



210 Park Ave, Columbia, MO 65203
P 573 499-1944 www.SelectSSE.com

September 27, 2018

Erin Keys, PE
Engineering and Operations Manager Columbia Sewer Utility
City of Columbia
701 E. Broadway
Columbia, MO 65201

Re: Additional Variance Information Renaissance Meadows Plat 1

Dear Erin Keys,

I am providing additional detail for the variance request submitted to the board of adjustment. As part of this submittal I will provide detailed information referencing Section 12A-110.

Sec 12A-110(b)(1)

Good and sufficient cause based on an unreasonable burden or hardship has been proved.

I have provided along with this letter a redesign of the site to meet the current City of Columbia stormwater regulations. The site constraints which create a hardship is an existing drainage area of approximately 2.05 acres which passes through our property. Per the stormwater manual we would be required to size our detention basin in a manner to convey and/or provide the volume storage to pass the stormwater through the basin. As you can see from Sheet C100 the sizing of the basin and the existing structure setback(20ft) to the detention pond would virtually encompass the entirety of lot 12A, rendering it undevelopable. I have also provided the hydrograph reports that verify the sizing and design of detention basin per the City of Columbia standards.

Sec 12A-110(b)(2)

The granting of the variance would not result in any increase in quantity or velocity of flow, degradation of water quality, or negative impacts upon adjoining or downstream properties, nor upon the stormwater system.

The proposed variance is a relief from detention requirements on site, the owner would still provide stormwater quality treatment. With the development of the single lot being an infill development in nature (surrounded by existing houses), the added impervious area would be negligible. Furthermore, there is no identified downstream critical flood area. This means the development would not have a negative impact on any downstream properties. Improvements proposed for this site would include an extension to the storm network to capture the 2.05 acres of runoff prior to it overtopping the curb and entering the street. This would be health safety improvement as this stormwater is no longer overtopping curb and entering street to reach inlet.

Sec 12A-110(b)(3)

The degree of variance is the minimum necessary to afford relief from the unreasonable burden or hardship imposed by the requirements of this chapter

The owner is only requesting a relief from detention requirements and will still provide provisions for a BMP which will treat the developed site to the level of

service required by the stormwater manual. This is the minimum relief necessary for the development of the lot.

Sec 12A-110(b)(3)

The variance may be granted without defeating the public health, safety and welfare purposes and intent of this chapter.

The improvements proposed for this site would include adding an extension to the storm network to capture the 2.05 acres of runoff prior to it overtopping the curb and entering the street. This would be health safety improvement as this stormwater is no longer overtopping curb and entering street to reach inlet.

Sec 12A-110(c)(3)

The board finds that meeting the minimum onsite management requirements is not feasible because of physical characteristics of the site.

I have provided along with this letter a redesign of the site if required to meet the current City of Columbia stormwater regulations see sheet C100. The existing drainage area that passes through the property creates a condition where the sizing of the detention basin will encompass all of lot 12A. Lot 12A is the site being subdivided and developed and is approximately 9,202sf or .21 acres. This significantly small site and large drainage area to the north creates a hardship for the owner and would be unable to develop the site as proposed on sheet C103.

The intent for the variance request is to provide stormwater quality treatment for the proposed development. The proposed infill development would be the development of a lot in an existing neighborhood. The development would have approximately 3,000 sf of impervious area added (house and driveway). This increase in impervious area is minimal. In addition, there is not a critical downstream flood area identified. The proposed solution as identified on C103 also provides a public health safety feature as the stormwater will no longer overtop the curb and enter the roadway to enter the stormwater system.

Overall, the existing site constraints for this infill development in the existing neighborhood generates a unique scenario that requires an adjustment to the stormwater ordinance. The proposed solution aligns and would exceed the requirements if this development met the definition for the city's redevelopment flow chart.

Please Contact me at 573-268-2068 if you have any questions.

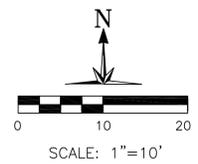
Thank you,



Keenan Simon, PE
SSE Civil Team Lead

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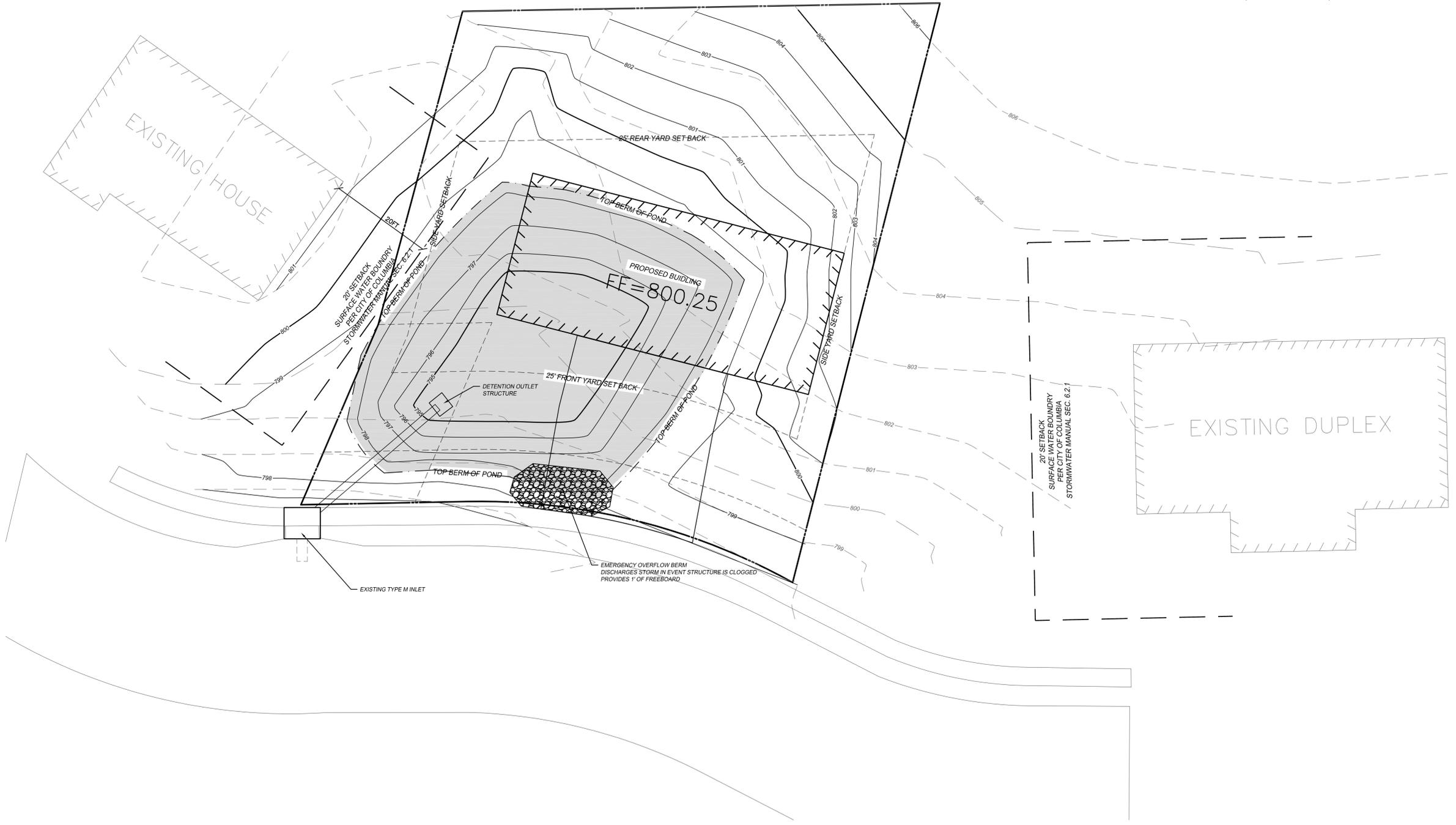


DETENTION POND FOOTPRINT = 2,800 SQFT

DETENTION NOTES:

TOP OF BERM = 798.75

STAGE	ELEVATION FT	CONTOUR AREA SQFT	TOTAL STORAGE SQFT
0	795.00	850	0.00
1	796.00	1,230	1,034
2	797.00	1,700	2,493
3	798.00	2,571	4,613
4	798.75	3,130	6,747



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 NOT FOR CONSTRUCTION

Keenan K. Simon
 MO-PE 2016017682
 MY LICENSE RENEWAL DATE IS DECEMBER 31, 2018
 9/27/2018

REVISIONS
△
△
△
△
△

RIA & MCKEE
 STORMWATER DETENTION

ENGINEER: KKS
 CHECKED BY: KKS
 DRAWN BY: TRA
 SSE PROJECT #: 18061

DETENTION PLAN
 DRAWING NO. C100
 SHEET NO. 01 OF 01

SITE CONDITIONS
TOTAL SITE AREA FOR LOT 12A = 9,202SF

LOS CACS (INCLUDES PORTION OF LOT 12B)
DA#1 (TURF SWALE TO BIO-SWALE)
TOTAL DRAINAGE AREA = 9,438SF
IMPERVIOUS AREA = 1,800SF
REQUIRED BIO-SWALE AREA = 655SF

PROVIDING LEVEL OF SERVICE OF 7.5 FOR 9,438SF WHICH IS GREATER THAN THE TOTAL AREA FOR LOT 12A.

SITE CONDITIONS LOT 12A

PRE DEVELOPED
TOTAL SITE AREA = 9,202SF
9,202 ACRES @ CN = 78
PRE DEVELOPED CN = 78

POST DEVELOPED (1/4 Res. Lots)
9,202SF @ CN = 87
POST DEVELOPED CN = 87

LEVEL OF SERVICE REQUIRED = 7.0

SITE DEVELOPED
TOTAL SITE IMPERVIOUS AREA
3000/9202 = 33% IMPERVIOUS AREA



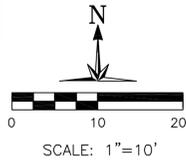
Simon and Struempf Engineering
210 Park Avenue Columbia, MO 65203
573.499.1944 www.SelectSSE.com

PROJECT#: 18020
PROJECT NAME: WOODSTRAIL RIDGE SUBDMISION
ENGINEER: KKS

DESIGN STORM = 100 YEAR STORM
RAINFALL (IN/HR) = 10.8" (Tc=5 Mins)
DATE = 6/25/2018

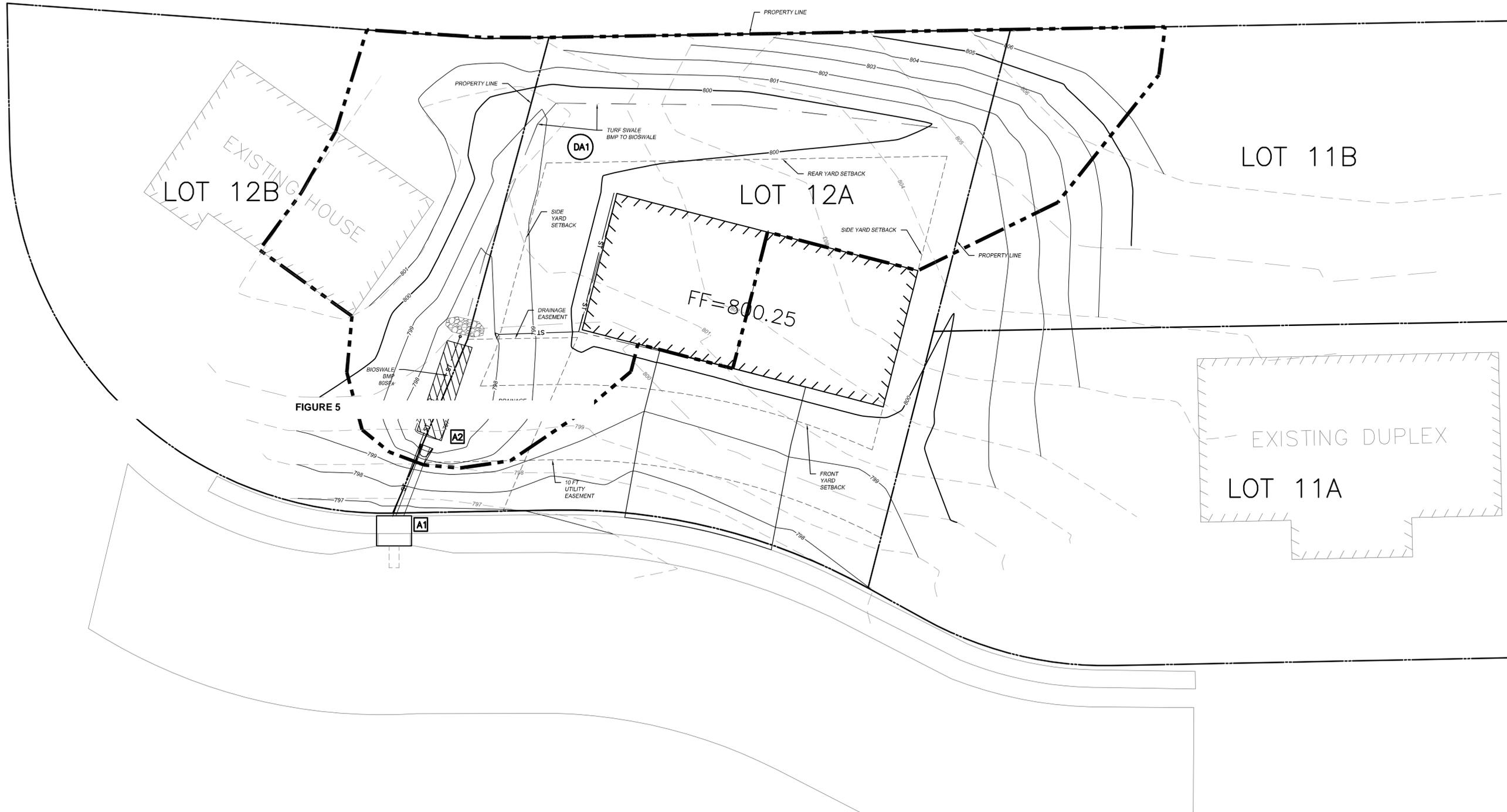
RATIONAL METHOD - PIPE DESIGN AND DRAINAGE AREA CALCULATIONS

INLET NUMBER	DRAIN AREA	DRAIN AREA SIZE A(acre)	RUNOFF COEFF. C	EQUIV. AREA C x A	ACC. EQUIV. AREA	TIME OF CONC. Tc	RAINFALL (in/hr) i	K Value	TOTAL RUNOFF Q(cfs)	LENGTH OF SEW. (ft)	SEW. SIZE (in)	SLOPE REQ'D (ft/ft)	SLOPE PROV. (ft/ft)	VELOC. FULL (ft/s)	CAPC. FULL (cfs)	FLOW TIME (min)	TOTAL TIME (min)	PIPE TYPE	ROUGH. COEFF. N
A1	DA1	1.76	0.51	0.90	0.90	5	10.80	1.25	12.12	16	15	0.0252	0.2	27.82	34.14	0.0	5	HDPE	0.011
TOTAL Q IN LINE A @ FLARED END A2									12.12										



LEGEND

- = DRAINAGE AREA BOUNDARY
- = DRAINAGE AREA
- = INLET NUMBER



MISSOURI CERTIFICATE OF AUTHORITY NO. E-2017015086
EXPIRES: DECEMBER 31, 2019

NOTICE:
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Keenan K. Simon
MO-PE 2016017682
MY LICENSE RENEWAL DATE IS DECEMBER 31, 2018
7/18/2018

REVISIONS

HORIZONTAL STEEL BUILDINGS LLC
RENAISSANCE MEADOWS PLAT 3 STORMWATER
COLUMBIA, MO

ENGINEER: KKS
DRAWN BY: KKS
CHECKED BY: KKS
SSE PROJECT #: 18061
STORMWATER PLAN
DRAWING NO. C103
SHEET NO. 00 OF 00

Hydrograph Reports for Renaissance Meadows Plat 1

Development of Proposed Lot 12A with Detention Basin

Columbia, MO

September 27, 2018

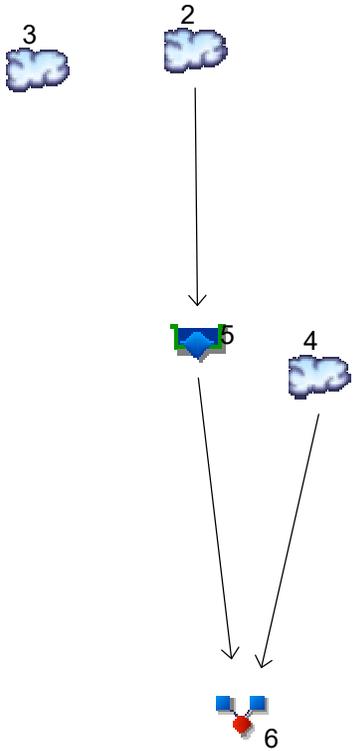


Keenan Simon, P.E. 09/27/2018
License No. PE-2016017682
My renewal date is December 31, 2018

I hereby certify this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Missouri.

Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
2	SCS Runoff	5.184	2	720	13,443	-----	-----	-----	DA AREA FROM NORTH	
3	SCS Runoff	5.183	2	720	13,437	-----	-----	-----	PRE DEVELOPED	
4	SCS Runoff	0.160	2	716	324	-----	-----	-----	OFF SITE NOT TO DETENTION	
5	Reservoir	4.833	2	724	12,923	2	796.97	2,432	DETENTION BASIN	
6	Combine	4.878	2	724	13,247	4, 5	-----	-----	TOTAL POST DEVELOPED	
KKS9.26.gpw					Return Period: 1 Year			Thursday, 09 / 27 / 2018		

Hydrograph Report

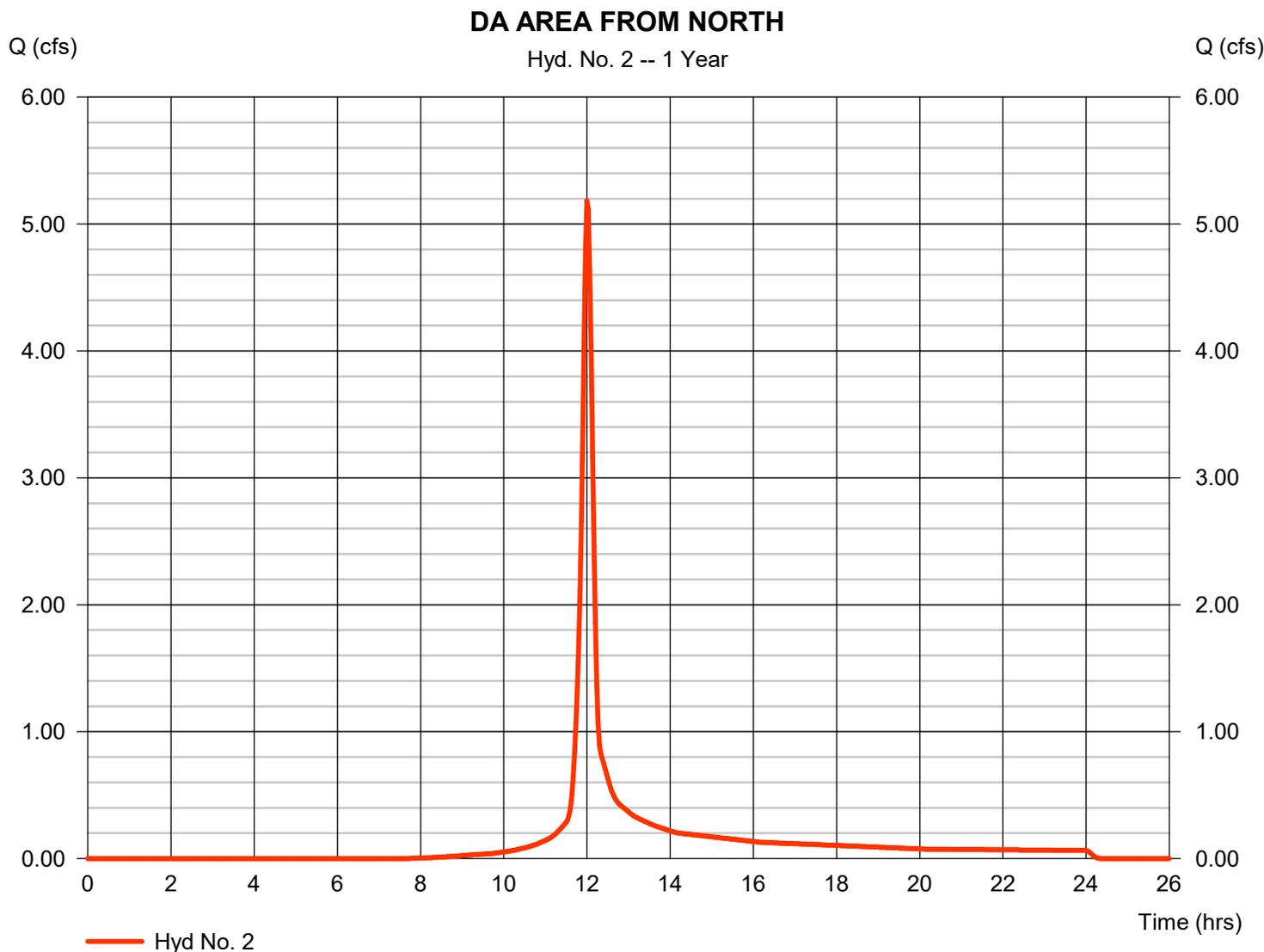
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Thursday, 09 / 27 / 2018

Hyd. No. 2

DA AREA FROM NORTH

Hydrograph type	= SCS Runoff	Peak discharge	= 5.184 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 13,443 cuft
Drainage area	= 2.160 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

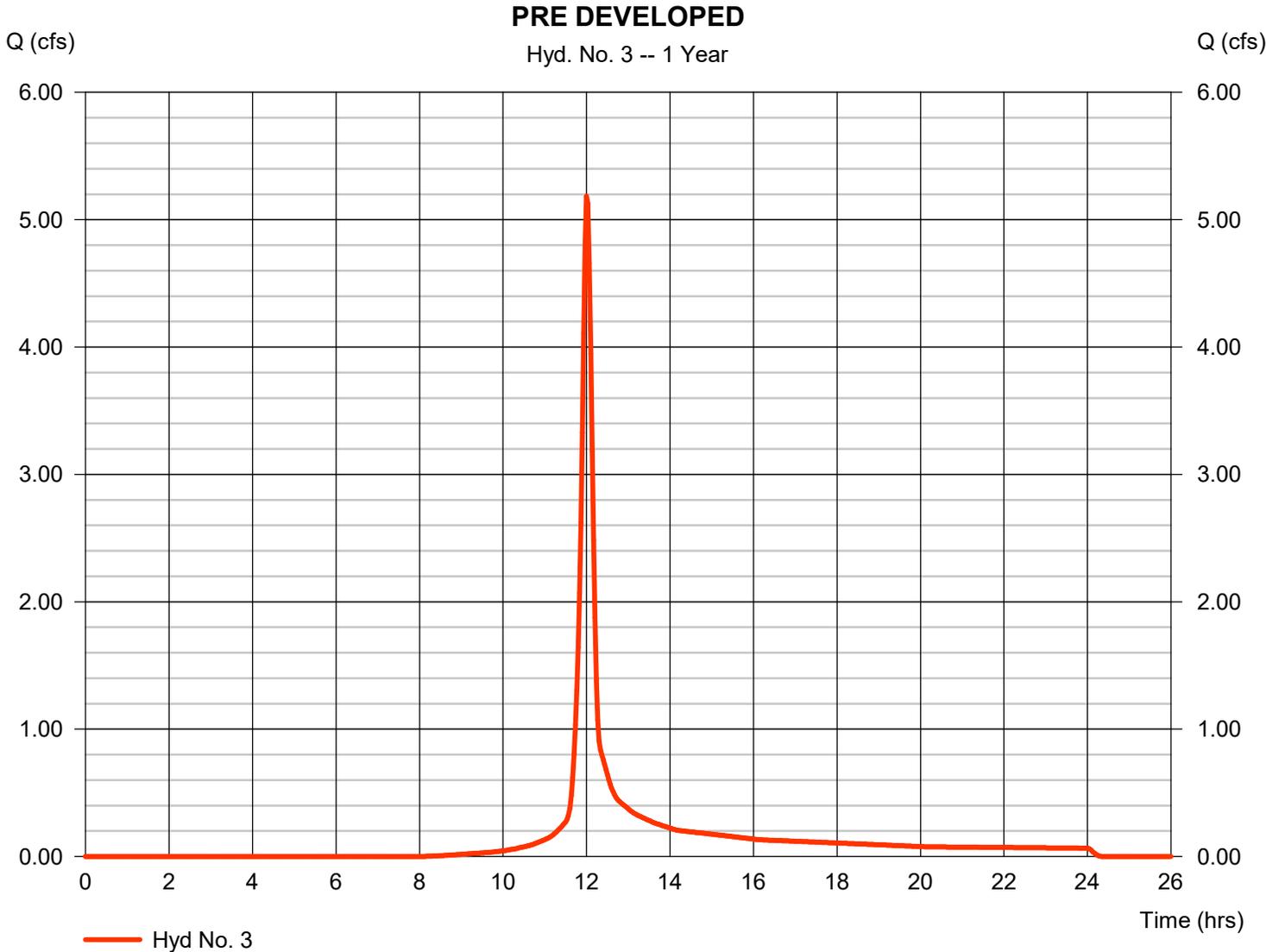


Hydrograph Report

Hyd. No. 3

PRE DEVELOPED

Hydrograph type	= SCS Runoff	Peak discharge	= 5.183 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 13,437 cuft
Drainage area	= 2.260 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

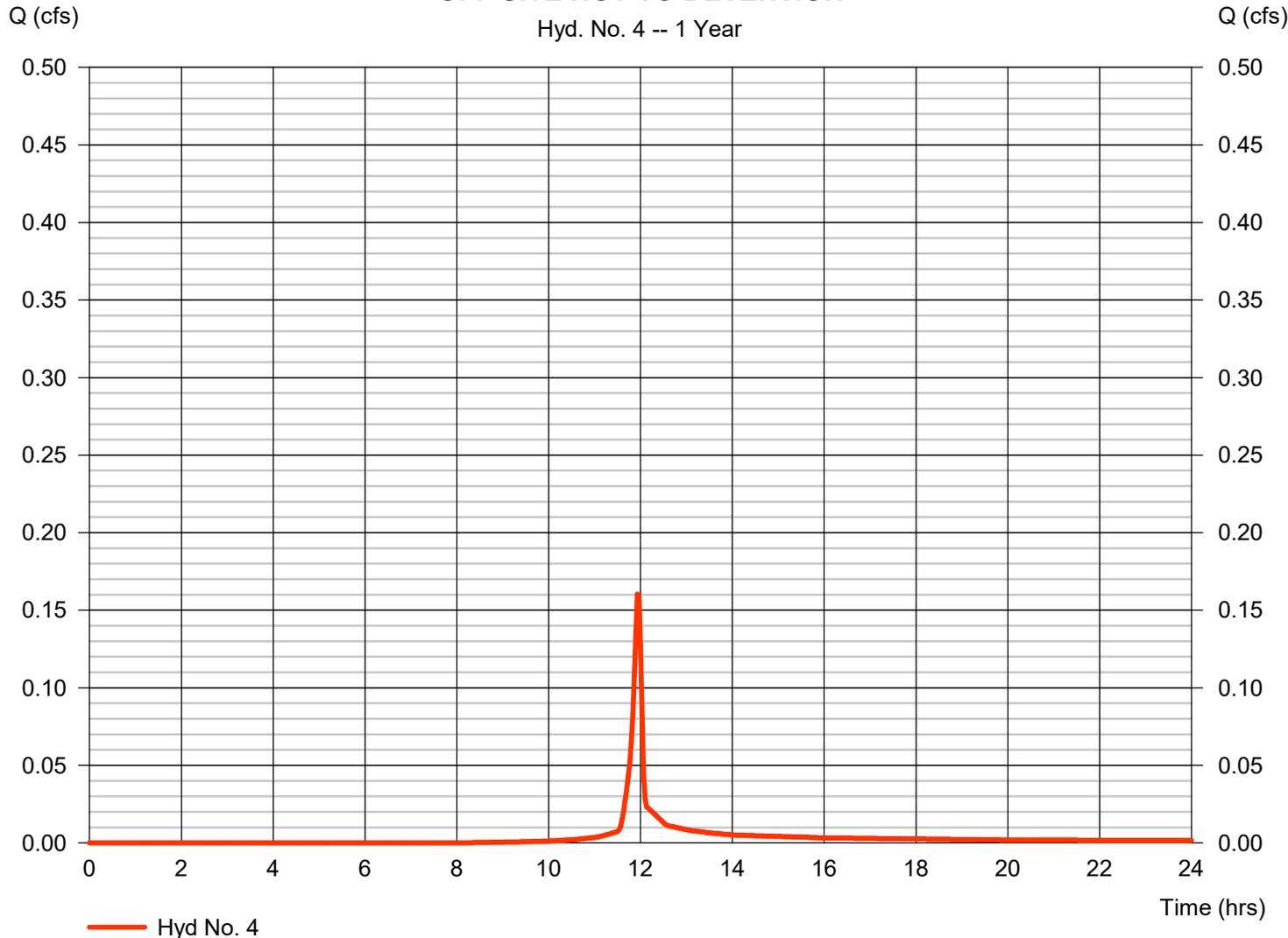
Thursday, 09 / 27 / 2018

Hyd. No. 4

OFF SITE NOT TO DETENTION

Hydrograph type	= SCS Runoff	Peak discharge	= 0.160 cfs
Storm frequency	= 1 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 324 cuft
Drainage area	= 0.060 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

OFF SITE NOT TO DETENTION



Hydrograph Report

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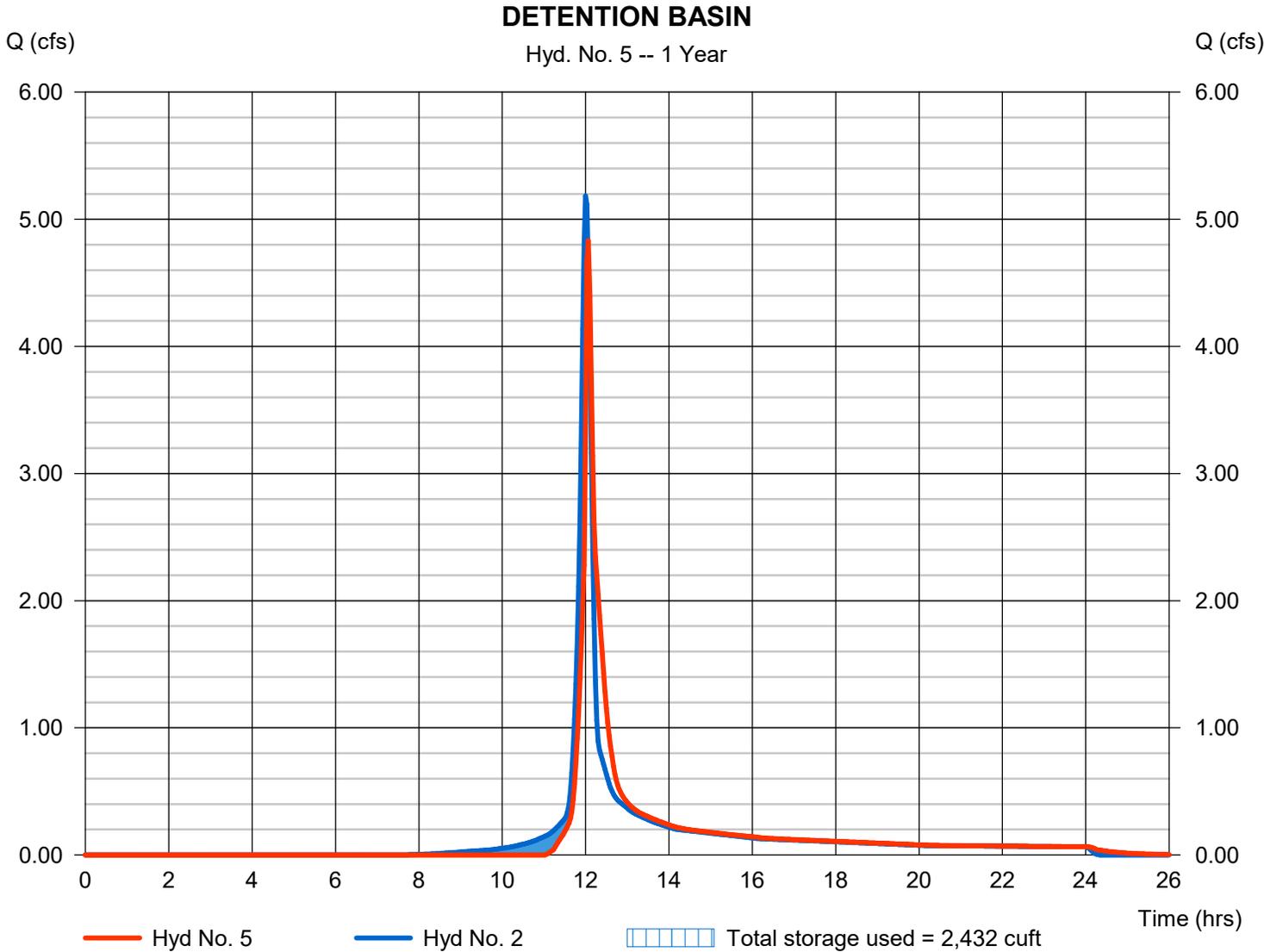
Thursday, 09 / 27 / 2018

Hyd. No. 5

DETENTION BASIN

Hydrograph type	= Reservoir	Peak discharge	= 4.833 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 12,923 cuft
Inflow hyd. No.	= 2 - DA AREA FROM NORTH	Max. Elevation	= 796.97 ft
Reservoir name	= <New Pond>	Max. Storage	= 2,432 cuft

Storage Indication method used.



