First Southern Baptist Church of Bryant

604 S REYNOLDS ROAD, BRYANT, AR 72022

DRAINAGE REPORT

FOR
City of Bryant, Saline County, AR

September 2024

Owner & Developer: Peter Cunningham.

By:

HOPE
CONSULTING
ENGINEERS - SURVEYORS

TABLE OF CONTENTS

ITEM DESCRIPTION

1. Narrative & Summary
2. Hydrograph Report

Narrative & Summary

PROJECT TITLE

First Southern Baptist Church of Bryant

PROJECT PROPERTY OWNER

Peter Cunningham

PROJECT LOCATION

604 S Reynolds Road, Bryant, AR

PROJECT DESCRIPTION

The proposed development is on South Reynolds Road, Bryant, AR. Total development site area is 7.58 acres.

DRAINAGE ANALYSIS

On Site Drainage- Rational method was used to determine the existing and proposed flows from proposed site. There will be one retention pond to detain water from this development. Detailed drainage calculations considering the future expected development have been conducted to determine the required detention pond and culvert dimensions. Summary of the calculations are below:

Retention Pond

- Pond is situated on the north-east side of the property.
- Pre-development area 7.36 acres.
- Post-development area 7.34 acres.
- Pre-development runoff cumulative coefficient 0.65.
- Post-development runoff cumulative coefficient 0.72
- Pond has a bottom area of 16,570 sqft with bottom elevation of 393.4'.
- A 5' wide spillway with a 3' wide weir outlet structure.

Peak flows for Pre and post development phase of onsite area have been tabulated below-

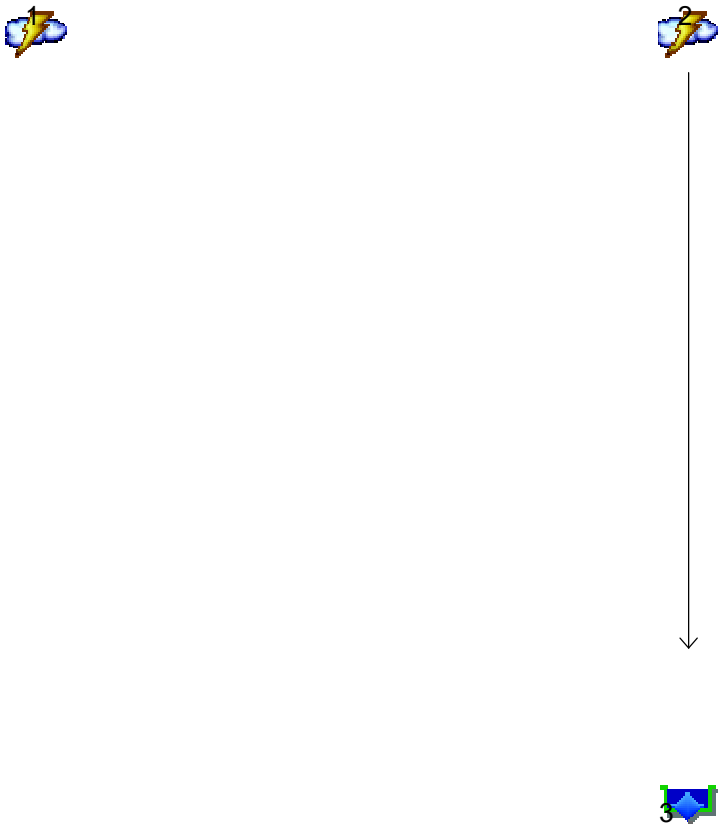
Period of time	Pre-development	Post-dev. Without detention	Post-dev. With detention
	Peak Flow (cfs)	Peak Flow (cfs)	Peak Flow (cfs)
2-Year	18.69	22.67	5.733
5-Year	20.65	25.15	6.587
10-Year	24.35	29.23	8.068
25-Year	27.93	33.44	9.693
50-Year	31.84	38.07	11.94
100-Year	33.86	40.40	13.17

CONCLUSION

From the onsite drainage calculation, it is seen that there is decrease in flow for all storm events due to the proposed retention pond.

