STORM DRAINAGE ANALYSIS

FOR

THE LOFTS AT BLACK BIRCH
COMMUNITY CENTER REDEVELOPMENT

BANNER ROAD

IN

EAST HADDAM, CONNECTICUT

JUNE 20, 2021

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BACKGROUND

The Banner Development and Black Birch Country Club are located on a 405.57 acre parcel of land that abuts Cherry Swamp Road to the north and intercepts Banner Road in East Haddam, Connecticut. (See Figure-1) The site is bordered by Cherry Swamp Road to the north, residential properties from the northeast to southeast, and woods to the south and west. The site is composed of a golf course, a core area of development, and wooded land. There are approximately 20.77 acres of wetlands scattered throughout the site and golf course.

Watershed: The subject site is located within the Moodus River (4710) sub-regional watershed, which is approximately 17.6 square miles in area. This sub-watershed is associated with the Salmon Regional Basin (47), which is approximately 148.7 square miles in area. The runoff from the subject area occurs via overland flow and channel flow through a pond (dammed) and into an intermittent watercourse, located west of the proposed core development area. According to the Flood Insurance Rate Map (FIRM), panel 09007C0164G, effective 08/28/08; the subject development area is not located within any area of potential flooding. (See Figure-2)

Soil Conditions: In review of the site soil types, identified in the Soil Survey of Middlesex County, the site development area is mostly composed of Udorthents – Urban Land Complex. These soils have been disturbed over the years due to the development and grading operations. Figure-3 shows the Soils Map of the site with the various soils classifications.

Existing Conditions: The Banner condominium complex is constructed adjacent to an 18-hole golf course centrally situated on a 405.57 acre parcel in East Haddam, Connecticut. The condominium complex is divided into four previously approved sections; Section A through Section D totaling 86 approved units. There are 48 units that currently occupy Sections A, B and C with access roads, parking areas, sidewalks and associated utility connections. Section D currently remains in disrepair but has been previously approved for renovation and infrastructure improvements and permitted by both Planning and Zoning and Inland Wetlands (Phase II Development Approved for 86 units in 2006). Subsequently in 2016, a Phase III Development proposal was approved for the maximum parcel build out for an additional 247 units (333 Total).

In order to analyze existing site conditions, two (2) points of analysis were considered in order to protect areas down gradient of the proposed development and to evaluate any increase in stormwater runoff offsite. For this analysis, the impervious surfaces and buildings from the development prior to their removal circa 2004 are shown as the 'existing condition'. As shown on Figure-4, the site was broken down into two sub-watersheds that are identified as sub-watersheds EXWS-30 and EXWS-40 which are described below:

- Sub-watershed EXWS-30 is an area which encompasses a large wooded portion of north-east corner of the property and adjacent property north of the Cherry Swamp Road. This area directs stormwater runoff via overland flow to a pond located at the central portion of the property.
- Sub-watershed EXWS-40 is an area which encompasses a majority of the infrastructure development associated with the pro shop, Sections A & B, the

community center, associated roadways and parking areas along with about a third of the golf course. The remaining area consists of a large wooded portion west of the golf course that directs runoff via overland flow to a wetland system and well defined channel directing flow offsite to the south identified as POA 1.

- Existing Pinehurst Lane is the site specific watershed area surrounding the community center that directs runoff to an existing drainage oufall (POA B) via subsurface stormwater collection system.

Proposed Conditions: The proposed development consists of the renovation of the existing community center into 20 individual one bedroom rental apartments along with reconstructing the parking lots south and east of the building. New drainage structures are proposed and will be connected to the existing subsurface stormwater collection system directed through Section B down Pinehurst Lane. The proposal will also include the construction of a new subsurface wastewater disposal system that will require permitting through the Department of Energy and Environmental Protection (DEEP), a new fire protection system, utility connections, landscaping, lighting and associated appurtenances. There is adequate water supply provide by CT Water. The parcel is approved for the maximum density permitted by the zoning regulations and the proposed 20 individual units will not adversely impact the maximum Phase III build out.

The same two (2) points of analysis were considered in order to protect areas down gradient of the proposed development and to evaluate any increase in stormwater runoff offsite. For this analysis, the net change in impervious surfaces and buildings from 2004 development were taken into consideration. As shown on Figure-5, the two sub-watersheds identified as sub-watersheds PRWS-30 and PRWS-40 are described below:

- Sub-watershed PRWS-30 is an area which encompasses a large wooded portion of north-east corner of the property and adjacent property north of the Cherry Swamp Road. This area directs stormwater runoff via overland flow to a pond located at the central portion of the property. This watershed remains unchanged
- Sub-watershed PRWS-40 is an area which encompasses a majority of the infrastructure development associated with the pro shop, Sections A & B, the community center renovation area, associated roadways and parking areas along with about a third of the golf course. The remaining area consists of a large wooded portion west of the golf course that directs runoff via overland flow to a wetland system and well defined channel directing flow offsite to the south identified as POA 1.
- Proposed Pinehurst Lane is the site specific watershed area surrounding the community center that directs runoff to POA B via subsurface stormwater collection system. The overall watershed has been slightly reduced along with an overall reduction in impervious surfaces due to the removal of the old buildings and parking lot.

COMPUTER MODELING (HYDRAFLOW HYDROGRAPHS)

A major element of this study was the watershed analysis utilizing the Computer Program Hydraflow Hydrographs, Version 2020. The Hydraflow Hydrograph model develops flood hydrographs from runoff and routes the flow through stream channels and reservoirs. Routed hydrographs are combined with those from tributaries to compute peak discharges, their times of occurrence and water surface elevations at any desired cross-section or structure.

Curve Numbers, Runoff coefficients, times of concentration and areas for each the sub-areas were input into the Computer Program Hydraflow Hydrographs, Version 2020. An Intensity-Duration-Frequency (IDF) curve was developed for (Moodus) Middlesex County using rainfall values from the National Oceanic and Atmospheric Administration NOAA Atlas 14; and used in this analysis. Five rainfall events (2-yr., 10-yr., 25-yr., 50-yr. and 100-yr.) using the IDF curve, were modeled for both existing and proposed conditions.

Model Construction/Assumptions:

The runoff to sub-watersheds was calculated using the SCS and Rational Method in which drainage areas, runoff coefficients, and time of concentrations are calculated as explained below.

Drainage Areas: The drainage areas were delineated based on a supplied site-specific topographical map.

Runoff Coefficients and Time of Concentration: The SCS unit hydrograph method uses the runoff curve number (CN) estimated based on land use and soil type. The Rational Method uses runoff coefficients (C-Values) based on land use. Land uses for the watersheds were classified as woods, grass, gravel and impervious based on survey, aerial map and field inspection. Soil types in the watershed were determined from the Connecticut Department of Environmental Protection GIS database of the NRCS soil survey for Middlesex County, Connecticut. The NRCS divides soils into four hydrologic groups: A, B, C, or D, depending on their infiltration capacity and ability to absorb water. Based on the soil types and land use, weighted curve number was developed for the watershed.

Times of concentration (Tc) were calculated based on procedure given in the ConnDOT Drainage Manual. Intensity-Duration-Frequency (IDF) curves were developed for Middlesex County for the design storm events and then were applied to the sub watersheds. Included in Appendix A is the IDF curve data. The runoff coefficients, times of concentration and travel times for each sub-area were determined and summarized on Table 1 and Table 2 as shown below:

Table 1 – Existing Drainage Area Summary

Sub Watershed	Area (acres)	CN / C-Value	Tc (min)
30	119.80	55	37
40	125.10	60	32
E Pinehurst	7.23	0.56	23

Table 2 – Proposed Drainage Area Summary

Sub Watershed	Area (acres)	CN / C-Value	Tc (min)
30	119.80	55	37
40	125.10	60	32
P Pinehurst	6.79	0.56	23

Results: The site has been designed with the intent to achieve a zero net increase in peak stormwater discharges. While there is a net increase in impervious surfaces to PRWS-40 from the 2004 'existing condition', there is no change in the resultant Curve Number to produce any measurable peak flow increase due to the large contributing watershed. To focus on the impact in the immediate vicinity of the proposed community center renovation, the related infrastructure improvements resulted in a net loss of impervious surface and overall contributing watershed directed to Pinehurst Lane drainage system, which in return resulted in a decrease in flow to the existing outfall location (POA B). Therefore, there are no adverse impacts downgradient of the development or to offsite properties. The results of the existing and proposed conditions hydrograph models are included in Appendix C and summarized in Tables 3 and 4 below, which indicate that the design goal was met for all storm events.

Table 3 – Existing Points of Analysis Summary (cfs)

Location	2-yr Storm	10-yr Storm	25-yr Storm	50-yr Storm	100-yr Storm
POA 1	29.50	109.62	173.02	231.07	347.29
POA B	8.79	13.57	16.03	17.96	19.85

Table 4 – Proposed Points of Analysis Summary (cfs)

Location	2-yr Storm	10-yr Storm	25-yr Storm	50-yr Storm	100-yr Storm
POA 1	29.50	109.62	173.02	231.07	347.29
POA B	8.25	12.74	15.06	16.87	18.64

COMPUTER MODELING (HYDRAFLOW MODEL)

The proposed drainage systems were analyzed in accordance with procedures outlined in the U.S. Department of Transportation USDOT, Hydraulic Engineering Circular No. 22.

The runoff to catch basins was calculated using the Rational Method in which drainage areas, runoff coefficients, and time of concentrations are calculated as explained below.

Drainage Areas: The drainage areas were delineated based on a supplied site-specific topographical map. A summary of the drainage areas for the storm drainage structures is included in Table 6 in Appendix D.

Runoff Coefficient and Time of Concentration: The runoff coefficient (C) was based on land use and times of concentrations (Tc) were calculated based on runoff length and slope using the Seelye Chart. Intensity-Duration-Frequency (IDF) curves were developed for Middlesex County for the 10- and 25-year storm events and then were applied to the sub watersheds. Included in Appendix A is the IDF curve data. A table showing the proposed catch basin summary is included in Appendix B.

Model Construction/Assumptions:

The catch basins were evaluated using Hydraflow Storm Sewers version 2020, approved by the Connecticut Department of Transportation. Flows into the catch basins were obtained from the rational method, as previously discussed, which were then used to determine and evaluate the adequate size of the pipes connecting the catch basins from one to the other.

In order to successfully run Hydraflow, a starting hydraulic grade line (HGL), or tailwater elevation must be computed and entered into the model. The tailwater elevation is determined by: the average summation of the (critical depth of the pipe + the pipe diameter) + the downstream invert of the outlet to the drainage system. In the proposed model, the critical elevation of the discharge pipe was used, as computed by the Hydraflow software. Included in Appendix D is the output and Hydraulic Grade Line analysis from Hydraflow for the proposed systems.

Results: The results of the analysis indicate that the pipes are adequate to convey a 10-year design storm. All proposed manholes and catch basins are to be ConnDOT approved. Reinforced Concrete Pipe (RCP) or High Density Polyethylene Pipe (HDPE) was used throughout the site. The minimum cover (30 inches) is provided over all drainage pipes within a traffic bound surface and 18 inches in all grassed areas.

STORMWATER TREATMENT

Stormwater quality has plagued our rivers and streams for a number of years. New state and federal regulations are requiring towns to implement town-wide regulations for the removal of total suspended solids (TSS); typically this removal efficiency is 80 percent. As part of this project, Stormwater treatment practices include deep sump catch basins and a Hydrodynamic Stormwater Separator designed to treat the proposed parking lot surfaces. These Stormwater treatment devices are also known as Best Management Practices (BMPs).

STORMWATER MANAGEMENT SYSTEM MAINTENANCE PROGRAM

- **Pollution Prevention Team -** The owner and/or operator must designate a pollution prevention team consisting of personnel, at least one of whom must be available to work at the site on an 'as needed' basis along with regularly scheduled maintenance. This team will carry out all aspects of the stormwater management measures.

- **Sweeping** - All parking areas, sidewalks, driveways and other impervious surfaces (except roofs) shall be swept clean of sand, litter and any other possible pollutants at least twice a year, once between November 15 and December 15 (after leaf fall) and once during the month of April (after snow melt) and at other times as may be necessary.

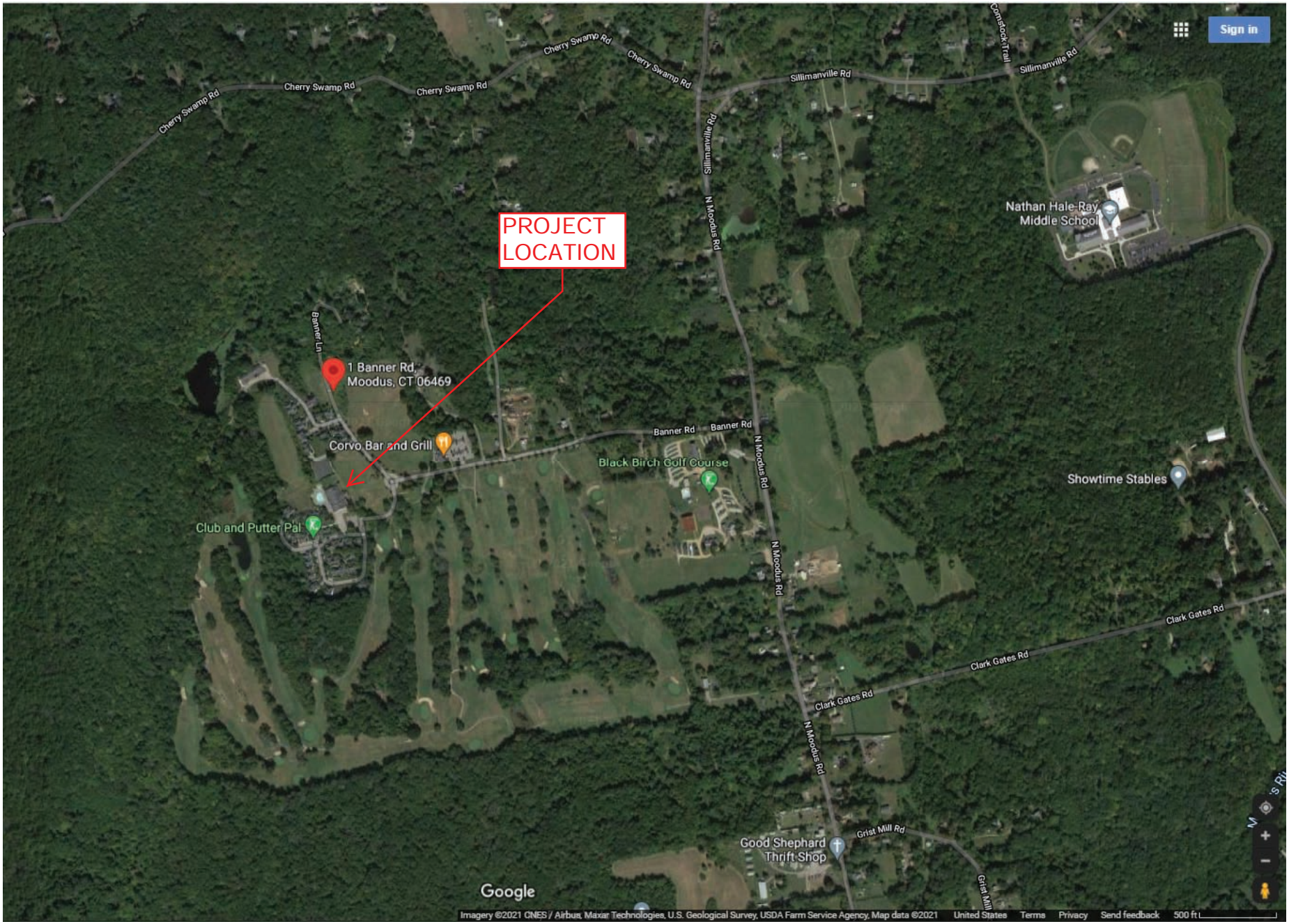
- **Drainage Systems -** All catch basins, manholes, stormwater treatment devices and detention structures shall be inspected and cleaned at least twice a year, once between November 15 and December 15 (after leaf fall) and once during the month of April (after snow melt) and at other times as may be necessary.

    - **Comprehensive Annual Stormwater Evaluation and Inspection-** once a year, a member of the Pollution Prevention Team will conduct a Comprehensive Annual Stormwater Evaluation and Inspection. All aspects of the stormwater collection and/or treatment system will be inspected for consistency with the Stormwater Management Plan. A report of the results of this inspection shall be prepared and a copy maintained on site.

CONCLUSION

Based on the foregoing drainage analysis, no health or safety impacts will result from the proposed redevelopment of the Community Center building.

FIGURES



LOFTS AT BLACK BIRCH COUNTRY CLUB
BANNER COMMUNITY CENTER REDEVELOPMENT
FIGURE-1

National Flood Hazard Layer FIRMette

FEMA

72°28'2"W 41°31'9"N



72°27'25"W 41°30'42"N

Feet 1:6,000

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

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

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 Cross Sections with 1% Annual Chance
- 17.5 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 5/11/2021 at 3:16 PM 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.

FIGURE-2

Soil Map—State of Connecticut
(THE LOFTS AT BLACK BIRCH)



Map Scale: 1:3,660 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

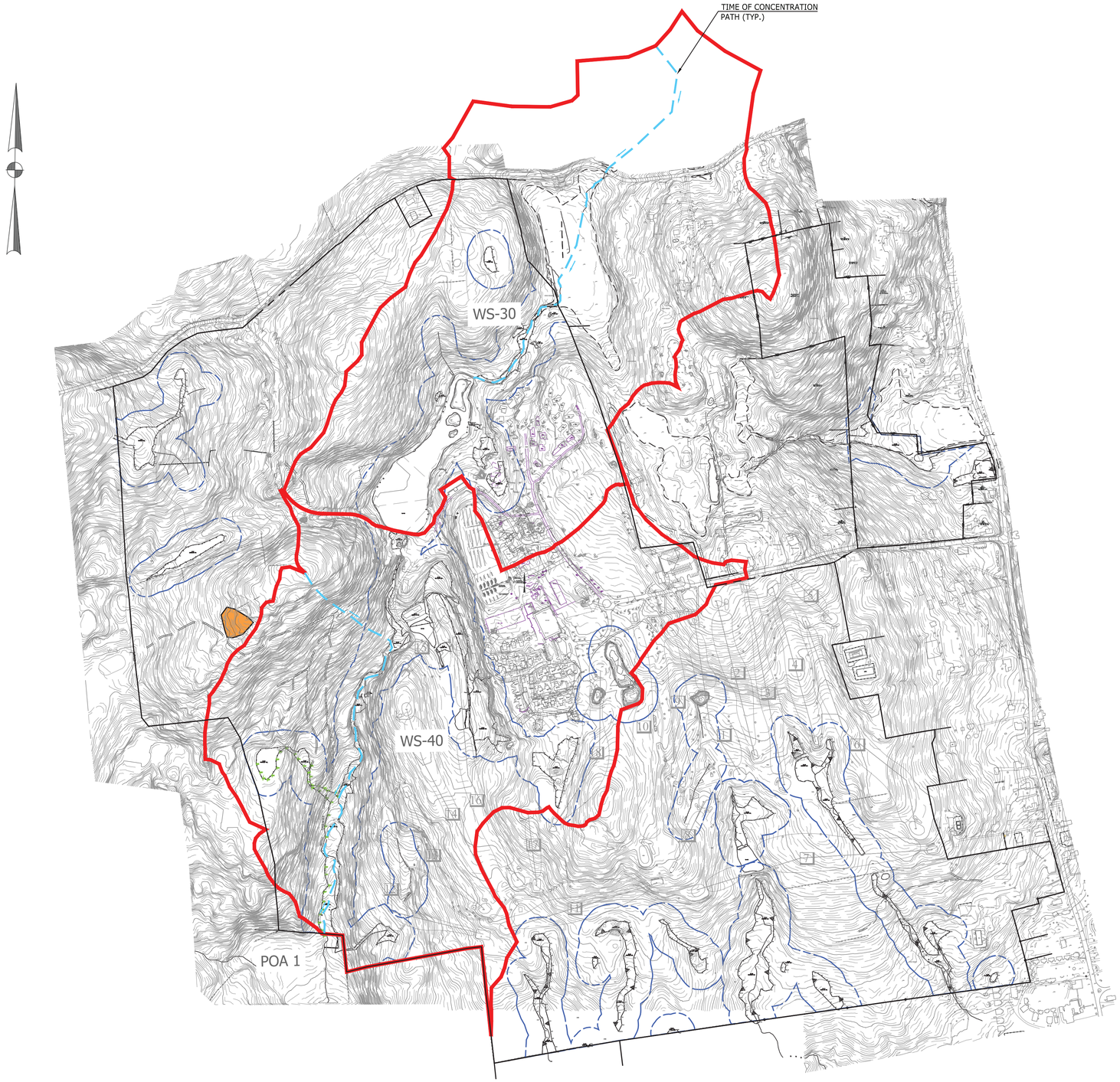
Feet
0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

USDA **Natural Resources Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

5/11/2021
FIGURE-3



GRAPHIC SCALE

350 0 175 350 700 1400

(IN FEET)
1 inch = 350 ft.

EXISTING WATERSHED BOUNDARY

WS EXISTING WATERSHED

POA POINT OF ANALYSIS

TIME OF CONCENTRATION

NO.	DATE	DESCRIPTION

REVISIONS

SUPV.	S.R.M.
DESIGN	R.E.B.
DRAWN	R.E.B.
CHECKED	S.R.M.
DATE	06/03/21

SCALE
1" = 350'

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1 BANNER ROAD
EAST HADDAM, CT 06423

EXISTING WATERSHED MAP HYDROGRAPHS
COMMUNITY CENTER REDEVELOPMENT
BANNER LANE - EAST HADDAM, CONNECTICUT

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET OF	
D	BLACK BIRCH APTS	07056.3 PD	07056.30			FIGURE-4



GRAPHIC SCALE

350 0 175 350 700 1400

(IN FEET)
1 inch = 350 ft.

EXISTING WATERSHED BOUNDARY

WS EXISTING WATERSHED

POA POINT OF ANALYSIS

TIME OF CONCENTRATION

NO.	DATE	DESCRIPTION

REVISIONS

SUPV.	S.R.M.
DESIGN	R.E.B.
DRAWN	R.E.B.
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DATE	06/03/21

SCALE
1" = 350'

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PROPOSED WATERSHED MAP - HYDROGRAPHS
COMMUNITY CENTER REDEVELOPMENT
BANNER LANE - EAST HADDAM, CONNECTICUT

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET
D	BLACK BIRCH APTS	07056.3 PD	07056.30		OF FIGURE-5

COUNTRY CLUB LANE

BANNER LANE

BANNER ROAD

Pinehurst Lane

Augusta D

OVERALL CONTRIBUTING WATERSHED TO EXISTING OUTFALL (CIRCA 2004) BEFORE THE FUNCTION HALL UPDATES AND REMOVAL OF ADJACENT BUILDINGS/PARKING LOT

TIME OF CONCENTRATION Tc PATH (TYP.)

IMPERVIOUS SURFACES (CIRCA 2004) SINCE REMOVED (TYP.)

POOL/PATIO

PATIO

FUNCTION HALL

PUMP HOUSE

PRO SHOP

SECTION A

SECTION B

POINT OF ANALYSIS "B"

GRAPHIC SCALE

(IN FEET)
1 inch = 40 ft.

NO.	DATE	DESCRIPTION
		REVISIONS

SUPV.	S.R.M.
DESIGN	R.E.B.
DRAWN	R.E.B.
CHECKED	S.R.M.
DATE	06/03/21

SCALE
1" = 40'

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EXISTING WATERSHED MAP HYDRAFLOW
COMMUNITY CENTER REDEVELOPMENT
BANNER LANE - EAST HADDAM, CONNECTICUT

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET OF	FIGURE-6
D	BLACK BIRCH APTS	07056.3 PD	07056.30			

COUNTRY CLUB LANE

TIME OF CONCENTRATION
Tc PATH (TYP.)

EXCB7

PCB3

BANNER LANE

PCB5

PCB4

POOL

EX6A

EX6R

PCB2R

PCB2

EXCB8

PRO SHOP

BANNER ROAD

EXCB1

EXCB2

SECTION B

PCB1

EXCB6

POINT OF ANALYSIS
"B"

Pinehurst Lane

EXCB3

EXCB5

SECTION A

EXCB4

Augusta D

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 inch = 40 ft.

NO.	DATE	DESCRIPTION
		REVISIONS

SUPV.	S.R.M.
DESIGN	R.E.B.
DRAWN	R.E.B.
CHECKED	S.R.M.
DATE	06/03/21

SCALE
1" = 40'

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EXISTING WATERSHED MAP HYDRAFLOW
COMMUNITY CENTER REDEVELOPMENT
BANNER LANE - EAST HADDAM, CONNECTICUT

SIZE	PROJECT	FILE NAME	NUMBER	REV.	SHEET OF
D	BLACK BIRCH APTS	07056.3 PD	07056.30		FIGURE-7

APPENDIX A

REFERENCE TABLES, CHARTS, & GRAPHS

Soil Map—State of Connecticut
(THE LOFTS AT BLACK BIRCH)



Map Scale: 1:3,660 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N 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 1:12,000.

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: State of Connecticut
Survey Area Data: Version 20, Jun 9, 2020

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

Date(s) aerial images were photographed: Sep 3, 2019—Oct 22, 2019

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
3	Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony	1.8	2.7%
4	Leicester fine sandy loam	5.9	8.7%
13	Walpole sandy loam, 0 to 3 percent slopes	0.0	0.0%
50B	Sutton fine sandy loam, 3 to 8 percent slopes	10.4	15.4%
57B	Gloucester gravelly sandy loam, 3 to 8 percent slopes	5.1	7.5%
57C	Gloucester gravelly sandy loam, 8 to 15 percent slopes	4.2	6.2%
57D	Gloucester gravelly sandy loam, 15 to 25 percent slopes	1.1	1.6%
59D	Gloucester gravelly sandy loam, 15 to 35 percent slopes, extremely stony	2.2	3.2%
62D	Canton and Charlton fine sandy loams, 15 to 35 percent slopes, extremely stony	3.3	4.8%
73C	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	6.6	9.7%
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	0.6	0.8%
306	Udorthents-Urban land complex	26.6	39.3%
Totals for Area of Interest		**67.7**	**100.0%**

NOAA Atlas 14, Volume 10, Version 3
Location name: Moodus, Connecticut, USA*
Latitude: 41.5154°, Longitude: -72.462°
Elevation: 357.62 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

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	0.333 (0.258-0.417)	0.403 (0.311-0.505)	0.517 (0.399-0.650)	0.611 (0.468-0.772)	0.741 (0.550-0.975)	0.839 (0.611-1.13)	0.941 (0.666-1.31)	1.06 (0.709-1.49)	1.22 (0.790-1.78)	1.36 (0.858-2.02)
10-min	0.472 (0.365-0.591)	0.571 (0.441-0.715)	0.732 (0.563-0.920)	0.865 (0.663-1.09)	1.05 (0.779-1.38)	1.19 (0.865-1.59)	1.33 (0.944-1.85)	1.50 (1.00-2.12)	1.73 (1.12-2.53)	1.92 (1.22-2.86)
15-min	0.555 (0.429-0.695)	0.671 (0.518-0.841)	0.860 (0.663-1.08)	1.02 (0.779-1.29)	1.23 (0.916-1.62)	1.40 (1.02-1.88)	1.57 (1.11-2.18)	1.76 (1.18-2.49)	2.03 (1.32-2.97)	2.26 (1.43-3.36)
30-min	0.761 (0.589-0.953)	0.920 (0.711-1.15)	1.18 (0.908-1.48)	1.40 (1.07-1.76)	1.69 (1.26-2.23)	1.91 (1.39-2.57)	2.15 (1.52-2.98)	2.41 (1.62-3.41)	2.79 (1.80-4.07)	3.09 (1.96-4.60)
60-min	0.967 (0.748-1.21)	1.17 (0.903-1.47)	1.50 (1.15-1.88)	1.77 (1.36-2.24)	2.15 (1.60-2.83)	2.43 (1.77-3.26)	2.73 (1.93-3.79)	3.06 (2.06-4.33)	3.54 (2.29-5.17)	3.93 (2.48-5.84)
2-hr	1.29 (1.00-1.60)	1.54 (1.20-1.92)	1.96 (1.52-2.44)	2.30 (1.78-2.89)	2.78 (2.08-3.64)	3.14 (2.30-4.18)	3.52 (2.51-4.86)	3.95 (2.67-5.55)	4.59 (2.99-6.65)	5.13 (3.25-7.56)
3-hr	1.50 (1.18-1.86)	1.80 (1.41-2.23)	2.28 (1.78-2.83)	2.68 (2.08-3.34)	3.22 (2.43-4.20)	3.63 (2.68-4.83)	4.07 (2.92-5.60)	4.58 (3.10-6.39)	5.33 (3.47-7.68)	5.97 (3.80-8.75)
6-hr	1.93 (1.53-2.38)	2.31 (1.82-2.84)	2.92 (2.30-3.60)	3.43 (2.69-4.25)	4.13 (3.13-5.34)	4.65 (3.46-6.14)	5.21 (3.77-7.12)	5.87 (3.99-8.12)	6.85 (4.48-9.78)	7.68 (4.90-11.2)
12-hr	2.41 (1.92-2.94)	2.89 (2.30-3.52)	3.67 (2.92-4.49)	4.32 (3.41-5.32)	5.21 (3.99-6.69)	5.88 (4.40-7.69)	6.59 (4.80-8.94)	7.43 (5.08-10.2)	8.69 (5.70-12.3)	9.76 (6.24-14.0)
24-hr	2.83 (2.28-3.42)	3.42 (2.76-4.15)	4.40 (3.53-5.34)	5.21 (4.15-6.36)	6.32 (4.88-8.05)	7.14 (5.40-9.29)	8.03 (5.90-10.8)	9.11 (6.25-12.4)	10.7 (7.06-15.0)	12.1 (7.78-17.3)
2-day	3.15 (2.57-3.79)	3.87 (3.14-4.65)	5.04 (4.08-6.08)	6.01 (4.83-7.28)	7.34 (5.72-9.31)	8.32 (6.35-10.8)	9.40 (6.98-12.7)	10.7 (7.40-14.5)	12.8 (8.46-17.8)	14.6 (9.41-20.6)
3-day	3.42 (2.80-4.09)	4.20 (3.43-5.03)	5.47 (4.46-6.57)	6.53 (5.28-7.88)	7.99 (6.25-10.1)	9.06 (6.95-11.7)	10.2 (7.63-13.7)	11.7 (8.09-15.7)	14.0 (9.26-19.3)	16.0 (10.3-22.4)
4-day	3.66 (3.01-4.37)	4.49 (3.69-5.36)	5.85 (4.78-7.00)	6.97 (5.66-8.38)	8.51 (6.68-10.7)	9.65 (7.42-12.4)	10.9 (8.15-14.6)	12.4 (8.62-16.6)	14.9 (9.86-20.5)	17.0 (11.0-23.8)
7-day	4.37 (3.62-5.18)	5.29 (4.38-6.28)	6.80 (5.60-8.09)	8.05 (6.59-9.63)	9.78 (7.72-12.2)	11.0 (8.54-14.1)	12.4 (9.32-16.4)	14.1 (9.83-18.8)	16.8 (11.2-22.9)	19.1 (12.3-26.4)
10-day	5.07 (4.22-5.99)	6.05 (5.03-7.16)	7.65 (6.33-9.07)	8.98 (7.38-10.7)	10.8 (8.56-13.4)	12.2 (9.42-15.4)	13.6 (10.2-17.8)	15.4 (10.7-20.3)	18.1 (12.0-24.5)	20.3 (13.2-28.1)
20-day	7.29 (6.12-8.54)	8.34 (7.00-9.79)	10.1 (8.42-11.9)	11.5 (9.55-13.6)	13.5 (10.8-16.5)	15.0 (11.6-18.6)	16.5 (12.4-21.2)	18.3 (12.8-23.8)	20.7 (13.9-27.9)	22.7 (14.8-31.1)
30-day	9.15 (7.74-10.7)	10.3 (8.65-12.0)	12.1 (10.1-14.1)	13.5 (11.3-15.9)	15.6 (12.5-18.9)	17.2 (13.4-21.1)	18.8 (14.0-23.7)	20.4 (14.4-26.5)	22.7 (15.2-30.2)	24.4 (15.9-33.1)
45-day	11.5 (9.76-13.3)	12.6 (10.7-14.7)	14.5 (12.3-16.9)	16.1 (13.5-18.8)	18.2 (14.6-21.9)	19.9 (15.5-24.3)	21.5 (16.0-26.9)	23.1 (16.4-29.7)	25.1 (16.9-33.2)	26.5 (17.3-35.8)
60-day	13.4 (11.5-15.6)	14.6 (12.5-17.0)	16.6 (14.1-19.3)	18.2 (15.3-21.2)	20.4 (16.4-24.4)	22.2 (17.3-26.9)	23.8 (17.8-29.5)	25.3 (18.0-32.5)	27.1 (18.4-35.8)	28.4 (18.6-38.1)

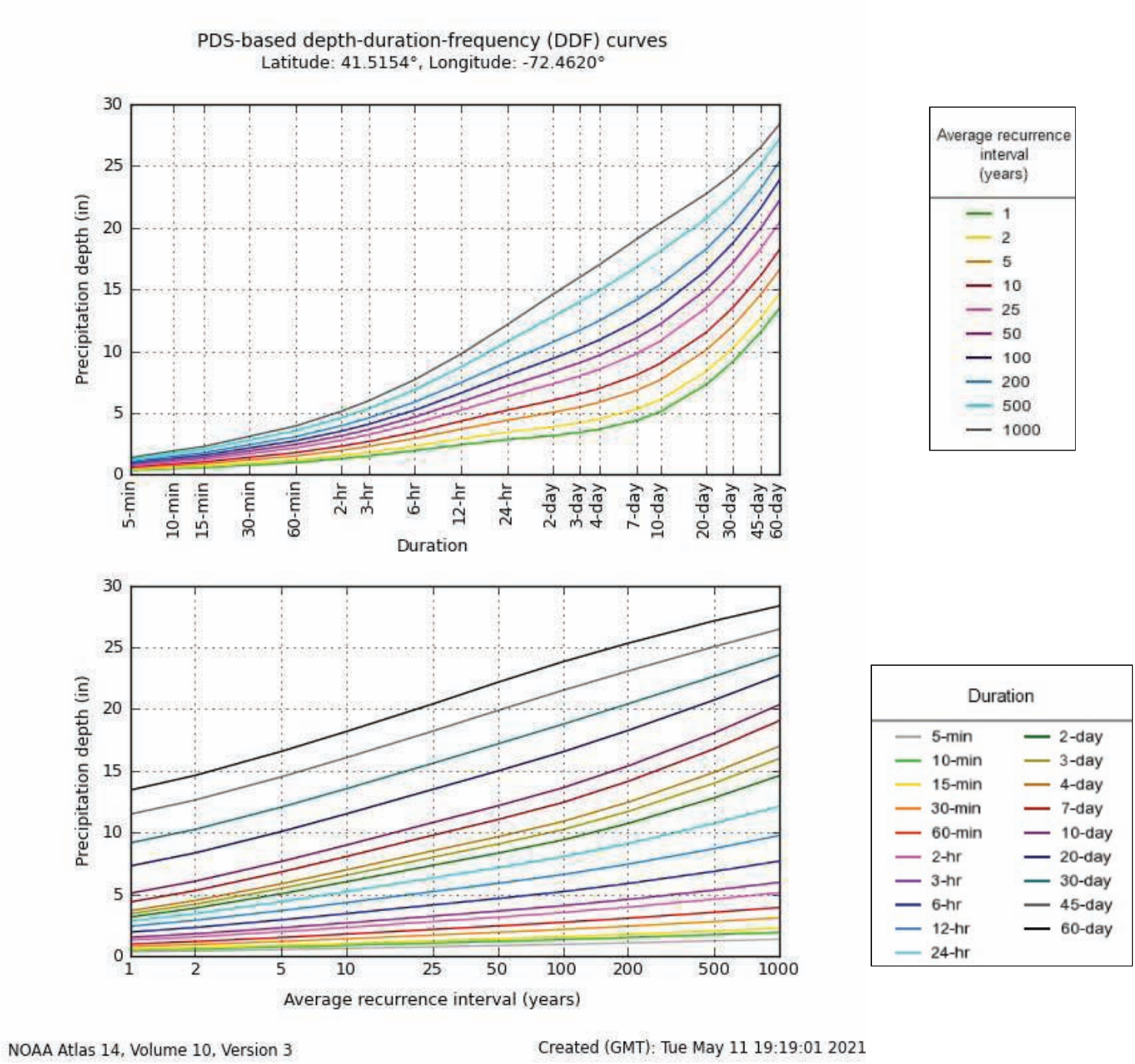
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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



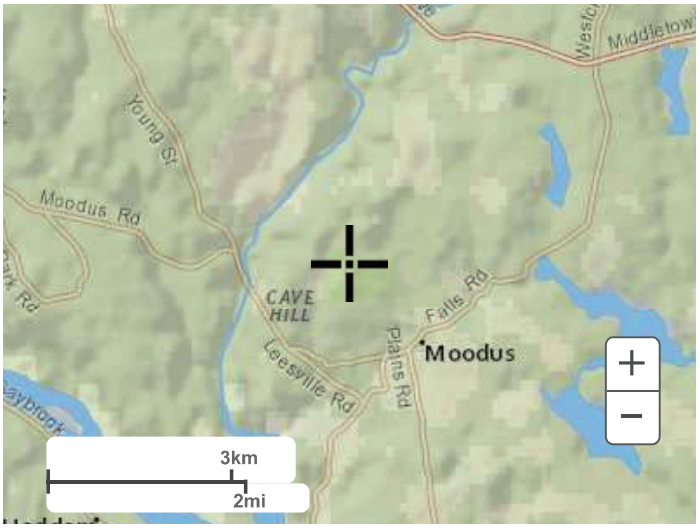
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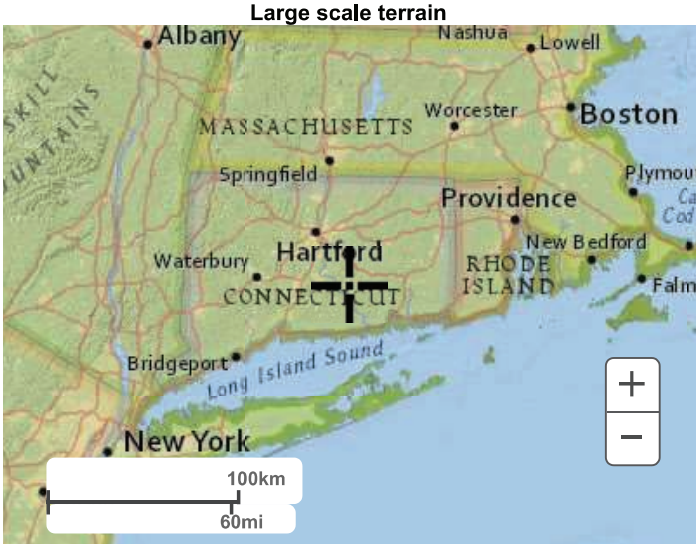
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Maps & aerials

