THE COTTAGES OF BRYANT
PROPOSED RESIDENTIAL DEVELOPMENT
PRICKETT RD,BRYANT, AR

DRAINAGE REPORT

FOR
City of Bryant, Saline County, AR

October 2026

Owner & Developer: Heritage Homes LLC

By:

HOPE
CONSULTING
ENGINEERS • SURVEYORS

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Narrative & Summary

PROJECT TITLE

The Cottages of Bryant

PROJECT PROPERTY OWNER

Heritage Homes LLC

PROJECT LOCATION

The site is on Prickett Road at North Reynolds Road (minor arterial, 80' R/W) in Bryant, Saline County, Arkansas, in Section 28, Township 1 South, Range 14 West. The detention pond is in the northwest corner of the property. It discharges north through a grouted riprap outfall.

PROJECT DESCRIPTION

The project is a 20-lots multi-family duplex residential subdivision on 5.85 acres, owned and developed by Heritage Homes LLC. It includes 1200 LF of public curb-and-gutter street, an underground storm sewer of 14"×22" and 19"×30" horizontal elliptical concrete pipe with five curb inlets, water and sanitary sewer service, and one dry detention pond with a multi-stage concrete weir outlet.

Before development, 6.28 acres of areas drain to the northwest, with a composite C of 0.49 and a time of concentration of 16 min. After development, the area draining to the pond is 5.97 acres: 4.39 acres of developed on-site area (C = 0.80, Tc = 6 min) and 1.58 acres of offsite area A2 and A3 (C = 0.49, Tc = 16 min), for a composite C of 0.72. The offsite areas are unchanged by the project and are routed through the pond.

DRAINAGE ANALYSIS

On-Site Drainage:

Peak flows were computed with the Rational Method using the City of Bryant IDF relationship. Times of concentration were computed as the sum of sheet flow, shallow concentrated flow, and channelized flow (Sheet C-4.0). Hydrographs were generated and routed with Hydra flow Hydrographs Extension for Autodesk Civil 3D 2026, and the storm sewer was analyzed with Hydra flow Storm Sewers Extension 2026.

There will be one detention pond to detain water from this development. Detailed drainage calculations considering the expected development have been conducted to determine the required detention pond and culvert dimensions. A summary of the calculations is below:

Detention Pond -

- Pond is situated on the northwest side of the property.
- Pre-development area 6.28 acres.
- Post-development area 5.97 acres.
- Pre-development runoff coefficient 0.49
- Post-development composite runoff coefficient 0.72
- Pond has a bottom elevation of 393.0

- One outlet control structure is proposed for outflow.

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

Time	Pre-development	Post-dev. With-out detention	Post-dev. With deten-tion (From Hydrograph)	Maximum High Water
	Peak Flow (cfs)	Peak Flow (cfs)	Peak Flow (cfs)	Elevation (ft)
2-Year	11.72	21.42	2.279	393.58
5-Year	13.96	25.41	3.418	393.69
10-Year	15.76	28.68	4.676	393.78
25-Year	18.07	32.90	6.465	393.89
50-Year	19.79	35.89	7.862	393.97
100-Year	21.44	38.99	9.253	394.05

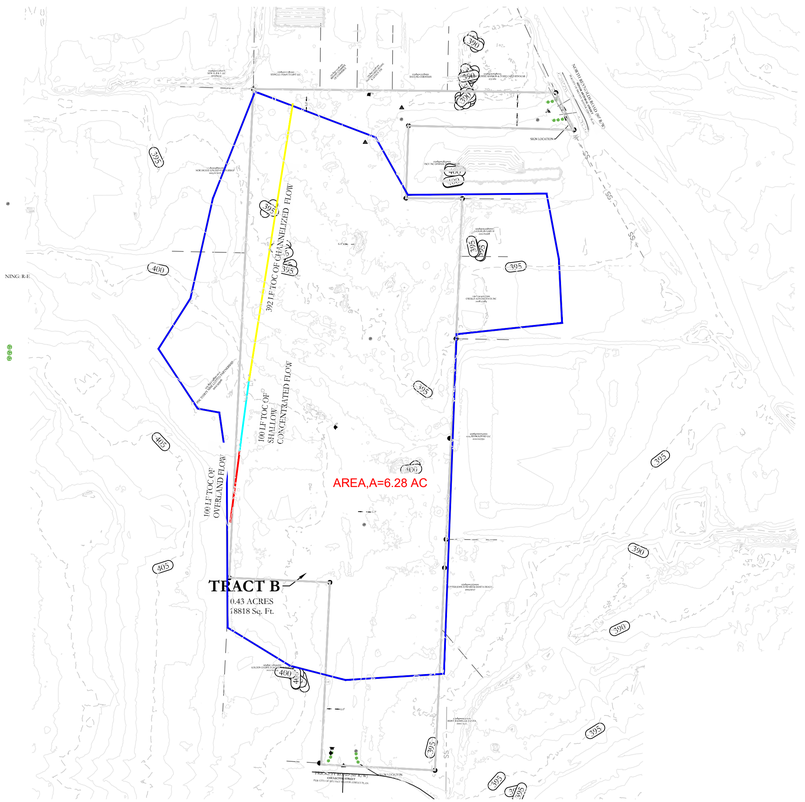
OUTLET CONTROL STRUCTURE:

The outlet is a reinforced concrete multi-stage rectangular weir in the north berm. Stage 1 is a 0.5' wide low-flow notch with its crest at 392.50. Stage 2 is a 4.5' wide opening with its crest at 393.50. Stage 3 is a 10.0' wide opening with its crest at 394.50. The top of the pond is at 395.50. It discharges onto grouted riprap (FL 392.35) with filter fabric conforming to AASHTO M288.

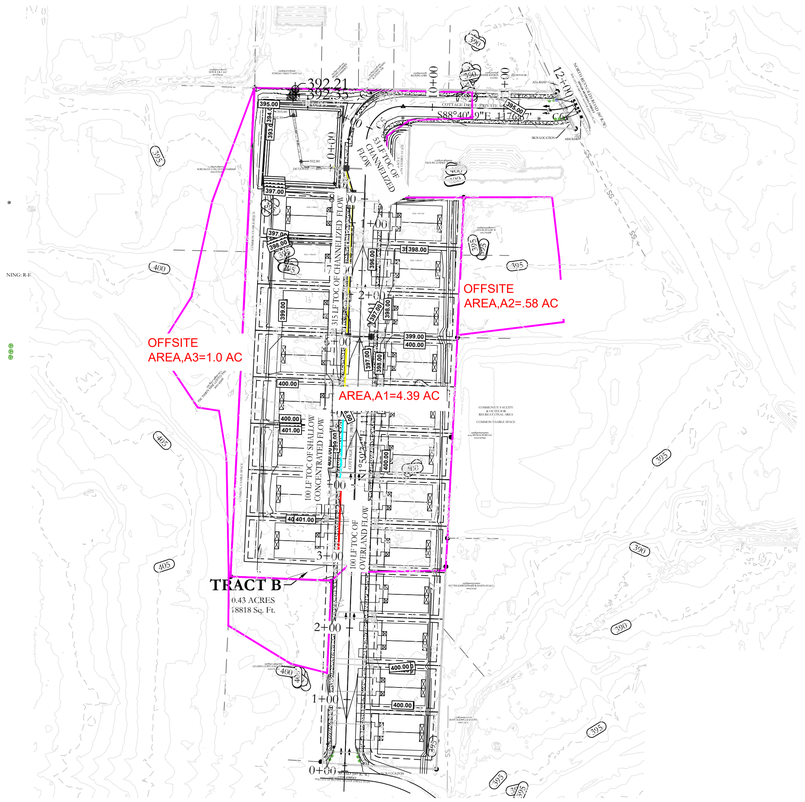
CONCLUSION

The onsite drainage calculation shows that the proposed detention pond decreases the flow for all storm events.

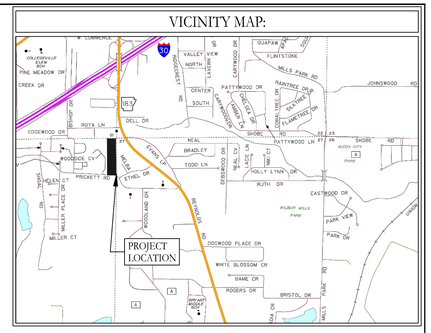
Hydrograph Summary Report



PRE DEVELOPMENT CONDITION:



POST DEVELOPMENT CONDITION:



OVERLAND FLOW

SHALLOW CONCENTRATED FLOW

CHANNELIZED FLOW

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

Time	Pre-development	Post-dev. Without detention	Post-dev. With detention (From Hydrograph)	Maximum High Water
	Peak Flow (cfs)	Peak Flow (cfs)	Peak Flow (cfs)	Elevation (ft)
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50-Year	19.79	35.89	7.862	393.97
100-Year	21.44	38.99	9.253	394.05

CERTIFICATE OF AUTHORIZATION HOPE CONSULTING, INC. No. 1931 ARKANSAS

STATE OF ARKANSAS LICENSED PROFESSIONAL ENGINEER NO. 20876 KAZEL TAMZIDUL ISLAM

BASIS OF BEARING: GRID NORTH, ARKANSAS COORDINATE SYSTEM, SOUTHZONE BY GPS OBSERVATION

120 60 0 120

LEGEND
- Found Aliquot Corner
- Found monument
- Set ½" Rebar
- Computed point
(M)- Measured
(P) - Plat/Deed
——— Fence

