**	**8.30**	**8.30**
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	**0.005**	+	**0.010**	+	**0.002**	**0.017**
						Channel Flow Sub-Total		**0.017 hours**

Channel Flow

			Segment ID					
21.	Flow Length, L	ft	**5**	**17**	**6**	**51**	**7**	**67**
22.	Cross Sectional flow area, a	ft^2	**0.88**	**0.88**	**0.88**	**0.88**	**0.88**	**0.88**
23.	Wetted Perimeter, P_w	ft	**2.40**	**2.40**	**2.40**	**2.40**	**2.40**	**2.40**
24.	Hydraulic Radius, r $r = a / P_w$	ft	**0.37**	**0.37**	**0.37**	**0.37**	**0.37**	**0.37**
25.	Channel Slope, s	ft/ft	**0.049**	**0.049**	**0.021**	**0.021**	**0.042**	**0.042**
26.	Manning's Roughness Coeff., n							
27.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s						
28.	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)	=	**0.038 hours**
Total Tc (minutes)	=	**2 minutes**

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: Present (**Developed**) — **Current Proposed Watershed PR-1C-D - 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	54		
4.	Two-year 24-hr rainfall, P_2	in	3.46		
5.	Land Slope, s	ft/ft	0.212		
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	0.054	+	+
				Sheet Flow Sub-Total	0.054 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	3	4
13.	Flow Length, L	ft	17	51	67
14.	Cross Sectional flow area, a	ft^2	0.88	0.88	0.88
15.	Wetted Perimeter, P_w	ft	2.40	2.40	2.40
16.	Hydraulic Radius, r $r = a / P_w$	ft	0.37	0.37	0.37
17.	Channel Slope, s	ft/ft	0.049	0.021	0.042
18.	Manning's Roughness Coeff., n		0.013	0.013	0.013
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	13.05	8.54	11.98
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.000	+ 0.002	+ 0.002
				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) =	0.058 hours
	Total Tc (minutes) =	3 minutes

Hydrograph Report

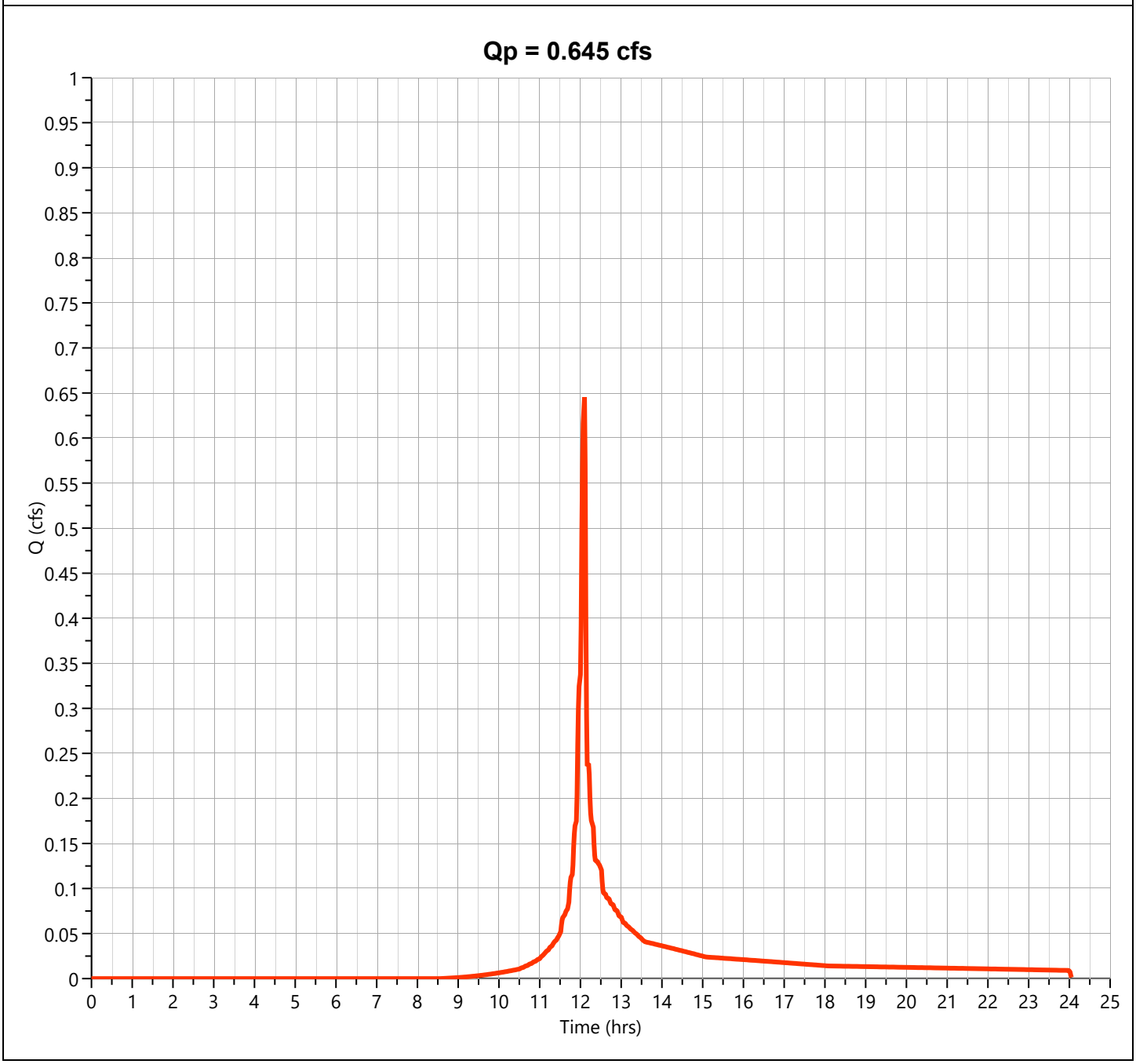
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1C-D Open Space D

Hyd. No. 24

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.645 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,748 cuft
Drainage Area	= 0.32 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

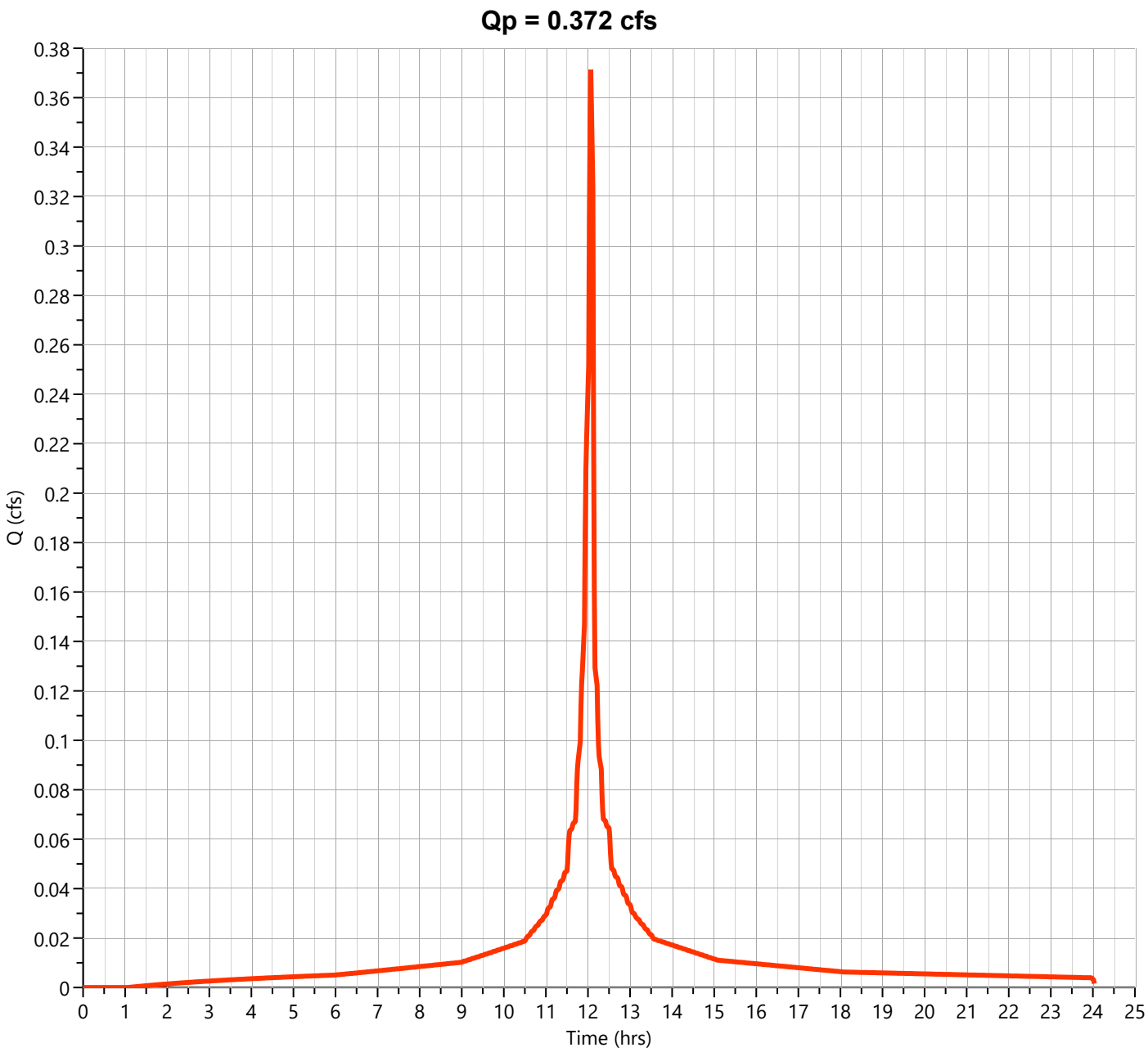
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1C-D Impervious

Hyd. No. 25

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	= 98.00
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

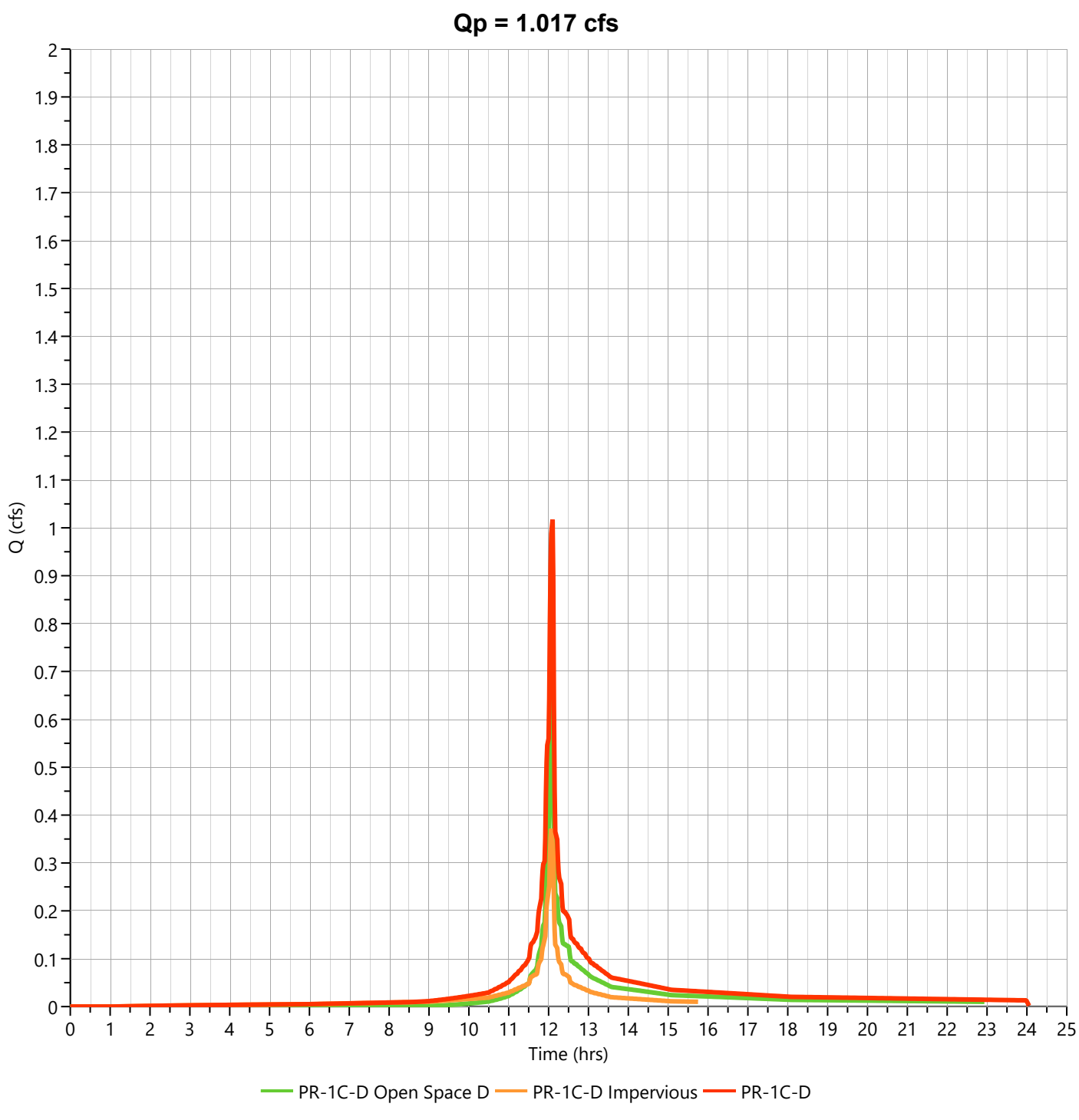
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1C-D

Hyd. No. 26

Hydrograph Type	= Junction	Peak Flow	= 1.017 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,955 cuft
Inflow Hydrographs	= 24, 25	Total Contrib. Area	= 0.43 ac



Hydrograph Report

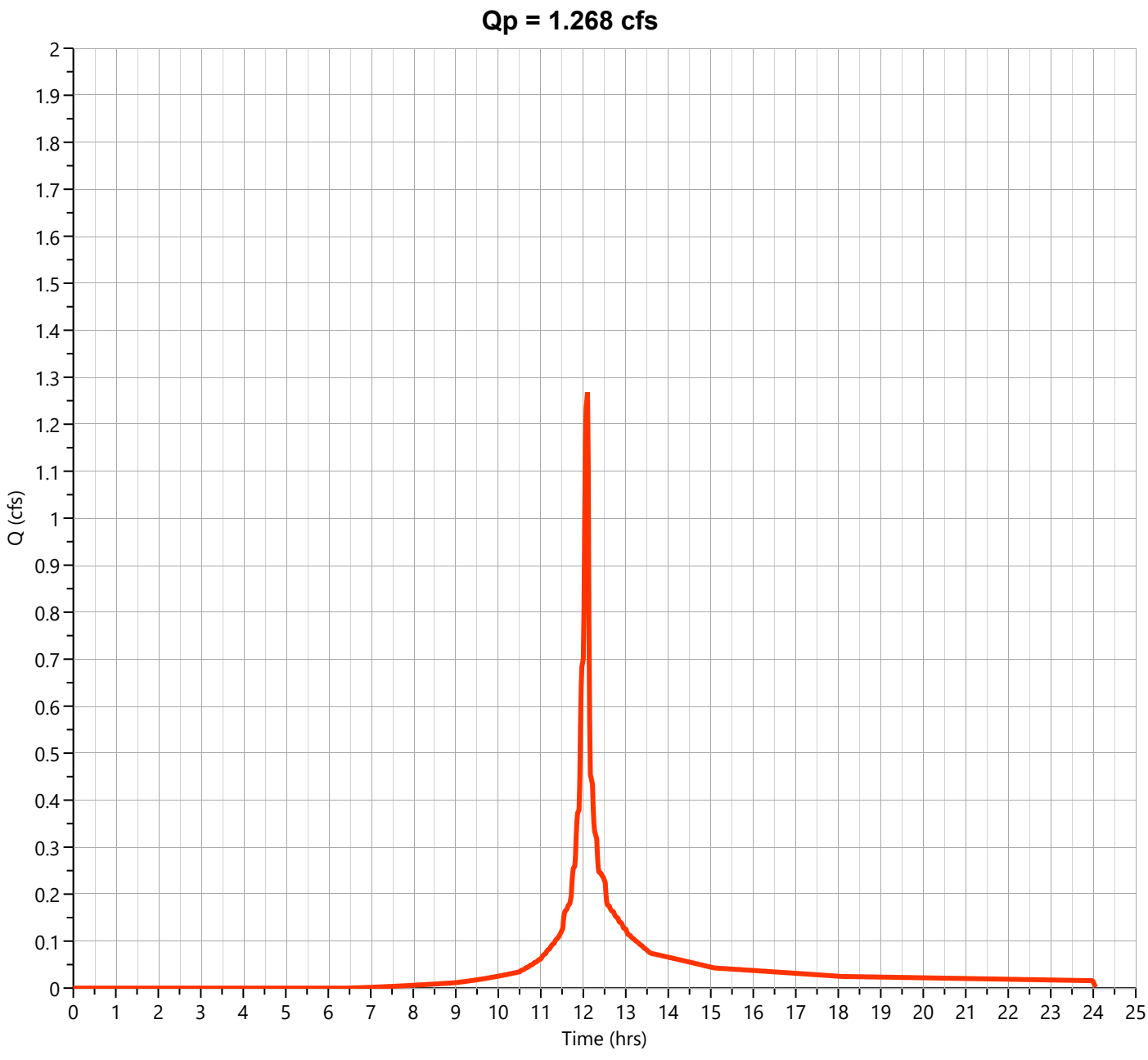
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1C-D Open Space D

Hyd. No. 24

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.268 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 3,514 cuft
Drainage Area	= 0.32 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

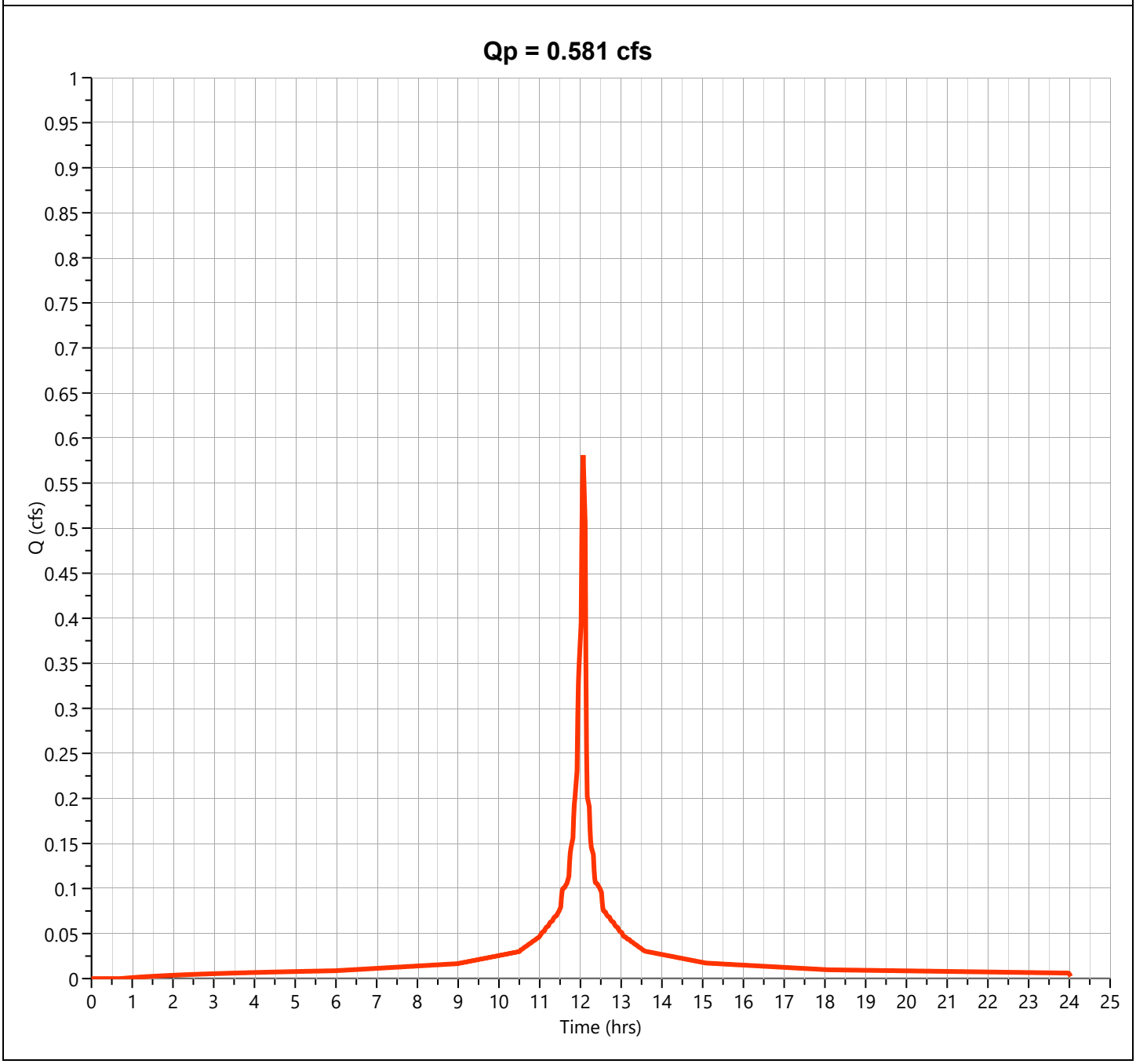
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1C-D Impervious

Hyd. No. 25

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	= 98.00
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

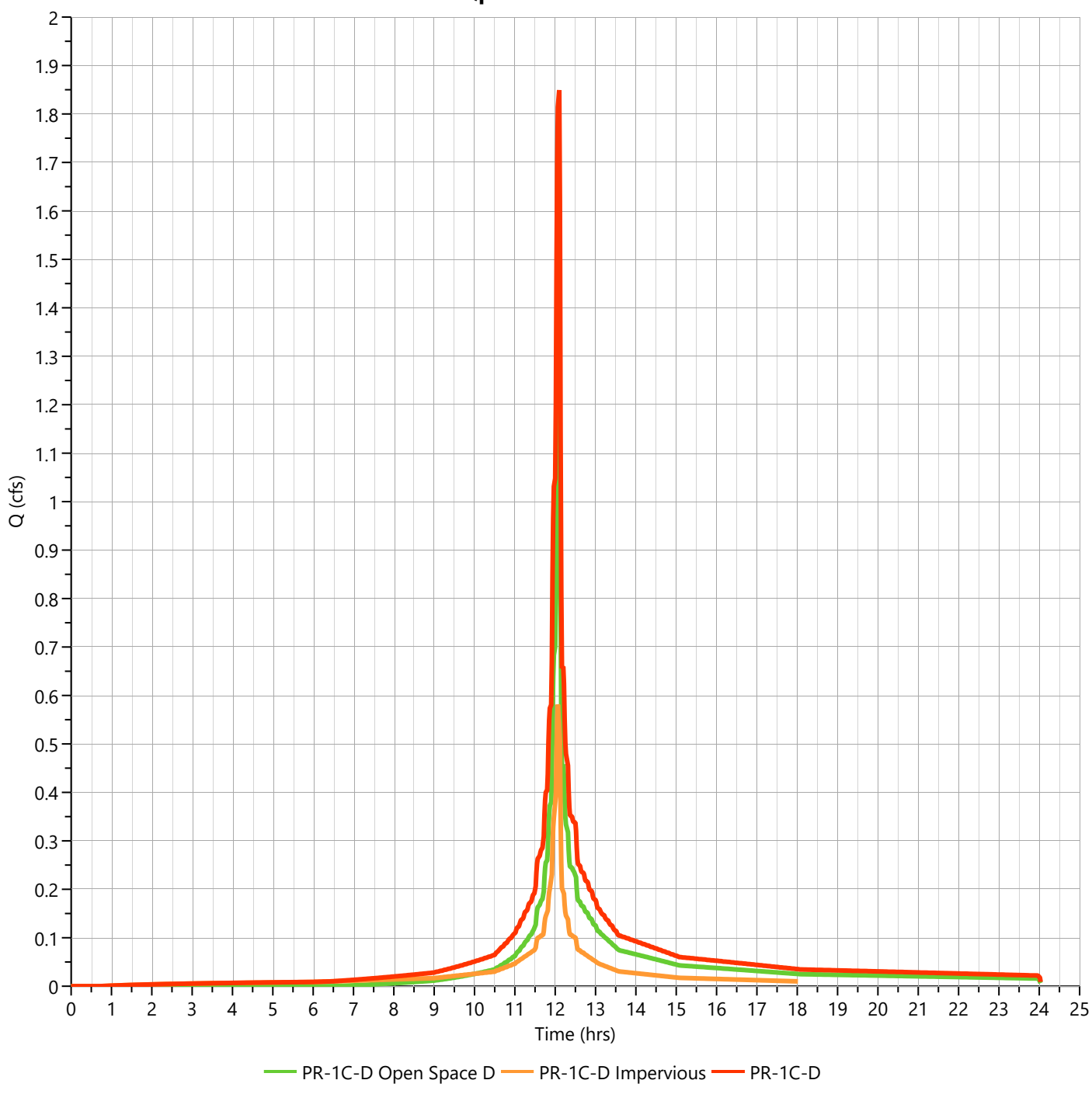
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1C-D

Hyd. No. 26

Hydrograph Type	= Junction	Peak Flow	= 1.849 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 5,439 cuft
Inflow Hydrographs	= 24, 25	Total Contrib. Area	= 0.43 ac



Hydrograph Report

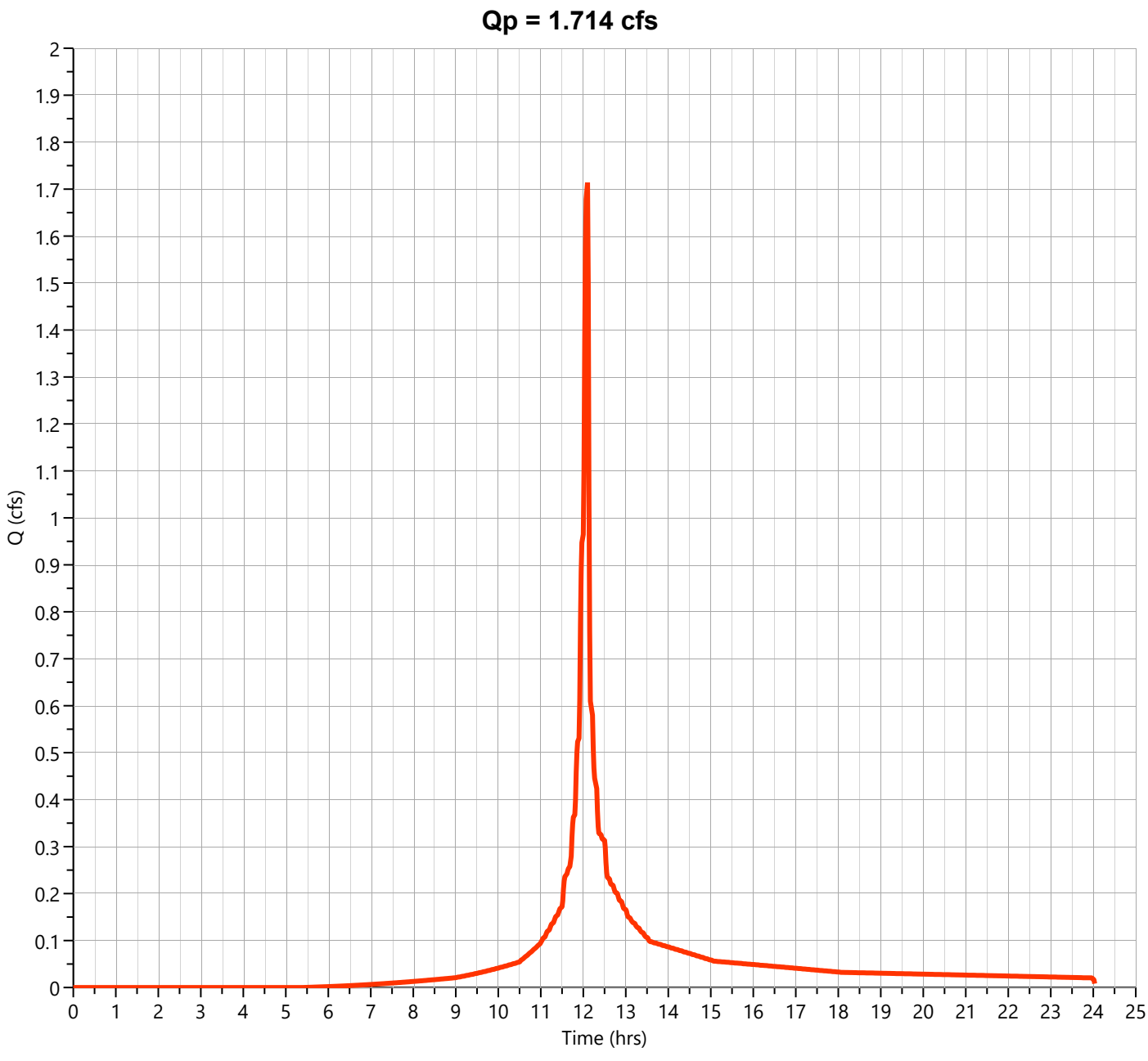
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1C-D Open Space D

Hyd. No. 24

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.714 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 4,832 cuft
Drainage Area	= 0.32 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

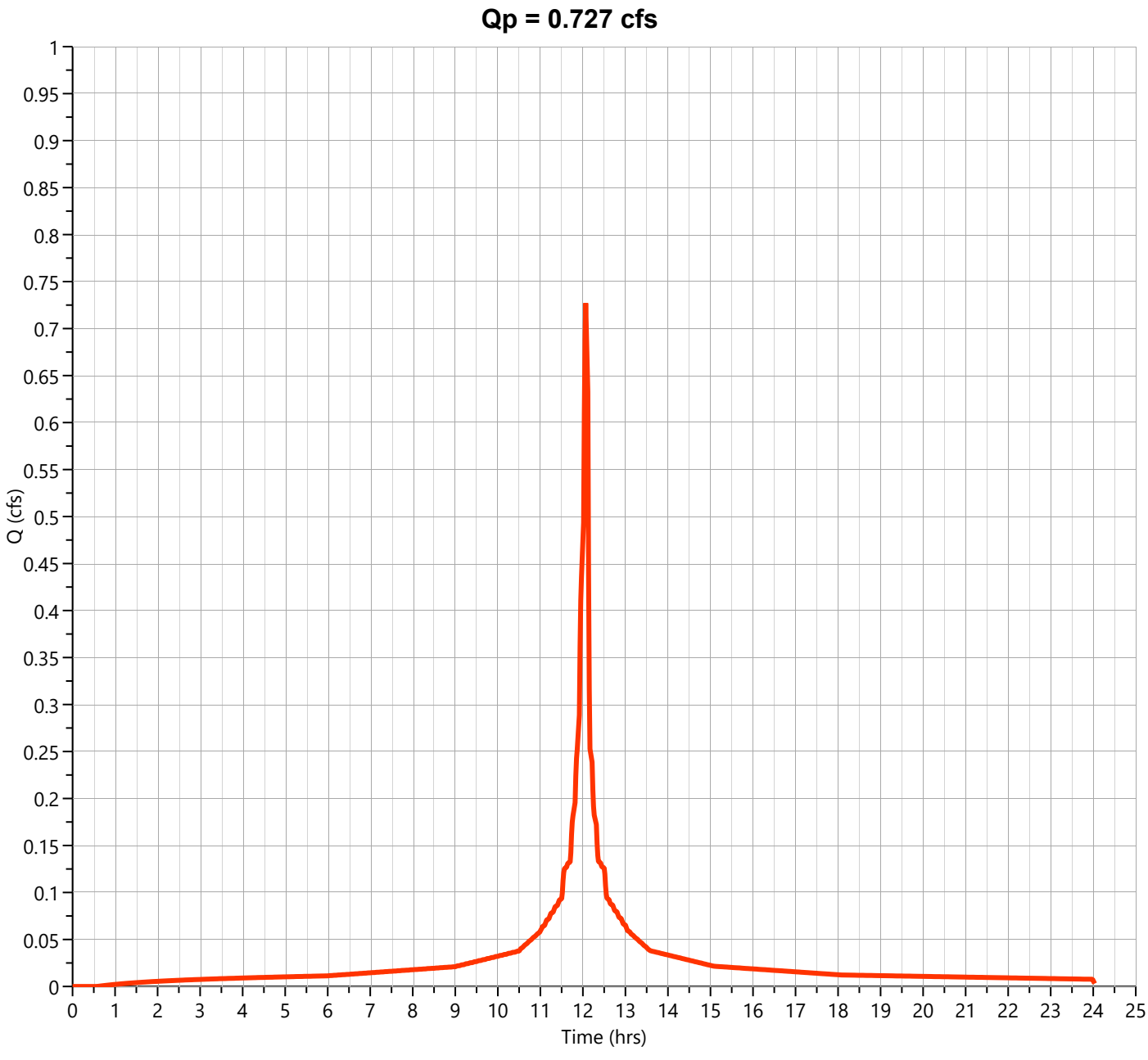
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1C-D Impervious

Hyd. No. 25

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.727 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 2,426 cuft
Drainage Area	= 0.11 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

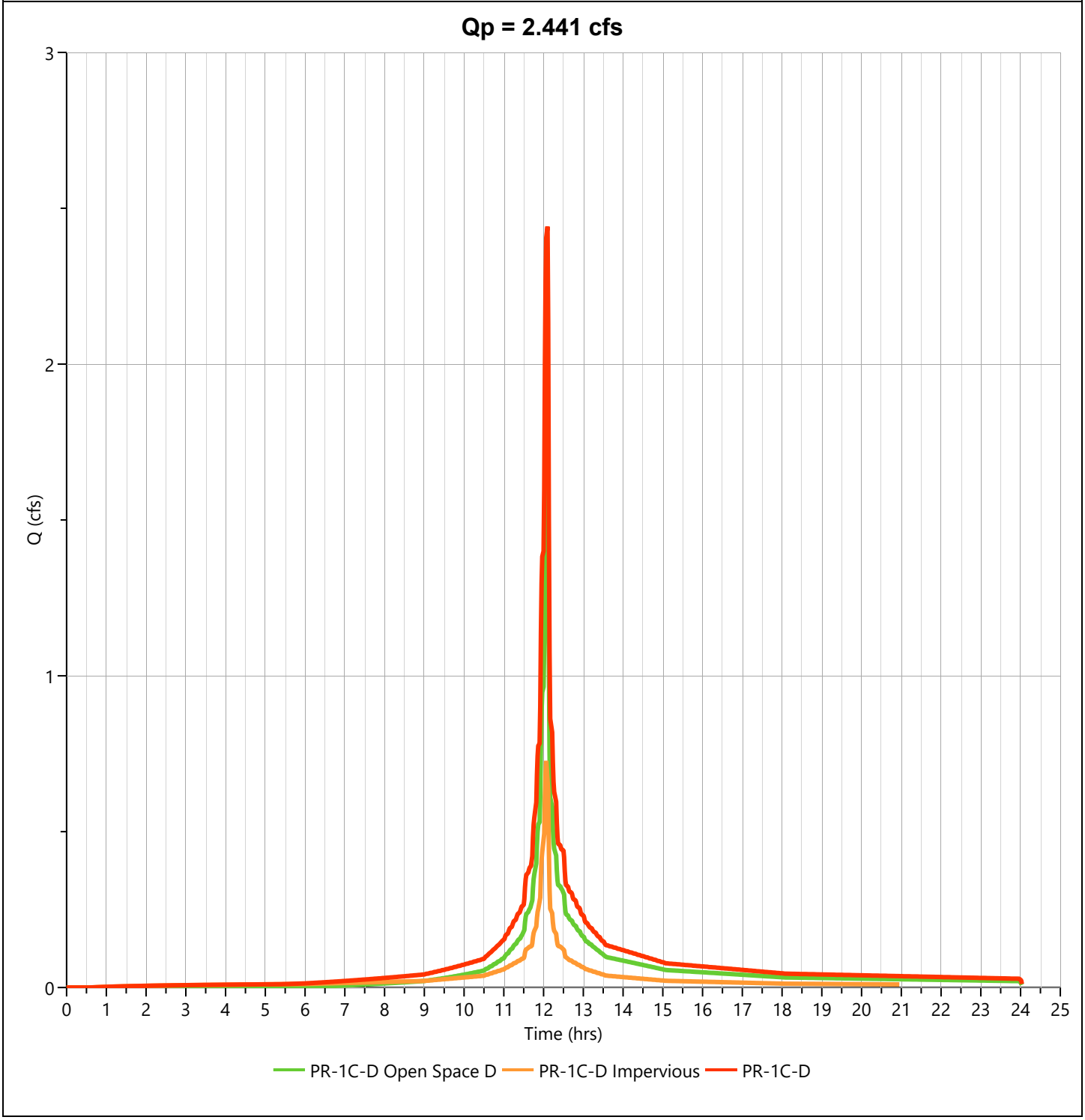
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1C-D

Hyd. No. 26

Hydrograph Type	= Junction	Peak Flow	= 2.441 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 7,258 cuft
Inflow Hydrographs	= 24, 25	Total Contrib. Area	= 0.43 ac



Hydrograph Report

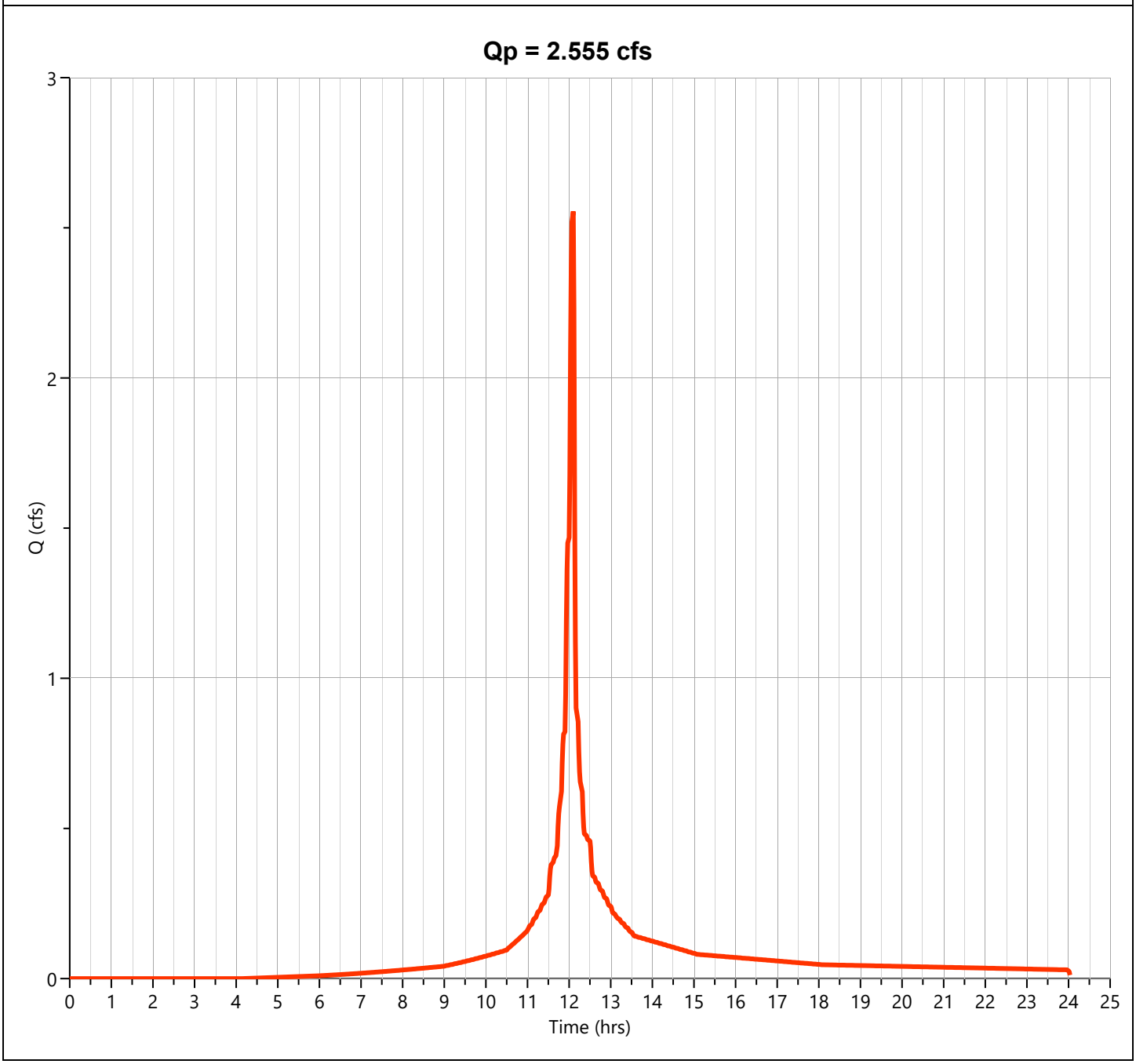
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1C-D Open Space D

Hyd. No. 24

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.555 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 7,401 cuft
Drainage Area	= 0.32 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

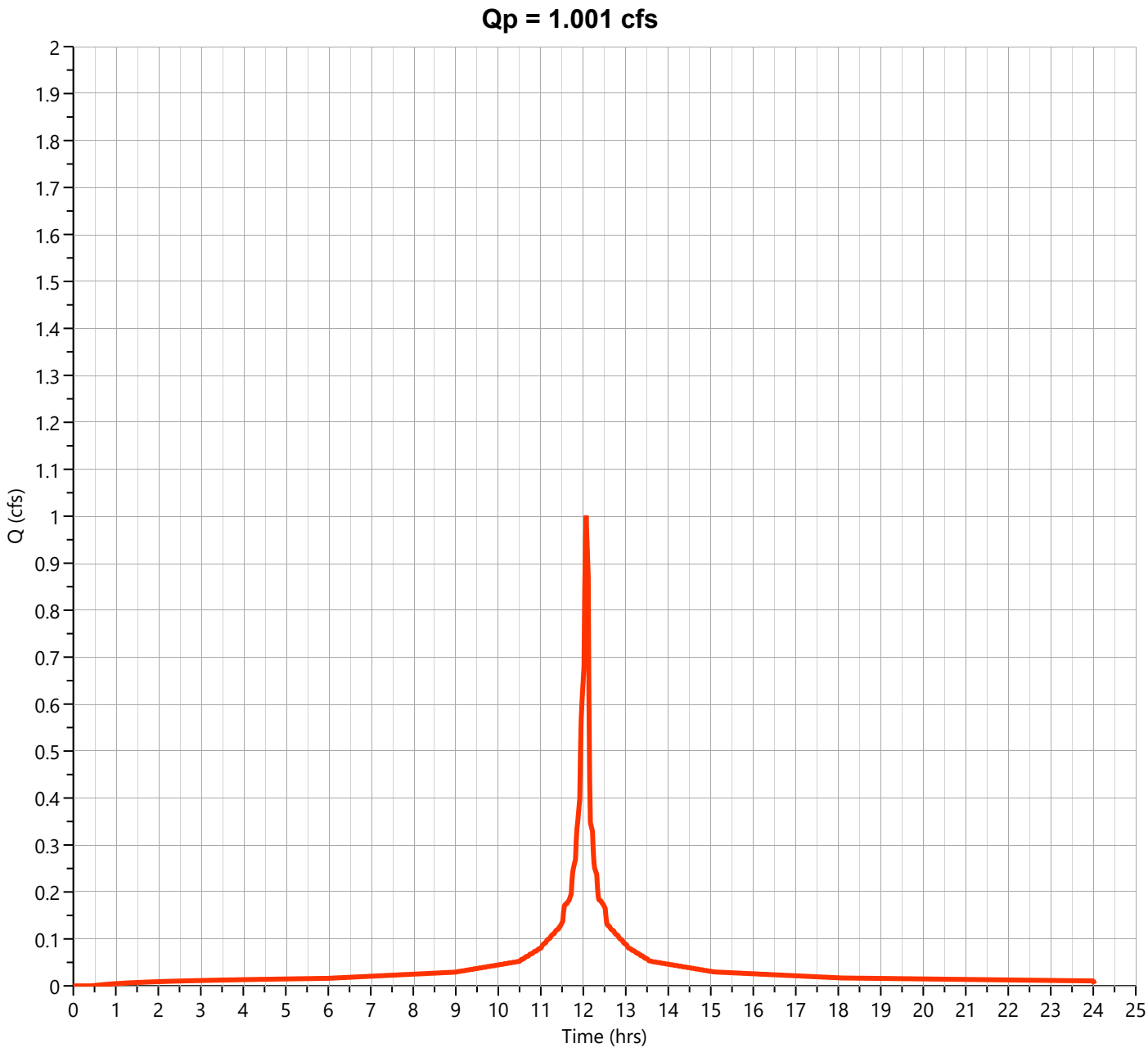
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1C-D Impervious

Hyd. No. 25

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.001 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 3,369 cuft
Drainage Area	= 0.11 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

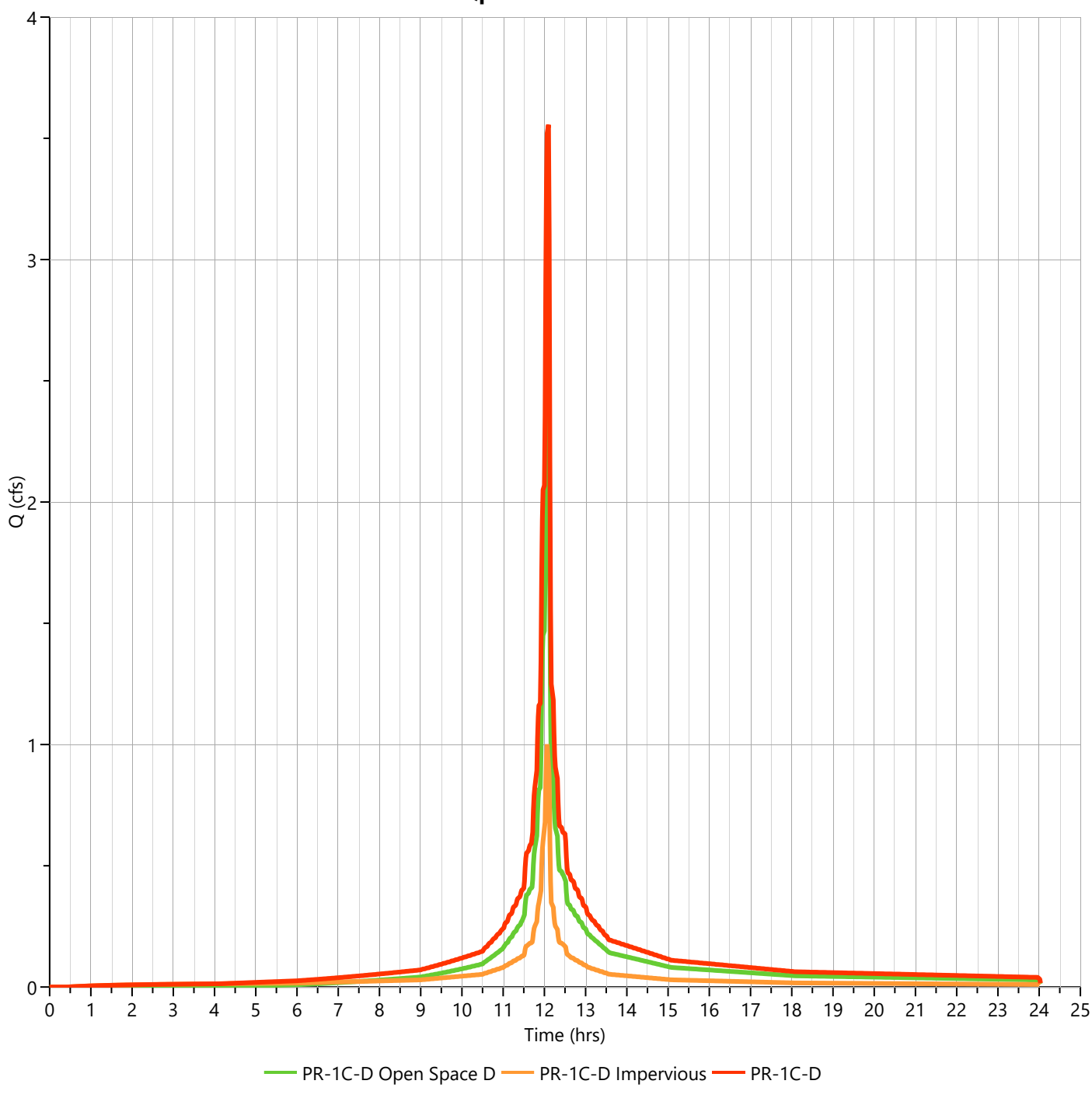
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1C-D

Hyd. No. 26

Hydrograph Type	= Junction	Peak Flow	= 3.556 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 10,770 cuft
Inflow Hydrographs	= 24, 25	Total Contrib. Area	= 0.43 ac



PR-1C-UNDISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: (**Present**) Developed — **Current Proposed Watershed PR-1C-U 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	60		
4.	Two-year 24-hr rainfall, P_2		in	3.46		
5.	Land Slope, s		ft/ft	0.032		
6.	Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.011	+	+

Sheet Flow Sub-Total: **0.011 hours**

Shallow Concentrated Flow

			Segment ID	2	3	4
7.	Surface Description			Pavement	Pavement	Pavement
8.	Flow Length, L		ft	66	474	164
9.	Watercourse Slope, s		ft/ft	0.033	0.073	0.016
10.	Average Velocity, V (NEH table 15-3)		ft/s	3.71	5.50	2.60
11.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.005	+ 0.024	+ 0.017

Shallow Conc. Flow Sub-Total: **0.046 hours**

Channel Flow

			Segment ID	5	6	
12.	Flow Length, L		ft	36	67	
13.	Cross Sectional flow area, a		ft^2	0.88	0.88	
14.	Wetted Perimeter, P_w		ft	2.40	2.40	
15.	Hydraulic Radius, r	$r = a / P_w$	ft	0.37	0.37	
16.	Channel Slope, s		ft/ft	0.032	0.042	
17.	Manning's Roughness Coeff., n			0.013	0.013	
18.	Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s	10.43	11.98	
19.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.001	+ 0.002	+

Channel Flow Sub-Total: **0.003 hours**

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

Total Tc (hours) =	**0.060 hours**
Total Tc (minutes) =	**4 minutes**

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: (**Present**) Developed — **Current Proposed Watershed PR-1C-U 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.	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	0.090		
6.	Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.126	+	+
					Sheet Flow Sub-Total	0.126 hours

Shallow Concentrated Flow

			Segment ID	2	3	4
7.	Surface Description			Grassed Waterways	Pavement	Pavement
8.	Flow Length, L		ft	178	207	164
9.	Watercourse Slope, s		ft/ft	0.078	0.067	0.016
10.	Average Velocity, V (NEH table 15-3)		ft/s	4.50	5.27	2.60
11.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.011	+ 0.011	+ 0.017
					Shallow Conc. Flow Sub-Total	0.039 hours

Channel Flow

			Segment ID	5	6	
12.	Flow Length, L		ft	36	67	
13.	Cross Sectional flow area, a		ft^2	0.88	0.88	
14.	Wetted Perimeter, P_w		ft	2.40	2.40	
15.	Hydraulic Radius, r	$r = a / P_w$	ft	0.37	0.37	
16.	Channel Slope, s		ft/ft	0.032	0.042	
17.	Manning's Roughness Coeff., n			0.013	0.013	
18.	Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s	10.43	11.98	
19.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.001	+ 0.002	+
					Channel Flow Sub-Total	0.003 hours

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

Total Tc (hours) =	**0.167 hours**
Total Tc (minutes) =	**10 minutes**

Hydrograph Report

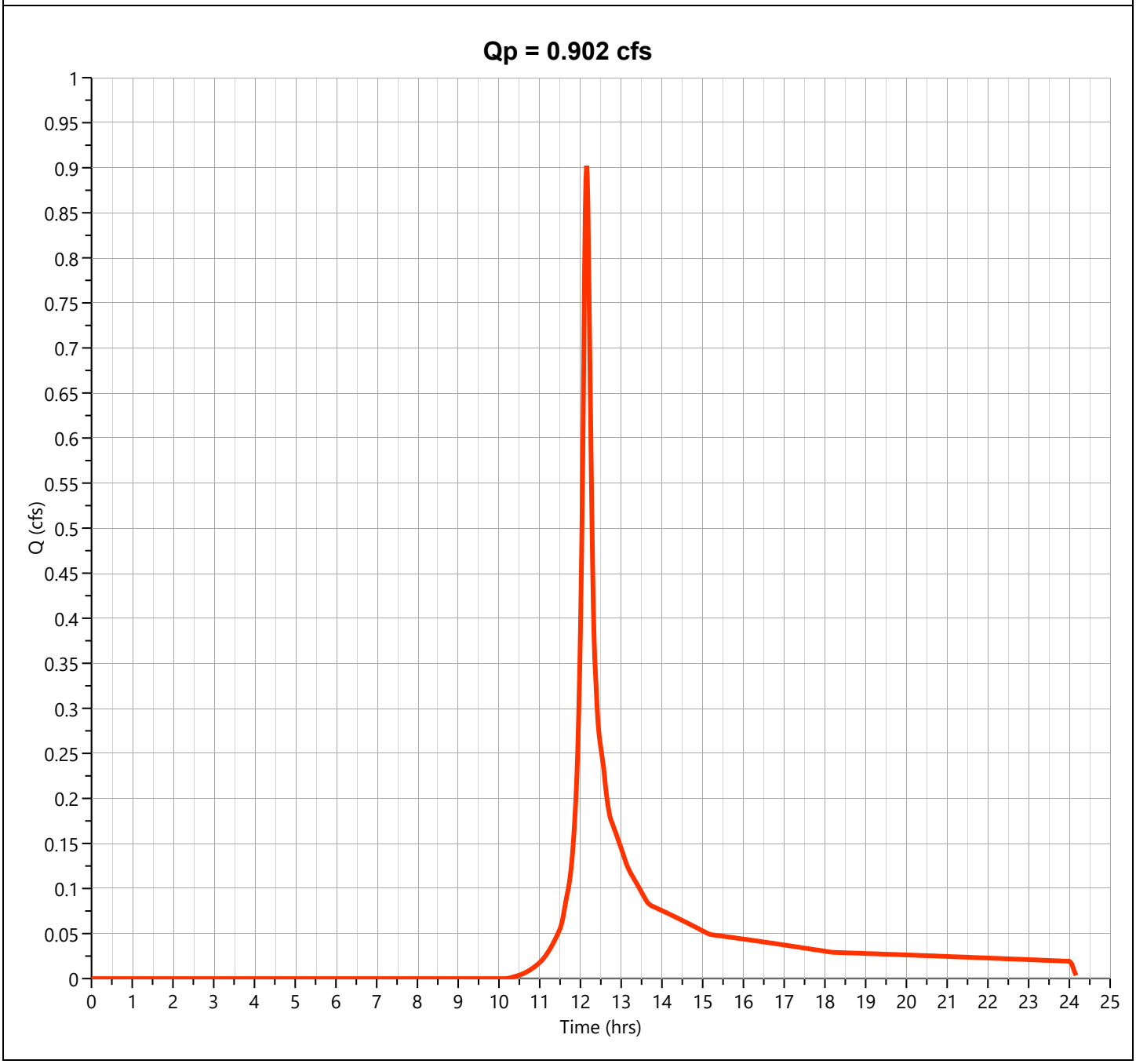
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1C-U Open Space C

Hyd. No. 28

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.902 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Runoff Volume	= 3,213 cuft
Drainage Area	= 0.73 ac	Curve Number	= 74.00
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

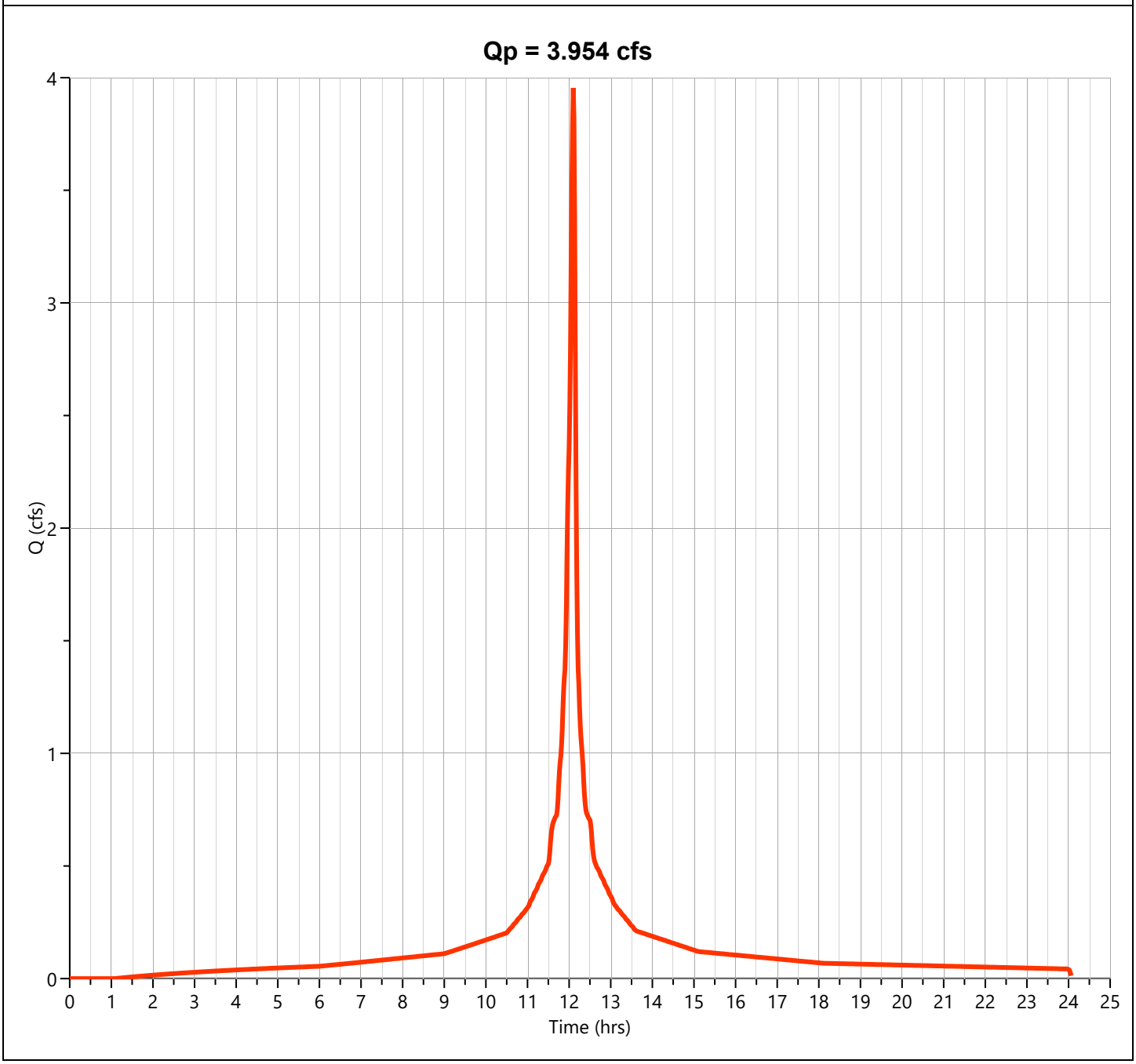
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1C-U Impervious

Hyd. No. 29

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.954 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 13,118 cuft
Drainage Area	= 1.12 ac	Curve Number	= 98.00
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

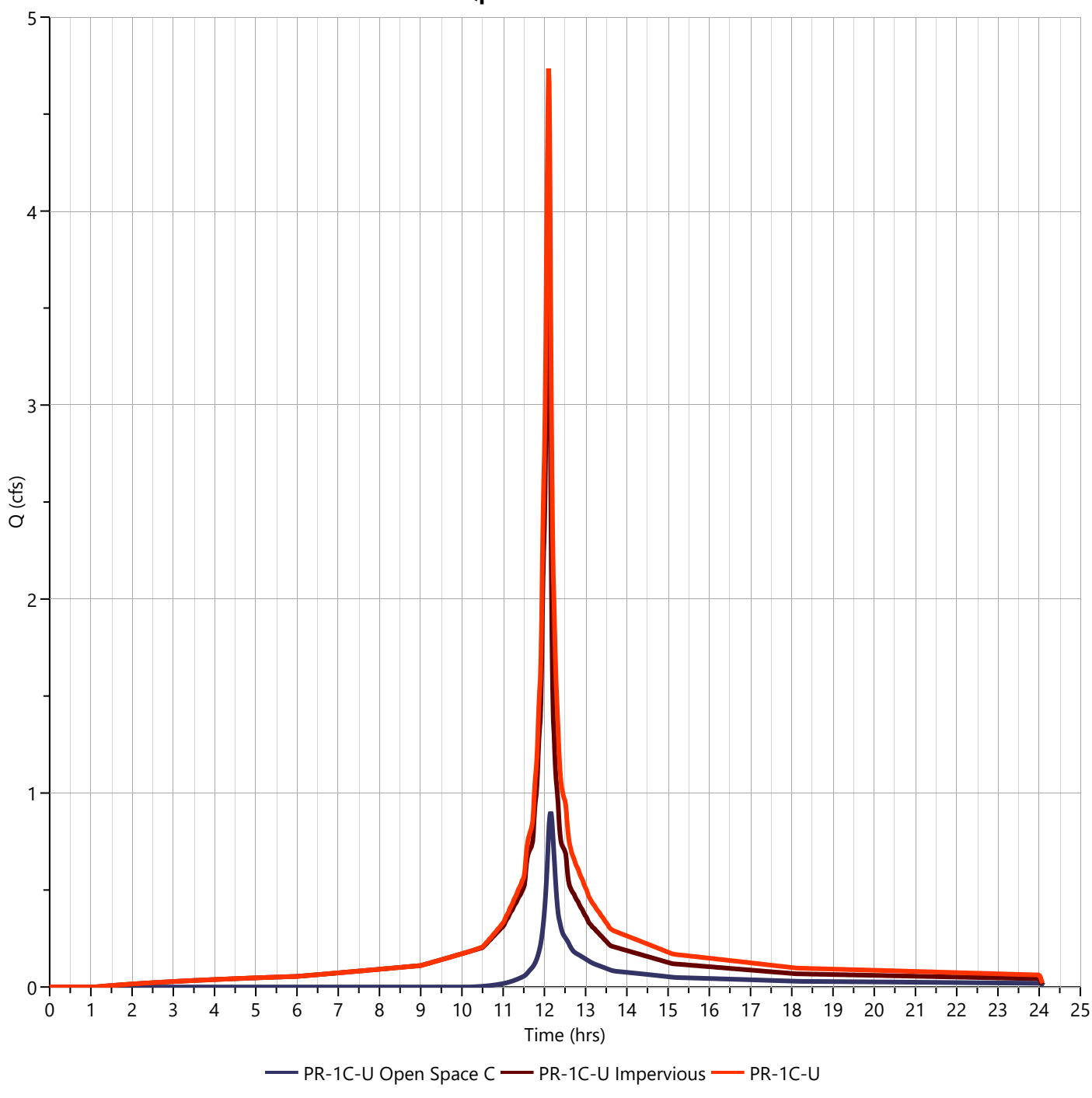
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1C-U

Hyd. No. 30

Hydrograph Type	= Junction	Peak Flow	= 4.735 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 16,331 cuft
Inflow Hydrographs	= 28, 29	Total Contrib. Area	= 1.85 ac



Hydrograph Report

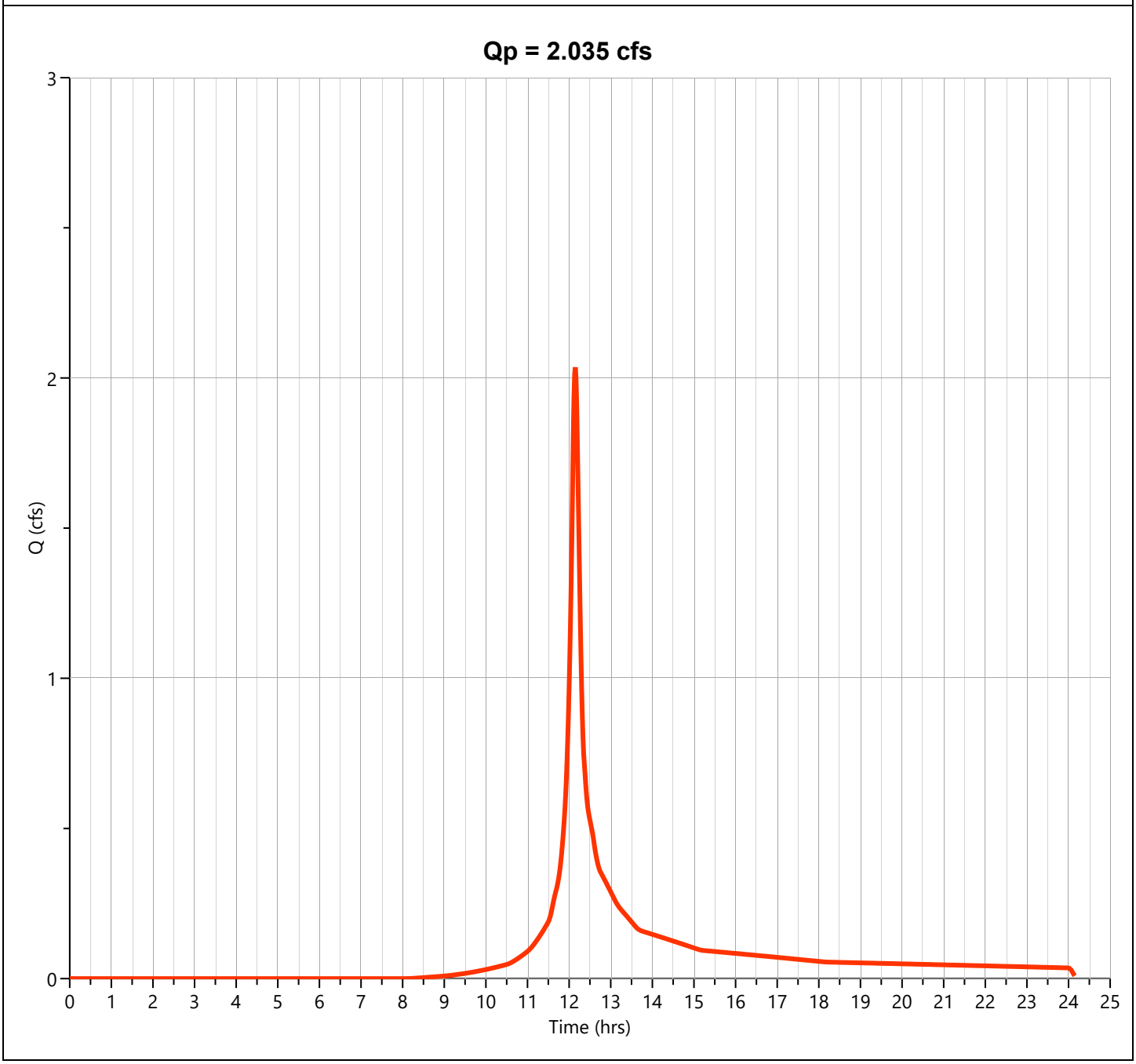
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1C-U Open Space C

Hyd. No. 28

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.035 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Runoff Volume	= 7,078 cuft
Drainage Area	= 0.73 ac	Curve Number	= 74.00
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

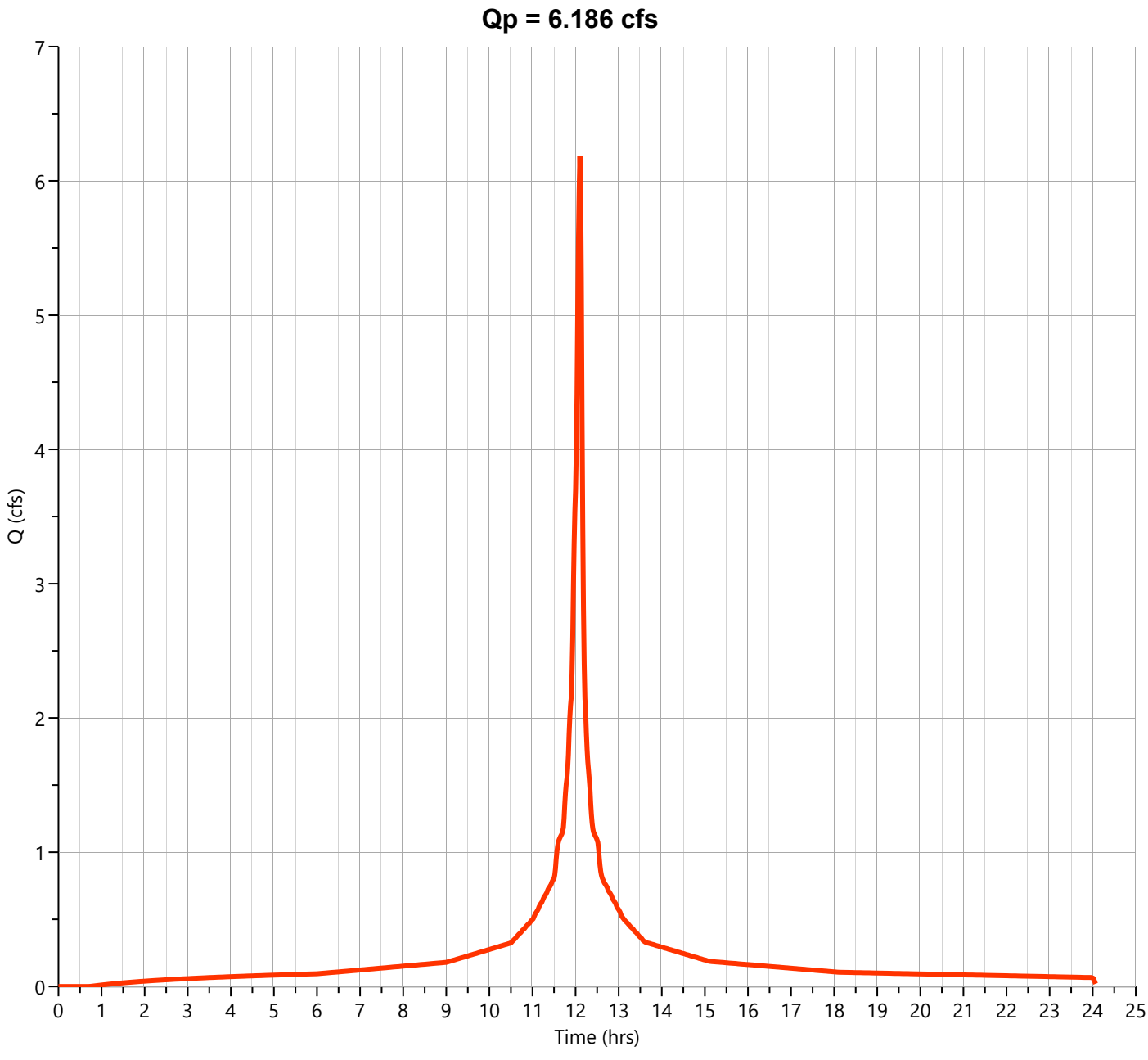
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1C-U Impervious

Hyd. No. 29

Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.186 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 20,908 cuft
Drainage Area	= 1.12 ac	Curve Number	= 98.00
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

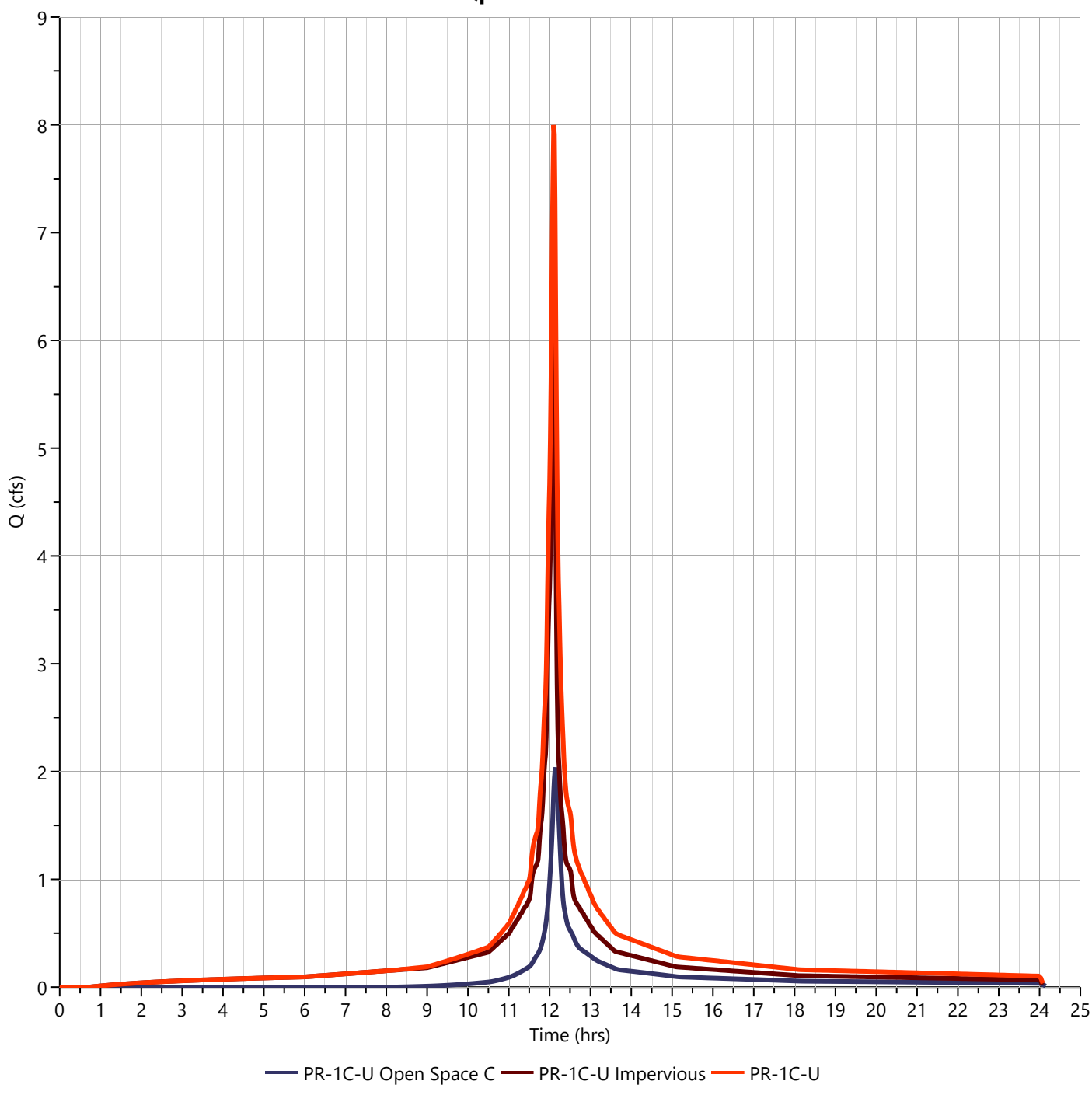
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1C-U

Hyd. No. 30

Hydrograph Type	= Junction	Peak Flow	= 7.998 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 27,986 cuft
Inflow Hydrographs	= 28, 29	Total Contrib. Area	= 1.85 ac



Hydrograph Report

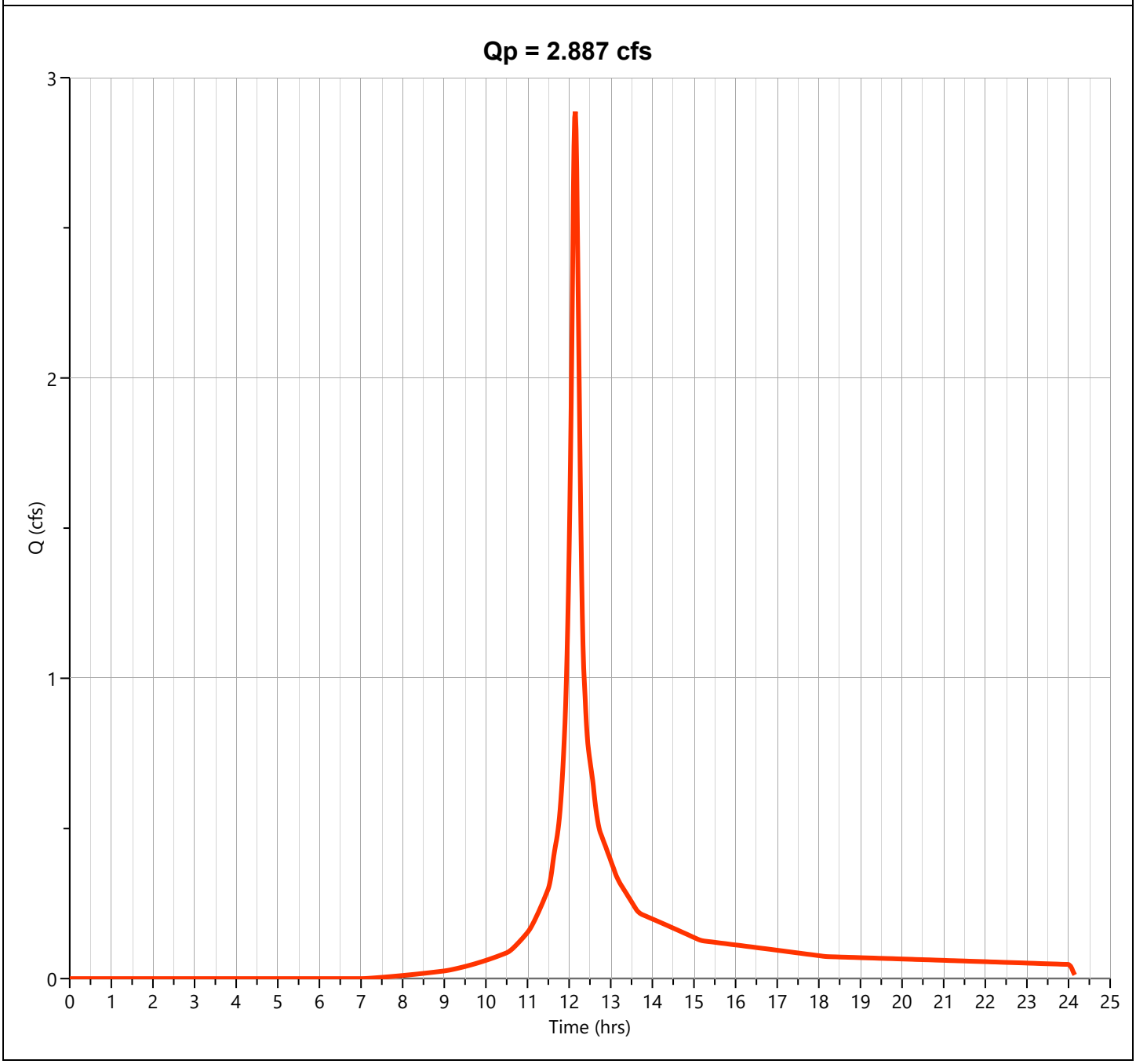
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1C-U Open Space C

Hyd. No. 28

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.887 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Runoff Volume	= 10,067 cuft
Drainage Area	= 0.73 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

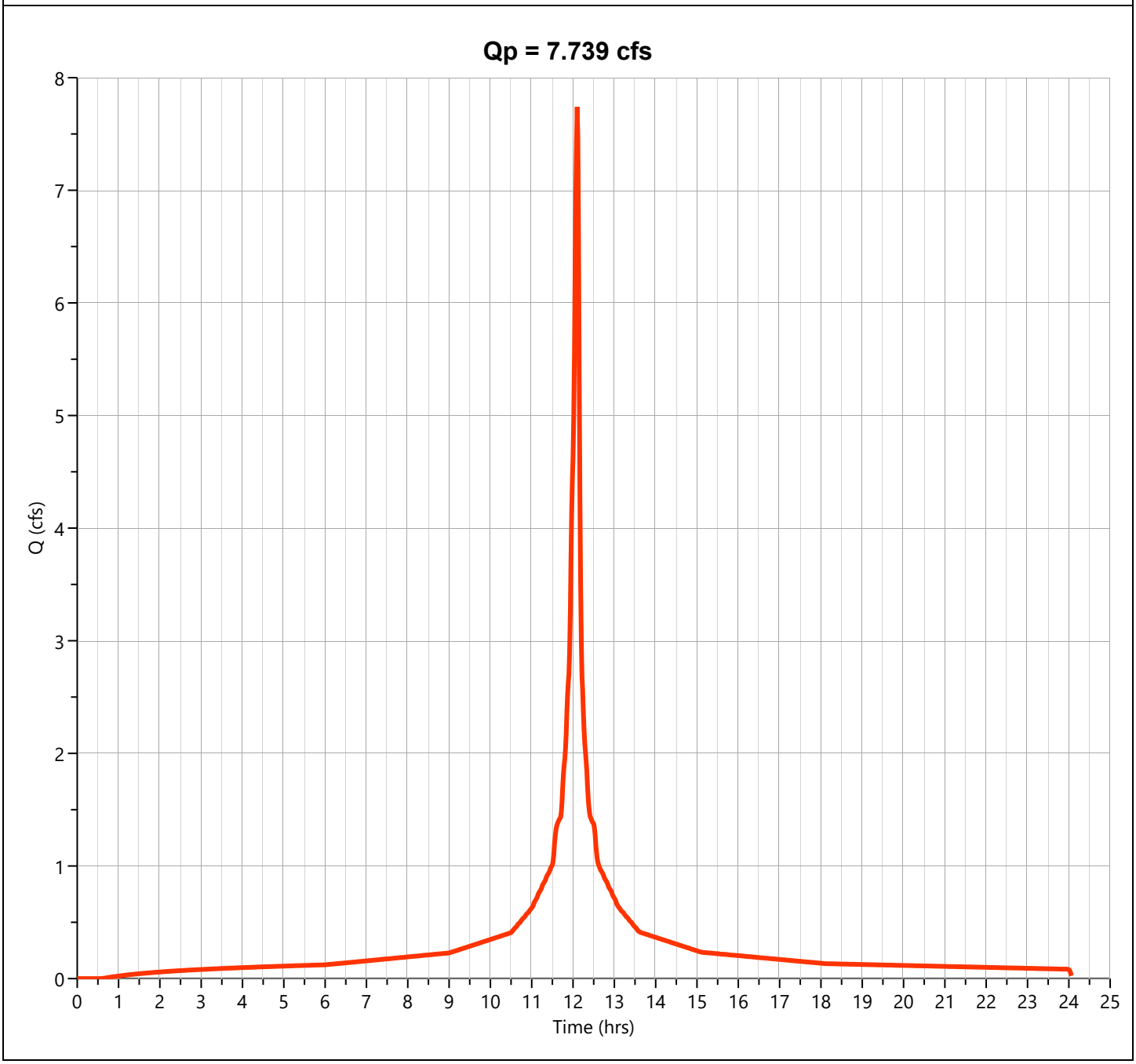
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1C-U Impervious

Hyd. No. 29

Hydrograph Type	= NRCS Runoff	Peak Flow	= 7.739 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 26,350 cuft
Drainage Area	= 1.12 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

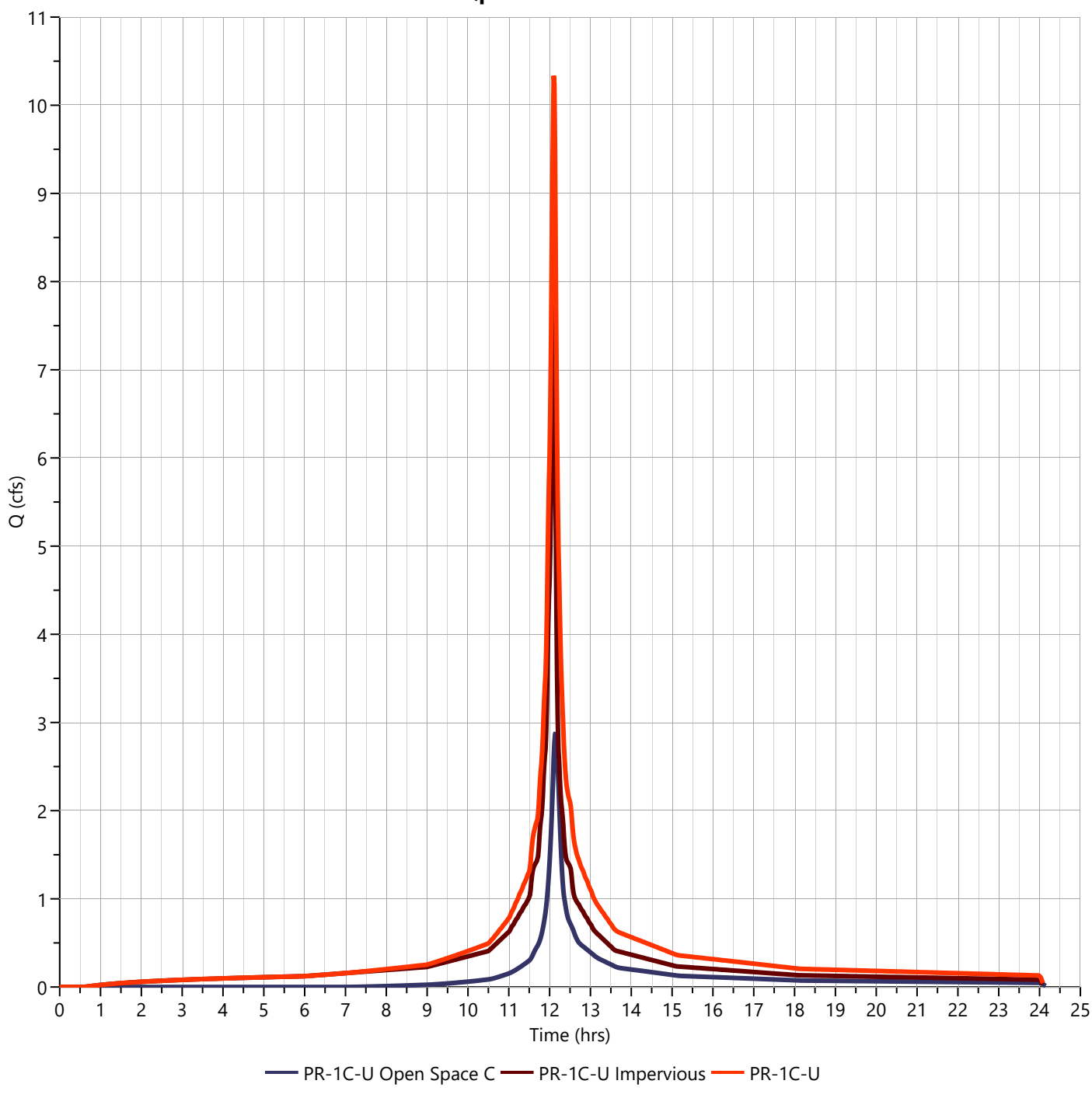
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1C-U

Hyd. No. 30

Hydrograph Type	= Junction	Peak Flow	= 10.33 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 36,417 cuft
Inflow Hydrographs	= 28, 29	Total Contrib. Area	= 1.85 ac



Hydrograph Report

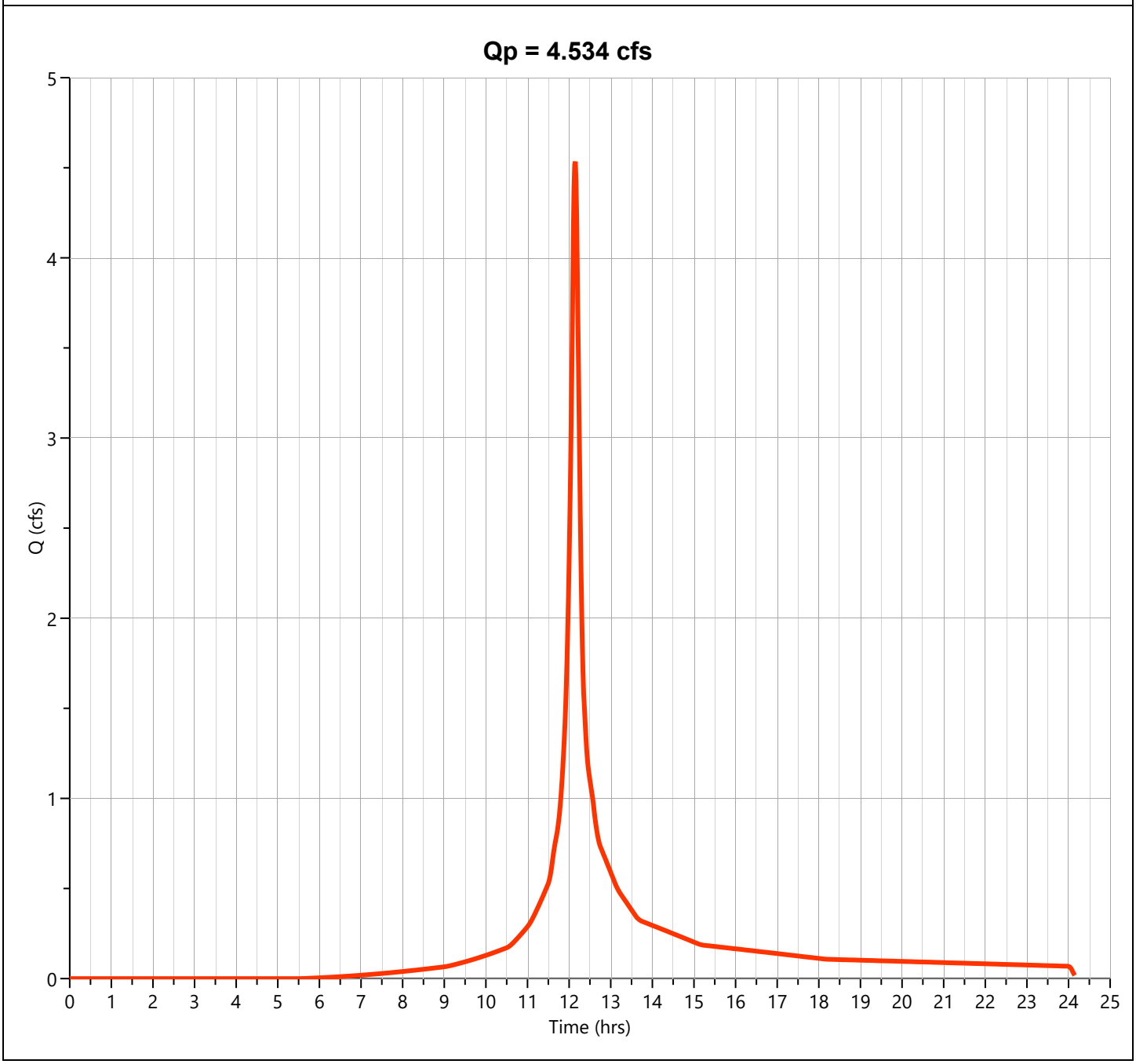
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1C-U Open Space C

Hyd. No. 28

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.534 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Runoff Volume	= 16,027 cuft
Drainage Area	= 0.73 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

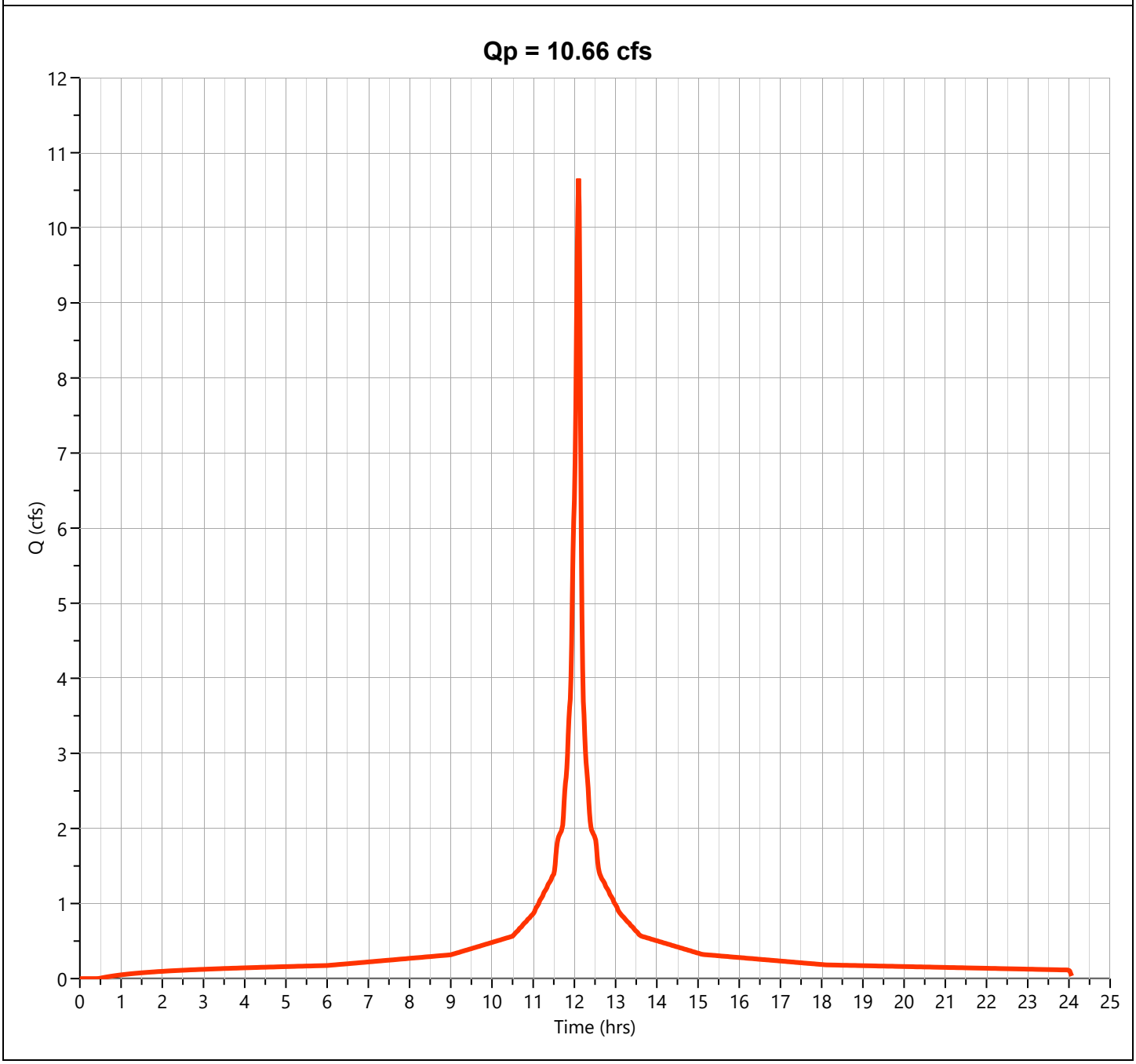
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1C-U Impervious

Hyd. No. 29

Hydrograph Type	= NRCS Runoff	Peak Flow	= 10.66 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 36,588 cuft
Drainage Area	= 1.12 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

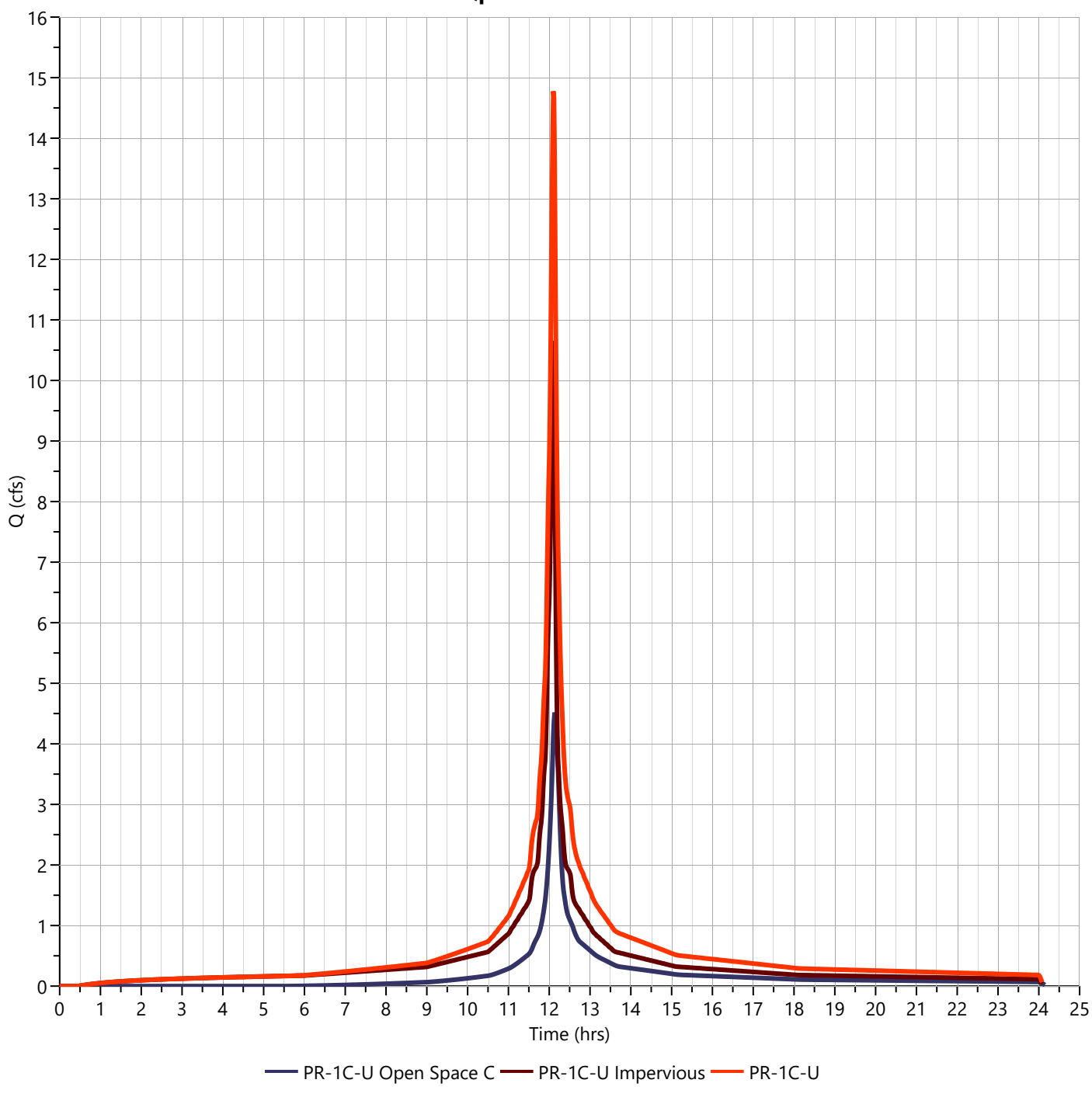
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-1C-U

Hyd. No. 30

Hydrograph Type	= Junction	Peak Flow	= 14.77 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 52,616 cuft
Inflow Hydrographs	= 28, 29	Total Contrib. Area	= 1.85 ac



TOTAL PROPOSED FLOW TO POA-1

Hydrograph Report

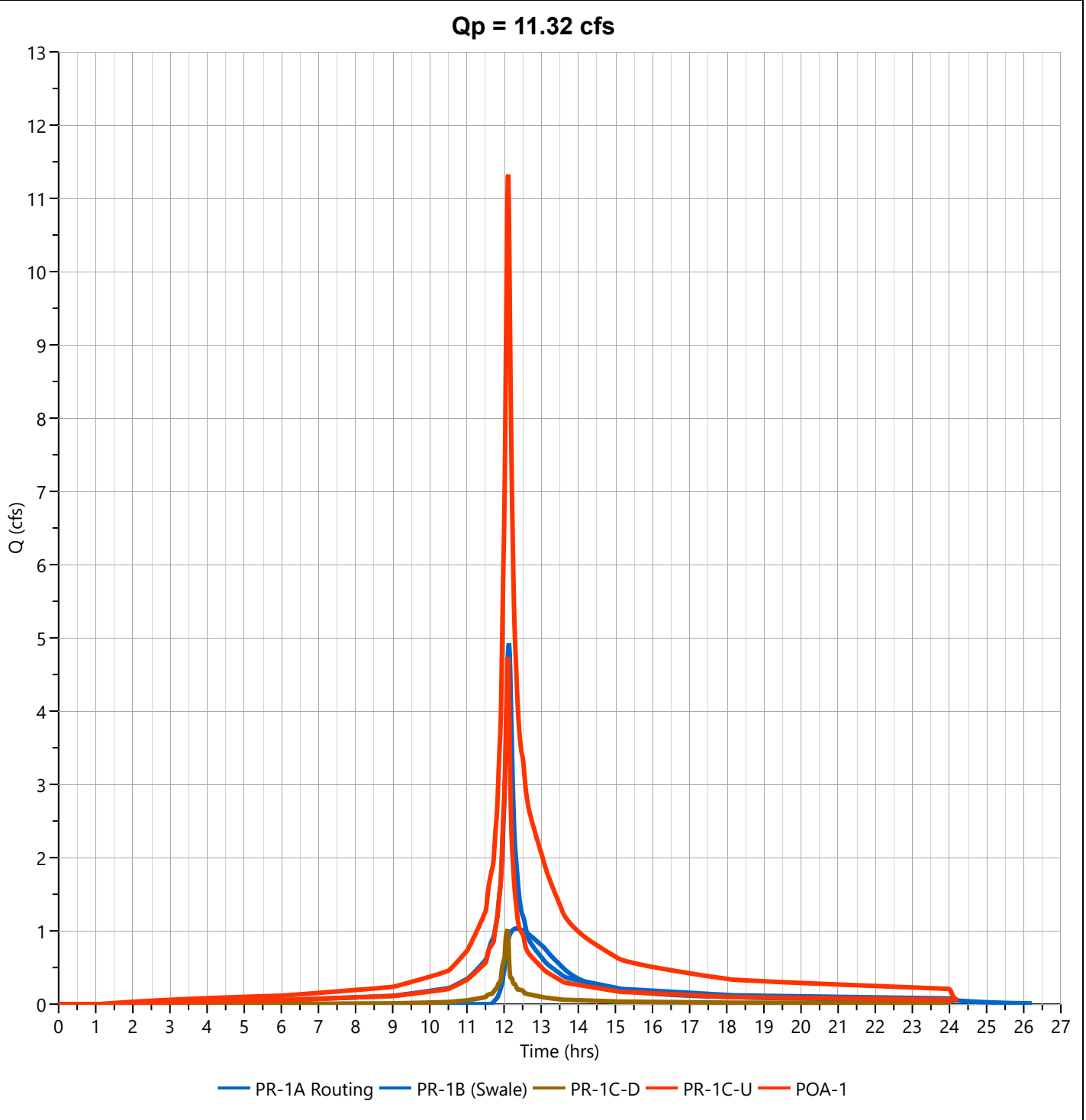
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

POA-1

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 11.32 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 48,102 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

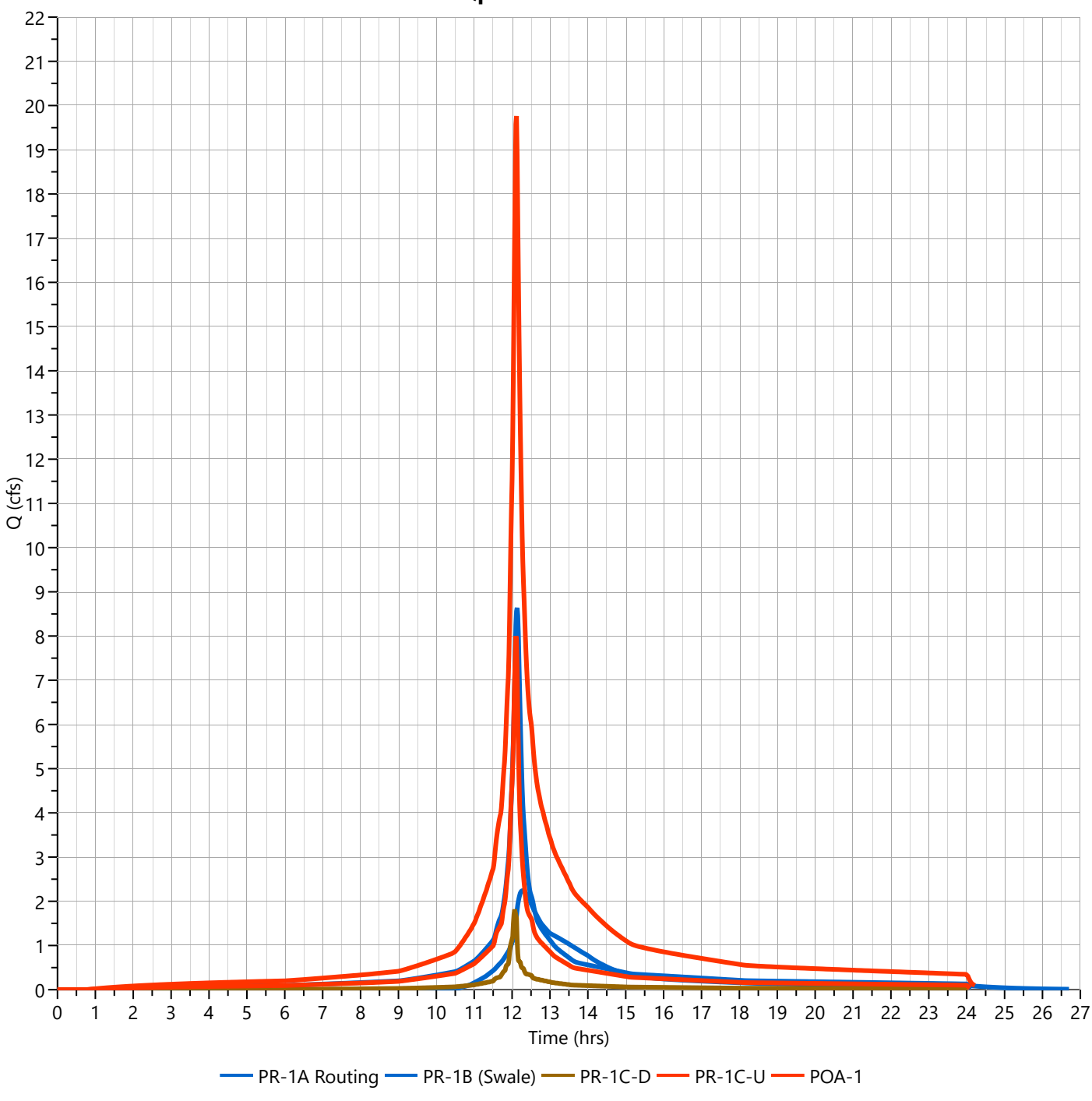
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

POA-1

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 19.76 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 86,331 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

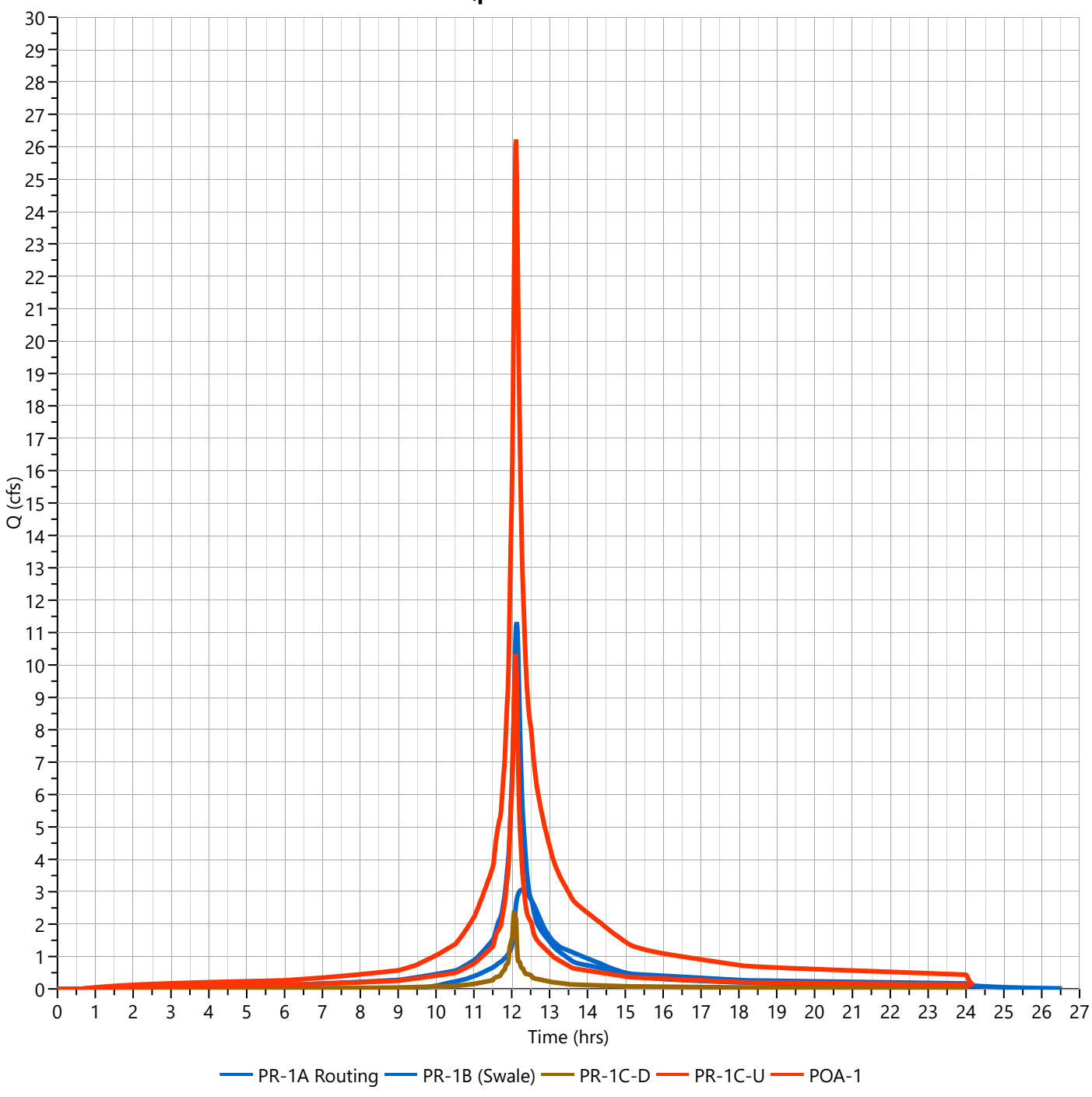
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

POA-1

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 26.22 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 114,179 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

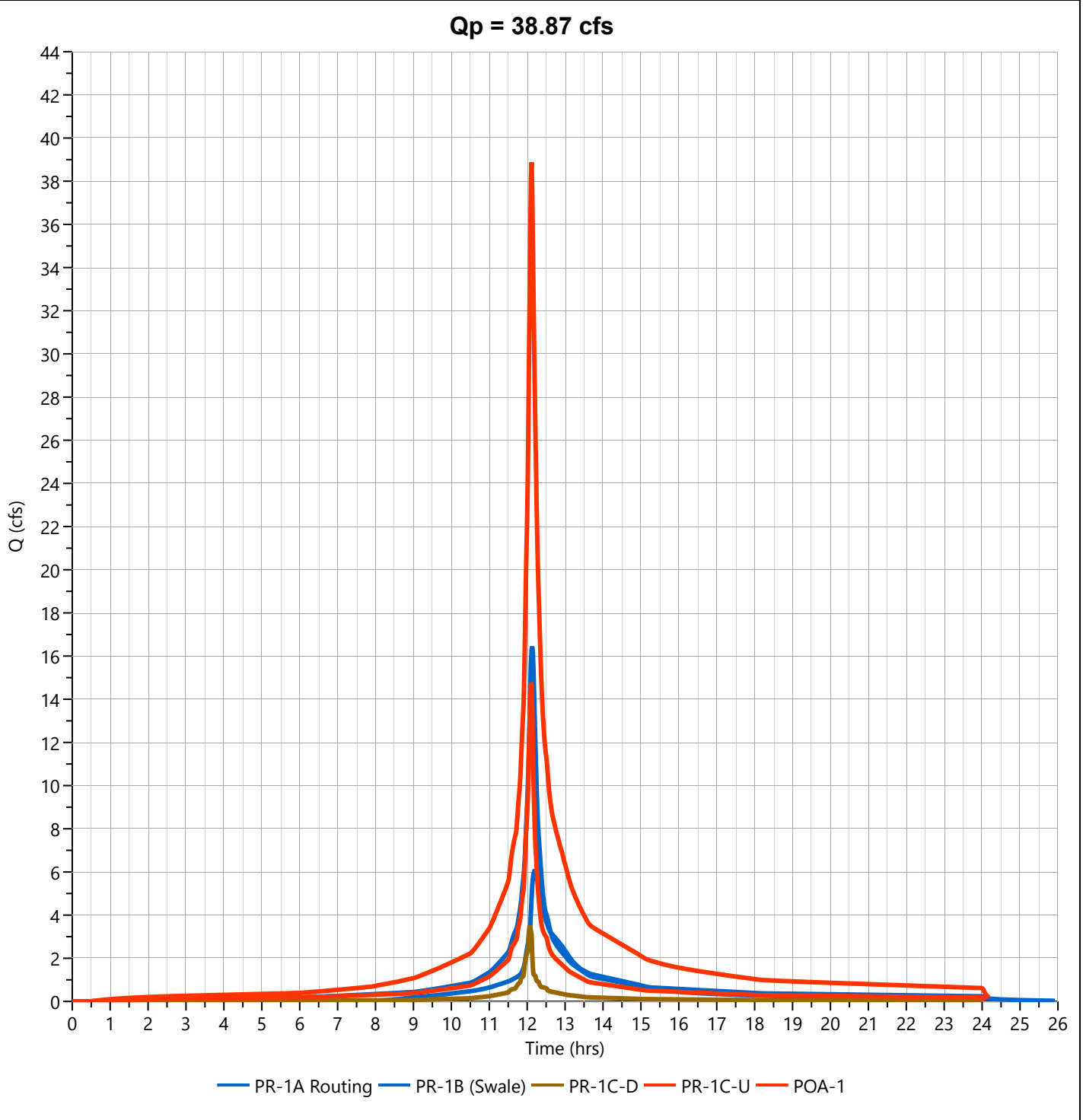
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

POA-1

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 38.87 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 167,892 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



PR-2A-DISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: Present (**Developed**) — **Current Proposed Watershed PR-2A-D - 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	90		
4.	Two-year 24-hr rainfall, P_2	in	3.46		
5.	Land Slope, s	ft/ft	0.019		
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	0.018	+	+
				Sheet Flow Sub-Total	0.018 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	3	
13.	Flow Length, L	ft	167	34	
14.	Cross Sectional flow area, a	ft^2	0.61	0.61	
15.	Wetted Perimeter, P_w	ft	2.00	2.00	
16.	Hydraulic Radius, r $r = a / P_w$	ft	0.31	0.31	
17.	Channel Slope, s	ft/ft	0.010	0.050	
18.	Manning's Roughness Coeff., n		0.012	0.012	
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	5.63	12.58	
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.008	+ 0.001	+
				Channel Flow Sub-Total	0.009 hours

Watershed or subarea T_c or T_t **(Add Sub-Total T_t from prior steps)**		
	Total Tc (hours) =	0.027 hours
	Software Limitations Require Minimum Tc =	2 minutes

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: Present (**Developed**) — **Current Proposed Watershed PR-2A-D - 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	62		
4.	Two-year 24-hr rainfall, P_2		in	3.46		
5.	Land Slope, s		ft/ft	0.066		
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	0.097	+	+
					Sheet Flow Sub-Total	0.097 hours

Shallow Concentrated Flow

			Segment ID	2		
8.	Surface Description			Grassed Waterways		
9.	Flow Length, L		ft	8		
10.	Watercourse Slope, s		ft/ft	0.120		
11.	Average Velocity, V (NEH table 15-3)		ft/s	5.59		
12.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.000	+	+
					Shallow Conc. Flow Sub-Total	0.000 hours

Channel Flow

			Segment ID	3	4	5
13.	Flow Length, L		ft	49	34	18
14.	Cross Sectional flow area, a		ft^2	0.61	0.61	0.61
15.	Wetted Perimeter, P_w		ft	2.00	2.00	2.00
16.	Hydraulic Radius, r	$r = a / P_w$	ft	0.31	0.31	0.31
17.	Channel Slope, s		ft/ft	0.071	0.005	0.035
18.	Manning's Roughness Coeff., n			0.012	0.012	0.012
19.	Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	15.01	3.98	10.56
20.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.001	+ 0.002	+ 0.000
					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) =	**0.101 hours**
Total Tc (minutes) =	**6 minutes**

Hydrograph Report

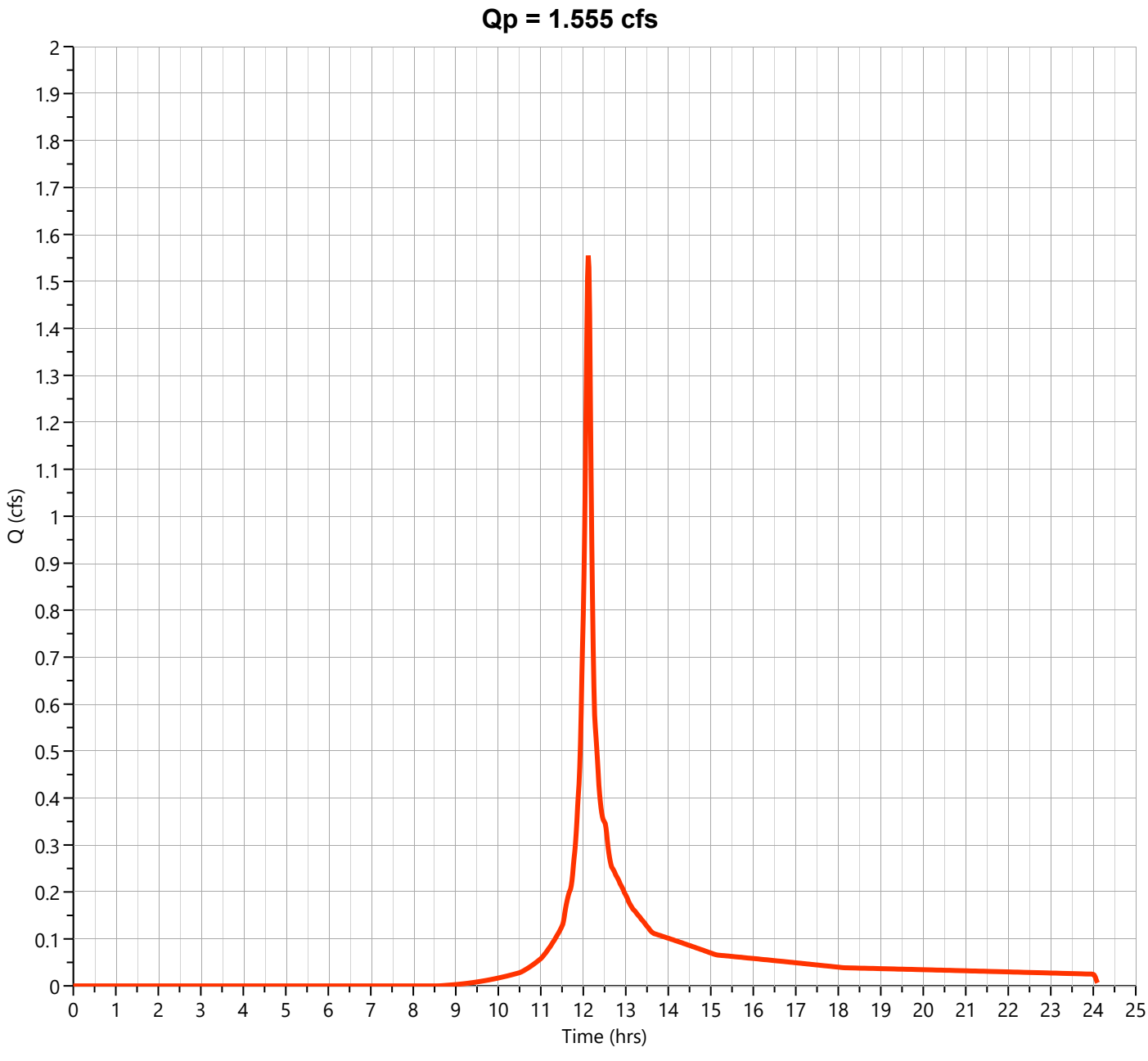
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-D Open Space D

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.555 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 4,806 cuft
Drainage Area	= 0.8 ac	Curve Number	= 80.00
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

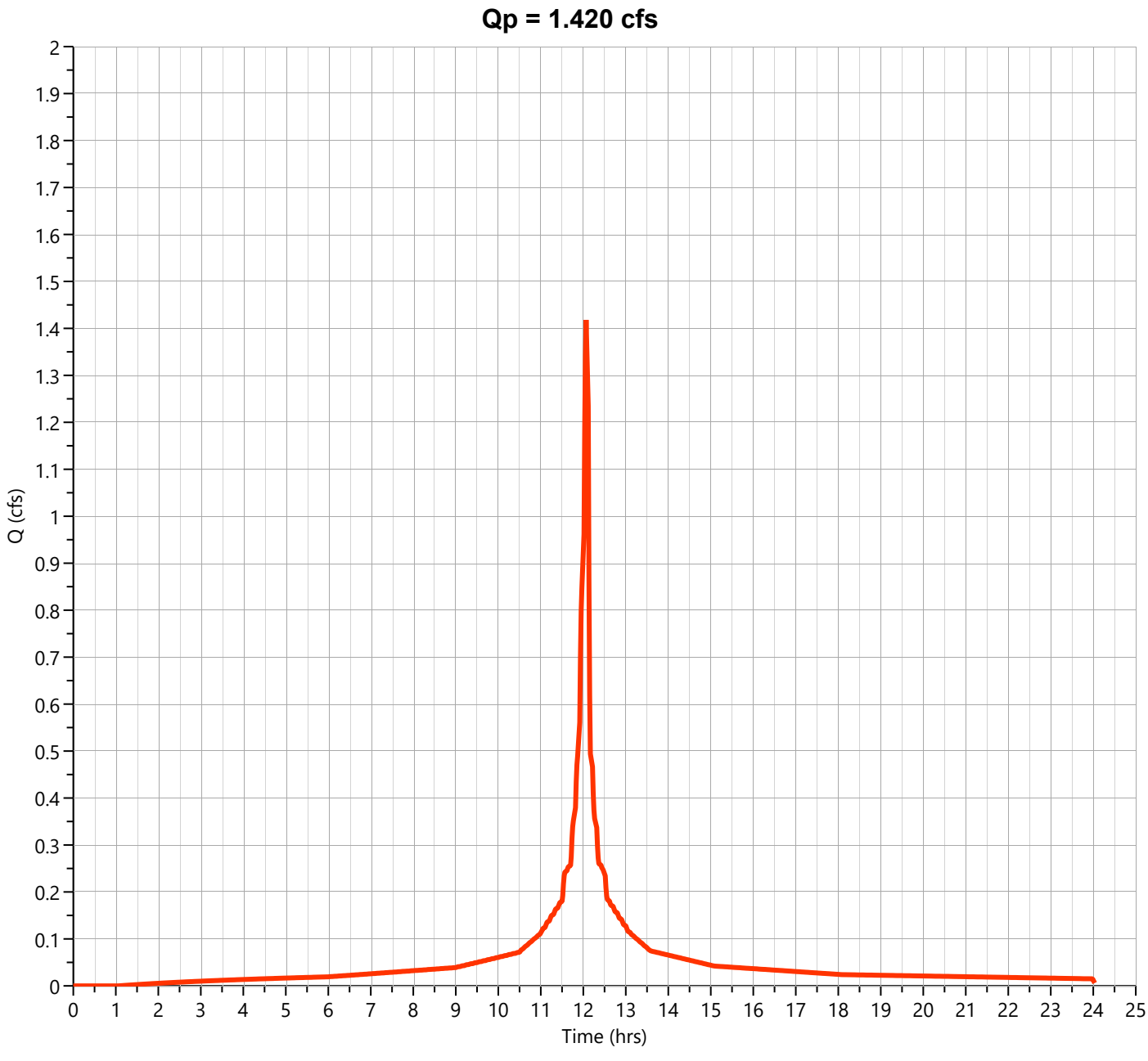
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-D Impervious

Hyd. No. 36

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.420 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 4,612 cuft
Drainage Area	= 0.42 ac	Curve Number	= 98.00
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

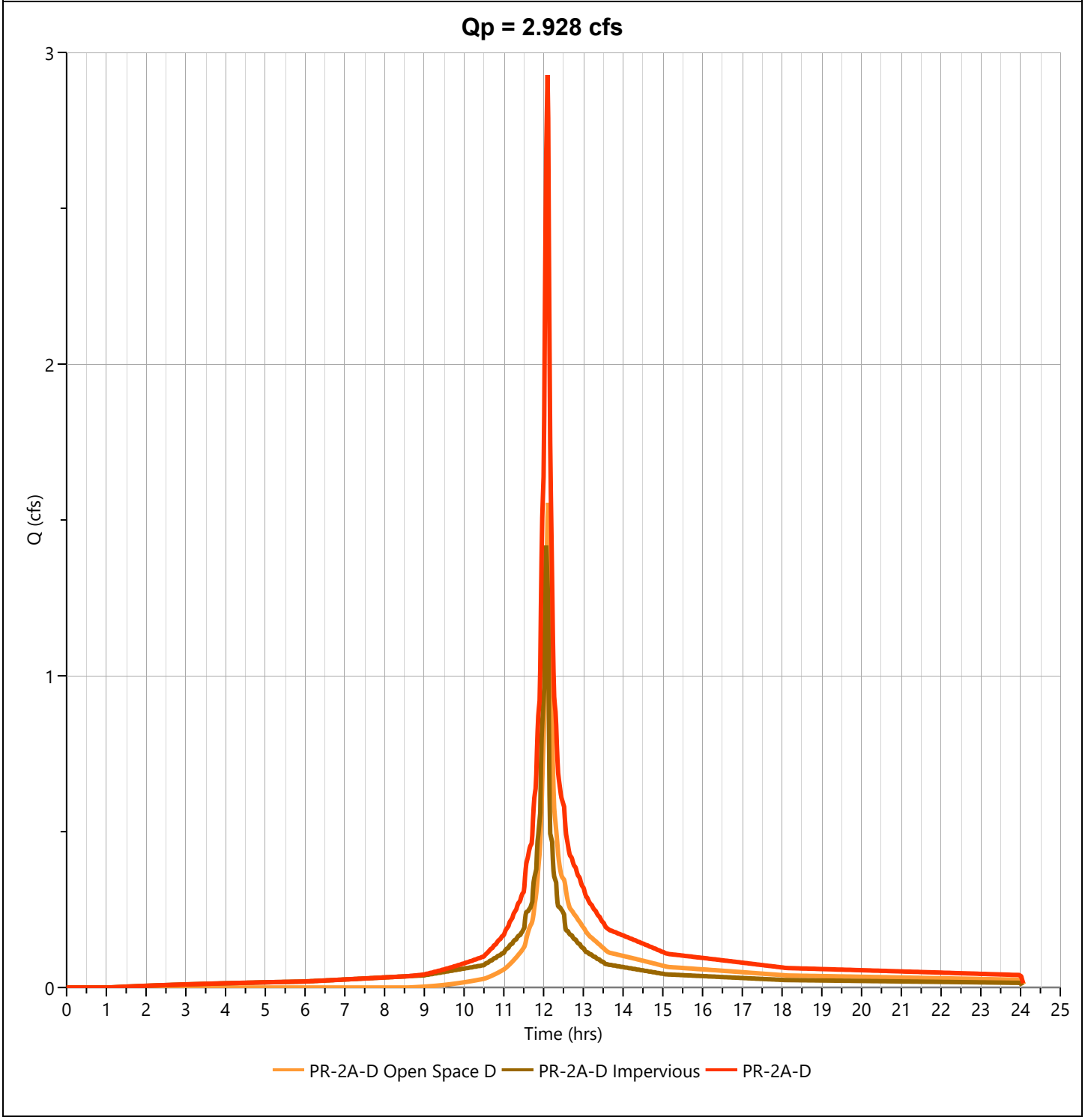
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-D

Hyd. No. 37

Hydrograph Type	= Junction	Peak Flow	= 2.928 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 9,417 cuft
Inflow Hydrographs	= 35, 36	Total Contrib. Area	= 1.22 ac



Hydrograph Report

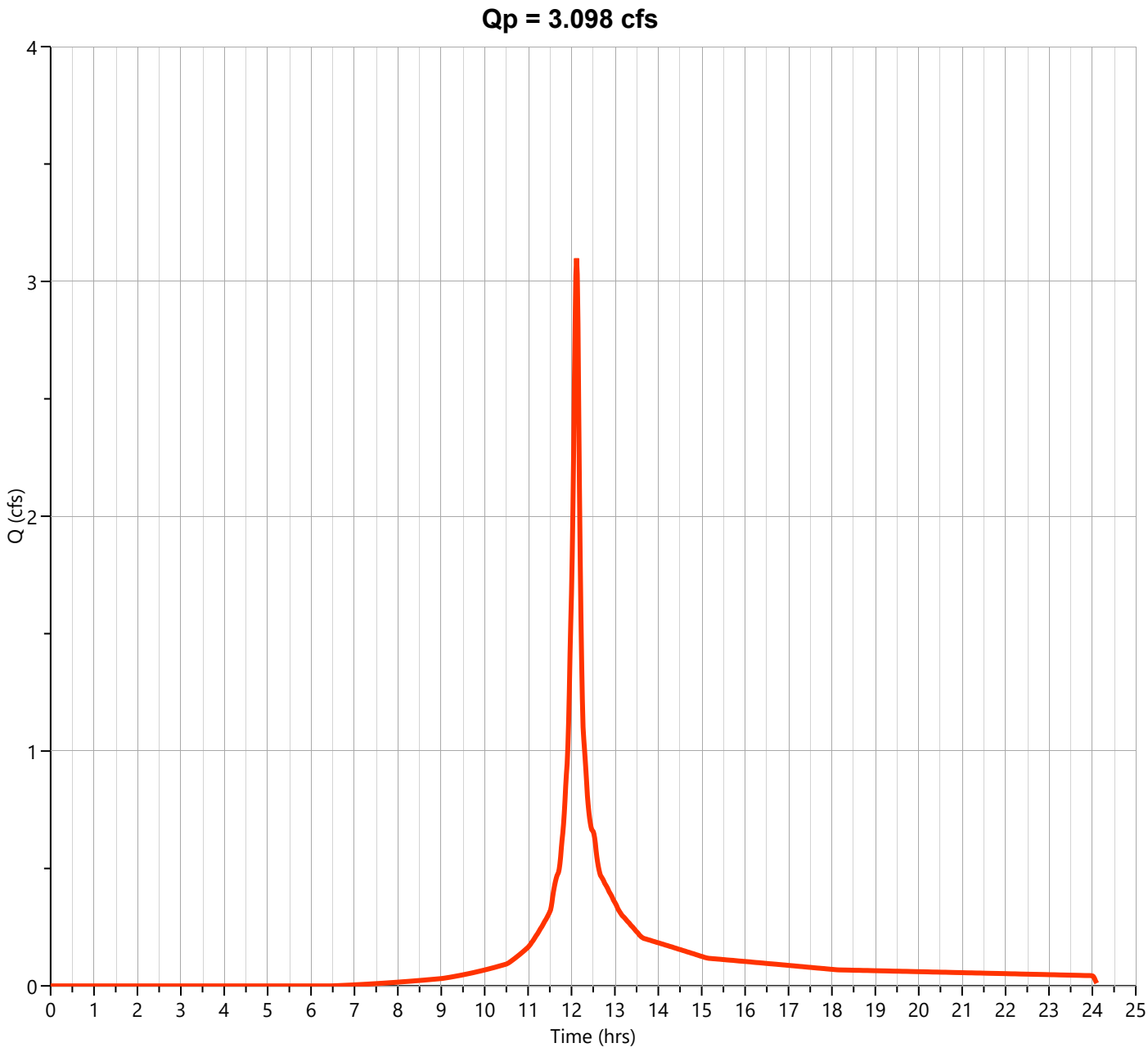
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-D Open Space D

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.098 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 9,664 cuft
Drainage Area	= 0.8 ac	Curve Number	= 80.00
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

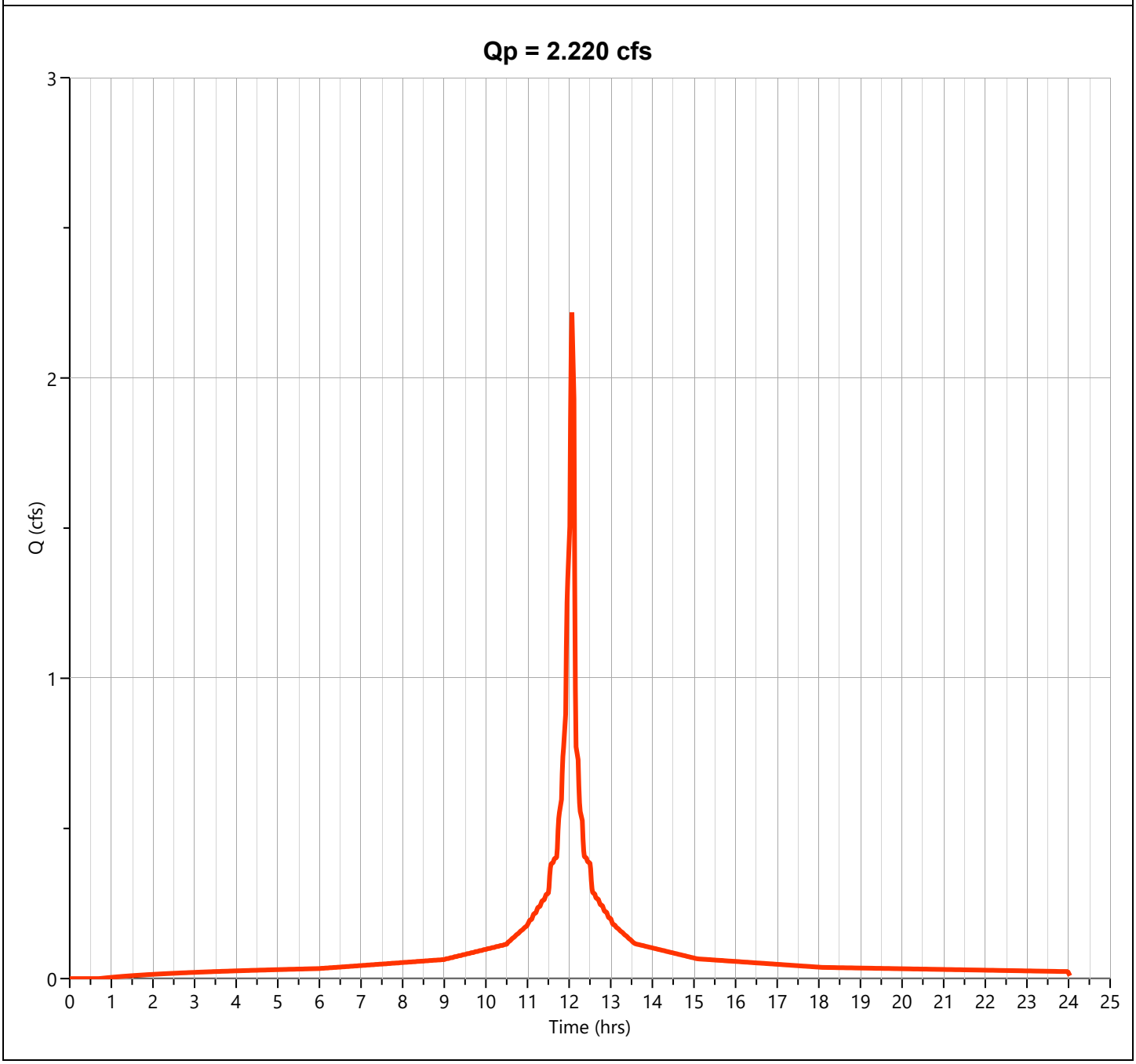
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-D Impervious

Hyd. No. 36

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.220 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 7,350 cuft
Drainage Area	= 0.42 ac	Curve Number	= 98.00
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

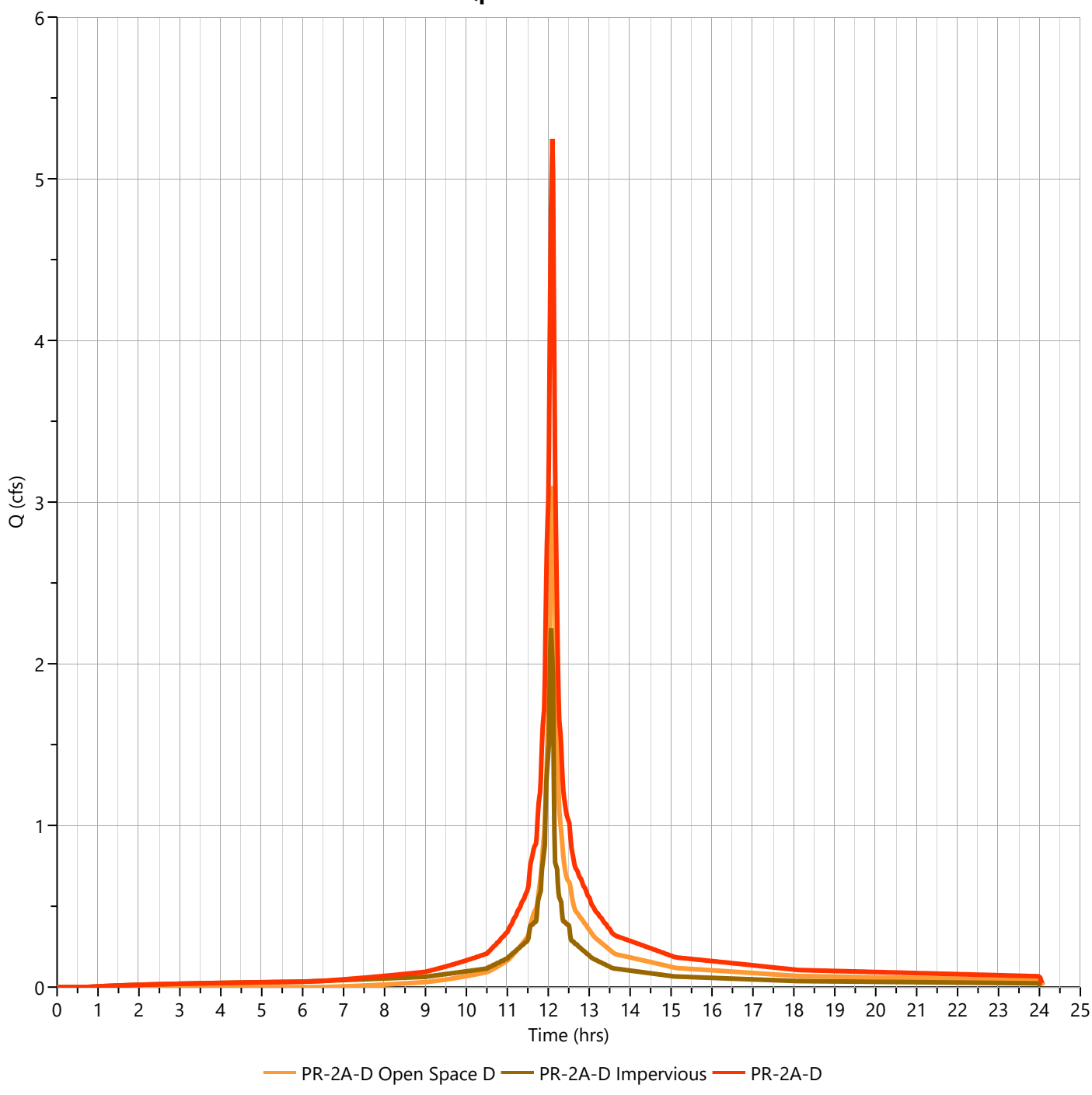
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-D

Hyd. No. 37

Hydrograph Type	= Junction	Peak Flow	= 5.246 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 17,014 cuft
Inflow Hydrographs	= 35, 36	Total Contrib. Area	= 1.22 ac



Hydrograph Report

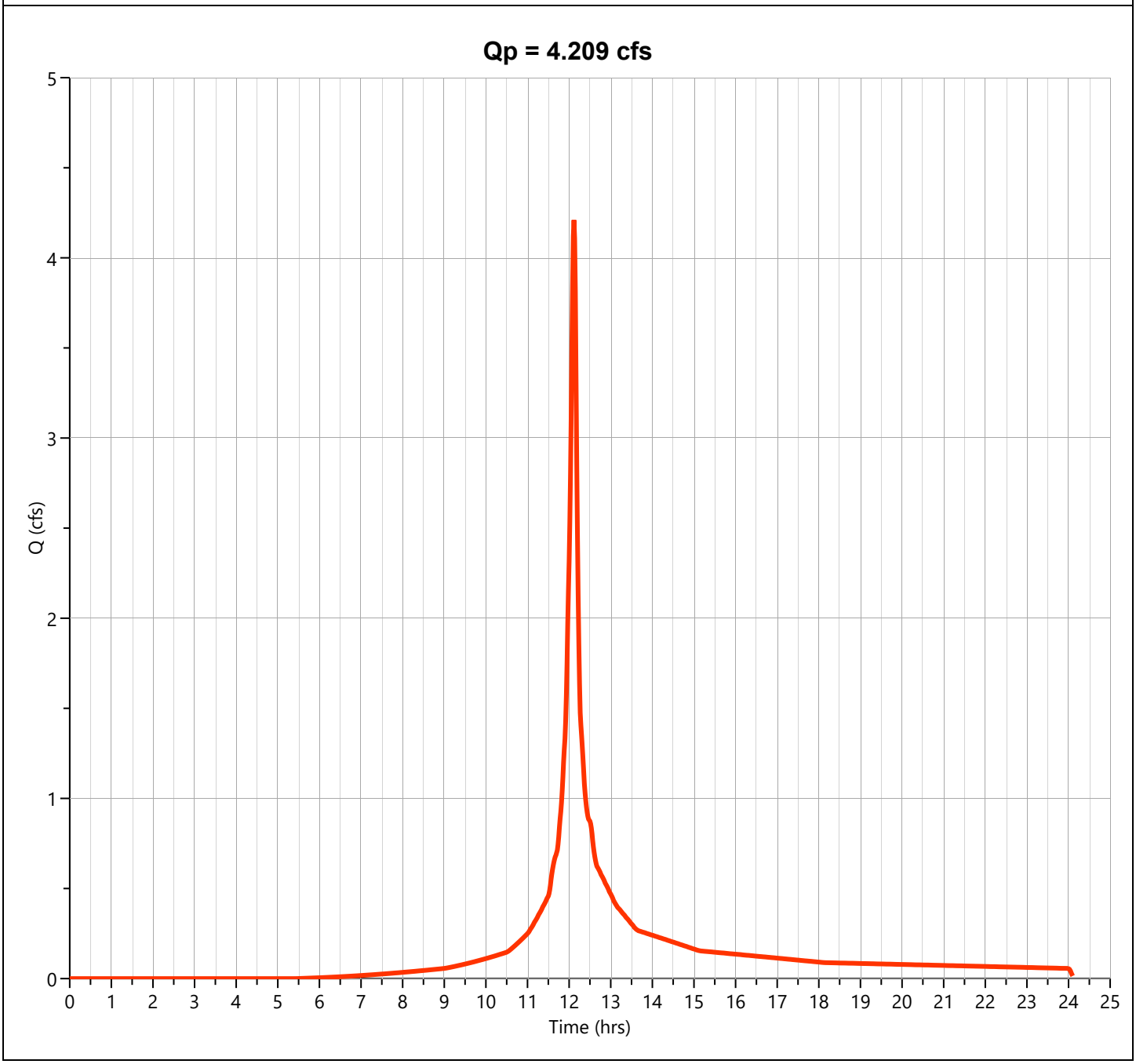
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-D Open Space D

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.209 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 13,287 cuft
Drainage Area	= 0.8 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

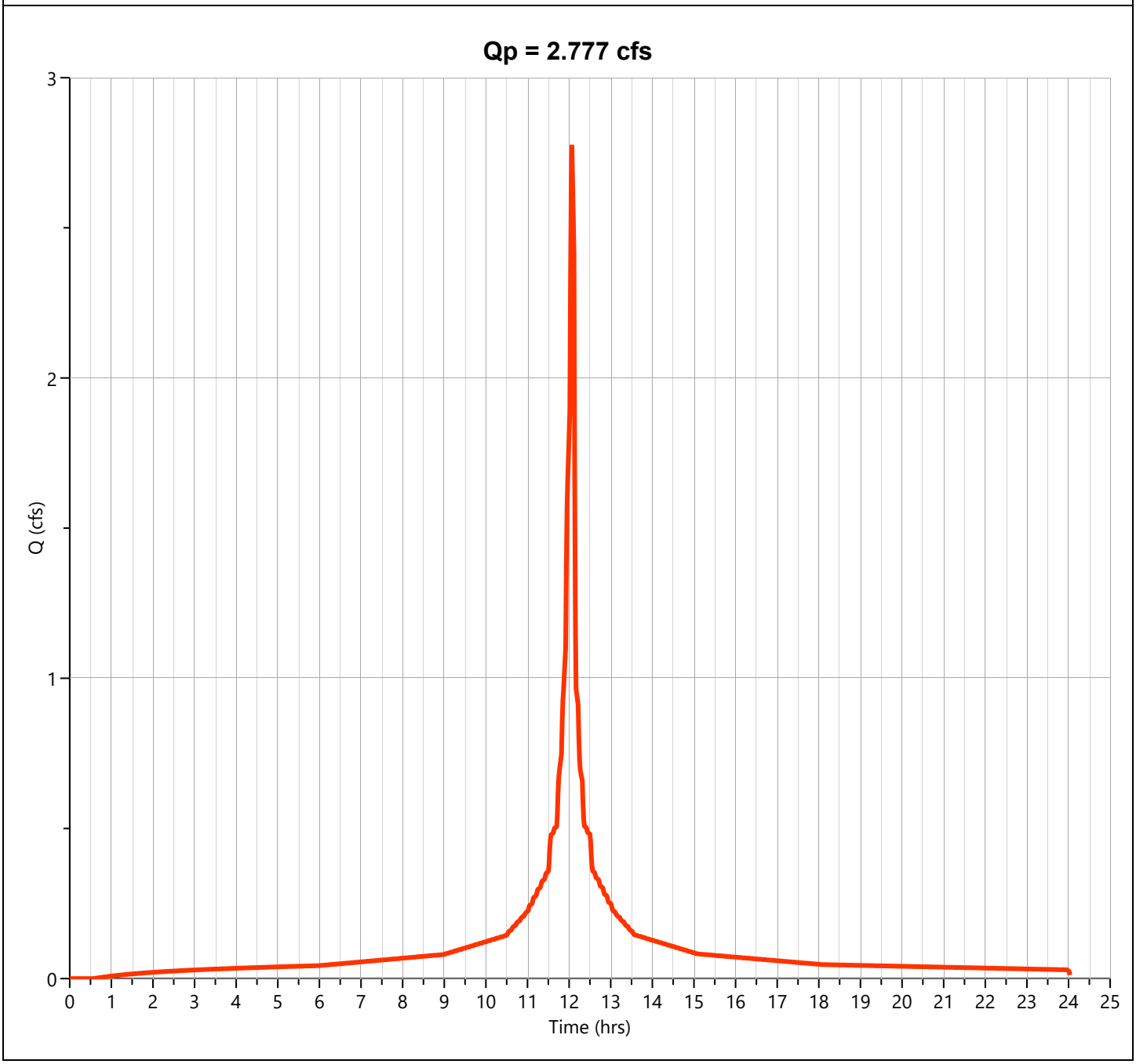
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-D Impervious

Hyd. No. 36

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.777 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 9,264 cuft
Drainage Area	= 0.42 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

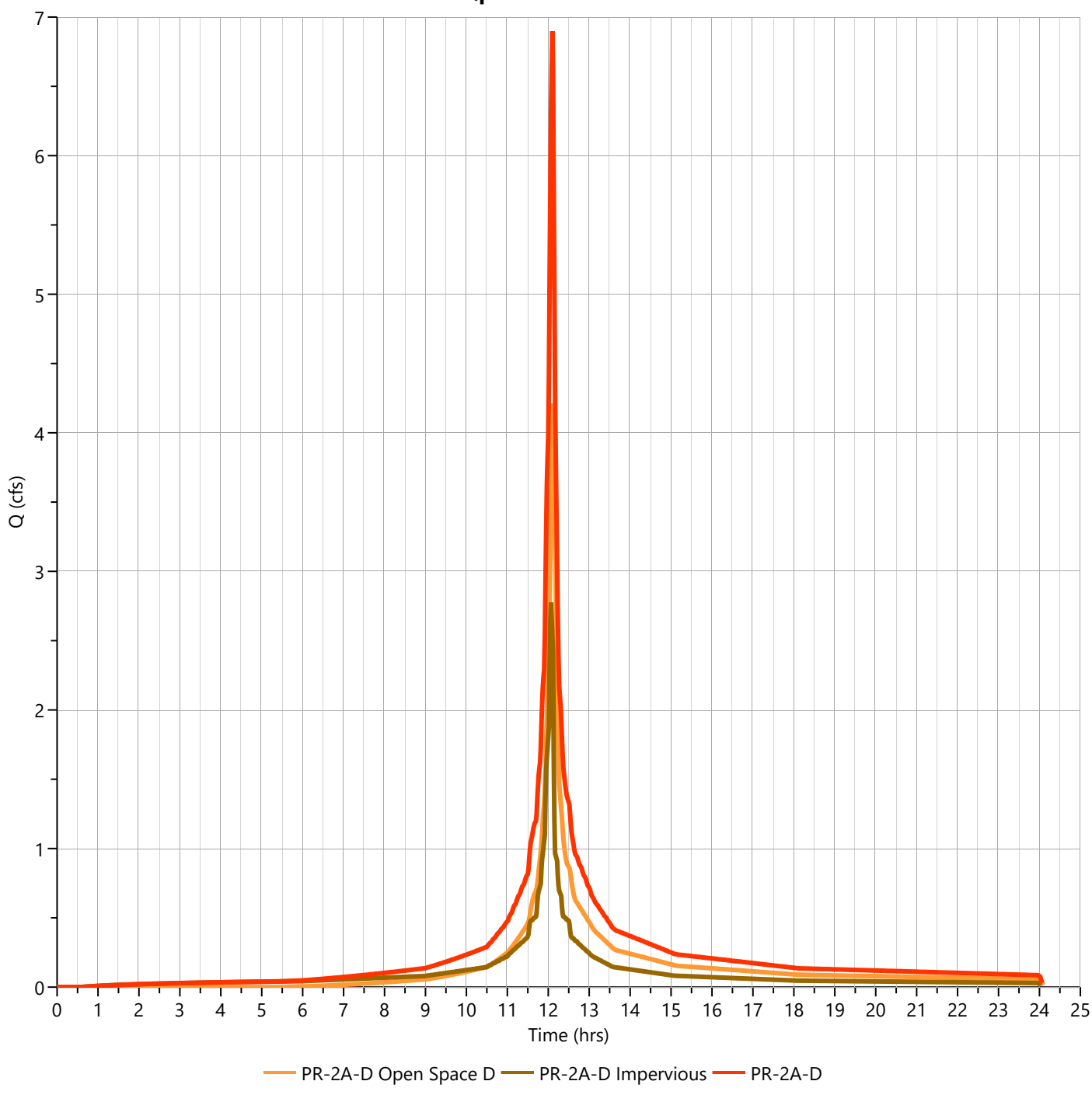
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-D

Hyd. No. 37

Hydrograph Type	= Junction	Peak Flow	= 6.898 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 22,551 cuft
Inflow Hydrographs	= 35, 36	Total Contrib. Area	= 1.22 ac



Hydrograph Report

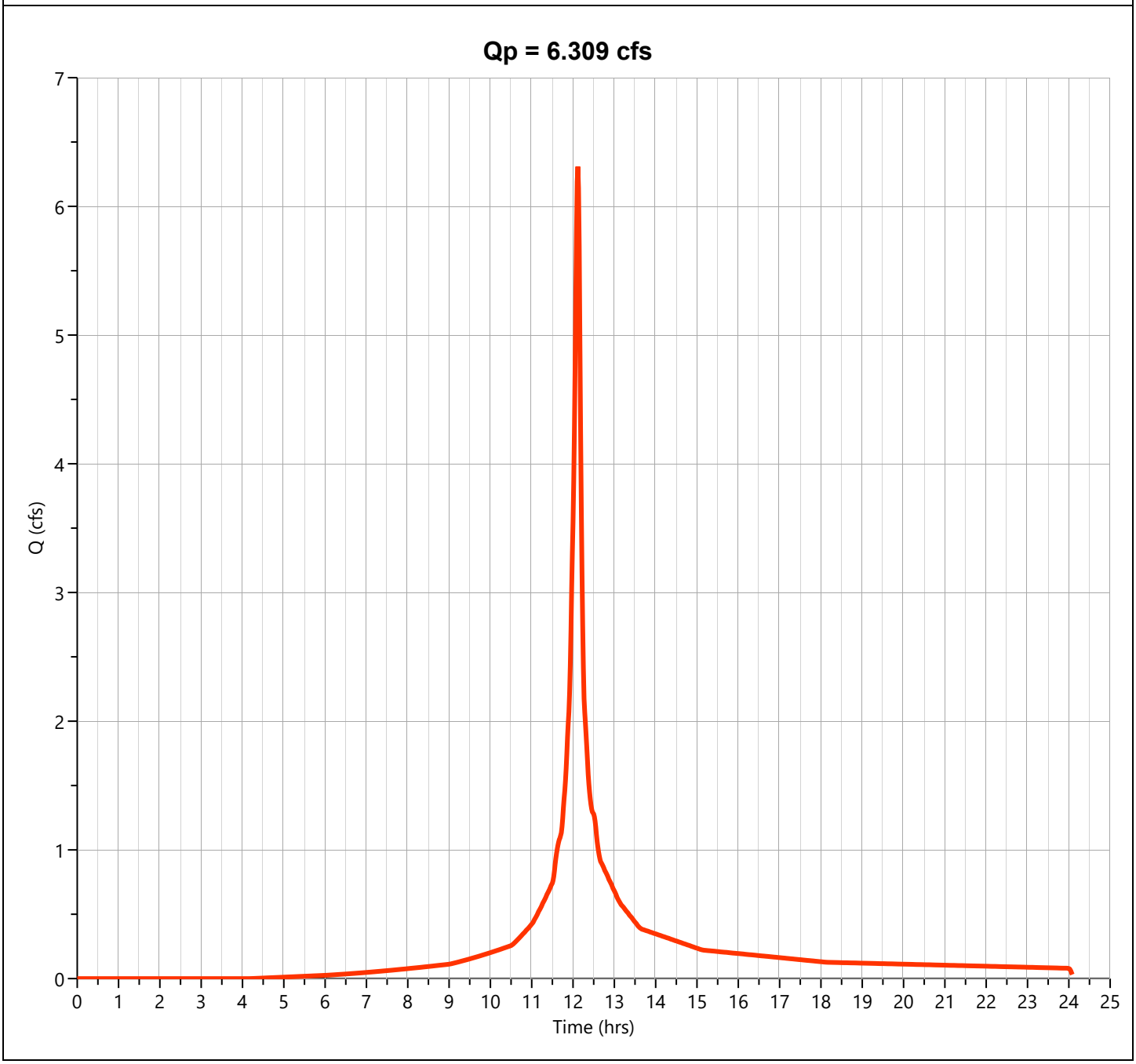
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-D Open Space D

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.309 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 20,352 cuft
Drainage Area	= 0.8 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

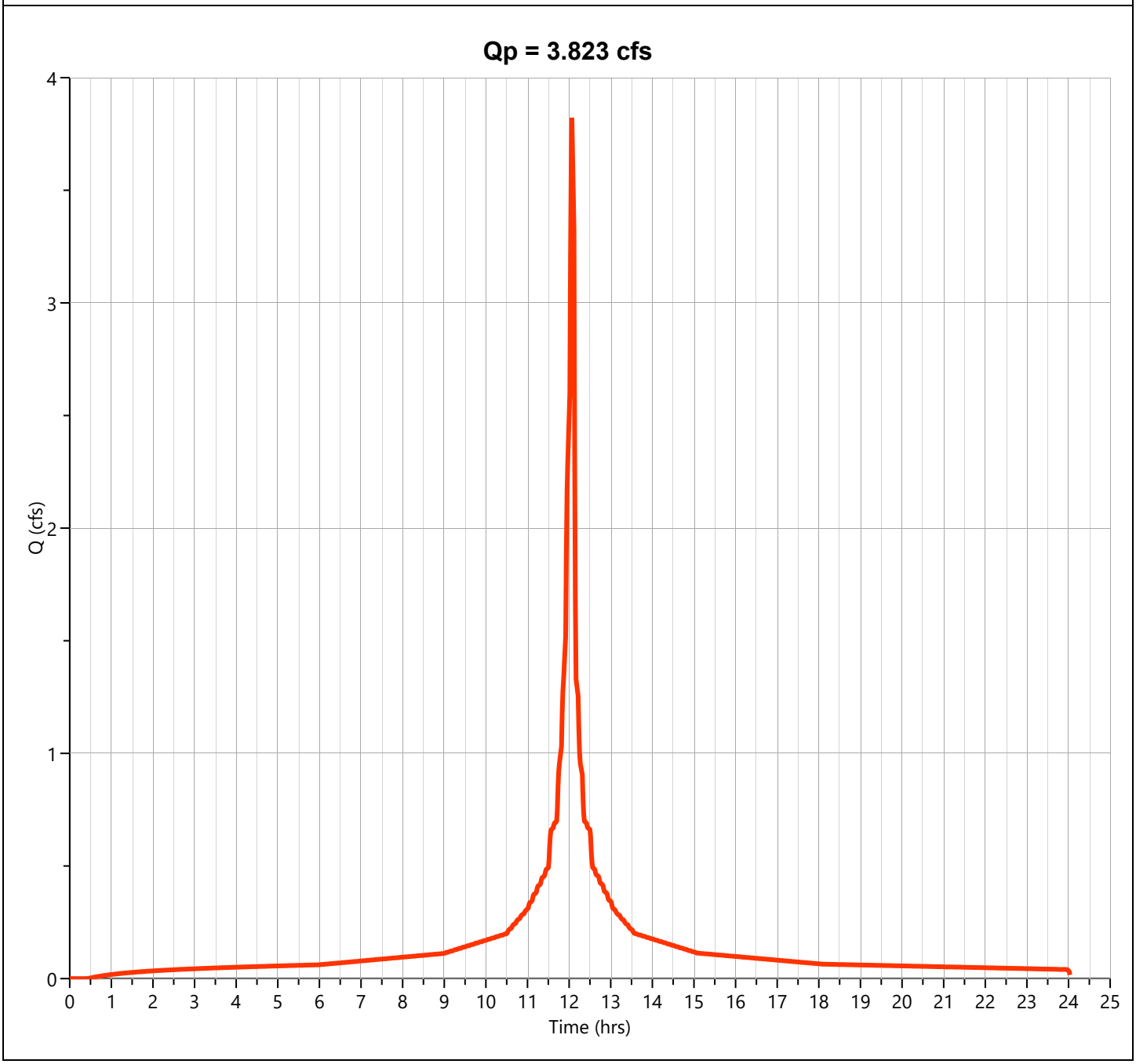
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-D Impervious

Hyd. No. 36

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.823 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 12,863 cuft
Drainage Area	= 0.42 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

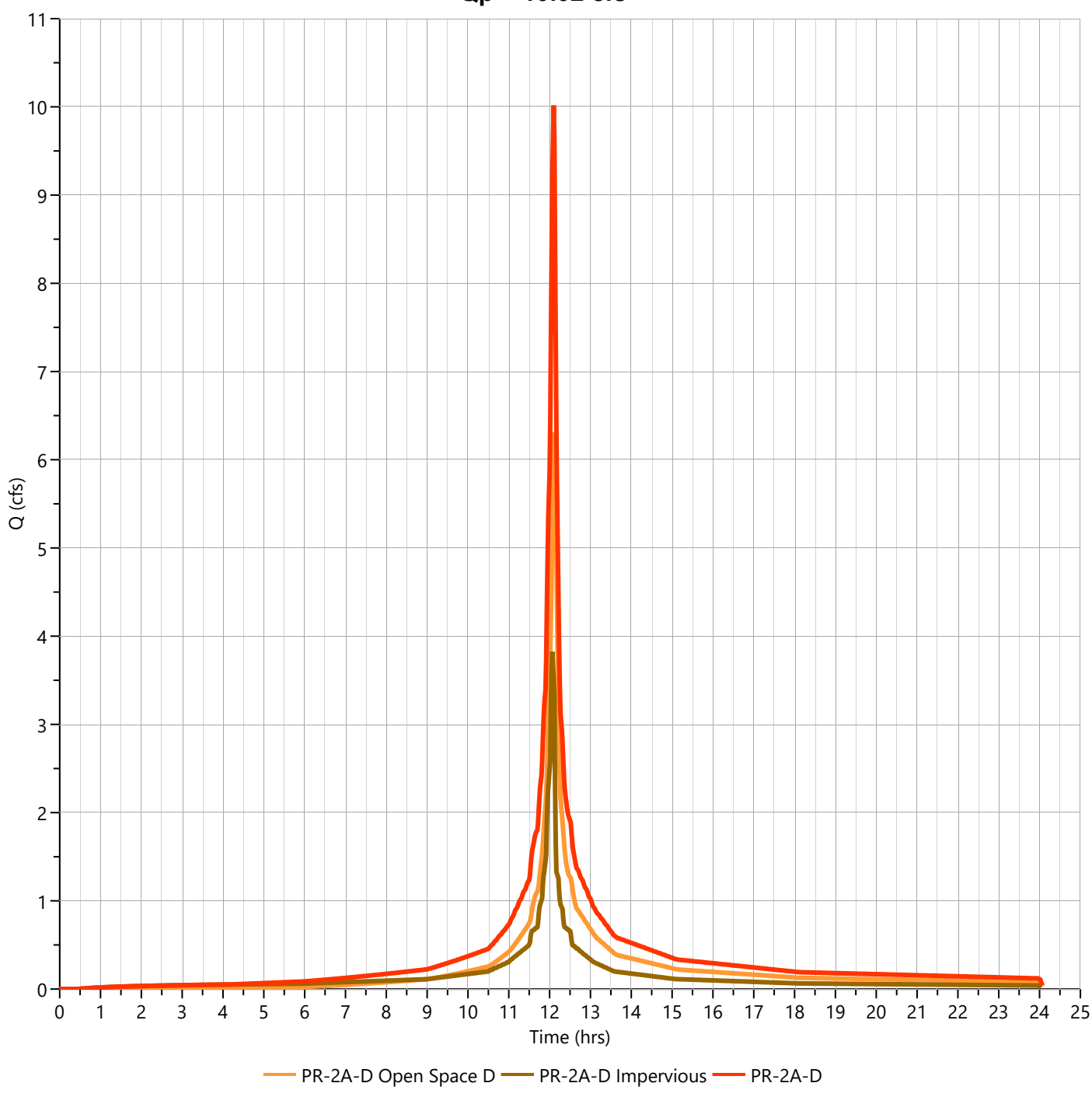
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-D

Hyd. No. 37

Hydrograph Type	= Junction	Peak Flow	= 10.02 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 33,216 cuft
Inflow Hydrographs	= 35, 36	Total Contrib. Area	= 1.22 ac



PR-2A-UNDISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: (**Present**) Developed — **Current Proposed Watershed PR-2A-U 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	0.040		
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	
7.	Surface Description			Pavement	Pavement	
8.	Flow Length, L		ft	166	276	
9.	Watercourse Slope, s		ft/ft	0.050	0.080	
10.	Average Velocity, V (NEH table 15-3)		ft/s	4.56	5.74	
11.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.010 +	0.013 +	

Shallow Conc. Flow Sub-Total: **0.023 hours**

Channel Flow

			Segment ID	4	5	6
12.	Flow Length, L		ft	49	34	18
13.	Cross Sectional flow area, a		ft^2	0.61	0.61	0.61
14.	Wetted Perimeter, P_w		ft	2.00	2.00	2.00
15.	Hydraulic Radius, r	$r = a / P_w$	ft	0.31	0.31	0.31
16.	Channel Slope, s		ft/ft	0.071	0.005	0.035
17.	Manning's Roughness Coeff., n			0.012	0.012	0.012
18.	Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s	15.01	3.98	10.53
19.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.001 +	0.002 +	0.000

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) =	**0.042 hours**
Total Tc (minutes) =	**3 minutes**

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: (**Present**) Developed — **Current Proposed Watershed PR-2A-U 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	0.053		
6.	Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.234	+	+

Sheet Flow Sub-Total: **0.234 hours**

Shallow Concentrated Flow

			Segment ID	2	3	4
7.	Surface Description			Grassed Waterways	Woodlands	Grassed Waterways
8.	Flow Length, L		ft	32	162	24
9.	Watercourse Slope, s		ft/ft	0.051	0.051	0.292
10.	Average Velocity, V (NEH table 15-3)		ft/s	3.65	1.13	8.71
11.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.002	+ 0.040	+ 0.001

Shallow Conc. Flow Sub-Total: **0.043 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) =	**0.277 hours**
Total Tc (minutes) =	**17 minutes**

Hydrograph Report

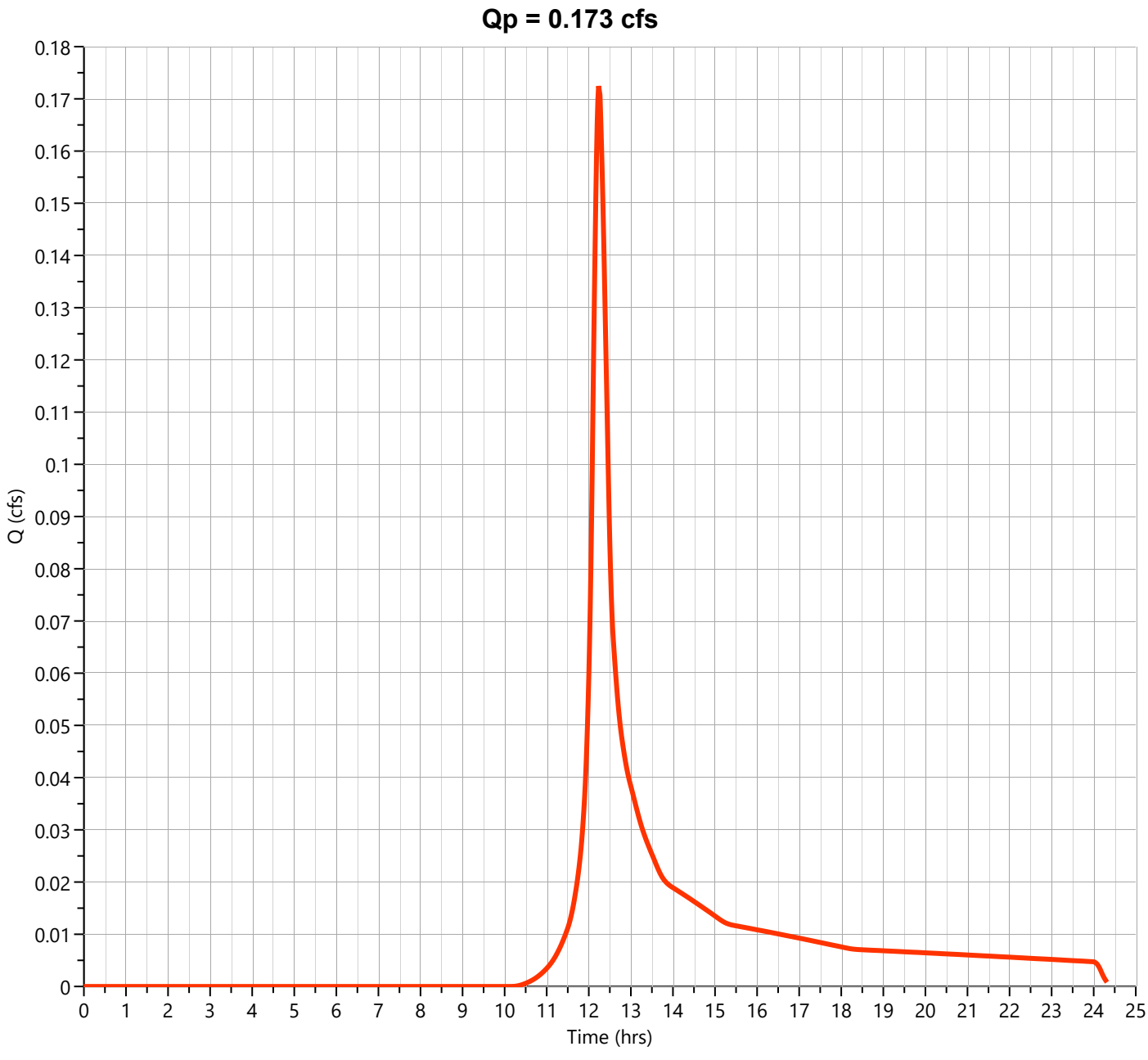
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-U Open Space C

Hyd. No. 39

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.173 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.25 hrs
Time Interval	= 1 min	Runoff Volume	= 783 cuft
Drainage Area	= 0.18 ac	Curve Number	= 74.00
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

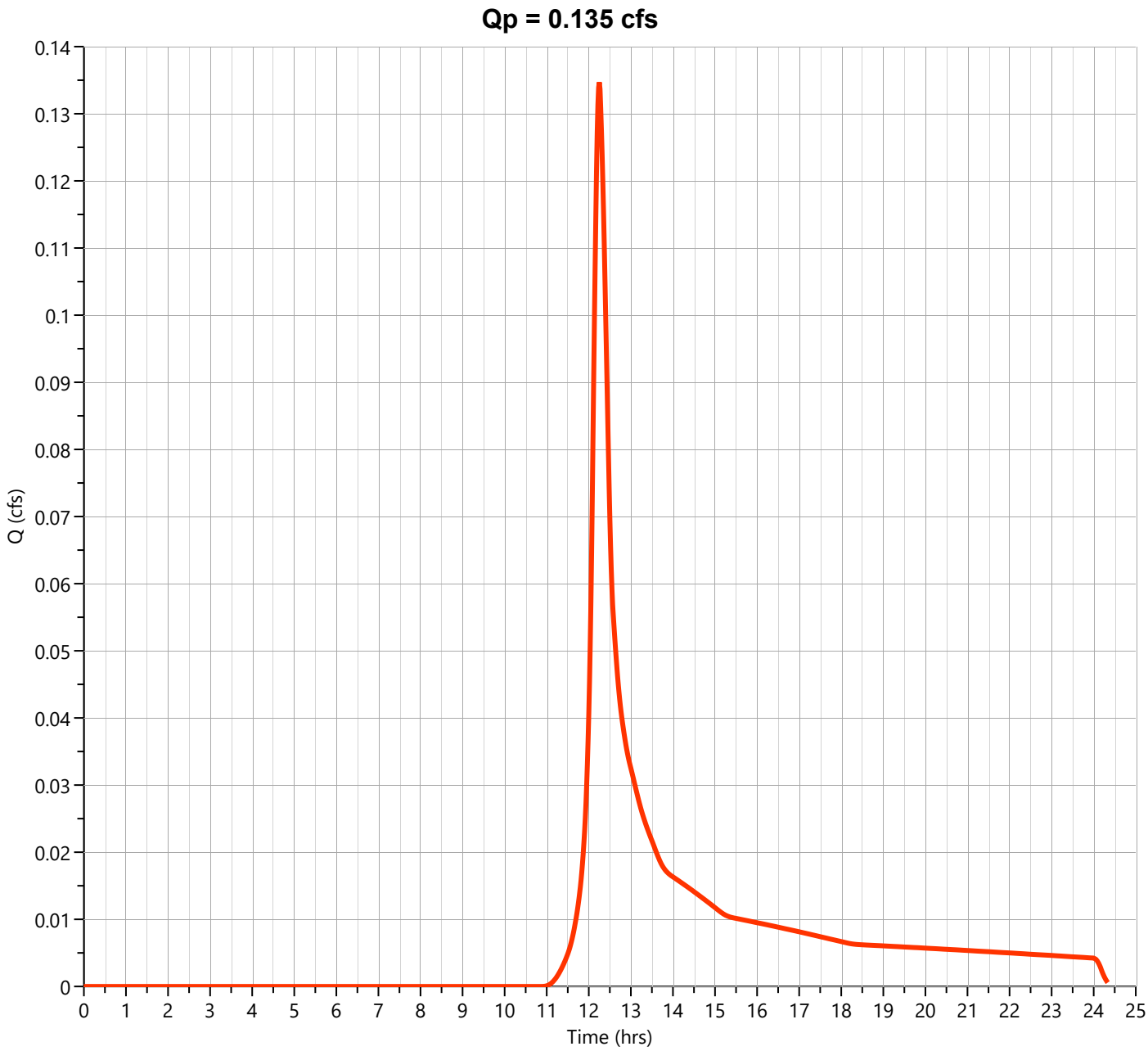
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-U Woods C

Hyd. No. 40

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.135 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.25 hrs
Time Interval	= 1 min	Runoff Volume	= 635 cuft
Drainage Area	= 0.18 ac	Curve Number	= 70.00
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

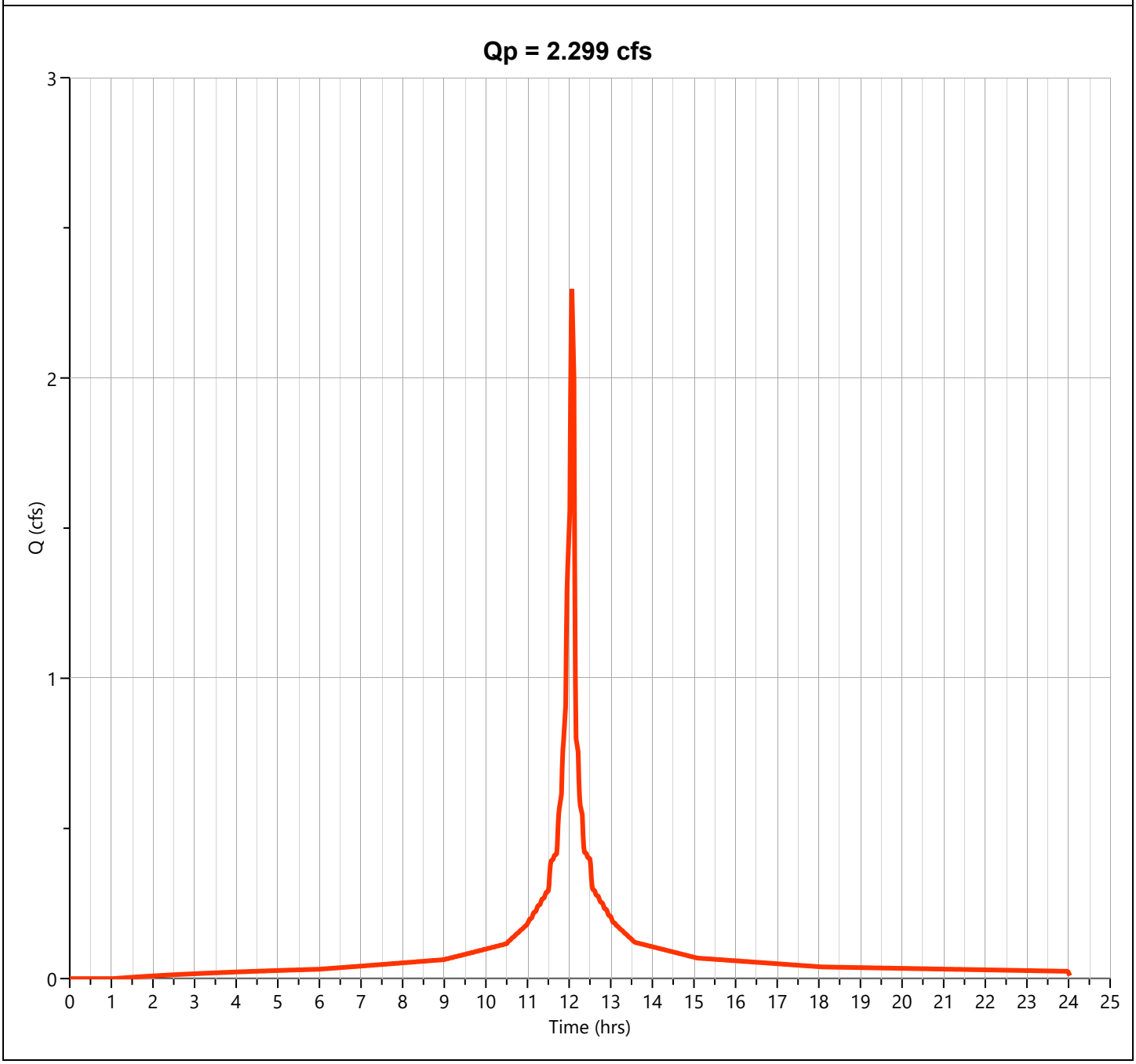
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-U Impervious

Hyd. No. 41

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.299 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 7,467 cuft
Drainage Area	= 0.68 ac	Curve Number	= 98.00
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

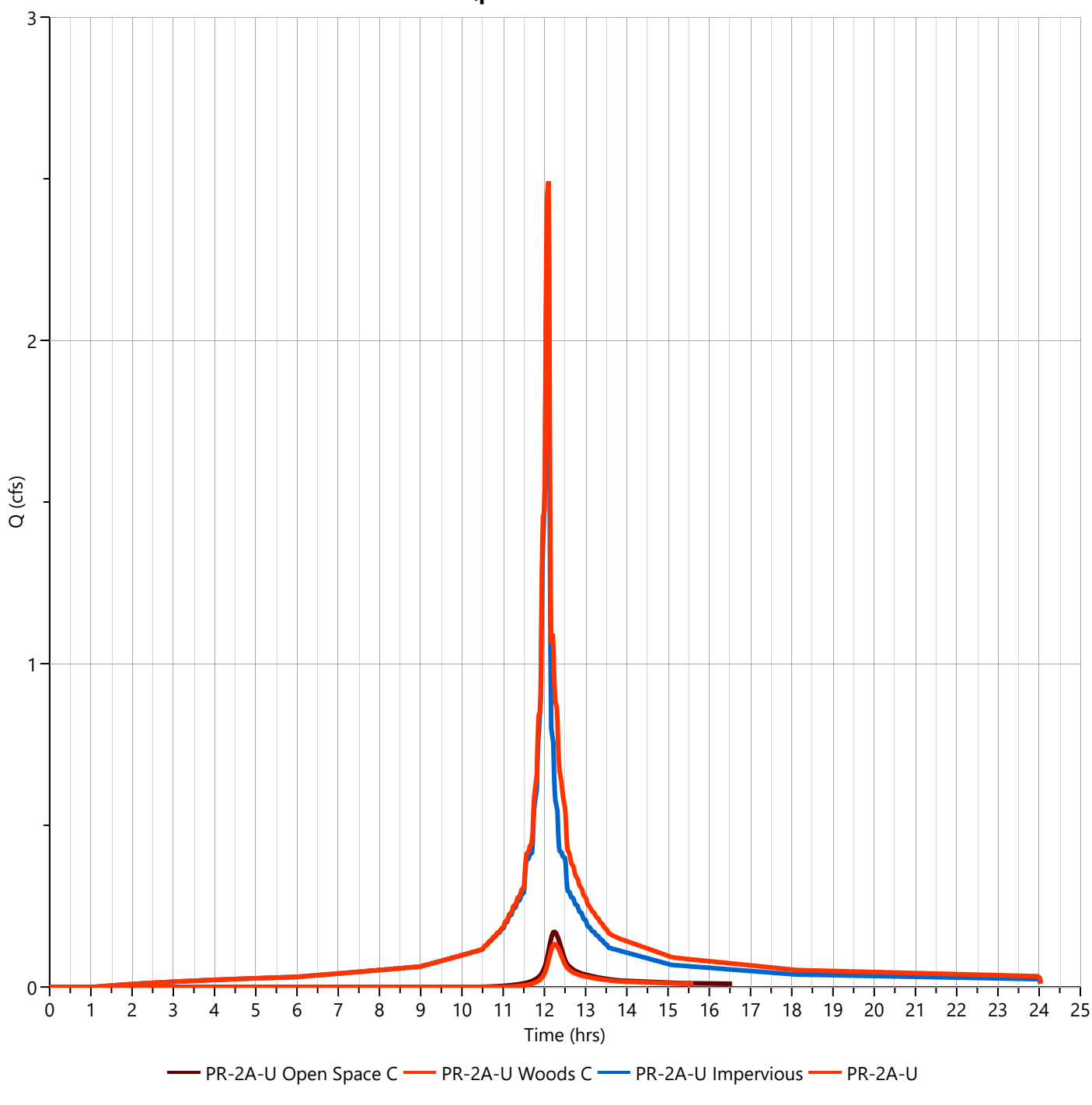
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-U

Hyd. No. 42

Hydrograph Type	= Junction	Peak Flow	= 2.492 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 8,885 cuft
Inflow Hydrographs	= 39, 40, 41	Total Contrib. Area	= 1.04 ac



Hydrograph Report

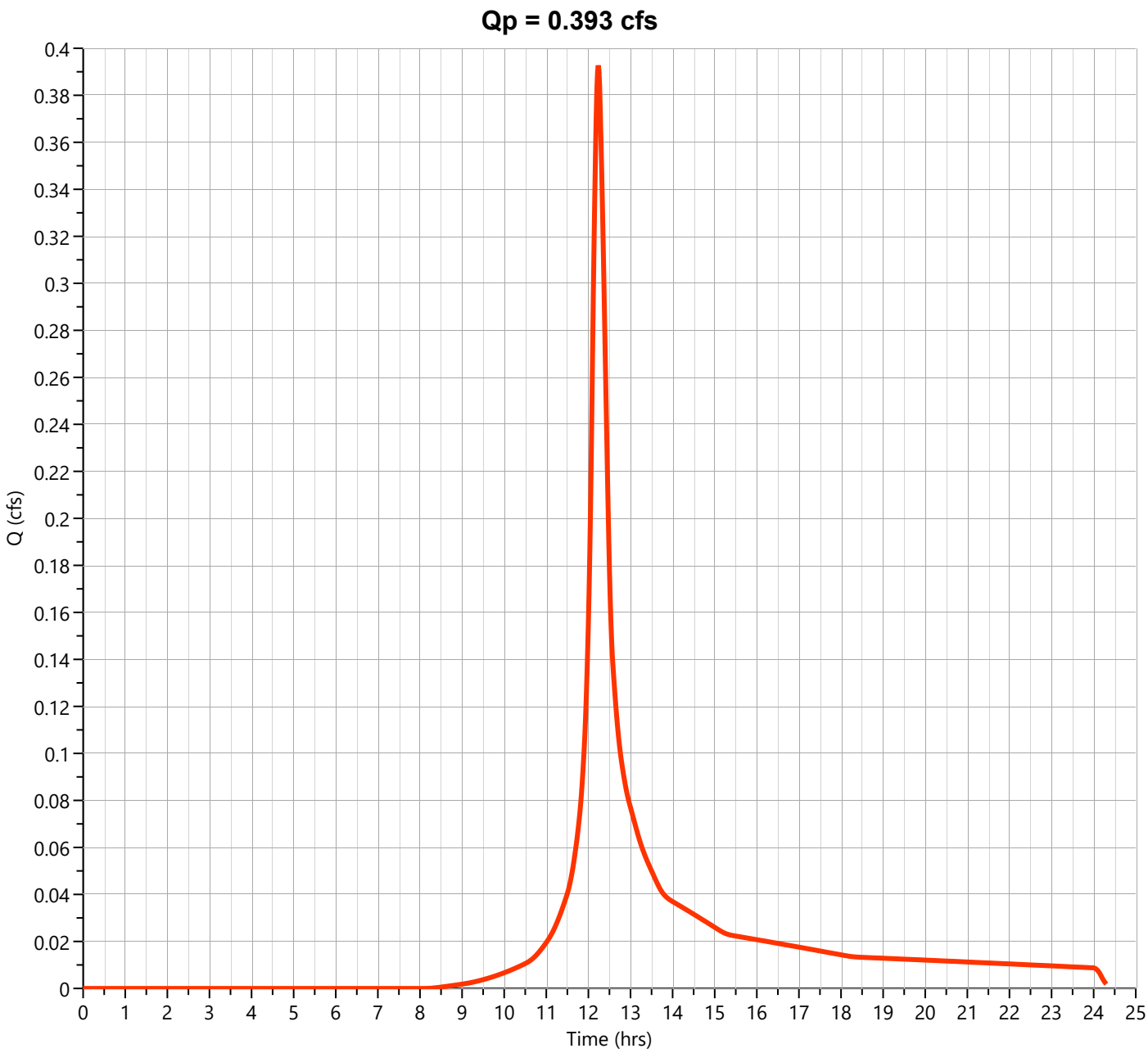
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-U Open Space C

Hyd. No. 39

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.393 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Runoff Volume	= 1,725 cuft
Drainage Area	= 0.18 ac	Curve Number	= 74.00
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

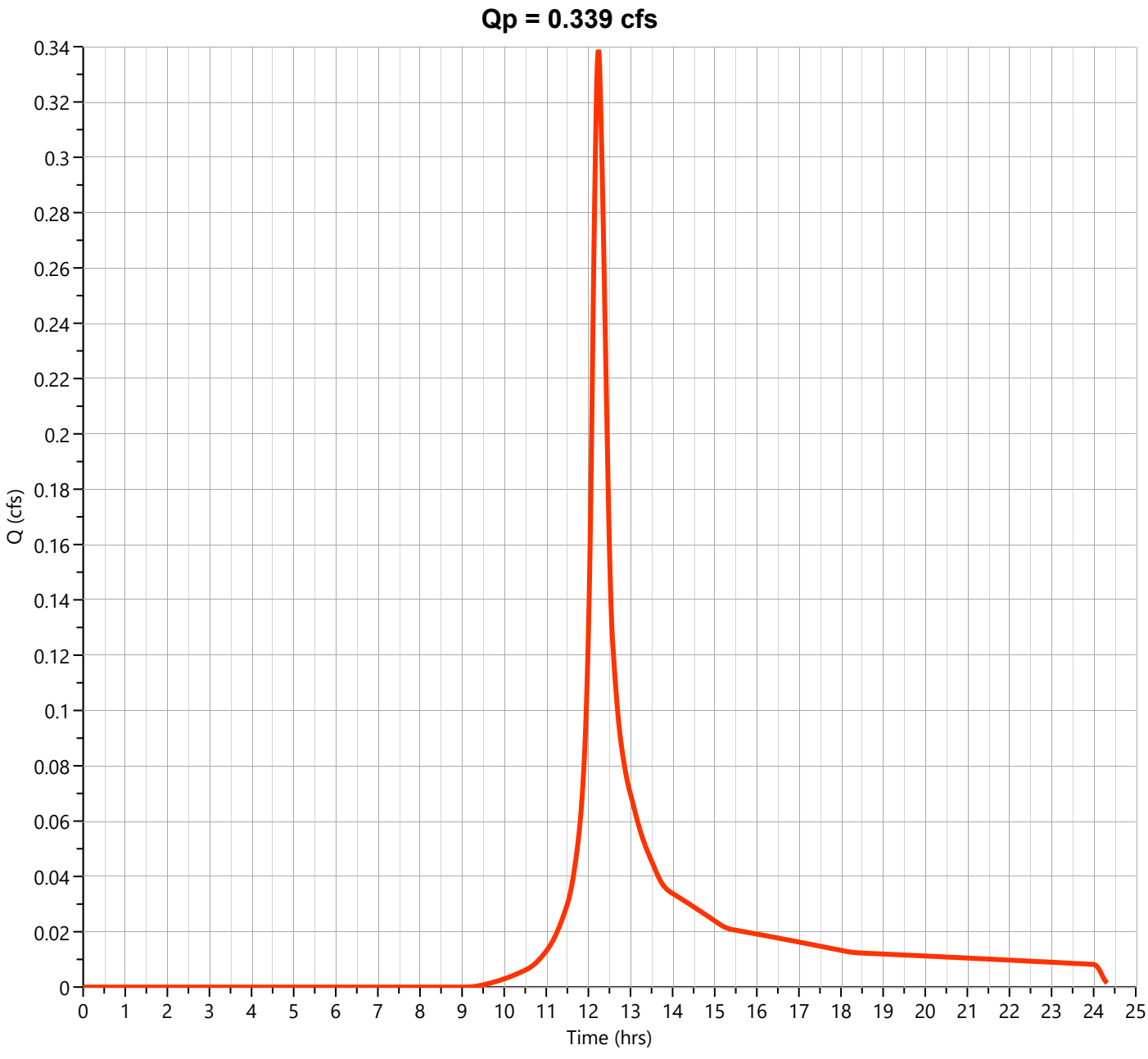
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-U Woods C

Hyd. No. 40

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.339 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Runoff Volume	= 1,500 cuft
Drainage Area	= 0.18 ac	Curve Number	= 70.00
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

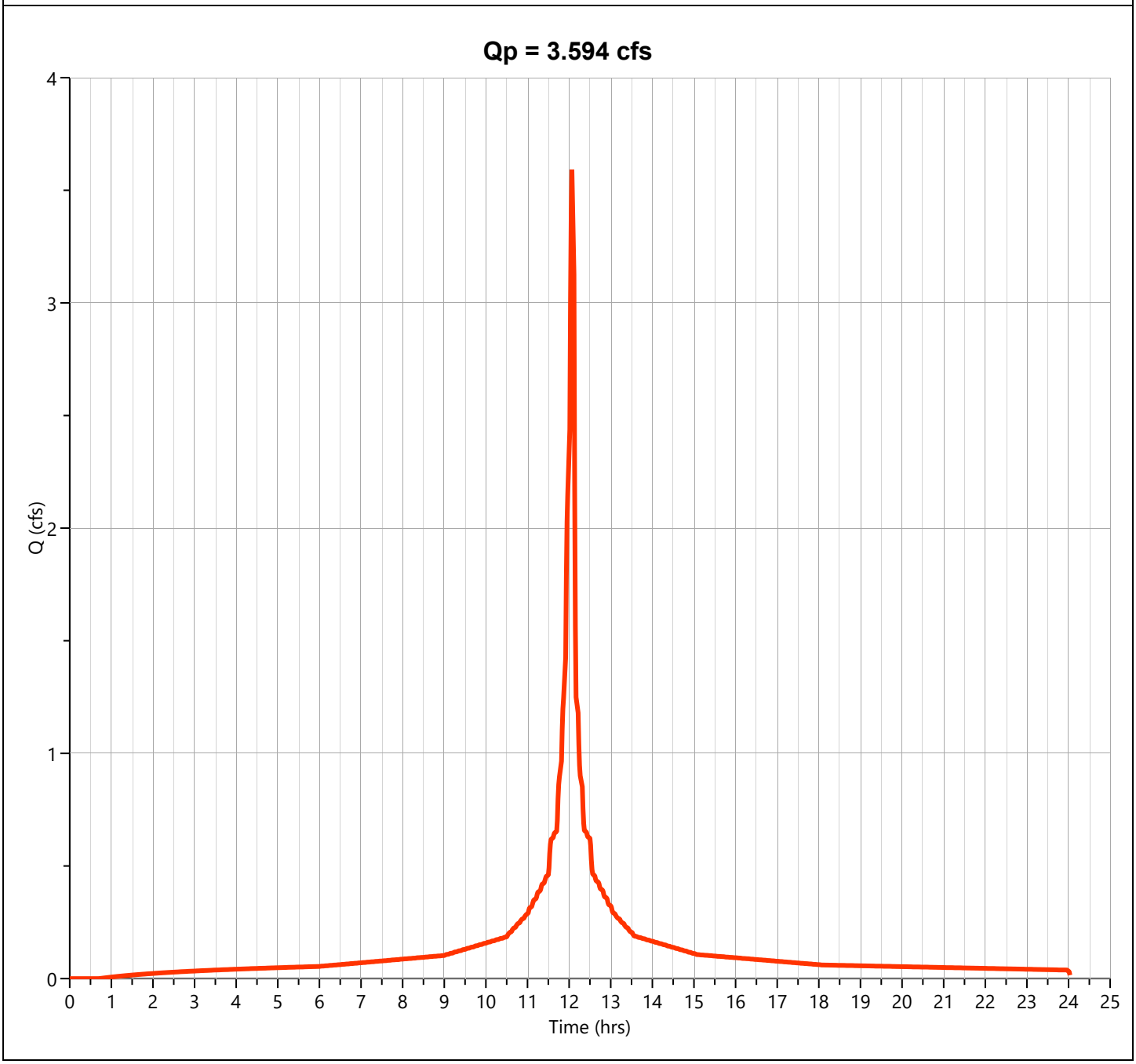
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-U Impervious

Hyd. No. 41

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.594 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 11,901 cuft
Drainage Area	= 0.68 ac	Curve Number	= 98.00
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

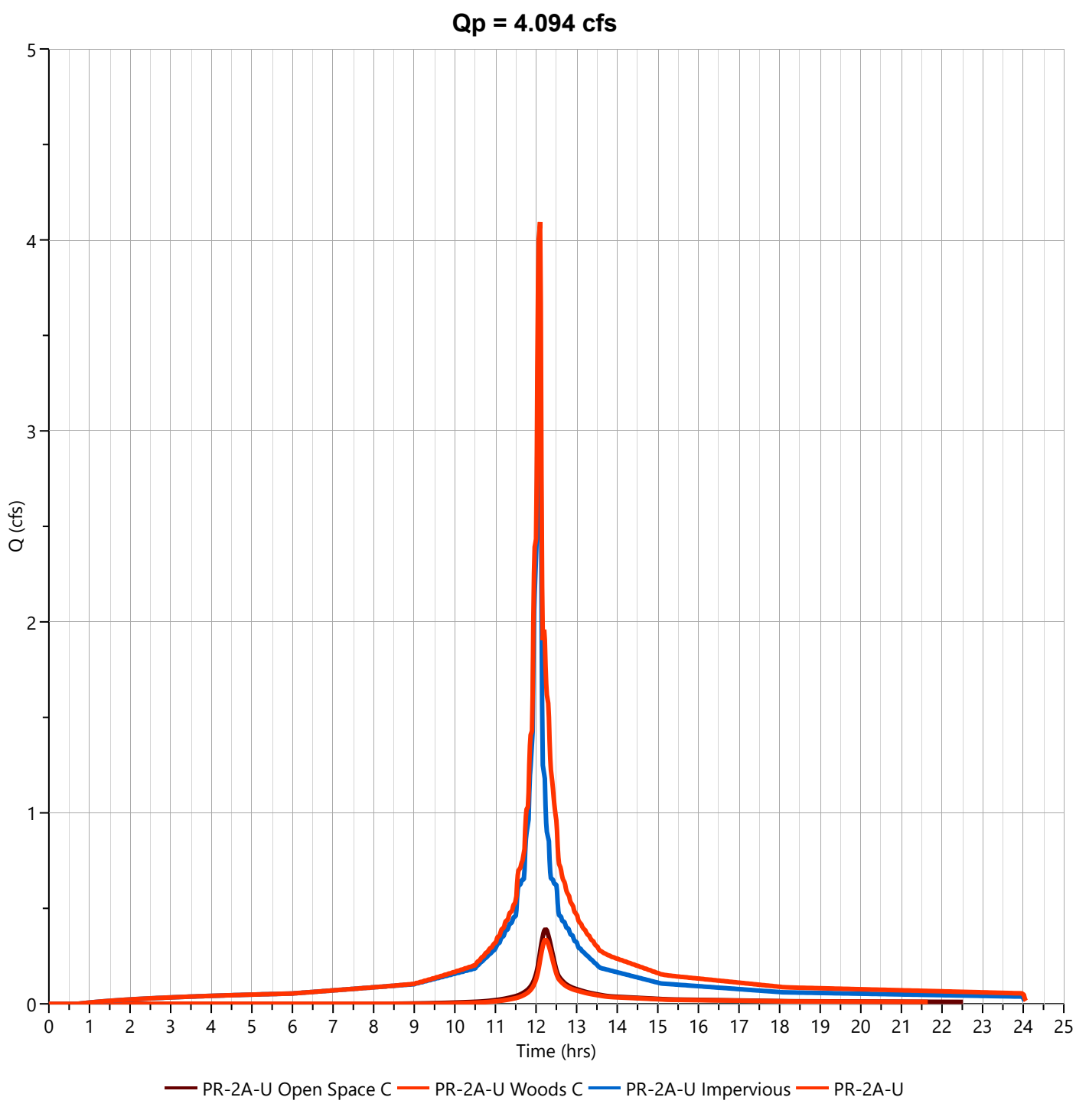
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-U

Hyd. No. 42

Hydrograph Type	= Junction	Peak Flow	= 4.094 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 15,126 cuft
Inflow Hydrographs	= 39, 40, 41	Total Contrib. Area	= 1.04 ac



Hydrograph Report

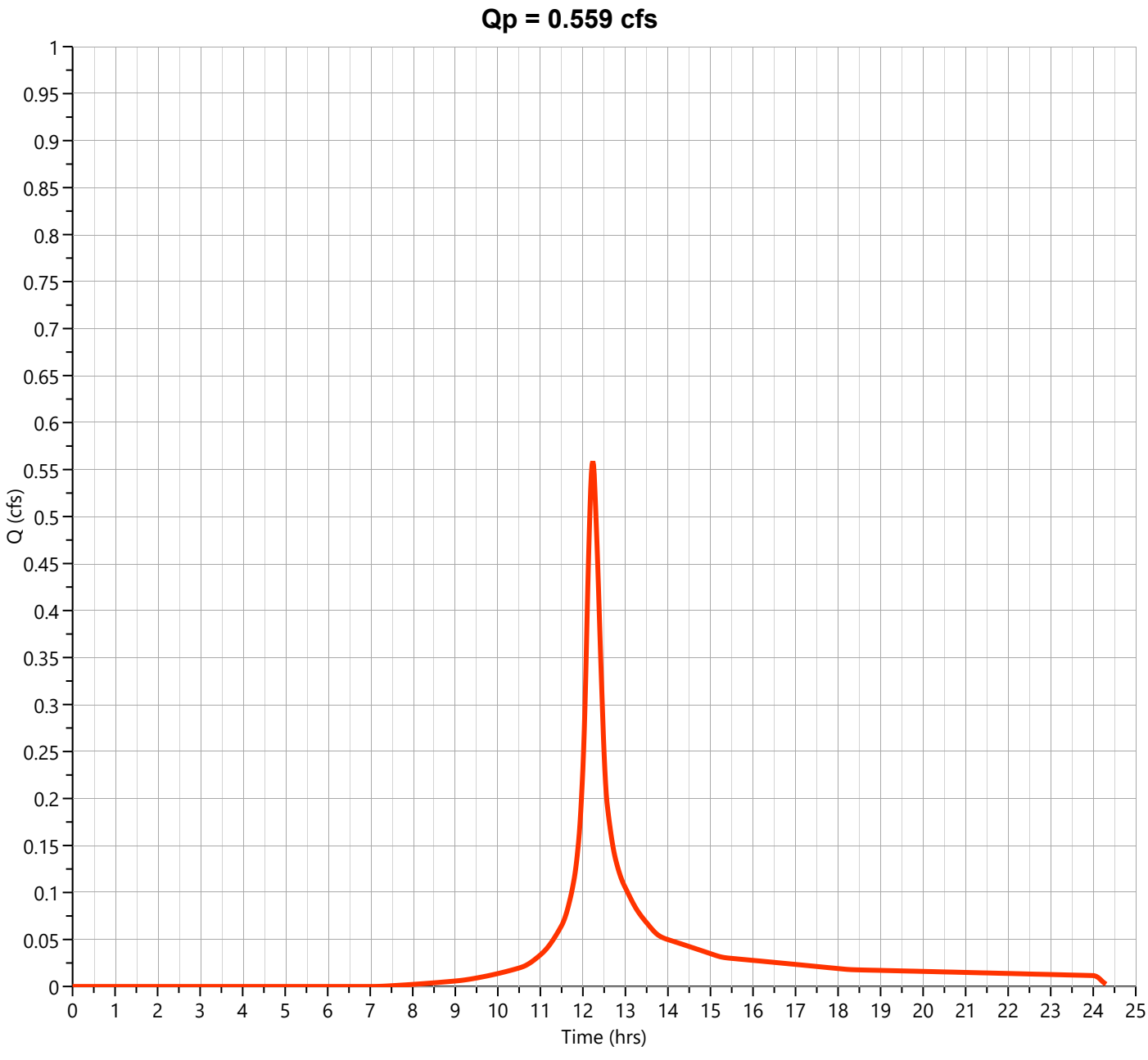
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-U Open Space C

Hyd. No. 39

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.559 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Runoff Volume	= 2,454 cuft
Drainage Area	= 0.18 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 17.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

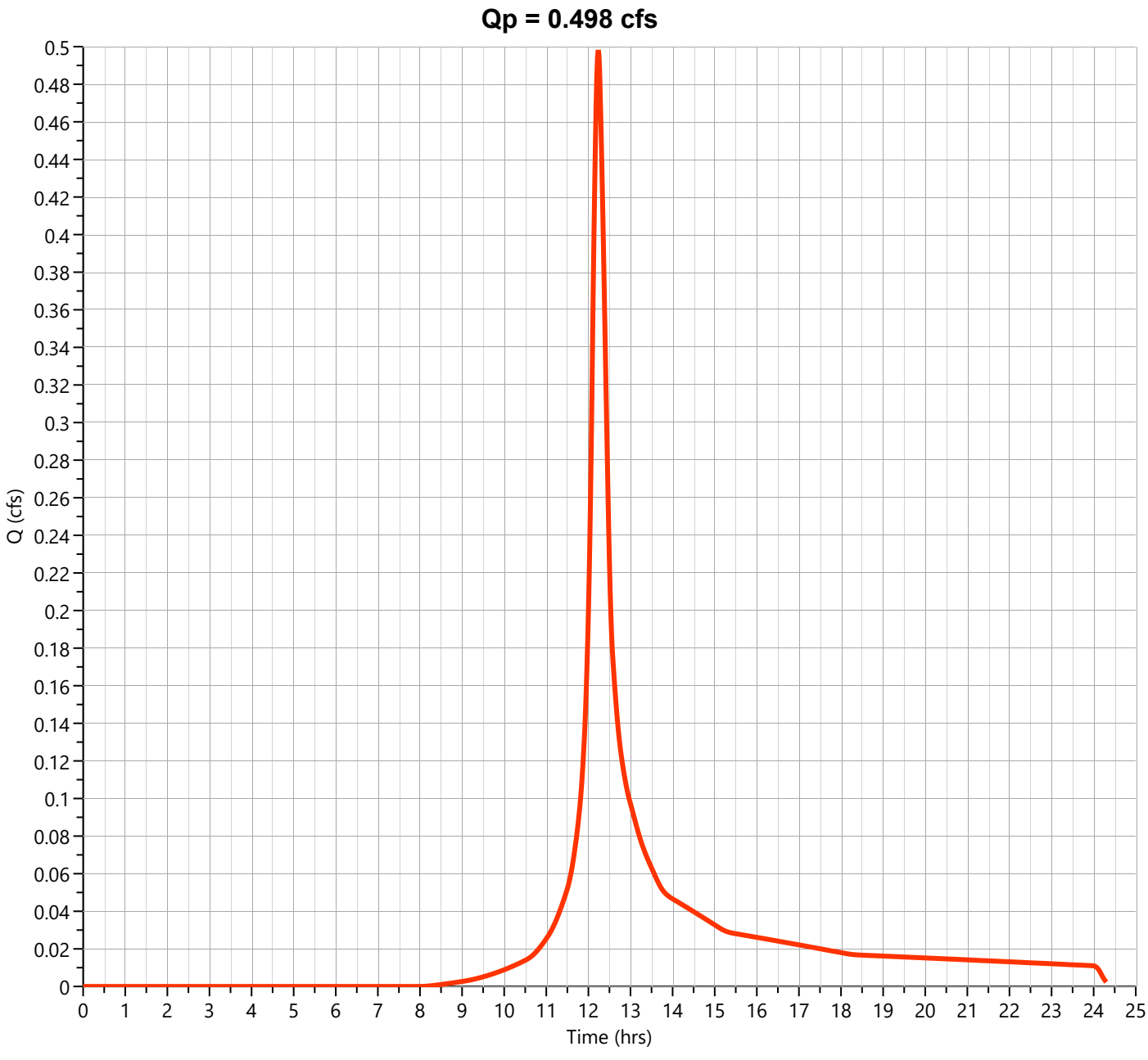
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-U Woods C

Hyd. No. 40

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.498 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Runoff Volume	= 2,188 cuft
Drainage Area	= 0.18 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 17.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

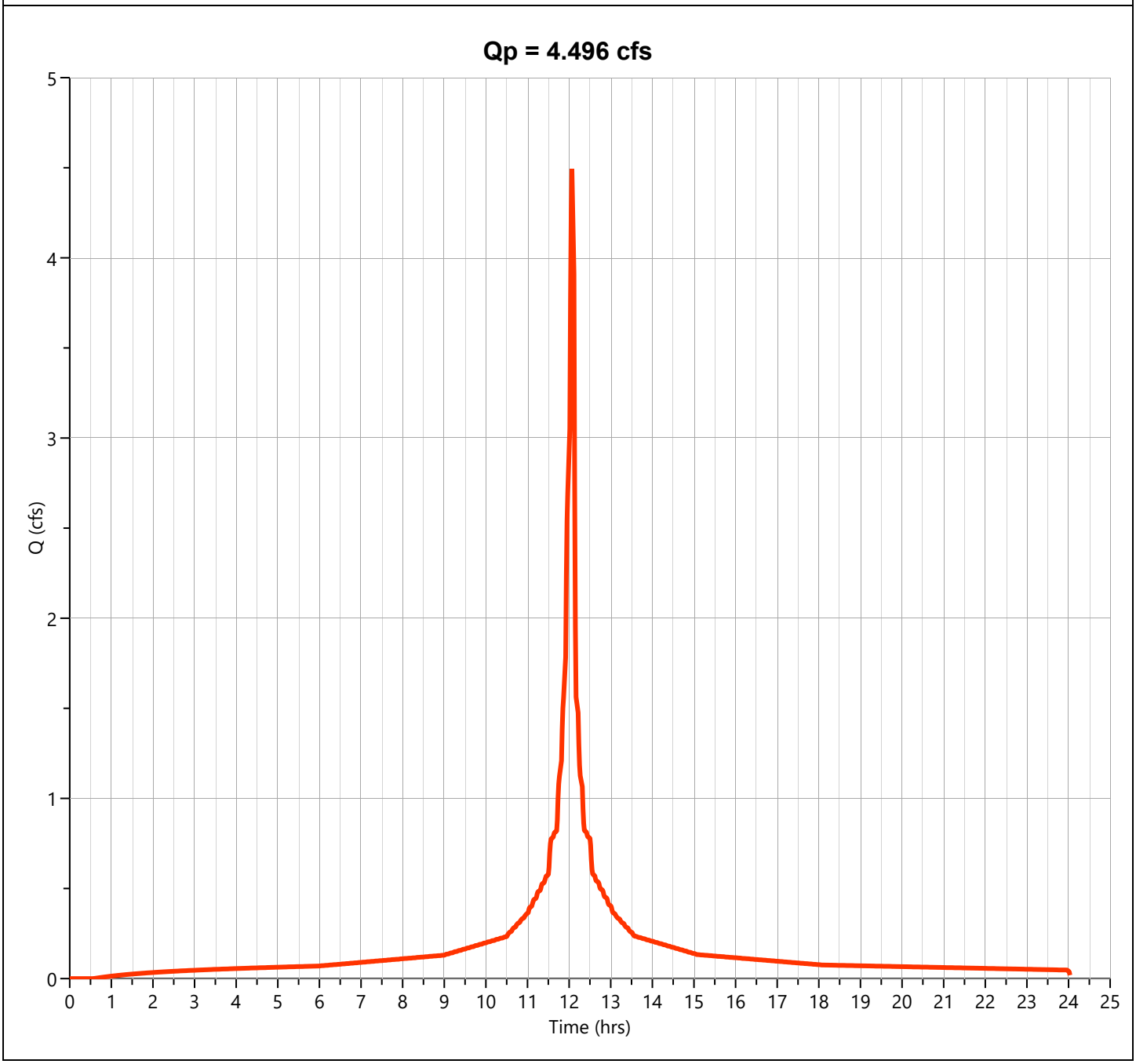
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-U Impervious

Hyd. No. 41

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.496 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 14,998 cuft
Drainage Area	= 0.68 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

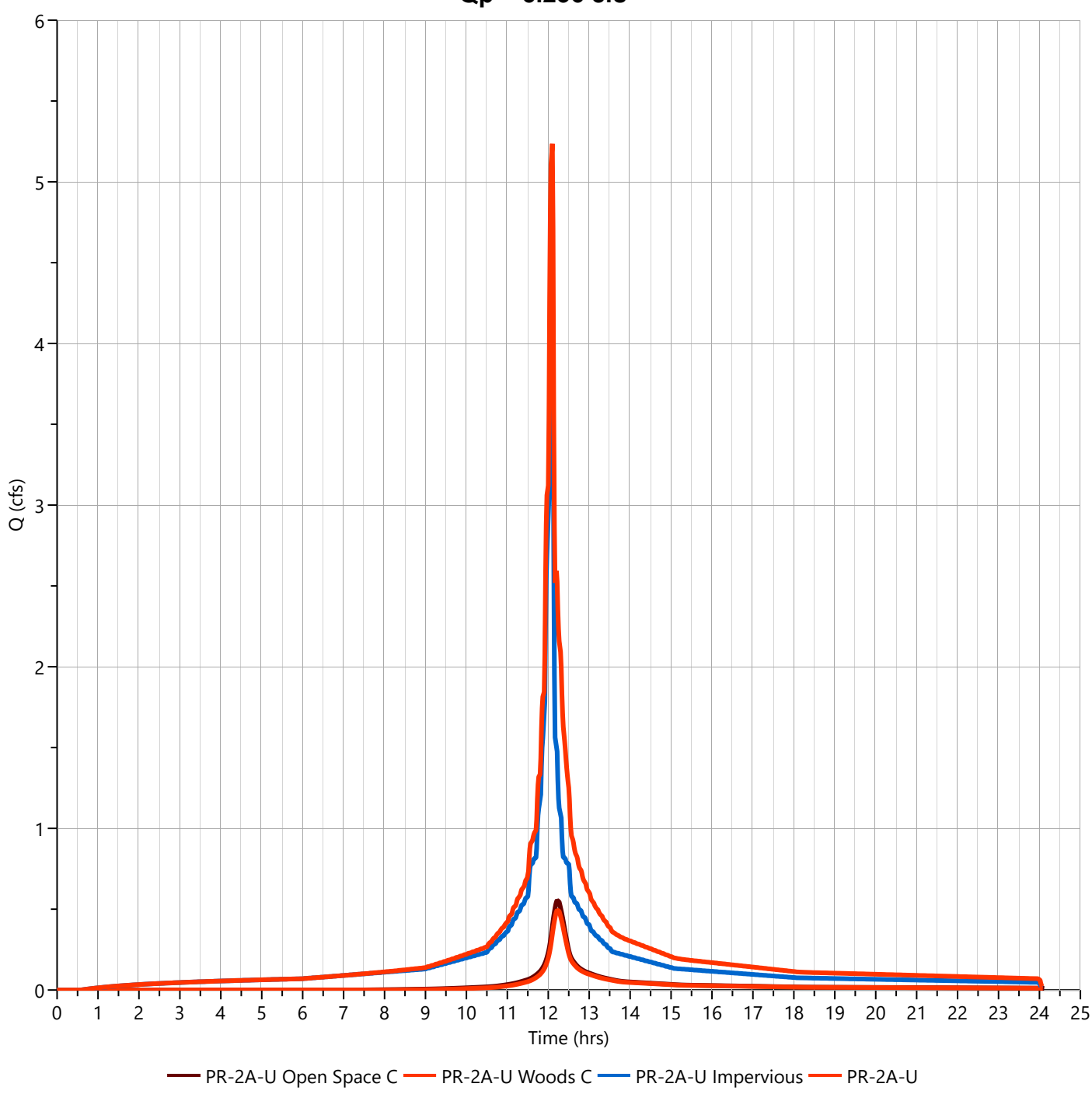
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-U

Hyd. No. 42

Hydrograph Type	= Junction	Peak Flow	= 5.236 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 19,640 cuft
Inflow Hydrographs	= 39, 40, 41	Total Contrib. Area	= 1.04 ac



Hydrograph Report

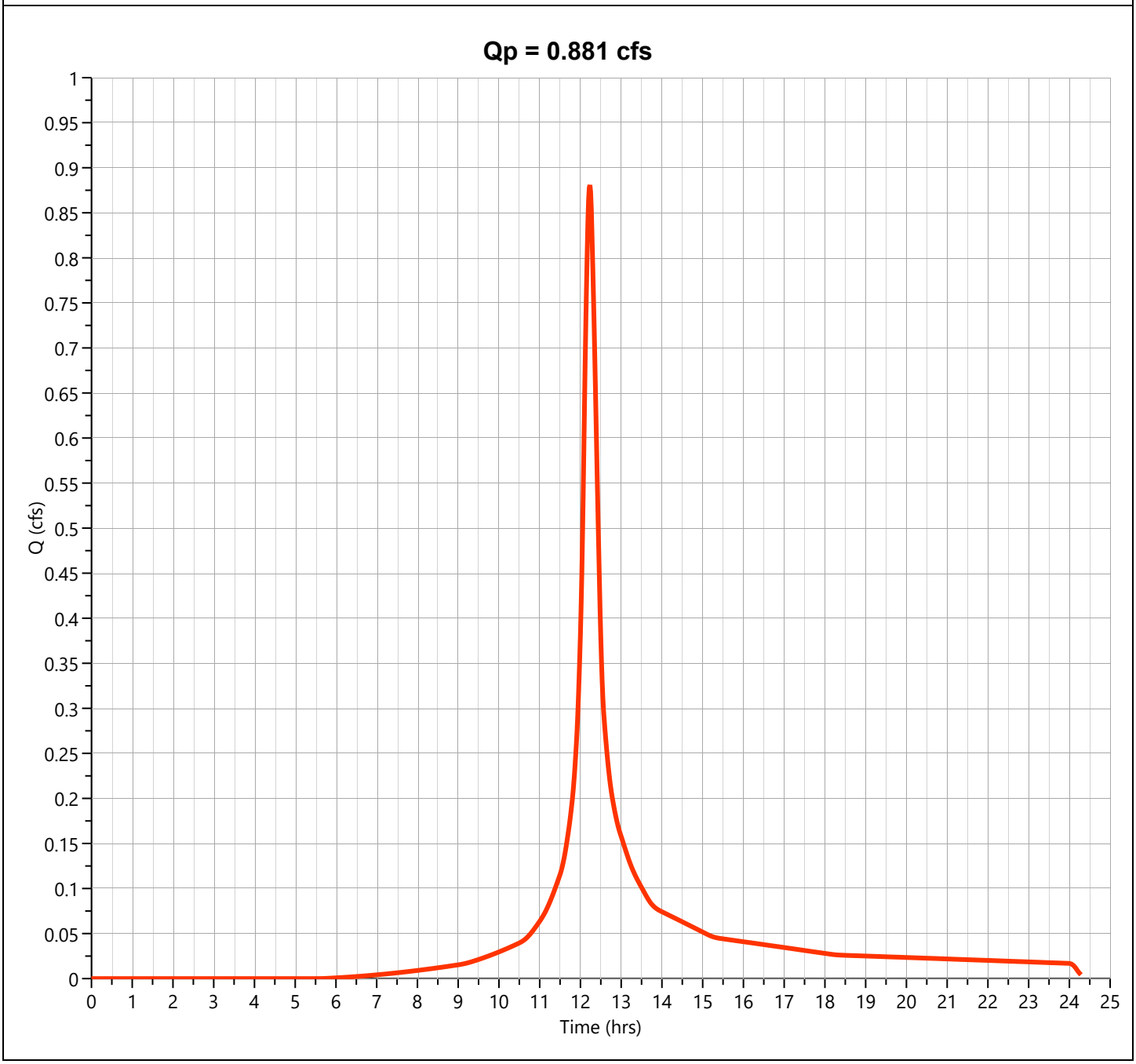
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-U Open Space C

Hyd. No. 39

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.881 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Runoff Volume	= 3,907 cuft
Drainage Area	= 0.18 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 17.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

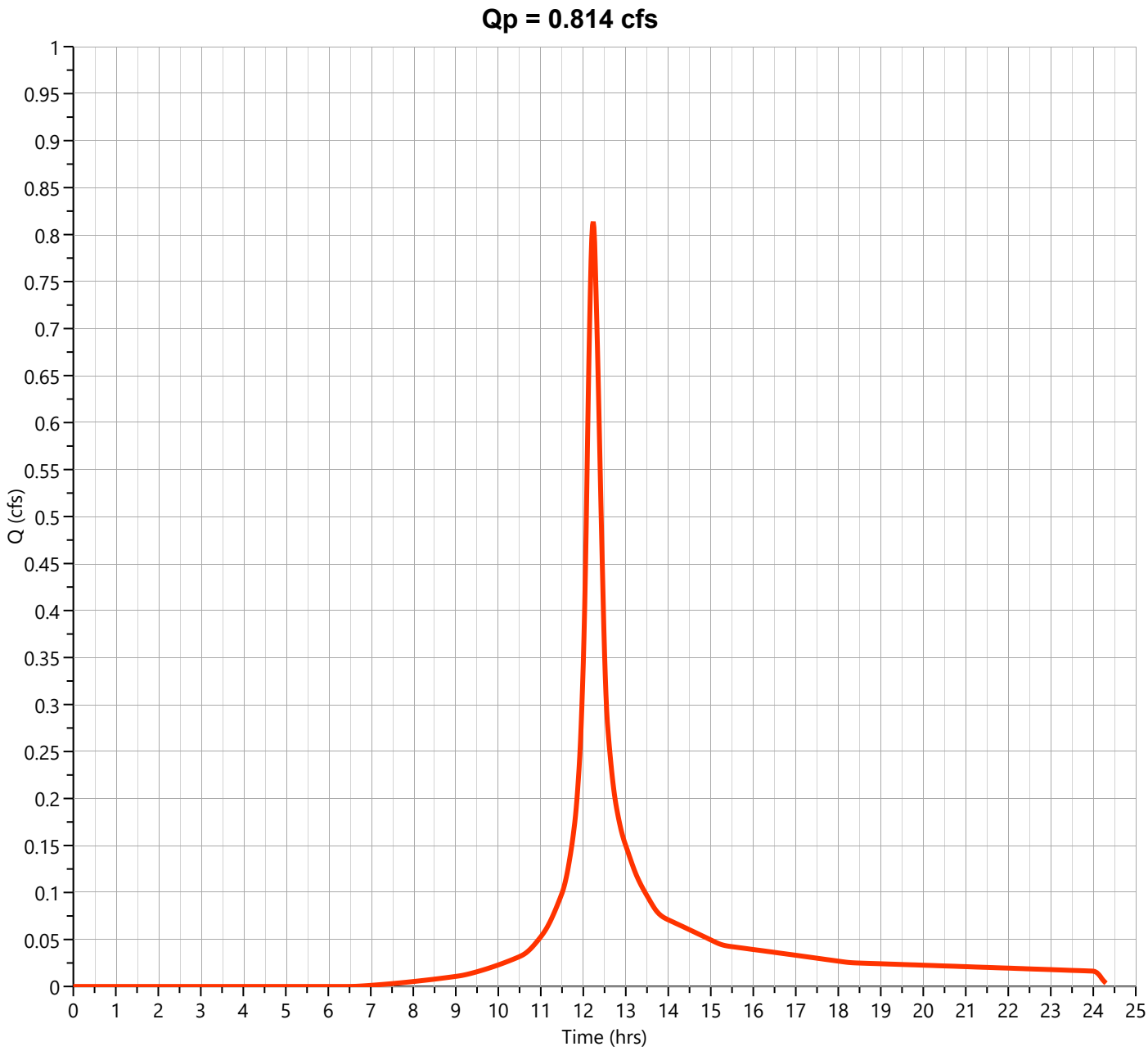
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-U Woods C

Hyd. No. 40

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.814 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Runoff Volume	= 3,583 cuft
Drainage Area	= 0.18 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 17.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

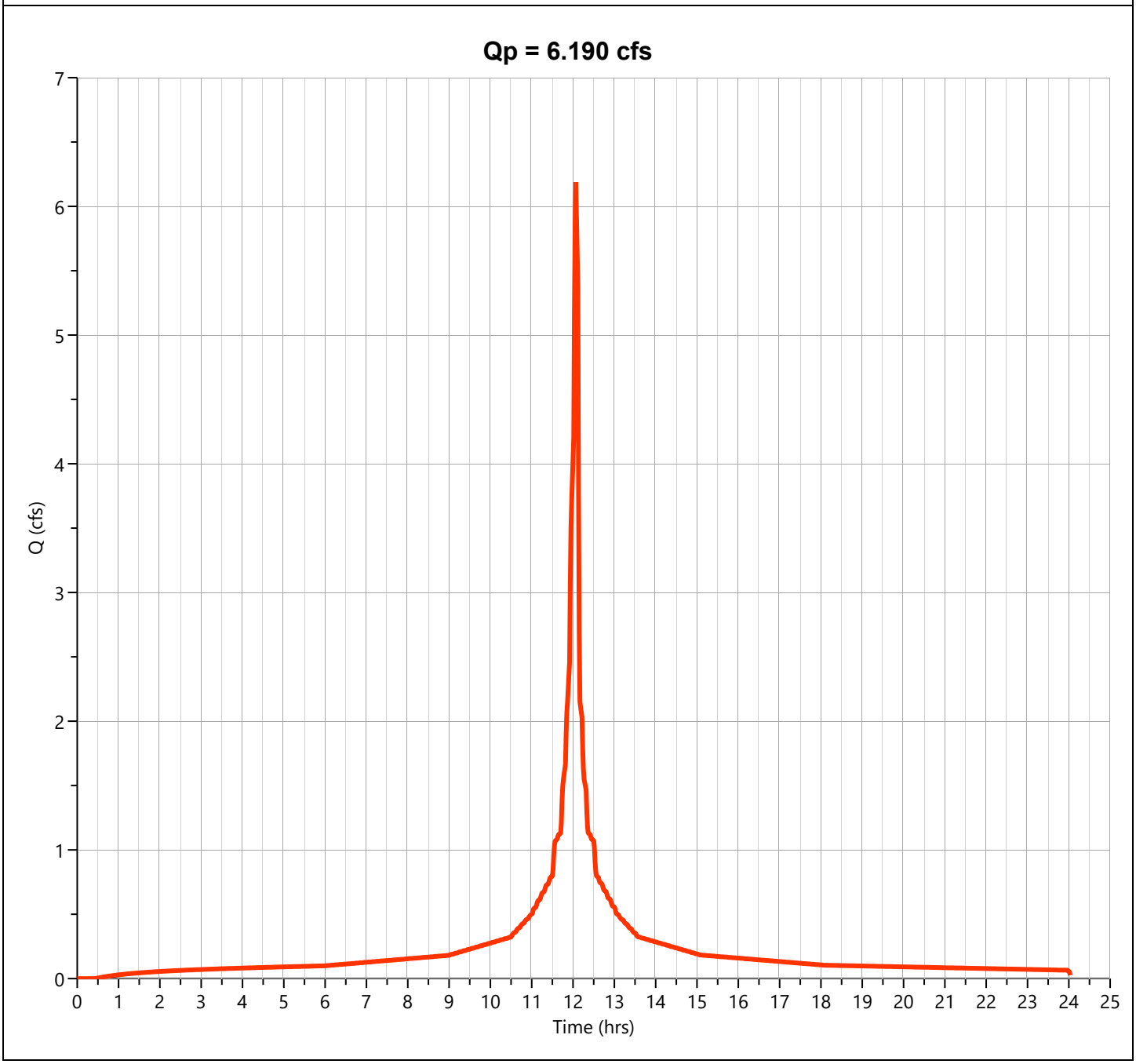
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-U Impervious

Hyd. No. 41

Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.190 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 20,826 cuft
Drainage Area	= 0.68 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

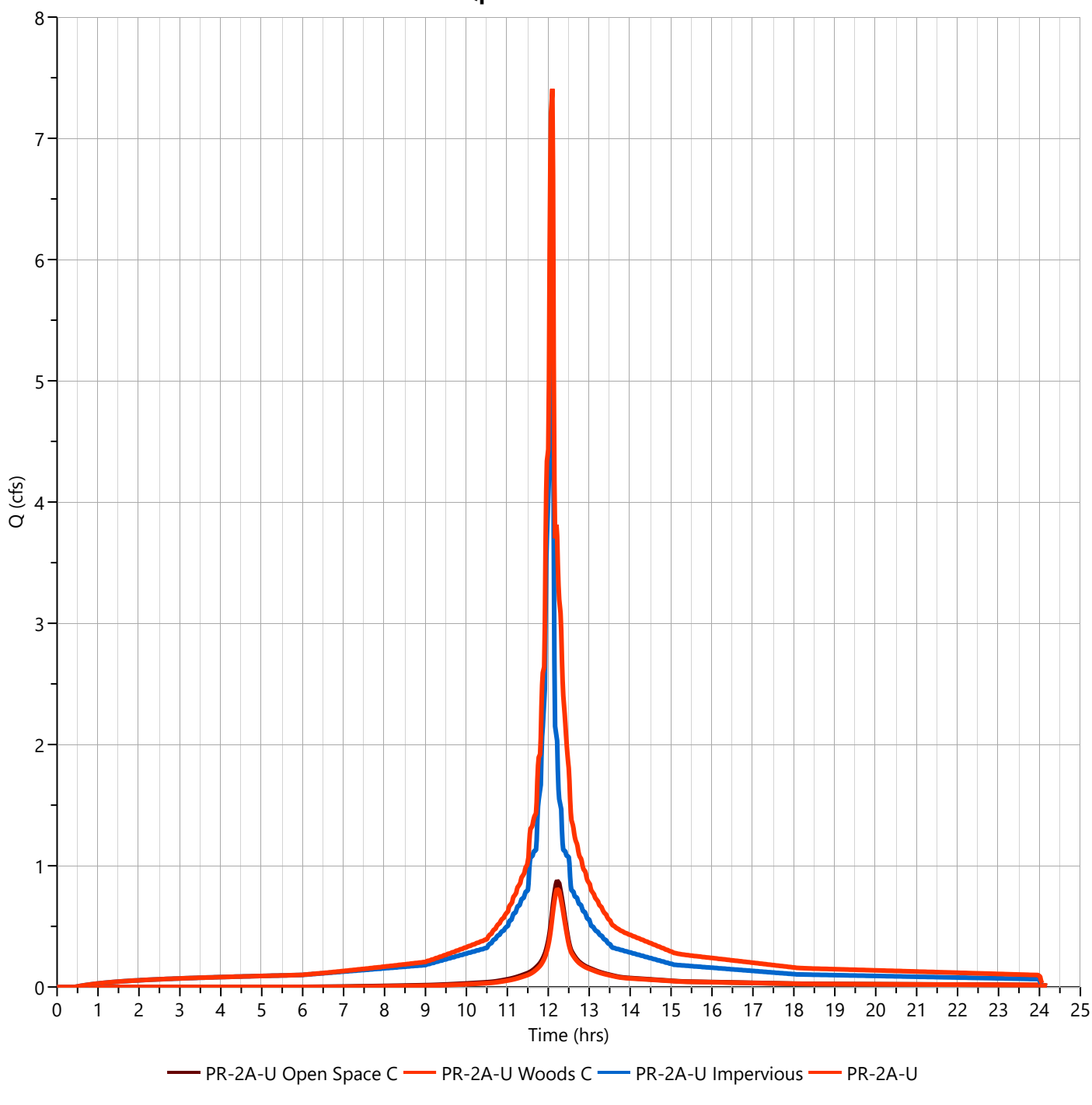
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A-U

