

# DRESDNER ROBIN

## STORMWATER MANAGEMENT & ENGINEERS REPORT

650 GROVE STREET

BLOCK 6101, LOTS 2 & 3

JERSEY CITY, HUDSON COUNTY, NJ

DRESDNER ROBIN PROJECT NO.: 10382-094

**PREPARED FOR**

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Jersey City, NJ 07310

**PREPARED BY**

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**DATE**

May 2021

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## 1.0 INTRODUCTION

The 650 Grove Street development project consists of a mixed-use development including a 10-story residential tower and a 2-story parking garage. The project site is located on 18th Street between Grove Street and Marin Boulevard in Jersey City's Jersey Avenue Light Rail Redevelopment Area. The development is to contain 108 residential units with the residential lobby entrance situated at the northwest corner of the building on 18th Street. The development also includes 34,346 sf of office space with an office lobby situated along 18<sup>th</sup> Street. The proposed 2-level parking garage has a vehicle entrance on the north side of the building at 18th Street.

As noted above, the project site contains 39,543 SF (0.908 acres). The site is composed of vacant land covered with meadow surface vegetation with limited amounts of debris. The entire project site will be disturbed by the construction of the proposed development and ancillary improvements discussed above. The applicant is seeking Preliminary and Final Site Plan approval for the 650 Grove Street Development Project. The project plans have been prepared in compliance with the provisions of the Jersey Avenue Light Rail Redevelopment Plan and the applicable provisions of the Jersey City Land Development Ordinance.

## 2.0 UTILITY SERVICES

The Project Site will be serviced by an existing utility and drainage infrastructure on 18th Street.

Sanitary sewage collection is handled by the Jersey City Municipal Utilities Authority (JCMUA). Secondary sewage treatment is provided by the Passaic Valley Sewage Commission's Newark Bay Treatment Plant. Water service is provided by JCMUA with finished water supplied to the Authority by United Water Jersey City. Telephone and digital broadband services are provided by Verizon and Comcast.

## 3.0 POTABLE WATER SERVICE

Potable water service for the project will be provided by way of connection to an existing 30-inch water main on 18th Street. The proposed building will be serviced by one 8-inch lateral into a water meter room at the northwestern side of the building. An isolation valve is proposed at the existing 30" water main between the proposed service lines for added resiliency in the event of an outage.

The estimated average total water demand for the development is 20,223 gallons per day. The anticipated peak water demand for the Tower is 60670 gallons per day. Residential potable water demand is based upon the requirements of the New Jersey Residential Site Improvement Standards (RSIS) at N.J.A.C. 5:21-5.1 and the distribution of unit types in the building. Nonresidential potable water demand is based upon New Jersey's Safe Drinking Water Act which is codified at N.J.A.C. 7:10-12.6 – TABLE 1. See Appendix A for the Water Demand Estimate which

has been prepared for this application. Based upon the projected demand for new water supply, this project will require a Bureau of Safe Drinking Water authorization which in Jersey City is provided pursuant to a master permit held by the Jersey City Municipal Utility Authority (JCMUA).

#### **4.0 SANITARY SEWER SERVICE**

Anticipated sewage flows from the proposed building will be handled by an existing 30" combined brick sewer pipe on 18th Street through an 8-inch SDR-35 PVC lateral at the northwestern side of the proposed building. Based upon the New Jersey Department of Environmental Protection (NJDEP) Treatment Works Regulations at N.J.A.C. 7:14A-23.3 and the current architectural design of the building, the estimated new daily sewage flow to be generated by the 650 Grove Street Development is 23,685 gallons per day. Based on the analysis provided in Appendix B, a proposed 8" SDR-35 PVC sanitary sewer laterals at 2.0 % minimum slope will have capacity for this demand. Since the anticipated new sewage flow from the proposed development exceeds 8,000 gallons per day, NJDEP Treatment Works Approval is required. In Jersey City, NJDEP Treatment Works Approval Applications must be endorsed by JCMUA and Passaic Valley Sewage Commission (PVSC) officials prior to being submitted to NJDEP for consideration.

#### **5.0 STORMWATER MANAGEMENT**

The proposed development 650 Grove Street will disturb roughly 49,800 square feet or 1.14 acres. As a result, the project is classified as a Major Development by the New Jersey Residential Site Improvement Standards (RSIS) Stormwater Regulations at N.J.A.C. 5:21-7 and the Jersey City Stormwater Control Ordinance. Under most circumstances, classification as a Major Development results in the need to tailor the site drainage design to address stormwater quality, peak runoff reductions and groundwater recharge criteria.

In the present condition, the project site is consisting of vacant land. The proposed development includes the proposed building, covering the majority of the site. A cast in place concrete detention basin inside the building underneath the ramp at the southeastern corner is proposed to accommodate and attenuate runoff from the developed site and is discharged to the existing 30" combined brick sewer pipe on Marin Boulevard with a backflow preventer.

Due to the project's classification as a 'Major Development' pursuant to the stormwater rules, the following stormwater criteria must be addressed in the design.

- Stormwater Quality: Per NJDEP, "Stormwater management measures shall only be required for water quality control if an additional one-quarter acre of impervious surface is being proposed on a development site." (N.J.A.C. 7:8-5.5). Despite the proposed increase in impervious surface coverage in excess of the threshold of ¼ acre, water quality treatment measures are not necessary for compliance with this

requirement. The proposed onsite impervious surface coverage consists of the building rooftop. No new impervious surface areas on the project site are subject to vehicular traffic. Runoff generated over rooftops and areas not subject to vehicular traffic is considered clean and need not be treated.

- **Runoff Peak Flow Reduction:** The site requires peak runoff reduction because the increase in impervious surface coverage is greater than one-quarter acre. In accordance with the New Jersey RSIS Stormwater Rules cited above, peak runoff reductions are required in order to accommodate developed peak runoff rates which are 50%, 75% and 80% of present peak runoff for the two-, 10 and 100-year storm events respectively. An underground cast in place concrete stormwater detention chamber is proposed to provide adequate runoff attenuation allowing for compliance with the regulation. The following table provides a summary of the present and developed peak runoff at the project site.

<b>650 Grove Street Preliminary and Final Site Plan RUNOFF SUMMARY TABLE</b>					
<b>Storm Event</b>	<b>Present Peak Runoff (cfs)</b>	<b>Developed Post-detention Peak Runoff (cfs)</b>	<b>Allowable % of Existing Peak Runoff</b>	<b>Allowable Peak Runoff (cfs)</b>	<b>Developed % of Existing Peak Runoff</b>
2	2.185	1.087	50%	1.093	49.75%
10	2.929	1.549	75%	2.197	52.88%
100	3.882	2.033	80%	3.106	52.37%

- **Groundwater Recharge:** The site is exempt from groundwater recharge requirements because it is located within New Jersey’s designated Metropolitan Planning Area (PA1) based on the State Planning Policy Map (SPPM). The applicable regulation reads: “This groundwater recharge requirement does not apply to projects that qualify as within the urban redevelopment area” (N.J.A.C. 7:8-5.4(a)2ii). An “Urban Redevelopment Area” is defined as: “delineated on the State Plan Policy Map (SPPM) as the Metropolitan Planning Area (PA1), Designated Centers, Cores or Nodes” (N.J.A.C. 7:8-1.2).

# **APPENDIX 1 – WATER DEMAND CALCULATIONS**

WATER DEMAND CALCULATIONS								
650 GROVE STREET BLOCK 6101, LOT 2 JERSEY CITY, NJ DR PROJECT NO. 10382-094								
Residential Demand <sup>1</sup>								
Type of Establishment	Measurement	# Units	GPD/Unit	Daily Demand (GPD)	Daily Demand (MGD)	Peaking Factor	Peak Daily Demand (GPD)	Peak Daily Demand (MGD)
Studio	Per Dwelling	12	80	960	0.001	3	2,880	0.003
1-Bedroom	Per Dwelling	54	120	6,480	0.006	3	19,440	0.019
2-Bedroom	Per Dwelling	30	175	5,250	0.005	3	15,750	0.016
3-Bedroom	Per Dwelling	12	270	3,240	0.003	3	9,720	0.010
Total Units		108						
<b>Total Residential Demand</b>				15,930	0.016		47,790	0.048
Non-Residential Demand <sup>2</sup>								
Type of Establishment	Measurement	# Units	GPD/Unit	Daily Demand (GPD)	Daily Demand (MGD)	Peaking Factor	Peak Daily Demand (GPD)	Peak Daily Demand (MGD)
Office/Retail	SF	34,346	0.125	4,293	0.004	3	12,880	0.013
<b>Total Non-Residential Demand</b>				4,293	0.004		12,880	0.013
<b>Total Site Demand</b>				20,223	0.020		60,670	0.061

Notes:

<sup>1</sup> Residential demand as per N.J.A.C. 5:21-5.1

<sup>2</sup> Non-residential demand as per N.J.A.C. 7:10-12.6 (Table 1)

# **APPENDIX 2 – SANITARY SEWER CALCULATIONS**

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## SANITARY SEWER CALCULATIONS

650 GROVE STREET  
BLOCK 6101, LOT 2  
JERSEY CITY, NJ  
DR PROJECT NO. 10382-094

Type of Establishment	Measurement	# Units	GPD/Unit	GPD
Studio	Per Dwelling	12	150	1,800
1 Bedroom	Per Dwelling	54	150	8,100
2 Bedroom	Per Dwelling	30	225	6,750
3 Bedroom	Per Dwelling	12	300	3,600
Office	Sq. Ft.	34,346	0.100	3,435
Flow Received				100%
Total Flow (GPD) ( $Q_{\text{projected}}$ )				23,685
Total Flow (CFS) ( $Q_{\text{projected}}$ )				0.037

Projected Estimates per N.J.A.C. 7:14A-23.3

Pipe Length (LF)	Diameter (in)	Material	Slope	n*
45	8	PVC	2.00%	0.013

\* Per JCMUA Rules and Regulations, Section 5.01

Half Flow Pipe Capacity	
Depth of Flow, h (in)	4
h/D	0.500
Pipe Radius, r (ft)	0.333
Circ. Segment Height, h (ft)	0.333
Central Angle, $\theta$ (radians)	3.142
Cross-Sectional Area, A (ft <sup>2</sup> )	0.175
Wetted Perimeter, P (ft)	1.047
Hydraulic Radius, R (ft)	0.167
Discharge, Q (cfs)	0.857
$Q_{\text{projected}}$ (x2) (cfs)	0.073
Pipe % Full $[(A/A_{\text{full}})*100\%]$	50.00%
<b>Average Velocity, V (ft/sec)</b>	4.909
$Q_{\text{pipe}} > 2xQ_{\text{projected}}$	<b>TRUE</b>
$V \geq 2.2$ ft/sec	<b>TRUE</b>
<b>Therefore, design is</b>	<b>ADEQUATE</b>

Actual Pipe Velocity	
**Depth of Flow, h (in)	0.800
Pipe Radius, r (ft)	0.333
Circ. Segment Height, h (ft)	0.067
Central Angle, $\theta$ (radians)	1.287
Cross-Sectional Area, A (ft <sup>2</sup> )	0.018
Wetted Perimeter, P (ft)	0.429
Hydraulic Radius, R (ft)	0.042
Pipe % Full $[(A/A_{\text{full}})*100\%]$	5.20%
<b>Actual Velocity, V (ft/sec)</b>	1.969

\*\*Must have  $h < r$

Compare	
Discharge, Q (cfs)	0.036
$Q_{\text{projected}}$ (cfs)	0.037

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5/14/2021

*Equations used for calculations:*

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Manning's Formula:

$$Q = \left(\frac{1.49}{n}\right) AR^{2/3}\sqrt{S}$$

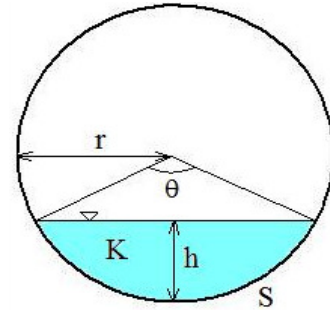
Q = Flow Rate, (ft<sup>3</sup>/s)

n = Manning's Coefficient

A = Flow Area, (ft<sup>2</sup>)

R = Hydraulic Radius, (ft)

