DRAINAGE CALCULATIONS

FOR

17-19 COLFAX STREET

(BLOCK 95 – LOTS 12 & 13)

BOROUGH OF RARITAN, SOMERSET COUNTY, NEW JERSEY

Prepared By:

ENGINEERING ASSOCIATES

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Certificate of Authorization Number 24GA28108300

Date: February 08, 2023

Project Number: 4273

Matthew G. Clark, P.E.

N.J. Professional Engineer License No. 40394

Impervious Area Summary:

Existing = 8,042 sf.
Proposed = 12,756 sf.

Difference = (12,756 sf. – 8,042 sf.) = + 4,714 sf. (0.108 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, & 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.

Cw = (7,352 x 0.25) + (8,042 x 0.99) / 15,394.00 = 0.61

Proposed Conditions (see attached map):

Lot Area to Subsurface Detention System = 14,003.00 sf. (0.321 ac.):

- Pervious area = 1,309 sf.
- Impervious area = 12,694 sf.

Cw = (1,309 x 0.25) + (12,694 x 0.99) / 14,003 = 0.92

Lot Area to "By Pass" Subsurface Detention System = 1,391 sf. (0.032 ac.):

- Pervious area = 1,329 sf.
- Impervious area = 62 sf.

Cw = (1,329 x 0.25) + (62 x 0.99) / 1,391 = 0.28

Stormwater Summary Table

Storm Event	Existing Peak Flow (cfs.)	Proposed Bypass Flow (cfs.)	Target Flow from Pond (cfs.)	Routed Peak Flow from Pond (cfs.)	Maximum Water Surface Elevation (ft.)	Maximum Storage (cf.)
2 Year	0.900	0.037	0.863	0.864	60.01	207
10 Year	1.196	0.050	1.146	1.099	60.24	318
100 Year	1.636	0.068	1.568	1.418	60.62	487

Note:

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

17–19 COLFAX STREET

EXISTING CONDITIONS

0' 30' 60'

GRAPHIC SCALE

SCALE: 1"=2,000' ±

IMPERVIOUS AREA

MCB ENGINEERING ASSOCIATES, L.L.C.

P.O. BOX 588, 11 FURLER STREET
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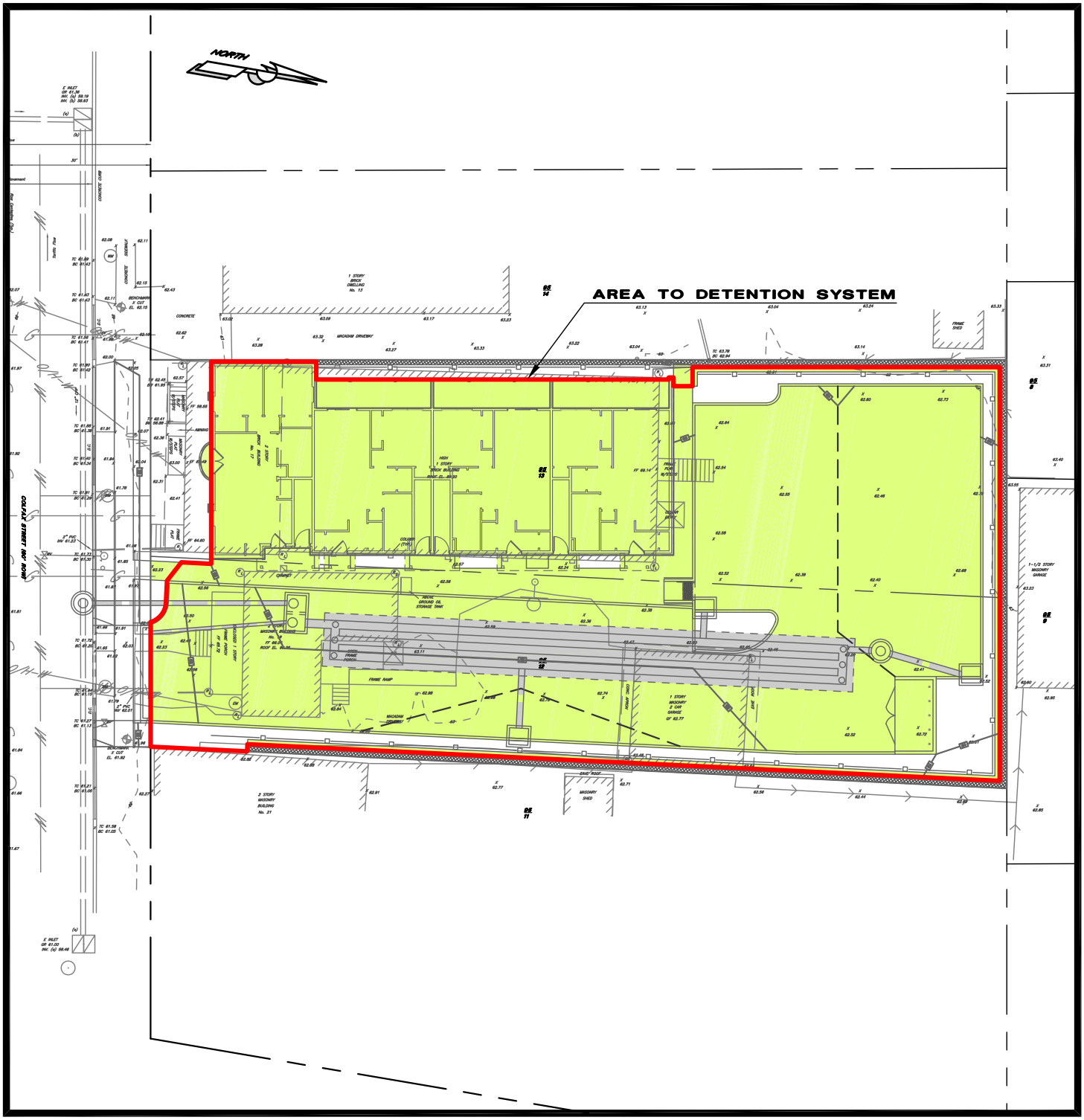
PHONE: (973) 812–6680 – FACSIMILE: (973) 812–6681
Email: mcbea@mcbea.com – Certificate of Authorization No. 24GA28108300

PROJ. No. 4273



17–19 COLFAX STREET

PROPOSED CONDITIONS

0' 30' 60'

GRAPHIC SCALE

SCALE: 1"=2,000' ±

IMPERVIOUS AREA

MCB ENGINEERING ASSOCIATES, L.L.C.
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PROJ. No. 4273

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Basin Model

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Hydrograph by Return Period

Project Name: 4273

02-08-2023

Hydrology Studio v 3.0.0.26

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		0.900			1.196			1.636
2	Rational	Bypass		0.037			0.050			0.068
3	Mod Rational	To Pond		0.921			1.211			1.553
4	Pond Route	Pond Routed		0.864			1.099			1.418

Hydrograph 2-yr Summary

Project Name: 4273

02-08-2023

Hydrology Studio v 3.0.0.26

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	0.900	0.17	540	----		
2	Rational	Bypass	0.037	0.17	22.5	----		
3	Mod Rational	To Pond	0.921	0.17	1,050	----		
4	Pond Route	Pond Routed	0.864	0.33	1,050	3	60.01	207