Hyd. No. 42

Hydrograph Type	= Junction	Peak Flow	= 7.407 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 28,316 cuft
Inflow Hydrographs	= 39, 40, 41	Total Contrib. Area	= 1.04 ac



PR-2A WATERSHED
(COMBINED PROPOSED FLOW TO SSBB-2)

Hydrograph Report

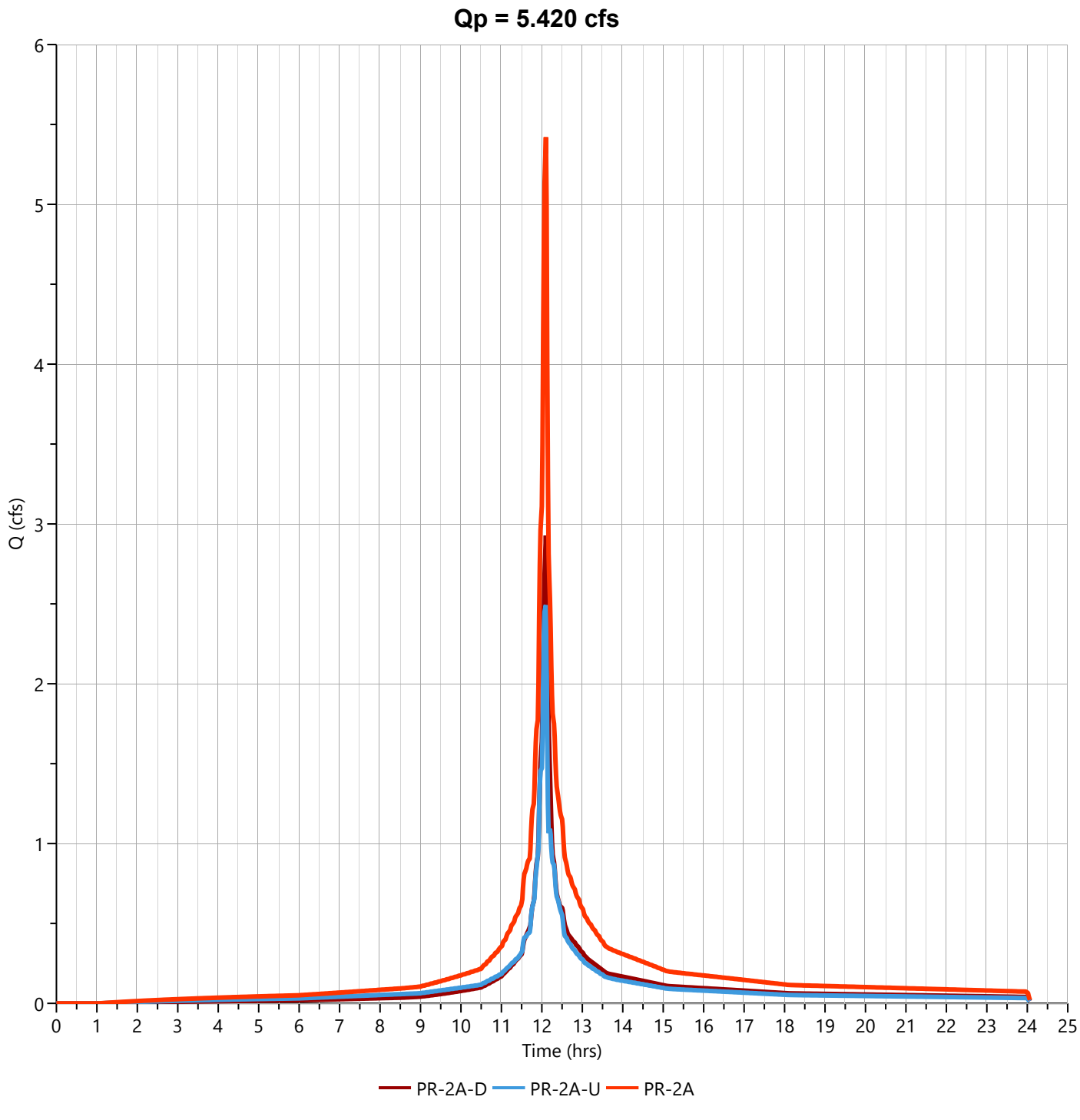
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A

Hyd. No. 45

Hydrograph Type	= Junction	Peak Flow	= 5.420 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 18,303 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

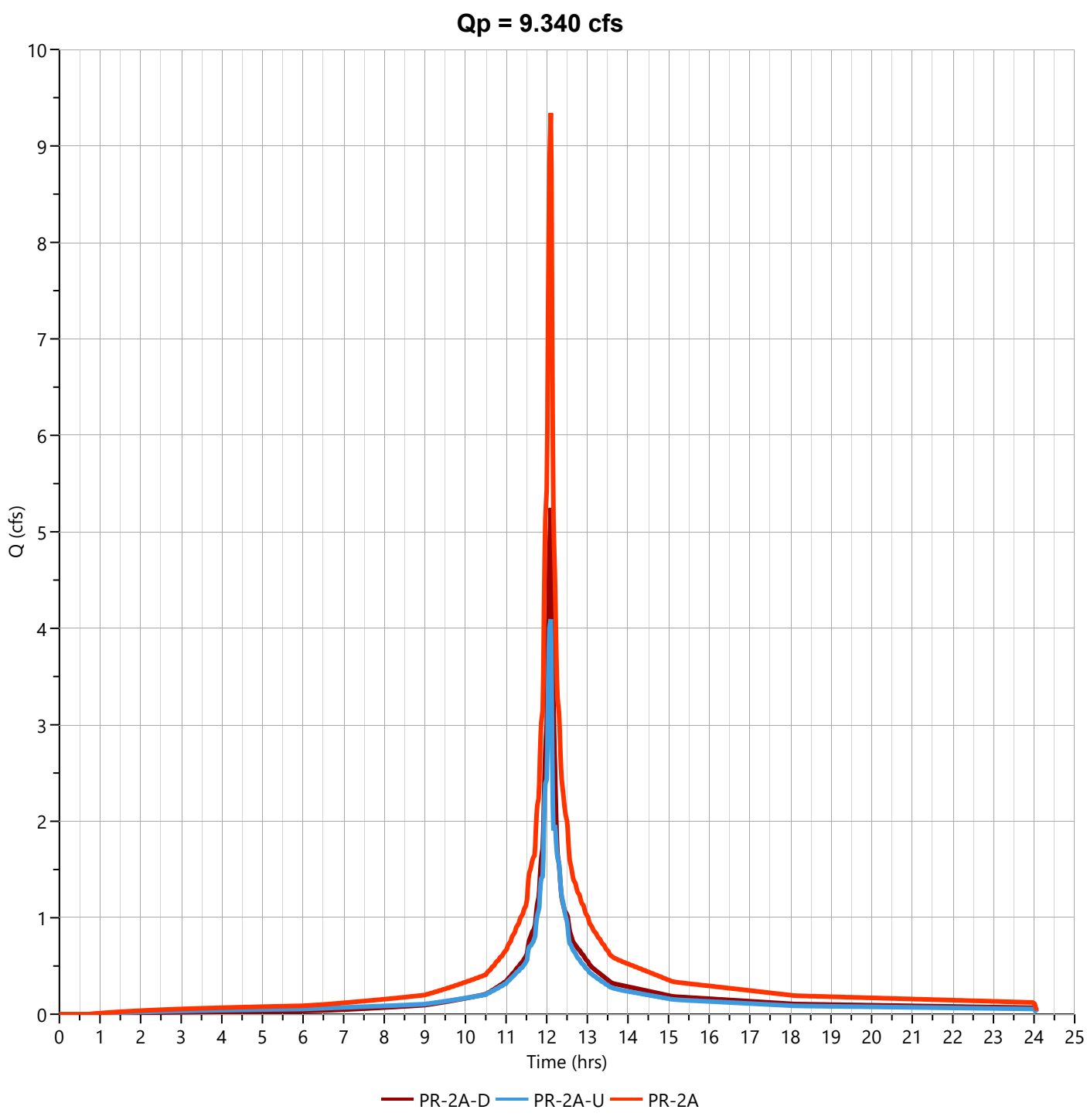
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A

Hyd. No. 45

Hydrograph Type	= Junction	Peak Flow	= 9.340 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 32,140 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

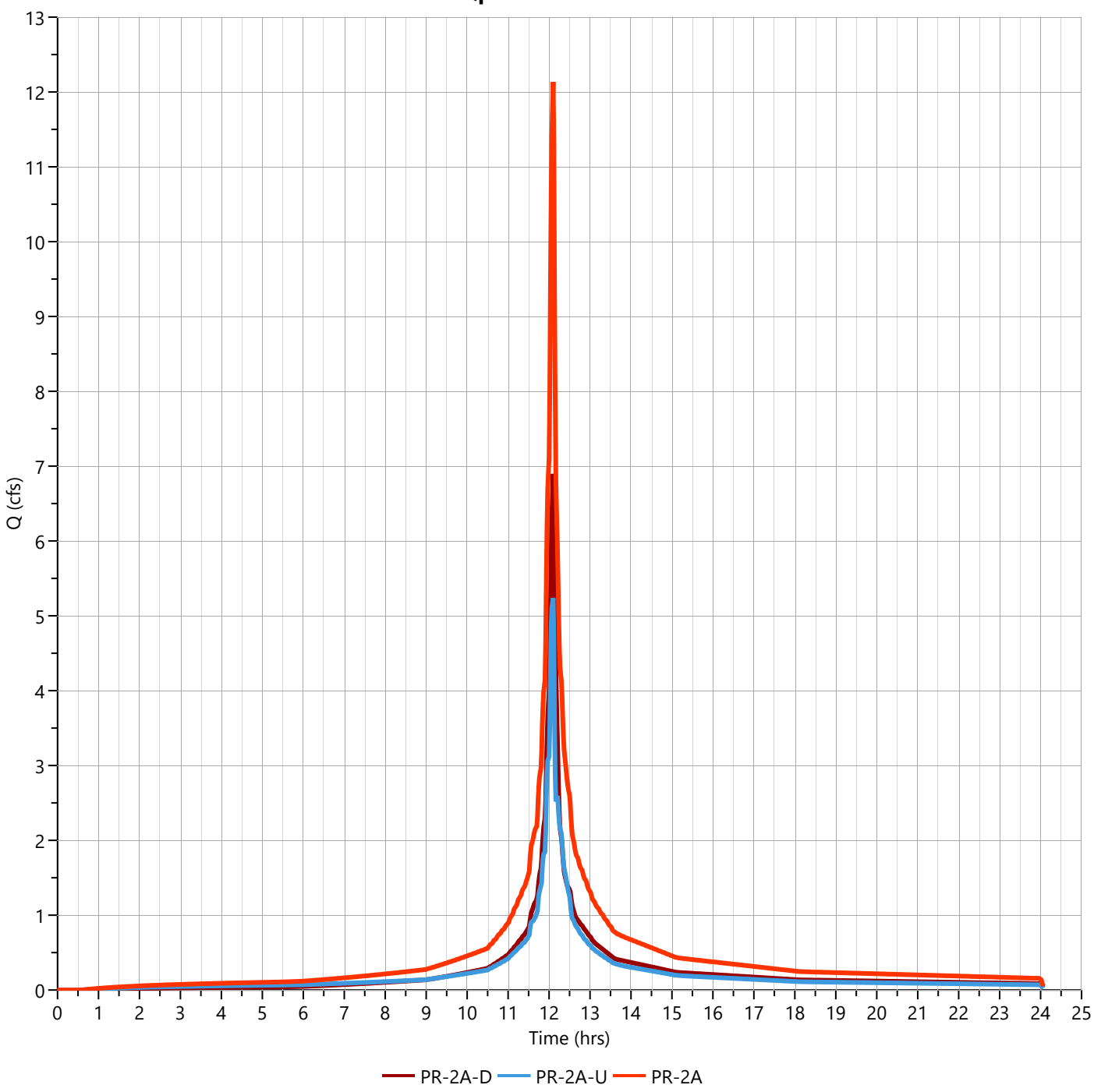
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A

Hyd. No. 45

Hydrograph Type	= Junction	Peak Flow	= 12.13 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 42,191 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

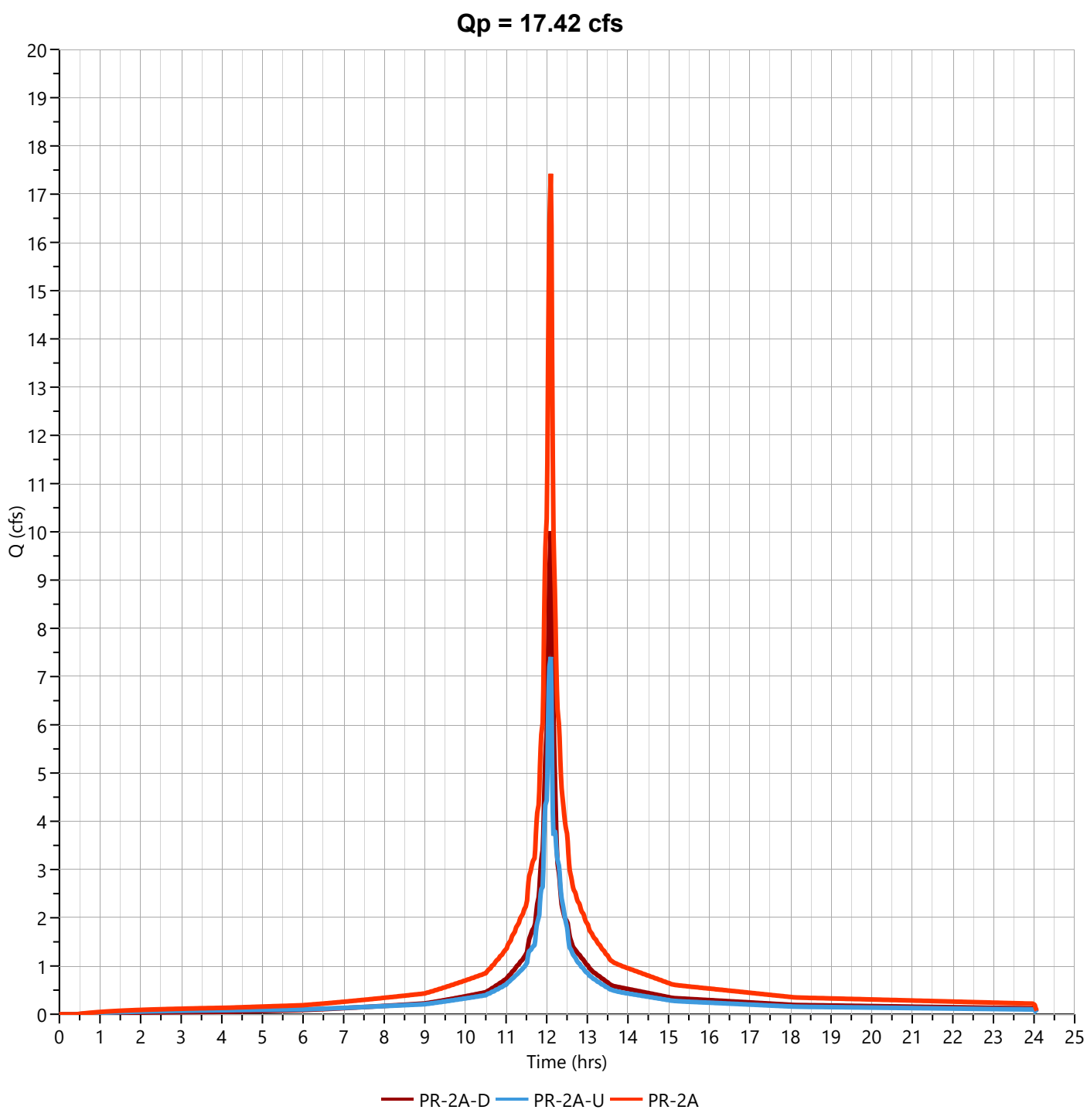
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2A

Hyd. No. 45

Hydrograph Type	= Junction	Peak Flow	= 17.42 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 61,532 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



PR-2B-DISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: Present **(Developed)** — **Current Proposed Watershed PR-2B-D - 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	100		
4.	Two-year 24-hr rainfall, P_2	in	3.46		
5.	Land Slope, s	ft/ft	0.074		
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		Pavement		
9.	Flow Length, L	ft	155		
10.	Watercourse Slope, s	ft/ft	0.040		
11.	Average Velocity, V (NEH table 15-3)	ft/s	4.06		
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 **(Add Sub-Total T_t from prior steps)**		
	Total Tc (hours) =	0.022 hours
	Software Limitations Require Minimum Tc =	2 minutes

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: Present (**Developed**) — **Current Proposed Watershed PR-2B-D - 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} (L_{des} < 100 ft)	ft	34		55		
4.	Two-year 24-hr rainfall, P_2	in	3.46		3.46		
5.	Land Slope, s	ft/ft	0.072		0.037		
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	0.058	+	0.009	+	
					Sheet Flow Sub-Total		0.067 hours

Shallow Concentrated Flow		Segment ID	3				
8.	Surface Description		Pavement				
9.	Flow Length, L	ft	41				
10.	Watercourse Slope, s	ft/ft	0.020				
11.	Average Velocity, V (NEH table 15-3)	ft/s	2.87				
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					
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) =	**0.071 hours**
	Total Tc (minutes) =	**4 minutes**

Hydrograph Report

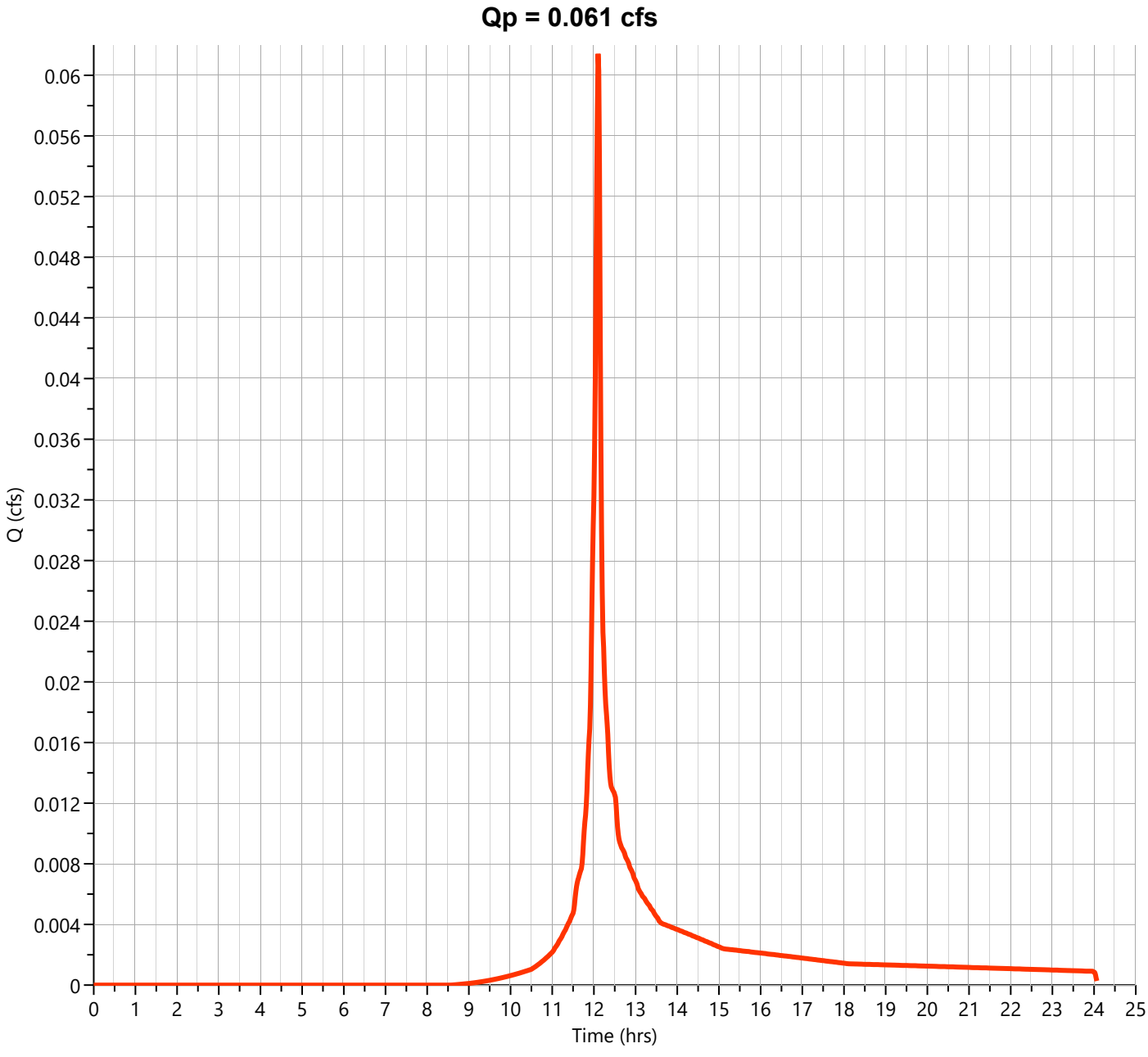
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B-D Open Space D

Hyd. No. 48

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.061 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 175 cuft
Drainage Area	= 0.03 ac	Curve Number	= 80.00
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

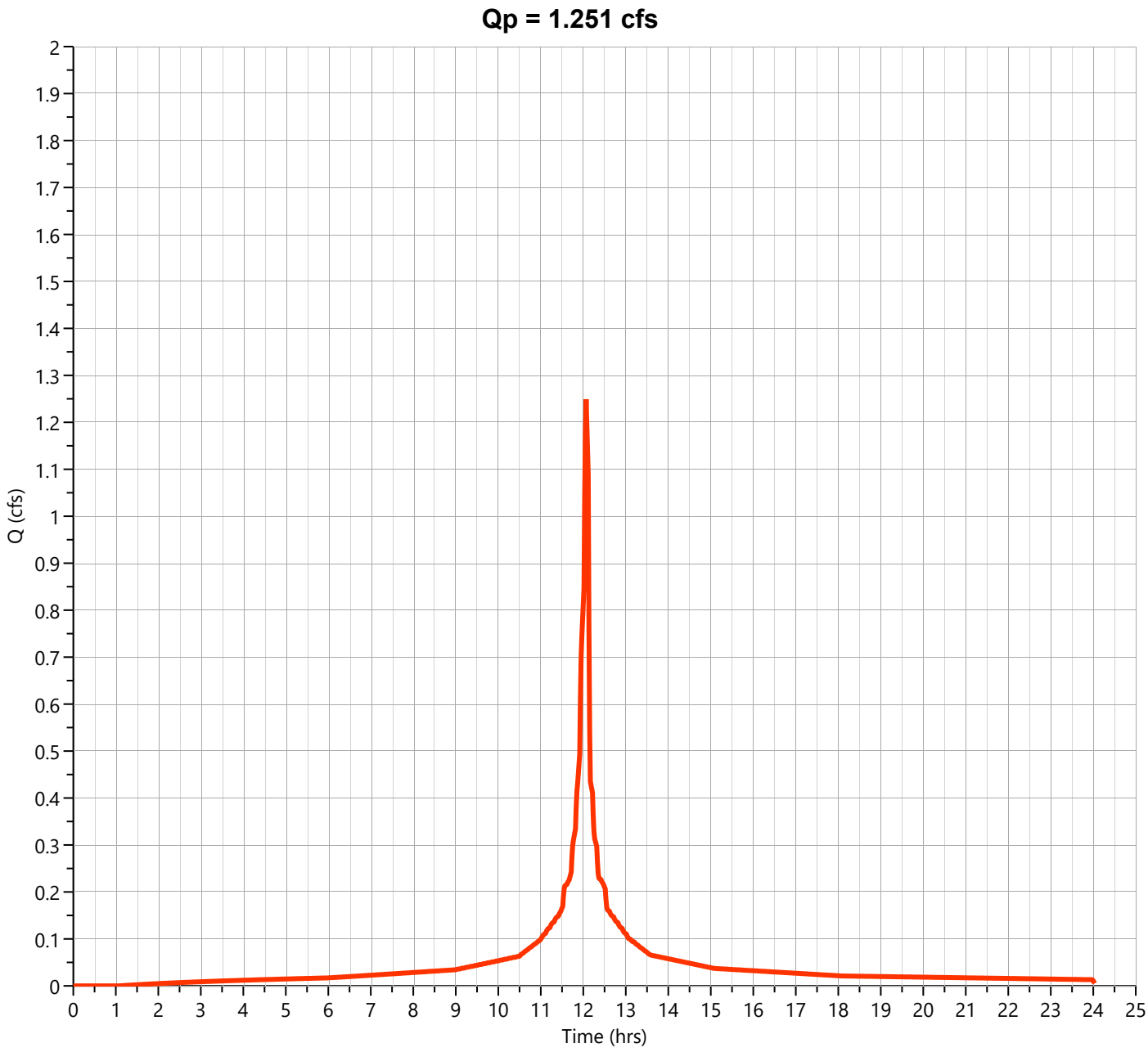
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B-D Impervious

Hyd. No. 49

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.251 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 4,063 cuft
Drainage Area	= 0.37 ac	Curve Number	= 98.00
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

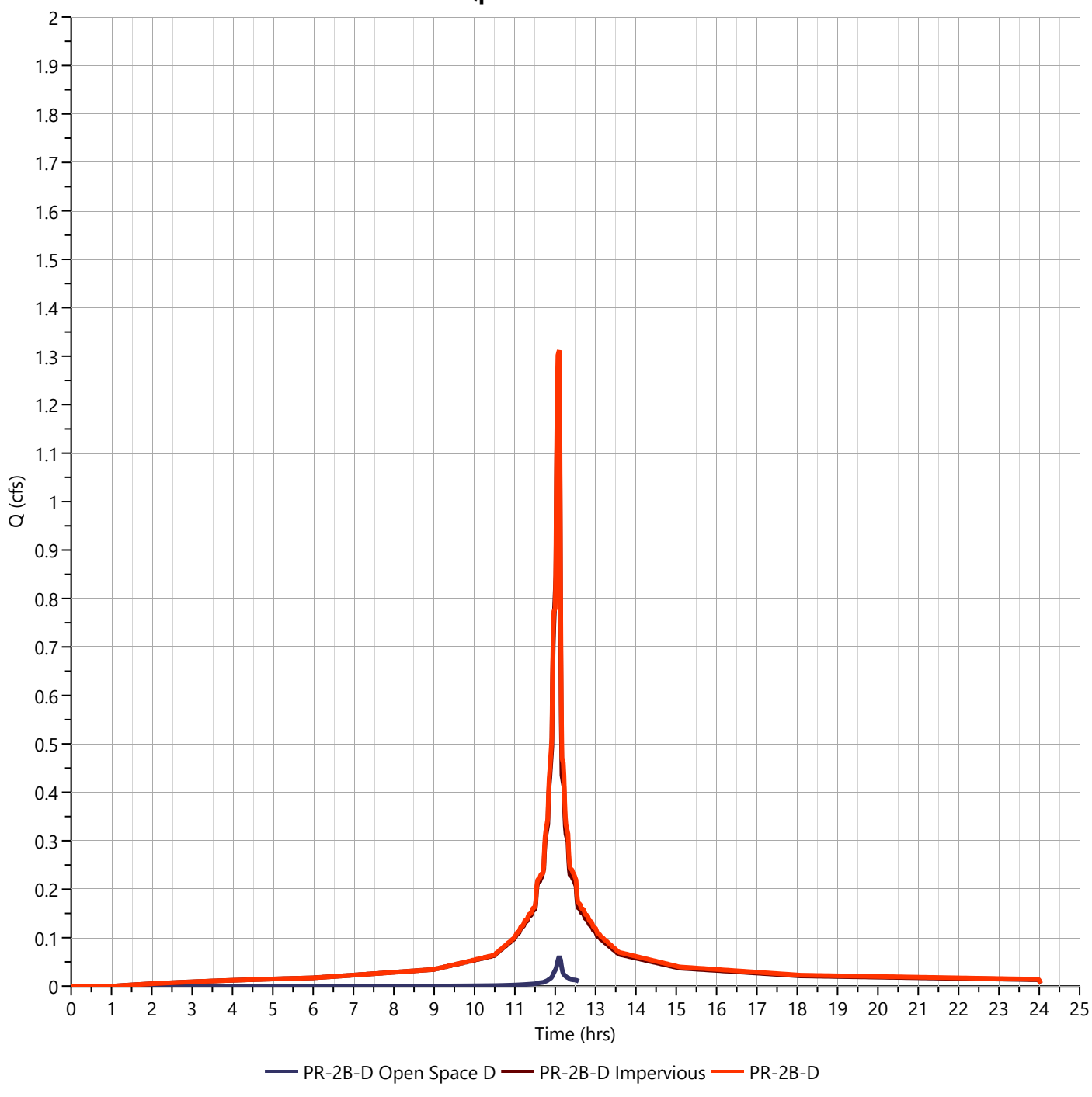
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B-D

Hyd. No. 50

Hydrograph Type	= Junction	Peak Flow	= 1.312 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 4,238 cuft
Inflow Hydrographs	= 48, 49	Total Contrib. Area	= 0.4 ac



Hydrograph Report

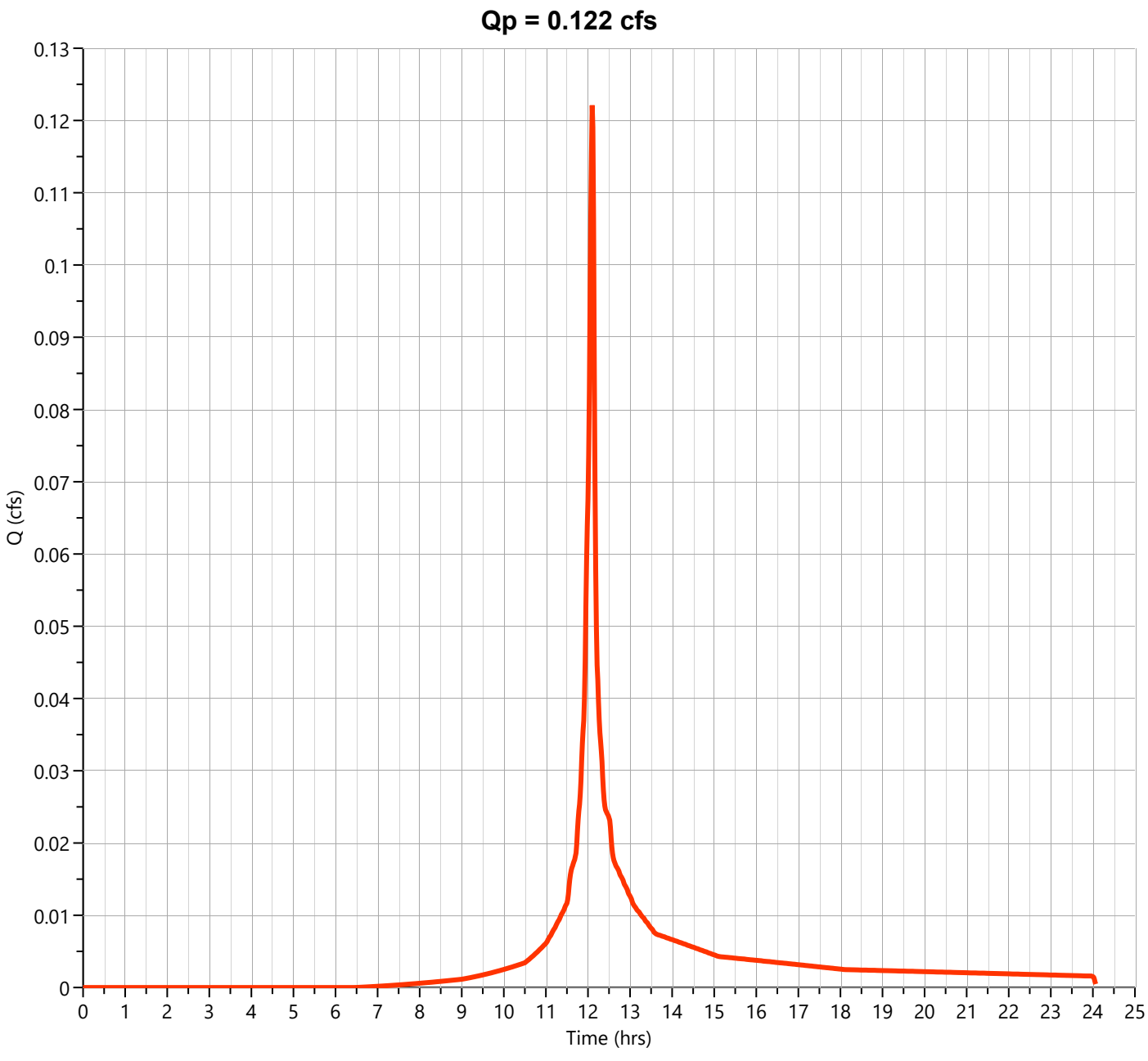
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B-D Open Space D

Hyd. No. 48

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.122 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 351 cuft
Drainage Area	= 0.03 ac	Curve Number	= 80.00
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

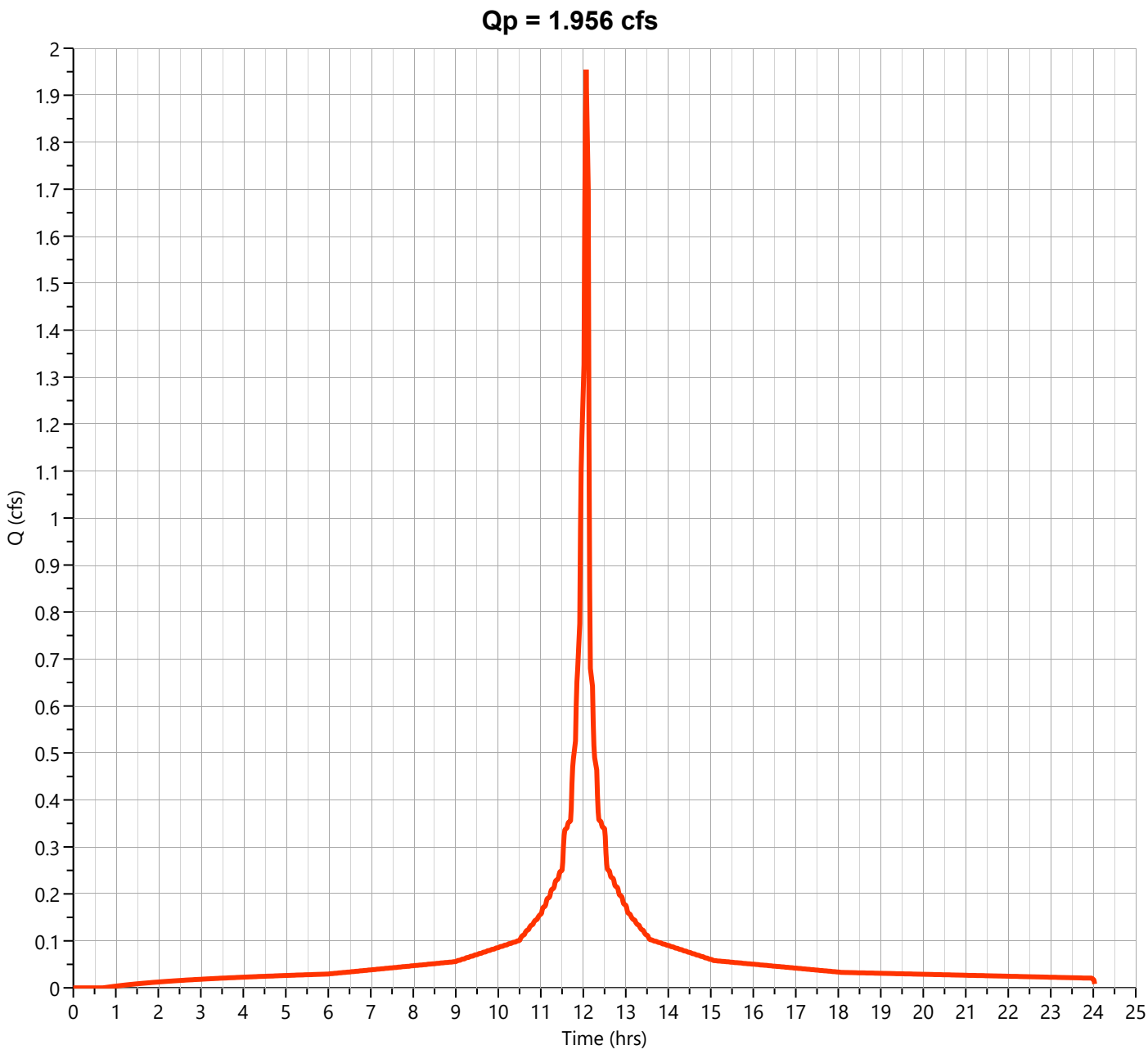
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B-D Impervious

Hyd. No. 49

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.956 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 6,475 cuft
Drainage Area	= 0.37 ac	Curve Number	= 98.00
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

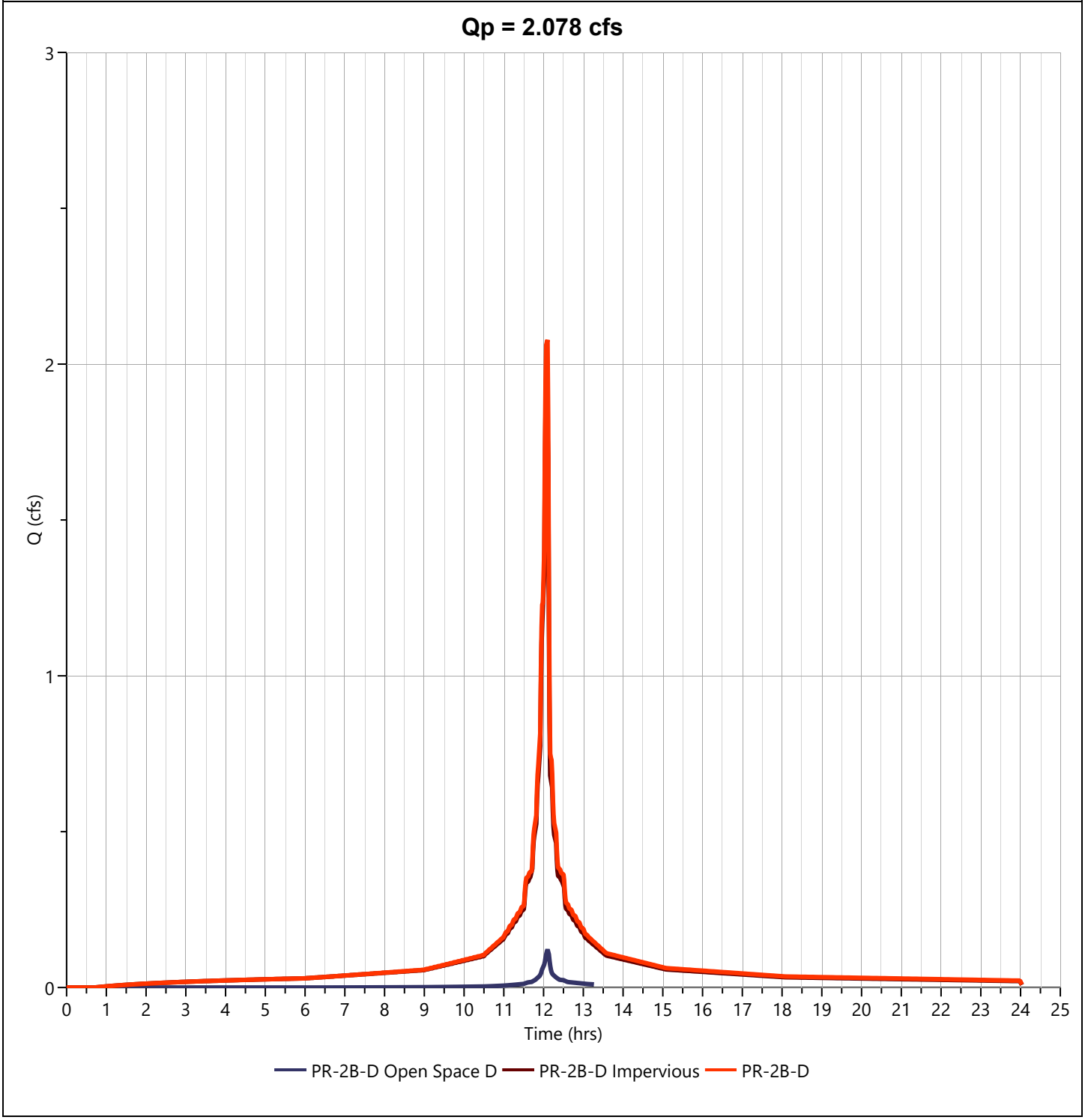
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B-D

Hyd. No. 50

Hydrograph Type	= Junction	Peak Flow	= 2.078 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 6,827 cuft
Inflow Hydrographs	= 48, 49	Total Contrib. Area	= 0.4 ac



Hydrograph Report

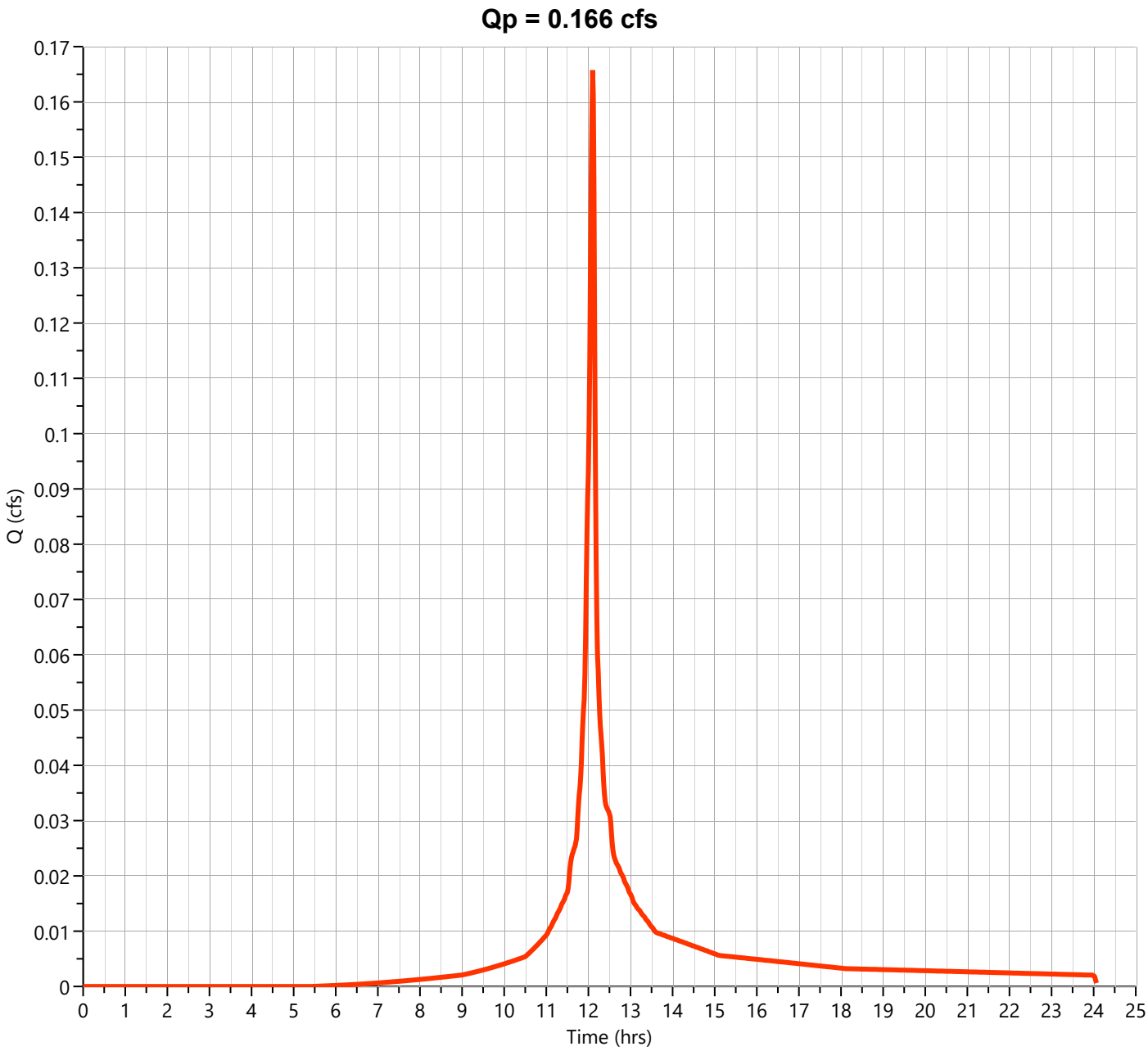
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B-D Open Space D

Hyd. No. 48

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.166 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 483 cuft
Drainage Area	= 0.03 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

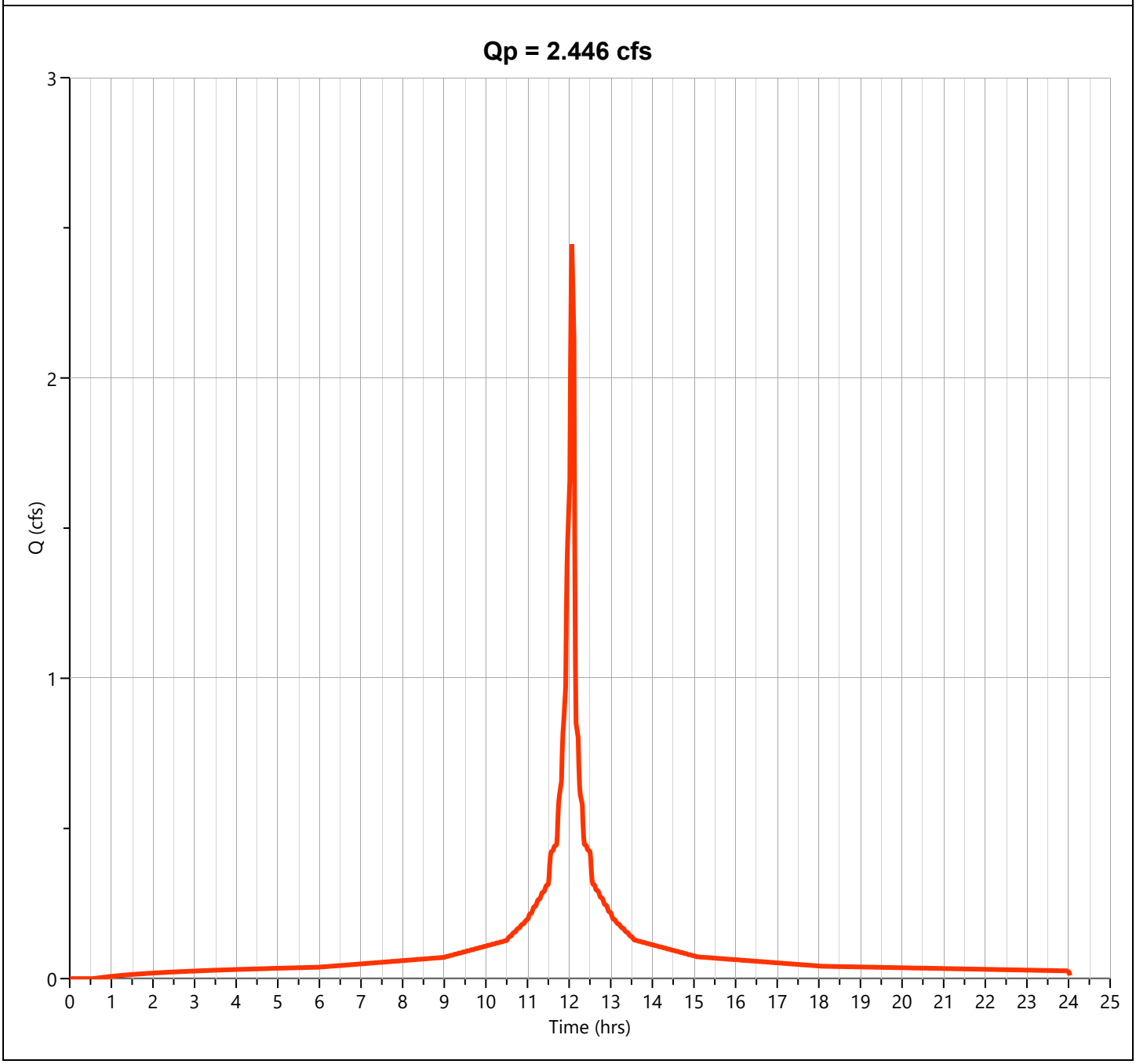
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B-D Impervious

Hyd. No. 49

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.446 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 8,161 cuft
Drainage Area	= 0.37 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

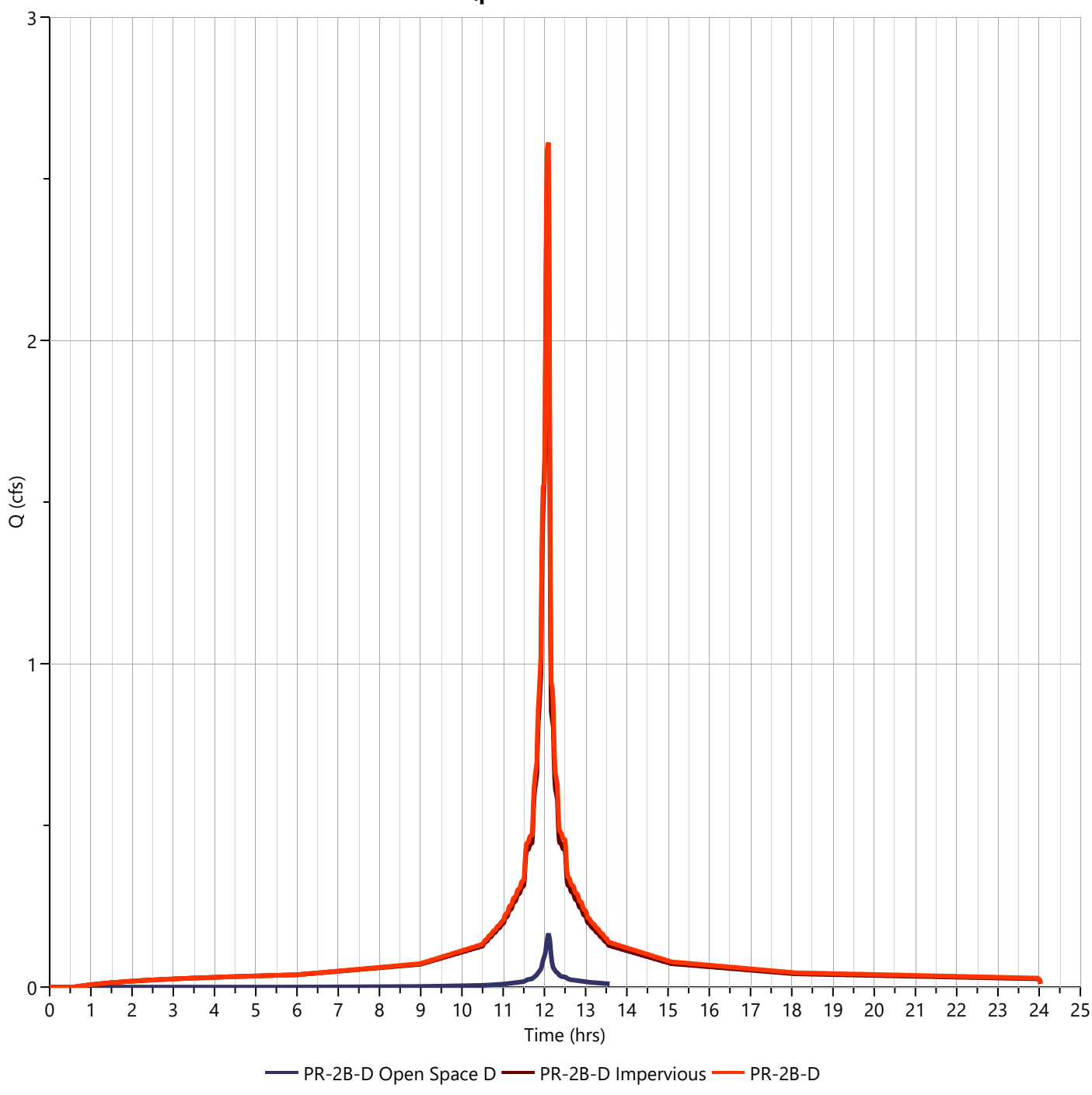
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B-D

Hyd. No. 50

Hydrograph Type	= Junction	Peak Flow	= 2.612 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 8,644 cuft
Inflow Hydrographs	= 48, 49	Total Contrib. Area	= 0.4 ac



Hydrograph Report

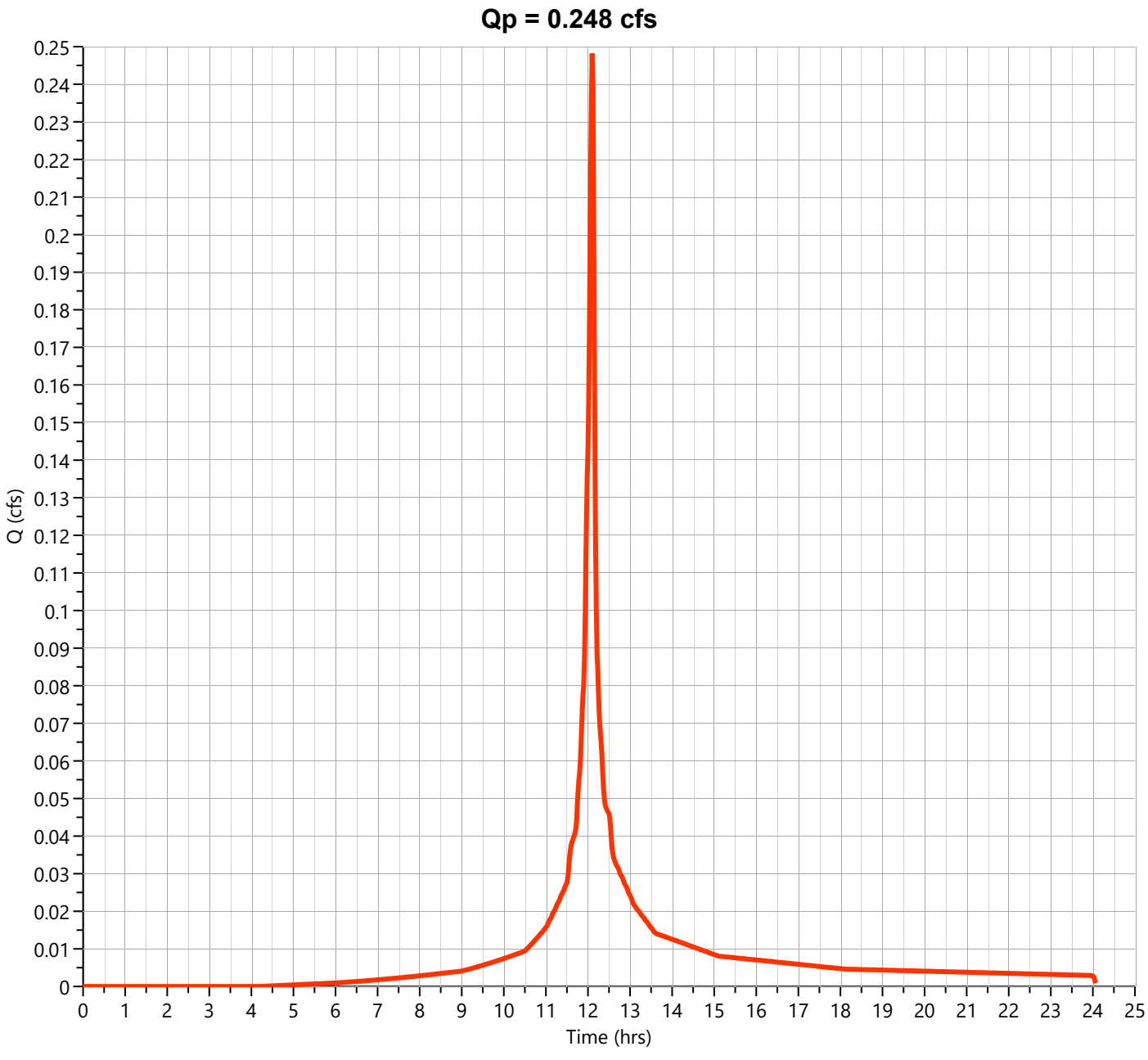
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B-D Open Space D

Hyd. No. 48

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.248 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 740 cuft
Drainage Area	= 0.03 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

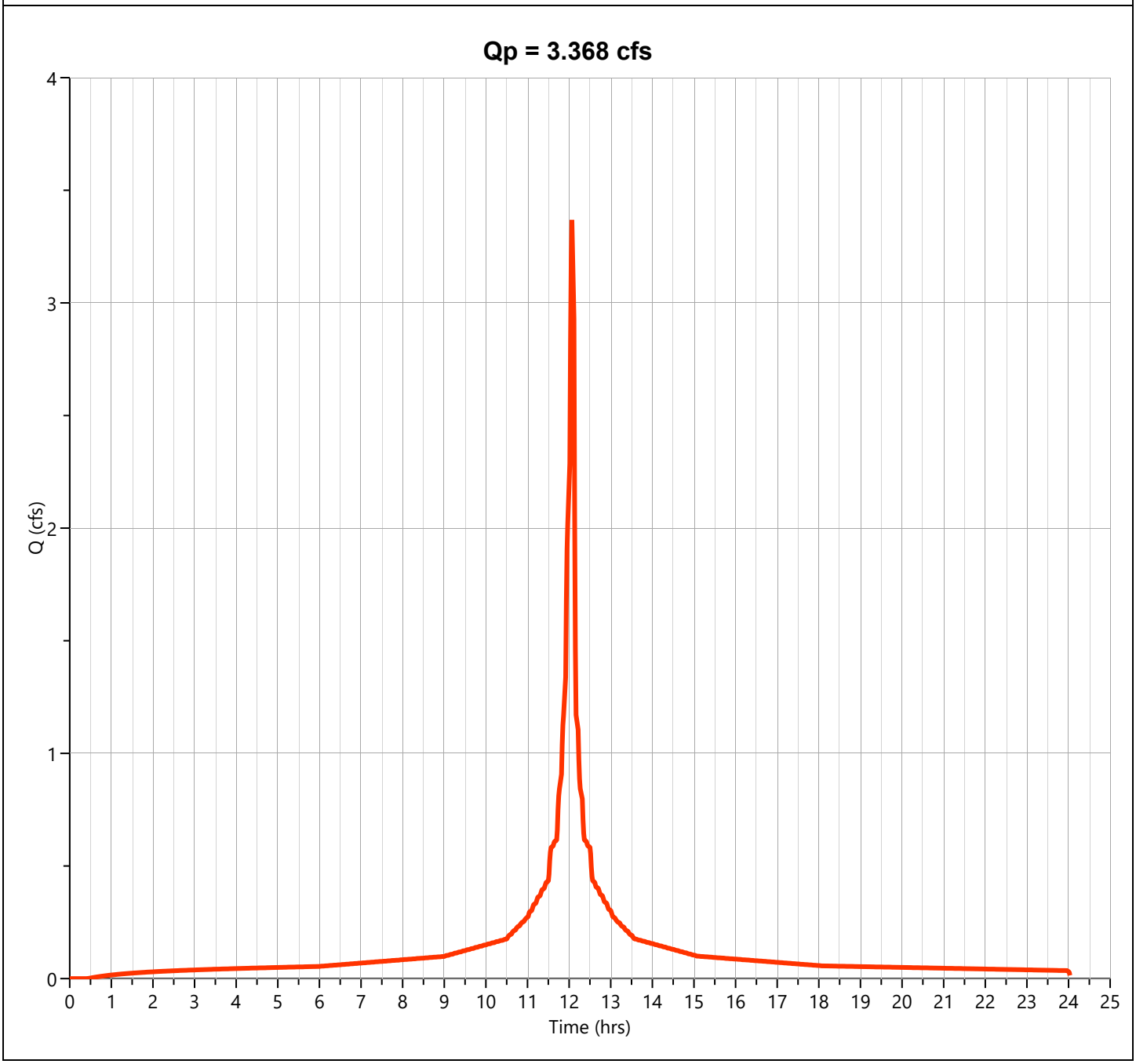
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B-D Impervious

Hyd. No. 49

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.368 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 11,332 cuft
Drainage Area	= 0.37 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

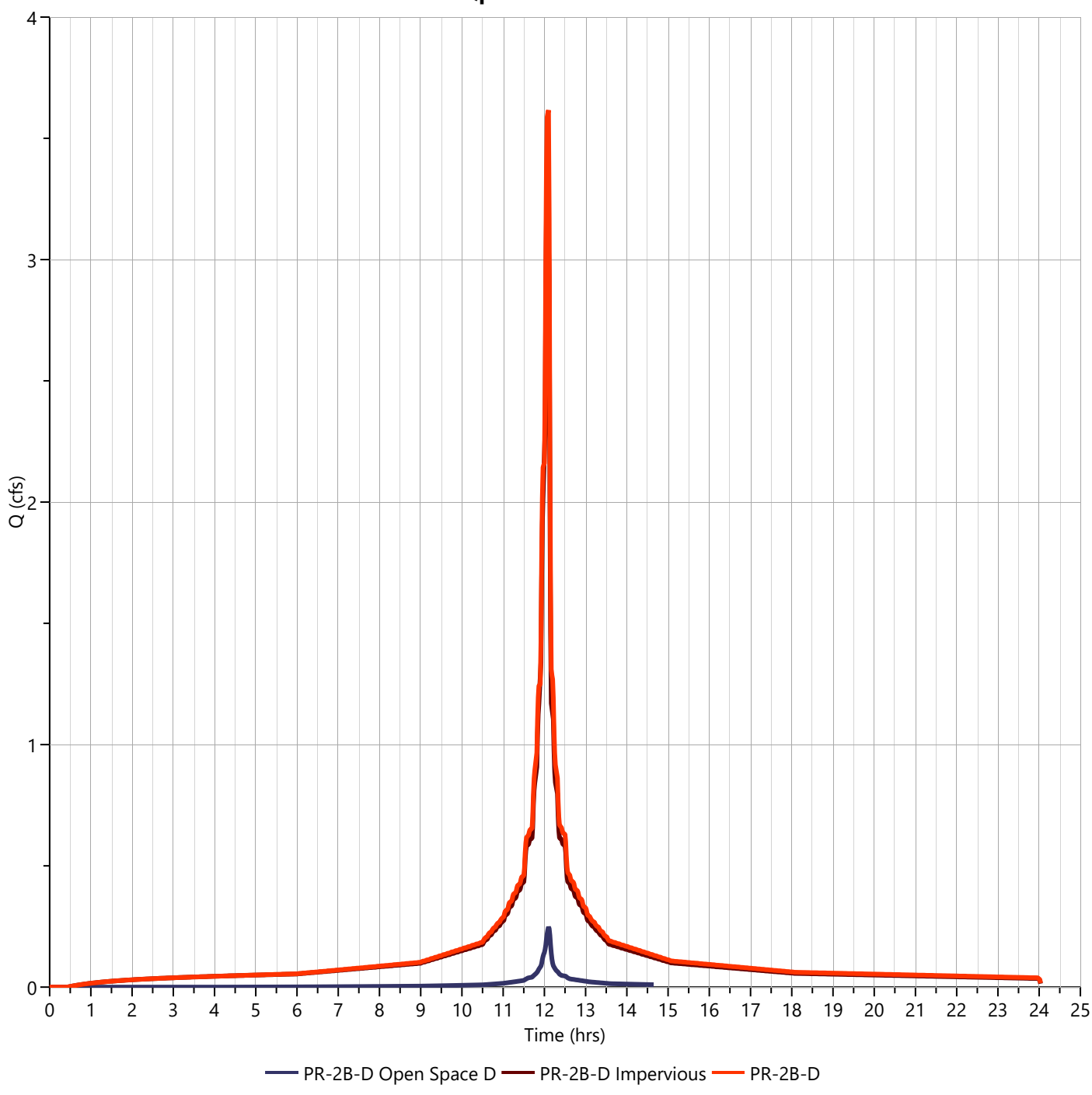
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B-D

Hyd. No. 50

Hydrograph Type	= Junction	Peak Flow	= 3.616 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 12,072 cuft
Inflow Hydrographs	= 48, 49	Total Contrib. Area	= 0.4 ac



PR-2B-UNDISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: Present **(Developed)** — **Current Proposed Watershed PR-2B-U - 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	100		
4.	Two-year 24-hr rainfall, P_2		in	3.46		
5.	Land Slope, s		ft/ft	0.073		
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			Pavement		
9.	Flow Length, L		ft	263		
10.	Watercourse Slope, s		ft/ft	0.054		
11.	Average Velocity, V (NEH table 15-3)		ft/s	4.73		
12.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.015	+	+

Shallow Conc. Flow Sub-Total: **0.015 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)	=	**0.027 hours**
Software Limitations Require Minimum Tc	=	**2 minutes**

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: Present **(Developed)** — **Current Proposed Watershed PR-2B-U - 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	23		
4.	Two-year 24-hr rainfall, P_2	in	3.46		
5.	Land Slope, s	ft/ft	0.130		
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	0.033	+	+
				Sheet Flow Sub-Total	0.033 hours

Shallow Concentrated Flow		Segment ID	2		
8.	Surface Description		Pavement		
9.	Flow Length, L	ft	231		
10.	Watercourse Slope, s	ft/ft	0.048		
11.	Average Velocity, V (NEH table 15-3)	ft/s	4.45		
12.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	0.014	+	+
				Shallow Conc. Flow Sub-Total	0.014 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) =	**0.048 hours**
	Total Tc (minutes) =	**3 minutes**

Hydrograph Report

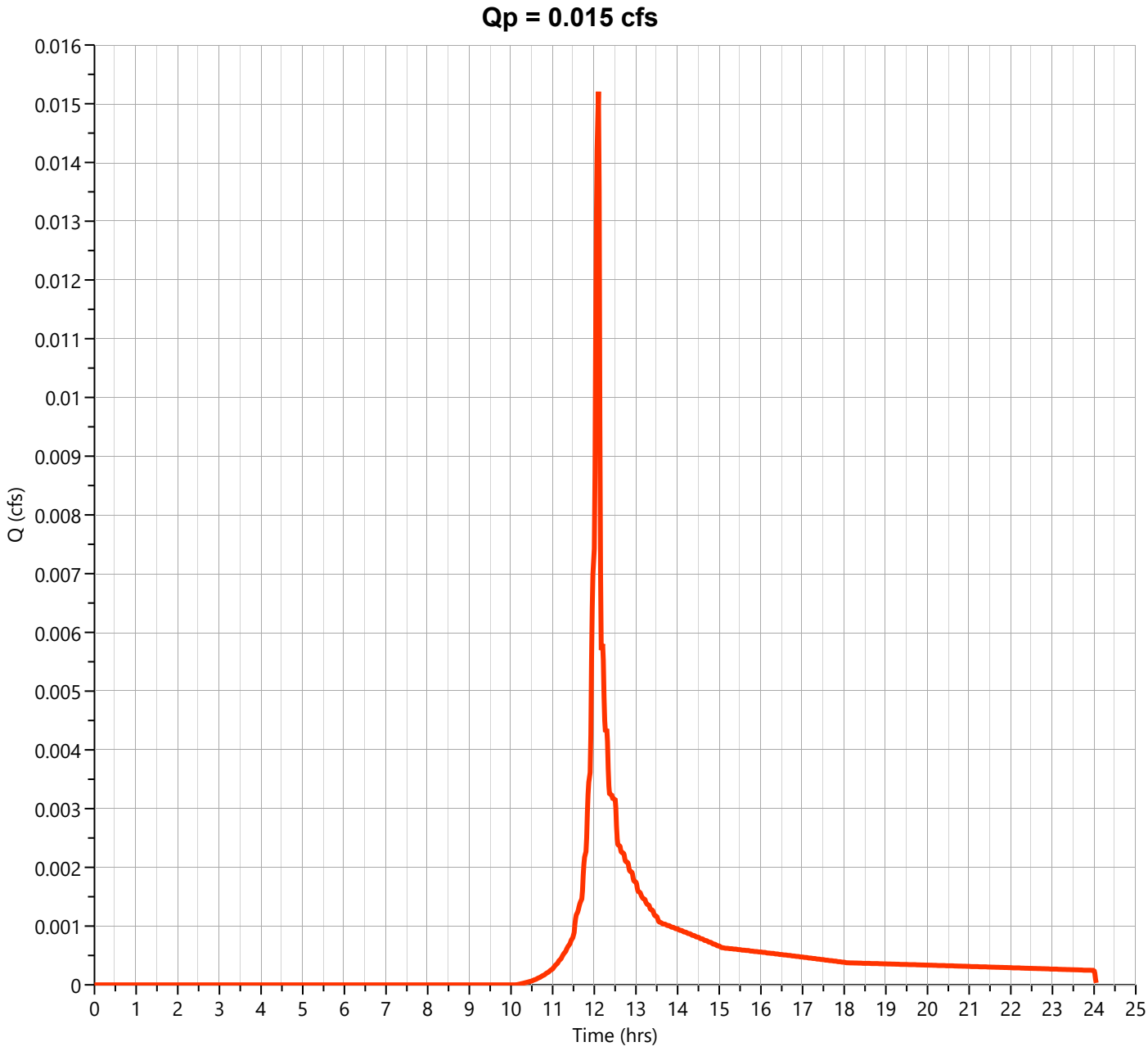
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B-U Open Space C

Hyd. No. 52

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	= 41.3 cuft
Drainage Area	= 0.01 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

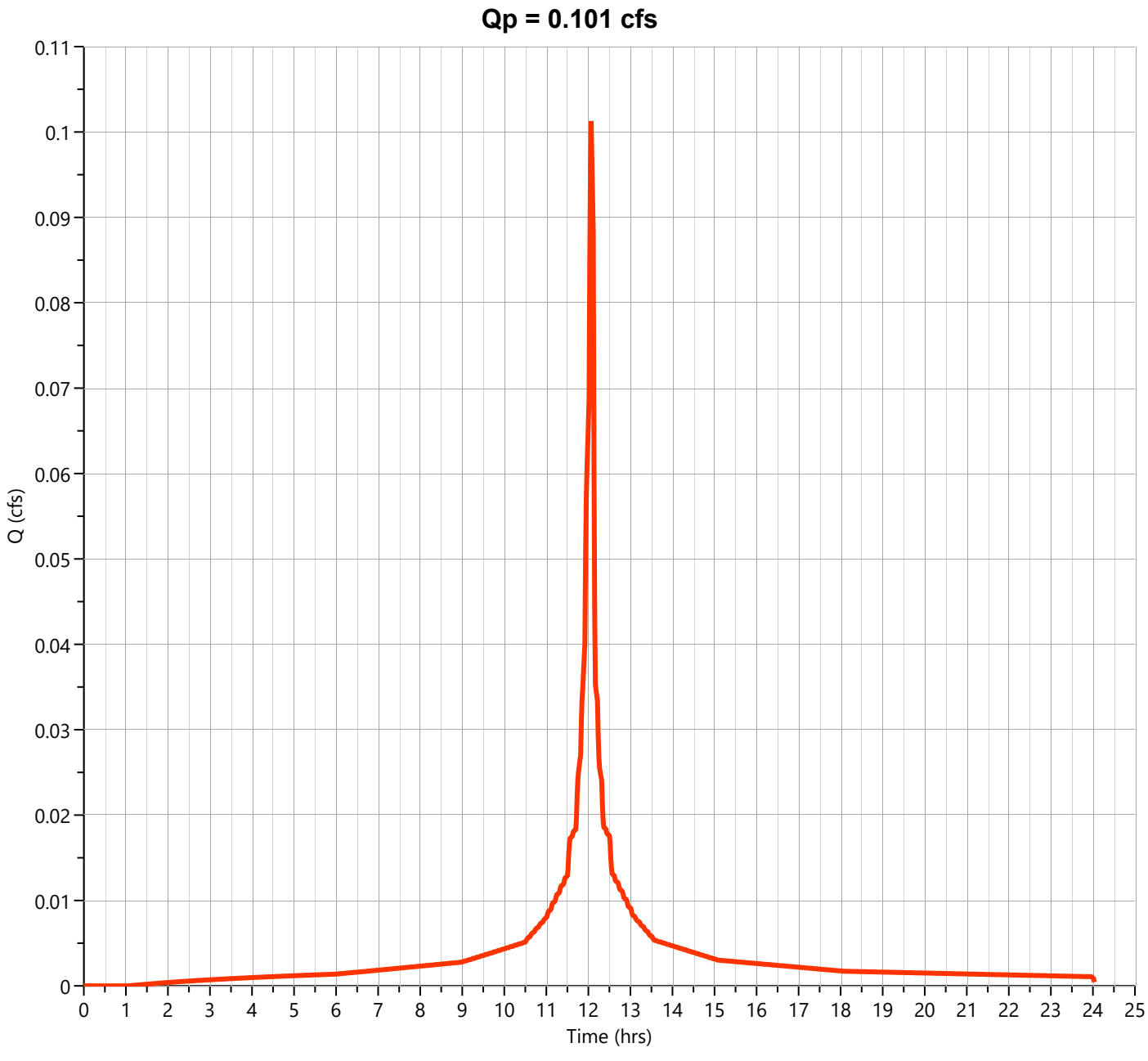
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B-U Impervious

Hyd. No. 53

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.101 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 329 cuft
Drainage Area	= 0.03 ac	Curve Number	= 98.00
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

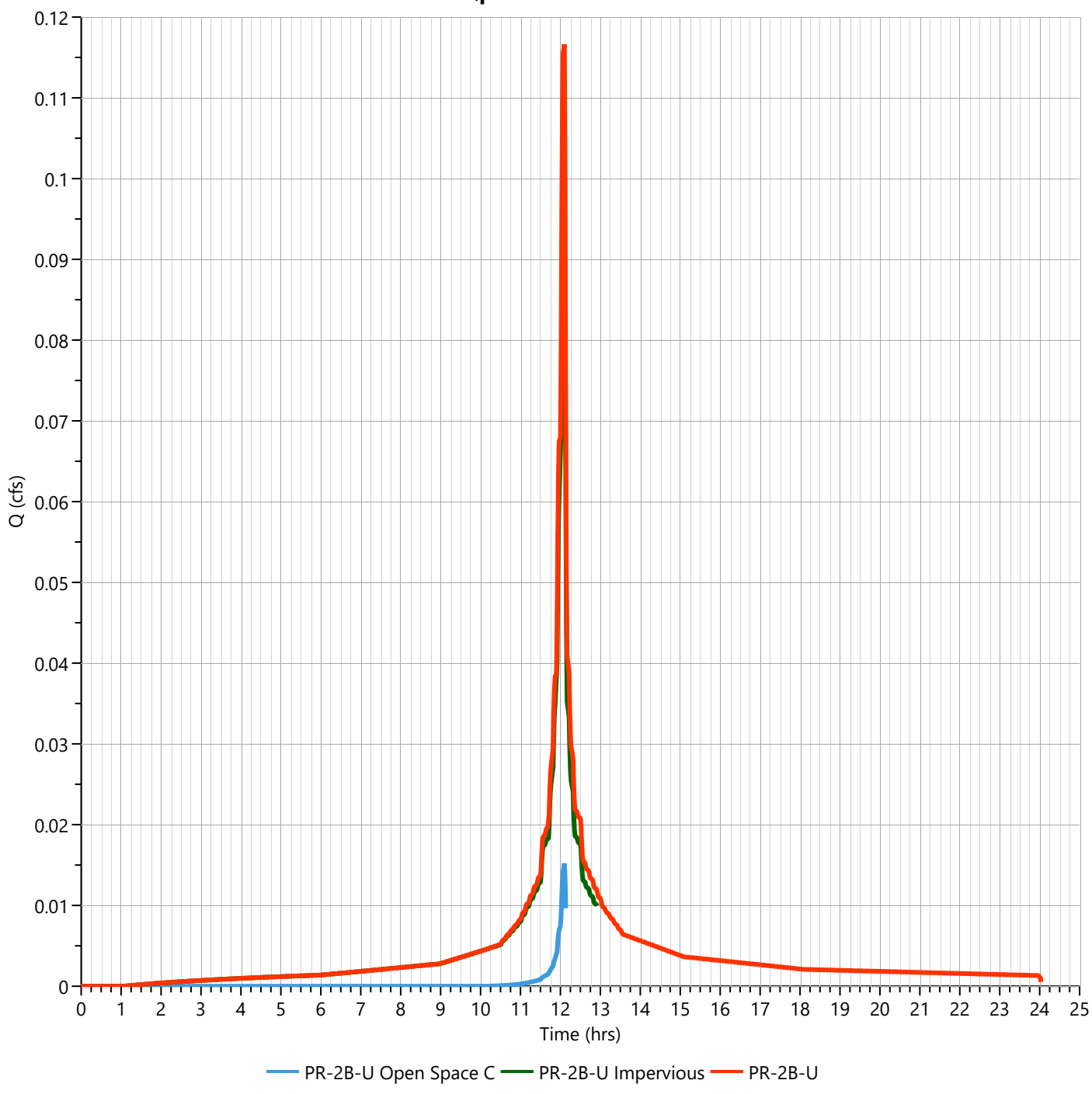
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B-U

Hyd. No. 54

Hydrograph Type	= Junction	Peak Flow	= 0.117 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 371 cuft
Inflow Hydrographs	= 52, 53	Total Contrib. Area	= 0.04 ac



Hydrograph Report

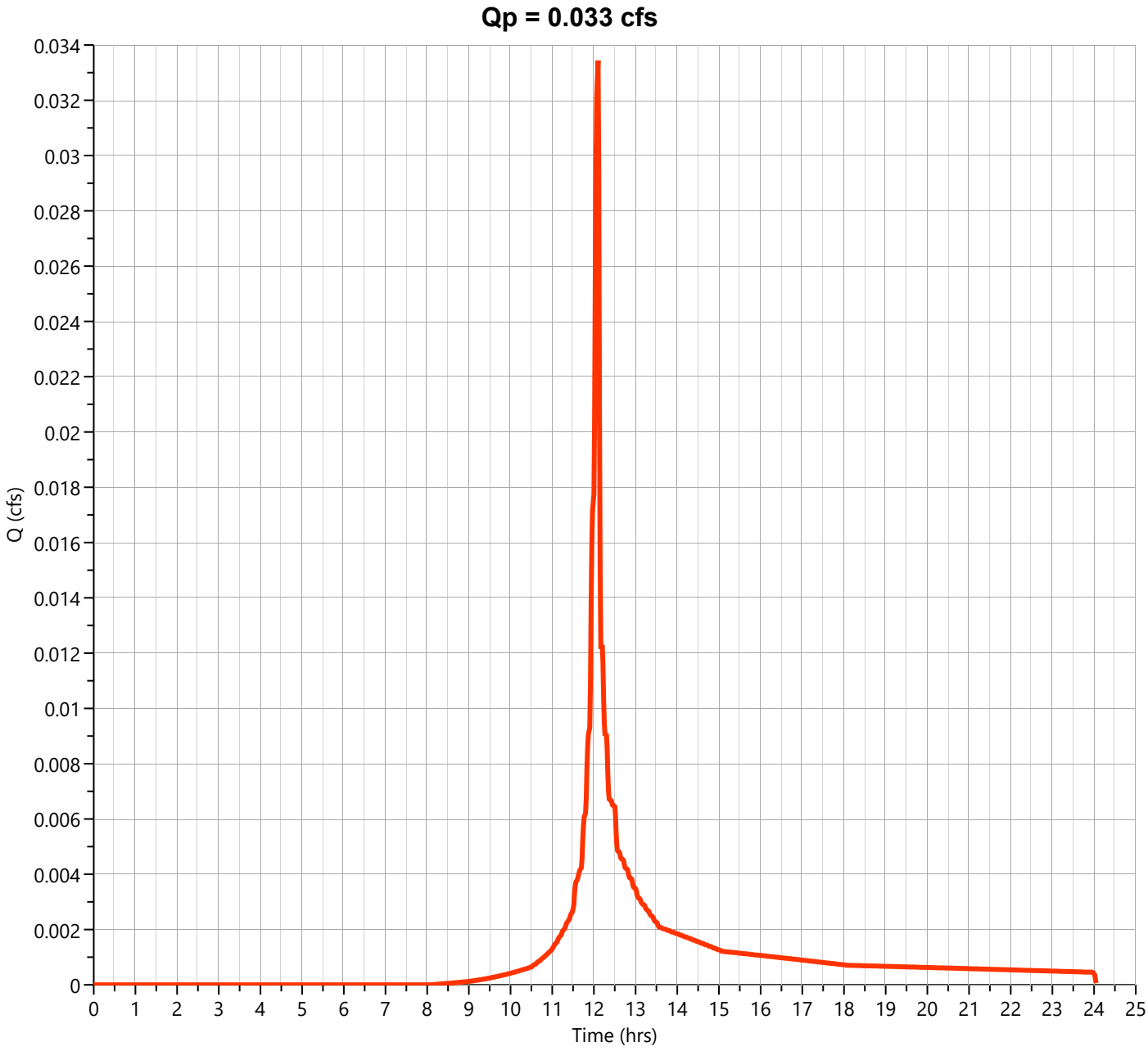
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B-U Open Space C

Hyd. No. 52

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.033 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 90.9 cuft
Drainage Area	= 0.01 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

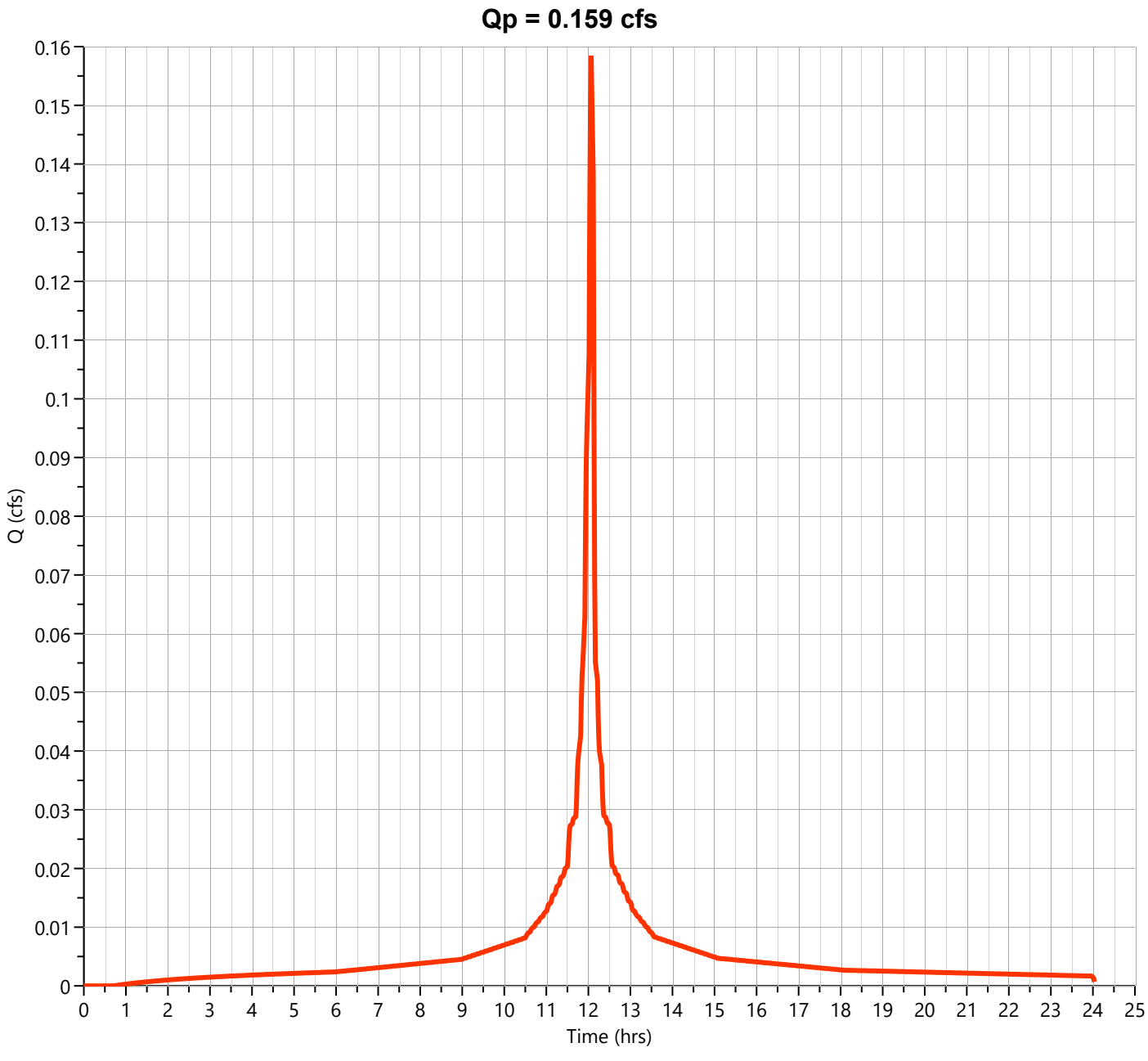
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B-U Impervious

Hyd. No. 53

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.159 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 525 cuft
Drainage Area	= 0.03 ac	Curve Number	= 98.00
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

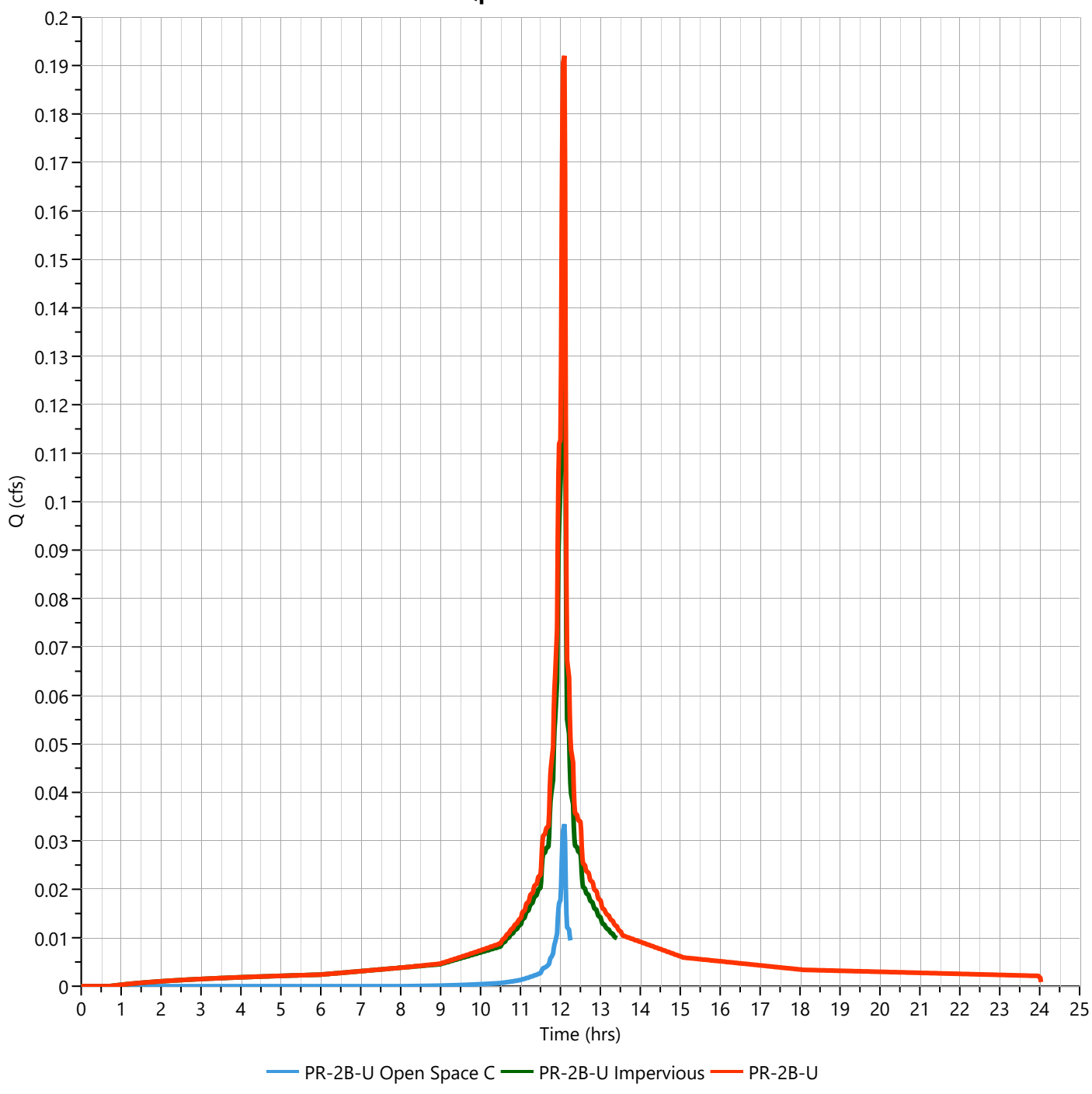
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B-U

Hyd. No. 54

Hydrograph Type	= Junction	Peak Flow	= 0.192 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 616 cuft
Inflow Hydrographs	= 52, 53	Total Contrib. Area	= 0.04 ac



Hydrograph Report

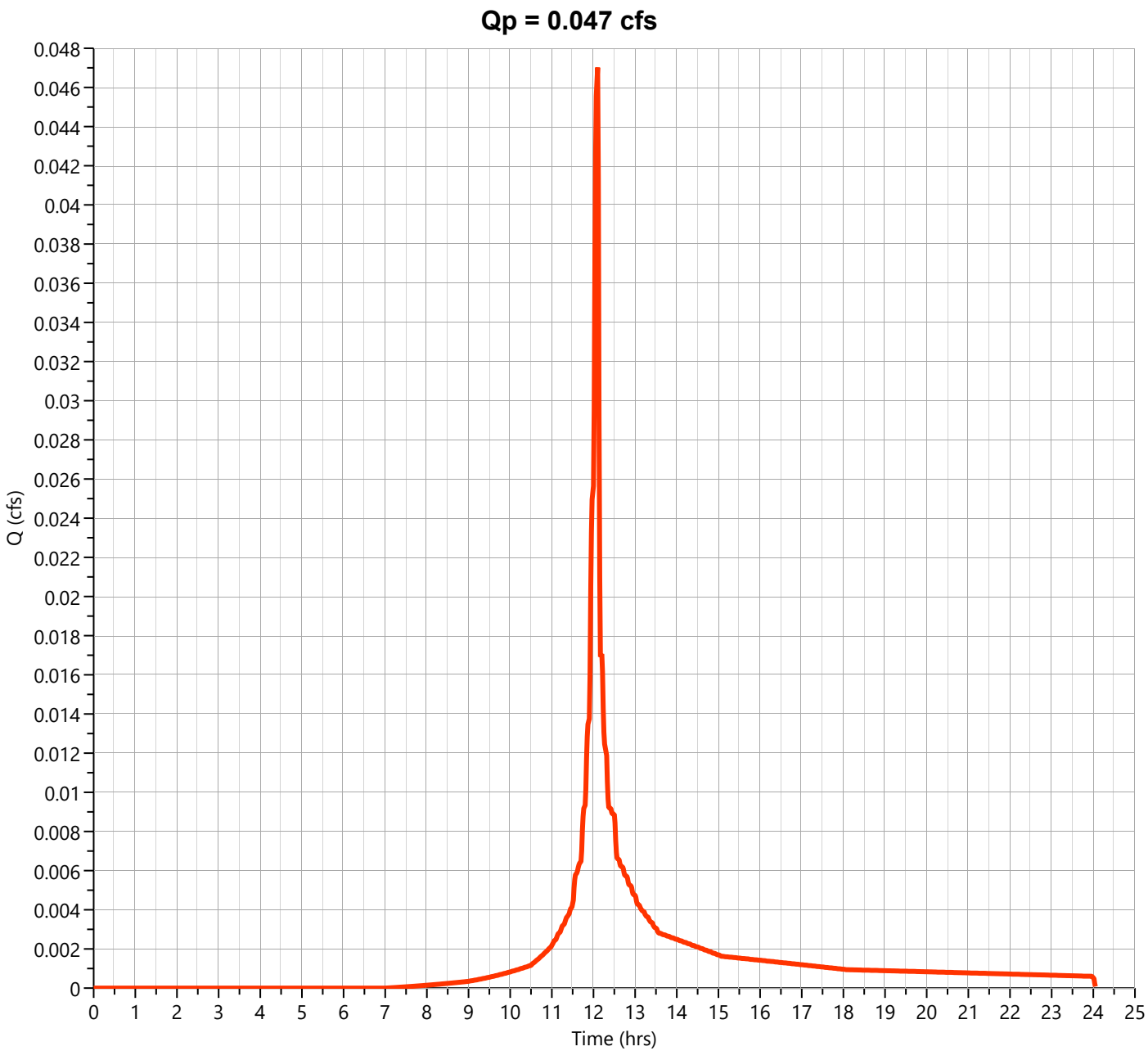
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B-U Open Space C

Hyd. No. 52

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.047 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 129 cuft
Drainage Area	= 0.01 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

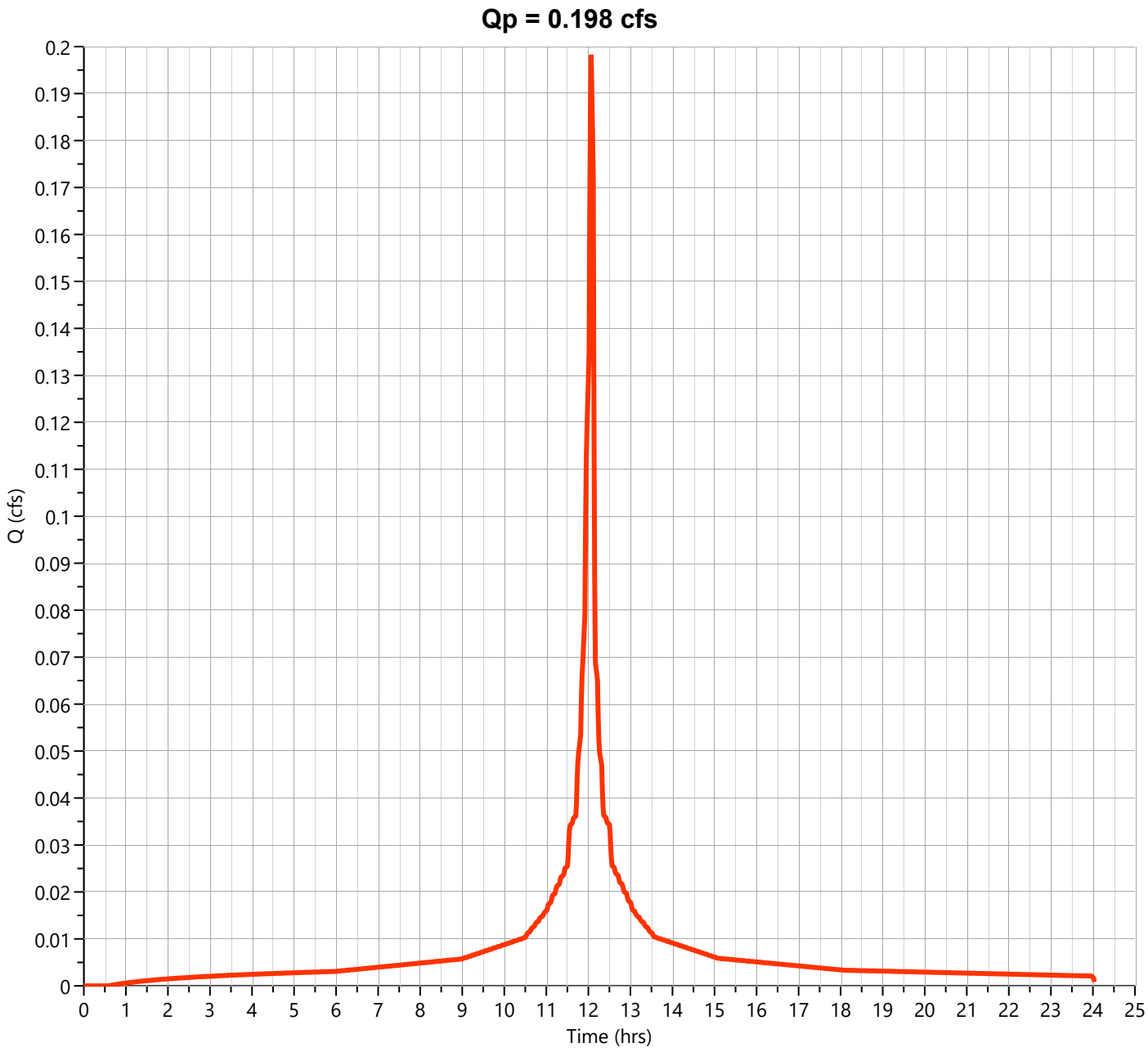
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B-U Impervious

Hyd. No. 53

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.198 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 662 cuft
Drainage Area	= 0.03 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

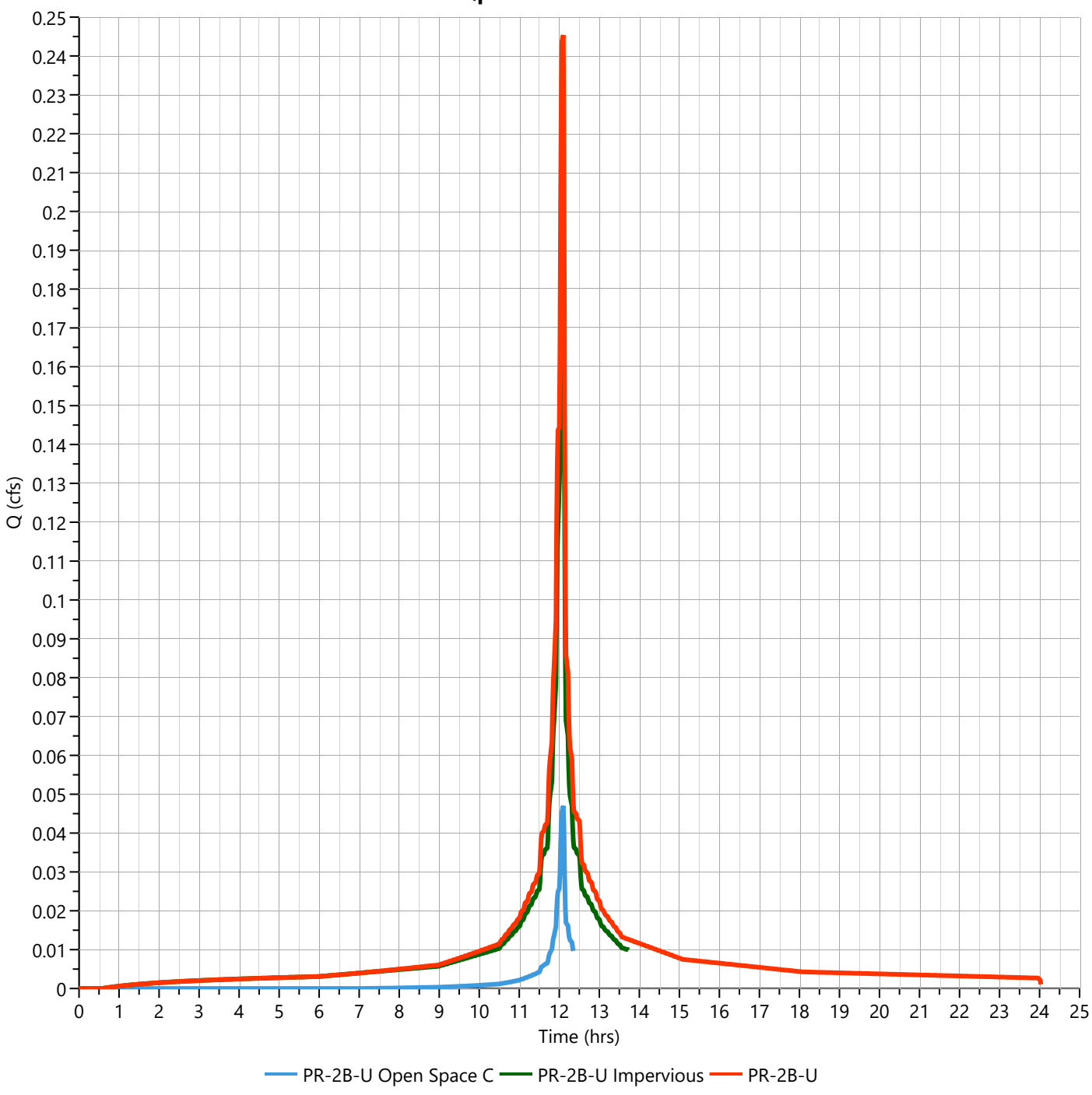
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B-U

Hyd. No. 54

Hydrograph Type	= Junction	Peak Flow	= 0.245 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 791 cuft
Inflow Hydrographs	= 52, 53	Total Contrib. Area	= 0.04 ac



Hydrograph Report

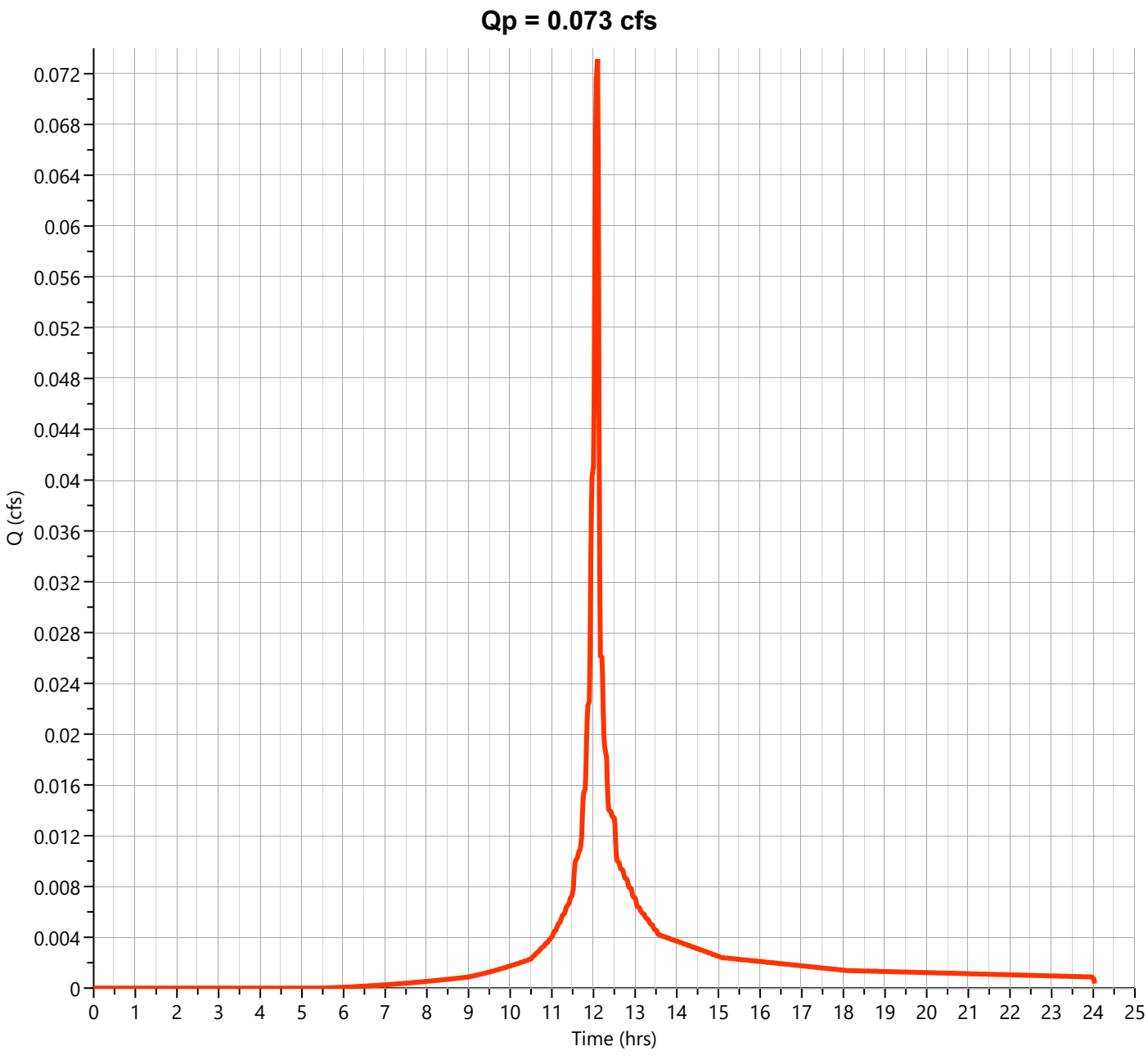
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B-U Open Space C

Hyd. No. 52

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.073 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 206 cuft
Drainage Area	= 0.01 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

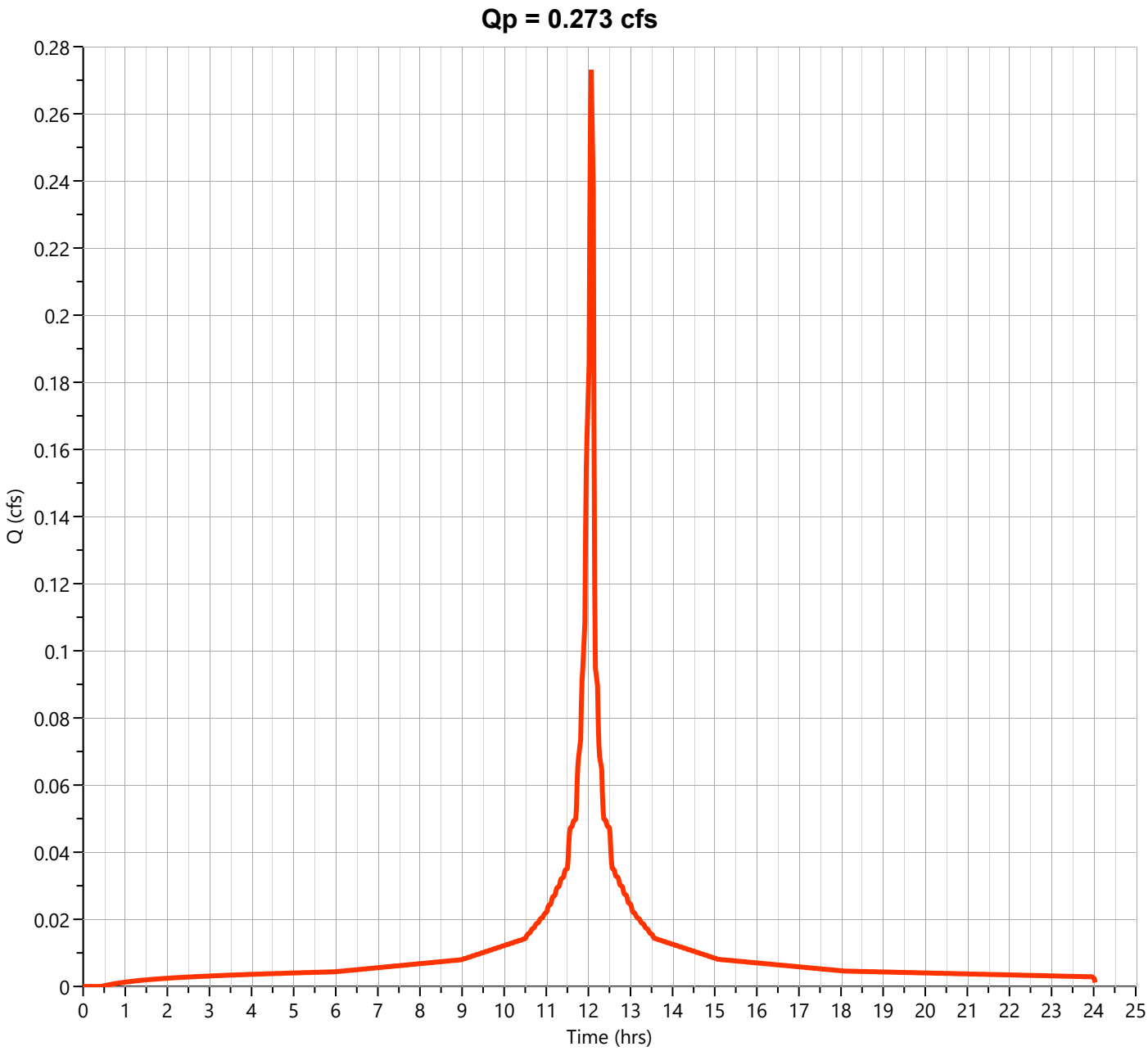
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B-U Impervious

Hyd. No. 53

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.273 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 919 cuft
Drainage Area	= 0.03 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

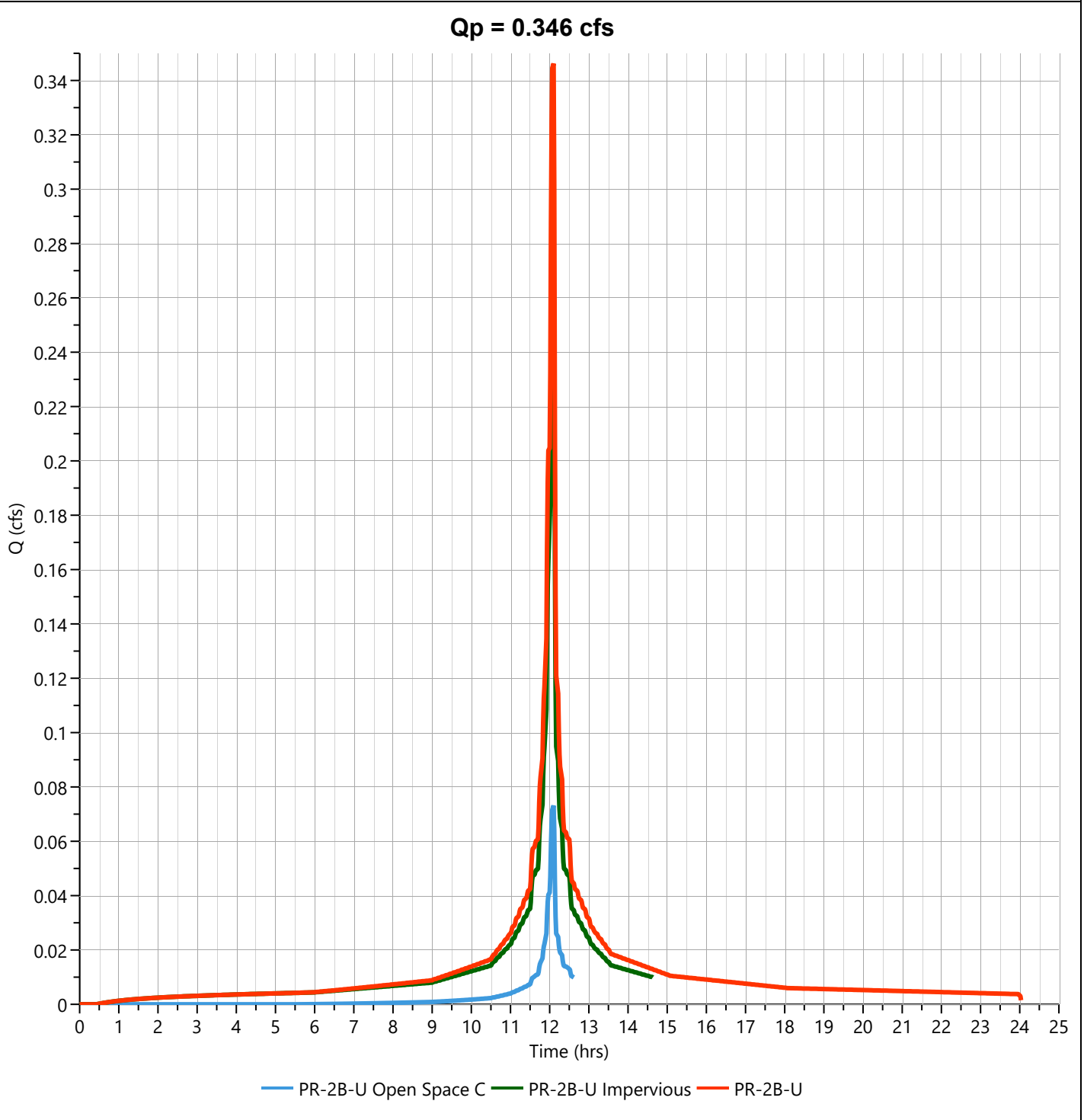
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B-U

Hyd. No. 54

Hydrograph Type	= Junction	Peak Flow	= 0.346 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,125 cuft
Inflow Hydrographs	= 52, 53	Total Contrib. Area	= 0.04 ac



PR-2B WATERSHED
(COMBINED PROPOSED FLOW TO PAPS-1)

Hydrograph Report

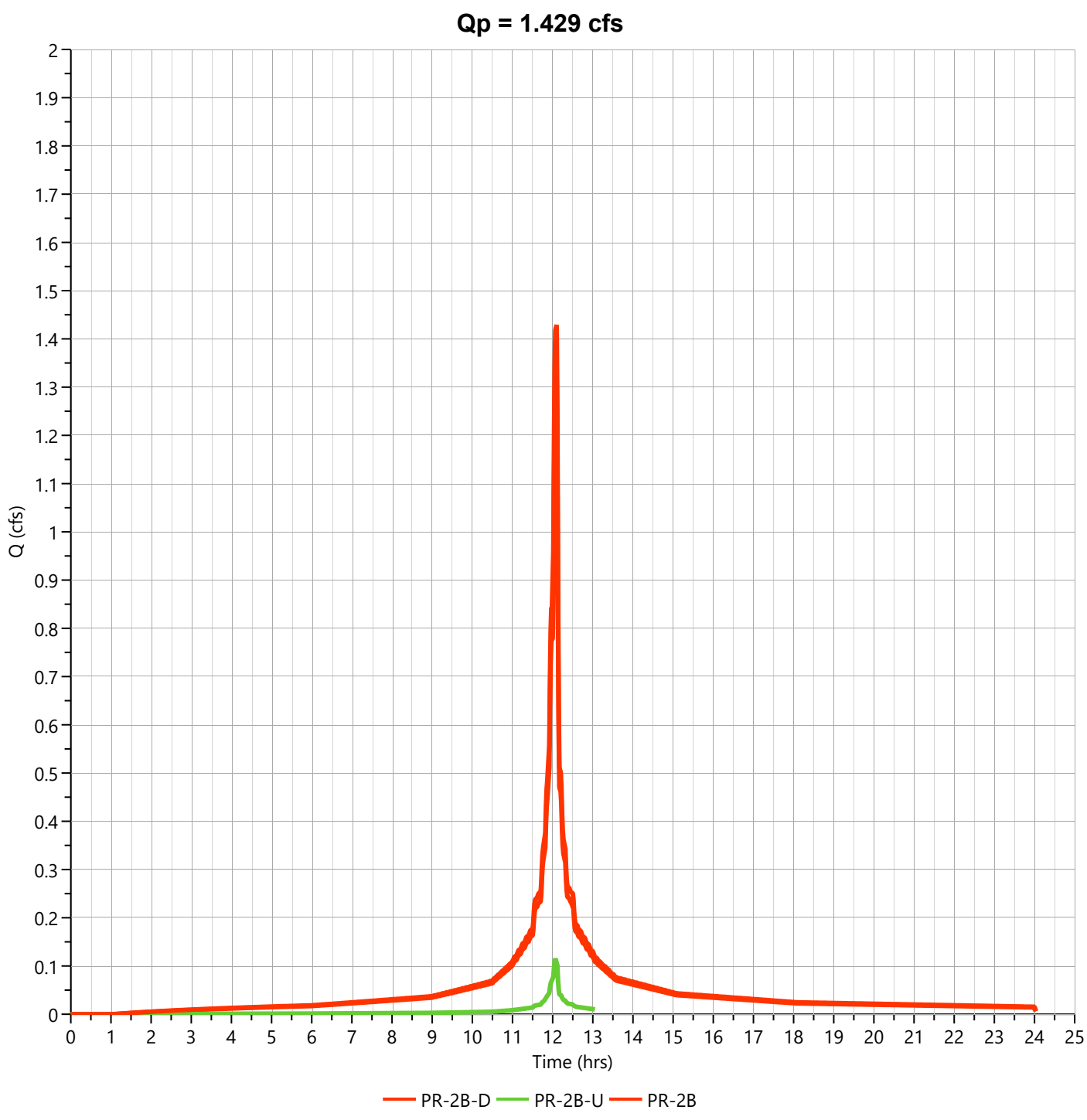
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B

Hyd. No. 56

Hydrograph Type	= Junction	Peak Flow	= 1.429 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 4,608 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

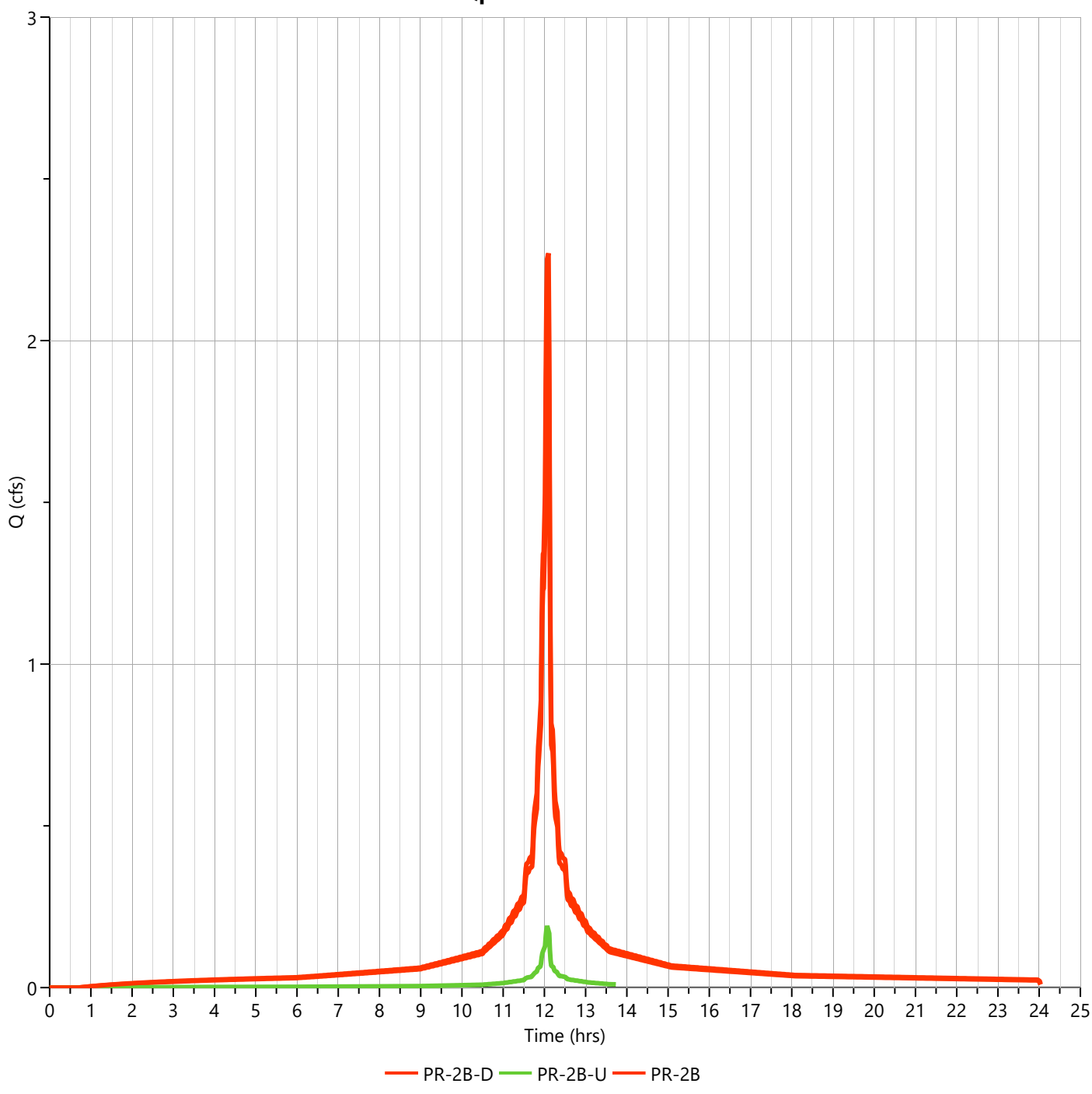
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B

Hyd. No. 56

Hydrograph Type	= Junction	Peak Flow	= 2.270 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 7,443 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

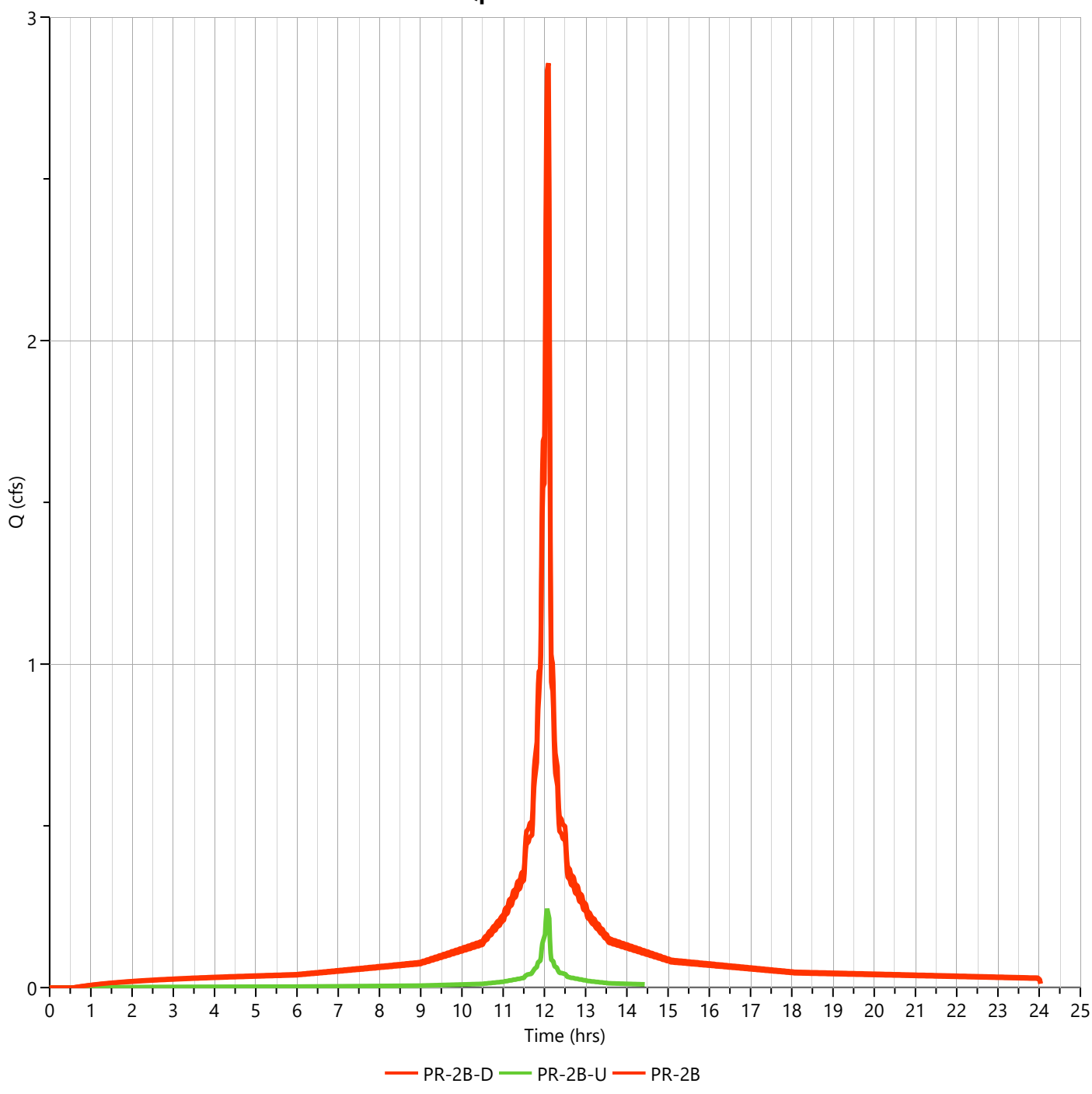
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B

Hyd. No. 56

Hydrograph Type	= Junction	Peak Flow	= 2.857 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 9,435 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

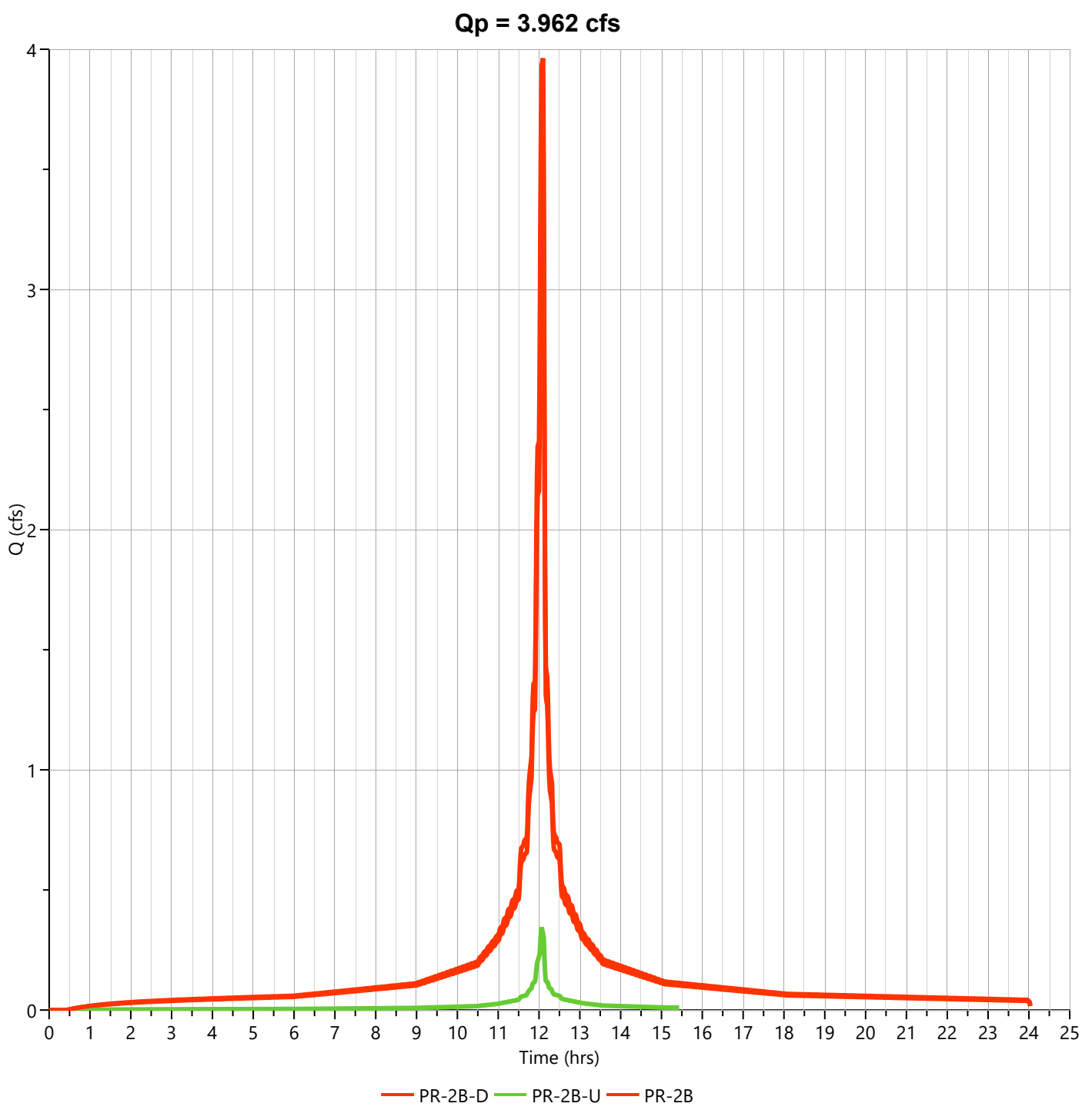
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2B

Hyd. No. 56

Hydrograph Type	= Junction	Peak Flow	= 3.962 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 13,197 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



PR-2C-DISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: Present (**Developed**) — **Current Proposed Watershed PR-2C-D - 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.	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	**20**				
4.	Two-year 24-hr rainfall, P_2		in	**3.46**				
5.	Land Slope, s		ft/ft	**0.011**				
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			**Pavement**				
9.	Flow Length, L		ft	**69**				
10.	Watercourse Slope, s		ft/ft	**0.010**				
11.	Average Velocity, V (NEH table 15-3)		ft/s	**2.03**				
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**		**4**		**5**
13.	Flow Length, L		ft	**107**		**46**		**51**
14.	Cross Sectional flow area, a		ft^2	**0.61**		**0.61**		**0.61**
15.	Wetted Perimeter, P_w		ft	**2.00**		**2.00**		**2.00**
16.	Hydraulic Radius, r	$r = a / P_w$	ft	**0.31**		**0.31**		**0.31**
17.	Channel Slope, s		ft/ft	**0.005**		**0.008**		**0.010**
18.	Manning's Roughness Coeff., n			**0.013**		**0.013**		**0.013**
19.	Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	**3.69**		**4.52**		**5.21**
20.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	**0.008**	+	**0.003**	+	**0.003**

Channel Flow Sub-Total **0.014 hours**

Channel Flow

			Segment ID	**6**		**7**		**8**
21.	Flow Length, L		ft	**267**		**52**		**125**
22.	Cross Sectional flow area, a		ft^2	**0.88**		**0.88**		**0.88**
23.	Wetted Perimeter, P_w		ft	**2.40**		**2.40**		**2.40**
24.	Hydraulic Radius, r	$r = a / P_w$	ft	**0.37**		**0.37**		**0.37**
25.	Channel Slope, s		ft/ft	**0.005**		**0.012**		**0.013**
26.	Manning's Roughness Coeff., n			**0.013**		**0.013**		**0.013**
27.	Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	**4.15**		**6.56**		**6.69**
28.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	**0.018**	+	**0.002**	+	**0.005**

Channel Flow Sub-Total **0.025 hours**

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

Total Tc (hours) =	**0.055 hours**
Total Tc (minutes) =	**3 minutes**

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: Present **(Developed)** — **Current Proposed Watershed PR-2C-D - 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	**15**			
4.	Two-year 24-hr rainfall, P_2	in	**3.46**			
5.	Land Slope, s	ft/ft	**0.812**			
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	**0.011**	+		+
					Sheet Flow Sub-Total	**0.011 hours**

Shallow Concentrated Flow

	Segment ID		**2**			
8.	Surface Description		**Grassed Waterways**			
9.	Flow Length, L	ft	**165**			
10.	Watercourse Slope, s	ft/ft	**0.092**			
11.	Average Velocity, V (NEH table 15-3)	ft/s	**4.91**			
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**	**4**	**5**	
13.	Flow Length, L	ft	**11**	**24**	**32**	
14.	Cross Sectional flow area, a	ft^2	**0.61**	**0.61**	**0.61**	
15.	Wetted Perimeter, P_w	ft	**2.00**	**2.00**	**2.00**	
16.	Hydraulic Radius, r $r = a / P_w$	ft	**0.31**	**0.31**	**0.31**	
17.	Channel Slope, s	ft/ft	**0.020**	**0.005**	**0.032**	
18.	Manning's Roughness Coeff., n		**0.012**	**0.012**	**0.013**	
19.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	**7.99**	**3.99**	**9.35**	
20.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	**0.000**	**0.002**	**0.001**	
					Channel Flow Sub-Total	**0.003 hours**

Channel Flow

	Segment ID		**6**	**7**	**8**	
21.	Flow Length, L	ft	**267**	**52**	**125**	
22.	Cross Sectional flow area, a	ft^2	**0.88**	**0.88**	**0.88**	
23.	Wetted Perimeter, P_w	ft	**2.40**	**2.40**	**2.40**	
24.	Hydraulic Radius, r $r = a / P_w$	ft	**0.37**	**0.37**	**0.37**	
25.	Channel Slope, s	ft/ft	**0.005**	**0.012**	**0.013**	
26.	Manning's Roughness Coeff., n		**0.013**	**0.013**	**0.013**	
27.	Velocity, V $V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	**4.14**	**6.56**	**6.70**	
28.	Compute T_t $T_t = \frac{L}{3600\ V}$	hr	**0.018**	**0.002**	**0.005**	
					Channel Flow Sub-Total	**0.025 hours**

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

Total Tc (hours) =	**0.049 hours**
Total Tc (minutes) =	**3 minutes**

Hydrograph Report

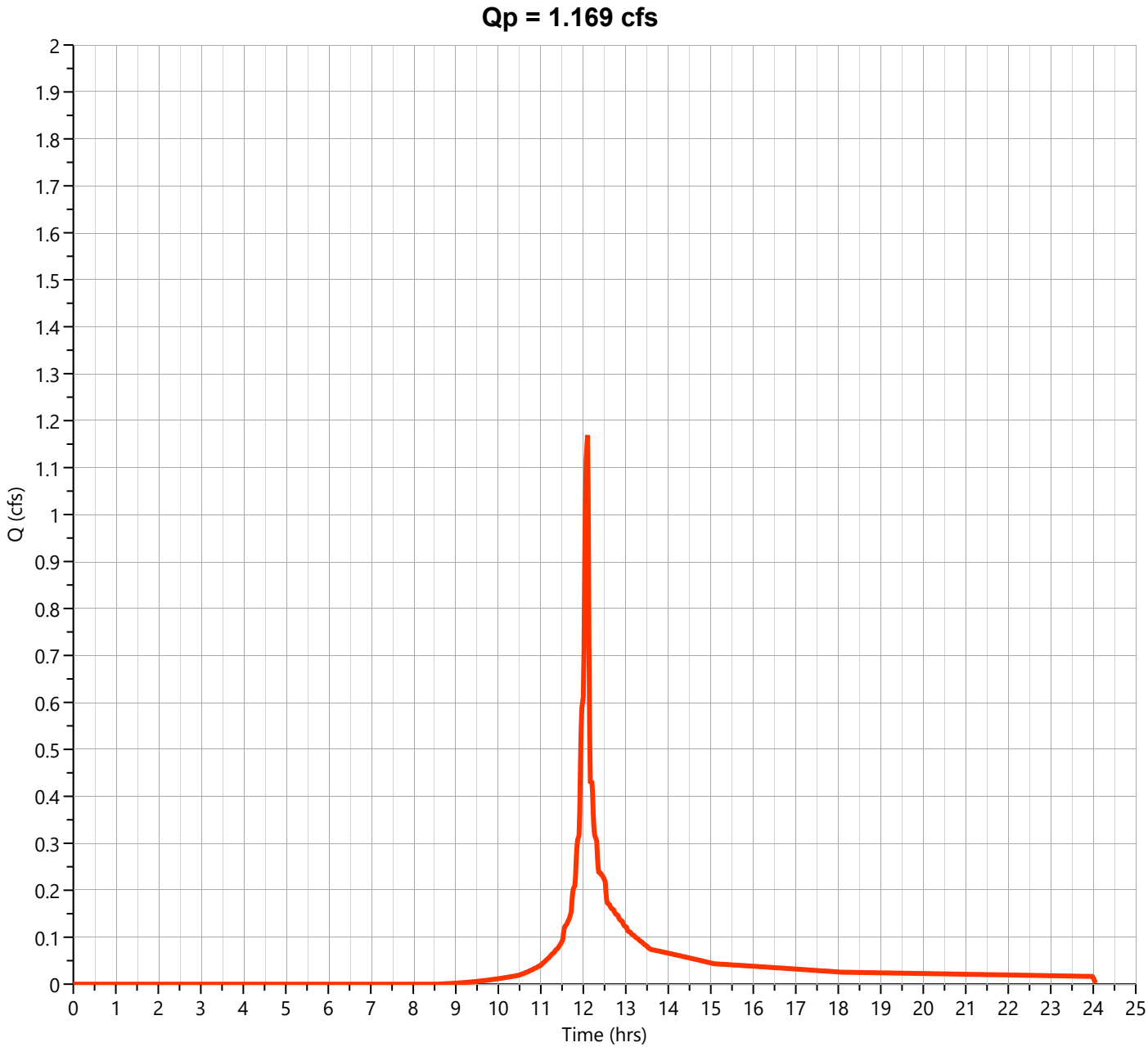
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-D Open Space D

Hyd. No. 59

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.169 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 3,167 cuft
Drainage Area	= 0.58 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

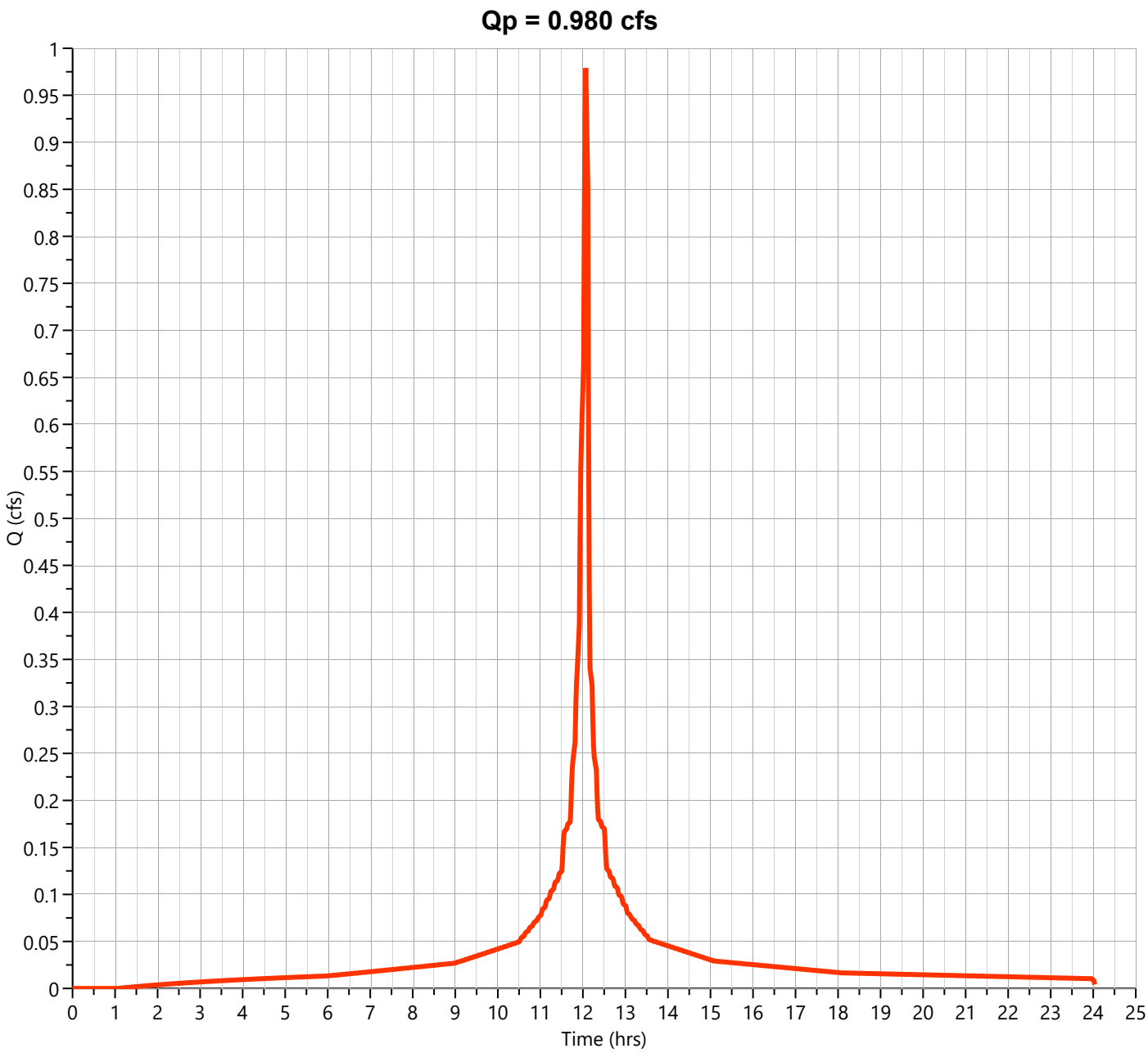
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-D Impervious

Hyd. No. 60

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.980 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 3,184 cuft
Drainage Area	= 0.29 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 3.46 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

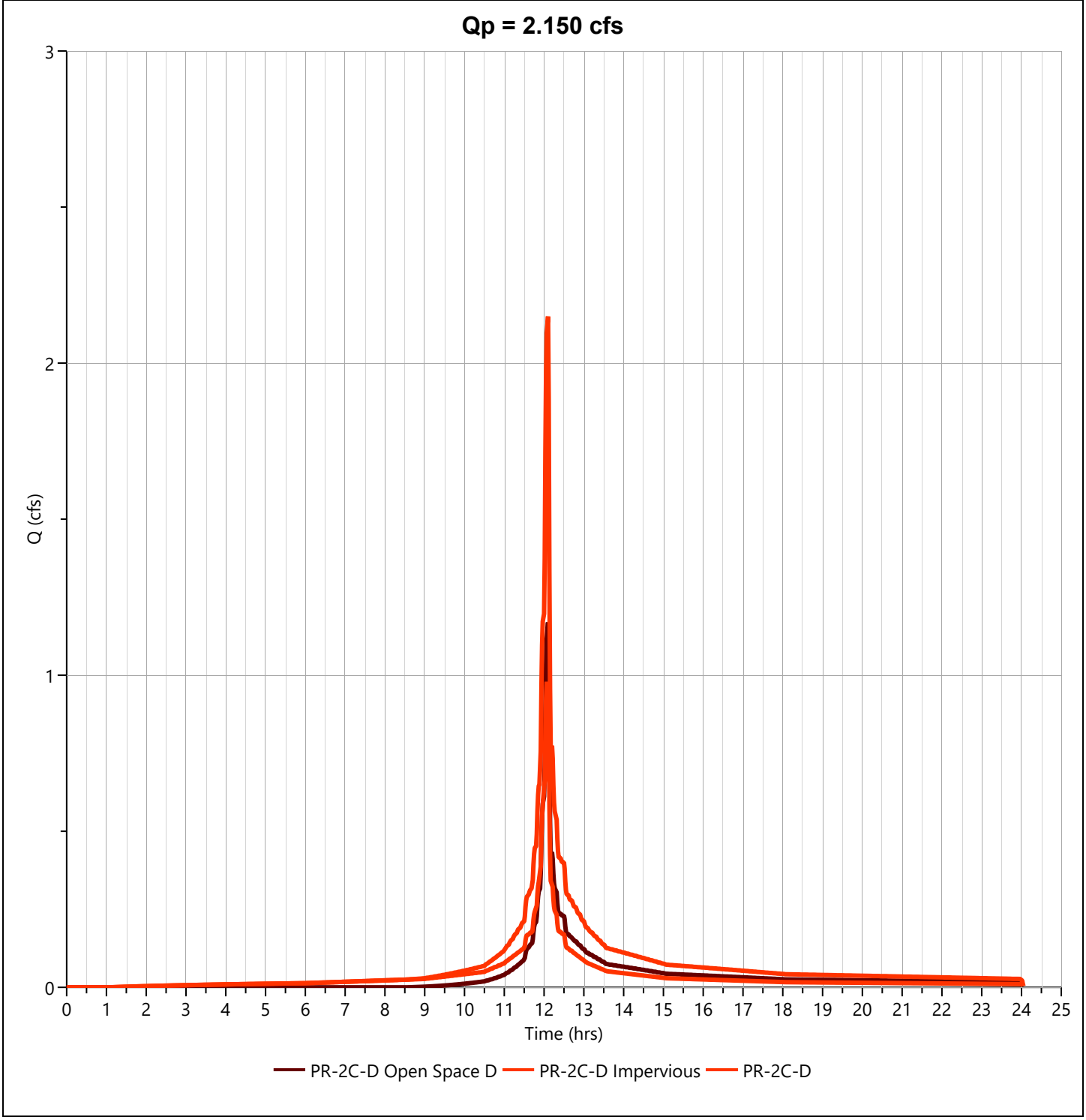
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-D

Hyd. No. 61

Hydrograph Type	= Junction	Peak Flow	= 2.150 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 6,352 cuft
Inflow Hydrographs	= 59, 60	Total Contrib. Area	= 0.87 ac



Hydrograph Report

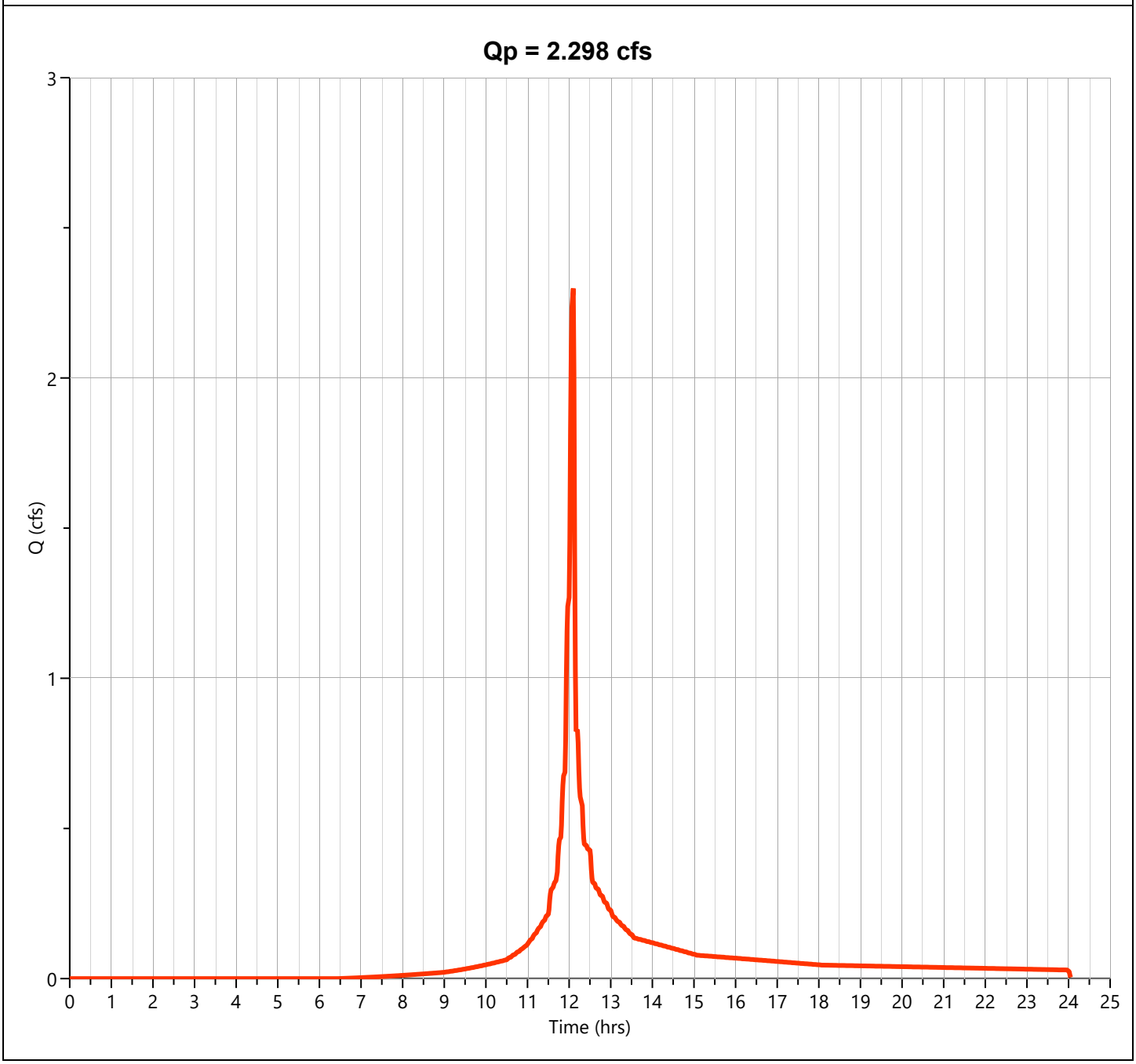
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-D Open Space D

Hyd. No. 59

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.298 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 6,369 cuft
Drainage Area	= 0.58 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

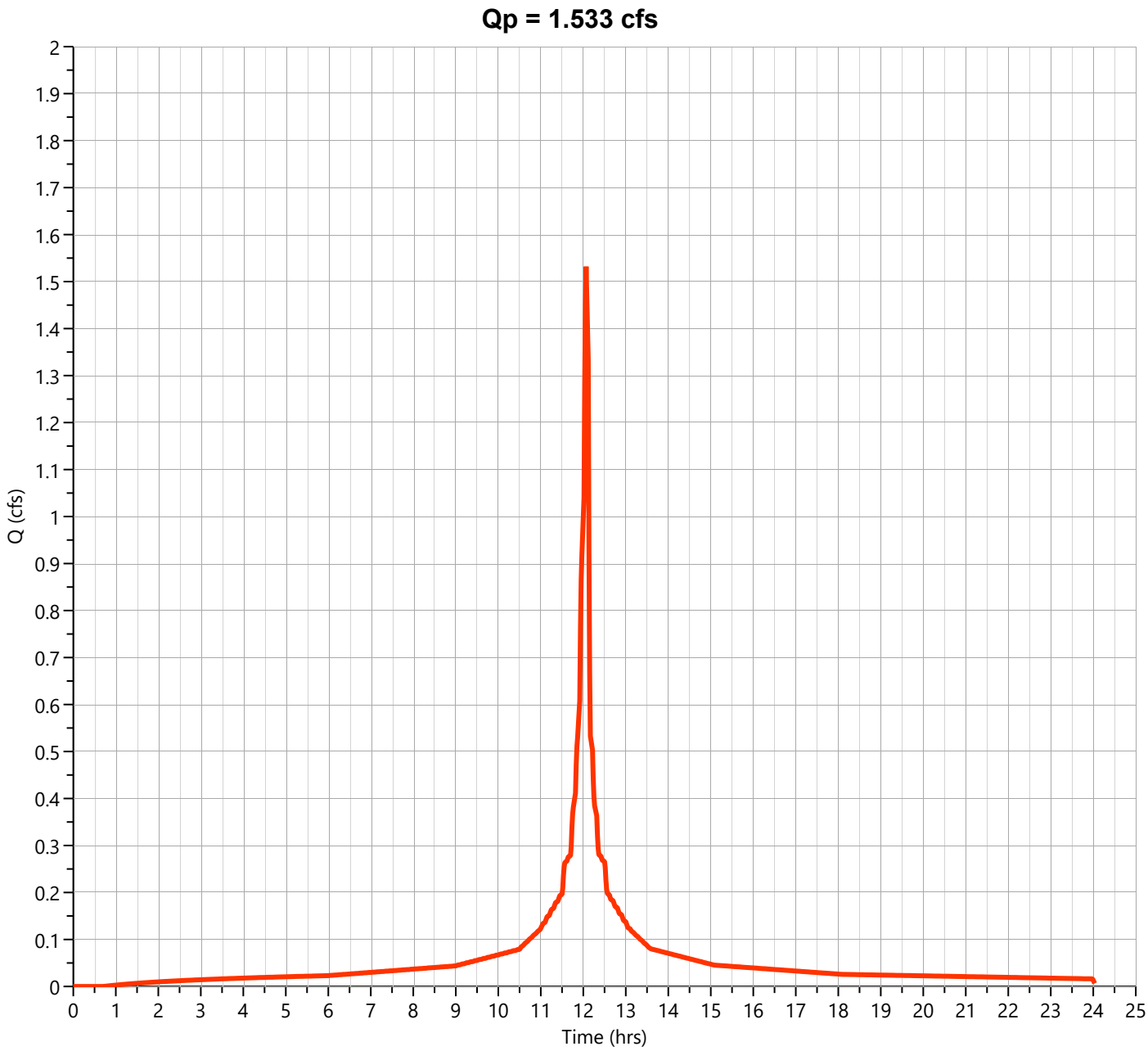
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-D Impervious

Hyd. No. 60

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.533 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 5,075 cuft
Drainage Area	= 0.29 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 5.38 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

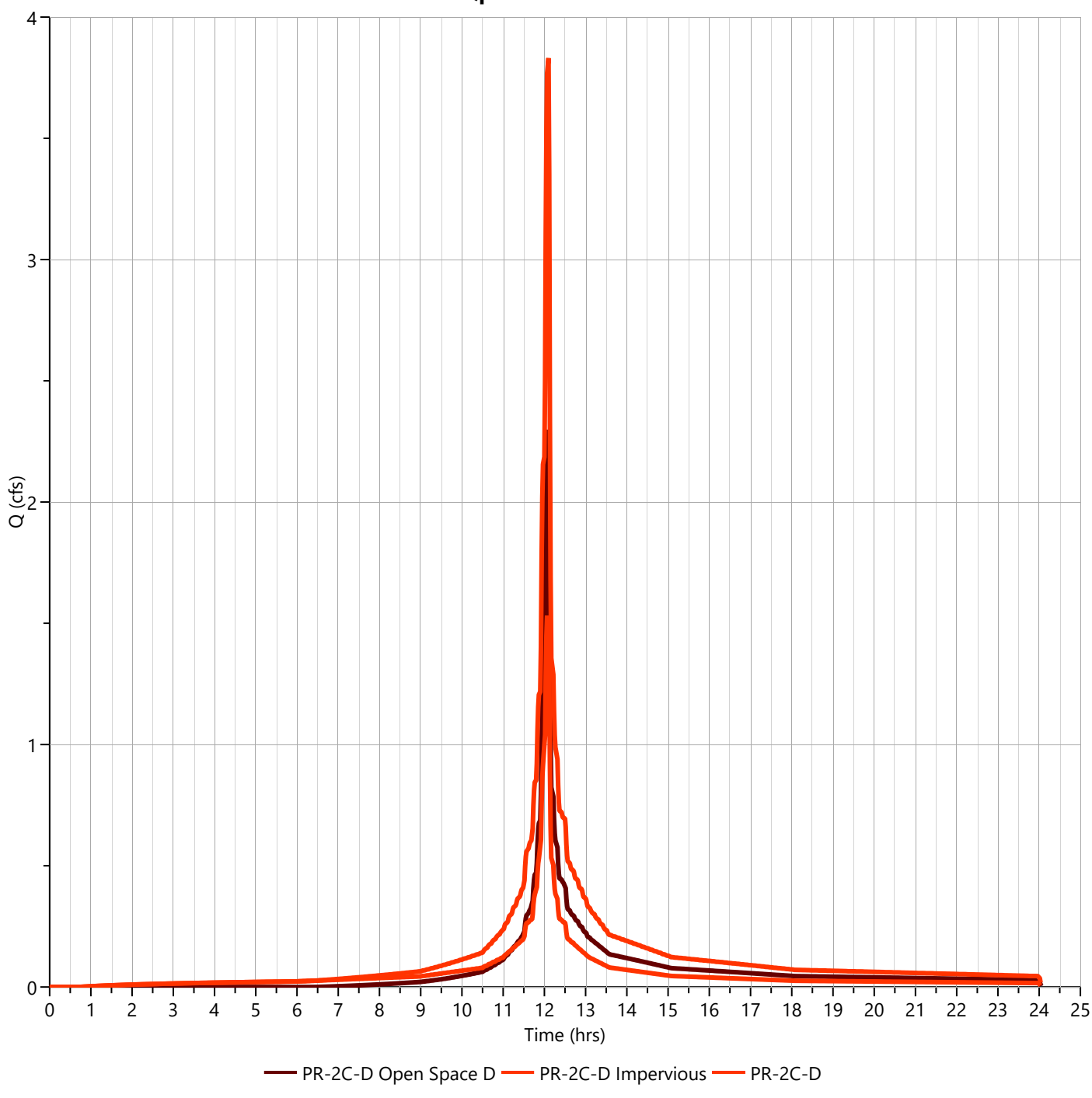
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-D

Hyd. No. 61

Hydrograph Type	= Junction	Peak Flow	= 3.831 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 11,445 cuft
Inflow Hydrographs	= 59, 60	Total Contrib. Area	= 0.87 ac



Hydrograph Report

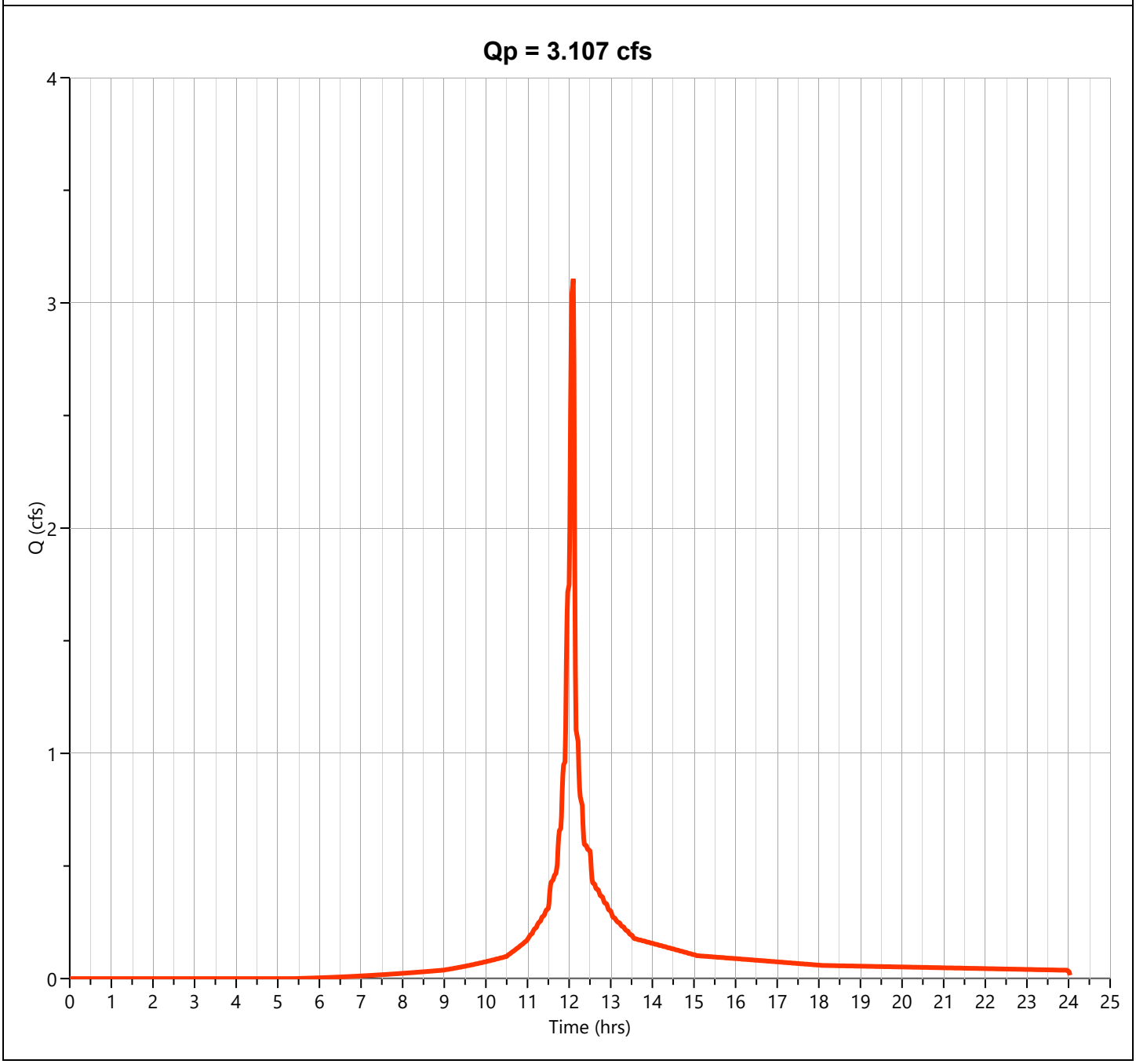
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-D Open Space D

Hyd. No. 59

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.107 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 8,757 cuft
Drainage Area	= 0.58 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

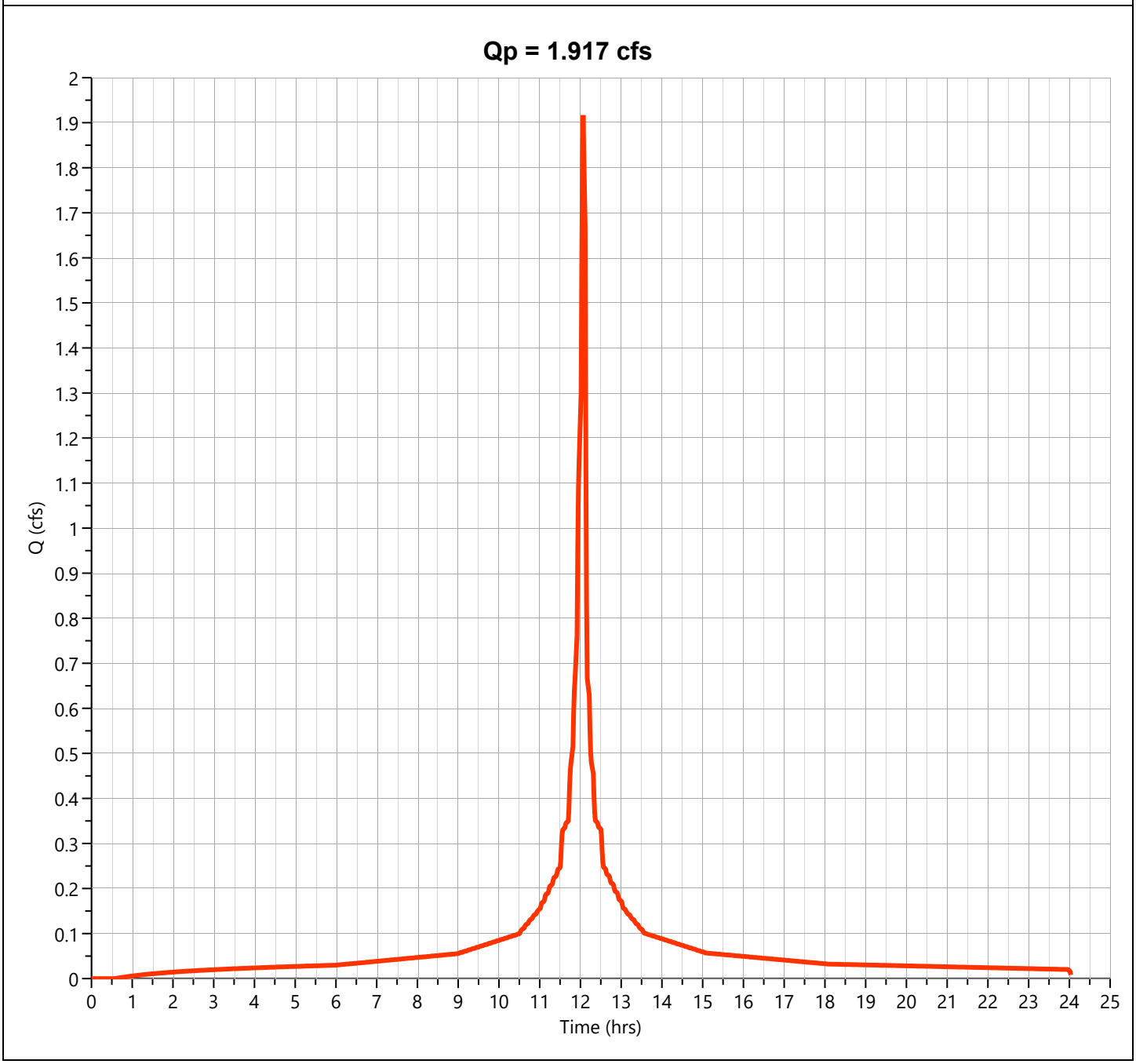
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-D Impervious

Hyd. No. 60

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.917 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 6,396 cuft
Drainage Area	= 0.29 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

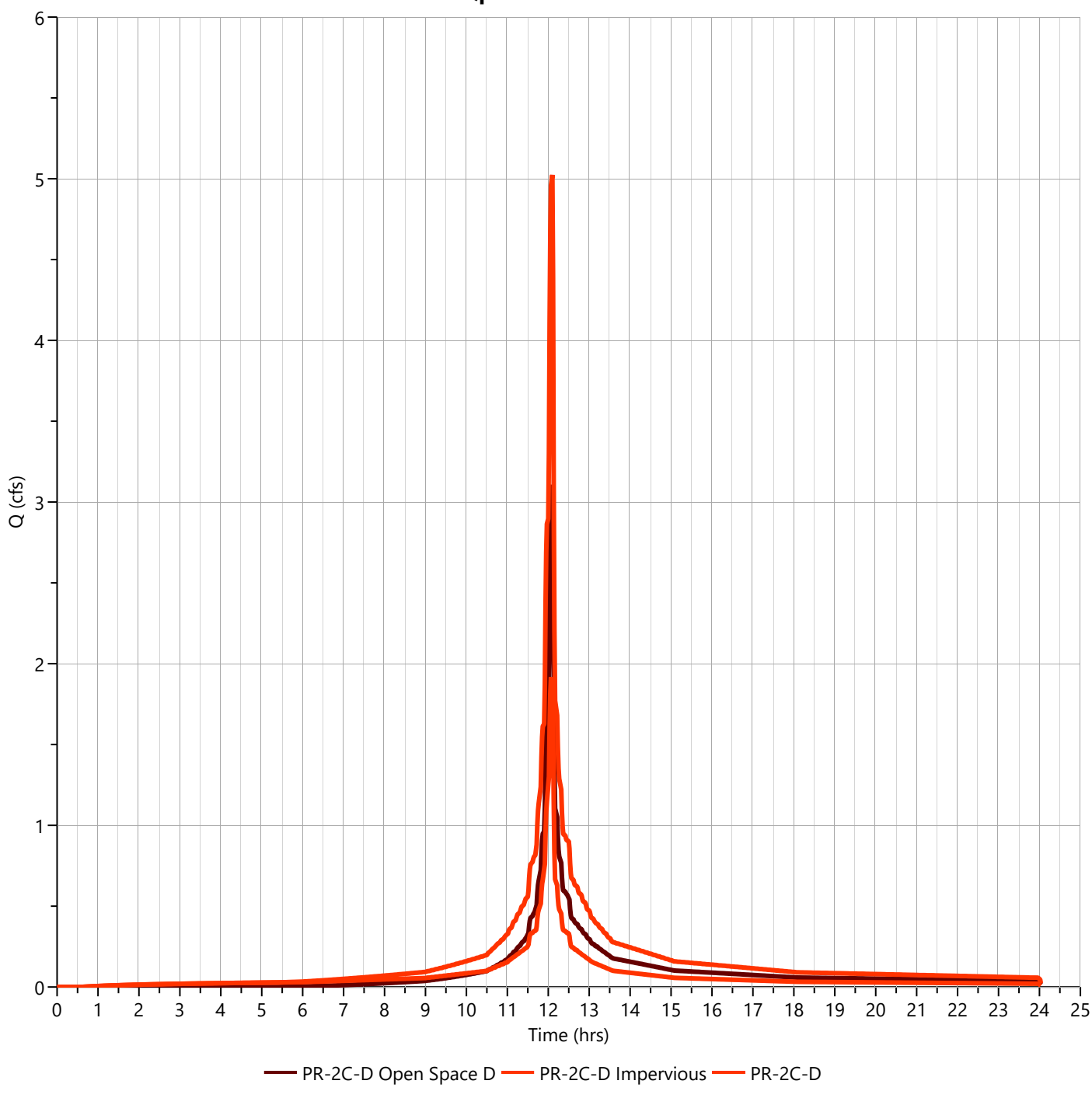
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-D

Hyd. No. 61

Hydrograph Type	= Junction	Peak Flow	= 5.024 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 15,154 cuft
Inflow Hydrographs	= 59, 60	Total Contrib. Area	= 0.87 ac



Hydrograph Report

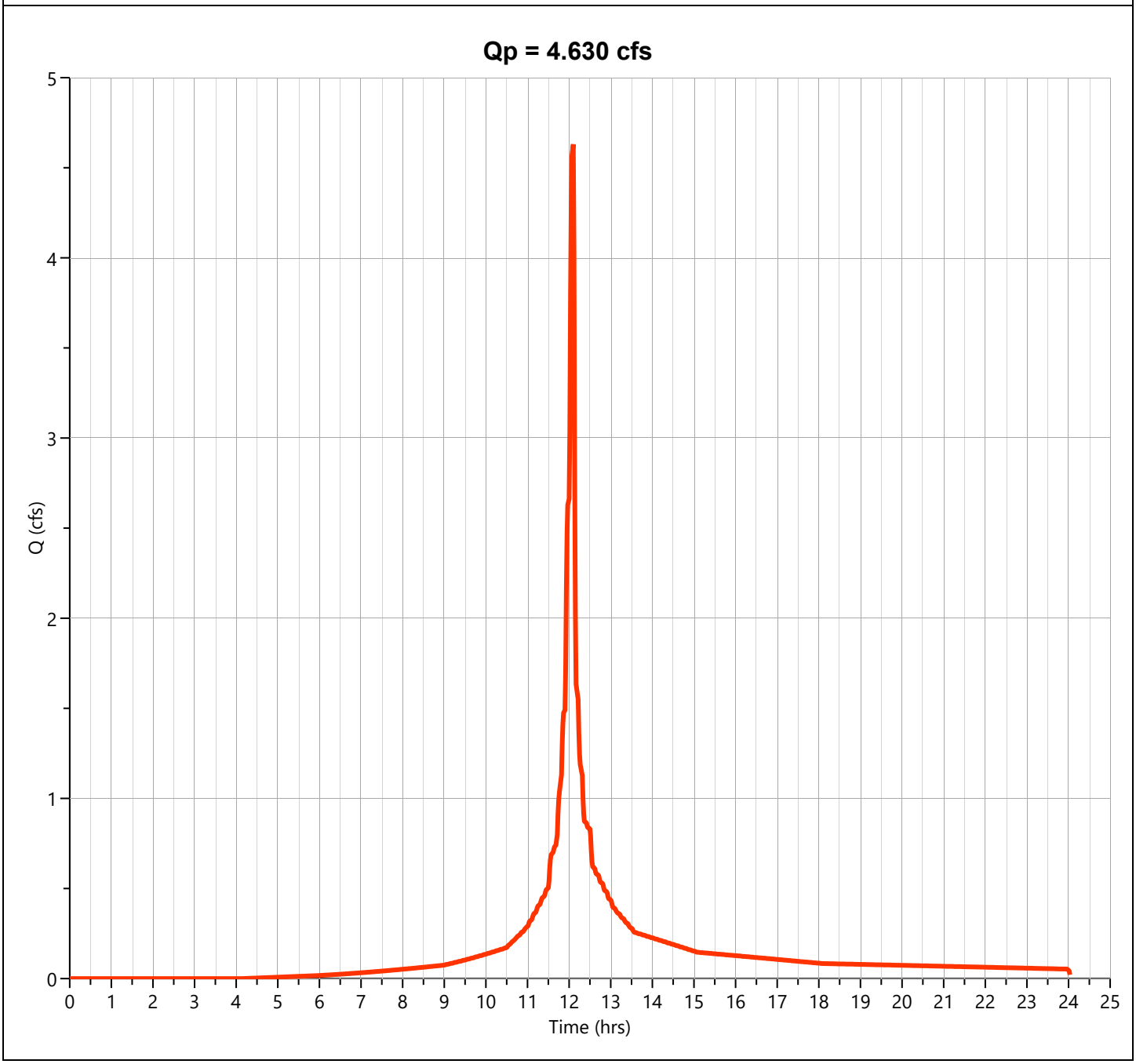
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-D Open Space D

Hyd. No. 59

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.630 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 13,414 cuft
Drainage Area	= 0.58 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

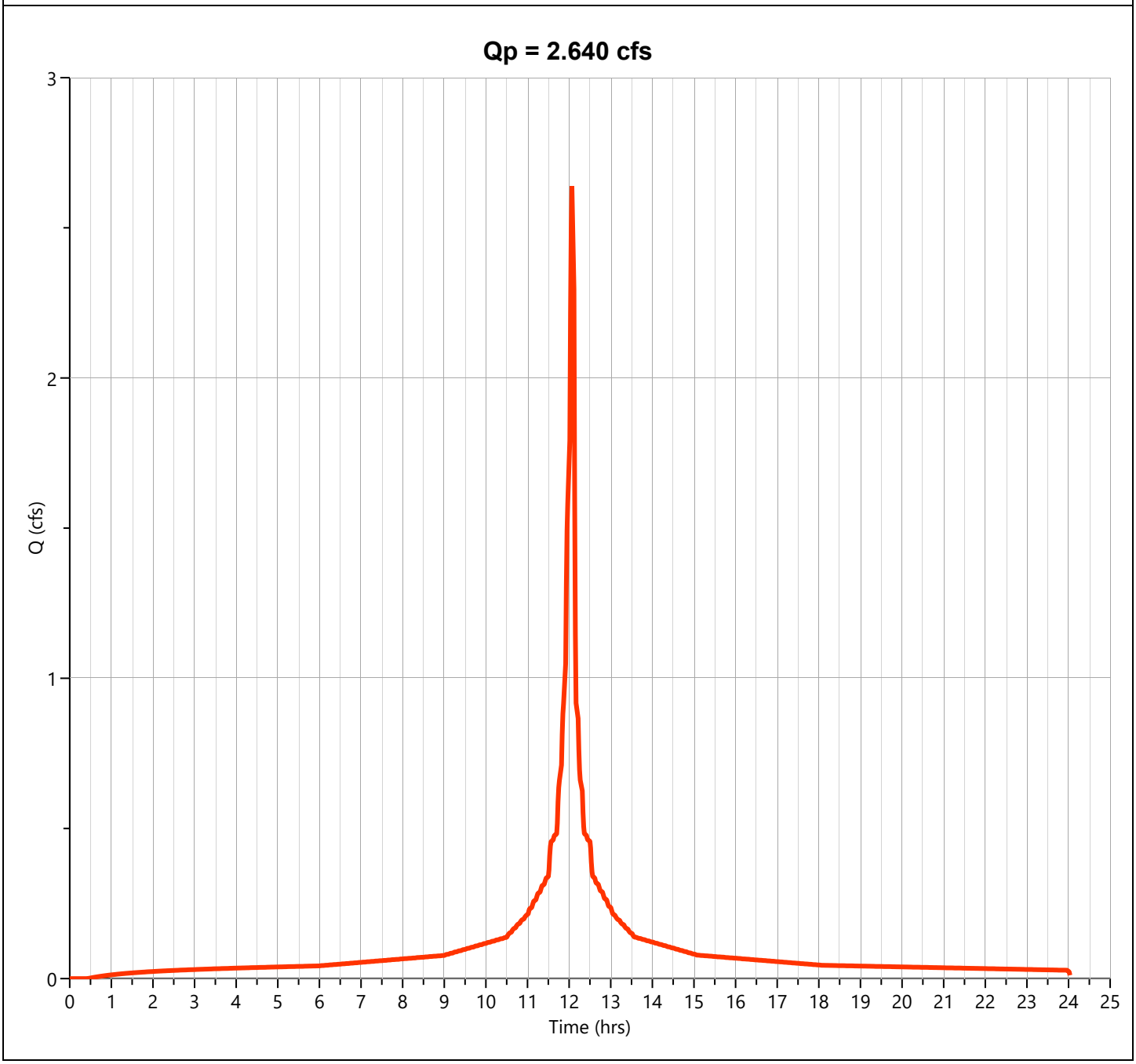
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-D Impervious

Hyd. No. 60

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.640 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 8,882 cuft
Drainage Area	= 0.29 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

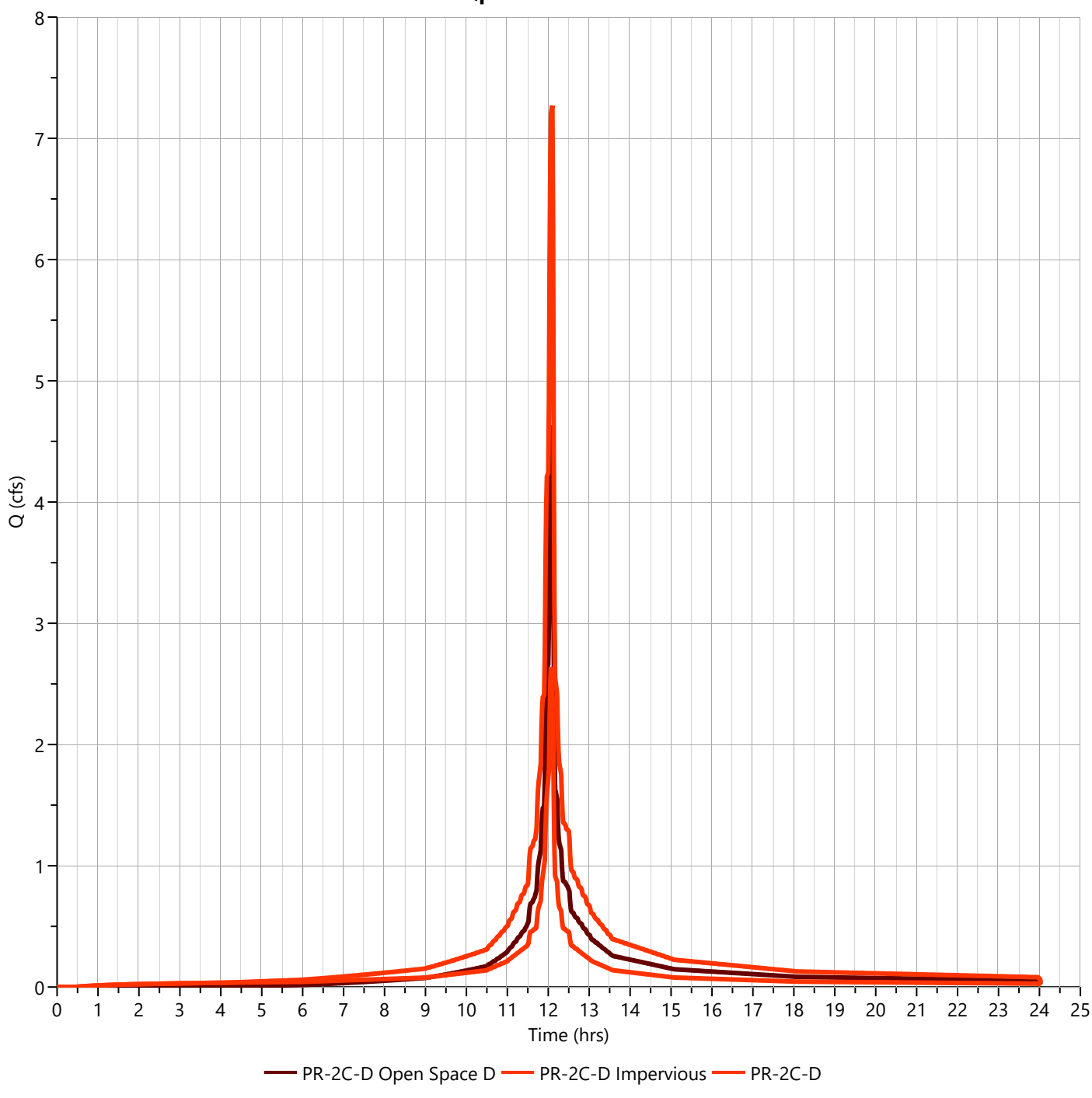
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-D

Hyd. No. 61

Hydrograph Type	= Junction	Peak Flow	= 7.270 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 22,296 cuft
Inflow Hydrographs	= 59, 60	Total Contrib. Area	= 0.87 ac



PR-2C-UNDISTURBED WATERSHED

Project: Eagle Rock Avenue | **By:** TEG | **Date:** 10/21/2025

Location: West Orange, NJ | **Checked By:** MJV | **Date Checked:** 10/21/2025

Circle One: (Present) Developed — **Current Proposed Watershed PR-2C-U 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	89		
4.	Two-year 24-hr rainfall, P_2		in	3.46		
5.	Land Slope, s		ft/ft	0.089		
6.	Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.010	+	+
				Sheet Flow Sub-Total		0.010 hours

Shallow Concentrated Flow

			Segment ID	2		
7.	Surface Description			Pavement		
8.	Flow Length, L		ft	29		
9.	Watercourse Slope, s		ft/ft	0.010		
10.	Average Velocity, V (NEH table 15-3)		ft/s	2.05		
11.	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	4	5
12.	Flow Length, L		ft	157	36	139
13.	Cross Sectional flow area, a		ft^2	0.61	0.61	0.61
14.	Wetted Perimeter, P_w		ft	2.00	2.00	2.00
15.	Hydraulic Radius, r	$r = a / P_w$	ft	0.31	0.31	0.31
16.	Channel Slope, s		ft/ft	0.028	0.080	0.040
17.	Manning's Roughness Coeff., n			0.012	0.012	0.012
18.	Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s	9.34	15.91	11.25
19.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.005	+ 0.001	+ 0.003
				Channel Flow Sub-Total		0.009 hours

Channel Flow

			Segment ID	6	7	8
20.	Flow Length, L		ft	79	54	195
21.	Cross Sectional flow area, a		ft^2	0.61	0.61	0.88
22.	Wetted Perimeter, P_w		ft	2.00	2.00	2.40
23.	Hydraulic Radius, r	$r = a / P_w$	ft	0.31	0.31	0.37
24.	Channel Slope, s		ft/ft	0.020	0.015	0.013
25.	Manning's Roughness Coeff., n			0.012	0.012	0.013
26.	Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s	7.96	6.89	6.71
27.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.003	+ 0.002	+ 0.008
				Channel Flow Sub-Total		0.013 hours

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

Total Tc (hours) =	0.035 hours
Total Tc (minutes) =	2 minutes

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: (**Present**) Developed — **Current Proposed Watershed PR-2C-U 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	0.060		
6.	Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.222	+	+

Sheet Flow Sub-Total: **0.222 hours**

Shallow Concentrated Flow

			Segment ID	2	3	4
7.	Surface Description			Woodlands	Grassed Waterways	Pavement
8.	Flow Length, L		ft	155	68	15
9.	Watercourse Slope, s		ft/ft	0.049	0.055	0.055
10.	Average Velocity, V (NEH table 15-3)		ft/s	1.12	3.80	4.78
11.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.039	+ 0.005	+ 0.001

Shallow Conc. Flow Sub-Total: **0.044 hours**

Channel Flow

			Segment ID	5	6	
12.	Flow Length, L		ft	10	125	
13.	Cross Sectional flow area, a		ft^2	0.61	0.61	
14.	Wetted Perimeter, P_w		ft	1.96	1.96	
15.	Hydraulic Radius, r	$r = a / P_w$	ft	0.31	0.31	
16.	Channel Slope, s		ft/ft	0.113	0.009	
17.	Manning's Roughness Coeff., n			0.013	0.013	
18.	Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s	17.69	5.11	
19.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.000	+ 0.007	+

Channel Flow Sub-Total: **0.007 hours**

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

Total Tc (hours) =	**0.273 hours**
Total Tc (minutes) =	**16 minutes**

Hydrograph Report

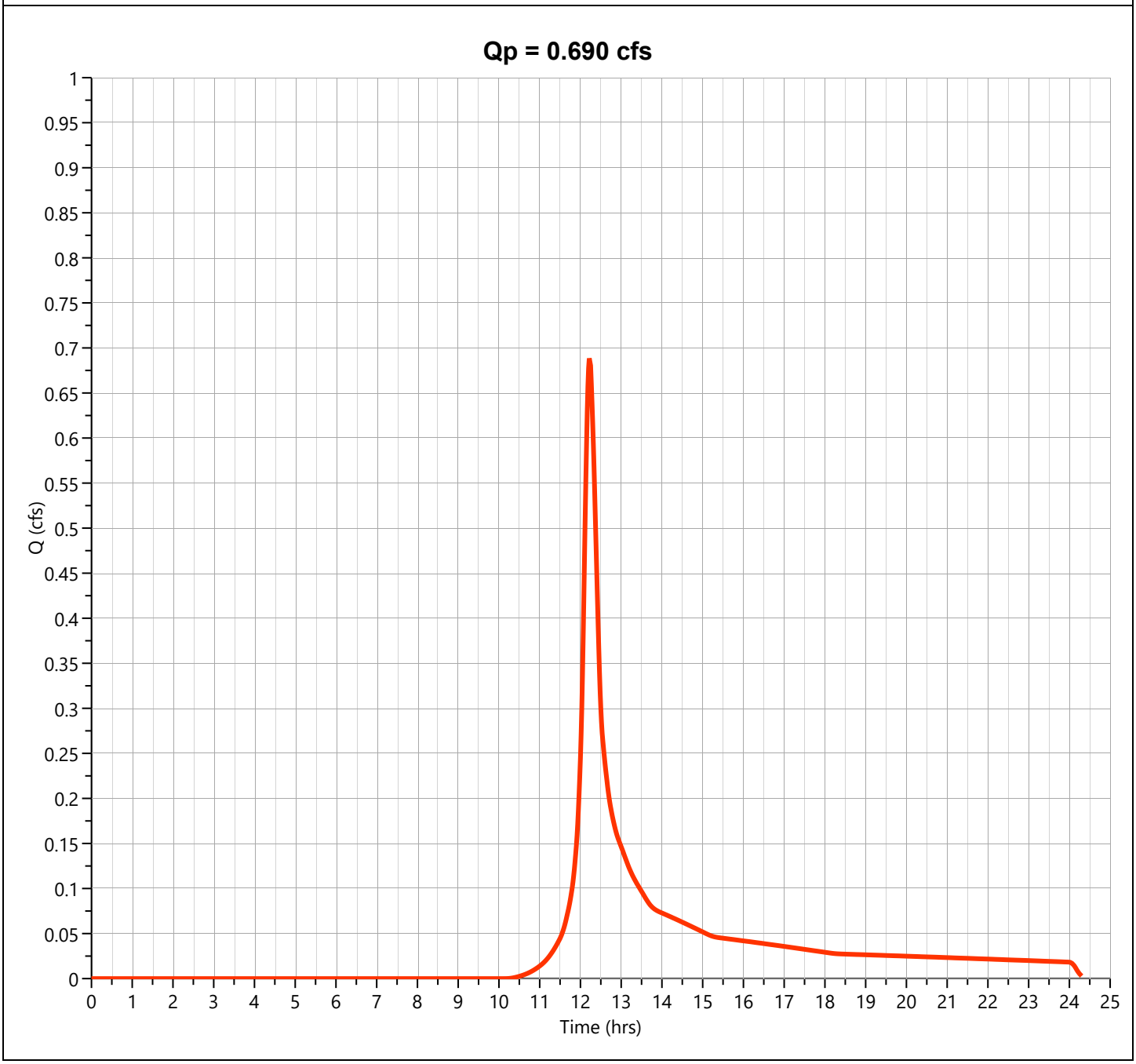
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-U Open Space C

Hyd. No. 63

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.690 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Runoff Volume	= 3,030 cuft
Drainage Area	= 0.68 ac	Curve Number	= 74.00
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

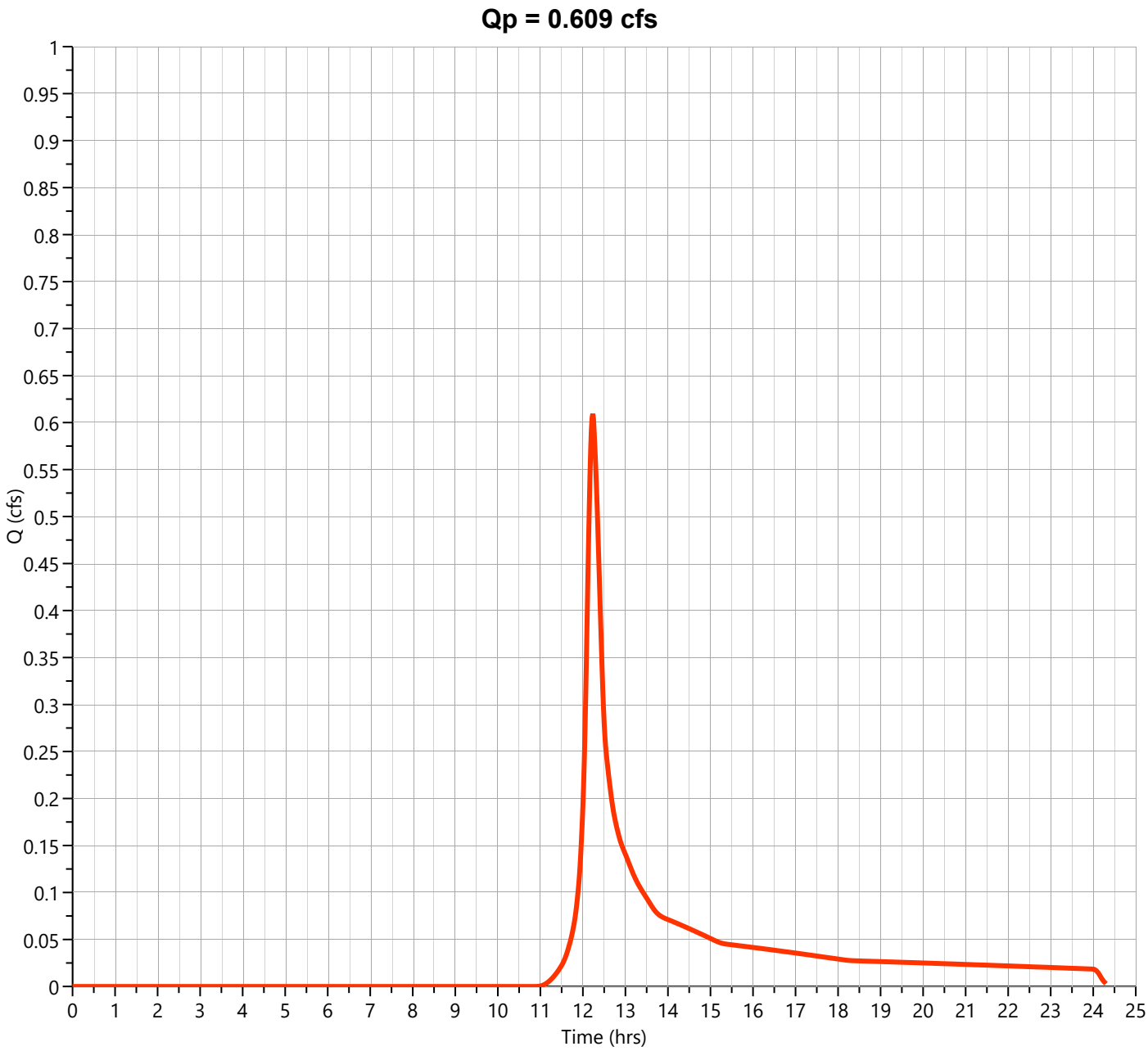
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-U Woods C

Hyd. No. 64

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.609 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Runoff Volume	= 2,783 cuft
Drainage Area	= 0.77 ac	Curve Number	= 70.00
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

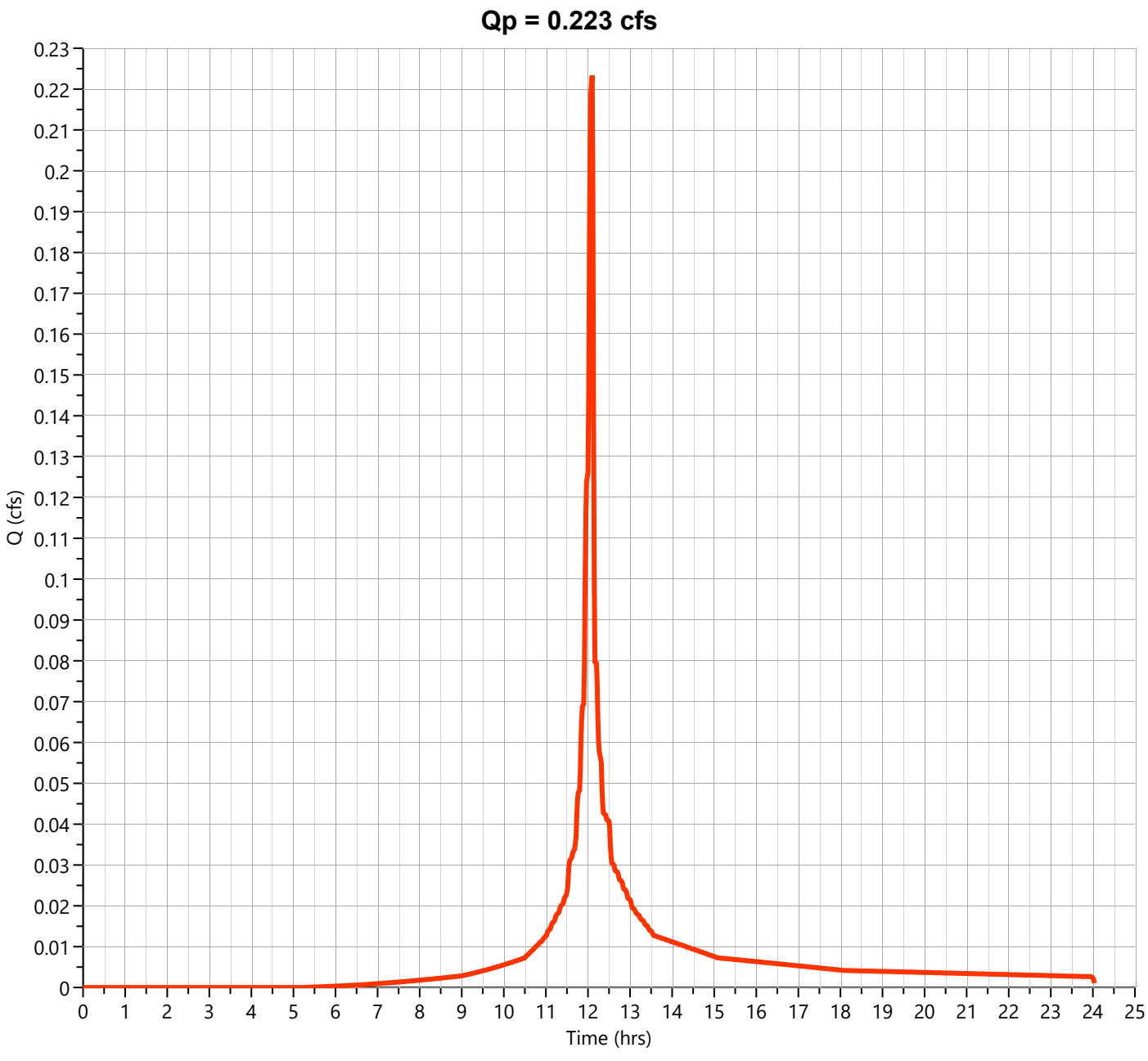
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-U Gravel C

Hyd. No. 65

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.223 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 632 cuft
Drainage Area	= 0.08 ac	Curve Number	= 89.00
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

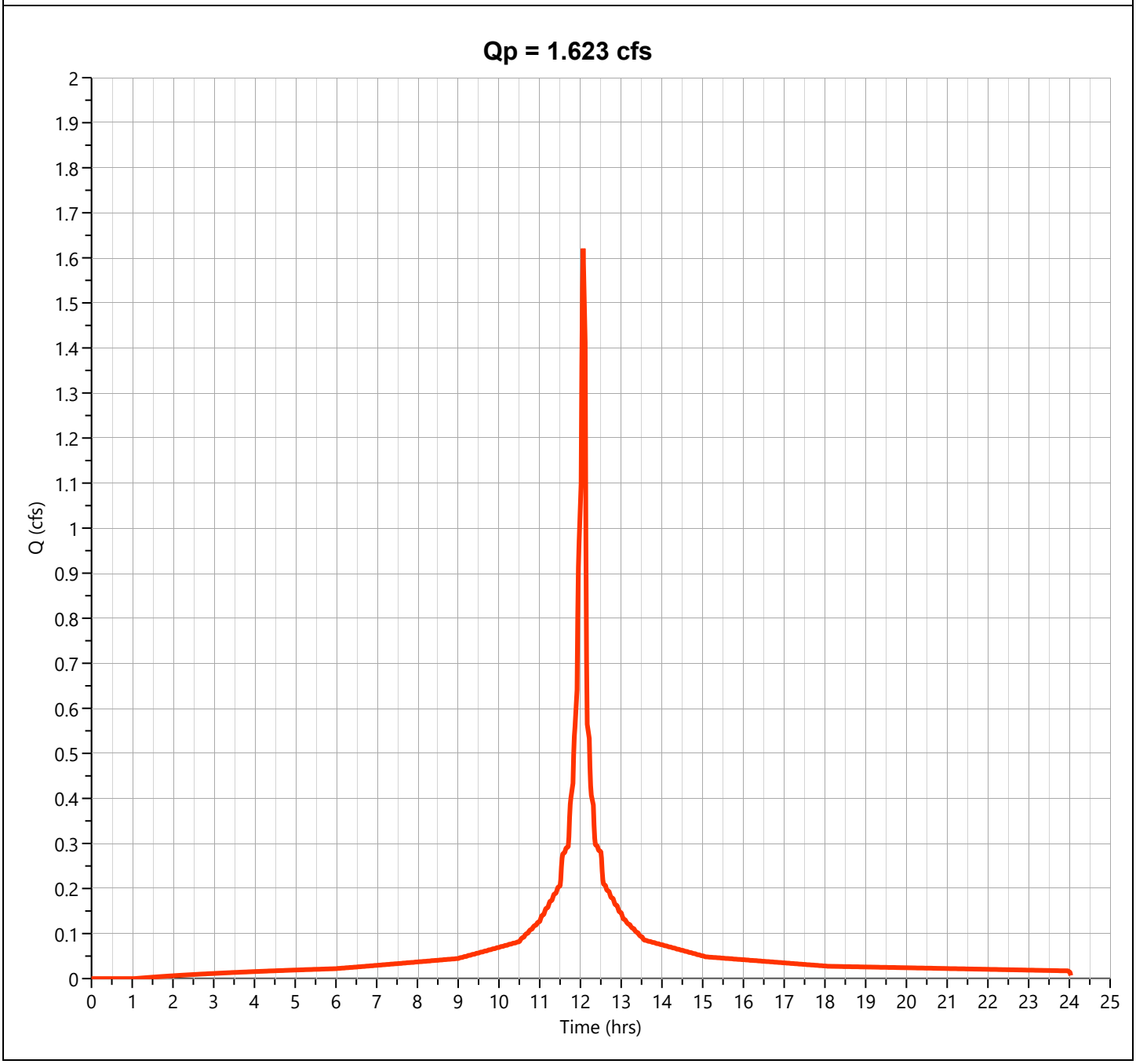
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-U Impervious

Hyd. No. 66

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.623 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 5,271 cuft
Drainage Area	= 0.48 ac	Curve Number	= 98.00
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

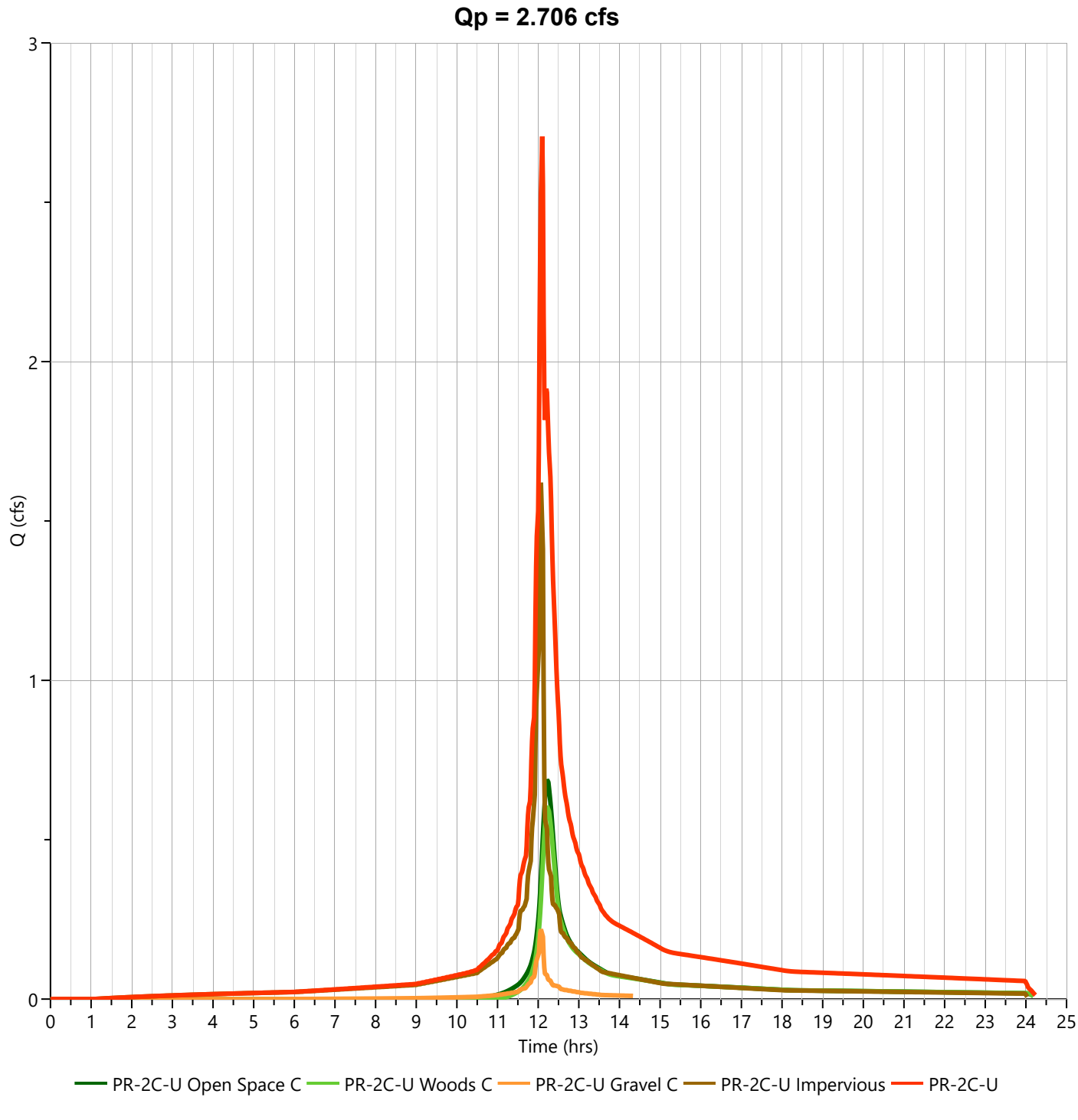
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-U

Hyd. No. 67

Hydrograph Type	= Junction	Peak Flow	= 2.706 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 11,716 cuft
Inflow Hydrographs	= 63, 64, 65, 66	Total Contrib. Area	= 2.01 ac



Hydrograph Report

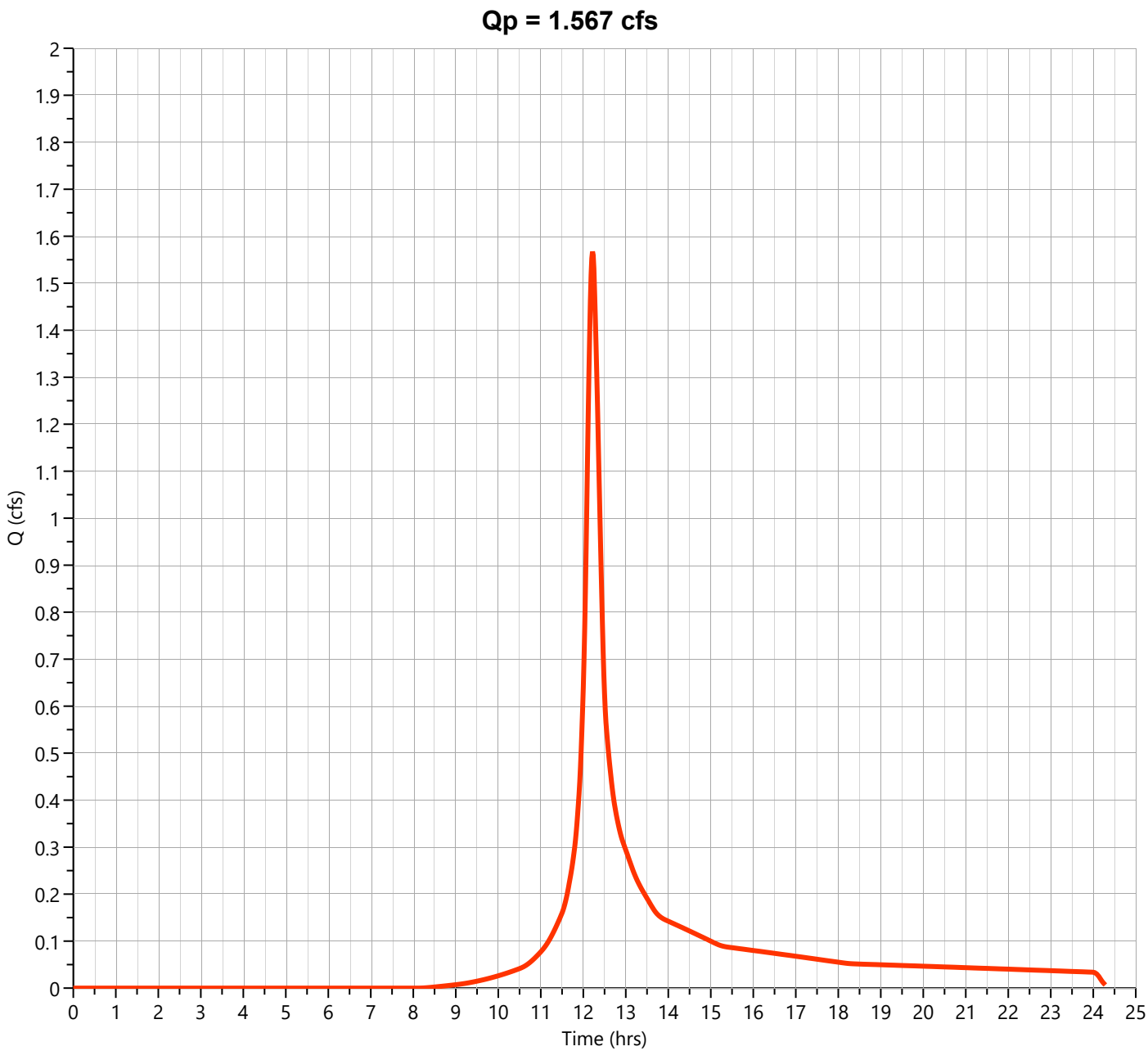
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-U Open Space C

Hyd. No. 63

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.567 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.22 hrs
Time Interval	= 1 min	Runoff Volume	= 6,675 cuft
Drainage Area	= 0.68 ac	Curve Number	= 74.00
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

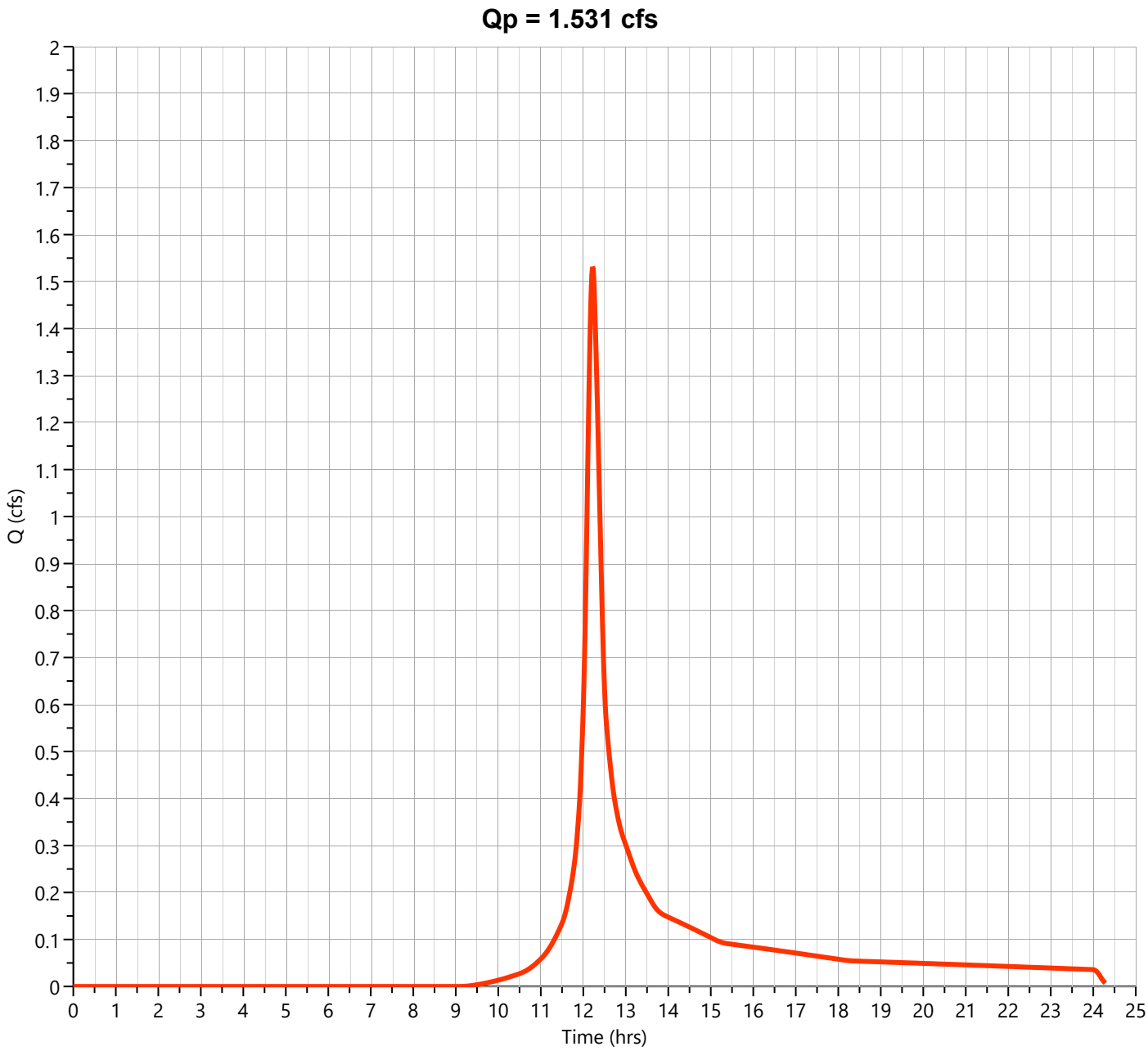
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-U Woods C

Hyd. No. 64

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.531 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.22 hrs
Time Interval	= 1 min	Runoff Volume	= 6,572 cuft
Drainage Area	= 0.77 ac	Curve Number	= 70.00
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

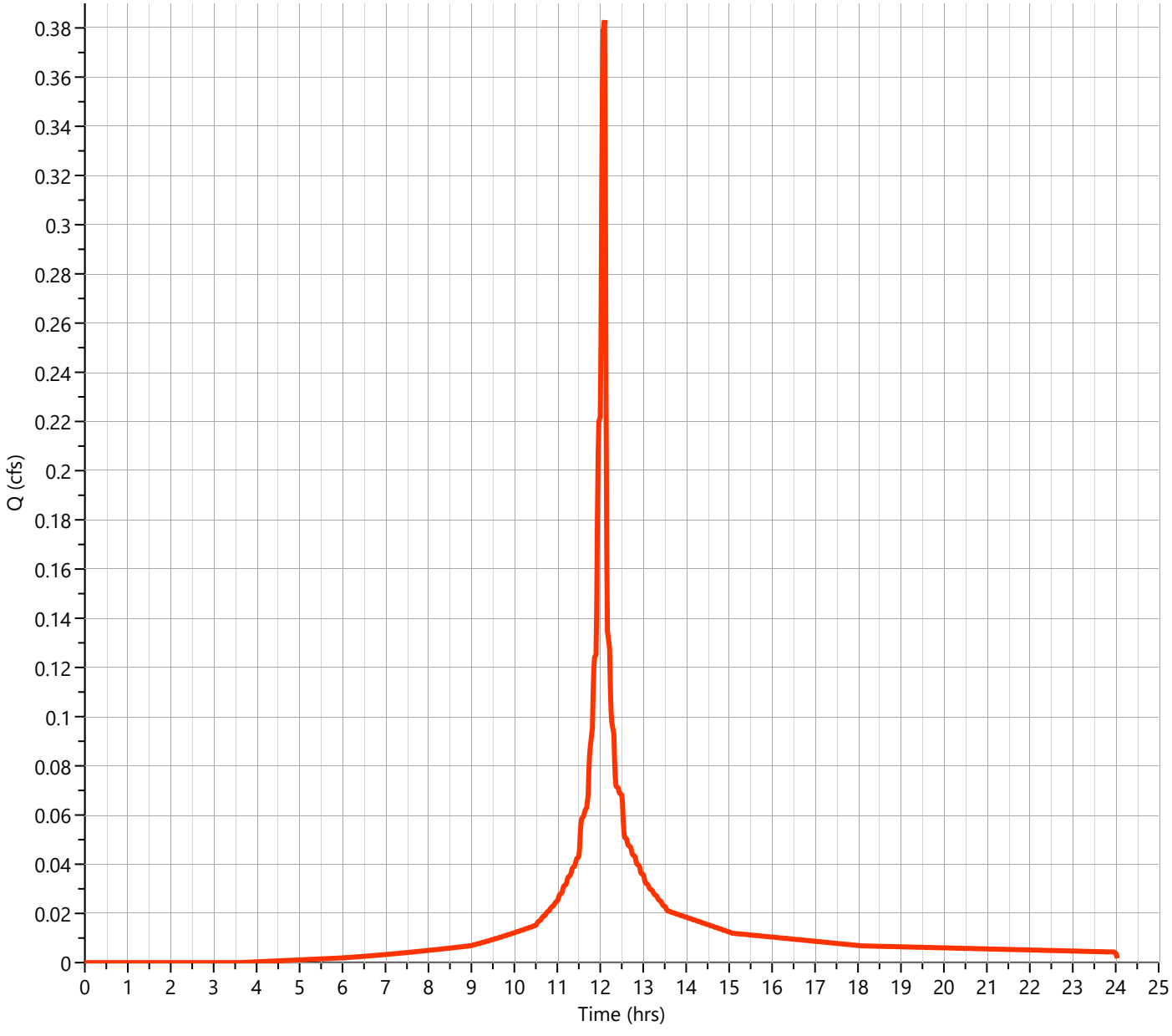
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-U Gravel C

Hyd. No. 65

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.383 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,126 cuft
Drainage Area	= 0.08 ac	Curve Number	= 89.00
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

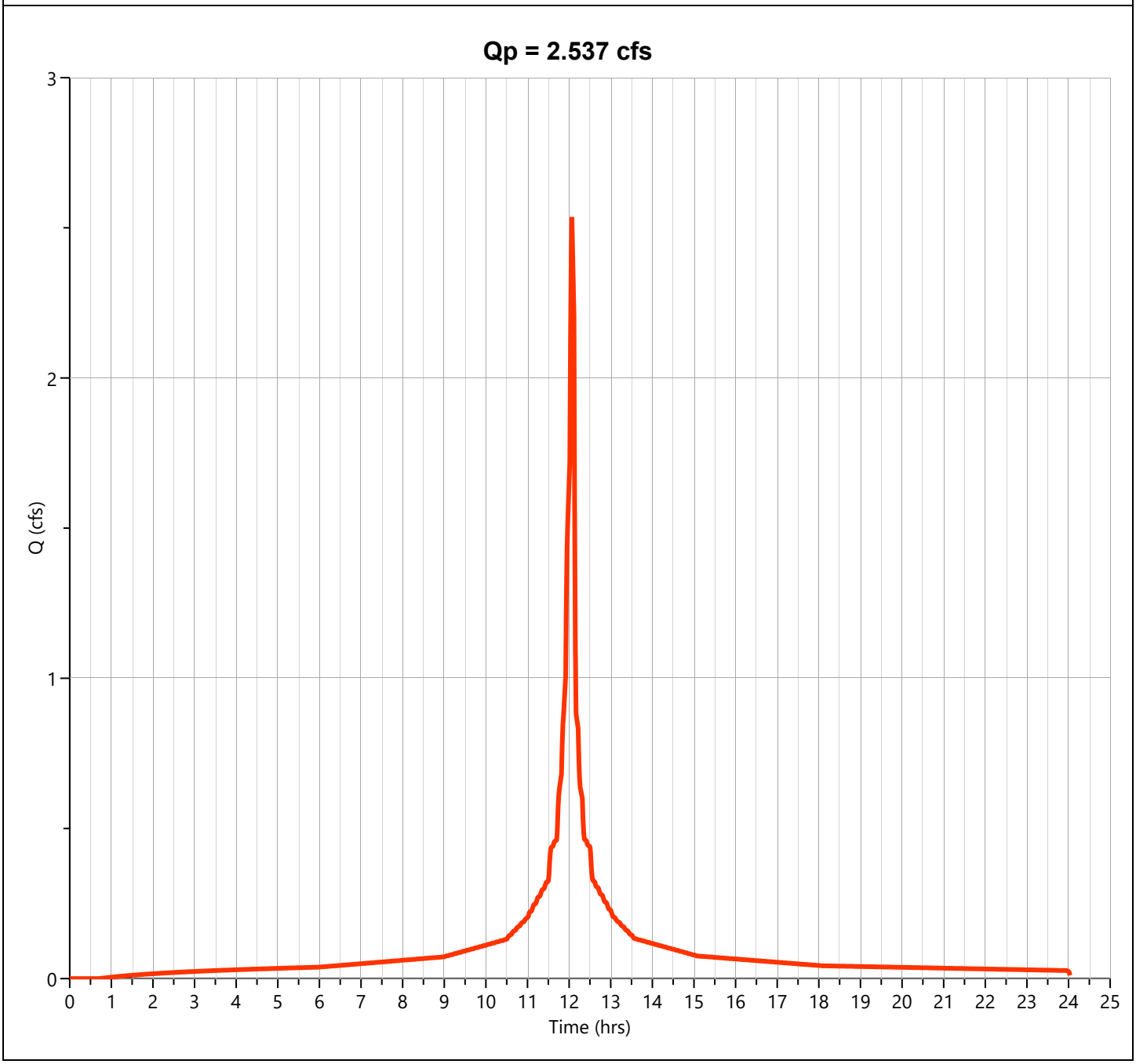
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-U Impervious

Hyd. No. 66

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.537 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 8,400 cuft
Drainage Area	= 0.48 ac	Curve Number	= 98.00
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

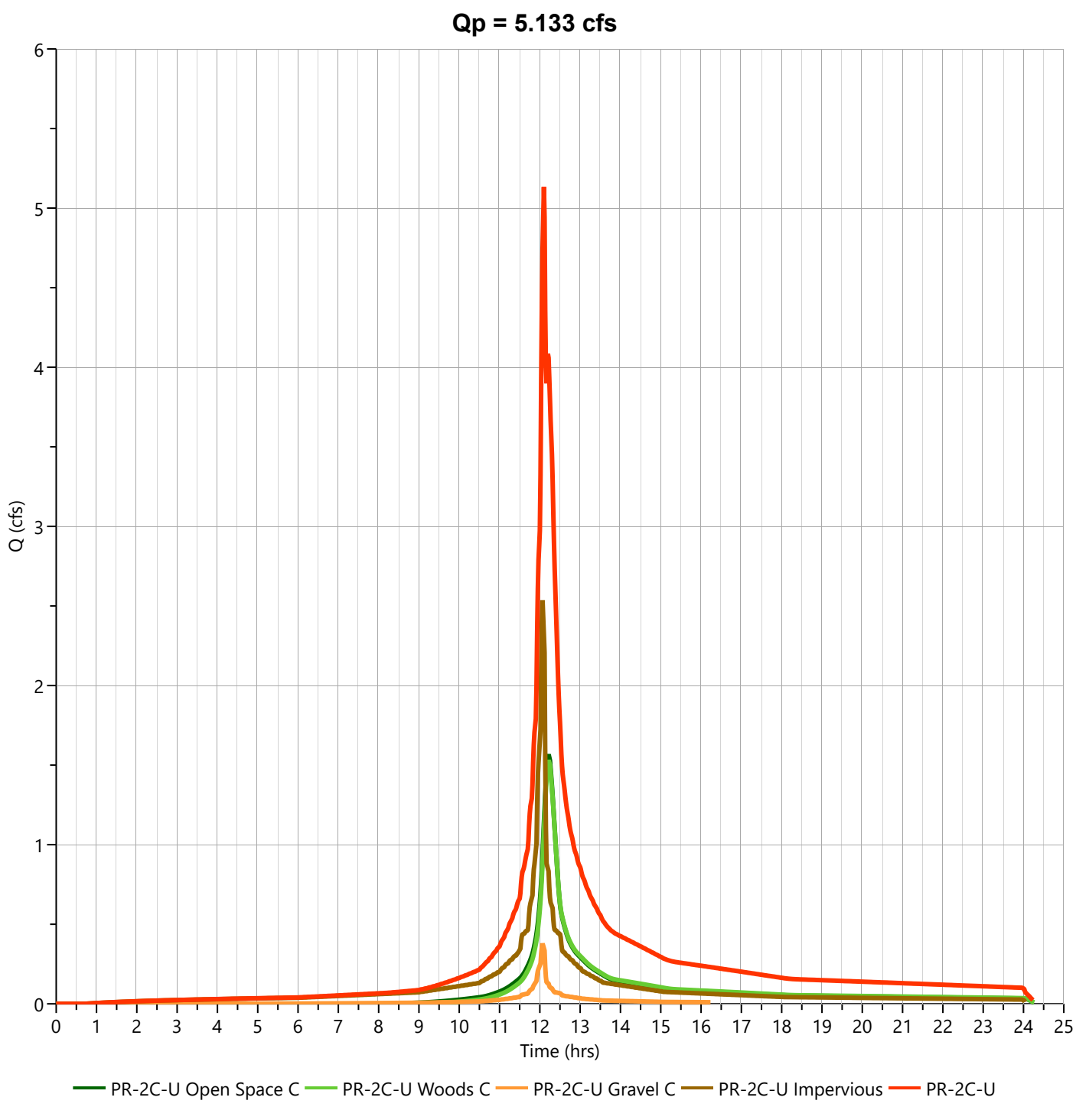
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-U

Hyd. No. 67

Hydrograph Type	= Junction	Peak Flow	= 5.133 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 22,774 cuft
Inflow Hydrographs	= 63, 64, 65, 66	Total Contrib. Area	= 2.01 ac



Hydrograph Report

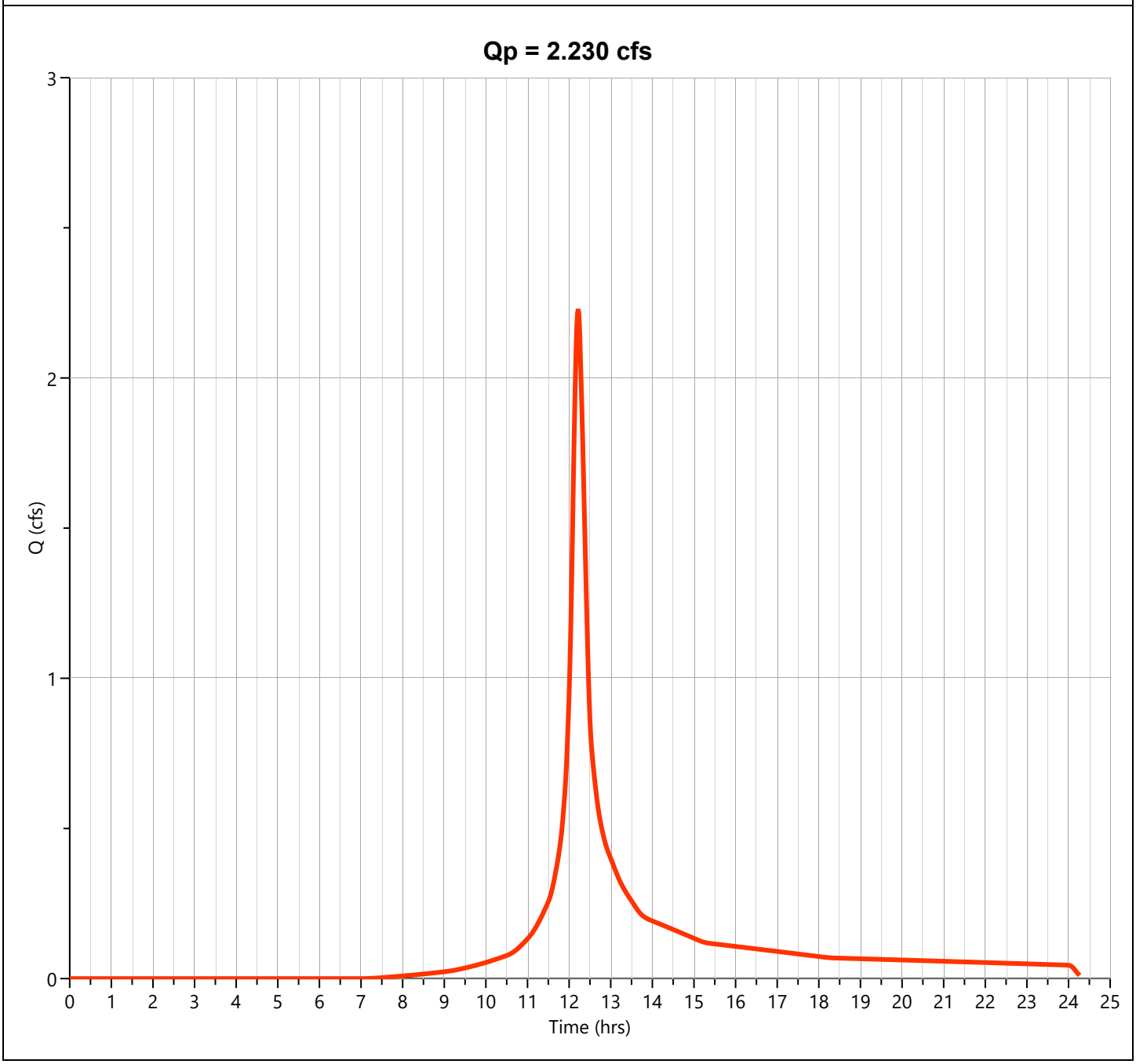
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-U Open Space C

Hyd. No. 63

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.230 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.22 hrs
Time Interval	= 1 min	Runoff Volume	= 9,495 cuft
Drainage Area	= 0.68 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 16.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