S = Channel Slope, (ft/ft)



$$\theta = 2 \arccos\left(\frac{r-h}{r}\right)$$

$$A = \frac{r^2(\theta - \sin\theta)}{2}$$

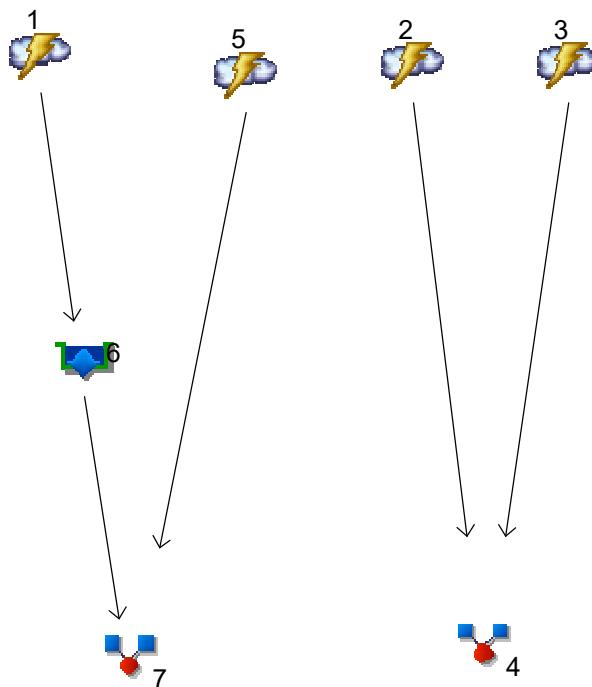
$$P = r\theta$$

# **APPENDIX 3 – DETENTION CALCULATIONS**

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# Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12



## Legend

<u>Hyd.</u>	<u>Origin</u>	<u>Description</u>
1	Mod. Rational Building	
2	Rational	Existing - lot 2
3	Rational	Existing - lot 2
4	Combine	Existing - total
5	Mod. Rational Undetained	
6	Reservoir	DB
7	Combine	Total

# Hydrograph Return Period Recap

Hydroflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	Mod. Rational	-----	-----	1.032	-----	-----	1.579	-----	-----	2.013	Building
2	Rational	-----	-----	1.768	-----	-----	2.370	-----	-----	3.141	Existing - lot 2
3	Rational	-----	-----	0.417	-----	-----	0.559	-----	-----	0.741	Existing - lot 2
4	Combine	2, 3	-----	2.185	-----	-----	2.929	-----	-----	3.882	Existing - total
5	Mod. Rational	-----	-----	0.575	-----	-----	0.908	-----	-----	1.290	Undetained
6	Reservoir	1	-----	0.746	-----	-----	1.268	-----	-----	1.958	DB
7	Combine	5, 6	-----	1.087	-----	-----	1.549	-----	-----	2.033	Total

# Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

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	Mod. Rational	1.032	1	10	2,786	-----	-----	-----	Building	
2	Rational	1.768	1	10	1,061	-----	-----	-----	Existing - lot 2	
3	Rational	0.417	1	10	250	-----	-----	-----	Existing - lot 2	
4	Combine	2.185	1	10	1,311	2, 3	-----	-----	Existing - total	
5	Mod. Rational	0.575	1	10	1,004	-----	-----	-----	Undetained	
6	Reservoir	0.746	1	48	2,170	1	2.37	1,670	DB	
7	Combine	1.087	1	29	3,171	5, 6	-----	-----	Total	
10382-094 650 Grove.gpw					Return Period: 2 Year			Friday, 02 / 7 / 2020		

# Hydrograph Report

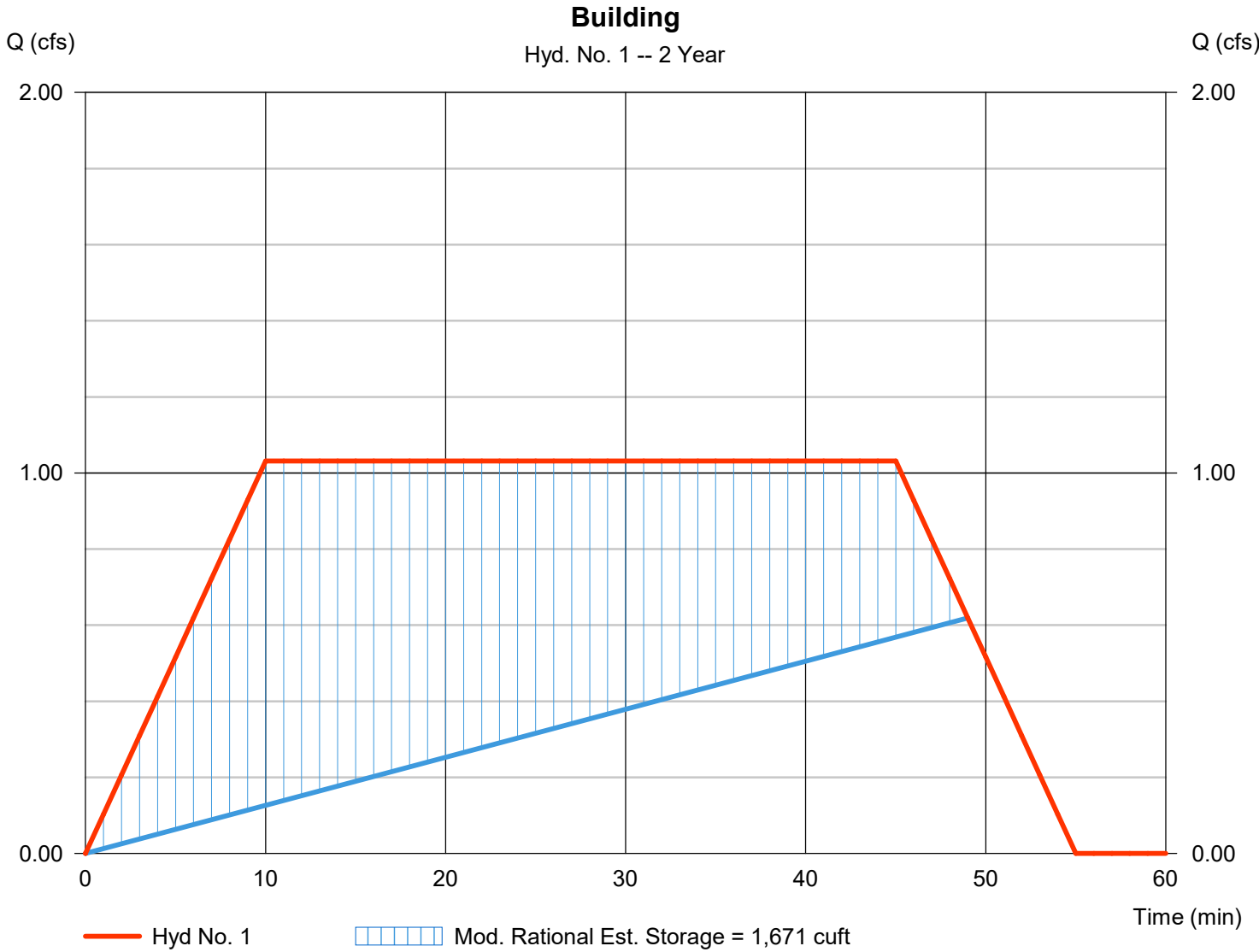
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

Friday, 02 / 7 / 2020

## Hyd. No. 1

### Building

Hydrograph type	= Mod. Rational	Peak discharge	= 1.032 cfs
Storm frequency	= 2 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 2,786 cuft
Drainage area	= 0.628 ac	Runoff coeff.	= 0.99
Intensity	= 1.659 in/hr	Tc by User	= 10.00 min
IDF Curve	= JerseyCityIDF.IDF	Storm duration	= 4.5 x Tc
Target Q	=0.670 cfs	Est. Req'd Storage	=1,671 cuft



# Hydrograph Report

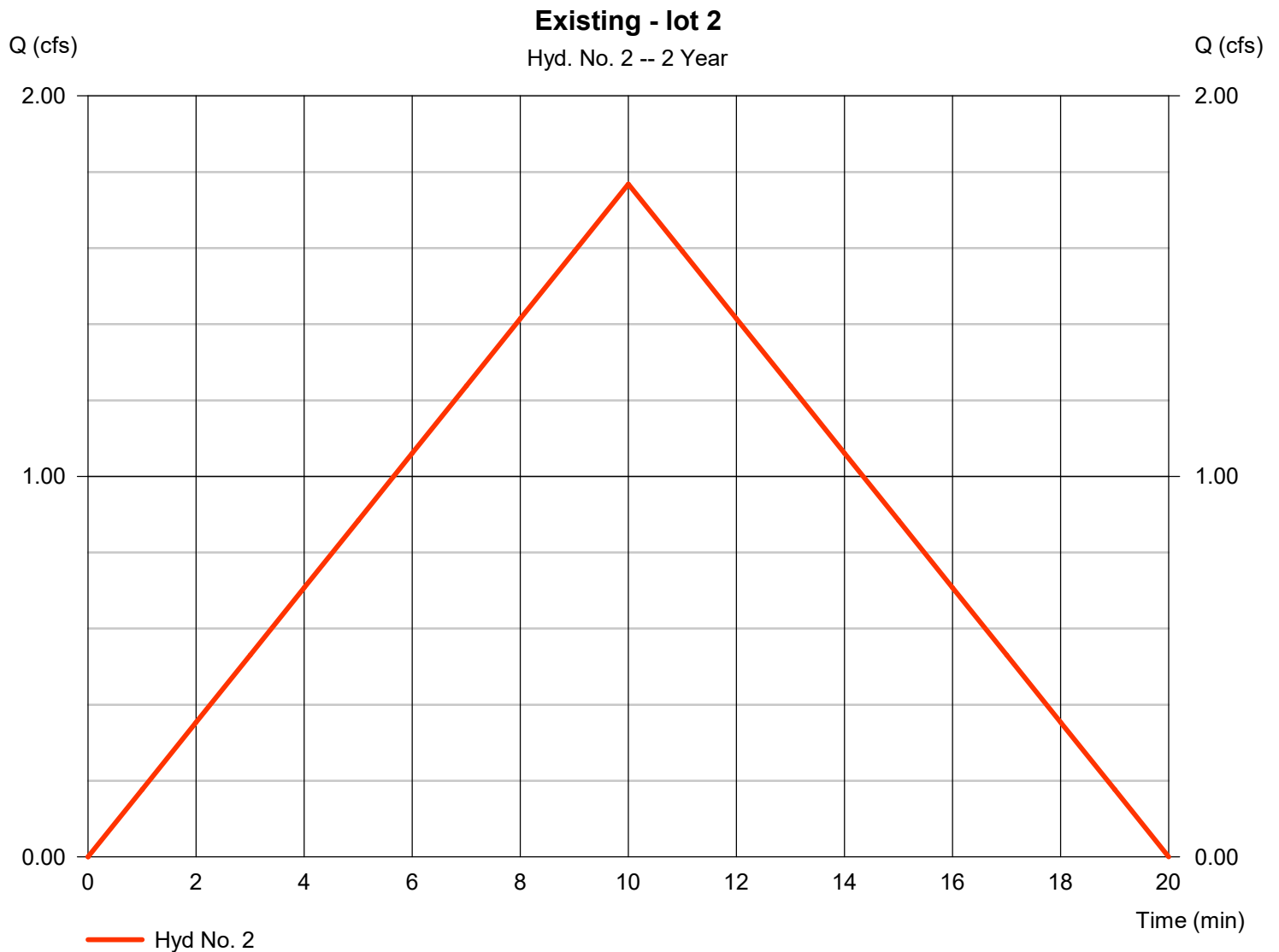
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

Friday, 02 / 7 / 2020

## Hyd. No. 2

Existing - lot 2

Hydrograph type	= Rational	Peak discharge	= 1.768 cfs
Storm frequency	= 2 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 1,061 cuft
Drainage area	= 0.908 ac	Runoff coeff.	= 0.51
Intensity	= 3.819 in/hr	Tc by User	= 10.00 min
IDF Curve	= JerseyCityIDF.IDF	Asc/Rec limb fact	= 1/1