Hydrograph Report

Project Name: 4273

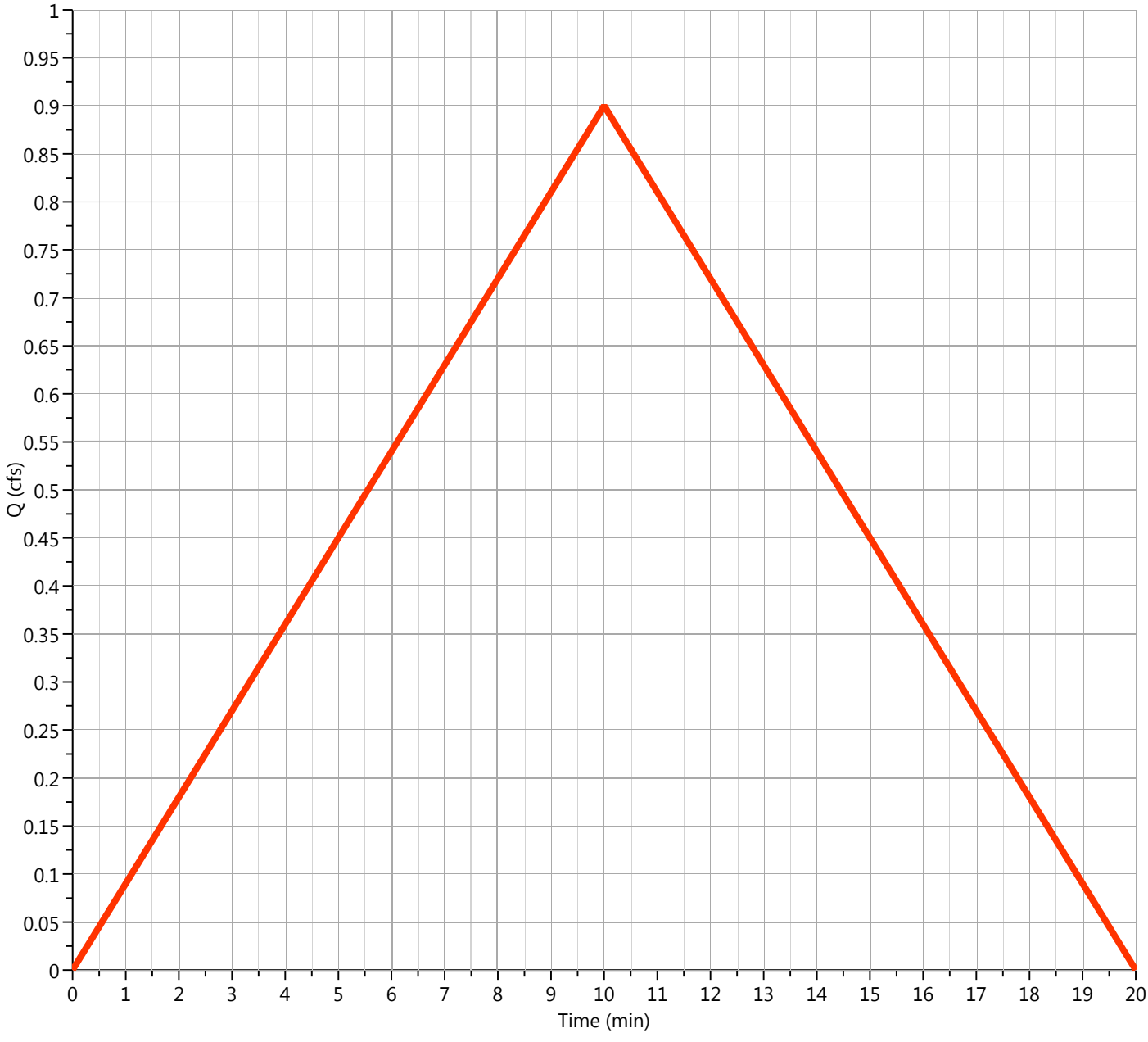
Hydrology Studio v 3.0.0.26

02-08-2023

Existing

Hyd. No. 1

Hydrograph Type	= Rational	Peak Flow	= 0.900 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 540 cuft
Drainage Area	= 0.353 ac	Runoff Coeff.	= 0.61
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

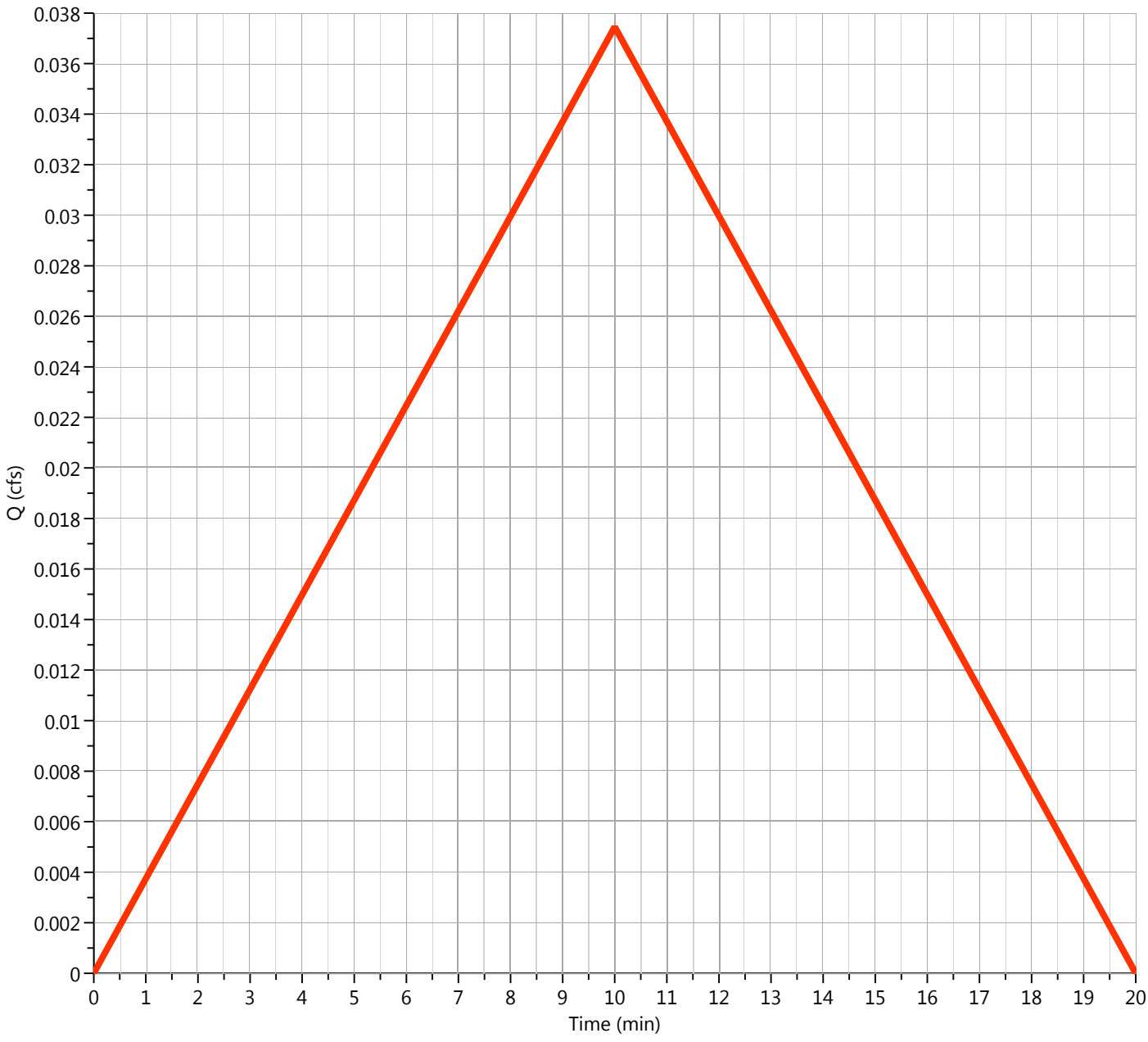


Hydrograph Report

Bypass

Hyd. No. 2

Hydrograph Type	= Rational	Peak Flow	= 0.037 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 22.5 cuft
Drainage Area	= 0.032 ac	Runoff Coeff.	= 0.28
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