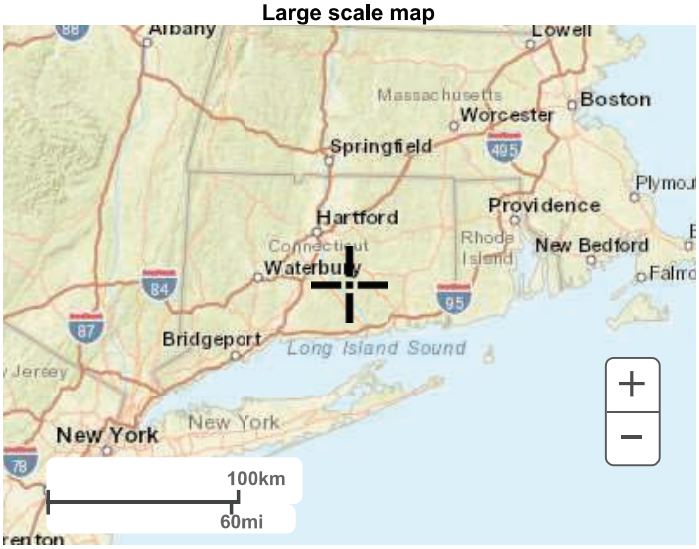
Small scale terrain



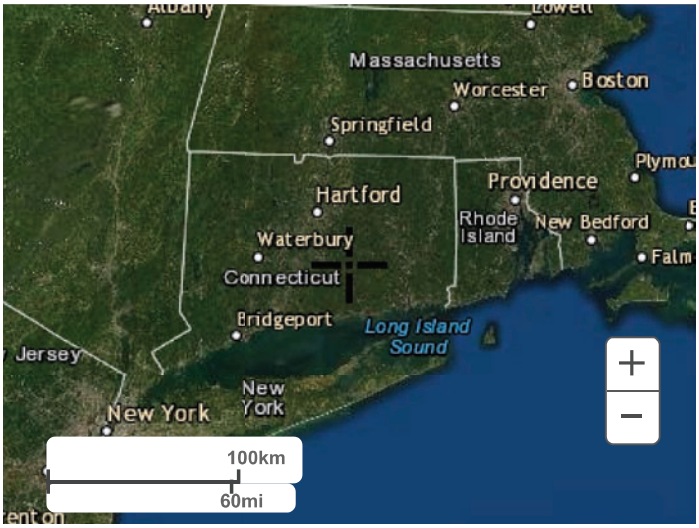
Large scale terrain



Large scale map



Large scale aerial



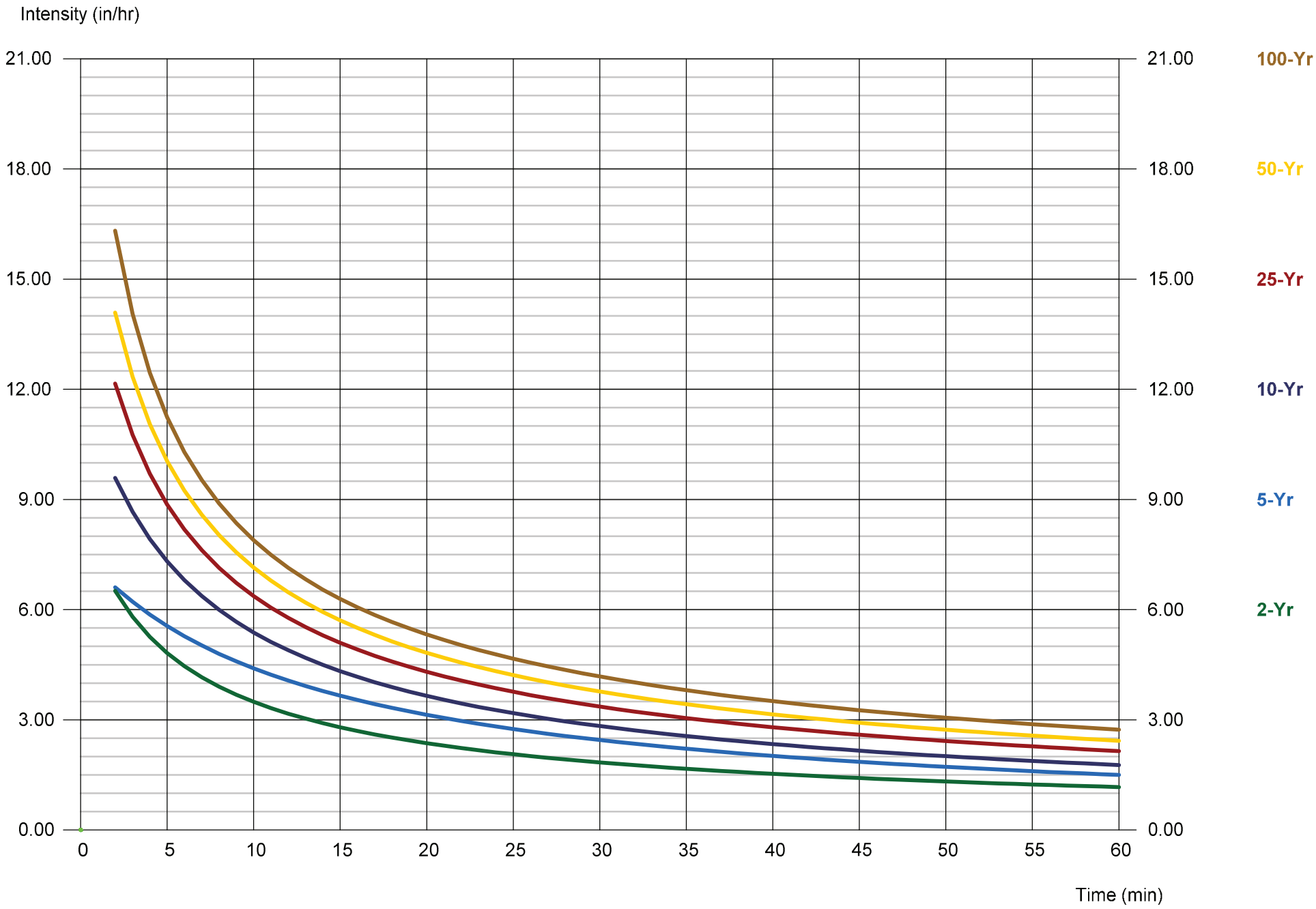
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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Hydraflow IDF Curves

IDF file: Middlesex.idf



APPENDIX B

PROJECT CALCULATIONS / ASSUMPTIONS

Banner Commnunity Center Renovation Drainage Analysis
East Haddam, Connecticut
WMC Job Number: 07056.10

Date: 6/20/2021
Calculated By: REB
Checked By:

TABLE 5
Proposed Summary of Catchment System (Pinehurst Lane)

SUBAREA	TOTAL AREA (S.F.)	TOTAL AREA AC.	PAVED AREA (S.F.)	GRASS AREA (S.F.)	COMPOSITE C-VALUE	ESTIMATED Tc (MIN)
EXCB1	22550	0.52	9000	13550	0.54	15
EXCB2	69330	1.59	23000	46330	0.50	20
EXCB3	16060	0.37	8500	7560	0.62	10
EXCB4	34165	0.78	18000	16165	0.62	15
EXCB5	2430	0.06	1500	930	0.67	5
EXCB6	15140	0.35	9100	6040	0.66	10
EX6A	14665	0.34	14665	0	0.70	5
EX6R	6650	0.15	6650	0	0.90	5
EXCB7	25360	0.58	0	25360	0.30	20
EXCB8	2000	0.05	0	2000	0.30	10
PCB1	17350	0.40	7900	9450	0.57	10
PCB2	6980	0.16	4000	2980	0.64	5
PCB2R	6650	0.15	6650	0	0.90	5
PCB3	19400	0.45	1285	18115	0.34	20
PCB4	17600	0.40	7000	10600	0.54	10
PCB5	19460	0.45	11450	8010	0.65	10

Assumed Impervious C-value = 0.9
Assumed Paver C-value = 0.7
Assumed Non-Impervious C-value = 0.3
Time of Concentration estimated using Seelye Chart for overland flow.
Catchment systems coordinate with Hydraflow Models.

WMC
CONSULTING ENGINEERS

Project: Banner Community Center Redvelopment Project No.: 07056.10
Location: East Haddam, CT
Calc By: REB Date: 6/20/2021

STORMWATER CALCULATIONS

Purpose: To calculate the first flush runoff flow rate (WQF) over a given site area. In this situation the Water Quality Volume (WQV) to be analyzed is the runoff produced by the first 1" of rainfall.

Reference: United States Department of Agriculture Natural Resources Conservation Service TR-55 Manual
2004 Connecticut Stormwater Quality Manual

Given:

Structure Name	A (acres)	Runoff Coefficient	Area Imp (ac)	Area Perv (ac)	Tc (min)	Tc (hr)
SWQU-1	2.64	0.50	0.88	1.76	23	0.38

*Assumes pervious runoff coefficent of 0.3 and 0.90 for impervious areas.

Procedure: The Water Quality Flow (WQF) is calculated using the Water Quality Volume (WQV) as described in the 2004 Connecticut Stormwater Quality Manual.

1) Compute WQV in watershed inches using the following equation:

WQV = (P * R * A) / 12

where: WQV = water quality volume (ac-ft)
P = design precipitation (inches) = (1" for water quality storm)
R = volumetric runoff coefficient = 0.05 + 0.009(I)
I = percent impervious cover

Structure Name	Percent Imp (%)	R	P (in)	WQV (ac-ft)
SWQU-1	33	0.350	1.00	0.077

2) Compute the NRCS Runoff Curve Number (CN) using the following equation, or graphically using Figure 2-1 from TR-55 (USDA, 1986)

$$CN = \frac{1000}{[10+5P+10Q - 10(Q^2+1.25QP)^{.5}]}$$

where: CN = Runoff Curve Number
P = design precipitation (inches) = (1" for water quality storm)
Q = runoff depth (watershed inches) = [WQV x 12(in/ft)] / area(ac)

Structure Name	Q (in)	CN
SWQU-1	0.35	91

3) Using computed CN, read initial abstraction (Ia) from Table 4-1 in Chapter 4 of TR-55: compute Ia/P, interpolating when appropriate

Structure Name	Ia (in)	Ia/P
SWQU-1	0.198	0.198

4) Read the unit peak discharge (qu) from Exhibit 4-III in Chapter 4 of TR-55 for appropriate tc for Type III rainfall distribution.

Structure Name	Tc (hr)	Ia/P	qu (csm/in)
SWQU-1	0.38333333	0.198	420

5) Substituting WQV (watershed inches) for runoff depth (Q), compute the water quality flow (WQF) from the following equation:

WQF = (qu) * (A) * (Q)

where: WQF = water quality flow (cfs)
qu = unit peak discharge (cfs/mi^2/inch)
A = drainage area (mi^2)
Q = runoff depth (watershed inches)

Structure Name	qu (csm/in)	A (mi^2)	Q (in)	WQF (cfs)
SWQU-1	420	0.004118	0.35	0.61

2. Compute the time of concentration (t_c) based on the methods described in Chapter 3 of TR-55. A minimum value of 0.167 hours (10 minutes) should be used. For sheet flow, the flow path should not be longer than 300 feet.

3. Using the computed CN, t_c, and drainage area (A) in acres, compute the peak discharge for the water quality storm (i.e., the water quality flow [WQF]), based on the procedures described in Chapter 4 of TR-55.

   - *Read initial abstraction (I_a) from Table 4-1 in Chapter 4 of TR-55 (reproduced below); compute I_a/P*

Table 4-1 I_a values for runoff curve numbers

Curve number	I_a (in)	Curve number	I_a (in)	Curve number	I_a (in)	Curve number	I_a (in)
40	3.000	55	1.636	70	0.857	85	0.353
41	2.878	56	1.571	71	0.817	86	0.326
42	2.762	57	1.509	72	0.778	87	0.299
43	2.651	58	1.448	73	0.740	88	0.273
44	2.545	59	1.390	74	0.703	89	0.247
45	2.444	60	1.333	75	0.667	90	0.222
46	2.348	61	1.279	76	0.632	91	0.198
47	2.255	62	1.226	77	0.597	92	0.174
48	2.167	63	1.175	78	0.564	93	0.151
49	2.082	64	1.125	79	0.532	94	0.128
50	2.000	65	1.077	80	0.500	95	0.105
51	1.922	66	1.030	81	0.469	96	0.083
52	1.846	67	0.985	82	0.439	97	0.062
53	1.774	68	0.941	83	0.410	98	0.041
54	1.704	69	0.899	84	0.381		

   - *Read the unit peak discharge (q_u) from Exhibit 4-III in Chapter 4 of TR-55 (reproduced below) for appropriate t_c*

Exhibit 4-111 Unit peak discharge (q_u) for NRCS (SCS) type III rainfall distribution

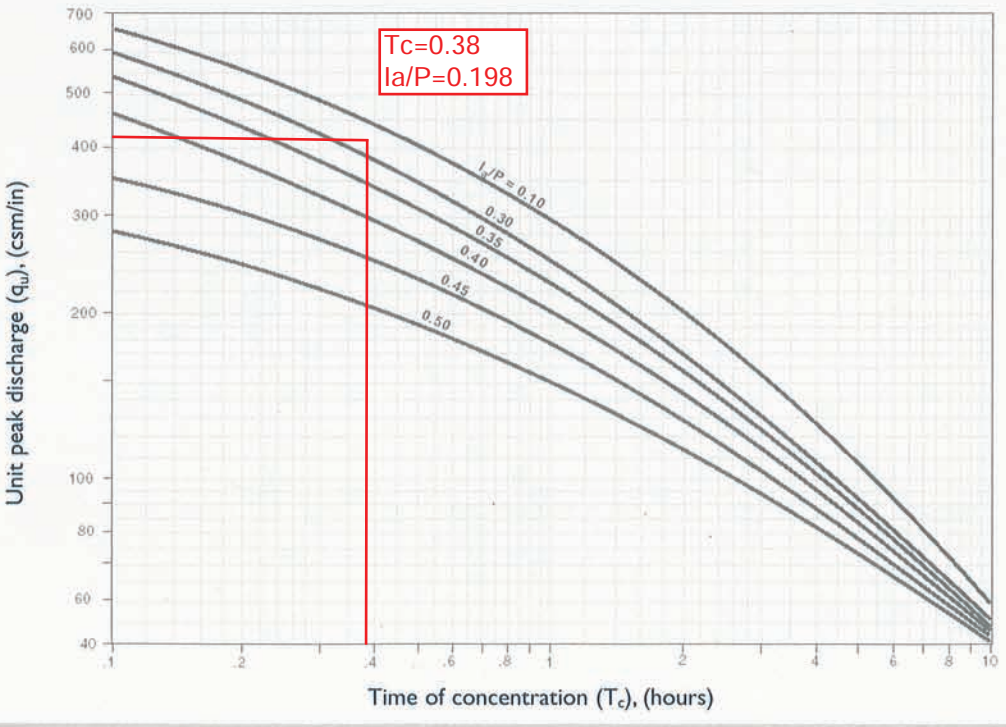


TABLE 2 - PERFORMANCE MATRIX FOR CONNDOT APPROVED HYDRODYNAMIC SEPARATORS

Maximum WQF (cfs)	Product Model								
	Downstream Defender	***Flogard***	***High Eff. CDS***	***Hydroguard***	***Stormceptor OSR***	***Stormceptor STC***	***Vortechs***	***Vortsentry***	***V2B1***
0.4	4-ft	DVS-36	2015-4G; 2015-4	HG 4	065	450	1000	VS30	2
0.5	4-ft	DVS-36	2015-4G; 2015-4	HG 4	065	900	1000	VS30	2
0.6	4-ft	DVS-36	2015-4G; 2015-4	HG 4	065	900	1000	VS40	2
0.7	4-ft	DVS-48	2015-4G; 2015-4	HG 4	140	900	1000	VS40	2
0.8	4-ft	DVS-48	2015-4G; 2015-4	HG 4	140	900	1000	VS40	2
0.9	4-ft	DVS-48	2015-4G; 2015-4	HG 4	140	1200	1000	VS40	3
1.0	4-ft	DVS-48	2015-4G; 2015-4	HG 4	140	1800	1000	VS40	3
1.1	4-ft	DVS-48	2015-4G; 2015-4	HG 4	140	1800	1000	VS40	4
1.2	6-ft	DVS-48	2015	HG 5	140	2400	1000	VS50	4
1.3	6-ft	DVS-60	2015	HG 5	140	2400	1000	VS50	4
1.4	6-ft	DVS-60	2015	HG 5	140	2400	2000	VS50	4
1.5	6-ft	DVS-60	2020	HG 5	140	2400	2000	VS50	6
1.6	6-ft	DVS-60	2020	HG 5	140	2400	2000	VS50	6
1.7	6-ft	DVS-60	2020	HG 5	250	2400	2000	VS50	6
1.8	6-ft	DVS-60	2020	HG 6	250	2400	2000	VS50	7
1.9	6-ft	DVS-60	2020	HG 6	250	3600	2000	VS60	7
2.0	6-ft	DVS-60	2020	HG 6	250	3600	2000	VS60	7
2.1	6-ft	DVS-60	2020	HG 6	250	3600	2000	VS60	9
2.2	6-ft	DVS-72	2025	HG 6	250	3600	2000	VS60	8
2.3	6-ft	DVS-72	3020, 3020-D	HG 6	250	3600	2000	VS60	8
2.4	6-ft	DVS-72	3035; 3035-D	HG 6	250	4800	2000	VS60	8
2.5	6-ft	DVS-72	3035; 3035-D	HG 6	250	4800	3000	VS60	10
2.6	6-ft	DVS-72	3035; 3035-D	HG 6	250	4800	3000	VS60	11
2.7	6-ft	DVS-72	3035; 3035-D	HG 7	250	4800	3000	VS60	11
2.8	6-ft	DVS-72	3035; 3035-D	HG 7	250	4800	3000	VS70	11
2.9	6-ft	DVS-72	3035; 3035-D	HG 7	250	4800	3000	VS70	12
3.0	6-ft	DVS-72	3035; 3035-D	HG 7	390	4800	3000	VS70	12

TIME OF CONCENTRATION COMPUTATIONS

Time of Concentration Worksheet

Project:	Community Center Renovation	By:	REB	Date:	6/20/2021
Location:	EXWS30	Checked:		Date:	

Check one: ☑ Present ☐ Developed
Check one: ☑ English Units ☐ Metric Units

Sheet flow (Applicable to T_c only)

			Segment ID				
			1				
1	Surface description (Table 6.C.1)		light underbrush				
2	Manning's roughness coeff., n (Table 6.C.1)		0.400		0.000		
3	Flow length, L (See Section 6.C.4)	ft	150				
4	Two-yr 24-hr rainfall, P_2 (Table B-1)	in	3.4		3.4		
5	Land slope, s	ft/ft	0.040				
6	Travel Time, T_t (Equation 6.C.2)	hr	0.36	+	0.00	=	0.36

Shallow concentrated flow

			Segment ID				
			2				
7	Surface description (paved or unpaved)		unpaved				
8	Flow length, L	ft	1175				
9	Watercourse slope, s	ft/ft	0.070				
10	Average velocity, V (Equation 6.C.4 or 6.C.5)	ft/s	4.3		0.0		
11	Travel Time, T_t (Equation 6.C.3)	hr	0.08	+	0.00	=	0.08

Channel flow

			Segment ID				
			3		4		
12	Cross sectional flow area, a	ft^2	604.00		6.25		
13	Wetted perimeter, p_w	ft	305.66		15.10		
14	Hydraulic radius, $r=a/p_w$	ft	1.98		0.41		
15	Channel slope, s	ft/ft	0.004		0.013		
16	Manning's roughness coeff., n (Table 7-1 & Append. A, Ch. 8)		0.050		0.050		
17	Average velocity, v (Equation 6.C.6)	ft/s	3.0		1.9		
18	Flow length, L	ft	560		800		
19	Travel Time, T_t (Equation 6.C.3)	hr	0.06	+	0.12	=	0.18

Time of Concentration = 0.62 hours
= 37 minutes

WMC Consulting Engineers
Newington, CT
(860)667-9624

Time of Concentration Worksheet

Project:	Community Center Renovation	By:	REB	Date:	6/20/2021
Location:	EXWS40	Checked:		Date:	

Check one: ☑ Present ☐ Developed
Check one: ☑ English Units ☐ Metric Units

Sheet flow (Applicable to T_c only)

		Segment ID	1					
1	Surface description (Table 6.C.1)	Dense Woods						
2	Manning's roughness coeff., n (Table 6.C.1)		0.800		0.000			
3	Flow length, L (See Section 6.C.4)	ft	100					
4	Two-yr 24-hr rainfall, P_2 (Table B-1)	in	3.4		3.4			
5	Land slope, s	ft/ft	0.050					
6	Travel Time, T_t (Equation 6.C.2)	hr	0.42	+	0.00	=	0.42	

Shallow concentrated flow

		Segment ID	2					
7	Surface description (paved or unpaved)		unpaved					
8	Flow length, L	ft	890					
9	Watercourse slope, s	ft/ft	0.180					
10	Average velocity, V (Equation 6.C.4 or 6.C.5)	ft/s	6.8		0.0			
11	Travel Time, T_t (Equation 6.C.3)	hr	0.04	+	0.00	=	0.04	

Channel flow

		Segment ID	3					
12	Cross sectional flow area, a	ft^2	110.00					
13	Wetted perimeter, p_w	ft	120.10					
14	Hydraulic radius, $r=a/p_w$	ft	0.92					
15	Channel slope, s	ft/ft	0.045					
16	Manning's roughness coeff., n (Table 7-1 & Append. A, Ch. 8)		0.050					
17	Average velocity, v (Equation 6.C.6)	ft/s	6.0					
18	Flow length, L	ft	1625					
19	Travel Time, T_t (Equation 6.C.3)	hr	0.08	+	0.00	=	0.08	

Time of Concentration = 0.54 hours
= 32 minutes

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(860)667-9624

Time of Concentration Worksheet

Project:	Community Center Renovation	By:	REB	Date:	6/20/2021
Location:	PRWS30	Checked:		Date:	

Check one: ☐ Present ☑ Developed
Check one: ☑ English Units ☐ Metric Units

Sheet flow (Applicable to T_c only)

			Segment ID				
			1				
1	Surface description (Table 6.C.1)		light underbrush				
2	Manning's roughness coeff., n (Table 6.C.1)		0.400		0.000		
3	Flow length, L (See Section 6.C.4)	ft	150				
4	Two-yr 24-hr rainfall, P_2 (Table B-1)	in	3.4		3.4		
5	Land slope, s	ft/ft	0.040				
6	Travel Time, T_t (Equation 6.C.2)	hr	0.36	+	0.00	=	0.36

Shallow concentrated flow

			Segment ID				
			2				
7	Surface description (paved or unpaved)		unpaved				
8	Flow length, L	ft	1175				
9	Watercourse slope, s	ft/ft	0.070				
10	Average velocity, V (Equation 6.C.4 or 6.C.5)	ft/s	4.3		0.0		
11	Travel Time, T_t (Equation 6.C.3)	hr	0.08	+	0.00	=	0.08

Channel flow

			Segment ID				
			3		4		
12	Cross sectional flow area, a	ft^2	604.00		6.25		
13	Wetted perimeter, p_w	ft	305.66		15.10		
14	Hydraulic radius, $r=a/p_w$	ft	1.98		0.41		
15	Channel slope, s	ft/ft	0.004		0.013		
16	Manning's roughness coeff., n (Table 7-1 & Append. A, Ch. 8)		0.050		0.050		
17	Average velocity, v (Equation 6.C.6)	ft/s	3.0		1.9		
18	Flow length, L	ft	560		800		
19	Travel Time, T_t (Equation 6.C.3)	hr	0.06	+	0.12	=	0.18

Time of Concentration = 0.62 hours
= 37 minutes

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(860)667-9624

Time of Concentration Worksheet

Project:	Community Center Renovation	By:	REB	Date:	6/20/2021
Location:	PRWS40	Checked:		Date:	

Check one: ☐ Present ☑ Developed
Check one: ☑ English Units ☐ Metric Units

Sheet flow (Applicable to T_c only)

		Segment ID	1					
1	Surface description (Table 6.C.1)	Dense Woods						
2	Manning's roughness coeff., n (Table 6.C.1)		0.800		0.000			
3	Flow length, L (See Section 6.C.4)	ft	100					
4	Two-yr 24-hr rainfall, P_2 (Table B-1)	in	3.4		3.4			
5	Land slope, s	ft/ft	0.050					
6	Travel Time, T_t (Equation 6.C.2)	hr	0.42	+	0.00	=	0.42	

Shallow concentrated flow

		Segment ID	2					
7	Surface description (paved or unpaved)		unpaved					
8	Flow length, L	ft	890					
9	Watercourse slope, s	ft/ft	0.180					
10	Average velocity, V (Equation 6.C.4 or 6.C.5)	ft/s	6.8		0.0			
11	Travel Time, T_t (Equation 6.C.3)	hr	0.04	+	0.00	=	0.04	

Channel flow

		Segment ID	3					
12	Cross sectional flow area, a	ft^2	110.00					
13	Wetted perimeter, p_w	ft	120.10					
14	Hydraulic radius, $r=a/p_w$	ft	0.92					
15	Channel slope, s	ft/ft	0.045					
16	Manning's roughness coeff., n (Table 7-1 & Append. A, Ch. 8)		0.050					
17	Average velocity, v (Equation 6.C.6)	ft/s	6.0					
18	Flow length, L	ft	1625					
19	Travel Time, T_t (Equation 6.C.3)	hr	0.08	+	0.00	=	0.08	

Time of Concentration = 0.54 hours
= 32 minutes

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CURVE NUMBER COMPUTATIONS

Worksheet 2: Runoff curve number and runoff

Project Banner Community Center Renovation By REB Date 6/20/2021

Location East Haddam Checked _____ Date _____

Existing EXWS30

1. Runoff curve number (CN)

Hydrologic group (appendix A)	Cover description	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area X acres / mi^2 / %	Product of CN x area
Group A	Woods	30			20.80	624.00
Group A	Grass	39			11.50	448.50
Group B	Woods	55			55.90	3074.50
Group B	Grass	61			9.90	603.90
Group D	Woods	77			8.75	673.75
Group D	Grass	80			5.50	440.00
Group W	Water (Pond)	98			3.45	338.10
N/A	Impervious (Roadways & Houses)	98			4.00	392.00
1/ Use only one CN source per line.				Totals =	119.80	6594.75

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{\quad}{\quad} = _____$; Use CN = **55**

Worksheet 2: Runoff curve number and runoff

Project Banner Community Center Renovation By REB Date 6/20/2021

Location East Haddam Checked _____ Date _____

Existing EXWS40

1. Runoff curve number (CN)

Hydrologic group (appendix A)	Cover description	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area [X] acres [ ] mi^2 [ ] %	Product of CN x area
Group A	Woods	30			12.40	372.00
Group A	Grass	39			0.20	7.80
Group A	Gravel	76			0.10	7.60
Group B	Woods	55			52.40	2882.00
Group B	Grass	61			37.00	2257.00
Group B	Gravel	85			1.25	106.25
Group D	Woods	77			9.00	693.00
Group D	Grass	80			5.00	400.00
Group D	Gravel	91			0.10	9.10
N/A	Water (Pond)	98			1.25	122.50
N/A	Impervious (Roof Area)	98			2.50	245.00
N/A	Impervious (Roadway & Parking)	98			3.90	382.20
				Totals =	125.10	7484.45

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{\quad}{\quad} = _____$; Use CN = **60**

Worksheet 2: Runoff curve number and runoff

Project Banner Community Center Renovation By REB Date 6/20/2021

Location East Haddam Checked _____ Date _____

Proposed PRWS30

1. Runoff curve number (CN)

Hydrologic group (appendix A)	Cover description	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area (X acres / mi^2 / %)	Product of CN x area
Group A	Woods	30			20.80	624.00
Group A	Grass	39			11.50	448.50
Group B	Woods	55			55.90	3074.50
Group B	Grass	61			9.90	603.90
Group D	Woods	77			8.75	673.75
Group D	Grass	80			5.50	440.00
Group W	Water (Pond)	98			3.45	338.10
N/A	Impervious (Roadways & Houses)	98			4.00	392.00
1/ Use only one CN source per line.				Totals =	119.80	6594.75

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{\quad}{\quad} = _____$; Use CN = **55**

Worksheet 2: Runoff curve number and runoff

Project Banner Community Center Renovation By REB Date 6/20/2021

Location East Haddam Checked _____ Date _____

Proposed PRWS40

1. Runoff curve number (CN)

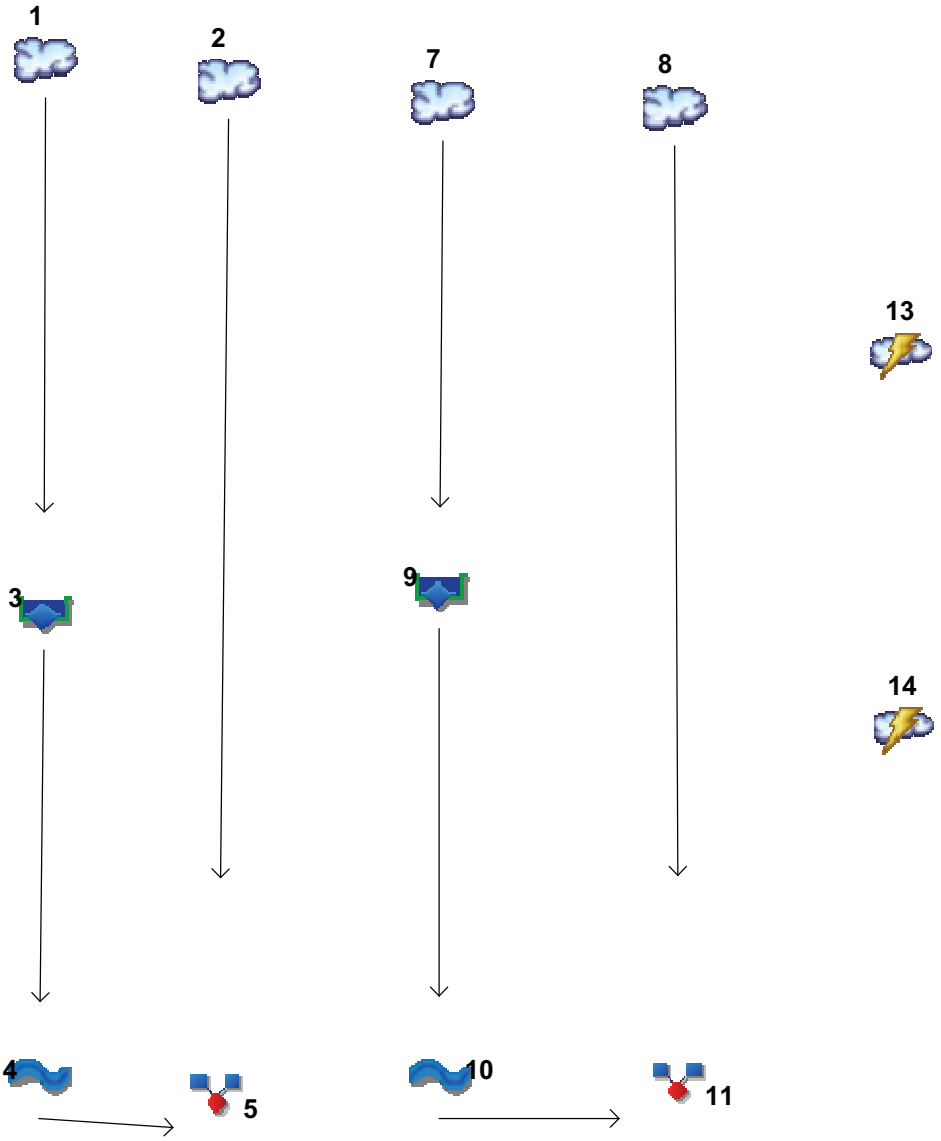
Hydrologic group (appendix A)	Cover description	CN 1/ Table 2-2	CN 1/ Figure 2-3	CN 1/ Figure 2-4	Area [X] acres [ ] mi^2 [ ] %	Product of CN x area
Group A	Woods	30			12.40	372.00
Group A	Grass	39			0.20	7.80
Group A	Gravel	76			0.10	7.60
Group B	Woods	55			52.40	2882.00
Group B	Grass	61			36.40	2220.40
Group B	Gravel	85			1.25	106.25
Group D	Woods	77			9.00	693.00
Group D	Grass	80			5.00	400.00
Group D	Gravel	91			0.10	9.10
N/A	Water (Pond)	98			1.25	122.50
N/A	Impervious (Roof Area)	98			2.25	220.50
N/A	Impervious (Roadway & Parking)	98			4.75	465.50
1/ Use only one CN source per line.				Totals =	125.10	7506.65

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{\quad}{\quad} = _____$; Use CN = **60**

APPENDIX C

HYDROGRAPH MODEL RESULTS

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	EXWS-30
2	SCS Runoff	EXWS-40
3	Reservoir	North Pond
4	Reach	EX-North Reach
5	Combine	EX POA OFFSITE
7	SCS Runoff	PRWS-30
8	SCS Runoff	PRWS-40
9	Reservoir	North Pond
10	Reach	PR-North Reach
11	Combine	PR POA OFFSITE
13	Rational	Existing Section B Outfall
14	Rational	Proposed Section B Outfall

Hydrograph Return Period Recap

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	SCS Runoff	------	-------	11.88	-------	36.03	63.40	108.35	145.42	188.26	EXWS-30
2	SCS Runoff	------	-------	29.48	-------	68.75	108.97	170.48	219.43	275.10	EXWS-40
3	Reservoir	1	-------	2.568	-------	7.160	18.07	73.79	121.40	172.24	North Pond
4	Reach	3	-------	2.564	-------	7.149	17.44	68.06	113.76	163.74	EX-North Reach
5	Combine	2, 4	-------	29.50	-------	69.06	109.62	173.02	231.07	347.29	EX POA OFFSITE
7	SCS Runoff	------	-------	11.88	-------	36.03	63.40	108.35	145.42	188.26	PRWS-30
8	SCS Runoff	------	-------	29.48	-------	68.75	108.97	170.48	219.43	275.10	PRWS-40
9	Reservoir	7	-------	2.568	-------	7.160	18.07	73.79	121.40	172.24	North Pond
10	Reach	9	-------	2.564	-------	7.149	17.44	68.06	113.76	163.74	PR-North Reach
11	Combine	8, 10	-------	29.50	-------	69.06	109.62	173.02	231.07	347.29	PR POA OFFSITE
13	Rational	------	-------	8.791	-------	11.71	13.57	16.03	17.96	19.85	Existing Section B Outfall
14	Rational	------	-------	8.256	-------	10.99	12.74	15.06	16.87	18.64	Proposed Section B Outfall

Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	11.88	5	765	135,077	------	------	------	EXWS-30
2	SCS Runoff	29.48	5	750	232,940	------	------	------	EXWS-40
3	Reservoir	2.568	5	1025	135,002	1	324.47	88,647	North Pond
4	Reach	2.564	5	1045	134,325	3	------	------	EX-North Reach
5	Combine	29.50	5	750	367,265	2, 4	------	------	EX POA OFFSITE
7	SCS Runoff	11.88	5	765	135,077	------	------	------	PRWS-30
8	SCS Runoff	29.48	5	750	232,940	------	------	------	PRWS-40
9	Reservoir	2.568	5	1025	135,002	7	324.47	88,647	North Pond
10	Reach	2.564	5	1045	134,325	9	------	------	PR-North Reach
11	Combine	29.50	5	750	367,265	8, 10	------	------	PR POA OFFSITE
13	Rational	8.791	1	23	12,132	------	------	------	Existing Section B Outfall
14	Rational	8.256	1	23	11,394	------	------	------	Proposed Section B Outfall

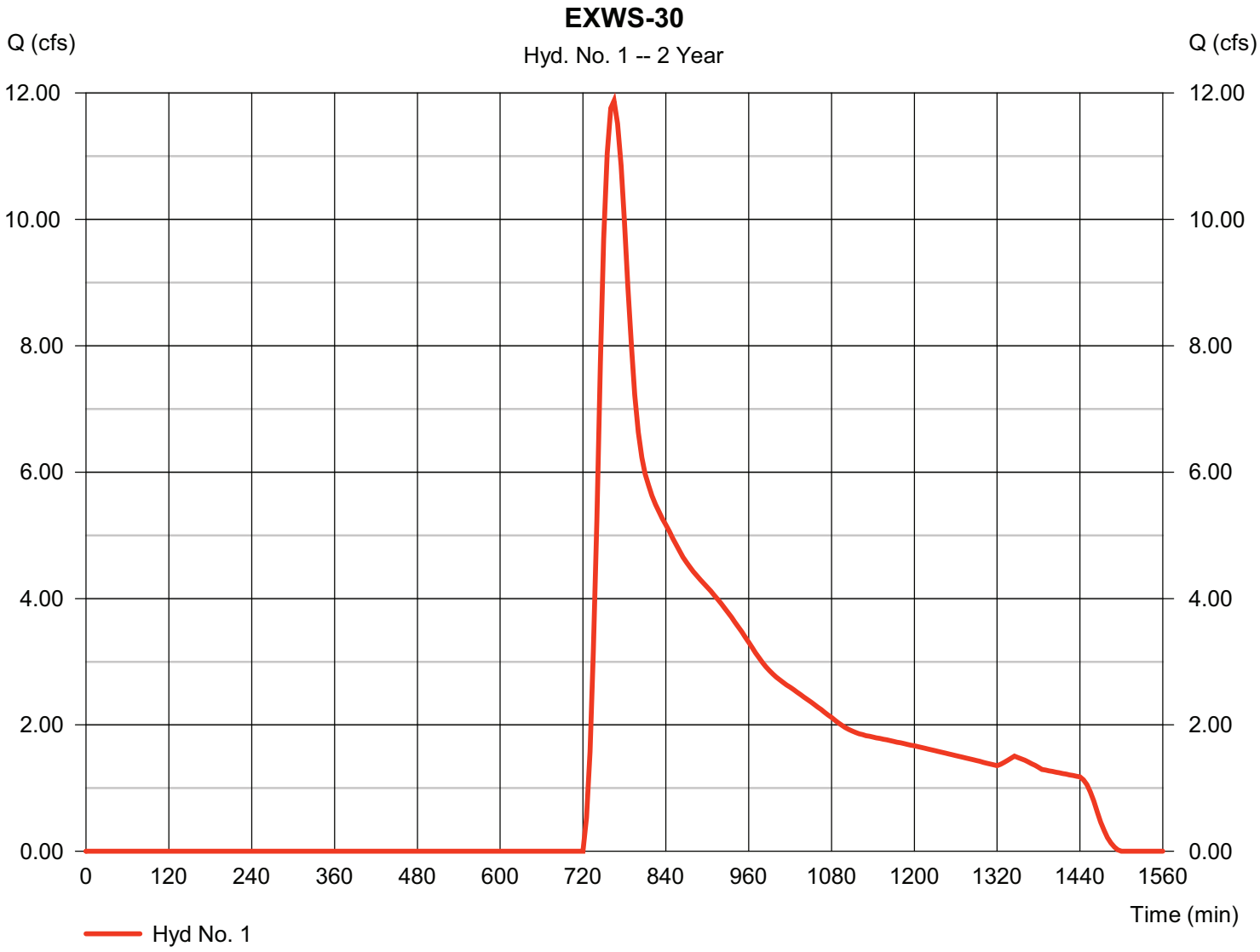
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 1

