ARKANSAS STORAGE CENTER

BRYANT, AR

DRAINAGE REPORT

FOR
City of Bryant, Saline County, AR

October 2023

Owner & Developer: STUART FINLEY
Address: P.O Box 10, Bryant, AR. 72089

By:

HOPE
CONSULTING
ENGINEERS • SURVEYORS

PROJECT TITLE

I-30 SELF STORAGE

PROJECT PROPERTY OWNER

STUART FINLEY

PROJECT LOCATION

25300 I-30 North, Bryant, AR

PROJECT DESCRIPTION

The proposed self-storage facility development is located on High-way I-30 in the city of Bryant, Arkansas. The total development area is 24.31 acres.

DRAINAGE ANALYSIS

On Site Drainage- Rational method was used to determine the existing and proposed flows from proposed site. Detailed drainage calculations considering the future expected development have been conducted. Summary of the calculations are below:

- Pre-development area: 28.91 acres.
- Post-development area: 28.91 acres.
- Pre-development runoff coefficient: 0.47.
- Post-development runoff coefficient: 0.88.
- Time of Concentration for Pre-development Area: 16.05 min
- Time of Concentration for Post-development Area: 8.03 min
- Pond has a bottom area of 1.67 acres with bottom elevation of 349.00'
- One 18'' RCP with 0.5% slope is proposed for outflow culvert.

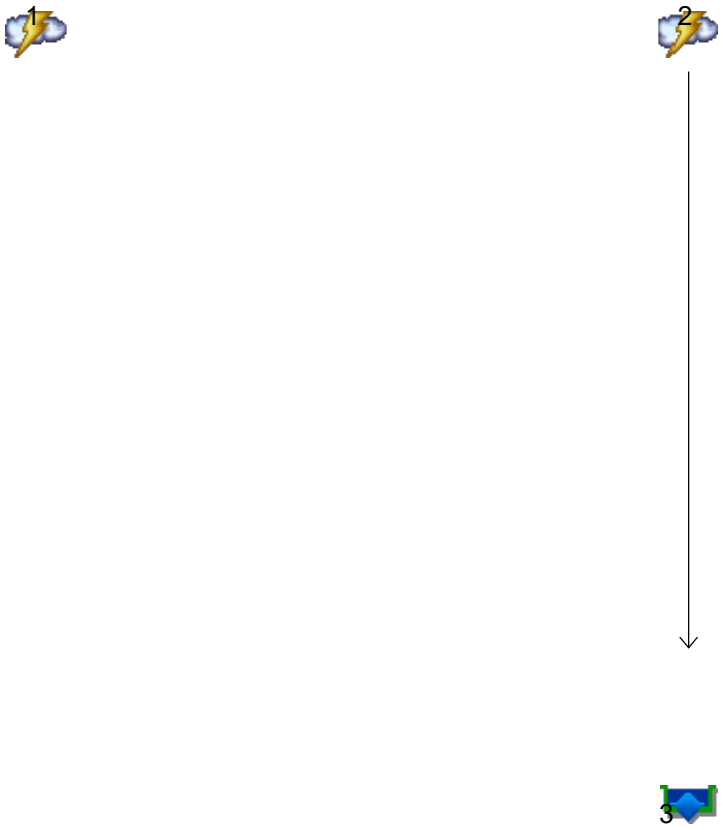
Peak flows for Pre and post development phase of onsite area have been tabulated below-

	Pre-Development	Post-Development without Detention	Post-Development with Detention
	Peak Flow (cfs)	Peak Flow (cfs)	Peak Flow (cfs)
2-Year	53.08	131.14	2.99
5-Year	58.66	147.91	3.498
10-Year	69.15	166.14	4.020
25-Year	79.33	189.21	4.600
50-Year	90.45	213.91	5.051
100-Year	96.16	226.82	5.157
TOC	**16.05 min**	**8.03 min**	

CONCLUSION

The onsite drainage calculation for pre and post condition has been provided.

Watershed Model Schematic



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	53.08	1	16	50,961	------	------	------	Pre-development
2	Rational	131.14	1	8	62,945	------	------	------	Post-Development
3	Reservoir	2.990	1	16	57,823	2	349.84	61,739	Pond

Hydrograph Report

Hyd. No. 1

Pre-development

Hydrograph type	=	Rational	Peak discharge	=	53.08 cfs
Storm frequency	=	2 yrs	Time to peak	=	16 min
Time interval	=	1 min	Hyd. volume	=	50,961 cuft
Drainage area	=	28.910 ac	Runoff coeff.	=	0.47
Intensity	=	3.907 in/hr	Tc by User	=	16.00 min
IDF Curve	=	Bryant 50.IDF	Asc/Rec limb fact	=	1/1

Hydrograph Summary Report

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

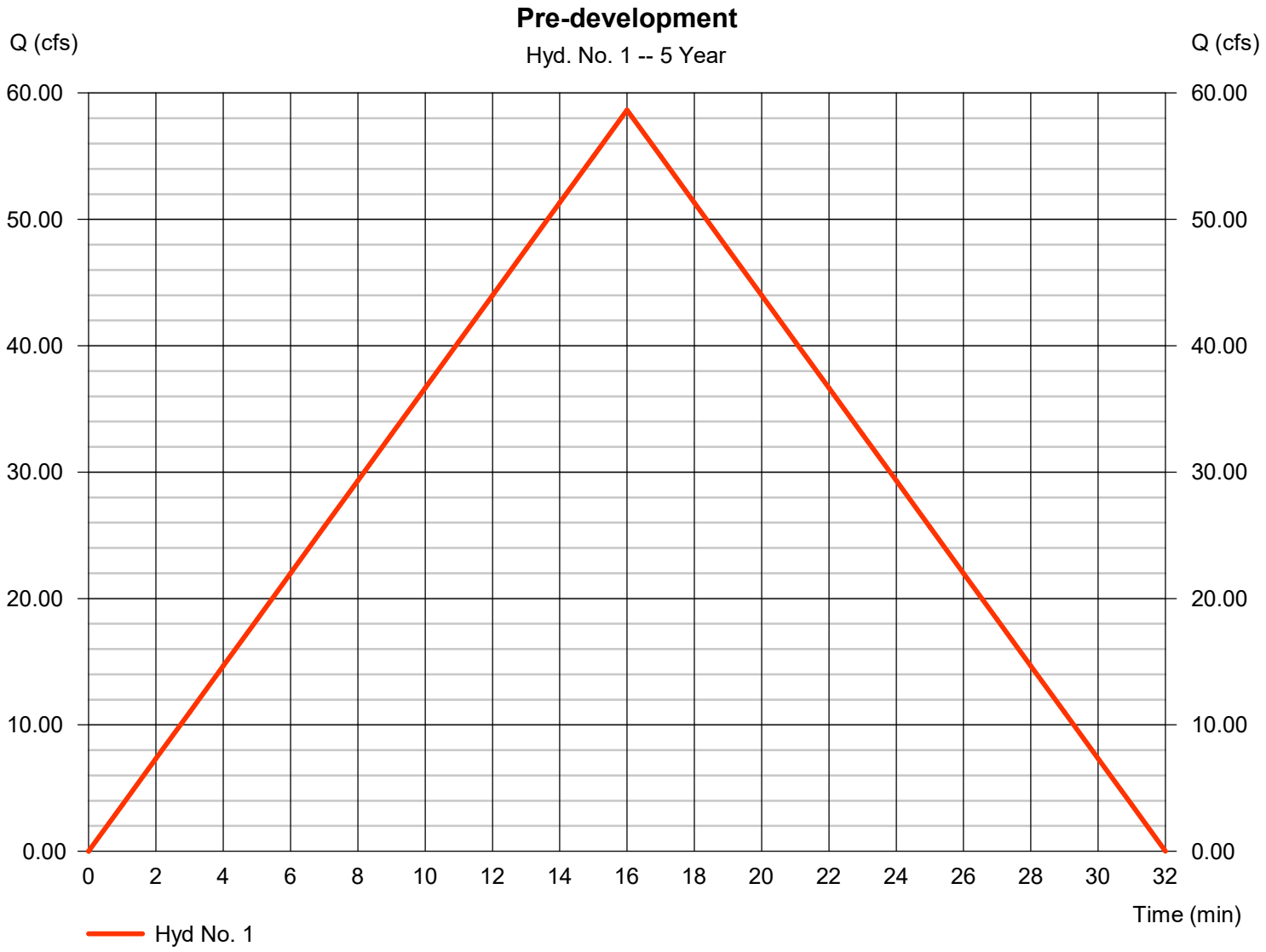
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Rational	58.66	1	16	56,310	------	------	------	Pre-development
2	Rational	147.91	1	8	70,997	------	------	------	Post-Development
3	Reservoir	3.498	1	16	65,800	2	349.95	69,554	Pond