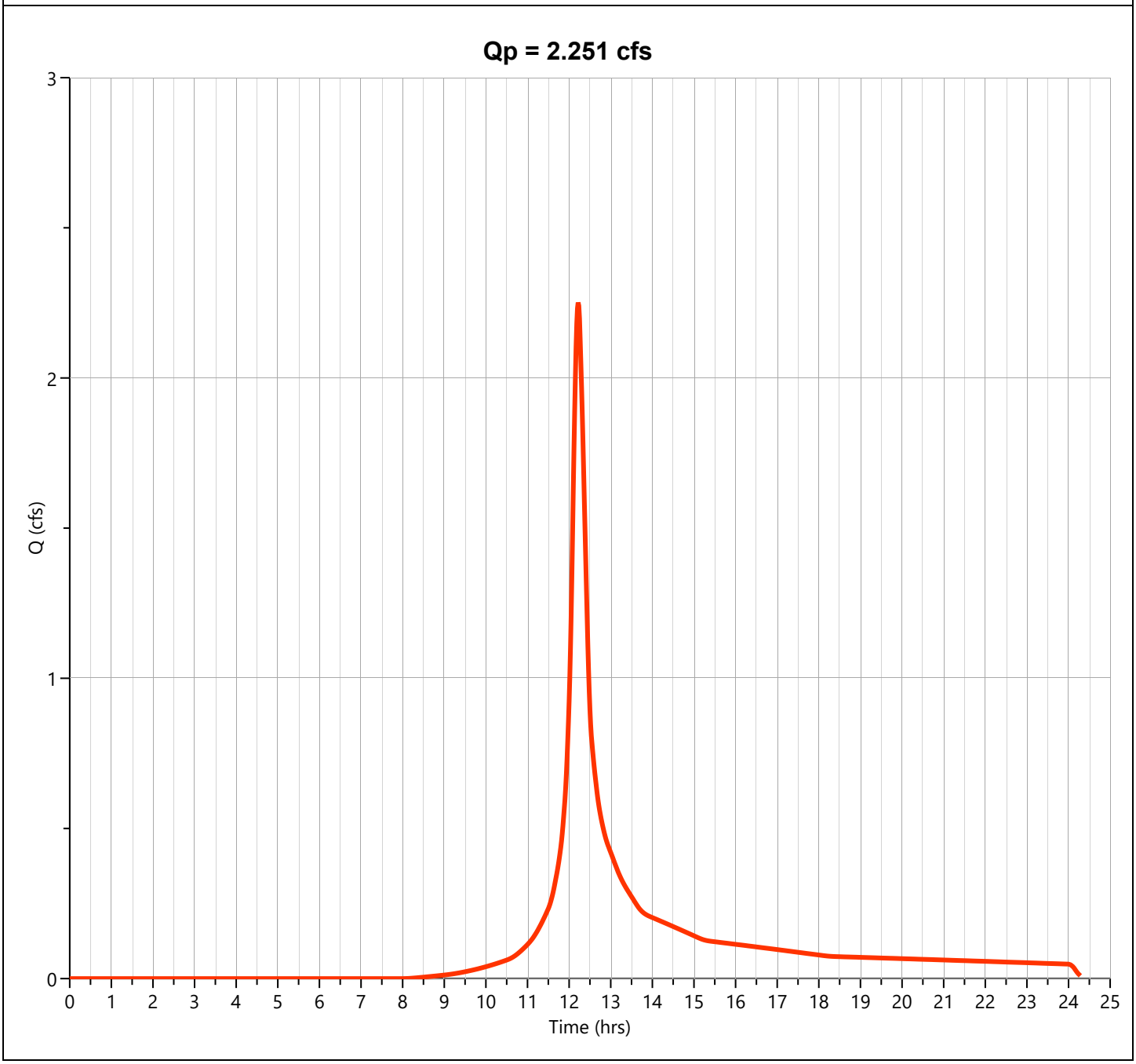
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-U Woods C

Hyd. No. 64

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.251 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.22 hrs
Time Interval	= 1 min	Runoff Volume	= 9,585 cuft
Drainage Area	= 0.77 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 16.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

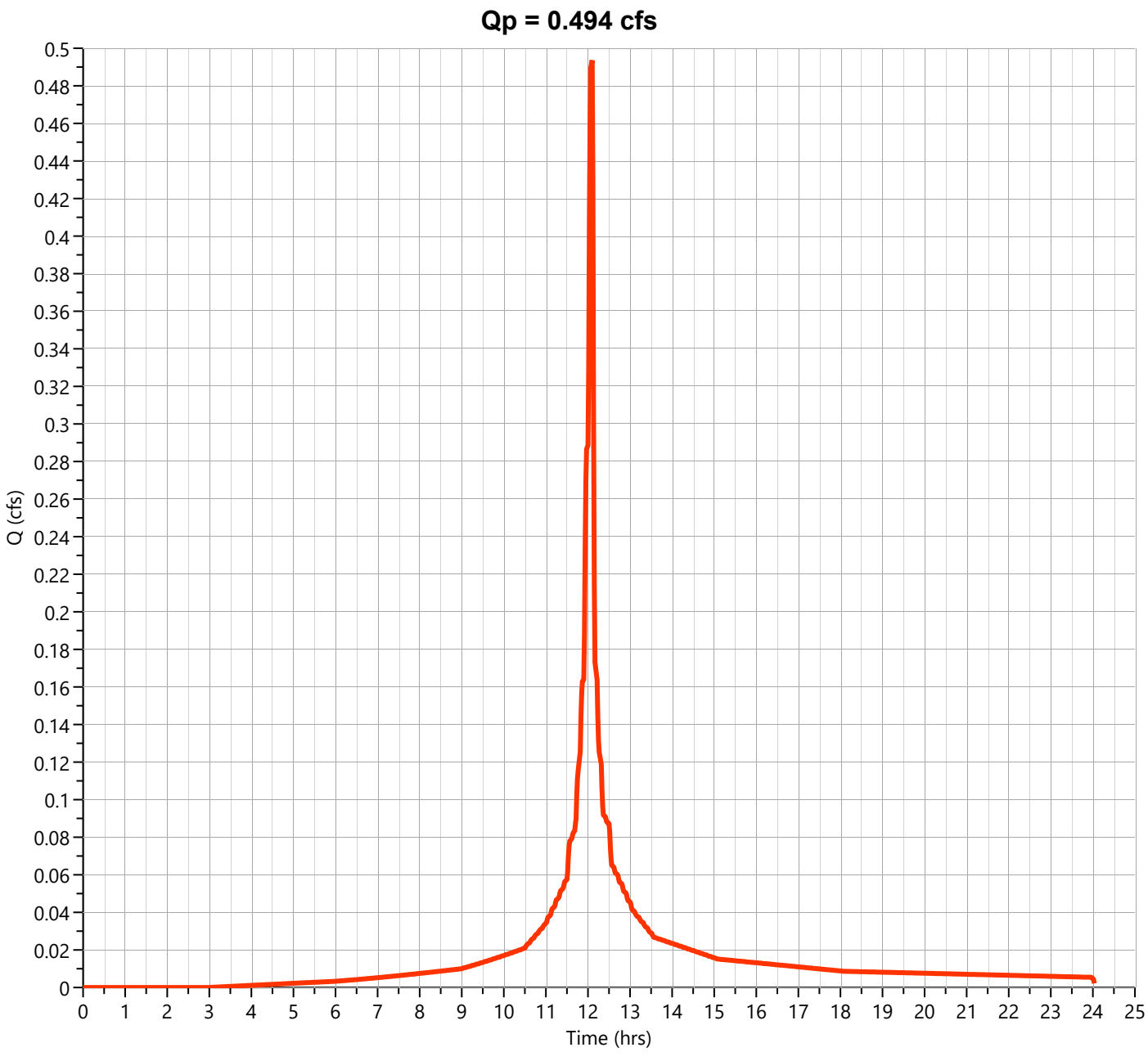
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-U Gravel C

Hyd. No. 65

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.494 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,480 cuft
Drainage Area	= 0.08 ac	Curve Number	= 89.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

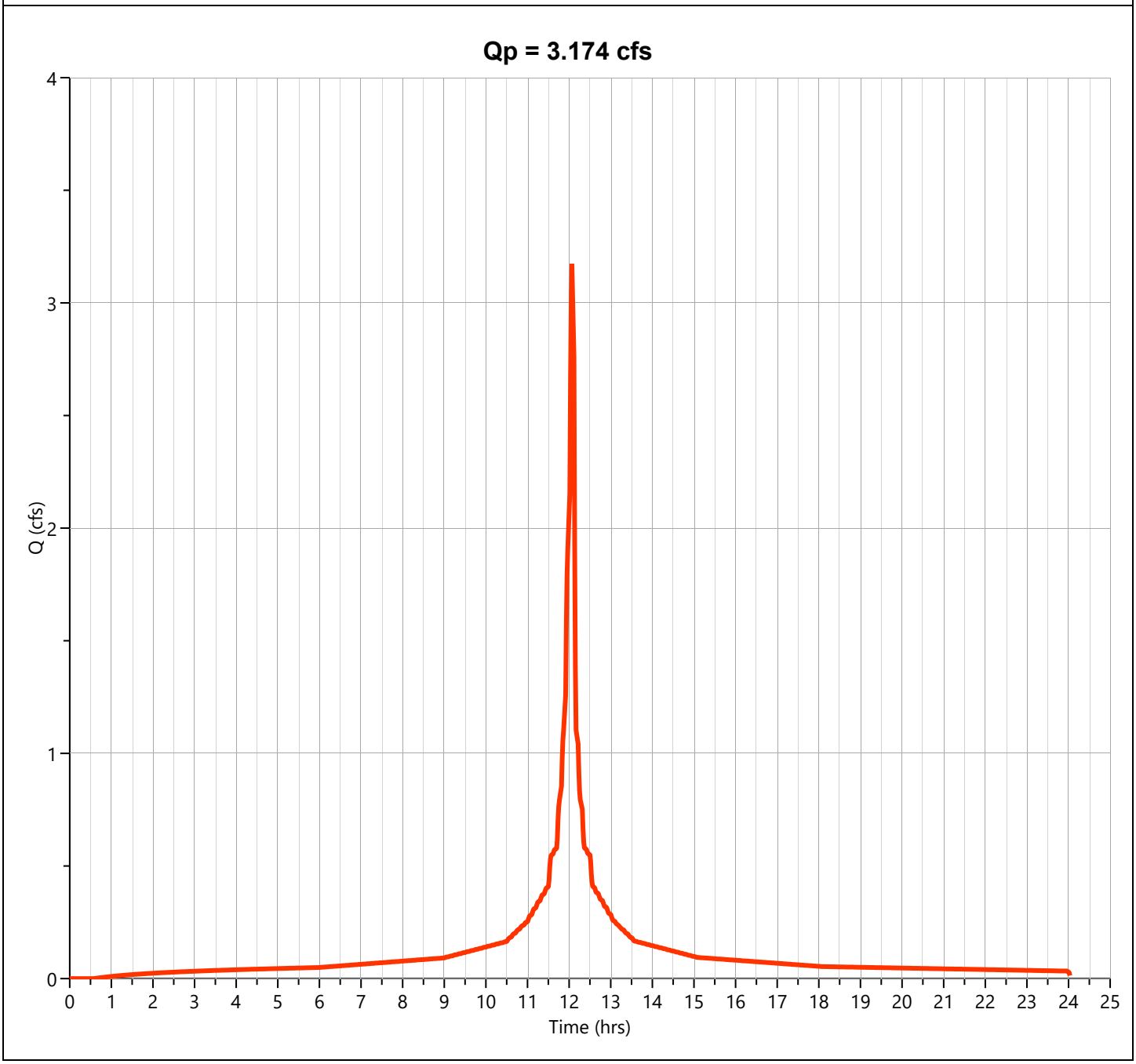
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-U Impervious

Hyd. No. 66

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.174 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 10,587 cuft
Drainage Area	= 0.48 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.72 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

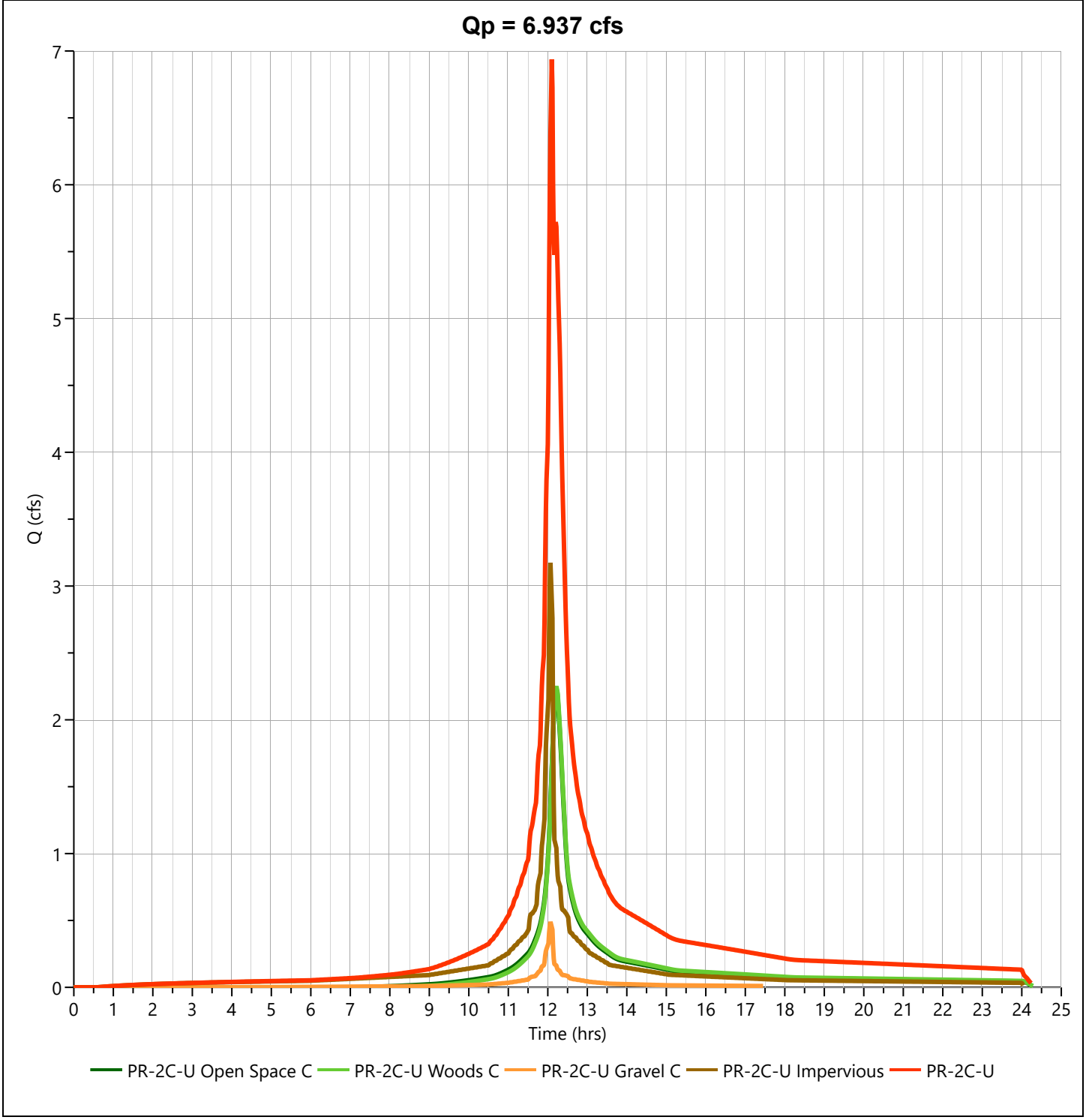
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-U

Hyd. No. 67

Hydrograph Type	= Junction	Peak Flow	= 6.937 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 31,147 cuft
Inflow Hydrographs	= 63, 64, 65, 66	Total Contrib. Area	= 2.01 ac



Hydrograph Report

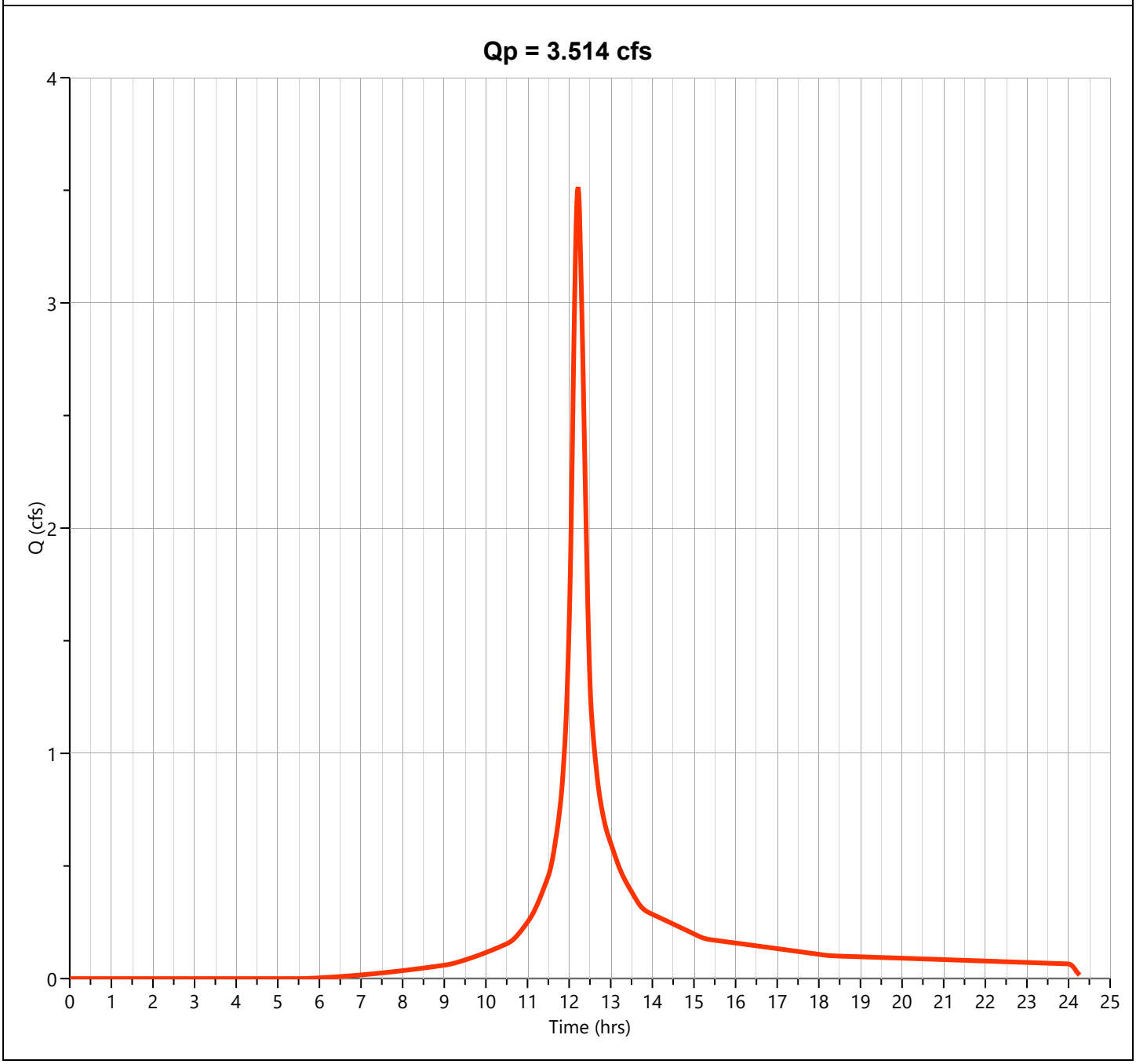
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-U Open Space C

Hyd. No. 63

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.514 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.22 hrs
Time Interval	= 1 min	Runoff Volume	= 15,116 cuft
Drainage Area	= 0.68 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 16.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

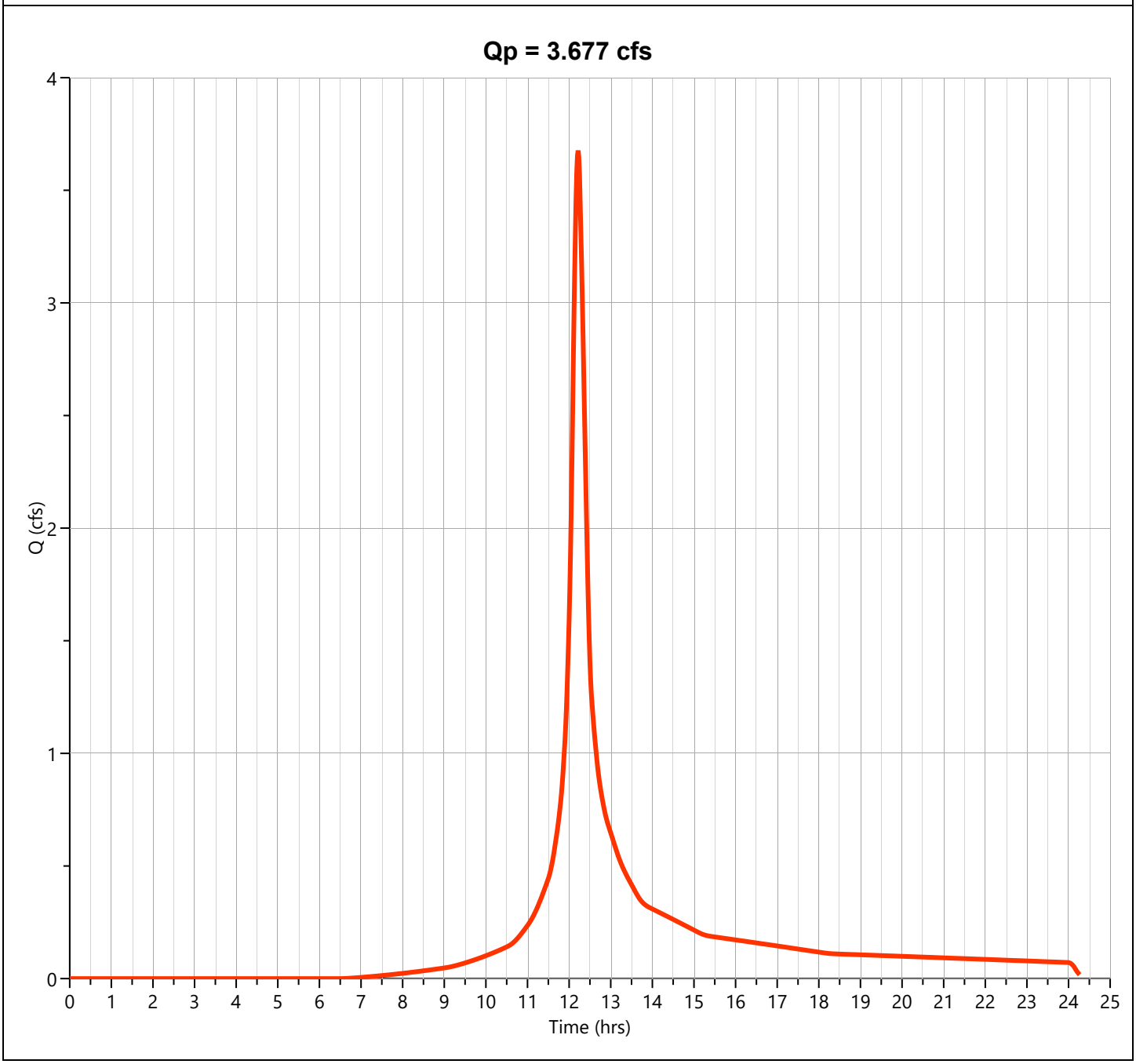
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-U Woods C

Hyd. No. 64

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.677 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.22 hrs
Time Interval	= 1 min	Runoff Volume	= 15,698 cuft
Drainage Area	= 0.77 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 16.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

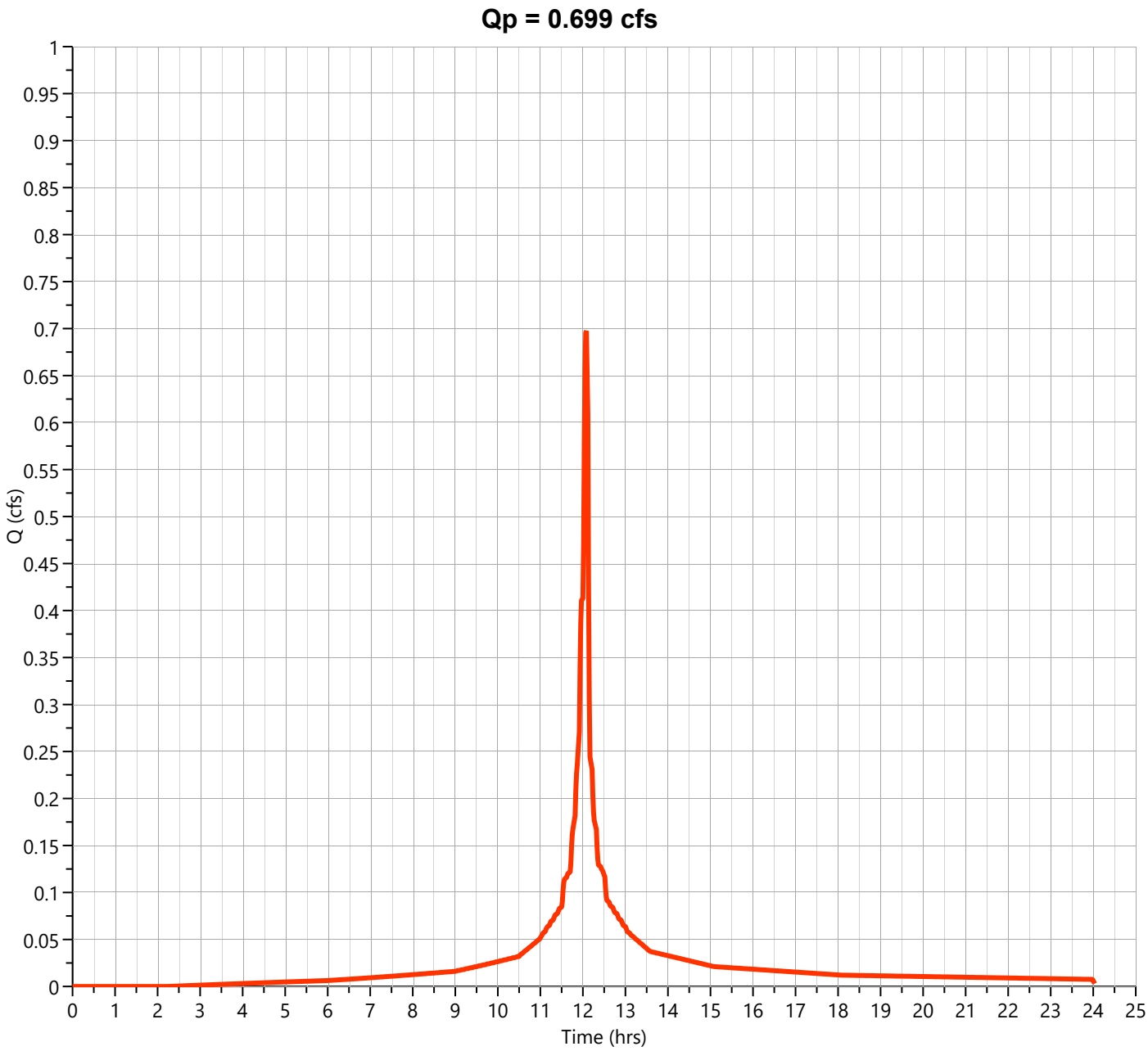
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-U Gravel C

Hyd. No. 65

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.699 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 2,152 cuft
Drainage Area	= 0.08 ac	Curve Number	= 89.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

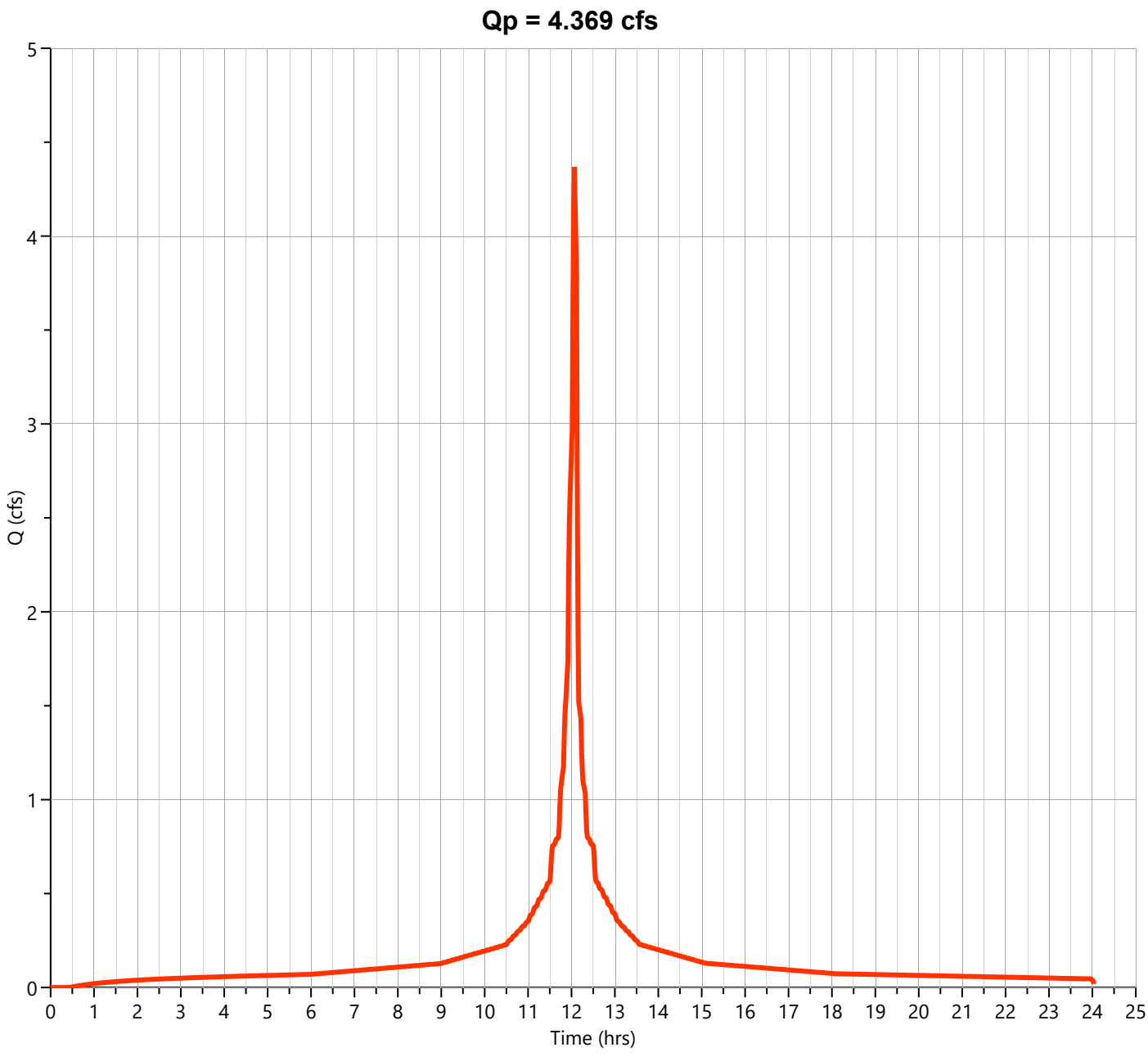
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-U Impervious

Hyd. No. 66

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.369 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 14,701 cuft
Drainage Area	= 0.48 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 9.24 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

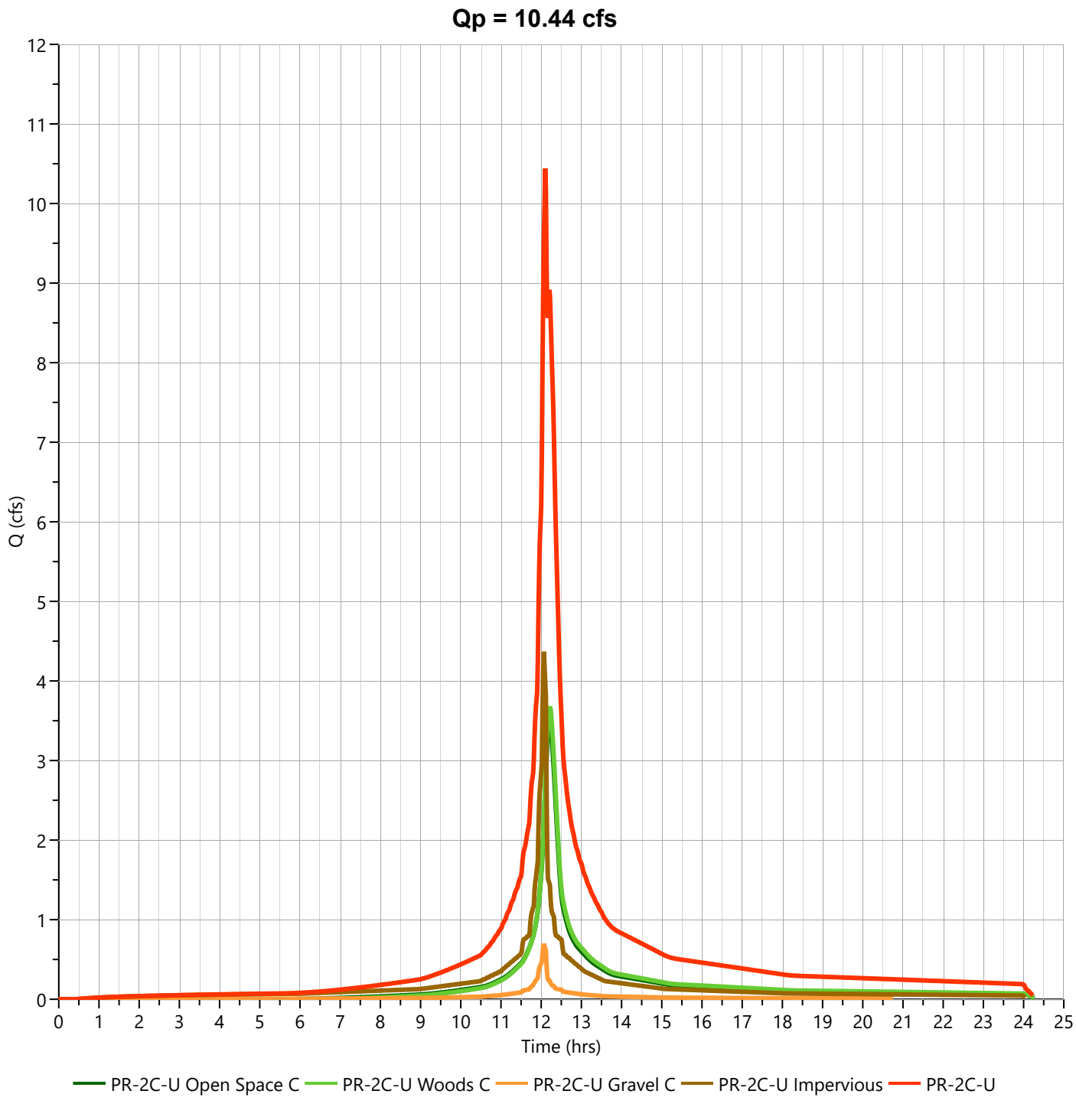
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

PR-2C-U

Hyd. No. 67

Hydrograph Type	= Junction	Peak Flow	= 10.44 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 47,667 cuft
Inflow Hydrographs	= 63, 64, 65, 66	Total Contrib. Area	= 2.01 ac



TOTAL PROPOSED FLOW TO POA-2

Hydrograph Report

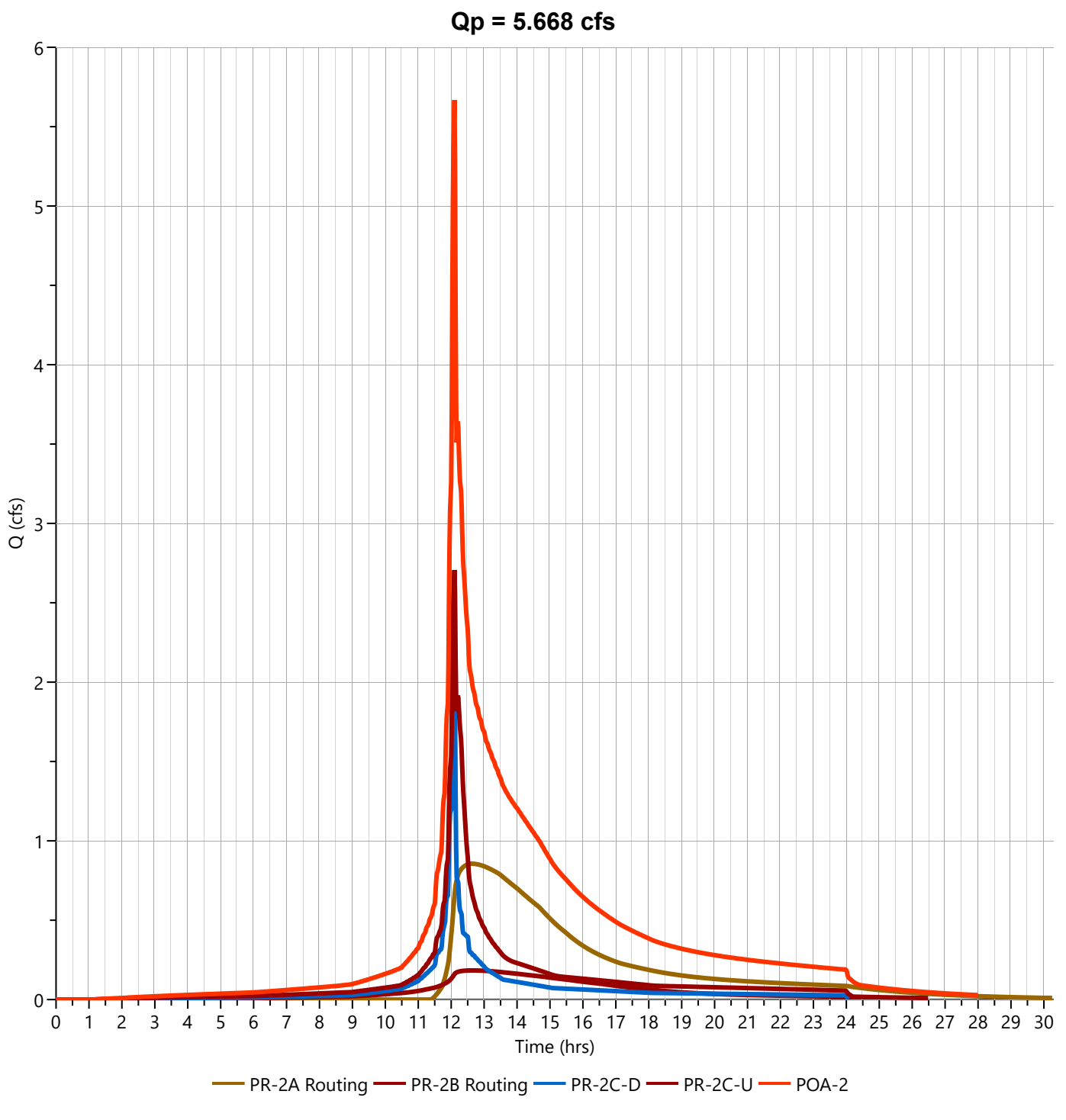
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

POA-2

Hyd. No. 70

Hydrograph Type	= Junction	Peak Flow	= 5.668 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 37,577 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

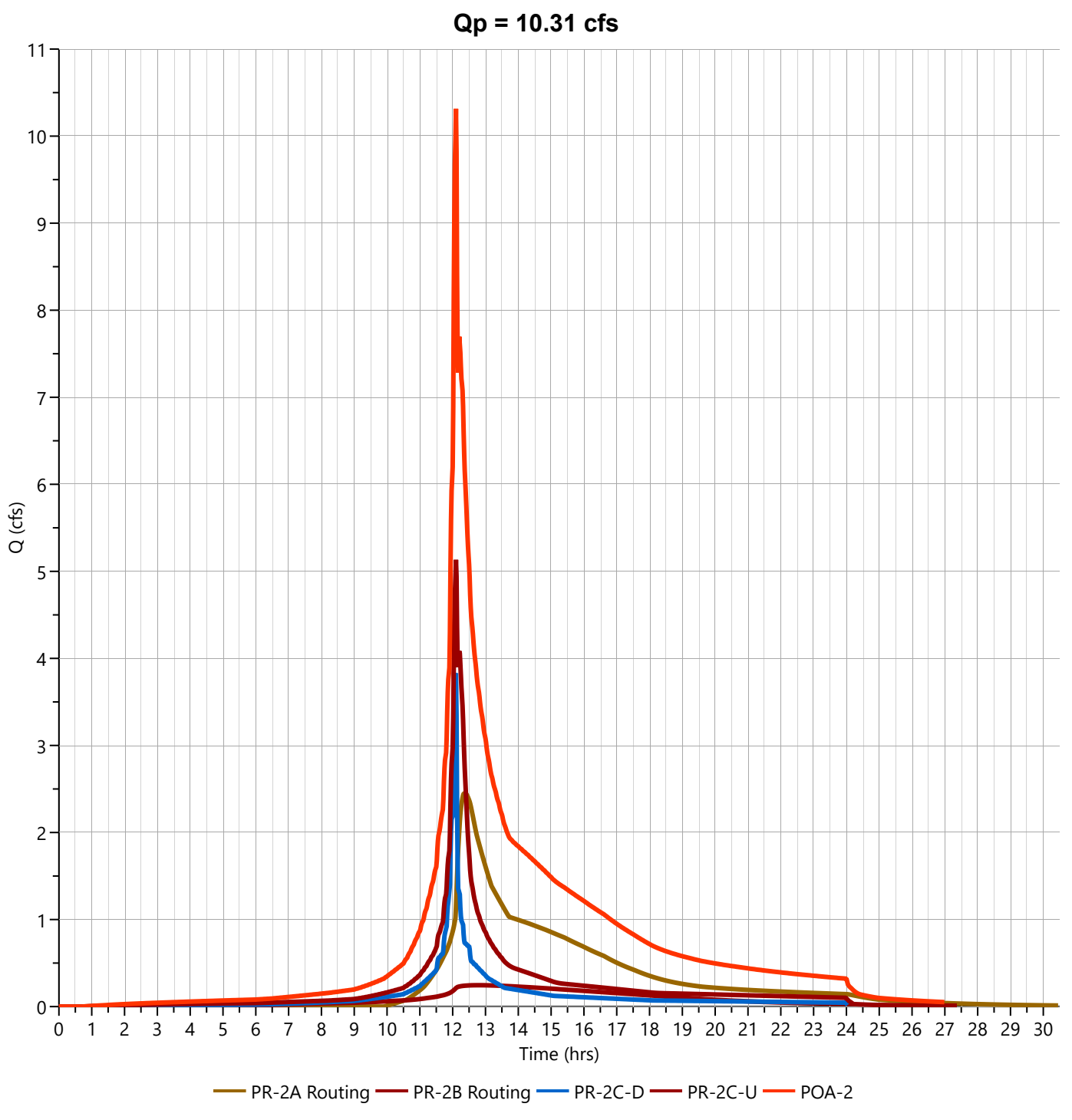
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

POA-2

Hyd. No. 70

Hydrograph Type	= Junction	Peak Flow	= 10.31 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 70,401 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

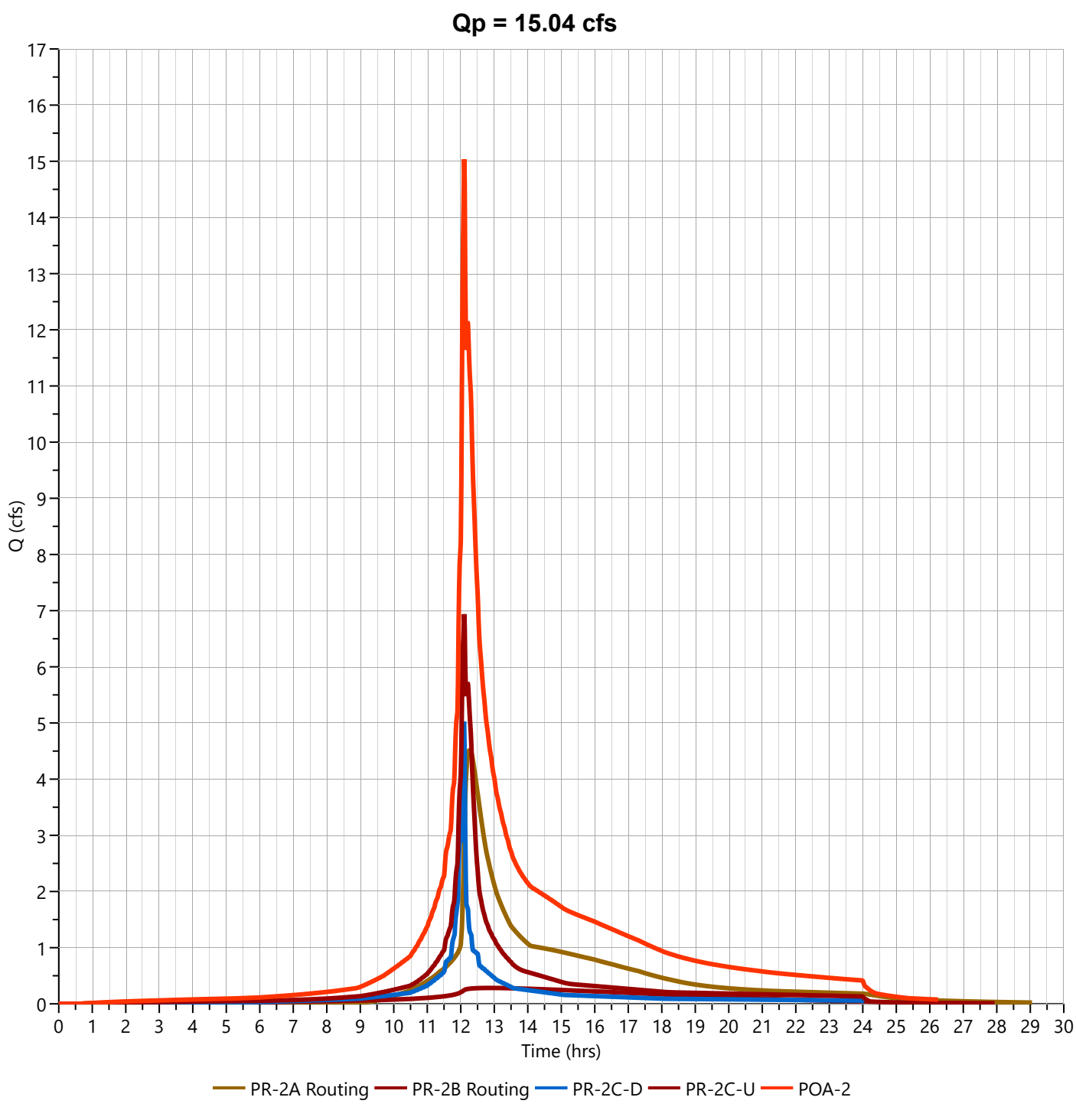
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

POA-2

Hyd. No. 70

Hydrograph Type	= Junction	Peak Flow	= 15.04 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 94,525 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

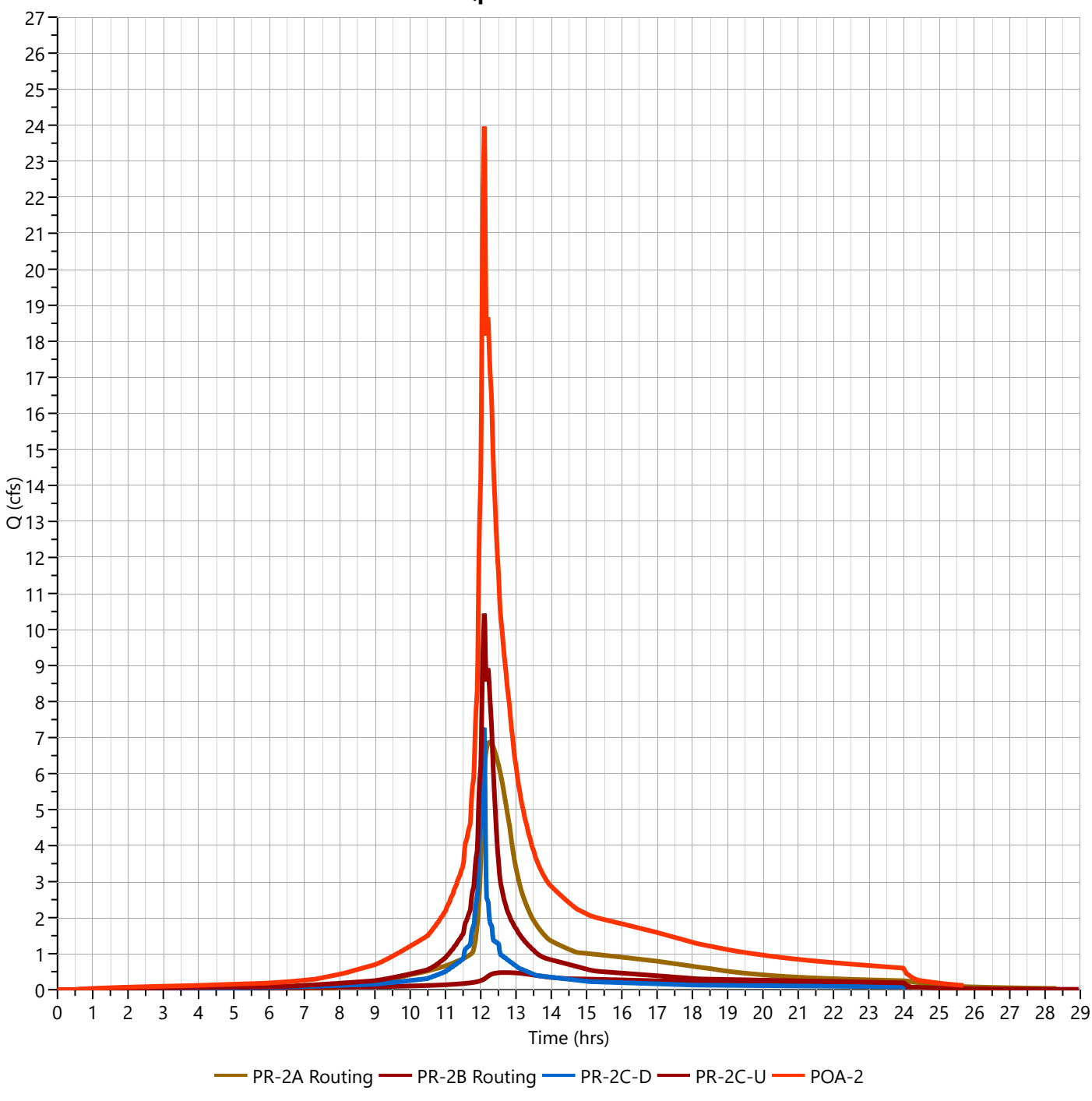
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

POA-2

Hyd. No. 70

Hydrograph Type	= Junction	Peak Flow	= 23.96 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 141,291 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



SUMMARY OF PROPOSED PEAK DISCHARGES

Hydrograph 2-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys

10-21-2025

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-D Grass D	0.575	12.13	1,874	----		
2	NRCS Runoff	PR-1A-D Imp	1.082	12.10	3,514	----		
3	Junction	PR-1A-D	1.622	12.10	5,388	1, 2		
5	NRCS Runoff	PR-1A-U Open Space C	0.389	12.17	1,478	----		
6	NRCS Runoff	PR-1A-U Woods C	0.074	12.18	291	----		
7	NRCS Runoff	PR-1A-U Imp	1.690	12.10	5,490	----		
8	Junction	PR-1A-U	2.062	12.10	7,259	5, 6, 7		
10	Junction	PR-1A Total	3.684	12.10	12,647	3, 8		
11	Pond Route	PR-1A Routing	1.034	12.33	9,748	10	535.18	5,747
13	NRCS Runoff	PR-1B-D	0.680	12.12	2,102	----		
15	NRCS Runoff	PR-1B-U Open Space C	0.305	12.20	1,276	----		
16	NRCS Runoff	PR-1B-U Woods C	0.510	12.22	2,213	----		
17	NRCS Runoff	PR-1B-U Impervious	3.580	12.12	13,475	----		
18	Junction	PR-1B-U	4.256	12.13	16,965	15, 16, 17		
21	Junction	PR-1B (Swale)	4.925	12.13	19,068	13, 18		
24	NRCS Runoff	PR-1C-D Open Space D	0.645	12.10	1,748	----		
25	NRCS Runoff	PR-1C-D Impervious	0.372	12.10	1,208	----		
26	Junction	PR-1C-D	1.017	12.10	2,955	24, 25		
28	NRCS Runoff	PR-1C-U Open Space C	0.902	12.15	3,213	----		
29	NRCS Runoff	PR-1C-U Impervious	3.954	12.10	13,118	----		
30	Junction	PR-1C-U	4.735	12.10	16,331	28, 29		
32	Junction	POA-1	11.32	12.12	48,102	11, 21, 26, 30		
35	NRCS Runoff	PR-2A-D Open Space D	1.555	12.12	4,806	----		
36	NRCS Runoff	PR-2A-D Impervious	1.420	12.10	4,612	----		

Hydrograph 2-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys

10-21-2025

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
37	Junction	PR-2A-D	2.928	12.10	9,417	35, 36		
39	NRCS Runoff	PR-2A-U Open Space C	0.173	12.25	783	----		
40	NRCS Runoff	PR-2A-U Woods C	0.135	12.25	635	----		
41	NRCS Runoff	PR-2A-U Impervious	2.299	12.10	7,467	----		
42	Junction	PR-2A-U	2.492	12.10	8,885	39, 40, 41		
45	Junction	PR-2A	5.420	12.10	18,303	37, 42		
46	Pond Route	PR-2A Routing	0.856	12.62	14,915	45	538.07	9,171
48	NRCS Runoff	PR-2B-D Open Space D	0.061	12.10	175	----		
49	NRCS Runoff	PR-2B-D Impervious	1.251	12.10	4,063	----		
50	Junction	PR-2B-D	1.312	12.10	4,238	48, 49		
52	NRCS Runoff	PR-2B-U Open Space C	0.015	12.10	41.3	----		
53	NRCS Runoff	PR-2B-U Impervious	0.101	12.10	329	----		
54	Junction	PR-2B-U	0.117	12.10	371	52, 53		
56	Junction	PR-2B	1.429	12.10	4,608	50, 54		
57	Pond Route	PR-2B Routing	0.184	12.62	4,595	56	553.73	1,923
59	NRCS Runoff	PR-2C-D Open Space D	1.169	12.10	3,167	----		
60	NRCS Runoff	PR-2C-D Impervious	0.980	12.10	3,184	----		
61	Junction	PR-2C-D	2.150	12.10	6,352	59, 60		
63	NRCS Runoff	PR-2C-U Open Space C	0.690	12.23	3,030	----		
64	NRCS Runoff	PR-2C-U Woods C	0.609	12.23	2,783	----		
65	NRCS Runoff	PR-2C-U Gravel C	0.223	12.10	632	----		
66	NRCS Runoff	PR-2C-U Impervious	1.623	12.10	5,271	----		
67	Junction	PR-2C-U	2.706	12.10	11,716	63, 64, 65, 66		
70	Junction	POA-2	5.668	12.10	37,577	46, 57, 61, 67		

Hydrograph 10-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys

10-21-2025

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-D Grass D	1.147	12.13	3,769	----		
2	NRCS Runoff	PR-1A-D Imp	1.691	12.10	5,600	----		
3	Junction	PR-1A-D	2.783	12.10	9,369	1, 2		
5	NRCS Runoff	PR-1A-U Open Space C	0.881	12.17	3,257	----		
6	NRCS Runoff	PR-1A-U Woods C	0.185	12.17	686	----		
7	NRCS Runoff	PR-1A-U Imp	2.643	12.10	8,750	----		
8	Junction	PR-1A-U	3.532	12.10	12,694	5, 6, 7		
10	Junction	PR-1A Total	6.316	12.10	22,063	3, 8		
11	Pond Route	PR-1A Routing	2.246	12.28	19,163	10	535.71	8,419
13	NRCS Runoff	PR-1B-D	1.356	12.12	4,228	----		
15	NRCS Runoff	PR-1B-U Open Space C	0.694	12.20	2,812	----		
16	NRCS Runoff	PR-1B-U Woods C	1.281	12.20	5,227	----		
17	NRCS Runoff	PR-1B-U Impervious	5.603	12.12	21,477	----		
18	Junction	PR-1B-U	7.312	12.13	29,515	15, 16, 17		
21	Junction	PR-1B (Swale)	8.638	12.13	33,743	13, 18		
24	NRCS Runoff	PR-1C-D Open Space D	1.268	12.10	3,514	----		
25	NRCS Runoff	PR-1C-D Impervious	0.581	12.10	1,925	----		
26	Junction	PR-1C-D	1.849	12.10	5,439	24, 25		
28	NRCS Runoff	PR-1C-U Open Space C	2.035	12.15	7,078	----		
29	NRCS Runoff	PR-1C-U Impervious	6.186	12.10	20,908	----		
30	Junction	PR-1C-U	7.998	12.10	27,986	28, 29		
32	Junction	POA-1	19.76	12.12	86,331	11, 21, 26, 30		
35	NRCS Runoff	PR-2A-D Open Space D	3.098	12.12	9,664	----		
36	NRCS Runoff	PR-2A-D Impervious	2.220	12.10	7,350	----		

Hydrograph 10-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys

10-21-2025

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
37	Junction	PR-2A-D	5.246	12.10	17,014	35, 36		
39	NRCS Runoff	PR-2A-U Open Space C	0.393	12.23	1,725	----		
40	NRCS Runoff	PR-2A-U Woods C	0.339	12.23	1,500	----		
41	NRCS Runoff	PR-2A-U Impervious	3.594	12.10	11,901	----		
42	Junction	PR-2A-U	4.094	12.10	15,126	39, 40, 41		
45	Junction	PR-2A	9.340	12.10	32,140	37, 42		
46	Pond Route	PR-2A Routing	2.457	12.37	28,753	45	538.57	14,024
48	NRCS Runoff	PR-2B-D Open Space D	0.122	12.10	351	----		
49	NRCS Runoff	PR-2B-D Impervious	1.956	12.10	6,475	----		
50	Junction	PR-2B-D	2.078	12.10	6,827	48, 49		
52	NRCS Runoff	PR-2B-U Open Space C	0.033	12.10	90.9	----		
53	NRCS Runoff	PR-2B-U Impervious	0.159	12.10	525	----		
54	Junction	PR-2B-U	0.192	12.10	616	52, 53		
56	Junction	PR-2B	2.270	12.10	7,443	50, 54		
57	Pond Route	PR-2B Routing	0.246	12.82	7,429	56	554.20	3,173
59	NRCS Runoff	PR-2C-D Open Space D	2.298	12.10	6,369	----		
60	NRCS Runoff	PR-2C-D Impervious	1.533	12.10	5,075	----		
61	Junction	PR-2C-D	3.831	12.10	11,445	59, 60		
63	NRCS Runoff	PR-2C-U Open Space C	1.567	12.22	6,675	----		
64	NRCS Runoff	PR-2C-U Woods C	1.531	12.22	6,572	----		
65	NRCS Runoff	PR-2C-U Gravel C	0.383	12.10	1,126	----		
66	NRCS Runoff	PR-2C-U Impervious	2.537	12.10	8,400	----		
67	Junction	PR-2C-U	5.133	12.10	22,774	63, 64, 65, 66		
70	Junction	POA-2	10.31	12.10	70,401	46, 57, 61, 67		

Hydrograph 25-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys

10-21-2025

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-D Grass D	1.559	12.13	5,182	----		
2	NRCS Runoff	PR-1A-D Imp	2.116	12.10	7,058	----		
3	Junction	PR-1A-D	3.607	12.10	12,240	1, 2		
5	NRCS Runoff	PR-1A-U Open Space C	1.250	12.17	4,632	----		
6	NRCS Runoff	PR-1A-U Woods C	0.271	12.17	1,001	----		
7	NRCS Runoff	PR-1A-U Imp	3.306	12.10	11,028	----		
8	Junction	PR-1A-U	4.592	12.10	16,661	5, 6, 7		
10	Junction	PR-1A Total	8.199	12.10	28,901	3, 8		
11	Pond Route	PR-1A Routing	3.069	12.27	26,002	10	536.03	10,002
13	NRCS Runoff	PR-1B-D	1.842	12.12	5,813	----		
15	NRCS Runoff	PR-1B-U Open Space C	0.986	12.20	3,999	----		
16	NRCS Runoff	PR-1B-U Woods C	1.881	12.20	7,623	----		
17	NRCS Runoff	PR-1B-U Impervious	7.010	12.12	27,067	----		
18	Junction	PR-1B-U	9.525	12.13	38,689	15, 16, 17		
21	Junction	PR-1B (Swale)	11.32	12.13	44,502	13, 18		
24	NRCS Runoff	PR-1C-D Open Space D	1.714	12.10	4,832	----		
25	NRCS Runoff	PR-1C-D Impervious	0.727	12.10	2,426	----		
26	Junction	PR-1C-D	2.441	12.10	7,258	24, 25		
28	NRCS Runoff	PR-1C-U Open Space C	2.887	12.15	10,067	----		
29	NRCS Runoff	PR-1C-U Impervious	7.739	12.10	26,350	----		
30	Junction	PR-1C-U	10.33	12.10	36,417	28, 29		
32	Junction	POA-1	26.22	12.12	114,179	11, 21, 26, 30		
35	NRCS Runoff	PR-2A-D Open Space D	4.209	12.12	13,287	----		
36	NRCS Runoff	PR-2A-D Impervious	2.777	12.10	9,264	----		

Hydrograph 25-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys

10-21-2025

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
37	Junction	PR-2A-D	6.898	12.10	22,551	35, 36		
39	NRCS Runoff	PR-2A-U Open Space C	0.559	12.23	2,454	----		
40	NRCS Runoff	PR-2A-U Woods C	0.498	12.23	2,188	----		
41	NRCS Runoff	PR-2A-U Impervious	4.496	12.10	14,998	----		
42	Junction	PR-2A-U	5.236	12.10	19,640	39, 40, 41		
45	Junction	PR-2A	12.13	12.10	42,191	37, 42		
46	Pond Route	PR-2A Routing	4.531	12.25	38,803	45	538.80	16,329
48	NRCS Runoff	PR-2B-D Open Space D	0.166	12.10	483	----		
49	NRCS Runoff	PR-2B-D Impervious	2.446	12.10	8,161	----		
50	Junction	PR-2B-D	2.612	12.10	8,644	48, 49		
52	NRCS Runoff	PR-2B-U Open Space C	0.047	12.10	129	----		
53	NRCS Runoff	PR-2B-U Impervious	0.198	12.10	662	----		
54	Junction	PR-2B-U	0.245	12.10	791	52, 53		
56	Junction	PR-2B	2.857	12.10	9,435	50, 54		
57	Pond Route	PR-2B Routing	0.283	12.92	9,422	56	554.56	4,100
59	NRCS Runoff	PR-2C-D Open Space D	3.107	12.10	8,757	----		
60	NRCS Runoff	PR-2C-D Impervious	1.917	12.10	6,396	----		
61	Junction	PR-2C-D	5.024	12.10	15,154	59, 60		
63	NRCS Runoff	PR-2C-U Open Space C	2.230	12.22	9,495	----		
64	NRCS Runoff	PR-2C-U Woods C	2.251	12.22	9,585	----		
65	NRCS Runoff	PR-2C-U Gravel C	0.494	12.10	1,480	----		
66	NRCS Runoff	PR-2C-U Impervious	3.174	12.10	10,587	----		
67	Junction	PR-2C-U	6.937	12.10	31,147	63, 64, 65, 66		
70	Junction	POA-2	15.04	12.10	94,525	46, 57, 61, 67		

Hydrograph 100-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys

10-21-2025

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-D Grass D	2.337	12.13	7,937	----		
2	NRCS Runoff	PR-1A-D Imp	2.913	12.10	9,800	----		
3	Junction	PR-1A-D	5.159	12.10	17,738	1, 2		
5	NRCS Runoff	PR-1A-U Open Space C	1.966	12.17	7,374	----		
6	NRCS Runoff	PR-1A-U Woods C	0.441	12.17	1,640	----		
7	NRCS Runoff	PR-1A-U Imp	4.551	12.10	15,313	----		
8	Junction	PR-1A-U	6.615	12.10	24,327	5, 6, 7		
10	Junction	PR-1A Total	11.77	12.10	42,065	3, 8		
11	Pond Route	PR-1A Routing	6.121	12.22	39,166	10	536.47	12,336
13	NRCS Runoff	PR-1B-D	2.760	12.12	8,904	----		
15	NRCS Runoff	PR-1B-U Open Space C	1.552	12.20	6,367	----		
16	NRCS Runoff	PR-1B-U Woods C	3.068	12.20	12,484	----		
17	NRCS Runoff	PR-1B-U Impervious	9.653	12.12	37,585	----		
18	Junction	PR-1B-U	13.76	12.13	56,436	15, 16, 17		
21	Junction	PR-1B (Swale)	16.45	12.13	65,340	13, 18		
24	NRCS Runoff	PR-1C-D Open Space D	2.555	12.10	7,401	----		
25	NRCS Runoff	PR-1C-D Impervious	1.001	12.10	3,369	----		
26	Junction	PR-1C-D	3.556	12.10	10,770	24, 25		
28	NRCS Runoff	PR-1C-U Open Space C	4.534	12.15	16,027	----		
29	NRCS Runoff	PR-1C-U Impervious	10.66	12.10	36,588	----		
30	Junction	PR-1C-U	14.77	12.10	52,616	28, 29		
32	Junction	POA-1	38.87	12.12	167,892	11, 21, 26, 30		
35	NRCS Runoff	PR-2A-D Open Space D	6.309	12.12	20,352	----		
36	NRCS Runoff	PR-2A-D Impervious	3.823	12.10	12,863	----		

Hydrograph 100-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys

10-21-2025

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
37	Junction	PR-2A-D	10.02	12.10	33,216	35, 36		
39	NRCS Runoff	PR-2A-U Open Space C	0.881	12.23	3,907	----		
40	NRCS Runoff	PR-2A-U Woods C	0.814	12.23	3,583	----		
41	NRCS Runoff	PR-2A-U Impervious	6.190	12.10	20,826	----		
42	Junction	PR-2A-U	7.407	12.10	28,316	39, 40, 41		
45	Junction	PR-2A	17.42	12.10	61,532	37, 42		
46	Pond Route	PR-2A Routing	6.883	12.25	58,144	45	539.24	21,029
48	NRCS Runoff	PR-2B-D Open Space D	0.248	12.10	740	----		
49	NRCS Runoff	PR-2B-D Impervious	3.368	12.10	11,332	----		
50	Junction	PR-2B-D	3.616	12.10	12,072	48, 49		
52	NRCS Runoff	PR-2B-U Open Space C	0.073	12.10	206	----		
53	NRCS Runoff	PR-2B-U Impervious	0.273	12.10	919	----		
54	Junction	PR-2B-U	0.346	12.10	1,125	52, 53		
56	Junction	PR-2B	3.962	12.10	13,197	50, 54		
57	Pond Route	PR-2B Routing	0.476	12.67	13,183	56	555.14	5,649
59	NRCS Runoff	PR-2C-D Open Space D	4.630	12.10	13,414	----		
60	NRCS Runoff	PR-2C-D Impervious	2.640	12.10	8,882	----		
61	Junction	PR-2C-D	7.270	12.10	22,296	59, 60		
63	NRCS Runoff	PR-2C-U Open Space C	3.514	12.22	15,116	----		
64	NRCS Runoff	PR-2C-U Woods C	3.677	12.22	15,698	----		
65	NRCS Runoff	PR-2C-U Gravel C	0.699	12.10	2,152	----		
66	NRCS Runoff	PR-2C-U Impervious	4.369	12.10	14,701	----		
67	Junction	PR-2C-U	10.44	12.10	47,667	63, 64, 65, 66		
70	Junction	POA-2	23.96	12.10	141,291	46, 57, 61, 67		

FUTURE HYDROGRAPH CALCULATIONS

PR-1A-DISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: Present **(Developed)** — **Future Proposed Watershed PR-1A-D - 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	85		
4.	Two-year 24-hr rainfall, P_2		in	4.08		
5.	Land Slope, s		ft/ft	0.034		
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			Pavement		
9.	Flow Length, L		ft	105		
10.	Watercourse Slope, s		ft/ft	0.008		
11.	Average Velocity, V (NEH table 15-3)		ft/s	1.86		
12.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.016	+	+

Shallow Conc. Flow Sub-Total: **0.016 hours**

Channel Flow

			Segment ID	3	4	5
13.	Flow Length, L		ft	30	66	96
14.	Cross Sectional flow area, a		ft^2	0.61	0.61	0.61
15.	Wetted Perimeter, P_w		ft	2.00	2.00	2.00
16.	Hydraulic Radius, r	$r = a / P_w$	ft	0.31	0.31	0.31
17.	Channel Slope, s		ft/ft	0.005	0.070	0.080
18.	Manning's Roughness Coeff., n			0.012	0.012	0.012
19.	Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	3.98	14.89	15.91
20.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.002	+ 0.001	+ 0.002

Channel Flow Sub-Total: **0.005 hours**

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

Total Tc (hours)	=	**0.033 hours**
Software Limitations Require Minimum Tc	=	**2 minutes**

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: Present (**Developed**) — **Future Proposed Watershed PR-1A-D - 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	100			
4.	Two-year 24-hr rainfall, P_2	in	4.08			
5.	Land Slope, s	ft/ft	0.095			
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	0.113	+		+
					Sheet Flow Sub-Total	0.113 hours

Shallow Concentrated Flow

			Segment ID			
			2			
8.	Surface Description		Grassed Waterways			
9.	Flow Length, L	ft	105			
10.	Watercourse Slope, s	ft/ft	0.213			
11.	Average Velocity, V (NEH table 15-3)	ft/s	7.45			
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			
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) =	**0.117 hours**
	Total Tc (minutes) =	**7 minutes**

Hydrograph Report

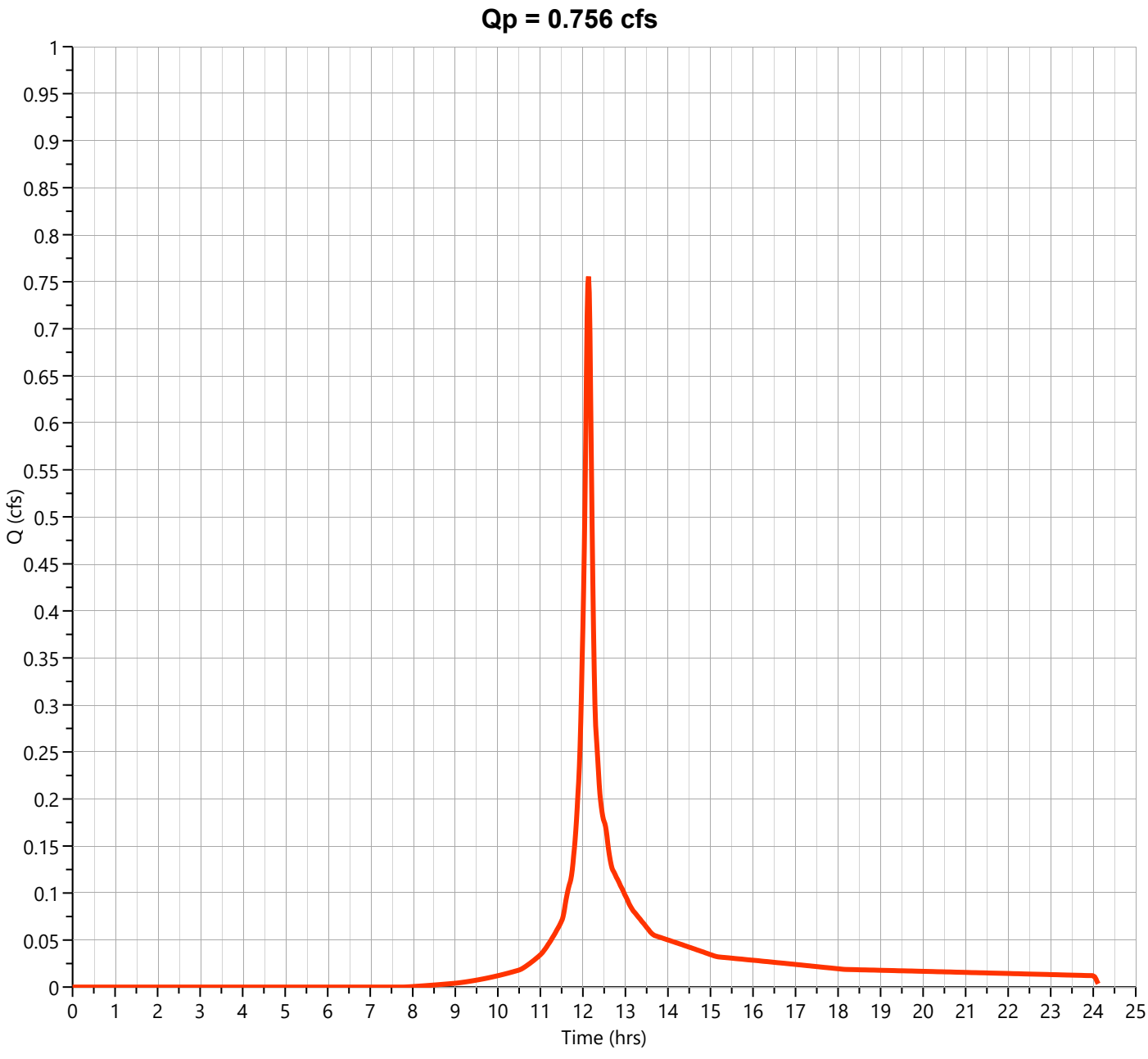
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File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A-D Grass D

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.756 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 2,462 cuft
Drainage Area	= 0.33 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 7.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

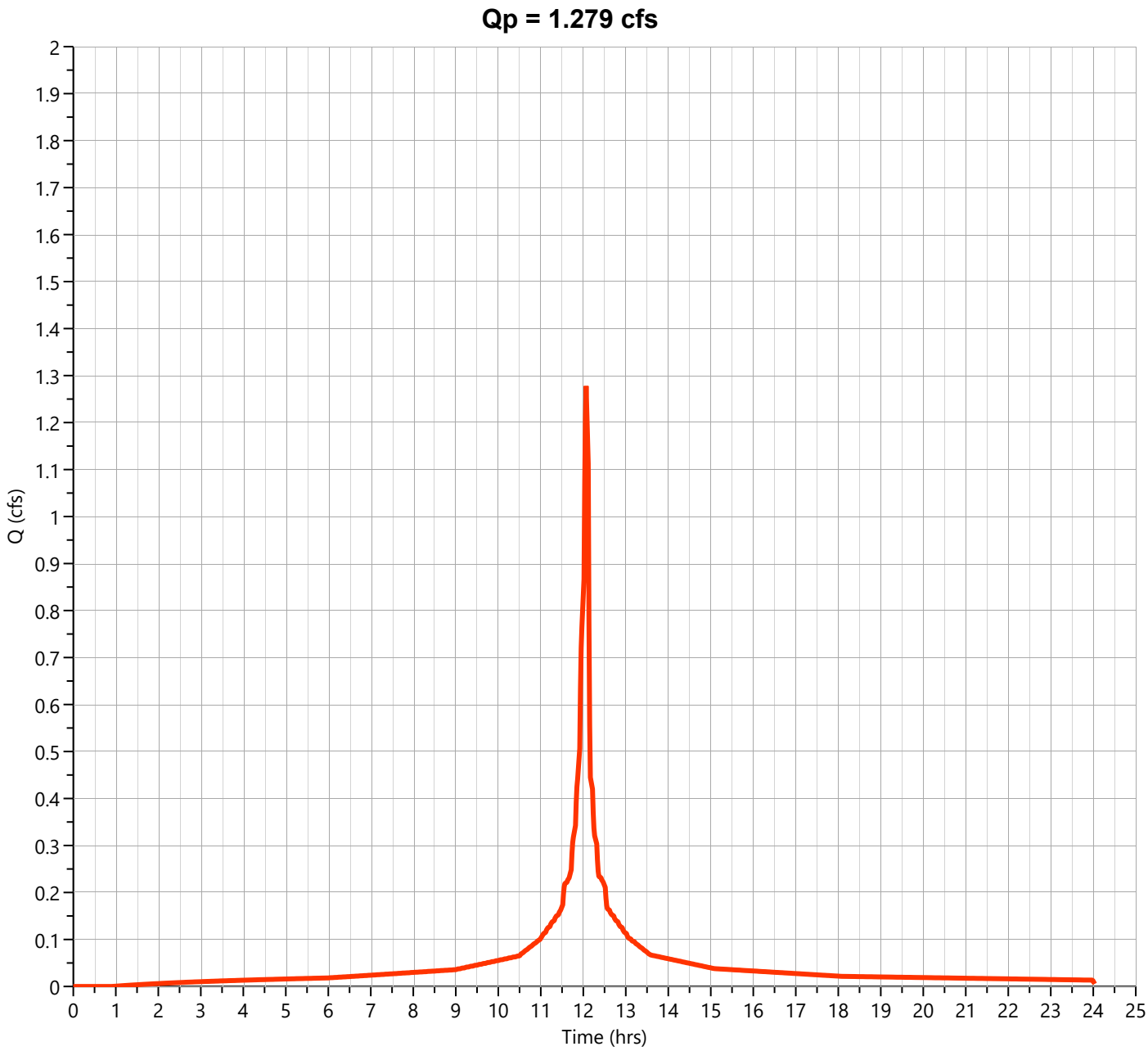
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A-D Imp

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.279 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 4,187 cuft
Drainage Area	= 0.32 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

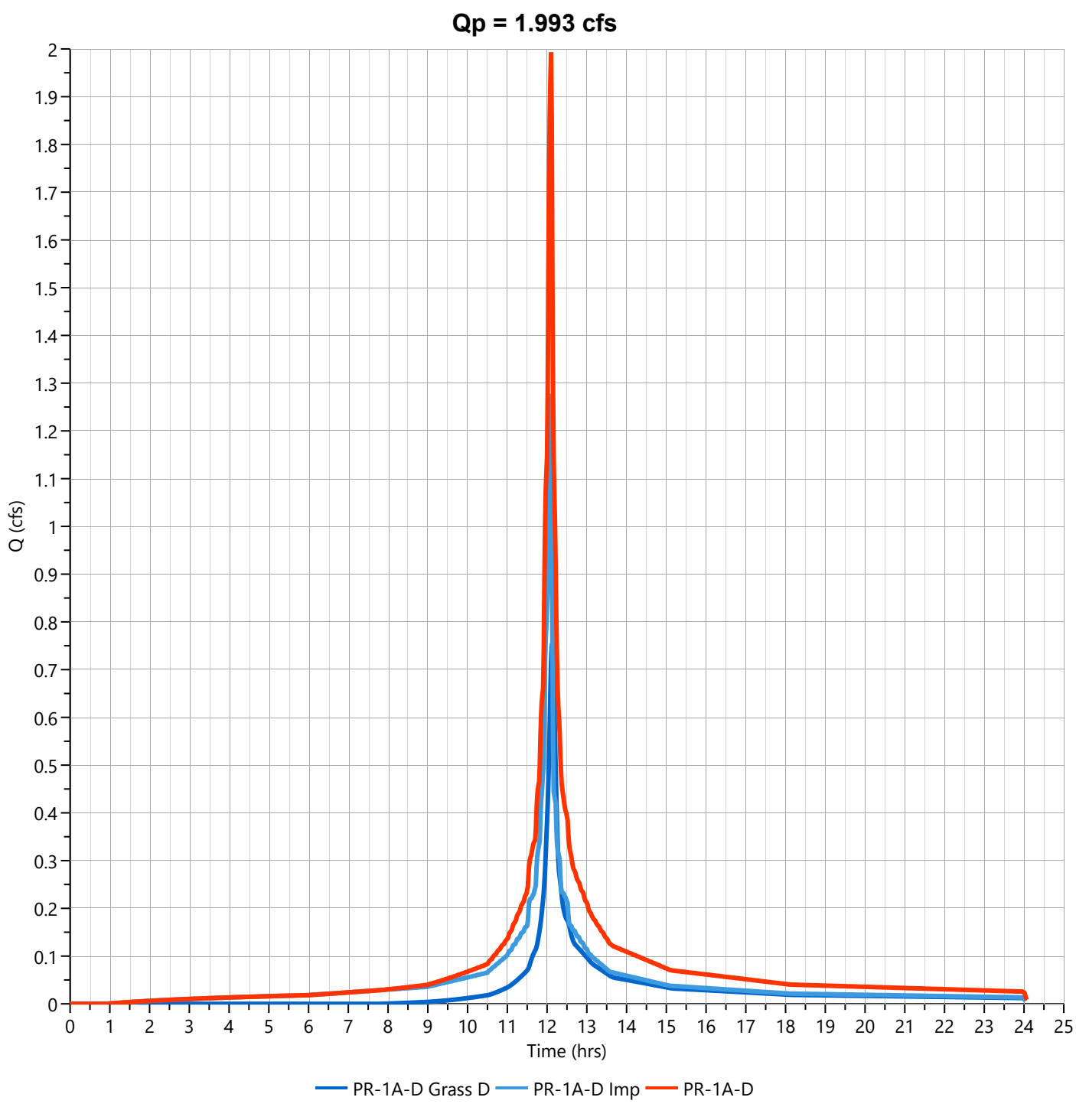
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File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A-D

Hyd. No. 3

Hydrograph Type	= Junction	Peak Flow	= 1.993 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 6,649 cuft
Inflow Hydrographs	= 1, 2	Total Contrib. Area	= 0.65 ac



Hydrograph Report

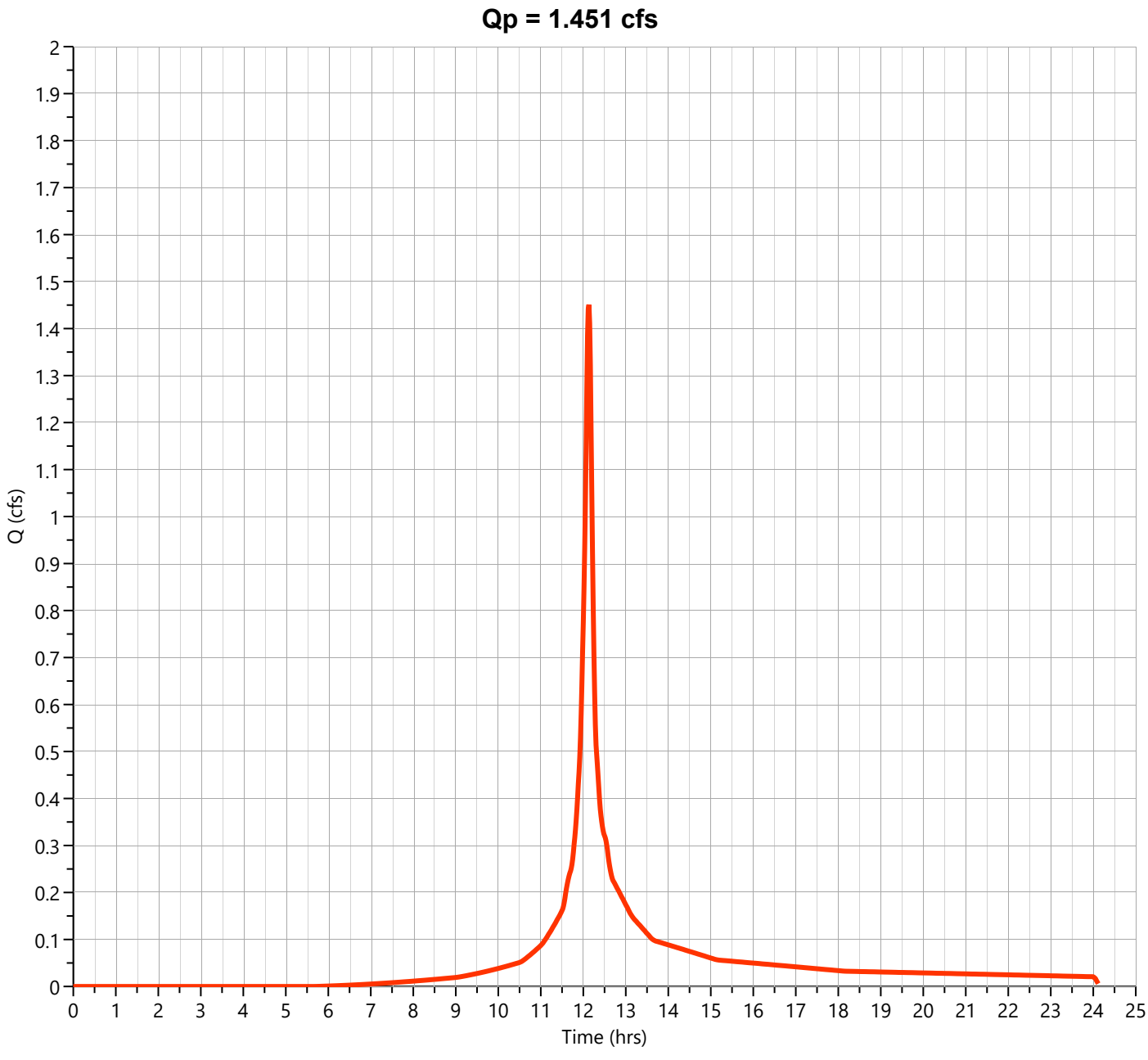
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File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A-D Grass D

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.451 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 4,808 cuft
Drainage Area	= 0.33 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 7.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

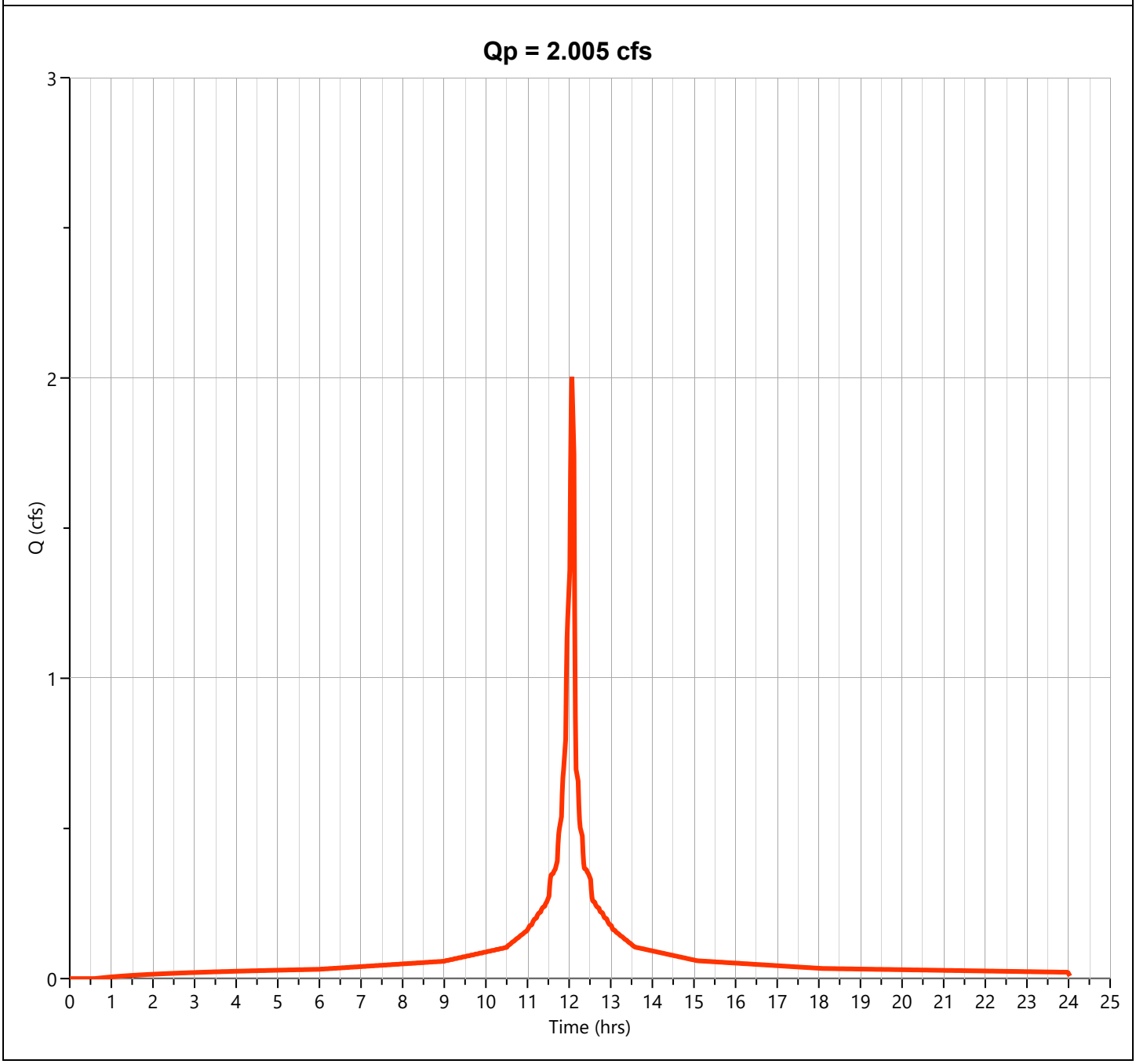
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File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A-D Imp

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.005 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 6,677 cuft
Drainage Area	= 0.32 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

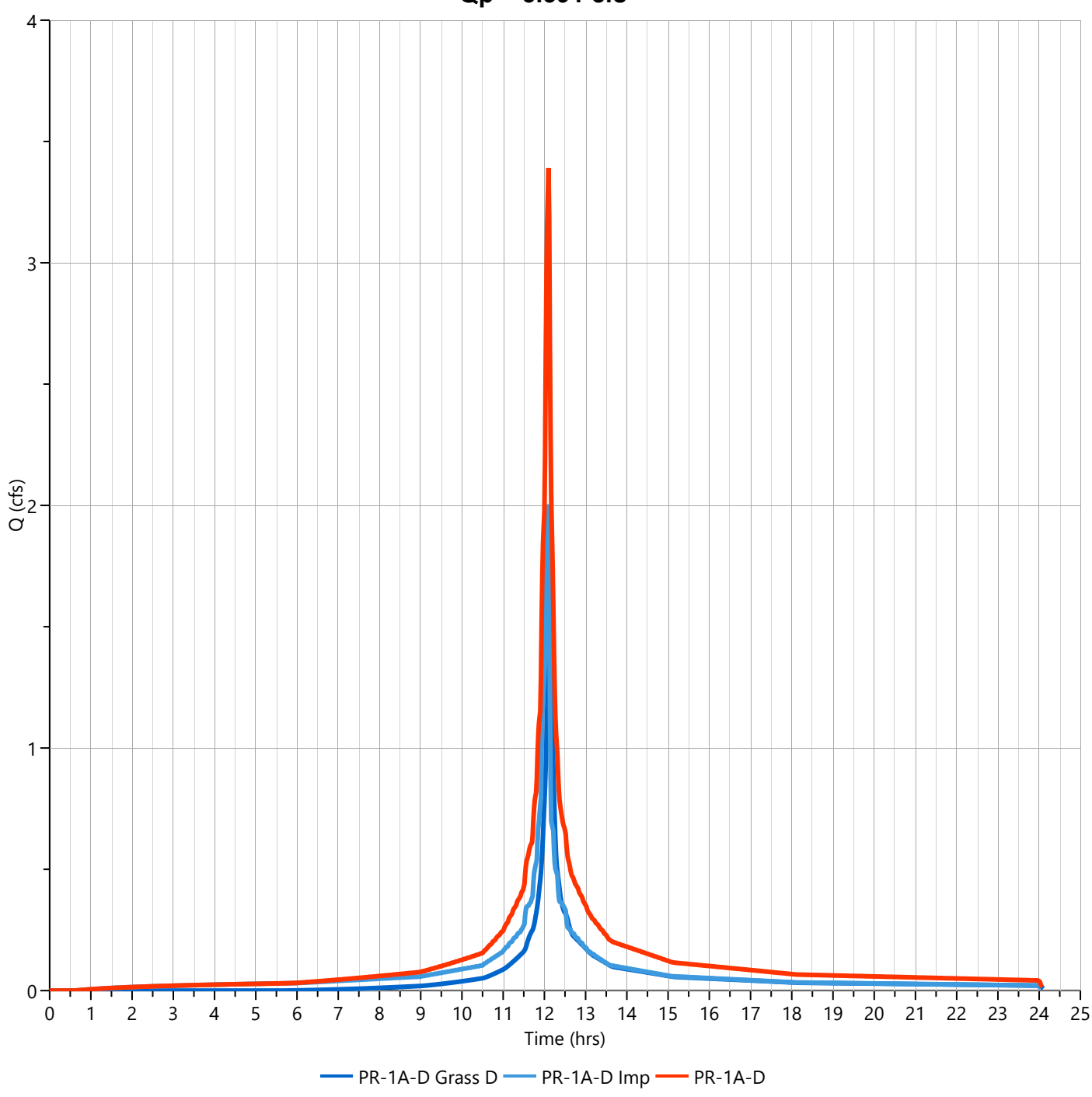
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File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A-D

Hyd. No. 3

Hydrograph Type	= Junction	Peak Flow	= 3.391 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 11,485 cuft
Inflow Hydrographs	= 1, 2	Total Contrib. Area	= 0.65 ac



Hydrograph Report

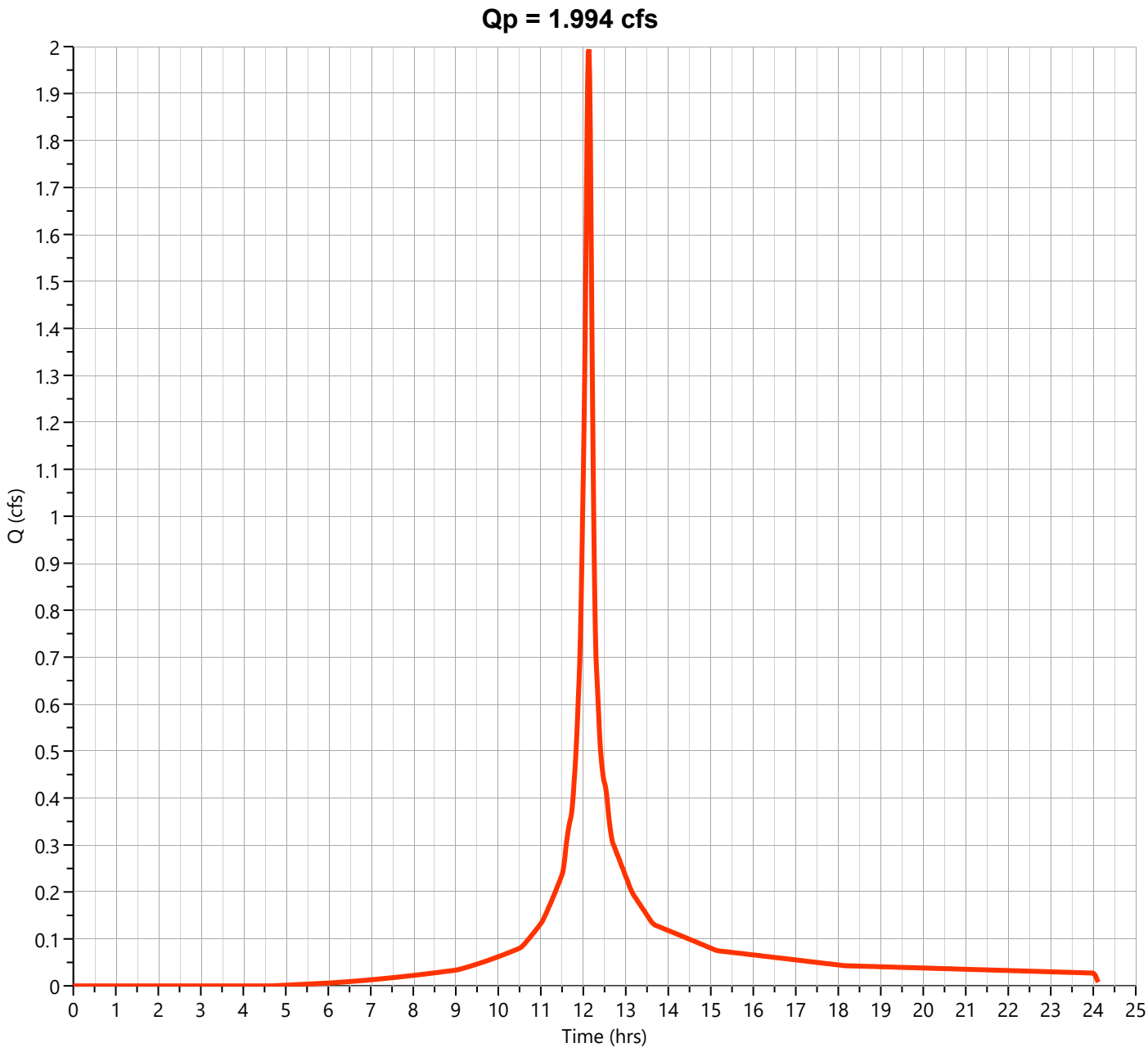
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File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A-D Grass D

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.994 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 6,712 cuft
Drainage Area	= 0.33 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 7.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

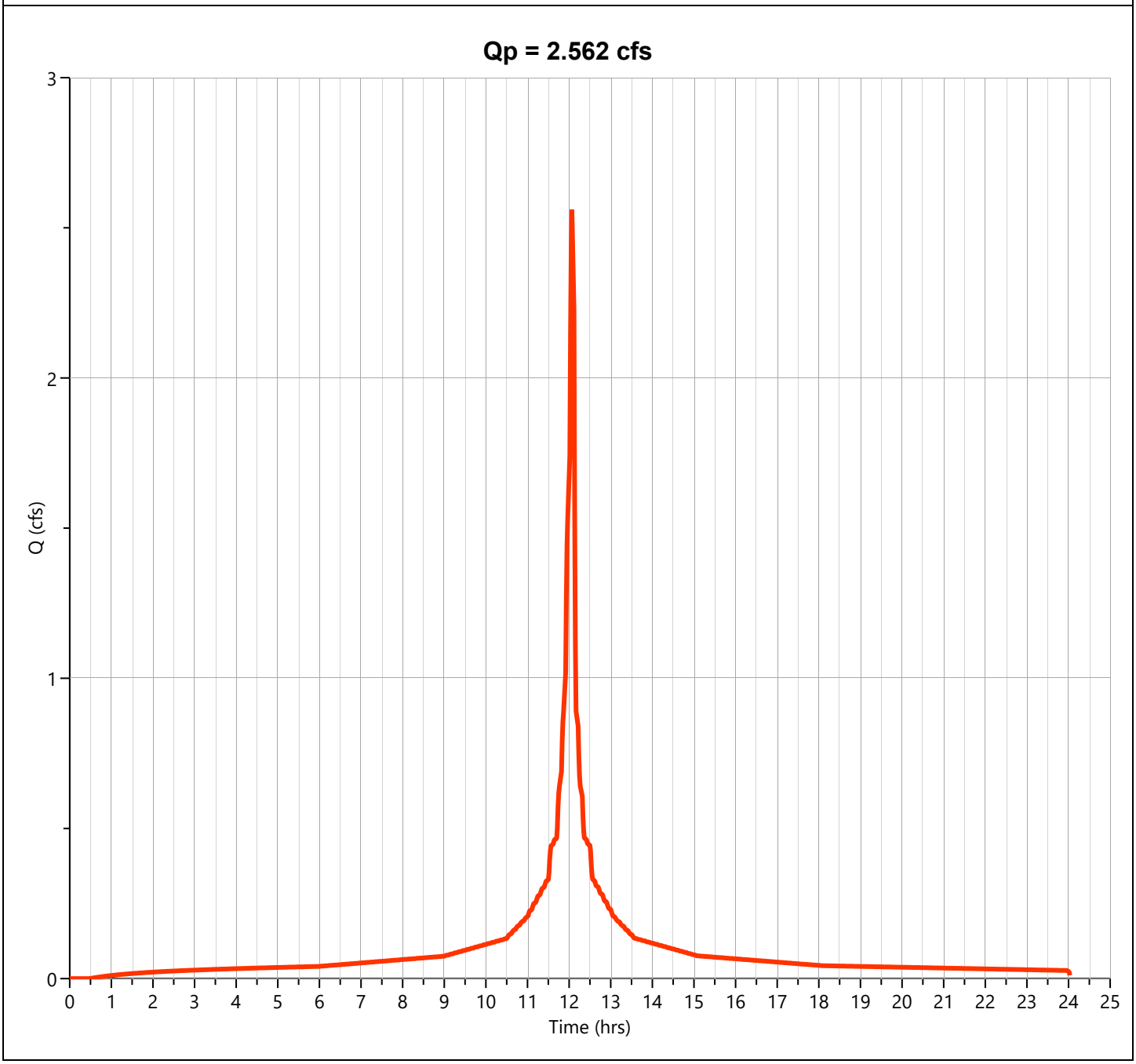
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A-D Imp

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.562 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 8,592 cuft
Drainage Area	= 0.32 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

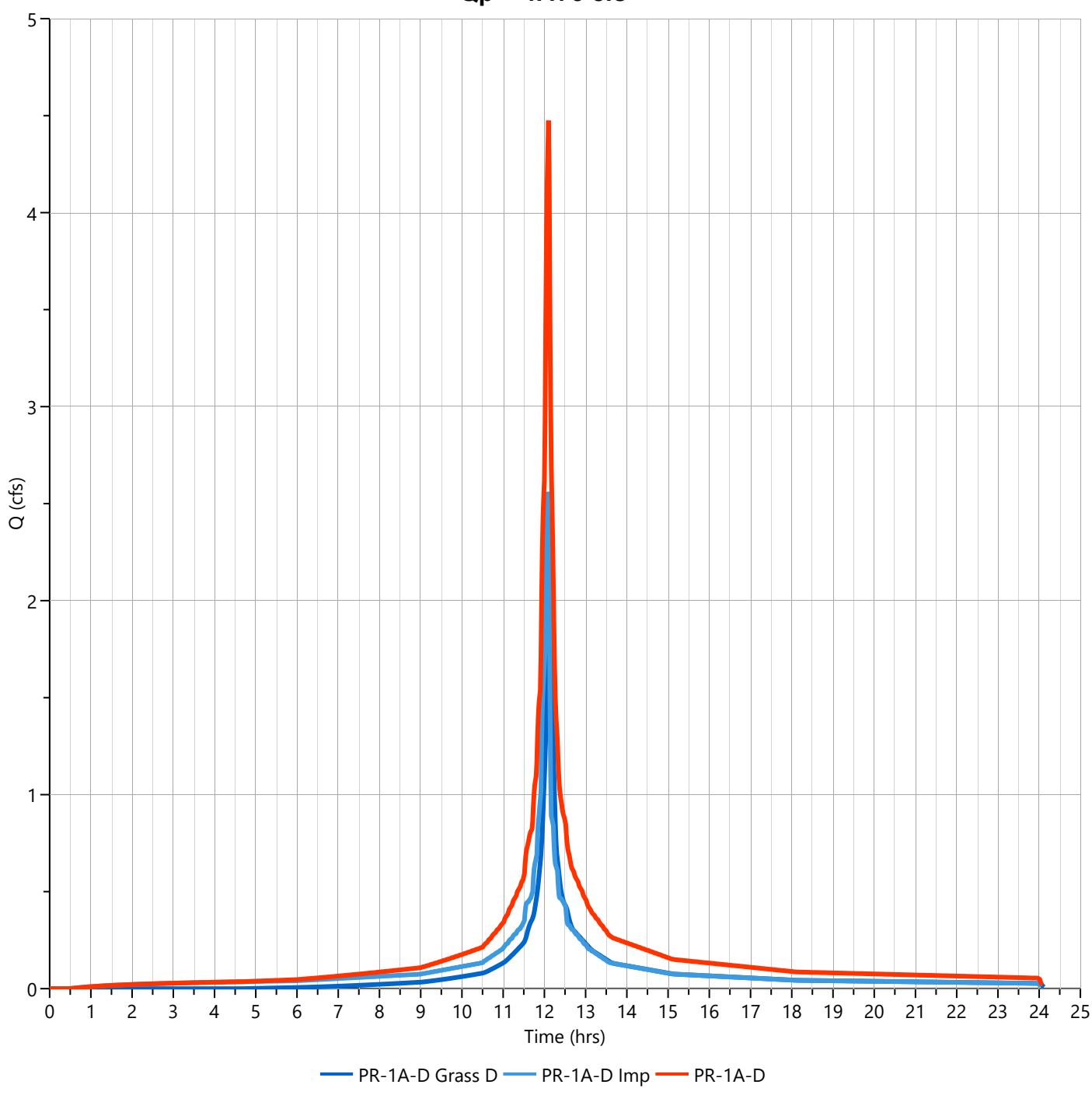
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File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A-D

Hyd. No. 3

Hydrograph Type	= Junction	Peak Flow	= 4.475 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 15,305 cuft
Inflow Hydrographs	= 1, 2	Total Contrib. Area	= 0.65 ac



Hydrograph Report

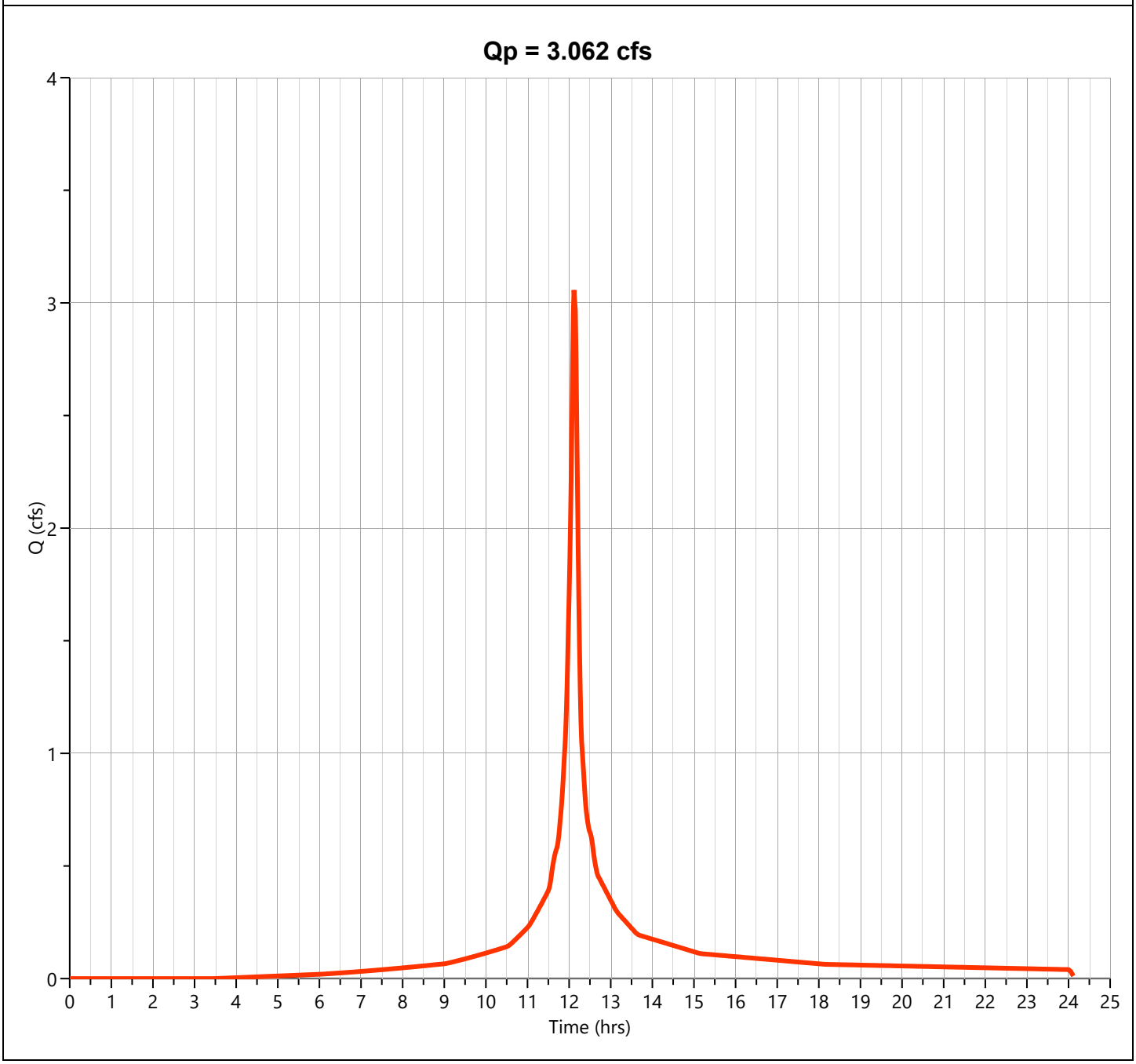
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A-D Grass D

Hyd. No. 1

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.062 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Runoff Volume	= 10,581 cuft
Drainage Area	= 0.33 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 7.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

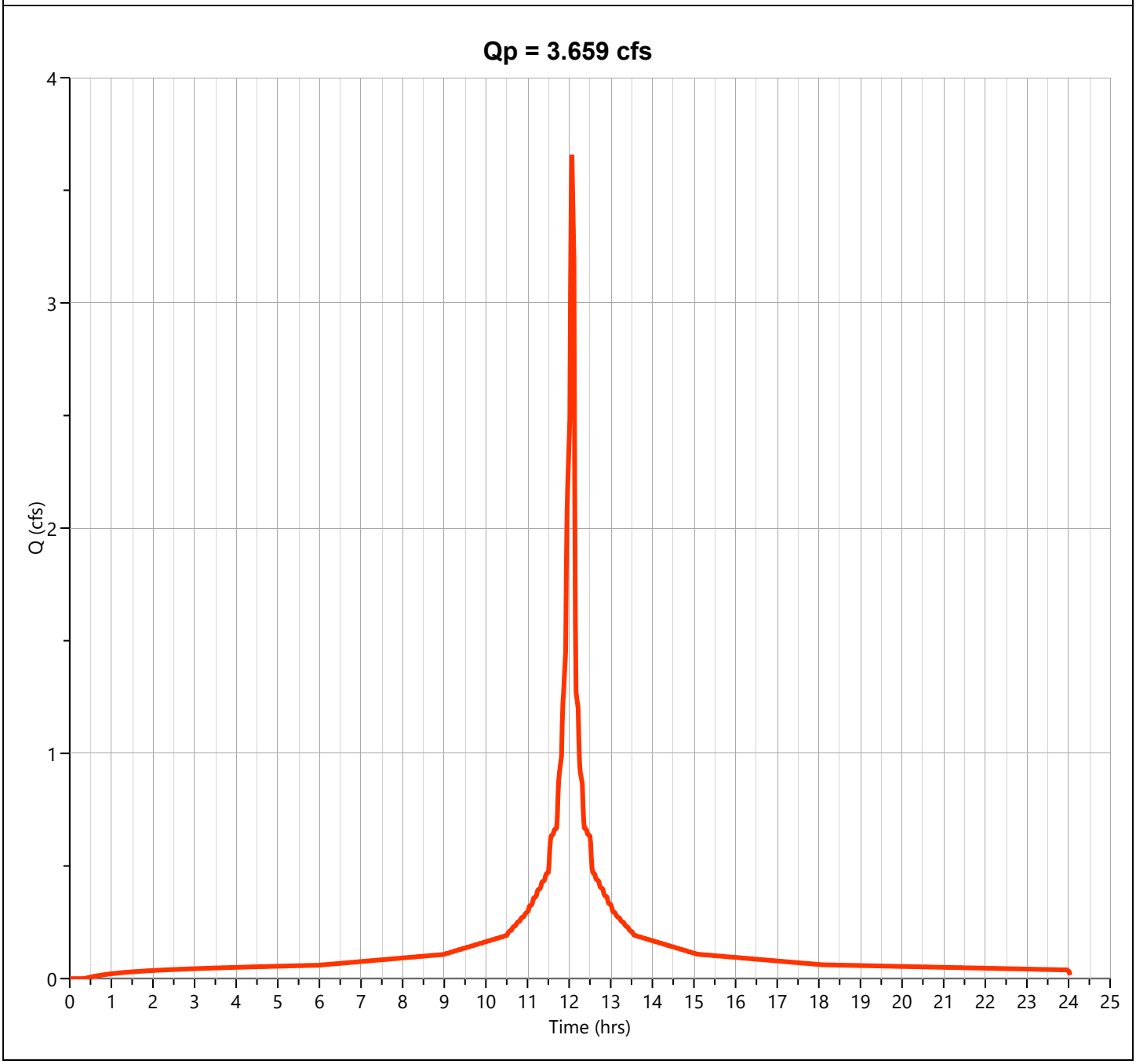
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A-D Imp

Hyd. No. 2

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.659 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 12,370 cuft
Drainage Area	= 0.32 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

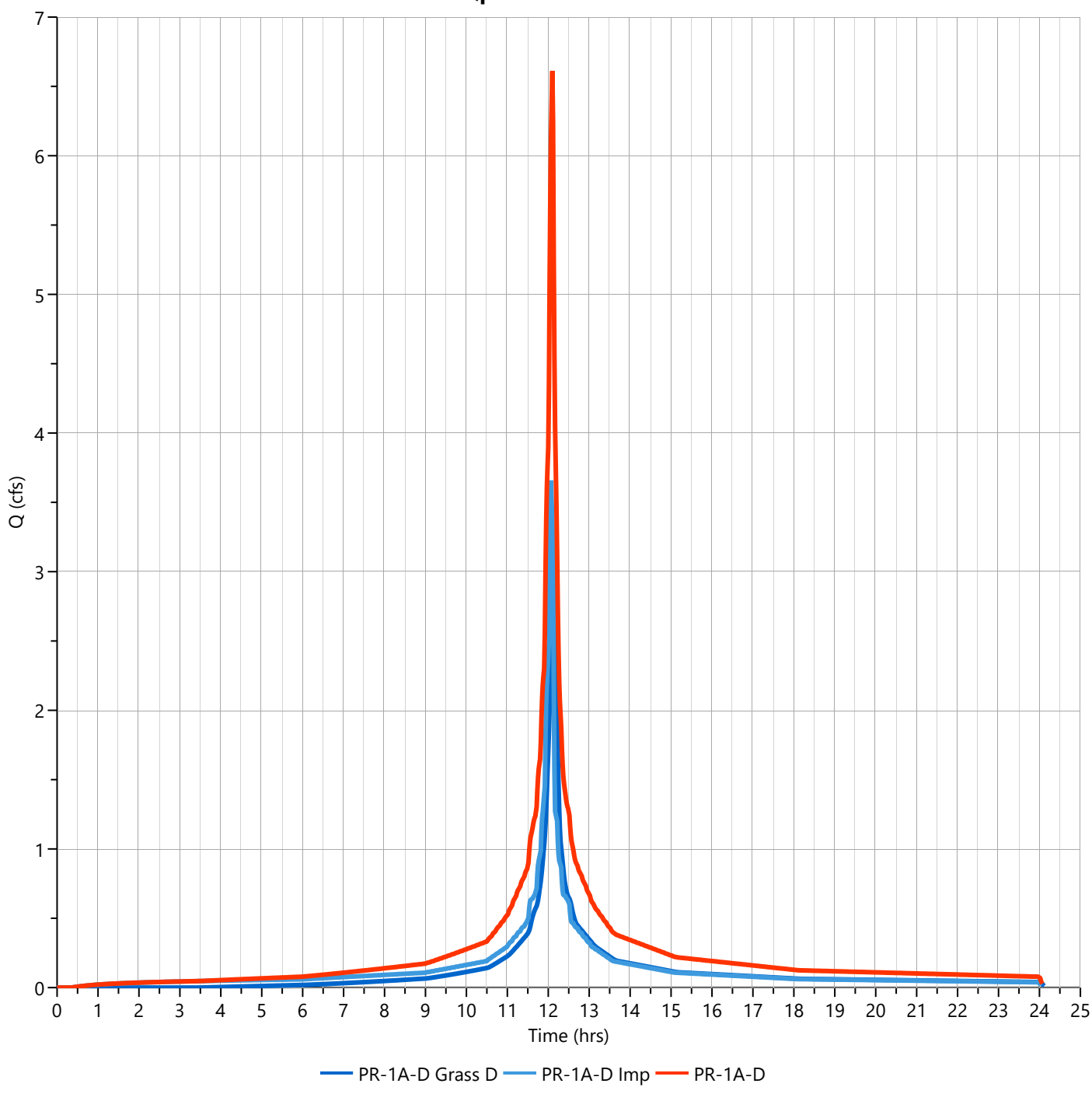
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A-D

Hyd. No. 3

Hydrograph Type	= Junction	Peak Flow	= 6.611 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 22,951 cuft
Inflow Hydrographs	= 1, 2	Total Contrib. Area	= 0.65 ac



PR-1A-UNDISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: (**Present**) Developed — **Future Proposed Watershed PR-1A-U 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)

$$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$$

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	**4.08**					
5. Land Slope, s	ft/ft	**0.034**					
6. Compute T_t	hr	**0.014**	+		+		
				Sheet Flow Sub-Total		**0.014 hours**	

Shallow Concentrated Flow

$$T_t = \frac{L}{3600\,V}$$

Segment ID		**2**					
7. Surface Description		**Pavement**					
8. Flow Length, L	ft	**48**					
9. Watercourse Slope, s	ft/ft	**0.024**					
10. Average Velocity, V (NEH table 15-3)	ft/s	**3.16**					
11. Compute T_t	hr	**0.004**	+		+		
				Shallow Conc. Flow Sub-Total		**0.004 hours**	

Channel Flow

$r = a / P_w$

$V = (1.49\, r^{2/3} s^{1/2}) / n$

$$T_t = \frac{L}{3600\,V}$$

Segment ID		**3**		**4**		**5**	
12. Flow Length, L	ft	**65**		**110**		**66**	
13. Cross Sectional flow area, a	ft^2	**0.61**		**0.61**		**0.61**	
14. Wetted Perimeter, P_w	ft	**2.00**		**2.00**		**2.00**	
15. Hydraulic Radius, r	ft	**0.31**		**0.31**		**0.31**	
16. Channel Slope, s	ft/ft	**0.026**		**0.005**		**0.070**	
17. Manning's Roughness Coeff., n		**0.012**		**0.012**		**0.012**	
18. Velocity, V	ft/s	**9.11**		**3.98**		**14.89**	
19. Compute T_t	hr	**0.002**	+	**0.008**	+	**0.001**	
				Channel Flow Sub-Total		**0.011 hours**	

Channel Flow

$r = a / P_w$

$V = (1.49\, r^{2/3} s^{1/2}) / n$

$$T_t = \frac{L}{3600\,V}$$

Segment ID		**6**					
20. Flow Length, L	ft	**96**					
21. Cross Sectional flow area, a	ft^2	**0.61**					
22. Wetted Perimeter, P_w	ft	**2.00**					
23. Hydraulic Radius, r	ft	**0.31**					
24. Channel Slope, s	ft/ft	**0.080**					
25. Manning's Roughness Coeff., n		**0.012**					
26. Velocity, V	ft/s	**15.91**					
27. Compute T_t	hr	**0.002**	+		+		
				Channel Flow Sub-Total		**0.002 hours**	

Watershed or subarea T_c or T_t (Add Sub-Total T_t from prior steps)		
	Total Tc (hours) =	**0.031 hours**
	Software Limitations Require Minimum Tc =	**2 minutes**

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Circle One: (**Present**) Developed — **Future Proposed Watershed PR-1A-U 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	73		27		
4.	Two-year 24-hr rainfall, P_2		in	4.08		4.08		
5.	Land Slope, s		ft/ft	0.080		0.068		
6.	Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.094	+	0.068	+	

Sheet Flow Sub-Total **0.162 hours**

Shallow Concentrated Flow

			Segment ID	3		4		
7.	Surface Description			Woodlands		Grassed Waterways		
8.	Flow Length, L		ft	21		198		
9.	Watercourse Slope, s		ft/ft	0.090		0.110		
10.	Average Velocity, V (NEH table 15-3)		ft/s	1.51		5.34		
11.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.004	+	0.010	+	

Shallow Conc. Flow Sub-Total **0.014 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) =	**0.177 hours**
Total Tc (minutes) =	**11 minutes**

Hydrograph Report

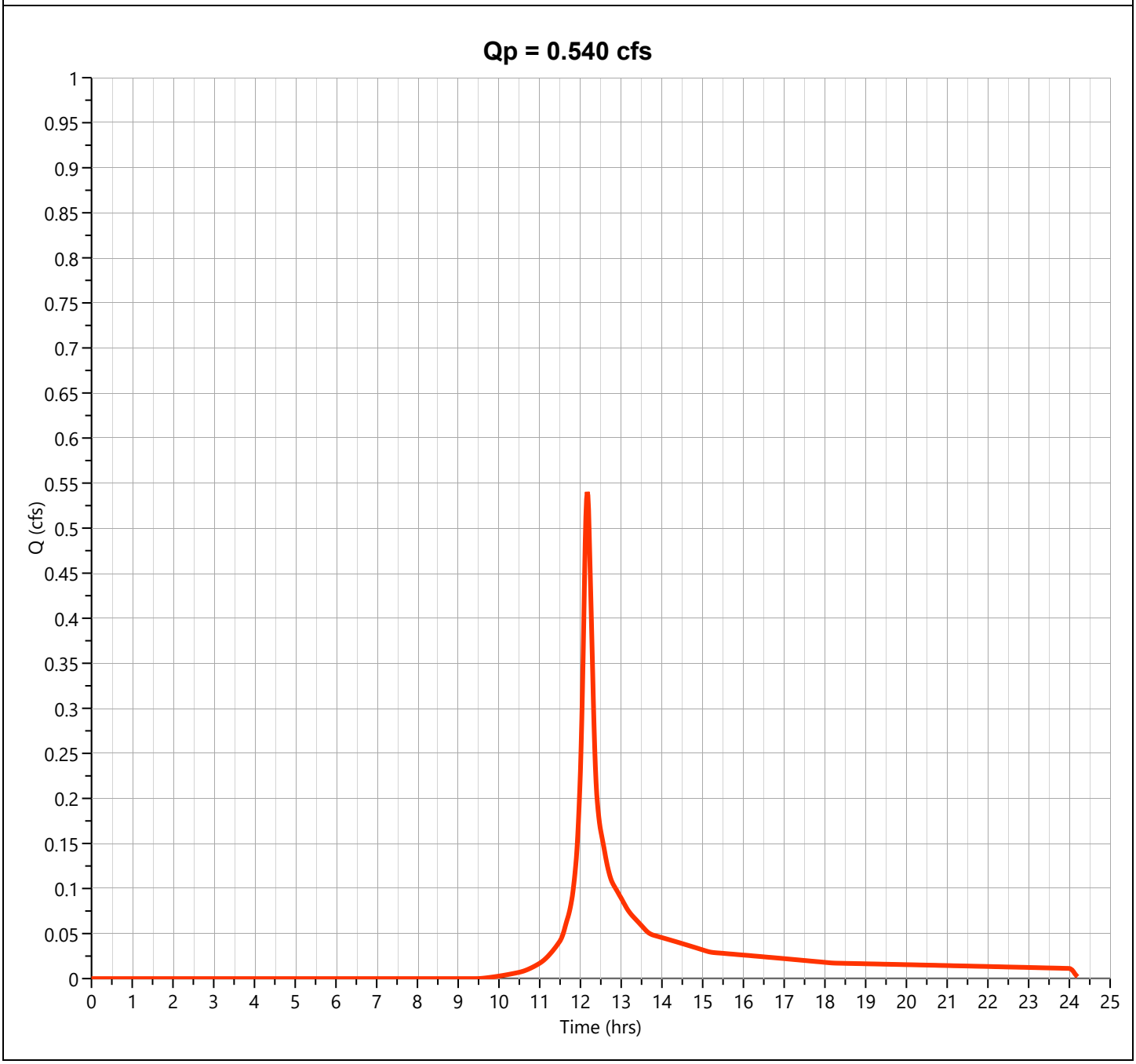
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A-U Open Space C

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.540 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Runoff Volume	= 2,018 cuft
Drainage Area	= 0.33 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 11.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

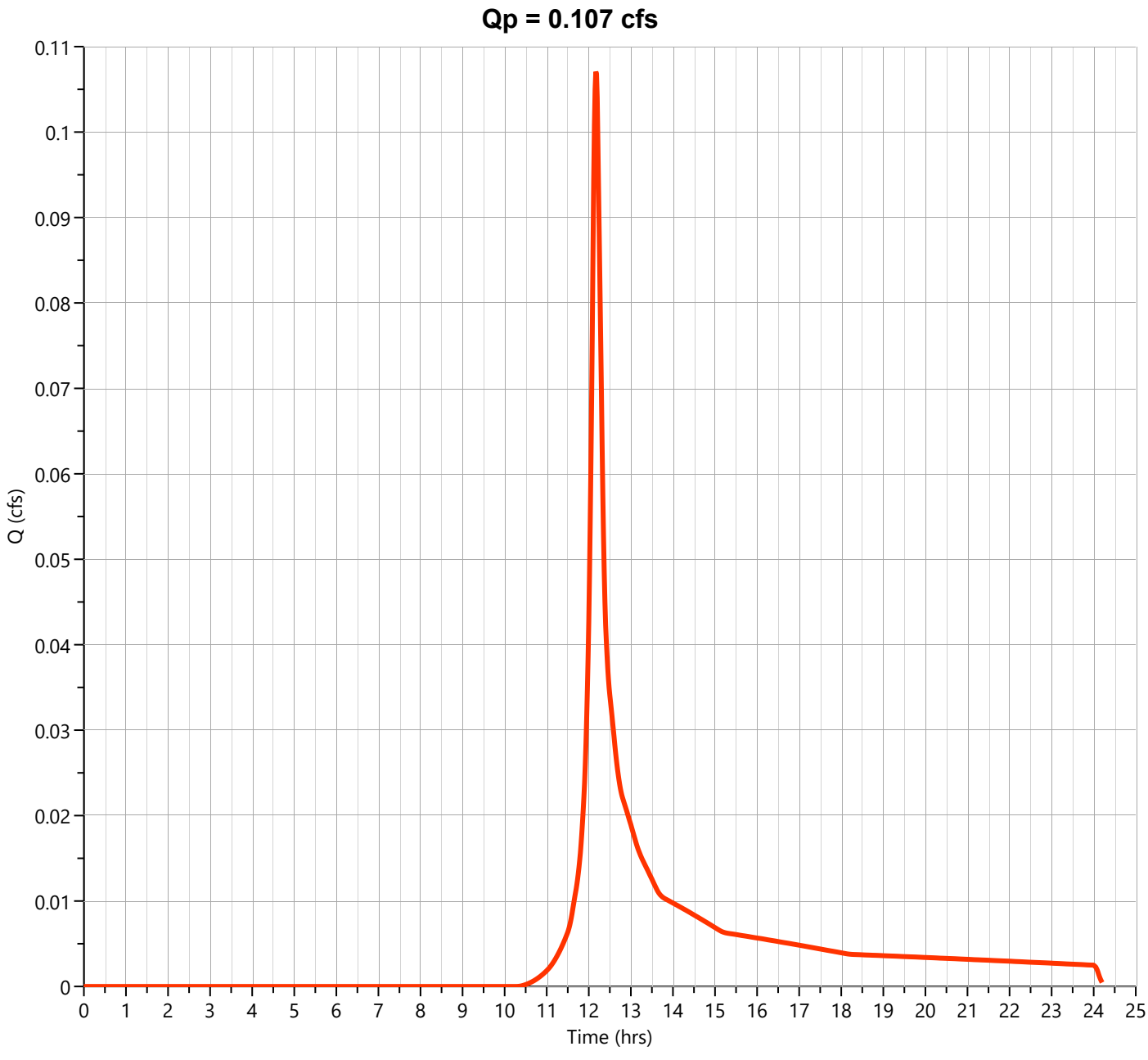
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File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A-U Woods C

Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.107 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Runoff Volume	= 409 cuft
Drainage Area	= 0.08 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 11.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

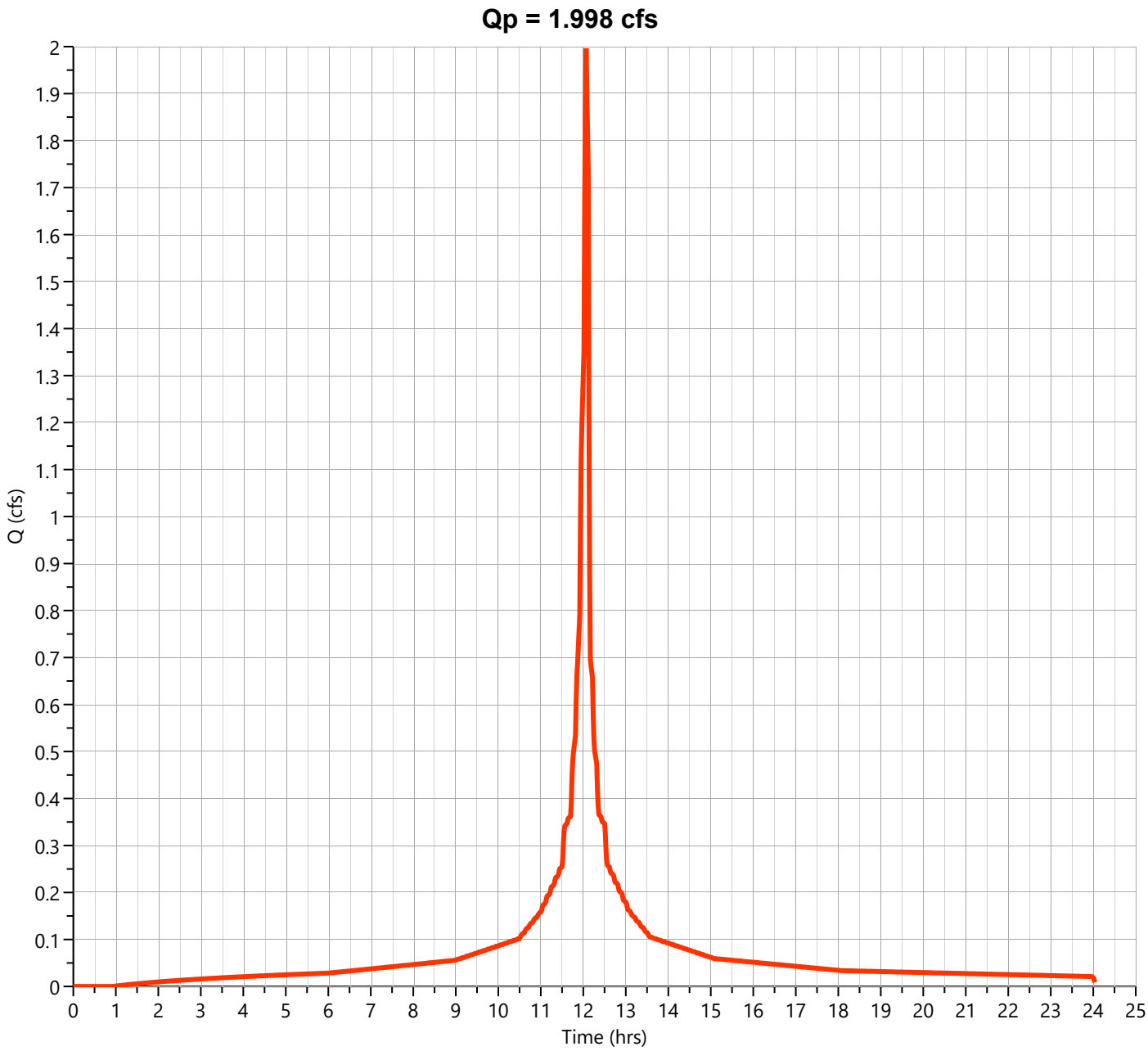
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File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A-U Imp

Hyd. No. 7

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.998 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 6,542 cuft
Drainage Area	= 0.5 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

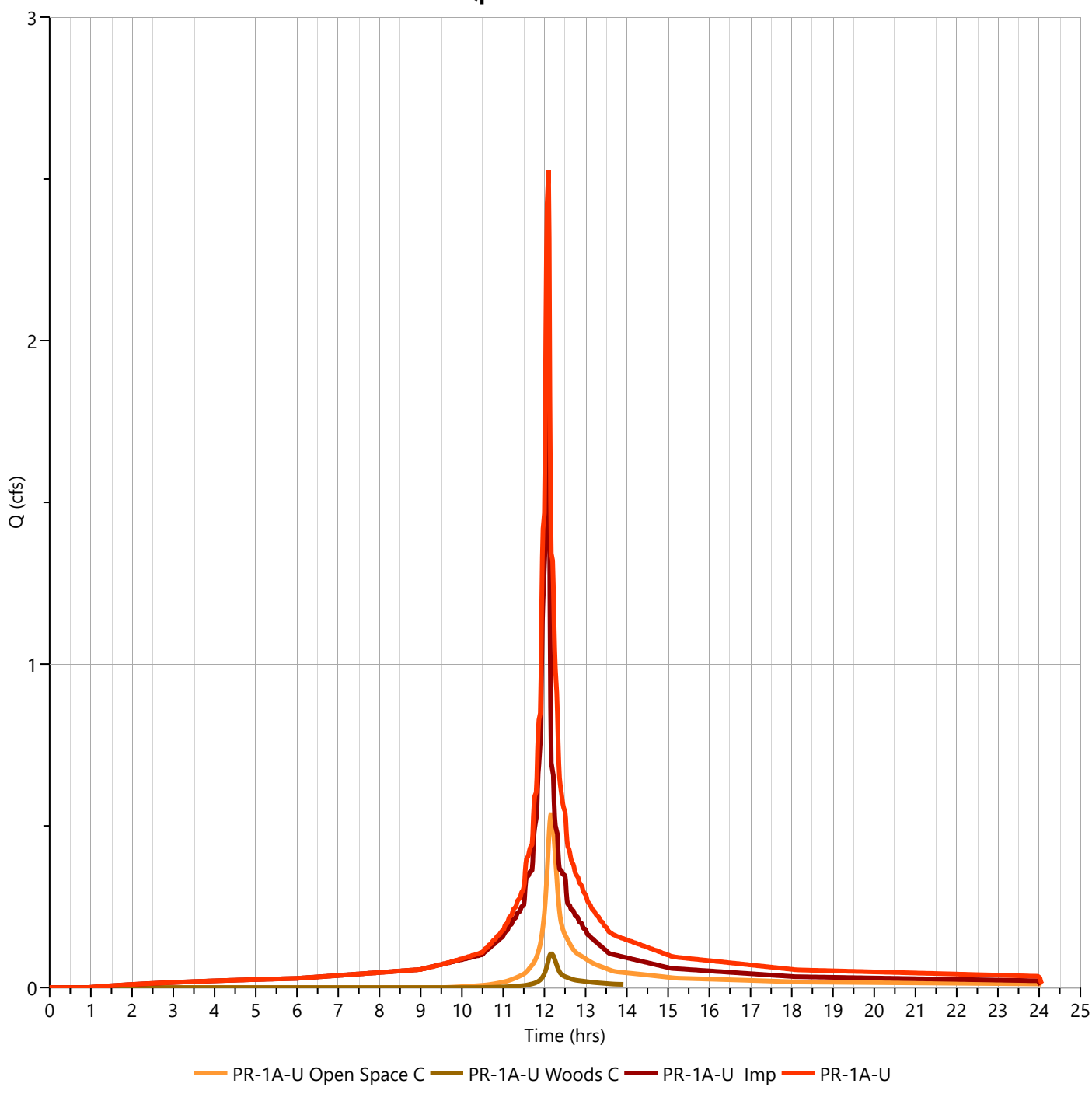
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10-21-2025

PR-1A-U

Hyd. No. 8

Hydrograph Type	= Junction	Peak Flow	= 2.527 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 8,970 cuft
Inflow Hydrographs	= 5, 6, 7	Total Contrib. Area	= 0.91 ac



Hydrograph Report

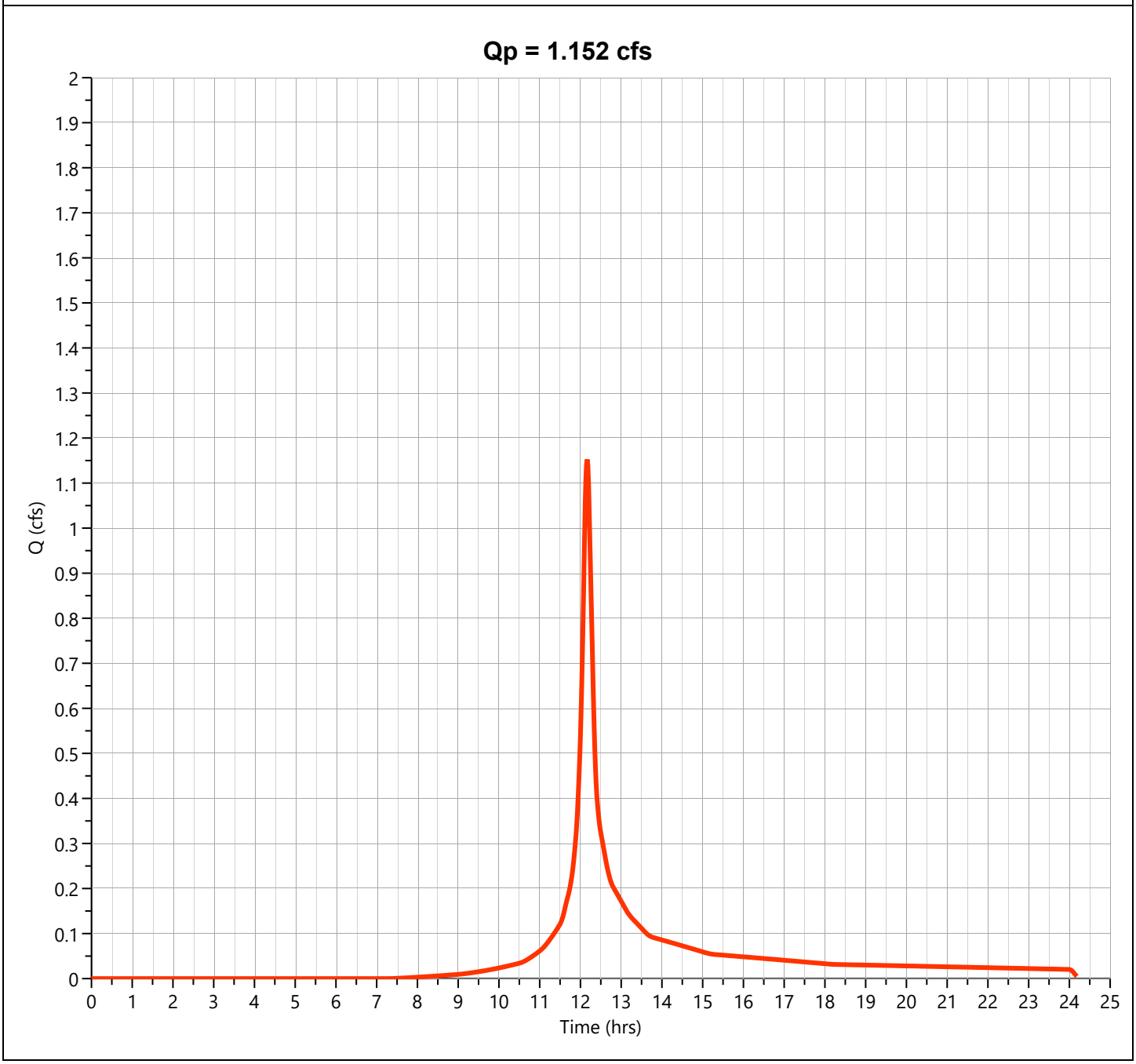
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10-21-2025

PR-1A-U Open Space C

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.152 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Runoff Volume	= 4,266 cuft
Drainage Area	= 0.33 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 11.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

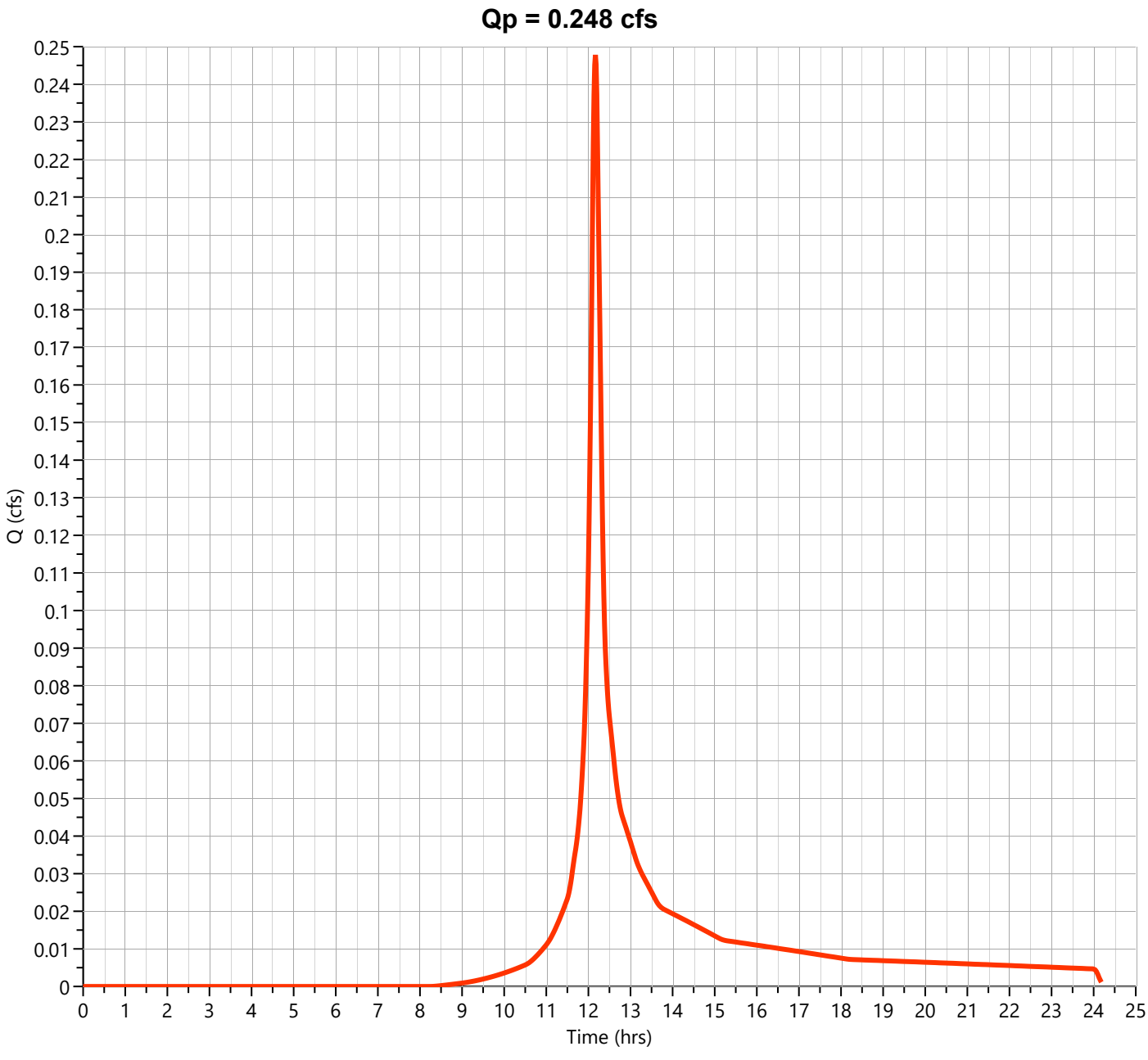
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10-21-2025

PR-1A-U Woods C

Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.248 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Runoff Volume	= 917 cuft
Drainage Area	= 0.08 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 11.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

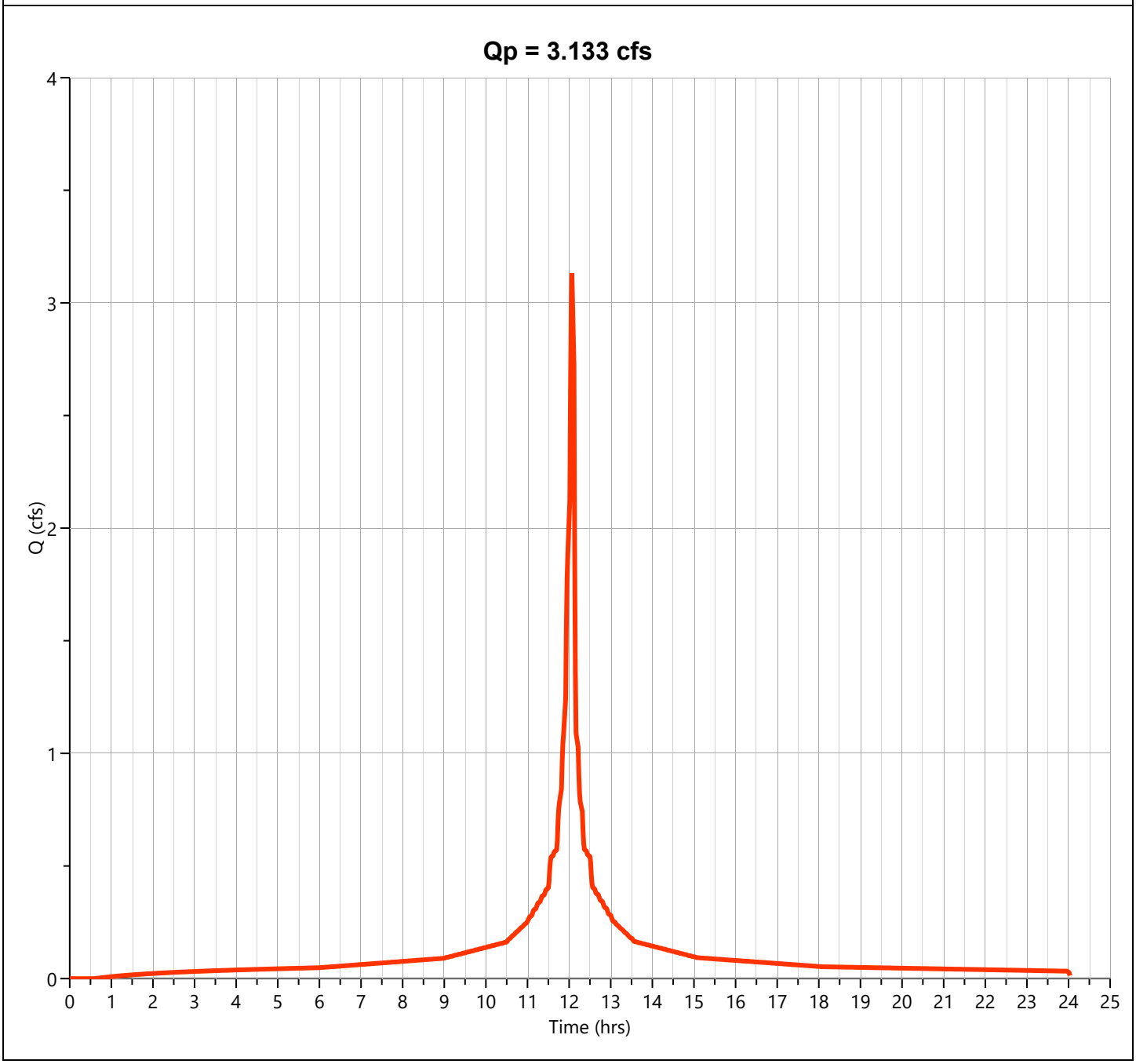
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File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A-U Imp

Hyd. No. 7

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.133 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 10,433 cuft
Drainage Area	= 0.5 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

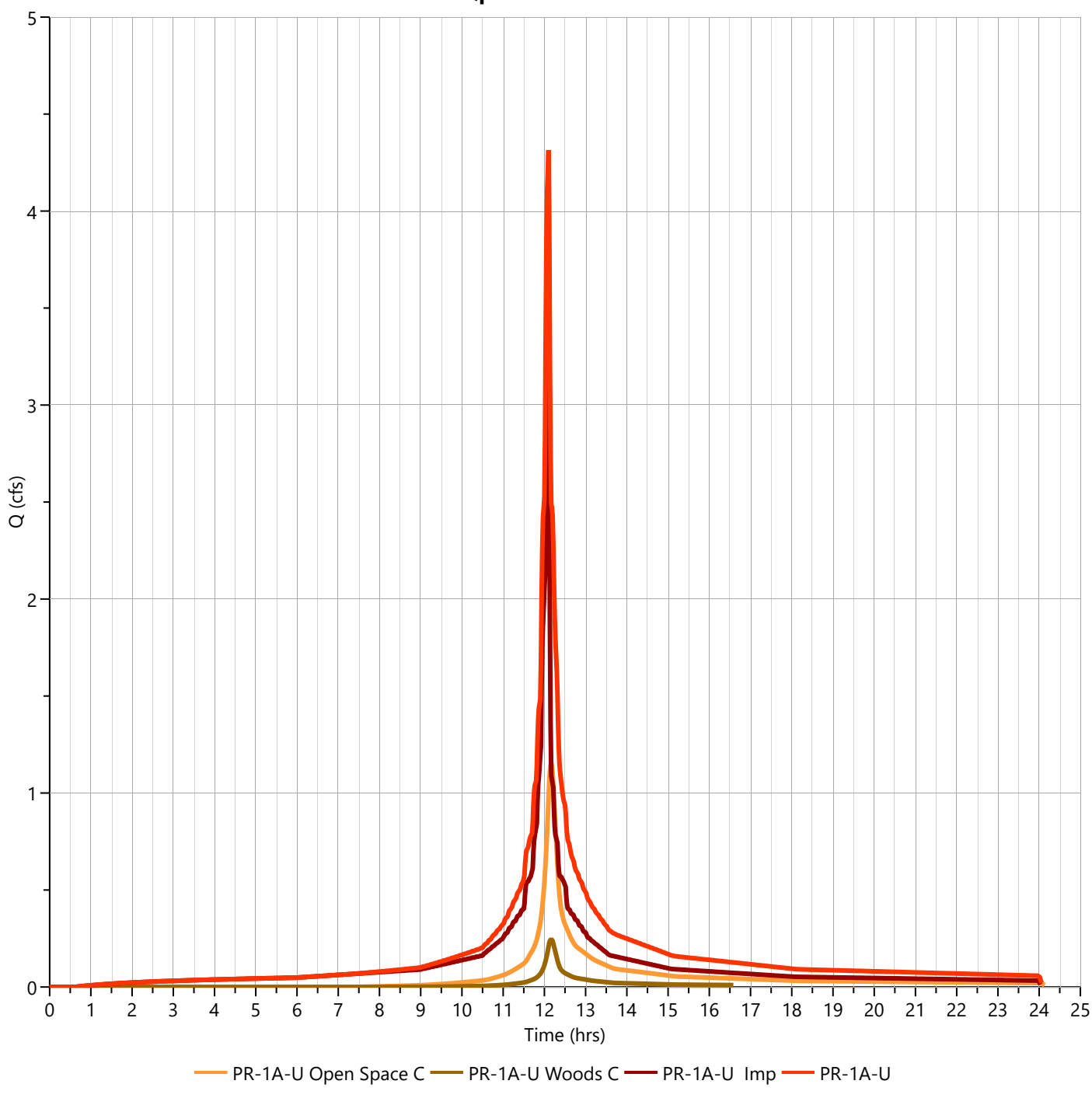
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A-U

Hyd. No. 8

Hydrograph Type	= Junction	Peak Flow	= 4.314 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 15,615 cuft
Inflow Hydrographs	= 5, 6, 7	Total Contrib. Area	= 0.91 ac



Hydrograph Report

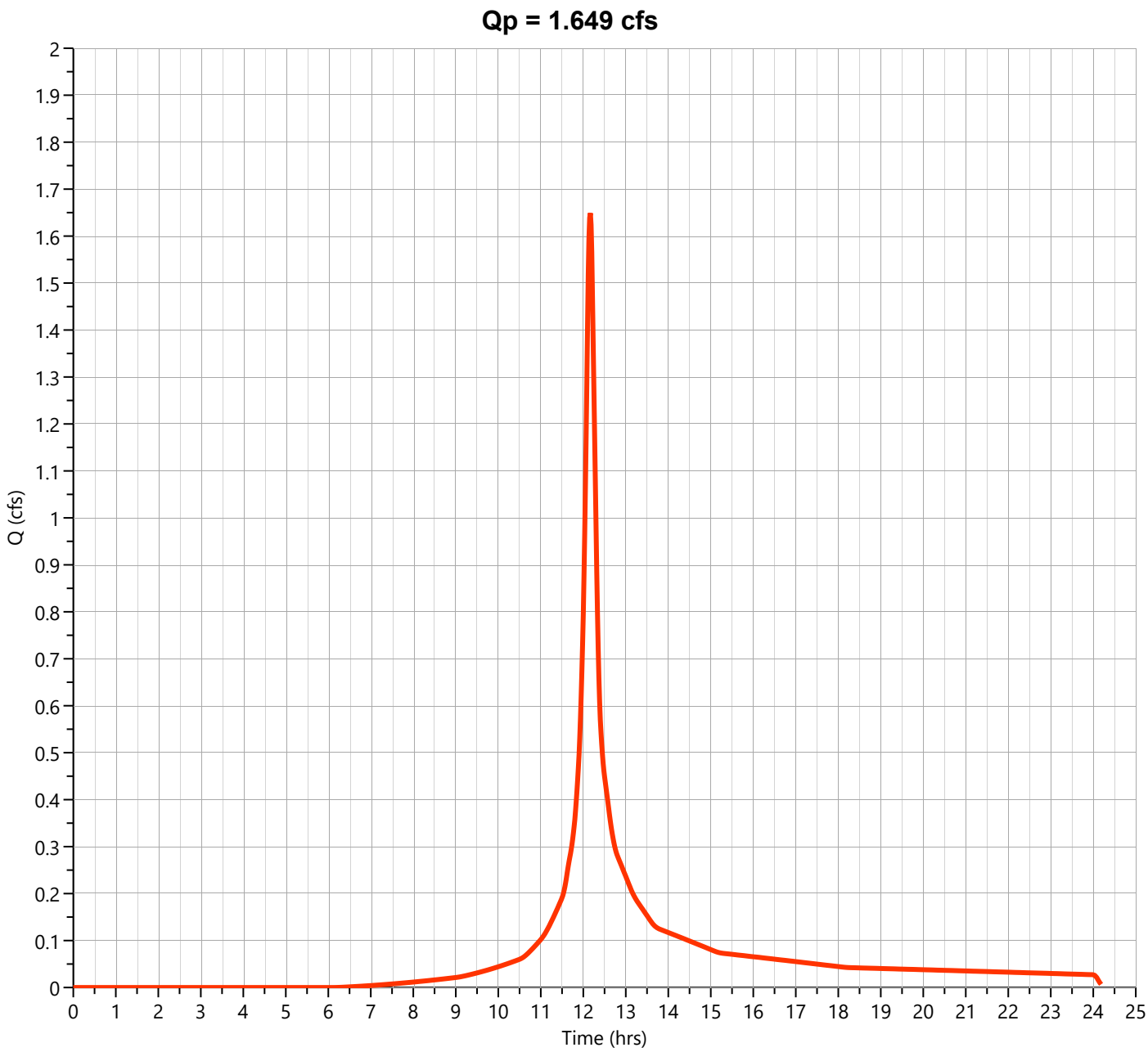
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10-21-2025

PR-1A-U Open Space C

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.649 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Runoff Volume	= 6,148 cuft
Drainage Area	= 0.33 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 11.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

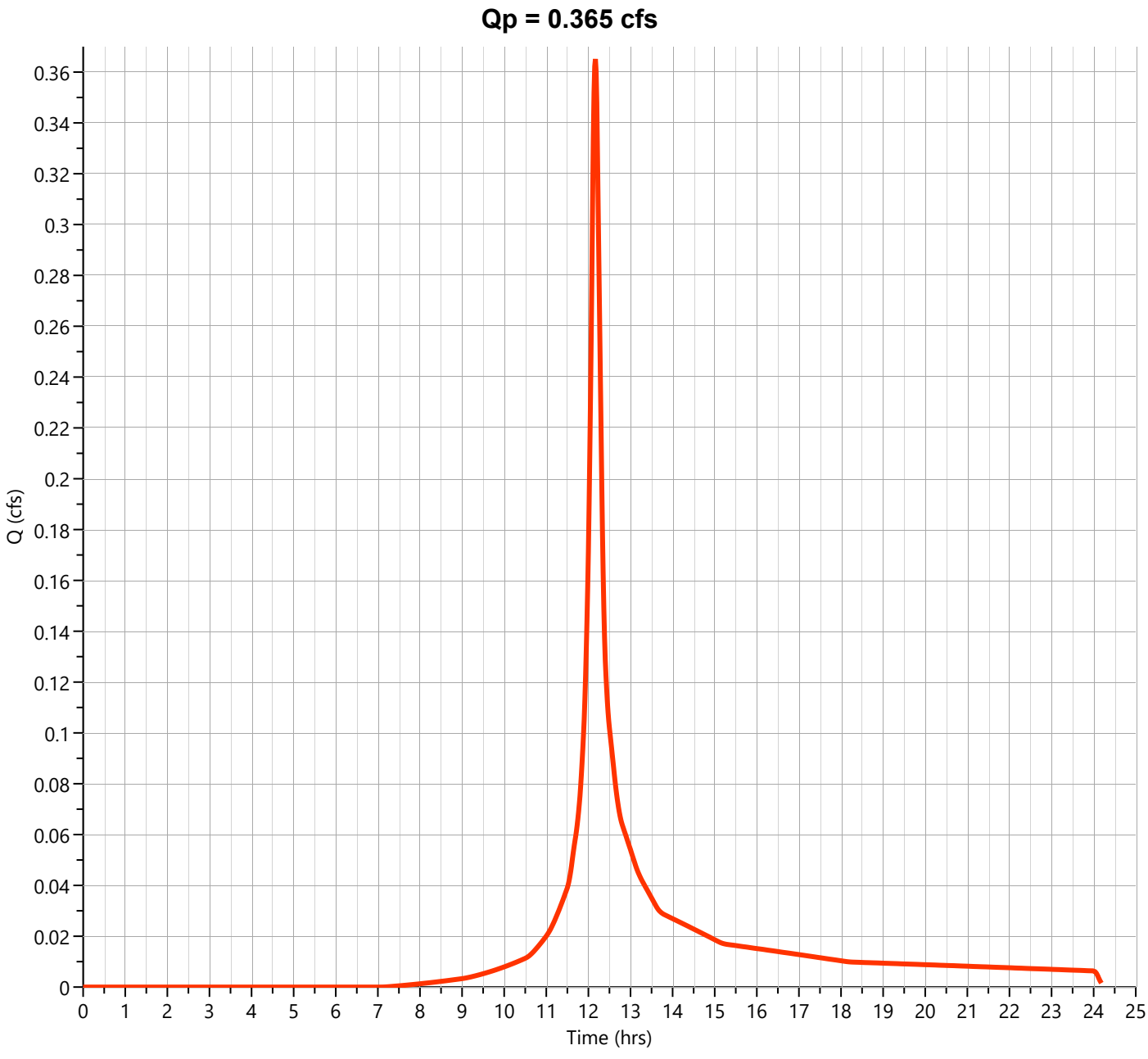
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File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A-U Woods C

Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.365 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Runoff Volume	= 1,353 cuft
Drainage Area	= 0.08 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 11.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

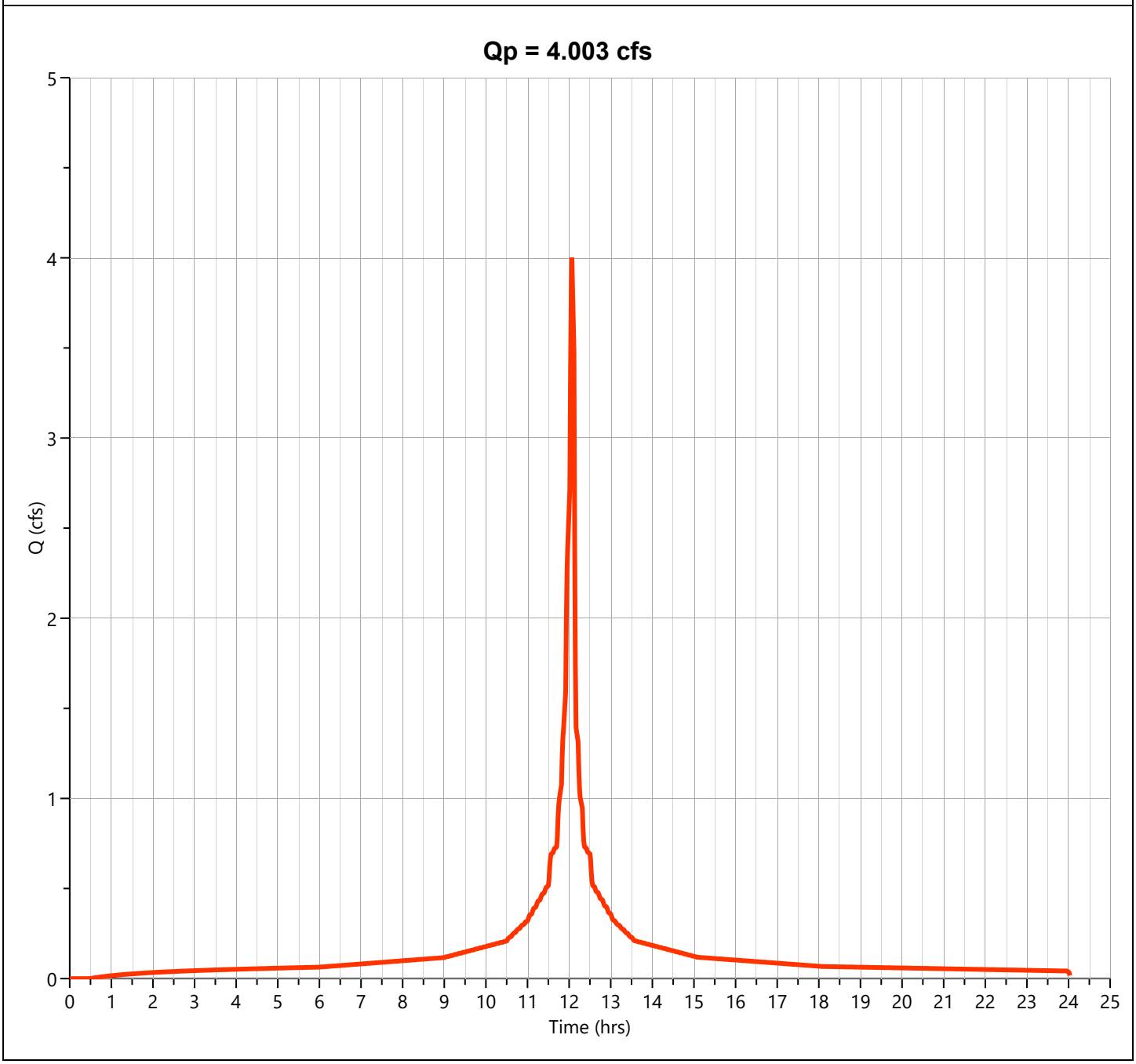
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File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A-U Imp

Hyd. No. 7

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.003 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 13,426 cuft
Drainage Area	= 0.5 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

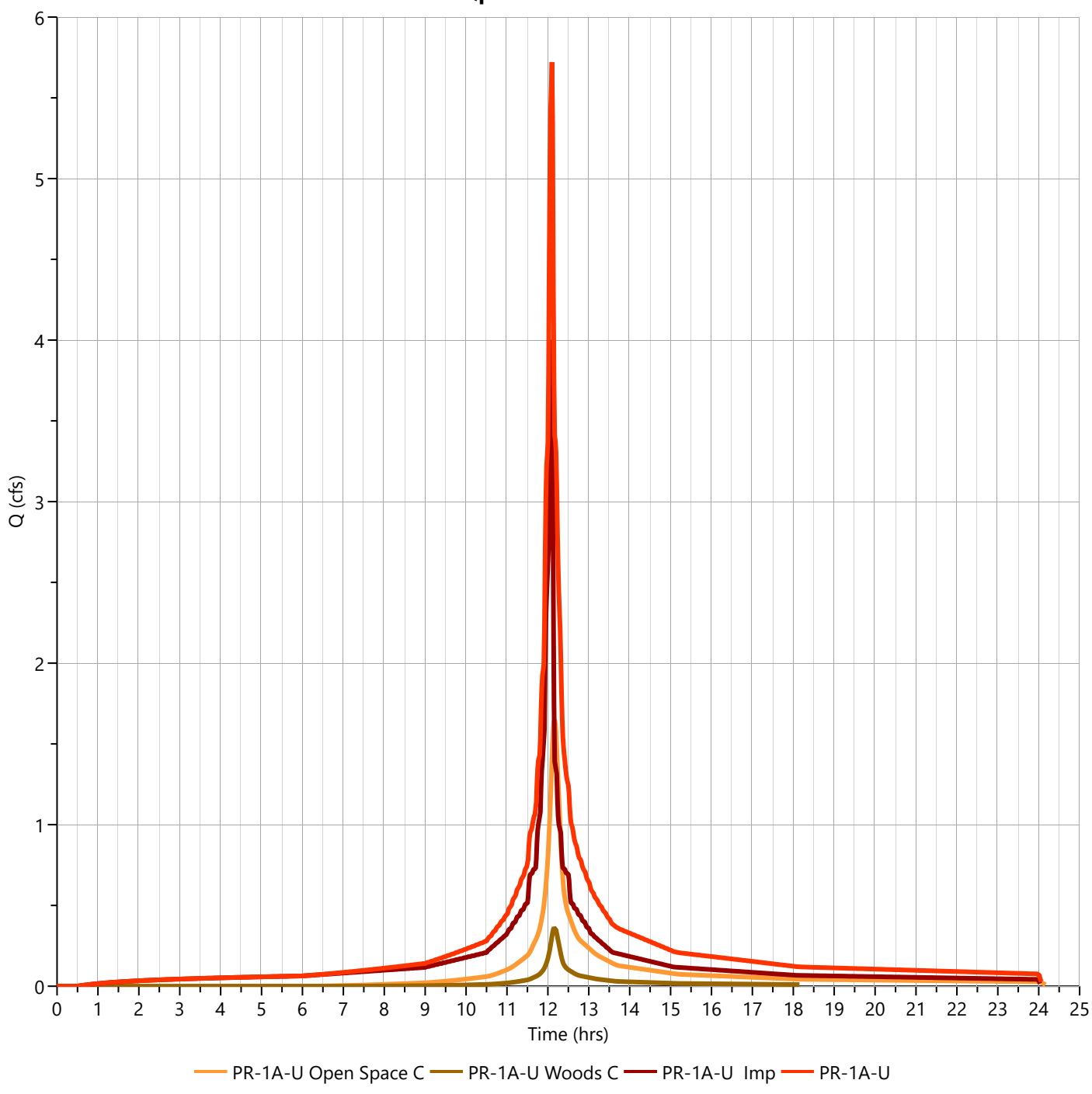
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File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A-U

Hyd. No. 8

Hydrograph Type	= Junction	Peak Flow	= 5.721 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 20,926 cuft
Inflow Hydrographs	= 5, 6, 7	Total Contrib. Area	= 0.91 ac



Hydrograph Report

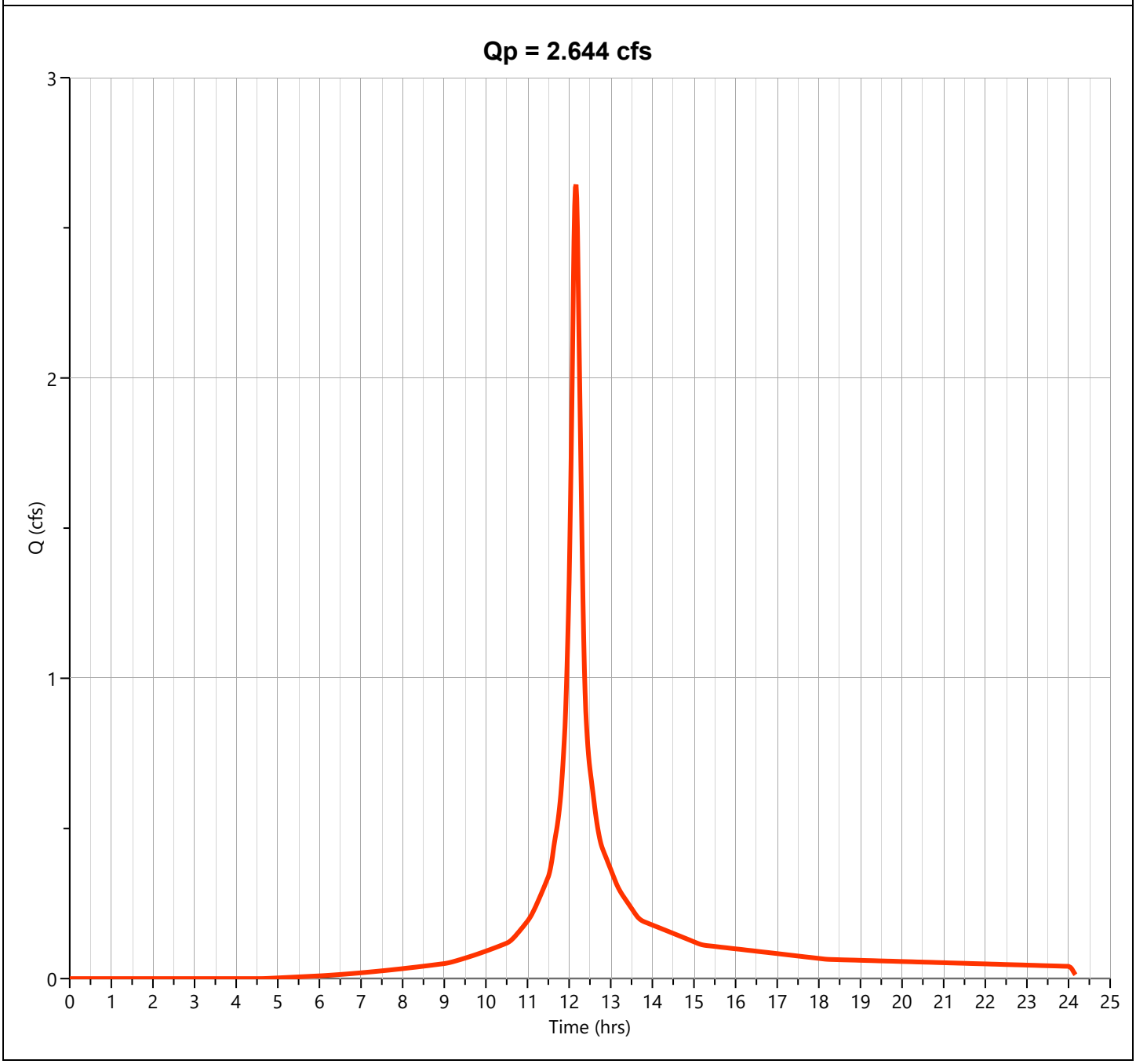
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File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A-U Open Space C

Hyd. No. 5

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.644 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Runoff Volume	= 10,047 cuft
Drainage Area	= 0.33 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 11.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

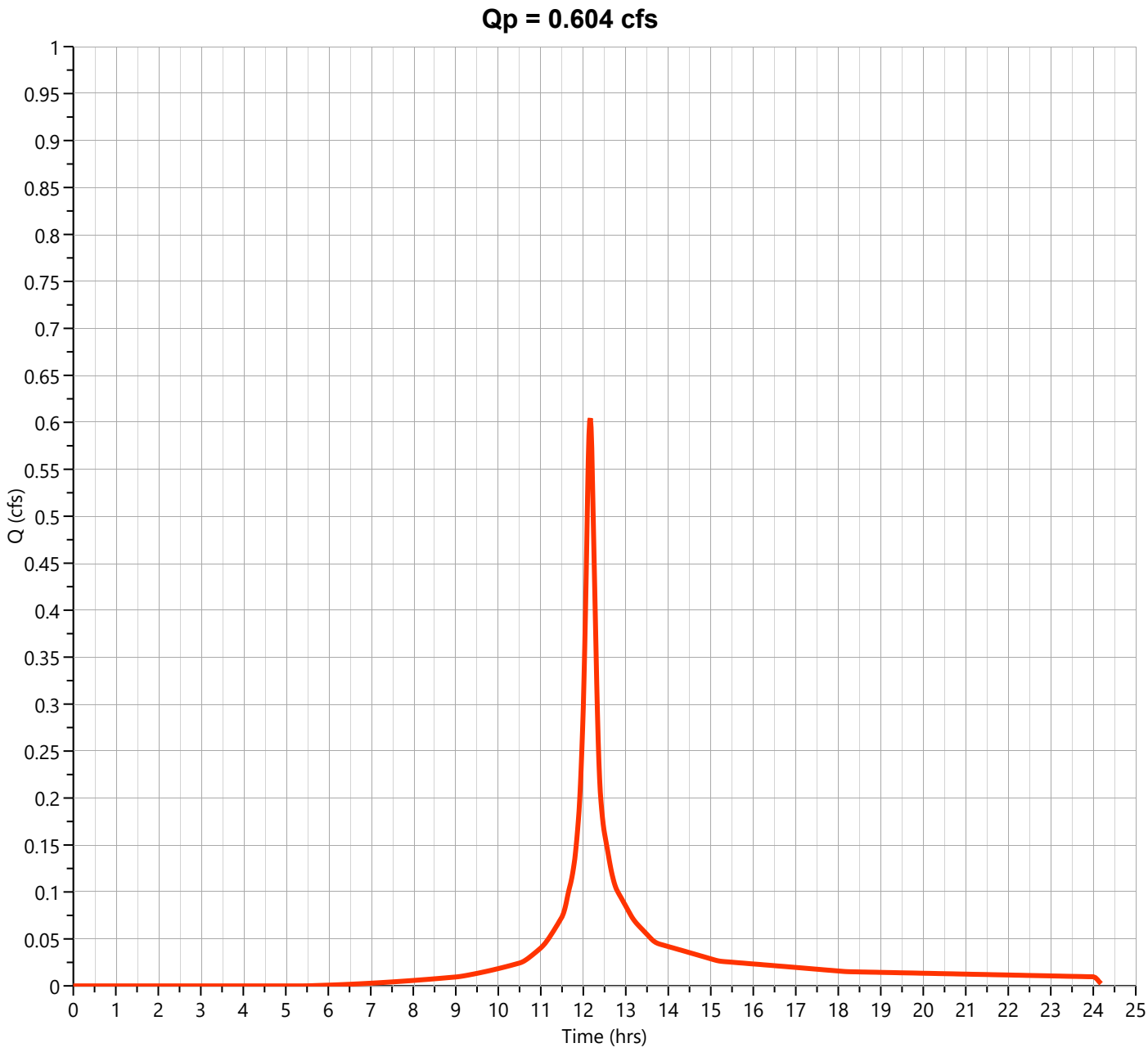
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File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A-U Woods C

Hyd. No. 6

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.604 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.17 hrs
Time Interval	= 1 min	Runoff Volume	= 2,270 cuft
Drainage Area	= 0.08 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 11.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

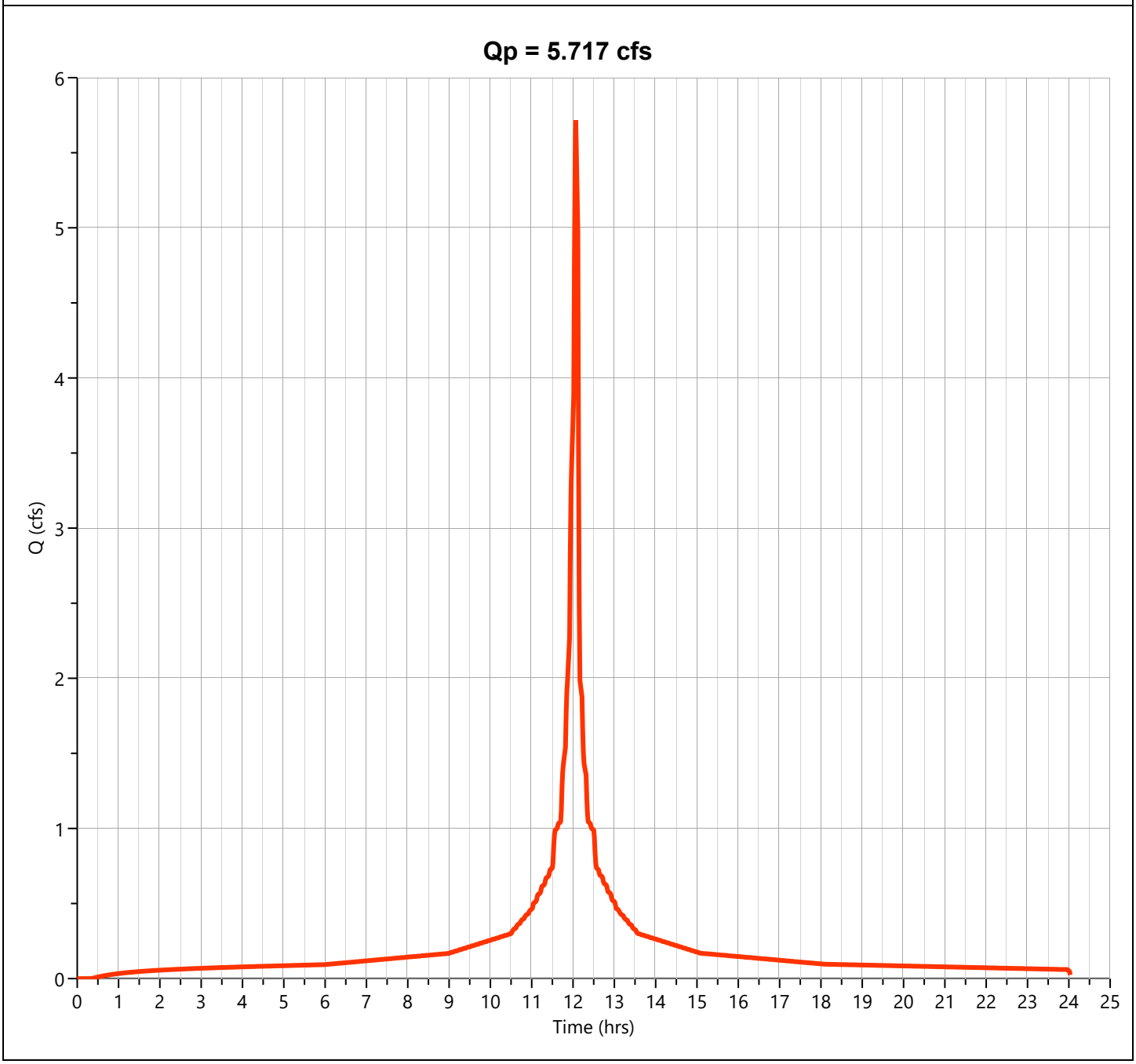
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A-U Imp

Hyd. No. 7

Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.717 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 19,327 cuft
Drainage Area	= 0.5 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

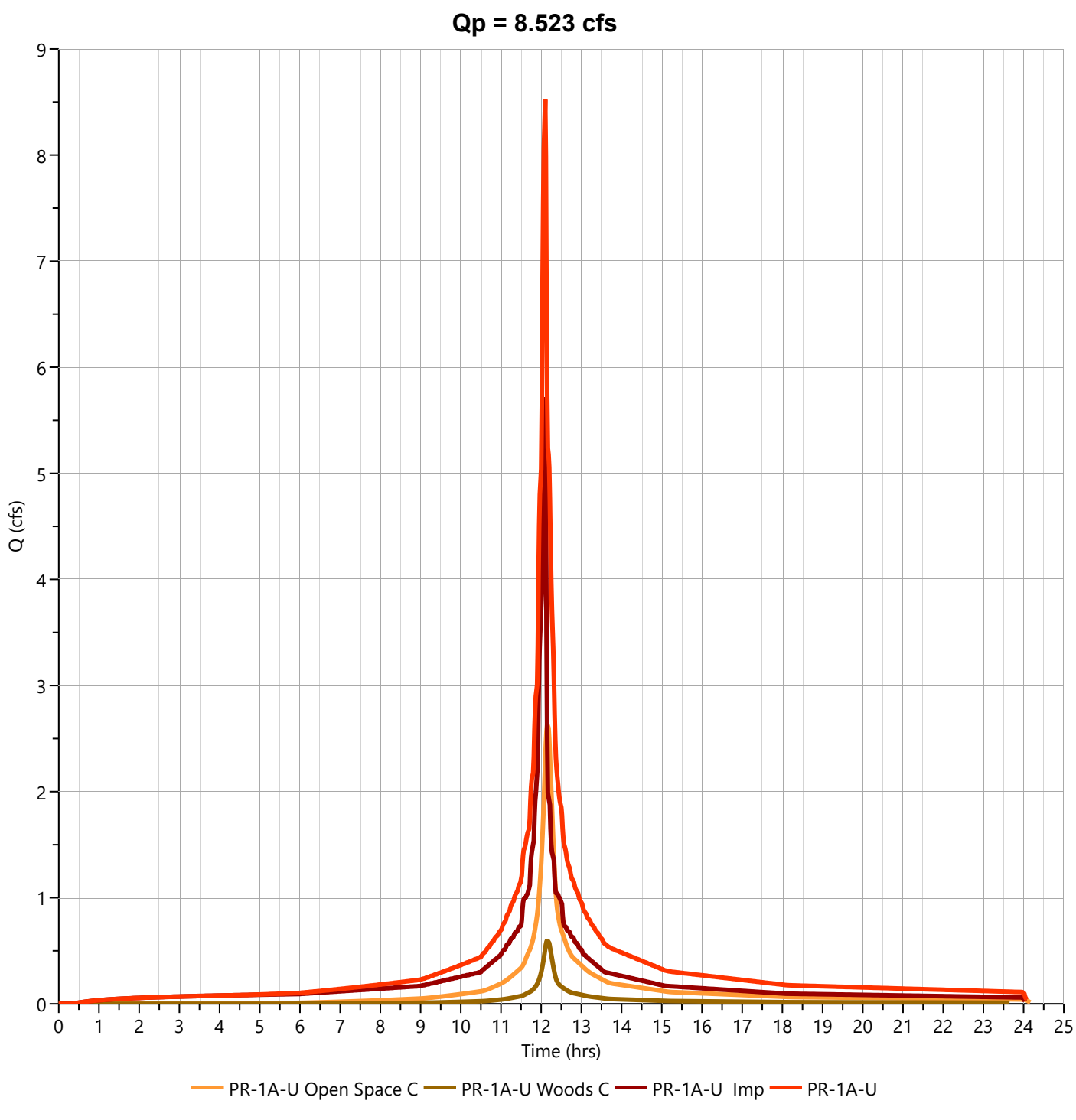
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File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A-U

Hyd. No. 8

Hydrograph Type	= Junction	Peak Flow	= 8.523 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 31,645 cuft
Inflow Hydrographs	= 5, 6, 7	Total Contrib. Area	= 0.91 ac



PR-1A WATERSHED
(COMBINED PROPOSED FLOW TO SSBB-1)

Hydrograph Report

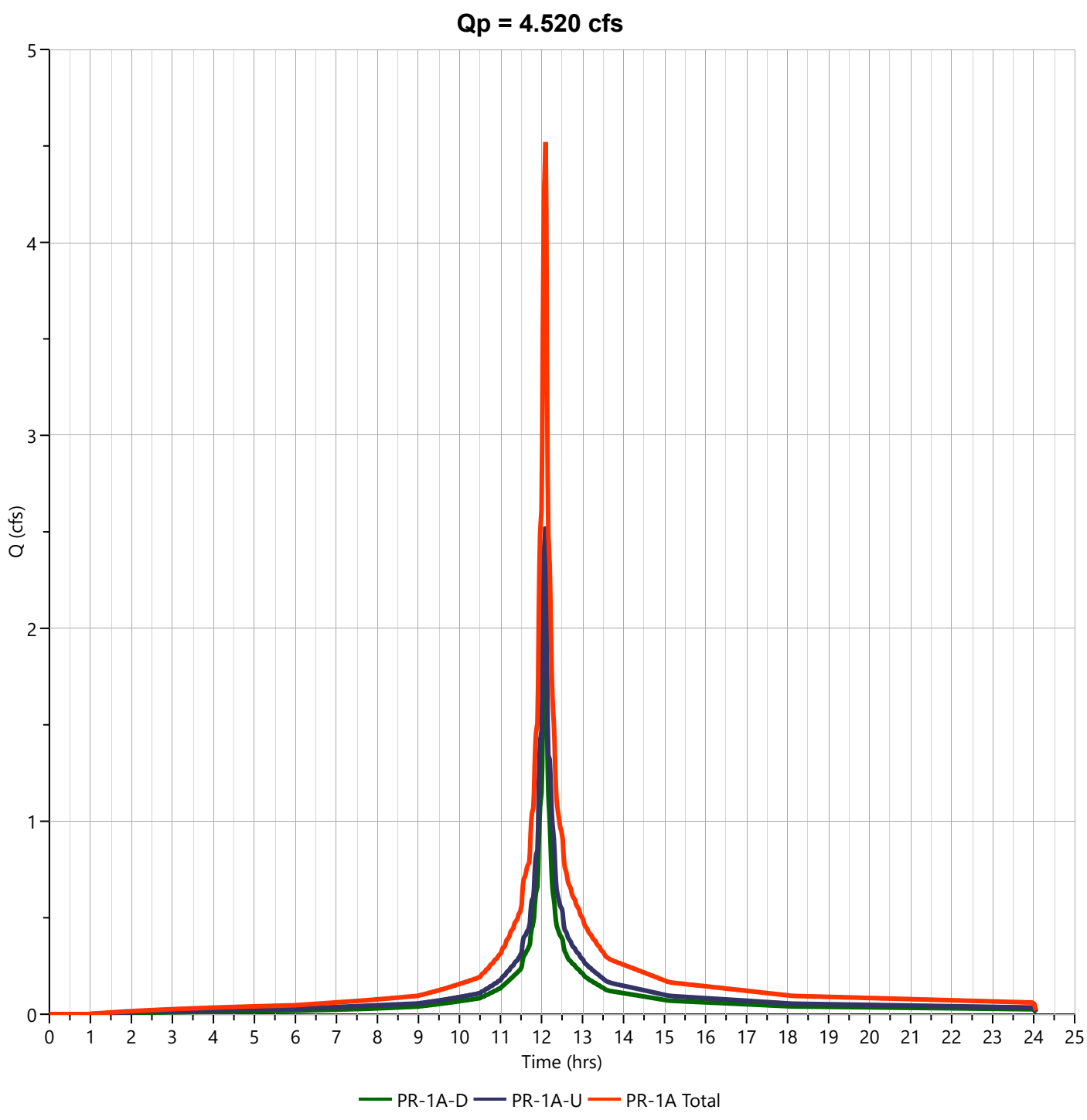
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File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A Total

Hyd. No. 10

Hydrograph Type	= Junction	Peak Flow	= 4.520 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 15,619 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

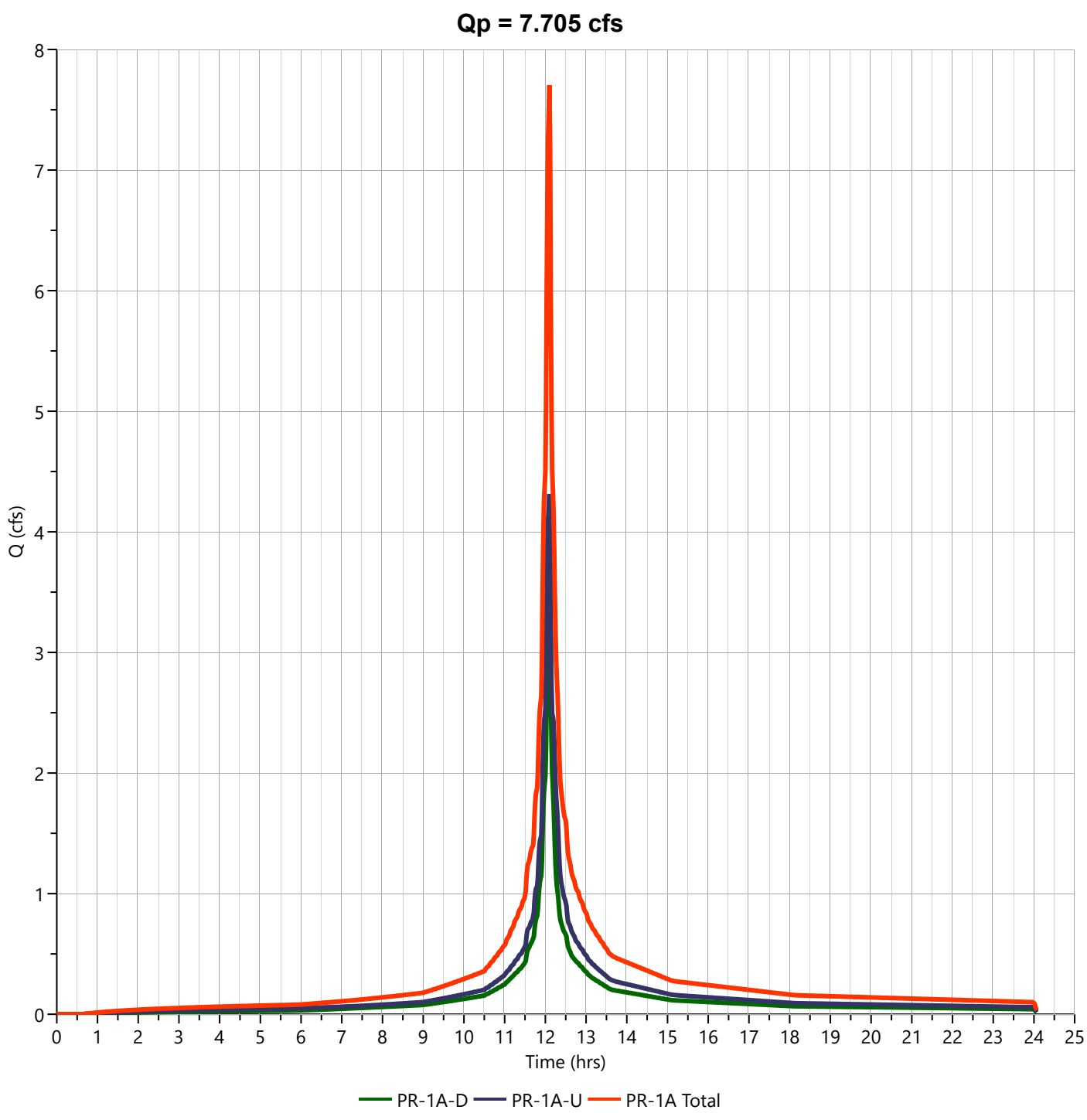
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A Total

Hyd. No. 10

Hydrograph Type	= Junction	Peak Flow	= 7.705 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 27,101 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

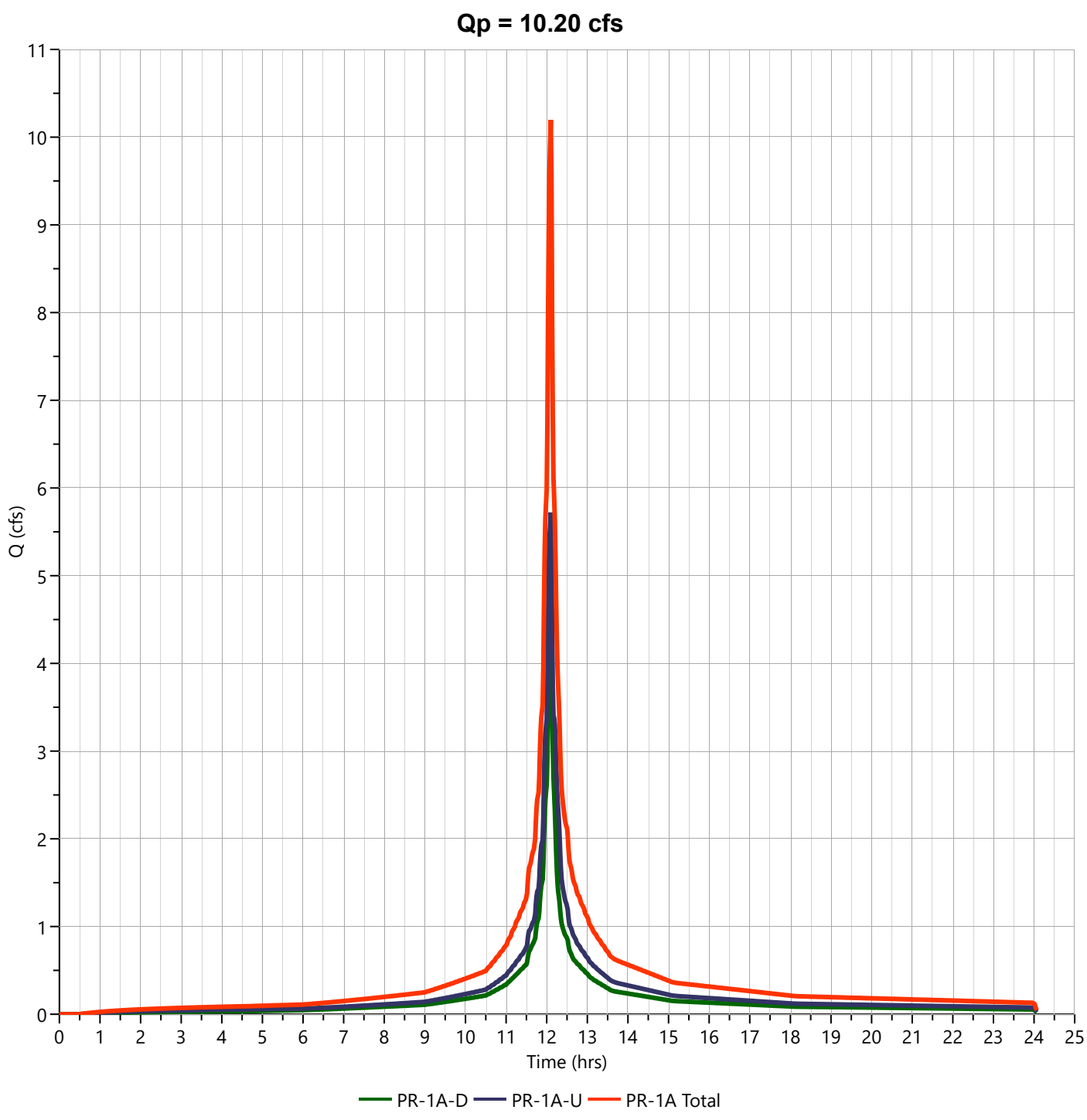
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File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A Total

Hyd. No. 10

Hydrograph Type	= Junction	Peak Flow	= 10.20 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 36,231 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

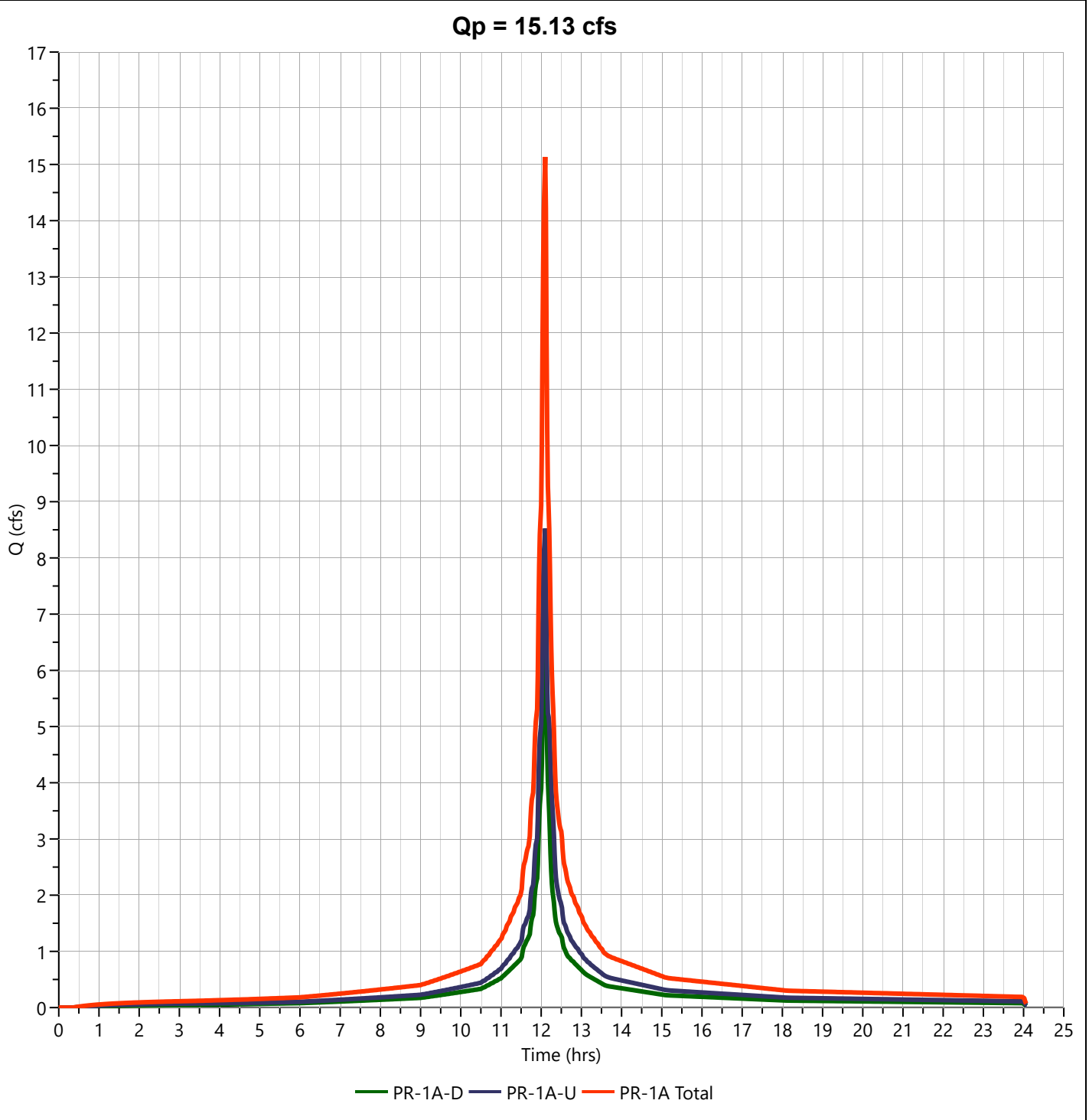
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File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1A Total

Hyd. No. 10

Hydrograph Type	= Junction	Peak Flow	= 15.13 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 54,595 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



PR-1B-DISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: Present (**Developed**) — **Future Proposed Watershed PR-1B-D - 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.	Surface Description (NEH table 15-1)			**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	**10**		
4.	Two-year 24-hr rainfall, P_2		in	**4.08**		
5.	Land Slope, s		ft/ft	**0.352**		
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	**0.011**	+	+
					Sheet Flow Sub-Total	**0.011 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**	**3**	**4**
13.	Flow Length, L		ft	**397**	**25**	**117**
14.	Cross Sectional flow area, a		ft^2	**0.69**	**0.61**	**0.61**
15.	Wetted Perimeter, P_w		ft	**3.58**	**2.00**	**2.00**
16.	Hydraulic Radius, r	$r = a / P_w$	ft	**0.19**	**0.31**	**0.31**
17.	Channel Slope, s		ft/ft	**0.010**	**0.080**	**0.023**
18.	Manning's Roughness Coeff., n			**0.035**	**0.013**	**0.013**
19.	Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	**1.42**	**14.69**	**7.89**
20.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	**0.078**	+ **0.000**	+ **0.004**
					Channel Flow Sub-Total	**0.082 hours**

Channel Flow

			Segment ID	**5**	**6**	
21.	Flow Length, L		ft	**15**	**51**	
22.	Cross Sectional flow area, a		ft^2	**0.61**	**0.61**	
23.	Wetted Perimeter, P_w		ft	**2.00**	**2.00**	
24.	Hydraulic Radius, r	$r = a / P_w$	ft	**0.31**	**0.31**	
25.	Channel Slope, s		ft/ft	**0.055**	**0.021**	
26.	Manning's Roughness Coeff., n			**0.013**	**0.013**	
27.	Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	**12.14**	**7.59**	
28.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	**0.000**	+ **0.002**	+
					Channel Flow Sub-Total	**0.002 hours**

Watershed or subarea T_c or T_t		
(Add Sub-Total T_t from prior steps)	Total Tc (hours) =	**0.095 hours**
	Total Tc (minutes) =	**6 minutes**

Hydrograph Report

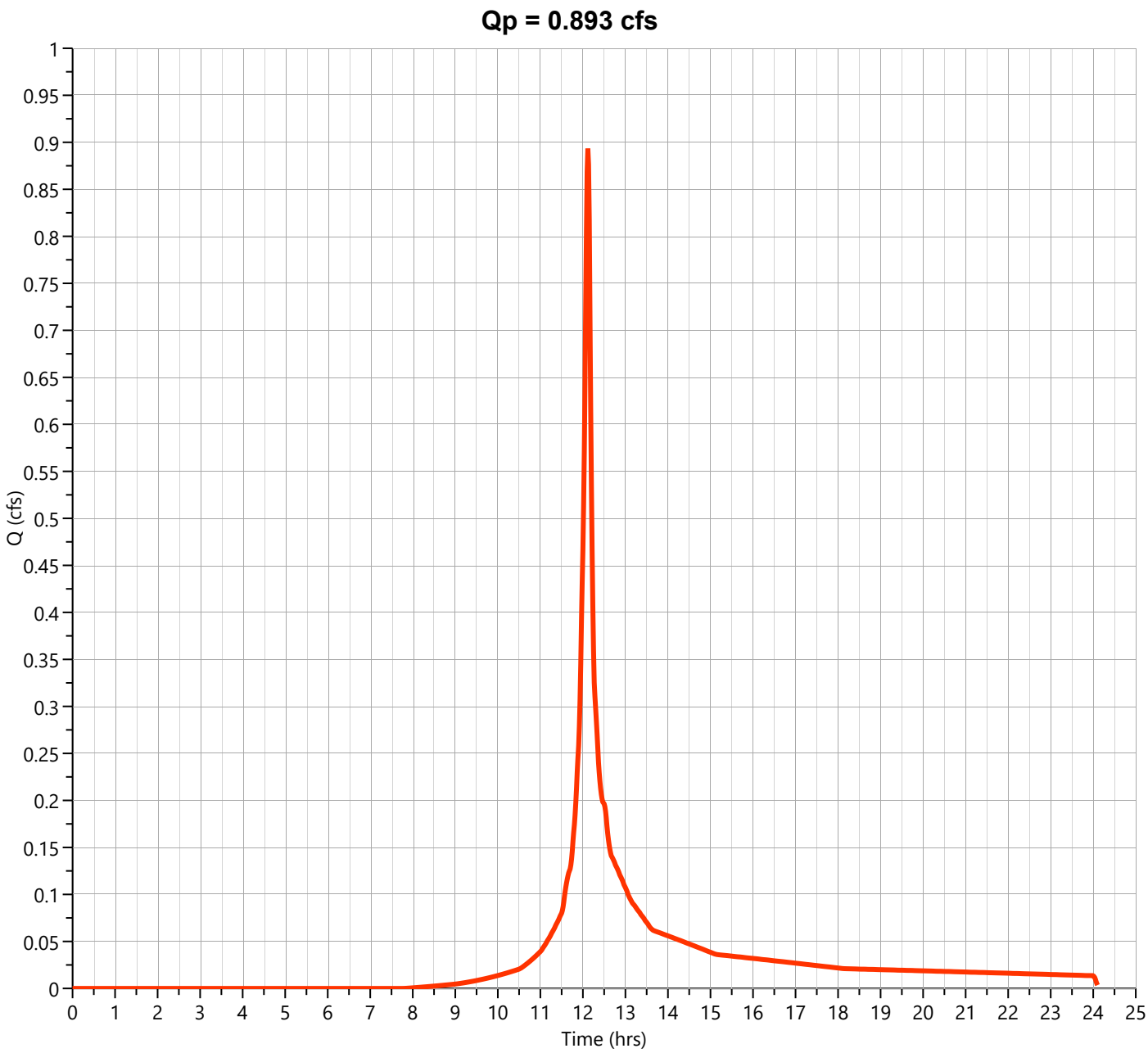
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1B-D

Hyd. No. 13

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.893 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 2,762 cuft
Drainage Area	= 0.35 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

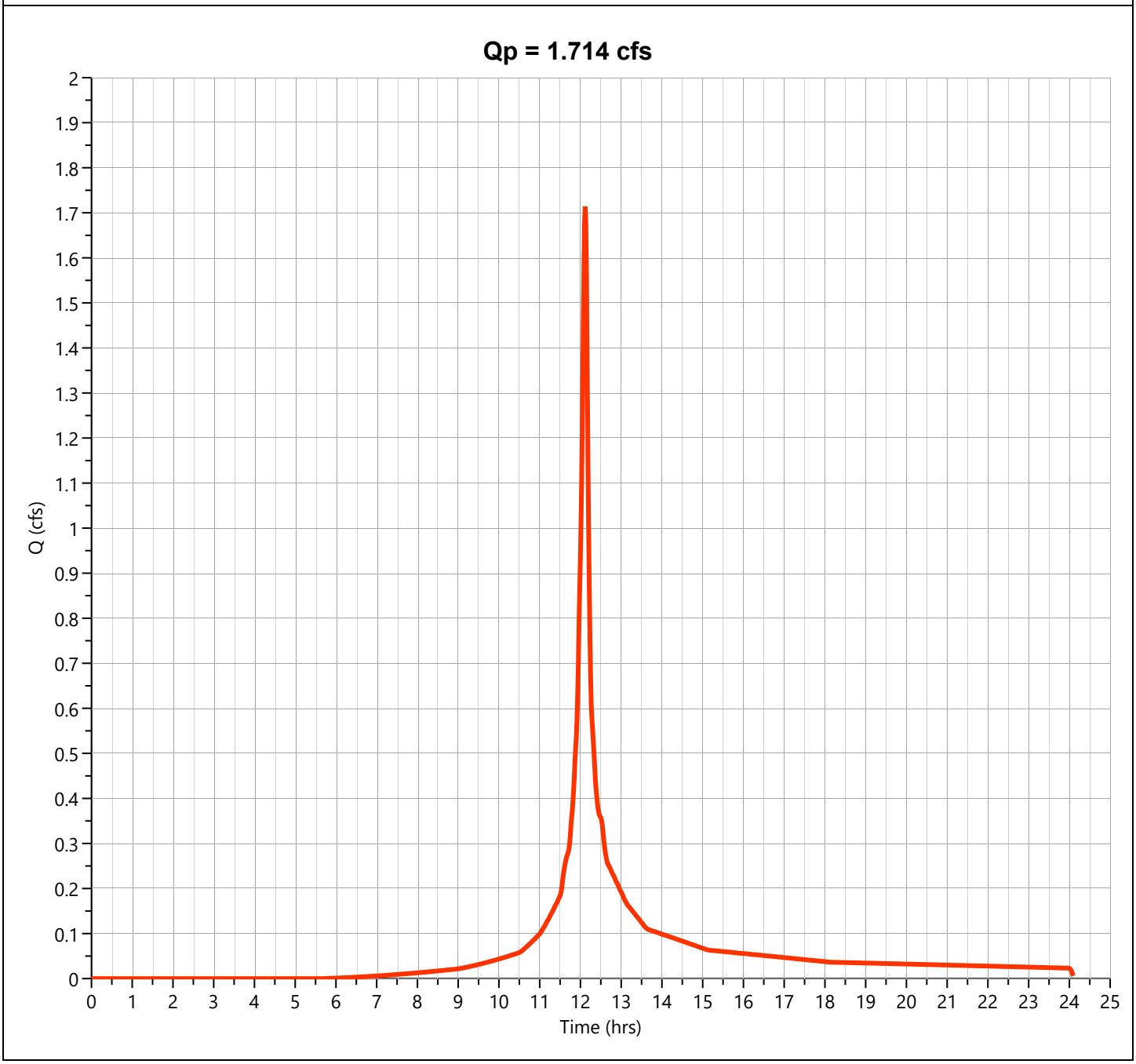
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1B-D

Hyd. No. 13

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.714 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 5,394 cuft
Drainage Area	= 0.35 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

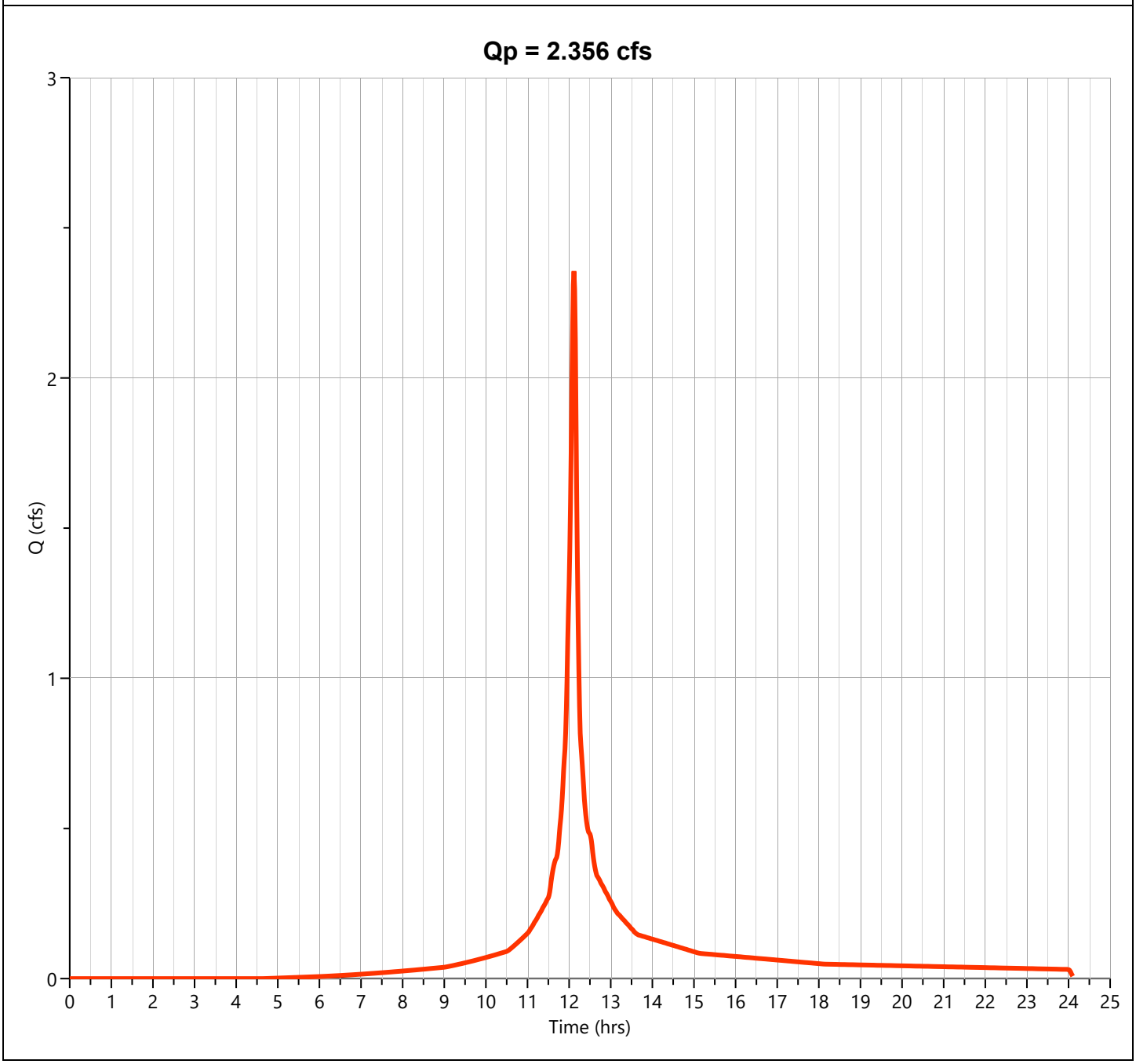
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1B-D

Hyd. No. 13

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.356 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 7,530 cuft
Drainage Area	= 0.35 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

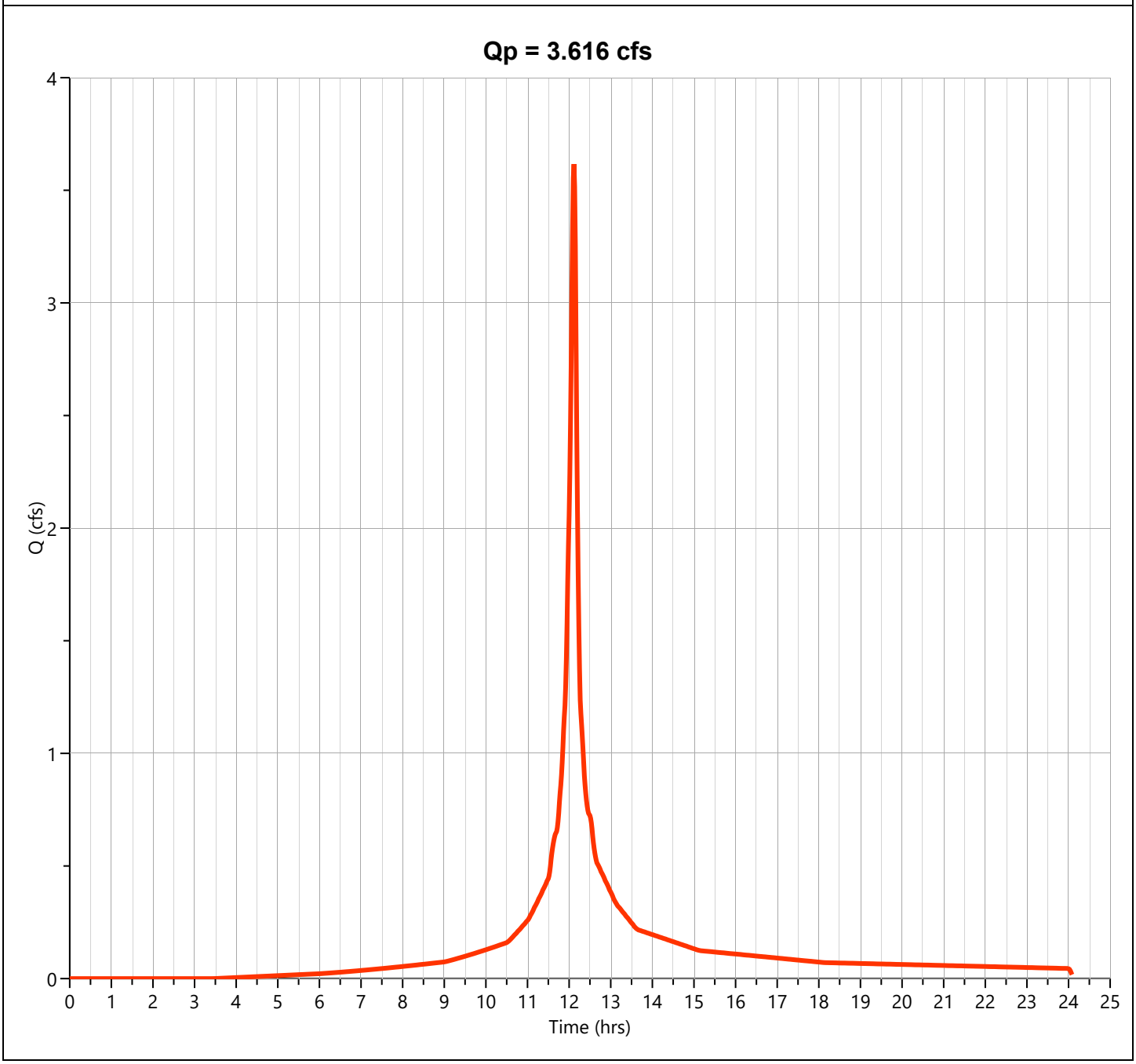
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1B-D

Hyd. No. 13

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.616 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 11,870 cuft
Drainage Area	= 0.35 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



PR-1B-UNDISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: (**Present**) Developed — **Future Proposed Watershed PR-1B-U 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)

$$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$$

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	4.08			
5. Land Slope, s	ft/ft	0.044			
6. Compute T_t	hr	0.013	+		+

Sheet Flow Sub-Total: **0.013 hours**

Shallow Concentrated Flow

$$T_t = \frac{L}{3600\,V}$$

Segment ID		2	3		4
7. Surface Description		Pavement	Grassed Waterways		Woodlands
8. Flow Length, L	ft	369	32		44
9. Watercourse Slope, s	ft/ft	0.035	0.170		0.290
10. Average Velocity, V (NEH table 15-3)	ft/s	3.81	6.65		2.71
11. Compute T_t	hr	0.027	+ 0.001	+	0.005

Shallow Conc. Flow Sub-Total: **0.033 hours**

Channel Flow

$$r = a / P_w$$

$$V = (1.49\, r^{2/3} s^{1/2}) / n$$

$$T_t = \frac{L}{3600\,V}$$

Segment ID		5	6		7
12. Flow Length, L	ft	358	25		117
13. Cross Sectional flow area, a	ft^2	0.69	0.61		0.61
14. Wetted Perimeter, P_w	ft	3.58	2.00		2.00
15. Hydraulic Radius, r	ft	0.19	0.31		0.31
16. Channel Slope, s	ft/ft	0.010	0.080		0.023
17. Manning's Roughness Coeff., n		0.035	0.013		0.013
18. Velocity, V	ft/s	1.42	14.69		7.89
19. Compute T_t	hr	0.070	+ 0.000	+	0.004

Channel Flow Sub-Total: **0.075 hours**

Channel Flow

$$r = a / P_w$$

$$V = (1.49\, r^{2/3} s^{1/2}) / n$$

$$T_t = \frac{L}{3600\,V}$$

Segment ID		8	9		
20. Flow Length, L	ft	15	51		
21. Cross Sectional flow area, a	ft^2	0.61	0.61		
22. Wetted Perimeter, P_w	ft	2.00	2.00		
23. Hydraulic Radius, r	ft	0.31	0.31		
24. Channel Slope, s	ft/ft	0.055	0.021		
25. Manning's Roughness Coeff., n		0.013	0.013		
26. Velocity, V	ft/s	12.14	7.59		
27. Compute T_t	hr	0.000	+ 0.002	+	

Channel Flow Sub-Total: **0.002 hours**

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

Total Tc (hours) =	**0.123 hours**
Total Tc (minutes) =	**7 minutes**

Project: Eagle Rock Avenue | **By:** TEG | **Date:** 10/21/2025

Location: West Orange, NJ | **Checked By:** MJV | **Date Checked:** 10/21/2025

Circle One: (Present) Developed — **Future Proposed Watershed PR-1B-U 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		Woods Light Underbrush		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.40		0.40		
3.	Flow Length, L (total L < 100 ft)	ft	67		23		
4.	Two-year 24-hr rainfall, P_2	in	4.08		4.08		
5.	Land Slope, s	ft/ft	0.068		0.505		
6.	Compute T_t $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.141	+	0.027	+	
					Sheet Flow Sub-Total		0.168 hours

Shallow Concentrated Flow

		Segment ID	3				
7.	Surface Description		Grassed Waterways				
8.	Flow Length, L	ft	13				
9.	Watercourse Slope, s	ft/ft	0.372				
10.	Average Velocity, V (NEH table 15-3)	ft/s	9.85				
11.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr	0.000	+		+	
					Shallow Conc. Flow Sub-Total		0.000 hours

Channel Flow

		Segment ID	4		5		6
12.	Flow Length, L	ft	245		25		117
13.	Cross Sectional flow area, a	ft^2	0.69		0.61		0.61
14.	Wetted Perimeter, P_w	ft	3.58		2.00		2.00
15.	Hydraulic Radius, r $r = a / P_w$	ft	0.19		0.31		0.31
16.	Channel Slope, s	ft/ft	0.010		0.080		0.023
17.	Manning's Roughness Coeff., n		0.035		0.013		0.013
18.	Velocity, V $V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s	1.42		14.69		7.89
19.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr	0.048	+	0.000	+	0.004
					Channel Flow Sub-Total		0.053 hours

Channel Flow

		Segment ID	7		8		
20.	Flow Length, L	ft	15		51		
21.	Cross Sectional flow area, a	ft^2	0.61		0.61		
22.	Wetted Perimeter, P_w	ft	2.00		2.00		
23.	Hydraulic Radius, r $r = a / P_w$	ft	0.31		0.31		
24.	Channel Slope, s	ft/ft	0.055		0.021		
25.	Manning's Roughness Coeff., n		0.013		0.013		
26.	Velocity, V $V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s	12.14		7.59		
27.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr	0.000	+	0.002	+	
					Channel Flow Sub-Total		0.002 hours

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

Total Tc (hours) =	0.223 hours
Total Tc (minutes) =	13 minutes

Hydrograph Report

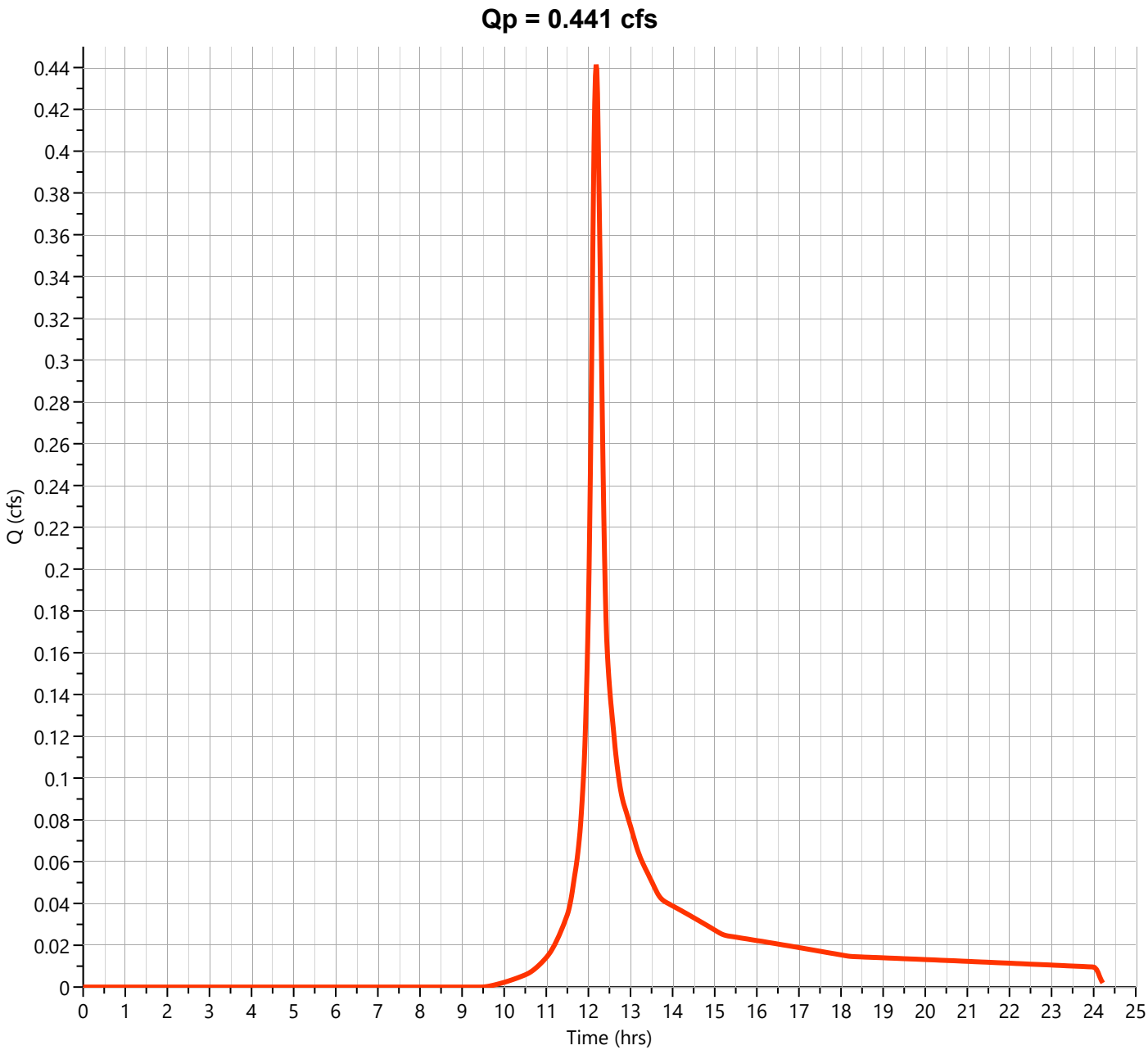
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1B-U Open Space C

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.441 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 1,715 cuft
Drainage Area	= 0.29 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 13.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

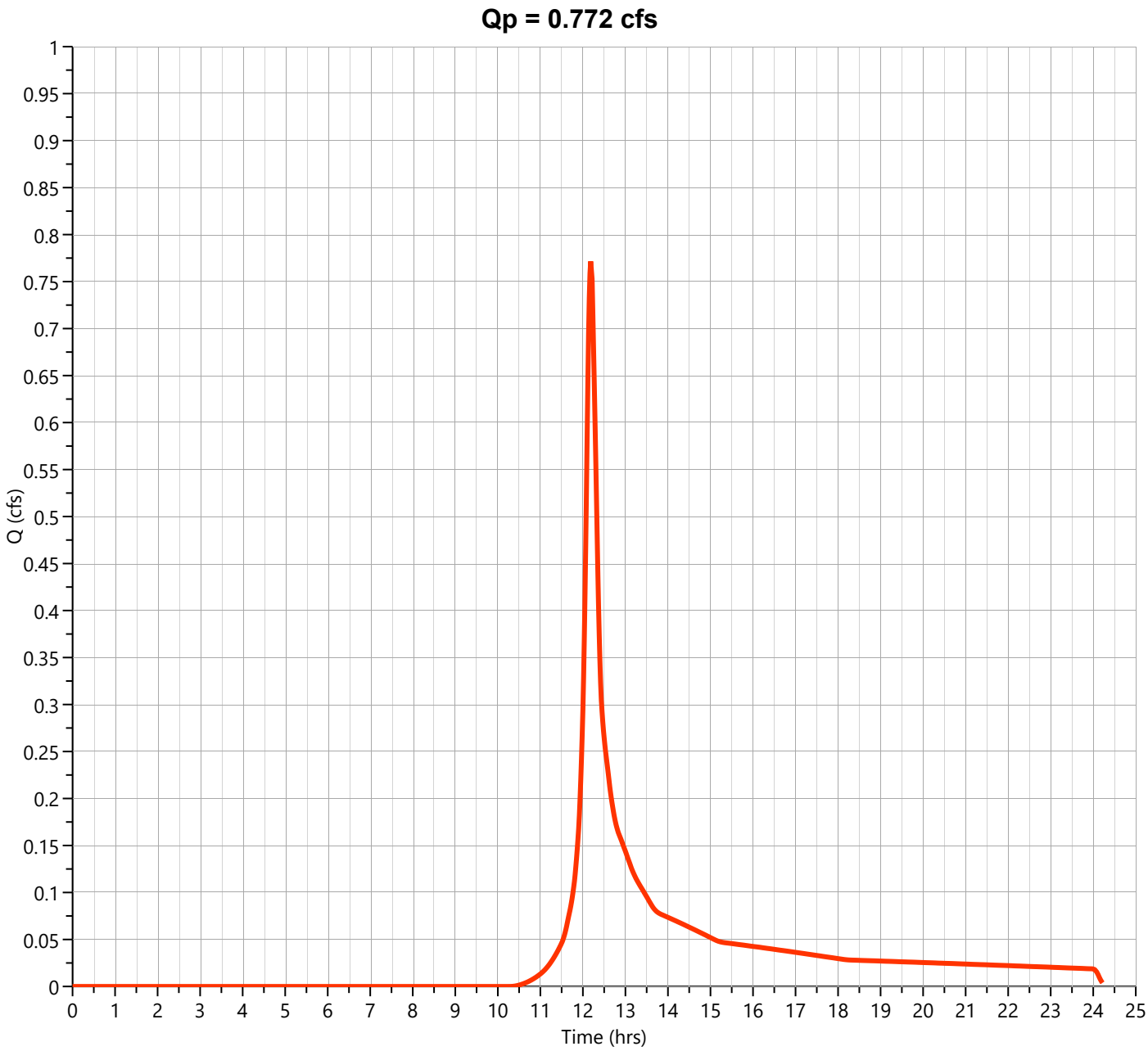
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1B-U Woods C