EXWS-30

Hydrograph type	= SCS Runoff	Peak discharge	= 11.88 cfs
Storm frequency	= 2 yrs	Time to peak	= 765 min
Time interval	= 5 min	Hyd. volume	= 135,077 cuft
Drainage area	= 119.800 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 37.00 min
Total precip.	= 3.42 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



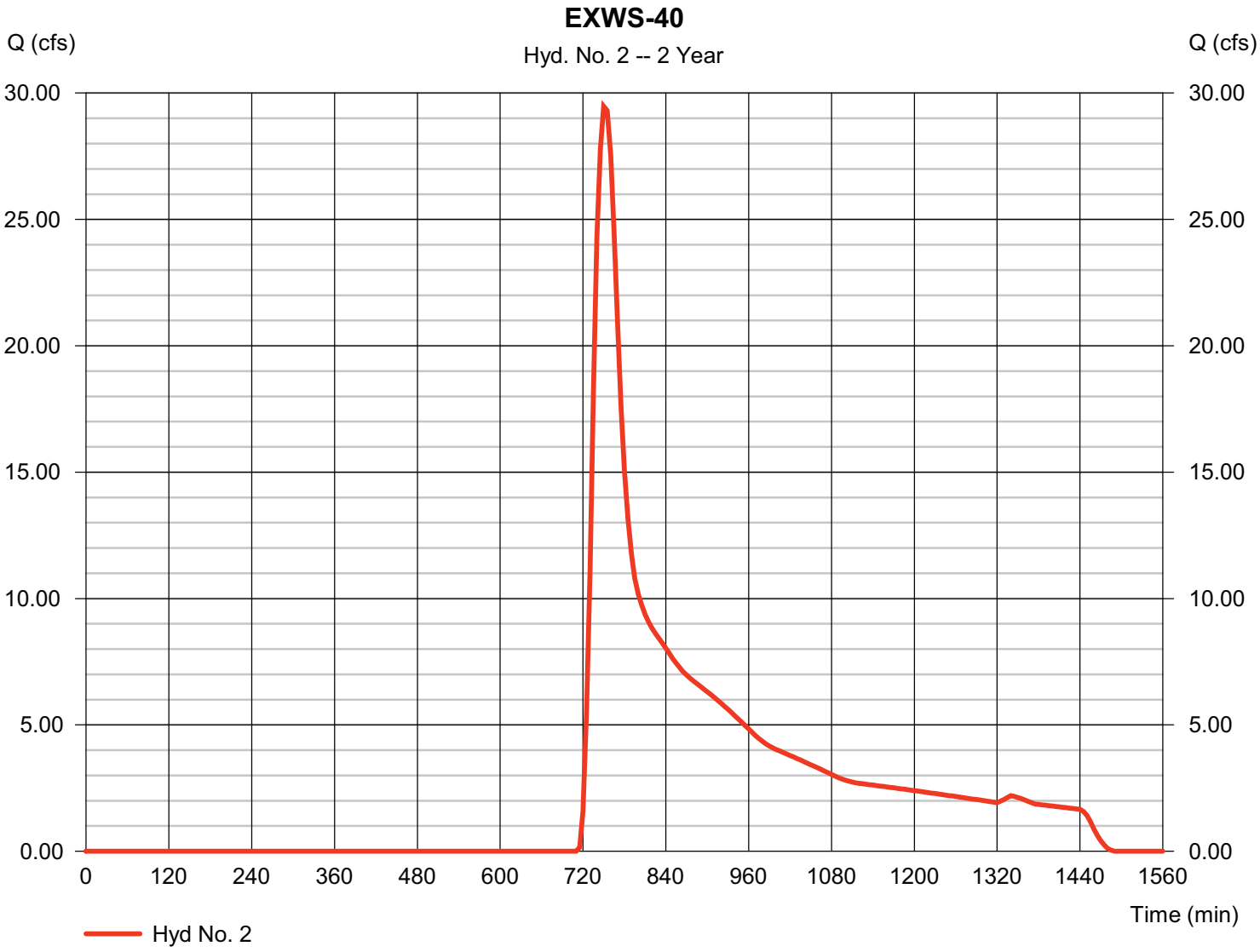
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 2

EXWS-40

Hydrograph type	= SCS Runoff	Peak discharge	= 29.48 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 5 min	Hyd. volume	= 232,940 cuft
Drainage area	= 125.100 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 32.00 min
Total precip.	= 3.42 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

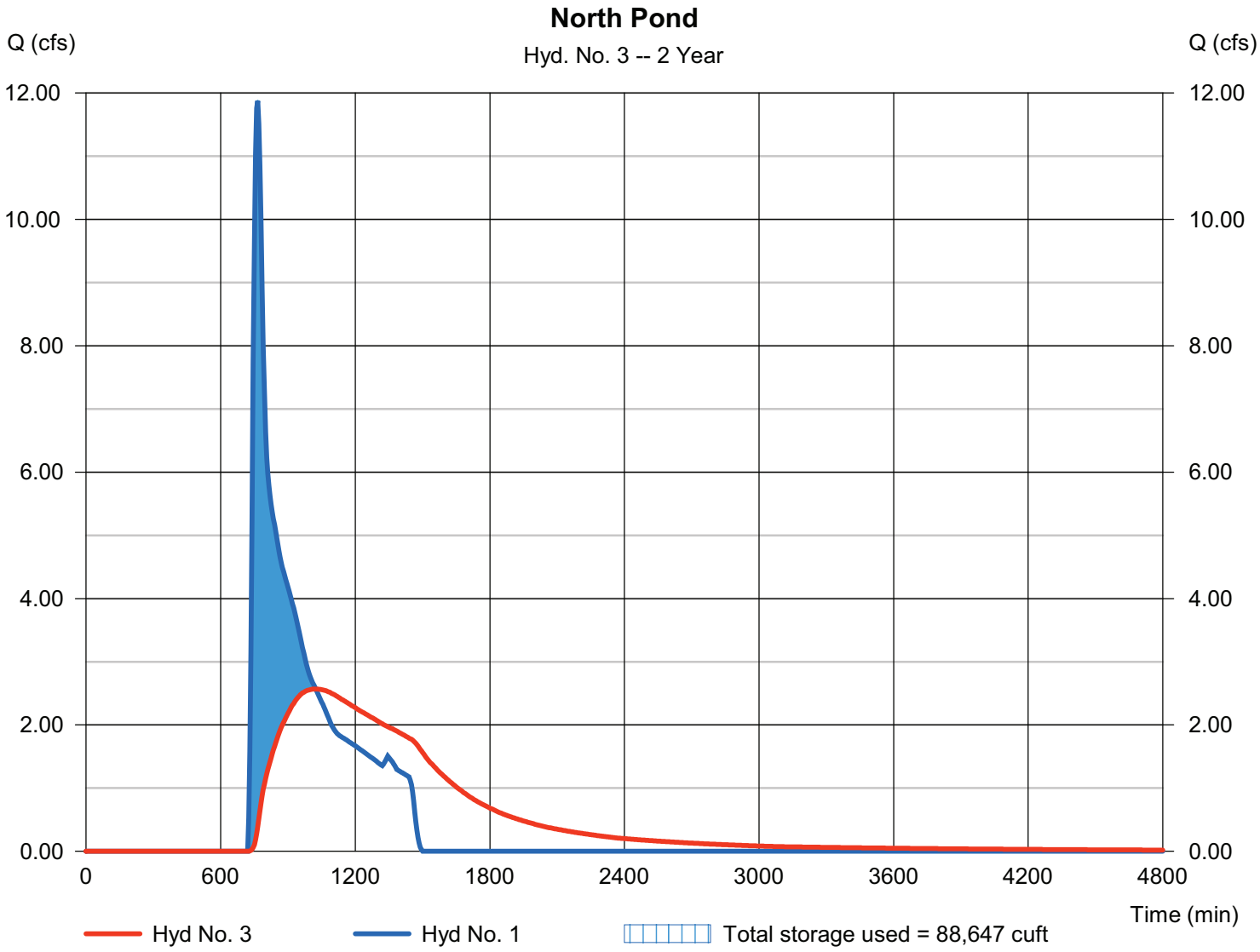
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 3

North Pond

Hydrograph type	= Reservoir	Peak discharge	= 2.568 cfs
Storm frequency	= 2 yrs	Time to peak	= 1025 min
Time interval	= 5 min	Hyd. volume	= 135,002 cuft
Inflow hyd. No.	= 1 - EXWS-30	Max. Elevation	= 324.47 ft
Reservoir name	= North Pond	Max. Storage	= 88,647 cuft

Storage Indication method used. Wet pond routing start elevation = 324.15 ft.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Pond No. 1 - North Pond

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 324.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	324.00	180,000	0	0
0.30	324.30	188,471	55,271	55,271
1.00	325.00	205,222	137,793	193,063
2.00	326.00	213,579	209,400	402,464
3.00	327.00	227,525	220,552	623,016

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	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	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.25	257.00	0.00	0.00
Crest El. (ft)	= 324.15	325.00	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Rect	Broad	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	324.00	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.30	55,271	324.30	---	---	---	---	0.82	0.00	---	---	---	---	0.822
1.00	193,063	325.00	---	---	---	---	11.09	0.00	---	---	---	---	11.09
2.00	402,464	326.00	---	---	---	---	35.61	668.20	---	---	---	---	703.81
3.00	623,016	327.00	---	---	---	---	68.09	1889.95	---	---	---	---	1958.05

Hydrograph Report

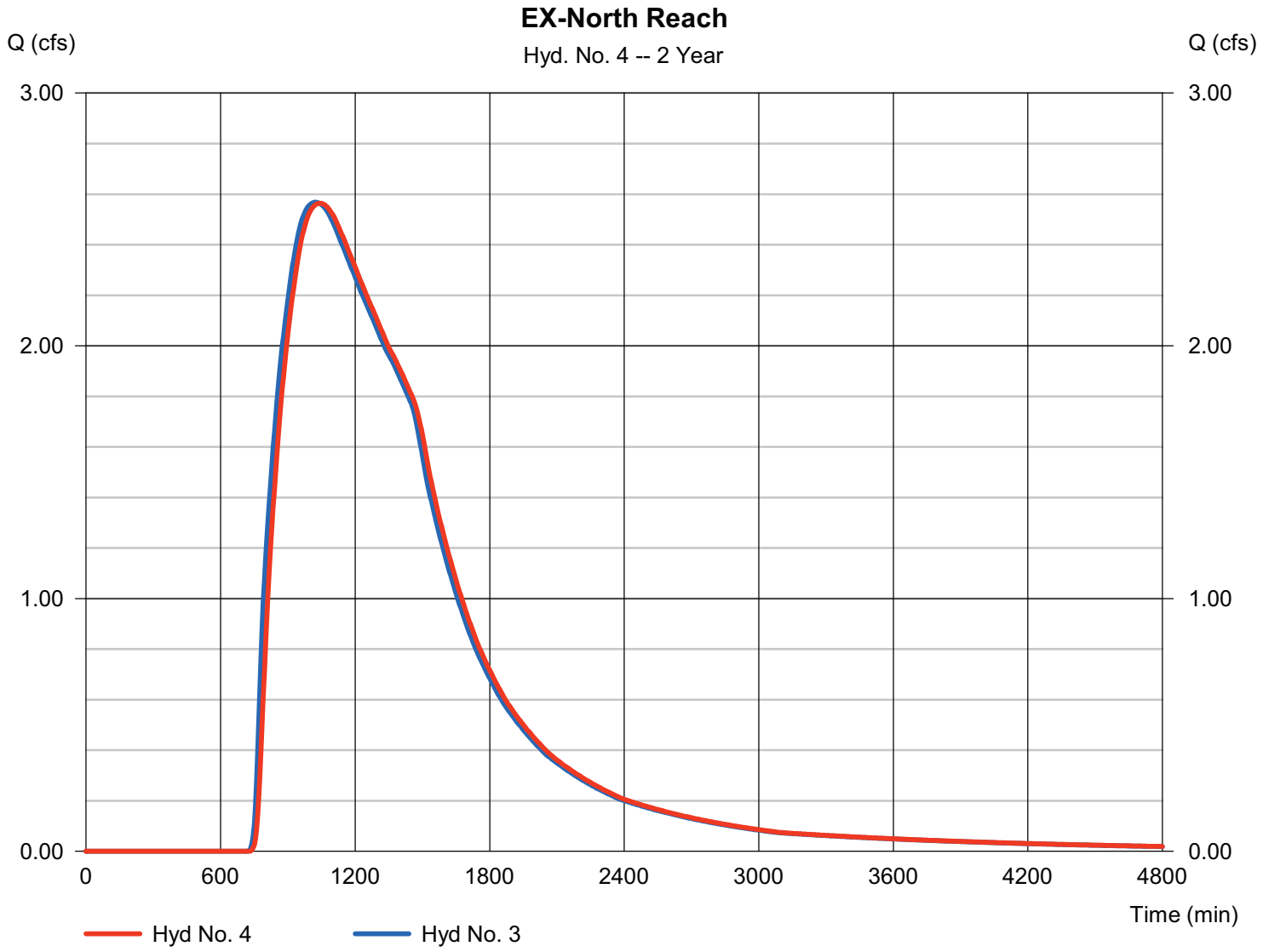
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Hyd. No. 4

EX-North Reach

Hydrograph type	=	Reach	Peak discharge	=	2.564 cfs
Storm frequency	=	2 yrs	Time to peak	=	1045 min
Time interval	=	5 min	Hyd. volume	=	134,325 cuft
Inflow hyd. No.	=	3 - North Pond	Section type	=	Trapezoidal
Reach length	=	2800.0 ft	Channel slope	=	4.8 %
Manning's n	=	0.050	Bottom width	=	5.0 ft
Side slope	=	3.0:1	Max. depth	=	3.0 ft
Rating curve x	=	2.232	Rating curve m	=	1.321
Ave. velocity	=	2.31 ft/s	Routing coeff.	=	0.2809

Modified Att-Kin routing method used.



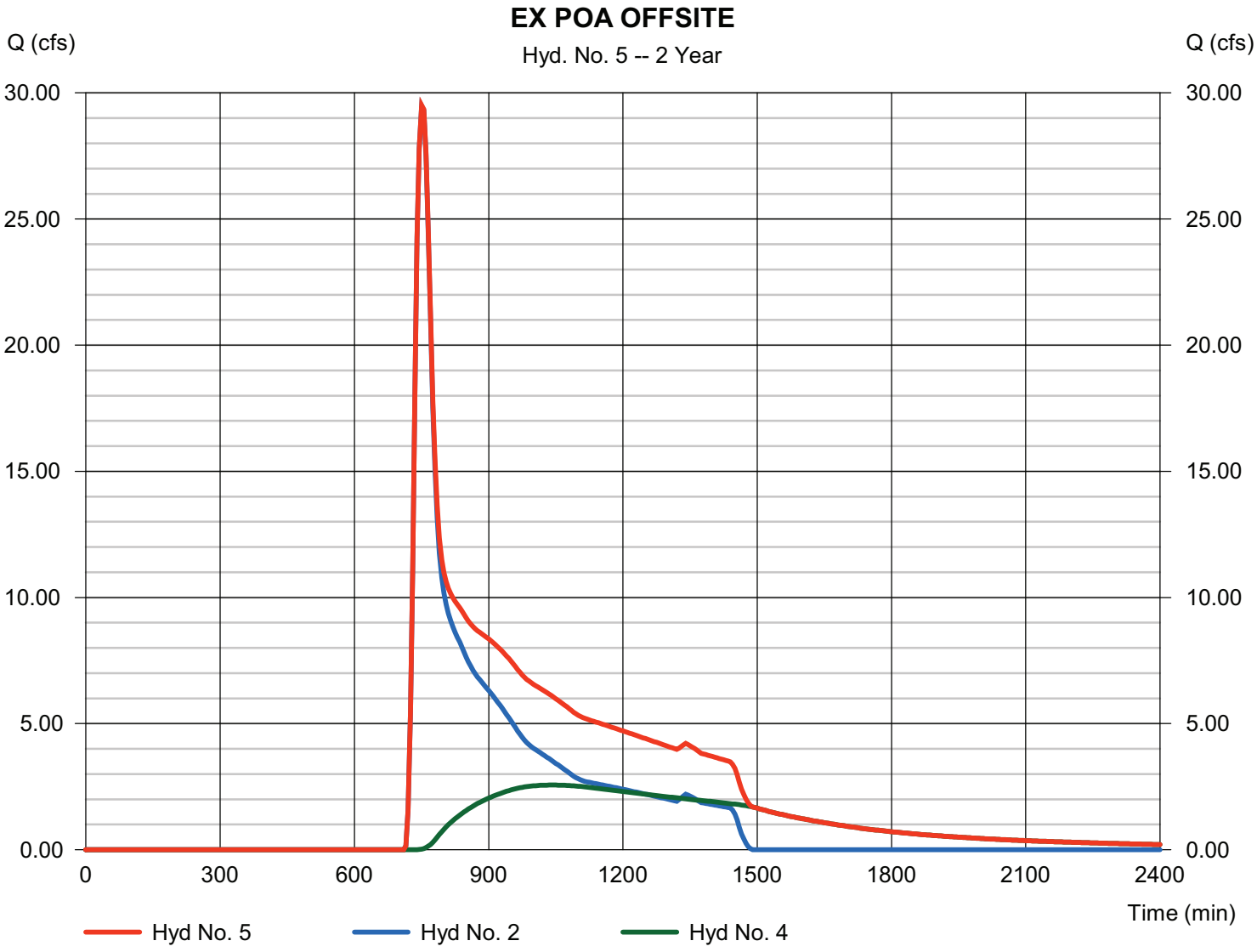
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 5

EX POA OFFSITE

Hydrograph type	= Combine	Peak discharge	= 29.50 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 5 min	Hyd. volume	= 367,265 cuft
Inflow hyds.	= 2, 4	Contrib. drain. area	= 125.100 ac



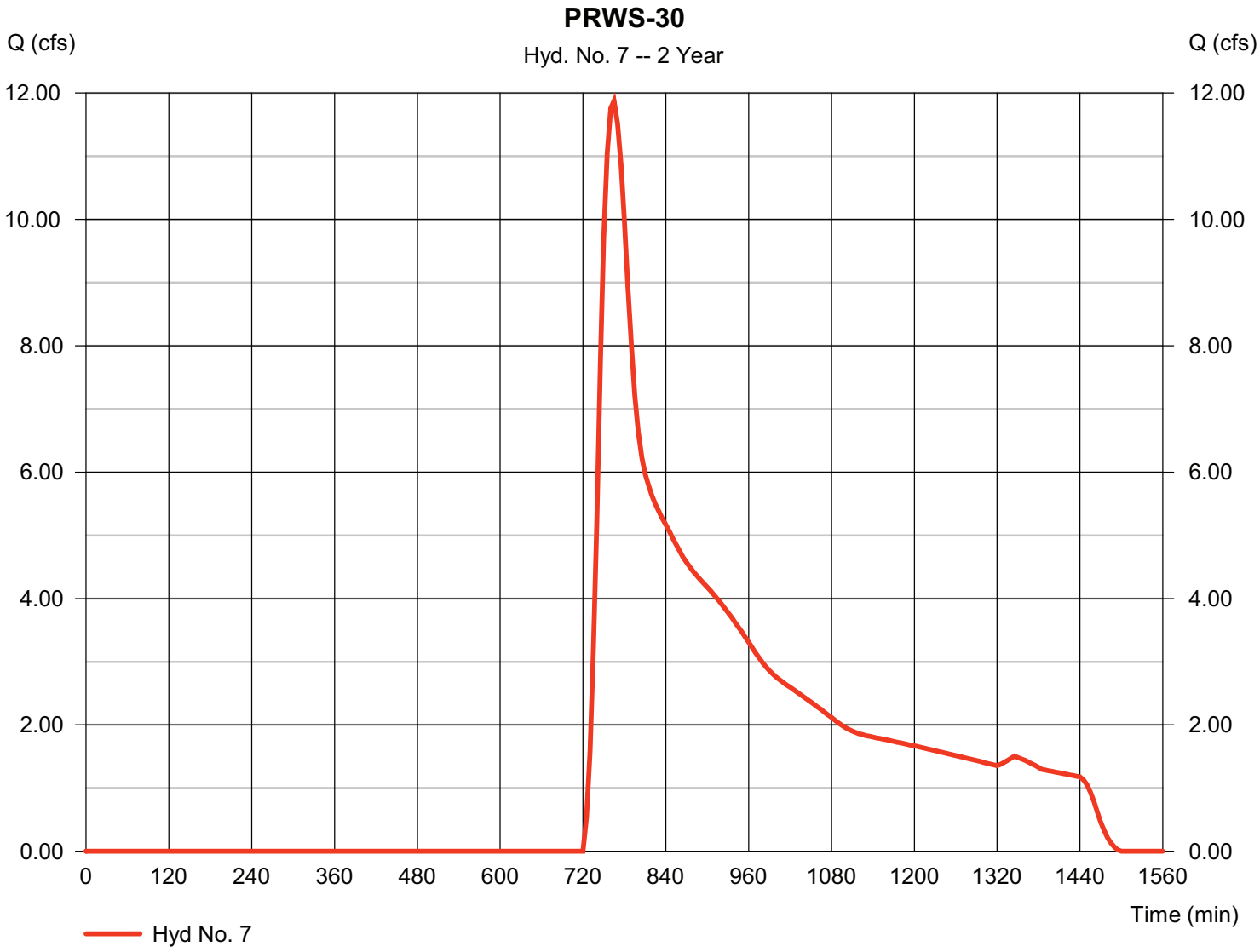
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 7

PRWS-30

Hydrograph type	=	SCS Runoff	Peak discharge	=	11.88 cfs
Storm frequency	=	2 yrs	Time to peak	=	765 min
Time interval	=	5 min	Hyd. volume	=	135,077 cuft
Drainage area	=	119.800 ac	Curve number	=	55
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	37.00 min
Total precip.	=	3.42 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



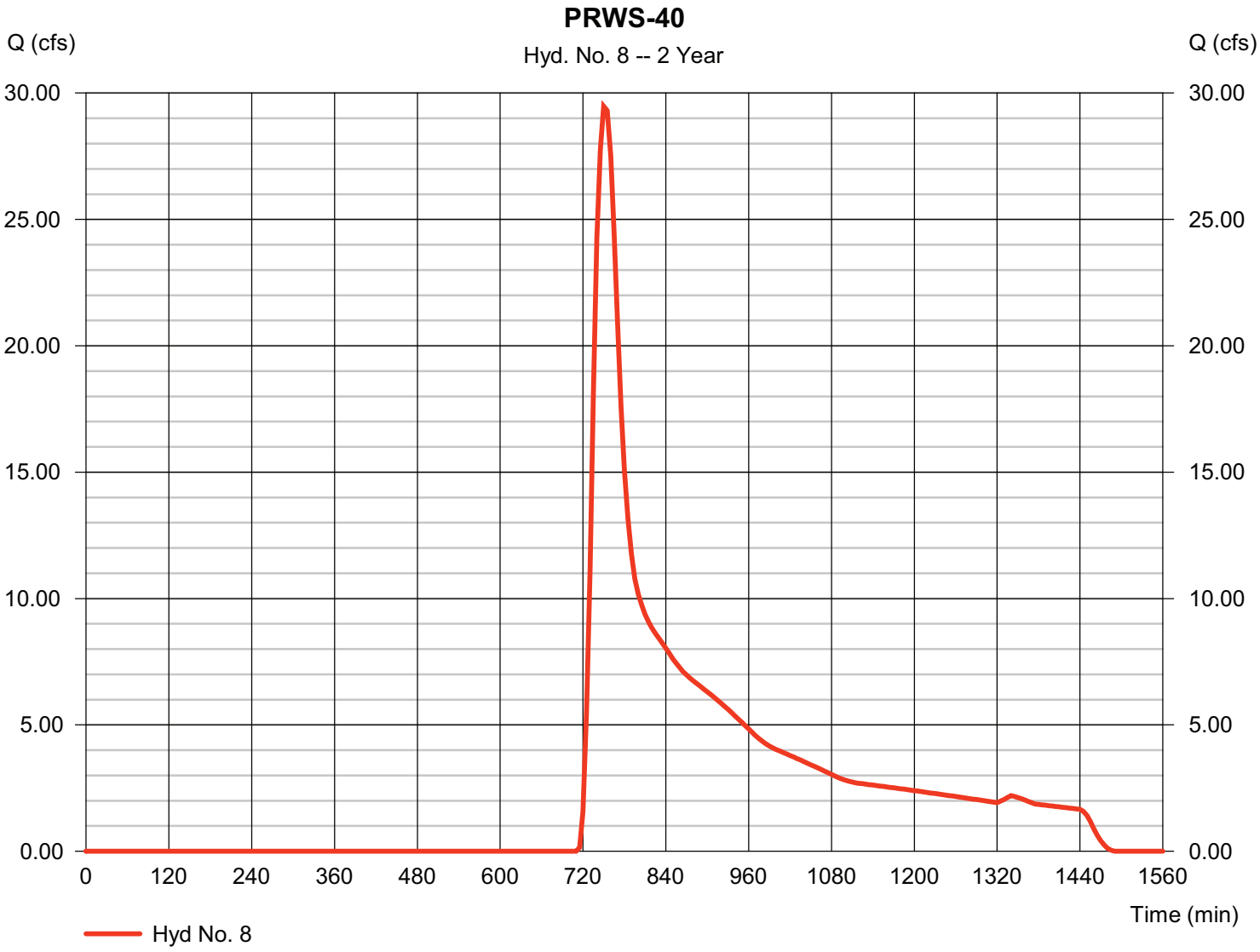
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 8

PRWS-40

Hydrograph type	=	SCS Runoff	Peak discharge	=	29.48 cfs
Storm frequency	=	2 yrs	Time to peak	=	750 min
Time interval	=	5 min	Hyd. volume	=	232,940 cuft
Drainage area	=	125.100 ac	Curve number	=	60
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	32.00 min
Total precip.	=	3.42 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

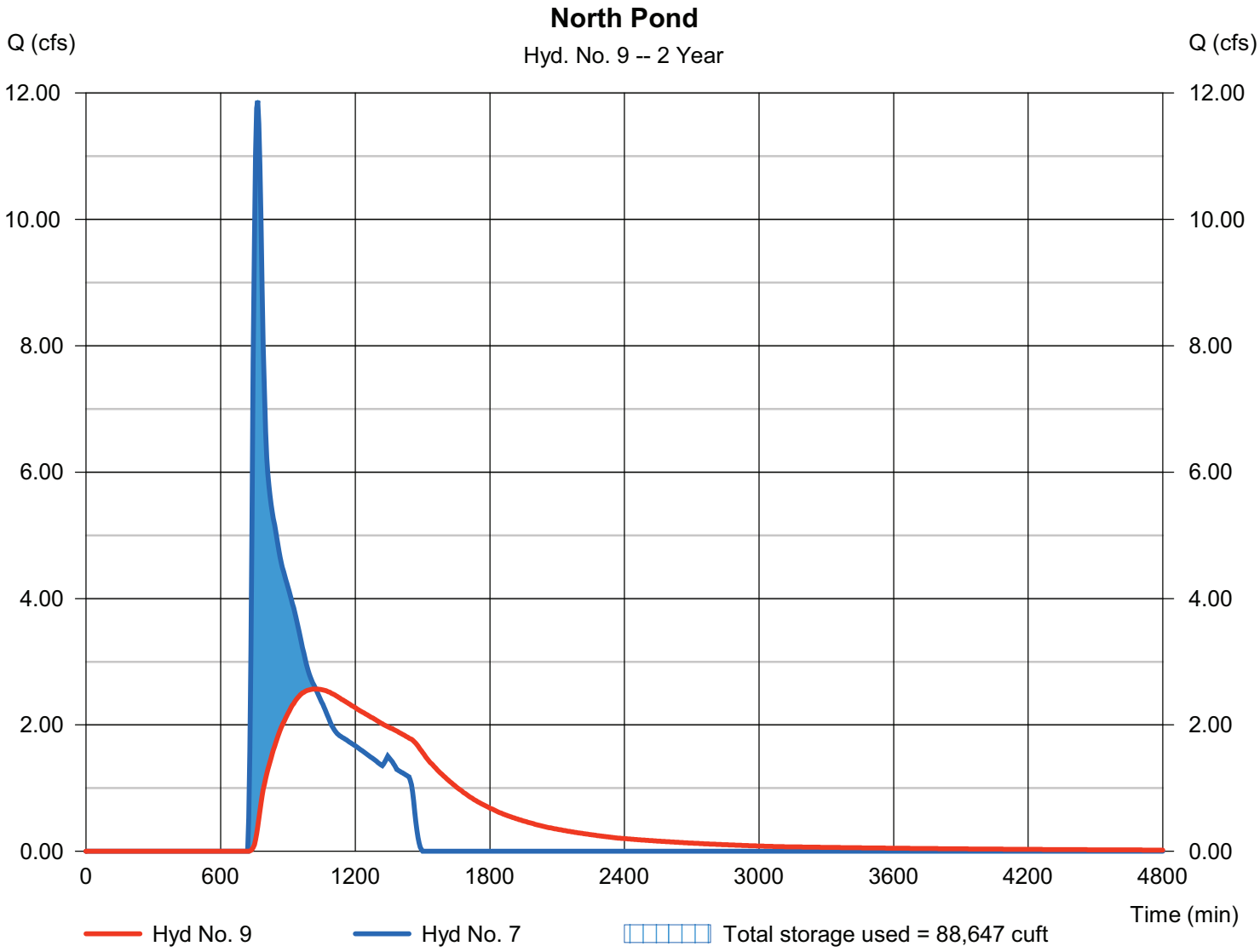
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 9

North Pond

Hydrograph type	= Reservoir	Peak discharge	= 2.568 cfs
Storm frequency	= 2 yrs	Time to peak	= 1025 min
Time interval	= 5 min	Hyd. volume	= 135,002 cuft
Inflow hyd. No.	= 7 - PRWS-30	Max. Elevation	= 324.47 ft
Reservoir name	= North Pond	Max. Storage	= 88,647 cuft

Storage Indication method used. Wet pond routing start elevation = 324.15 ft.



Pond Report

Pond No. 1 - North Pond

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 324.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	324.00	180,000	0	0
0.30	324.30	188,471	55,271	55,271
1.00	325.00	205,222	137,793	193,063
2.00	326.00	213,579	209,400	402,464
3.00	327.00	227,525	220,552	623,016

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	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	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.25	257.00	0.00	0.00
Crest El. (ft)	= 324.15	325.00	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Rect	Broad	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	324.00	---	---	---	---	0.00	0.00	---	---	---	---	0.000
0.30	55,271	324.30	---	---	---	---	0.82	0.00	---	---	---	---	0.822
1.00	193,063	325.00	---	---	---	---	11.09	0.00	---	---	---	---	11.09
2.00	402,464	326.00	---	---	---	---	35.61	668.20	---	---	---	---	703.81
3.00	623,016	327.00	---	---	---	---	68.09	1889.95	---	---	---	---	1958.05

Hydrograph Report

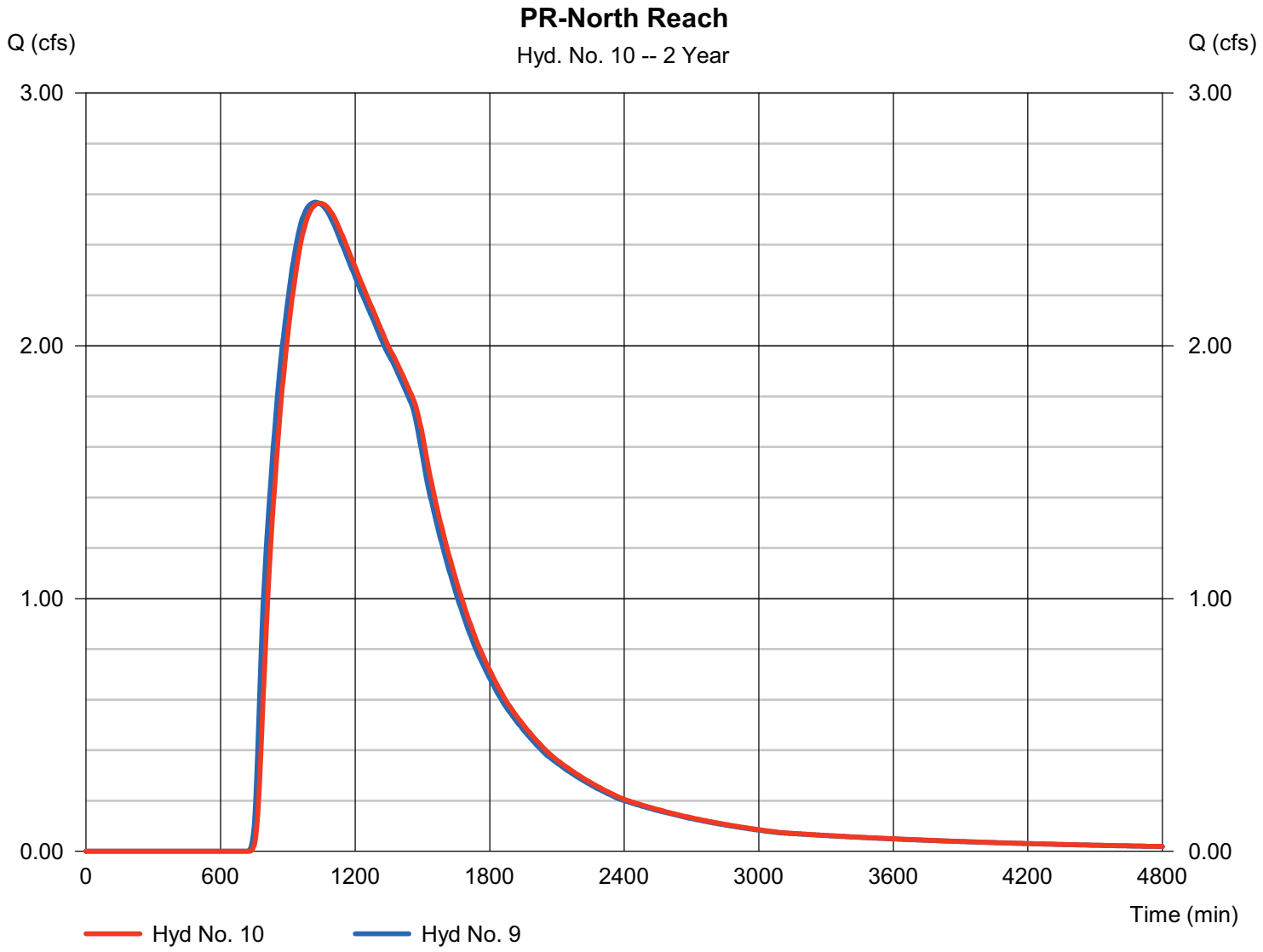
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 10

PR-North Reach

Hydrograph type	= Reach	Peak discharge	= 2.564 cfs
Storm frequency	= 2 yrs	Time to peak	= 1045 min
Time interval	= 5 min	Hyd. volume	= 134,325 cuft
Inflow hyd. No.	= 9 - North Pond	Section type	= Trapezoidal
Reach length	= 2800.0 ft	Channel slope	= 4.8 %
Manning's n	= 0.050	Bottom width	= 5.0 ft
Side slope	= 3.0:1	Max. depth	= 3.0 ft
Rating curve x	= 2.232	Rating curve m	= 1.321
Ave. velocity	= 2.31 ft/s	Routing coeff.	= 0.2809

Modified Att-Kin routing method used.

