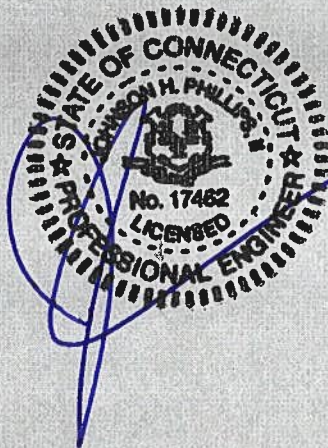


DRAINAGE REPORT

Valvoline

818 Sullivan Ave.
South Windsor, CT

August 11, 2020



PREPARED BY:

BORGHESI BUILDING & ENGINEERING CO.

2155 EAST MAIN STREET
TORRINGTON, CT 06790
(860) 482-7613

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SUMMARY

The applicant proposes to construct a two story 3,837 sf oil change facility at 818 Sullivan Ave., South Windsor. The existing site currently has a car wash and an office. Minor grading and limited land clearing is required for construction. The proposed drainage system is designed with detention basin to reduce post - development flows to pre-development levels for the 2-yr, 10-yr, 25-yr, 50-yr, and 100-year storms.

The proposed site grading will direct runoff from the proposed parking area into catch basins. The catch basins are equipped with 4' sumps to capture sediment in the runoff. The last catch basin before the detention basins has a hood to keep floatables from entering the detention basin. The detention basin reduces the post-development flows to pre-development levels prior to discharging into an existing drainage system in Sullivan Ave. A summary of the watershed analysis is found on the next page. Hydraflow Hydrographs software is used to evaluate the pre- and post- development conditions.

The proposed piping system is designed for a 25-year storm in accordance with CONNDOT methods. The rational method is used to estimate rates of runoff from the watershed. Watershed areas for the basins are determined using site plans prepared by Borghesi Building & Engineering Co. (BBE). A watershed map is presented in Appendix D.

"Hydraflow" software is used to evaluate the proposed drainage system. The software uses the Rational Method for hydrologic calculations and basic hydraulic principals to evaluate selected pipe sizes and inverts. The starting water surface elevation corresponds to the crown of the outlet pipe. All pipes are designed to convey the design flow while maintaining at least 1.0 feet of freeboard in each basin.

Drainage calculations for the proposed piping system are found in Appendix C.

BORGHESI BUILDING & ENGINEERING CO.

2155 EAST MAIN ST., TORRINGTON, CT

Valvoline

818 Sullivan Ave., South Windsor, CT

SUMMARY OF DISCHARGES

STORM (YEAR)	EXISTING (CFS)	PROPOSED (CFS)	CHANGE (CFS)
2	0.62	0.46	-0.16
10	1.18	0.57	-0.61
25	1.50	0.61	-0.89
50	1.78	0.63	-1.15
100	2.06	0.65	-1.41

APPENDIX A:

HYDROLOGIC CALCULATIONS: EXISTING CONDITIONS

BORGHESI BUILDING & ENGINEERING CO.

2155 EAST MAIN ST., TORRINGTON, CT

Valvoline

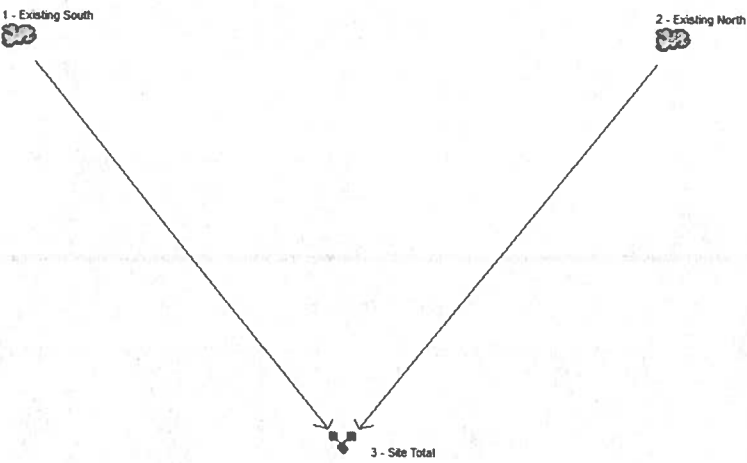
818 Sullivan Ave., South Windsor, CT

RUNOFF CURVE NUMBERS

LINE	AREA DESCRIPTION	AREA (ACRE)	C	CA	HSG	TC (MIN)
EXISTING SOUTH	PAVED, BLDG.	0.01	98	1	C	
	GRASS	0.11	74	8	C	
	GRAVEL	0.03	89	3	C	
	TOTAL	0.15	78.6	12		5
EXISTING NORTH	PAVED, BLDG.	0.01	98	1	C	
	GRASS	0.15	74	11	C	
	GRAVEL	0.09	89	8	C	
	TOTAL	0.25	80.4	20		5
PROPOSED SOUTH	PAVED, BLDG.	0.13	98	13	C	
	GRASS	0.12	74	9	C	
	GRAVEL	0.00	89	0	C	
	TOTAL	0.25	86.5	22		5
PROPOSED NORTH	PAVED, BLDG.	0.12	98	12	C	
	GRASS	0.03	74	2	C	
	GRAVEL	0.00	89	0	C	
	TOTAL	0.15	93.2	14		5

Watershed Model Schematic

Hydraflow Hydrographs by Intelisolve v9.1



Legend

<u>Hyd.</u>	<u>Origin</u>	<u>Description</u>
1	SCS Runoff	Existing South
2	SCS Runoff	Existing North
3	Combine	Site Total

Hydrograph Report

3

Hydraflow Hydrographs by Intelisolve v9.1

Wednesday, Jul 29, 2020

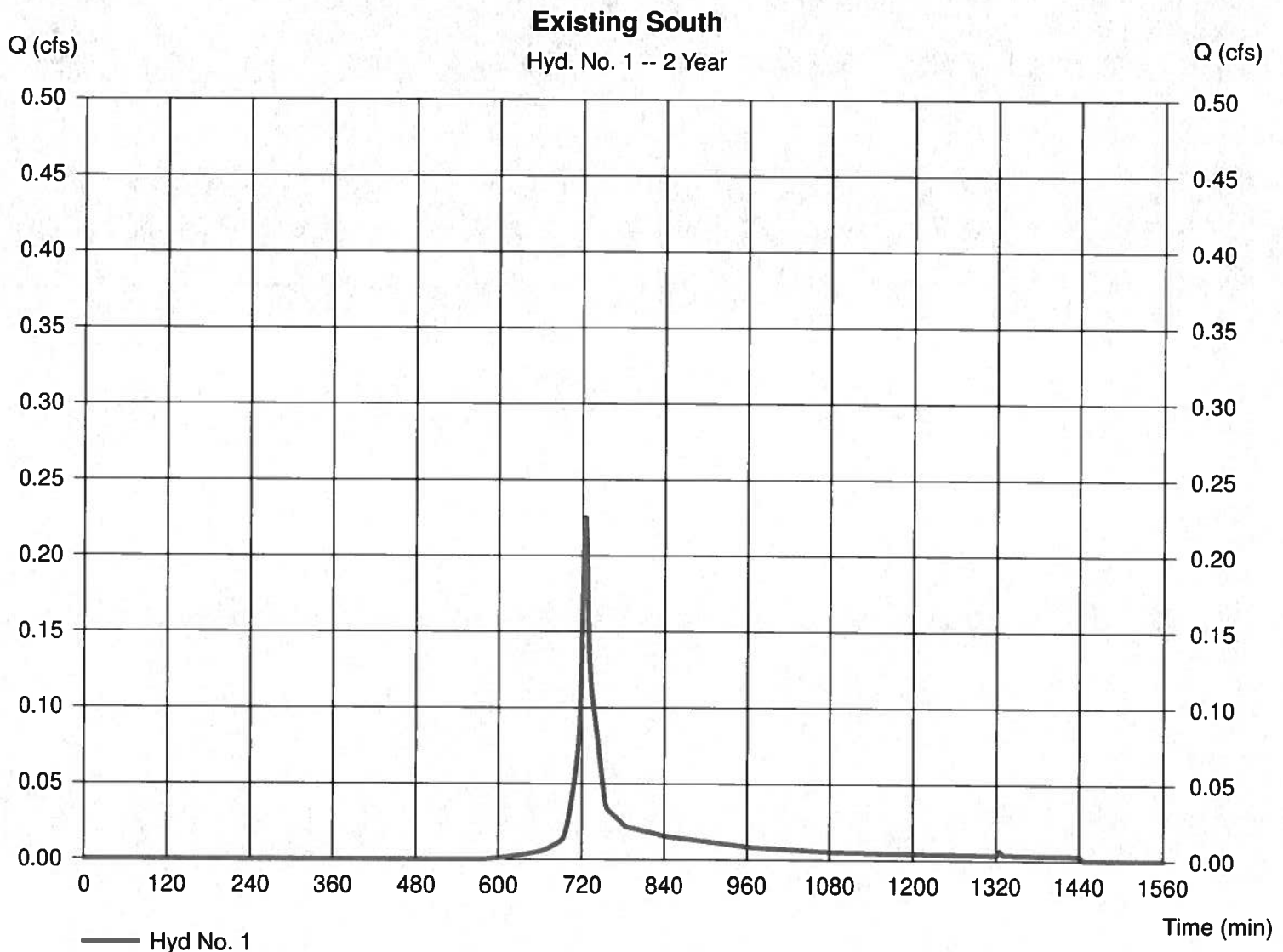
Hyd. No. 1

Existing South

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 2 min
Drainage area = 0.150 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 3.20 in
Storm duration = 24 hrs

Peak discharge = 0.225 cfs
Time to peak = 724 min
Hyd. volume = 682 cuft
Curve number = 79*
Hydraulic length = 0 ft
Time of conc. (Tc) = 5.00 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = $[(0.010 \times 98) + (0.030 \times 89) + (0.110 \times 74)] / 0.150$



Hydrograph Report

Hydraflow Hydrographs by Intellisolve v9.1

Wednesday, Jul 29, 2020

Hyd. No. 2

Existing North

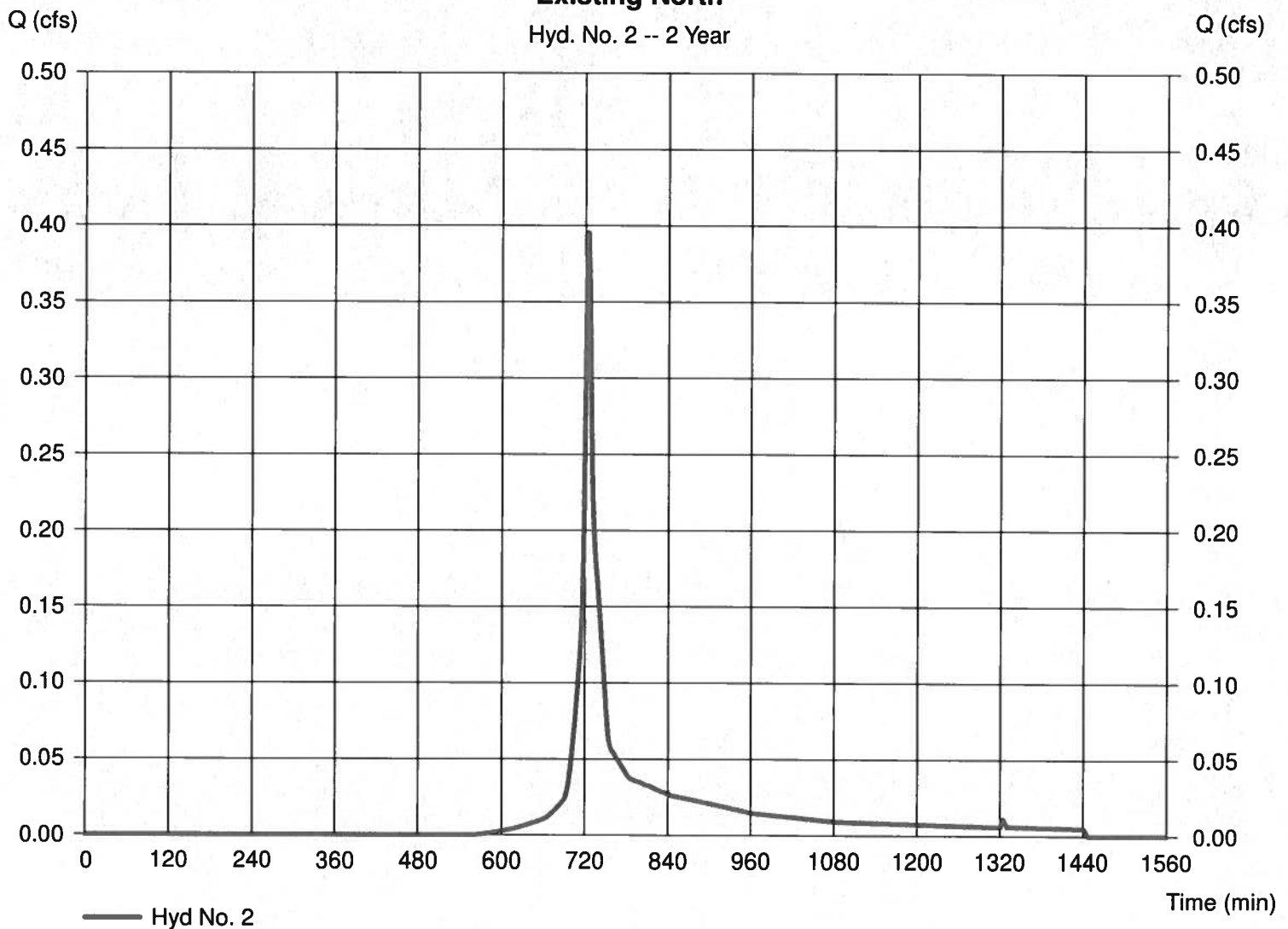
Hydrograph type = SCS Runoff
 Storm frequency = 2 yrs
 Time interval = 2 min
 Drainage area = 0.250 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 3.20 in
 Storm duration = 24 hrs

Peak discharge = 0.396 cfs
 Time to peak = 724 min
 Hyd. volume = 1,193 cuft
 Curve number = 80*
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

* Composite (Area/CN) = $[(0.010 \times 98) + (0.090 \times 89) + (0.150 \times 74)] / 0.250$

Existing North

Hyd. No. 2 -- 2 Year



Hydrograph Report

5

Hydraflow Hydrographs by Intelisolve v9.1

Wednesday, Jul 29, 2020

Hyd. No. 3

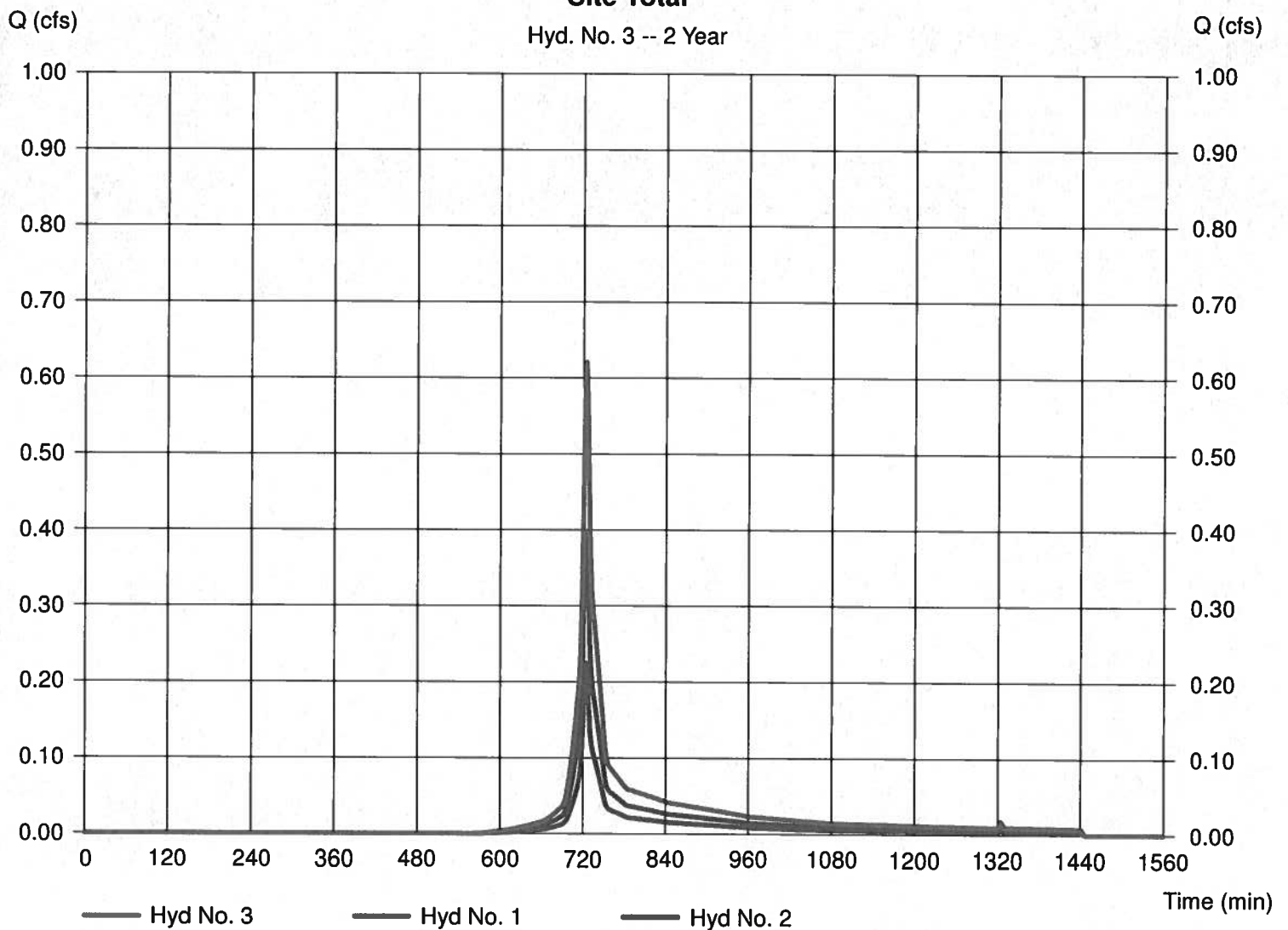
Site Total

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 2 min
Inflow hyds. = 1, 2

Peak discharge = 0.621 cfs
Time to peak = 724 min
Hyd. volume = 1,875 cuft
Contrib. drain. area = 0.400 ac

Site Total

Hyd. No. 3 -- 2 Year



Hydrograph Report

6

Hydraflow Hydrographs by Intelisolve v9.1

Wednesday, Jul 29, 2020

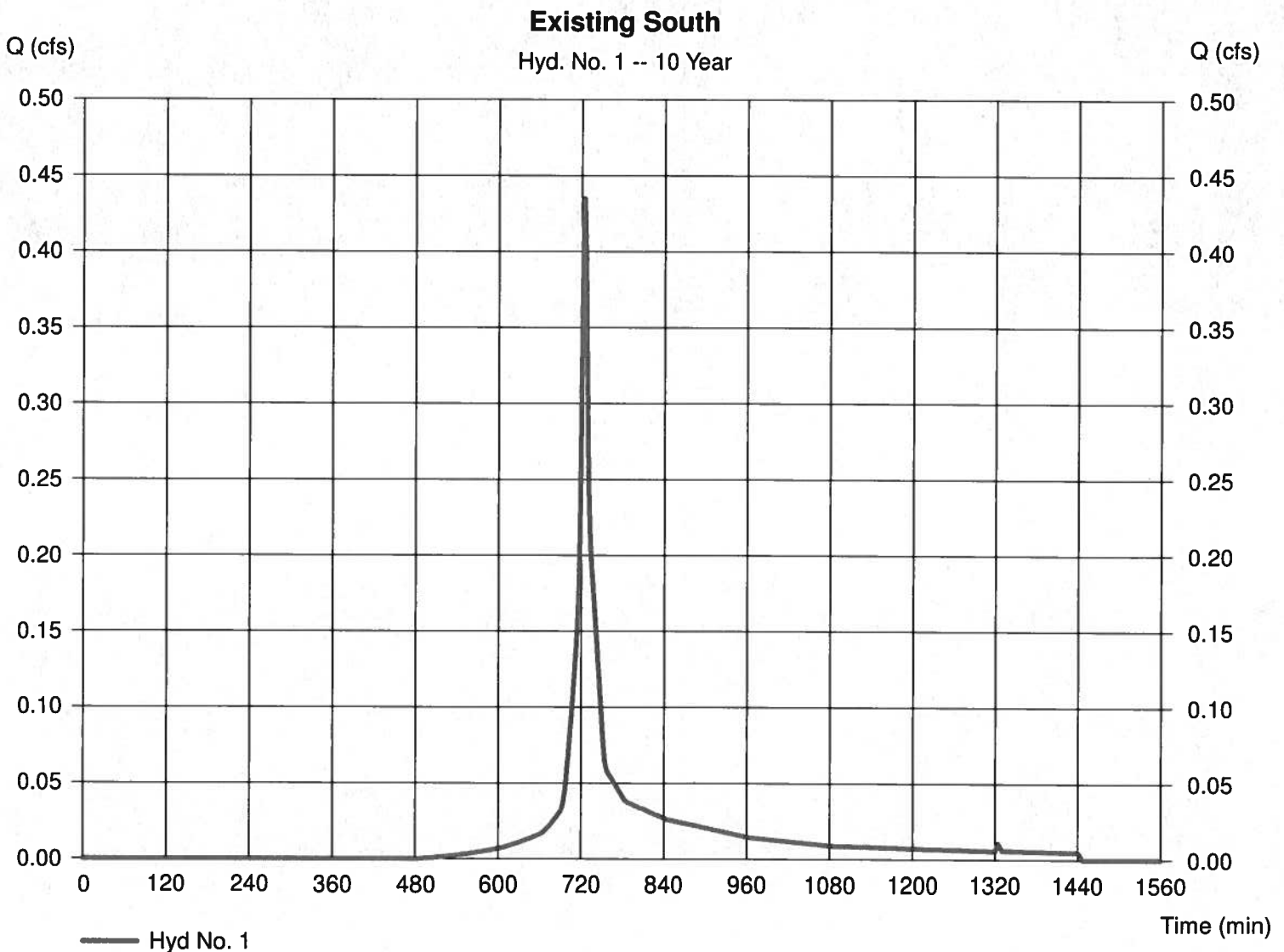
Hyd. No. 1

Existing South

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 2 min
Drainage area = 0.150 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 4.70 in
Storm duration = 24 hrs