Hydrograph Summary Report

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	Rational	Pre-Dev Flow
2	Rational	Development Generated Flow
3	Reservoir	Post Development Flow

Multi-Hydrograph Plot

Hyd. No. 1

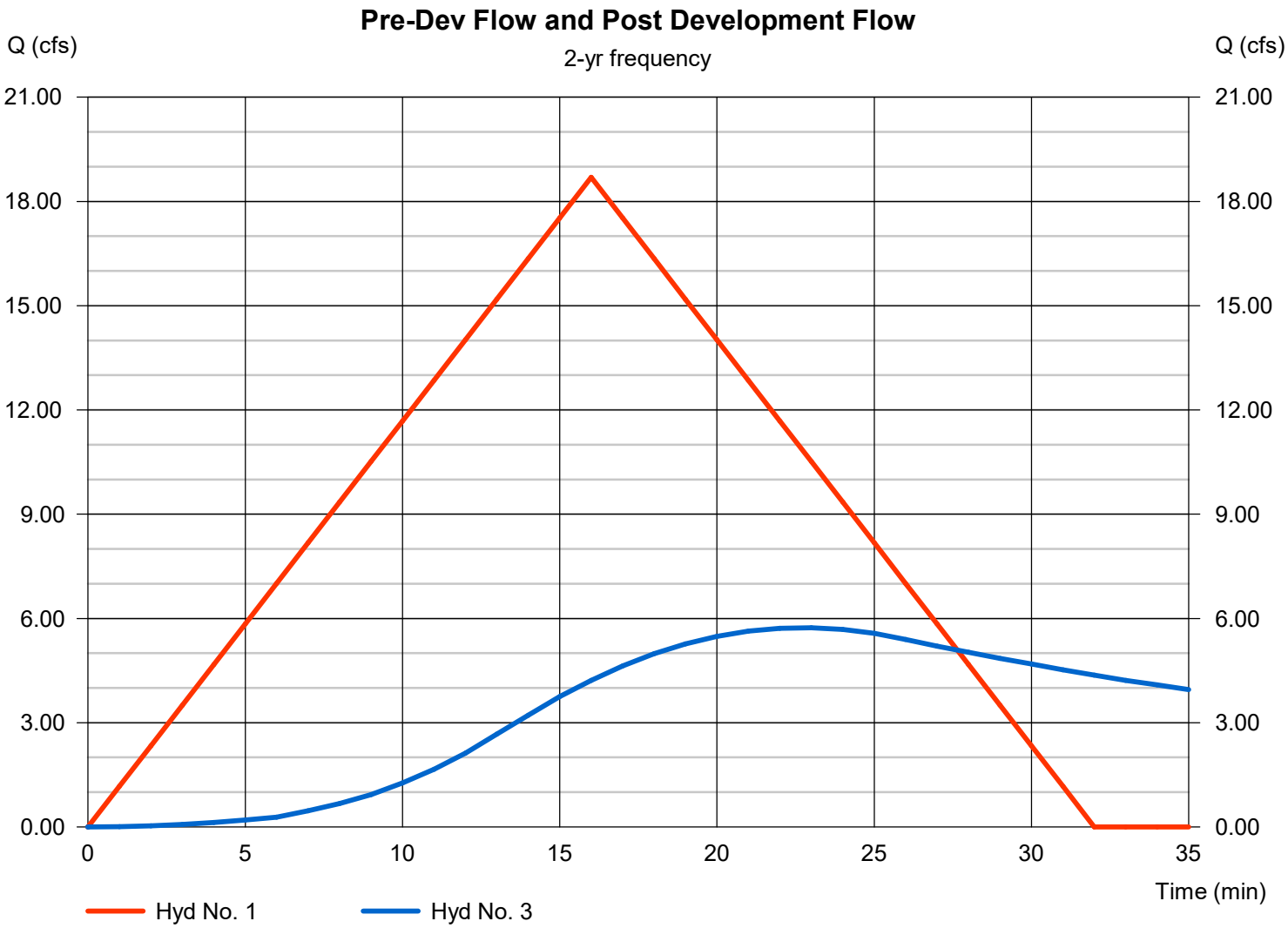
Pre-Dev Flow

Hydrograph type	=	Rational
Peak discharge	=	18.69 cfs
Time to peak	=	16 min
Hyd. Volume	=	17,943 cuft

Hyd. No. 3

Post Development Flow

Hydrograph type	=	Reservoir
Peak discharge	=	5.73 cfs
Time to peak	=	23 min
Hyd. Volume	=	17,672 cuft