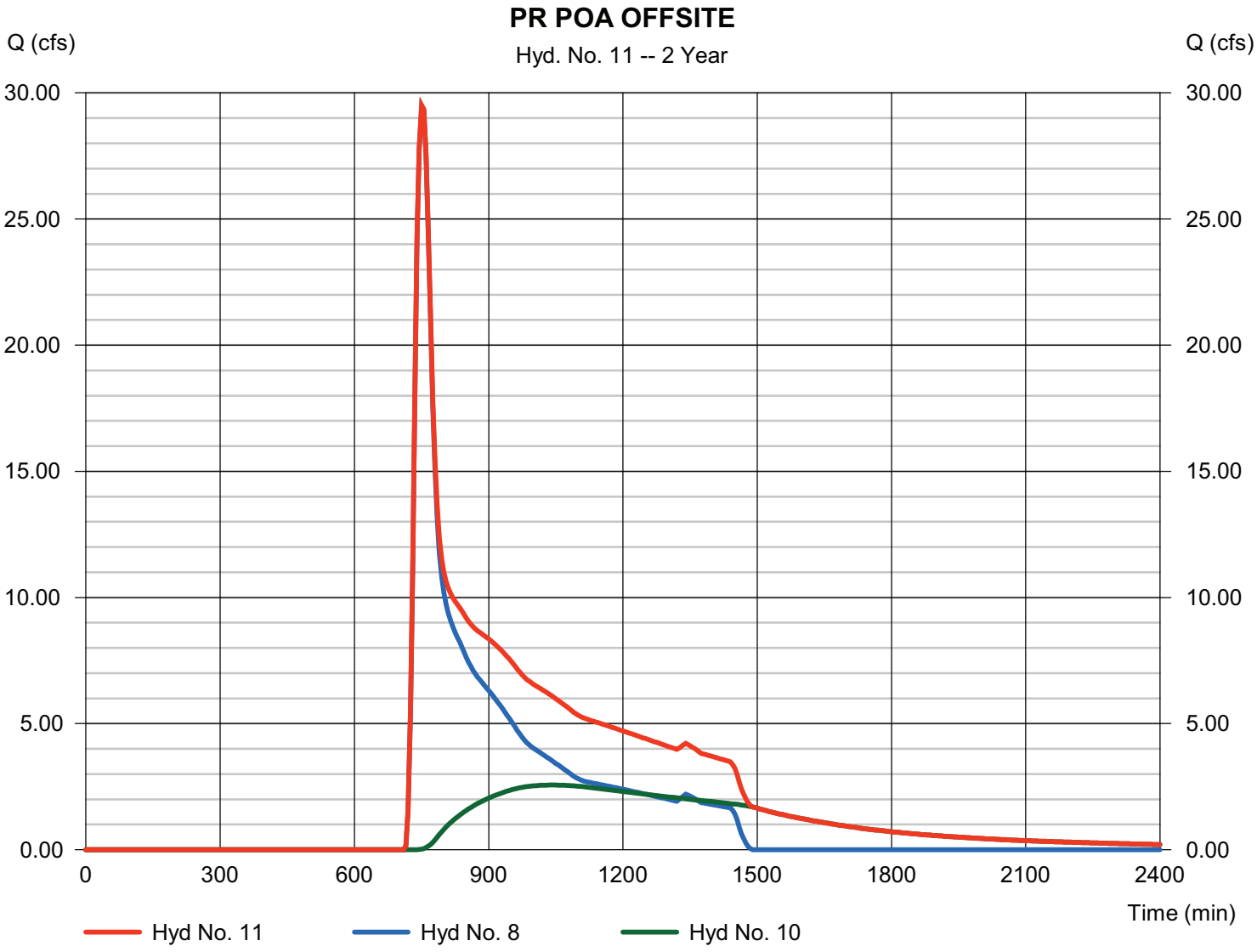


Hydrograph Report

Hyd. No. 11

PR POA OFFSITE

Hydrograph type	= Combine	Peak discharge	= 29.50 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 5 min	Hyd. volume	= 367,265 cuft
Inflow hyds.	= 8, 10	Contrib. drain. area	= 125.100 ac



Hydrograph Report

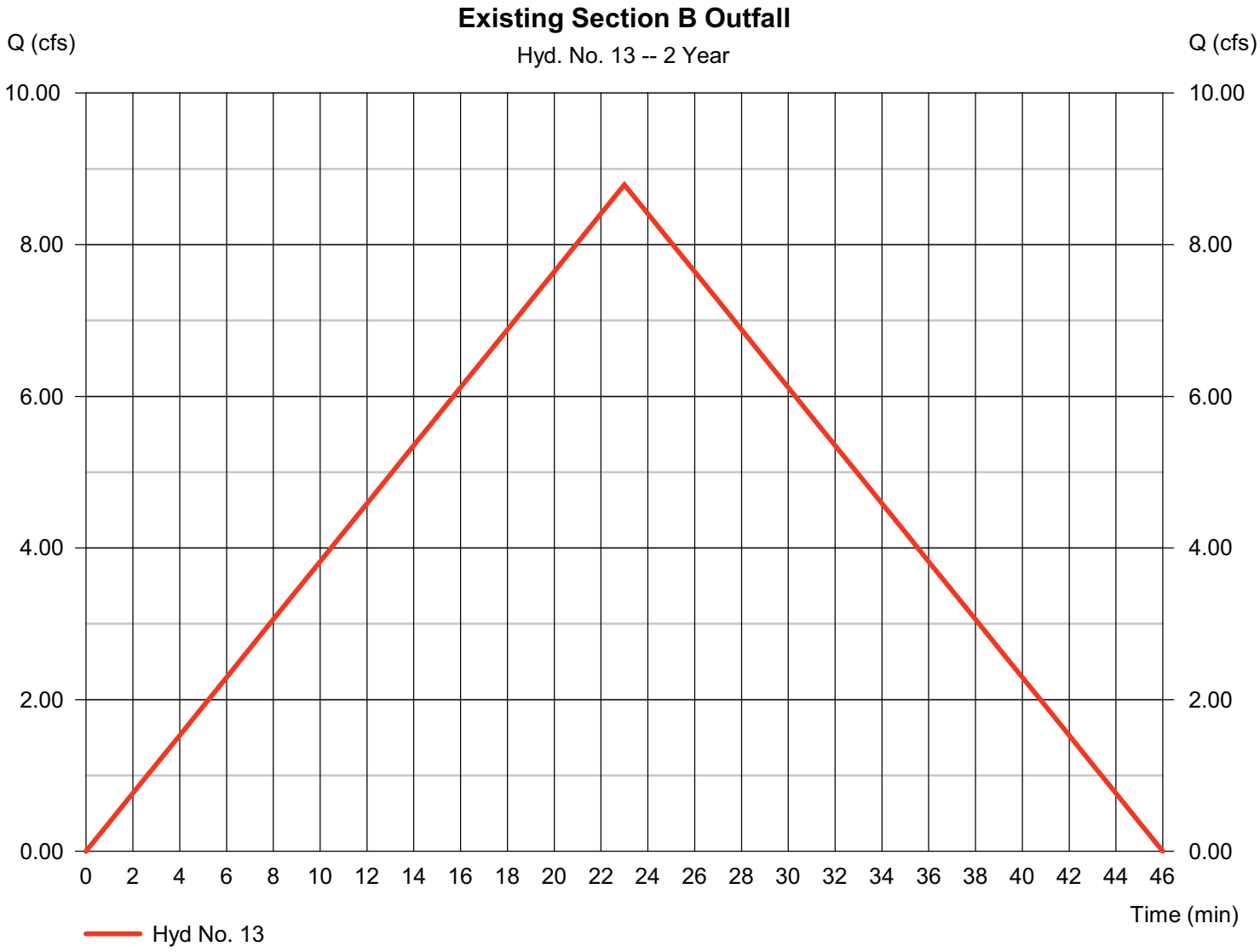
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Hyd. No. 13

Existing Section B Outfall

Hydrograph type	= Rational	Peak discharge	= 8.791 cfs
Storm frequency	= 2 yrs	Time to peak	= 23 min
Time interval	= 1 min	Hyd. volume	= 12,132 cuft
Drainage area	= 7.230 ac	Runoff coeff.	= 0.56*
Intensity	= 2.171 in/hr	Tc by User	= 23.00 min
IDF Curve	= Middlesex.idf	Asc/Rec limb fact	= 1/1

* Composite (Area/C) = [(3.150 x 0.90) + (4.080 x 0.30)] / 7.230



Hydrograph Report

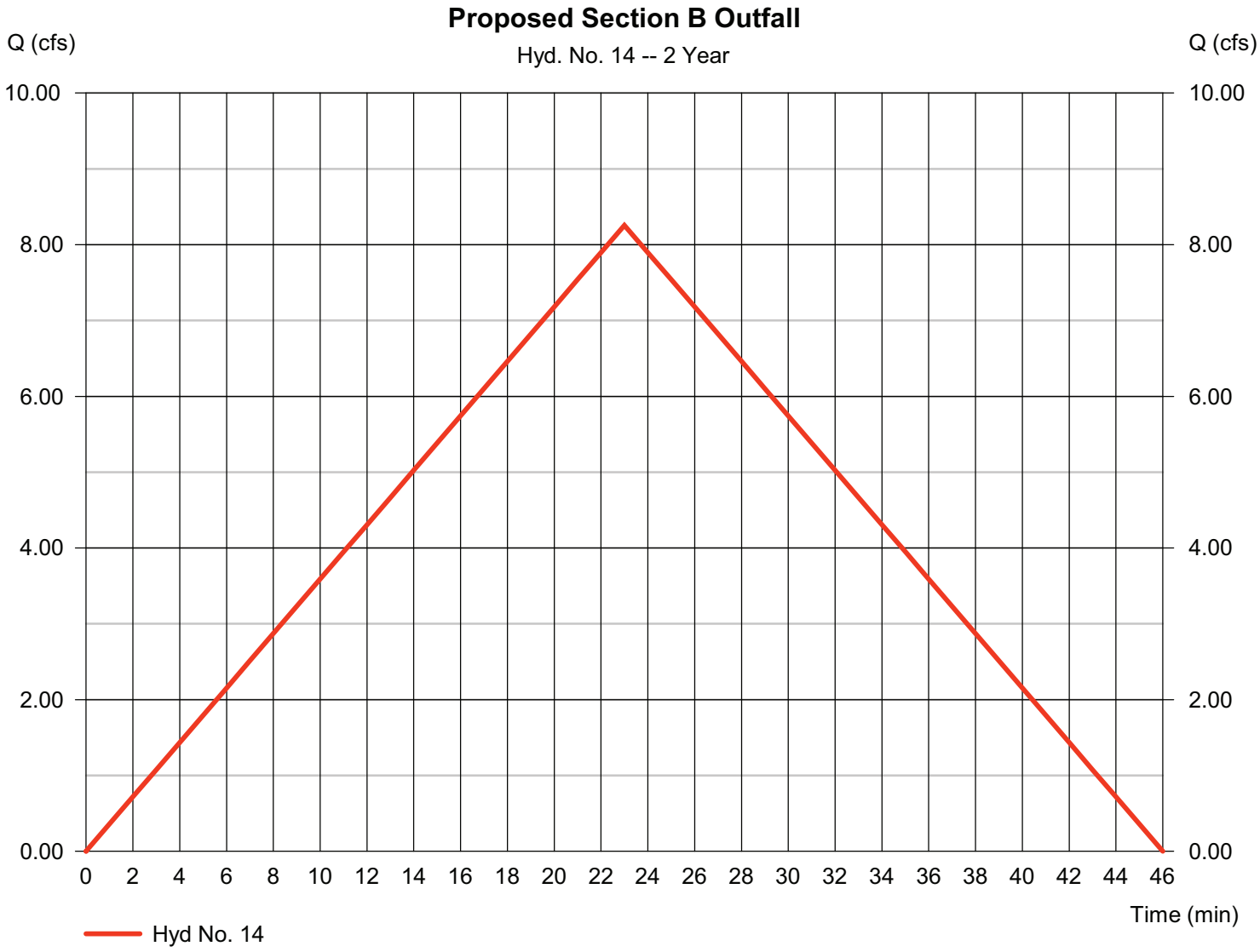
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 14

Proposed Section B Outfall

Hydrograph type	=	Rational	Peak discharge	=	8.256 cfs
Storm frequency	=	2 yrs	Time to peak	=	23 min
Time interval	=	1 min	Hyd. volume	=	11,394 cuft
Drainage area	=	6.790 ac	Runoff coeff.	=	0.56*
Intensity	=	2.171 in/hr	Tc by User	=	23.00 min
IDF Curve	=	Middlesex.idf	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(2.950 x 0.90) + (3.840 x 0.30)] / 6.790



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	63.40	5	755	460,613	------	------	------	EXWS-30
2	SCS Runoff	108.97	5	745	667,523	------	------	------	EXWS-40
3	Reservoir	18.07	5	810	460,538	1	325.03	199,376	North Pond
4	Reach	17.44	5	825	459,863	3	------	------	EX-North Reach
5	Combine	109.62	5	745	1,127,386	2, 4	------	------	EX POA OFFSITE
7	SCS Runoff	63.40	5	755	460,613	------	------	------	PRWS-30
8	SCS Runoff	108.97	5	745	667,523	------	------	------	PRWS-40
9	Reservoir	18.07	5	810	460,538	7	325.03	199,376	North Pond
10	Reach	17.44	5	825	459,863	9	------	------	PR-North Reach
11	Combine	109.62	5	745	1,127,386	8, 10	------	------	PR POA OFFSITE
13	Rational	13.57	1	23	18,727	------	------	------	Existing Section B Outfall
14	Rational	12.74	1	23	17,587	------	------	------	Proposed Section B Outfall

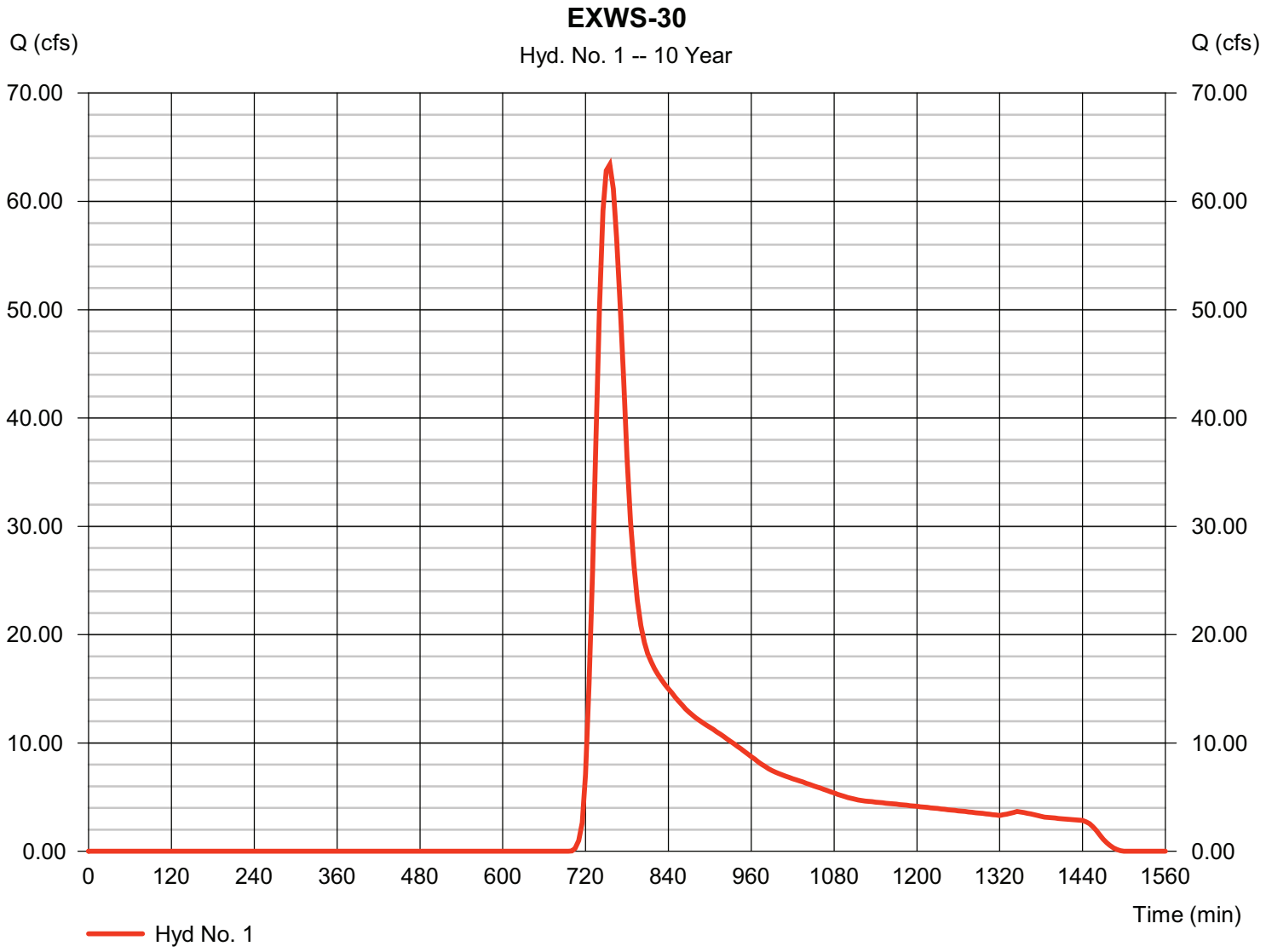
Hydrograph Report

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Hyd. No. 1

EXWS-30

Hydrograph type	= SCS Runoff	Peak discharge	= 63.40 cfs
Storm frequency	= 10 yrs	Time to peak	= 755 min
Time interval	= 5 min	Hyd. volume	= 460,613 cuft
Drainage area	= 119.800 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 37.00 min
Total precip.	= 5.21 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



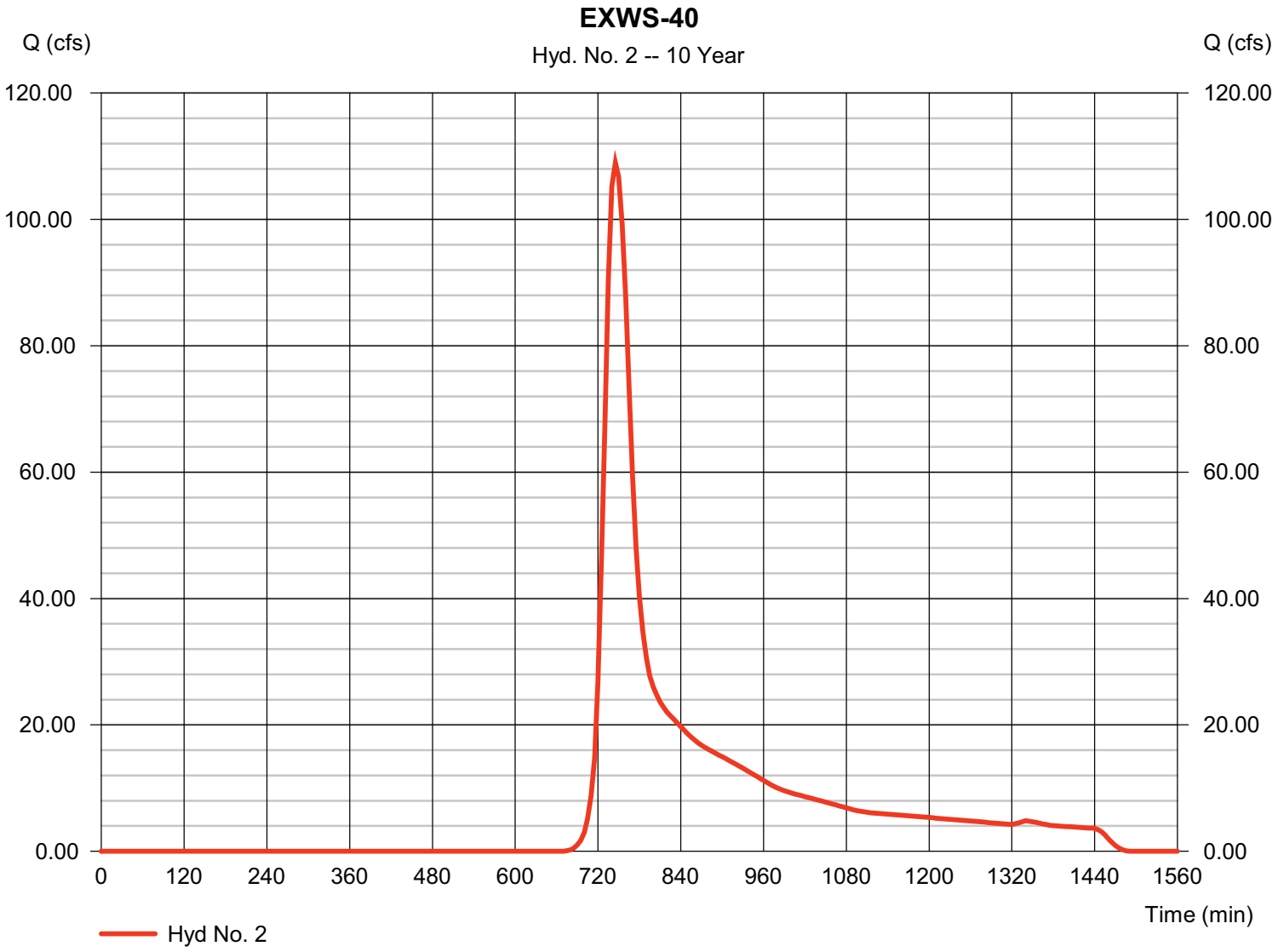
Hydrograph Report

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Hyd. No. 2

EXWS-40

Hydrograph type	= SCS Runoff	Peak discharge	= 108.97 cfs
Storm frequency	= 10 yrs	Time to peak	= 745 min
Time interval	= 5 min	Hyd. volume	= 667,523 cuft
Drainage area	= 125.100 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 32.00 min
Total precip.	= 5.21 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

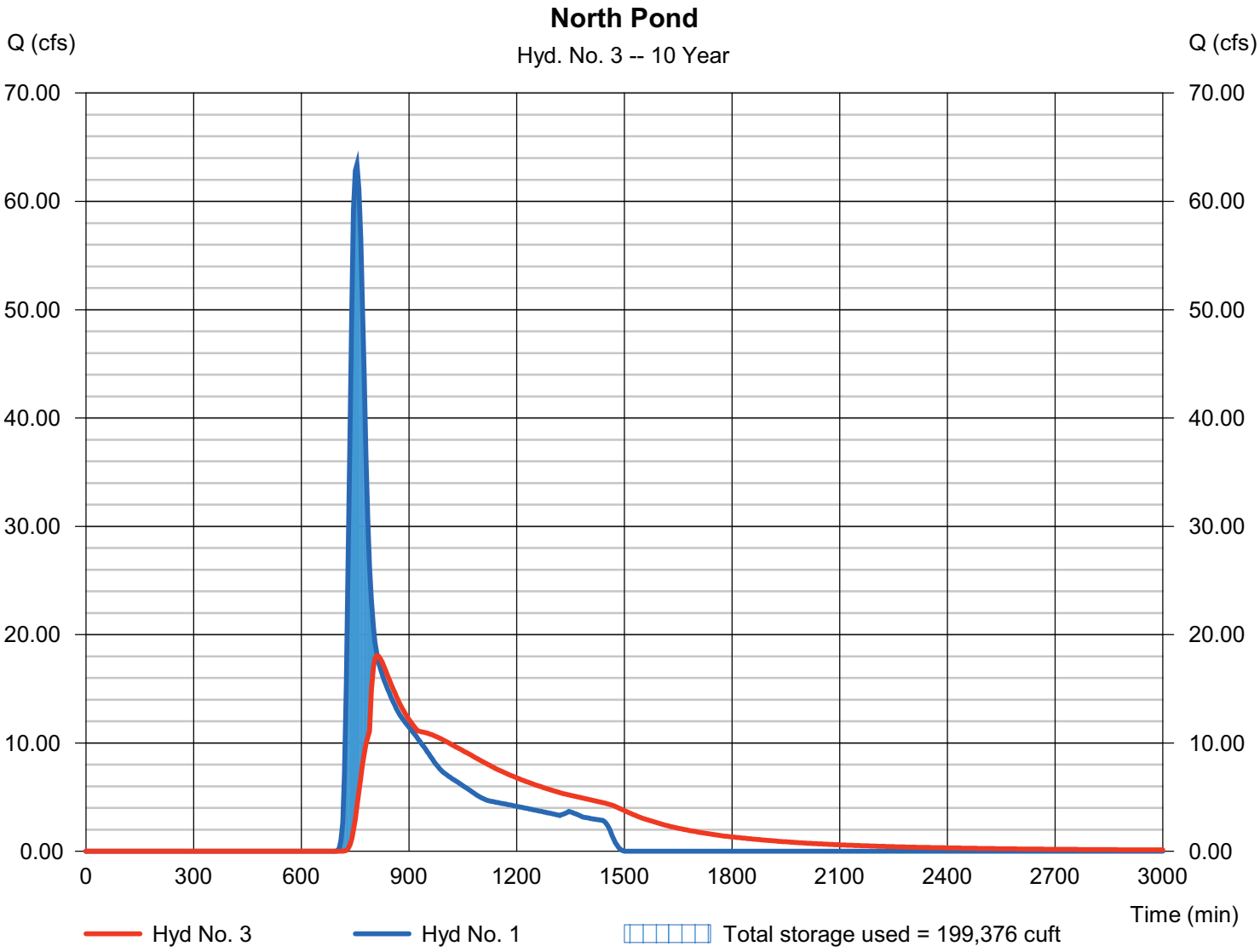
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Hyd. No. 3

North Pond

Hydrograph type	= Reservoir	Peak discharge	= 18.07 cfs
Storm frequency	= 10 yrs	Time to peak	= 810 min
Time interval	= 5 min	Hyd. volume	= 460,538 cuft
Inflow hyd. No.	= 1 - EXWS-30	Max. Elevation	= 325.03 ft
Reservoir name	= North Pond	Max. Storage	= 199,376 cuft

Storage Indication method used. Wet pond routing start elevation = 324.15 ft.



Hydrograph Report

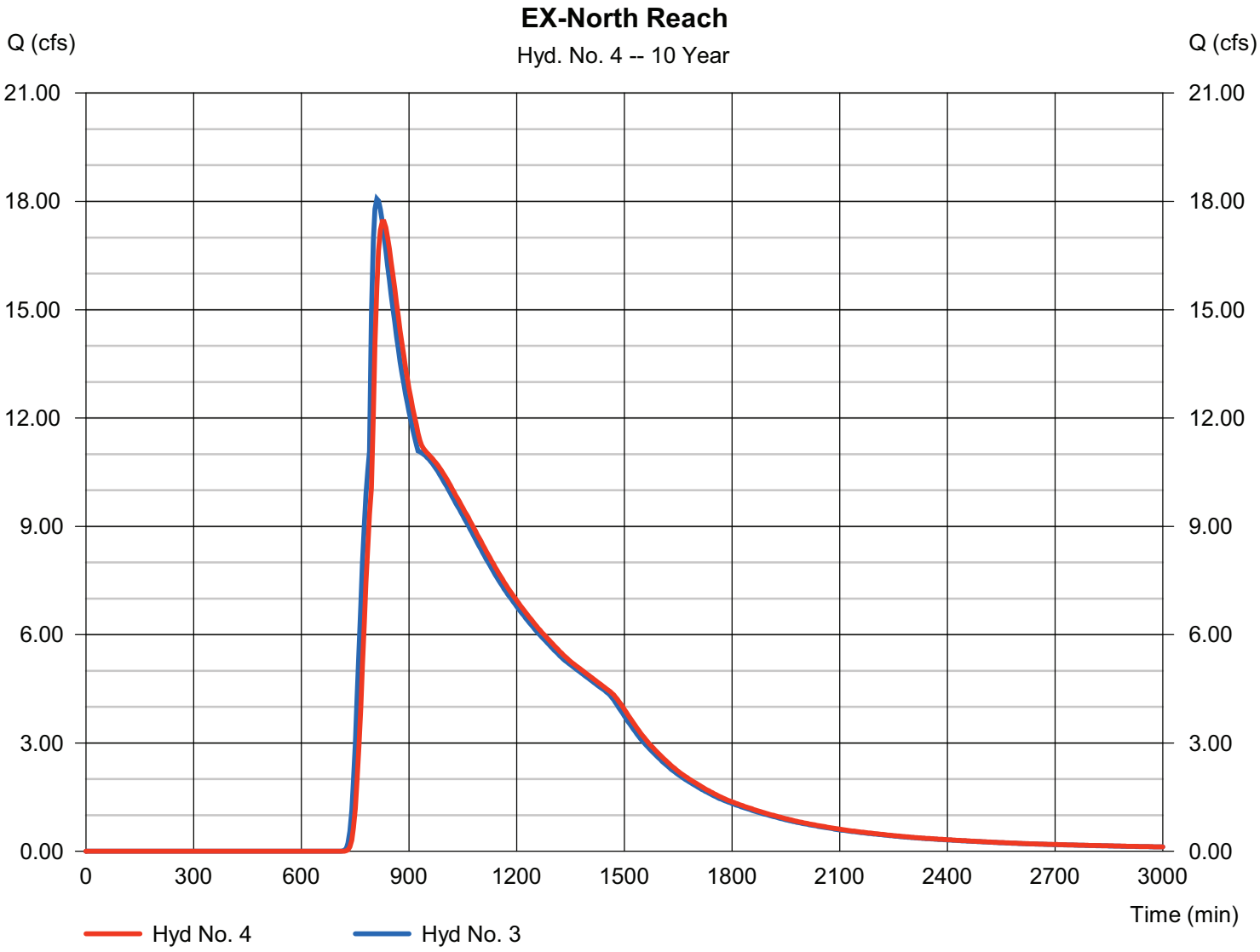
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 4

EX-North Reach

Hydrograph type	=	Reach	Peak discharge	=	17.44 cfs
Storm frequency	=	10 yrs	Time to peak	=	825 min
Time interval	=	5 min	Hyd. volume	=	459,863 cuft
Inflow hyd. No.	=	3 - North Pond	Section type	=	Trapezoidal
Reach length	=	2800.0 ft	Channel slope	=	4.8 %
Manning's n	=	0.050	Bottom width	=	5.0 ft
Side slope	=	3.0:1	Max. depth	=	3.0 ft
Rating curve x	=	2.232	Rating curve m	=	1.321
Ave. velocity	=	3.71 ft/s	Routing coeff.	=	0.4158

Modified Att-Kin routing method used.



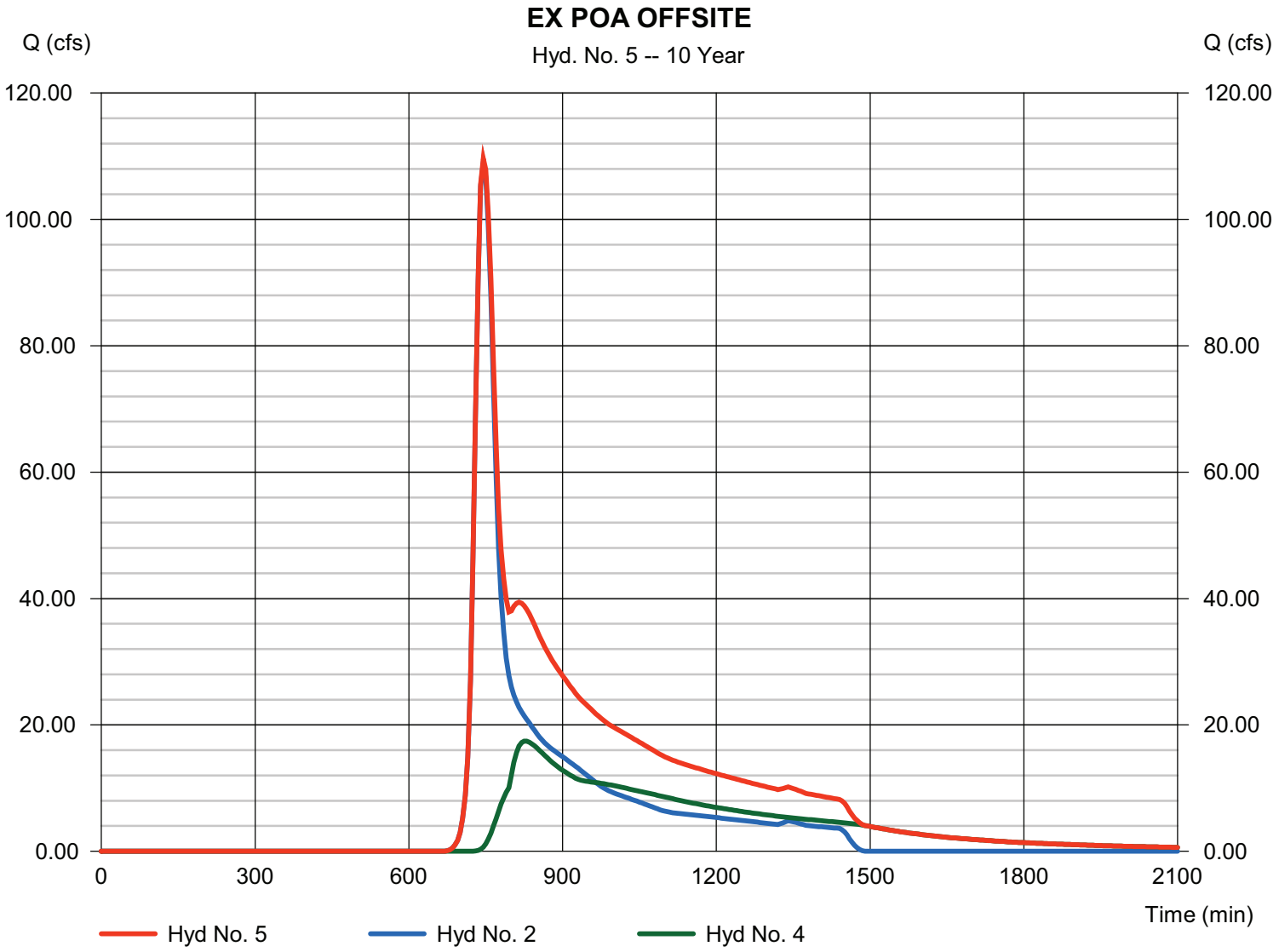
Hydrograph Report

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Hyd. No. 5

EX POA OFFSITE

Hydrograph type	=	Combine	Peak discharge	=	109.62 cfs
Storm frequency	=	10 yrs	Time to peak	=	745 min
Time interval	=	5 min	Hyd. volume	=	1,127,386 cuft
Inflow hyds.	=	2, 4	Contrib. drain. area	=	125.100 ac



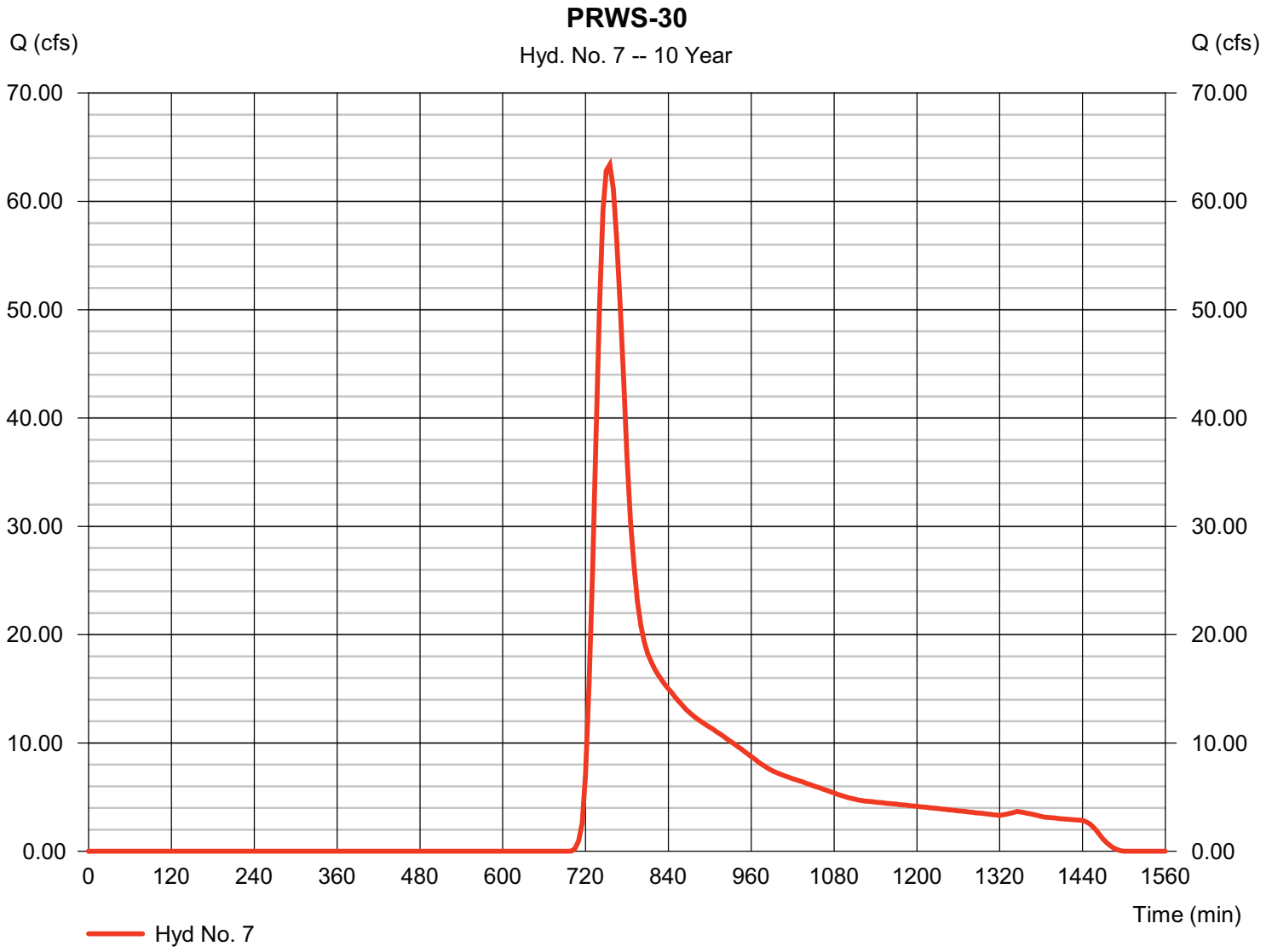
Hydrograph Report

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Hyd. No. 7

PRWS-30

Hydrograph type	= SCS Runoff	Peak discharge	= 63.40 cfs
Storm frequency	= 10 yrs	Time to peak	= 755 min
Time interval	= 5 min	Hyd. volume	= 460,613 cuft
Drainage area	= 119.800 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 37.00 min
Total precip.	= 5.21 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



