Bates & Associates, Inc.
Civil Engineering · Land Surveying · Landscape Architecture
91 W. Colt Square Dr. Suite 3 / Fayetteville, AR 72703
PH: 479-442-9350 * FAX: 479-521-9350

DRAINAGE DESIGN COMPUTATIONS

FOR

CENTRAL ELECTRIC

BA NO. 15-198

FLORANCE AVENUE
TONTITOWN, ARKANSAS

JULY 7, 2015

SUBMITTED TO:
CITY OF TONTITOWN

This Drainage Study has been reviewed for general compliance with the City of Tontitown Zoning and Planning Ordinances. Oversight of any regulations does not relieve the Owner of their responsibility to comply with all regulations.

Terry W. Carpenter, P.E.
Tontitown City Engineer, July 09, 2015

SHEET INDEX

PROJECT OWNER AND DEVELOPER:

Central Electric Contractors
228 S. 40th Street A
Springdale, AR 72756

I don't think this is the correct address.

PROJECT TITLE:

The following information is the drainage report for Central Electric.

PROJECT LOCATION:

This project is located at 284 South Mantegani Road, in Tontitown, Arkansas in Washington County. See the attached vicinity map for the exact location.

PROJECT DESCRIPTION:

This project site is a 1.27 acre tract in the existing Tontitown Plaza subdivision. Improvements to the site will consist of paving parking lot, drives and adding a 5,000 s.f. building. See the large scale development plan for details.

SITE DRAINAGE:

This project is a small part of a large drainage basin that flows into Brush Creek and eventually discharging into the Illinois River. The soil type for the drainage basin found in the Natural Resources Conservation Service Soil Survey is Captina silt loam which belongs to Hydrologic Soil Group C and Johnsburg which belongs to Hydrologic Soil Group D. The majority of the soil types in the basin are in Soil Group C.

Soil group C soils have low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward movement of water and soils with moderately fine to fine texture. These soils have a low rate of water transmission.

Group D soils have very low infiltration rates when thoroughly wetted and consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very low rate of water transmission (0-0.05 in/hr).

No portion of this property is located within Flood Zone “AE” and the “Floodway” as determined by the National Flood Insurance Program's Flood Insurance Rate Map for Washington County, Arkansas (Map No. 05143C0045 F, May 16, 2008).

Currently, the runoff from this site sheet flows from the northwest to southeast. Once developed, the runoff from the site will continue in the same general pattern.

AREA DRAIANGE PROBLEMS:

To our knowledge, there are no known drainage problems in this area at this time.

DRAINAGE DESIGN:

Runoff Coefficients for each drainage basin was selected from the Tontitown Drainage Manual. The coefficient was selected based on the amount of pervious and impervious area in the basin. A composite runoff curve number was then calculated for the basin. The composite runoff coefficients are as follows:

Cover	(50%) Type C	(50%) Type D
Open Space (good cover)	86	89
Gravel	89	
Impervious	98	98

Pre Developed Basin1 (0.28 ac)

86	Open space	0.28 ac

Pre Developed Basin 2 (0.75 ac)

89	Open space	0.75 ac

Post Developed Basin 1 (0.23 ac)

86	Open space	0.08 ac
98	Impervious	0.15 ac

90 Post developed composite curve number

Post Developed Basin 2 (0.80 ac)

89	Open space	0.32 ac
89	Gravel	0.27 ac
98	Impervious	0.21 ac

91 Post developed composite curve number

Basin 1 Runoff Calculations

The 2-year through 100-year frequency storm events for pre- and post-development flows were calculated using the drainage program Hydraflow Hydrographs (SCS Method). The post developed peak flows decreased slightly due to decreasing the basin size.

Basin 1:

The peak runoff will slightly increase in basin 1 due to the increase in impervious area.

(Peak flow in cfs)

Design Storm	Pre-Dev.	Post-Dev	Difference
2-yr	0.75	0.69	-0.06
5-yr	0.89	0.80	-.009
10-yr	1.23	1.08	-0.15
25-yr	1.47	1.28	-0.19
100-yr	1.89	1.62	-0.27

Basin 2:

The peak runoff will slightly increase in basin 2 due to the increase in impervious area. However, detention is proposed to reduce the peak runoff to pre developed conditions.

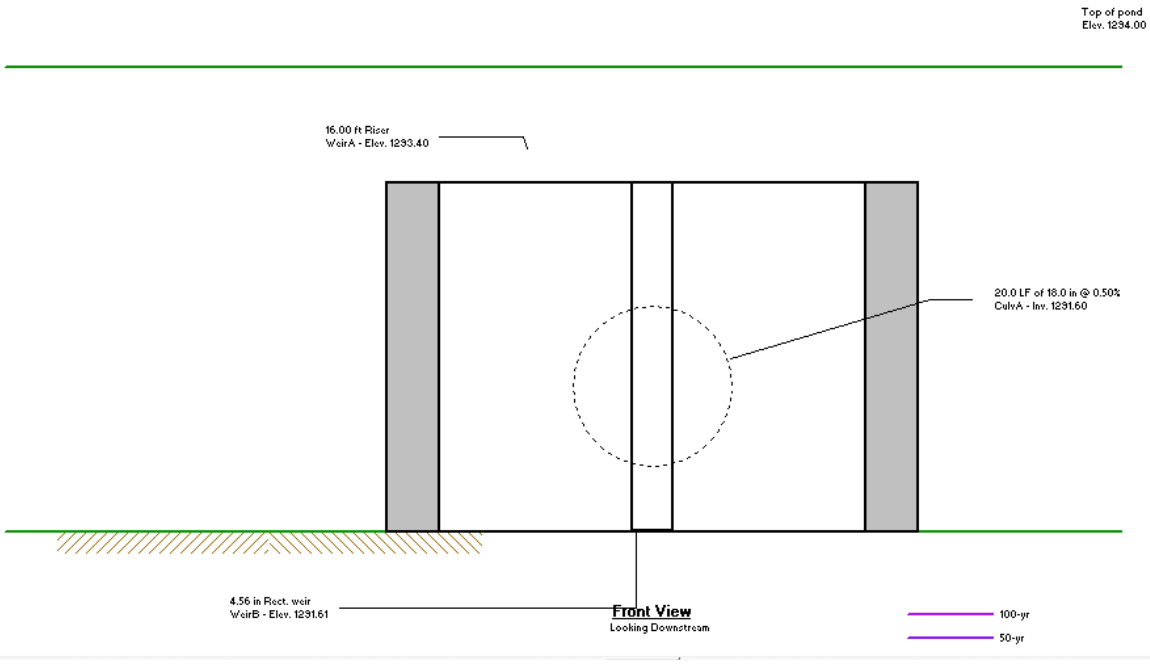
(Peak flow in cfs)

Design Storm	Pre-Dev.	Post-Dev	Difference
2-yr	1.59	1.57	-0.02
5-yr	1.88	1.77	-0.11
10-yr	2.55	2.09	-0.46
25-yr	3.03	2.36	-0.67
100-yr	3.85	3.67	-0.18

DETENTION BASIN 1:

The 100 year WSEL in the pond is 1293.5 and the berm is at elevation 1294.5. This provides 12 inches of freeboard. The release structure consists of a 4'x4' riser with a 4.5" weir and an 18" corrugated metal pipe outlet. See the grading plan for details.

Design Storm	Storage Cu. Ft	Elevation
2-yr	4,895	1287.41
10-yr	8,986	1287.84
25-yr	11,483	1288.04
50-yr	13,885	1288.15
100-yr	15,743	1288.23



EROSION AND SEDIMENT CONTROL:

Erosion and sediment control will be achieved through the use of silt fences and rip rap ditch checks.

CONCLUSION:

The improvements to the site consist of adding parking, drives and a building. The peak runoff will increase due to the improvements replacing pervious area with impervious area. However, detention is proposed to lower the peak runoff to pre developed conditions.

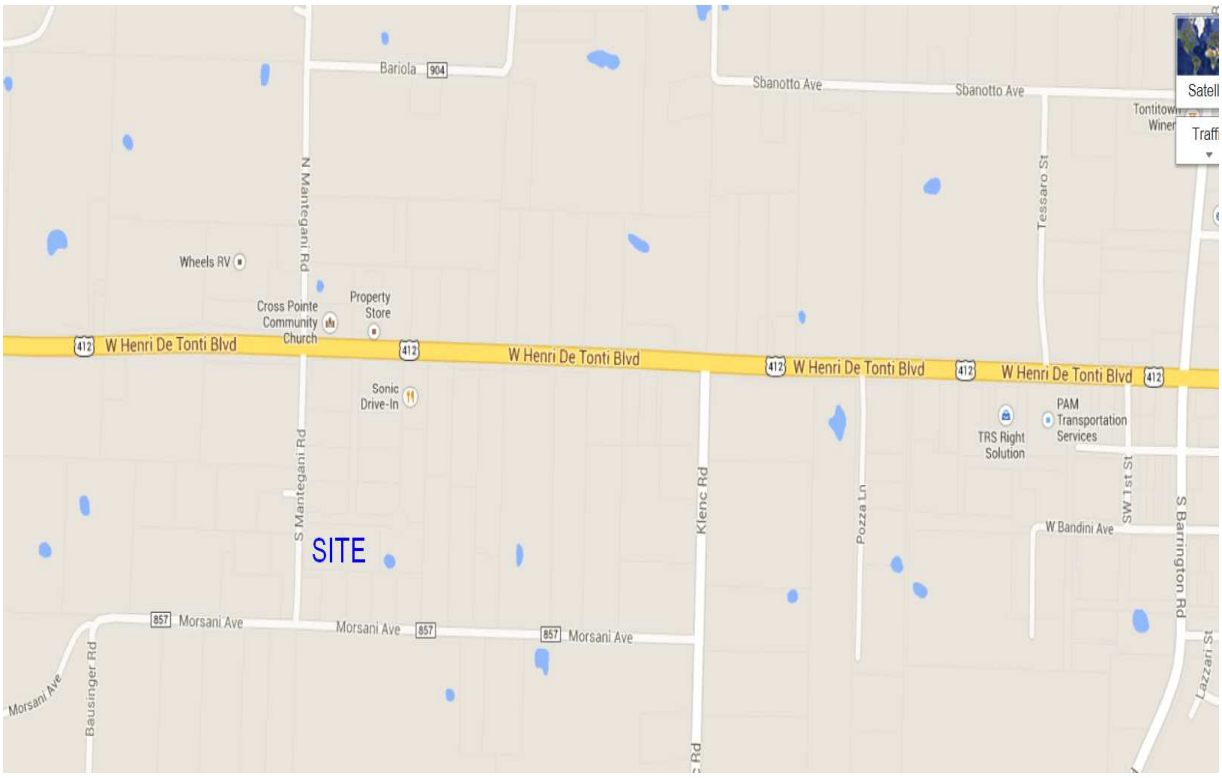
CERTIFICATION:

I, Geoffrey H. Bates, Registered Professional Engineer No. 9810 in the State of Arkansas, hereby certify that the drainage studies, reports, calculations, designs, and specifications contained in this report have been prepared in accordance with the requirements of the City of Tontitown. Further, I hereby acknowledge that the review of the drainage studies, reports, calculations, designs, and specifications by the City of Tontitown or its representatives cannot and does not relieve me from any professional responsibility or liability."

Sincerely,

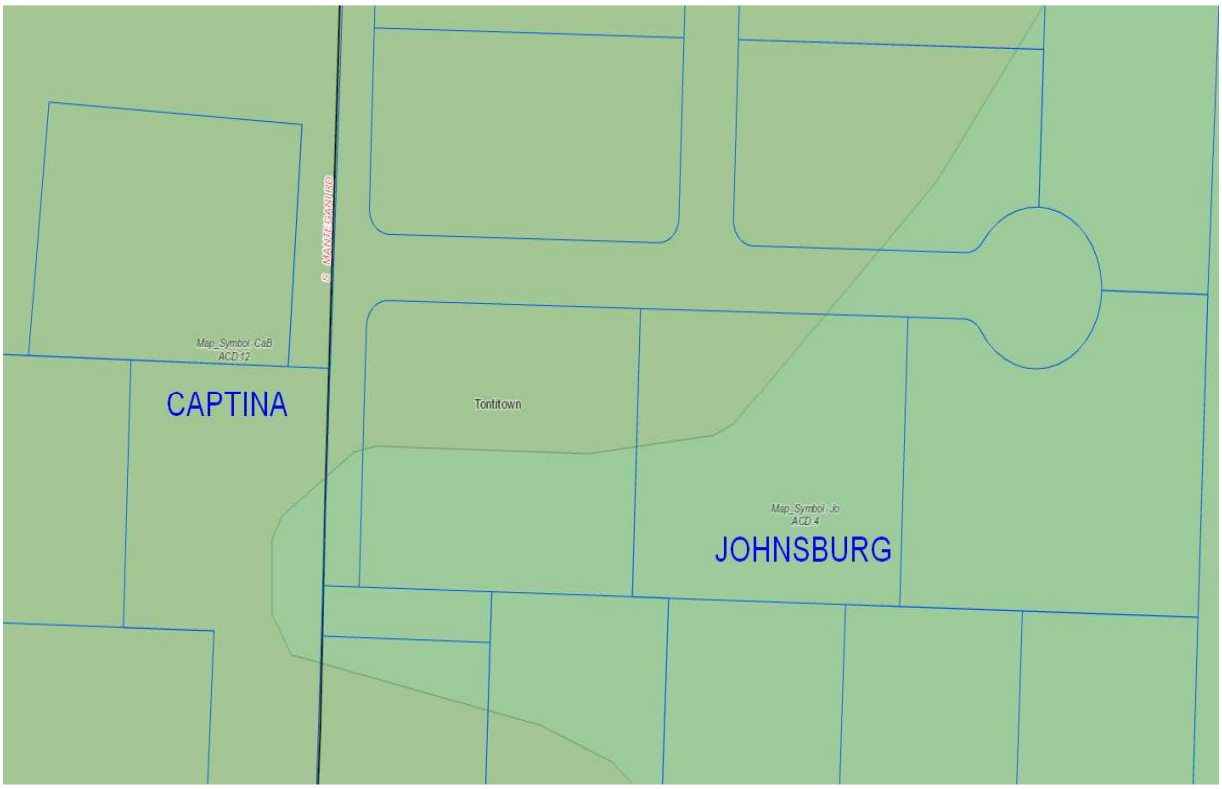
Bates & Associates, Inc.

Geoffrey H. Bates, P.E.
President of Engineering



VICINITY MAP

AERIAL PHOTOGRAPH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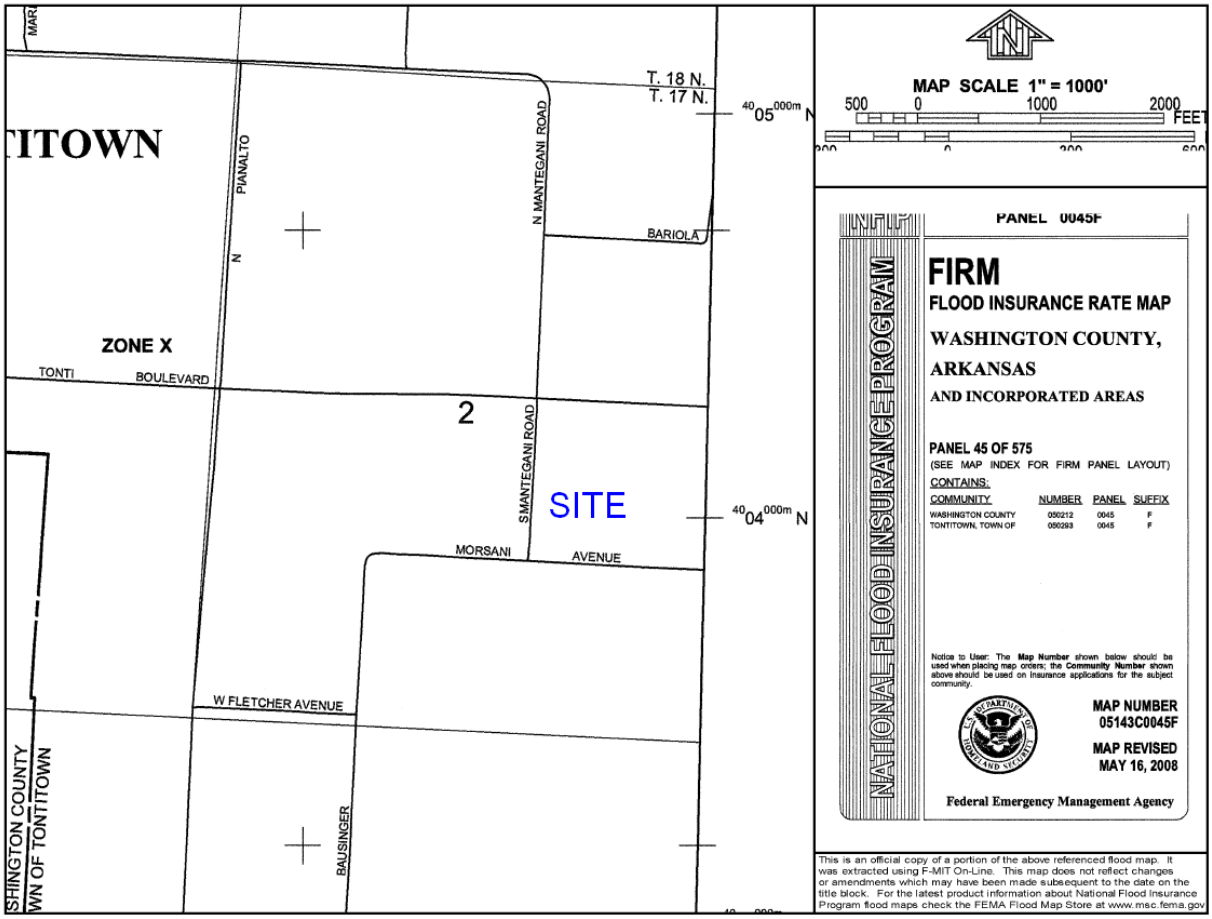
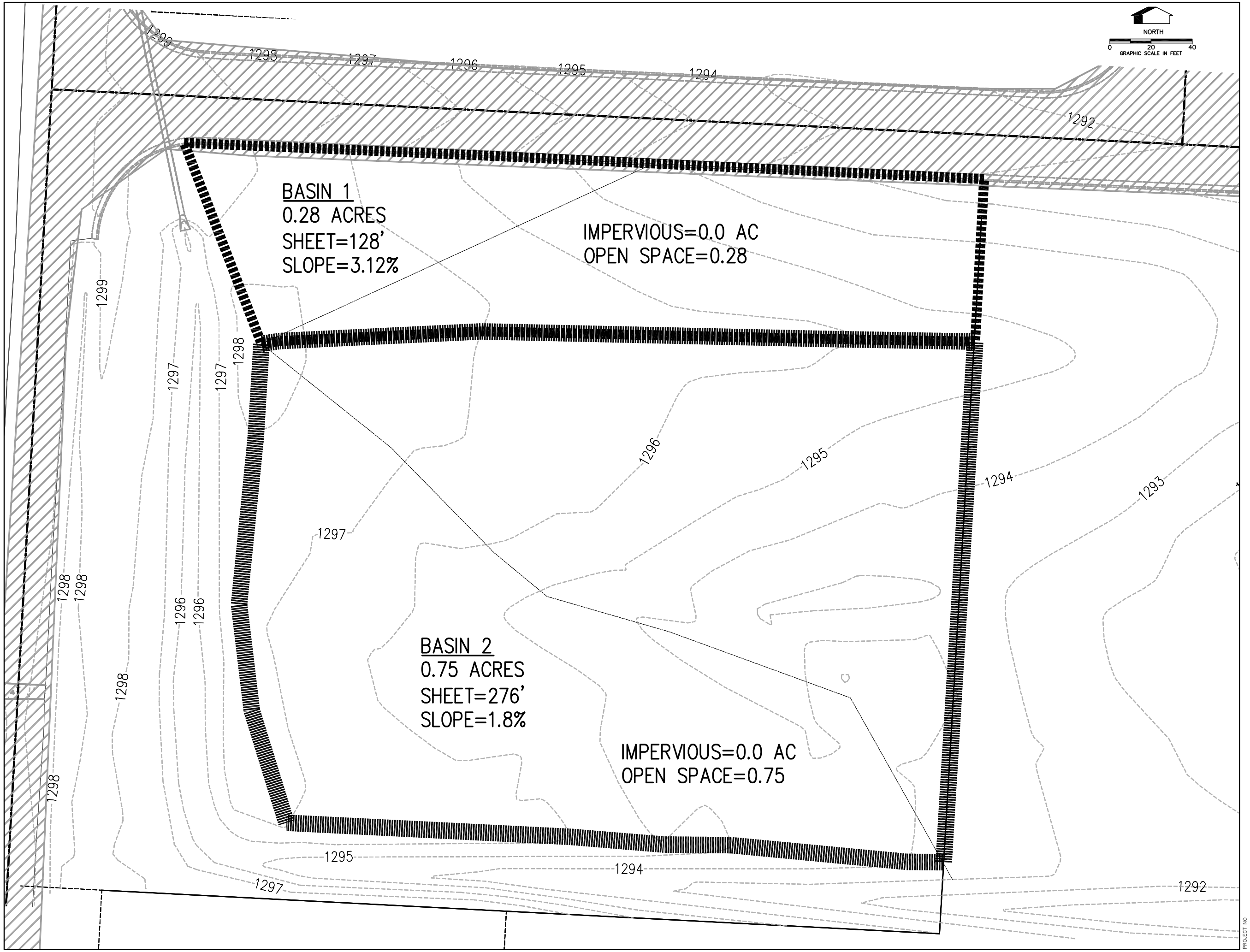
ACD 12
CAPTINA
Tontitown
Map_Symbol_Jo
ACD 4
JOHNSBURG

