

PCSM PLAN NARRATIVE & CALCULATIONS
208 North Aberdeen Ave Townhouses
Radnor Township, Delaware County
Plan Prepared For: 210 N. Aberdeen Associates, Owner

Date: May 6, 2020

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Plan Prepared By:
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P.O. Box 1992
Southeastern, PA 19399



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EXECUTIVE SUMMARY
GRADING PERMIT
NARRATIVE

The Owner/Applicant, 210 N. Aberdeen Associates, LLC, proposes to construct 6 townhomes at 208 Aberdeen Ave per draft Ordinance 2019-15, dated February 19, 2020. Stormwater design is based on the maximum impervious coverage of 60%, 12,049 SF (including 77 SF of future impervious). The property is in the Gulph Creek Watershed. The proposed stormwater basin will reduce the post-construction storm peak runoff rate to the pre-construction storm peak runoff rates required by Table 408.2 and provide the required retention and water quality volumes.

The limit of disturbance and stormwater regulatory area is 18,034 SF. During construction erosion and sediment control is accomplished through limited disturbance, immediate stabilization, and silt barriers.

A	B	C	D	E	F	G	H	I																								
COMPLIANCE SUMMARY																																
1	EVENT: RADNOR STORMWATER MANAGEMENT PROJECT: 208 N ABERDEEN LOCATION: ENTIRE DRAINAGE AREA																															
2	DATE: 5/1/2020																															
3	BY: LPS																															
4	REVISED:																															
5																																
6	Hydrograph Description		Peak Outflow (cfs)				COMMENTS																									
7	1-Yr	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr																									
8	PROJECT AREA ANALYSIS																															
9	RELEASE District	408.2	2YR POST<=1YR PRE; 5<=2;10<=5;25<=10;50<=25;100<=100																													
10	PRE-DEV - REGULATED AREA	1.13	1.53	1.70	1.90	2.12	2.32	Hydrograph #1																								
11	REQUIREMENT FOR RA	-	1.31	1.53	1.70	1.90	2.32	Table408.2																								
12	SITE DISCHARGE	-	0.25	0.29	0.33	0.36	0.41	Hydrograph #6																								
13	PASS/ FAIL	-	PASS	PASS	PASS	PASS	PASS																									
14																																
15	CHAPTER 245-22.A(2)(a): RETENTION VOLUME, Rev (=>1,500 SF)																															
16																																
17	2 YEAR POST-DEVELOPMENT		427	C.F.				HYD#2																								
18	2 YEAR PRE-DEVELOPMENT		393	C.F.				HYD#1																								
19	DIFFERENCE		34	C.F.																												
20	BASIN INFILTRATION VOL		778	C.F.																												
21			PASS																													
22																																
23																																
24	PROVIDED INFILTRATION VOLUME																															
25		ELEVATION	CU FT																													
26	LOWER ELEVATION	371.50	778																													
27	LOWEST ORIFICE	371.50	778																													
28	UPPER ELEVATION																															
29																																
30	CHAP 245-22.A(1)(c): DEWATER TIME																															
31	INFILTRATION RATE (IN/HR - TESTED)	0.1																														
32	BASIN FOOTPRINT (SF)	731																														
33	INFILTRATION VOLUME (CF)	778																														
34	DEWATER TIME (HRS)	91																														
35	MAX ALLOWED	96																														
36		Pass																														
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3">CHAP 245-22.A(2)(b): RETENTION VOLUME, Rev (>500&<1,500 SF)</th> </tr> <tr> <th>PARAMETER</th> <th>VALUE</th> <th>UNIT</th> </tr> </thead> <tbody> <tr> <td>P</td> <td>1</td> <td>IN</td> </tr> <tr> <td>IMPERVIOUS</td> <td>>1500 SF</td> <td>SF</td> </tr> <tr> <td>Rev</td> <td>N/A</td> <td>CF</td> </tr> <tr> <td>BASIN</td> <td>778</td> <td>CF</td> </tr> <tr> <td></td> <td>N/A</td> <td></td> </tr> </tbody> </table>									CHAP 245-22.A(2)(b): RETENTION VOLUME, Rev (>500&<1,500 SF)			PARAMETER	VALUE	UNIT	P	1	IN	IMPERVIOUS	>1500 SF	SF	Rev	N/A	CF	BASIN	778	CF		N/A				
CHAP 245-22.A(2)(b): RETENTION VOLUME, Rev (>500&<1,500 SF)																																
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<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3">CHAP 245-23.D(1): WATER QUALITY VOLUME, WQV</th> </tr> <tr> <th>PARAMETER</th> <th>VALUE</th> <th>UNIT</th> </tr> </thead> <tbody> <tr> <td>P</td> <td>1</td> <td>IN</td> </tr> <tr> <td>A</td> <td>0.34</td> <td>AC</td> </tr> <tr> <td>I</td> <td>65</td> <td>%</td> </tr> <tr> <td>Rev</td> <td>775</td> <td>CF</td> </tr> <tr> <td>BASIN</td> <td>778</td> <td>CF</td> </tr> <tr> <td></td> <td>PASS</td> <td></td> </tr> </tbody> </table>									CHAP 245-23.D(1): WATER QUALITY VOLUME, WQV			PARAMETER	VALUE	UNIT	P	1	IN	A	0.34	AC	I	65	%	Rev	775	CF	BASIN	778	CF		PASS	
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Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

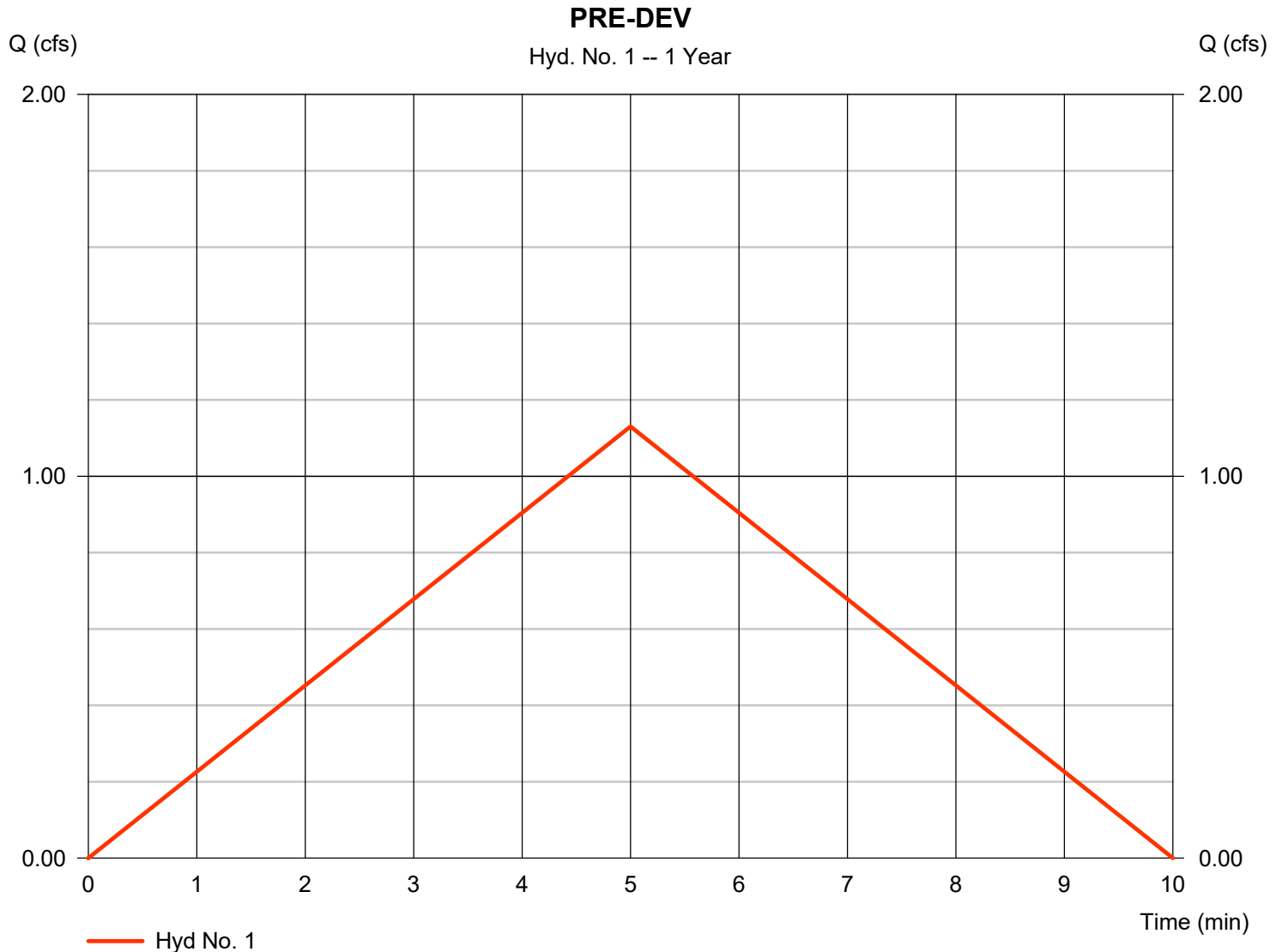
Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	Mod. Rational	-----	1.130	1.309	-----	1.527	1.701	1.895	2.123	2.315	PRE-DEV
2	Mod. Rational	-----	1.229	1.423	-----	1.660	1.849	2.060	2.308	2.516	POST-DEV
3	Mod. Rational	-----	0.217	0.252	-----	0.294	0.327	0.364	0.408	0.445	POST-DEV BYPASS
4	Mod. Rational	-----	1.087	1.259	-----	1.468	1.635	1.822	2.042	2.226	POST-DEV CAPTURED
5	Reservoir	4	0.000	0.000	-----	0.000	0.000	0.000	0.000	0.000	POST-DEV BED DISCHARGE
6	Combine	3, 5	0.217	0.252	-----	0.294	0.327	0.364	0.408	0.445	TOTAL SITE DISCHARGE

Hyd. No. 1

PRE-DEV

Hydrograph type	= Mod. Rational	Peak discharge	= 1.130 cfs
Storm frequency	= 1 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 339 cuft
Drainage area	= 0.410 ac	Runoff coeff.	= 0.69*
Intensity	= 3.995 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.246 x 0.99) + (0.168 x 0.25)] / 0.410



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

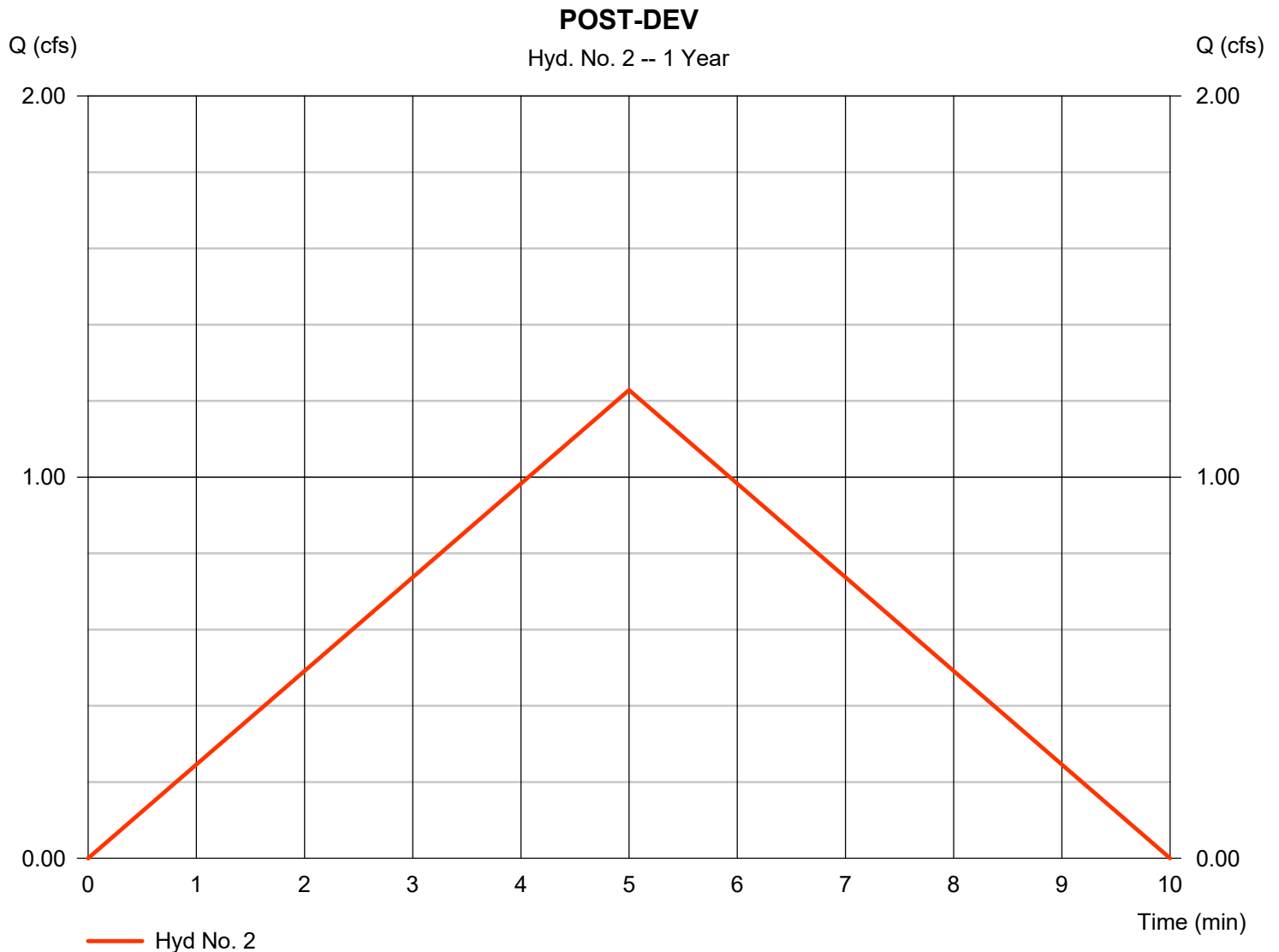
Wednesday, 05 / 6 / 2020

Hyd. No. 2

POST-DEV

Hydrograph type	= Mod. Rational	Peak discharge	= 1.229 cfs
Storm frequency	= 1 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 369 cuft
Drainage area	= 0.410 ac	Runoff coeff.	= 0.75*
Intensity	= 3.995 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.277 x 0.99) + (0.137 x 0.25)] / 0.410



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

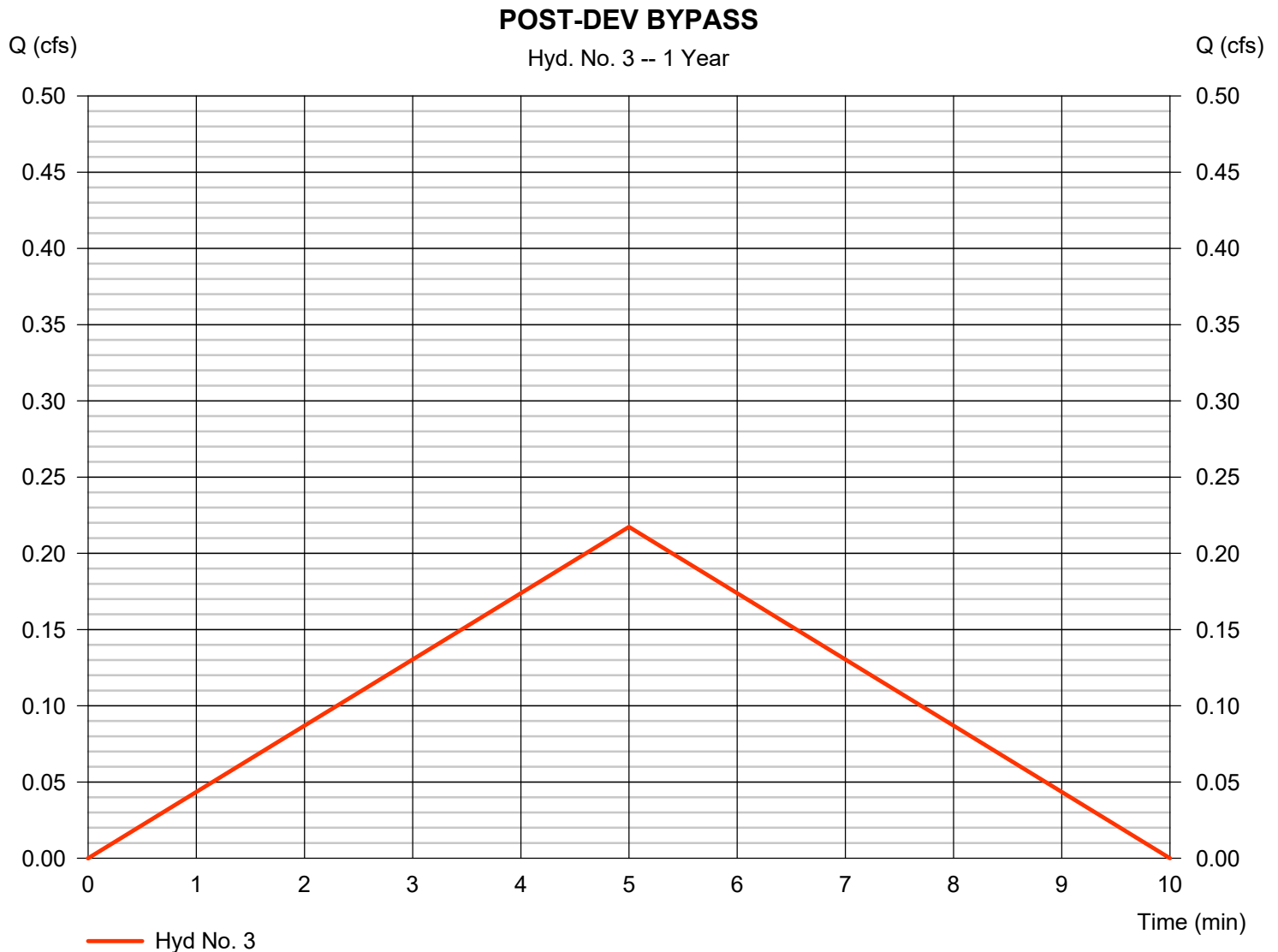
Wednesday, 05 / 6 / 2020

Hyd. No. 3

POST-DEV BYPASS

Hydrograph type	= Mod. Rational	Peak discharge	= 0.217 cfs
Storm frequency	= 1 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 65 cuft
Drainage area	= 0.080 ac	Runoff coeff.	= 0.68*
Intensity	= 3.995 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.044 x 0.99) + (0.032 x 0.25)] / 0.080

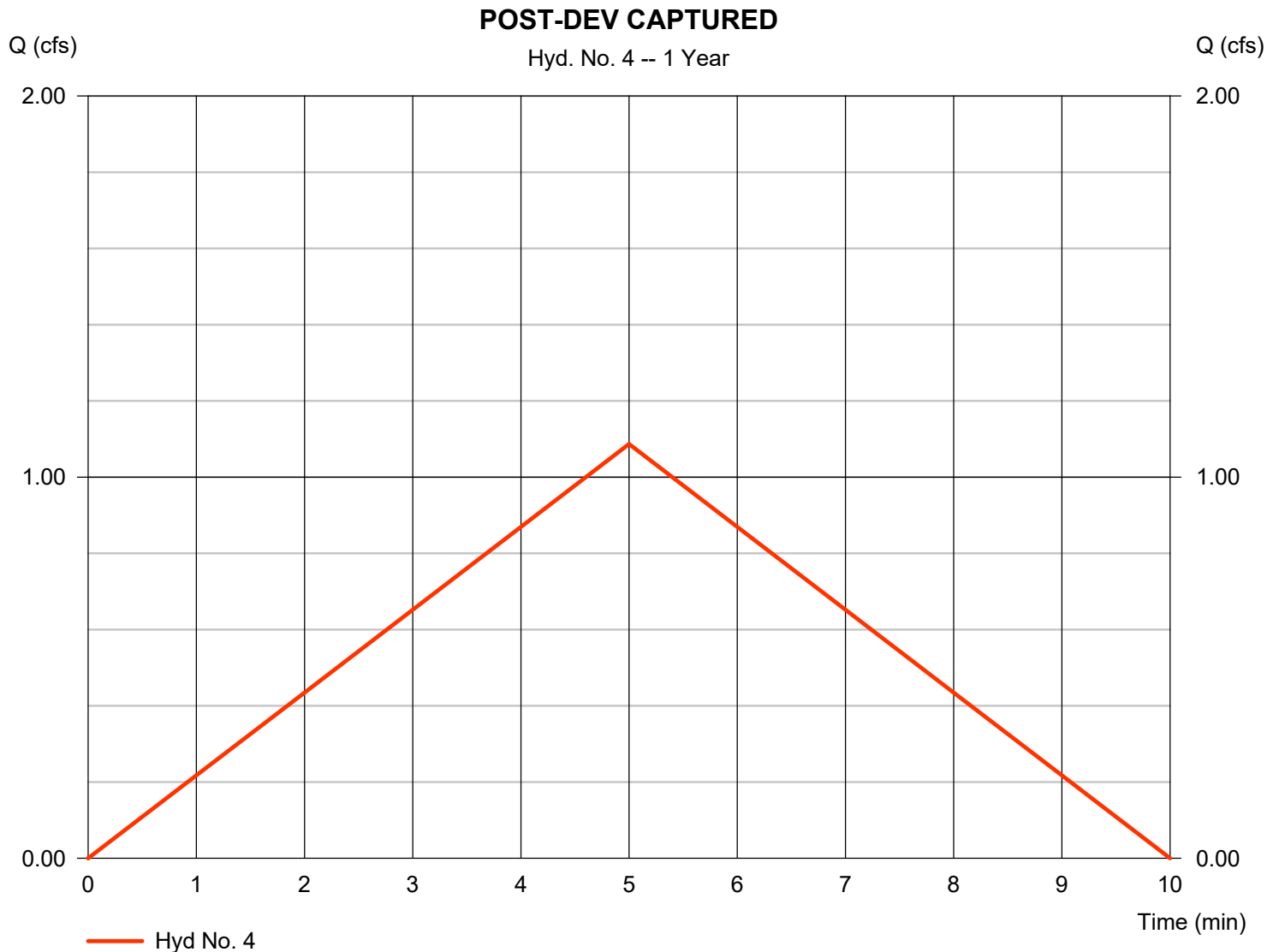


Hyd. No. 4

POST-DEV CAPTURED

Hydrograph type	= Mod. Rational	Peak discharge	= 1.087 cfs
Storm frequency	= 1 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 326 cuft
Drainage area	= 0.340 ac	Runoff coeff.	= 0.8*
Intensity	= 3.995 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.253 x 0.99) + (0.085 x 0.25)] / 0.340



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

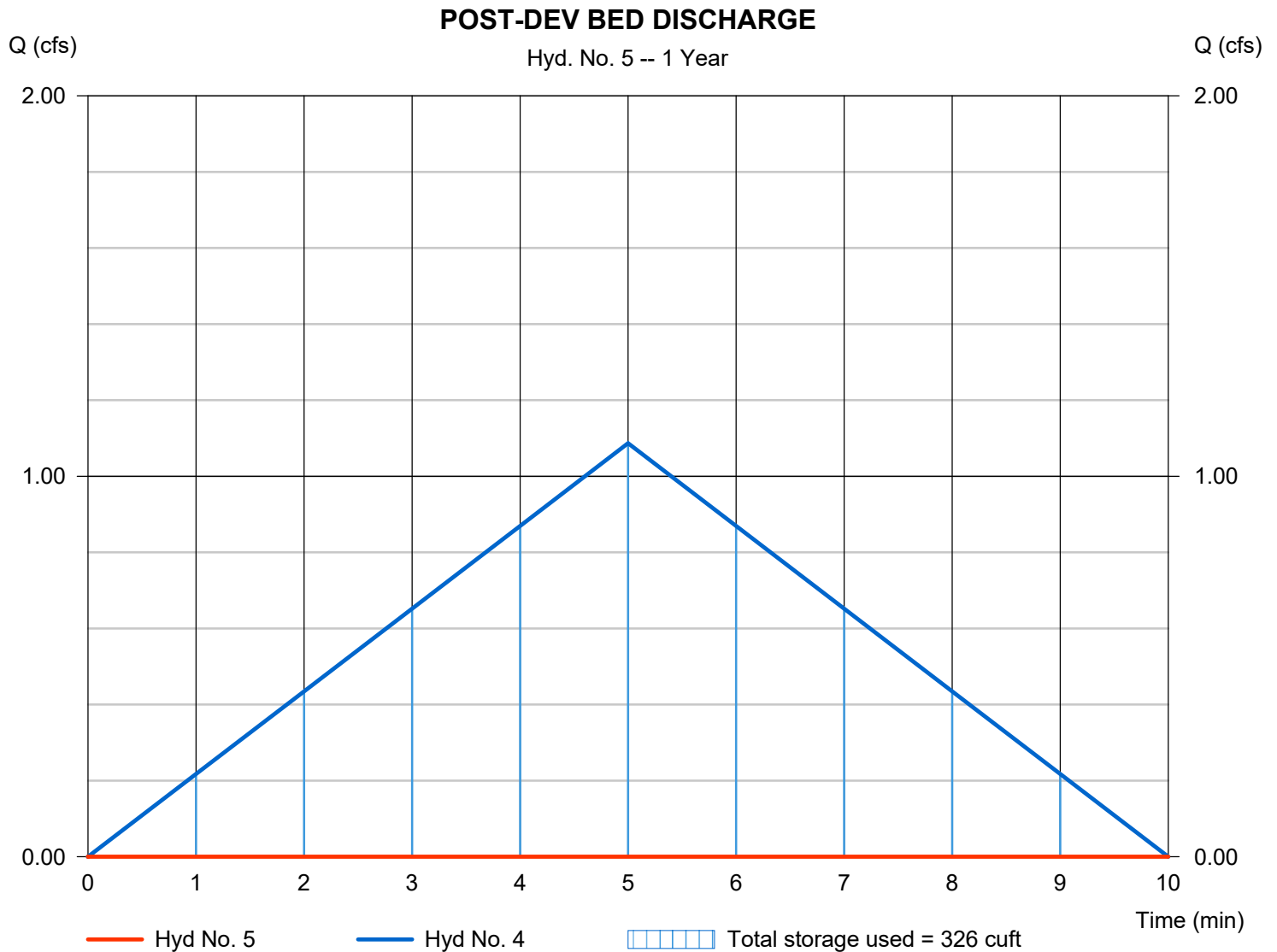
Wednesday, 05 / 6 / 2020

Hyd. No. 5

POST-DEV BED DISCHARGE

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 4 - POST-DEV CAPTURED	Max. Elevation	= 369.81 ft
Reservoir name	= INFILTRATION TRENCH	Max. Storage	= 326 cuft

Storage Indication method used.



