Storm Water Impact Analysis

Domino's Zebulon

1000 Hendricks Drive
Zebulon, NC 27597

Prepared by:

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Brandon Wright

Project #: 2023018

Project Overview:

This narrative describes the routing analysis (pre- vs post-) as depicted on the sheets titled "Pre-Development and Post-Development Drainage Area Map".

The proposed project site is located at 1000 Hendricks Drive, Zebulon, NC.

The existing property consists primarily of managed lawn. There is one existing dry detention pond that will remain. The new project consists of 1 commercial building (restaurant), parking lot, driveway connections and a slight road widening.

Refer to the attached Post Development DA Map for the routing study area.

The existing dry pond was initially designed to collect storm water from 3 developments in the immediate area. The purpose of this study is to make sure that our development will adequately work with the existing dry pond.

Existing Conditions (Routing Analysis):

Refer to the Pre-Developed Drainage Area Map of this report. The existing property consists of managed lawn with a ditch near the south property corner.

The site generally slopes from north to south. The onsite project area is 0.93 acres for the Domino's site specifically. For this study, all 3 developments that discharge to the dry pond will be considered onsite equating to 2.84 acres. There are currently 2 other commercial developments that drain to the dry detention pond on our site.

There is offsite drainage area totaling 3.62 acres of existing agricultural crops from the north, which enters the property as shown on the Pre-Developed DA Map.

The Soils Survey mapping shows that the soils on the site are predominately Ur (Urban Land):

The USGS and soils survey maps indicate that there are no streams onsite. There are no known wetlands on the property. FEMA FIRM 3720270600K indicates that there is no regulatory floodplain on the property, and the site lies within Zone X.

Post-Developed Conditions (Routing Analysis):

Refer to the Post-Developed Drainage Area Map of this report. The project includes 1 commercial building, parking lot, and an existing dry detention pond. Refer to the Site Plan sheet for all lot impervious allocations. The project includes minor road widening on E. Jones Street.

Total Proposed Onsite Impervious for this Study = 1.89 AC

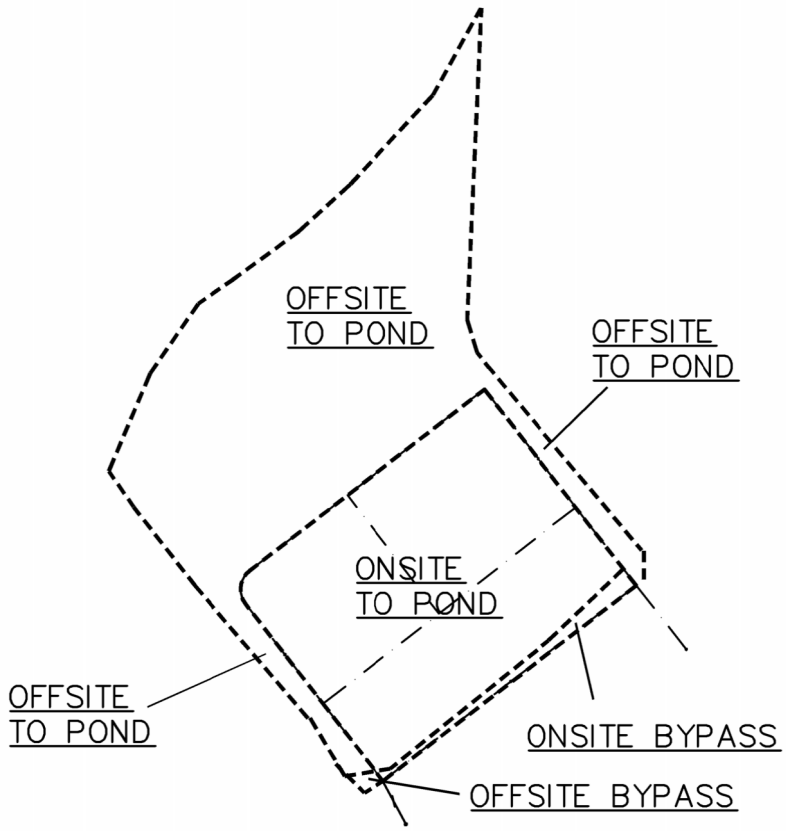
Proposed Offsite Impervious = 0.42 AC

Predeveloped Conditions:

Onsite:
A = 2.84 acres
CN = 60
Offsite:
A = 3.62 acres
CN = 68
A = 0.42 acres
CN = 98
Combined:
A = 6.88 acres
CN = 67
(SCS Method)

Predeveloped Runoff Summary

	Predeveloped Runoff
Year	CFS
1	1.73
2	3.19
5	5.88
10	8.37
25	12.11
100	18.93



FINAL DEVELOPED CONDITIONS

TO POND	BYPASS
ONSITE:	ONSITE
A=0.92 ACRES	A=0.03 ACRES
CN=68	CN=68
A=1.87 ACRES	A=0.02 ACRES
CN=98	CN=98
OFFSITE:	OFFSITE
A=3.61 ACRES	A=0.01 ACRES
CN=68	CN=68
A=0.42 ACRES	COMBINED
CN=98	A=0.06 ACRES
COMBINED:	CN=78
A=6.82 ACRES	(SCS METHOD)
CN=78	
(RESERVOIR ROUTING)	

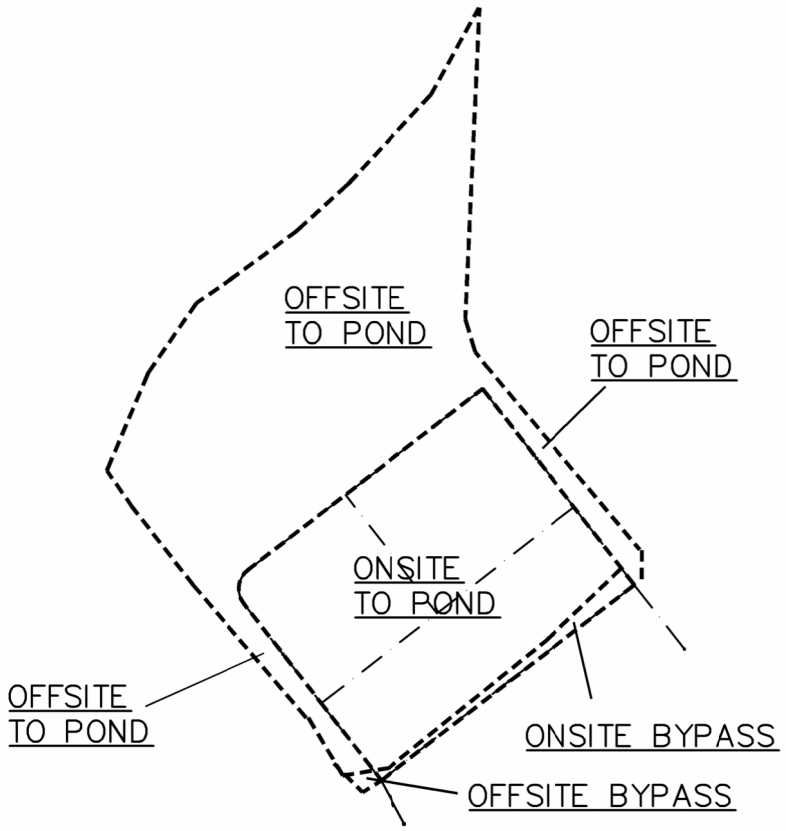
FINAL DEVELOPED
CONDITIONS
TWISTED 52°

Final Developed Conditions:

Onsite to Pond:
A = 0.92 acres
CN = 68
A = 1.87 acres
CN = 98
Offsite to Pond:
A = 3.61 acres
CN = 68
A = 0.42 acres
CN = 98
Combined:
A = 6.82 acres
CN = 78
(Reservoir Routing)

Onsite Bypass:
A = 0.03 acres
CN = 68
A = 0.02 acres
CN = 98
Offsite Bypass:
A = 0.01 acres
CN = 68
Combined:
A = 0.06 acres
CN = 78
(SCS Method)

	Predeveloped Runoff	Final Developed Runoff
Year	CFS	CFS
1	1.73	3.08
2	3.19	3.59
5	5.88	6.31
10	8.37	9.22
25	12.11	13.33
100	18.93	20.28



PREDEVELOPED CONDITIONS

ONSITE:
A=2.84 ACRES
CN=60
OFFSITE:
A=3.62 ACRES
CN=68
A=0.42 ACRES
CN= 98
COMBINED:
A=6.88 ACRES
CN=67
(SCS METHOD)

EXISTING CONDITIONS
TWISTED 52°

Methodology:

Hydrologic and hydraulic routing calculations were performed using Hydraflow Hydrographs software. Time of concentrations were calculated using the TR-55 segmented approach. Hydrologic calculations utilized the NRCS SCS Method within the Hydraflow software. The stormwater dry detention pond was routed within the Hydraflow software, which uses the Storage Indication Method.

Conclusions:

Through the use of the existing stormwater dry detention pond, this project detains the 100-yr storm onsite.

List of Appendices:

- Maps
  - Pre-Developed Drainage Area Map
  - Post-Developed Drainage Area Map
  - Soils Survey Map
  - FEMA Firmette
  - USGS Map

- Calculations
  - Table of Subareas, Land Uses, & Curve Numbers
  - Peak Flow Summary
  - Hydraflow Routing Report

NOAA Atlas 14, Volume 2, Version 3
Location name: Zebulon, North Carolina, USA*
Latitude: 35.8383°, Longitude: -78.3233°
Elevation: 335 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.405** (0.369-0.444)	**0.468** (0.428-0.512)	**0.530** (0.485-0.580)	**0.601** (0.548-0.657)	**0.670** (0.609-0.732)	**0.728** (0.658-0.795)	**0.780** (0.701-0.851)	**0.827** (0.739-0.904)	**0.880** (0.780-0.963)	**0.930** (0.818-1.02)
10-min	**0.646** (0.590-0.710)	**0.748** (0.685-0.819)	**0.849** (0.777-0.929)	**0.961** (0.877-1.05)	**1.07** (0.970-1.17)	**1.16** (1.05-1.27)	**1.24** (1.11-1.35)	**1.31** (1.17-1.43)	**1.39** (1.23-1.52)	**1.46** (1.29-1.61)
15-min	**0.808** (0.737-0.887)	**0.941** (0.861-1.03)	**1.07** (0.983-1.18)	**1.22** (1.11-1.33)	**1.35** (1.23-1.48)	**1.47** (1.33-1.60)	**1.57** (1.41-1.71)	**1.65** (1.48-1.81)	**1.75** (1.55-1.92)	**1.84** (1.62-2.02)
30-min	**1.11** (1.01-1.22)	**1.30** (1.19-1.42)	**1.53** (1.40-1.67)	**1.76** (1.61-1.92)	**2.00** (1.82-2.19)	**2.21** (2.00-2.42)	**2.40** (2.16-2.62)	**2.57** (2.30-2.81)	**2.79** (2.47-3.05)	**2.98** (2.62-3.27)
60-min	**1.38** (1.26-1.52)	**1.63** (1.49-1.78)	**1.96** (1.79-2.14)	**2.29** (2.09-2.51)	**2.67** (2.42-2.92)	**3.00** (2.71-3.27)	**3.30** (2.97-3.60)	**3.61** (3.23-3.95)	**4.00** (3.55-4.38)	**4.35** (3.82-4.77)
2-hr	**1.62** (1.46-1.79)	**1.91** (1.74-2.10)	**2.32** (2.11-2.56)	**2.76** (2.50-3.03)	**3.27** (2.94-3.59)	**3.74** (3.35-4.10)	**4.19** (3.73-4.59)	**4.66** (4.13-5.10)	**5.29** (4.63-5.79)	**5.86** (5.09-6.44)
3-hr	**1.71** (1.55-1.90)	**2.03** (1.85-2.24)	**2.47** (2.25-2.74)	**2.96** (2.68-3.26)	**3.54** (3.18-3.90)	**4.08** (3.65-4.49)	**4.62** (4.10-5.08)	**5.20** (4.57-5.71)	**5.97** (5.20-6.57)	**6.71** (5.77-7.39)
6-hr	**2.05** (1.87-2.27)	**2.43** (2.22-2.68)	**2.97** (2.70-3.27)	**3.55** (3.23-3.91)	**4.27** (3.85-4.68)	**4.94** (4.43-5.41)	**5.62** (4.99-6.14)	**6.34** (5.58-6.93)	**7.34** (6.37-8.02)	**8.28** (7.10-9.07)
12-hr	**2.41** (2.20-2.66)	**2.86** (2.62-3.15)	**3.51** (3.21-3.86)	**4.22** (3.84-4.64)	**5.11** (4.62-5.60)	**5.96** (5.34-6.50)	**6.82** (6.05-7.43)	**7.76** (6.80-8.44)	**9.06** (7.82-9.86)	**10.3** (8.77-11.2)
24-hr	**2.85** (2.65-3.09)	**3.46** (3.21-3.74)	**4.38** (4.06-4.74)	**5.14** (4.75-5.55)	**6.20** (5.71-6.69)	**7.07** (6.48-7.64)	**8.00** (7.29-8.64)	**8.99** (8.14-9.73)	**10.4** (9.34-11.3)	**11.6** (10.3-12.6)
2-day	**3.30** (3.07-3.56)	**3.98** (3.71-4.30)	**5.02** (4.66-5.41)	**5.85** (5.42-6.31)	**7.02** (6.47-7.58)	**7.98** (7.32-8.61)	**8.99** (8.21-9.71)	**10.1** (9.13-10.9)	**11.6** (10.4-12.6)	**12.9** (11.4-14.0)
3-day	**3.51** (3.27-3.77)	**4.22** (3.93-4.54)	**5.29** (4.92-5.68)	**6.14** (5.70-6.60)	**7.35** (6.79-7.90)	**8.33** (7.66-8.96)	**9.36** (8.57-10.1)	**10.5** (9.51-11.3)	**12.0** (10.8-13.0)	**13.3** (11.9-14.4)
4-day	**3.71** (3.46-3.98)	**4.46** (4.16-4.78)	**5.56** (5.18-5.95)	**6.44** (5.99-6.89)	**7.67** (7.11-8.22)	**8.68** (8.00-9.30)	**9.73** (8.93-10.4)	**10.8** (9.89-11.7)	**12.4** (11.2-13.4)	**13.7** (12.3-14.8)
7-day	**4.31** (4.03-4.61)	**5.16** (4.82-5.52)	**6.35** (5.93-6.80)	**7.31** (6.81-7.82)	**8.64** (8.02-9.24)	**9.71** (8.99-10.4)	**10.8** (9.97-11.6)	**12.0** (11.0-12.9)	**13.6** (12.4-14.7)	**15.0** (13.5-16.2)
10-day	**4.92** (4.61-5.25)	**5.87** (5.50-6.26)	**7.12** (6.67-7.59)	**8.11** (7.59-8.64)	**9.47** (8.83-10.1)	**10.6** (9.81-11.3)	**11.7** (10.8-12.5)	**12.8** (11.8-13.7)	**14.4** (13.2-15.5)	**15.7** (14.3-16.9)
20-day	**6.60** (6.21-7.03)	**7.82** (7.36-8.32)	**9.33** (8.77-9.93)	**10.5** (9.88-11.2)	**12.2** (11.4-12.9)	**13.5** (12.6-14.3)	**14.8** (13.8-15.8)	**16.2** (15.0-17.2)	**18.0** (16.6-19.3)	**19.5** (17.8-20.9)
30-day	**8.20** (7.74-8.70)	**9.67** (9.13-10.3)	**11.4** (10.7-12.0)	**12.7** (11.9-13.4)	**14.4** (13.5-15.3)	**15.8** (14.8-16.8)	**17.1** (16.0-18.2)	**18.5** (17.2-19.7)	**20.4** (18.9-21.7)	**21.8** (20.1-23.3)
45-day	**10.4** (9.90-11.0)	**12.3** (11.6-12.9)	**14.2** (13.4-14.9)	**15.6** (14.8-16.5)	**17.6** (16.6-18.6)	**19.0** (18.0-20.1)	**20.5** (19.3-21.7)	**22.0** (20.6-23.3)	**23.9** (22.3-25.4)	**25.4** (23.6-27.0)
60-day	**12.5** (11.9-13.2)	**14.7** (13.9-15.4)	**16.7** (15.9-17.6)	**18.4** (17.4-19.3)	**20.4** (19.4-21.5)	**22.0** (20.8-23.2)	**23.6** (22.2-24.9)	**25.1** (23.6-26.5)	**27.1** (25.4-28.7)	**28.6** (26.7-30.4)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical

NOAA Atlas 14, Volume 2, Version 3
Location name: Zebulon, North Carolina, USA*
Latitude: 35.8383°, Longitude: -78.3233°
Elevation: 335 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**4.86** (4.43-5.33)	**5.62** (5.14-6.14)	**6.36** (5.82-6.96)	**7.21** (6.58-7.88)	**8.04** (7.31-8.78)	**8.74** (7.90-9.54)	**9.36** (8.41-10.2)	**9.92** (8.87-10.8)	**10.6** (9.36-11.6)	**11.2** (9.82-12.3)
10-min	**3.88** (3.54-4.26)	**4.49** (4.11-4.91)	**5.09** (4.66-5.57)	**5.77** (5.26-6.30)	**6.41** (5.82-7.00)	**6.95** (6.29-7.60)	**7.43** (6.68-8.11)	**7.86** (7.03-8.59)	**8.35** (7.40-9.14)	**8.79** (7.73-9.64)
15-min	**3.23** (2.95-3.55)	**3.76** (3.44-4.12)	**4.30** (3.93-4.70)	**4.86** (4.44-5.32)	**5.41** (4.92-5.91)	**5.87** (5.31-6.42)	**6.26** (5.63-6.84)	**6.61** (5.91-7.23)	**7.01** (6.21-7.67)	**7.36** (6.46-8.07)
30-min	**2.22** (2.02-2.43)	**2.60** (2.38-2.84)	**3.05** (2.79-3.34)	**3.52** (3.21-3.85)	**4.01** (3.64-4.38)	**4.42** (4.00-4.83)	**4.80** (4.31-5.23)	**5.15** (4.60-5.63)	**5.57** (4.94-6.10)	**5.96** (5.23-6.53)
60-min	**1.38** (1.26-1.52)	**1.63** (1.49-1.78)	**1.96** (1.79-2.14)	**2.29** (2.09-2.51)	**2.67** (2.42-2.92)	**3.00** (2.71-3.27)	**3.30** (2.97-3.60)	**3.61** (3.23-3.95)	**4.00** (3.55-4.38)	**4.35** (3.82-4.77)
2-hr	**0.807** (0.731-0.894)	**0.956** (0.870-1.05)	**1.16** (1.06-1.28)	**1.38** (1.25-1.52)	**1.64** (1.47-1.79)	**1.87** (1.68-2.05)	**2.10** (1.86-2.29)	**2.33** (2.06-2.55)	**2.64** (2.32-2.90)	**2.93** (2.54-3.22)
3-hr	**0.569** (0.516-0.633)	**0.675** (0.615-0.746)	**0.823** (0.748-0.911)	**0.985** (0.892-1.09)	**1.18** (1.06-1.30)	**1.36** (1.22-1.50)	**1.54** (1.36-1.69)	**1.73** (1.52-1.90)	**1.99** (1.73-2.19)	**2.23** (1.92-2.46)
6-hr	**0.342** (0.311-0.379)	**0.405** (0.370-0.447)	**0.495** (0.451-0.545)	**0.593** (0.538-0.652)	**0.712** (0.643-0.781)	**0.825** (0.739-0.903)	**0.938** (0.833-1.03)	**1.06** (0.931-1.16)	**1.22** (1.06-1.34)	**1.38** (1.18-1.51)
12-hr	**0.200** (0.182-0.220)	**0.237** (0.217-0.261)	**0.291** (0.266-0.320)	**0.350** (0.319-0.385)	**0.424** (0.383-0.464)	**0.494** (0.443-0.539)	**0.565** (0.502-0.616)	**0.643** (0.564-0.700)	**0.751** (0.649-0.818)	**0.856** (0.727-0.932)
24-hr	**0.118** (0.110-0.128)	**0.143** (0.133-0.155)	**0.182** (0.169-0.197)	**0.214** (0.197-0.231)	**0.258** (0.237-0.278)	**0.294** (0.270-0.318)	**0.333** (0.303-0.360)	**0.374** (0.339-0.405)	**0.433** (0.389-0.470)	**0.482** (0.429-0.525)
2-day	**0.068** (0.063-0.074)	**0.082** (0.077-0.089)	**0.104** (0.097-0.112)	**0.121** (0.112-0.131)	**0.146** (0.134-0.157)	**0.166** (0.152-0.179)	**0.187** (0.170-0.202)	**0.209** (0.190-0.226)	**0.241** (0.217-0.262)	**0.267** (0.238-0.292)
3-day	**0.048** (0.045-0.052)	**0.058** (0.054-0.063)	**0.073** (0.068-0.078)	**0.085** (0.079-0.091)	**0.102** (0.094-0.109)	**0.115** (0.106-0.124)	**0.129** (0.119-0.140)	**0.145** (0.132-0.156)	**0.166** (0.150-0.180)	**0.184** (0.164-0.200)
4-day	**0.038** (0.036-0.041)	**0.046** (0.043-0.049)	**0.057** (0.053-0.062)	**0.067** (0.062-0.071)	**0.079** (0.074-0.085)	**0.090** (0.083-0.096)	**0.101** (0.092-0.108)	**0.112** (0.102-0.121)	**0.129** (0.116-0.139)	**0.142** (0.127-0.154)
7-day	**0.025** (0.023-0.027)	**0.030** (0.028-0.032)	**0.037** (0.035-0.040)	**0.043** (0.040-0.046)	**0.051** (0.047-0.055)	**0.057** (0.053-0.061)	**0.064** (0.059-0.069)	**0.071** (0.065-0.076)	**0.081** (0.073-0.087)	**0.089** (0.080-0.096)
10-day	**0.020** (0.019-0.021)	**0.024** (0.022-0.026)	**0.029** (0.027-0.031)	**0.033** (0.031-0.036)	**0.039** (0.036-0.042)	**0.043** (0.040-0.046)	**0.048** (0.045-0.051)	**0.053** (0.049-0.057)	**0.060** (0.055-0.064)	**0.065** (0.059-0.070)
20-day	**0.013** (0.012-0.014)	**0.016** (0.015-0.017)	**0.019** (0.018-0.020)	**0.021** (0.020-0.023)	**0.025** (0.023-0.026)	**0.028** (0.026-0.029)	**0.030** (0.028-0.032)	**0.033** (0.031-0.035)	**0.037** (0.034-0.040)	**0.040** (0.037-0.043)
30-day	**0.011** (0.010-0.012)	**0.013** (0.012-0.014)	**0.015** (0.014-0.016)	**0.017** (0.016-0.018)	**0.020** (0.018-0.021)	**0.021** (0.020-0.023)	**0.023** (0.022-0.025)	**0.025** (0.023-0.027)	**0.028** (0.026-0.030)	**0.030** (0.027-0.032)
45-day	**0.009** (0.009-0.010)	**0.011** (0.010-0.011)	**0.013** (0.012-0.013)	**0.014** (0.013-0.015)	**0.016** (0.015-0.017)	**0.017** (0.016-0.018)	**0.019** (0.017-0.020)	**0.020** (0.019-0.021)	**0.022** (0.020-0.023)	**0.023** (0.021-0.025)
60-day	**0.008** (0.008-0.009)	**0.010** (0.009-0.010)	**0.011** (0.011-0.012)	**0.012** (0.012-0.013)	**0.014** (0.013-0.014)	**0.015** (0.014-0.016)	**0.016** (0.015-0.017)	**0.017** (0.016-0.018)	**0.018** (0.017-0.019)	**0.019** (0.018-0.021)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.729	2	744	12,674	------	------	------	Pre-Developed Total
3	SCS Runoff	4.437	2	742	25,107	------	------	------	Post Development (To Pond)
4	SCS Runoff	0.039	2	742	221	------	------	------	Post Development (Bypass)
6	Reservoir	3.053	2	764	25,107	3	33.78	2,580	Pond Route
8	Combine	3.080	2	762	25,327	4, 6,	------	------	Post Development (Detained)

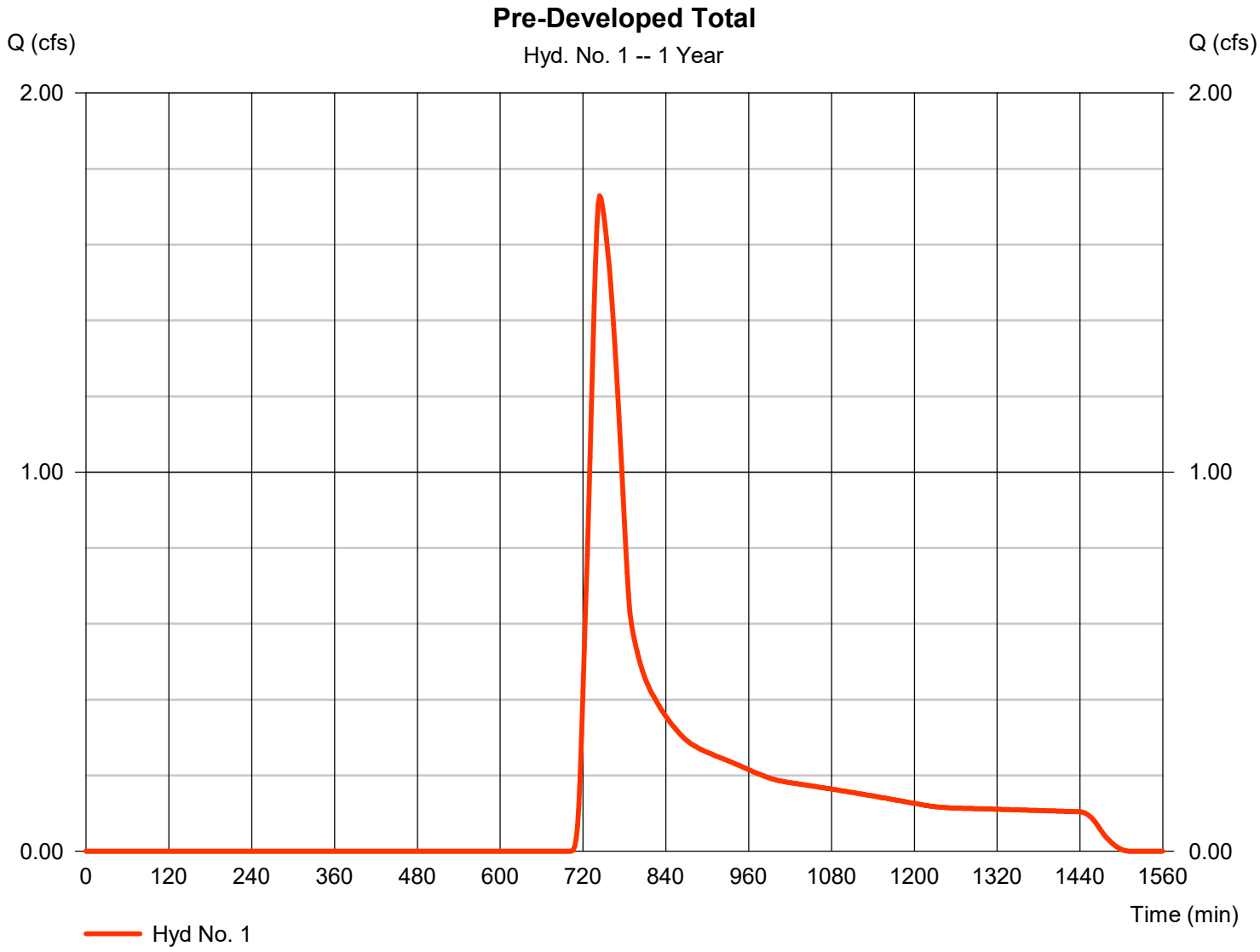
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 1

Pre-Developed Total

Hydrograph type	= SCS Runoff	Peak discharge	= 1.729 cfs
Storm frequency	= 1 yrs	Time to peak	= 744 min
Time interval	= 2 min	Hyd. volume	= 12,674 cuft
Drainage area	= 6.880 ac	Curve number	= 67
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 45.00 min
Total precip.	= 2.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



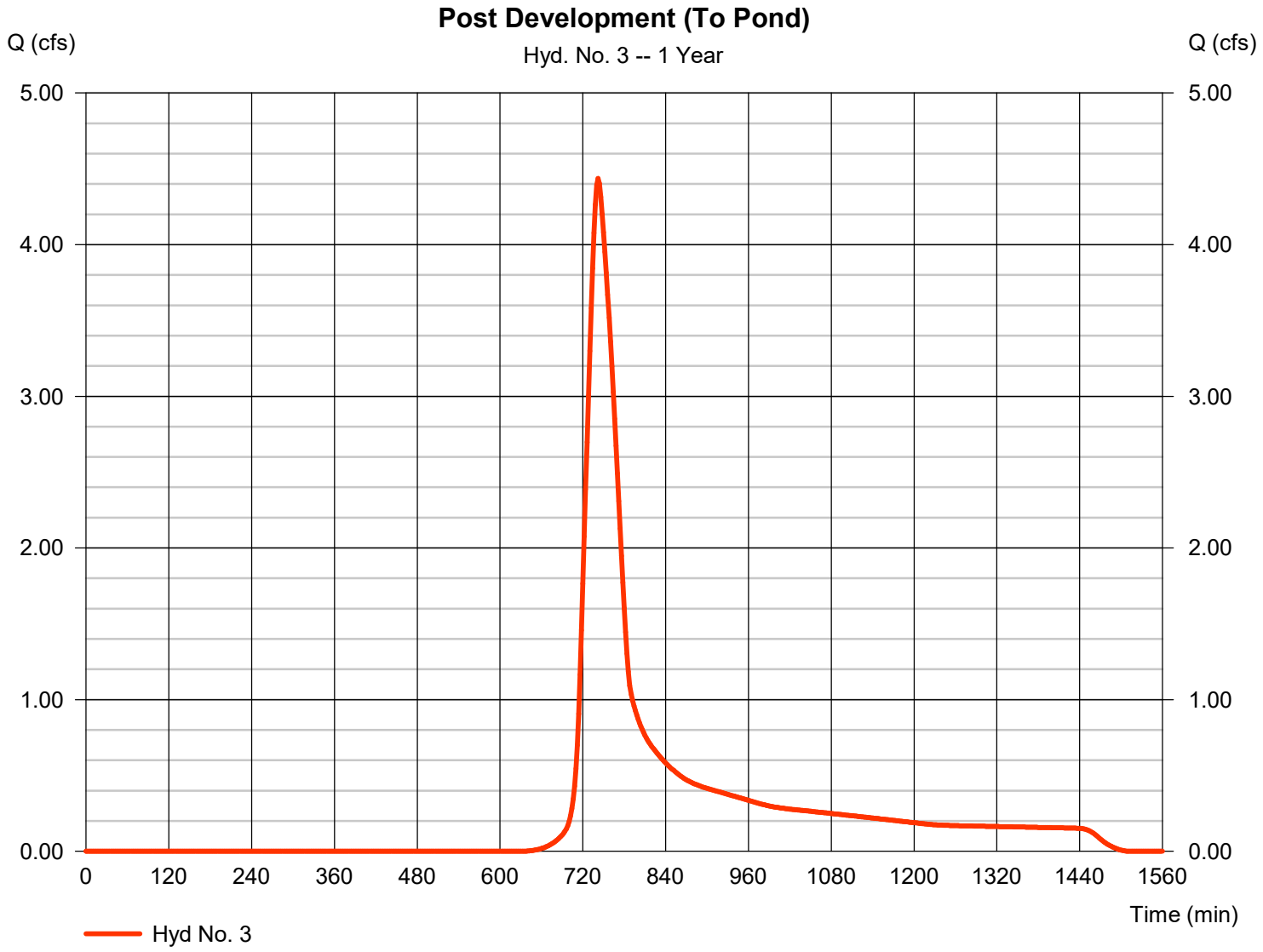
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 3

Post Development (To Pond)

Hydrograph type	= SCS Runoff	Peak discharge	= 4.437 cfs
Storm frequency	= 1 yrs	Time to peak	= 742 min
Time interval	= 2 min	Hyd. volume	= 25,107 cuft
Drainage area	= 6.820 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 45.00 min
Total precip.	= 2.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



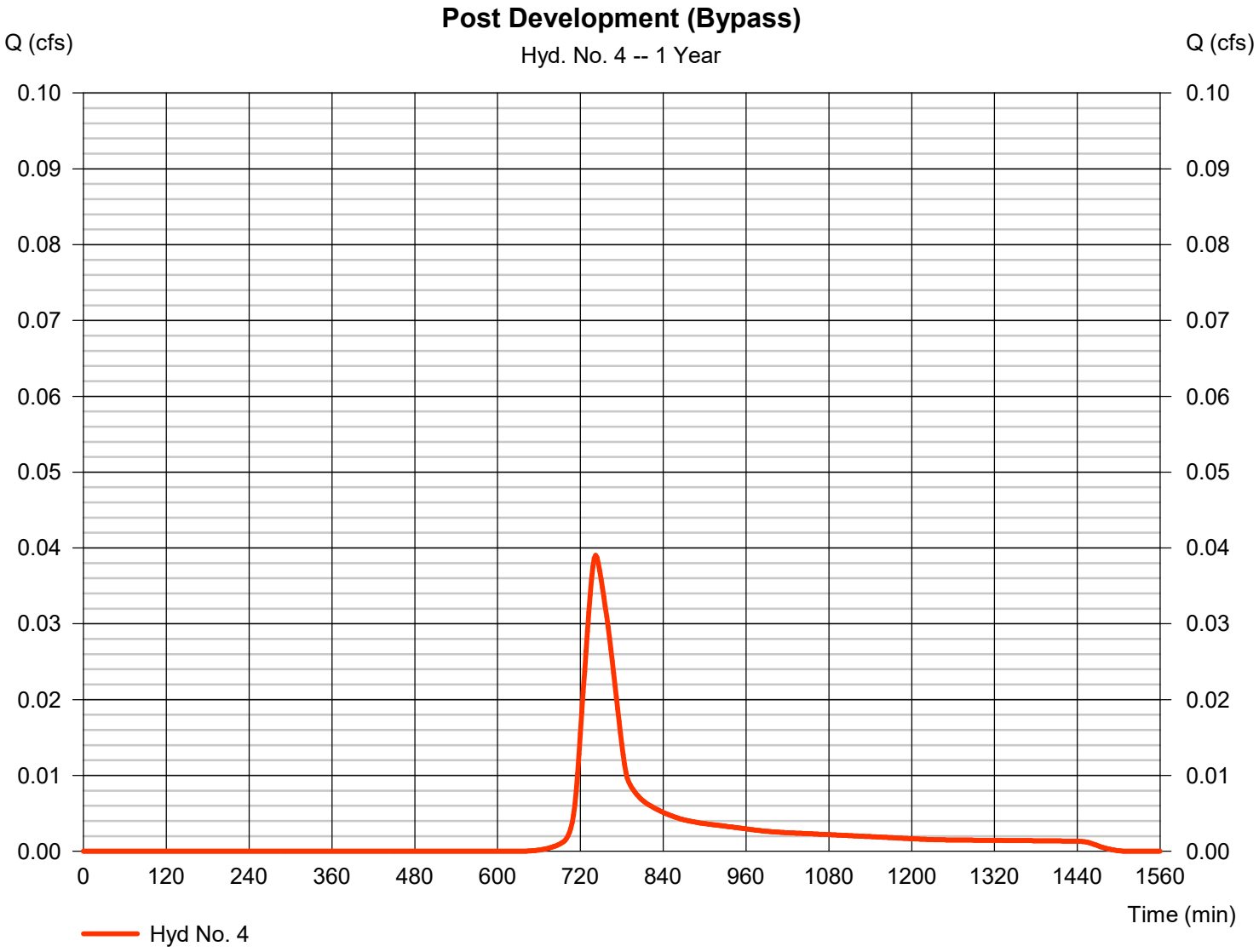
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 4

Post Development (Bypass)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.039 cfs
Storm frequency	= 1 yrs	Time to peak	= 742 min
Time interval	= 2 min	Hyd. volume	= 221 cuft
Drainage area	= 0.060 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 45.00 min
Total precip.	= 2.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

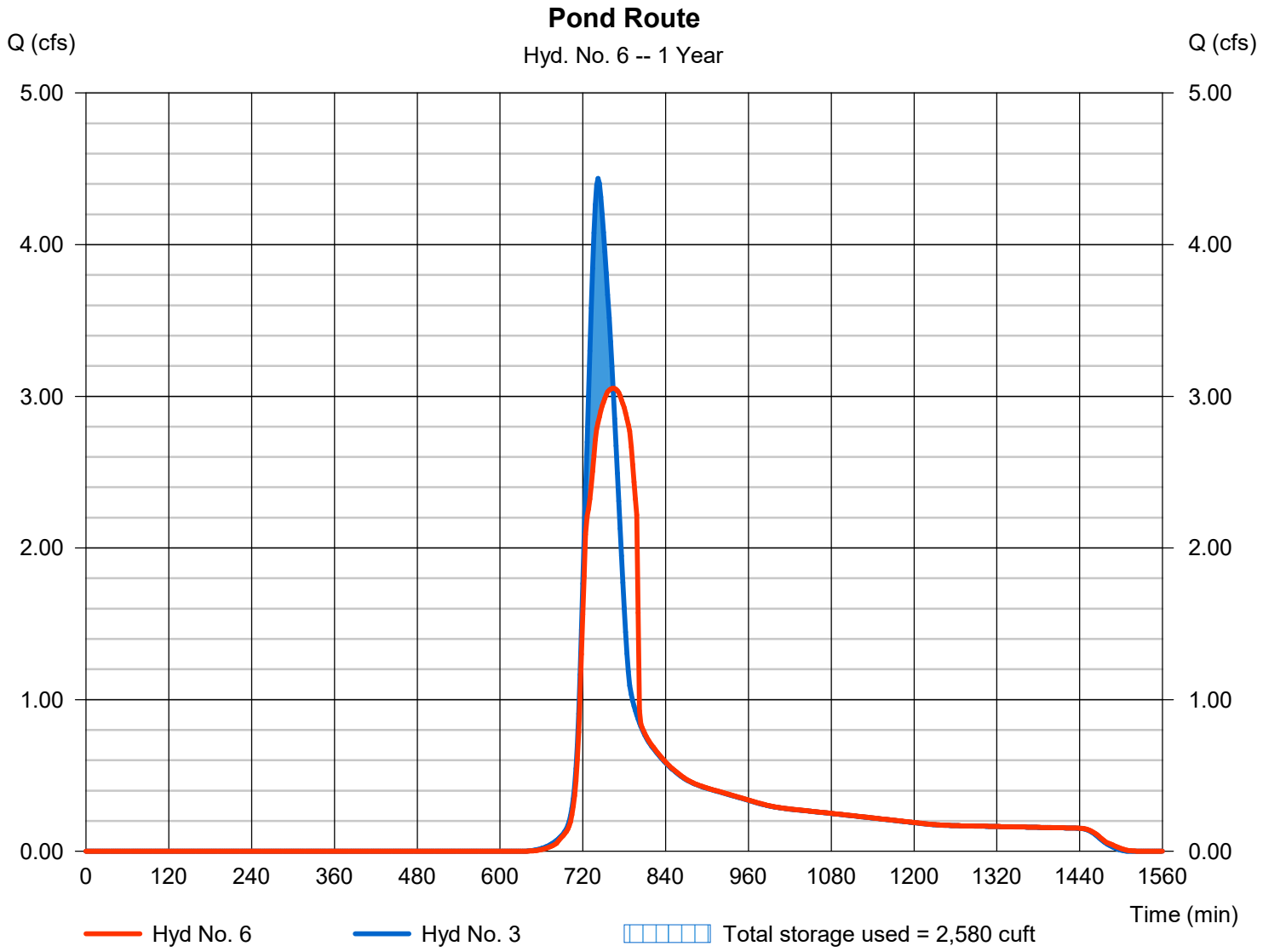
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 6