SOILS MAP



FEMA FIRM PANEL

RUNOFF CALCULATIONS



STATE OF ARKANSAS
REGISTERED PROFESSIONAL ENGINEER
No. 9810
GEOFFREY H. BATES

BATES & ASSOCIATES, INC. #335
CERTIFICATE OF AUTHORIZATION

ENGINEER: G. Bates
DRAWN BY: J. Young

REVISIONS	DATE
FIRST SUBMITTAL	07/07/15

CENTRAL ELECTRICAL CONTRACTORS
LARGE SCALE DEVELOPMENT PLANS

PRE DEVELOPED DRAINAGE MAP

TONTITOWN, ARKANSAS

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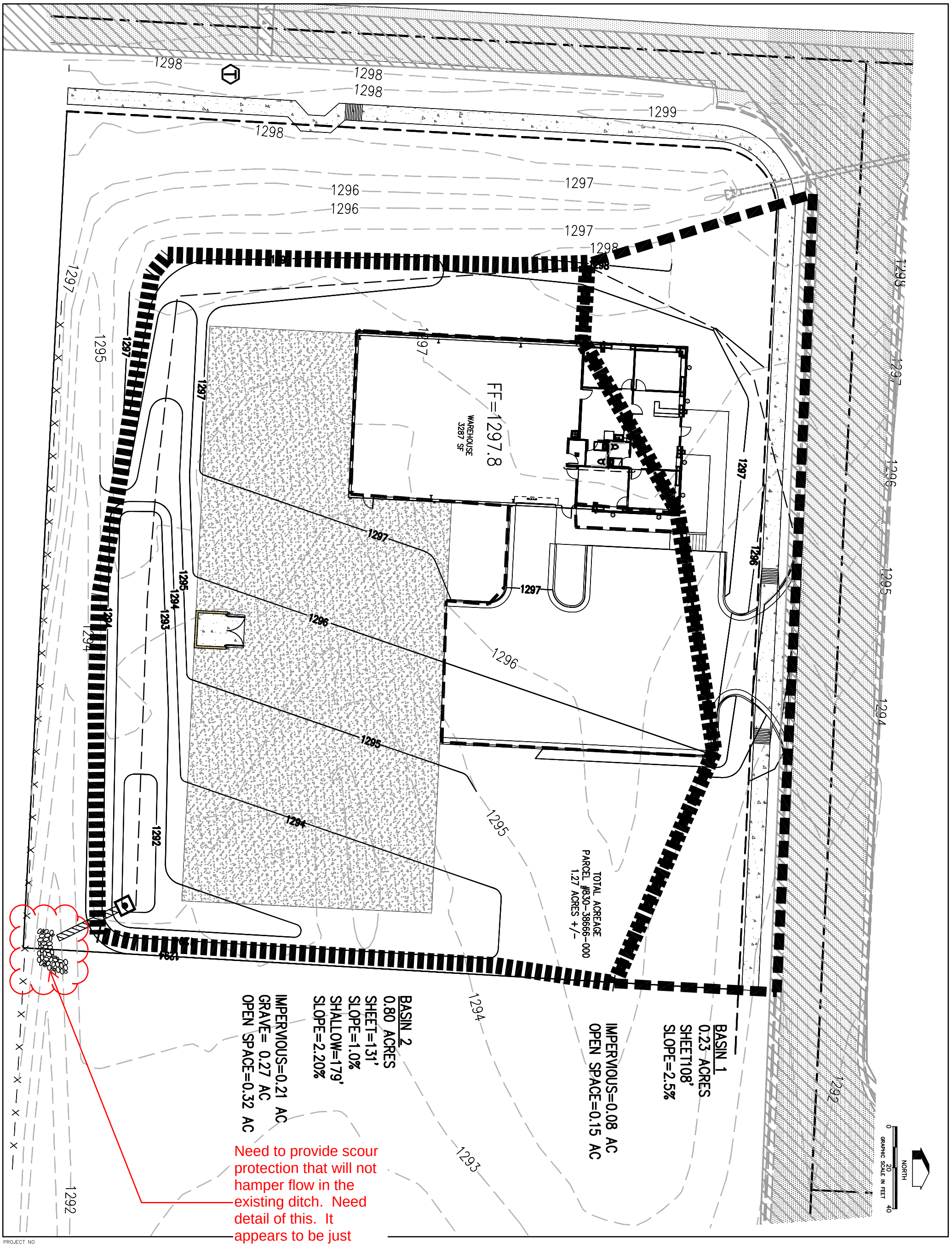
PROJECT NO
15-198

DRAWING NO
01



PROJECT NO
15-198

DRAWING NO
02

Bates & Associates, Inc.
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CENTRAL ELECTRICAL CONTRACTORS
LARGE SCALE DEVELOPMENT PLANS

POST DEVELOPED DRAINAGE MAP

TONTITOWN, ARKANSAS

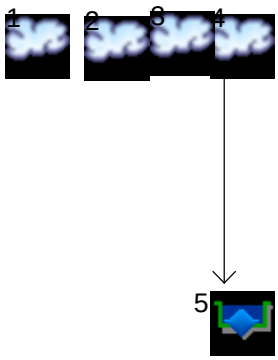
REVISIONS	DATE
FIRST SUBMITTAL	07/07/15

DRAWN BY: J. Young ENGINEER: G. Bates

CERTIFICATE OF AUTHORIZATION BATES & ASSOCIATES, INC. A335

STATE OF ARKANSAS REGISTERED PROFESSIONAL ENGINEER GEOFFREY H. BATES No. 9810

Watershed Model Schematic



Hydrograph Return Period Recap

Hydraflow Hydrographs by Intelisolve v9.2

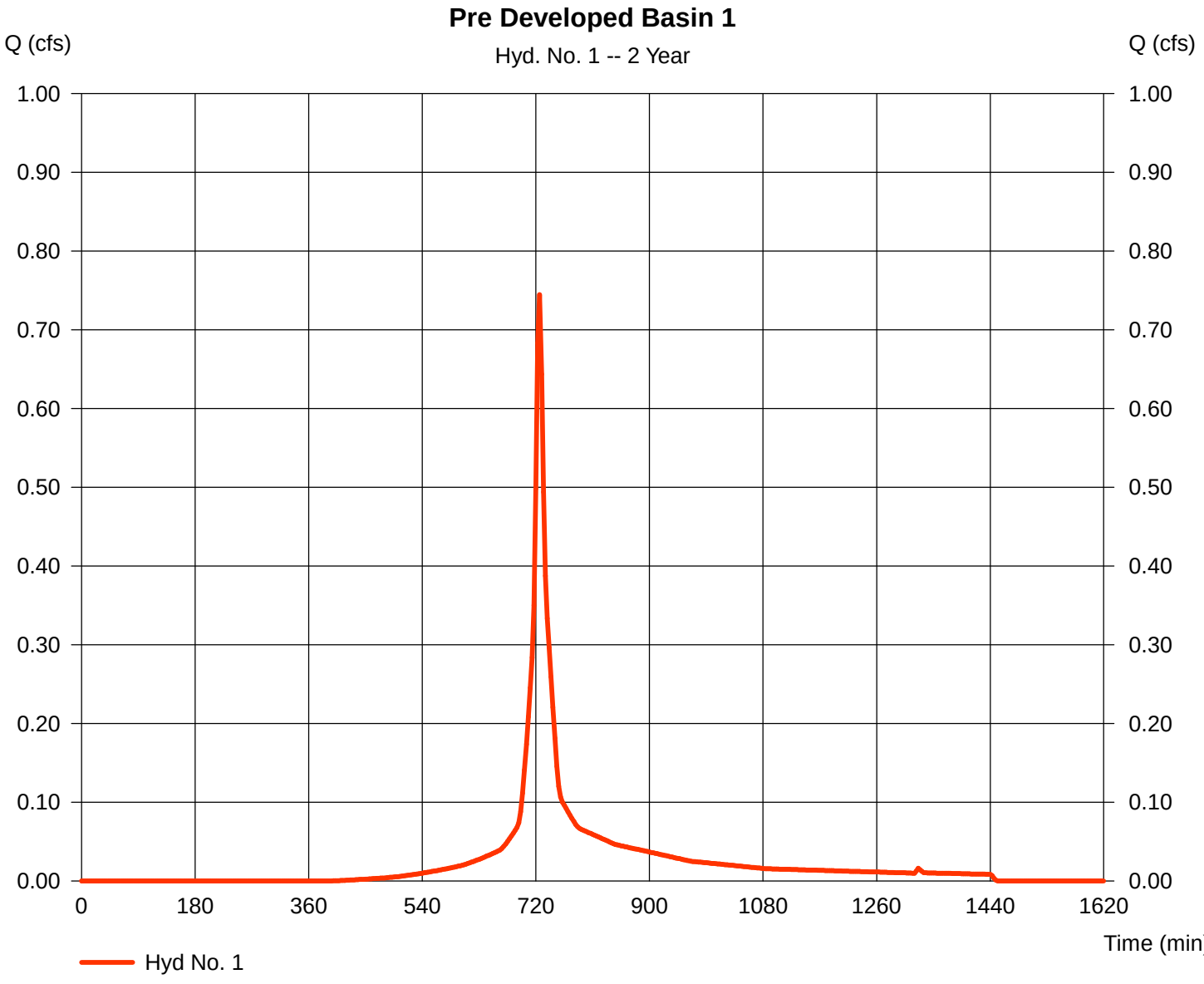
Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-------	-------	0.745	-------	0.888	1.228	1.470	1.710	1.890	Pre Developed Basin 1
2	SCS Runoff	-------	-------	1.593	-------	1.878	2.551	3.026	3.499	3.852	Pre Developed Basin 2
3	SCS Runoff	-------	-------	0.685	-------	0.803	1.081	1.276	1.471	1.617	Post Developed Basin 1
4	SCS Runoff	-------	-------	2.026	-------	2.367	3.171	3.739	4.303	4.725	Post Developed Basin 2
5	Reservoir	4	-------	1.569	-------	1.766	2.094	2.359	3.128	3.670	Detention Pond

Hydrograph Report

Hyd. No. 1

Pre Developed Basin 1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.745 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 2,495 cuft
Drainage area	= 0.280 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 8.80 min
Total precip.	= 4.08 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 1

Pre Developed Basin 1

Description	A	B	C	Totals
Sheet Flow				
Manning's n-value	= 0.150	0.011	0.011	
Flow length (ft)	= 128.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 4.08	0.00	0.00	
Land slope (%)	= 3.12	0.00	0.00	
Travel Time (min)	**= 8.85**	**+ 0.00**	**+ 0.00**	**= 8.85**
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	0.00	0.00	
Watercourse slope (%)	= 0.00	0.00	0.00	
Surface description	= Paved	Paved	Paved	
Average velocity (ft/s)	= 0.00	0.00	0.00	
Travel Time (min)	**= 0.00**	**+ 0.00**	**+ 0.00**	**= 0.00**
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	= 0.00	0.00	0.00	
Flow length (ft)	= 0.0	0.0	0.0	
Travel Time (min)	**= 0.00**	**+ 0.00**	**+ 0.00**	**= 0.00**

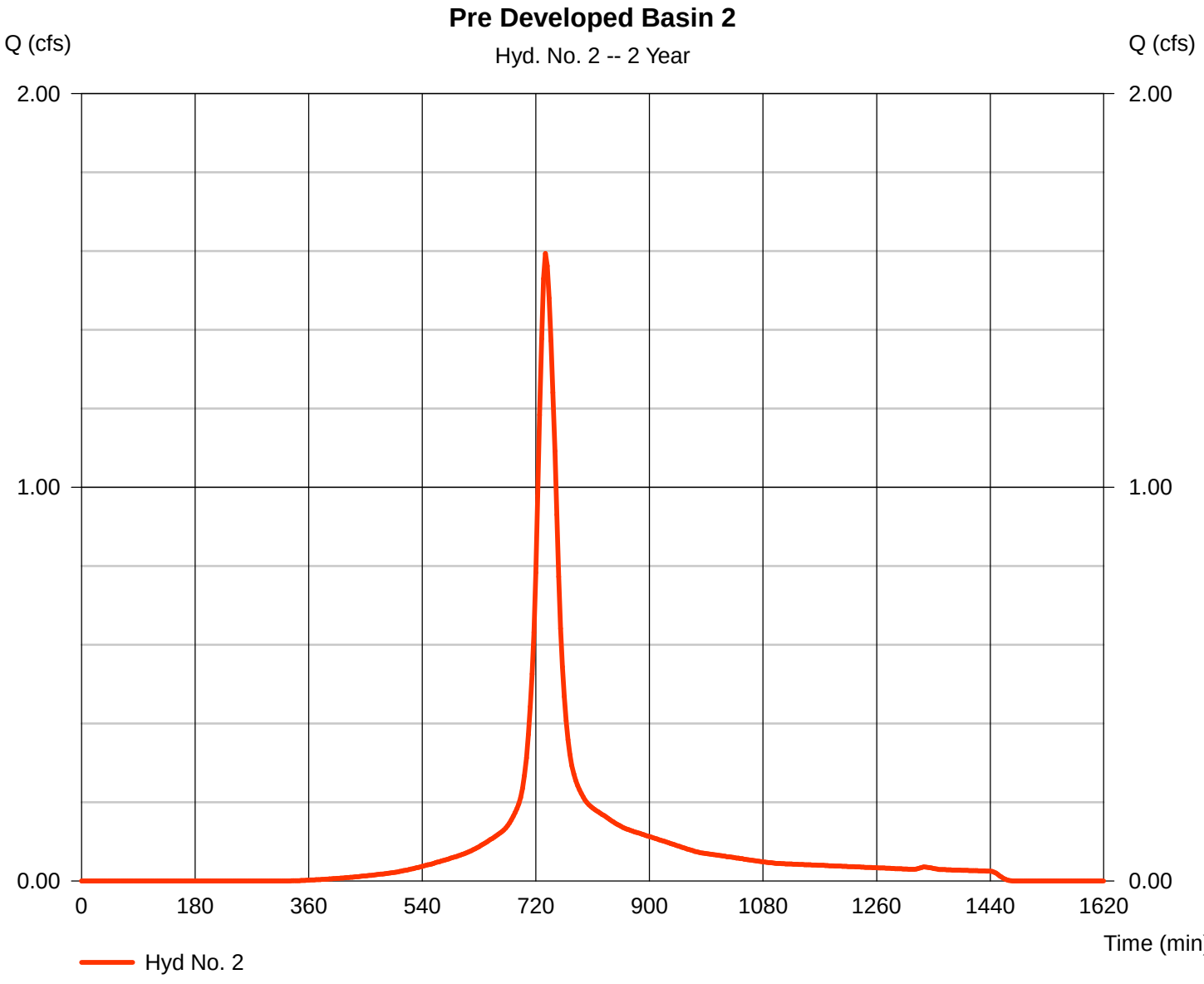
Total Travel Time, Tc ..... 8.80 min

Hydrograph Report

Hyd. No. 2

Pre Developed Basin 2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.593 cfs
Storm frequency	= 2 yrs	Time to peak	= 735 min
Time interval	= 3 min	Hyd. volume	= 7,693 cuft
Drainage area	= 0.750 ac	Curve number	= 89
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 20.40 min
Total precip.	= 4.08 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 2

Pre Developed Basin 2

Description	A	B	C	Totals
Sheet Flow				
Manning's n-value	= 0.150	0.011	0.011	
Flow length (ft)	= 276.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 4.08	0.00	0.00	
Land slope (%)	= 1.80	0.00	0.00	
Travel Time (min)	**= 20.39**	**+ 0.00**	**+ 0.00**	**= 20.39**
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	0.00	0.00	
Watercourse slope (%)	= 0.00	0.00	0.00	
Surface description	= Paved	Paved	Paved	
Average velocity (ft/s)	= 0.00	0.00	0.00	
Travel Time (min)	**= 0.00**	**+ 0.00**	**+ 0.00**	**= 0.00**
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	= 0.00	0.00	0.00	
Flow length (ft)	= 0.0	0.0	0.0	
Travel Time (min)	**= 0.00**	**+ 0.00**	**+ 0.00**	**= 0.00**

Total Travel Time, Tc ..... 20.40 min

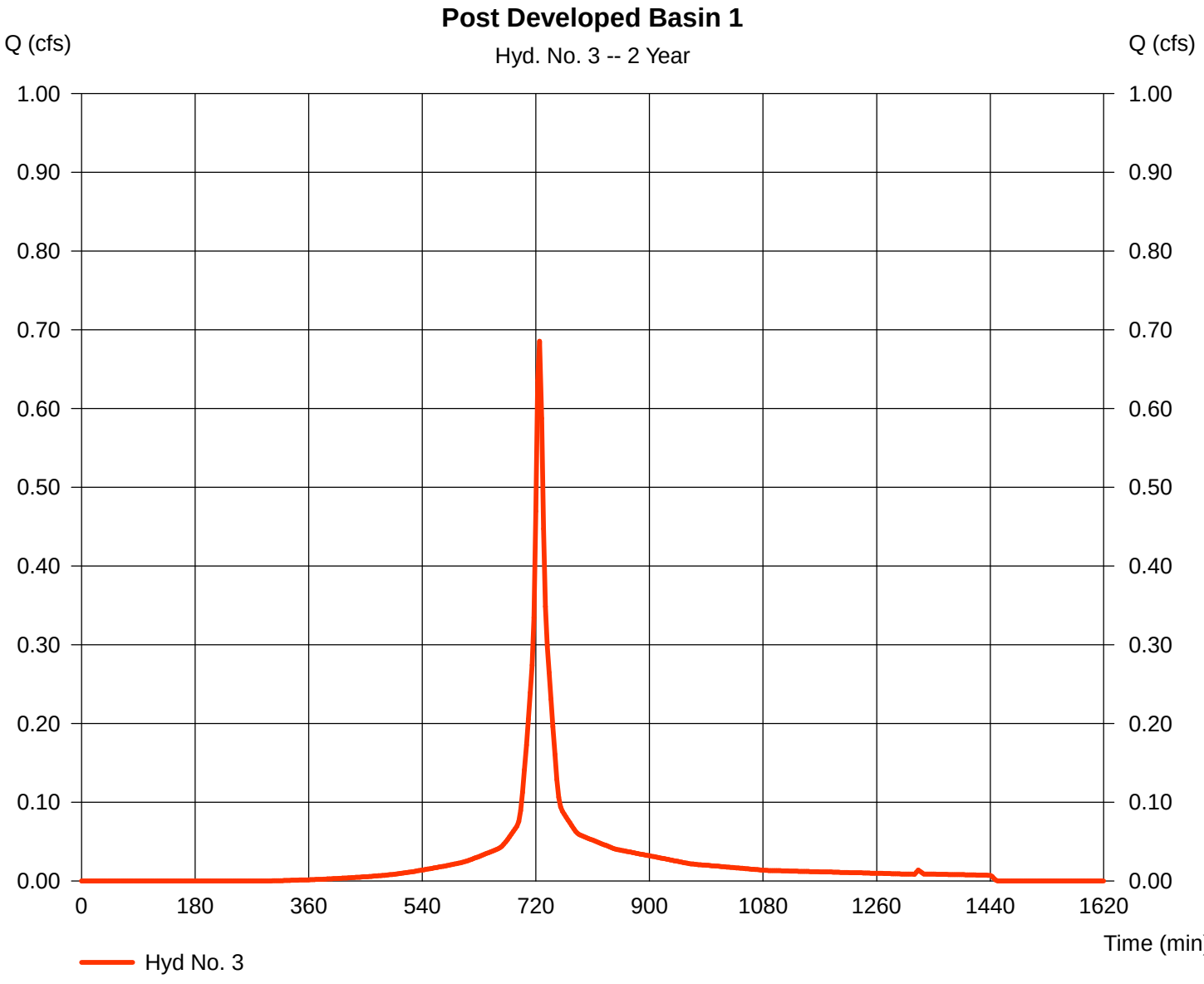
Hydrograph Report

Hyd. No. 3

Post Developed Basin 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.685 cfs
Storm frequency	=	2 yrs	Time to peak	=	726 min
Time interval	=	3 min	Hyd. volume	=	2,344 cuft
Drainage area	=	0.230 ac	Curve number	=	90*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	8.40 min
Total precip.	=	4.08 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.080 x 98) + (0.150 x 86)] / 0.230