Pond No. 1 - INFILTRATION TRENCH

Pond Data

UG Chambers -Invert elev. = 368.50 ft, Rise x Span = 3.00 x 3.00 ft, Barrel Len = 110.00 ft, No. Barrels = 1, Slope = 0.00%, Headers = No

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	368.50	n/a	0	0
0.30	368.80	n/a	40	40
0.60	369.10	n/a	70	111
0.90	369.40	n/a	86	196
1.20	369.70	n/a	94	291
1.50	370.00	n/a	98	389
1.80	370.30	n/a	98	487
2.10	370.60	n/a	94	582
2.40	370.90	n/a	85	667
2.70	371.20	n/a	70	737
3.00	371.50	n/a	40	778

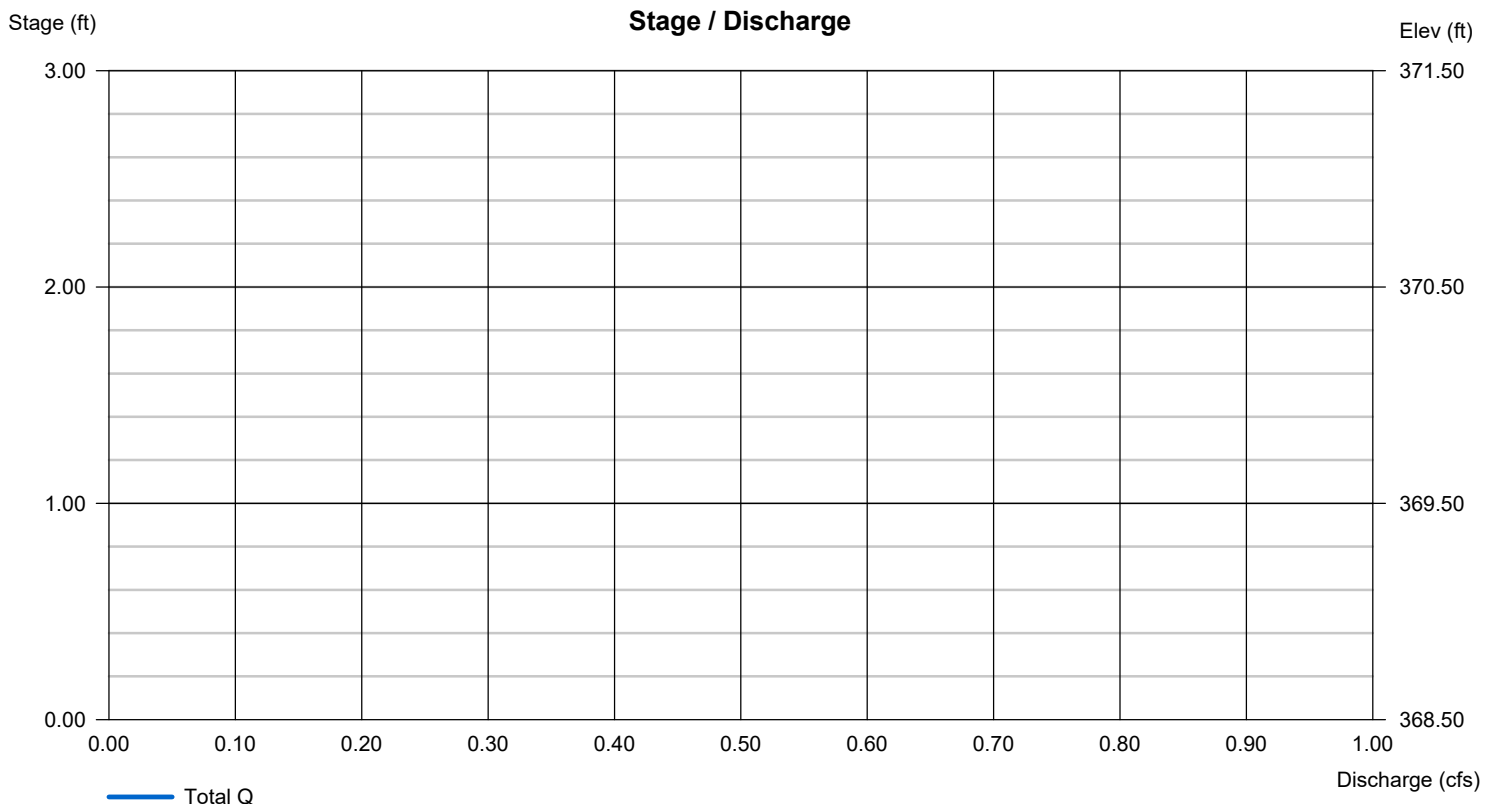
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .000	.000	.000	n/a
Orifice Coeff.	= 0.00	0.00	0.00	0.00
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.	= 0.00	0.00	0.00	0.00
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

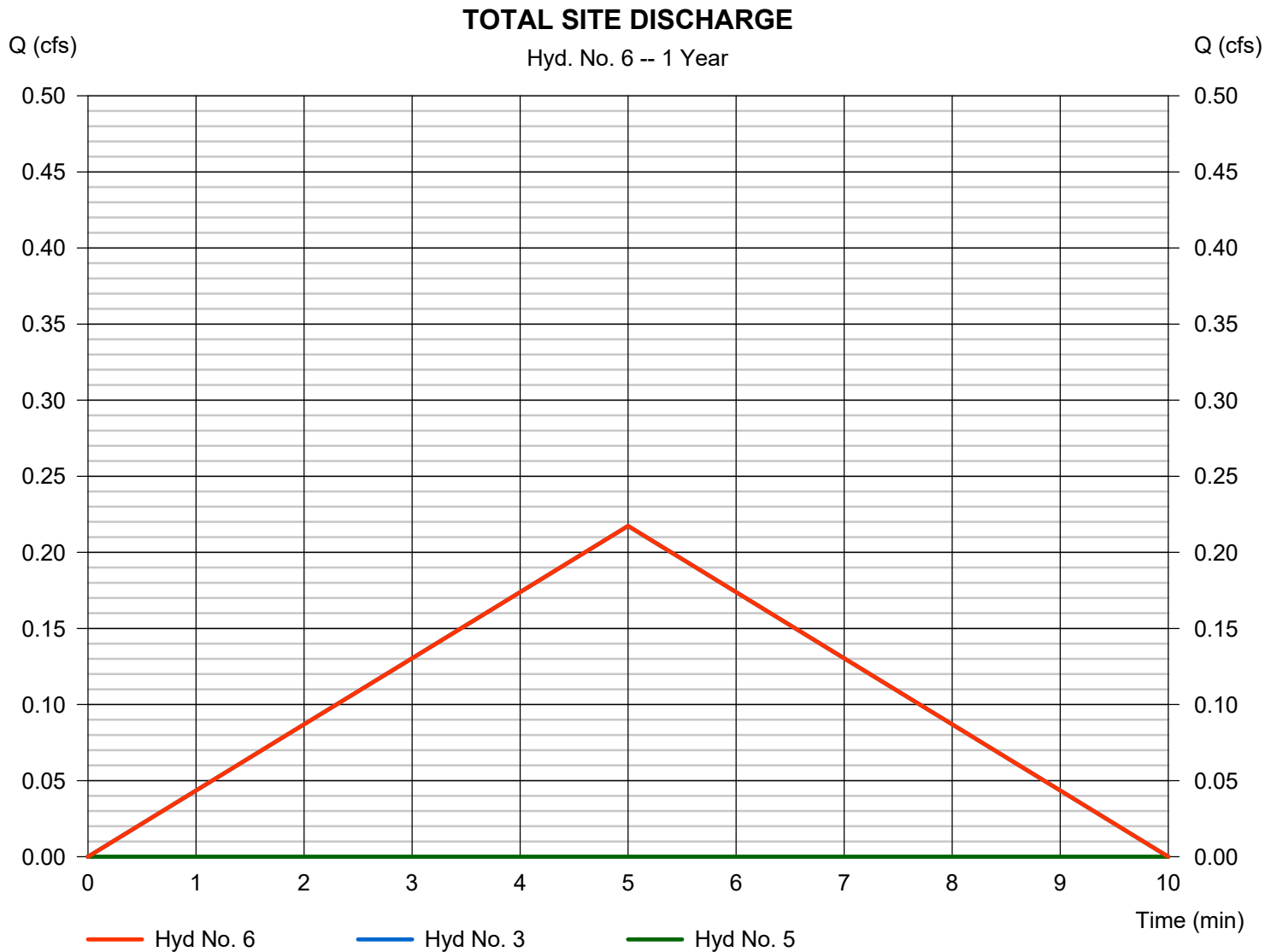
Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hyd. No. 6

TOTAL SITE DISCHARGE

Hydrograph type	= Combine	Peak discharge	= 0.217 cfs
Storm frequency	= 1 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 65 cuft
Inflow hyds.	= 3, 5	Contrib. drain. area	= 0.080 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Wednesday, 05 / 6 / 2020

Hyd. No. 1

PRE-DEV

Hydrograph type	= Mod. Rational	Peak discharge	= 1.309 cfs
Storm frequency	= 2 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 393 cuft
Drainage area	= 0.410 ac	Runoff coeff.	= 0.69*
Intensity	= 4.628 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.246 x 0.99) + (0.168 x 0.25)] / 0.410



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

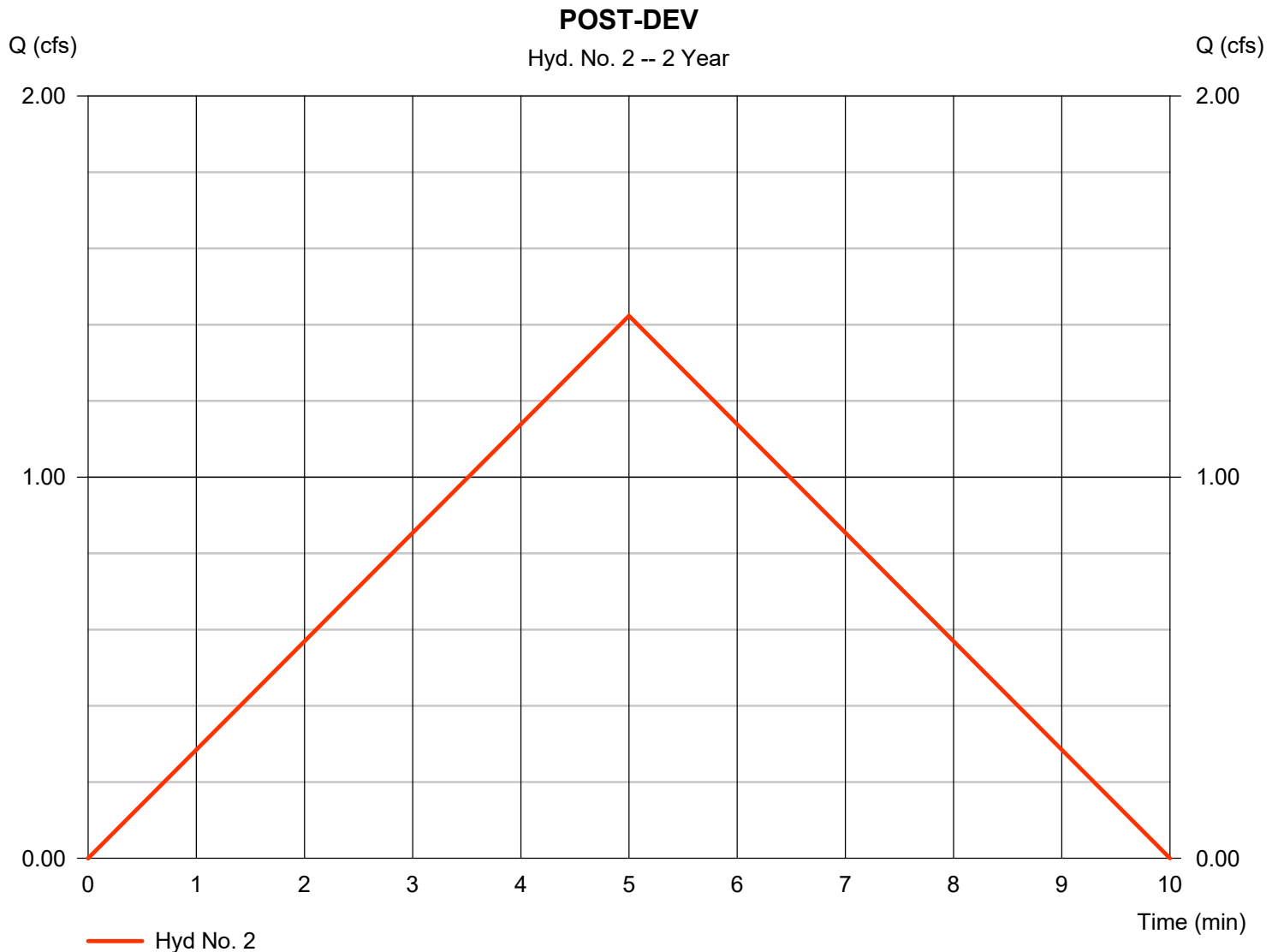
Wednesday, 05 / 6 / 2020

Hyd. No. 2

POST-DEV

Hydrograph type	= Mod. Rational	Peak discharge	= 1.423 cfs
Storm frequency	= 2 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 427 cuft
Drainage area	= 0.410 ac	Runoff coeff.	= 0.75*
Intensity	= 4.628 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.277 x 0.99) + (0.137 x 0.25)] / 0.410



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

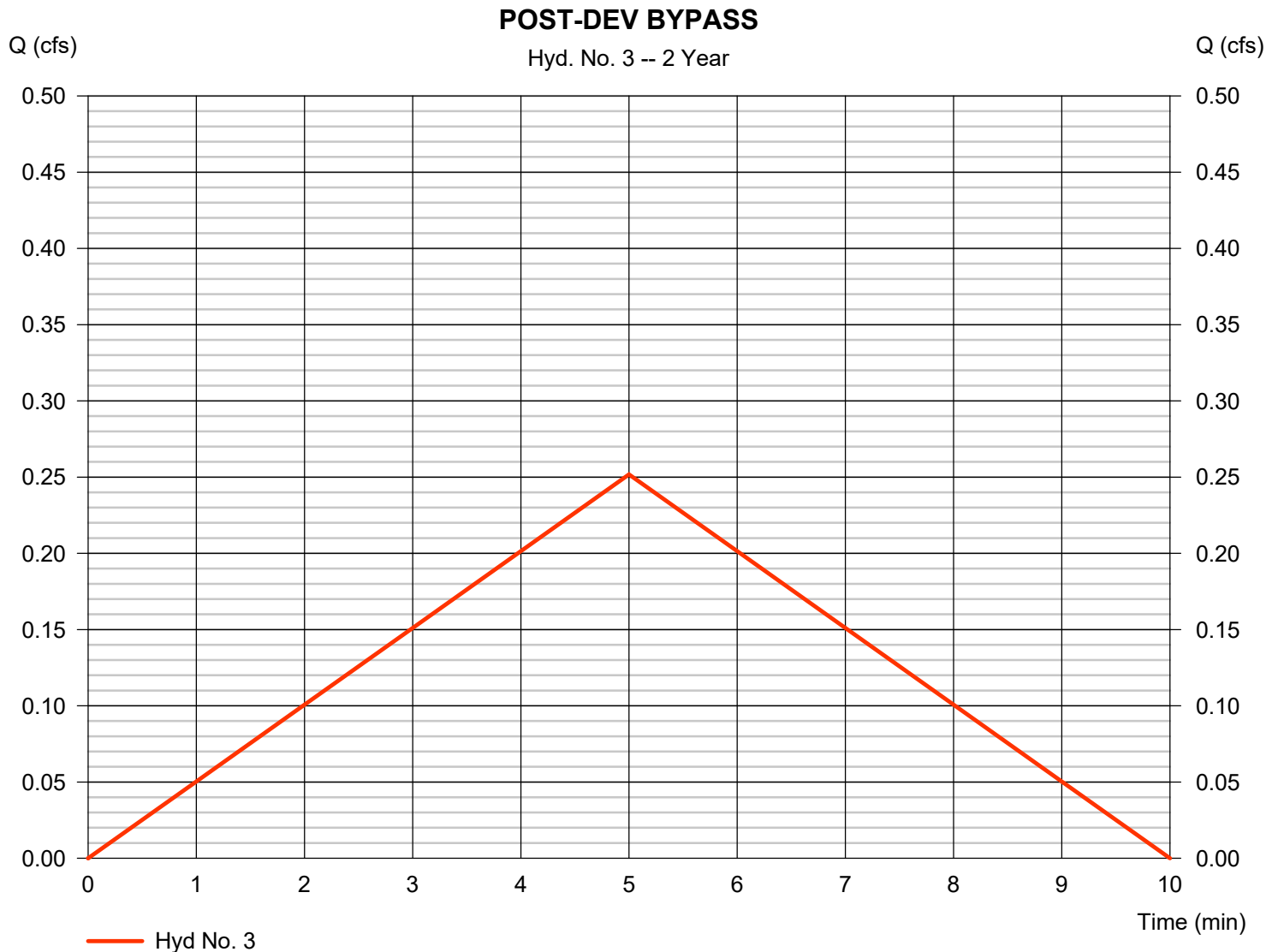
Wednesday, 05 / 6 / 2020

Hyd. No. 3

POST-DEV BYPASS

Hydrograph type	= Mod. Rational	Peak discharge	= 0.252 cfs
Storm frequency	= 2 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 76 cuft
Drainage area	= 0.080 ac	Runoff coeff.	= 0.68*
Intensity	= 4.628 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.044 x 0.99) + (0.032 x 0.25)] / 0.080

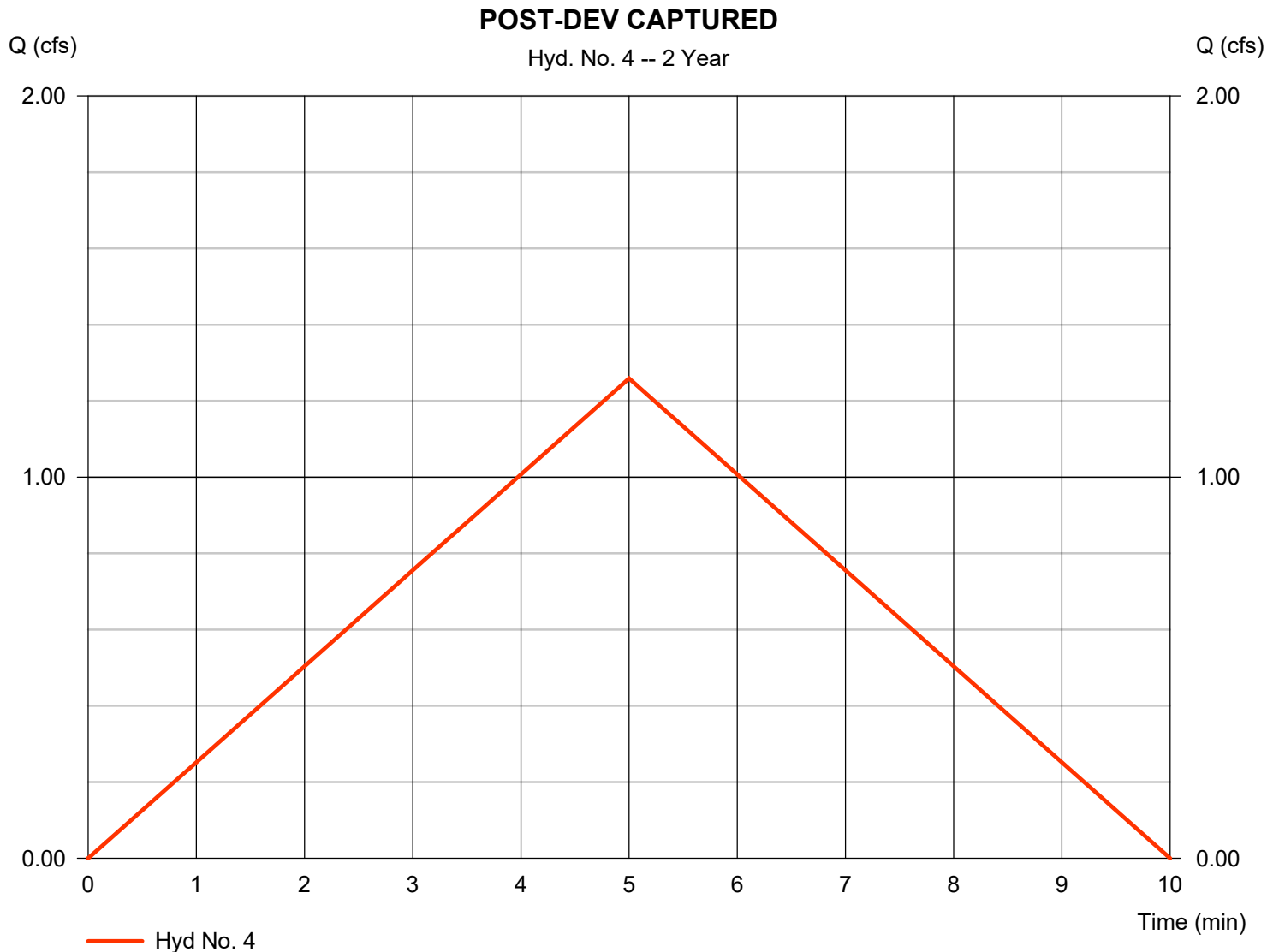


Hyd. No. 4

POST-DEV CAPTURED

Hydrograph type	= Mod. Rational	Peak discharge	= 1.259 cfs
Storm frequency	= 2 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 378 cuft
Drainage area	= 0.340 ac	Runoff coeff.	= 0.8*
Intensity	= 4.628 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.253 x 0.99) + (0.085 x 0.25)] / 0.340