Hydrograph Report

Hyd. No. 1

Pre-development

Hydrograph type	=	Rational	Peak discharge	=	58.66 cfs
Storm frequency	=	5 yrs	Time to peak	=	16 min
Time interval	=	1 min	Hyd. volume	=	56,310 cuft
Drainage area	=	28.910 ac	Runoff coeff.	=	0.47
Intensity	=	4.317 in/hr	Tc by User	=	16.00 min
IDF Curve	=	Bryant 50.IDF	Asc/Rec limb fact	=	1/1



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	69.15	1	16	66,385	------	------	------	Pre-development
2	Rational	166.14	1	8	79,748	------	------	------	Post-Development
3	Reservoir	4.020	1	16	74,479	2	350.06	78,053	Pond

Hydrograph Report

Hyd. No. 1

Pre-development

Hydrograph type	=	Rational	Peak discharge	=	69.15 cfs
Storm frequency	=	10 yrs	Time to peak	=	16 min
Time interval	=	1 min	Hyd. volume	=	66,385 cuft
Drainage area	=	28.910 ac	Runoff coeff.	=	0.47
Intensity	=	5.089 in/hr	Tc by User	=	16.00 min
IDF Curve	=	Bryant 50.IDF	Asc/Rec limb fact	=	1/1

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	79.33	1	16	76,152	------	------	------	Pre-development
2	Rational	189.21	1	8	90,822	------	------	------	Post-Development
3	Reservoir	4.600	1	16	85,472	2	350.21	88,823	Pond

Hydrograph Report

Hyd. No. 1

Pre-development

Hydrograph type	=	Rational	Peak discharge	=	79.33 cfs
Storm frequency	=	25 yrs	Time to peak	=	16 min
Time interval	=	1 min	Hyd. volume	=	76,152 cuft
Drainage area	=	28.910 ac	Runoff coeff.	=	0.47
Intensity	=	5.838 in/hr	Tc by User	=	16.00 min
IDF Curve	=	Bryant 50.IDF	Asc/Rec limb fact	=	1/1

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	90.45	1	16	86,827	------	------	------	Pre-development
2	Rational	213.91	1	8	102,677	------	------	------	Post-Development
3	Reservoir	5.051	1	16	97,246	2	350.36	100,388	Pond

Hydrograph Report

Hyd. No. 1

Pre-development

Hydrograph type	=	Rational	Peak discharge	=	90.45 cfs
Storm frequency	=	50 yrs	Time to peak	=	16 min
Time interval	=	1 min	Hyd. volume	=	86,827 cuft
Drainage area	=	28.910 ac	Runoff coeff.	=	0.47
Intensity	=	6.656 in/hr	Tc by User	=	16.00 min
IDF Curve	=	Bryant 50.IDF	Asc/Rec limb fact	=	1/1

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	96.16	1	16	92,318	------	------	------	Pre-development
2	Rational	226.82	1	8	108,874	------	------	------	Post-Development
3	Reservoir	5.157	1	16	103,403	2	350.44	106,461	Pond

Hydrograph Report

Hyd. No. 1

Pre-development

Hydrograph type	=	Rational	Peak discharge	=	96.16 cfs
Storm frequency	=	100 yrs	Time to peak	=	16 min
Time interval	=	1 min	Hyd. volume	=	92,318 cuft
Drainage area	=	28.910 ac	Runoff coeff.	=	0.47
Intensity	=	7.077 in/hr	Tc by User	=	16.00 min
IDF Curve	=	Bryant 50.IDF	Asc/Rec limb fact	=	1/1