Multi-Hydrograph Plot

Hyd. No. 1

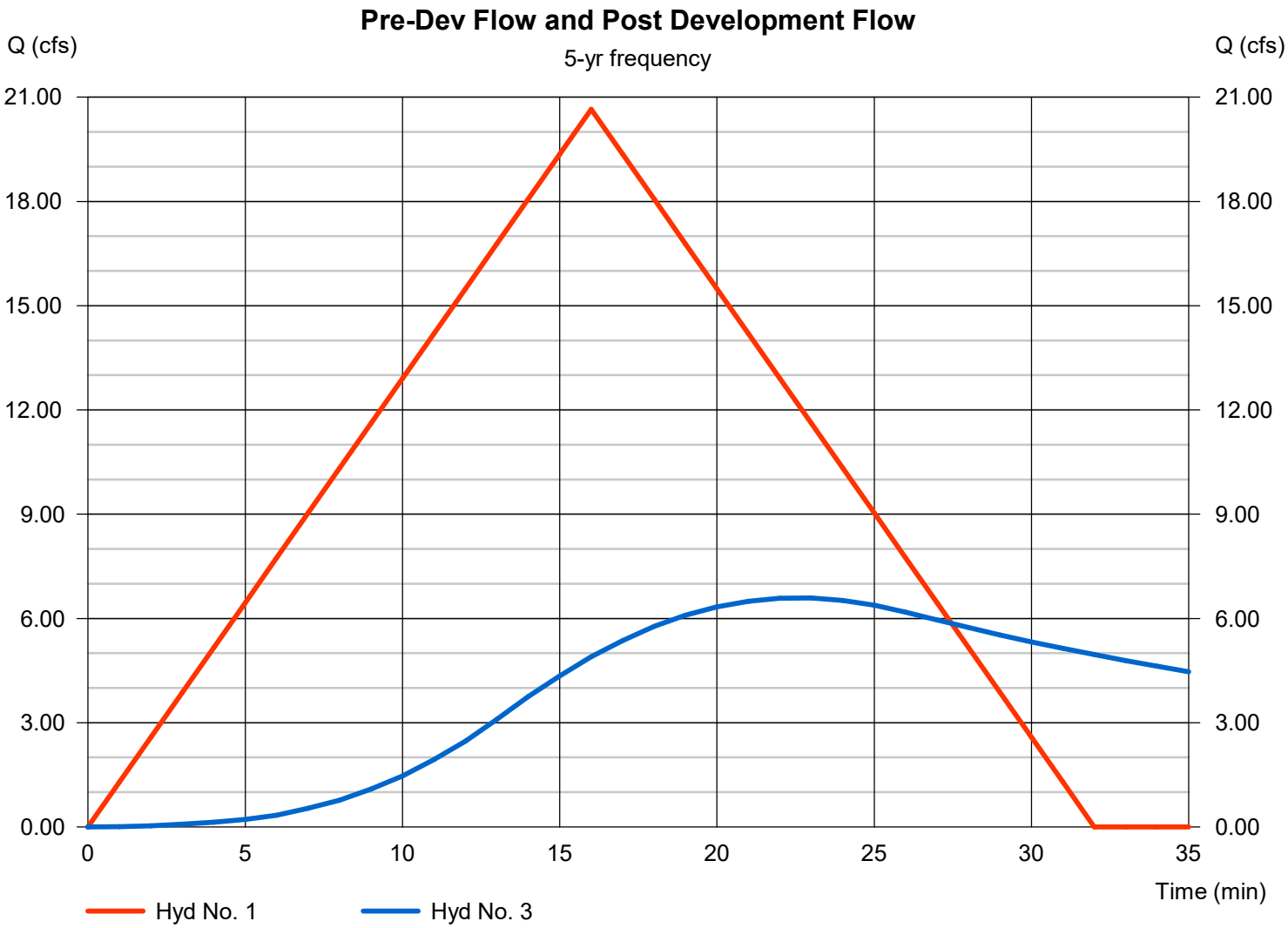
Pre-Dev Flow

Hydrograph type	=	Rational
Peak discharge	=	20.65 cfs
Time to peak	=	16 min
Hyd. Volume	=	19,826 cuft

Hyd. No. 3

Post Development Flow

Hydrograph type	=	Reservoir
Peak discharge	=	6.59 cfs
Time to peak	=	23 min
Hyd. Volume	=	19,608 cuft