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

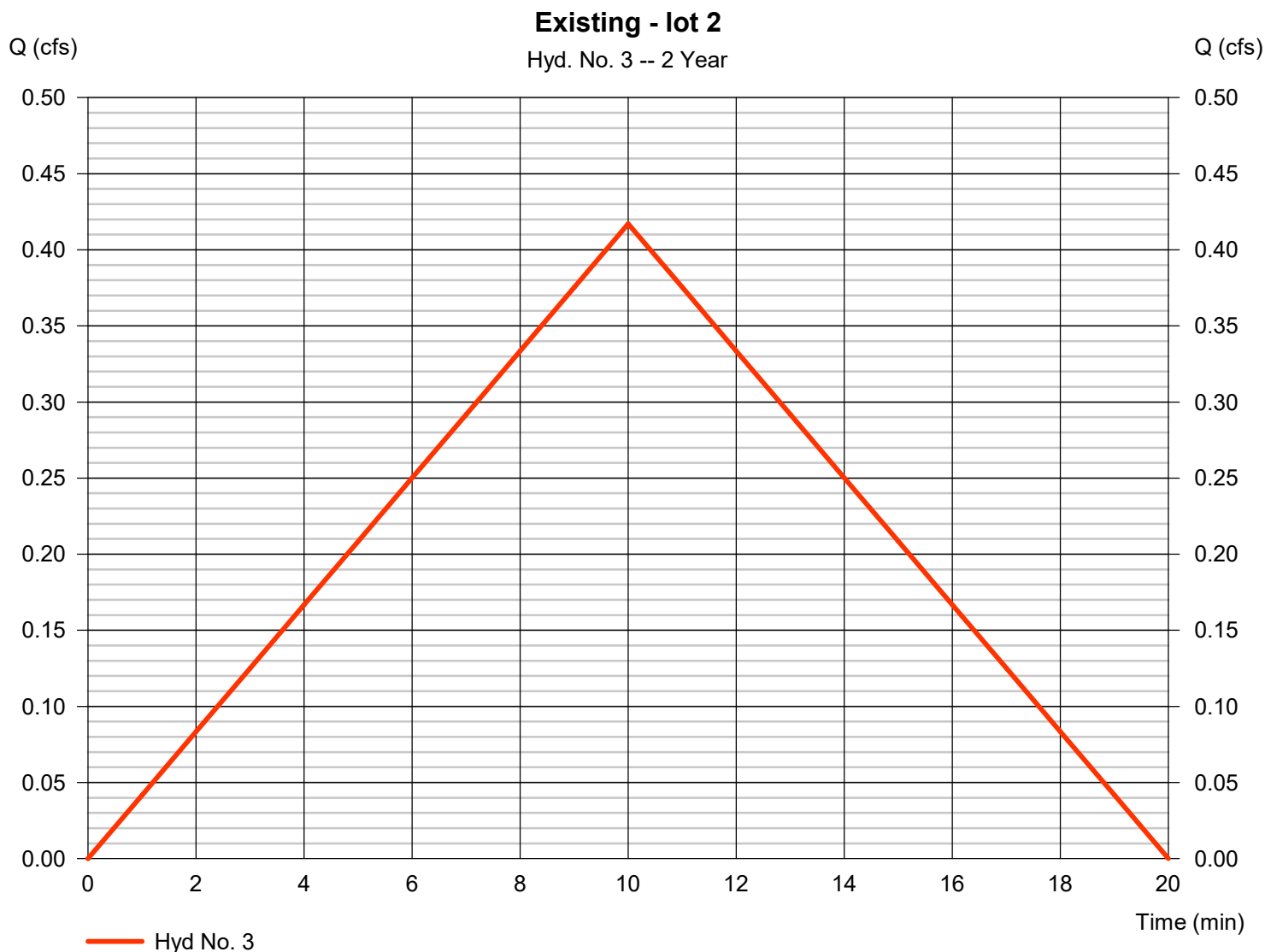
Friday, 02 / 7 / 2020

## Hyd. No. 3

Existing - lot 2

Hydrograph type	= Rational	Peak discharge	= 0.417 cfs
Storm frequency	= 2 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 250 cuft
Drainage area	= 0.120 ac	Runoff coeff.	= 0.91*
Intensity	= 3.819 in/hr	Tc by User	= 10.00 min
IDF Curve	= JerseyCityIDF.IDF	Asc/Rec limb fact	= 1/1

\* Composite (Area/C) = [(0.100 x 0.99) + (0.020 x 0.51)] / 0.120



# Hydrograph Report

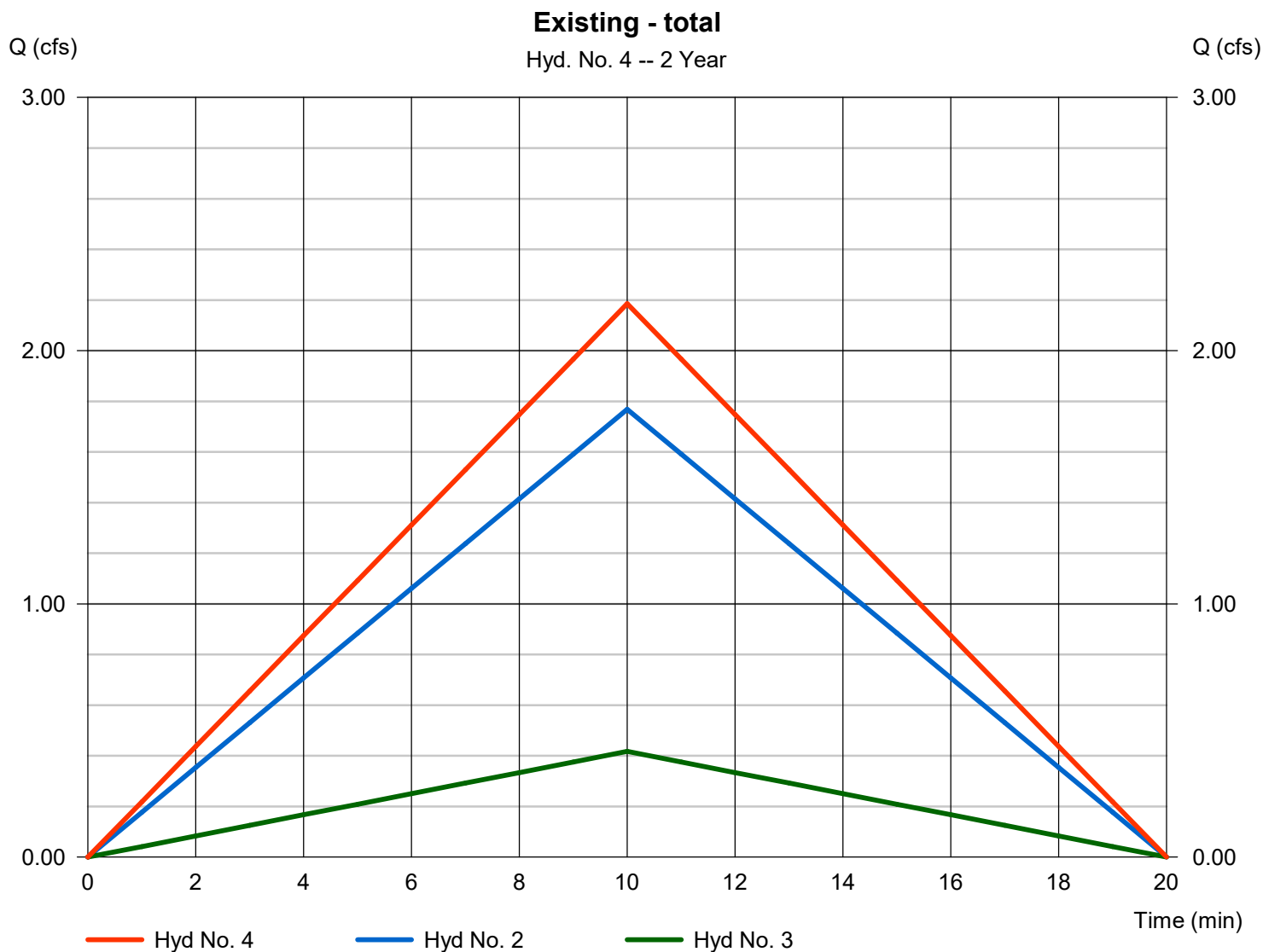
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

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## Hyd. No. 4

Existing - total

Hydrograph type	= Combine	Peak discharge	= 2.185 cfs
Storm frequency	= 2 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 1,311 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 1.028 ac



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

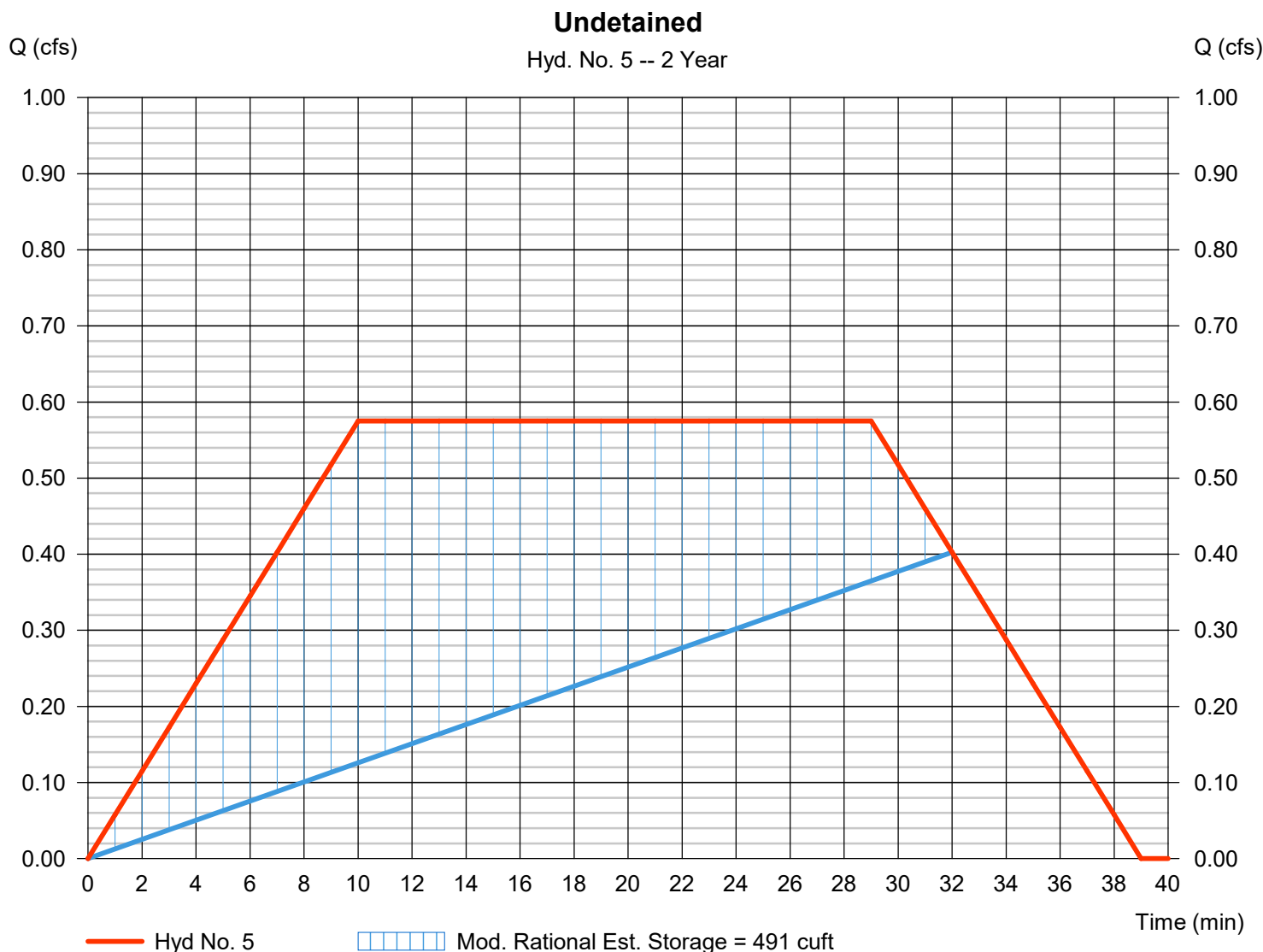
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## Hyd. No. 5

Undetained

Hydrograph type	= Mod. Rational	Peak discharge	= 0.575 cfs
Storm frequency	= 2 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 1,004 cuft
Drainage area	= 0.400 ac	Runoff coeff.	= 0.65*
Intensity	= 2.212 in/hr	Tc by User	= 10.00 min
IDF Curve	= JerseyCityIDF.IDF	Storm duration	= 2.9 x Tc
Target Q	=0.430 cfs	Est. Req'd Storage	=491 cuft