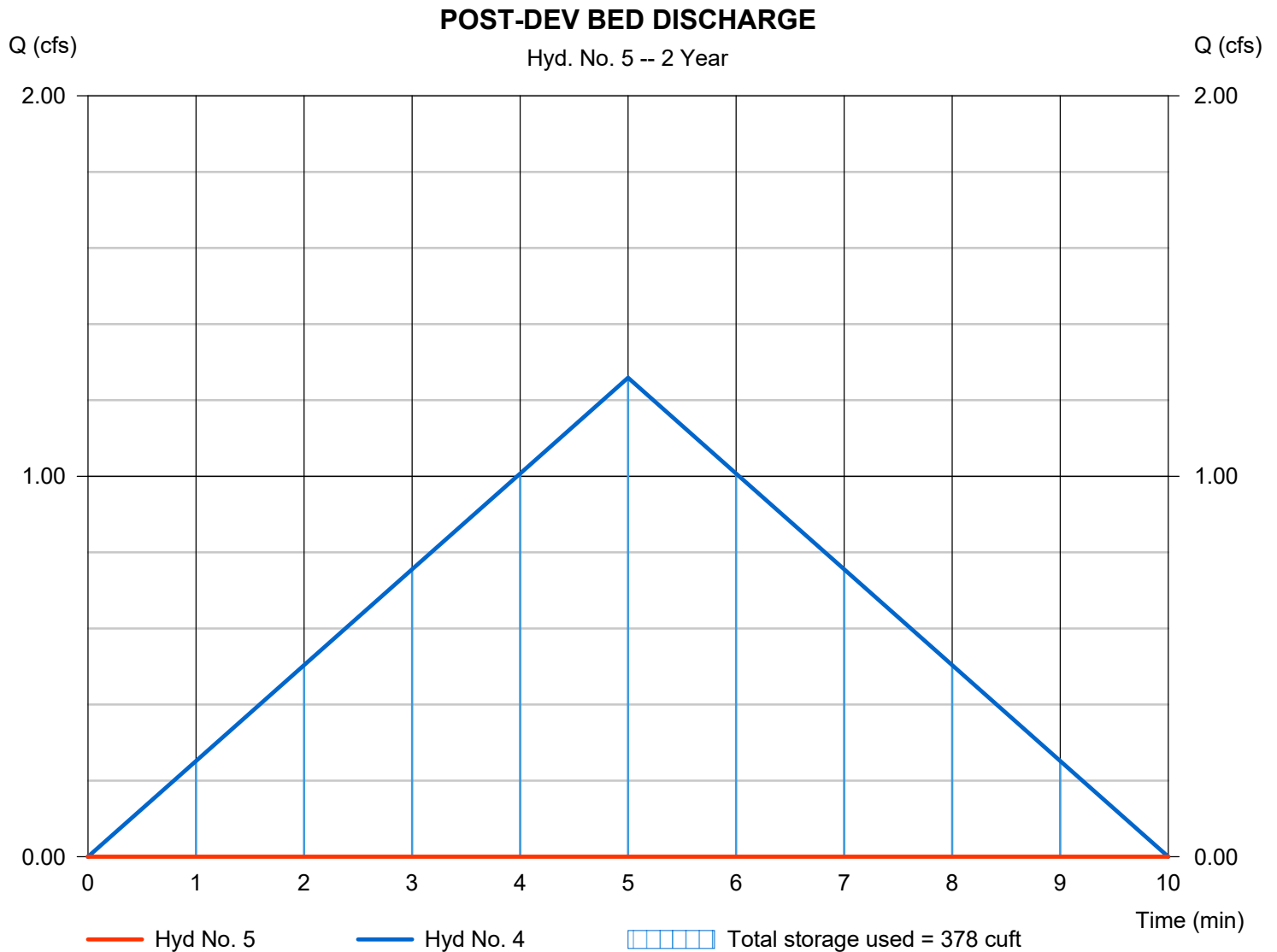


Hyd. No. 5

POST-DEV BED DISCHARGE

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 4 - POST-DEV CAPTURED	Max. Elevation	= 369.97 ft
Reservoir name	= INFILTRATION TRENCH	Max. Storage	= 378 cuft

Storage Indication method used.

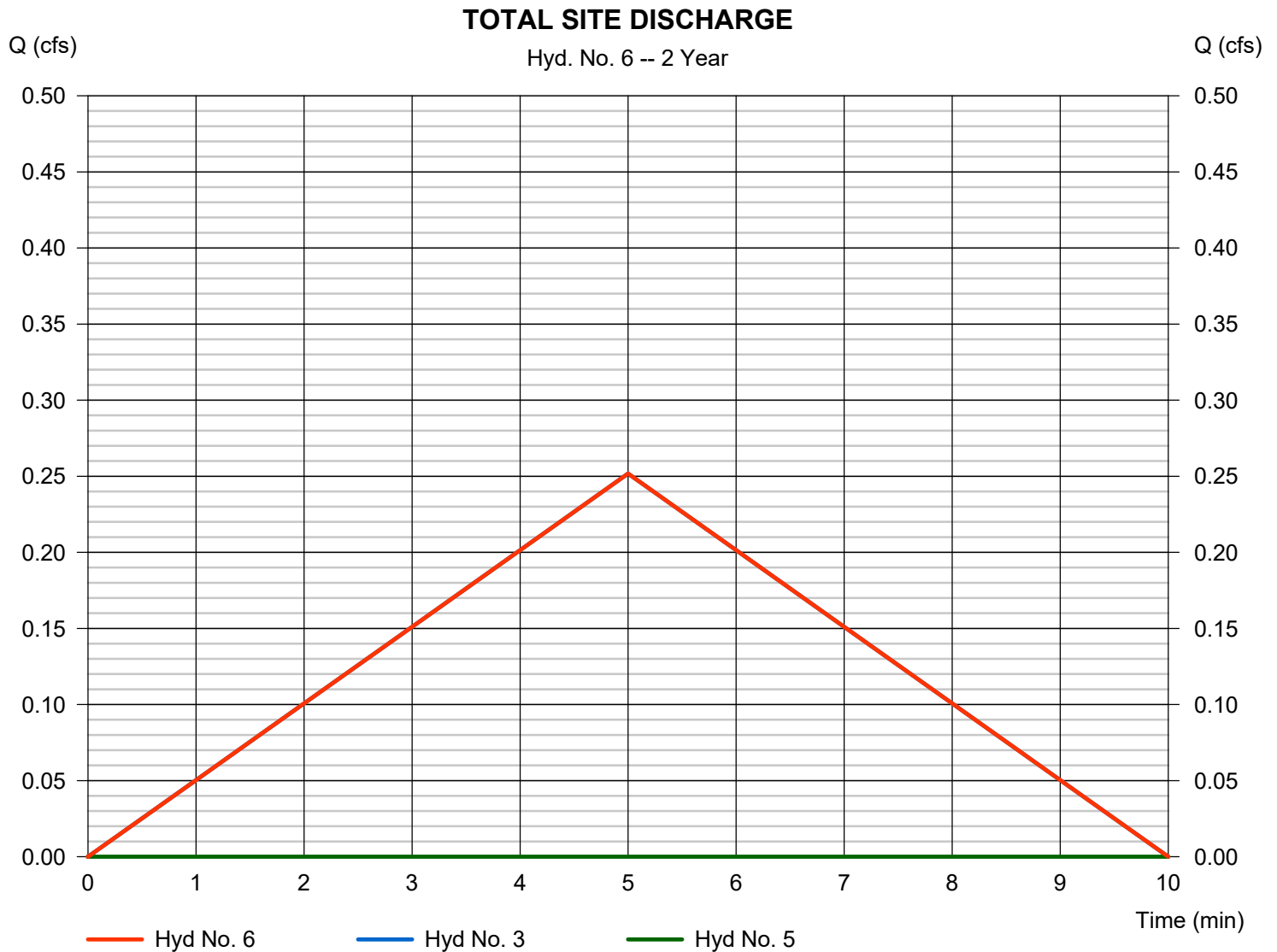


Hyd. No. 6

TOTAL SITE DISCHARGE

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 1 min
Inflow hyds. = 3, 5

Peak discharge = 0.252 cfs
Time to peak = 5 min
Hyd. volume = 76 cuft
Contrib. drain. area = 0.080 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

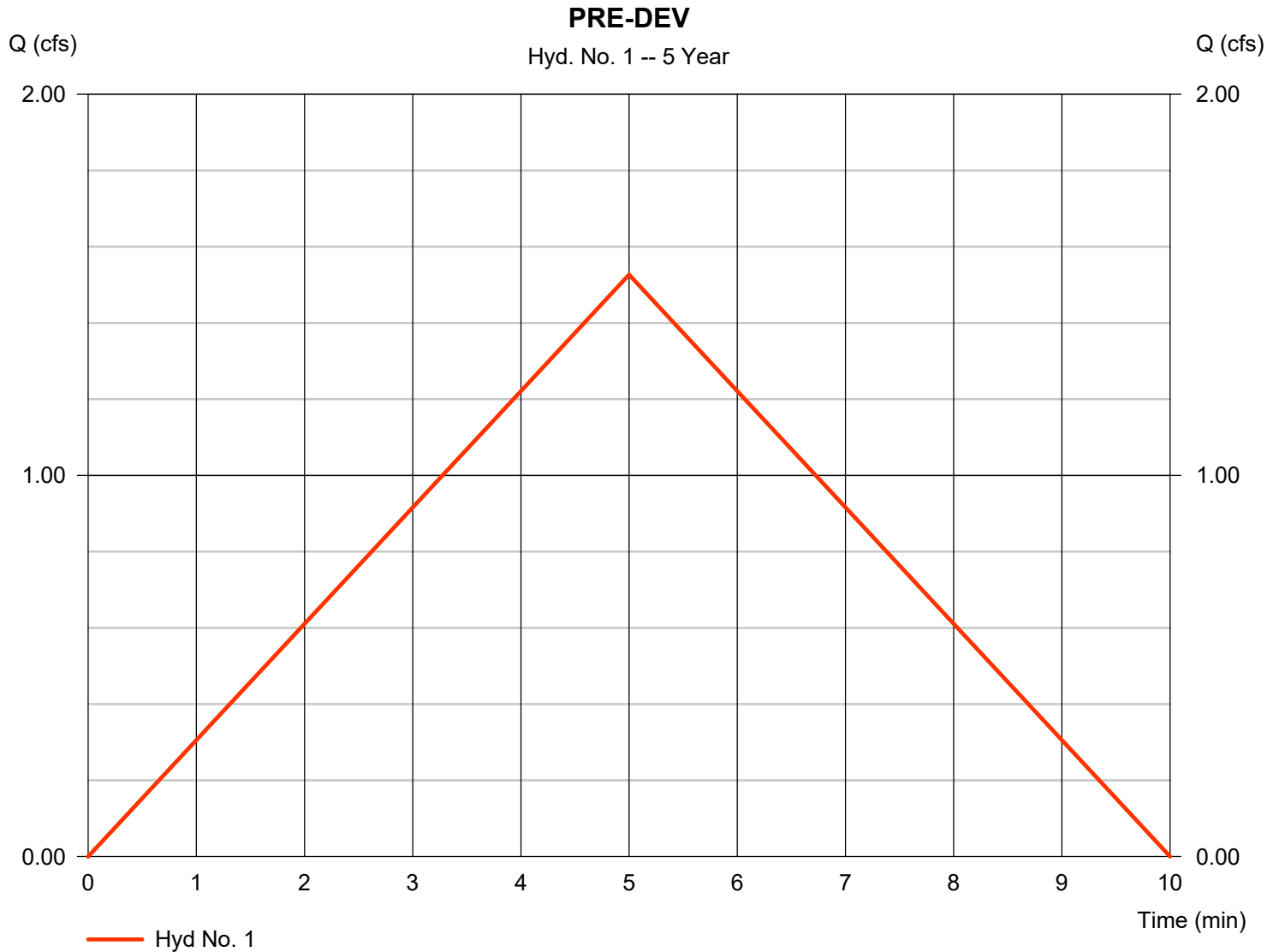
Wednesday, 05 / 6 / 2020

Hyd. No. 1

PRE-DEV

Hydrograph type	= Mod. Rational	Peak discharge	= 1.527 cfs
Storm frequency	= 5 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 458 cuft
Drainage area	= 0.410 ac	Runoff coeff.	= 0.69*
Intensity	= 5.397 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.246 x 0.99) + (0.168 x 0.25)] / 0.410



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

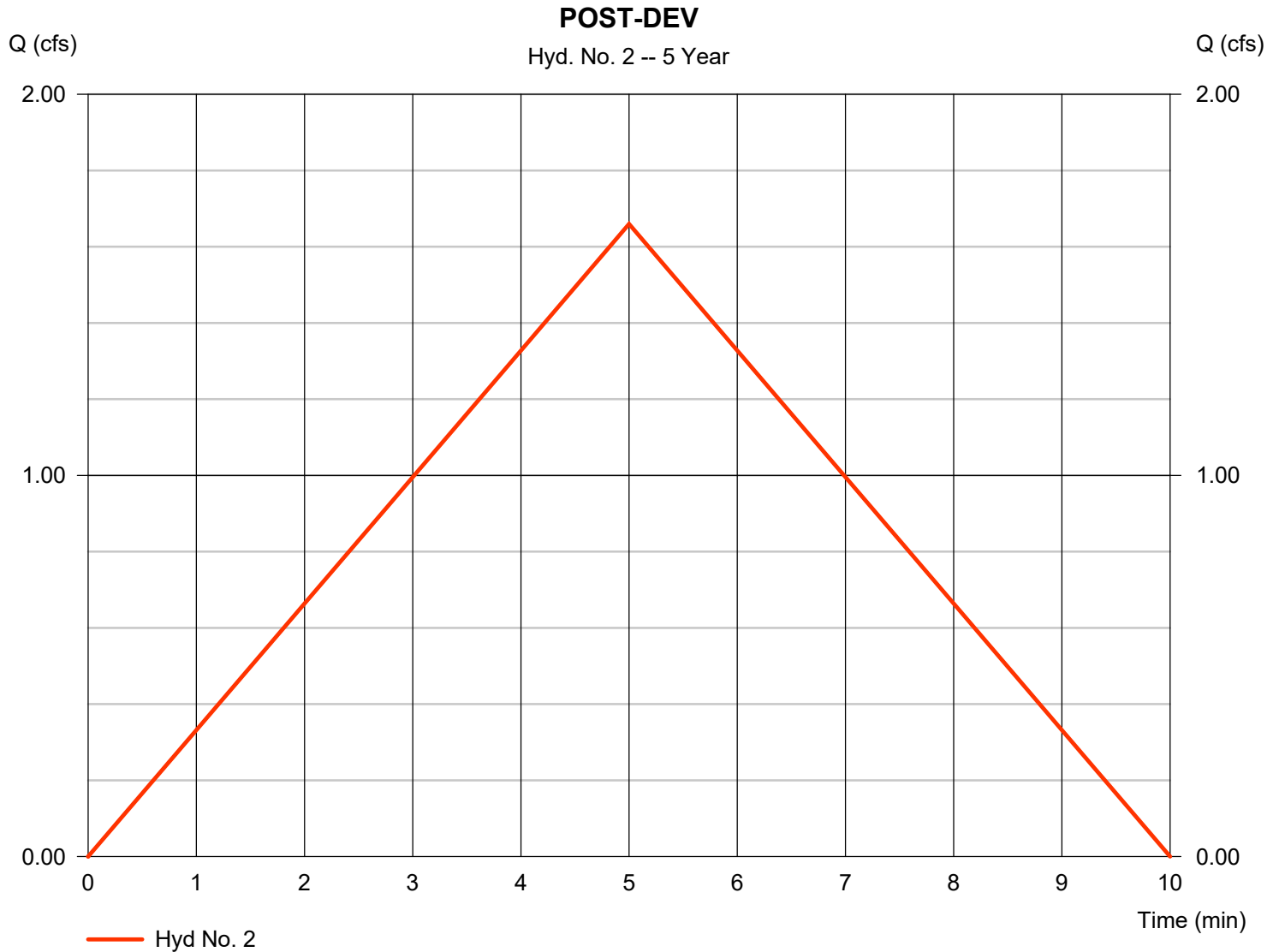
Wednesday, 05 / 6 / 2020

Hyd. No. 2

POST-DEV

Hydrograph type	= Mod. Rational	Peak discharge	= 1.660 cfs
Storm frequency	= 5 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 498 cuft
Drainage area	= 0.410 ac	Runoff coeff.	= 0.75*
Intensity	= 5.397 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.277 x 0.99) + (0.137 x 0.25)] / 0.410



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

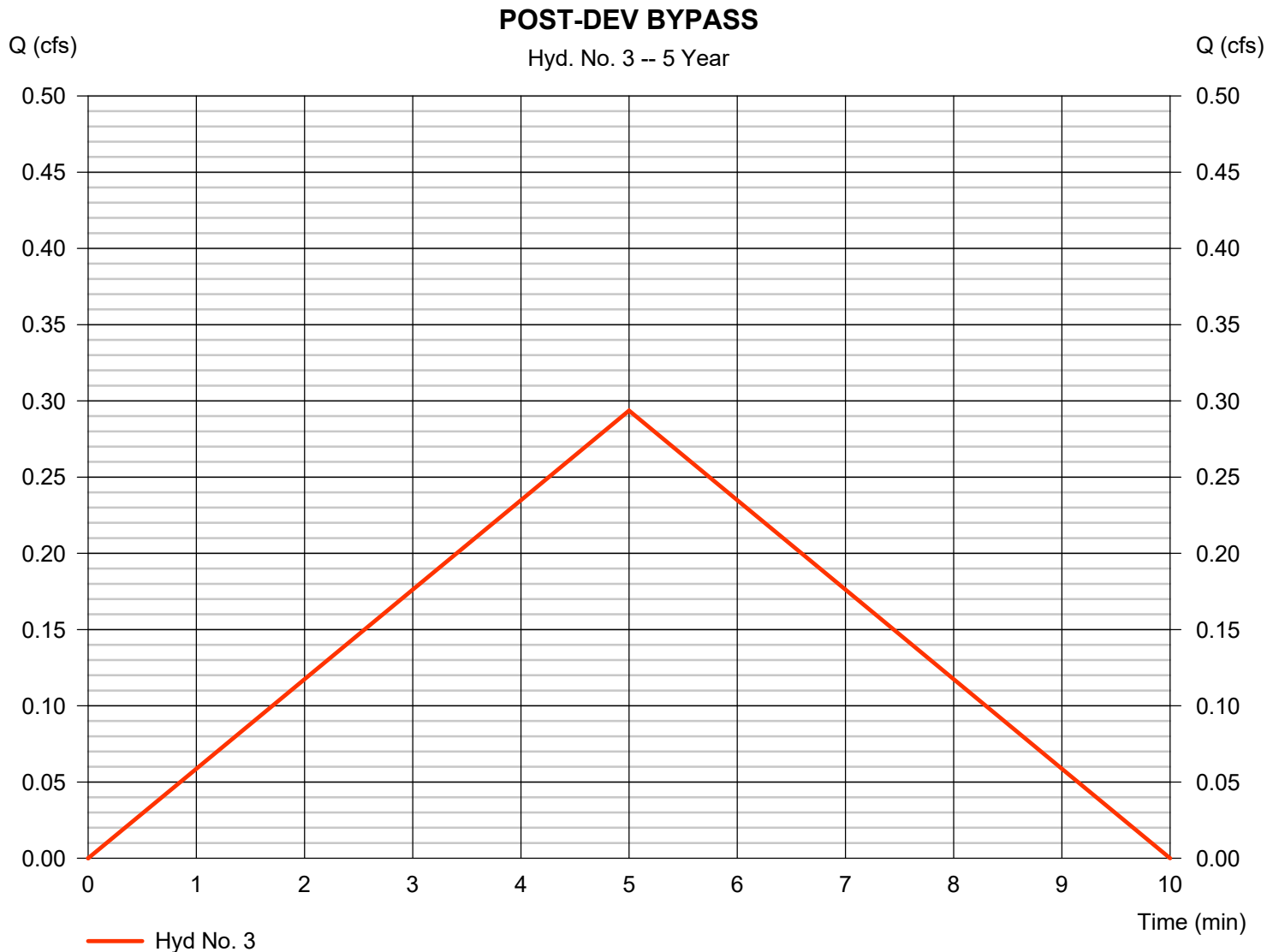
Wednesday, 05 / 6 / 2020

Hyd. No. 3

POST-DEV BYPASS

Hydrograph type	= Mod. Rational	Peak discharge	= 0.294 cfs
Storm frequency	= 5 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 88 cuft
Drainage area	= 0.080 ac	Runoff coeff.	= 0.68*
Intensity	= 5.397 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.044 x 0.99) + (0.032 x 0.25)] / 0.080