Multi-Hydrograph Plot

Hyd. No. 1

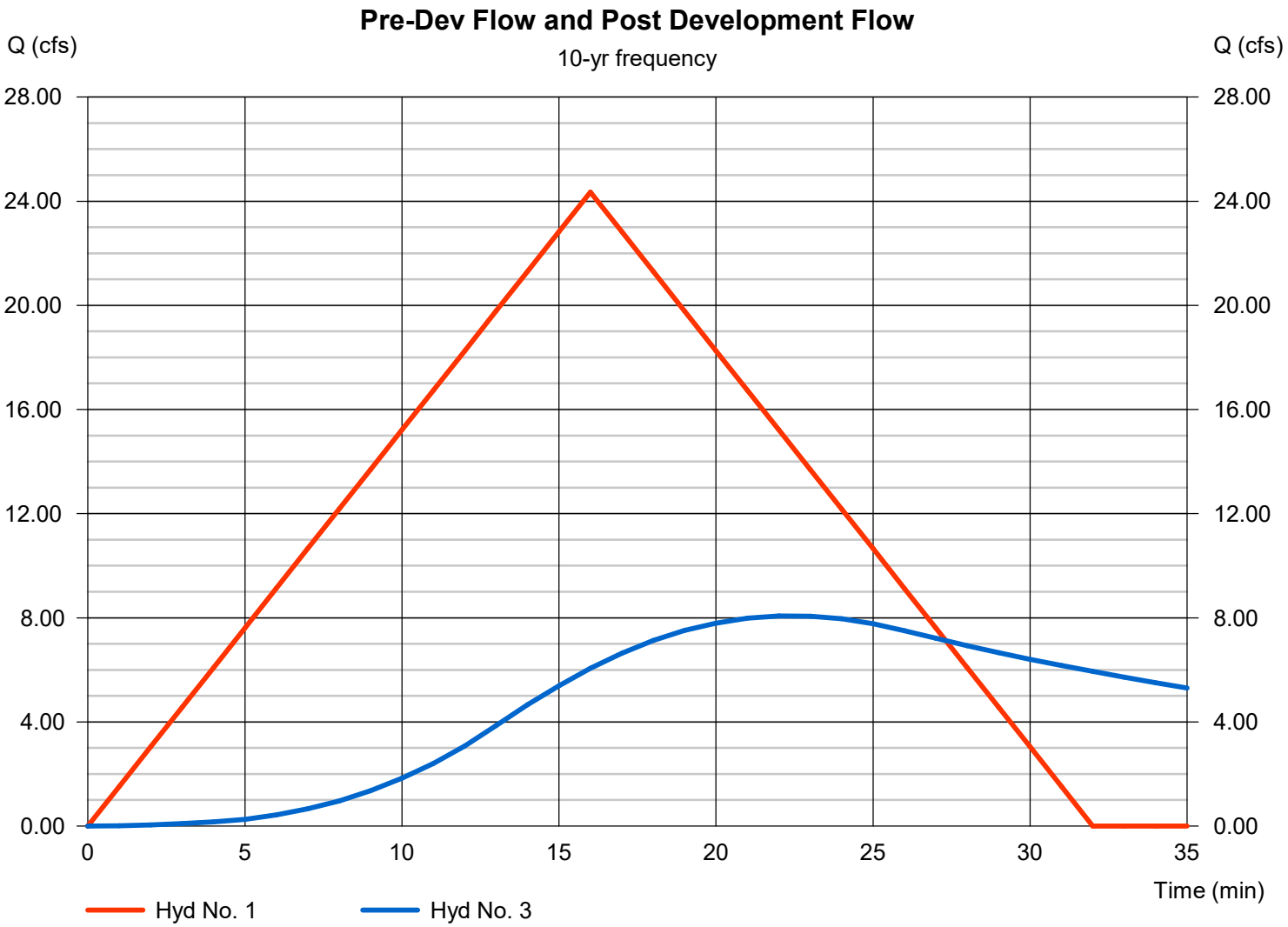
Pre-Dev Flow

Hydrograph type	=	Rational
Peak discharge	=	24.35 cfs
Time to peak	=	16 min
Hyd. Volume	=	23,373 cuft

Hyd. No. 3

Post Development Flow

Hydrograph type	=	Reservoir
Peak discharge	=	8.07 cfs
Time to peak	=	22 min
Hyd. Volume	=	22,791 cuft