\* Composite (Area/C) = [(0.280 x 0.51) + (0.120 x 0.99)] / 0.400



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

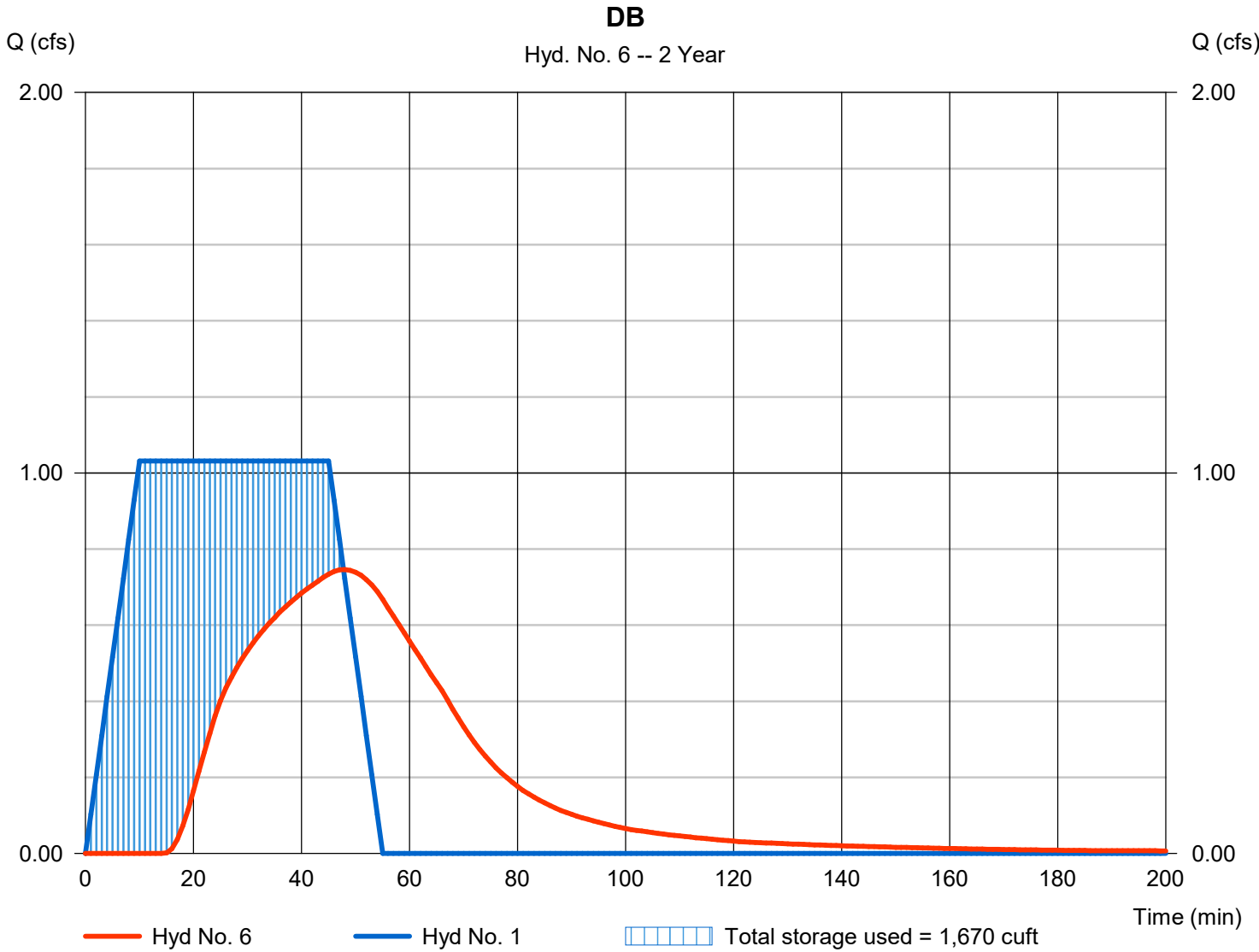
Friday, 02 / 7 / 2020

## Hyd. No. 6

DB

Hydrograph type	= Reservoir	Peak discharge	= 0.746 cfs
Storm frequency	= 2 yrs	Time to peak	= 48 min
Time interval	= 1 min	Hyd. volume	= 2,170 cuft
Inflow hyd. No.	= 1 - Building	Max. Elevation	= 2.37 ft
Reservoir name	= <New Pond>	Max. Storage	= 1,670 cuft

Storage Indication method used.



# Hydrograph Report

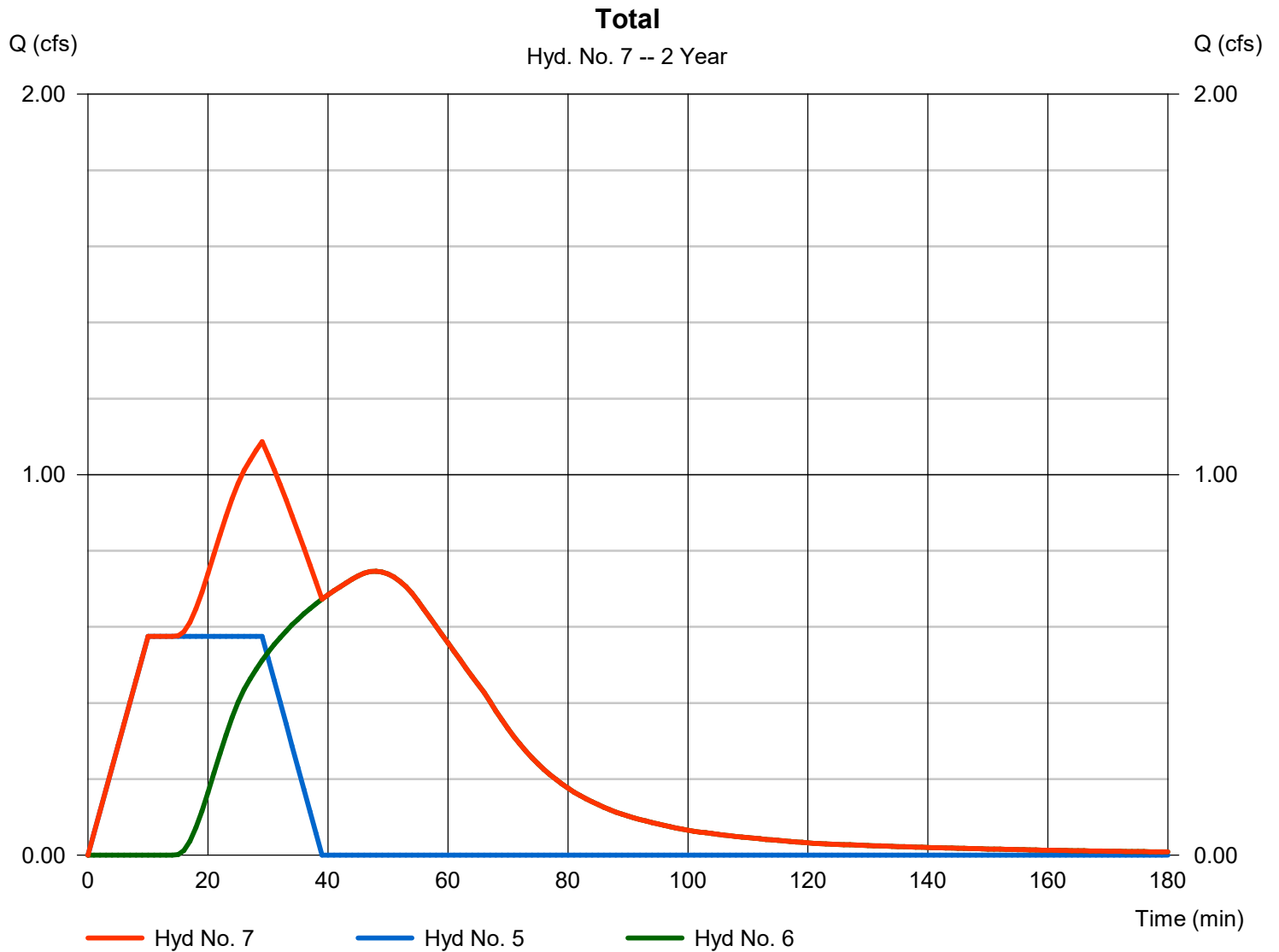
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

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## Hyd. No. 7

Total

Hydrograph type	= Combine	Peak discharge	= 1.087 cfs
Storm frequency	= 2 yrs	Time to peak	= 29 min
Time interval	= 1 min	Hyd. volume	= 3,171 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 0.400 ac



# Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

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	Mod. Rational	1.579	1	10	3,800	-----	-----	-----	Building	
2	Rational	2.370	1	10	1,422	-----	-----	-----	Existing - lot 2	
3	Rational	0.559	1	10	335	-----	-----	-----	Existing - lot 2	
4	Combine	2.929	1	10	1,757	2, 3	-----	-----	Existing - total	
5	Mod. Rational	0.908	1	10	1,258	-----	-----	-----	Undetained	
6	Reservoir	1.268	1	42	3,175	1	2.80	2,184	DB	
7	Combine	1.549	1	23	4,428	5, 6	-----	-----	Total	
10382-094 650 Grove.gpw					Return Period: 10 Year			Friday, 02 / 7 / 2020		

# Hydrograph Report

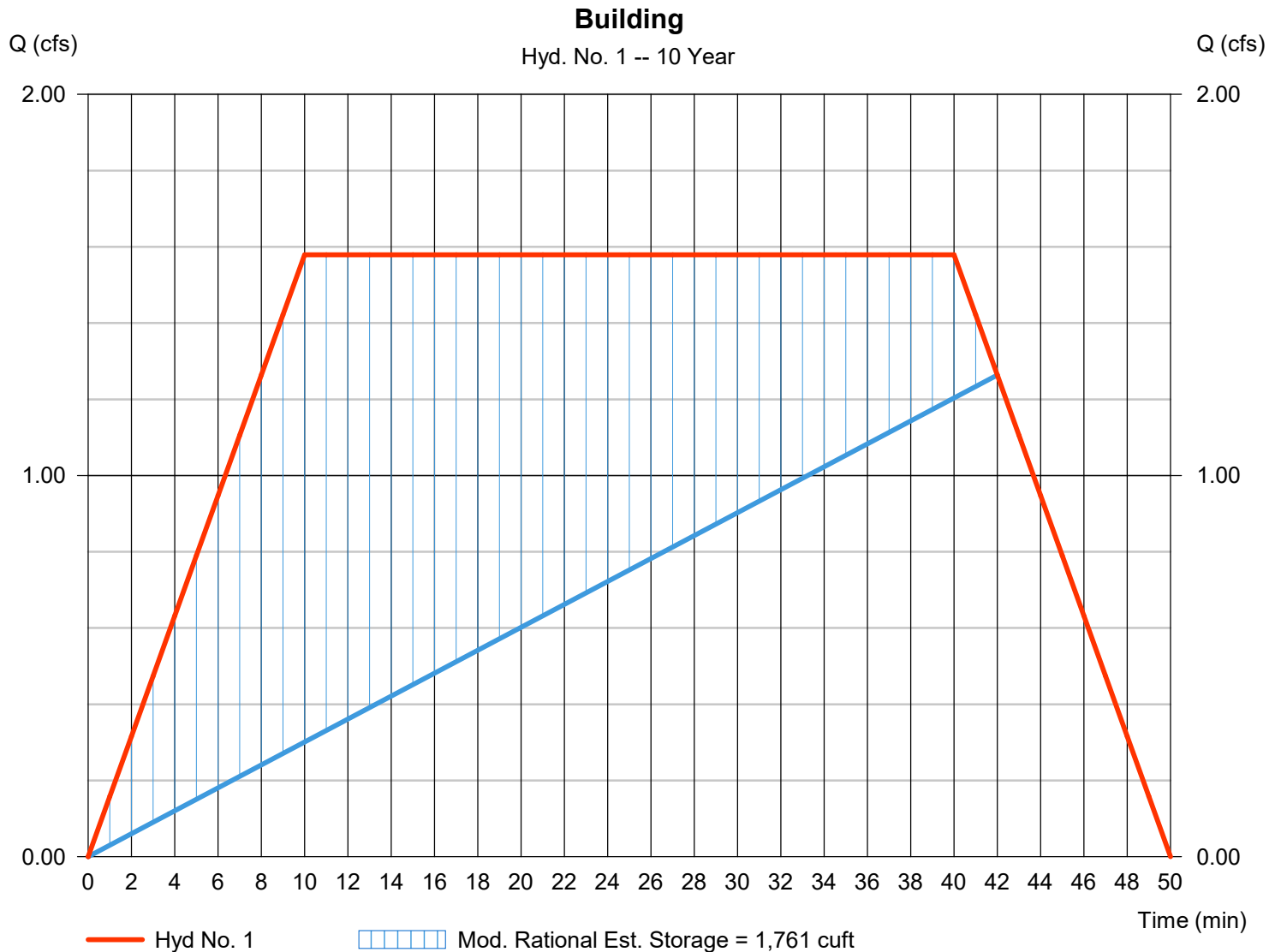
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