Multi-Hydrograph Plot

Hyd. No. 1

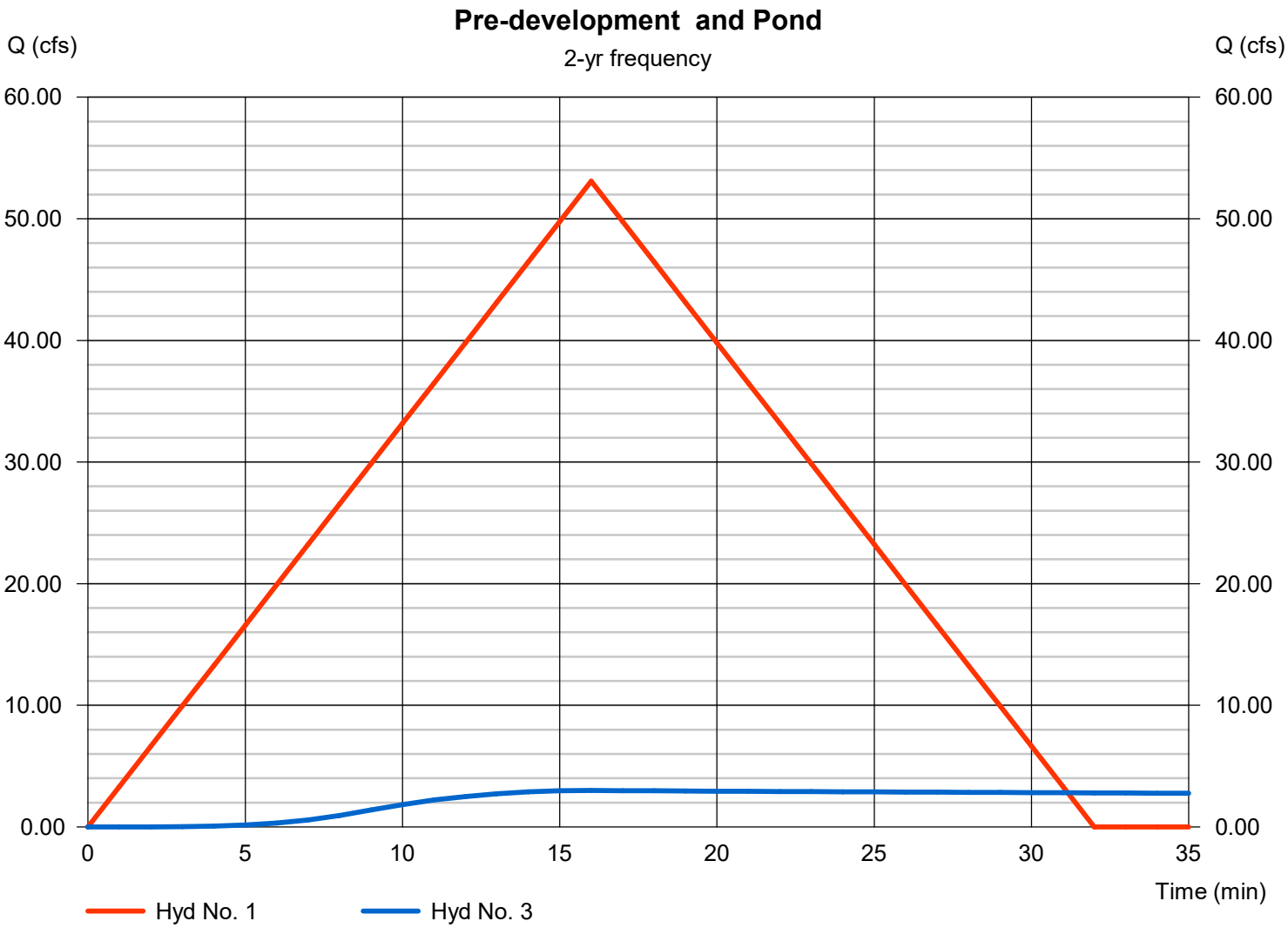
Pre-development

Hydrograph type	=	Rational
Peak discharge	=	53.08 cfs
Time to peak	=	16 min
Hyd. Volume	=	50,961 cuft

Hyd. No. 3

Pond

Hydrograph type	=	Reservoir
Peak discharge	=	2.99 cfs
Time to peak	=	16 min
Hyd. Volume	=	57,823 cuft



Multi-Hydrograph Plot

Hyd. No. 1

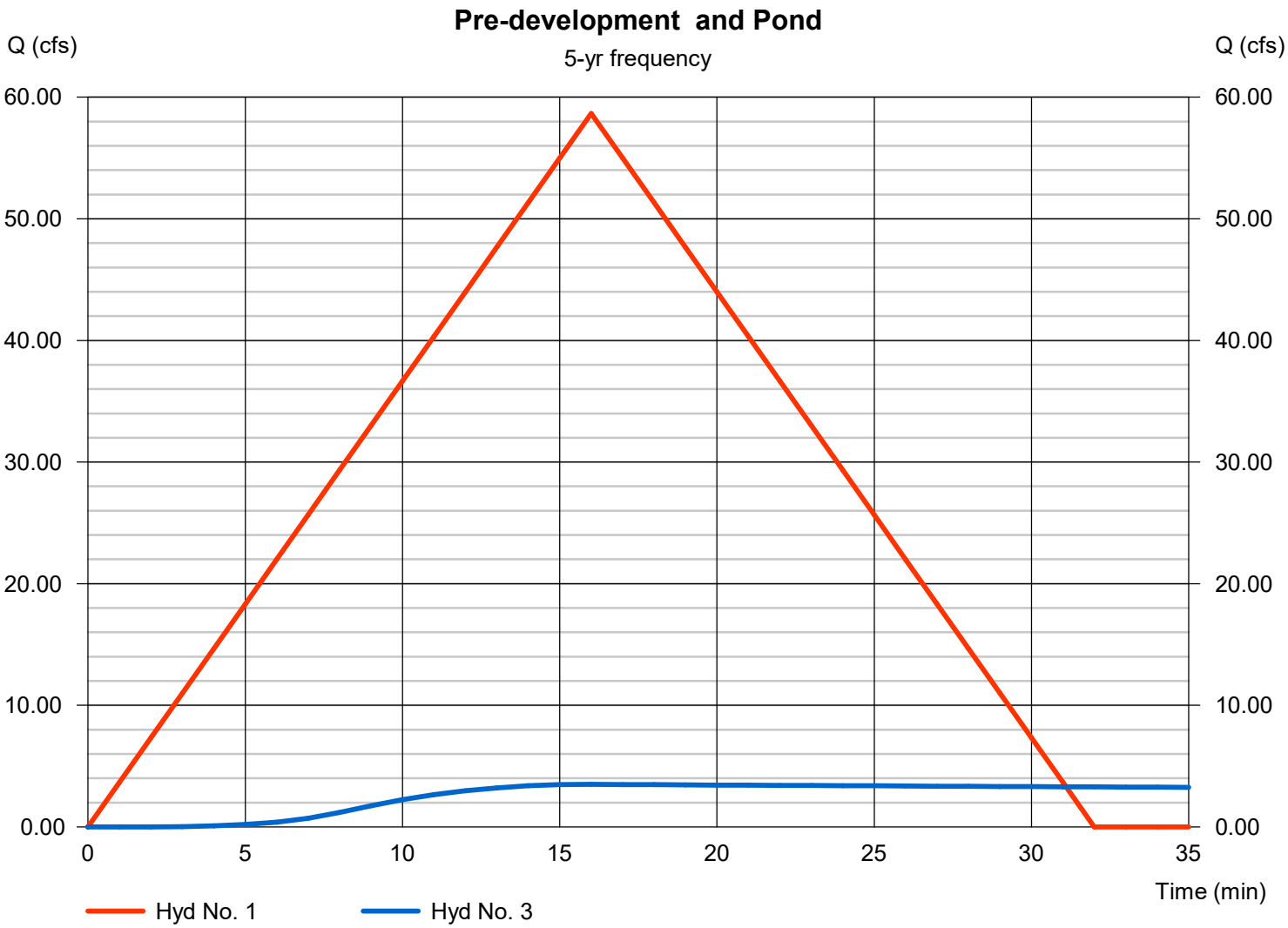
Pre-development

Hydrograph type	=	Rational
Peak discharge	=	58.66 cfs
Time to peak	=	16 min
Hyd. Volume	=	56,310 cuft

Hyd. No. 3

Pond

Hydrograph type	=	Reservoir
Peak discharge	=	3.50 cfs
Time to peak	=	16 min
Hyd. Volume	=	65,800 cuft



