

DRAINAGE CALCULATIONS

FOR

17-19 COLFAX STREET

(BLOCK 95 – LOTS 12 & 13)

BOROUGH OF RARITAN, SOMERSET COUNTY, NEW JERSEY

Prepared By:



P.O. Box 588, 11 Furler Street, Totowa, New Jersey 07511-0588
Phone: (973) 812-6680 • Facsimile: (973) 812-6681
Certificate of Authorization Number 24GA28108300

Dated: February 08, 2023

Revised: August 08, 2023

Project Number: 4273

A handwritten signature in blue ink, appearing to read 'Matthew G. Clark', is written over a horizontal line.

Matthew G. Clark, P.E.

N.J. Professional Engineer License No. 40394

Impervious Area Summary:

Existing = 8,042 sf.
Proposed = 12,607 sf.

Difference = (12,607 sf. – 8,042 sf.) = + 4,565 sf. (0.105 ac.)

Ultimate Disturbance Summary:

Proposed = 0.373 ac.

(Refer to the soil erosion & sediment control plan sheet)

Design:

Since the ultimate disturbance is less than 1 acre and the increase in impervious area is less than 0.25 acres the project is not classified as a “major development” per NJAC 5:21 and the Borough of Raritan “Chapter 315 Stormwater Management” code.

The site has been designed so that the post developed peak rate of storm water runoff for the 2, 10, 25, & 100-year storm events is less than the pre-developed condition. A subsurface detention system is proposed as part of the design.

Subsurface Detention System:

Existing Conditions (see attached map):

Lot Area = 15,394.00 sf. (0.353 ac.):

- Pervious area = 7,352 sf.
- Impervious area = 8,042 sf.

$C_w = (7,352 \times 0.51) + (8,042 \times 0.99) / 15,394.00 = 0.76$

Proposed Conditions (see attached map):

Lot Area to Subsurface Detention System = 14,801.00 sf. (0.339 ac.):

- Pervious area = 2,238 sf.
- Impervious area = 12,563 sf.

$C_w = (2,238 \times 0.51) + (12,563 \times 0.99) / 14,801 = 0.92$

Lot Area to “Bypass” Subsurface Detention System = 593 sf. (0.014 ac.):

- Pervious area = 549 sf.
- Impervious area = 44 sf.

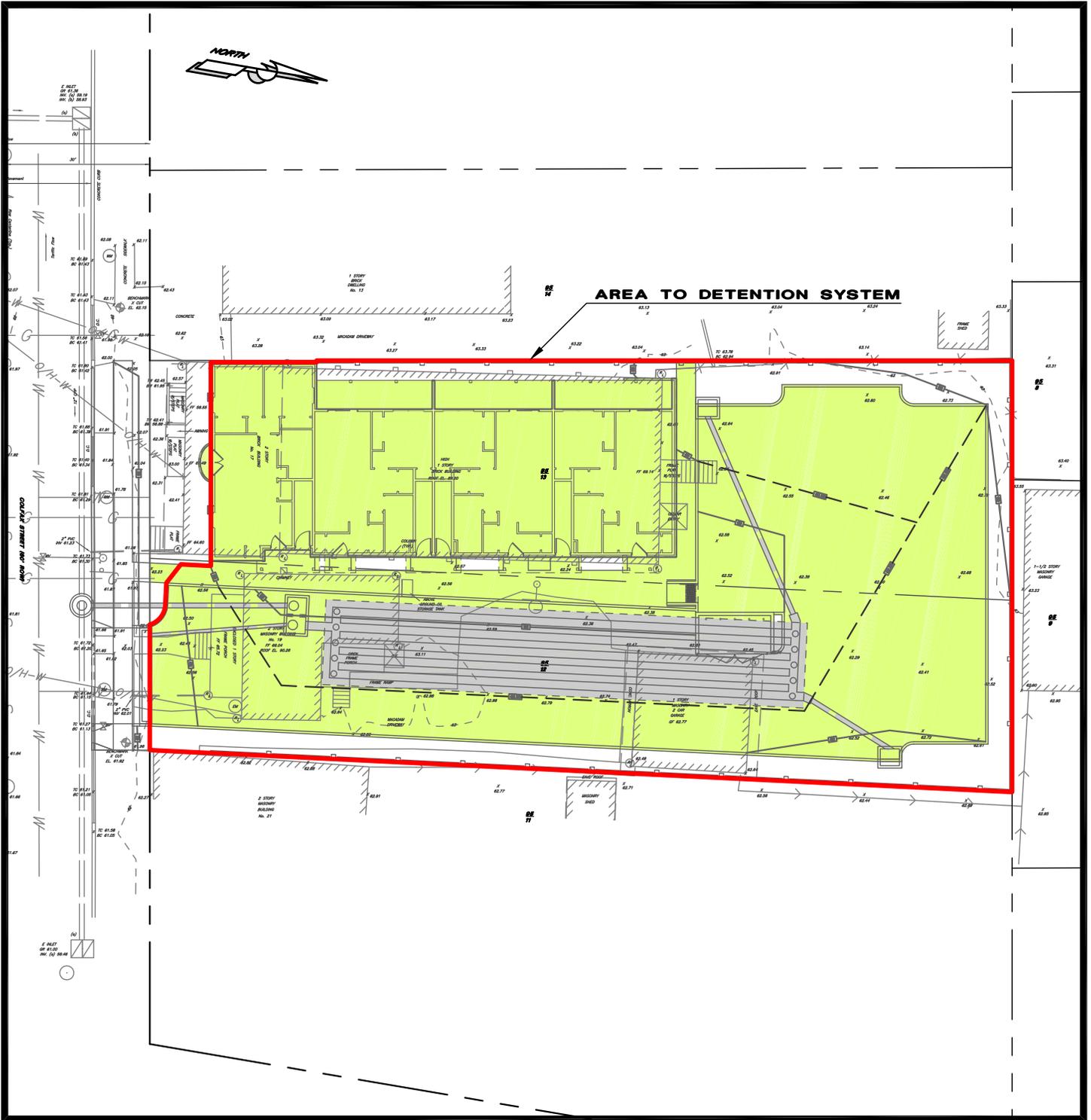
$C_w = (549 \times 0.51) + (44 \times 0.99) / 593 = 0.55$

Stormwater Summary Table

<u>Storm Event</u>	<u>Existing Peak Flow (cfs.)</u>	<u>Proposed Bypass Flow (cfs.)</u>	<u>Target Flow from Pond (cfs.)</u>	<u>Routed Peak Flow from Pond (cfs.)</u>	<u>Maximum Water Surface Elevation (ft.)</u>	<u>Maximum Storage (cf.)</u>
2 Year	1.121	0.032	1.089	0.769	59.76	360
10 Year	1.490	0.043	1.447	0.956	60.01	540
25 Year	1.703	0.049	1.654	1.049	60.17	644
100 Year	2.039	0.059	1.980	1.268	60.56	844

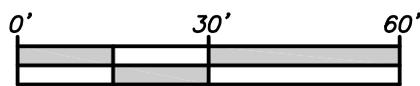
Note:

1. Target flow from pond = (existing peak flow – proposed bypass flow).



17-19 COLFAX STREET

PROPOSED CONDITIONS



GRAPHIC SCALE
SCALE: 1"=2,000' ±

IMPERVIOUS AREA



MCB ENGINEERING ASSOCIATES, L.L.C.

P.O. BOX 588, 11 FURLER STREET
TOTOWA, NEW JERSEY 07511-0588
PHONE: (973) 812-6680 – FACSIMILE: (973) 812-6681

Email: mcbea@mcbea.com – Certificate of Authorization No. 24GA28108300

PROJ. No. 4273

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Basin Model

Existing



Bypass



To Pond



Pond Routed



Hydrograph by Return Period

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Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Outflow (cfs)							
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
1	Rational	Existing		1.121			1.490	1.703		2.039
2	Rational	Bypass		0.032			0.043	0.049		0.059
3	Mod Rational	To Pond		1.062			1.429	1.629		1.938
4	Pond Route	Pond Routed		0.769			0.956	1.049		1.268

Hydrograph 2-yr Summary

Project Name: 4273

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Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	Rational	Existing	1.121	0.17	673	---		
2	Rational	Bypass	0.032	0.17	19.3	---		
3	Mod Rational	To Pond	1.062	0.17	1,019	---		
4	Pond Route	Pond Routed	0.769	0.32	1,019	3	59.76	360

Hydrograph Report

Project Name: 4273

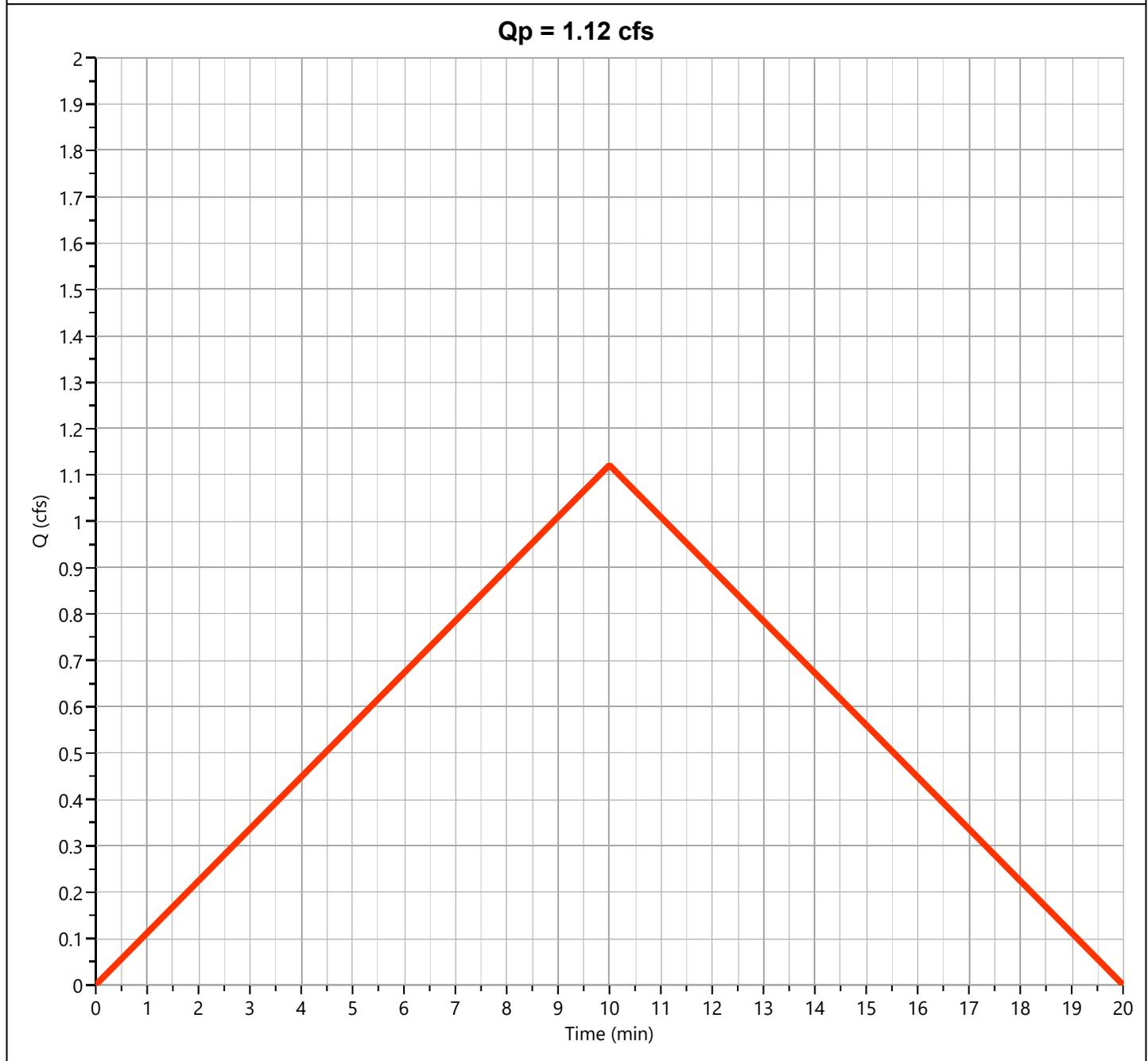
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08-08-2023