TR55 Tc Worksheet

Hyd. No. 3

Post Developed Basin 1

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 108.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 4.08		0.00		0.00		
Land slope (%)	= 2.50		0.00		0.00		
Travel Time (min)	**= 8.44**	**+**	**0.00**	**+**	**0.00**	**=**	**8.44**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	= 0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	= 0.00		0.00		0.00		
Flow length (ft)	= 0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 8.40 min

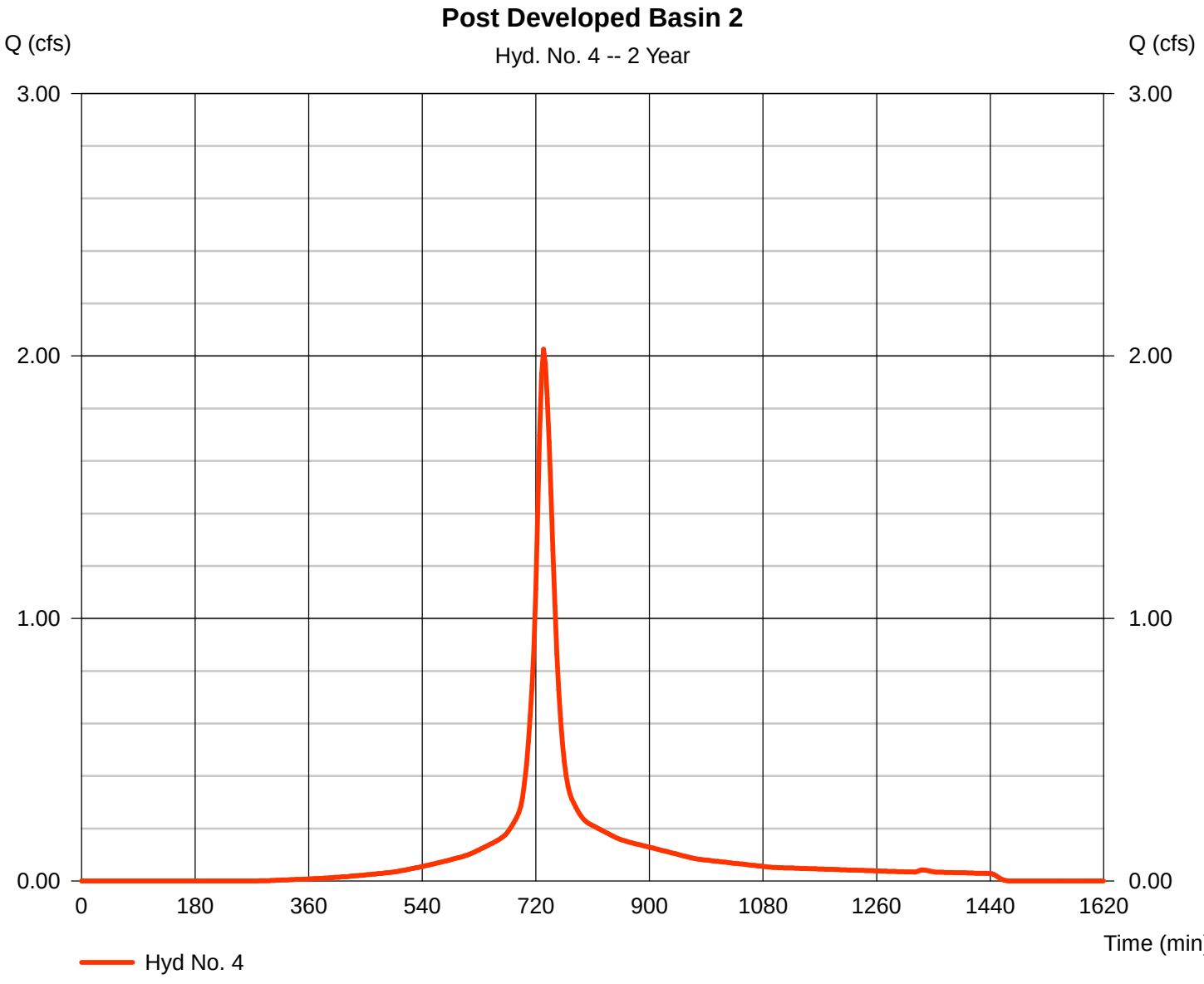
Hydrograph Report

Hyd. No. 4

Post Developed Basin 2

Hydrograph type	= SCS Runoff	Peak discharge	= 2.026 cfs
Storm frequency	= 2 yrs	Time to peak	= 732 min
Time interval	= 3 min	Hyd. volume	= 9,266 cuft
Drainage area	= 0.800 ac	Curve number	= 91*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 15.50 min
Total precip.	= 4.08 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.320 x 89) + (0.270 x 89) + (0.210 x 98)] / 0.800



TR55 Tc Worksheet

Hyd. No. 4

Post Developed Basin 2

Description	A	B	C	Totals
Sheet Flow				
Manning's n-value	= 0.150	0.011	0.011	
Flow length (ft)	= 131.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 4.08	0.00	0.00	
Land slope (%)	= 1.00	0.00	0.00	
Travel Time (min)	**= 14.21**	**+ 0.00**	**+ 0.00**	**= 14.21**
Shallow Concentrated Flow				
Flow length (ft)	= 179.00	0.00	0.00	
Watercourse slope (%)	= 2.20	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	= 2.39	0.00	0.00	
Travel Time (min)	**= 1.25**	**+ 0.00**	**+ 0.00**	**= 1.25**
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	= 0.00	0.00	0.00	
Flow length (ft)	= 0.0	0.0	0.0	
Travel Time (min)	**= 0.00**	**+ 0.00**	**+ 0.00**	**= 0.00**

Total Travel Time, Tc ..... 15.50 min

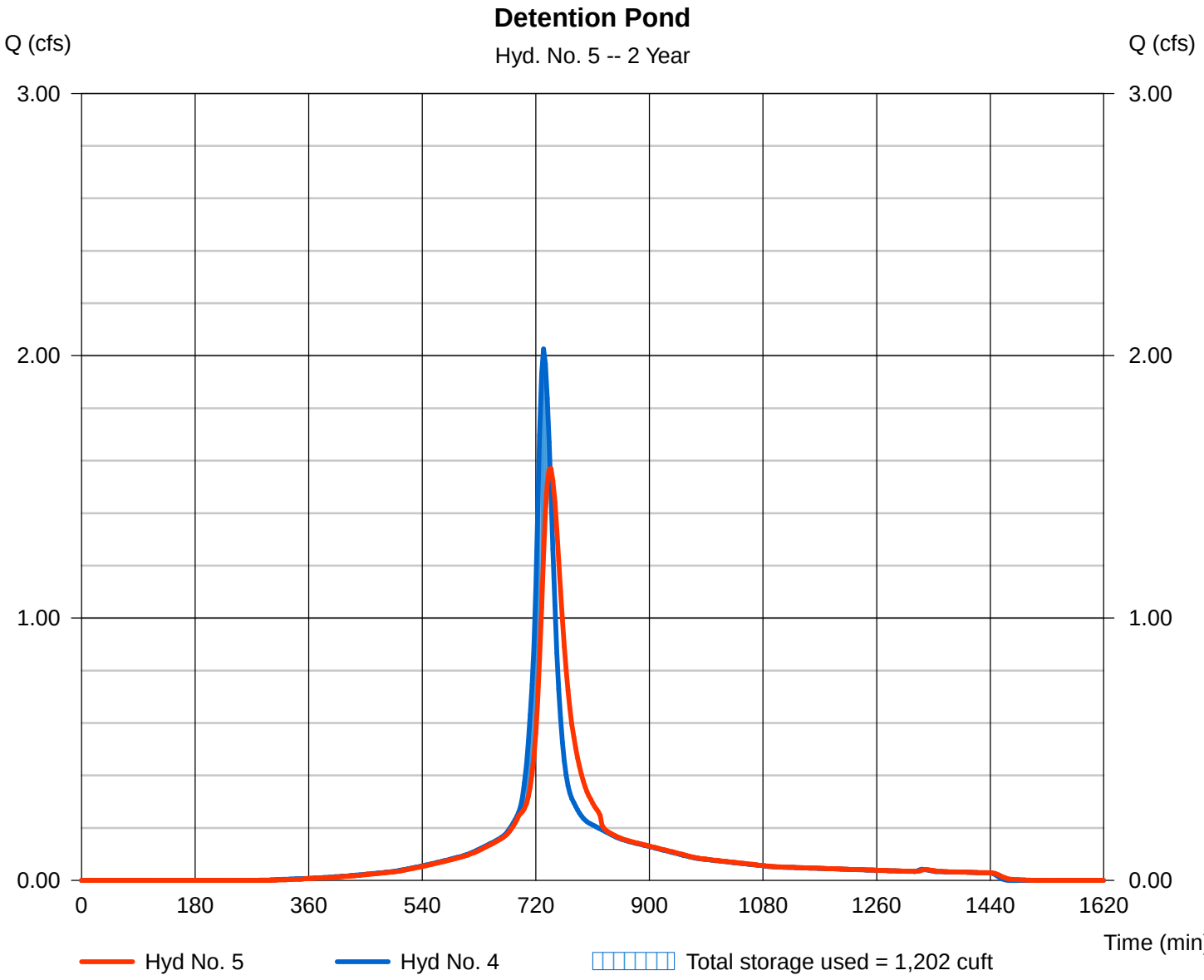
Hydrograph Report

Hyd. No. 5

Detention Pond

Hydrograph type	=	Reservoir	Peak discharge	=	1.569 cfs
Storm frequency	=	2 yrs	Time to peak	=	744 min
Time interval	=	3 min	Hyd. volume	=	9,264 cuft
Inflow hyd. No.	=	4 - Post Developed Basin 2	Max. Elevation	=	1292.93 ft
Reservoir name	=	<New Pond>	Max. Storage	=	1,202 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - <New Pond>

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1291.60 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1291.60	10	0	0
0.40	1292.00	412	65	65
1.40	1293.00	2,308	1,232	1,296
2.40	1294.00	6,245	4,116	5,412

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	18.00	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)	1291.60	0.00	0.00	0.00
Length (ft)	20.00	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

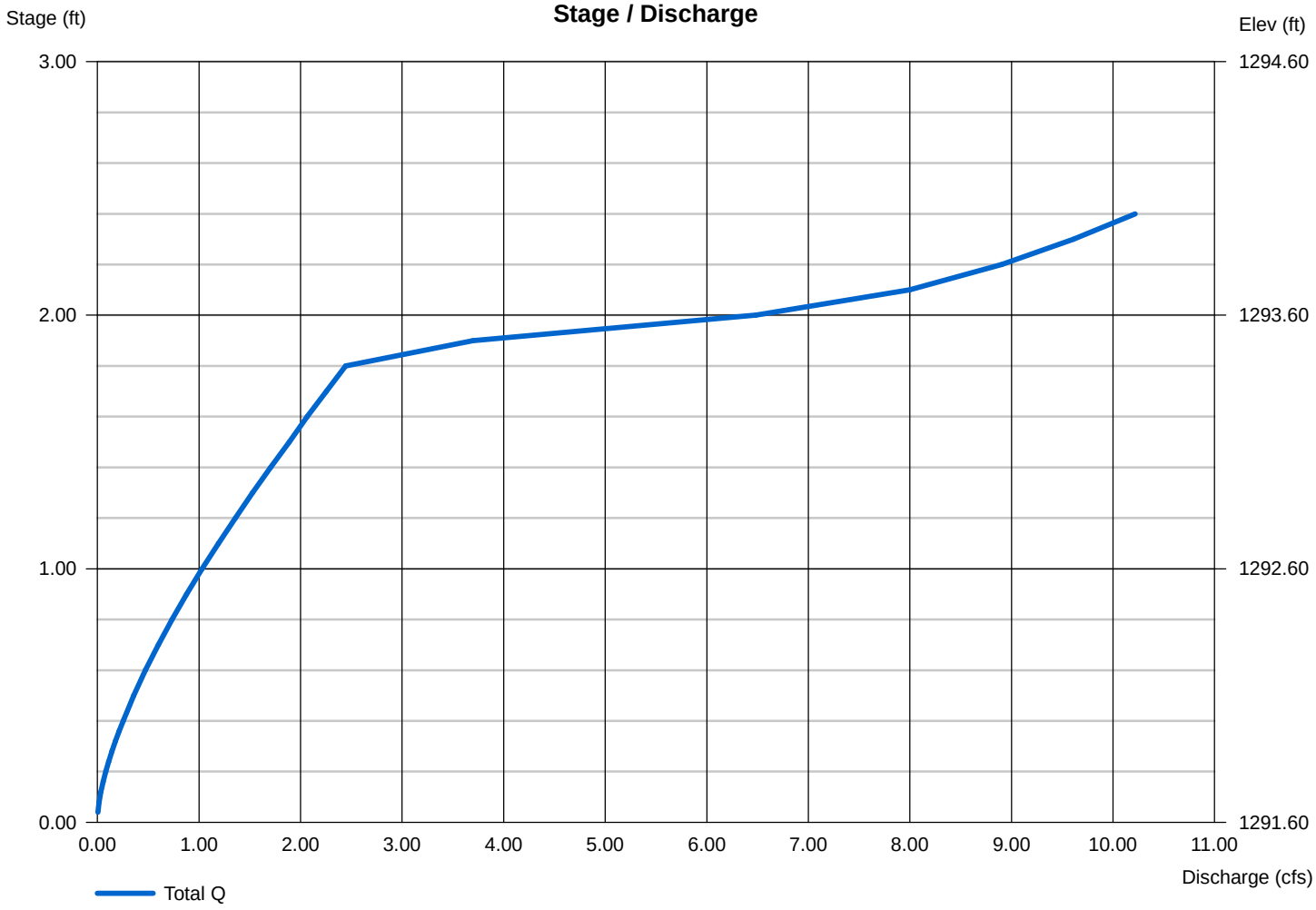
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	16.00	0.38	0.00	0.00
Crest El. (ft)	1293.40	1291.61	0.00	0.00
Weir Coeff.	3.33	3.33	3.33	3.33
Weir Type	Riser	Rect	---	---
Multi-Stage	Yes	Yes	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).

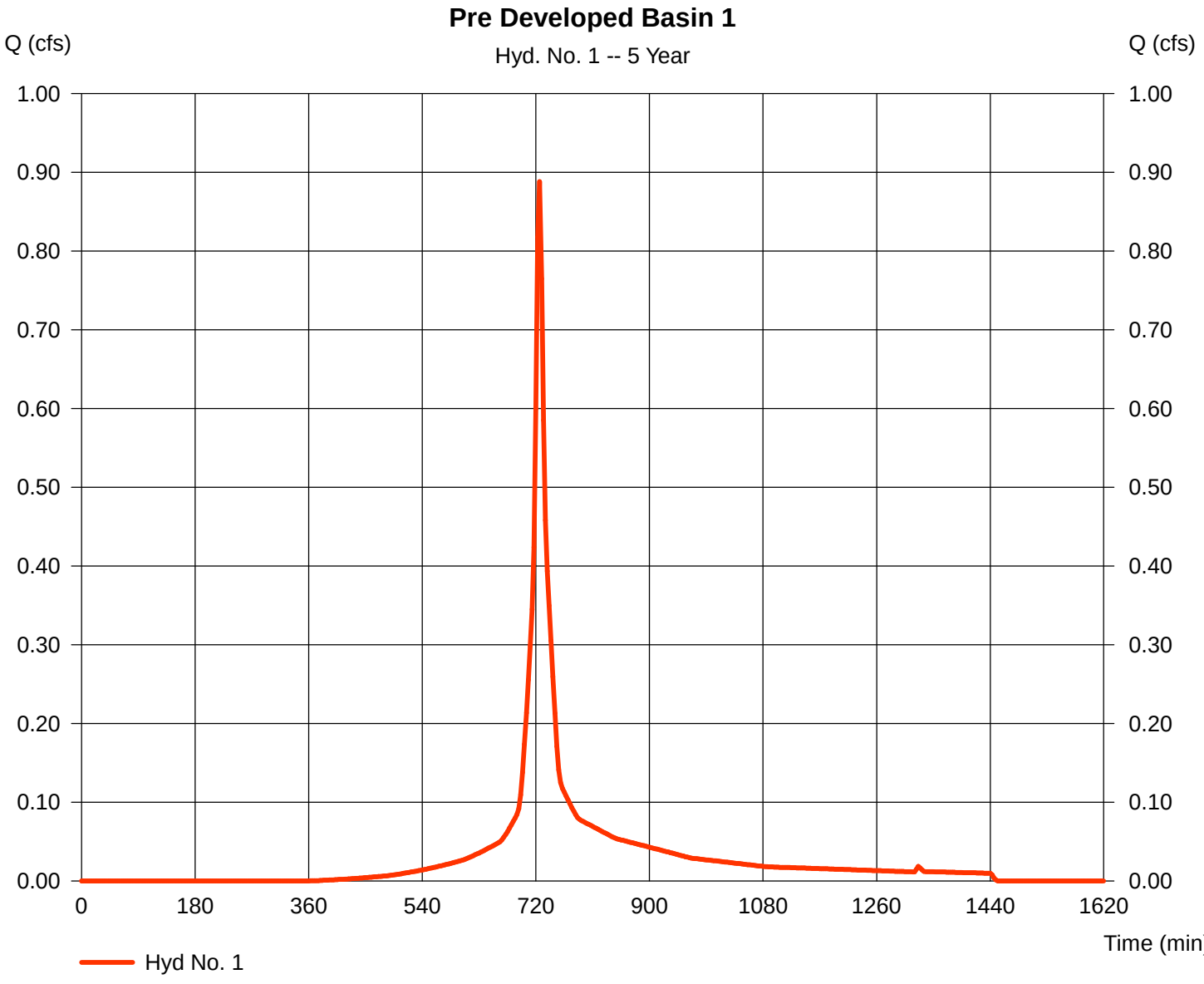


Hydrograph Report

Hyd. No. 1

Pre Developed Basin 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.888 cfs
Storm frequency	=	5 yrs	Time to peak	=	726 min
Time interval	=	3 min	Hyd. volume	=	2,994 cuft
Drainage area	=	0.280 ac	Curve number	=	86
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	8.80 min
Total precip.	=	4.65 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