Multi-Hydrograph Plot

Hyd. No. 1

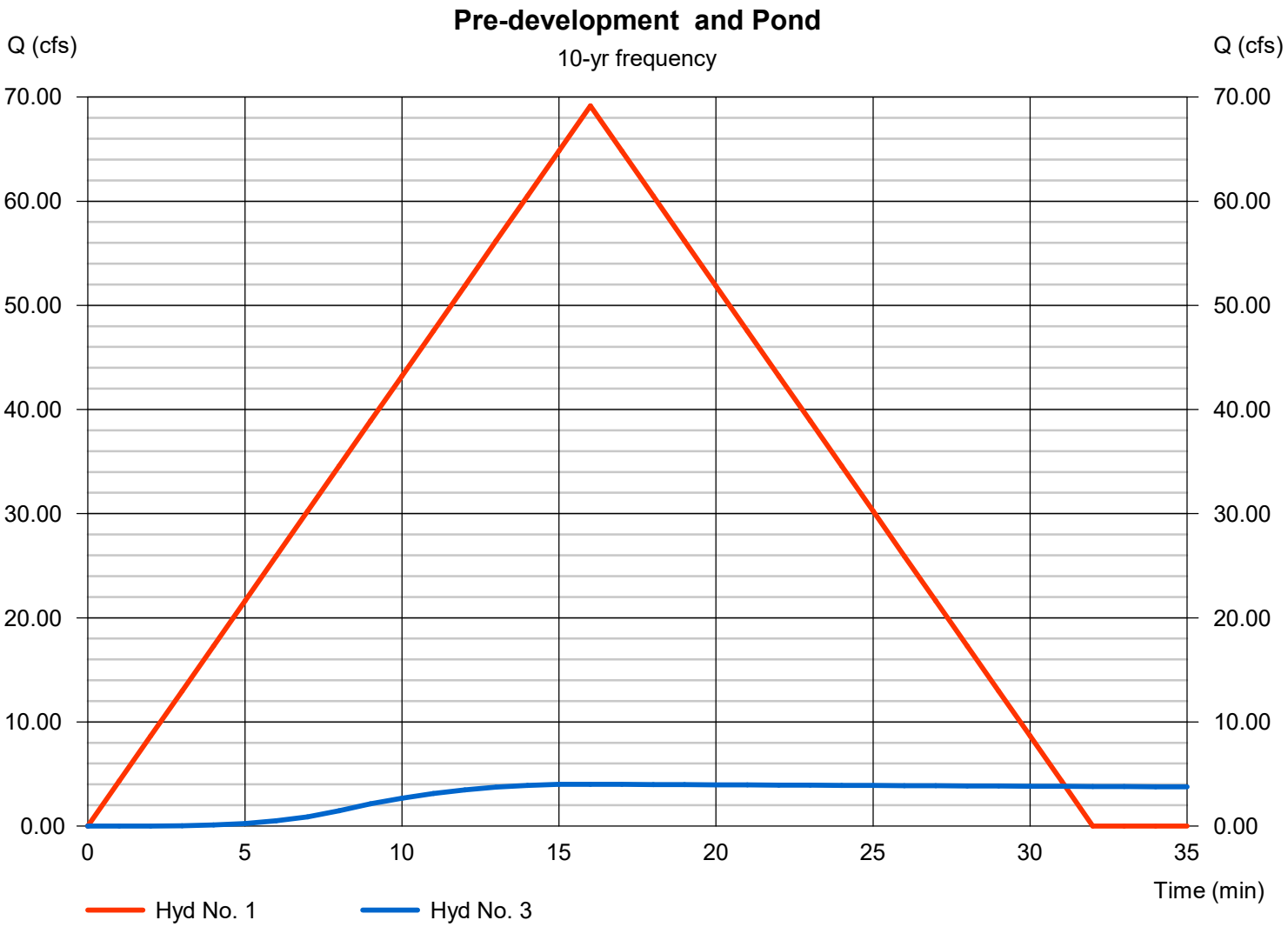
Pre-development

Hydrograph type	=	Rational
Peak discharge	=	69.15 cfs
Time to peak	=	16 min
Hyd. Volume	=	66,385 cuft

Hyd. No. 3

Pond

Hydrograph type	=	Reservoir
Peak discharge	=	4.02 cfs
Time to peak	=	16 min
Hyd. Volume	=	74,479 cuft