Multi-Hydrograph Plot

Hyd. No. 1

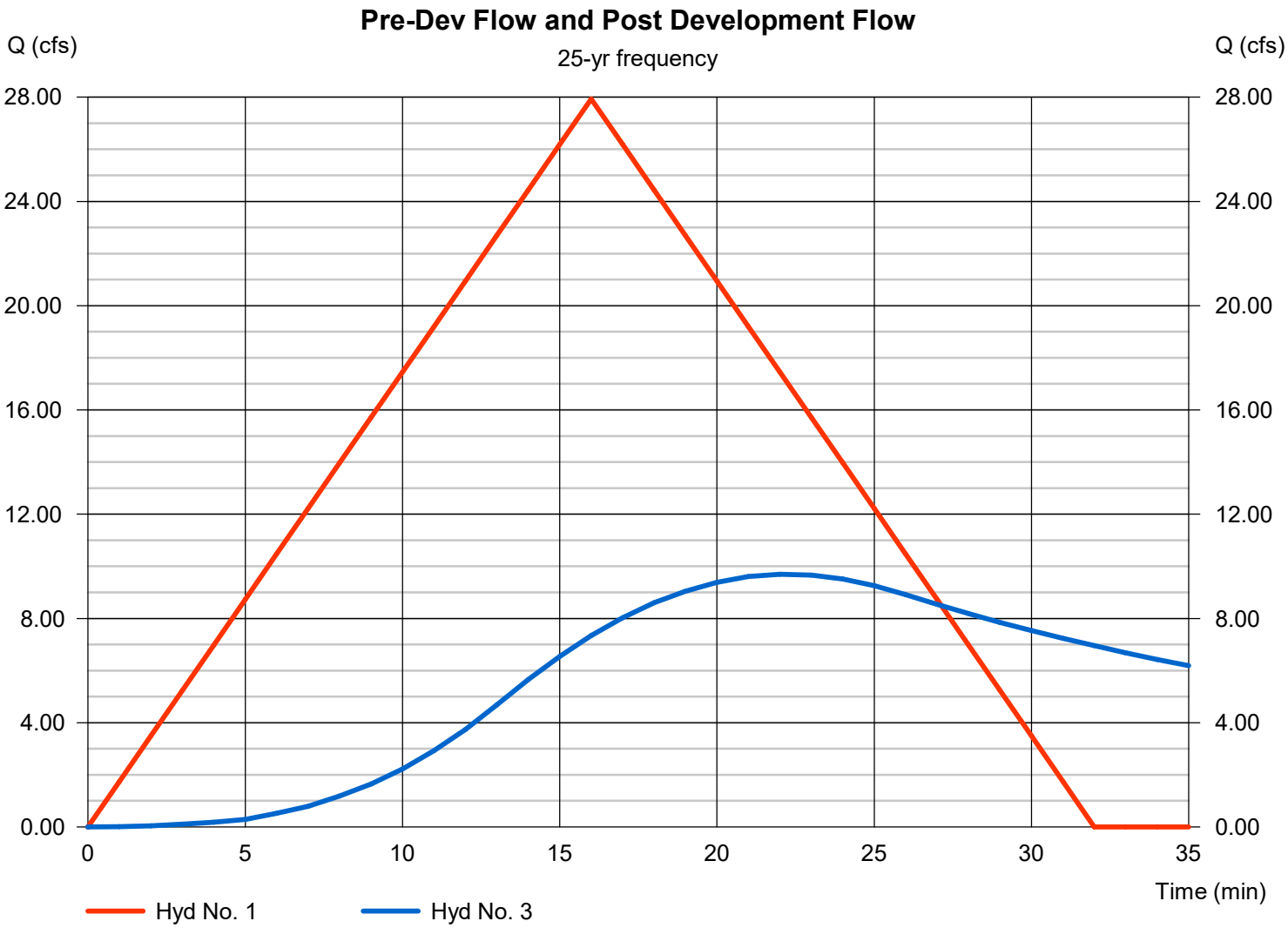
Pre-Dev Flow

Hydrograph type	=	Rational
Peak discharge	=	27.93 cfs
Time to peak	=	16 min
Hyd. Volume	=	26,812 cuft

Hyd. No. 3

Post Development Flow

Hydrograph type	=	Reservoir
Peak discharge	=	9.69 cfs
Time to peak	=	22 min
Hyd. Volume	=	26,080 cuft