HOPE CONSULTING ENGINEERS - SURVEYORS
129N. Main Street,
Benton, Arkansas 72015
PH. (501)315-2626
FAX (501) 315-0024
www.hopeconsulting.com

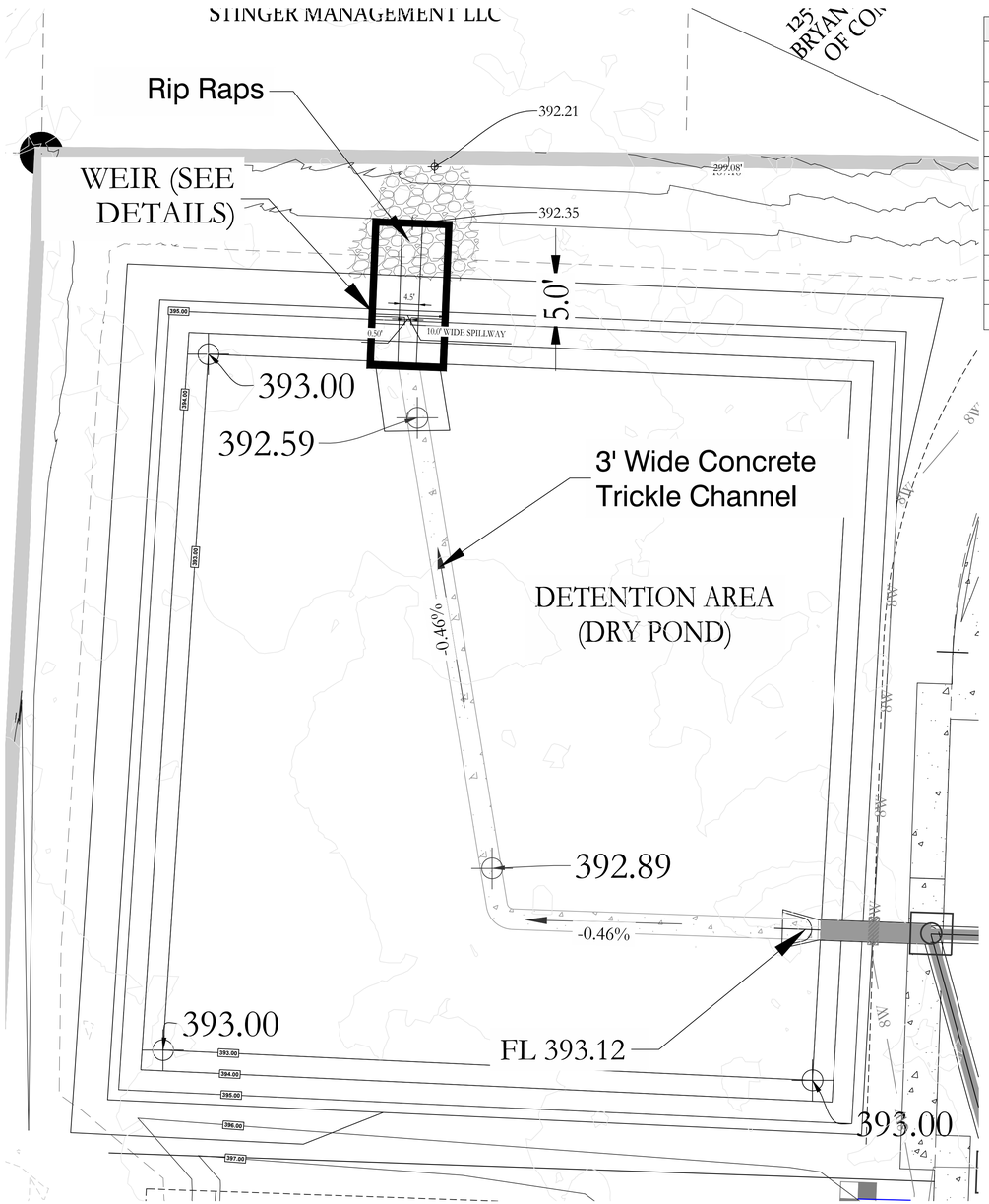
FOR USE AND BENEFIT OF:
HERITAGE HOMES

THE COTTAGES OF BRYANT
DRAINAGE CALCULTIONS
PRICKETT ROAD, BRYANT ,ARKANSAS

DATE:	09-23-2026	C.A.D. BY:	DRAWING NUMBER:
REVISED:	10-21-2026	CHECKED BY:	26-0288
SHEET:	C-4.0	SCALE:	

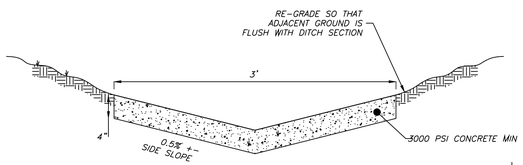
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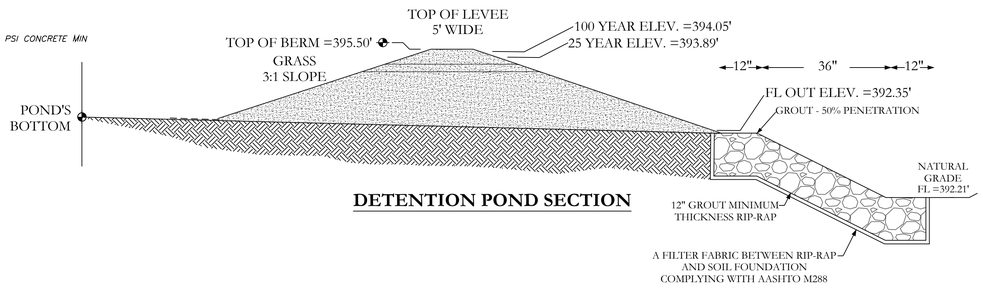


DETENTION POND

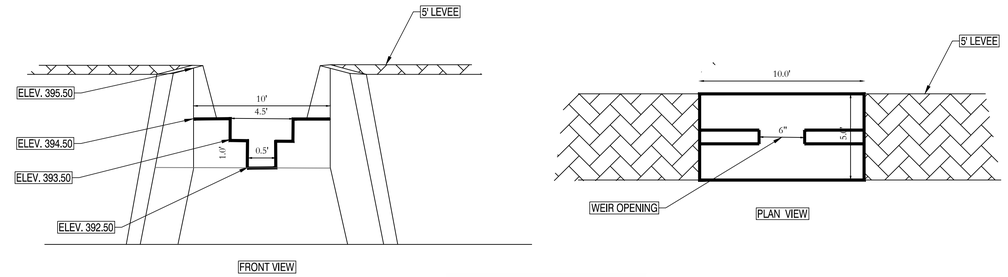
POND DETAILS	
Pond bottom	393.00' min. (at channel edges, weir end), graded at 0.5% min. toward trickle channel
FES invert / rim	393.12' / 394.99'
Trickle channel type	3'-0" wide x 6" deep concrete V-ditch, 3:1 side slopes
Trickle channel flowline, FES end	393.12' (top of edge 393.62')
Trickle channel flowline, weir end	392.50' (top of edge 393.00')
Trickle channel length / grade	135' at 0.46%
Weir opening invert	392.50'
Weir opening width	4.5'
25-year WSE	393.89'
100-year WSE	394.05'
Top of berm	395.50'



DETAIL (NTS)
TRICKLE CHANNEL SECTION



DETENTION POND SECTION

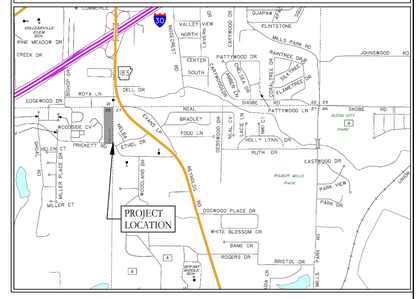


POND WEIR

EARTHEN SLOPE NOTE:
EARTHEN DETENTION POND SLOPES ON BOTH THE INTERIOR AND EXTERIOR OF THE POND SHALL HAVE A MAXIMUM SLOPE OF 3:1.

NOTE:
1. DETENTION POND WILL BE REQUIRED TO BE STABILIZED WITH SOLID SOD/SEED STABILIZATION PER THE STORM WATER MANAGEMENT MANUAL.
2. DETENTION POND WILL HAVE A 5' WIDE LEVEE.
3. SAFETY: UPON COMPLETION, THE DETENTION BASIN SHALL BE ENCLOSED WITH FENCING PER THE FENCE DETAIL ON THIS SHEET,WITH A LOCKABLE MAINTENANCE ACCESS GATE, IN ACCORDANCE WITH SECTION 1000.7 OF THE CITY OF BRYANT STORMWATER MANAGEMENT MANUAL.

VICINITY MAP:



STATE OF ARKANSAS
LICENSED PROFESSIONAL ENGINEER
NO. 20876
KAZI TAMZIDUL ISLAM

CERTIFICATE OF AUTHORIZATION
HOPE CONSULTING INC.
No. 1931
ARKANSAS

DETENTION POND MAINTENANCE PLAN

Background
The Detention pond is located at the North West of the subjected property. It is designed to temporarily detain stormwater to meet water quantity criteria before discharging off the property.

Routine Maintenance
Routine maintenance will include but not be limited to:
-Mowing of the bank slopes and area around the pond on a monthly basis during the growing season and as needed during the cooler months.

-The outlet pipe from the pond and other areas will be inspected monthly for debris which could inhibit the proper flow of discharge. Any debris will be removed immediately and disposed of or placed in a location to prevent future maintenance and to not cause impact up or downstream of the structure.

-Trash will be removed from around the pond to prevent entering the pond. Generally, the site should be kept free of loose trash which could be carried off site by wind or rain.