Peak discharge = 0.435 cfs
Time to peak = 724 min
Hyd. volume = 1,299 cuft
Curve number = 79*
Hydraulic length = 0 ft
Time of conc. (Tc) = 5.00 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = $[(0.010 \times 98) + (0.030 \times 89) + (0.110 \times 74)] / 0.150$



Hydrograph Report

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Hydraflow Hydrographs by Intelisolve v9.1

Wednesday, Jul 29, 2020

Hyd. No. 2

Existing North

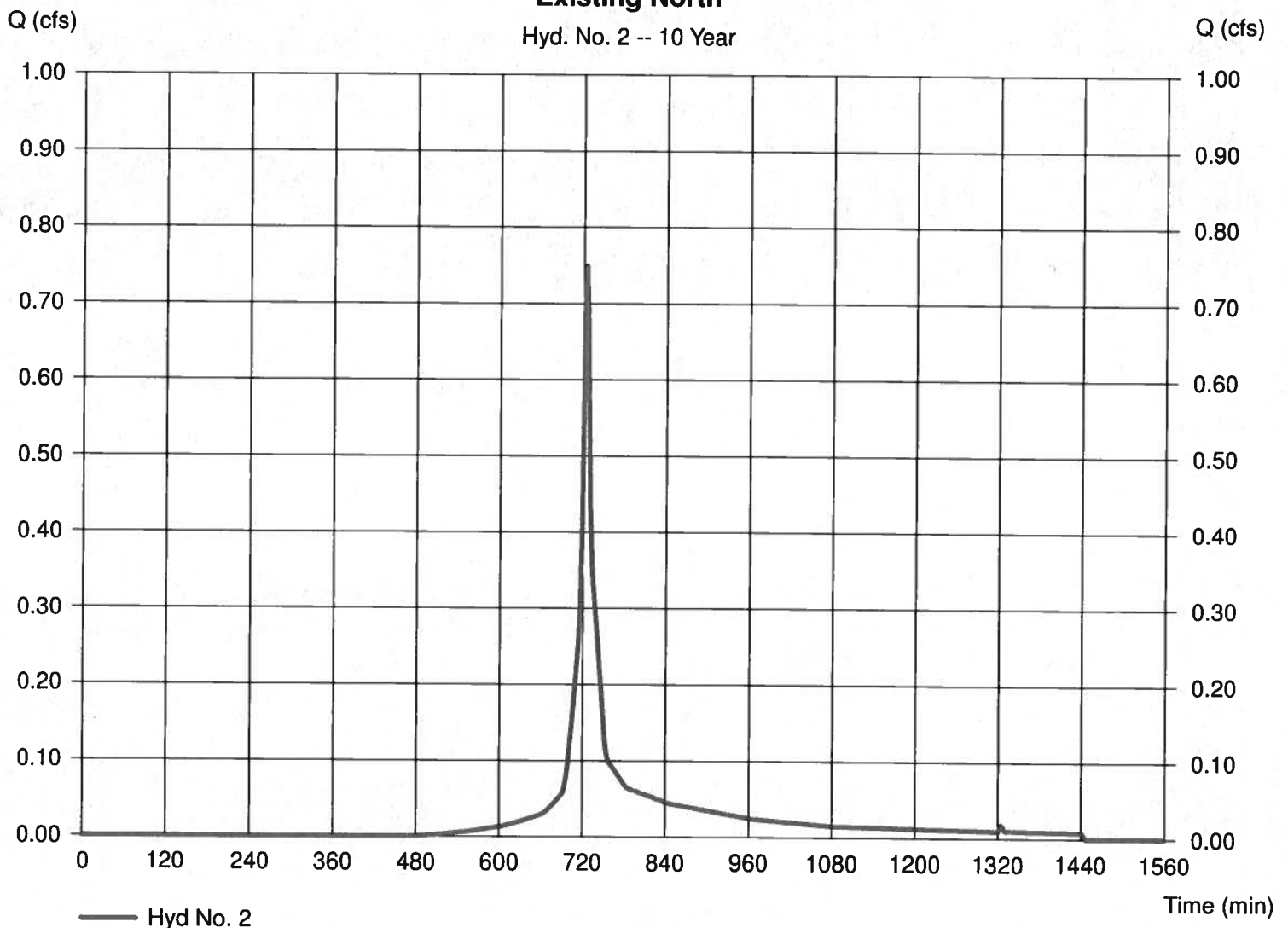
Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 2 min
Drainage area = 0.250 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 4.70 in
Storm duration = 24 hrs

Peak discharge = 0.749 cfs
Time to peak = 724 min
Hyd. volume = 2,240 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 5.00 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = $[(0.010 \times 98) + (0.090 \times 89) + (0.150 \times 74)] / 0.250$

Existing North

Hyd. No. 2 -- 10 Year



Hydrograph Report

8

Hydraflow Hydrographs by Intelisolve v9.1

Wednesday, Jul 29, 2020

Hyd. No. 3

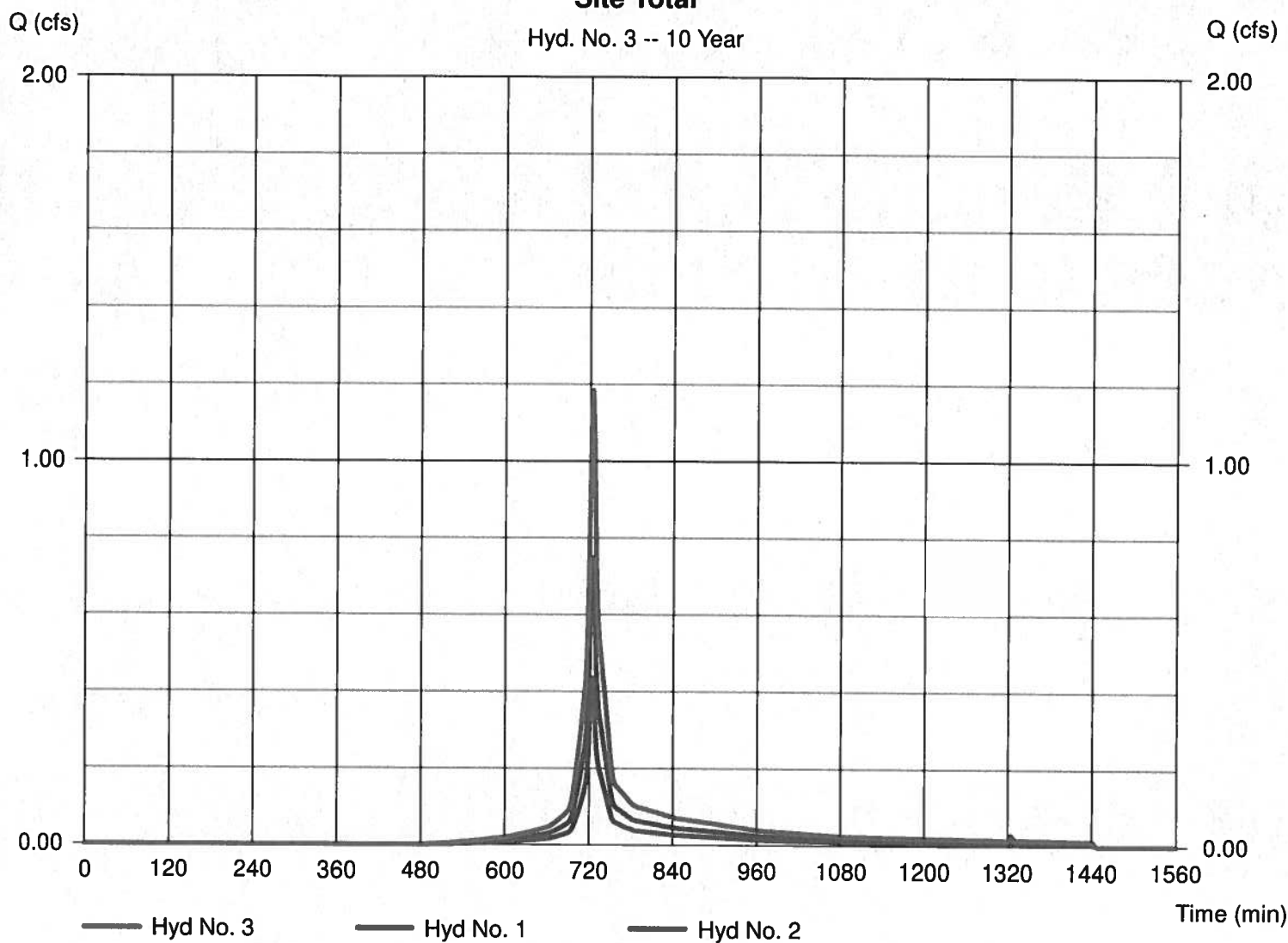
Site Total

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 2 min
Inflow hyds. = 1, 2

Peak discharge = 1.184 cfs
Time to peak = 724 min
Hyd. volume = 3,539 cuft
Contrib. drain. area = 0.400 ac

Site Total

Hyd. No. 3 -- 10 Year



Hydrograph Report

9

Hydraflow Hydrographs by Intelisolve v9.1

Wednesday, Jul 29, 2020

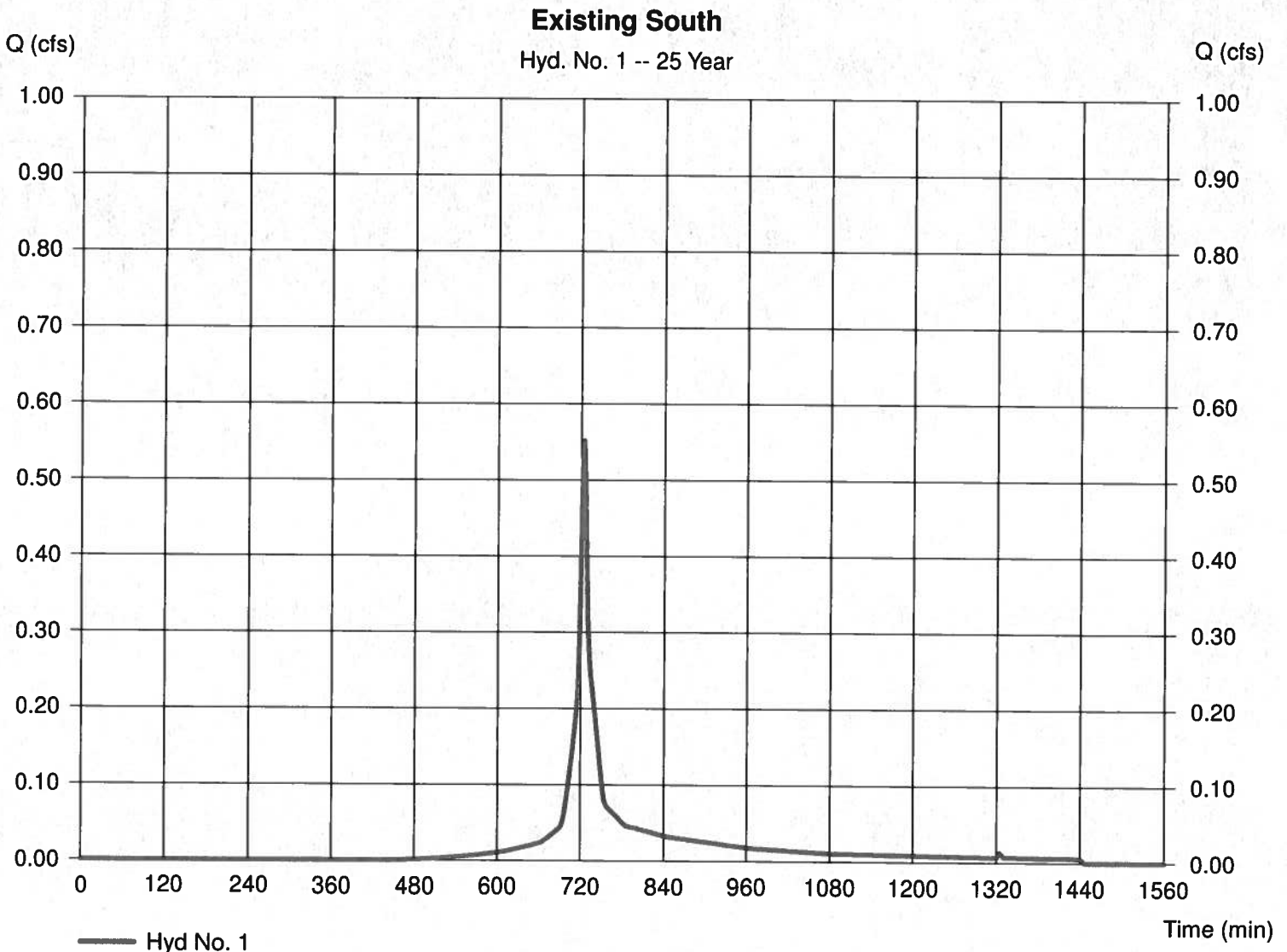
Hyd. No. 1

Existing South

Hydrograph type = SCS Runoff
Storm frequency = 25 yrs
Time interval = 2 min
Drainage area = 0.150 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 5.50 in
Storm duration = 24 hrs

Peak discharge = 0.552 cfs
Time to peak = 724 min
Hyd. volume = 1,652 cuft
Curve number = 79*
Hydraulic length = 0 ft
Time of conc. (Tc) = 5.00 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = $[(0.010 \times 98) + (0.030 \times 89) + (0.110 \times 74)] / 0.150$



Hydrograph Report

10

Hydraflow Hydrographs by Intelisolve v9.1

Wednesday, Jul 29, 2020

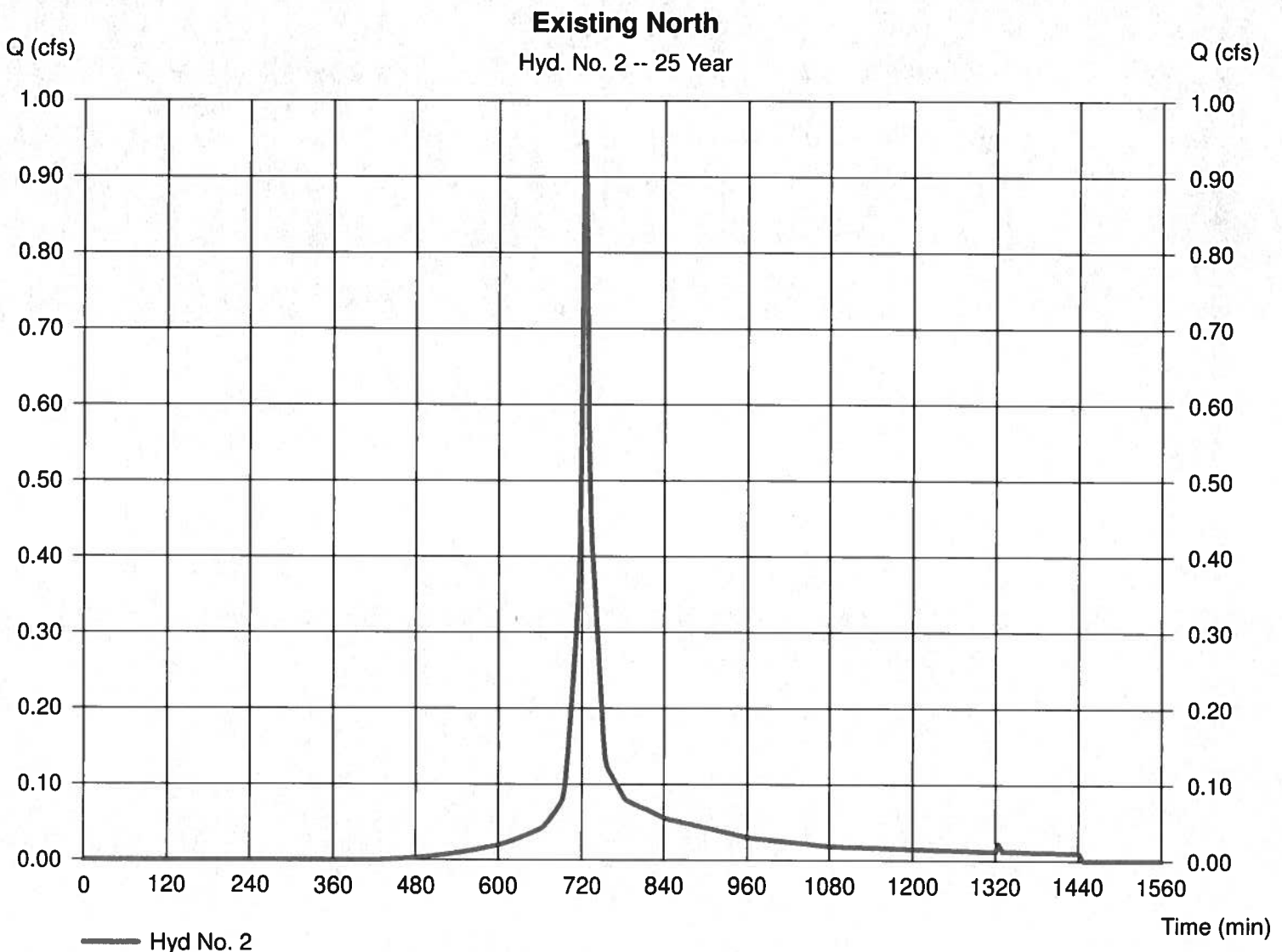
Hyd. No. 2

Existing North

Hydrograph type = SCS Runoff
Storm frequency = 25 yrs
Time interval = 2 min
Drainage area = 0.250 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 5.50 in
Storm duration = 24 hrs

Peak discharge = 0.946 cfs
Time to peak = 724 min
Hyd. volume = 2,836 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 5.00 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = $[(0.010 \times 98) + (0.090 \times 89) + (0.150 \times 74)] / 0.250$