Multi-Hydrograph Plot

Hyd. No. 1

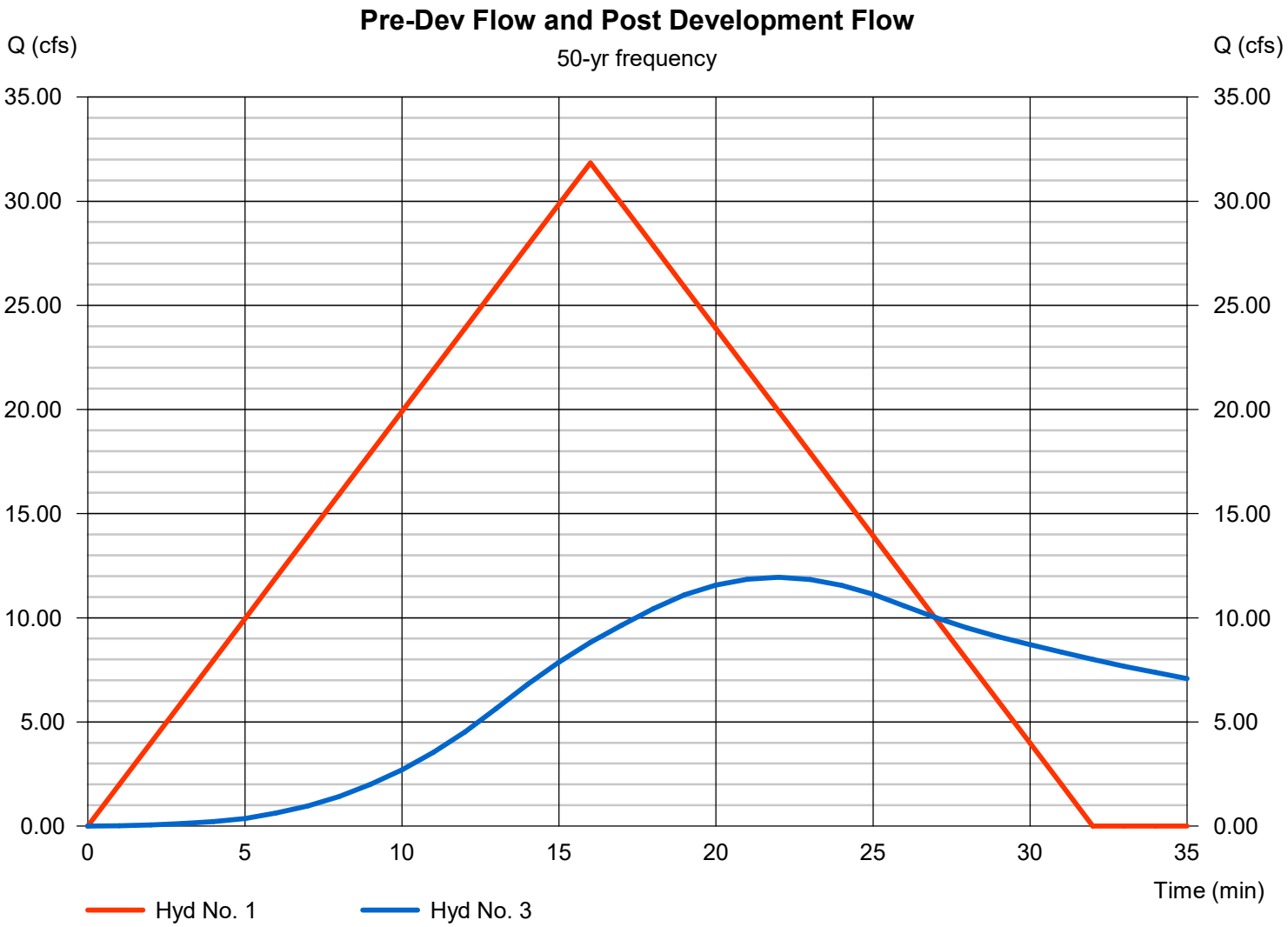
Pre-Dev Flow

Hydrograph type	=	Rational
Peak discharge	=	31.84 cfs
Time to peak	=	16 min
Hyd. Volume	=	30,570 cuft

Hyd. No. 3

Post Development Flow

Hydrograph type	=	Reservoir
Peak discharge	=	11.94 cfs
Time to peak	=	22 min
Hyd. Volume	=	29,692 cuft