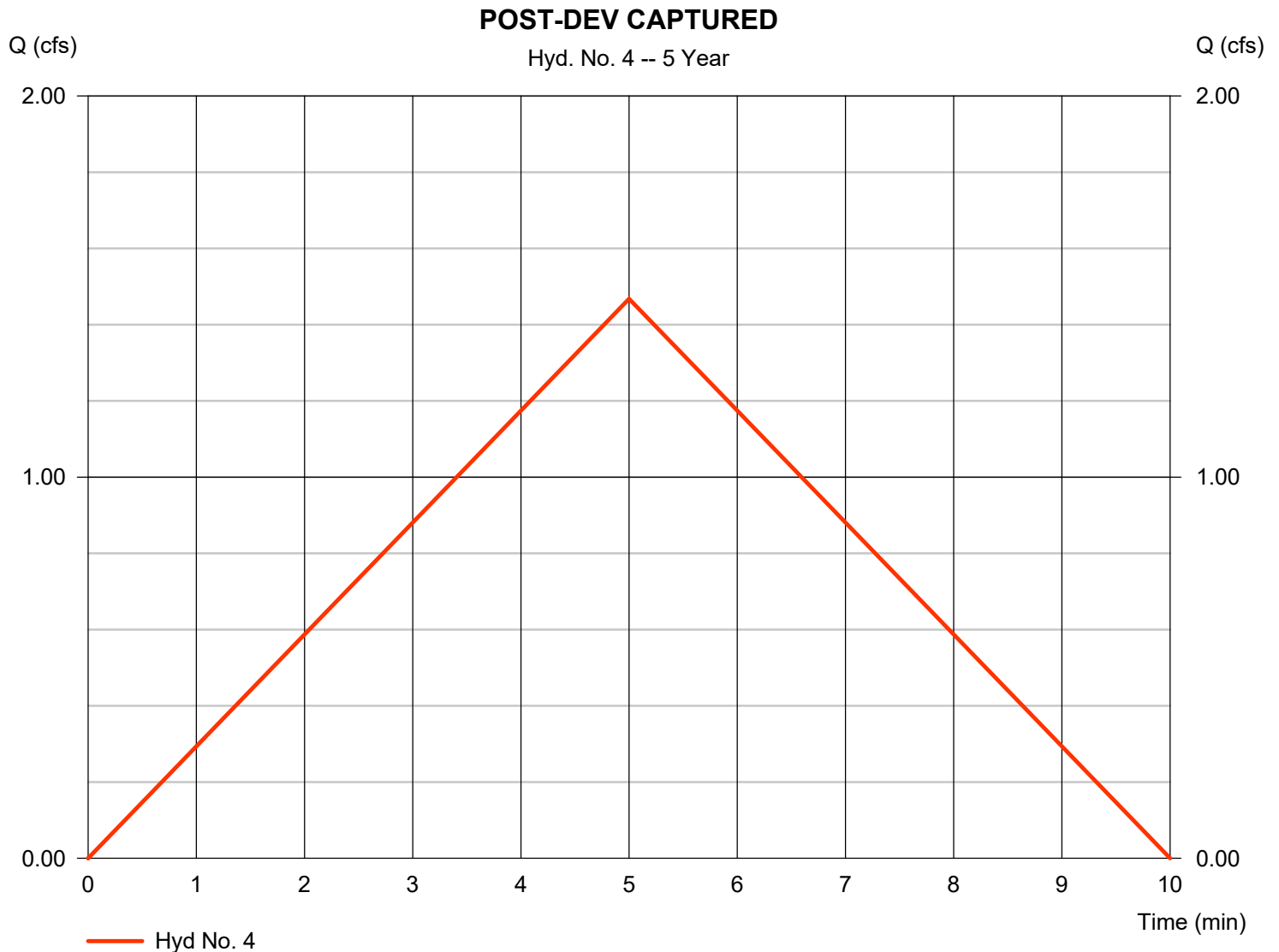


Hyd. No. 4

POST-DEV CAPTURED

Hydrograph type	= Mod. Rational	Peak discharge	= 1.468 cfs
Storm frequency	= 5 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 440 cuft
Drainage area	= 0.340 ac	Runoff coeff.	= 0.8*
Intensity	= 5.397 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.253 x 0.99) + (0.085 x 0.25)] / 0.340

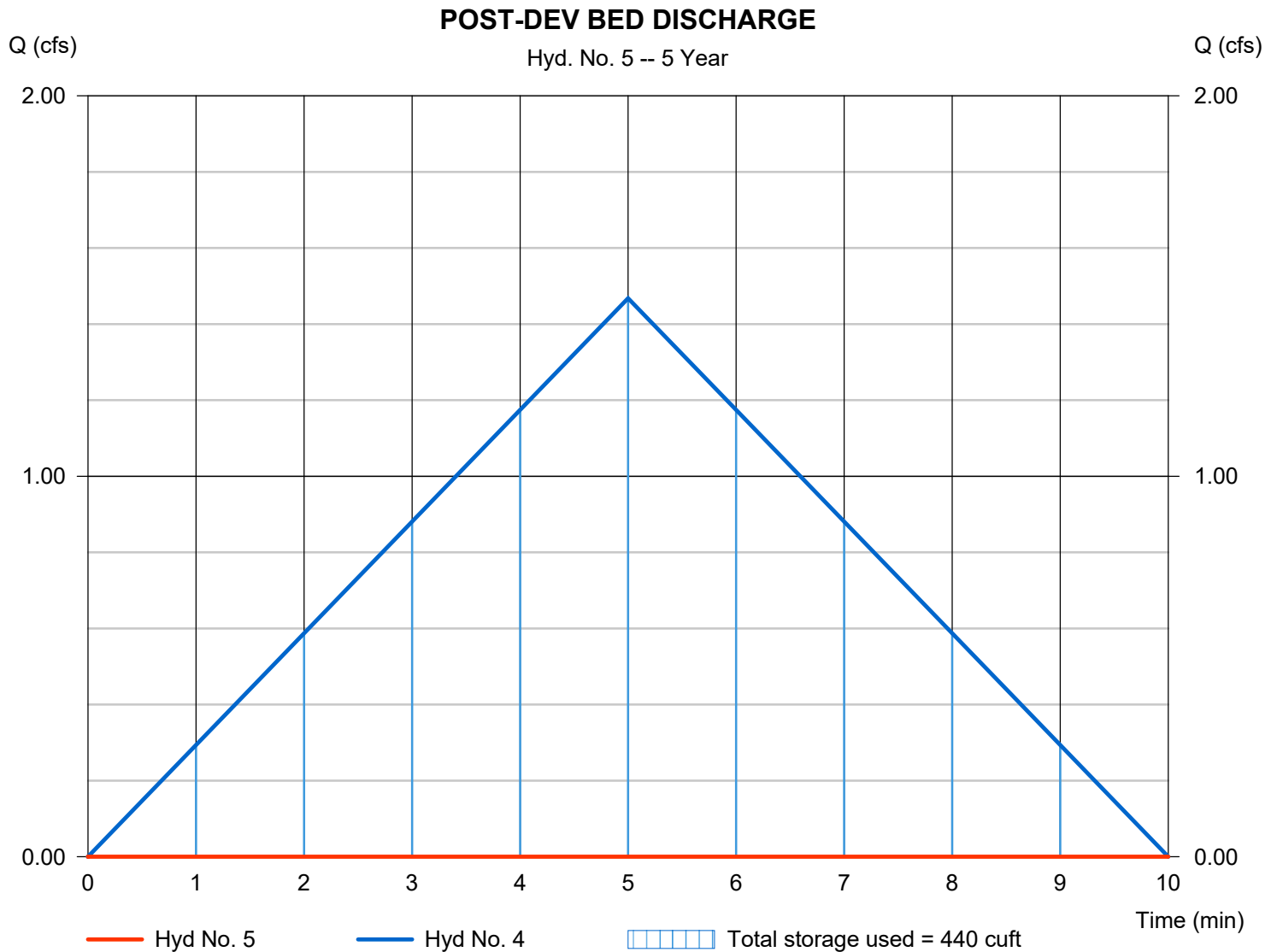


Hyd. No. 5

POST-DEV BED DISCHARGE

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 5 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 4 - POST-DEV CAPTURED	Max. Elevation	= 370.16 ft
Reservoir name	= INFILTRATION TRENCH	Max. Storage	= 440 cuft

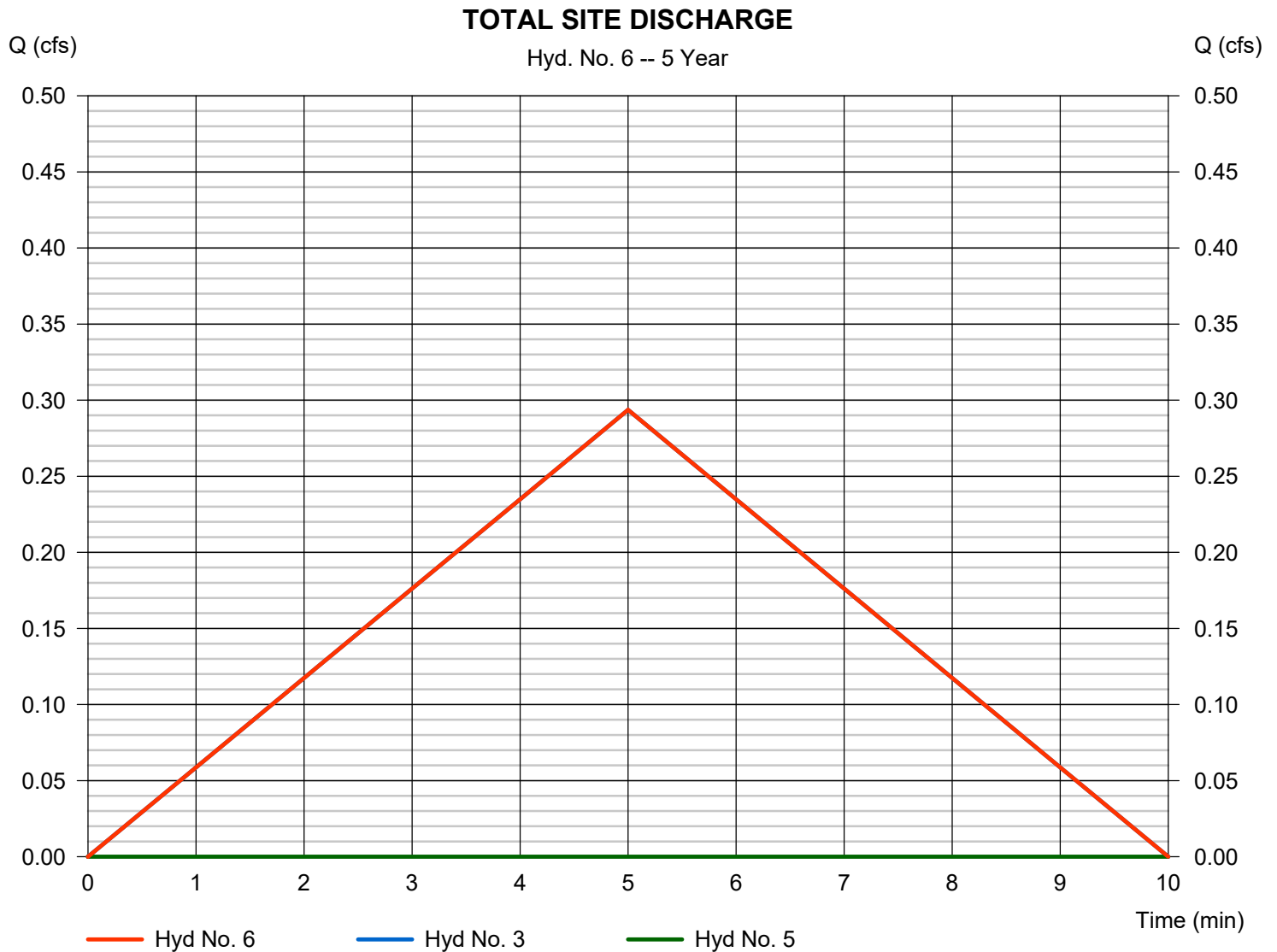
Storage Indication method used.



Hyd. No. 6

TOTAL SITE DISCHARGE

Hydrograph type	= Combine	Peak discharge	= 0.294 cfs
Storm frequency	= 5 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 88 cuft
Inflow hyds.	= 3, 5	Contrib. drain. area	= 0.080 ac

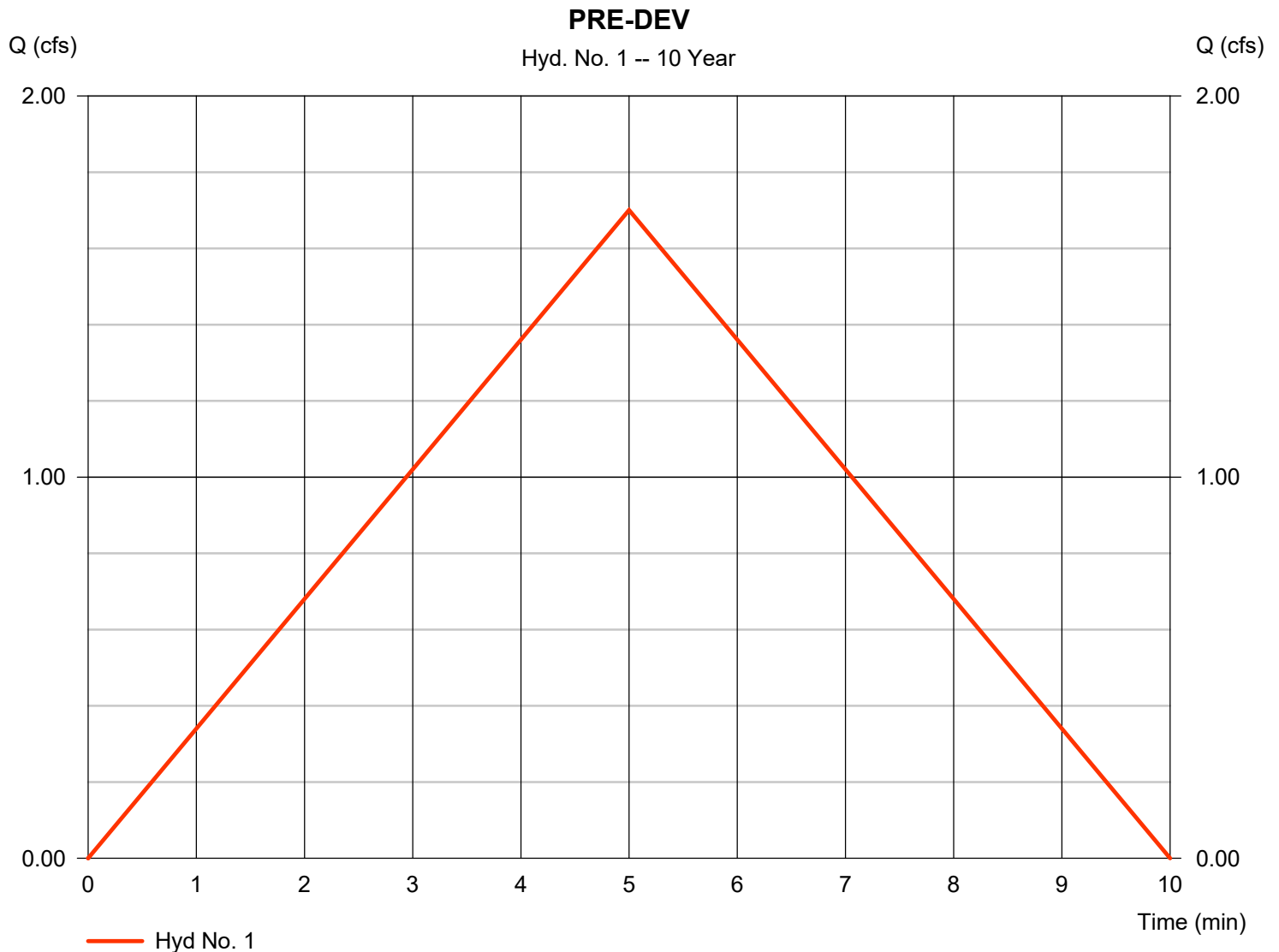


Hyd. No. 1

PRE-DEV

Hydrograph type	= Mod. Rational	Peak discharge	= 1.701 cfs
Storm frequency	= 10 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 510 cuft
Drainage area	= 0.410 ac	Runoff coeff.	= 0.69*
Intensity	= 6.012 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.246 x 0.99) + (0.168 x 0.25)] / 0.410



Hyd. No. 2

POST-DEV

Hydrograph type	= Mod. Rational	Peak discharge	= 1.849 cfs
Storm frequency	= 10 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 555 cuft
Drainage area	= 0.410 ac	Runoff coeff.	= 0.75*
Intensity	= 6.012 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.277 x 0.99) + (0.137 x 0.25)] / 0.410



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

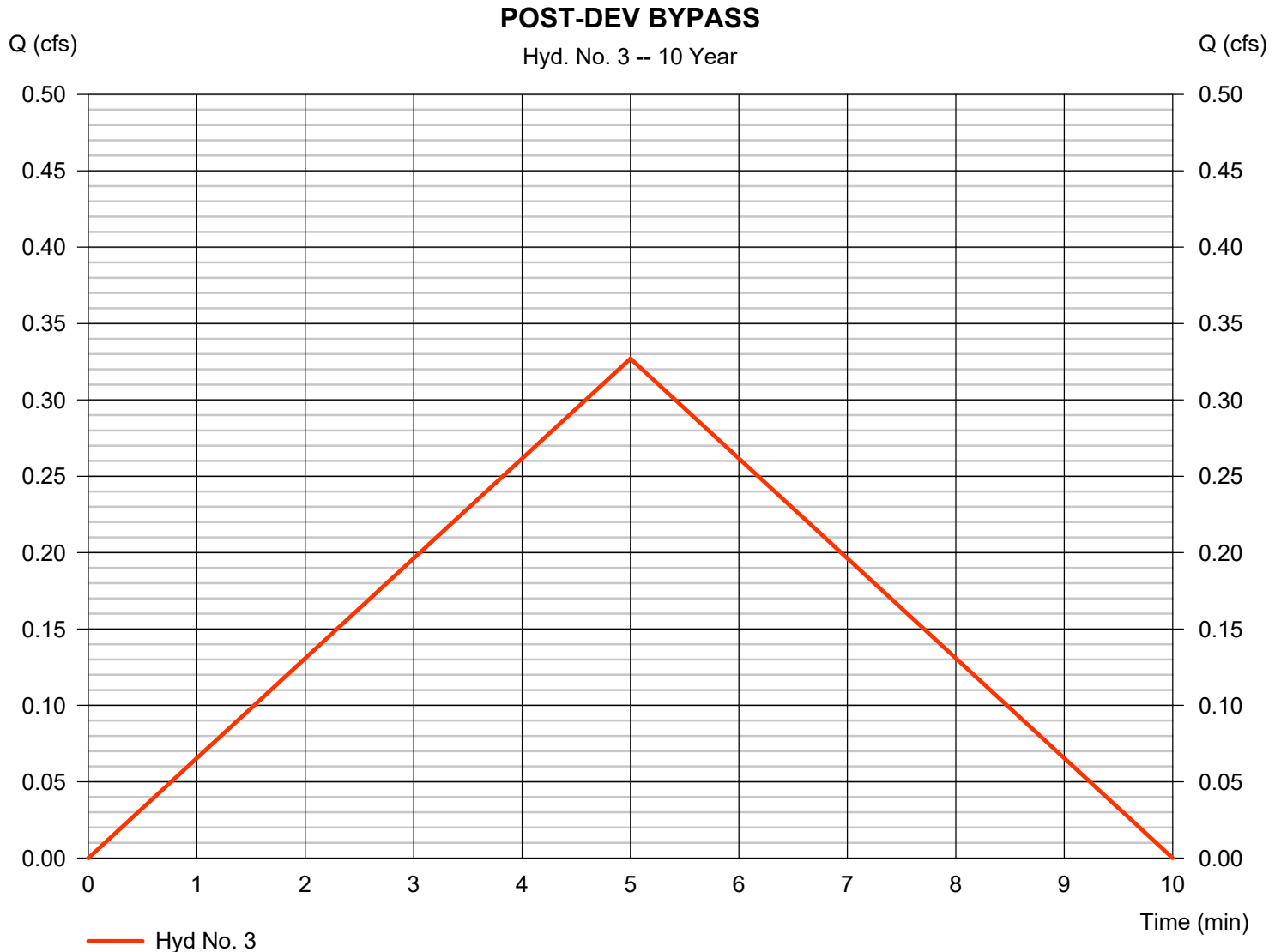
Wednesday, 05 / 6 / 2020

Hyd. No. 3

POST-DEV BYPASS

Hydrograph type	= Mod. Rational	Peak discharge	= 0.327 cfs
Storm frequency	= 10 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 98 cuft
Drainage area	= 0.080 ac	Runoff coeff.	= 0.68*
Intensity	= 6.012 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.044 x 0.99) + (0.032 x 0.25)] / 0.080



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

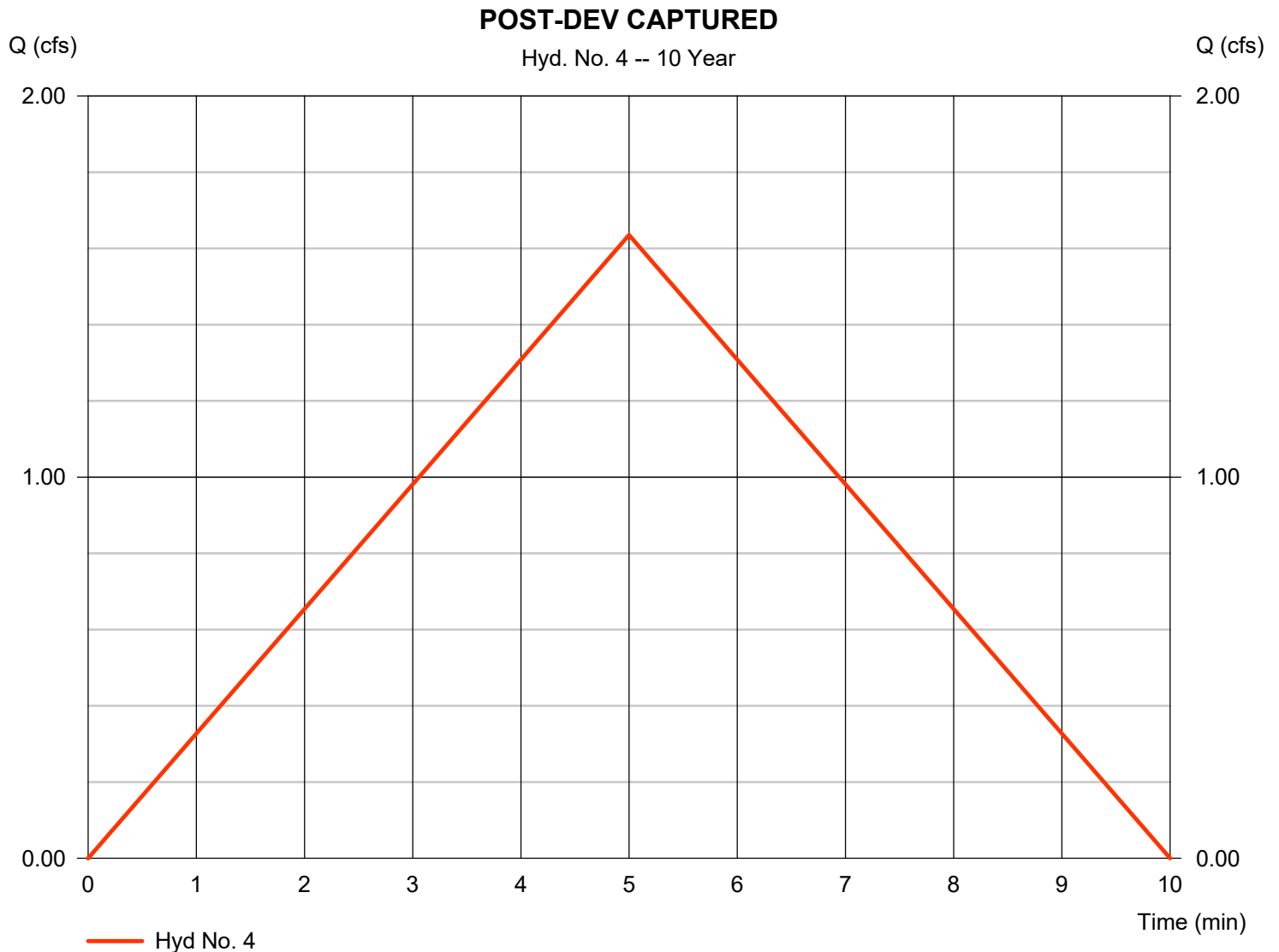
Wednesday, 05 / 6 / 2020

Hyd. No. 4

POST-DEV CAPTURED

Hydrograph type	= Mod. Rational	Peak discharge	= 1.635 cfs
Storm frequency	= 10 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 491 cuft
Drainage area	= 0.340 ac	Runoff coeff.	= 0.8*
Intensity	= 6.012 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.253 x 0.99) + (0.085 x 0.25)] / 0.340