Multi-Hydrograph Plot

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

Hyd. No. 1

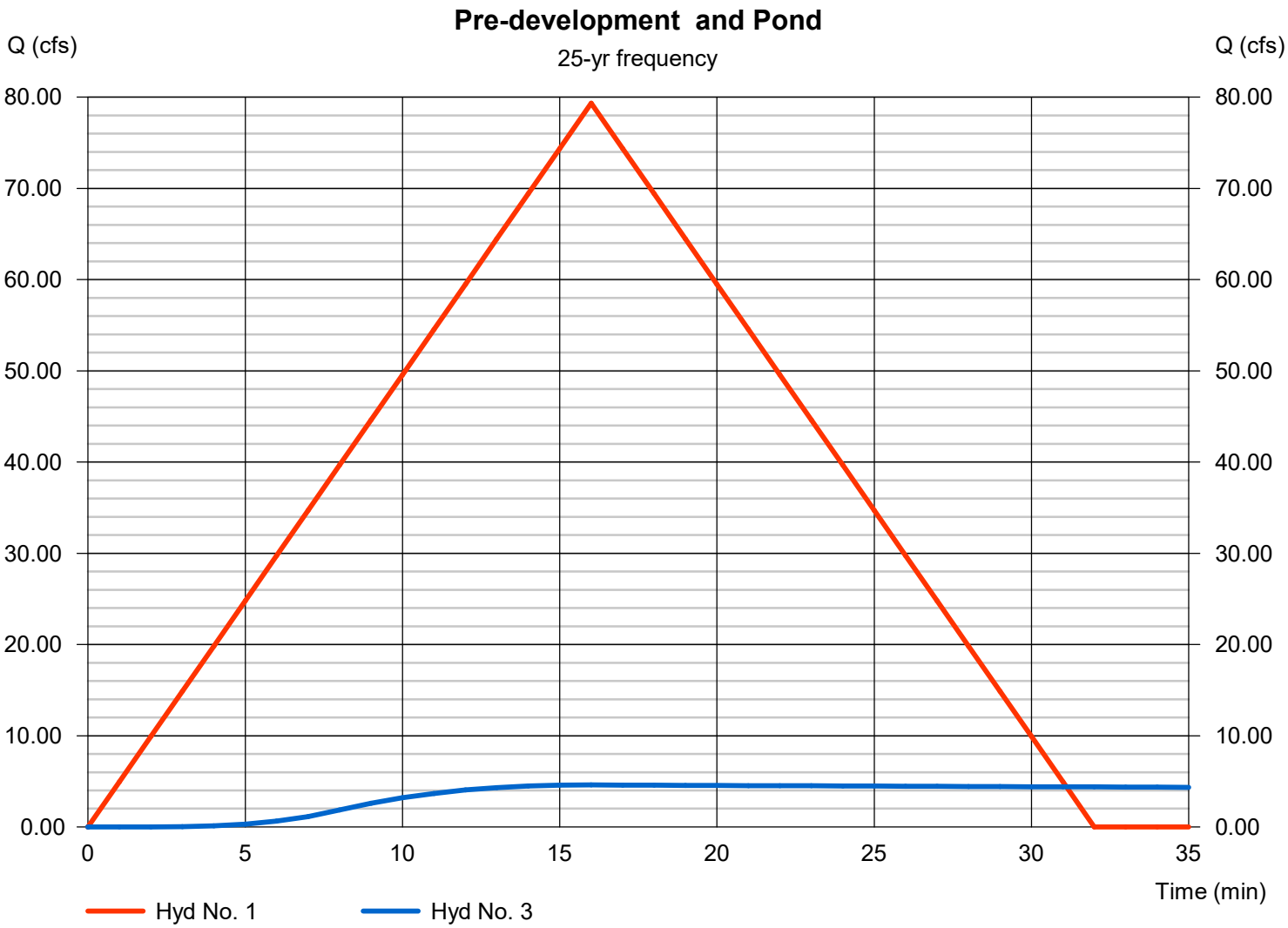
Pre-development

Hydrograph type	=	Rational
Peak discharge	=	79.33 cfs
Time to peak	=	16 min
Hyd. Volume	=	76,152 cuft

Hyd. No. 3

Pond

Hydrograph type	=	Reservoir
Peak discharge	=	4.60 cfs
Time to peak	=	16 min
Hyd. Volume	=	85,472 cuft



Multi-Hydrograph Plot

Hyd. No. 1

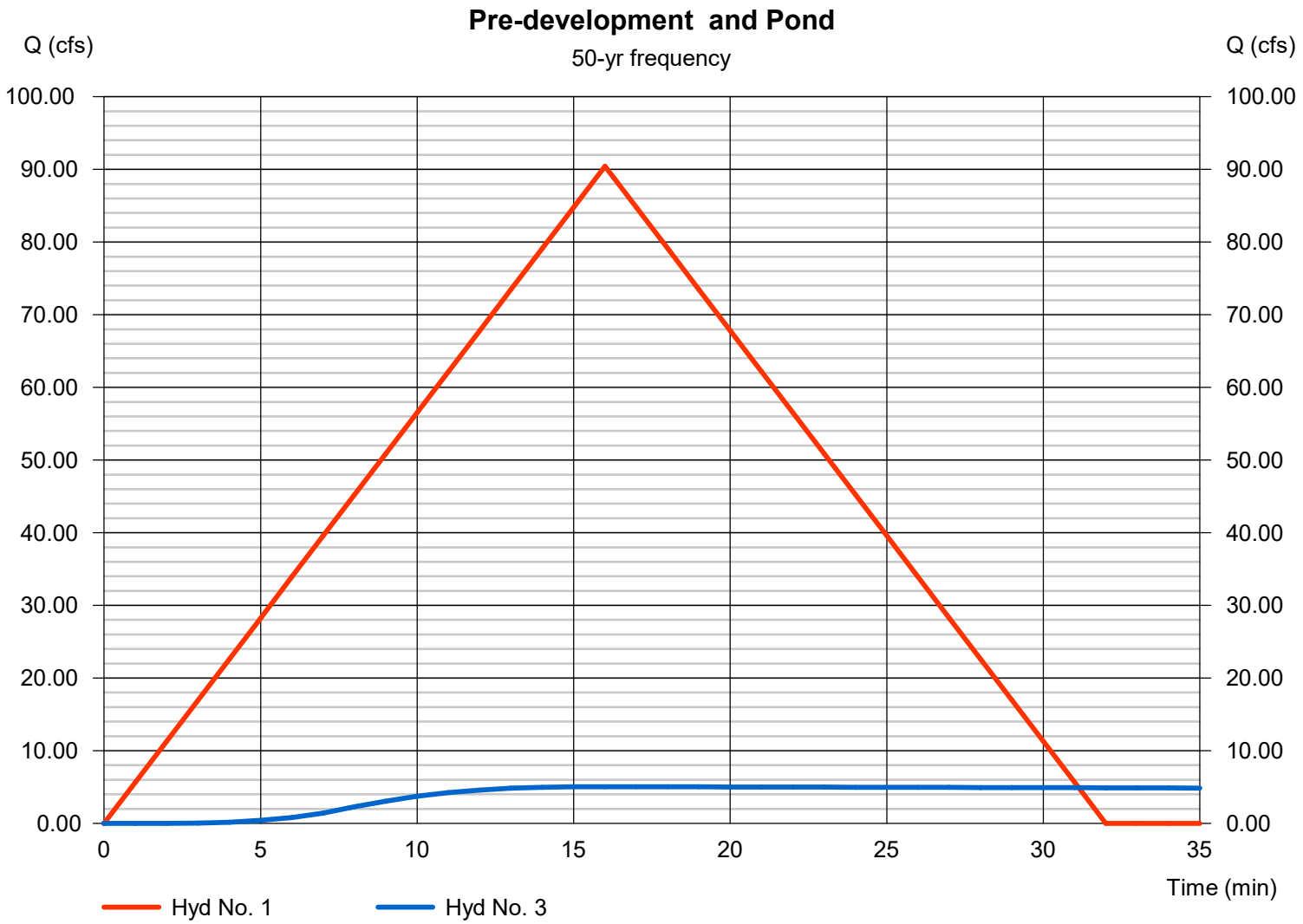
Pre-development

Hydrograph type	=	Rational
Peak discharge	=	90.45 cfs
Time to peak	=	16 min
Hyd. Volume	=	86,827 cuft

Hyd. No. 3

Pond

Hydrograph type	=	Reservoir
Peak discharge	=	5.05 cfs
Time to peak	=	16 min
Hyd. Volume	=	97,246 cuft