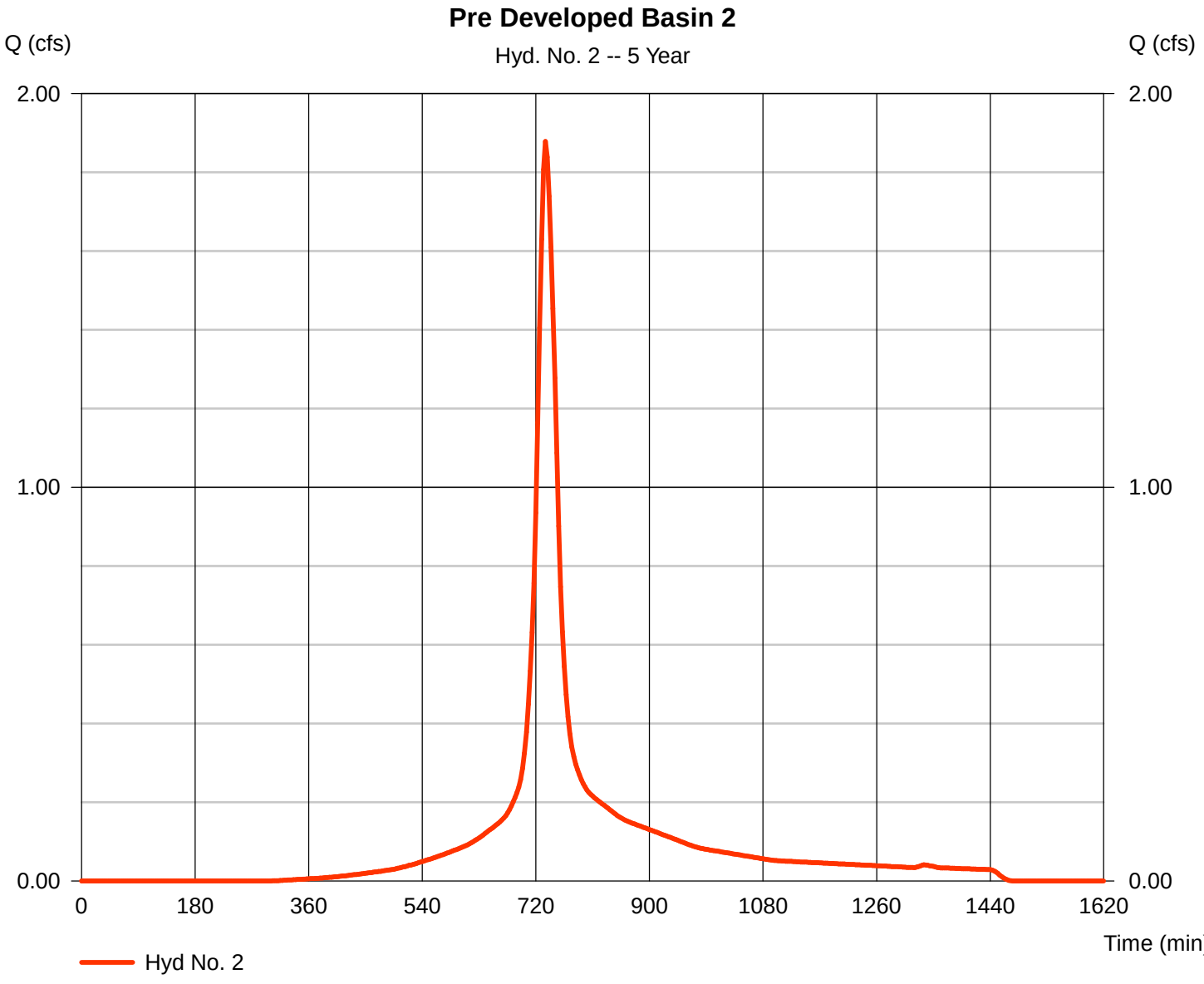


Hydrograph Report

Hyd. No. 2

Pre Developed Basin 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.878 cfs
Storm frequency	=	5 yrs	Time to peak	=	735 min
Time interval	=	3 min	Hyd. volume	=	9,125 cuft
Drainage area	=	0.750 ac	Curve number	=	89
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	20.40 min
Total precip.	=	4.65 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



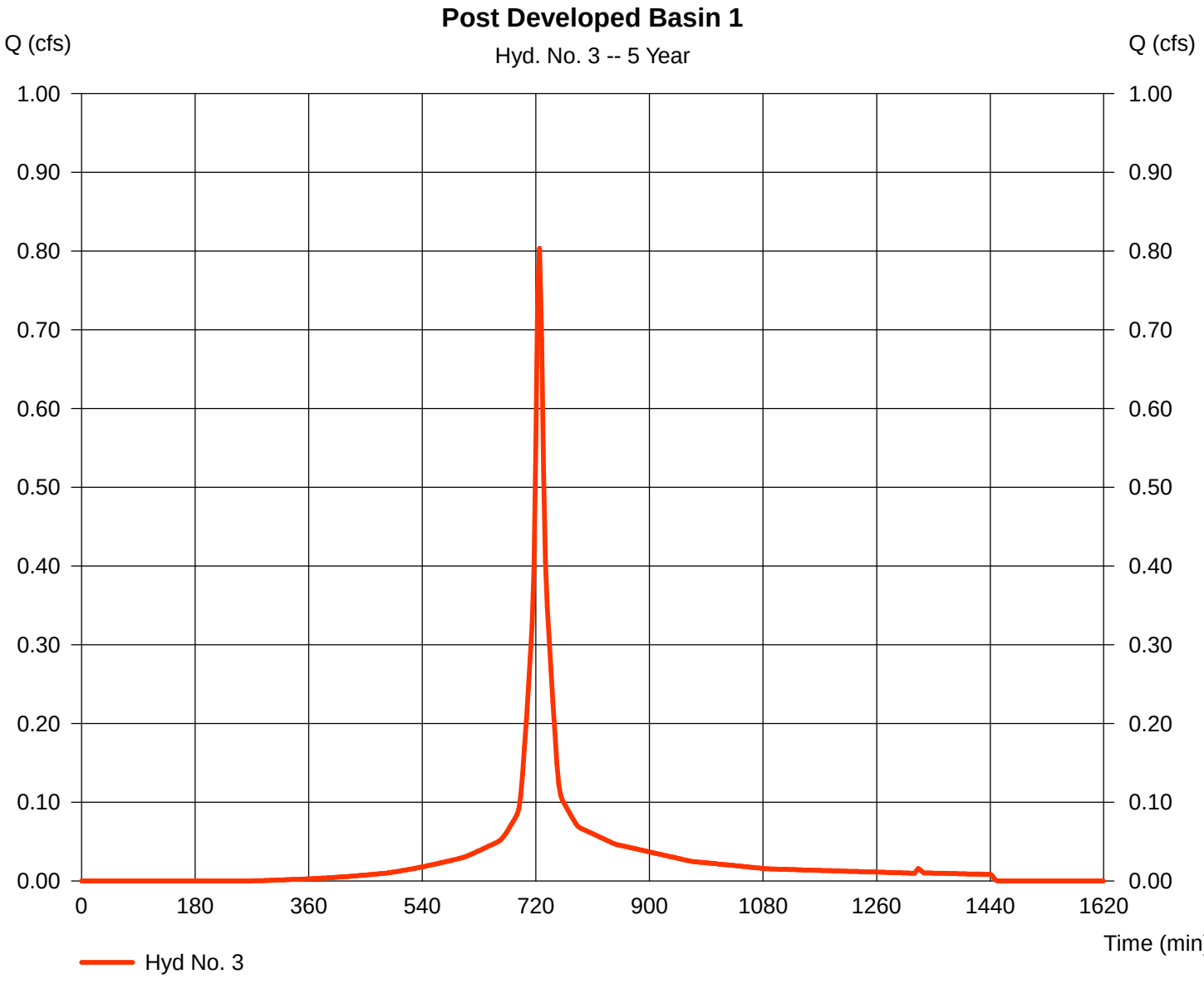
Hydrograph Report

Hyd. No. 3

Post Developed Basin 1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.803 cfs
Storm frequency	= 5 yrs	Time to peak	= 726 min
Time interval	= 3 min	Hyd. volume	= 2,770 cuft
Drainage area	= 0.230 ac	Curve number	= 90*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 8.40 min
Total precip.	= 4.65 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.080 x 98) + (0.150 x 86)] / 0.230



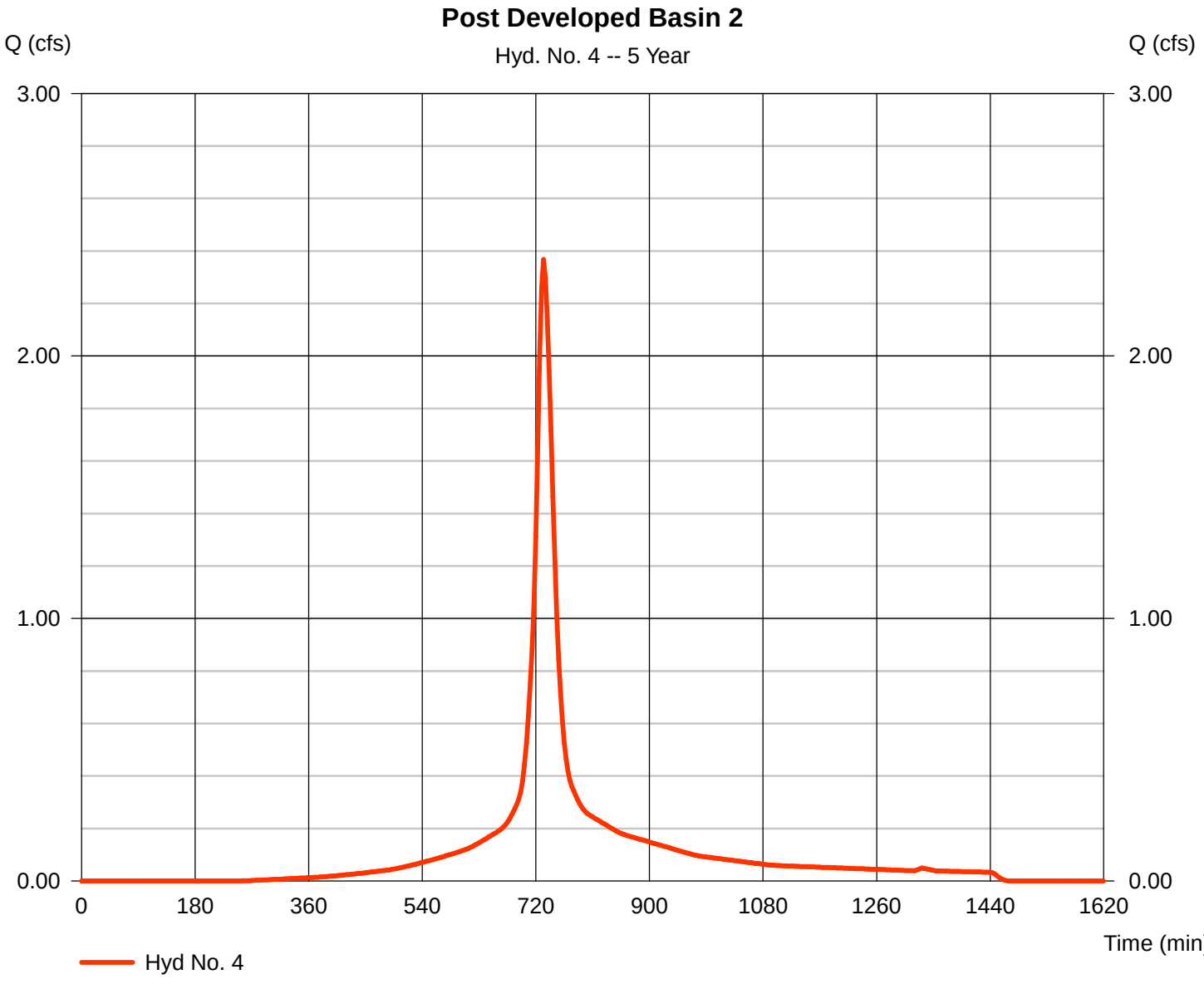
Hydrograph Report

Hyd. No. 4

Post Developed Basin 2

Hydrograph type	= SCS Runoff	Peak discharge	= 2.367 cfs
Storm frequency	= 5 yrs	Time to peak	= 732 min
Time interval	= 3 min	Hyd. volume	= 10,910 cuft
Drainage area	= 0.800 ac	Curve number	= 91*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 15.50 min
Total precip.	= 4.65 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.320 x 89) + (0.270 x 89) + (0.210 x 98)] / 0.800



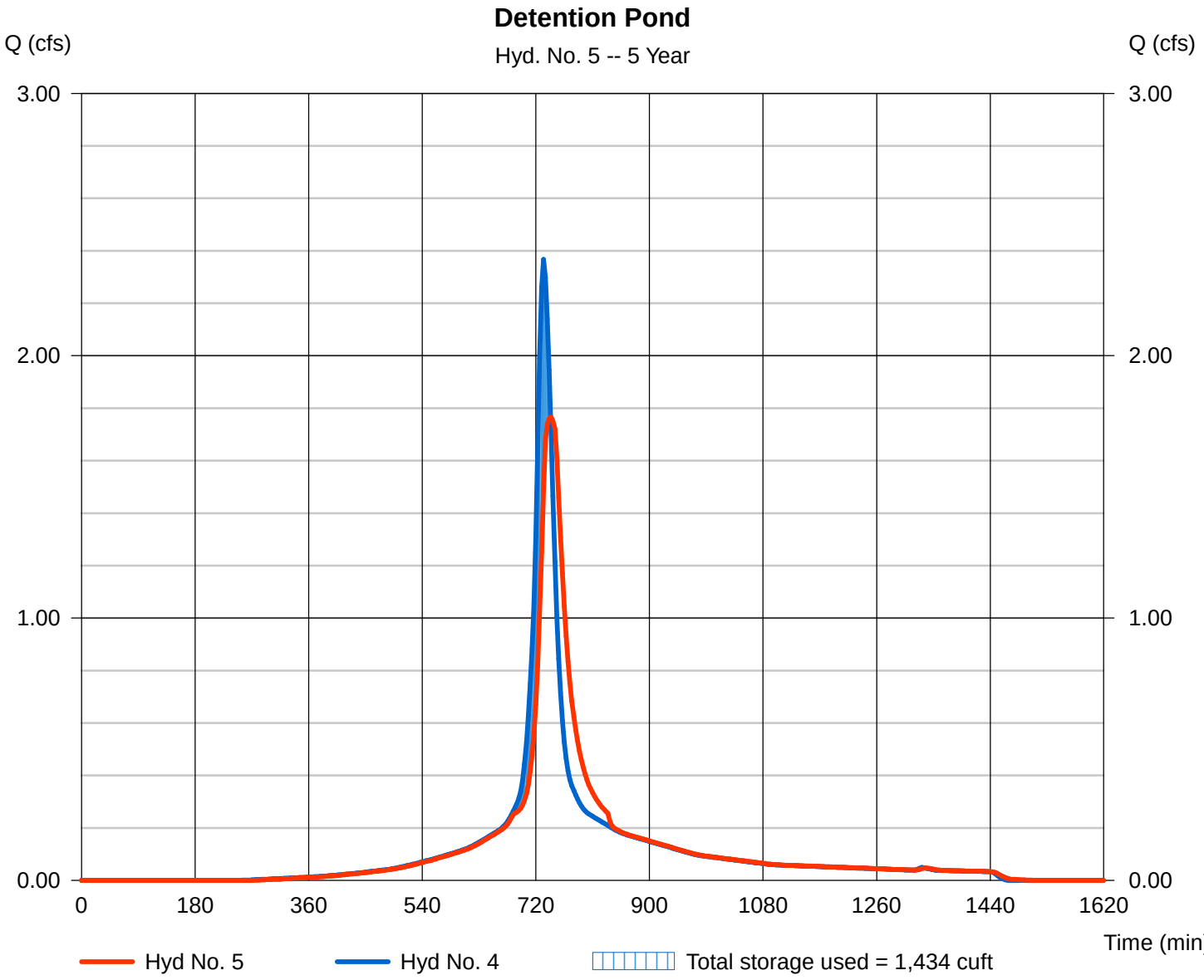
Hydrograph Report

Hyd. No. 5

Detention Pond

Hydrograph type	=	Reservoir	Peak discharge	=	1.766 cfs
Storm frequency	=	5 yrs	Time to peak	=	744 min
Time interval	=	3 min	Hyd. volume	=	10,908 cuft
Inflow hyd. No.	=	4 - Post Developed Basin 2	Max. Elevation	=	1293.04 ft
Reservoir name	=	<New Pond>	Max. Storage	=	1,434 cuft

Storage Indication method used.

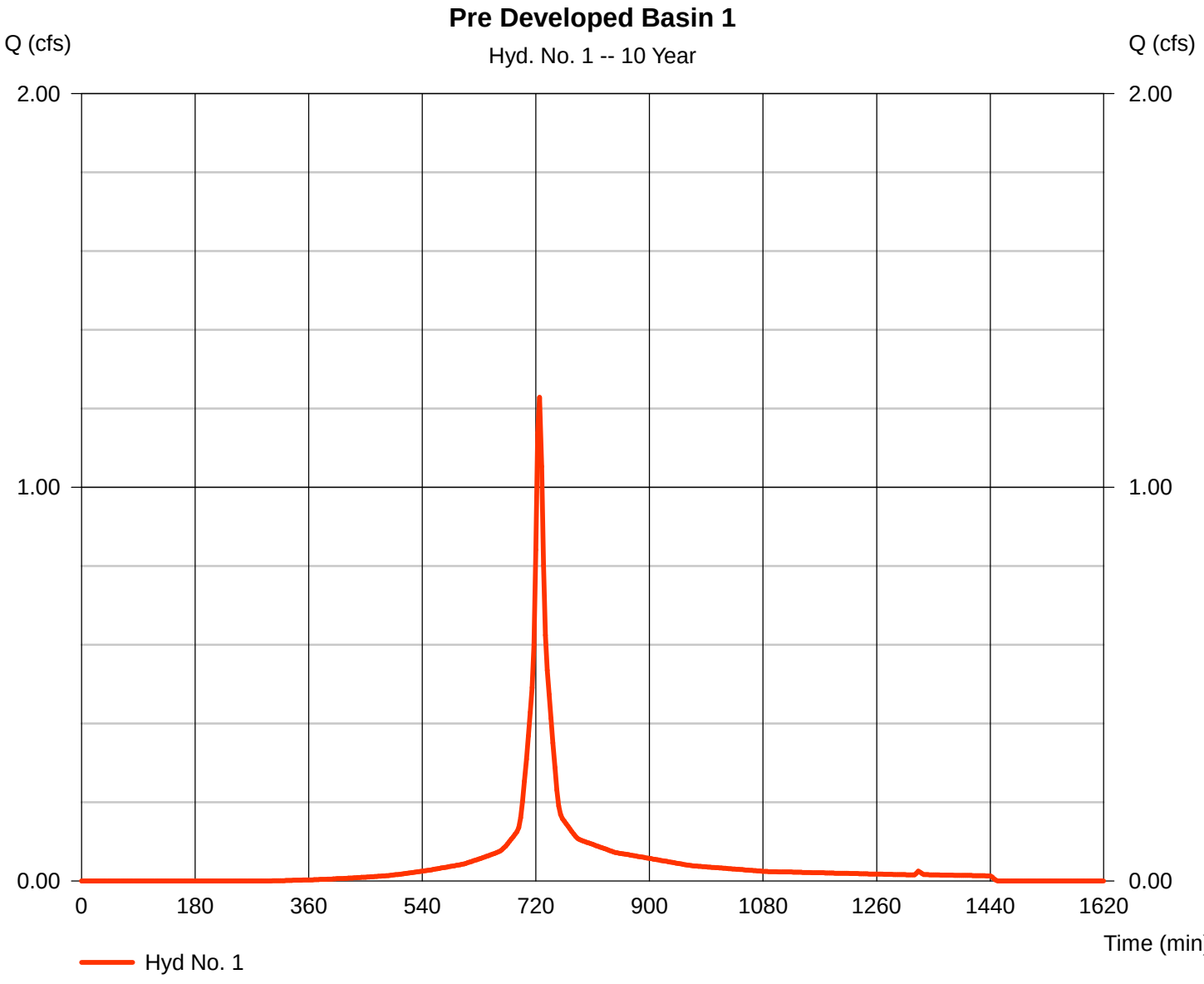


Hydrograph Report

Hyd. No. 1

Pre Developed Basin 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.228 cfs
Storm frequency	=	10 yrs	Time to peak	=	726 min
Time interval	=	3 min	Hyd. volume	=	4,202 cuft
Drainage area	=	0.280 ac	Curve number	=	86
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	8.80 min
Total precip.	=	6.00 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