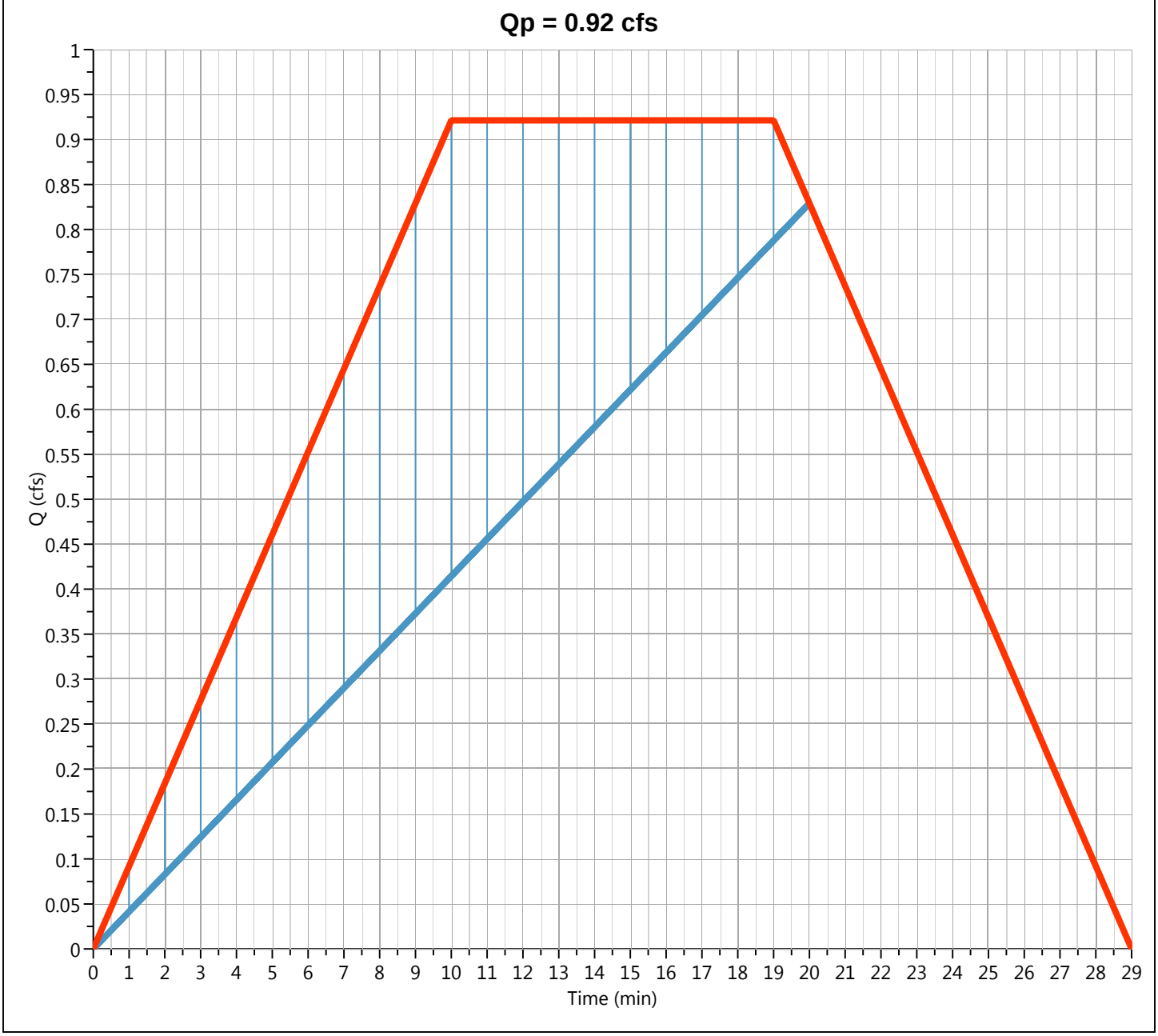
Hydrology Studio v 3.0.0.26

02-08-2023

To Pond

Hyd. No. 3

Hydrograph Type	= Mod Rational	Peak Flow	= 0.921 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 1,050 cuft
Drainage Area	= 0.321 ac	Runoff Coeff.	= 0.92
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
IDF Curve	= NJ RSIS 2017 IDF.idf	Intensity	= 3.12 in/hr
Freq. Corr. Factor	= 1.00	Storm Duration	= 1.9 x Tc
Target Q	= 0.863 cfs	Required Storage	= 299 cuft



Hydrograph Report

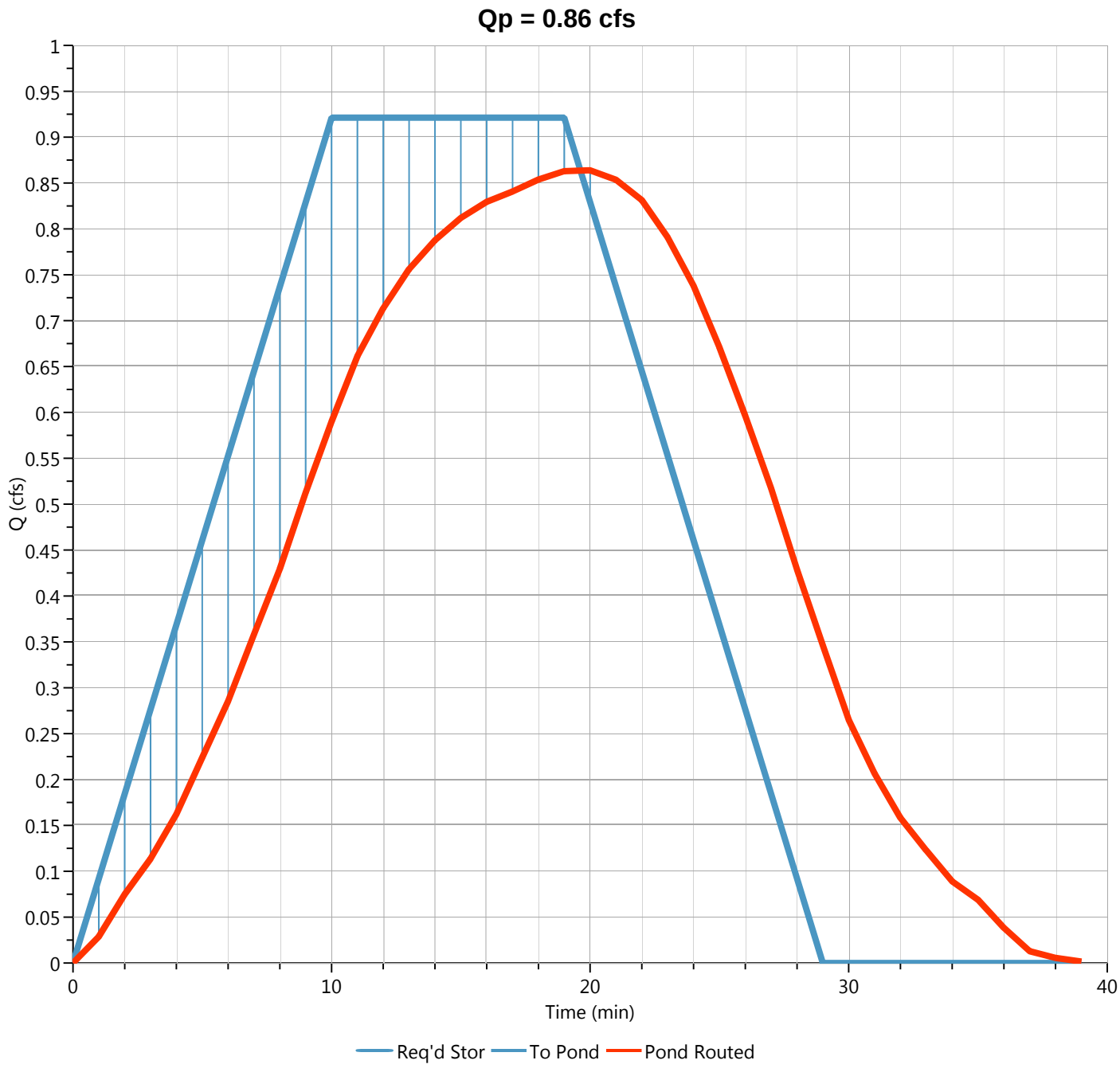
Pond Routed

Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 0.864 cfs
Storm Frequency	= 2-yr	Time to Peak	= 0.33 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,050 cuft
Inflow Hydrograph	= 3 - To Pond	Max. Elevation	= 60.01 ft
Pond Name	= Pond 1	Max. Storage	= 207 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 4 min