-Inspect the pond and outlet pipe for non-routine maintenance need.

-The pond shall be maintained in accordance with section 1000 of the city of bryant storm water management manual.

-Mosquito control: the detention pond is designed as a dry pond and shall drain completely within 72 hours after a storm event.

Standing water shall not be permitted. The owner shall correct any ponding areas by regrading and shall keep the trickle channel and outlet free of debris.

-The engineer of record shall be responsible for inspection of the detention pond, outlet structure,and trickle channel during construction and shall certify that the pond was constructed in accordance with the approved plans prior to final acceptance.

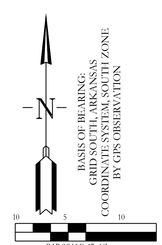
Periodic or Non-Routine Maintenance
The routine inspection of the pond area and discharge pipe will identify needed repairs and non-routine maintenance. These items may include but not be limited to:

-Re-growth of trees on or around the pond bank. These should be cut and removed from the pond area.

-Sediment from the site may accumulate in the pond bottom and reduce the pond to below design volume requirements. The pond should be excavated if the pond bottom elevation reached a level that allows excessive aquatic growth or reduces the pond efficiency such, that the sediments are passing the discharge structure and release off site.

-Stabilization or re-grading of side slopes may be required periodically or after excessive rain events. Any disturbance of slopes should be reseeded or may require installation of erosion control materials until seeding can reestablish adequate grasses to prevent future erosion.

-Any other maintenance or repairs which would minimize other maintenance to the pond or outfall structures.



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FOR USE AND BENEFIT OF:
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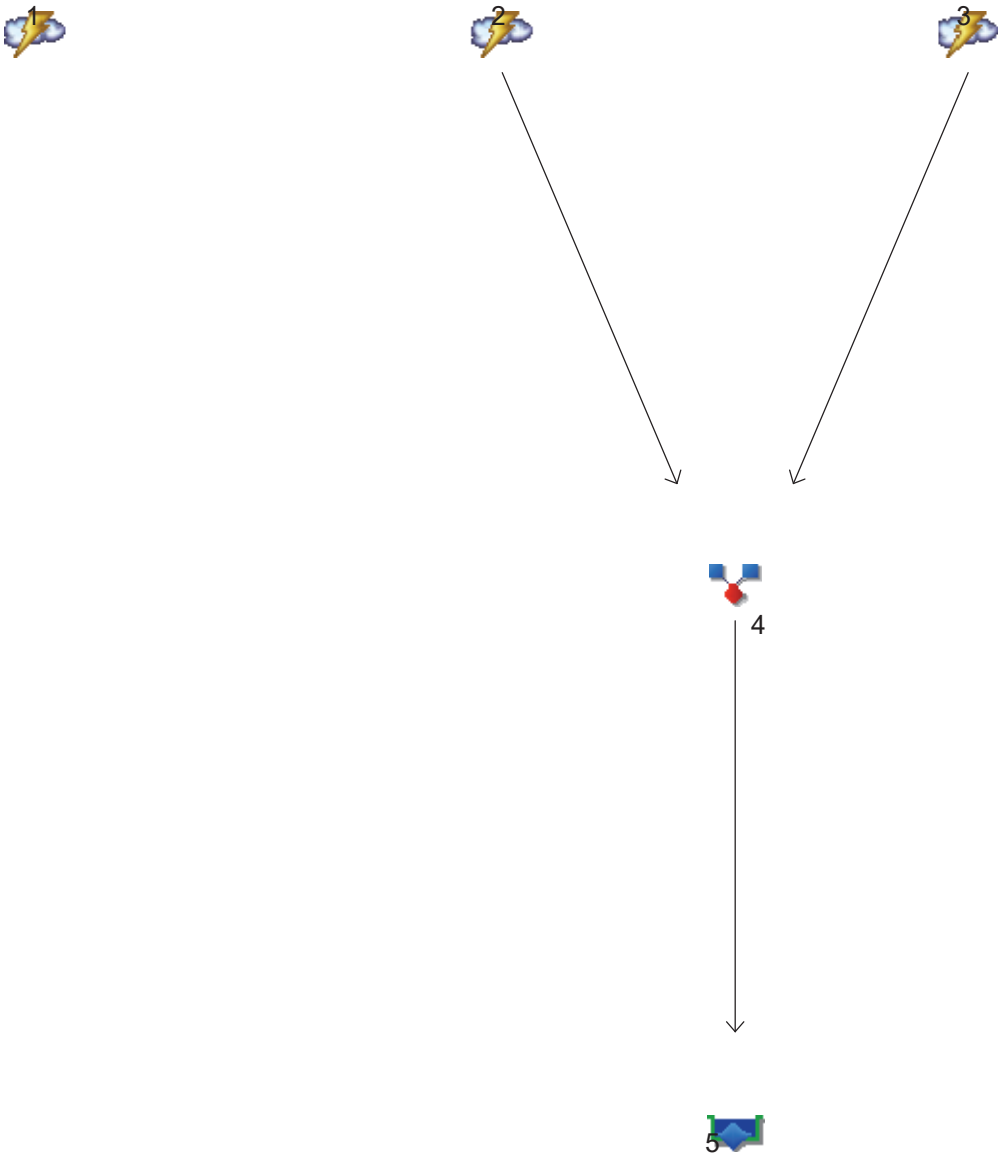
THE COTTAGES OF BRYANT
DETENTION POND
PRICKETT ROAD, BRYANT ,ARKANSAS

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Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	Rational	Pre Dev. Flow
2	Rational	DEV GENERATED FLOW-(ONSITE)
3	Rational	DEV GENERATED FLOW(OFF SITE)
4	Combine	<no description>
5	Reservoir	POST DEVELOPMENT FLOW

Multi-Hydrograph Plot

Hyd. No. 1

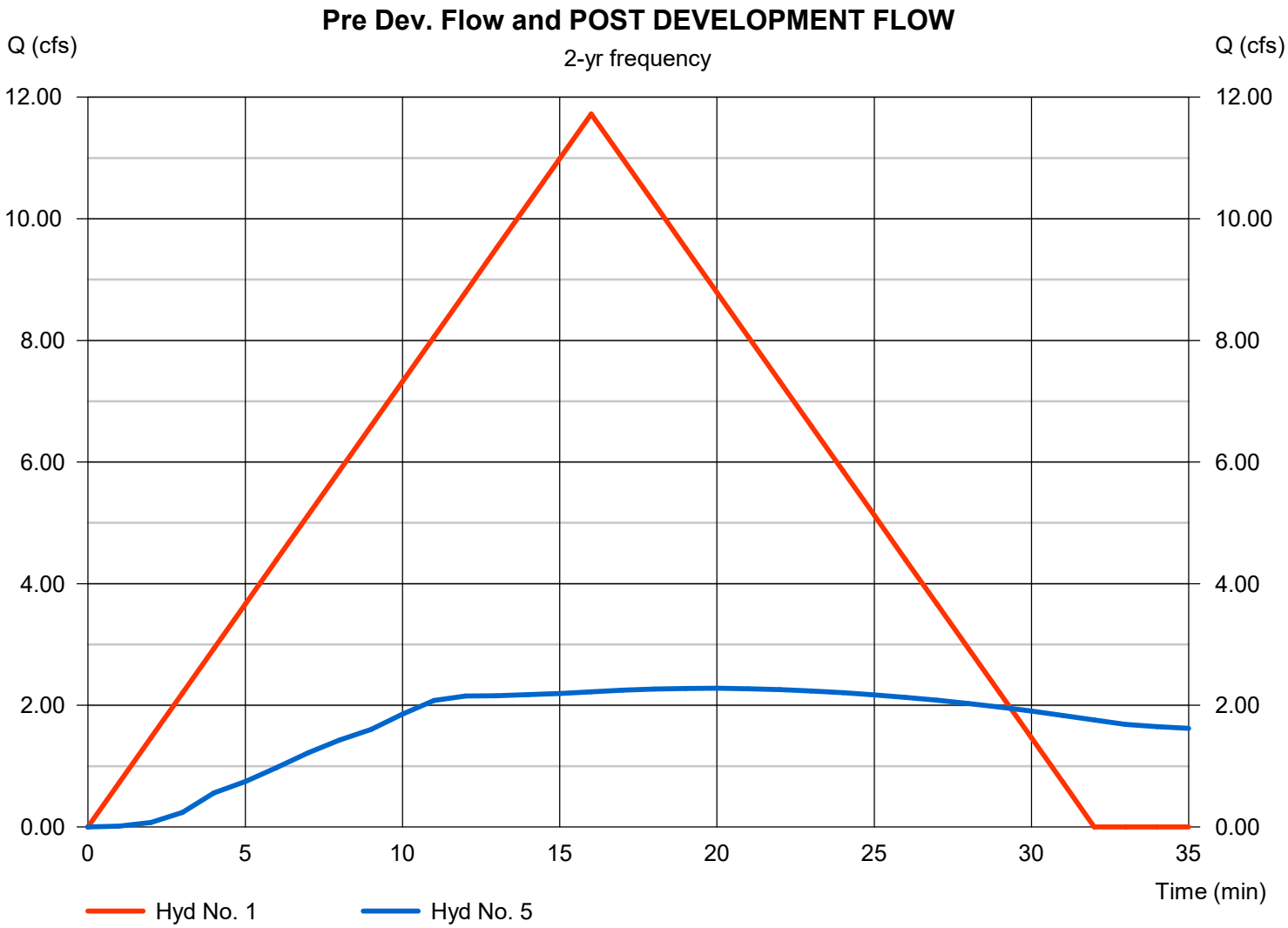
Pre Dev. Flow

Hydrograph type	=	Rational
Peak discharge	=	11.72 cfs
Time to peak	=	16 min
Hyd. Volume	=	11,251 cuft