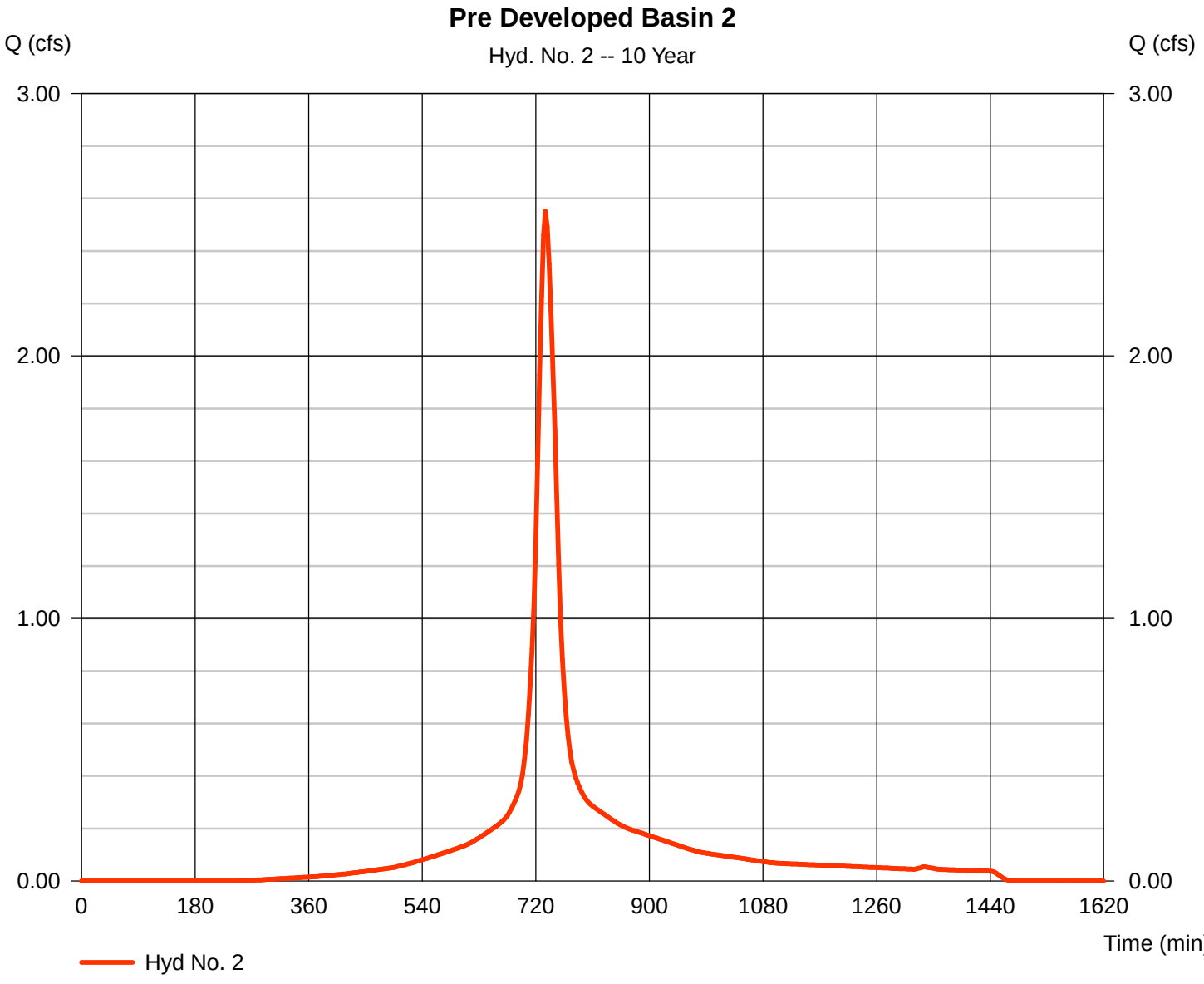


Hydrograph Report

Hyd. No. 2

Pre Developed Basin 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.551 cfs
Storm frequency	=	10 yrs	Time to peak	=	735 min
Time interval	=	3 min	Hyd. volume	=	12,570 cuft
Drainage area	=	0.750 ac	Curve number	=	89
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	20.40 min
Total precip.	=	6.00 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



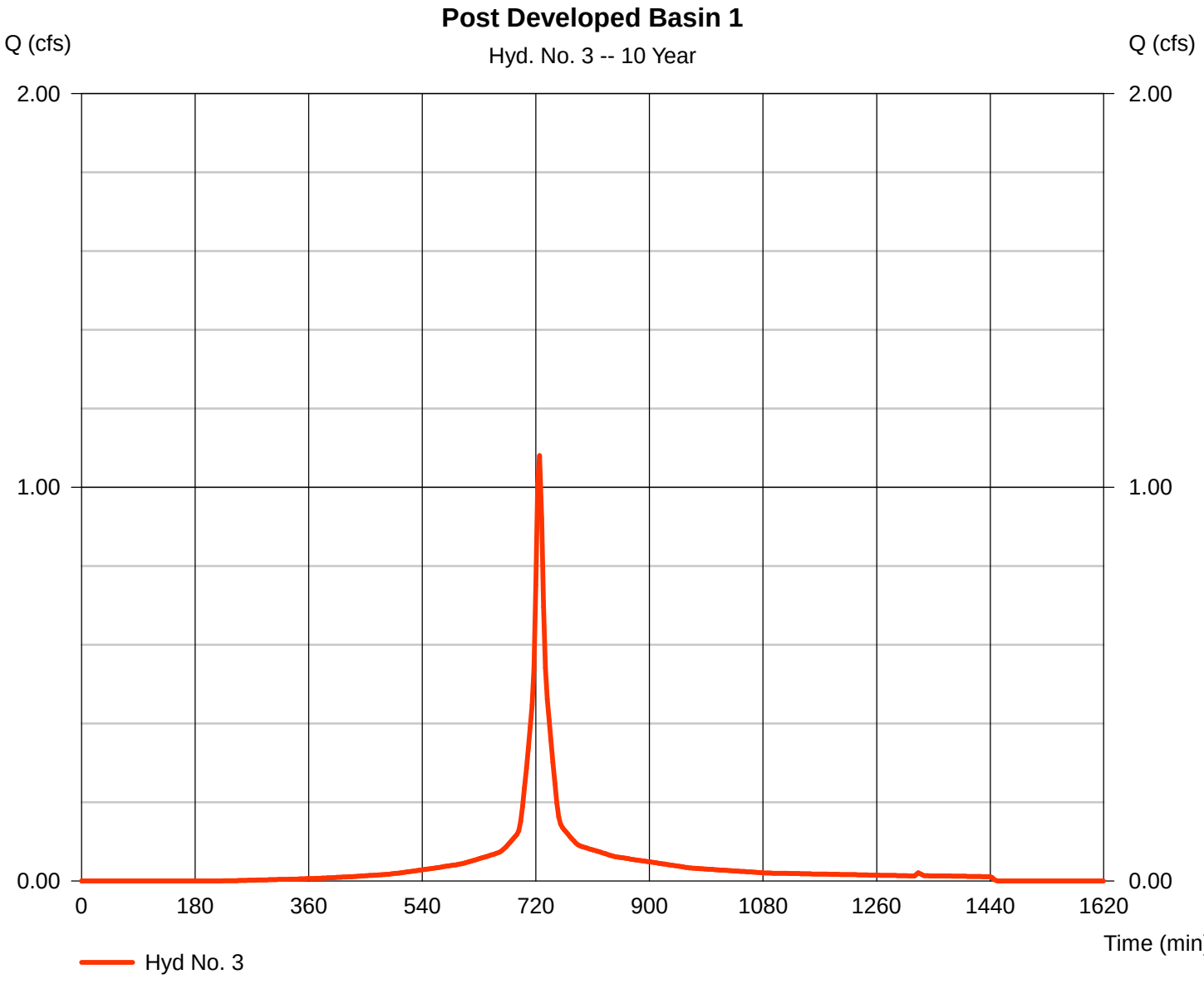
Hydrograph Report

Hyd. No. 3

Post Developed Basin 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.081 cfs
Storm frequency	=	10 yrs	Time to peak	=	726 min
Time interval	=	3 min	Hyd. volume	=	3,793 cuft
Drainage area	=	0.230 ac	Curve number	=	90*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	8.40 min
Total precip.	=	6.00 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.080 x 98) + (0.150 x 86)] / 0.230



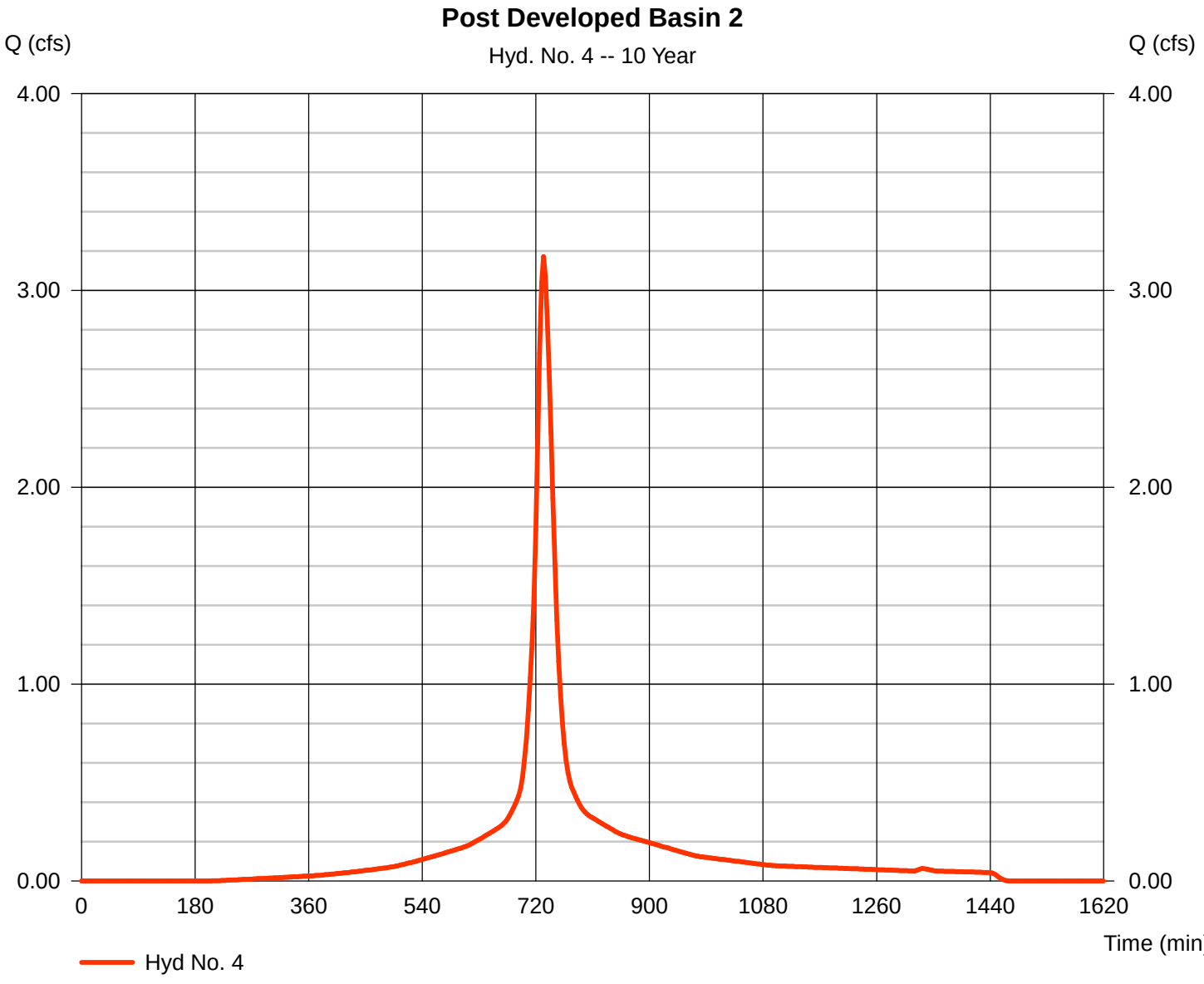
Hydrograph Report

Hyd. No. 4

Post Developed Basin 2

Hydrograph type	= SCS Runoff	Peak discharge	= 3.171 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 3 min	Hyd. volume	= 14,846 cuft
Drainage area	= 0.800 ac	Curve number	= 91*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 15.50 min
Total precip.	= 6.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.320 x 89) + (0.270 x 89) + (0.210 x 98)] / 0.800



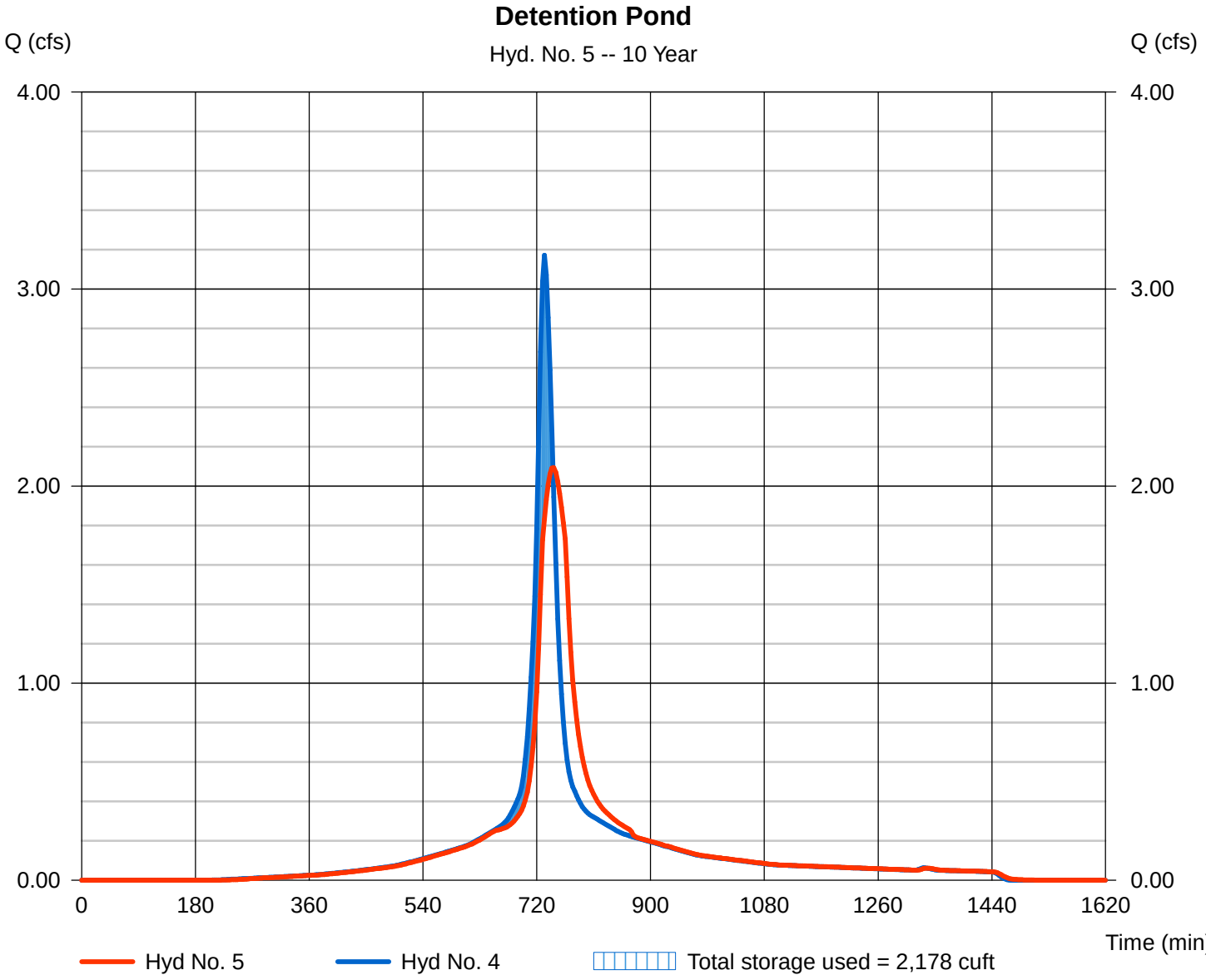
Hydrograph Report

Hyd. No. 5

Detention Pond

Hydrograph type	=	Reservoir	Peak discharge	=	2.094 cfs
Storm frequency	=	10 yrs	Time to peak	=	747 min
Time interval	=	3 min	Hyd. volume	=	14,844 cuft
Inflow hyd. No.	=	4 - Post Developed Basin 2	Max. Elevation	=	1293.22 ft
Reservoir name	=	<New Pond>	Max. Storage	=	2,178 cuft

Storage Indication method used.