Pond No. 1 - <New Pond>

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 795.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	795.00	850	0	0
1.00	796.00	1,230	1,034	1,034
2.00	797.00	1,700	1,459	2,493
3.00	798.00	2,571	2,120	4,613
3.75	798.75	3,130	2,134	6,747

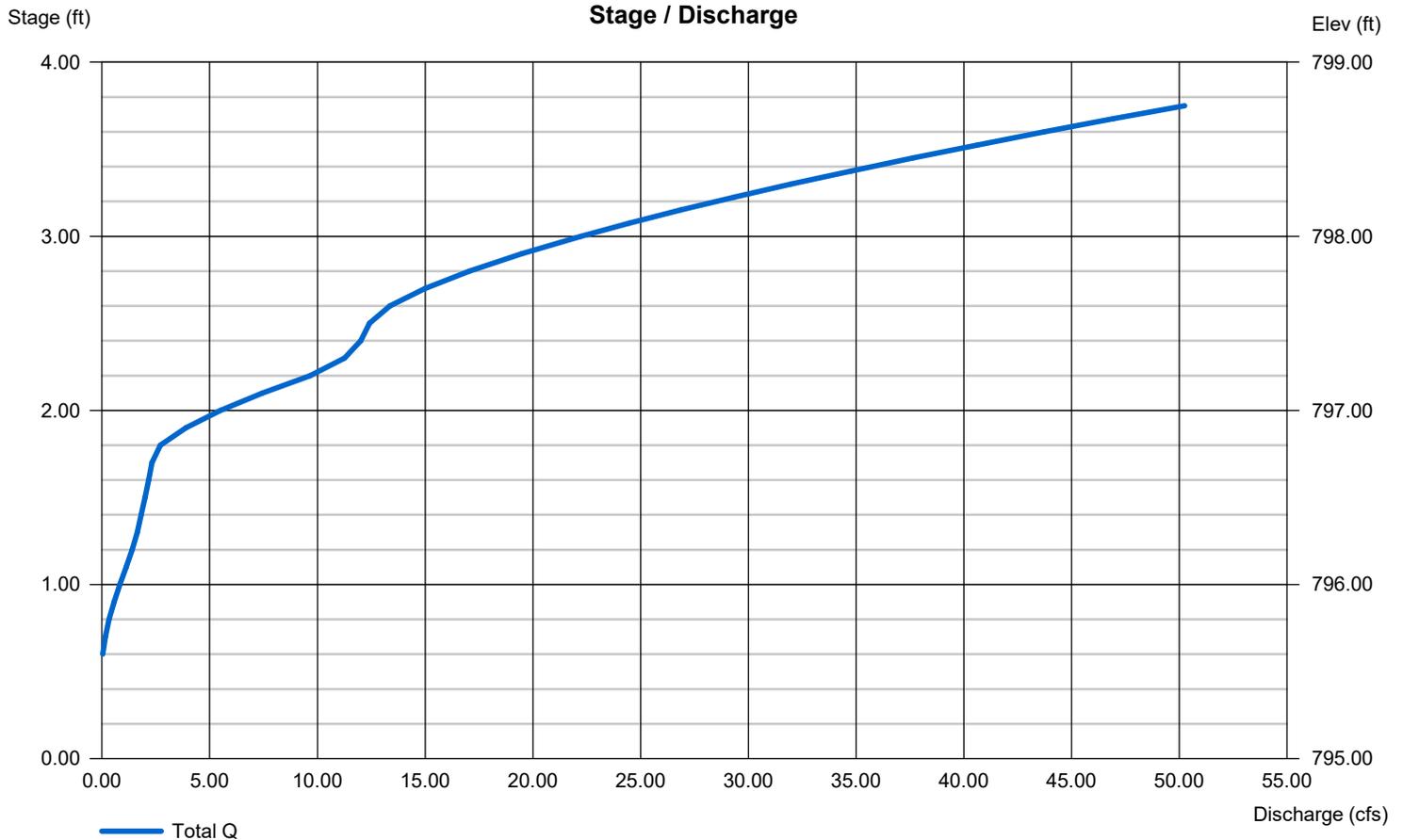
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	10.00	6.00	0.00
Span (in)	= 15.00	10.00	78.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 792.00	795.50	796.75	0.00
Length (ft)	= 30.00	0.00	0.00	0.00
Slope (%)	= 2.00	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	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.00	0.00	0.00	0.00
Crest El. (ft)	= 797.50	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
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

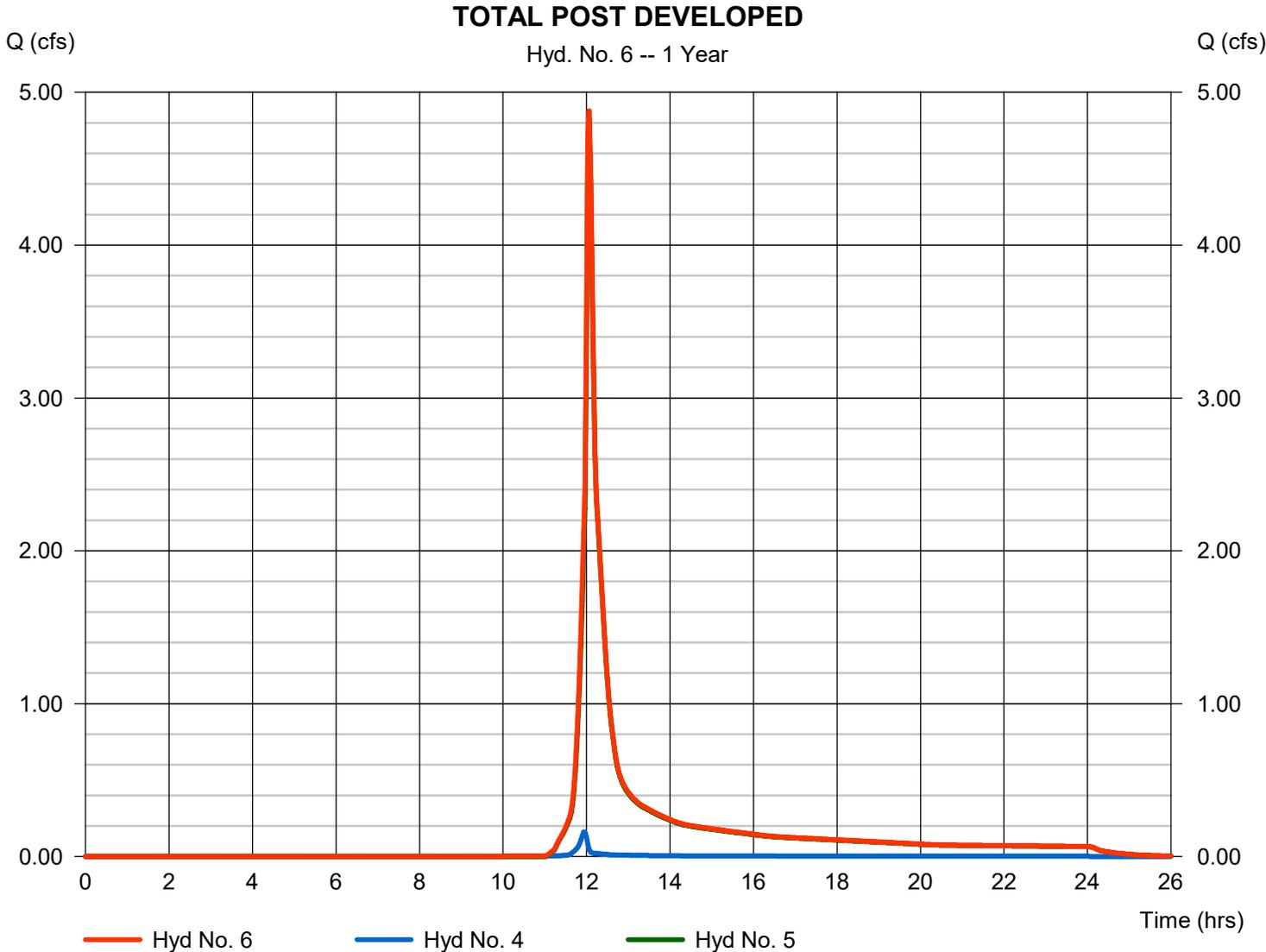
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Thursday, 09 / 27 / 2018

Hyd. No. 6

TOTAL POST DEVELOPED

Hydrograph type	= Combine	Peak discharge	= 4.878 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 13,247 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 0.060 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
2	SCS Runoff	6.525	2	720	16,967	-----	-----	-----	DA AREA FROM NORTH	
3	SCS Runoff	6.572	2	720	17,059	-----	-----	-----	PRE DEVELOPED	
4	SCS Runoff	0.202	2	716	412	-----	-----	-----	OFF SITE NOT TO DETENTION	
5	Reservoir	6.284	2	722	16,447	2	797.04	2,578	DETENTION BASIN	
6	Combine	6.385	2	722	16,859	4, 5	-----	-----	TOTAL POST DEVELOPED	
KKS9.26.gpw					Return Period: 2 Year			Thursday, 09 / 27 / 2018		

Hydrograph Report

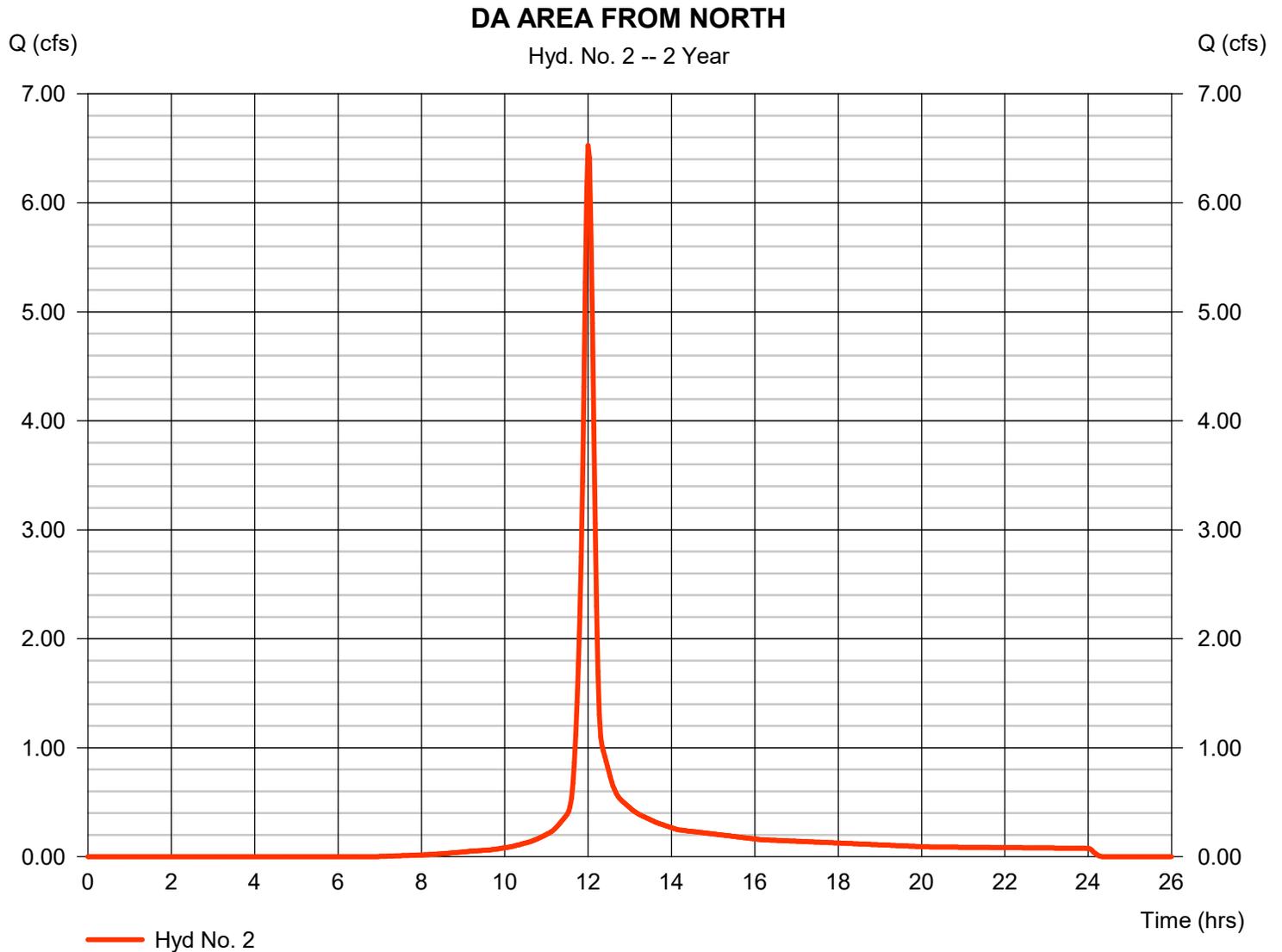
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Thursday, 09 / 27 / 2018

Hyd. No. 2

DA AREA FROM NORTH

Hydrograph type	= SCS Runoff	Peak discharge	= 6.525 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 16,967 cuft
Drainage area	= 2.160 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