Hyd. No. 5

POST DEVELOPMENT FLOW

Hydrograph type	=	Reservoir
Peak discharge	=	2.28 cfs
Time to peak	=	20 min
Hyd. Volume	=	10,135 cuft



Multi-Hydrograph Plot

Hyd. No. 1

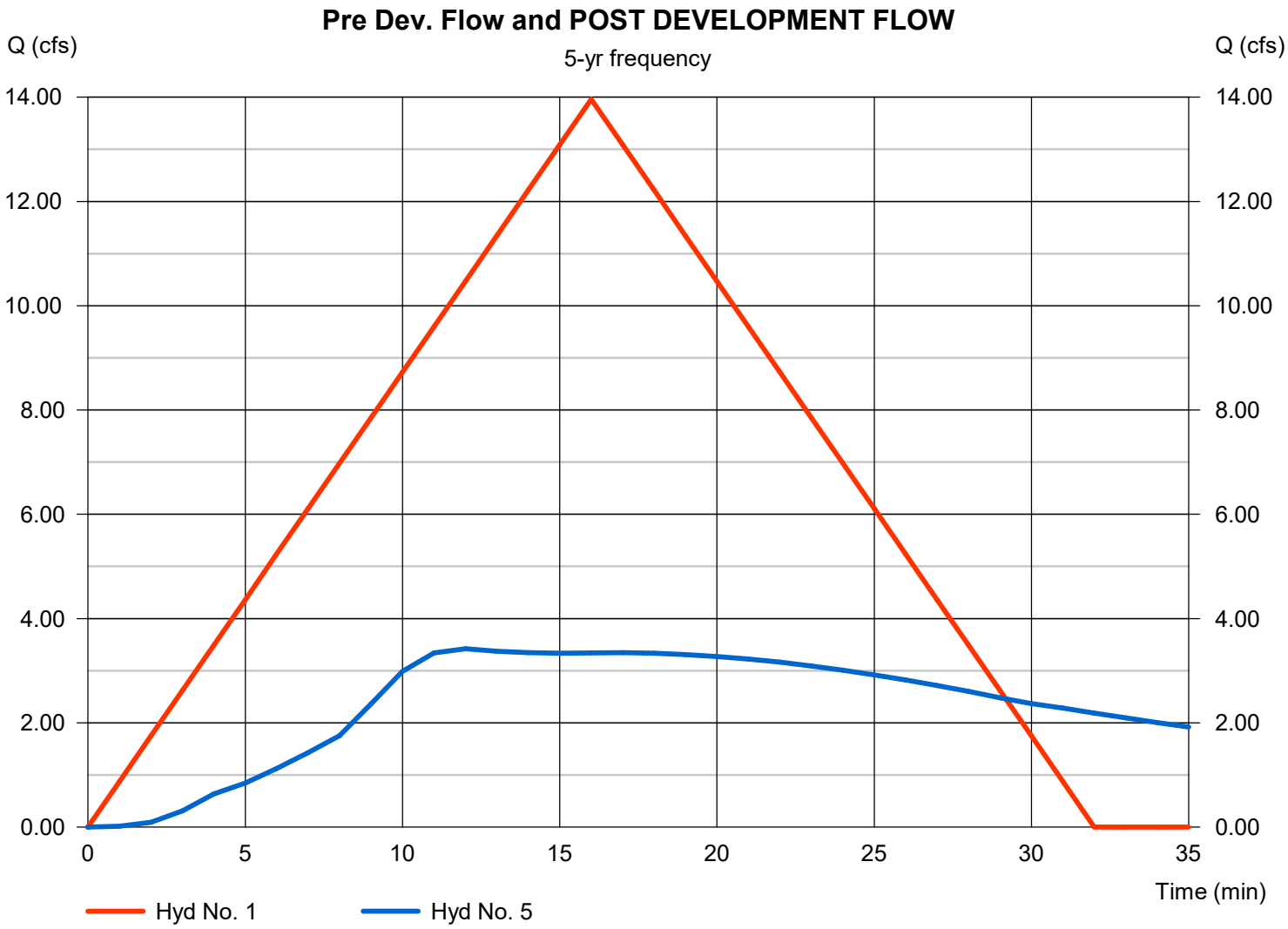
Pre Dev. Flow

Hydrograph type	=	Rational
Peak discharge	=	13.96 cfs
Time to peak	=	16 min
Hyd. Volume	=	13,401 cuft

Hyd. No. 5

POST DEVELOPMENT FLOW

Hydrograph type	=	Reservoir
Peak discharge	=	3.42 cfs
Time to peak	=	12 min
Hyd. Volume	=	12,037 cuft



Multi-Hydrograph Plot

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

Hyd. No. 1

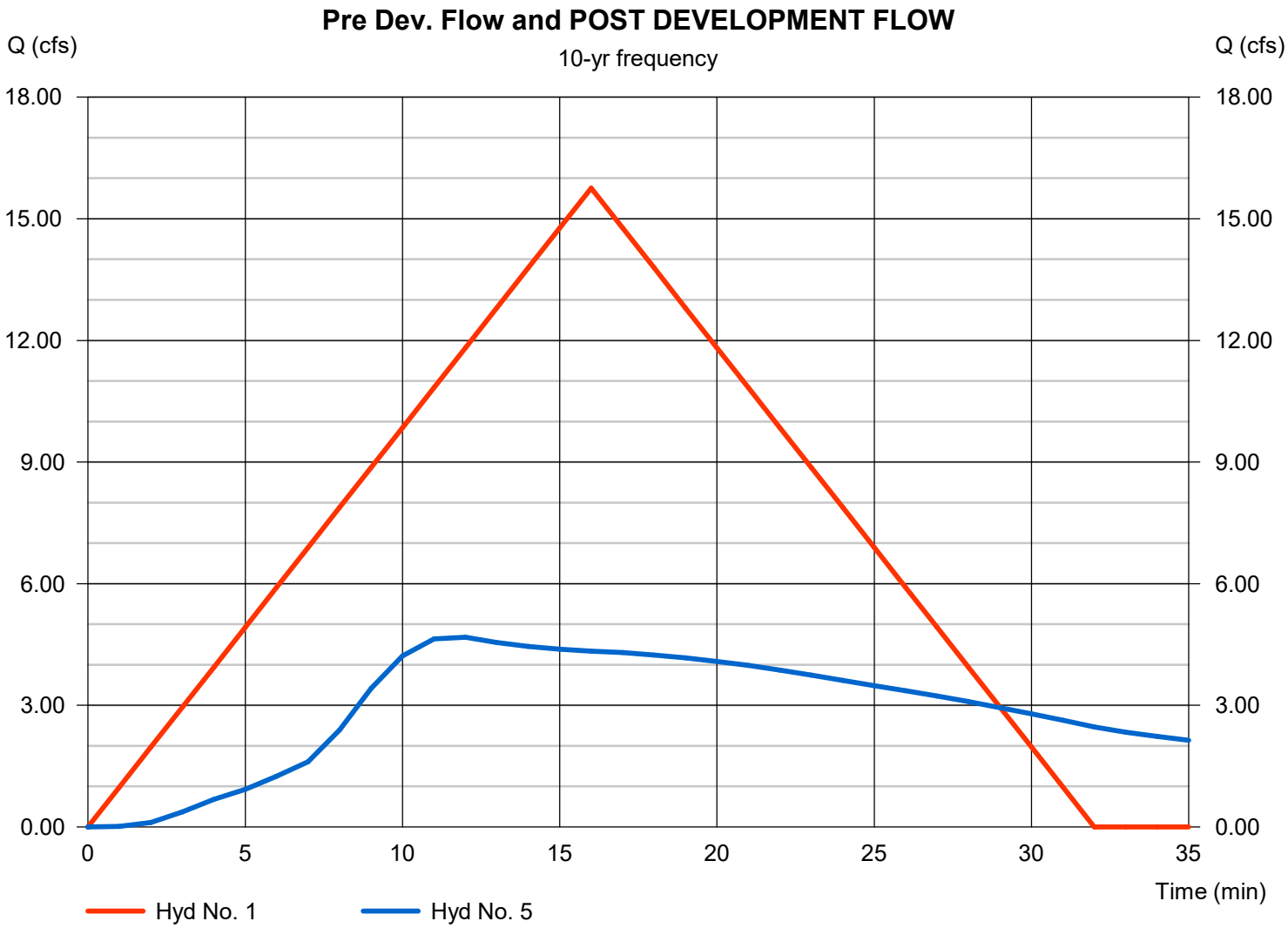
Pre Dev. Flow

Hydrograph type	=	Rational
Peak discharge	=	15.76 cfs
Time to peak	=	16 min
Hyd. Volume	=	15,128 cuft

Hyd. No. 5

POST DEVELOPMENT FLOW

Hydrograph type	=	Reservoir
Peak discharge	=	4.68 cfs
Time to peak	=	12 min
Hyd. Volume	=	13,586 cuft