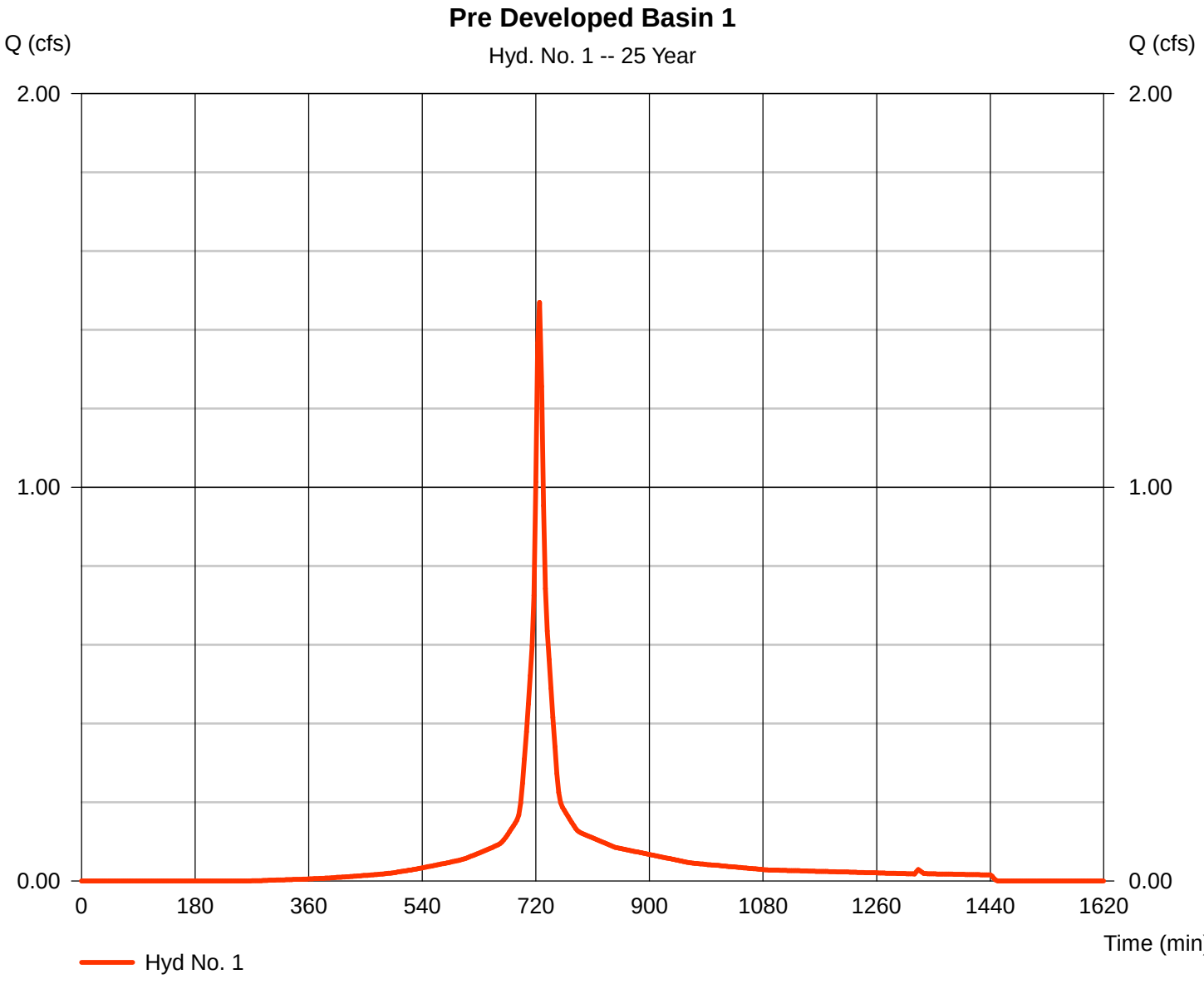


Hydrograph Report

Hyd. No. 1

Pre Developed Basin 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.470 cfs
Storm frequency	=	25 yrs	Time to peak	=	726 min
Time interval	=	3 min	Hyd. volume	=	5,076 cuft
Drainage area	=	0.280 ac	Curve number	=	86
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	8.80 min
Total precip.	=	6.96 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

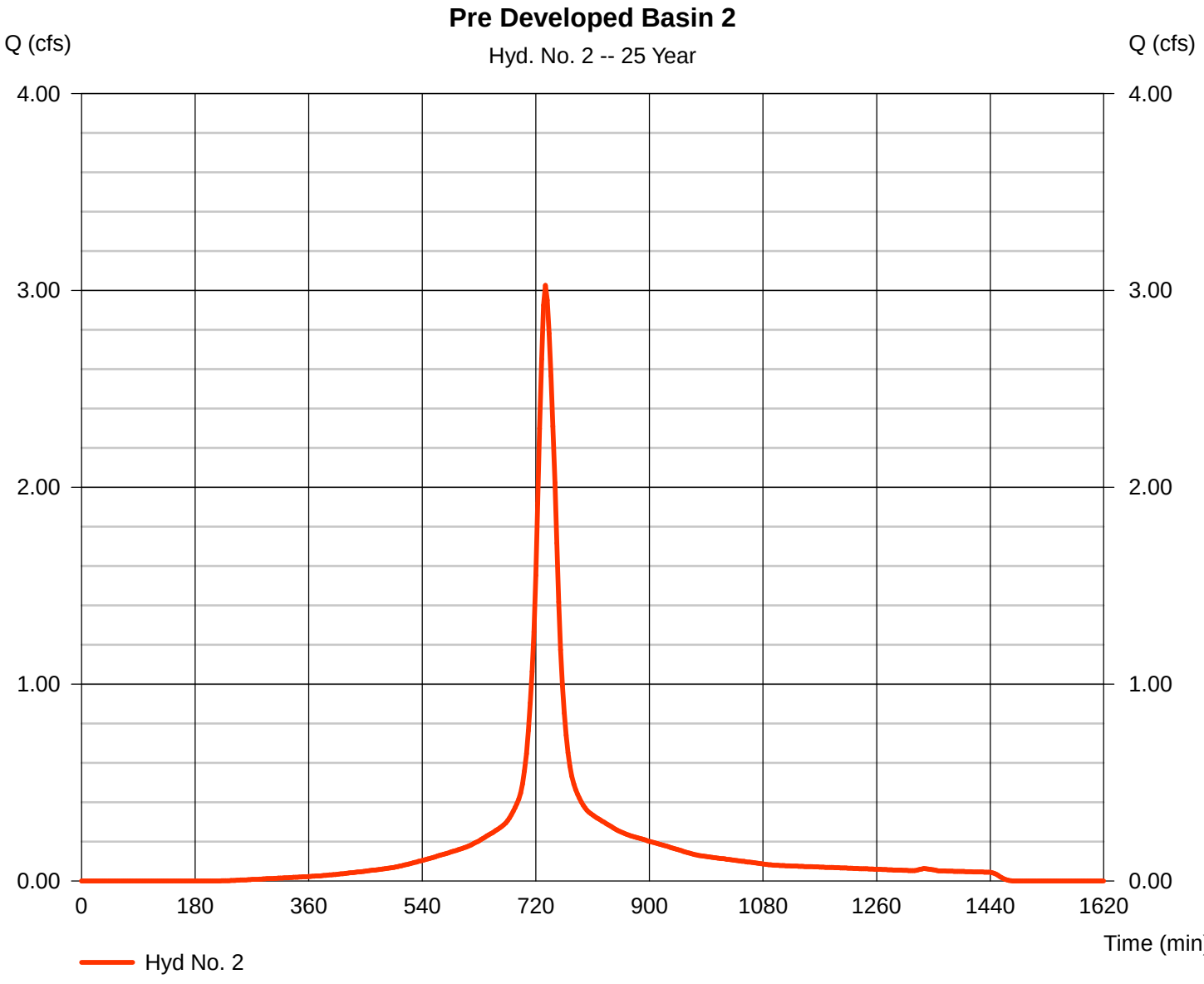


Hydrograph Report

Hyd. No. 2

Pre Developed Basin 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.026 cfs
Storm frequency	=	25 yrs	Time to peak	=	735 min
Time interval	=	3 min	Hyd. volume	=	15,048 cuft
Drainage area	=	0.750 ac	Curve number	=	89
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	20.40 min
Total precip.	=	6.96 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



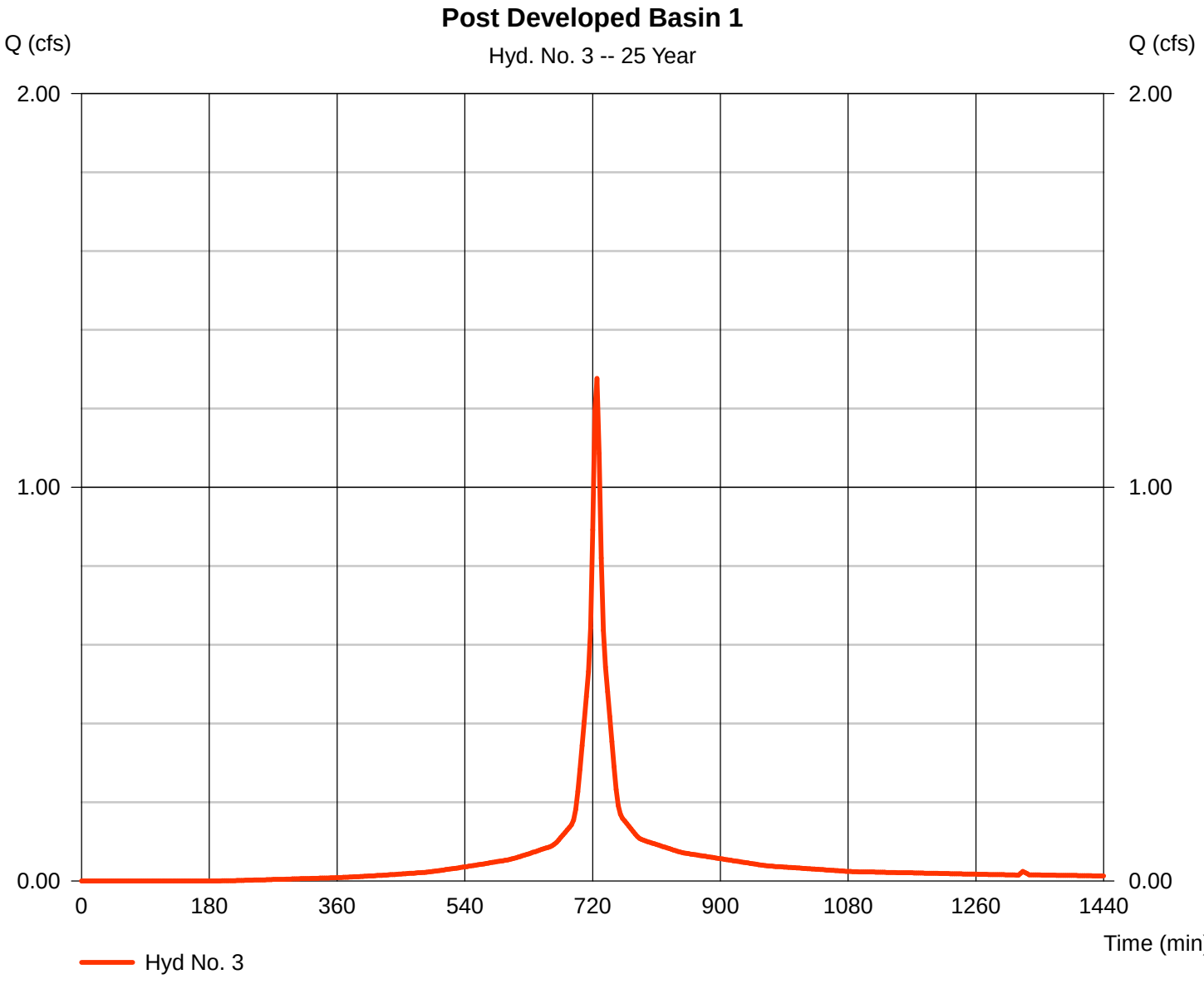
Hydrograph Report

Hyd. No. 3

Post Developed Basin 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.276 cfs
Storm frequency	=	25 yrs	Time to peak	=	726 min
Time interval	=	3 min	Hyd. volume	=	4,527 cuft
Drainage area	=	0.230 ac	Curve number	=	90*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	8.40 min
Total precip.	=	6.96 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.080 x 98) + (0.150 x 86)] / 0.230



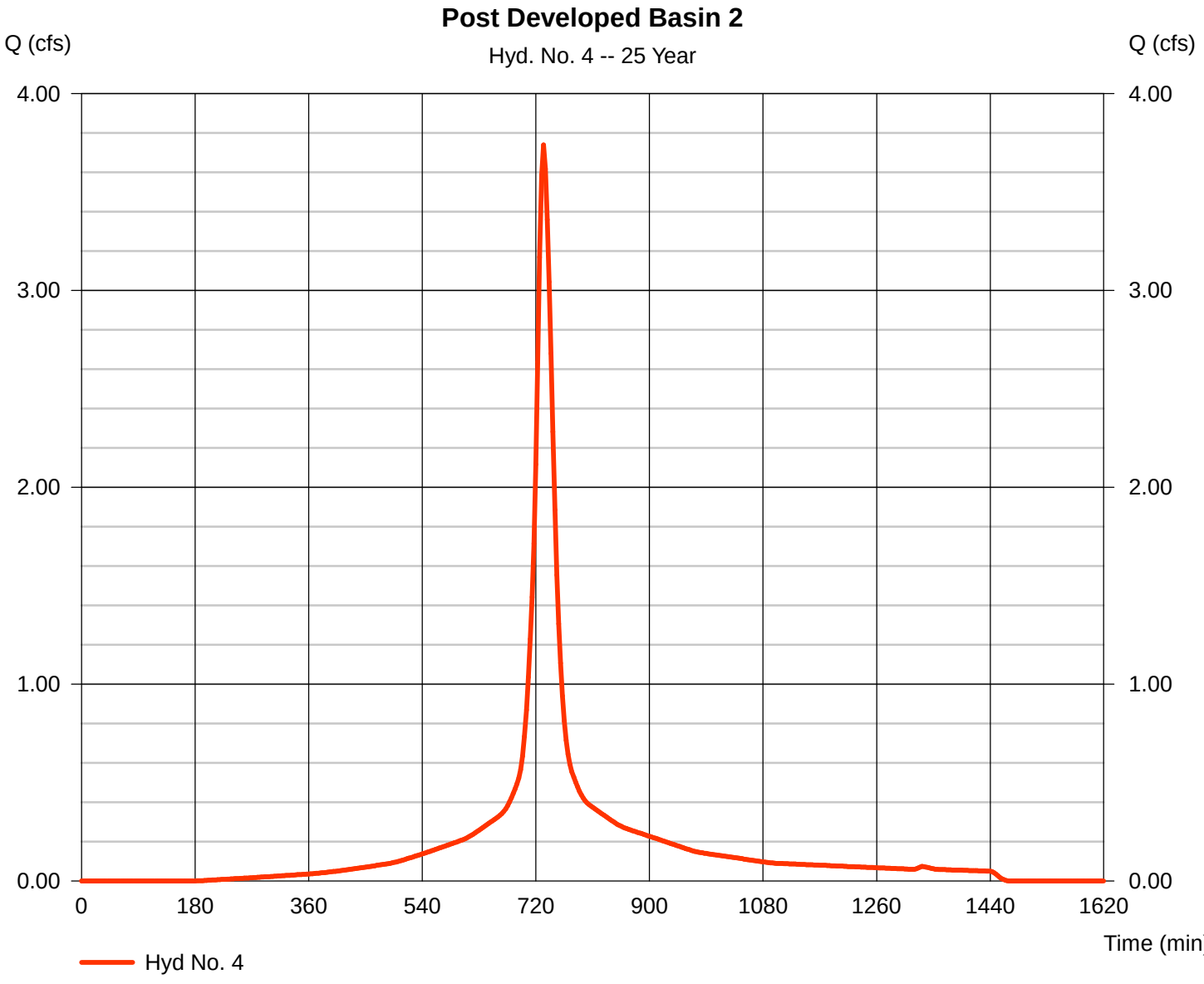
Hydrograph Report

Hyd. No. 4

Post Developed Basin 2

Hydrograph type	= SCS Runoff	Peak discharge	= 3.739 cfs
Storm frequency	= 25 yrs	Time to peak	= 732 min
Time interval	= 3 min	Hyd. volume	= 17,667 cuft
Drainage area	= 0.800 ac	Curve number	= 91*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 15.50 min
Total precip.	= 6.96 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.320 x 89) + (0.270 x 89) + (0.210 x 98)] / 0.800



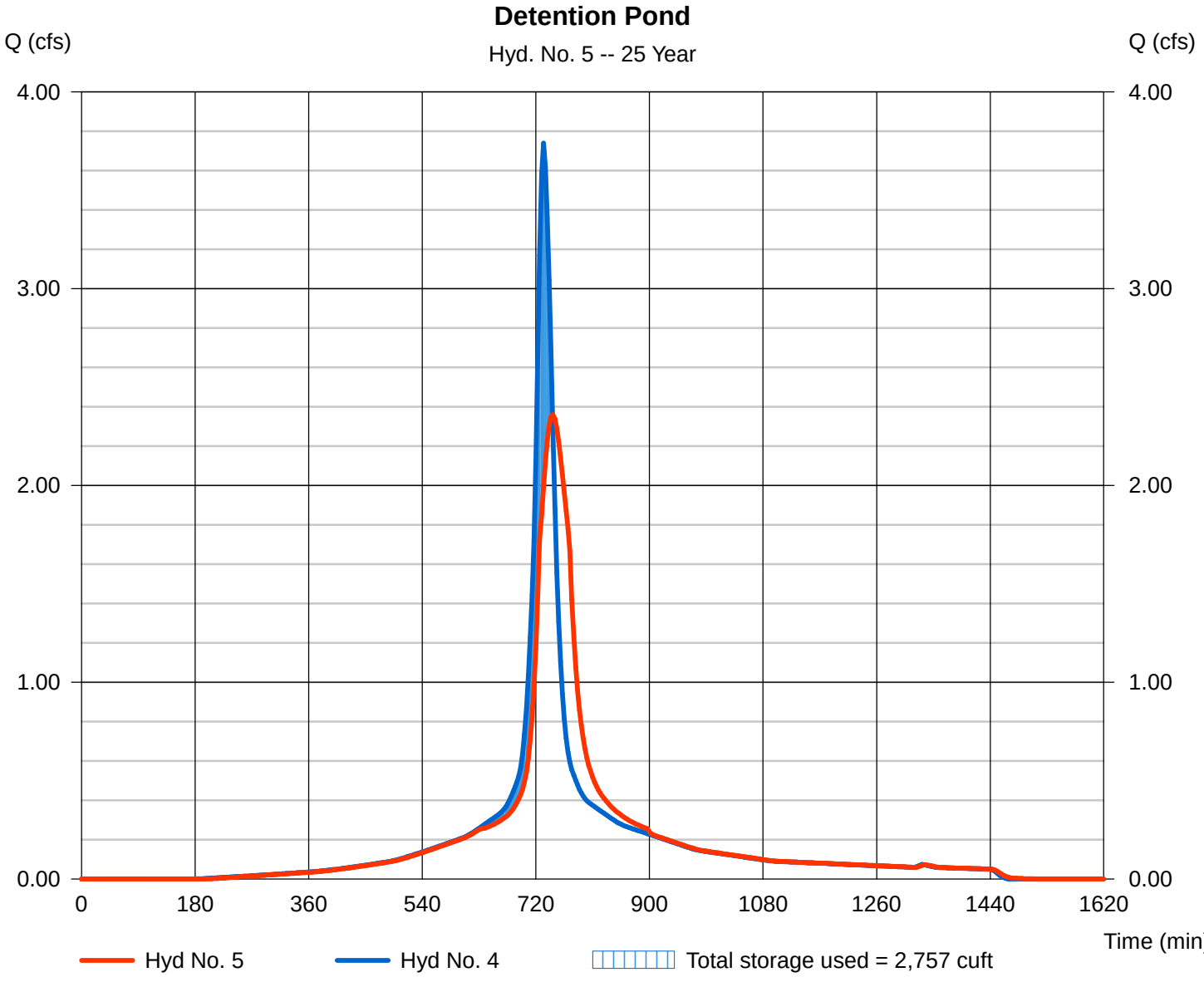
Hydrograph Report

Hyd. No. 5

Detention Pond

Hydrograph type	=	Reservoir	Peak discharge	=	2.359 cfs
Storm frequency	=	25 yrs	Time to peak	=	747 min
Time interval	=	3 min	Hyd. volume	=	17,666 cuft
Inflow hyd. No.	=	4 - Post Developed Basin 2	Max. Elevation	=	1293.36 ft
Reservoir name	=	<New Pond>	Max. Storage	=	2,757 cuft

Storage Indication method used.