Friday, 02 / 7 / 2020

## Hyd. No. 1

### Building

Hydrograph type	= Mod. Rational	Peak discharge	= 1.579 cfs
Storm frequency	= 10 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 3,800 cuft
Drainage area	= 0.628 ac	Runoff coeff.	= 0.99
Intensity	= 2.539 in/hr	Tc by User	= 10.00 min
IDF Curve	= JerseyCityIDF.IDF	Storm duration	= 4.0 x Tc
Target Q	= 1.340 cfs	Est. Req'd Storage	= 1,761 cuft



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

Friday, 02 / 7 / 2020

## Hyd. No. 2

Existing - lot 2

Hydrograph type	= Rational	Peak discharge	= 2.370 cfs
Storm frequency	= 10 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 1,422 cuft
Drainage area	= 0.908 ac	Runoff coeff.	= 0.51
Intensity	= 5.118 in/hr	Tc by User	= 10.00 min
IDF Curve	= JerseyCityIDF.IDF	Asc/Rec limb fact	= 1/1



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

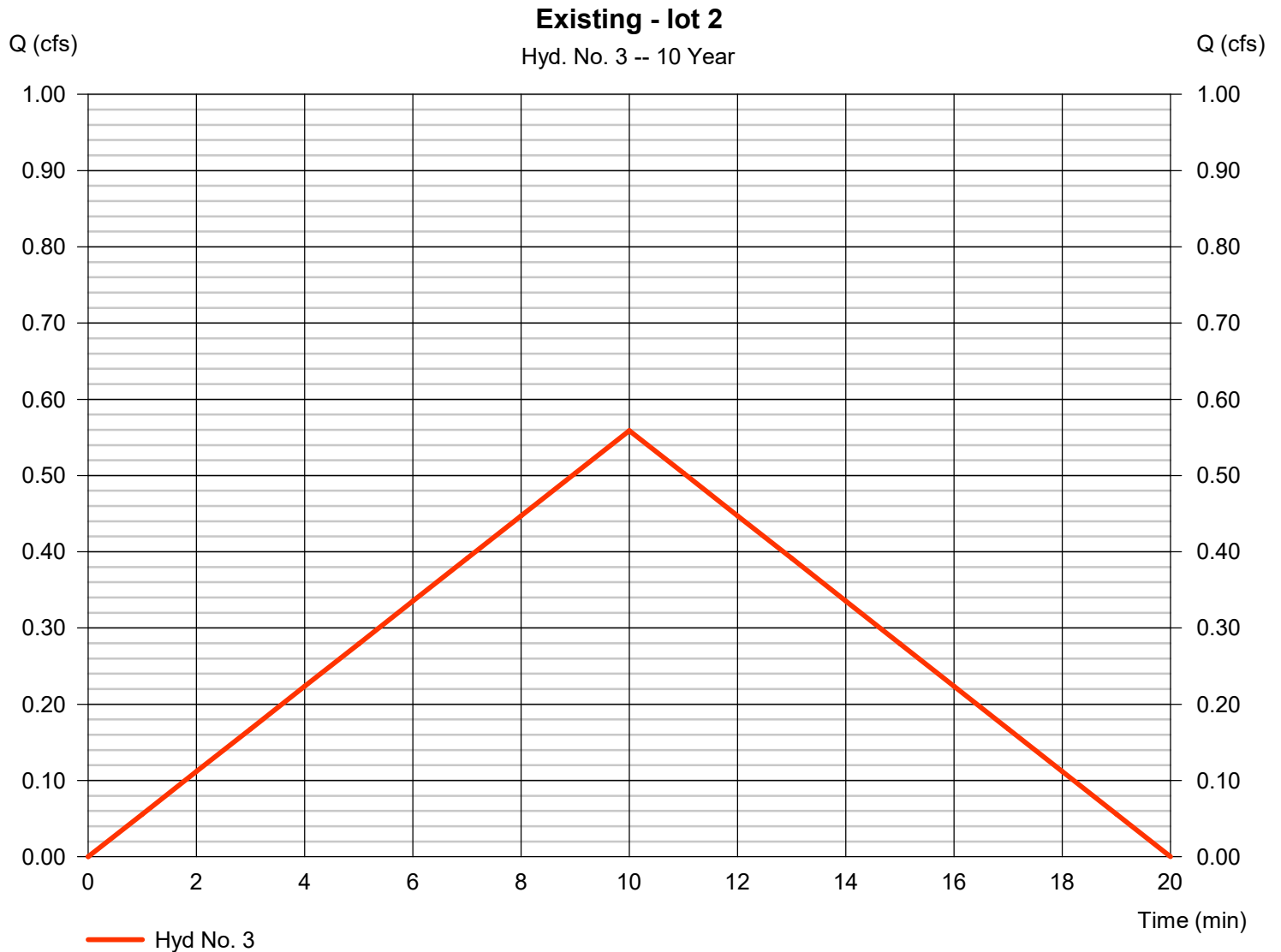
Friday, 02 / 7 / 2020

## Hyd. No. 3

Existing - lot 2

Hydrograph type	= Rational	Peak discharge	= 0.559 cfs
Storm frequency	= 10 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 335 cuft
Drainage area	= 0.120 ac	Runoff coeff.	= 0.91*
Intensity	= 5.118 in/hr	Tc by User	= 10.00 min
IDF Curve	= JerseyCityIDF.IDF	Asc/Rec limb fact	= 1/1

\* Composite (Area/C) = [(0.100 x 0.99) + (0.020 x 0.51)] / 0.120



# Hydrograph Report

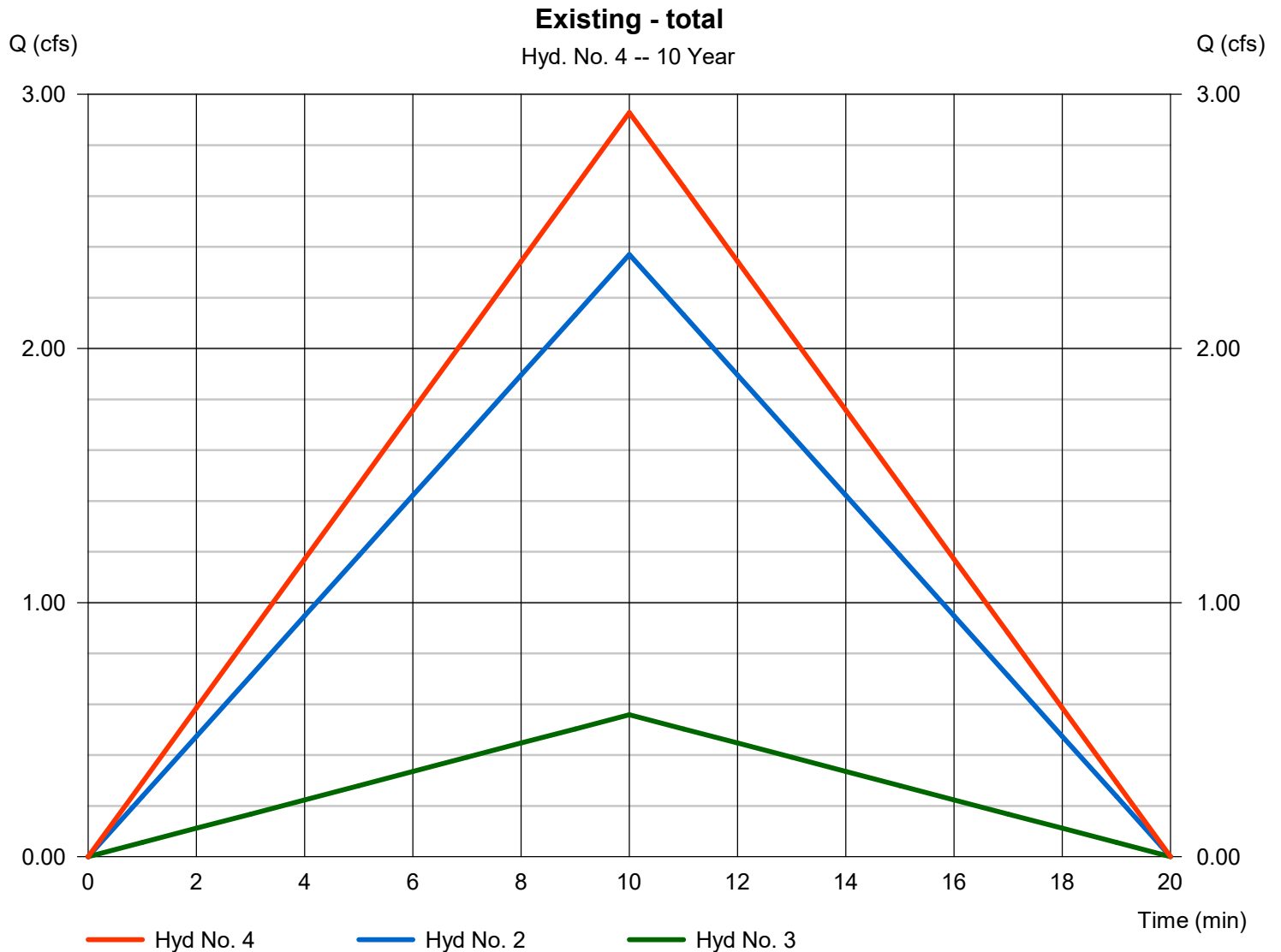
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

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## Hyd. No. 4

Existing - total

Hydrograph type	= Combine	Peak discharge	= 2.929 cfs
Storm frequency	= 10 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 1,757 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 1.028 ac



# Hydrograph Report

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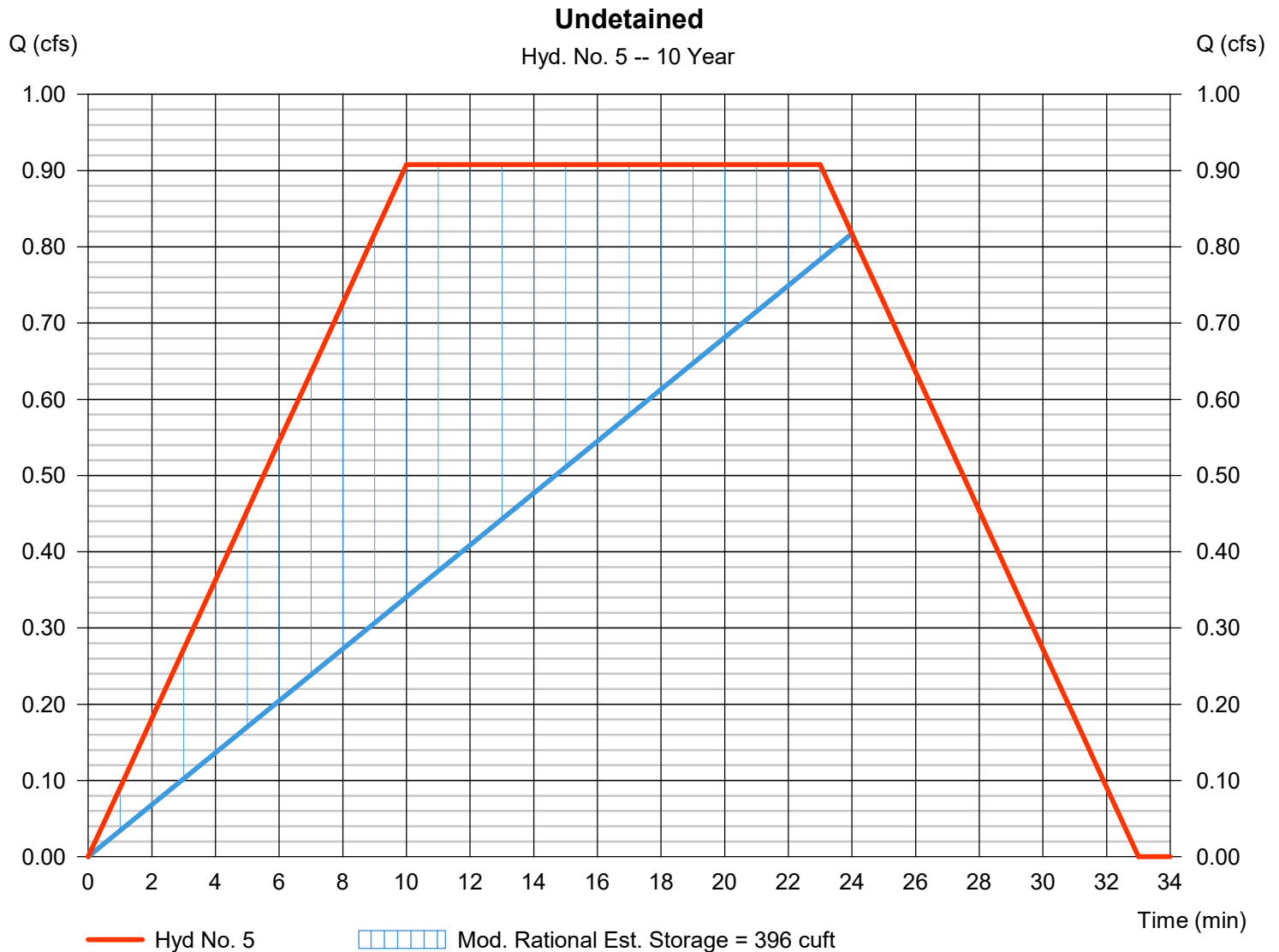
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## Hyd. No. 5