Pond Report

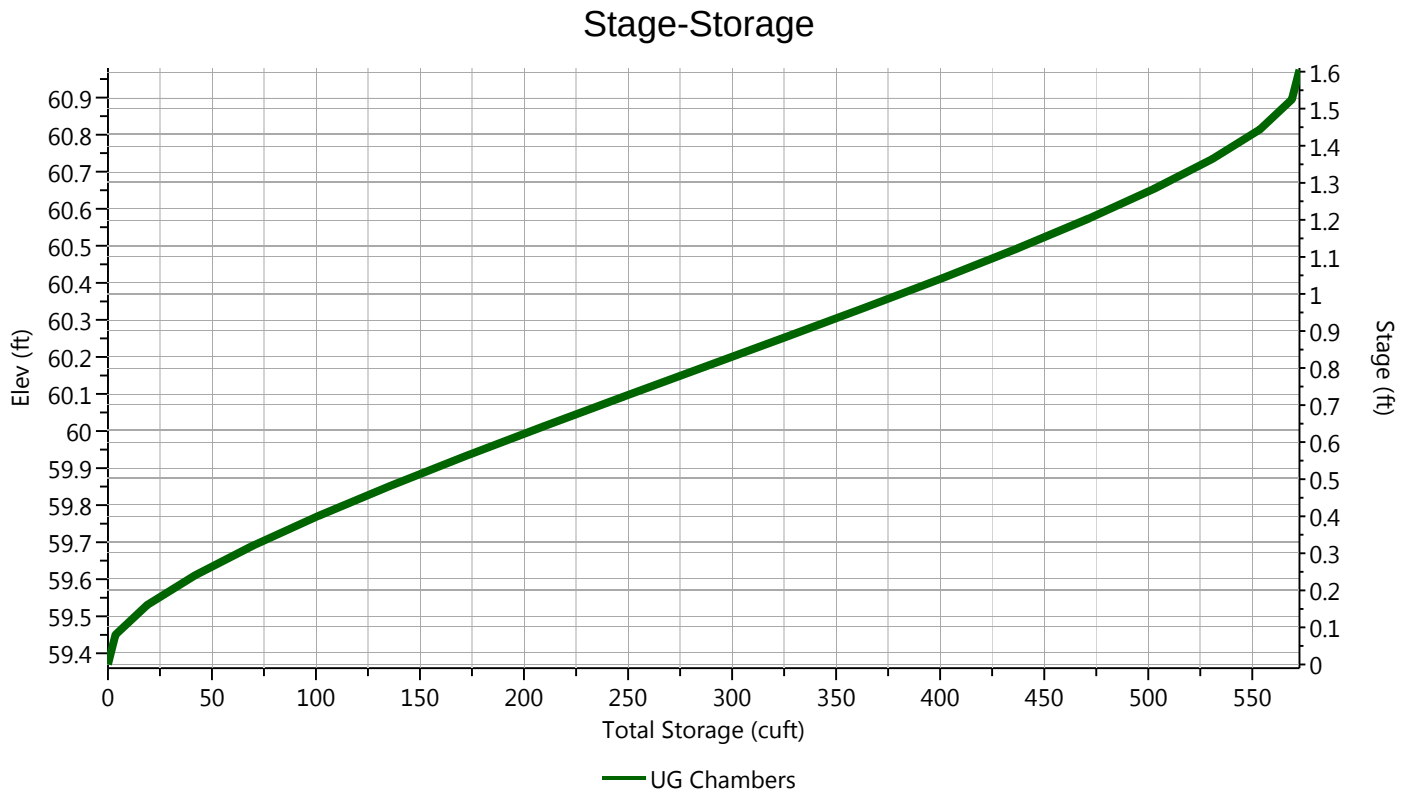
Pond 1

Stage-Storage

Underground Chambers	
Description	**Input**
Invert Elev Down, ft	59.37
Chamber Rise, ft	1.50
Chamber Shape	Circular
Chamber Span, ft	1.50
Barrel Length, ft	105.00
No. Barrels	3
Barrel Slope, %	0.10
Headers, y/n	Yes
Stone Encasement, y/n	No
Encasement Bottom Elevation, ft	0.00
Encasement Width per Chamber, ft	0.00
Encasement Depth, ft	0.00
Encasement Voids, %	40.00

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour Area (sqft)	Incr. Storage (cuft)	Total Storage (cuft)
0.00	59.37	n/a	0.000	0.000
0.08	59.45	n/a	3.66	3.66
0.16	59.53	n/a	15.3	18.9
0.24	59.61	n/a	23.0	42.0
0.32	59.69	n/a	27.9	69.9
0.40	59.77	n/a	31.5	101
0.48	59.85	n/a	34.2	135
0.56	59.93	n/a	36.1	172
0.64	60.01	n/a	37.5	209
0.72	60.09	n/a	38.5	248
0.80	60.17	n/a	38.9	286
0.88	60.25	n/a	39.0	325
0.96	60.33	n/a	38.3	364
1.04	60.41	n/a	37.6	401
1.12	60.49	n/a	36.1	437
1.20	60.57	n/a	34.1	471
1.28	60.65	n/a	31.4	503
1.36	60.73	n/a	27.9	531
1.44	60.81	n/a	23.0	554
1.52	60.89	n/a	15.2	569
1.61	60.98	n/a	3.65	573



Pond 1

Stage-Discharge

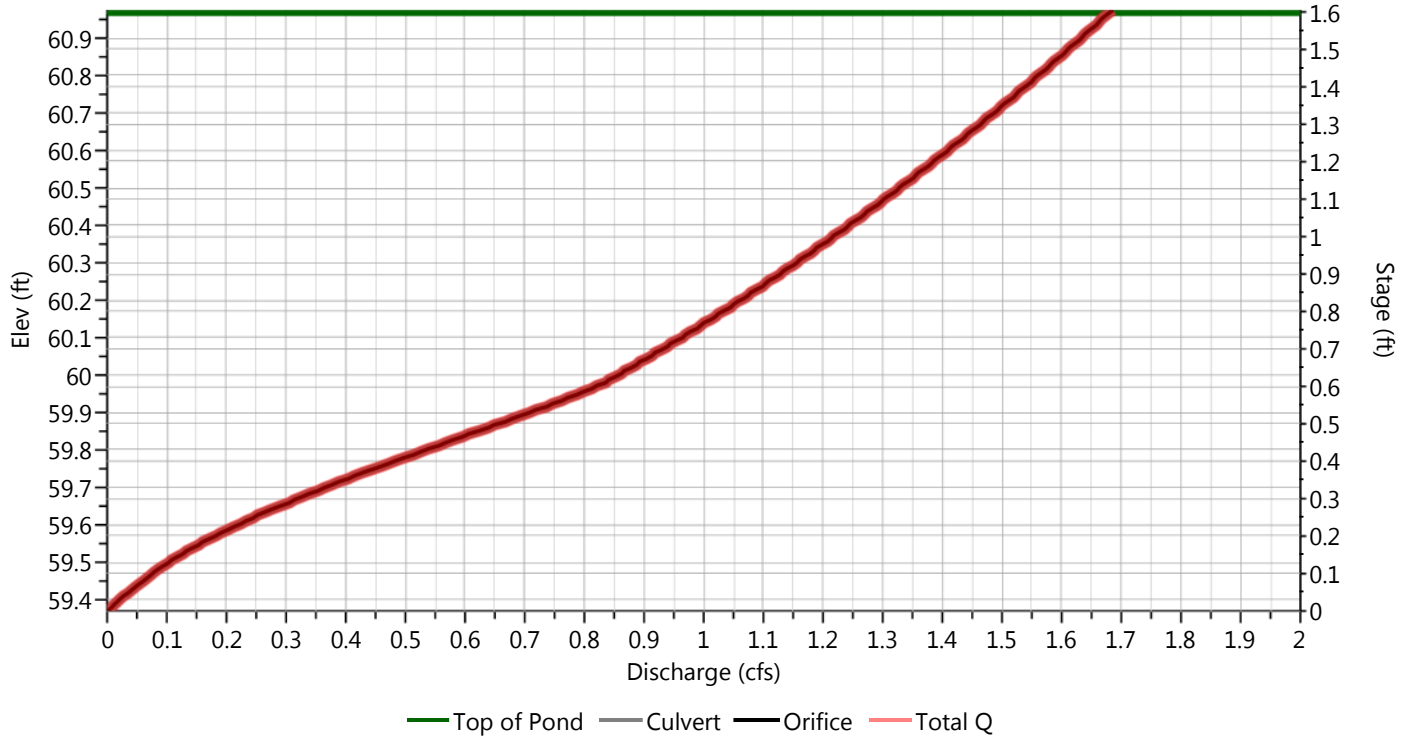
Culvert / Orifices	Culvert	Orifices		
		1*	2	3
Rise, in	12	8		
Span, in	12	8		
No. Barrels	1	1		
Invert Elevation, ft	59.27	59.32		
Orifice Coefficient, Co	0.60	0.60		
Length, ft	41			
Barrel Slope, %	1			
N-Value, n	0.010			

Weirs	Riser*	Weirs		
		1	2	3
Shape / Type				
Crest Elevation, ft				
Crest Length, ft				
Angle, deg				
Weir Coefficient, Cw				

Perforated Riser	
Hole Diameter, in	
No. holes	
Invert Elevation, ft	
Height, ft	
Orifice Coefficient, Co	