Existing

Hyd. No. 1

Hydrograph Type	= Rational	Peak Flow	= 1.121 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 673 cuft
Drainage Area	= 0.353 ac	Runoff Coeff.	= 0.76
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
IDF Curve	= NJ RSIS 2017 IDF.idf	Intensity	= 4.18 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1



Hydrograph Report

Project Name: 4273

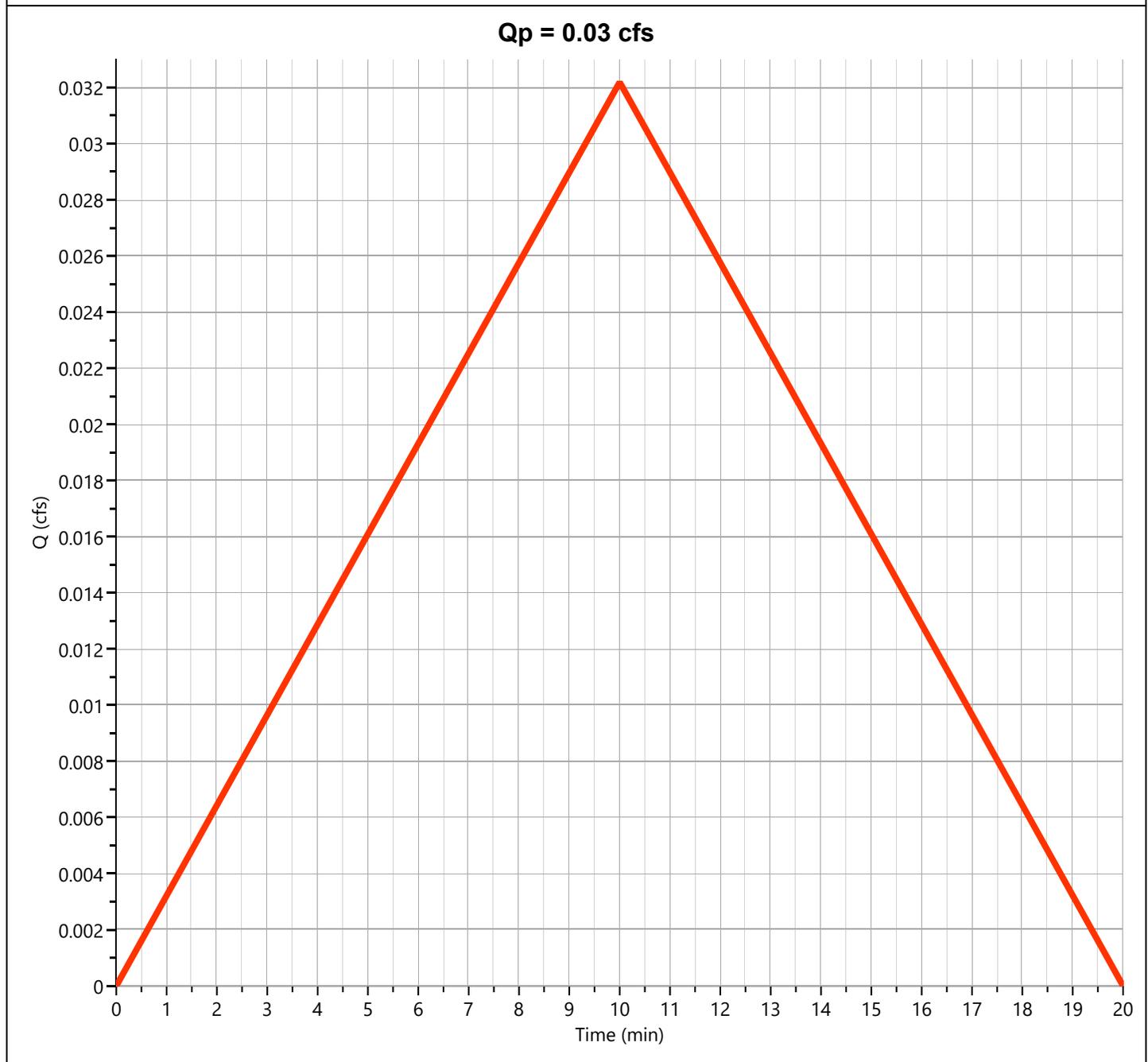
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08-08-2023

Bypass

Hyd. No. 2

Hydrograph Type	= Rational	Peak Flow	= 0.032 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 19.3 cuft
Drainage Area	= 0.014 ac	Runoff Coeff.	= 0.55
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
IDF Curve	= NJ RSIS 2017 IDF.idf	Intensity	= 4.18 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1



Hydrograph Report

Project Name: 4273

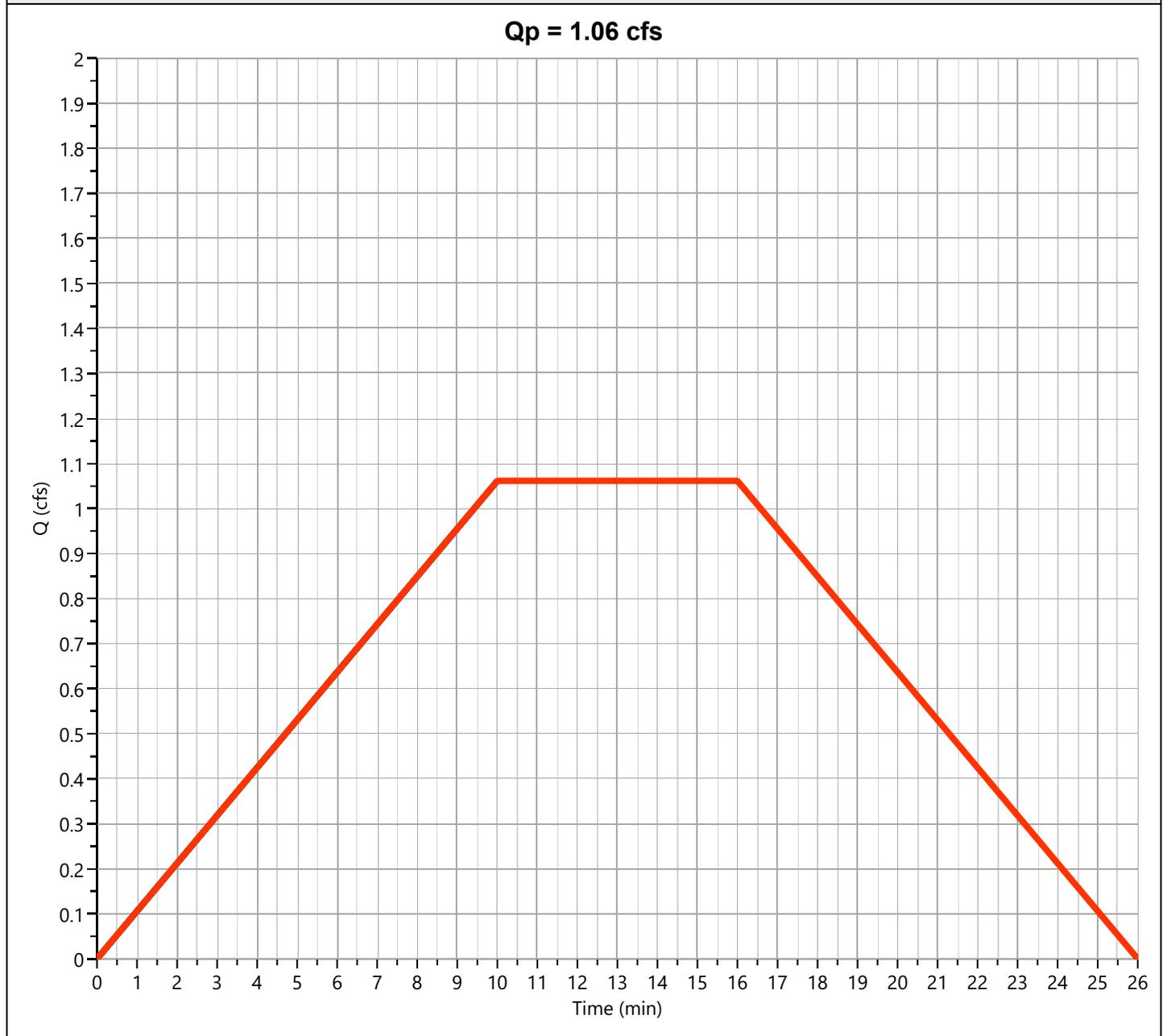
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08-08-2023

To Pond

Hyd. No. 3

Hydrograph Type	= Mod Rational	Peak Flow	= 1.062 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 1,019 cuft
Drainage Area	= 0.339 ac	Runoff Coeff.	= 0.92
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
IDF Curve	= NJ RSIS 2017 IDF.idf	Intensity	= 3.40 in/hr
Freq. Corr. Factor	= 1.00	Storm Duration	= 1.6 x Tc
Target Q	= 1.090 cfs	Required Storage	= 169 cuft