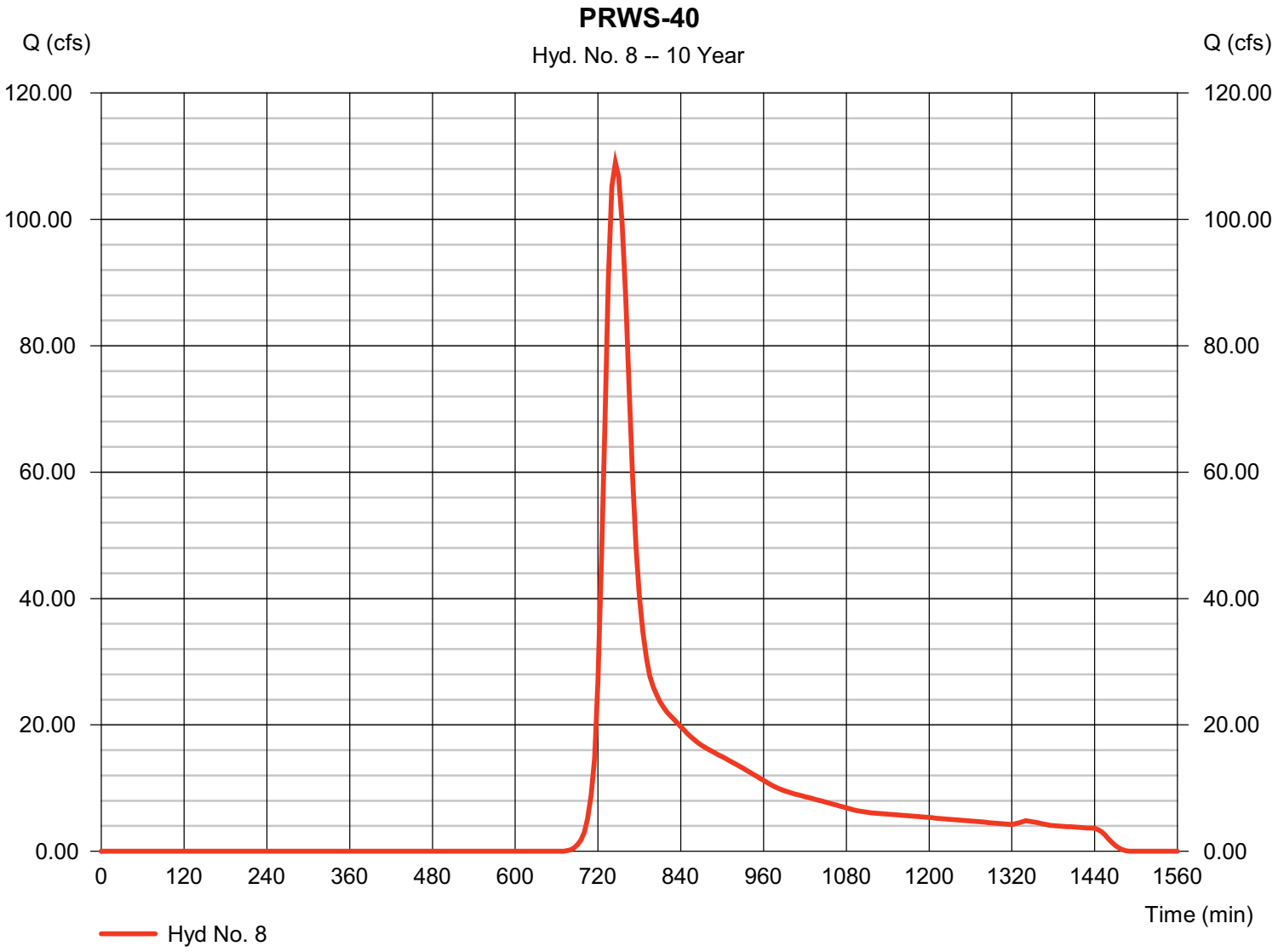
Hydrograph Report

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Hyd. No. 8

PRWS-40

Hydrograph type	= SCS Runoff	Peak discharge	= 108.97 cfs
Storm frequency	= 10 yrs	Time to peak	= 745 min
Time interval	= 5 min	Hyd. volume	= 667,523 cuft
Drainage area	= 125.100 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 32.00 min
Total precip.	= 5.21 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

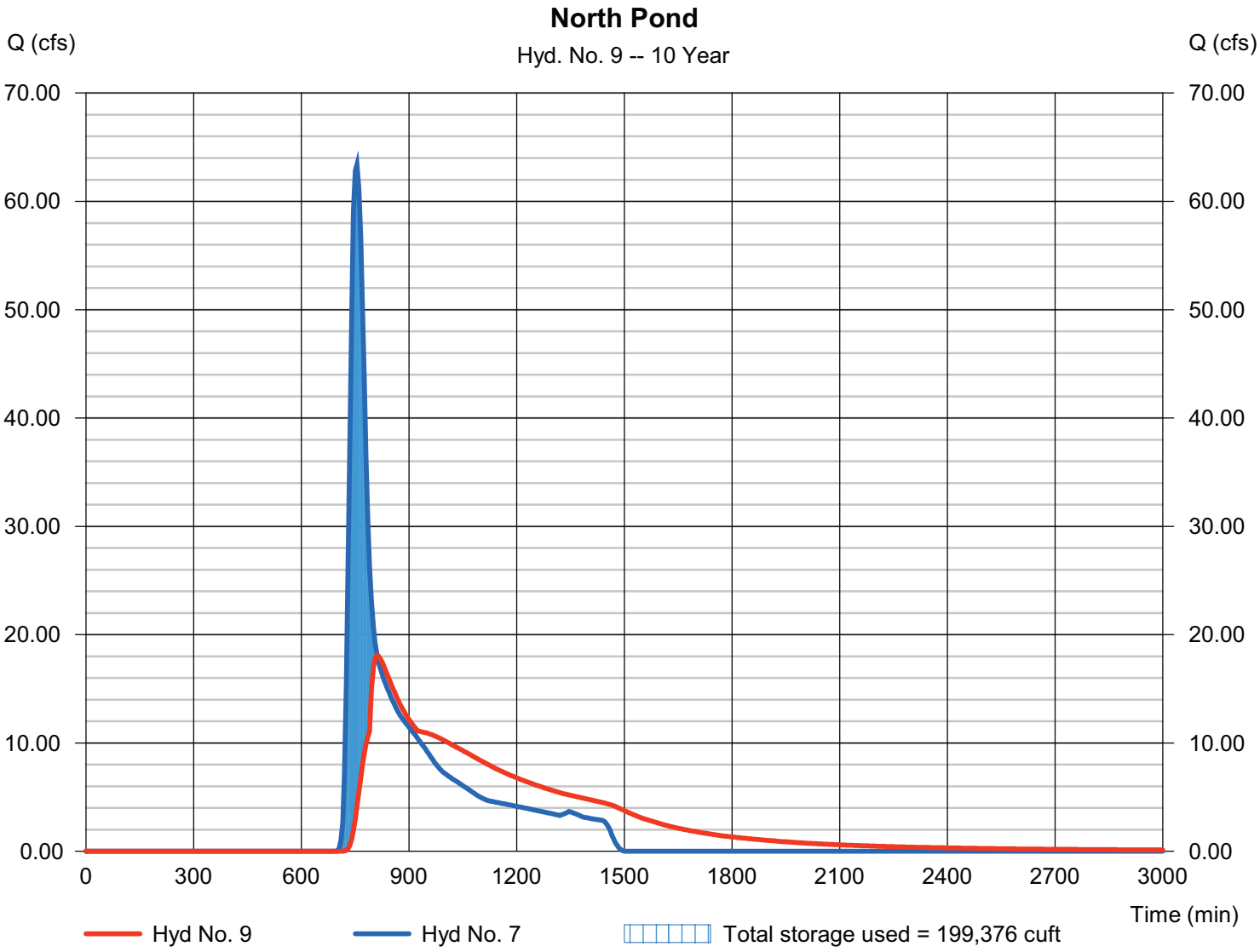
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Hyd. No. 9

North Pond

Hydrograph type	= Reservoir	Peak discharge	= 18.07 cfs
Storm frequency	= 10 yrs	Time to peak	= 810 min
Time interval	= 5 min	Hyd. volume	= 460,538 cuft
Inflow hyd. No.	= 7 - PRWS-30	Max. Elevation	= 325.03 ft
Reservoir name	= North Pond	Max. Storage	= 199,376 cuft

Storage Indication method used. Wet pond routing start elevation = 324.15 ft.



Hydrograph Report

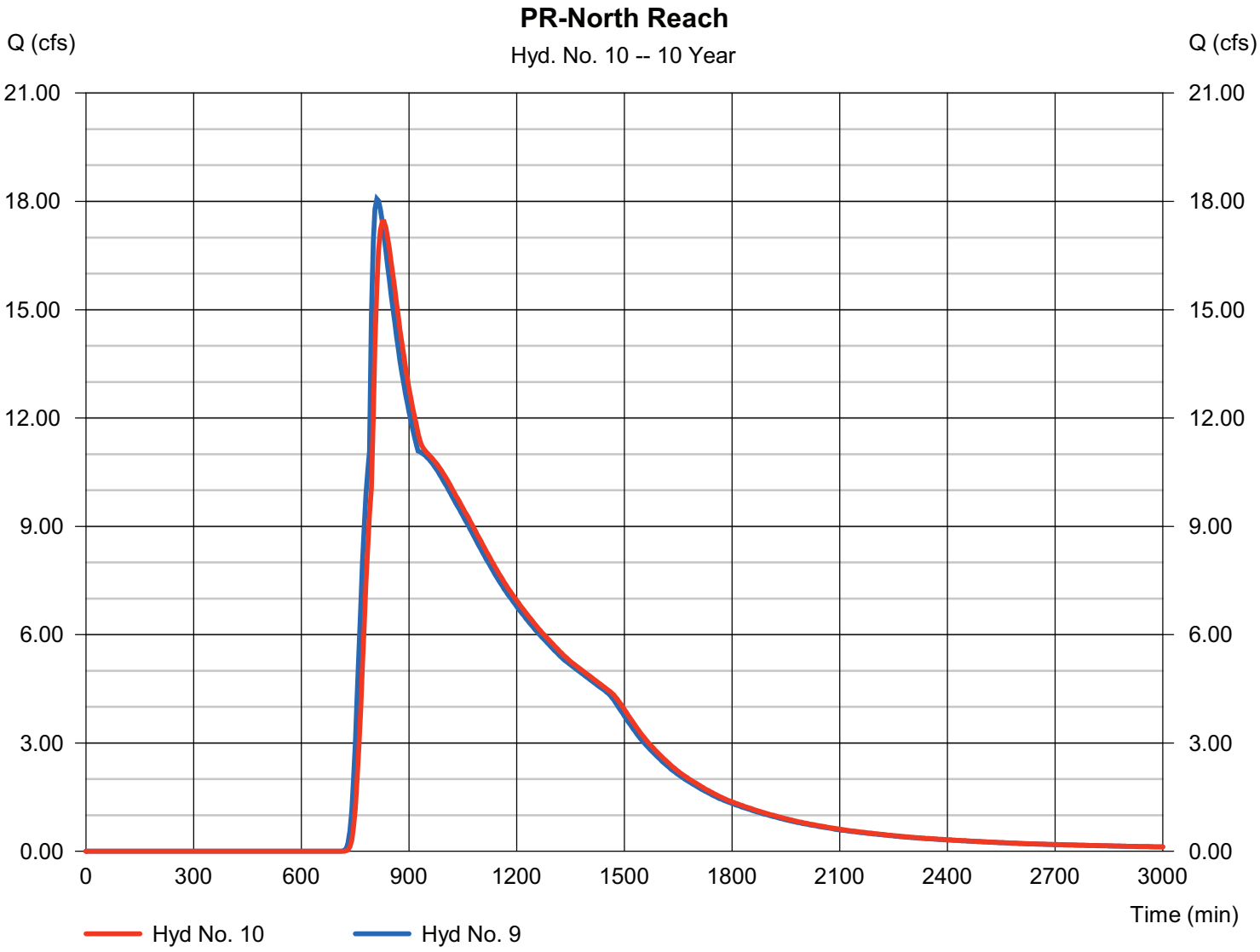
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Hyd. No. 10

PR-North Reach

Hydrograph type	= Reach	Peak discharge	= 17.44 cfs
Storm frequency	= 10 yrs	Time to peak	= 825 min
Time interval	= 5 min	Hyd. volume	= 459,863 cuft
Inflow hyd. No.	= 9 - North Pond	Section type	= Trapezoidal
Reach length	= 2800.0 ft	Channel slope	= 4.8 %
Manning's n	= 0.050	Bottom width	= 5.0 ft
Side slope	= 3.0:1	Max. depth	= 3.0 ft
Rating curve x	= 2.232	Rating curve m	= 1.321
Ave. velocity	= 3.71 ft/s	Routing coeff.	= 0.4158

Modified Att-Kin routing method used.



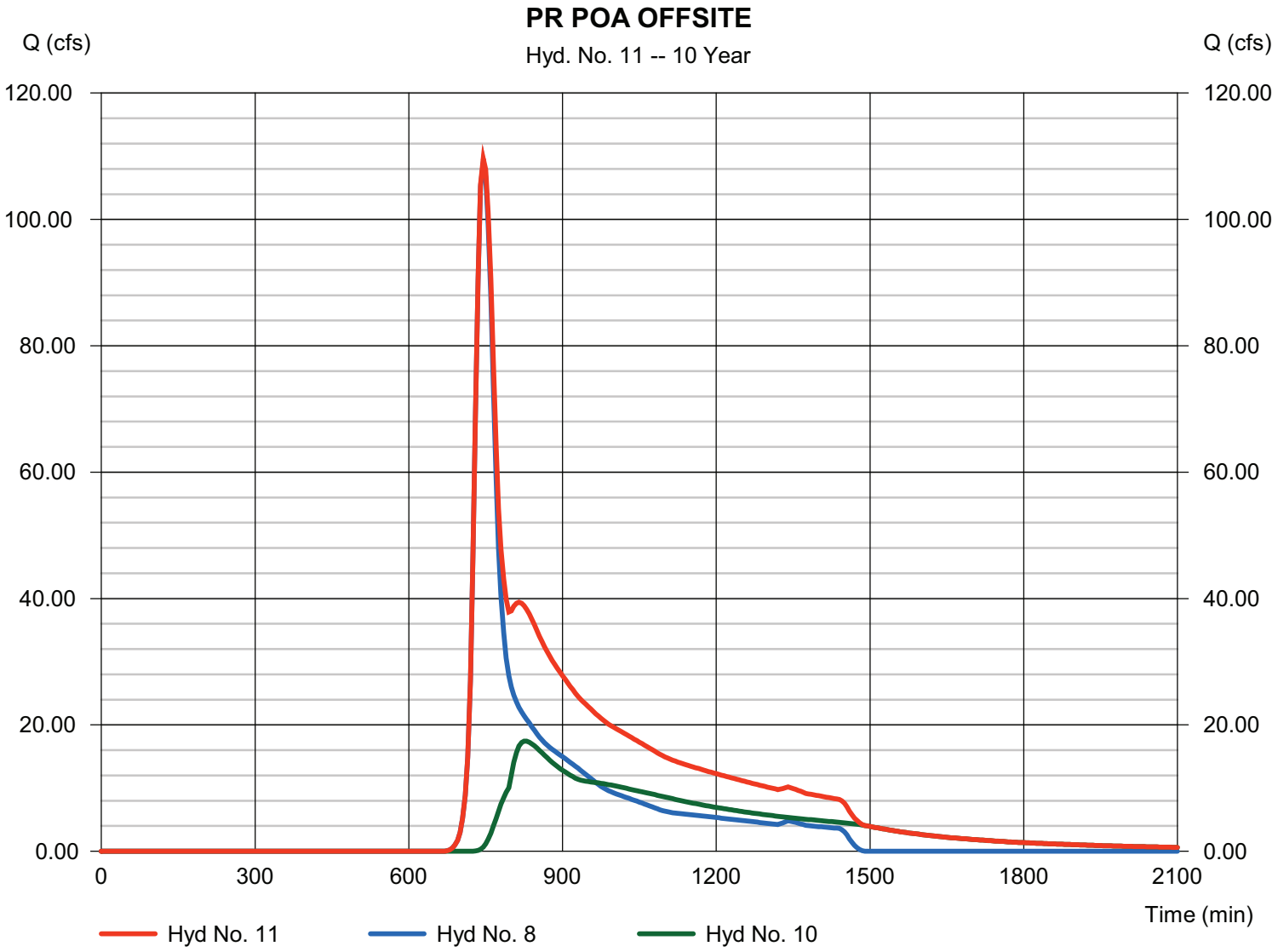
Hydrograph Report

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Hyd. No. 11

PR POA OFFSITE

Hydrograph type	=	Combine	Peak discharge	=	109.62 cfs
Storm frequency	=	10 yrs	Time to peak	=	745 min
Time interval	=	5 min	Hyd. volume	=	1,127,386 cuft
Inflow hyds.	=	8, 10	Contrib. drain. area	=	125.100 ac



Hydrograph Report

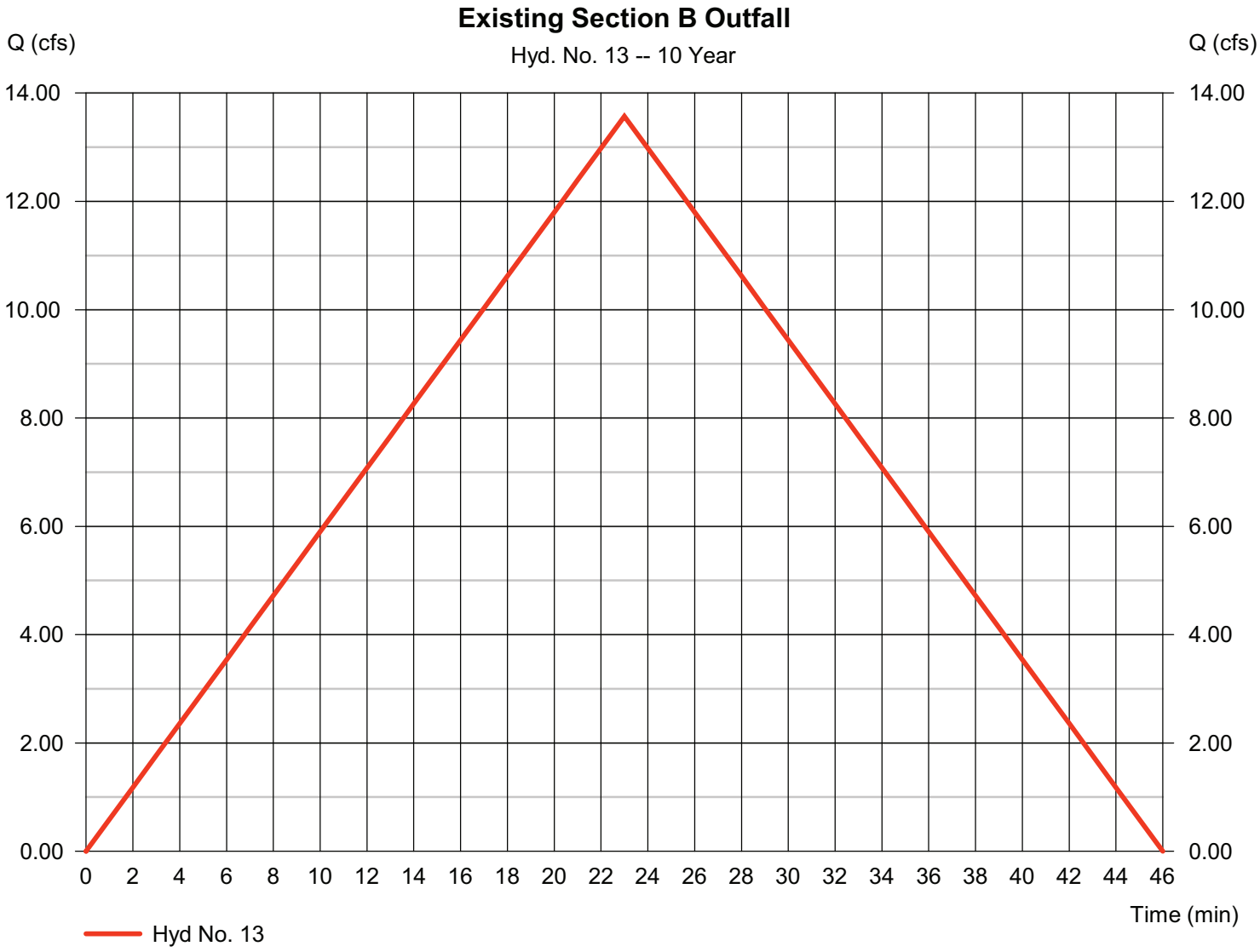
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Hyd. No. 13

Existing Section B Outfall

Hydrograph type	=	Rational	Peak discharge	=	13.57 cfs
Storm frequency	=	10 yrs	Time to peak	=	23 min
Time interval	=	1 min	Hyd. volume	=	18,727 cuft
Drainage area	=	7.230 ac	Runoff coeff.	=	0.56*
Intensity	=	3.352 in/hr	Tc by User	=	23.00 min
IDF Curve	=	Middlesex.idf	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(3.150 x 0.90) + (4.080 x 0.30)] / 7.230



Hydrograph Report

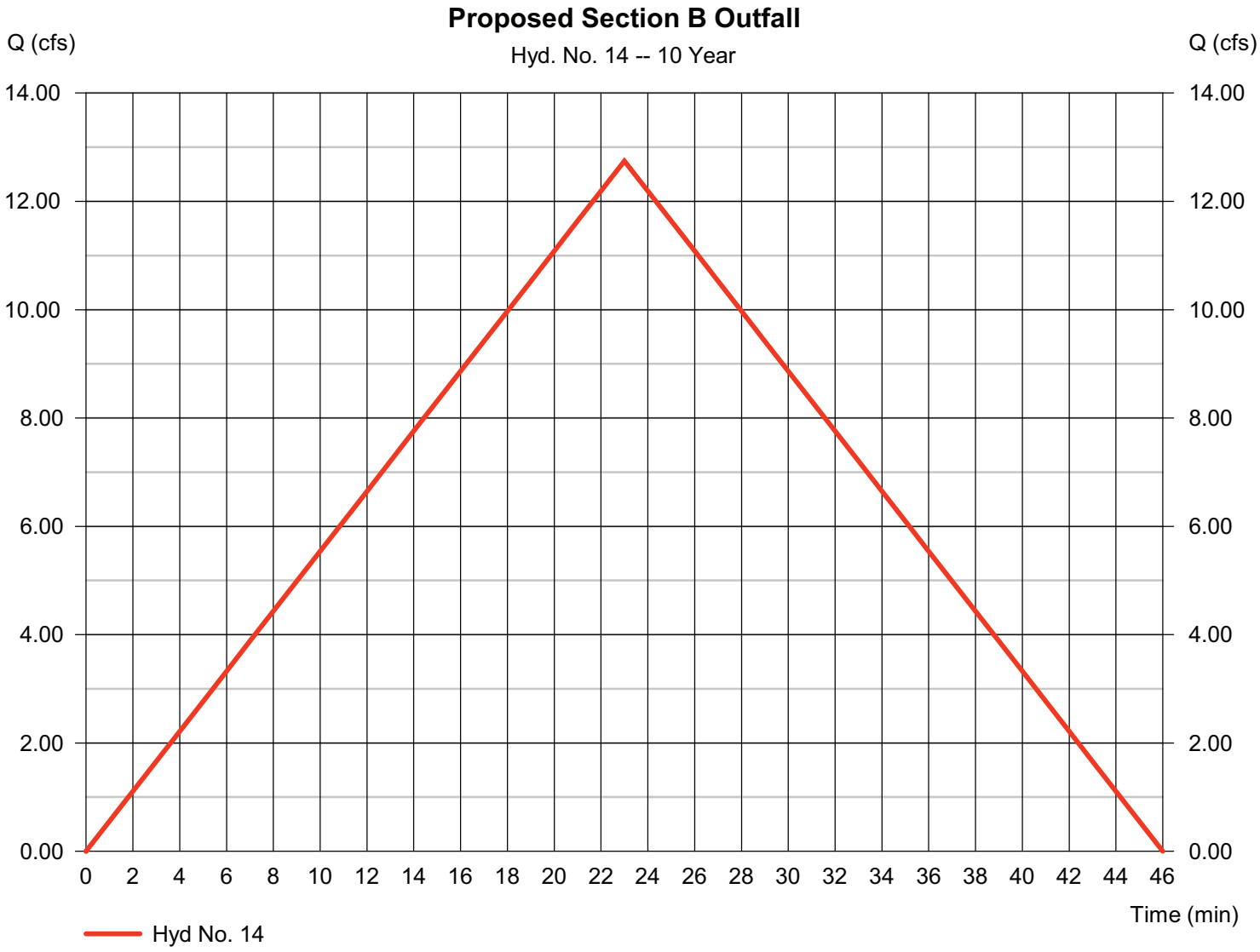
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Hyd. No. 14

Proposed Section B Outfall

Hydrograph type	=	Rational	Peak discharge	=	12.74 cfs
Storm frequency	=	10 yrs	Time to peak	=	23 min
Time interval	=	1 min	Hyd. volume	=	17,587 cuft
Drainage area	=	6.790 ac	Runoff coeff.	=	0.56*
Intensity	=	3.352 in/hr	Tc by User	=	23.00 min
IDF Curve	=	Middlesex.idf	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(2.950 x 0.90) + (3.840 x 0.30)] / 6.790



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	108.35	5	750	722,939	------	------	------	EXWS-30
2	SCS Runoff	170.48	5	745	999,305	------	------	------	EXWS-40
3	Reservoir	73.79	5	775	722,863	1	325.20	234,321	North Pond
4	Reach	68.06	5	785	722,187	3	------	------	EX-North Reach
5	Combine	173.02	5	745	1,721,494	2, 4	------	------	EX POA OFFSITE
7	SCS Runoff	108.35	5	750	722,939	------	------	------	PRWS-30
8	SCS Runoff	170.48	5	745	999,305	------	------	------	PRWS-40
9	Reservoir	73.79	5	775	722,863	7	325.20	234,321	North Pond
10	Reach	68.06	5	785	722,187	9	------	------	PR-North Reach
11	Combine	173.02	5	745	1,721,494	8, 10	------	------	PR POA OFFSITE
13	Rational	16.03	1	23	22,124	------	------	------	Existing Section B Outfall
14	Rational	15.06	1	23	20,778	------	------	------	Proposed Section B Outfall

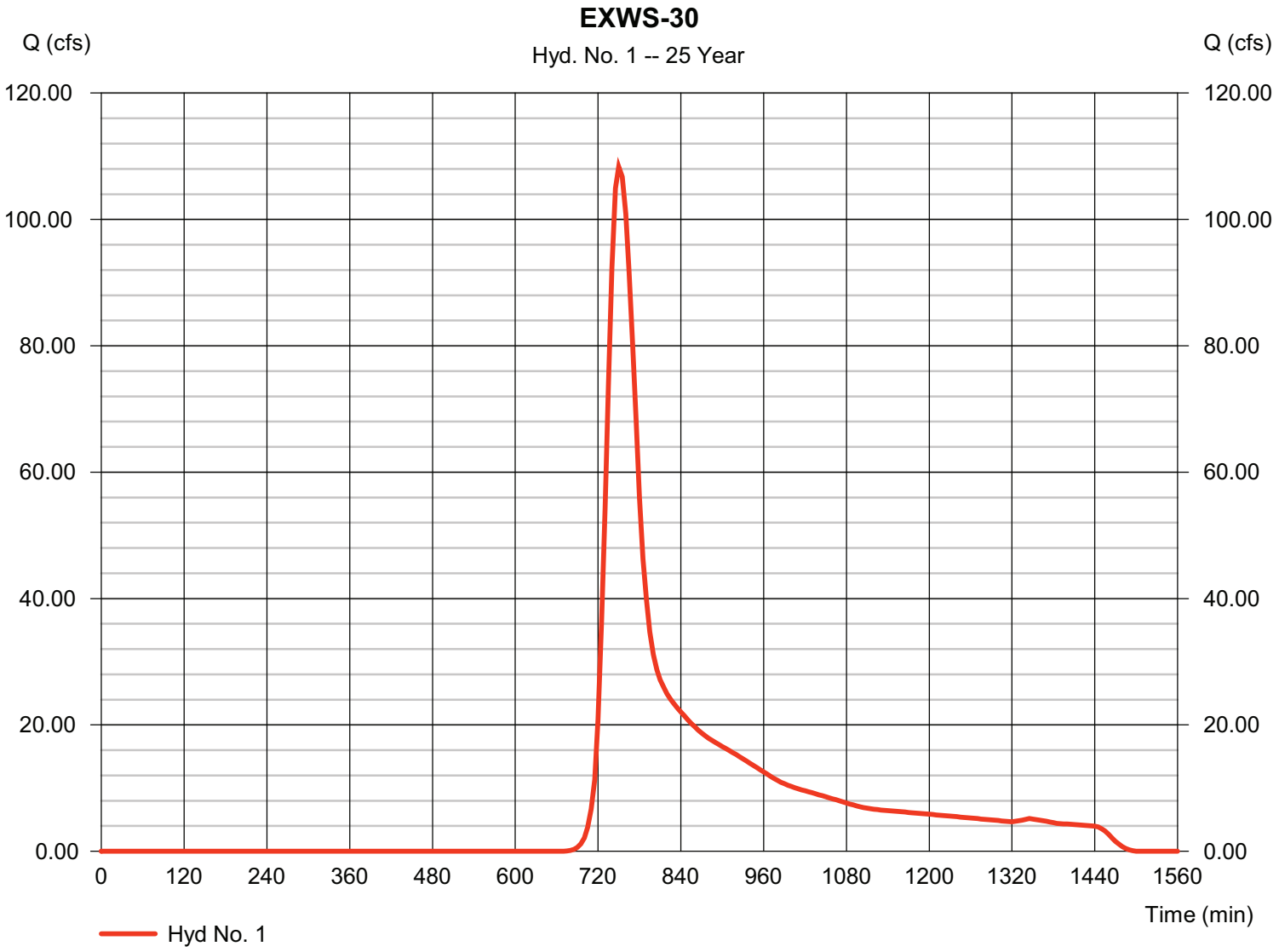
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 1

EXWS-30

Hydrograph type	= SCS Runoff	Peak discharge	= 108.35 cfs
Storm frequency	= 25 yrs	Time to peak	= 750 min
Time interval	= 5 min	Hyd. volume	= 722,939 cuft
Drainage area	= 119.800 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 37.00 min
Total precip.	= 6.32 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



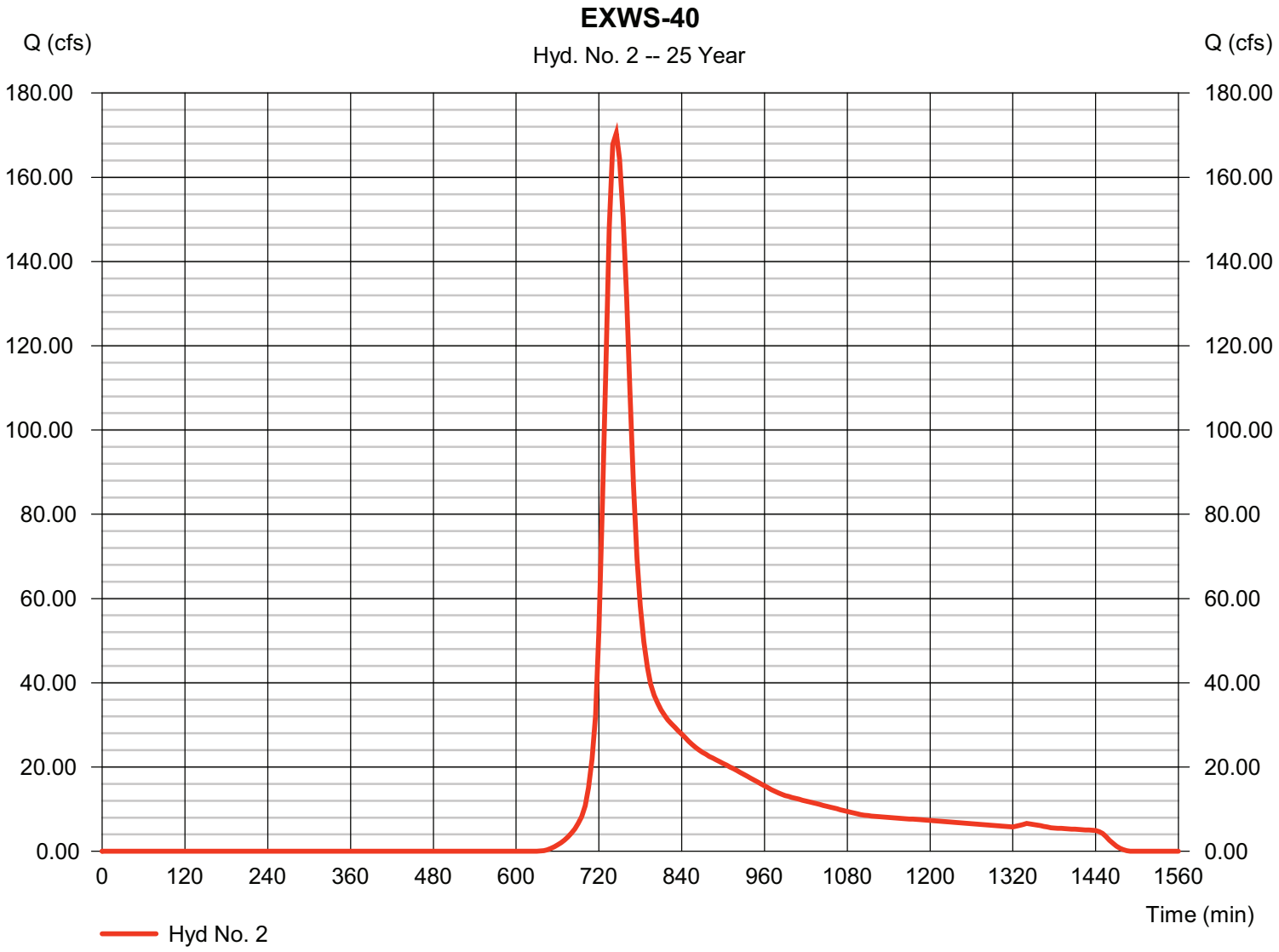
Hydrograph Report

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Hyd. No. 2

EXWS-40

Hydrograph type	= SCS Runoff	Peak discharge	= 170.48 cfs
Storm frequency	= 25 yrs	Time to peak	= 745 min
Time interval	= 5 min	Hyd. volume	= 999,305 cuft
Drainage area	= 125.100 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 32.00 min
Total precip.	= 6.32 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

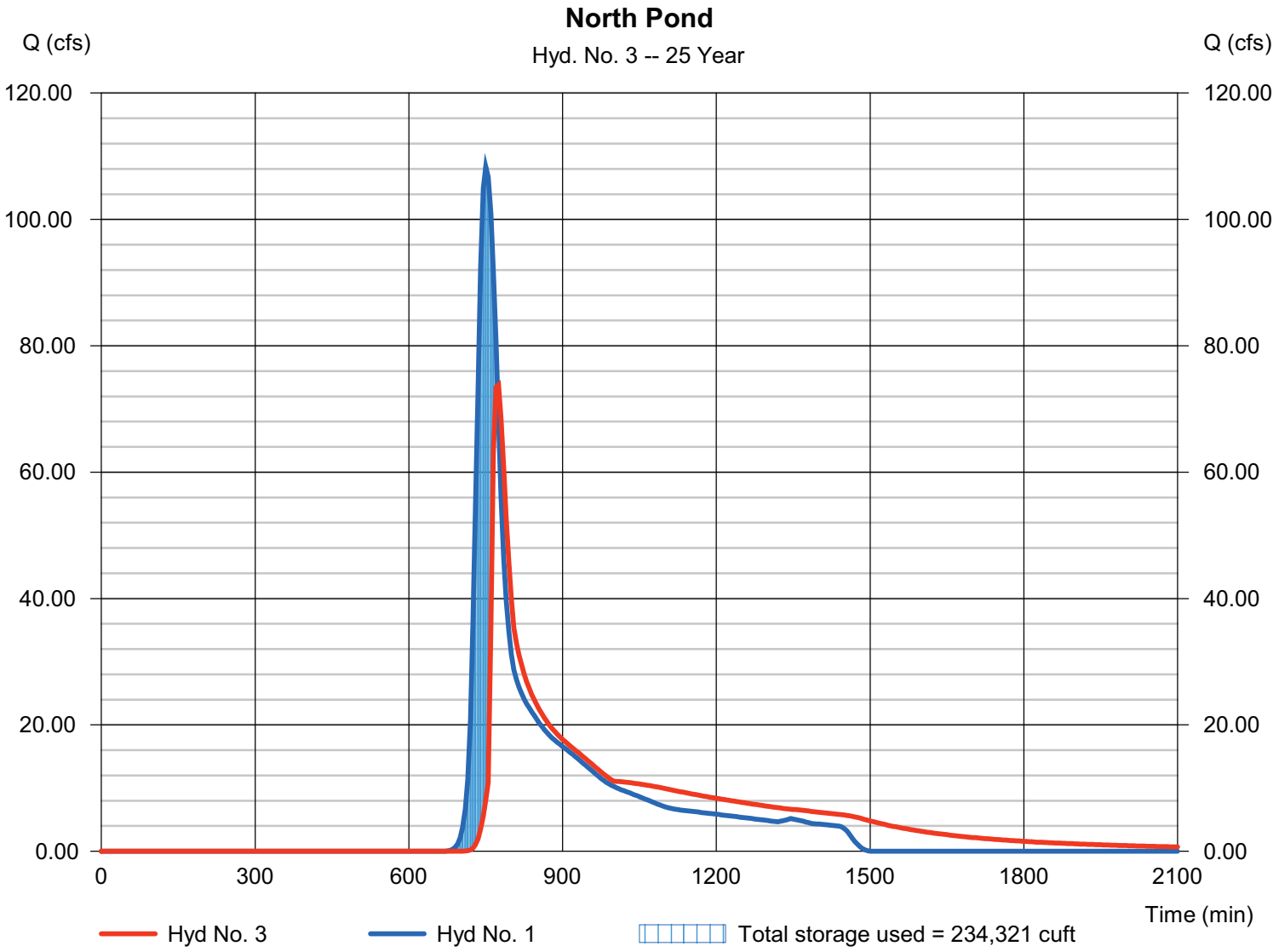
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Hyd. No. 3

North Pond

Hydrograph type	=	Reservoir	Peak discharge	=	73.79 cfs
Storm frequency	=	25 yrs	Time to peak	=	775 min
Time interval	=	5 min	Hyd. volume	=	722,863 cuft
Inflow hyd. No.	=	1 - EXWS-30	Max. Elevation	=	325.20 ft
Reservoir name	=	North Pond	Max. Storage	=	234,321 cuft

Storage Indication method used. Wet pond routing start elevation = 324.15 ft.