Ancillary	
Exfiltration, in/hr	

**Routes through Culvert.*



Pond 1

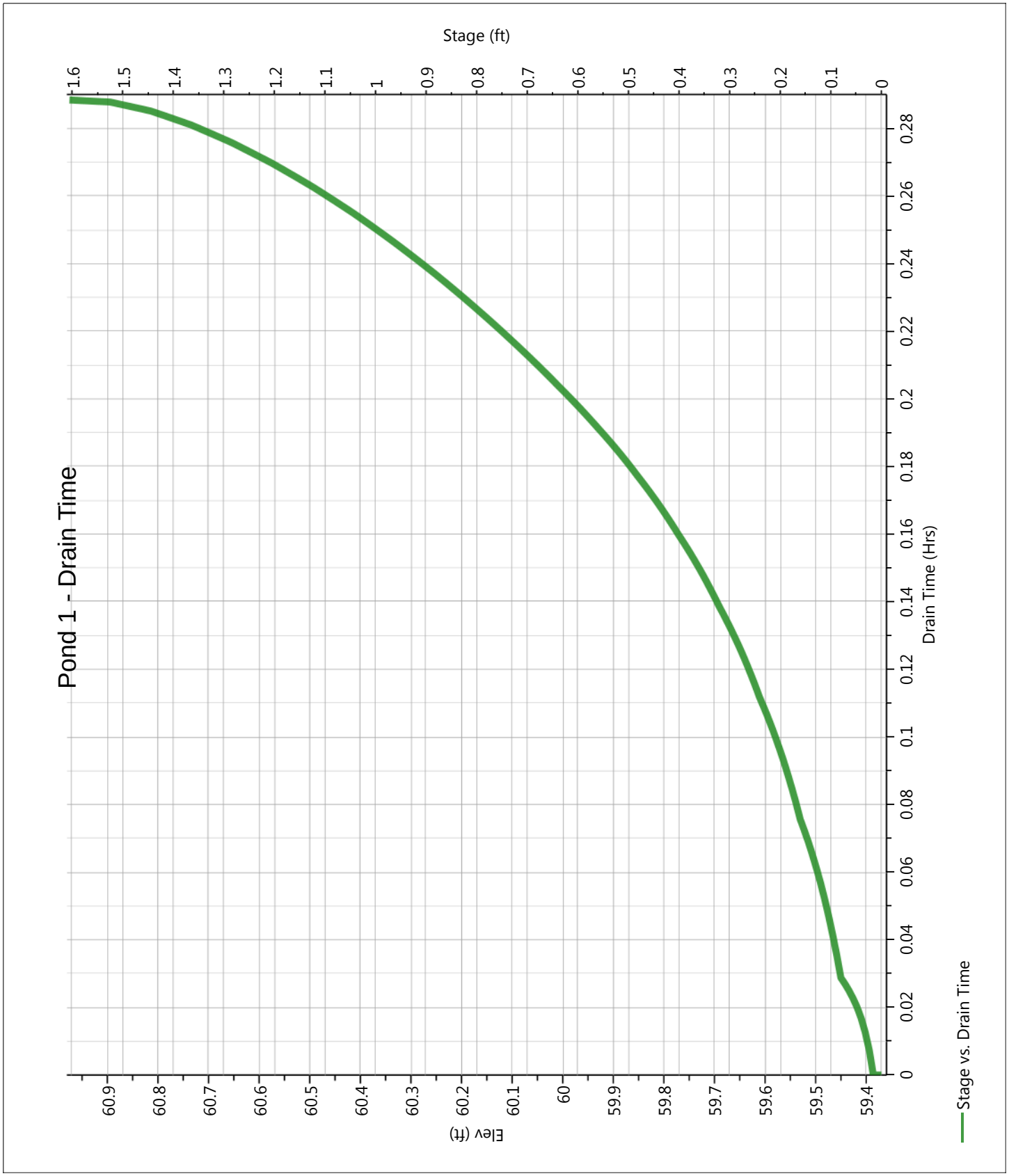
Stage-Storage-Discharge Summary

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	59.37	0.000	0.000	0.000										0.000
0.08	59.45	3.66	0.061 ic	0.061										0.061
0.16	59.53	18.9	0.133 ic	0.133										0.133
0.24	59.61	42.0	0.233 ic	0.233										0.233
0.32	59.69	69.9	0.353 ic	0.353										0.353
0.40	59.77	101	0.484 ic	0.484										0.484
0.48	59.85	135	0.624 ic	0.624										0.624
0.56	59.93	172	0.762 ic	0.762										0.762
0.64	60.01	209	0.867 ic	0.867										0.867
0.72	60.09	248	0.954 ic	0.954										0.954
0.80	60.17	286	1.034 ic	1.034										1.034
0.88	60.25	325	1.109 ic	1.109										1.109
0.96	60.33	364	1.185 ic	1.185										1.185
1.04	60.41	401	1.255 ic	1.255										1.255
1.12	60.49	437	1.324 ic	1.324										1.324
1.20	60.57	471	1.386 ic	1.386										1.386
1.28	60.65	503	1.450 ic	1.450										1.450
1.36	60.73	531	1.512 ic	1.512										1.512
1.44	60.81	554	1.572 ic	1.572										1.572
1.52	60.89	569	1.630 ic	1.630										1.630
1.61	60.98	573	1.686 ic	1.686										1.686

Suffix key: ic = inlet control, oc = outlet control, s = submerged weir

Pond 1

Pond Drawdown



Hydrograph 10-yr Summary

Project Name: 4273

02-08-2023

Hydrology Studio v 3.0.0.26

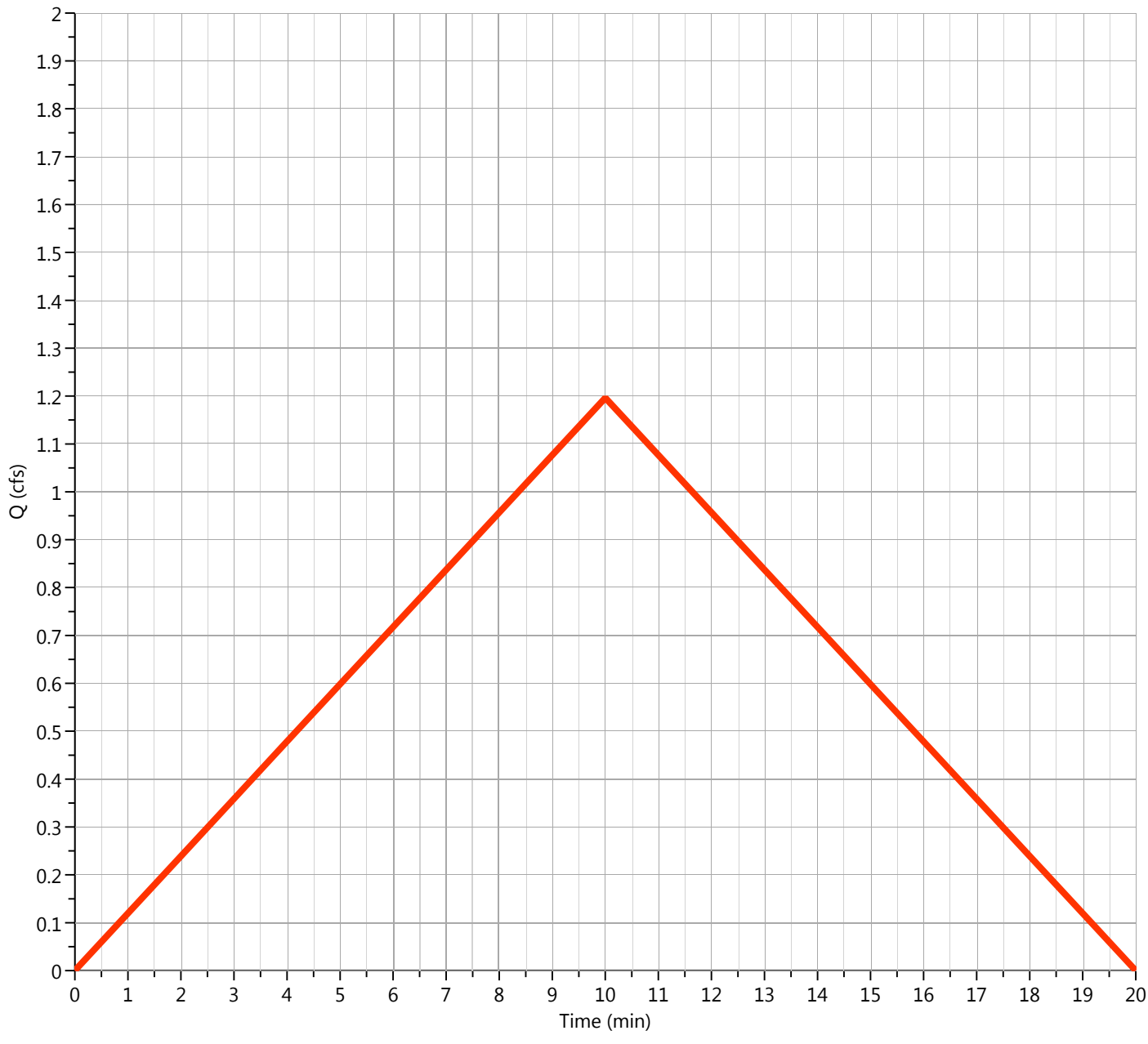
Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	Rational	Existing	1.196	0.17	718	----		
2	Rational	Bypass	0.050	0.17	29.9	----		
3	Mod Rational	To Pond	1.211	0.17	1,454	----		
4	Pond Route	Pond Routed	1.099	0.35	1,454	3	60.24	318

Hydrograph Report

Existing

Hyd. No. 1

Hydrograph Type	= Rational	Peak Flow	= 1.196 cfs
Storm Frequency	= 10-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 718 cuft
Drainage Area	= 0.353 ac	Runoff Coeff.	= 0.61
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