Hyd. No. 16

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.772 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 3,065 cuft
Drainage Area	= 0.62 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 13.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

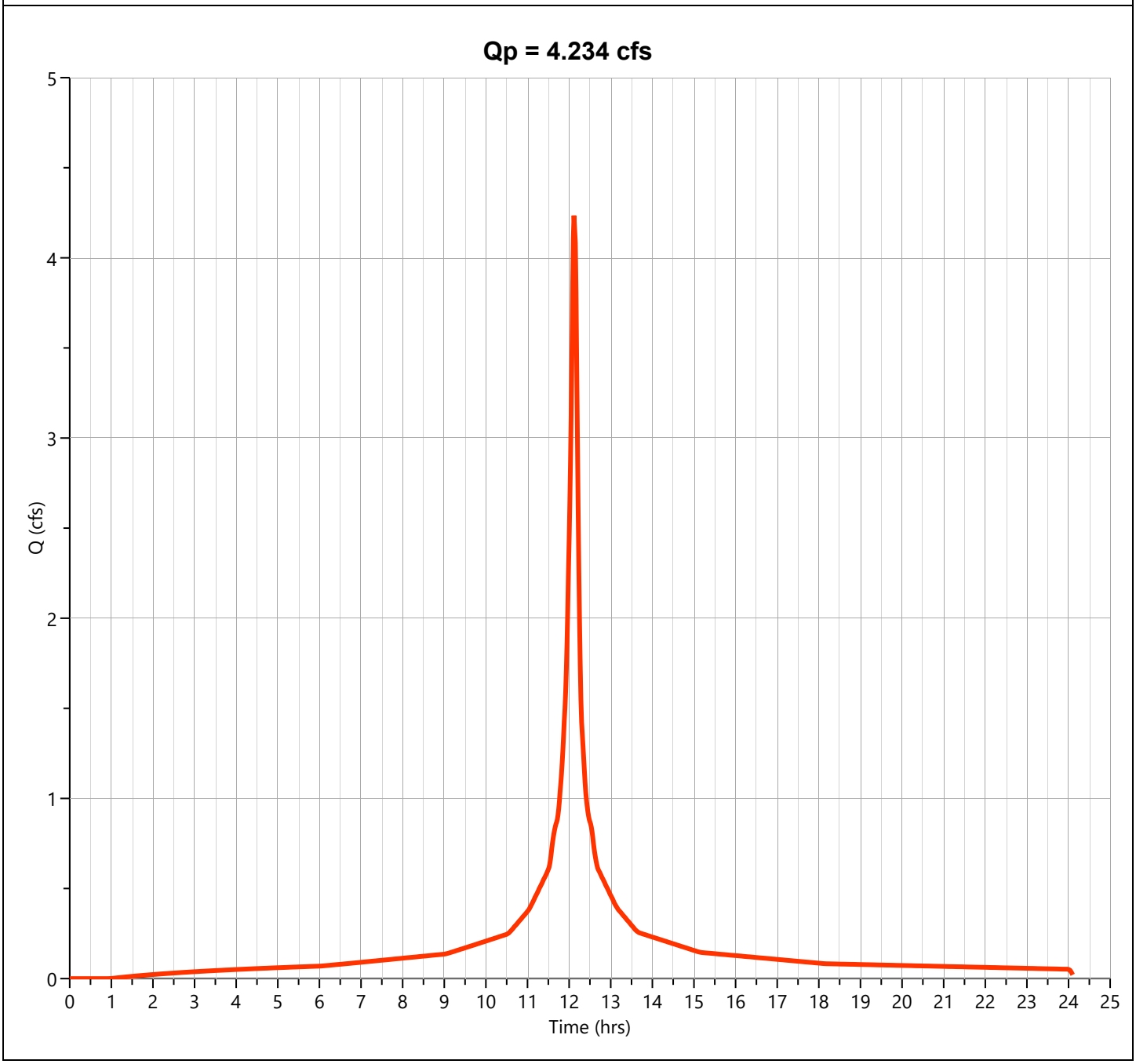
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1B-U Impervious

Hyd. No. 17

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.234 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 16,058 cuft
Drainage Area	= 1.18 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 7.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

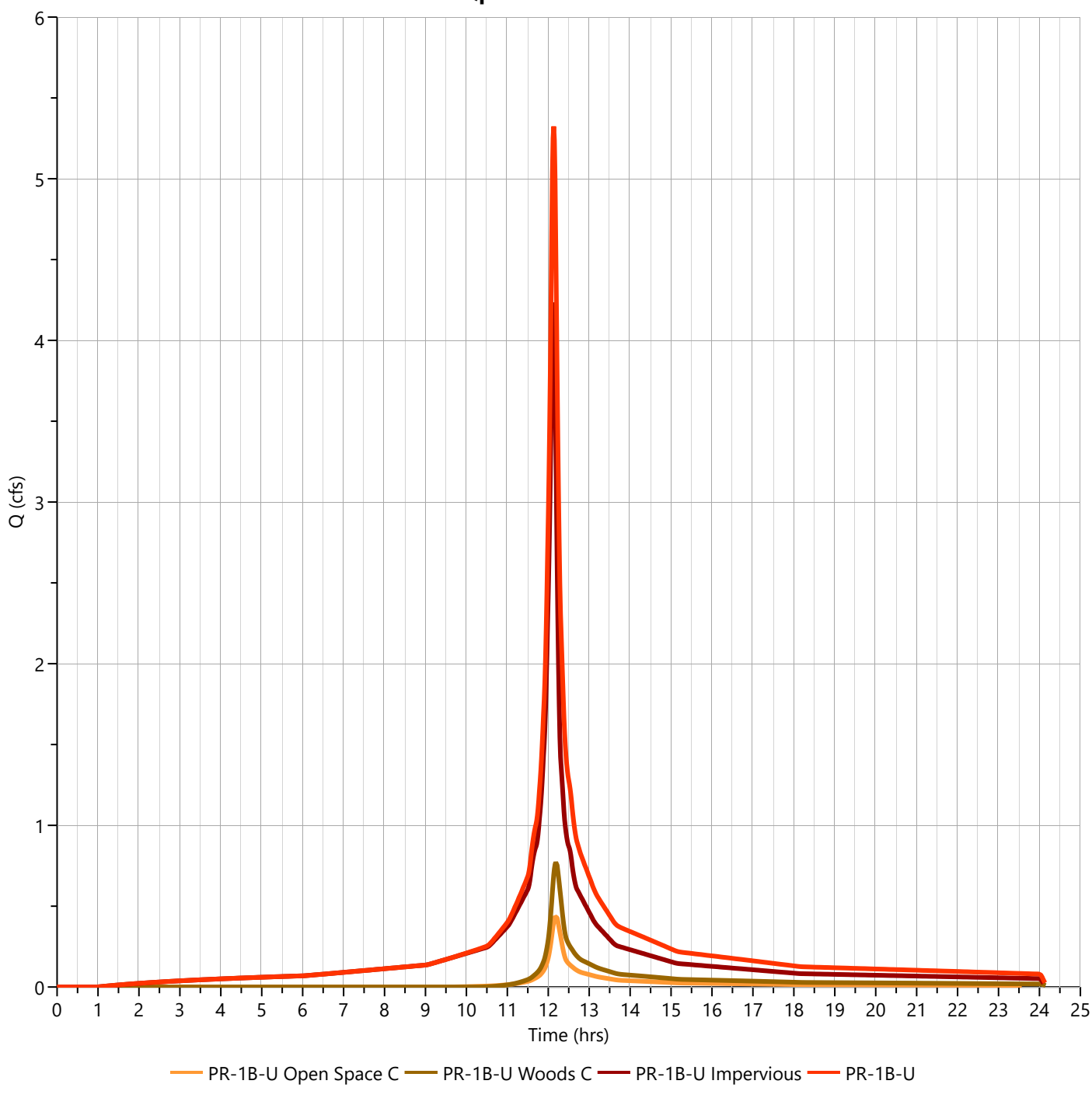
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1B-U

Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 5.324 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 20,838 cuft
Inflow Hydrographs	= 15, 16, 17	Total Contrib. Area	= 2.09 ac



Hydrograph Report

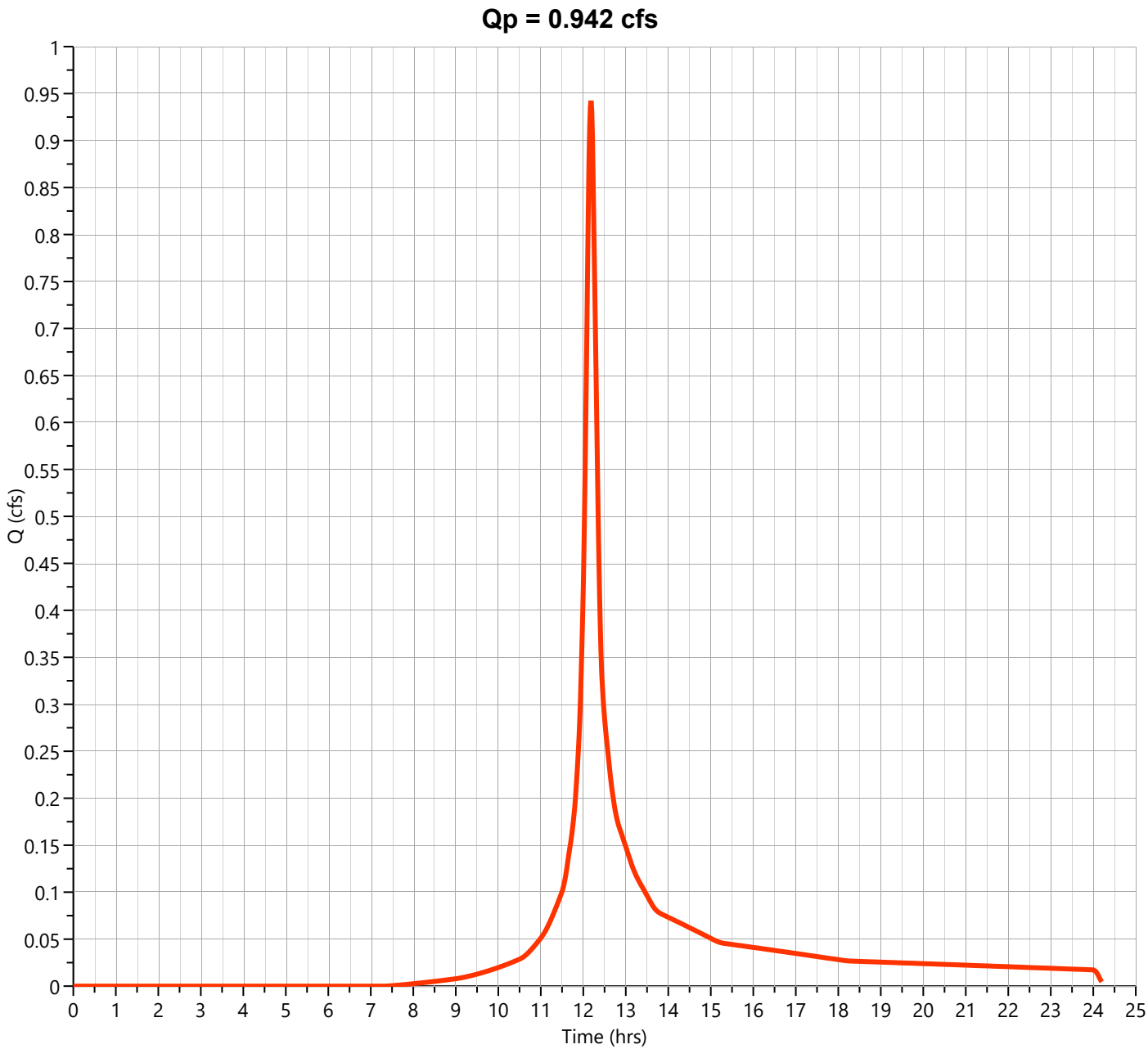
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1B-U Open Space C

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.942 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 3,625 cuft
Drainage Area	= 0.29 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 13.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

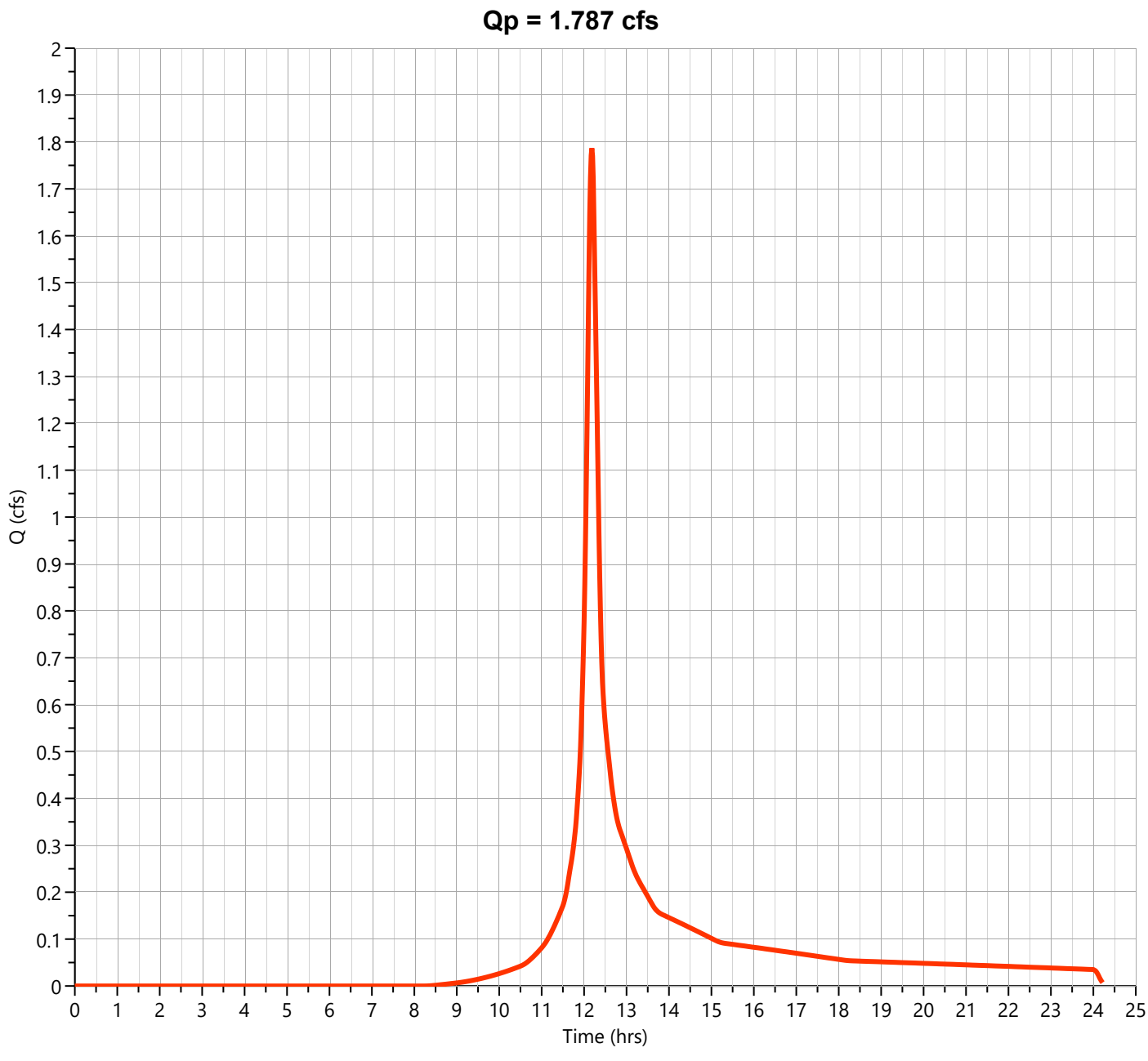
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1B-U Woods C

Hyd. No. 16

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.787 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 6,871 cuft
Drainage Area	= 0.62 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 13.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

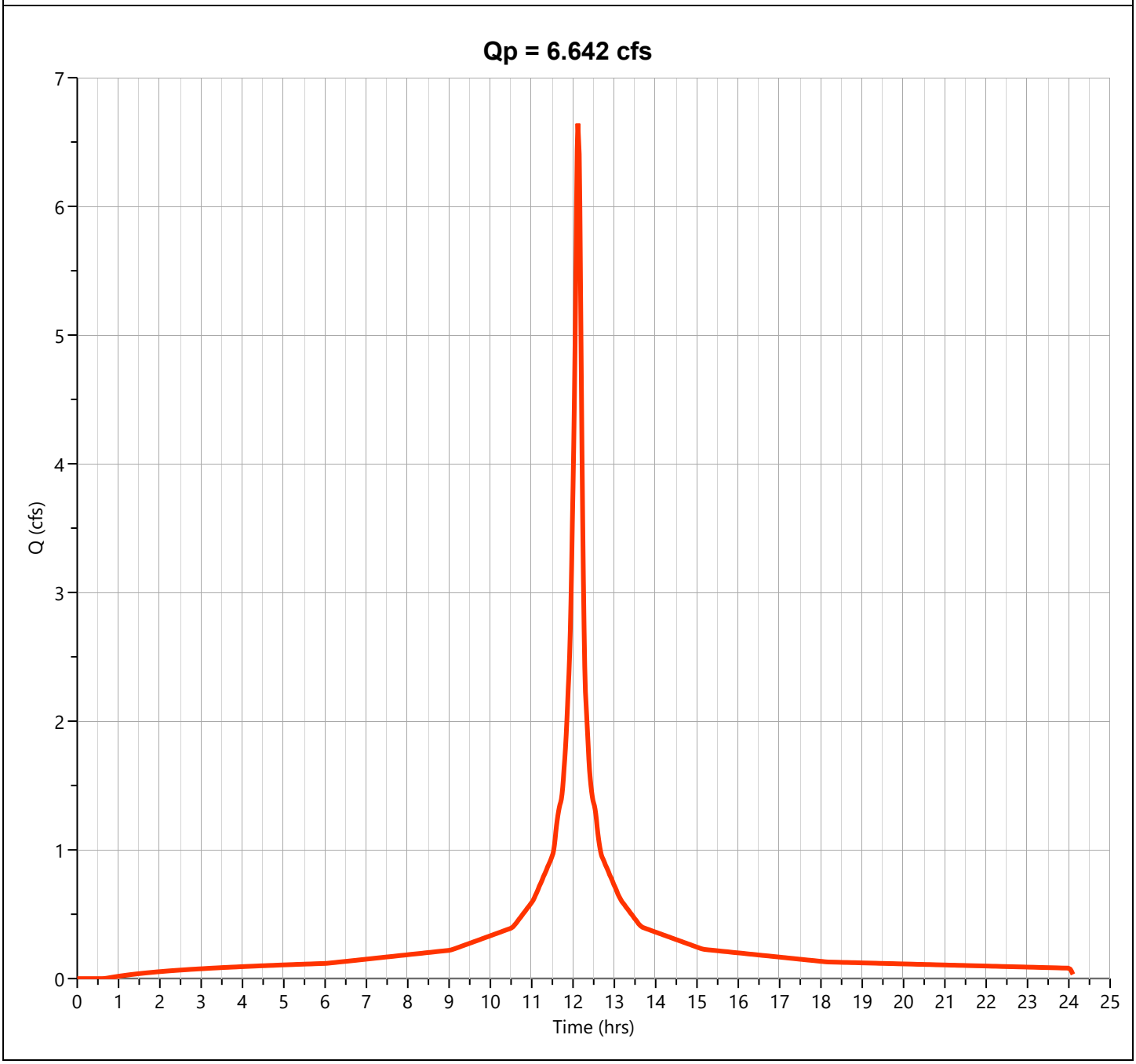
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1B-U Impervious

Hyd. No. 17

Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.642 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 25,607 cuft
Drainage Area	= 1.18 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 7.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

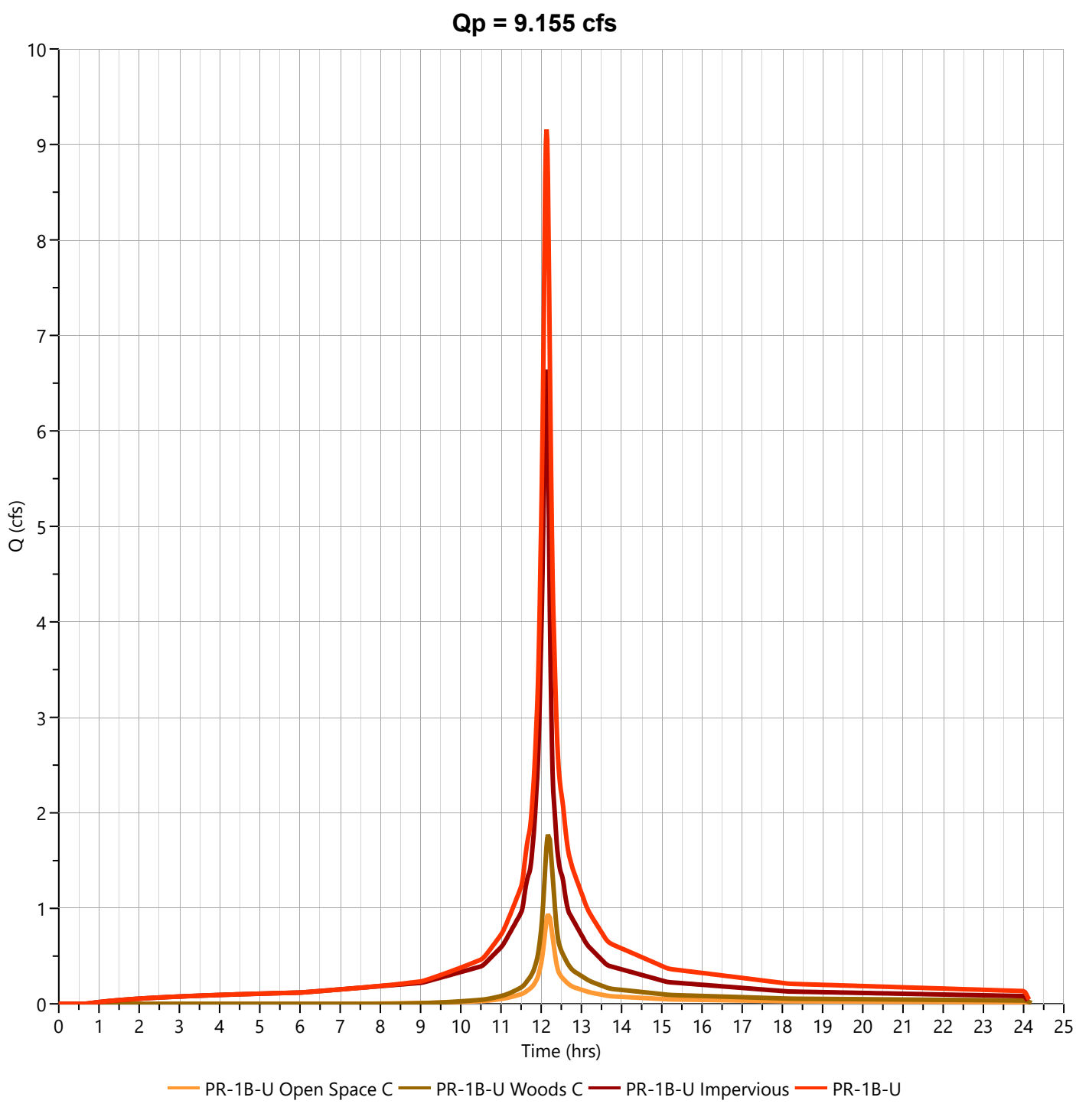
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1B-U

Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 9.155 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 36,104 cuft
Inflow Hydrographs	= 15, 16, 17	Total Contrib. Area	= 2.09 ac



Hydrograph Report

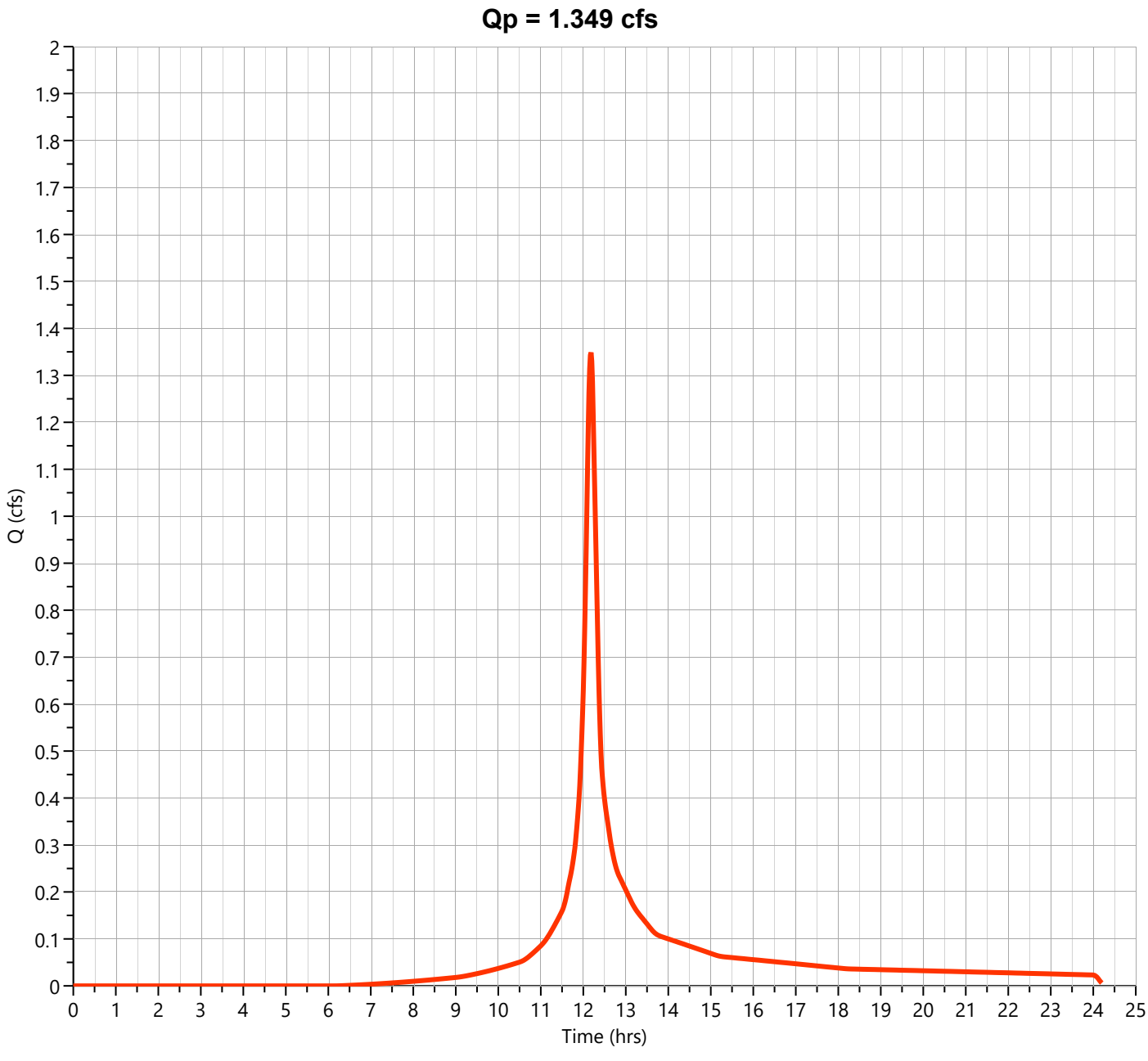
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1B-U Open Space C

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.349 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 5,225 cuft
Drainage Area	= 0.29 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 13.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

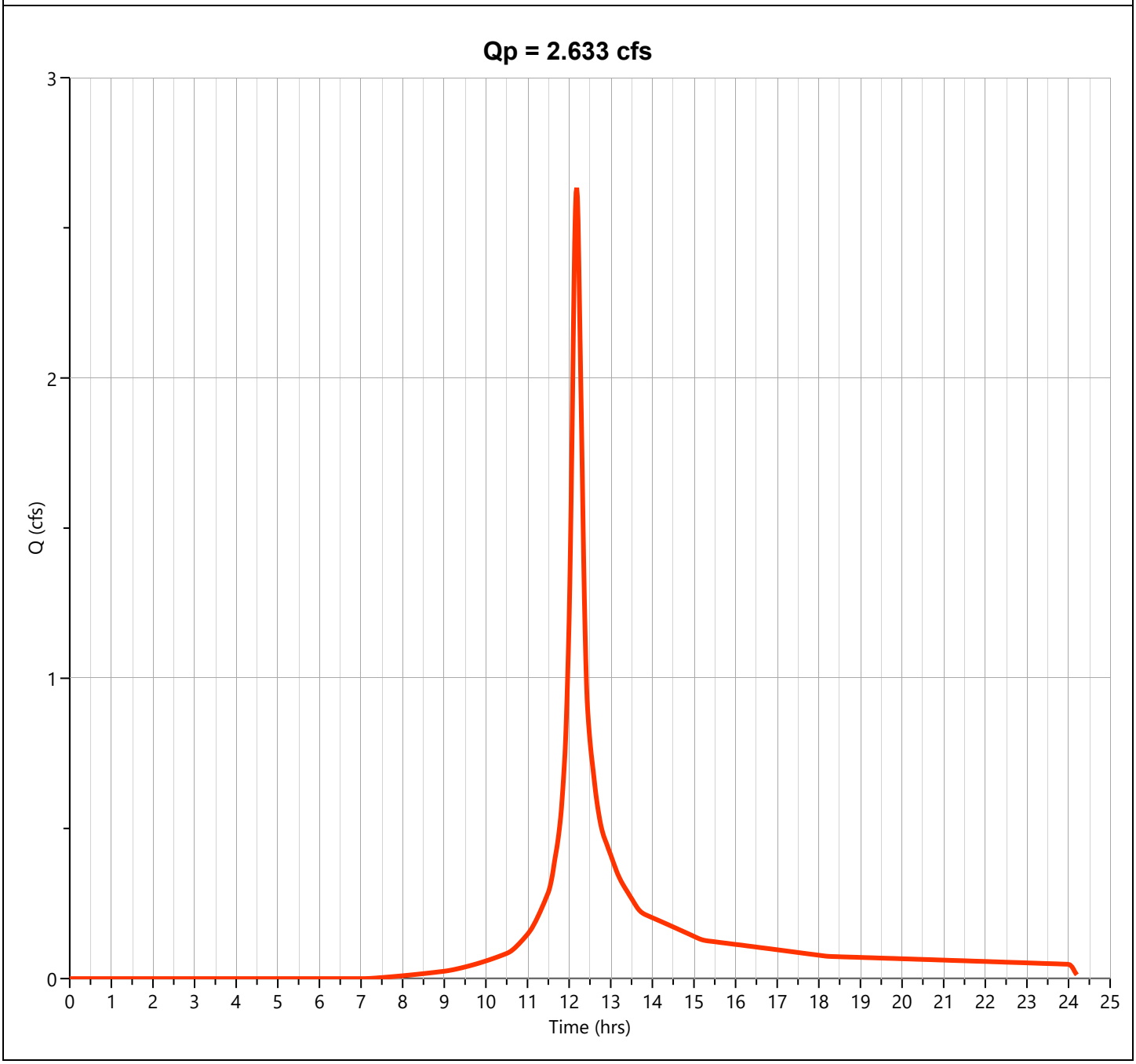
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1B-U Woods C

Hyd. No. 16

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.633 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 10,138 cuft
Drainage Area	= 0.62 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 13.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

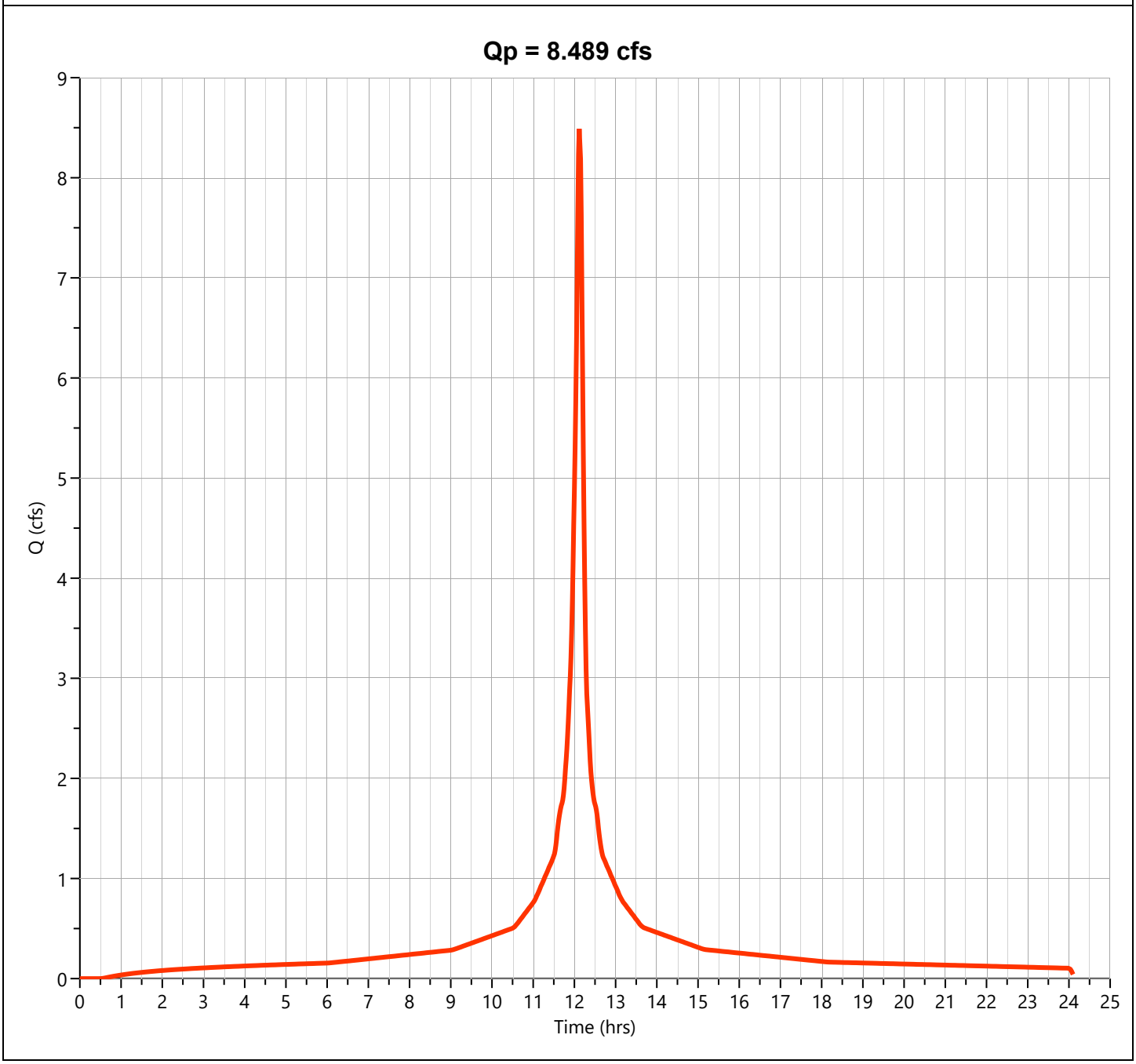
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1B-U Impervious

Hyd. No. 17

Hydrograph Type	= NRCS Runoff	Peak Flow	= 8.489 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 32,952 cuft
Drainage Area	= 1.18 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 7.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

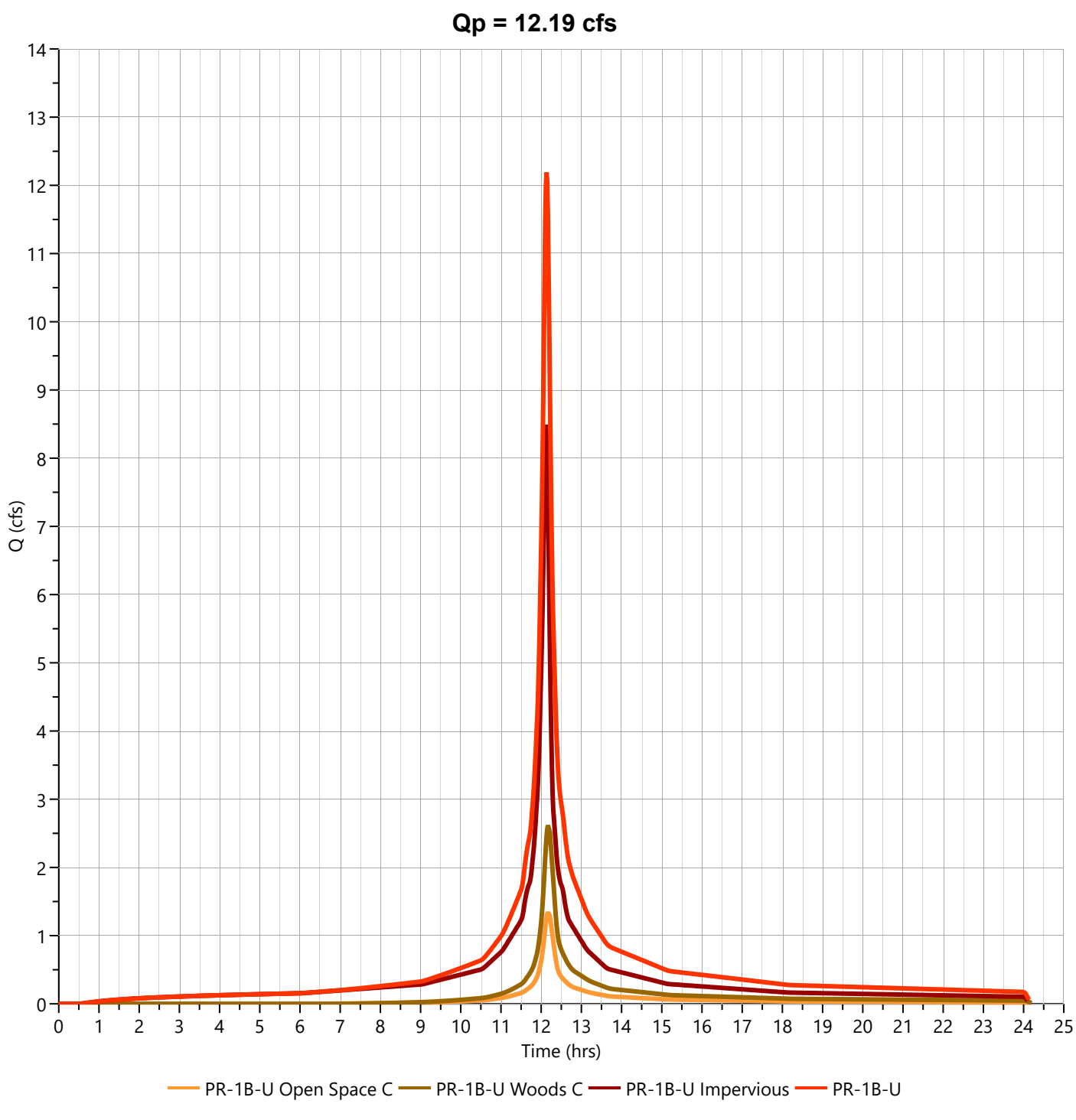
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1B-U

Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 12.19 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 48,315 cuft
Inflow Hydrographs	= 15, 16, 17	Total Contrib. Area	= 2.09 ac



Hydrograph Report

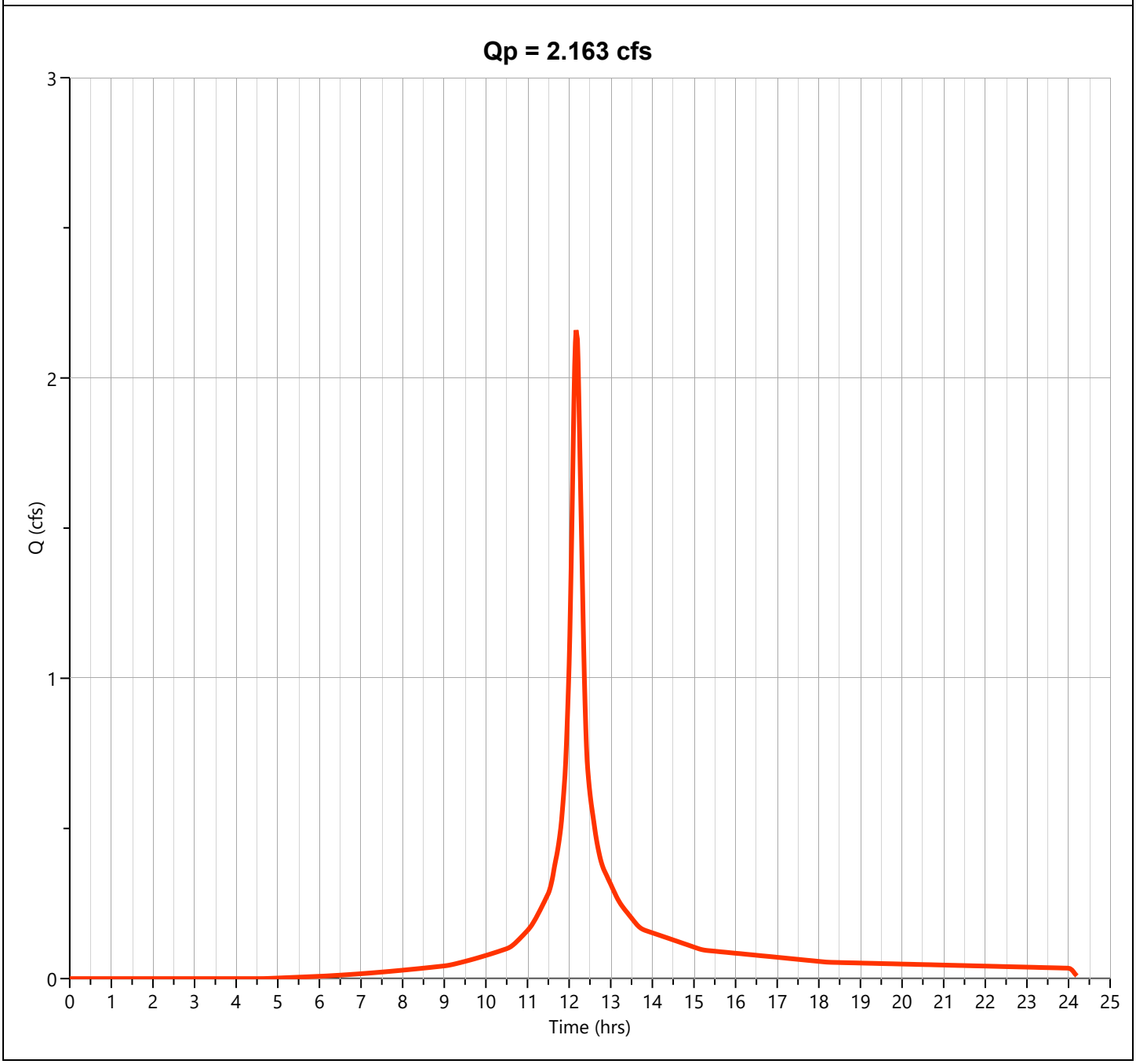
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1B-U Open Space C

Hyd. No. 15

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.163 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 8,539 cuft
Drainage Area	= 0.29 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 13.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

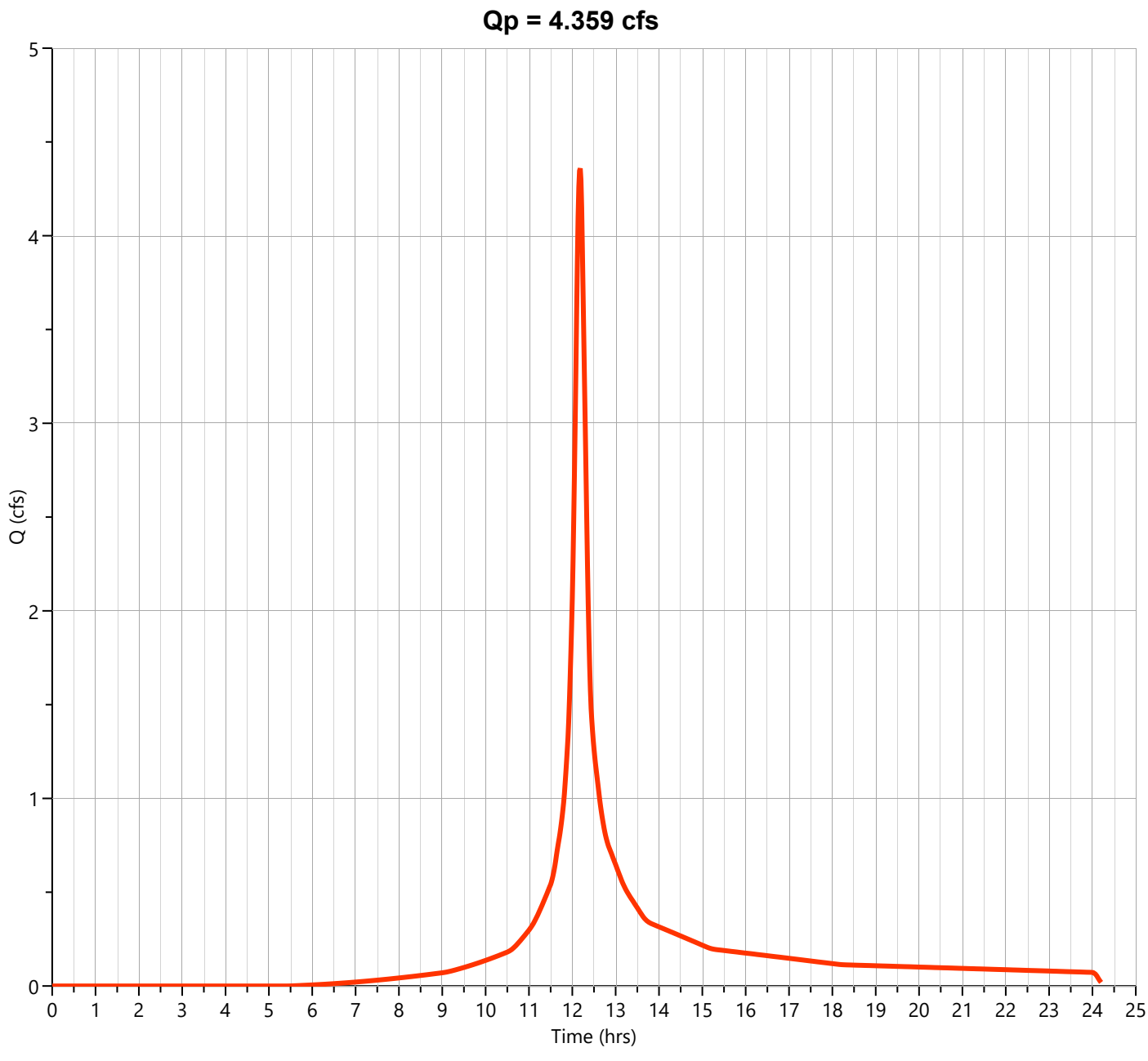
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1B-U Woods C

Hyd. No. 16

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.359 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.18 hrs
Time Interval	= 1 min	Runoff Volume	= 17,013 cuft
Drainage Area	= 0.62 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 13.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

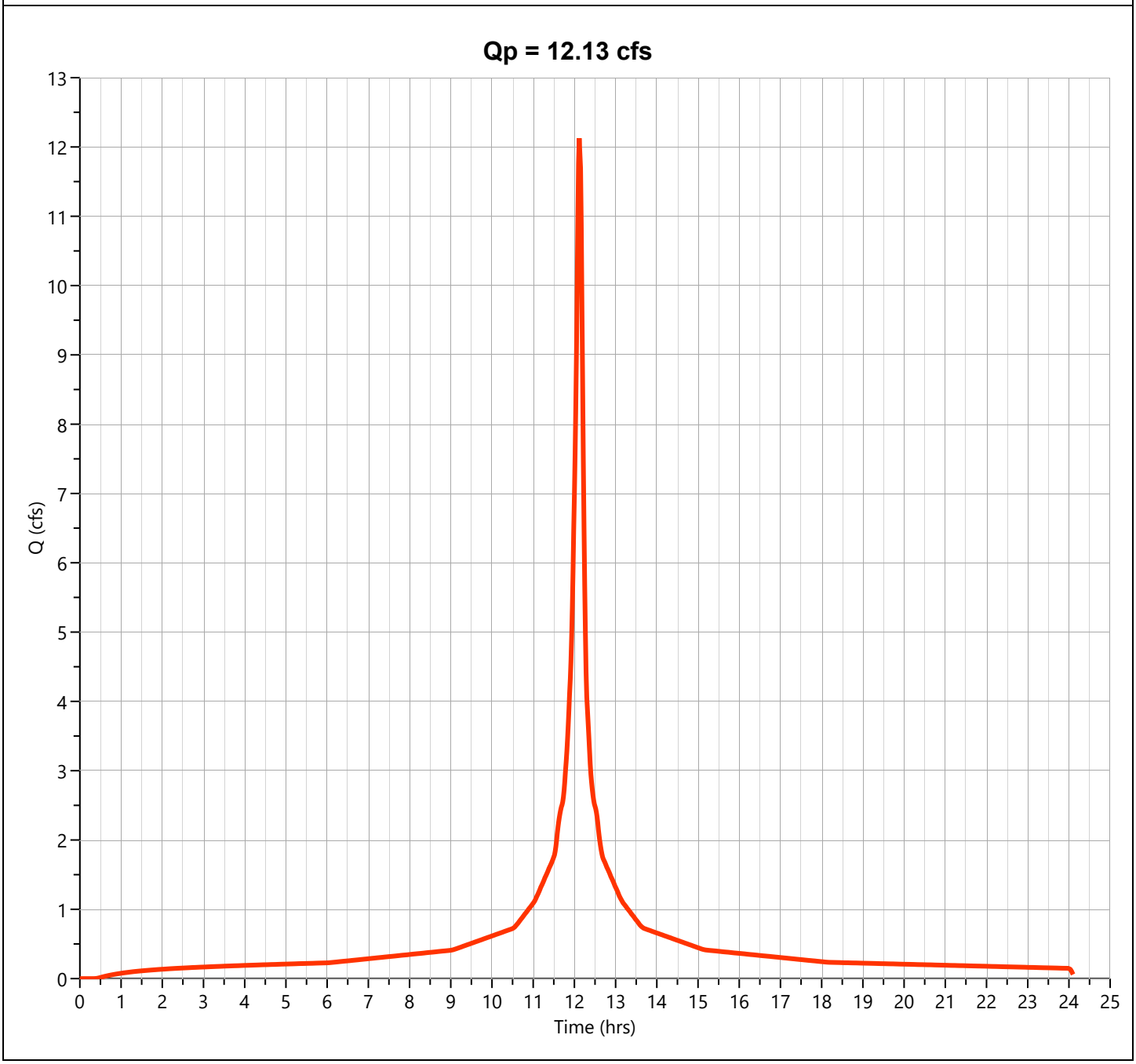
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1B-U Impervious

Hyd. No. 17

Hydrograph Type	= NRCS Runoff	Peak Flow	= 12.13 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 47,437 cuft
Drainage Area	= 1.18 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 7.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

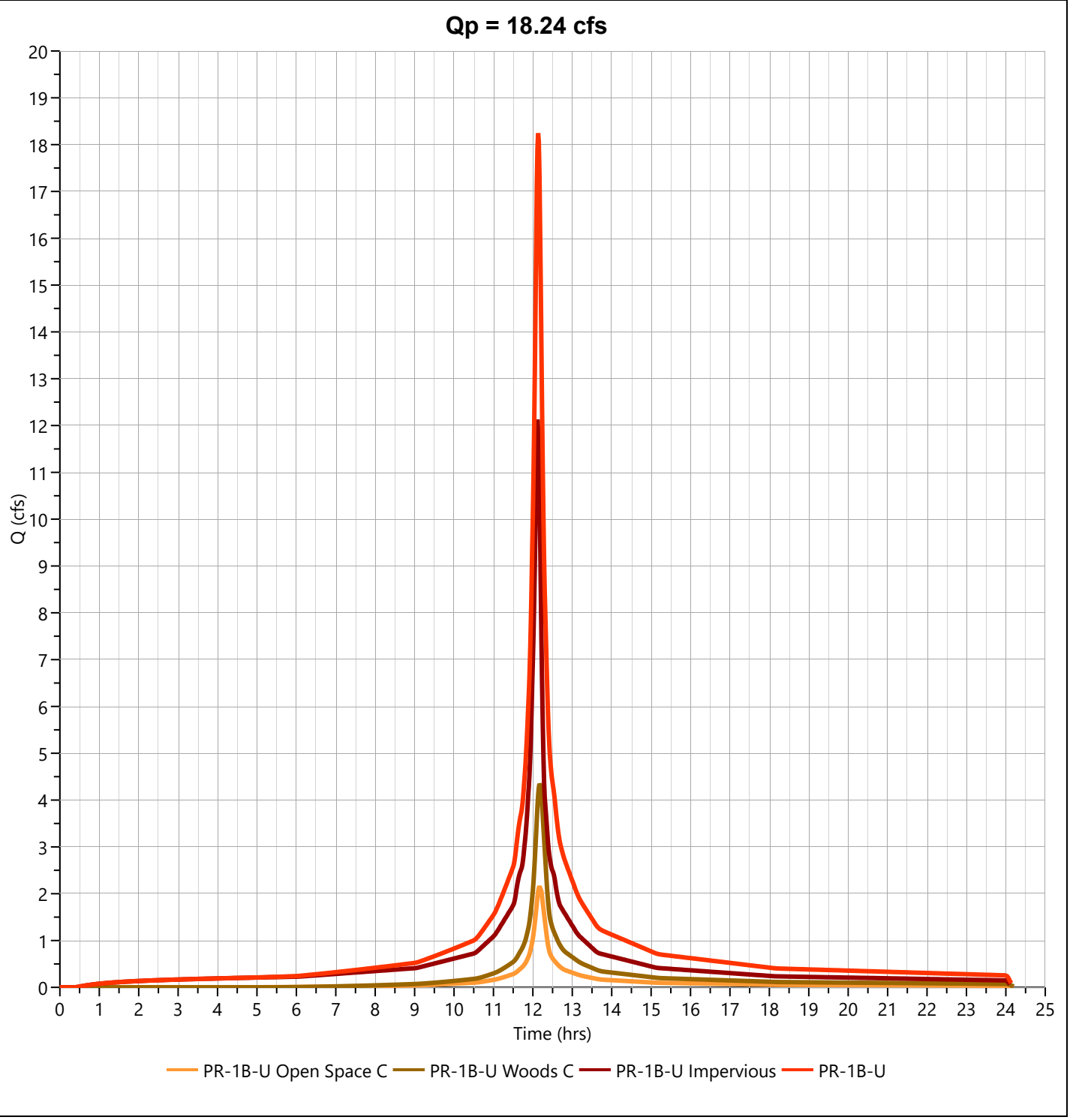
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1B-U

Hyd. No. 18

Hydrograph Type	= Junction	Peak Flow	= 18.24 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 72,989 cuft
Inflow Hydrographs	= 15, 16, 17	Total Contrib. Area	= 2.09 ac



PR-1B WATERSHED
(COMBINED PROPOSED FLOW TO SWALE 1)

Hydrograph Report

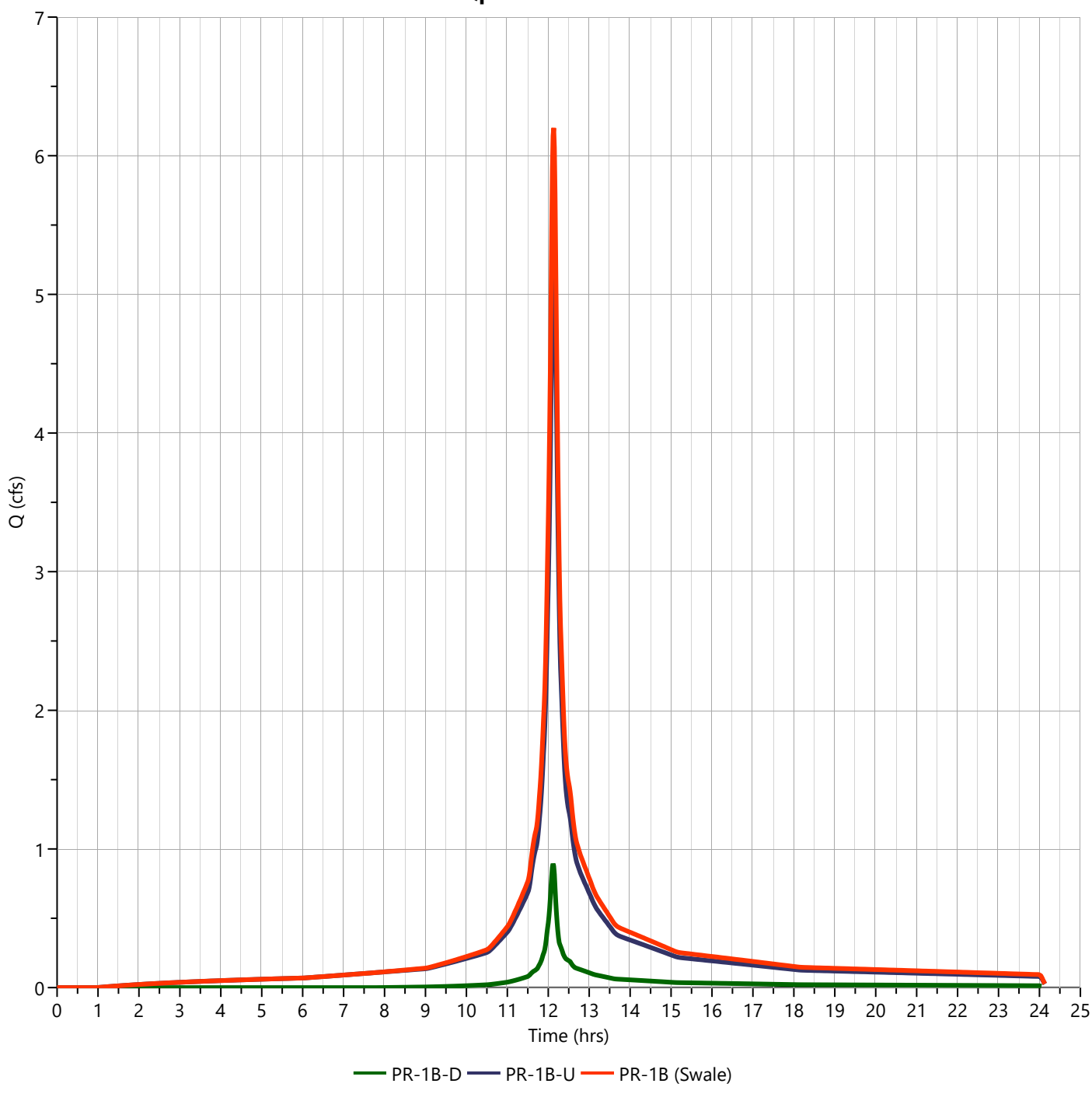
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1B (Swale)

Hyd. No. 21

Hydrograph Type	= Junction	Peak Flow	= 6.200 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 23,599 cuft
Inflow Hydrographs	= 13	Total Contrib. Area	= 0.35 ac



Hydrograph Report

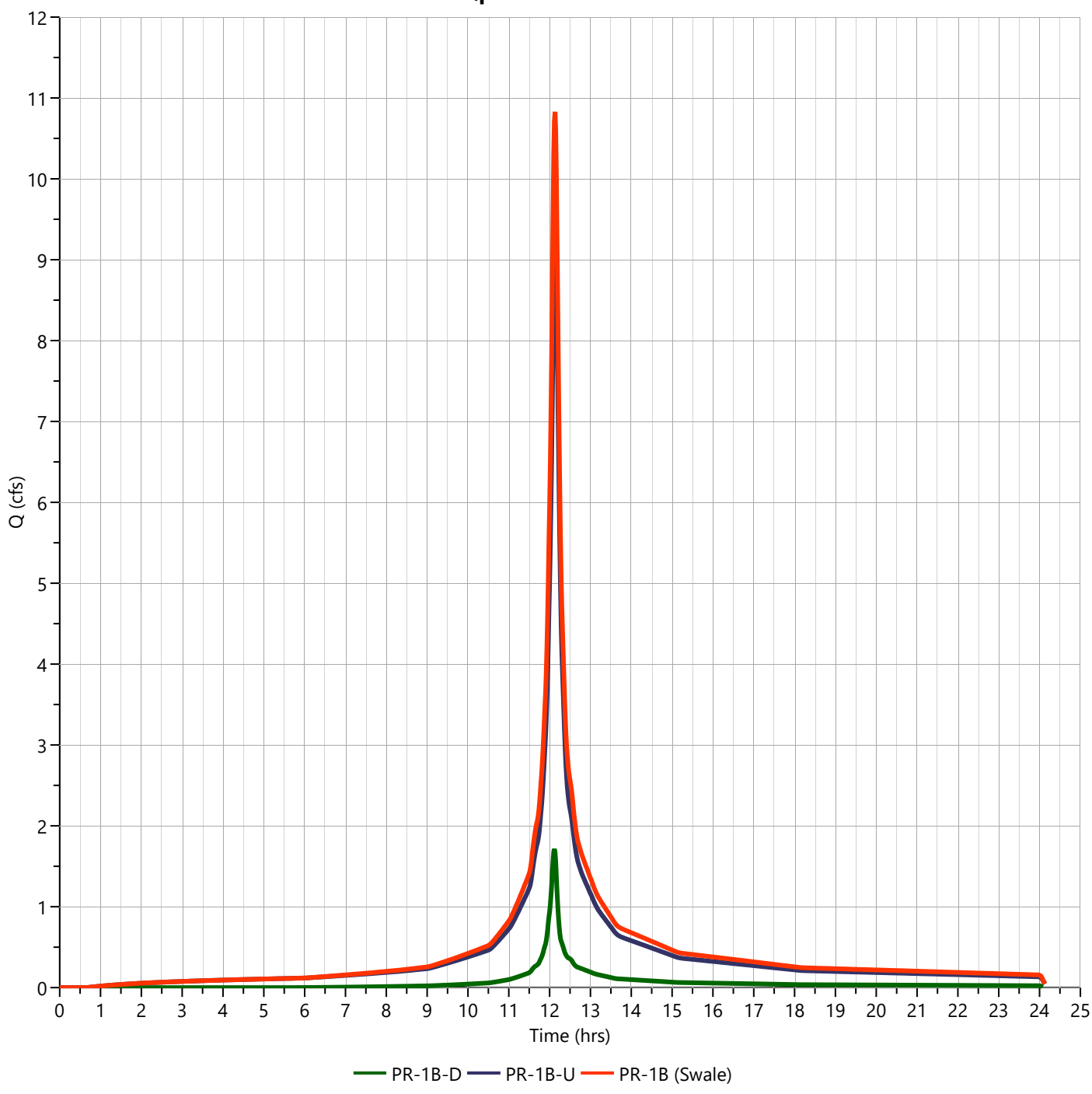
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1B (Swale)

Hyd. No. 21

Hydrograph Type	= Junction	Peak Flow	= 10.83 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 41,497 cuft
Inflow Hydrographs	= 13	Total Contrib. Area	= 0.35 ac



Hydrograph Report

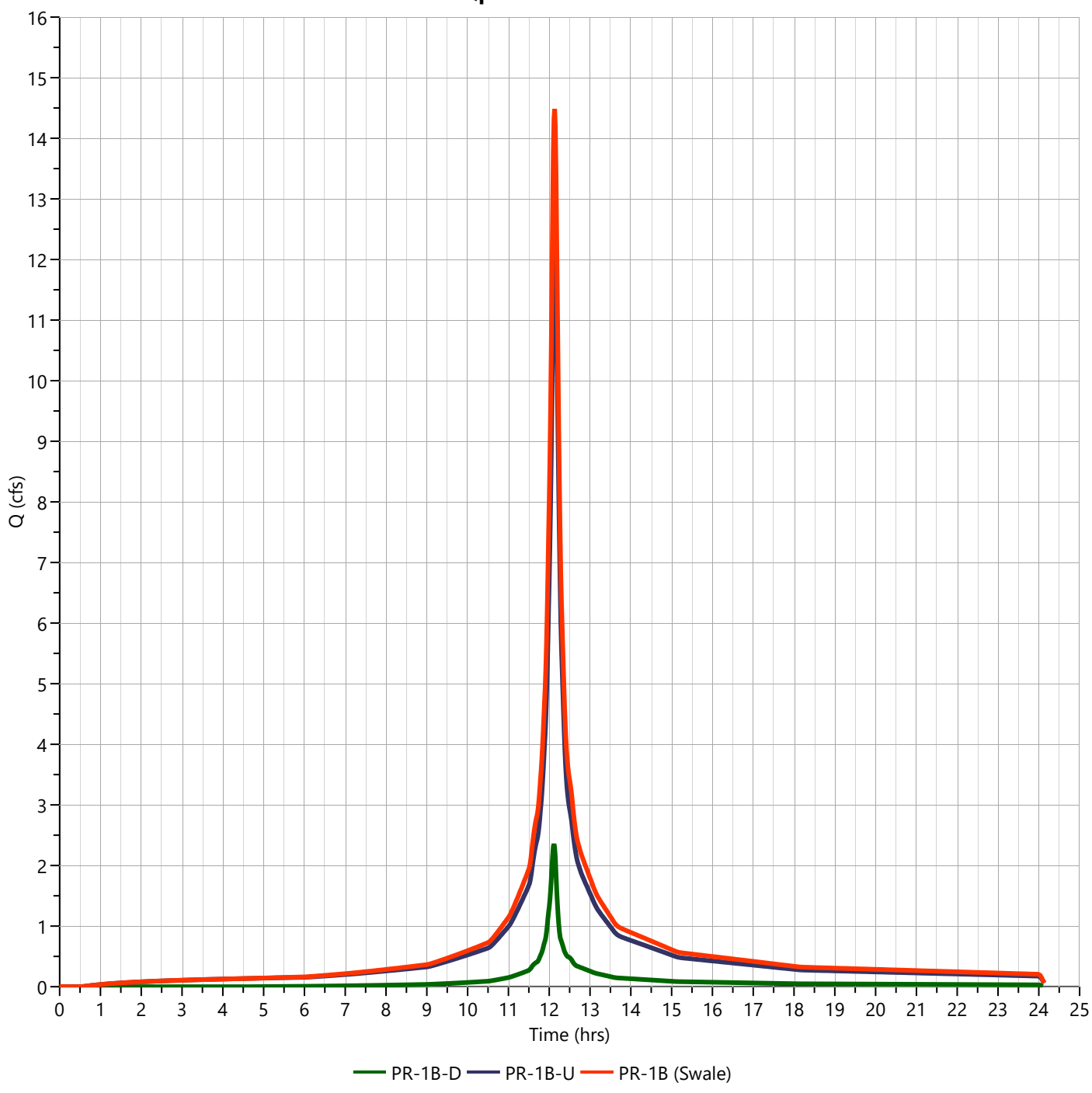
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1B (Swale)

Hyd. No. 21

Hydrograph Type	= Junction	Peak Flow	= 14.48 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 55,845 cuft
Inflow Hydrographs	= 13	Total Contrib. Area	= 0.35 ac



Hydrograph Report

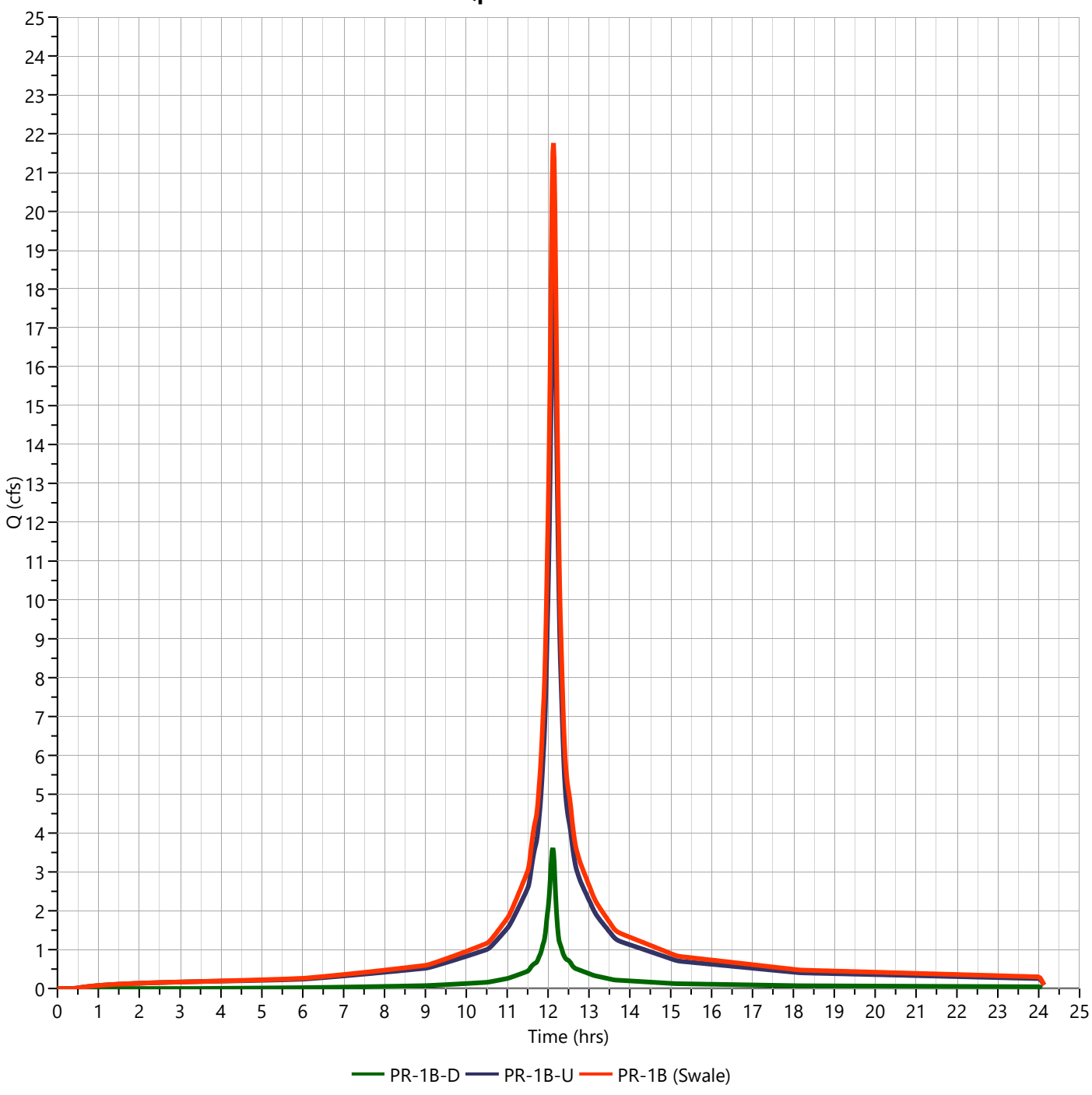
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1B (Swale)

Hyd. No. 21

Hydrograph Type	= Junction	Peak Flow	= 21.76 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.13 hrs
Time Interval	= 1 min	Hydrograph Volume	= 84,859 cuft
Inflow Hydrographs	= 13	Total Contrib. Area	= 0.35 ac



PR-1C-DISTURBED WATERSHED

Project: Eagle Rock Avenue | **By:** TEG | **Date:** 10/21/2025

Location: West Orange, NJ | **Checked By:** MJV | **Date Checked:** 10/21/2025

Circle One: Present (**Developed**) — **Future Proposed Watershed PR-1C-D - 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	79		
4. Two-year 24-hr rainfall, P_2		in	4.08		
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	0.020	+	+
				Sheet Flow Sub-Total	0.020 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	3	4
13. Flow Length, L		ft	69	282	54
14. Cross Sectional flow area, a		ft^2	0.61	0.61	0.88
15. Wetted Perimeter, P_w		ft	2.00	2.00	2.40
16. Hydraulic Radius, r	$r = a / P_w$	ft	0.31	0.31	0.37
17. Channel Slope, s		ft/ft	0.005	0.023	0.020
18. Manning's Roughness Coeff., n			0.013	0.013	0.013
19. Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	3.67	7.95	8.30
20. Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.005	+ 0.010	+ 0.002
				Channel Flow Sub-Total	0.017 hours

Channel Flow		Segment ID	5	6	7
21. Flow Length, L		ft	17	51	67
22. Cross Sectional flow area, a		ft^2	0.88	0.88	0.88
23. Wetted Perimeter, P_w		ft	2.40	2.40	2.40
24. Hydraulic Radius, r	$r = a / P_w$	ft	0.37	0.37	0.37
25. Channel Slope, s		ft/ft	0.049	0.021	0.042
26. Manning's Roughness Coeff., n					
27. Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s			
28. 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) =	0.036 hours
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	2 minutes

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: Present **(Developed)** — **Future Proposed Watershed PR-1C-D - 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	54		
4.	Two-year 24-hr rainfall, P_2		in	4.08		
5.	Land Slope, s		ft/ft	0.212		
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	0.050	+	+
					Sheet Flow Sub-Total	0.050 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	3	4
13.	Flow Length, L		ft	17	51	67
14.	Cross Sectional flow area, a		ft^2	0.88	0.88	0.88
15.	Wetted Perimeter, P_w		ft	2.40	2.40	2.40
16.	Hydraulic Radius, r	$r = a / P_w$	ft	0.37	0.37	0.37
17.	Channel Slope, s		ft/ft	0.049	0.021	0.042
18.	Manning's Roughness Coeff., n			0.013	0.013	0.013
19.	Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	13.05	8.54	11.98
20.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.000	+ 0.002	+ 0.002
					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) =	**0.054 hours**
Total Tc (minutes) =	**3 minutes**

Hydrograph Report

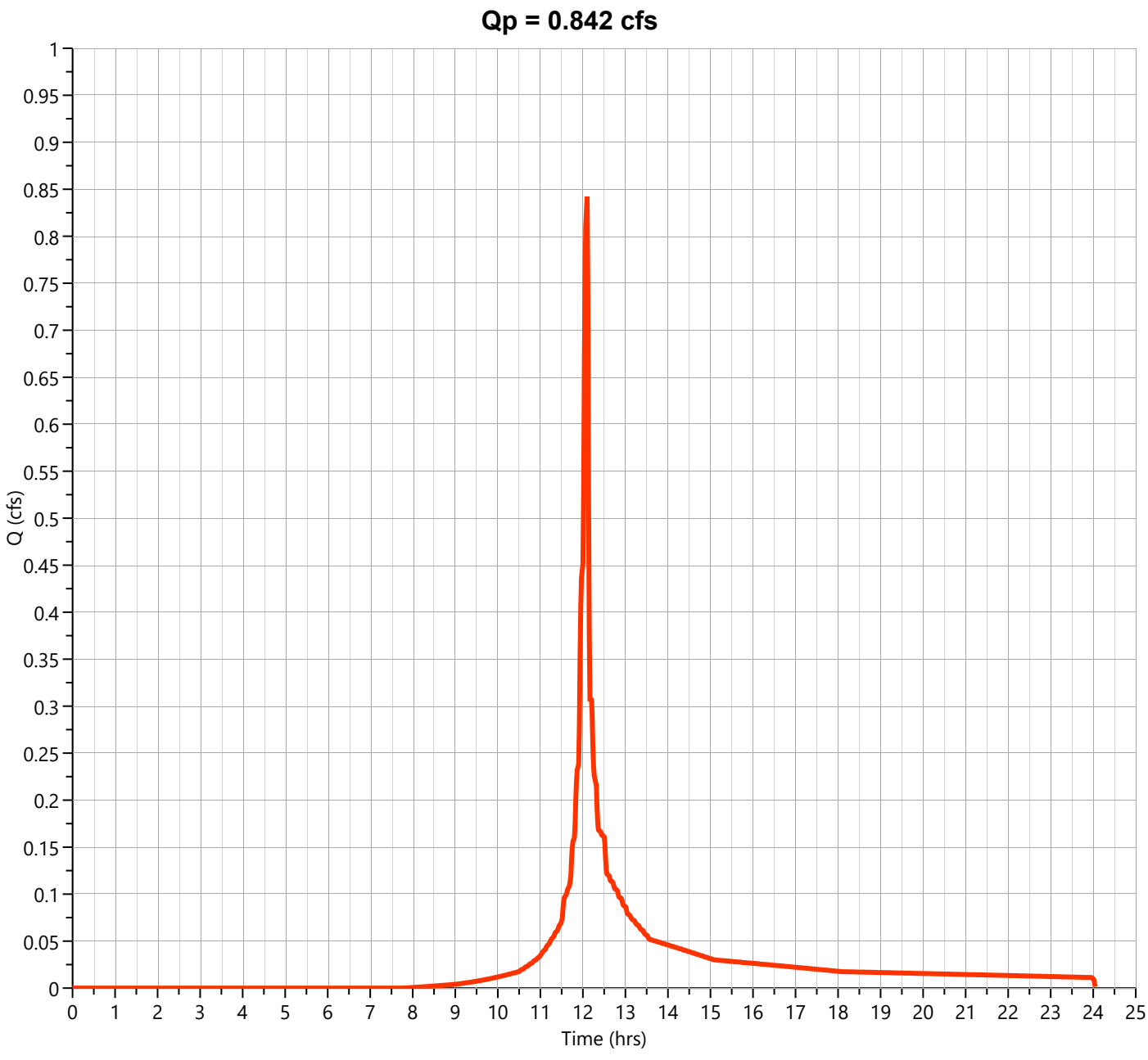
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1C-D Open Space D

Hyd. No. 24

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.842 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 2,296 cuft
Drainage Area	= 0.32 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

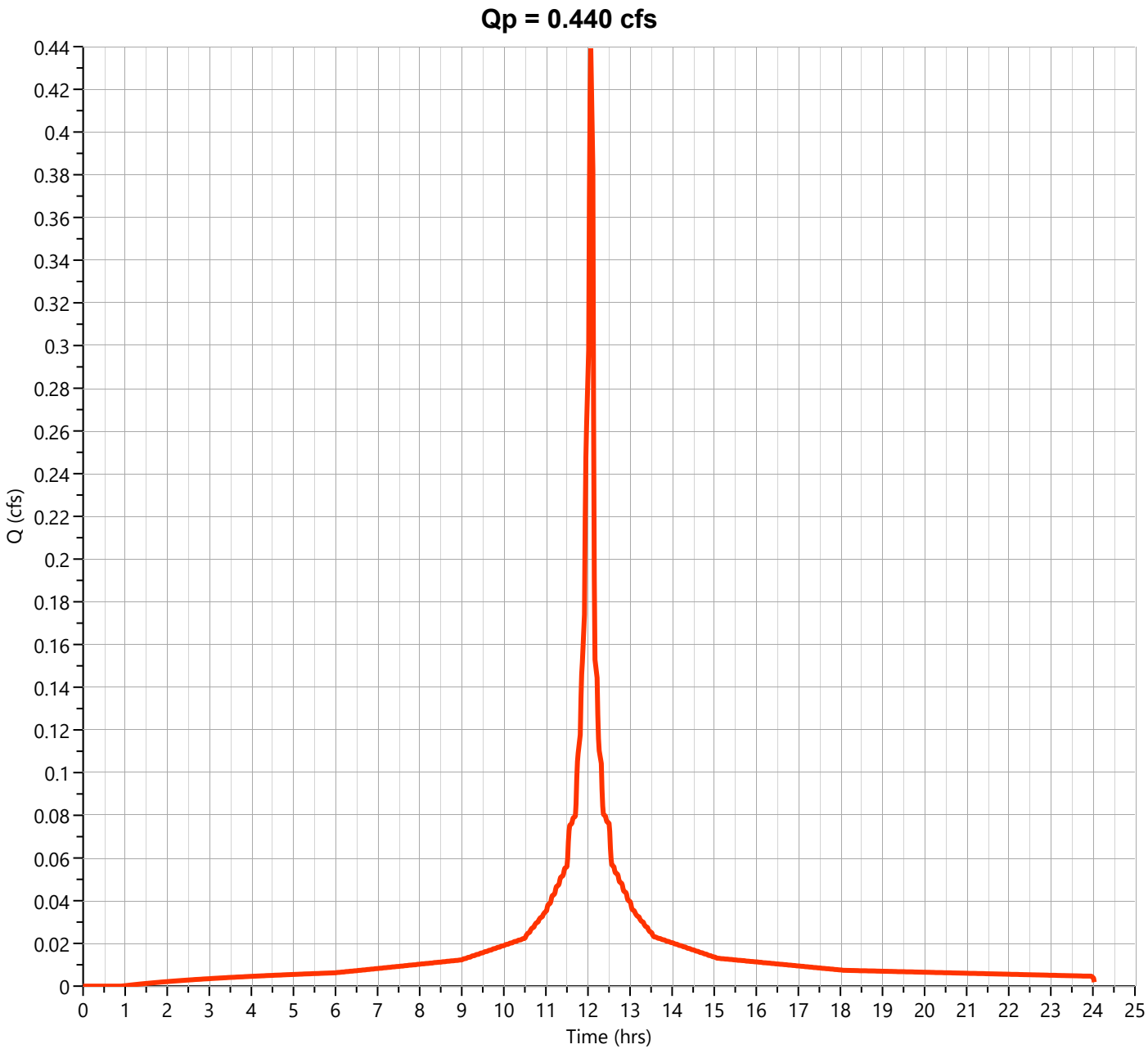
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1C-D Impervious

Hyd. No. 25

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.440 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,439 cuft
Drainage Area	= 0.11 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

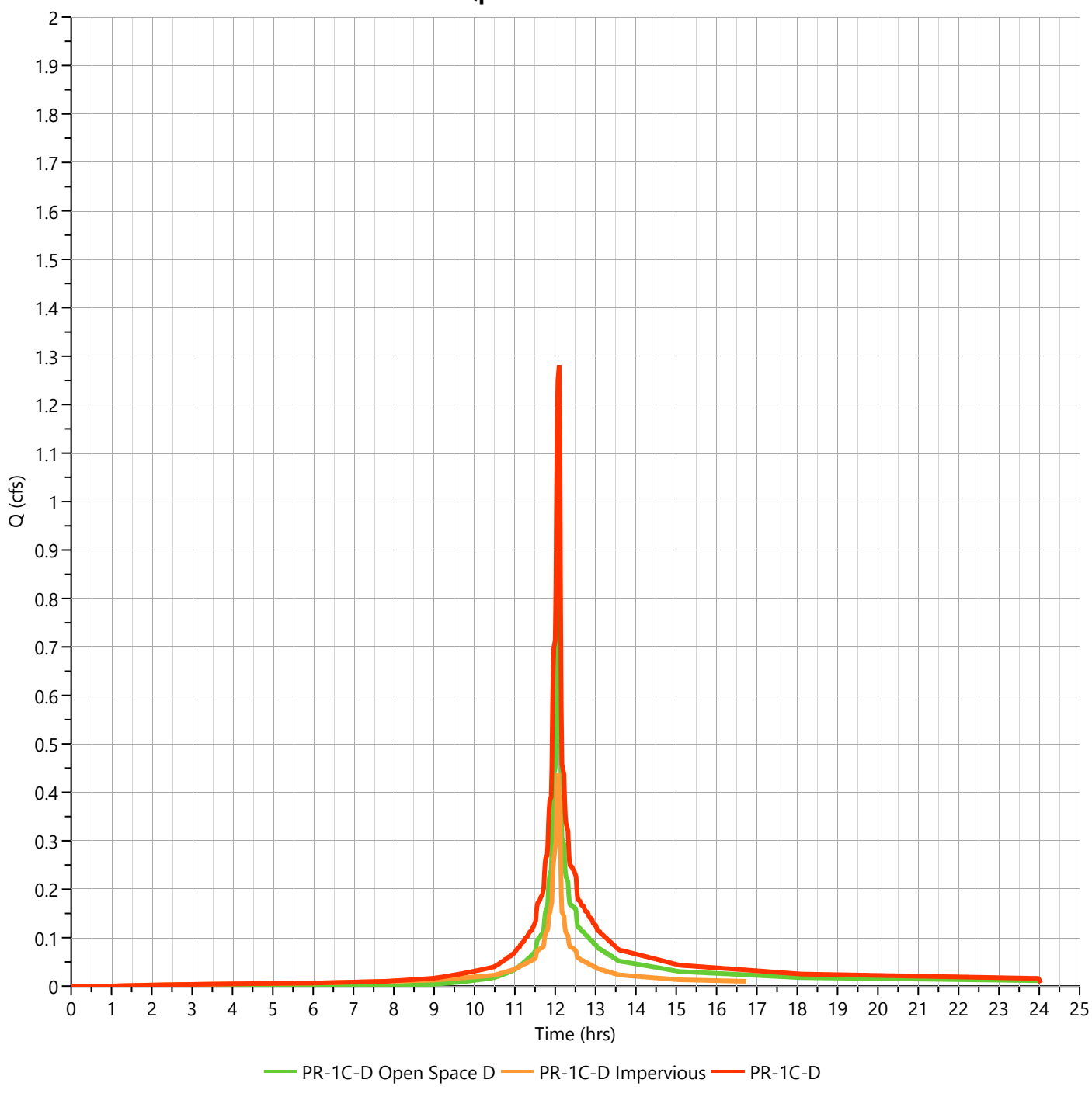
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1C-D

Hyd. No. 26

Hydrograph Type	= Junction	Peak Flow	= 1.282 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 3,735 cuft
Inflow Hydrographs	= 24, 25	Total Contrib. Area	= 0.43 ac



Hydrograph Report

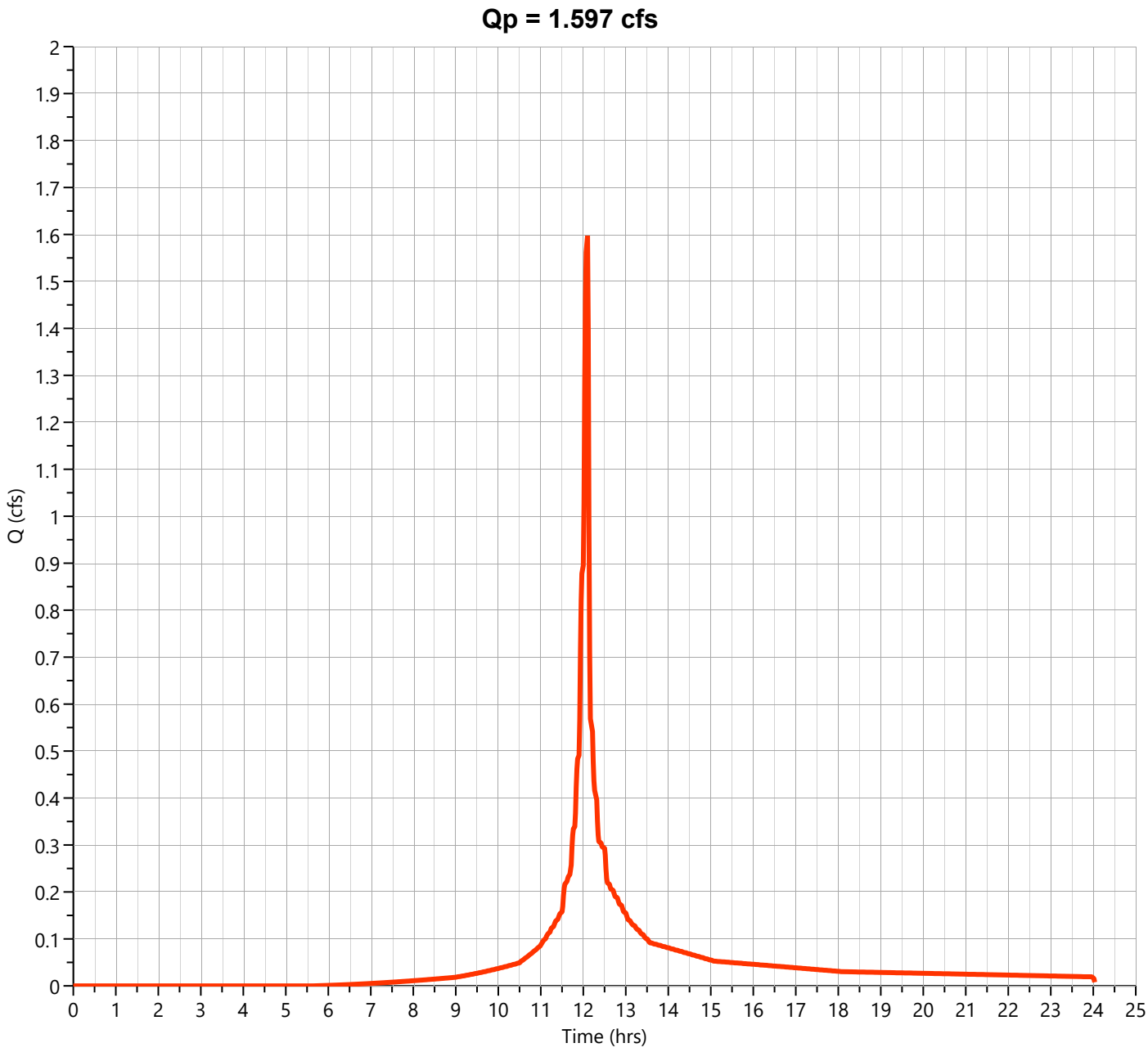
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1C-D Open Space D

Hyd. No. 24

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.597 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 4,483 cuft
Drainage Area	= 0.32 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

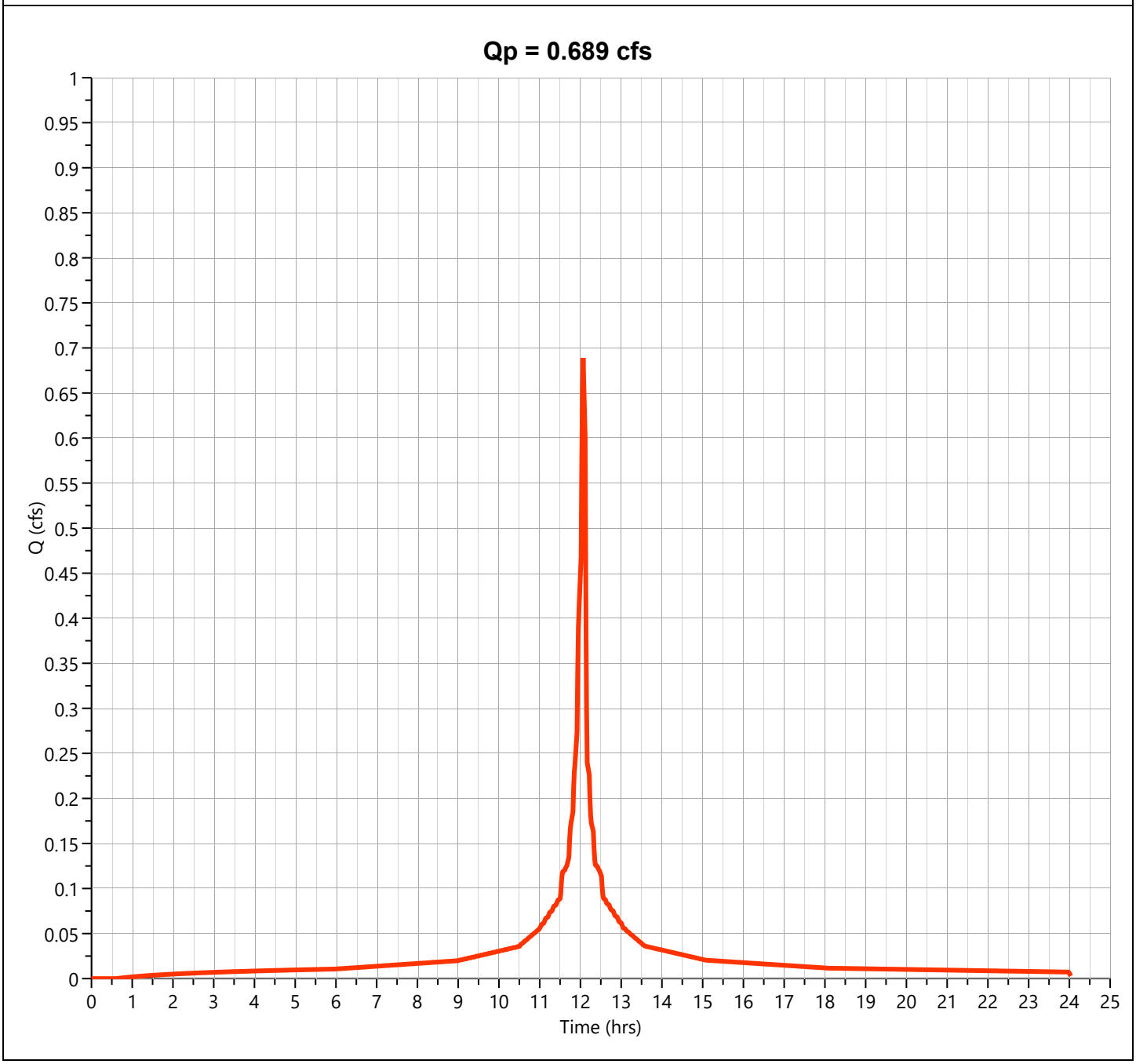
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1C-D Impervious

Hyd. No. 25

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.689 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 2,295 cuft
Drainage Area	= 0.11 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

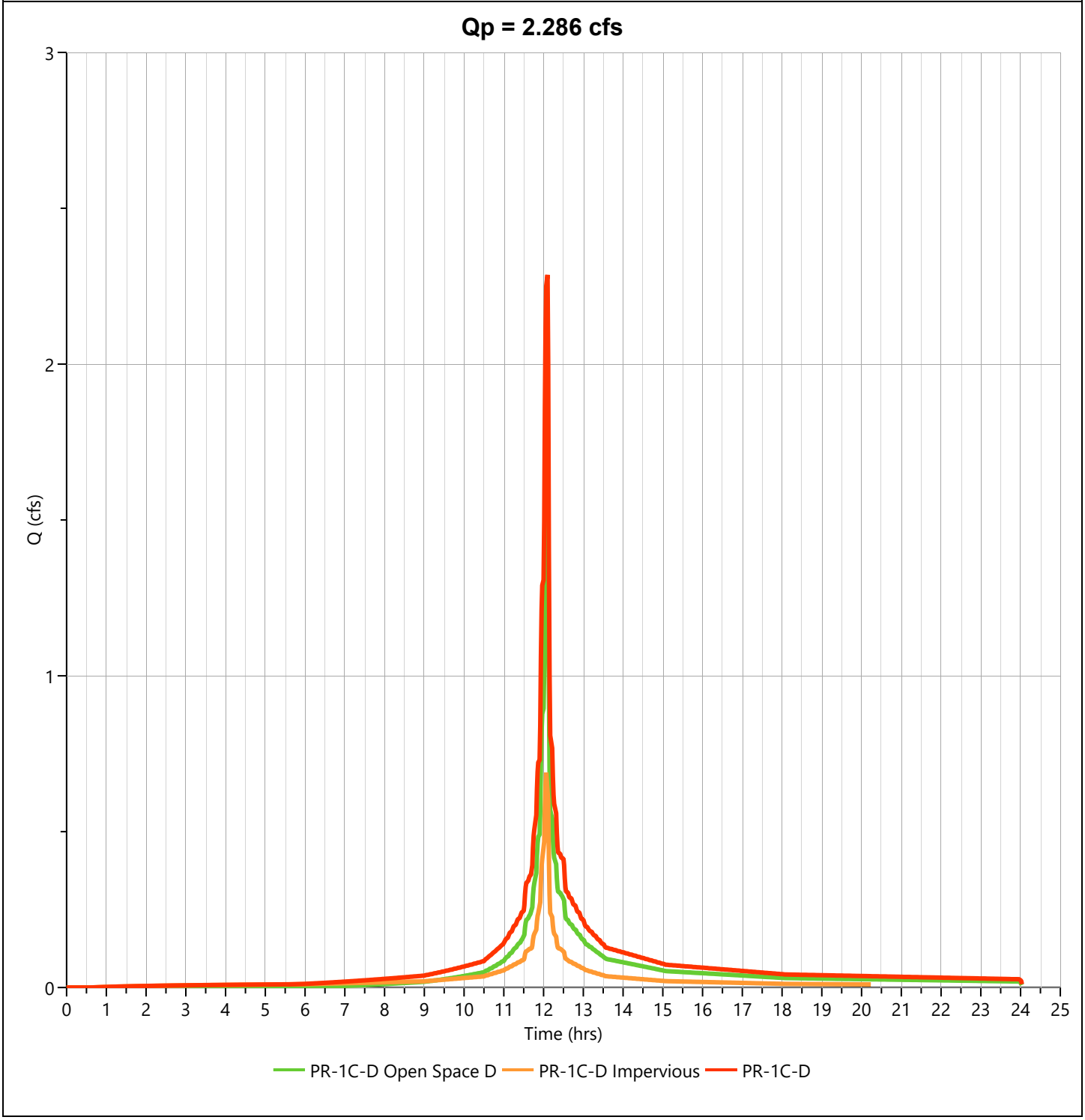
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1C-D

Hyd. No. 26

Hydrograph Type	= Junction	Peak Flow	= 2.286 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 6,778 cuft
Inflow Hydrographs	= 24, 25	Total Contrib. Area	= 0.43 ac



Hydrograph Report

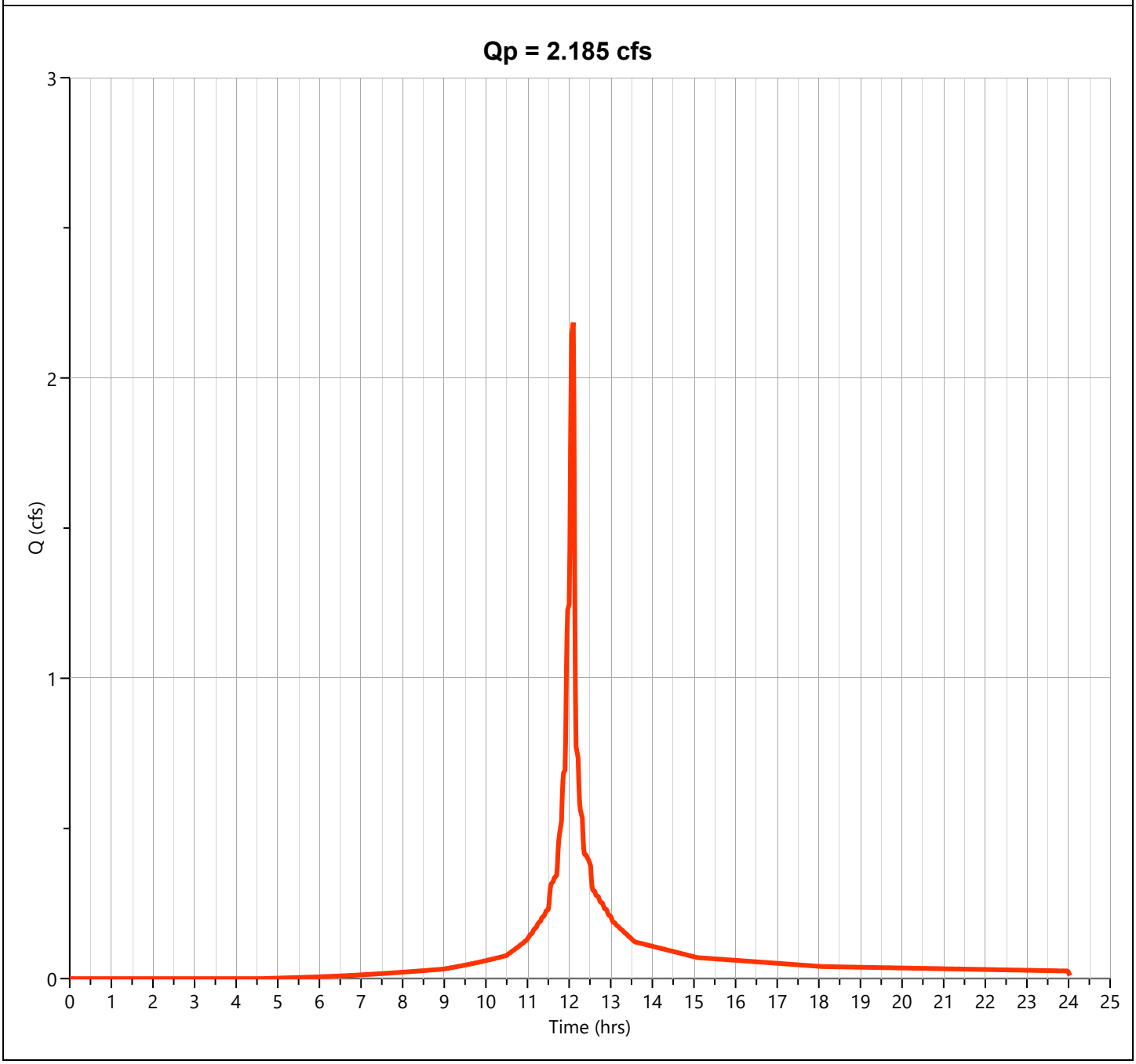
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1C-D Open Space D

Hyd. No. 24

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.185 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 6,258 cuft
Drainage Area	= 0.32 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

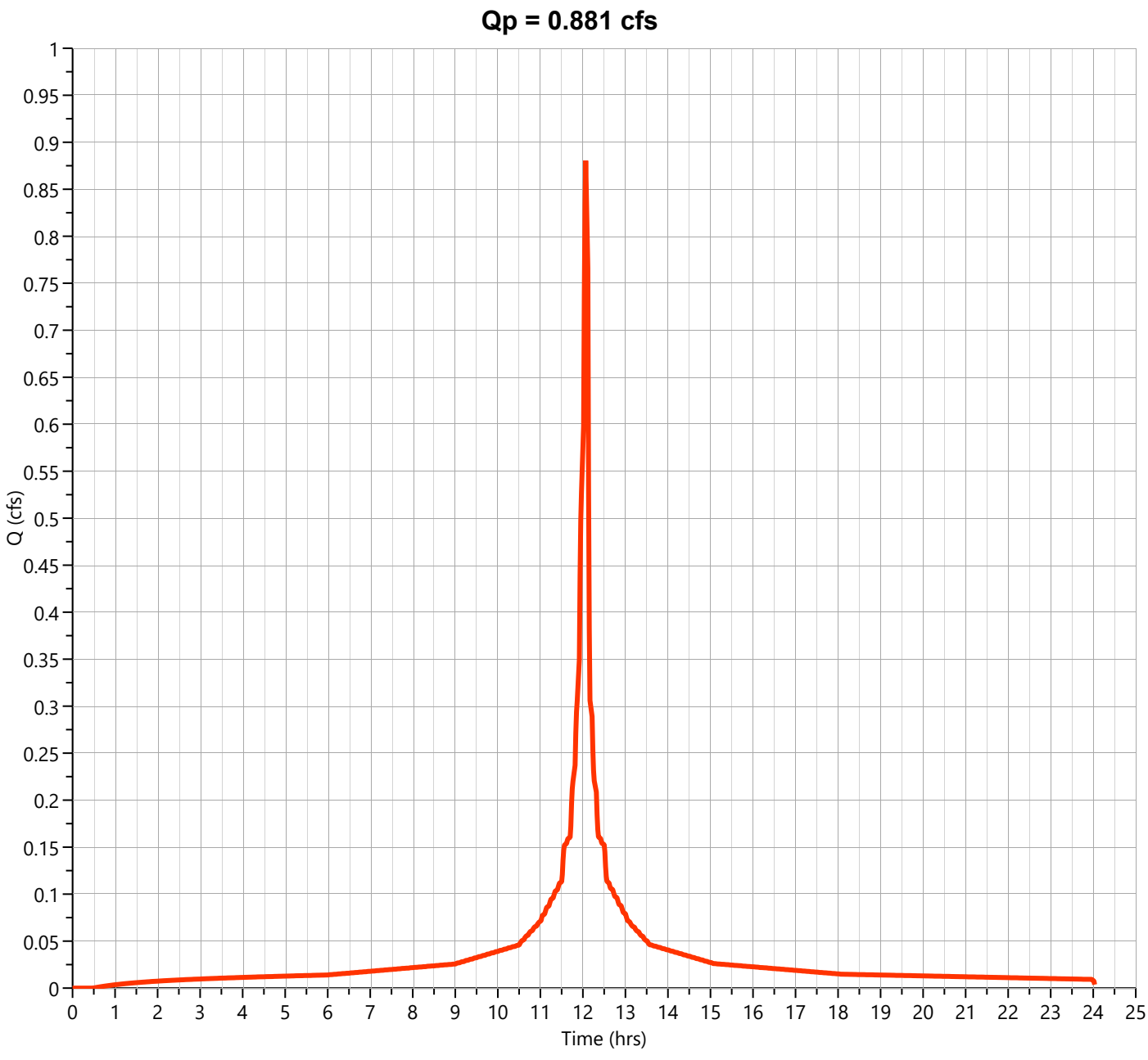
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1C-D Impervious

Hyd. No. 25

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.881 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 2,954 cuft
Drainage Area	= 0.11 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

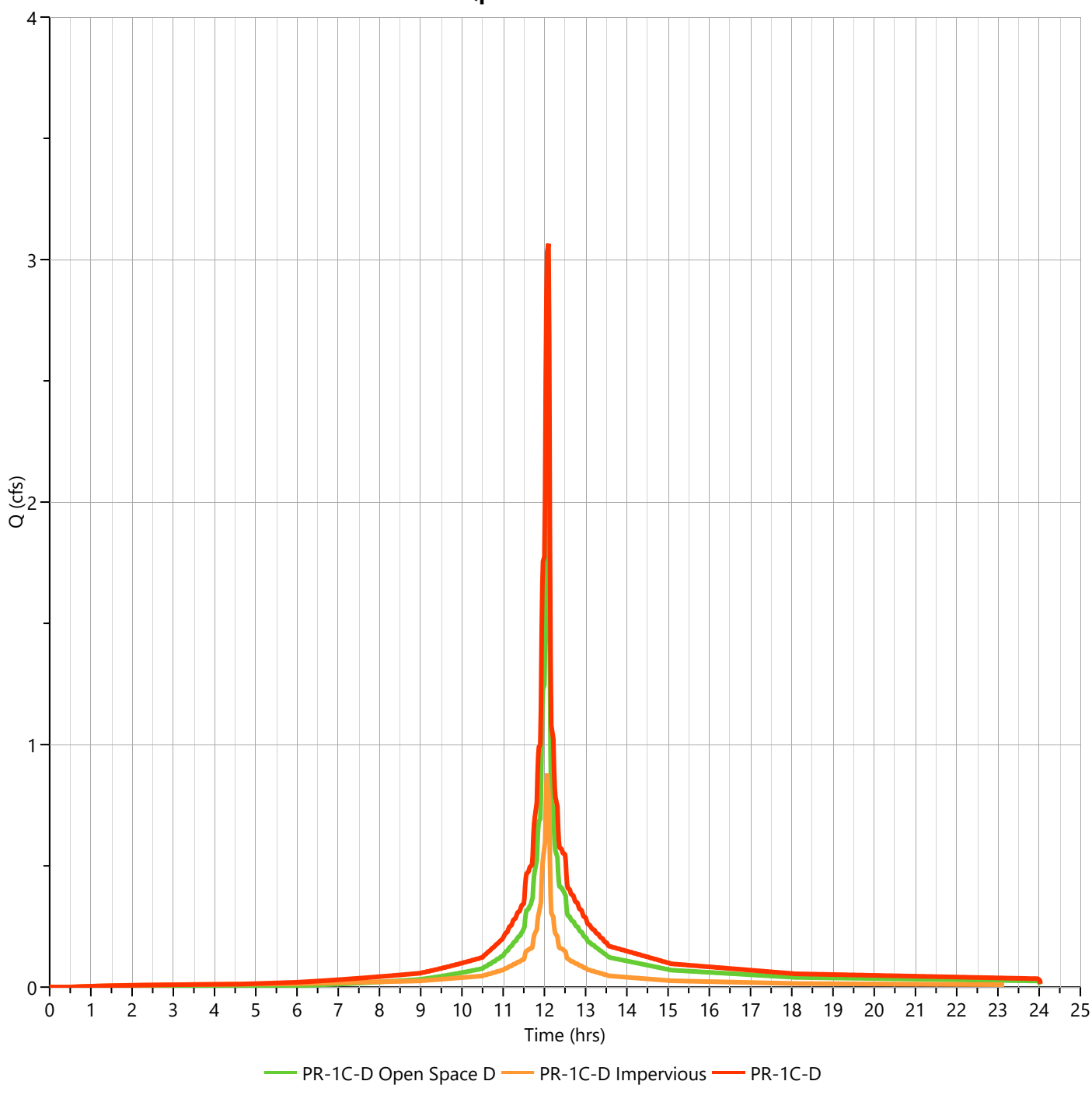
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1C-D

Hyd. No. 26

Hydrograph Type	= Junction	Peak Flow	= 3.065 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 9,212 cuft
Inflow Hydrographs	= 24, 25	Total Contrib. Area	= 0.43 ac



Hydrograph Report

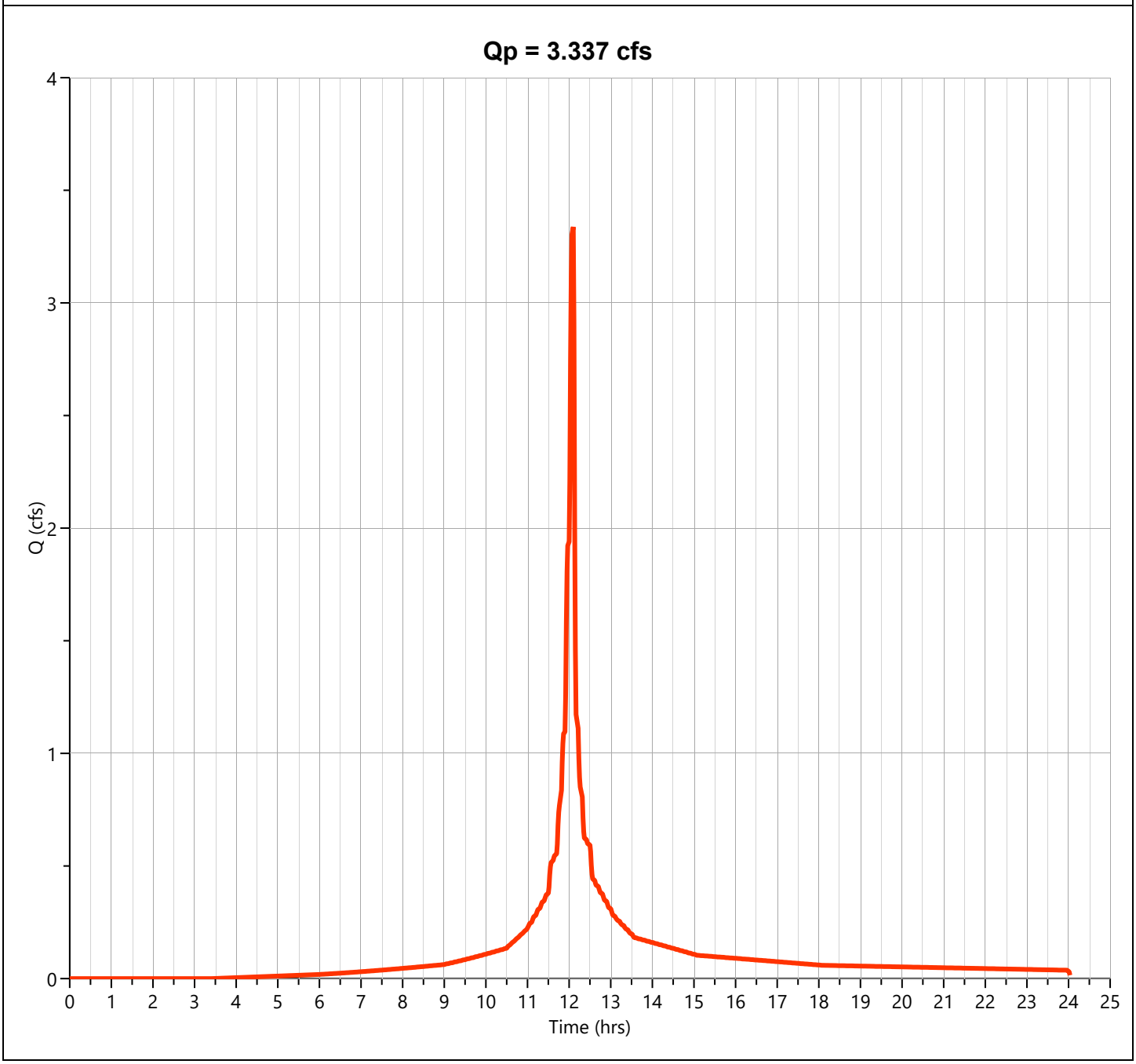
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1C-D Open Space D

Hyd. No. 24

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.337 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 9,866 cuft
Drainage Area	= 0.32 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

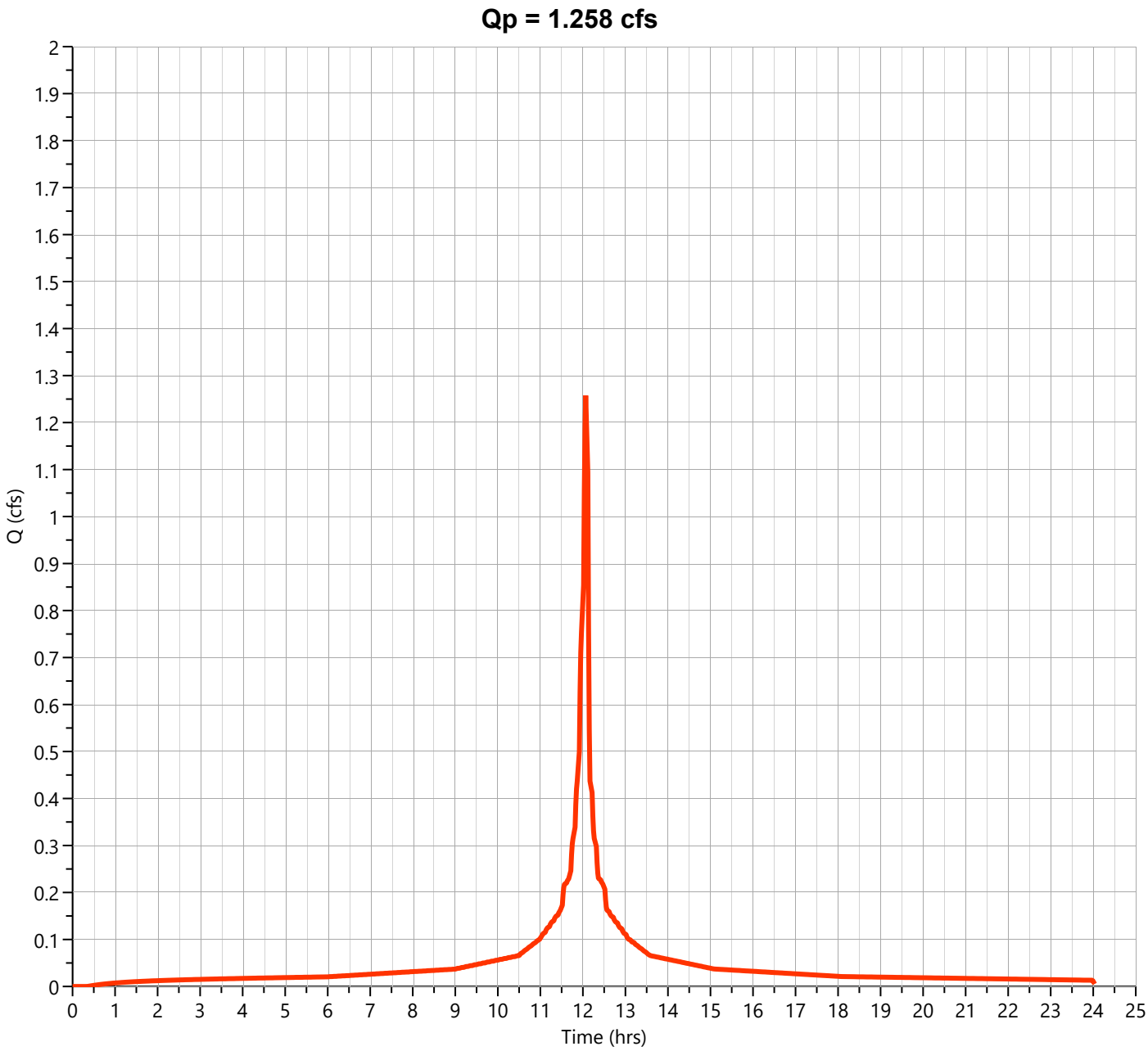
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1C-D Impervious

Hyd. No. 25

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.258 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 4,252 cuft
Drainage Area	= 0.11 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

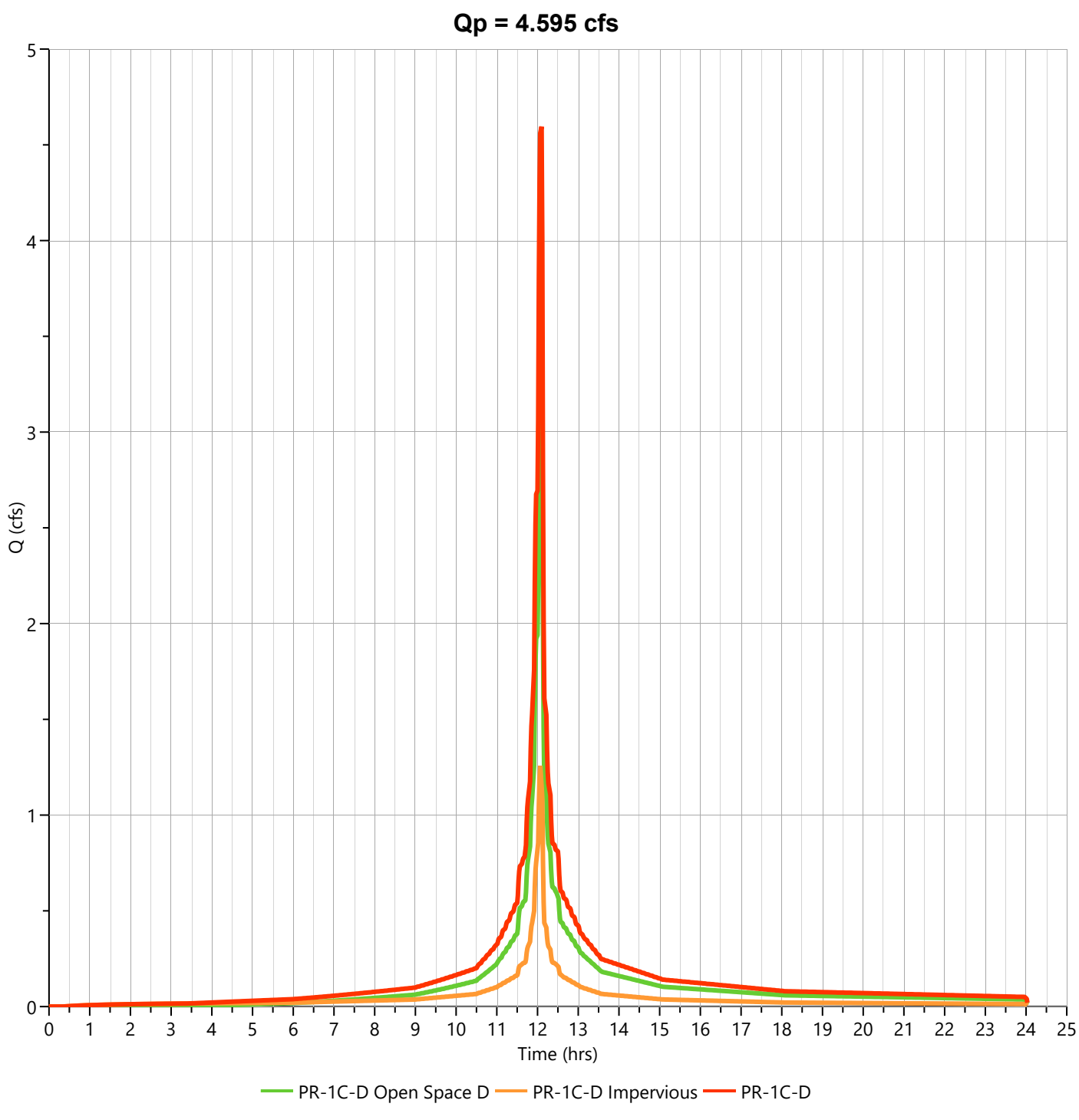
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1C-D

Hyd. No. 26

Hydrograph Type	= Junction	Peak Flow	= 4.595 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 14,118 cuft
Inflow Hydrographs	= 24, 25	Total Contrib. Area	= 0.43 ac



PR-1C-UNDISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: (**Present**) Developed — **Future Proposed Watershed PR-1C-U 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)

$$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$$

		Segment ID	1					
			Smooth Surfaces					
1.	Surface Description (NEH table 15-1)							
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.011					
3.	Flow Length, L (total L < 100 ft)	ft	60					
4.	Two-year 24-hr rainfall, P_2	in	4.08					
5.	Land Slope, s	ft/ft	0.032					
6.	Compute T_t	hr	0.010	+		+		

Sheet Flow Sub-Total: **0.010 hours**

Shallow Concentrated Flow

$$T_t = \frac{L}{3600\,V}$$

		Segment ID	2		3		4	
			Pavement		Pavement		Pavement	
7.	Surface Description							
8.	Flow Length, L	ft	66		474		164	
9.	Watercourse Slope, s	ft/ft	0.033		0.073		0.016	
10.	Average Velocity, V (NEH table 15-3)	ft/s	3.71		5.50		2.60	
11.	Compute T_t	hr	0.005	+	0.024	+	0.017	

Shallow Conc. Flow Sub-Total: **0.046 hours**

Channel Flow

$$r = a / P_w$$

$$V = (1.49\, r^{2/3} s^{1/2}) / n$$

$$T_t = \frac{L}{3600\,V}$$

		Segment ID	5		6			
12.	Flow Length, L	ft	36		67			
13.	Cross Sectional flow area, a	ft^2	0.88		0.88			
14.	Wetted Perimeter, P_w	ft	2.40		2.40			
15.	Hydraulic Radius, r	ft	0.37		0.37			
16.	Channel Slope, s	ft/ft	0.032		0.042			
17.	Manning's Roughness Coeff., n		0.013		0.013			
18.	Velocity, V	ft/s	10.43		11.98			
19.	Compute T_t	hr	0.001	+	0.002	+		

Channel Flow Sub-Total: **0.003 hours**

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

Total Tc (hours) =	**0.059 hours**
Total Tc (minutes) =	**4 minutes**

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: (**Present**) Developed — **Future Proposed Watershed PR-1C-U 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.	Flow Length, L (total L < 100 ft)		ft	100		
4.	Two-year 24-hr rainfall, P_2		in	4.08		
5.	Land Slope, s		ft/ft	0.090		
6.	Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.116	+	+
					Sheet Flow Sub-Total	0.116 hours

Shallow Concentrated Flow

			Segment ID	2	3	4
7.	Surface Description			Grassed Waterways	Pavement	Pavement
8.	Flow Length, L		ft	178	207	164
9.	Watercourse Slope, s		ft/ft	0.078	0.067	0.016
10.	Average Velocity, V (NEH table 15-3)		ft/s	4.50	5.27	2.60
11.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.011	+ 0.011	+ 0.017
					Shallow Conc. Flow Sub-Total	0.039 hours

Channel Flow

			Segment ID	5	6	
12.	Flow Length, L		ft	36	67	
13.	Cross Sectional flow area, a		ft^2	0.88	0.88	
14.	Wetted Perimeter, P_w		ft	2.40	2.40	
15.	Hydraulic Radius, r	$r = a / P_w$	ft	0.37	0.37	
16.	Channel Slope, s		ft/ft	0.032	0.042	
17.	Manning's Roughness Coeff., n			0.013	0.013	
18.	Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s	10.43	11.98	
19.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.001	+ 0.002	+
					Channel Flow Sub-Total	0.003 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**

Hydrograph Report

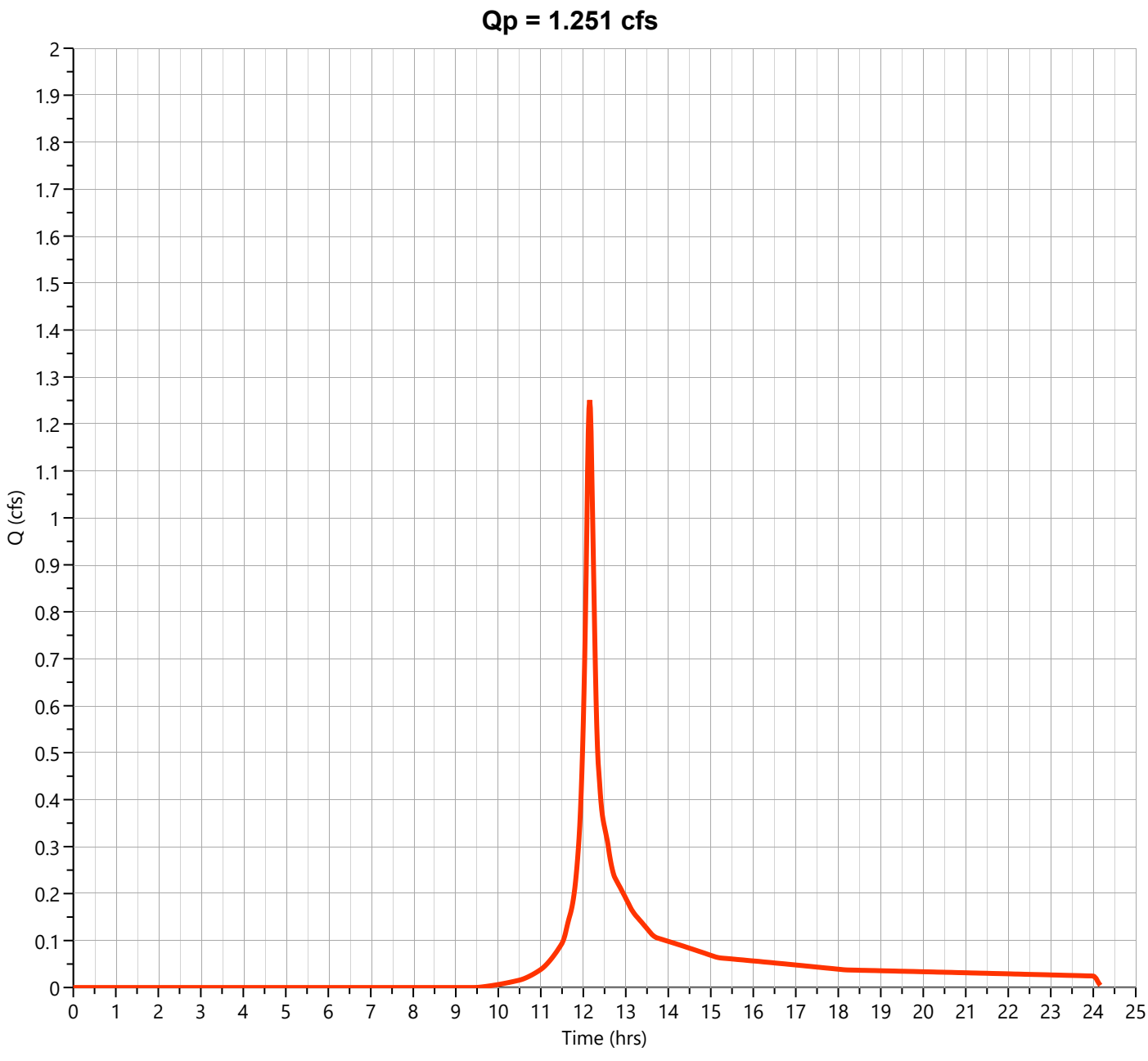
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1C-U Open Space C

Hyd. No. 28

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.251 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Runoff Volume	= 4,386 cuft
Drainage Area	= 0.73 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 9.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

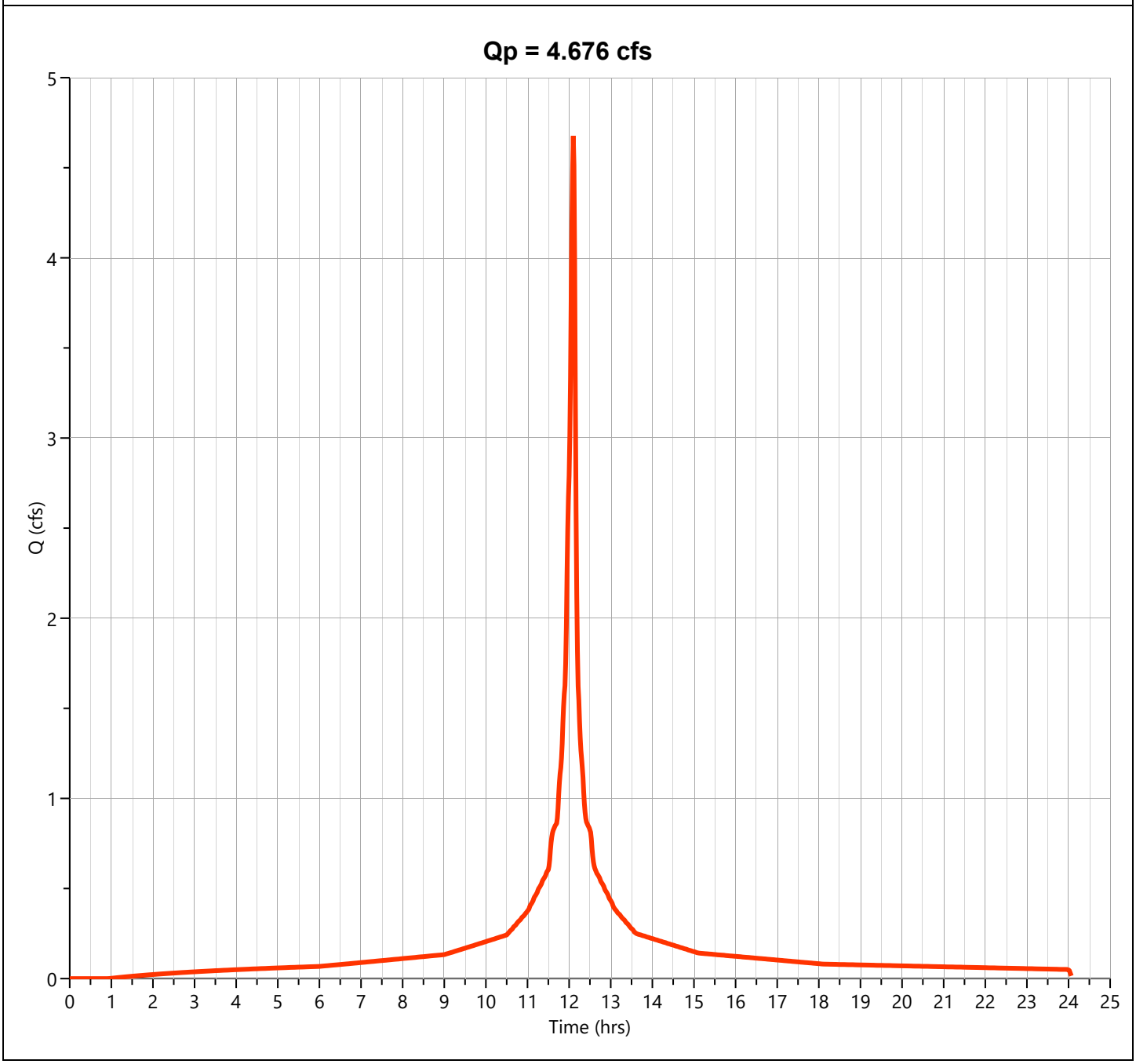
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1C-U Impervious

Hyd. No. 29

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.676 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 15,632 cuft
Drainage Area	= 1.12 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

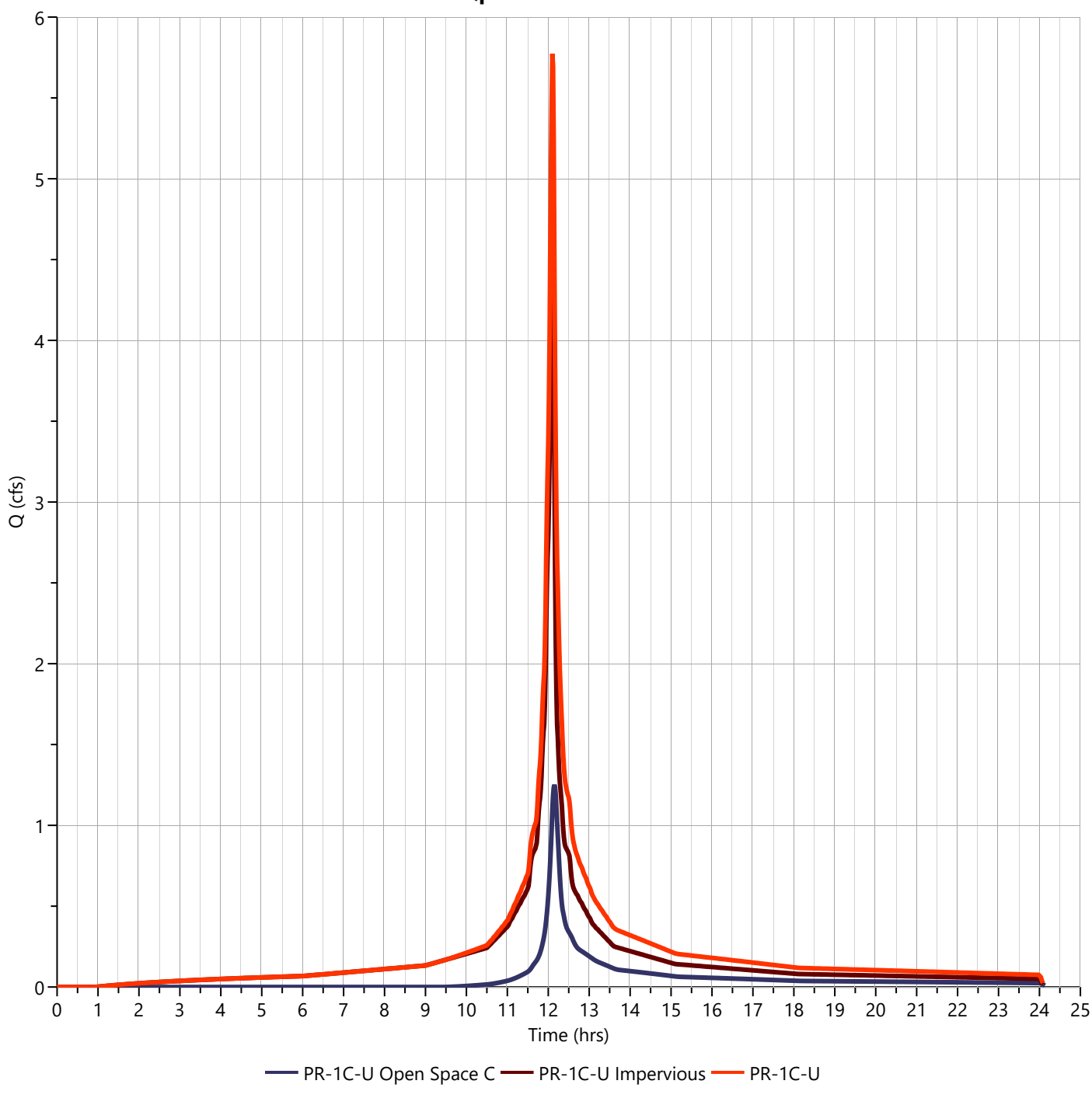
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1C-U

Hyd. No. 30

Hydrograph Type	= Junction	Peak Flow	= 5.772 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 20,018 cuft
Inflow Hydrographs	= 28, 29	Total Contrib. Area	= 1.85 ac



Hydrograph Report

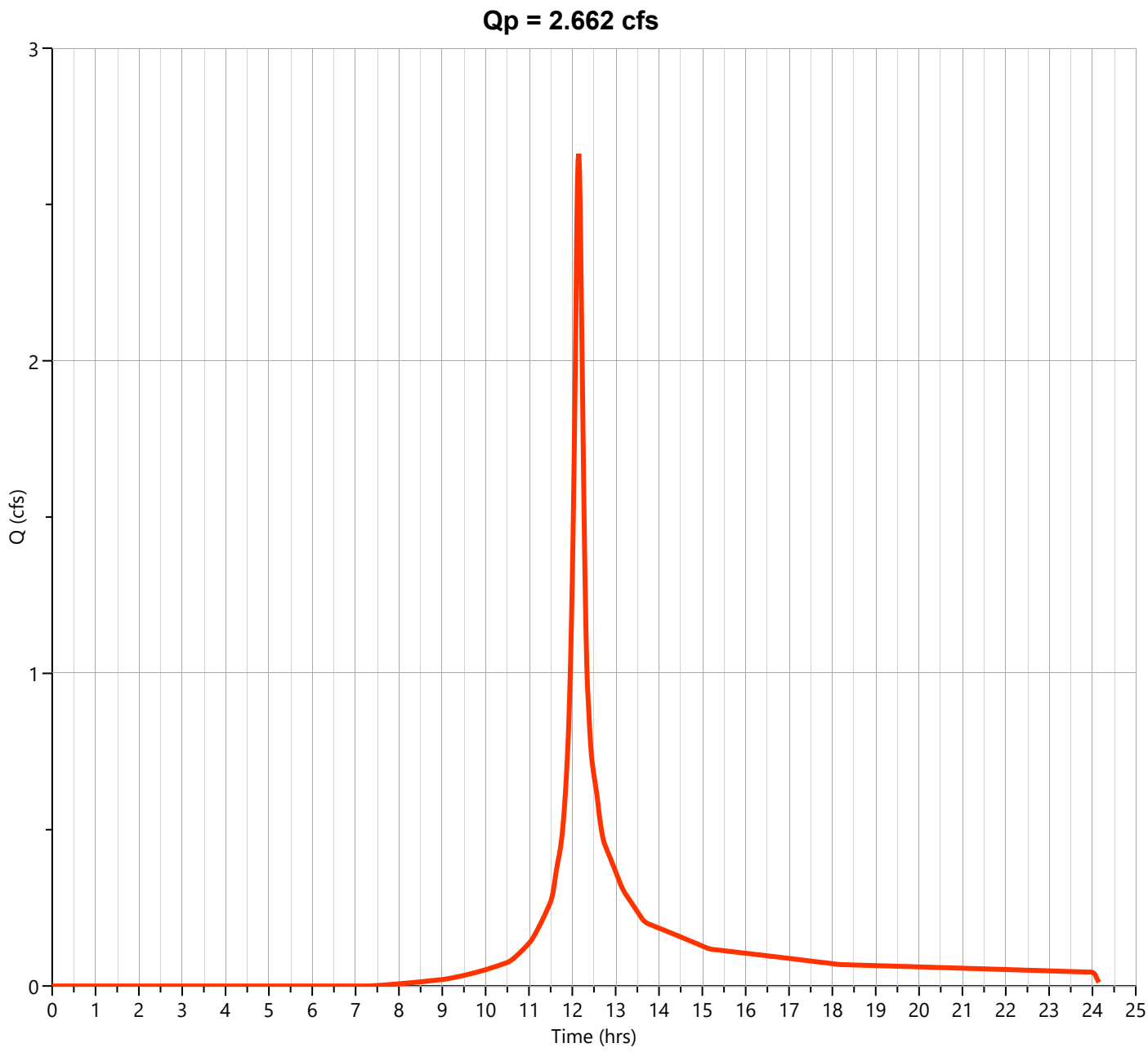
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1C-U Open Space C

Hyd. No. 28

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.662 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Runoff Volume	= 9,270 cuft
Drainage Area	= 0.73 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 9.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

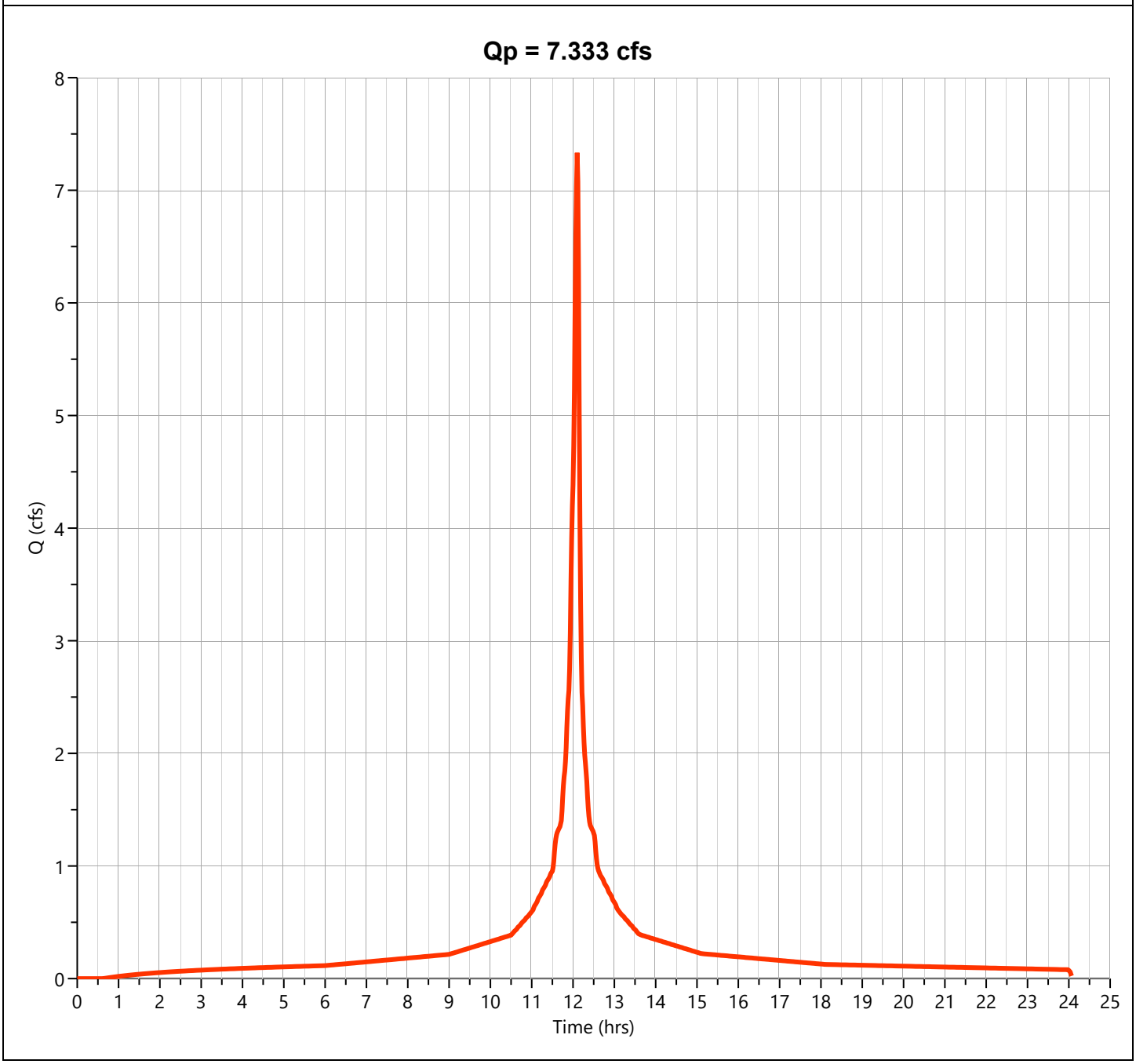
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1C-U Impervious

Hyd. No. 29

Hydrograph Type	= NRCS Runoff	Peak Flow	= 7.333 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 24,928 cuft
Drainage Area	= 1.12 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

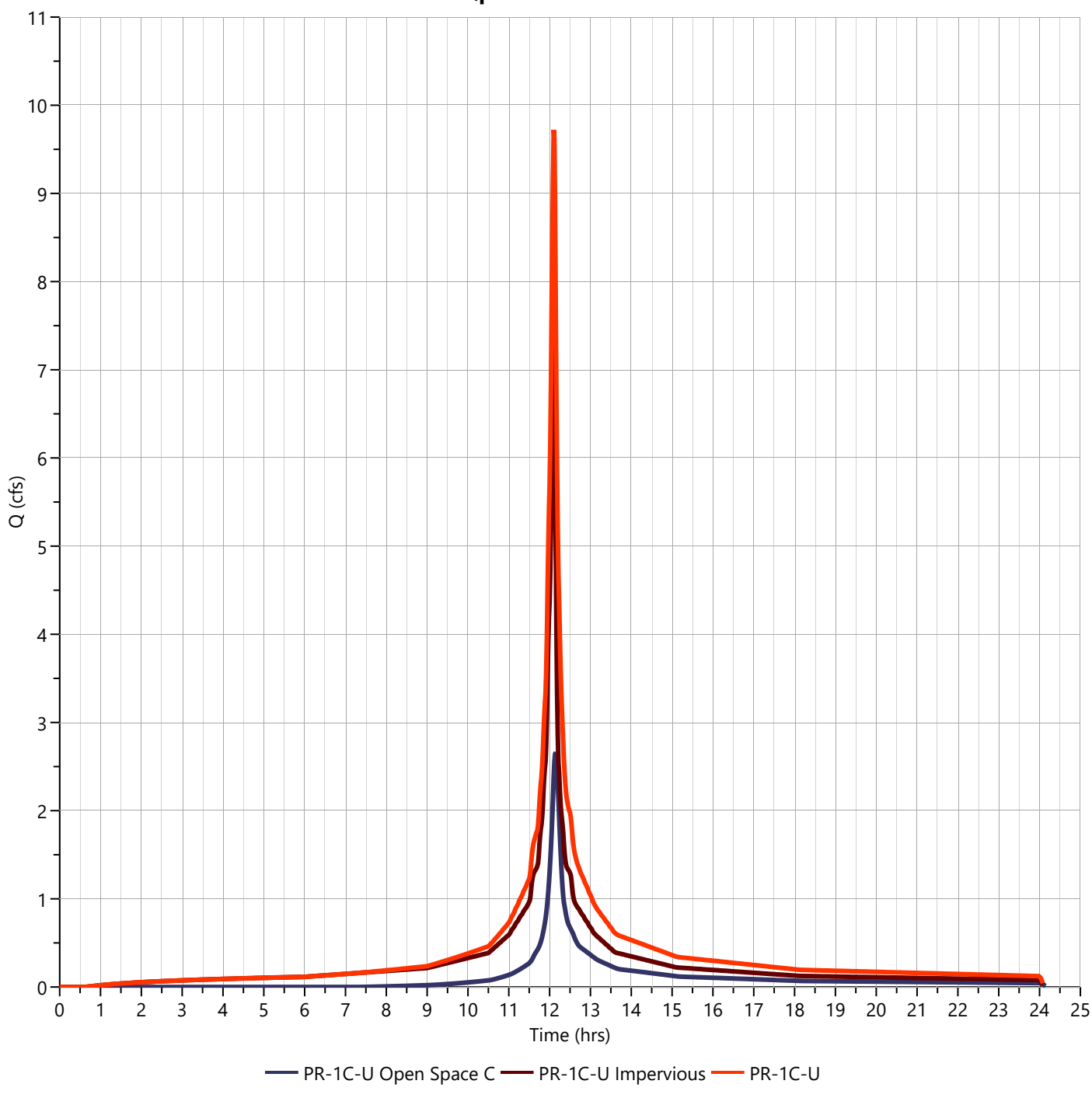
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1C-U

Hyd. No. 30

Hydrograph Type	= Junction	Peak Flow	= 9.721 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 34,199 cuft
Inflow Hydrographs	= 28, 29	Total Contrib. Area	= 1.85 ac



Hydrograph Report

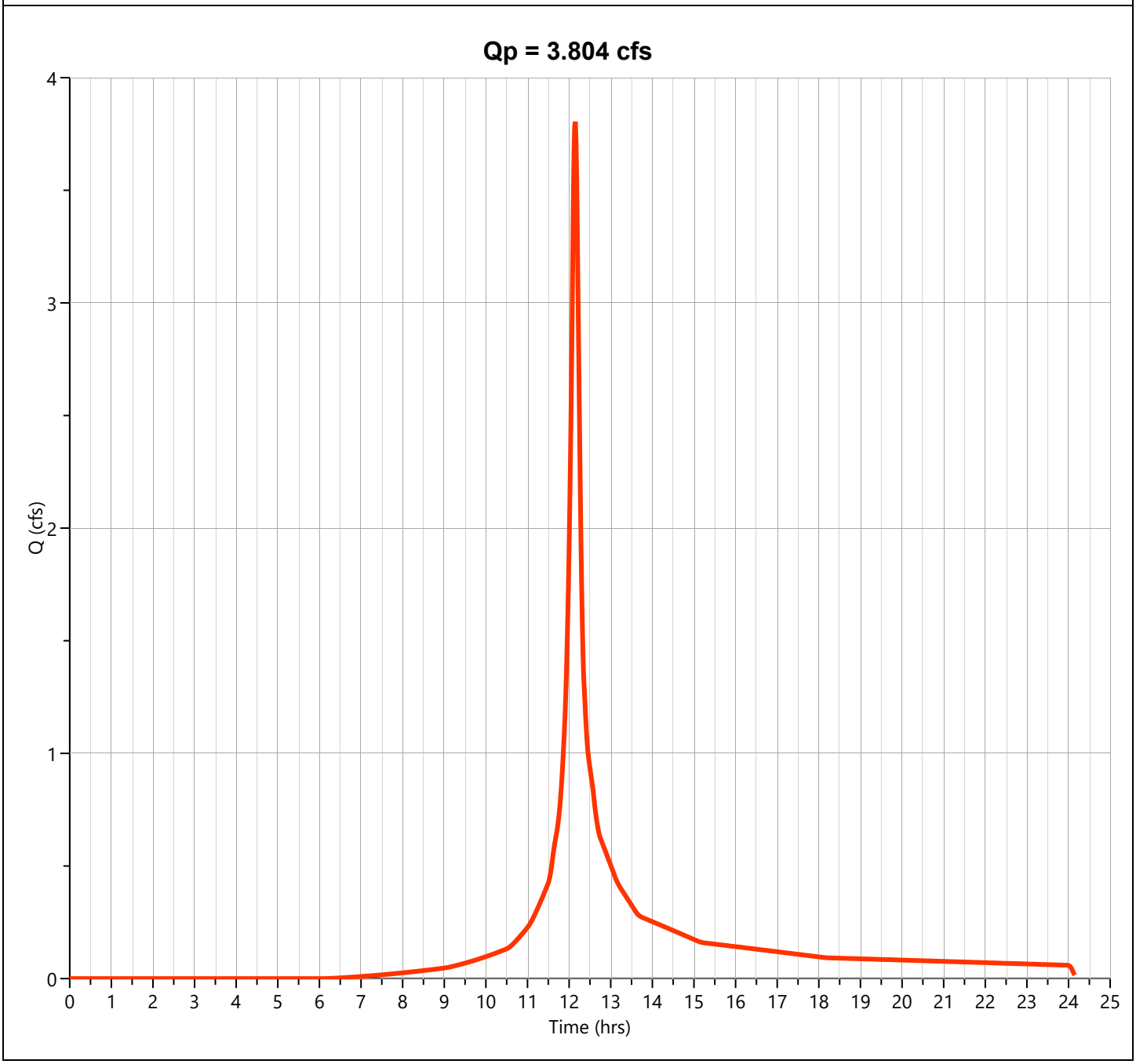
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1C-U Open Space C

Hyd. No. 28

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.804 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Runoff Volume	= 13,361 cuft
Drainage Area	= 0.73 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 9.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

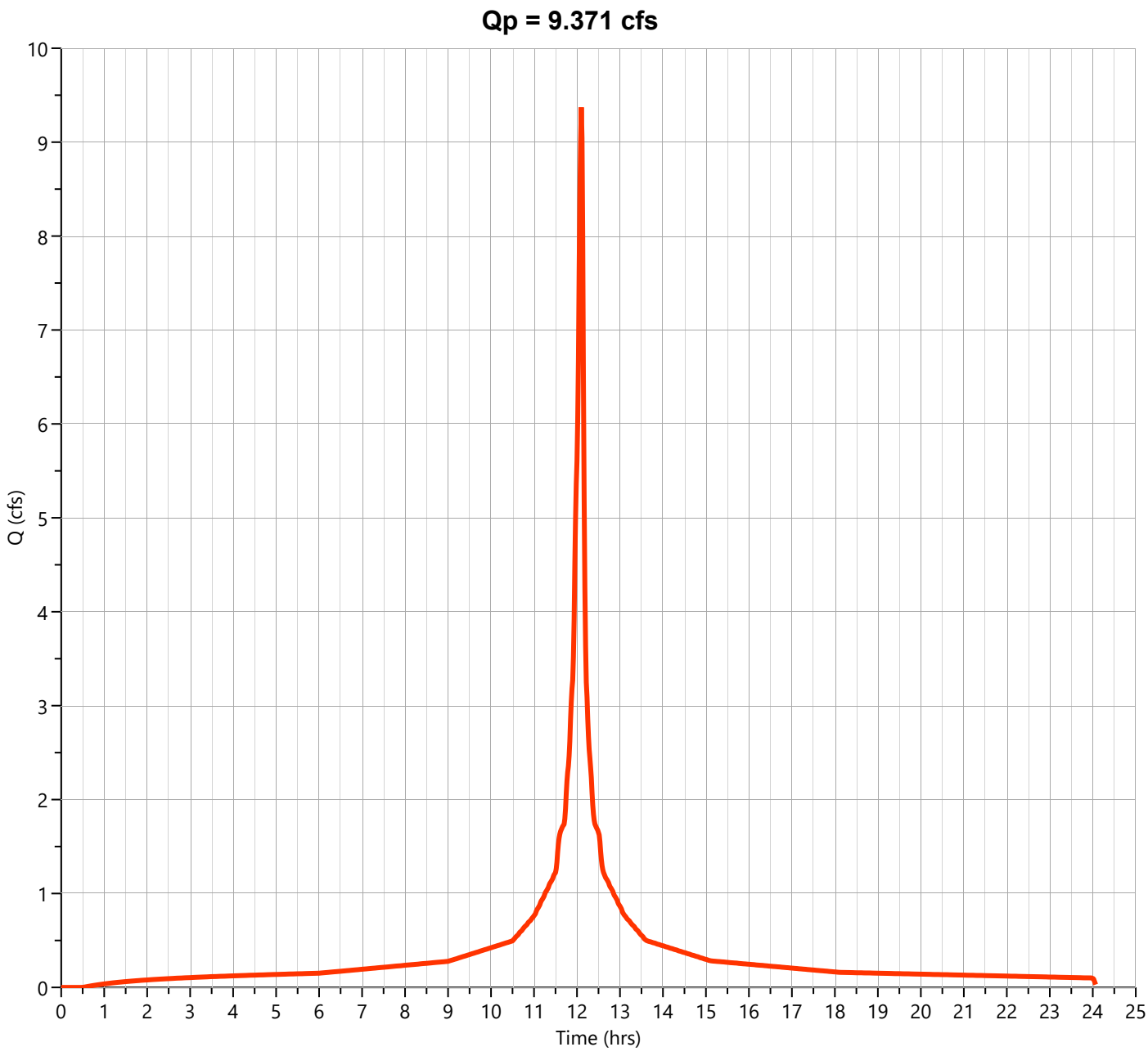
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1C-U Impervious

Hyd. No. 29

Hydrograph Type	= NRCS Runoff	Peak Flow	= 9.371 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 32,078 cuft
Drainage Area	= 1.12 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

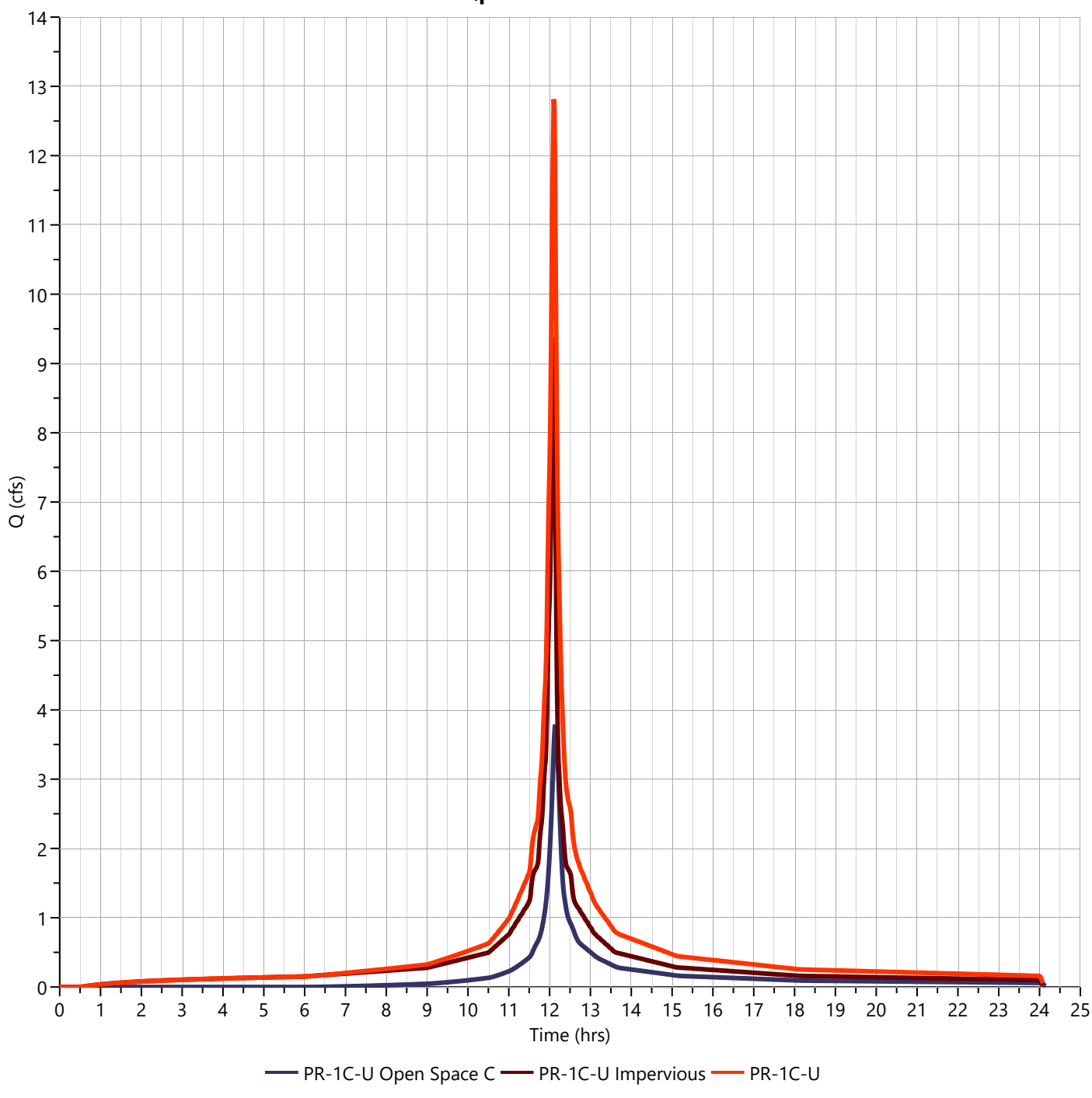
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1C-U

Hyd. No. 30

Hydrograph Type	= Junction	Peak Flow	= 12.81 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 45,439 cuft
Inflow Hydrographs	= 28, 29	Total Contrib. Area	= 1.85 ac



Hydrograph Report

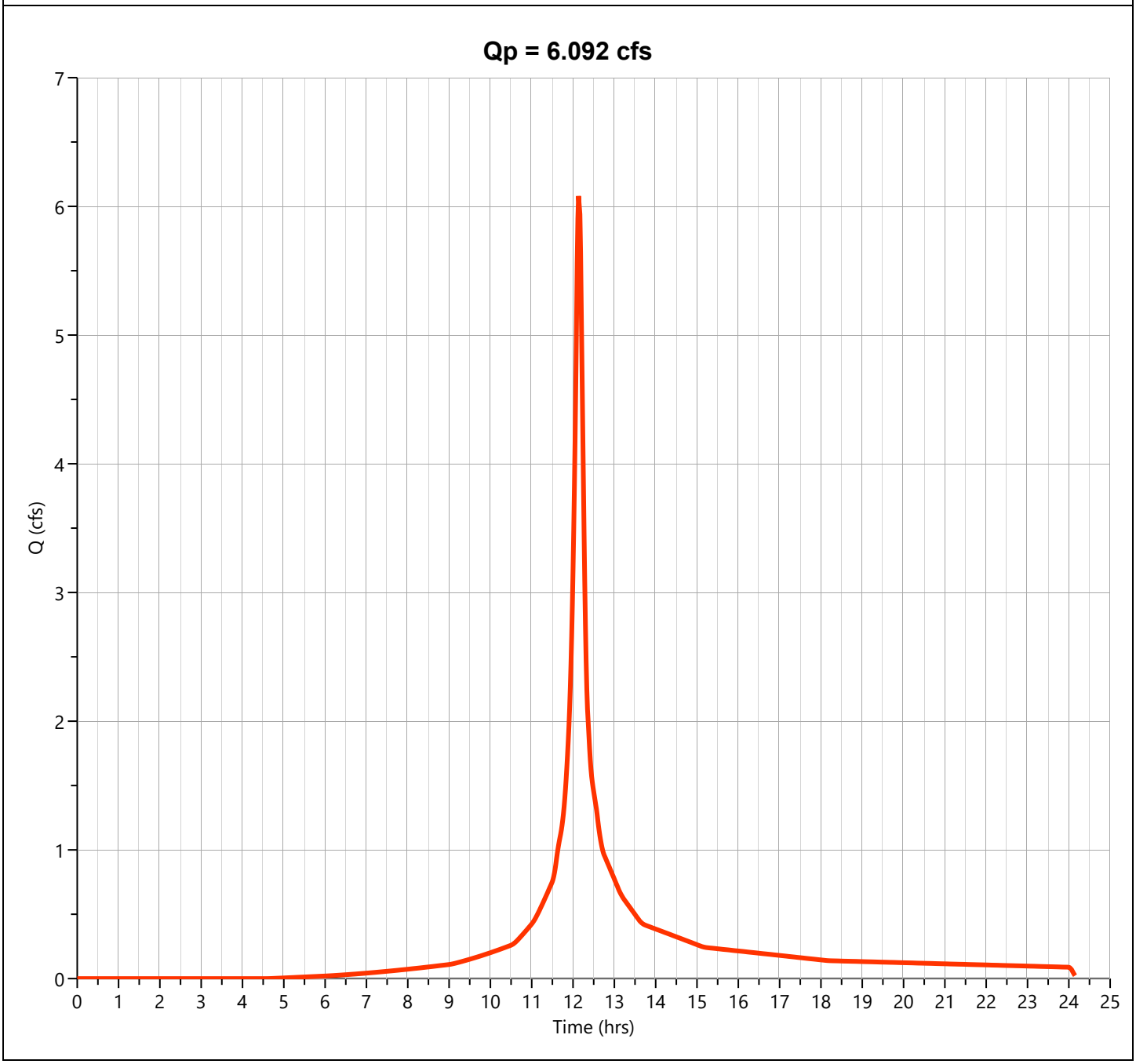
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1C-U Open Space C

Hyd. No. 28

Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.092 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Runoff Volume	= 21,836 cuft
Drainage Area	= 0.73 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 9.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

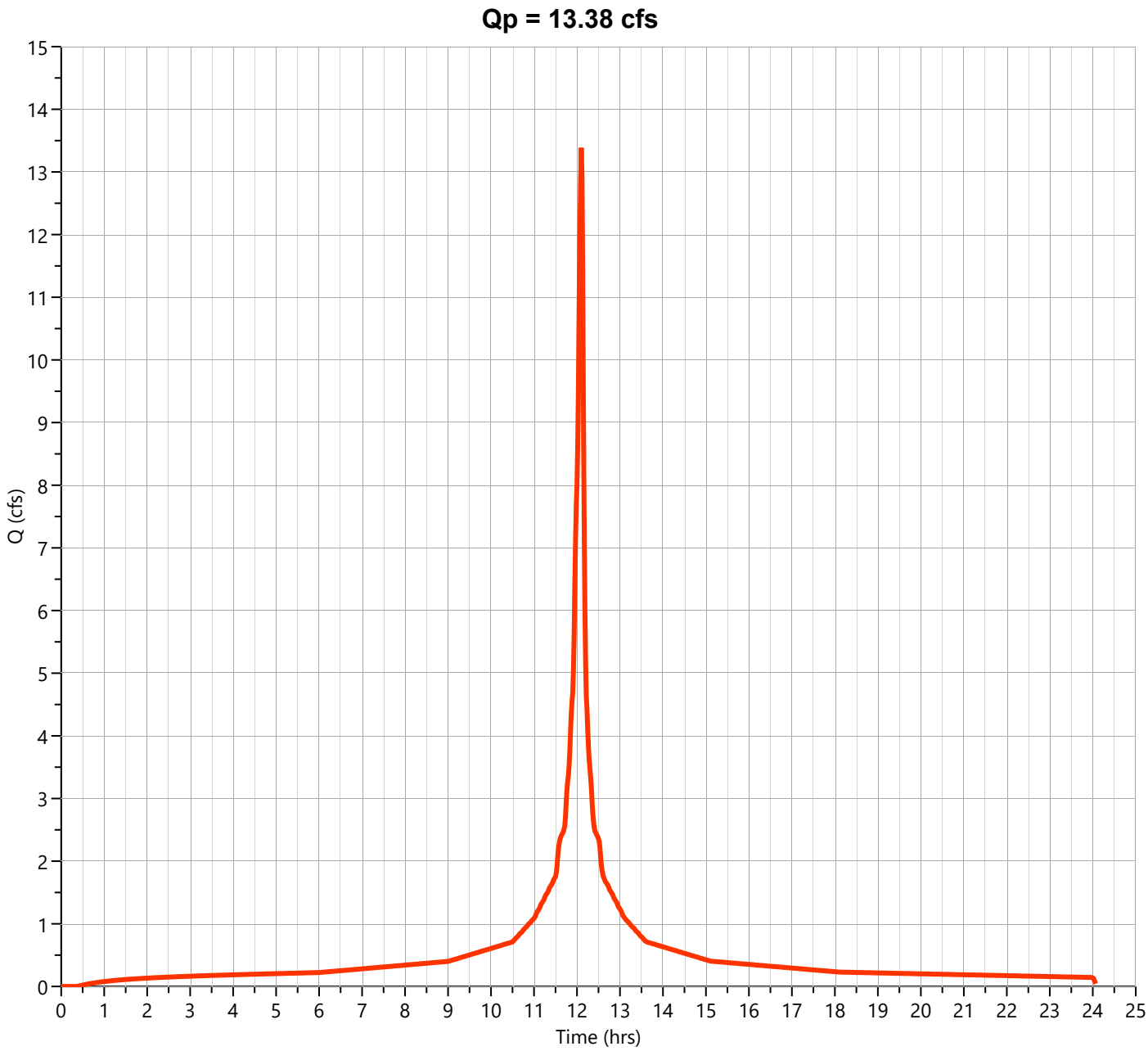
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1C-U Impervious

Hyd. No. 29

Hydrograph Type	= NRCS Runoff	Peak Flow	= 13.38 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 46,180 cuft
Drainage Area	= 1.12 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

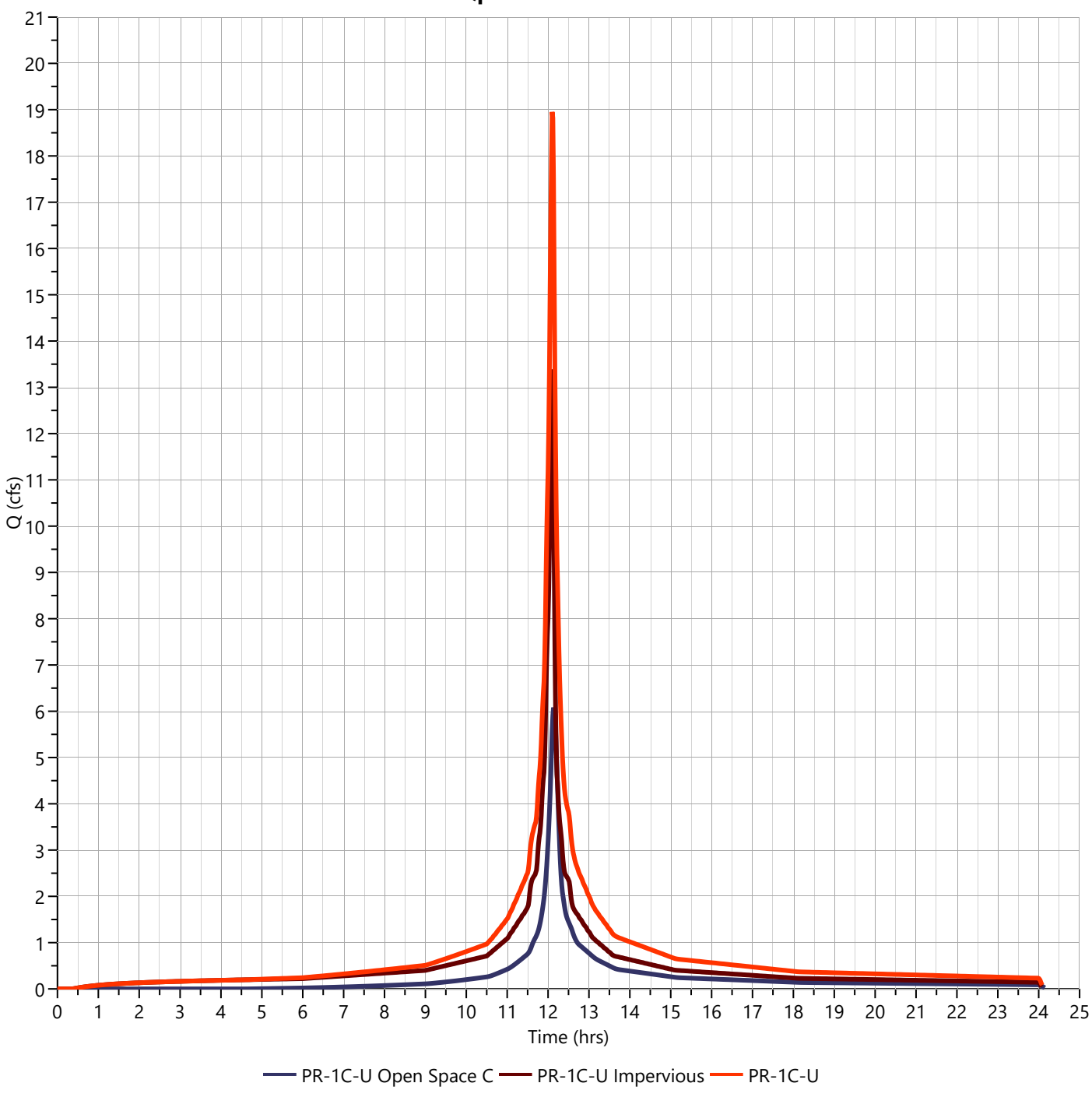
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-1C-U

Hyd. No. 30

Hydrograph Type	= Junction	Peak Flow	= 18.95 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 68,016 cuft
Inflow Hydrographs	= 28, 29	Total Contrib. Area	= 1.85 ac



TOTAL PROPOSED FLOW TO POA-1

Hydrograph Report

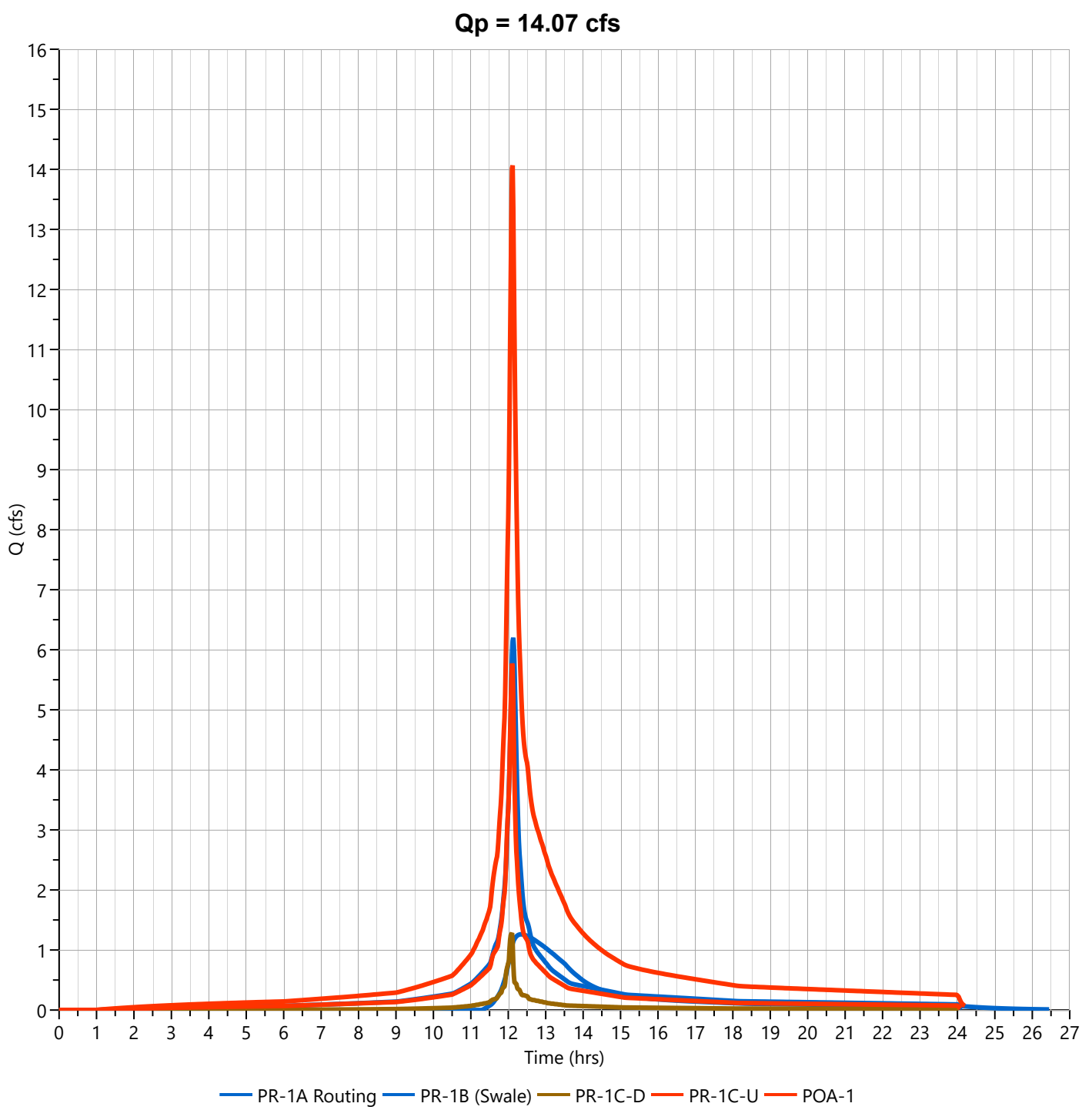
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

POA-1

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 14.07 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 60,072 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

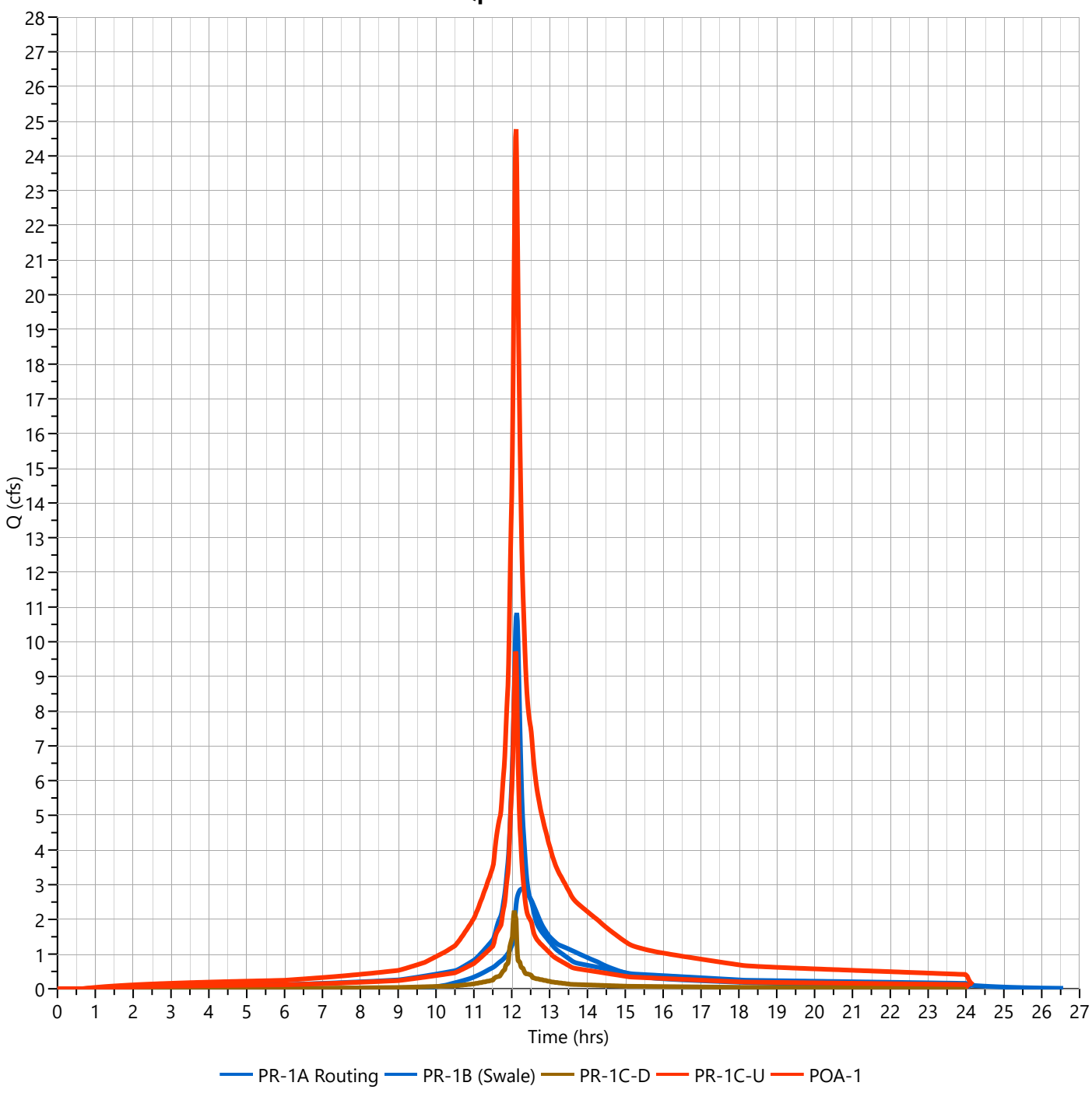
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

POA-1

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 24.77 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 106,676 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

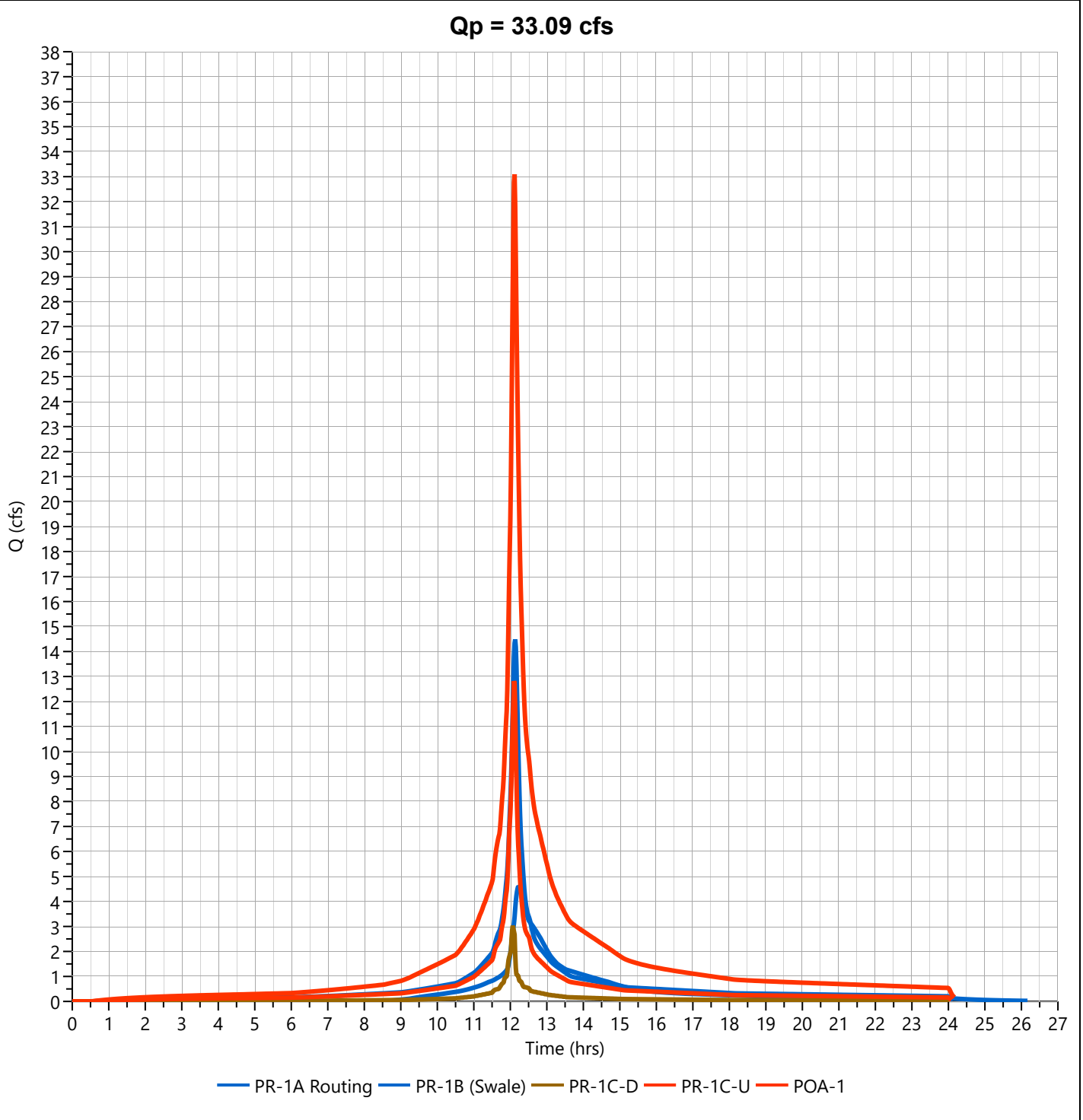
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

POA-1

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 33.09 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 143,827 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

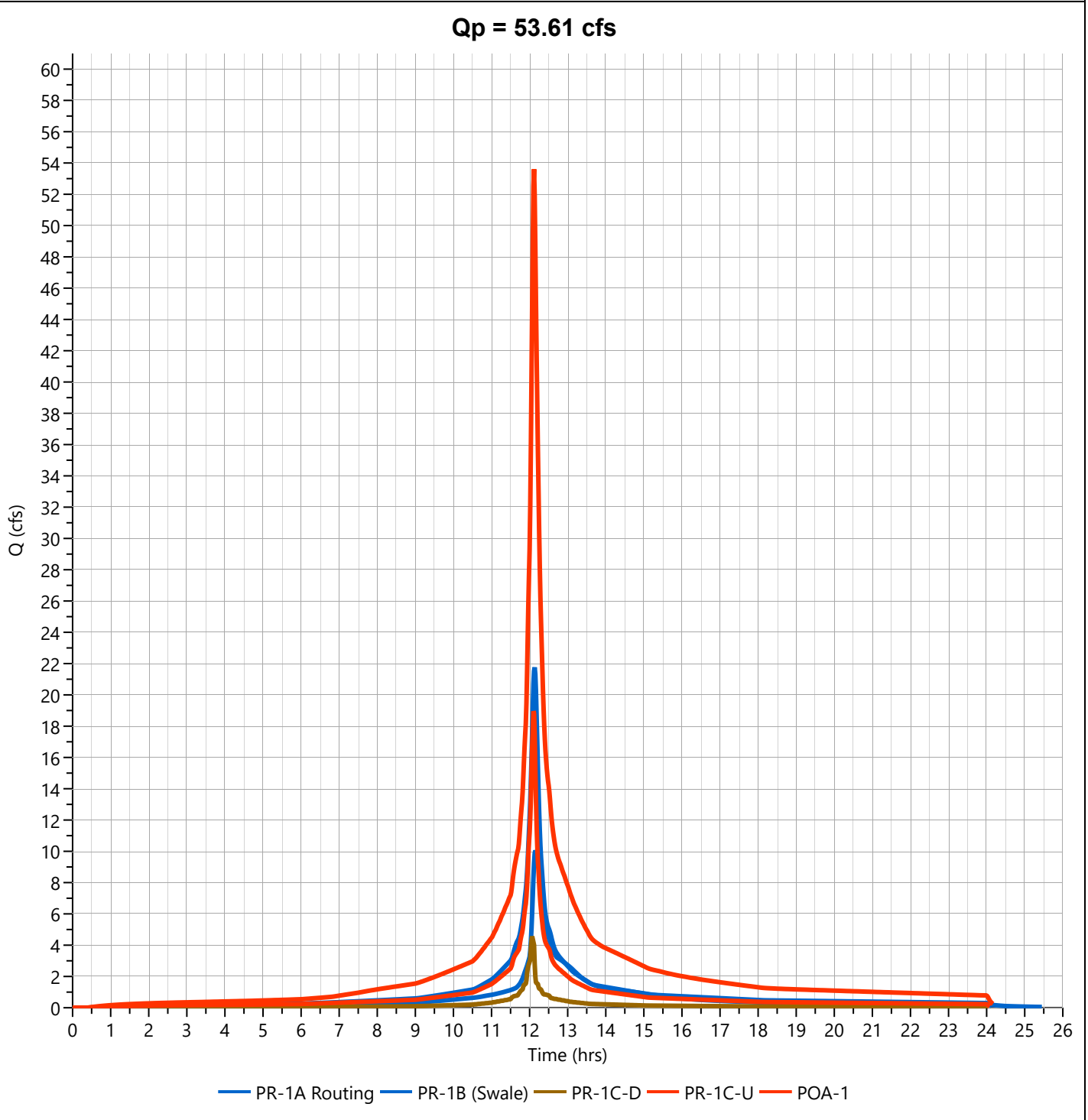
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

POA-1

Hyd. No. 32

Hydrograph Type	= Junction	Peak Flow	= 53.61 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Hydrograph Volume	= 218,689 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



PR-2A-DISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: Present **(Developed)** — **Future Proposed Watershed PR-2A-D - 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	90		
4.	Two-year 24-hr rainfall, P_2		in	4.08		
5.	Land Slope, s		ft/ft	0.019		
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	0.017	+	+

Sheet Flow Sub-Total: **0.017 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	3	
13.	Flow Length, L		ft	167	34	
14.	Cross Sectional flow area, a		ft^2	0.61	0.61	
15.	Wetted Perimeter, P_w		ft	2.00	2.00	
16.	Hydraulic Radius, r	$r = a / P_w$	ft	0.31	0.31	
17.	Channel Slope, s		ft/ft	0.010	0.050	
18.	Manning's Roughness Coeff., n			0.012	0.012	
19.	Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	5.63	12.58	
20.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.008	+ 0.001	+

Channel Flow Sub-Total: **0.009 hours**

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

Total Tc (hours)	=	**0.026 hours**
Software Limitations Require Minimum Tc	=	**2 minutes**

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: Present **(Developed)** — **Future Proposed Watershed PR-2A-D - 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	62		
4.	Two-year 24-hr rainfall, P_2		in	4.08		
5.	Land Slope, s		ft/ft	0.066		
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	0.089	+	+
					Sheet Flow Sub-Total	0.089 hours

Shallow Concentrated Flow

			Segment ID	2		
8.	Surface Description			Grassed Waterways		
9.	Flow Length, L		ft	8		
10.	Watercourse Slope, s		ft/ft	0.120		
11.	Average Velocity, V (NEH table 15-3)		ft/s	5.59		
12.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.000	+	+
					Shallow Conc. Flow Sub-Total	0.000 hours

Channel Flow

			Segment ID	3	4	5
13.	Flow Length, L		ft	49	34	18
14.	Cross Sectional flow area, a		ft^2	0.61	0.61	0.61
15.	Wetted Perimeter, P_w		ft	2.00	2.00	2.00
16.	Hydraulic Radius, r	$r = a / P_w$	ft	0.31	0.31	0.31
17.	Channel Slope, s		ft/ft	0.071	0.005	0.035
18.	Manning's Roughness Coeff., n			0.012	0.012	0.012
19.	Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	15.01	3.98	10.56
20.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.001	+ 0.002	+ 0.000
					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) =	**0.093 hours**
Total Tc (minutes) =	**6 minutes**

Hydrograph Report

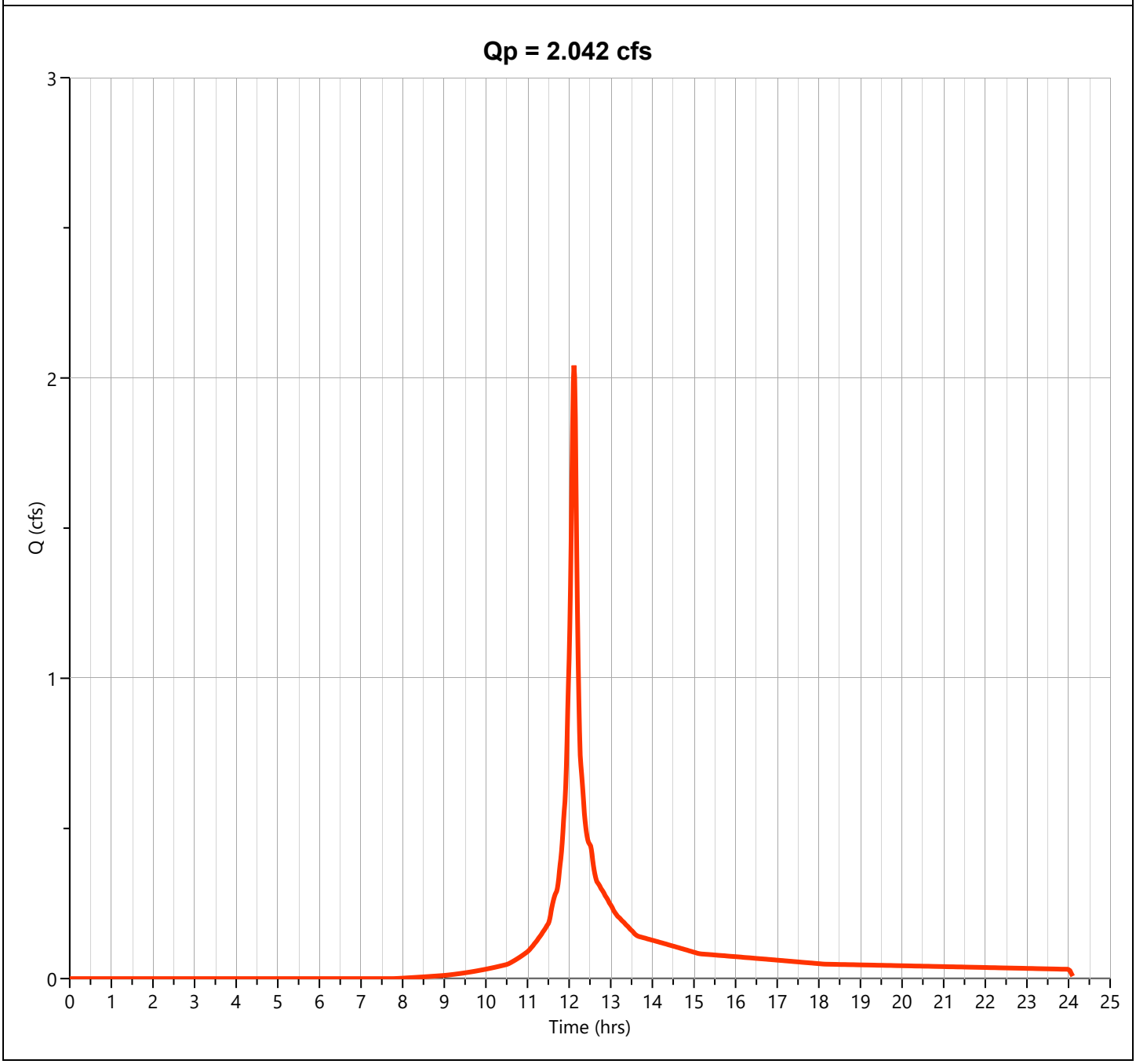
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-D Open Space D

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.042 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 6,313 cuft
Drainage Area	= 0.8 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

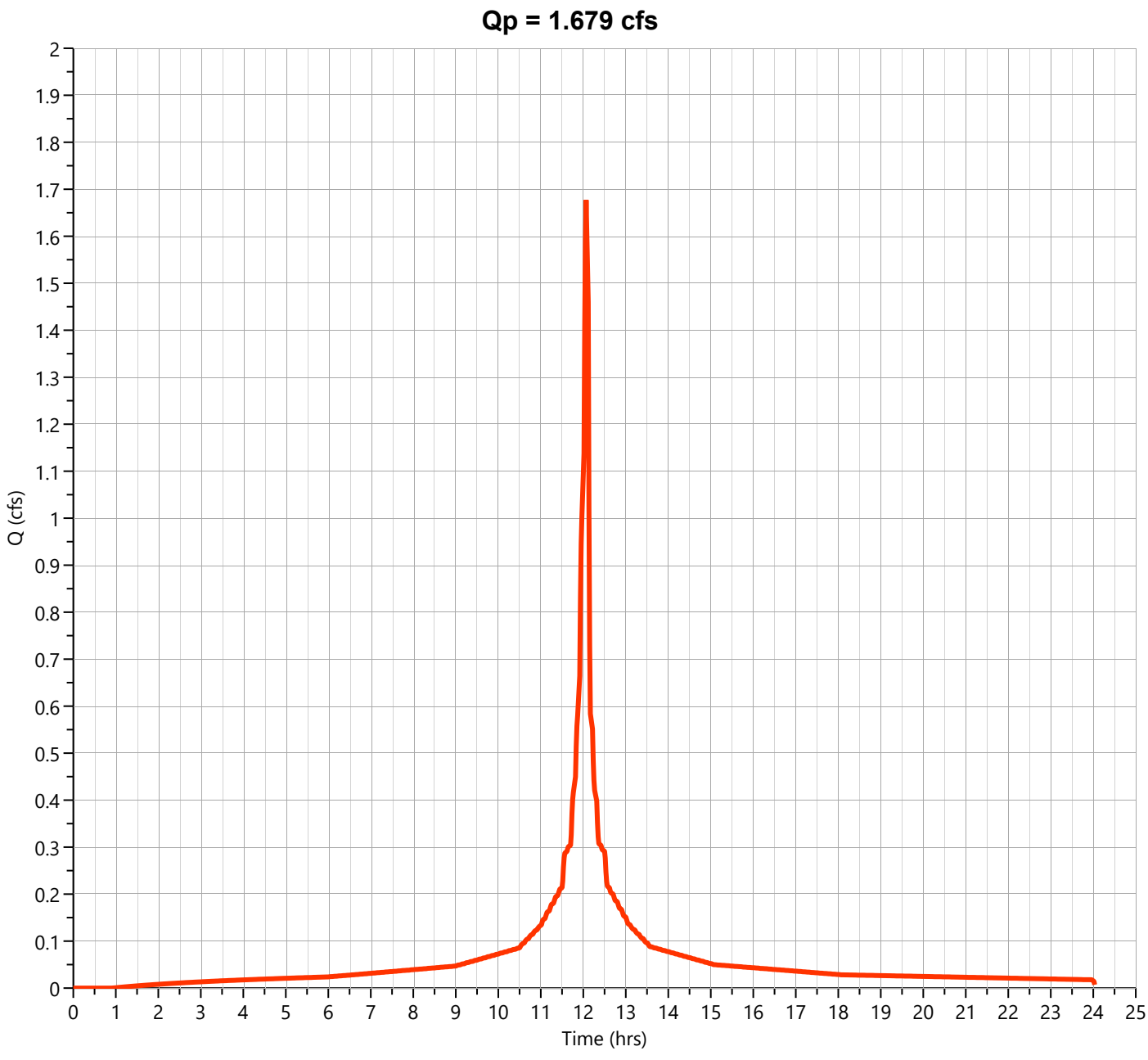
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-D Impervious

Hyd. No. 36

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.679 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 5,496 cuft
Drainage Area	= 0.42 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

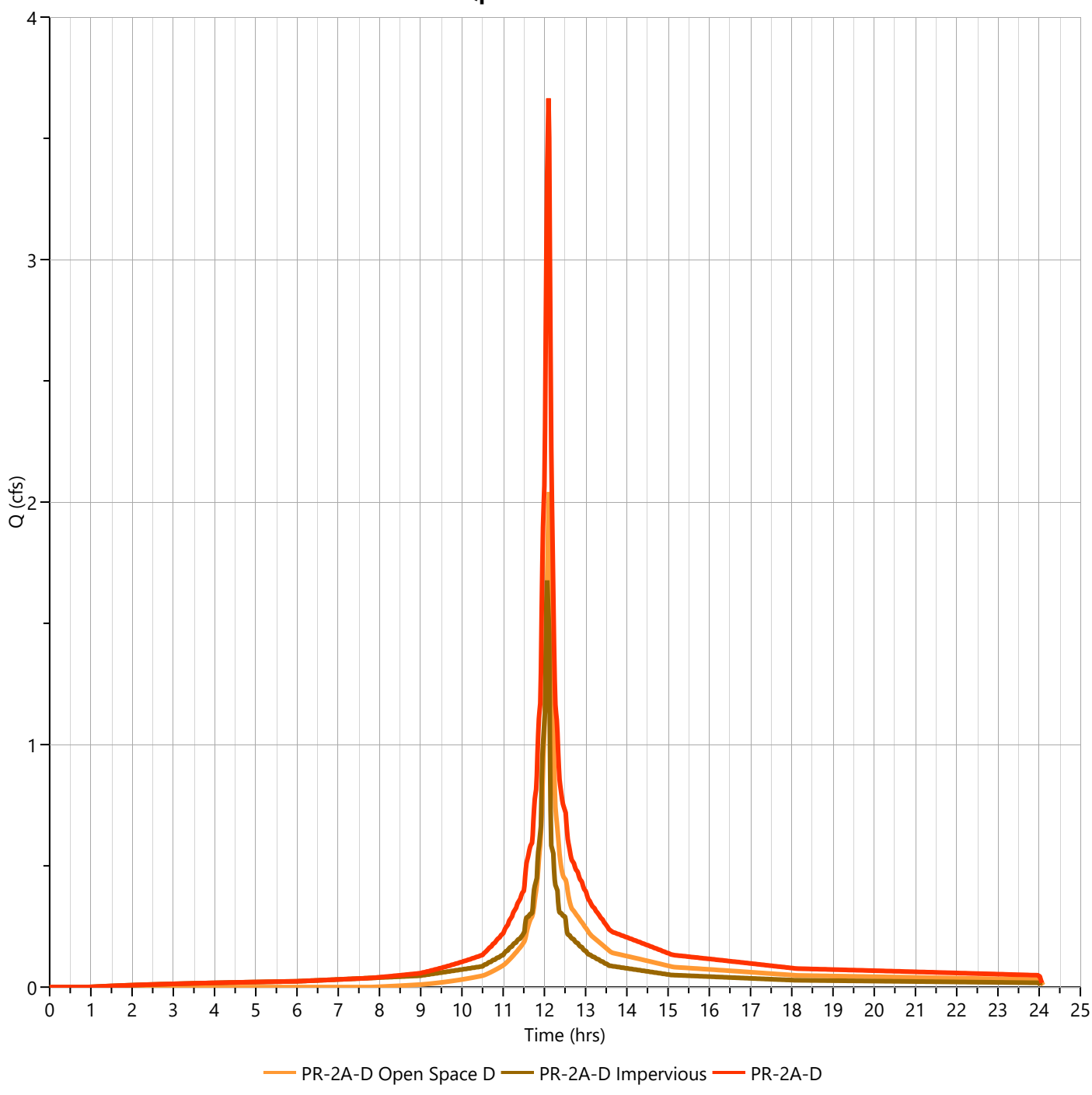
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-D

Hyd. No. 37

Hydrograph Type	= Junction	Peak Flow	= 3.665 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 11,808 cuft
Inflow Hydrographs	= 35, 36	Total Contrib. Area	= 1.22 ac



Hydrograph Report

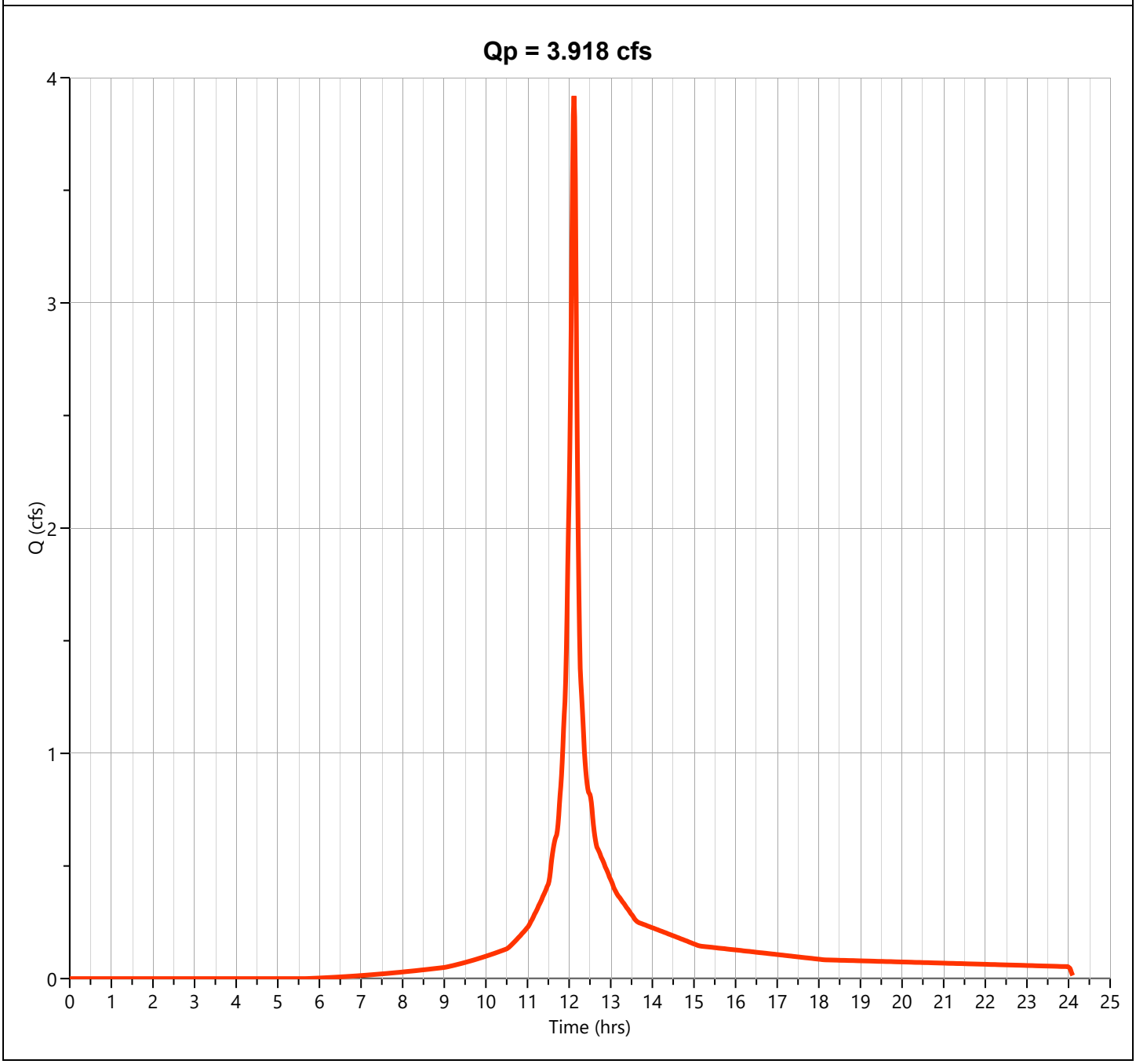
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-D Open Space D

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.918 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 12,329 cuft
Drainage Area	= 0.8 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

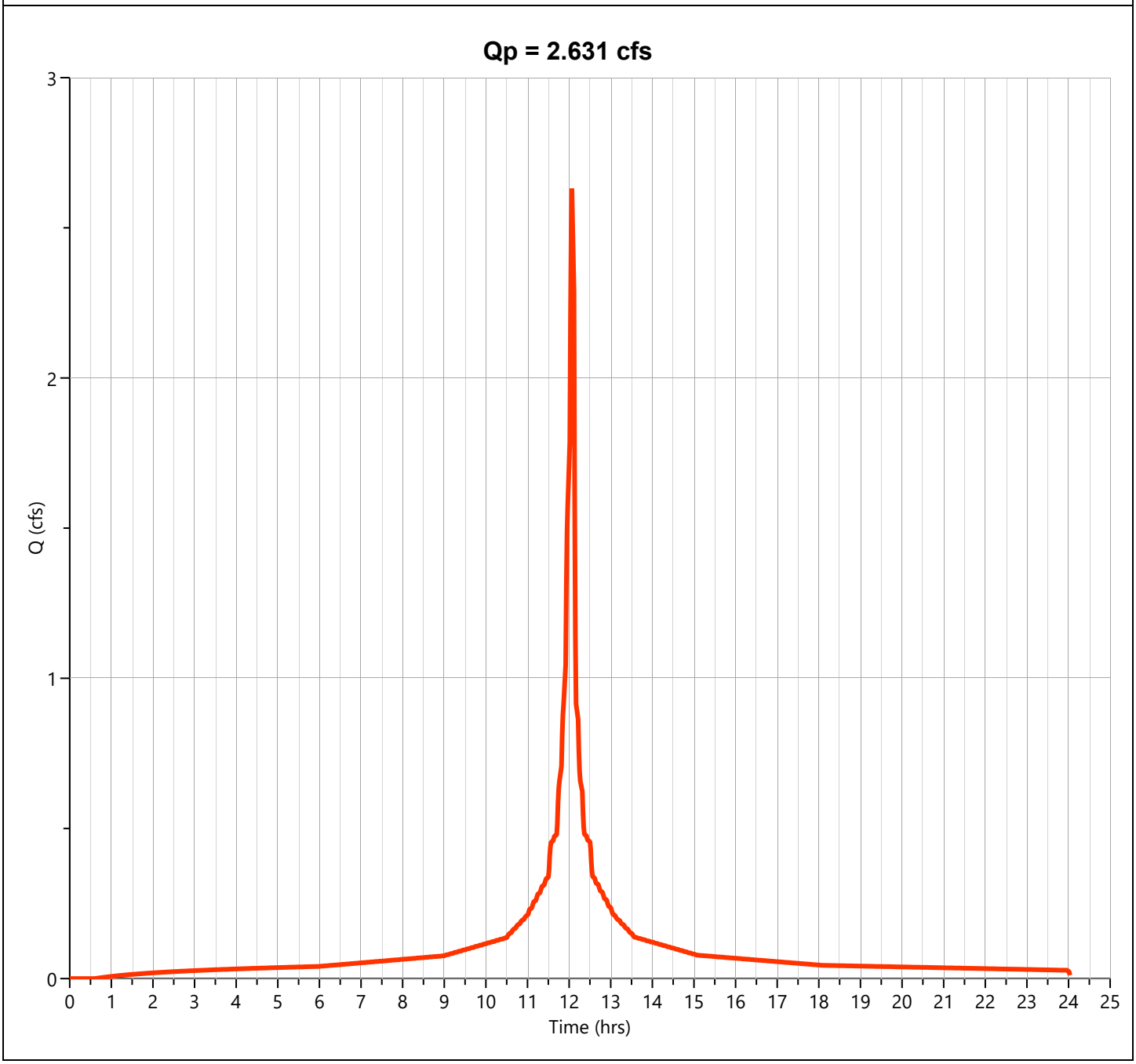
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-D Impervious

Hyd. No. 36

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.631 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 8,764 cuft
Drainage Area	= 0.42 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

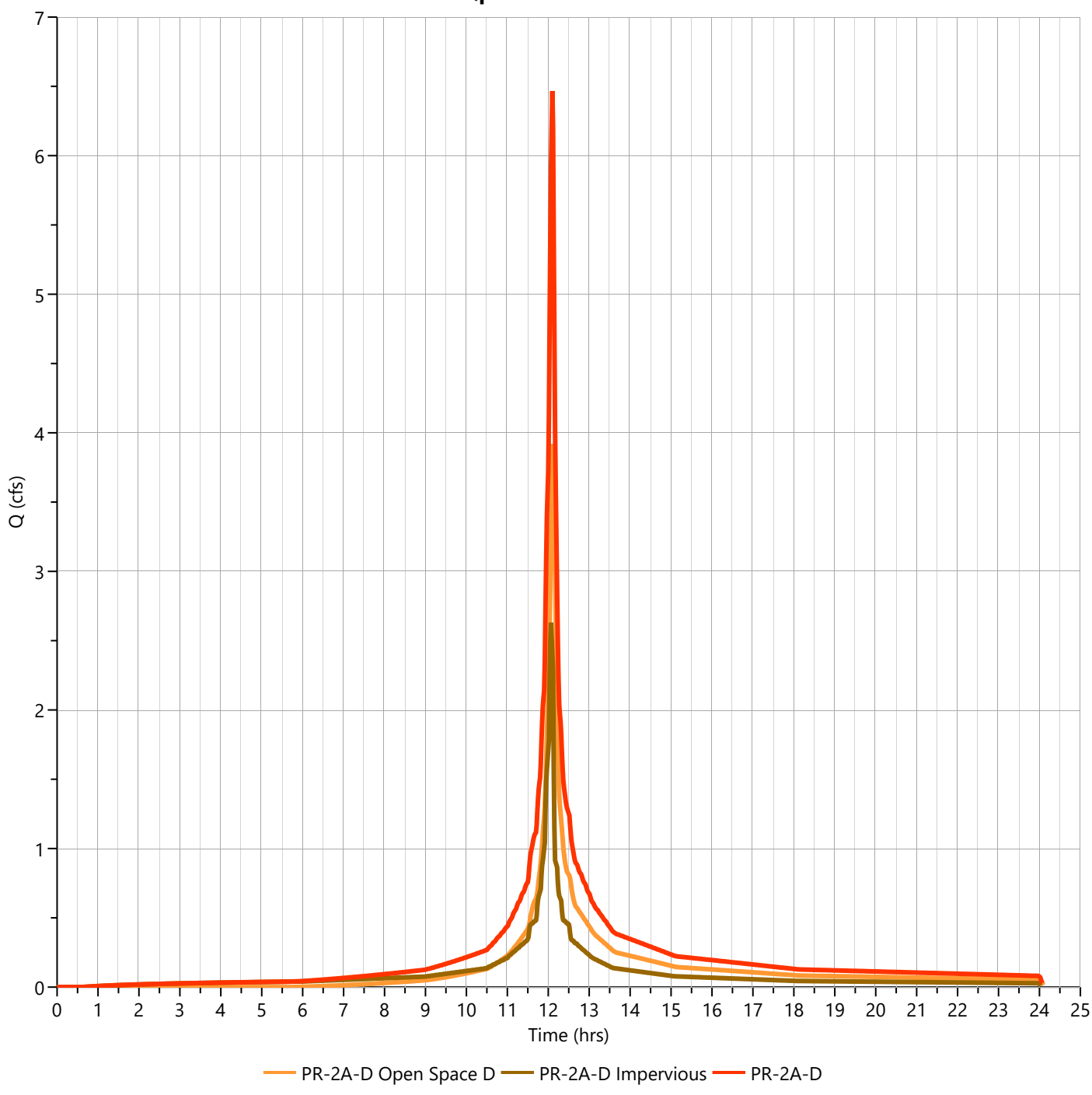
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-D

Hyd. No. 37

Hydrograph Type	= Junction	Peak Flow	= 6.465 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 21,092 cuft
Inflow Hydrographs	= 35, 36	Total Contrib. Area	= 1.22 ac



Hydrograph Report

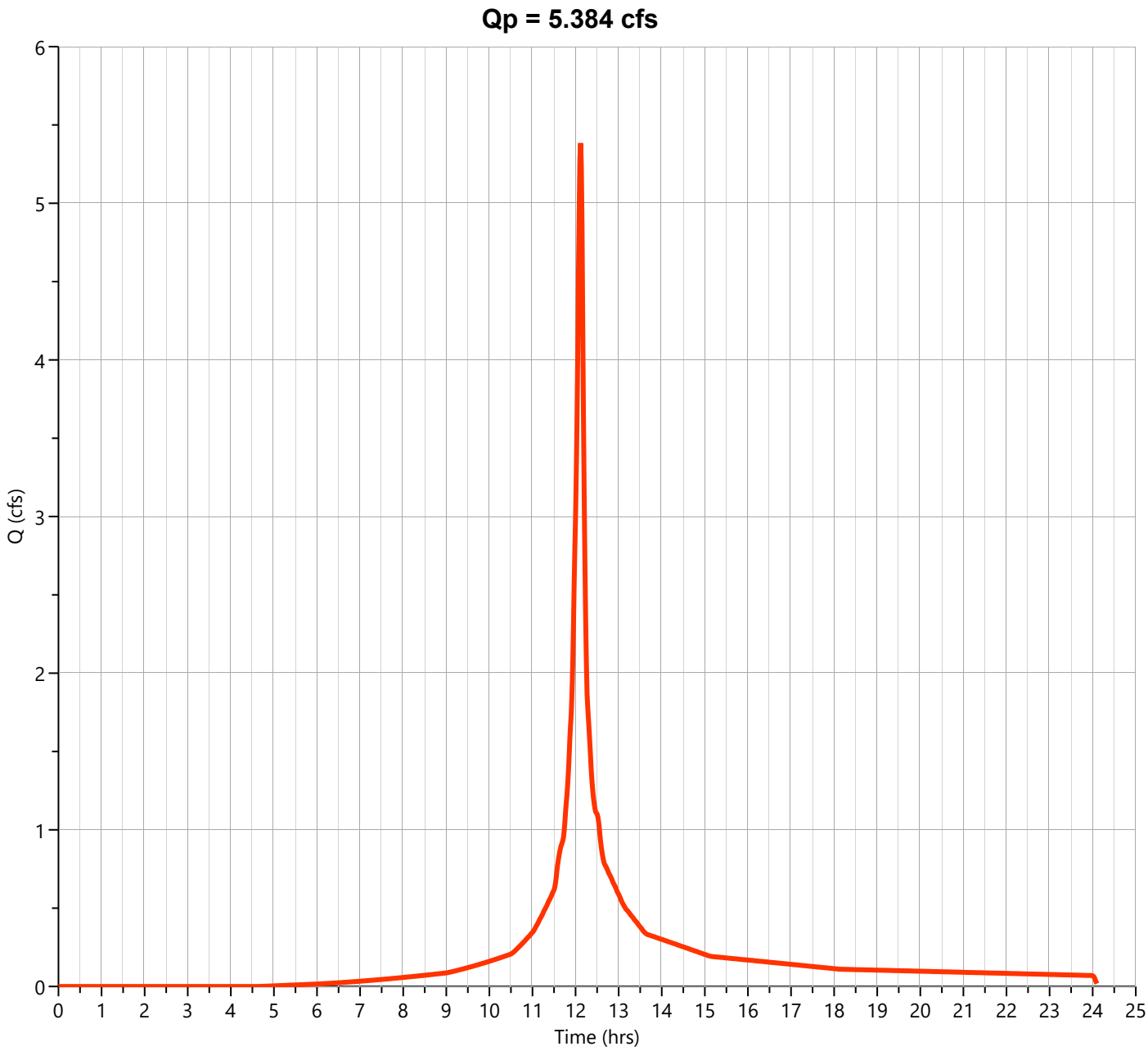
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-D Open Space D

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.384 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 17,211 cuft
Drainage Area	= 0.8 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

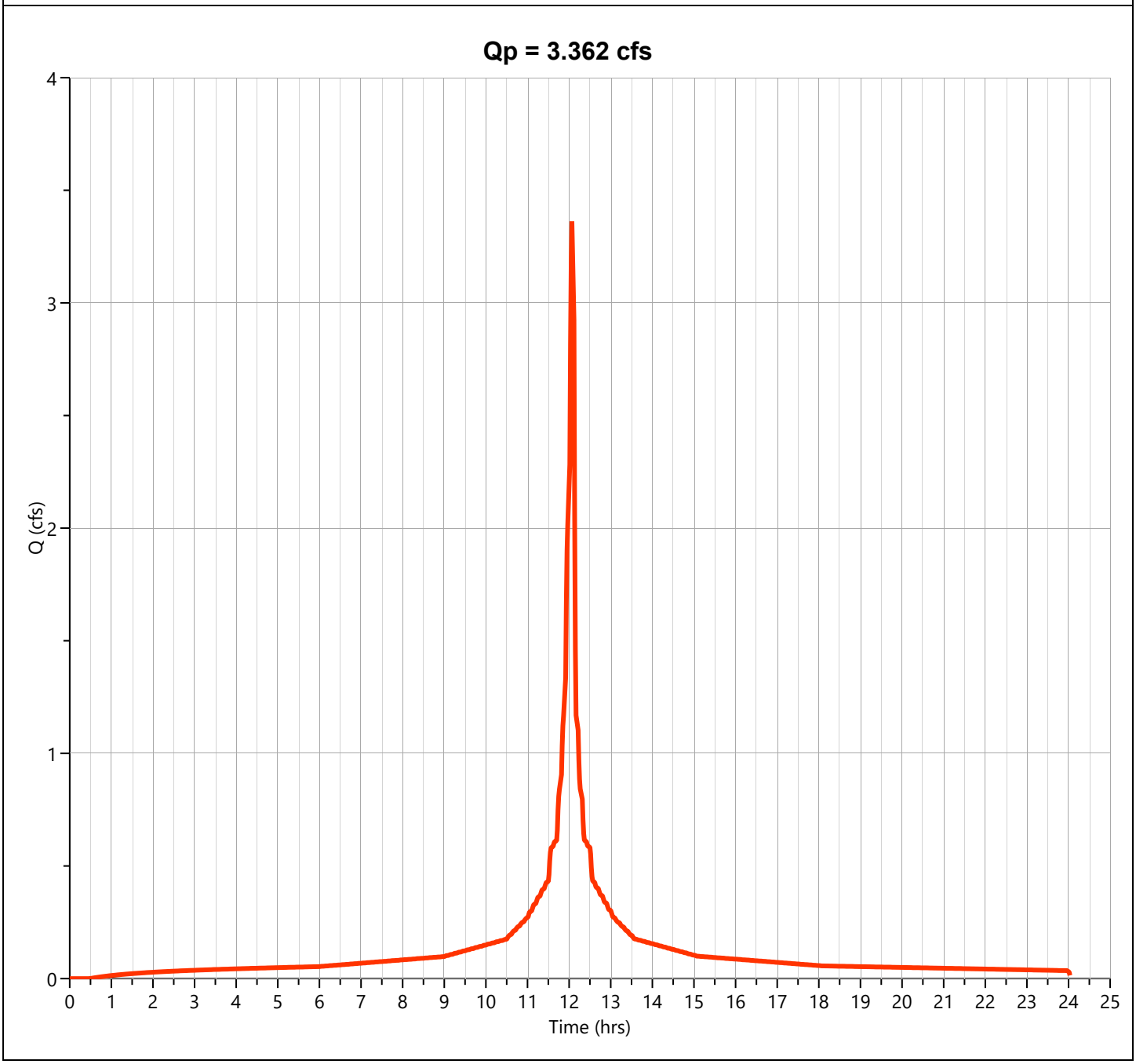
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-D Impervious

Hyd. No. 36

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.362 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 11,277 cuft
Drainage Area	= 0.42 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

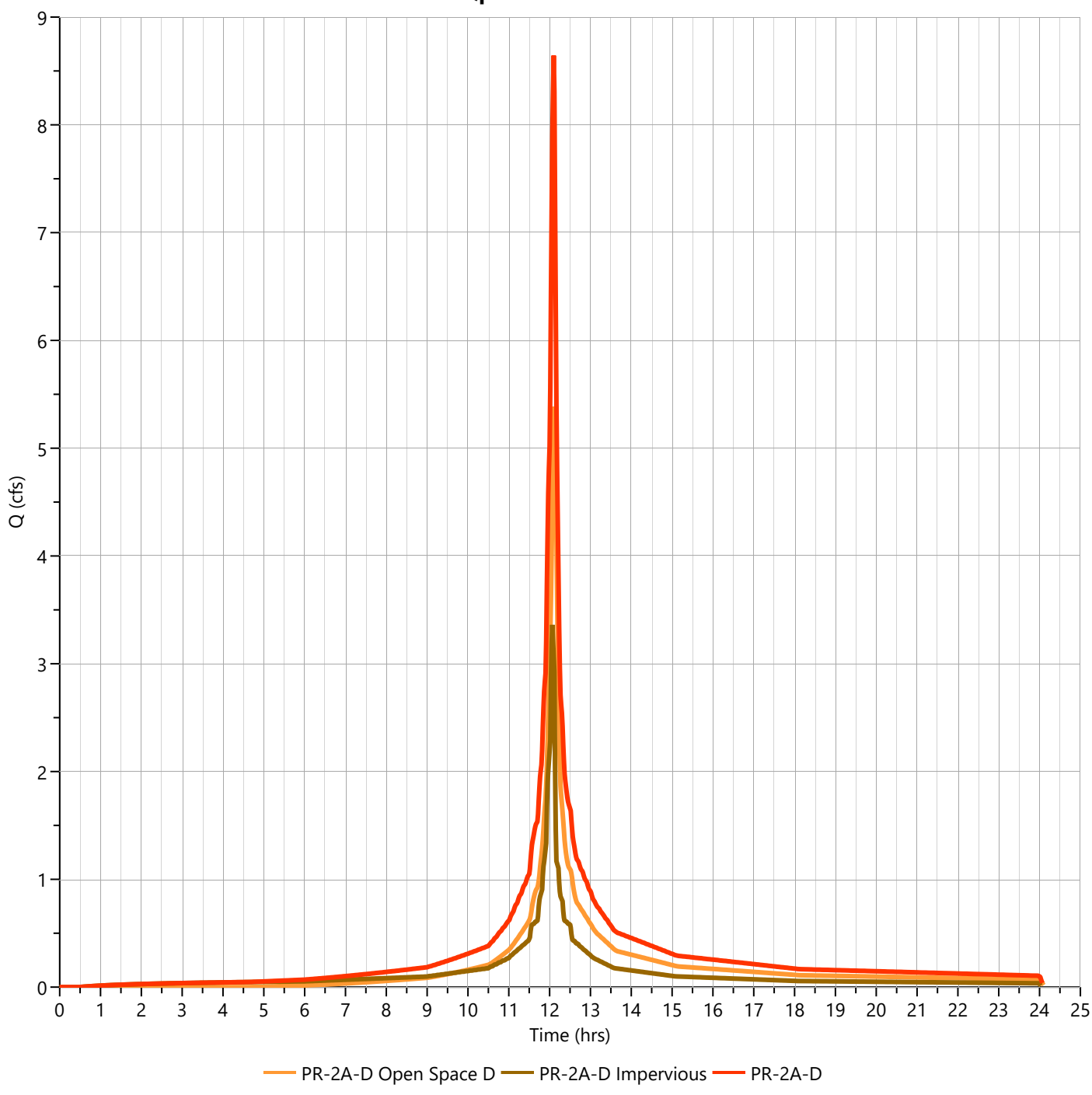
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-D

Hyd. No. 37

Hydrograph Type	= Junction	Peak Flow	= 8.643 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 28,488 cuft
Inflow Hydrographs	= 35, 36	Total Contrib. Area	= 1.22 ac



Hydrograph Report

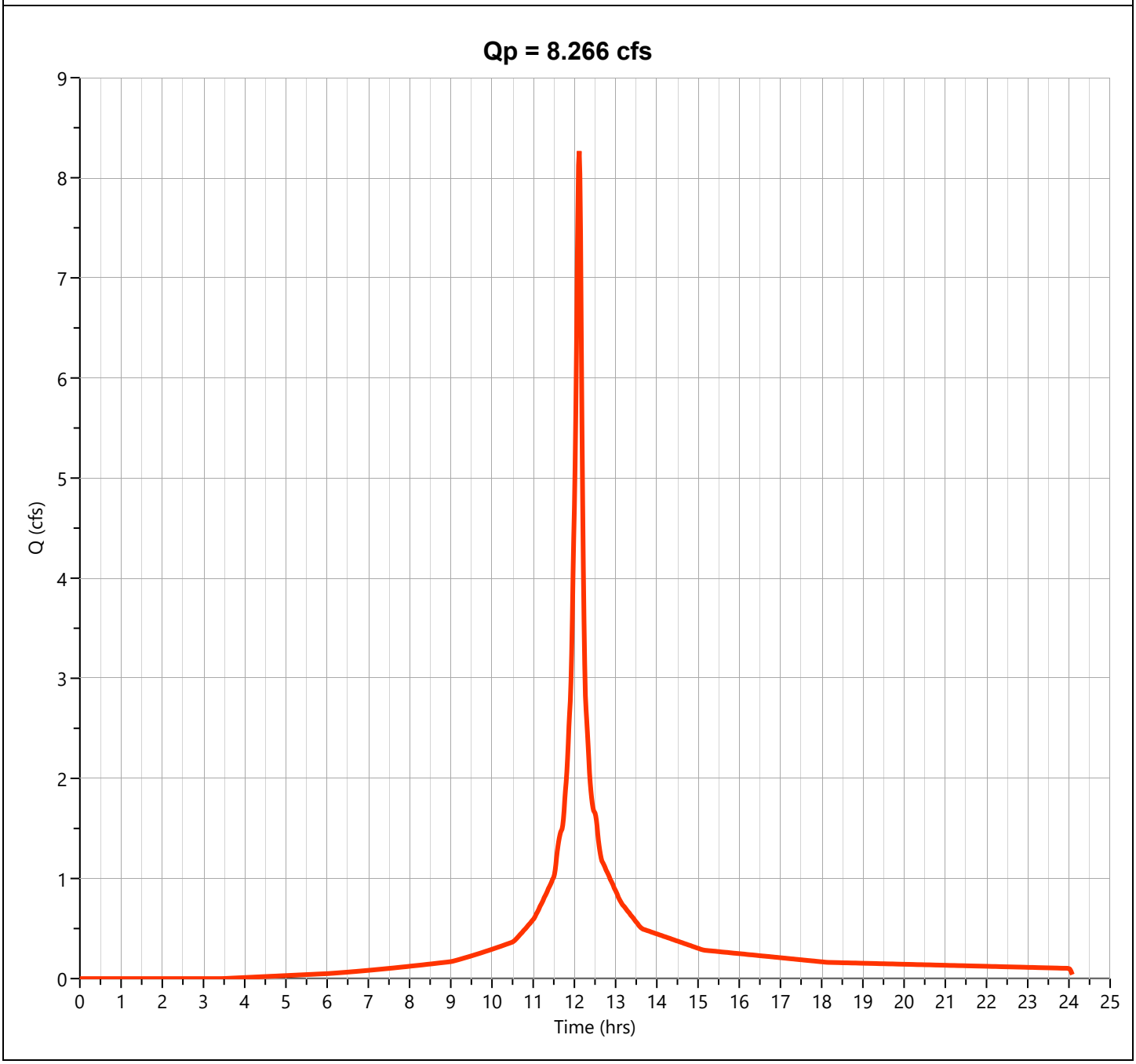
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-D Open Space D

