MIDDLETON DETENTION POND

1800 Woodlands Park, Bryant, AR 72019

DRAINAGE REPORT

FOR
City of Bryant, Saline County, AR

DECEMBER 2022

Owner & Developer: CEM Properties Limited Partnership

By:

HOPE
CONSULTING
ENGINEERS • SURVEYORS

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Narrative & Summary

PROJECT TITLE

Middleton Detention Pond

PROJECT PROPERTY OWNER

CEM Properties Limited Partnership

PROJECT LOCATION

1800 Woodlands Park, Bryant, AR

PROJECT DESCRIPTION

The proposed development is on 1800 Woodlands Park, Bryant, AR. Total development site area is 15.37 acres.

DRAINAGE ANALYSIS

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

Detention Pond

- Pond is situated on the east side of the property.
- Pre-development area 15.37 acres.
- Post-development area 15.37 acres.
- Pre-development runoff coefficient 0.49.
- Post-development runoff cumulative coefficient 0.97
- Pond has a bottom area of 35,000 sft with bottom elevation of 388.00'.
- One 18'' RCP with 0.5% slope is proposed for outflow culverts.

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

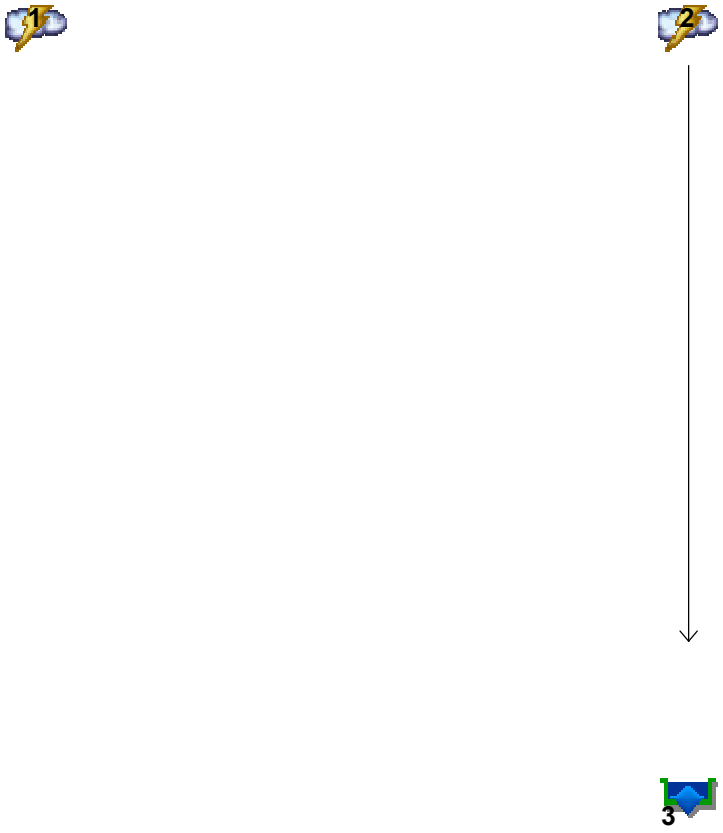
Period of time	Pre-development	Post-dev. Without detention	Post-dev. With detention
	Peak Flow (cfs)	Peak Flow (cfs)	Peak Flow (cfs)
2-Year	23.40	66.13	7.348
10-Year	31.33	84.98	15.38
25-Year	36.17	97.15	21.77
50-Year	41.20	110.51	29.15
100-Year	44.23	117.19	32.81

CONCLUSION

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

Hydrograph Summary Report

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	Rational	Pre development
2	Rational	Post development
3	Reservoir	Reservoir