Hydrograph Report

11

Hydraflow Hydrographs by Intelisolve v9.1

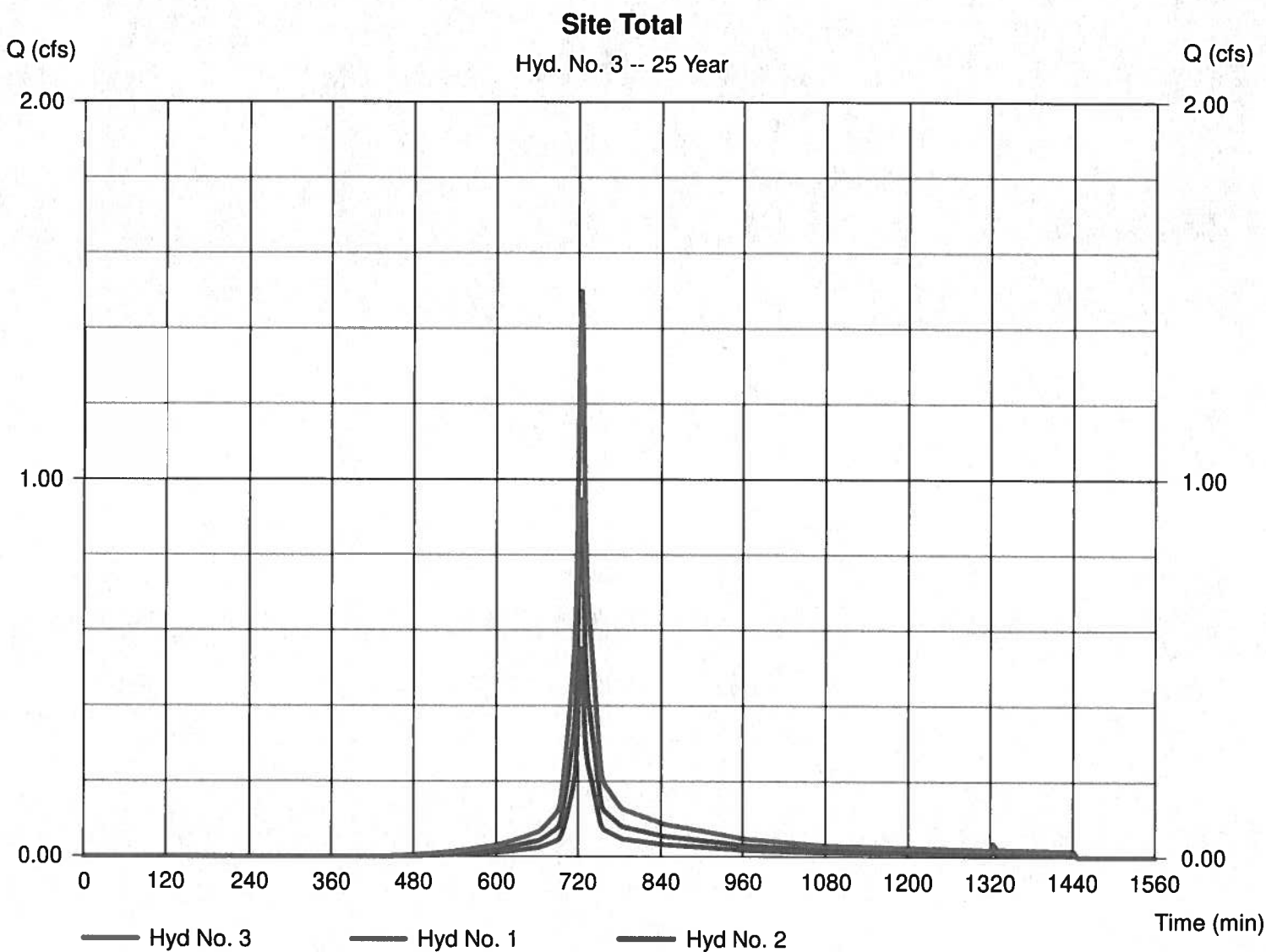
Wednesday, Jul 29, 2020

Hyd. No. 3

Site Total

Hydrograph type = Combine
Storm frequency = 25 yrs
Time interval = 2 min
Inflow hyds. = 1, 2

Peak discharge = 1.498 cfs
Time to peak = 724 min
Hyd. volume = 4,488 cuft
Contrib. drain. area = 0.400 ac



Hydrograph Report

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Hydraflow Hydrographs by Intelisolve v9.1

Wednesday, Jul 29, 2020

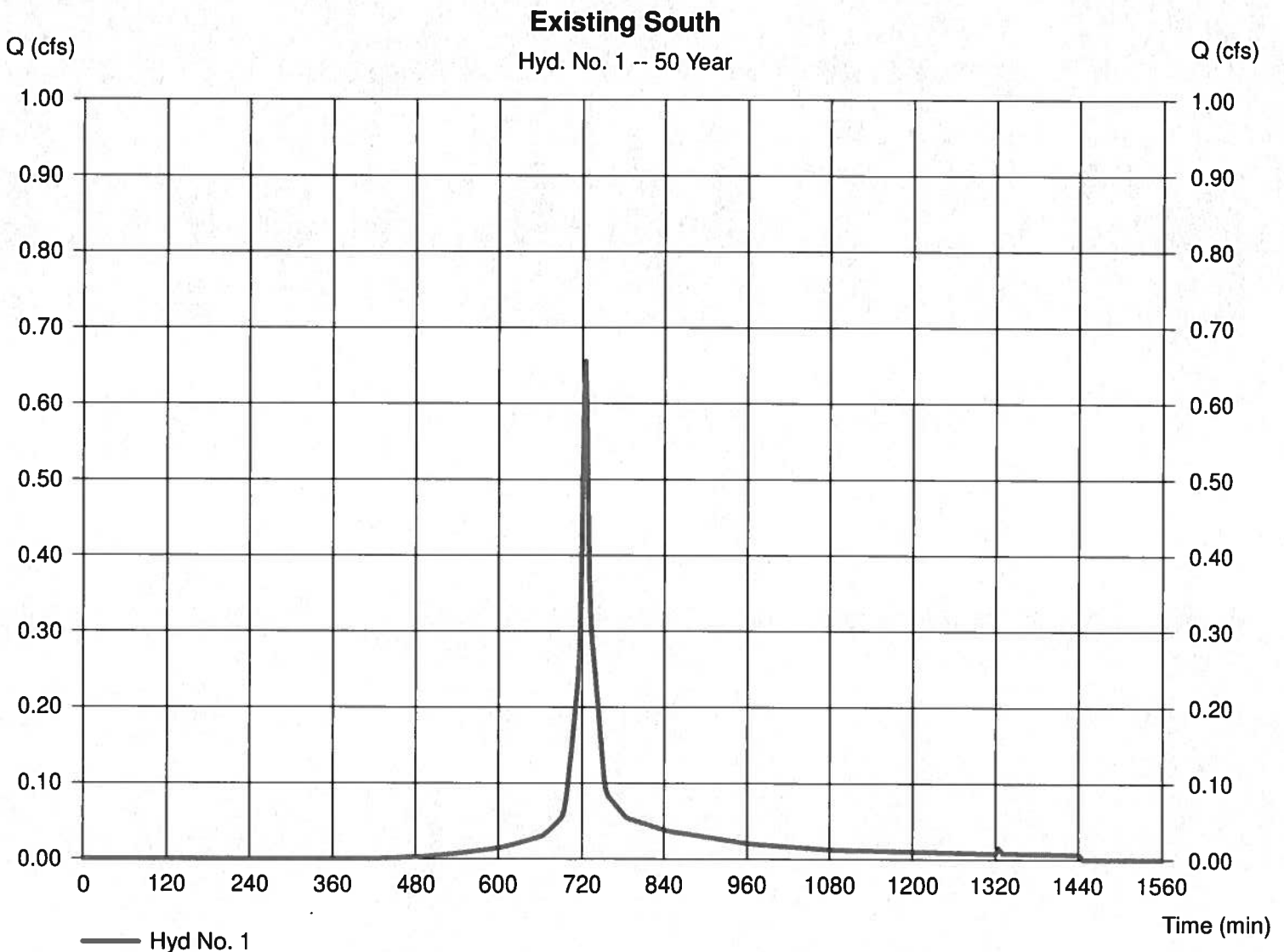
Hyd. No. 1

Existing South

Hydrograph type = SCS Runoff
Storm frequency = 50 yrs
Time interval = 2 min
Drainage area = 0.150 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 6.20 in
Storm duration = 24 hrs

Peak discharge = 0.656 cfs
Time to peak = 724 min
Hyd. volume = 1,970 cuft
Curve number = 79*
Hydraulic length = 0 ft
Time of conc. (Tc) = 5.00 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = $[(0.010 \times 98) + (0.030 \times 89) + (0.110 \times 74)] / 0.150$



Hydrograph Report

13

Hydraflow Hydrographs by Intelisolve v9.1

Wednesday, Jul 29, 2020

Hyd. No. 2

Existing North

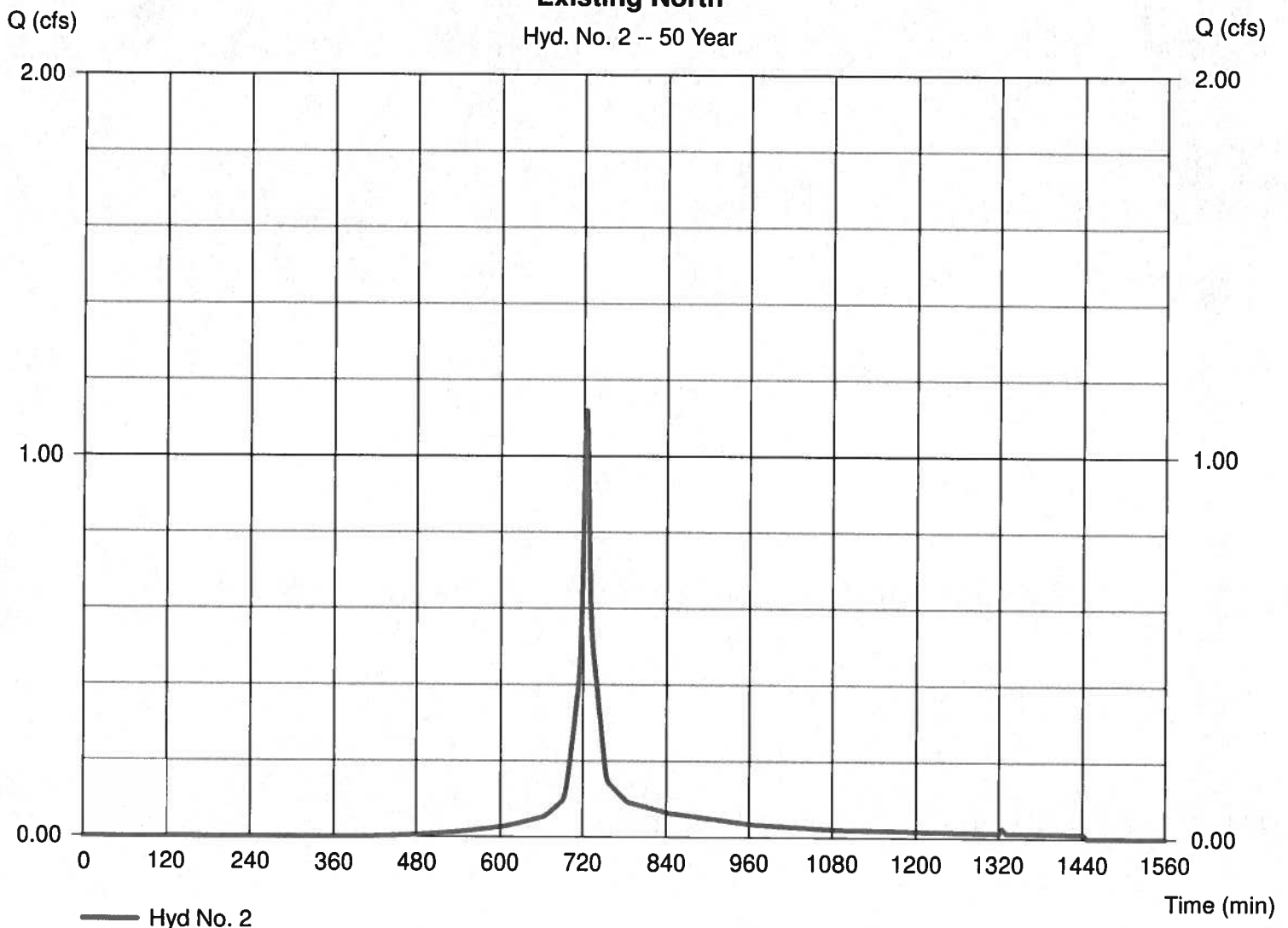
Hydrograph type = SCS Runoff
Storm frequency = 50 yrs
Time interval = 2 min
Drainage area = 0.250 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 6.20 in
Storm duration = 24 hrs

Peak discharge = 1.120 cfs
Time to peak = 724 min
Hyd. volume = 3,371 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 5.00 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = $[(0.010 \times 98) + (0.090 \times 89) + (0.150 \times 74)] / 0.250$

Existing North

Hyd. No. 2 -- 50 Year

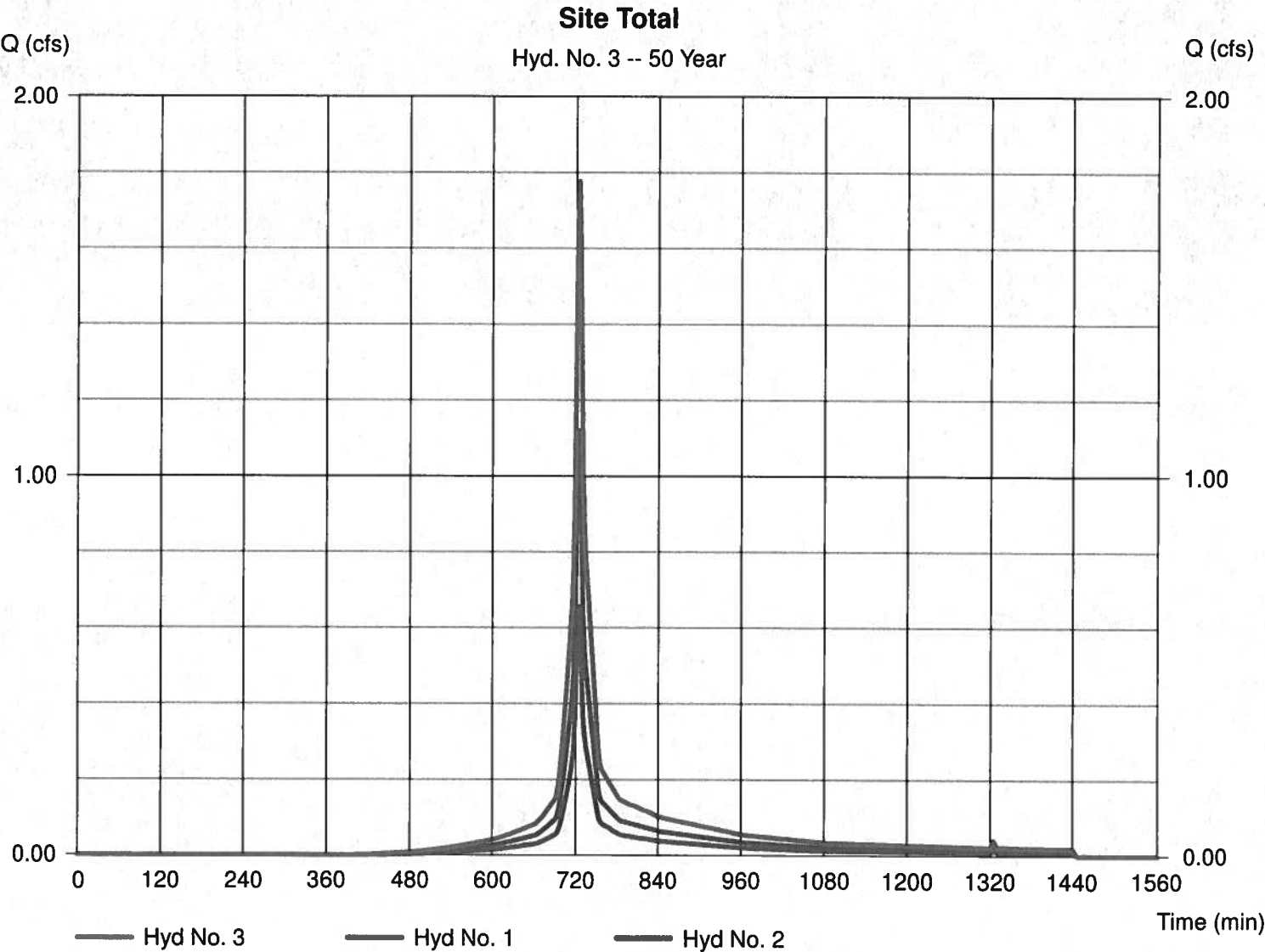


Hydrograph Report

Hyd. No. 3

Site Total

Hydrograph type	= Combine	Peak discharge	= 1.776 cfs
Storm frequency	= 50 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 5,341 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 0.400 ac



Hydrograph Report

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Hydraflow Hydrographs by Intelisolve v9.1

Wednesday, Jul 29, 2020

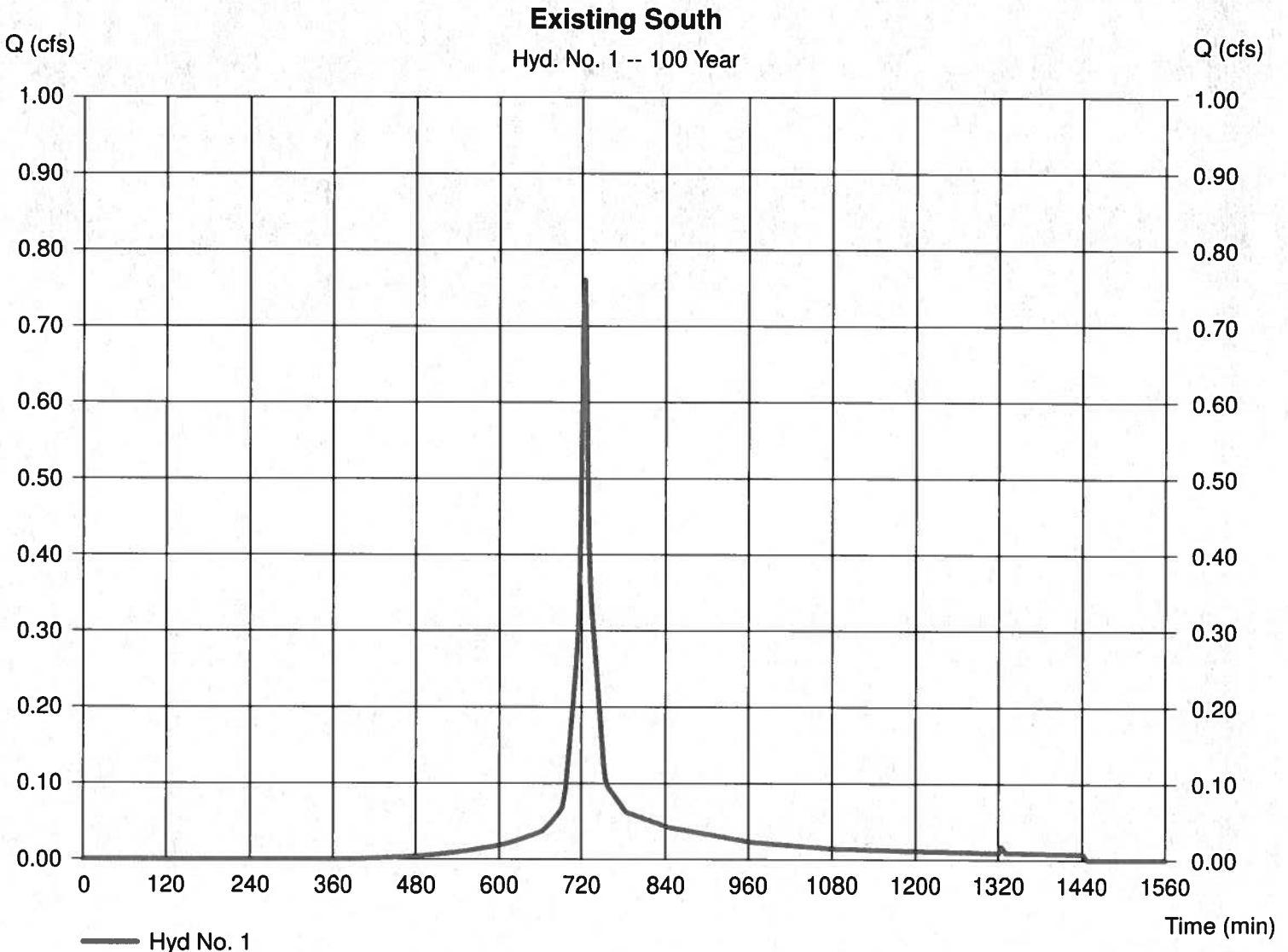
Hyd. No. 1

Existing South

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 2 min
Drainage area = 0.150 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 6.90 in
Storm duration = 24 hrs

Peak discharge = 0.761 cfs
Time to peak = 724 min
Hyd. volume = 2,294 cuft
Curve number = 79*
Hydraulic length = 0 ft
Time of conc. (Tc) = 5.00 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = $[(0.010 \times 98) + (0.030 \times 89) + (0.110 \times 74)] / 0.150$



Hydrograph Report

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Hydraflow Hydrographs by Intelisolve v9.1