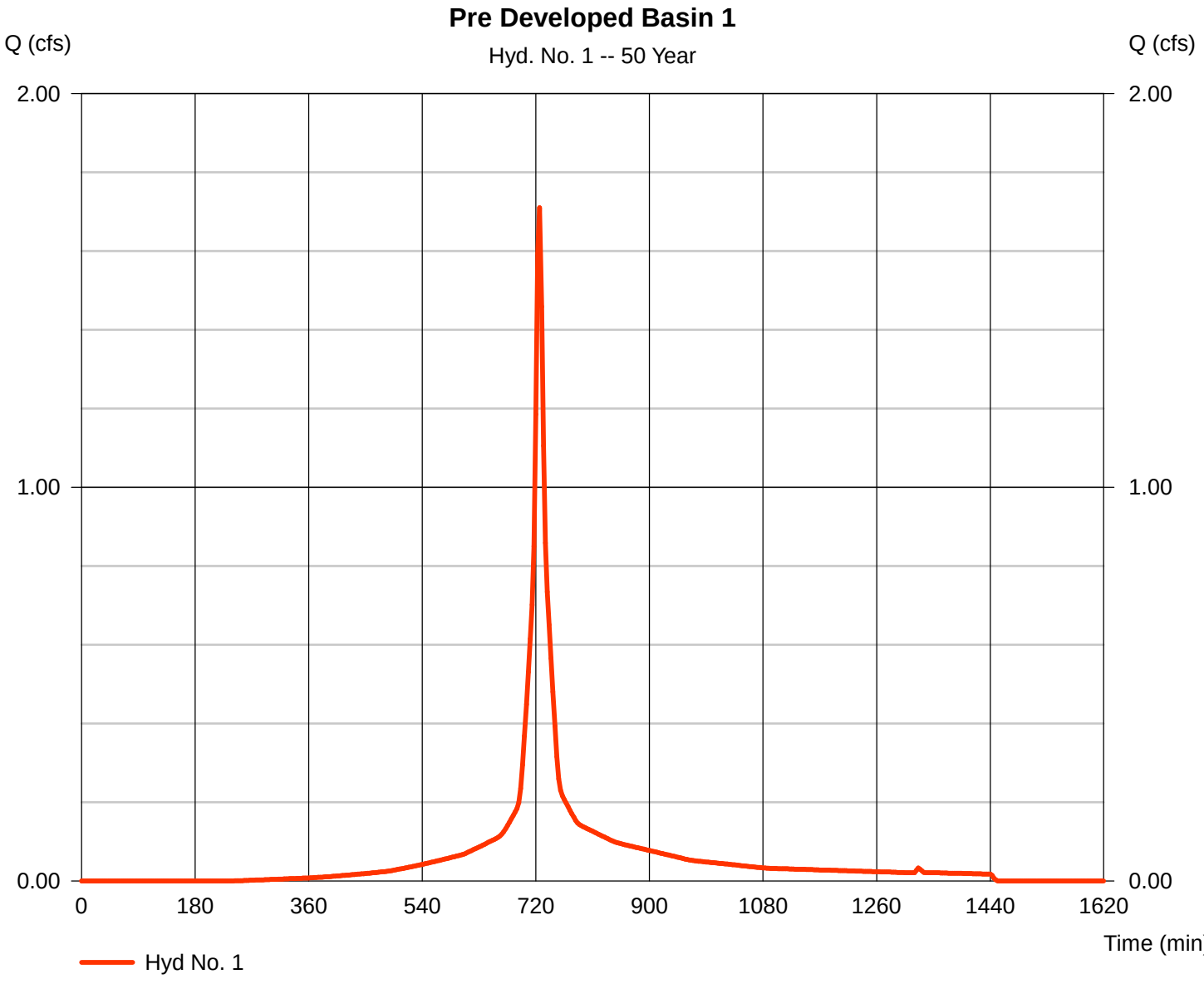


Hydrograph Report

Hyd. No. 1

Pre Developed Basin 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.710 cfs
Storm frequency	=	50 yrs	Time to peak	=	726 min
Time interval	=	3 min	Hyd. volume	=	5,959 cuft
Drainage area	=	0.280 ac	Curve number	=	86
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	8.80 min
Total precip.	=	7.92 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

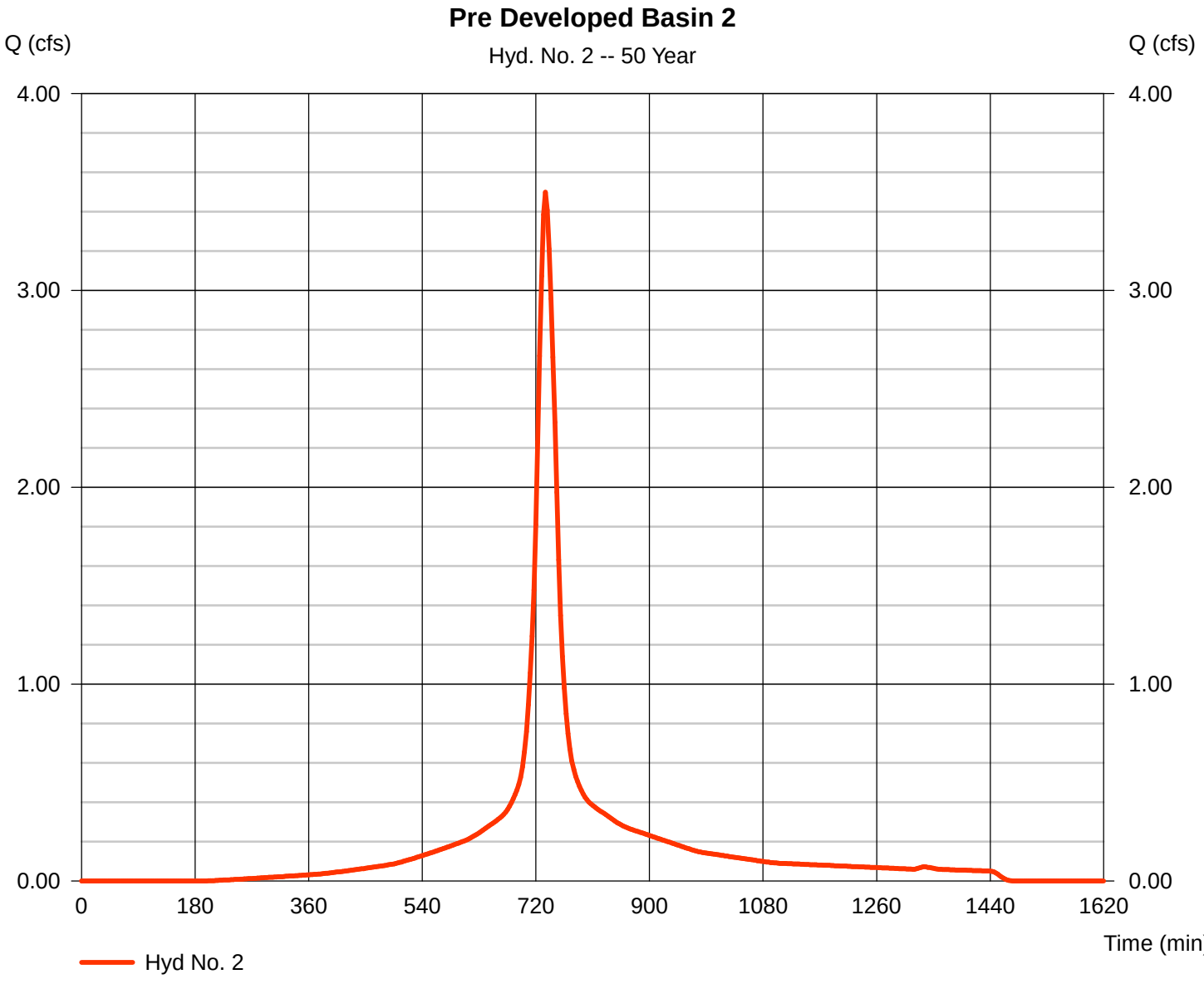


Hydrograph Report

Hyd. No. 2

Pre Developed Basin 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.499 cfs
Storm frequency	=	50 yrs	Time to peak	=	735 min
Time interval	=	3 min	Hyd. volume	=	17,541 cuft
Drainage area	=	0.750 ac	Curve number	=	89
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	20.40 min
Total precip.	=	7.92 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



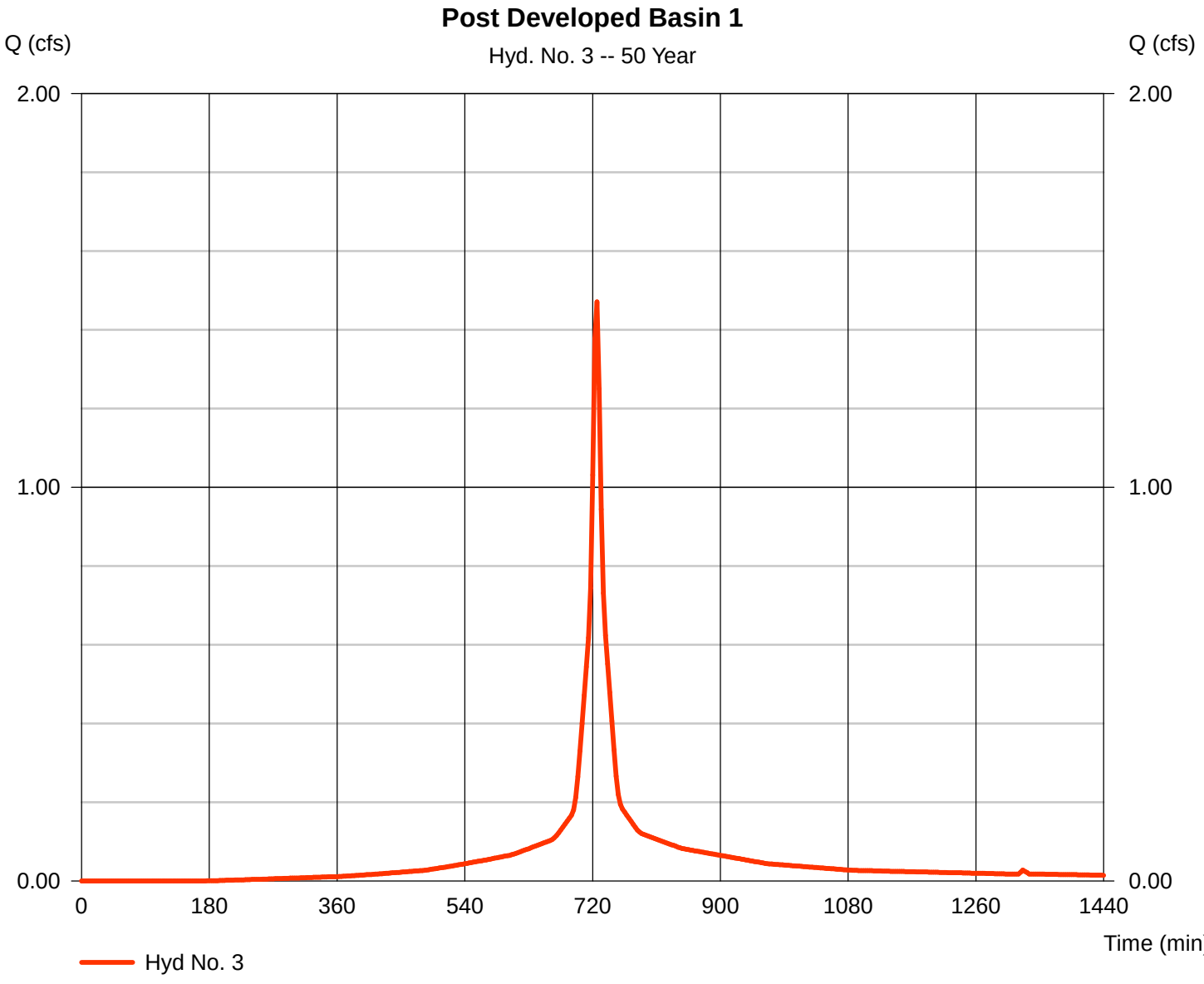
Hydrograph Report

Hyd. No. 3

Post Developed Basin 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.471 cfs
Storm frequency	=	50 yrs	Time to peak	=	726 min
Time interval	=	3 min	Hyd. volume	=	5,265 cuft
Drainage area	=	0.230 ac	Curve number	=	90*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	8.40 min
Total precip.	=	7.92 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.080 x 98) + (0.150 x 86)] / 0.230



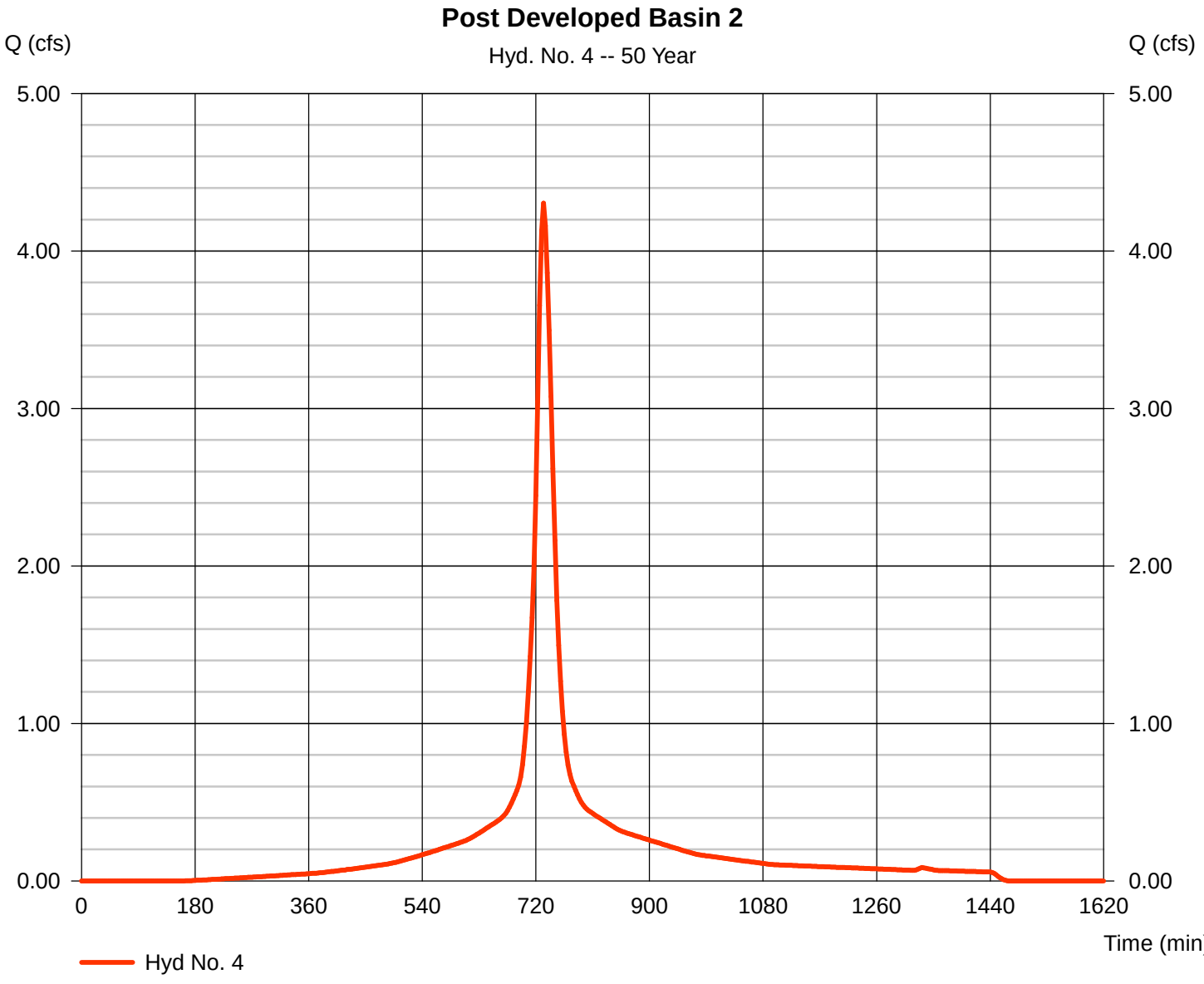
Hydrograph Report

Hyd. No. 4

Post Developed Basin 2

Hydrograph type	= SCS Runoff	Peak discharge	= 4.303 cfs
Storm frequency	= 50 yrs	Time to peak	= 732 min
Time interval	= 3 min	Hyd. volume	= 20,500 cuft
Drainage area	= 0.800 ac	Curve number	= 91*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 15.50 min
Total precip.	= 7.92 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.320 x 89) + (0.270 x 89) + (0.210 x 98)] / 0.800



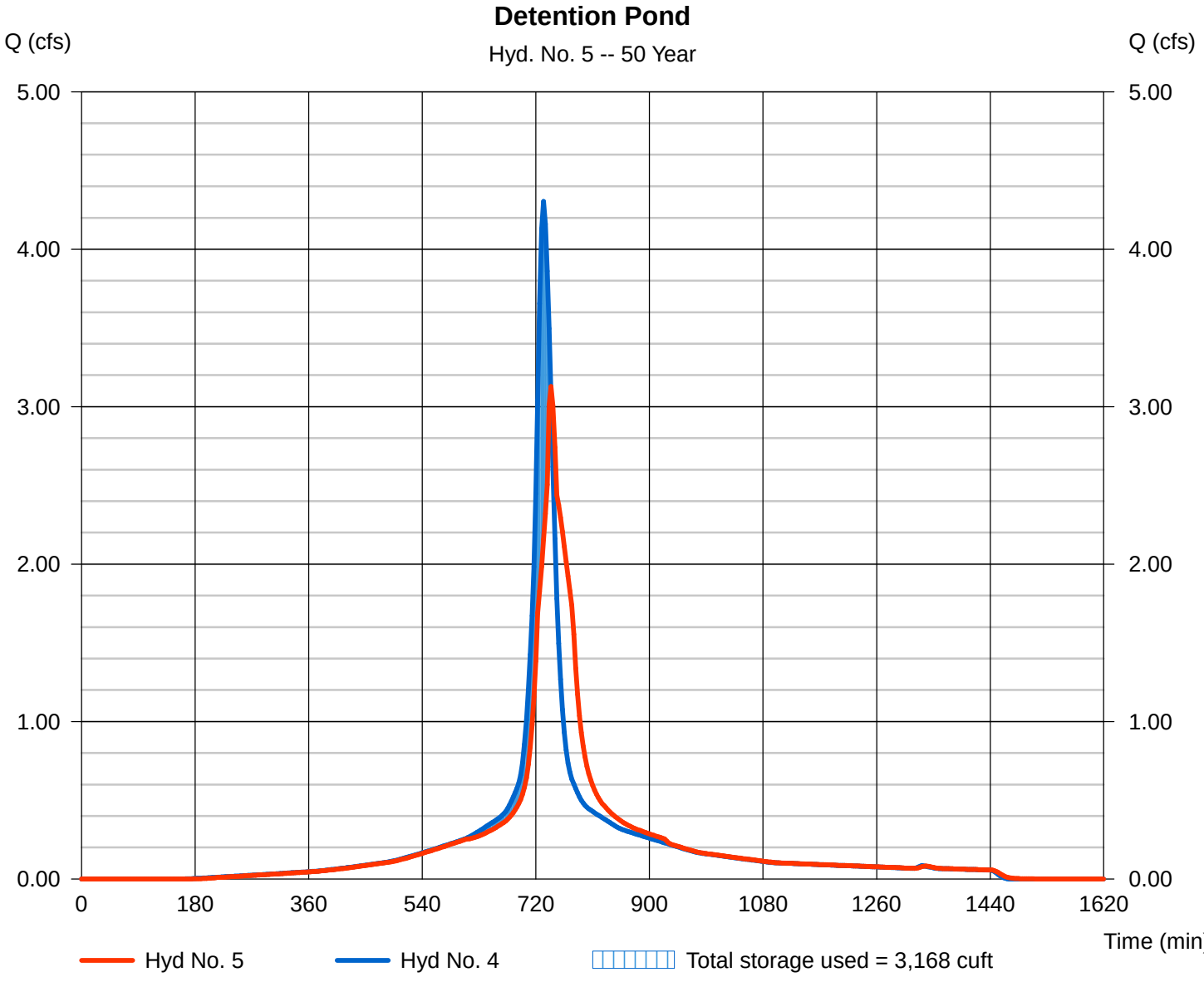
Hydrograph Report

Hyd. No. 5

Detention Pond

Hydrograph type	=	Reservoir	Peak discharge	=	3.128 cfs
Storm frequency	=	50 yrs	Time to peak	=	744 min
Time interval	=	3 min	Hyd. volume	=	20,499 cuft
Inflow hyd. No.	=	4 - Post Developed Basin 2	Max. Elevation	=	1293.46 ft
Reservoir name	=	<New Pond>	Max. Storage	=	3,168 cuft

Storage Indication method used.