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

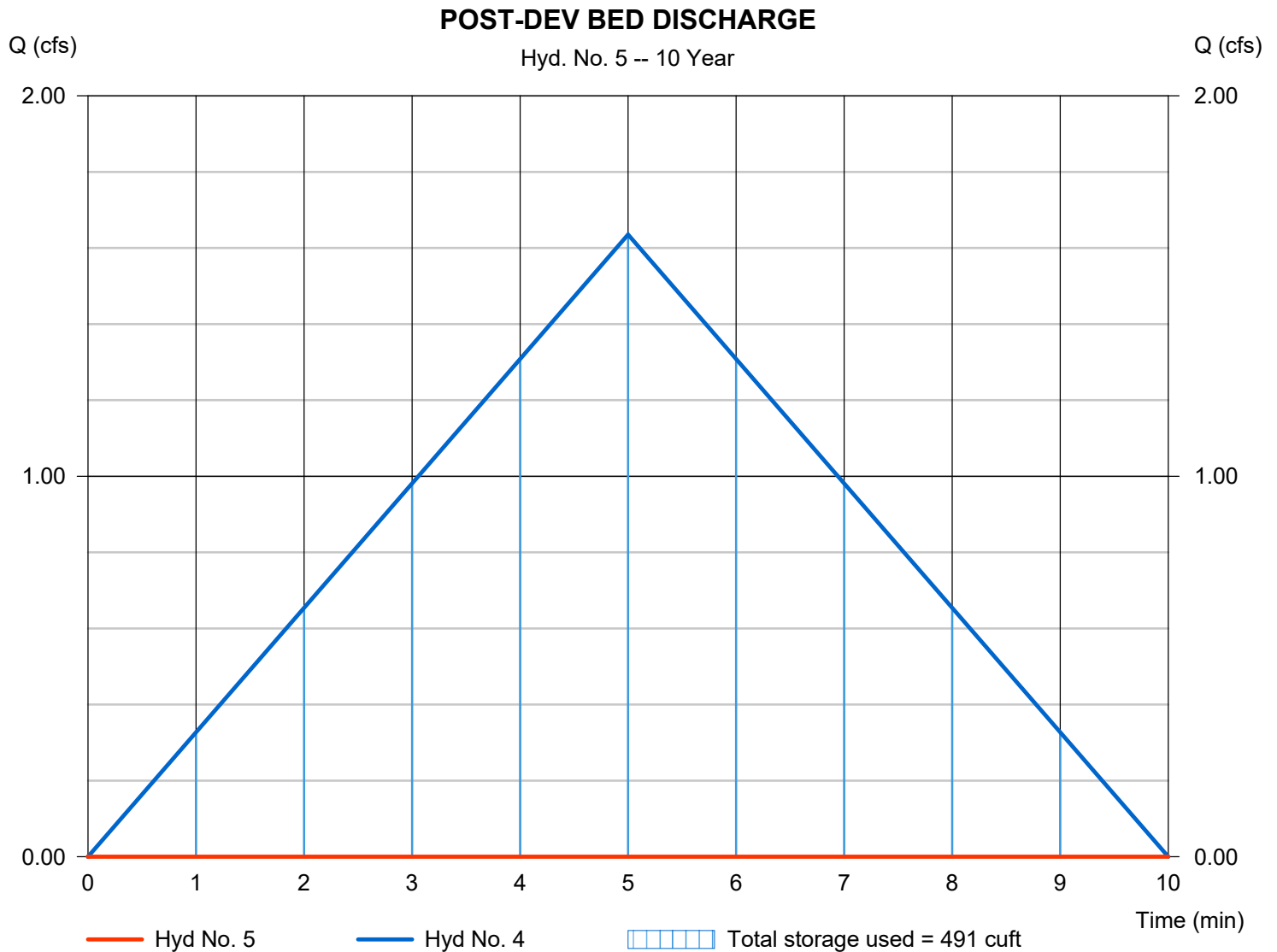
Wednesday, 05 / 6 / 2020

Hyd. No. 5

POST-DEV BED DISCHARGE

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 4 - POST-DEV CAPTURED	Max. Elevation	= 370.31 ft
Reservoir name	= INFILTRATION TRENCH	Max. Storage	= 491 cuft

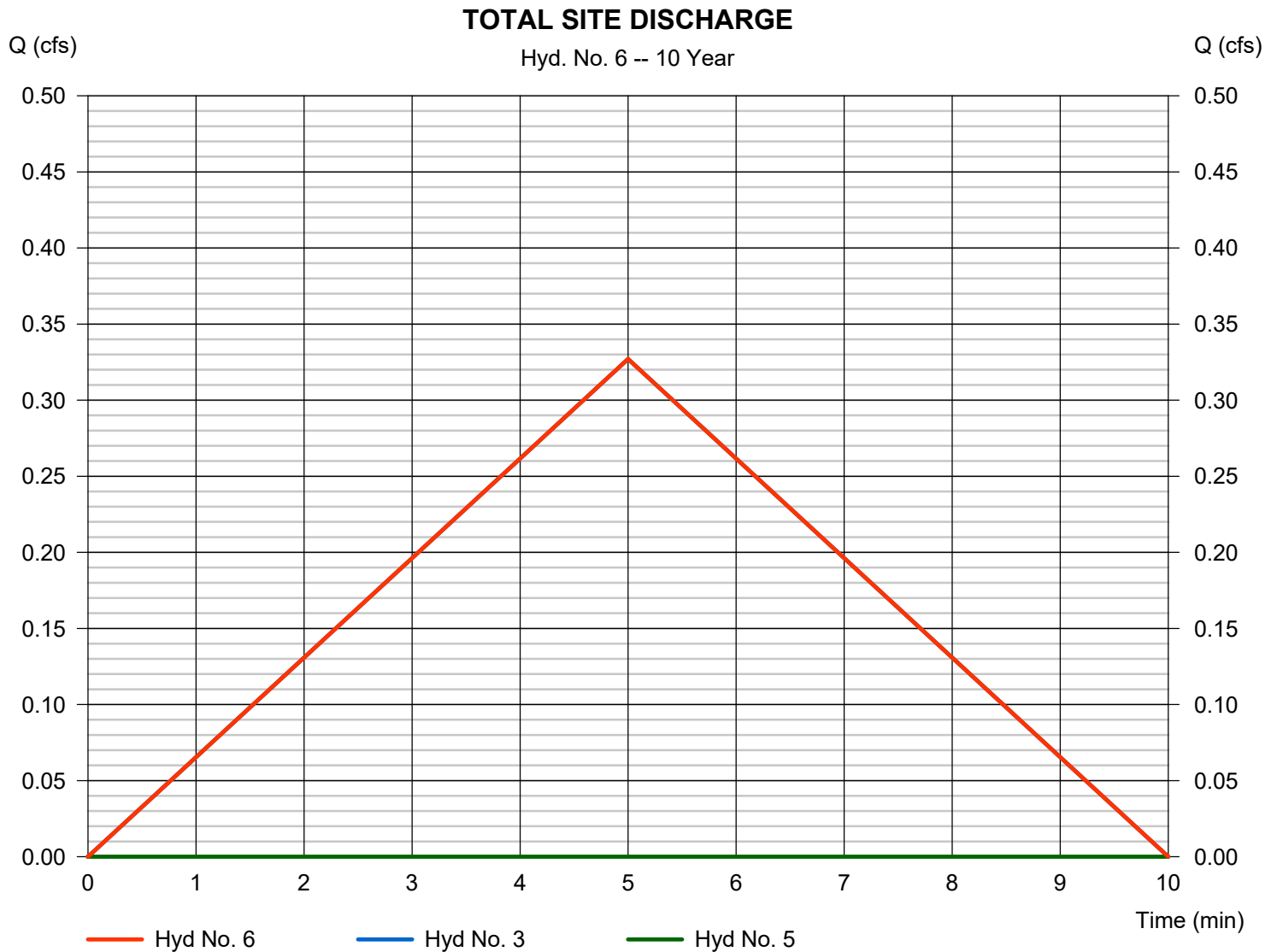
Storage Indication method used.



Hyd. No. 6

TOTAL SITE DISCHARGE

Hydrograph type	= Combine	Peak discharge	= 0.327 cfs
Storm frequency	= 10 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 98 cuft
Inflow hyds.	= 3, 5	Contrib. drain. area	= 0.080 ac



Hyd. No. 1

PRE-DEV

Hydrograph type	= Mod. Rational	Peak discharge	= 1.895 cfs
Storm frequency	= 25 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 568 cuft
Drainage area	= 0.410 ac	Runoff coeff.	= 0.69*
Intensity	= 6.698 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.246 x 0.99) + (0.168 x 0.25)] / 0.410



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

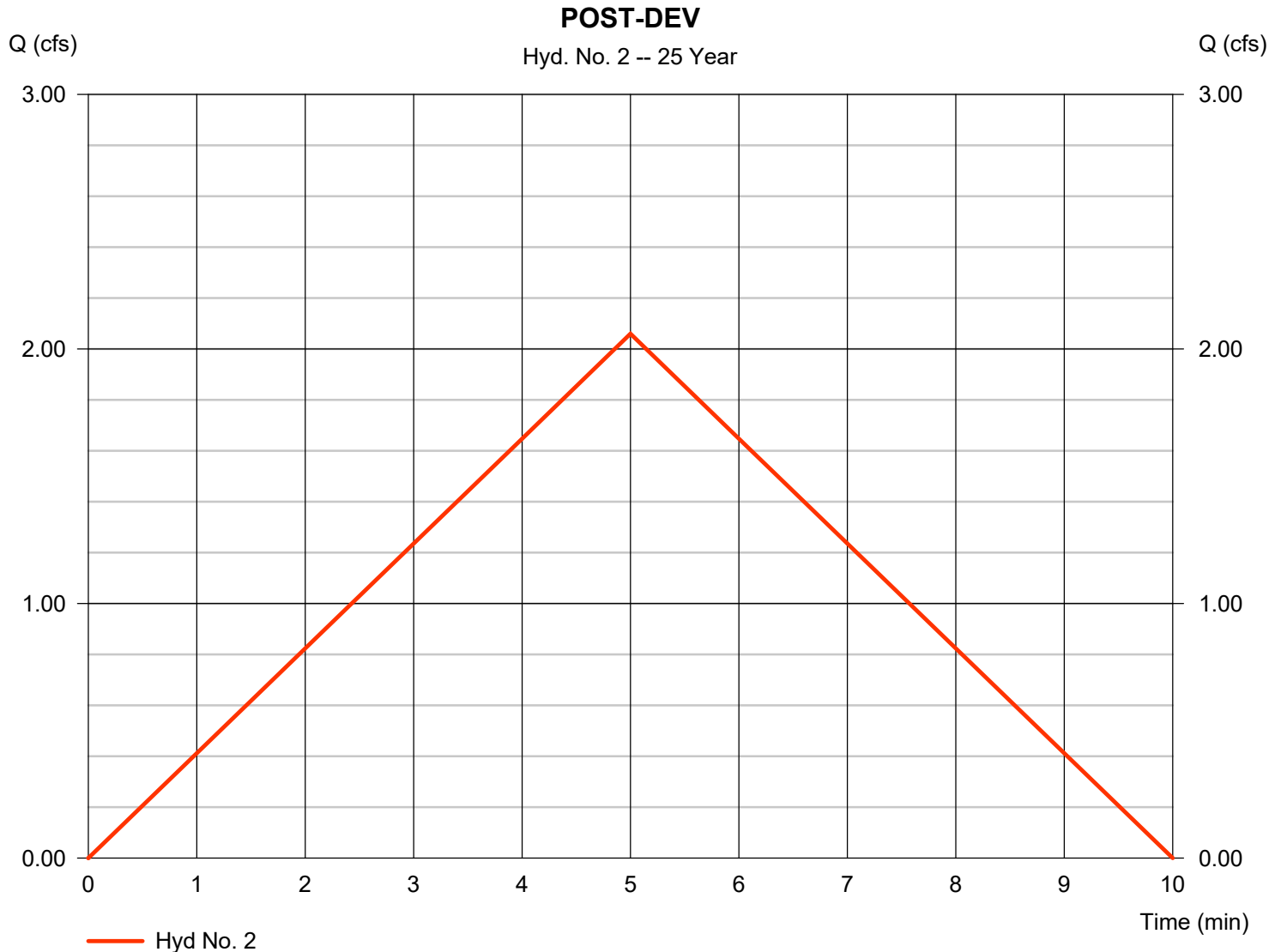
Wednesday, 05 / 6 / 2020

Hyd. No. 2

POST-DEV

Hydrograph type	= Mod. Rational	Peak discharge	= 2.060 cfs
Storm frequency	= 25 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 618 cuft
Drainage area	= 0.410 ac	Runoff coeff.	= 0.75*
Intensity	= 6.698 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.277 x 0.99) + (0.137 x 0.25)] / 0.410



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

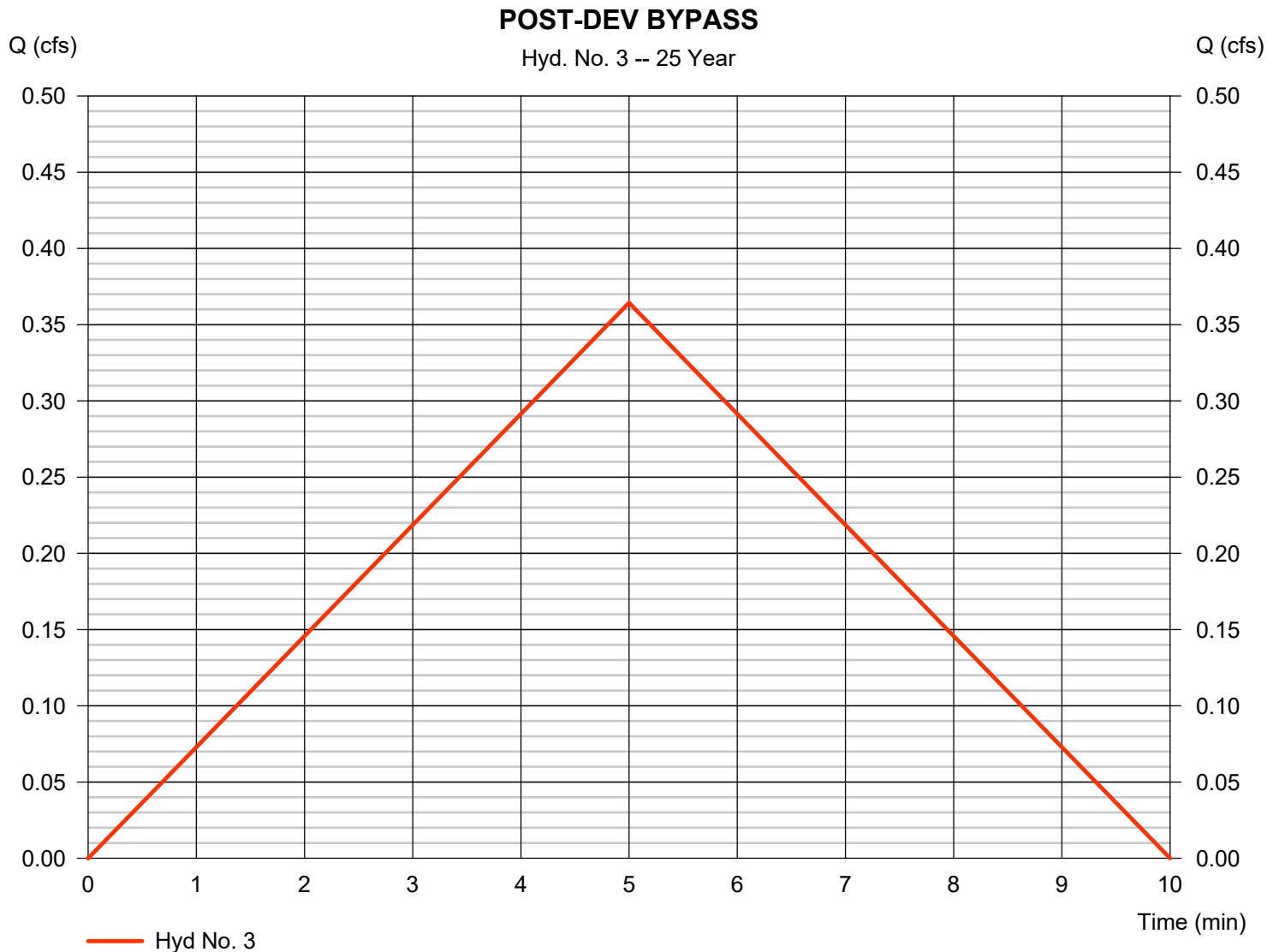
Wednesday, 05 / 6 / 2020

Hyd. No. 3

POST-DEV BYPASS

Hydrograph type	= Mod. Rational	Peak discharge	= 0.364 cfs
Storm frequency	= 25 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 109 cuft
Drainage area	= 0.080 ac	Runoff coeff.	= 0.68*
Intensity	= 6.698 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.044 x 0.99) + (0.032 x 0.25)] / 0.080



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

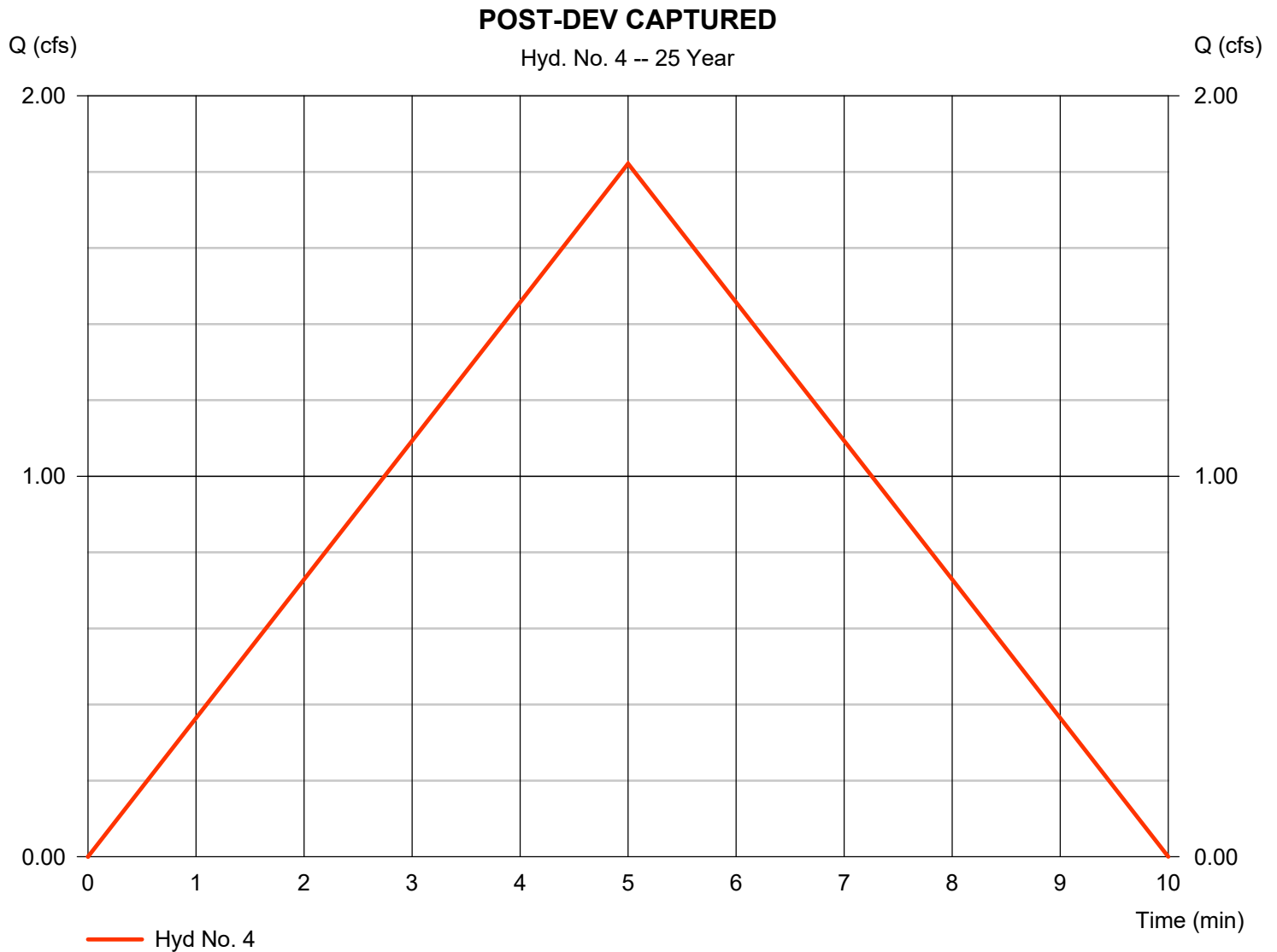
Wednesday, 05 / 6 / 2020

Hyd. No. 4

POST-DEV CAPTURED

Hydrograph type	= Mod. Rational	Peak discharge	= 1.822 cfs
Storm frequency	= 25 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 547 cuft
Drainage area	= 0.340 ac	Runoff coeff.	= 0.8*
Intensity	= 6.698 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.253 x 0.99) + (0.085 x 0.25)] / 0.340



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

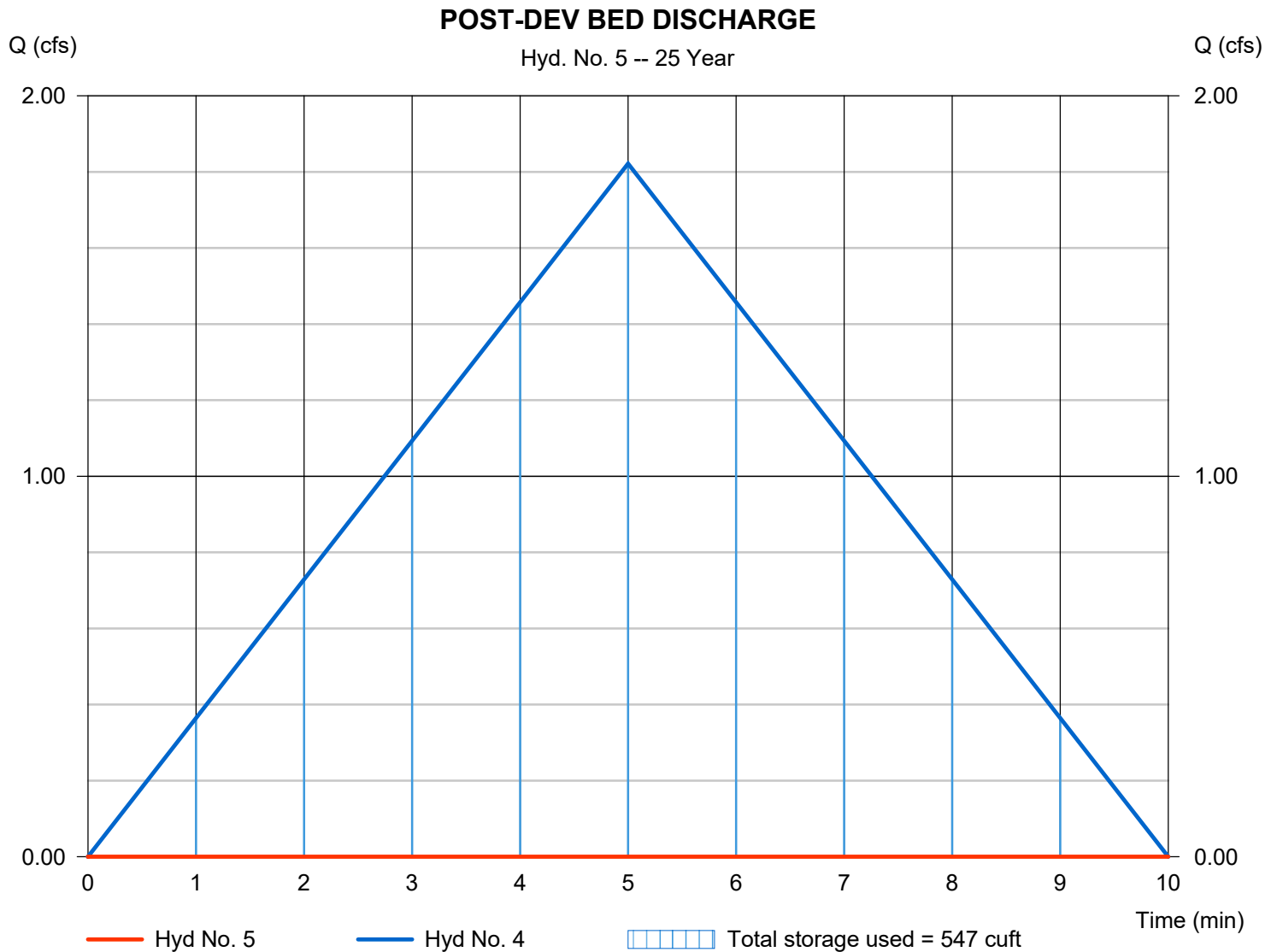
Wednesday, 05 / 6 / 2020

Hyd. No. 5

POST-DEV BED DISCHARGE

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 4 - POST-DEV CAPTURED	Max. Elevation	= 370.49 ft
Reservoir name	= INFILTRATION TRENCH	Max. Storage	= 547 cuft