Hyd. No. 35

Hydrograph Type	= NRCS Runoff	Peak Flow	= 8.266 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.12 hrs
Time Interval	= 1 min	Runoff Volume	= 27,131 cuft
Drainage Area	= 0.8 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 6.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

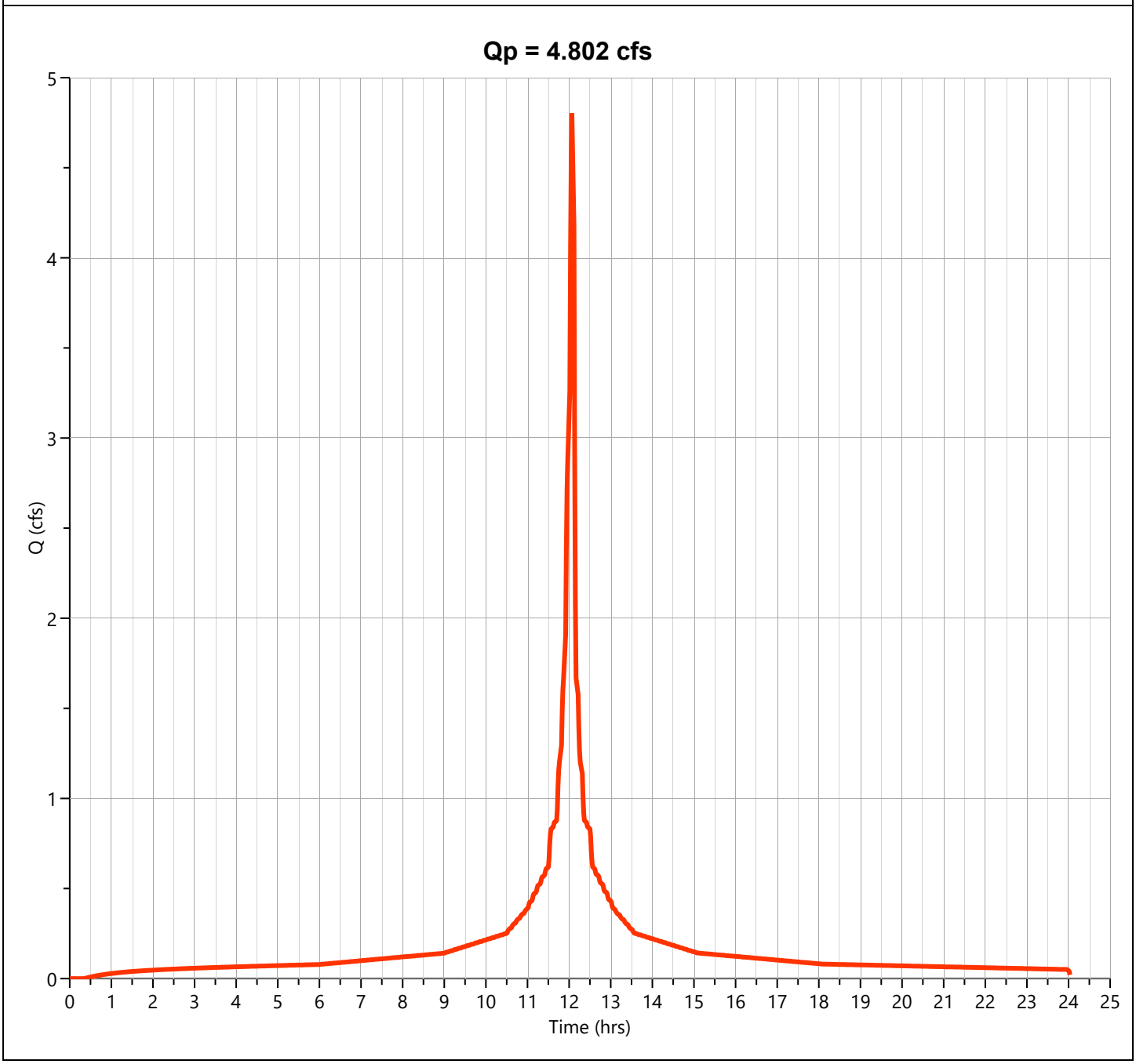
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-D Impervious

Hyd. No. 36

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.802 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 16,235 cuft
Drainage Area	= 0.42 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

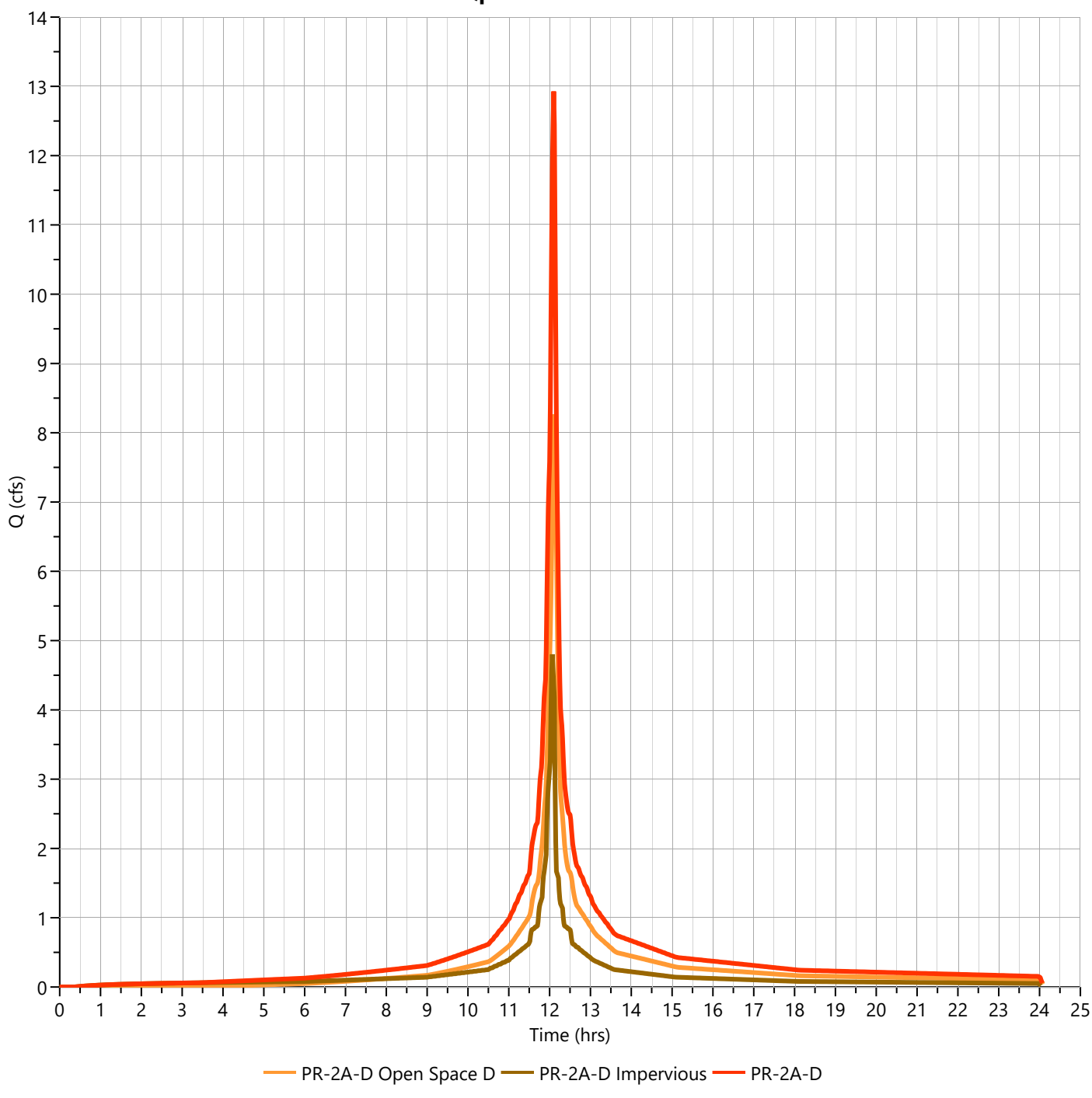
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-D

Hyd. No. 37

Hydrograph Type	= Junction	Peak Flow	= 12.93 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 43,366 cuft
Inflow Hydrographs	= 35, 36	Total Contrib. Area	= 1.22 ac



PR-2A-UNDISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: (**Present**) Developed — **Future Proposed Watershed PR-2A-U 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)

$$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$$

		Segment ID	1					
			Smooth Surfaces					
1.	Surface Description (NEH table 15-1)							
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	4.08					
5.	Land Slope, s	ft/ft	0.040					
6.	Compute T_t	hr	0.013	+		+		

Sheet Flow Sub-Total **0.013 hours**

Shallow Concentrated Flow

$$T_t = \frac{L}{3600\,V}$$

		Segment ID	2		3			
			Pavement		Pavement			
7.	Surface Description							
8.	Flow Length, L	ft	166		276			
9.	Watercourse Slope, s	ft/ft	0.050		0.080			
10.	Average Velocity, V (NEH table 15-3)	ft/s	4.56		5.74			
11.	Compute T_t	hr	0.010	+	0.013	+		

Shallow Conc. Flow Sub-Total **0.023 hours**

Channel Flow

$r = a / P_w$

$V = (1.49\, r^{2/3} s^{1/2}) / n$

$$T_t = \frac{L}{3600\,V}$$

		Segment ID	4		5		6	
12.	Flow Length, L	ft	49		34		18	
13.	Cross Sectional flow area, a	ft^2	0.61		0.61		0.61	
14.	Wetted Perimeter, P_w	ft	2.00		2.00		2.00	
15.	Hydraulic Radius, r	ft	0.31		0.31		0.31	
16.	Channel Slope, s	ft/ft	0.071		0.005		0.035	
17.	Manning's Roughness Coeff., n		0.012		0.012		0.012	
18.	Velocity, V	ft/s	15.01		3.98		10.53	
19.	Compute T_t	hr	0.001	+	0.002	+	0.000	

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) =	**0.041 hours**
Total Tc (minutes) =	**2 minutes**

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: (**Present**) Developed — **Future Proposed Watershed PR-2A-U 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	4.08		
5.	Land Slope, s		ft/ft	0.053		
6.	Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.215	+	+

Sheet Flow Sub-Total: **0.215 hours**

Shallow Concentrated Flow

			Segment ID	2	3	4
7.	Surface Description			Grassed Waterways	Woodlands	Grassed Waterways
8.	Flow Length, L		ft	32	162	24
9.	Watercourse Slope, s		ft/ft	0.051	0.051	0.292
10.	Average Velocity, V (NEH table 15-3)		ft/s	3.65	1.13	8.71
11.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.002	+ 0.040	+ 0.001

Shallow Conc. Flow Sub-Total: **0.043 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) =	**0.258 hours**
Total Tc (minutes) =	**15 minutes**

Hydrograph Report

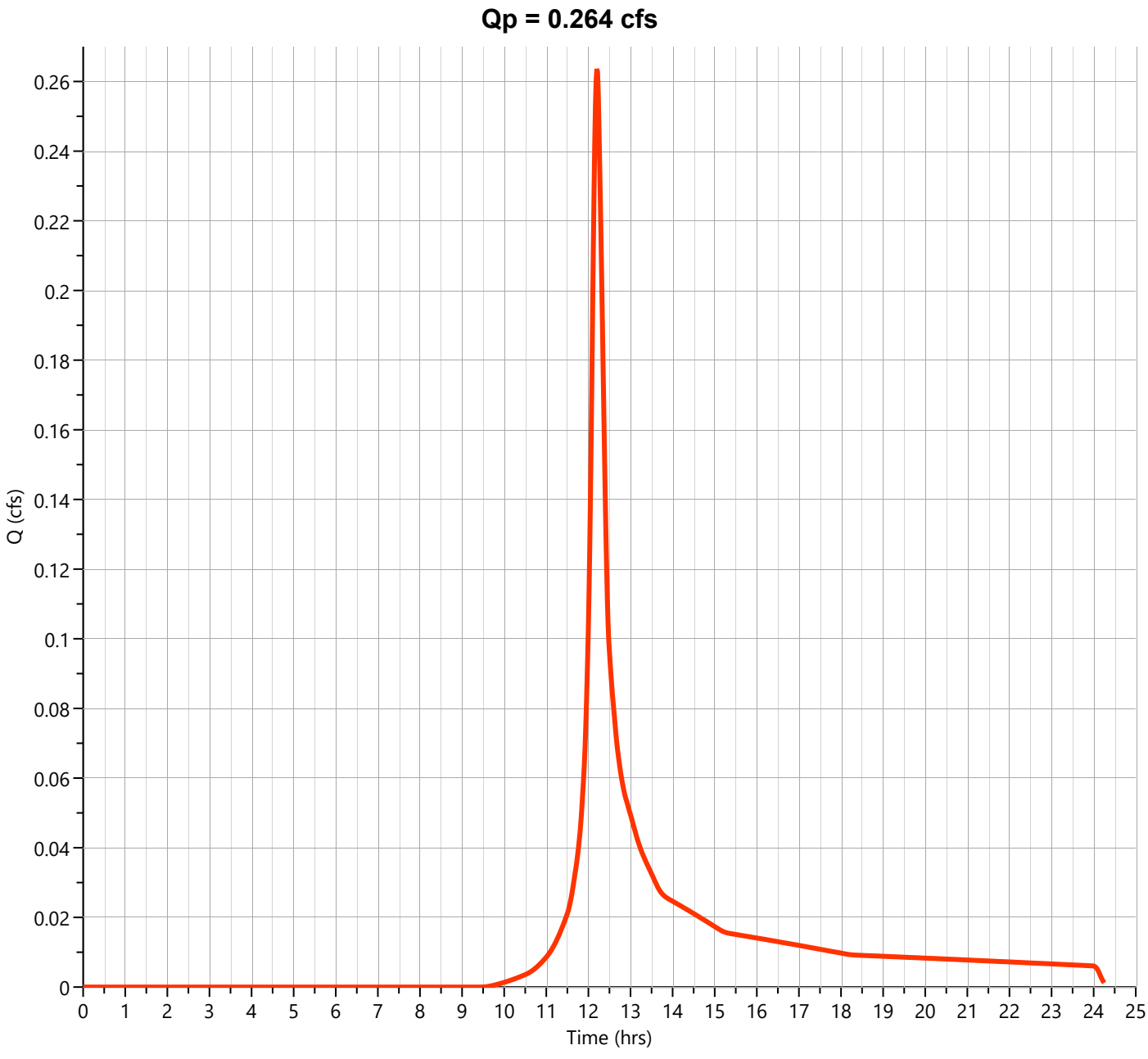
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-U Open Space C

Hyd. No. 39

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.264 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 1,082 cuft
Drainage Area	= 0.18 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

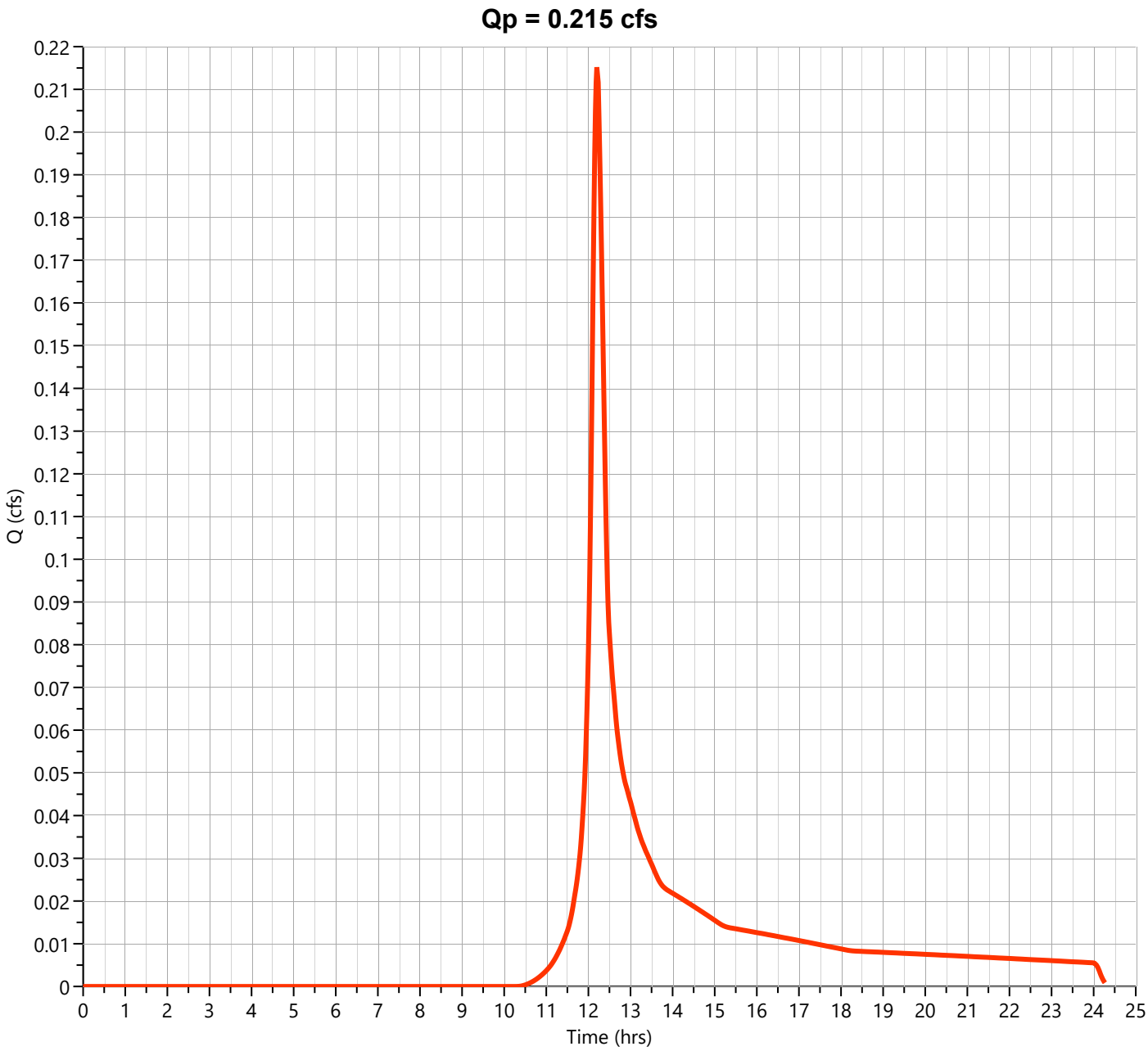
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-U Woods C

Hyd. No. 40

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.215 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.22 hrs
Time Interval	= 1 min	Runoff Volume	= 904 cuft
Drainage Area	= 0.18 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

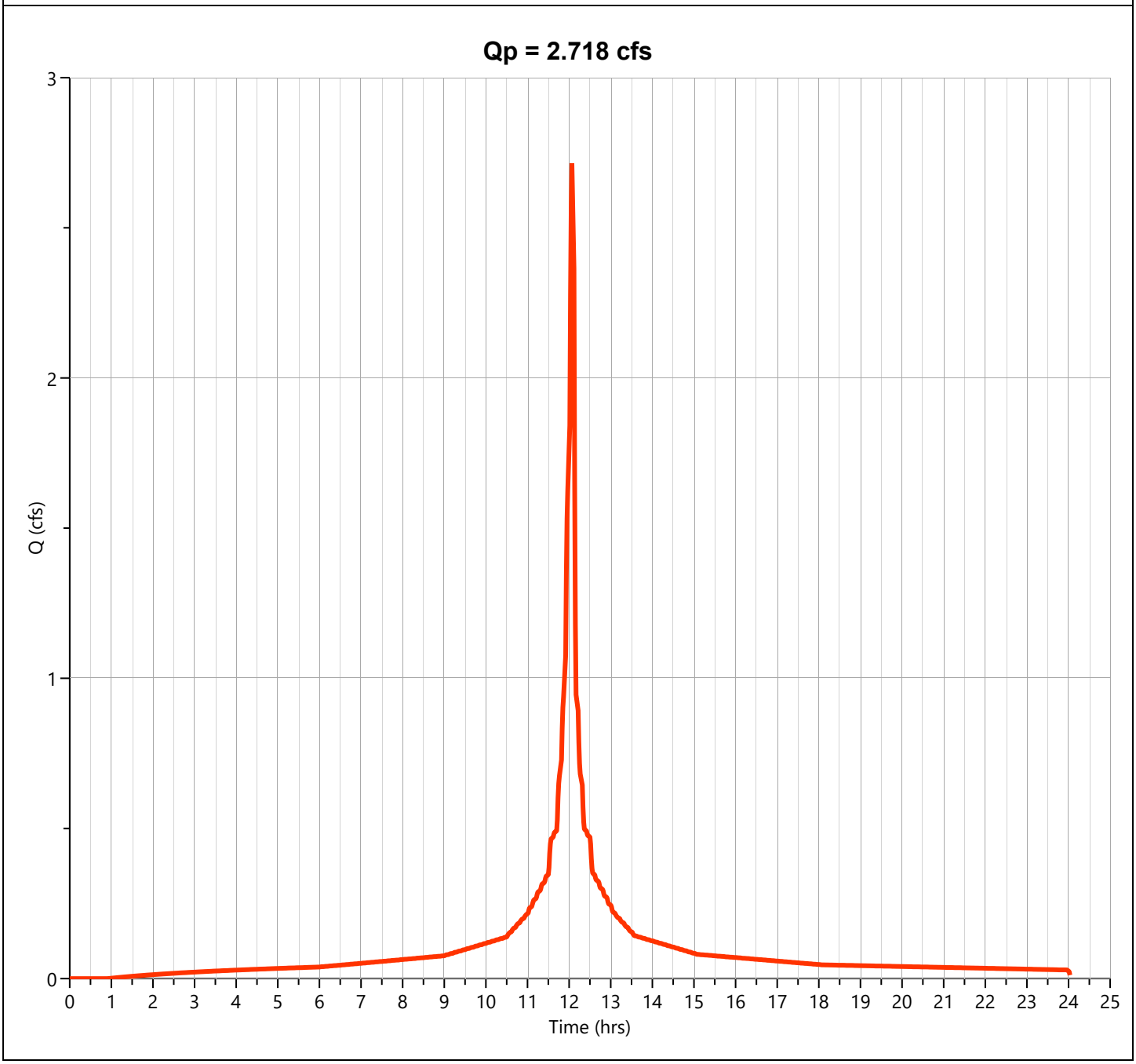
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-U Impervious

Hyd. No. 41

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.718 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 8,898 cuft
Drainage Area	= 0.68 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

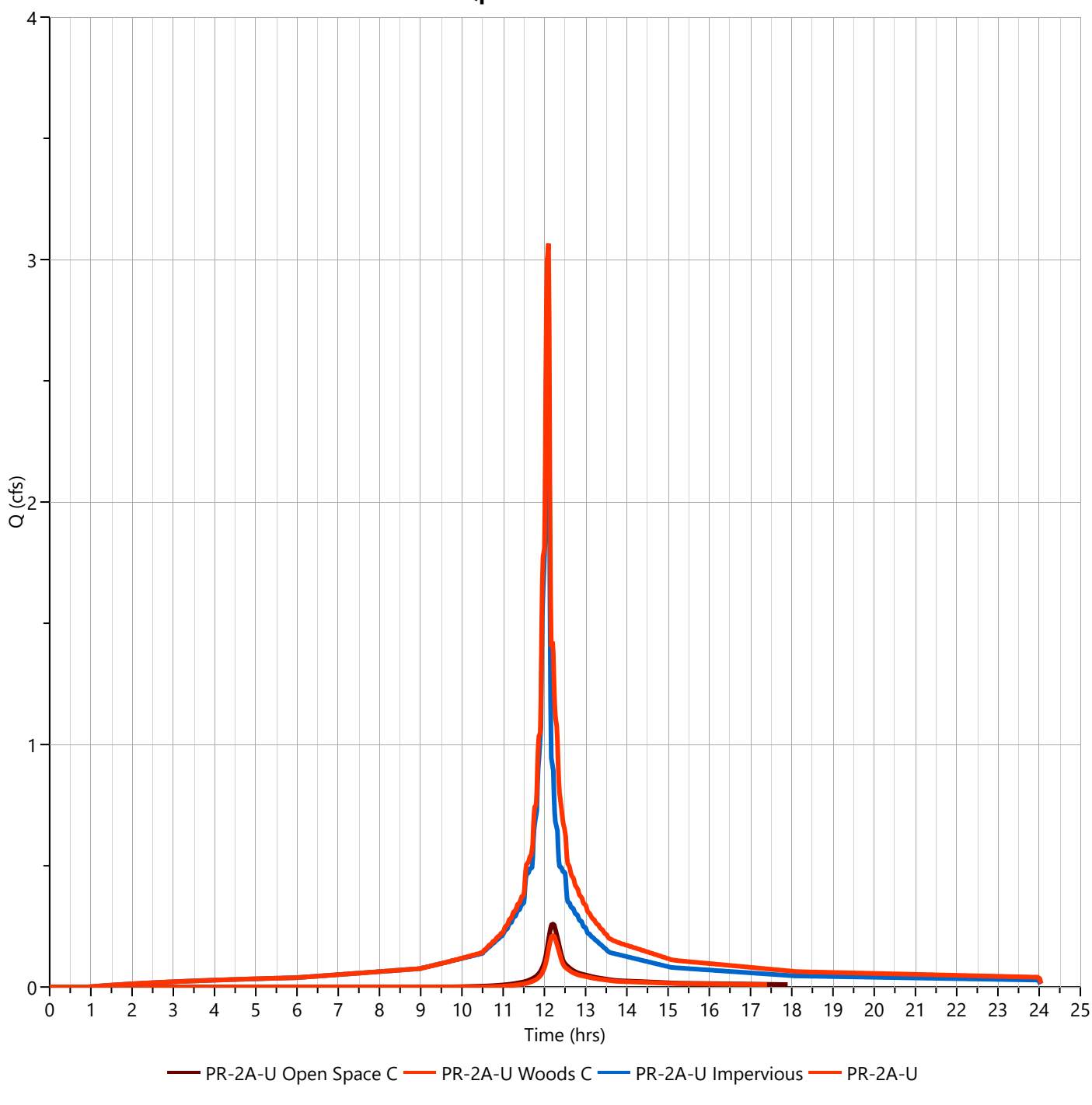
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-U

Hyd. No. 42

Hydrograph Type	= Junction	Peak Flow	= 3.066 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 10,883 cuft
Inflow Hydrographs	= 39, 40, 41	Total Contrib. Area	= 1.04 ac



Hydrograph Report

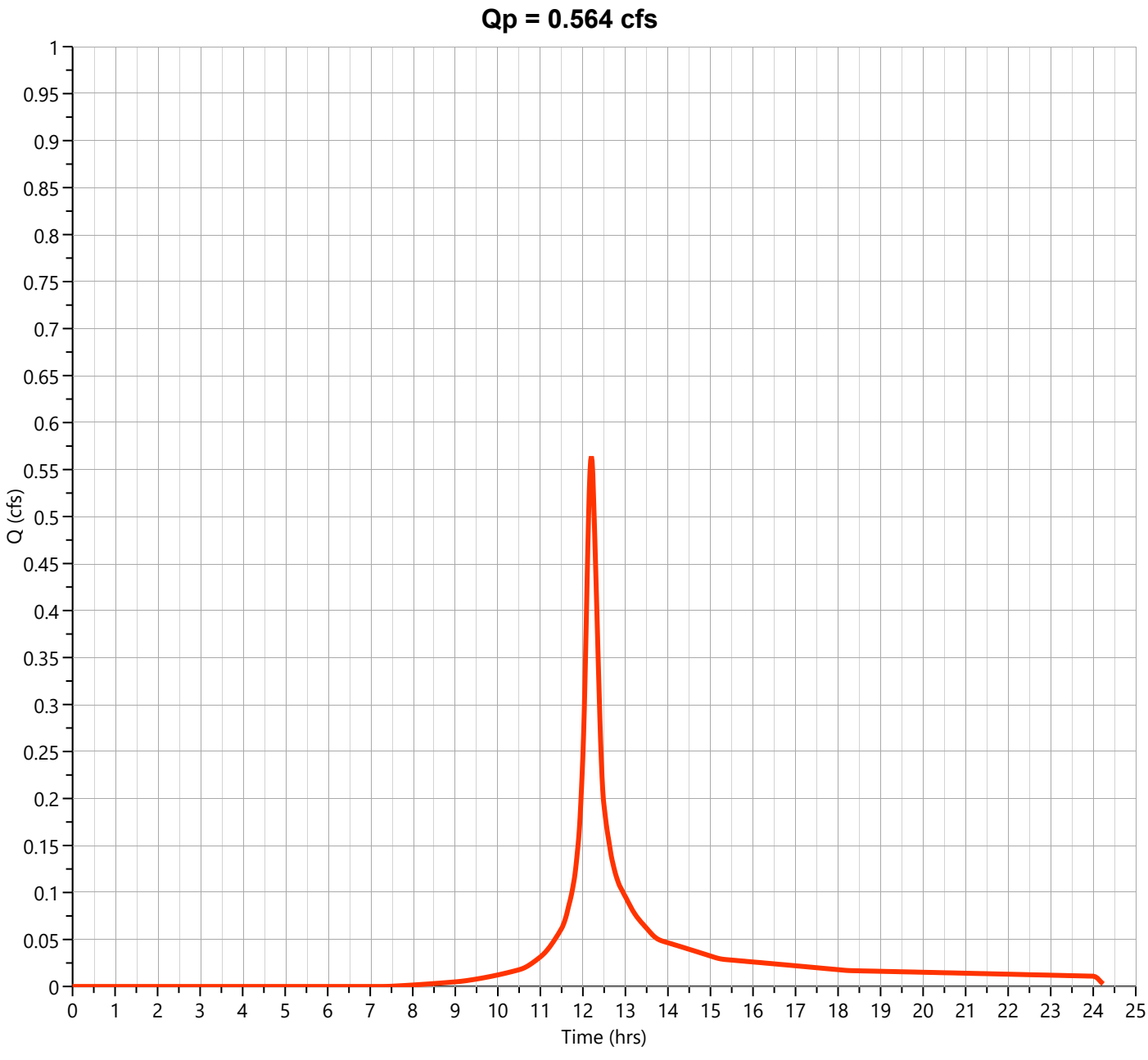
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-U Open Space C

Hyd. No. 39

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.564 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 2,286 cuft
Drainage Area	= 0.18 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

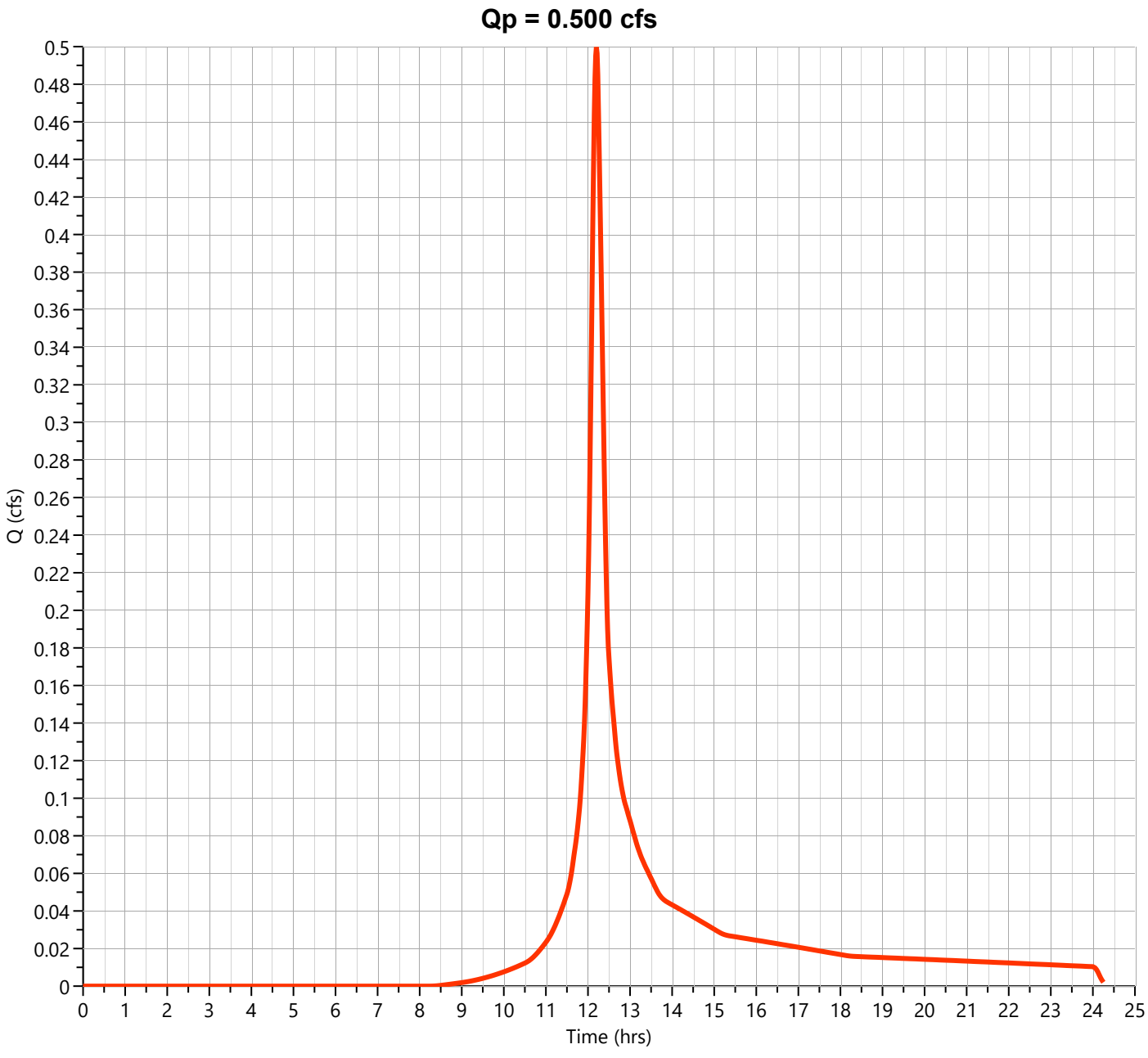
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-U Woods C

Hyd. No. 40

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.500 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 2,027 cuft
Drainage Area	= 0.18 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

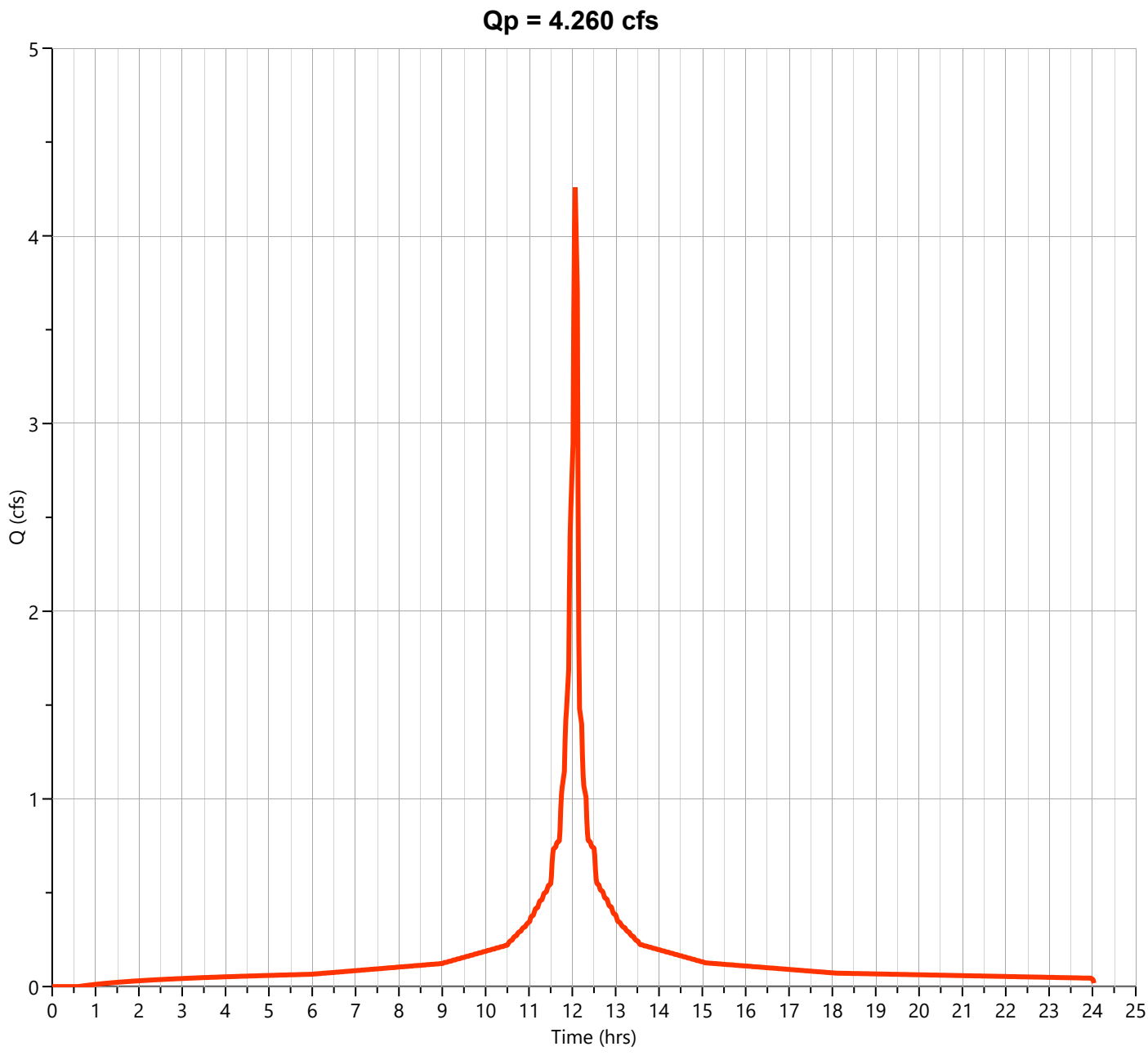
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-U Impervious

Hyd. No. 41

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.260 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 14,189 cuft
Drainage Area	= 0.68 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

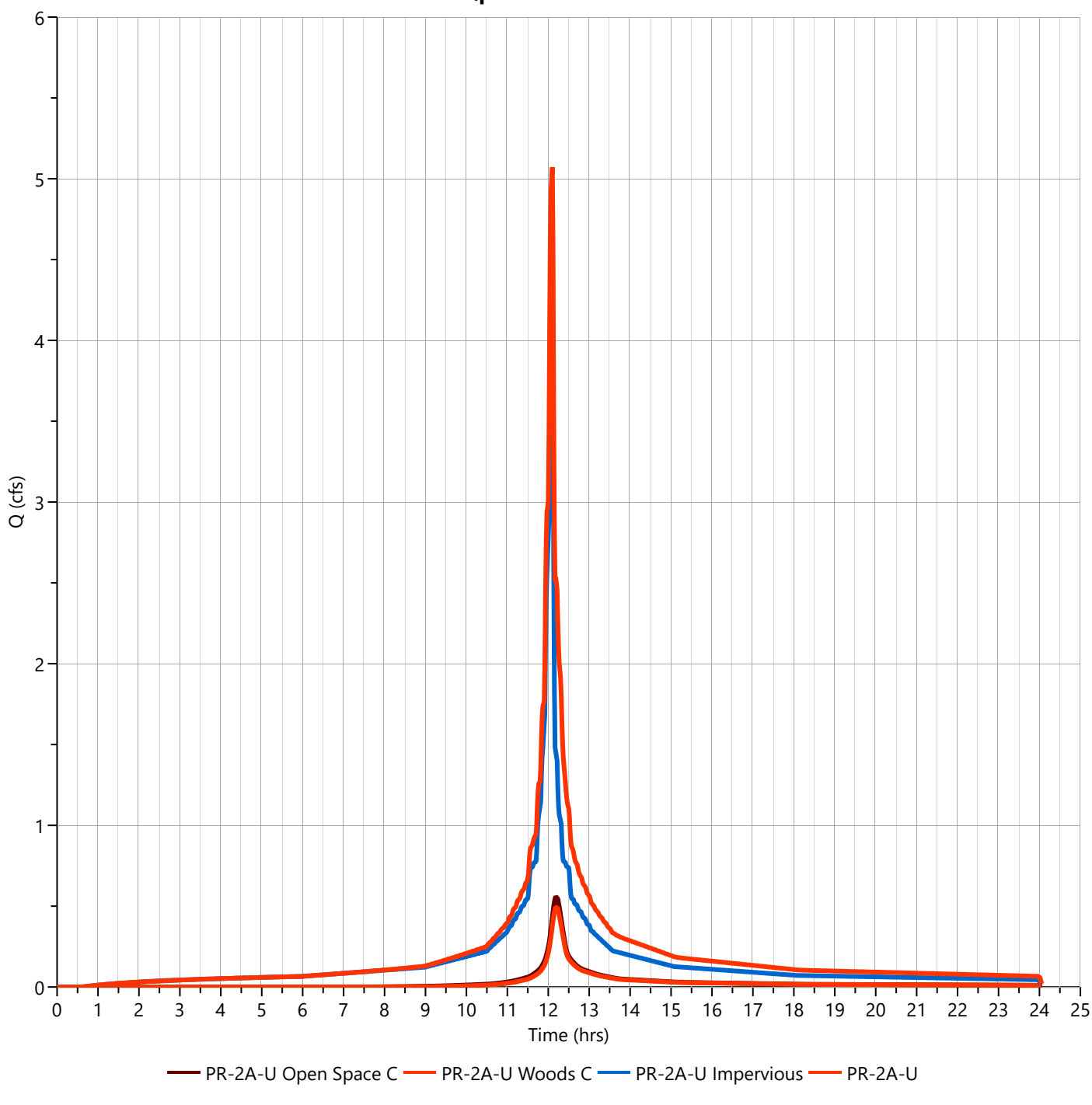
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-U

Hyd. No. 42

Hydrograph Type	= Junction	Peak Flow	= 5.071 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 18,502 cuft
Inflow Hydrographs	= 39, 40, 41	Total Contrib. Area	= 1.04 ac



Hydrograph Report

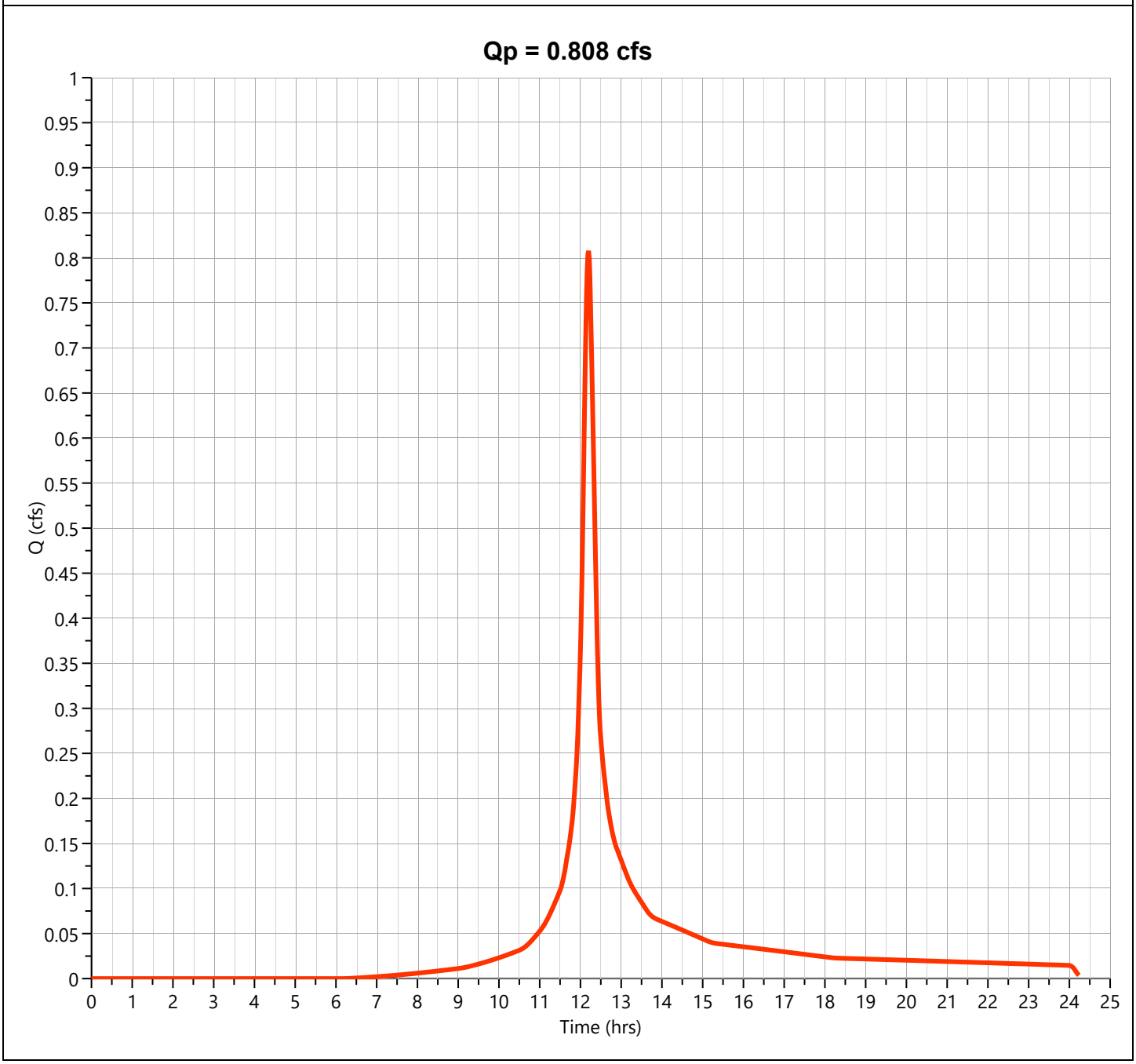
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-U Open Space C

Hyd. No. 39

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.808 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 3,295 cuft
Drainage Area	= 0.18 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

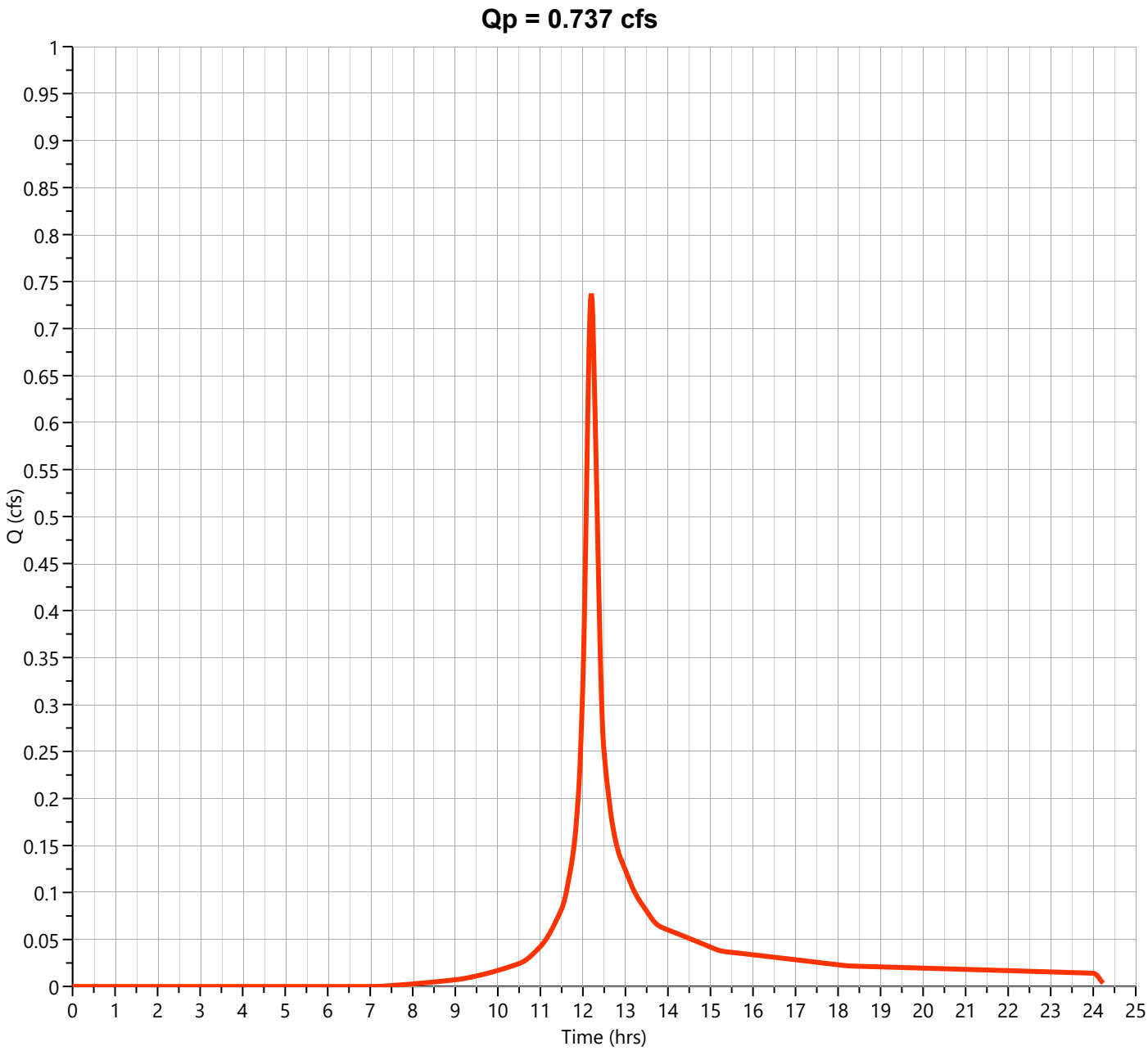
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-U Woods C

Hyd. No. 40

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.737 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 2,990 cuft
Drainage Area	= 0.18 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

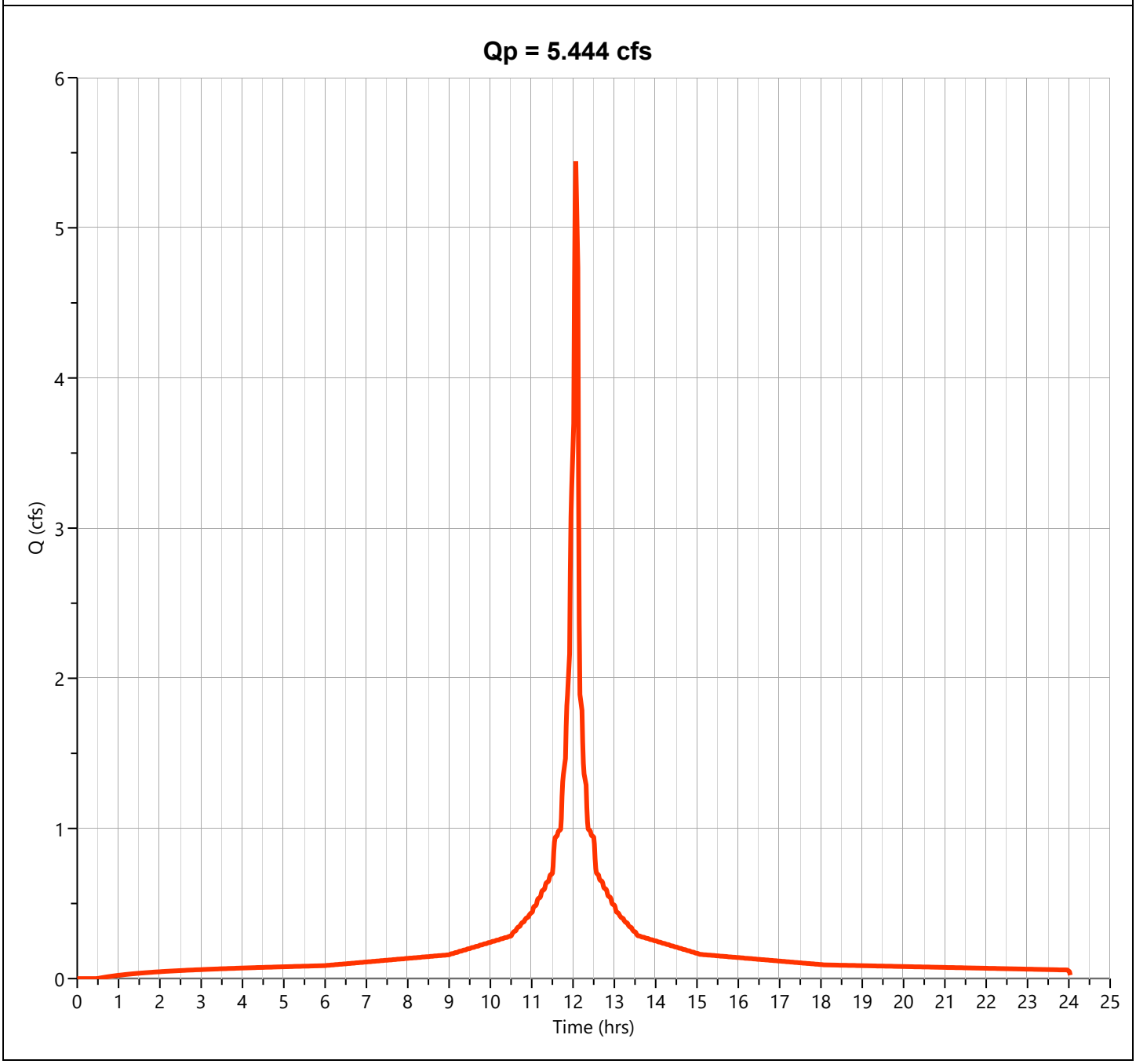
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-U Impervious

Hyd. No. 41

Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.444 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 18,259 cuft
Drainage Area	= 0.68 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

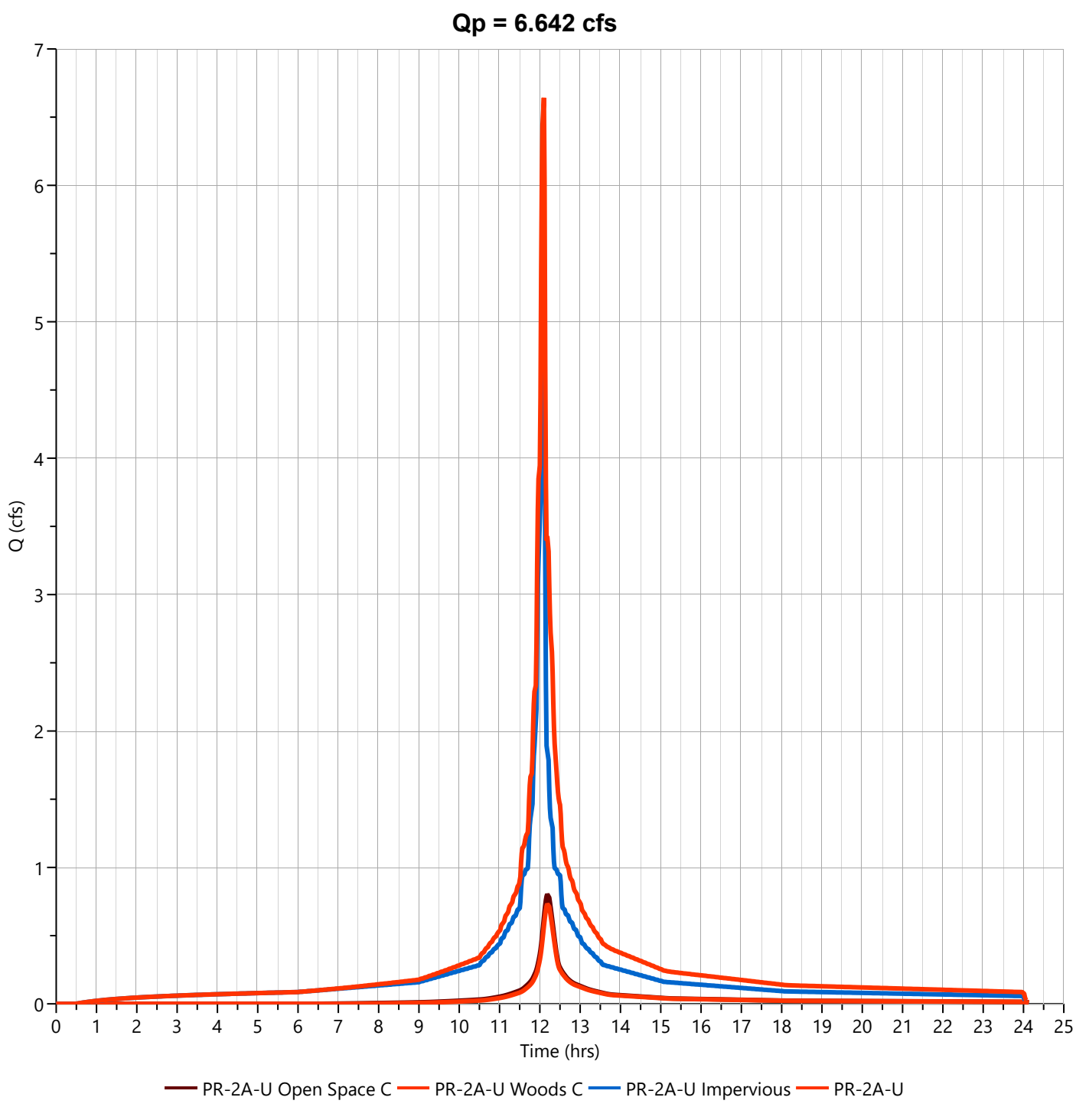
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-U

Hyd. No. 42

Hydrograph Type	= Junction	Peak Flow	= 6.642 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 24,543 cuft
Inflow Hydrographs	= 39, 40, 41	Total Contrib. Area	= 1.04 ac



Hydrograph Report

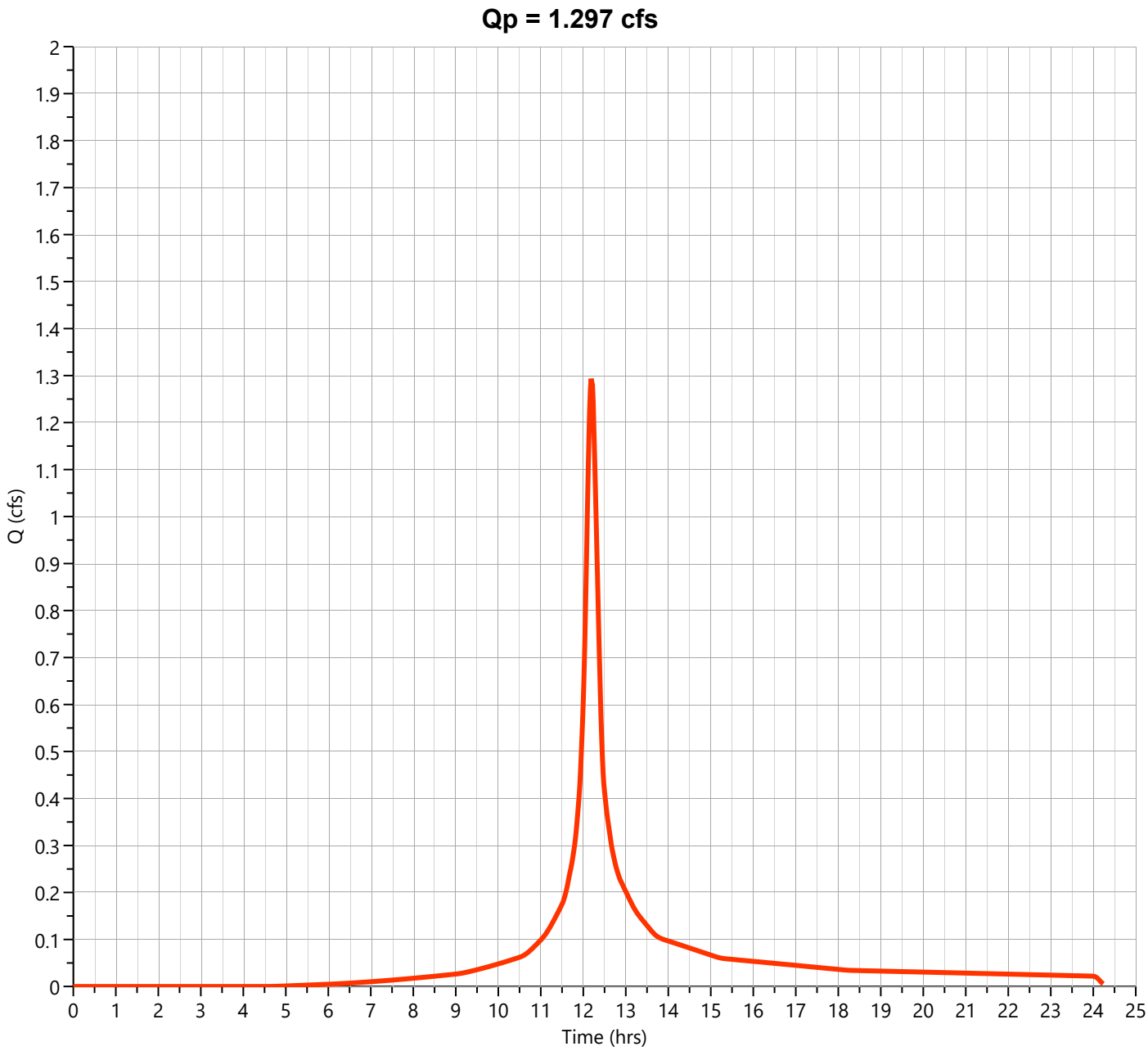
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-U Open Space C

Hyd. No. 39

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.297 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 5,384 cuft
Drainage Area	= 0.18 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

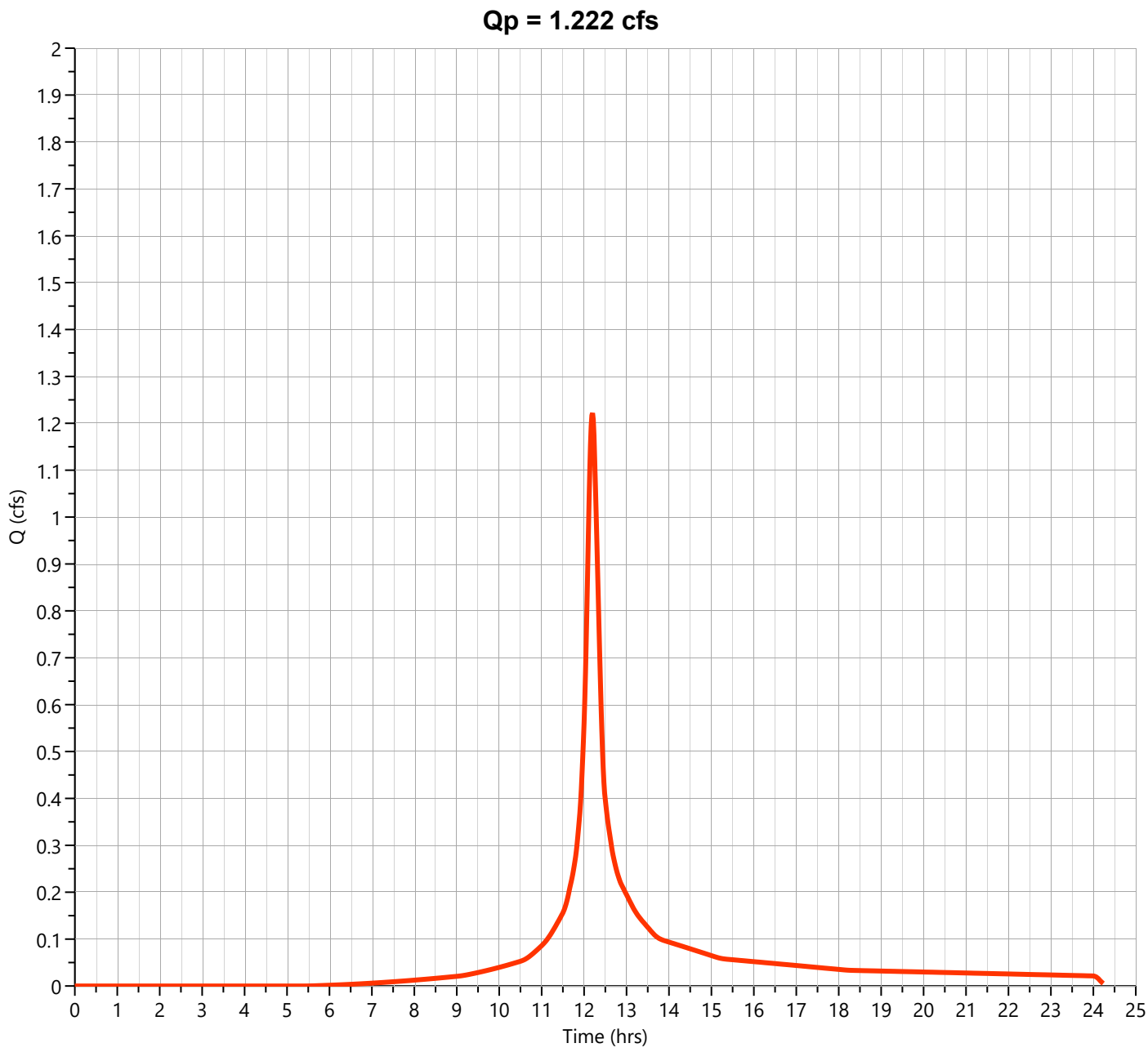
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-U Woods C

Hyd. No. 40

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.222 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 5,018 cuft
Drainage Area	= 0.18 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

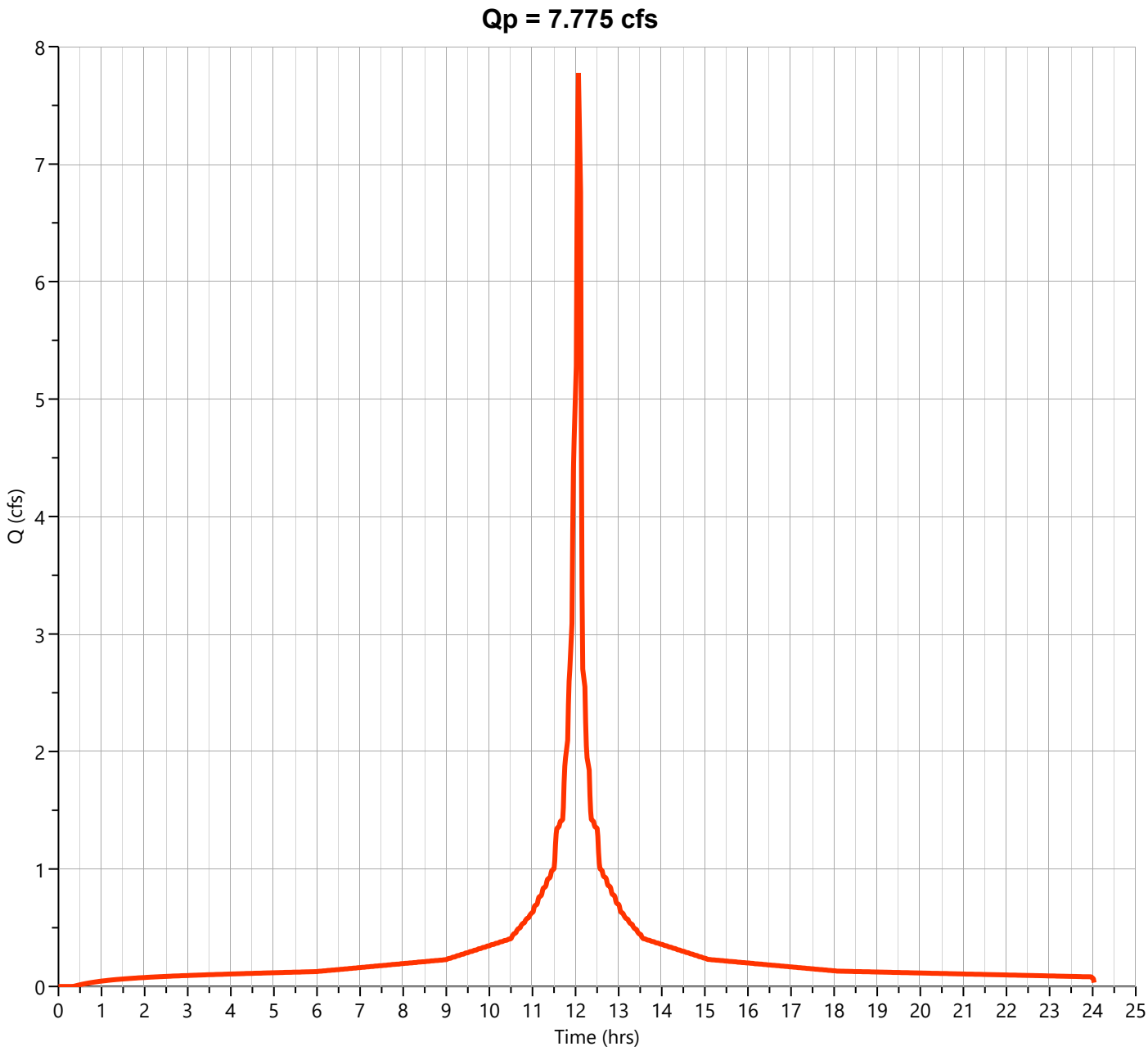
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-U Impervious

Hyd. No. 41

Hydrograph Type	= NRCS Runoff	Peak Flow	= 7.775 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 26,285 cuft
Drainage Area	= 0.68 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

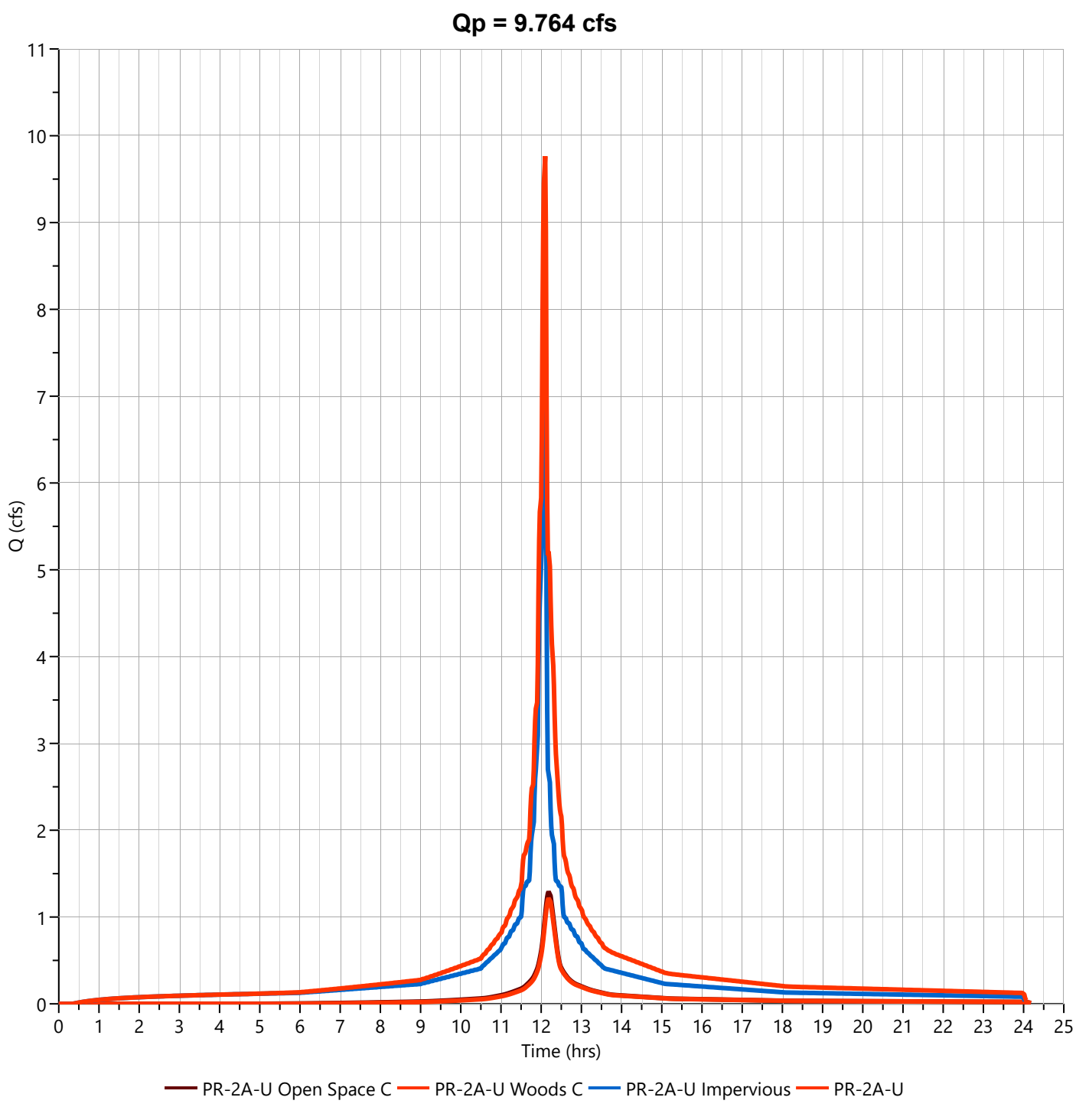
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A-U

Hyd. No. 42

Hydrograph Type	= Junction	Peak Flow	= 9.764 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 36,687 cuft
Inflow Hydrographs	= 39, 40, 41	Total Contrib. Area	= 1.04 ac



PR-2A WATERSHED
(COMBINED PROPOSED FLOW TO SSBB-2)

Hydrograph Report

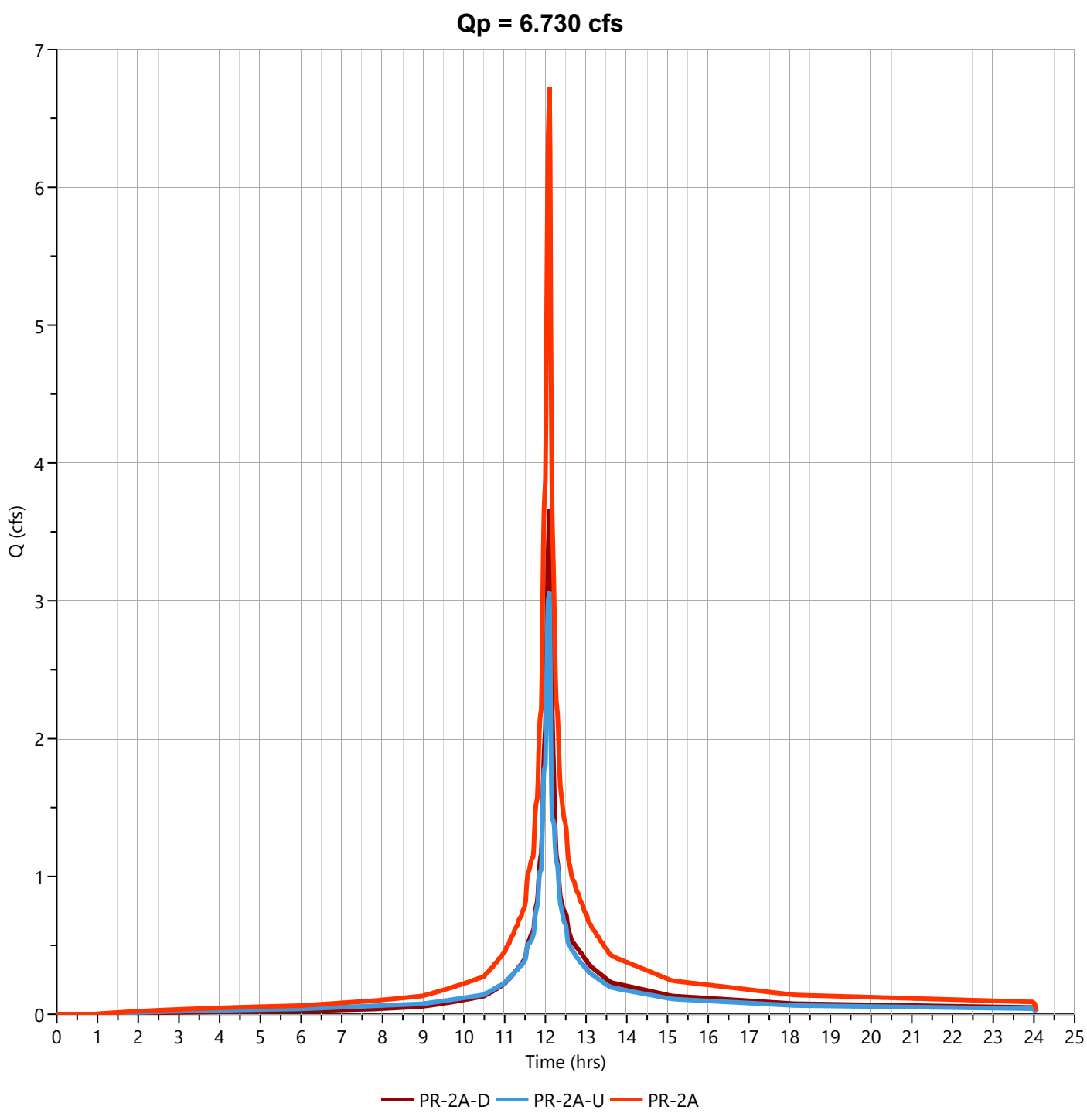
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A

Hyd. No. 45

Hydrograph Type	= Junction	Peak Flow	= 6.730 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 22,691 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

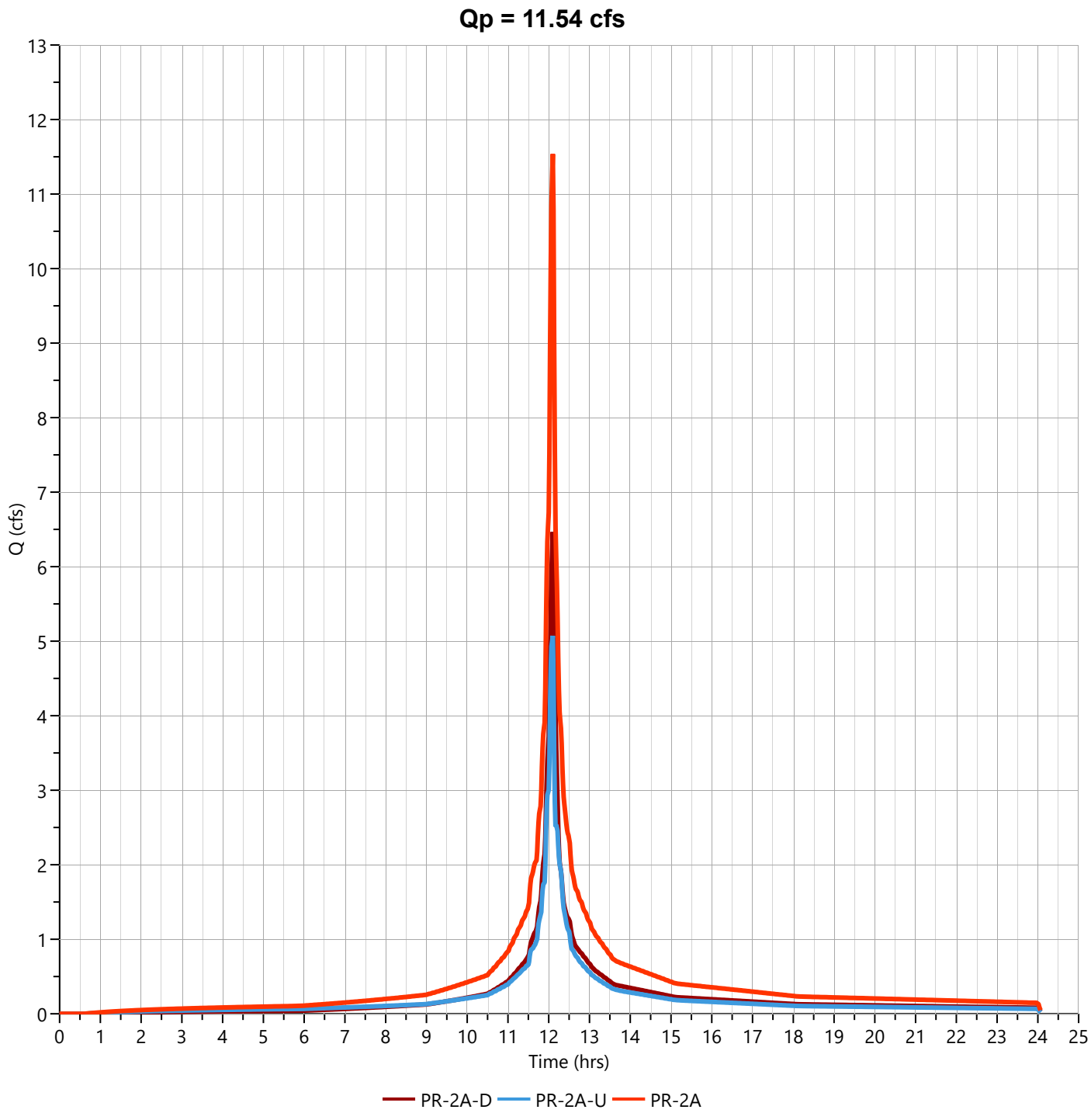
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A

Hyd. No. 45

Hydrograph Type	= Junction	Peak Flow	= 11.54 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 39,594 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

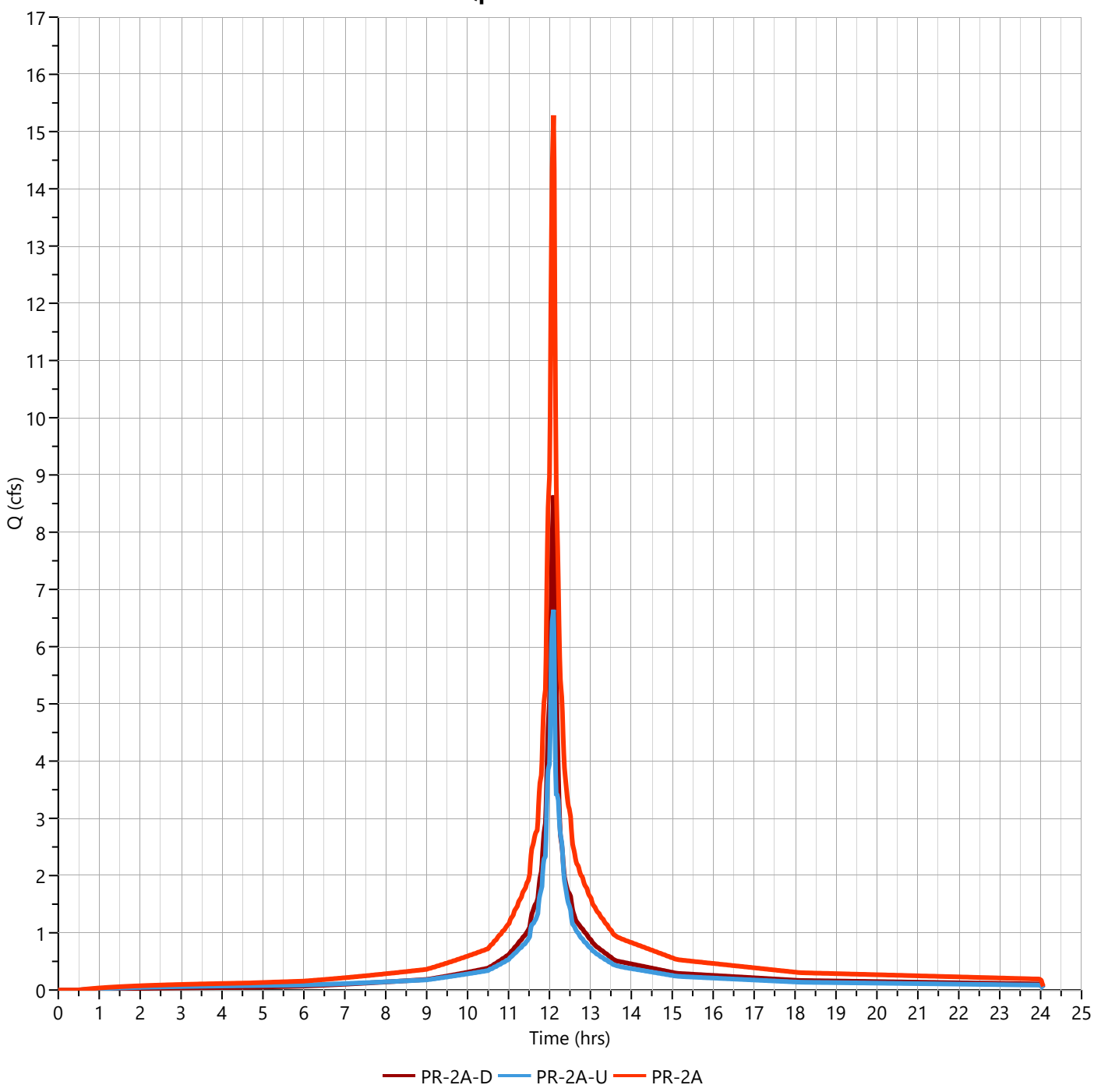
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A

Hyd. No. 45

Hydrograph Type	= Junction	Peak Flow	= 15.28 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 53,032 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

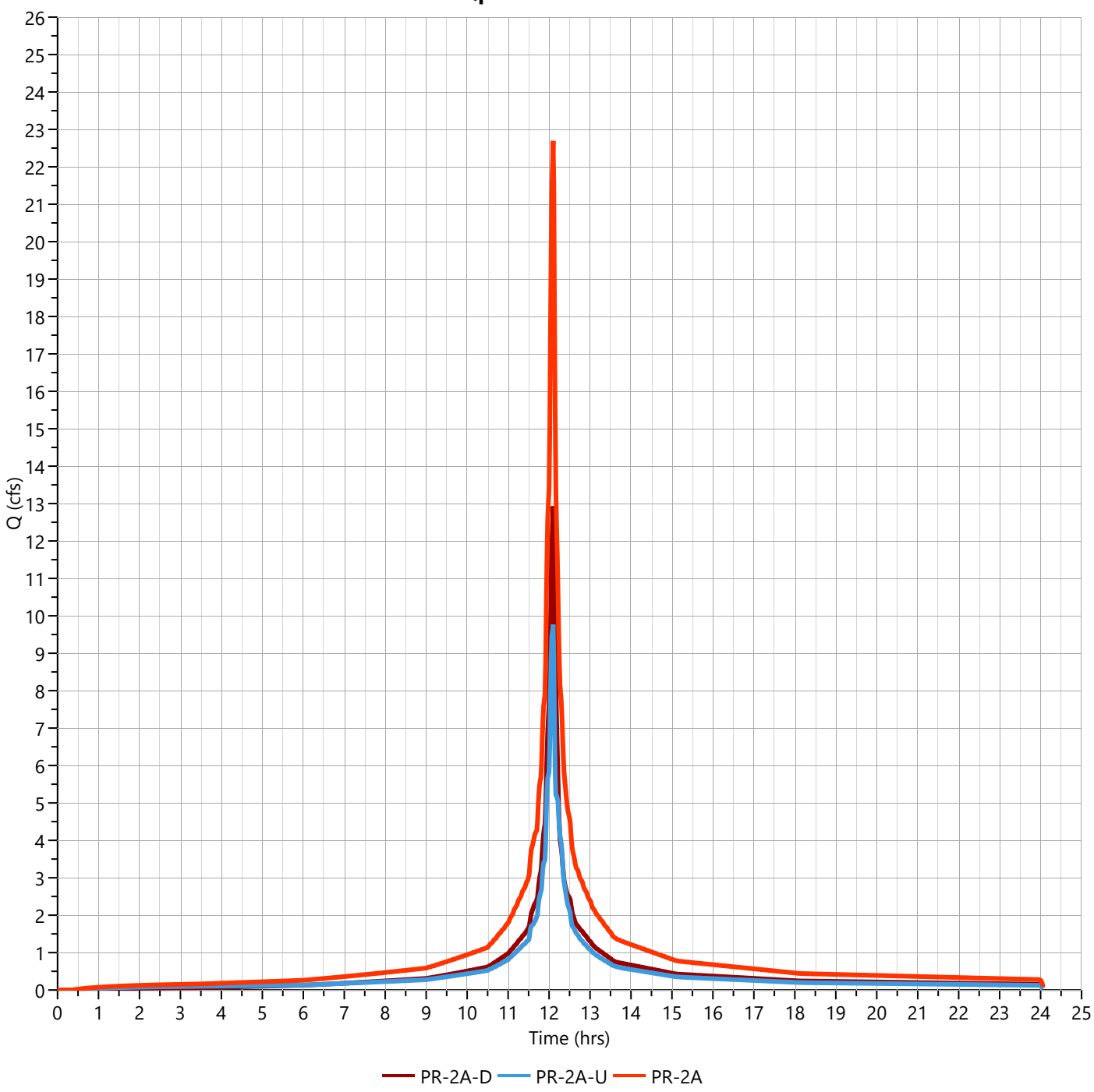
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2A

Hyd. No. 45

Hydrograph Type	= Junction	Peak Flow	= 22.69 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 80,053 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



PR-2B-DISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: Present **(Developed)** — **Future Proposed Watershed PR-2B-D - 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	**100**			
4.	Two-year 24-hr rainfall, P_2	in	**4.08**			
5.	Land Slope, s	ft/ft	**0.074**			
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	**0.011**	+		+
					Sheet Flow Sub-Total	**0.011 hours**

Shallow Concentrated Flow

	Segment ID		**2**			
8.	Surface Description		**Pavement**			
9.	Flow Length, L	ft	**155**			
10.	Watercourse Slope, s	ft/ft	**0.040**			
11.	Average Velocity, V (NEH table 15-3)	ft/s	**4.06**			
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) =	**0.021 hours**
(Add Sub-Total T_t from prior steps)	Software Limitations Require Minimum Tc =	**2 minutes**

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: Present (**Developed**) — **Future Proposed Watershed PR-2B-D - 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} (L_{des} < 100 ft)	ft	34		55		
4.	Two-year 24-hr rainfall, P_2	in	4.08		4.08		
5.	Land Slope, s	ft/ft	0.072		0.037		
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	0.053	+	0.009	+	
					Sheet Flow Sub-Total		0.062 hours

Shallow Concentrated Flow		Segment ID	3				
8.	Surface Description		Pavement				
9.	Flow Length, L	ft	41				
10.	Watercourse Slope, s	ft/ft	0.020				
11.	Average Velocity, V (NEH table 15-3)	ft/s	2.87				
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					
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) =	**0.066 hours**
	Total Tc (minutes) =	**4 minutes**

Hydrograph Report

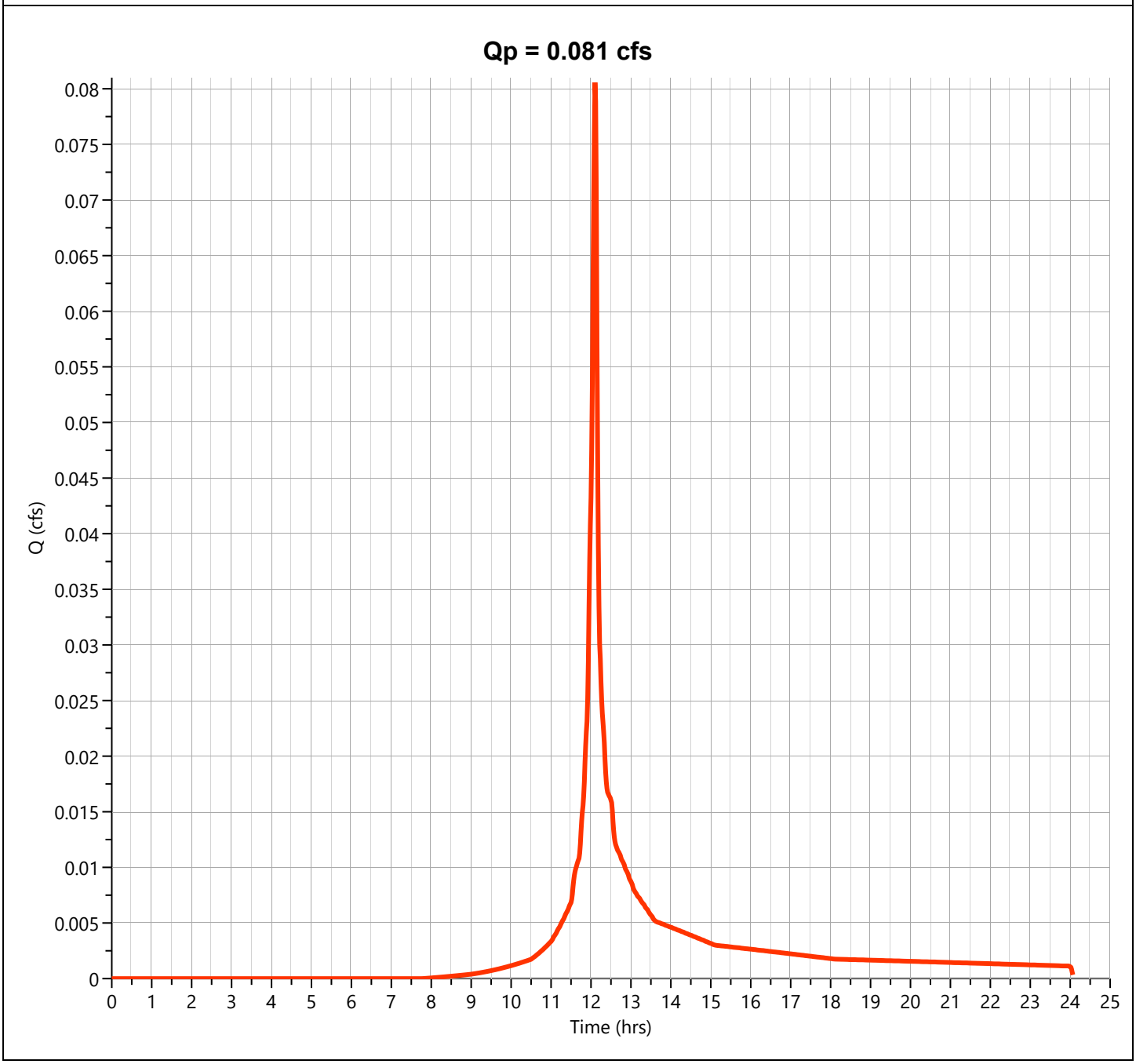
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B-D Open Space D

Hyd. No. 48

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	= 230 cuft
Drainage Area	= 0.03 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

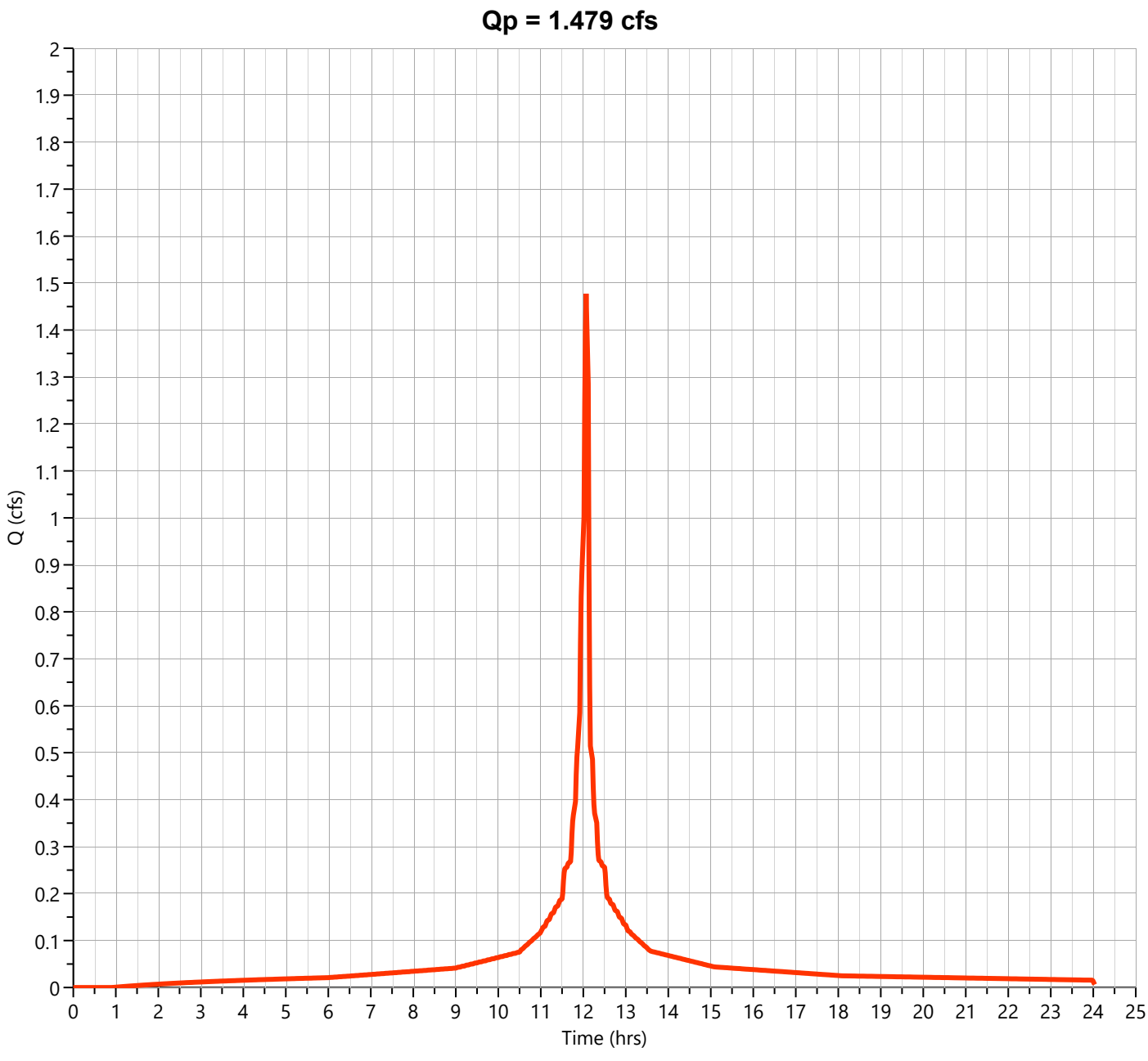
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B-D Impervious

Hyd. No. 49

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.479 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 4,841 cuft
Drainage Area	= 0.37 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

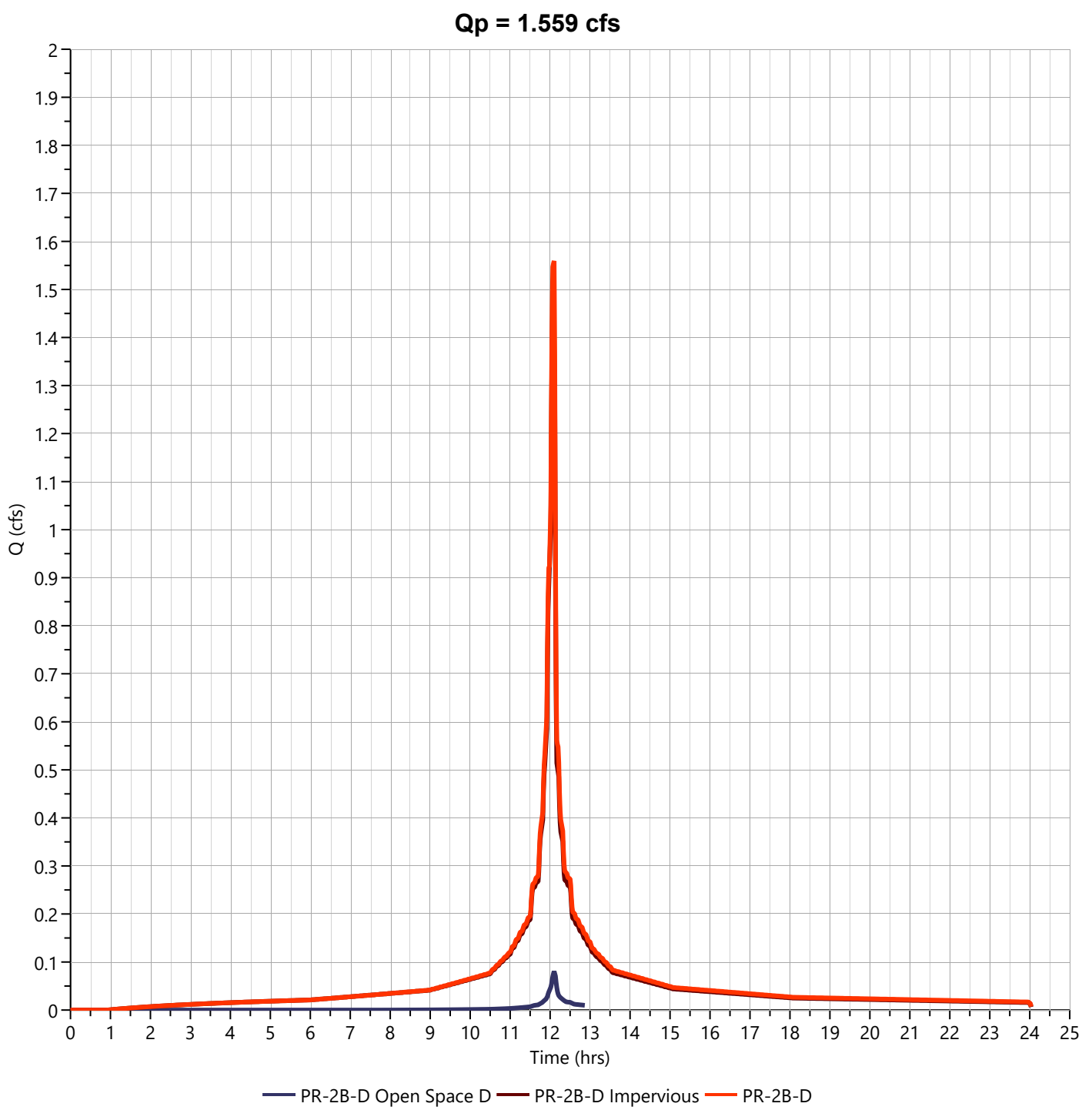
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B-D

Hyd. No. 50

Hydrograph Type	= Junction	Peak Flow	= 1.559 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 5,071 cuft
Inflow Hydrographs	= 48, 49	Total Contrib. Area	= 0.4 ac



Hydrograph Report

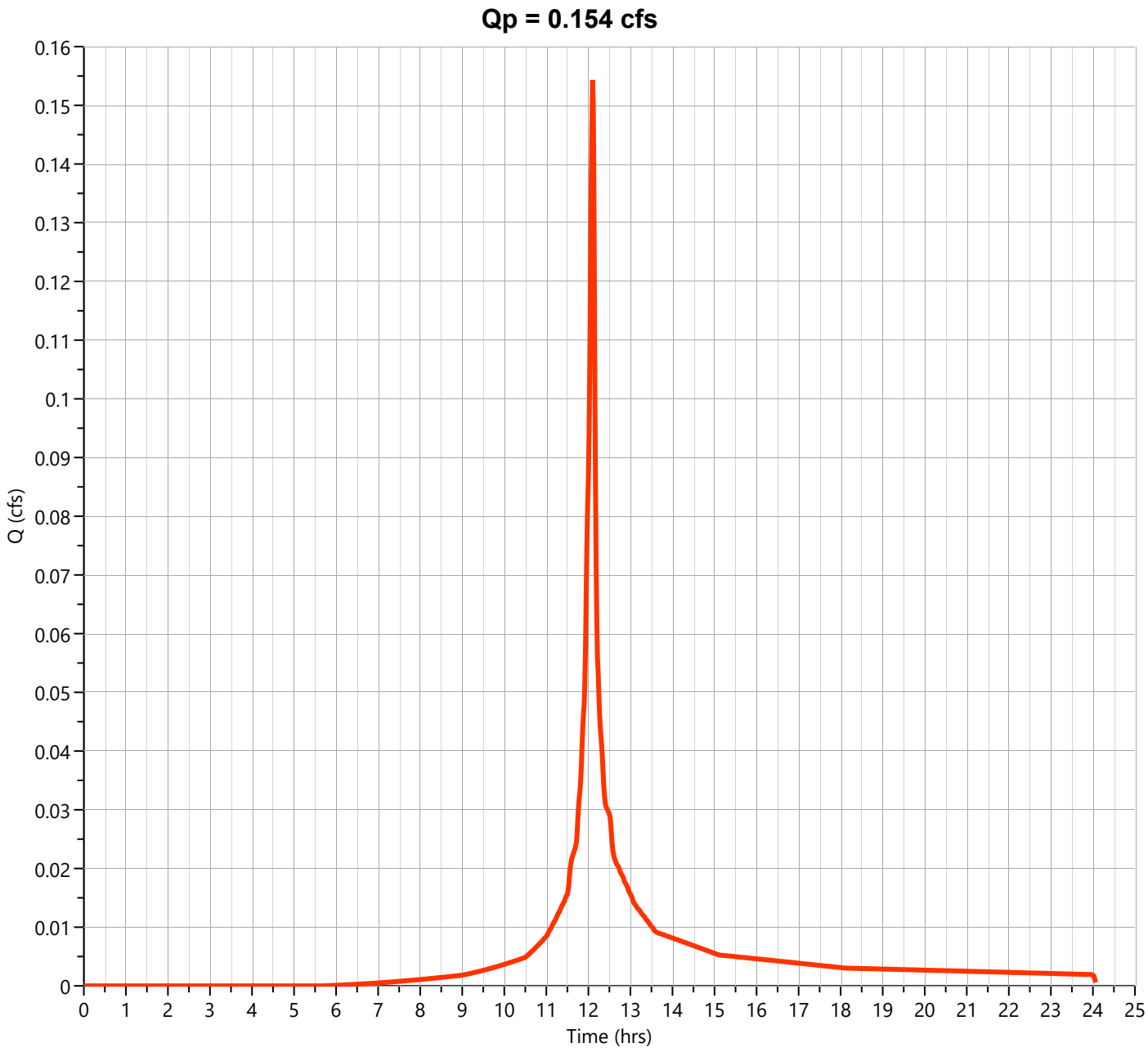
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B-D Open Space D

Hyd. No. 48

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.154 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 448 cuft
Drainage Area	= 0.03 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

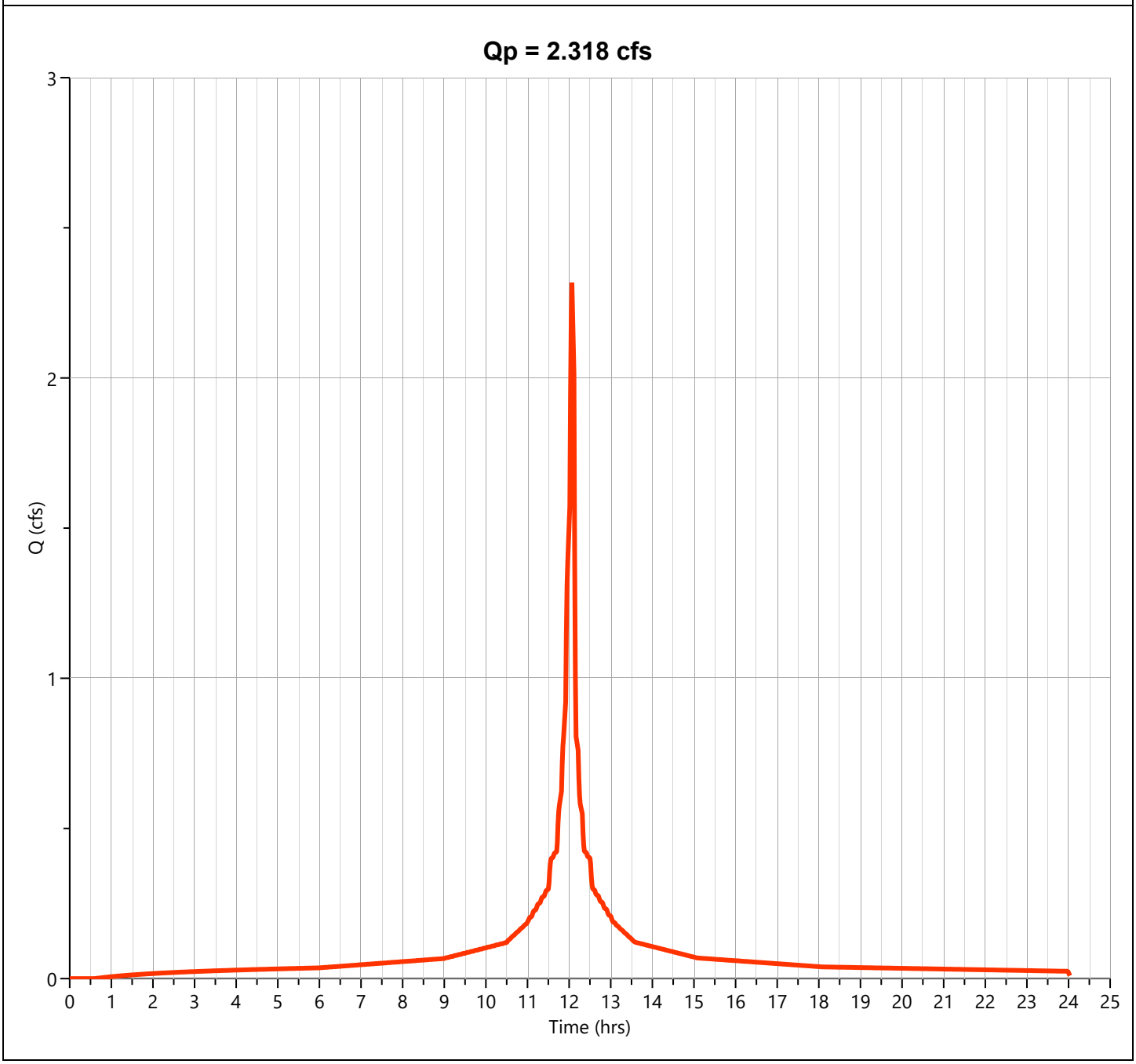
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B-D Impervious

Hyd. No. 49

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.318 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 7,720 cuft
Drainage Area	= 0.37 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

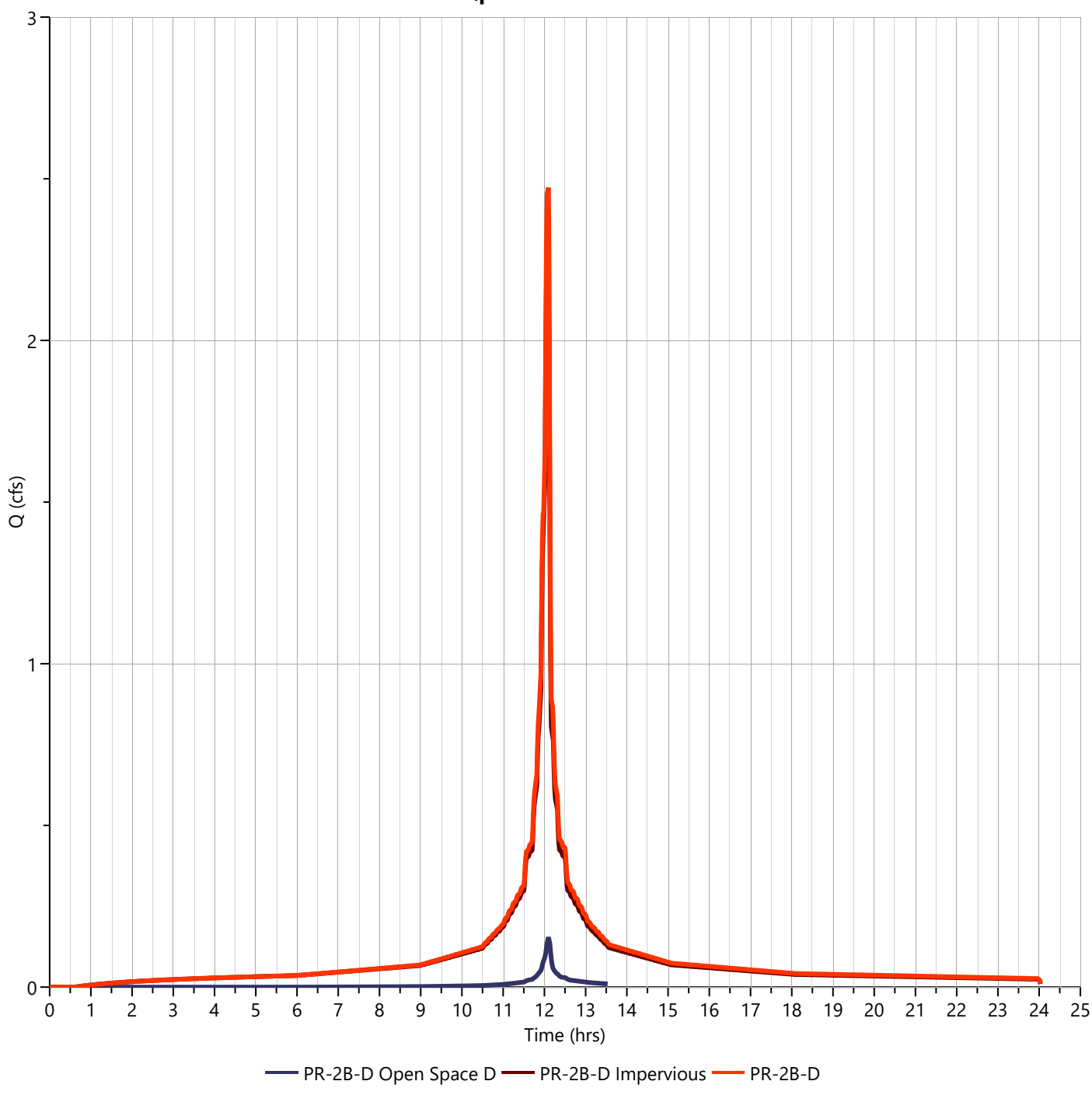
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B-D

Hyd. No. 50

Hydrograph Type	= Junction	Peak Flow	= 2.472 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 8,169 cuft
Inflow Hydrographs	= 48, 49	Total Contrib. Area	= 0.4 ac



Hydrograph Report

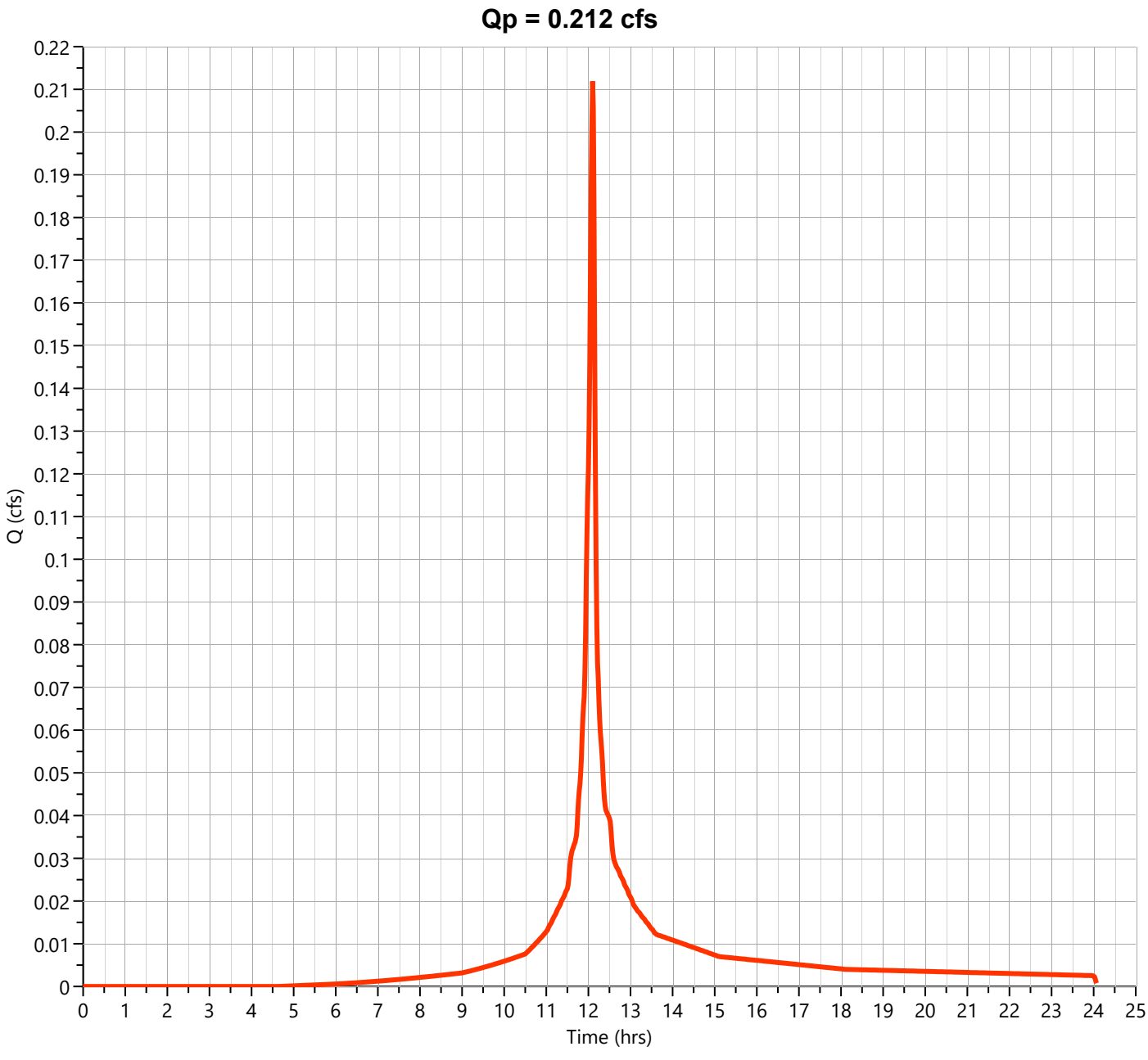
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B-D Open Space D

Hyd. No. 48

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.212 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 626 cuft
Drainage Area	= 0.03 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

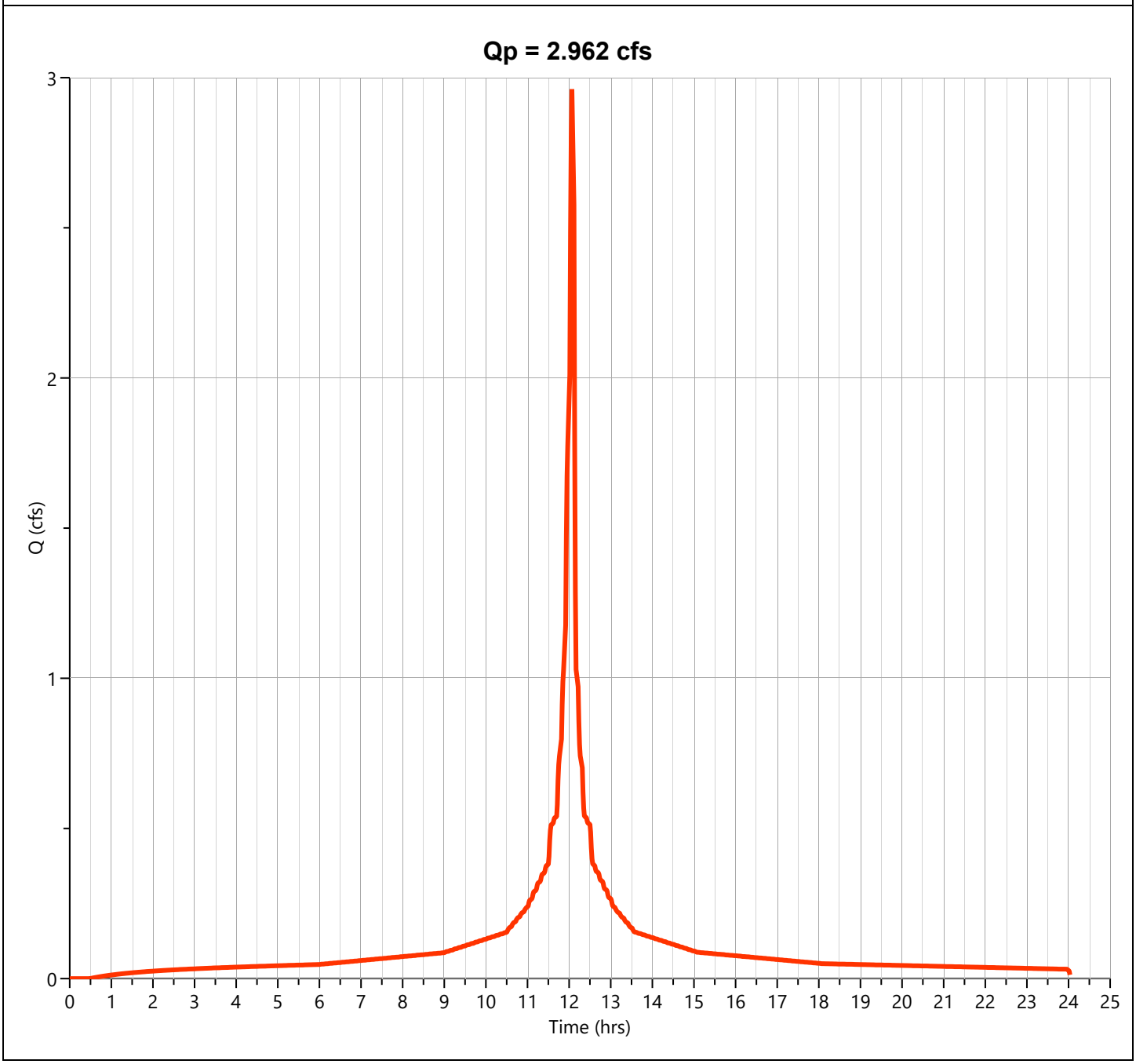
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B-D Impervious

Hyd. No. 49

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.962 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 9,935 cuft
Drainage Area	= 0.37 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

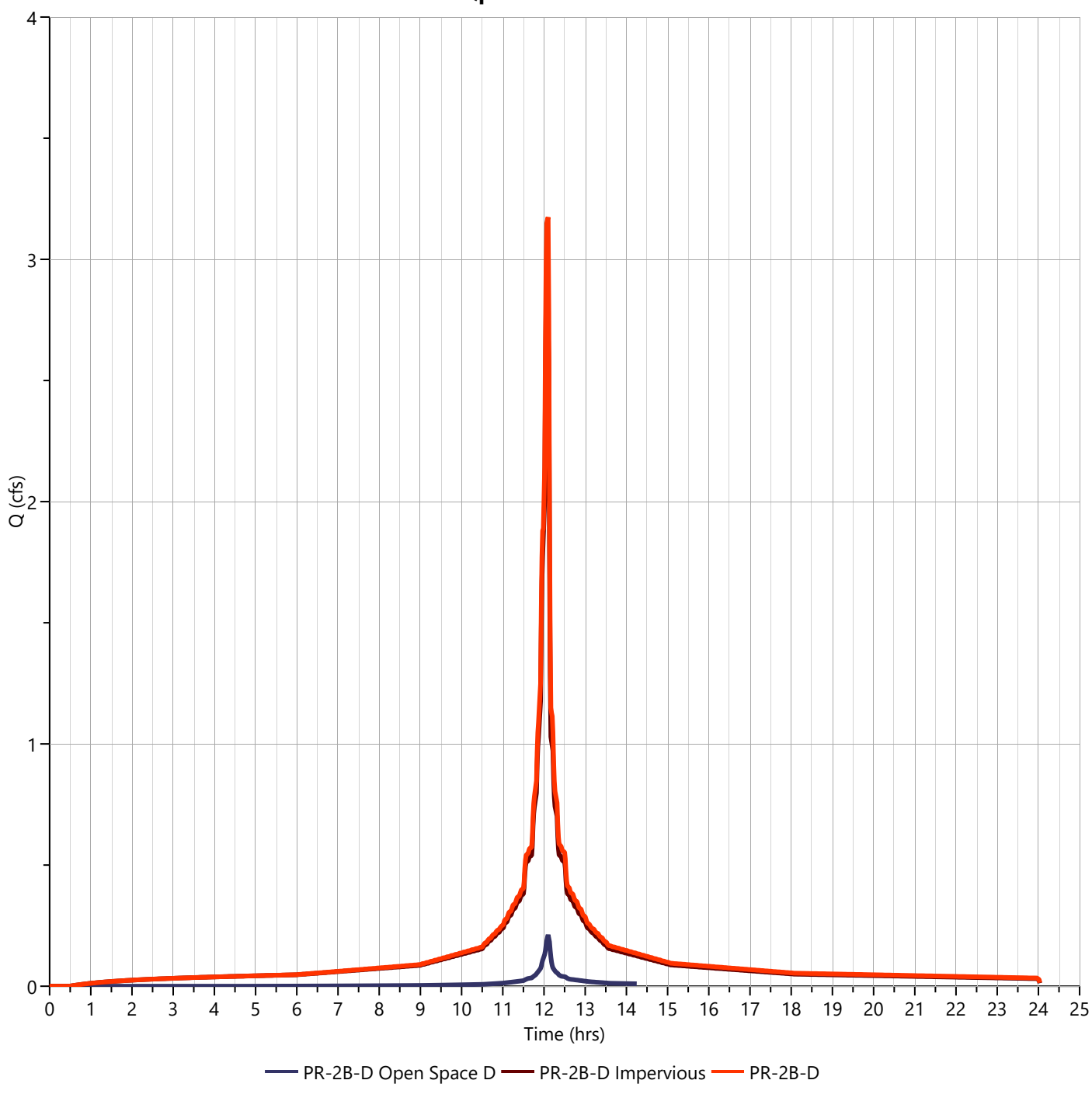
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B-D

Hyd. No. 50

Hydrograph Type	= Junction	Peak Flow	= 3.174 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 10,561 cuft
Inflow Hydrographs	= 48, 49	Total Contrib. Area	= 0.4 ac



Hydrograph Report

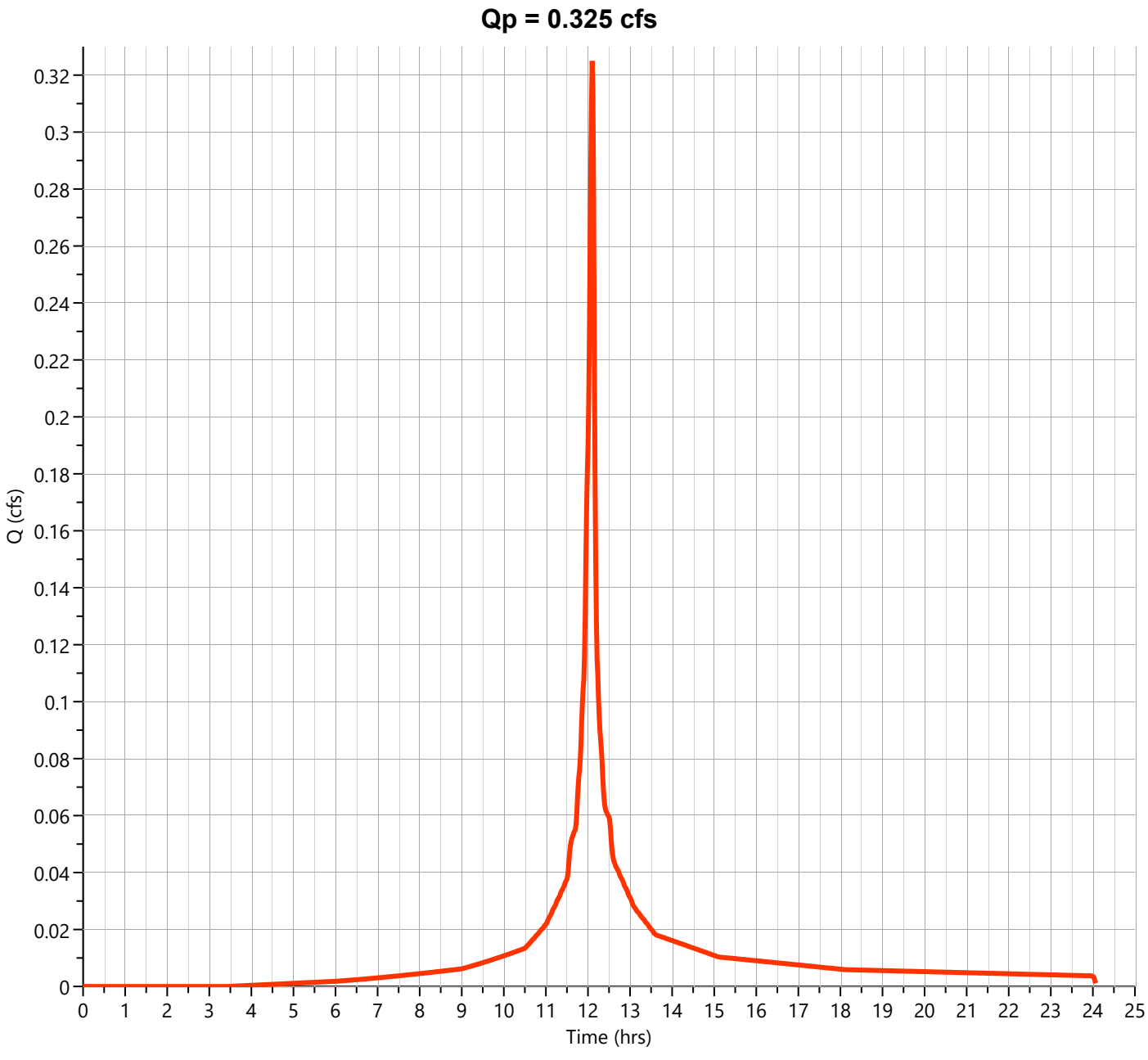
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B-D Open Space D

Hyd. No. 48

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.325 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 987 cuft
Drainage Area	= 0.03 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 4.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

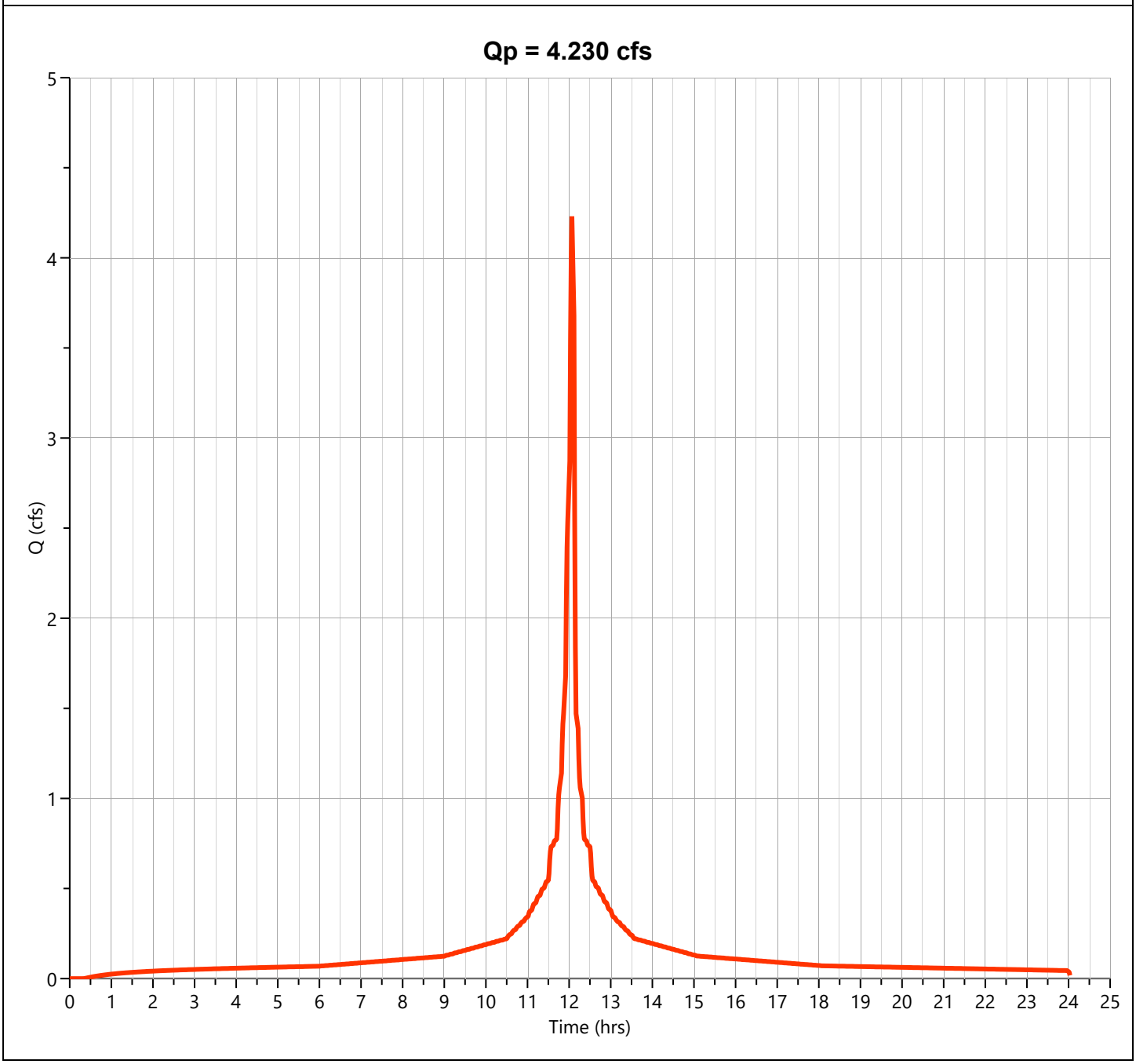
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B-D Impervious

Hyd. No. 49

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.230 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 14,302 cuft
Drainage Area	= 0.37 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

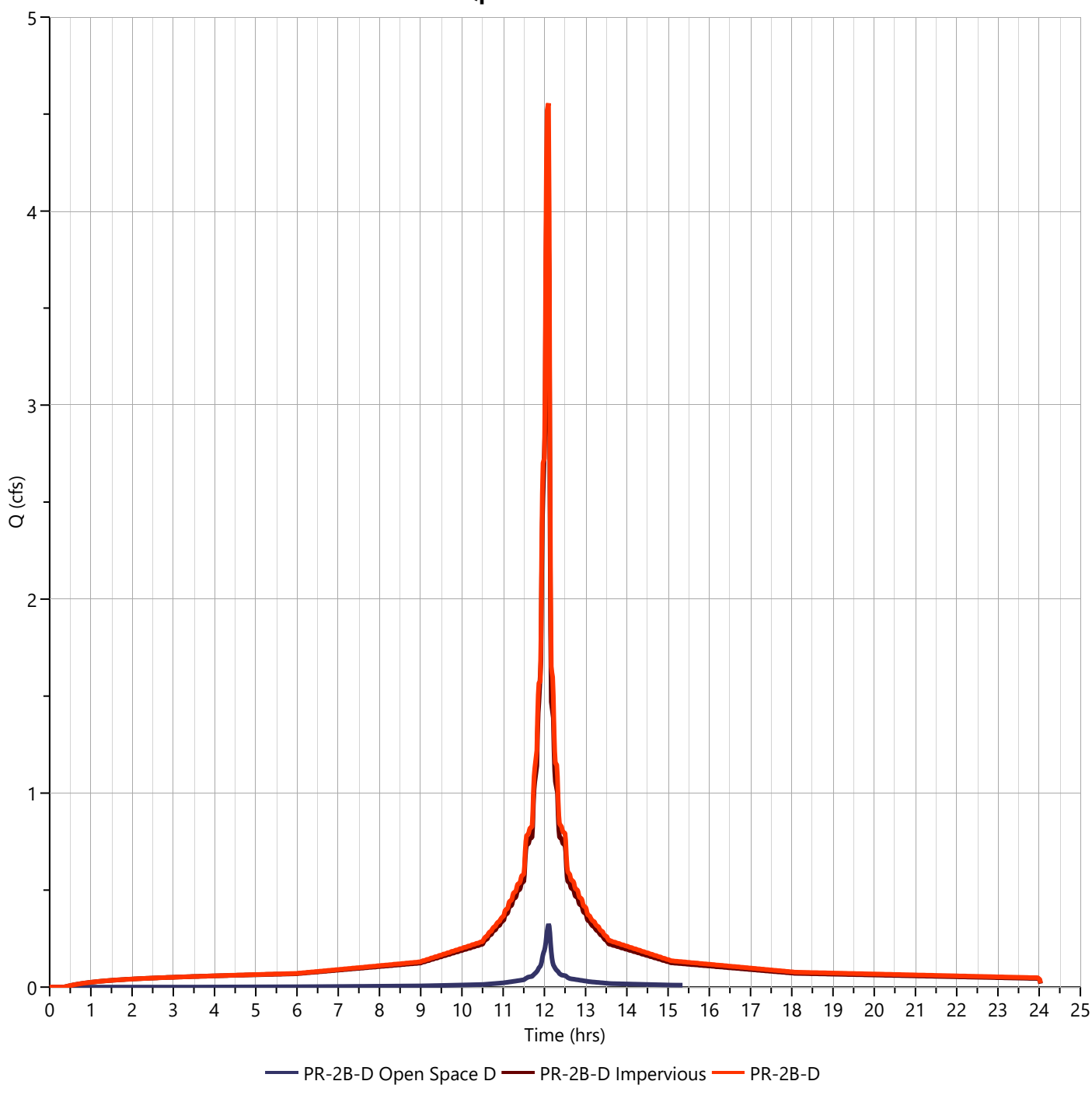
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B-D

Hyd. No. 50

Hydrograph Type	= Junction	Peak Flow	= 4.555 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 15,289 cuft
Inflow Hydrographs	= 48, 49	Total Contrib. Area	= 0.4 ac



PR-2B-UNDISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: Present (**Developed**) — **Future Proposed Watershed PR-2B-U - 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	100		
4.	Two-year 24-hr rainfall, P_2		in	4.08		
5.	Land Slope, s		ft/ft	0.073		
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	0.011	+	+

Sheet Flow Sub-Total: **0.011 hours**

Shallow Concentrated Flow

			Segment ID	2		
8.	Surface Description			Pavement		
9.	Flow Length, L		ft	263		
10.	Watercourse Slope, s		ft/ft	0.054		
11.	Average Velocity, V (NEH table 15-3)		ft/s	4.73		
12.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.015	+	+

Shallow Conc. Flow Sub-Total: **0.015 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)	=	**0.026 hours**
Software Limitations Require Minimum Tc	=	**2 minutes**

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: Present **(Developed)** — **Future Proposed Watershed PR-2B-U - 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	23		
4.	Two-year 24-hr rainfall, P_2		in	4.08		
5.	Land Slope, s		ft/ft	0.130		
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	0.031	+	+

Sheet Flow Sub-Total: **0.031 hours**

Shallow Concentrated Flow

			Segment ID	2		
8.	Surface Description			Pavement		
9.	Flow Length, L		ft	231		
10.	Watercourse Slope, s		ft/ft	0.048		
11.	Average Velocity, V (NEH table 15-3)		ft/s	4.45		
12.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.014	+	+

Shallow Conc. Flow Sub-Total: **0.014 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) =	**0.045 hours**
Total Tc (minutes) =	**3 minutes**

Hydrograph Report

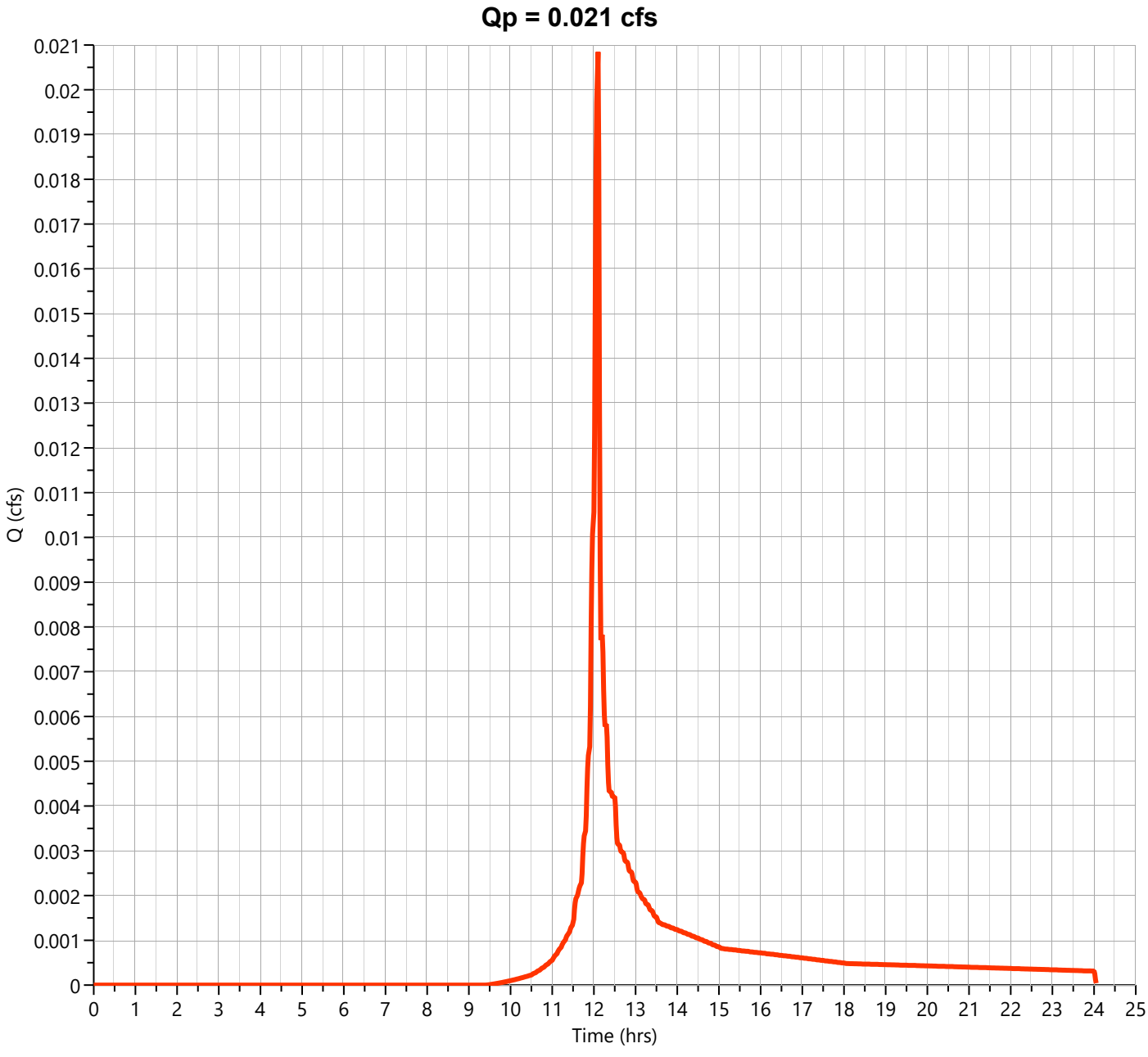
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B-U Open Space C

Hyd. No. 52

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	= 56.3 cuft
Drainage Area	= 0.01 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

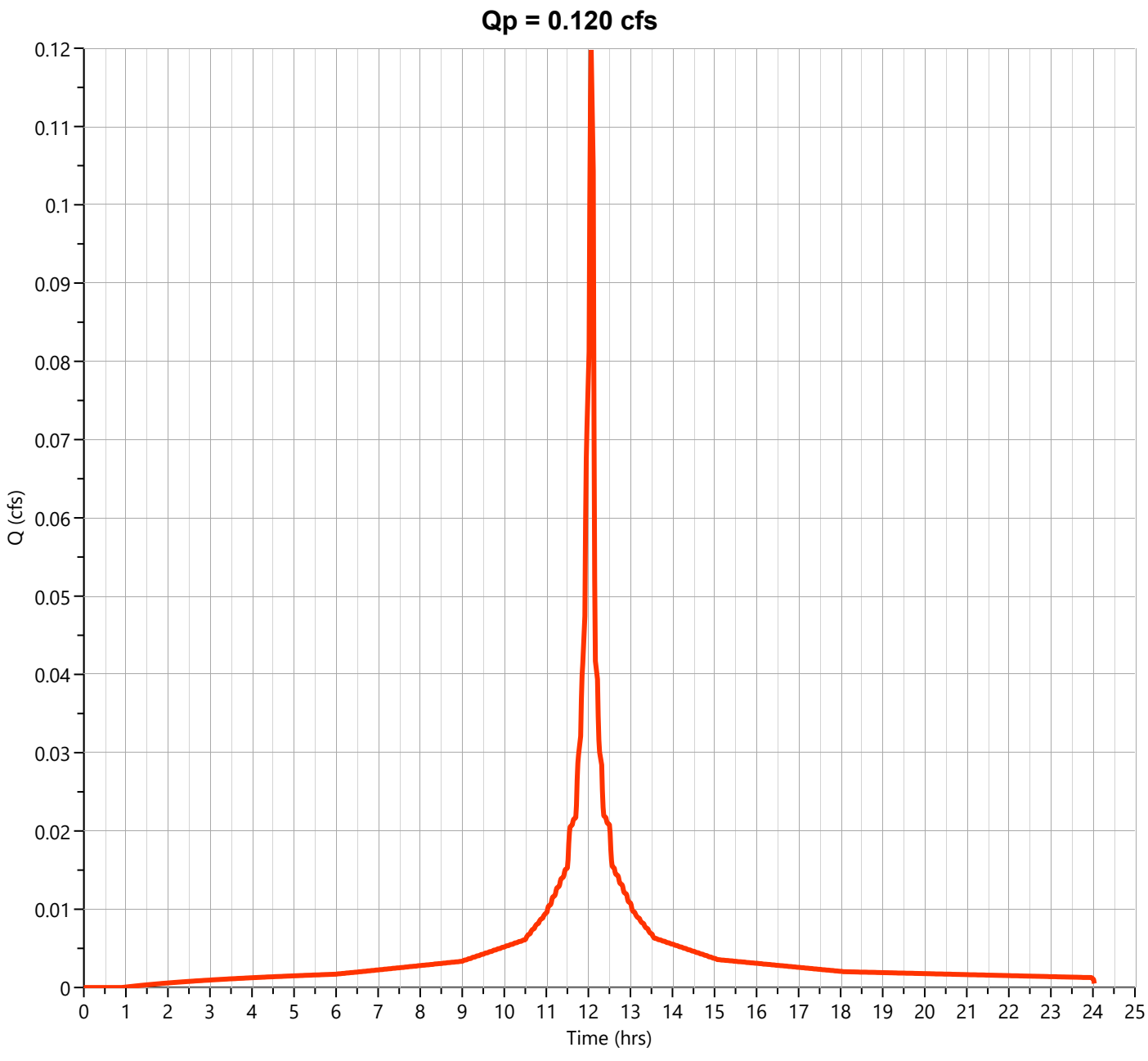
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B-U Impervious

Hyd. No. 53

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.120 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 393 cuft
Drainage Area	= 0.03 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

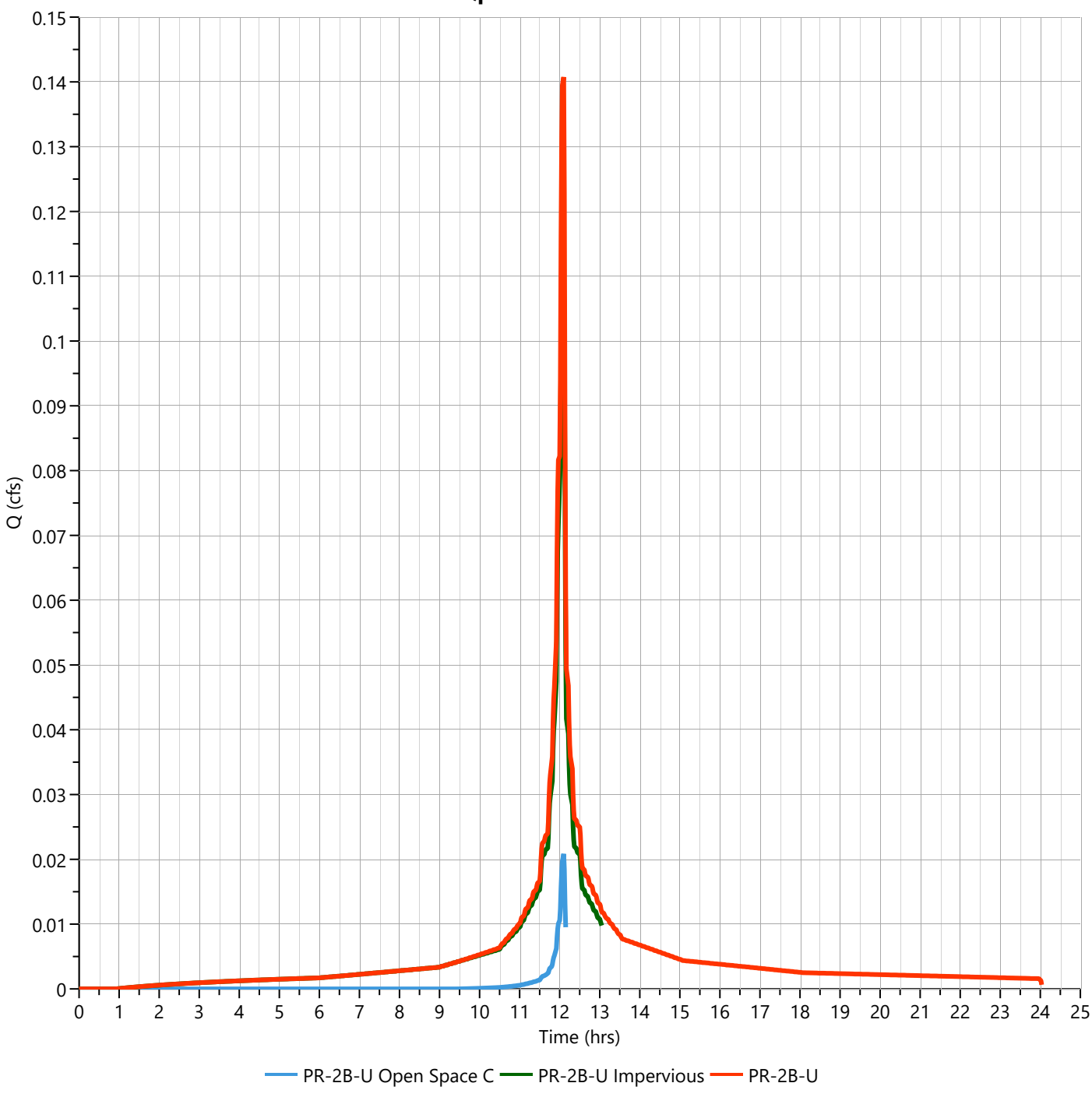
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B-U

Hyd. No. 54

Hydrograph Type	= Junction	Peak Flow	= 0.141 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 449 cuft
Inflow Hydrographs	= 52, 53	Total Contrib. Area	= 0.04 ac



Hydrograph Report

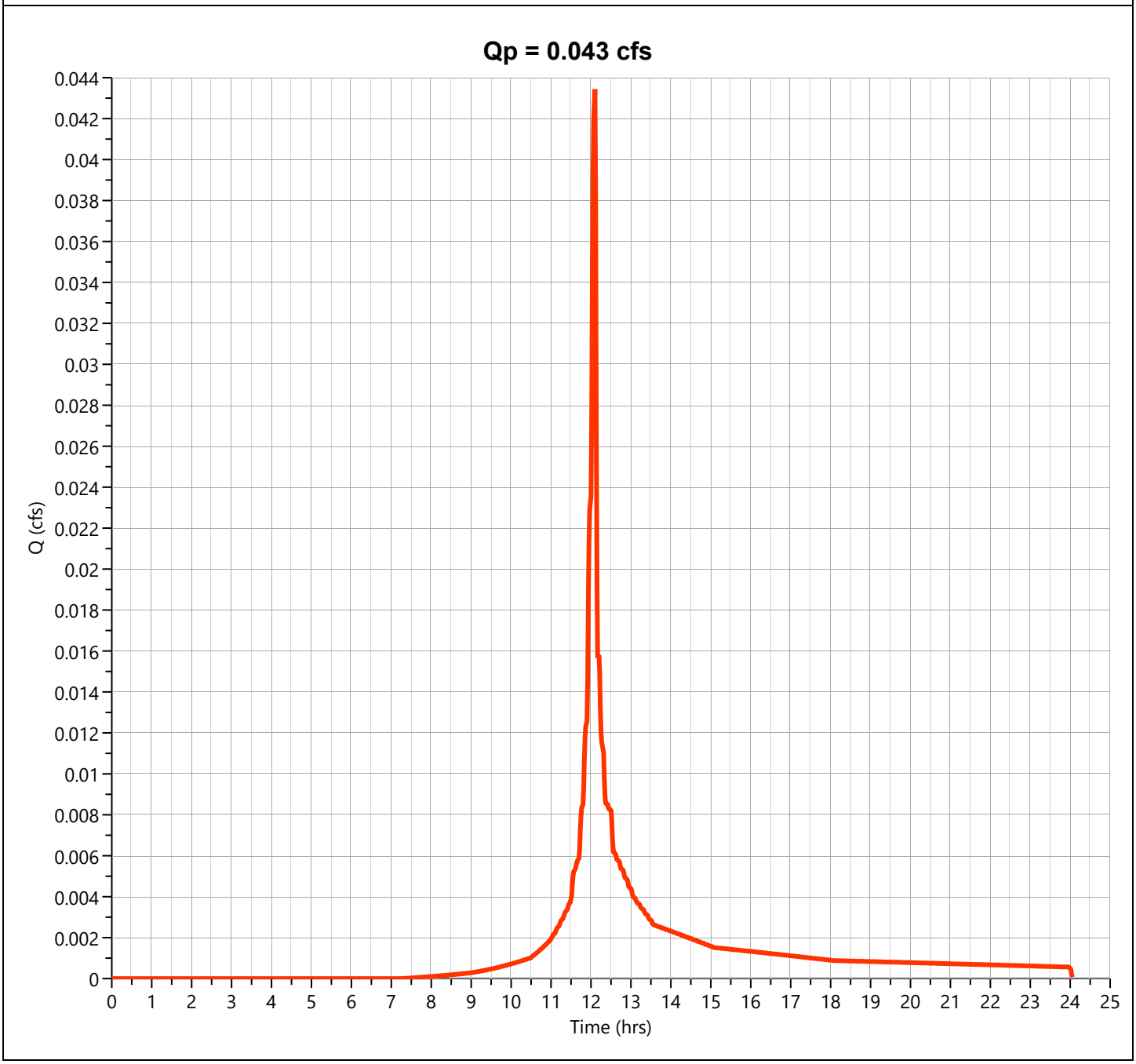
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B-U Open Space C

Hyd. No. 52

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.043 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 119 cuft
Drainage Area	= 0.01 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

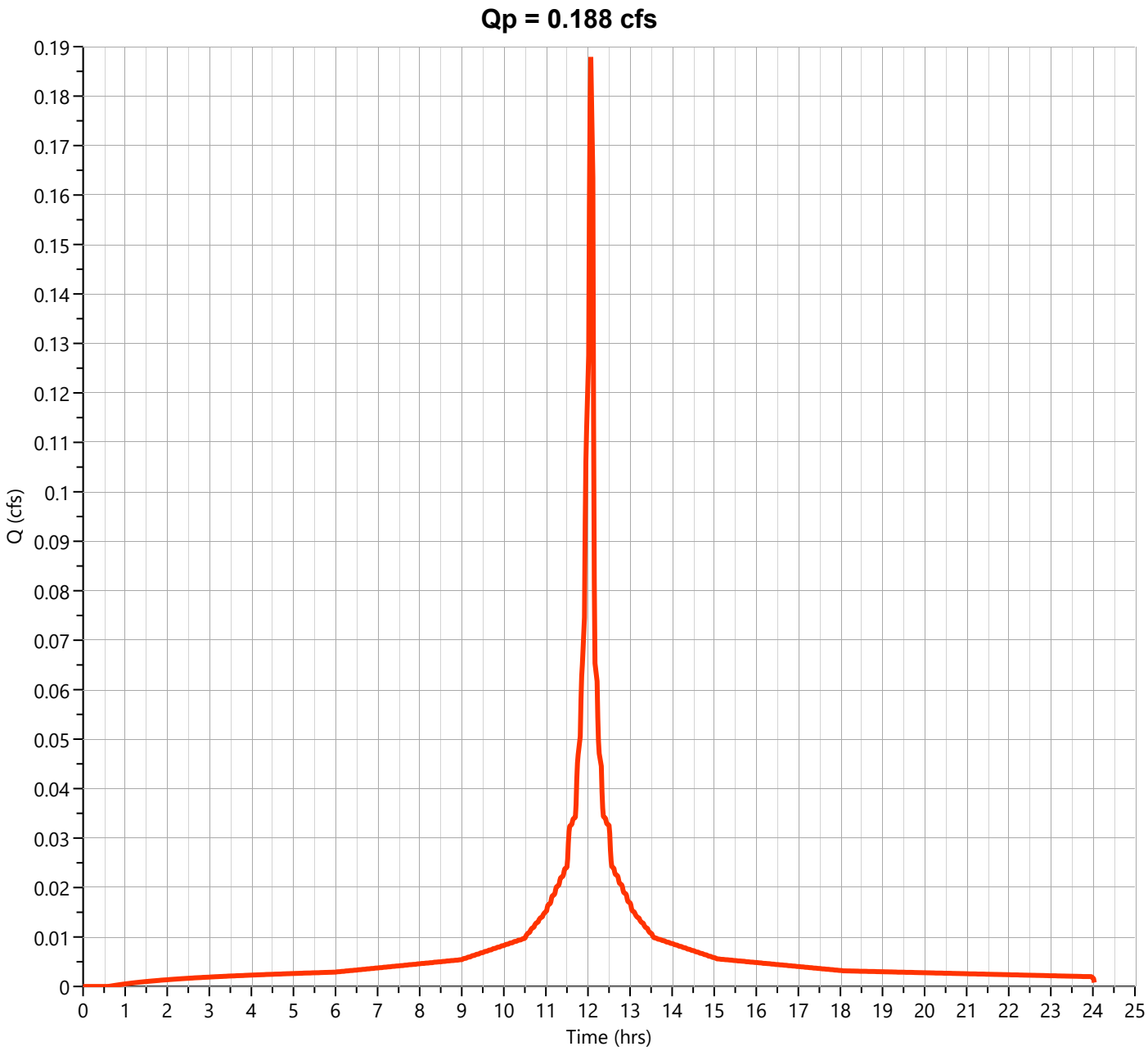
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B-U Impervious

Hyd. No. 53

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.188 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 626 cuft
Drainage Area	= 0.03 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

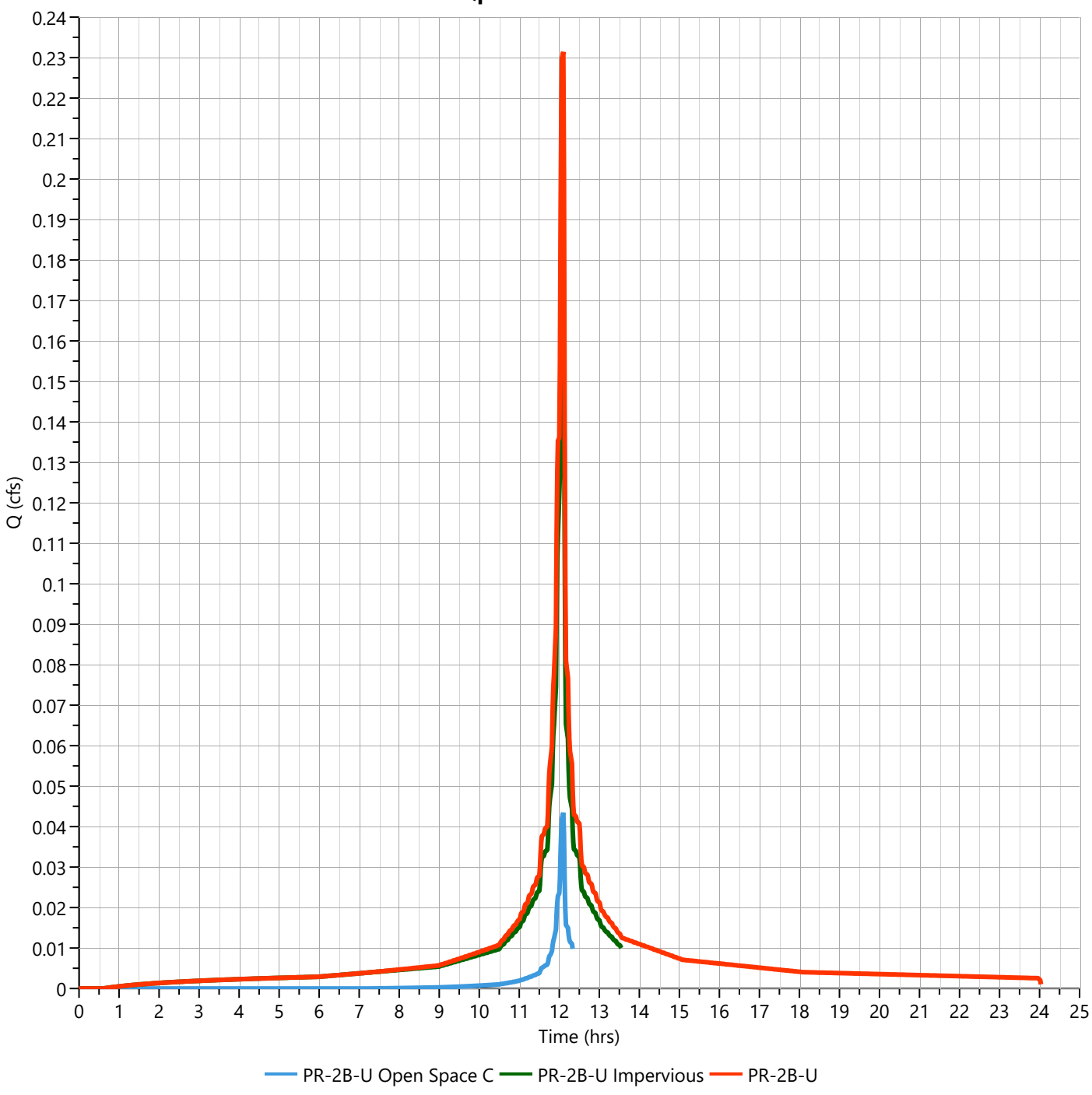
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B-U

Hyd. No. 54

Hydrograph Type	= Junction	Peak Flow	= 0.231 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 745 cuft
Inflow Hydrographs	= 52, 53	Total Contrib. Area	= 0.04 ac



Hydrograph Report

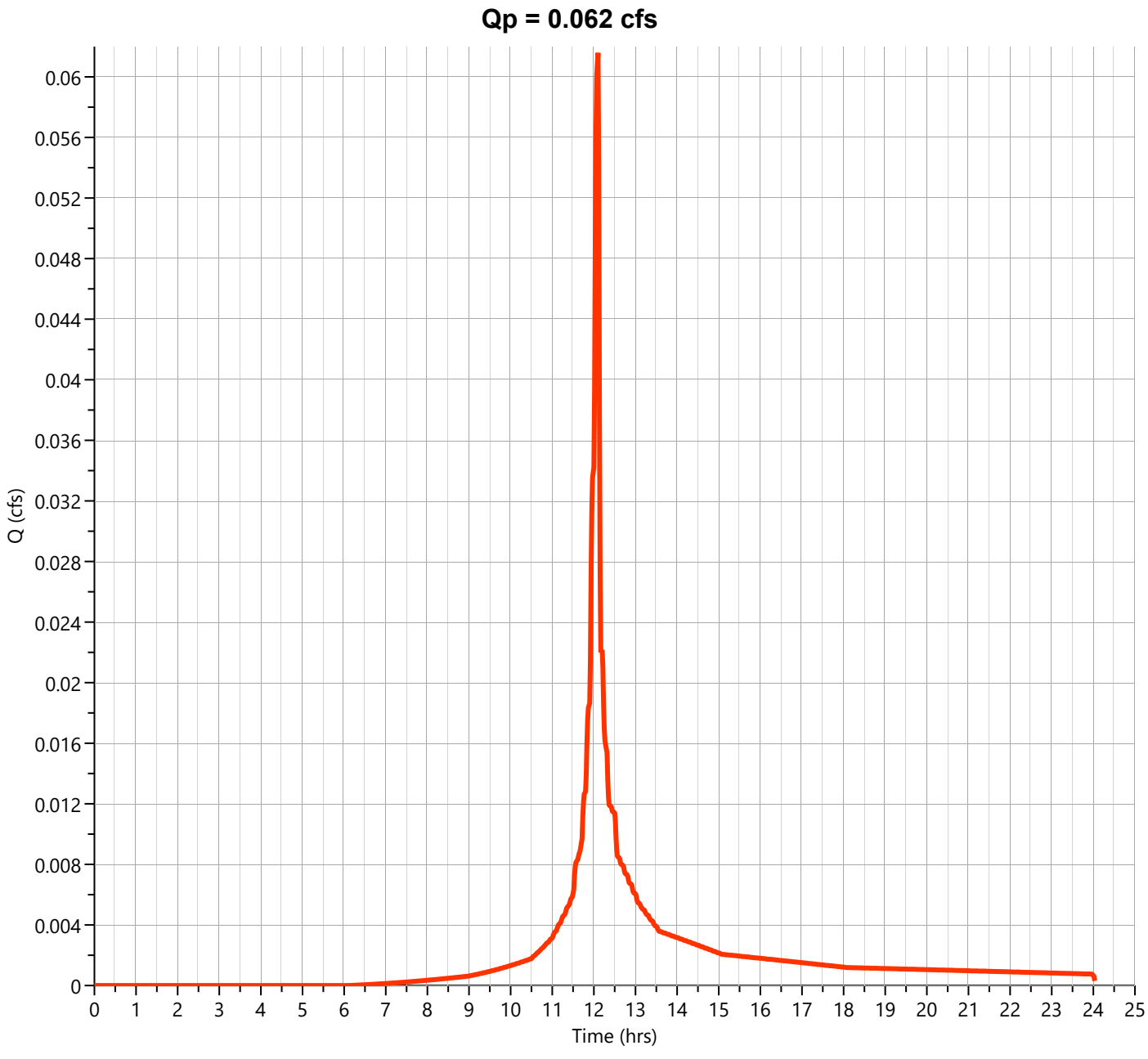
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B-U Open Space C

Hyd. No. 52

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.062 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 172 cuft
Drainage Area	= 0.01 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

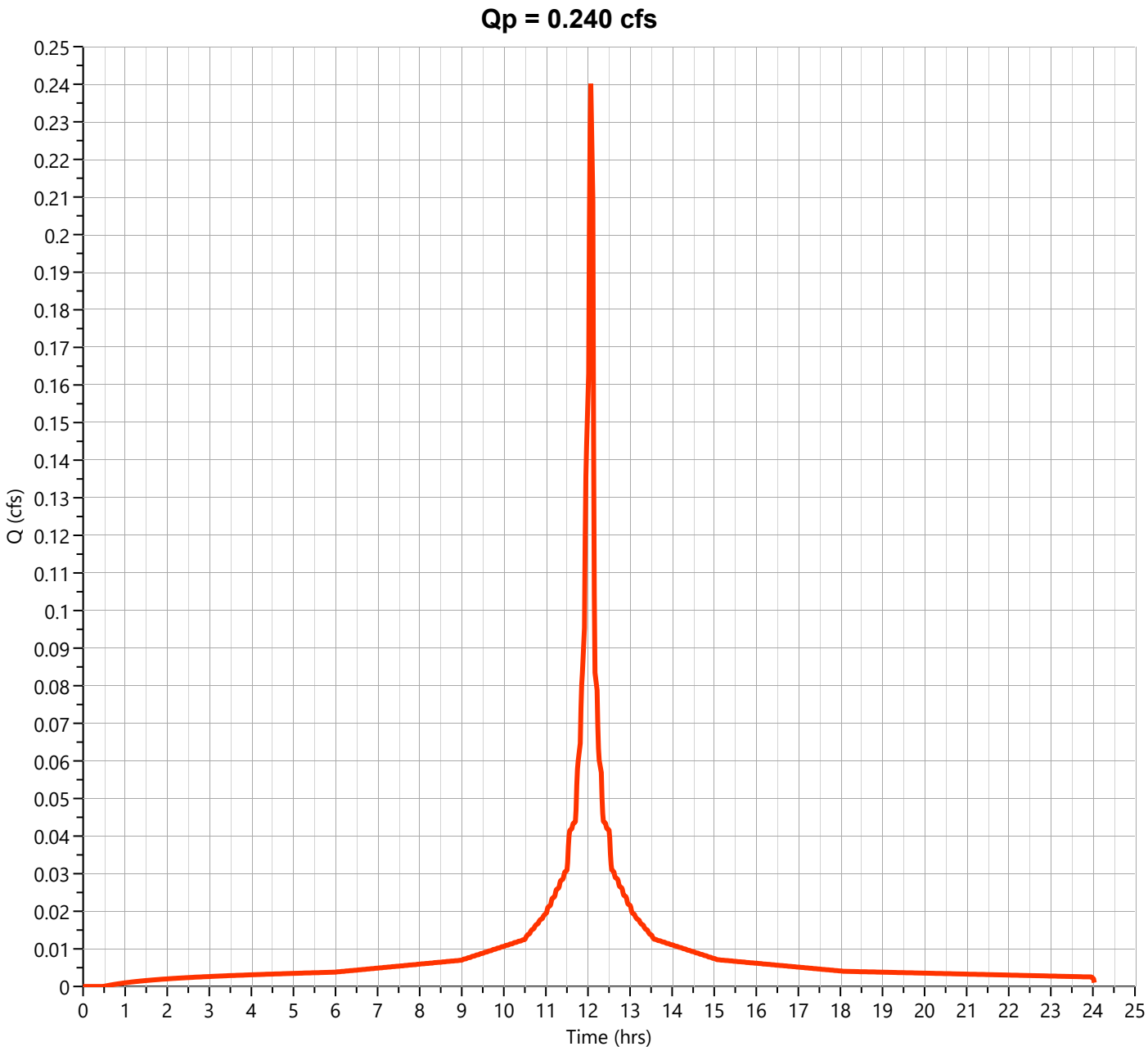
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B-U Impervious

Hyd. No. 53

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.240 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 806 cuft
Drainage Area	= 0.03 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

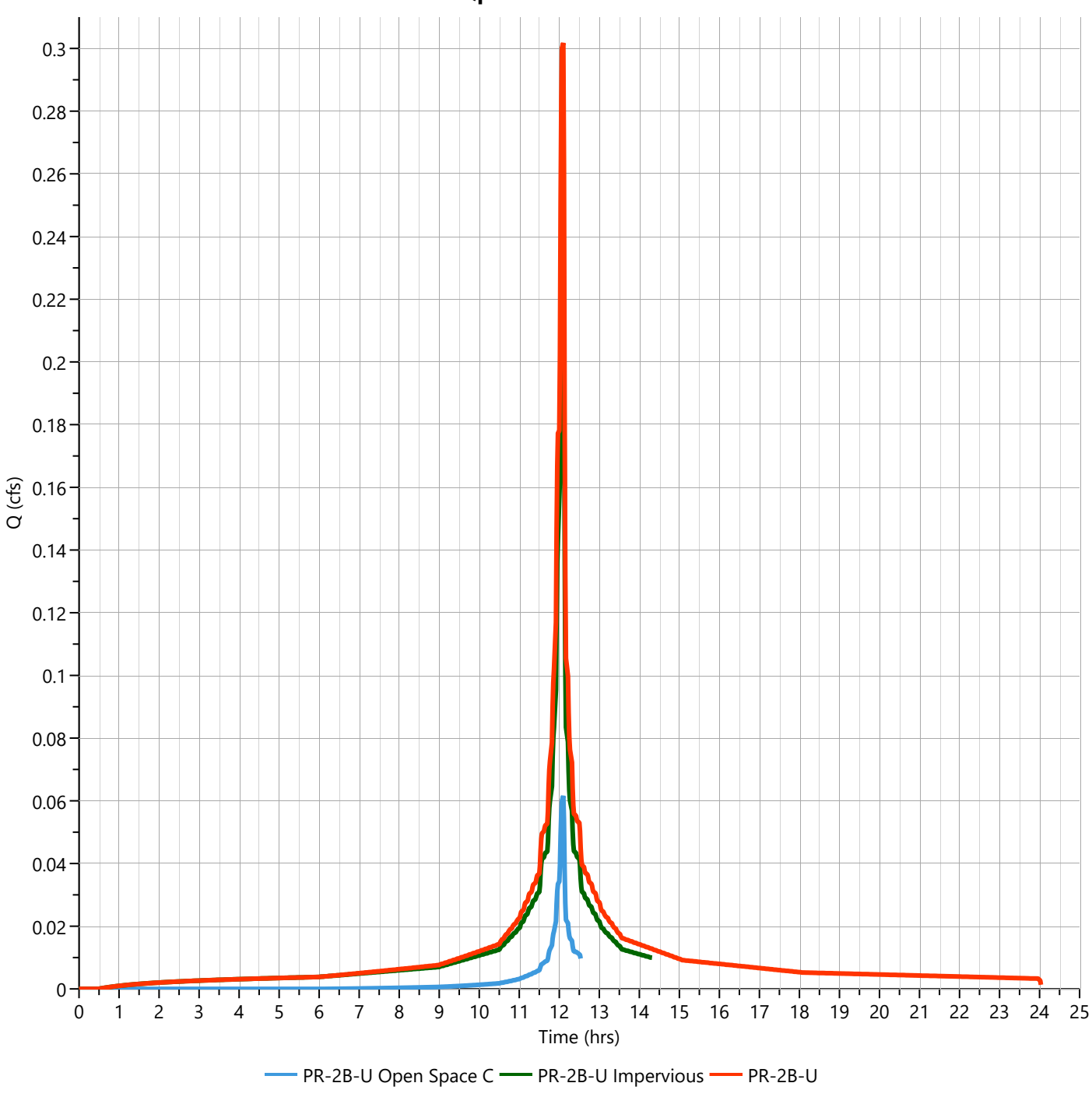
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B-U

Hyd. No. 54

Hydrograph Type	= Junction	Peak Flow	= 0.302 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 977 cuft
Inflow Hydrographs	= 52, 53	Total Contrib. Area	= 0.04 ac



Hydrograph Report

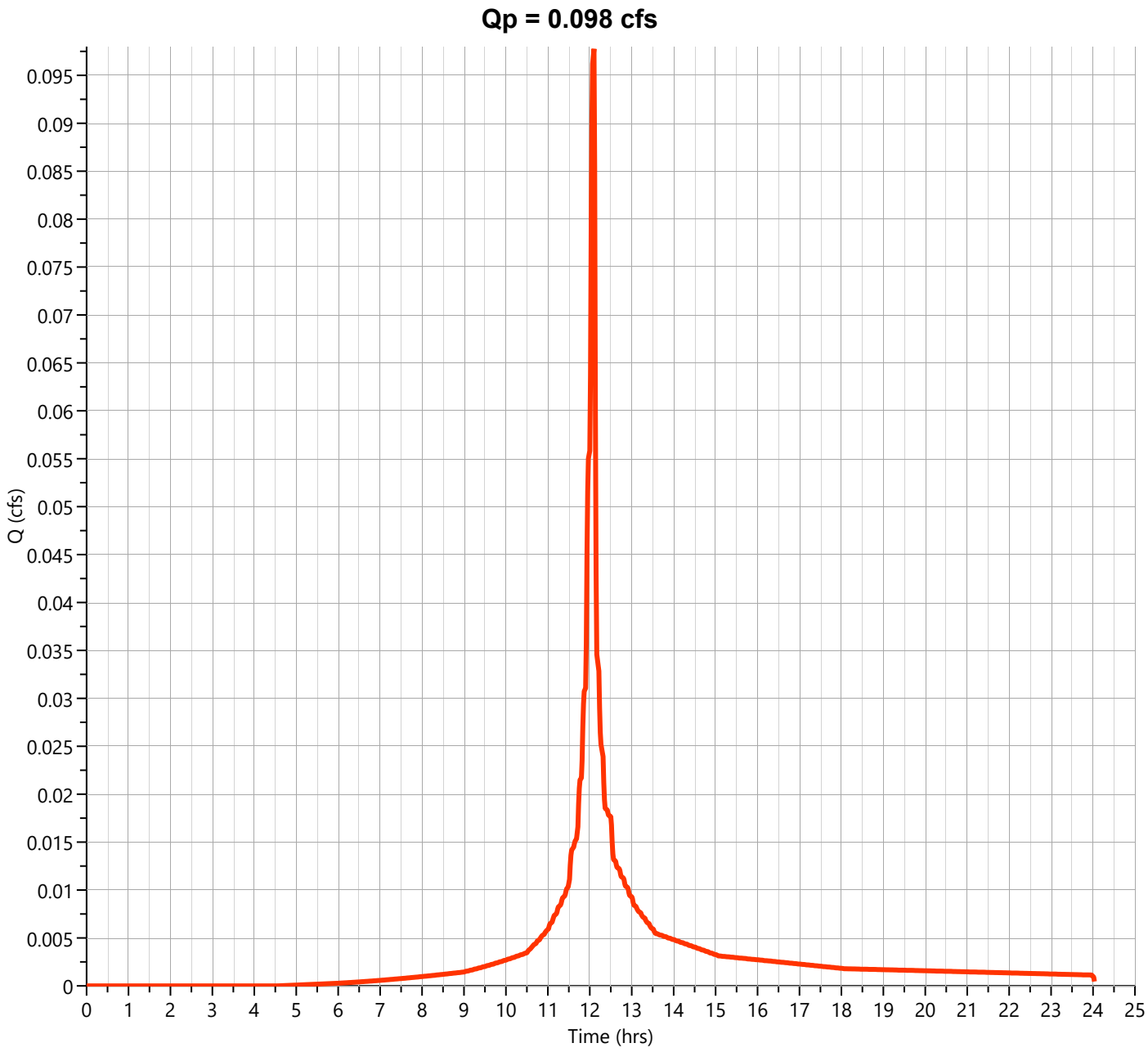
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B-U Open Space C

Hyd. No. 52

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.098 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 280 cuft
Drainage Area	= 0.01 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

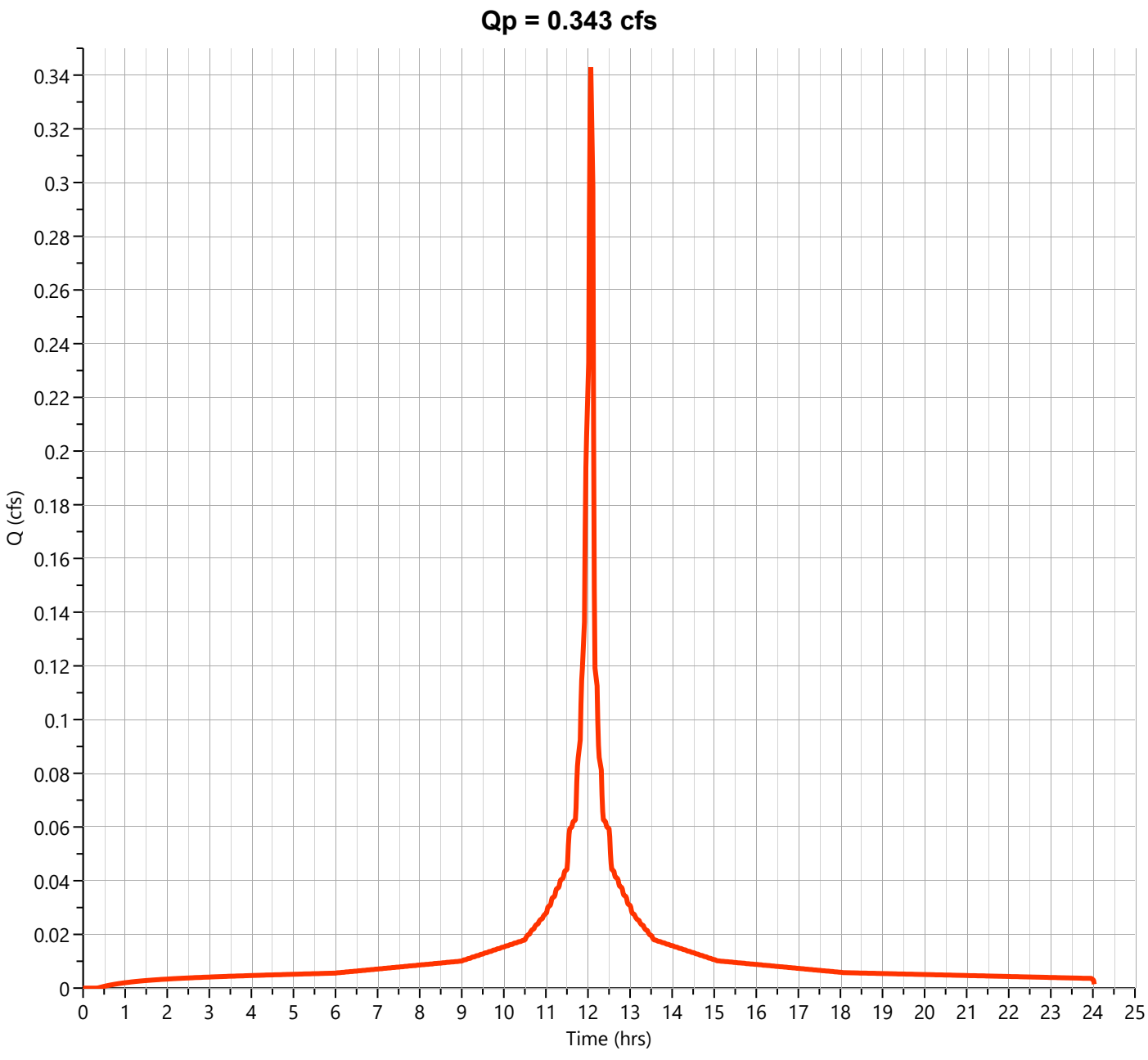
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B-U Impervious

Hyd. No. 53

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.343 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,160 cuft
Drainage Area	= 0.03 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

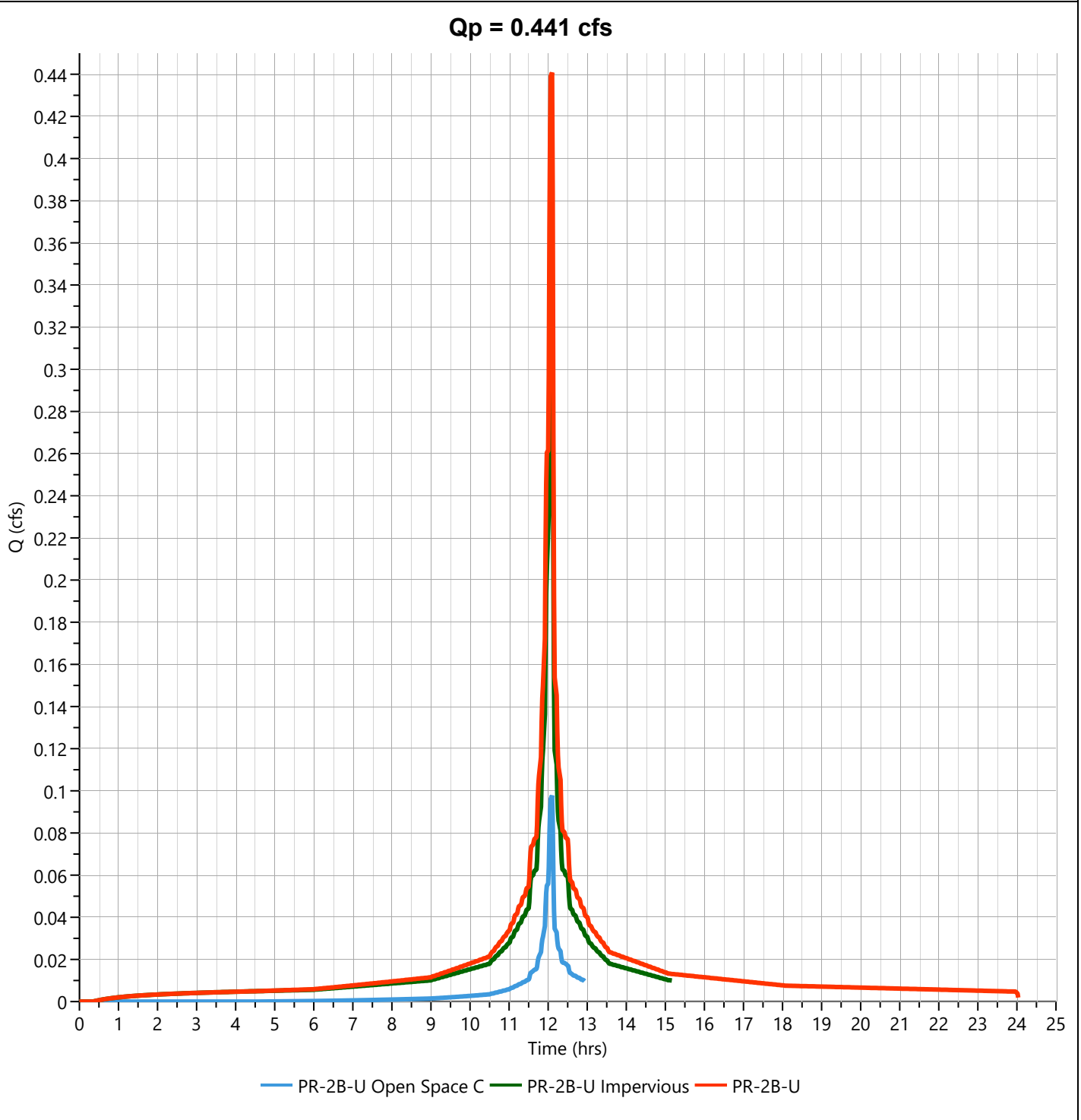
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B-U

Hyd. No. 54

Hydrograph Type	= Junction	Peak Flow	= 0.441 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,440 cuft
Inflow Hydrographs	= 52, 53	Total Contrib. Area	= 0.04 ac



PR-2B WATERSHED
(COMBINED PROPOSED FLOW TO PAPS-1)

Hydrograph Report

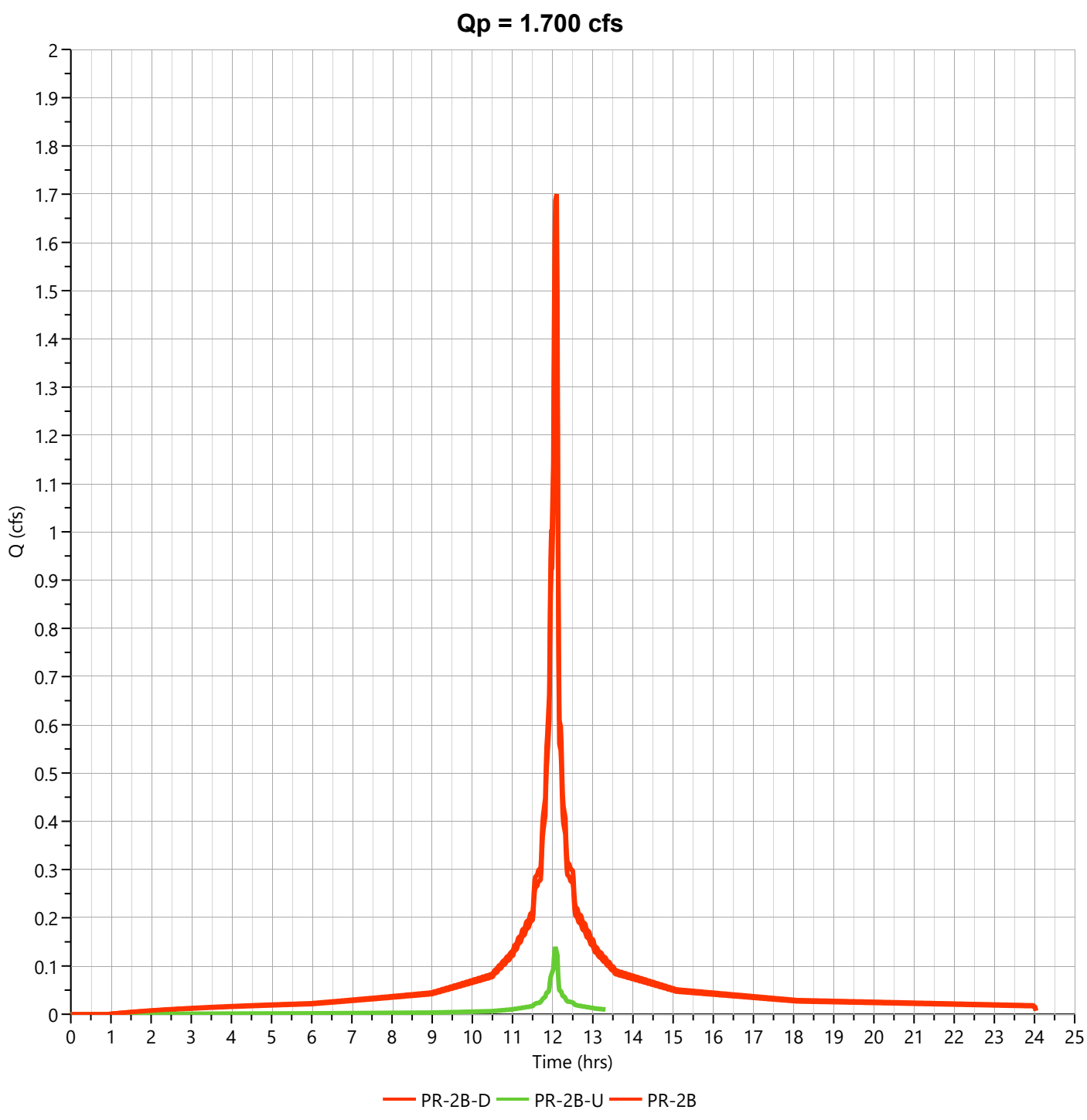
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B

Hyd. No. 56

Hydrograph Type	= Junction	Peak Flow	= 1.700 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 5,520 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

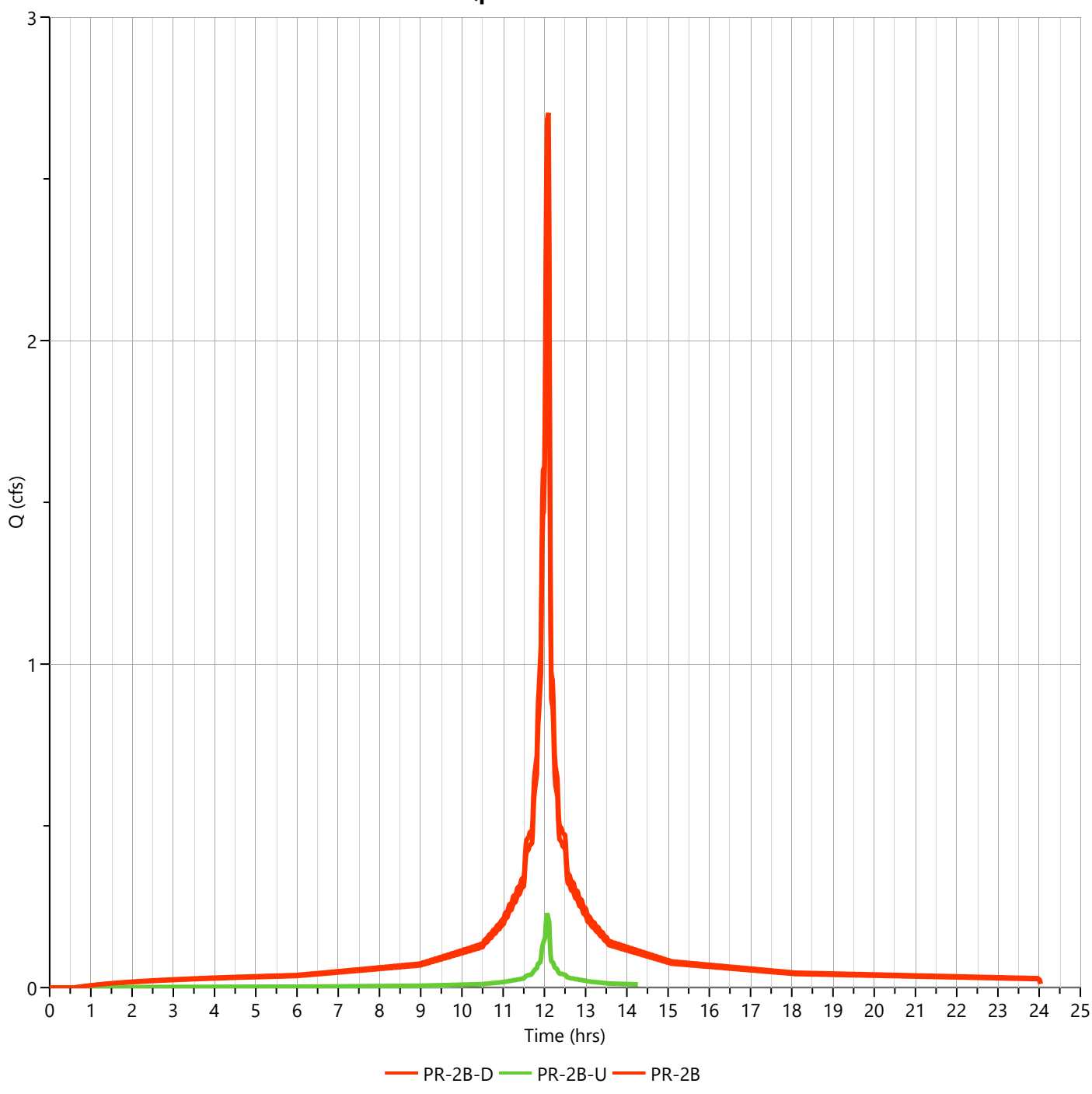
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B

Hyd. No. 56

Hydrograph Type	= Junction	Peak Flow	= 2.704 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 8,914 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

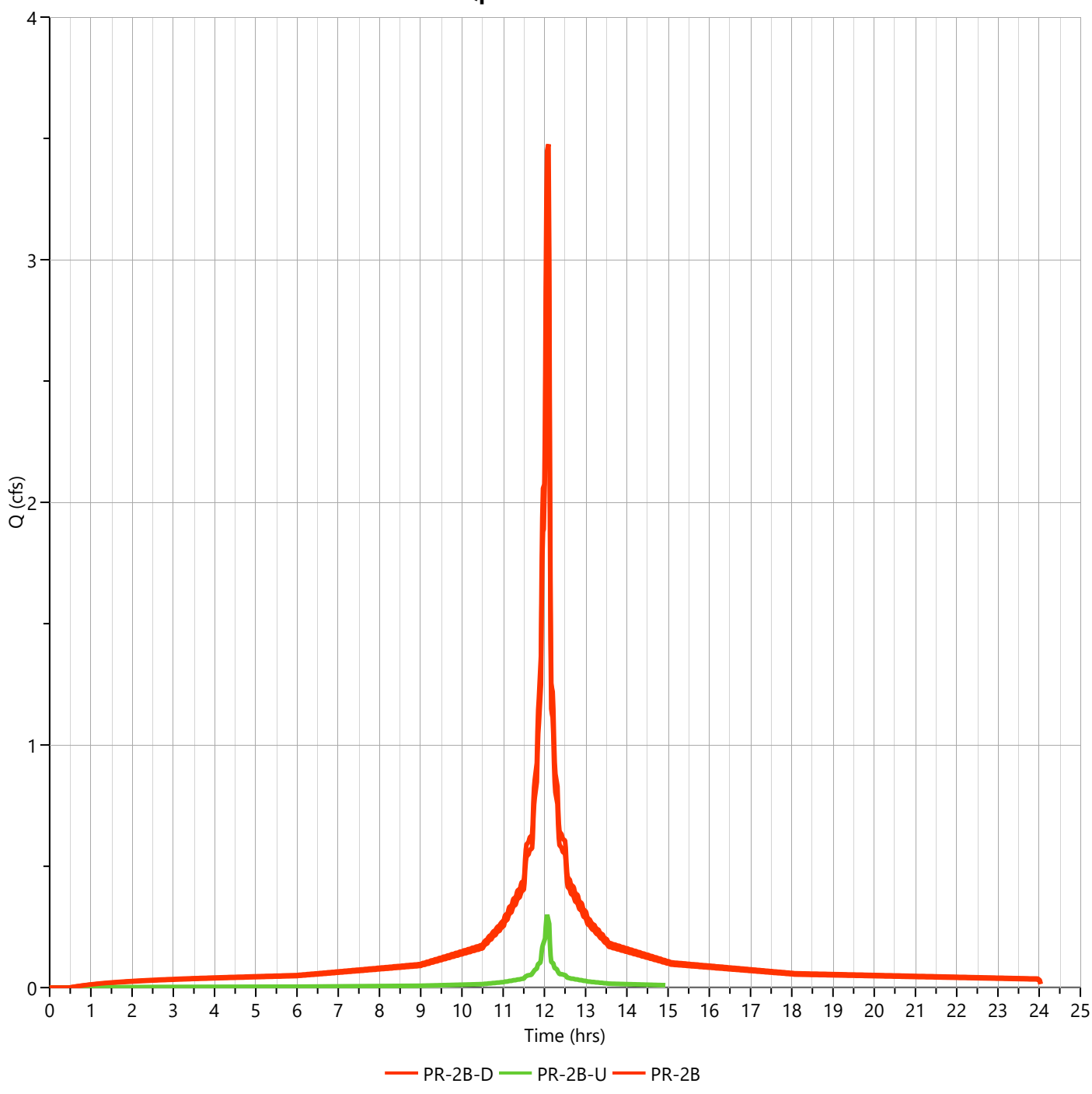
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B

Hyd. No. 56

Hydrograph Type	= Junction	Peak Flow	= 3.476 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 11,538 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

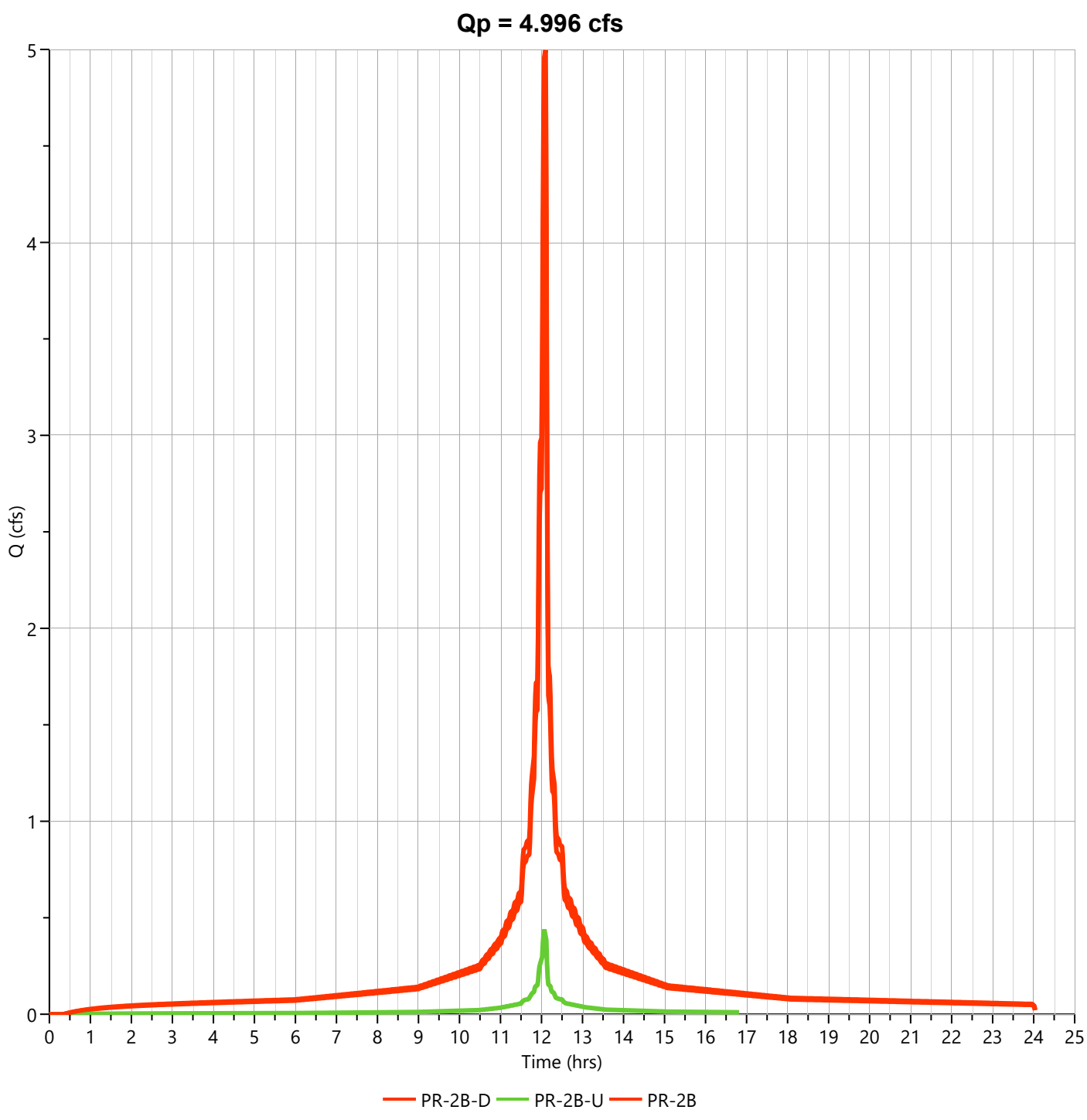
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2B

Hyd. No. 56

Hydrograph Type	= Junction	Peak Flow	= 4.996 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 16,729 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



PR-2C-DISTURBED WATERSHED

Project: Eagle Rock Avenue | **By:** TEG | **Date:** 10/21/2025

Location: West Orange, NJ | **Checked By:** MJV | **Date Checked:** 10/21/2025

Circle One: Present (**Developed**) — **Future Proposed Watershed PR-2C-D - 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	20		
4.	Two-year 24-hr rainfall, P_2		in	4.08		
5.	Land Slope, s		ft/ft	0.011		
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	2		
8.	Surface Description			Pavement		
9.	Flow Length, L		ft	69		
10.	Watercourse Slope, s		ft/ft	0.010		
11.	Average Velocity, V (NEH table 15-3)		ft/s	2.03		
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	4	5
13.	Flow Length, L		ft	107	46	51
14.	Cross Sectional flow area, a		ft^2	0.61	0.61	0.61
15.	Wetted Perimeter, P_w		ft	2.00	2.00	2.00
16.	Hydraulic Radius, r	$r = a / P_w$	ft	0.31	0.31	0.31
17.	Channel Slope, s		ft/ft	0.005	0.008	0.010
18.	Manning's Roughness Coeff., n			0.013	0.013	0.013
19.	Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	3.69	4.52	5.21
20.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.008	0.003	0.003

Channel Flow Sub-Total: **0.014 hours**

Channel Flow

			Segment ID	6	7	8
21.	Flow Length, L		ft	267	52	125
22.	Cross Sectional flow area, a		ft^2	0.88	0.88	0.88
23.	Wetted Perimeter, P_w		ft	2.40	2.40	2.40
24.	Hydraulic Radius, r	$r = a / P_w$	ft	0.37	0.37	0.37
25.	Channel Slope, s		ft/ft	0.005	0.012	0.013
26.	Manning's Roughness Coeff., n			0.013	0.013	0.013
27.	Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	4.15	6.56	6.69
28.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.018	0.002	0.005

Channel Flow Sub-Total: **0.025 hours**

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

Total Tc (hours) =	**0.055 hours**
Total Tc (minutes) =	**3 minutes**

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: Present **(Developed)** — **Future Proposed Watershed PR-2C-D - 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	15		
4.	Two-year 24-hr rainfall, P_2		in	4.08		
5.	Land Slope, s		ft/ft	0.812		
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	0.010	+	+

Sheet Flow Sub-Total: **0.010 hours**

Shallow Concentrated Flow

			Segment ID	2		
8.	Surface Description			Grassed Waterways		
9.	Flow Length, L		ft	165		
10.	Watercourse Slope, s		ft/ft	0.092		
11.	Average Velocity, V (NEH table 15-3)		ft/s	4.91		
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	4	5
13.	Flow Length, L		ft	11	24	32
14.	Cross Sectional flow area, a		ft^2	0.61	0.61	0.61
15.	Wetted Perimeter, P_w		ft	2.00	2.00	2.00
16.	Hydraulic Radius, r	$r = a / P_w$	ft	0.31	0.31	0.31
17.	Channel Slope, s		ft/ft	0.020	0.005	0.032
18.	Manning's Roughness Coeff., n			0.012	0.012	0.013
19.	Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	7.99	3.99	9.35
20.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.000	+ 0.002	+ 0.001

Channel Flow Sub-Total: **0.003 hours**

Channel Flow

			Segment ID	6	7	8
21.	Flow Length, L		ft	267	52	125
22.	Cross Sectional flow area, a		ft^2	0.88	0.88	0.88
23.	Wetted Perimeter, P_w		ft	2.40	2.40	2.40
24.	Hydraulic Radius, r	$r = a / P_w$	ft	0.37	0.37	0.37
25.	Channel Slope, s		ft/ft	0.005	0.012	0.013
26.	Manning's Roughness Coeff., n			0.013	0.013	0.013
27.	Velocity, V	$V = (1.49\ r^{2/3} s^{1/2}) / n$	ft/s	4.14	6.56	6.70
28.	Compute T_t	$T_t = \frac{L}{3600\ V}$	hr	0.018	+ 0.002	+ 0.005

Channel Flow Sub-Total: **0.025 hours**

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

Total Tc (hours) =	**0.048 hours**
Total Tc (minutes) =	**3 minutes**

Hydrograph Report

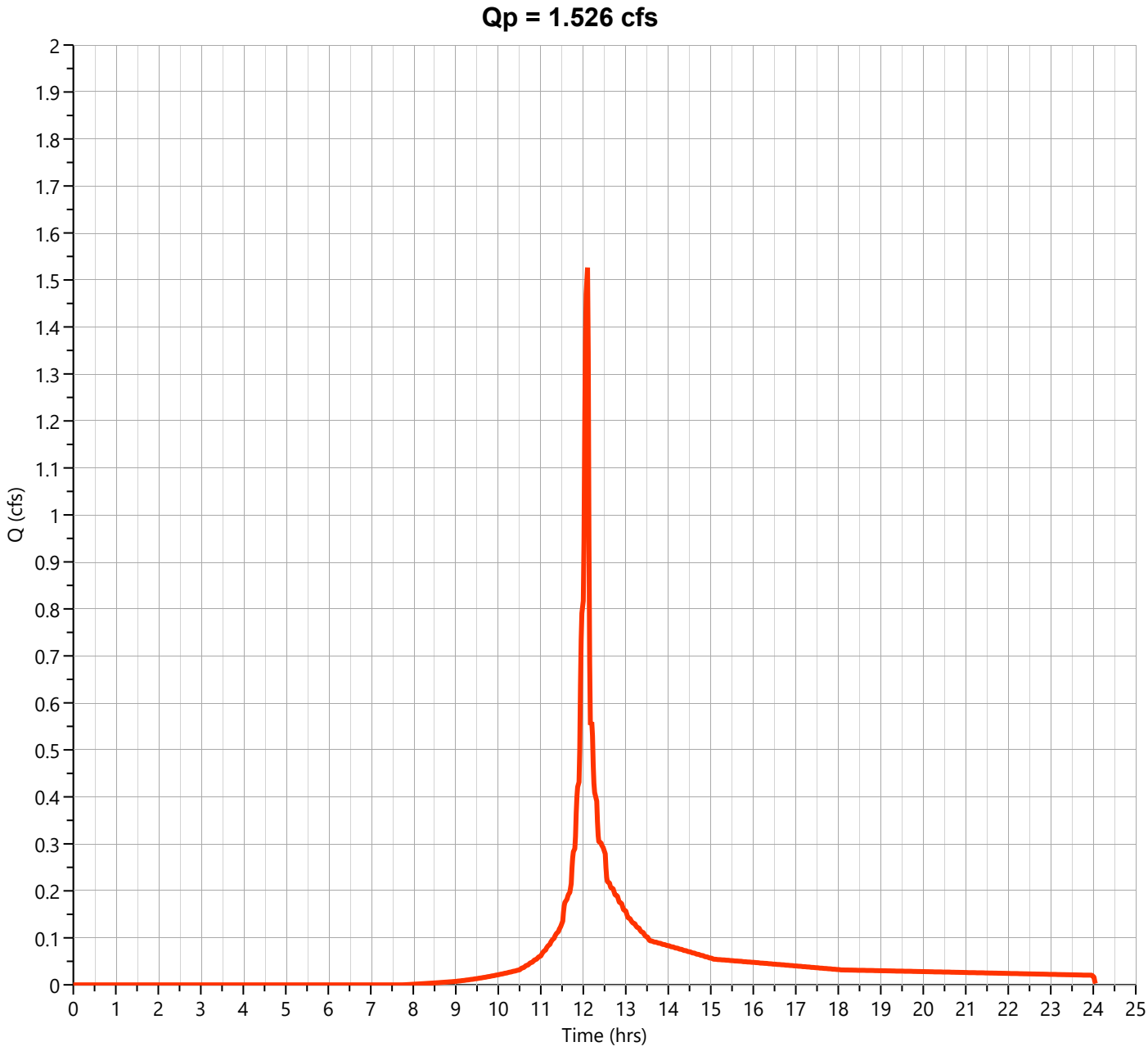
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-D Open Space D

Hyd. No. 59

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.526 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 4,161 cuft
Drainage Area	= 0.58 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

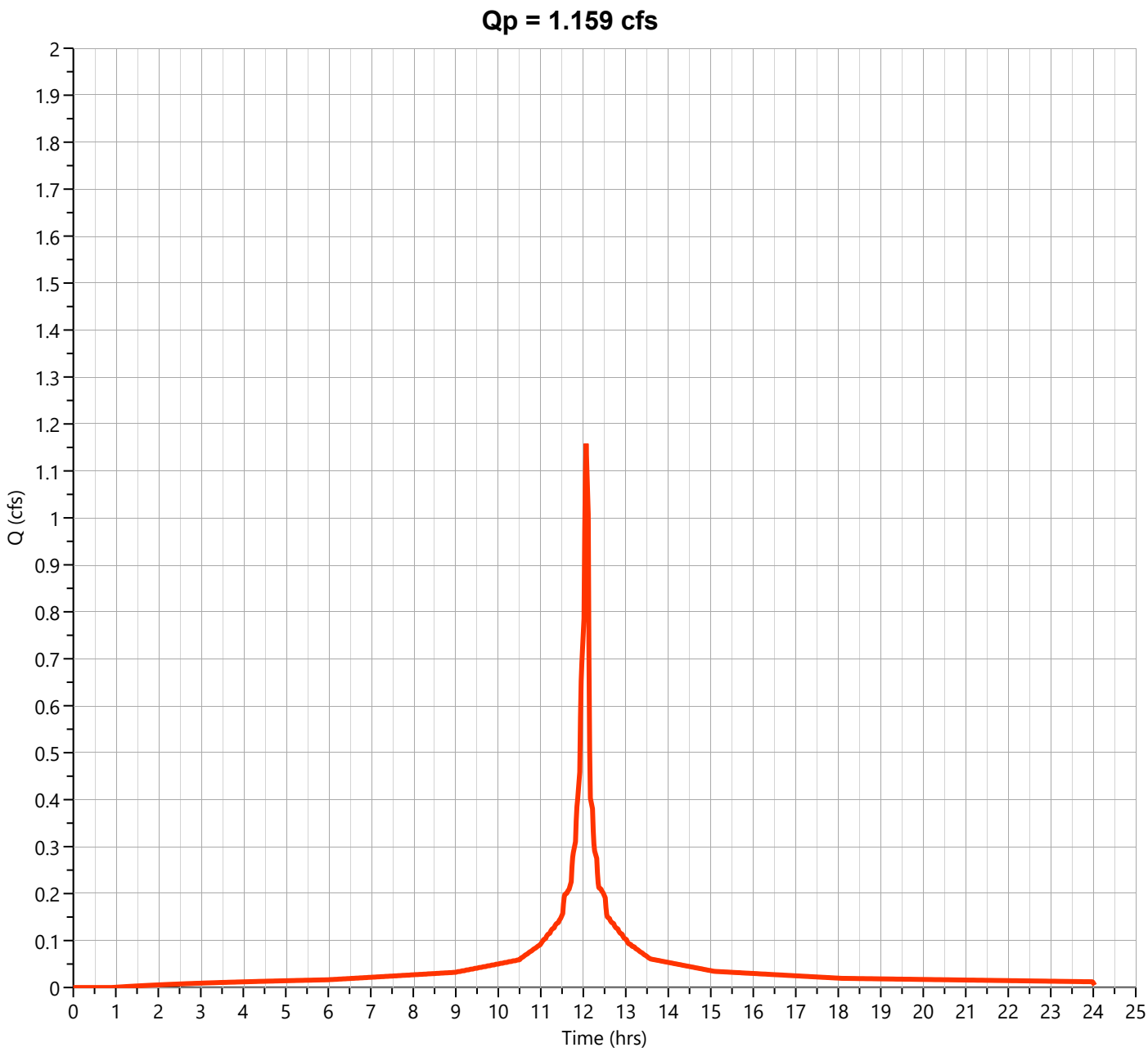
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-D Impervious

Hyd. No. 60

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.159 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 3,795 cuft
Drainage Area	= 0.29 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

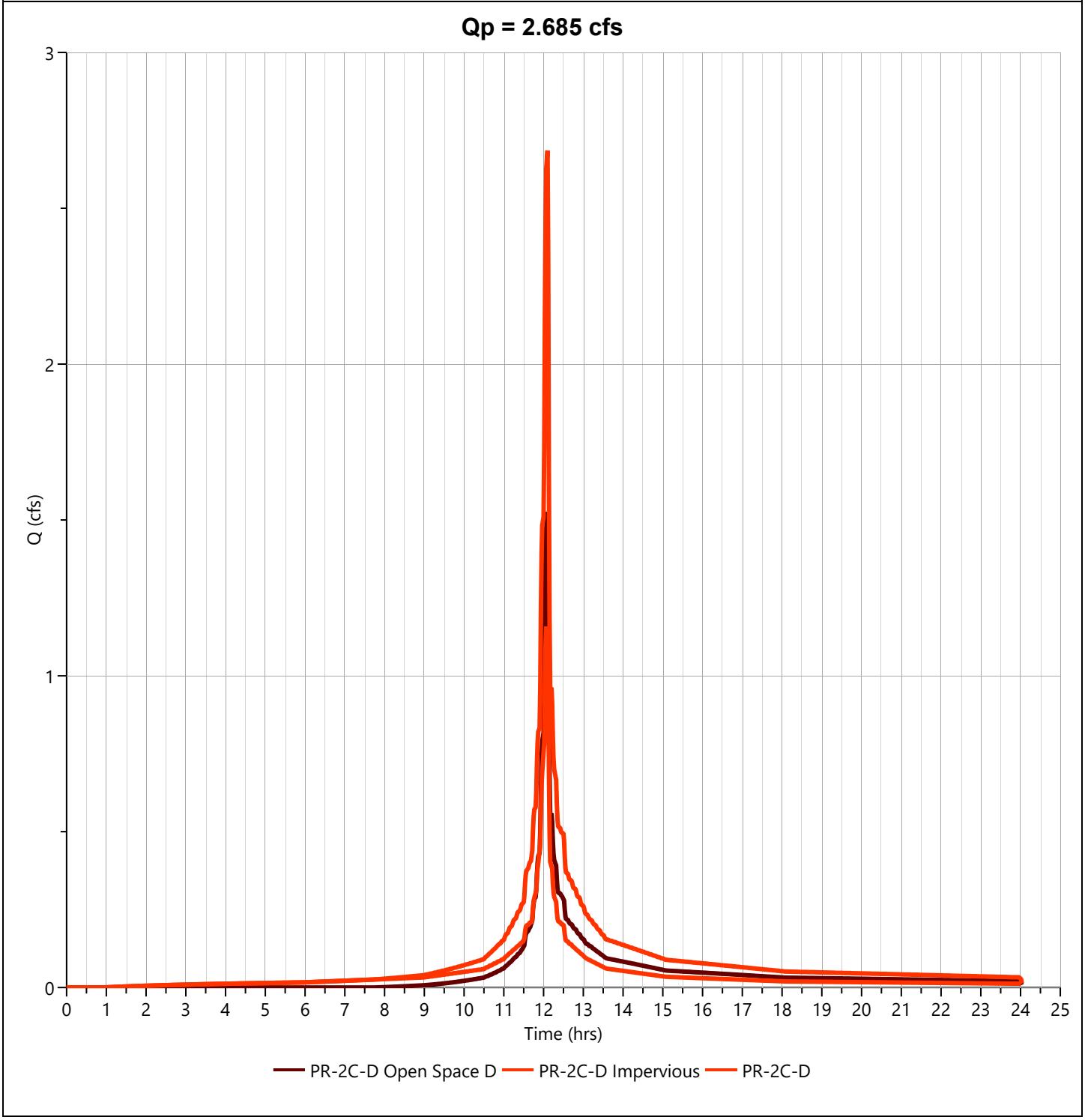
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-D

Hyd. No. 61

Hydrograph Type	= Junction	Peak Flow	= 2.685 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 7,955 cuft
Inflow Hydrographs	= 59, 60	Total Contrib. Area	= 0.87 ac



Hydrograph Report

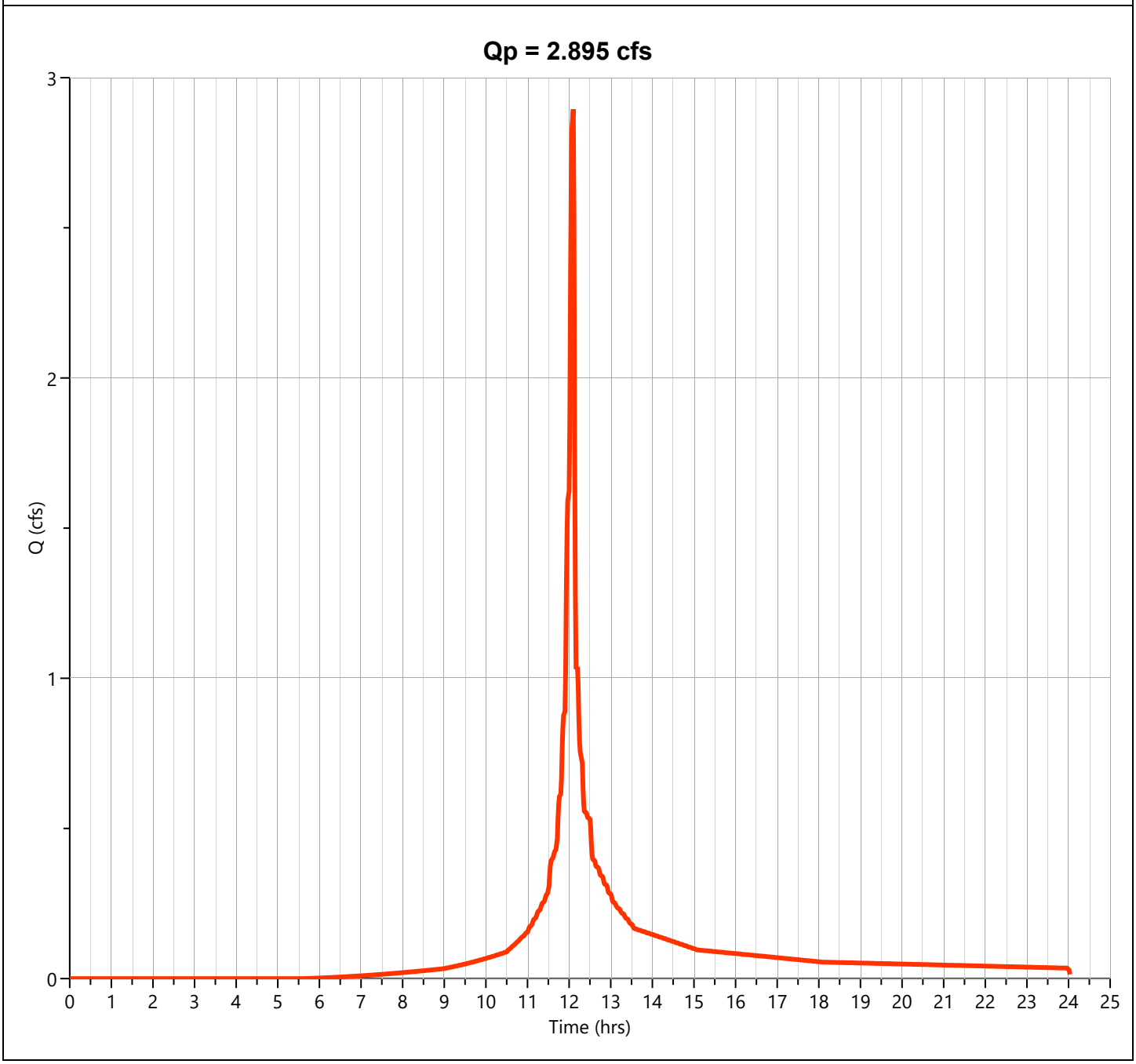
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-D Open Space D

Hyd. No. 59

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.895 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 8,126 cuft
Drainage Area	= 0.58 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

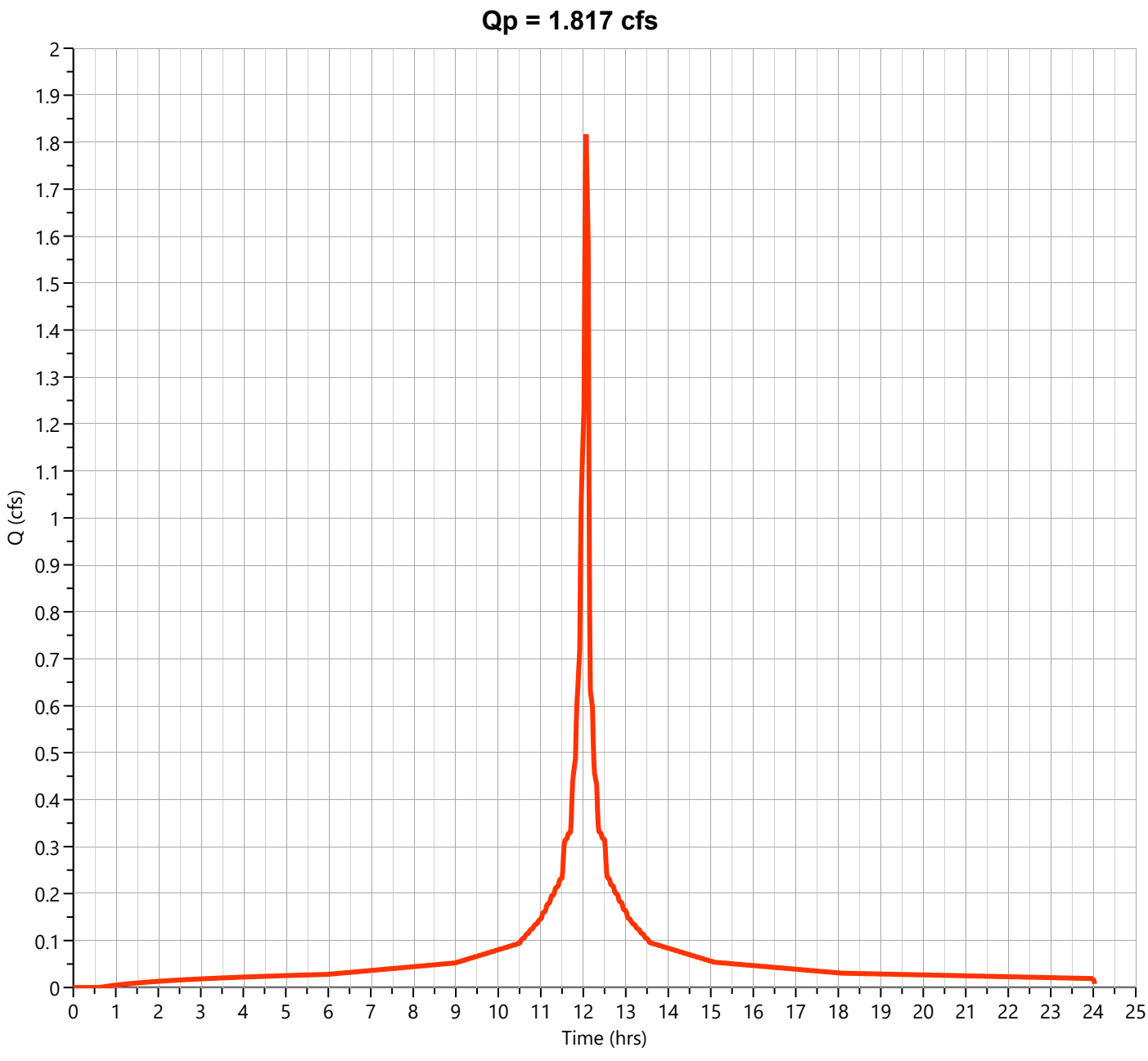
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-D Impervious

Hyd. No. 60

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.817 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 6,051 cuft
Drainage Area	= 0.29 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