Hydrograph Report

Project Name: 4273

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Pond Routed

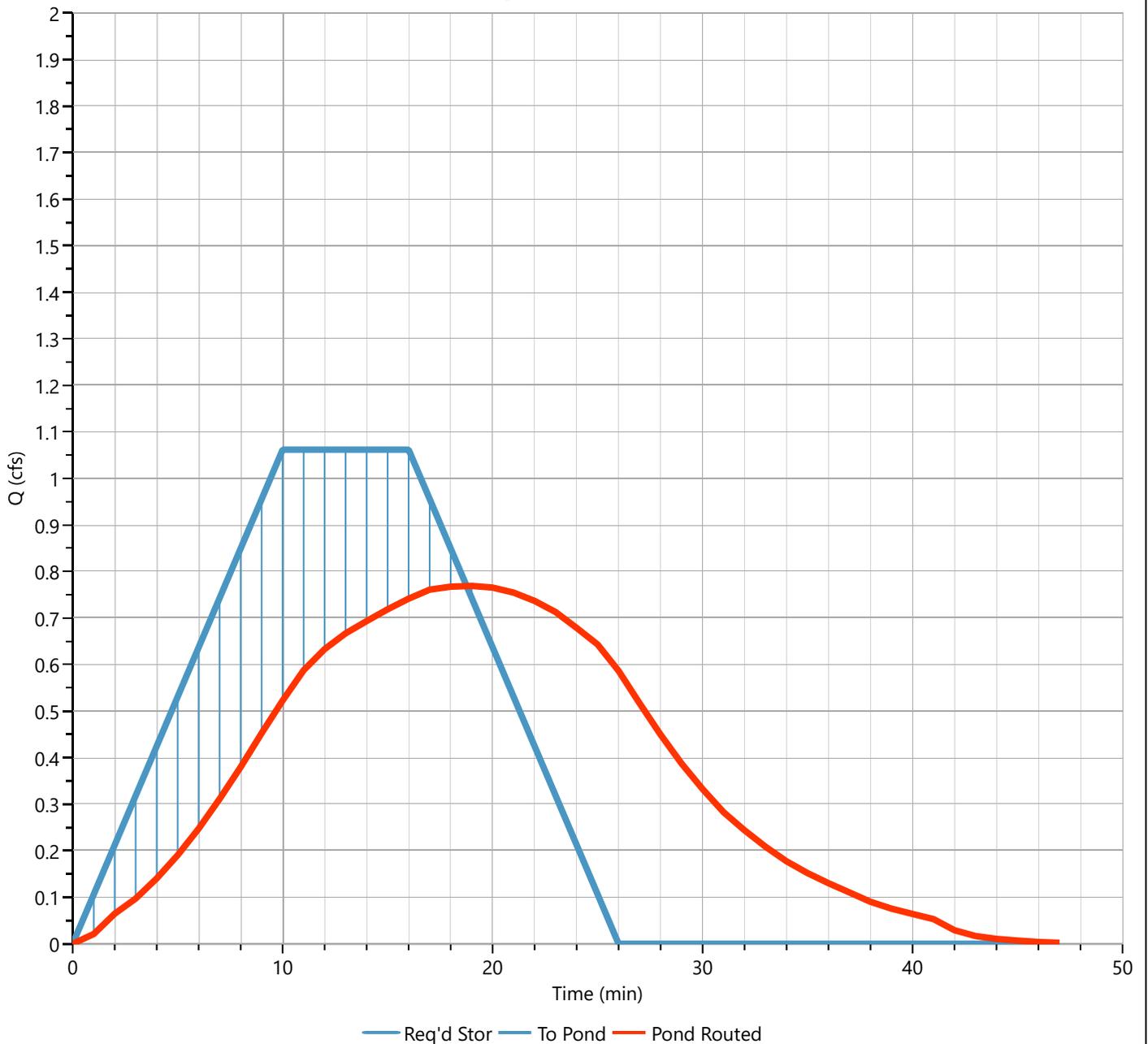
Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 0.769 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.32 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,019 cuft
Inflow Hydrograph	= 3 - To Pond	Max. Elevation	= 59.76 ft
Pond Name	= Pond 1	Max. Storage	= 360 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 6 min

Qp = 0.77 cfs



Pond Report

Project Name: 4273

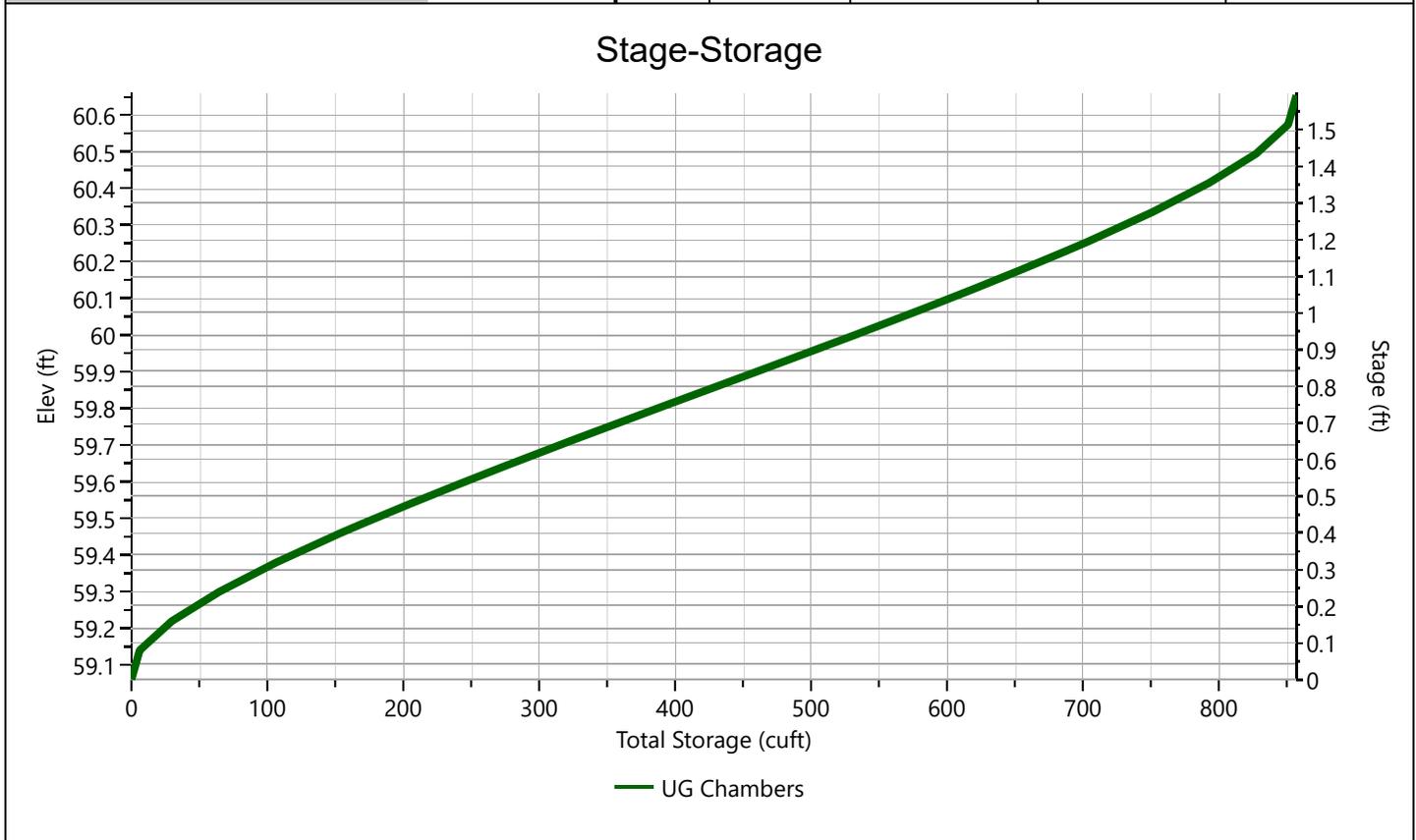
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08-08-2023

Pond 1

Stage-Storage

Underground Chambers		Stage / Storage Table				
Description	Input	Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
Invert Elev Down, ft	59.06	0.00	59.06	n/a	0.000	0.000
Chamber Rise, ft	1.50	0.08	59.14	n/a	6.12	6.12
Chamber Shape	Circular	0.16	59.22	n/a	23.7	29.9
Chamber Span, ft	1.50	0.24	59.30	n/a	34.7	64.5
Barrel Length, ft	94.00	0.32	59.38	n/a	41.8	106
No. Barrels	5	0.40	59.46	n/a	47.0	153
Barrel Slope, %	0.10	0.48	59.54	n/a	50.8	204
Headers, y/n	Yes	0.56	59.62	n/a	53.7	258
Stone Encasement, y/n	No	0.64	59.70	n/a	55.9	314
Encasement Bottom Elevation, ft	0.00	0.72	59.78	n/a	57.2	371
Encasement Width per Chamber, ft	0.00	0.80	59.86	n/a	57.9	429
Encasement Depth, ft	0.00	0.88	59.94	n/a	57.8	487
Encasement Voids, %	40.00	0.96	60.02	n/a	57.1	544
		1.04	60.10	n/a	55.9	600
		1.12	60.18	n/a	53.7	653
		1.20	60.26	n/a	50.8	704
		1.28	60.34	n/a	47.0	751
		1.35	60.41	n/a	41.7	793
		1.43	60.49	n/a	34.7	827
		1.51	60.57	n/a	23.6	851
		1.59	60.65	n/a	6.10	857



Pond Report

Project Name: 4273

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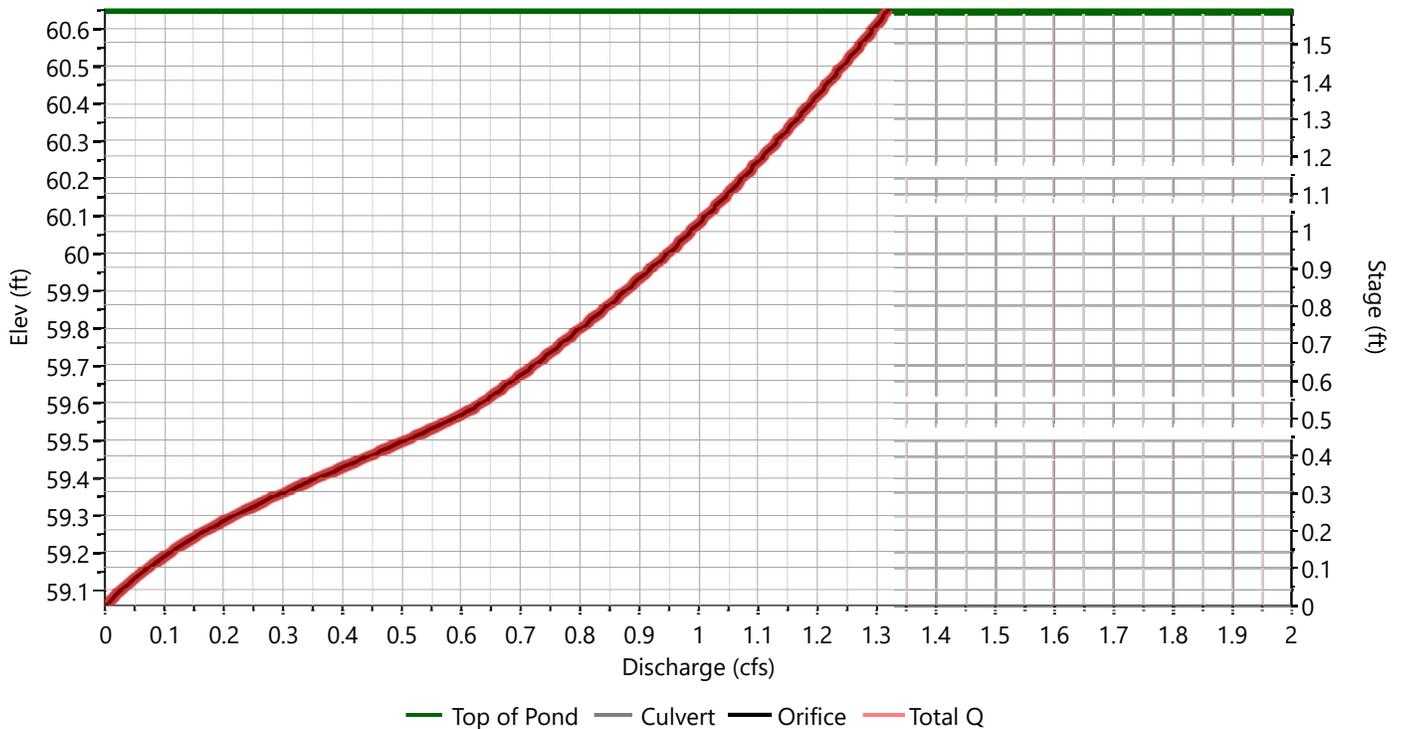
Pond 1

Stage-Discharge

Culvert / Orifices	Culvert	Orifices			Perforated Riser
		1*	2	3	
Rise, in	12	7			Hole Diameter, in
Span, in	12	7			No. holes
No. Barrels	1	1			Invert Elevation, ft
Invert Elevation, ft	58.96	59.01			Height, ft
Orifice Coefficient, Co	0.60	0.60			Orifice Coefficient, Co
Length, ft	40				
Barrel Slope, %	.5				
N-Value, n	0.010				
Weirs	Riser*	Weirs			Ancillary
		1	2	3	
Shape / Type					Exfiltration, in/hr
Crest Elevation, ft					
Crest Length, ft					
Angle, deg					
Weir Coefficient, Cw					

*Routes through Culvert.