Undetained

Hydrograph type	= Mod. Rational	Peak discharge	= 0.908 cfs
Storm frequency	= 10 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 1,258 cuft
Drainage area	= 0.400 ac	Runoff coeff.	= 0.65*
Intensity	= 3.492 in/hr	Tc by User	= 10.00 min
IDF Curve	= JerseyCityIDF.IDF	Storm duration	= 2.3 x Tc
Target Q	=0.850 cfs	Est. Req'd Storage	=396 cuft

\* Composite (Area/C) = [(0.280 x 0.51) + (0.120 x 0.99)] / 0.400



# Hydrograph Report

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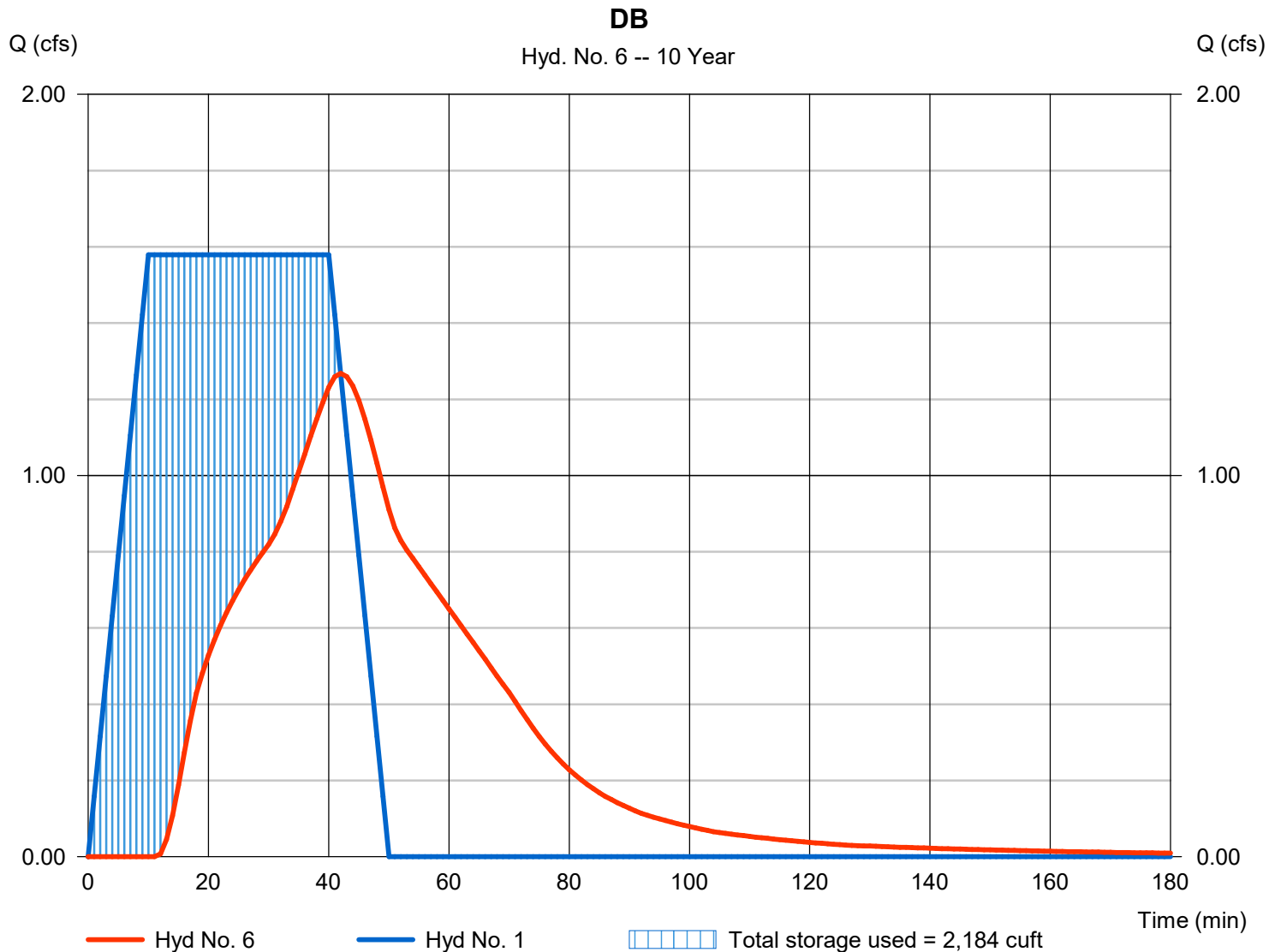
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## Hyd. No. 6

DB

Hydrograph type	= Reservoir	Peak discharge	= 1.268 cfs
Storm frequency	= 10 yrs	Time to peak	= 42 min
Time interval	= 1 min	Hyd. volume	= 3,175 cuft
Inflow hyd. No.	= 1 - Building	Max. Elevation	= 2.80 ft
Reservoir name	= <New Pond>	Max. Storage	= 2,184 cuft

Storage Indication method used.



# Hydrograph Report

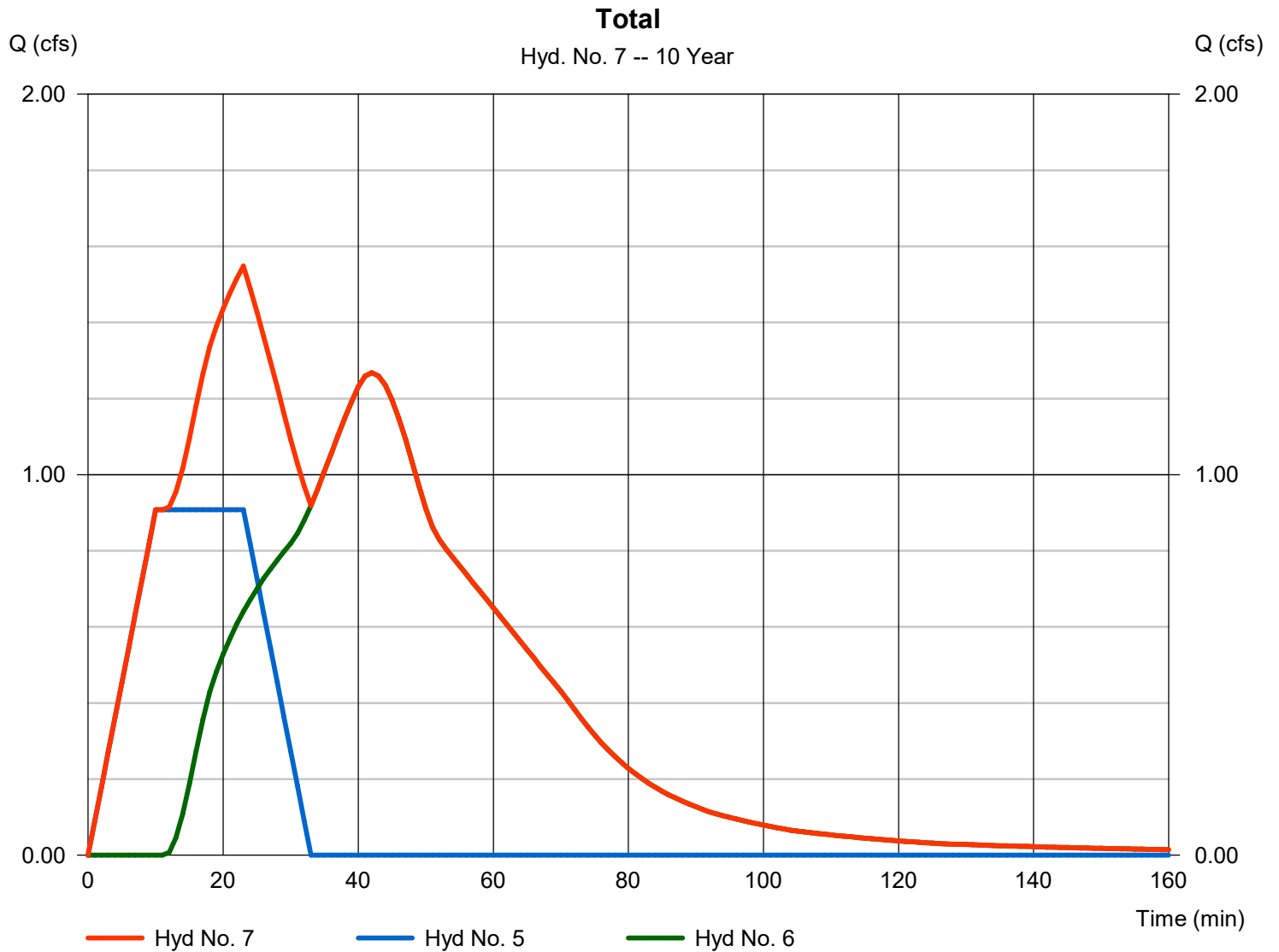
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## Hyd. No. 7

Total

Hydrograph type	= Combine	Peak discharge	= 1.549 cfs
Storm frequency	= 10 yrs	Time to peak	= 23 min
Time interval	= 1 min	Hyd. volume	= 4,428 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 0.400 ac



# Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

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	Mod. Rational	2.013	1	10	5,797	-----	-----	-----	Building	
2	Rational	3.141	1	10	1,885	-----	-----	-----	Existing - lot 2	
3	Rational	0.741	1	10	445	-----	-----	-----	Existing - lot 2	
4	Combine	3.882	1	10	2,329	2, 3	-----	-----	Existing - total	
5	Mod. Rational	1.290	1	10	1,634	-----	-----	-----	Undetained	
6	Reservoir	1.958	1	48	5,182	1	3.05	2,494	DB	
7	Combine	2.033	1	21	6,808	5, 6	-----	-----	Total	
10382-094 650 Grove.gpw					Return Period: 100 Year			Friday, 02 / 7 / 2020		