Hydrograph Report

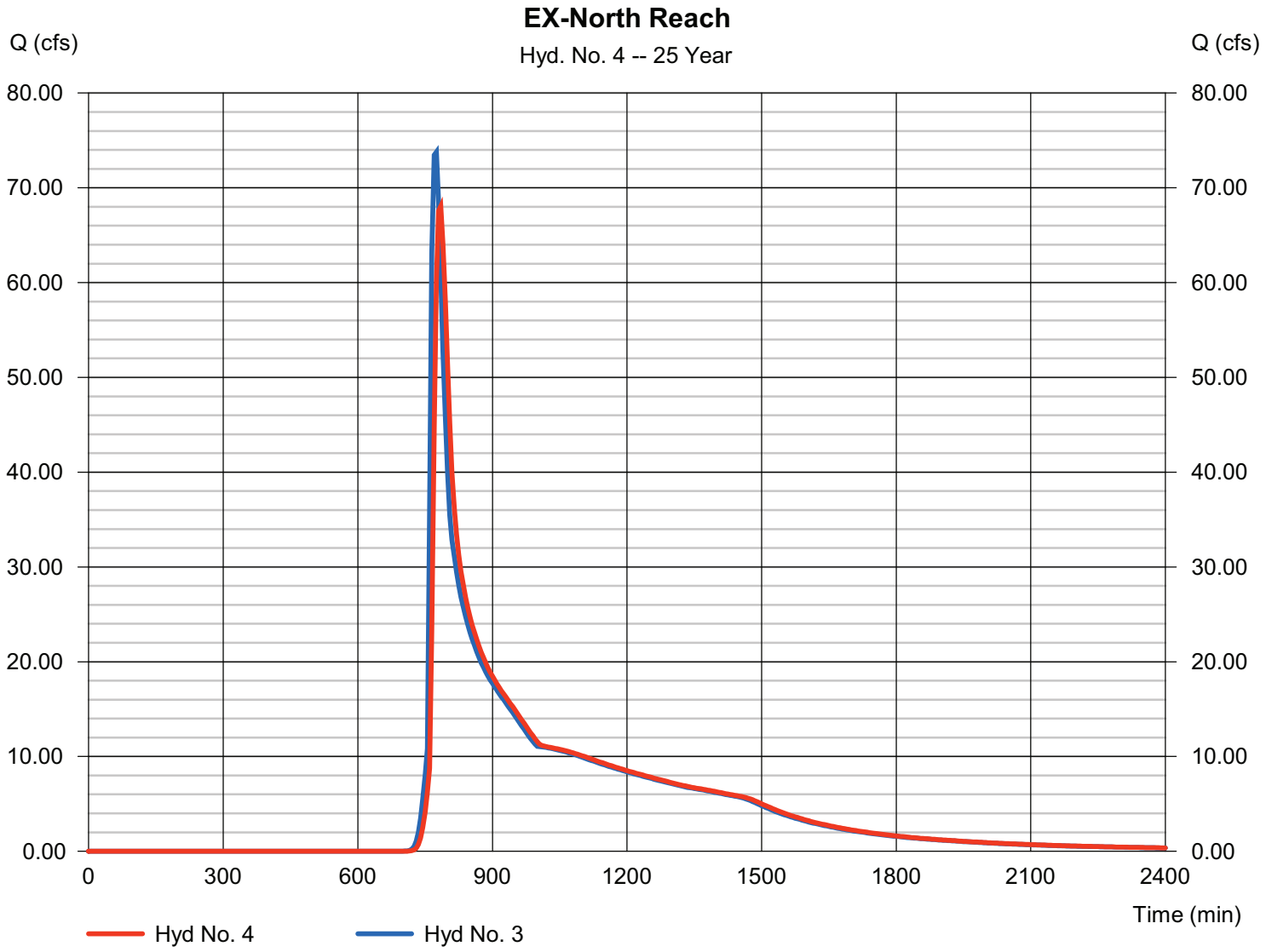
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 4

EX-North Reach

Hydrograph type	=	Reach	Peak discharge	=	68.06 cfs
Storm frequency	=	25 yrs	Time to peak	=	785 min
Time interval	=	5 min	Hyd. volume	=	722,187 cuft
Inflow hyd. No.	=	3 - North Pond	Section type	=	Trapezoidal
Reach length	=	2800.0 ft	Channel slope	=	4.8 %
Manning's n	=	0.050	Bottom width	=	5.0 ft
Side slope	=	3.0:1	Max. depth	=	3.0 ft
Rating curve x	=	2.232	Rating curve m	=	1.321
Ave. velocity	=	5.22 ft/s	Routing coeff.	=	0.5395

Modified Att-Kin routing method used.

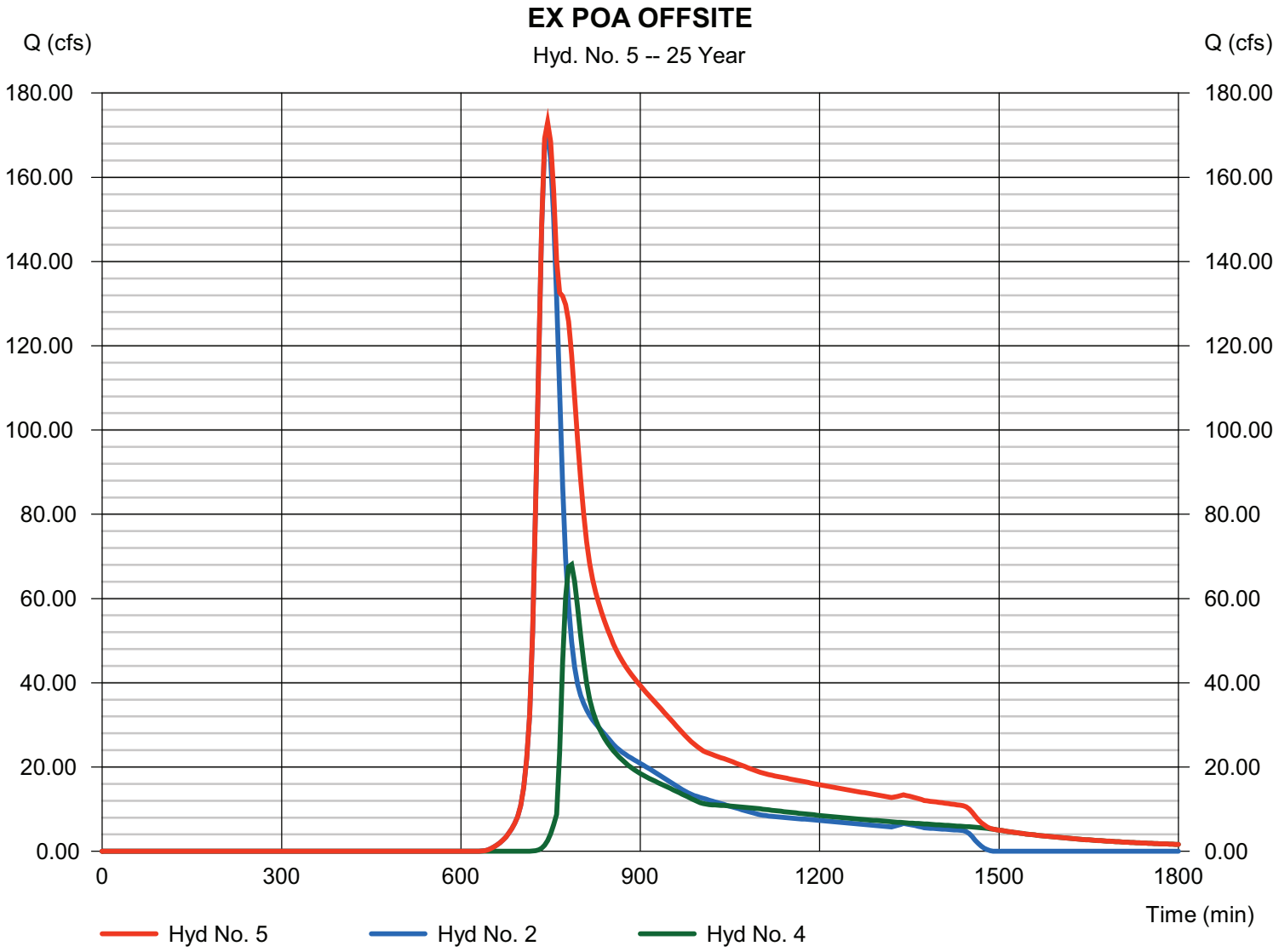


Hydrograph Report

Hyd. No. 5

EX POA OFFSITE

Hydrograph type	=	Combine	Peak discharge	=	173.02 cfs
Storm frequency	=	25 yrs	Time to peak	=	745 min
Time interval	=	5 min	Hyd. volume	=	1,721,494 cuft
Inflow hyds.	=	2, 4	Contrib. drain. area	=	125.100 ac



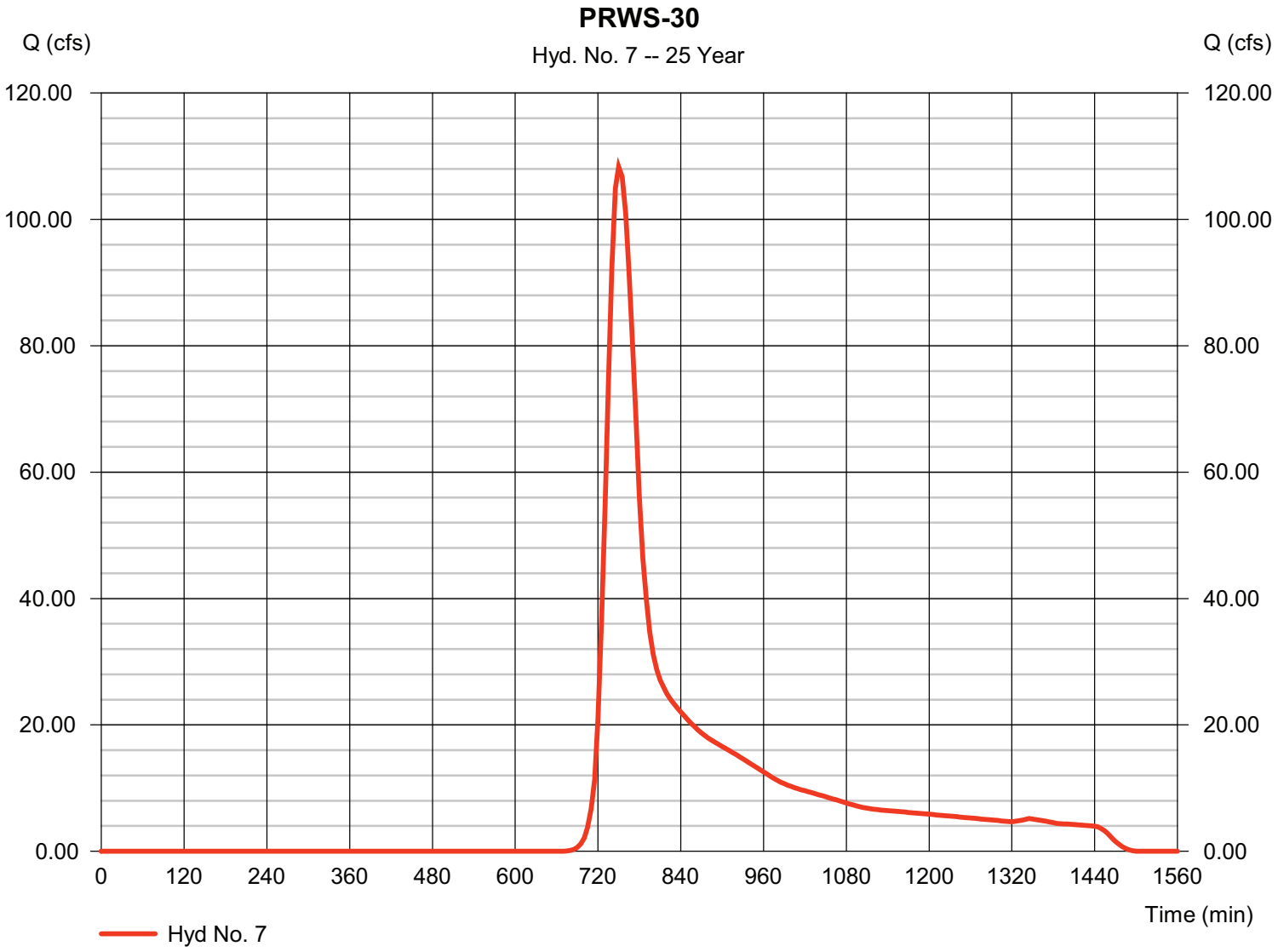
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 7

PRWS-30

Hydrograph type	= SCS Runoff	Peak discharge	= 108.35 cfs
Storm frequency	= 25 yrs	Time to peak	= 750 min
Time interval	= 5 min	Hyd. volume	= 722,939 cuft
Drainage area	= 119.800 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 37.00 min
Total precip.	= 6.32 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



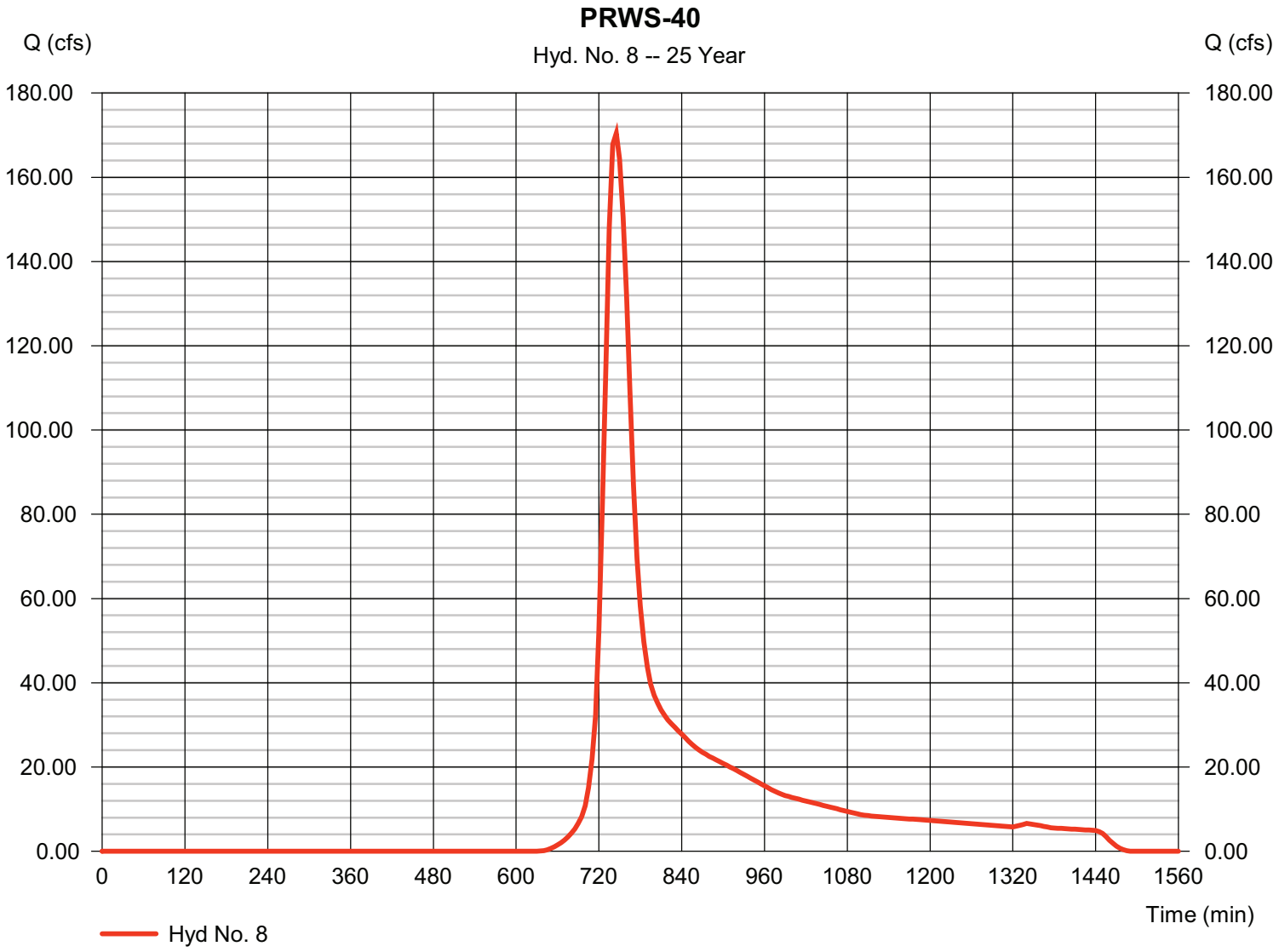
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 8

PRWS-40

Hydrograph type	= SCS Runoff	Peak discharge	= 170.48 cfs
Storm frequency	= 25 yrs	Time to peak	= 745 min
Time interval	= 5 min	Hyd. volume	= 999,305 cuft
Drainage area	= 125.100 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 32.00 min
Total precip.	= 6.32 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

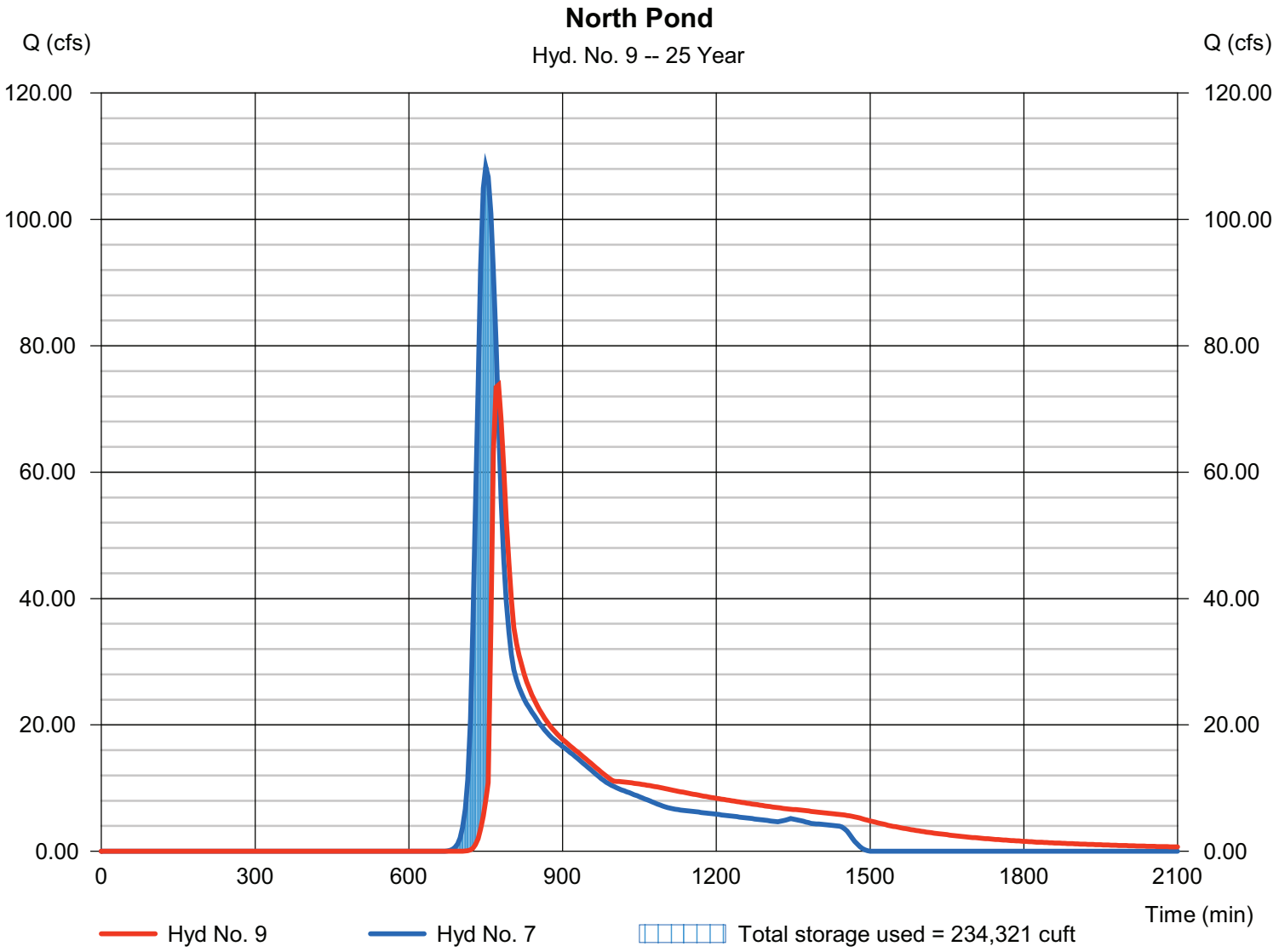
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 9

North Pond

Hydrograph type	=	Reservoir	Peak discharge	=	73.79 cfs
Storm frequency	=	25 yrs	Time to peak	=	775 min
Time interval	=	5 min	Hyd. volume	=	722,863 cuft
Inflow hyd. No.	=	7 - PRWS-30	Max. Elevation	=	325.20 ft
Reservoir name	=	North Pond	Max. Storage	=	234,321 cuft

Storage Indication method used. Wet pond routing start elevation = 324.15 ft.



Hydrograph Report

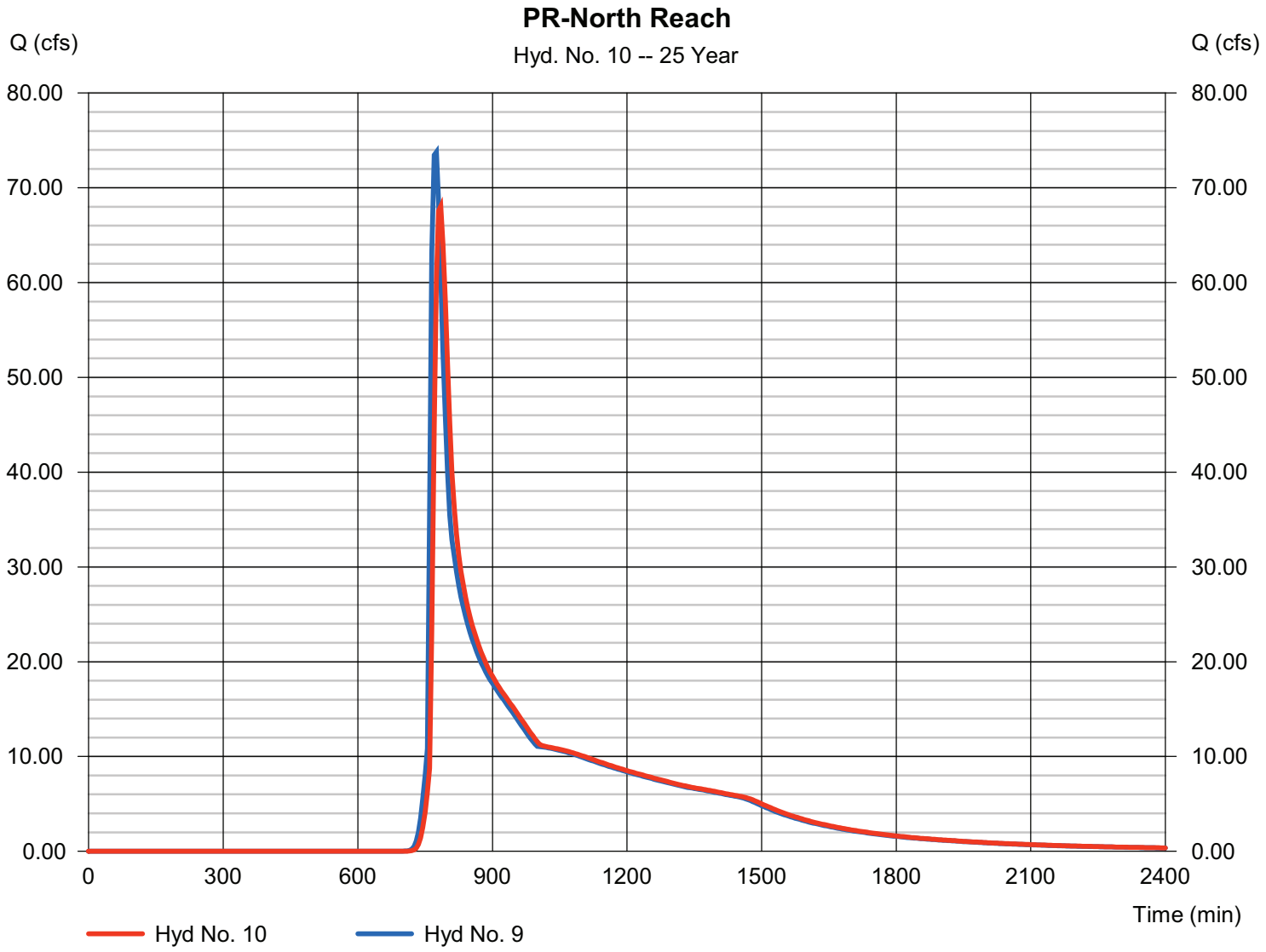
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 10

PR-North Reach

Hydrograph type	= Reach	Peak discharge	= 68.06 cfs
Storm frequency	= 25 yrs	Time to peak	= 785 min
Time interval	= 5 min	Hyd. volume	= 722,187 cuft
Inflow hyd. No.	= 9 - North Pond	Section type	= Trapezoidal
Reach length	= 2800.0 ft	Channel slope	= 4.8 %
Manning's n	= 0.050	Bottom width	= 5.0 ft
Side slope	= 3.0:1	Max. depth	= 3.0 ft
Rating curve x	= 2.232	Rating curve m	= 1.321
Ave. velocity	= 5.22 ft/s	Routing coeff.	= 0.5395

Modified Att-Kin routing method used.



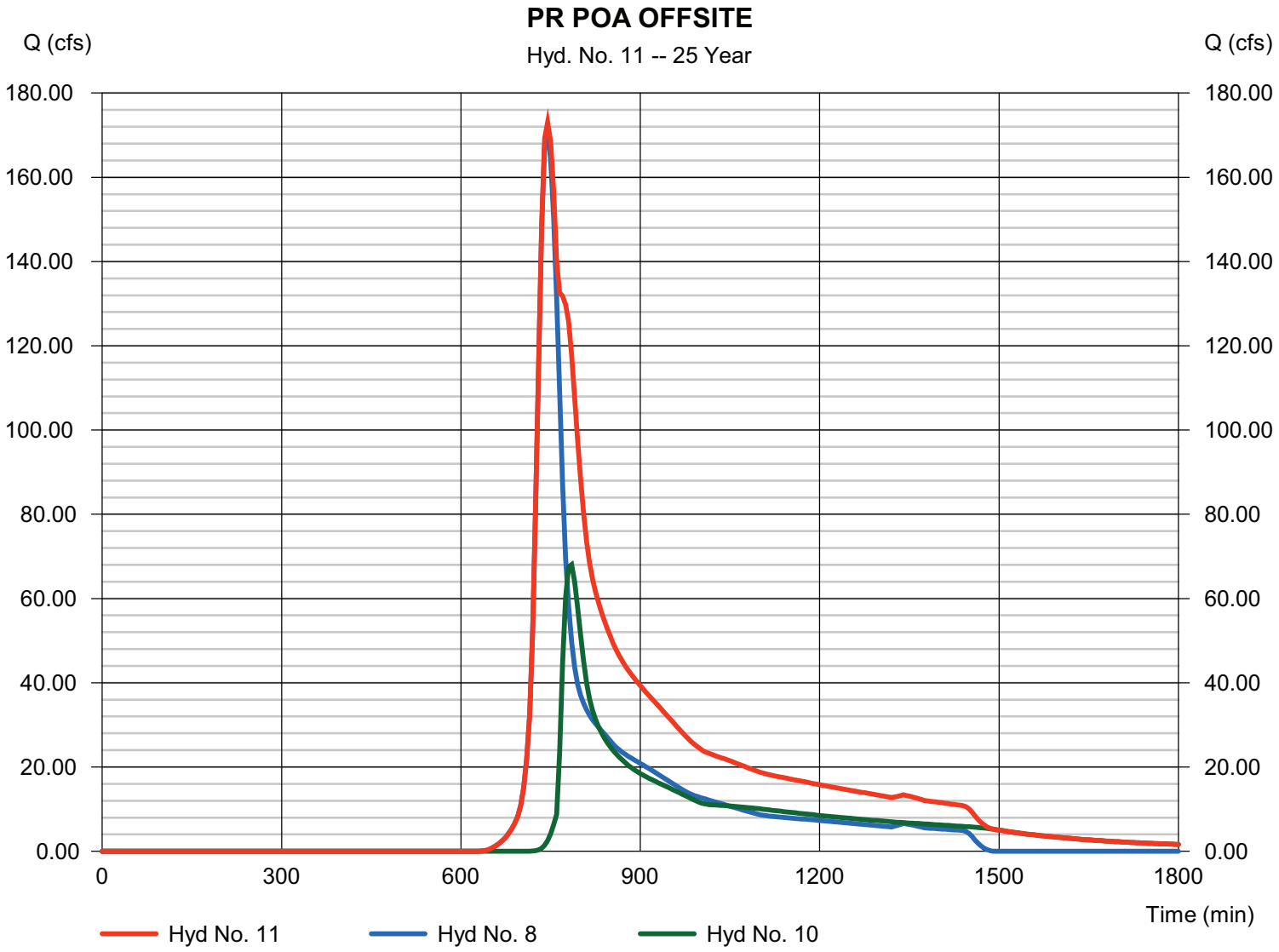
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 11

PR POA OFFSITE

Hydrograph type	= Combine	Peak discharge	= 173.02 cfs
Storm frequency	= 25 yrs	Time to peak	= 745 min
Time interval	= 5 min	Hyd. volume	= 1,721,494 cuft
Inflow hyds.	= 8, 10	Contrib. drain. area	= 125.100 ac



Hydrograph Report

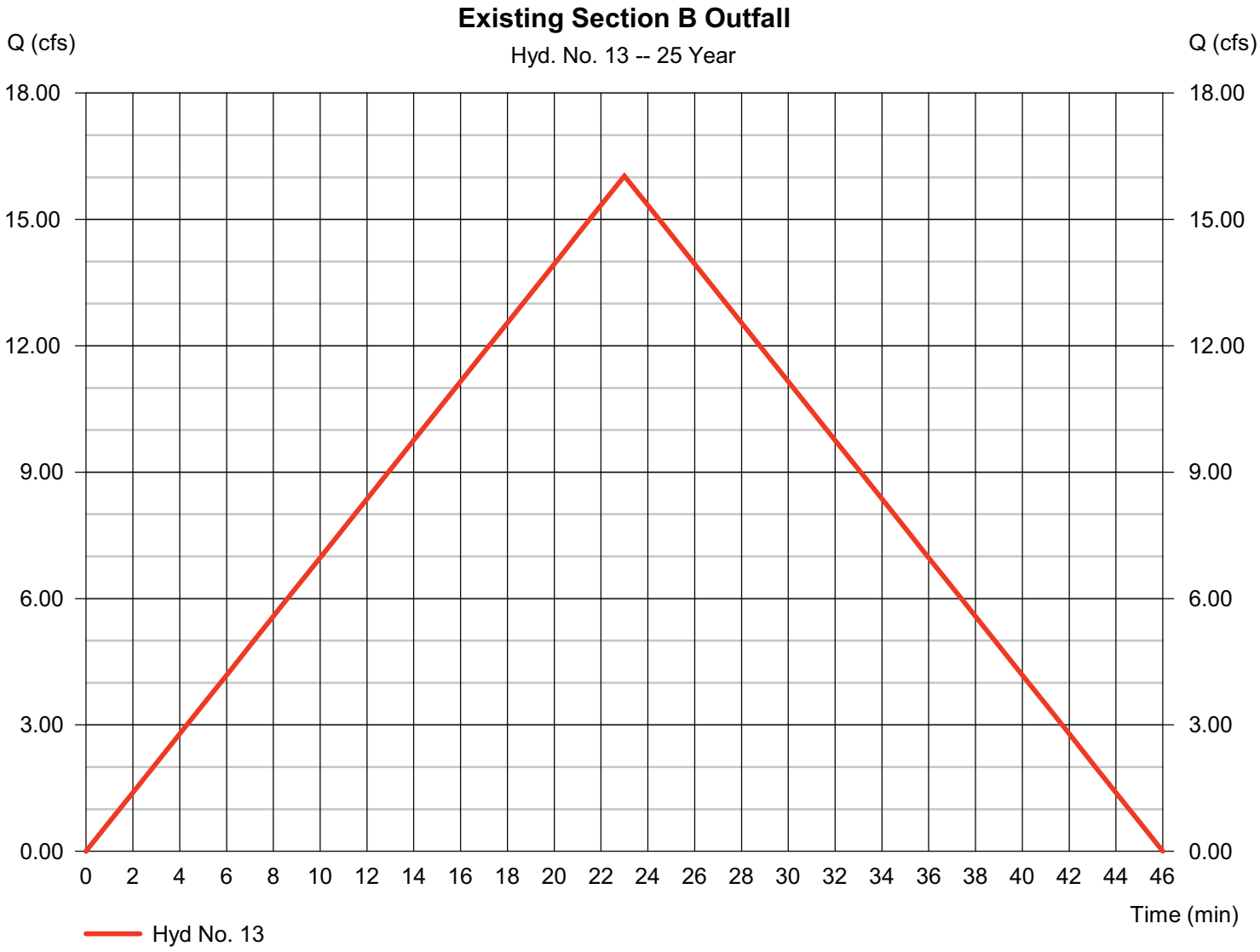
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 13

Existing Section B Outfall

Hydrograph type	=	Rational	Peak discharge	=	16.03 cfs
Storm frequency	=	25 yrs	Time to peak	=	23 min
Time interval	=	1 min	Hyd. volume	=	22,124 cuft
Drainage area	=	7.230 ac	Runoff coeff.	=	0.56*
Intensity	=	3.960 in/hr	Tc by User	=	23.00 min
IDF Curve	=	Middlesex.idf	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(3.150 x 0.90) + (4.080 x 0.30)] / 7.230



Hydrograph Report

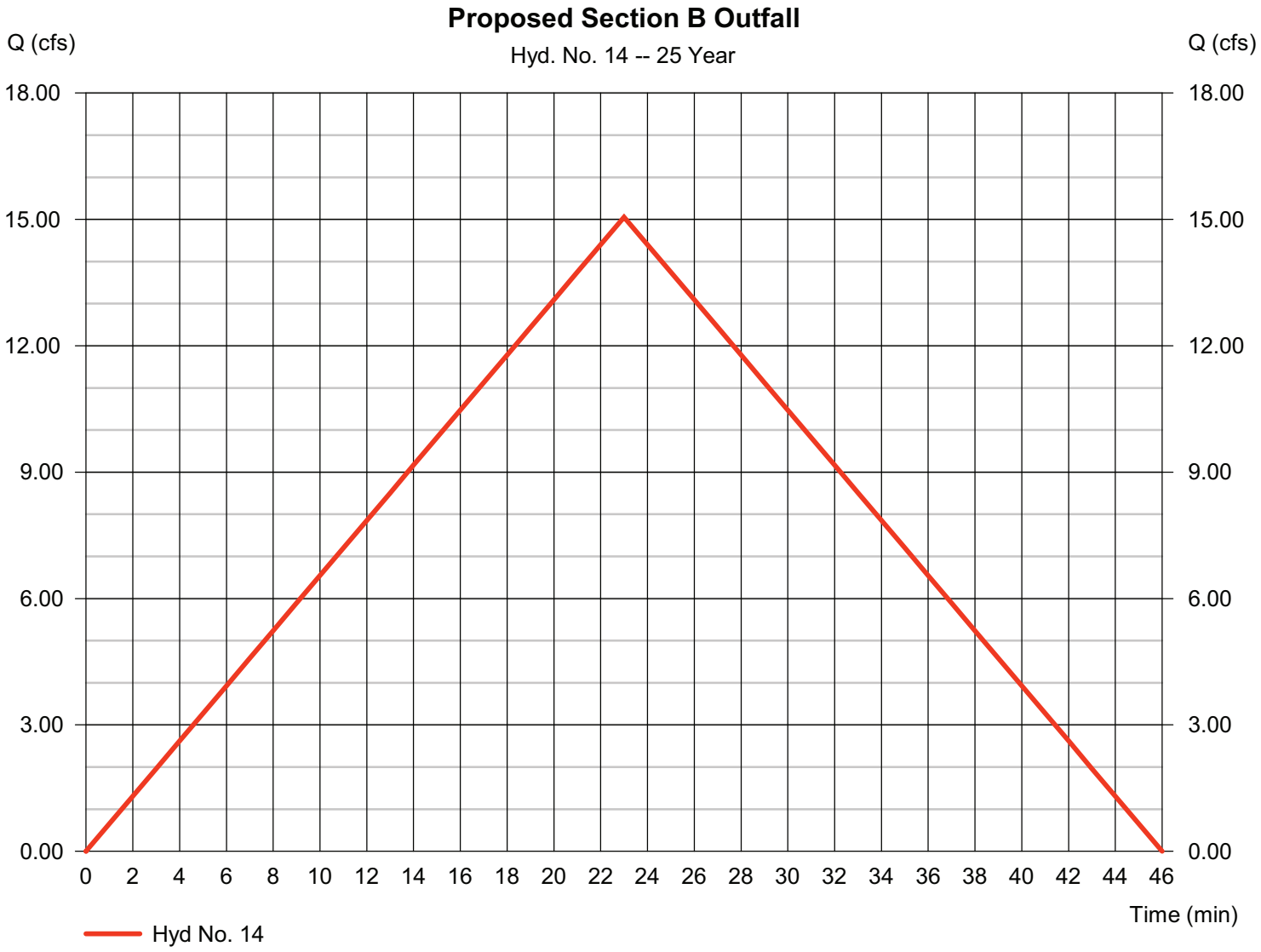
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 14

Proposed Section B Outfall

Hydrograph type	=	Rational	Peak discharge	=	15.06 cfs
Storm frequency	=	25 yrs	Time to peak	=	23 min
Time interval	=	1 min	Hyd. volume	=	20,778 cuft
Drainage area	=	6.790 ac	Runoff coeff.	=	0.56*
Intensity	=	3.960 in/hr	Tc by User	=	23.00 min
IDF Curve	=	Middlesex.idf	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(2.950 x 0.90) + (3.840 x 0.30)] / 6.790



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	145.42	5	750	938,431	------	------	------	EXWS-30
2	SCS Runoff	219.43	5	745	1,265,888	------	------	------	EXWS-40
3	Reservoir	121.40	5	765	938,357	1	325.29	253,536	North Pond
4	Reach	113.76	5	775	937,678	3	------	------	EX-North Reach
5	Combine	231.07	5	765	2,203,569	2, 4	------	------	EX POA OFFSITE
7	SCS Runoff	145.42	5	750	938,431	------	------	------	PRWS-30
8	SCS Runoff	219.43	5	745	1,265,888	------	------	------	PRWS-40
9	Reservoir	121.40	5	765	938,357	7	325.29	253,536	North Pond
10	Reach	113.76	5	775	937,678	9	------	------	PR-North Reach
11	Combine	231.07	5	765	2,203,569	8, 10	------	------	PR POA OFFSITE
13	Rational	17.96	1	23	24,786	------	------	------	Existing Section B Outfall
14	Rational	16.87	1	23	23,278	------	------	------	Proposed Section B Outfall