Stage-Discharge



Pond Report

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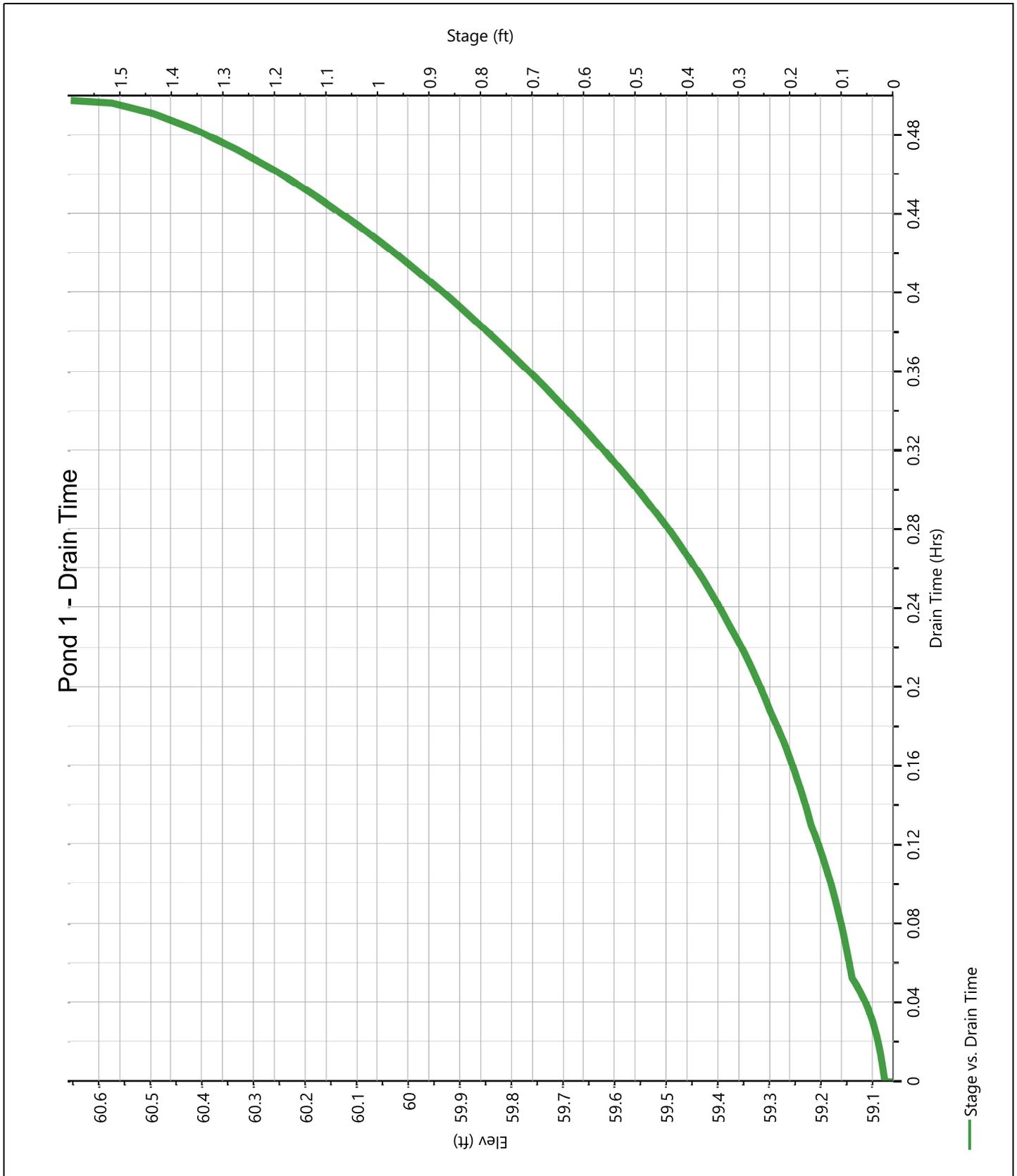
Pond 1

Stage-Storage-Discharge Summary

Stage (ft)	Elev. (ft)	Storage (cuft)	Culvert (cfs)	Orifices, cfs			Riser (cfs)	Weirs, cfs			Pf Riser (cfs)	Exfil (cfs)	User (cfs)	Total (cfs)
				1	2	3		1	2	3				
0.00	59.06	0.000	0.000	0.000										0.000
0.08	59.14	6.12	0.055 ic	0.055										0.055
0.16	59.22	29.9	0.125 ic	0.125										0.125
0.24	59.30	64.5	0.217 ic	0.217										0.217
0.32	59.38	106	0.324 ic	0.324										0.324
0.40	59.46	153	0.442 ic	0.442										0.442
0.48	59.54	204	0.559 ic	0.559										0.559
0.56	59.62	258	0.648 ic	0.648										0.648
0.64	59.70	314	0.717 ic	0.717										0.717
0.72	59.78	371	0.785 ic	0.785										0.785
0.80	59.86	429	0.842 ic	0.842										0.842
0.88	59.94	487	0.903 ic	0.903										0.903
0.96	60.02	544	0.960 oc	0.960										0.960
1.04	60.10	600	1.007 oc	1.007										1.007
1.12	60.18	653	1.058 oc	1.058										1.058
1.20	60.26	704	1.107 oc	1.107										1.107
1.28	60.34	751	1.151 oc	1.151										1.151
1.35	60.41	793	1.194 oc	1.194										1.194
1.43	60.49	827	1.238 oc	1.238										1.238
1.51	60.57	851	1.280 oc	1.280										1.280
1.59	60.65	857	1.321 oc	1.321										1.321

Pond 1

Pond Drawdown



Hydrograph 10-yr Summary

Project Name: 4273

Hydrology Studio v 3.0.0.27

08-08-2023

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	Rational	Existing	1.490	0.17	894	---		
2	Rational	Bypass	0.043	0.17	25.7	---		
3	Mod Rational	To Pond	1.429	0.17	1,372	---		
4	Pond Route	Pond Routed	0.956	0.32	1,372	3	60.01	540

Hydrograph Report

Project Name: 4273

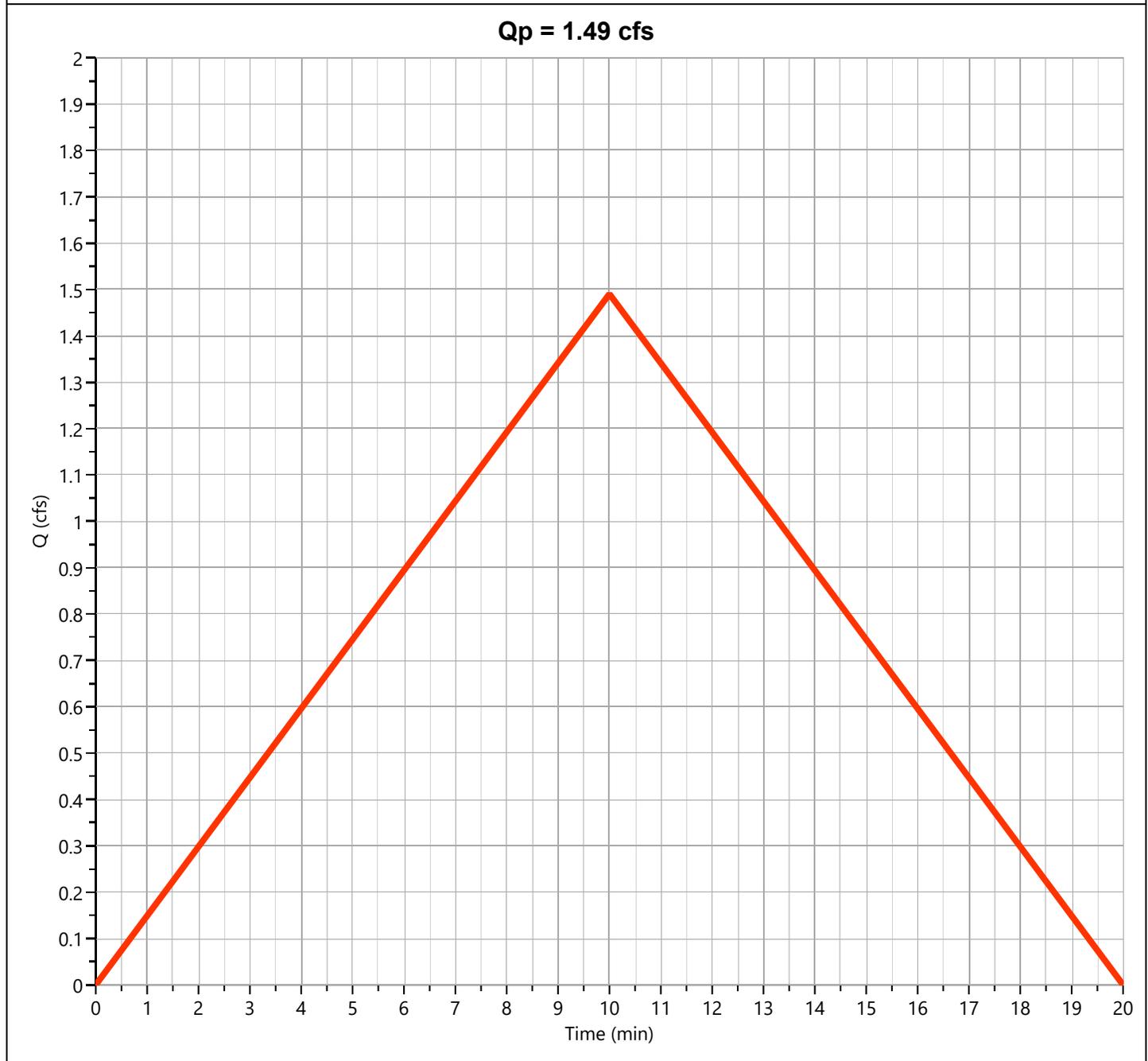
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08-08-2023