Wednesday, Jul 29, 2020

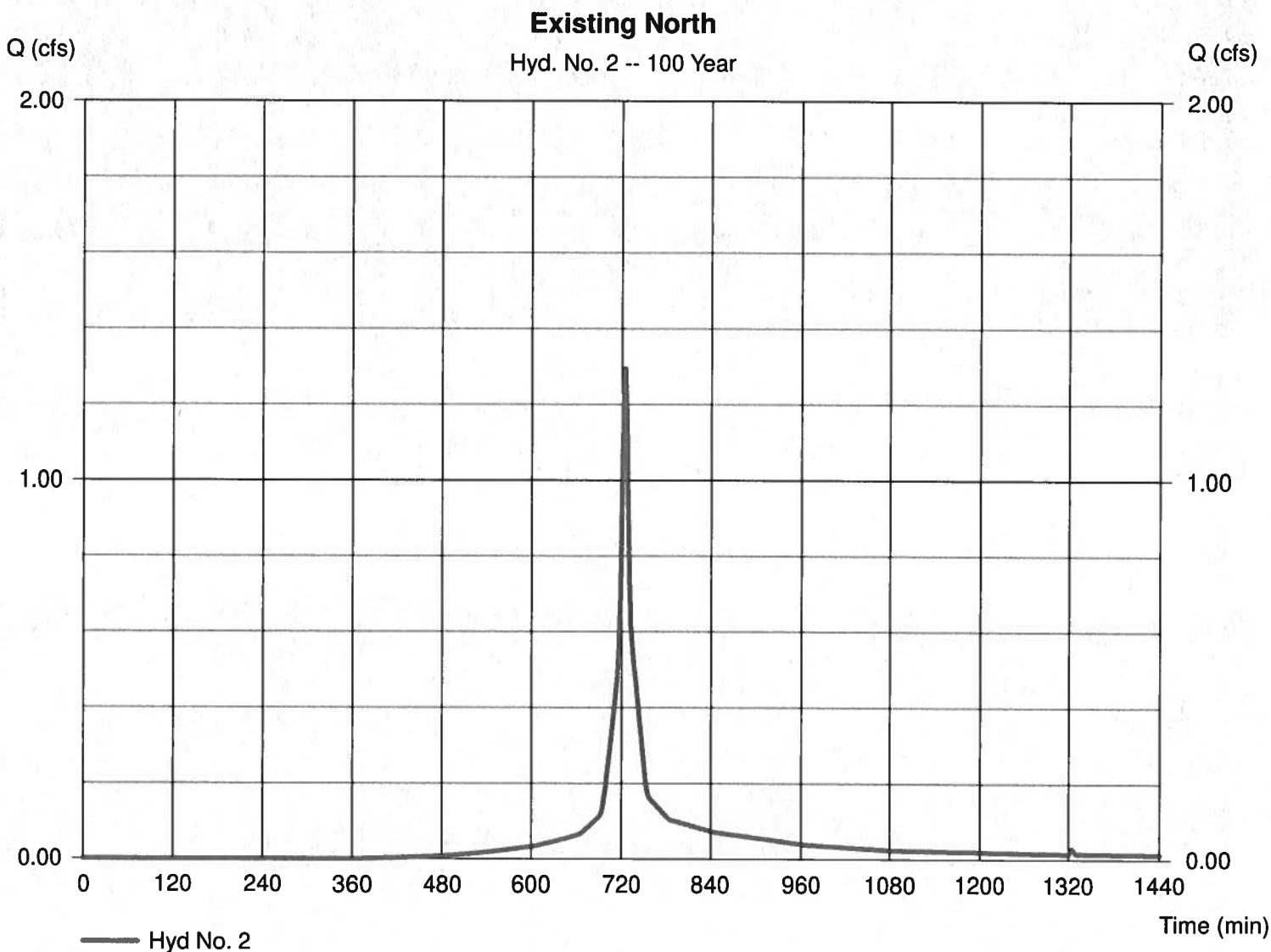
Hyd. No. 2

Existing North

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 2 min
Drainage area = 0.250 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 6.90 in
Storm duration = 24 hrs

Peak discharge = 1.295 cfs
Time to peak = 724 min
Hyd. volume = 3,916 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 5.00 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = $[(0.010 \times 98) + (0.090 \times 89) + (0.150 \times 74)] / 0.250$



Hydrograph Report

17

Hydraflow Hydrographs by Intelisolve v9.1

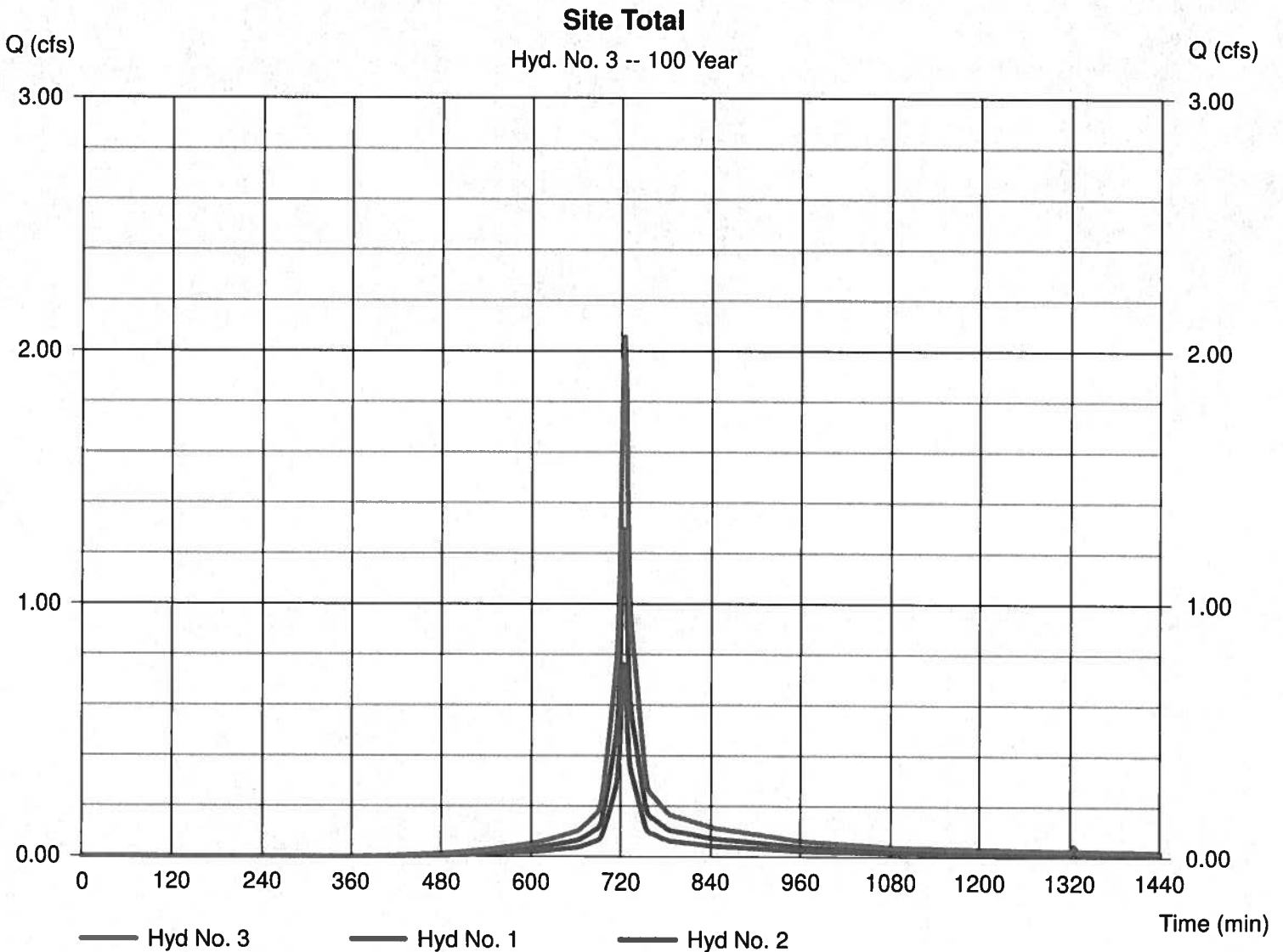
Wednesday, Jul 29, 2020

Hyd. No. 3

Site Total

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 2 min
Inflow hyds. = 1, 2

Peak discharge = 2.056 cfs
Time to peak = 724 min
Hyd. volume = 6,209 cuft
Contrib. drain. area = 0.400 ac



APPENDIX B:

HYDROLOGIC CALCULATIONS: PROPOSED CONDITIONS

BORGHESI BUILDING & ENGINEERING CO.

2155 EAST MAIN ST., TORRINGTON, CT

Valvoline

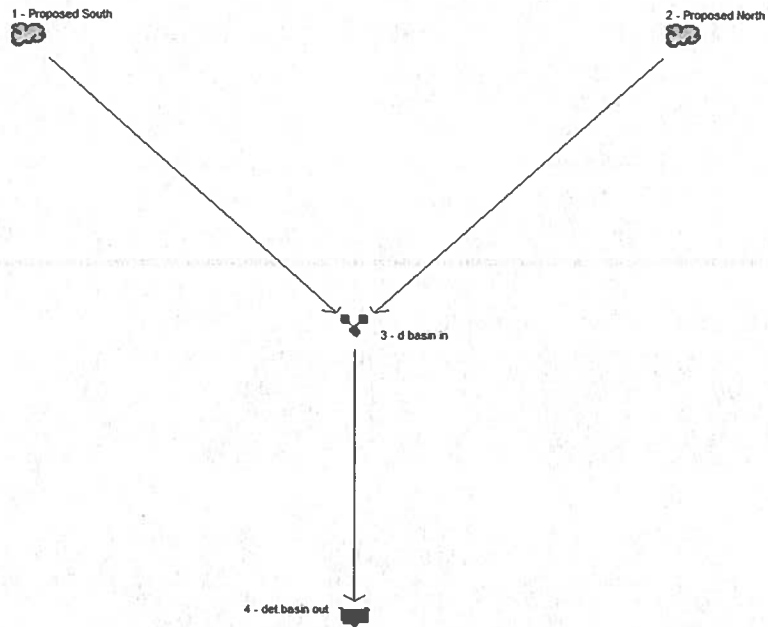
818 Sullivan Ave., South Windsor, CT

RUNOFF CURVE NUMBERS

LINE	AREA DESCRIPTION	AREA (ACRE)	C	CA	HSG	TC (MIN)
EXISTING SOUTH	PAVED, BLDG.	0.01	98	1	C	
	GRASS	0.11	74	8	C	
	GRAVEL	0.03	89	3	C	
	TOTAL	0.15	78.6	12		5
EXISTING NORTH	PAVED, BLDG.	0.01	98	1	C	
	GRASS	0.15	74	11	C	
	GRAVEL	0.09	89	8	C	
	TOTAL	0.25	80.4	20		5
PROPOSED SOUTH	PAVED, BLDG.	0.13	98	13	C	
	GRASS	0.12	74	9	C	
	GRAVEL	0.00	89	0	C	
	TOTAL	0.25	86.5	22		5
PROPOSED NORTH	PAVED, BLDG.	0.12	98	12	C	
	GRASS	0.03	74	2	C	
	GRAVEL	0.00	89	0	C	
	TOTAL	0.15	93.2	14		5

Watershed Model Schematic

Hydraflow Hydrographs by Intelisolve v9.1



Legend

<u>Hvd.</u>	<u>Origin</u>	<u>Description</u>
1	SCS Runoff	Proposed South
2	SCS Runoff	Proposed North
3	Combine	d basin in
4	Reservoir	det.basin out

[illegible]

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Tuesday, Aug 11, 2020

Hyd. No. 1

Proposed South

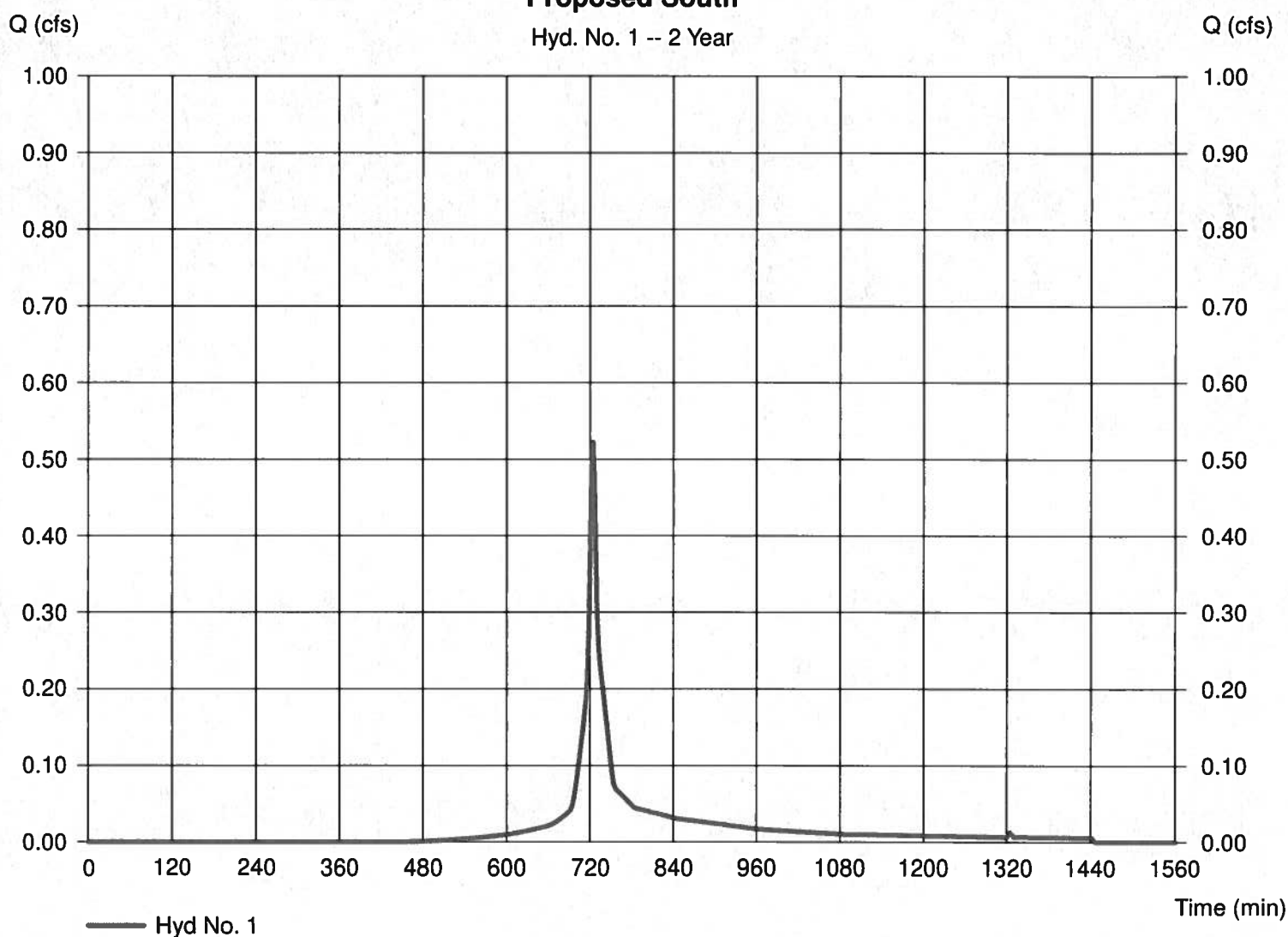
Hydrograph type = SCS Runoff
 Storm frequency = 2 yrs
 Time interval = 2 min
 Drainage area = 0.250 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 3.20 in
 Storm duration = 24 hrs

Peak discharge = 0.522 cfs
 Time to peak = 724 min
 Hyd. volume = 1,561 cuft
 Curve number = 86*
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

* Composite (Area/CN) = $[(0.130 \times 98) + (0.120 \times 74)] / 0.250$

Proposed South

Hyd. No. 1 -- 2 Year



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Tuesday, Aug 11, 2020

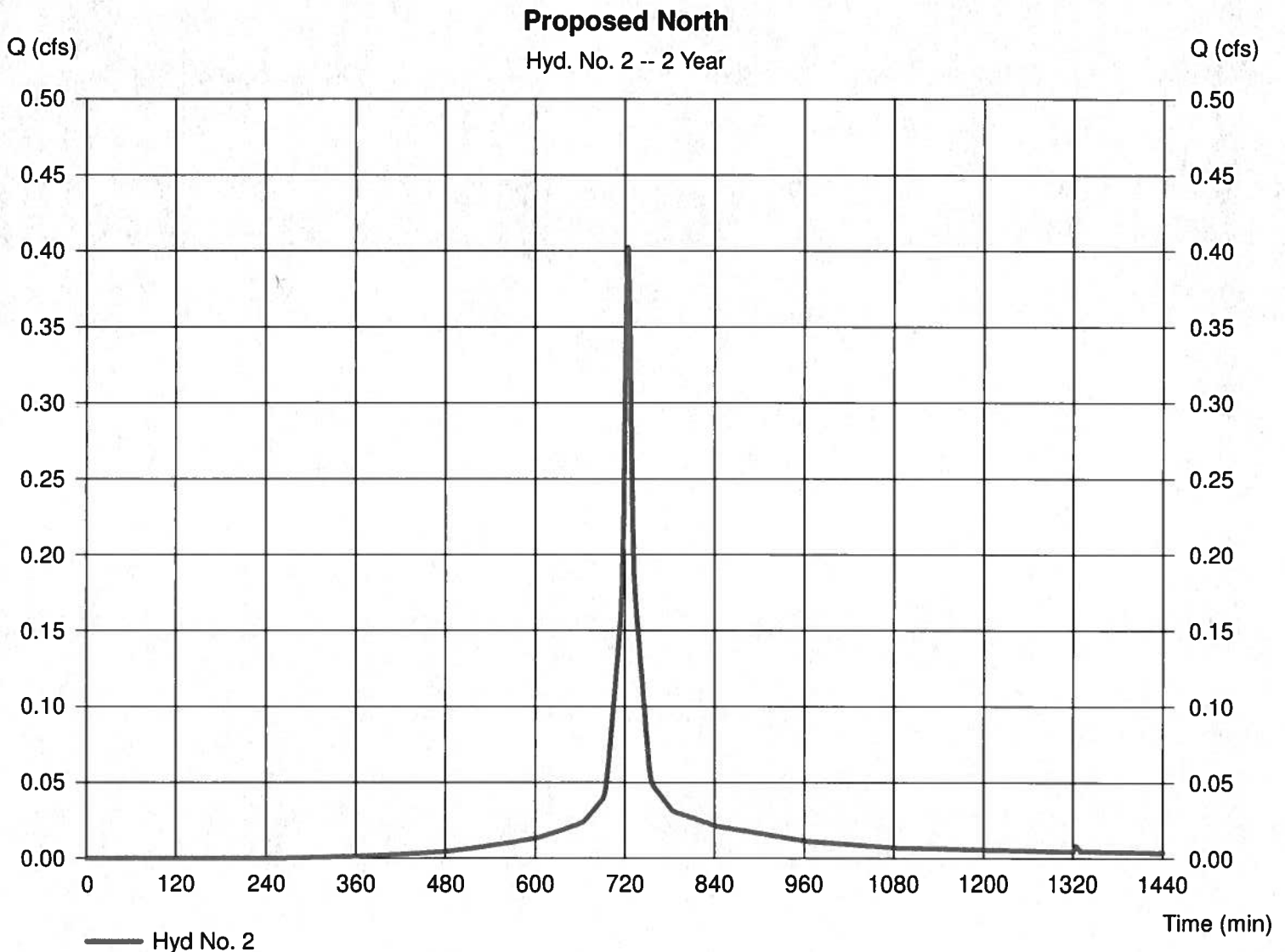
Hyd. No. 2

Proposed North

Hydrograph type = SCS Runoff
 Storm frequency = 2 yrs
 Time interval = 2 min
 Drainage area = 0.150 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 3.20 in
 Storm duration = 24 hrs

Peak discharge = 0.403 cfs
 Time to peak = 724 min
 Hyd. volume = 1,248 cuft
 Curve number = 93*
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