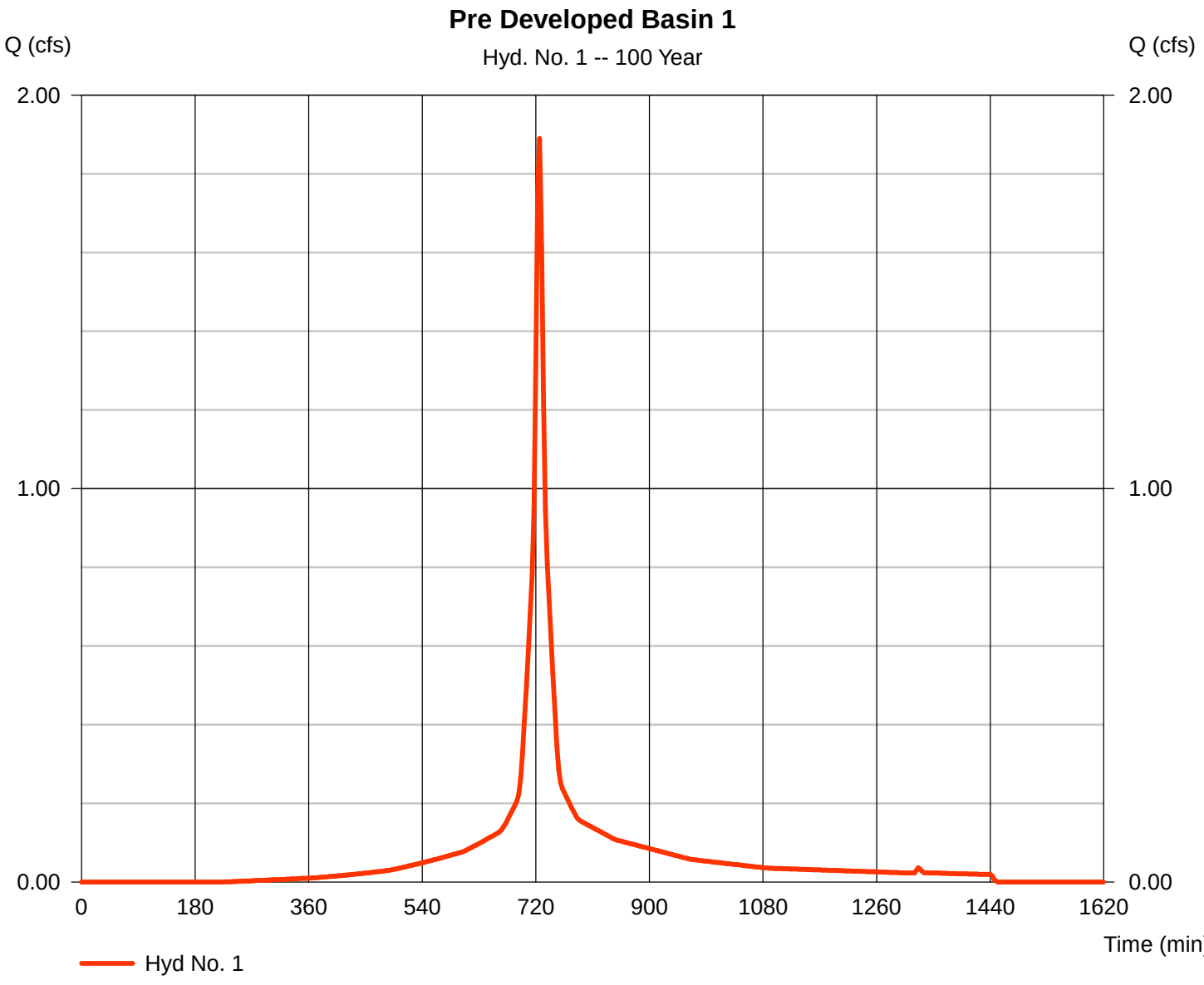


Hydrograph Report

Hyd. No. 1

Pre Developed Basin 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.890 cfs
Storm frequency	=	100 yrs	Time to peak	=	726 min
Time interval	=	3 min	Hyd. volume	=	6,625 cuft
Drainage area	=	0.280 ac	Curve number	=	86
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	8.80 min
Total precip.	=	8.64 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

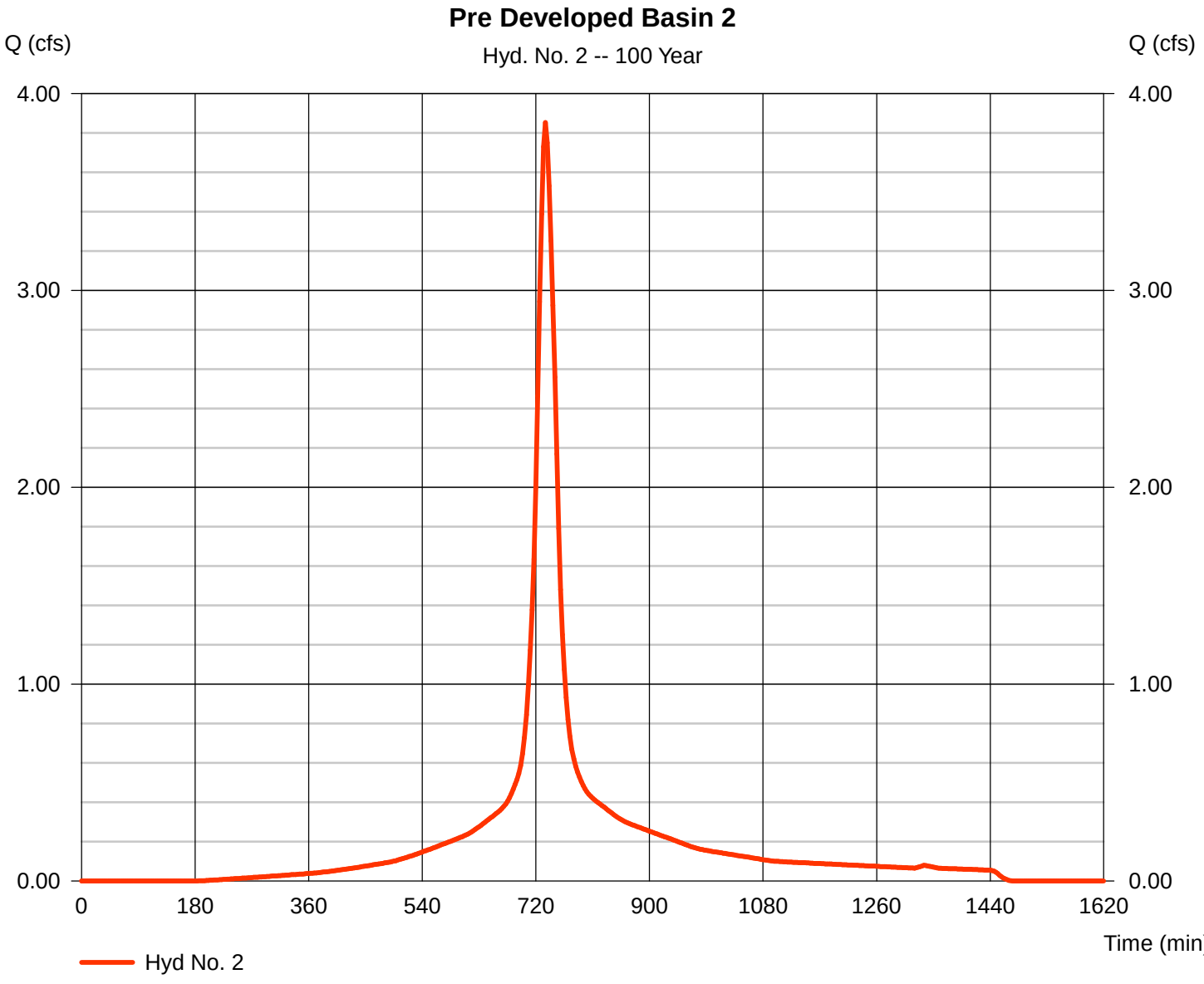


Hydrograph Report

Hyd. No. 2

Pre Developed Basin 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.852 cfs
Storm frequency	=	100 yrs	Time to peak	=	735 min
Time interval	=	3 min	Hyd. volume	=	19,419 cuft
Drainage area	=	0.750 ac	Curve number	=	89
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	20.40 min
Total precip.	=	8.64 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



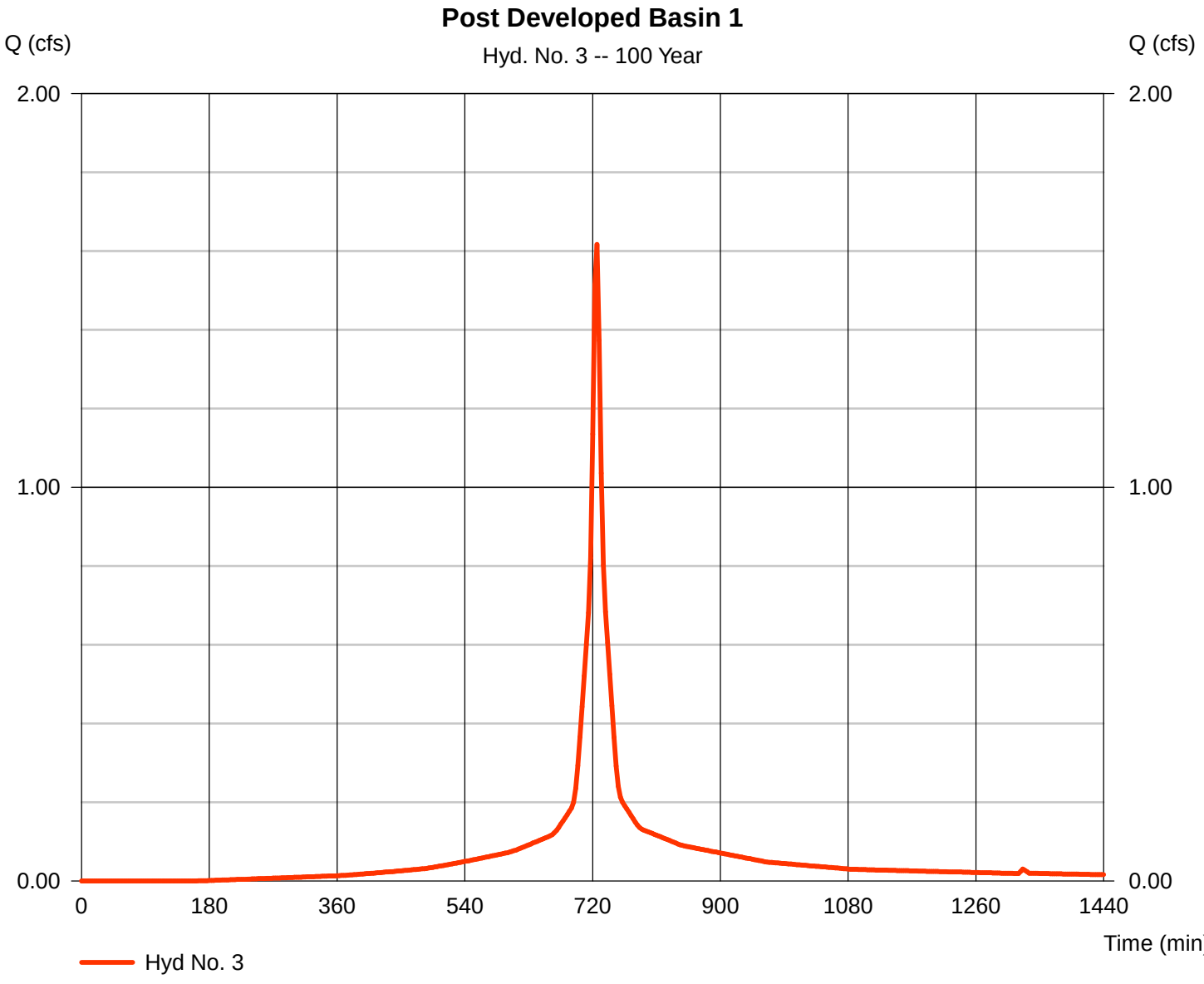
Hydrograph Report

Hyd. No. 3

Post Developed Basin 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.617 cfs
Storm frequency	=	100 yrs	Time to peak	=	726 min
Time interval	=	3 min	Hyd. volume	=	5,820 cuft
Drainage area	=	0.230 ac	Curve number	=	90*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	8.40 min
Total precip.	=	8.64 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.080 x 98) + (0.150 x 86)] / 0.230



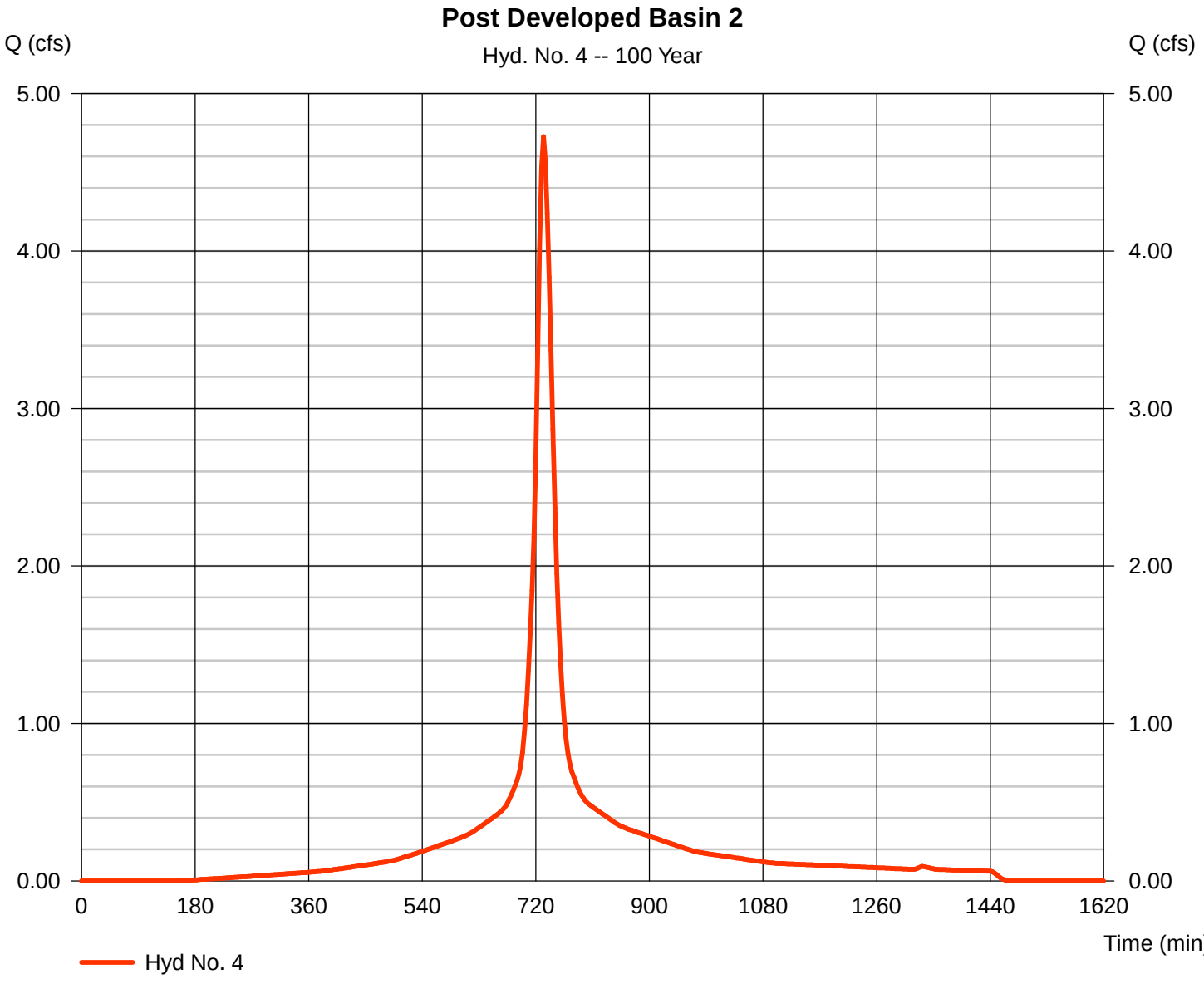
Hydrograph Report

Hyd. No. 4

Post Developed Basin 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.725 cfs
Storm frequency	=	100 yrs	Time to peak	=	732 min
Time interval	=	3 min	Hyd. volume	=	22,631 cuft
Drainage area	=	0.800 ac	Curve number	=	91*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.50 min
Total precip.	=	8.64 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.320 x 89) + (0.270 x 89) + (0.210 x 98)] / 0.800



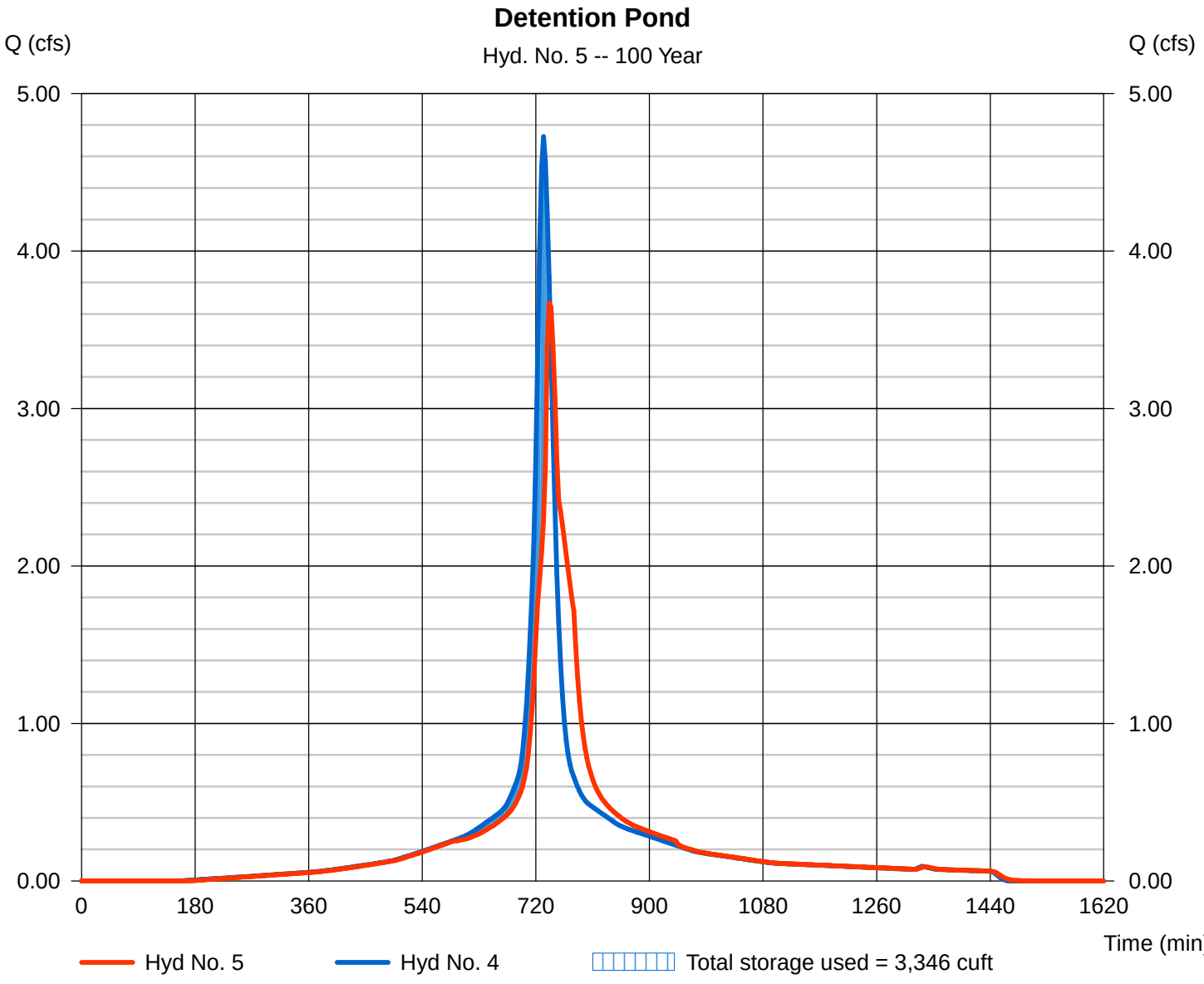
Hydrograph Report

Hyd. No. 5

Detention Pond

Hydrograph type	=	Reservoir	Peak discharge	=	3.670 cfs
Storm frequency	=	100 yrs	Time to peak	=	741 min
Time interval	=	3 min	Hyd. volume	=	22,630 cuft
Inflow hyd. No.	=	4 - Post Developed Basin 2	Max. Elevation	=	1293.50 ft
Reservoir name	=	<New Pond>	Max. Storage	=	3,346 cuft

Storage Indication method used.



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Central Electric.gpw

Hydraflow Hydrographs by Intelisolve v9.2

Wednesday, Jul 1, 2015