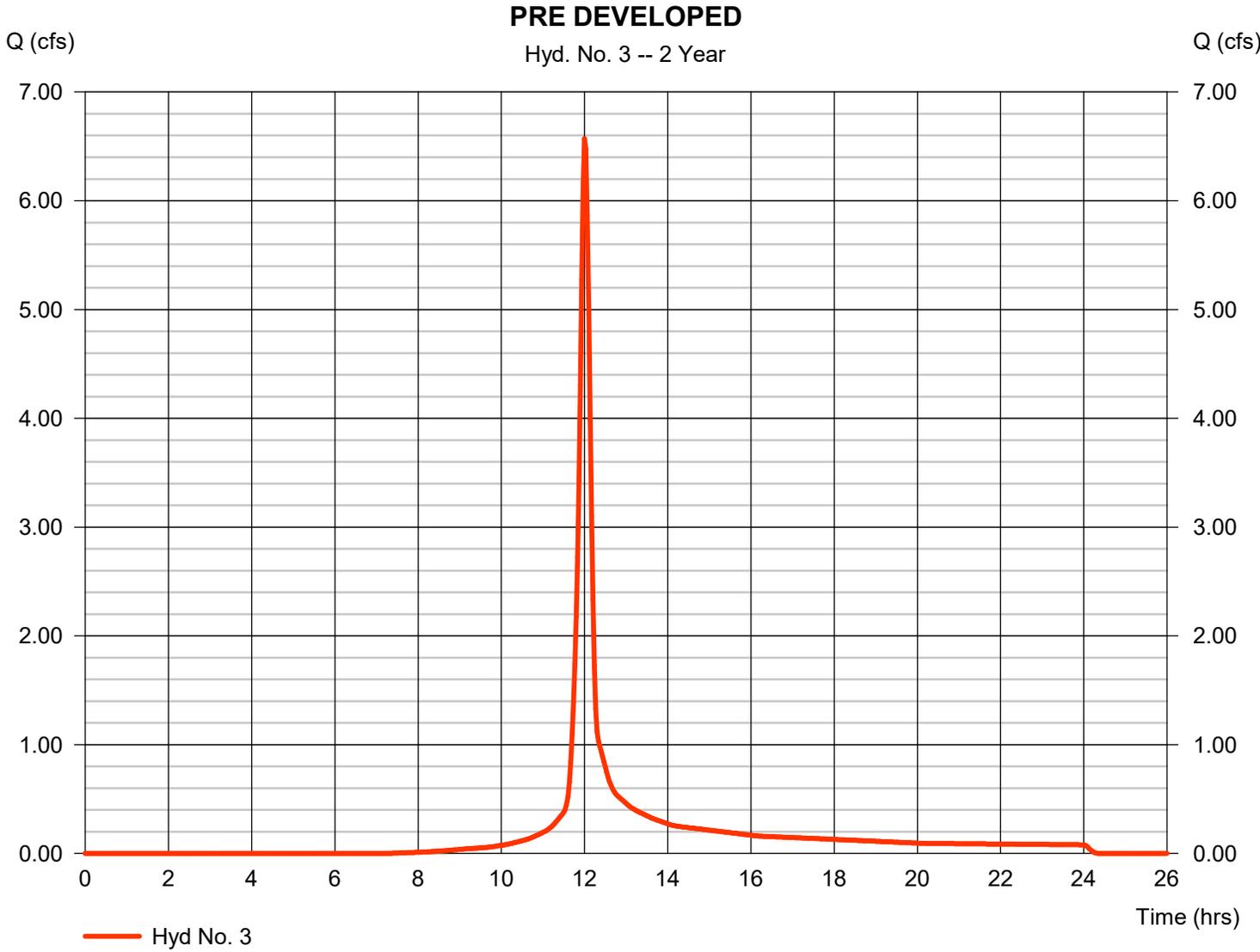


Hydrograph Report

Hyd. No. 3

PRE DEVELOPED

Hydrograph type	= SCS Runoff	Peak discharge	= 6.572 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 17,059 cuft
Drainage area	= 2.260 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

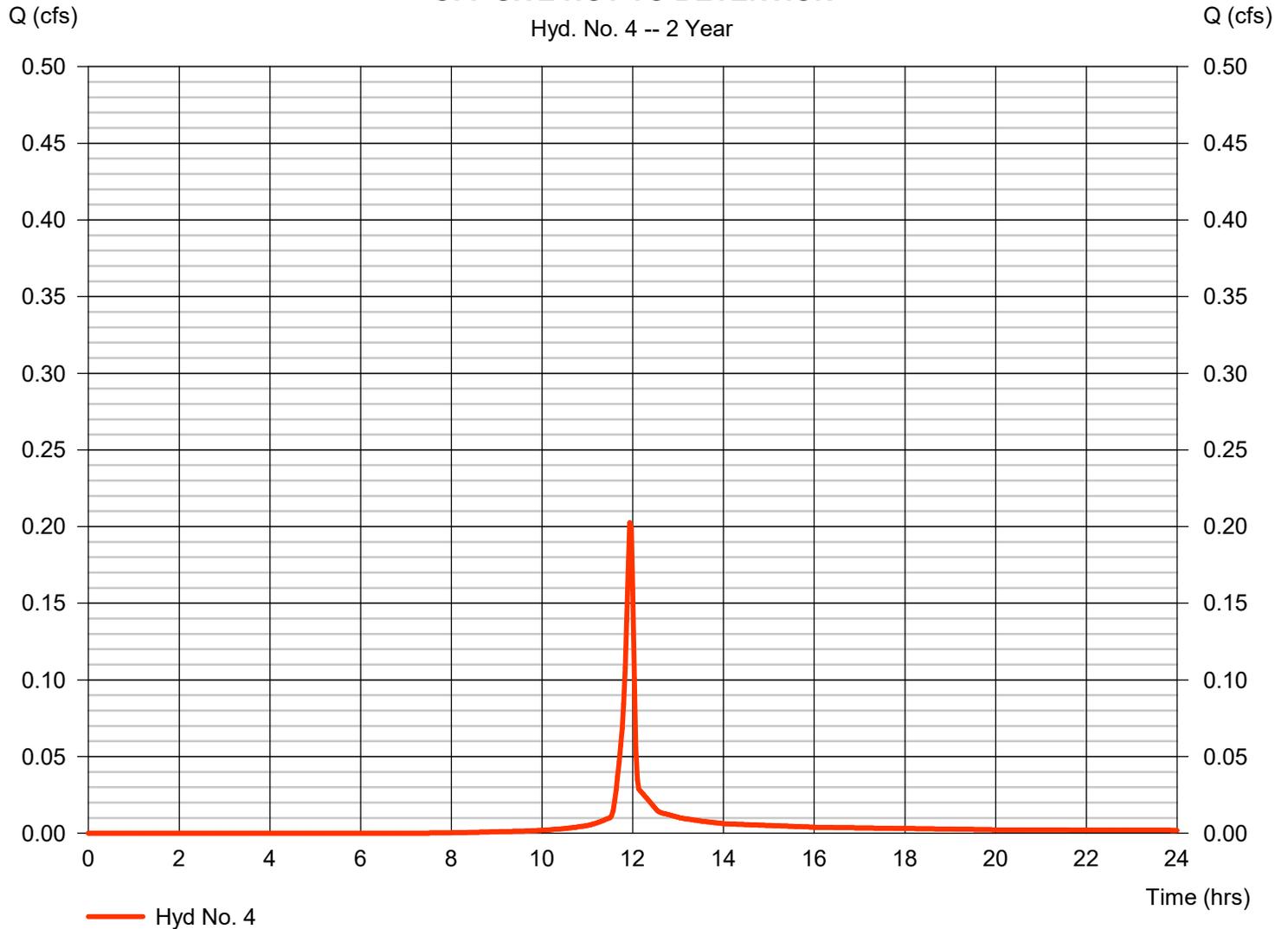
Thursday, 09 / 27 / 2018

Hyd. No. 4

OFF SITE NOT TO DETENTION

Hydrograph type	= SCS Runoff	Peak discharge	= 0.202 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 412 cuft
Drainage area	= 0.060 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

OFF SITE NOT TO DETENTION



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

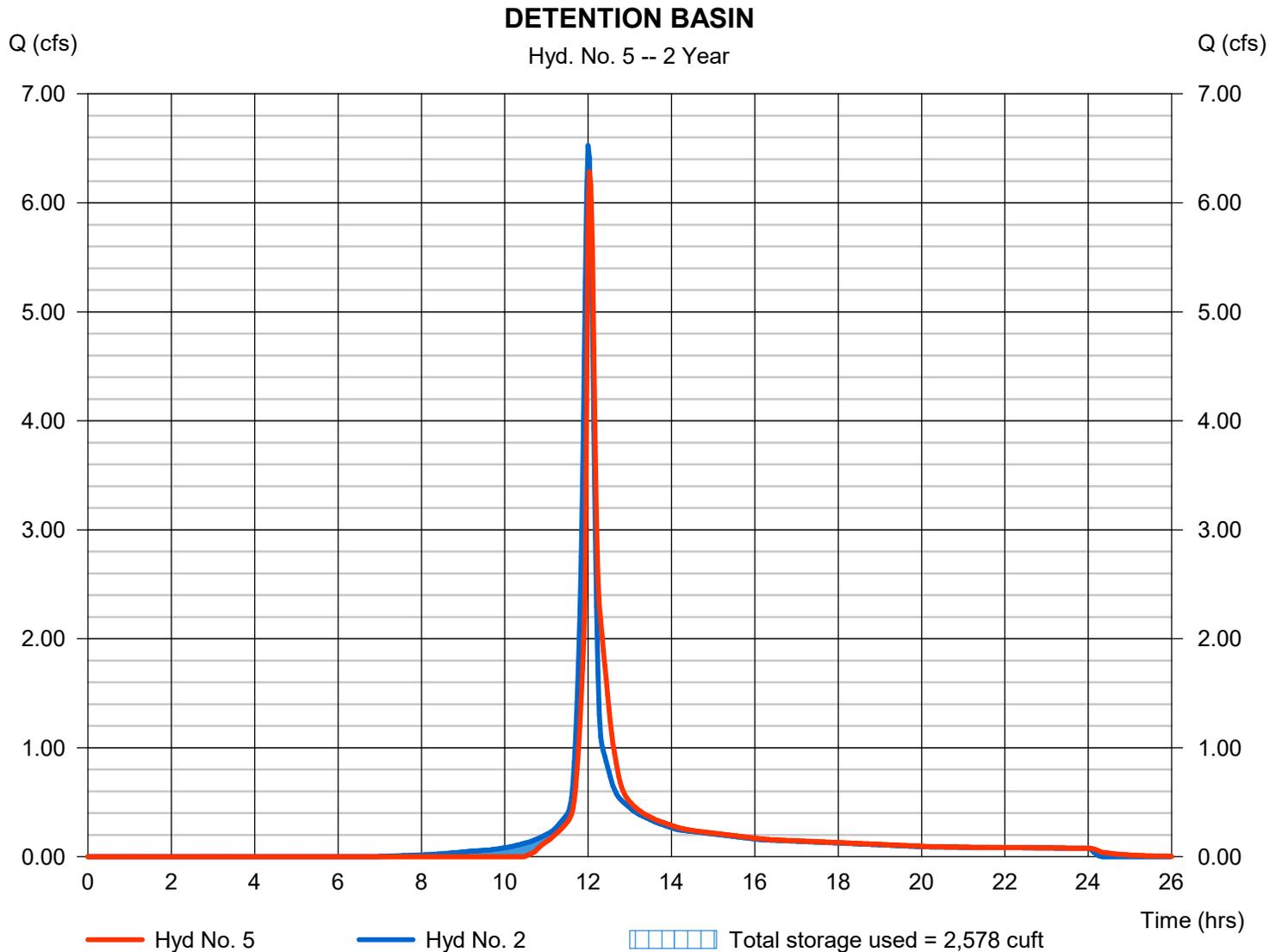
Thursday, 09 / 27 / 2018

Hyd. No. 5

DETENTION BASIN

Hydrograph type	= Reservoir	Peak discharge	= 6.284 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 16,447 cuft
Inflow hyd. No.	= 2 - DA AREA FROM NORTH	Max. Elevation	= 797.04 ft
Reservoir name	= <New Pond>	Max. Storage	= 2,578 cuft

Storage Indication method used.



Hydrograph Report

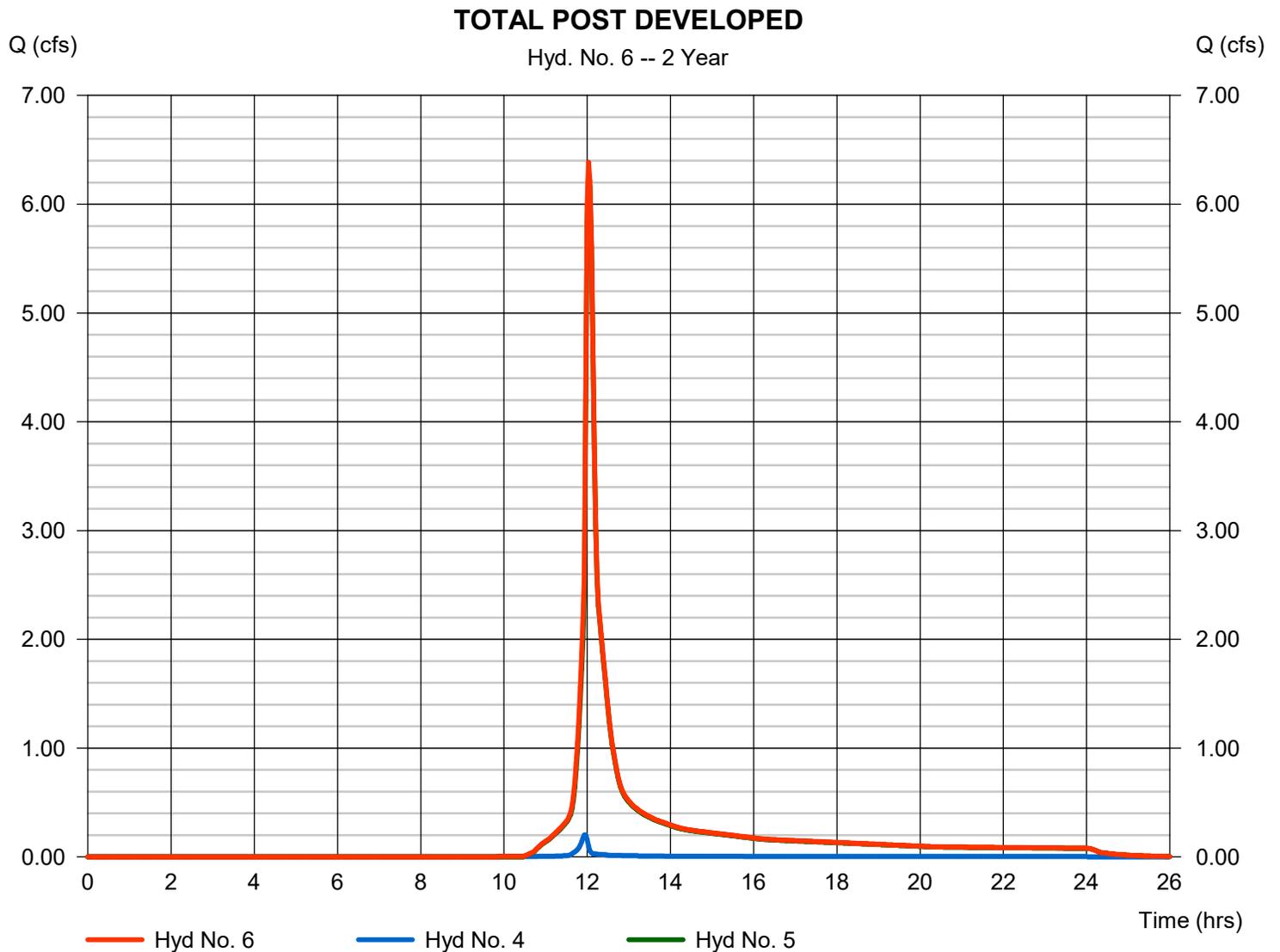
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Hyd. No. 6

TOTAL POST DEVELOPED

Hydrograph type	= Combine	Peak discharge	= 6.385 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 16,859 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 0.060 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
2	SCS Runoff	11.17	2	720	29,546	-----	-----	-----	DA AREA FROM NORTH
3	SCS Runoff	11.42	2	720	30,062	-----	-----	-----	PRE DEVELOPED
4	SCS Runoff	0.349	2	716	726	-----	-----	-----	OFF SITE NOT TO DETENTION
5	Reservoir	10.78	2	722	29,027	2	797.27	3,065	DETENTION BASIN
6	Combine	10.95	2	722	29,752	4, 5	-----	-----	TOTAL POST DEVELOPED
KKS9.26.gpw					Return Period: 10 Year			Thursday, 09 / 27 / 2018	