Pond Route

Hydrograph type	= Reservoir	Peak discharge	= 3.053 cfs
Storm frequency	= 1 yrs	Time to peak	= 764 min
Time interval	= 2 min	Hyd. volume	= 25,107 cuft
Inflow hyd. No.	= 3 - Post Development (To Pond)	Max. Elevation	= 33.78 ft
Reservoir name	= Dry Detention Pond	Max. Storage	= 2,580 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Pond No. 1 - Dry Detention Pond

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 31.70 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	31.70	00	0	0
1.30	33.00	338	220	220
1.80	33.50	3,378	929	1,149
2.30	34.00	6,755	2,533	3,682
2.80	34.50	9,093	3,962	7,644
3.30	35.00	11,386	5,120	12,764
3.80	35.50	12,276	5,915	18,679
4.30	36.00	13,208	6,371	25,050

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	10.00	0.00	0.00
Span (in)	= 24.00	10.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 31.70	31.70	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	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

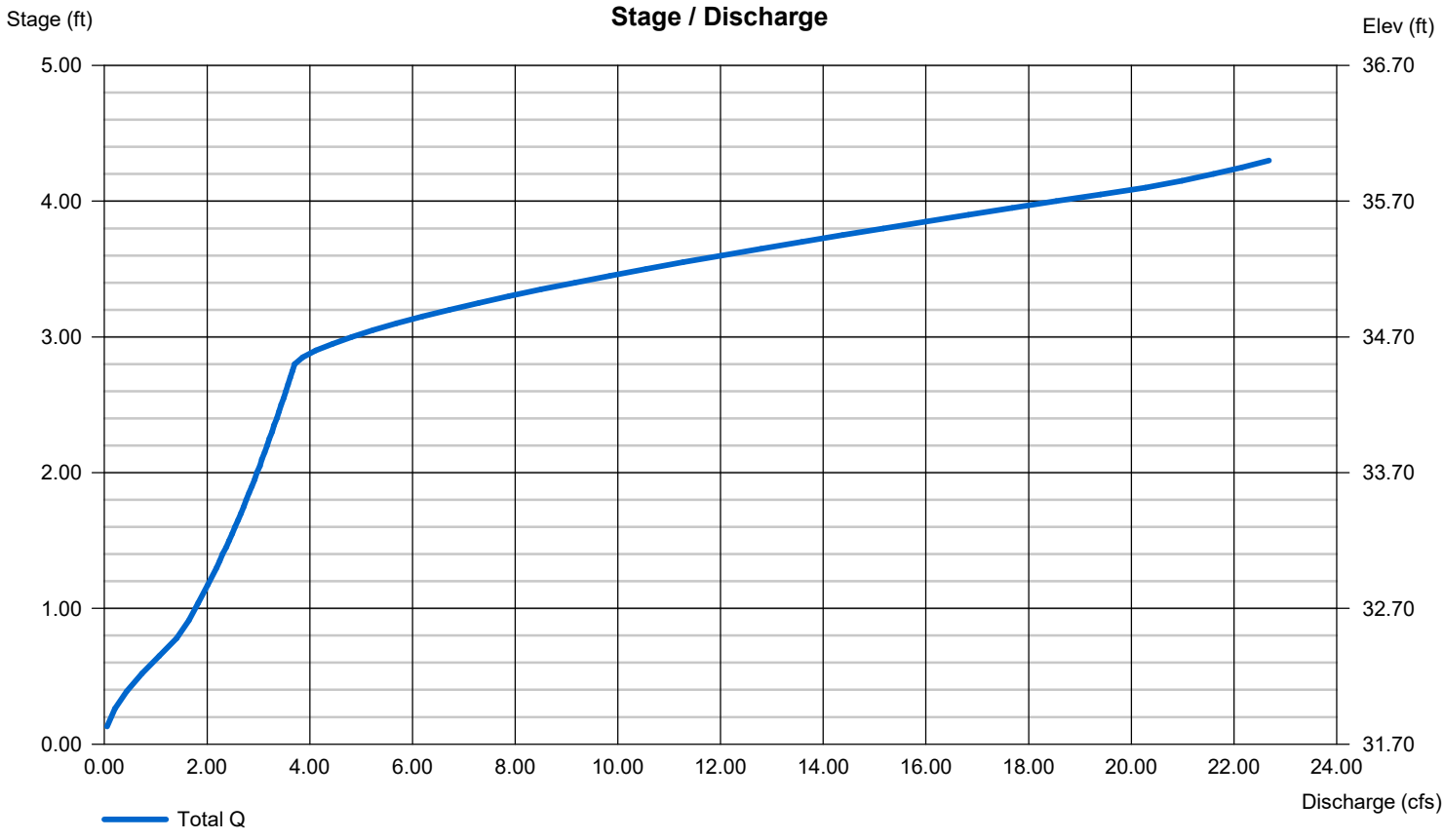
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.50	0.00	0.00	0.00
Crest El. (ft)	= 34.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	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).



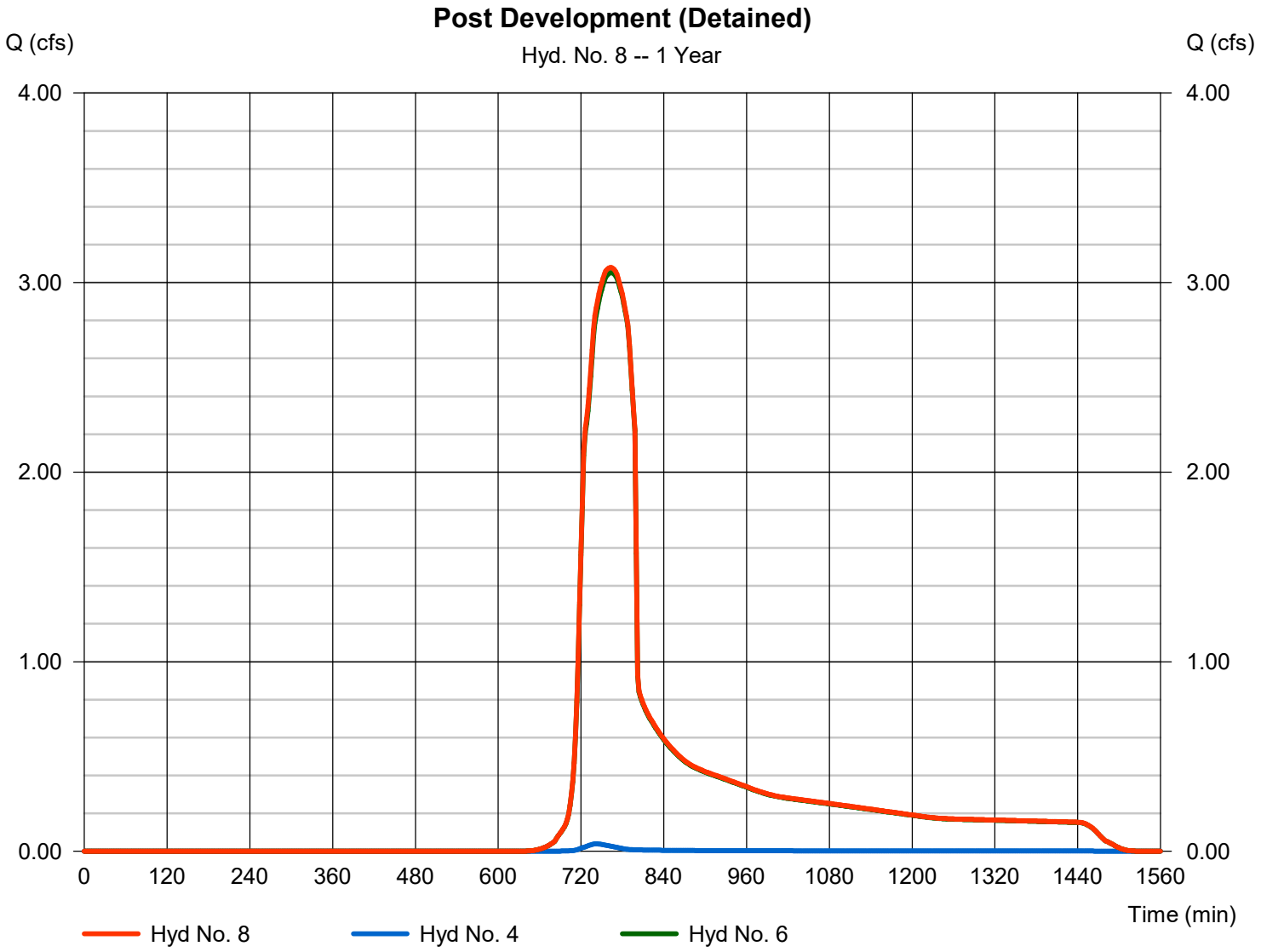
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 8

Post Development (Detained)

Hydrograph type	= Combine	Peak discharge	= 3.080 cfs
Storm frequency	= 1 yrs	Time to peak	= 762 min
Time interval	= 2 min	Hyd. volume	= 25,327 cuft
Inflow hyds.	= 4, 6	Contrib. drain. area	= 0.060 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.193	2	744	20,487	------	------	------	Pre-Developed Total
3	SCS Runoff	6.548	2	742	35,995	------	------	------	Post Development (To Pond)
4	SCS Runoff	0.058	2	742	317	------	------	------	Post Development (Bypass)
6	Reservoir	3.560	2	770	35,994	3	34.33	6,321	Pond Route
8	Combine	3.592	2	768	36,311	4, 6,	------	------	Post Development (Detained)

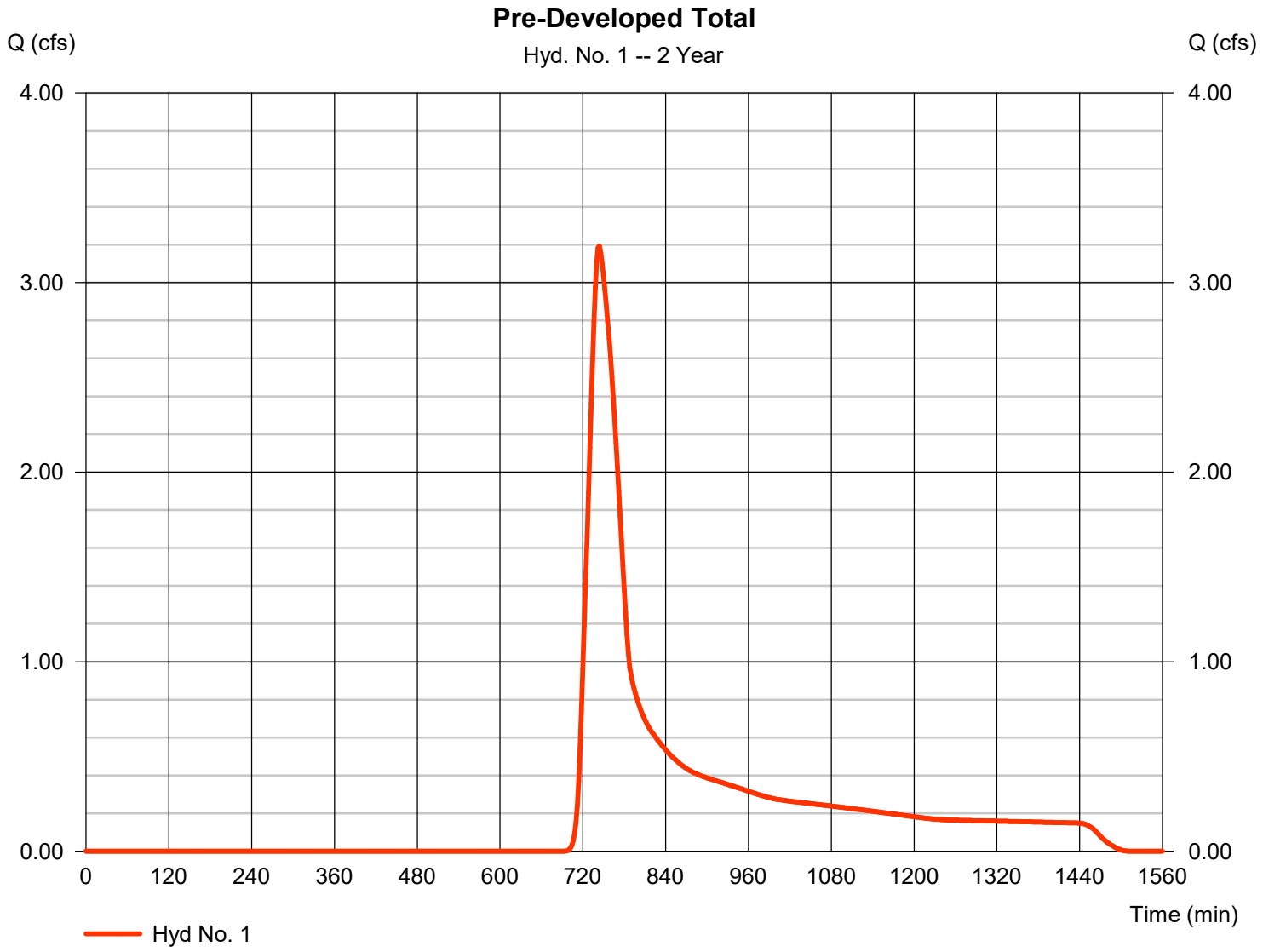
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 1

Pre-Developed Total

Hydrograph type	= SCS Runoff	Peak discharge	= 3.193 cfs
Storm frequency	= 2 yrs	Time to peak	= 744 min
Time interval	= 2 min	Hyd. volume	= 20,487 cuft
Drainage area	= 6.880 ac	Curve number	= 67
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 45.00 min
Total precip.	= 3.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



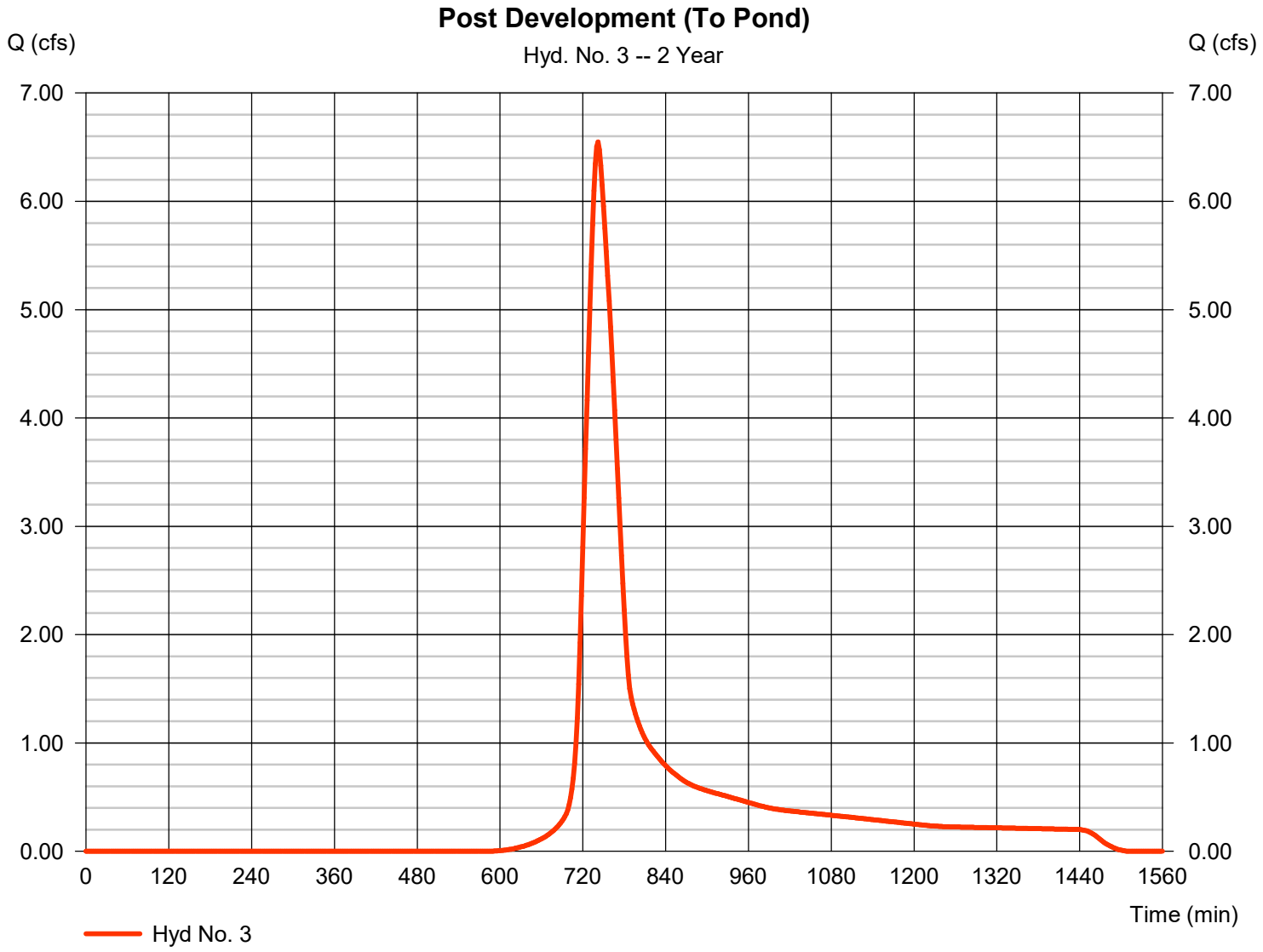
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 3

Post Development (To Pond)

Hydrograph type	= SCS Runoff	Peak discharge	= 6.548 cfs
Storm frequency	= 2 yrs	Time to peak	= 742 min
Time interval	= 2 min	Hyd. volume	= 35,995 cuft
Drainage area	= 6.820 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 45.00 min
Total precip.	= 3.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



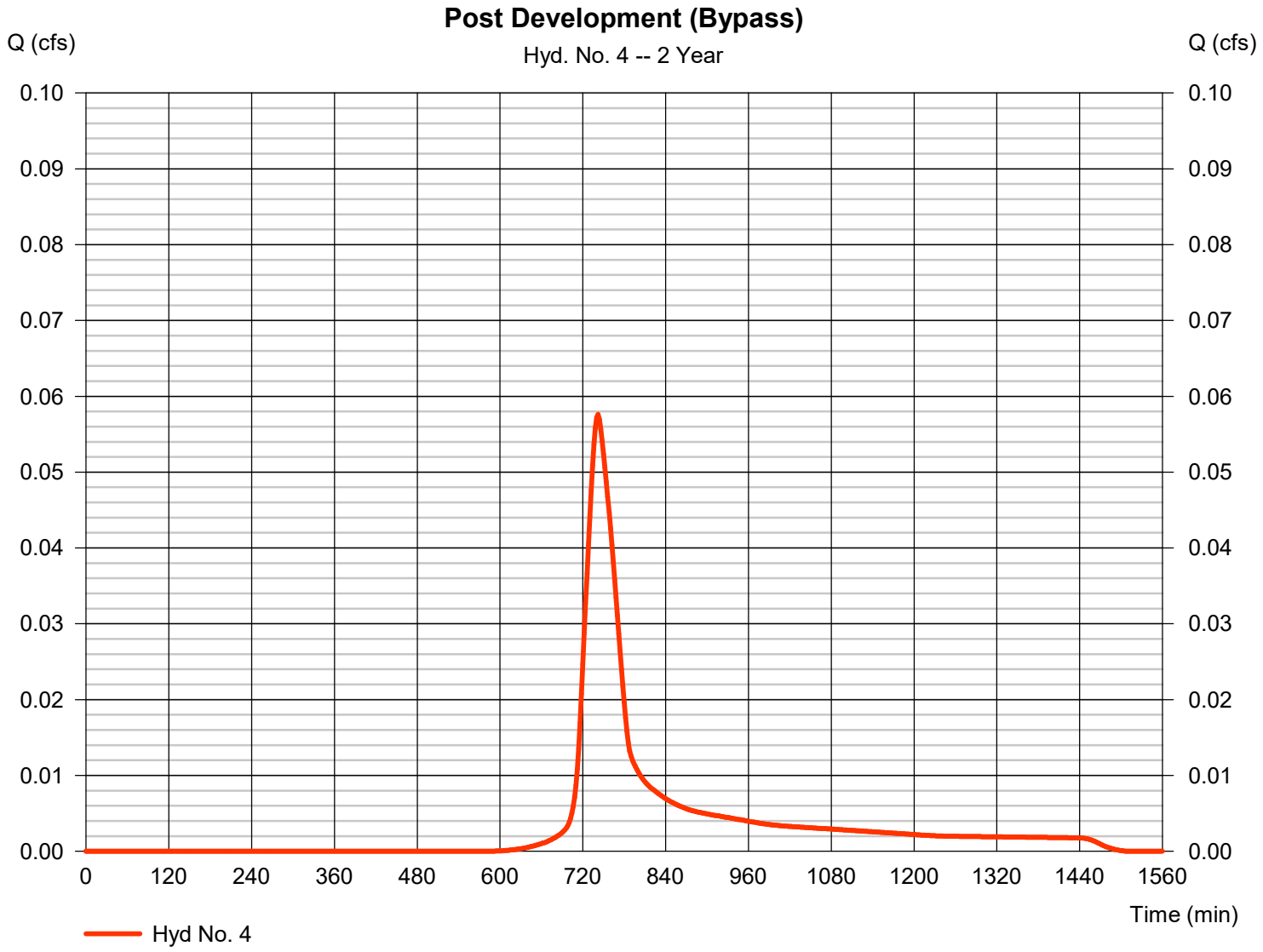
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 4