* Composite (Area/CN) = $[(0.120 \times 98) + (0.030 \times 74)] / 0.150$



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

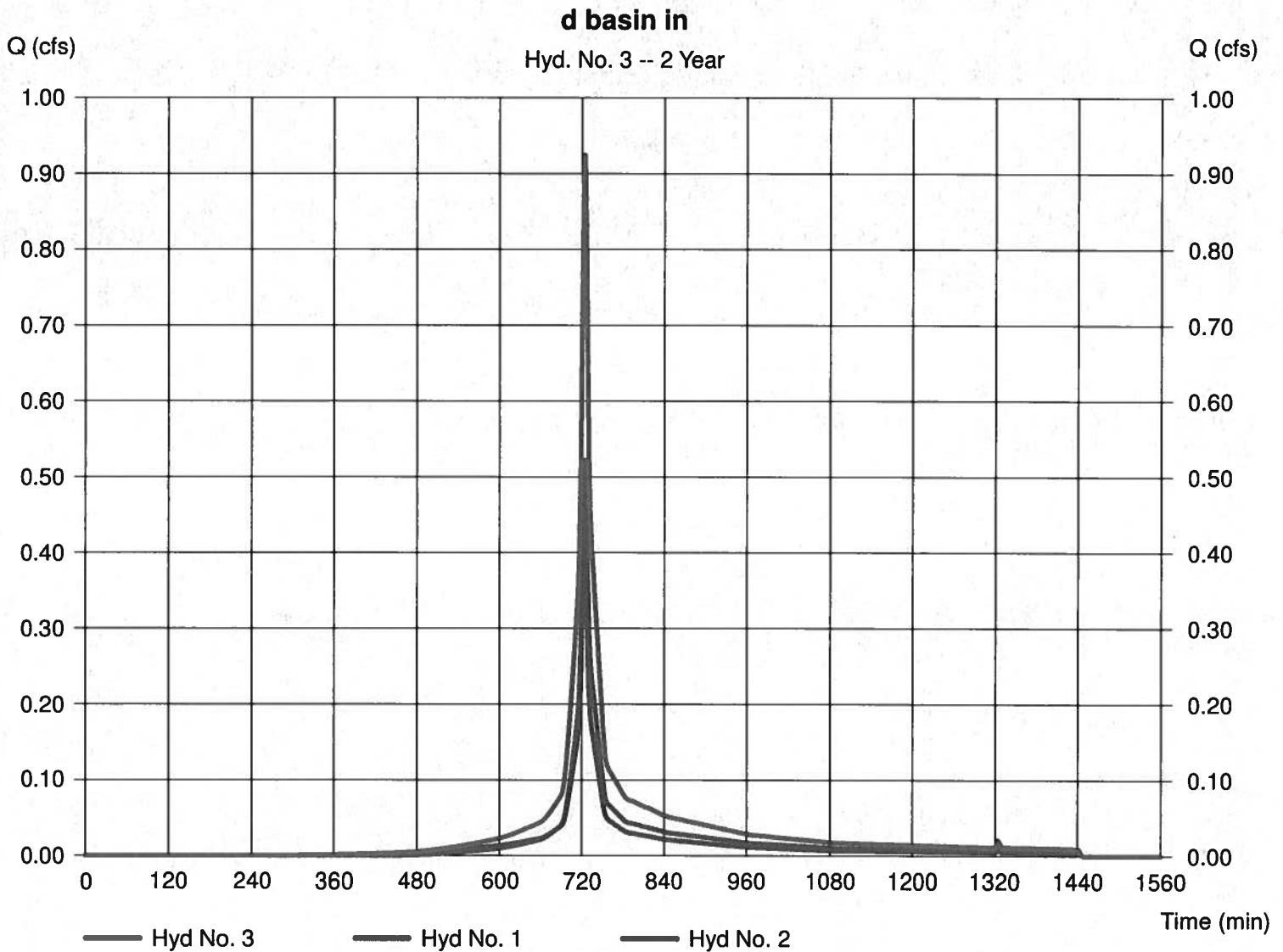
Tuesday, Aug 11, 2020

Hyd. No. 3

d basin in

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 2 min
Inflow hyds. = 1, 2

Peak discharge = 0.925 cfs
Time to peak = 724 min
Hyd. volume = 2,810 cuft
Contrib. drain. area = 0.400 ac



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Tuesday, Aug 11, 2020

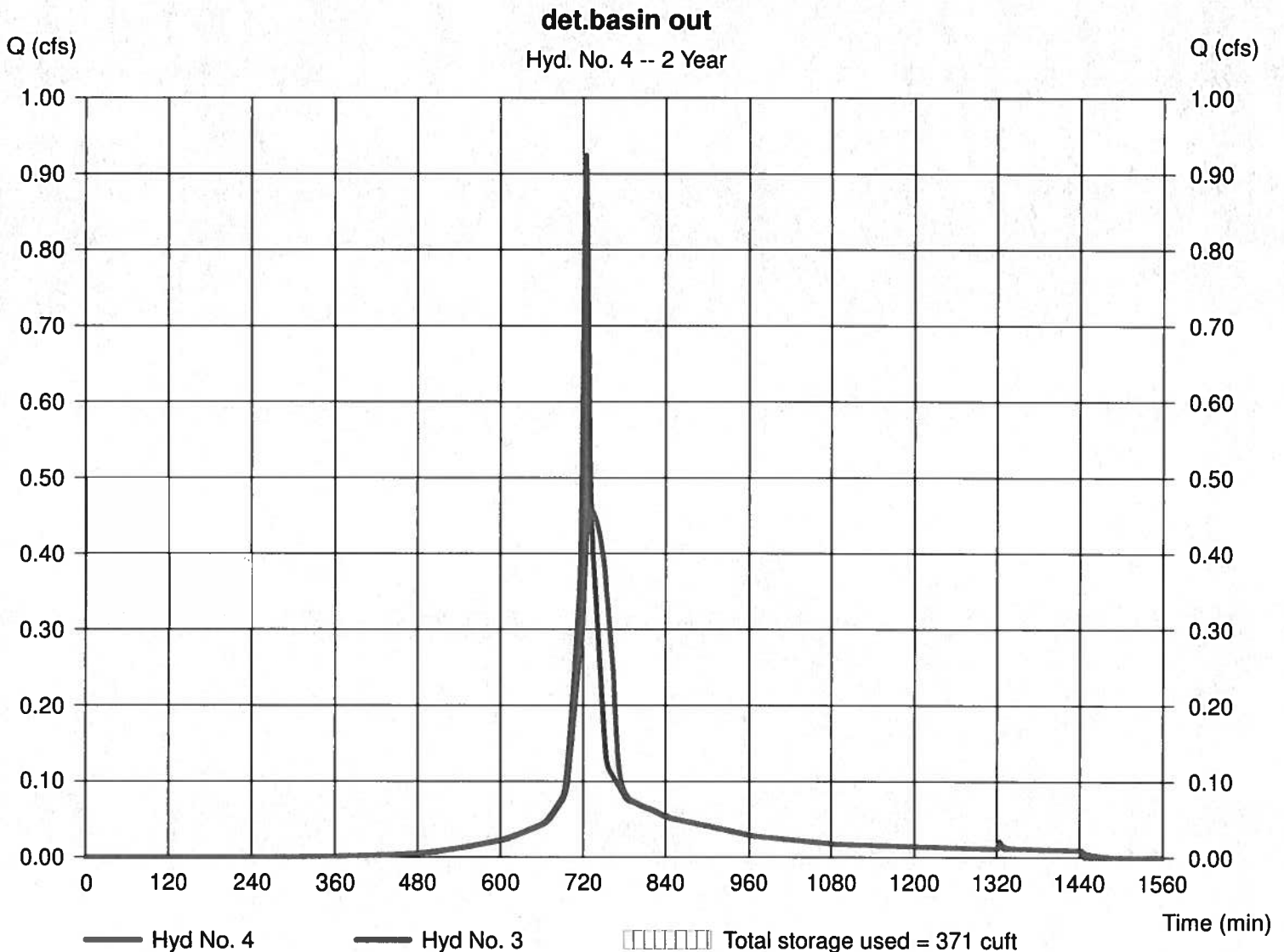
Hyd. No. 4

det.basin out

Hydrograph type = Reservoir
 Storm frequency = 2 yrs
 Time interval = 2 min
 Inflow hyd. No. = 3 - d basin in
 Reservoir name = <New Pond>

Peak discharge = 0.457 cfs
 Time to peak = 732 min
 Hyd. volume = 2,809 cuft
 Max. Elevation = 83.35 ft
 Max. Storage = 371 cuft

Storage Indication method used.



Pond Report

7

Hydraflow Hydrographs by Intelisolve v9.1

Tuesday, Aug 11, 2020

Pond No. 1 - <New Pond>

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 82.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	82.00	70	0	0
0.50	82.50	220	69	69
1.00	83.00	370	146	215
1.50	83.50	530	224	439
2.00	84.00	700	306	745
2.50	84.50	1,025	429	1,174
3.00	85.00	1,350	592	1,766
3.50	85.50	1,675	755	2,520

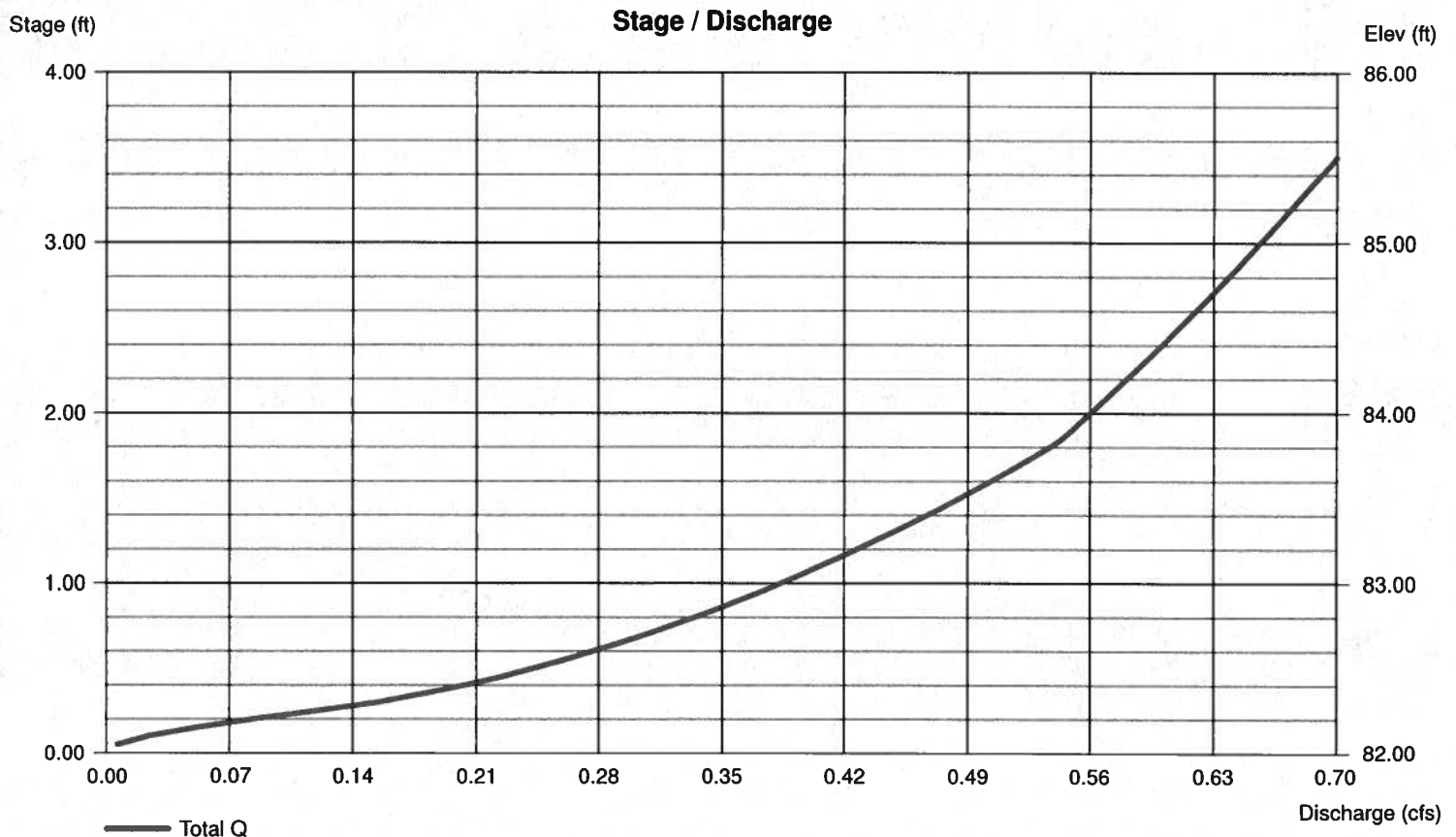
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 4.00	0.00	0.00	0.00
Span (in)	= 4.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 82.00	0.00	0.00	0.00
Length (ft)	= 20.00	0.00	0.00	0.00
Slope (%)	= 5.00	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)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
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 Report

Hydraflow Hydrographs by Intelisolve v9.1

Tuesday, Aug 11, 2020

Hyd. No. 1

Proposed South

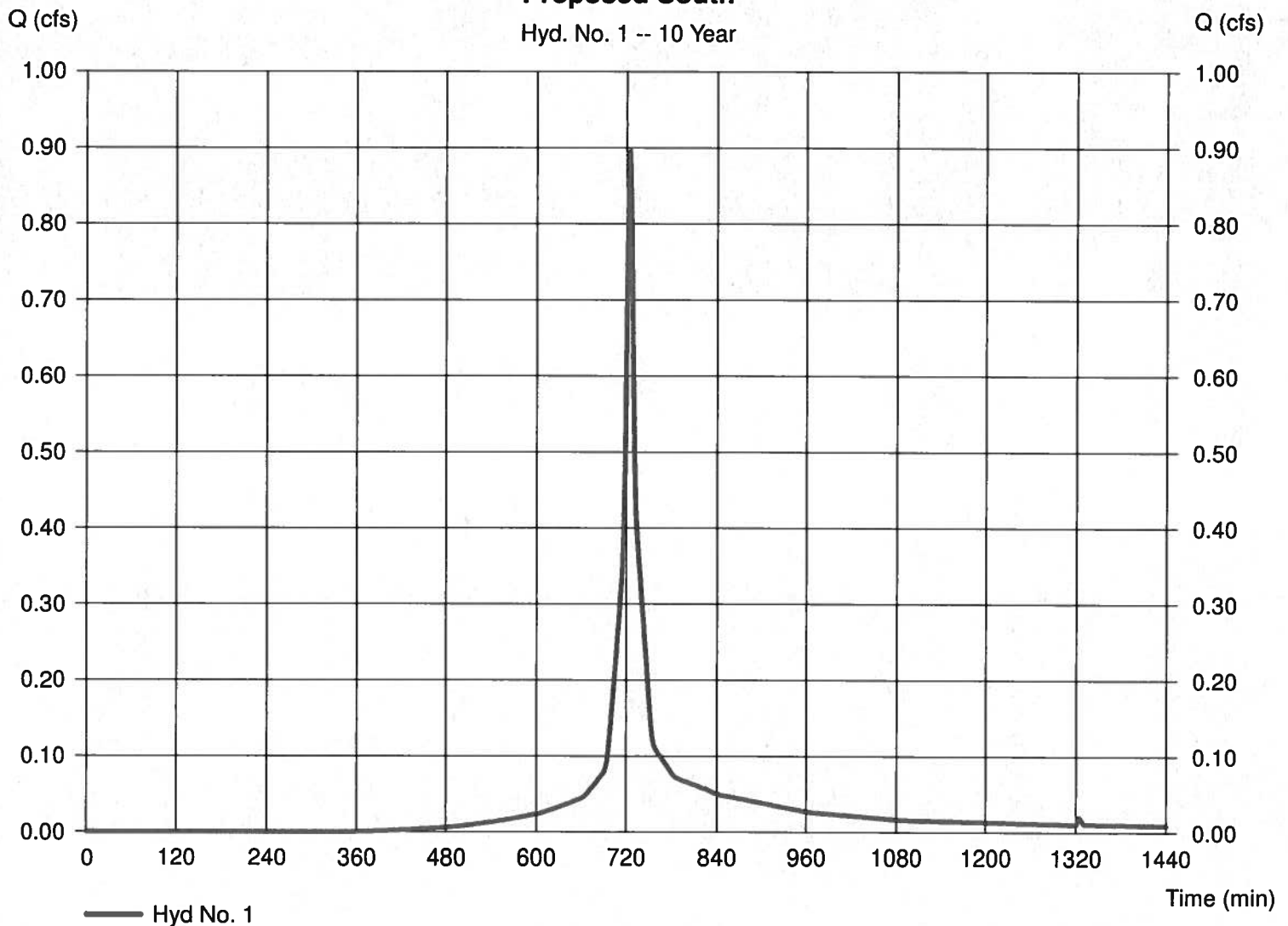
Hydrograph type = SCS Runoff
 Storm frequency = 10 yrs
 Time interval = 2 min
 Drainage area = 0.250 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 4.70 in
 Storm duration = 24 hrs

Peak discharge = 0.895 cfs
 Time to peak = 724 min
 Hyd. volume = 2,712 cuft
 Curve number = 86*
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

* Composite (Area/CN) = $[(0.130 \times 98) + (0.120 \times 74)] / 0.250$

Proposed South

Hyd. No. 1 -- 10 Year



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Tuesday, Aug 11, 2020

Hyd. No. 2

Proposed North

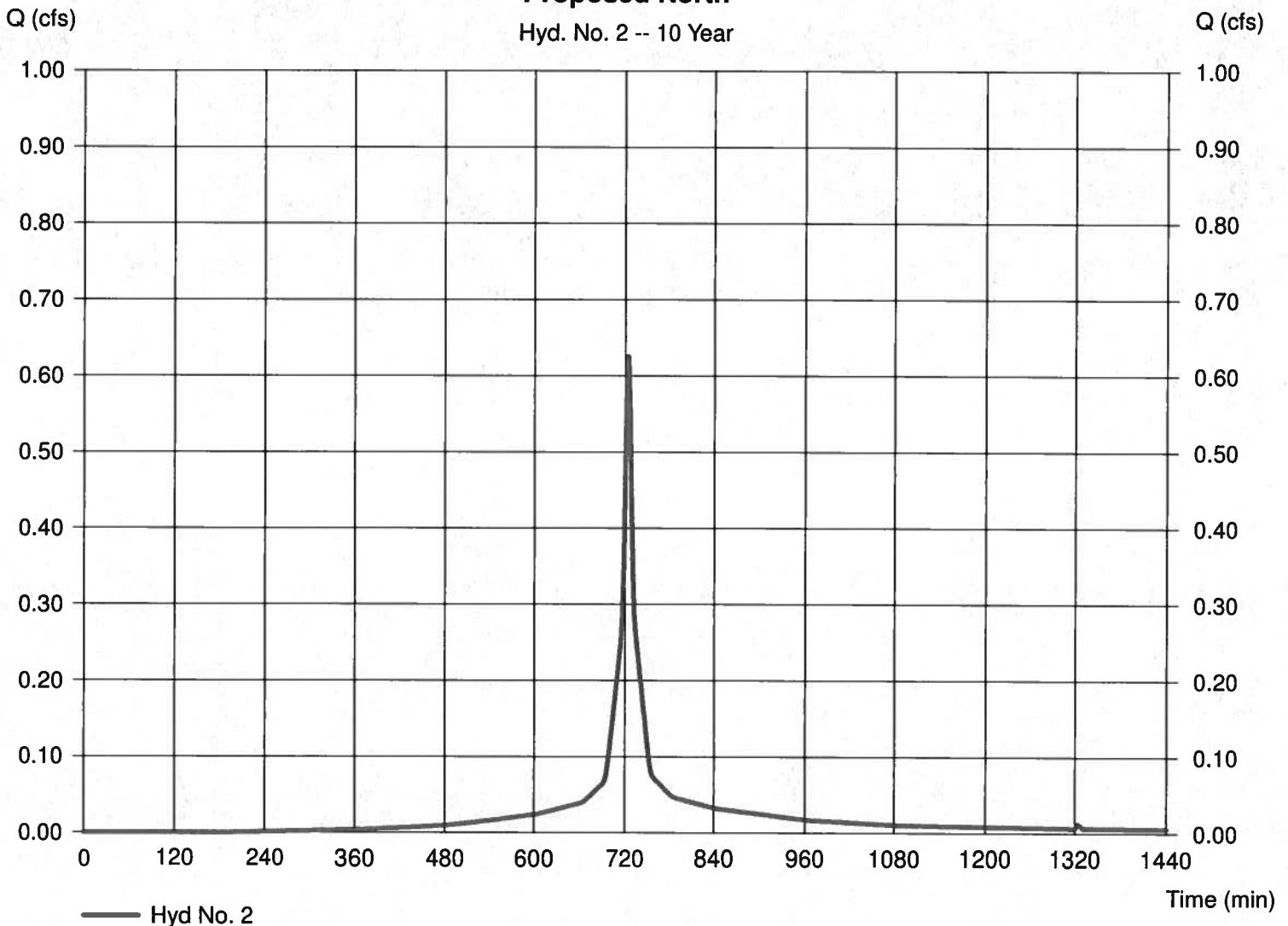
Hydrograph type = SCS Runoff
 Storm frequency = 10 yrs
 Time interval = 2 min
 Drainage area = 0.150 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 4.70 in
 Storm duration = 24 hrs

Peak discharge = 0.626 cfs
 Time to peak = 724 min
 Hyd. volume = 1,993 cuft
 Curve number = 93*
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