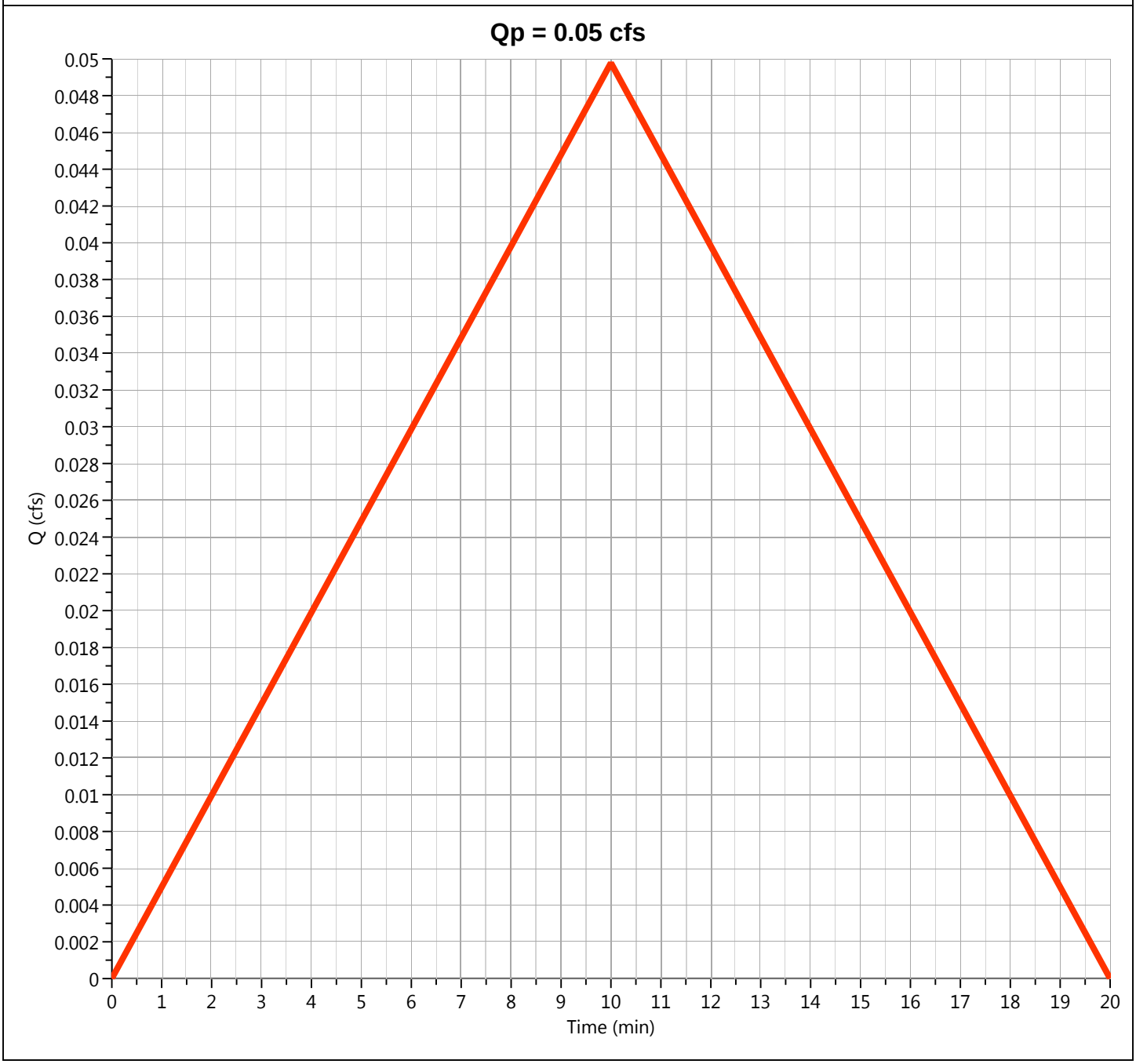


Hydrograph Report

Bypass

Hyd. No. 2

Hydrograph Type	= Rational	Peak Flow	= 0.050 cfs
Storm Frequency	= 10-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 29.9 cuft
Drainage Area	= 0.032 ac	Runoff Coeff.	= 0.28
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

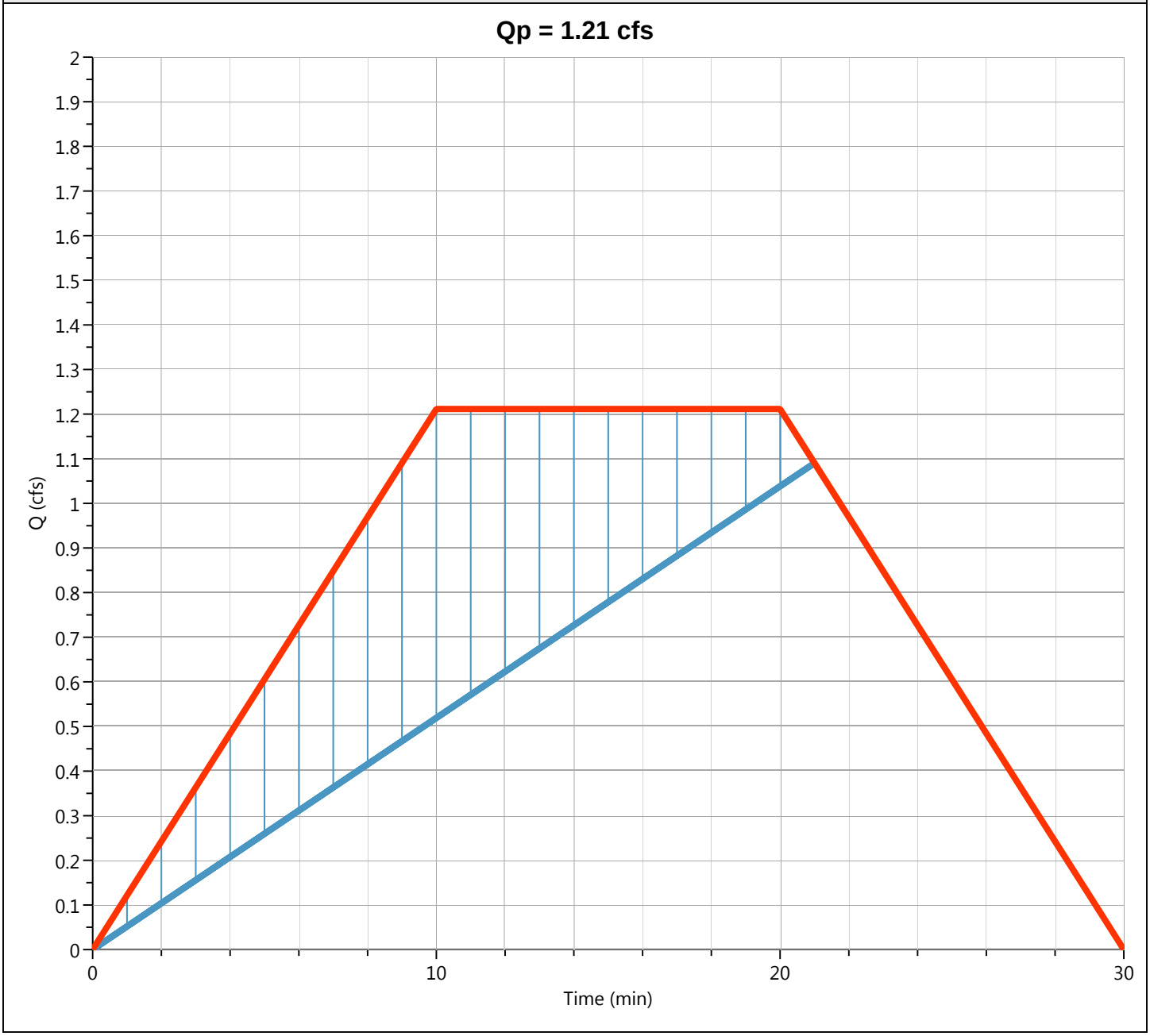
Hydrology Studio v 3.0.0.26

02-08-2023

To Pond

Hyd. No. 3

Hydrograph Type	= Mod Rational	Peak Flow	= 1.211 cfs
Storm Frequency	= 10-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 1,454 cuft
Drainage Area	= 0.321 ac	Runoff Coeff.	= 0.92
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
IDF Curve	= NJ RSIS 2017 IDF.idf	Intensity	= 4.10 in/hr
Freq. Corr. Factor	= 1.00	Storm Duration	= 2 x Tc
Target Q	= 1.146 cfs	Required Storage	= 422 cuft