Multi-Hydrograph Plot

Hyd. No. 1

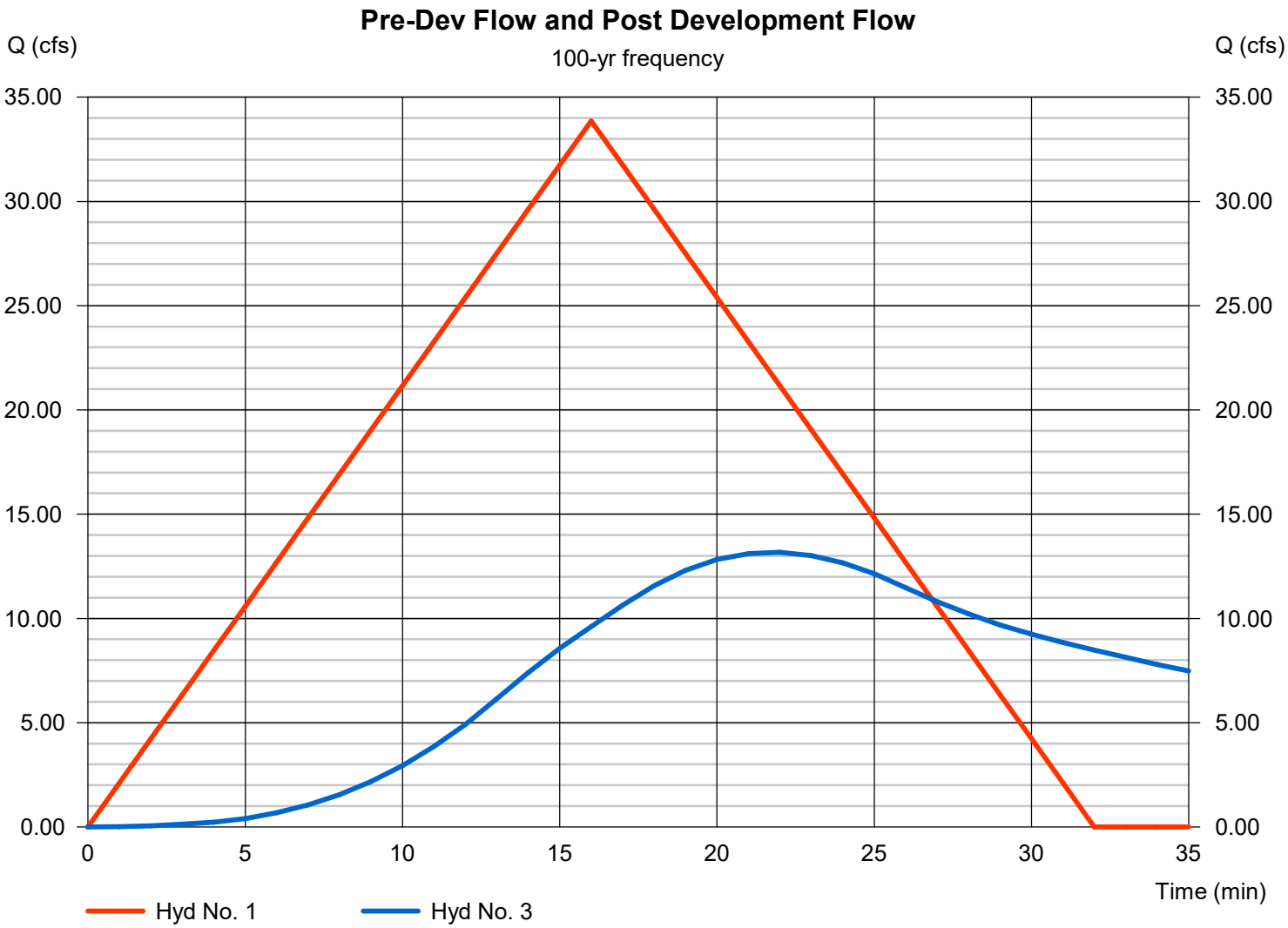
Pre-Dev Flow

Hydrograph type	=	Rational
Peak discharge	=	33.86 cfs
Time to peak	=	16 min
Hyd. Volume	=	32,504 cuft

Hyd. No. 3

Post Development Flow

Hydrograph type	=	Reservoir
Peak discharge	=	13.17 cfs
Time to peak	=	22 min
Hyd. Volume	=	31,502 cuft



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2026 Thursday, 08 / 7 / 2025

Pond No. 1 - Retention Pond

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 393.40 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	393.40	16,570	0	0
1.00	394.40	21,182	18,827	18,827
1.40	394.80	23,045	8,842	27,669

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	Inactive	Inactive	Inactive	Inactive
Span (in)	= 8.00	8.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 393.40	393.40	0.00	0.00
Length (ft)	= 25.00	25.00	0.00	0.00
Slope (%)	= 0.52	0.52	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