Multi-Hydrograph Plot

Hyd. No. 1

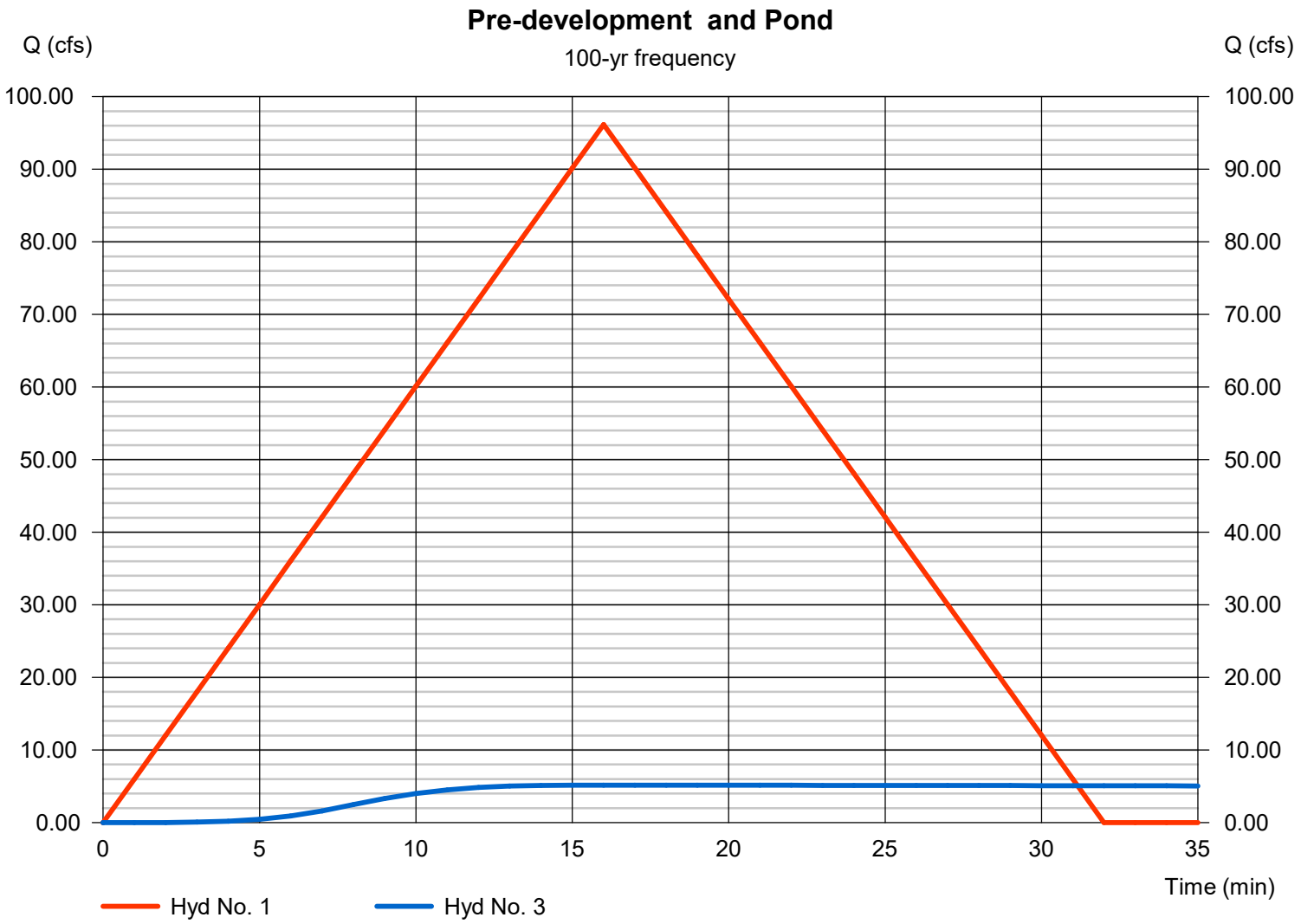
Pre-development

Hydrograph type	=	Rational
Peak discharge	=	96.16 cfs
Time to peak	=	16 min
Hyd. Volume	=	92,318 cuft

Hyd. No. 3

Pond

Hydrograph type	=	Reservoir
Peak discharge	=	5.16 cfs
Time to peak	=	16 min
Hyd. Volume	=	103,403 cuft



Pond Report

Pond No. 1 - <New Pond>

Pond Data

Trapezoid -Bottom L x W = 412.0 x 175.0 ft, Side slope = 2.00:1, Bottom elev. = 349.00 ft, Depth = 5.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	349.00	72,100	0	0
0.50	349.50	73,278	36,344	36,344
1.00	350.00	74,464	36,935	73,279
1.50	350.50	75,658	37,530	110,810
2.00	351.00	76,860	38,129	148,939
2.50	351.50	78,070	38,732	187,671
3.00	352.00	79,288	39,339	227,010
3.50	352.50	80,514	39,950	266,960
4.00	353.00	81,748	40,565	307,525
4.50	353.50	82,990	41,184	348,710
5.00	354.00	84,240	41,807	390,517

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	Inactive	Inactive	0.00
Span (in)	= 18.00	18.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 349.00	347.00	0.00	0.00
Length (ft)	= 70.00	30.00	0.00	0.00
Slope (%)	= 0.50	0.50	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