Multi-Hydrograph Plot

Hyd. No. 1

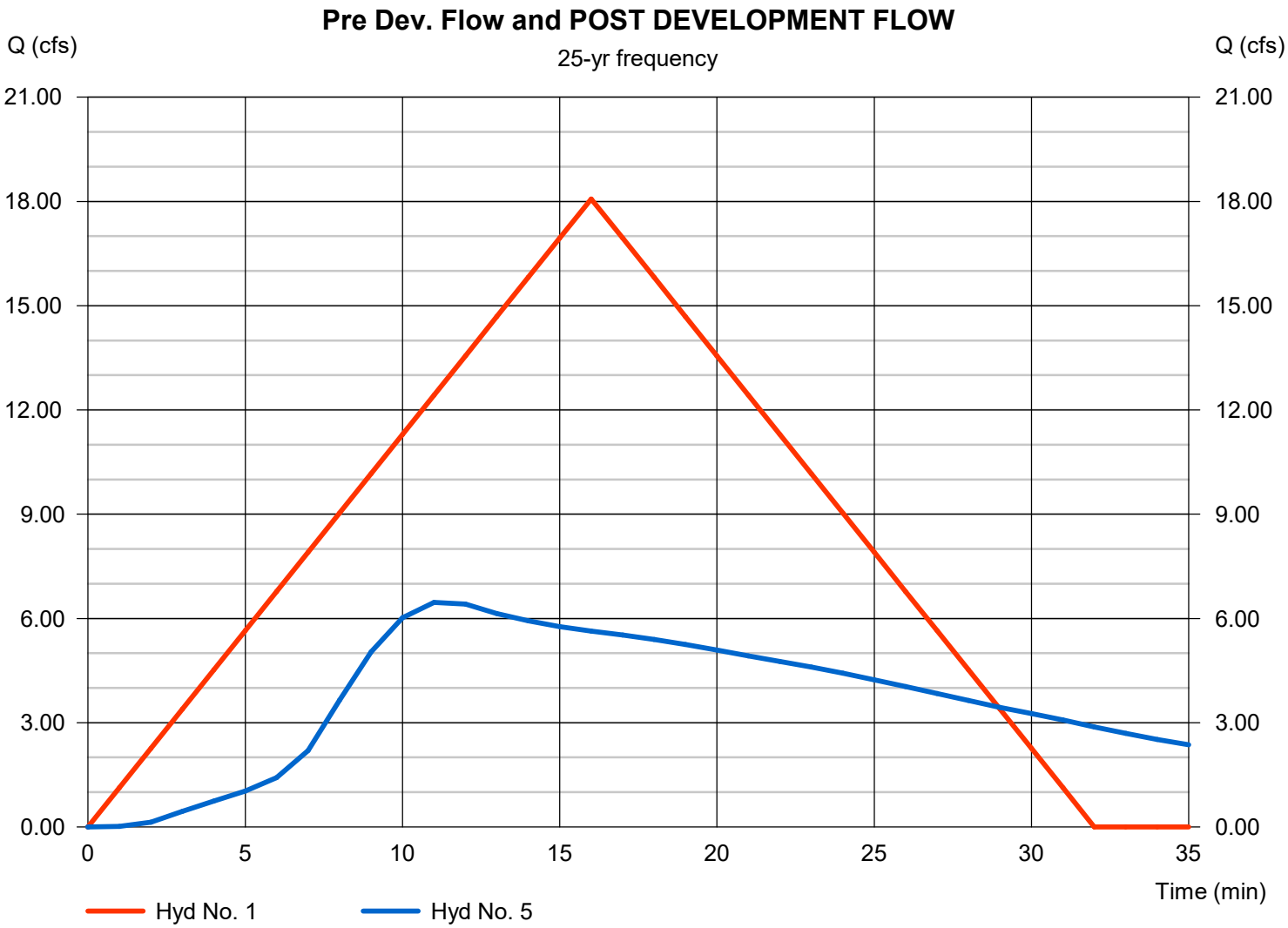
Pre Dev. Flow

Hydrograph type	=	Rational
Peak discharge	=	18.07 cfs
Time to peak	=	16 min
Hyd. Volume	=	17,350 cuft

Hyd. No. 5

POST DEVELOPMENT FLOW

Hydrograph type	=	Reservoir
Peak discharge	=	6.46 cfs
Time to peak	=	11 min
Hyd. Volume	=	15,585 cuft



Multi-Hydrograph Plot

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

Hyd. No. 1

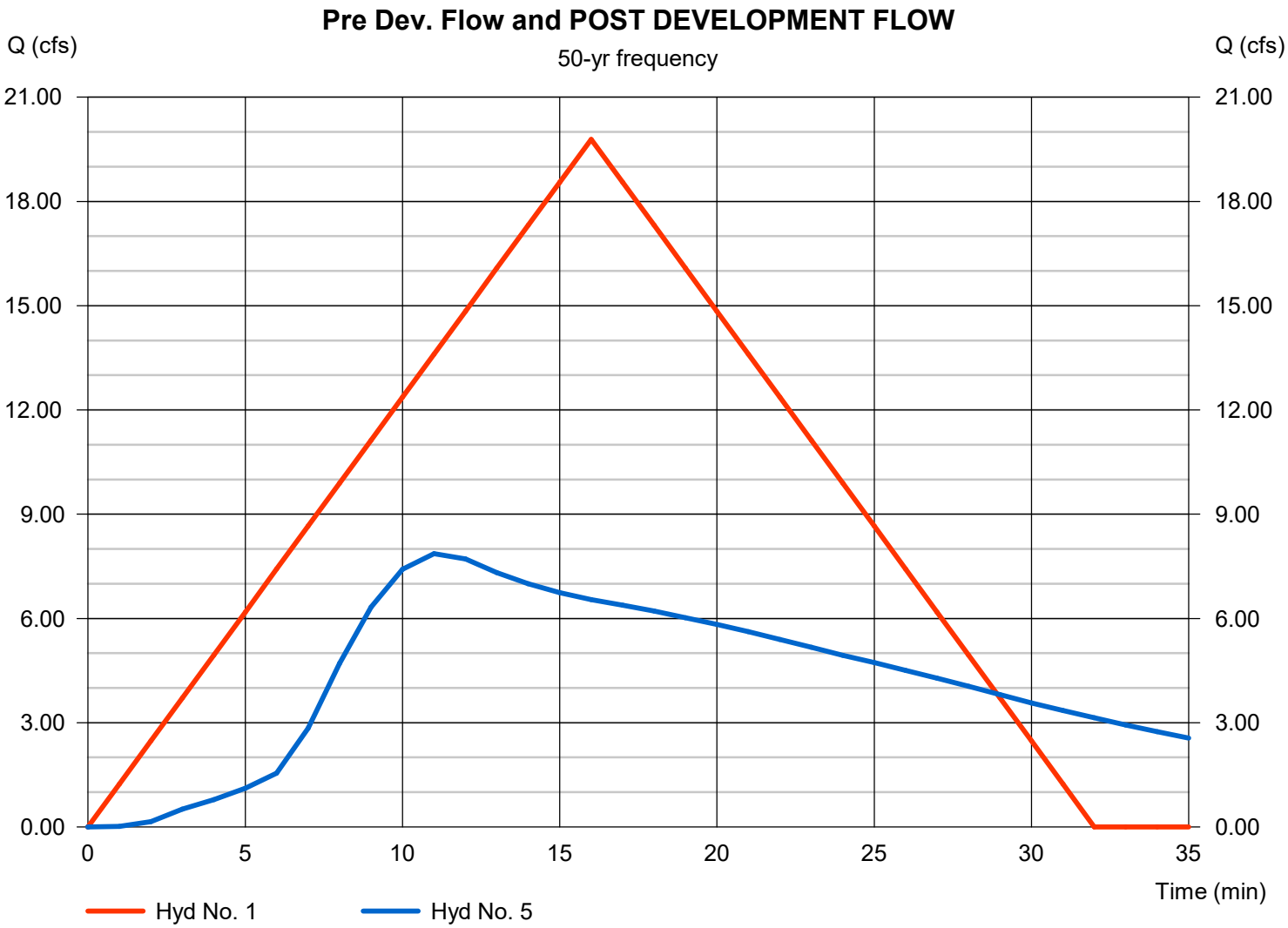
Pre Dev. Flow

Hydrograph type	=	Rational
Peak discharge	=	19.79 cfs
Time to peak	=	16 min
Hyd. Volume	=	18,995 cuft

Hyd. No. 5

POST DEVELOPMENT FLOW

Hydrograph type	=	Reservoir
Peak discharge	=	7.86 cfs
Time to peak	=	11 min
Hyd. Volume	=	17,017 cuft