Multi-Hydrograph Plot

Hyd. No. 1

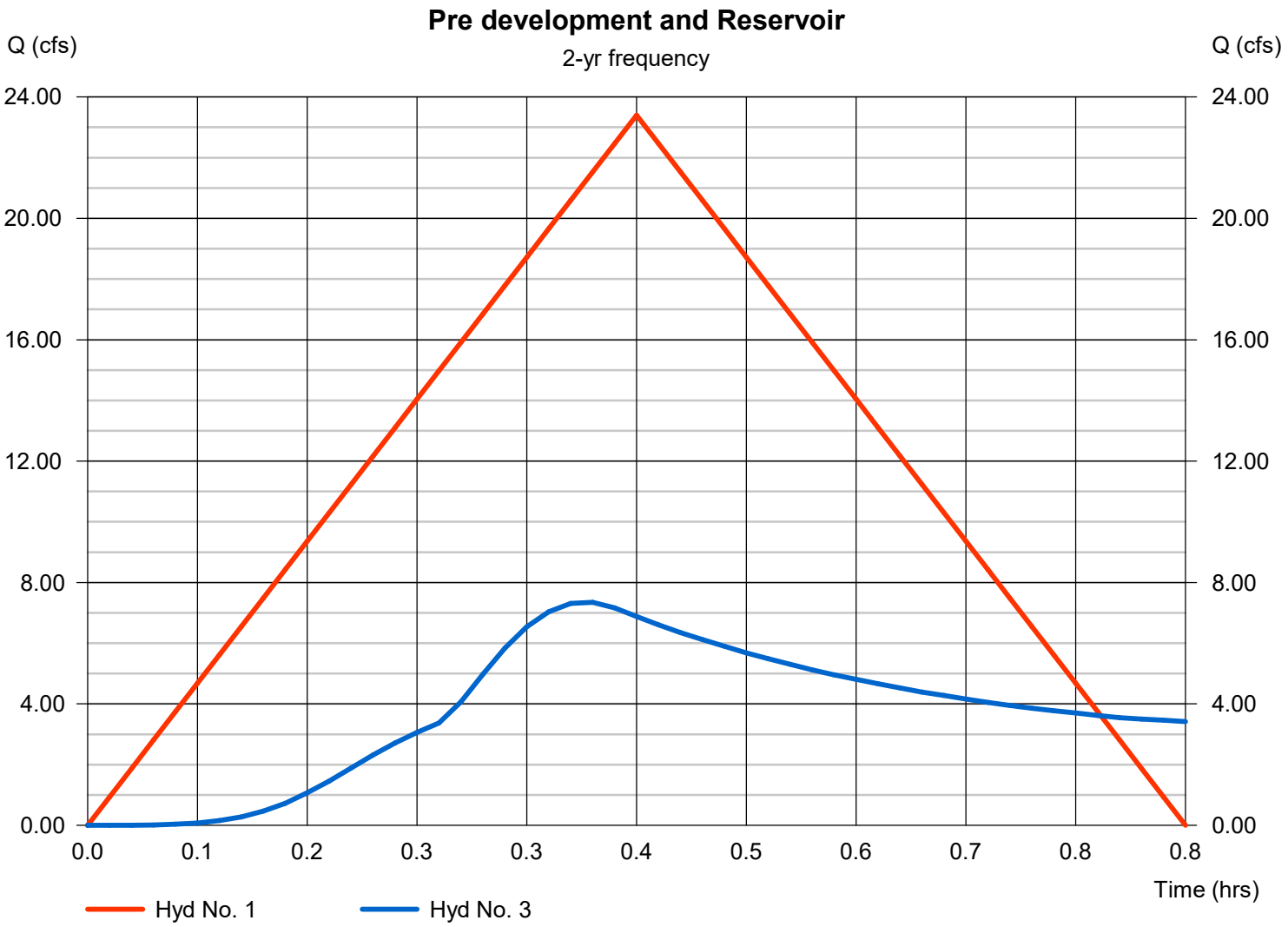
Pre development

Hydrograph type	=	Rational
Peak discharge	=	23.40 cfs
Time to peak	=	0.42 hrs
Hyd. Volume	=	35,100 cuft