Hydrograph Report

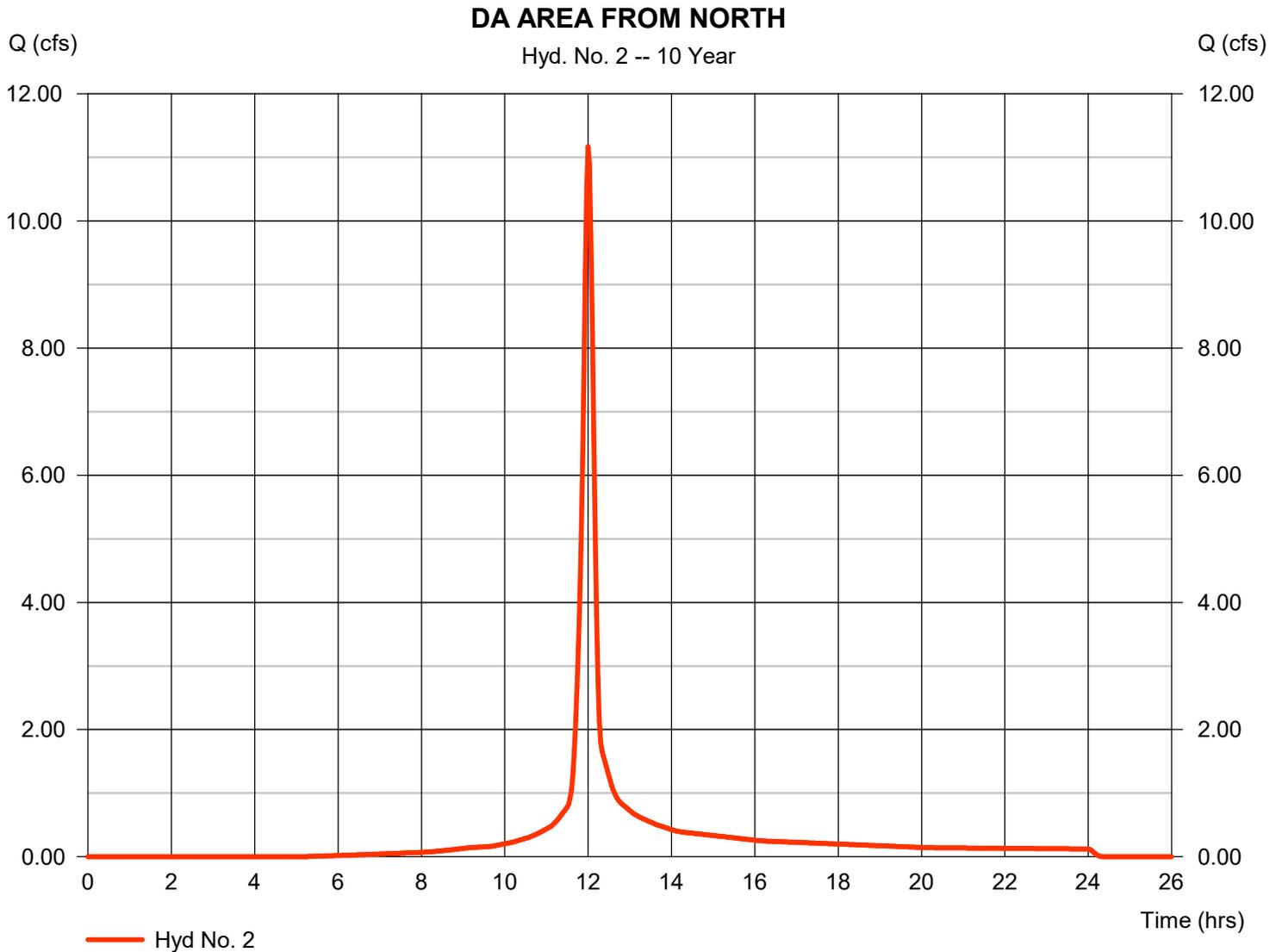
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Thursday, 09 / 27 / 2018

Hyd. No. 2

DA AREA FROM NORTH

Hydrograph type	= SCS Runoff	Peak discharge	= 11.17 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 29,546 cuft
Drainage area	= 2.160 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

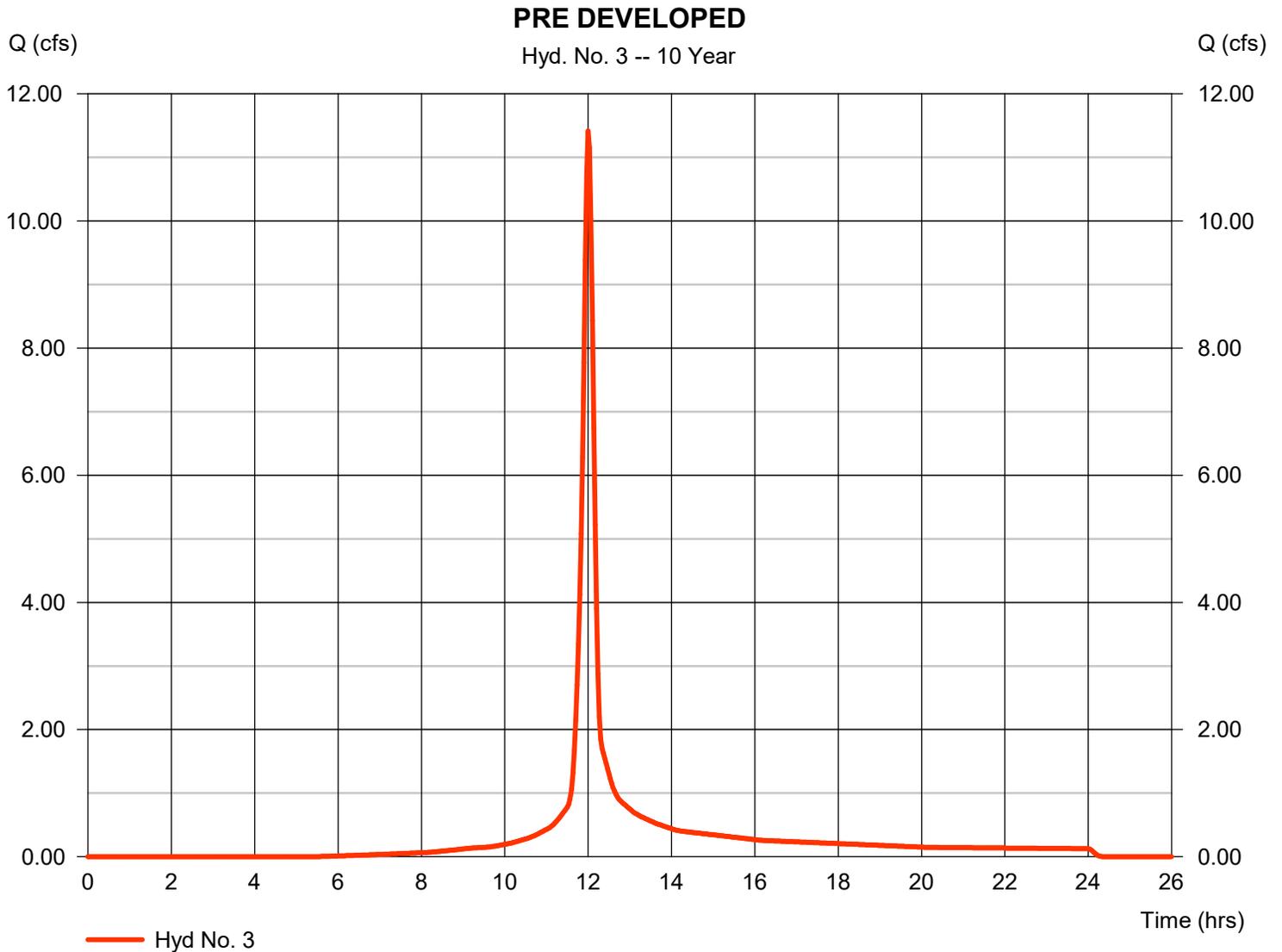
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Thursday, 09 / 27 / 2018

Hyd. No. 3

PRE DEVELOPED

Hydrograph type	= SCS Runoff	Peak discharge	= 11.42 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 30,062 cuft
Drainage area	= 2.260 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

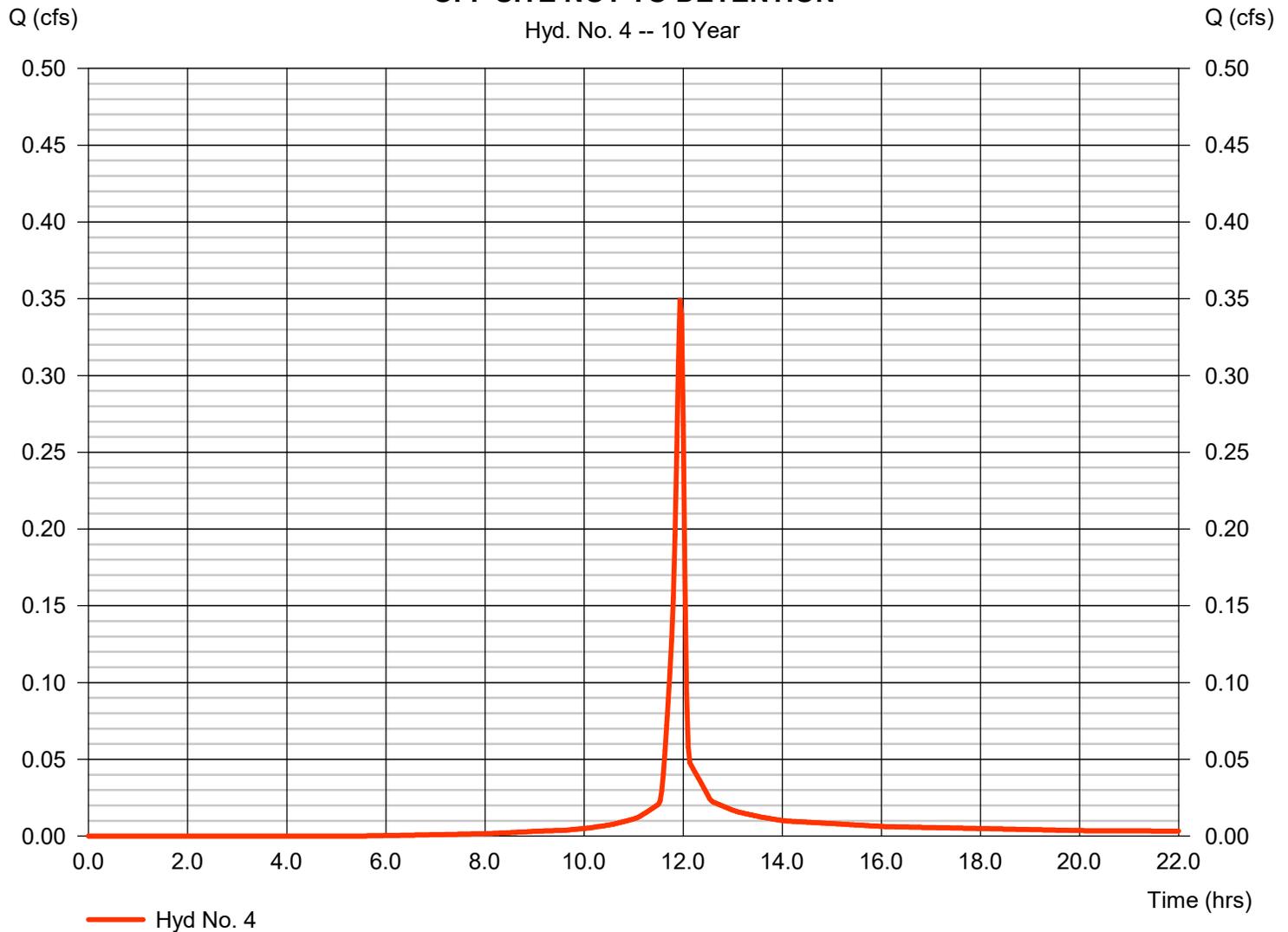
Thursday, 09 / 27 / 2018

Hyd. No. 4

OFF SITE NOT TO DETENTION

Hydrograph type	= SCS Runoff	Peak discharge	= 0.349 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 726 cuft
Drainage area	= 0.060 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

OFF SITE NOT TO DETENTION



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

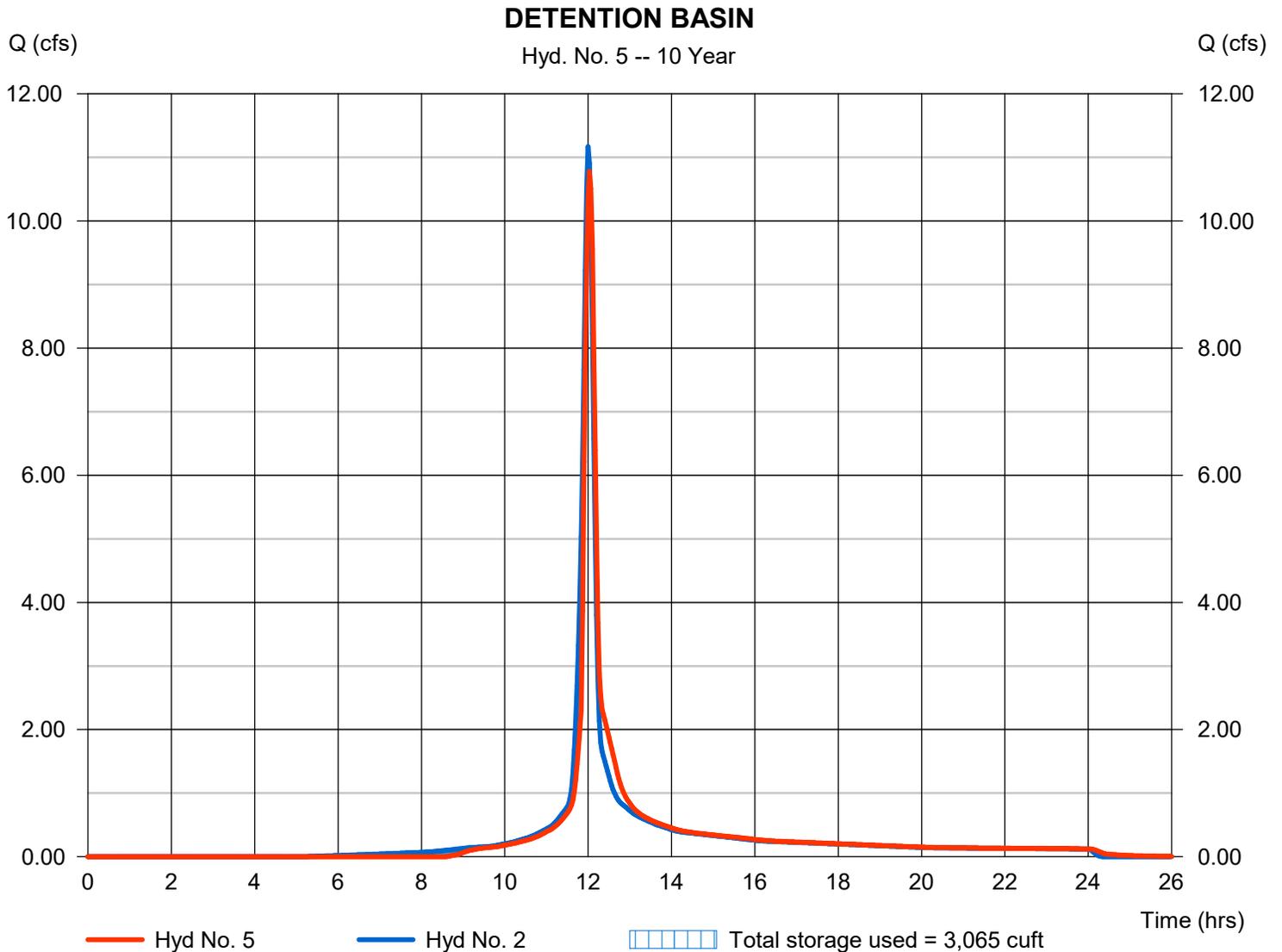
Thursday, 09 / 27 / 2018

Hyd. No. 5

DETENTION BASIN

Hydrograph type	= Reservoir	Peak discharge	= 10.78 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 29,027 cuft
Inflow hyd. No.	= 2 - DA AREA FROM NORTH	Max. Elevation	= 797.27 ft
Reservoir name	= <New Pond>	Max. Storage	= 3,065 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