Existing

Hyd. No. 1

Hydrograph Type	= Rational	Peak Flow	= 1.490 cfs
Storm Frequency	= 10-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 894 cuft
Drainage Area	= 0.353 ac	Runoff Coeff.	= 0.76
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
IDF Curve	= NJ RSIS 2017 IDF.idf	Intensity	= 5.56 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1



Hydrograph Report

Project Name: 4273

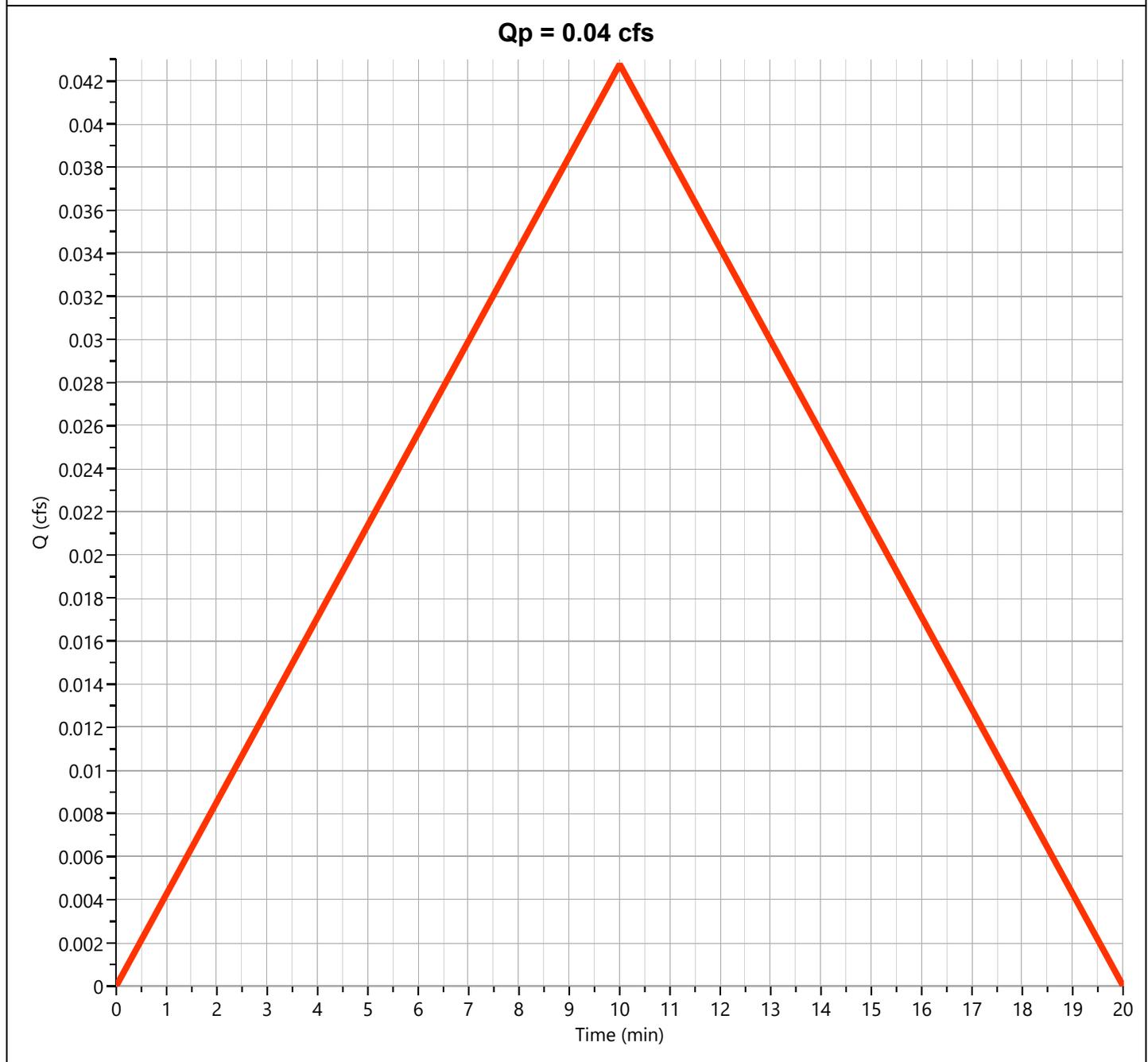
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08-08-2023

Bypass

Hyd. No. 2

Hydrograph Type	= Rational	Peak Flow	= 0.043 cfs
Storm Frequency	= 10-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 25.7 cuft
Drainage Area	= 0.014 ac	Runoff Coeff.	= 0.55
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
IDF Curve	= NJ RSIS 2017 IDF.idf	Intensity	= 5.56 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1



Hydrograph Report

Project Name: 4273

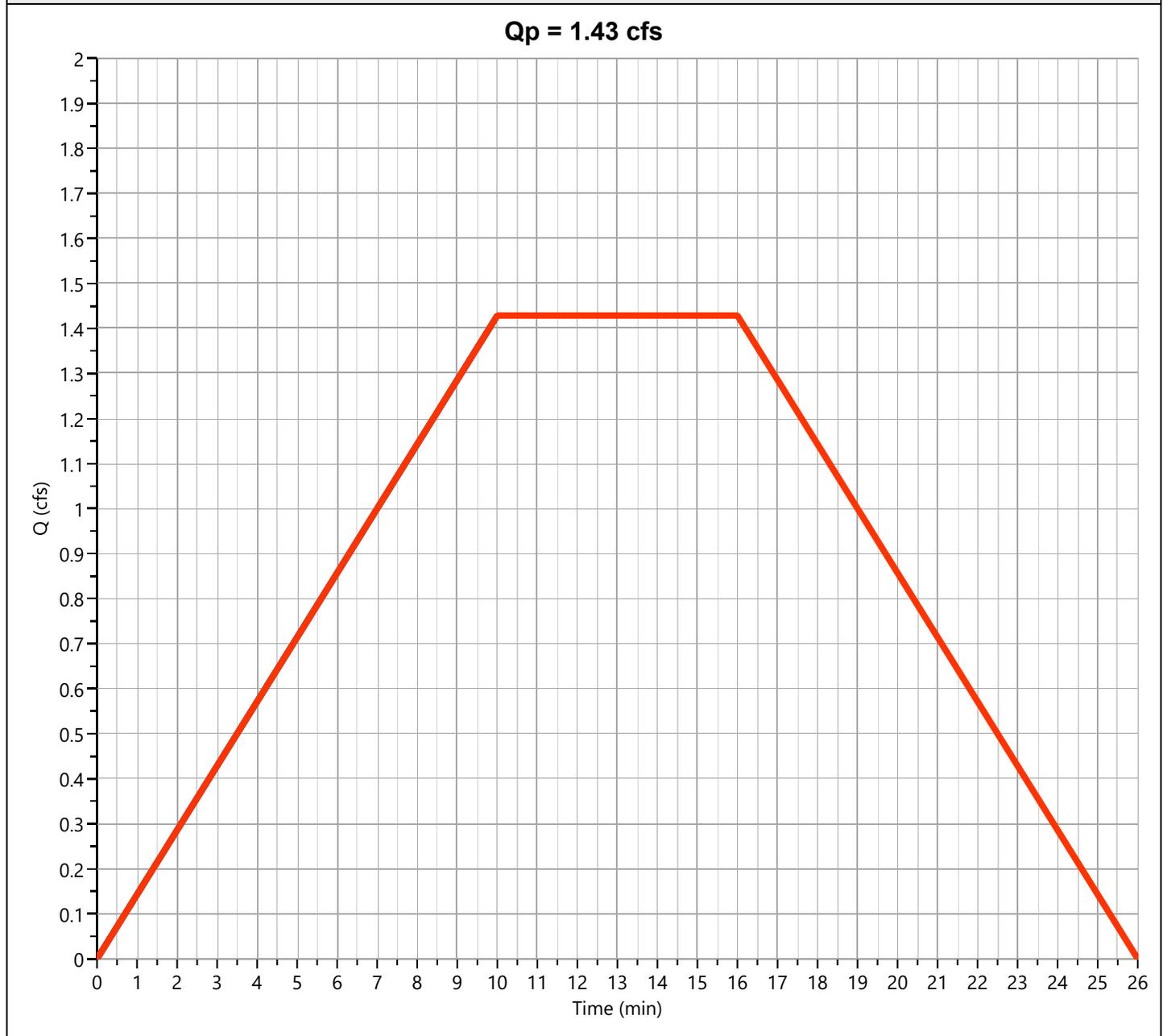
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To Pond

Hyd. No. 3

Hydrograph Type	= Mod Rational	Peak Flow	= 1.429 cfs
Storm Frequency	= 10-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 1,372 cuft
Drainage Area	= 0.339 ac	Runoff Coeff.	= 0.92
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
IDF Curve	= NJ RSIS 2017 IDF.idf	Intensity	= 4.58 in/hr
Freq. Corr. Factor	= 1.00	Storm Duration	= 1.6 x Tc
Target Q	= 1.450 cfs	Required Storage	= 241 cuft



Hydrograph Report

Project Name: 4273

Hydrology Studio v 3.0.0.27

08-08-2023

Pond Routed

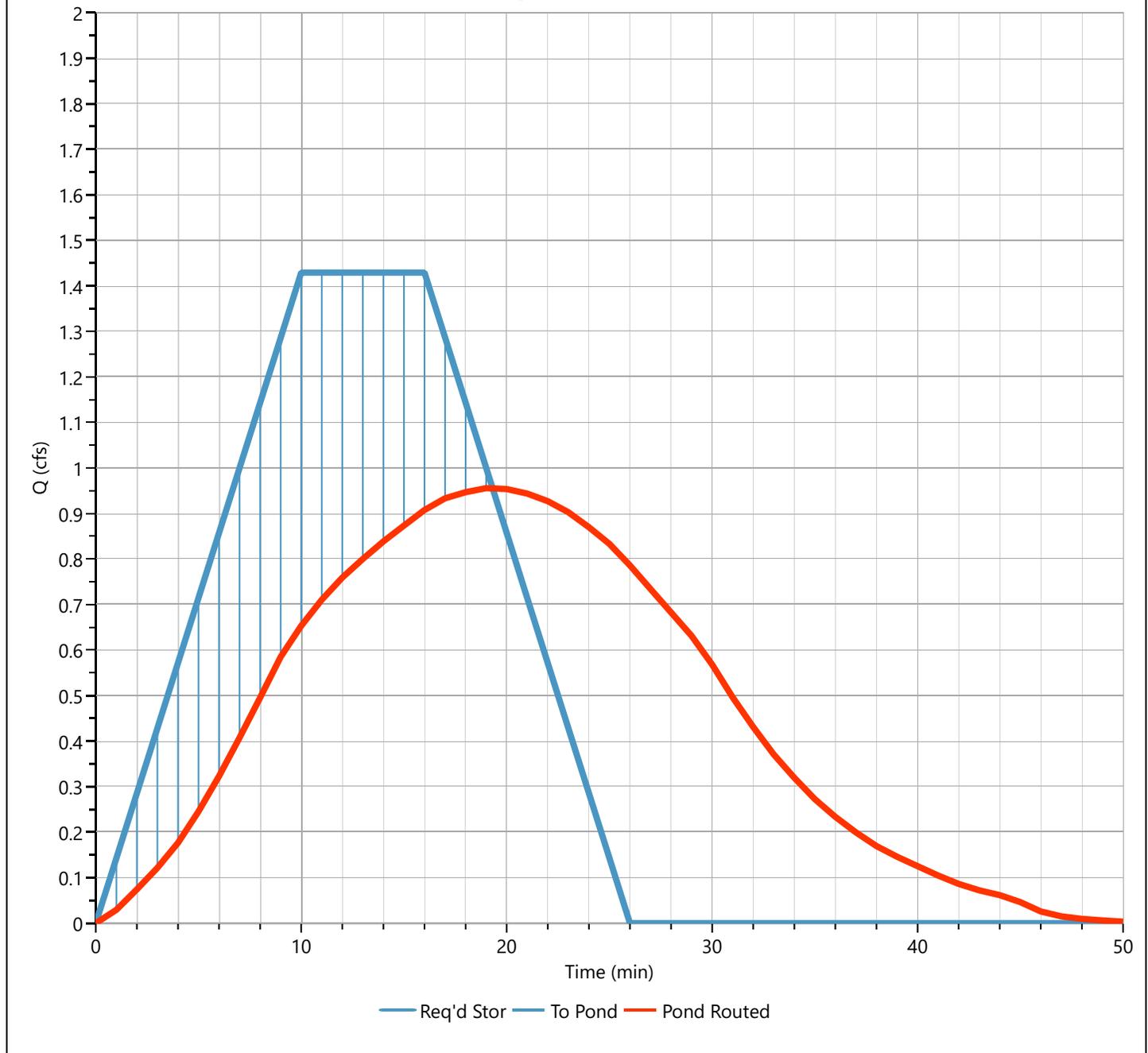
Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 0.956 cfs
Storm Frequency	= 10-yr	Time to Peak	= 0.32 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,372 cuft
Inflow Hydrograph	= 3 - To Pond	Max. Elevation	= 60.01 ft
Pond Name	= Pond 1	Max. Storage	= 540 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 8 min