Hyd. No. 3

Reservoir

Hydrograph type	=	Reservoir
Peak discharge	=	7.35 cfs
Time to peak	=	0.38 hrs
Hyd. Volume	=	46,352 cuft



Multi-Hydrograph Plot

Hyd. No. 1

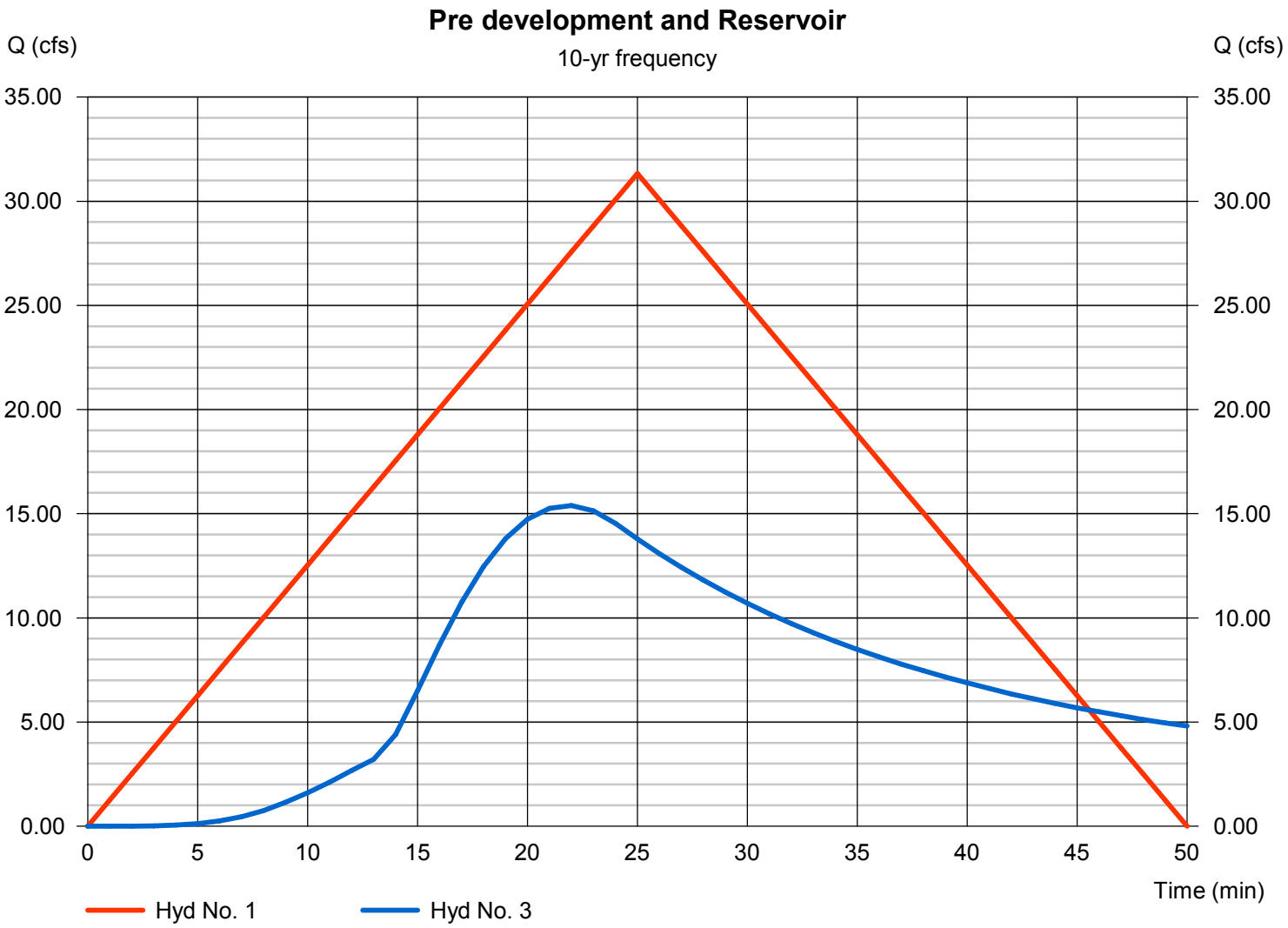
Pre development

Hydrograph type	=	Rational
Peak discharge	=	31.33 cfs
Time to peak	=	25 min
Hyd. Volume	=	46,997 cuft