Multi-Hydrograph Plot

Hyd. No. 1

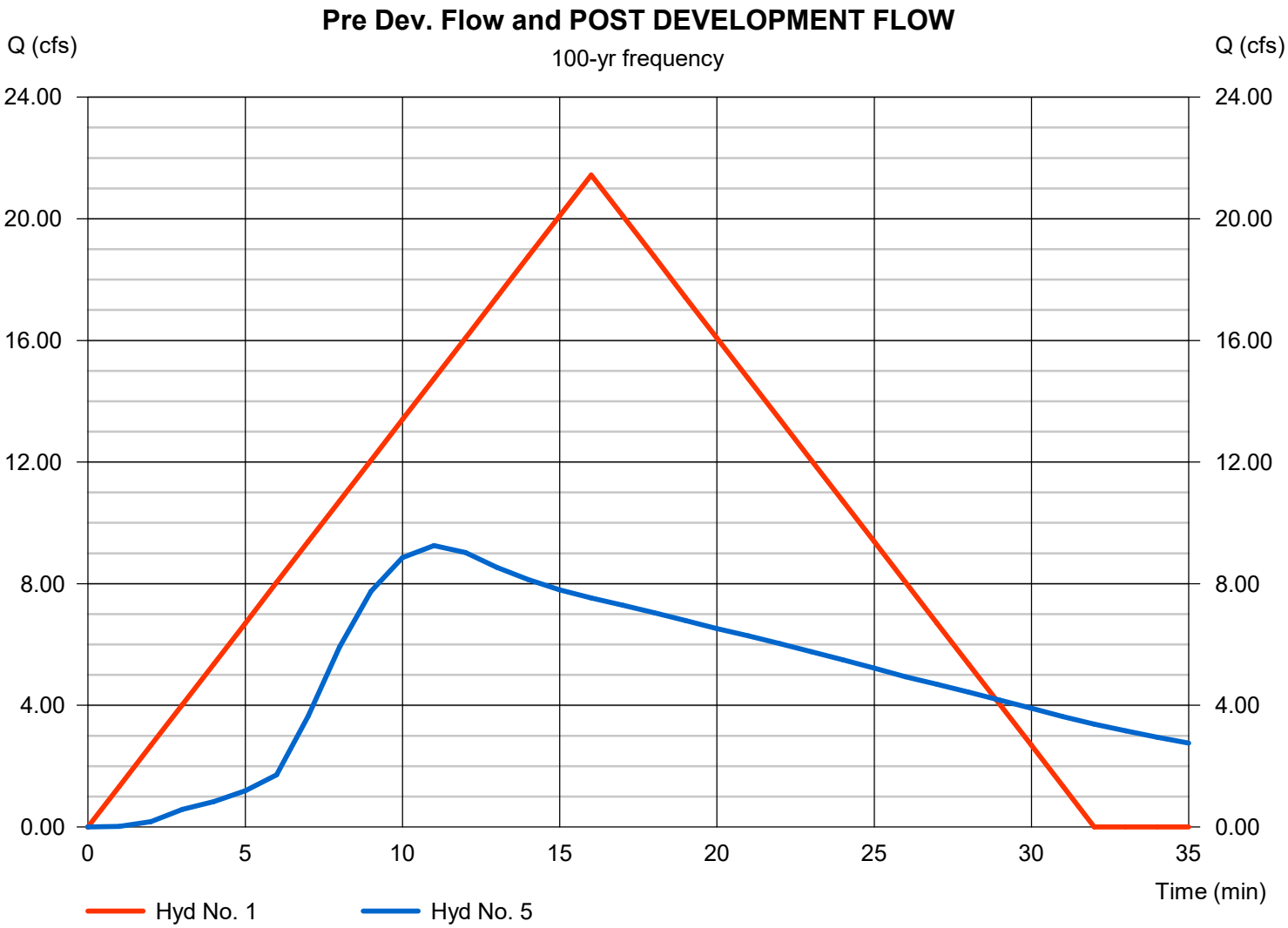
Pre Dev. Flow

Hydrograph type	=	Rational
Peak discharge	=	21.44 cfs
Time to peak	=	16 min
Hyd. Volume	=	20,582 cuft

Hyd. No. 5

POST DEVELOPMENT FLOW

Hydrograph type	=	Reservoir
Peak discharge	=	9.25 cfs
Time to peak	=	11 min
Hyd. Volume	=	18,476 cuft



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2026 Thursday, 10 / 22 / 2026

Pond No. 1 - Detention Pond

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 392.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	392.50	100	0	0
0.50	393.00	9,384	1,742	1,742
1.50	394.00	10,584	9,977	11,719
2.50	395.00	11,857	11,213	22,932
3.00	395.50	12,520	6,093	29,025

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	Inactive	0.00	0.00	0.00
Span (in)	= 18.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 392.00	0.00	0.00	0.00
Length (ft)	= 24.00	0.00	0.00	0.00
Slope (%)	= 1.45	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

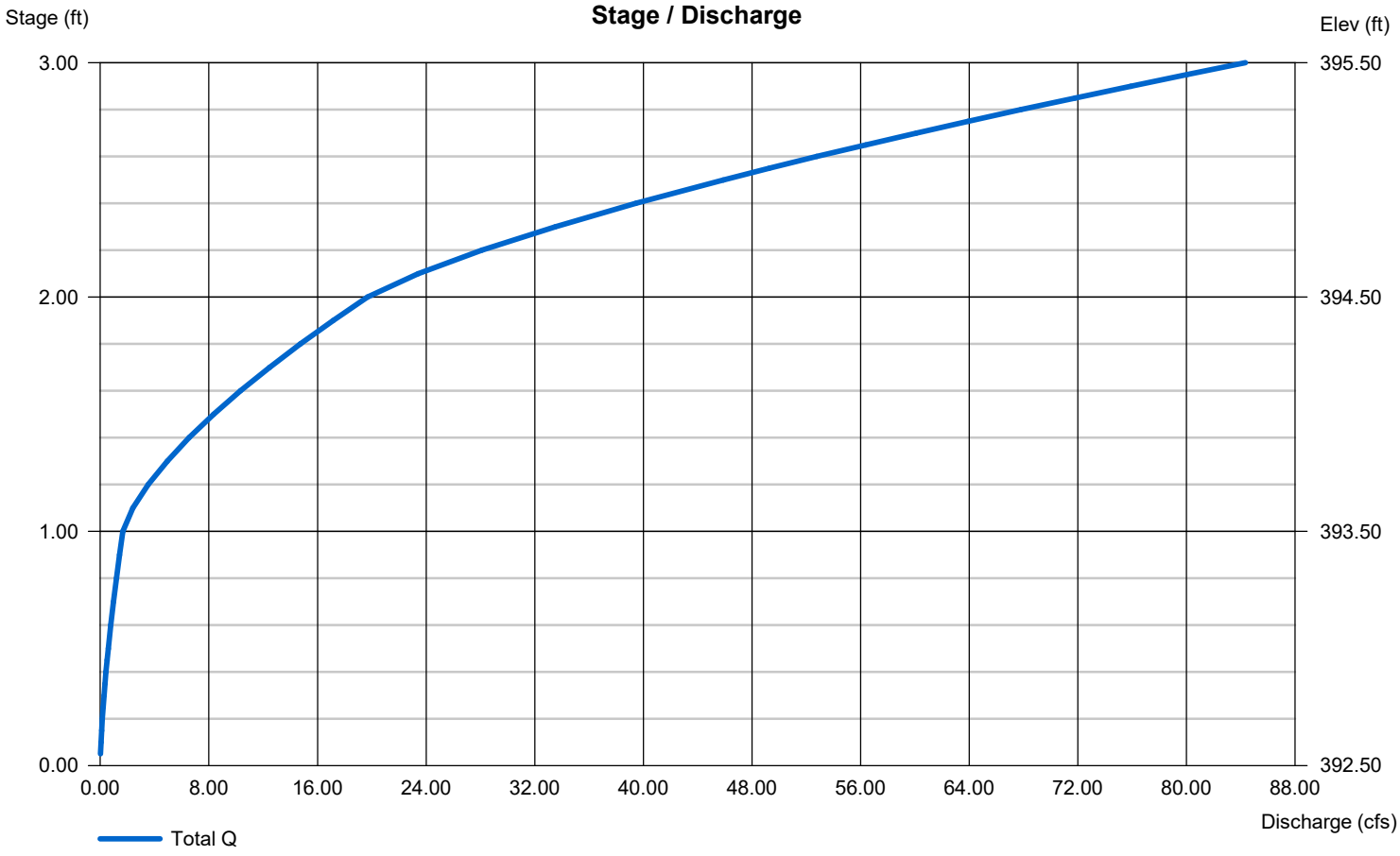
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.50	4.50	10.00	0.00
Crest El. (ft)	= 392.50	393.50	394.50	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	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	11.72	1	16	11,251	------	------	------	Pre Dev. Flow
2	Rational	20.31	1	6	7,313	------	------	------	DEV GENERATED FLOW-(ONSITE)
3	Rational	2.949	1	16	2,831	------	------	------	DEV GENERATED FLOW(OFF SITE
4	Combine	21.42	1	6	10,144	2, 3	------	------	<no description>
5	Reservoir	2.279	1	20	10,135	4	393.58	7,570	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	13.96	1	16	13,401	------	------	------	Pre Dev. Flow
2	Rational	24.10	1	6	8,675	------	------	------	DEV GENERATED FLOW-(ONSITE)
3	Rational	3.512	1	16	3,372	------	------	------	DEV GENERATED FLOW(OFF SITE
4	Combine	25.41	1	6	12,046	2, 3	------	------	<no description>
5	Reservoir	3.418	1	12	12,037	4	393.69	8,627	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	15.76	1	16	15,128	------	------	------	Pre Dev. Flow
2	Rational	27.19	1	6	9,789	------	------	------	DEV GENERATED FLOW-(ONSITE)
3	Rational	3.965	1	16	3,806	------	------	------	DEV GENERATED FLOW(OFF SITE
4	Combine	28.68	1	6	13,595	2, 3	------	------	<no description>
5	Reservoir	4.676	1	12	13,586	4	393.78	9,542	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	18.07	1	16	17,350	------	------	------	Pre Dev. Flow
2	Rational	31.19	1	6	11,229	------	------	------	DEV GENERATED FLOW-(ONSITE)
3	Rational	4.547	1	16	4,365	------	------	------	DEV GENERATED FLOW(OFF SITE
4	Combine	32.90	1	6	15,594	2, 3	------	------	<no description>
5	Reservoir	6.465	1	11	15,585	4	393.89	10,669	POST DEVELOPMENT FLOW