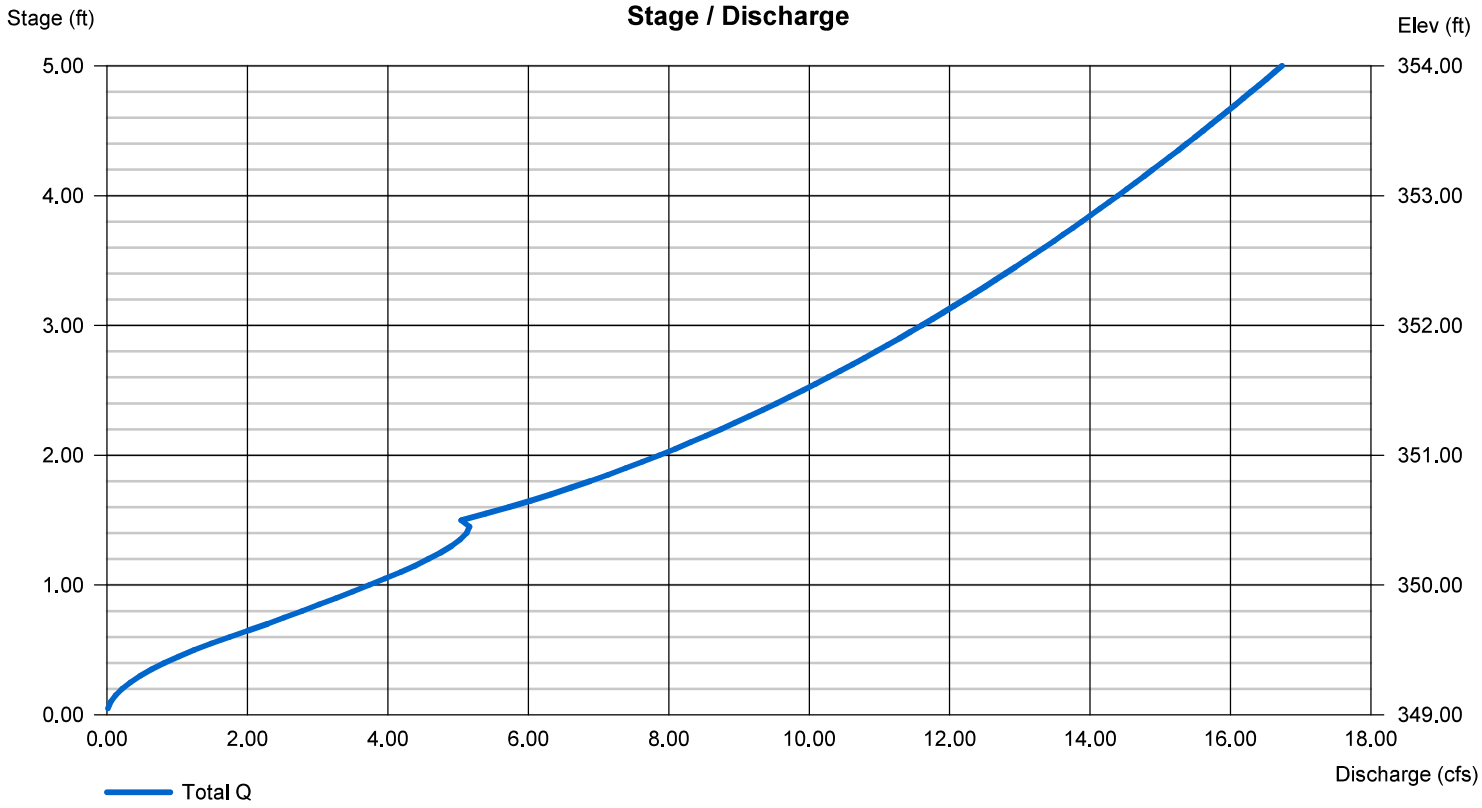
Weir Structures

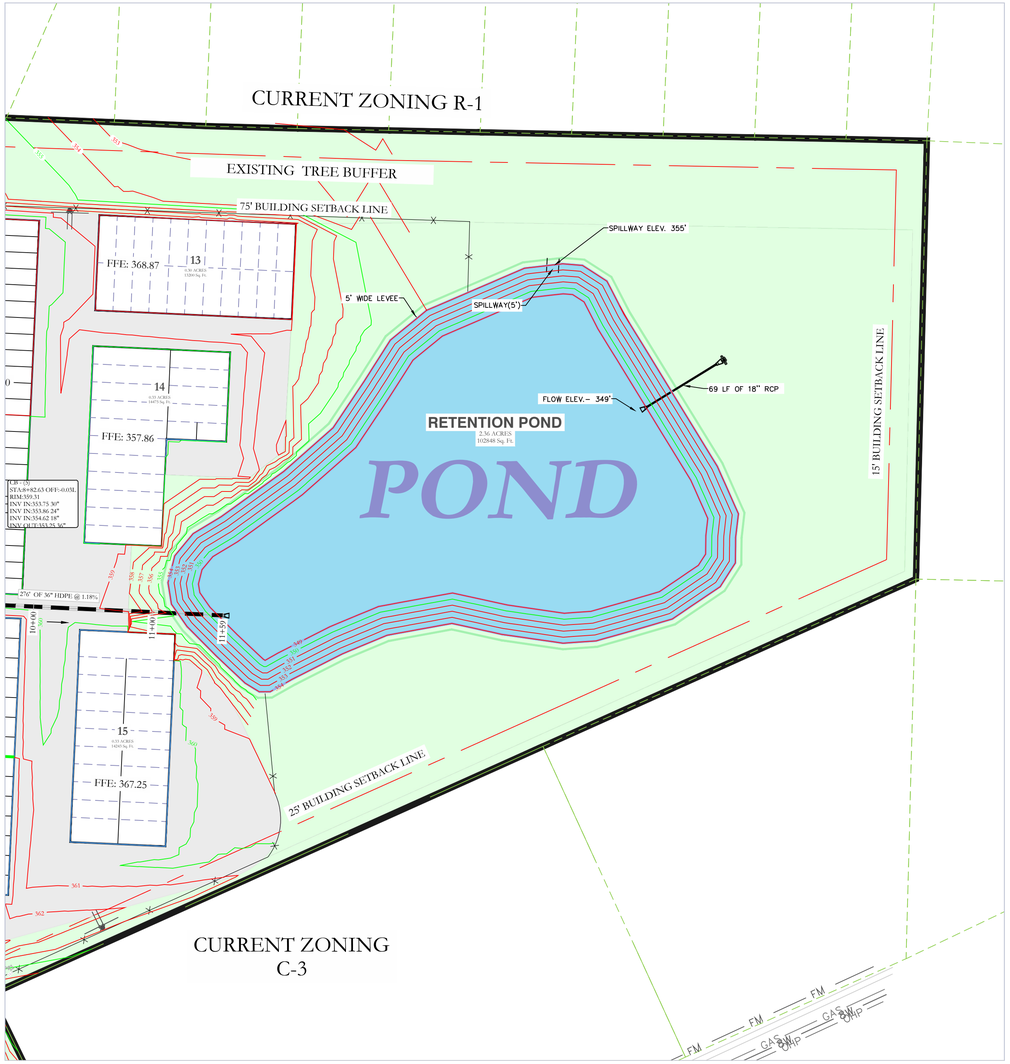
	[A]	[B]	[C]	[D]
Crest Len (ft)	= 5.00	0.00	0.00	0.00
Crest El. (ft)	= 355.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

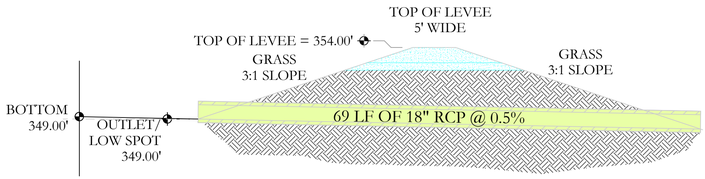
Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

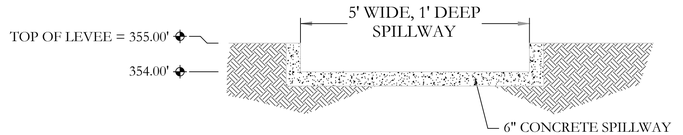
Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).







OUTLET SECTION
NTS



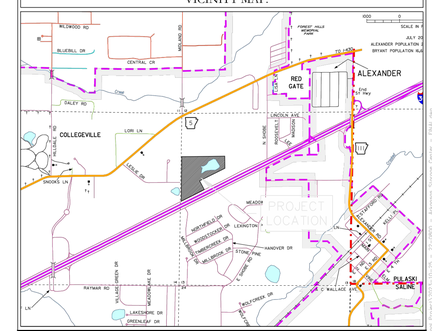
SPILLWAY END VIEW
NTS

LEGEND

EXISTING CONTOUR LINE 363
PROPOSED CONTOUR LINE 363
PROPOSED HDPE STORM PIPE
PROPOSED RCP STORM PIPE

60' 30' 0 60'

VICINITY MAP:



DETENTION POND MAINTENANCE PLAN

Background
There will be one retention pond in this project.The retention pond is located at the North-East of the subject property. It is designed to temporarily detain stormwater to meet water quantity criteria before discharging off the property.

Routine Maintenance
The property owners association will maintain the drainage easements. 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.

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.

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

FOR USE AND BENEFIT OF:
STUART FINLEY

ARKANSAS STORAGE CENTER
RETENTION POND PLAN
BRYANT, SALINE COUNTY, ARKANSAS

DATE: 10-25-2023	C.A.D. BY:	DRAWING NUMBER:	
REVISED:	CHECKED BY:	22-0800	
SHEET: C-4.4	SCALE:		

500	01S	14W	0	21	300	62	1762

CURRENT ZONING R-1

CURRENT ZONING C-2

CURRENT ZONING R-E

CURRENT ZONING C-3

EXISTING TREE BUFFER

25' BUILDING SETBACK LINE

75' BUILDING SETBACK LINE

15' BUILDING SETBACK LINE

50' BUILDING SETBACK LINE

EXISTING TREE BUFFER

RETENTION POND
2.36 ACRES
102848 Sq. Ft.