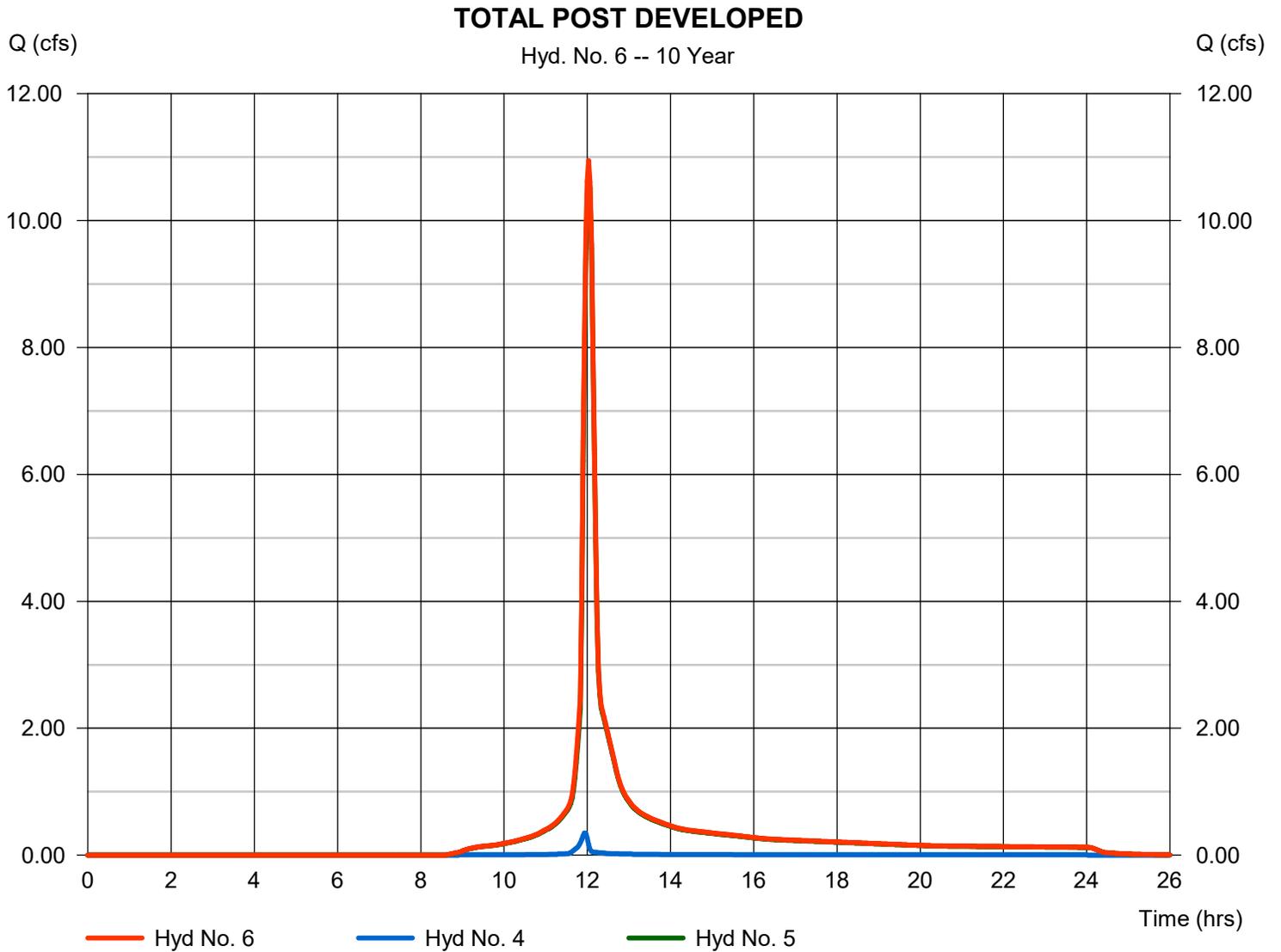
Thursday, 09 / 27 / 2018

Hyd. No. 6

TOTAL POST DEVELOPED

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 2 min
Inflow hyds. = 4, 5

Peak discharge = 10.95 cfs
Time to peak = 12.03 hrs
Hyd. volume = 29,752 cuft
Contrib. drain. area = 0.060 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
2	SCS Runoff	13.09	2	720	34,886	-----	-----	-----	DA AREA FROM NORTH
3	SCS Runoff	13.43	2	720	35,603	-----	-----	-----	PRE DEVELOPED
4	SCS Runoff	0.410	2	716	859	-----	-----	-----	OFF SITE NOT TO DETENTION
5	Reservoir	12.08	2	724	34,366	2	797.43	3,377	DETENTION BASIN
6	Combine	12.27	2	722	35,226	4, 5	-----	-----	TOTAL POST DEVELOPED
KKS9.26.gpw					Return Period: 25 Year			Thursday, 09 / 27 / 2018	

Hydrograph Report

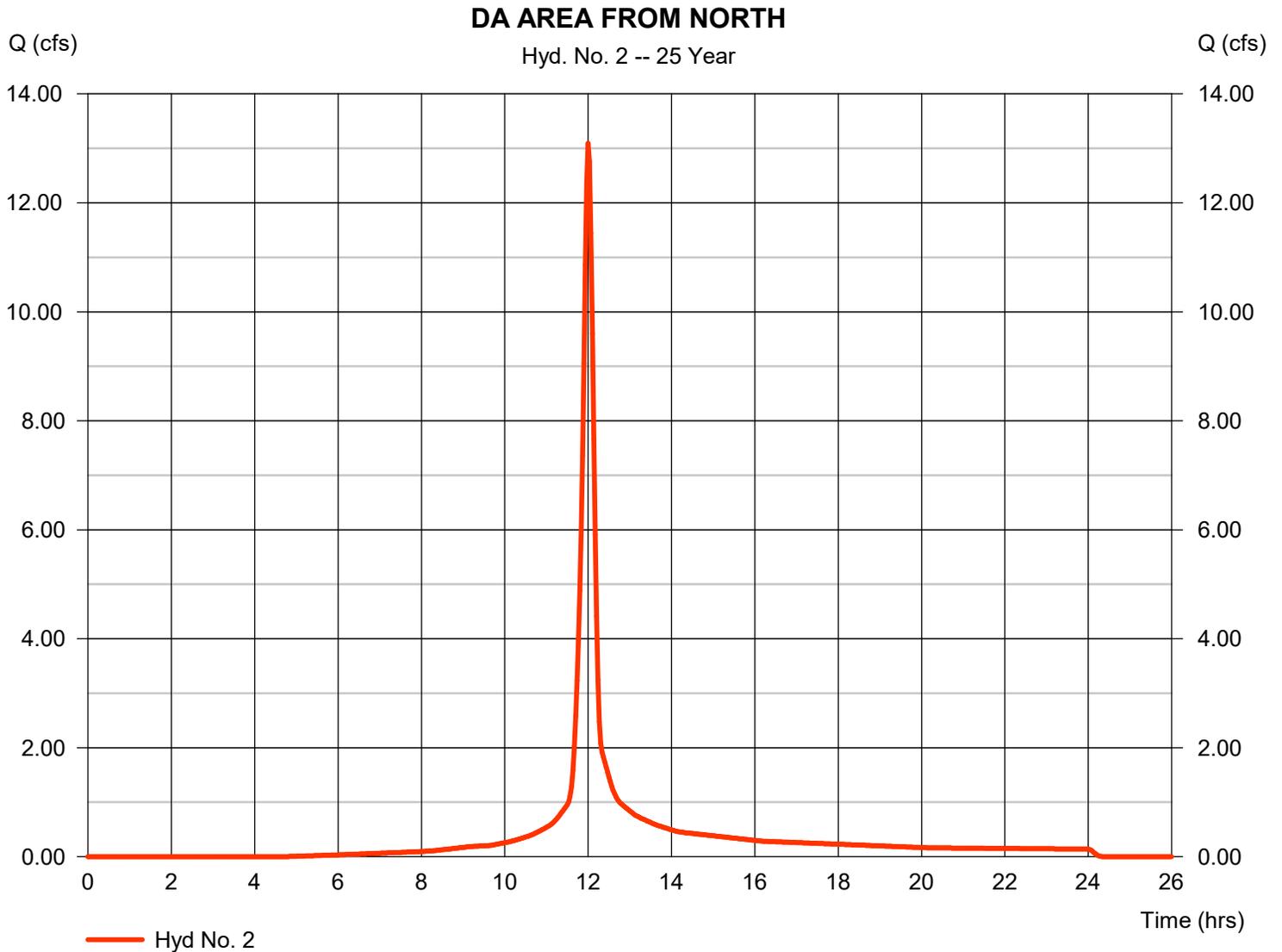
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Thursday, 09 / 27 / 2018

Hyd. No. 2

DA AREA FROM NORTH

Hydrograph type	= SCS Runoff	Peak discharge	= 13.09 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 34,886 cuft
Drainage area	= 2.160 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

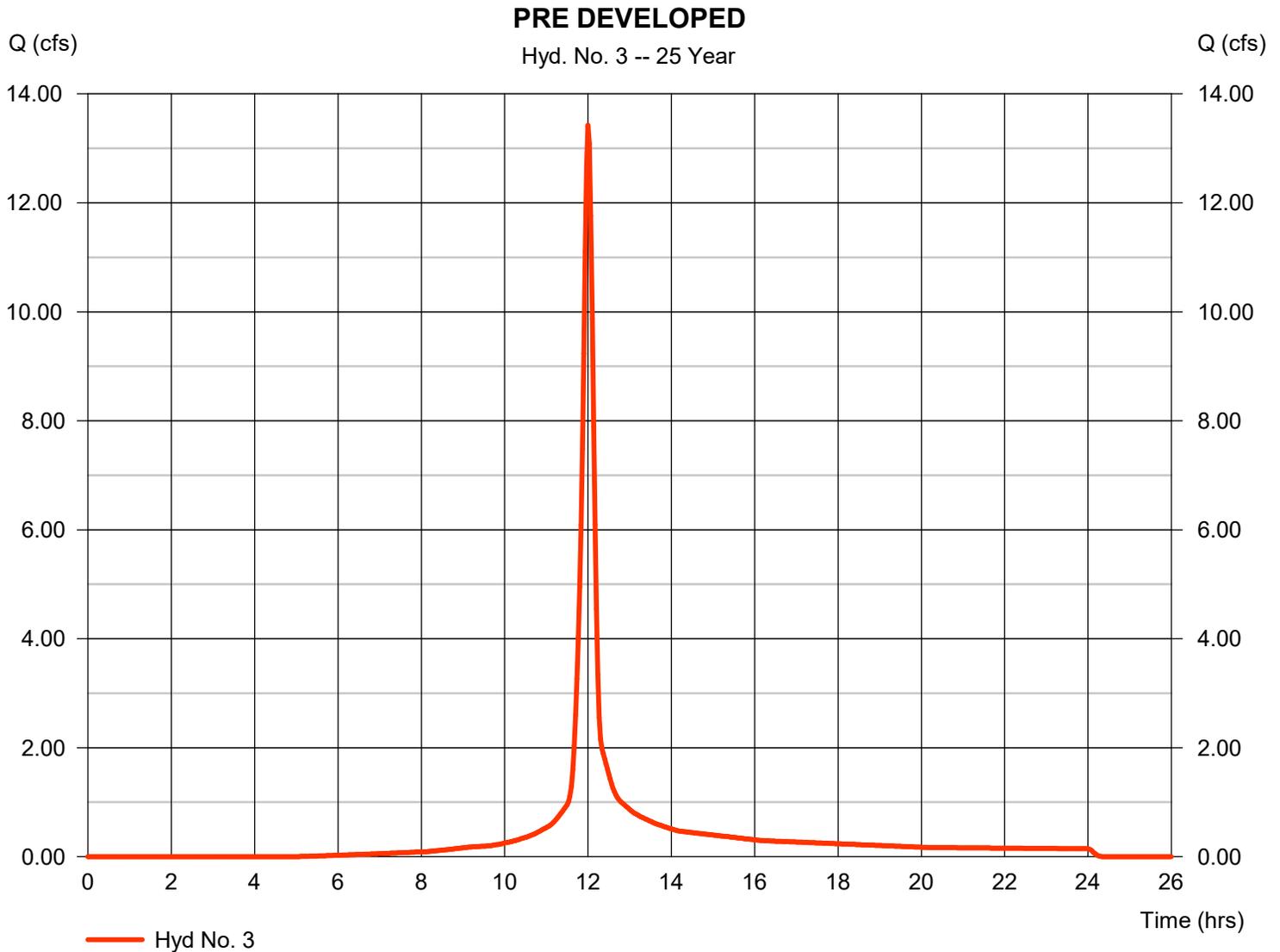
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Thursday, 09 / 27 / 2018

Hyd. No. 3

PRE DEVELOPED

Hydrograph type	= SCS Runoff	Peak discharge	= 13.43 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 35,603 cuft
Drainage area	= 2.260 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

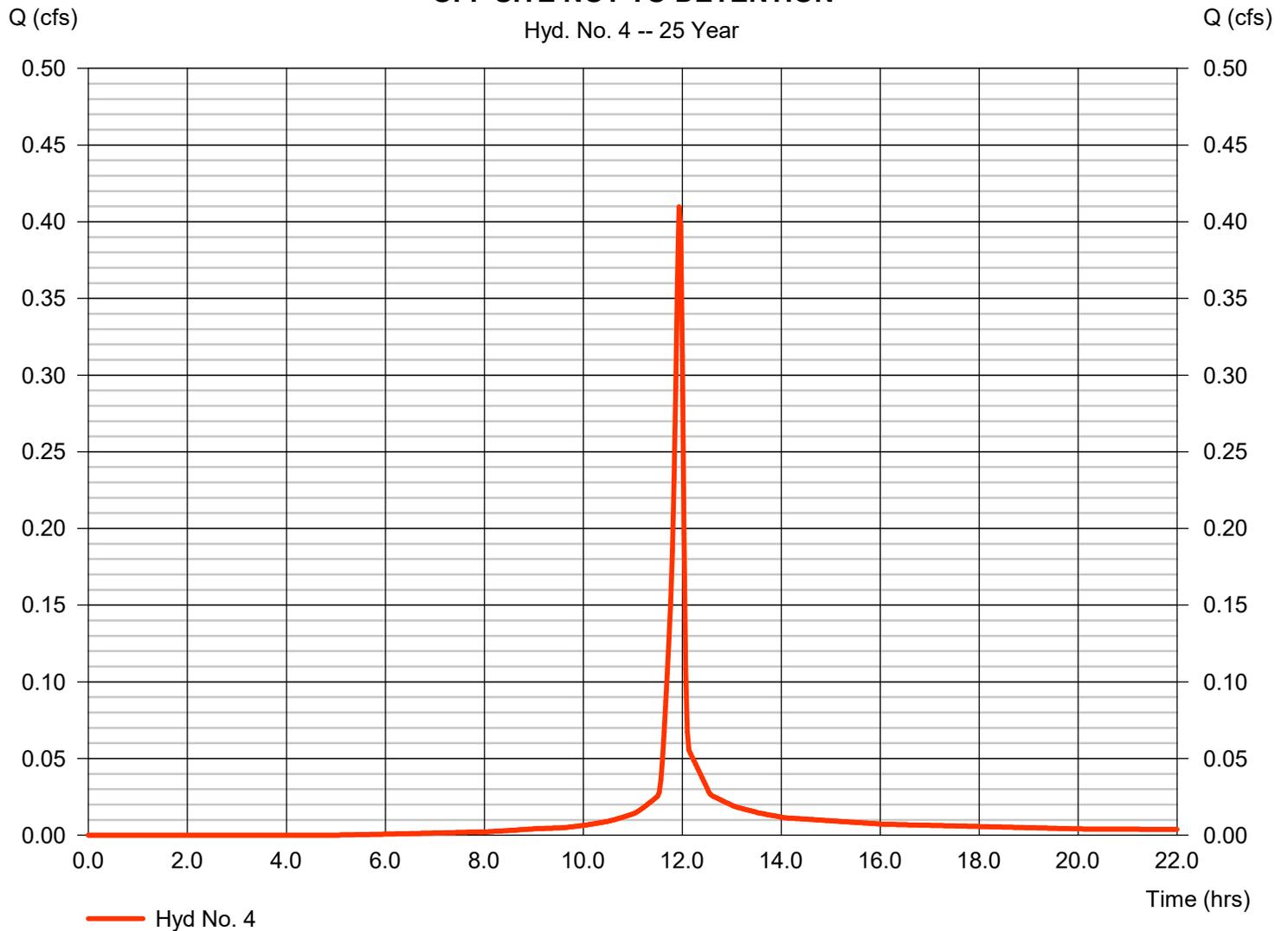
Thursday, 09 / 27 / 2018

Hyd. No. 4

OFF SITE NOT TO DETENTION

Hydrograph type	= SCS Runoff	Peak discharge	= 0.410 cfs
Storm frequency	= 25 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 859 cuft
Drainage area	= 0.060 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