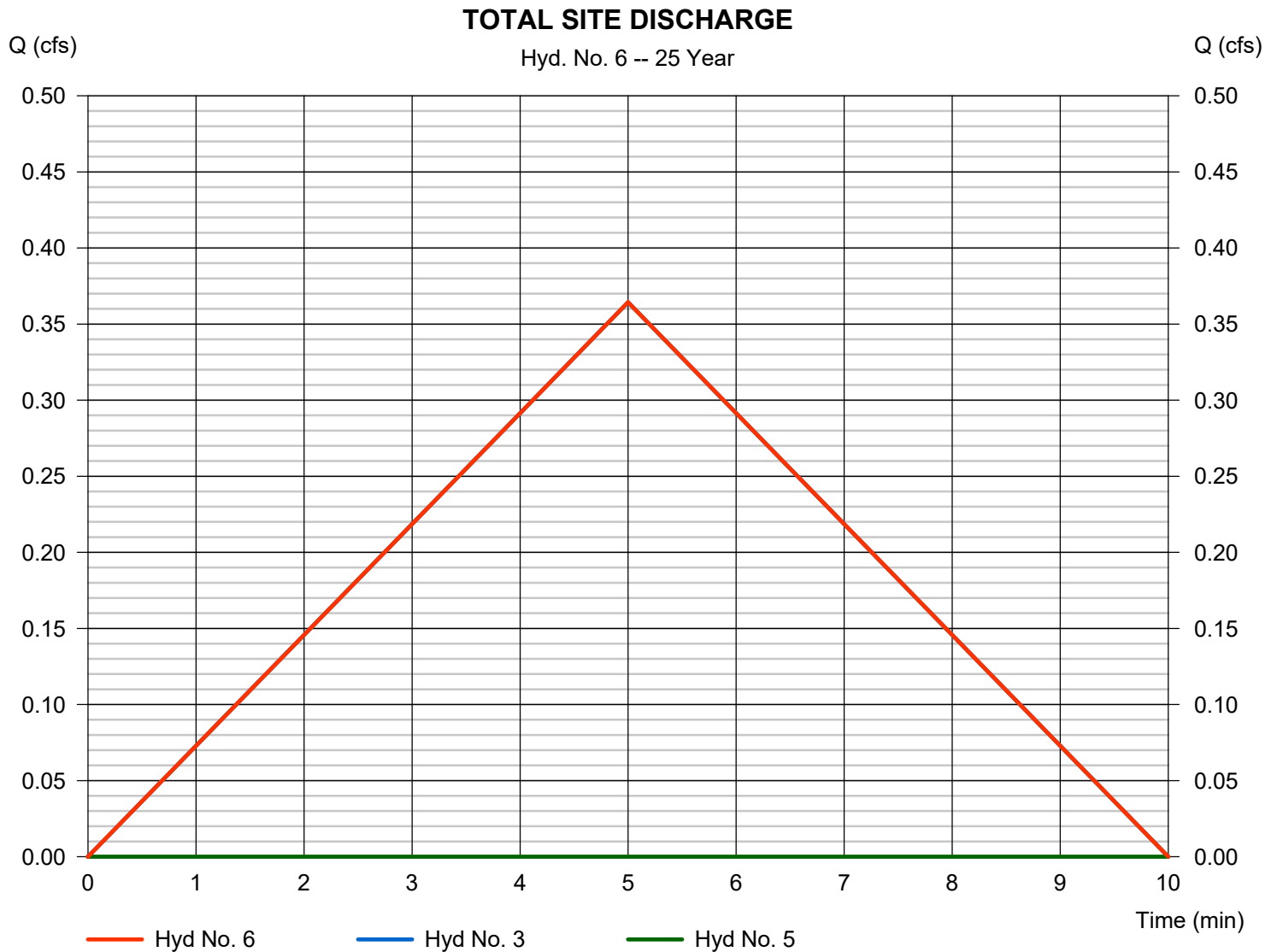
Storage Indication method used.



Hyd. No. 6

TOTAL SITE DISCHARGE

Hydrograph type	= Combine	Peak discharge	= 0.364 cfs
Storm frequency	= 25 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 109 cuft
Inflow hyds.	= 3, 5	Contrib. drain. area	= 0.080 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Wednesday, 05 / 6 / 2020

Hyd. No. 1

PRE-DEV

Hydrograph type	= Mod. Rational	Peak discharge	= 2.123 cfs
Storm frequency	= 50 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 637 cuft
Drainage area	= 0.410 ac	Runoff coeff.	= 0.69*
Intensity	= 7.506 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.246 x 0.99) + (0.168 x 0.25)] / 0.410



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

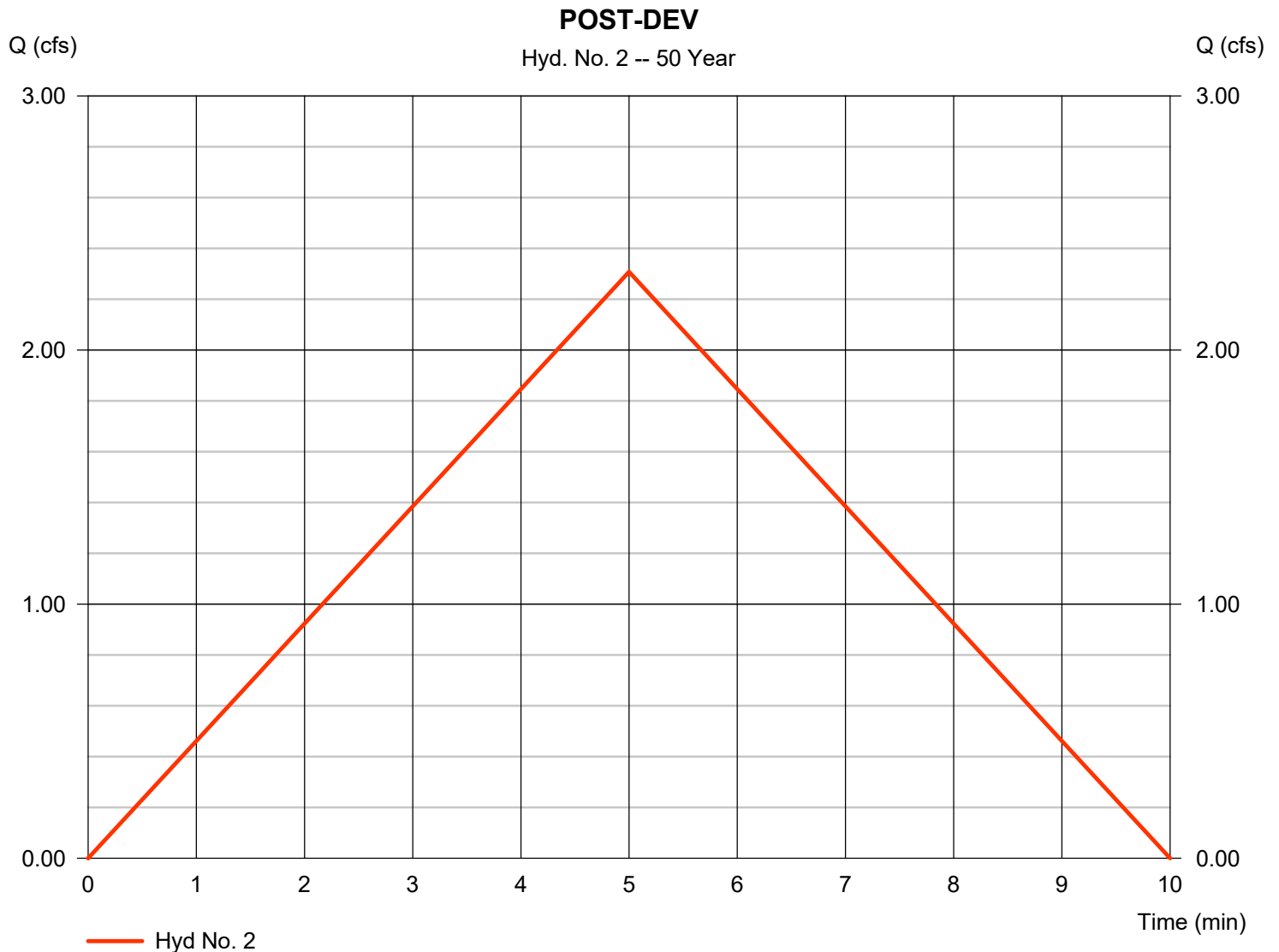
Wednesday, 05 / 6 / 2020

Hyd. No. 2

POST-DEV

Hydrograph type	= Mod. Rational	Peak discharge	= 2.308 cfs
Storm frequency	= 50 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 692 cuft
Drainage area	= 0.410 ac	Runoff coeff.	= 0.75*
Intensity	= 7.506 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.277 x 0.99) + (0.137 x 0.25)] / 0.410



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

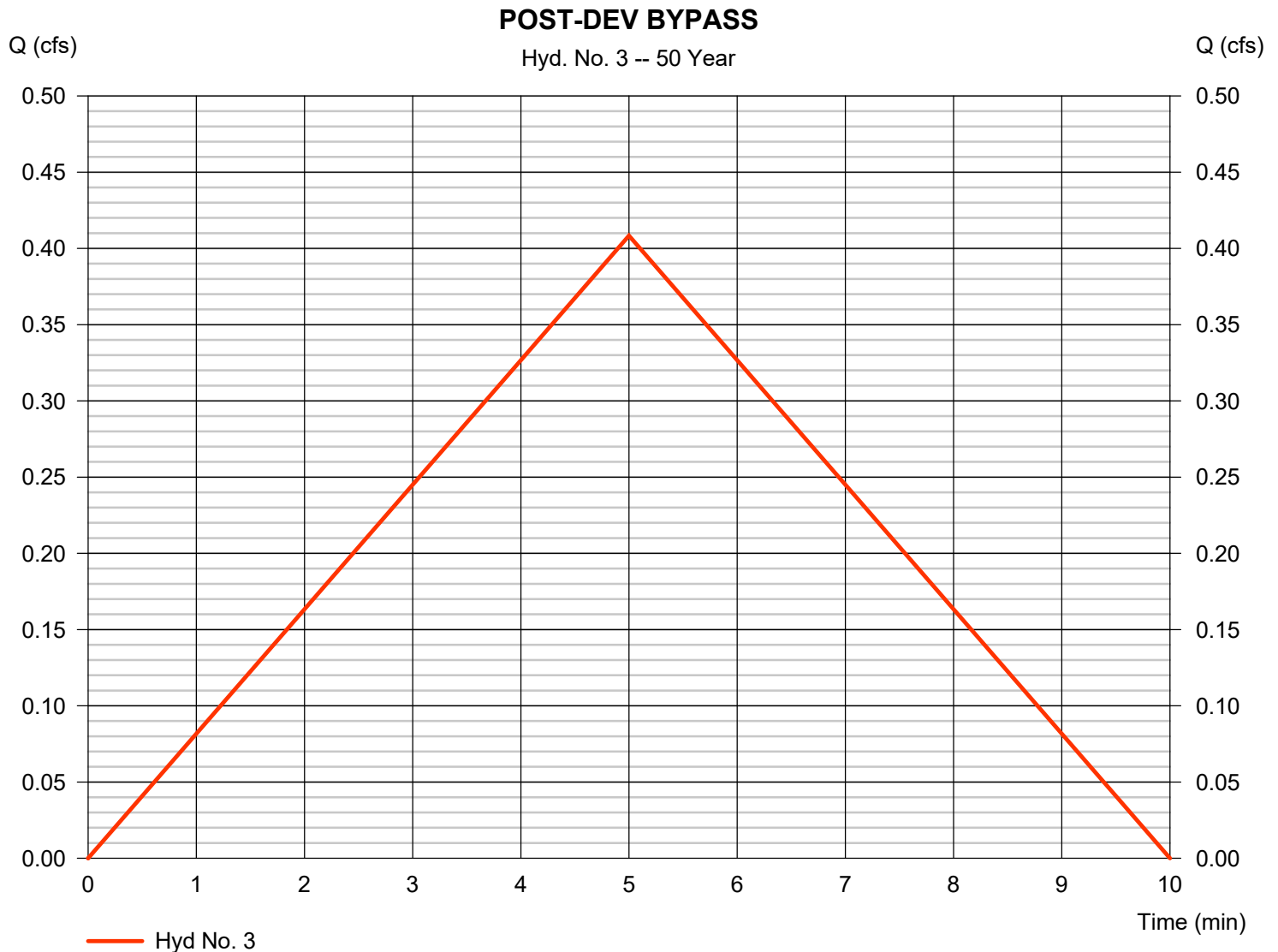
Wednesday, 05 / 6 / 2020

Hyd. No. 3

POST-DEV BYPASS

Hydrograph type	= Mod. Rational	Peak discharge	= 0.408 cfs
Storm frequency	= 50 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 122 cuft
Drainage area	= 0.080 ac	Runoff coeff.	= 0.68*
Intensity	= 7.506 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.044 x 0.99) + (0.032 x 0.25)] / 0.080

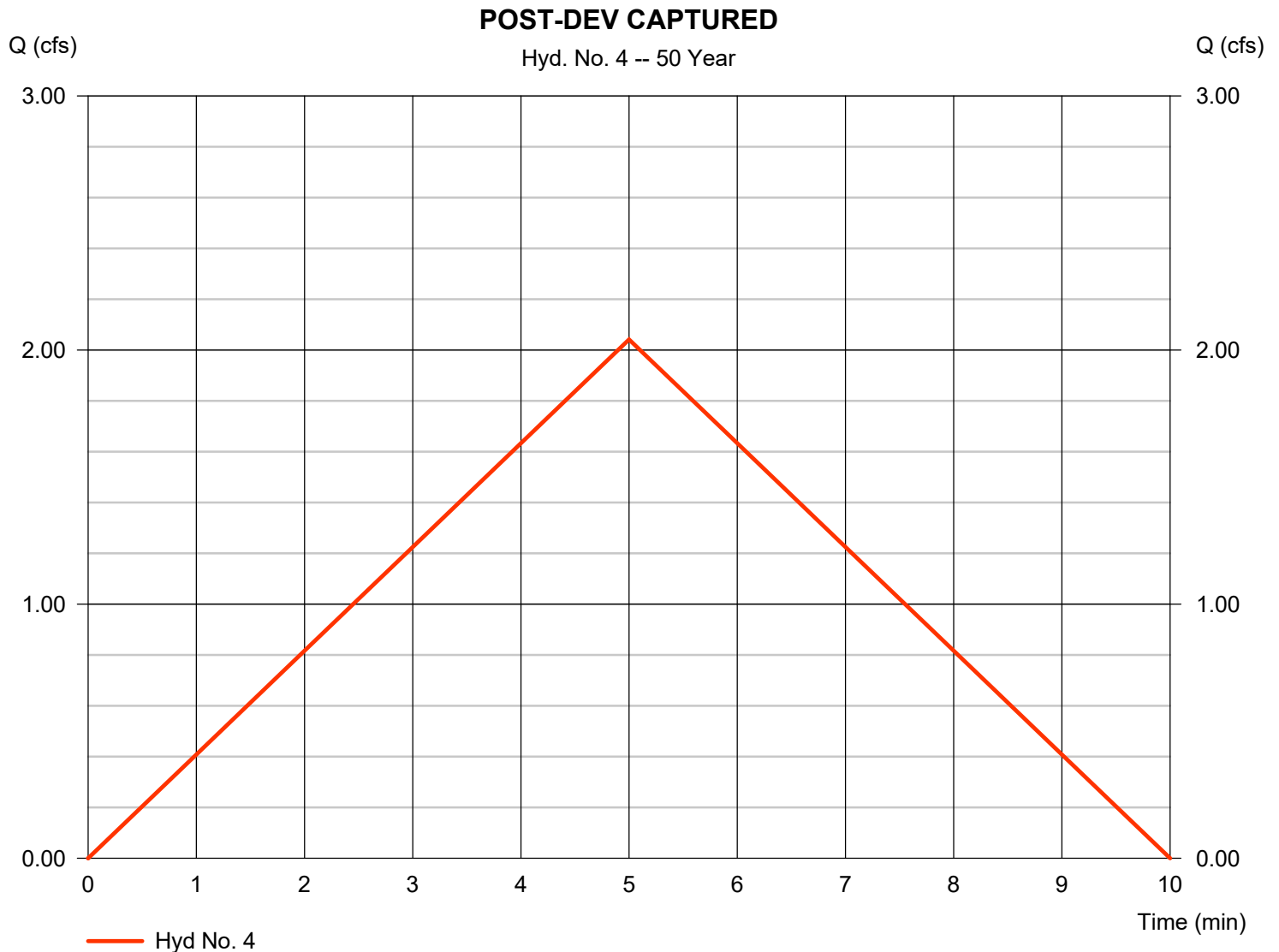


Hyd. No. 4

POST-DEV CAPTURED

Hydrograph type	= Mod. Rational	Peak discharge	= 2.042 cfs
Storm frequency	= 50 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 612 cuft
Drainage area	= 0.340 ac	Runoff coeff.	= 0.8*
Intensity	= 7.506 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.253 x 0.99) + (0.085 x 0.25)] / 0.340



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

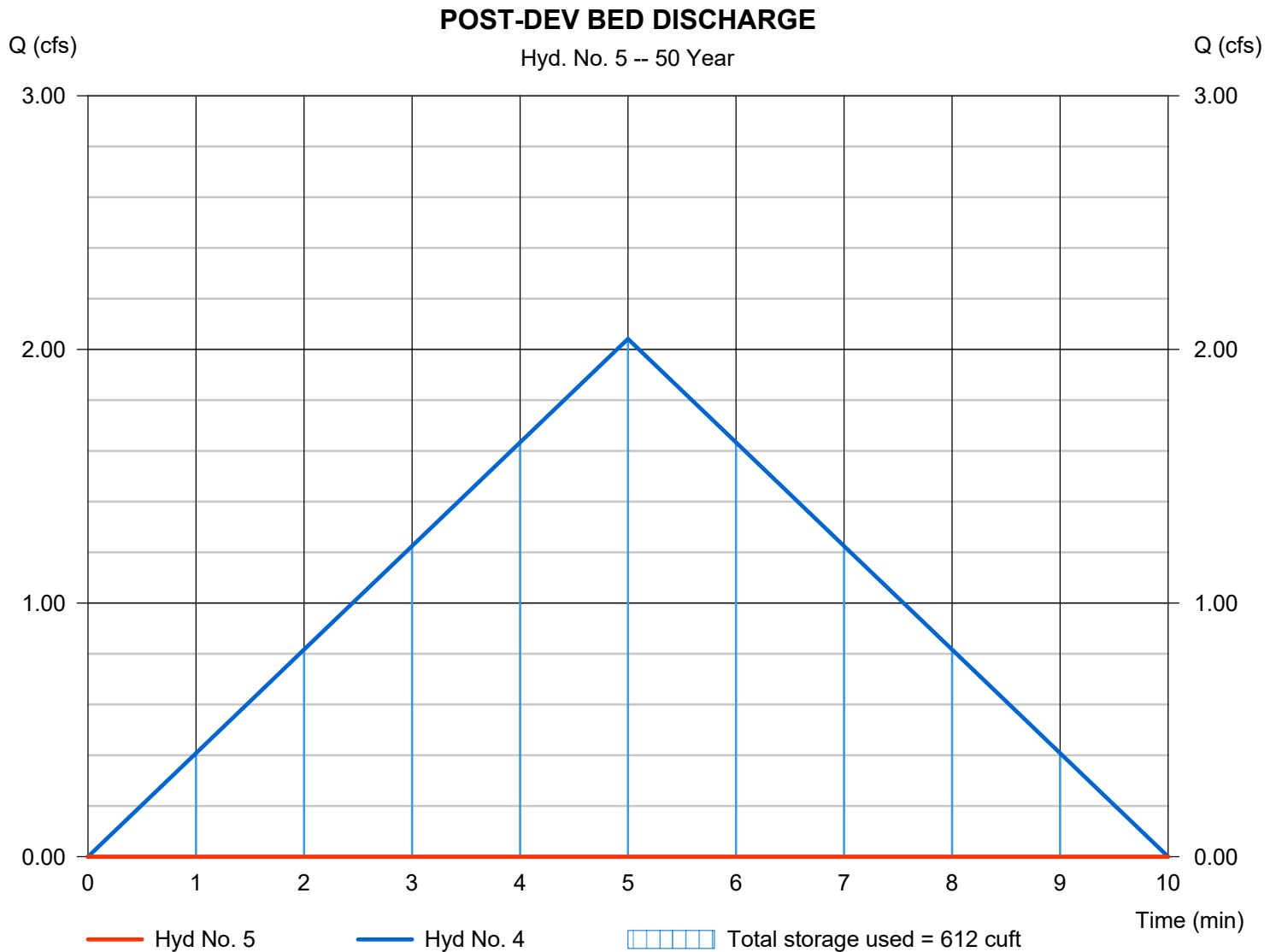
Wednesday, 05 / 6 / 2020

Hyd. No. 5

POST-DEV BED DISCHARGE

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 50 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 4 - POST-DEV CAPTURED	Max. Elevation	= 370.71 ft
Reservoir name	= INFILTRATION TRENCH	Max. Storage	= 612 cuft

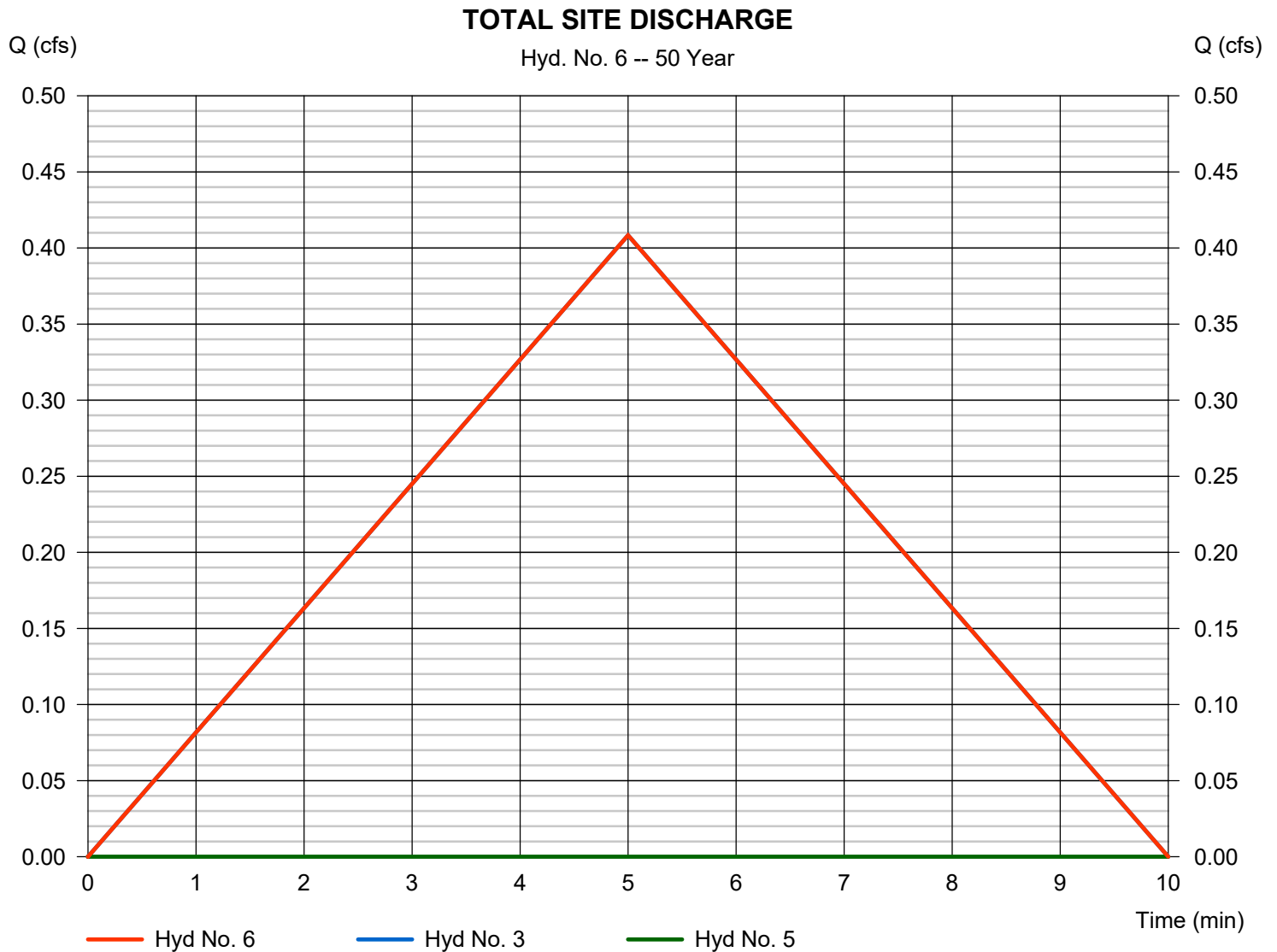
Storage Indication method used.