Post Development (Bypass)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.058 cfs
Storm frequency	=	2 yrs	Time to peak	=	742 min
Time interval	=	2 min	Hyd. volume	=	317 cuft
Drainage area	=	0.060 ac	Curve number	=	78
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	45.00 min
Total precip.	=	3.46 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

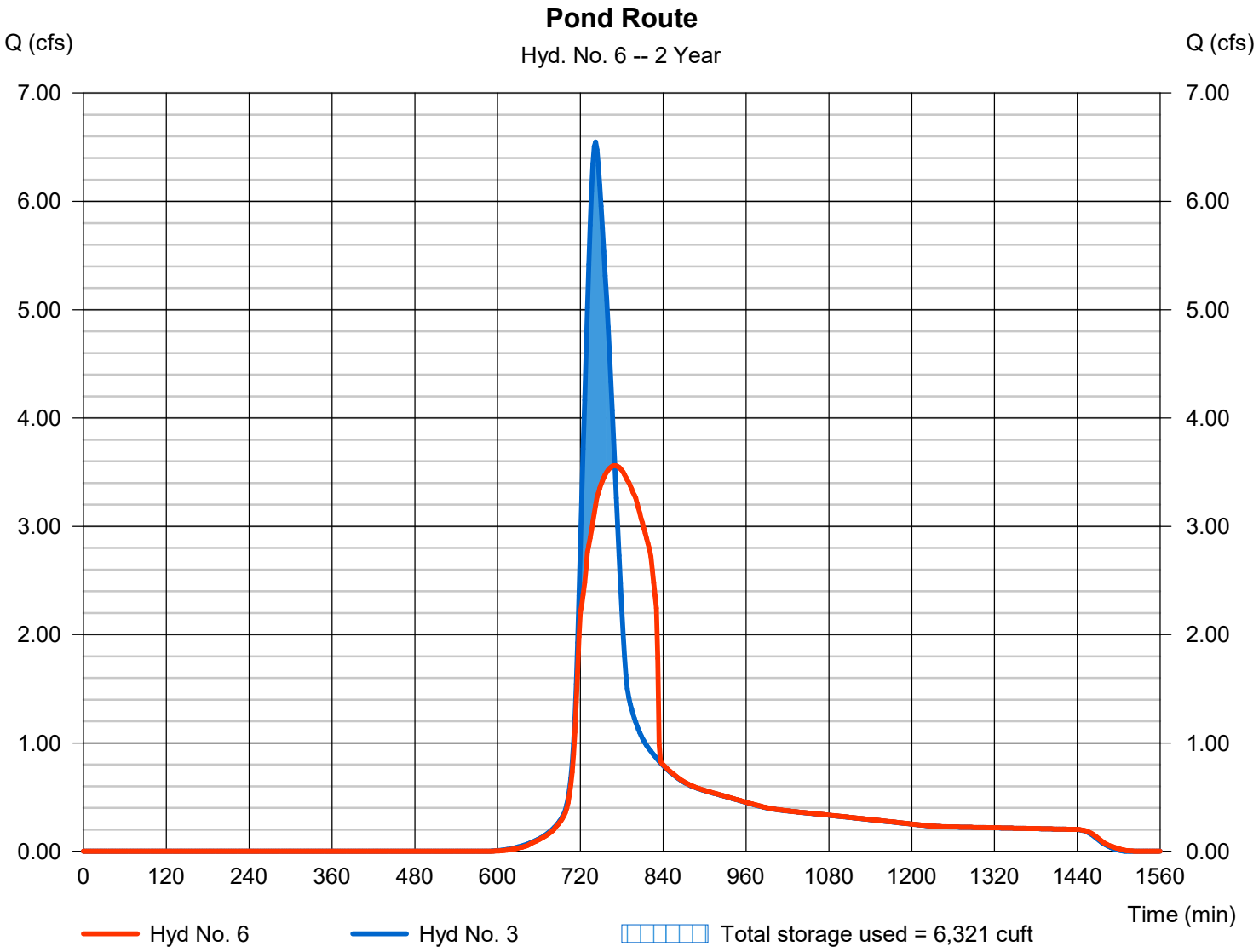
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 6

Pond Route

Hydrograph type	=	Reservoir	Peak discharge	=	3.560 cfs
Storm frequency	=	2 yrs	Time to peak	=	770 min
Time interval	=	2 min	Hyd. volume	=	35,994 cuft
Inflow hyd. No.	=	3 - Post Development (To Pond)	Max. Elevation	=	34.33 ft
Reservoir name	=	Dry Detention Pond	Max. Storage	=	6,321 cuft

Storage Indication method used.



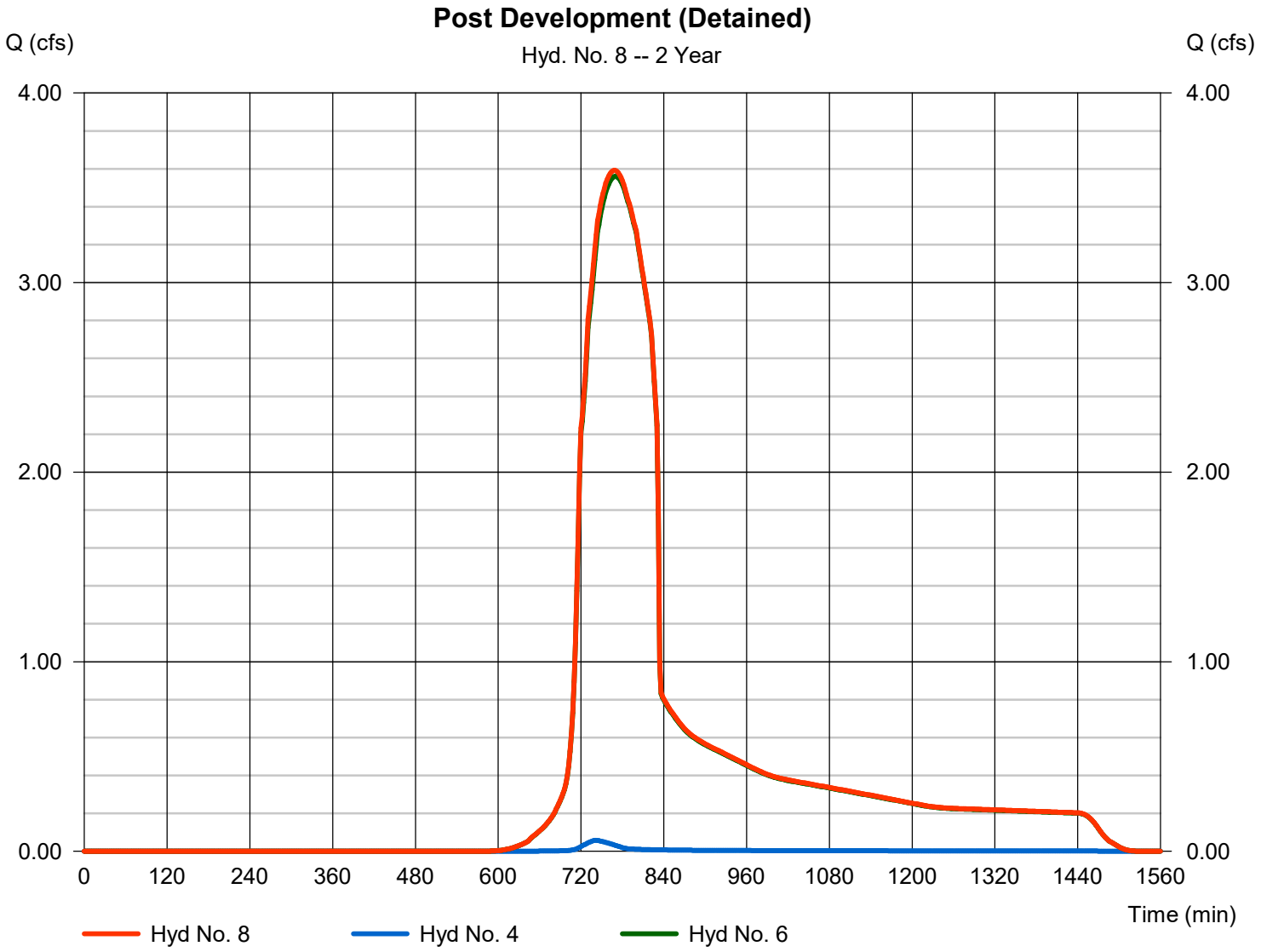
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 8

Post Development (Detained)

Hydrograph type	= Combine	Peak discharge	= 3.592 cfs
Storm frequency	= 2 yrs	Time to peak	= 768 min
Time interval	= 2 min	Hyd. volume	= 36,311 cuft
Inflow hyds.	= 4, 6	Contrib. drain. area	= 0.060 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	5.879	2	742	34,286	------	------	------	Pre-Developed Total
3	SCS Runoff	9.972	2	742	53,834	------	------	------	Post Development (To Pond)
4	SCS Runoff	0.088	2	742	474	------	------	------	Post Development (Bypass)
6	Reservoir	6.255	2	764	53,833	3	34.86	11,288	Pond Route
8	Combine	6.311	2	764	54,307	4, 6,	------	------	Post Development (Detained)

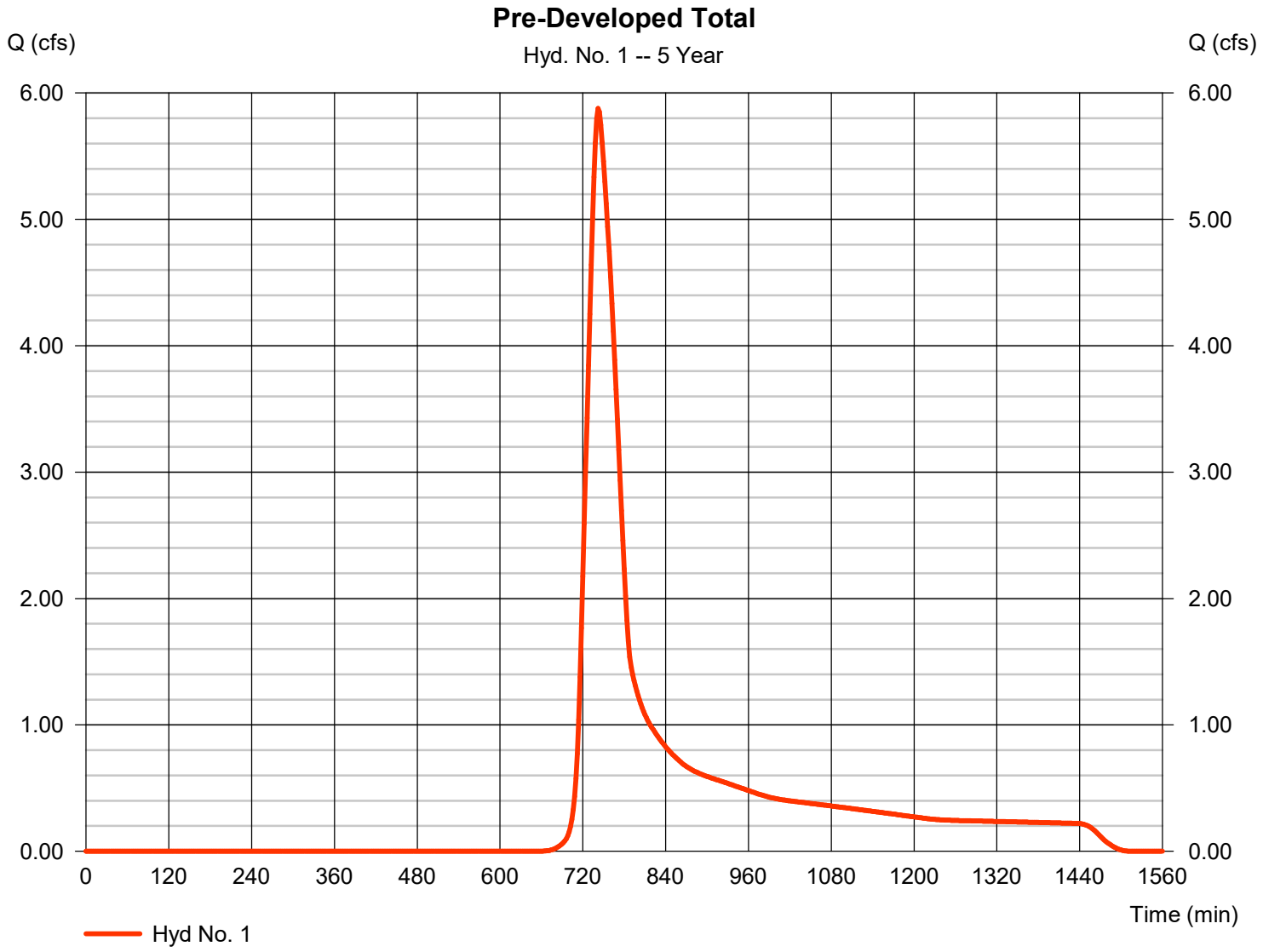
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 1

Pre-Developed Total

Hydrograph type	= SCS Runoff	Peak discharge	= 5.879 cfs
Storm frequency	= 5 yrs	Time to peak	= 742 min
Time interval	= 2 min	Hyd. volume	= 34,286 cuft
Drainage area	= 6.880 ac	Curve number	= 67
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 45.00 min
Total precip.	= 4.38 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



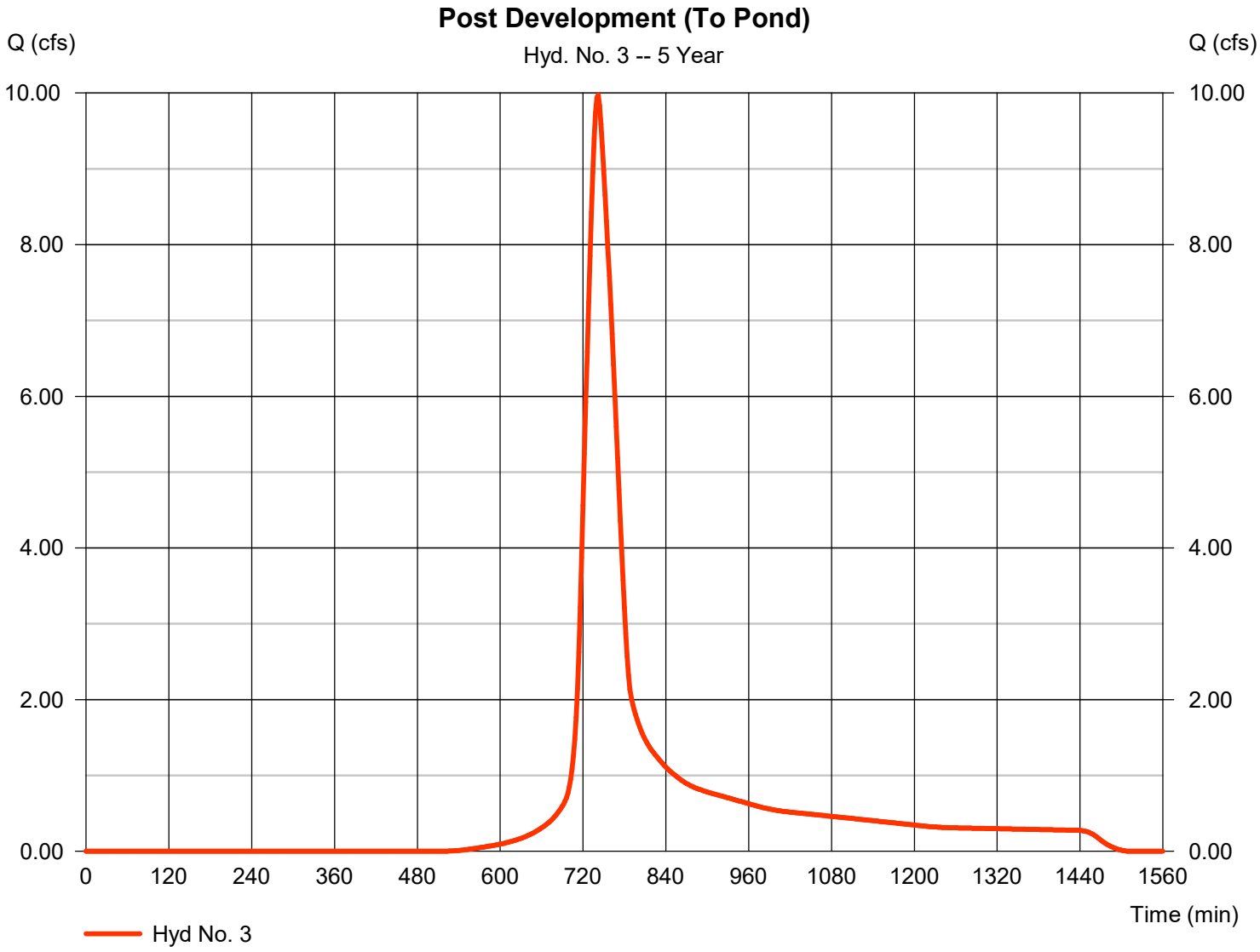
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 3

Post Development (To Pond)

Hydrograph type	= SCS Runoff	Peak discharge	= 9.972 cfs
Storm frequency	= 5 yrs	Time to peak	= 742 min
Time interval	= 2 min	Hyd. volume	= 53,834 cuft
Drainage area	= 6.820 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 45.00 min
Total precip.	= 4.38 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