Hyd. No. 3

Reservoir

Hydrograph type	=	Reservoir
Peak discharge	=	15.38 cfs
Time to peak	=	22 min
Hyd. Volume	=	59,917 cuft



Multi-Hydrograph Plot

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Hyd. No. 1

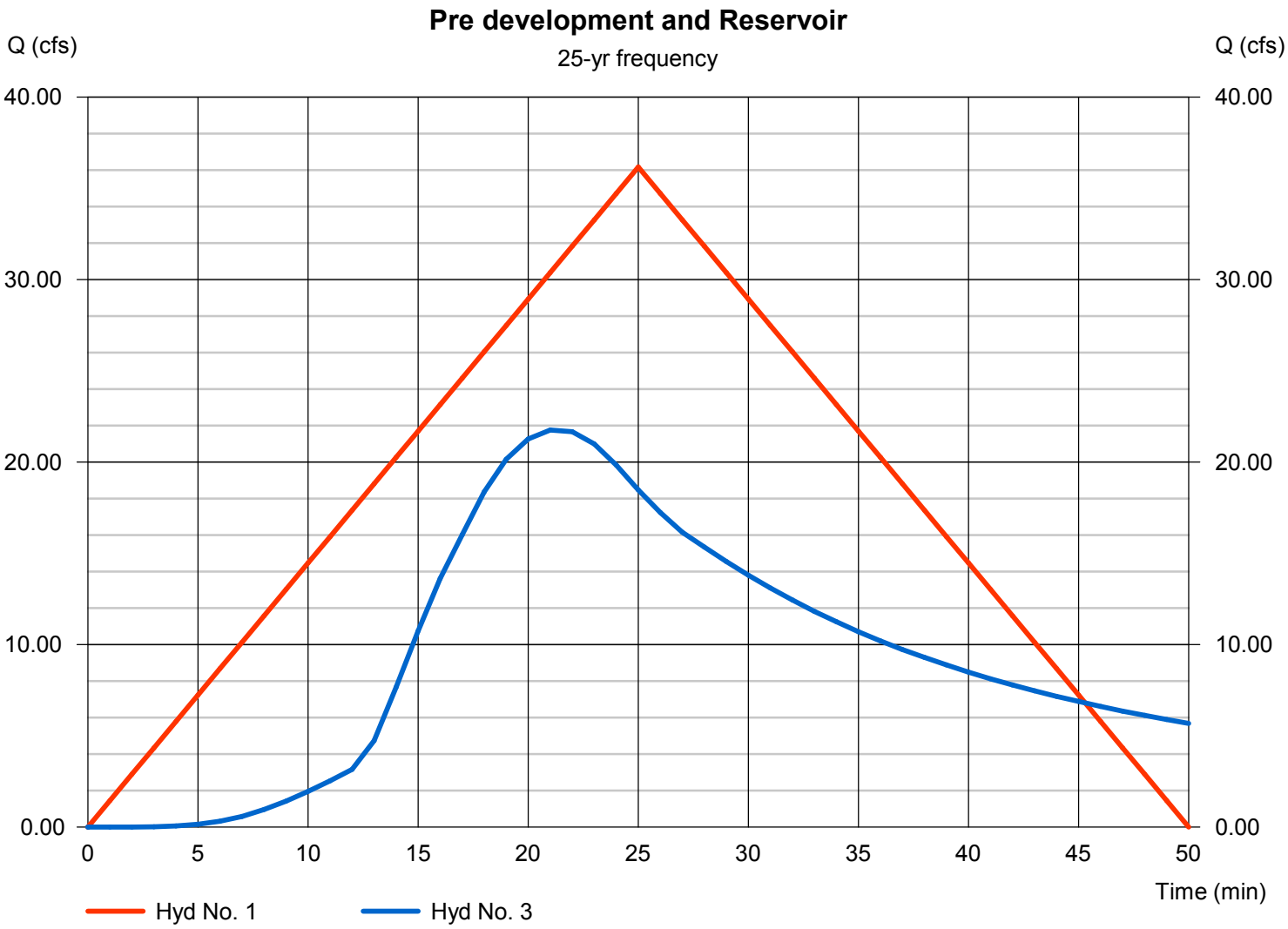
Pre development

Hydrograph type	=	Rational
Peak discharge	=	36.17 cfs
Time to peak	=	25 min
Hyd. Volume	=	54,256 cuft

Hyd. No. 3

Reservoir

Hydrograph type	=	Reservoir
Peak discharge	=	21.77 cfs
Time to peak	=	21 min
Hyd. Volume	=	68,679 cuft