Qp = 0.96 cfs



Hydrograph 25-yr Summary

Project Name: 4273

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08-08-2023

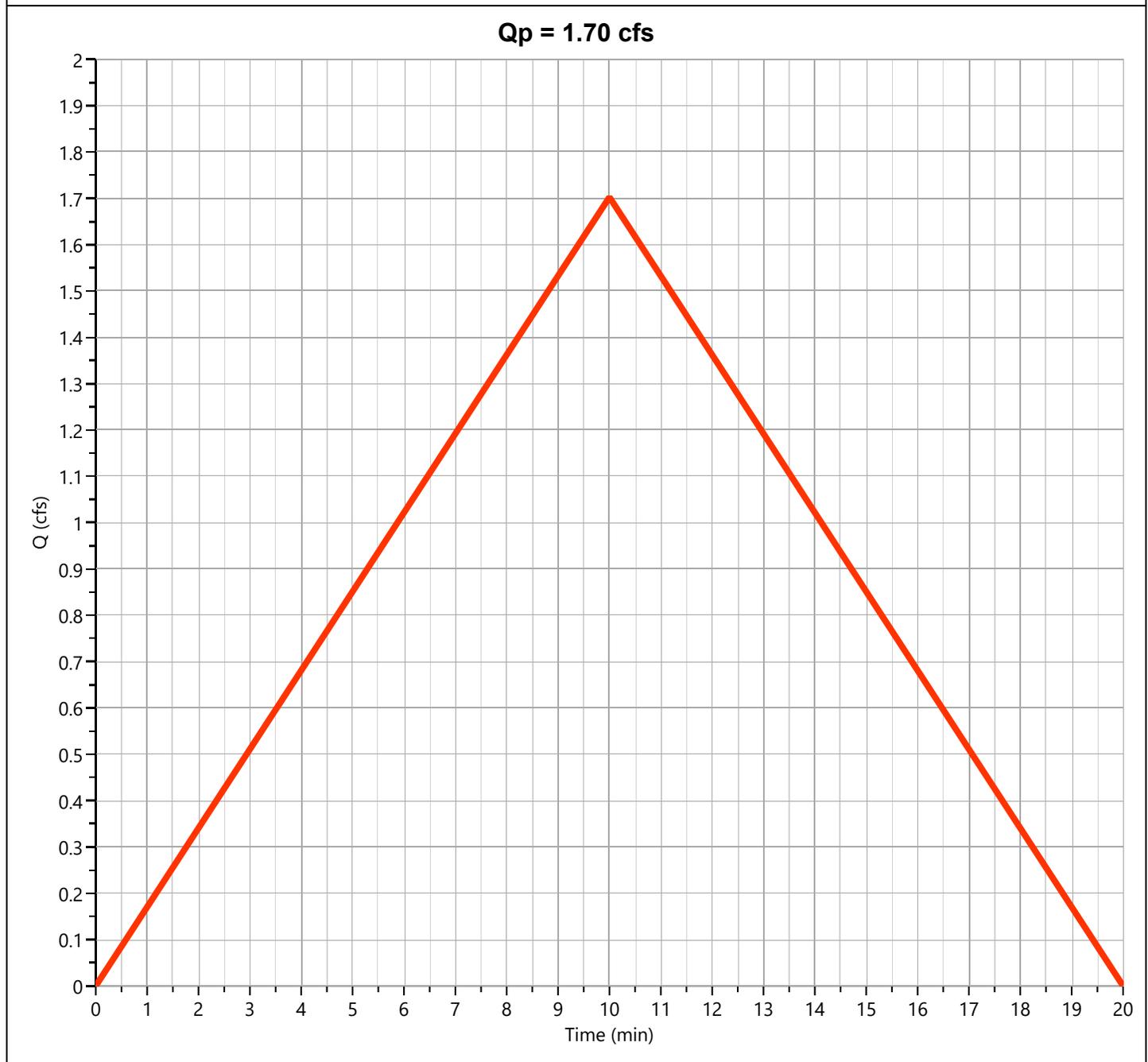
Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	Rational	Existing	1.703	0.17	1,022	---		
2	Rational	Bypass	0.049	0.17	29.3	---		
3	Mod Rational	To Pond	1.629	0.17	1,564	---		
4	Pond Route	Pond Routed	1.049	0.33	1,564	3	60.17	644

Hydrograph Report

Existing

Hyd. No. 1

Hydrograph Type	= Rational	Peak Flow	= 1.703 cfs
Storm Frequency	= 25-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 1,022 cuft
Drainage Area	= 0.353 ac	Runoff Coeff.	= 0.76
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
IDF Curve	= NJ RSIS 2017 IDF.idf	Intensity	= 6.35 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1



Hydrograph Report

Project Name: 4273

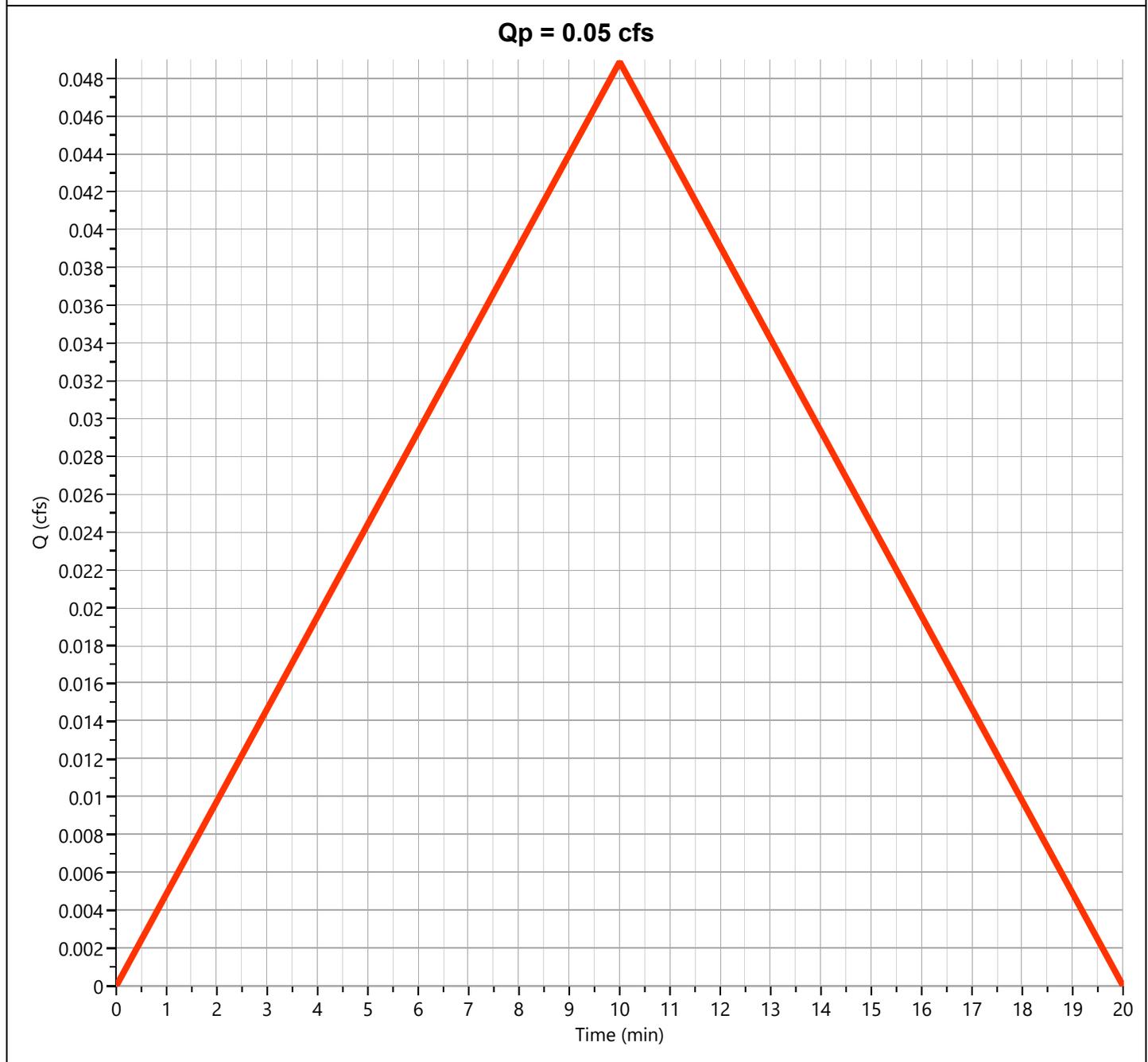
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08-08-2023

Bypass

Hyd. No. 2

Hydrograph Type	= Rational	Peak Flow	= 0.049 cfs
Storm Frequency	= 25-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 29.3 cuft
Drainage Area	= 0.014 ac	Runoff Coeff.	= 0.55
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
IDF Curve	= NJ RSIS 2017 IDF.idf	Intensity	= 6.35 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1