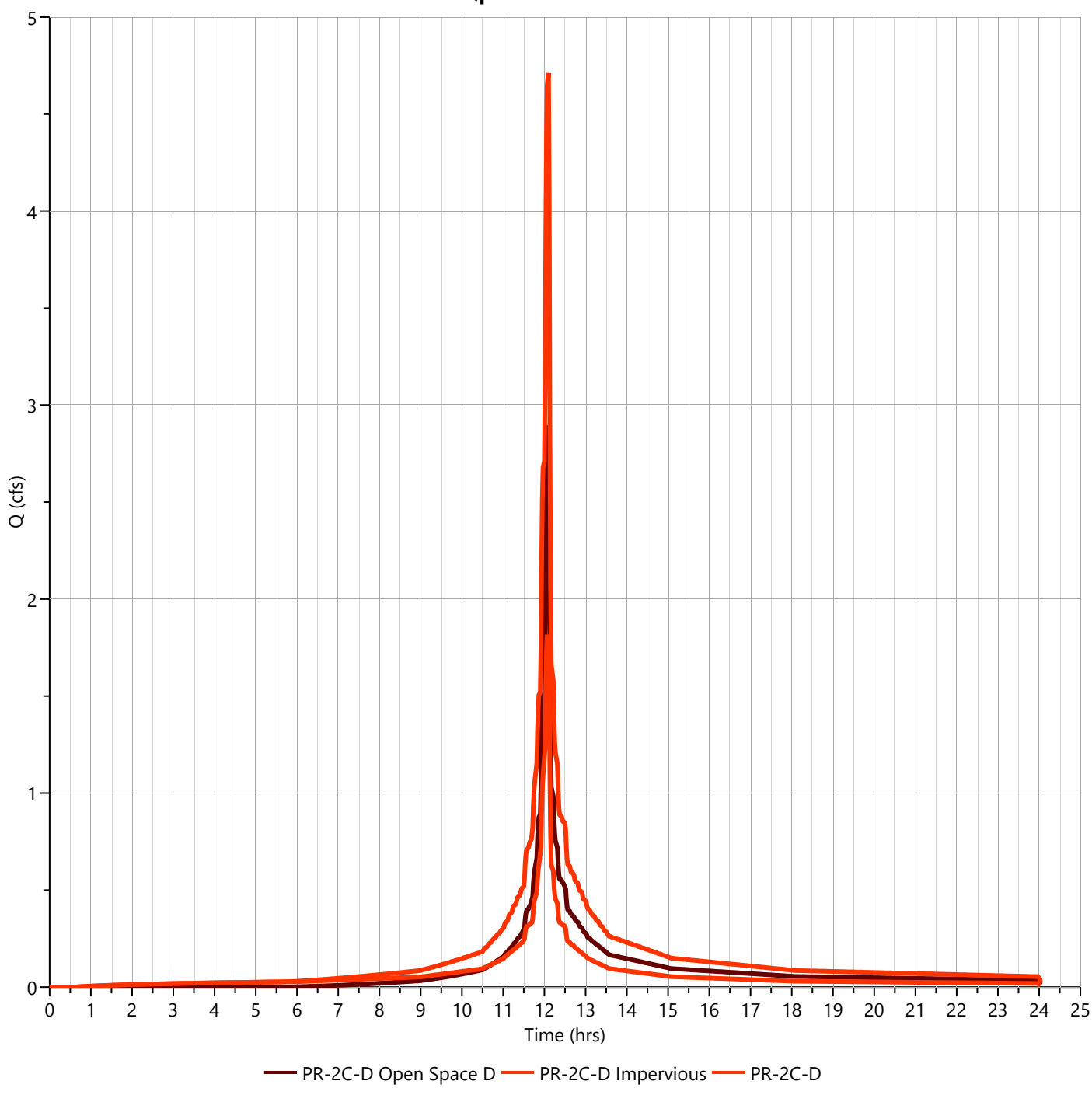
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-D

Hyd. No. 61

Hydrograph Type	= Junction	Peak Flow	= 4.712 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 14,177 cuft
Inflow Hydrographs	= 59, 60	Total Contrib. Area	= 0.87 ac



Hydrograph Report

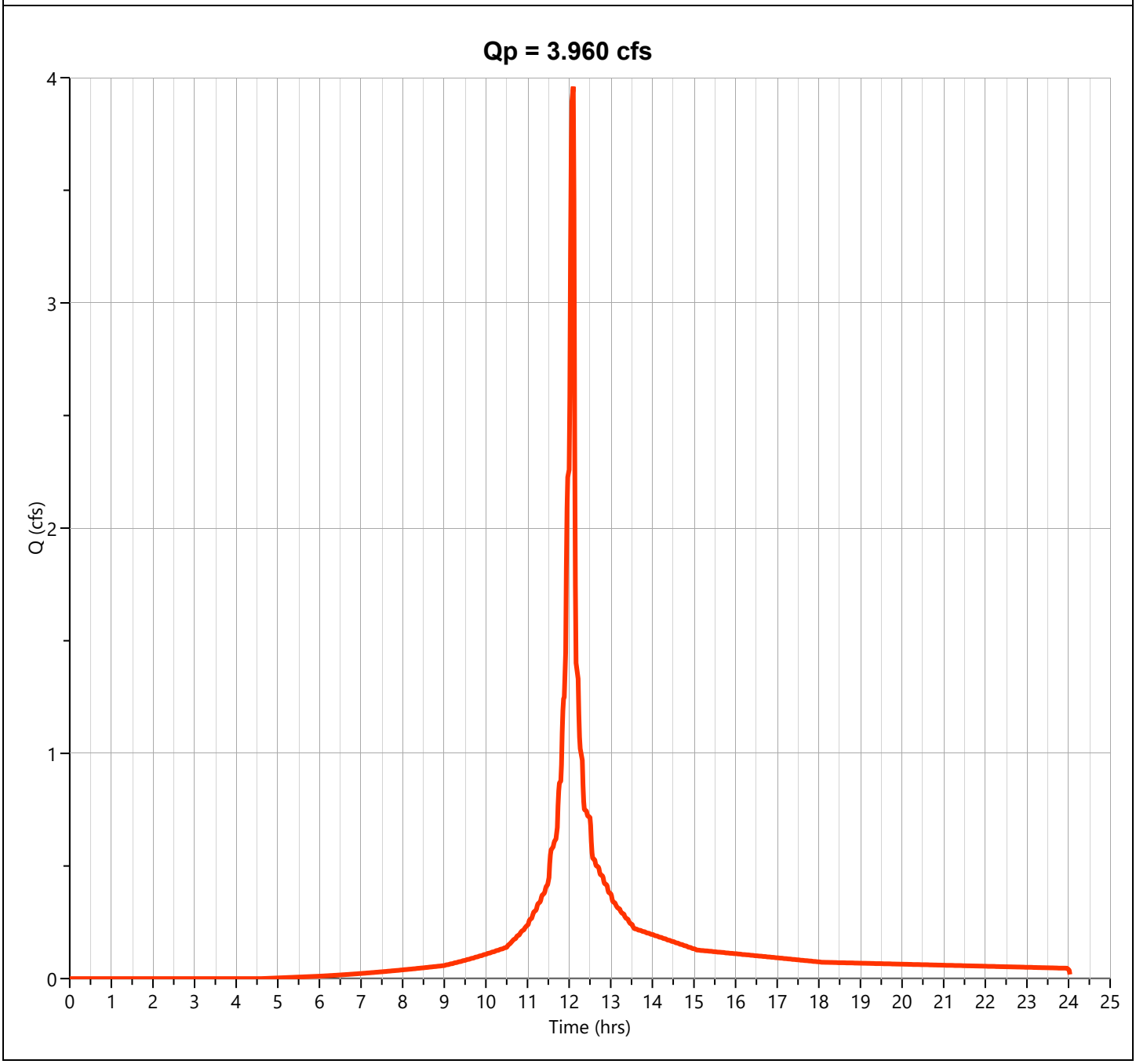
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-D Open Space D

Hyd. No. 59

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.960 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 11,343 cuft
Drainage Area	= 0.58 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

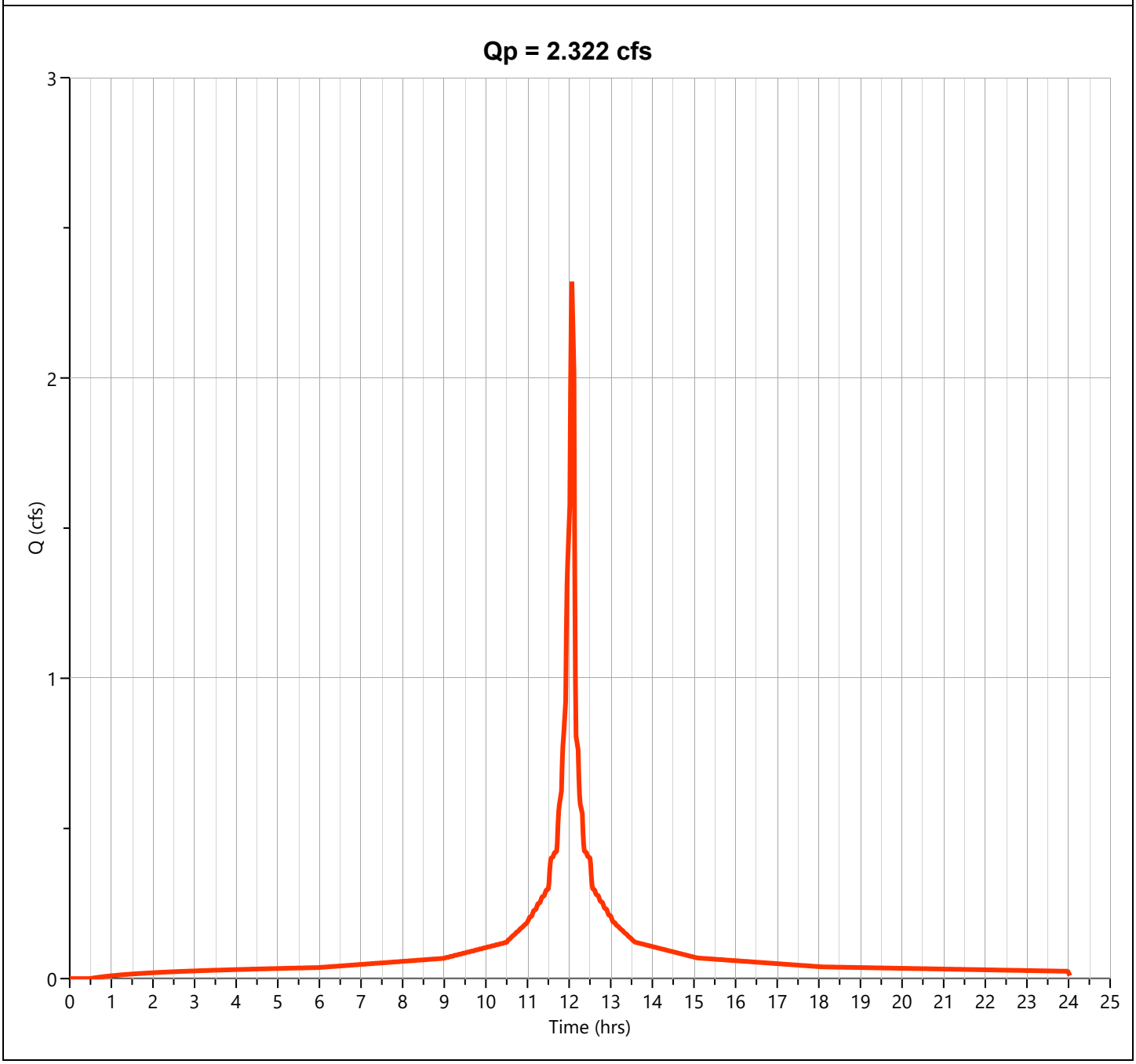
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-D Impervious

Hyd. No. 60

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.322 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 7,787 cuft
Drainage Area	= 0.29 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

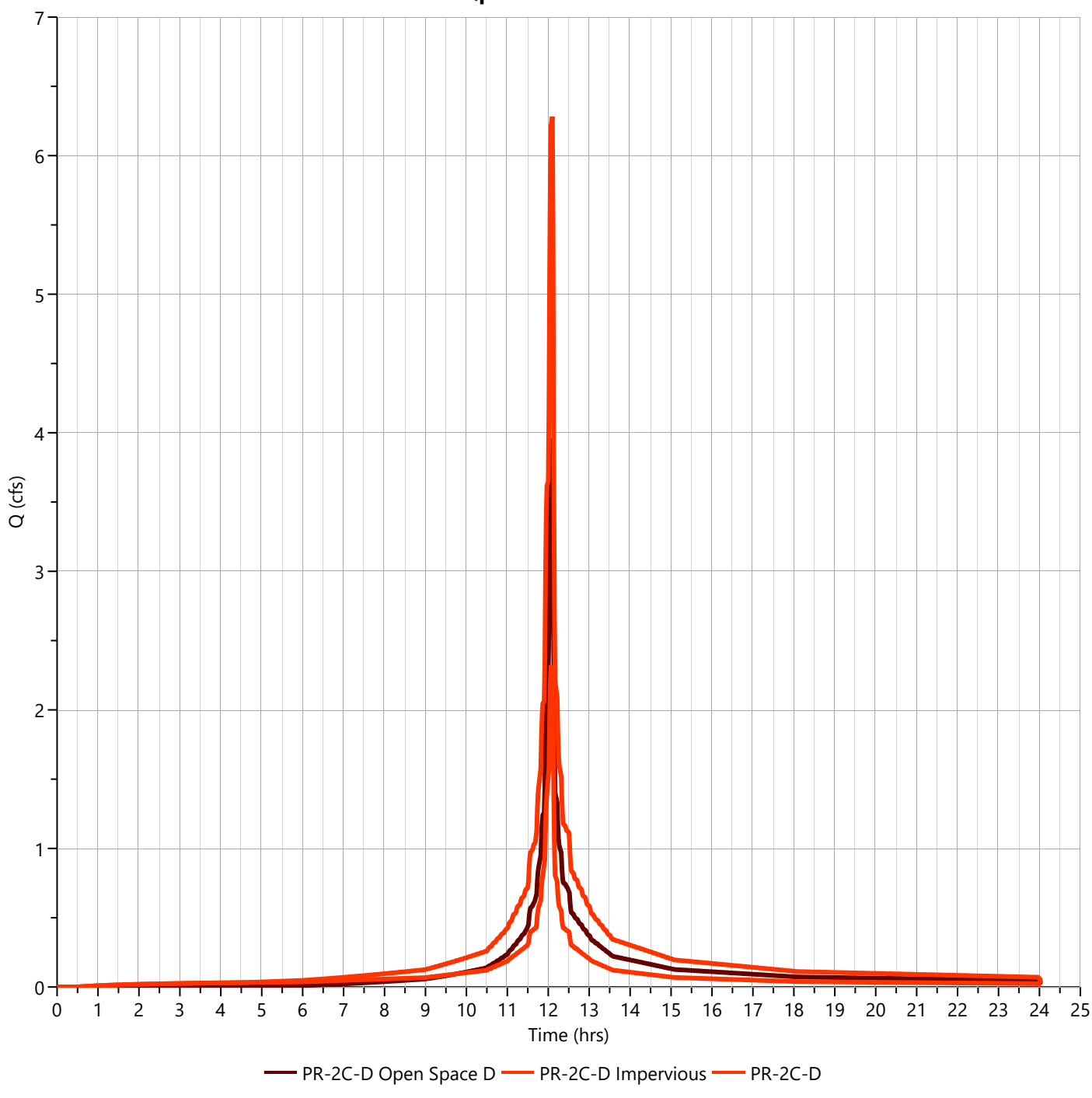
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-D

Hyd. No. 61

Hydrograph Type	= Junction	Peak Flow	= 6.281 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 19,130 cuft
Inflow Hydrographs	= 59, 60	Total Contrib. Area	= 0.87 ac



Hydrograph Report

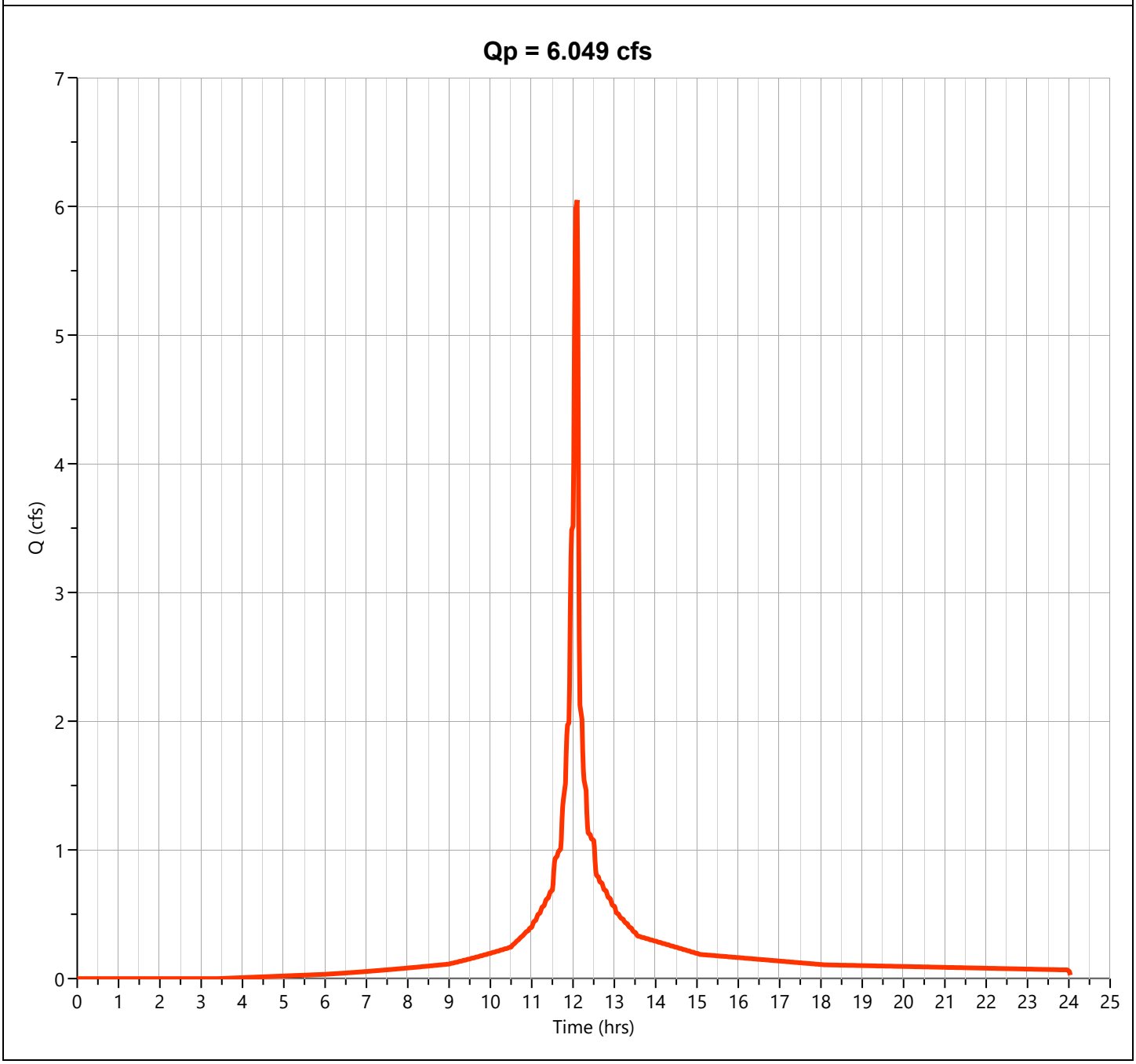
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-D Open Space D

Hyd. No. 59

Hydrograph Type	= NRCS Runoff	Peak Flow	= 6.049 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 17,882 cuft
Drainage Area	= 0.58 ac	Curve Number	= 80.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

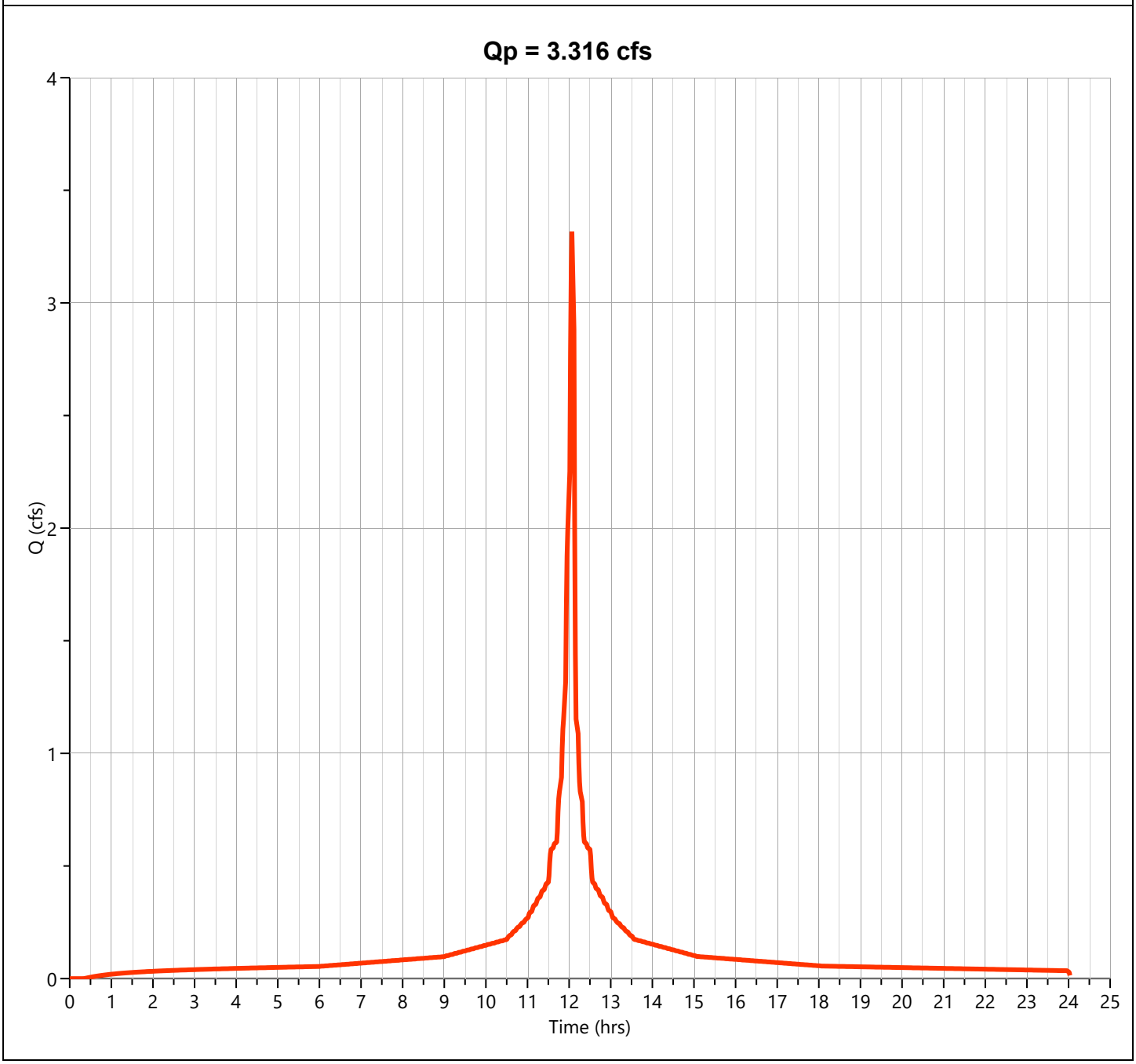
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-D Impervious

Hyd. No. 60

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.316 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 11,210 cuft
Drainage Area	= 0.29 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 3.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

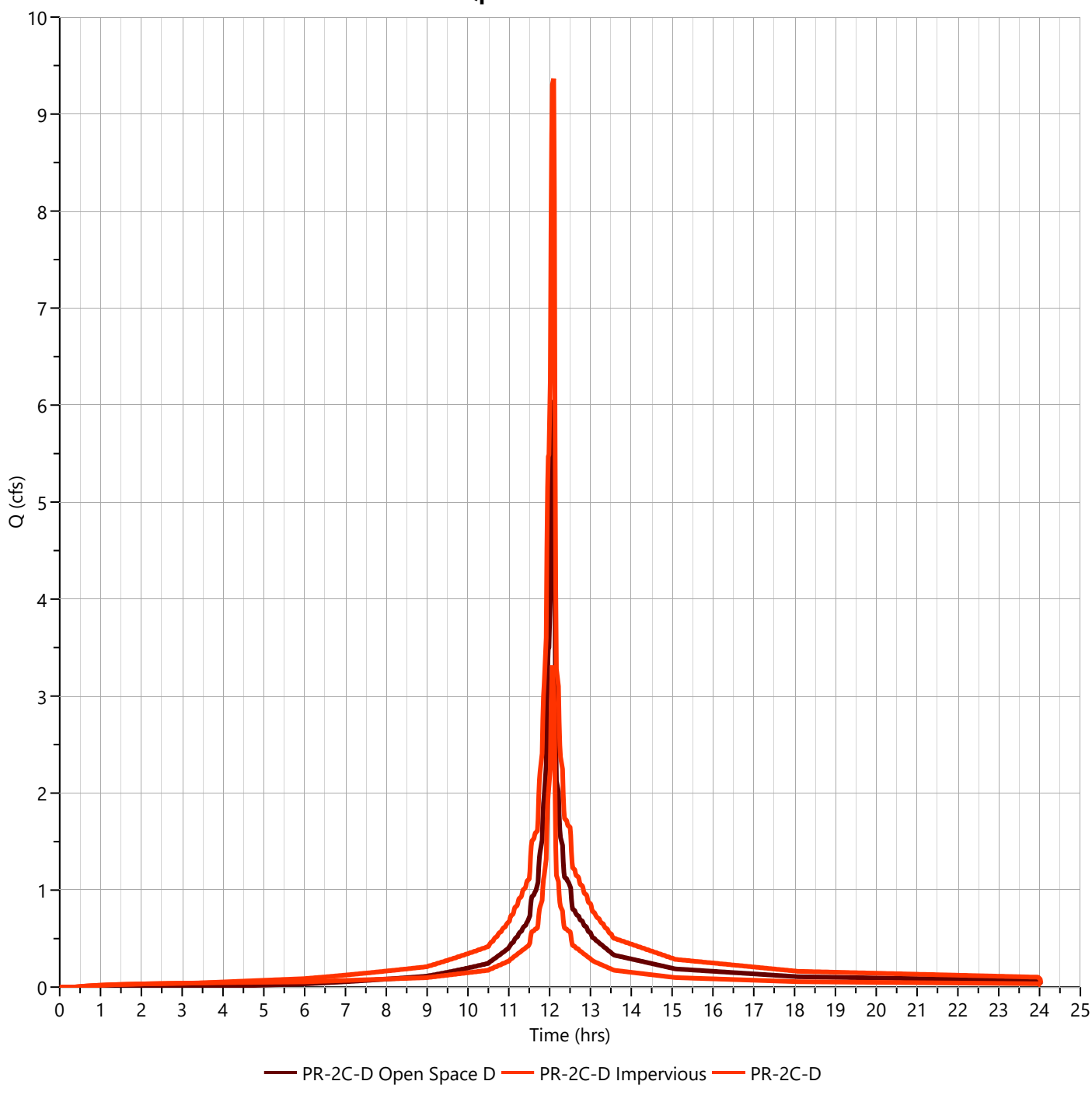
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-D

Hyd. No. 61

Hydrograph Type	= Junction	Peak Flow	= 9.365 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 29,092 cuft
Inflow Hydrographs	= 59, 60	Total Contrib. Area	= 0.87 ac



PR-2C-UNDISTURBED WATERSHED

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: (**Present**) Developed — **Future Proposed Watershed PR-2C-U 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)

$$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$$

			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	89				
4.	Two-year 24-hr rainfall, P_2		in	4.08				
5.	Land Slope, s		ft/ft	0.089				
6.	Compute T_t		hr	0.009	+		+	
						Sheet Flow Sub-Total		0.009 hours

Shallow Concentrated Flow

$$T_t = \frac{L}{3600\,V}$$

			Segment ID	2				
7.	Surface Description			Pavement				
8.	Flow Length, L		ft	29				
9.	Watercourse Slope, s		ft/ft	0.010				
10.	Average Velocity, V (NEH table 15-3)		ft/s	2.05				
11.	Compute T_t		hr	0.004	+		+	
						Shallow Conc. Flow Sub-Total		0.004 hours

Channel Flow

$$r = a / P_w$$

$$V = (1.49\, r^{2/3} s^{1/2}) / n$$

$$T_t = \frac{L}{3600\,V}$$

			Segment ID	3		4		5
12.	Flow Length, L		ft	157		36		139
13.	Cross Sectional flow area, a		ft^2	0.61		0.61		0.61
14.	Wetted Perimeter, P_w		ft	2.00		2.00		2.00
15.	Hydraulic Radius, r		ft	0.31		0.31		0.31
16.	Channel Slope, s		ft/ft	0.028		0.080		0.040
17.	Manning's Roughness Coeff., n			0.012		0.012		0.012
18.	Velocity, V		ft/s	9.34		15.91		11.25
19.	Compute T_t		hr	0.005	+	0.001	+	0.003
						Channel Flow Sub-Total		0.009 hours

Channel Flow

$$r = a / P_w$$

$$V = (1.49\, r^{2/3} s^{1/2}) / n$$

$$T_t = \frac{L}{3600\,V}$$

			Segment ID	6		7		8
20.	Flow Length, L		ft	79		54		195
21.	Cross Sectional flow area, a		ft^2	0.61		0.61		0.88
22.	Wetted Perimeter, P_w		ft	2.00		2.00		2.40
23.	Hydraulic Radius, r		ft	0.31		0.31		0.37
24.	Channel Slope, s		ft/ft	0.020		0.015		0.013
25.	Manning's Roughness Coeff., n			0.012		0.012		0.013
26.	Velocity, V		ft/s	7.96		6.89		6.71
27.	Compute T_t		hr	0.003	+	0.002	+	0.008
						Channel Flow Sub-Total		0.013 hours

Watershed or subarea T_c or T_t	Total Tc (hours) =	**0.035 hours**
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	**2 minutes**

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/21/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/21/2025**

Circle One: (**Present**) Developed — **Future Proposed Watershed PR-2C-U 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	4.08		
5.	Land Slope, s		ft/ft	0.060		
6.	Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.204	+	+

Sheet Flow Sub-Total: **0.204 hours**

Shallow Concentrated Flow

			Segment ID	2	3	4
7.	Surface Description			Woodlands	Grassed Waterways	Pavement
8.	Flow Length, L		ft	155	68	15
9.	Watercourse Slope, s		ft/ft	0.049	0.055	0.055
10.	Average Velocity, V (NEH table 15-3)		ft/s	1.12	3.80	4.78
11.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.039	+ 0.005	+ 0.001

Shallow Conc. Flow Sub-Total: **0.044 hours**

Channel Flow

			Segment ID	5	6	
12.	Flow Length, L		ft	10	125	
13.	Cross Sectional flow area, a		ft^2	0.61	0.61	
14.	Wetted Perimeter, P_w		ft	1.96	1.96	
15.	Hydraulic Radius, r	$r = a / P_w$	ft	0.31	0.31	
16.	Channel Slope, s		ft/ft	0.113	0.009	
17.	Manning's Roughness Coeff., n			0.013	0.013	
18.	Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s	17.69	5.11	
19.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.000	+ 0.007	+

Channel Flow Sub-Total: **0.007 hours**

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

Total Tc (hours) =	**0.256 hours**
Total Tc (minutes) =	**15 minutes**

Hydrograph Report

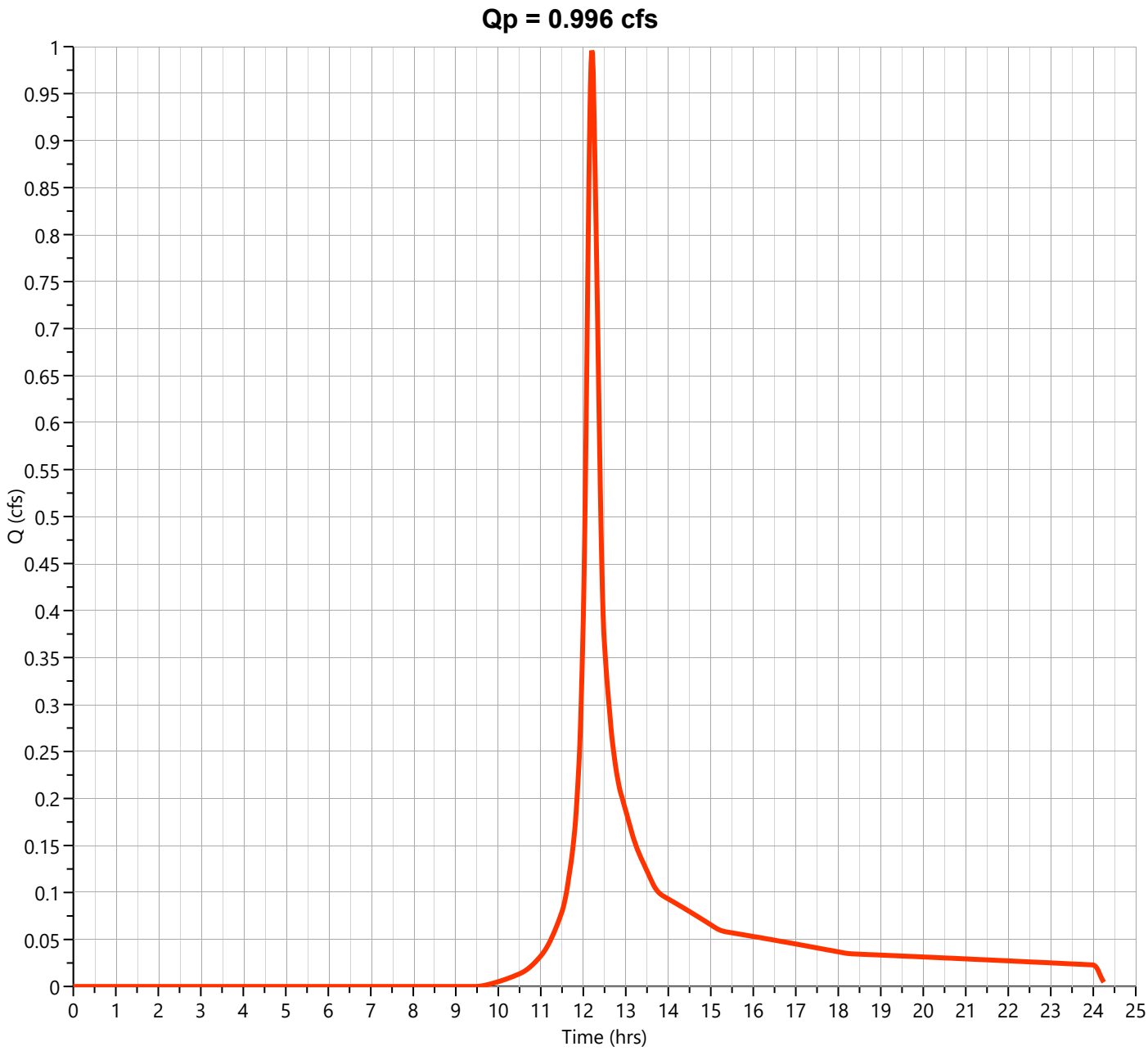
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-U Open Space C

Hyd. No. 63

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.996 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 4,086 cuft
Drainage Area	= 0.68 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

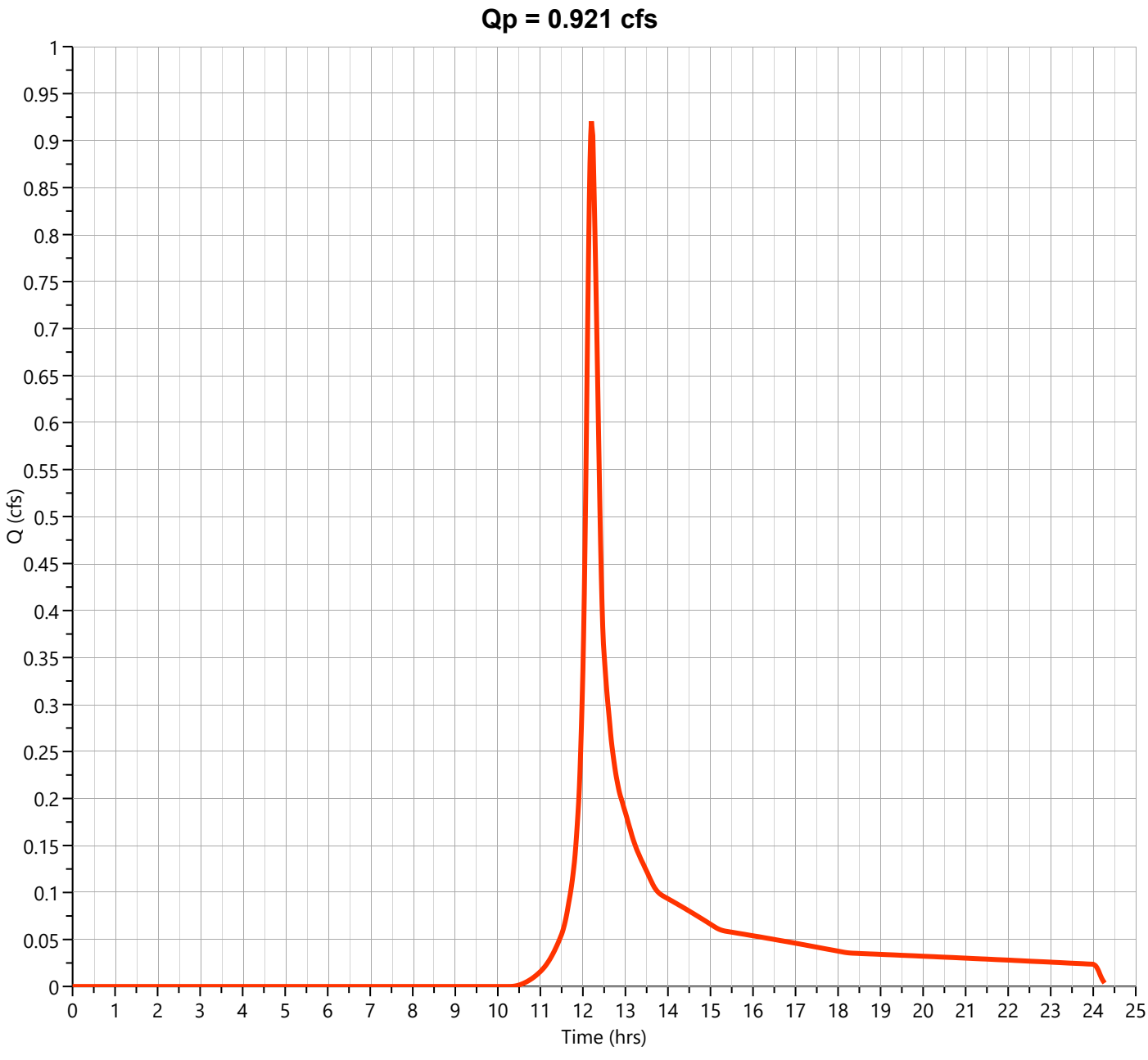
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-U Woods C

Hyd. No. 64

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.921 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.22 hrs
Time Interval	= 1 min	Runoff Volume	= 3,867 cuft
Drainage Area	= 0.77 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

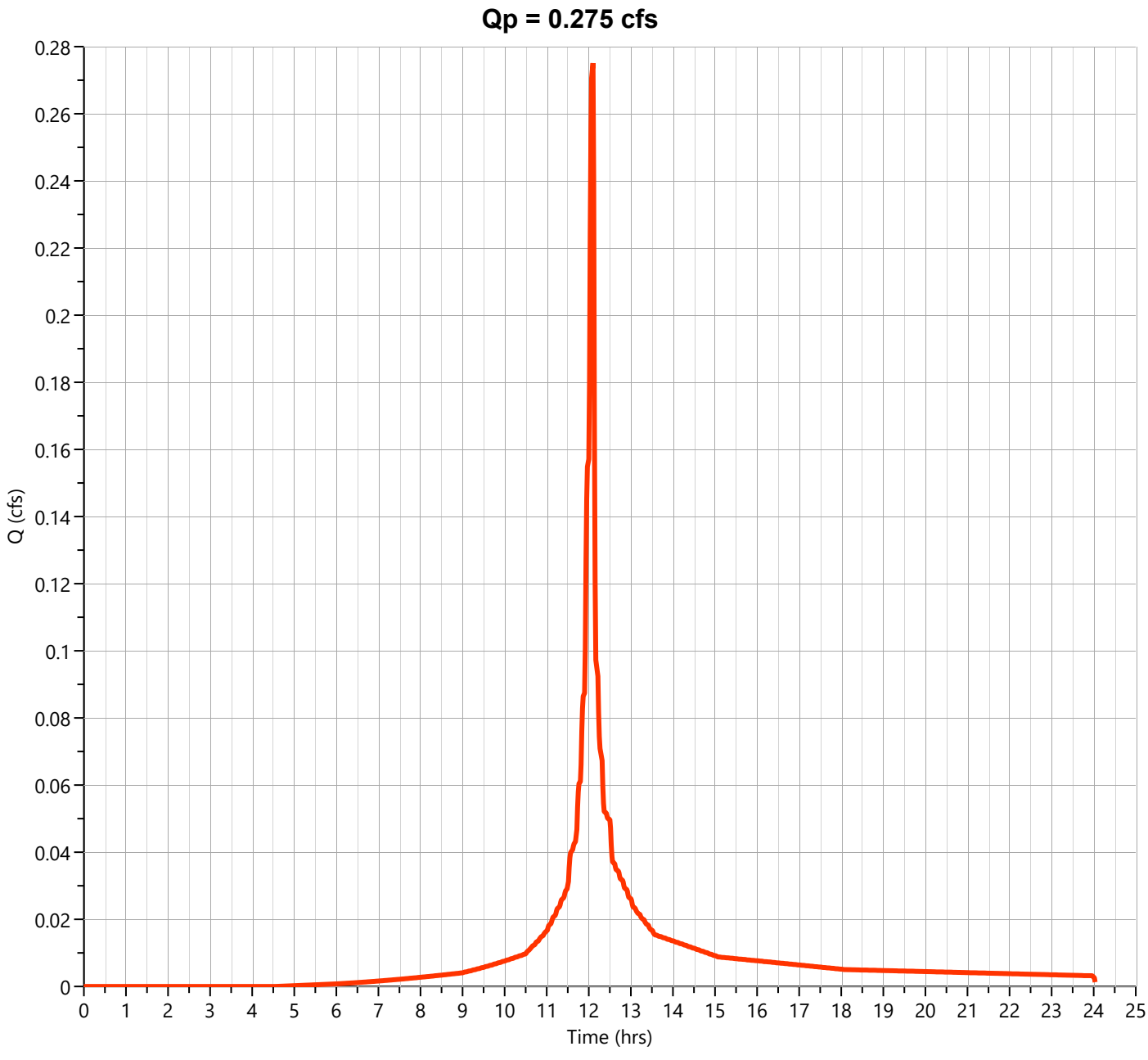
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-U Gravel C

Hyd. No. 65

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.275 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 789 cuft
Drainage Area	= 0.08 ac	Curve Number	= 89.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

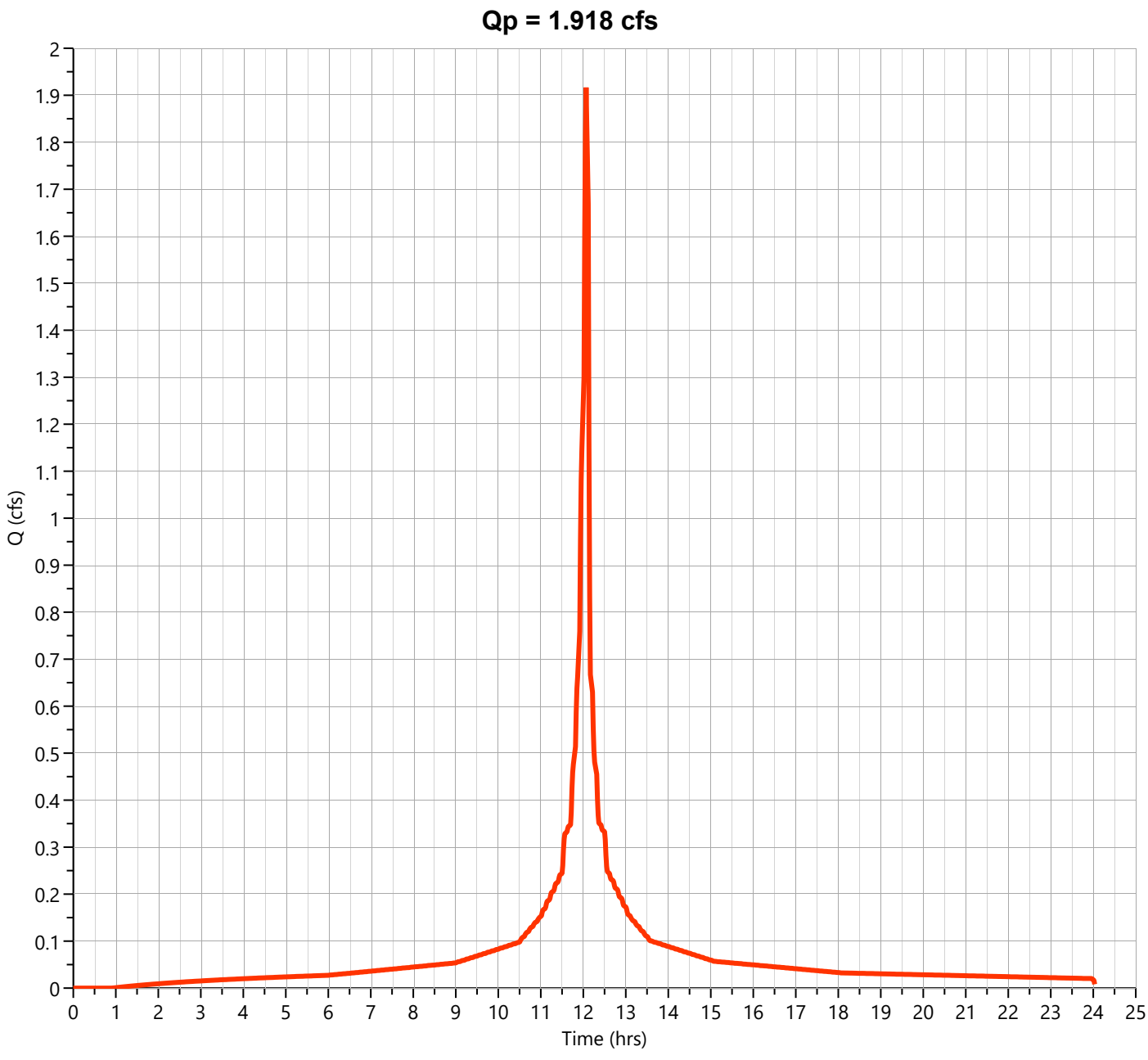
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-U Impervious

Hyd. No. 66

Hydrograph Type	= NRCS Runoff	Peak Flow	= 1.918 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 6,281 cuft
Drainage Area	= 0.48 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 4.08 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

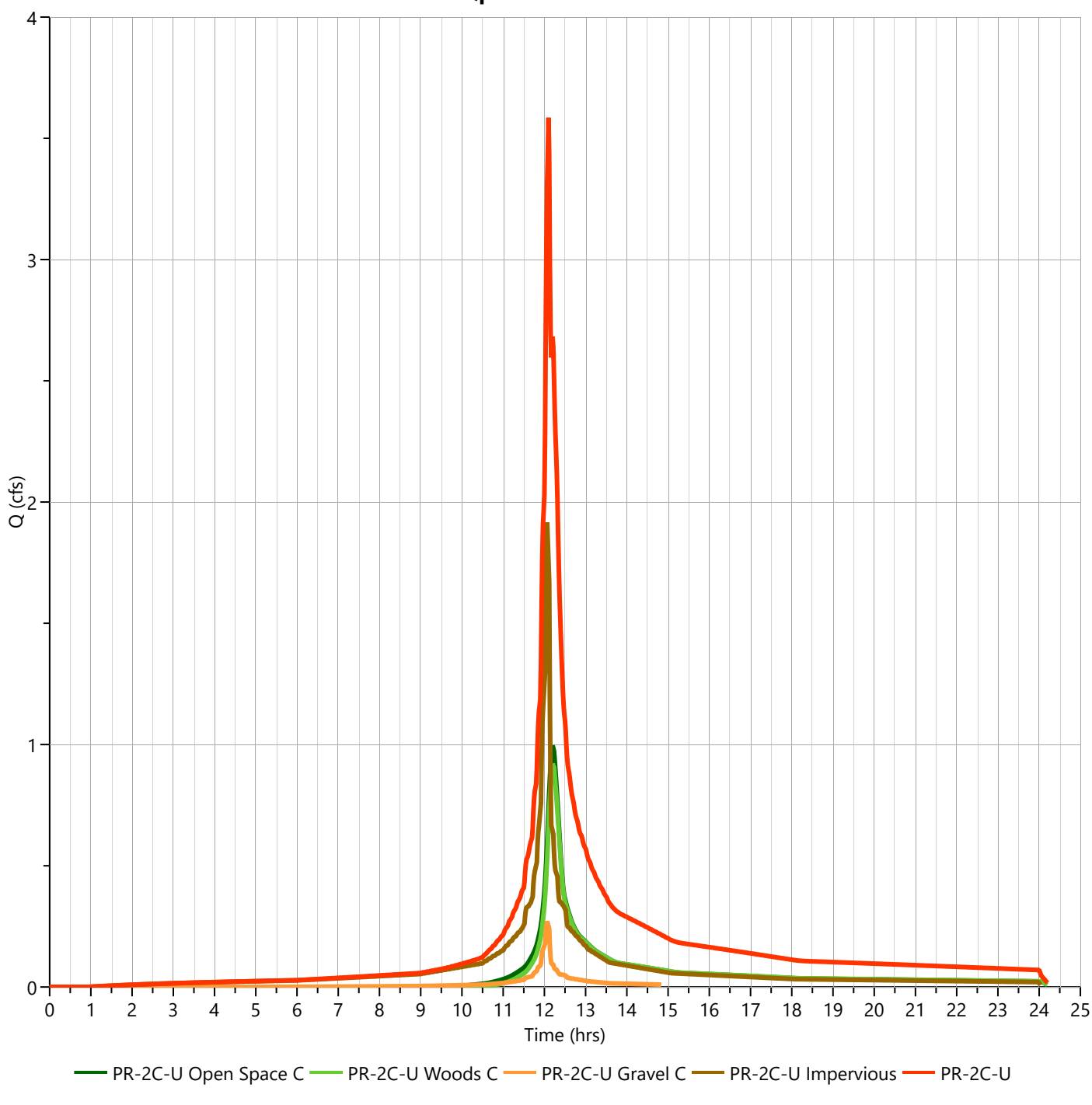
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-U

Hyd. No. 67

Hydrograph Type	= Junction	Peak Flow	= 3.584 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 15,022 cuft
Inflow Hydrographs	= 63, 64, 65, 66	Total Contrib. Area	= 2.01 ac



Hydrograph Report

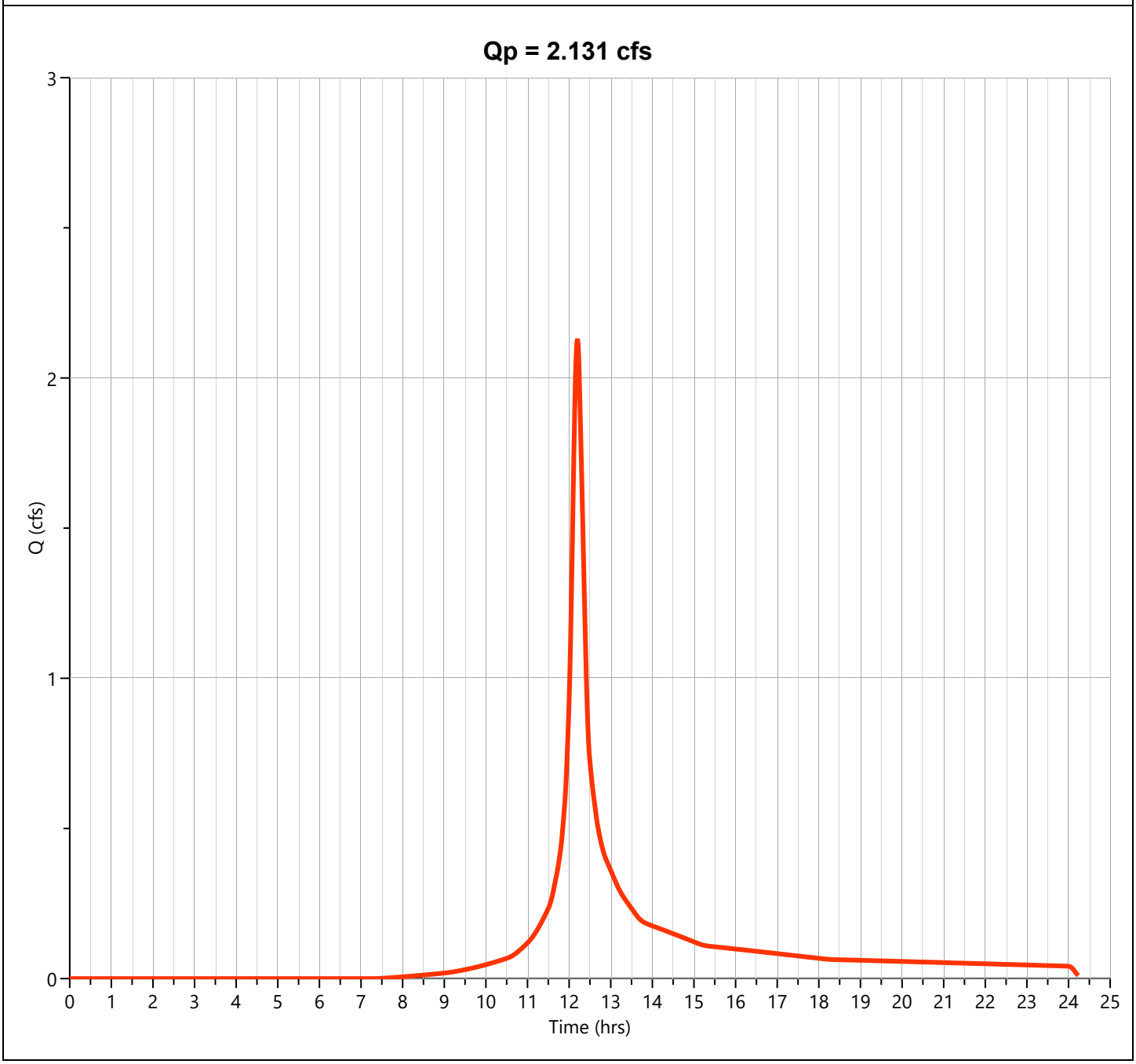
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-U Open Space C

Hyd. No. 63

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.131 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 8,635 cuft
Drainage Area	= 0.68 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

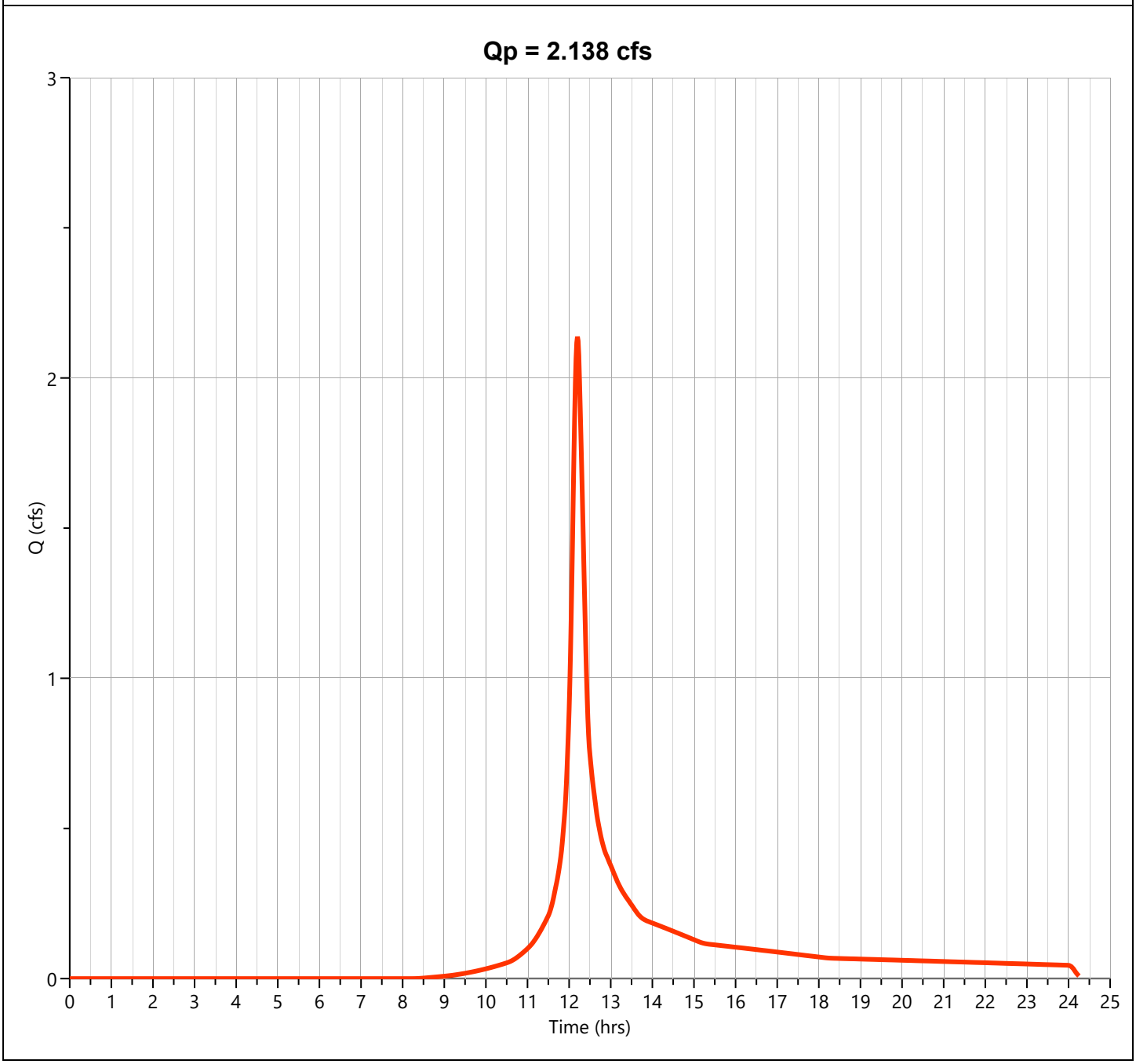
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-U Woods C

Hyd. No. 64

Hydrograph Type	= NRCS Runoff	Peak Flow	= 2.138 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 8,669 cuft
Drainage Area	= 0.77 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

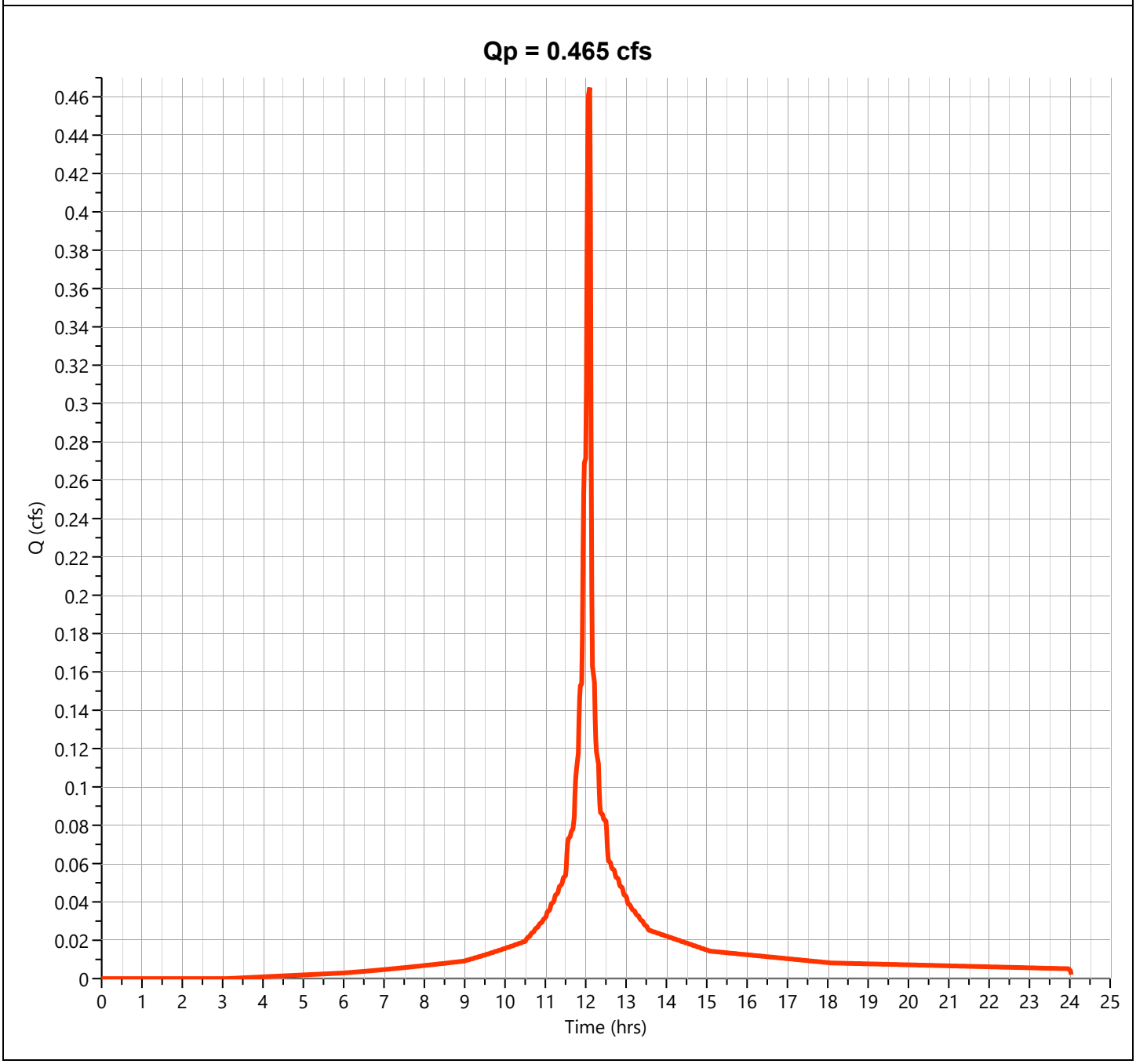
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-U Gravel C

Hyd. No. 65

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.465 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,387 cuft
Drainage Area	= 0.08 ac	Curve Number	= 89.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

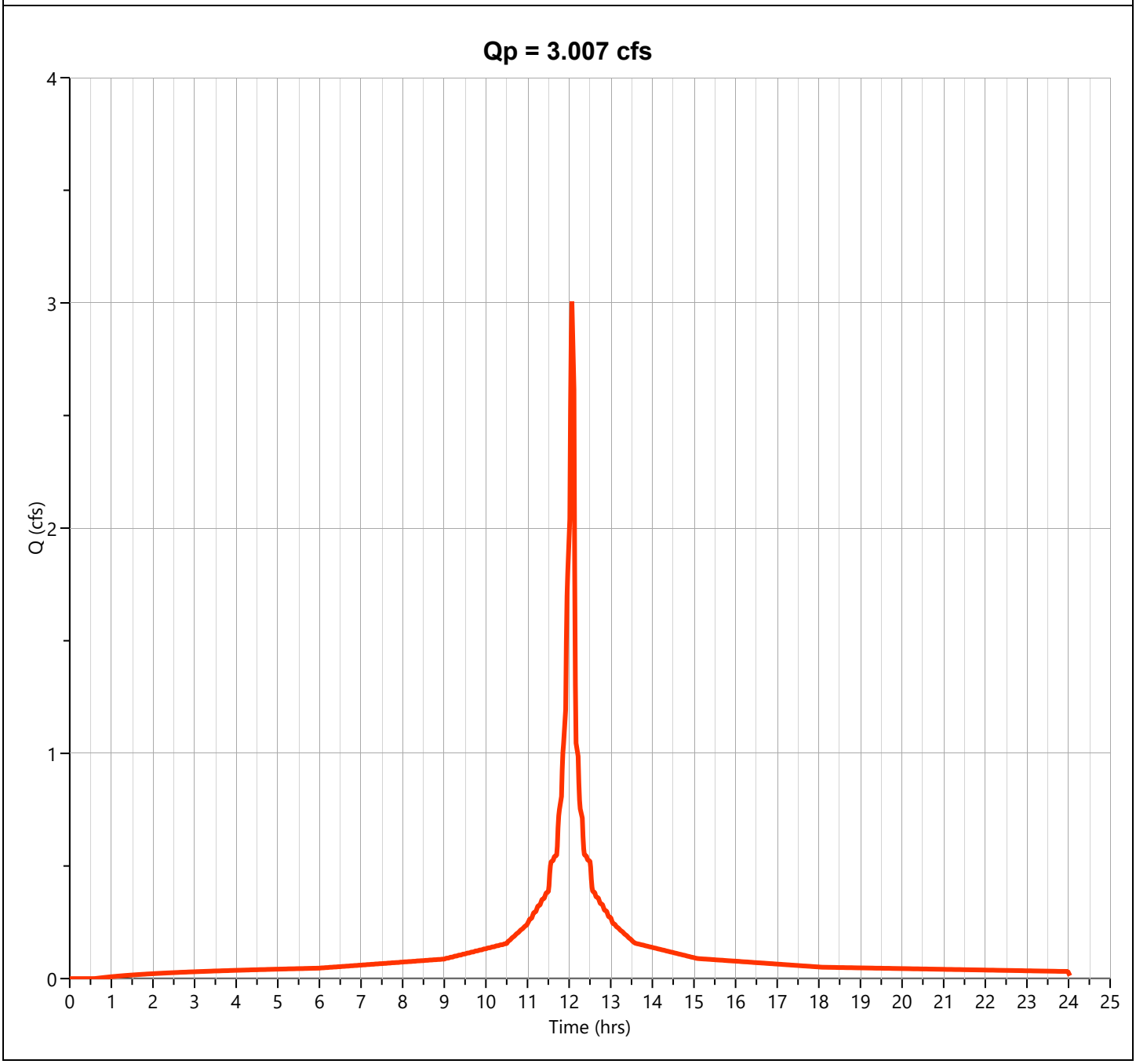
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-U Impervious

Hyd. No. 66

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.007 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 10,016 cuft
Drainage Area	= 0.48 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 6.37 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

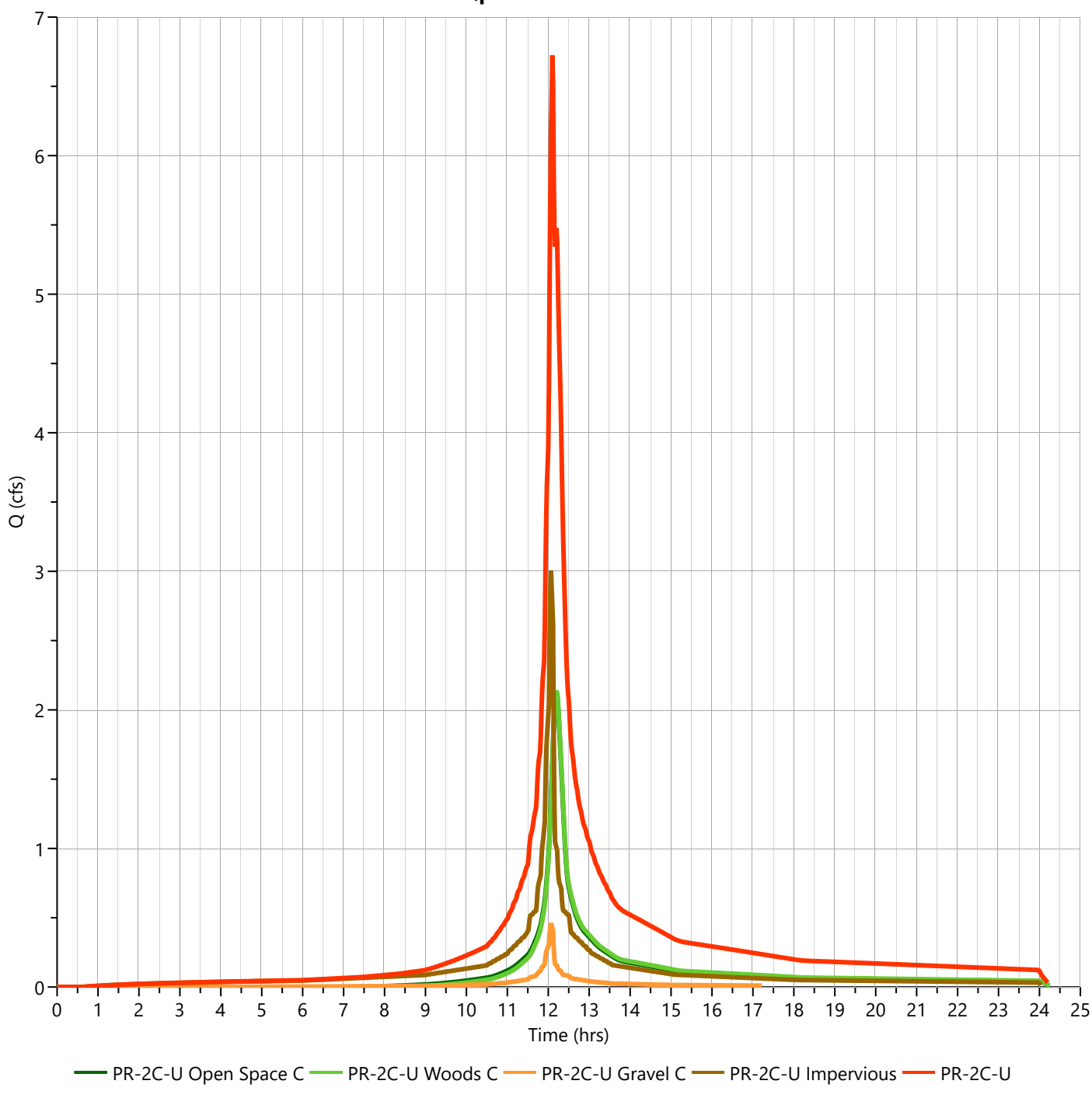
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-U

Hyd. No. 67

Hydrograph Type	= Junction	Peak Flow	= 6.724 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 28,708 cuft
Inflow Hydrographs	= 63, 64, 65, 66	Total Contrib. Area	= 2.01 ac



Hydrograph Report

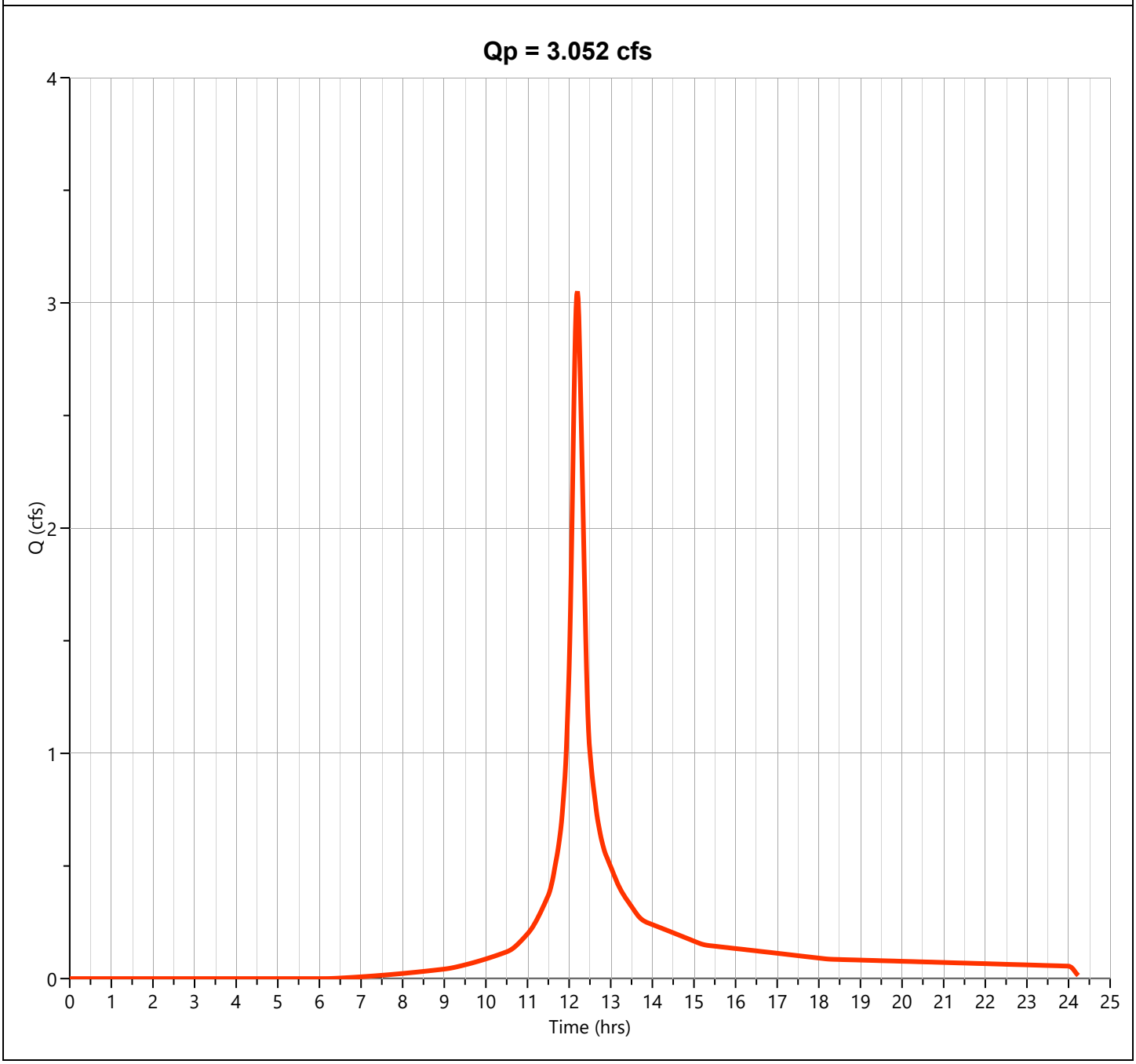
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-U Open Space C

Hyd. No. 63

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.052 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 12,446 cuft
Drainage Area	= 0.68 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

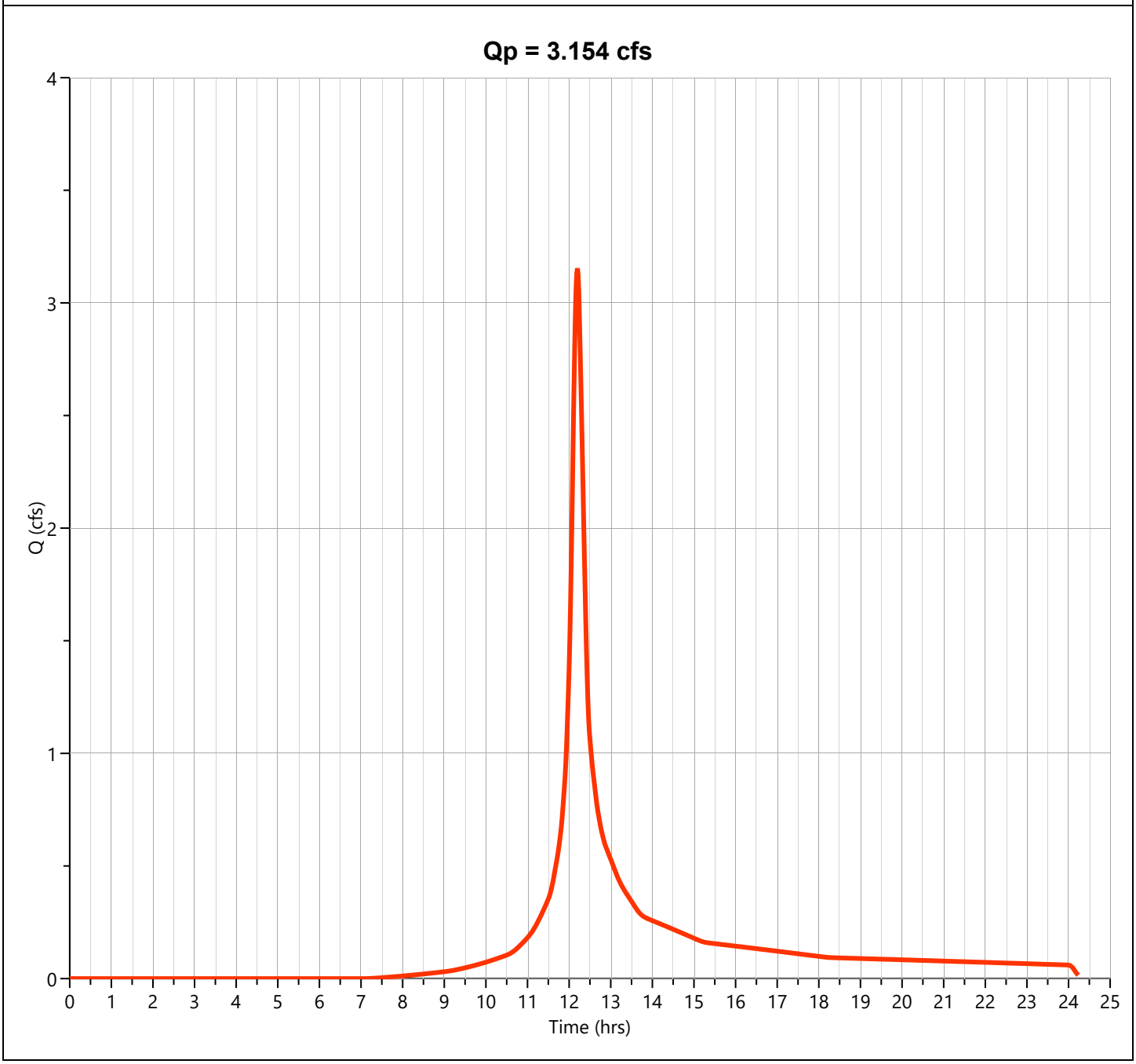
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-U Woods C

Hyd. No. 64

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.154 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 12,791 cuft
Drainage Area	= 0.77 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

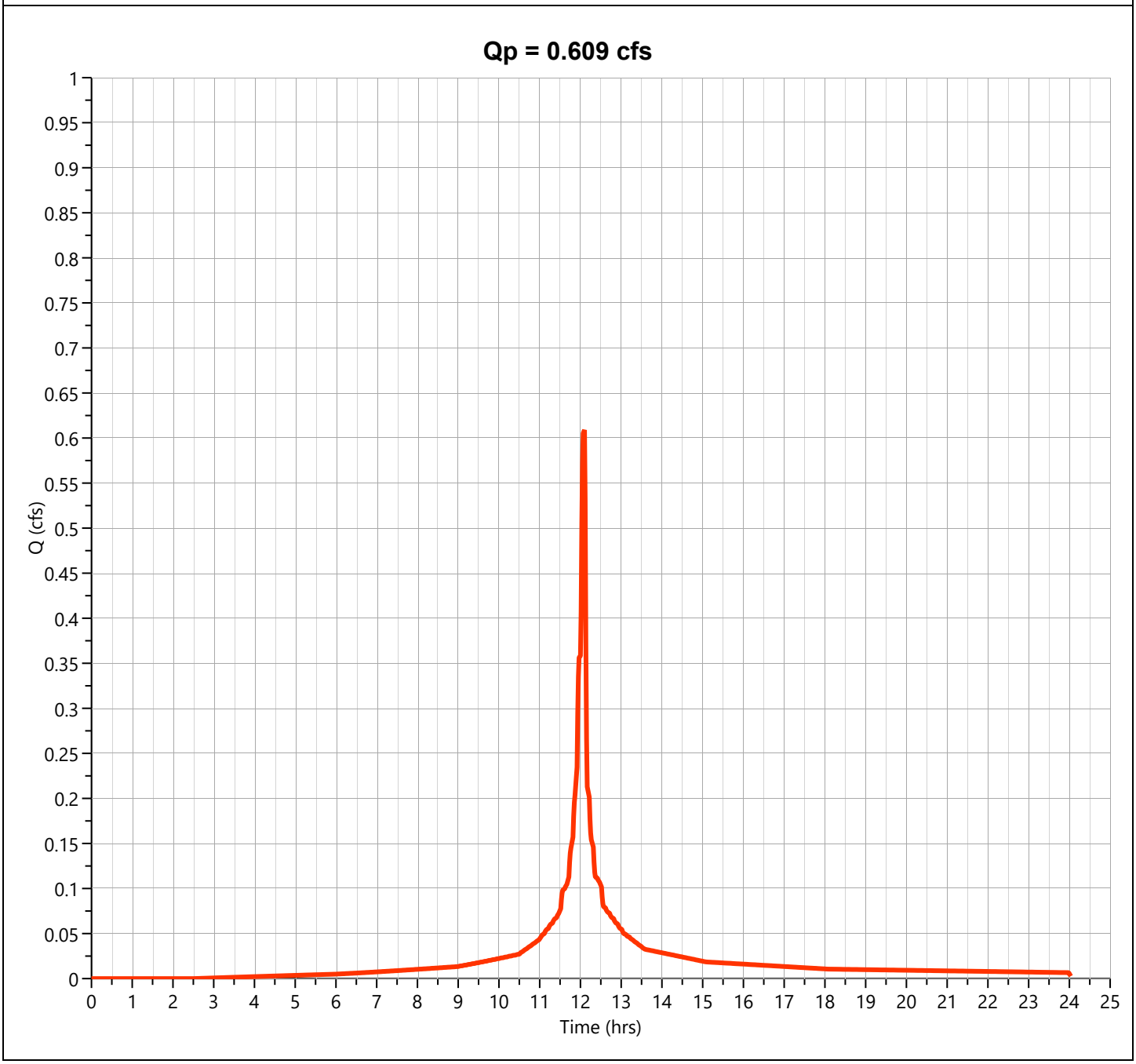
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-U Gravel C

Hyd. No. 65

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.609 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 1,855 cuft
Drainage Area	= 0.08 ac	Curve Number	= 89.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

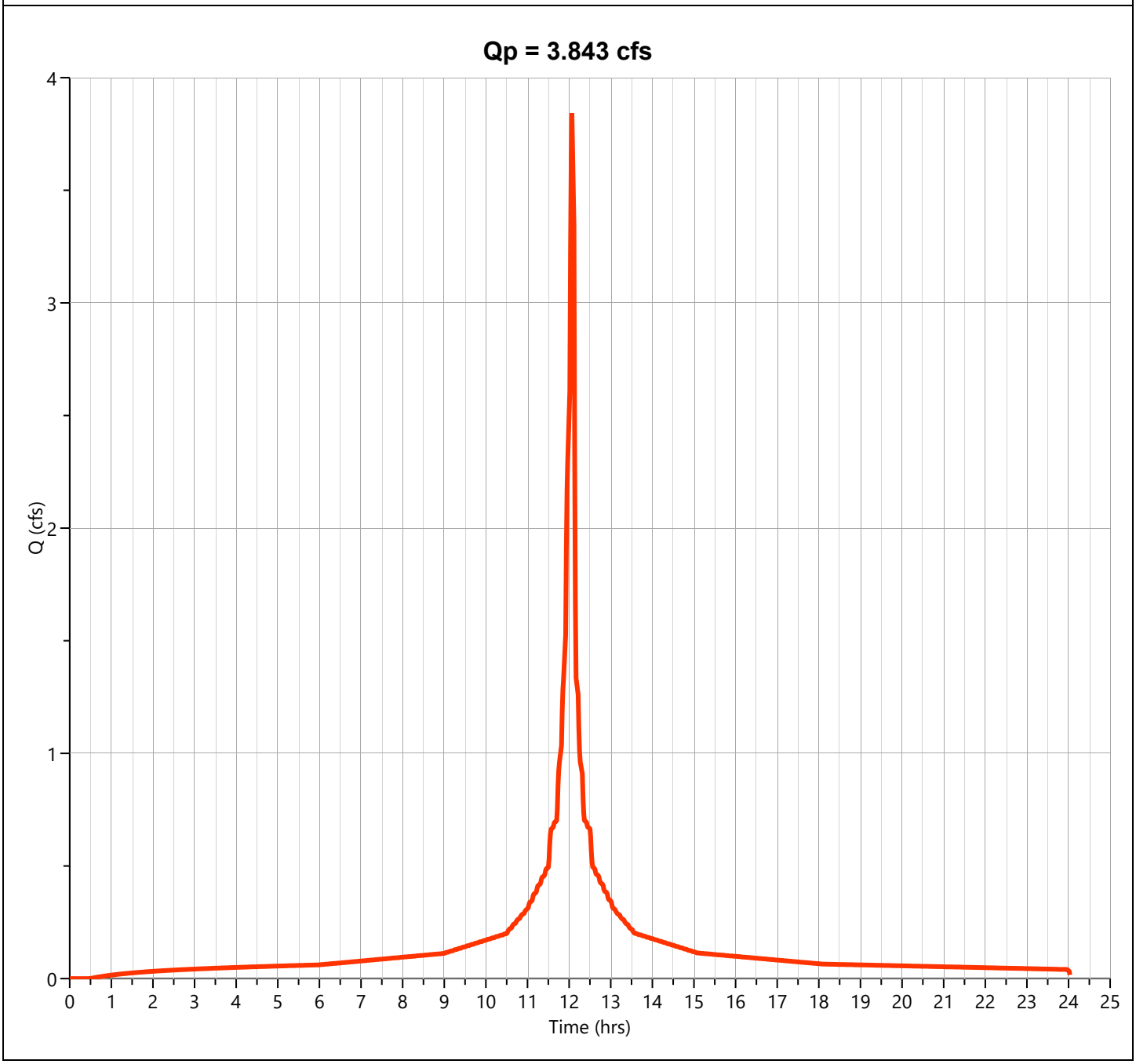
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-U Impervious

Hyd. No. 66

Hydrograph Type	= NRCS Runoff	Peak Flow	= 3.843 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 12,889 cuft
Drainage Area	= 0.48 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 8.13 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

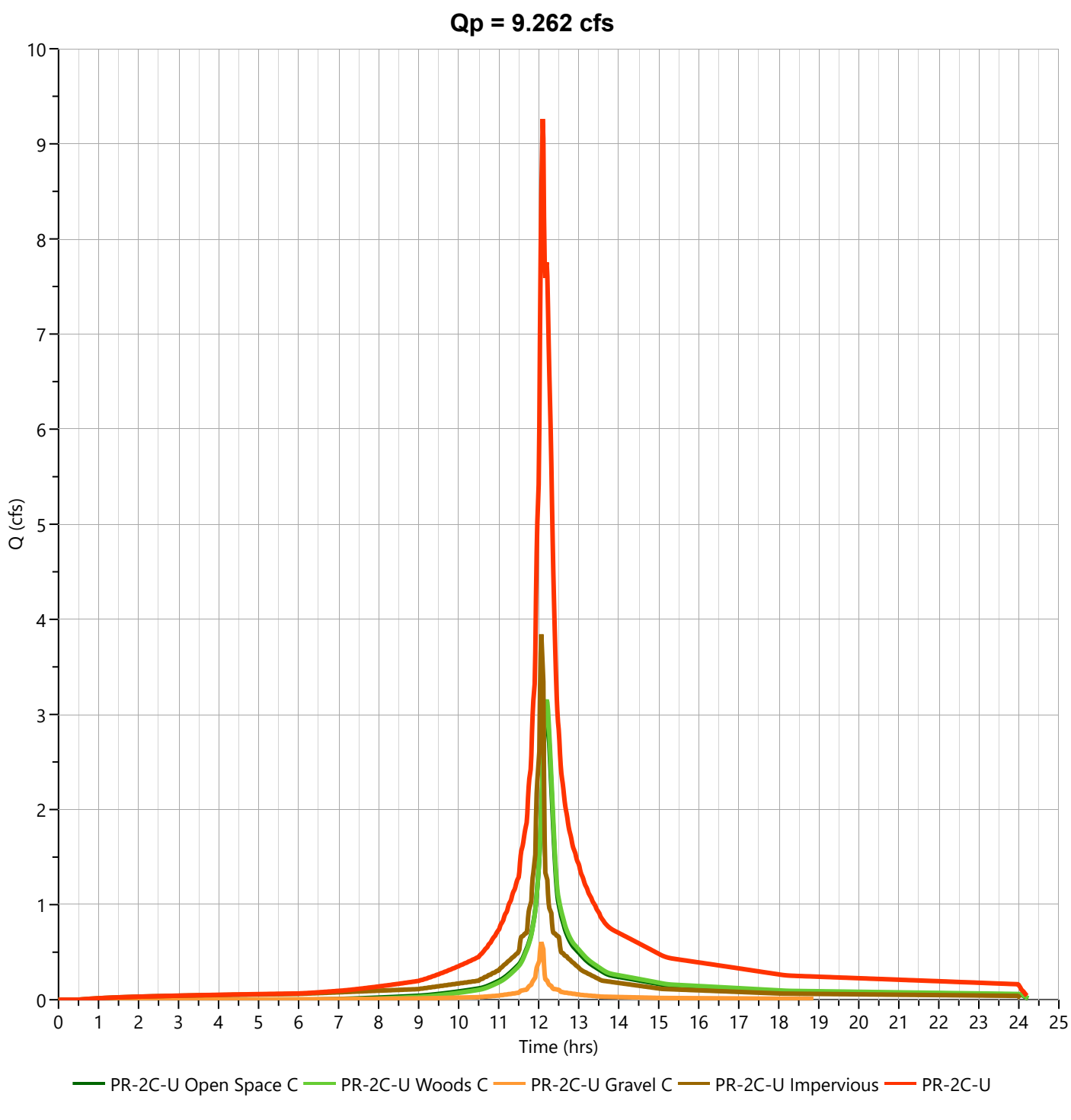
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-U

Hyd. No. 67

Hydrograph Type	= Junction	Peak Flow	= 9.262 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 39,981 cuft
Inflow Hydrographs	= 63, 64, 65, 66	Total Contrib. Area	= 2.01 ac



Hydrograph Report

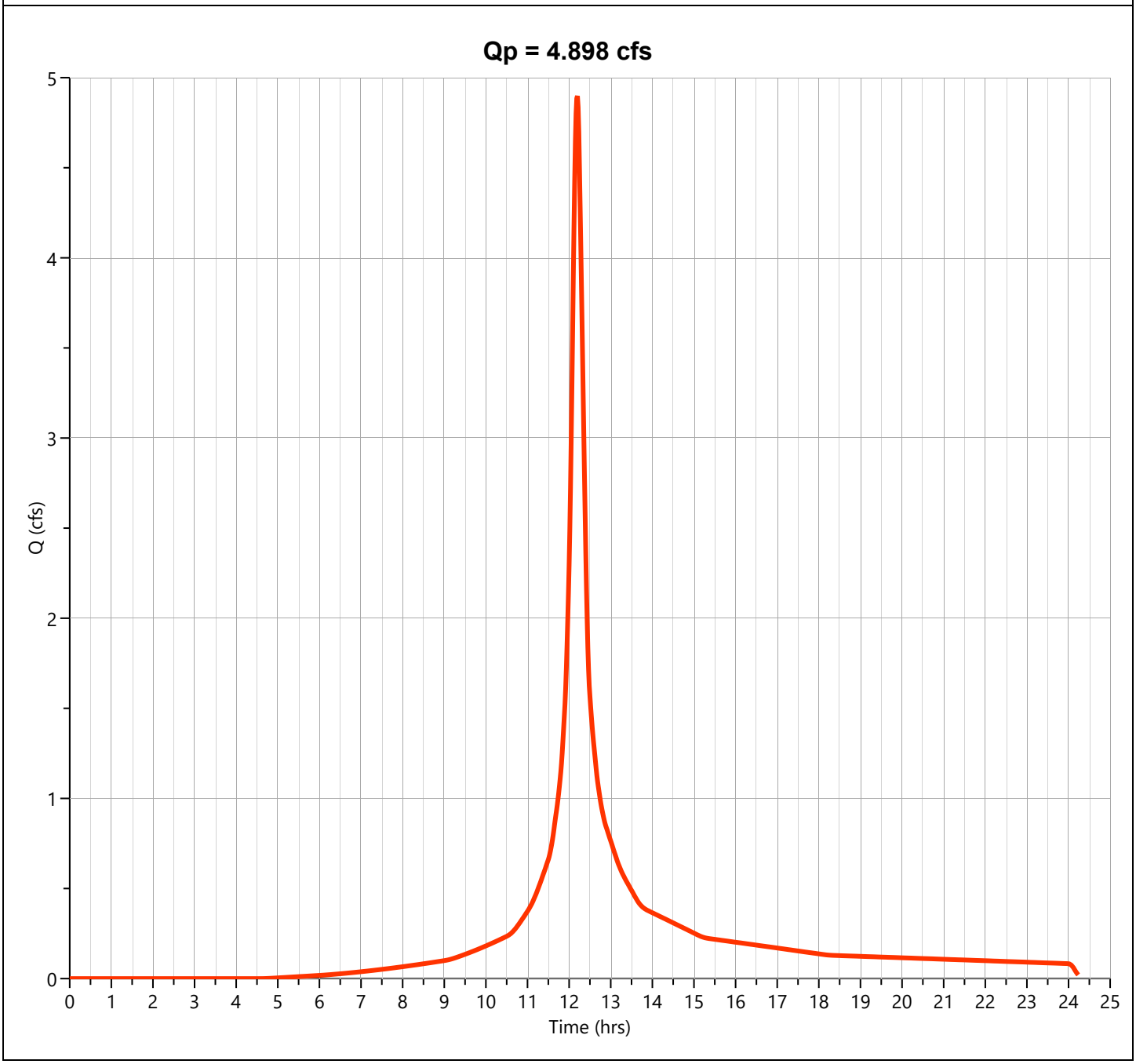
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-U Open Space C

Hyd. No. 63

Hydrograph Type	= NRCS Runoff	Peak Flow	= 4.898 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 20,341 cuft
Drainage Area	= 0.68 ac	Curve Number	= 74.00
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

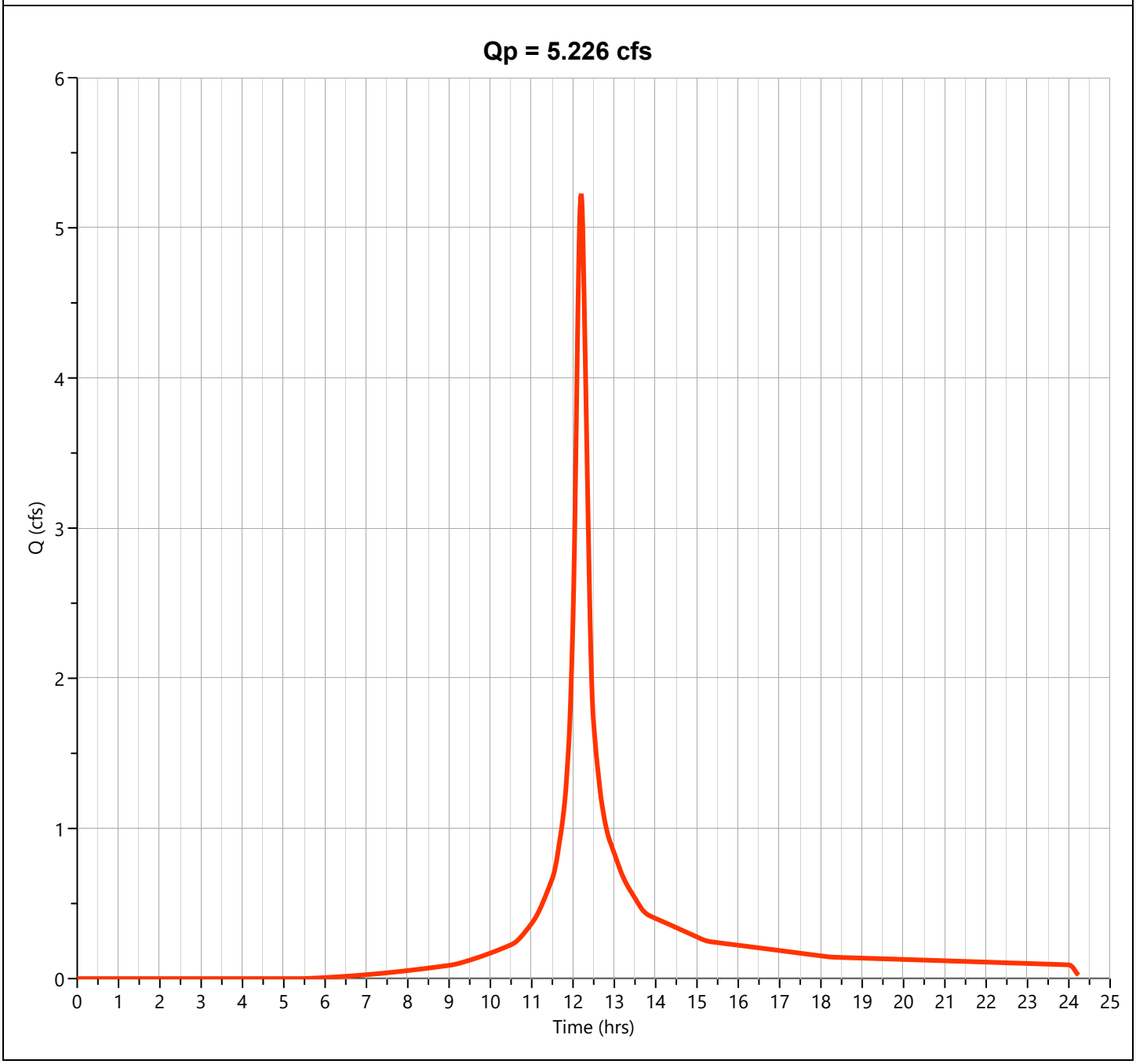
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-U Woods C

Hyd. No. 64

Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.226 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.20 hrs
Time Interval	= 1 min	Runoff Volume	= 21,464 cuft
Drainage Area	= 0.77 ac	Curve Number	= 70.00
Tc Method	= User	Time of Conc. (Tc)	= 15.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

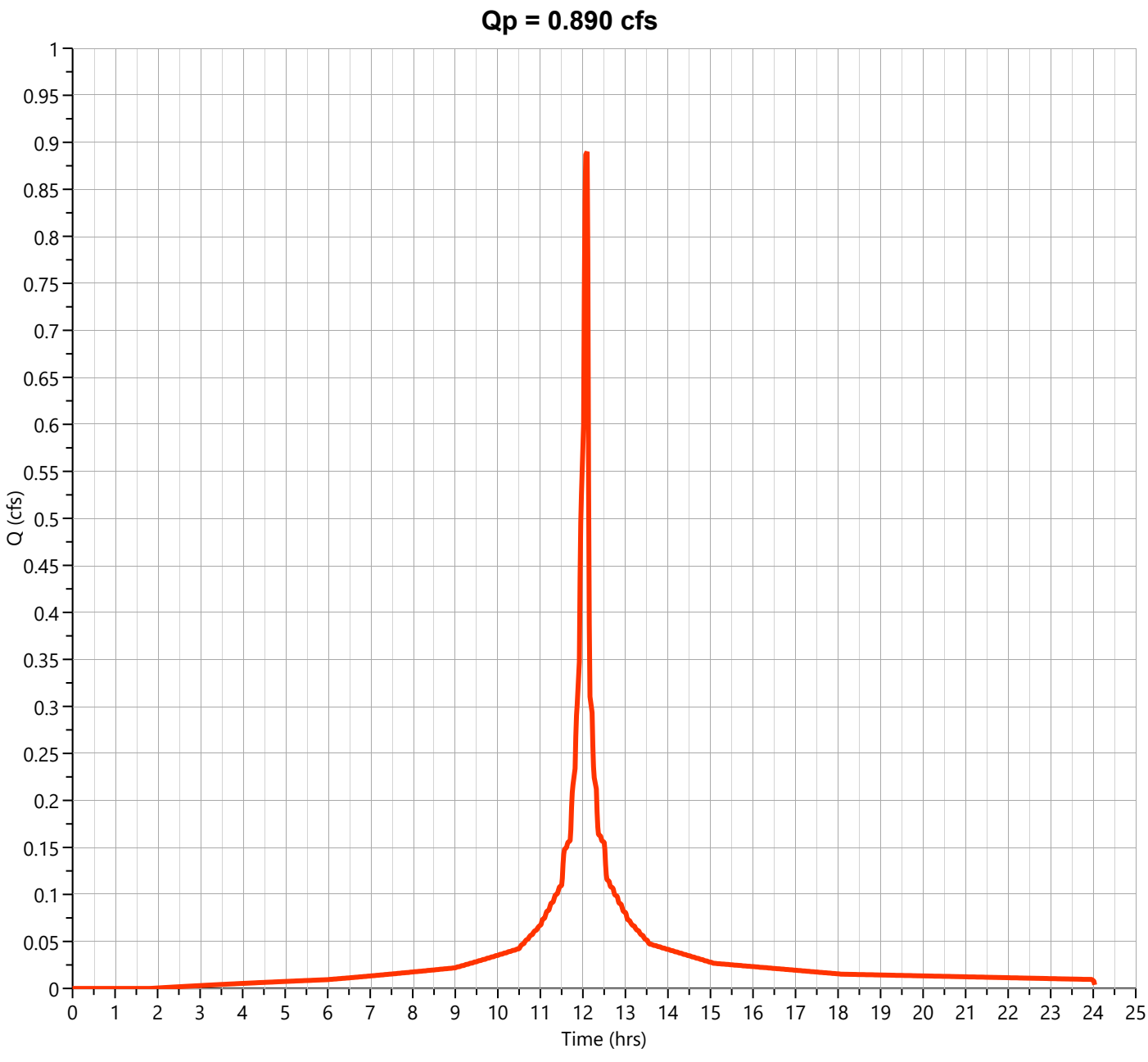
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-U Gravel C

Hyd. No. 65

Hydrograph Type	= NRCS Runoff	Peak Flow	= 0.890 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 2,787 cuft
Drainage Area	= 0.08 ac	Curve Number	= 89.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

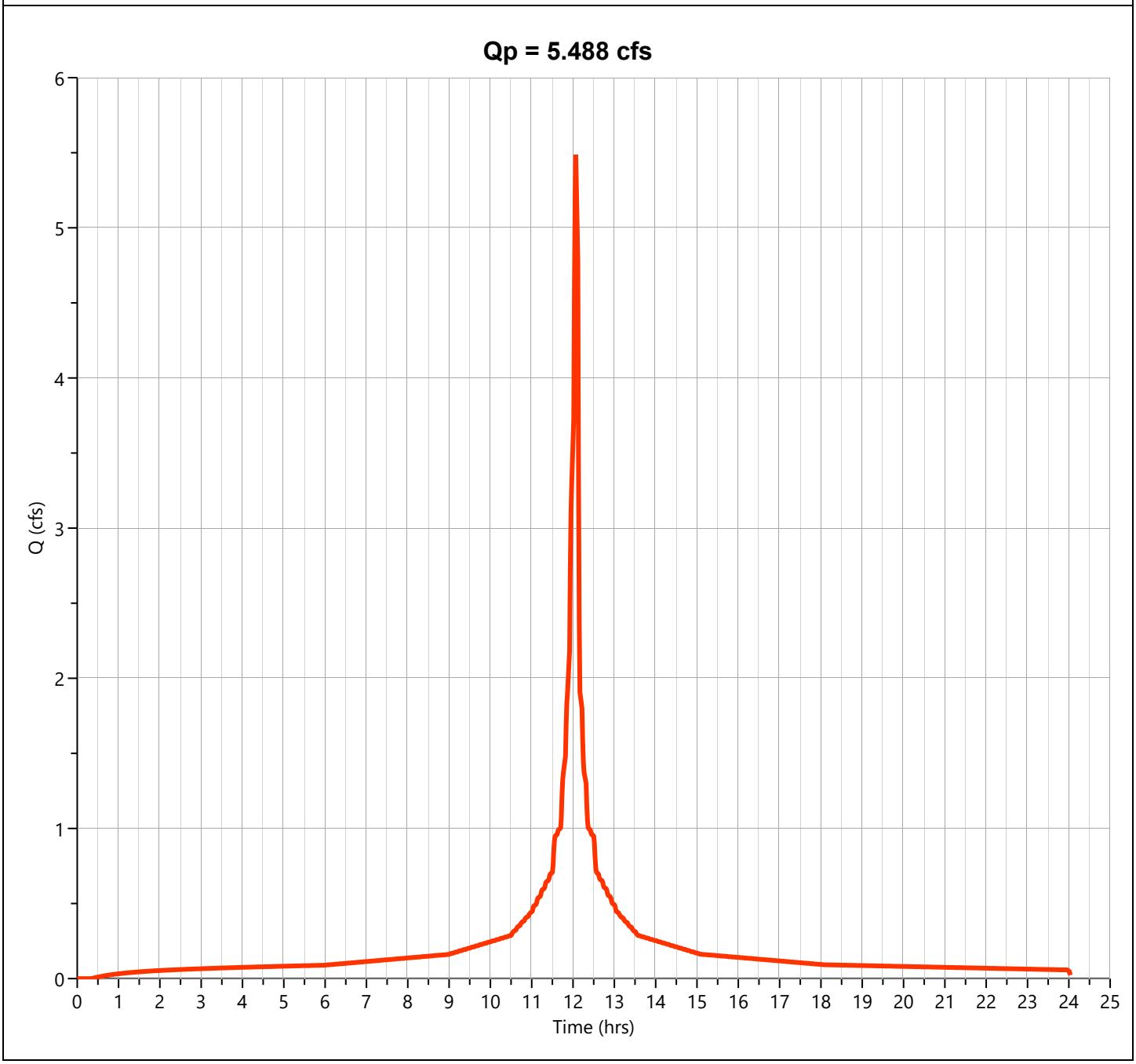
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-U Impervious

Hyd. No. 66

Hydrograph Type	= NRCS Runoff	Peak Flow	= 5.488 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Runoff Volume	= 18,554 cuft
Drainage Area	= 0.48 ac	Curve Number	= 98.00
Tc Method	= User	Time of Conc. (Tc)	= 2.0 min
Total Rainfall	= 11.60 in	Design Storm	= NOAA-D
Storm Duration	= 24 hrs	Shape Factor	= 484



Hydrograph Report

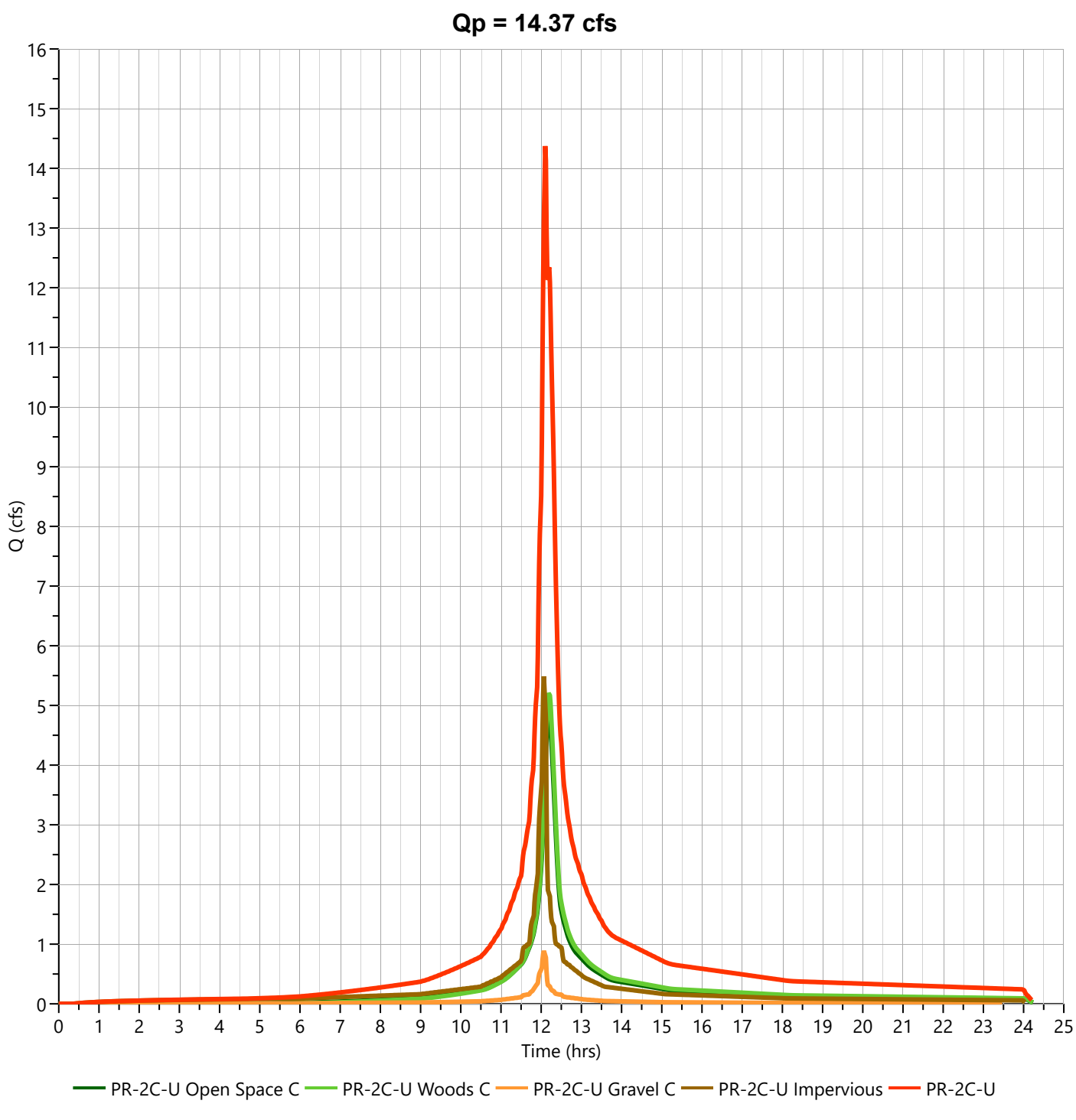
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

PR-2C-U

Hyd. No. 67

Hydrograph Type	= Junction	Peak Flow	= 14.37 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 63,147 cuft
Inflow Hydrographs	= 63, 64, 65, 66	Total Contrib. Area	= 2.01 ac



TOTAL PROPOSED FLOW TO POA-2

Hydrograph Report

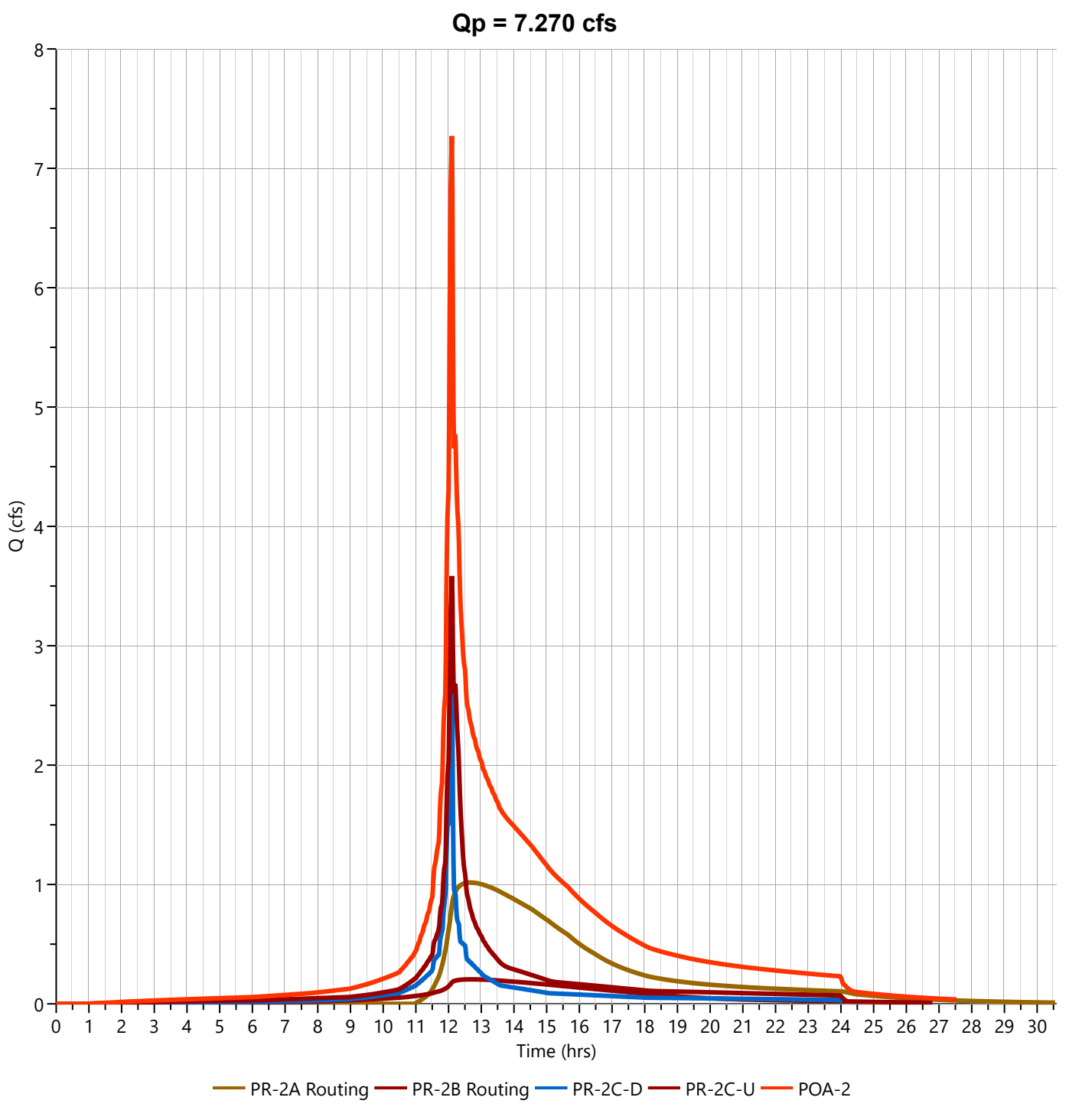
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

POA-2

Hyd. No. 70

Hydrograph Type	= Junction	Peak Flow	= 7.270 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 47,788 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

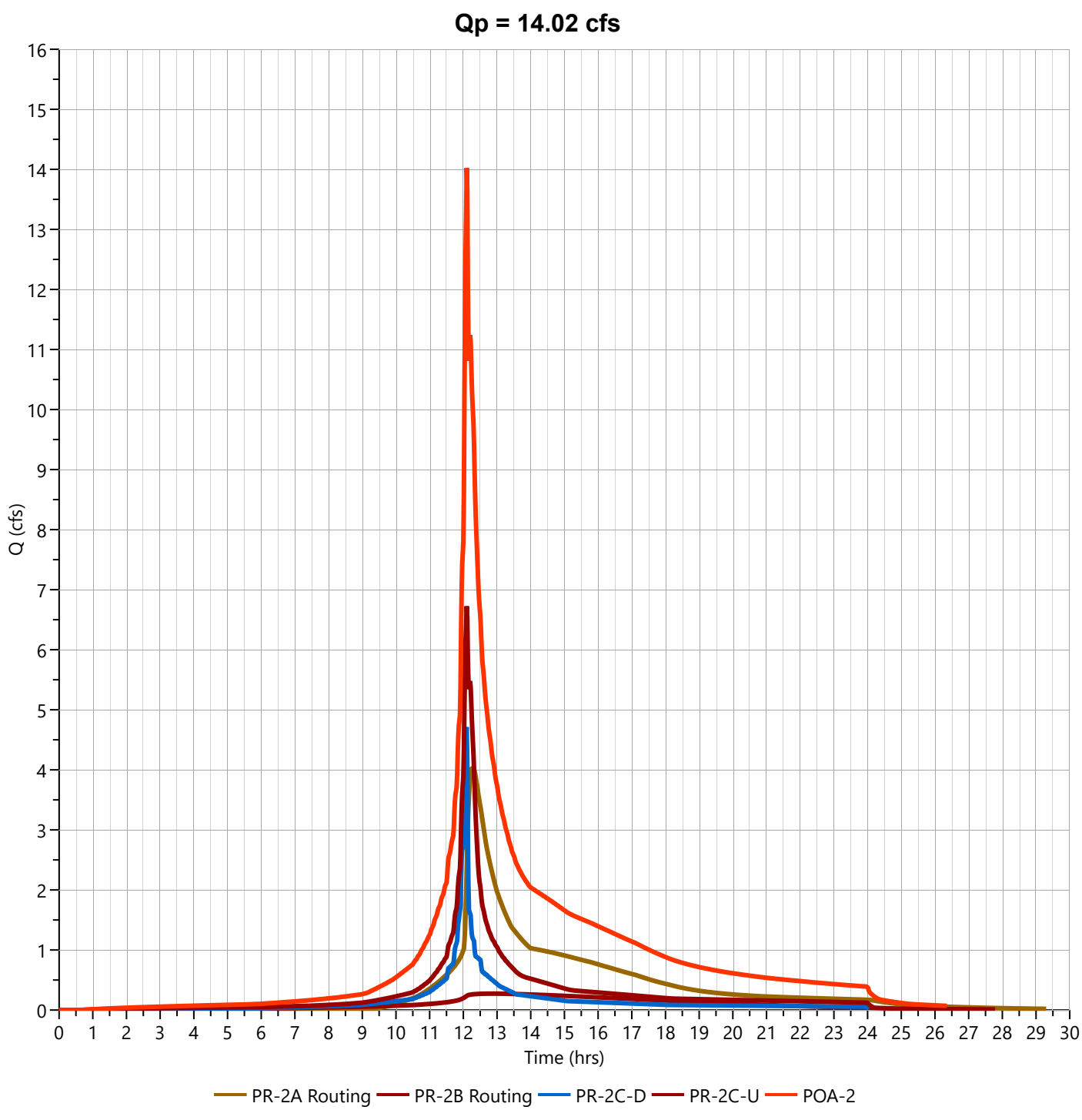
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

POA-2

Hyd. No. 70

Hydrograph Type	= Junction	Peak Flow	= 14.02 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 87,991 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

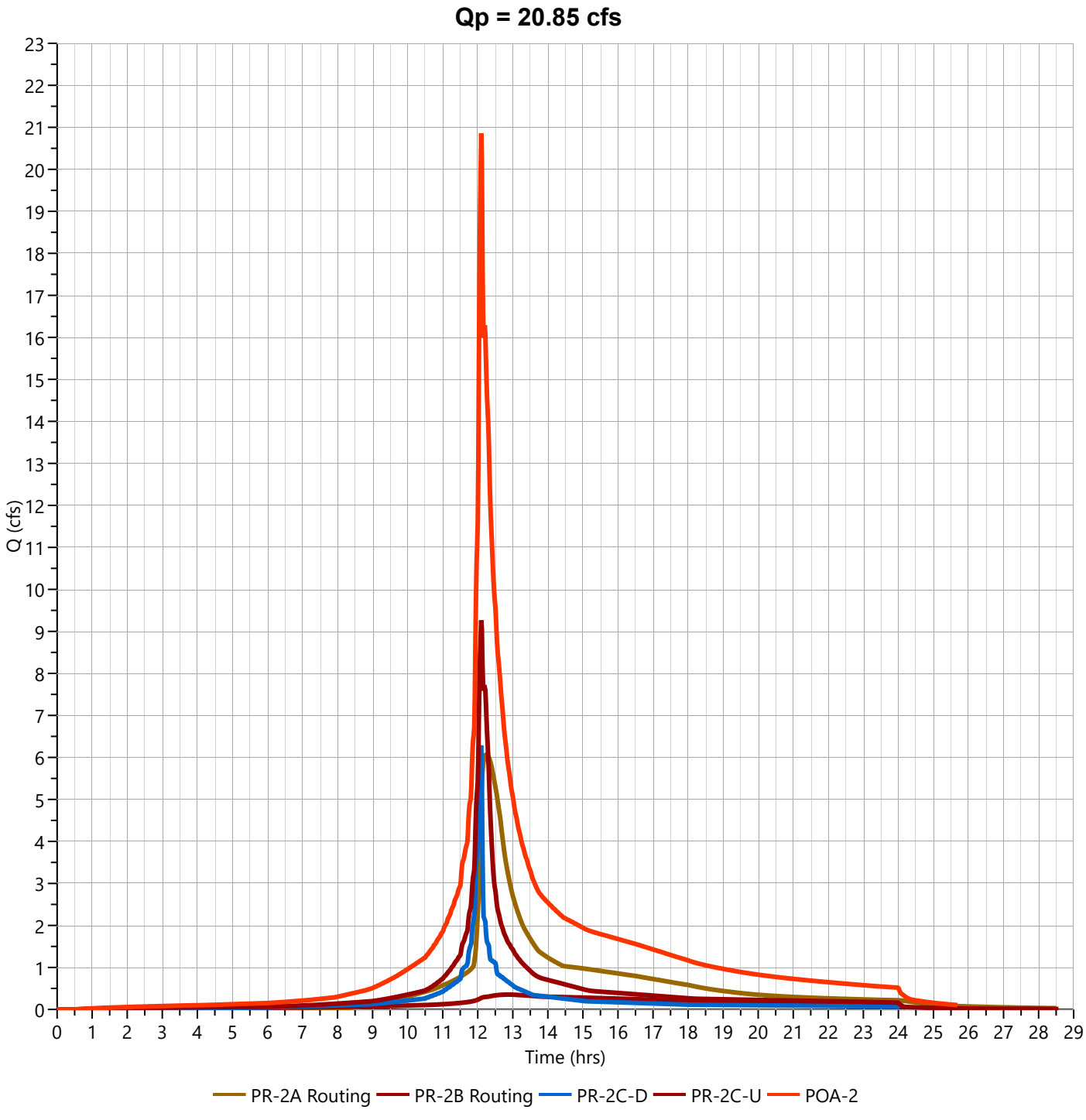
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

POA-2

Hyd. No. 70

Hydrograph Type	= Junction	Peak Flow	= 20.85 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 120,279 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



Hydrograph Report

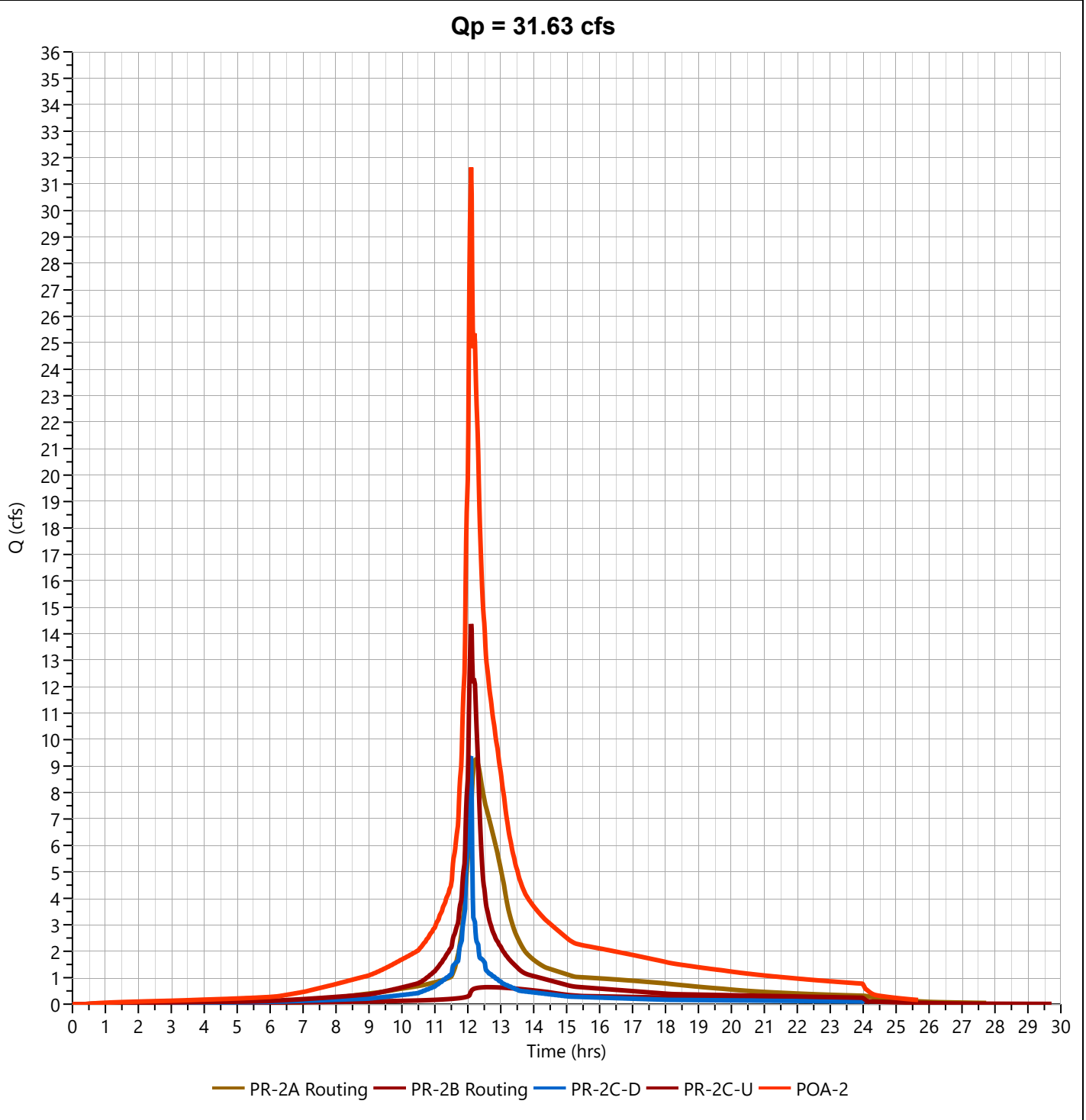
Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

POA-2

Hyd. No. 70

Hydrograph Type	= Junction	Peak Flow	= 31.63 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.10 hrs
Time Interval	= 1 min	Hydrograph Volume	= 185,620 cuft
Inflow Hydrographs		Total Contrib. Area	= 0.0 ac



SUMMARY OF PROPOSED PEAK DISCHARGES

Hydrograph 2-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys

10-21-2025

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-D Grass D	0.756	12.13	2,462	----		
2	NRCS Runoff	PR-1A-D Imp	1.279	12.10	4,187	----		
3	Junction	PR-1A-D	1.993	12.10	6,649	1, 2		
5	NRCS Runoff	PR-1A-U Open Space C	0.540	12.17	2,018	----		
6	NRCS Runoff	PR-1A-U Woods C	0.107	12.17	409	----		
7	NRCS Runoff	PR-1A-U Imp	1.998	12.10	6,542	----		
8	Junction	PR-1A-U	2.527	12.10	8,970	5, 6, 7		
10	Junction	PR-1A Total	4.520	12.10	15,619	3, 8		
11	Pond Route	PR-1A Routing	1.262	12.33	12,719	10	535.39	6,769
13	NRCS Runoff	PR-1B-D	0.893	12.12	2,762	----		
15	NRCS Runoff	PR-1B-U Open Space C	0.441	12.18	1,715	----		
16	NRCS Runoff	PR-1B-U Woods C	0.772	12.18	3,065	----		
17	NRCS Runoff	PR-1B-U Impervious	4.234	12.12	16,058	----		
18	Junction	PR-1B-U	5.324	12.13	20,838	15, 16, 17		
21	Junction	PR-1B (Swale)	6.200	12.13	23,599	13, 18		
24	NRCS Runoff	PR-1C-D Open Space D	0.842	12.10	2,296	----		
25	NRCS Runoff	PR-1C-D Impervious	0.440	12.10	1,439	----		
26	Junction	PR-1C-D	1.282	12.10	3,735	24, 25		
28	NRCS Runoff	PR-1C-U Open Space C	1.251	12.15	4,386	----		
29	NRCS Runoff	PR-1C-U Impervious	4.676	12.10	15,632	----		
30	Junction	PR-1C-U	5.772	12.10	20,018	28, 29		
32	Junction	POA-1	14.07	12.12	60,072	11, 21, 26, 30		
35	NRCS Runoff	PR-2A-D Open Space D	2.042	12.12	6,313	----		
36	NRCS Runoff	PR-2A-D Impervious	1.679	12.10	5,496	----		

Hydrograph 2-yr Summary

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File: Eagle Rock Proposed (Future).hys

10-21-2025

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
37	Junction	PR-2A-D	3.665	12.10	11,808	35, 36		
39	NRCS Runoff	PR-2A-U Open Space C	0.264	12.20	1,082	----		
40	NRCS Runoff	PR-2A-U Woods C	0.215	12.22	904	----		
41	NRCS Runoff	PR-2A-U Impervious	2.718	12.10	8,898	----		
42	Junction	PR-2A-U	3.066	12.10	10,883	39, 40, 41		
45	Junction	PR-2A	6.730	12.10	22,691	37, 42		
46	Pond Route	PR-2A Routing	1.017	12.63	19,304	45	538.28	11,216
48	NRCS Runoff	PR-2B-D Open Space D	0.081	12.10	230	----		
49	NRCS Runoff	PR-2B-D Impervious	1.479	12.10	4,841	----		
50	Junction	PR-2B-D	1.559	12.10	5,071	48, 49		
52	NRCS Runoff	PR-2B-U Open Space C	0.021	12.10	56.3	----		
53	NRCS Runoff	PR-2B-U Impervious	0.120	12.10	393	----		
54	Junction	PR-2B-U	0.141	12.10	449	52, 53		
56	Junction	PR-2B	1.700	12.10	5,520	50, 54		
57	Pond Route	PR-2B Routing	0.205	12.70	5,506	56	553.88	2,314
59	NRCS Runoff	PR-2C-D Open Space D	1.526	12.10	4,161	----		
60	NRCS Runoff	PR-2C-D Impervious	1.159	12.10	3,795	----		
61	Junction	PR-2C-D	2.685	12.10	7,955	59, 60		
63	NRCS Runoff	PR-2C-U Open Space C	0.996	12.20	4,086	----		
64	NRCS Runoff	PR-2C-U Woods C	0.921	12.22	3,867	----		
65	NRCS Runoff	PR-2C-U Gravel C	0.275	12.10	789	----		
66	NRCS Runoff	PR-2C-U Impervious	1.918	12.10	6,281	----		
67	Junction	PR-2C-U	3.584	12.10	15,022	63, 64, 65, 66		
70	Junction	POA-2	7.270	12.10	47,788	46, 57, 61, 67		

Hydrograph 10-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys

10-21-2025

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-D Grass D	1.451	12.13	4,808	----		
2	NRCS Runoff	PR-1A-D Imp	2.005	12.10	6,677	----		
3	Junction	PR-1A-D	3.391	12.10	11,485	1, 2		
5	NRCS Runoff	PR-1A-U Open Space C	1.152	12.17	4,266	----		
6	NRCS Runoff	PR-1A-U Woods C	0.248	12.17	917	----		
7	NRCS Runoff	PR-1A-U Imp	3.133	12.10	10,433	----		
8	Junction	PR-1A-U	4.314	12.10	15,615	5, 6, 7		
10	Junction	PR-1A Total	7.705	12.10	27,101	3, 8		
11	Pond Route	PR-1A Routing	2.884	12.27	24,202	10	535.94	9,573
13	NRCS Runoff	PR-1B-D	1.714	12.12	5,394	----		
15	NRCS Runoff	PR-1B-U Open Space C	0.942	12.18	3,625	----		
16	NRCS Runoff	PR-1B-U Woods C	1.787	12.18	6,871	----		
17	NRCS Runoff	PR-1B-U Impervious	6.642	12.12	25,607	----		
18	Junction	PR-1B-U	9.155	12.13	36,104	15, 16, 17		
21	Junction	PR-1B (Swale)	10.83	12.13	41,497	13, 18		
24	NRCS Runoff	PR-1C-D Open Space D	1.597	12.10	4,483	----		
25	NRCS Runoff	PR-1C-D Impervious	0.689	12.10	2,295	----		
26	Junction	PR-1C-D	2.286	12.10	6,778	24, 25		
28	NRCS Runoff	PR-1C-U Open Space C	2.662	12.15	9,270	----		
29	NRCS Runoff	PR-1C-U Impervious	7.333	12.10	24,928	----		
30	Junction	PR-1C-U	9.721	12.10	34,199	28, 29		
32	Junction	POA-1	24.77	12.12	106,676	11, 21, 26, 30		
35	NRCS Runoff	PR-2A-D Open Space D	3.918	12.12	12,329	----		
36	NRCS Runoff	PR-2A-D Impervious	2.631	12.10	8,764	----		

Hydrograph 10-yr Summary

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File: Eagle Rock Proposed (Future).hys

10-21-2025

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
37	Junction	PR-2A-D	6.465	12.10	21,092	35, 36		
39	NRCS Runoff	PR-2A-U Open Space C	0.564	12.20	2,286	----		
40	NRCS Runoff	PR-2A-U Woods C	0.500	12.20	2,027	----		
41	NRCS Runoff	PR-2A-U Impervious	4.260	12.10	14,189	----		
42	Junction	PR-2A-U	5.071	12.10	18,502	39, 40, 41		
45	Junction	PR-2A	11.54	12.10	39,594	37, 42		
46	Pond Route	PR-2A Routing	4.038	12.27	36,206	45	538.75	15,826
48	NRCS Runoff	PR-2B-D Open Space D	0.154	12.10	448	----		
49	NRCS Runoff	PR-2B-D Impervious	2.318	12.10	7,720	----		
50	Junction	PR-2B-D	2.472	12.10	8,169	48, 49		
52	NRCS Runoff	PR-2B-U Open Space C	0.043	12.10	119	----		
53	NRCS Runoff	PR-2B-U Impervious	0.188	12.10	626	----		
54	Junction	PR-2B-U	0.231	12.10	745	52, 53		
56	Junction	PR-2B	2.704	12.10	8,914	50, 54		
57	Pond Route	PR-2B Routing	0.273	12.87	8,901	56	554.46	3,854
59	NRCS Runoff	PR-2C-D Open Space D	2.895	12.10	8,126	----		
60	NRCS Runoff	PR-2C-D Impervious	1.817	12.10	6,051	----		
61	Junction	PR-2C-D	4.712	12.10	14,177	59, 60		
63	NRCS Runoff	PR-2C-U Open Space C	2.131	12.20	8,635	----		
64	NRCS Runoff	PR-2C-U Woods C	2.138	12.20	8,669	----		
65	NRCS Runoff	PR-2C-U Gravel C	0.465	12.10	1,387	----		
66	NRCS Runoff	PR-2C-U Impervious	3.007	12.10	10,016	----		
67	Junction	PR-2C-U	6.724	12.10	28,708	63, 64, 65, 66		
70	Junction	POA-2	14.02	12.10	87,991	46, 57, 61, 67		

Hydrograph 25-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys

10-21-2025

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-D Grass D	1.994	12.13	6,712	----		
2	NRCS Runoff	PR-1A-D Imp	2.562	12.10	8,592	----		
3	Junction	PR-1A-D	4.475	12.10	15,305	1, 2		
5	NRCS Runoff	PR-1A-U Open Space C	1.649	12.17	6,148	----		
6	NRCS Runoff	PR-1A-U Woods C	0.365	12.17	1,353	----		
7	NRCS Runoff	PR-1A-U Imp	4.003	12.10	13,426	----		
8	Junction	PR-1A-U	5.721	12.10	20,926	5, 6, 7		
10	Junction	PR-1A Total	10.20	12.10	36,231	3, 8		
11	Pond Route	PR-1A Routing	4.639	12.23	33,331	10	536.30	11,447
13	NRCS Runoff	PR-1B-D	2.356	12.12	7,530	----		
15	NRCS Runoff	PR-1B-U Open Space C	1.349	12.18	5,225	----		
16	NRCS Runoff	PR-1B-U Woods C	2.633	12.18	10,138	----		
17	NRCS Runoff	PR-1B-U Impervious	8.489	12.12	32,952	----		
18	Junction	PR-1B-U	12.19	12.13	48,315	15, 16, 17		
21	Junction	PR-1B (Swale)	14.48	12.13	55,845	13, 18		
24	NRCS Runoff	PR-1C-D Open Space D	2.185	12.10	6,258	----		
25	NRCS Runoff	PR-1C-D Impervious	0.881	12.10	2,954	----		
26	Junction	PR-1C-D	3.065	12.10	9,212	24, 25		
28	NRCS Runoff	PR-1C-U Open Space C	3.804	12.15	13,361	----		
29	NRCS Runoff	PR-1C-U Impervious	9.371	12.10	32,078	----		
30	Junction	PR-1C-U	12.81	12.10	45,439	28, 29		
32	Junction	POA-1	33.09	12.12	143,827	11, 21, 26, 30		
35	NRCS Runoff	PR-2A-D Open Space D	5.384	12.12	17,211	----		
36	NRCS Runoff	PR-2A-D Impervious	3.362	12.10	11,277	----		

Hydrograph 25-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys

10-21-2025

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
37	Junction	PR-2A-D	8.643	12.10	28,488	35, 36		
39	NRCS Runoff	PR-2A-U Open Space C	0.808	12.20	3,295	----		
40	NRCS Runoff	PR-2A-U Woods C	0.737	12.20	2,990	----		
41	NRCS Runoff	PR-2A-U Impervious	5.444	12.10	18,259	----		
42	Junction	PR-2A-U	6.642	12.10	24,543	39, 40, 41		
45	Junction	PR-2A	15.28	12.10	53,032	37, 42		
46	Pond Route	PR-2A Routing	6.082	12.25	49,644	45	539.07	19,070
48	NRCS Runoff	PR-2B-D Open Space D	0.212	12.10	626	----		
49	NRCS Runoff	PR-2B-D Impervious	2.962	12.10	9,935	----		
50	Junction	PR-2B-D	3.174	12.10	10,561	48, 49		
52	NRCS Runoff	PR-2B-U Open Space C	0.062	12.10	172	----		
53	NRCS Runoff	PR-2B-U Impervious	0.240	12.10	806	----		
54	Junction	PR-2B-U	0.302	12.10	977	52, 53		
56	Junction	PR-2B	3.476	12.10	11,538	50, 54		
57	Pond Route	PR-2B Routing	0.354	12.85	11,525	56	554.92	5,060
59	NRCS Runoff	PR-2C-D Open Space D	3.960	12.10	11,343	----		
60	NRCS Runoff	PR-2C-D Impervious	2.322	12.10	7,787	----		
61	Junction	PR-2C-D	6.281	12.10	19,130	59, 60		
63	NRCS Runoff	PR-2C-U Open Space C	3.052	12.20	12,446	----		
64	NRCS Runoff	PR-2C-U Woods C	3.154	12.20	12,791	----		
65	NRCS Runoff	PR-2C-U Gravel C	0.609	12.10	1,855	----		
66	NRCS Runoff	PR-2C-U Impervious	3.843	12.10	12,889	----		
67	Junction	PR-2C-U	9.262	12.10	39,981	63, 64, 65, 66		
70	Junction	POA-2	20.85	12.10	120,279	46, 57, 61, 67		

Hydrograph 100-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys

10-21-2025

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-D Grass D	3.062	12.13	10,581	----		
2	NRCS Runoff	PR-1A-D Imp	3.659	12.10	12,370	----		
3	Junction	PR-1A-D	6.611	12.10	22,951	1, 2		
5	NRCS Runoff	PR-1A-U Open Space C	2.644	12.17	10,047	----		
6	NRCS Runoff	PR-1A-U Woods C	0.604	12.17	2,270	----		
7	NRCS Runoff	PR-1A-U Imp	5.717	12.10	19,327	----		
8	Junction	PR-1A-U	8.523	12.10	31,645	5, 6, 7		
10	Junction	PR-1A Total	15.13	12.10	54,595	3, 8		
11	Pond Route	PR-1A Routing	10.05	12.15	51,696	10	536.73	13,696
13	NRCS Runoff	PR-1B-D	3.616	12.12	11,870	----		
15	NRCS Runoff	PR-1B-U Open Space C	2.163	12.18	8,539	----		
16	NRCS Runoff	PR-1B-U Woods C	4.359	12.18	17,013	----		
17	NRCS Runoff	PR-1B-U Impervious	12.13	12.12	47,437	----		
18	Junction	PR-1B-U	18.24	12.13	72,989	15, 16, 17		
21	Junction	PR-1B (Swale)	21.76	12.13	84,859	13, 18		
24	NRCS Runoff	PR-1C-D Open Space D	3.337	12.10	9,866	----		
25	NRCS Runoff	PR-1C-D Impervious	1.258	12.10	4,252	----		
26	Junction	PR-1C-D	4.595	12.10	14,118	24, 25		
28	NRCS Runoff	PR-1C-U Open Space C	6.092	12.15	21,836	----		
29	NRCS Runoff	PR-1C-U Impervious	13.38	12.10	46,180	----		
30	Junction	PR-1C-U	18.95	12.10	68,016	28, 29		
32	Junction	POA-1	53.61	12.12	218,689	11, 21, 26, 30		
35	NRCS Runoff	PR-2A-D Open Space D	8.266	12.12	27,131	----		
36	NRCS Runoff	PR-2A-D Impervious	4.802	12.10	16,235	----		

Hydrograph 100-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys

10-21-2025

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
37	Junction	PR-2A-D	12.93	12.10	43,366	35, 36		
39	NRCS Runoff	PR-2A-U Open Space C	1.297	12.20	5,384	----		
40	NRCS Runoff	PR-2A-U Woods C	1.222	12.20	5,018	----		
41	NRCS Runoff	PR-2A-U Impervious	7.775	12.10	26,285	----		
42	Junction	PR-2A-U	9.764	12.10	36,687	39, 40, 41		
45	Junction	PR-2A	22.69	12.10	80,053	37, 42		
46	Pond Route	PR-2A Routing	9.295	12.23	76,666	45	539.63	25,429
48	NRCS Runoff	PR-2B-D Open Space D	0.325	12.10	987	----		
49	NRCS Runoff	PR-2B-D Impervious	4.230	12.10	14,302	----		
50	Junction	PR-2B-D	4.555	12.10	15,289	48, 49		
52	NRCS Runoff	PR-2B-U Open Space C	0.098	12.10	280	----		
53	NRCS Runoff	PR-2B-U Impervious	0.343	12.10	1,160	----		
54	Junction	PR-2B-U	0.441	12.10	1,440	52, 53		
56	Junction	PR-2B	4.996	12.10	16,729	50, 54		
57	Pond Route	PR-2B Routing	0.641	12.62	16,716	56	555.69	7,083
59	NRCS Runoff	PR-2C-D Open Space D	6.049	12.10	17,882	----		
60	NRCS Runoff	PR-2C-D Impervious	3.316	12.10	11,210	----		
61	Junction	PR-2C-D	9.365	12.10	29,092	59, 60		
63	NRCS Runoff	PR-2C-U Open Space C	4.898	12.20	20,341	----		
64	NRCS Runoff	PR-2C-U Woods C	5.226	12.20	21,464	----		
65	NRCS Runoff	PR-2C-U Gravel C	0.890	12.10	2,787	----		
66	NRCS Runoff	PR-2C-U Impervious	5.488	12.10	18,554	----		
67	Junction	PR-2C-U	14.37	12.10	63,147	63, 64, 65, 66		
70	Junction	POA-2	31.63	12.10	185,620	46, 57, 61, 67		

APPENDIX C

Pond Routing Calculations

APPENDIX C
TABLE OF CONTENTS

CURRENT POND ROUTING CALCULATIONS

PR-1A WATERSHED POND ROUTING
- **Small-Scale Bioretention Basin Pond Report**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

PR-2A WATERSHED POND ROUTING
- **Small-Scale Bioretention Basin Pond Report**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

PR-2B WATERSHED POND ROUTING
- **Porous Asphalt Pavement System Pond Report**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

FUTURE POND ROUTING CALCULATIONS

PR-1A WATERSHED POND ROUTING
- **Small-Scale Bioretention Basin Pond Report**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

PR-2A WATERSHED POND ROUTING
- **Small-Scale Bioretention Basin Pond Report**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

PR-2B WATERSHED POND ROUTING
- **Porous Asphalt Pavement System Pond Report**
- **2 Year Design Storm Event**
- **10 Year Design Storm Event**
- **25 Year Design Storm Event**
- **100 Year Design Storm Event**

WATER QUALITY DESIGN STORM ROUTING CALCULATIONS FOR SETTING BOTTOM ORIFICE INVERT ELEVATIONS

SMALL-SCALE BIORETENTION BASIN 1

SMALL-SCALE BIORETENTION BASIN 2

EMERGENCY SPILLWAY CALCULATIONS

SMALL-SCALE BIORETENTION BASIN 1

SMALL-SCALE BIORETENTION BASIN 2

ANTI-SEEP COLLAR CALCULATIONS

SMALL-SCALE BIORETENTION BASIN 1

SMALL-SCALE BIORETENTION BASIN 2

CURRENT POND ROUTING CALCULATIONS

PR-1A WATERSHED POND ROUTING

Pond Report

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10-21-2025

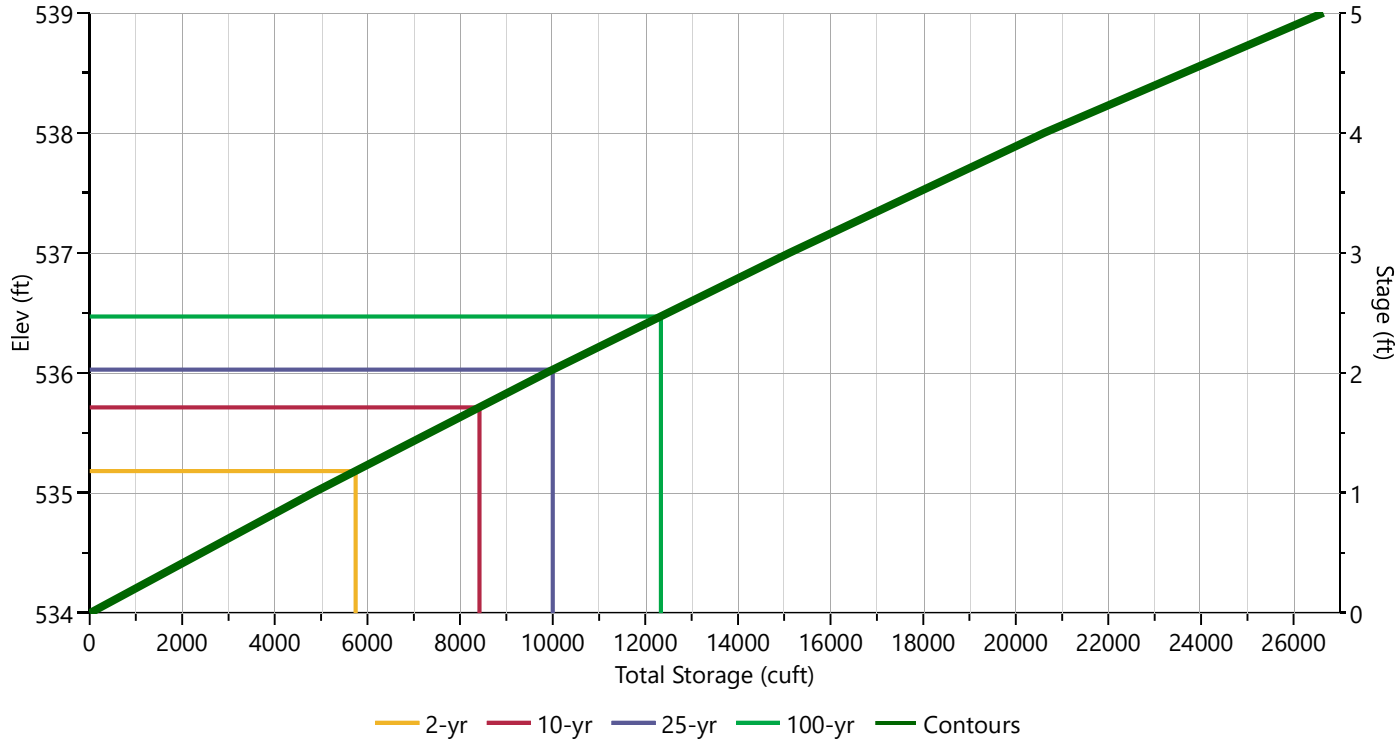
SSBB-1

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	534.00
Voids (%)	100.00
Volume Calc	Conic

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	534.00	4,713	0.000	0.000
1.00	535.00	4,938	4,825	4,825
2.00	536.00	5,145	5,041	9,865
3.00	537.00	5,354	5,249	15,114
4.00	538.00	5,649	5,500	20,614
5.00	539.00	6,413	6,026	26,641



Pond Report

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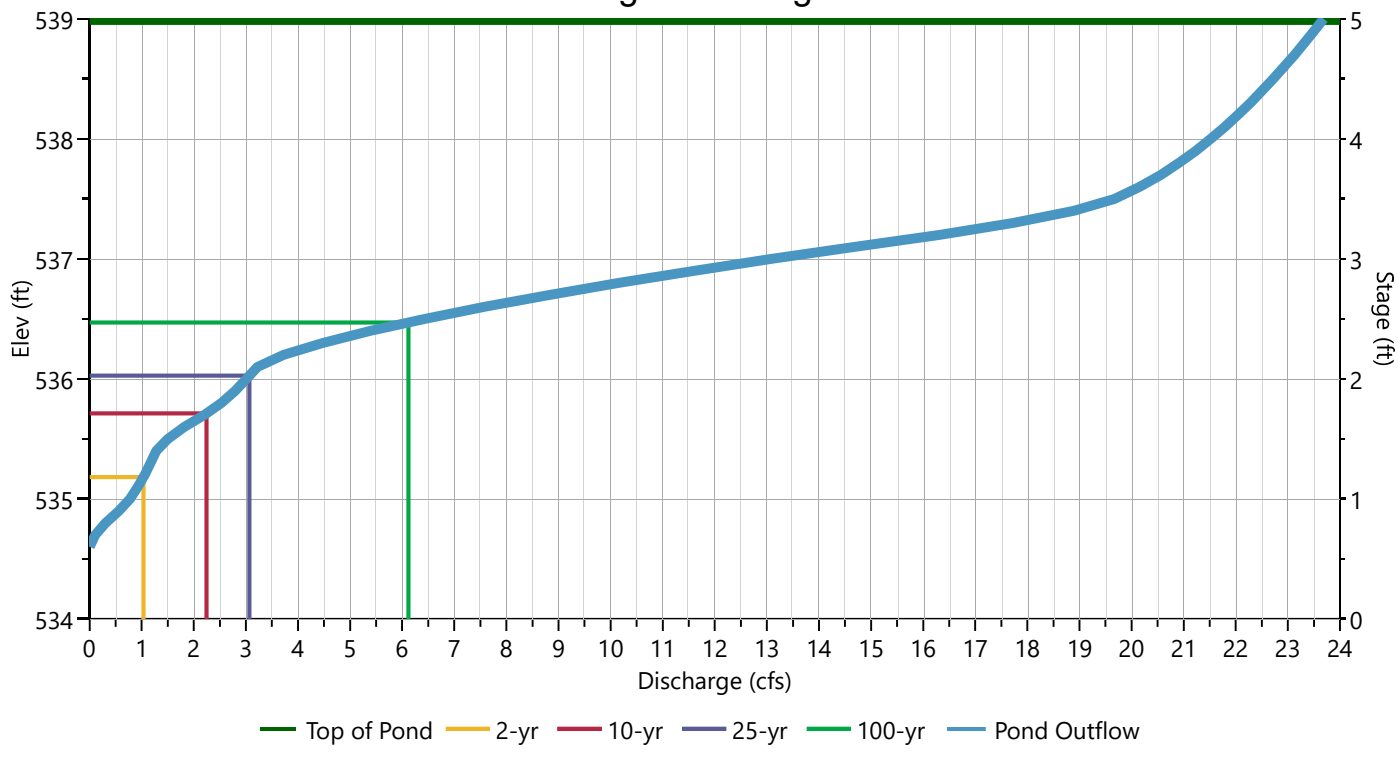
SSBB-1

Stage-Discharge

Culvert / Orifices	Cir Culvert	Orifice			Perforated Riser	
		1 (m)	2 (m)	3		
Rise, in	18	4	4		Hole Diameter, in	
Span, in	18	12	14		No. holes	
No. Barrels	1	1	1		Invert Elevation, ft	
Invert Elevation, ft	530.25	534.60	535.40		Height, ft	
Orifice Coefficient, Co	0.60	0.60	0.60		Orifice Coefficient, Co	
Length, ft	47					
Barrel Slope, %	7.34					
N-Value, n	0.013					

Weirs	Riser	Weir			Ancillary	
		1 (m)	2	3		
Shape / Type		Rectangular			Exfiltration, in/hr	
Crest Elevation, ft		536.1				
Crest Length, ft		3				
Angle, deg						
Weir Coefficient, Cw		3.3				

m = Flows through Culvert, i = Independent



Hydrograph Report

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

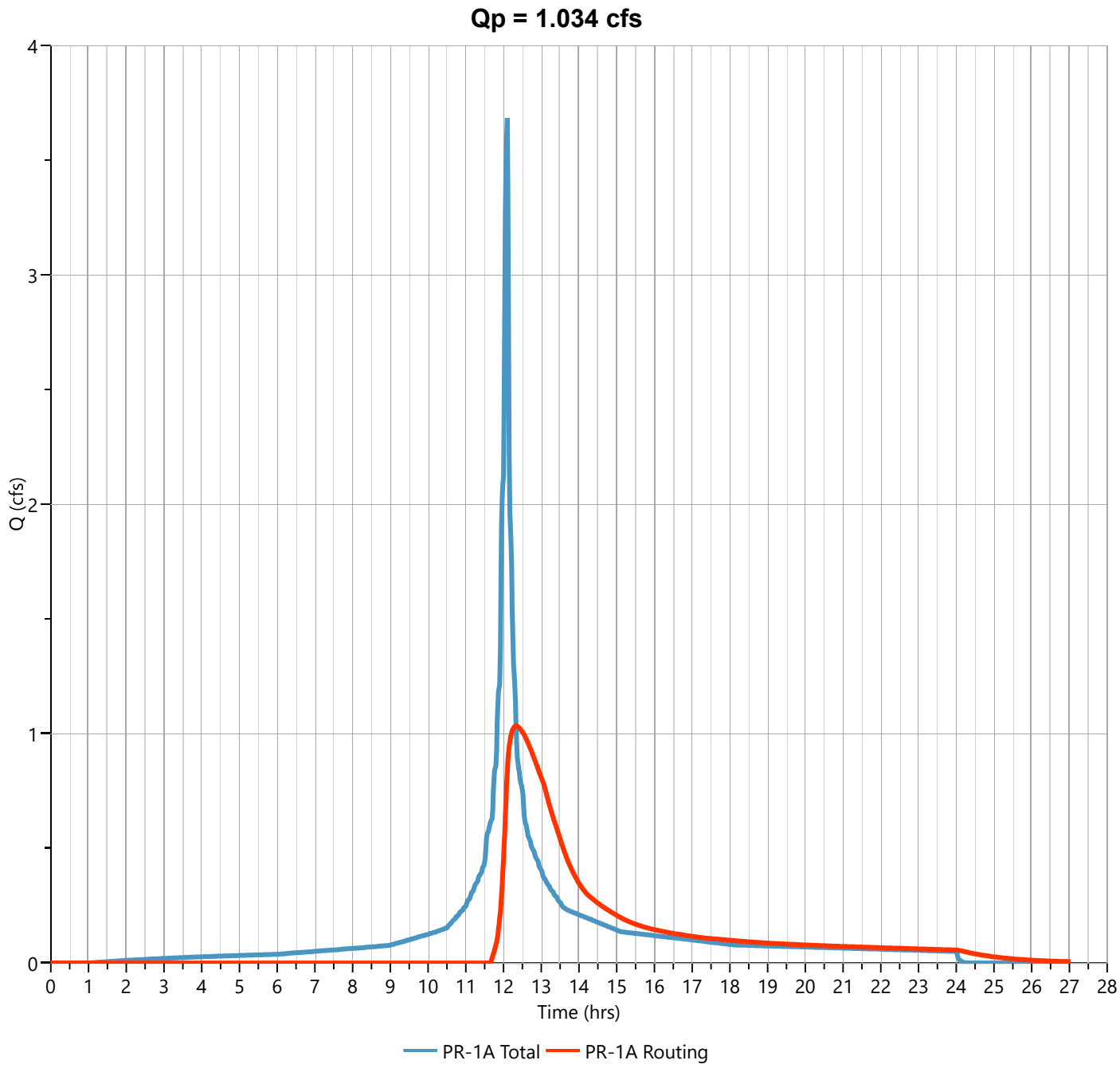
PR-1A Routing

Hyd. No. 11

Hydrograph Type	= Pond Route	Peak Flow	= 1.034 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.33 hrs
Time Interval	= 1 min	Hydrograph Volume	= 9,748 cuft
Inflow Hydrograph	= 10 - PR-1A Total	Max. Elevation	= 535.18 ft
Pond Name	= SSBB-1	Max. Storage	= 5,747 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.00 hrs



Hydrograph Report

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

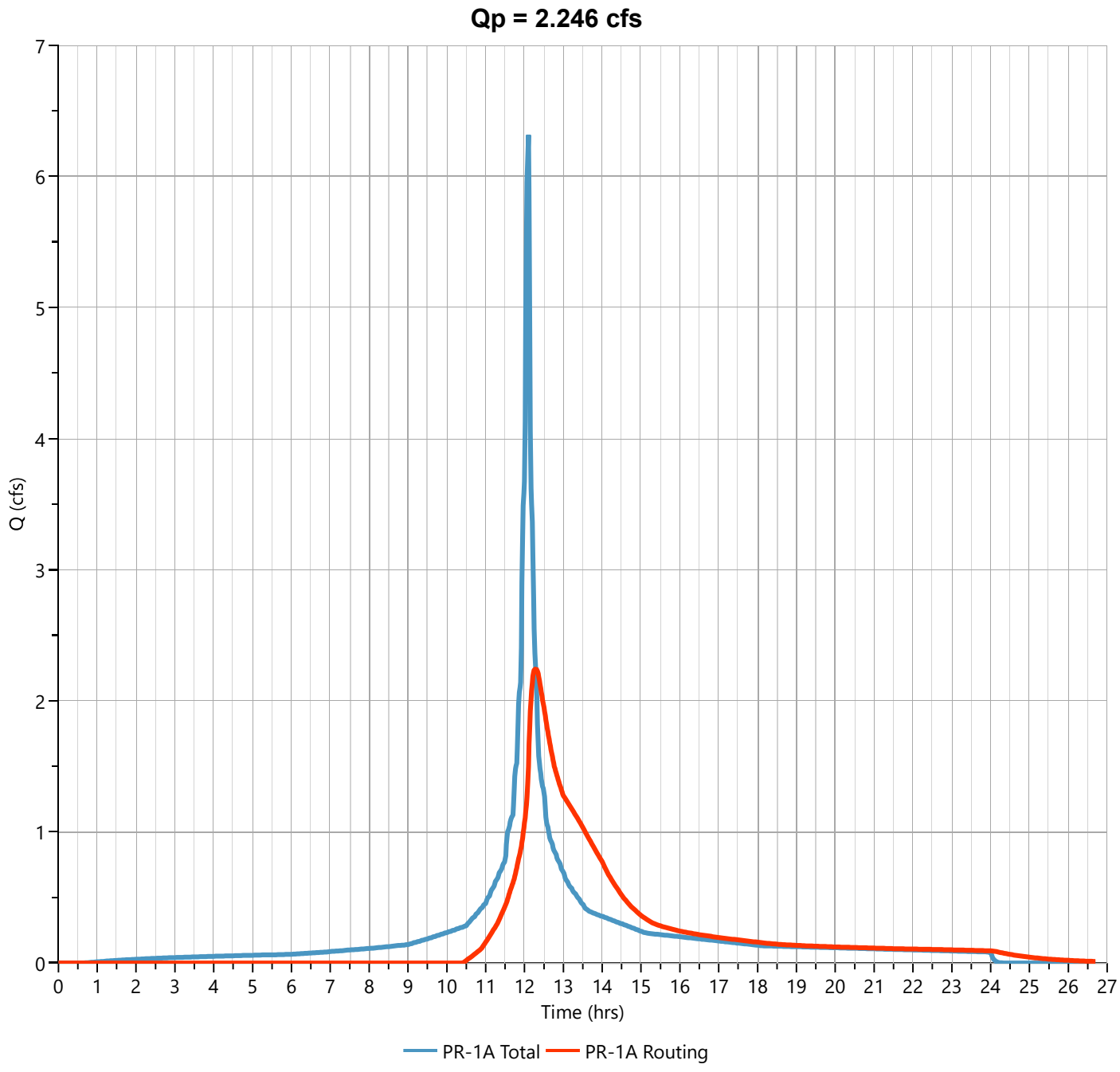
PR-1A Routing

Hyd. No. 11

Hydrograph Type	= Pond Route	Peak Flow	= 2.246 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.28 hrs
Time Interval	= 1 min	Hydrograph Volume	= 19,163 cuft
Inflow Hydrograph	= 10 - PR-1A Total	Max. Elevation	= 535.71 ft
Pond Name	= SSBB-1	Max. Storage	= 8,419 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.63 hrs



Hydrograph Report

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

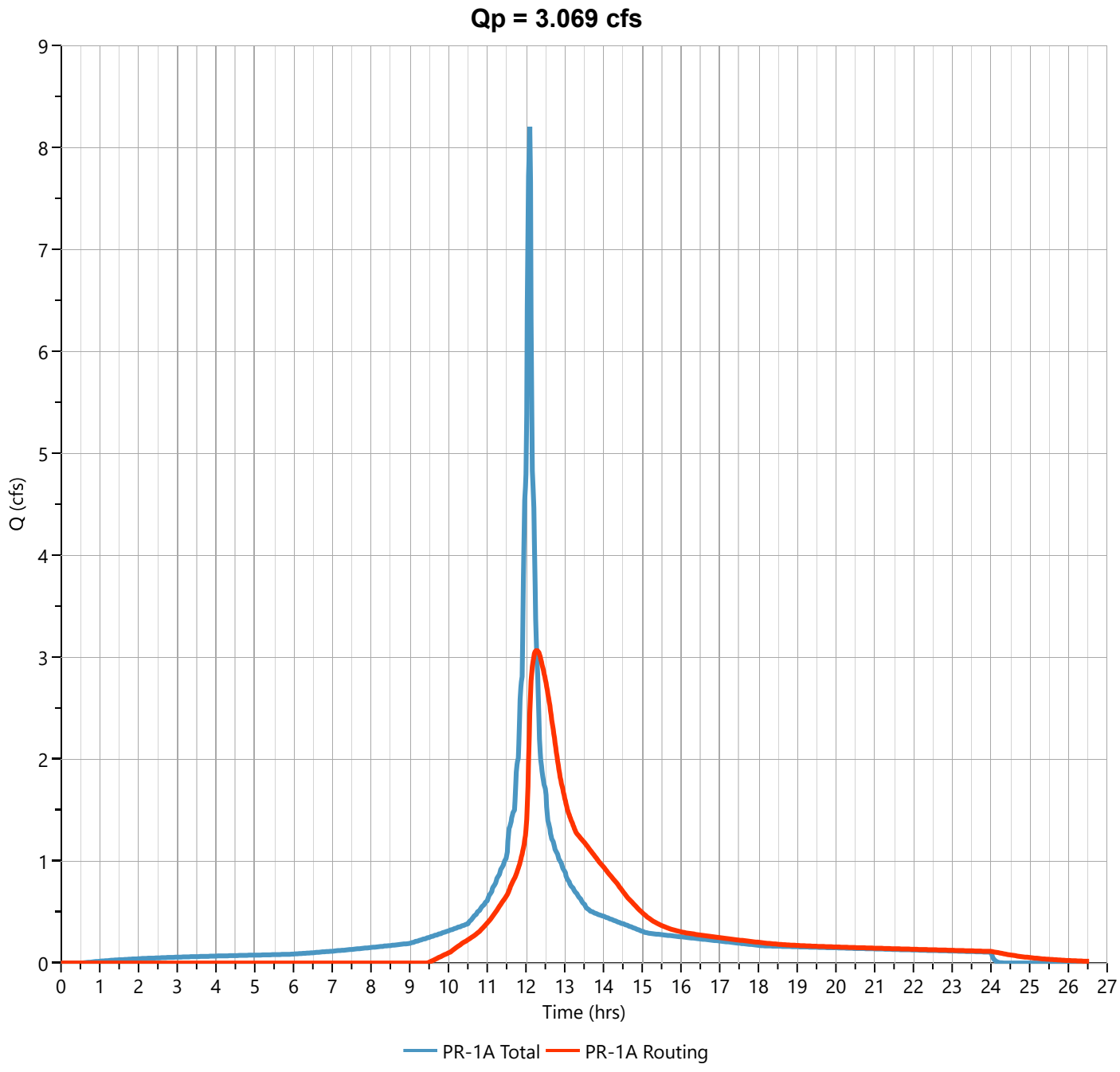
PR-1A Routing

Hyd. No. 11

Hydrograph Type	= Pond Route	Peak Flow	= 3.069 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.27 hrs
Time Interval	= 1 min	Hydrograph Volume	= 26,002 cuft
Inflow Hydrograph	= 10 - PR-1A Total	Max. Elevation	= 536.03 ft
Pond Name	= SSBB-1	Max. Storage	= 10,002 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.46 hrs



Hydrograph Report

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

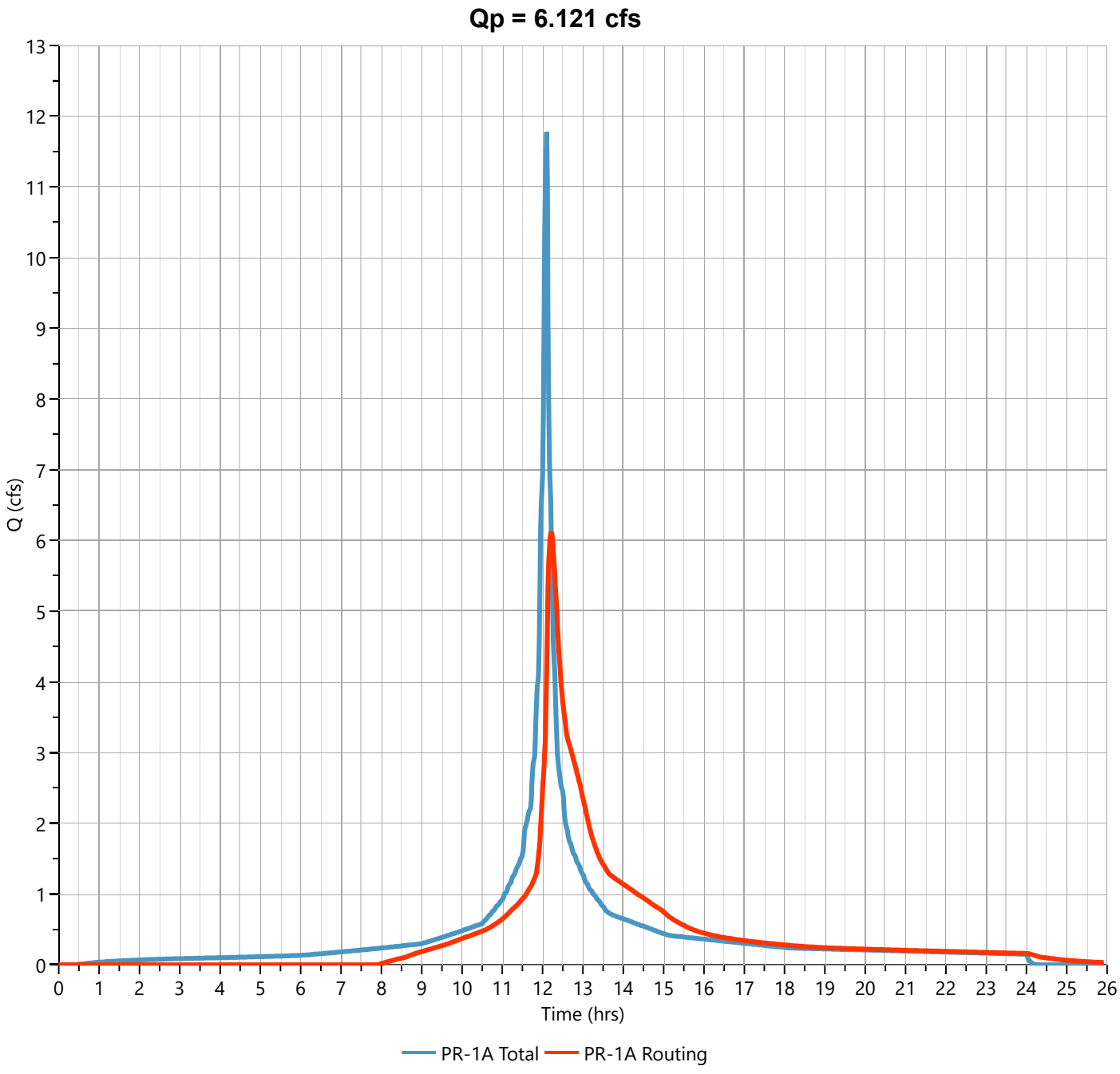
PR-1A Routing

Hyd. No. 11

Hydrograph Type	= Pond Route	Peak Flow	= 6.121 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.22 hrs
Time Interval	= 1 min	Hydrograph Volume	= 39,166 cuft
Inflow Hydrograph	= 10 - PR-1A Total	Max. Elevation	= 536.47 ft
Pond Name	= SSBB-1	Max. Storage	= 12,336 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.21 hrs



PR-2A WATERSHED POND ROUTING

Pond Report

File: Eagle Rock Proposed (Current).hys

Hydrology Studio v 3.0.0.39

10-21-2025

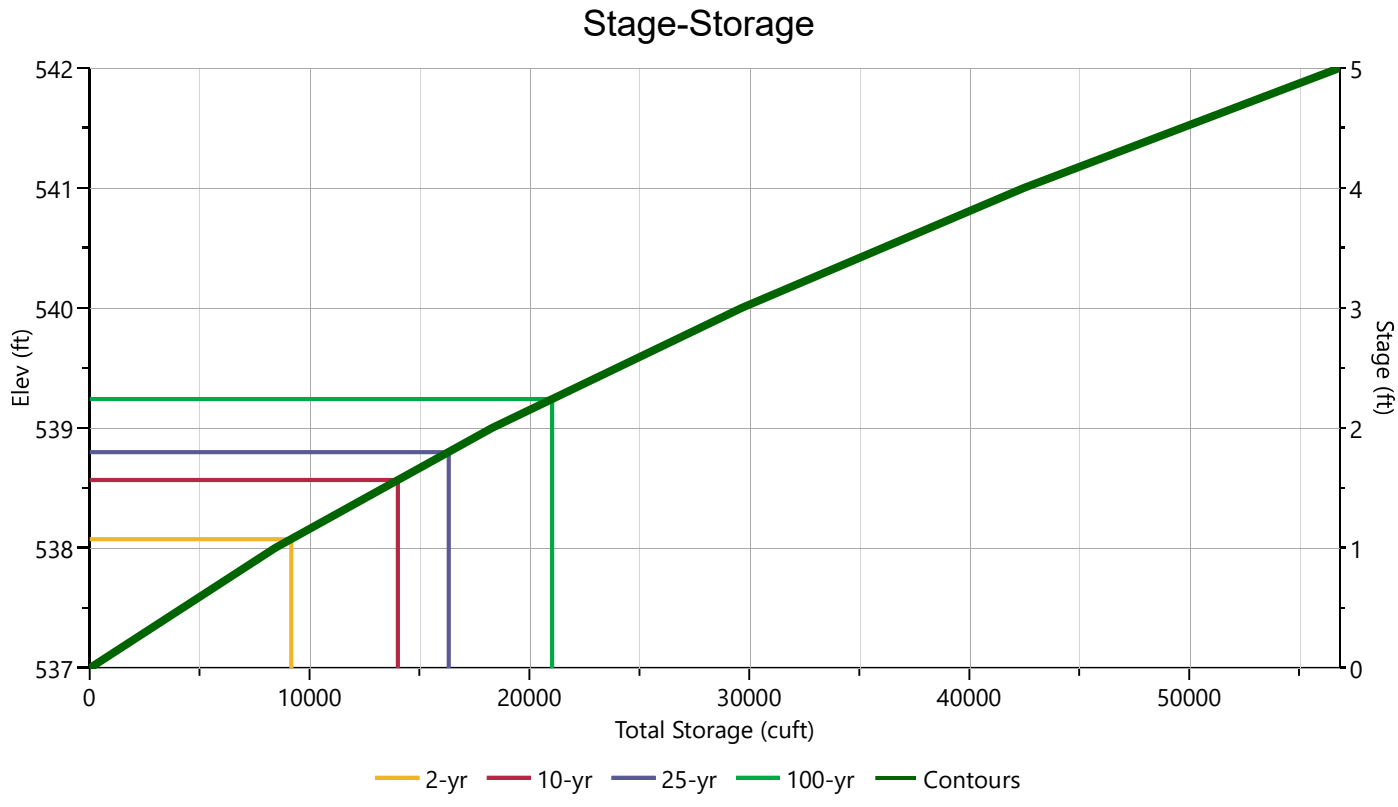
SSBB-2

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	537.00
Voids (%)	100.00
Volume Calc	Conic

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	537.00	7,745	0.000	0.000
1.00	538.00	9,163	8,443	8,443
2.00	539.00	10,607	9,875	18,318
3.00	540.00	12,084	11,337	29,655
4.00	541.00	13,601	12,834	42,489
5.00	542.00	15,155	14,369	56,858



Pond Report

File: Eagle Rock Proposed (Current).hys

Hydrology Studio v 3.0.0.39

10-21-2025

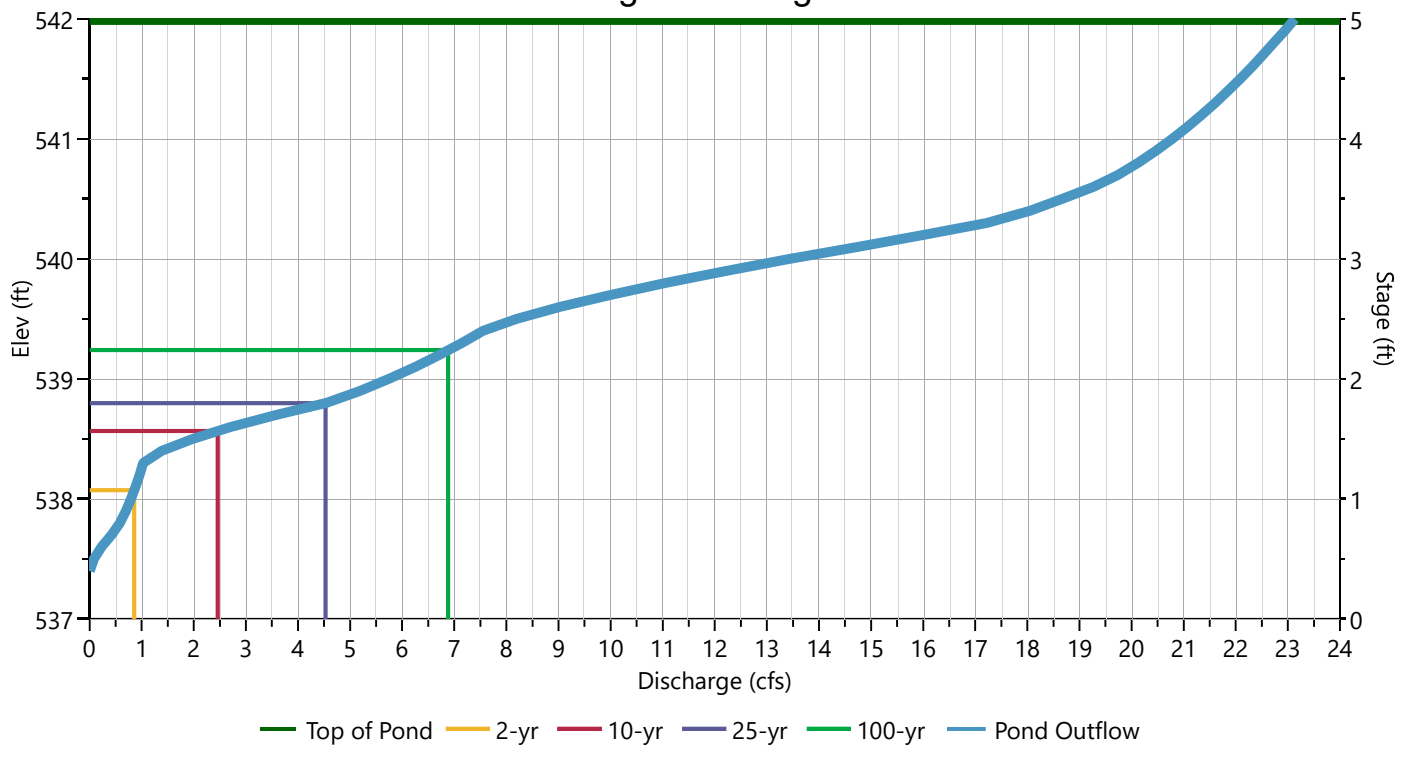
SSBB-2

Stage-Discharge

Culvert / Orifices	Cir Culvert	Orifice			Perforated Riser	
		1 (m)	2 (m)	3		
Rise, in	18	4	6		Hole Diameter, in	
Span, in	18	9	16		No. holes	
No. Barrels	1	1	2		Invert Elevation, ft	
Invert Elevation, ft	533.50	537.40	538.30		Height, ft	
Orifice Coefficient, Co	0.60	0.60	0.60		Orifice Coefficient, Co	
Length, ft	36					
Barrel Slope, %	1.5					
N-Value, n	0.012					

Weirs	Riser	Weir			Ancillary	
		1 (m)	2	3		
Shape / Type		Rectangular			Exfiltration, in/hr	
Crest Elevation, ft		539.4				
Crest Length, ft		2.5				
Angle, deg						
Weir Coefficient, Cw		3.3				

m = Flows through Culvert, i = Independent



Hydrograph Report

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

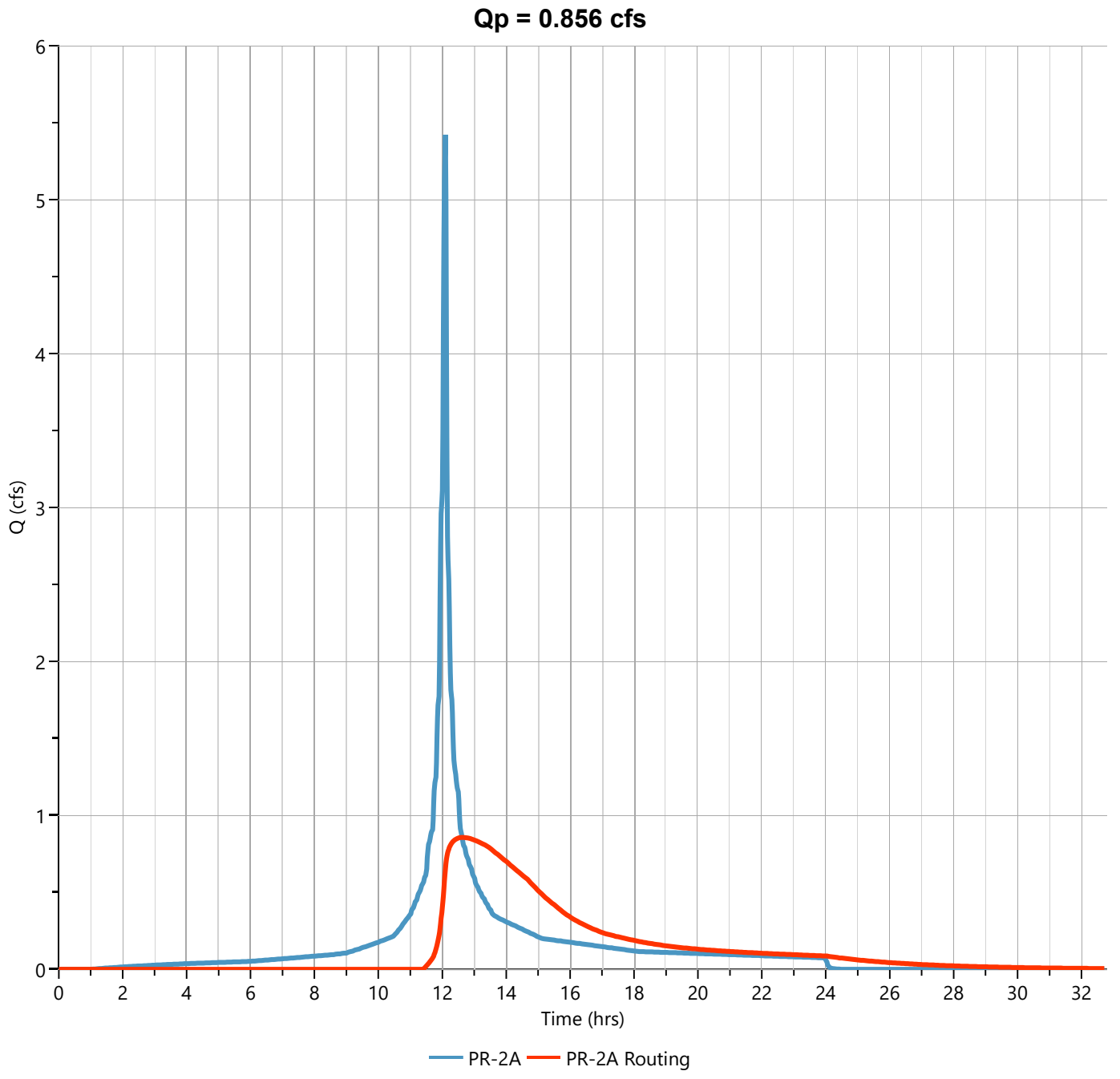
PR-2A Routing

Hyd. No. 46

Hydrograph Type	= Pond Route	Peak Flow	= 0.856 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.62 hrs
Time Interval	= 1 min	Hydrograph Volume	= 14,915 cuft
Inflow Hydrograph	= 45 - PR-2A	Max. Elevation	= 538.07 ft
Pond Name	= SSBB-2	Max. Storage	= 9,171 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.85 hrs



Hydrograph Report

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

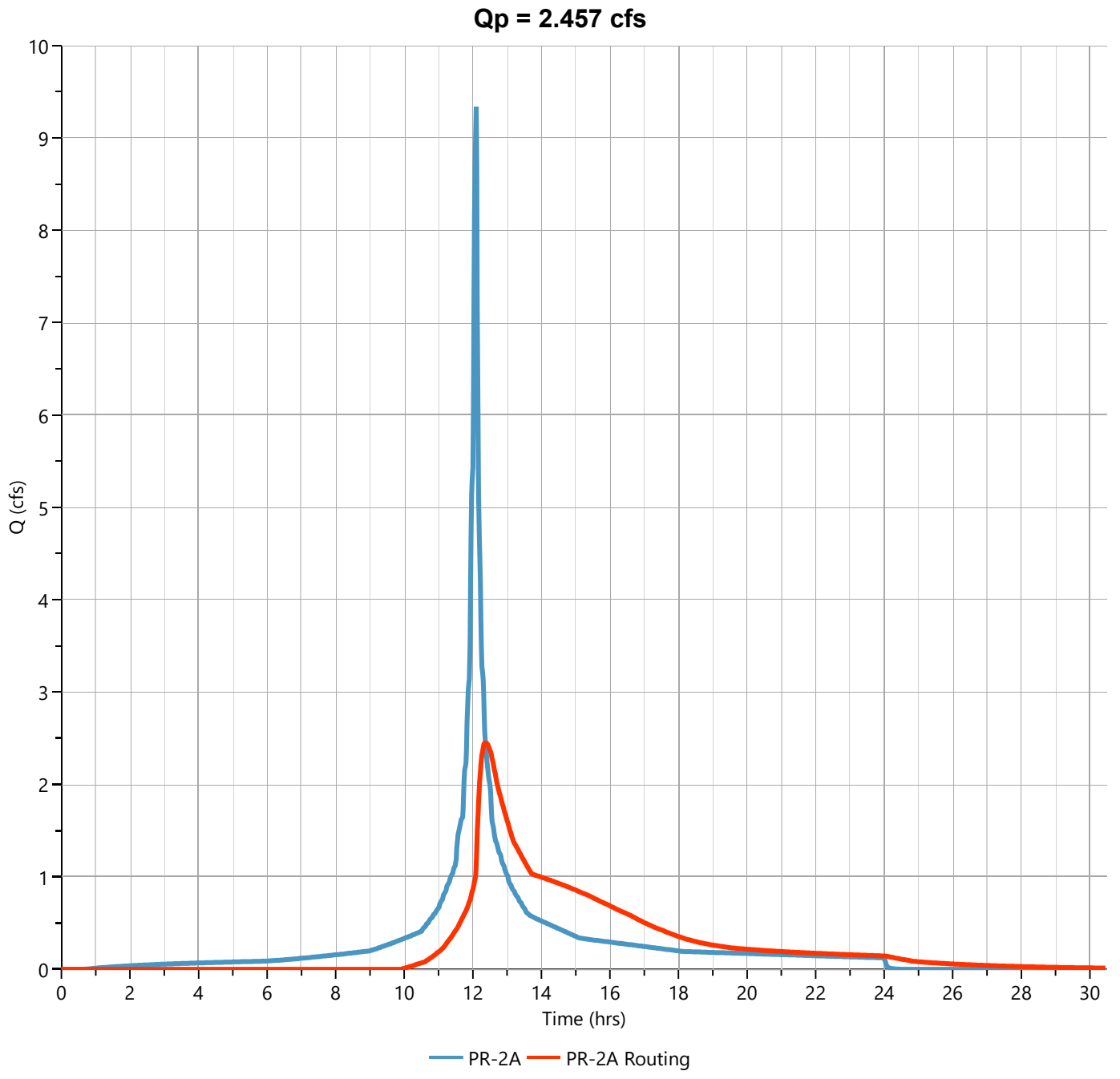
PR-2A Routing

Hyd. No. 46

Hydrograph Type	= Pond Route	Peak Flow	= 2.457 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.37 hrs
Time Interval	= 1 min	Hydrograph Volume	= 28,753 cuft
Inflow Hydrograph	= 45 - PR-2A	Max. Elevation	= 538.57 ft
Pond Name	= SSBB-2	Max. Storage	= 14,024 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.38 hrs



Hydrograph Report

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

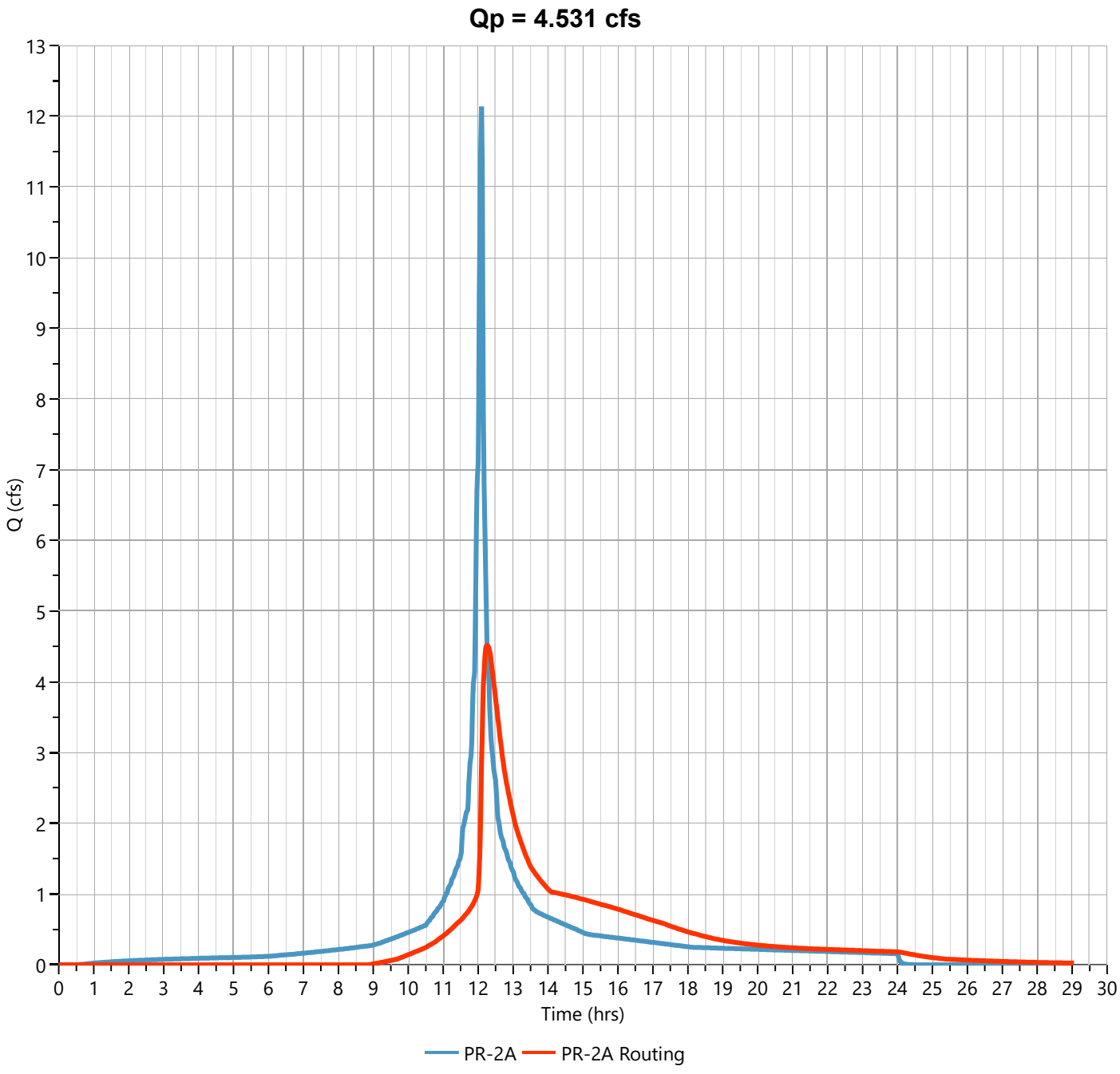
PR-2A Routing

Hyd. No. 46

Hydrograph Type	= Pond Route	Peak Flow	= 4.531 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.25 hrs
Time Interval	= 1 min	Hydrograph Volume	= 38,803 cuft
Inflow Hydrograph	= 45 - PR-2A	Max. Elevation	= 538.80 ft
Pond Name	= SSBB-2	Max. Storage	= 16,329 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.04 hrs



Hydrograph Report

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

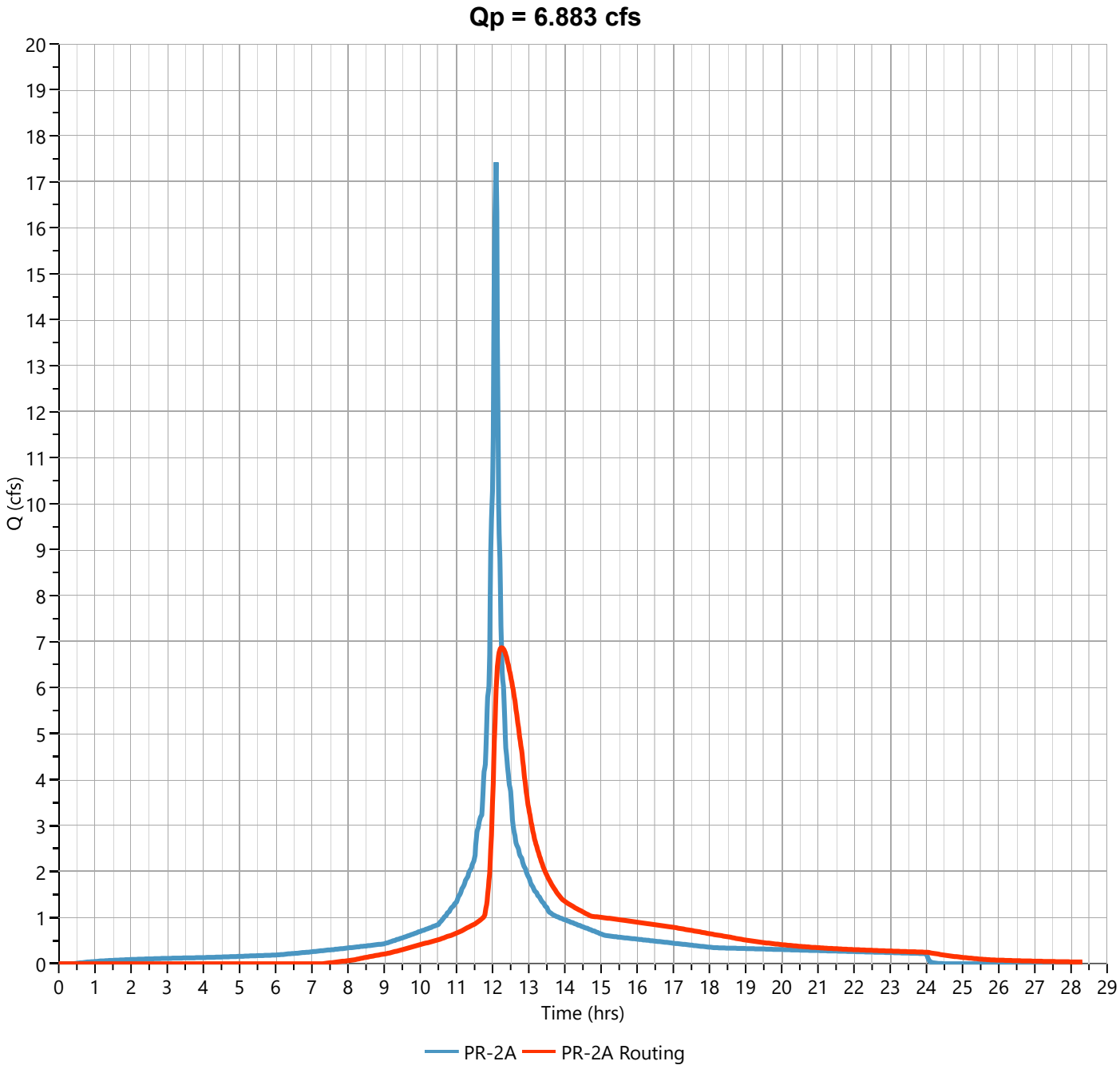
PR-2A Routing

Hyd. No. 46

Hydrograph Type	= Pond Route	Peak Flow	= 6.883 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.25 hrs
Time Interval	= 1 min	Hydrograph Volume	= 58,144 cuft
Inflow Hydrograph	= 45 - PR-2A	Max. Elevation	= 539.24 ft
Pond Name	= SSBB-2	Max. Storage	= 21,029 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.71 hrs



PR-2B WATERSHED POND ROUTING

Pond Report

File: Eagle Rock Proposed (Current).hys

Hydrology Studio v 3.0.0.39

10-21-2025

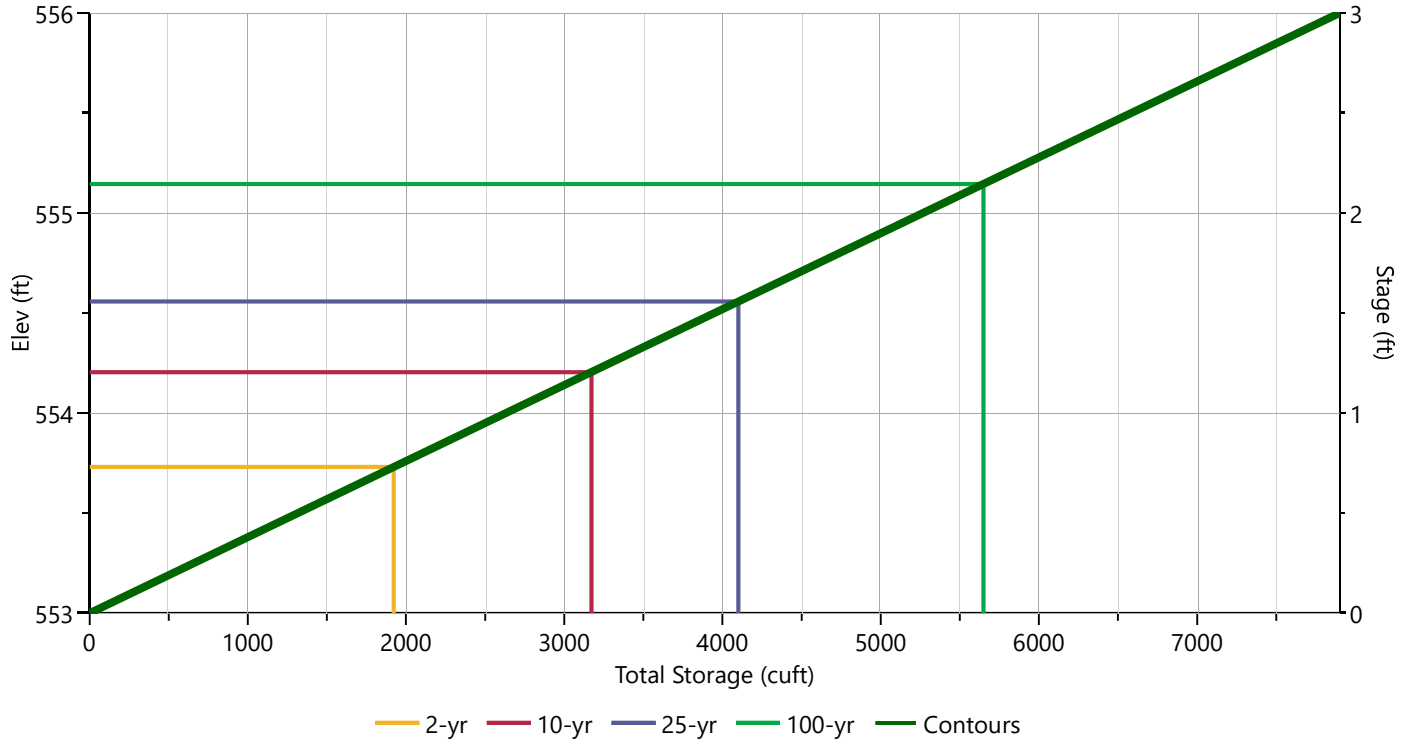
PAPS-1

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	553.00
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	553.00	6,586	0.000	0.000
1.00	554.00	6,586	2,634	2,634
2.00	555.00	6,586	2,634	5,269
3.00	556.00	6,586	2,634	7,903



Pond Report

File: Eagle Rock Proposed (Current).hys

Hydrology Studio v 3.0.0.39

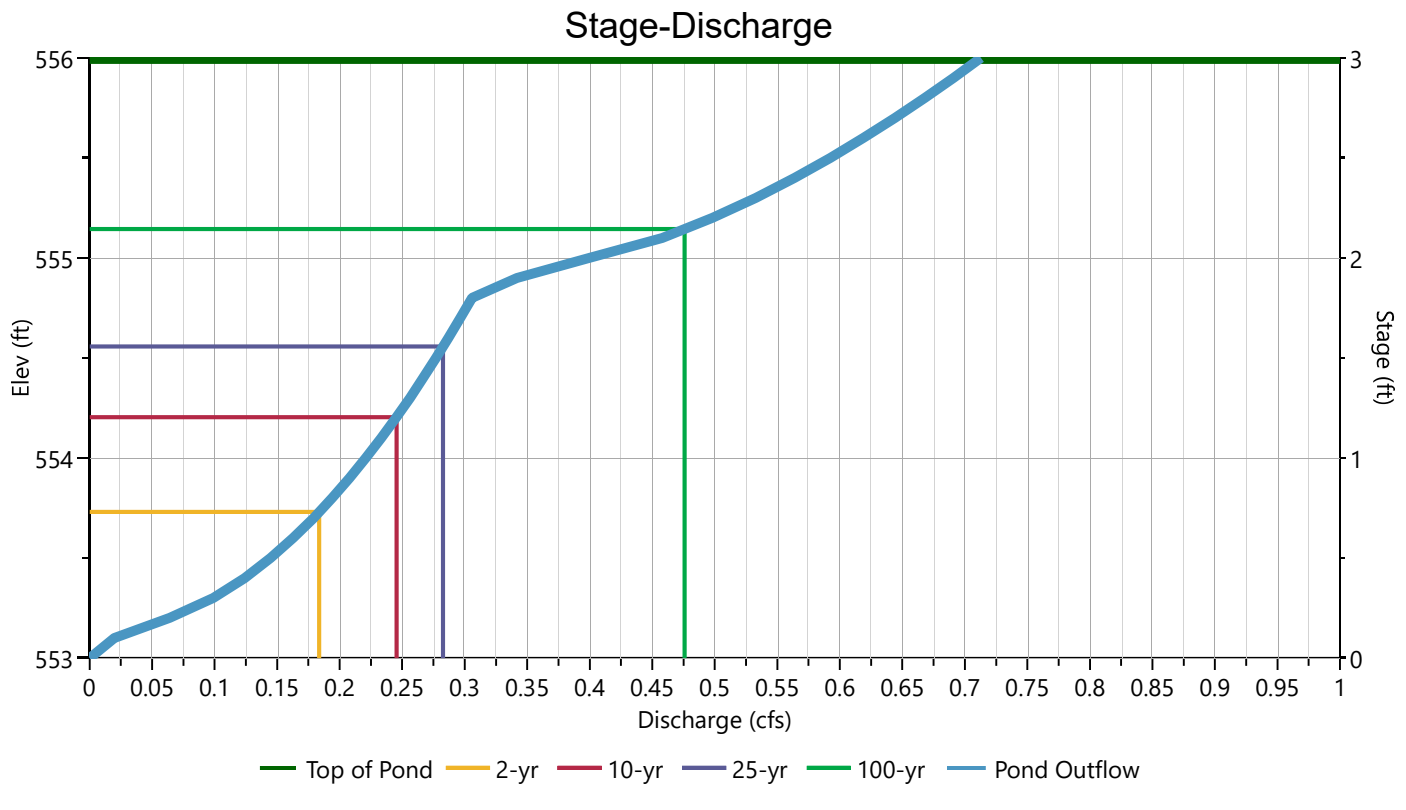
10-21-2025

PAPS-1

Stage-Discharge

Culvert / Orifices	Cir Culvert	Orifice			Perforated Riser	
		1 (i)	2 (i)	3		
Rise, in		3	3		Hole Diameter, in	
Span, in		3	3		No. holes	
No. Barrels		1	1		Invert Elevation, ft	
Invert Elevation, ft		553.00	554.80		Height, ft	
Orifice Coefficient, Co		0.60	0.60		Orifice Coefficient, Co	
Length, ft						
Barrel Slope, %						
N-Value, n						
Weirs	**Riser**	**Weir**			**Ancillary**	
		1	2	3		
Shape / Type					Exfiltration, in/hr	
Crest Elevation, ft						
Crest Length, ft						
Angle, deg						
Weir Coefficient, Cw						

m = Flows through Culvert, i = Independent



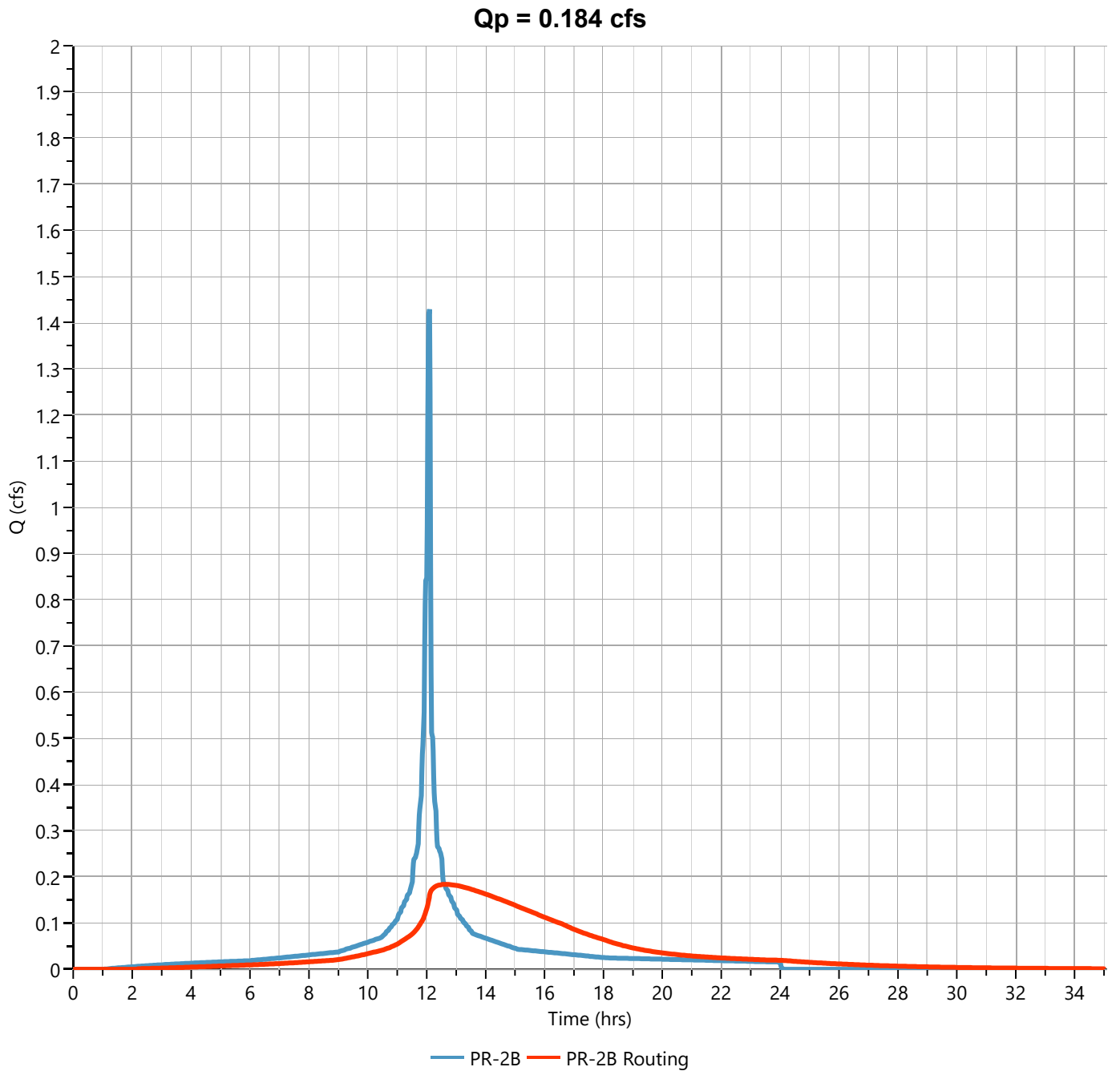
PR-2B Routing

Hyd. No. 57

Hydrograph Type	= Pond Route	Peak Flow	= 0.184 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.62 hrs
Time Interval	= 1 min	Hydrograph Volume	= 4,595 cuft
Inflow Hydrograph	= 56 - PR-2B	Max. Elevation	= 553.73 ft
Pond Name	= PAPS-1	Max. Storage	= 1,923 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.64 hrs



Hydrograph Report

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

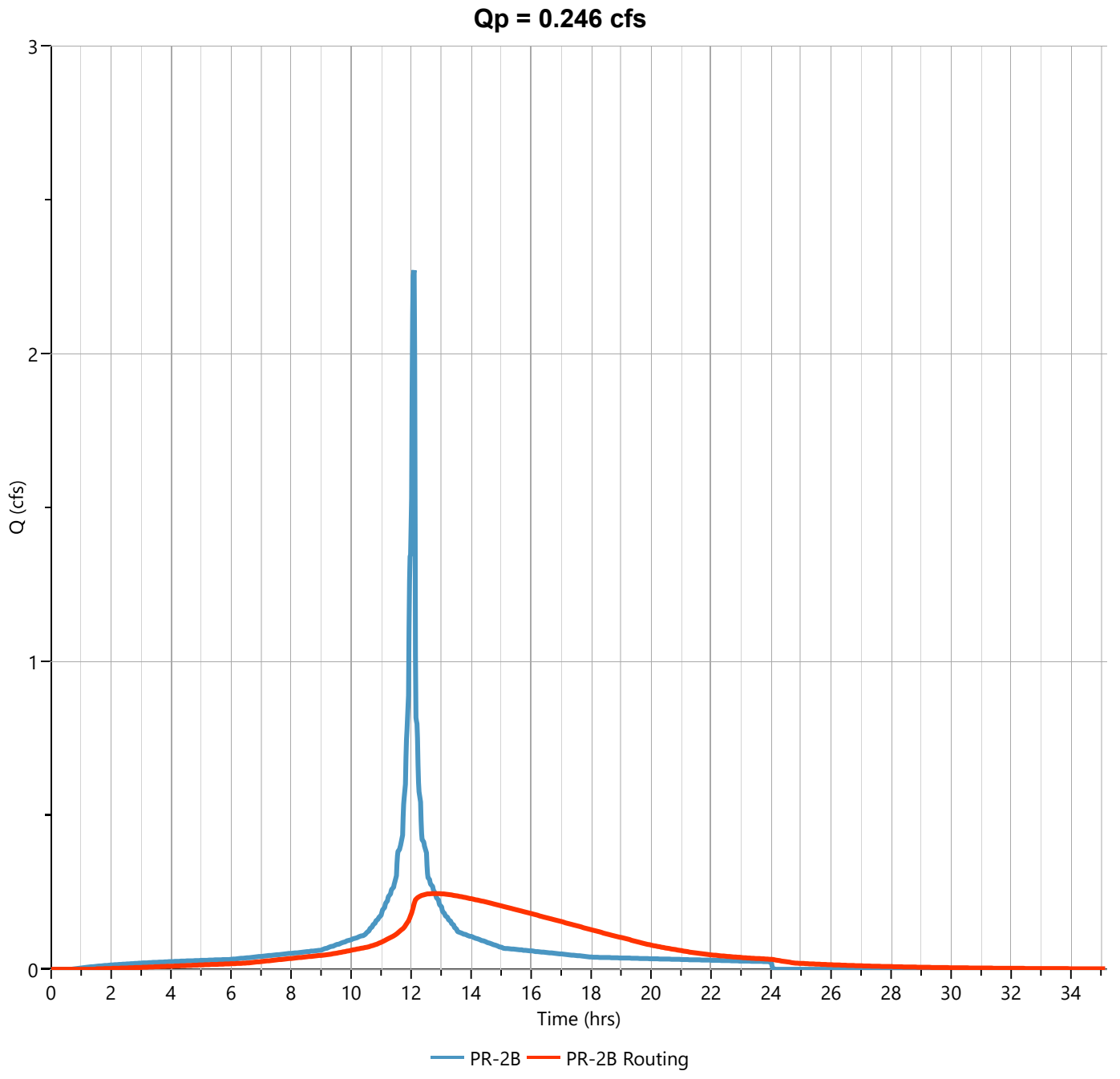
PR-2B Routing

Hyd. No. 57

Hydrograph Type	= Pond Route	Peak Flow	= 0.246 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.82 hrs
Time Interval	= 1 min	Hydrograph Volume	= 7,429 cuft
Inflow Hydrograph	= 56 - PR-2B	Max. Elevation	= 554.20 ft
Pond Name	= PAPS-1	Max. Storage	= 3,173 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.85 hrs



Hydrograph Report

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

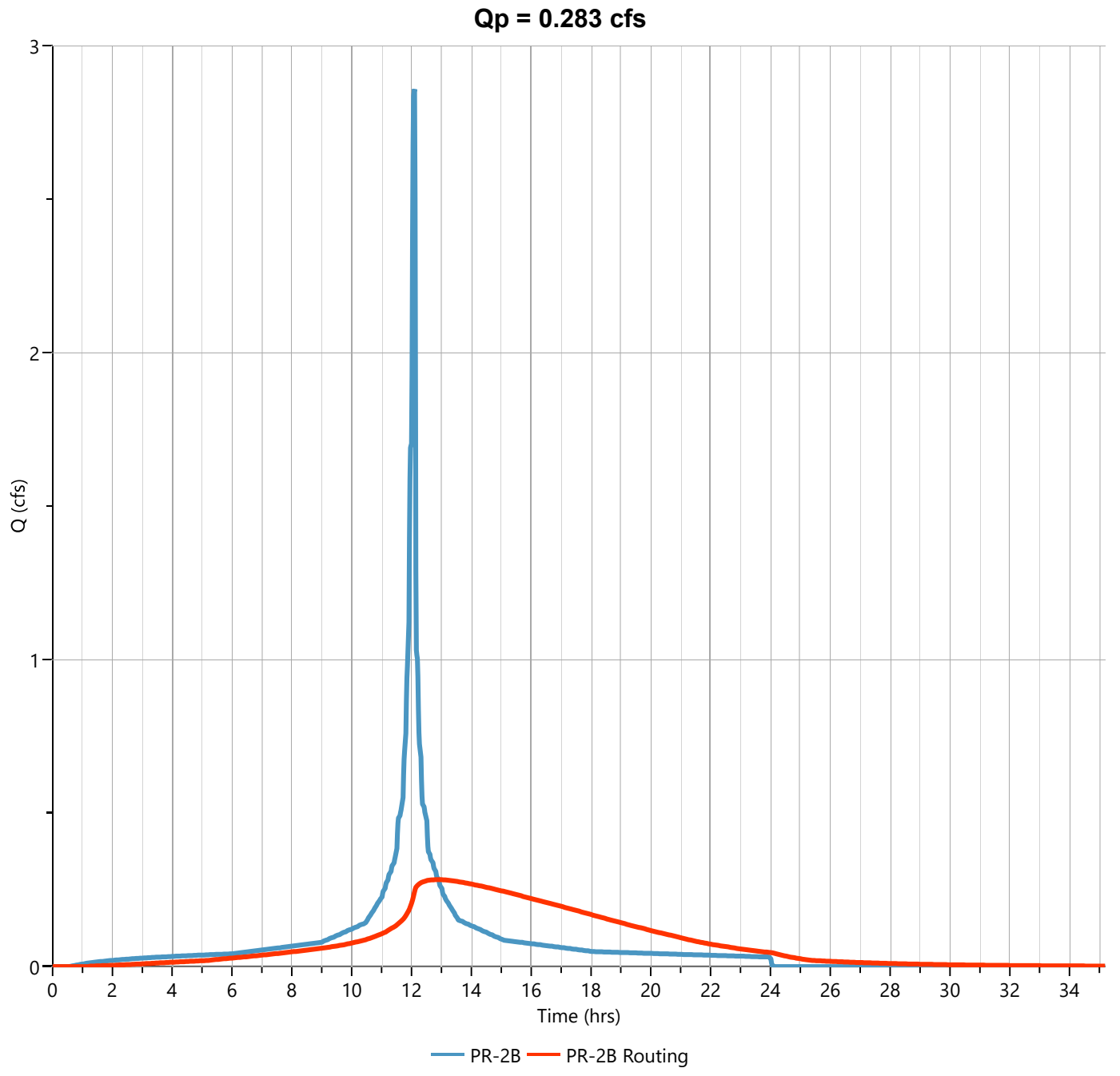
PR-2B Routing

Hyd. No. 57

Hydrograph Type	= Pond Route	Peak Flow	= 0.283 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.92 hrs
Time Interval	= 1 min	Hydrograph Volume	= 9,422 cuft
Inflow Hydrograph	= 56 - PR-2B	Max. Elevation	= 554.56 ft
Pond Name	= PAPS-1	Max. Storage	= 4,100 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 3.05 hrs



Hydrograph Report

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Current).hys
10-21-2025

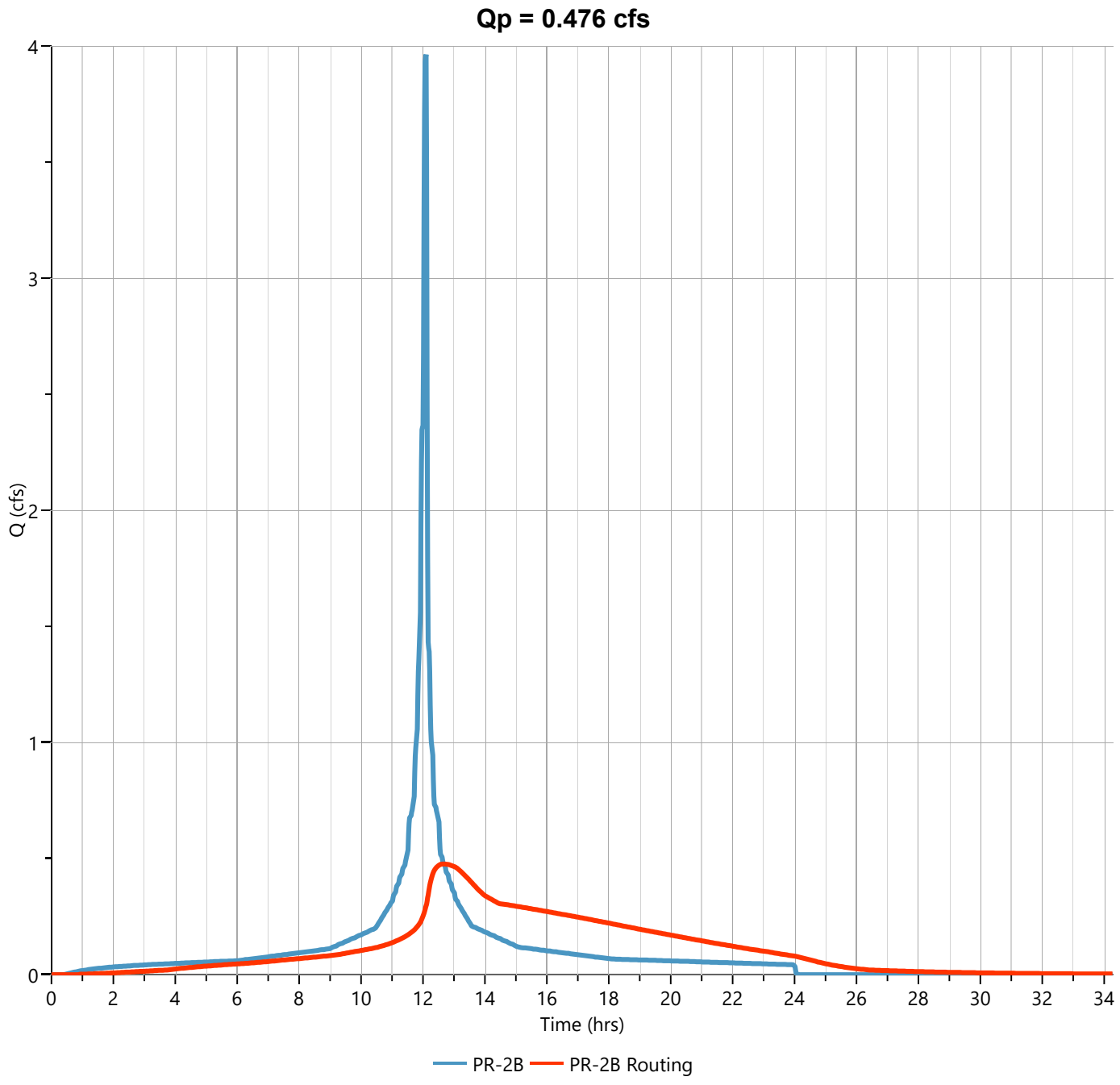
PR-2B Routing

Hyd. No. 57

Hydrograph Type	= Pond Route	Peak Flow	= 0.476 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.67 hrs
Time Interval	= 1 min	Hydrograph Volume	= 13,183 cuft
Inflow Hydrograph	= 56 - PR-2B	Max. Elevation	= 555.14 ft
Pond Name	= PAPS-1	Max. Storage	= 5,649 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 3.15 hrs



FUTURE POND ROUTING CALCULATIONS

PR-1A WATERSHED POND ROUTING

Pond Report

File: Eagle Rock Proposed (Future).hys

Hydrology Studio v 3.0.0.39

10-21-2025

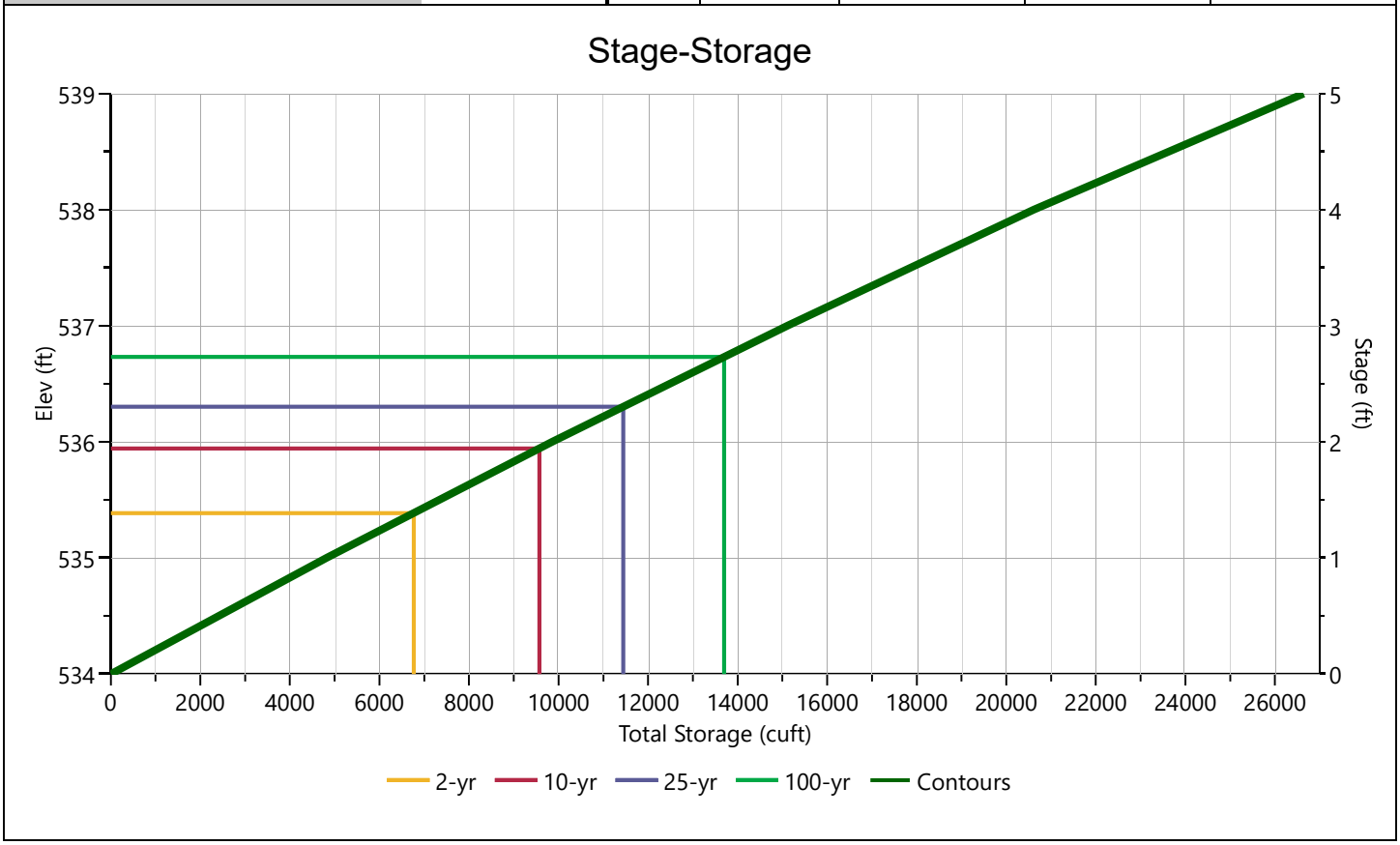
SSBB-1

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	534.00
Voids (%)	100.00
Volume Calc	Conic

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	534.00	4,713	0.000	0.000
1.00	535.00	4,938	4,825	4,825
2.00	536.00	5,145	5,041	9,865
3.00	537.00	5,354	5,249	15,114
4.00	538.00	5,649	5,500	20,614
5.00	539.00	6,413	6,026	26,641



Pond Report

File: Eagle Rock Proposed (Future).hys

Hydrology Studio v 3.0.0.39

10-21-2025

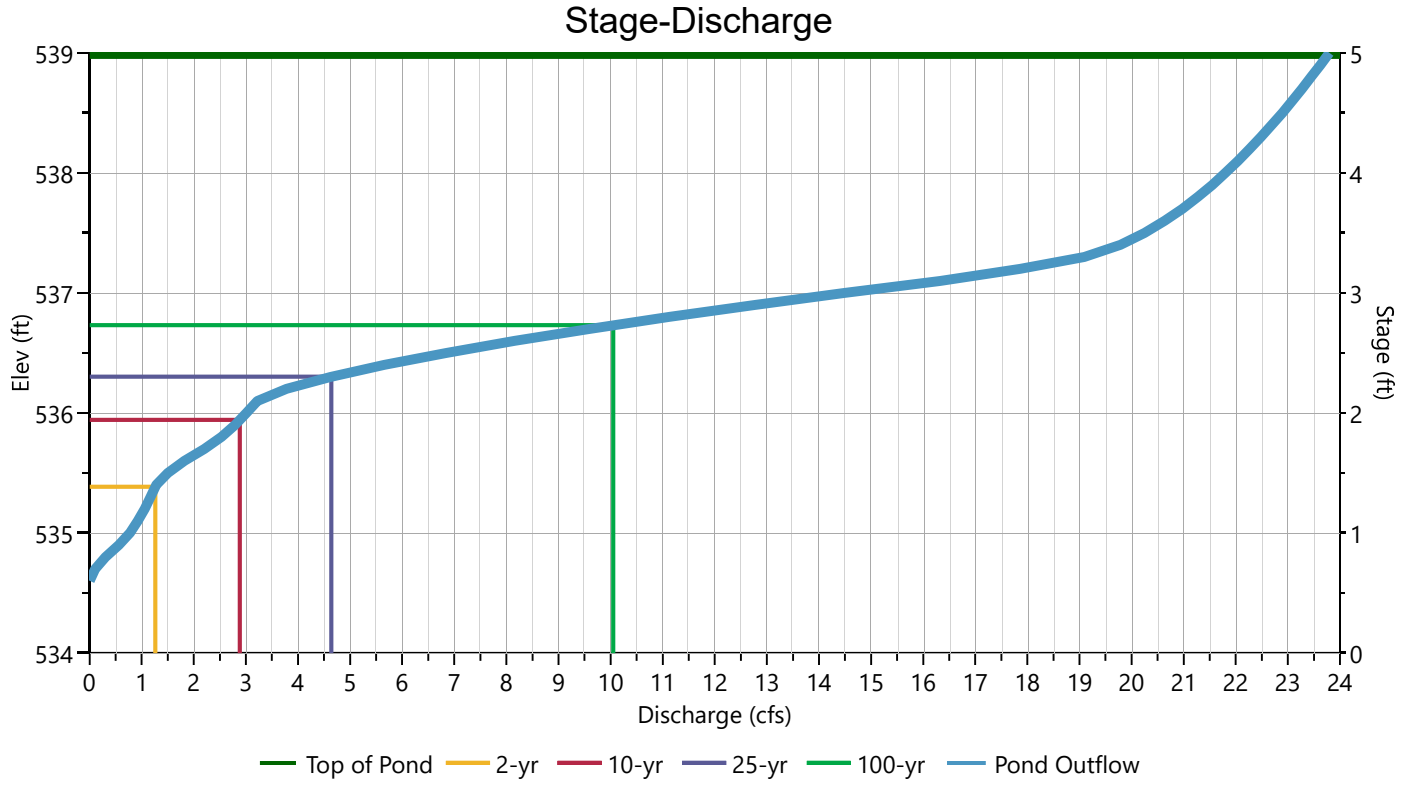
SSBB-1

Stage-Discharge

Culvert / Orifices	Cir Culvert	Orifice			Perforated Riser	
		1 (m)	2 (m)	3		
Rise, in	18	4	4		Hole Diameter, in	
Span, in	18	12	14		No. holes	
No. Barrels	1	1	1		Invert Elevation, ft	
Invert Elevation, ft	530.25	534.60	535.40		Height, ft	
Orifice Coefficient, Co	0.60	0.60	0.60		Orifice Coefficient, Co	
Length, ft	47					
Barrel Slope, %	7.34					
N-Value, n	0.013					