* Composite (Area/CN) = $[(0.120 \times 98) + (0.030 \times 74)] / 0.150$

Proposed North

Hyd. No. 2 -- 10 Year

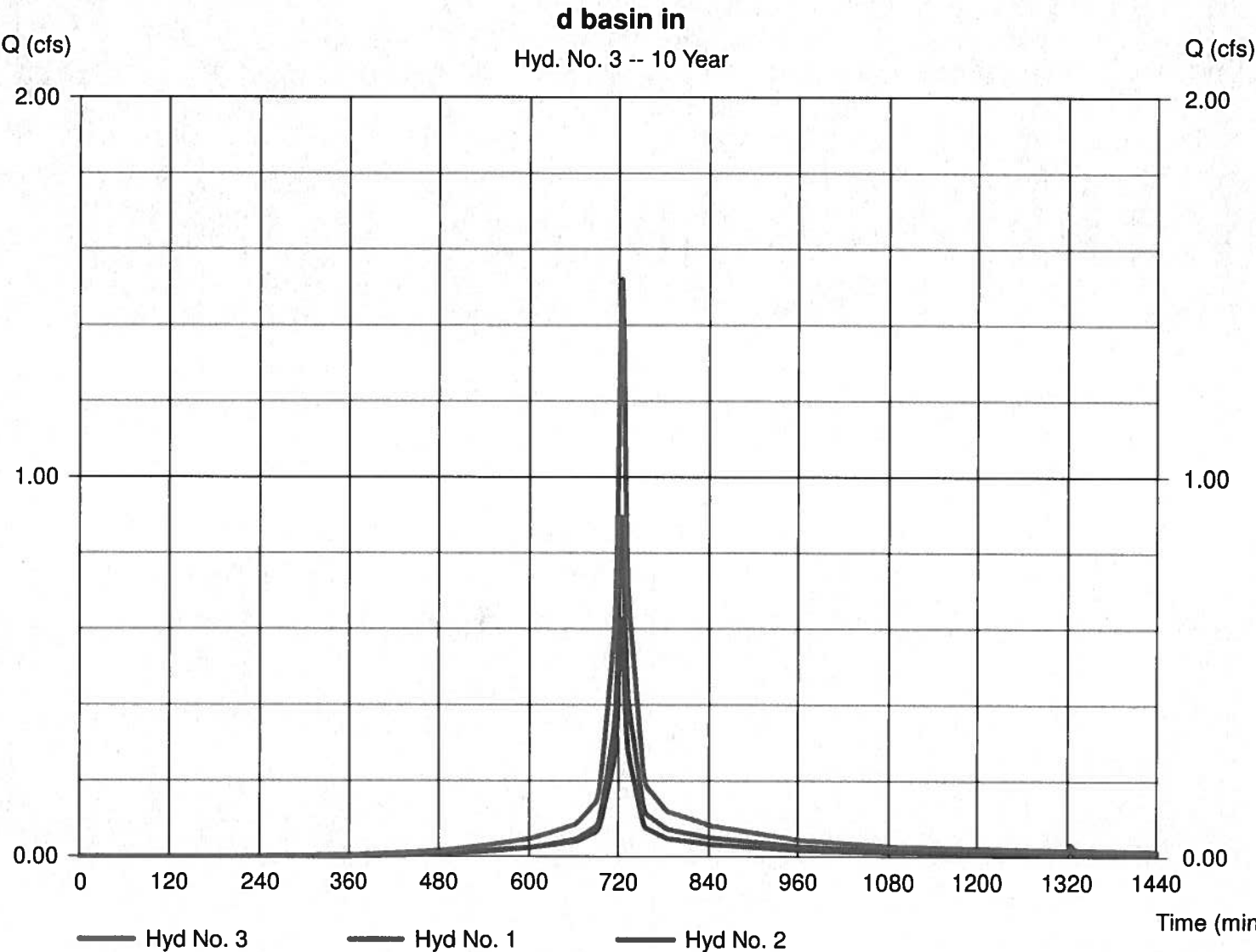


Hydrograph Report

Hyd. No. 3

d basin in

Hydrograph type	= Combine	Peak discharge	= 1.521 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 4,705 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 0.400 ac



Hydrograph Report

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Hydraflow Hydrographs by Intelisolve v9.1

Tuesday, Aug 11, 2020

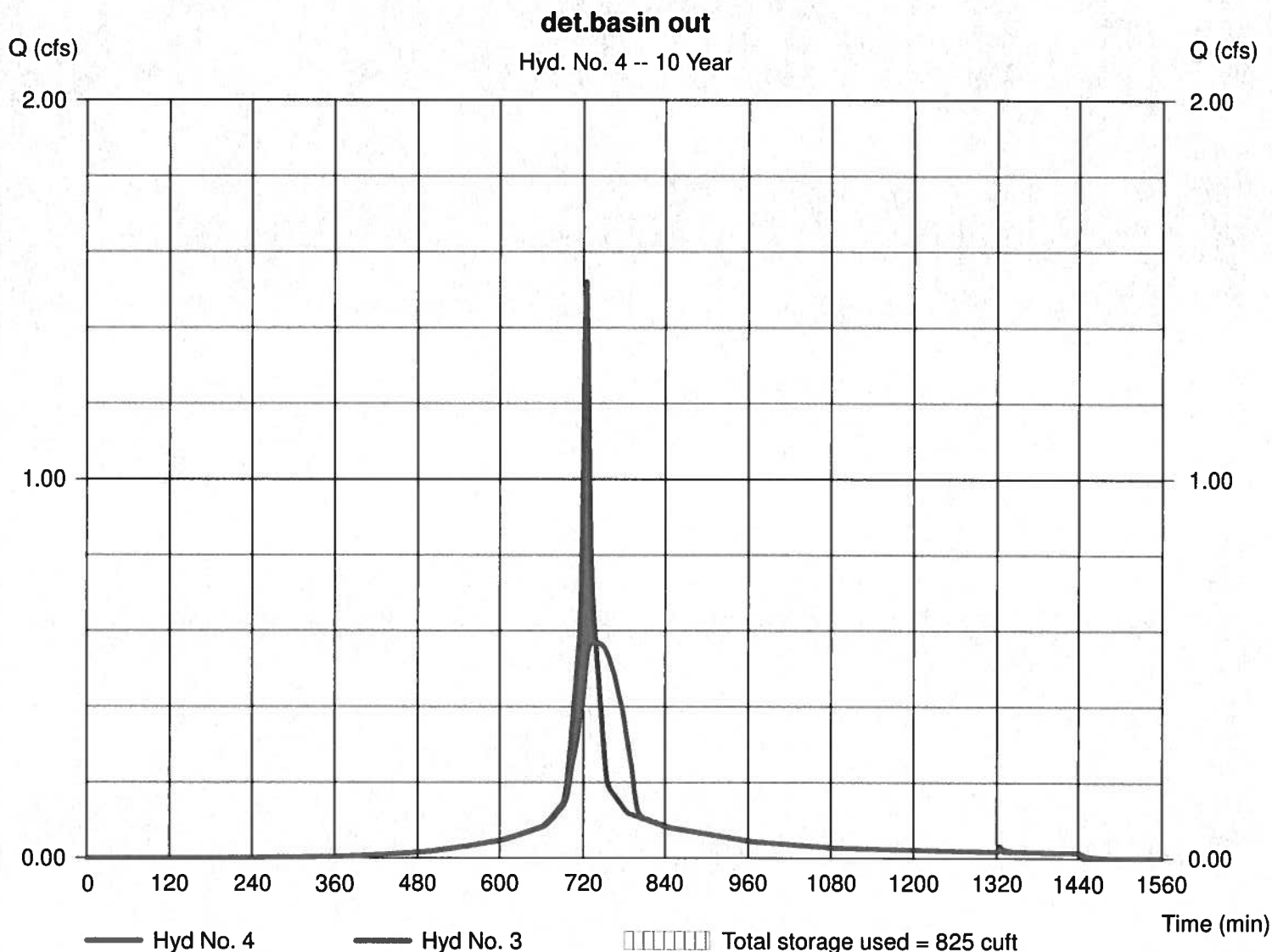
Hyd. No. 4

det.basin out

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Time interval = 2 min
Inflow hyd. No. = 3 - d basin in
Reservoir name = <New Pond>

Peak discharge = 0.570 cfs
Time to peak = 738 min
Hyd. volume = 4,704 cuft
Max. Elevation = 84.09 ft
Max. Storage = 825 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Tuesday, Aug 11, 2020

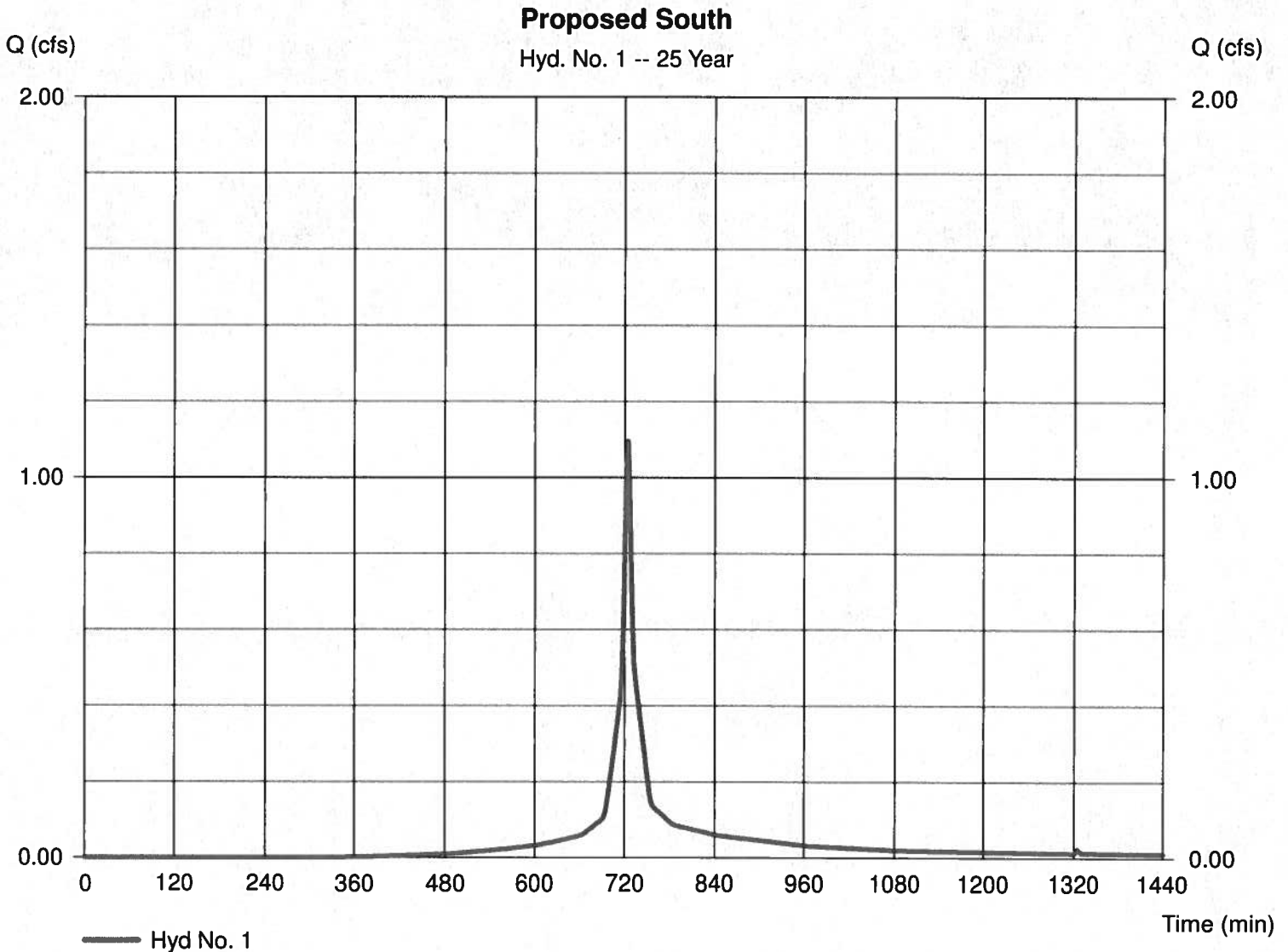
Hyd. No. 1

Proposed South

Hydrograph type = SCS Runoff
 Storm frequency = 25 yrs
 Time interval = 2 min
 Drainage area = 0.250 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 5.50 in
 Storm duration = 24 hrs

Peak discharge = 1.096 cfs
 Time to peak = 724 min
 Hyd. volume = 3,349 cuft
 Curve number = 86*
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

* Composite (Area/CN) = $[(0.130 \times 98) + (0.120 \times 74)] / 0.250$



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Tuesday, Aug 11, 2020

Hyd. No. 2

Proposed North

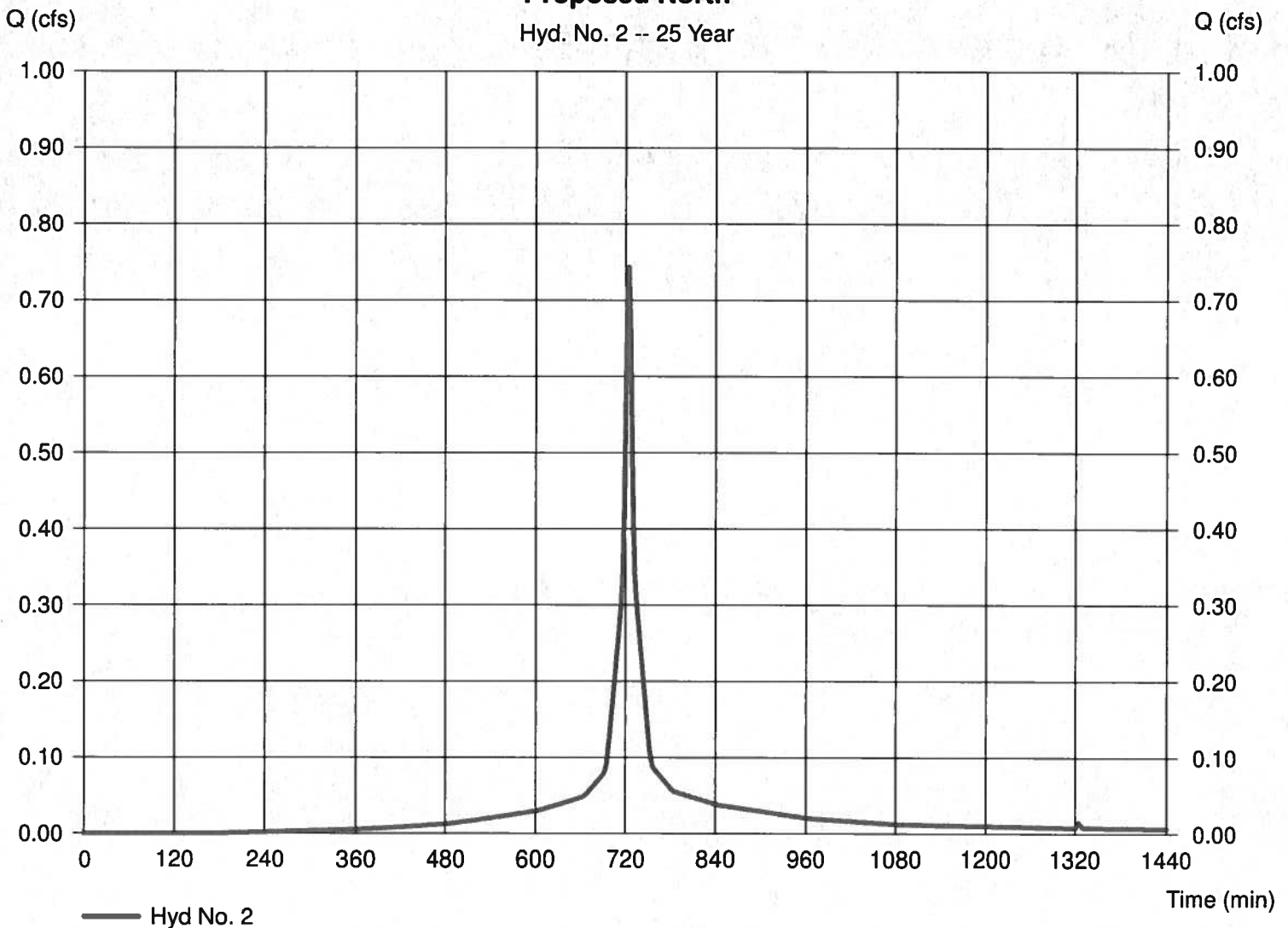
Hydrograph type = SCS Runoff
 Storm frequency = 25 yrs
 Time interval = 2 min
 Drainage area = 0.150 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 5.50 in
 Storm duration = 24 hrs

Peak discharge = 0.743 cfs
 Time to peak = 724 min
 Hyd. volume = 2,394 cuft
 Curve number = 93*
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

* Composite (Area/CN) = $[(0.120 \times 98) + (0.030 \times 74)] / 0.150$

Proposed North

Hyd. No. 2 -- 25 Year



Hydrograph Report

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Hydraflow Hydrographs by Intelisolve v9.1

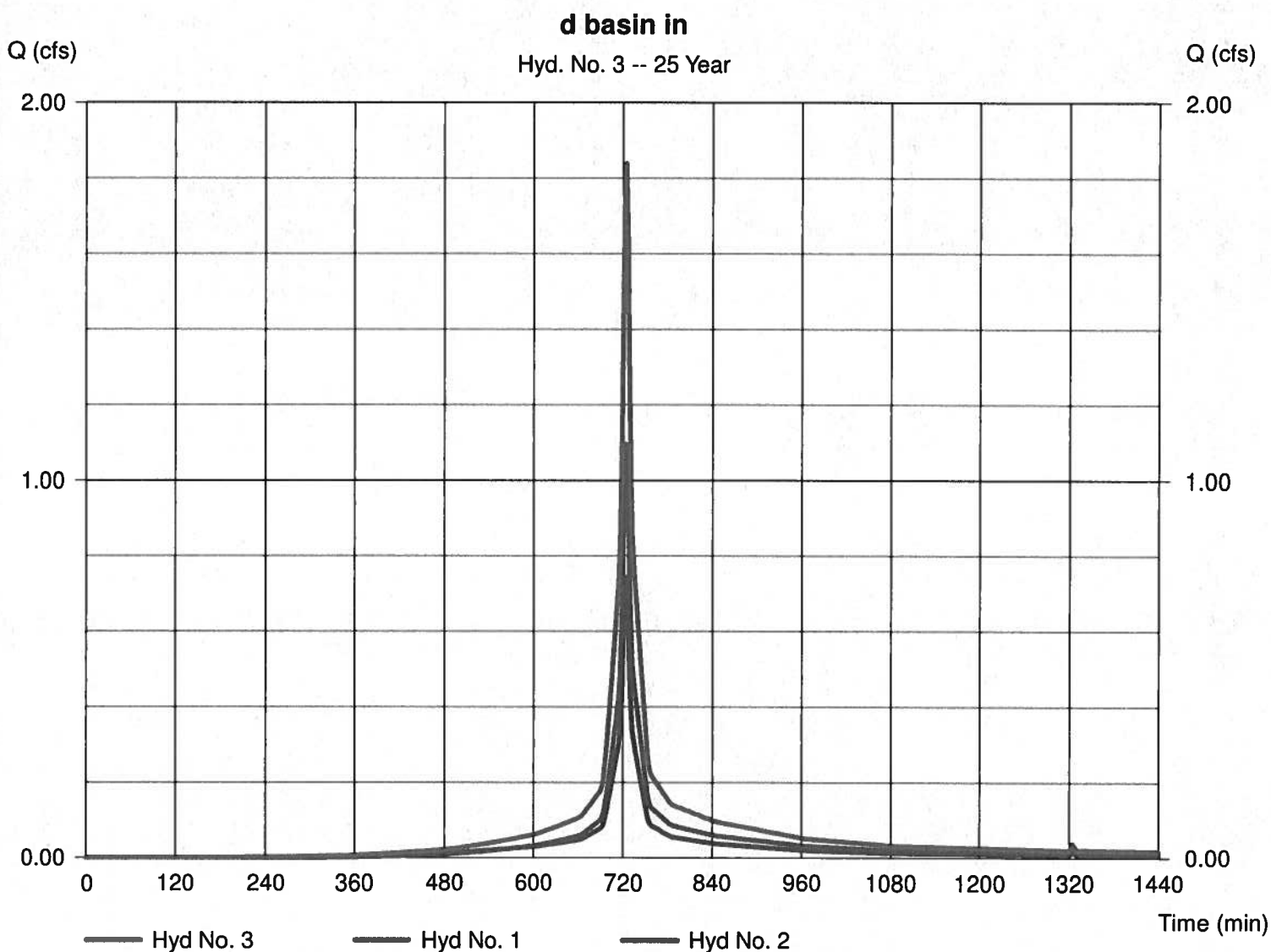
Tuesday, Aug 11, 2020

Hyd. No. 3

d basin in

Hydrograph type = Combine
Storm frequency = 25 yrs
Time interval = 2 min
Inflow hyds. = 1, 2

Peak discharge = 1.839 cfs
Time to peak = 724 min
Hyd. volume = 5,743 cuft
Contrib. drain. area = 0.400 ac



Hydrograph Report

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Hydraflow Hydrographs by Intelisolve v9.1