Hydrograph Summary Report

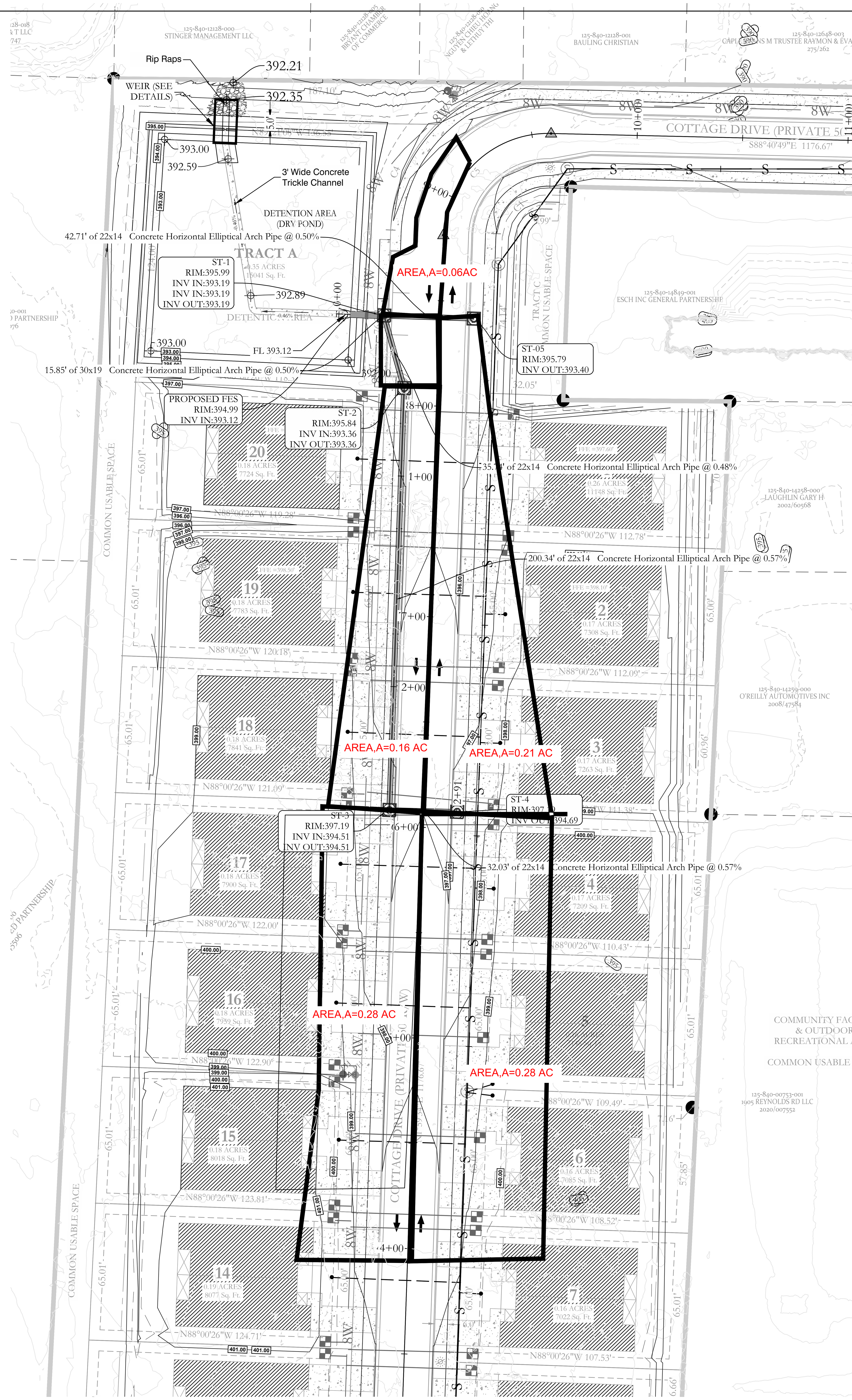
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2026

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	19.79	1	16	18,995	------	------	------	Pre Dev. Flow
2	Rational	34.02	1	6	12,247	------	------	------	DEV GENERATED FLOW-(ONSITE)
3	Rational	4.978	1	16	4,779	------	------	------	DEV GENERATED FLOW(OFF SITE
4	Combine	35.89	1	6	17,026	2, 3	------	------	<no description>
5	Reservoir	7.862	1	11	17,017	4	393.97	11,446	POST DEVELOPMENT FLOW

Hydrograph Summary Report

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

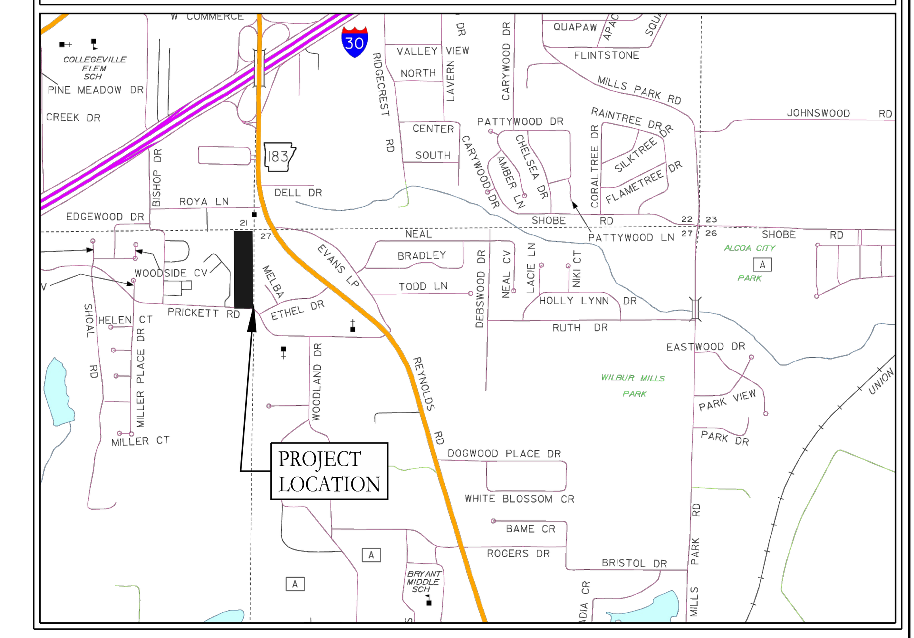
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	21.44	1	16	20,582	------	------	------	Pre Dev. Flow
2	Rational	36.96	1	6	13,307	------	------	------	DEV GENERATED FLOW-(ONSITE)
3	Rational	5.394	1	16	5,178	------	------	------	DEV GENERATED FLOW(OFF SITE
4	Combine	38.99	1	6	18,486	2, 3	------	------	<no description>
5	Reservoir	9.253	1	11	18,476	4	394.05	12,227	POST DEVELOPMENT FLOW



NOTES:

1. ALL WATER LINES CROSSING UNDER ANY STORM DRAIN, SHALL BE STEEL ENCASED A MINIMUM OF 5 FEET EITHER SIDE OF THE STORM DRAIN.
2. THE ENGINEER OF RECORD TO PROVIDE INSPECTIONS ON CONSTRUCTION ACTIVITIES FOR STORM LINES.
3. ALL THE STORM DRAINAGE HAVE BEEN DESIGNED IN COMPLIANCE WITH THE CITY OF BRYANT STANDARD SPECIFICATIONS AND STORM DRAINAGE MANUAL.

VICINITY MAP:



811 Know what's below. Call before you dig.

N

BASIS OF BEARING: GRID NORTH, ARKANSAS COORDINATE SYSTEM, SOUTHZONE BY GPS OBSERVATION

30 15 0 30

LEGEND
- Found Aliquot Corner
- Found monument
- Set ½" Rebar
- Computed point
(M)- Measured
(P)- Plat/Deed
- Fence

CERTIFICATE OF AUTHORIZATION HOPE CONSULTING, INC. ARKANSAS

STATE OF ARKANSAS LICENSED PROFESSIONAL ENGINEER

HOPE CONSULTING
ENGINEERS - SURVEYORS

129N. Main Street,
Benton, Arkansas 72015
PH. (501)315-2626
FAX (501) 315-0024
www.hopeconsulting.com

FOR USE AND BENEFIT OF:
HERITAGE HOMES

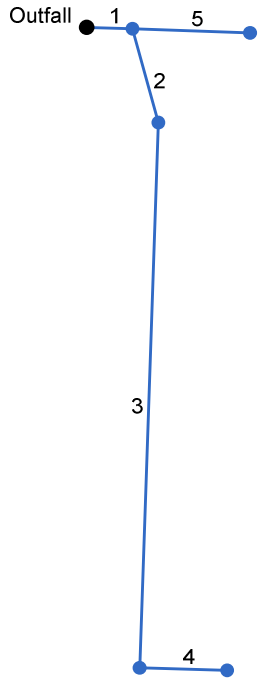
THE COTTAGES OF BRYANT
DRAINAGE EXHIBIT
PRICKETT ROAD, BRYANT ,ARKANSAS

DATE:	09-23-2026	C.A.D. BY:	DRAWING NUMBER:
REVISED:	10-21-2026	CHECKED BY:	26-0288
SHEET:	C-4.1	SCALE:	

500	01S	14W	0	28		62	1664

SHARED\HOPECONSULTING\LAND PROJECTS 2004\SUBDIVISIONS\2026\26-0288 HERITAGE HOMES - PRICKETT RD\DWG

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: storm analysis 9-21-2026.stm	Number of lines: 5	Date: 10/22/2026