OFF SITE NOT TO DETENTION



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

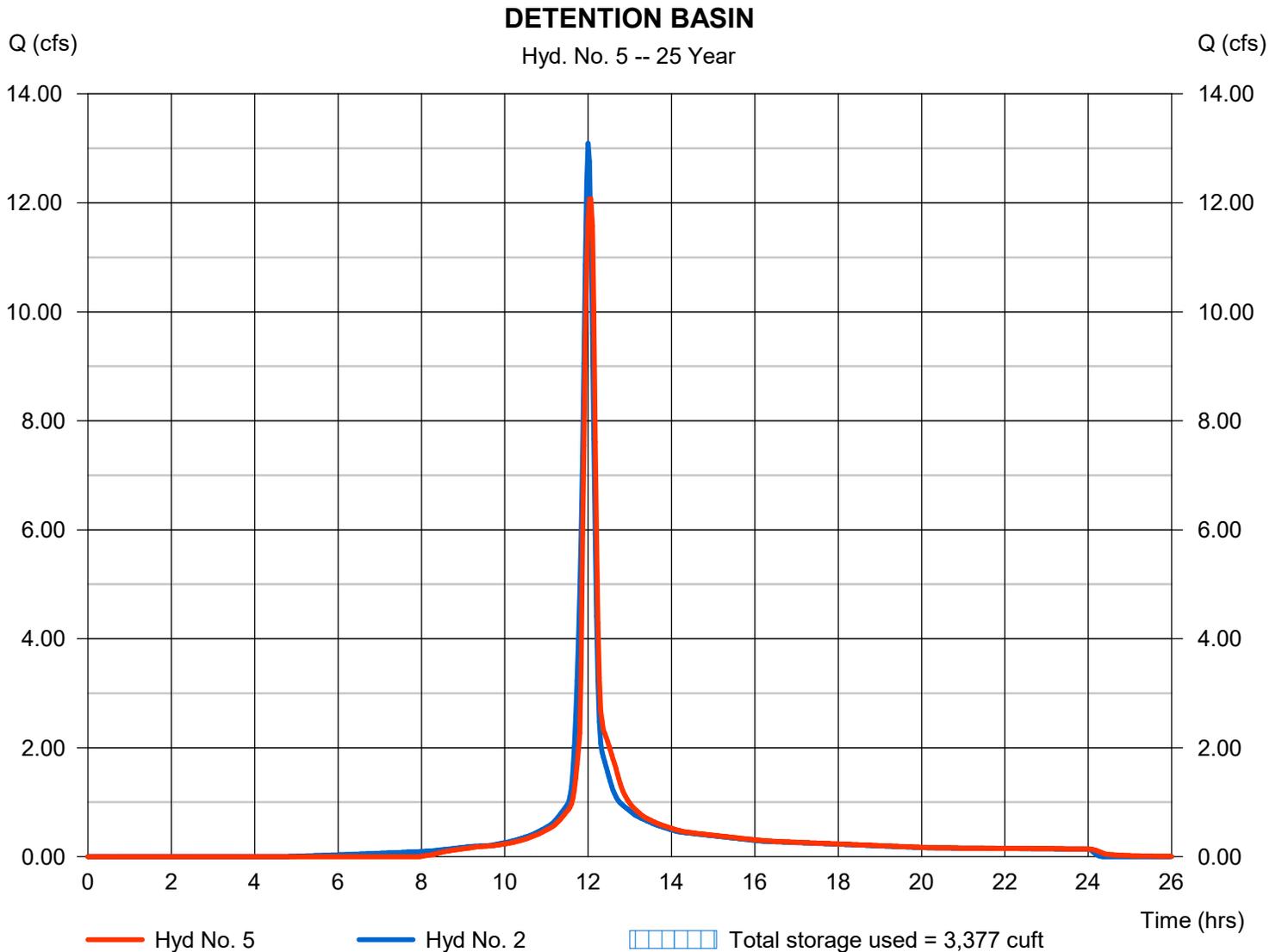
Thursday, 09 / 27 / 2018

Hyd. No. 5

DETENTION BASIN

Hydrograph type	= Reservoir	Peak discharge	= 12.08 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 34,366 cuft
Inflow hyd. No.	= 2 - DA AREA FROM NORTH	Max. Elevation	= 797.43 ft
Reservoir name	= <New Pond>	Max. Storage	= 3,377 cuft

Storage Indication method used.



Hydrograph Report

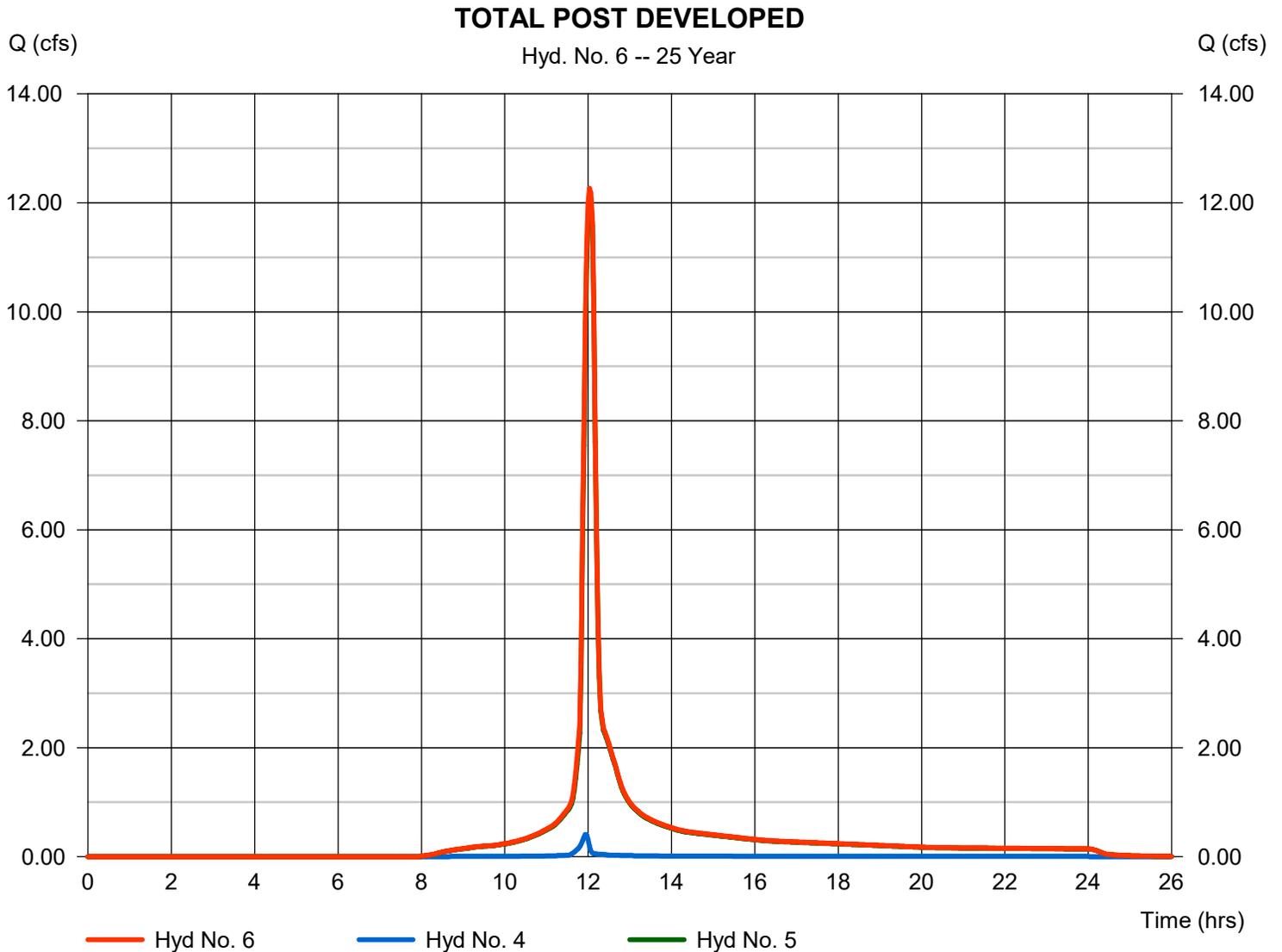
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Thursday, 09 / 27 / 2018

Hyd. No. 6

TOTAL POST DEVELOPED

Hydrograph type	= Combine	Peak discharge	= 12.27 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 35,226 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 0.060 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
2	SCS Runoff	16.93	2	720	45,722	-----	-----	-----	DA AREA FROM NORTH	
3	SCS Runoff	17.44	2	720	46,868	-----	-----	-----	PRE DEVELOPED	
4	SCS Runoff	0.531	2	716	1,131	-----	-----	-----	OFF SITE NOT TO DETENTION	
5	Reservoir	16.10	2	722	45,202	2	797.76	4,091	DETENTION BASIN	
6	Combine	16.35	2	722	46,334	4, 5	-----	-----	TOTAL POST DEVELOPED	
KKS9.26.gpw					Return Period: 100 Year			Thursday, 09 / 27 / 2018		

Hydrograph Report

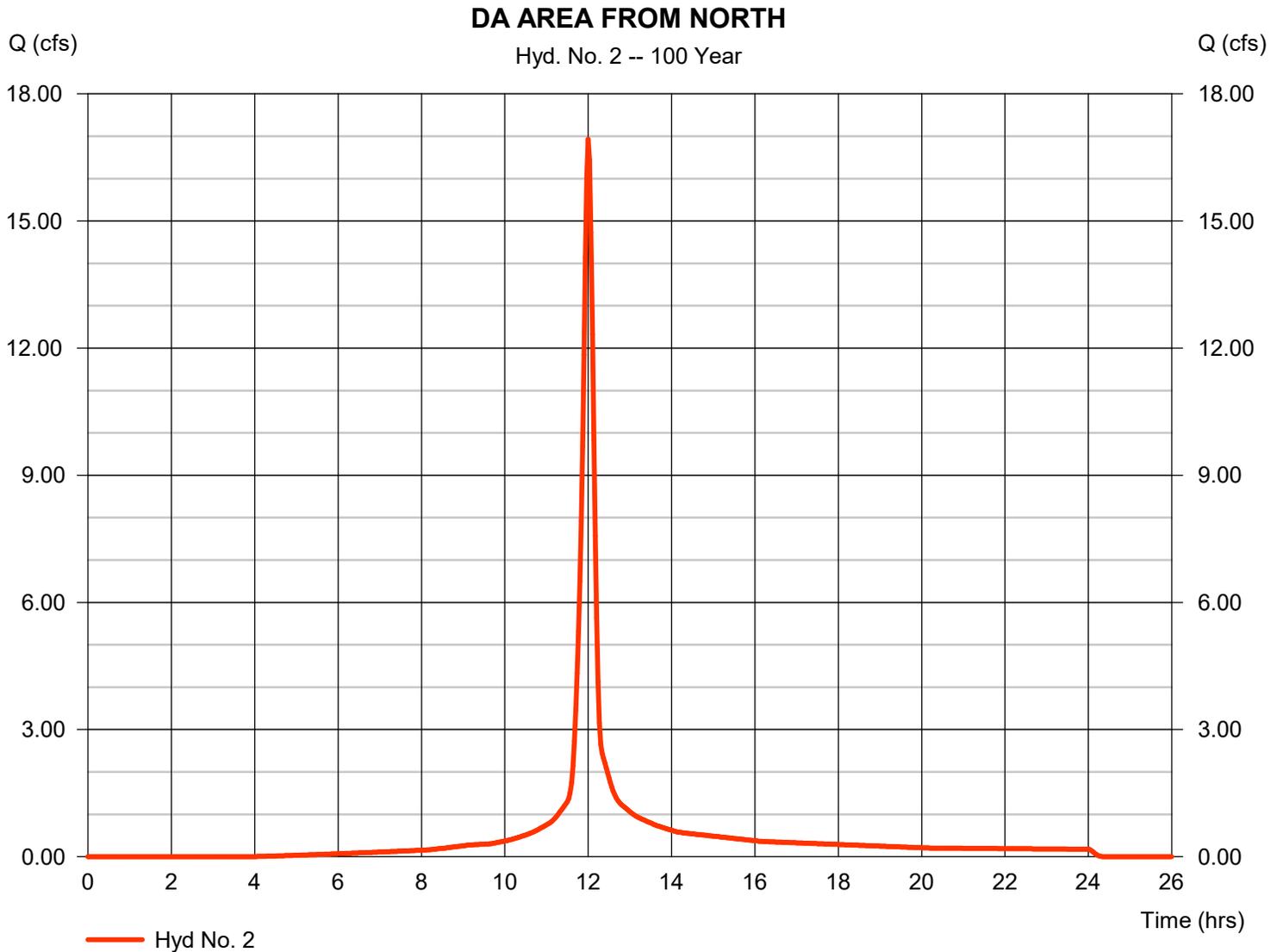
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Thursday, 09 / 27 / 2018

Hyd. No. 2

DA AREA FROM NORTH

Hydrograph type	= SCS Runoff	Peak discharge	= 16.93 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 45,722 cuft
Drainage area	= 2.160 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 7.30 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

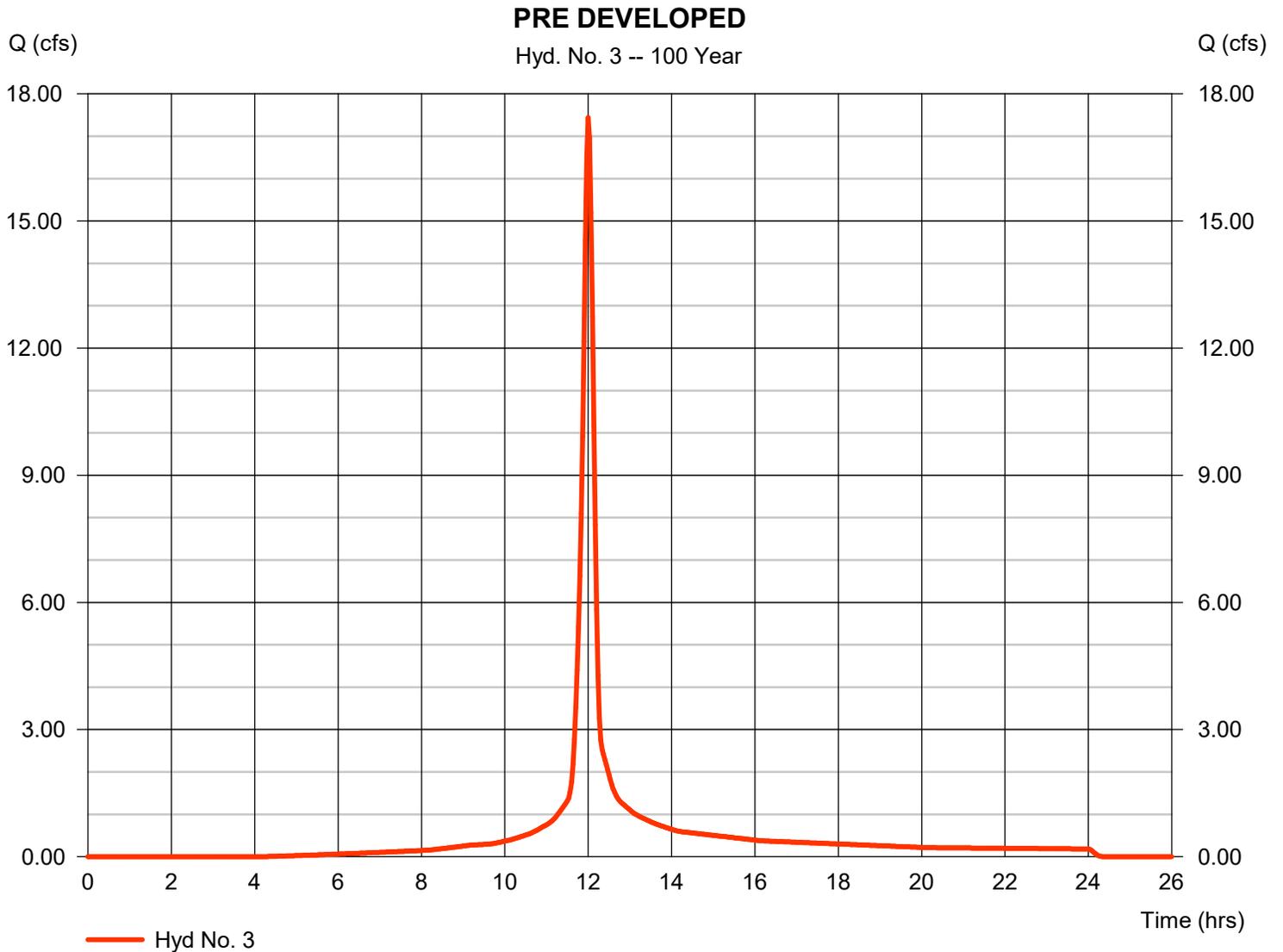
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Thursday, 09 / 27 / 2018