Hydrograph Report

Project Name: 4273

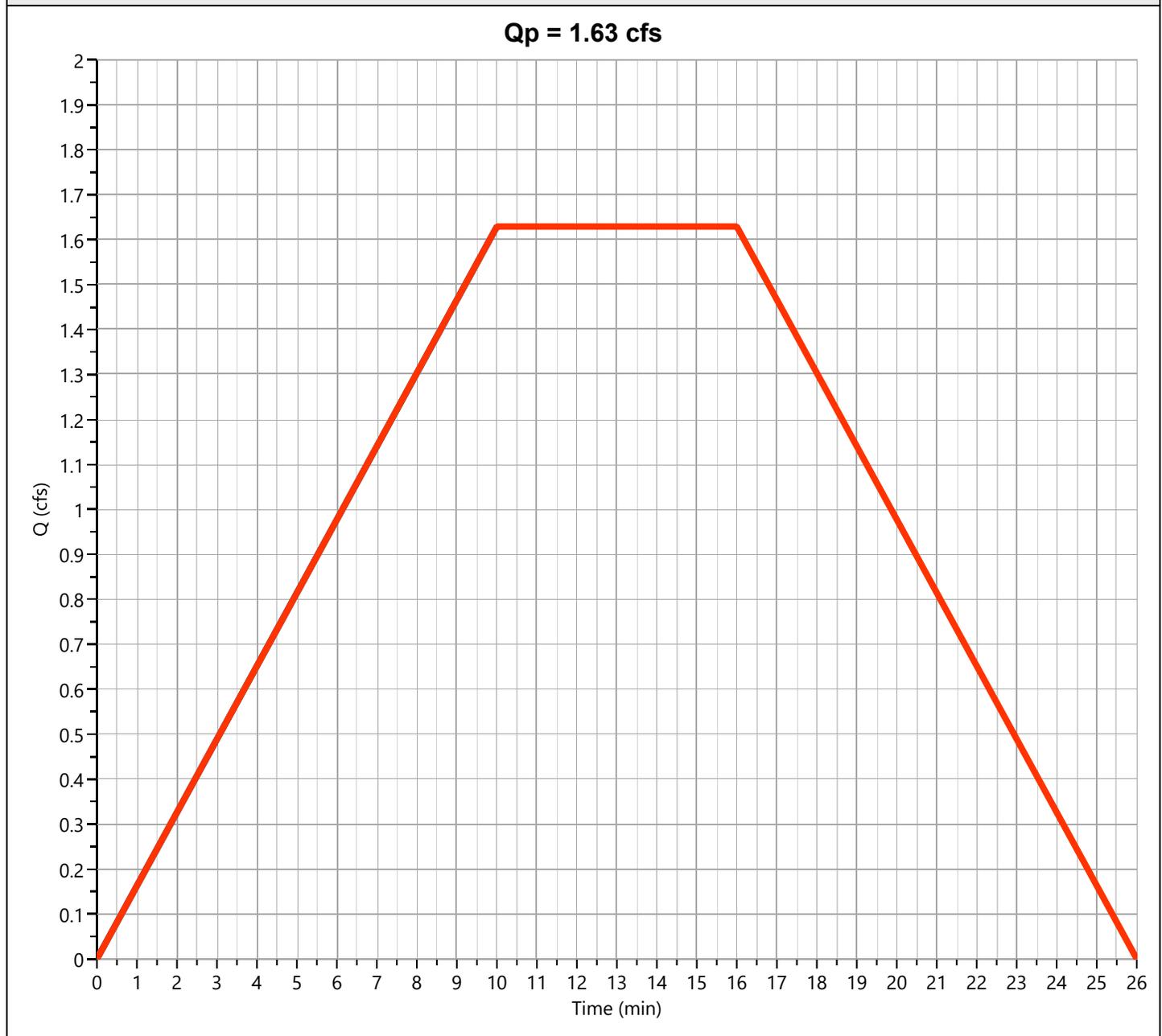
Hydrology Studio v 3.0.0.27

08-08-2023

To Pond

Hyd. No. 3

Hydrograph Type	= Mod Rational	Peak Flow	= 1.629 cfs
Storm Frequency	= 25-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 1,564 cuft
Drainage Area	= 0.339 ac	Runoff Coeff.	= 0.92
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
IDF Curve	= NJ RSIS 2017 IDF.idf	Intensity	= 5.22 in/hr
Freq. Corr. Factor	= 1.00	Storm Duration	= 1.6 x Tc
Target Q	= 1.650 cfs	Required Storage	= 277 cuft



Hydrograph Report

Project Name: 4273

Hydrology Studio v 3.0.0.27

08-08-2023

Pond Routed

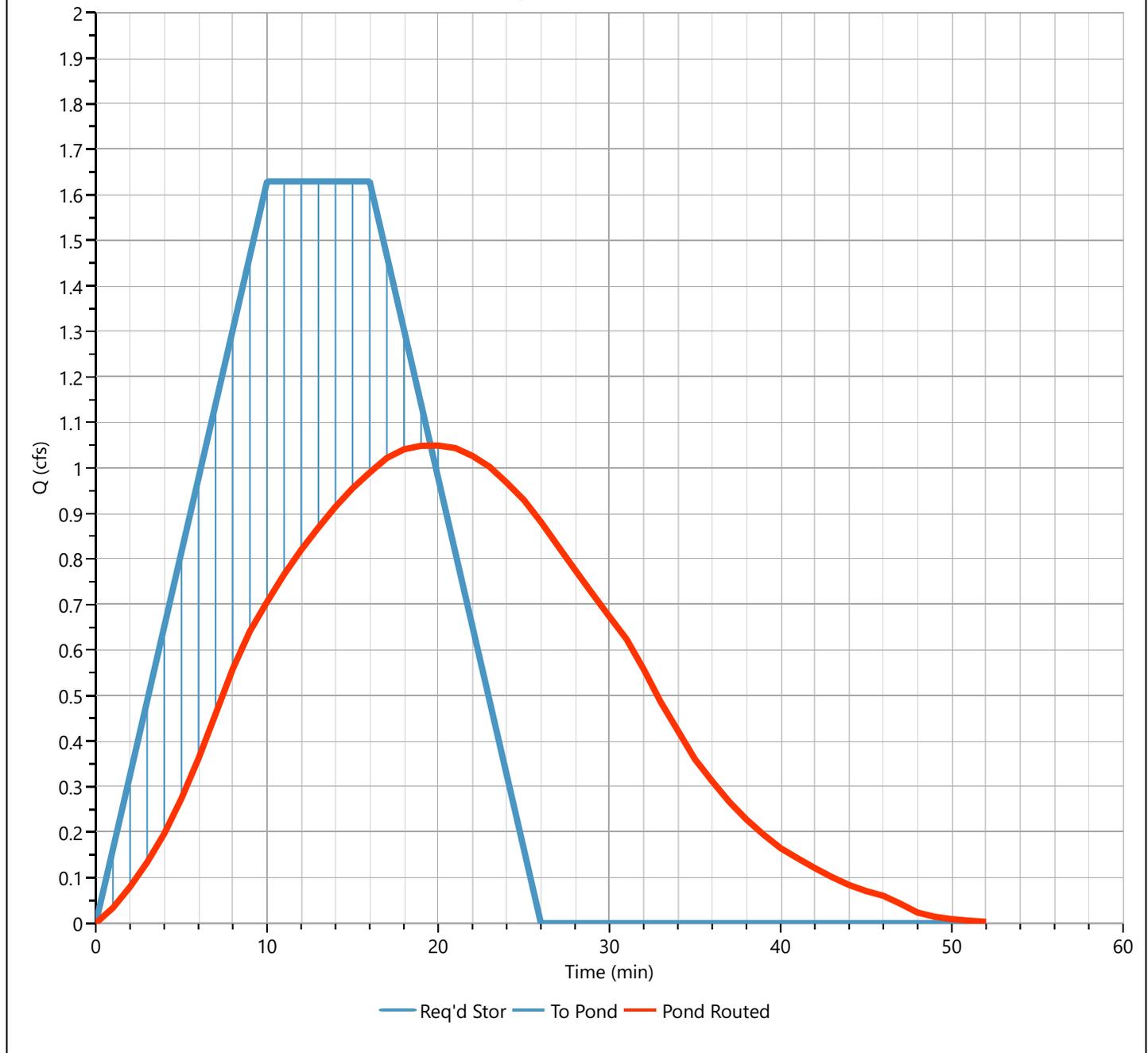
Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 1.049 cfs
Storm Frequency	= 25-yr	Time to Peak	= 0.33 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,564 cuft
Inflow Hydrograph	= 3 - To Pond	Max. Elevation	= 60.17 ft
Pond Name	= Pond 1	Max. Storage	= 644 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 8 min

Qp = 1.05 cfs



Hydrograph 100-yr Summary

Project Name: 4273

Hydrology Studio v 3.0.0.27

08-08-2023

Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	Rational	Existing	2.039	0.17	1,223	---		
2	Rational	Bypass	0.059	0.17	35.1	---		
3	Mod Rational	To Pond	1.938	0.17	1,977	---		
4	Pond Route	Pond Routed	1.268	0.33	1,977	3	60.56	844