Multi-Hydrograph Plot

Hyd. No. 1

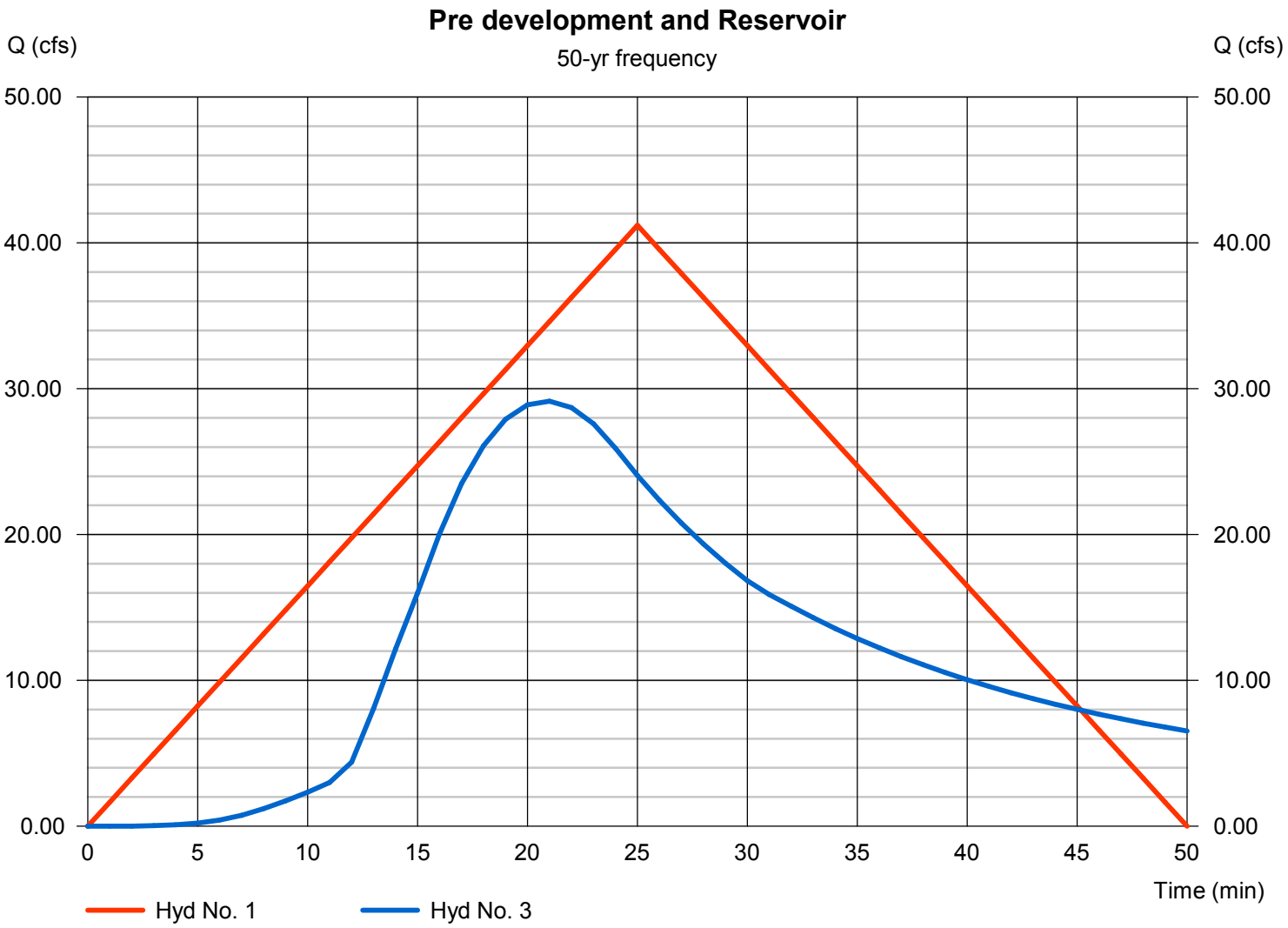
Pre development

Hydrograph type	=	Rational
Peak discharge	=	41.20 cfs
Time to peak	=	25 min
Hyd. Volume	=	61,798 cuft

Hyd. No. 3

Reservoir

Hydrograph type	=	Reservoir
Peak discharge	=	29.15 cfs
Time to peak	=	21 min
Hyd. Volume	=	78,295 cuft