Hyd. No. 6

TOTAL SITE DISCHARGE

Hydrograph type	= Combine	Peak discharge	= 0.408 cfs
Storm frequency	= 50 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 122 cuft
Inflow hyds.	= 3, 5	Contrib. drain. area	= 0.080 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

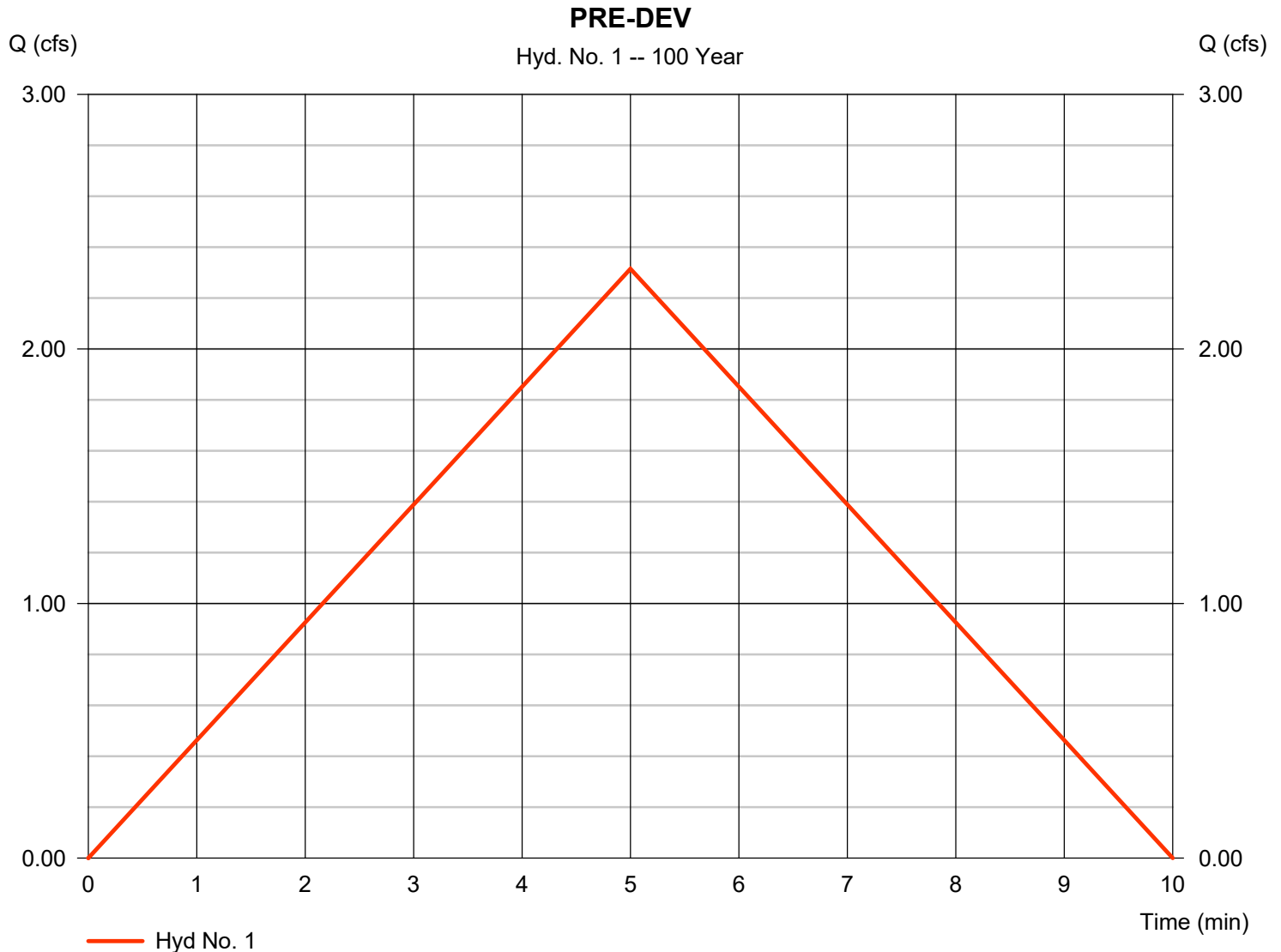
Wednesday, 05 / 6 / 2020

Hyd. No. 1

PRE-DEV

Hydrograph type	= Mod. Rational	Peak discharge	= 2.315 cfs
Storm frequency	= 100 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 694 cuft
Drainage area	= 0.410 ac	Runoff coeff.	= 0.69*
Intensity	= 8.182 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.246 x 0.99) + (0.168 x 0.25)] / 0.410



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

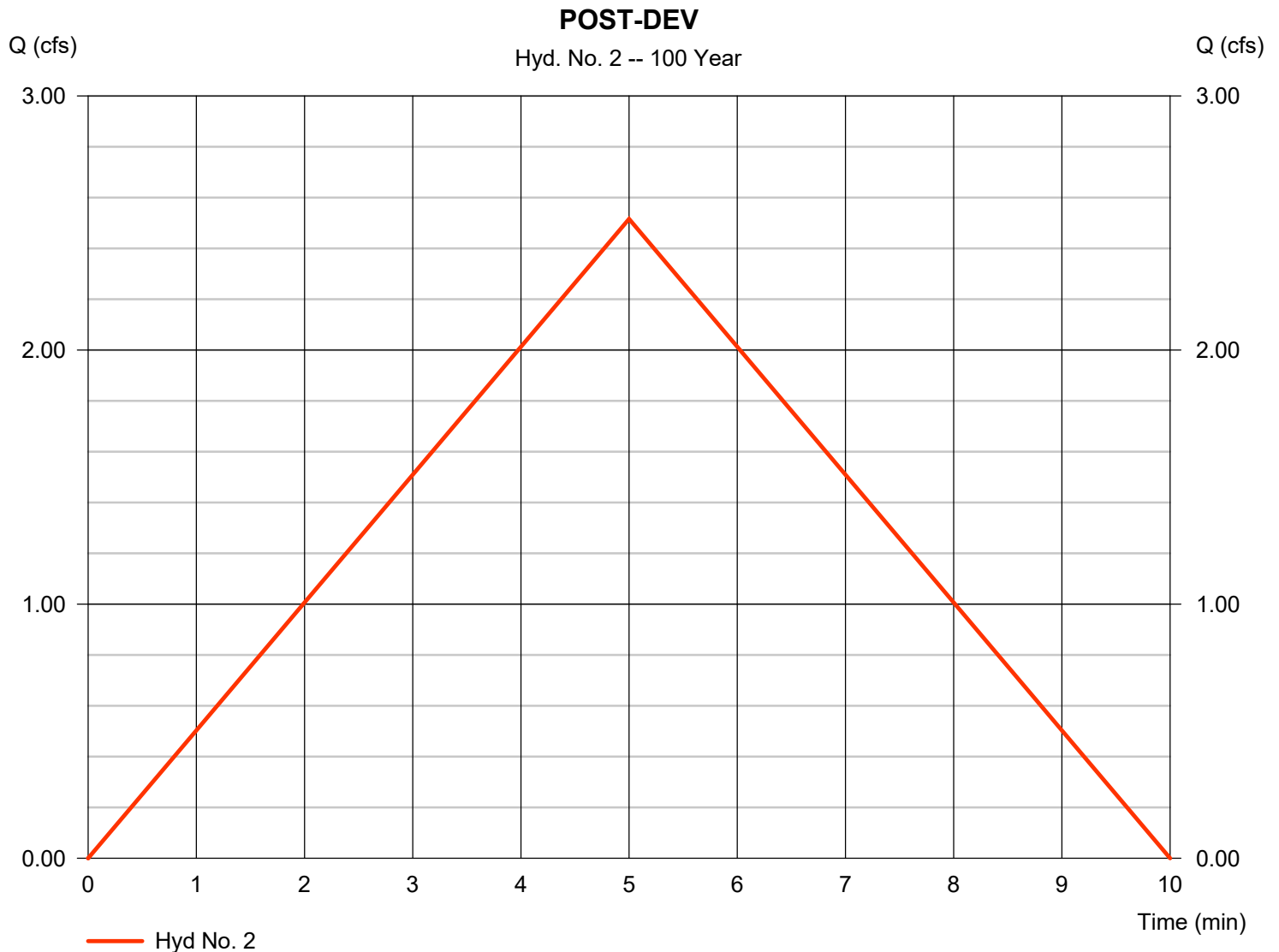
Wednesday, 05 / 6 / 2020

Hyd. No. 2

POST-DEV

Hydrograph type	= Mod. Rational	Peak discharge	= 2.516 cfs
Storm frequency	= 100 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 755 cuft
Drainage area	= 0.410 ac	Runoff coeff.	= 0.75*
Intensity	= 8.182 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.277 x 0.99) + (0.137 x 0.25)] / 0.410



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

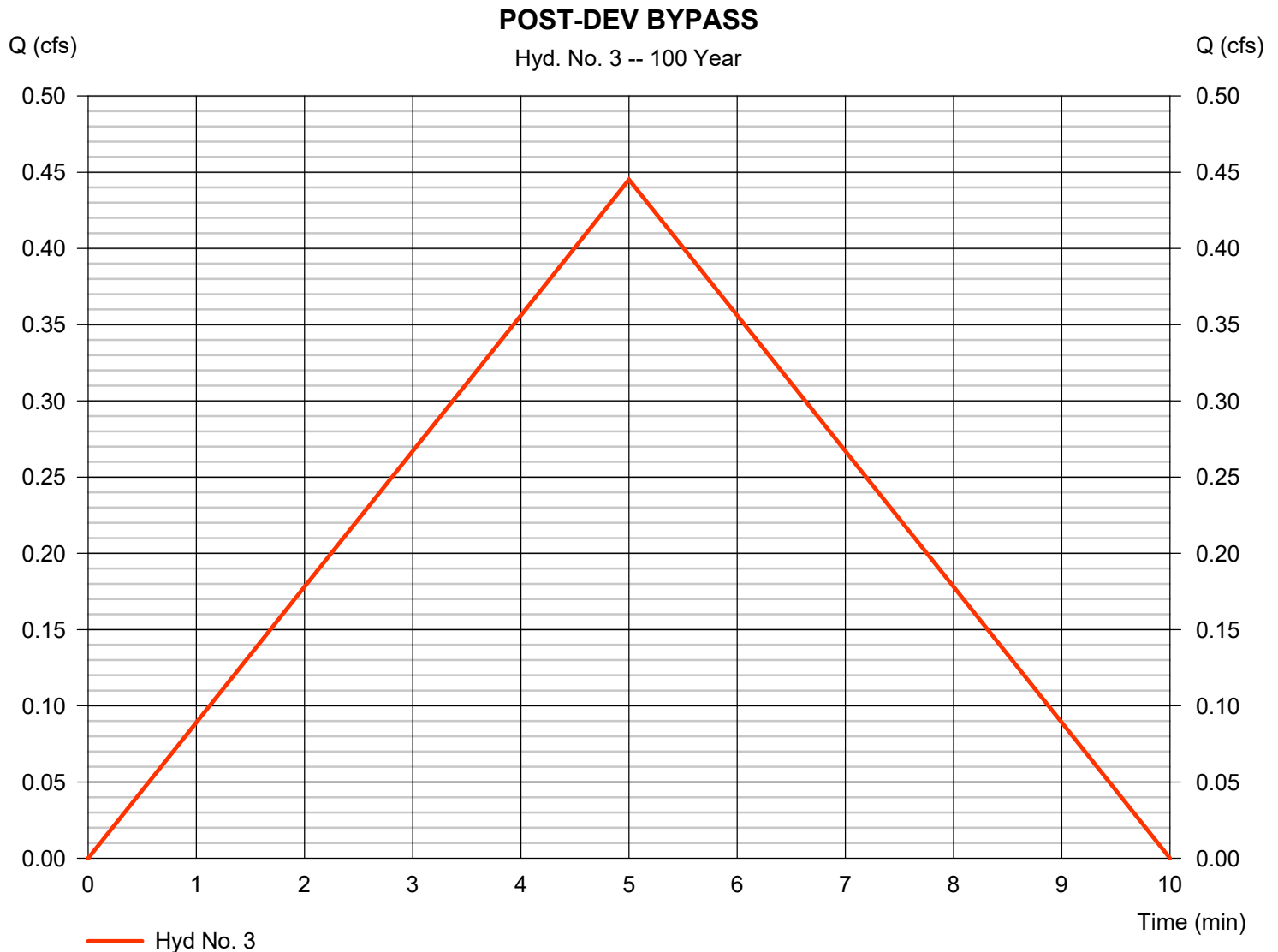
Wednesday, 05 / 6 / 2020

Hyd. No. 3

POST-DEV BYPASS

Hydrograph type	= Mod. Rational	Peak discharge	= 0.445 cfs
Storm frequency	= 100 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 134 cuft
Drainage area	= 0.080 ac	Runoff coeff.	= 0.68*
Intensity	= 8.182 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.044 x 0.99) + (0.032 x 0.25)] / 0.080



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

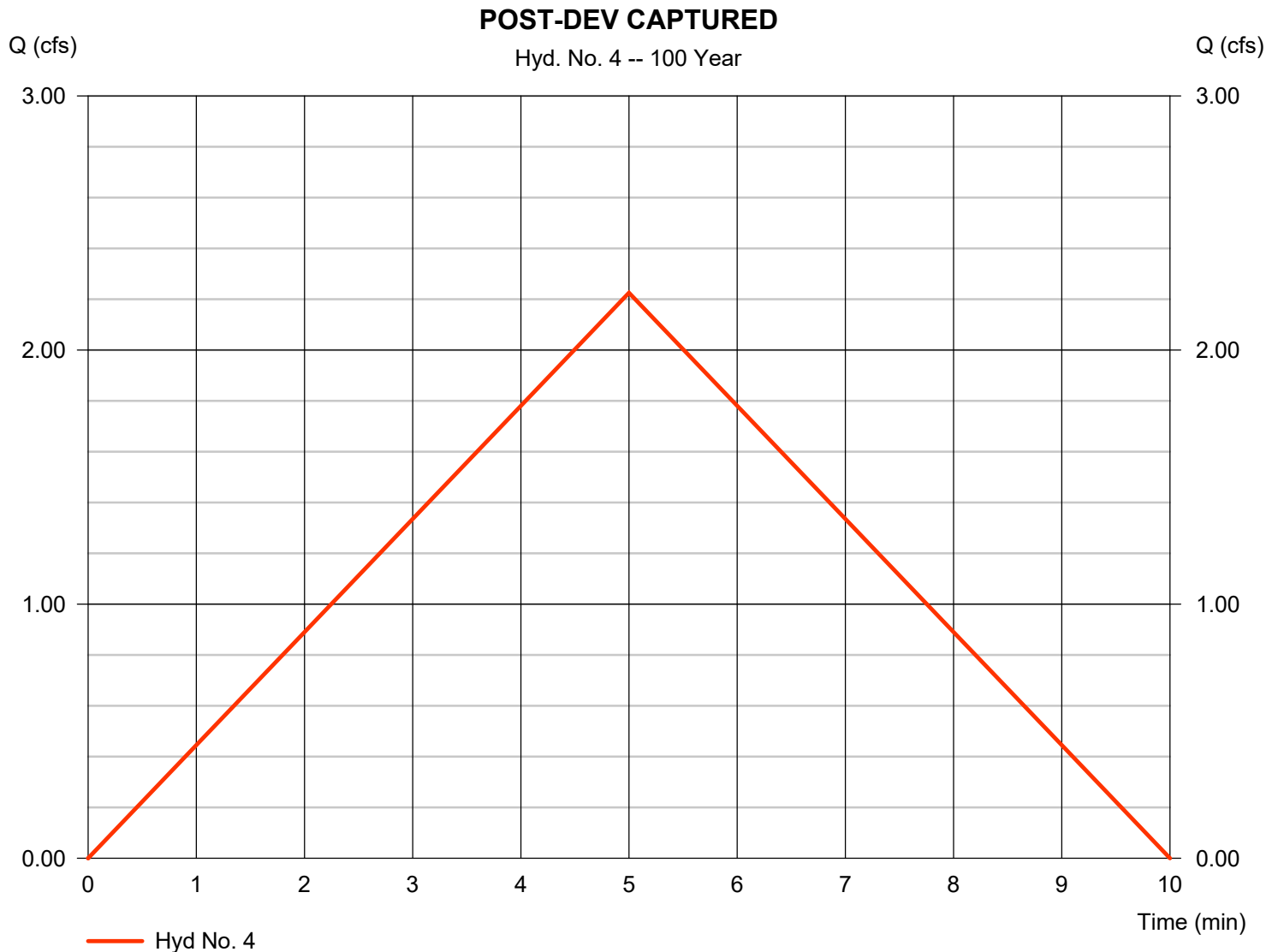
Wednesday, 05 / 6 / 2020

Hyd. No. 4

POST-DEV CAPTURED

Hydrograph type	= Mod. Rational	Peak discharge	= 2.226 cfs
Storm frequency	= 100 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 668 cuft
Drainage area	= 0.340 ac	Runoff coeff.	= 0.8*
Intensity	= 8.182 in/hr	Tc by User	= 5.00 min
IDF Curve	= Region5.IDF	Storm duration	= 1.0 x Tc
Target Q	=n/a	Est. Req'd Storage	=n/a

* Composite (Area/C) = [(0.253 x 0.99) + (0.085 x 0.25)] / 0.340



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

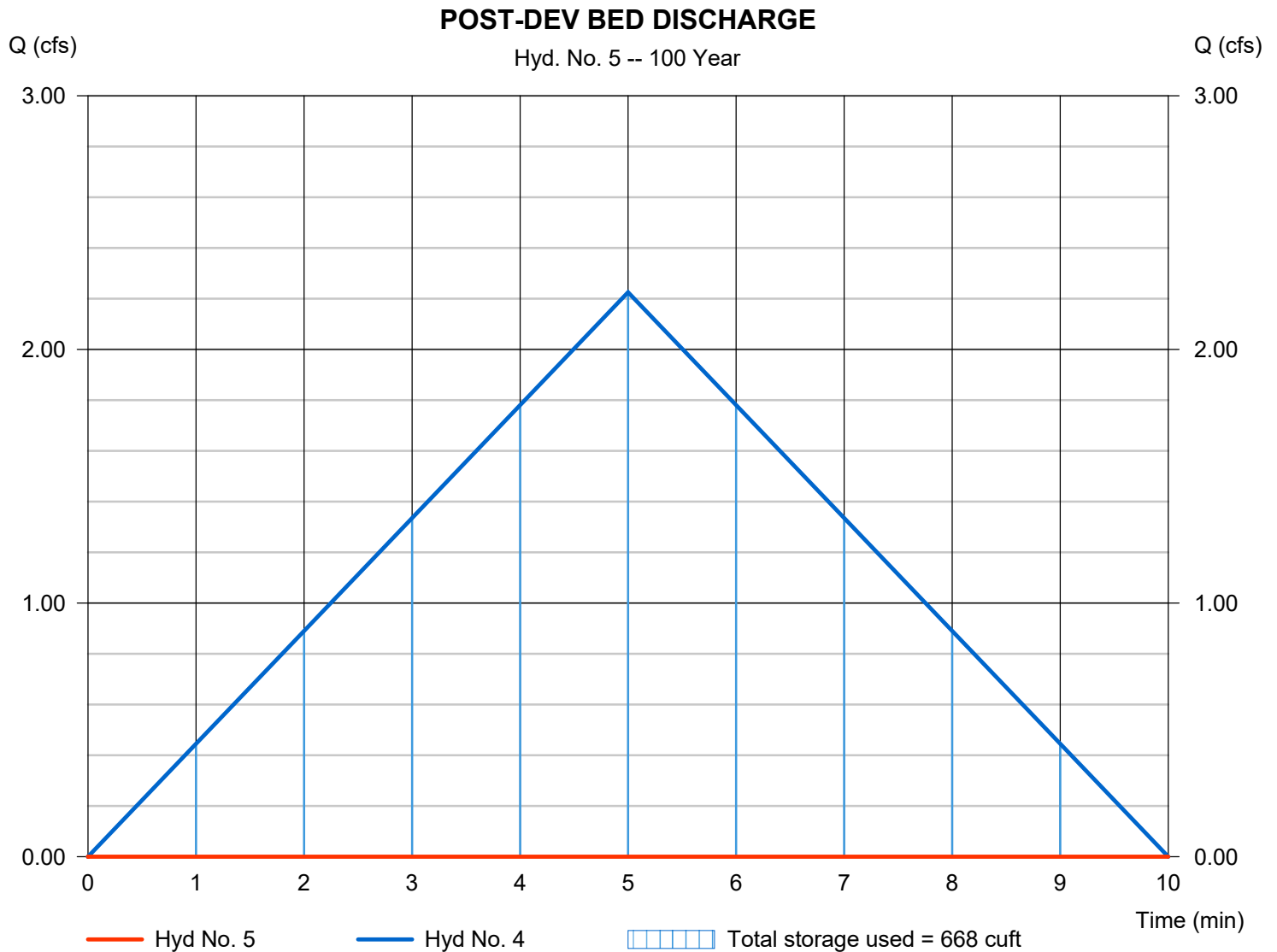
Wednesday, 05 / 6 / 2020

Hyd. No. 5

POST-DEV BED DISCHARGE

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 4 - POST-DEV CAPTURED	Max. Elevation	= 370.90 ft
Reservoir name	= INFILTRATION TRENCH	Max. Storage	= 668 cuft