Hydrograph Report

Project Name: 4273

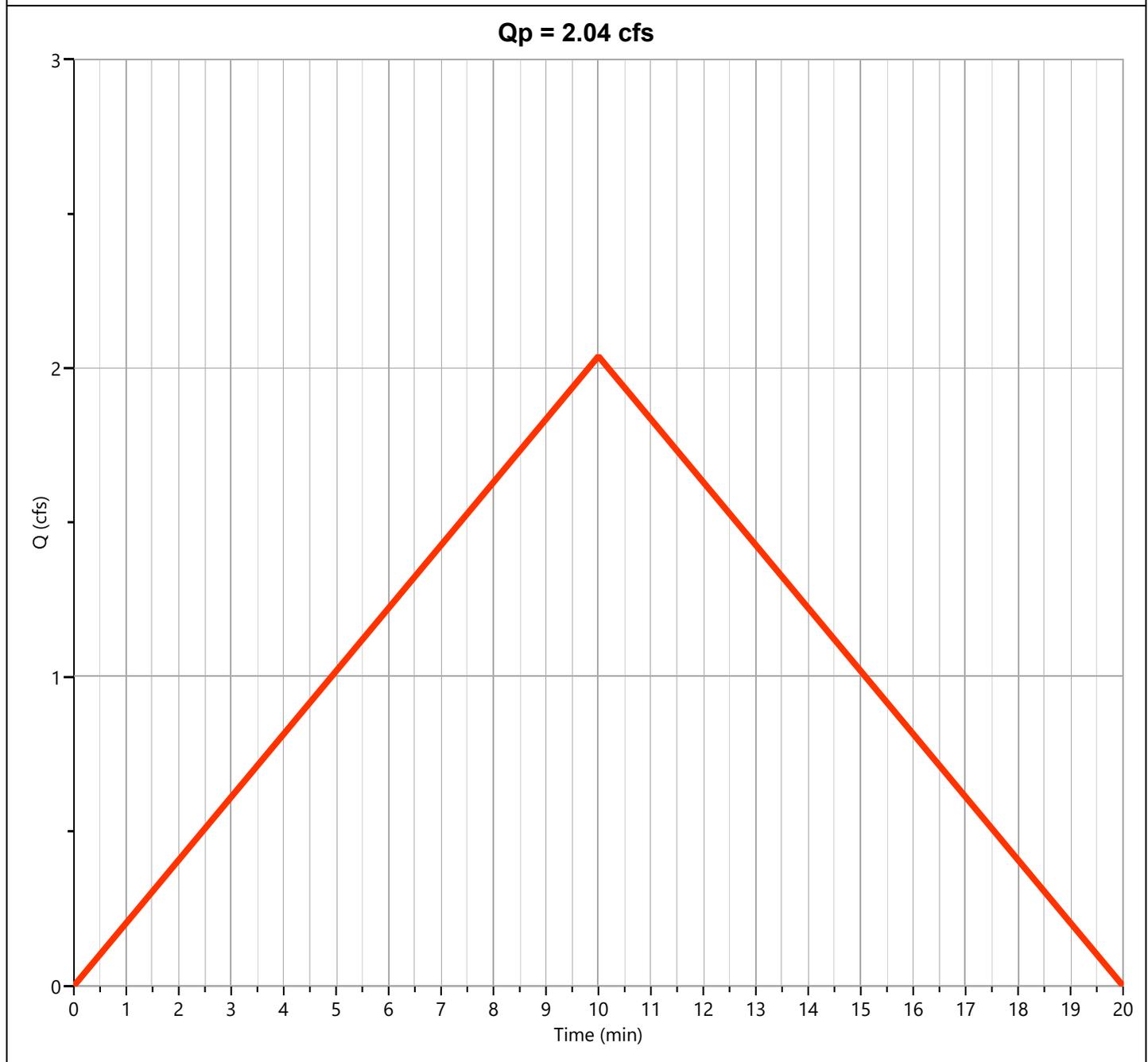
Hydrology Studio v 3.0.0.27

08-08-2023

Existing

Hyd. No. 1

Hydrograph Type	= Rational	Peak Flow	= 2.039 cfs
Storm Frequency	= 100-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 1,223 cuft
Drainage Area	= 0.353 ac	Runoff Coeff.	= 0.76
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
IDF Curve	= NJ RSIS 2017 IDF.idf	Intensity	= 7.60 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1



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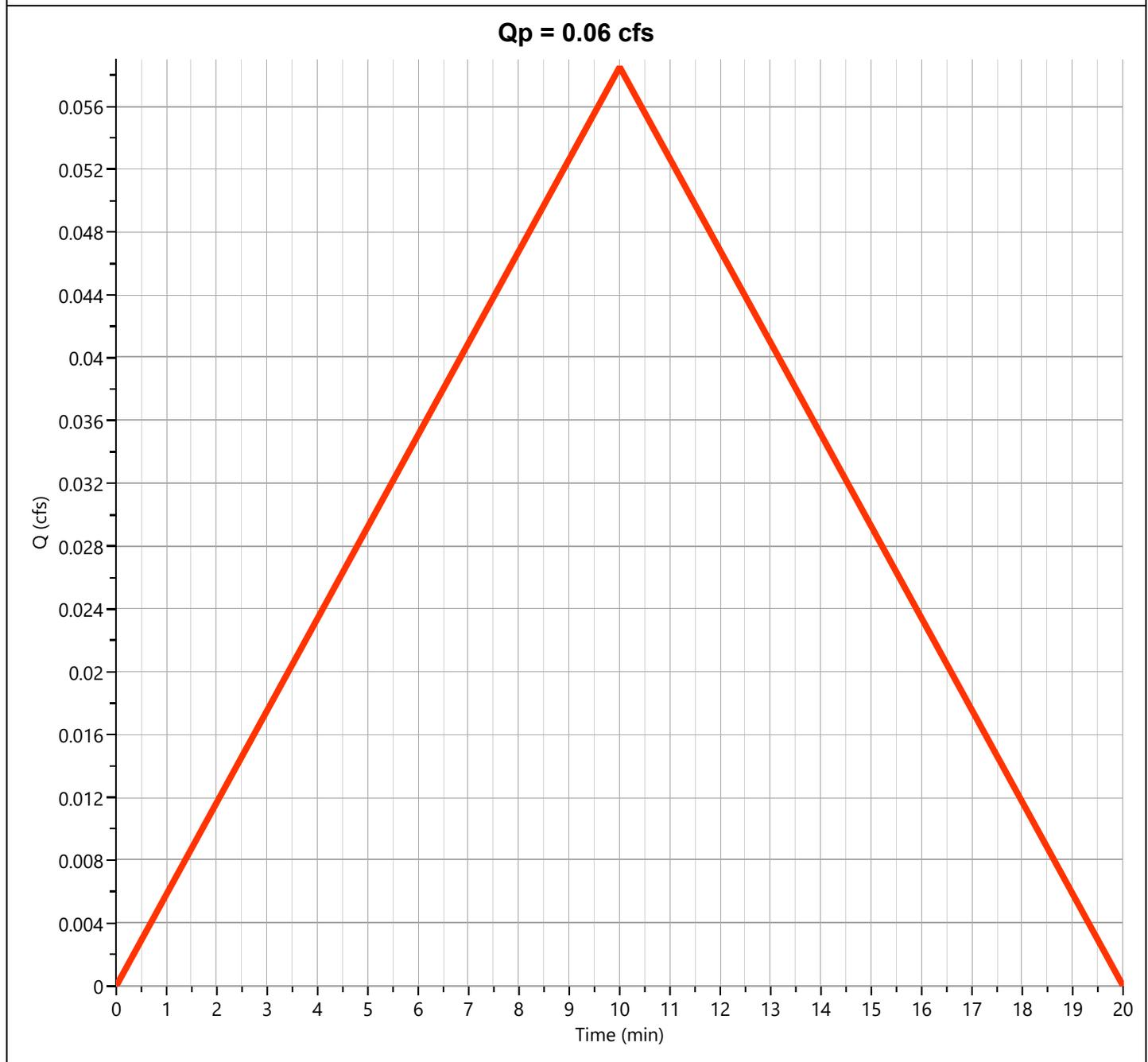
Hydrology Studio v 3.0.0.27

08-08-2023

Bypass

Hyd. No. 2

Hydrograph Type	= Rational	Peak Flow	= 0.059 cfs
Storm Frequency	= 100-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 35.1 cuft
Drainage Area	= 0.014 ac	Runoff Coeff.	= 0.55
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
IDF Curve	= NJ RSIS 2017 IDF.idf	Intensity	= 7.60 in/hr
Freq. Corr. Factor	= 1.00	Asc/Rec Limb Factors	= 1/1



Hydrograph Report

Project Name: 4273

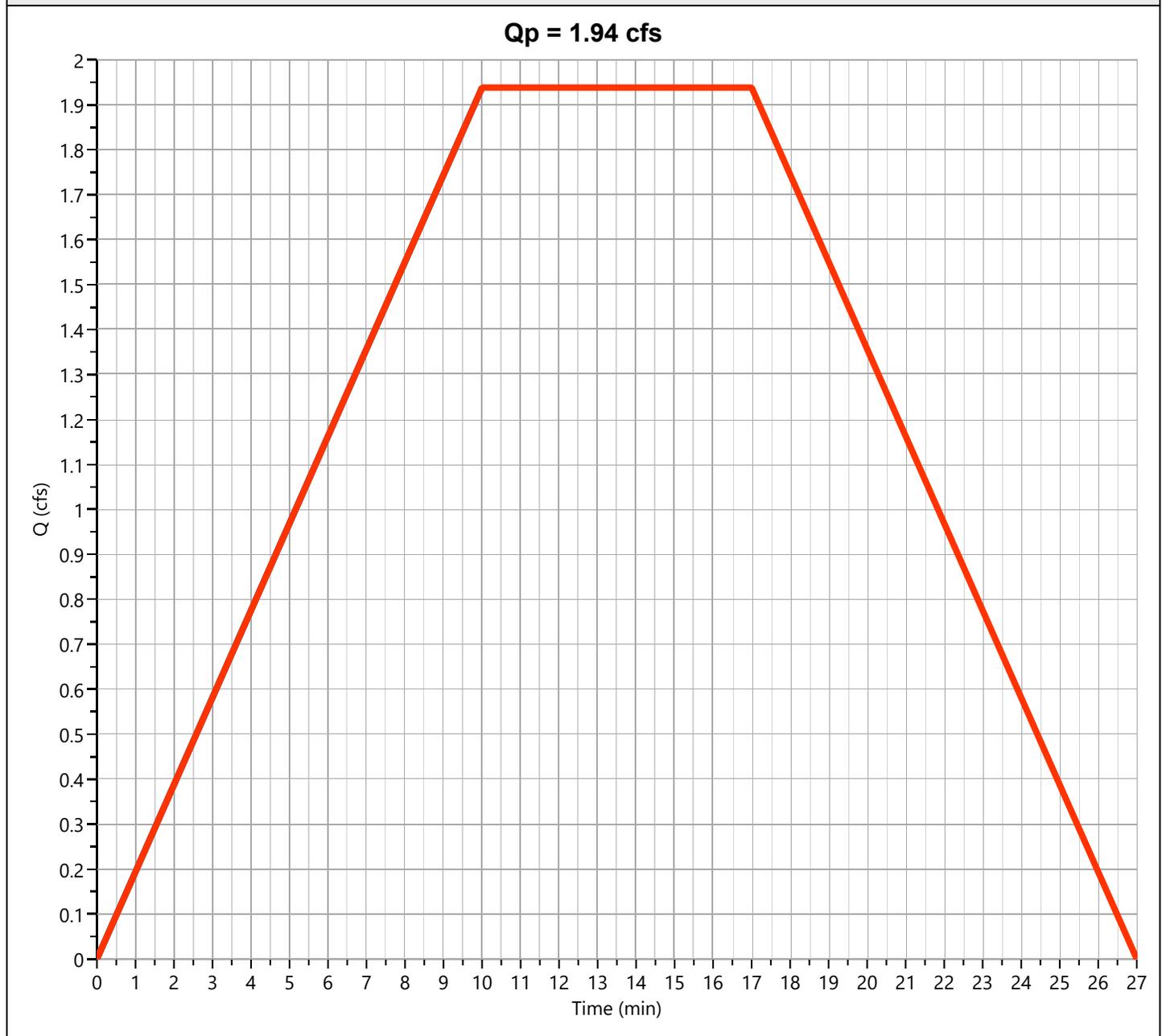
Hydrology Studio v 3.0.0.27

08-08-2023

To Pond

Hyd. No. 3

Hydrograph Type	= Mod Rational	Peak Flow	= 1.938 cfs
Storm Frequency	= 100-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 1,977 cuft
Drainage Area	= 0.339 ac	Runoff Coeff.	= 0.92
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
IDF Curve	= NJ RSIS 2017 IDF.idf	Intensity	= 6.21 in/hr
Freq. Corr. Factor	= 1.00	Storm Duration	= 1.7 x Tc
Target Q	= 1.980 cfs	Required Storage	= 373 cuft



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Hydrology Studio v 3.0.0.27

08-08-2023

Pond Routed

Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 1.268 cfs
Storm Frequency	= 100-yr	Time to Peak	= 0.33 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,977 cuft
Inflow Hydrograph	= 3 - To Pond	Max. Elevation	= 60.56 ft
Pond Name	= Pond 1	Max. Storage	= 844 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 9 min

Qp = 1.27 cfs