Multi-Hydrograph Plot

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Hyd. No. 1

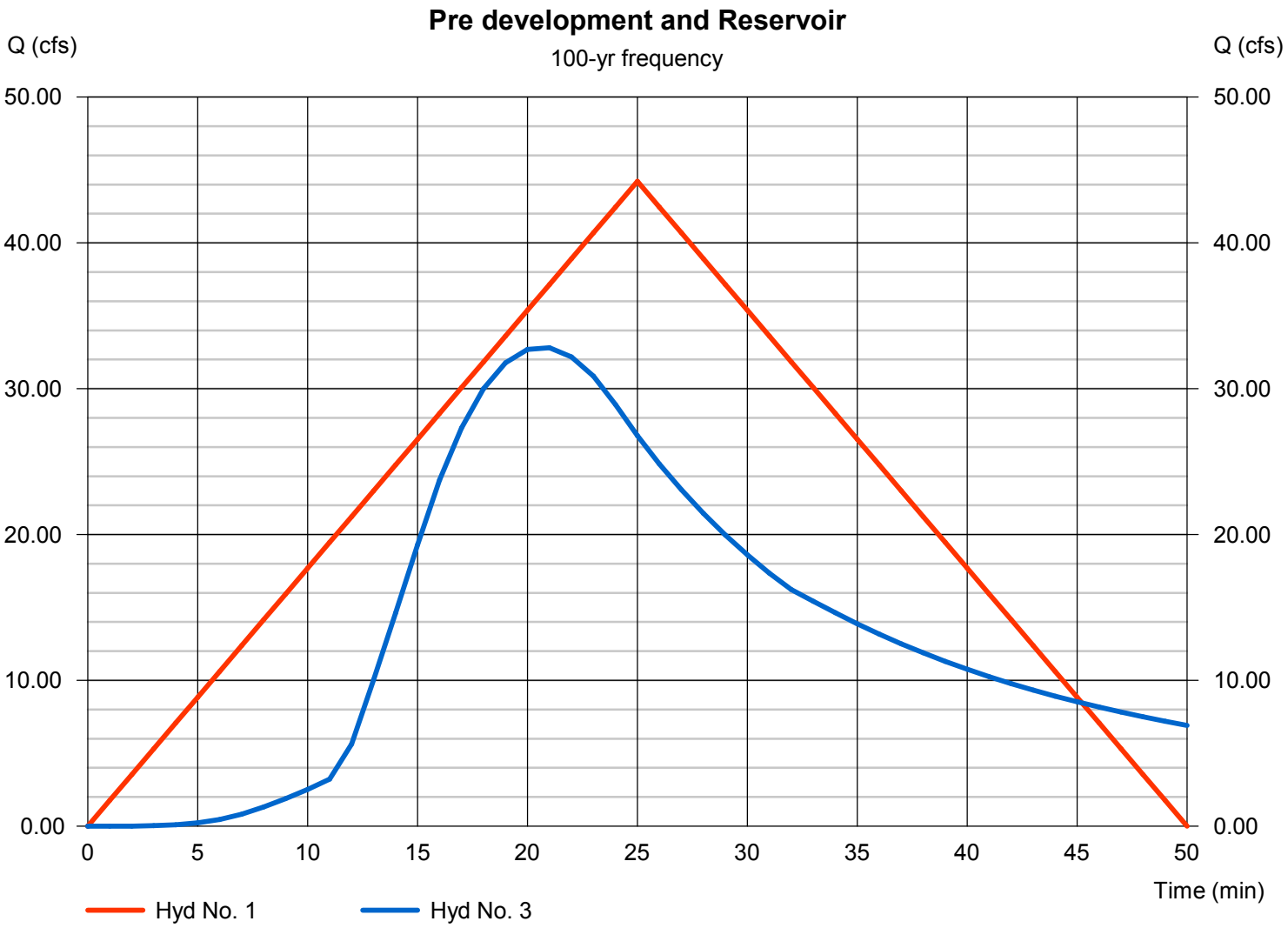
Pre development

Hydrograph type	=	Rational
Peak discharge	=	44.23 cfs
Time to peak	=	25 min
Hyd. Volume	=	66,339 cuft

Hyd. No. 3

Reservoir

Hydrograph type	=	Reservoir
Peak discharge	=	32.81 cfs
Time to peak	=	21 min
Hyd. Volume	=	83,103 cuft



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 12 / 19 / 2022

Pond No. 1 - Detention

Pond Data

Trapezoid -Bottom L x W = 200.0 x 175.0 ft, Side slope = 3.00:1, Bottom elev. = 388.00 ft, Depth = 3.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	388.00	35,000	0	0
0.30	388.30	35,678	10,602	10,602
0.60	388.60	36,363	10,806	21,408
0.90	388.90	37,054	11,012	32,420
1.20	389.20	37,752	11,221	43,641
1.50	389.50	38,456	11,431	55,072
1.80	389.80	39,167	11,643	66,715
2.10	390.10	39,884	11,857	78,572
2.40	390.40	40,607	12,073	90,646
2.70	390.70	41,337	12,292	102,937
3.00	391.00	42,074	12,512	115,449

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	Inactive	Inactive	0.00
Span (in)	= 18.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 388.00	0.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	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