Weirs	Riser	Weir			Ancillary	
		1 (m)	2	3		
Shape / Type		Rectangular			Exfiltration, in/hr	
Crest Elevation, ft		536.1				
Crest Length, ft		3.5				
Angle, deg						
Weir Coefficient, Cw		3.3				

m = Flows through Culvert, i = Independent



Hydrograph Report

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

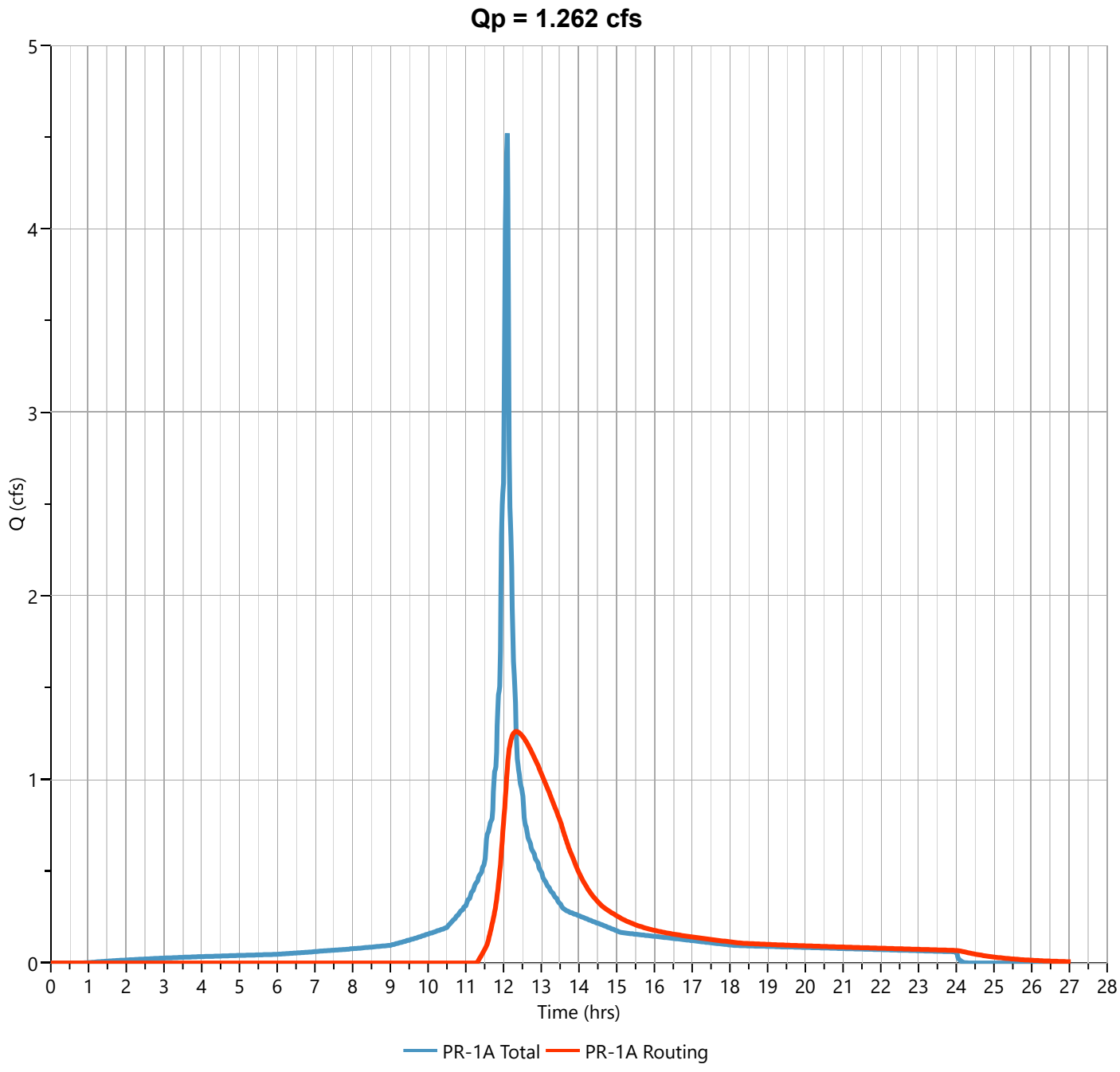
PR-1A Routing

Hyd. No. 11

Hydrograph Type	= Pond Route	Peak Flow	= 1.262 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.33 hrs
Time Interval	= 1 min	Hydrograph Volume	= 12,719 cuft
Inflow Hydrograph	= 10 - PR-1A Total	Max. Elevation	= 535.39 ft
Pond Name	= SSBB-1	Max. Storage	= 6,769 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.86 hrs



Hydrograph Report

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

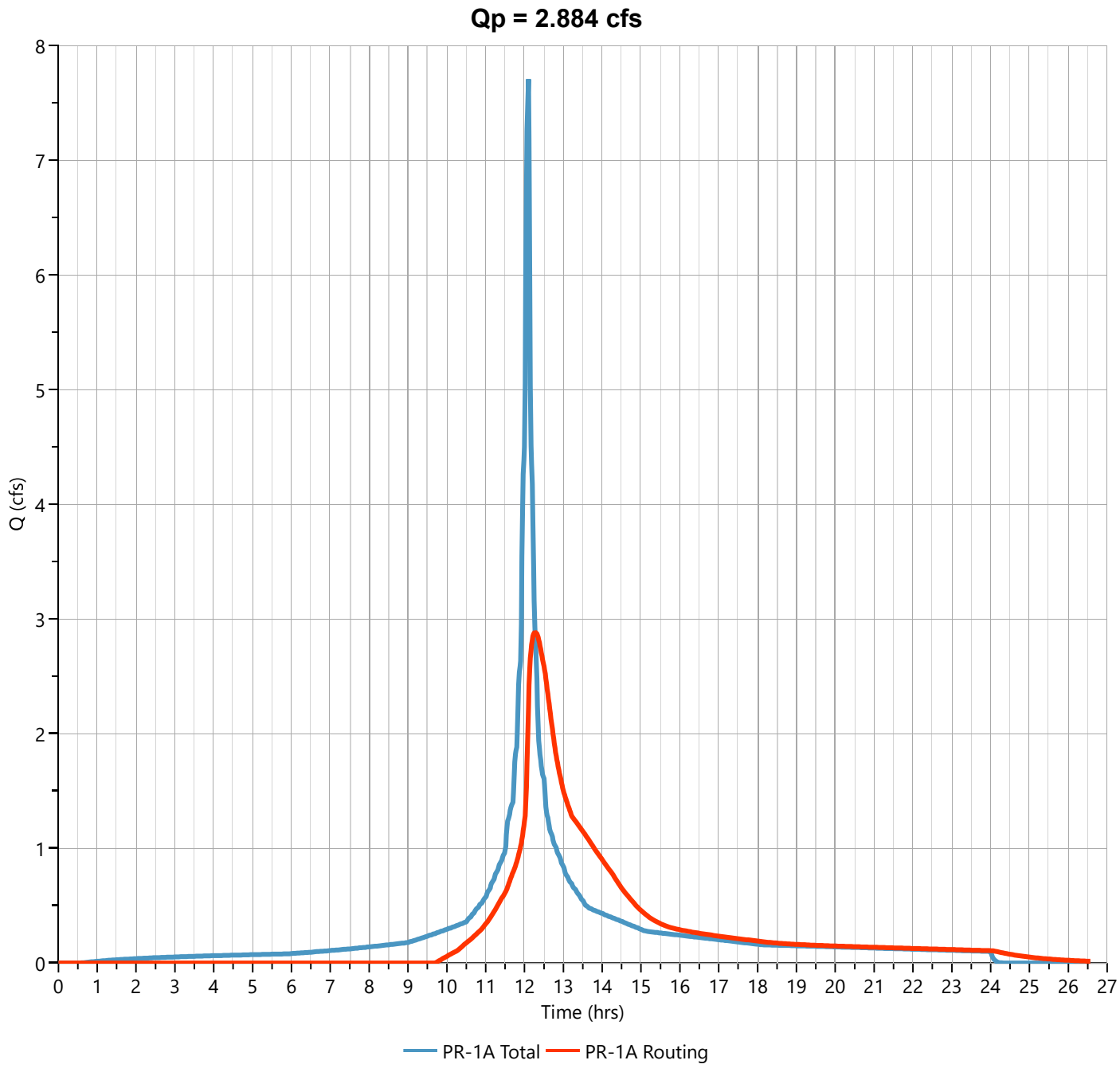
PR-1A Routing

Hyd. No. 11

Hydrograph Type	= Pond Route	Peak Flow	= 2.884 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.27 hrs
Time Interval	= 1 min	Hydrograph Volume	= 24,202 cuft
Inflow Hydrograph	= 10 - PR-1A Total	Max. Elevation	= 535.94 ft
Pond Name	= SSBB-1	Max. Storage	= 9,573 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.49 hrs



Hydrograph Report

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

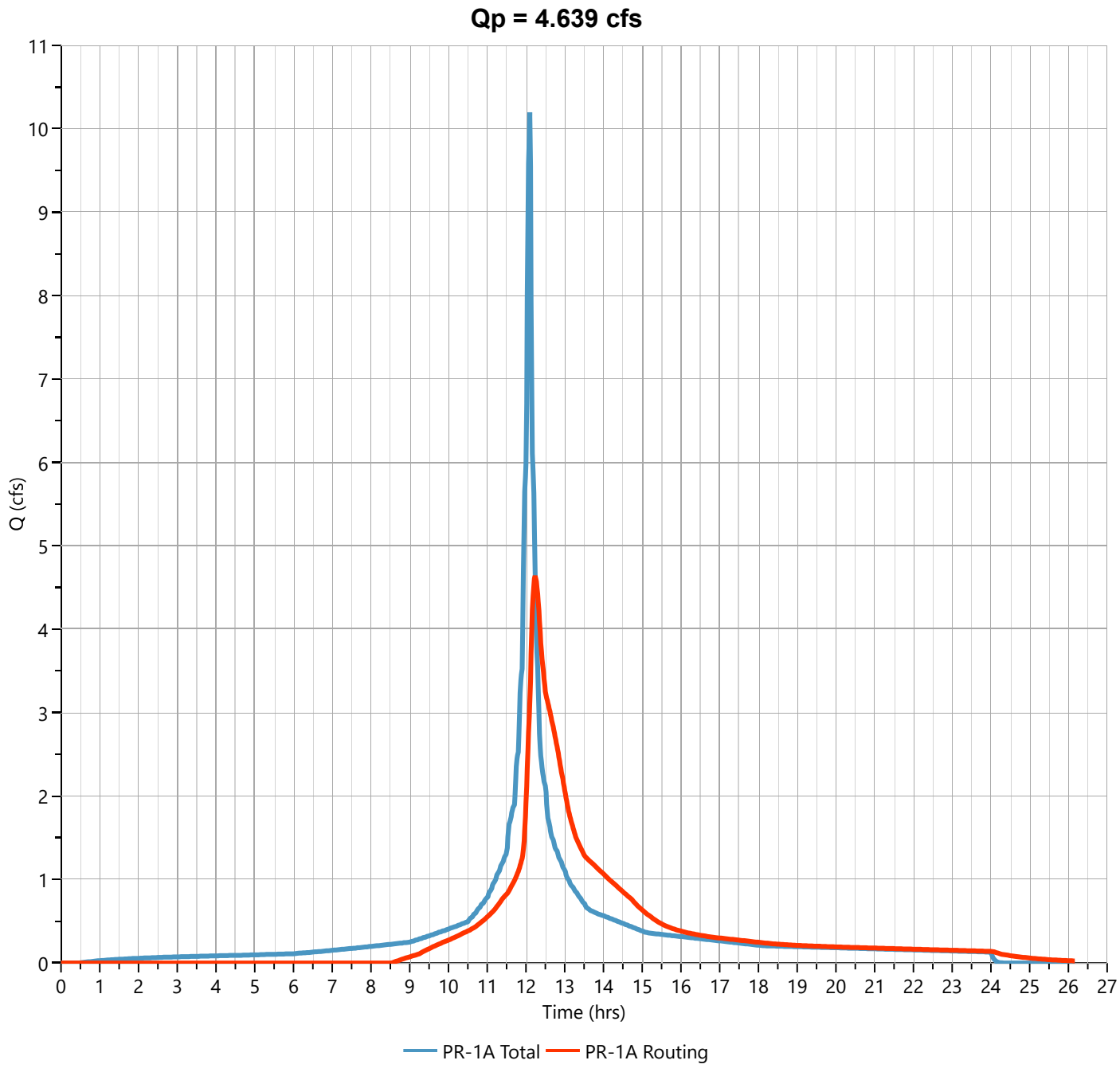
PR-1A Routing

Hyd. No. 11

Hydrograph Type	= Pond Route	Peak Flow	= 4.639 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Hydrograph Volume	= 33,331 cuft
Inflow Hydrograph	= 10 - PR-1A Total	Max. Elevation	= 536.30 ft
Pond Name	= SSBB-1	Max. Storage	= 11,447 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.31 hrs



Hydrograph Report

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

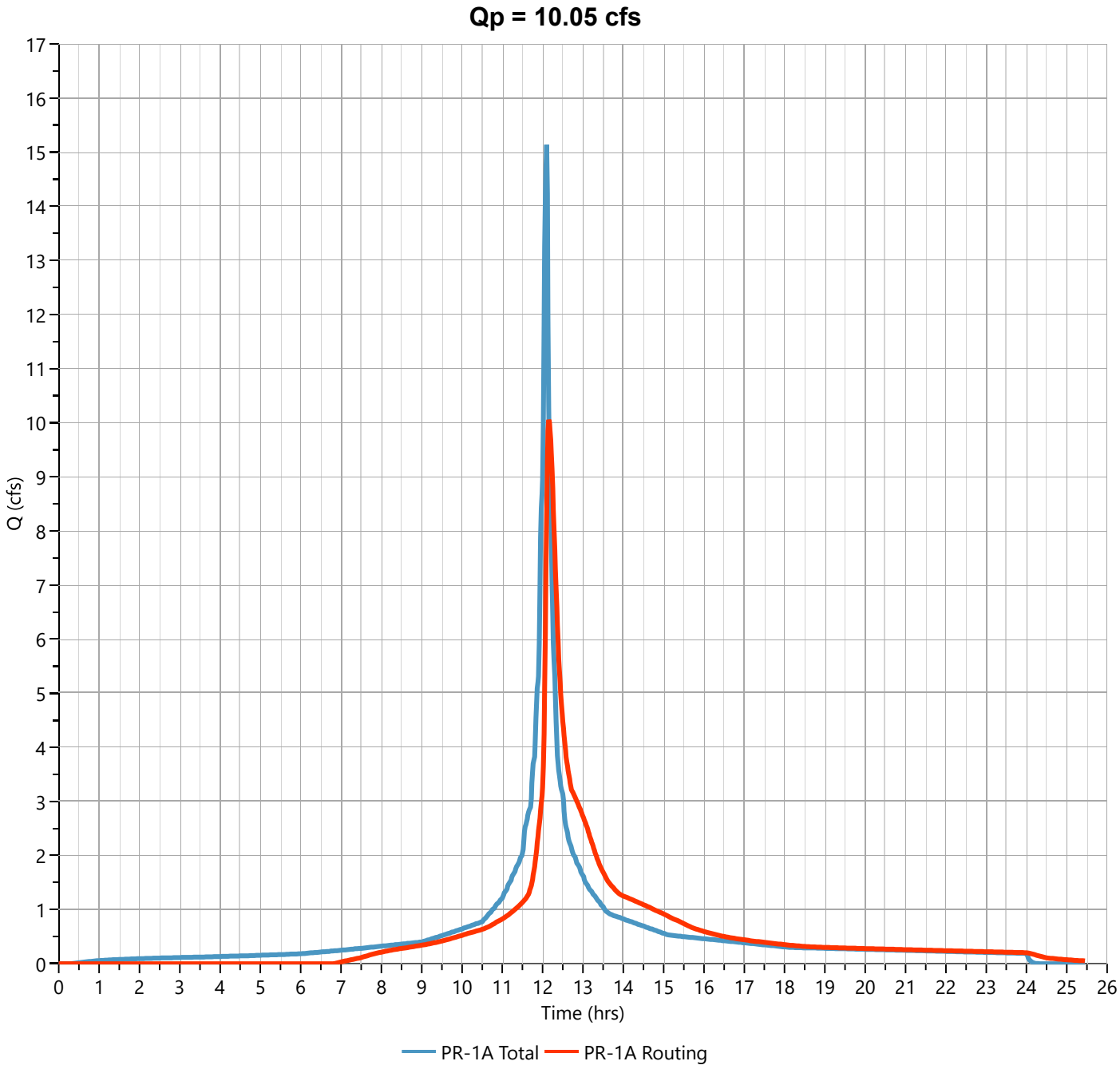
PR-1A Routing

Hyd. No. 11

Hydrograph Type	= Pond Route	Peak Flow	= 10.05 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.15 hrs
Time Interval	= 1 min	Hydrograph Volume	= 51,696 cuft
Inflow Hydrograph	= 10 - PR-1A Total	Max. Elevation	= 536.73 ft
Pond Name	= SSBB-1	Max. Storage	= 13,696 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.04 hrs



PR-2A WATERSHED POND ROUTING

Pond Report

File: Eagle Rock Proposed (Future).hys

Hydrology Studio v 3.0.0.39

10-21-2025

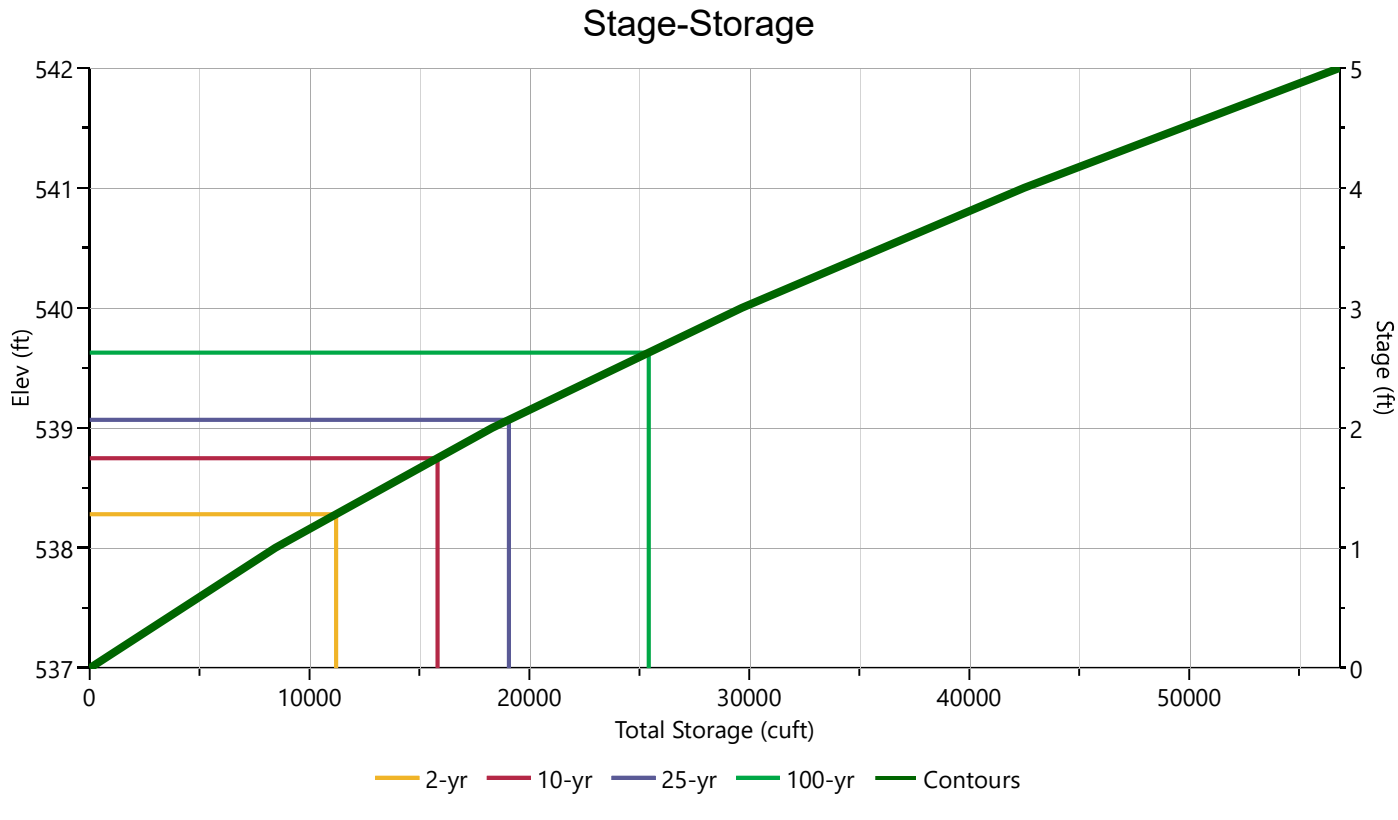
SSBB-2

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	537.00
Voids (%)	100.00
Volume Calc	Conic

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	537.00	7,745	0.000	0.000
1.00	538.00	9,163	8,443	8,443
2.00	539.00	10,607	9,875	18,318
3.00	540.00	12,084	11,337	29,655
4.00	541.00	13,601	12,834	42,489
5.00	542.00	15,155	14,369	56,858



Pond Report

File: Eagle Rock Proposed (Future).hys

Hydrology Studio v 3.0.0.39

10-21-2025

SSBB-2

Stage-Discharge

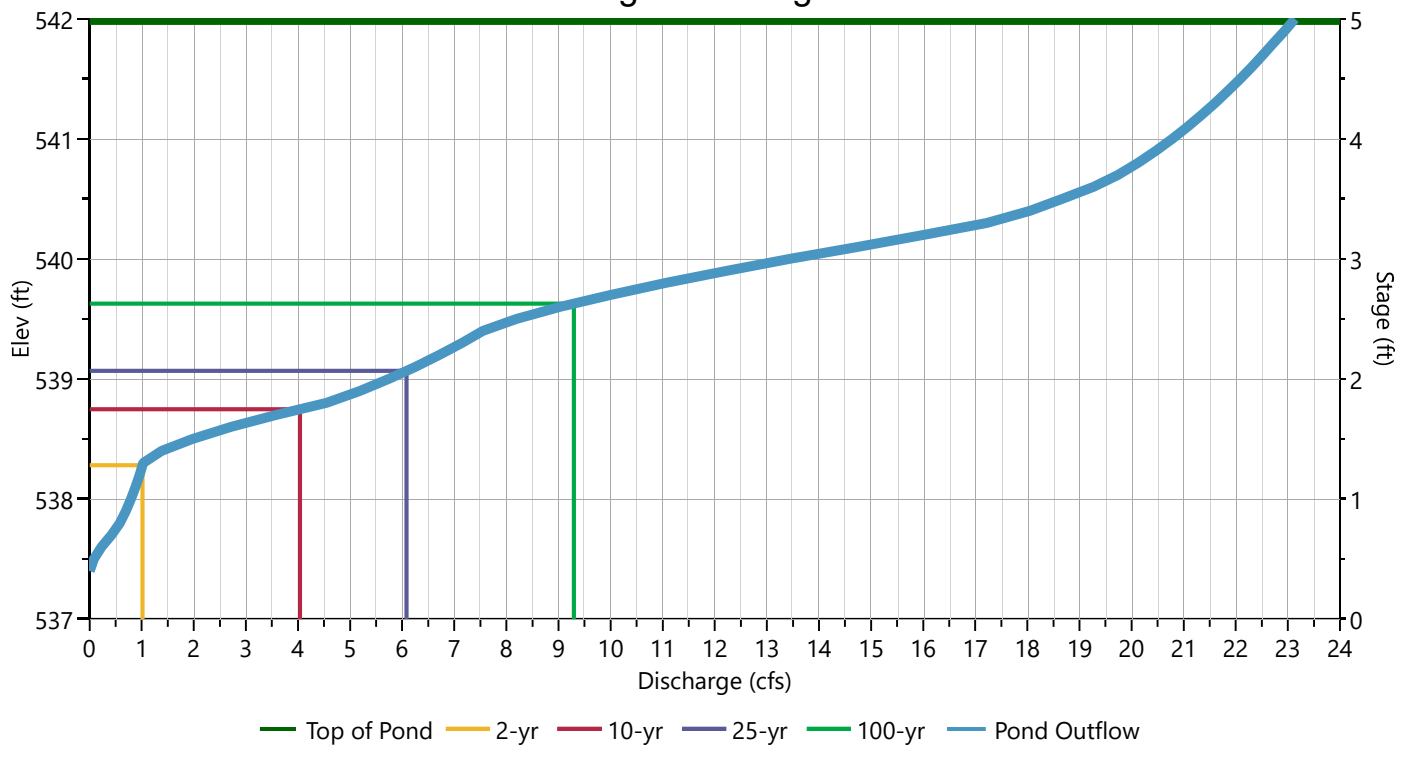
Culvert / Orifices	Cir Culvert	Orifice		
		1 (m)	2 (m)	3
Rise, in	18	4	6	
Span, in	18	9	16	
No. Barrels	1	1	2	
Invert Elevation, ft	533.50	537.40	538.30	
Orifice Coefficient, Co	0.60	0.60	0.60	
Length, ft	36			
Barrel Slope, %	1.5			
N-Value, n	0.012			

Perforated Riser	
Hole Diameter, in	
No. holes	
Invert Elevation, ft	
Height, ft	
Orifice Coefficient, Co	

Weirs	Riser	Weir		
		1 (m)	2	3
Shape / Type		Rectangular		
Crest Elevation, ft		539.4		
Crest Length, ft		2.5		
Angle, deg				
Weir Coefficient, Cw		3.3		

Ancillary	
Exfiltration, in/hr	

m = Flows through Culvert, i = Independent



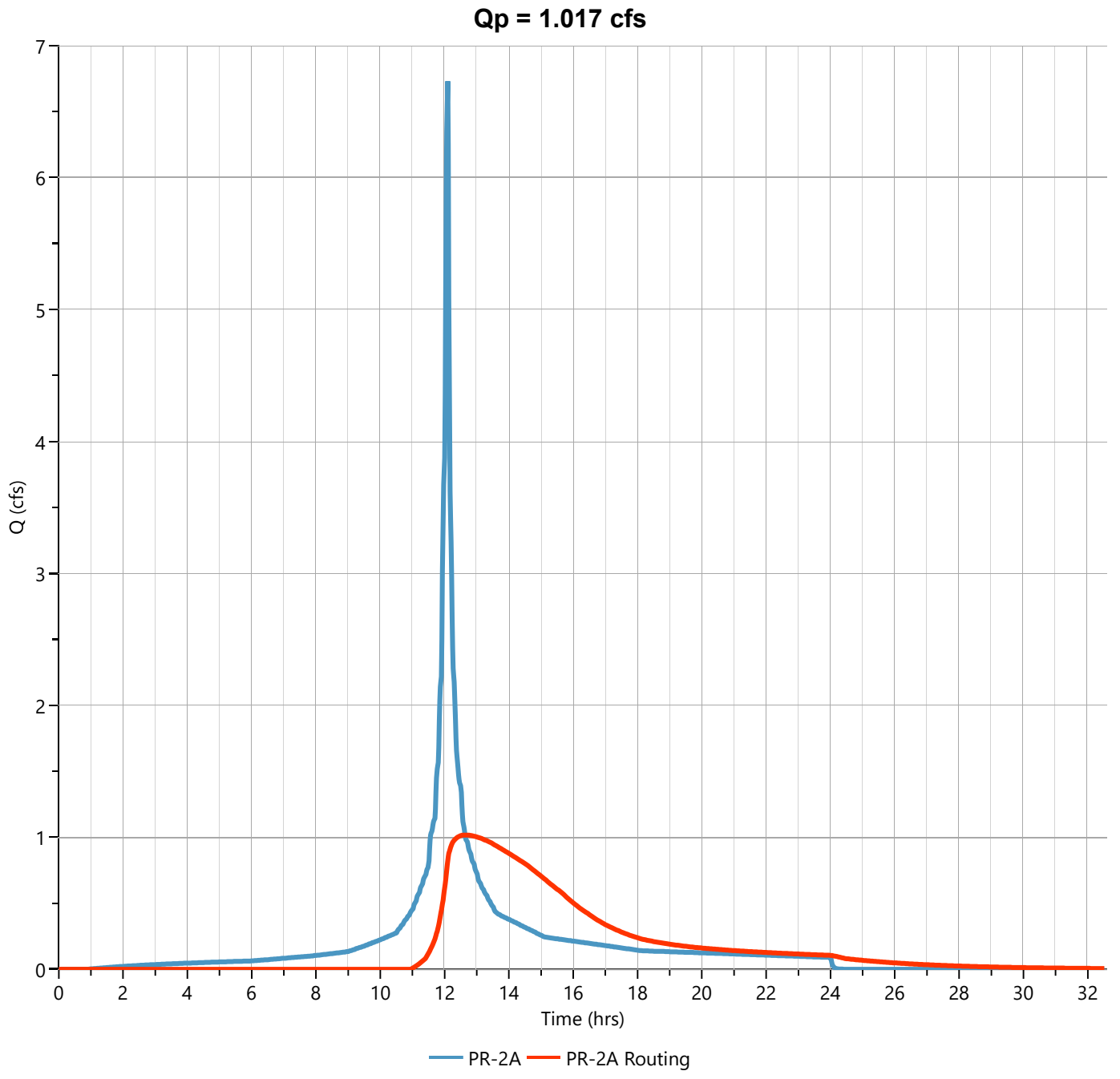
PR-2A Routing

Hyd. No. 46

Hydrograph Type	= Pond Route	Peak Flow	= 1.017 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.63 hrs
Time Interval	= 1 min	Hydrograph Volume	= 19,304 cuft
Inflow Hydrograph	= 45 - PR-2A	Max. Elevation	= 538.28 ft
Pond Name	= SSBB-2	Max. Storage	= 11,216 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.78 hrs



Hydrograph Report

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

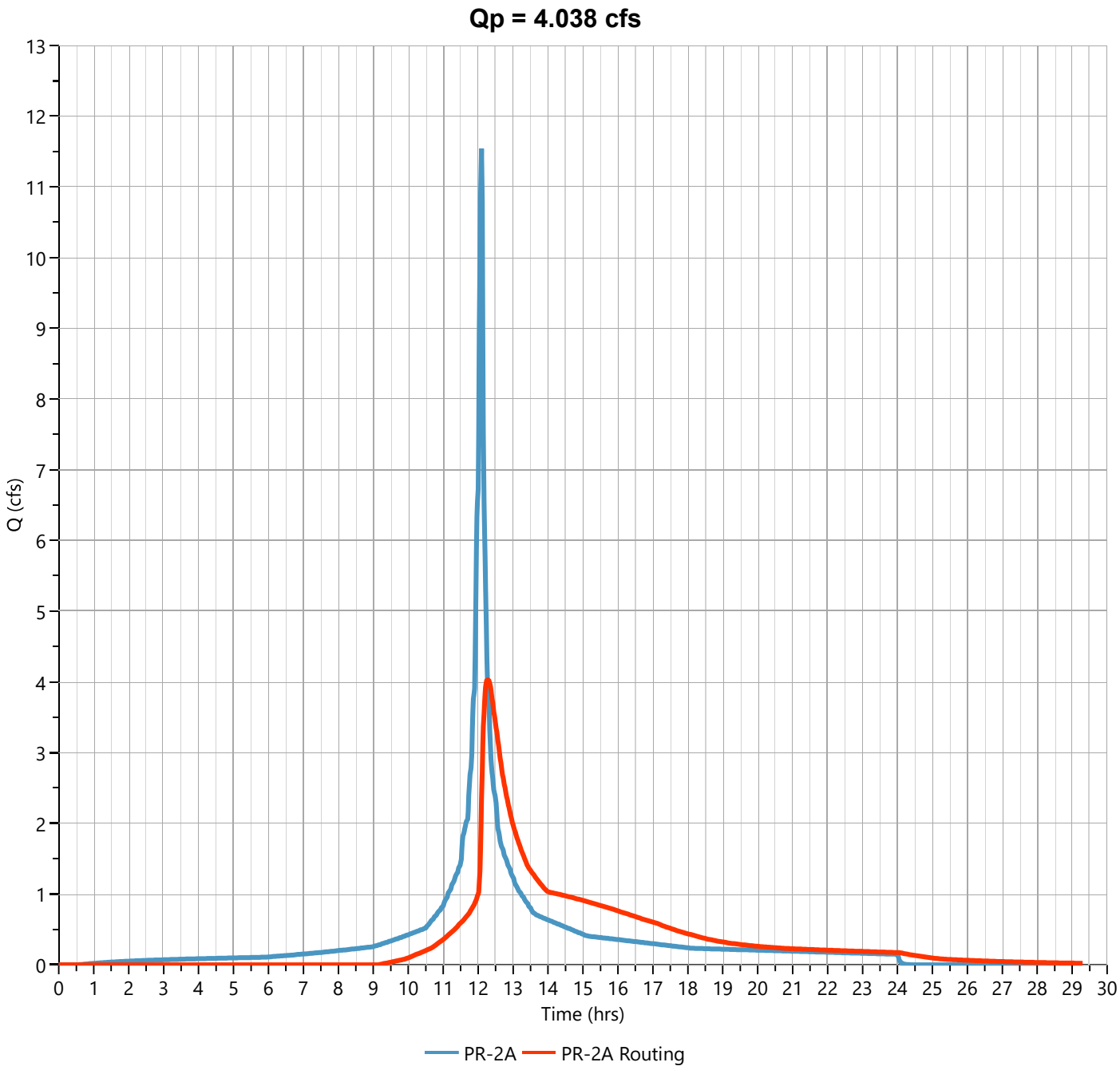
PR-2A Routing

Hyd. No. 46

Hydrograph Type	= Pond Route	Peak Flow	= 4.038 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.27 hrs
Time Interval	= 1 min	Hydrograph Volume	= 36,206 cuft
Inflow Hydrograph	= 45 - PR-2A	Max. Elevation	= 538.75 ft
Pond Name	= SSBB-2	Max. Storage	= 15,826 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.11 hrs



Hydrograph Report

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

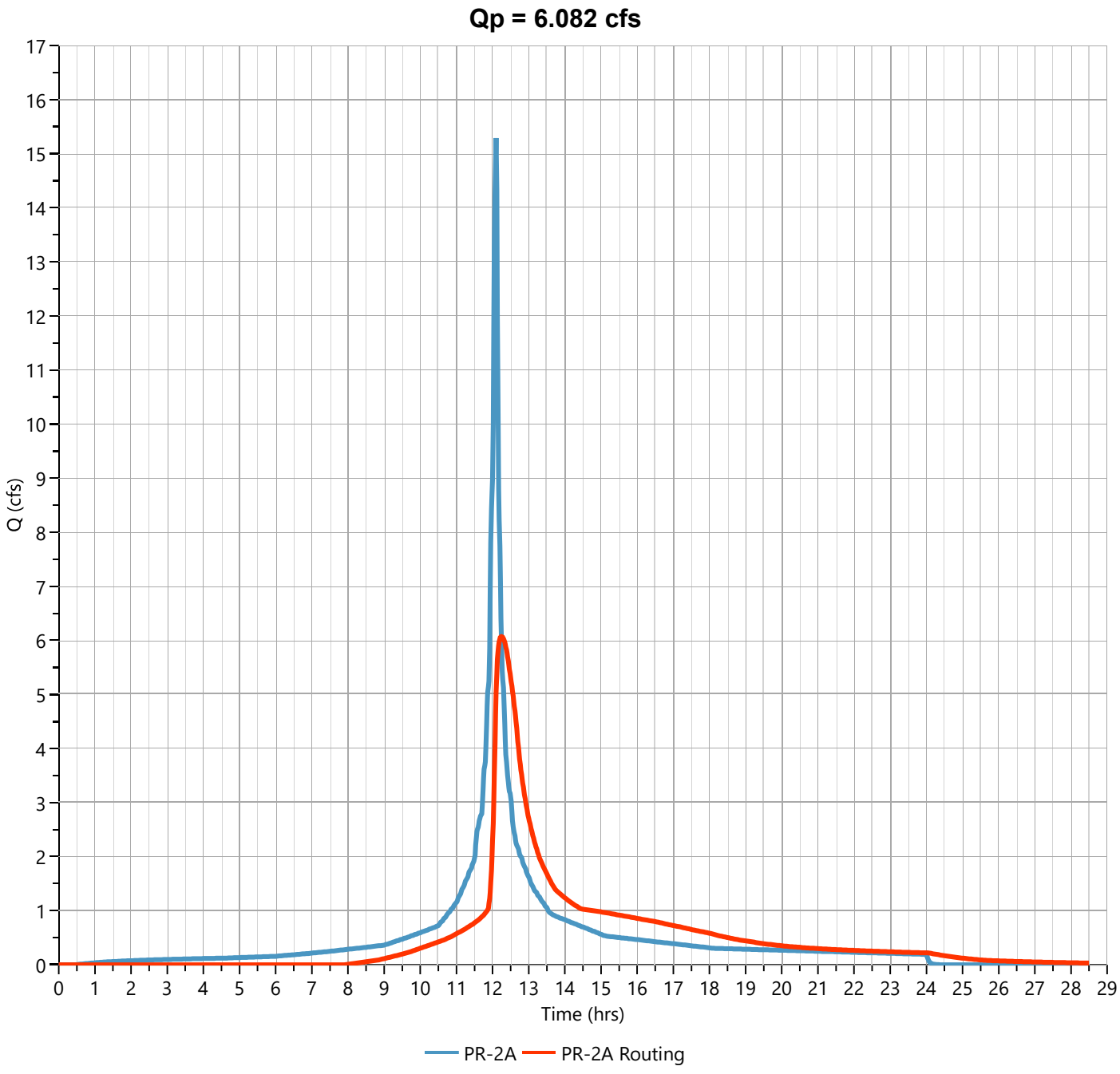
PR-2A Routing

Hyd. No. 46

Hydrograph Type	= Pond Route	Peak Flow	= 6.082 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.25 hrs
Time Interval	= 1 min	Hydrograph Volume	= 49,644 cuft
Inflow Hydrograph	= 45 - PR-2A	Max. Elevation	= 539.07 ft
Pond Name	= SSBB-2	Max. Storage	= 19,070 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.82 hrs



Hydrograph Report

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

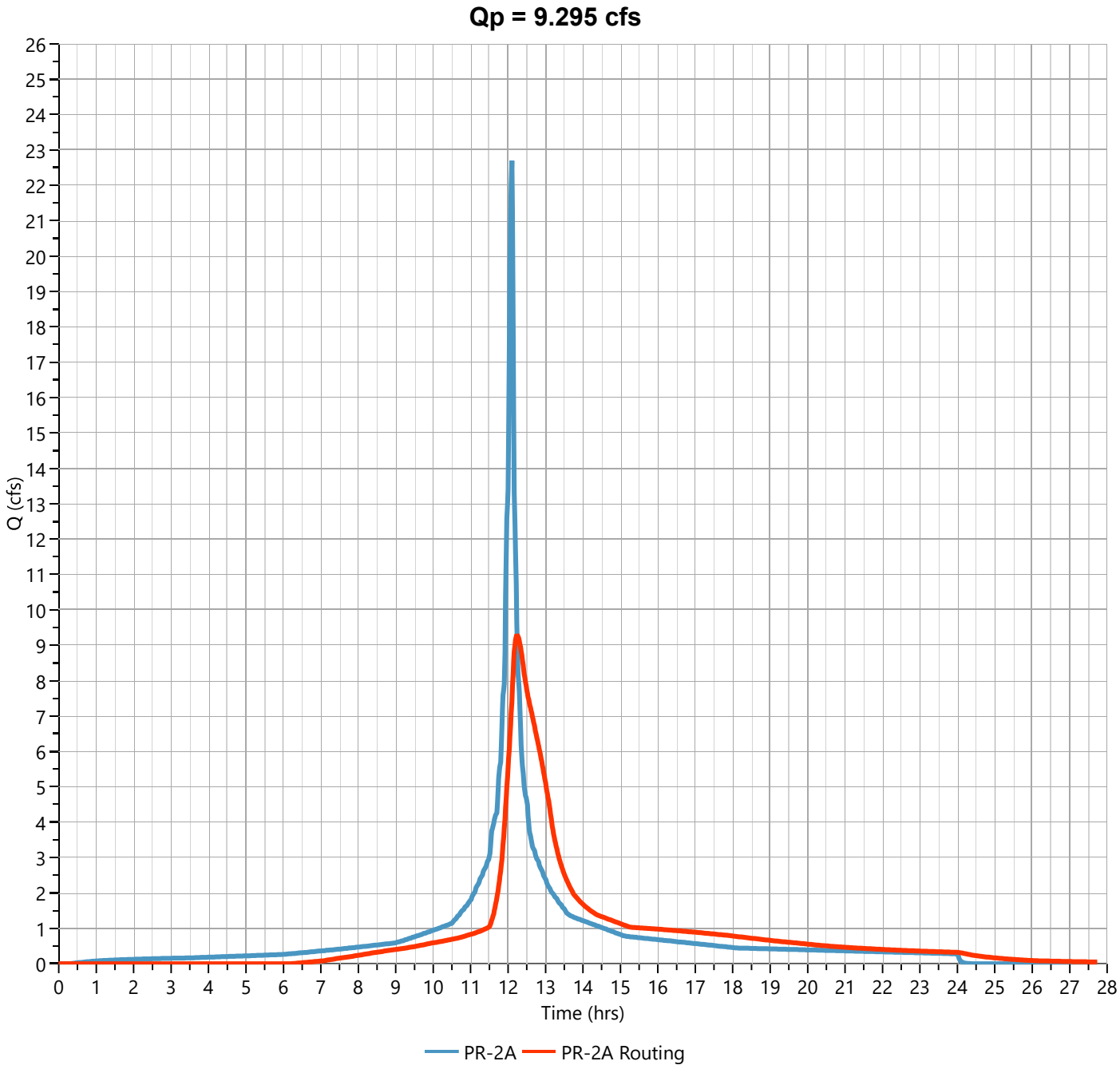
PR-2A Routing

Hyd. No. 46

Hydrograph Type	= Pond Route	Peak Flow	= 9.295 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.23 hrs
Time Interval	= 1 min	Hydrograph Volume	= 76,666 cuft
Inflow Hydrograph	= 45 - PR-2A	Max. Elevation	= 539.63 ft
Pond Name	= SSBB-2	Max. Storage	= 25,429 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.54 hrs



PR-2B WATERSHED POND ROUTING

Pond Report

File: Eagle Rock Proposed (Future).hys

Hydrology Studio v 3.0.0.39

10-21-2025

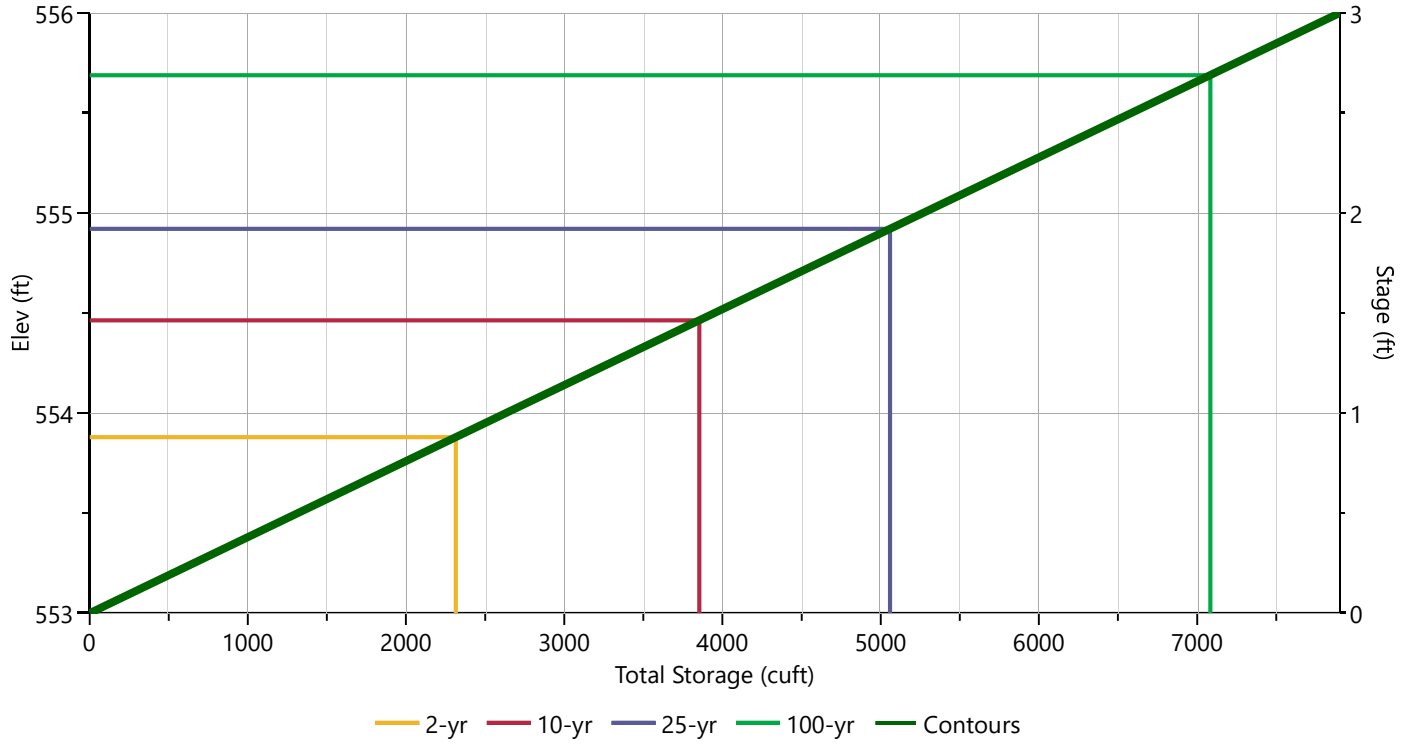
PAPS-1

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	553.00
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	553.00	6,586	0.000	0.000
1.00	554.00	6,586	2,634	2,634
2.00	555.00	6,586	2,634	5,269
3.00	556.00	6,586	2,634	7,903



Pond Report

File: Eagle Rock Proposed (Future).hys

Hydrology Studio v 3.0.0.39

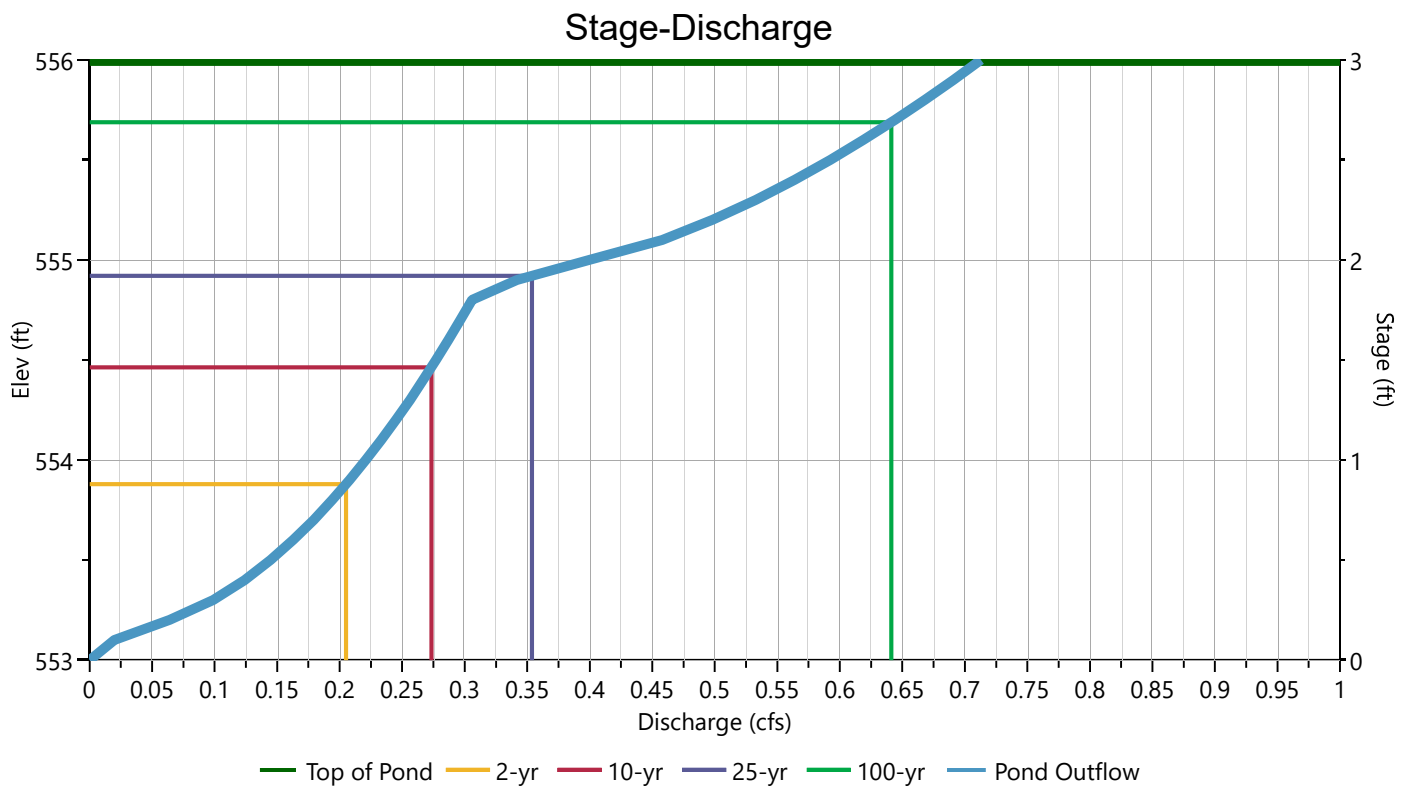
10-21-2025

PAPS-1

Stage-Discharge

Culvert / Orifices	Cir Culvert	Orifice			Perforated Riser	
		1 (i)	2 (i)	3		
Rise, in		3	3		Hole Diameter, in	
Span, in		3	3		No. holes	
No. Barrels		1	1		Invert Elevation, ft	
Invert Elevation, ft		553.00	554.80		Height, ft	
Orifice Coefficient, Co		0.60	0.60		Orifice Coefficient, Co	
Length, ft						
Barrel Slope, %						
N-Value, n						
Weirs	**Riser**	**Weir**			**Ancillary**	
		1	2	3		
Shape / Type					Exfiltration, in/hr	
Crest Elevation, ft						
Crest Length, ft						
Angle, deg						
Weir Coefficient, Cw						

m = Flows through Culvert, i = Independent



Hydrograph Report

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

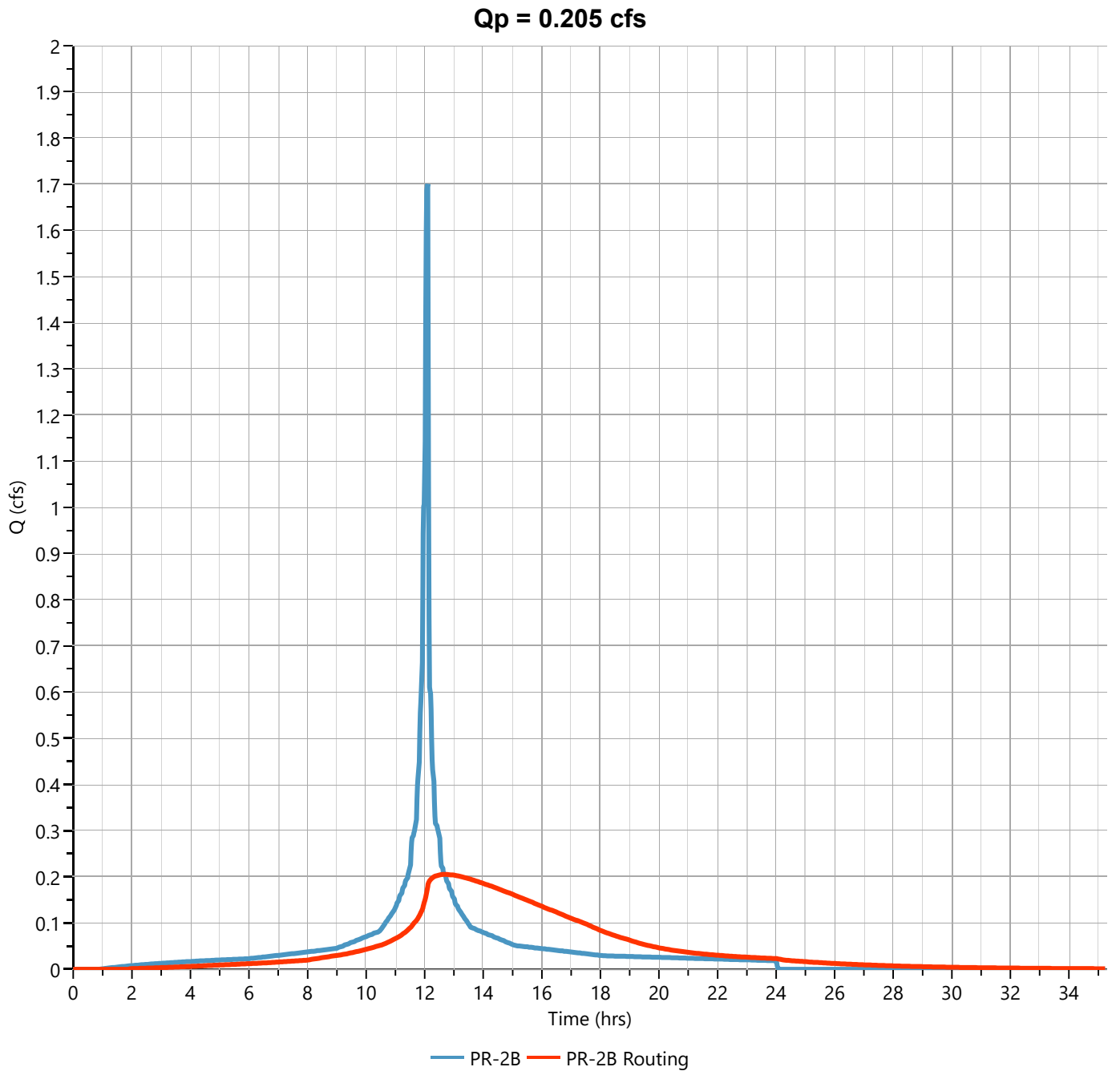
PR-2B Routing

Hyd. No. 57

Hydrograph Type	= Pond Route	Peak Flow	= 0.205 cfs
Storm Frequency	= 2-yr	Time to Peak	= 12.70 hrs
Time Interval	= 1 min	Hydrograph Volume	= 5,506 cuft
Inflow Hydrograph	= 56 - PR-2B	Max. Elevation	= 553.88 ft
Pond Name	= PAPS-1	Max. Storage	= 2,314 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.69 hrs



Hydrograph Report

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

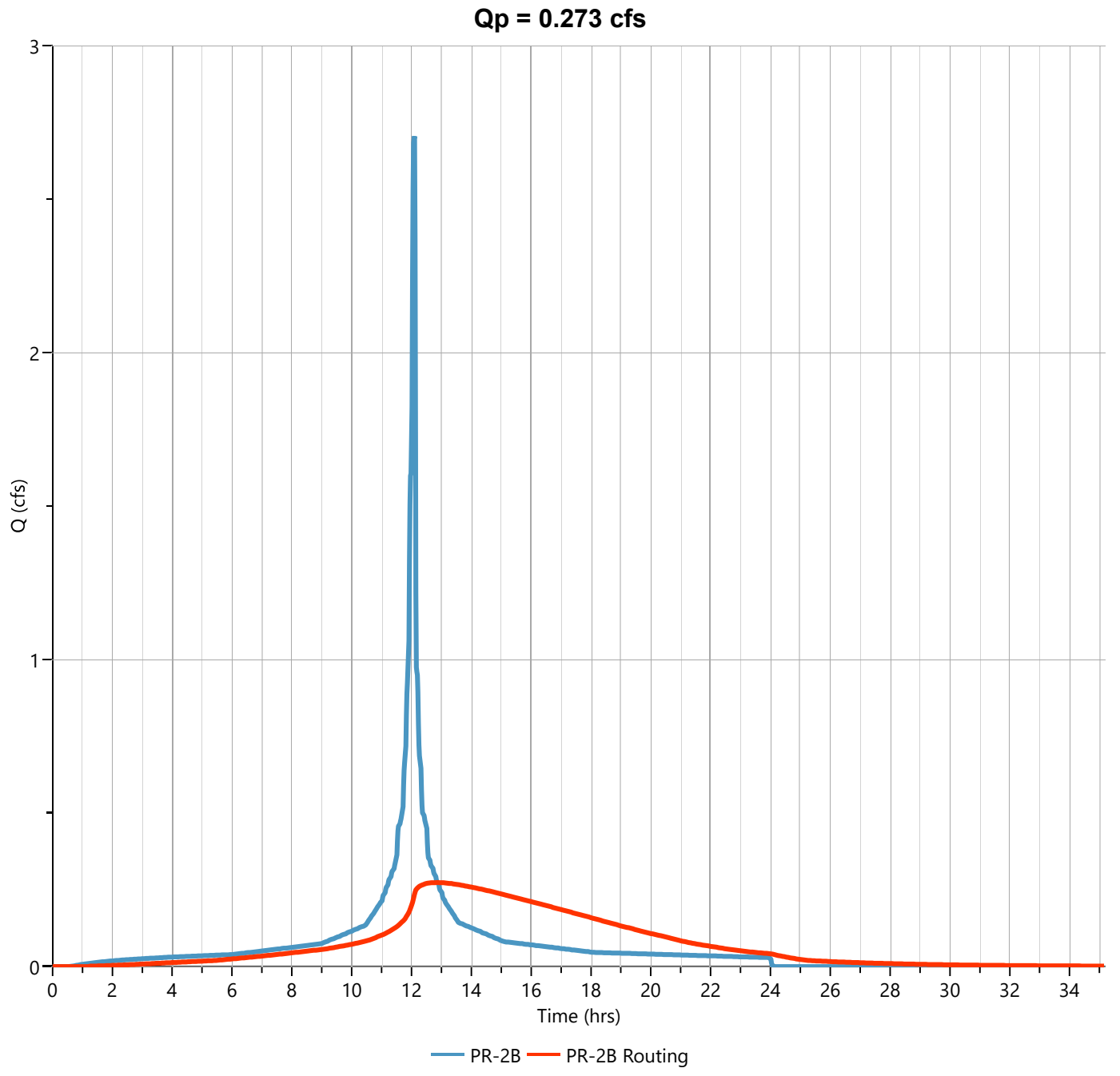
PR-2B Routing

Hyd. No. 57

Hydrograph Type	= Pond Route	Peak Flow	= 0.273 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.87 hrs
Time Interval	= 1 min	Hydrograph Volume	= 8,901 cuft
Inflow Hydrograph	= 56 - PR-2B	Max. Elevation	= 554.46 ft
Pond Name	= PAPS-1	Max. Storage	= 3,854 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.99 hrs



Hydrograph Report

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

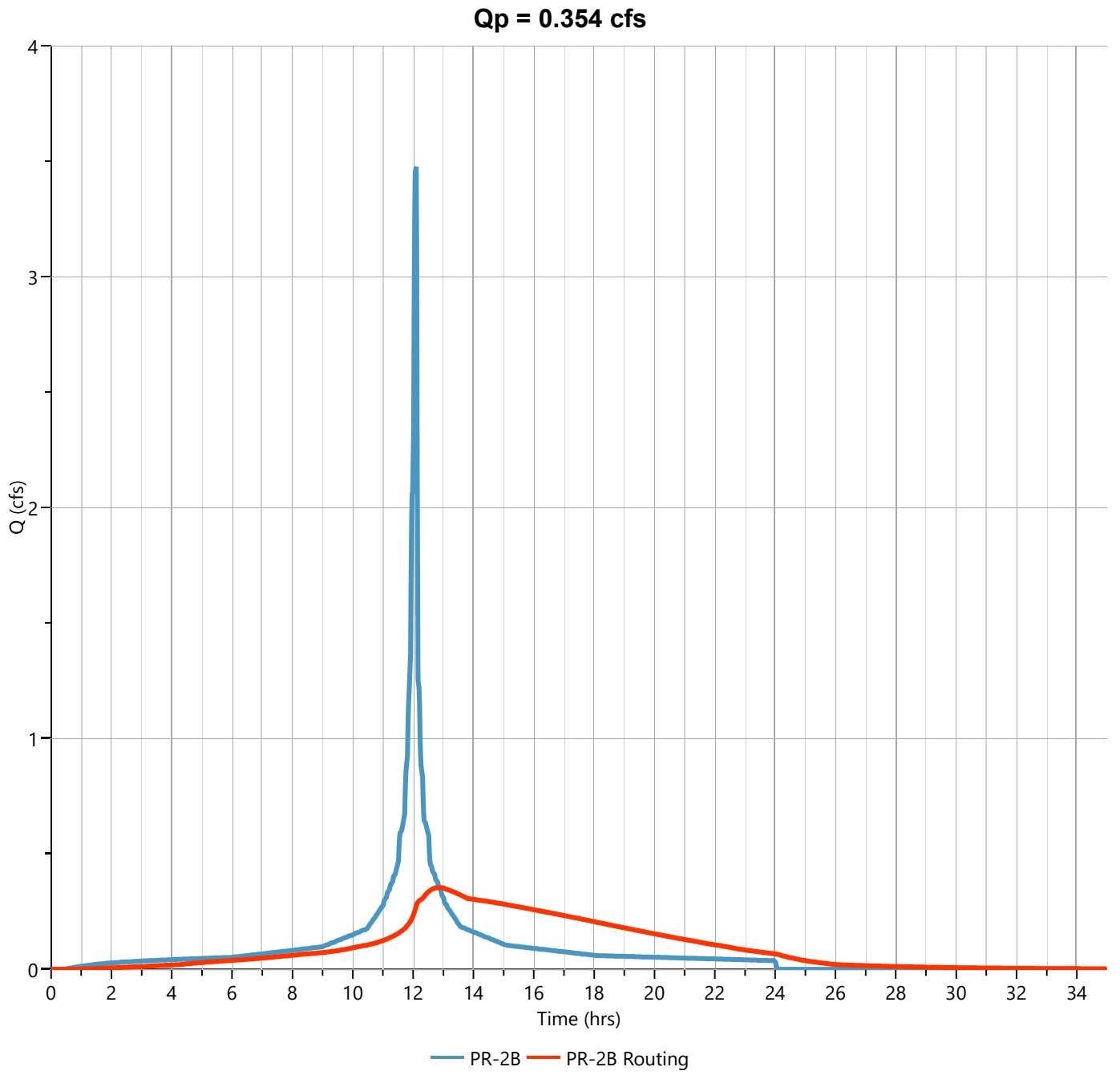
PR-2B Routing

Hyd. No. 57

Hydrograph Type	= Pond Route	Peak Flow	= 0.354 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.85 hrs
Time Interval	= 1 min	Hydrograph Volume	= 11,525 cuft
Inflow Hydrograph	= 56 - PR-2B	Max. Elevation	= 554.92 ft
Pond Name	= PAPS-1	Max. Storage	= 5,060 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 3.22 hrs



Hydrograph Report

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

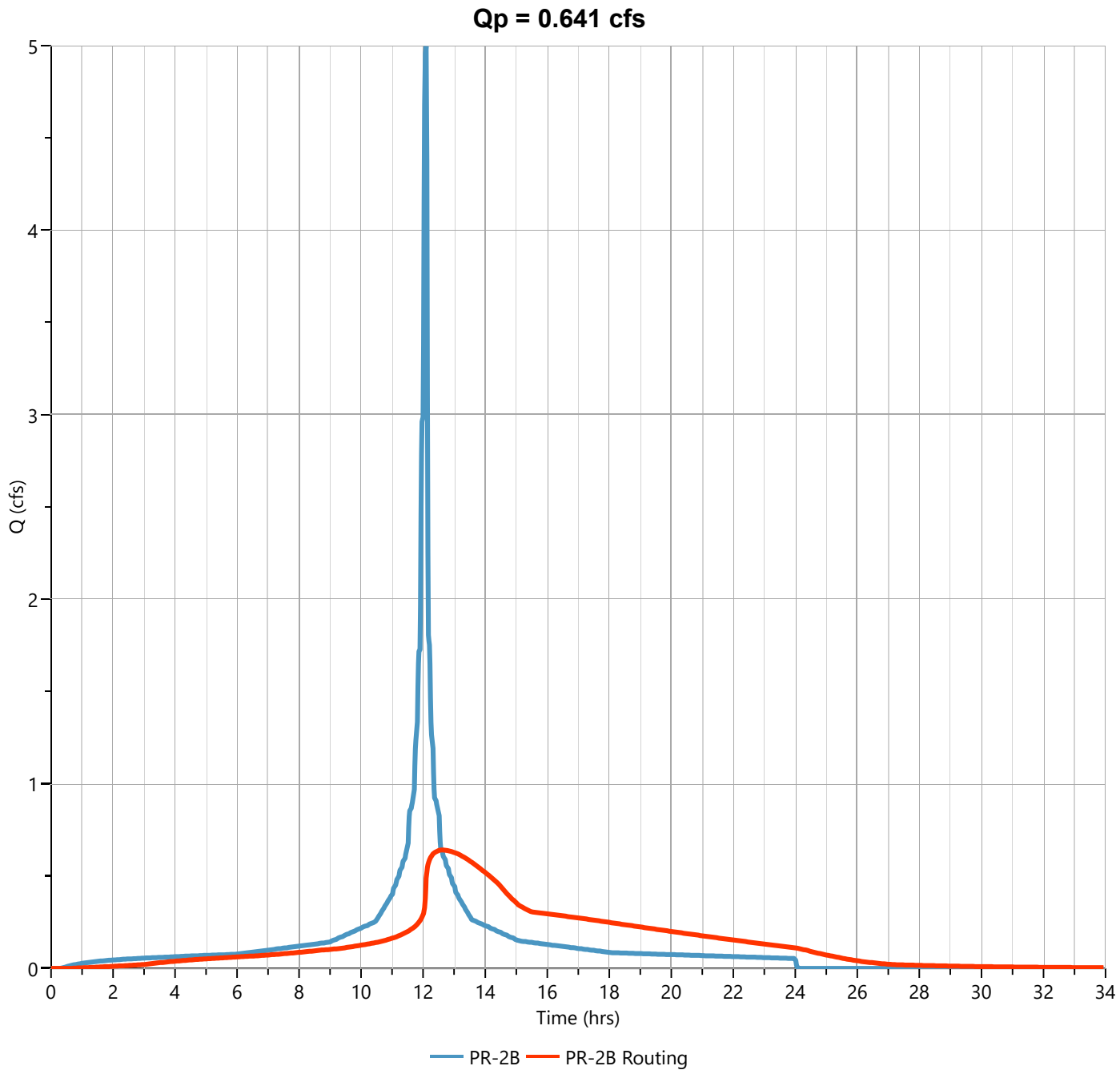
PR-2B Routing

Hyd. No. 57

Hydrograph Type	= Pond Route	Peak Flow	= 0.641 cfs
Storm Frequency	= 100-yr	Time to Peak	= 12.62 hrs
Time Interval	= 1 min	Hydrograph Volume	= 16,716 cuft
Inflow Hydrograph	= 56 - PR-2B	Max. Elevation	= 555.69 ft
Pond Name	= PAPS-1	Max. Storage	= 7,083 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 3.07 hrs



WATER QUALITY DESIGN STORM ROUTING CALCULATIONS FOR SETTING BOTTOM ORIFICE INVERT ELEVATIONS

SMALL-SCALE BIORETENTION BASIN 1

Hydrograph Report

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

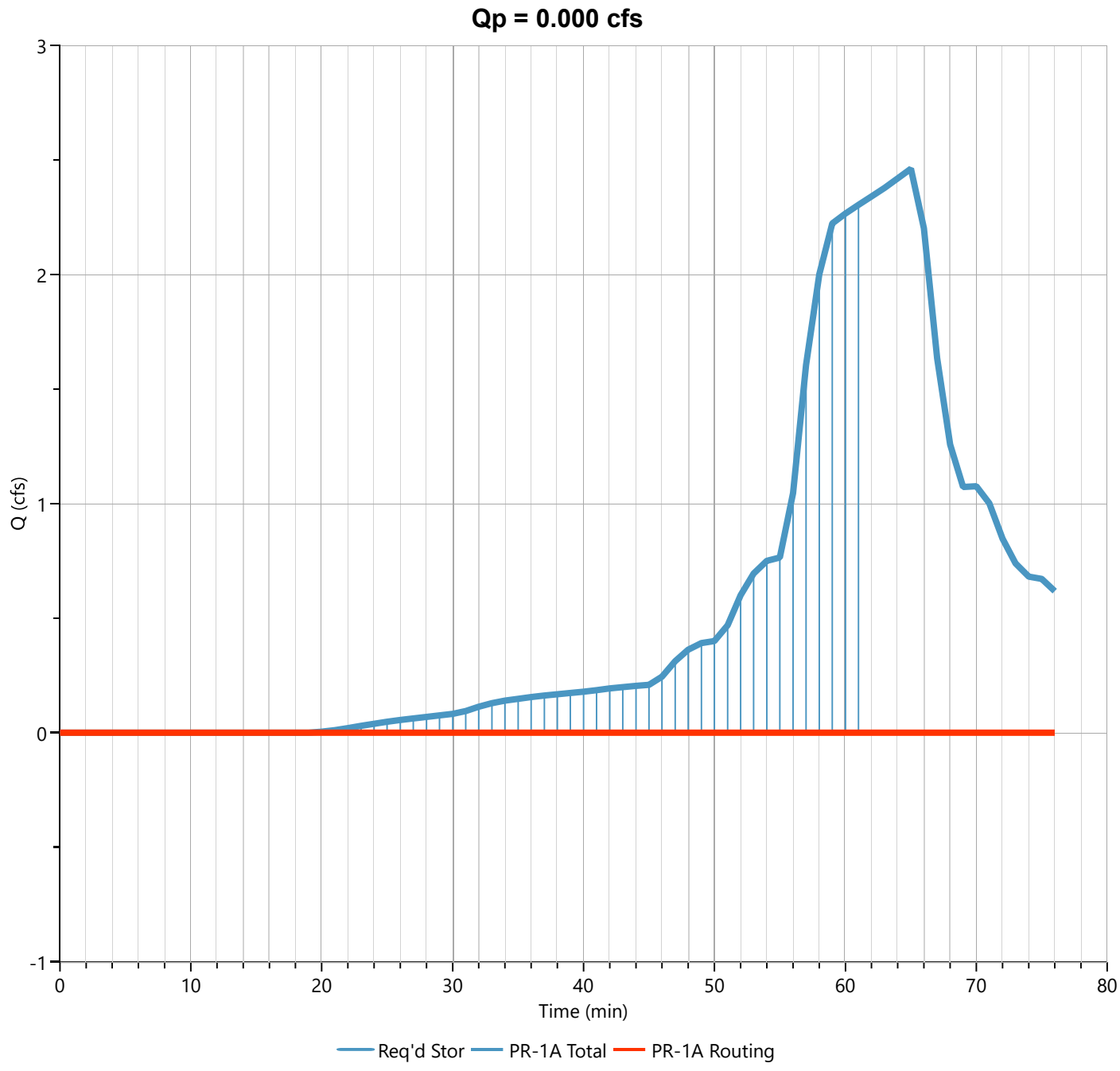
PR-1A Routing

Hyd. No. 11

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 61 min
Time Interval	= 1 min	Hydrograph Volume	= 0.001 cuft
Inflow Hydrograph	= 10 - PR-1A Total	Max. Elevation	= 534.52 ft
Pond Name	= SSBB-1	Max. Storage	= 2,487 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.59 hrs



Pond Report

File: Eagle Rock Proposed (Future).hys

Hydrology Studio v 3.0.0.39

10-21-2025

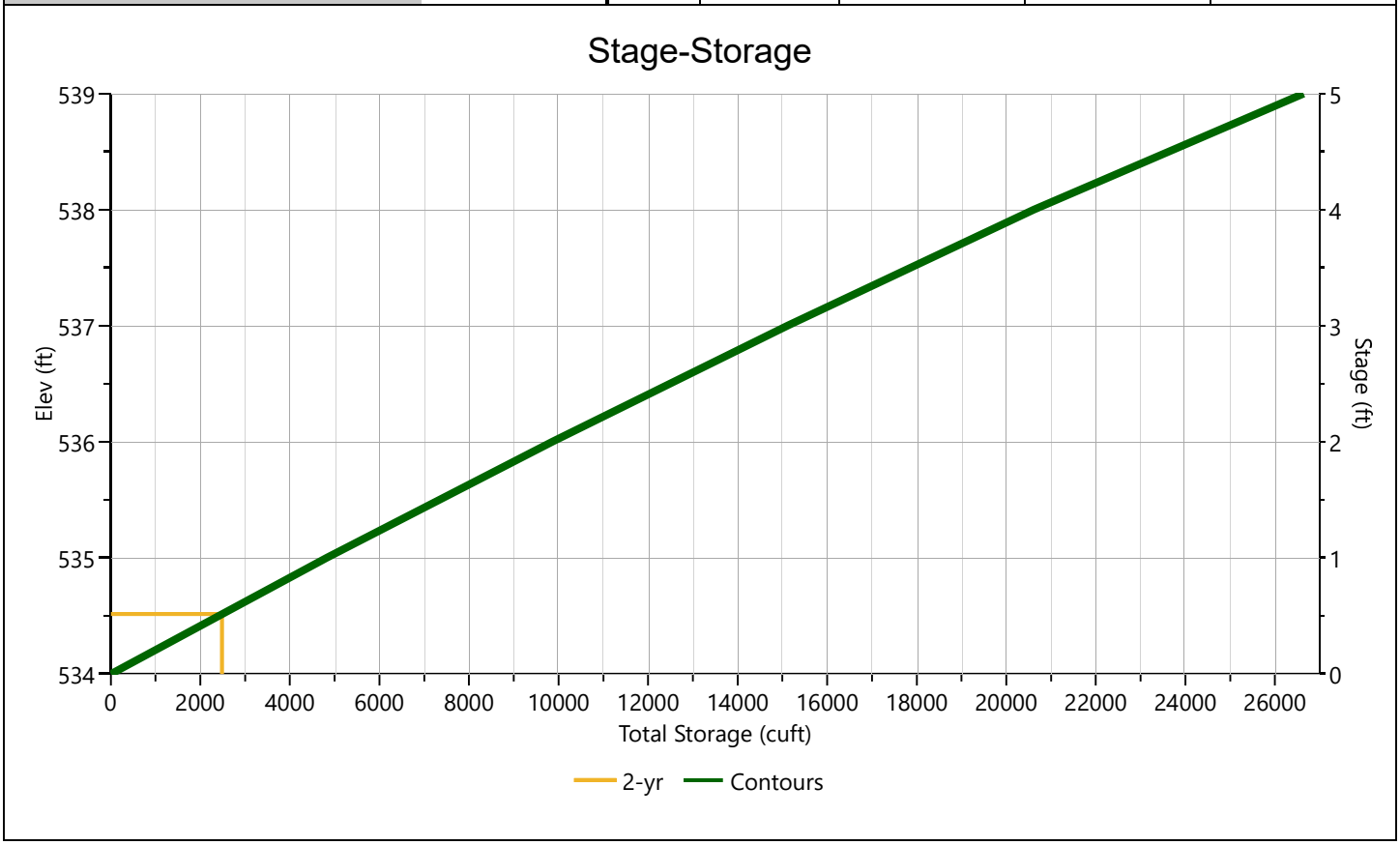
SSBB-1

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	534.00
Voids (%)	100.00
Volume Calc	Conic

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	534.00	4,713	0.000	0.000
1.00	535.00	4,938	4,825	4,825
2.00	536.00	5,145	5,041	9,865
3.00	537.00	5,354	5,249	15,114
4.00	538.00	5,649	5,500	20,614
5.00	539.00	6,413	6,026	26,641



Pond Report

File: Eagle Rock Proposed (Future).hys

Hydrology Studio v 3.0.0.39

10-21-2025

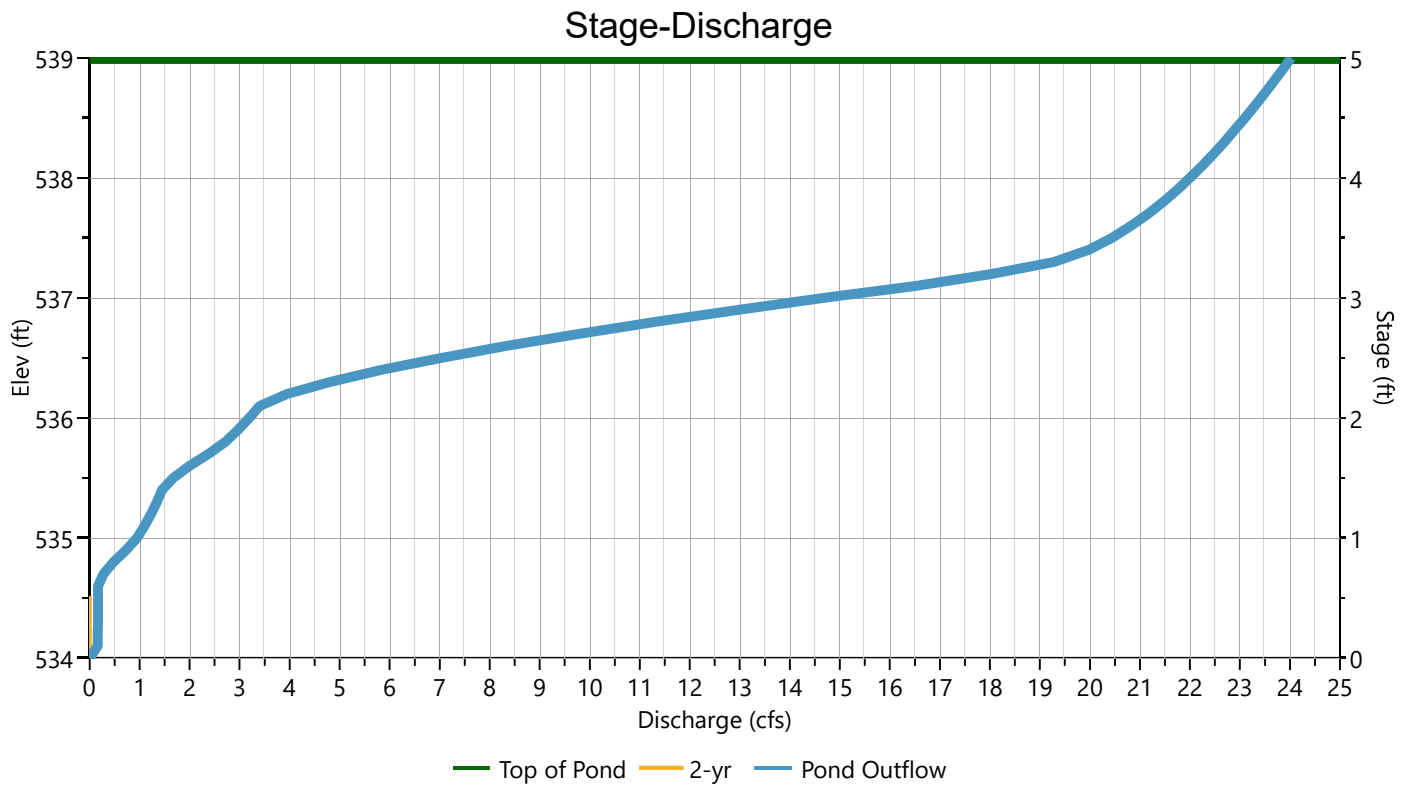
SSBB-1

Stage-Discharge

Culvert / Orifices	Cir Culvert	Orifice			Perforated Riser	
		1 (m)	2 (m)	3		
Rise, in	18	4	4		Hole Diameter, in	
Span, in	18	12	14		No. holes	
No. Barrels	1	1	1		Invert Elevation, ft	
Invert Elevation, ft	530.25	534.60	535.40		Height, ft	
Orifice Coefficient, Co	0.60	0.60	0.60		Orifice Coefficient, Co	
Length, ft	47					
Barrel Slope, %	7.34					
N-Value, n	0.013					

Weirs	Riser	Weir			Ancillary	
		1 (m)	2	3		
Shape / Type		Rectangular			Exfiltration, in/hr	1.50**
Crest Elevation, ft		536.1				
Crest Length, ft		3.5				
Angle, deg						
Weir Coefficient, Cw		3.3				

*m = Flows through Culvert, i = Independent **Exfiltration extracted from outflow hydrograph. Rate applied to contours.*



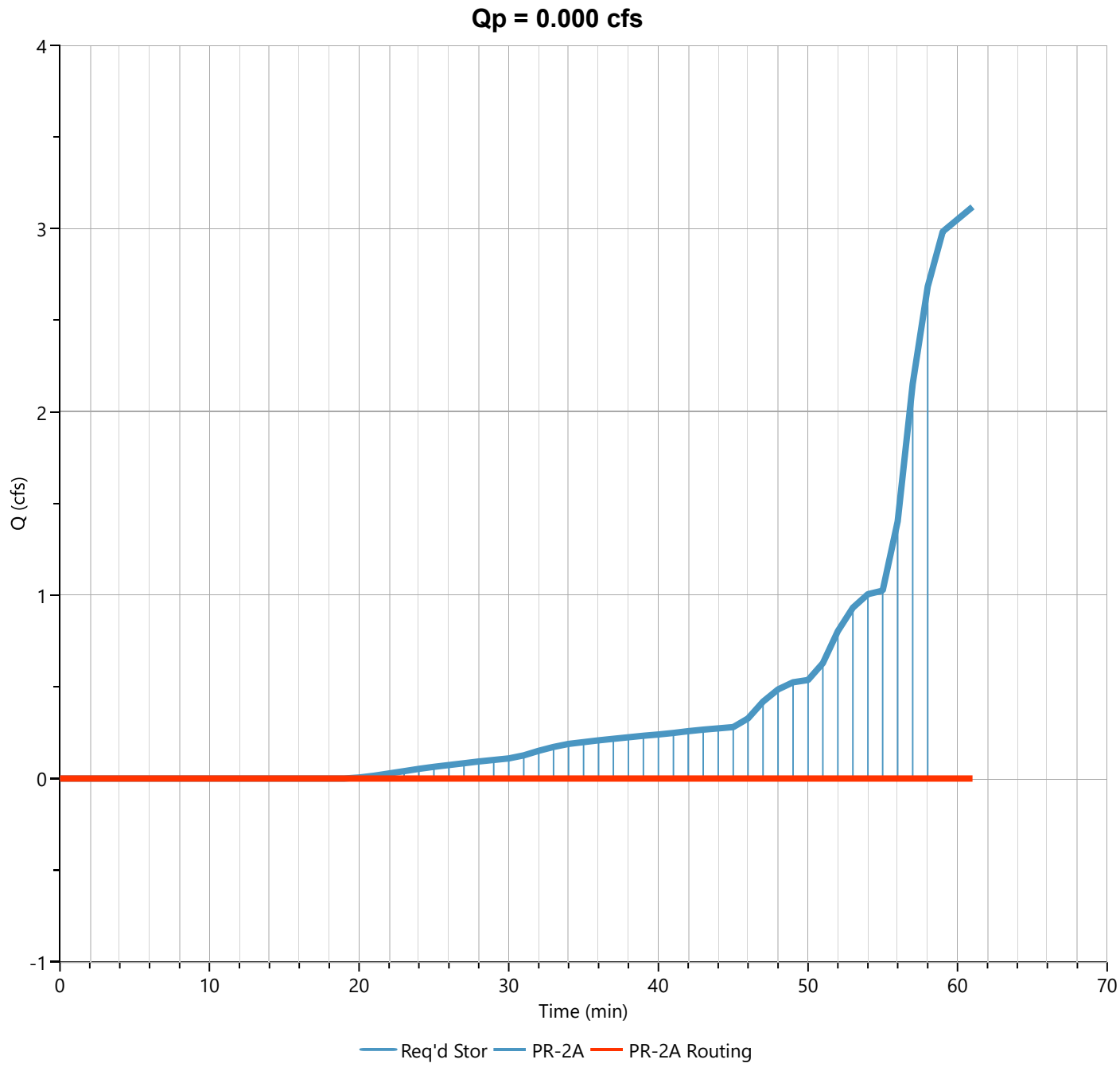
SMALL-SCALE BIORETENTION BASIN 2

PR-2A Routing

Hyd. No. 46

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 58 min
Time Interval	= 1 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 45 - PR-2A	Max. Elevation	= 537.39 ft
Pond Name	= SSBB-2	Max. Storage	= 3,332 cuft

Pond Routing by Storage Indication Method



Pond Report

File: Eagle Rock Proposed (Future).hys

Hydrology Studio v 3.0.0.39

10-21-2025

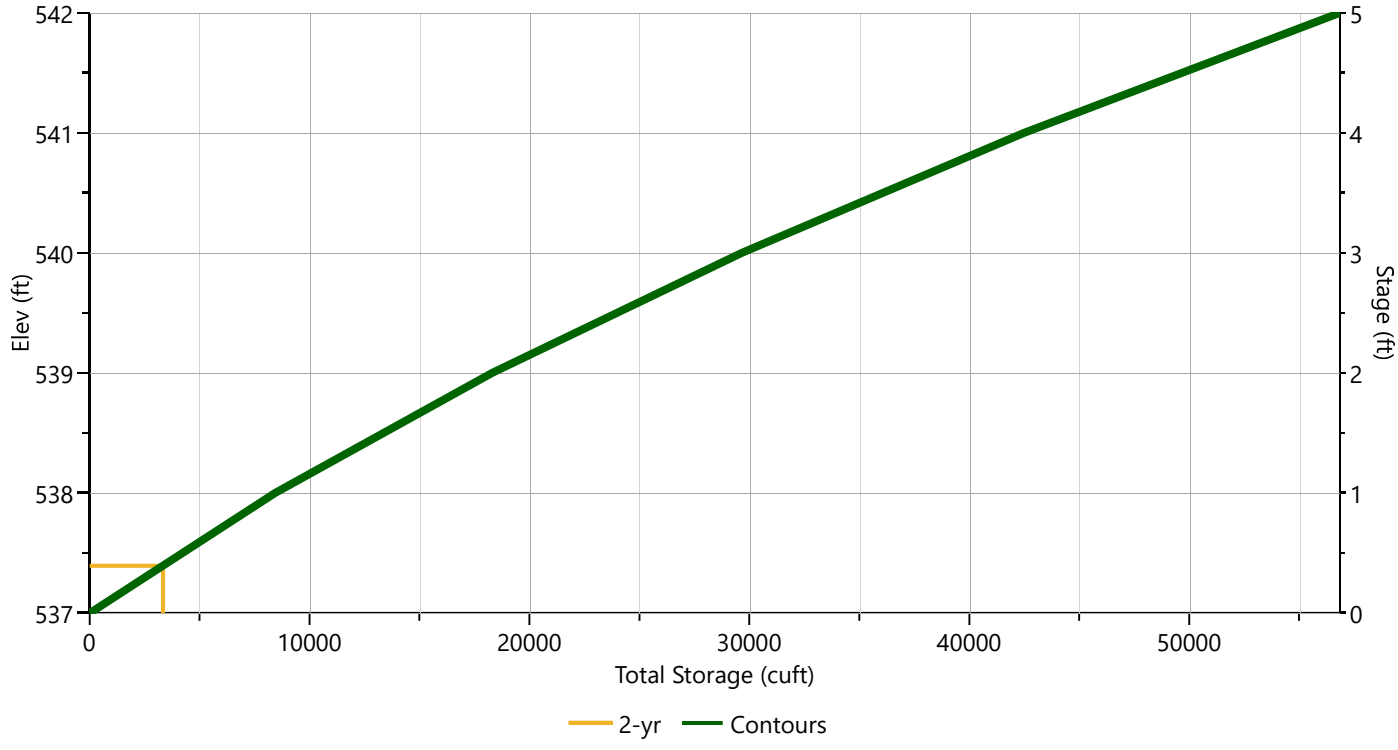
SSBB-2

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	537.00
Voids (%)	100.00
Volume Calc	Conic

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	537.00	7,745	0.000	0.000
1.00	538.00	9,163	8,443	8,443
2.00	539.00	10,607	9,875	18,318
3.00	540.00	12,084	11,337	29,655
4.00	541.00	13,601	12,834	42,489
5.00	542.00	15,155	14,369	56,858



Pond Report

File: Eagle Rock Proposed (Future).hys

Hydrology Studio v 3.0.0.39

10-21-2025

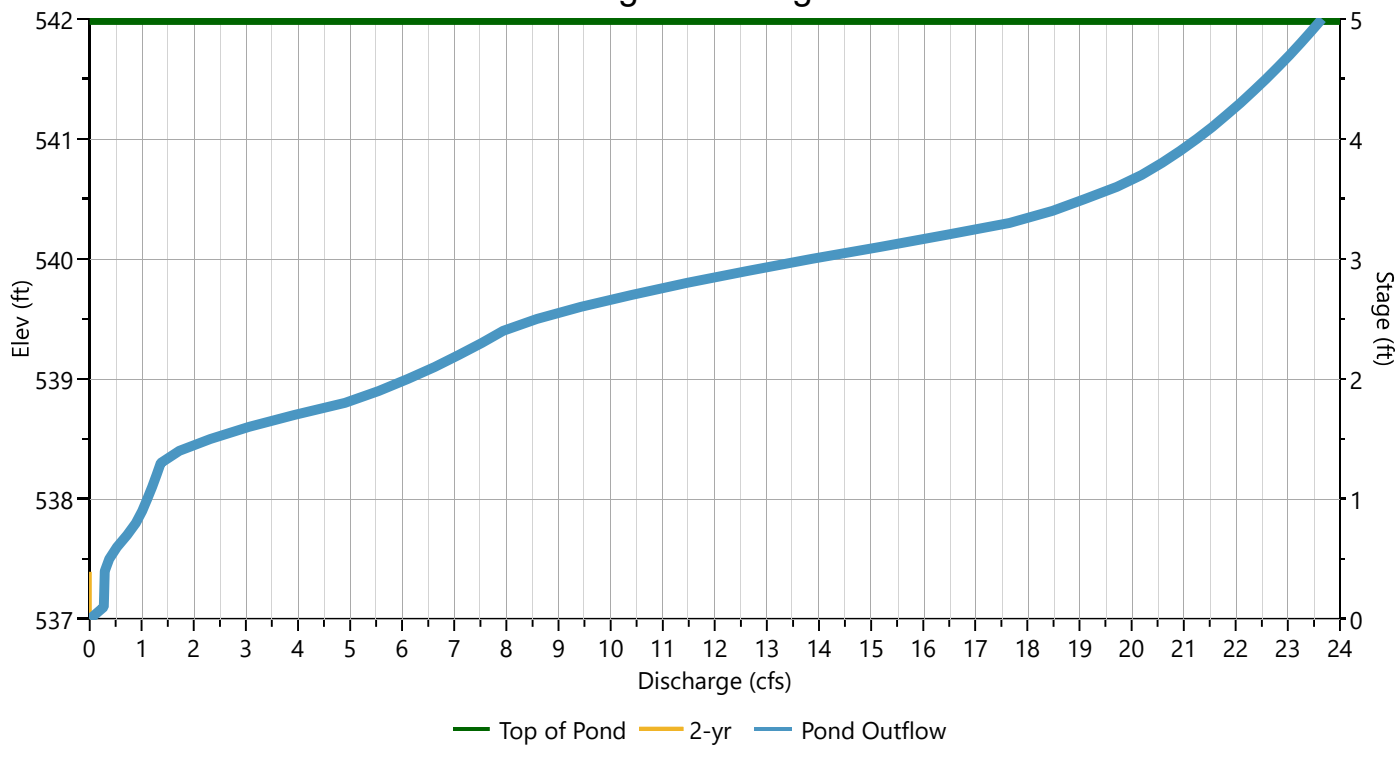
SSBB-2

Stage-Discharge

Culvert / Orifices	Cir Culvert	Orifice			Perforated Riser	
		1 (m)	2 (m)	3		
Rise, in	18	4	6		Hole Diameter, in	
Span, in	18	9	16		No. holes	
No. Barrels	1	1	2		Invert Elevation, ft	
Invert Elevation, ft	533.50	537.40	538.30		Height, ft	
Orifice Coefficient, Co	0.60	0.60	0.60		Orifice Coefficient, Co	
Length, ft	36					
Barrel Slope, %	1.5					
N-Value, n	0.012					

Weirs	Riser	Weir			Ancillary	
		1 (m)	2	3		
Shape / Type		Rectangular			Exfiltration, in/hr	1.50**
Crest Elevation, ft		539.4				
Crest Length, ft		2.5				
Angle, deg						
Weir Coefficient, Cw		3.3				

*m = Flows through Culvert, i = Independent **Exfiltration extracted from outflow hydrograph. Rate applied to contours.*



EMERGENCY SPILLWAY CALCULATIONS

SMALL-SCALE BIORETENTION BASIN 1

LANGAN

Basin Emergency Spillway

Basin: SSBB-1
Project: 101049802
Date: 10/17/2025

The basin will use a spillway over the proposed berm to serve as a means of emergency overflow. The spillway has been designed to convey the 100-year storm event design flow entirely through the spillway with a maximum flow depth. The following calculations demonstrate the adequacy of the spillway:

1. Q_{req} for the 100yr + 50% Flow = 22.70 CFS

z = 3.00
100-yr Elev. = 536.73
OCS Grate Elevation = 537.75

2. Spillway Capacity = Q_{design}

C = Weir Coefficient = 3.00
L = Weir Length = 62.00
H = Flow Depth = 0.25
Freeboard = 1.00

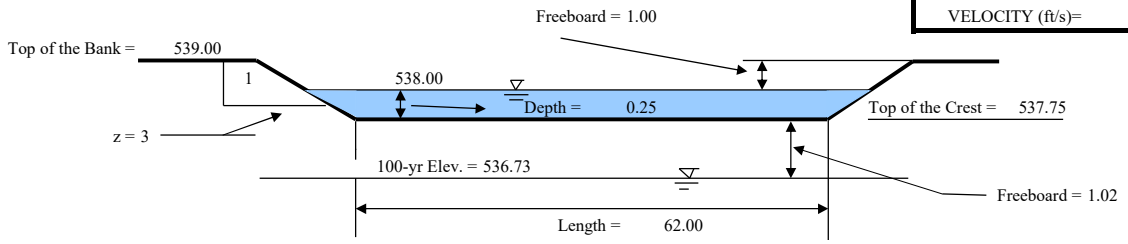
$Q = CLH^{3/2}$

Q (cfs) = 23.25

23.25 > 22.70 GOOD

3. Top of the Crest Elevation = 537.75
4. Top of the Berm Elevation = 539.00

Top Width (ft) = 69.50
AREA (SF)= 15.69
VELOCITY (ft/s)= 1.45



Shear Stress Calculation

$\tau_d = 62.4\ (d*S)$

Vmax C350 Shear Stress Capacity	12	lb/ft^2
Vmax C350 Maximum Allowable Velocity	20	ft/sec

τ_d = 10.296 lb/ft^2 Pass | V_{MAX} = 1.45 ft/sec Pass

Variables

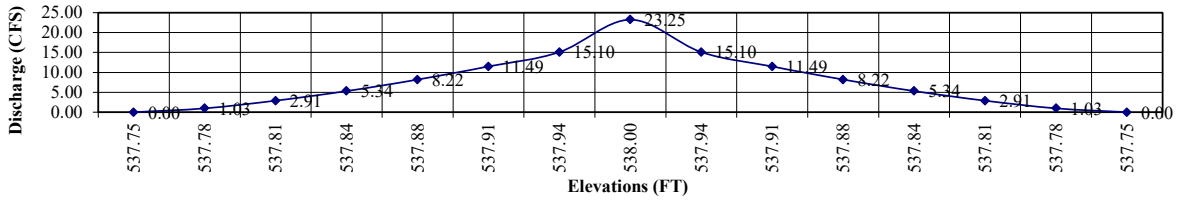
Channel Bed Slope	S	0.33	ft/ft
Depth of Water Over Spillway	d	0.50	ft

Velocity (ft/s)	Median Stone Size (in)	d_{50} (in)	Filter Size NSA-No.	Filter Thickness NSA-No.	*d (in)
1.45	**C350**	**N/A**	**N/A**	**N/A**	**N/A**



*d = 1.5 times the maximum stone diameter but not less than 6 inches.

Discharge Curve



SMALL-SCALE BIORETENTION BASIN 2

LANGAN

Basin Emergency Spillway

Basin: SSBB-2
Project: 101049802
Date: 10/17/2025

The basin will use a spillway over the proposed berm to serve as a means of emergency overflow. The spillway has been designed to convey the 100-year storm event design flow entirely through the spillway with a maximum flow depth. The following calculations demonstrate the adequacy of the spillway:

1. Q_{req} for the 100yr + 50% Flow = 34.04 CFS

z = 3.00
100-yr Elev. = 539.63
OCS Grate Elevation = 540.67

2. Spillway Capacity = Q_{design}

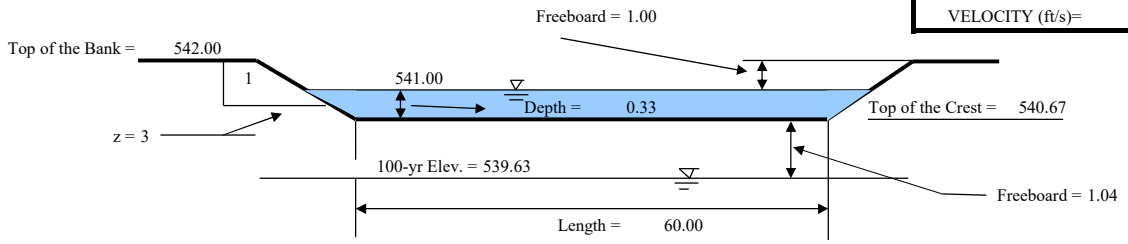
C = Weir Coefficient = 3.00
L = Weir Length = 60.00
H = Flow Depth = 0.33
Freeboard = 1.00

$Q = CLH^{3/2}$
Q (cfs) = 34.12

34.12 > 34.04 GOOD

3. Top of the Crest Elevation = 540.67
4. Top of the Berm Elevation = 542.00

Top Width (ft) = 68.00
AREA (SF)= 20.13
VELOCITY (ft/s)= 1.69



Shear Stress Calculation

$\tau_d = 62.4\ (d*S)$

Vmax C350 Shear Stress Capacity	12	lb/ft^2
Vmax C350 Maximum Allowable Velocity	20	ft/sec

τ_d =	10.296	lb/ft^2	Pass	V_{MAX} = 1.69 ft/sec	Pass

Variables

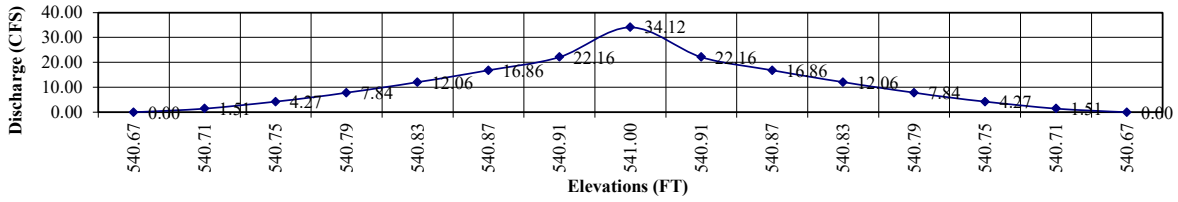
Channel Bed Slope	S	0.33	ft/ft
Depth of Water Over Spillway	d	0.50	ft

Velocity (ft/s)	Median Stone Size (in)	d_{50} (in)	Filter Size NSA-No.	Filter Thickness NSA-No.	*d (in)
1.69	**C350**	**N/A**	**N/A**	**N/A**	**N/A**



*d = 1.5 times the maximum stone diameter but not less than 6 inches.

Discharge Curve



ANTI-SEEP COLLAR CALCULATIONS

SMALL-SCALE BIORETENTION BASIN 1

ANTI-SEEP COLLAR DESIGN

PROJECT NAME: Crestmont Country Club & Eagle Rock Ave Improvements
PROJECT LOCATION: West Orange, New Jersey
BASIN ID# SSBB-1
DONE BY: TEG **DATE:** 10/17/25 **CHECKED:** MJV **DATE:** 10/17/25

OUTLET PIPE:

INVERT UPSTREAM (Yup)	530.25	
INVERT DOWNSTREAM (Ydn)	526.80	
PIPE RISE:	18	inches
PIPE SPAN:	18	inches
PIPE LENGTH:	47	ft
PIPE SLOPE (So):	0.073	
100-YEAR BASIN ELEV. (Y100):	536.73	
EMBANKMENT SLOPE (Z):	1	(EXAMPLE 3:1 SLOPE -> Z=3)

CALCULATIONS:

Y=Y100-Yup=	6.48	
Lsz=Y(Z+4)*(1+(So/0.25-So))=	39.53	ft
SAFETY FACTOR Lsz*1.15=	45.47	ft
USE Lsz=	45.00	ft

SPACING DESIGN:

COLLAR WIDTH(OR DIAM.):	7.00	ft	
NO. OF COLLARS REQ.:	0.30		=(L-Lsz)/2*collar width
USE	**1.00**	collars	
MAX. SPACING ALLOWED:	14.00	ft	=14ft*no. of collars
CALCULATED SPACING:	39.53	ft	=Lsz/(no. of collars)
USE LESSER OF MAX. OR CALCULATED SPACING:	**14.00**	ft	

COLLAR DIMENSIONS FOR OUTLET PIPE:

USING RECTANGULAR COLLARS,
THE DIMENSION OF THE

HEIGHT SHOULD BE:	7.00	ft	=2*2'+pipe rise
WIDTH SHOULD BE:	7.00	ft	=2*2'+pipe span
THICKNESS TO BE:	12	inches	

SMALL-SCALE BIORETENTION BASIN 2

ANTI-SEEP COLLAR DESIGN

PROJECT NAME: Crestmont Country Club & Eagle Rock Ave Improvements
PROJECT LOCATION: West Orange, New Jersey
BASIN ID# SSBB-2
DONE BY: TEG **DATE:** 10/17/25 **CHECKED:** MJV **DATE:** 10/17/25

OUTLET PIPE:

INVERT UPSTREAM (Yup)	533.50	
INVERT DOWNSTREAM (Ydn)	532.96	
PIPE RISE:	18	inches
PIPE SPAN:	18	inches
PIPE LENGTH:	36	ft
PIPE SLOPE (So):	0.015	
100-YEAR BASIN ELEV. (Y100):	539.63	
EMBANKMENT SLOPE (Z):	3	(EXAMPLE 3:1 SLOPE -> Z=3)

CALCULATIONS:

Y=Y100-Yup=	6.13	
Lsz=Y(Z+4)*(1+(So/0.25-So))=	44.85	ft
SAFETY FACTOR Lsz*1.15=	51.58	ft
USE Lsz=	52.00	ft

SPACING DESIGN:

COLLAR WIDTH(OR DIAM.):	7.00	ft	
NO. OF COLLARS REQ.:	0.50		=(L-Lsz)/2*collar width
USE	**1.00**	collars	
MAX. SPACING ALLOWED:	14.00	ft	=14ft*no. of collars
CALCULATED SPACING:	44.85	ft	=Lsz/(no. of collars)
USE LESSER OF MAX. OR CALCULATED SPACING:	**14.00**	ft	

COLLAR DIMENSIONS FOR OUTLET PIPE:

USING RECTANGULAR COLLARS,
THE DIMENSION OF THE

HEIGHT SHOULD BE:	7.00	ft	=2*2'+pipe rise
WIDTH SHOULD BE:	7.00	ft	=2*2'+pipe span
THICKNESS TO BE:	12	inches	

APPENDIX D

Stormwater Conveyance Calculations

APPENDIX D
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IDF CURVE RAINFALL INTENSITY DATA

NOAA Atlas 14, Volume 2, Version 3
Location name: West Orange, New Jersey, USA*
Latitude: 40.8124°, Longitude: -74.2707°
Elevation: 539 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)	**4.81** (4.40-5.28)	**5.69** (5.20-6.25)	**6.35** (5.77-6.96)	**7.13** (6.47-7.81)	**7.67** (6.94-8.40)	**8.21** (7.38-8.99)	**8.74** (7.80-9.56)	**9.34** (8.27-10.2)	**9.78** (8.59-10.8)
10-min	**3.21** (2.93-3.53)	**3.84** (3.51-4.21)	**4.54** (4.15-4.99)	**5.04** (4.58-5.53)	**5.64** (5.11-6.18)	**6.07** (5.48-6.64)	**6.47** (5.82-7.09)	**6.85** (6.13-7.51)	**7.31** (6.47-8.03)	**7.62** (6.70-8.39)
15-min	**2.67** (2.44-2.93)	**3.20** (2.93-3.52)	**3.82** (3.48-4.19)	**4.24** (3.86-4.65)	**4.75** (4.31-5.21)	**5.10** (4.61-5.59)	**5.45** (4.90-5.97)	**5.75** (5.14-6.30)	**6.12** (5.41-6.71)	**6.37** (5.60-7.01)
30-min	**1.82** (1.66-2.00)	**2.20** (2.01-2.42)	**2.70** (2.46-2.96)	**3.05** (2.78-3.34)	**3.50** (3.17-3.83)	**3.82** (3.45-4.19)	**4.14** (3.72-4.53)	**4.43** (3.96-4.86)	**4.82** (4.27-5.29)	**5.10** (4.48-5.61)
60-min	**1.13** (1.03-1.24)	**1.38** (1.26-1.51)	**1.72** (1.57-1.89)	**1.98** (1.80-2.17)	**2.32** (2.10-2.54)	**2.58** (2.33-2.82)	**2.84** (2.55-3.11)	**3.10** (2.77-3.39)	**3.44** (3.05-3.78)	**3.70** (3.26-4.08)
2-hr	**0.693** (0.633-0.761)	**0.844** (0.772-0.929)	**1.07** (0.975-1.18)	**1.25** (1.13-1.37)	**1.49** (1.34-1.63)	**1.69** (1.52-1.85)	**1.89** (1.69-2.07)	**2.11** (1.86-2.31)	**2.41** (2.10-2.64)	**2.65** (2.29-2.90)
3-hr	**0.516** (0.472-0.567)	**0.628** (0.575-0.691)	**0.797** (0.729-0.876)	**0.929** (0.846-1.02)	**1.11** (1.01-1.22)	**1.26** (1.13-1.38)	**1.41** (1.26-1.54)	**1.57** (1.40-1.72)	**1.80** (1.57-1.97)	**1.97** (1.71-2.16)
6-hr	**0.334** (0.307-0.366)	**0.406** (0.372-0.444)	**0.514** (0.470-0.561)	**0.602** (0.548-0.656)	**0.727** (0.657-0.791)	**0.832** (0.747-0.903)	**0.943** (0.840-1.02)	**1.06** (0.937-1.15)	**1.24** (1.07-1.34)	**1.38** (1.18-1.50)
12-hr	**0.207** (0.189-0.228)	**0.252** (0.230-0.277)	**0.320** (0.292-0.352)	**0.378** (0.344-0.414)	**0.463** (0.417-0.505)	**0.536** (0.478-0.583)	**0.615** (0.542-0.668)	**0.702** (0.612-0.763)	**0.831** (0.711-0.903)	**0.941** (0.792-1.02)
24-hr	**0.118** (0.109-0.128)	**0.143** (0.132-0.155)	**0.183** (0.169-0.199)	**0.217** (0.200-0.236)	**0.269** (0.246-0.291)	**0.313** (0.284-0.339)	**0.363** (0.326-0.393)	**0.418** (0.371-0.454)	**0.502** (0.437-0.546)	**0.573** (0.493-0.627)
2-day	**0.069** (0.064-0.075)	**0.084** (0.078-0.091)	**0.107** (0.099-0.117)	**0.127** (0.117-0.138)	**0.155** (0.142-0.169)	**0.180** (0.163-0.195)	**0.206** (0.186-0.224)	**0.235** (0.210-0.257)	**0.278** (0.244-0.305)	**0.314** (0.272-0.346)
3-day	**0.048** (0.045-0.053)	**0.059** (0.054-0.064)	**0.075** (0.069-0.081)	**0.088** (0.081-0.095)	**0.107** (0.098-0.116)	**0.124** (0.113-0.134)	**0.141** (0.128-0.153)	**0.160** (0.143-0.174)	**0.188** (0.166-0.206)	**0.211** (0.184-0.233)
4-day	**0.038** (0.035-0.041)	**0.046** (0.043-0.050)	**0.058** (0.054-0.063)	**0.069** (0.063-0.074)	**0.083** (0.077-0.090)	**0.095** (0.087-0.103)	**0.109** (0.098-0.118)	**0.123** (0.110-0.133)	**0.143** (0.127-0.156)	**0.160** (0.140-0.176)
7-day	**0.026** (0.024-0.028)	**0.031** (0.029-0.033)	**0.038** (0.036-0.041)	**0.045** (0.041-0.048)	**0.054** (0.049-0.058)	**0.061** (0.056-0.066)	**0.069** (0.063-0.074)	**0.077** (0.070-0.084)	**0.089** (0.079-0.097)	**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** (0.048-0.056)	**0.058** (0.053-0.063)	**0.066** (0.059-0.072)	**0.073** (0.065-0.080)
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

CONVEYANCE SYSTEM DESIGN

SUBSURFACE CONVEYANCE NETWORK 1

WEIGHTED RUNOFF COEFFICIENT CALCULATIONS

DRAINAGE SUBAREA RUNOFF COEFFICIENT CALCULATIONS
PROPOSED STORMWATER CONVEYANCE DESIGN
CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS
LANGAN PROJECT #10104802

PROPOSED CONVEYANCE SYSTEM

SUB-DRAINAGE AREA	OPEN SPACE HSGC C C = 0.51 (SF)	OPEN SPACE HSGC D C = 0.65 (SF)	WOODS HSGC C C = 0.45 (SF)	GRAVEL HSGC C C = 0.84 (SF)	IMPERVIOUS AREA C = 0.99 (SF)	TOTAL AREA (SF)	TOTAL AREA (AC)	RUNOFF COEFFICIENT C (Weighted)	STRUCTURE TYPE
NETWORK 1									
CB1-1	0	170	0	0	3,228	3,397	0.08	0.97	GRATE INLET
CB1-2	0	538	0	0	4,111	4,649	0.11	0.95	GRATE INLET
CB1-3	0	28	0	0	1,516	1,544	0.04	0.98	GRATE INLET
CB1-4	0	911	0	0	5,583	6,493	0.15	0.94	GRATE INLET
CB1-5	299	0	0	0	5,911	6,210	0.14	0.97	GRATE INLET
CB1-6	0	1,263	0	0	2,061	3,324	0.08	0.86	GRATE INLET
CB1-7 (SWALE 1)	12,719	14,998	26,663	0	51,764	106,144	2.44	0.75	GRATE INLET
CB1-8	0	1,392	0	0	1,395	2,787	0.06	0.82	GRATE INLET
CB1-9	0	469	0	0	1,511	1,980	0.05	0.91	GRATE INLET
CB1-10	0	982	0	0	910	1,892	0.04	0.81	GRATE INLET
CB1-11	0	0	0	0	860	860	0.02	0.99	GRATE INLET
CB1-12	0	4,023	0	0	0	4,023	0.09	0.65	GRATE INLET
CB1-13	23,541	0	13,477	3,739	8,953	49,710	1.14	0.61	GRATE INLET
CB1-14	0	1,302	0	0	600	1,902	0.04	0.76	GRATE INLET
CB1-15	135	0	0	0	4,053	4,188	0.10	0.97	GRATE INLET
CB1-16	0	380	0	0	5,234	5,614	0.13	0.97	GRATE INLET
CB1-17	2,265	820	0	0	6,372	9,457	0.22	0.85	GRATE INLET
CB1-18	1,434	497	0	0	1,460	3,390	0.08	0.74	GRATE INLET
CB1-19	390	0	0	0	15,512	15,901	0.37	0.98	GRATE INLET
CB1-20	305	1,105	0	0	12,028	13,438	0.31	0.95	GRATE INLET
CB1-21	0	1,763	0	0	1,138	2,901	0.07	0.78	GRATE INLET
CB1-22	0	0	0	0	7,887	7,887	0.18	0.99	GRATE INLET
CB1-23	0	1,502	0	0	3,000	4,502	0.10	0.88	GRATE INLET
CB1-24	0	1,025	0	0	1,575	2,600	0.06	0.86	GRATE INLET
CB1-25	0	1,140	0	0	1,863	3,003	0.07	0.86	GRATE INLET
CB1-26	0	1,497	0	0	2,291	3,788	0.09	0.86	GRATE INLET
CB1-27	0	919	0	0	2,786	3,705	0.09	0.91	GRATE INLET
CB1-28	0	622	0	0	1,841	2,463	0.06	0.90	GRATE INLET
CB1-29	0	675	0	0	1,950	2,625	0.06	0.90	GRATE INLET
CB1-30	0	761	0	0	1,839	2,600	0.06	0.89	GRATE INLET
CB1-31	3,812	0	0	0	0	3,812	0.09	0.51	GRATE INLET
CB1-32	0	1,526	0	0	2,284	3,810	0.09	0.85	GRATE INLET
CB1-33	81	7,209	0	0	5,357	12,647	0.29	0.79	GRATE INLET
CB1-34	0	1,217	0	0	1,800	3,017	0.07	0.85	GRATE INLET
CB1-35	0	1,325	0	0	1,285	2,610	0.06	0.82	GRATE INLET
CB1-36	0	1,479	0	0	1,149	2,628	0.06	0.80	GRATE INLET
CB1-37 (SWALE 2)	2,181	3,915	1,185	0	0	7,281	0.17	0.58	GRATE INLET
CB1-38	2,140	803	987	0	12,442	16,372	0.38	0.88	GRATE INLET
MH1-17	0	0	0	0	15,268	15,268	0.35	0.99	MANHOLE
EX-CB1-1	0	1,205	0	0	1,298	2,503	0.06	0.83	GRATE INLET
EX-CB1-2	33,066	4,704	0	0	21,788	59,558	1.37	0.70	GRATE INLET
EX-CB1-3	0	0	0	0	11,824	11,824	0.27	0.99	GRATE INLET
EX-CB1-4	0	0	0	0	1,686	1,686	0.04	0.99	GRATE INLET
EX-CB1-5	610	991	6,281	0	2,447	10,329	0.24	0.60	GRATE INLET
EX-CB1-6	0	49	1,972	0	200	2,221	0.05	0.50	GRATE INLET
EX-CB1-7	161	530	241	0	857	1,789	0.04	0.77	GRATE INLET
EX-CB1-8	670	842	10,344	0	0	11,855	0.27	0.47	GRATE 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.

TIME OF CONCENTRATION CALCULATIONS

CB1-7 (SWALE 1)

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/22/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/22/2025**

Circle One: (**Present**) Developed — **Inlet CB1-7 (Swale 1)**

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		Woods Light Underbrush		
2.	Manning's Roughness Coeff., n (NEH table 15-1)			0.40		0.40		
3.	Flow Length, L (total L < 100 ft)		ft	67		23		
4.	Two-year 24-hr rainfall, P_2		in	3.43		3.43		
5.	Land Slope, s		ft/ft	0.068		0.505		
6.	Compute T_t	$T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.154	+	0.029	+	

Sheet Flow Sub-Total **0.183 hours**

Shallow Concentrated Flow

			Segment ID	3				
7.	Surface Description			Grassed Waterways				
8.	Flow Length, L		ft	13				
9.	Watercourse Slope, s		ft/ft	0.372				
10.	Average Velocity, V (NEH table 15-3)		ft/s	9.85				
11.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.000	+		+	

Shallow Conc. Flow Sub-Total **0.000 hours**

Channel Flow

			Segment ID	4				
12.	Flow Length, L		ft	308				
13.	Cross Sectional flow area, a		ft^2	0.69				
14.	Wetted Perimeter, P_w		ft	3.58				
15.	Hydraulic Radius, r	$r = a / P_w$	ft	0.19				
16.	Channel Slope, s		ft/ft	0.010				
17.	Manning's Roughness Coeff., n			0.035				
18.	Velocity, V	$V = (1.49\, r^{2/3} s^{1/2}) / n$	ft/s	1.42				
19.	Compute T_t	$T_t = \frac{L}{3600\,V}$	hr	0.060	+		+	

Channel Flow Sub-Total **0.060 hours**

Watershed or subarea T_c or T_t	Total Tc (hours) =	**0.244 hours**
(Add Sub-Total T_t from prior steps)	Total Tc (minutes) =	**15 minutes**

CB1-13

Project:	**Eagle Rock Avenue**	**By:**	**TEG**	**Date:**	**10/22/2025**
Location:	**West Orange, NJ**	**Checked By:**	**MJV**	**Date Checked:**	**10/22/2025**

Circle One: (**Present**) Developed — **Inlet CB1-13**

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)		Bermuda Grass		Bermuda Grass		
2.	Manning's Roughness Coeff., n (NEH table 15-1)		0.40		0.40		
3.	Flow Length, L (total L < 100 ft)	ft	28		72		
4.	Two-year 24-hr rainfall, P_2	in	3.43		3.43		
5.	Land Slope, s	ft/ft	0.357		0.035		
6.	Compute T_t $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$	hr	0.039	+	0.213	+	
					Sheet Flow Sub-Total		0.253 hours

Shallow Concentrated Flow

		Segment ID	3		4		
7.	Surface Description		Pavement		Pavement		
8.	Flow Length, L	ft	70		140		
9.	Watercourse Slope, s	ft/ft	0.137		0.000		
10.	Average Velocity, V (NEH table 15-3)	ft/s	7.53		0.00		
11.	Compute T_t $T_t = \frac{L}{3600\,V}$	hr	0.003	+		+	
					Shallow Conc. Flow Sub-Total		0.003 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) =	**0.255 hours**
Total Tc (minutes) =	**15 minutes**

SUPPORTING BASIN OUTFLOW HYDROGRAPH REPORTS

SSBB-1

PR-1A Routing

Hyd. No. 11

Hydrograph Type	= Pond Route	Peak Flow	= 3.069 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.27 hrs
Time Interval	= 1 min	Hydrograph Volume	= 26,002 cuft
Inflow Hydrograph	= 10 - PR-1A Total	Max. Elevation	= 536.03 ft
Pond Name	= SSBB-1	Max. Storage	= 10,002 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.46 hrs

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
9.63	0.031	10.05	0.106	10.47	0.219	10.88	0.343	11.30	0.547
9.65	0.034	10.07	0.111	10.48	0.223	10.90	0.350	11.32	0.557
9.67	0.038	10.08	0.116	10.50	0.227	10.92	0.357	11.33	0.566
9.68	0.041	10.10	0.121	10.52	0.230	10.93	0.364	11.35	0.575
9.70	0.044	10.12	0.126	10.53	0.234	10.95	0.371	11.37	0.584
9.72	0.047	10.13	0.131	10.55	0.239	10.97	0.378	11.38	0.593
9.73	0.050	10.15	0.136	10.57	0.243	10.98	0.385	11.40	0.602
9.75	0.053	10.17	0.141	10.58	0.247	11.00	0.392	11.42	0.612
9.77	0.056	10.18	0.146	10.60	0.251	11.02	0.399	11.43	0.621
9.78	0.059	10.20	0.150	10.62	0.256	11.03	0.406	11.45	0.631
9.80	0.062	10.22	0.155	10.63	0.260	11.05	0.414	11.47	0.641
9.82	0.065	10.23	0.159	10.65	0.265	11.07	0.422	11.48	0.651
9.83	0.068	10.25	0.164	10.67	0.269	11.08	0.430	11.50	0.661
9.85	0.071	10.27	0.169	10.68	0.274	11.10	0.438	11.52	0.672
9.87	0.074	10.28	0.173	10.70	0.279	11.12	0.446	11.53	0.684
9.88	0.077	10.30	0.177	10.72	0.283	11.13	0.454	11.55	0.699
9.90	0.080	10.32	0.182	10.73	0.288	11.15	0.463	11.57	0.715
9.92	0.083	10.33	0.186	10.75	0.293	11.17	0.472	11.58	0.731
9.93	0.086	10.35	0.190	10.77	0.298	11.18	0.481	11.60	0.748
9.95	0.089	10.37	0.195	10.78	0.303	11.20	0.489	11.62	0.764
9.97	0.092	10.38	0.199	10.80	0.310	11.22	0.498	11.63	0.779
9.98	0.095	10.40	0.203	10.82	0.316	11.23	0.508	11.65	0.791
10.00	0.098	10.42	0.207	10.83	0.323	11.25	0.517	11.67	0.803
10.02	0.101	10.43	0.211	10.85	0.330	11.27	0.527	11.68	0.815
10.03	0.103	10.45	0.215	10.87	0.336	11.28	0.537	11.70	0.827

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd — *PR-1A Routing*

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
11.72	0.840	12.32	3.056	12.92	1.760	13.52	1.176	14.12	0.884
11.73	0.855	12.33	3.044	12.93	1.730	13.53	1.168	14.13	0.876
11.75	0.872	12.35	3.026	12.95	1.700	13.55	1.160	14.15	0.868
11.77	0.890	12.37	3.004	12.97	1.671	13.57	1.151	14.17	0.860
11.78	0.909	12.38	2.978	12.98	1.642	13.58	1.143	14.18	0.853
11.80	0.928	12.40	2.951	13.00	1.615	13.60	1.134	14.20	0.845
11.82	0.946	12.42	2.924	13.02	1.588	13.62	1.126	14.22	0.838
11.83	0.966	12.43	2.895	13.03	1.561	13.63	1.118	14.23	0.830
11.85	0.990	12.45	2.866	13.05	1.534	13.65	1.109	14.25	0.823
11.87	1.015	12.47	2.837	13.07	1.507	13.67	1.101	14.27	0.816
11.88	1.042	12.48	2.808	13.08	1.487	13.68	1.093	14.28	0.809
11.90	1.067	12.50	2.778	13.10	1.469	13.70	1.085	14.30	0.802
11.92	1.093	12.52	2.745	13.12	1.452	13.72	1.077	14.32	0.795
11.93	1.125	12.53	2.711	13.13	1.434	13.73	1.069	14.33	0.788
11.95	1.165	12.55	2.674	13.15	1.417	13.75	1.061	14.35	0.781
11.97	1.206	12.57	2.637	13.17	1.400	13.77	1.053	14.37	0.774
11.98	1.248	12.58	2.600	13.18	1.383	13.78	1.045	14.38	0.764
12.00	1.306	12.60	2.563	13.20	1.366	13.80	1.036	14.40	0.754
12.02	1.405	12.62	2.523	13.22	1.350	13.82	1.028	14.42	0.745
12.03	1.533	12.63	2.475	13.23	1.333	13.83	1.019	14.43	0.736
12.05	1.730	12.65	2.428	13.25	1.317	13.85	1.011	14.45	0.726
12.07	1.968	12.67	2.381	13.27	1.301	13.87	1.003	14.47	0.717
12.08	2.226	12.68	2.336	13.28	1.285	13.88	0.995	14.48	0.709
12.10	2.454	12.70	2.291	13.30	1.274	13.90	0.987	14.50	0.700
12.12	2.636	12.72	2.248	13.32	1.266	13.92	0.979	14.52	0.692
12.13	2.765	12.73	2.206	13.33	1.259	13.93	0.971	14.53	0.683
12.15	2.850	12.75	2.158	13.35	1.251	13.95	0.963	14.55	0.675
12.17	2.910	12.77	2.111	13.37	1.244	13.97	0.955	14.57	0.667
12.18	2.958	12.78	2.066	13.38	1.236	13.98	0.948	14.58	0.659
12.20	3.001	12.80	2.022	13.40	1.229	14.00	0.940	14.60	0.652
12.22	3.032	12.82	1.980	13.42	1.221	14.02	0.933	14.62	0.644
12.23	3.053	12.83	1.939	13.43	1.214	14.03	0.925	14.63	0.637
12.25	3.064	12.85	1.899	13.45	1.206	14.05	0.917	14.65	0.630
12.27	**3.069**	12.87	1.859	13.47	1.199	14.07	0.908	14.67	0.622
12.28	3.068	12.88	1.821	13.48	1.191	14.08	0.900	14.68	0.615
12.30	3.064	12.90	1.790	13.50	1.184	14.10	0.892	14.70	0.608

Printed values > 1% of Qpeak. nth-point print interval = 1

SSBB-2

PR-2A Routing

Hyd. No. 46

Hydrograph Type	= Pond Route	Peak Flow	= 4.531 cfs
Storm Frequency	= 25-yr	Time to Peak	= 12.25 hrs
Time Interval	= 1 min	Hydrograph Volume	= 38,803 cuft
Inflow Hydrograph	= 45 - PR-2A	Max. Elevation	= 538.80 ft
Pond Name	= SSBB-2	Max. Storage	= 16,329 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.04 hrs

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
9.37	0.046	9.78	0.098	10.20	0.181	10.62	0.276	11.03	0.421
9.38	0.048	9.80	0.102	10.22	0.184	10.63	0.281	11.05	0.427
9.40	0.050	9.82	0.105	10.23	0.187	10.65	0.286	11.07	0.434
9.42	0.051	9.83	0.108	10.25	0.191	10.67	0.291	11.08	0.440
9.43	0.053	9.85	0.111	10.27	0.194	10.68	0.296	11.10	0.446
9.45	0.055	9.87	0.115	10.28	0.197	10.70	0.301	11.12	0.453
9.47	0.056	9.88	0.118	10.30	0.201	10.72	0.307	11.13	0.459
9.48	0.058	9.90	0.121	10.32	0.204	10.73	0.312	11.15	0.466
9.50	0.060	9.92	0.125	10.33	0.207	10.75	0.317	11.17	0.474
9.52	0.062	9.93	0.128	10.35	0.211	10.77	0.323	11.18	0.481
9.53	0.063	9.95	0.131	10.37	0.214	10.78	0.329	11.20	0.488
9.55	0.065	9.97	0.135	10.38	0.217	10.80	0.334	11.22	0.496
9.57	0.067	9.98	0.138	10.40	0.221	10.82	0.340	11.23	0.503
9.58	0.069	10.00	0.141	10.42	0.224	10.83	0.346	11.25	0.511
9.60	0.070	10.02	0.145	10.43	0.227	10.85	0.352	11.27	0.519
9.62	0.072	10.03	0.148	10.45	0.231	10.87	0.358	11.28	0.527
9.63	0.074	10.05	0.151	10.47	0.236	10.88	0.364	11.30	0.535
9.65	0.076	10.07	0.154	10.48	0.240	10.90	0.370	11.32	0.544
9.67	0.078	10.08	0.158	10.50	0.244	10.92	0.376	11.33	0.552
9.68	0.079	10.10	0.161	10.52	0.248	10.93	0.382	11.35	0.561
9.70	0.082	10.12	0.164	10.53	0.253	10.95	0.389	11.37	0.570
9.72	0.085	10.13	0.168	10.55	0.257	10.97	0.395	11.38	0.579
9.73	0.088	10.15	0.171	10.57	0.262	10.98	0.402	11.40	0.586
9.75	0.092	10.17	0.174	10.58	0.267	11.00	0.408	11.42	0.593
9.77	0.095	10.18	0.178	10.60	0.271	11.02	0.415	11.43	0.599

Printed values > 1% of Qpeak. nth-point print interval = 1

Hydrograph Discharge Table, cont'd — *PR-2A Routing*

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
11.45	0.606	12.05	1.643	12.65	3.123	13.25	1.699	13.85	1.154
11.47	0.613	12.07	1.971	12.67	3.056	13.27	1.675	13.87	1.144
11.48	0.620	12.08	2.395	12.68	2.992	13.28	1.653	13.88	1.135
11.50	0.627	12.10	2.832	12.70	2.930	13.30	1.630	13.90	1.126
11.52	0.635	12.12	3.286	12.72	2.870	13.32	1.608	13.92	1.116
11.53	0.643	12.13	3.656	12.73	2.811	13.33	1.587	13.93	1.107
11.55	0.652	12.15	3.940	12.75	2.753	13.35	1.565	13.95	1.098
11.57	0.662	12.17	4.135	12.77	2.699	13.37	1.544	13.97	1.089
11.58	0.672	12.18	4.275	12.78	2.652	13.38	1.522	13.98	1.080
11.60	0.683	12.20	4.386	12.80	2.606	13.40	1.502	14.00	1.072
11.62	0.694	12.22	4.467	12.82	2.562	13.42	1.482	14.02	1.063
11.63	0.703	12.23	4.514	12.83	2.518	13.43	1.462	14.03	1.055
11.65	0.713	**12.25**	**4.531**	12.85	2.474	13.45	1.442	14.05	1.046
11.67	0.723	12.27	4.527	12.87	2.431	13.47	1.422	14.07	1.038
11.68	0.733	12.28	4.513	12.88	2.389	13.48	1.402	14.08	1.031
11.70	0.743	12.30	4.494	12.90	2.349	13.50	1.384	14.10	1.029
11.72	0.753	12.32	4.468	12.92	2.309	13.52	1.373	14.12	1.027
11.73	0.765	12.33	4.429	12.93	2.270	13.53	1.361	14.13	1.026
11.75	0.778	12.35	4.377	12.95	2.231	13.55	1.349	14.15	1.024
11.77	0.792	12.37	4.315	12.97	2.192	13.57	1.338	14.17	1.022
11.78	0.803	12.38	4.250	12.98	2.155	13.58	1.326	14.18	1.020
11.80	0.814	12.40	4.183	13.00	2.119	13.60	1.314	14.20	1.019
11.82	0.826	12.42	4.114	13.02	2.083	13.62	1.303	14.22	1.017
11.83	0.839	12.43	4.044	13.03	2.048	13.63	1.291	14.23	1.015
11.85	0.854	12.45	3.973	13.05	2.012	13.65	1.280	14.25	1.014
11.87	0.870	12.47	3.902	13.07	1.977	13.67	1.269	14.27	1.012
11.88	0.885	12.48	3.832	13.08	1.950	13.68	1.257	14.28	1.010
11.90	0.901	12.50	3.763	13.10	1.923	13.70	1.246	14.30	1.008
11.92	0.917	12.52	3.694	13.12	1.897	13.72	1.236	14.32	1.006
11.93	0.937	12.53	3.620	13.13	1.871	13.73	1.225	14.33	1.005
11.95	0.961	12.55	3.546	13.15	1.845	13.75	1.214	14.35	1.003
11.97	0.985	12.57	3.473	13.17	1.819	13.77	1.204	14.37	1.001
11.98	1.010	12.58	3.401	13.18	1.794	13.78	1.194	14.38	0.999
12.00	1.061	12.60	3.330	13.20	1.770	13.80	1.184	14.40	0.997
12.02	1.198	12.62	3.260	13.22	1.746	13.82	1.174	14.42	0.996
12.03	1.358	12.63	3.191	13.23	1.722	13.83	1.164	14.43	0.994

Printed values > 1% of Qpeak. nth-point print interval = 1

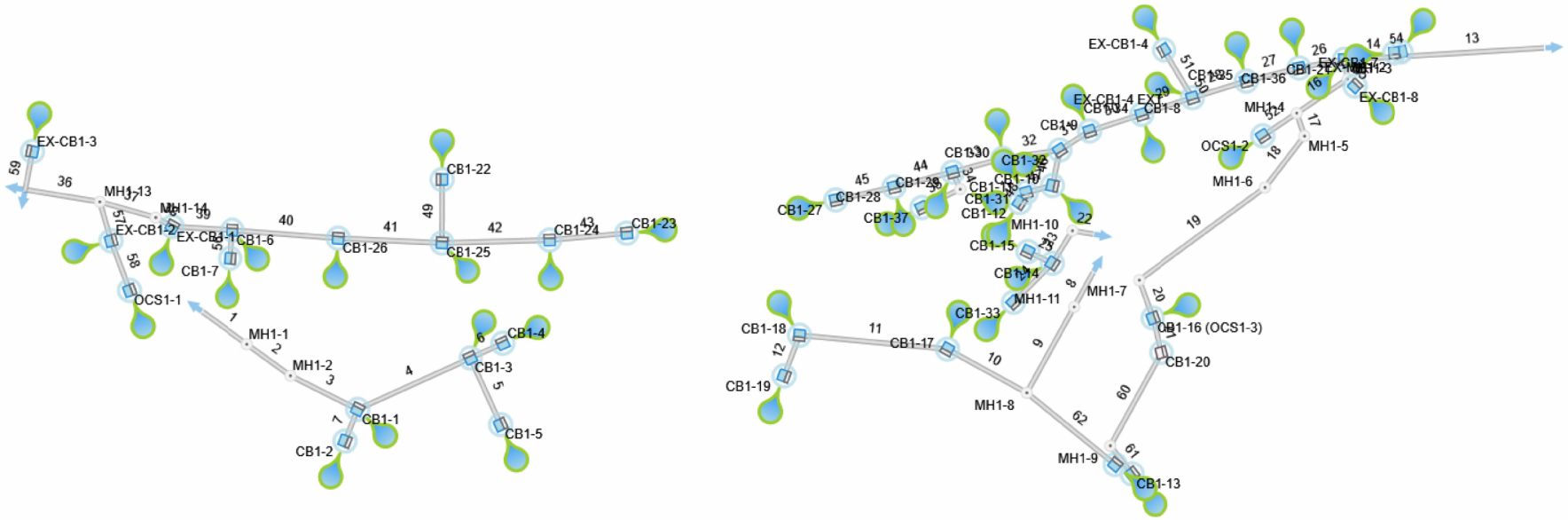
HYDRAULIC REPORTS
25-YEAR STORM EVENT

Plan View

Stormwater Studio 2026 v 3.0.0.40

Project Name: NST0101

10-22-2025



Project File: NST0101 25-YR (NEW).sws

Storm Sewer Tabulation

Project Name: NST0101

Stormwater Studio 2026 v 3.0.0.40

10-22-2025

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)	
MH1-1 TO HW1-1	48.30	0.000	0.512	0.00	0.00	0.49	10.0	10.87	5.62	2.75	19.79	3.20	15	8.00	537.86	534.00	538.53	536.03	550.21	539.00	1
MH1-2 TO MH1-1	47.72	0.000	0.512	0.00	0.00	0.49	10.0	10.80	5.63	2.76	19.79	6.88	15	8.01	550.65	546.83	551.32	547.19	557.15	550.21	2
CB1-1 TO MH1-2	66.49	0.078	0.512	0.97	0.08	0.49	10.0	10.70	5.65	2.77	18.50	6.85	15	6.99	558.15	553.50	558.82	553.86	565.17	557.15	3
CB1-3 TO CB1-1	110.47	0.035	0.327	0.98	0.03	0.31	10.0	10.20	5.75	1.80	4.95	3.64	15	0.50	561.37	560.82	561.90	561.34	565.70	565.17	4
CB1-5 TO CB1-3	64.84	0.143	0.143	0.97	0.14	0.14	10.0	10.00	5.80	0.80	11.33	3.79	15	2.62	563.88	562.18	564.24	562.43	567.40	565.70	5
CB1-4 TO CB1-3	31.53	0.149	0.149	0.94	0.14	0.14	10.0	10.00	5.80	0.81	4.95	1.66	15	0.50	561.63	561.47	562.09	562.08	565.00	565.70	6
CB1-2 TO CB1-1	30.27	0.107	0.107	0.95	0.10	0.10	10.0	10.00	5.80	0.59	4.95	2.60	15	0.50	560.86	560.71	561.17	561.00	565.23	565.17	7
MH1-11 to HW1-3	34.09	0.000	1.036	0.00	0.00	0.93	0.0	11.04	5.59	5.20	15.63	4.83	15	4.99	538.70	537.00	539.61	538.80	558.75	558.20	8
MH1-8 to MH1-11	86.91	0.000	1.036	0.00	0.00	0.93	0.0	10.80	5.63	5.24	7.00	5.74	15	1.00	550.75	549.88	551.67	550.71	562.03	558.75	9
CB1-17 TO MH1-8	80.26	0.217	0.660	0.85	0.18	0.60	10.0	10.61	5.67	3.40	9.44	5.48	15	1.82	558.22	556.76	558.96	557.32	563.19	562.03	10
CB1-18 TO CB1-17	132.40	0.078	0.443	0.74	0.06	0.42	10.0	10.06	5.78	2.40	4.95	3.97	15	0.50	558.99	558.32	559.61	558.94	563.31	563.19	11
CB1-19 TO CB1-18	38.54	0.365	0.365	0.98	0.36	0.36	10.0	10.00	5.80	2.07	19.79	6.22	15	8.00	562.17	559.08	562.74	559.40	566.95	563.31	12
EX-MH1-2 TO EX-CB1-5	125.03	0.000	2.668	0.00	0.00	1.79	10.0	16.10	4.78	11.61	11.99	7.37	18	1.30	530.90	529.27	532.20	530.48	534.56	533.25	13
CB1-21 TO EX-MH1-2	51.85	0.067	2.576	0.78	0.05	1.73	10.0	15.99	4.79	11.36	11.74	7.19	18	1.25	531.90	531.25	533.19	532.47	534.65	534.56	14
MH1-3 TO CB1-21	17.64	0.000	1.412	0.00	0.00	0.82	10.0	15.95	4.80	7.02	12.86	3.97	18	1.50	532.16	531.90	533.89	533.81	536.42	534.65	15
MH1-4 TO MH1-3	54.28	0.000	1.140	0.00	0.00	0.70	10.0	15.83	4.82	6.42	13.81	3.72	18	1.47	532.96	532.16	534.32	534.18	542.00	536.42	16
MH1-5 TO MH1-4	21.53	0.000	1.140	0.00	0.00	0.70	10.0	15.78	4.82	3.59	9.89	3.30	15	2.00	533.64	533.21	534.57	534.58	542.00	542.00	17
MH1-6 TO MH1-5	57.45	0.000	1.140	0.00	0.00	0.70	10.0	15.65	4.84	3.61	9.90	3.88	15	2.00	534.89	533.74	535.65	534.84	542.17	542.00	18
MH1-7 TO MH1-6	138.92	0.000	1.140	0.00	0.00	0.70	10.0	15.41	4.87	3.63	13.99	6.77	15	4.00	540.55	534.99	541.31	535.45	546.00	542.17	19
CB1-16 TO MH1-7	35.70	0.000	1.140	0.00	0.00	0.70	10.0	15.36	4.88	3.63	19.80	7.25	15	8.01	545.36	542.50	546.12	542.93	556.76	546.00	20
CB1-20 TO CB1-16 (OCS1-3)	31.48	0.000	1.140	0.00	0.00	0.70	10.0	15.29	4.89	3.40	9.90	5.30	15	2.00	551.23	550.60	551.97	551.18	556.77	556.76	21
MH1-10 TO FES1-2	17.76	0.000	0.430	0.00	0.00	0.36	10.0	10.30	5.73	2.04	13.15	1.68	15	3.53	537.63	537.00	538.81	538.80	542.00	537.62	22

Notes: IDF File = West Orange Rainfall.idf, Return Period = 25-yrs.

Project File: NST0101 25-YR (NEW).sws

Storm Sewer Tabulation

Project Name: NST0101

Stormwater Studio 2026 v 3.0.0.40

10-22-2025

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)	
CB1-14 TO MH1-10	33.97	0.044	0.430	0.76	0.03	0.36	10.0	10.15	5.76	2.05	4.95	1.88	15	0.50	537.90	537.73	538.87	538.86	541.55	542.00	23
CB1-33 TO CB1-14	48.78	0.290	0.290	0.79	0.23	0.23	10.0	10.00	5.80	1.33	18.67	5.44	15	7.12	541.59	538.12	542.05	538.37	545.08	541.55	24
CB1-15 TO CB1-14	24.00	0.096	0.096	0.97	0.09	0.09	10.0	10.00	5.80	0.54	4.95	0.59	15	0.50	538.13	538.01	538.95	538.95	541.50	541.55	25
CB1-36 TO CB1-21	40.90	0.060	1.097	0.80	0.05	0.85	10.0	11.97	5.42	4.63	7.22	2.64	14x23e	0.50	532.35	532.15	533.98	533.89	535.15	534.65	26
CB1-35 TO CB1-36	48.34	0.060	1.037	0.82	0.05	0.81	10.0	11.79	5.45	4.39	7.55	2.49	18	0.52	532.60	532.35	534.10	534.05	535.73	535.15	27
CB1-8 TO CB1-35	49.83	0.064	0.977	0.82	0.05	0.76	10.0	11.59	5.48	4.15	7.42	2.39	18	0.50	532.85	532.60	534.23	534.16	536.31	535.73	28
CB1-34 TO CB1-8	47.99	0.069	0.874	0.85	0.06	0.67	10.0	11.40	5.52	3.68	7.43	2.22	18	0.50	533.09	532.85	534.34	534.30	536.75	536.31	29
CB1-9 TO CB1-34	48.50	0.045	0.805	0.91	0.04	0.61	10.0	11.21	5.56	3.38	7.43	2.48	18	0.50	533.43	533.19	534.42	534.39	537.22	536.75	30
CB1-32 TO CB1-9	31.37	0.087	0.759	0.85	0.07	0.57	10.0	11.08	5.58	3.16	7.50	2.94	18	0.51	533.69	533.53	534.50	534.49	537.45	537.22	31
CB1-30 TO CB1-32	51.01	0.060	0.516	0.89	0.05	0.38	10.0	10.90	5.61	2.12	6.46	4.11	15	1.00	534.45	533.94	535.03	534.46	538.01	537.45	32
CB1-29 TO CB1-30	45.99	0.060	0.457	0.90	0.05	0.32	10.0	10.71	5.65	1.83	5.55	3.76	15	0.74	534.89	534.55	535.43	535.06	538.74	538.01	33
CB1-31 TO CB1-29	16.56	0.088	0.255	0.51	0.04	0.14	10.0	10.09	5.78	0.82	18.23	2.06	15	7.97	536.31	534.99	536.67	535.61	540.76	538.74	34
CB1-37 TO CB1-31	38.36	0.167	0.167	0.58	0.10	0.10	10.0	10.00	5.80	0.56	19.79	4.33	15	8.00	540.38	537.31	540.68	537.47	546.53	540.76	35
MH1-13 TO EX-MH1-1	66.94	0.000	4.438	0.00	0.00	3.35	10.0	15.20	4.90	18.89	21.44	11.69	18	4.17	524.17	521.38	525.63	522.57	530.20	528.83	36
MH1-14 TO MH1-13	51.41	0.000	3.071	0.00	0.00	2.40	10.0	15.11	4.92	11.78	15.29	6.67	18	2.12	525.36	524.27	527.67	527.02	531.22	530.20	37
EX-CB1-1 TO MH1-14	16.68	0.057	3.071	0.83	0.05	2.40	10.0	15.09	4.92	11.79	23.28	8.49	18	4.92	527.89	527.07	529.20	528.04	531.40	531.22	38
CB1-6 TO EX-CB1-1	53.75	0.076	3.013	0.86	0.07	2.35	10.0	15.03	4.93	11.57	14.40	8.58	14x23e	1.99	528.96	527.89	529.66	529.60	532.89	531.40	39
CB1-26 TO CB1-6	94.42	0.087	0.500	0.86	0.07	0.46	10.0	11.11	5.57	2.54	10.21	3.05	15	2.50	531.57	529.21	532.21	531.36	535.41	532.89	40
CB1-25 TO CB1-26	92.00	0.069	0.413	0.86	0.06	0.38	10.0	10.86	5.62	2.14	9.23	4.75	15	2.04	533.55	531.67	534.14	532.10	537.67	535.41	41
CB1-24 TO CB1-25	96.15	0.060	0.163	0.86	0.05	0.14	10.0	10.46	5.70	0.81	7.50	3.31	15	1.35	535.51	534.21	535.87	534.49	539.18	537.67	42
CB1-23 TO CB1-24	68.61	0.103	0.103	0.88	0.09	0.09	10.0	10.00	5.80	0.53	4.57	2.31	15	0.50	535.95	535.61	536.24	535.92	539.46	539.18	43
CB1-28 TO CB1-29	54.43	0.057	0.142	0.90	0.05	0.13	10.0	10.37	5.72	0.74	4.55	1.70	15	0.50	535.26	534.99	535.65	535.62	538.81	538.74	44

Notes: IDF File = West Orange Rainfall.idf, Return Period = 25-yrs. r = rectangular e = elliptical a = arch

Project File: NST0101 25-YR (NEW).sws

Storm Sewer Tabulation

Project Name: NST0101

Stormwater Studio 2026 v 3.0.0.40

10-22-2025

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)	
CB1-27 TO CB1-28	52.77	0.085	0.085	0.91	0.08	0.08	10.0	10.00	5.80	0.45	4.53	2.38	15	0.49	535.62	535.36	535.89	535.62	539.11	538.81	45
CB1-10 TO CB1-32	32.06	0.043	0.156	0.81	0.04	0.11	10.0	10.21	5.75	0.66	11.57	1.72	15	3.21	534.97	533.94	535.30	534.70	538.61	537.45	46
CB1-11 TO CB1-10	24.06	0.020	0.112	0.99	0.02	0.08	10.0	10.05	5.79	0.46	4.94	2.41	15	0.50	535.19	535.07	535.46	535.33	538.69	538.61	47
CB1-12 TO CB1-11	10.72	0.092	0.092	0.65	0.06	0.06	10.0	10.00	5.80	0.35	9.79	2.54	15	1.96	535.50	535.29	535.74	535.48	538.94	538.69	48
CB1-22 TO CB1-25	56.17	0.181	0.181	0.99	0.18	0.18	10.0	10.00	5.80	1.04	4.57	2.06	15	0.50	533.93	533.65	534.38	534.33	537.46	537.67	49
EX-CB1-4 EXT. TO CB1-8	9.13	0.000	0.039	0.00	0.00	0.04	10.0	10.20	5.75	0.22	10.13	0.18	15	2.46	533.17	532.95	534.34	534.34	536.51	536.31	50
EX-CB1-4 TO EX-CB1-4 EXT.	40.24	0.039	0.039	0.99	0.04	0.04	10.0	10.00	5.80	0.22	10.13	0.93	15	2.46	534.16	533.17	534.37	534.34	536.33	536.51	51
OCS1-2 TO MH1-4	36.21	0.000	0.000	0.00	0.00	0.00	10.0	10.00	5.80	2.83	13.89	1.78	18	1.49	533.50	532.96	534.64	534.64	537.00	542.00	52
EX-CB1-6 TO EX-MH1-2	4.21	0.051	0.092	0.50	0.03	0.06	10.0	10.03	5.79	0.33	0.00	0.27	15	0.00	531.40	531.40	532.99	532.99	534.26	534.56	53
EX-CB1-7 TO EX-CB1-6	6.45	0.041	0.041	0.77	0.03	0.03	10.0	10.00	5.80	0.18	10.17	0.15	15	2.48	531.88	531.72	532.99	532.99	534.30	534.26	54
EX-CB1-8 TO MH1-3	9.00	0.272	0.272	0.47	0.13	0.13	10.0	10.00	5.80	0.74	14.44	0.67	15	5.00	533.34	532.89	534.29	534.30	536.38	536.42	55
CB1-7 TO CB1-6	25.00	2.437	2.437	0.75	1.83	1.83	15.0	15.00	4.93	9.01	18.26	7.47	15	8.00	531.21	529.21	532.37	530.90	541.04	532.89	56
EX-CB1-2 TO MH1-13	35.89	1.367	1.367	0.70	0.96	0.96	10.0	10.08	5.78	7.98	18.63	5.19	18	3.15	526.80	525.67	527.88	527.24	529.50	530.20	57
OCS1-1 TO EX-CB1-2	47.03	0.000	0.000	0.00	0.00	0.00	10.0	10.00	5.80	2.45	28.44	2.56	18	7.34	530.25	526.80	530.85	528.40	534.00	529.50	58
EX-CB1-3 TO EX-MH1-1	34.36	0.271	0.271	0.99	0.27	0.27	10.0	10.00	5.80	1.56	13.22	4.77	15	4.19	524.11	522.67	524.61	522.99	527.91	528.83	59
MH1-9 to CB1-20	94.50	0.000	1.140	0.00	0.00	0.70	0.0	15.12	4.91	3.42	13.99	6.57	15	4.00	555.11	551.33	555.85	551.78	558.73	556.77	60
CB1-13 to MH1-9	31.44	1.140	1.140	0.61	0.70	0.70	15.0	15.00	4.93	3.43	4.94	4.10	15	0.50	555.37	555.21	556.14	556.06	558.40	558.73	61
CB1-38 to MH1-8	100.84	0.376	0.376	0.88	0.33	0.33	10.0	10.00	5.80	1.92	7.00	4.14	15	1.00	554.33	553.32	554.88	553.78	558.63	562.03	62

Notes: IDF File = West Orange Rainfall.idf, Return Period = 25-yrs.

Project File: NST0101 25-YR (NEW).sws

OUTLET PROTECTION CALCULATIONS

HW1-1

Based on "Standards for Soil Erosion and Sediment Control in New Jersey," dated 2014

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) = 3.2 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) = 2.75 cfs (25 year storm)
*q (unit discharge, = Q/W_o) = 2.2 cfs / foot
** T_w (tail water) = 2.03 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:

$$L_a = (1.8\frac{q}{D_o^{1/2}}) + 7D_o$$

$T_w < ½\ D_o$ $L_a =$ 0 feet

$$L_a = 3\frac{q}{D_o^{1/2}}$$

$T_w > ½\ D_o$ **$L_a =$ 6 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 = 6 feet

For tailwater elevation less than the elevation of the center of the pipe,

$$W = 3W_o + L_a$$

W = 0 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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Project:
HW1-1
RIP RAP APRON DESIGN
WEST ORANGE **NEW JERSEY**

Project No.	Date:	By:	Ckd:	Sheet. No.
101049802	10/17/2025	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} = 0.02 ft *OR* D_{50} = 0.3 inches

Use Min. D_{50} = 3.0 inches

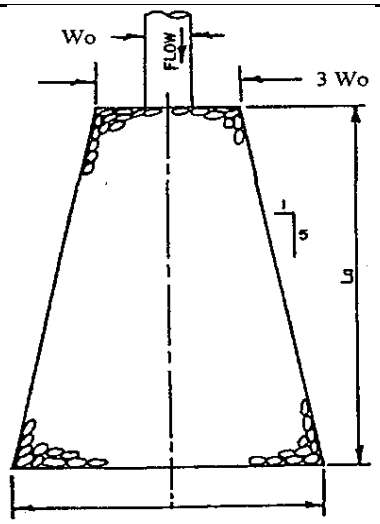
Note: For discharge into Detention Basins, analyze the hydraulic characteristics of the basin for the design storm to determine the combination of conduit discharge and tailwater that results in the largest required D50 stone size.

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 = 0.8 inches
2. A thickness of at least two times the D_{50} size if a filter layer is used. t = 0.5 inches

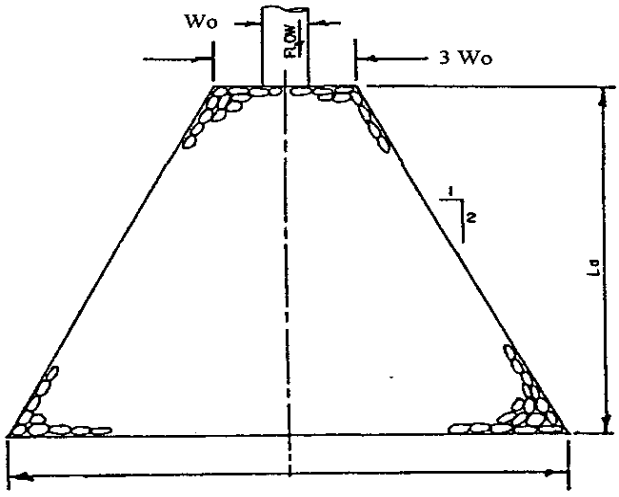
*Minimum required thickness is 6 inches. **Use Min. t = 6.0 inches**



For tailwater elevation greater than or equal to the elevation of the center of the pipe

L_a = 6

W = 6



For tailwater elevation less than the elevation of the center of the pipe

L_a = 0

W= 0

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Project:

HW1-1
RIP RAP APRON DESIGN
WEST ORANGE **NEW JERSEY**

Project No.	Date:	By:	Ckd:	Sheet. No.
101049802	10/17/2025	TEG	MJV	2 of 2

FES1-2

Based on "Standards for Soil Erosion and Sediment Control in New Jersey," dated 2014

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) = 1.68 ft/sec
Rip Rap Apron required? 0 (1 = yes, 0 = no)

Given:

D_o (max inside height) = 1.25 feet
W_o (max inside width) = 1.25 feet
Q (discharge) = 2.04 cfs (25 year storm)
*q (unit discharge, = Q/W_o) = 1.7 cfs / foot
** T_w (tail water) = 1.8 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:

$$L_a = (1.8\frac{q}{D_o^{1/2}}) + 7D_o$$

$T_w < ½\ D_o$ $L_a =$ 0 feet

$$L_a = 3\frac{q}{D_o^{1/2}}$$

$T_w > ½\ D_o$ **$L_a =$ 5 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 = 6 feet

For tailwater elevation less than the elevation of the center of the pipe,

$$W = 3W_o + L_a$$

W = 0 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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Project:
FES1-2
RIP RAP APRON DESIGN
WEST ORANGE **NEW JERSEY**

Project No.	Date:	By:	Ckd:	Sheet. No.
101049802	10/17/2025	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} = 0.02 ft *OR* D_{50} = 0.2 inches

Use Min. D_{50} = 3.0 inches

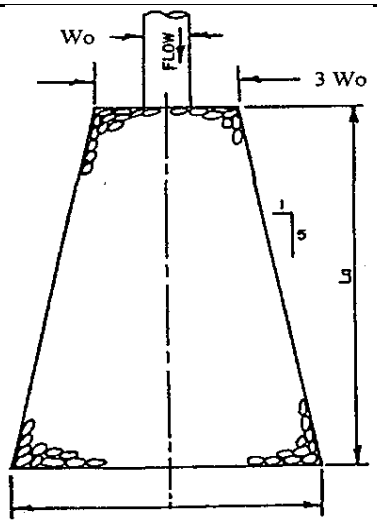
Note: For discharge into Detention Basins, analyze the hydraulic characteristics of the basin for the design storm to determine the combination of conduit discharge and tailwater that results in the largest required D50 stone size.

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 = 0.6 inches
2. A thickness of at least two times the D_{50} size if a filter layer is used. t = 0.4 inches

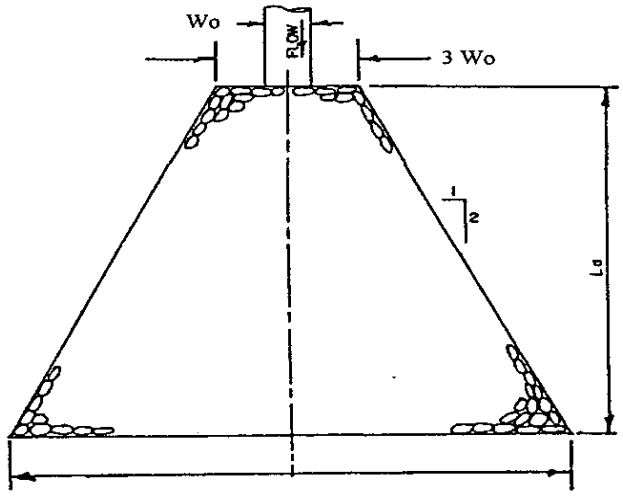
*Minimum required thickness is 6 inches. **Use Min. t = 6.0 inches**



W = 6

For tailwater elevation greater than or equal to the elevation of the center of the pipe

L_a = 5



W= 0

For tailwater elevation less than the elevation of the center of the pipe

L_a = 0

LANGAN

300 Kimball Drive Parsippany, NJ
P: 973.560.4900 F: 973.560.4901
NJ Certificate of Authorization No: 24GA27996400

Project:

FES1-2
RIP RAP APRON DESIGN
WEST ORANGE **NEW JERSEY**

Project No.	Date:	By:	Ckd:	Sheet. No.
101049802	10/17/2025	TEG	MJV	2 of 2

HW1-3

Based on "Standards for Soil Erosion and Sediment Control in New Jersey," dated 2014

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) = 4.83 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) = 5.2 cfs (25 year storm)
*q (unit discharge, = Q/W_o) = 4.2 cfs / foot
** T_w (tail water) = 1.8 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:

$$L_a = (1.8\frac{q}{D_o^{1/2}}) + 7D_o$$

$T_w < ½\ D_o$ $L_a =$ 0 feet

$$L_a = 3\frac{q}{D_o^{1/2}}$$

$T_w > ½\ D_o$ **$L_a =$ 11 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 = 8 feet

For tailwater elevation less than the elevation of the center of the pipe,

$$W = 3W_o + L_a$$

W = 0 feet

Where L_a is the length of the apron determined from the formula and W_o is the culvert width.

LANGAN
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Project:
HW1-3
RIP RAP APRON DESIGN
WEST ORANGE **NEW JERSEY**

Project No.	Date:	By:	Ckd:	Sheet. No.
101049802	10/17/2025	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} = 0.06 ft *OR* D_{50} = 0.7 inches

Use Min. D_{50} = 3.0 inches

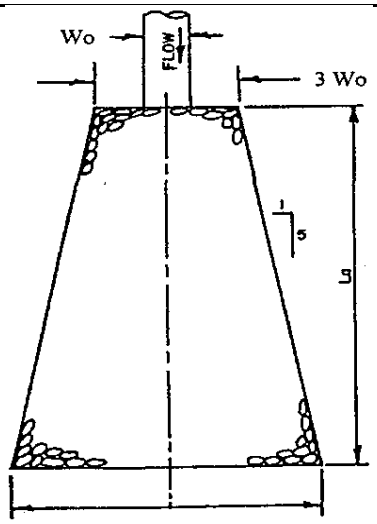
Note: For discharge into Detention Basins, analyze the hydraulic characteristics of the basin for the design storm to determine the combination of conduit discharge and tailwater that results in the largest required D50 stone size.

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 = 2.2 inches
2. A thickness of at least two times the D_{50} size if a filter layer is used. t = 1.4 inches

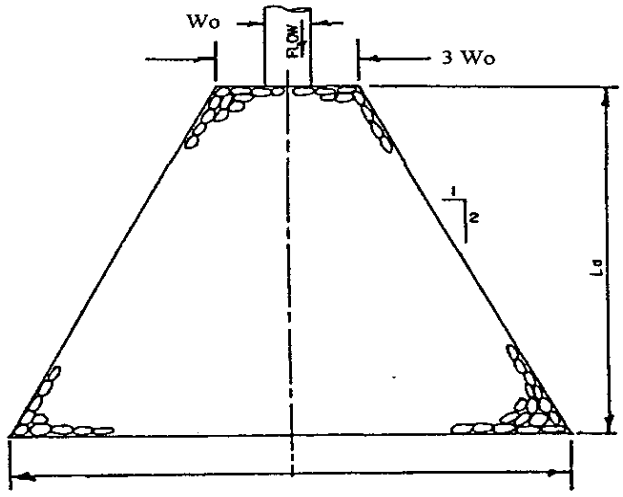
*Minimum required thickness is 6 inches. **Use Min. t = 6.0 inches**



W = 8

For tailwater elevation greater than or equal to the elevation of the center of the pipe

L_a = 11



W= 0

For tailwater elevation less than the elevation of the center of the pipe

L_a = 0

LANGAN

300 Kimball Drive Parsippany, NJ
P: 973.560.4900 F: 973.560.4901
NJ Certificate of Authorization No: 24GA27996400

Project:

HW1-3
RIP RAP APRON DESIGN
WEST ORANGE **NEW JERSEY**

Project No.	Date:	By:	Ckd:	Sheet. No.
101049802	10/17/2025	TEG	MJV	2 of 2

COUNTY CONVEYANCE SYSTEM DESIGN

SUPPORTING BASIN OUTFLOW HYDROGRAPH REPORTS

SSBB-1

PR-1A Routing

Hyd. No. 11

Hydrograph Type	= Pond Route	Peak Flow	= 2.246 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.28 hrs
Time Interval	= 1 min	Hydrograph Volume	= 19,163 cuft
Inflow Hydrograph	= 10 - PR-1A Total	Max. Elevation	= 535.71 ft
Pond Name	= SSBB-1	Max. Storage	= 8,419 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 1.63 hrs

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
10.53	0.026	10.95	0.136	11.37	0.344	11.78	0.703	12.20	2.136
10.55	0.029	10.97	0.144	11.38	0.355	11.80	0.725	12.22	2.185
10.57	0.033	10.98	0.151	11.40	0.366	11.82	0.747	12.23	2.218
10.58	0.037	11.00	0.158	11.42	0.377	11.83	0.774	12.25	2.235
10.60	0.040	11.02	0.166	11.43	0.388	11.85	0.794	12.27	2.244
10.62	0.044	11.03	0.173	11.45	0.399	11.87	0.816	**12.28**	**2.246**
10.63	0.048	11.05	0.181	11.47	0.410	11.88	0.839	12.30	2.245
10.65	0.052	11.07	0.188	11.48	0.421	11.90	0.862	12.32	2.238
10.67	0.055	11.08	0.196	11.50	0.432	11.92	0.887	12.33	2.226
10.68	0.059	11.10	0.204	11.52	0.443	11.93	0.918	12.35	2.207
10.70	0.063	11.12	0.211	11.53	0.456	11.95	0.953	12.37	2.182
10.72	0.067	11.13	0.219	11.55	0.471	11.97	0.990	12.38	2.154
10.73	0.071	11.15	0.227	11.57	0.487	11.98	1.029	12.40	2.125
10.75	0.075	11.17	0.235	11.58	0.503	12.00	1.067	12.42	2.096
10.77	0.079	11.18	0.243	11.60	0.519	12.02	1.106	12.43	2.066
10.78	0.083	11.20	0.251	11.62	0.536	12.03	1.153	12.45	2.036
10.80	0.087	11.22	0.259	11.63	0.552	12.05	1.206	12.47	2.005
10.82	0.091	11.23	0.267	11.65	0.567	12.07	1.263	12.48	1.976
10.83	0.095	11.25	0.276	11.67	0.581	12.08	1.371	12.50	1.947
10.85	0.099	11.27	0.284	11.68	0.596	12.10	1.498	12.52	1.918
10.87	0.103	11.28	0.292	11.70	0.610	12.12	1.670	12.53	1.887
10.88	0.107	11.30	0.301	11.72	0.624	12.13	1.807	12.55	1.854
10.90	0.114	11.32	0.311	11.73	0.641	12.15	1.921	12.57	1.820
10.92	0.121	11.33	0.321	11.75	0.661	12.17	2.007	12.58	1.792
10.93	0.129	11.35	0.333	11.77	0.682	12.18	2.076	12.60	1.764

Printed values > 1% of Qpeak. nth-point print interval = 1

SSBB-2

PR-2A Routing

Hyd. No. 46

Hydrograph Type	= Pond Route	Peak Flow	= 2.457 cfs
Storm Frequency	= 10-yr	Time to Peak	= 12.37 hrs
Time Interval	= 1 min	Hydrograph Volume	= 28,753 cuft
Inflow Hydrograph	= 45 - PR-2A	Max. Elevation	= 538.57 ft
Pond Name	= SSBB-2	Max. Storage	= 14,024 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.38 hrs

Hydrograph Discharge Table

Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)	Time (hrs)	Outflow (cfs)
10.13	0.025	10.55	0.074	10.97	0.177	11.38	0.355	11.80	0.633
10.15	0.027	10.57	0.076	10.98	0.182	11.40	0.364	11.82	0.646
10.17	0.029	10.58	0.078	11.00	0.187	11.42	0.373	11.83	0.661
10.18	0.031	10.60	0.080	11.02	0.192	11.43	0.383	11.85	0.678
10.20	0.033	10.62	0.084	11.03	0.197	11.45	0.392	11.87	0.696
10.22	0.035	10.63	0.088	11.05	0.203	11.47	0.402	11.88	0.713
10.23	0.037	10.65	0.092	11.07	0.208	11.48	0.411	11.90	0.729
10.25	0.039	10.67	0.096	11.08	0.214	11.50	0.421	11.92	0.747
10.27	0.041	10.68	0.100	11.10	0.219	11.52	0.429	11.93	0.769
10.28	0.042	10.70	0.104	11.12	0.225	11.53	0.439	11.95	0.794
10.30	0.044	10.72	0.108	11.13	0.231	11.55	0.449	11.97	0.816
10.32	0.046	10.73	0.113	11.15	0.239	11.57	0.460	11.98	0.839
10.33	0.048	10.75	0.117	11.17	0.247	11.58	0.472	12.00	0.863
10.35	0.050	10.77	0.122	11.18	0.254	11.60	0.483	12.02	0.888
10.37	0.052	10.78	0.126	11.20	0.262	11.62	0.495	12.03	0.915
10.38	0.054	10.80	0.130	11.22	0.270	11.63	0.507	12.05	0.948
10.40	0.056	10.82	0.135	11.23	0.278	11.65	0.520	12.07	0.982
10.42	0.058	10.83	0.139	11.25	0.286	11.67	0.532	12.08	1.017
10.43	0.060	10.85	0.144	11.27	0.295	11.68	0.545	12.10	1.138
10.45	0.062	10.87	0.149	11.28	0.303	11.70	0.557	12.12	1.306
10.47	0.064	10.88	0.153	11.30	0.311	11.72	0.570	12.13	1.487
10.48	0.066	10.90	0.158	11.32	0.320	11.73	0.584	12.15	1.665
10.50	0.068	10.92	0.163	11.33	0.328	11.75	0.595	12.17	1.802
10.52	0.070	10.93	0.168	11.35	0.337	11.77	0.607	12.18	1.913
10.53	0.072	10.95	0.173	11.37	0.346	11.78	0.620	12.20	2.021

Printed values > 1% of Qpeak. nth-point print interval = 1

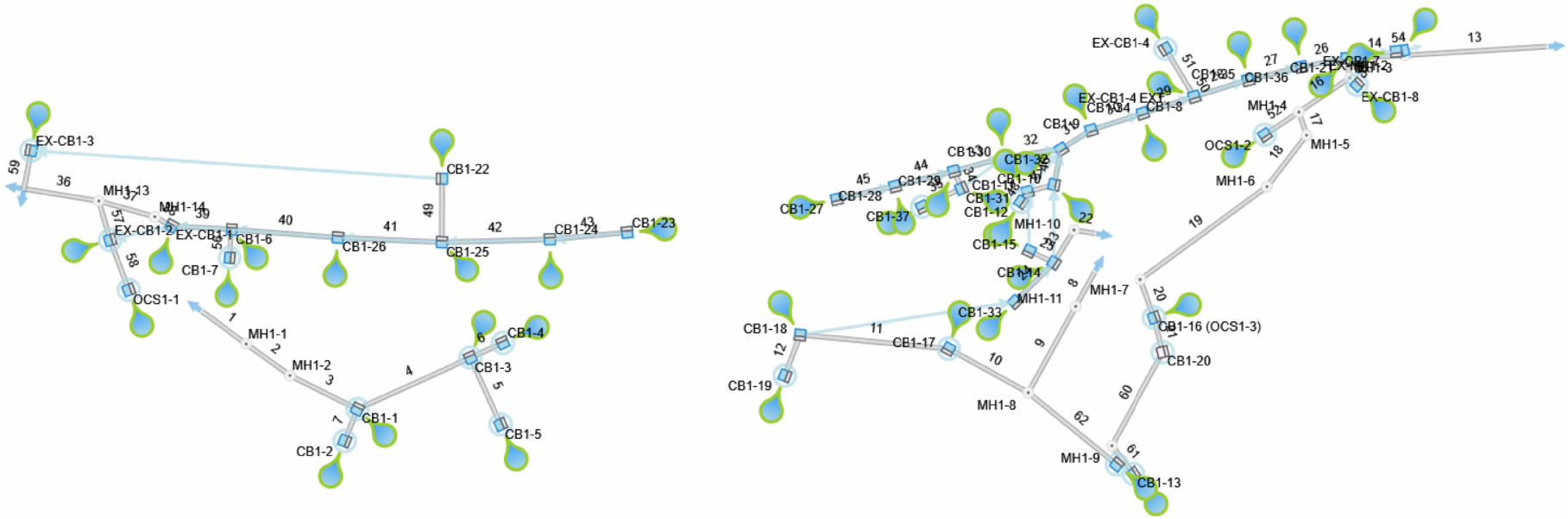
HYDRAULIC REPORTS
10-YEAR DESIGN STORM EVENT

Plan View

Stormwater Studio 2026 v 3.0.0.40

Project Name: NST0101

10-22-2025



Project File: NST0101 NJDOT 10-YR (NEW).sws

Inlet Report

Stormwater Studio 2026 v 3.0.0.40

Project Name: NST0101

10-22-2025

Line No	Inlet		Q				Curb		Grate			Gutter							Inlet			Byp Line No
	Id	Type	Catch (cfs)	Carry (cfs)	Capt (cfs)	Byp (cfs)	Ht (in)	L (ft)	L (ft)	W (ft)	Area (sqft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	MH1-1	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	MH1-2	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	CB1-1	Combination	0.38	0.00	0.38	0.00	4.0	3.70	4.00	2.00	0.18	Sag	2.00	0.050	0.020	0.013	0.14	4.00	0.14	4.00	0.0	0
4	CB1-3	Combination	0.18	0.00	0.18	0.00	4.0	3.70	4.00	2.00	0.08	Sag	2.00	0.050	0.020	0.013	0.13	3.50	0.13	3.50	0.0	0
5	CB1-5	Combination	0.70	0.00	0.70	0.00	4.0	3.70	4.00	2.00	0.33	Sag	2.00	0.050	0.020	0.013	0.15	4.50	0.15	4.50	0.0	0
6	CB1-4	Combination	0.71	0.00	0.71	0.00	4.0	3.70	4.00	2.00	0.34	Sag	2.00	0.050	0.020	0.013	0.15	4.50	0.15	4.50	0.0	0
7	CB1-2	Combination	0.51	0.00	0.51	0.00	4.0	3.70	4.00	2.00	0.25	Sag	2.00	0.050	0.020	0.013	0.15	4.50	0.15	4.50	0.0	0
8	MH1-11	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	MH1-8	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	CB1-17	Combination	0.93	0.00	0.93	0.00	4.0	3.70	4.00	2.00	0.45	Sag	2.00	0.050	0.020	0.013	0.16	5.00	0.16	5.00	0.0	0
11	CB1-18	Combination	0.29	0.00	0.29	0.00	4.0	3.70	4.00	2.00	-	0.040	2.00	0.045	0.045	0.013	0.09	1.96	0.09	1.96	0.0	24
12	CB1-19	Combination	1.80	0.00	1.80	0.00	4.0	3.70	4.00	2.00	0.87	Sag	2.00	0.050	0.020	0.013	0.23	8.50	0.23	8.50	0.0	0
13	EX-MH1-2	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	CB1-21	Combination	0.26	0.03	0.26	0.03	4.0	4.00	4.00	2.00	-	0.015	2.00	0.021	0.021	0.013	0.08	3.81	0.08	3.81	0.0	54
15	MH1-3	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	MH1-4	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	MH1-5	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	MH1-6	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	MH1-7	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	CB1-16 (OCS1-3)	Combination	0.24	0.00	0.24	0.00	4.0	3.70	4.00	2.00	0.30	Sag	2.00	0.050	0.020	0.013	0.10	2.00	0.10	2.00	0.0	0
21	CB1-20	Combination	0.00	0.00	0.00	0.00	4.0	3.70	4.00	2.00	0.71	Sag	2.00	0.050	0.020	0.013	0.00	0.00	0.00	0.00	0.0	0
22	MH1-10	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: Return Period = 10-yrs. All curb inlets are Horiz throat.,

Project File: NST0101 NJDOT 10-YR (NEW).sws

Inlet Report

Stormwater Studio 2026 v 3.0.0.40

Project Name: NST0101

10-22-2025

Line No	Inlet		Q				Curb		Grate			Gutter							Inlet			Byp Line No
	Id	Type	Catch (cfs)	Carry (cfs)	Capt (cfs)	Byp (cfs)	Ht (in)	L (ft)	L (ft)	W (ft)	Area (sqft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
23	CB1-14	Combination	0.17	0.34	0.43	0.08	4.0	3.70	4.00	2.00	-	0.064	2.00	0.020	0.020	0.013	0.07	3.70	0.07	3.70	0.0	46
24	CB1-33	Combination	1.16	0.00	0.81	0.34	4.0	3.70	4.00	2.00	-	0.070	2.00	0.020	0.020	0.013	0.10	4.95	0.10	4.95	0.0	23
25	CB1-15	Combination	0.47	0.00	0.41	0.06	4.0	3.70	4.00	2.00	-	0.096	2.00	0.020	0.020	0.013	0.07	3.30	0.07	3.30	0.0	47
26	CB1-36	Combination	0.24	0.03	0.24	0.03	4.0	3.70	4.00	2.00	-	0.012	2.00	0.020	0.020	0.013	0.08	4.00	0.08	4.00	0.0	14
27	CB1-35	Combination	0.25	0.04	0.25	0.03	4.0	3.70	4.00	2.00	-	0.012	2.00	0.021	0.021	0.013	0.08	3.95	0.08	3.95	0.0	26
28	CB1-8	Combination	0.26	0.04	0.27	0.04	4.0	3.70	4.00	2.00	-	0.015	2.00	0.020	0.020	0.013	0.08	4.00	0.08	4.00	0.0	27
29	CB1-34	Combination	0.30	0.04	0.29	0.04	4.0	3.70	4.00	2.00	-	0.014	2.00	0.022	0.022	0.013	0.09	3.95	0.09	3.95	0.0	28
30	CB1-9	Combination	0.21	0.10	0.27	0.04	4.0	3.70	4.00	2.00	-	0.013	2.00	0.021	0.021	0.013	0.08	4.00	0.08	4.00	0.0	29
31	CB1-32	Combination	0.37	0.09	0.36	0.10	4.0	3.70	4.00	2.00	-	0.010	2.00	0.016	0.016	0.013	0.09	5.81	0.09	5.81	0.0	30
32	CB1-30	Combination	0.27	0.07	0.31	0.03	4.0	3.70	4.00	2.00	-	0.010	2.00	0.025	0.025	0.013	0.10	3.92	0.10	3.92	0.0	31
33	CB1-29	Combination	0.27	0.03	0.27	0.03	4.0	3.70	4.00	2.00	-	0.007	2.00	0.025	0.025	0.013	0.10	3.96	0.10	3.96	0.0	32
34	CB1-31	Grate	0.22	0.00	0.18	0.05	-	-	4.00	2.00	-	0.050	2.00	0.010	0.010	0.013	0.04	4.40	0.04	4.40	0.0	32
35	CB1-37	Grate	0.49	0.00	0.49	0.00	-	-	4.00	2.00	0.23	Sag	2.00	0.050	0.020	0.013	0.20	7.01	0.20	7.01	0.0	0
36	MH1-13	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	MH1-14	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	EX-CB1-1	Combination	0.24	0.06	0.28	0.02	4.0	3.70	4.00	2.00	-	0.028	2.00	0.025	0.025	0.013	0.08	3.08	0.08	3.08	0.0	57
39	CB1-6	Combination	0.33	0.07	0.34	0.06	4.0	3.70	4.00	2.00	-	0.027	2.00	0.020	0.020	0.013	0.08	3.95	0.08	3.95	0.0	38
40	CB1-26	Combination	0.38	0.05	0.35	0.07	4.0	3.70	4.00	2.00	-	0.027	2.00	0.020	0.020	0.013	0.08	4.05	0.08	4.05	0.0	39
41	CB1-25	Combination	0.30	0.04	0.29	0.05	4.0	3.70	4.00	2.00	-	0.020	2.00	0.020	0.020	0.013	0.08	3.95	0.08	3.95	0.0	40
42	CB1-24	Combination	0.26	0.06	0.28	0.04	4.0	3.70	4.00	2.00	-	0.017	2.00	0.020	0.020	0.013	0.08	3.95	0.08	3.95	0.0	41
43	CB1-23	Combination	0.46	0.00	0.40	0.06	4.0	3.70	4.00	2.00	-	0.018	2.00	0.025	0.025	0.013	0.10	3.92	0.10	3.92	0.0	42
44	CB1-28	Combination	0.26	0.04	0.27	0.03	4.0	3.70	4.00	2.00	-	0.007	2.00	0.025	0.025	0.013	0.10	3.96	0.10	3.96	0.0	33

Notes: Return Period = 10-yrs. All curb inlets are Horiz throat.,

Project File: NST0101 NJDOT 10-YR (NEW).sws

Inlet Report

Project Name: NST0101

Stormwater Studio 2026 v 3.0.0.40

10-22-2025

Line No	Inlet		Q				Curb		Grate			Gutter							Inlet			Byp Line No
	Id	Type	Catch (cfs)	Carry (cfs)	Capt (cfs)	Byp (cfs)	Ht (in)	L (ft)	L (ft)	W (ft)	Area (sqft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
45	CB1-27	Combination	0.39	0.00	0.35	0.04	4.0	3.70	4.00	2.00	-	0.010	2.00	0.026	0.026	0.013	0.10	4.00	0.10	4.00	0.0	44
46	CB1-10	Combination	0.18	0.08	0.22	0.04	4.0	3.70	4.00	2.00	-	0.020	2.00	0.015	0.015	0.013	0.06	4.27	0.06	4.27	0.0	31
47	CB1-11	Combination	0.10	0.06	0.14	0.02	4.0	3.70	4.00	2.00	-	0.020	2.00	0.015	0.015	0.013	0.05	3.53	0.05	3.53	0.0	31
48	CB1-12	Grate	0.30	0.00	0.30	0.00	-	-	4.00	2.00	0.15	Sag	2.00	0.050	0.020	0.013	0.20	7.01	0.20	7.01	0.0	0
49	CB1-22	Combination	0.90	0.00	0.79	0.11	4.0	3.70	4.00	2.00	-	0.025	2.00	0.039	0.039	0.013	0.14	3.59	0.14	3.59	0.0	59
50	EX-CB1-4 EXT.	None	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	EX-CB1-4	Combination	0.19	0.00	0.19	0.00	4.0	3.70	4.00	2.00	0.09	Sag	2.00	0.050	0.020	0.013	0.14	4.00	0.14	4.00	0.0	0
52	OCS1-2	Grate	1.14	0.00	1.14	0.00	-	-	4.00	2.00	1.42	Sag	2.00	0.050	0.020	0.013	0.18	6.04	0.18	6.04	0.0	0
53	EX-CB1-6	Combination	0.13	0.01	0.13	0.01	4.0	3.70	4.00	2.00	-	0.009	1.00	0.020	0.020	0.013	0.07	3.35	0.07	3.35	0.0	0
54	EX-CB1-7	Combination	0.16	0.03	0.18	0.01	4.0	3.70	4.00	2.00	-	0.010	2.00	0.021	0.021	0.013	0.07	3.52	0.07	3.52	0.0	53
55	EX-CB1-8	Grate	0.64	0.00	0.64	0.00	-	-	4.00	4.00	2.00	Sag	2.00	0.050	0.020	0.013	0.17	5.42	0.17	5.42	0.0	0
56	CB1-7	Grate	7.76	0.00	7.76	0.00	-	-	4.00	4.00	2.00	Sag	2.00	0.050	0.020	0.013	0.62	28.04	0.62	28.04	0.0	0
57	EX-CB1-2	Combination	4.82	0.02	4.85	0.00	4.0	3.70	4.00	2.00	2.32	Sag	2.00	0.041	0.041	0.013	0.39	9.54	0.39	9.54	0.0	0
58	OCS1-1	Grate	1.50	0.00	1.50	0.00	-	-	4.00	2.00	1.16	Sag	2.00	0.050	0.020	0.013	0.21	7.36	0.21	7.36	0.0	0
59	EX-CB1-3	Combination	1.35	0.11	1.46	0.00	4.0	3.70	4.00	2.00	0.65	Sag	2.00	0.050	0.020	0.013	0.20	7.00	0.20	7.00	0.0	0
60	MH1-9	Manhole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
61	CB1-13	Combination	2.95	0.00	2.95	0.00	4.0	3.70	3.77	2.00	2.00	Sag	2.00	0.020	0.020	0.013	0.28	14.00	0.28	14.00	0.0	60
62		Combination	1.67	0.00	1.67	0.00	4.0	3.70	3.70	2.00	2.00	Sag	2.00	0.020	0.020	0.013	0.20	10.00	0.20	10.00	0.0	9

Notes: Return Period = 10-yrs. All curb inlets are Horiz throat.,

Project File: NST0101 NJDOT 10-YR (NEW).sws

EXISTING CONDITIONS WEIGHTED RUNOFF COEFFICIENT CALCULATIONS

DRAINAGE SUBAREA RUNOFF COEFFICIENT CALCULATIONS
EXISTING CONDITIONS STORMWATER CONVEYANCE
CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS
LANGAN PROJECT #10104802

PROPOSED CONVEYANCE SYSTEM

SUB-DRAINAGE AREA	OPEN SPACE HSGC C C = 0.51 (SF)	OPEN SPACE HSGC D C = 0.65 (SF)	WOODS HSGC C C = 0.45 (SF)	WOODS HSGC D C = 0.59 (SF)	GRAVEL HSGC C C = 0.84 (SF)	IMPERVIOUS AREA C = 0.99 (SF)	TOTAL AREA (SF)	TOTAL AREA (AC)	RUNOFF COEFFICIENT C (Weighted)	STRUCTURE TYPE
NETWORK 1										
EX-CB1-2	46,220	16,005	2,062	2,630	0	21,788	88,705	2.04	0.65	GRATE INLET
EX-CB1-3	0	0	0		0	17,450	17,450	0.40	0.99	GRATE 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.

EXISTING CONDITIONS INLET SPREAD CALCULATIONS

Existing Conditions Inlet Gutter Spread of Flow Calculations

PROJECT NAME: CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE **LANGAN PROJECT #:** 101049802 **DATE:** 8/25/2025

Variables

Sx1 = Roadway Cross-Slope (ft/ft)
Sx2 = Proposed Access Slope (ft/ft)
Sl = Longitudinal Slope (ft/ft)
N = Roughness Coefficient
I= Rainfall intensity of 10-year storm of 10 minute duration(in/hr)
T = Flow Width
Ku = constant 0.56
Q = Flow (cfs)

Equations

Sx = (Sx1*Sx2)/(Sx1+Sx2)
T = [(Q*N)/(Ku*Sx^(1.67)*Sl^(0.5)]^0.375
Encroachment = T*(Sx2/(Sx1*Sx2))

Drainage Area	Area (acres)	C	Equivalent Area	I	Q	Q Bypass	Total Q	N	Sx1	Sx2	Sl	Sx	T	Shoulder Width	Travel Lane Width	Max. Encroachment	Acceptable?
EX-CB1-2	2.04	0.65	1.332	5.04	6.71	0.00	6.71	0.013	0.041	1.000	0.020	0.039	7.86	0.0	12.0	4.00	NO
EX-CB1-3	0.40	0.99	0.397	5.04	2.00	0.00	2.00	0.013	0.034	1.000	0.025	0.033	5.36	0.0	12.0	4.00	NO

Notes: 1. Per Table 10.5-C in the NJDOT Roadway Design Manual, the maximum encroachment of water on the roadway pavement for a land service road shall not exceed one-third (1/3) of the width of a through traffic lane during a 10-year storm of 10 minute duration.

2. Sx2 for the gutter spread calculations is valued at 1 to reflect curbed sections.

3. Q ByPass represents the bypass flow from the nearest upstream structure(s) during the 10-year storm. Refer to Stormwater Studio report for bypass flow calculations.

PROPOSED CONDITIONS INLET SPREAD CALCULATIONS

Proposed Conditions Inlet Gutter Spread of Flow Calculations

PROJECT NAME: CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE **LANGAN PROJECT #:** 101049802 **DATE:** 10/23/2025

Variables

Sx1 = Roadway Cross-Slope (ft/ft)
Sx2 = Proposed Access Slope (ft/ft)
Sl = Longitudinal Slope (ft/ft)
N = Roughness Coefficient
I= Rainfall intensity of 10-year storm of 10 minute duration(in/hr)
T = Flow Width
Ku = constant 0.56
Q = Flow (cfs)

Equations

Sx = (Sx1*Sx2)/(Sx1+Sx2)
T = [(Q*N)/(Ku*Sx^(1.67)*Sl^(0.5)]^0.375
Encroachment = T*(Sx2/(Sx1*Sx2))

Drainage Area	Area (acres)	C	Equivalent Area	I	Q	Q Bypass	Total Q	N	Sx1	Sx2	Sl	Sx	T	Shoulder Width	Travel Lane Width	Max. Encroachment	Acceptable?
EX-CB1-1	0.06	0.83	0.047	5.04	0.24	0.06	0.30	0.013	0.025	1.000	0.028	0.024	3.10	0.0	12.0	4.00	YES
EX-CB1-2	1.37	0.70	0.953	5.04	4.80	0.02	4.82	0.013	0.041	1.000	0.020	0.039	6.94	0.0	12.0	4.00	NO[4]
EX-CB1-3	0.27	0.99	0.269	5.04	1.35	0.11	1.46	0.013	0.034	1.000	0.025	0.033	4.77	0.0	12.0	4.00	NO[4]
EX-CB1-4	0.04	0.99	0.038	5.04	0.19	0.00	0.19	0.013	0.023	1.000	0.012	0.022	3.25	0.0	11.0	3.67	YES
EX-CB1-5	0.24	0.60	0.142	5.04	0.72	0.01	0.72	0.013	0.037	1.000	0.030	0.036	3.33	0.0	10.0	3.33	YES
EX-CB1-6	0.051	0.50	0.026	5.04	0.13	0.01	0.14	0.013	0.020	1.000	0.009	0.020	3.26	0.0	10.3	3.43	YES
EX-CB1-7	0.041	0.77	0.032	5.04	0.16	0.03	0.19	0.013	0.021	1.000	0.010	0.021	3.47	0.0	10.4	3.47	YES
CB1-6	0.08	0.86	0.066	5.04	0.33	0.07	0.40	0.013	0.020	1.000	0.027	0.020	4.00	0.0	12.0	4.00	YES
CB1-8	0.064	0.82	0.052	5.04	0.26	0.04	0.30	0.013	0.020	1.000	0.015	0.020	3.98	0.0	12.0	4.00	YES
CB1-9	0.045	0.91	0.041	5.04	0.21	0.10	0.31	0.013	0.021	1.000	0.013	0.021	3.99	0.0	12.0	4.00	YES
CB1-21	0.067	0.78	0.052	5.04	0.26	0.03	0.29	0.013	0.021	1.000	0.015	0.021	3.80	0.0	11.5	3.83	YES
CB1-22	0.18	0.99	0.179	5.04	0.90	0.00	0.90	0.013	0.039	1.000	0.025	0.038	3.66	0.0	11.0	3.67	YES
CB1-23	0.10	0.88	0.091	5.04	0.46	0.00	0.46	0.013	0.025	1.000	0.018	0.024	3.95	0.0	12.0	4.00	YES
CB1-24	0.06	0.86	0.051	5.04	0.26	0.06	0.32	0.013	0.020	1.000	0.017	0.020	3.99	0.0	12.0	4.00	YES
CB1-25	0.07	0.86	0.059	5.04	0.30	0.04	0.34	0.013	0.020	1.000	0.020	0.020	3.97	0.0	12.0	4.00	YES
CB1-26	0.09	0.86	0.074	5.04	0.38	0.05	0.43	0.013	0.021	1.000	0.027	0.021	3.97	0.0	12.0	4.00	YES
CB1-27	0.09	0.91	0.077	5.04	0.39	0.00	0.39	0.013	0.026	1.000	0.010	0.026	3.98	0.0	12.0	4.00	YES
CB1-28	0.06	0.90	0.051	5.04	0.26	0.04	0.30	0.013	0.025	1.000	0.007	0.025	3.99	0.0	12.0	4.00	YES
CB1-29	0.06	0.90	0.054	5.04	0.27	0.03	0.30	0.013	0.025	1.000	0.007	0.025	3.99	0.0	12.0	4.00	YES
CB1-30	0.060	0.89	0.053	5.04	0.27	0.07	0.34	0.013	0.025	1.000	0.010	0.024	3.94	0.0	12.0	4.00	YES
CB1-32	0.087	0.85	0.075	5.04	0.38	0.09	0.47	0.013	0.016	1.000	0.010	0.016	5.84	0.0	18.0	6.00	YES
CB1-34	0.069	0.85	0.059	5.04	0.30	0.04	0.34	0.013	0.022	1.000	0.014	0.022	3.99	0.0	12.0	4.00	YES
CB1-35	0.060	0.82	0.049	5.04	0.25	0.04	0.29	0.013	0.021	1.000	0.012	0.021	3.98	0.0	12.0	4.00	YES
CB1-36	0.060	0.80	0.048	5.04	0.24	0.03	0.27	0.013	0.020	1.000	0.012	0.020	3.98	0.0	12.0	4.00	YES

Notes: 1. Per Table 10.5-C in the NJDOT Roadway Design Manual, the maximum encroachment of water on the roadway pavement for a land service road shall not exceed one-third (1/3) of the width of a through traffic lane during a 10-year storm of 10 minute duration.

2. Sx2 for the gutter spread calculations is valued at 1 to reflect curbed sections.

3. Q ByPass represents the bypass flow from the nearest upstream structure(s) during the 10-year storm. Refer to Stormwater Studio report for bypass flow calculations.

4. As shown in the Existing Conditions Inlet Gutter Spread Flow Calculations, inlets EX-CB1-2 and EXCB1-3 exceed the maximum allowable encroachment in the existing condition. These existing inlets are located at the far western portion of the project area where no proposed grading improvements are to take place. The proposed project conveyance design reduces the drainage area contributing to both of these two inlets, therefore reducing the spread compared to the existing condition.

DRAINAGE SWALE CALCULATIONS

SWALE 1

Channel Design Calculations

PROJECT NAME: CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS
LOCATION: WEST ORANGE, ESSEX COUNTY, NJ
PREPARED BY: TEG DATE: 7/17/2025
CHECKED BY: MJV DATE: 7/17/2025

CHANNEL OR CHANNEL SECTION		Swale 1 (Min. Slope)	Swale 1 (Min. Slope)	Swale 1 (Max. Slope)	Swale 1 (Max. Slope)
TEMPORARY OR PERMANENT	(T OR P)	P	P	P	P
DESIGN STORM	(YR)	10	25	10	25
DRAINAGE AREA	(AC)	2.44	2.44	2.44	2.44
Q_r (REQUIRED CAPACITY)	(CFS)	7.97	9.02	7.97	9.02
Q (CALCULATED AT FLOW DEPTH d)	(CFS)	8.06	9.06	8.01	9.16
PROTECTIVE LINING		Eronet P300	Eronet P300	Eronet P300	Eronet P300
n (MANNING'S COEFFICIENT)		0.030	0.030	0.030	0.030
V_a (ALLOWABLE VELOCITY)	(FPS)	7.00	7.00	7.00	7.00
V (CALCULATED AT FLOW DEPTH d)	(FPS)	2.87	2.96	3.69	3.83
τ_a (MAX ALLOWABLE SHEAR STRESS)	(LB/FT^2)	8.00	8.00	8.00	8.00
τ_d (CALC'DSHEAR STRESS AT FLOW DEPTH d)	(LB/FT^2)	0.43	0.46	0.72	0.77
CHANNEL BOTTOM WIDTH	(FT)	2.00	2.00	2.00	2.00
CHANNEL SIDE SLOPES	(H:V)	3.00	3.00	3.00	3.00
D (TOTAL DEPTH)	(FT)	2.00	2.00	2.00	2.00
CHANNEL TOP WIDTH @ D	(FT)	14.00	14.00	14.00	14.00
d (CALCULATED FLOW DEPTH)	(FT)	0.69	0.73	0.58	0.62
CHANNEL TOP WIDTH @ d	(FT)	6.14	6.38	5.48	5.72
d_{50} STONE SIZE	(IN)	-	-	-	-
A (CROSS-SECTIONAL AREA)	(SQ. FT.)	2.81	3.06	2.17	2.39
R (HYDRAULIC RADIUS)		0.44	0.46	0.38	0.40
S (BED SLOPE)	(FT/FT)	0.0100	0.0100	0.0200	0.0200
MINIMUM REQUIRED FREEBOARD	(FT)	1.00	0.30	1.00	0.30
DESIGN METHOD FOR PROTECTIVE LINING VELOCITY (V) OR SHEAR STRESS (S)	PERMISSIBLE	V	V	V	V

Hydrograph Report

Project Name: New Project

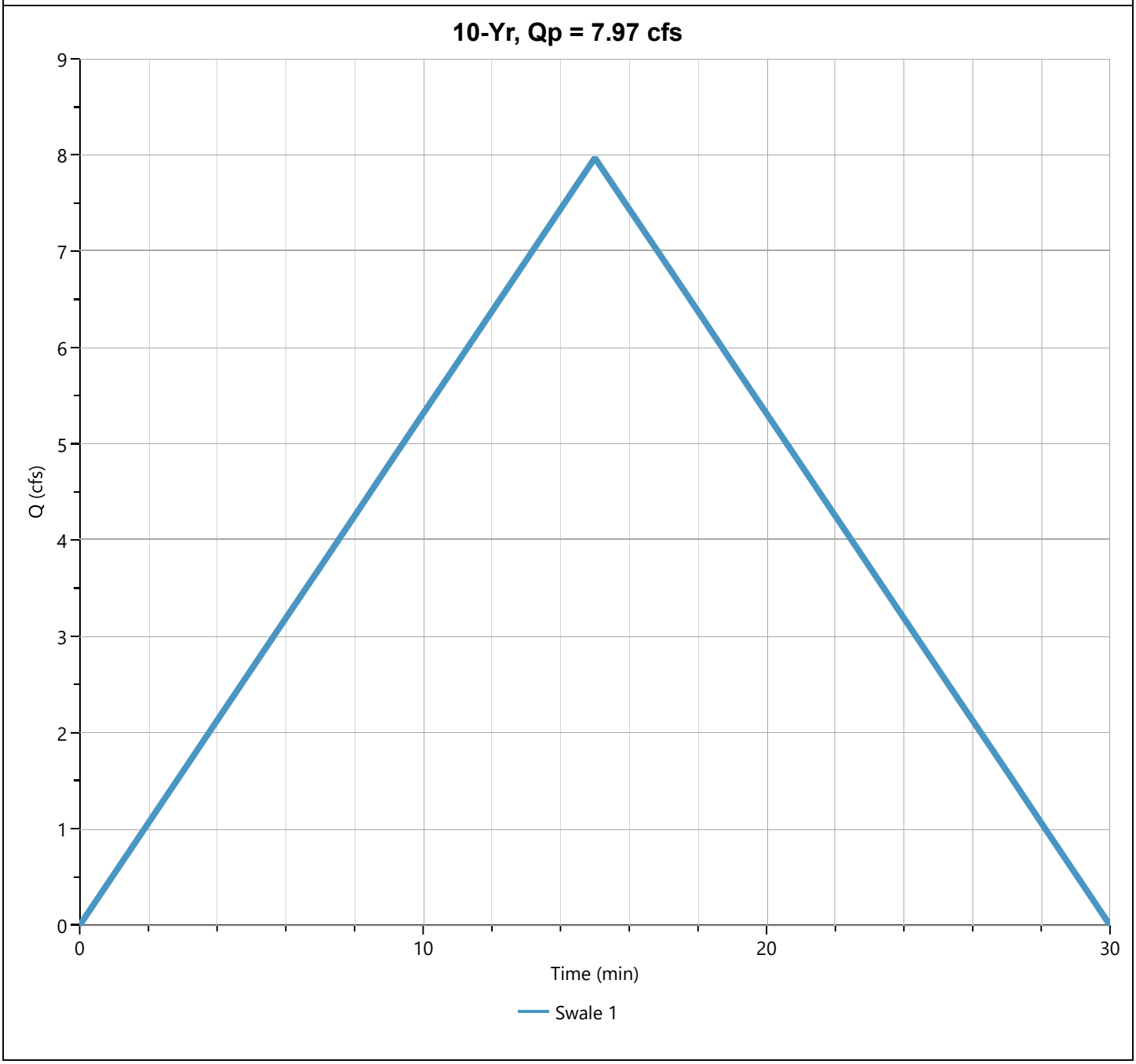
Studio Express by Hydrology Studio v 1.0.0.20

10-22-2025

Swale 1

Hyd. No. 1

Hydrograph Type	= Rational	Peak Flow	= 7.970 cfs
Storm Frequency	= 10-yr	Time to Peak	= 15 min
Time Interval	= 1 min	Runoff Volume	= 7,173 cft
Drainage Area	= 2.44 ac	Runoff Coeff.	= 0.75
Tc Method	= User-Defined	Time of Conc. (Tc)	= 15.0 min
IDF Curve	= West Orange Rainfall.idf	Intensity	= 4.355 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1



Channel Report

Project filename: Swale Sizing Calcs.stx

Studio Express by Hydrology Studio v 1.0.0.20

10-22-2025

Swale 1 10-YR (1%)

Channel 1

TRAPEZOIDAL

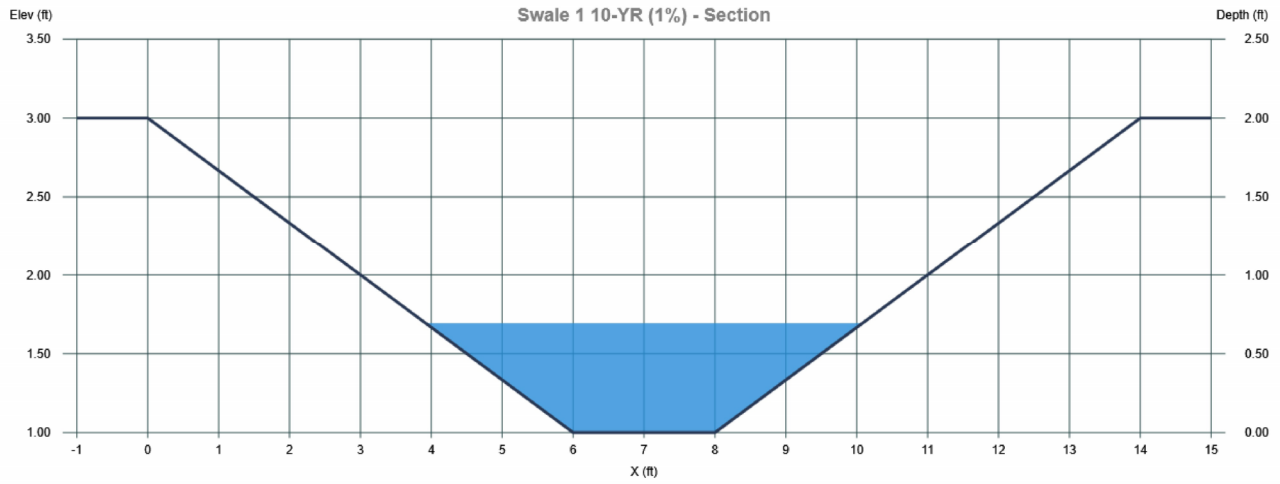
Bottom Width	= 2.00 ft
Side Slope Left, z:1	= 3.00
Side Slope Right, z:1	= 3.00
Total Depth	= 2.00 ft
Invert Elevation	= 1.00 ft
Channel Slope	= 1.000 %
Manning's n	= 0.030

DISCHARGE

Method	= Known Q
Known Q	= 7.97 cfs

CALCULATION SAMPLE

Flow	Depth	Area	Velocity	WP	n-value	Crit Depth	HGL	EGL	Max Shear	Top Width
(cfs)	(ft)	(sqft)	(ft/s)	(ft)		(ft)	(ft)	(ft)	(lb/sqft)	(ft)
7.97	0.69	2.81	2.84	6.36	0.030	0.59	1.69	1.82	0.43	6.14



Channel Report

Project filename: Swale Sizing Calcs.stx

Studio Express by Hydrology Studio v 1.0.0.20

10-22-2025

Swale 1 10-YR (2%)

Channel 5

TRAPEZOIDAL

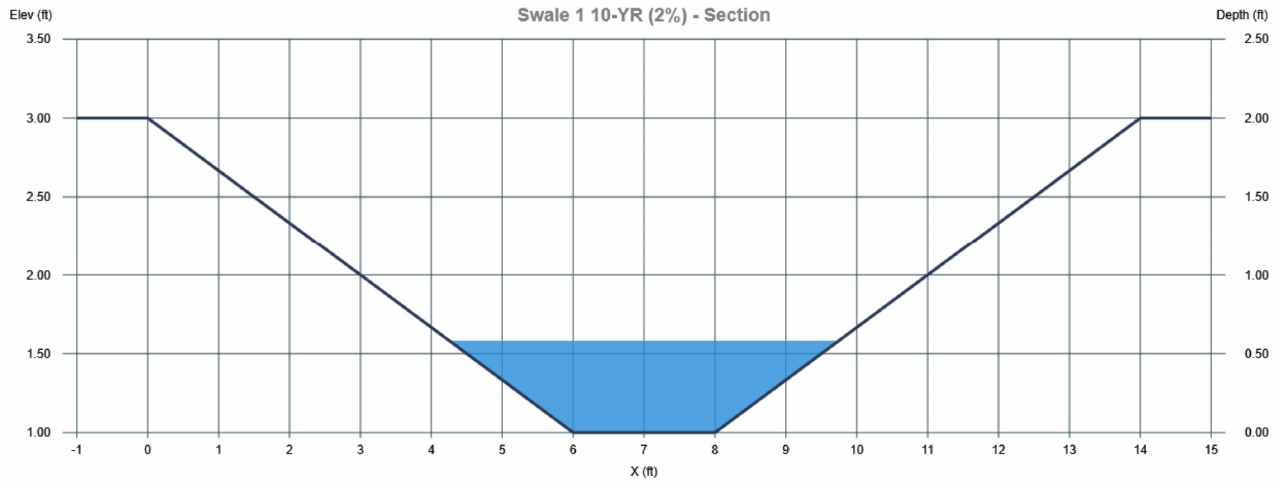
Bottom Width	= 2.00 ft
Side Slope Left, z:1	= 3.00
Side Slope Right, z:1	= 3.00
Total Depth	= 2.00 ft
Invert Elevation	= 1.00 ft
Channel Slope	= 2.000 %
Manning's n	= 0.030

DISCHARGE

Method	= Known Q
Known Q	= 7.97 cfs

CALCULATION SAMPLE

Flow	Depth	Area	Velocity	WP	n-value	Crit Depth	HGL	EGL	Max Shear	Top Width
(cfs)	(ft)	(sqft)	(ft/s)	(ft)		(ft)	(ft)	(ft)	(lb/sqft)	(ft)
7.97	0.58	2.17	3.67	5.67	0.030	0.59	1.58	1.79	0.72	5.48



Hydrograph Report

Project Name: New Project

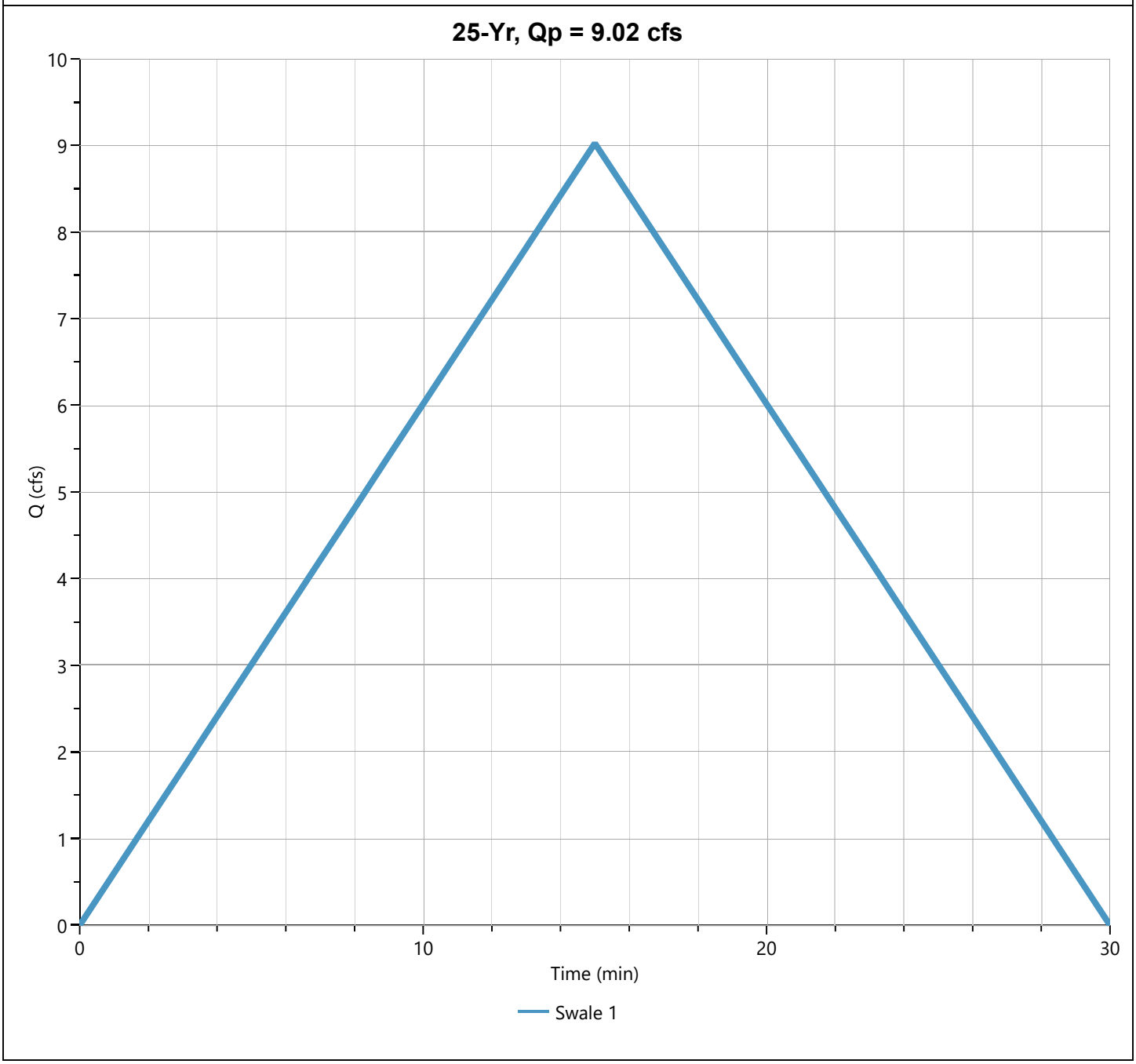
Studio Express by Hydrology Studio v 1.0.0.20

10-22-2025

Swale 1

Hyd. No. 1

Hydrograph Type	= Rational	Peak Flow	= 9.024 cfs
Storm Frequency	= 25-yr	Time to Peak	= 15 min
Time Interval	= 1 min	Runoff Volume	= 8,121 cft
Drainage Area	= 2.44 ac	Runoff Coeff.	= 0.75
Tc Method	= User-Defined	Time of Conc. (Tc)	= 15.0 min
IDF Curve	= West Orange Rainfall.idf	Intensity	= 4.931 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1



Channel Report

Project filename: Swale Sizing Calcs.stx

Studio Express by Hydrology Studio v 1.0.0.20

10-22-2025

Swale 1 25-YR (1%)

Channel 3

TRAPEZOIDAL

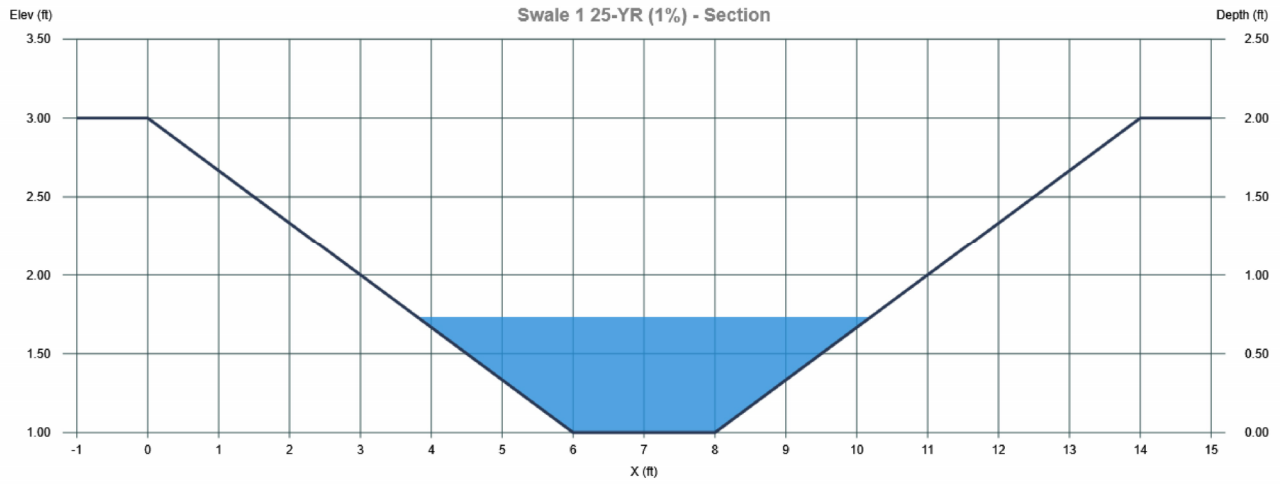
Bottom Width	= 2.00 ft
Side Slope Left, z:1	= 3.00
Side Slope Right, z:1	= 3.00
Total Depth	= 2.00 ft
Invert Elevation	= 1.00 ft
Channel Slope	= 1.000 %
Manning's n	= 0.030

DISCHARGE

Method	= Known Q
Known Q	= 9.02 cfs

CALCULATION SAMPLE

Flow	Depth	Area	Velocity	WP	n-value	Crit Depth	HGL	EGL	Max Shear	Top Width
(cfs)	(ft)	(sqft)	(ft/s)	(ft)		(ft)	(ft)	(ft)	(lb/sqft)	(ft)
9.02	0.73	3.06	2.95	6.62	0.030	0.63	1.73	1.87	0.46	6.38



Channel Report

Project filename: Swale Sizing Calcs.stx

Studio Express by Hydrology Studio v 1.0.0.20

10-22-2025

Swale 1 25-YR (2%)

Channel 6

TRAPEZOIDAL

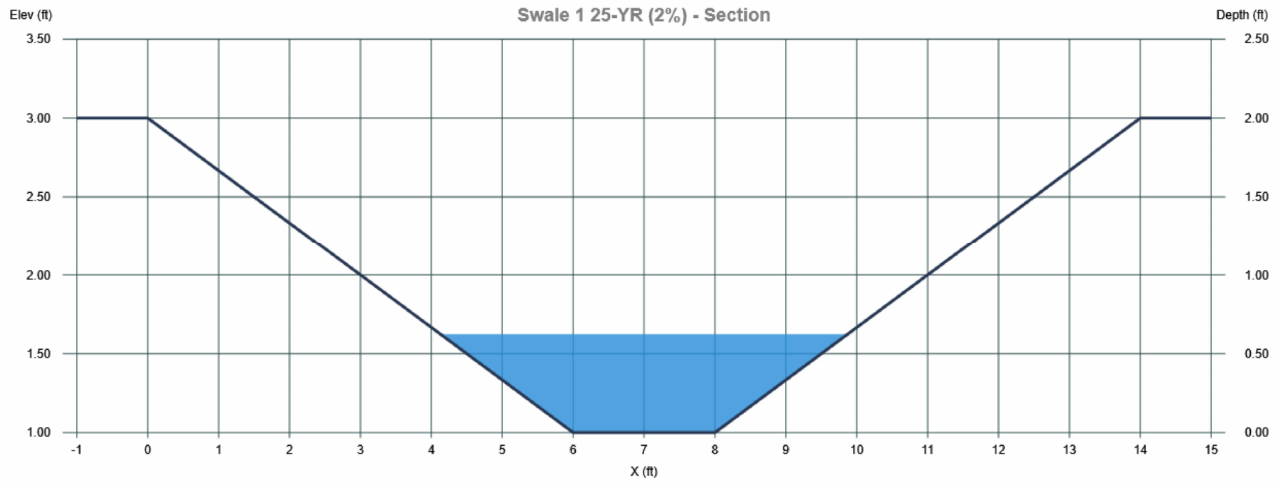
Bottom Width	= 2.00 ft
Side Slope Left, z:1	= 3.00
Side Slope Right, z:1	= 3.00
Total Depth	= 2.00 ft
Invert Elevation	= 1.00 ft
Channel Slope	= 2.000 %
Manning's n	= 0.030

DISCHARGE

Method	= Known Q
Known Q	= 9.02 cfs

CALCULATION SAMPLE

Flow	Depth	Area	Velocity	WP	n-value	Crit Depth	HGL	EGL	Max Shear	Top Width
(cfs)	(ft)	(sqft)	(ft/s)	(ft)		(ft)	(ft)	(ft)	(lb/sqft)	(ft)
9.02	0.62	2.39	3.77	5.92	0.030	0.63	1.62	1.84	0.77	5.72



SWALE 2

Channel Design Calculations

PROJECT NAME:	CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS		
LOCATION:	WEST ORANGE, ESSEX COUNTY, NJ		
PREPARED BY:	TEG	DATE:	7/17/2025
CHECKED BY:	MJV	DATE:	7/17/2025

CHANNEL OR CHANNEL SECTION		Swale 2	Swale 2	
TEMPORARY OR PERMANENT	(T OR P)	P	P	
DESIGN STORM	(YR)	10	25	
DRAINAGE AREA	(AC)	0.17	0.17	
Q_r (REQUIRED CAPACITY)	(CFS)	0.51	0.57	
Q (CALCULATED AT FLOW DEPTH d)	(CFS)	0.57	0.63	
PROTECTIVE LINING		Eronet P300	Eronet P300	
n (MANNING'S COEFFICIENT)		0.030	0.030	
V_a (ALLOWABLE VELOCITY)	(FPS)	7.00	7.00	
V (CALCULATED AT FLOW DEPTH d)	(FPS)	1.33	1.37	
τ_a (MAX ALLOWABLE SHEAR STRESS)	(LB/FT^2)	8.00	8.00	
τ_d (CALC'DSHEAR STRESS AT FLOW DEPTH d)	(LB/FT^2)	0.11	0.11	
CHANNEL BOTTOM WIDTH	(FT)	2.00	2.00	
CHANNEL SIDE SLOPES	(H:V)	3.00	3.00	
D (TOTAL DEPTH)	(FT)	1.50	1.50	
CHANNEL TOP WIDTH @ D	(FT)	11.00	11.00	
d (CALCULATED FLOW DEPTH)	(FT)	0.17	0.18	
CHANNEL TOP WIDTH @ d	(FT)	3.02	3.08	
d_{50} STONE SIZE	(IN)	-	-	
A (CROSS-SECTIONAL AREA)	(SQ. FT.)	0.43	0.46	
R (HYDRAULIC RADIUS)		0.14	0.15	
S (BED SLOPE)	(FT/FT)	0.0100	0.0100	
MINIMUM REQUIRED FREEBOARD	(FT)	1.00	0.30	
DESIGN METHOD FOR PROTECTIVE LINING VELOCITY (V) OR SHEAR STRESS (S)	PERMISSIBLE	V	V	

Hydrograph Report

Project Name: New Project

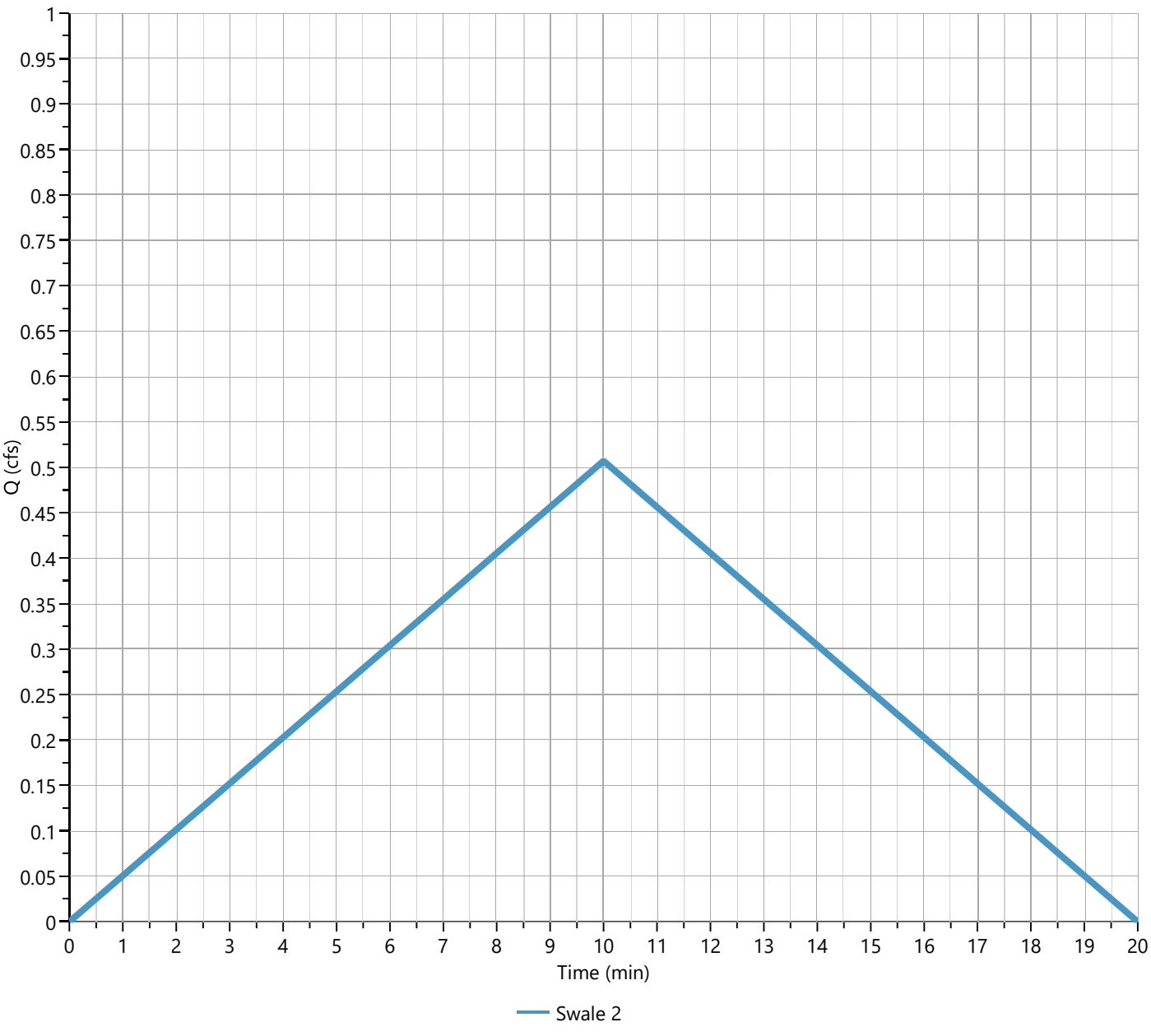
Studio Express by Hydrology Studio v 1.0.0.20

10-22-2025

Swale 2

Hyd. No. 2

Hydrograph Type	= Rational	Peak Flow	= 0.507 cfs
Storm Frequency	= 10-yr	Time to Peak	= 10 min
Time Interval	= 1 min	Runoff Volume	= 304 cft
Drainage Area	= 0.17 ac	Runoff Coeff.	= 0.58
Tc Method	= User-Defined	Time of Conc. (Tc)	= 10.0 min
IDF Curve	= West Orange Rainfall.idf	Intensity	= 5.142 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1



Channel Report

Project filename: Swale Sizing Calcs.stx

Studio Express by Hydrology Studio v 1.0.0.20

10-22-2025

Swale 2 10-YR

Channel 2

TRAPEZOIDAL

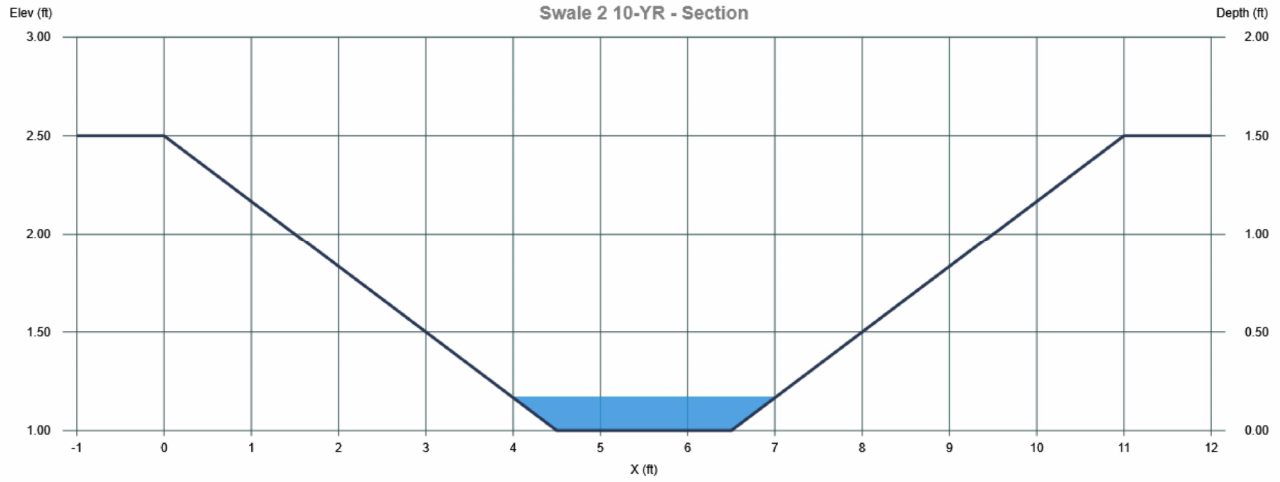
Bottom Width	= 2.00 ft
Side Slope Left, z:1	= 3.00
Side Slope Right, z:1	= 3.00
Total Depth	= 1.50 ft
Invert Elevation	= 1.00 ft
Channel Slope	= 1.000 %
Manning's n	= 0.030

DISCHARGE

Method	= Known Q
Known Q	= 0.51 cfs

CALCULATION SAMPLE

Flow	Depth	Area	Velocity	WP	n-value	Crit Depth	HGL	EGL	Max Shear	Top Width
(cfs)	(ft)	(sqft)	(ft/s)	(ft)		(ft)	(ft)	(ft)	(lb/sqft)	(ft)
0.51	0.17	0.43	1.20	3.08	0.030	0.12	1.17	1.19	0.11	3.02



Hydrograph Report

Project Name: New Project

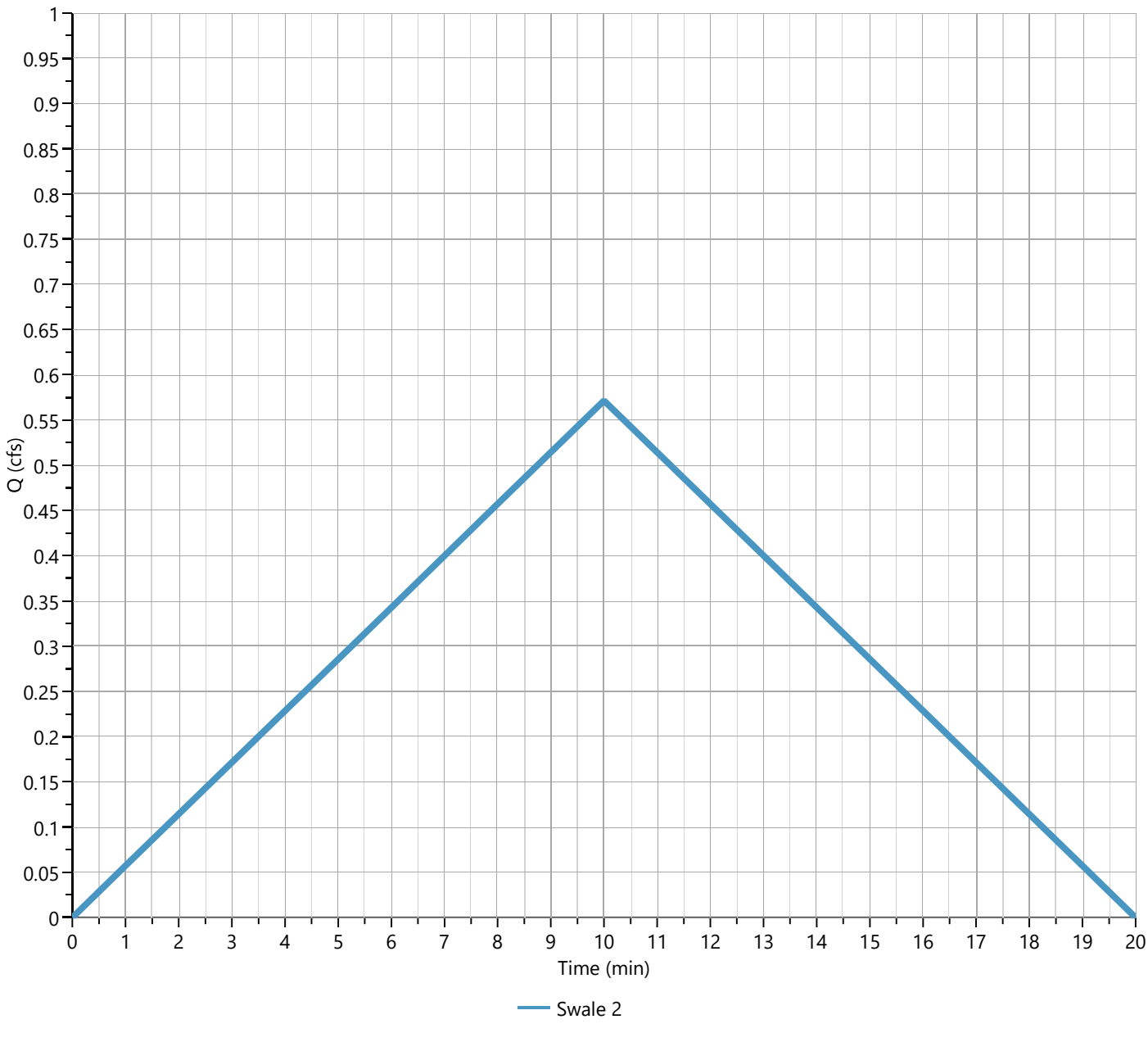
Studio Express by Hydrology Studio v 1.0.0.20

10-22-2025

Swale 2

Hyd. No. 2

Hydrograph Type	= Rational	Peak Flow	= 0.571 cfs
Storm Frequency	= 25-yr	Time to Peak	= 10 min
Time Interval	= 1 min	Runoff Volume	= 343 cft
Drainage Area	= 0.17 ac	Runoff Coeff.	= 0.58
Tc Method	= User-Defined	Time of Conc. (Tc)	= 10.0 min
IDF Curve	= West Orange Rainfall.idf	Intensity	= 5.795 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1