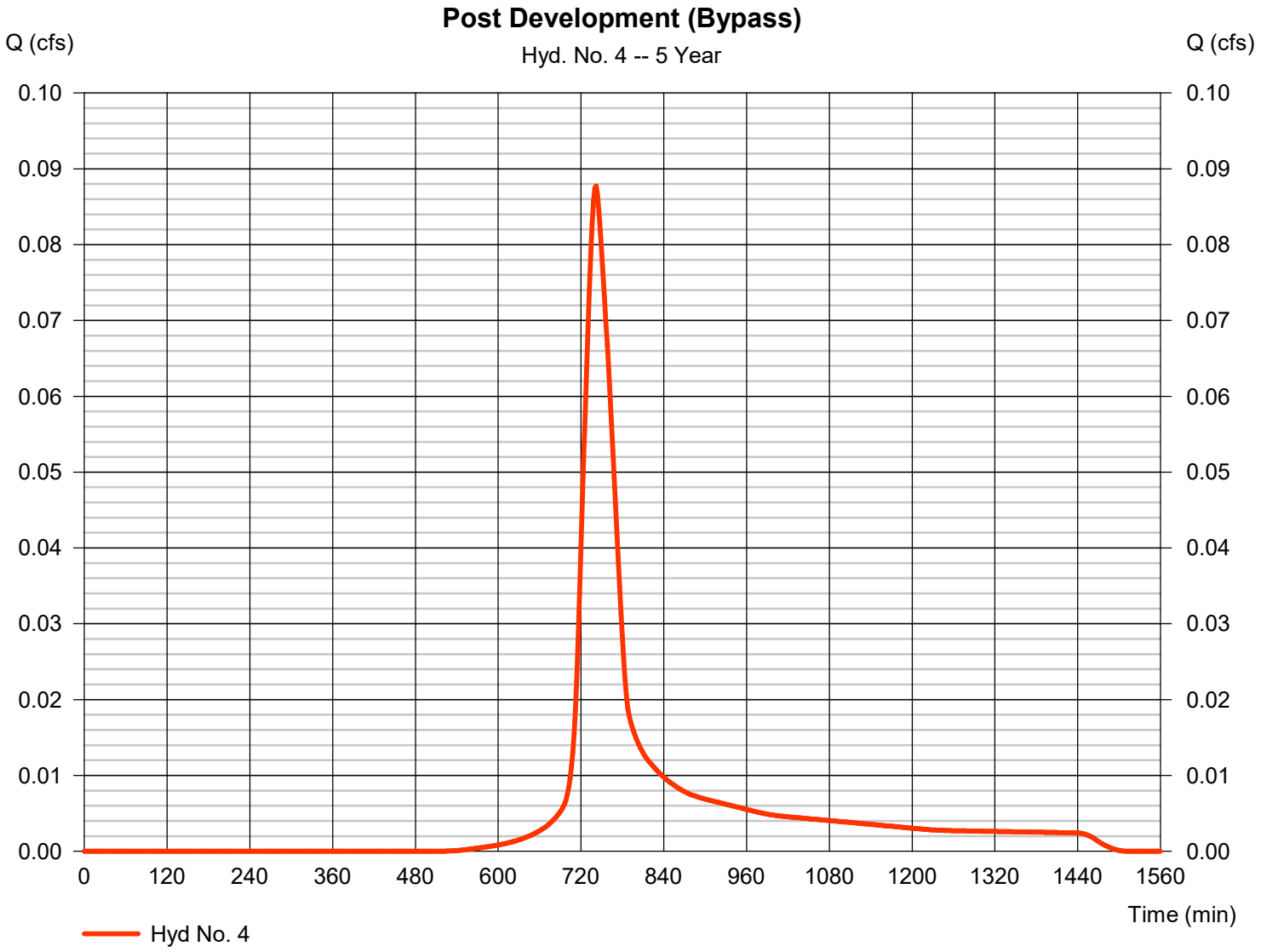
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 4

Post Development (Bypass)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.088 cfs
Storm frequency	=	5 yrs	Time to peak	=	742 min
Time interval	=	2 min	Hyd. volume	=	474 cuft
Drainage area	=	0.060 ac	Curve number	=	78
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	45.00 min
Total precip.	=	4.38 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



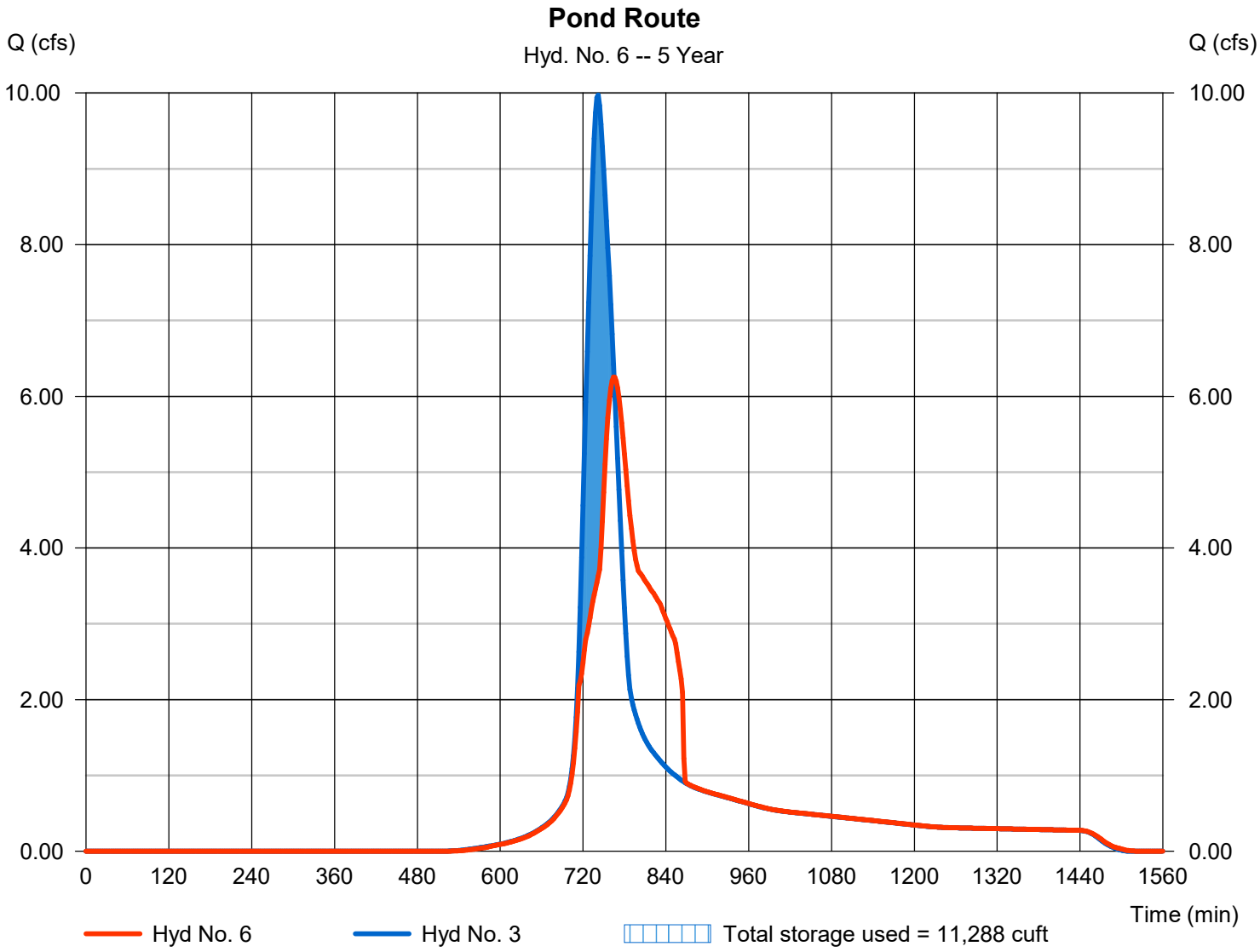
Hydrograph Report

Hyd. No. 6

Pond Route

Hydrograph type	=	Reservoir	Peak discharge	=	6.255 cfs
Storm frequency	=	5 yrs	Time to peak	=	764 min
Time interval	=	2 min	Hyd. volume	=	53,833 cuft
Inflow hyd. No.	=	3 - Post Development (To Pond)	Max. Elevation	=	34.86 ft
Reservoir name	=	Dry Detention Pond	Max. Storage	=	11,288 cuft

Storage Indication method used.



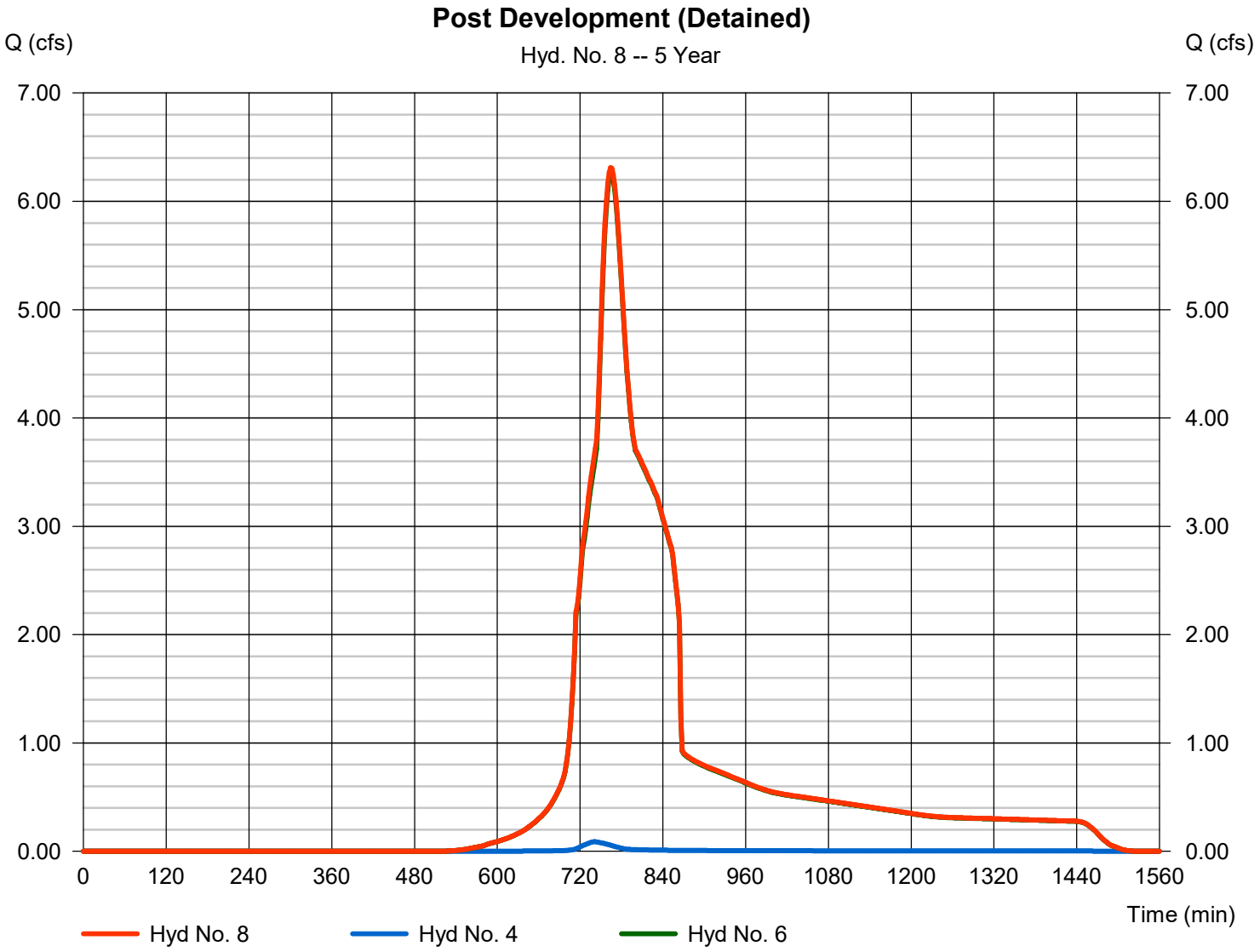
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 8

Post Development (Detained)

Hydrograph type	= Combine	Peak discharge	= 6.311 cfs
Storm frequency	= 5 yrs	Time to peak	= 764 min
Time interval	= 2 min	Hyd. volume	= 54,307 cuft
Inflow hyds.	= 4, 6	Contrib. drain. area	= 0.060 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	8.367	2	742	47,057	------	------	------	Pre-Developed Total
3	SCS Runoff	12.94	2	742	69,459	------	------	------	Post Development (To Pond)
4	SCS Runoff	0.114	2	742	611	------	------	------	Post Development (Bypass)
6	Reservoir	9.139	2	760	69,458	3	35.10	13,928	Pond Route
8	Combine	9.220	2	760	70,070	4, 6,	------	------	Post Development (Detained)

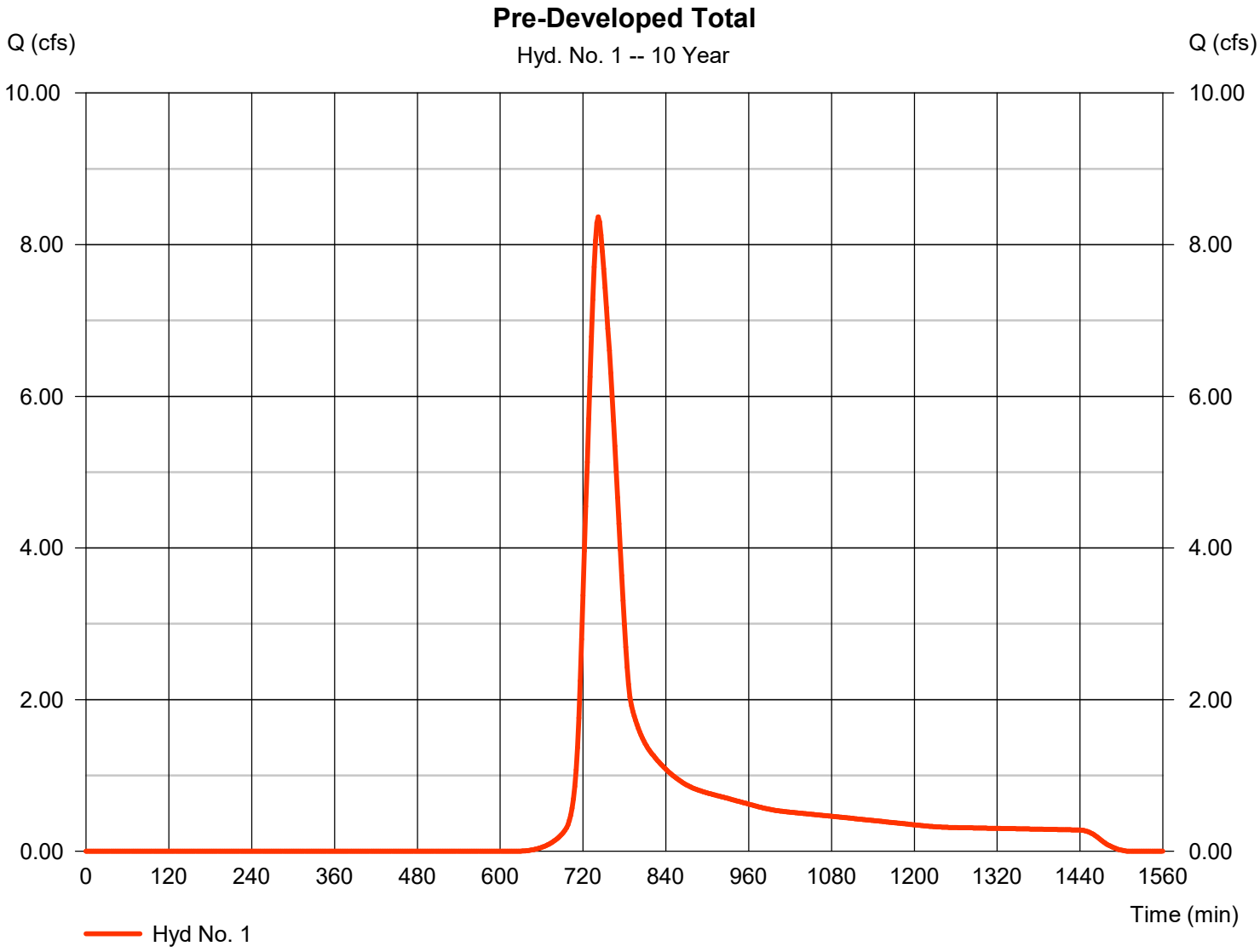
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 1

Pre-Developed Total

Hydrograph type	= SCS Runoff	Peak discharge	= 8.367 cfs
Storm frequency	= 10 yrs	Time to peak	= 742 min
Time interval	= 2 min	Hyd. volume	= 47,057 cuft
Drainage area	= 6.880 ac	Curve number	= 67
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 45.00 min
Total precip.	= 5.14 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



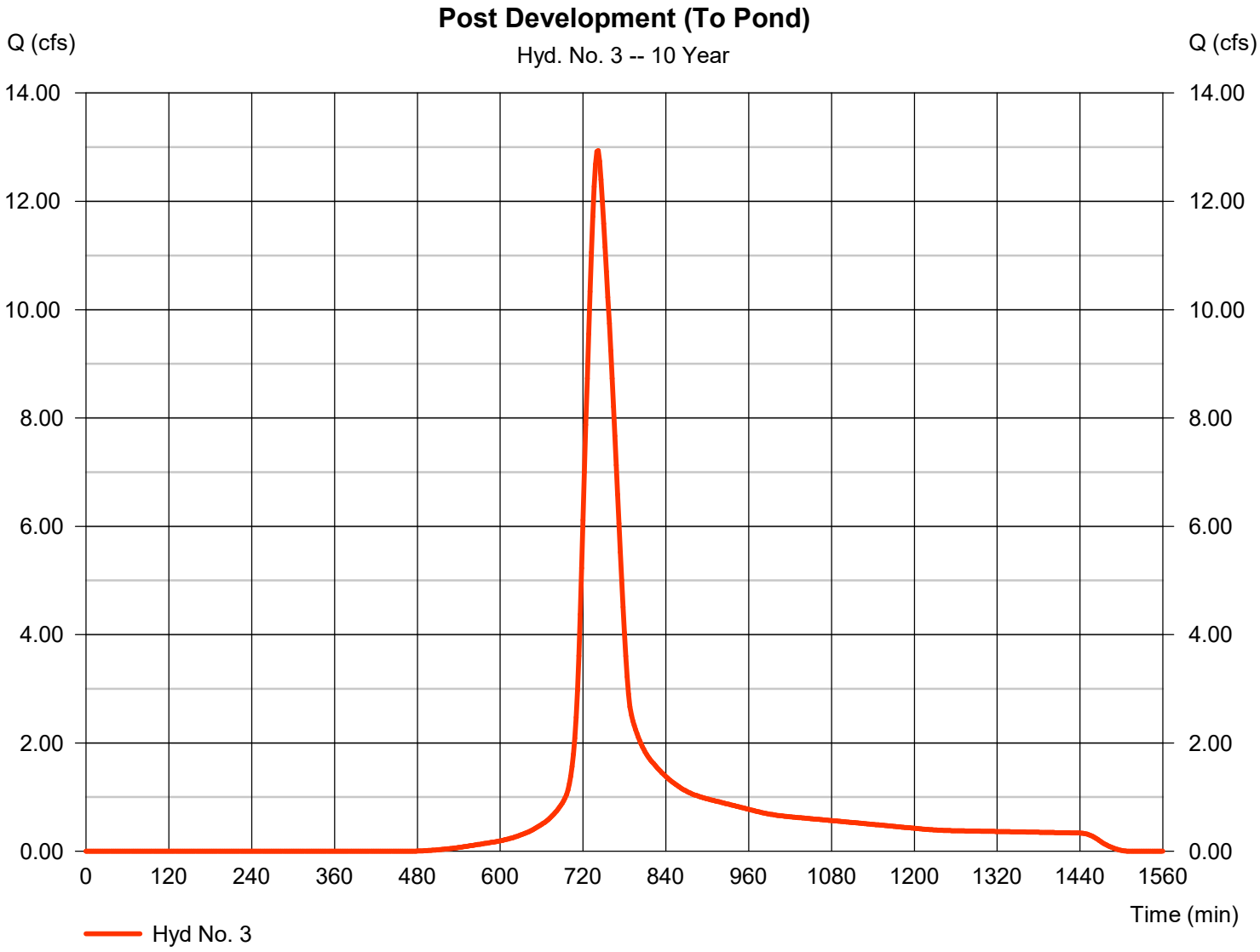
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 3

Post Development (To Pond)

Hydrograph type	= SCS Runoff	Peak discharge	= 12.94 cfs
Storm frequency	= 10 yrs	Time to peak	= 742 min
Time interval	= 2 min	Hyd. volume	= 69,459 cuft
Drainage area	= 6.820 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 45.00 min
Total precip.	= 5.14 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