Hyd. No. 3

PRE DEVELOPED

Hydrograph type	= SCS Runoff	Peak discharge	= 17.44 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 46,868 cuft
Drainage area	= 2.260 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 7.30 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

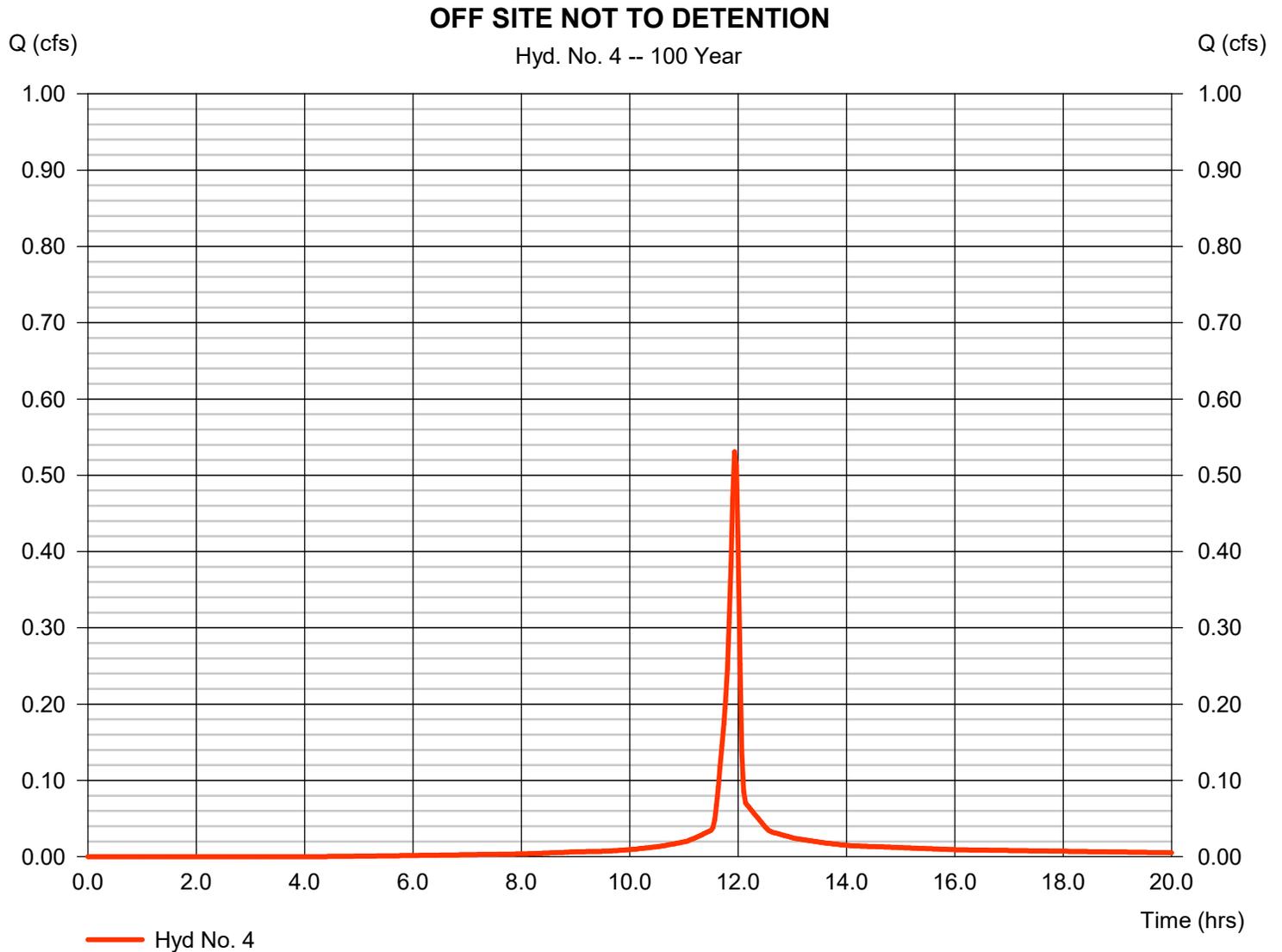
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Thursday, 09 / 27 / 2018

Hyd. No. 4

OFF SITE NOT TO DETENTION

Hydrograph type	= SCS Runoff	Peak discharge	= 0.531 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 1,131 cuft
Drainage area	= 0.060 ac	Curve number	= 85
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.30 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

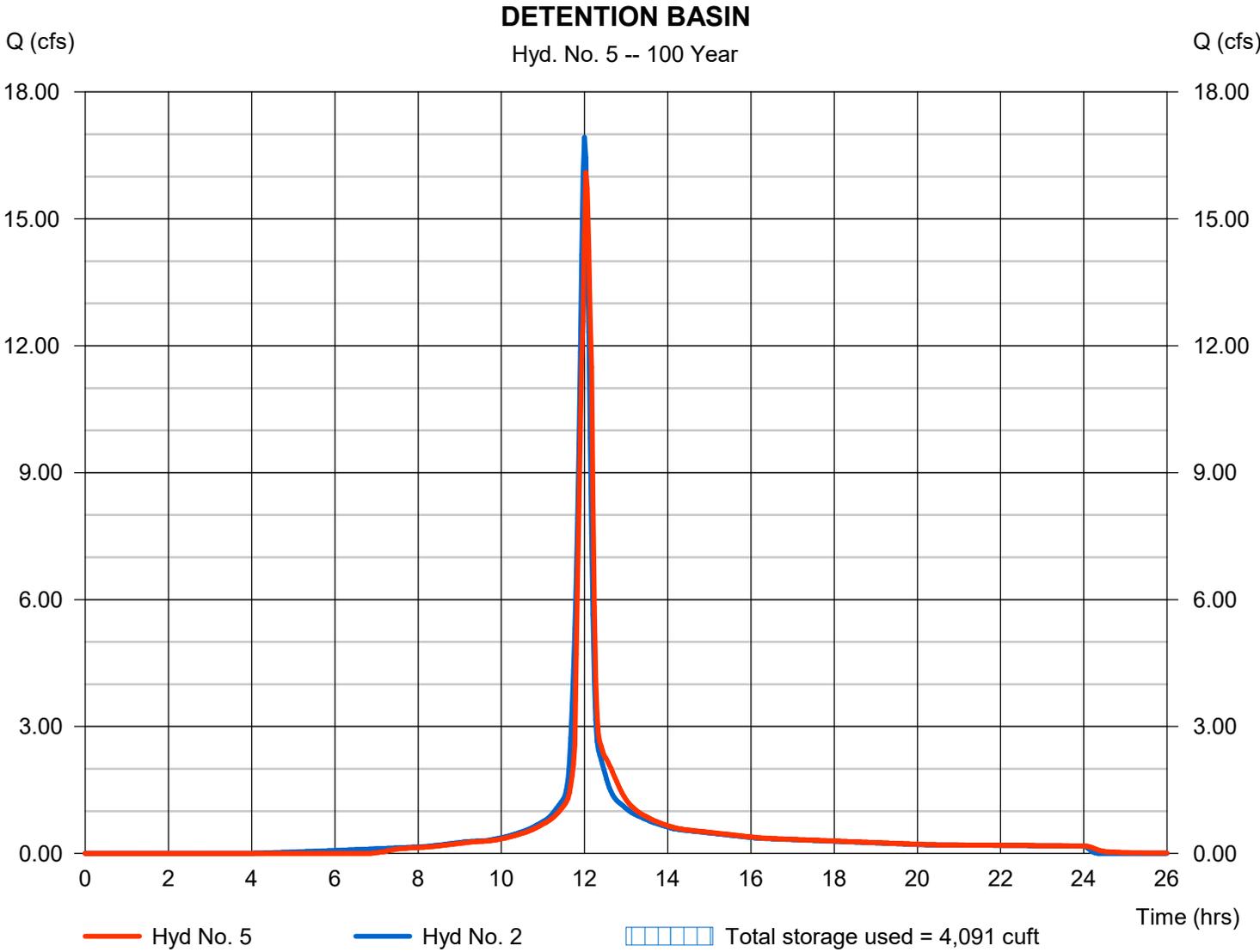
Thursday, 09 / 27 / 2018

Hyd. No. 5

DETENTION BASIN

Hydrograph type	= Reservoir	Peak discharge	= 16.10 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 45,202 cuft
Inflow hyd. No.	= 2 - DA AREA FROM NORTH	Max. Elevation	= 797.76 ft
Reservoir name	= <New Pond>	Max. Storage	= 4,091 cuft

Storage Indication method used.



Hydrograph Report

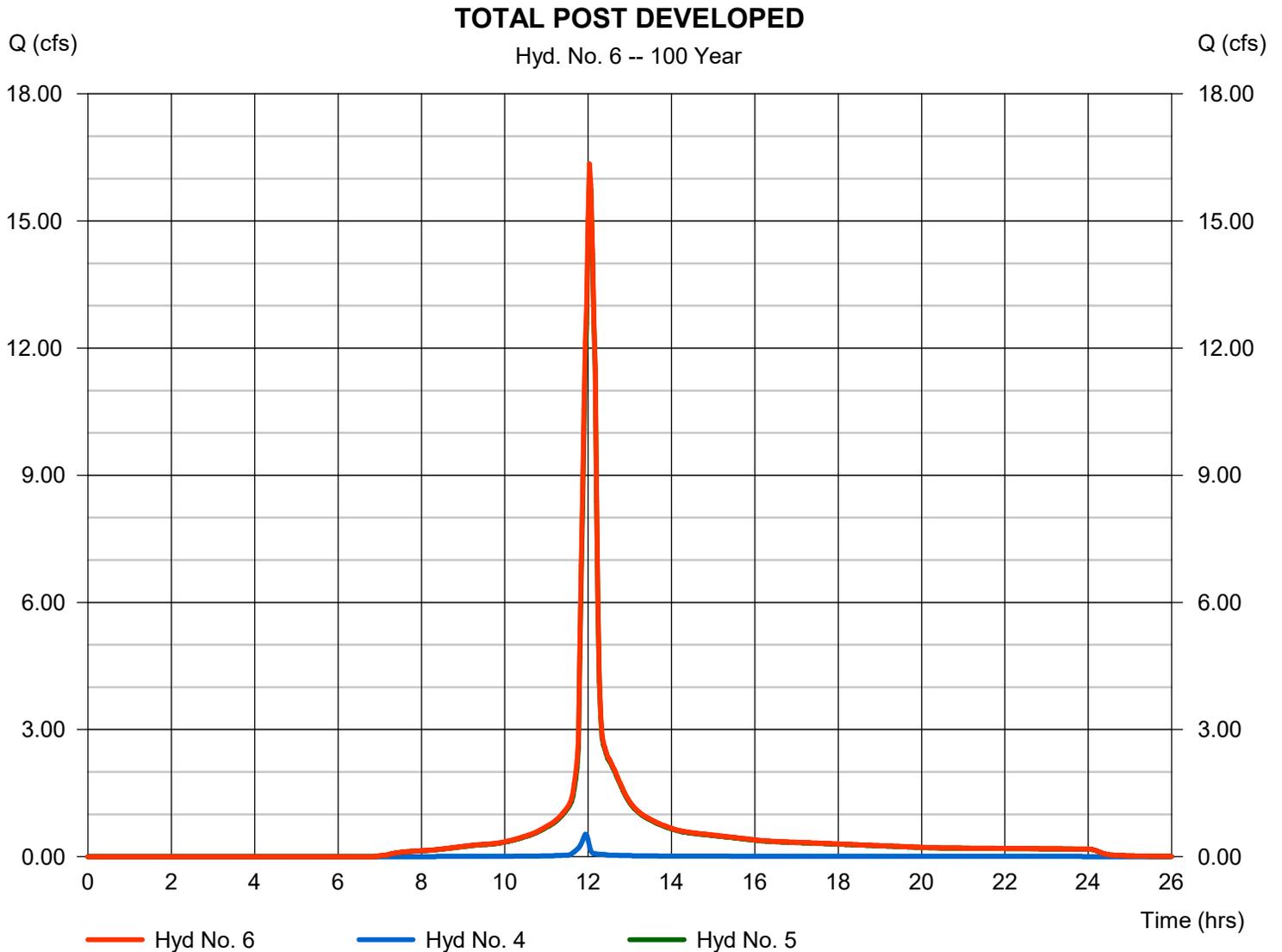
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Thursday, 09 / 27 / 2018

Hyd. No. 6

TOTAL POST DEVELOPED

Hydrograph type	= Combine	Peak discharge	= 16.35 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 46,334 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 0.060 ac





Erin Keys <erin.keys@como.gov>

Renaissance Meadows Plat 1 Variance Request

3 messages

Keenan Simon <ksimon@selectsse.com>
To: Erin.Keys@como.gov

Fri, Sep 28, 2018 at 9:28 AM

Erin,

I went through the preliminary sizing for detention if we only had to provide detention basin sizing for lot 12A (roughly .21 acres) the required size would be roughly 100 cubic ft. To try and give the board some perspective of the amount of additional increase in stormwater runoff for a 25 year design storm would be approximately 0.24 CFS.

Hope this helps let me know if you need anything else.

Thanks,

Keenan Simon, PE

Civil Team Lead



210 Park Avenue, Columbia, MO 65203

O (573) 499 -1944 | C (573) 268 -2068

www.SelectSSE.com

Erin Keys <Erin.Keys@como.gov>
To: ksimon@selectsse.com

Fri, Sep 28, 2018 at 12:10 PM

Thanks Keenan.
And what is the size of the bioretention that you plan to install?
Erin Keys, P.E.

9/28/2018

City of Columbia, MO Mail - Renaissance Meadows Plat 1 Variance Request

Engineering & Operations Manager
Sanitary Sewer and Storm Water Utilities
City of Columbia, MO
Email: Erin.Keys@CoMo.gov
Phone: [573-874-7502](tel:573-874-7502)

[Quoted text hidden]



image002.png
20K

Keenan Simon <ksimon@selectsse.com>
To: Erin Keys <Erin.Keys@como.gov>

Fri, Sep 28, 2018 at 1:06 PM

Erin,

It would be approximately 80sf of bioretention material. Proposed BMP shown on display C103 is to be a bioswale.

Thanks
Keenan

Sent from my iPhone
[Quoted text hidden]