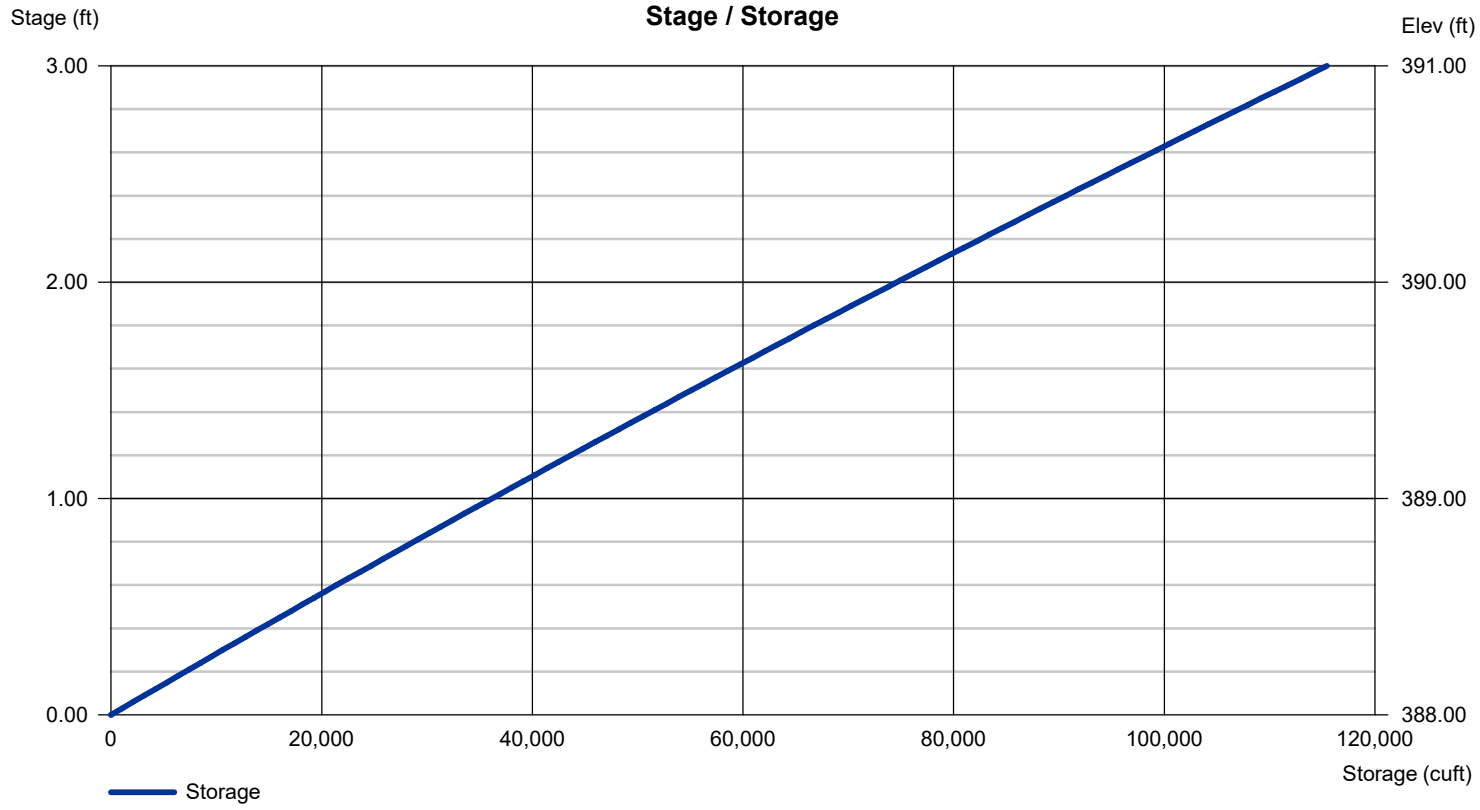
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.00	Inactive	Inactive	0.00
Crest El. (ft)	= 389.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 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. v2023

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	23.40	1	25	35,100	------	------	------	Pre development
2	Rational	66.13	1	12	47,611	------	------	------	Post development
3	Reservoir	7.348	1	23	46,352	2	389.21	44,023	Reservoir

Hydrograph Summary Report

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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	31.33	1	25	46,997	------	------	------	Pre development
2	Rational	84.98	1	12	61,183	------	------	------	Post development
3	Reservoir	15.38	1	22	59,917	2	389.47	53,932	Reservoir

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

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	36.17	1	25	54,256	------	------	------	Pre development
2	Rational	97.15	1	12	69,947	------	------	------	Post development
3	Reservoir	21.77	1	21	68,679	2	389.62	59,683	Reservoir

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

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	41.20	1	25	61,798	------	------	------	Pre development
2	Rational	110.51	1	12	79,565	------	------	------	Post development
3	Reservoir	29.15	1	21	78,295	2	389.77	65,595	Reservoir

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

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	44.23	1	25	66,339	------	------	------	Pre development
2	Rational	117.19	1	12	84,373	------	------	------	Post development
3	Reservoir	32.81	1	21	83,103	2	389.84	68,409	Reservoir