Tuesday, Aug 11, 2020

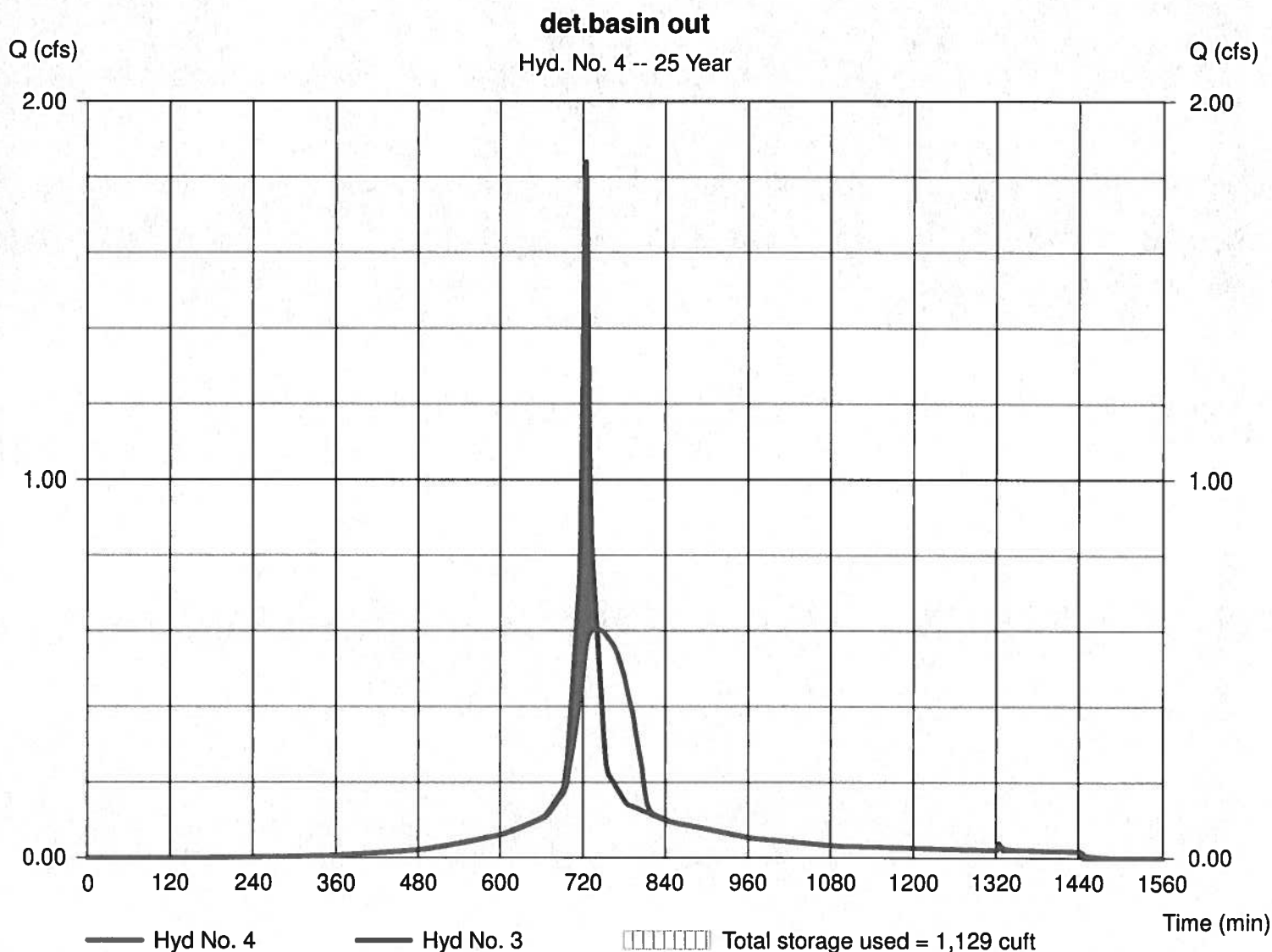
Hyd. No. 4

det.basin out

Hydrograph type = Reservoir
Storm frequency = 25 yrs
Time interval = 2 min
Inflow hyd. No. = 3 - d basin in
Reservoir name = <New Pond>

Peak discharge = 0.605 cfs
Time to peak = 740 min
Hyd. volume = 5,742 cuft
Max. Elevation = 84.45 ft
Max. Storage = 1,129 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Tuesday, Aug 11, 2020

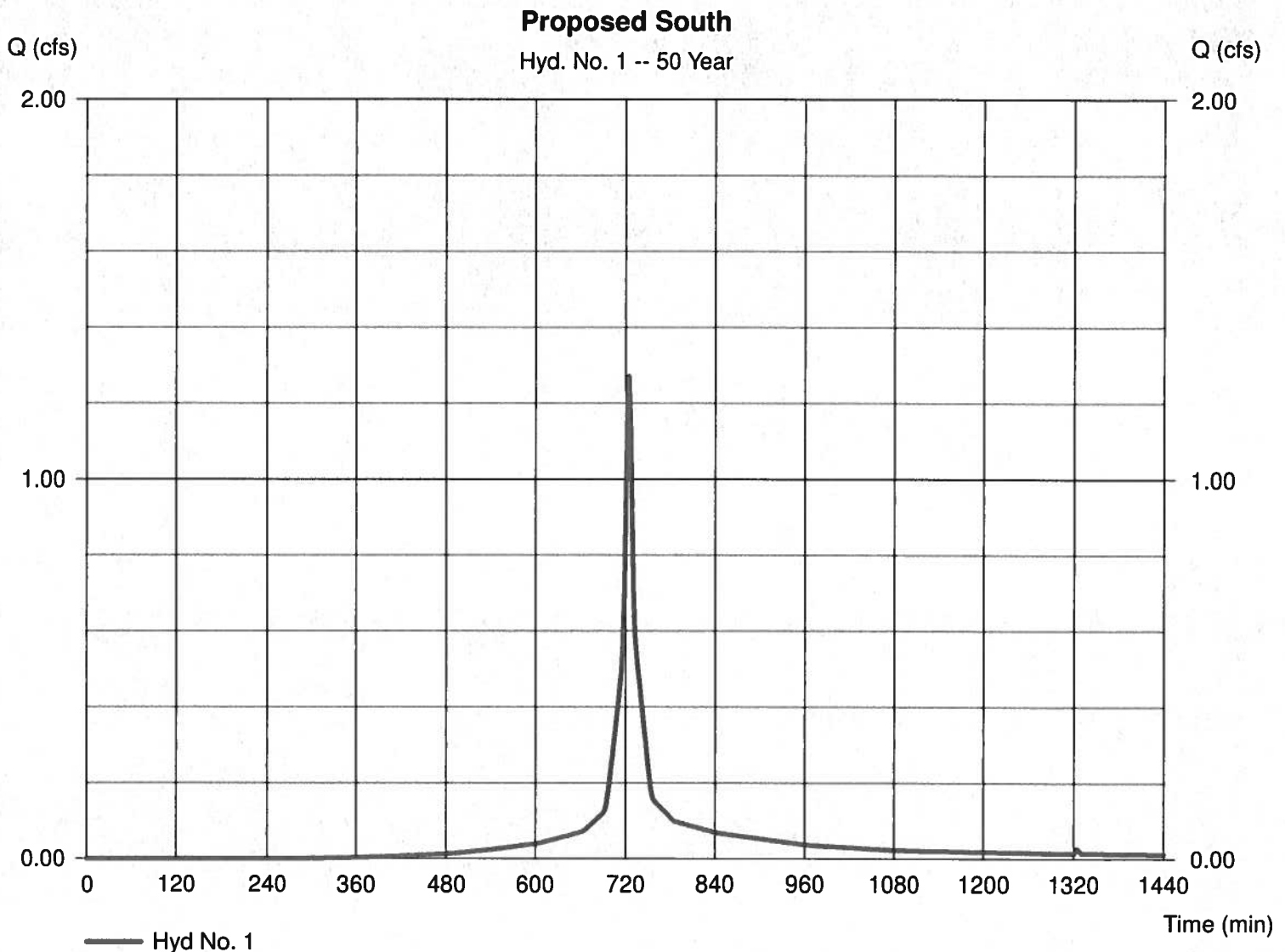
Hyd. No. 1

Proposed South

Hydrograph type = SCS Runoff
 Storm frequency = 50 yrs
 Time interval = 2 min
 Drainage area = 0.250 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 6.20 in
 Storm duration = 24 hrs

Peak discharge = 1.271 cfs
 Time to peak = 724 min
 Hyd. volume = 3,913 cuft
 Curve number = 86*
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

* Composite (Area/CN) = $[(0.130 \times 98) + (0.120 \times 74)] / 0.250$



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Tuesday, Aug 11, 2020

Hyd. No. 2

Proposed North

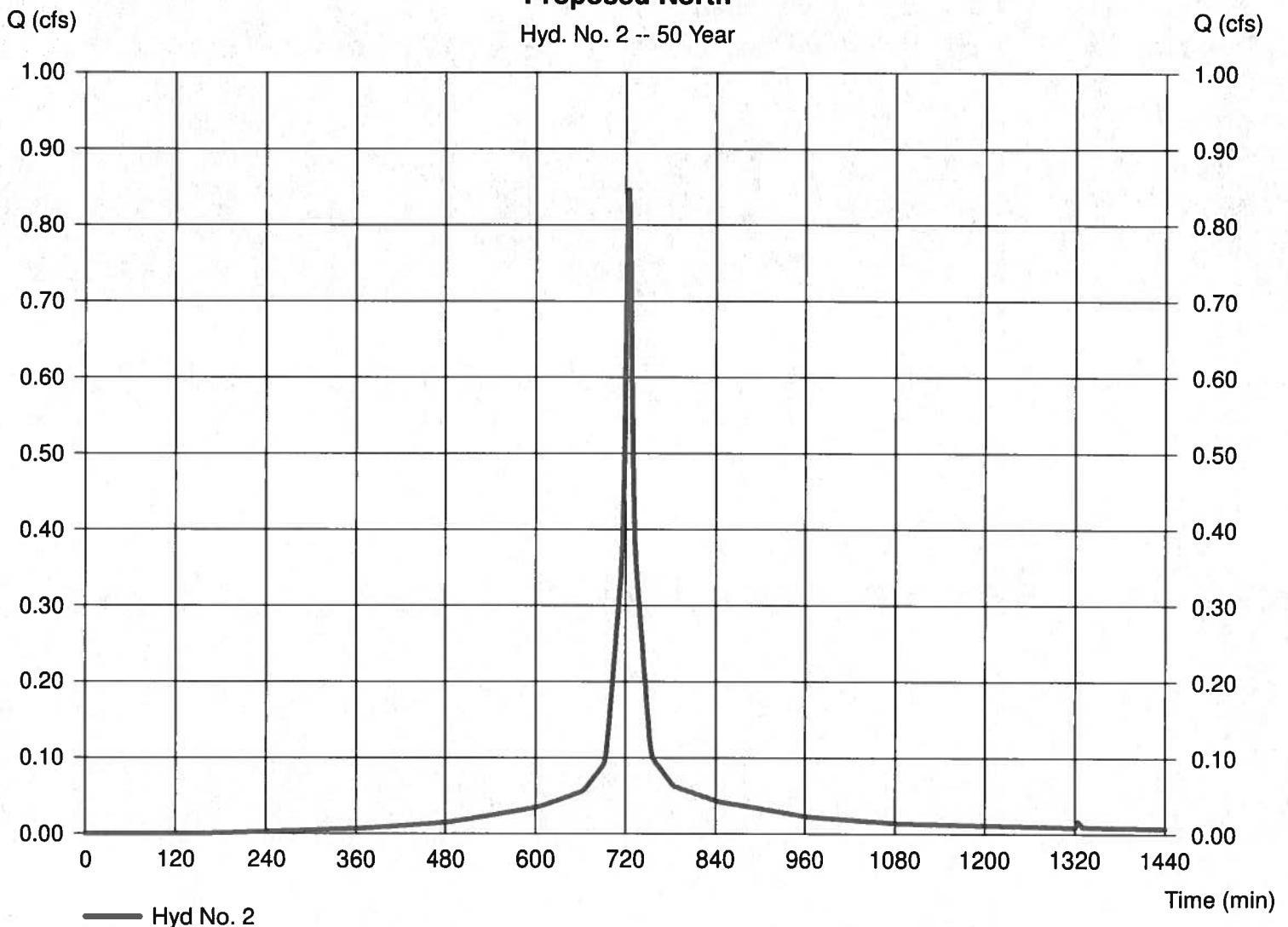
Hydrograph type = SCS Runoff
 Storm frequency = 50 yrs
 Time interval = 2 min
 Drainage area = 0.150 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 6.20 in
 Storm duration = 24 hrs

Peak discharge = 0.846 cfs
 Time to peak = 724 min
 Hyd. volume = 2,746 cuft
 Curve number = 93*
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

* Composite (Area/CN) = $[(0.120 \times 98) + (0.030 \times 74)] / 0.150$

Proposed North

Hyd. No. 2 -- 50 Year



Hydrograph Report

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Hydraflow Hydrographs by Intelisolve v9.1

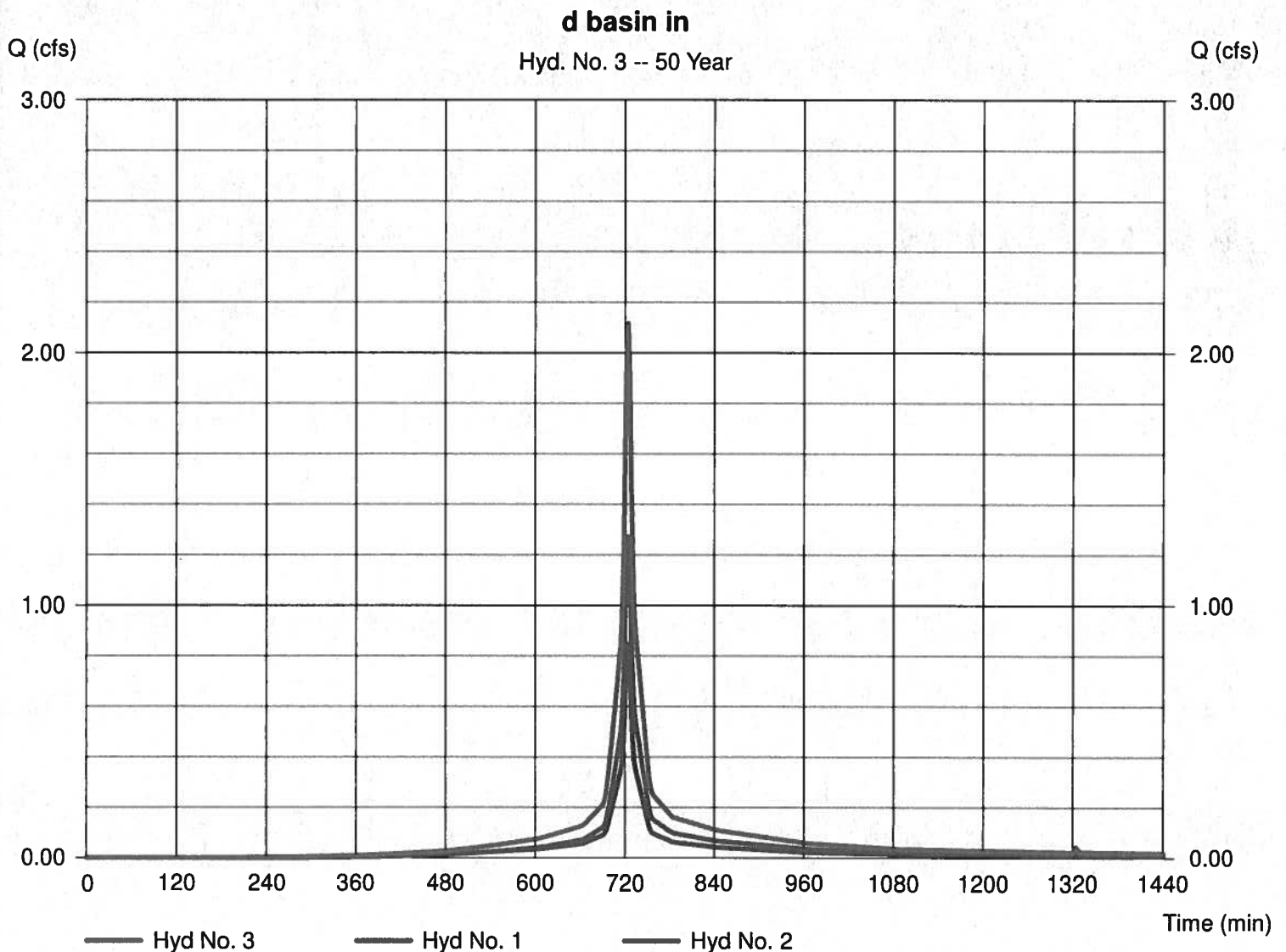
Tuesday, Aug 11, 2020

Hyd. No. 3

d basin in

Hydrograph type = Combine
Storm frequency = 50 yrs
Time interval = 2 min
Inflow hyds. = 1, 2

Peak discharge = 2.117 cfs
Time to peak = 724 min
Hyd. volume = 6,660 cuft
Contrib. drain. area = 0.400 ac



Hydrograph Report

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Hydraflow Hydrographs by Intelisolve v9.1

Tuesday, Aug 11, 2020

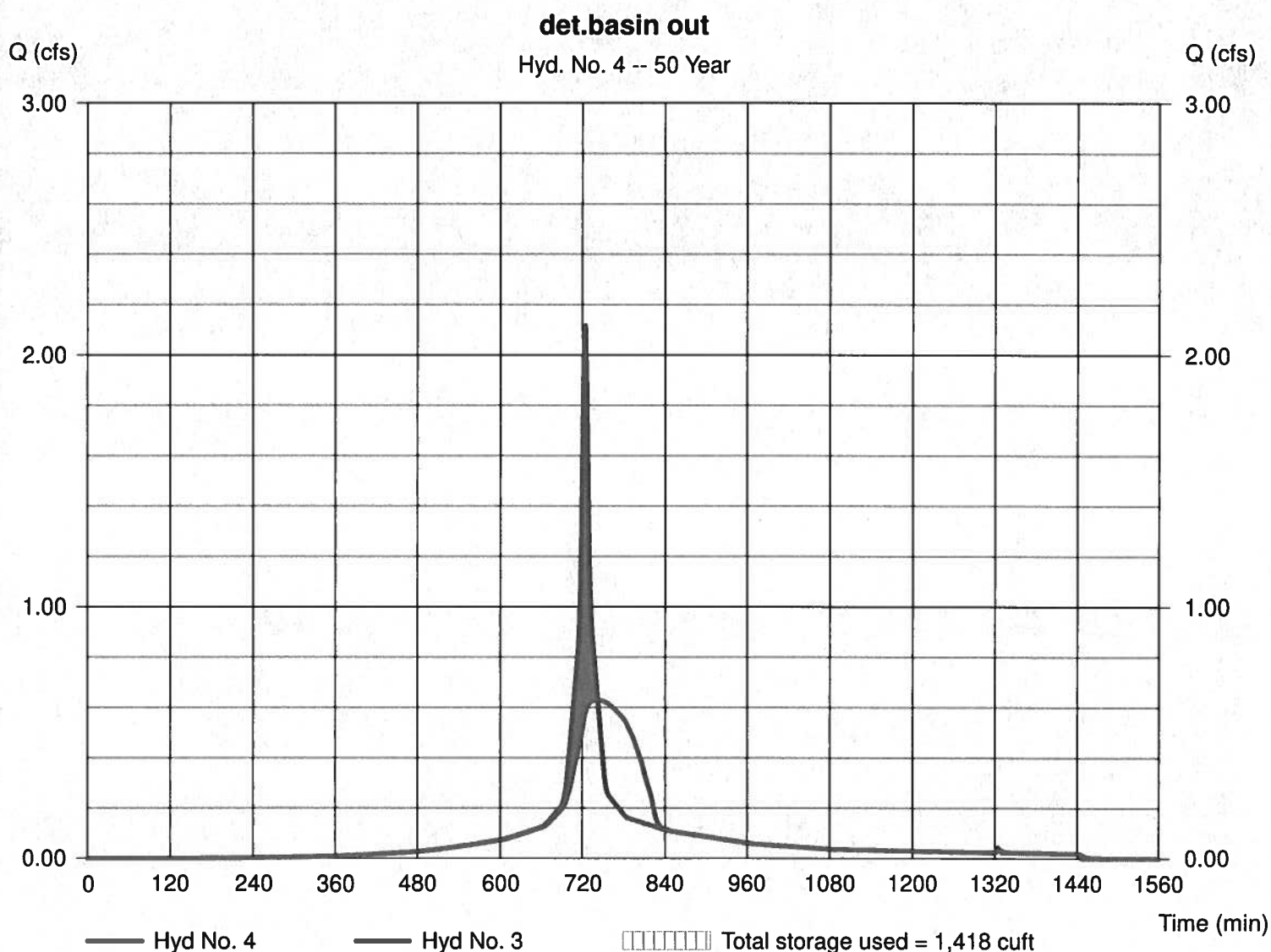
Hyd. No. 4

det.basin out

Hydrograph type = Reservoir
Storm frequency = 50 yrs
Time interval = 2 min
Inflow hyd. No. = 3 - d basin in
Reservoir name = <New Pond>