POND

PRE-DEVELOPMENT WATER-FLOW

PRE-DEVELOPMENT CATCHING AREA

PRE-DEVELOPMENT WATER-FLOW

L-30 FRONTAGE ROAD

1 — FFE: 364.25 — 0.65 ACRES 28304 Sq. Ft.
2 — FFE: 364.4 — 0.65 ACRES 28304 Sq. Ft.
3 — FFE: 365.25 — 0.65 ACRES 28304 Sq. Ft.
4 — FFE: 362.23 — 0.66 ACRES 28748 Sq. Ft.
5 — FFE: 364.13 — 0.65 ACRES 28304 Sq. Ft.
6 — FFE: 363.68 — 0.91 ACRES 39640 Sq. Ft.
7 — FFE: 360.00 — 0.65 ACRES 28304 Sq. Ft.
8 — FFE: 361.34 — 0.65 ACRES 28304 Sq. Ft.
9 — FFE: 361.75 — 0.65 ACRES 28304 Sq. Ft.
10 — FFE: 362.00 — 0.65 ACRES 28304 Sq. Ft.
11 — FFE: 368.60 — 0.65 ACRES 28304 Sq. Ft.
12 — FFE: 368.75 — 0.65 ACRES 28304 Sq. Ft.
13 — FFE: 368.87 — 0.56 ACRES 24394 Sq. Ft.
14 — FFE: 357.86 — 0.53 ACRES 23087 Sq. Ft.
15 — FFE: 367.25 — 0.63 ACRES 27443 Sq. Ft.
FFE: 369.75
FFE: 361.00

LEGEND

EXISTING CONTOUR LINE — 363
PROPOSED CONTOUR LINE — 363
PROPOSED HDPE STORM PIPE
PROPOSED RCP STORM PIPE

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

N

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

60' 30' 0 60'

	Pre-Development Peak Flow (cfs)	Post-Development without Detention Peak Flow (cfs)	Post-Development with Detention Peak Flow (cfs)
2-Year	53.08	131.14	2.99
5-Year	58.66	147.91	3.498
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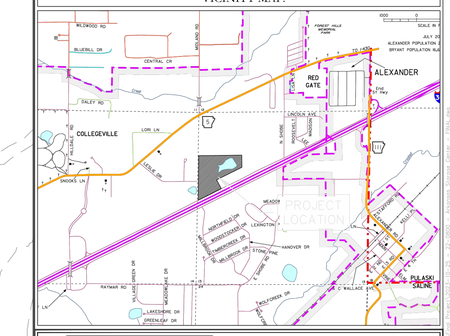
VICINITY MAP:



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FOR USE AND BENEFIT OF:
STUART FINLEY

ARKANSAS STORAGE CENTER
PRE-DEVELOPMENT FLOW
BRYANT, SALINE COUNTY, ARKANSAS

DATE:	10-25-2023	C.A.D. BY:	DRAWING NUMBER:
REVISED:		CHECKED BY:	22-0800
SHEET:	C-4.5	SCALE: 1" = 60'	

500	01S	14W	0	21	300	62	1762

CURRENT ZONING R-1

CURRENT ZONING C-2

CURRENT ZONING R-E

CURRENT ZONING C-3

EXISTING TREE BUFFER

25' BUILDING SETBACK LINE

75' BUILDING SETBACK LINE

15' BUILDING SETBACK LINE

50' BUILDING SETBACK LINE

EXISTING TREE BUFFER

SPILLWAY ELEV. 355'

SPILLWAY(5')

5' WIDE LEVEE

FLOW ELEV.- 349'

69 LF OF 18" RCP

RETENTION POND
2.36 ACRES
102848 Sq. Ft.

POND

POST-DEVELOPMENT WATER-FLOW

POST-DEVELOPMENT WATER-FLOW

POST-DEVELOPMENT WATER-FLOW

POST-DEVELOPMENT CATCHING AREA

I-30 FRONTAGE ROAD

1 — FFE: 364.25 — 0.28 ACRES 12365 Sq. Ft.
2 — FFE: 364.4 — 0.37 ACRES 15941 Sq. Ft.
3 — FFE: 365.25 — 0.01 ACRES 5000 Sq. Ft.
4 — FFE: 362.23 — 0.26 ACRES 11340 Sq. Ft.
5 — FFE: 364.13 — 0.01 ACRES 5127 Sq. Ft.
6 — FFE: 363.68 — 0.78 ACRES 34000 Sq. Ft.
7 — FFE: 360.00 — 0.03 ACRES 2394 Sq. Ft.
8 — FFE: 361.34 — 0.05 ACRES 2320 Sq. Ft.
9 — FFE: 361.75 — 0.01 ACRES 5000 Sq. Ft.
10 — FFE: 362.00 — 0.39 ACRES 17001 Sq. Ft.
11 — FFE: 368.60 — 0.01 ACRES 5028 Sq. Ft.
12 — FFE: 369.75 — 0.01 ACRES 5000 Sq. Ft.
13 — FFE: 368.87 — 0.26 ACRES 11309 Sq. Ft.
14 — FFE: 357.86 — 0.33 ACRES 14477 Sq. Ft.
15 — FFE: 367.25 — 0.03 ACRES 1500 Sq. Ft.

LEGEND

EXISTING CONTOUR LINE 363
PROPOSED CONTOUR LINE 363
PROPOSED HDPE STORM PIPE
PROPOSED RCP STORM PIPE

	Pre-Development Peak Flow (cfs)	Post-Development without Detention Peak Flow (cfs)	Post-Development with Detention Peak Flow (cfs)
2-Year	53.08	131.14	2.99
5-Year	58.66	147.91	3.498
10-Year	69.15	166.14	4.020
25-Year	79.33	189.21	4.600
50-Year	90.45	213.91	5.051
100-Year	96.16	226.82	5.157
TOC	**16.05 min**	**8.03 min**	

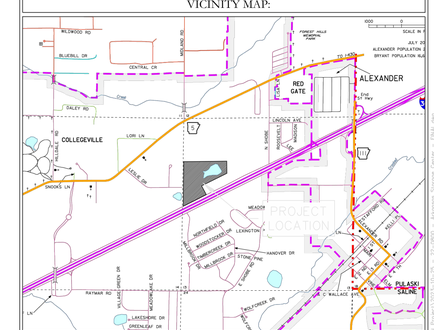
CERTIFICATE OF AUTHORIZATION
HOPE CONSULTING, INC.
No. 1931
ARKANSAS

-N-

BASIS OF BEARING
GRID NORTH, ARKANSAS
COORDINATE SYSTEM, SOUTH ZONE
BY GPS OBSERVATION

60' 30' 0 60'

VICINITY MAP:



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www.hopeconsulting.com

FOR USE AND BENEFIT OF:
STUART FINLEY

ARKANSAS STORAGE CENTER

POST-DEVELOPMENT FLOW

BRYANT, SALINE COUNTY, ARKANSAS

DATE:	10-25-2023	C.A.D. BY:	DRAWING NUMBER:
REVISED:		CHECKED BY:	22-0800
SHEET:	C-4.6	SCALE: 1" = 60'	

500	01S	14W	0	21	300	62	1762