Hydrograph Report

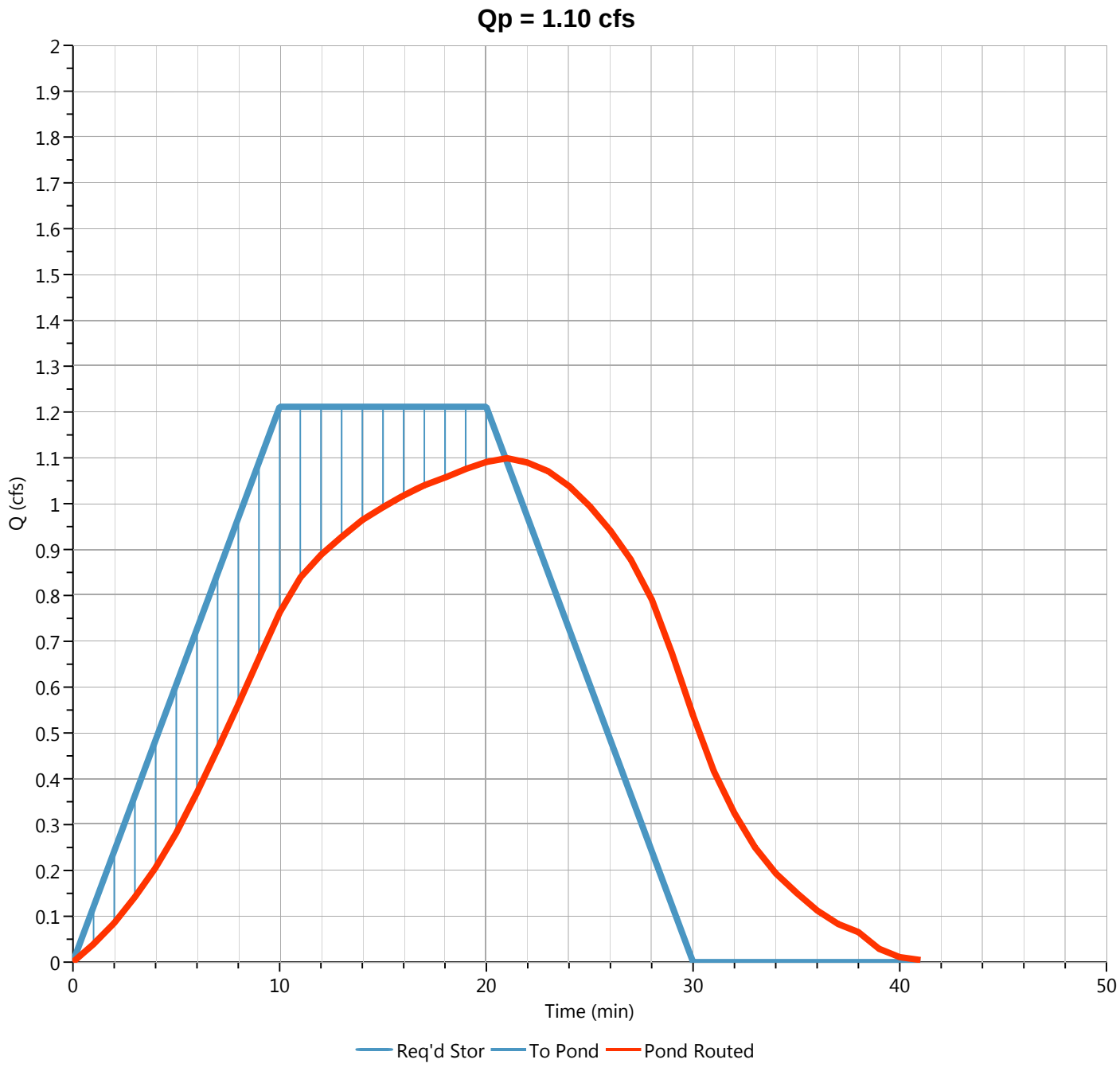
Pond Routed

Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 1.099 cfs
Storm Frequency	= 10-yr	Time to Peak	= 0.35 hrs
Time Interval	= 1 min	Hydrograph Volume	= 1,454 cuft
Inflow Hydrograph	= 3 - To Pond	Max. Elevation	= 60.24 ft
Pond Name	= Pond 1	Max. Storage	= 318 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 4 min



Hydrograph 100-yr Summary

Project Name: 4273

02-08-2023

Hydrology Studio v 3.0.0.26

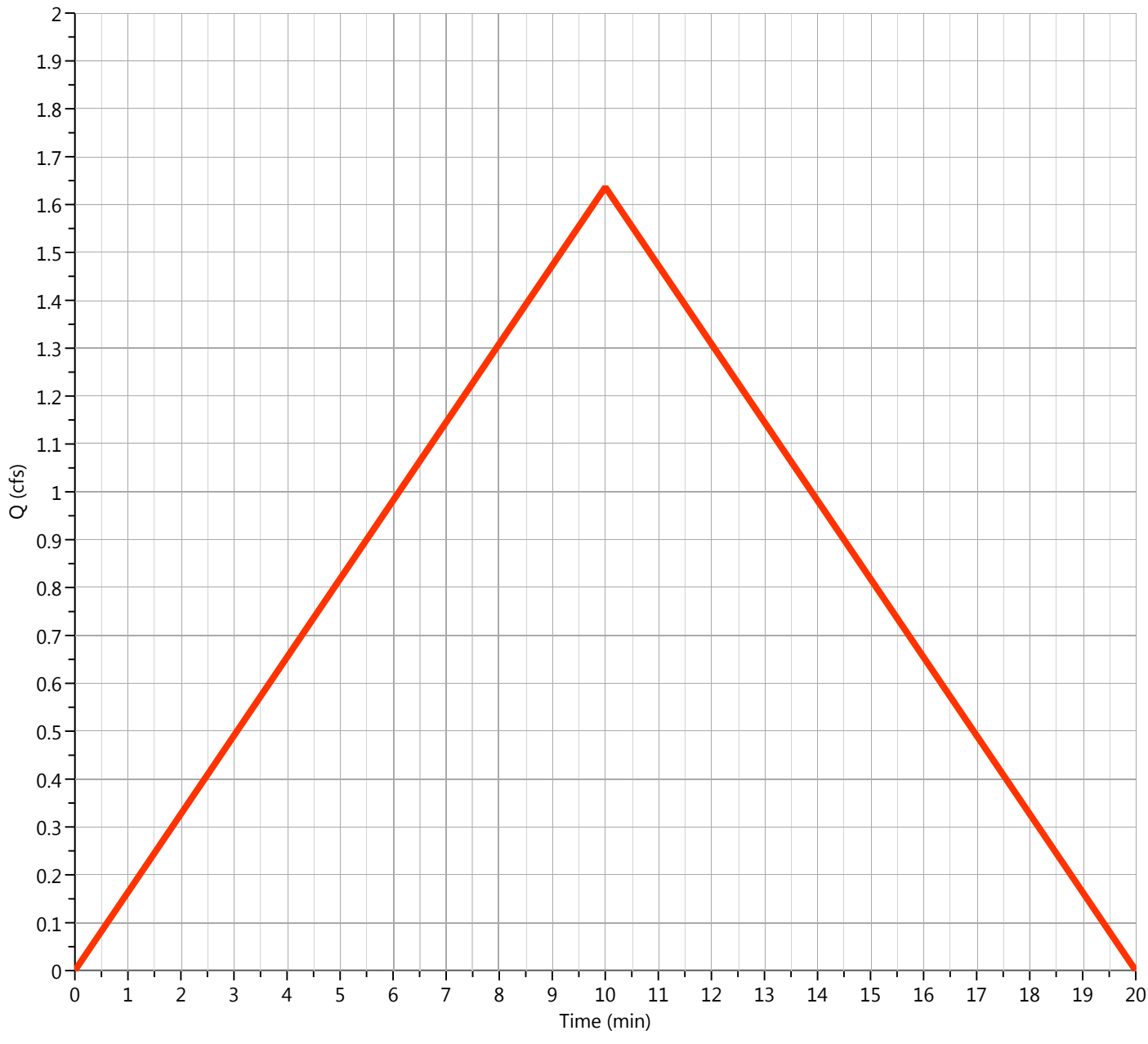
Hyd. No.	Hydrograph Type	Hydrograph Name	Peak Flow (cfs)	Time to Peak (hrs)	Hydrograph Volume (cuft)	Inflow Hyd(s)	Maximum Elevation (ft)	Maximum Storage (cuft)
1	Rational	Existing	1.636	0.17	982	----		
2	Rational	Bypass	0.068	0.17	40.9	----		
3	Mod Rational	To Pond	1.553	0.17	2,237	----		
4	Pond Route	Pond Routed	1.418	0.40	2,144	3	60.62	487

Hydrograph Report

Existing

Hyd. No. 1

Hydrograph Type	= Rational	Peak Flow	= 1.636 cfs
Storm Frequency	= 100-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 982 cuft
Drainage Area	= 0.353 ac	Runoff Coeff.	= 0.61
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