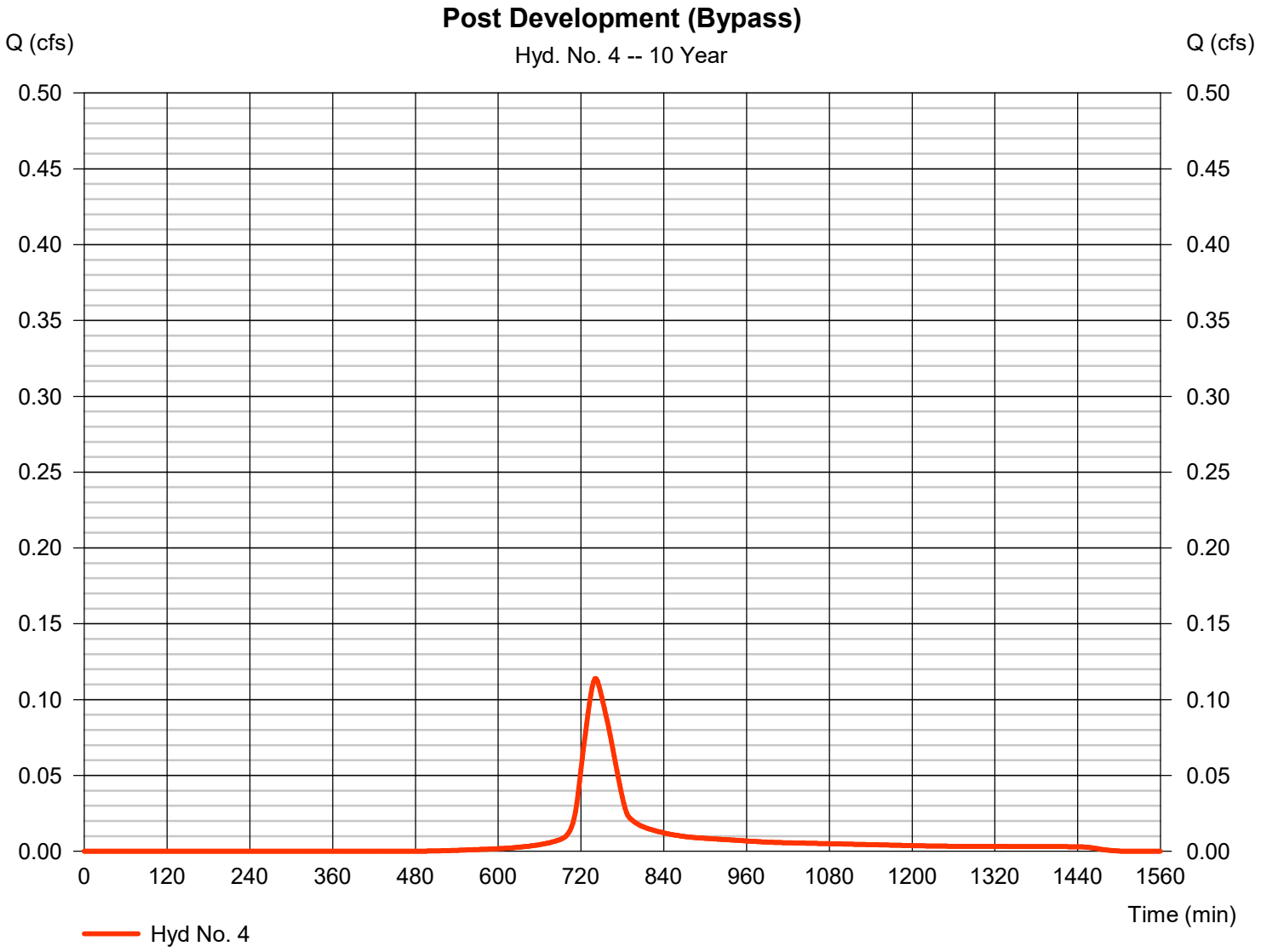
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 4

Post Development (Bypass)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.114 cfs
Storm frequency	=	10 yrs	Time to peak	=	742 min
Time interval	=	2 min	Hyd. volume	=	611 cuft
Drainage area	=	0.060 ac	Curve number	=	78
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	45.00 min
Total precip.	=	5.14 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

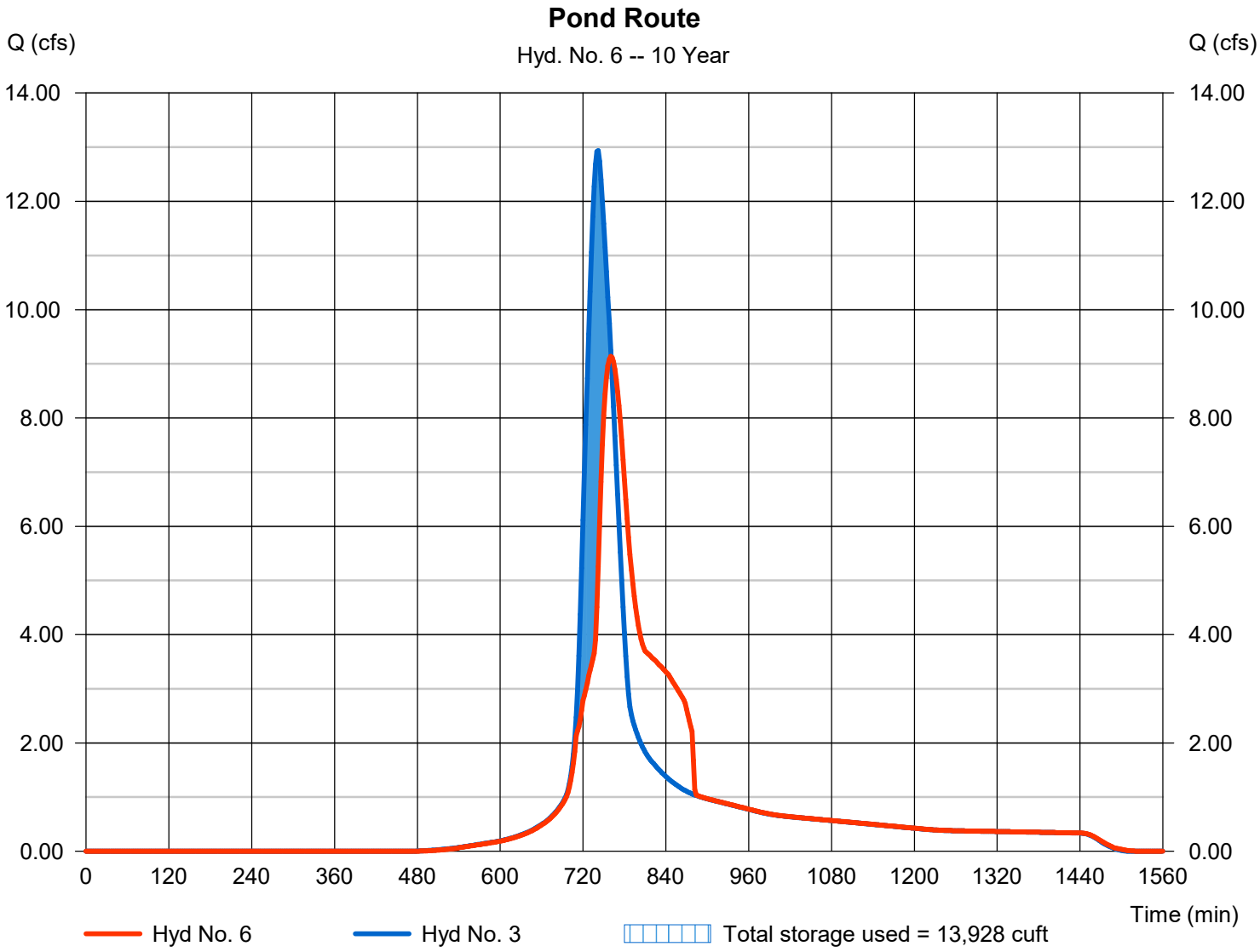
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 6

Pond Route

Hydrograph type	=	Reservoir	Peak discharge	=	9.139 cfs
Storm frequency	=	10 yrs	Time to peak	=	760 min
Time interval	=	2 min	Hyd. volume	=	69,458 cuft
Inflow hyd. No.	=	3 - Post Development (To Pond)	Max. Elevation	=	35.10 ft
Reservoir name	=	Dry Detention Pond	Max. Storage	=	13,928 cuft

Storage Indication method used.



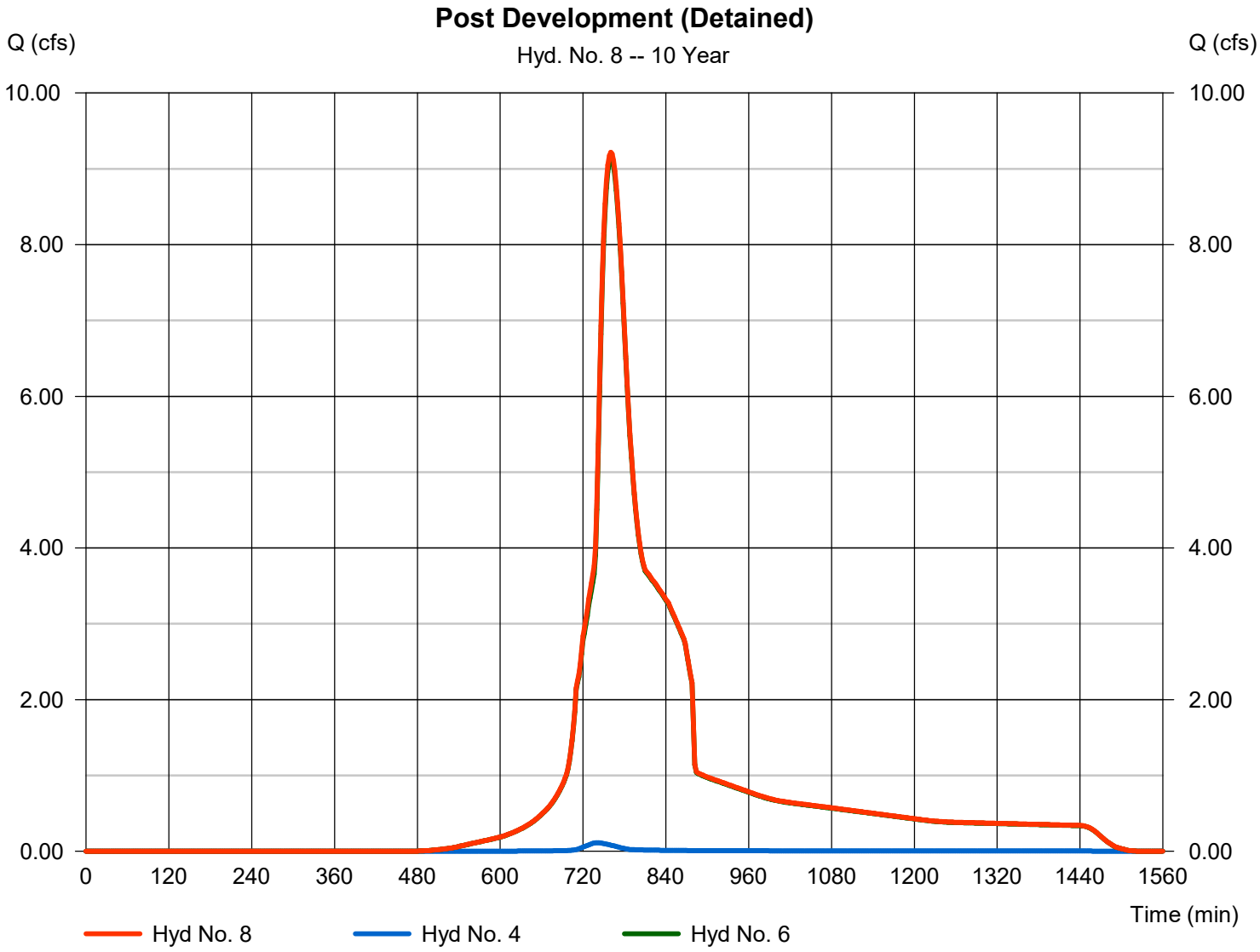
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 8

Post Development (Detained)

Hydrograph type	= Combine	Peak discharge	= 9.220 cfs
Storm frequency	= 10 yrs	Time to peak	= 760 min
Time interval	= 2 min	Hyd. volume	= 70,070 cuft
Inflow hyds.	= 4, 6	Contrib. drain. area	= 0.060 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	12.11	2	742	66,381	------	------	------	Pre-Developed Total
3	SCS Runoff	17.20	2	740	92,159	------	------	------	Post Development (To Pond)
4	SCS Runoff	0.151	2	740	811	------	------	------	Post Development (Bypass)
6	Reservoir	13.21	2	756	92,158	3	35.38	17,220	Pond Route
8	Combine	13.33	2	756	92,969	4, 6,	------	------	Post Development (Detained)

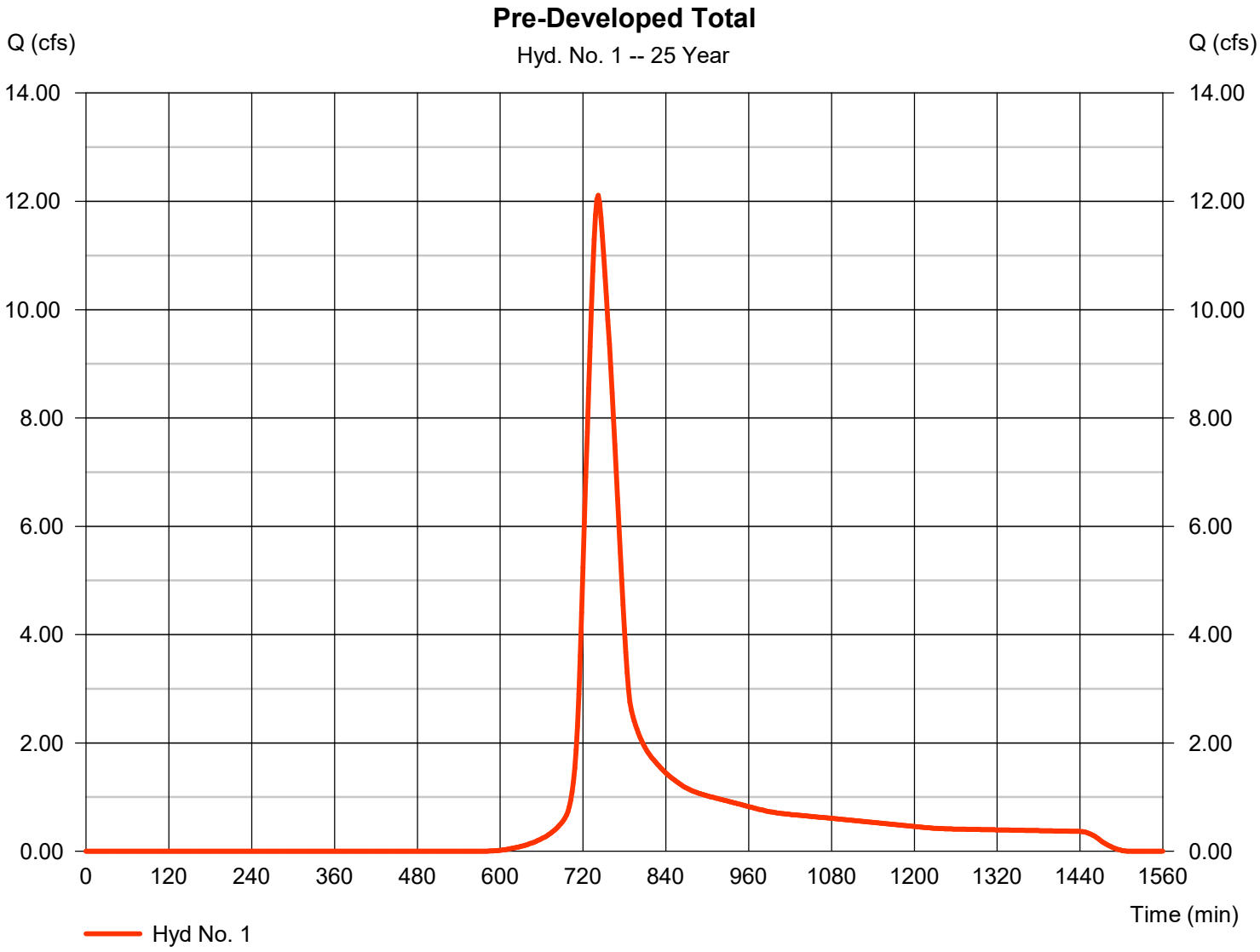
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 1

Pre-Developed Total

Hydrograph type	= SCS Runoff	Peak discharge	= 12.11 cfs
Storm frequency	= 25 yrs	Time to peak	= 742 min
Time interval	= 2 min	Hyd. volume	= 66,381 cuft
Drainage area	= 6.880 ac	Curve number	= 67
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 45.00 min
Total precip.	= 6.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



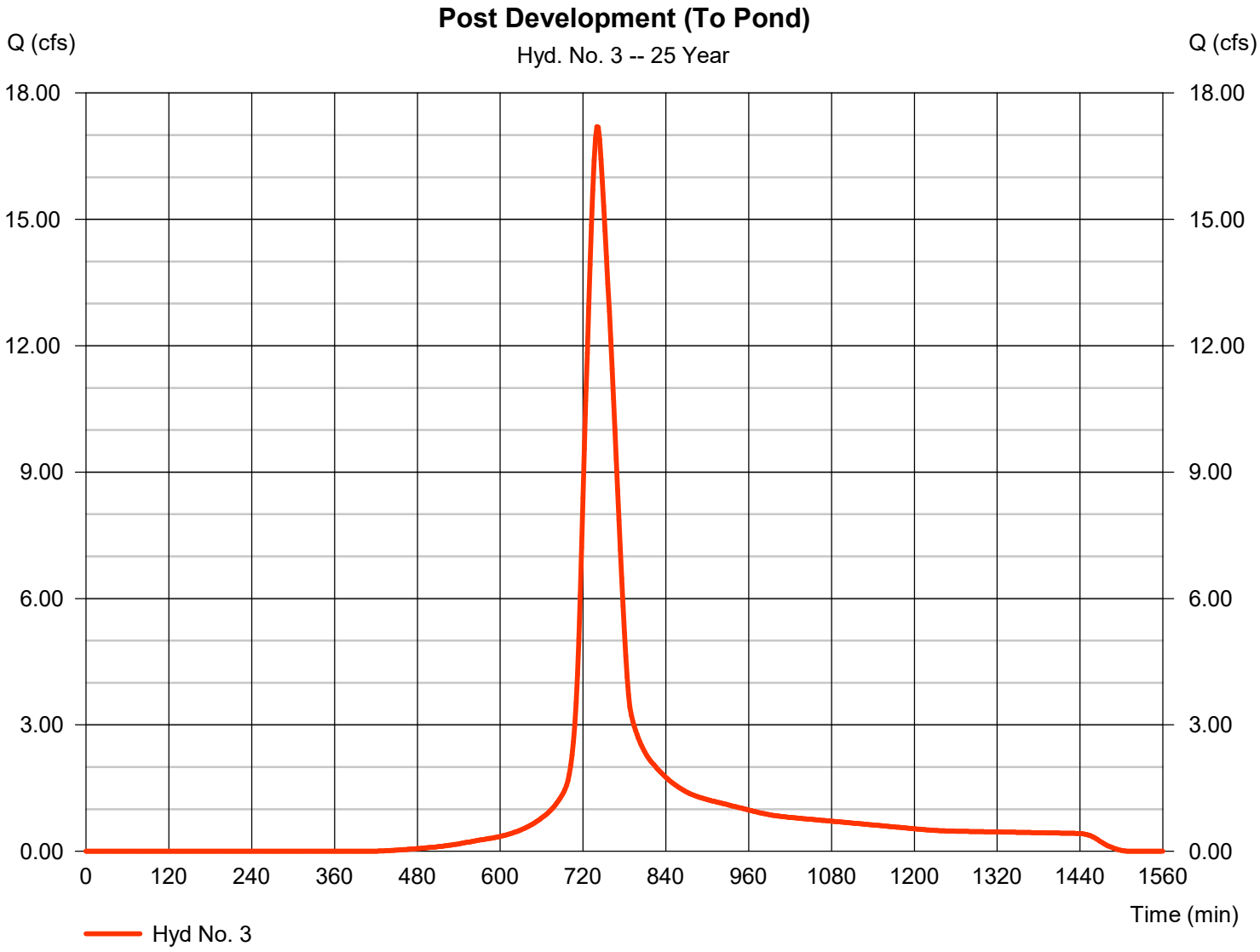
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 3