Channel Report

Project filename: Swale Sizing Calcs.stx

Studio Express by Hydrology Studio v 1.0.0.20

10-22-2025

Swale 2 25-YR

Channel 4

TRAPEZOIDAL

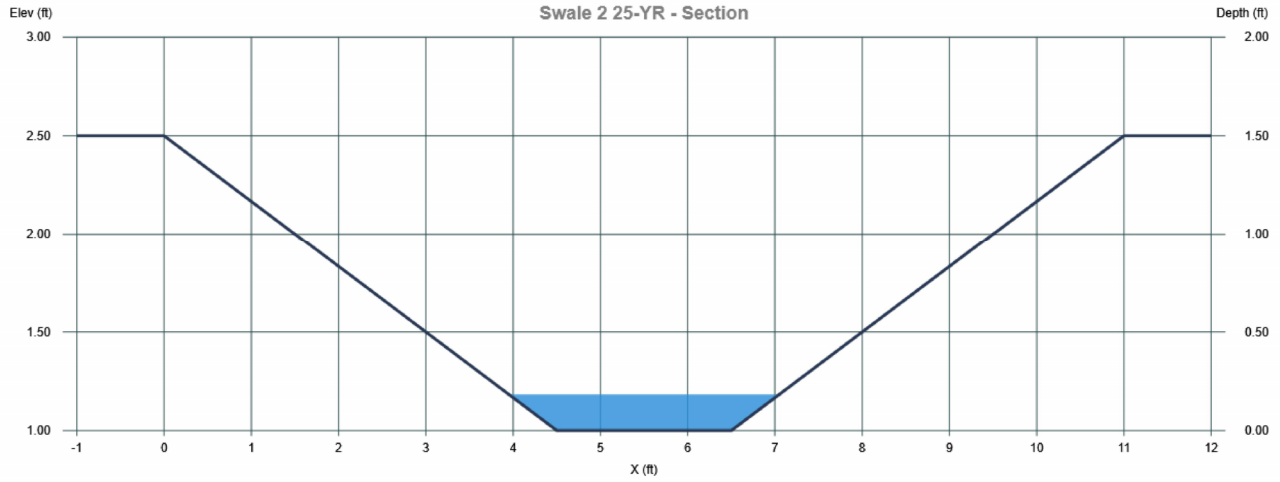
Bottom Width	= 2.00 ft
Side Slope Left, z:1	= 3.00
Side Slope Right, z:1	= 3.00
Total Depth	= 1.50 ft
Invert Elevation	= 1.00 ft
Channel Slope	= 1.000 %
Manning's n	= 0.030

DISCHARGE

Method	= Known Q
Known Q	= 0.57 cfs

CALCULATION SAMPLE

Flow	Depth	Area	Velocity	WP	n-value	Crit Depth	HGL	EGL	Max Shear	Top Width
(cfs)	(ft)	(sqft)	(ft/s)	(ft)		(ft)	(ft)	(ft)	(lb/sqft)	(ft)
0.57	0.18	0.46	1.25	3.14	0.030	0.13	1.18	1.20	0.11	3.08



APPENDIX E

Stormwater Quality Calculations

APPENDIX E
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WATER QUALITY CALCULATIONS

REQUIRED TSS REMOVAL CALCULATIONS

PROPOSED TSS REMOVAL CALCULATIONS

NJDEP WATER QUALITY DESIGN STORM ROUTINGS

SSBB-1

SSBB-2

PAPS-1

SUMMARY

SMALL-SCALE BIORETENTION BASIN DESIGN SUMMARY

POROUS ASPHALT PAVEMENT DESIGN CALCULATIONS

WATER QUALITY CALCULATIONS

REQUIRED TSS REMOVAL CALCULATIONS

REQUIRED TSS REMOVAL RATE CALCULATIONS CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS LANGAN PROJECT #101049802				
Point of Analysis	**Existing Motor Vehicle Surface to Proposed Motor Vehicle Surface (SF)**	**Existing Motor Vehicle Surface to Proposed Motor Vehicle Surface (AC)**	**Existing Non-Motor Vehicle Surface to Proposed Motor Vehicle Surface (SF)**	**Existing Non-Motor Vehicle Surface to Proposed Motor Vehicle Surface (AC)**
POA-1 & POA-2	27,536	0.63	37,125	0.85

Required TSS Removal Rate
$= \frac{(0.63*0.50) + (0.85*0.80)}{1.48}$
= 67.2%

PROPOSED TSS REMOVAL CALCULATIONS

PROPOSED TSS REMOVAL RATE CALCULATIONS FLOWING TO PACKANACK BROOK CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS LANGAN PROJECT #101049802						
Point of Analysis	**Proposed 80% TSS Removal Rate (SF)**	**Proposed 80% TSS Removal Rate (AC)**	**Proposed 90% TSS Removal Rate (SF)**	**Proposed 90% TSS Removal Rate (AC)**	**No Treatment (SF)**	**No Treatment (AC)**
POA-1 & POA-2	60,650	1.39	20,347	0.47	17,156	0.39

Proposed TSS Removal Rate
$= \frac{(1.39*0.8) + (0.47*0.90) + (0.39*0)}{2.25}$
= 68.2%

NJDEP WATER QUALITY DESIGN STORM ROUTINGS

SSBB-1

Hydrograph Report

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys
10-21-2025

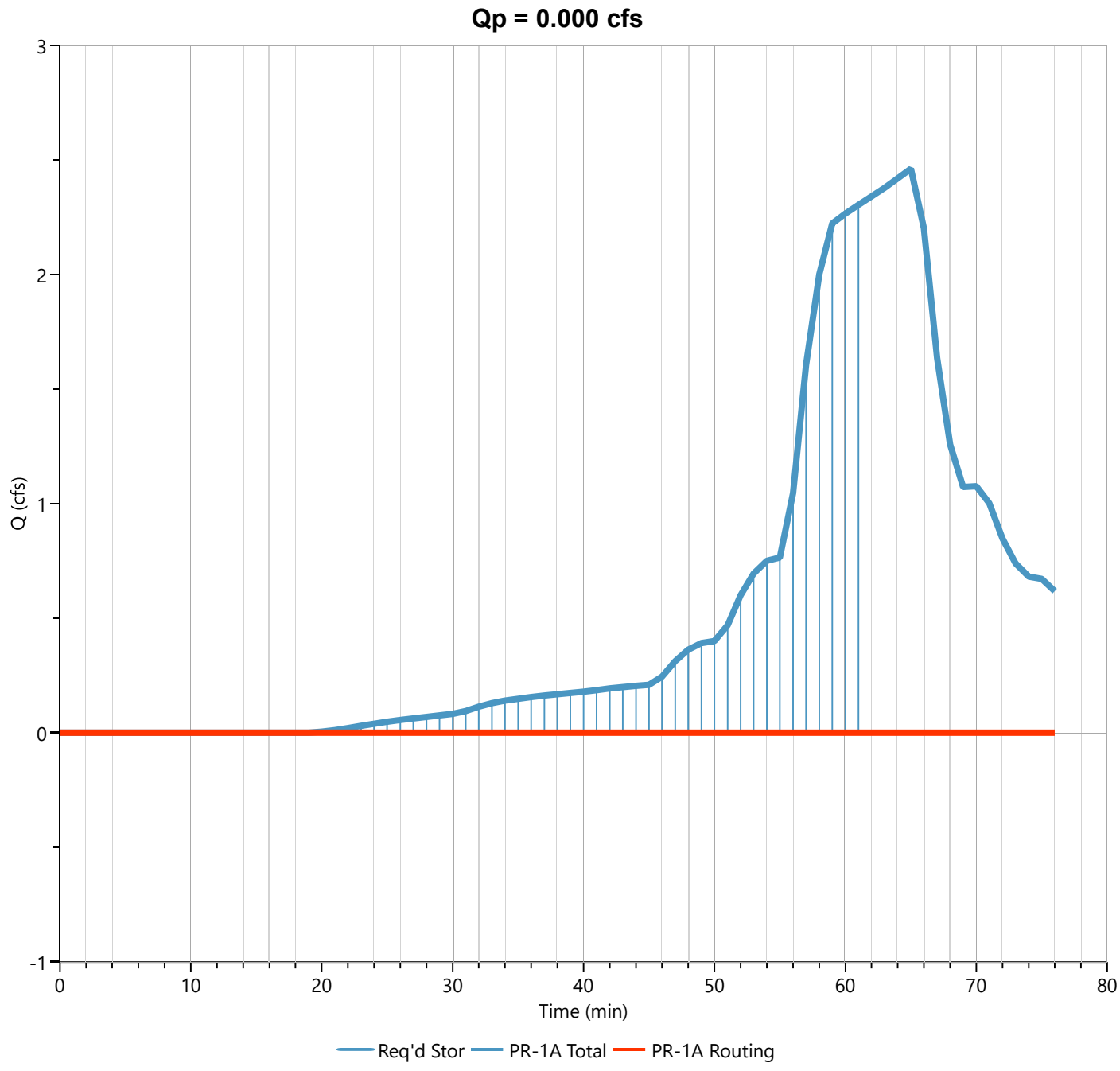
PR-1A Routing

Hyd. No. 11

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 61 min
Time Interval	= 1 min	Hydrograph Volume	= 0.001 cuft
Inflow Hydrograph	= 10 - PR-1A Total	Max. Elevation	= 534.52 ft
Pond Name	= SSBB-1	Max. Storage	= 2,487 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.59 hrs



Pond Report

File: Eagle Rock Proposed (Future).hys

Hydrology Studio v 3.0.0.39

10-21-2025

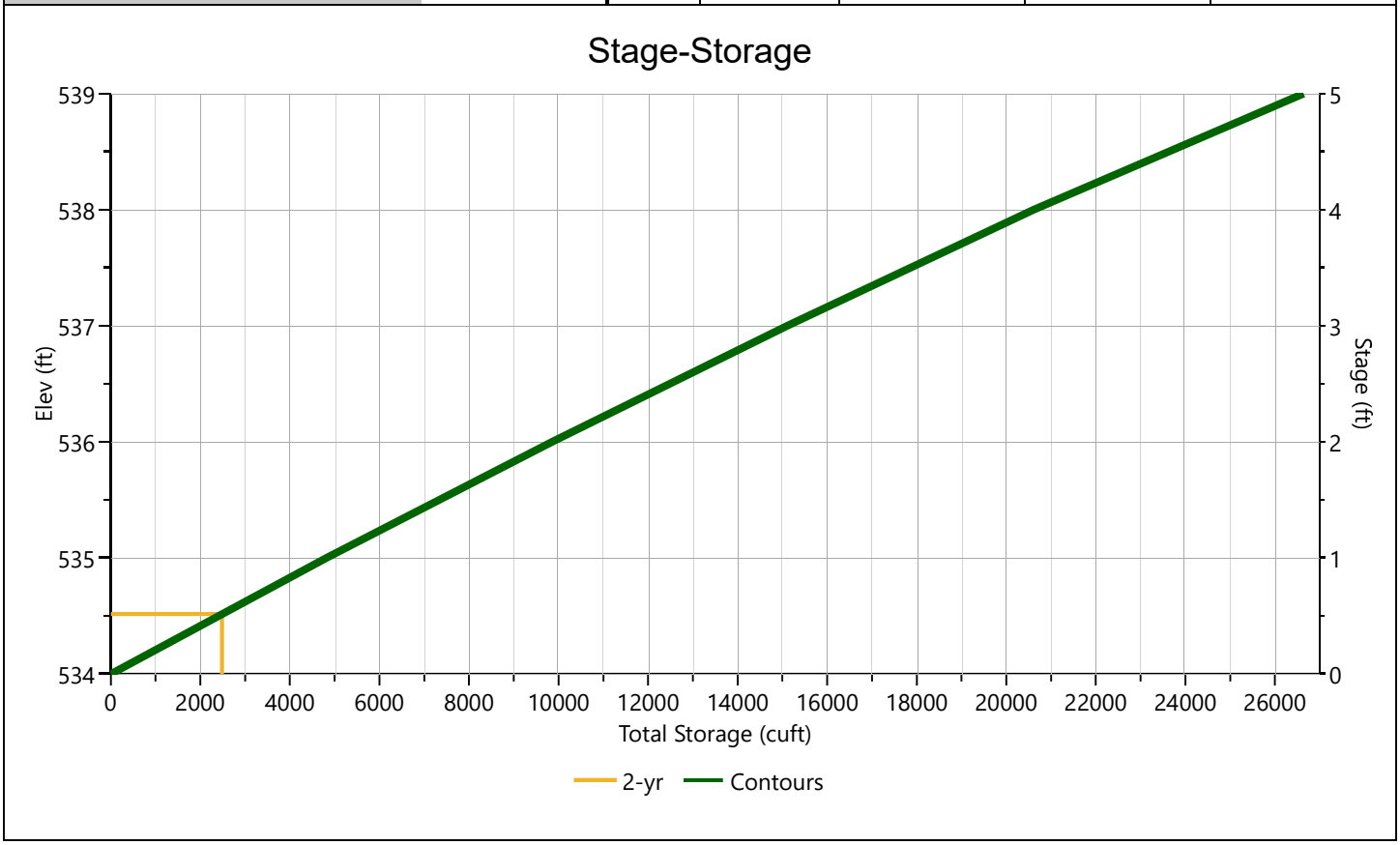
SSBB-1

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	534.00
Voids (%)	100.00
Volume Calc	Conic

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	534.00	4,713	0.000	0.000
1.00	535.00	4,938	4,825	4,825
2.00	536.00	5,145	5,041	9,865
3.00	537.00	5,354	5,249	15,114
4.00	538.00	5,649	5,500	20,614
5.00	539.00	6,413	6,026	26,641



Pond Report

File: Eagle Rock Proposed (Future).hys

Hydrology Studio v 3.0.0.39

10-21-2025

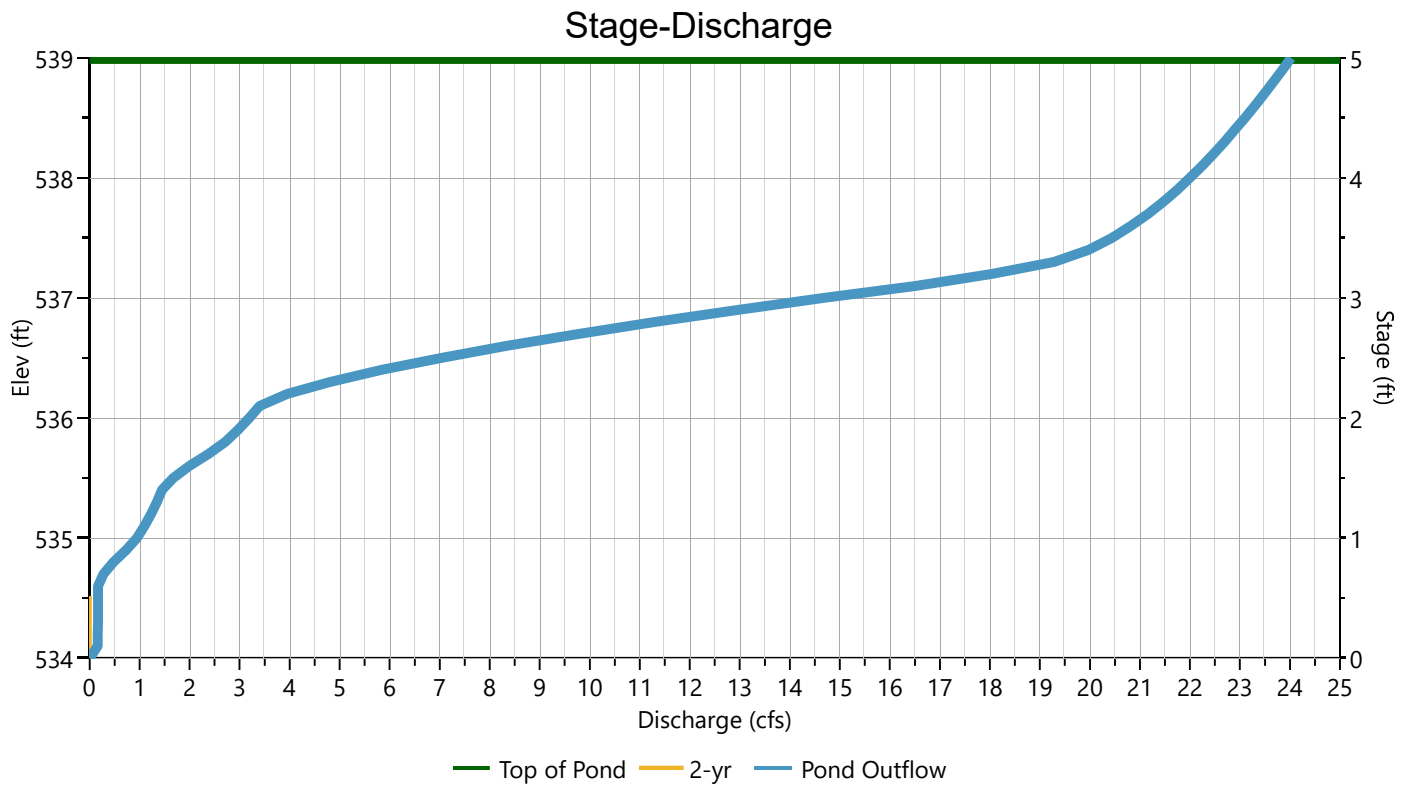
SSBB-1

Stage-Discharge

Culvert / Orifices	Cir Culvert	Orifice			Perforated Riser	
		1 (m)	2 (m)	3		
Rise, in	18	4	4		Hole Diameter, in	
Span, in	18	12	14		No. holes	
No. Barrels	1	1	1		Invert Elevation, ft	
Invert Elevation, ft	530.25	534.60	535.40		Height, ft	
Orifice Coefficient, Co	0.60	0.60	0.60		Orifice Coefficient, Co	
Length, ft	47					
Barrel Slope, %	7.34					
N-Value, n	0.013					

Weirs	Riser	Weir			Ancillary	
		1 (m)	2	3		
Shape / Type		Rectangular			Exfiltration, in/hr	1.50**
Crest Elevation, ft		536.1				
Crest Length, ft		3.5				
Angle, deg						
Weir Coefficient, Cw		3.3				

*m = Flows through Culvert, i = Independent **Exfiltration extracted from outflow hydrograph. Rate applied to contours.*



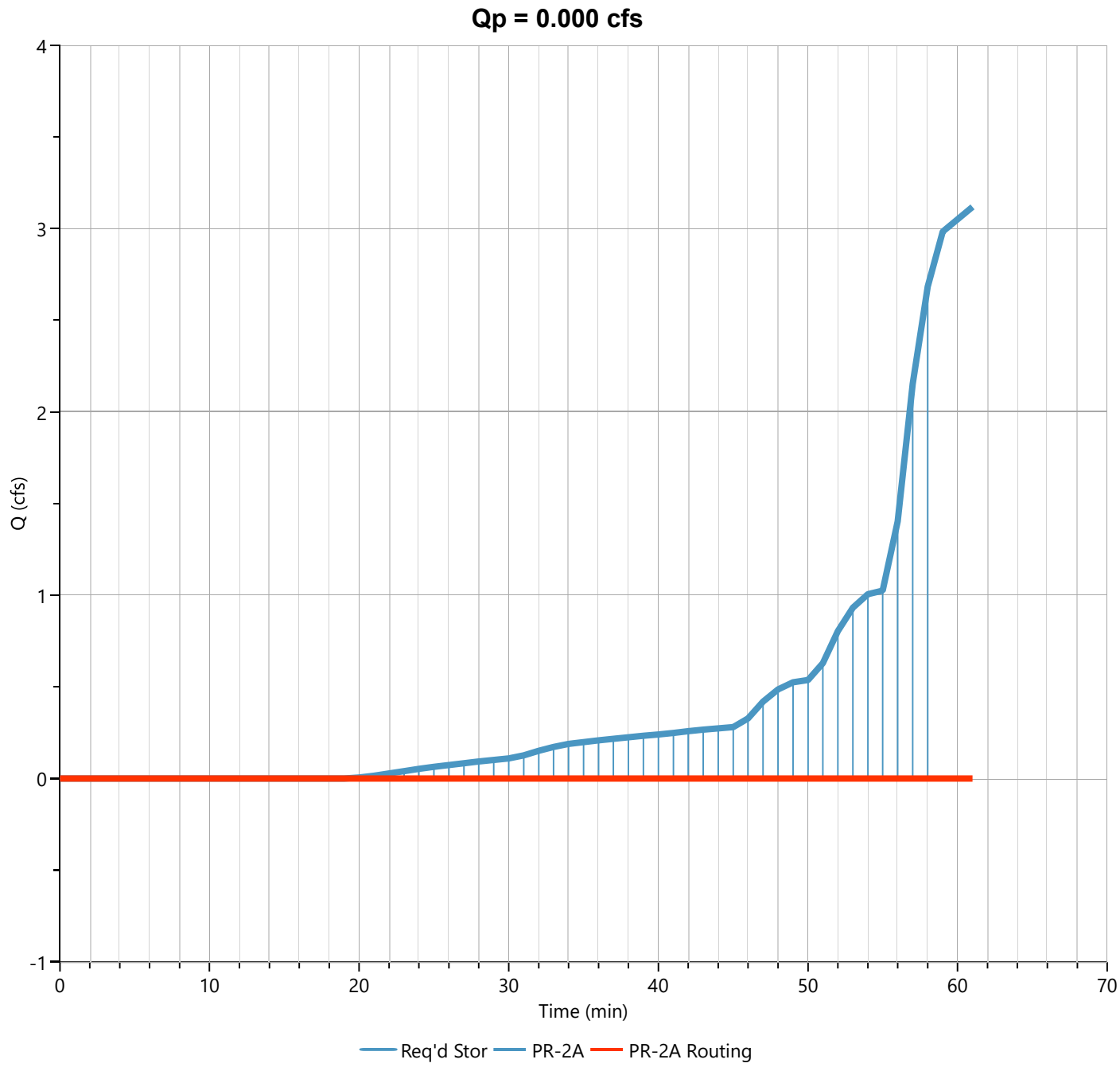
SSBB-2

PR-2A Routing

Hyd. No. 46

Hydrograph Type	= Pond Route	Peak Flow	= 0.000 cfs
Storm Frequency	= 2-yr	Time to Peak	= 58 min
Time Interval	= 1 min	Hydrograph Volume	= 0.000 cuft
Inflow Hydrograph	= 45 - PR-2A	Max. Elevation	= 537.39 ft
Pond Name	= SSBB-2	Max. Storage	= 3,332 cuft

Pond Routing by Storage Indication Method



Pond Report

File: Eagle Rock Proposed (Future).hys

Hydrology Studio v 3.0.0.39

10-21-2025

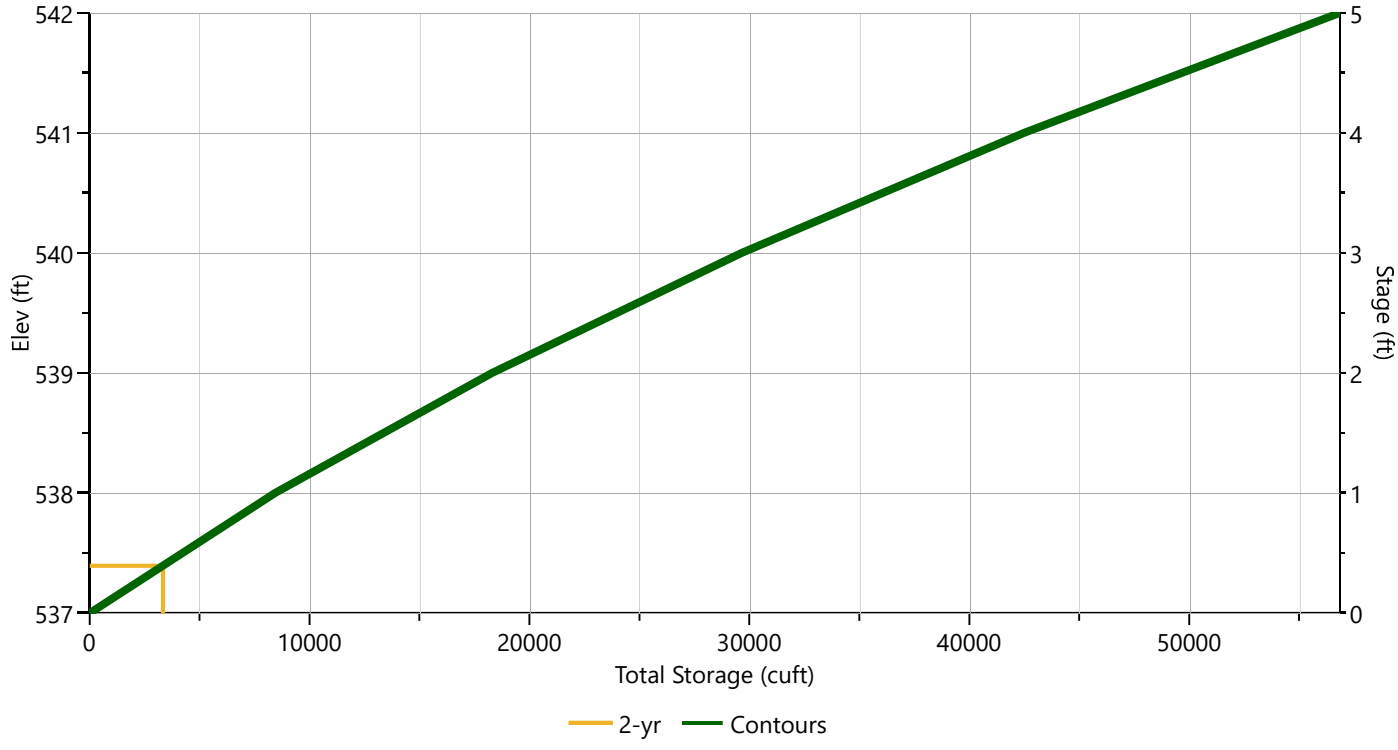
SSBB-2

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	537.00
Voids (%)	100.00
Volume Calc	Conic

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	537.00	7,745	0.000	0.000
1.00	538.00	9,163	8,443	8,443
2.00	539.00	10,607	9,875	18,318
3.00	540.00	12,084	11,337	29,655
4.00	541.00	13,601	12,834	42,489
5.00	542.00	15,155	14,369	56,858



Pond Report

File: Eagle Rock Proposed (Future).hys

Hydrology Studio v 3.0.0.39

10-21-2025

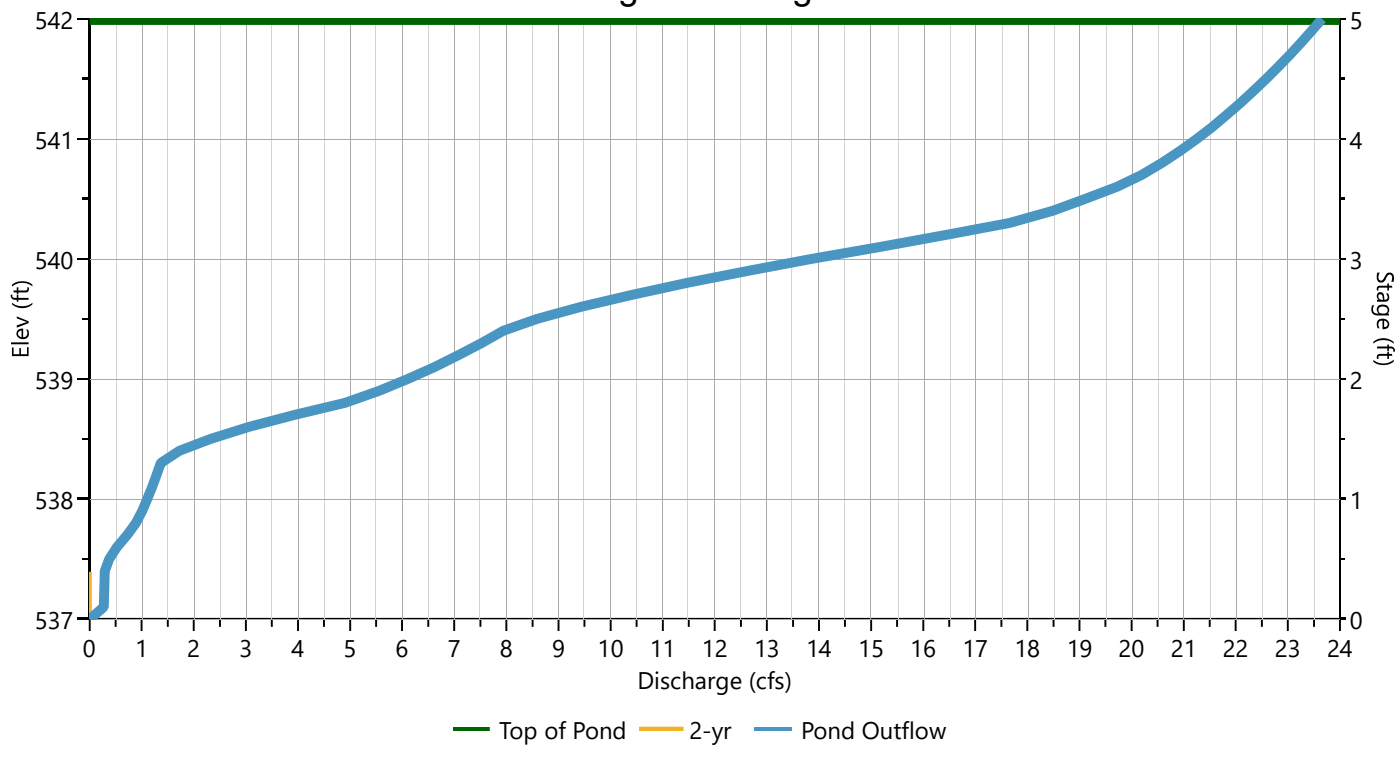
SSBB-2

Stage-Discharge

Culvert / Orifices	Cir Culvert	Orifice			Perforated Riser	
		1 (m)	2 (m)	3		
Rise, in	18	4	6		Hole Diameter, in	
Span, in	18	9	16		No. holes	
No. Barrels	1	1	2		Invert Elevation, ft	
Invert Elevation, ft	533.50	537.40	538.30		Height, ft	
Orifice Coefficient, Co	0.60	0.60	0.60		Orifice Coefficient, Co	
Length, ft	36					
Barrel Slope, %	1.5					
N-Value, n	0.012					

Weirs	Riser	Weir			Ancillary	
		1 (m)	2	3		
Shape / Type		Rectangular			Exfiltration, in/hr	1.50**
Crest Elevation, ft		539.4				
Crest Length, ft		2.5				
Angle, deg						
Weir Coefficient, Cw		3.3				

*m = Flows through Culvert, i = Independent **Exfiltration extracted from outflow hydrograph. Rate applied to contours.*



PAPS-1

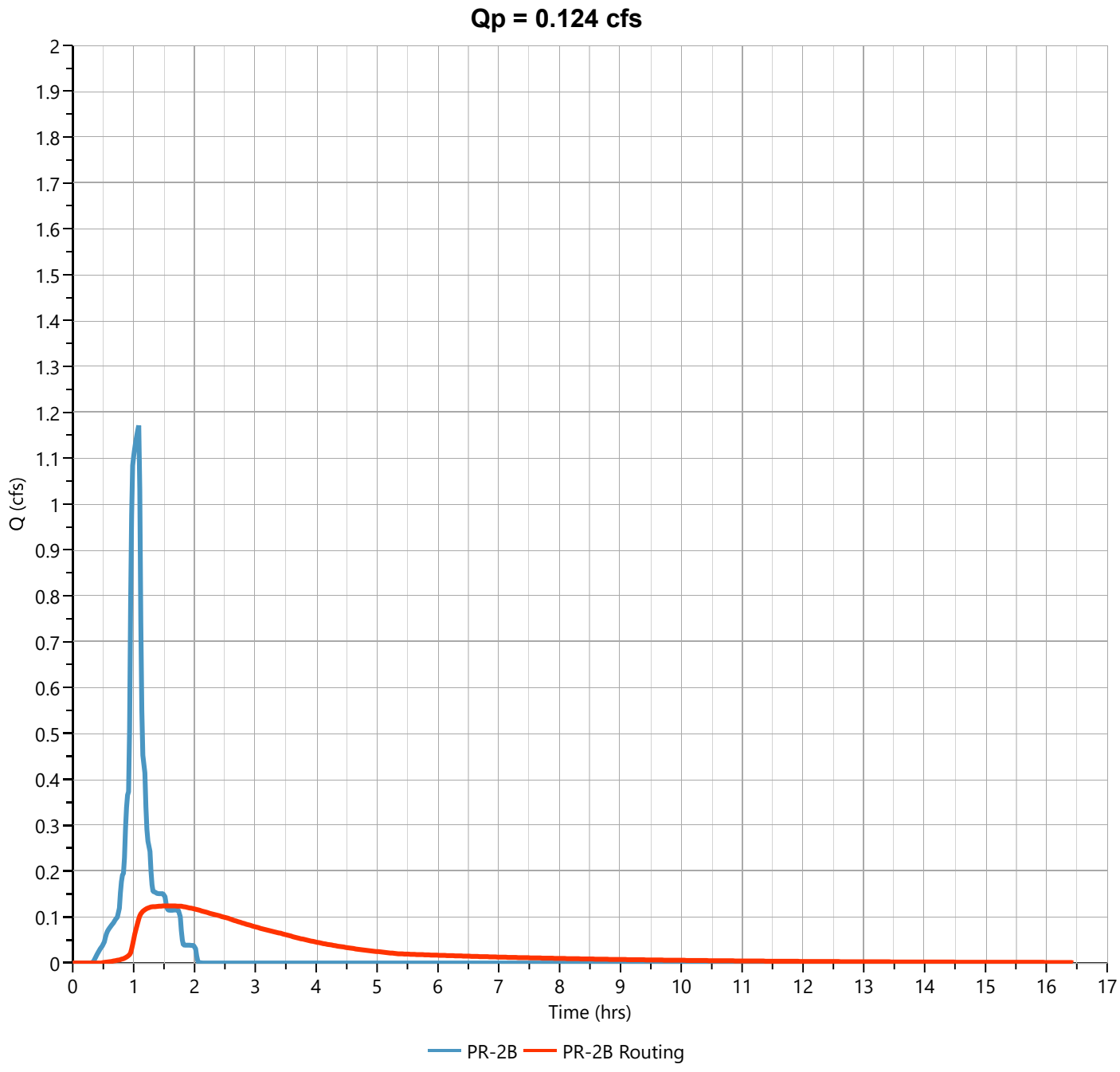
PR-2B Routing

Hyd. No. 57

Hydrograph Type	= Pond Route	Peak Flow	= 0.124 cfs
Storm Frequency	= 2-yr	Time to Peak	= 93 min
Time Interval	= 1 min	Hydrograph Volume	= 1,416 cuft
Inflow Hydrograph	= 56 - PR-2B	Max. Elevation	= 553.40 ft
Pond Name	= PAPS-1	Max. Storage	= 1,059 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 2.47 hrs



Pond Report

File: Eagle Rock Proposed (Future).hys

Hydrology Studio v 3.0.0.39

10-22-2025

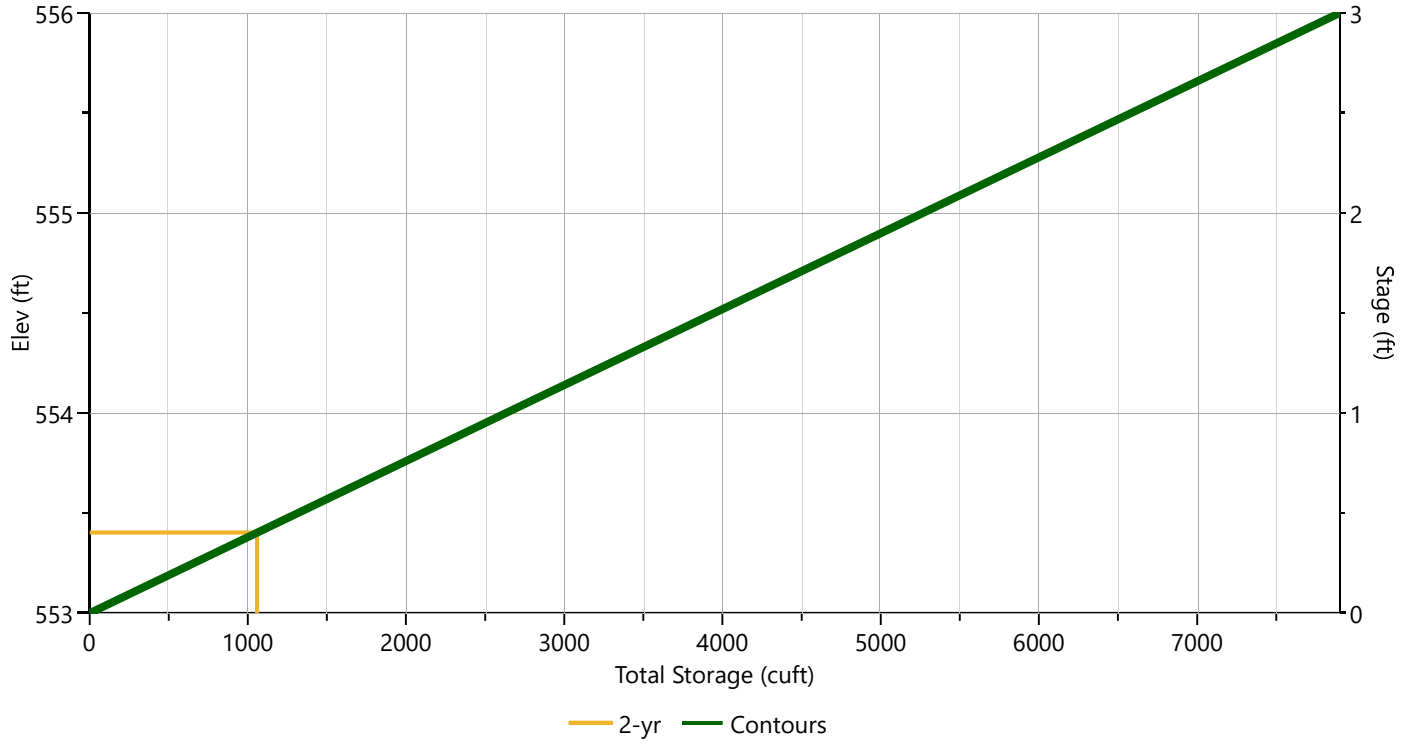
PAPS-1

Stage-Storage

User Defined Contours	
Description	**Input**
Bottom Elevation, ft	553.00
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	553.00	6,586	0.000	0.000
1.00	554.00	6,586	2,634	2,634
2.00	555.00	6,586	2,634	5,269
3.00	556.00	6,586	2,634	7,903



Pond Report

File: Eagle Rock Proposed (Future).hys

Hydrology Studio v 3.0.0.39

10-22-2025

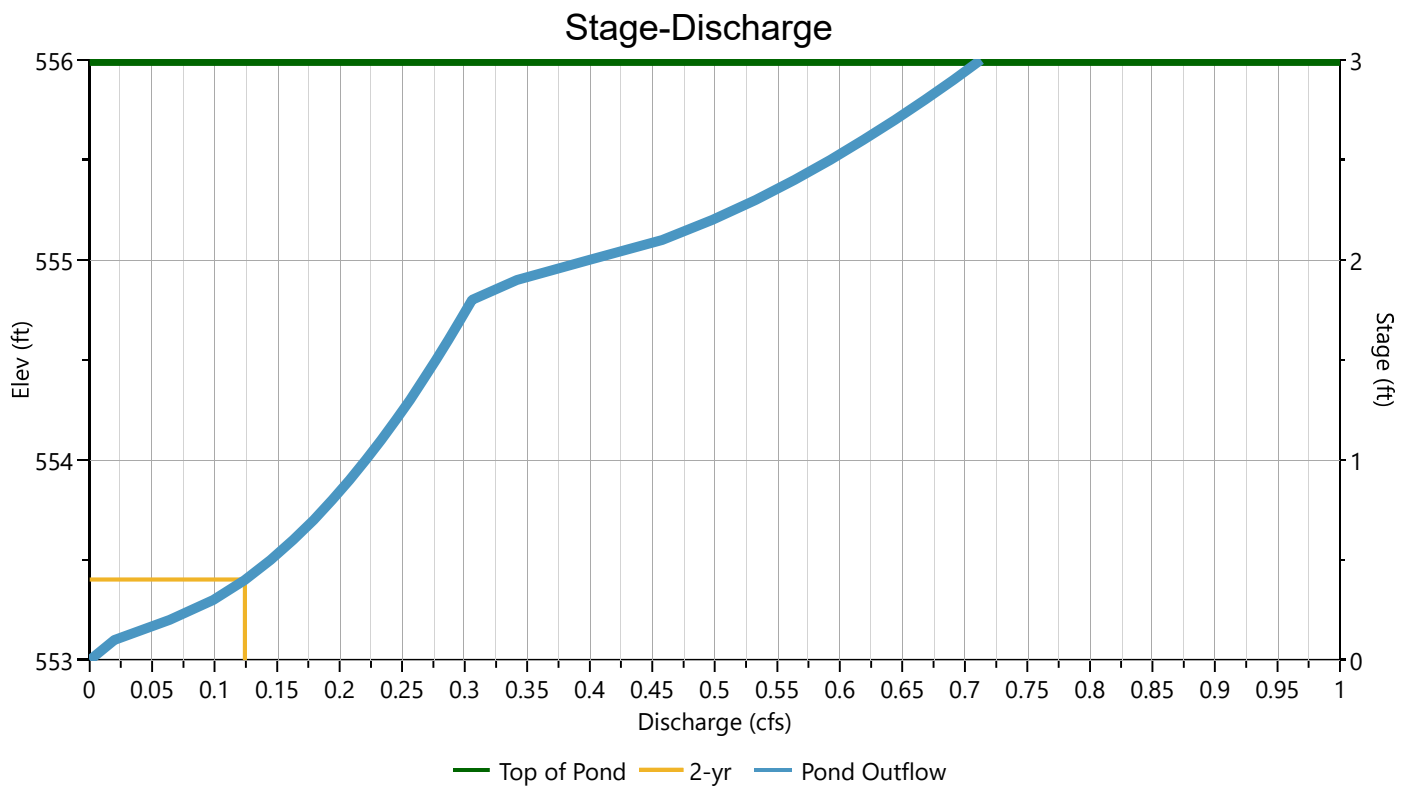
PAPS-1

Stage-Discharge

Culvert / Orifices	Cir Culvert	Orifice			Perforated Riser	
		1 (i)	2 (i)	3		
Rise, in		3	3		Hole Diameter, in	
Span, in		3	3		No. holes	
No. Barrels		1	1		Invert Elevation, ft	
Invert Elevation, ft		553.00	554.80		Height, ft	
Orifice Coefficient, Co		0.60	0.60		Orifice Coefficient, Co	
Length, ft						
Barrel Slope, %						
N-Value, n						

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

m = Flows through Culvert, i = Independent



SUMMARY

Hydrograph 2-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys

10-22-2025

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-D Grass D	0.150	69	202	----		
2	NRCS Runoff	PR-1A-D Imp	0.924	65	1,127	----		
3	Junction	PR-1A-D	1.013	65	1,329	1, 2		
5	NRCS Runoff	PR-1A-U Open Space C	0.044	76	89.7	----		
6	NRCS Runoff	PR-1A-U Woods C	0.004	81	9.73	----		
7	NRCS Runoff	PR-1A-U Imp	1.444	65	1,760	----		
8	Junction	PR-1A-U	1.449	65	1,860	5, 6, 7		
10	Junction	PR-1A Total	2.461	65	3,188	3, 8		
11	Pond Route	PR-1A Routing	0.000	61	0.001	10	534.52	2,487
13	NRCS Runoff	PR-1B-D	0.180	68	227	----		
15	NRCS Runoff	PR-1B-U Open Space C	0.036	77	76.3	----		
16	NRCS Runoff	PR-1B-U Woods C	0.027	83	72.9	----		
17	NRCS Runoff	PR-1B-U Impervious	3.349	66	4,321	----		
18	Junction	PR-1B-U	3.355	66	4,470	15, 16, 17		
21	Junction	PR-1B (Swale)	3.512	66	4,696	13, 18		
24	NRCS Runoff	PR-1C-D Open Space D	0.192	65	188	----		
25	NRCS Runoff	PR-1C-D Impervious	0.318	65	387	----		
26	Junction	PR-1C-D	0.510	65	576	24, 25		
28	NRCS Runoff	PR-1C-U Open Space C	0.103	75	195	----		
29	NRCS Runoff	PR-1C-U Impervious	3.417	65	4,206	----		
30	Junction	PR-1C-U	3.432	65	4,401	28, 29		
32	Junction	POA-1	7.380	65	9,673	11, 21, 26, 30		
35	NRCS Runoff	PR-2A-D Open Space D	0.412	68	518	----		
36	NRCS Runoff	PR-2A-D Impervious	1.213	65	1,479	----		

Hydrograph 2-yr Summary

Hydrology Studio v 3.0.0.39

File: Eagle Rock Proposed (Future).hys

10-22-2025

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)
37	Junction	PR-2A-D	1.509	65	1,997	35, 36		
39	NRCS Runoff	PR-2A-U Open Space C	0.022	79	48.1	----		
40	NRCS Runoff	PR-2A-U Woods C	0.008	87	21.5	----		
41	NRCS Runoff	PR-2A-U Impervious	1.963	65	2,394	----		
42	Junction	PR-2A-U	1.965	65	2,464	39, 40, 41		
45	Junction	PR-2A	3.474	65	4,460	37, 42		
46	Pond Route	PR-2A Routing	0.000	58	0.000	45	537.39	3,332
48	NRCS Runoff	PR-2B-D Open Space D	0.017	67	18.8	----		
49	NRCS Runoff	PR-2B-D Impervious	1.068	65	1,303	----		
50	Junction	PR-2B-D	1.083	65	1,322	48, 49		
52	NRCS Runoff	PR-2B-U Open Space C	0.002	66	2.50	----		
53	NRCS Runoff	PR-2B-U Impervious	0.087	65	106	----		
54	Junction	PR-2B-U	0.088	65	108	52, 53		
56	Junction	PR-2B	1.171	65	1,430	50, 54		
57	Pond Route	PR-2B Routing	0.124	93	1,416	56	553.40	1,059
59	NRCS Runoff	PR-2C-D Open Space D	0.348	65	341	----		
60	NRCS Runoff	PR-2C-D Impervious	0.837	65	1,021	----		
61	Junction	PR-2C-D	1.186	65	1,362	59, 60		
63	NRCS Runoff	PR-2C-U Open Space C	0.081	79	182	----		
64	NRCS Runoff	PR-2C-U Woods C	0.034	87	92.0	----		
65	NRCS Runoff	PR-2C-U Gravel C	0.125	65	122	----		
66	NRCS Runoff	PR-2C-U Impervious	1.386	65	1,690	----		
67	Junction	PR-2C-U	1.517	65	2,086	63, 64, 65, 66		
70	Junction	POA-2	2.799	65	4,865	46, 57, 61, 67		

SMALL-SCALE BIORETENTION BASIN DESIGN SUMMARY

SMALL-SCALE BIORETENTION BASIN DESIGN SUMMARY TABLE
CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS
LANGAN PROJECT #101049802

BIORETENTION BASIN	BOTTOM OF UNDERDRAIN STONE BEDDING EL.	BOTTOM OF STORAGE EL.	OCS FIRST ORIFICE OPENING EL.	DESIGN 100-YR WATER SURFACE EL.	EMERGENCY SPILLWAY CREST EL.	TOP OF BERM EL.	TOTAL CONTRIBUTING WATERSHED (AC)	SURFACE AREA OF BASIN (AC)	INFLOW DRAINAGE AREA (AC)	SOIL MEDIA DESIGN PERCOLATION RATE (IN/HR)
SSBB-1	530.50	534.00	534.60	536.73	537.75	539.00	1.56	0.15	1.41	1.50
SSBB-2	533.50	537.00	537.40	539.63	540.67	542.00	2.26	0.35	1.91	1.50

NOTES:

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)
PAPS-1	6,586	36	7,903	1,511	4	0.005	0.15

Pavement Area	Cover Type	Soil Type	Area (ac)	Area (sf)	CN	S	Q Runoff (in)	Runoff Volume (CF)
PAPS-1	Open Space/Grass	C	0.01	305	74	3.51	0.07	2
	Open Space/Grass	D	0.03	1,485	80	2.50	0.17	21
	Impervious	-	0.40	17,262	98	0.20	1.03	1,488
TOTAL:			0.44	19,052				1,511

ADDITIONAL INFLOW DRAINAGE AREA RATIO (X:1) 1.89 **ADDITIONAL INFLOW IMPERVIOUS AREA RATIO (X:1) 1.62**

APPENDIX F

GEOTECHNICAL INVESTIGATION INFORMATION

LANGAN

Memorandum

300 Kimball Drive Parsippany, NJ 07054 T: 973.560.4900 F: 973.560.4901

To: Mark Hoffman/ Garden Homes

From: Adam Yoda / Langan
Bhumi Peer / Langan

Info: Michael Vitello / Langan

Date: 25 August 2025
Revised: 12 February 2026

Re: Stormwater Management Field Testing Results
Eagle Rock Ave & Oval Road Improvements
750 Eagle Rock Avenue
West Orange, New Jersey
Langan Project No.: 101049802

This memorandum presents the results of the field investigation and associated tube permeameter testing performed by Langan Engineering and Environmental Services, LLC (Langan) for the proposed Eagle Rock Ave and Oval Road road widening project site in West Orange, New Jersey.

The elevations given in this memorandum are referenced to the surface contours provided in the drawing entitled "Right of Way & Partial Site Survey" dated 11 February 2026, prepared by Langan.

The proposed stormwater management system information provided in this memorandum is referenced to the drawings entitled "Partial Grading Plan" dated 12 February, 2026, prepared by Langan.

PROJECT DESCRIPTION

The site is located immediately south of Eagle Rock Avenue between Laurel Avenue and Wakeman Street in West Orange, New Jersey. The site is currently occupied by wooded areas, landscape areas and paved areas associated with the Crestmont Country Club (CCC). Surface grades vary across the proposed project site, typically sloping downward from elevation (el) 570 at the existing parking area to el 530 at Eagle Rock Avenue.

The proposed road widening project will also include the construction of site features at the CCC property. The proposed new site features will include additional parking lots, new roadways, site retaining walls and two (2) stormwater bioretention basins. Our field investigation was performed to support the design of the stormwater management systems for the project.

FIELD INVESTIGATIONS

The stormwater field investigation included excavating exploratory profile test pits under full-time observation of Langan and performing laboratory tube permeameter tests. The profile test pit locations and proposed target elevations were identified by Langan during the field investigation.

The locations of all test pits are shown on Figures 1A and 1B. Logs of the profile test pits and test pit photographs are provided in Appendix A and B, respectively.

Profile Test Pits

A total of twenty-one (21) exploratory profile test pits were excavated by Frank Semeraro Construction, Inc. throughout the project site. Profile test pits identified as TP-1 through TP-10 were excavated between 25 and 26 April 2024 using a CAT 306 excavator. Profile test pits identified as TP-11 through TP-21 were excavated between 14 and 15 April 2025 using a Hitachi Excavator 7X85. The profile test pits extended between 1.75 ft and 12 ft below existing surface grade. Upon completion, the profile test pits were backfilled with excavated materials and compacted with the excavator bucket.

Laboratory Tube Permeameter Tests

A total of twenty (20) tube permeameter samples were collected and tested during the 2024 and 2025 subsurface investigation. These samples were collected within the upper 40 inches of the existing surface grade in compliance with the latest version of the New Jersey Stormwater Best Management Practices Manual, Chapter 12, Subsection A2: Tube Permeameter Test.

The tube permeameter samples, identified using the corresponding profile test pit identification number, were collected in close proximity to the respective profile test pit location. The samples were tested to determine the soil hydraulic conductivity, which was used to determine the Hydrologic Soil Group (HSG).

SUBSURFACE CONDITIONS

The generalized subsurface conditions consist of surficial materials over sand and silt material underlain by bedrock. Significant amounts of gravel and cobbles were observed to be intermixed in the overburden soil layer. A generalized description of the subsurface conditions is provided below.

Surficial Material

Surficial materials consisted of grass and topsoil. An approximately 0.5-ft to 3-ft-thick layer of fill material, generally consisting of gravel, sand, or silt was encountered in the majority of the test pits beneath the surficial materials. In test pit TP-17, a 10-ft thick layer of fill material consisting of silty sand was encountered beneath the surficial materials. A buried topsoil layer approximately 1.25 ft thick was encountered in test pit TP-18 at approximately 3 ft below surface grade.

Natural Soils

Natural soils generally consisting of intermixed layers of sand and silt with varying amounts of gravel, clay, cobbles and boulders were encountered below the surficial and fill materials. The thickness of this natural overburden soil layer generally ranged from approximately 1 ft to 10 ft.

Bedrock

The top of bedrock was encountered below the natural soils ranging from approximately 1 ft to 9 ft below surface grade in test pits TP-1, TP-7, TP-14, TP-15, TP-16, TP-18, TP-19, TP-20 and TP-21. The remaining test pits were terminated prior to reaching the top of bedrock.

Signs of Seasonal High Water Table

The signs of Seasonal High Water Table (SHWT) as identified in the New Jersey Stormwater Best Practices Manual include visual observation of groundwater seepage and soil mottling. The location, depth and elevation of observed soil mottling and/or water seepage encountered in the profile test pits are summarized below. The determination of the SHWT elevation is provided in Table 1 – Summary of Profile Test Pits and Infiltration Testing Results.

Soil Mottling

Test Pit	Approximate Depth of Observed Mottling	Approximate Elevation of Observed Mottling
TP-8	7 ft	el 537
TP-10	2 ft	el 535
TP-20	2 ft	el 564.5
TP-21	6 ft	el 533.5

Water Seepage

Test Pit	Approximate Depth of Observed Water Seepage	Approximate Elevation of Observed Water Seepage
TP-2	8 ft	el 529
TP-8	6 ft	el 538
TP-10	7.7 ft	el 529.3
TP-13	3 ft	el 548
TP-21	1 ft	el 538.5

PERMEABILITY TESTING RESULTS AND HSG RECLASSIFICATION

The hydraulic conductivity rates ranging from approximately 0.000417 to 0.0484 inches per hour were determined in the 20 samples taken as part of this subsurface investigation.

In accordance with the New Jersey Stormwater Best Practices Manual and the NRCS National Engineering Handbook, Part 630 – Hydrology, Chapter 7 Hydrologic Soil Groups, Table 7-1: Criteria for Assignment of Hydrologic Soil Group, the Hydrologic Soil Group (HSG) has been evaluated at select test pit locations based on the depth to observed groundwater level, observations of soil mottling (an indicator of SHGW), soil gradation, and laboratory tube permeameter testing of select soil samples. Based on this evaluation, the site is classified as Hydrologic Soil Group D.

The laboratory testing results are provided in Appendix C and are summarized in Table 1.

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 proposed Eagle Rock Avenue and Oval Road Improvement in West Orange, New Jersey.

\\langan.com\data\PAR\data8\101049801\Project Data_Discipline\Site Civil\Reports\Stormwater\2026-02-12 SWM Report\Appendix F\2025-08-25- Geotech SWM Result Memo.docx

TABLES

Table 1 Summary of Profile Test Pits and Laboratory Testing Results

101049802
Eagle Rock Ave Widening Project
West Orange, New Jersey

8/23/2025

TABLE 1 - SUMMARY OF PROFILE TEST PITS AND INFILTRATION TESTING RESULTS

Profile Test ID	Profile Pit Completed Date	ApproximateExisting Surface Grade	Approximate Profile Pit Bottom		Top of Weathered or Competent Bedrock		Approximate Observed Top of Soil Mottling Layer		Approximate Bottom of Observed Soil Mottling Layer		Observed Groundwater Level or Water Seepage		Determined Seasonal High Groundwater	Type of Infiltration Test Type	Infiltration Test Depth (most restrictive layer)	Measured Hydraulic Conductivity	Percent Fine material Passing the #200 Sieve	Determined Hydrologic Soil Group (HSG)	Remarks
		(el)	(ft)	(el)	(ft)	(el)	(ft)	(el)	(ft)	(el)	(ft)	(el)	(el)		(inches below surface grade)	(inch/hour)	%		
TP-1	4/25/2024	538	4	534	4	534	-	NE	-	NE	-	NE	NE	Tube	24	0.00202	50.9	D	
TP-2	4/25/2024	537	9	528	9	528	-	NE	-	NE	8	529	529.0	-	-	-	-	-	
TP-3	4/26/2024	542	8	534	8	534	-	NE	-	NE	-	NE	NE	Tube	12	0.00449	51.7	D	
TP-4	4/25/2024	541	8	533	8	533	-	NE	-	NE	-	NE	NE	-	-	-	-	-	
TP-5	4/26/2024	550	7.5	542.5	7.5	542.5	-	NE	-	NE	-	NE	NE	Tube	12	0.0484	46.6	D	
TP-6	4/26/2024	2	5.5	-3.5	5.5	-3.5	-	NE	-	NE	-	NE	NE	Tube	18	0.000417	93.0	D	
TP-7	4/26/2024	548	3	545	3	545	-	NE	-	NE	-	NE	NE	Tube	8	0.0253	56.2	D	
TP-8	4/26/2024	544	7	537	7	537	4	540	7	537	6	538	540.0	Tube	20	0.00182	57.6	D	
TP-9	4/26/2024	553	8	545	8	545	-	NE	-	NE	-	NE	NE	Tube	24	0.00517	47.1	D	
TP-10	4/25/2024	537	11	526	11	526	1	536	2	535	7.7	529.3	536.0	Tube	16	0.000858	65.4	D	
TP-11	4/15/2025	543	7	536	7	536	-	NE	-	NE	-	NE	NE	Tube	21	0.0048	60.0	D	
TP-12	4/15/2025	548.5	8	540.5	8	540.5	-	NE	-	NE	-	NE	NE	Tube	12	0.015	46.1	D	
TP-13	4/15/2025	551	8.5	542.5	8.5	542.5	-	NE	-	NE	3	548	548.0	Tube	30	0.0434	39.0	D	
TP-14	4/15/2025	559	1.75	557.25	1.75	557.25	-	NE	-	NE	-	NE	NE	Tube	15	0.0126	40.1	D	
TP-15	4/15/2025	551	3	548	3	548	-	NE	-	NE	-	NE	NE	Tube	16	0.00747	52.4	D	
TP-16	4/14/2025	562.5	10.5	552	9	553.5	-	NE	-	NE	-	NE	NE	Tube	30	0.0118	41.4	D	
TP-17	7/15/2025	566	12	554	12	554	-	NE	-	NE	-	NE	NE	Tube A	6	0.00494	37.8	D	
														Tube B	6	0.00137	45.0	D	
TP-18	4/14/2025	567	4	563	3.75	563.25	-	NE	-	NE	-	NE	NE	Tube	18	0.0104	42.6	D	
TP-19	4/14/2025	563	2	561	1	562	-	NE	-	NE	-	NE	NE	Tube	4	0.0333	36.2	D	
TP-20	4/14/2025	566.5	2	564.5	2	564.5	1.5	565	2	564.5	-	NE	565.0	Tube	18	0.00811	55.6	D	
TP-21	4/14/2025	539.5	6.5	533	6.5	533	4	535.5	6	533.5	1	538.5	538.5	Tube	20	0.000981	71.1	D	

LEGEND

NE Not Encountered

NOTES

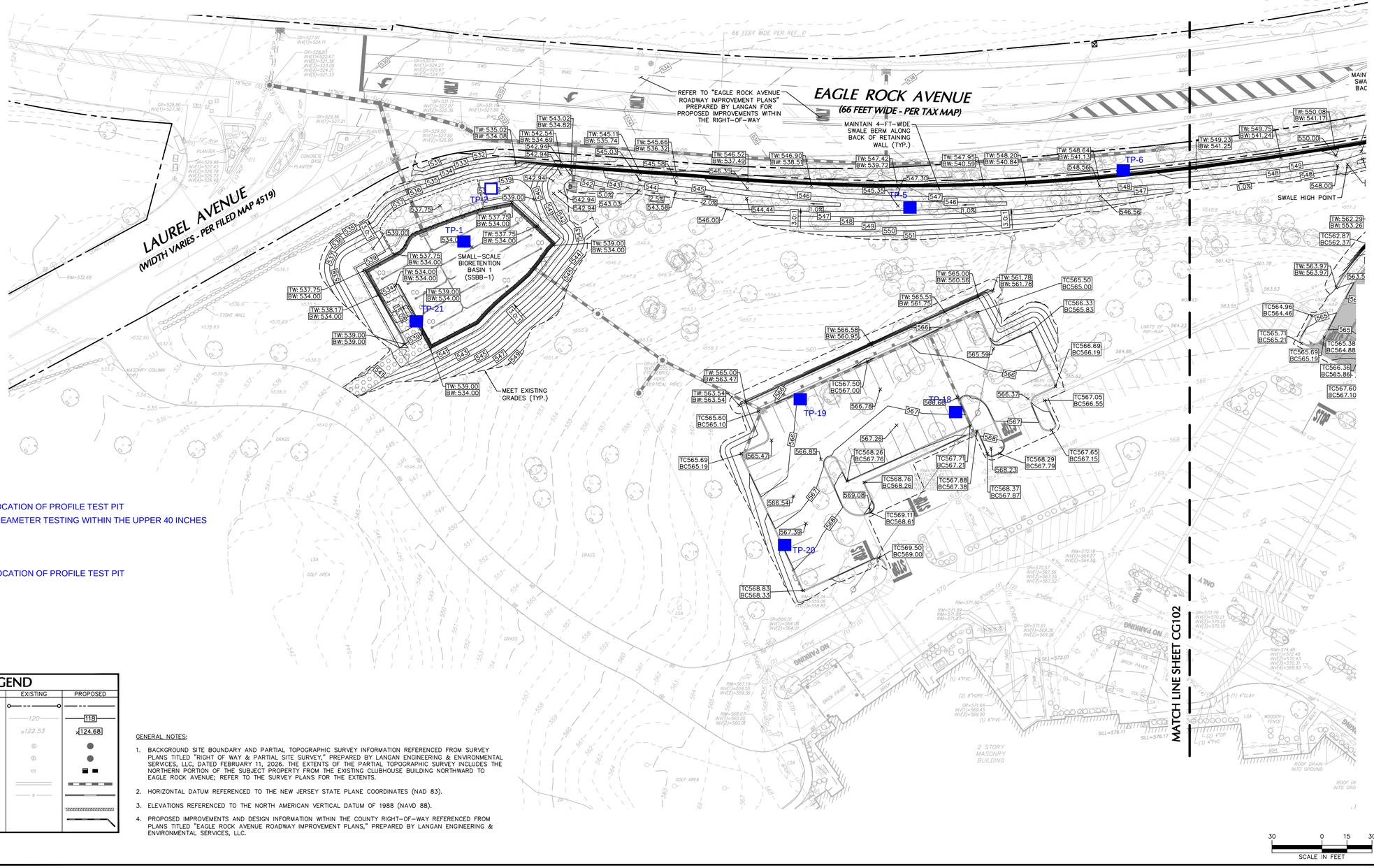
1 The infiltration tests were performed per Chapter 12, Subsection A2: Tube Permeameter Test provided in the NJSBMP Manual dated March 2024.

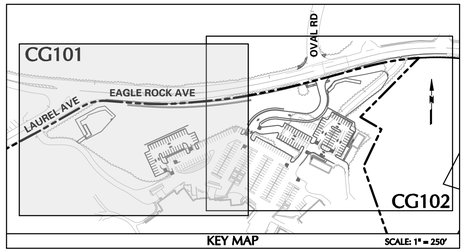
2 Refer to profile test pits and lab results for details.

3 The elevations and depths provided in this table are approximate.

FIGURES

Figure 1A and 1B Profile Test Pit Location Plan





KEY MAP SCALE: 1" = 250'

LEGEND

TP-1 APPROXIMATE LOCATION OF PROFILE TEST PIT WITH TUBE PERMEAMETER TESTING WITHIN THE UPPER 40 INCHES

TP- 2 APPROXIMATE LOCATION OF PROFILE TEST PIT

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		
ROOF DRAIN/ UNDERDAIN		

GENERAL NOTES:

1. BACKGROUND SITE BOUNDARY AND PARTIAL TOPOGRAPHIC SURVEY INFORMATION REFERENCED FROM SURVEY PLANS TITLED "RIGHT OF WAY & PARTIAL SITE SURVEY," PREPARED BY LANGAN ENGINEERING & ENVIRONMENTAL SERVICES, LLC, DATED FEBRUARY 11, 2026. THE EXTENTS OF THE PARTIAL TOPOGRAPHIC SURVEY INCLUDES THE NORTHERN PORTION OF THE SUBJECT PROPERTY FROM THE EXISTING CLUBHOUSE BUILDING NORTHWARD TO EAGLE ROCK AVENUE; REFER TO THE SURVEY PLANS FOR THE EXTENTS.
2. HORIZONTAL DATUM REFERENCED TO THE NEW JERSEY STATE PLANE COORDINATES (NAD 83).
3. ELEVATIONS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
4. PROPOSED IMPROVEMENTS AND DESIGN INFORMATION WITHIN THE COUNTY RIGHT-OF-WAY REFERENCED FROM PLANS TITLED "EAGLE ROCK AVENUE ROADWAY IMPROVEMENT PLANS," PREPARED BY LANGAN ENGINEERING & ENVIRONMENTAL SERVICES, LLC.

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REVISIONS

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300 Kimball Drive
Parsippany, NJ 07054
T: 973.560.4900 F: 973.560.4901 www.langan.com
NJ Certificate of Authorization No. 24GA27996400

Project
CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS
BLOCK No. 174, LOT No. 1.01
TOWNSHIP OF WEST ORANGE
ESSEX COUNTY NEW JERSEY

Drawing Title
PROFILE TEST PIT LOCATION PLAN

Project No. 101049802
Date FEBRUARY 12, 2026
Drawn By AY
Checked By MJV
Figure 1A

LANGAN
Project No. 101049802

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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		
RETAINING WALL		
ROOF DRAIN/ UNDERDRAIN		

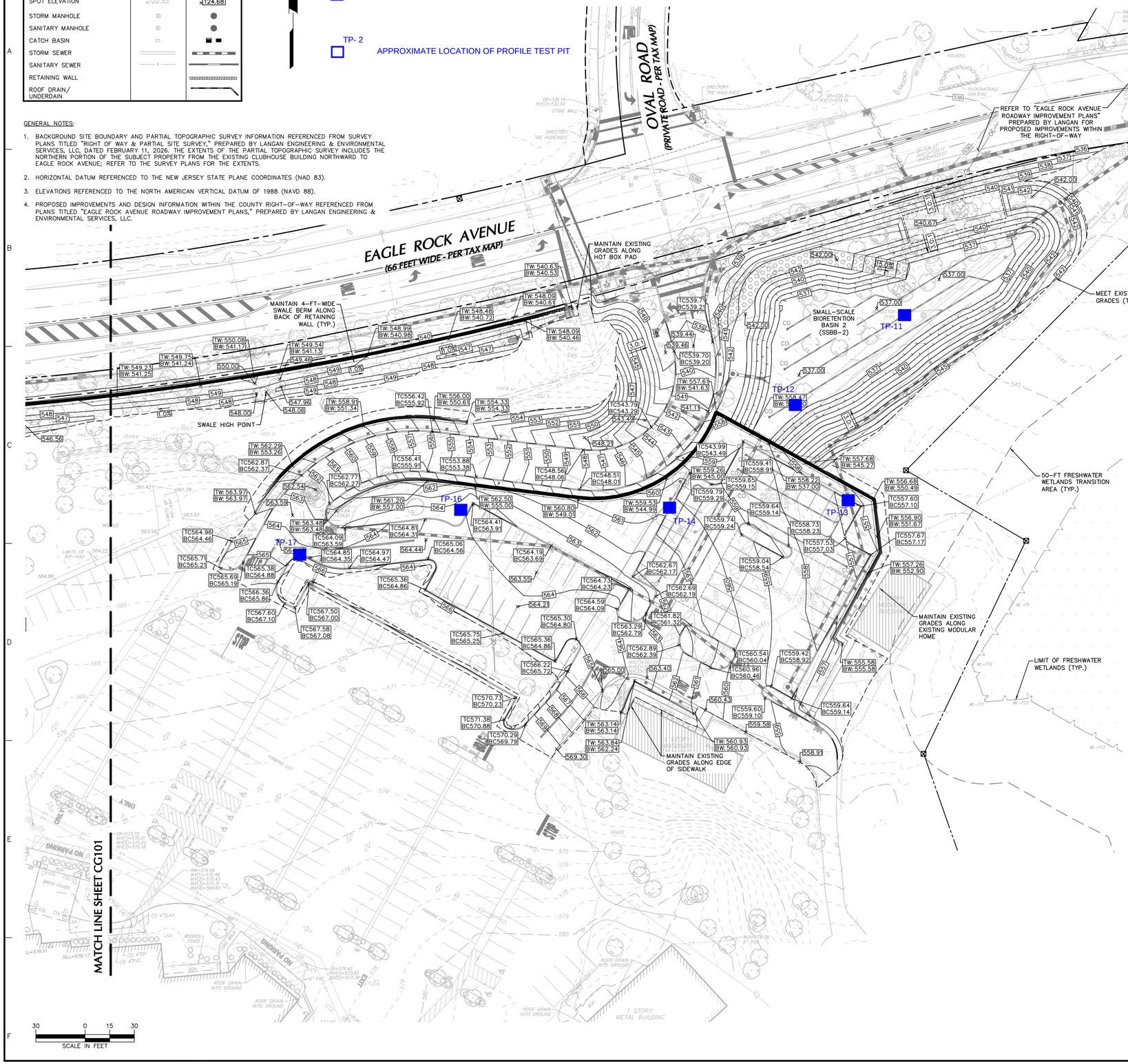
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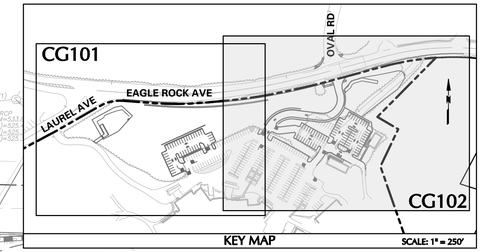
TP-1 APPROXIMATE LOCATION OF PROFILE TEST PIT

TP- 2 APPROXIMATE LOCATION OF PROFILE TEST PIT

GENERAL NOTES:

1. BACKGROUND SITE BOUNDARY AND PARTIAL TOPOGRAPHIC SURVEY INFORMATION REFERENCED FROM SURVEY PLANS TITLED "RIGHT OF WAY & PARTIAL SITE SURVEY," PREPARED BY LANGAN ENGINEERING & ENVIRONMENTAL SERVICES, LLC, DATED FEBRUARY 11, 2026. THE EXTENTS OF THE PARTIAL TOPOGRAPHIC SURVEY INCLUDES THE NORTHERN PORTION OF THE SUBJECT PROPERTY FROM THE EXISTING CLUBHOUSE BUILDING NORTHWARD TO EAGLE ROCK AVENUE; REFER TO THE SURVEY PLANS FOR THE EXTENTS.
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Date	Description	No.

REVISIONS

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NJ Certificate of Authorization No. 24GA27996400

Project
CRESTMONT COUNTRY CLUB & EAGLE ROCK AVE IMPROVEMENTS
BLOCK No. 174, LOT No. 1.01
TOWNSHIP OF WEST ORANGE
ESSEX COUNTY **NEW JERSEY**

Drawing Title
PROFILE TEST PIT LOCATION PLAN

Project No.	**10104980****2**
Date	**FEBRUARY 12, 2026**
Drawn By	**AY**
Checked By	**MJV**

Figure
1B

LANGAN
Project No. 101049802

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Date: 2/13/2026 Time: 07:52 User: tgreen Style Table: Langan.stb Layout: CG102 Document Code: 101049802-0102-CG101-0103

APPENDIX A

LOGS OF PROFILE TEST PITS

LOG OF TEST PIT TP-1

PROJECT NAME	PROJECT NUMBER	DATE
Eagle Rock Ave Widening	101049801	4/25/2024

LOCATION	ELEVATION
West Orange, NJ	Approx. el 538 (NAVD88)

EXCAVATION CONTRACTOR	DEPTH	WATER LEVEL - First	WATER LEVEL - Completion
Semeraro Construction, Co., Inc.	4 ft	- ▽	- ▼

EQUIPMENT	FOREMAN	LANGAN PERSONNEL
CAT 306 Excavator	Mike	Marie Vilsaint

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+538.0	Dark gray to black Silty f-c SAND, some roots (dry) [TOPSOIL]	0	S-1	GRAB	Started excavating on 4/25/2024.
	+537.0	Gray coarse GRAVEL (dry) [FILL]	1	S-2	GRAB	
	+536.0	Brown Sandy SILT, some f-c gravel, trace roots, trace cobbles (moist)	2	S-3	GRAB	HSG taken from 24" to 36" bgs.
	+534.0	End of Test Pit at 4ft bgs.	3			Refusal encountered at 2.5 to 4ft bgs (bucket teeth scraping at bottom). Top of bedrock was observed to slope East to West along Eagle Rock Ave from 2.5ft (east) to 4ft (west) bgs in 4ft span. Completed excavating on 4/25/2024. Test pit backfilled with excavated material upon completion. Easy digging observed from 0 to 4ft bgs. No mottling nor groundwater seepage obeserved in the dug test pit.
			4			
			5			
			6			
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			8			
			9			
			10			
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			12			
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LANGAN

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LOG OF TEST PIT TP-2

PROJECT NAME	PROJECT NUMBER	DATE
Eagle Rock Ave Widening	101049801	4/25/2024

LOCATION	ELEVATION
West Orange, NJ	Approx. el 537 (NAVD88)

EXCAVATION CONTRACTOR	DEPTH	WATER LEVEL - First	WATER LEVEL - Completion
Semeraro Construction, Co., Inc.	9 ft	9 ft ▽	- ▼

EQUIPMENT	FOREMAN	LANGAN PERSONNEL
CAT 306 Excavator	Mike	Marie Vilsaint

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+537.0	Dark gray to black Silty f-c SAND, some roots (dry) [TOPSOIL]	0	S-1	GRAB	Started excavating on 4/25/2024.
	+536.0	Dark gray SILT, trace glass, trace roots (dry) [FILL]	1			
			2	S-2	GRAB	
	+534.5	Tan SILT, trace roots (moist)	3	S-3	GRAB	
	+533.0	Brown Silty fine SAND, some gravel, trace cobbles (wet)	4			
			5			
			6	S-4	GRAB	
			7			
			8			Groundwater seepage observed at 8ft bgs.
			9 ▽			Groundwater ponding observed at 9ft bgs.
	+528.0	End of Test Pit at 9ft bgs.				Refusal encountered at 9ft bgs (bucket teeth scraping at bottom).
			10			Completed excavating on 4/25/2024.
						Test pit backfilled with excavated material upon completion.
			11			Easy digging observed from 0 to 9ft bgs.
			12			No mottling observed.
			13			
			14			
			15			

LANGAN

\\LANGAN.COM\DATA\PAR\DATA8\101049801\PROJECT DATA_DISCIPLINE\GEOTECHNICAL\GINTLOGS\101049801_TEST PITS.GPJ ... 8/25/2025 10:49:08 AM ... Report: Log - LANGANTP

LOG OF TEST PIT TP-3

PROJECT NAME	PROJECT NUMBER	DATE
Eagle Rock Ave Widening	101049801	4/26/2024

LOCATION	ELEVATION
West Orange, NJ	Approx. el 542 (NAVD88)

EXCAVATION CONTRACTOR	DEPTH	WATER LEVEL - First	WATER LEVEL - Completion
Semeraro Construction, Co., Inc.	8 ft	- ▽	- ▼

EQUIPMENT	FOREMAN	LANGAN PERSONNEL
CAT 306 Excavator	Mike	Marie Vilsaint

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+542.0	Dark gray to black Silty SAND, some roots (dry) [TOPSOIL]	0	S-1	GRAB	Started excavating on 4/26/2024.
	+541.0	Light brown Sandy SILT, trace gravel, trace roots (wet)	1	S-2	GRAB	HSG taken from 12 to 24" bgs.
	+540.0	Brown Sandy SILT, trace fine gravel, trace roots (moist)	2	S-3	GRAB	
			3			
			4			
			5			
			6			
			7			
	+534.0		8			Refusal encountered at 8ft bgs (bucket teeth scraping at bottom). Completed excavating on 4/26/2024. Test pit backfilled with excavated material upon completion. Easy digging observed from 0 to 8ft bgs. No mottling nor groundwater seepage observed in the dug test pit.
		End of Test Pit at 8ft bgs.	9			
			10			
			11			
			12			
			13			
			14			
			15			

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LOG OF TEST PIT TP-4

PROJECT NAME	PROJECT NUMBER	DATE
Eagle Rock Ave Widening	101049801	4/25/2024

LOCATION	ELEVATION
West Orange, NJ	Approx. el 541 (NAVD88)

EXCAVATION CONTRACTOR	DEPTH	WATER LEVEL - First	WATER LEVEL - Completion
Semeraro Construction, Co., Inc.	8 ft	- ▽	- ▼

EQUIPMENT	FOREMAN	LANGAN PERSONNEL
CAT 306 Excavator	Mike	Marie Vilsaint

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+541.0	Dark gray to black Silty SAND, some roots (dry) [TOPSOIL]	0	S-1	GRAB	Started excavating on 4/25/2024.
	+540.0	Tan SILT, trace gravel, trace roots (moist)	1	S-2	GRAB	
	+538.5	Brown Silty fine SAND, some gravel, trace cobbles (moist)	2			
			3	S-3	GRAB	
			4			
			5			
			6			
			7			
	+533.0	End of Test Pit at 8ft bgs.	8			Refusal encountered at 8ft bgs (bucket teeth scraping at bottom). Completed excavating on 4/25/2024. Test pit backfilled with excavated material upon completion. Easy digging observed from 0 to 8ft bgs. No mottling nor groundwater seepage obeserved in the dug test pit.
			9			
			10			
			11			
			12			
			13			
			14			
			15			

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LOG OF TEST PIT TP-5

PROJECT NAME	PROJECT NUMBER	DATE
Eagle Rock Ave Widening	101049801	4/26/2024

LOCATION	ELEVATION
West Orange, NJ	Approx. el 550 (NAVD88)

EXCAVATION CONTRACTOR	DEPTH	WATER LEVEL - First	WATER LEVEL - Completion
Semeraro Construction, Co., Inc.	7.5 ft	- ▽	- ▼

EQUIPMENT	FOREMAN	LANGAN PERSONNEL
CAT 306 Excavator	Mike	Marie Vilsaint

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+550.0	Dark gray to black Silty SAND, some roots (dry) [TOPSOIL]	0	S-1	GRAB	Started excavating on 4/26/2024.
	+549.0	Brown to tan Silty fine GRAVEL, some f-c sand, trace cobbles (moist)	1			HSG taken from 12 to 24" bgs.
			2			
			3			
			4	S-2	GRAB	
			5			
			6			
			7			Refusal encountered at 7.5ft bgs (bucket teeth scraping at bottom).
	+542.5	End of Test Pit at 7.5ft bgs.	8			Completed excavating on 4/26/2024. Test pit backfilled with excavated material upon completion. Easy digging observed from 0 to 7.5ft bgs. No mottling nor groundwater seepage obeserved in the dug test pit.
			9			
			10			
			11			
			12			
			13			
			14			
			15			

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LOG OF TEST PIT TP-6

PROJECT NAME	PROJECT NUMBER	DATE
Eagle Rock Ave Widening	101049801	4/26/2024
LOCATION	**ELEVATION**	
West Orange, NJ	Approx. el 545 (NAVD88)	
EXCAVATION CONTRACTOR	**DEPTH**	**WATER LEVEL - First** / **WATER LEVEL - Completion**
Semeraro Construction, Co., Inc.	5.5 ft	- / -
EQUIPMENT	**FOREMAN**	**LANGAN PERSONNEL**
CAT 306 Excavator	Mike	Marie Vilsaint

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+545.0	Dark gray to black Silty SAND, some roots (dry) [TOPSOIL]	0	S-1	GRAB	Started excavating on 4/26/2024.
	+543.5	Tan SILT, some roots, trace f-c sand (moist)	1	S-2	GRAB	HSG taken from 18" to 30" bgs.
	+541.5	Brown SILT, some cobbles, trace fine sand, trace roots (moist)	2	S-3	GRAB	
	+539.5	End of Test Pit at 5.5ft bgs.	3			Refusal encountered at 5.5ft bgs (bucket teeth scraping at bottom). Completed excavating on 4/26/2024. Test pit backfilled with excavated material upon completion. Easy digging observed from 0 to 5.5ft bgs. No mottling nor groundwater seepage obeserved in the dug test pit.
			4			
			5			
			6			
			7			
			8			
			9			
			10			
			11			
			12			
			13			
			14			
			15			

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LOG OF TEST PIT TP-7

PROJECT NAME	PROJECT NUMBER	DATE
Eagle Rock Ave Widening	101049801	4/26/2024
LOCATION	**ELEVATION**	
West Orange, NJ	Approx. el 548 (NAVD88)	
EXCAVATION CONTRACTOR	**DEPTH**	**WATER LEVEL - First** / **WATER LEVEL - Completion**
Semeraro Construction, Co., Inc.	3 ft	- / -
EQUIPMENT	**FOREMAN**	**LANGAN PERSONNEL**
CAT 306 Excavator	Mike	Marie Vilsaint

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+548.0	Dark gray to black Silty SAND, some roots (dry) [TOPSOIL]	0	S-1	GRAB	Started excavating on 4/26/2024.
	+547.3	Tan SILT, some roots, trace gravel (moist)	1	S-2	GRAB	HSG taken from 8" to 18" bgs.
	+546.5	Brown SILT, some f-c sand, trace f-c gravel, trace cobbles, trace roots	2	S-3	GRAB	Refusal encountered at 2.5 to 3ft bgs (bucket teeth scraping at bottom). Top of bedrock was observed to slope South to North towards Eagle Rock Ave from 2.5ft (south) to 3ft bgs(north) in 8ft span. Completed excavating on 4/26/2024. Test pit backfilled with excavated material upon completion. Easy digging observed from 0 to 2.5ft bgs. No mottling nor groundwater seepage obeserved in the dug test pit.
	+545.0	End of Test Pit at 3ft bgs.	3			
			4			
			5			
			6			
			7			
			8			
			9			
			10			
			11			
			12			
			13			
			14			
			15			

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LOG OF TEST PIT TP-8

PROJECT NAME	PROJECT NUMBER	DATE
Eagle Rock Ave Widening	101049801	4/26/2024
LOCATION	**ELEVATION**	
West Orange, NJ	Approx. el 544 (NAVD88)	
EXCAVATION CONTRACTOR	**DEPTH**	**WATER LEVEL - First** / **WATER LEVEL - Completion**
Semeraro Construction, Co., Inc.	7 ft	7 ft ▽ / - ▼
EQUIPMENT	**FOREMAN**	**LANGAN PERSONNEL**
CAT 306 Excavator	Mike	Marie Vilsaint

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+544.0	Dark gray to black Silty SAND, some roots (dry) [TOPSOIL]	0	S-1	GRAB	Started excavating on 4/26/2024.
	+542.5	Tan Sandy SILT, some roots, trace cobbles, trace fine gravel (moist)	1			
			2	S-2	GRAB	HSG taken from 20" to 32" bgs.
			3			
	+540.0	Brown Sandy SILT, some gravel, trace cobbles, trace roots (moist)	4	S-3	GRAB	Mottling observed at 4ft bgs.
			5			
			6			Groundwater seepage observed at 6ft bgs.
			7 ▽			Groundwater ponding at 7ft bgs.
	+537.0	End of Test Pit at 7ft bgs				Refusal encountered at 7ft bgs (bucket teeth scraping at bottom).
			8			Completed excavating on 4/26/2024.
			9			Test pit backfilled with excavated material upon completion.
			10			Easy digging observed from 0 to 7ft bgs.
			11			
			12			
			13			
			14			
			15			

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LOG OF TEST PIT TP-9

PROJECT NAME	PROJECT NUMBER	DATE
Eagle Rock Ave Widening	101049801	4/26/2024
LOCATION	**ELEVATION**	
West Orange, NJ	Approx. el 553 (NAVD88)	
EXCAVATION CONTRACTOR	**DEPTH**	**WATER LEVEL - First** / **WATER LEVEL - Completion**
Semeraro Construction, Co., Inc.	8 ft	- / -
EQUIPMENT	**FOREMAN**	**LANGAN PERSONNEL**
CAT 306 Excavator	Mike	Marie Vilsaint

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+553.0	Dark gray to black Silty SAND, some roots (dry) [TOPSOIL]	0	S-1	GRAB	Started excavating on 4/26/2024.
	+551.0	Tan SILT, some fine sand, trace fine gravel, trace roots (wet)	2	S-2	GRAB	HSG taken from 24" to 36" bgs.
	+550.0	Brown Sandy SILT, some f-c gravel, some cobbles (moist)	3	S-3	GRAB	
	+545.0	End of Test Pit at 8ft bgs	8			Refusal encountered at 8ft bgs (bucket teeth scraping at bottom). Completed excavating on 4/26/2024. Test pit backfilled with excavated material upon completion. Easy digging observed from 0 to 8ft bgs. No mottling nor groundwater seepage obeserved in the dug test pit.

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LOG OF TEST PIT TP-10

PROJECT NAME	PROJECT NUMBER	DATE
Eagle Rock Ave Widening	101049801	4/25/2024

LOCATION	ELEVATION
West Orange, NJ	Approx. el 537 (NAVD88)

EXCAVATION CONTRACTOR	DEPTH	WATER LEVEL - First	WATER LEVEL - Completion
Semeraro Construction, Co., Inc.	11 ft	10.75 ft ▽	- ▼

EQUIPMENT	FOREMAN	LANGAN PERSONNEL
CAT 306 Excavator	Mike	Marie Vilsaint

Symbol	ELEV (feet)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+537.0	Dark gray to black Silty SAND, some roots (dry) [TOPSOIL]	0	S-1	GRAB	Started excavating on 4/25/2024.
	+536.0	Light brown SILT, trace fine sand	1	S-2	GRAB	Mottling observed between 1 to 2ft bgs.
	+535.0	Brown SILT, some f-c sand, trace gravel, trace cobbles (moist) [ML]	2	S-3	GRAB	HSG taken from 16" to 28" bgs.
			3			
			4			
			5			
			6			
			7			
			8			Groundwater seepage observed at 7.7ft bgs.
			9			
			10			
		▽	11			Groundwater ponding at 10.75ft bgs.
	+526.0	End of Test pit at 11ft bgs	12			Hard digging at about 11ft bgs. Completed excavating on 4/25/2024. Test pit backfilled with excavated material upon completion. Easy digging observed from 0 to 11ft bgs.
			13			
			14			
			15			

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Log of Test Pit **TP-11** Sheet 1 of 1

Project: West Essex Highlands	Project No.: 101049801	Date: 4/15/2025
Location: West Orange, New Jersey	Elevation and Datum: Approx. el. 543.0 (NAVD88)	
Excavation Company: Semeraro Construction, Co., Inc.	Depth: 7.0 ft	Water Level - First: - ▽ / Water Level - Completion: - ▼
Excavation Equipment: Hitachi Excavator 7X85	Excavation Foreman: Roy Westervelt	Field Engineer: Bhumi Peer

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+543.0					
	+542.8	Topsoil (Approx. 3") [TOPSOIL]	0			Began excavating on 4/15/2025 at 9:40 AM.
	+542.2	Gray CLAY, with organics (moist)		G-2	GRAB	
	+542.0	Brown SILT, some clay	1	G-1	GRAB	Roots greater than 1/2" in diameter extend to 0.5 ft bgs. Roots less than 1/2" in diameter extend to 1 ft bgs.
		Reddish brown to orangish brown Clayey SILT, trace fine gravel, trace fine to coarse sand (moist)		G-3	GRAB	HSG taken from 21" to 33" bgs.
			2			
			3			
	+539.0		4			Cobbles and small boulders (less than 1 ft dia.) encountered at 4 ft.
		Reddish brown SILT, some clay, some fine to coarse gravel, some fine to coarse sand, with cobbles and boulders (moist)				
			5			
			6	G-4	GRAB	
	+536.0		7			Excavator bucket refusal encountered at 7 ft. Possible weathered rock or boulder. No mottling observed.
		End of Test Pit at 7.0ft.				End of test pit at 10:00 AM on 4/15/2025. Test pit backfilled with excavated material.
			8			
			9			
			10			
			11			
			12			
			13			
			14			
			15			
			16			
			17			
			18			
			19			
			20			

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Log of Test Pit **TP-12** Sheet 1 of 1

Project	Project No.	Date
West Essex Highlands	101049801	4/15/2025

Location	Elevation and Datum
West Orange, New Jersey	Approx. el. 548.5 (NAVD88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
Semeraro Construction, Co., Inc.	8.0 ft	- ▽	- ▼

Excavation Equipment	Excavation Foreman	Field Engineer
Hitachi Excavator 7X85	Roy Westervelt	Bhumi Peer

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+548.5					
	+548.2	Topsoil (Approx. 4") [TOPSOIL]	0			Began excavating on 4/15/2025 at 8:35 AM.
		Gray Silty CLAY with organics (moist)		G-1	GRAB	Roots extend to 8" bgs.
	+547.5		1			HSG taken from 12" to 24" bgs.
		Brown to orangish brown Silty fine to medium SAND, some clay, trace gravel (moist)		G-2	GRAB	
	+546.5		2			
		Reddish brown Sandy SILT, some gravel, trace clay (moist)		G-3	GRAB	
			3			Cobbles encountered at 3 ft.
			4			
			5			
			6			Hard digging at 6 ft. Boulders (1 ft dia.) encountered at 6 ft.
			7			
	+540.5		8			Excavator bucket refusal encountered at 8 ft due to an obstruction. Possible weathered rock or boulder. No water seepage nor mottling observed in test pit.
		End of Test Pit at 8.0ft.	9			End of test pit at 9:13 AM on 4/15/2025. Test pit backfilled with excavated material.
			10			
			11			
			12			
			13			
			14			
			15			
			16			
			17			
			18			
			19			
			20			

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Log of Test Pit **TP-13** Sheet 1 of 1

Project: West Essex Highlands	Project No.: 101049801	Date: 4/15/2025
Location: West Orange, New Jersey	Elevation and Datum: Approx. el. 551.0 (NAVD88)	
Excavation Company: Semeraro Construction, Co., Inc.	Depth: 8.5 ft	Water Level - First: 3.0 ▽ / Water Level - Completion: - ▼
Excavation Equipment: Hitachi Excavator 7X85	Excavation Foreman: Roy Westervelt	Field Engineer: Bhumi Peer

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+551.0	Dark brown fine to coarse SAND, some silt with roots and construction debris [TOPSOIL and FILL]	0	G-1	GRAB	Began excavating on 4/15/2025 at 10:25 AM. Roots greater than 1/2" in diameter extend to 6" bgs. Roots less than 1/2" in diameter extend to 1 ft bgs.
	+550.0	Dark gray to gray CLAY, some silt (moist)	1	G-2	GRAB	
	+549.0	Orangish brown to reddish brown Silty fine to medium SAND, some clay, trace gravel (wet)	2			
		▽	3	G-3	GRAB	HSG taken from 30" to 40" bgs. Little water seepage observed at 3 ft.
	+546.0	Reddish brown SILT, some clay, some gravel, trace fine to coarse sand with cobbles and boulders (moist)	4			
			5			Cobbles and boulders (1 ft dia.) encountered at 5 ft.
			6			
			7	G-4	GRAB	Hard digging at 7.5 ft.
	+542.5		8			Obstruction and excavator bucket refusal at 8.5 ft. Possible weathered rock or boulder. No mottling observed. End of test pit at 11:00 AM on 4/15/2025. Test pit backfilled with excavated material.
		End of Test Pit at 8.5ft.	9			
			10			
			11			
			12			
			13			
			14			
			15			
			16			
			17			
			18			
			19			
			20			

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Log of Test Pit **TP-14** Sheet 1 of 1

Project: West Essex Highlands	Project No.: 101049801	Date: 4/15/2025
Location: West Orange, New Jersey	Elevation and Datum: Approx. el. 559.0 (NAVD88)	
Excavation Company: Semeraro Construction, Co., Inc.	Depth: 1.8 ft	Water Level - First: - ▽ / Water Level - Completion: - ▼
Excavation Equipment: Hitachi Excavator 7X85	Excavation Foreman: Roy Westervelt	Field Engineer: Bhumi Peer

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+559.0					
	+558.7	Topsoil (Approx. 4") [TOPSOIL]	0			Began excavating on 4/15/2025 at 7:35 AM.
		Brown fine to coarse SAND, some silt, trace gravel with wood and brick pieces (moist) [FILL]	1	G-1	GRAB	Roots less than 1/2" in diameter extend to 6" bgs.
	+557.8					HSG taken from 15" to 21" bgs.
	+557.2	Reddish brown Silty fine to medium SAND, some clay, trace gravel (moist)	2	G-2	GRAB	Excavator bucket refusal at 1.75 ft. Possible top of rock.
		End of Test Pit at 1.8ft.	3			No water seepage nor mottling observed.
			4			End of test pit at 8:00 AM on 4/15/2025.
			5			
			6			
			7			
			8			
			9			
			10			
			11			
			12			
			13			
			14			
			15			
			16			
			17			
			18			
			19			
			20			

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Log of Test Pit **TP-15** Sheet 1 of 1

Project	Project No.	Date
West Essex Highlands	101049801	4/15/2025

Location	Elevation and Datum
West Orange, New Jersey	Approx. el. 551.0 (NAVD88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
Semeraro Construction, Co., Inc.	3.0 ft	- ▽	- ▼

Excavation Equipment	Excavation Foreman	Field Engineer
Hitachi Excavator 7X85	Roy Westervelt	Bhumi Peer

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+551.0					
	+550.8	Topsoil (Approx. 3") [TOPSOIL]	0			Began excavating on 4/15/2025 at 8:05 AM.
		Brown SILT, some clay, trace gravel (moist)		G-1	GRAB	
	+550.0	Reddish brown Sandy SILT, some clay some gravel (moist)	1	G-2	GRAB	HSG taken from 16" to 28" bgs.
			2			Cobbles at 2 ft. Hard digging at 2.5 ft.
	+548.0	End of Test Pit at 3.0ft.	3			Excavator bucket refusal at 3 ft. Possible top of rock. No water seepage nor mottling observed. End of test pit at 8:25 AM on 4/15/2025. Test pit backfilled with excavated material
			4			
			5			
			6			
			7			
			8			
			9			
			10			
			11			
			12			
			13			
			14			
			15			
			16			
			17			
			18			
			19			
			20			

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Log of Test Pit **TP-16** Sheet 1 of 1

Project: West Essex Highlands	Project No.: 101049801	Date: 4/14/2025
Location: West Orange, New Jersey	Elevation and Datum: Approx. el. 562.5 (NAVD88)	
Excavation Company: Semeraro Construction, Co., Inc.	Depth: 10.5 ft	Water Level - First: - ▽ / Water Level - Completion: - ▼
Excavation Equipment: Hitachi Excavator 7X85	Excavation Foreman: Roy Westervelt	Field Engineer: Bhumi Peer

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+562.5					
	+562.2	Topsoil (Approx. 4") [TOPSOIL]				Began excavating on 4/14/2025 at 1:45 PM. Roots extend to 1.25 ft bgs.
		Dark brown SILT, some clay, some fine to medium sand, trace gravel with roots and construction debris (moist) [FILL]	0			
			1	G-1	GRAB	
	+561.0	Reddish brown to brown SILT, some clay, some gravel (moist)				
			2			
	+560.0	Reddish brown Silty fine to medium SAND, some clay, some gravel (moist)				HSG taken from 30" to 42" bgs.
			3	G-2	GRAB	
			4			
			5			
			6			
	+555.5	Reddish brown to tan Silty fine to medium SAND, trace clay, trace gravel (moist)	7			
			8	G-3	GRAB	
	+553.5	Tan ROCK PIECES (moist) [POSSIBLE BEDROCK]	9			Hard digging at 9 ft. Boulder (1 ft dia.) encountered at 9 ft.
			10	G-4	GRAB	
	+552.0	End of Test Pit at 10.5ft.	11			Excavator bucket refusal at 10.5 ft. No water seepage nor mottling observed. End of test pit at 2:35 PM on 4/14/2025. Test pit backfilled with excavated material.
			12			
			13			
			14			
			15			
			16			
			17			
			18			
			19			
			20			

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Log of Test Pit **TP-17** Sheet 1 of 1

Project: West Essex Highlands	Project No.: 101049801	Date: 4/14/2025
Location: West Orange, New Jersey	Elevation and Datum: Approx. el. 566.0 (NAVD88)	
Excavation Company: Semeraro Construction, Co., Inc.	Depth: 12.0 ft	Water Level - First: - ▽ / Water Level - Completion: - ▼
Excavation Equipment: Hitachi Excavator 7X85	Excavation Foreman: Roy Westervelt	Field Engineer: Bhumi Peer

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+566.0					
	+565.8	Topsoil (Approx 2") [TOPSOIL]	0	G-1	GRAB	Began excavating on 4/14/2025 at 12:15 PM. Fine roots extend to 1 ft bgs.
		Brown Silty fine to medium SAND, some clay, some gravel with trace roots and trace brick pieces (moist) [FILL]	1	G-2	GRAB	HSG taken from 18" to 30" bgs.
			2			Large pieces of concrete at 2 ft.
						Large pieces of rock from 2.5 ft to 4 ft.
			3			
			4			
			5	G-3	GRAB	
			6			Large chunk of concrete and bricks at 6 ft.
			7			
			8			
			9			
	+556.0		10			
		Tan to reddish brown Clayey SILT, some fine to medium sand, trace gravel (moist)		G-4	GRAB	
			11			
	+554.5					
	+554.0	Reddish brown SILT, some clay, some fine to medium sand, some gravel (moist)	12	G-5	GRAB	Excavator limit reached and southwest wall collapsing. No water seepage nor mottling observed.
		End of Test Pit at 12.0ft.				End of test pit at 1:15 PM on 4/14/2025.
			13			
			14			
			15			
			16			
			17			
			18			
			19			
			20			

LANGAN

Log of Test Pit **TP-18** Sheet 1 of 1

Project	Project No.	Date
West Essex Highlands	101049801	4/14/2025
Location	**Elevation and Datum**	
West Orange, New Jersey	Approx. el. 567.0 (NAVD88)	
Excavation Company	**Depth**	**Water Level - First** / **Water Level - Completion**
Semeraro Construction, Co., Inc.	4.0 ft	- / -
Excavation Equipment	**Excavation Foreman**	**Field Engineer**
Hitachi Excavator 7X85	Roy Westervelt	Bhumi Peer

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+567.0					
	+566.5	Topsoil (Approx. 6") [TOPSOIL]	0	G-1	GRAB	Began excavating on 4/14/2025 at 10:45 AM.
		Brown SILT, some clay, some gravel, trace fine to coarse sand with brick pieces (moist) [FILL]	1	G-2	GRAB	Roots 1/2" to 1" in diameter extend to 6" bgs. Roots less than 1/2" in diameter extend to 1 ft bgs.
	+565.5					
		Brown to reddish brown Silty fine to medium SAND, some clay with brick and concrete pieces (moist) [FILL]	2	G-3	GRAB	HSG taken from 18" to 30" bgs. Boulder (1 ft dia.) encountered at 2 ft. Concrete piece at northeast corner at 2 ft.
	+564.2					
		Dark brown fine to coarse SAND with roots and organics (moist) [BURIED TOPSOIL]	3	G-4	GRAB	
	+563.2					
	+563.0	Gray ROCK PIECES (moist) [POSSIBLE BEDROCK]	4	G-5	GRAB	Hard digging. Excavator bucket refusal at 4 ft. No water seepage nor mottling observed in test pit. End of test pit at 11:20 AM on 4/14/2025.
		End of Test Pit at 4.0ft.	5			
			6			
			7			
			8			
			9			
			10			
			11			
			12			
			13			
			14			
			15			
			16			
			17			
			18			
			19			
			20			

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Log of Test Pit **TP-19** Sheet 1 of 1

Project	Project No.	Date
West Essex Highlands	101049801	4/14/2025

Location	Elevation and Datum
West Orange, New Jersey	Approx. el. 563.0 (NAVD88)

Excavation Company	Depth	Water Level - First	Water Level - Completion
Semeraro Construction, Co., Inc.	2.0 ft	- ▽	- ▼

Excavation Equipment	Excavation Foreman	Field Engineer
Hitachi Excavator 7X85	Roy Westervelt	Bhumi Peer

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+563.0					
	+562.8	Topsoil (Approx. 2") [TOPSOIL]	0			Began excavating on 4/14/2025 at 10:05 AM.
		Dark gray GRAVEL (moist) [FILL]		G-1	GRAB	Roots greater than 1/2" in diameter extend to 6" bgs.
	+562.0		1			Roots less than 1/2" in diameter extend to 1 ft bgs.
		Reddish brown to gray ROCK PIECES (moist) [POSSIBLE BEDROCK]				HSG taken from 4" to 18" bgs.
	+561.0			G-2	GRAB	
		End of Test Pit at 2.0ft.	2			Hard digging. Excavator bucket refusal at 2 ft.
						No water seepage nor mottling observed.
						End of test pit at 10:30 AM on 4/14/2025.
			3			
			4			
			5			
			6			
			7			
			8			
			9			
			10			
			11			
			12			
			13			
			14			
			15			
			16			
			17			
			18			
			19			
			20			

LANGAN

Log of Test Pit **TP-20** Sheet 1 of 1

Project: West Essex Highlands	Project No.: 101049801	Date: 4/14/2025
Location: West Orange, New Jersey	Elevation and Datum: Approx. el. 566.5 (NAVD88)	
Excavation Company: Semeraro Construction, Co., Inc.	Depth: 2.0 ft	Water Level - First: - ▽ / Water Level - Completion: - ▼
Excavation Equipment: Hitachi Excavator 7X85	Excavation Foreman: Roy Westervelt	Field Engineer: Bhumi Peer

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+566.5					
	+566.2	Topsoil (Approx. 4") [TOPSOIL]	0	G-1	GRAB	Began excavating on 4/14/2025 at 9:20 AM.
		Brown Silty fine to coarse SAND, some gravel with trace roots and glass pieces (moist) [FILL]		G-2	GRAB	Roots 1/4" in diameter extend to 6" bgs.
	+565.0		1			
	+564.5	Tan to orangish brown Sandy SILT, some clay, some fine to coarse sand (moist)		G-3	GRAB	HSG taken from 18" to 30" bgs. Potential orange mottling at 1.5 ft
		End of Test Pit at 2.0ft.	2			Boulder (1 ft dia.) encountered at 2 ft. Obstruction and excavator bucket refusal at 2 ft. Potential top of rock. No water seepage observed. End of test pit at 9:50 AM on 4/14/2025.
			3			
			4			
			5			
			6			
			7			
			8			
			9			
			10			
			11			
			12			
			13			
			14			
			15			
			16			
			17			
			18			
			19			
			20			

LANGAN

Log of Test Pit **TP-21** Sheet 1 of 1

Project: West Essex Highlands	Project No.: 101049801	Date: 4/14/2025
Location: West Orange, New Jersey	Elevation and Datum: Approx. el. 539.5 (NAVD88)	
Excavation Company: Semeraro Construction, Co., Inc.	Depth: 6.5 ft	Water Level - First: 1.0 ▽ / Water Level - Completion: - ▼
Excavation Equipment: Hitachi Excavator 7X85	Excavation Foreman: Roy Westervelt	Field Engineer: Bhumi Peer

SYMBOL	Elev. (ft)	DESCRIPTION	Depth Scale	SAMPLE Number	SAMPLE Type	REMARKS
	+539.5					
	+538.9	Topsoil (Approx 7") [TOPSOIL]	0	G-1	GRAB	Began excavating on 4/14/2025 at 8:20 AM.
	+538.5	Gray GRAVEL (wet) [FILL] ▽		G-2	GRAB	
		Tan to brown SILT, some clay, trace gravel, trace fine to medium sand (wet)	1			Rapid water seepage at 1 ft HSG taken from 20" to 32" bgs.
			2			
			3	G-2	GRAB	
	+536.0	Reddish brown SILT, some clay, trace gravel, trace fine to medium sand (wet)	4			Potential orange mottling at 4 ft.
			5			
			6	G-4	GRAB	
	+533.0	End of Test Pit at 6.5ft.	7			Hard digging and excavator bucket refusal at 6.5'. Possible top of rock. End of test pit at 9:00 AM on 4/14/2025.
			8			
			9			
			10			
			11			
			12			
			13			
			14			
			15			
			16			
			17			
			18			
			19			
			20			

APPENDIX B

SELECT TEST PIT PHOTOGRAPHS



TP-1 – Sidewall



TP-1 – Sidewall and Bedrock Surface



TP-2 – Sidewall



TP-2 – Groundwater Seepage



TP-3 – Sidewall



TP-3 – Sidewall



TP-4



TP-4 – Sidewalls



TP-5



TP-5 – Sidewall



TP-6



TP-6 – Sidewall



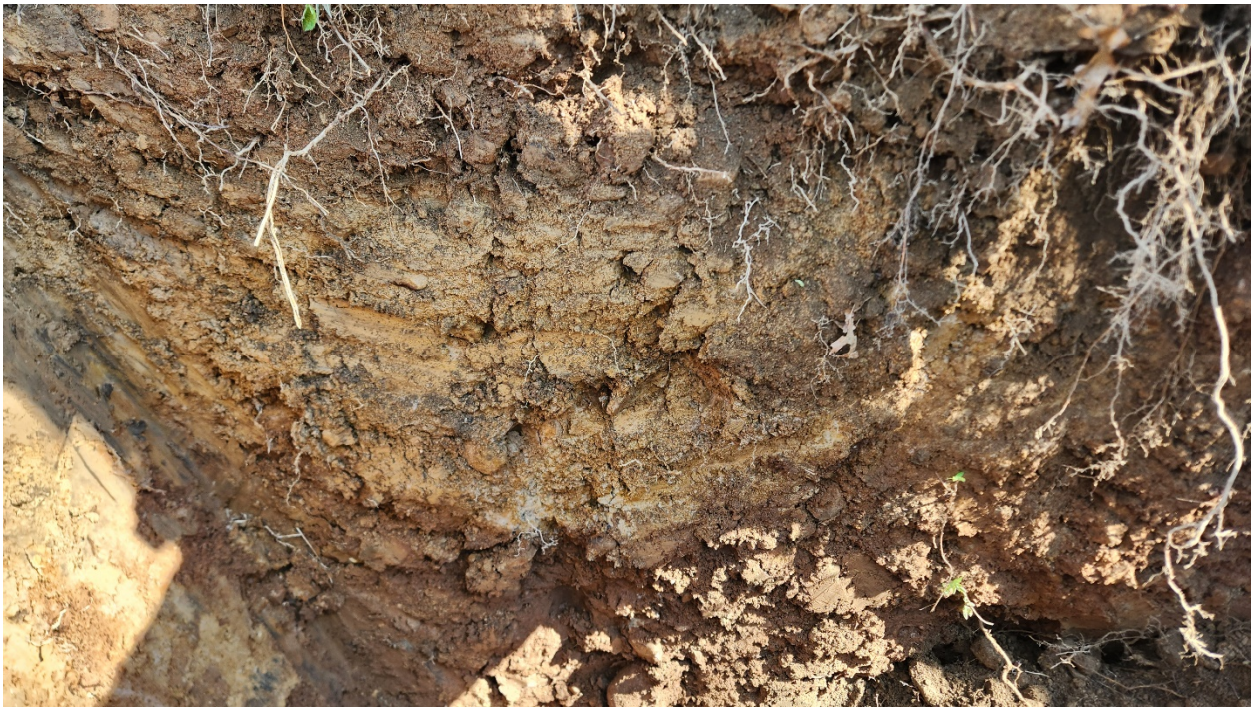
TP-7



TP-7 – Sidewalls



TP-8 – Sidewall



TP-8 – Mottling on Sidewall



TP-9 – Sidewall



TP-9 – Sidewall



TP-10 – Sidewall



TP-10 – Mottling on Sidewall



TP-11 – (Facing Northeast)



TP-11 – (Facing Northwest)



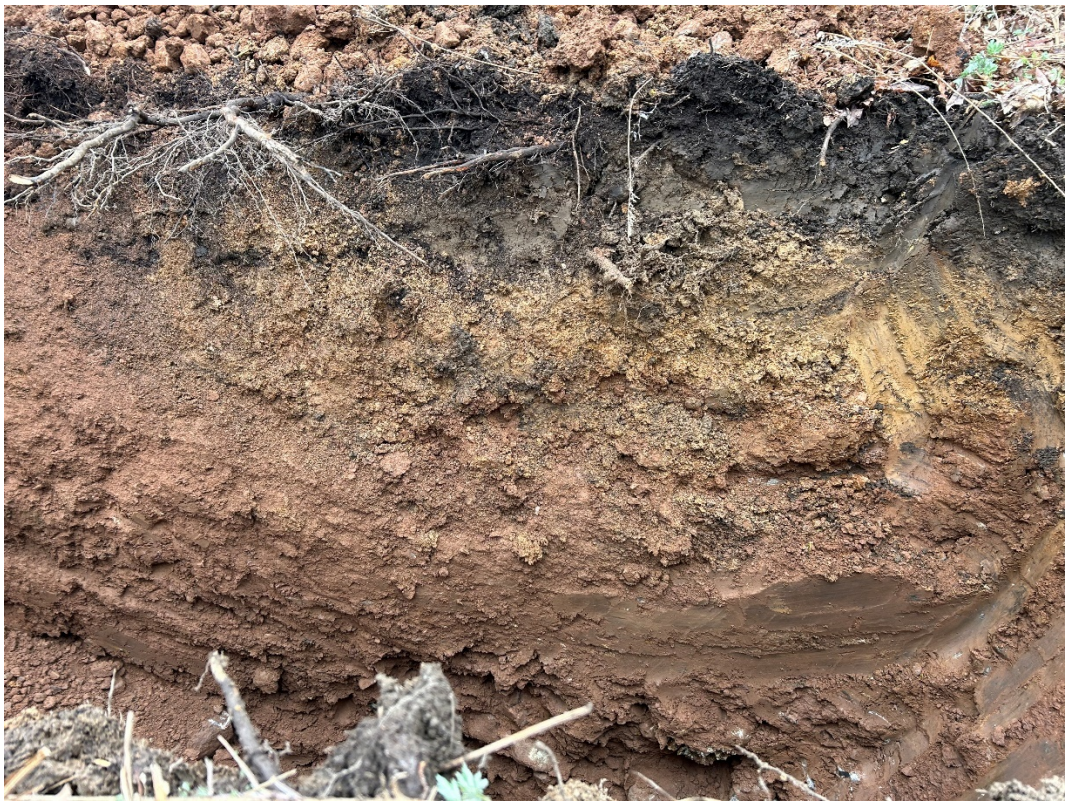
TP-11 – (Facing Southeast)



TP-11 – (Facing Southeast)



TP-12 – (Facing Southwest)



TP-12 – (Facing Northwest)



TP-12 – (Facing Northeast)



TP-12 – (Facing Southeast)



TP-13 – (Facing Northeast)



TP-13 – (Facing Northwest)



TP-13 – (Facing Southwest)



TP-13 – (Facing Southeast)



TP-14 – (Facing Northwest)



TP-14 – (Facing Southwest)



TP-14 – (Facing Northeast)



TP-14 – (Facing Southeast)



TP-15 – (Facing Southwest)



TP-15 – (Facing Northwest)



TP-15 – (Facing Northeast)



TP-15 – (Facing Southwest)



TP-16 – (Facing Northwest)



TP-16 – (Facing Northeast)



TP-16 – (Facing East)



TP-16 – (Facing Southeast)



TP-17 – (Facing Northwest)



TP-17 – (Facing Southwest)



TP-17 – (Facing Northeast)



TP-17 – (Facing Southeast)



TP-18 – (Facing East)



TP-18 – (Facing North)



TP-18 – (Facing West)



TP-18 – (Facing South)



TP-19 – (Facing North)



TP-19 – (Facing West)



TP-19 – (Facing South)



TP-19 – (Facing East)



TP-20 – (Facing West)



TP-20 – (Facing North)



TP-20 – (Facing East)



TP-20 – (Facing South)



TP-21 – (Facing Northeast)



TP-21 – (Facing Northwest)



TP-21 – (Facing North)



TP-21 – (Facing Southwest)



TP-21 – (Facing Southeast)

APPENDIX C

LABORATORY TESTING RESULTS

RSA GEOLAB

1017 Greeley Ave N
Union, NJ 07083
908-964-0786
www.RSAGeolab.com

Shelby Tybe Hydraulic Conductivity Test
ASTM D2434 (For Calculations)

Client:	Langan Eng. & Env. Services, Inc.	Job No.:	869
Project:	Eagle Rock Ave Widening Project Proj. No. 101049801	Lab Log No.:	L#24-3391
Sample:	TP-1 S-1 24"-36"	Date:	5/24/2024

Average Length of Soil Core	4.321 in.	Initial Weight of Soil Core	904.3	grams
		Final Weight of Soil Core	917.0	grams
		Dry Weight of Soil Core	763.7	grams
Diameter of Shelby Tube	2.875 in.	Initial Moisture Content	18.41%	
Diameter of Standpipe	0.250 in.	Final Moisture Content	20.07%	
		Wet Density, Initial	122.81	PCF
		Wet Density, Final	124.54	PCF
		Dry Density	103.72	PCF

Trial No.	Initial Height (inches)	Final Height (inches)	Change in Water Level (inches)	Time Interval (secs)	Hydraulic Conductivity	
					cm/sec	in/hr
1	39.5	38.4	1.1	1760.0	1.33E-06	1.89E-03
2	38.4	37.2	1.2	1800.0	1.46E-06	2.07E-03
3	37.2	36.0	1.2	1840.0	1.48E-06	2.10E-03

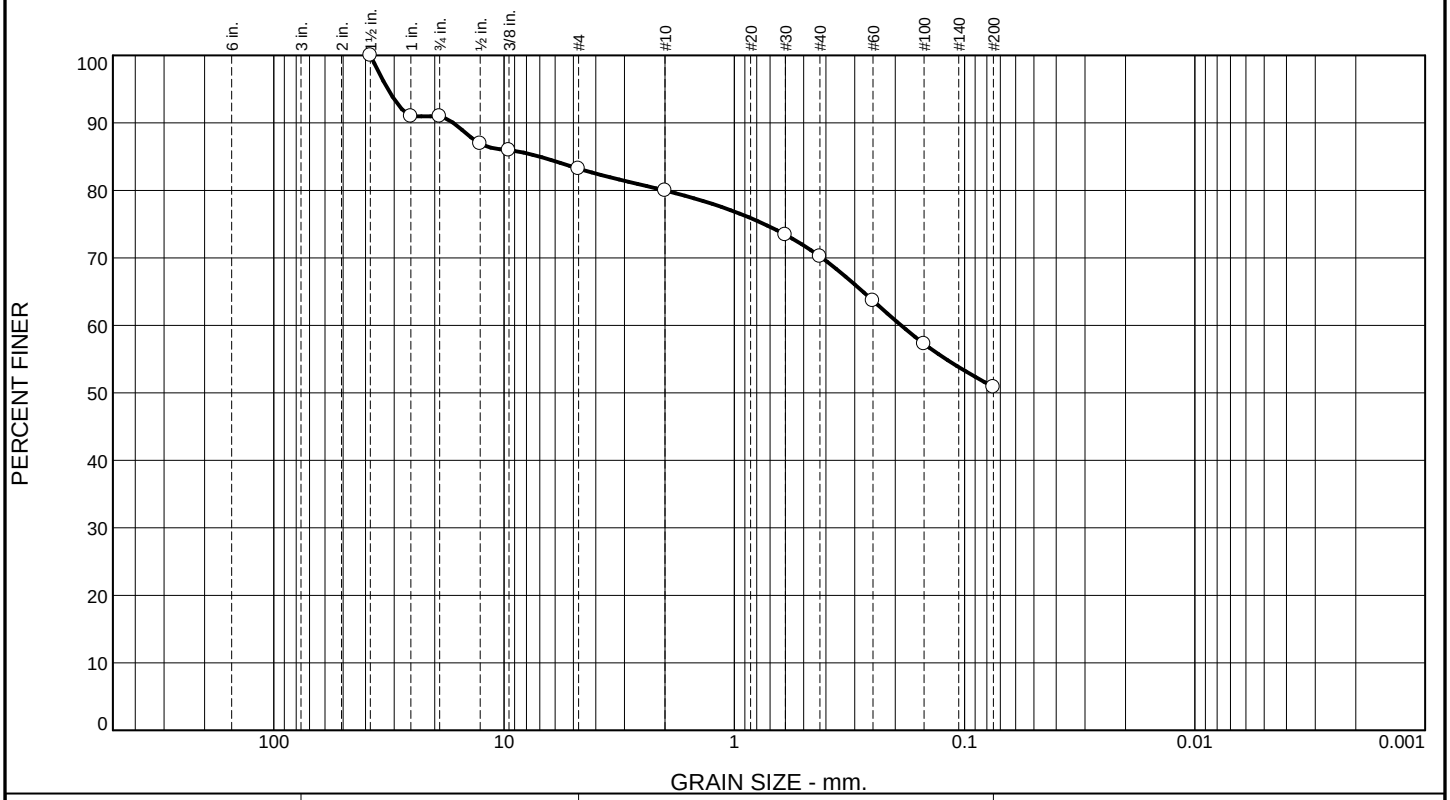
Average Hydraulic Conductivity	**1.42E-06**	cm/sec
	2.02E-03	in/hr

Remarks:

1. Test Conducted Using Daired Tap Water at Standard Temp. (72° F)
2. 100% Saturation Assumed

Tested by: AO
Checked by: KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	9.0	7.8	3.2	9.8	19.3	50.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	91.0		
.75	91.0		
.5	86.9		
.375	86.0		
#4	83.2		
#10	80.0		
#30	73.4		
#40	70.2		
#60	63.7		
#100	57.3		
#200	50.9		

* (no specification provided)

Material Description

Yellowish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 16.6181 D_{85}= 7.0062 D_{60}= 0.1887
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-1 S-1 24-36"

Date: 5-24-24

RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Eagle Rock Ave Widening Project, West Orange, NJ
Project#101049801
Project No: 869 **Figure**

Tested By: EE **Checked By:** KP

RSA GEOLAB

1017 Greeley Ave N
Union, NJ 07083
908-964-0786
www.RSAGeolab.com

Shelby Tybe Hydraulic Conductivity Test
ASTM D2434 (For Calculations)

Client:	Langan Eng. & Env. Services, Inc.	Job No.:	869
Project:	Eagle Rock Ave Widening Project Proj. No. 101049801	Lab Log No.:	L#24-3391
Sample:	TP-3 S-1 1'-2'	Date:	5/24/2024

Average Length of Soil Core	3.435 in.	Initial Weight of Soil Core	753.3	grams
		Final Weight of Soil Core	754.1	grams
		Dry Weight of Soil Core	634.7	grams
Diameter of Shelby Tube	2.875 in.	Initial Moisture Content	18.67%	
Diameter of Standpipe	0.250 in.	Final Moisture Content	18.81%	
		Wet Density, Initial	128.69	PCF
		Wet Density, Final	128.84	PCF
		Dry Density	108.44	PCF

Trial No.	Initial Height (inches)	Final Height (inches)	Change in Water Level (inches)	Time Interval (secs)	Hydraulic Conductivity	
					cm/sec	in/hr
1	39.9	39.0	0.9	480.0	3.14E-06	4.44E-03
2	39.0	38.0	1.0	540.0	3.17E-06	4.50E-03
3	38.0	37.0	1.0	550.0	3.20E-06	4.53E-03

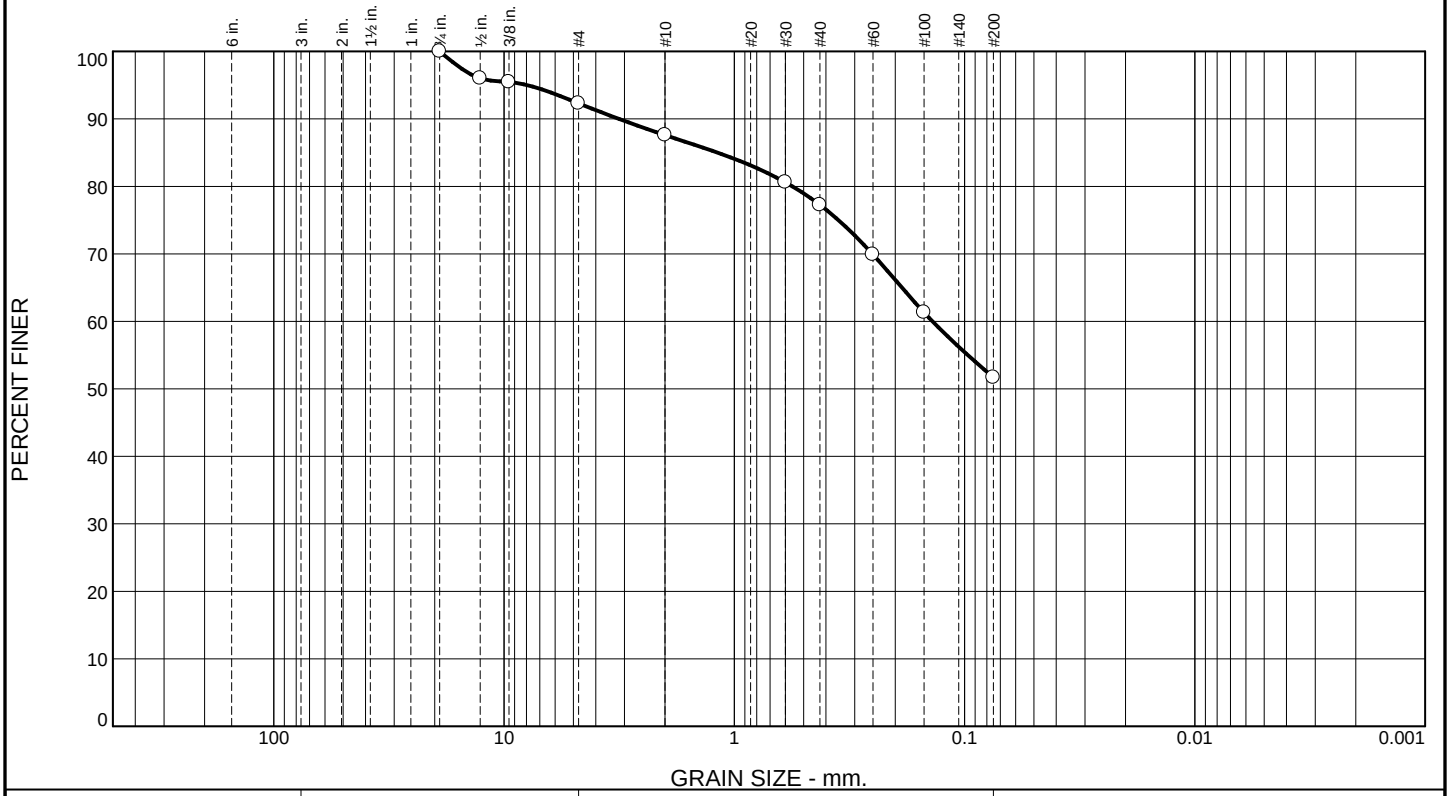
Average Hydraulic Conductivity	**3.17E-06**	cm/sec
	4.49E-03	in/hr

Remarks:

1. Test Conducted Using Daired Tap Water at Standard Temp. (72° F)
2. 100% Saturation Assumed

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	7.7	4.7	10.3	25.6	51.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	96.0		
.375	95.5		
#4	92.3		
#10	87.6		
#30	80.6		
#40	77.3		
#60	69.9		
#100	61.3		
#200	51.7		

* (no specification provided)

Material Description

Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 3.1705 D_{85}= 1.1826 D_{60}= 0.1379
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-3 S-1 1-2'

Date: 5-24-24

RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Eagle Rock Ave Widening Project, West Orange, NJ
Project#101049801
Project No: 869 **Figure**

Tested By: EE **Checked By:** KP

RSA GEOLAB

1017 Greeley Ave N
Union, NJ 07083
908-964-0786
www.RSAGeolab.com

Shelby Tybe Hydraulic Conductivity Test
ASTM D2434 (For Calculations)

Client:	Langan Eng. & Env. Services, Inc.	Job No.:	869
Project:	Eagle Rock Ave Widening Project Proj. No. 101049801	Lab Log No.:	L#24-3391
Sample:	TP-5 S-1 1'-2'	Date:	5/24/2024

Average Length of Soil Core	4.704 in.	Initial Weight of Soil Core	997.3	grams
		Final Weight of Soil Core	1008.6	grams
		Dry Weight of Soil Core	813.7	grams
Diameter of Shelby Tube	2.875 in.	Initial Moisture Content	22.56%	
Diameter of Standpipe	0.250 in.	Final Moisture Content	23.95%	
		Wet Density, Initial	124.42	PCF
		Wet Density, Final	125.82	PCF
		Dry Density	101.51	PCF

Trial No.	Initial Height (inches)	Final Height (inches)	Change in Water Level (inches)	Time Interval (secs)	Hydraulic Conductivity	
					cm/sec	in/hr
1	39.8	29.6	10.2	780.0	3.43E-05	4.86E-02
2	39.8	29.0	10.8	840.0	3.40E-05	4.83E-02
3	39.6	29.5	10.1	780.0	3.41E-05	4.83E-02

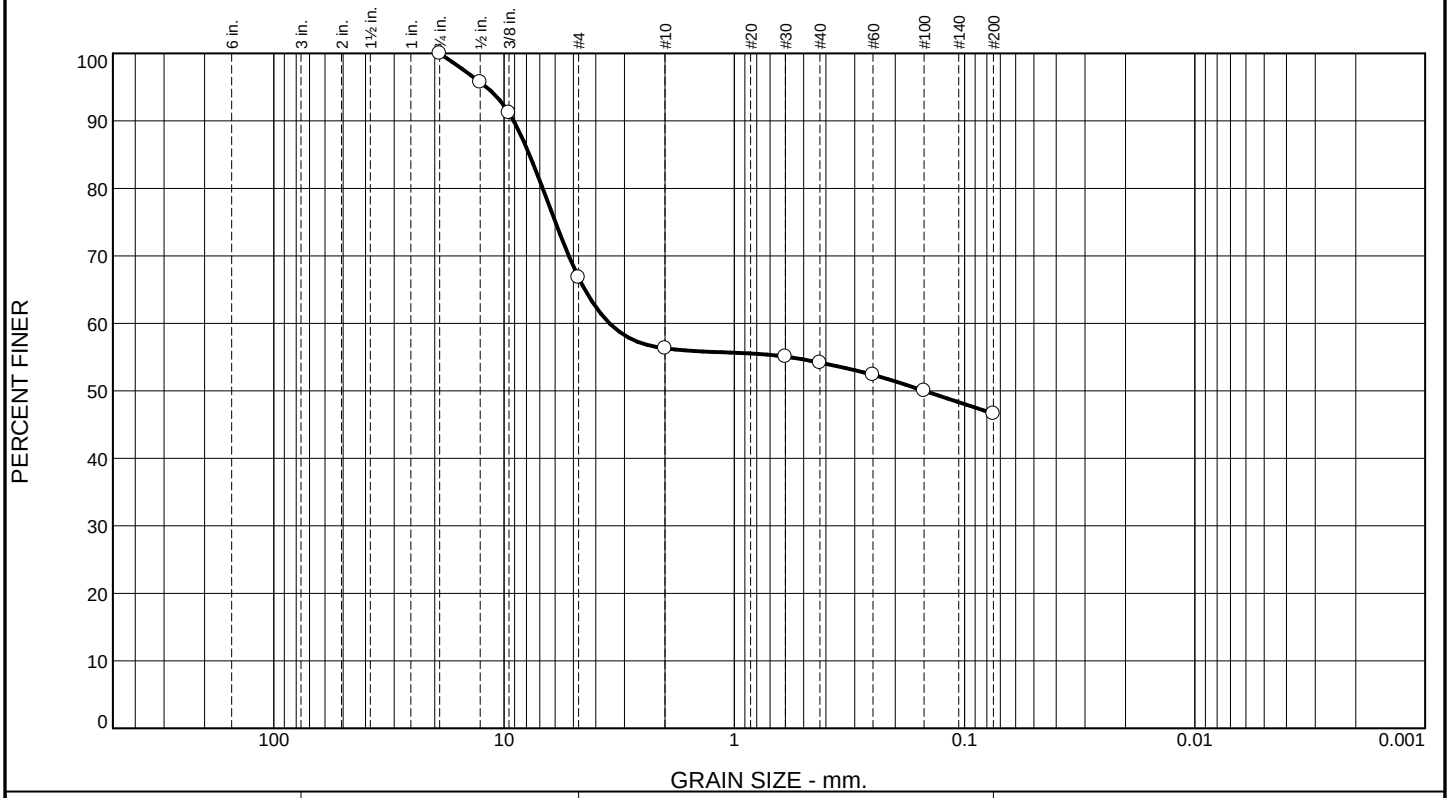
Average Hydraulic Conductivity	**3.41E-05**	cm/sec
	4.84E-02	in/hr

Remarks:

1. Test Conducted Using Daired Tap Water at Standard Temp. (72° F)
2. 100% Saturation Assumed

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	33.2	10.5	2.1	7.6	46.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	95.7		
.375	91.2		
#4	66.8		
#10	56.3		
#30	55.1		
#40	54.2		
#60	52.4		
#100	50.0		
#200	46.6		

* (no specification provided)

Material Description

Dark Yellowish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 9.0820 D_{85}= 7.7631 D_{60}= 3.4816
D_{50}= 0.1497 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-5 S-1 1-2'

Date: 5-24-24

RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Eagle Rock Ave Widening Project, West Orange, NJ
Project#101049801
Project No: 869 **Figure**

Tested By: EE **Checked By:** KP

RSA GEOLAB

1017 Greeley Ave N
Union, NJ 07083
908-964-0786
www.RSAGeolab.com

Shelby Tybe Hydraulic Conductivity Test
ASTM D2434 (For Calculations)

Client:	Langan Eng. & Env. Services, Inc.	Job No.:	869
Project:	Eagle Rock Ave Widening Project Proj. No. 101049801	Lab Log No.:	L#24-3391
Sample:	TP-6 S-1 1.5'-2.5'	Date:	5/24/2024

Average Length of Soil Core	4.331 in.	Initial Weight of Soil Core	890.4	grams
		Final Weight of Soil Core	893.3	grams
		Dry Weight of Soil Core	715.1	grams
Diameter of Shelby Tube	2.875 in.	Initial Moisture Content	24.51%	
Diameter of Standpipe	0.250 in.	Final Moisture Content	24.93%	
		Wet Density, Initial	120.64	PCF
		Wet Density, Final	121.04	PCF
		Dry Density	96.89	PCF

Trial No.	Initial Height (inches)	Final Height (inches)	Change in Water Level (inches)	Time Interval (secs)	Hydraulic Conductivity	
					cm/sec	in/hr
1	39.2	38.9	0.3	2140.0	2.99E-07	4.23E-04
2	38.9	38.6	0.3	2200.0	2.93E-07	4.15E-04
3	38.6	38.3	0.3	2220.0	2.92E-07	4.14E-04

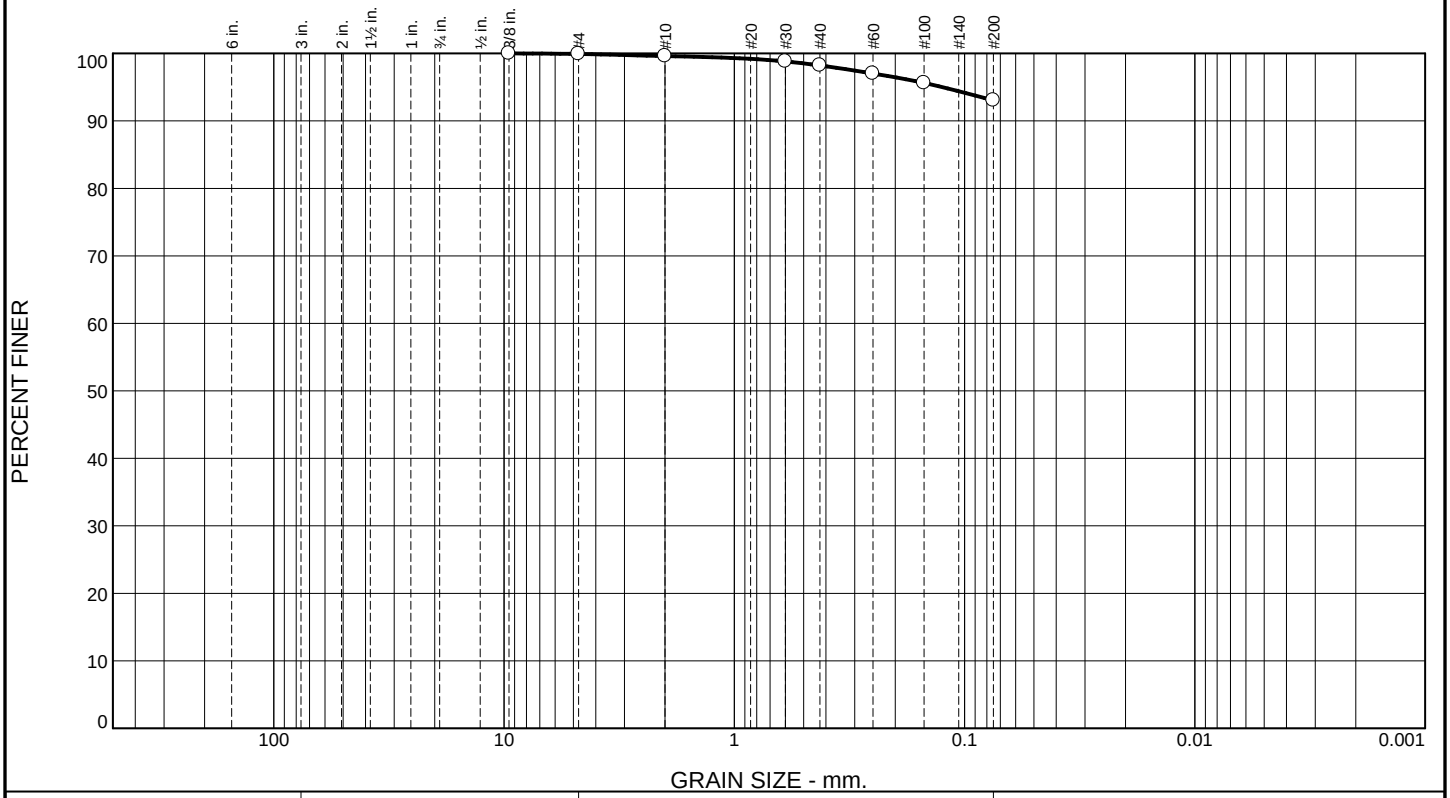
Average Hydraulic Conductivity	**2.95E-07**	cm/sec
	4.17E-04	in/hr

Remarks:

1. Test Conducted Using Daired Tap Water at Standard Temp. (72° F)
2. 100% Saturation Assumed

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	0.3	1.4	5.2	93.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.9		
#10	99.6		
#30	98.8		
#40	98.2		
#60	97.0		
#100	95.6		
#200	93.0		

* (no specification provided)

Material Description

Dark Yellowish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-6 S-1 1.5-2.5'

Date: 5-24-24

RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Eagle Rock Ave Widening Project, West Orange, NJ
Project#101049801
Project No: 869 **Figure**

Tested By: EE **Checked By:** KP

RSA GEOLAB

1017 Greeley Ave N
Union, NJ 07083
908-964-0786
www.RSAGeolab.com

Shelby Tybe Hydraulic Conductivity Test
ASTM D2434 (For Calculations)

Client:	Langan Eng. & Env. Services, Inc.	Job No.:	869
Project:	Eagle Rock Ave Widening Project Proj. No. 101049801	Lab Log No.:	L#24-3391
Sample:	TP-7 S-1 8"-18"	Date:	5/24/2024

Average Length of Soil Core	3.746 in.	Initial Weight of Soil Core	782.1	grams
		Final Weight of Soil Core	802.4	grams
		Dry Weight of Soil Core	670.1	grams
Diameter of Shelby Tube	2.875 in.	Initial Moisture Content	16.72%	
Diameter of Standpipe	0.250 in.	Final Moisture Content	19.75%	
		Wet Density, Initial	122.52	PCF
		Wet Density, Final	125.69	PCF
		Dry Density	104.97	PCF

Trial No.	Initial Height (inches)	Final Height (inches)	Change in Water Level (inches)	Time Interval (secs)	Hydraulic Conductivity	
					cm/sec	in/hr
1	39.6	35.0	4.6	520.0	1.71E-05	2.42E-02
2	35.0	31.0	4.0	490.0	1.78E-05	2.53E-02
3	31.0	27.2	3.8	505.0	1.86E-05	2.64E-02

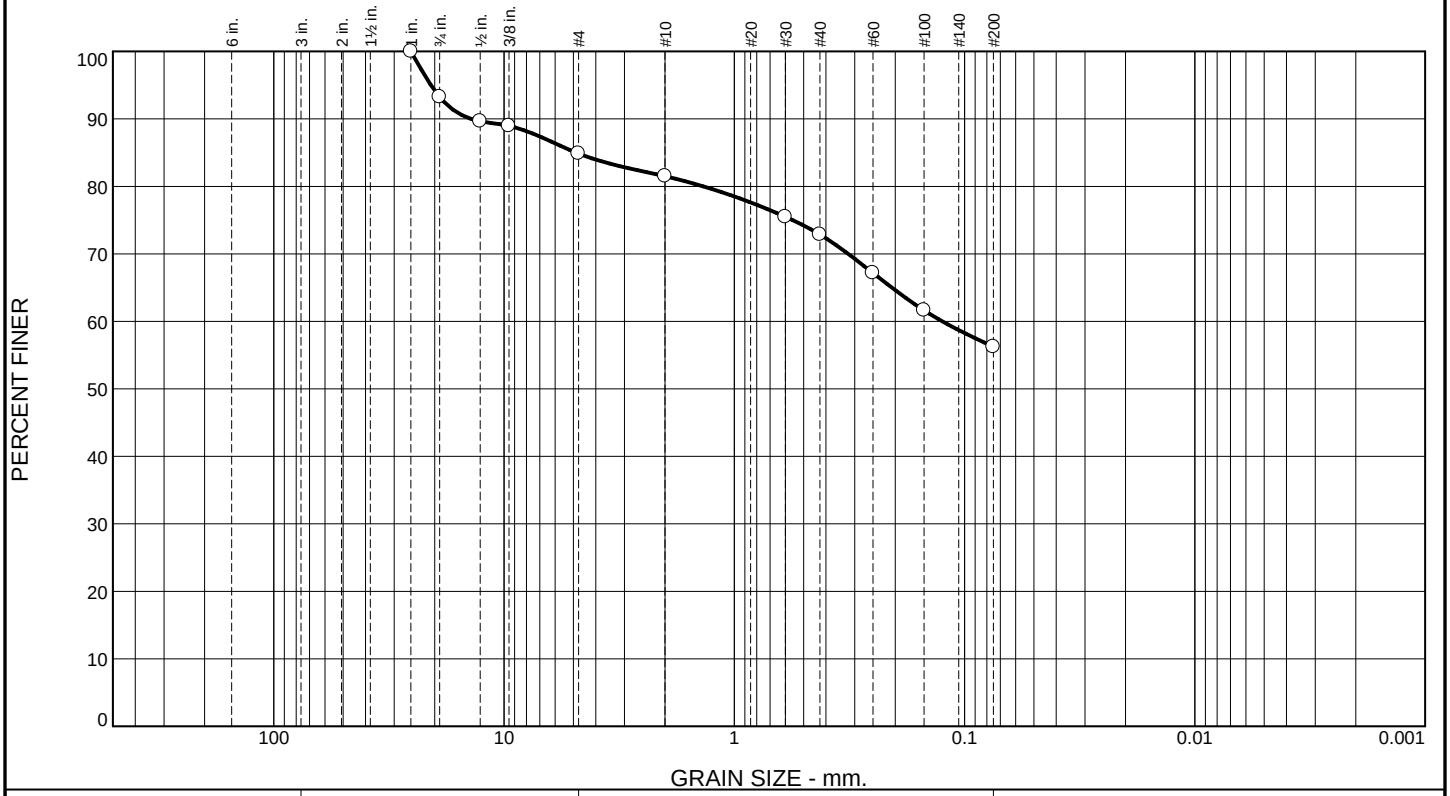
Average Hydraulic Conductivity	**1.78E-05**	cm/sec
	2.53E-02	in/hr

Remarks:

1. Test Conducted Using Daired Tap Water at Standard Temp. (72° F)
2. 100% Saturation Assumed

Tested by: AO
Checked by: KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.7	8.4	3.4	8.6	16.7	56.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	93.3		
.5	89.7		
.375	89.0		
#4	84.9		
#10	81.5		
#30	75.5		
#40	72.9		
#60	67.2		
#100	61.6		
#200	56.2		

* (no specification provided)

Material Description

Dark Yellowish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 13.8814 D_{85}= 4.8593 D_{60}= 0.1250
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-7 S-1 8-18"

Date: 5-24-24

RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Eagle Rock Ave Widening Project, West Orange, NJ
Project#101049801
Project No: 869 **Figure**

Tested By: EE **Checked By:** KP

RSA GEOLAB

1017 Greeley Ave N
Union, NJ 07083
908-964-0786
www.RSAGeolab.com

Shelby Tybe Hydraulic Conductivity Test
ASTM D2434 (For Calculations)

Client:	Langan Eng. & Env. Services, Inc.	Job No.:	869
Project:	Eagle Rock Ave Widening Project Proj. No. 101049801	Lab Log No.:	L#24-3391
Sample:	TP-8 S-1 20"-32"	Date:	5/24/2024

Average Length of Soil Core	4.553 in.	Initial Weight of Soil Core	1020.4	grams
		Final Weight of Soil Core	1018.3	grams
		Dry Weight of Soil Core	864.3	grams
Diameter of Shelby Tube	2.875 in.	Initial Moisture Content	18.06%	
Diameter of Standpipe	0.250 in.	Final Moisture Content	17.82%	
		Wet Density, Initial	131.51	PCF
		Wet Density, Final	131.25	PCF
		Dry Density	111.40	PCF

Trial No.	Initial Height (inches)	Final Height (inches)	Change in Water Level (inches)	Time Interval (secs)	Hydraulic Conductivity	
					cm/sec	in/hr
1	39.9	39.0	0.9	1680.0	1.19E-06	1.68E-03
2	39.0	38.0	1.0	1725.0	1.32E-06	1.87E-03
3	38.0	37.0	1.0	1730.0	1.35E-06	1.91E-03

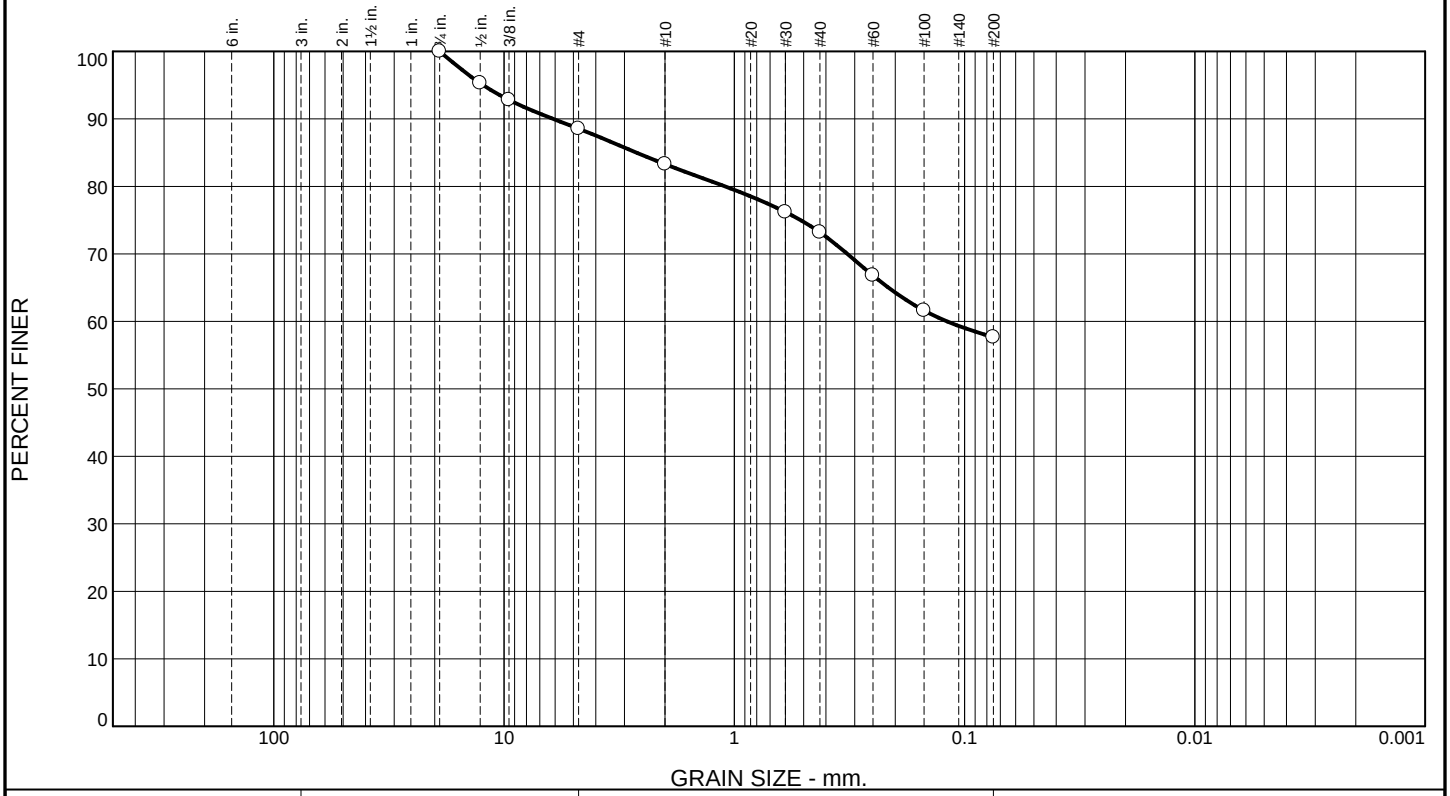
Average Hydraulic Conductivity	**1.28E-06**	cm/sec
	1.82E-03	in/hr

Remarks:

1. Test Conducted Using Daired Tap Water at Standard Temp. (72° F)
2. 100% Saturation Assumed

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	11.4	5.3	10.1	15.6	57.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	95.3		
.375	92.8		
#4	88.6		
#10	83.3		
#30	76.2		
#40	73.2		
#60	66.8		
#100	61.6		
#200	57.6		

* (no specification provided)

Material Description

Dark Yellowish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 6.1233 D_{85}= 2.6581 D_{60}= 0.1193
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-8 S-1 20-32"

Date: 5-24-24

RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Eagle Rock Ave Widening Project, West Orange, NJ
Project#101049801
Project No: 869 **Figure**

Tested By: EE **Checked By:** KP

RSA GEOLAB

1017 Greeley Ave N
Union, NJ 07083
908-964-0786
www.RSAGeolab.com

Shelby Tybe Hydraulic Conductivity Test
ASTM D2434 (For Calculations)

Client:	Langan Eng. & Env. Services, Inc.	Job No.:	869
Project:	Eagle Rock Ave Widening Project Proj. No. 101049801	Lab Log No.:	L#24-3391
Sample:	TP-9 S-1 24"-36"	Date:	5/24/2024

Average Length of Soil Core	4.493 in.	Initial Weight of Soil Core	1007.6	grams
		Final Weight of Soil Core	1008.1	grams
		Dry Weight of Soil Core	860.4	grams
Diameter of Shelby Tube	2.875 in.	Initial Moisture Content	17.10%	
Diameter of Standpipe	0.250 in.	Final Moisture Content	17.16%	
		Wet Density, Initial	131.60	PCF
		Wet Density, Final	131.67	PCF
		Dry Density	112.38	PCF

Trial No.	Initial Height (inches)	Final Height (inches)	Change in Water Level (inches)	Time Interval (secs)	Hydraulic Conductivity	
					cm/sec	in/hr
1	39.5	37.6	1.9	1220.0	3.49E-06	4.94E-03
2	37.6	35.4	2.2	1400.0	3.72E-06	5.27E-03
3	35.4	33.0	2.4	1620.0	3.74E-06	5.30E-03

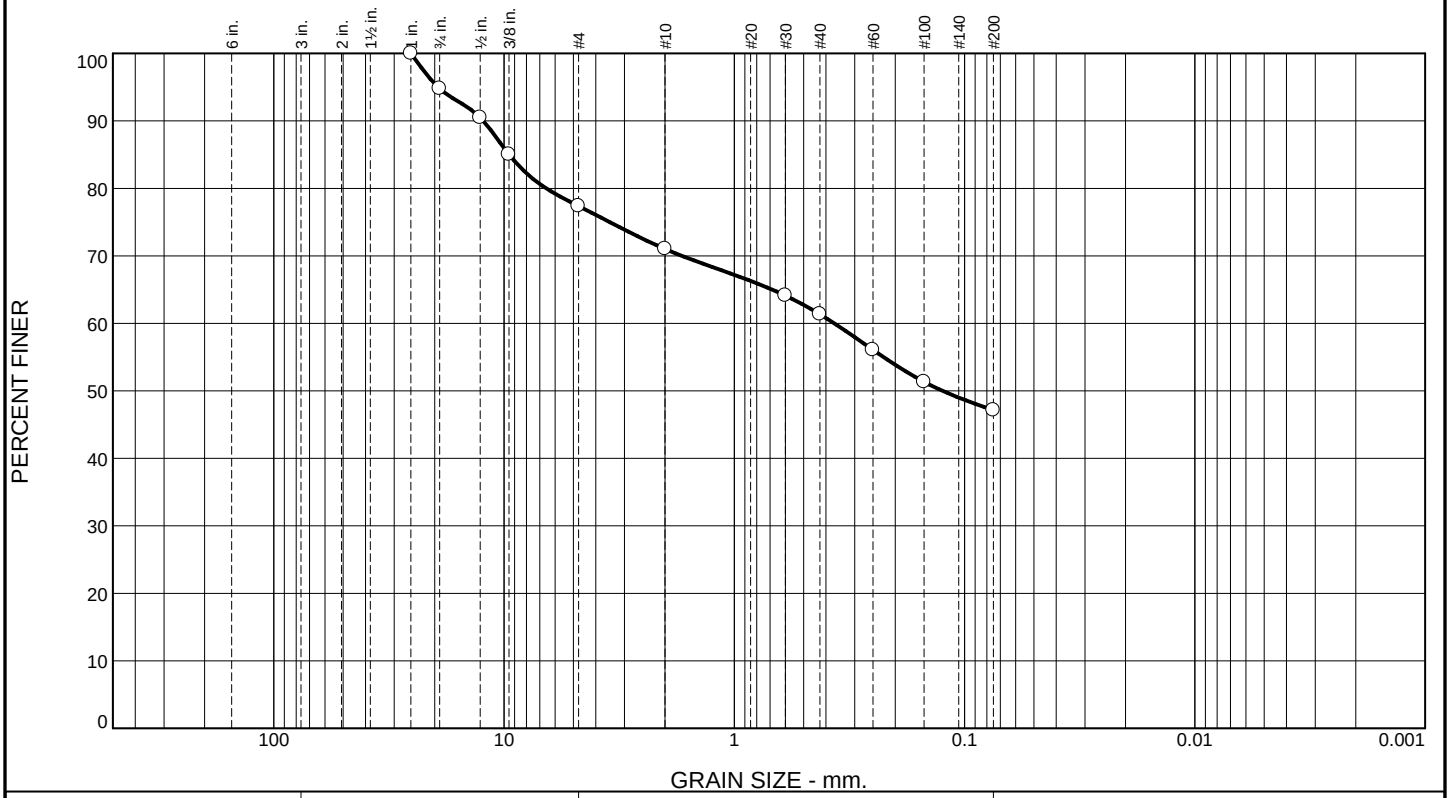
Average Hydraulic Conductivity	**3.65E-06**	cm/sec
	5.17E-03	in/hr

Remarks:

1. Test Conducted Using Daired Tap Water at Standard Temp. (72° F)
2. 100% Saturation Assumed

Tested by: AO
Checked by: KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.2	17.4	6.4	9.7	14.2	47.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	94.8		
.5	90.5		
.375	85.0		
#4	77.4		
#10	71.0		
# 30	64.1		
#40	61.3		
#60	56.1		
#100	51.3		
#200	47.1		

* (no specification provided)

Material Description

Reddish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 12.3140 D_{85}= 9.5121 D_{60}= 0.3681
D_{50}= 0.1245 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-9 S-1 24-36"

Date: 5-24-24

RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Eagle Rock Ave Widening Project, West Orange, NJ
Project#101049801
Project No: 869 **Figure**

Tested By: EE **Checked By:** KP

RSA GEOLAB

1017 Greeley Ave N
Union, NJ 07083
908-964-0786
www.RSAGeolab.com

Shelby Tybe Hydraulic Conductivity Test
ASTM D2434 (For Calculations)

Client:	Langan Eng. & Env. Services, Inc.	Job No.:	869
Project:	Eagle Rock Ave Widening Project Proj. No. 101049801	Lab Log No.:	L#24-3391
Sample:	TP-10 S-1 16"-28"	Date:	5/24/2024

Average Length of Soil Core	4.084 in.	Initial Weight of Soil Core	886.6	grams
		Final Weight of Soil Core	871.4	grams
		Dry Weight of Soil Core	718.9	grams
Diameter of Shelby Tube	2.875 in.	Initial Moisture Content	23.34%	
Diameter of Standpipe	0.250 in.	Final Moisture Content	21.22%	
		Wet Density, Initial	127.40	PCF
		Wet Density, Final	125.21	PCF
		Dry Density	103.29	PCF

Trial No.	Initial Height (inches)	Final Height (inches)	Change in Water Level (inches)	Time Interval (secs)	Hydraulic Conductivity	
					cm/sec	in/hr
1	39.2	38.7	0.5	1660.0	6.07E-07	8.60E-04
2	38.7	38.2	0.5	1670.0	6.11E-07	8.66E-04
3	38.2	37.8	0.4	1380.0	5.98E-07	8.48E-04

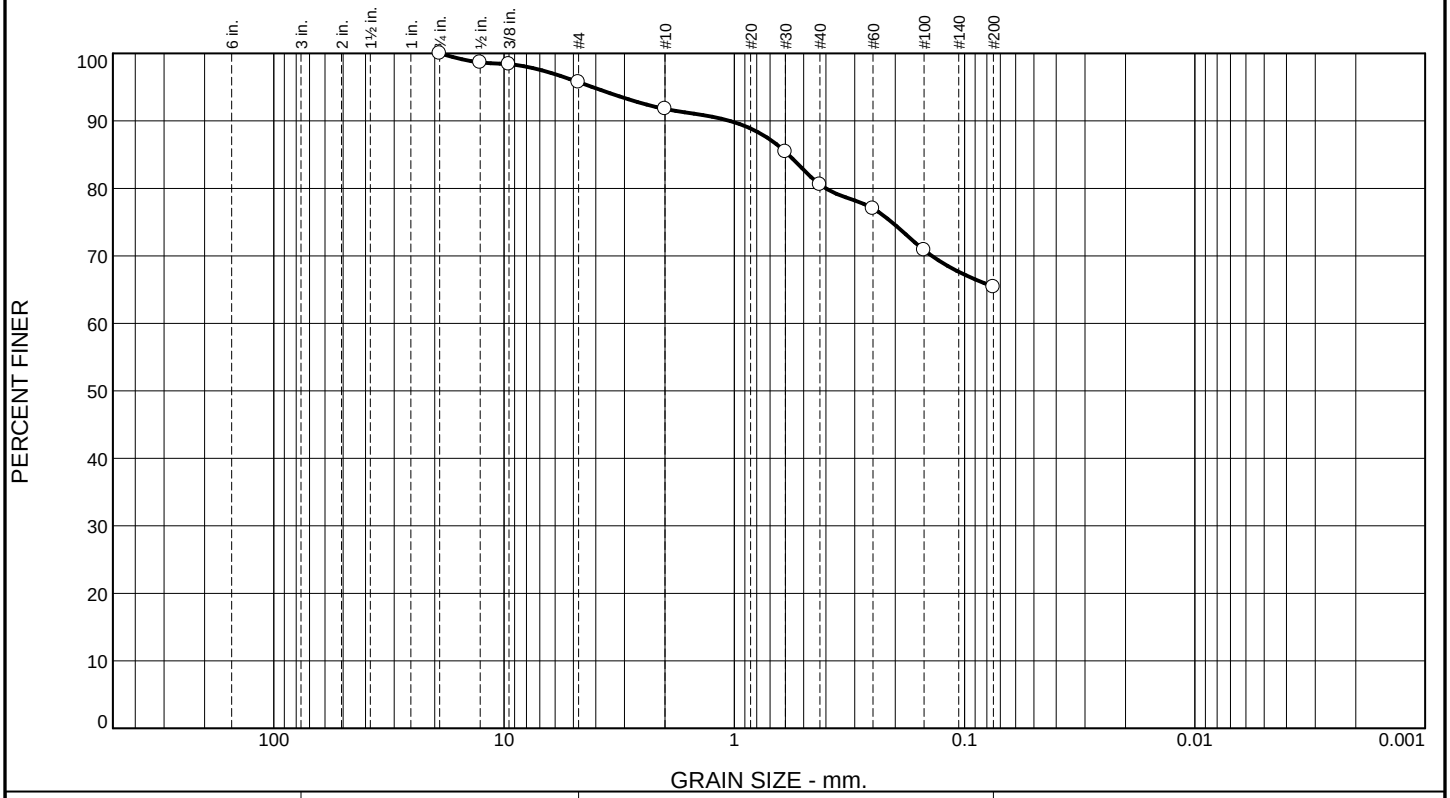
Average Hydraulic Conductivity	**6.05E-07**	cm/sec
	8.58E-04	in/hr

Remarks:

1. Test Conducted Using Daired Tap Water at Standard Temp. (72° F)
2. 100% Saturation Assumed

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	4.3	3.9	11.2	15.2	65.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	98.7		
.375	98.4		
#4	95.7		
#10	91.8		
#30	85.4		
#40	80.6		
#60	77.0		
#100	70.9		
#200	65.4		

* (no specification provided)

Material Description

Yellowish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.0452 D_{85}= 0.5822 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-10 S-1 16-28"

Date: 5-24-24

RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Eagle Rock Ave Widening Project, West Orange, NJ
Project#101049801
Project No: 869 **Figure**

Tested By: EE **Checked By:** KP

RSA GEOLAB

1017 Greeley Ave N
Union, NJ 07083
908-964-0786
www.RSAGeolab.com

Tube Permeameter Test

Client:	Langan Eng. & Env. Services, Inc.	Job No.:	869
Project:	Eagle Rock Ave Widening Project Proj. No. 101049802	Lab Log No.:	L#25-4128
Sample:	TP-11, ST-1, 1.75'	Date:	4/29/2025

Average Length of Soil Core	3.523 in.	Initial Weight of Soil Core	737.8	grams
		Final Weight of Soil Core	741.3	grams
		Dry Weight of Soil Core	599.2	grams
Diameter of Shelby Tube	2.875 in.	Initial Moisture Content	23.12%	
Diameter of Standpipe	0.250 in.	Final Moisture Content	23.71%	
		Wet Density, Initial	122.89	PCF
		Wet Density, Final	123.48	PCF
		Dry Density	99.81	PCF

Trial No.	Initial Height (inches)	Final Height (inches)	Change in Water Level (inches)	Time Interval (secs)	Hydraulic Conductivity	
					cm/sec	in/hr
1	39.8	38.9	0.9	470.0	3.29E-06	4.67E-03
2	38.9	37.9	1.0	520.0	3.39E-06	4.80E-03
3	37.9	36.9	1.0	520.0	3.48E-06	4.93E-03

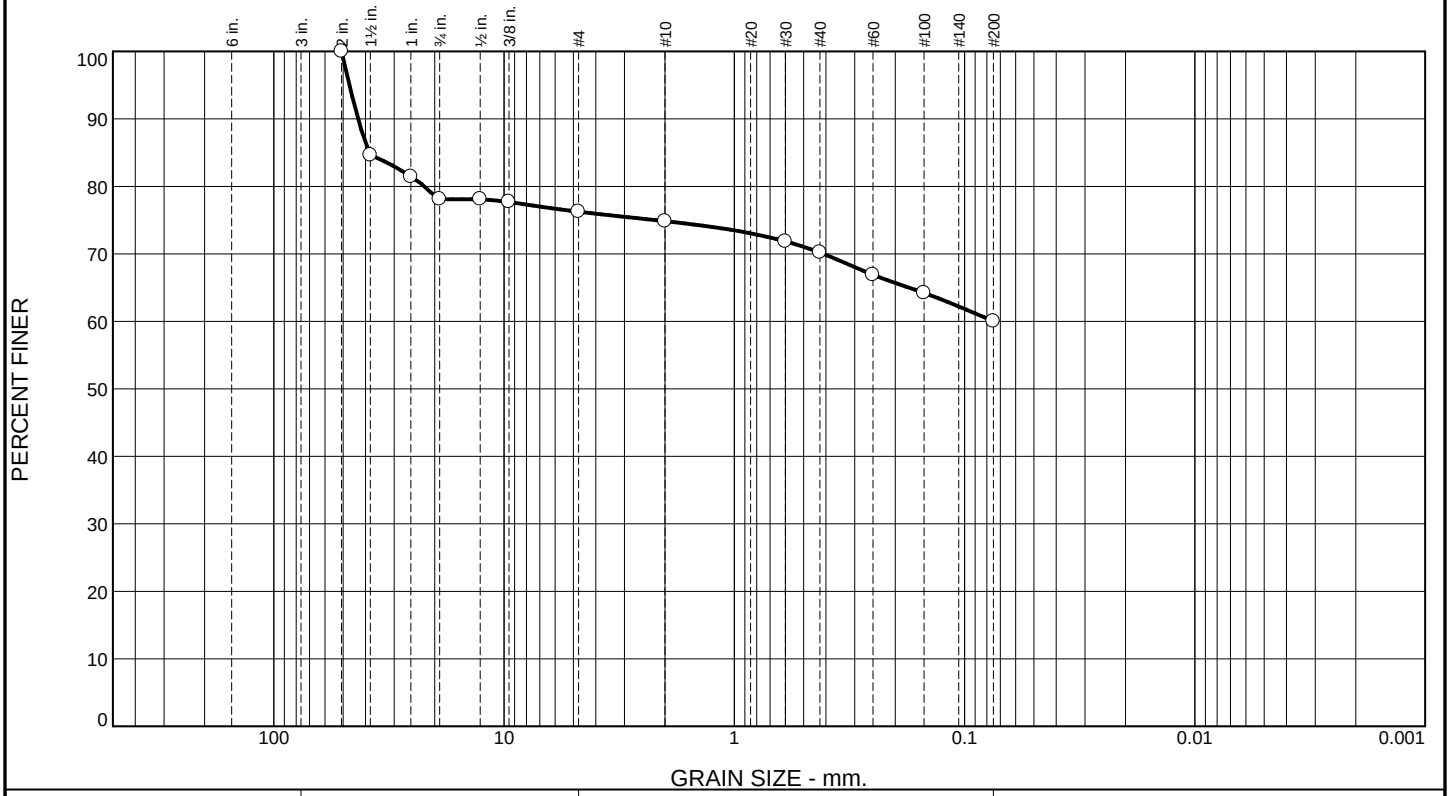
Average Hydraulic Conductivity	**3.39E-06**	cm/sec
	4.80E-03	in/hr

Remarks:

1. Test Conducted Using Daired Tap Water at Standard Temp. (72° F)
2. 100% Saturation Assumed

Tested by: SP
Checked by: KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	21.9	1.8	1.5	4.6	10.2	60.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2	100.0		
1.5	84.6		
1	81.4		
.75	78.1		
.5	78.1		
.375	77.7		
#4	76.3		
#10	74.8		
#30	71.8		
#40	70.2		
#60	66.9		
#100	64.2		
#200	60.0		

* (no specification provided)

Material Description

Strong Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 43.0891 D_{85}= 38.5386 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-11 ST-1 1.75'

Date: 4-29-25

RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Eagle Rock Ave. Widening Project, West Orange, NJ
Proj.#101049802
Project No: 869 **Figure**

Tested By: SP **Checked By:** KP

RSA GEOLAB

1017 Greeley Ave N
Union, NJ 07083
908-964-0786
www.RSAGeolab.com

Tube Permeameter Test

Client:	Langan Eng. & Env. Services, Inc.	Job No.:	869
Project:	Eagle Rock Ave Widening Project Proj. No. 101049802	Lab Log No.:	L#25-4128
Sample:	TP-12, ST-1, 1'	Date:	4/29/2025

Average Length of Soil Core	3.485 in.	Initial Weight of Soil Core	745.6	grams
		Final Weight of Soil Core	752.4	grams
		Dry Weight of Soil Core	629.7	grams
Diameter of Shelby Tube	2.875 in.	Initial Moisture Content	18.41%	
Diameter of Standpipe	0.250 in.	Final Moisture Content	19.50%	
		Wet Density, Initial	125.55	PCF
		Wet Density, Final	126.70	PCF
		Dry Density	106.03	PCF

Trial No.	Initial Height (inches)	Final Height (inches)	Change in Water Level (inches)	Time Interval (secs)	Hydraulic Conductivity	
					cm/sec	in/hr
1	39.8	38.6	1.2	255.0	8.04E-06	1.14E-02
2	38.6	37.5	1.1	235.0	8.23E-06	1.17E-02
3	37.5	36.3	1.2	270.0	8.06E-06	1.14E-02

Average Hydraulic Conductivity	**8.11E-06**	cm/sec
	1.15E-02	in/hr

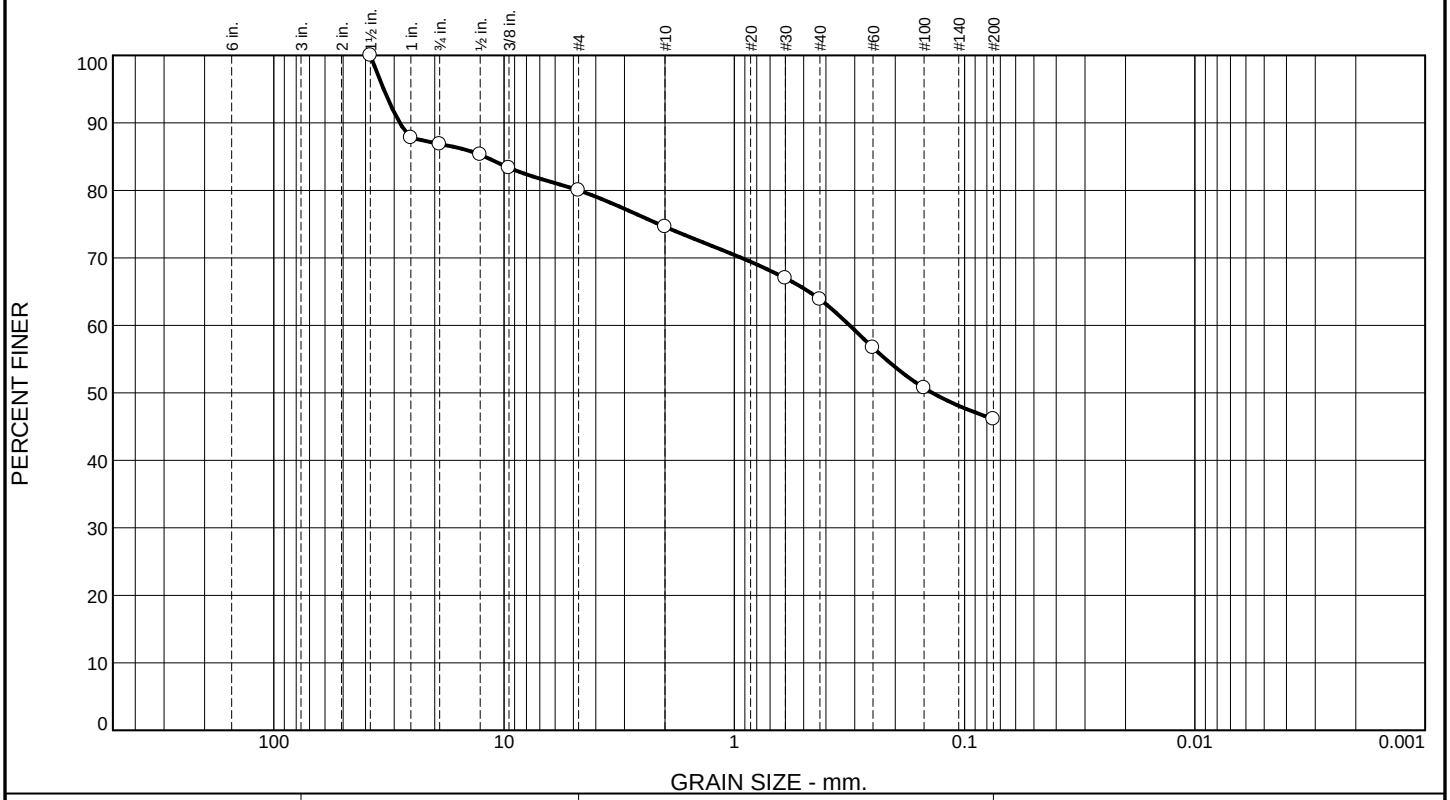
Remarks:

1. Test Conducted Using Daired Tap Water at Standard Temp. (72° F)
2. 100% Saturation Assumed

Tested by: SP

Checked by: KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	13.2	6.8	5.4	10.7	17.8	46.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	87.8		
.75	86.8		
.5	85.3		
.375	83.3		
#4	80.0		
#10	74.6		
#30	67.0		
#40	63.9		
#60	56.7		
#100	50.7		
#200	46.1		

* (no specification provided)

Material Description

Strong Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 28.3951 D_{85}= 12.1403 D_{60}= 0.3158
D_{50}= 0.1381 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-12 ST-1 1'

Date: 4-29-25

RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Eagle Rock Ave. Widening Project, West Orange, NJ
Proj.#101049802
Project No: 869 **Figure**

Tested By: SP **Checked By:** KP

RSA GEOLAB

1017 Greeley Ave N
Union, NJ 07083
908-964-0786
www.RSAGeolab.com

Tube Permeameter Test

Client:	Langan Eng. & Env. Services, Inc.	Job No.:	869
Project:	Eagle Rock Ave Widening Project Proj. No. 101049802	Lab Log No.:	L#25-4128
Sample:	TP-13, ST-1, 2.5'	Date:	4/29/2025

Average Length of Soil Core	4.012 in.	Initial Weight of Soil Core	854.8	grams
		Final Weight of Soil Core	861.4	grams
		Dry Weight of Soil Core	706.1	grams
Diameter of Shelby Tube	2.875 in.	Initial Moisture Content	21.06%	
Diameter of Standpipe	0.250 in.	Final Moisture Content	21.99%	
		Wet Density, Initial	125.03	PCF
		Wet Density, Final	125.99	PCF
		Dry Density	103.28	PCF

Trial No.	Initial Height (inches)	Final Height (inches)	Change in Water Level (inches)	Time Interval (secs)	Hydraulic Conductivity	
					cm/sec	in/hr
1	39.5	37.4	2.1	140.0	3.01E-05	4.26E-02
2	37.4	35.4	2.0	135.0	3.14E-05	4.45E-02
3	35.4	33.1	2.3	170.0	3.04E-05	4.32E-02

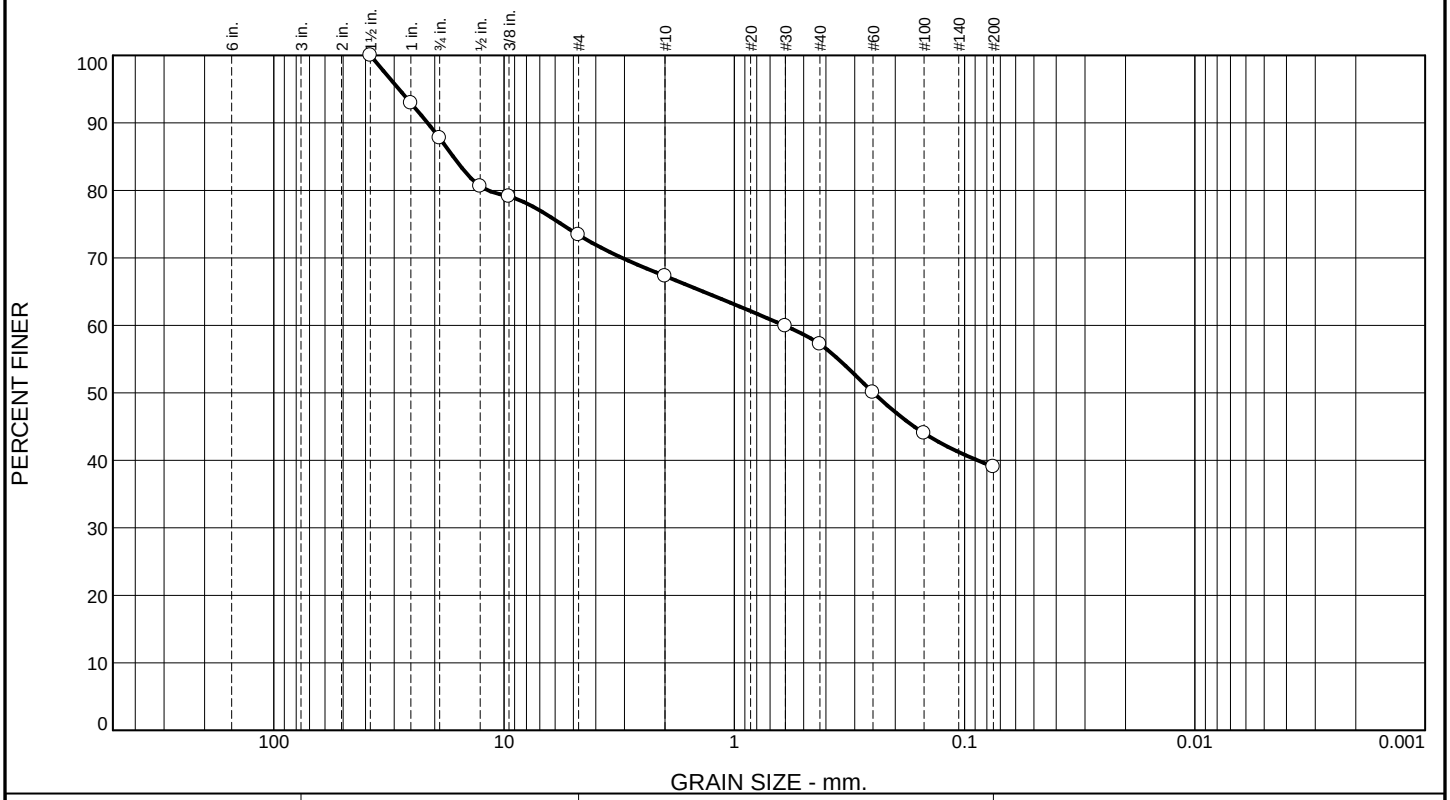
Average Hydraulic Conductivity	**3.06E-05**	cm/sec
	4.34E-02	in/hr

Remarks:

1. Test Conducted Using Daired Tap Water at Standard Temp. (72° F)
2. 100% Saturation Assumed

Tested by: SP
Checked by: KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.3	14.3	6.1	10.1	18.2	39.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	92.9		
.75	87.7		
.5	80.6		
.375	79.1		
#4	73.4		
#10	67.3		
#30	59.9		
#40	57.2		
#60	50.1		
#100	44.0		
#200	39.0		

* (no specification provided)

Material Description

Strong Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 21.4860 D_{85}= 16.6188 D_{60}= 0.6092
D_{50}= 0.2487 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-13 ST-1 2.5'

Date: 4-29-25

RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Eagle Rock Ave. Widening Project, West Orange, NJ
Proj.#101049802
Project No: 869 **Figure**

Tested By: SP **Checked By:** KP

RSA GEOLAB

1017 Greeley Ave N
Union, NJ 07083
908-964-0786
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Tube Permeameter Test

Client:	Langan Eng. & Env. Services, Inc.	Job No.:	869
Project:	Eagle Rock Ave Widening Project Proj. No. 101049802	Lab Log No.:	L#25-4128
Sample:	TP-14, ST-1, 1.25'	Date:	4/29/2025

Average Length of Soil Core	3.972 in.	Initial Weight of Soil Core	892.8	grams
		Final Weight of Soil Core	900.0	grams
		Dry Weight of Soil Core	786.4	grams
Diameter of Shelby Tube	2.875 in.	Initial Moisture Content	13.54%	
Diameter of Standpipe	0.250 in.	Final Moisture Content	14.45%	
		Wet Density, Initial	131.91	PCF
		Wet Density, Final	132.96	PCF
		Dry Density	116.18	PCF

Trial No.	Initial Height (inches)	Final Height (inches)	Change in Water Level (inches)	Time Interval (secs)	Hydraulic Conductivity	
					cm/sec	in/hr
1	39.8	38.4	1.4	310.0	8.81E-06	1.25E-02
2	38.4	37.0	1.4	315.0	8.99E-06	1.27E-02
3	37.0	35.5	1.5	355.0	8.89E-06	1.26E-02

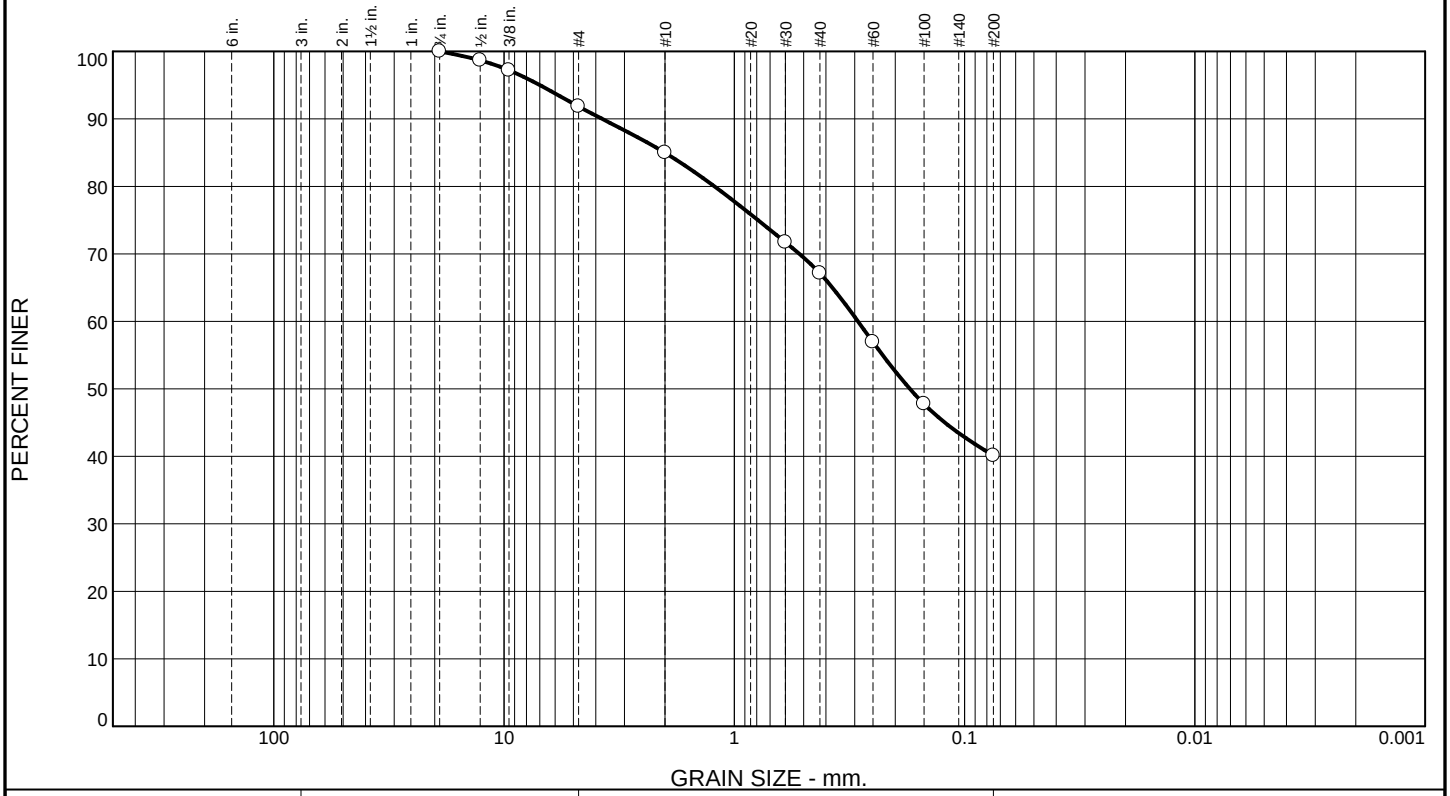
Average Hydraulic Conductivity	**8.90E-06**	cm/sec
	1.26E-02	in/hr

Remarks:

1. Test Conducted Using Daired Tap Water at Standard Temp. (72° F)
2. 100% Saturation Assumed

Tested by: SP
Checked by: KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	8.2	6.8	17.9	27.0	40.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	98.7		
.375	97.2		
#4	91.8		
#10	85.0		
#30	71.7		
#40	67.1		
#60	56.9		
#100	47.8		
#200	40.1		

* (no specification provided)

Material Description

Strong Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 3.7479 D_{85}= 2.0063 D_{60}= 0.2905
D_{50}= 0.1728 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-14 ST-1 1.25'

Date: 4-29-25

RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Eagle Rock Ave. Widening Project, West Orange, NJ
Proj.#101049802
Project No: 869 **Figure**

Tested By: SP **Checked By:** KP

RSA GEOLAB

1017 Greeley Ave N
Union, NJ 07083
908-964-0786
www.RSAGeolab.com

Tube Permeameter Test

Client:	Langan Eng. & Env. Services, Inc.	Job No.:	869
Project:	Eagle Rock Ave Widening Project Proj. No. 101049802	Lab Log No.:	L#25-4128
Sample:	TP-15, ST-1, 1.33'	Date:	4/29/2025

Average Length of Soil Core	3.512 in.	Initial Weight of Soil Core	778.1	grams
		Final Weight of Soil Core	782.5	grams
		Dry Weight of Soil Core	659.4	grams
Diameter of Shelby Tube	2.875 in.	Initial Moisture Content	18.00%	
Diameter of Standpipe	0.250 in.	Final Moisture Content	18.66%	
		Wet Density, Initial	130.02	PCF
		Wet Density, Final	130.74	PCF
		Dry Density	110.18	PCF

Trial No.	Initial Height (inches)	Final Height (inches)	Change in Water Level (inches)	Time Interval (secs)	Hydraulic Conductivity	
					cm/sec	in/hr
1	40.0	38.9	1.1	360.0	5.22E-06	7.41E-03
2	38.9	37.8	1.1	370.0	5.23E-06	7.41E-03
3	37.8	36.5	1.3	440.0	5.36E-06	7.60E-03

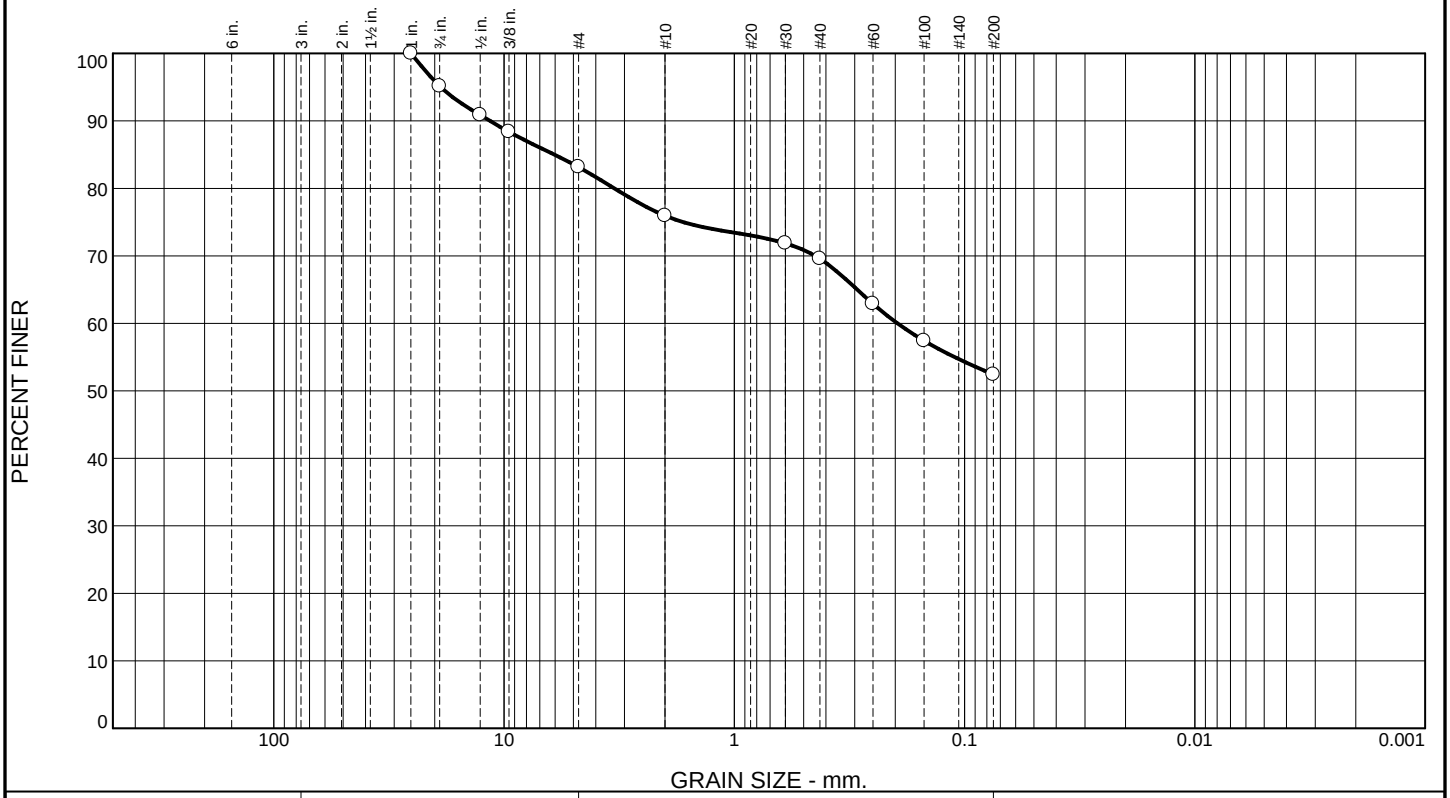
Average Hydraulic Conductivity	**5.27E-06**	cm/sec
	7.47E-03	in/hr

Remarks:

1. Test Conducted Using Daired Tap Water at Standard Temp. (72° F)
2. 100% Saturation Assumed

Tested by: SP
Checked by: KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.8	12.0	7.2	6.4	17.2	52.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	95.2		
.5	90.9		
.375	88.4		
#4	83.2		
#10	76.0		
#30	71.9		
#40	69.6		
#60	62.9		
#100	57.4		
#200	52.4		

* (no specification provided)

Material Description

Strong Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 11.5139 D_{85}= 6.0451 D_{60}= 0.1955
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-15 ST-1 1.33'

Date: 4-29-25

RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Eagle Rock Ave. Widening Project, West Orange, NJ
Proj.#101049802
Project No: 869 **Figure**

Tested By: SP **Checked By:** KP

RSA GEOLAB

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Union, NJ 07083
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Tube Permeameter Test

Client:	Langan Eng. & Env. Services, Inc.	Job No.:	869
Project:	Eagle Rock Ave Widening Project Proj. No. 101049802	Lab Log No.:	L#25-4128
Sample:	TP-16, ST-1, 2.5'	Date:	4/29/2025

Average Length of Soil Core	3.976 in.	Initial Weight of Soil Core	832.9	grams
		Final Weight of Soil Core	847.8	grams
		Dry Weight of Soil Core	716.1	grams
Diameter of Shelby Tube	2.875 in.	Initial Moisture Content	16.31%	
Diameter of Standpipe	0.250 in.	Final Moisture Content	18.39%	
		Wet Density, Initial	122.94	PCF
		Wet Density, Final	125.14	PCF
		Dry Density	105.69	PCF

Trial No.	Initial Height (inches)	Final Height (inches)	Change in Water Level (inches)	Time Interval (secs)	Hydraulic Conductivity	
					cm/sec	in/hr
1	39.2	38.2	1.0	240.0	8.22E-06	1.17E-02
2	38.2	37.0	1.2	290.0	8.40E-06	1.19E-02
3	37.0	35.9	1.1	275.0	8.38E-06	1.19E-02

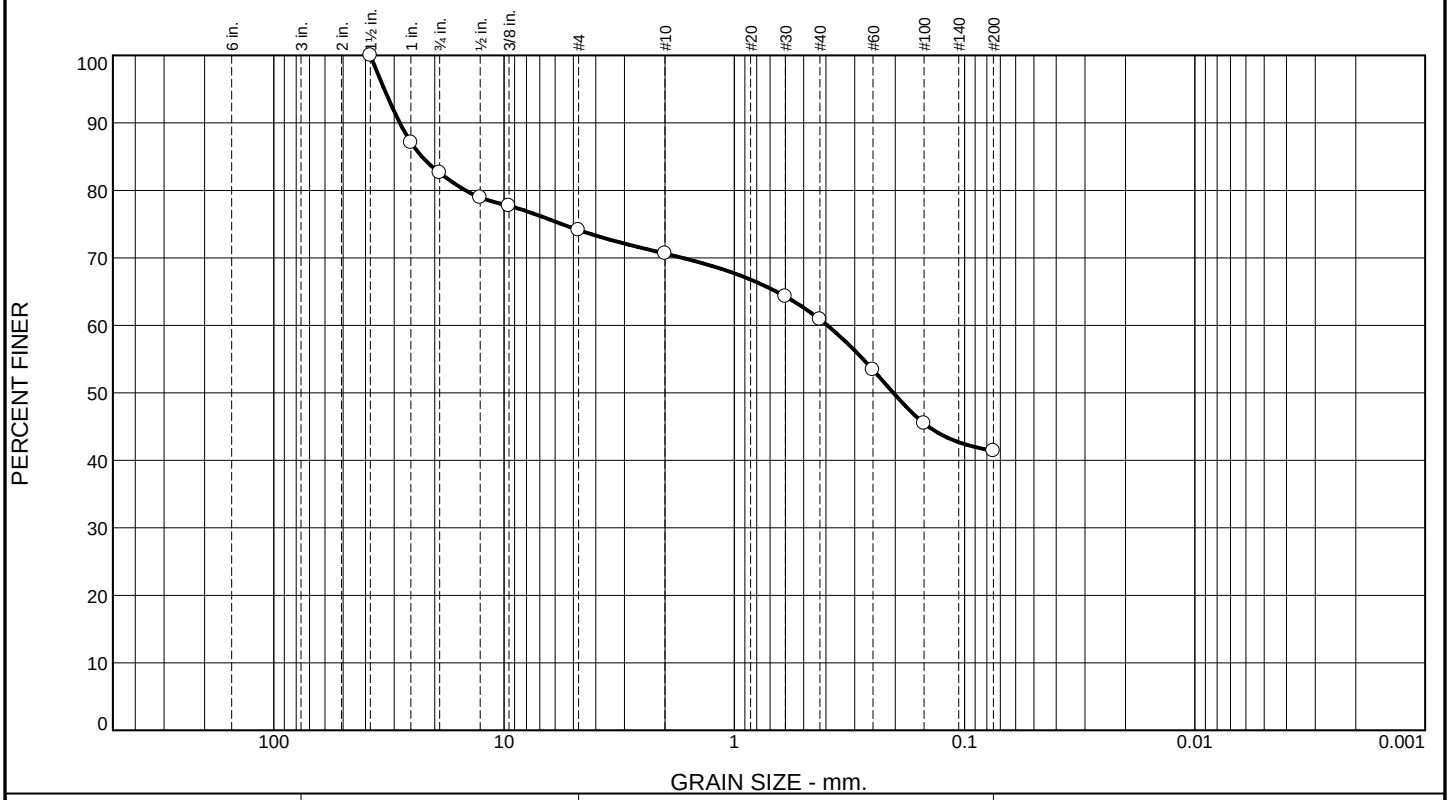
Average Hydraulic Conductivity	**8.34E-06**	cm/sec
	1.18E-02	in/hr

Remarks:

1. Test Conducted Using Daired Tap Water at Standard Temp. (72° F)
2. 100% Saturation Assumed

Tested by: SP
Checked by: KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	17.4	8.5	3.5	9.7	19.5	41.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	87.1		
.75	82.6		
.5	78.9		
.375	77.7		
#4	74.1		
#10	70.6		
#30	64.3		
#40	60.9		
#60	53.4		
#100	45.5		
#200	41.4		

* (no specification provided)

Material Description

Reddish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 28.3998 D_{85}= 22.7814 D_{60}= 0.3943
D_{50}= 0.2039 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-16 ST-1 2.5'

Date: 4-29-25

RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Eagle Rock Ave. Widening Project, West Orange, NJ
Proj.#101049802
Project No: 869 **Figure**

Tested By: SP **Checked By:** KP

RSA GEOLAB

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Shelby Tube Hydraulic Conductivity Test
ASTM D2434 (For Calculations)

Client: Langan Eng. & Env. Services, Inc.
Project: Eagle Rock Ave Widening
Proj. No. 101049802
Sample: TP-17A U-1 0.5'-1.25'

Job No.: 869
Lab Log No.: L#25-4301
Date: 7/18/2025

Average Length of Soil Core	4.089 in.	Initial Weight of Soil Core	1007.2	grams
		Final Weight of Soil Core	1035.2	grams
		Dry Weight of Soil Core	889.9	grams
Diameter of Shelby Tube	2.875 in.	Initial Moisture Content	13.18%	
Diameter of Standpipe	0.250 in.	Final Moisture Content	16.33%	
		Wet Density, Initial	144.55	PCF
		Wet Density, Final	148.57	PCF
		Dry Density	127.72	PCF

Trial No.	Initial Height (inches)	Final Height (inches)	Change in Water Level (inches)	Time Interval (secs)	Hydraulic Conductivity	
					cm/sec	in/hr
1	40.1	39.6	0.5	300.0	3.28E-06	4.66E-03
2	39.6	39.0	0.6	310.0	3.87E-06	5.48E-03
3	39.8	39.3	0.5	300.0	3.31E-06	4.69E-03

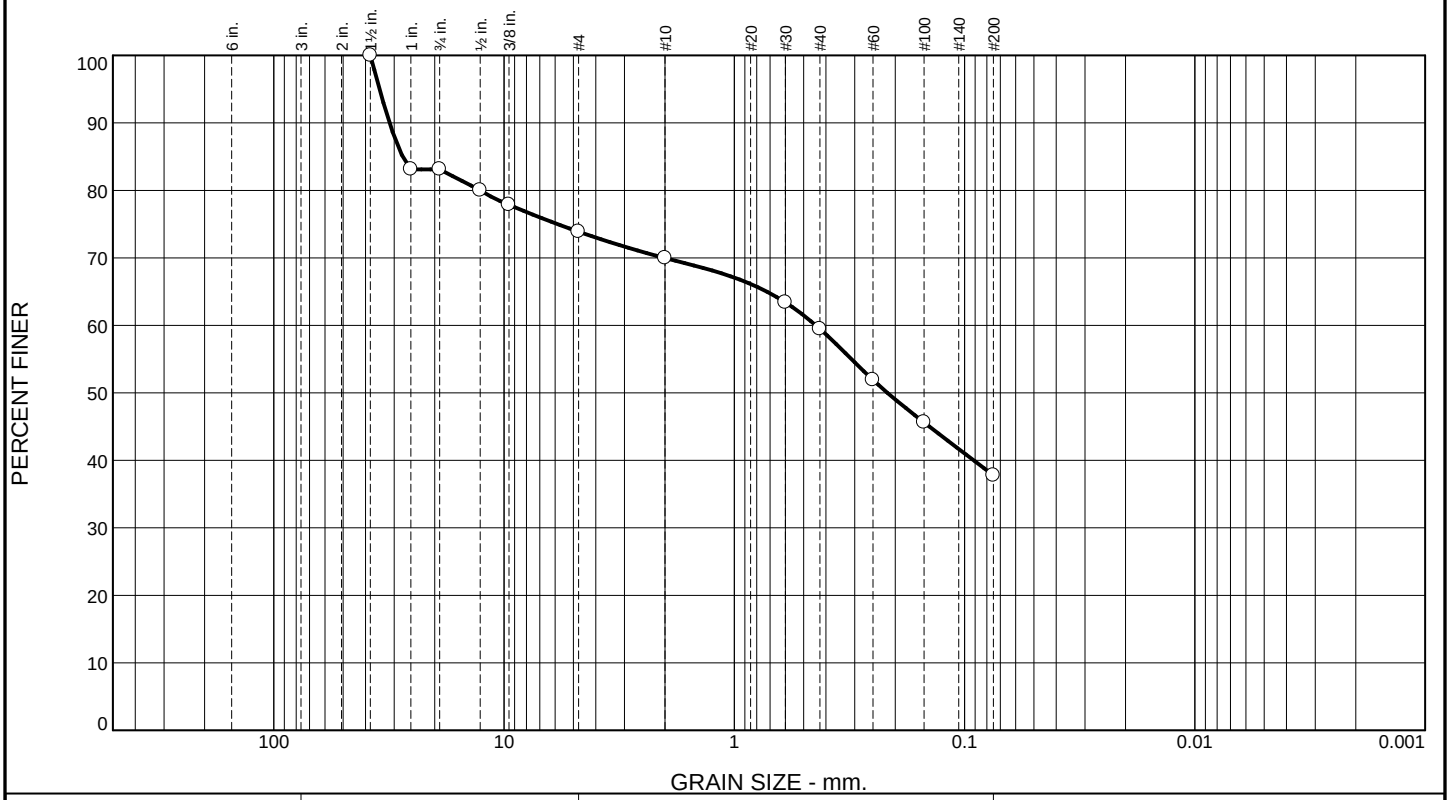
Average Hydraulic Conductivity **3.49E-06** cm/sec
4.94E-03 in/hr

Remarks:

1. Test Conducted Using Daired Tap Water at Standard Temp. (72° F)
2. 100% Saturation Assumed

Tested by: SP
Checked by: KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	16.9	9.2	3.9	10.5	21.7	37.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	83.1		
.75	83.1		
.5	80.0		
.375	77.9		
#4	73.9		
#10	70.0		
#30	63.4		
#40	59.5		
#60	51.9		
#100	45.6		
#200	37.8		

* (no specification provided)

Material Description

Strong Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 31.4271 D_{85}= 27.5989 D_{60}= 0.4425
D_{50}= 0.2162 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-17A U-1 0.5-1.25'

Date: 7-18-25

RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Eagle Rock Ave Widening, West Orange, NJ
Project#101049802
Project No: 869 **Figure**

Tested By: JK **Checked By:** KP

RSA GEOLAB

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www.RSAGeolab.com

Shelby Tube Hydraulic Conductivity Test
ASTM D2434 (For Calculations)

Client:	Langan Eng. & Env. Services, Inc.	Job No.:	869
Project:	Eagle Rock Ave Widening	Lab Log No.:	L#25-4301
	Proj. No. 101049802		
Sample:	TP-17B U-1 0.5'-1.25'	Date:	7/18/2025

Average Length of Soil Core	4.089 in.	Initial Weight of Soil Core	740.0	grams
		Final Weight of Soil Core	760.8	grams
		Dry Weight of Soil Core	610.1	grams
Diameter of Shelby Tube	2.875 in.	Initial Moisture Content	21.29%	
Diameter of Standpipe	0.250 in.	Final Moisture Content	24.71%	
		Wet Density, Initial	106.20	PCF
		Wet Density, Final	109.19	PCF
		Dry Density	87.55	PCF

Trial No.	Initial Height (inches)	Final Height (inches)	Change in Water Level (inches)	Time Interval (secs)	Hydraulic Conductivity	
					cm/sec	in/hr
1	38.8	38.1	0.7	1200.0	1.19E-06	1.69E-03
2	39.1	38.6	0.5	1180.0	8.57E-07	1.21E-03
3	39.0	38.5	0.5	1180.0	8.59E-07	1.22E-03

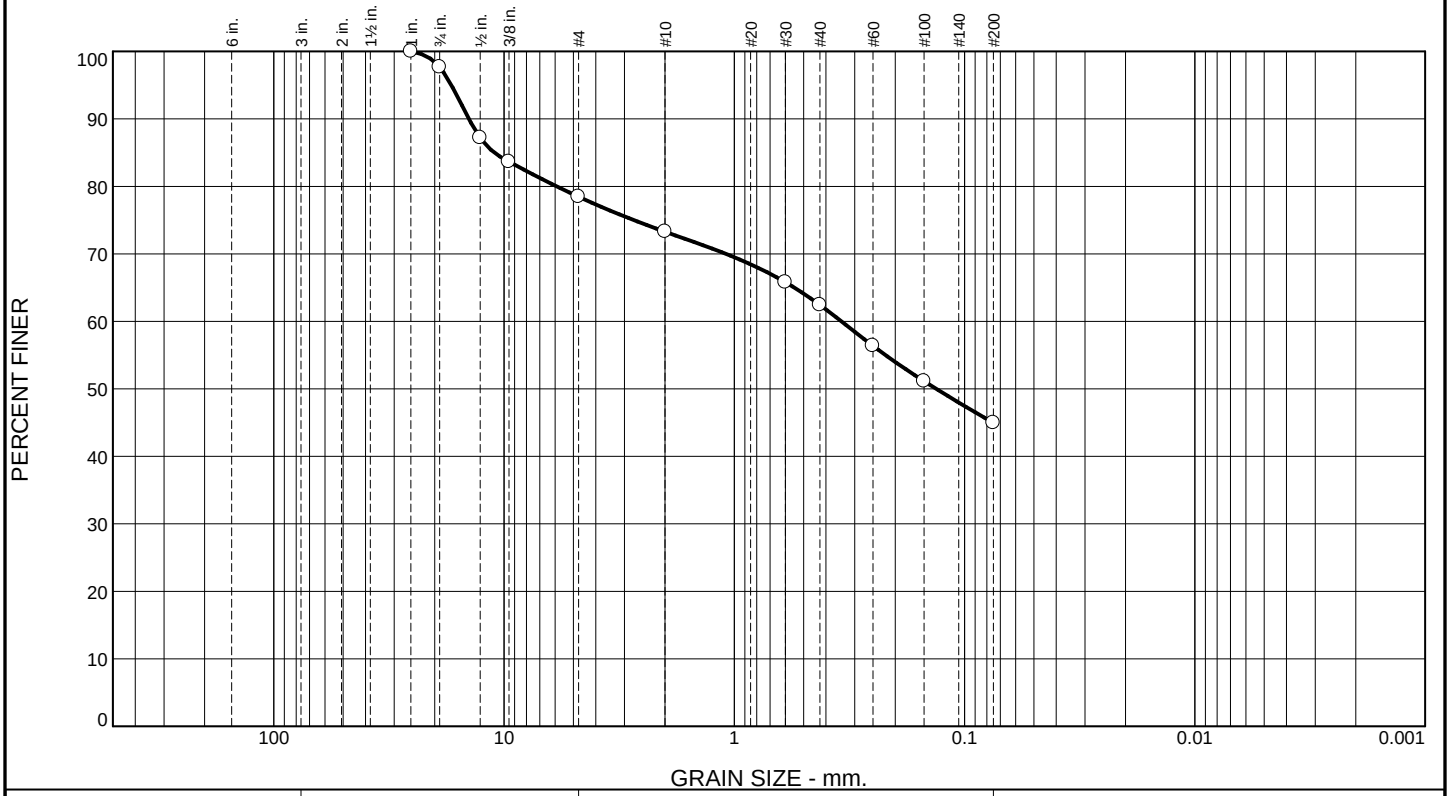
Average Hydraulic Conductivity **9.69E-07** cm/sec
1.37E-03 in/hr

Remarks:

1. Test Conducted Using Daired Tap Water at Standard Temp. (72° F)
2. 100% Saturation Assumed

Tested by: SP
Checked by: KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.3	19.2	5.2	10.9	17.4	45.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	97.7		
.5	87.2		
.375	83.7		
#4	78.5		
#10	73.3		
#30	65.8		
#40	62.4		
#60	56.4		
#100	51.1		
#200	45.0		

* (no specification provided)

Material Description

Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 14.2152 D_{85}= 11.0327 D_{60}= 0.3427
D_{50}= 0.1328 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-17B U-1 0.5-1.25'

Date: 7-18-25

RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Eagle Rock Ave Widening, West Orange, NJ
Project#101049802
Project No: 869

Figure

Tested By: JK **Checked By:** KP

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Tube Permeameter Test

Client:	Langan Eng. & Env. Services, Inc.	Job No.:	869
Project:	Eagle Rock Ave Widening Project Proj. No. 101049802	Lab Log No.:	L#25-4128
Sample:	TP-18, ST-1, 1.5'	Date:	4/29/2025

Average Length of Soil Core	3.566 in.	Initial Weight of Soil Core	764.8	grams
		Final Weight of Soil Core	779.9	grams
		Dry Weight of Soil Core	665.3	grams
Diameter of Shelby Tube	2.875 in.	Initial Moisture Content	14.95%	
Diameter of Standpipe	0.250 in.	Final Moisture Content	17.22%	
		Wet Density, Initial	125.85	PCF
		Wet Density, Final	128.35	PCF
		Dry Density	109.49	PCF

Trial No.	Initial Height (inches)	Final Height (inches)	Change in Water Level (inches)	Time Interval (secs)	Hydraulic Conductivity	
					cm/sec	in/hr
1	39.7	38.0	1.7	420.0	7.14E-06	1.01E-02
2	38.0	36.4	1.6	400.0	7.37E-06	1.04E-02
3	36.4	34.8	1.6	410.0	7.51E-06	1.06E-02

Average Hydraulic Conductivity	**7.34E-06**	cm/sec
	1.04E-02	in/hr

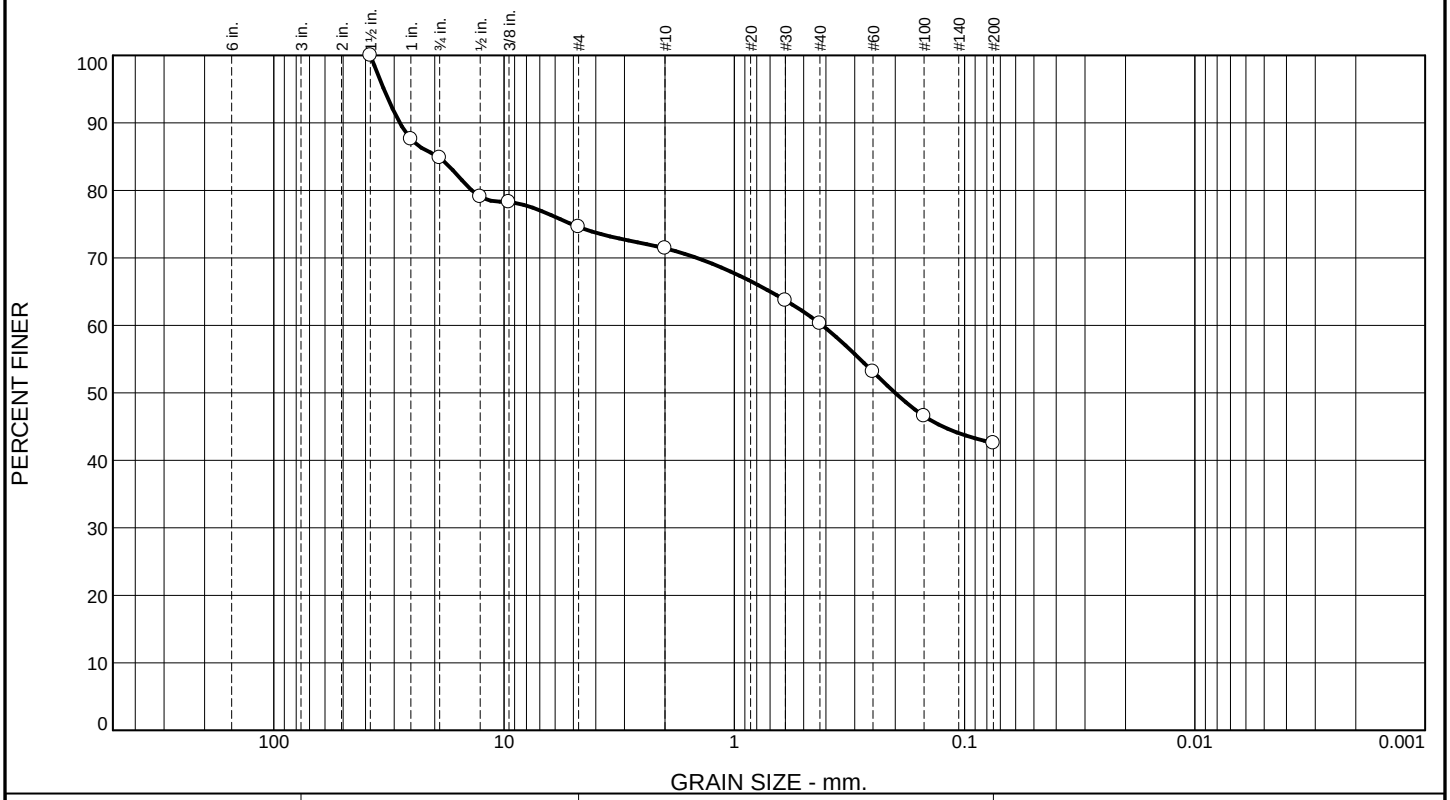
Remarks:

1. Test Conducted Using Daired Tap Water at Standard Temp. (72° F)
2. 100% Saturation Assumed

Tested by: SP

Checked by: KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	15.2	10.2	3.2	11.1	17.7	42.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	87.6		
.75	84.8		
.5	79.0		
.375	78.3		
#4	74.6		
#10	71.4		
#30	63.7		
#40	60.3		
#60	53.1		
#100	46.6		
#200	42.6		

* (no specification provided)

Material Description

Strong Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 28.3802 D_{85}= 19.3724 D_{60}= 0.4151
D_{50}= 0.2002 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-18 ST-1 1.5'

Date: 4-29-25

RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Eagle Rock Ave. Widening Project, West Orange, NJ
Proj.#101049802
Project No: 869 **Figure**

Tested By: SP **Checked By:** KP

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Tube Permeameter Test

Client:	Langan Eng. & Env. Services, Inc.	Job No.:	869
Project:	Eagle Rock Ave Widening Project Proj. No. 101049802	Lab Log No.:	L#25-4128
Sample:	TP-19, ST-3, 0.33'	Date:	4/29/2025

Average Length of Soil Core	5.203 in.	Initial Weight of Soil Core	1088.4	grams
		Final Weight of Soil Core	1092.5	grams
		Dry Weight of Soil Core	888.8	grams
Diameter of Shelby Tube	2.875 in.	Initial Moisture Content	22.46%	
Diameter of Standpipe	0.250 in.	Final Moisture Content	22.92%	
		Wet Density, Initial	122.76	PCF
		Wet Density, Final	123.22	PCF
		Dry Density	100.24	PCF

Trial No.	Initial Height (inches)	Final Height (inches)	Change in Water Level (inches)	Time Interval (secs)	Hydraulic Conductivity	
					cm/sec	in/hr
1	39.6	38.0	1.6	180.0	2.29E-05	3.25E-02
2	38.0	36.4	1.6	185.0	2.32E-05	3.29E-02
3	36.4	34.8	1.6	185.0	2.43E-05	3.44E-02

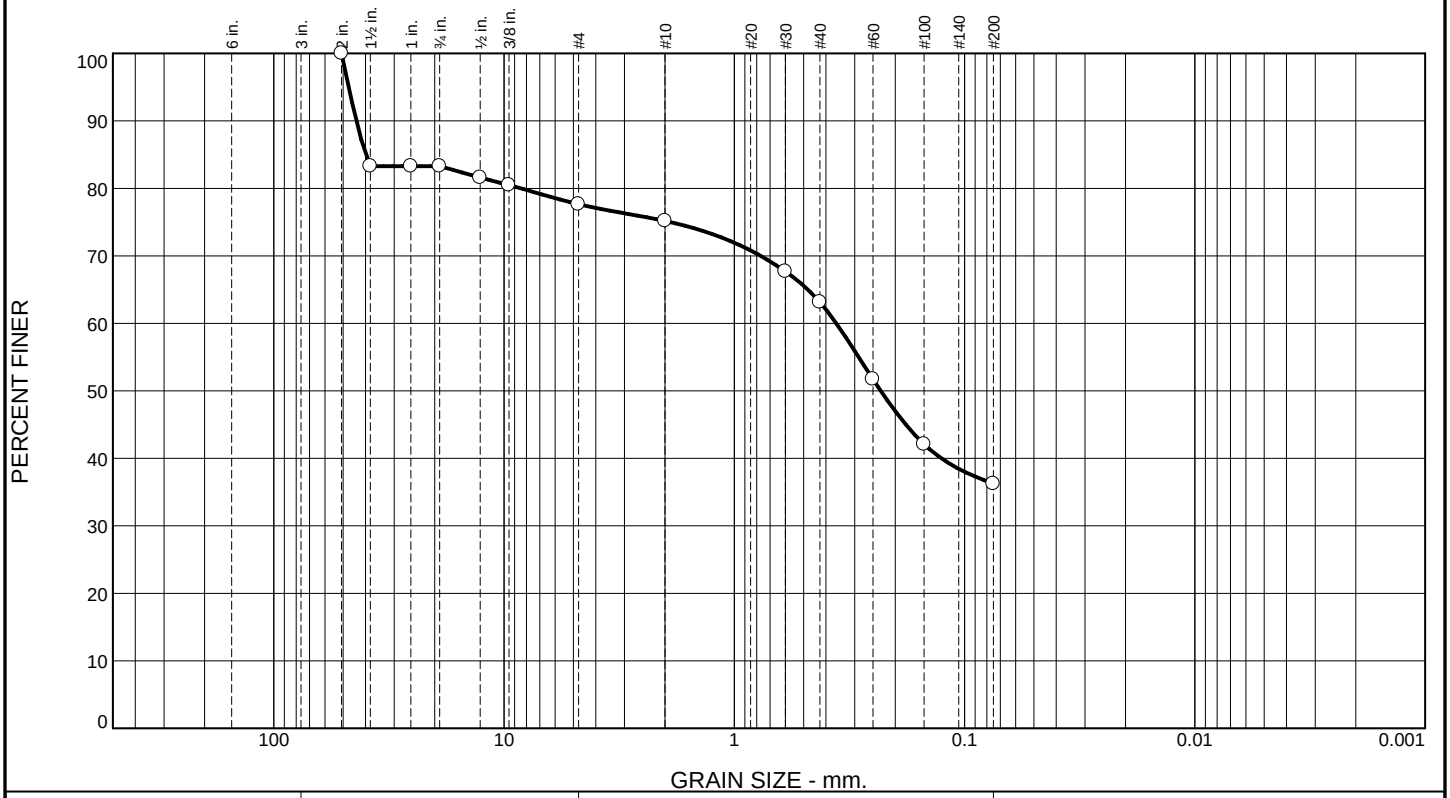
Average Hydraulic Conductivity	**2.35E-05**	cm/sec
	3.33E-02	in/hr

Remarks:

1. Test Conducted Using Daired Tap Water at Standard Temp. (72° F)
2. 100% Saturation Assumed

Tested by: SP
Checked by: KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	16.7	5.6	2.5	12.1	26.9	36.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2	100.0		
1.5	83.3		
1	83.3		
.75	83.3		
.5	81.6		
.375	80.5		
#4	77.7		
#10	75.2		
#30	67.7		
#40	63.1		
#60	51.7		
#100	42.1		
#200	36.2		

* (no specification provided)

Material Description

Dark Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 43.8325 D_{85}= 39.8687 D_{60}= 0.3609
D_{50}= 0.2313 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-19 ST-3 0.33'

Date: 4-29-25

RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Eagle Rock Ave. Widening Project, West Orange, NJ
Proj.#101049802
Project No: 869 **Figure**

Tested By: SP **Checked By:** KP

RSA GEOLAB

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Tube Permeameter Test

Client:	Langan Eng. & Env. Services, Inc.	Job No.:	869
Project:	Eagle Rock Ave Widening Project Proj. No. 101049802	Lab Log No.:	L#25-4128
Sample:	TP-20, ST-1, 1.5'	Date:	4/29/2025

Average Length of Soil Core	5.692 in.	Initial Weight of Soil Core	1177.8	grams
		Final Weight of Soil Core	1185.4	grams
		Dry Weight of Soil Core	988.6	grams
Diameter of Shelby Tube	2.875 in.	Initial Moisture Content	19.13%	
Diameter of Standpipe	0.250 in.	Final Moisture Content	19.91%	
		Wet Density, Initial	121.43	PCF
		Wet Density, Final	122.22	PCF
		Dry Density	101.93	PCF

Trial No.	Initial Height (inches)	Final Height (inches)	Change in Water Level (inches)	Time Interval (secs)	Hydraulic Conductivity	
					cm/sec	in/hr
1	39.9	38.4	1.5	720.0	5.82E-06	8.25E-03
2	38.4	37.0	1.4	710.0	5.72E-06	8.10E-03
3	37.0	35.7	1.3	695.0	5.63E-06	7.97E-03

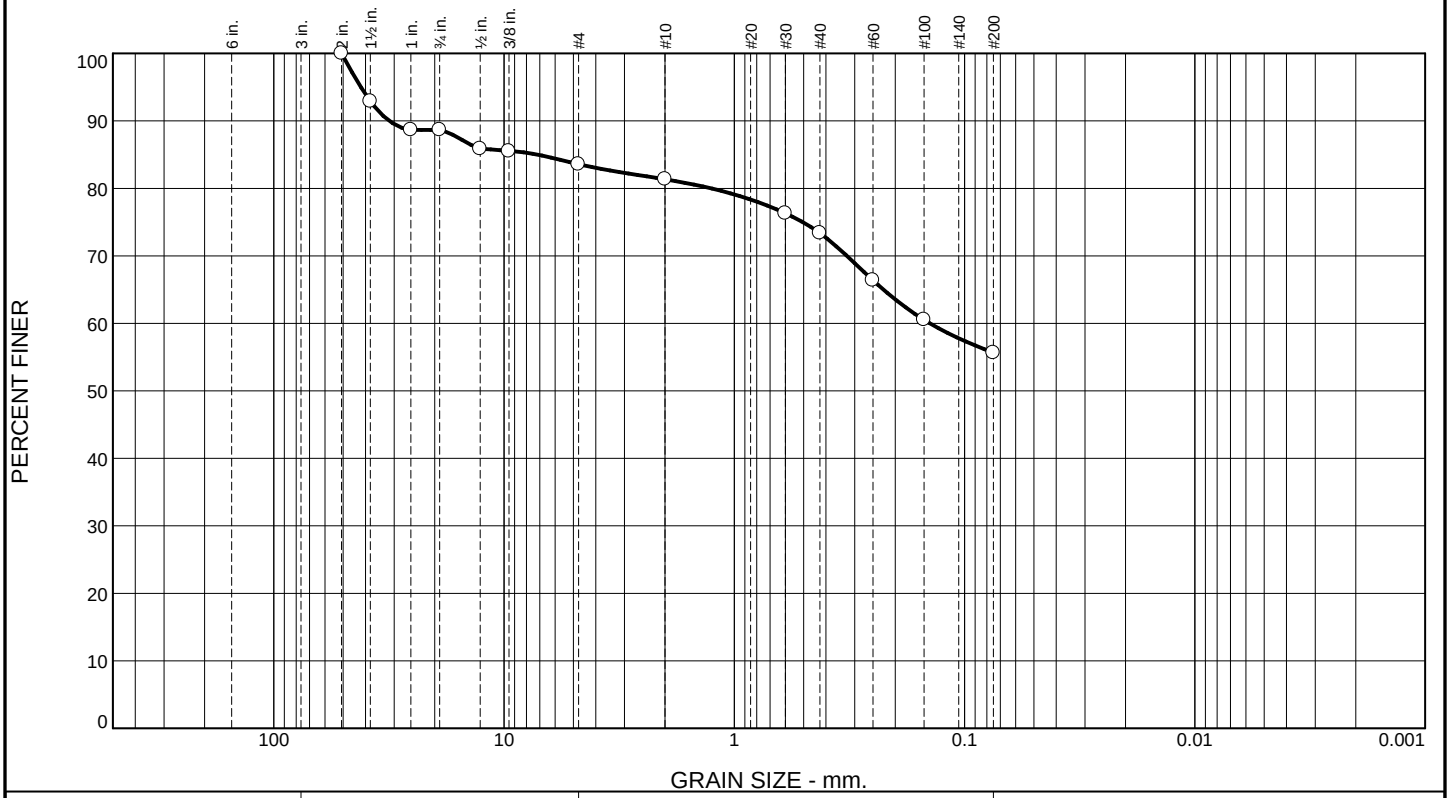
Average Hydraulic Conductivity	**5.72E-06**	cm/sec
	8.11E-03	in/hr

Remarks:

1. Test Conducted Using Daired Tap Water at Standard Temp. (72° F)
2. 100% Saturation Assumed

Tested by: SP
Checked by: KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	11.3	5.1	2.3	7.9	17.8	55.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2	100.0		
1.5	92.9		
1	88.7		
.75	88.7		
.5	85.9		
.375	85.5		
#4	83.6		
#10	81.3		
#30	76.3		
#40	73.4		
#60	66.4		
#100	60.5		
#200	55.6		

* (no specification provided)

Material Description

Strong Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 31.5267 D_{85}= 7.1542 D_{60}= 0.1415
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-20 ST-1 1.5'

Date: 4-29-25

RSA Geolab

Union, New Jersey

Client: Langan Engineering
Project: Eagle Rock Ave. Widening Project, West Orange, NJ
Proj.#101049802
Project No: 869 **Figure**

Tested By: SP **Checked By:** KP

RSA GEOLAB

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Tube Permeameter Test

Client:	Langan Eng. & Env. Services, Inc.	Job No.:	869
Project:	Eagle Rock Ave Widening Project Proj. No. 101049802	Lab Log No.:	L#25-4128
Sample:	TP-21, ST-1, 1.67'	Date:	4/29/2025

Average Length of Soil Core	4.070 in.	Initial Weight of Soil Core	866.2	grams
		Final Weight of Soil Core	868.8	grams
		Dry Weight of Soil Core	720.9	grams
Diameter of Shelby Tube	2.875 in.	Initial Moisture Content	20.16%	
Diameter of Standpipe	0.250 in.	Final Moisture Content	20.52%	
		Wet Density, Initial	124.89	PCF
		Wet Density, Final	125.27	PCF
		Dry Density	103.94	PCF

Trial No.	Initial Height (inches)	Final Height (inches)	Change in Water Level (inches)	Time Interval (secs)	Hydraulic Conductivity	
					cm/sec	in/hr
1	39.3	38.8	0.5	1460.0	6.86E-07	9.72E-04
2	38.8	38.3	0.5	1470.0	6.90E-07	9.78E-04
3	38.3	37.7	0.6	1760.0	7.01E-07	9.94E-04

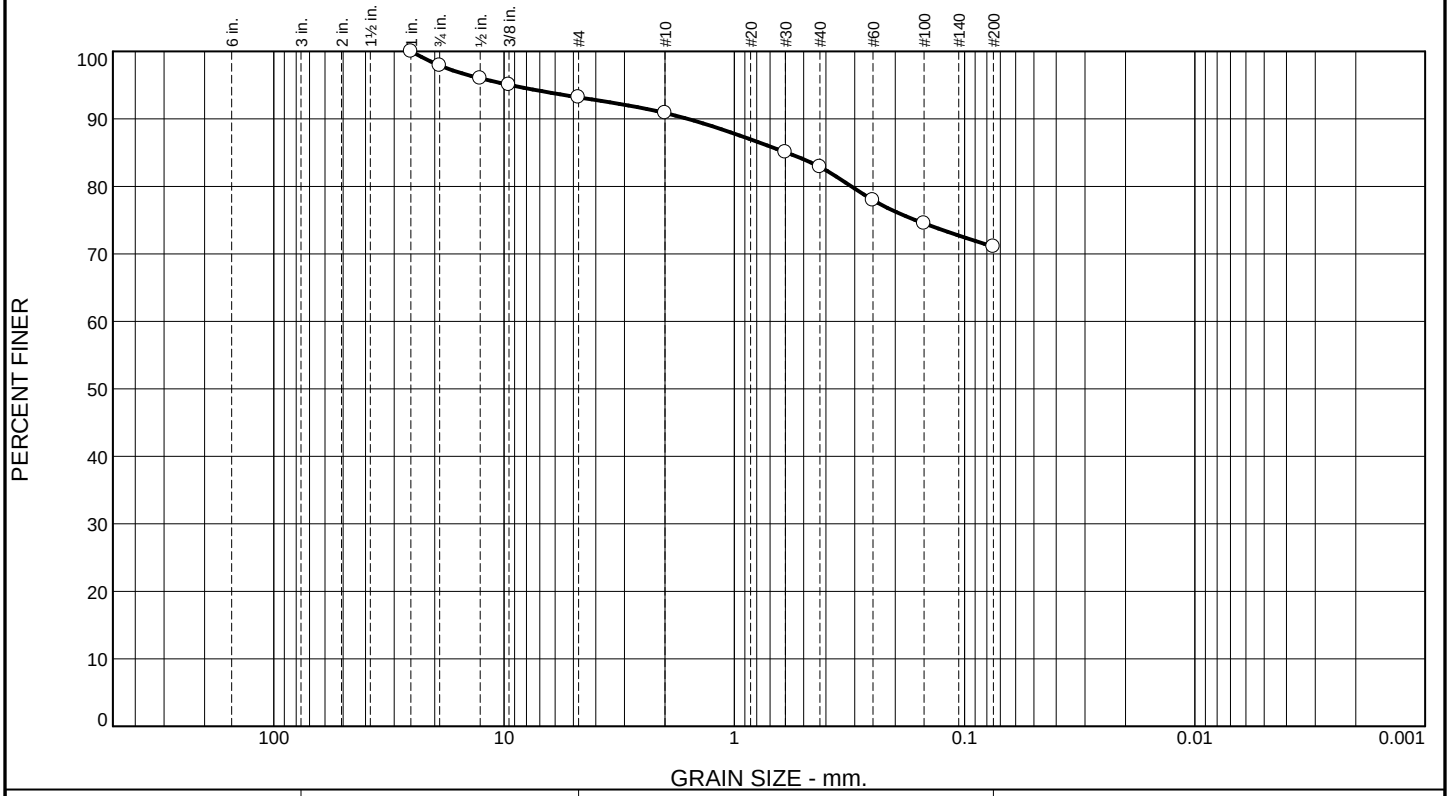
Average Hydraulic Conductivity	**6.92E-07**	cm/sec
	9.81E-04	in/hr

Remarks:

1. Test Conducted Using Daired Tap Water at Standard Temp. (72° F)
2. 100% Saturation Assumed

Tested by: SP
Checked by: KP

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.1	4.7	2.3	8.0	11.8	71.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	97.9		
.5	96.0		
.375	95.1		
#4	93.2		
#10	90.9		
#30	85.1		
#40	82.9		
#60	78.0		
#100	74.5		
#200	71.1		

* (no specification provided)

Material Description

Yellowish Brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.5925 D_{85}= 0.5933 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Sample Number: TP-21 ST-1 1.67'

Date: 4-29-25

RSA Geolab

Union, New Jersey

Client: Langan Engineering

Project: Eagle Rock Ave. Widening Project, West Orange, NJ
Proj.#101049802

Project No: 869 **Figure**

Tested By: SP **Checked By:** KP