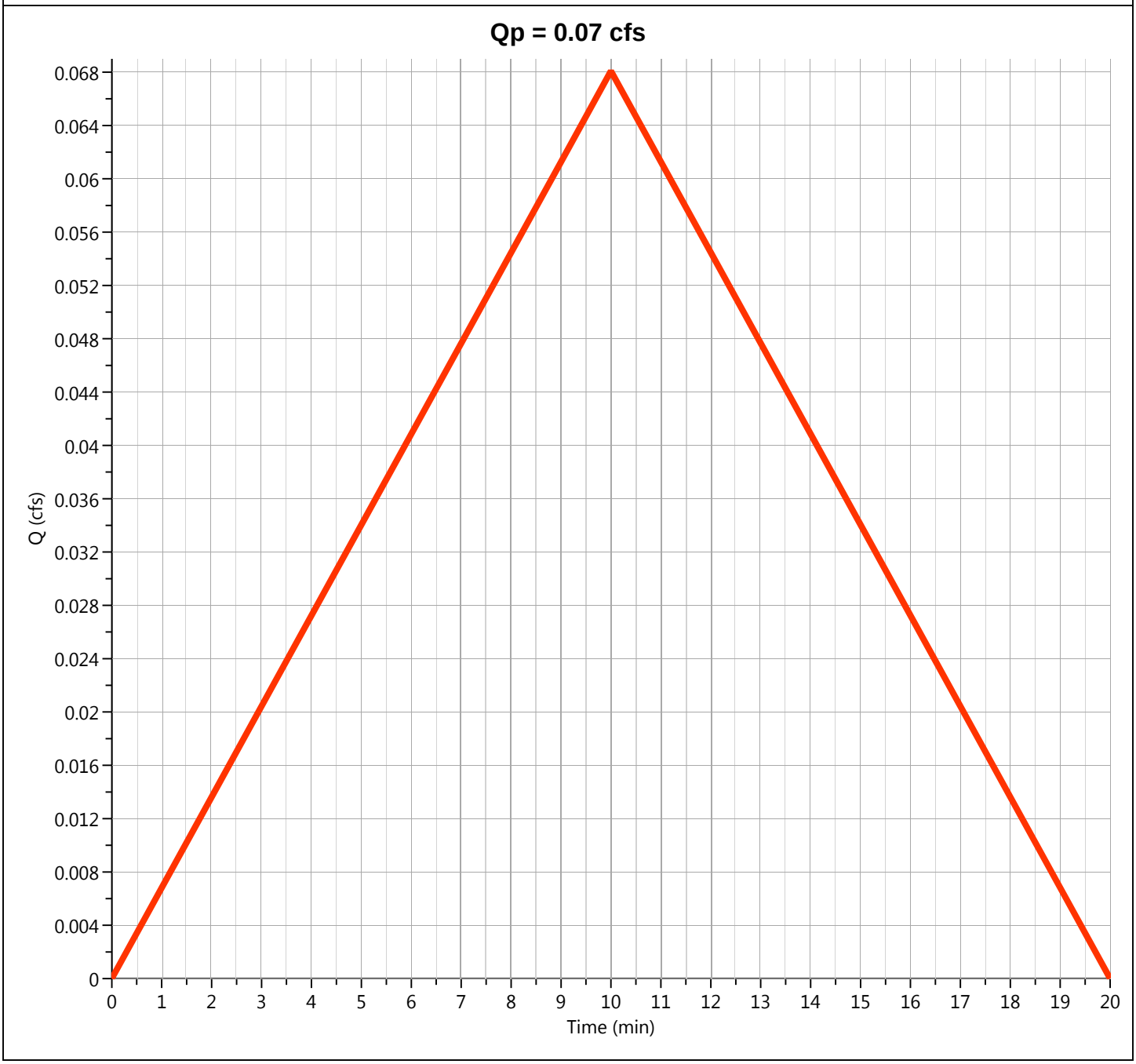


Hydrograph Report

Bypass

Hyd. No. 2

Hydrograph Type	= Rational	Peak Flow	= 0.068 cfs
Storm Frequency	= 100-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 40.9 cuft
Drainage Area	= 0.032 ac	Runoff Coeff.	= 0.28
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

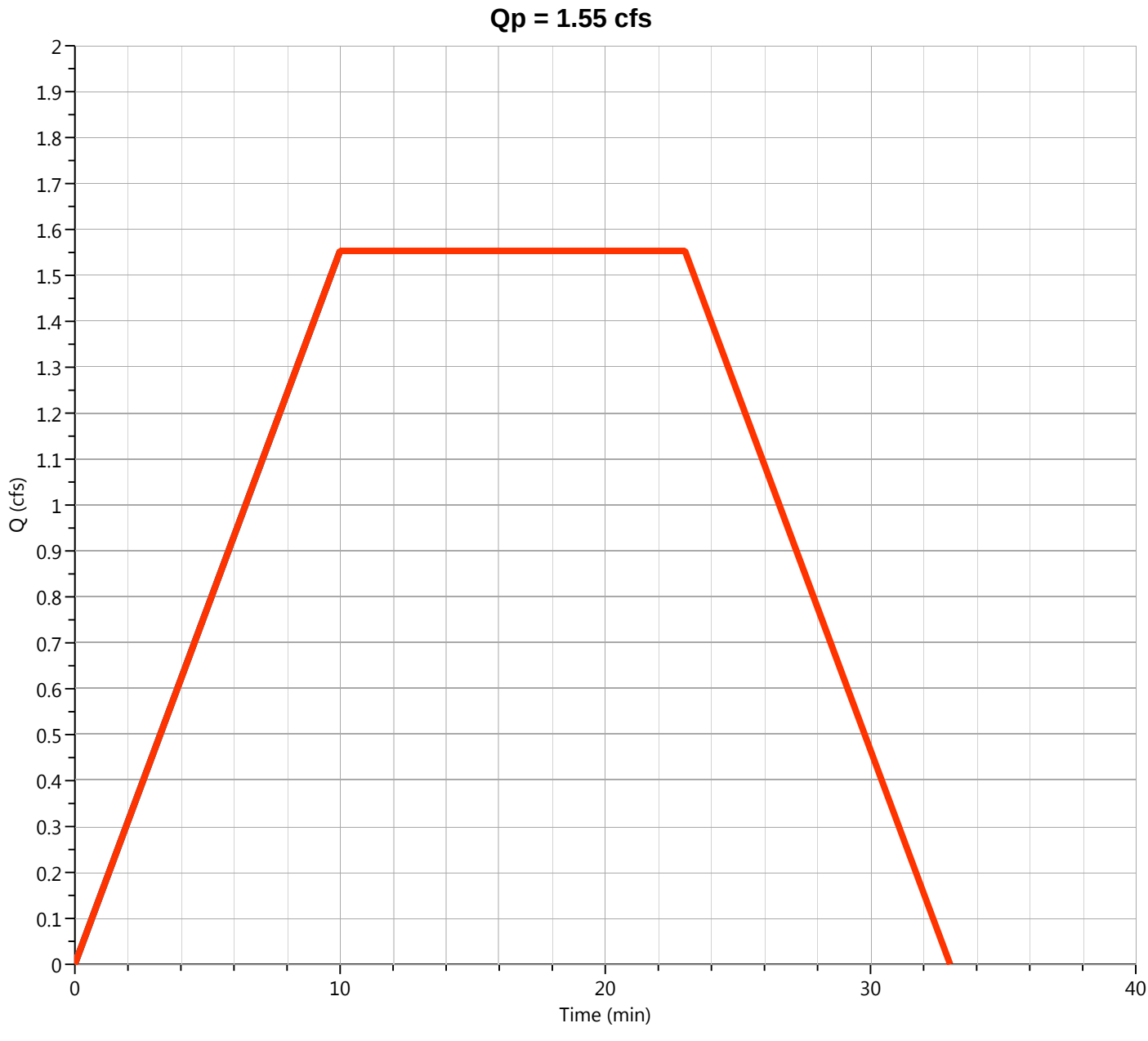


Hydrograph Report

To Pond

Hyd. No. 3

Hydrograph Type	= Mod Rational	Peak Flow	= 1.553 cfs
Storm Frequency	= 100-yr	Time to Peak	= 0.17 hrs
Time Interval	= 1 min	Runoff Volume	= 2,237 cuft
Drainage Area	= 0.321 ac	Runoff Coeff.	= 0.92
Tc Method	= User	Time of Conc. (Tc)	= 10.0 min
IDF Curve	= NJ RSIS 2017 IDF.idf	Intensity	= 5.26 in/hr
Freq. Corr. Factor	= 1.00	Storm Duration	= 2.4 x Tc
Target Q	= 1.568 cfs	Required Storage	= 685 cuft



Hydrograph Report

Pond Routed

Hyd. No. 4

Hydrograph Type	= Pond Route	Peak Flow	= 1.418 cfs
Storm Frequency	= 100-yr	Time to Peak	= 0.40 hrs
Time Interval	= 1 min	Hydrograph Volume	= 2,144 cuft
Inflow Hydrograph	= 3 - To Pond	Max. Elevation	= 60.62 ft
Pond Name	= Pond 1	Max. Storage	= 487 cuft

Pond Routing by Storage Indication Method

Center of mass detention time = 5 min