Peak discharge = 0.630 cfs
Time to peak = 742 min
Hyd. volume = 6,659 cuft
Max. Elevation = 84.71 ft
Max. Storage = 1,418 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.1

Tuesday, Aug 11, 2020

Hyd. No. 1

Proposed South

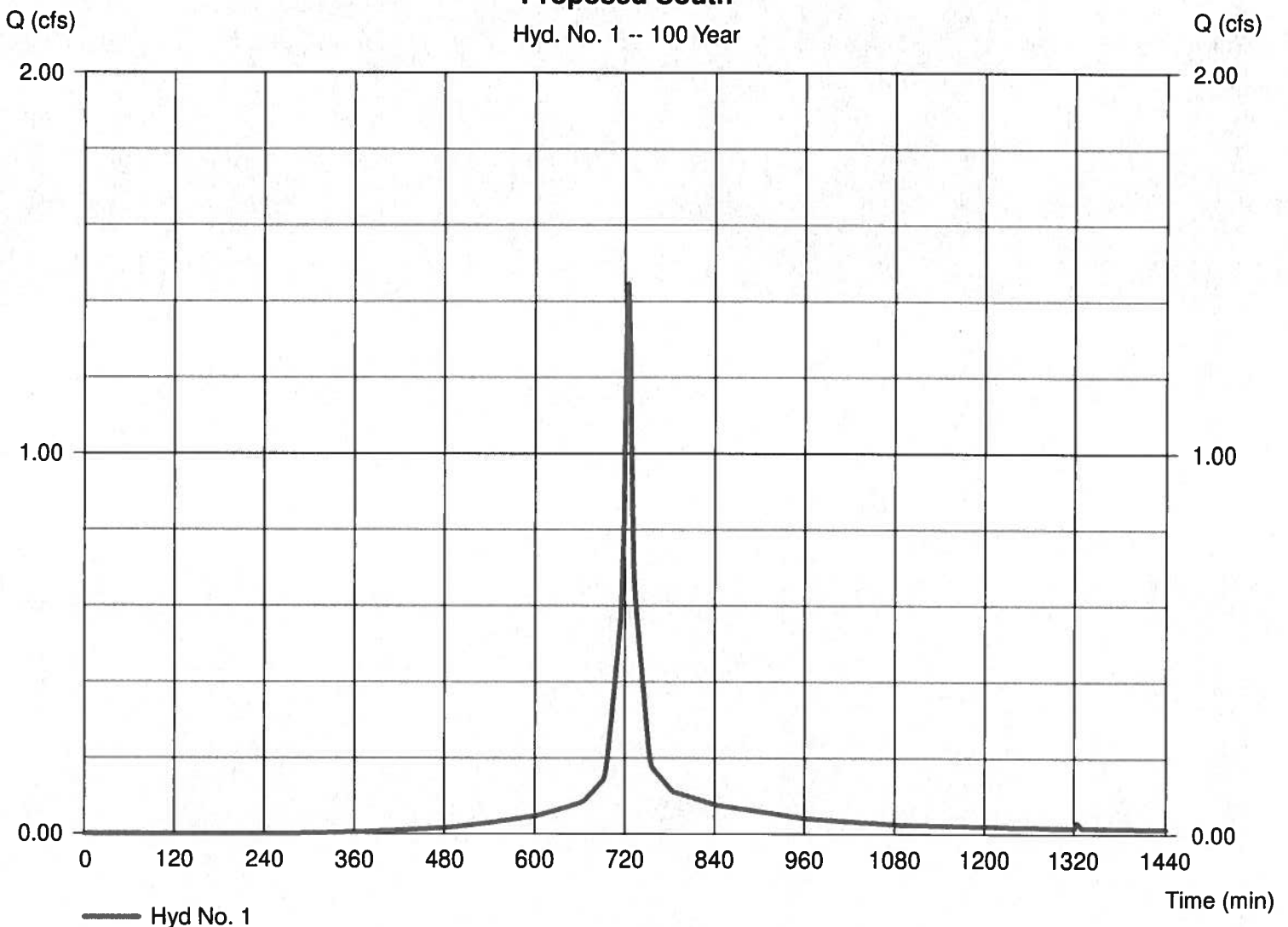
Hydrograph type = SCS Runoff
 Storm frequency = 100 yrs
 Time interval = 2 min
 Drainage area = 0.250 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 6.90 in
 Storm duration = 24 hrs

Peak discharge = 1.446 cfs
 Time to peak = 724 min
 Hyd. volume = 4,483 cuft
 Curve number = 86*
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type III
 Shape factor = 484

* Composite (Area/CN) = $[(0.130 \times 98) + (0.120 \times 74)] / 0.250$

Proposed South

Hyd. No. 1 -- 100 Year



Hydrograph Report

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Hydraflow Hydrographs by Intelisolve v9.1

Tuesday, Aug 11, 2020

Hyd. No. 2

Proposed North

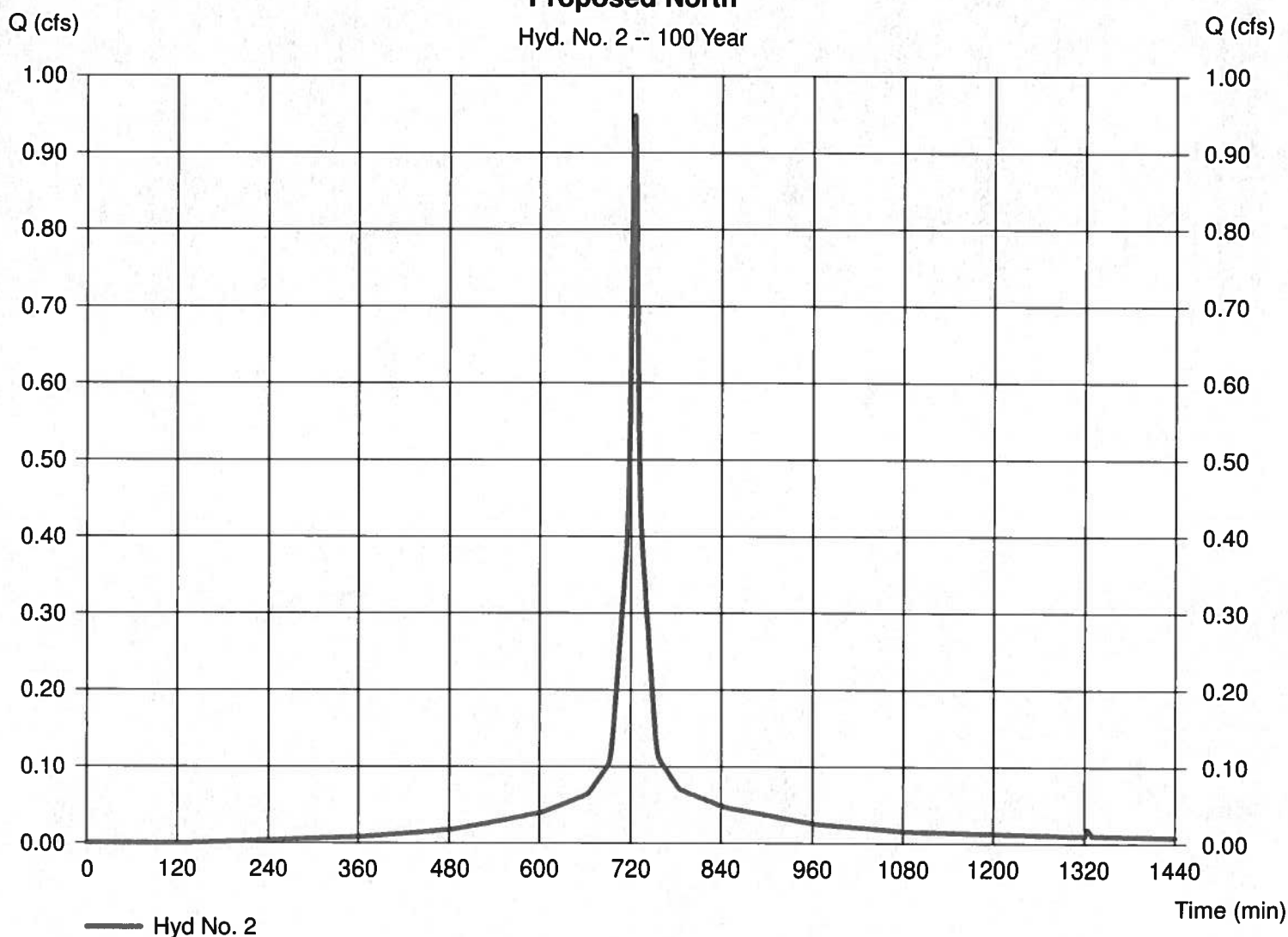
Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 2 min
Drainage area = 0.150 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 6.90 in
Storm duration = 24 hrs

Peak discharge = 0.948 cfs
Time to peak = 724 min
Hyd. volume = 3,100 cuft
Curve number = 93*
Hydraulic length = 0 ft
Time of conc. (Tc) = 5.00 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = $[(0.120 \times 98) + (0.030 \times 74)] / 0.150$

Proposed North

Hyd. No. 2 -- 100 Year

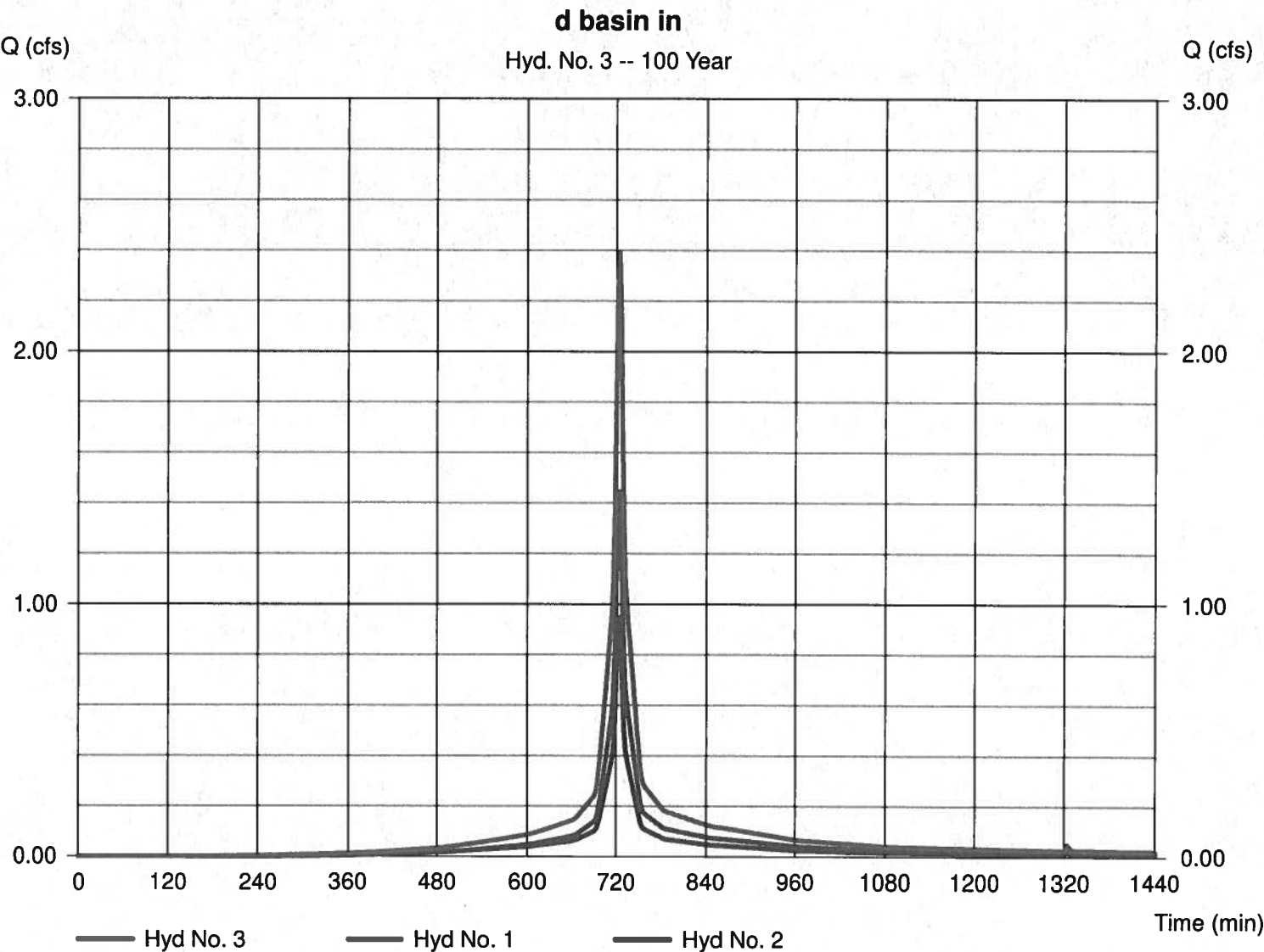


Hydrograph Report

Hyd. No. 3

d basin in

Hydrograph type	= Combine	Peak discharge	= 2.394 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 7,583 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 0.400 ac



Hydrograph Report

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Hydraflow Hydrographs by Intelisolve v9.1

Tuesday, Aug 11, 2020

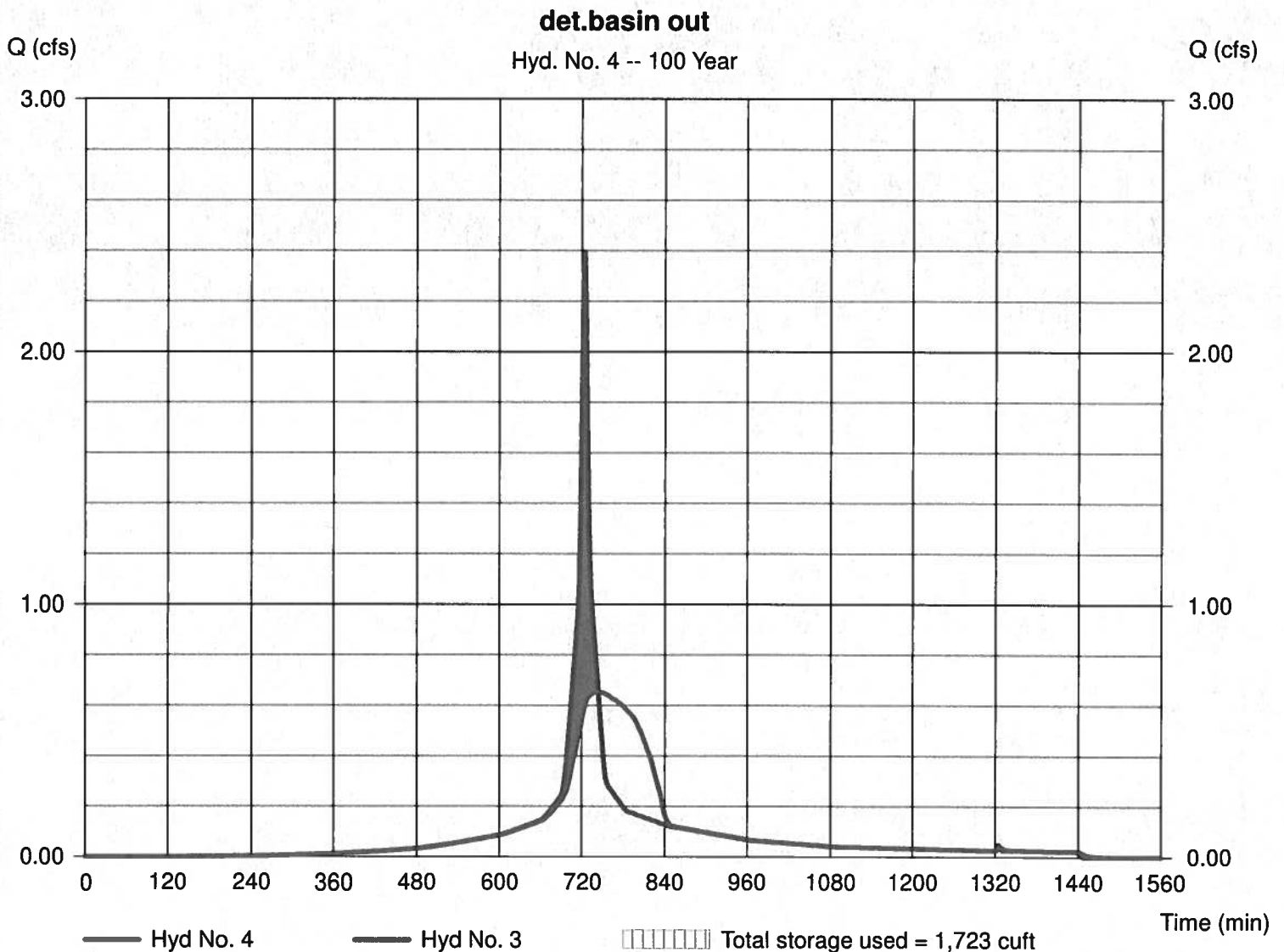
Hyd. No. 4

det.basin out

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Time interval = 2 min
Inflow hyd. No. = 3 - d basin in
Reservoir name = <New Pond>

Peak discharge = 0.653 cfs
Time to peak = 744 min
Hyd. volume = 7,582 cuft
Max. Elevation = 84.96 ft
Max. Storage = 1,723 cuft

Storage Indication method used.



APPENDIX C: DRAINAGE PIPING CALCULATIONS

BORGHESI BUILDING & ENGINEERING CO.

2155 EAST MAIN ST., TORRINGTON, CT

Valvoline

818 Sullivan Ave., South Windsor, CT

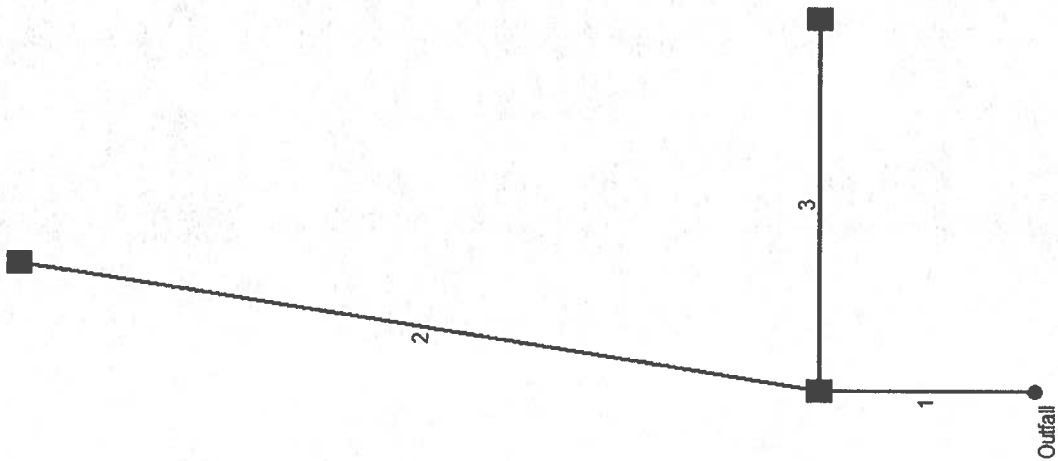
RUNOFF COEFFICIENTS

LINE	AREA DESCRIPTION	AREA (ACRE)	C	CA	TC (MIN)
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WATERSHED ANALYSIS

CB1	PAVED, BLDG.	0.03	0.95	0.03	5
	GRASS	0.00	0.30	0.00	
	TOTAL	0.03	0.95	0.03	
CB2	PAVED, BLDG.	0.12	0.95	0.11	5
	GRASS	0.03	0.30	0.01	
	TOTAL	0.15	0.82	0.12	
CB3	PAVED, BLDG.	0.10	0.95	0.10	5
	GRASS	0.03	0.30	0.01	
	TOTAL	0.13	0.80	0.10	

Hydraflow Plan View



Page 1

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID	
Line	To Line		Incr (ac)	Total (ac)		Incr	Total	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)		
1	End	20.0	0.03	0.31	0.95	0.03	0.26	5.0	6.2	6.4	1.63	2.52	3.40	12	0.50	82.10	82.00	82.69	82.59	85.50	86.00	CB1	
2	1	75.0	0.15	0.15	0.82	0.12	0.12	5.0	5.0	6.7	0.82	2.60	1.34	12	0.53	82.50	82.10	83.12	83.08	85.00	85.50	CB2	
3	1	38.0	0.13	0.13	0.80	0.10	0.10	5.0	5.0	6.7	0.70	3.65	1.15	12	1.05	82.50	82.10	83.10	83.10	85.50	85.50	CB3	
Project File: Valvoline South Windsor.stm																						Run Date: 08-11-2020	
Number of lines: 3																							
NOTES: Intensity = 101.98 / (Inlet time + 15.80) ^ 0.90; Return period = 25 Yrs.																							

APPENDIX D: WATERSHED MAP