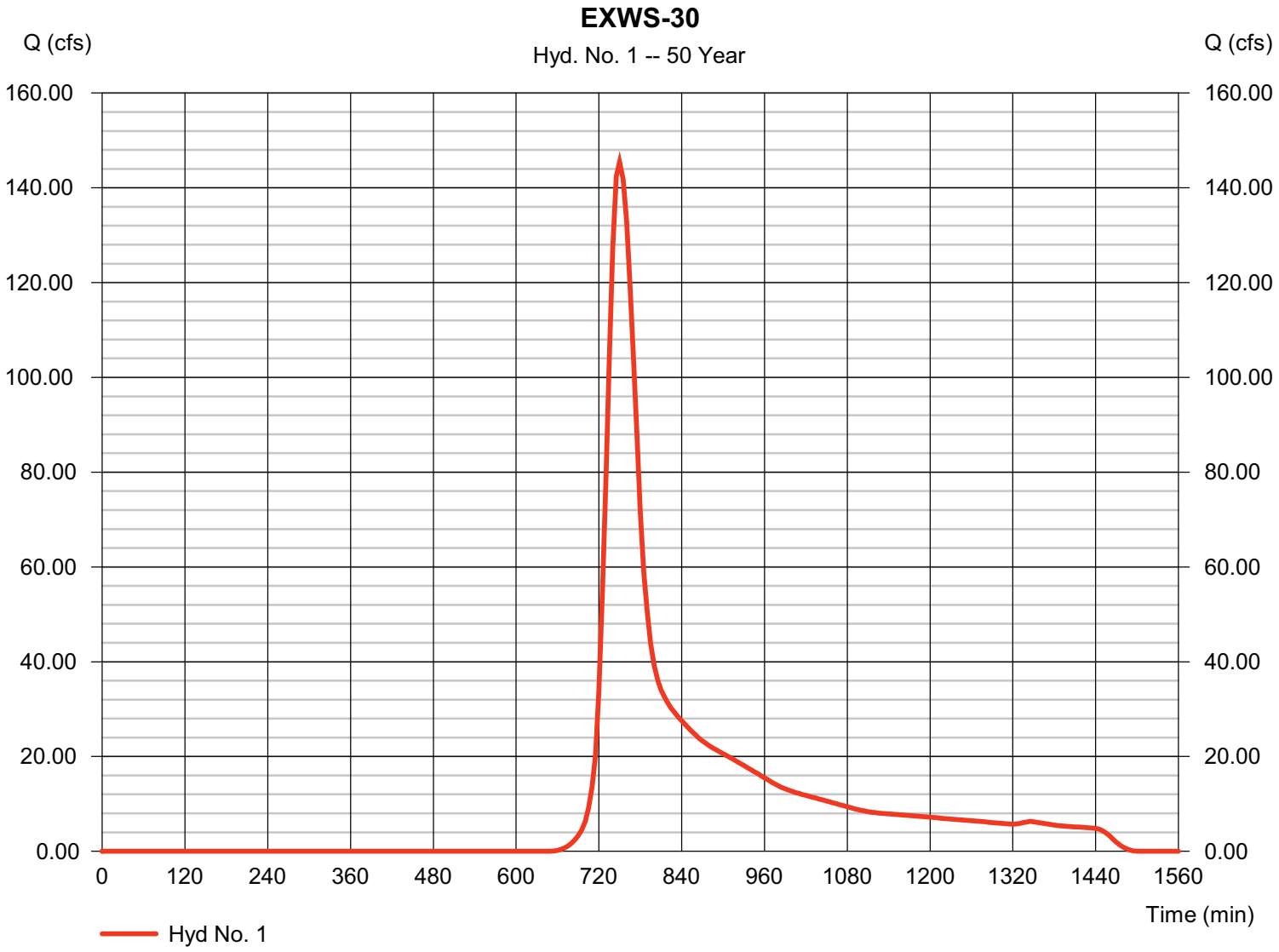
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 1

EXWS-30

Hydrograph type	= SCS Runoff	Peak discharge	= 145.42 cfs
Storm frequency	= 50 yrs	Time to peak	= 750 min
Time interval	= 5 min	Hyd. volume	= 938,431 cuft
Drainage area	= 119.800 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 37.00 min
Total precip.	= 7.14 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



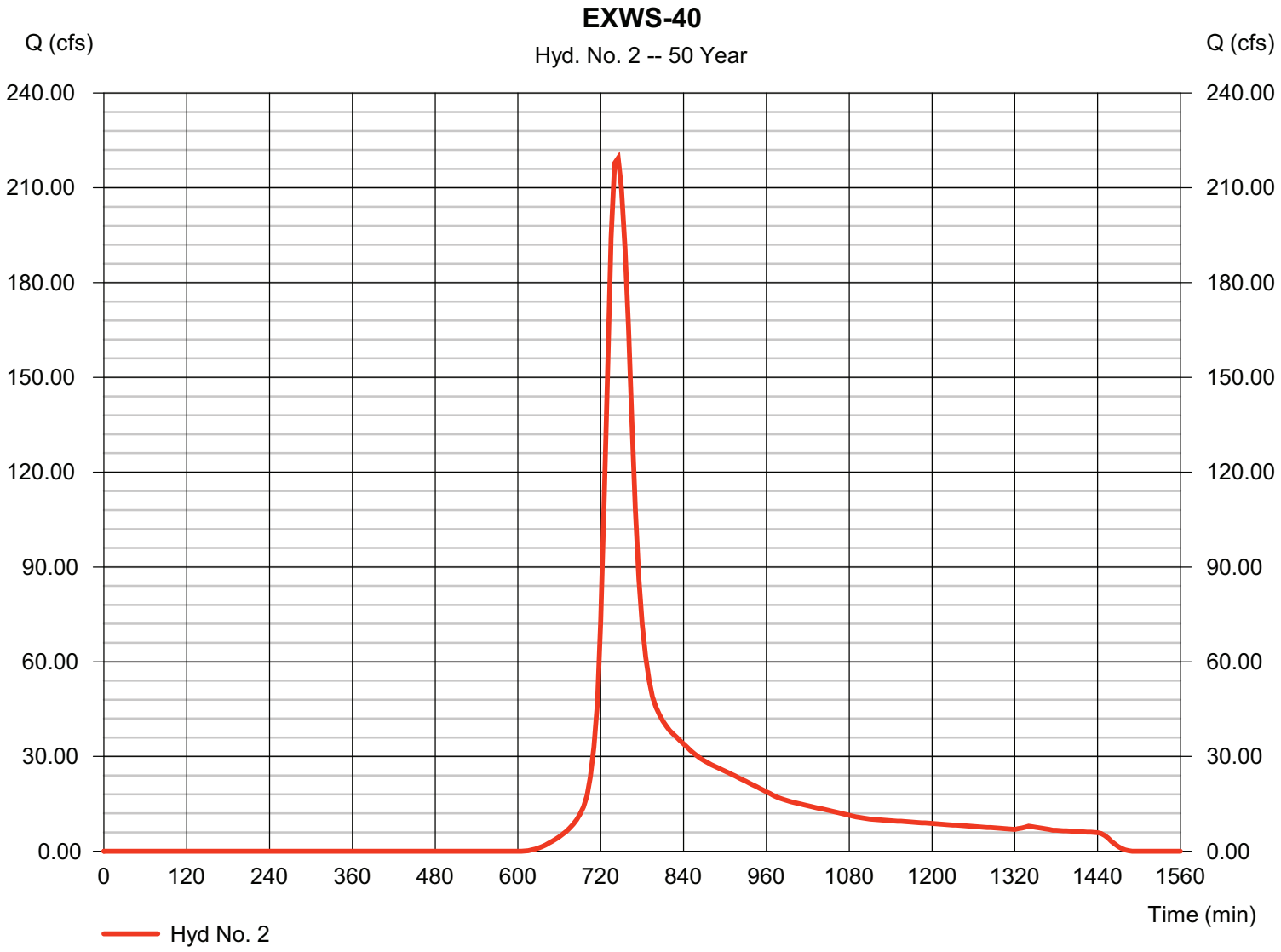
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 2

EXWS-40

Hydrograph type	= SCS Runoff	Peak discharge	= 219.43 cfs
Storm frequency	= 50 yrs	Time to peak	= 745 min
Time interval	= 5 min	Hyd. volume	= 1,265,888 cuft
Drainage area	= 125.100 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 32.00 min
Total precip.	= 7.14 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

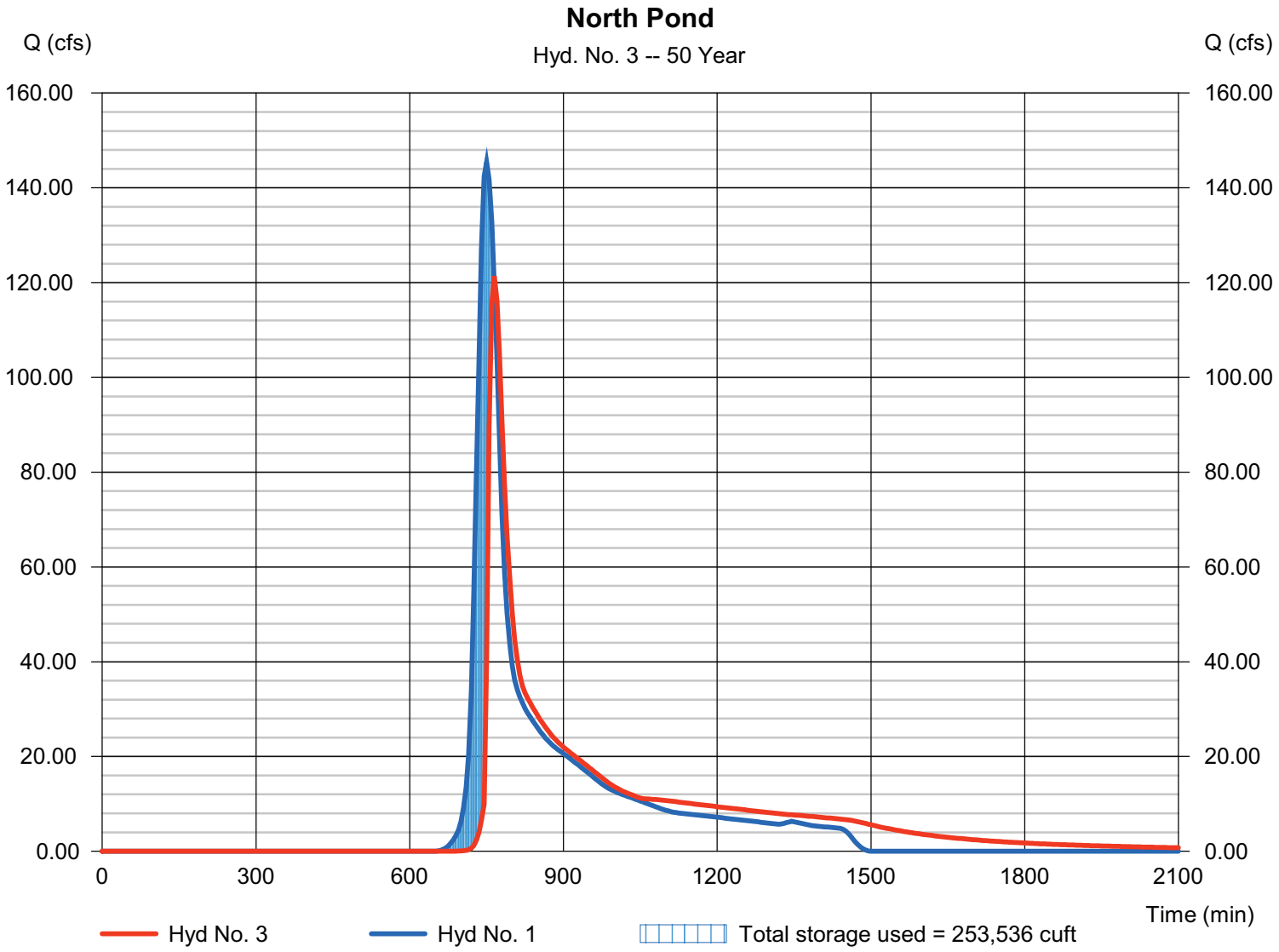
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 3

North Pond

Hydrograph type	=	Reservoir	Peak discharge	=	121.40 cfs
Storm frequency	=	50 yrs	Time to peak	=	765 min
Time interval	=	5 min	Hyd. volume	=	938,357 cuft
Inflow hyd. No.	=	1 - EXWS-30	Max. Elevation	=	325.29 ft
Reservoir name	=	North Pond	Max. Storage	=	253,536 cuft

Storage Indication method used. Wet pond routing start elevation = 324.15 ft.



Hydrograph Report

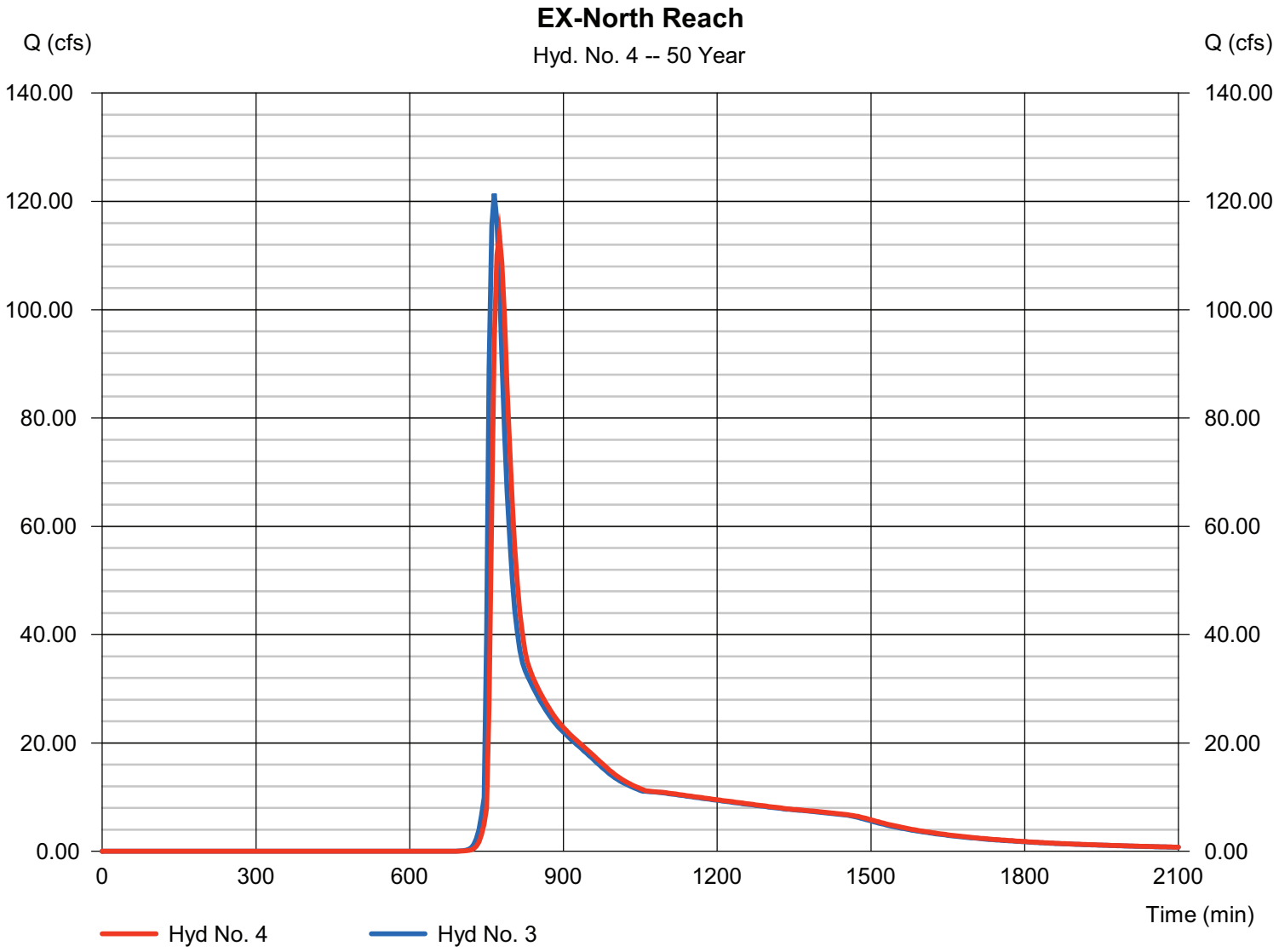
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 4

EX-North Reach

Hydrograph type	=	Reach	Peak discharge	=	113.76 cfs
Storm frequency	=	50 yrs	Time to peak	=	775 min
Time interval	=	5 min	Hyd. volume	=	937,678 cuft
Inflow hyd. No.	=	3 - North Pond	Section type	=	Trapezoidal
Reach length	=	2800.0 ft	Channel slope	=	4.8 %
Manning's n	=	0.050	Bottom width	=	5.0 ft
Side slope	=	3.0:1	Max. depth	=	3.0 ft
Rating curve x	=	2.232	Rating curve m	=	1.321
Ave. velocity	=	5.89 ft/s	Routing coeff.	=	0.5884

Modified Att-Kin routing method used.



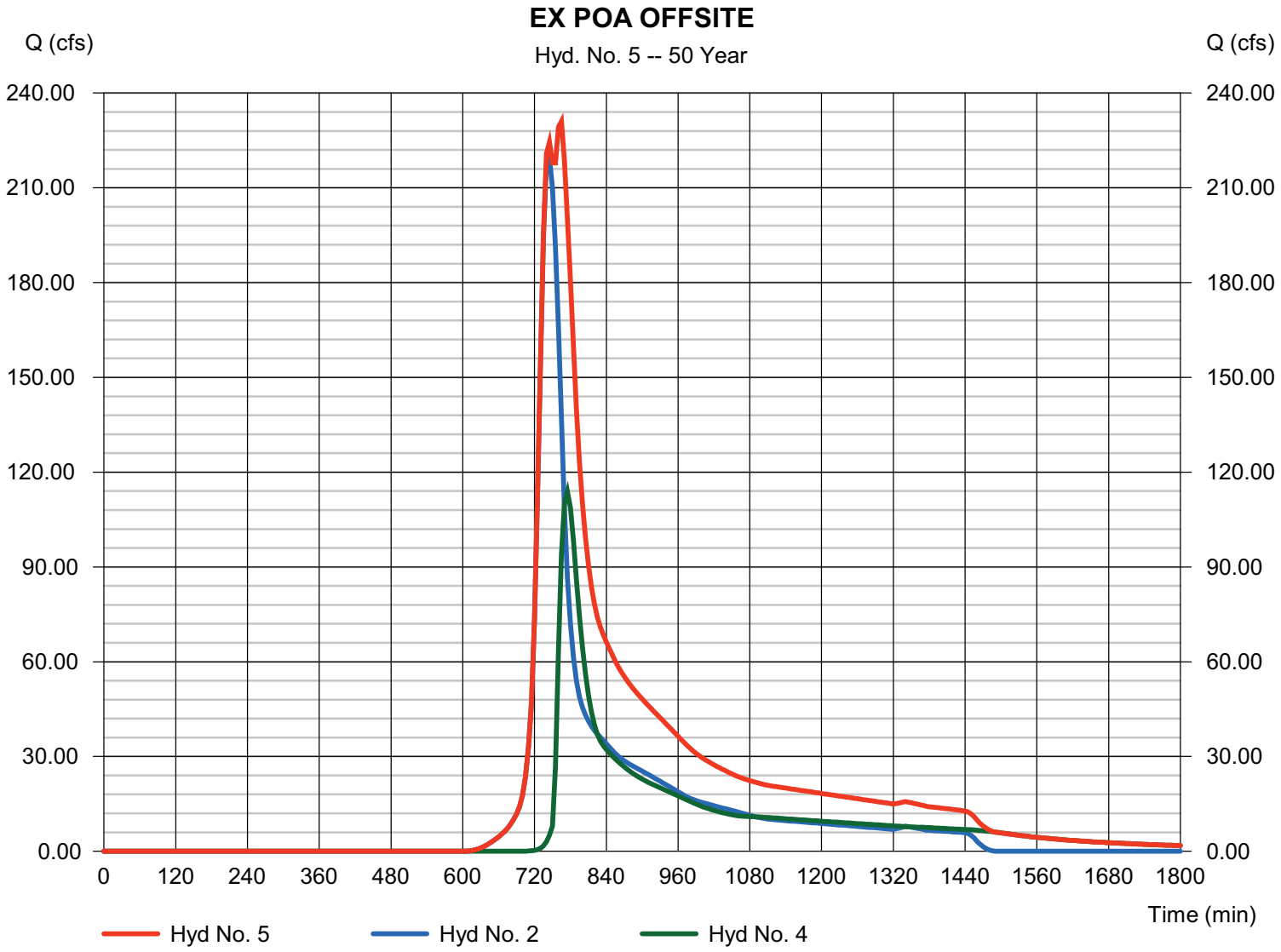
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 5

EX POA OFFSITE

Hydrograph type	=	Combine	Peak discharge	=	231.07 cfs
Storm frequency	=	50 yrs	Time to peak	=	765 min
Time interval	=	5 min	Hyd. volume	=	2,203,569 cuft
Inflow hyds.	=	2, 4	Contrib. drain. area	=	125.100 ac



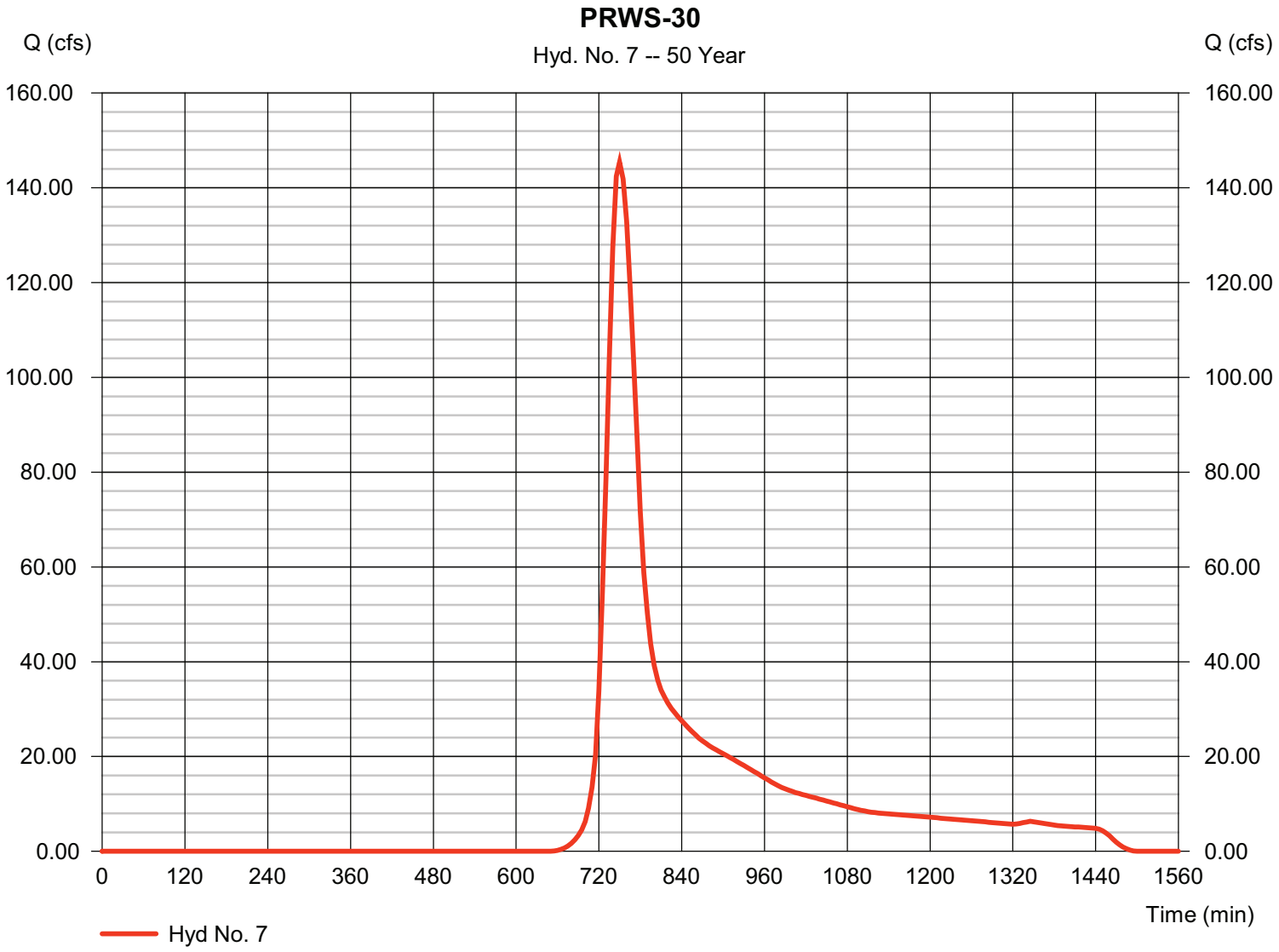
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 7

PRWS-30

Hydrograph type	= SCS Runoff	Peak discharge	= 145.42 cfs
Storm frequency	= 50 yrs	Time to peak	= 750 min
Time interval	= 5 min	Hyd. volume	= 938,431 cuft
Drainage area	= 119.800 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 37.00 min
Total precip.	= 7.14 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



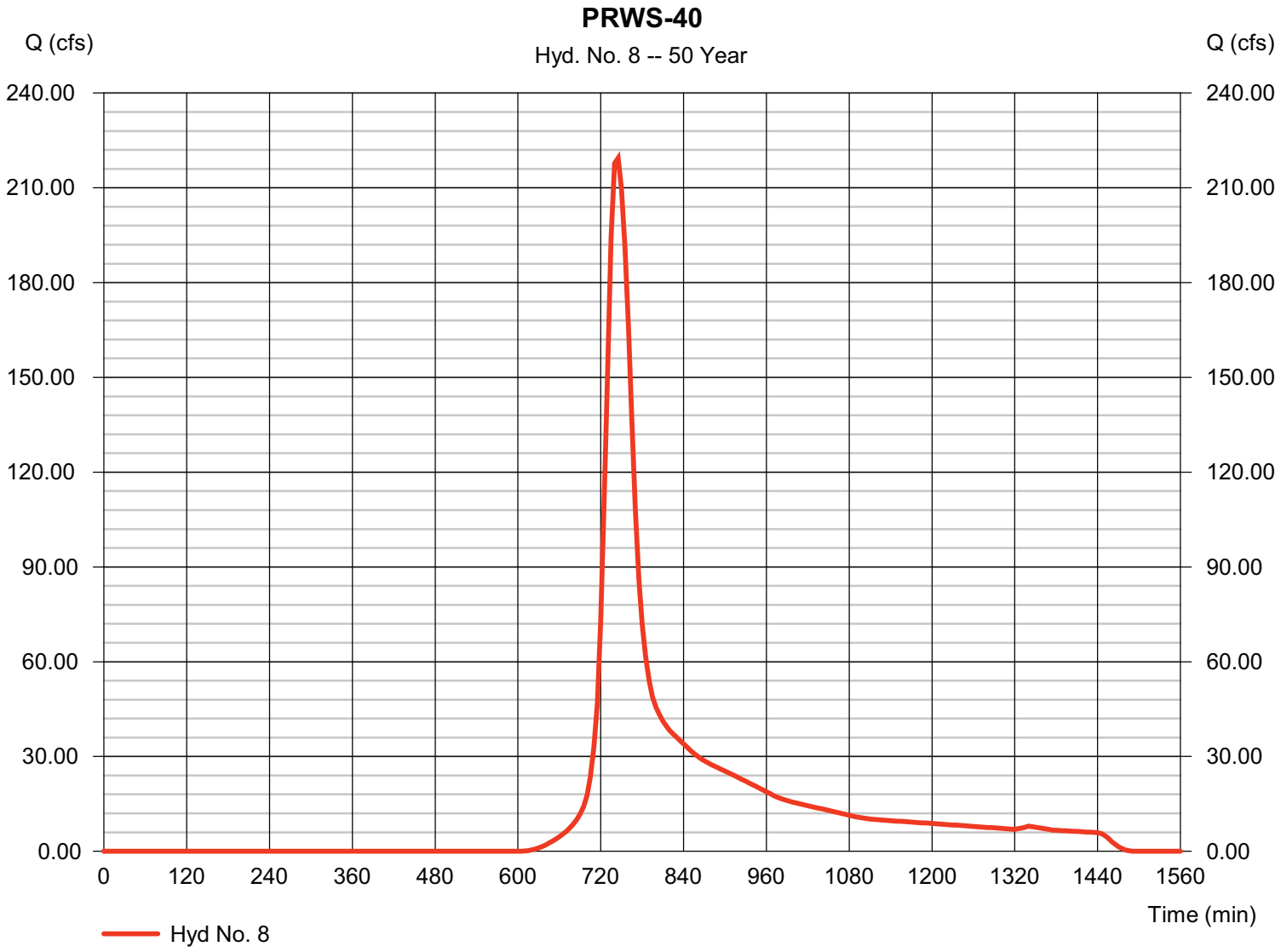
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 8

PRWS-40

Hydrograph type	= SCS Runoff	Peak discharge	= 219.43 cfs
Storm frequency	= 50 yrs	Time to peak	= 745 min
Time interval	= 5 min	Hyd. volume	= 1,265,888 cuft
Drainage area	= 125.100 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 32.00 min
Total precip.	= 7.14 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

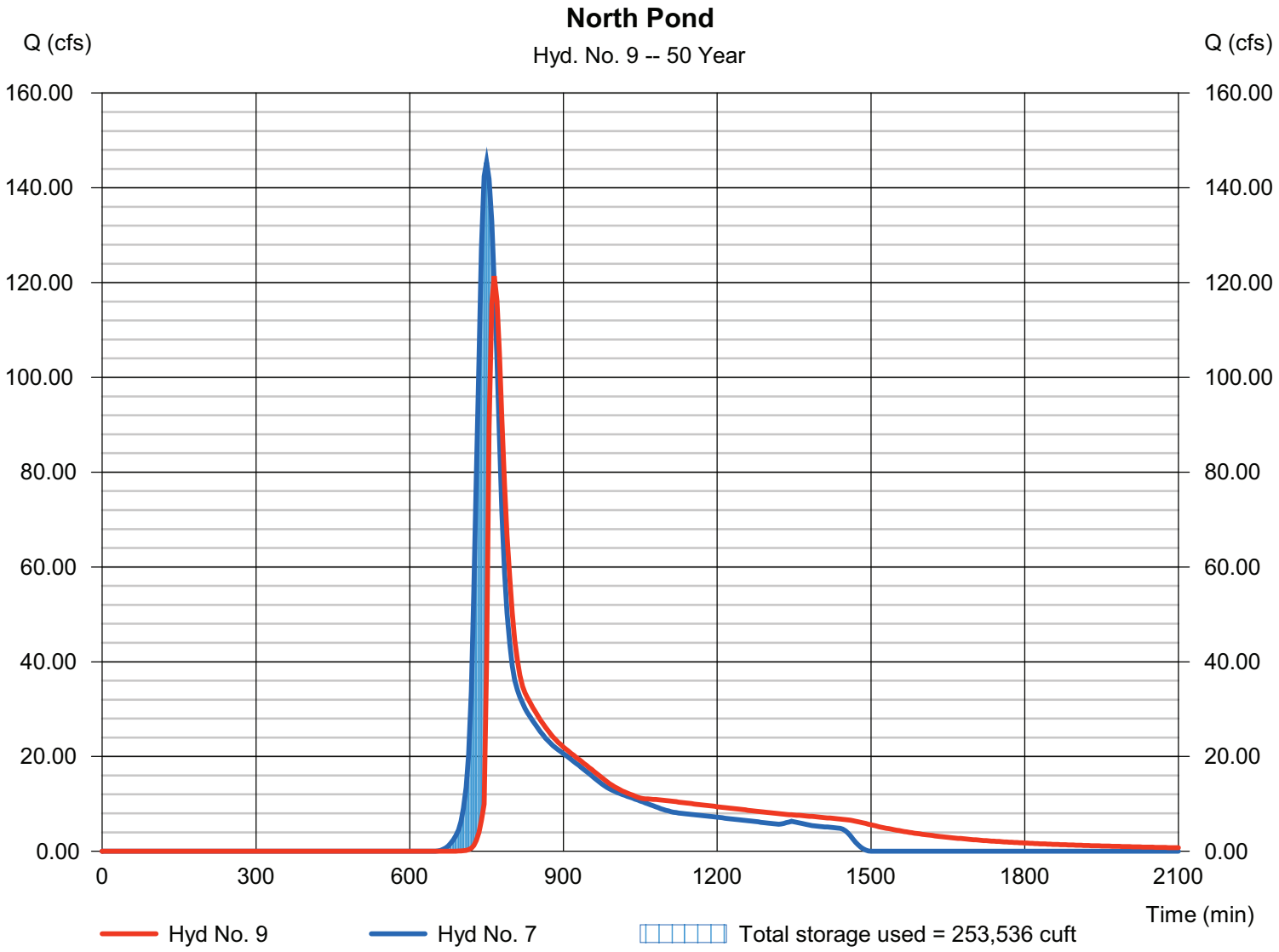
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 9

North Pond

Hydrograph type	=	Reservoir	Peak discharge	=	121.40 cfs
Storm frequency	=	50 yrs	Time to peak	=	765 min
Time interval	=	5 min	Hyd. volume	=	938,357 cuft
Inflow hyd. No.	=	7 - PRWS-30	Max. Elevation	=	325.29 ft
Reservoir name	=	North Pond	Max. Storage	=	253,536 cuft

Storage Indication method used. Wet pond routing start elevation = 324.15 ft.



Hydrograph Report

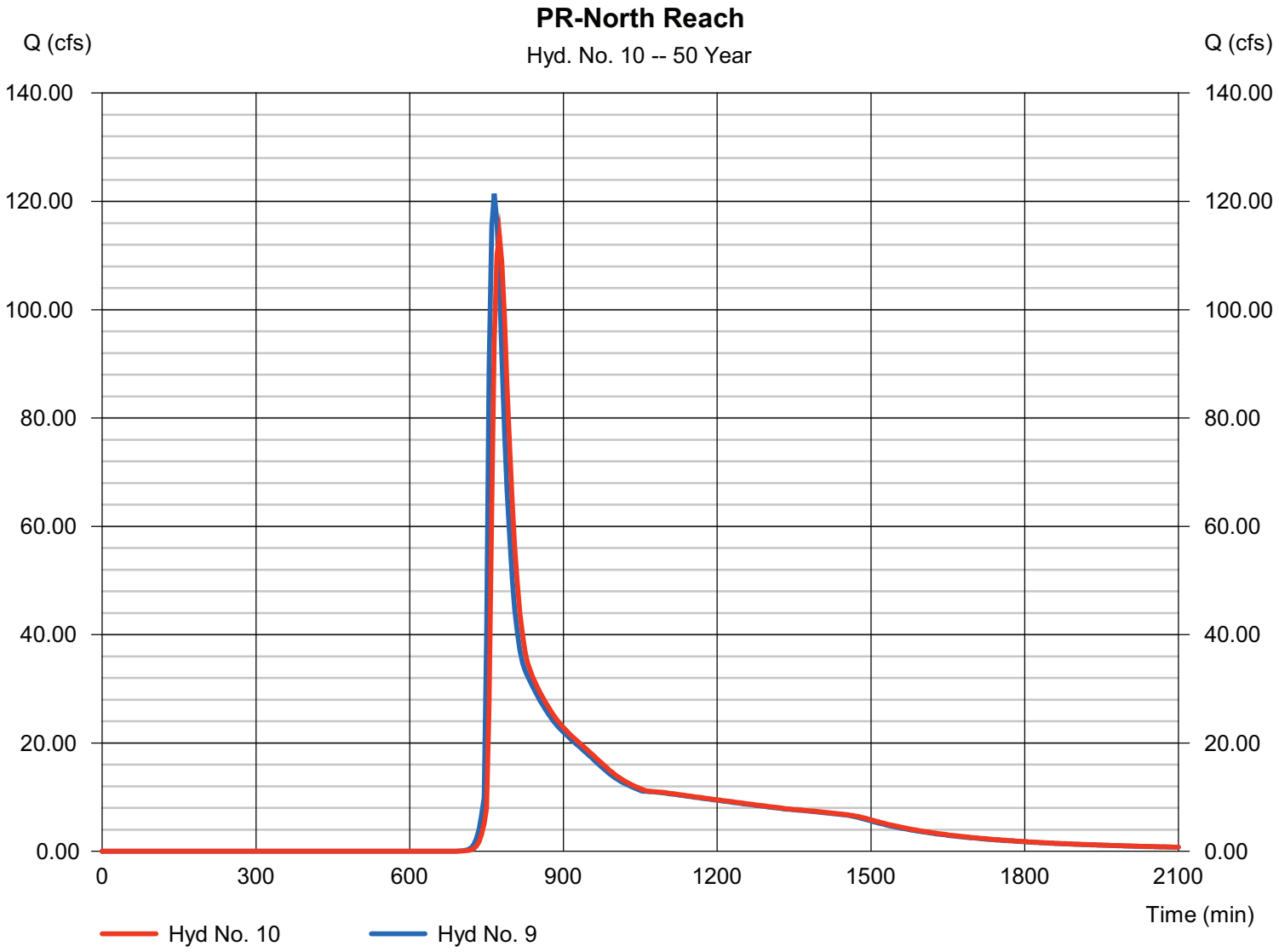
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 10

PR-North Reach

Hydrograph type	=	Reach	Peak discharge	=	113.76 cfs
Storm frequency	=	50 yrs	Time to peak	=	775 min
Time interval	=	5 min	Hyd. volume	=	937,678 cuft
Inflow hyd. No.	=	9 - North Pond	Section type	=	Trapezoidal
Reach length	=	2800.0 ft	Channel slope	=	4.8 %
Manning's n	=	0.050	Bottom width	=	5.0 ft
Side slope	=	3.0:1	Max. depth	=	3.0 ft
Rating curve x	=	2.232	Rating curve m	=	1.321
Ave. velocity	=	5.89 ft/s	Routing coeff.	=	0.5884

Modified Att-Kin routing method used.