Post Development (To Pond)

Hydrograph type	= SCS Runoff	Peak discharge	= 17.20 cfs
Storm frequency	= 25 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 92,159 cuft
Drainage area	= 6.820 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 45.00 min
Total precip.	= 6.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



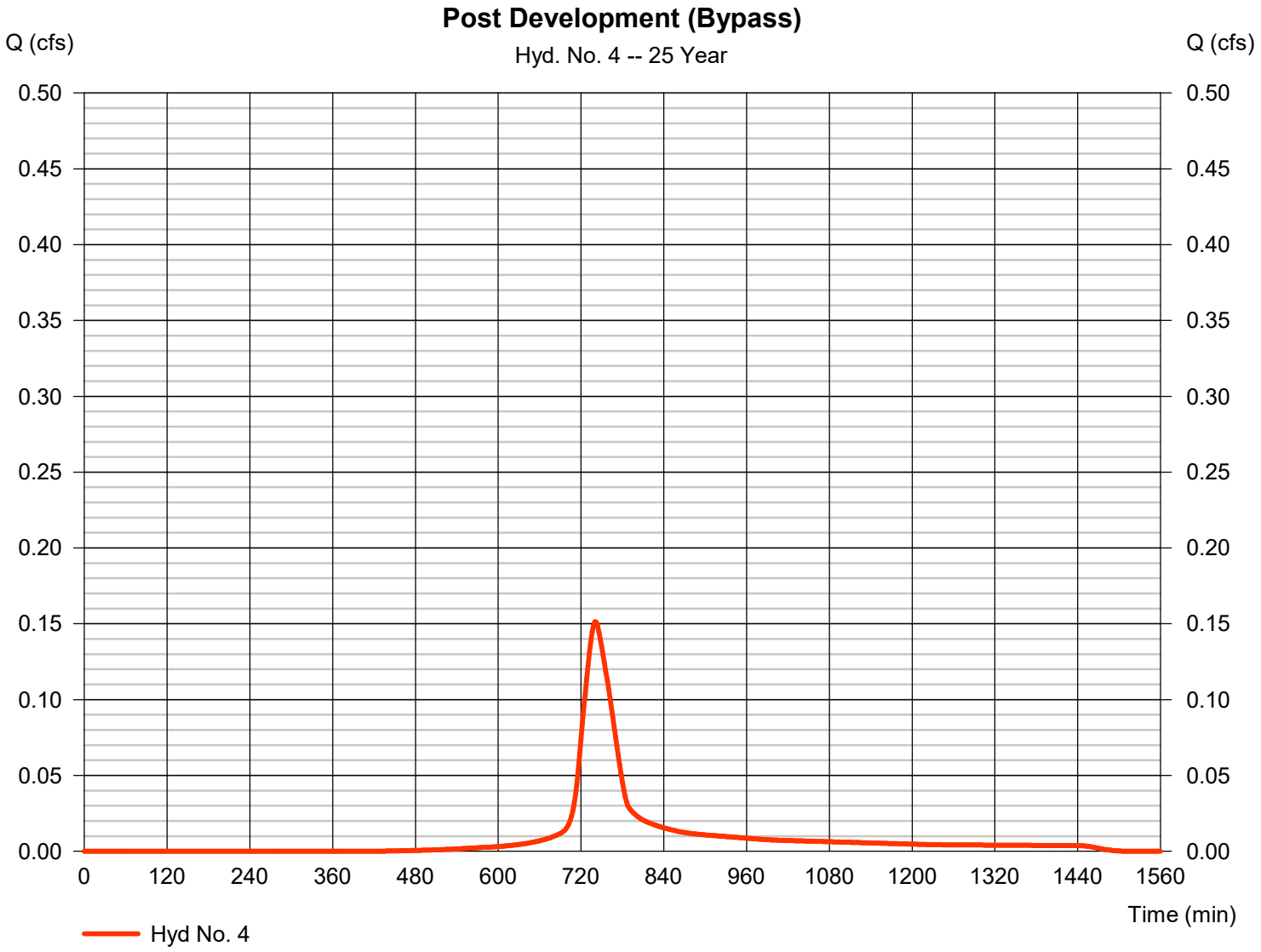
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 4

Post Development (Bypass)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.151 cfs
Storm frequency	= 25 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 811 cuft
Drainage area	= 0.060 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 45.00 min
Total precip.	= 6.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

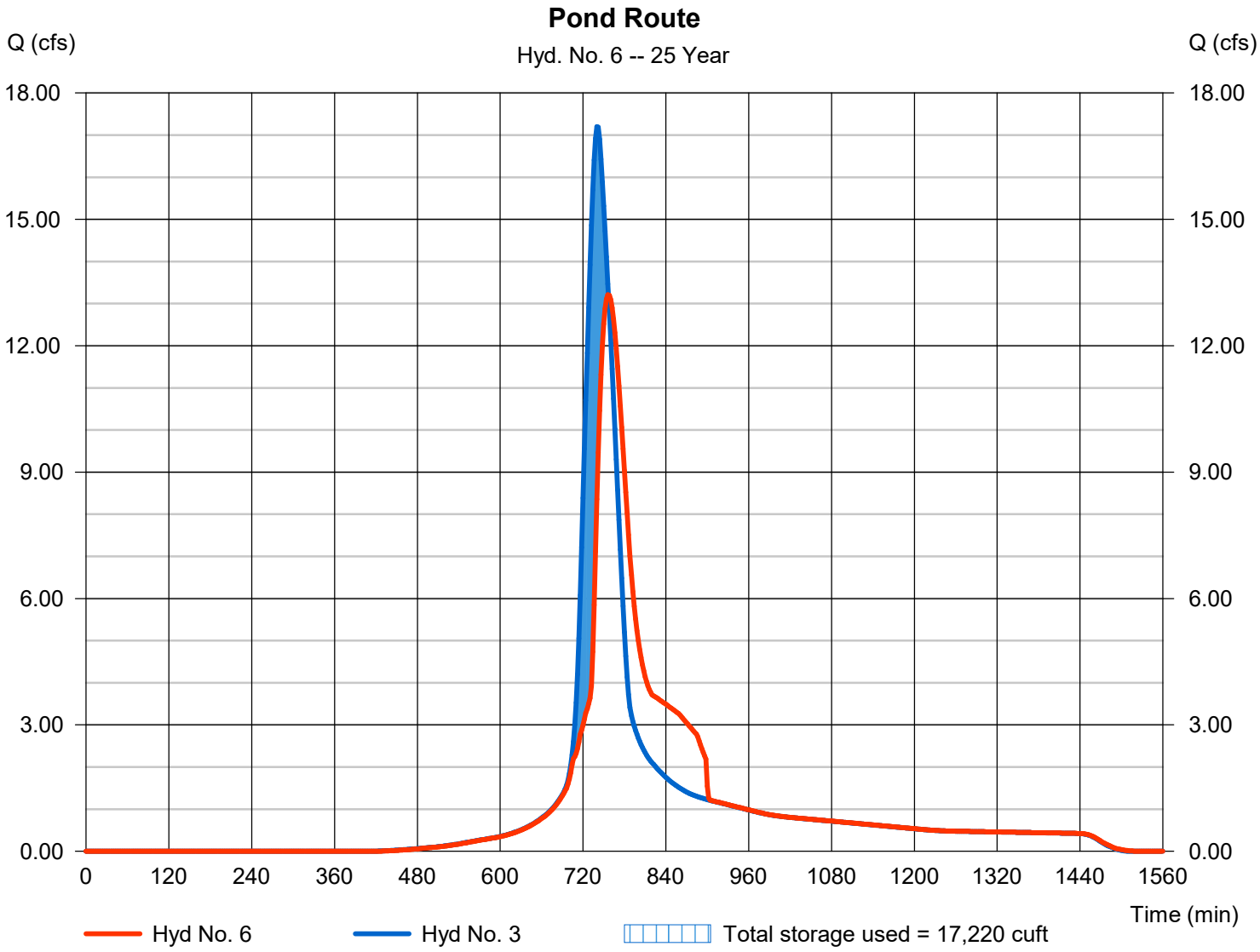
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 6

Pond Route

Hydrograph type	=	Reservoir	Peak discharge	=	13.21 cfs
Storm frequency	=	25 yrs	Time to peak	=	756 min
Time interval	=	2 min	Hyd. volume	=	92,158 cuft
Inflow hyd. No.	=	3 - Post Development (To Pond)	Max. Elevation	=	35.38 ft
Reservoir name	=	Dry Detention Pond	Max. Storage	=	17,220 cuft

Storage Indication method used.



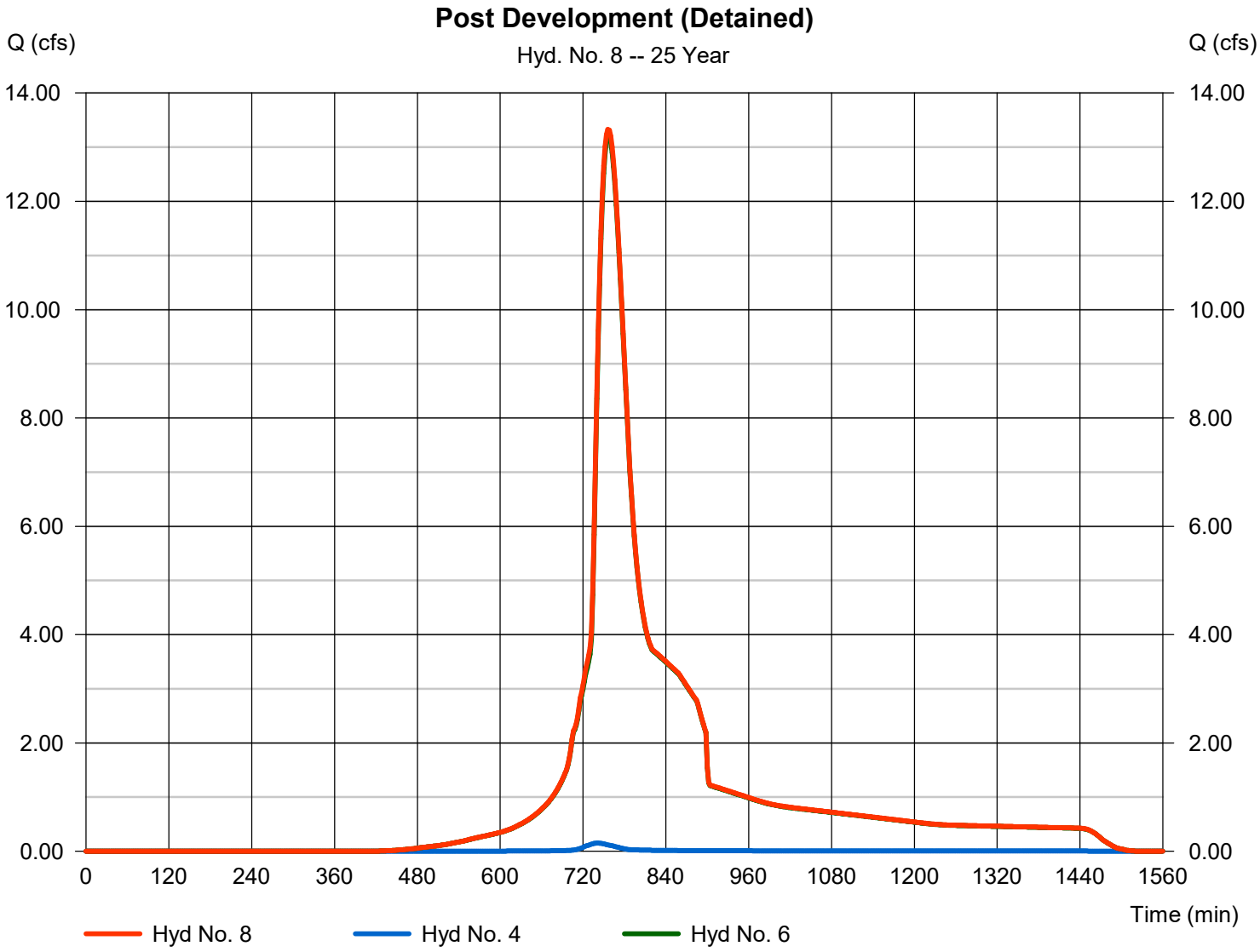
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 8

Post Development (Detained)

Hydrograph type	= Combine	Peak discharge	= 13.33 cfs
Storm frequency	= 25 yrs	Time to peak	= 756 min
Time interval	= 2 min	Hyd. volume	= 92,969 cuft
Inflow hyds.	= 4, 6	Contrib. drain. area	= 0.060 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	18.93	2	742	102,007	------	------	------	Pre-Developed Total
3	SCS Runoff	24.64	2	740	132,272	------	------	------	Post Development (To Pond)
4	SCS Runoff	0.217	2	740	1,164	------	------	------	Post Development (Bypass)
6	Reservoir	20.11	2	754	132,271	3	35.79	22,381	Pond Route
8	Combine	20.28	2	754	133,435	4, 6,	------	------	Post Development (Detained)

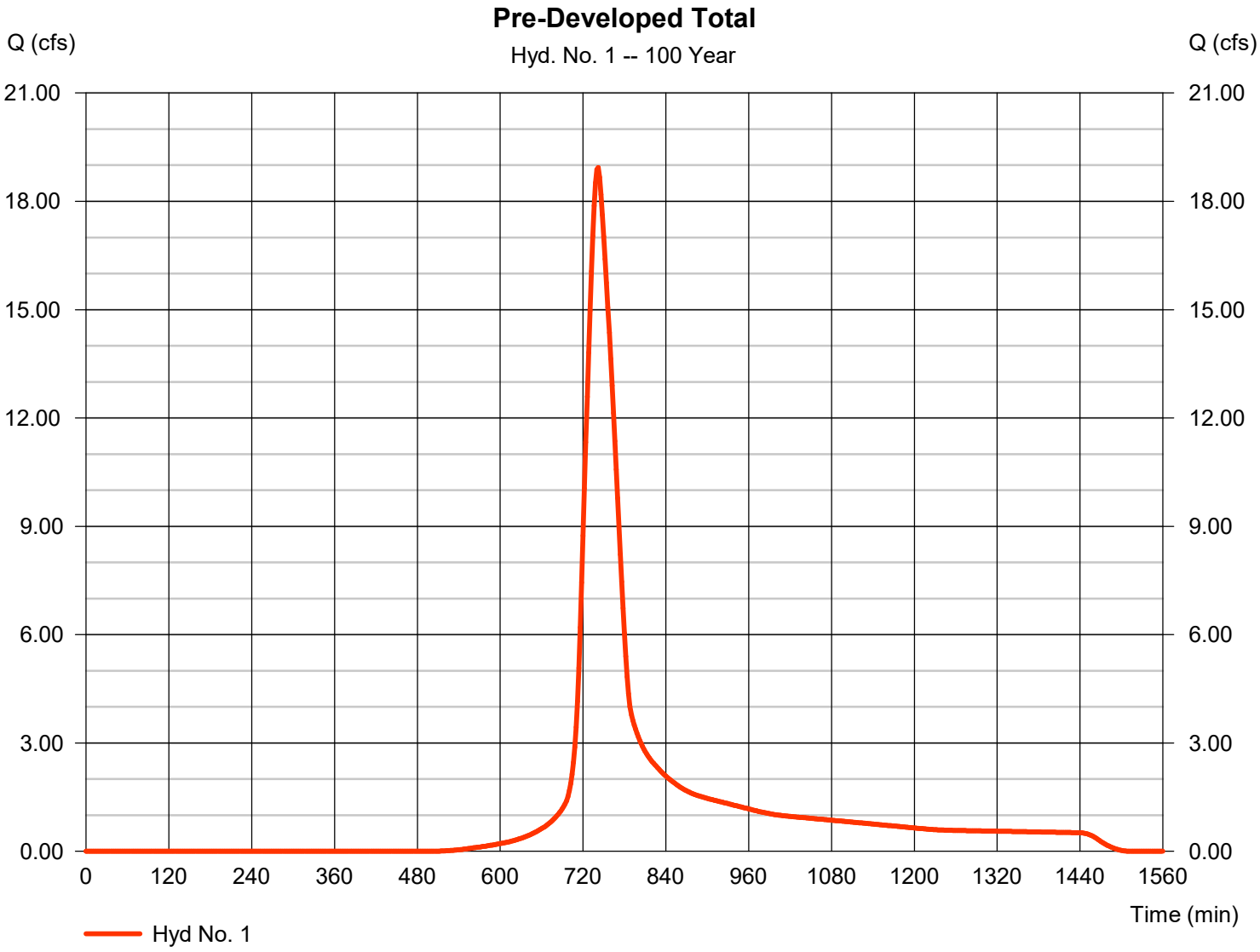
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 1

Pre-Developed Total

Hydrograph type	= SCS Runoff	Peak discharge	= 18.93 cfs
Storm frequency	= 100 yrs	Time to peak	= 742 min
Time interval	= 2 min	Hyd. volume	= 102,007 cuft
Drainage area	= 6.880 ac	Curve number	= 67
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 45.00 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



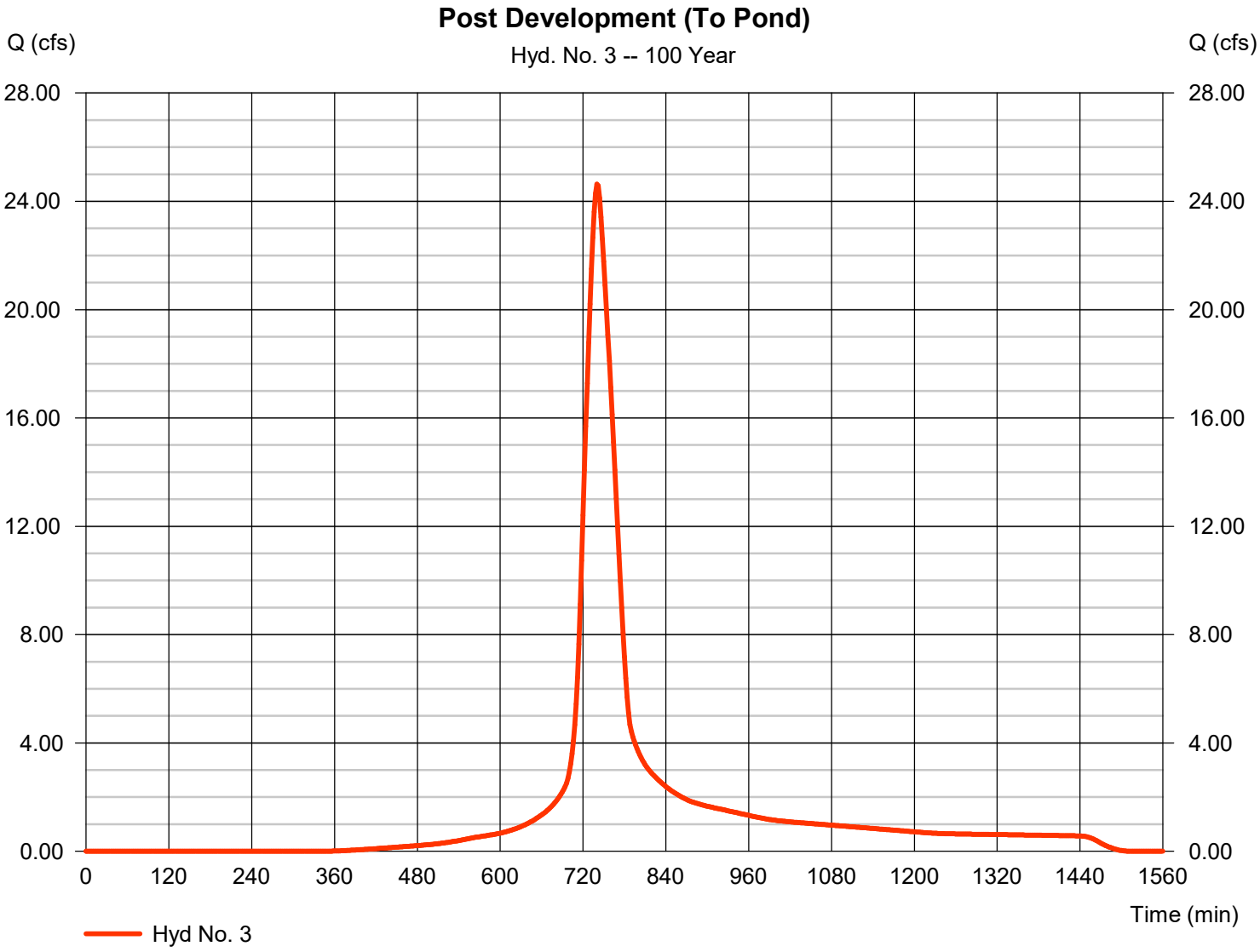
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 3