# Hydrograph Report

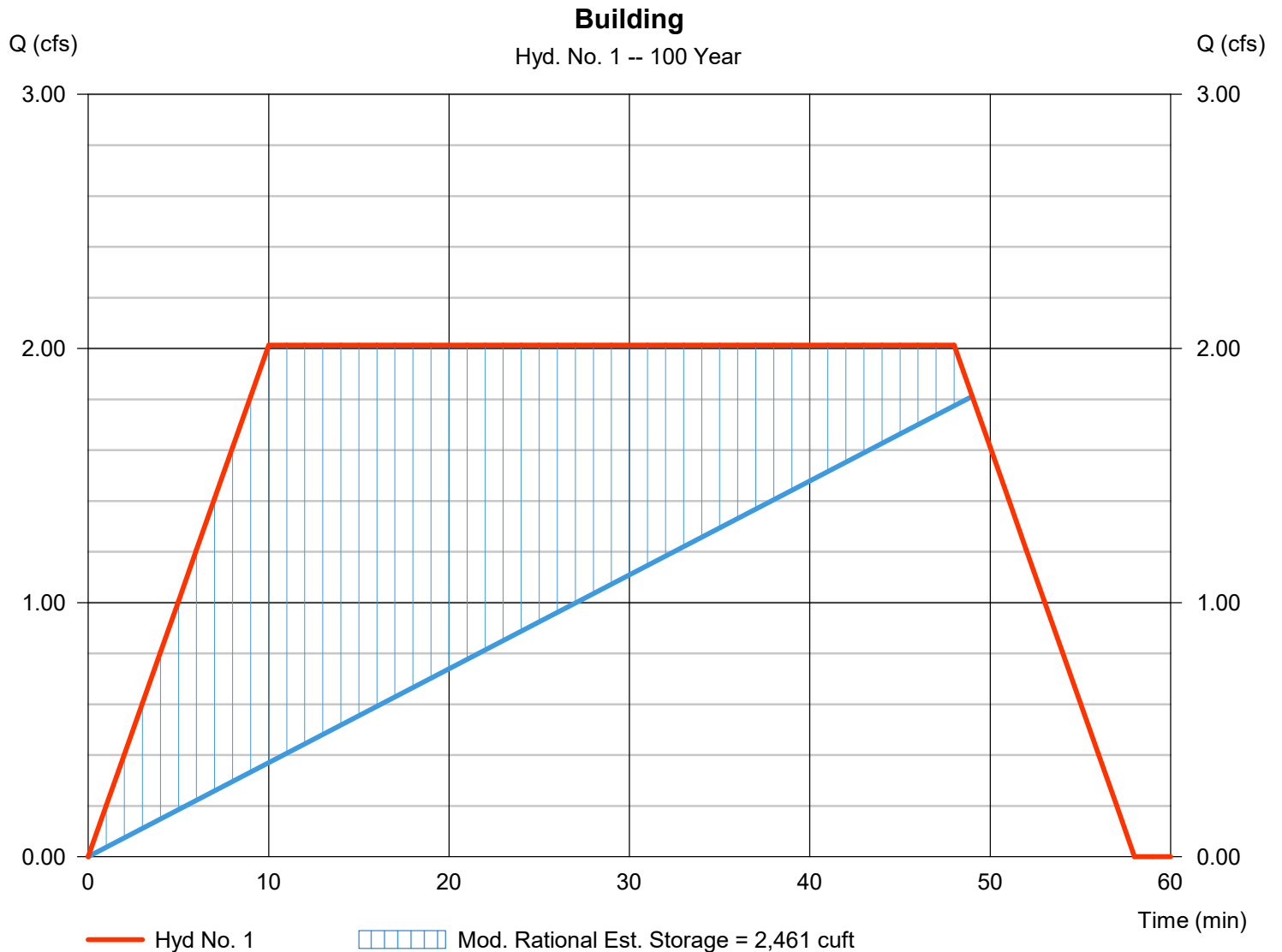
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## Hyd. No. 1

Building

Hydrograph type	= Mod. Rational	Peak discharge	= 2.013 cfs
Storm frequency	= 100 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 5,797 cuft
Drainage area	= 0.628 ac	Runoff coeff.	= 0.99
Intensity	= 3.236 in/hr	Tc by User	= 10.00 min
IDF Curve	= JerseyCityIDF.IDF	Storm duration	= 4.8 x Tc
Target Q	= 1.900 cfs	Est. Req'd Storage	= 2,461 cuft

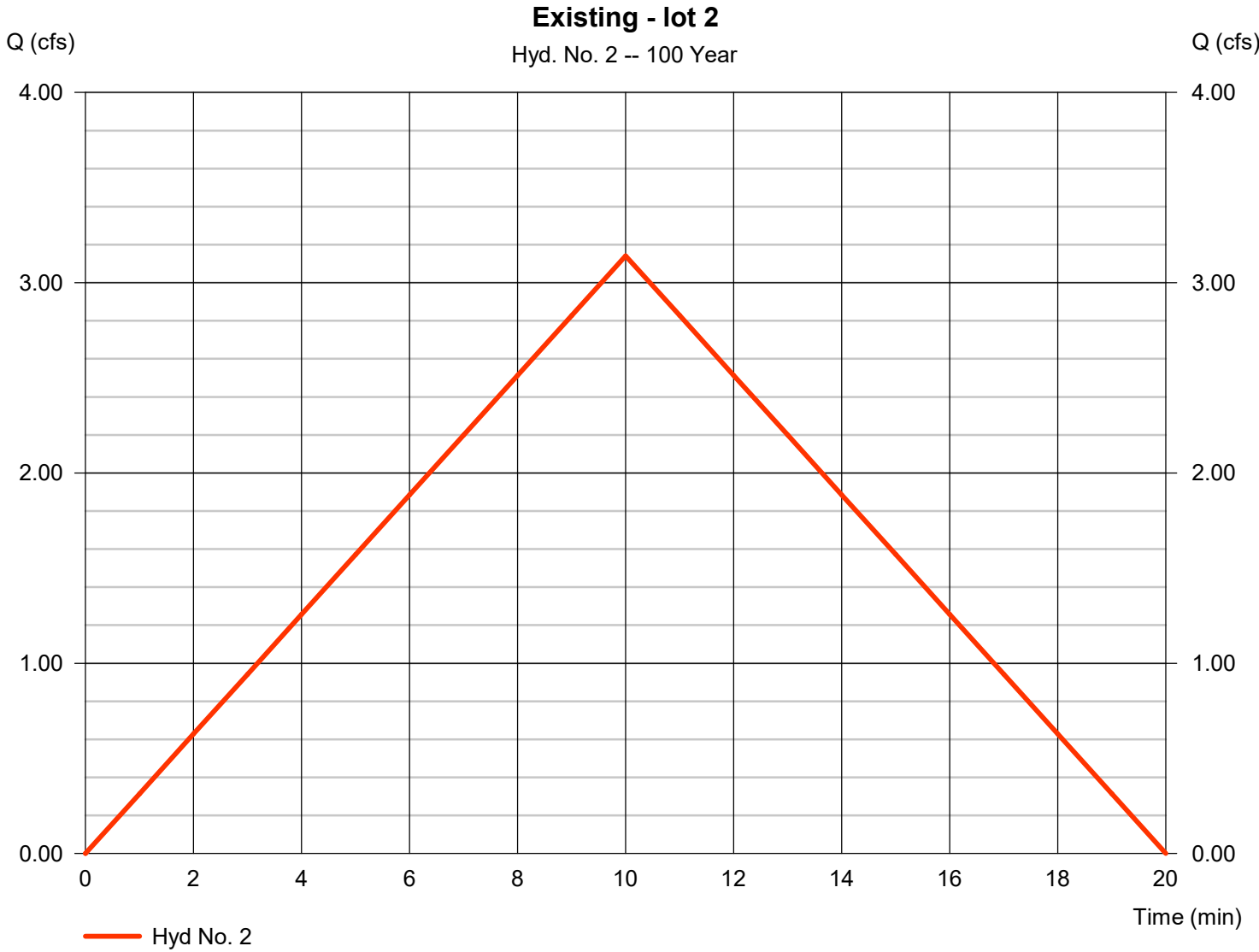


# Hydrograph Report

## Hyd. No. 2

Existing - lot 2

Hydrograph type	= Rational	Peak discharge	= 3.141 cfs
Storm frequency	= 100 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 1,885 cuft
Drainage area	= 0.908 ac	Runoff coeff.	= 0.51
Intensity	= 6.785 in/hr	Tc by User	= 10.00 min
IDF Curve	= JerseyCityIDF.IDF	Asc/Rec limb fact	= 1/1



# Hydrograph Report

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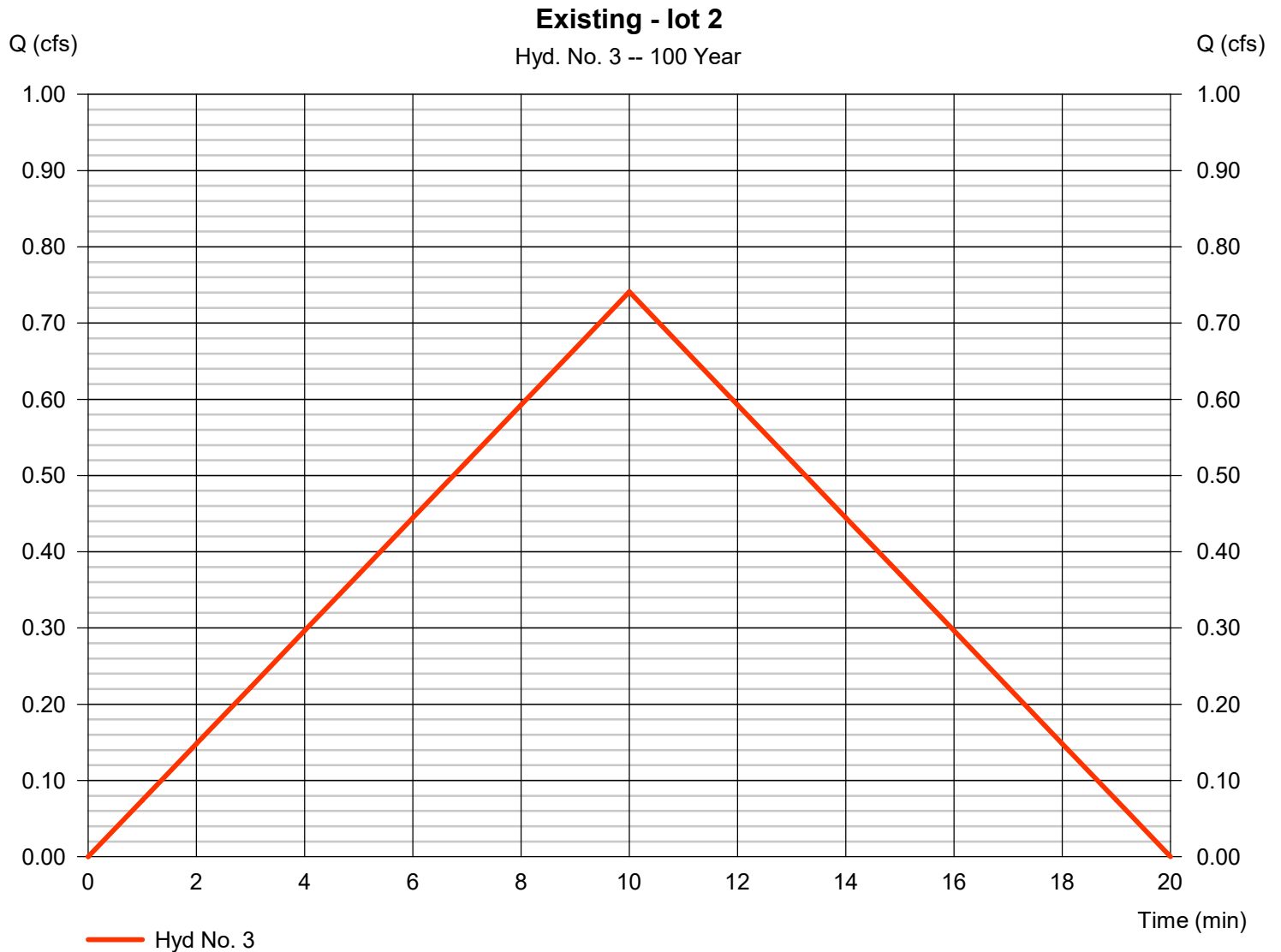
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## Hyd. No. 3

Existing - lot 2

Hydrograph type	= Rational	Peak discharge	= 0.741 cfs
Storm frequency	= 100 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 445 cuft
Drainage area	= 0.120 ac	Runoff coeff.	= 0.91*
Intensity	= 6.785 in/hr	Tc by User	= 10.00 min
IDF Curve	= JerseyCityIDF.IDF	Asc/Rec limb fact	= 1/1