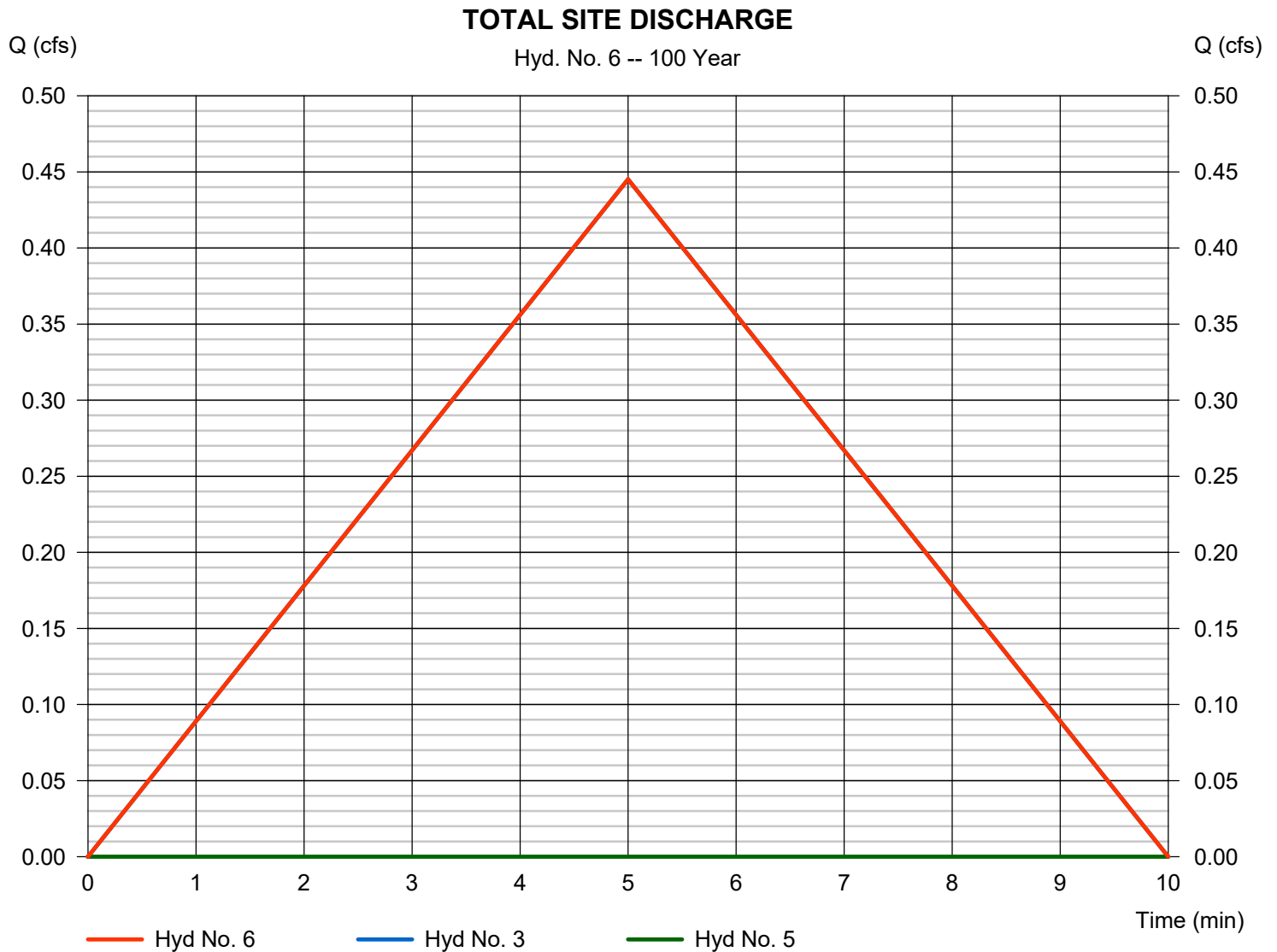
Storage Indication method used.



Hyd. No. 6

TOTAL SITE DISCHARGE

Hydrograph type	= Combine	Peak discharge	= 0.445 cfs
Storm frequency	= 100 yrs	Time to peak	= 5 min
Time interval	= 1 min	Hyd. volume	= 134 cuft
Inflow hyds.	= 3, 5	Contrib. drain. area	= 0.080 ac



HILBEC Engineering & Geosciences, LLC

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Office: 610.873.6204

www.hilbec.com

Fax: 610.873.6206

Wastewater * Stormwater * Hydrogeology * Environmental * Testing & Design

August 14, 2019

Site Engineering Concepts, LLC
Mr. Patrick Spellman, P.E.
PO Box 1992
Southeastern, PA 19399

Re: Stormwater Soil Evaluation
210 N Aberdeen Avenue
Radnor Township, Delaware County

Dear Mr. Spellman:

On August 13, 2019, I conducted soil evaluations for proposed stormwater management systems at the above noted property. A backhoe was used to excavate test pits to determine the most suitable depth to conduct permeability testing within the soil horizons. Test holes are typically excavated to the limits of the reach of the machine, bedrock, or a depth where water may be encountered entering the excavation.

Test pit #SWM-01 was located at the westerly side of the lot and just on the east side of the proposed infiltration area. Mixed compacted fill was noted from grade to a depth of 28 inches and then heavy clay laden loam soil exists to a depth of 74". Redoximorphic features (formerly called mottles), were observed between 44" and 74" with heavy clay above. No evidence of water or impenetrable bedrock was observed. The soil below the mottling was partly heavy due to intermixed clay throughout the horizon, likely contributing to the slow tested permeability rate.

Test pit #SWM-02 was located at the southerly side of the lot and just on the north side of the proposed infiltration area. Hard compacted mixed fill was noted from grade to a depth of 16 inches and then heavy clay laden loam soil exists to a depth of 75". Redoximorphic features, were observed between 39" and 75" with heavy clay above. No evidence of water or impenetrable bedrock was observed. The soil below the mottling had a lesser amount of intermixed clay within the horizon than that of test pit #SWM-01 and had a somewhat sandy mix.

Permeability testing was conducted at 96 inches at both locations.

A Guelph Permeameter was used to determine the permeability of the soil. The Guelph is a constant head borehole permeameter using the principle of the Mariotte Siphon to supply a constant level of water in the hole; unlike a percolation falling head test.

The Guelph allows the Field Saturated Permeability (K_{fs}) to be determined by running the test twice, at two different heads. Two tests are run at different heads or water elevations in order to provide the "gradient" portion of the required calculations. The gradient is used to measure the flux or water

movement within the soil. A fluid bulb quickly forms and allows the stabilized hydraulic conductivity to be calculated. Errors inherent in other types of permeability tests that are minimized or eliminated by the Guelph Permeameter are soil fracturing, varying heads, silted in holes, estimated readings due to scale, and leaking clay seals.

Permeability tests assume that homogeneous soil conditions exist at and below the test zone, which is why the central portions of one soil horizon are typically chosen for the test depths. However, soil suitability, PA DEP guidelines, and proposed system design may alter that test parameter. Even within a consistent soil, unseen heterogeneous soil conditions can exist and may consist of:

1. Changing soil horizons across or near the test zone
2. Rock or stony soil beneath the bottom of the test hole
3. Roots, animal burrows
4. Soil fractures & thinly laminated soils

The consistency of the soil can be estimated by comparing the assumed and calculated alpha value. The alpha value is a soil parameter that depends primarily upon the soil texture and structure. By definition, it is the ratio of gravity to capillary soil-water forces. The value of typical fine to coarse-grained soils ranges between 0.01 and 0.5 cm^{-1} . Values considerably outside of this range (and negative values) suggest that heterogeneous soil conditions, such as in stony areas, may be encountered. Large alpha values suggest coarse textured or highly structured soils. Low alpha values suggest finer grained soils or a fine matrix. The geometric mean of the single head tests can be used in place of the two head approach to provide the permeability values if heterogeneous soil conditions cannot be avoided, such as in rocky areas.

A summary of the test results is noted in the table below. The base of all stormwater systems must adhere to the 24" isolation distance to any limiting horizon as required by the PA DEP guidance. Based on the observed soil in the test pits, the following tolerances can be met:

Test ID	Test Probe #	Test Depth (inches)	Result (in/hr)	Geometric Mean
P1-A	SWM-01	96"	0.11	0.11
P1-B		96"	0.12	
P2-A	SWM-02	96"	0.30	0.32
P2-B		96"	0.33	
Test Pit ID	Limiting Depth	Limitation	Upper Installation Limit	Lower Installation Limit
SWM-01	120"	Pit Base	74"	96"
SWM-02	122"	Pit Base	75"	98"

The base of the stormwater systems should be kept between the upper and lower limits of each pit as measured from existing grade while using the respective permeability test results. The base of the system could vary due to design conditions but the base should be kept as close to the test depths as possible. The base of the excavation should be scarified so as not to clog the void spaces. No safety factor needs to be applied to the test results as this is a true permeability test, other than any additional

safety factor the designer may choose to add. The rock underlying this site and within the test probes is not a carbonate material.

I have directly performed and/or supervised the test procedures and preparation of this report. All information contained herein is accurate to the best of my knowledge and all test procedures have been performed using accepted practices. HILBEC Engineering & Geosciences, LLC cannot and does not make claim, warranty or guarantee that surface and sub-surface site conditions other than described herein, either natural or as altered by construction activities, may be different at some time in the future and thus may affect these findings.

Please refer to the attached test logs, permeability test data, and location map of the test areas. If you have any further questions, please contact our office.

Very truly yours,

For HILBEC Engineering & Geosciences, LLC



Kevin R. Sech, P.G., P.E.

HILBEC ENGINEERING & GEOSCIENCES, LLC

SOIL DESCRIPTIONS

Project Name:	210 N. Aberdeen Avenue
Municipality:	Radnor Township, Delaware County
Soil Profile Description Prepared By:	Kevin R. Sech, P.G., P.E.
General Location of the Test Pit:	Westerly yard
Probe #:	SWM-01
Test Date:	August 13, 2019
Soil Profile Limitation:	Redox features due to a perched water table @ 44" to 74" No water or bedrock observed

Horizon	Up	Low	Color	Texture	Structure		Consistence		CF%	Boundary	Roots	Coats	Redox
A	0	28	10YR 2/2 V Dark Brown	Silt Loam	---	Massive Structurless	Friable to Firm	Avg Moisture	25%	Clear	Irregular	Yes	---
A b	28	35	10YR 3/3 Dark Brown	Loam	Fine Weak Somewhat Compacted	SBK	Friable	Avg Moisture	<10%	Abrupt	Smooth	No	---
Bt 1	35	44	10YR 4/6 Dk Yellowish Brown	Silty Clay Loam	Medium Moderate	SBK	SI Plastic	Avg Moisture	10%	Clear	Wavy	No	---
Bt 2	44	74	10YR 4/6 Dk Yellowish Brown	Silty Clay Loam	Medium Moderate	SBK	SI Plastic	Avg Moisture	10%	Clear	Wavy	No	Many Prom
C	74	120	10YR 3/6 Variegated Dk Yellowish Brown	Silty Clay Loam	---	Massive Structurless	Friable	Avg Moisture	20%	Pit Base	---	No	---

Method of Excavation:	Backhoe/Trackhoe	Remarks:	
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PROJECT LIMITATIONS:
I state that I have visited the site and directly performed and/or supervised all test procedures and/or preparation of this report. All information contained herein is accurate to the best of my knowledge and all test procedures have been performed using accepted practices. HILBEC Engineering & Geosciences, LLC cannot and does not make claim, warranty, or guarantee that surface and sub-surface site conditions or test results, other than described or conducted at the time of the test, may be different at some time in the future and thus may affect these findings herein.

Kevin R. Sech
Kevin R. Sech, P.G., P.E.

Kevin R. Sech, P.G., P.E.

Project Name:	210 N. Aberdeen Avenue
Municipality:	Radnor Township, Delaware County
Soil Profile Description Prepared By:	Kevin R. Sech, P.G., P.E.
General Location of the Test Pit:	Southerly yard

Probe #:	SWM-02
Test Date:	August 13, 2019
Soil Profile Limitation:	Redox features due to a perched water table @ 39" to 75" No water or bedrock observed

Horizon	Up	Low	Color	Texture	Structure		Consistence	CF%	Boundary	Roots	Coats	Redox
					Massive	Structurless						
A	0	16	10YR 2/2 V Dark Brown	Silt Loam	---	Structureless	Friable to Firm	25%	Clear	Irregular	Yes	---
Fill with parking aggregate, railroad timbers, brick, limbs												
A b	16	22	10YR 3/3 Dark Brown	Silt Loam	Fine	Weak Somewhat Compacted	Friable	10%	Abrupt	Wavy	No	---
Buried topsoil												
Bt 1	22	39	10YR 4/6 Dk Yellowish Brown	Silty Clay Loam	Fine	Weak SBK	Ex Firm	10%	Clear	Wavy	No	---
Bt 2	39	75	10YR 4/4 Dk Yellowish Brown	Silt Loam	---	Massive Structureless	V Firm	10%	Clear	Wavy	No	Many Prom
C	75	122	10YR 4/6 Variegated Dk Yellowish Brown	Silty Clay Loam Sandy In-Part	---	Massive Structureless	Friable to Firm	10%	Pit Base	---	No	---
Method of Excavation:	Backhoe/Trackhoe		Remarks:									

PROJECT LIMITATIONS:

I state that I have visited the site and directly performed and/or supervised all test procedures and/or preparation of this report. All information contained herein is accurate to the best of my knowledge and all test procedures have been performed using accepted practices. HILBEC Engineering & Geosciences, LLC cannot and does not make claim, warranty, or guarantee that surface and sub-surface site conditions or test results, other than described or conducted at the time of the test, may be different at some time in the future and thus may affect these findings herein.

Kevin R. Sech

Kevin R. Sech, P.G., P.E.



HILBEC ENGINEERING & GEOSCIENCES, LLC

PERMEABILITY TEST RESULTS AND CALCULATIONS

CONSTANT HEAD BOREHOLE PERMEAMETER ANALYSIS
Guelph Permeameter

RANGE OF TYPICAL TEXTURAL DATA (ALPHA VALUES)
 0.36 cm-1 Sands, Gravels, Coarse Grained Saprolite, Soil Fractures
 0.12 cm-1 Structured Soils from Clays to Loams
 0.04 cm-1 Fine & Very Fine Textured Silts and Clay
 0.01 cm-1 Compacted and Structureless Clay, Landfill Caps, etc.

TEST PARAMETERS: RUN OF FIRST APPLIED HEAD
 First Applied Head (H) 5 cm
 Cross Sectional Area of Reservoir (35.22 or 2.15) 2.15 cm²
 Time Interval Of Readings (T) 30 seconds
 Stabilized Reading 0.7 cm
 Average Rate of Fall (R₁) 2.33E-02 cm/sec
 First Head Matric Flux Potential 7.57E-04 cm²/sec
 First Head Kfs 9.09E-05 cm/sec
 First Head Kfs (in/hr) 0.13 in/hr

TEST PARAMETERS: RUN OF SECOND APPLIED HEAD
 Second Applied Head (H) 10 cm
 Cross Sectional Area of Reservoir (35.22 or 2.15) 2.15 cm²
 Time Interval Of Readings (T) 30 seconds
 Stabilized Reading 0.8 cm
 Average Rate of Fall (R₂) 2.67E-02 cm/sec
 Second Head Matric Flux Potential 9.39E-04 cm²/sec
 Second Head Kfs 6.19E-05 cm/sec
 Second Head Kfs (in/hr) 0.09 in/hr

HYDRAULIC CONDUCTIVITY ANALYSIS
 Geometric Mean of Matric Flux Potential For Single Head Methods 8.43E-04 cm²/sec
 Geometric Mean of Field Saturated Hydraulic 7.50E-05 cm/sec
 Calculated Matric Flux Potential Over Gradient (µm) 1.40E-03 cm²/sec
 Calculated Alpha Value (α*) See Below cm-1
 Calculated Field Saturated Conductivity -2.20E-05 cm/sec

Geometric Mean Conductivity For Single Head Analysis (Kfs)
Gradient Head Does Not Apply For This Case
 0.11 inches/hour
 See 1 Below

The Single Head Geometric Mean is used when
 1. The Matrix Flux Potential, Alpha, or the Kfs values are Negative, a Heterogeneous soil likely exists
 2. The second rate is not greater than the first rate
0.11 inches/hour
FINAL CONDUCTIVITY RATE

CONSTANT HEAD PERMEAMETER TEST

PROJECT NAME: 210 N Aberdeen Ave
 TEST ID: P1-A
 TEST DEPTH: 96"
 NEAR SOIL PROBE #: SWM-01
 TEST DATE: August 13, 2019
 WEATHER / TEMP: Overcast / 80 Degrees
 HOLE DIAMETER: 6.0 cm or inch 2. 3/8
 SIDE OF TEST AREA: Northerly Side

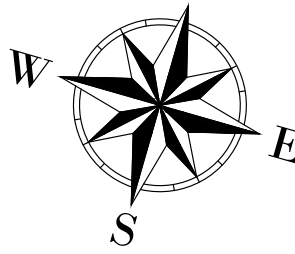
1st Level at 5 cm				2nd Level at 10 cm			
Time Interval (seconds)	Water Level Reading (cm)	Previous Water Level (cm)	Change in Level (cm)	Time Interval (seconds)	Water Level Reading (cm)	Previous Water Level (cm)	Change in Level (cm)
30	3.2	2.0	1.2	1	5.0	4.1	0.9
30	4.1	3.2	0.9	2	5.9	5.0	0.9
30	4.9	4.1	0.8	3	6.4	5.9	0.5
30	5.6	4.9	0.7	4	7.1	6.4	0.7
30	6.4	5.6	0.8	5	7.8	7.1	0.7
30	7.2	6.4	0.8	6	8.6	7.8	0.8
30	7.9	7.2	0.7	7	9.4	8.6	0.8
30	8.5	7.9	0.6	8	10.2	9.4	0.8
30	9.4	8.5	0.9	9			
30	10.1	9.4	0.7	10			
30	10.8	10.1	0.7	11			
30	11.5	10.8	0.7	12			
				13			
				14			
				15			
				16			
				17			
				18			
				19			
				20			
				21			
				22			
				23			
				24			
				25			
				26			
				27			
				28			
Stabilized At: 0.7 cm				Stabilized At: 0.8 cm			

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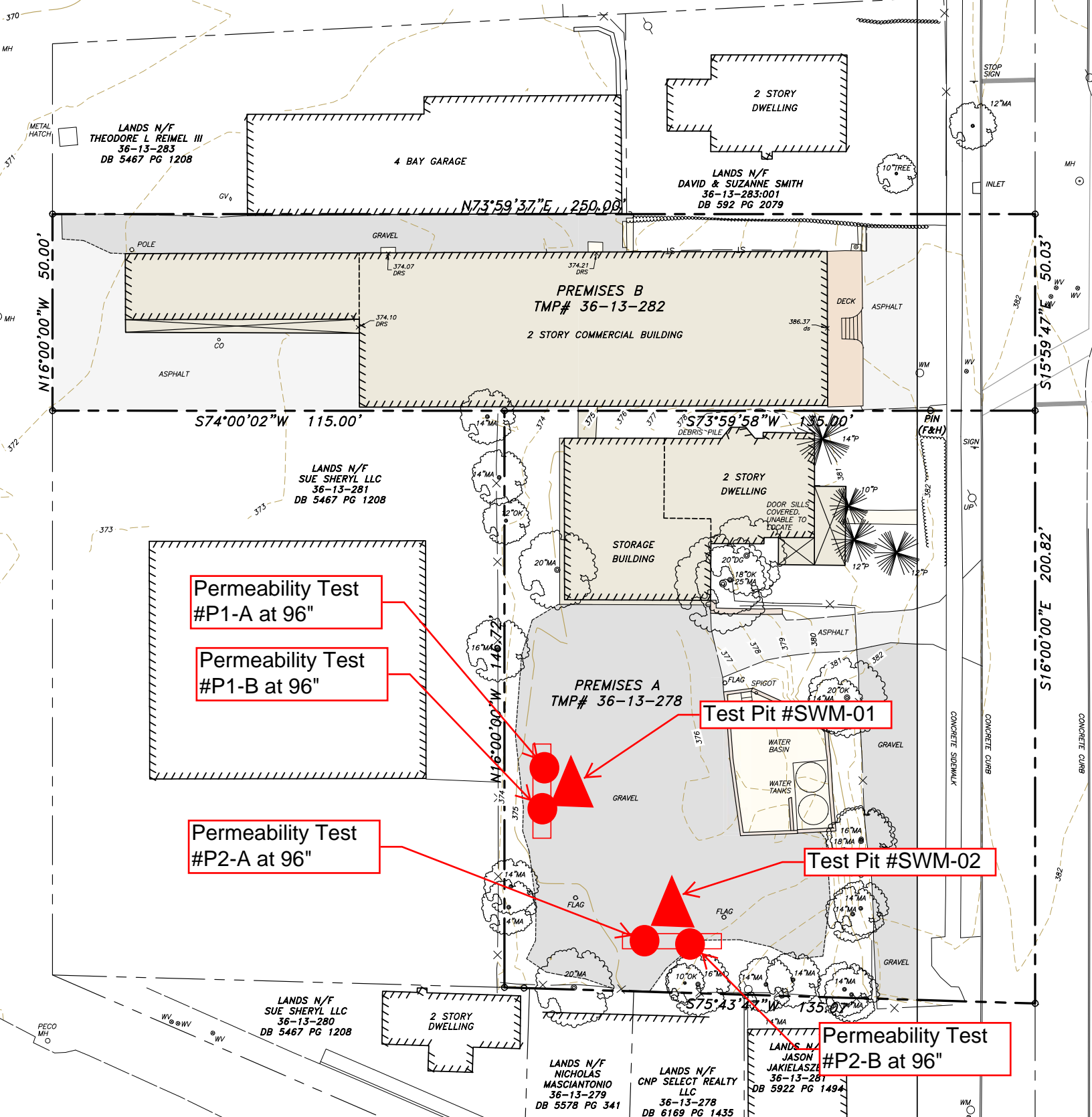
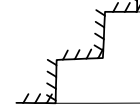
TEST LOCATION PLAN

210 N Aberdeen Avenue Stormwater Test Location Plan

August 1, 2019
Not To Scale



2 STORY DWELLING



Permeability Test #P1-A at 96"

Permeability Test #P1-B at 96"

Permeability Test #P2-A at 96"

Test Pit #SWM-01

Test Pit #SWM-02

Permeability Test #P2-B at 96"

LANDS N/F THEODORE L REIMEL III
36-13-283
DB 5467 PG 1208

4 BAY GARAGE

LANDS N/F DAVID & SUZANNE SMITH
36-13-283:001
DB 592 PG 2079

PREMISES B
TMP# 36-13-282

2 STORY COMMERCIAL BUILDING

LANDS N/F SUE SHERYL LLC
36-13-281
DB 5467 PG 1208

PREMISES A
TMP# 36-13-278

2 STORY DWELLING

STORAGE BUILDING

WATER TANKS

LANDS N/F SUE SHERYL LLC
36-13-280
DB 5467 PG 1208

2 STORY DWELLING

LANDS N/F NICHOLAS MASCANTONIO
36-13-279
DB 5578 PG 341

LANDS N/F CNP SELECT REALTY LLC
36-13-278
DB 6169 PG 1435

LANDS N/F JASON JAKIELASZ
36-13-281
DB 5922 PG 1494