Post Development (To Pond)

Hydrograph type	= SCS Runoff	Peak discharge	= 24.64 cfs
Storm frequency	= 100 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 132,272 cuft
Drainage area	= 6.820 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 45.00 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



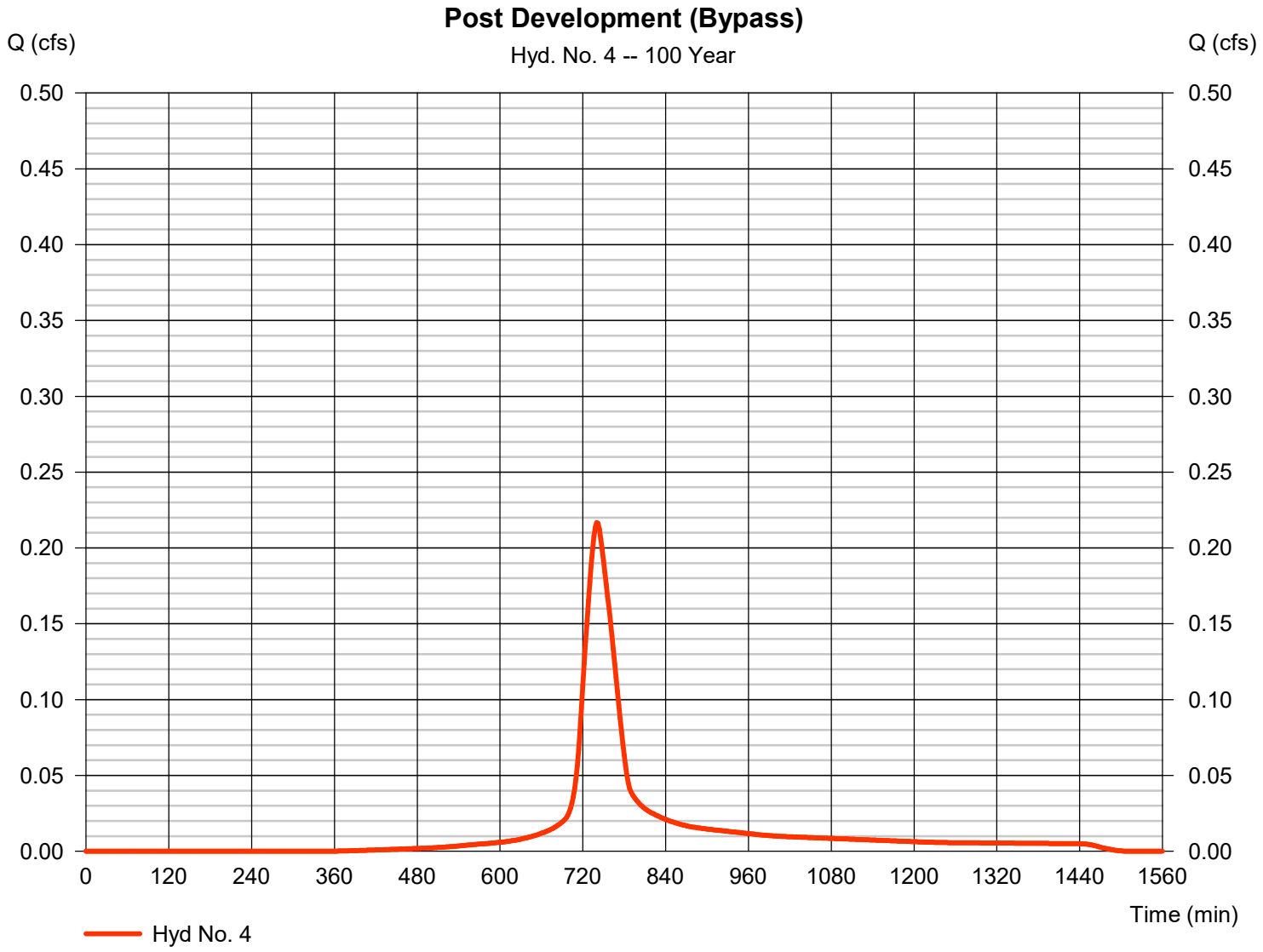
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 4

Post Development (Bypass)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.217 cfs
Storm frequency	=	100 yrs	Time to peak	=	740 min
Time interval	=	2 min	Hyd. volume	=	1,164 cuft
Drainage area	=	0.060 ac	Curve number	=	78
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	45.00 min
Total precip.	=	8.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

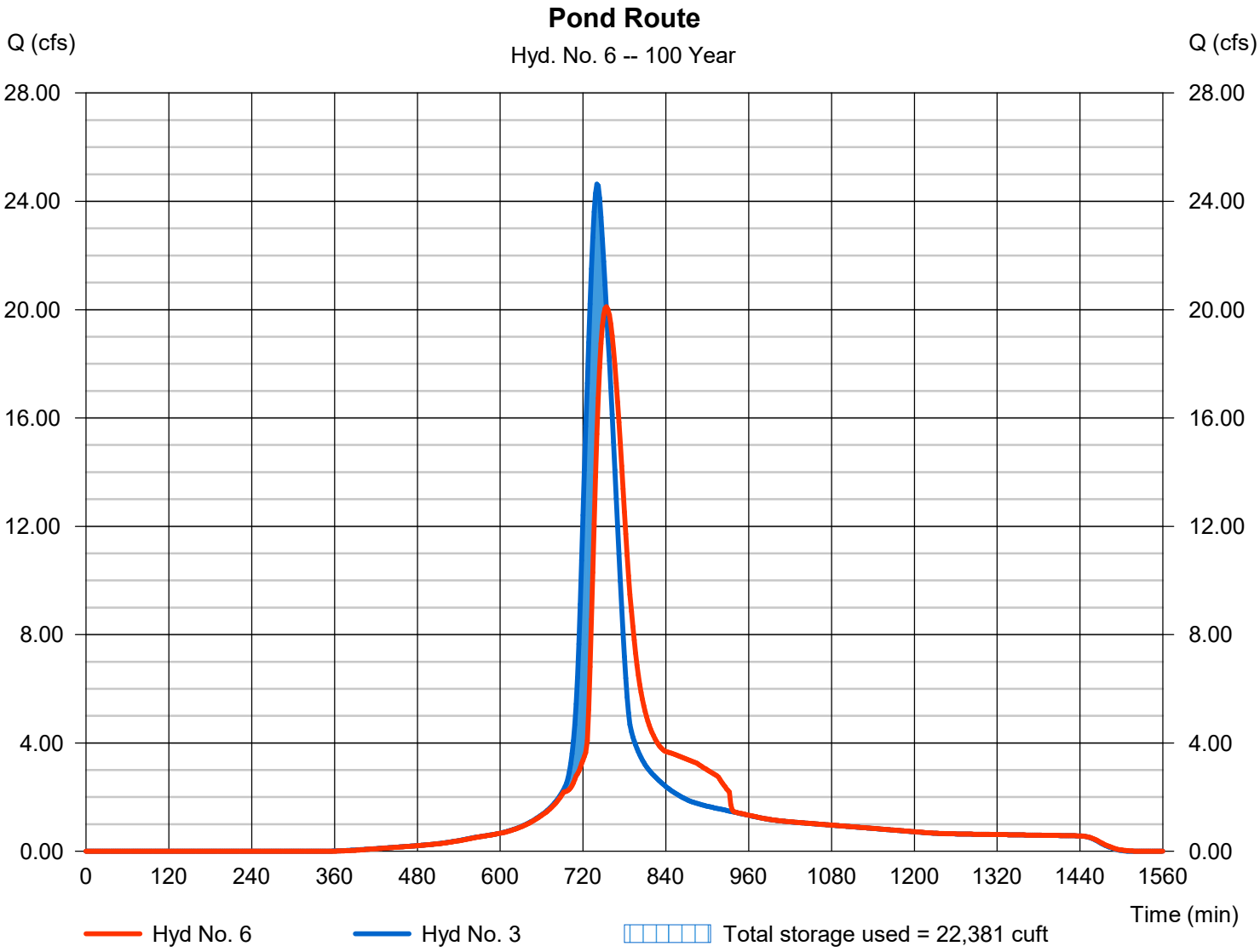
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 6

Pond Route

Hydrograph type	=	Reservoir	Peak discharge	=	20.11 cfs
Storm frequency	=	100 yrs	Time to peak	=	754 min
Time interval	=	2 min	Hyd. volume	=	132,271 cuft
Inflow hyd. No.	=	3 - Post Development (To Pond)	Max. Elevation	=	35.79 ft
Reservoir name	=	Dry Detention Pond	Max. Storage	=	22,381 cuft

Storage Indication method used.



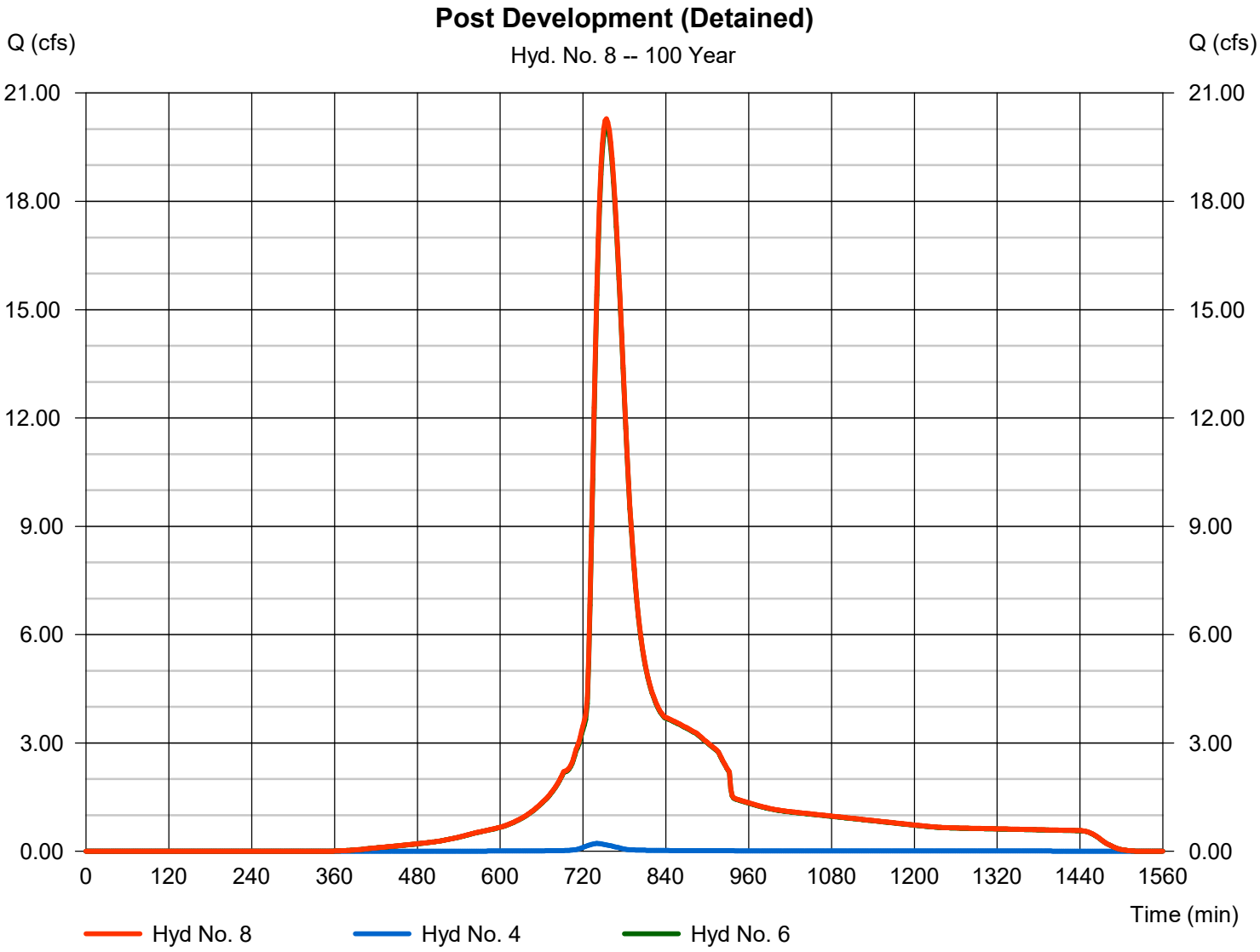
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Tuesday, 01 / 9 / 2024

Hyd. No. 8

Post Development (Detained)

Hydrograph type	= Combine	Peak discharge	= 20.28 cfs
Storm frequency	= 100 yrs	Time to peak	= 754 min
Time interval	= 2 min	Hyd. volume	= 133,435 cuft
Inflow hyds.	= 4, 6	Contrib. drain. area	= 0.060 ac



U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map US Topo

ZEBULON QUADRANGLE
NORTH CAROLINA
7.5-MINUTE SERIES

PROJECT SITE

Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid:Universal Transverse Mercator, Zone 17S

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery.....NAIP, May 2016 - November 2016
Roads.....U.S. Census Bureau, 2016
Names.....GNIS, 1980 - 2019
Hydrography.....National Hydrography Dataset, 1899 - 2018
Contours.....National Elevation Dataset, 2008
Boundaries.....Multiple sources; see metadata file 2017 - 2018

Wetlands.....FWS National Wetlands Inventory 1983

MN
GN
9°31′
169 MILS
1°34′
28 MILS
UTM GRID AND 2019 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000 - m Square ID
QV
Grid Zone Designation
17S

SCALE 1:24 000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 MILES 1
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 FEET

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.18

QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 Rolesville
2 Bunn West
3 Bunn East
4 Knightdale
5 Middlesex
6 Clayton
7 Flowers
8 Stancils Chapel

ADJOINING QUADRANGLES

ROAD CLASSIFICATION

Expressway	Local Connector
Secondary Hwy	Local Road
Ramp	4WD
Interstate Route	US Route
State Route	

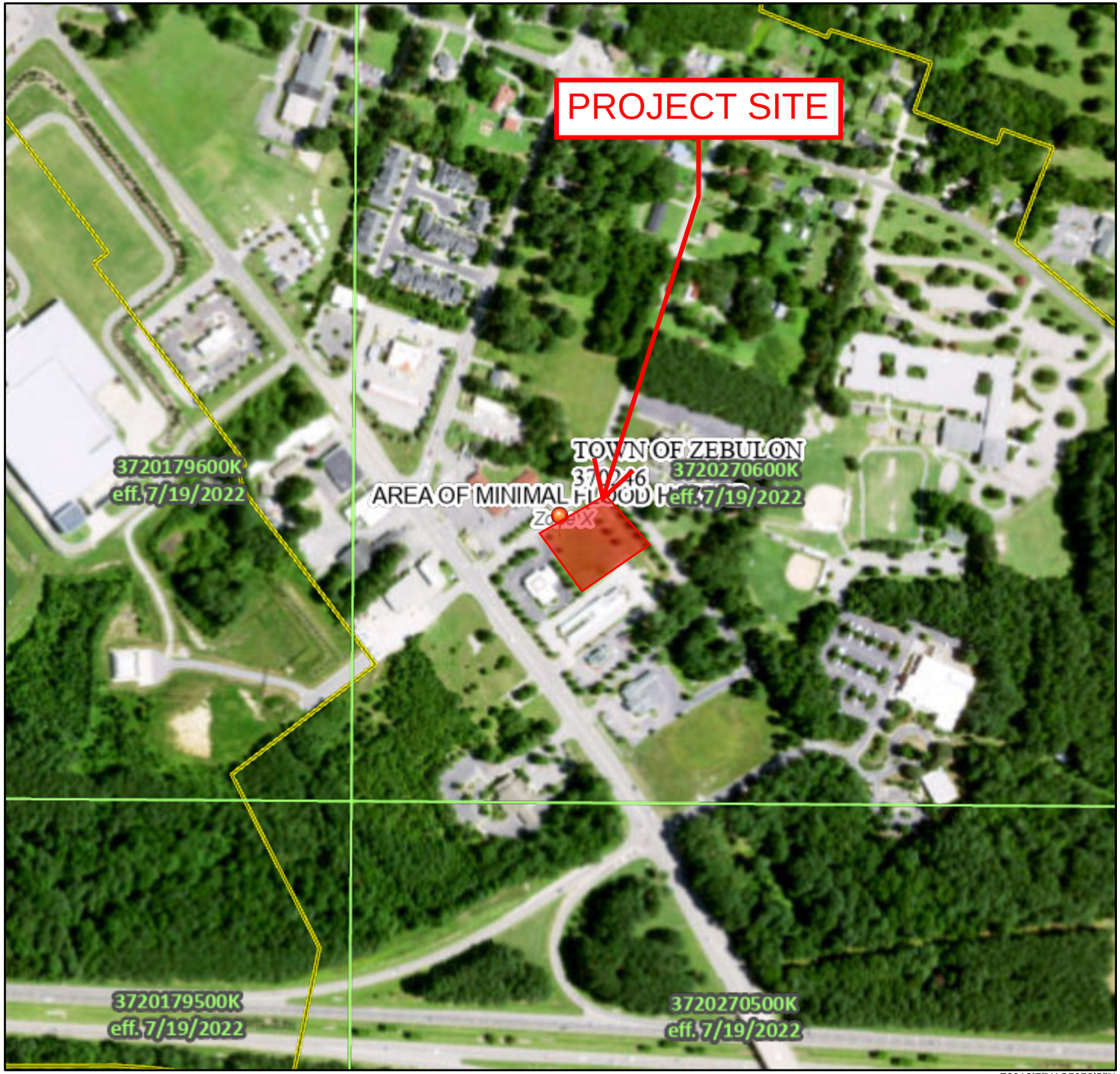
ZEBULON, NC
2019

NSN 7643016379377
NGA REF NO. USGSX24K72128

National Flood Hazard Layer FIRMette

FEMA

78°19'43"W 35°50'33"N



78°19'5"W 35°50'3"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/18/2024 at 8:32 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Wake County, North Carolina

January 18, 2024

Custom Soil Resource Report
Soil Map

Map Scale: 1:732 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 35 70 140 210

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Wake County, North Carolina
Survey Area Data: Version 25, Oct 2, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 24, 2022—May 9, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Ur	Urban land	1.1	100.0%
Totals for Area of Interest		**1.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Wake County, North Carolina

Ur—Urban land

Map Unit Setting

National map unit symbol: 2qwpc
Elevation: 70 to 1,400 feet
Mean annual precipitation: 39 to 51 inches
Mean annual air temperature: 54 to 63 degrees F
Frost-free period: 190 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Parent material: Impervious layers over human-transported material

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

References

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