\* Composite (Area/C) = [(0.100 x 0.99) + (0.020 x 0.51)] / 0.120



# Hydrograph Report

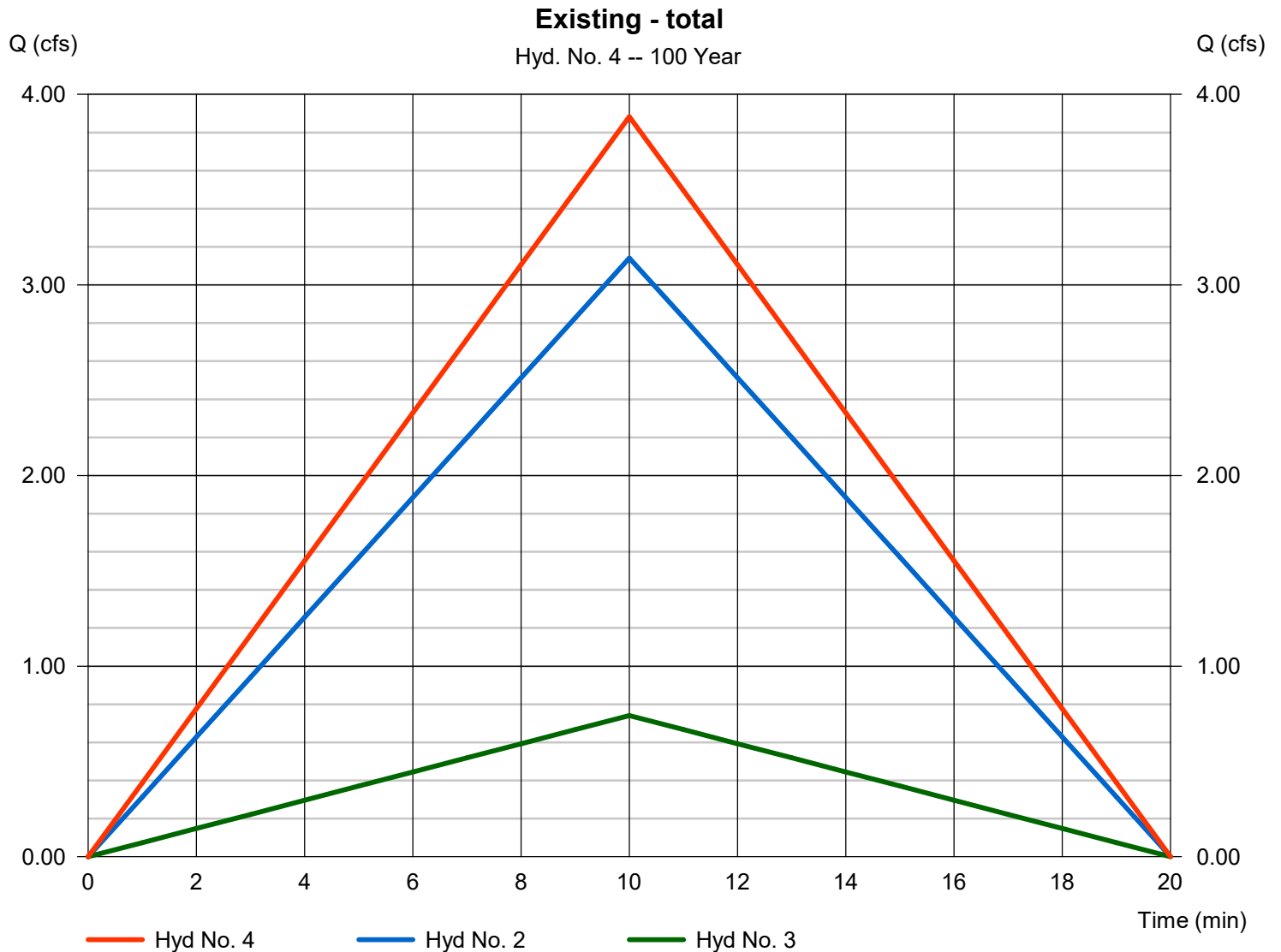
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

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## Hyd. No. 4

Existing - total

Hydrograph type	= Combine	Peak discharge	= 3.882 cfs
Storm frequency	= 100 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 2,329 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 1.028 ac



# Hydrograph Report

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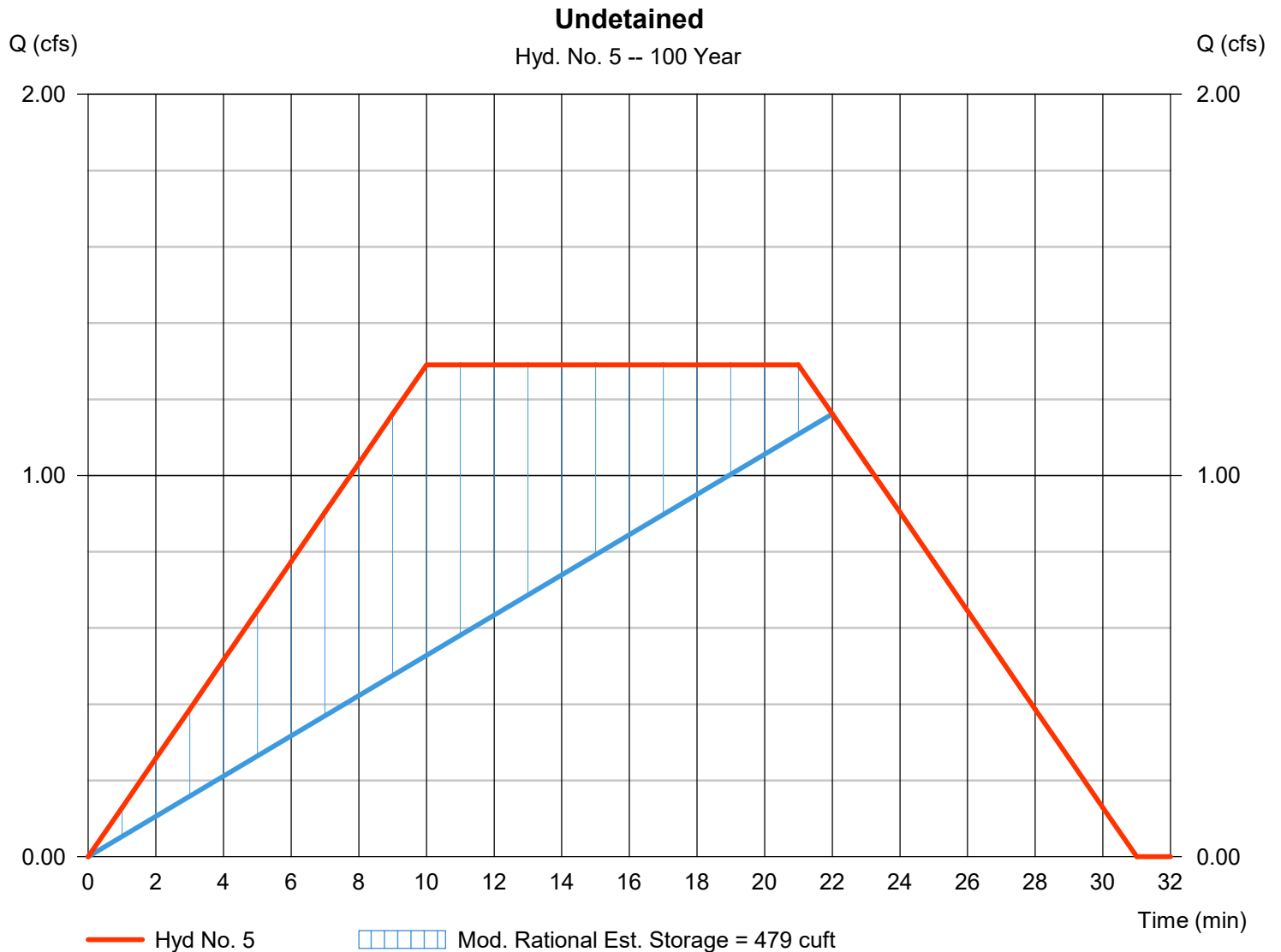
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## Hyd. No. 5

Undetained

Hydrograph type	= Mod. Rational	Peak discharge	= 1.290 cfs
Storm frequency	= 100 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 1,634 cuft
Drainage area	= 0.400 ac	Runoff coeff.	= 0.65*
Intensity	= 4.963 in/hr	Tc by User	= 10.00 min
IDF Curve	= JerseyCityIDF.IDF	Storm duration	= 2.1 x Tc
Target Q	= 1.210 cfs	Est. Req'd Storage	= 479 cuft

\* Composite (Area/C) = [(0.280 x 0.51) + (0.120 x 0.99)] / 0.400



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

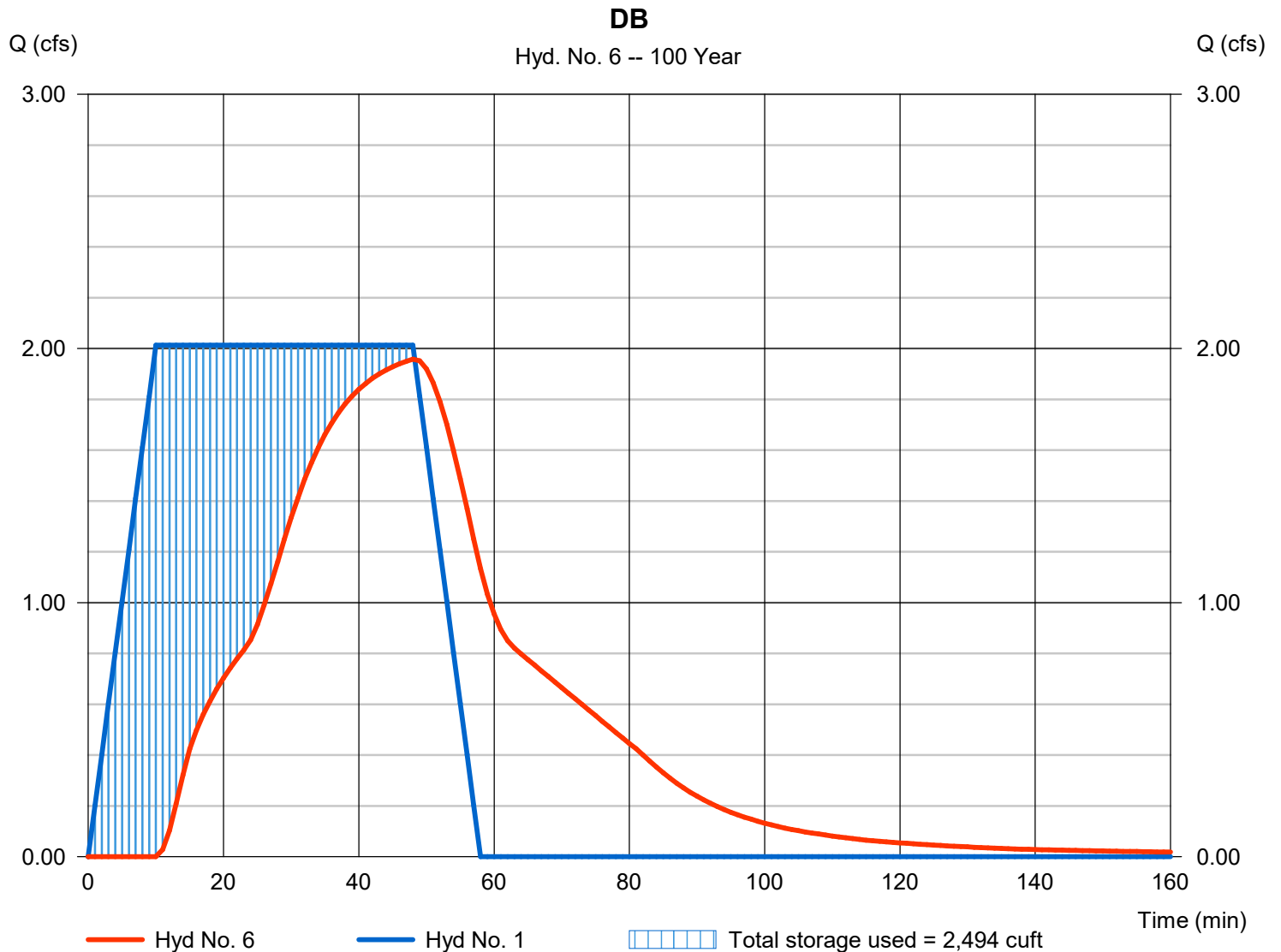
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## Hyd. No. 6

DB

Hydrograph type	= Reservoir	Peak discharge	= 1.958 cfs
Storm frequency	= 100 yrs	Time to peak	= 48 min
Time interval	= 1 min	Hyd. volume	= 5,182 cuft
Inflow hyd. No.	= 1 - Building	Max. Elevation	= 3.05 ft
Reservoir name	= <New Pond>	Max. Storage	= 2,494 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2018 by Autodesk, Inc. v12

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## Hyd. No. 7

Total

Hydrograph type	= Combine	Peak discharge	= 2.033 cfs
Storm frequency	= 100 yrs	Time to peak	= 21 min
Time interval	= 1 min	Hyd. volume	= 6,808 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 0.400 ac