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	16.793	1.818	Curb	0.00	0.06	0.80	6.0	393.12	0.42	393.19	19X30	Ell	0.012	1.44	395.92	Pipe - (9)
2	1	35.743	72.743	Curb	0.00	0.16	0.80	6.0	393.19	0.48	393.36	14X22	Ell	0.012	0.52	395.84	Pipe - (8)
3	2	200.344	17.431	Curb	0.00	0.28	0.80	6.0	393.36	0.57	394.51	14X22	Ell	0.012	1.50	397.19	Pipe - (10)
4	3	32.000	-90.463	Curb	0.00	0.26	0.80	6.0	394.51	0.56	394.69	14X22	Ell	0.012	1.00	397.19	Pipe - (13)
5	1	43.000	0.072	Curb	0.00	0.21	0.80	6.0	393.19	0.49	393.40	14X22	Ell	0.012	1.00	395.79	Pipe - (18)

Project File: storm analysis 9-21-2026.stm | Number of lines: 5 | Date: 10/22/2026

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	ST-1	Curb-	395.92	Cir	4.00	4.00	19x30	Ellip	393.19	14x22 14x22	Ellip Ellip	393.19 393.19
2	ST-2	Curb-	395.84	Cir	4.00	4.00	14x22	Ellip	393.36	14x22	Ellip	393.36
3	ST-3	Curb-	397.19	Cir	4.00	4.00	14x22	Ellip	394.51	14x22	Ellip	394.51
4	ST-4	Curb-	397.19	Cir	4.00	4.00	14x22	Ellip	394.69			
5	ST-05	Curb-	395.79	Cir	4.00	4.00	14x22	Ellip	393.40			

Project File: storm analysis 9-21-2026.stm | Number of Structures: 5 | Run Date: 10/22/2026

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	16.793	0.06	0.97	0.80	0.05	0.78	6.0	8.0	8.7	6.77	15.33	3.96	19 x 30 e	0.42	393.12	393.19	393.86	394.14	393.12	395.92	Pipe - (9)
2	1	35.743	0.16	0.70	0.80	0.13	0.56	6.0	7.8	8.8	4.93	7.21	4.12	14 x 22 e	0.48	393.19	393.36	394.32	394.20	395.92	395.84	Pipe - (8)
3	2	200.344	0.28	0.54	0.80	0.22	0.43	6.0	6.4	9.4	4.08	7.92	3.96	14 x 22 e	0.57	393.36	394.51	394.41	395.30	395.84	397.19	Pipe - (10)
4	3	32.000	0.26	0.26	0.80	0.21	0.21	6.0	6.0	9.7	2.01	7.84	2.94	14 x 22 e	0.56	394.51	394.69	395.47	395.25	397.19	397.19	Pipe - (13)
5	1	43.000	0.21	0.21	0.80	0.17	0.17	6.0	6.0	9.7	1.63	7.31	2.78	14 x 22 e	0.49	393.19	393.40	394.32	393.91	395.92	395.79	Pipe - (18)

Project File: storm analysis 9-21-2026.stm

Number of lines: 5

Run Date: 10/22/2026

NOTES:Intensity = 47.96 / (Inlet time + 5.50) ^ 0.65; Return period =Yrs. 50 ; c = cir e = ellip b = box

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	ST-1	0.46	0.00	0.47	0.00	Curb	4.0	8.00	0.00	0.00	0.00	Sag	1.50	0.050	0.020	0.013	0.12	3.57	0.12	3.57	0.0	Off
2	ST-2	1.24	0.18	1.42	0.00	Curb	4.0	8.00	0.00	0.00	0.00	0.005	1.50	0.050	0.020	0.013	0.21	8.34	0.20	0.59	2.0	1
3	ST-3	2.17	0.00	1.99	0.18	Curb	4.0	8.00	0.00	0.00	0.00	0.005	1.50	0.050	0.020	0.013	0.24	9.88	0.28	3.26	2.0	2
4	ST-4	2.01	0.00	2.01	0.00	Curb	4.0	12.00	0.00	0.00	0.00	0.005	1.50	0.050	0.020	0.013	0.24	9.59	0.25	0.00	3.0	3
5	ST-05	1.63	0.00	1.63	0.00	Curb	4.0	8.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.013	0.21	7.74	0.21	7.74	0.0	Off

Project File: storm analysis 9-21-2026.stm | Number of lines: 5 | Run Date: 10/22/2026

NOTES: Inlet N-Values = 0.016; Intensity = 47.96 / (Inlet time + 5.50) ^ 0.65; Return period = 50 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

Storm Sewer Inlet Time Tabulation

Line No.	Line ID	Tc Method	Sheet Flow					Shallow Concentrated Flow					Channel Flow							Total Travel Time (min)
			n-Value	flow Length (ft)	2-yr 24h P (in)	Land Slope (%)	Travel Time (min)	flow Length (ft)	Water Slope (%)	Surf Descr	Ave Vel (ft/s)	Travel Time (min)	X-sec Area (sqft)	Wetted Perim (ft)	Chan Slope (%)	n-Value	Vel	flow Length (ft)	Travel Time (min)	
1	Pipe - (9)	User																		6.00
2	Pipe - (8)	User																		6.00
3	Pipe - (10)	User																		6.00
4	Pipe - (13)	User																		6.00
5	Pipe - (18)	User																		6.00

Project File: storm analysis 9-21-2026.stm | Min. Tc used for intensity calculations = 5 min | Number of lines: 5 | Date: 10/22/2026

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	19 30 e	6.77	393.12	393.86	0.74	1.49	4.54	0.18	394.04	0.000	16.793	393.19	394.14	0.95**	2.01	3.38	0.18	394.32	0.000	0.000	n/a	1.44	0.26
2	14 22 e	4.93	393.19	394.32	1.13	1.08	4.55	0.21	394.53	0.000	35.743	393.36	394.20	0.84**	1.34	3.69	0.21	394.41	0.000	0.000	n/a	0.52	n/a
3	14 22 e	4.08	393.36	394.41	1.05	0.87	4.67	0.16	394.58	0.000	200.344	394.51	395.30	0.79**	1.26	3.24	0.16	395.47	0.000	0.000	n/a	1.50	0.24
4	14 22 e	2.01	394.51	395.47	0.96	0.60	3.38	0.10	395.56	0.000	32.000	394.69	395.25	0.56**	0.81	2.50	0.10	395.35	0.000	0.000	n/a	1.00	n/a
5	14 22 e	1.63	393.19	394.32	1.13	0.50	3.23	0.08	394.40	0.000	43.000	393.40	393.91	0.51**	0.70	2.33	0.08	394.00	0.000	0.000	n/a	1.00	0.08

Project File: storm analysis 9-21-2026.stm | Number of lines: 5 | Run Date: 10/22/2026

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

Supplemental Friction Slope Calculation (Manning's Equation)

Project file: storm analysis 9-21-2026.stm Hydraflow run date: 10/22/2026 Manning's n: 0.012 (RCP)

Purpose

Hydraflow Storm Sewers does not report friction slope (Sf) for lines whose upstream end is controlled by critical depth. All five lines in this run are critical at the upstream end (see HGL Computations, ** notation). This sheet computes Sf separately to document pipe friction for each line. It supplements, and does not replace, the Hydraflow output.

Method

$S_f = [\, Q\, n / (1.486\, A\, R^{2/3}) \,]^2$ where R = A / P (Q = flow, cfs; A = flow area, sq ft; P = wetted perimeter, ft; R = hydraulic radius, ft)

Flow rates (Q) and flow areas (A) at each end of each line are taken directly from the Hydraflow HGL Computations report. Wetted perimeter is computed from horizontal elliptical pipe geometry at the flow depth that produces the Hydraflow area. Velocities (V) are as reported by Hydraflow. Average Sf = (Sf downstream + Sf upstream) / 2; friction loss h_f = Average Sf / 100 x Line length.

Line	Size (in, ellip)	Q (cfs)	DOWNSTREAM					UPSTREAM					Avg Sf (%)	Length (ft)	h_f (ft)
			A (sq ft)	P (ft)	R (ft)	V (ft/s)	Sf (%)	A (sq ft)	P (ft)	R (ft)	V (ft/s)	Sf (%)			
1	19 x 30	6.77	1.49	3.20	0.466	4.54	**0.372**	2.01	3.62	0.555	3.38	**0.162**	**0.267**	16.793	0.045
2	14 x 22	4.93	1.08	2.66	0.407	4.55	**0.451**	1.34	3.01	0.445	3.69	**0.260**	**0.355**	35.743	0.127
3	14 x 22	4.08	0.87	2.42	0.360	4.67	**0.560**	1.26	2.89	0.436	3.24	**0.207**	**0.384**	200.344	0.769
4	14 x 22	2.01	0.60	2.12	0.284	3.38	**0.393**	0.81	2.35	0.344	2.50	**0.166**	**0.280**	32.000	0.089
5	14 x 22	1.63	0.50	1.99	0.251	3.23	**0.437**	0.70	2.23	0.314	2.33	**0.166**	**0.302**	43.000	0.130

Notes

1. Hydraflow does not report friction slope for lines whose upstream end is controlled by critical depth. Friction slopes above were computed separately using Manning's equation and the flow areas reported by Hydraflow.
2. Lines 2, 4 and 5 contain supercritical flow with a hydraulic jump near the downstream end. Downstream flow areas are the supercritical (pre-jump) values reported by Hydraflow, so downstream Sf is conservative (high).
3. Energy loss (EGL upstream minus EGL downstream) is not reported for these reaches because friction alone does not balance the energy equation where critical depth and a hydraulic jump occur. The friction loss h_f shown is pipe friction only.
4. HGL and EGL elevations are as computed by Hydraflow and are not modified by this calculation.