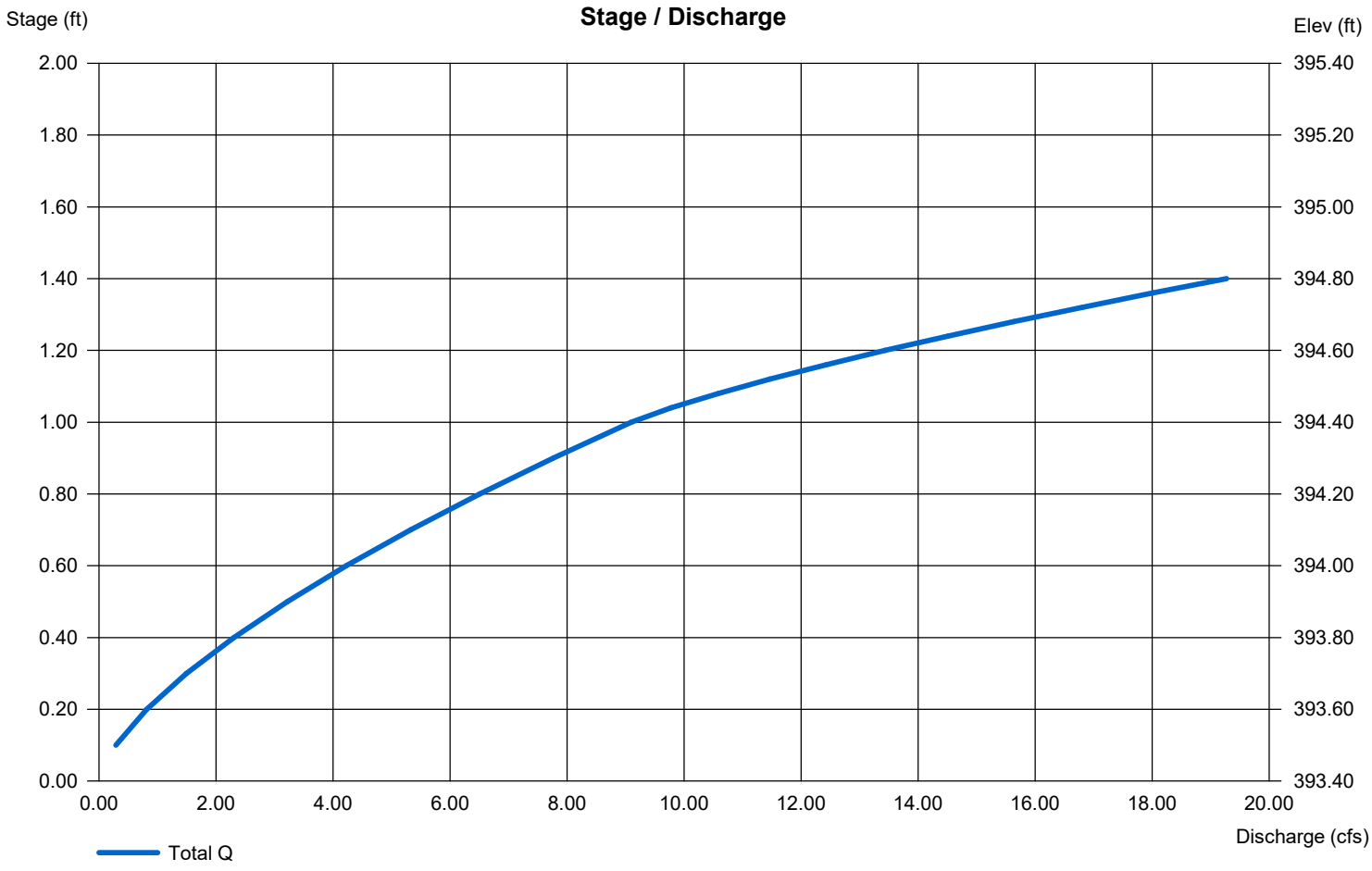
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	5.00	0.00	0.00
Crest El. (ft)	= 393.40	394.40	0.00	0.00
Weir Coeff.	= 3.03	3.33	3.33	3.33
Weir Type	= Rect	Rect	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2026

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	18.69	1	16	17,943	------	------	------	Pre-Dev Flow
2	Rational	22.67	1	13	17,679	------	------	------	Development Generated Flow
3	Reservoir	5.733	1	23	17,672	2	394.13	13,831	Post Development Flow

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2026

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	20.65	1	16	19,826	------	------	------	Pre-Dev Flow
2	Rational	25.15	1	13	19,614	------	------	------	Development Generated Flow
3	Reservoir	6.587	1	23	19,608	2	394.21	15,185	Post Development Flow

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2026

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	24.35	1	16	23,373	------	------	------	Pre-Dev Flow
2	Rational	29.23	1	13	22,797	------	------	------	Development Generated Flow
3	Reservoir	8.068	1	22	22,791	2	394.32	17,379	Post Development Flow

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2026

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	27.93	1	16	26,812	------	------	------	Pre-Dev Flow
2	Rational	33.44	1	13	26,086	------	------	------	Development Generated Flow
3	Reservoir	9.693	1	22	26,080	2	394.44	19,606	Post Development Flow

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2026

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	31.84	1	16	30,570	------	------	------	Pre-Dev Flow
2	Rational	38.07	1	13	29,698	------	------	------	Development Generated Flow
3	Reservoir	11.94	1	22	29,692	2	394.54	21,917	Post Development Flow

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2026

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	33.86	1	16	32,504	------	------	------	Pre-Dev Flow
2	Rational	40.40	1	13	31,509	------	------	------	Development Generated Flow
3	Reservoir	13.17	1	22	31,502	2	394.59	23,012	Post Development Flow