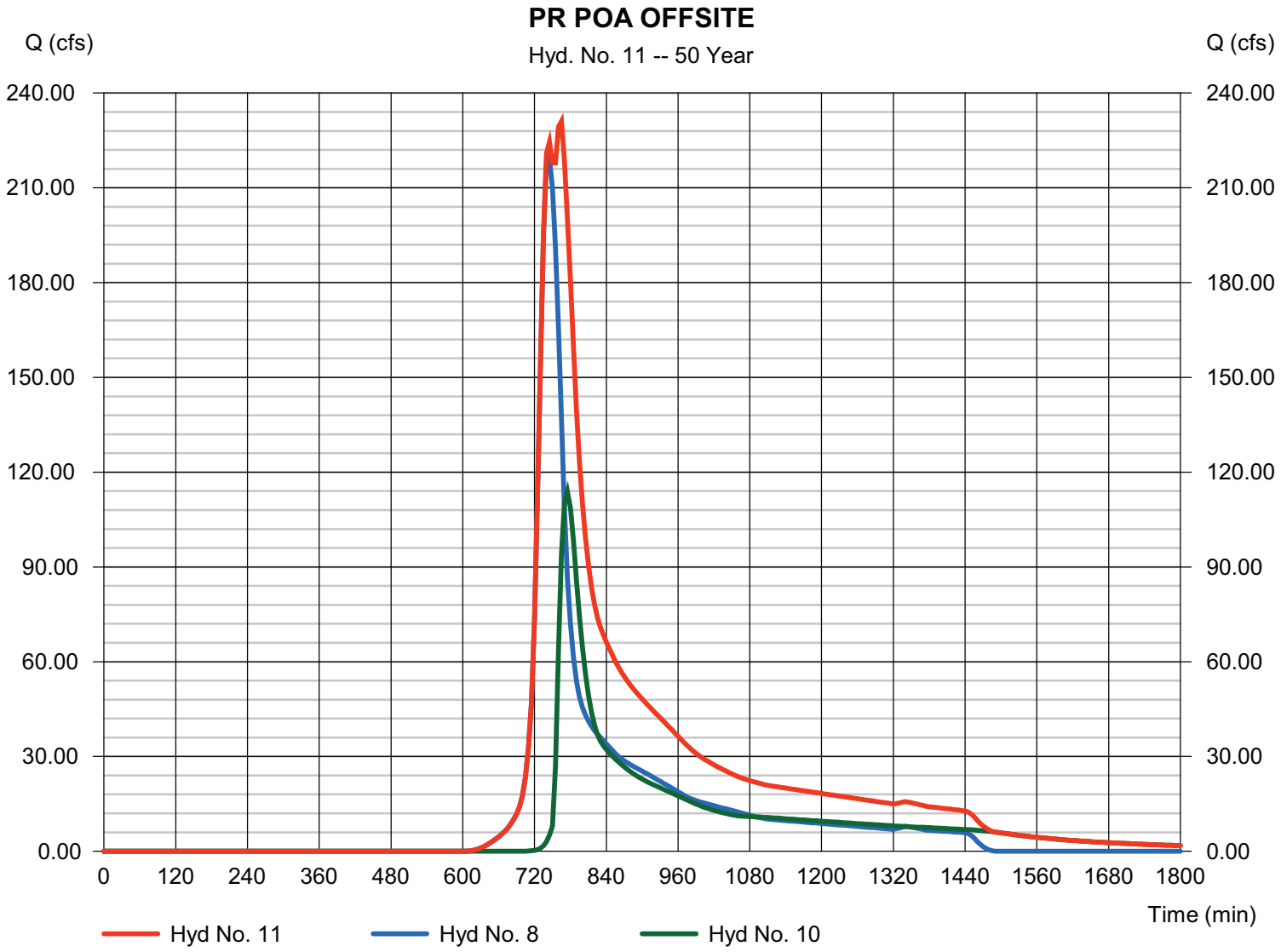
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 11

PR POA OFFSITE

Hydrograph type	=	Combine	Peak discharge	=	231.07 cfs
Storm frequency	=	50 yrs	Time to peak	=	765 min
Time interval	=	5 min	Hyd. volume	=	2,203,569 cuft
Inflow hyds.	=	8, 10	Contrib. drain. area	=	125.100 ac



Hydrograph Report

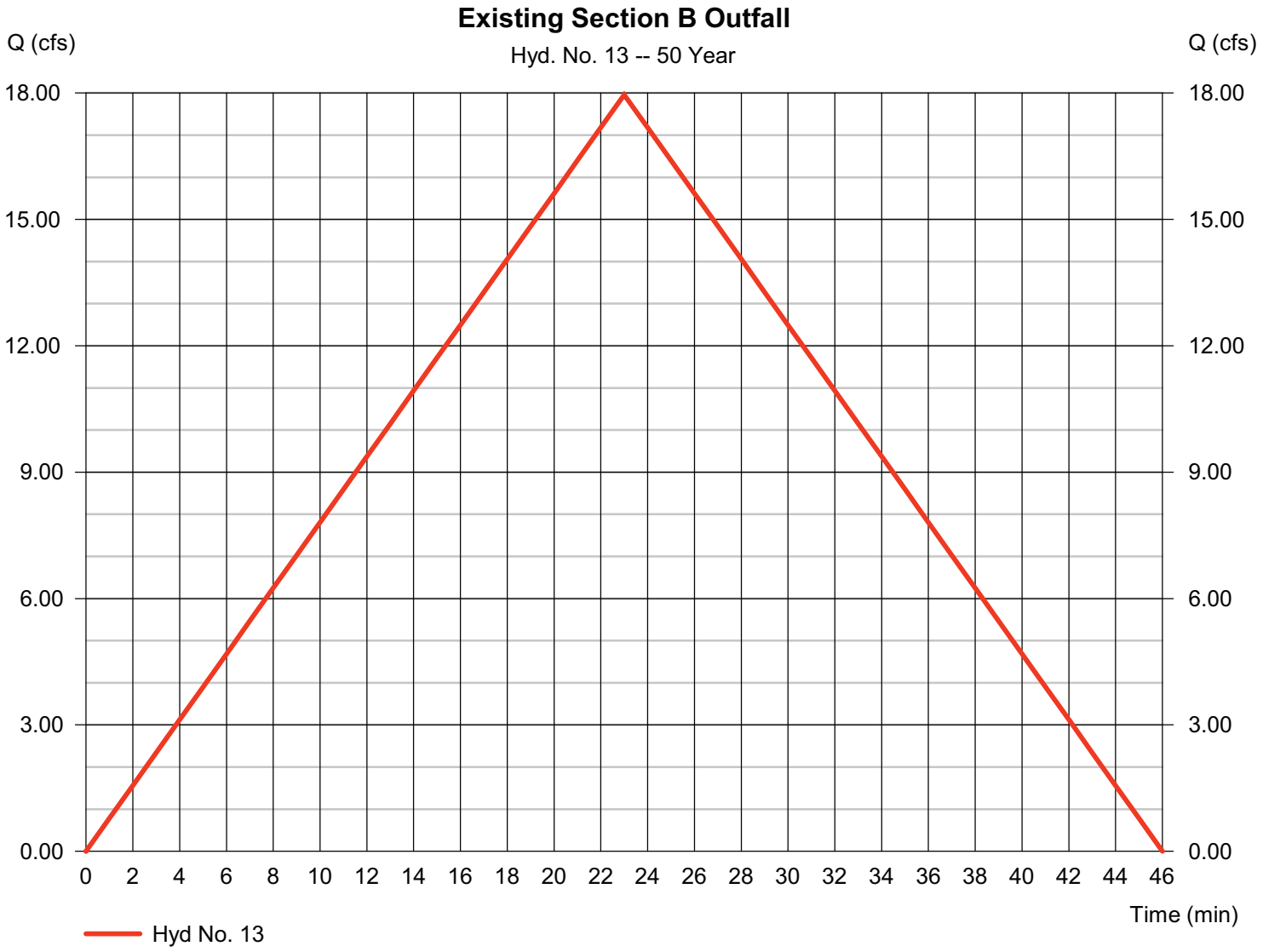
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 13

Existing Section B Outfall

Hydrograph type	=	Rational	Peak discharge	=	17.96 cfs
Storm frequency	=	50 yrs	Time to peak	=	23 min
Time interval	=	1 min	Hyd. volume	=	24,786 cuft
Drainage area	=	7.230 ac	Runoff coeff.	=	0.56*
Intensity	=	4.436 in/hr	Tc by User	=	23.00 min
IDF Curve	=	Middlesex.idf	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(3.150 x 0.90) + (4.080 x 0.30)] / 7.230



Hydrograph Report

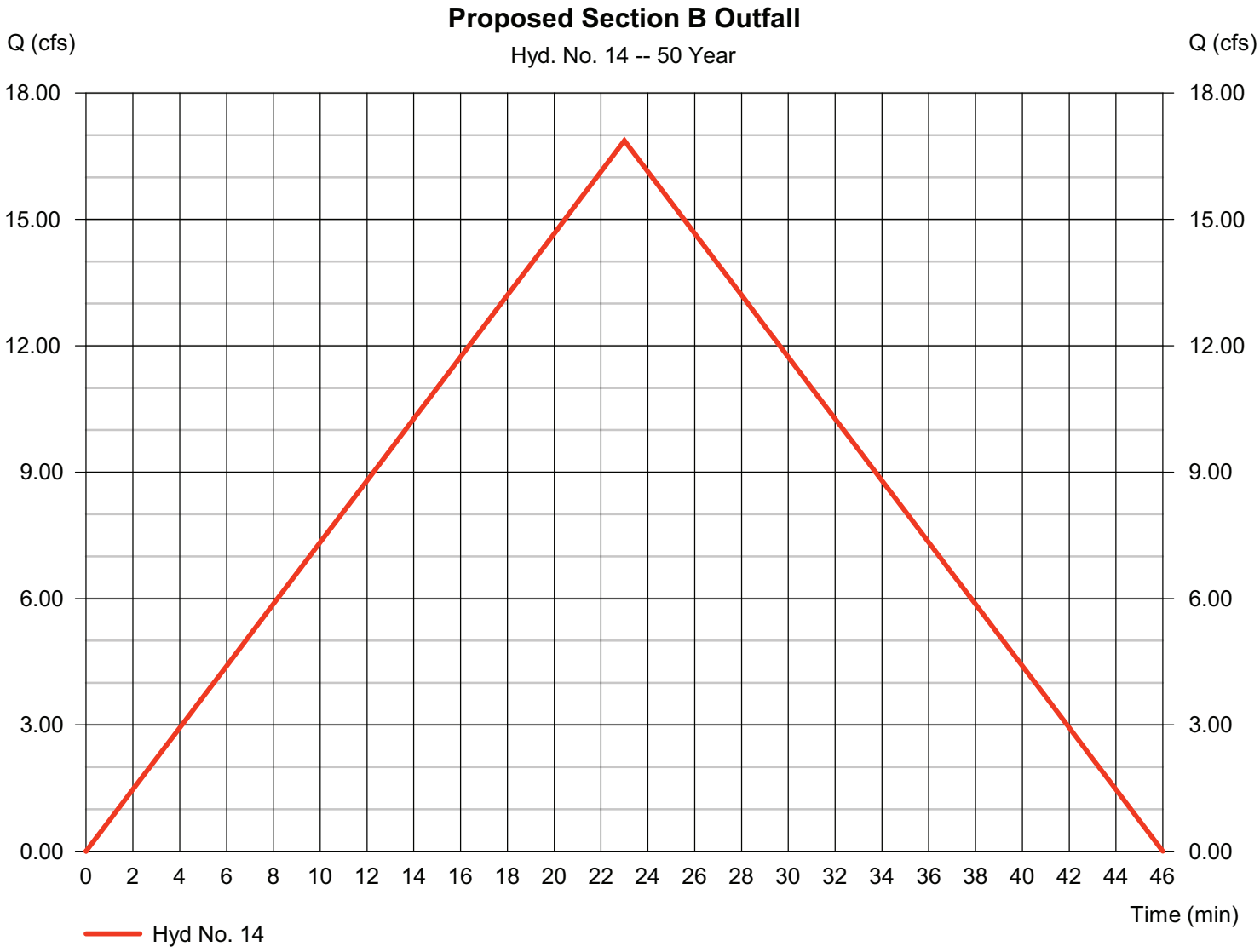
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 14

Proposed Section B Outfall

Hydrograph type	=	Rational	Peak discharge	=	16.87 cfs
Storm frequency	=	50 yrs	Time to peak	=	23 min
Time interval	=	1 min	Hyd. volume	=	23,278 cuft
Drainage area	=	6.790 ac	Runoff coeff.	=	0.56*
Intensity	=	4.436 in/hr	Tc by User	=	23.00 min
IDF Curve	=	Middlesex.idf	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(2.950 x 0.90) + (3.840 x 0.30)] / 6.790



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	188.26	5	750	1,189,153	------	------	------	EXWS-30
2	SCS Runoff	275.10	5	745	1,571,558	------	------	------	EXWS-40
3	Reservoir	172.24	5	760	1,189,078	1	325.37	271,178	North Pond
4	Reach	163.74	5	770	1,188,403	3	------	------	EX-North Reach
5	Combine	347.29	5	760	2,759,959	2, 4	------	------	EX POA OFFSITE
7	SCS Runoff	188.26	5	750	1,189,153	------	------	------	PRWS-30
8	SCS Runoff	275.10	5	745	1,571,558	------	------	------	PRWS-40
9	Reservoir	172.24	5	760	1,189,078	7	325.37	271,178	North Pond
10	Reach	163.74	5	770	1,188,403	9	------	------	PR-North Reach
11	Combine	347.29	5	760	2,759,959	8, 10	------	------	PR POA OFFSITE
13	Rational	19.85	1	23	27,391	------	------	------	Existing Section B Outfall
14	Rational	18.64	1	23	25,724	------	------	------	Proposed Section B Outfall

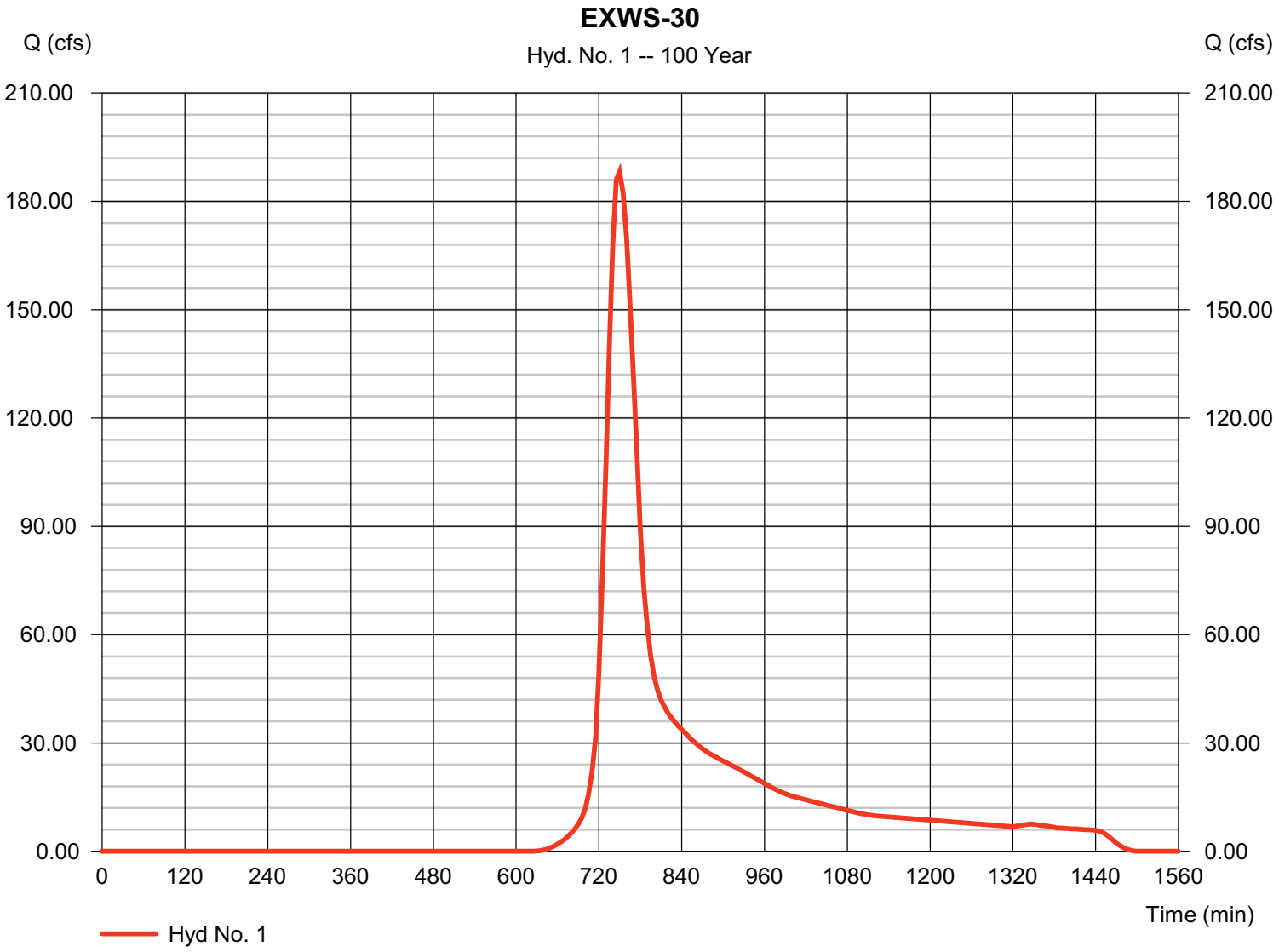
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 1

EXWS-30

Hydrograph type	=	SCS Runoff	Peak discharge	=	188.26 cfs
Storm frequency	=	100 yrs	Time to peak	=	750 min
Time interval	=	5 min	Hyd. volume	=	1,189,153 cuft
Drainage area	=	119.800 ac	Curve number	=	55
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	37.00 min
Total precip.	=	8.03 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



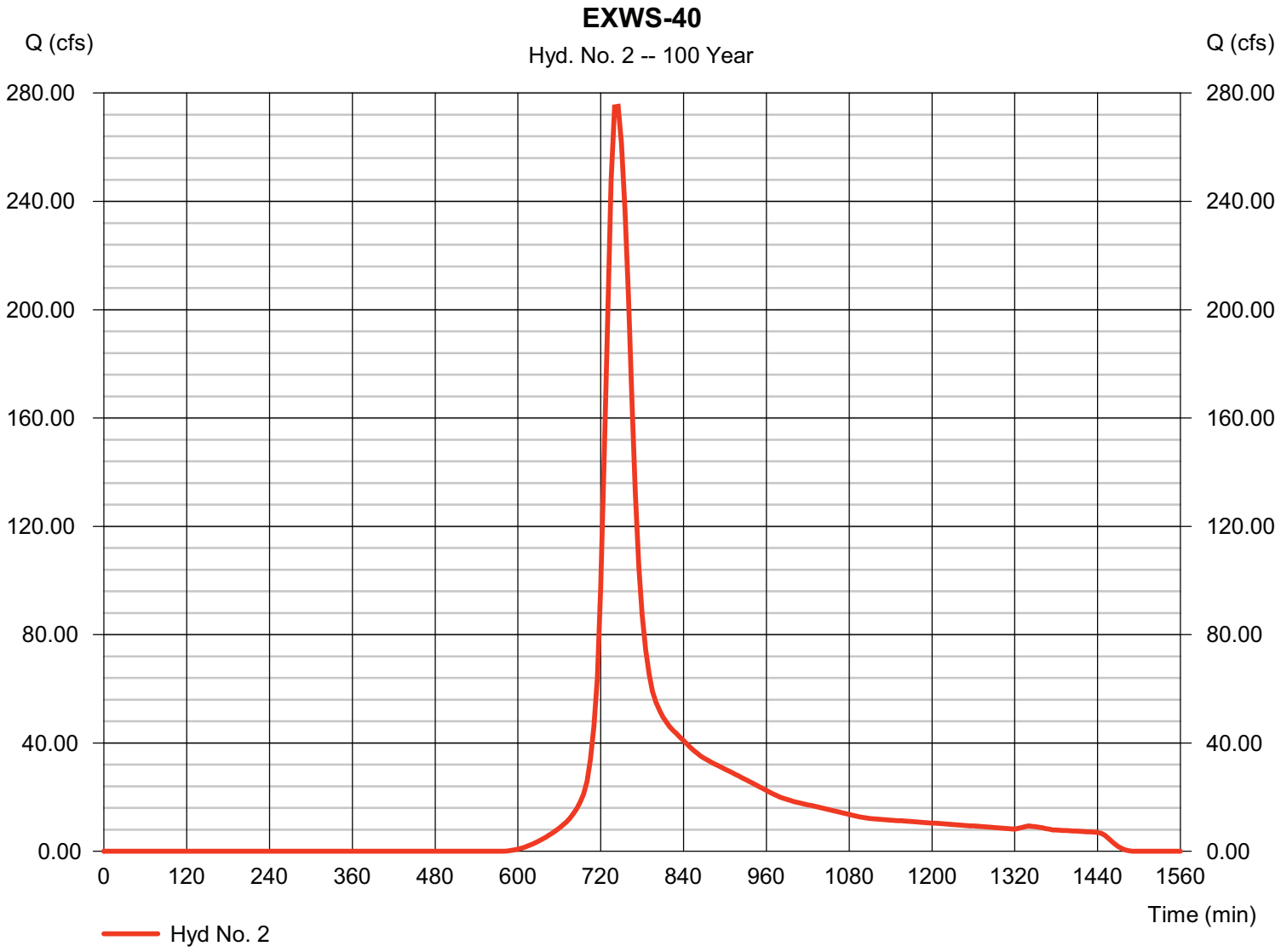
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 2

EXWS-40

Hydrograph type	= SCS Runoff	Peak discharge	= 275.10 cfs
Storm frequency	= 100 yrs	Time to peak	= 745 min
Time interval	= 5 min	Hyd. volume	= 1,571,558 cuft
Drainage area	= 125.100 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 32.00 min
Total precip.	= 8.03 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

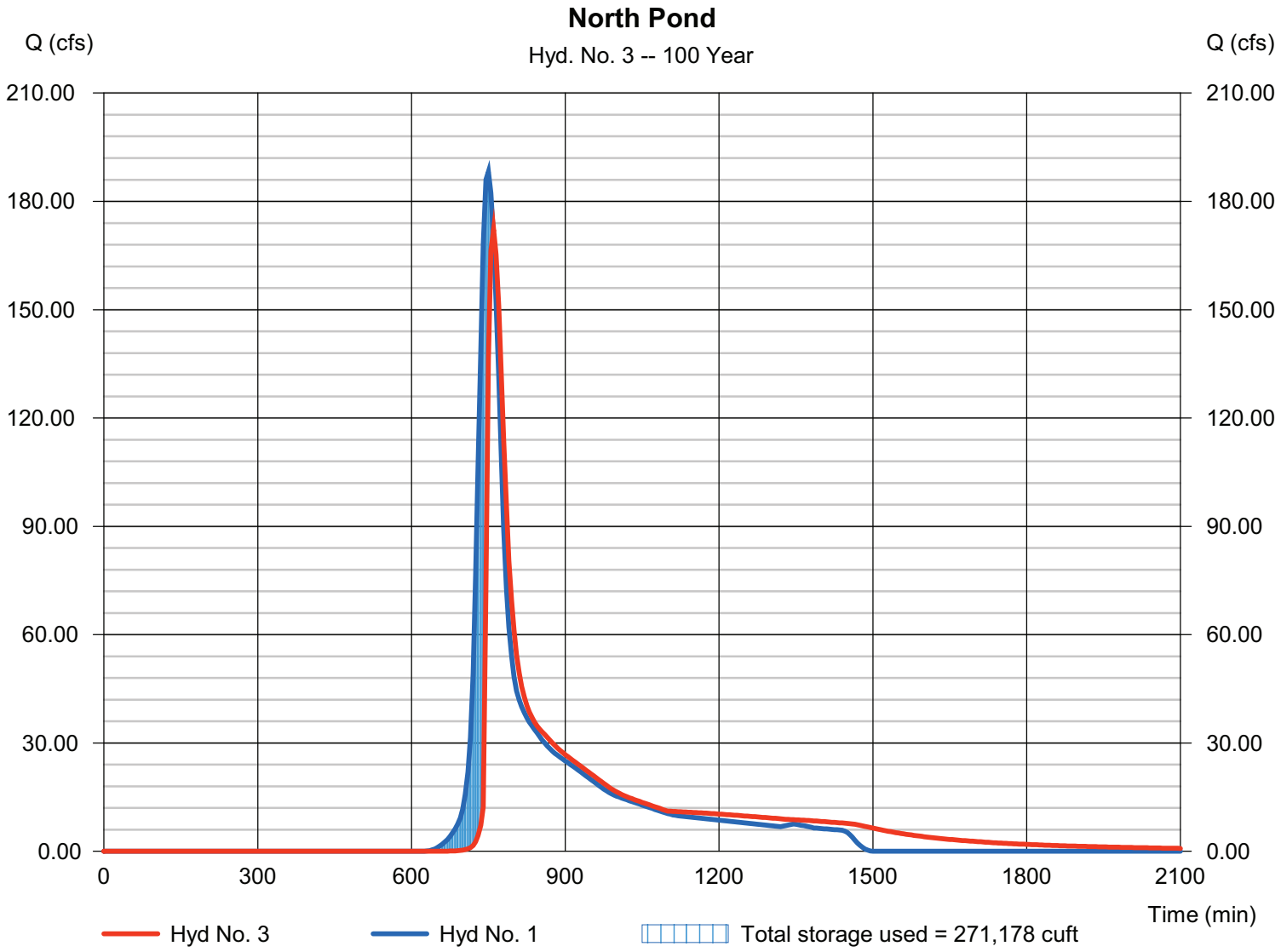
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 3

North Pond

Hydrograph type	=	Reservoir	Peak discharge	=	172.24 cfs
Storm frequency	=	100 yrs	Time to peak	=	760 min
Time interval	=	5 min	Hyd. volume	=	1,189,078 cuft
Inflow hyd. No.	=	1 - EXWS-30	Max. Elevation	=	325.37 ft
Reservoir name	=	North Pond	Max. Storage	=	271,178 cuft

Storage Indication method used. Wet pond routing start elevation = 324.15 ft.



Hydrograph Report

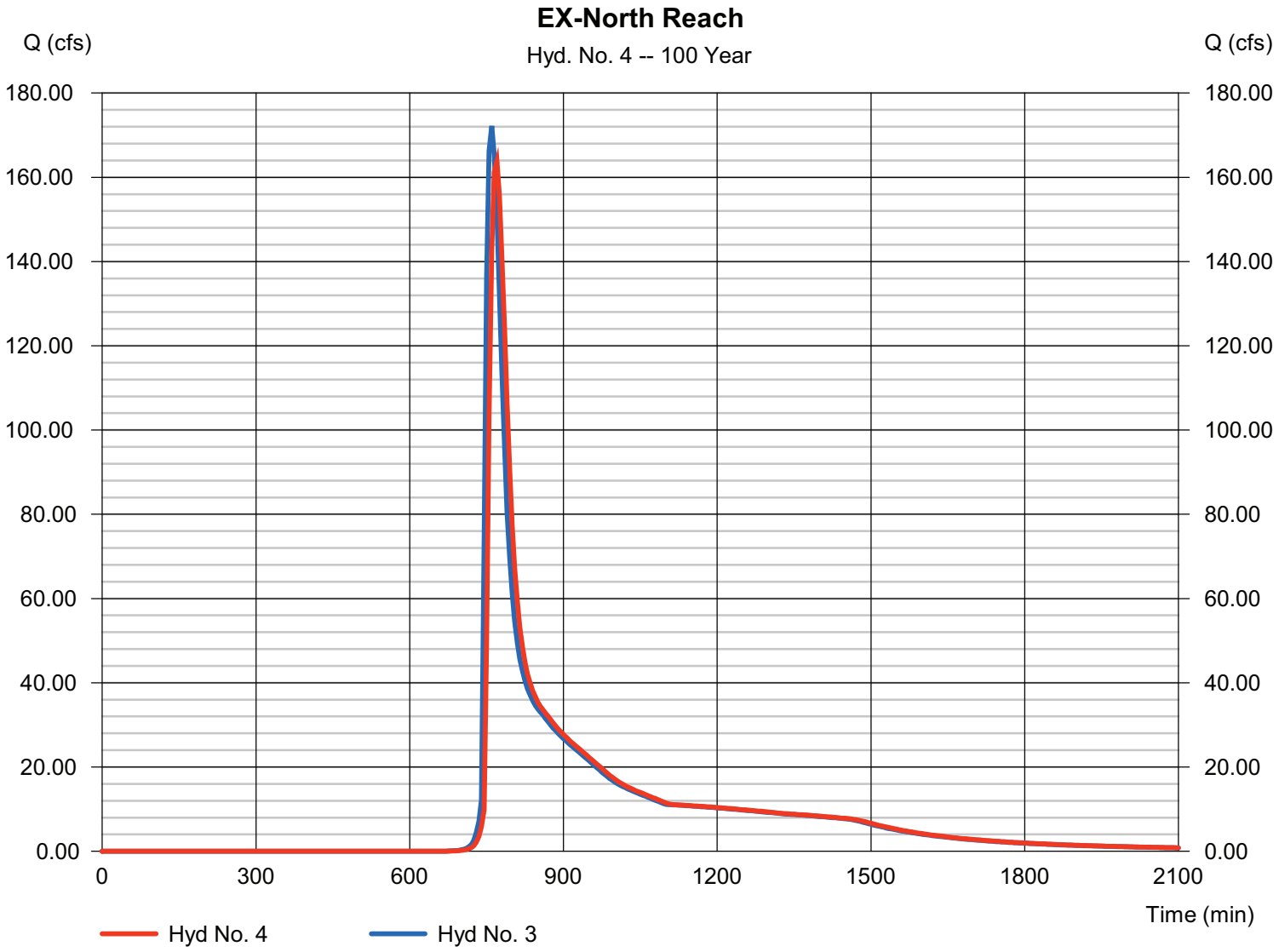
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 4

EX-North Reach

Hydrograph type	=	Reach	Peak discharge	=	163.74 cfs
Storm frequency	=	100 yrs	Time to peak	=	770 min
Time interval	=	5 min	Hyd. volume	=	1,188,403 cuft
Inflow hyd. No.	=	3 - North Pond	Section type	=	Trapezoidal
Reach length	=	2800.0 ft	Channel slope	=	4.8 %
Manning's n	=	0.050	Bottom width	=	5.0 ft
Side slope	=	3.0:1	Max. depth	=	3.0 ft
Rating curve x	=	2.232	Rating curve m	=	1.321
Ave. velocity	=	6.41 ft/s	Routing coeff.	=	0.6243

Modified Att-Kin routing method used.



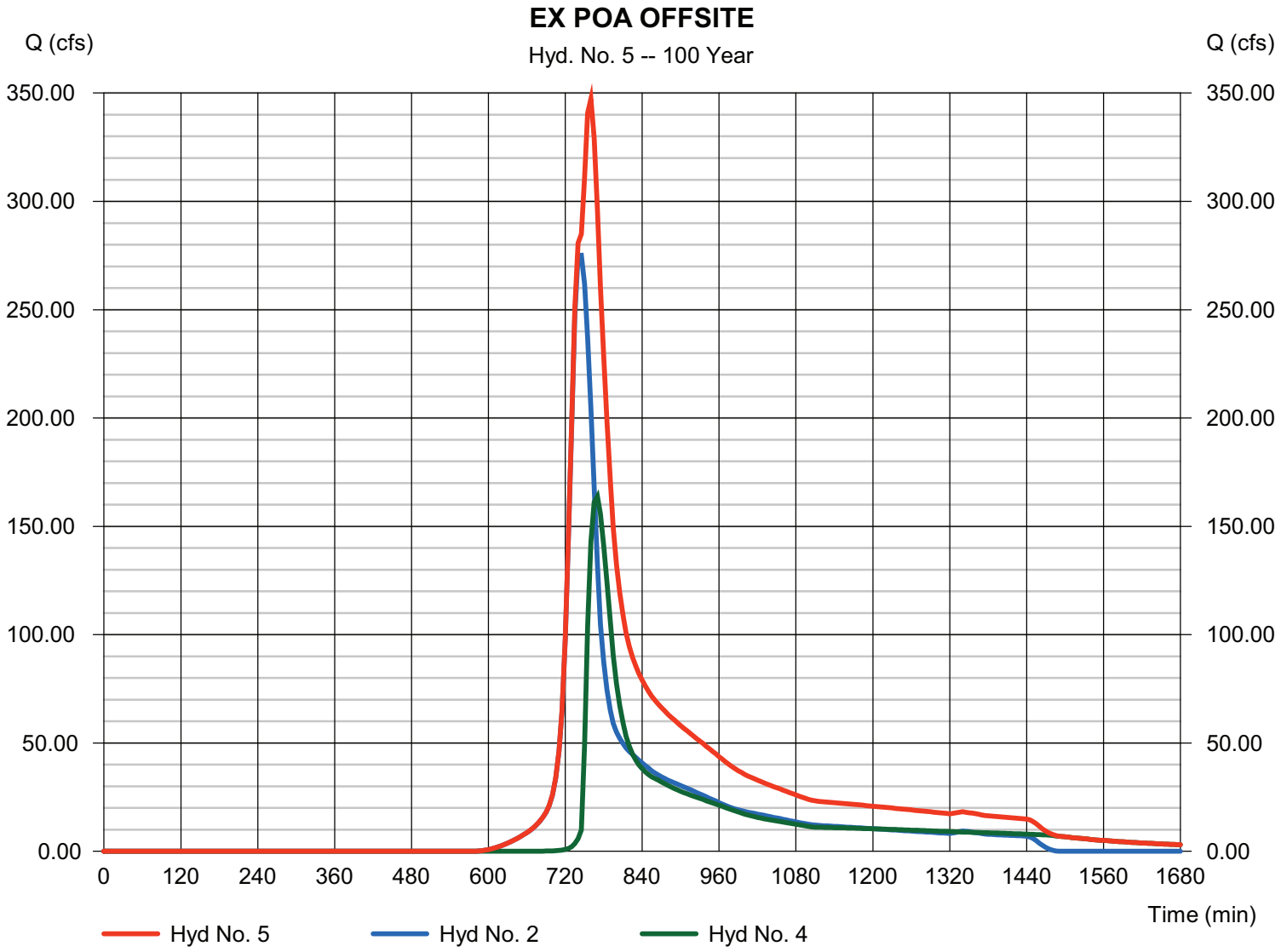
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 5

EX POA OFFSITE

Hydrograph type	= Combine	Peak discharge	= 347.29 cfs
Storm frequency	= 100 yrs	Time to peak	= 760 min
Time interval	= 5 min	Hyd. volume	= 2,759,959 cuft
Inflow hyds.	= 2, 4	Contrib. drain. area	= 125.100 ac



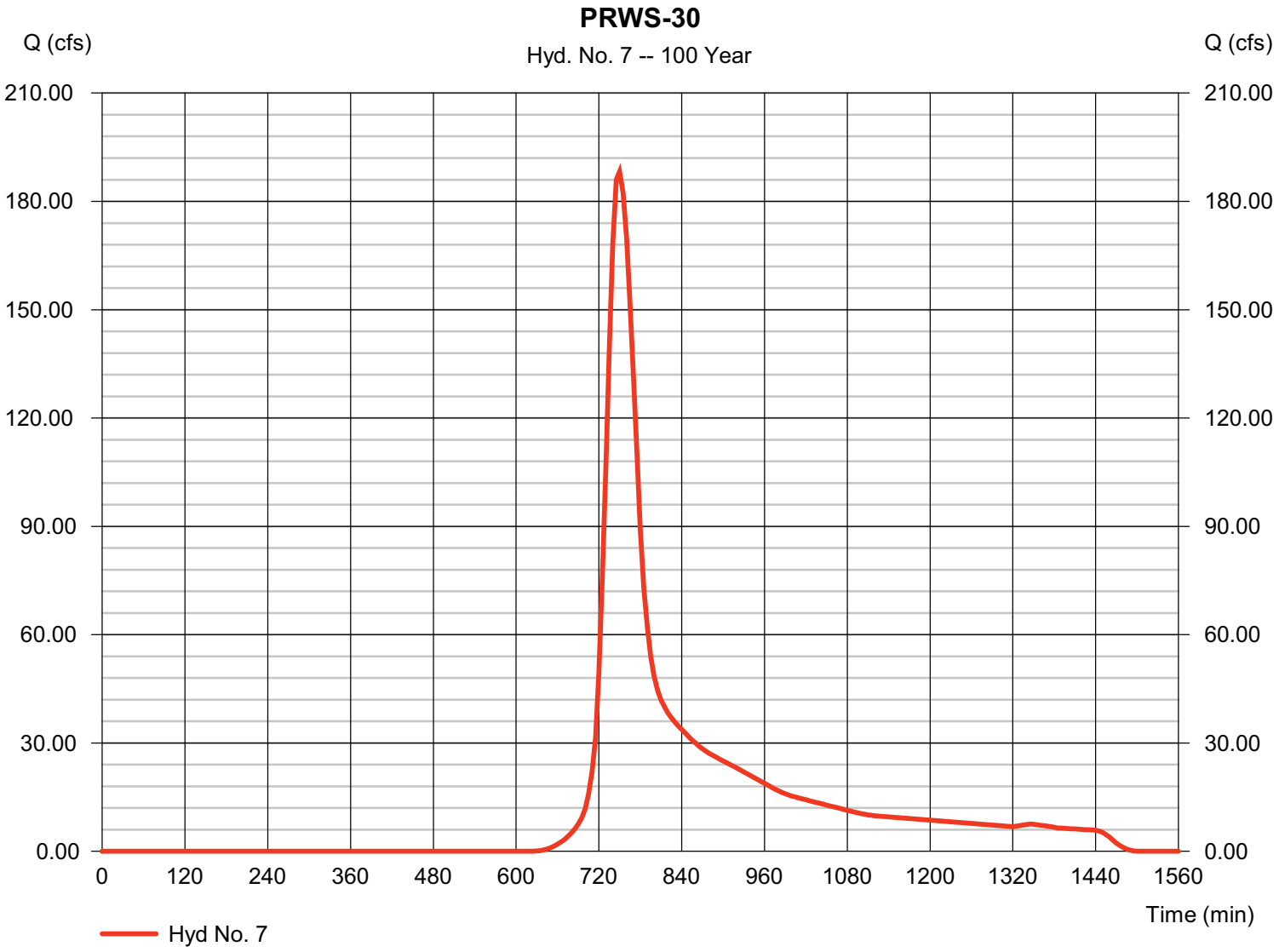
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 7

PRWS-30

Hydrograph type	=	SCS Runoff	Peak discharge	=	188.26 cfs
Storm frequency	=	100 yrs	Time to peak	=	750 min
Time interval	=	5 min	Hyd. volume	=	1,189,153 cuft
Drainage area	=	119.800 ac	Curve number	=	55
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	37.00 min
Total precip.	=	8.03 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



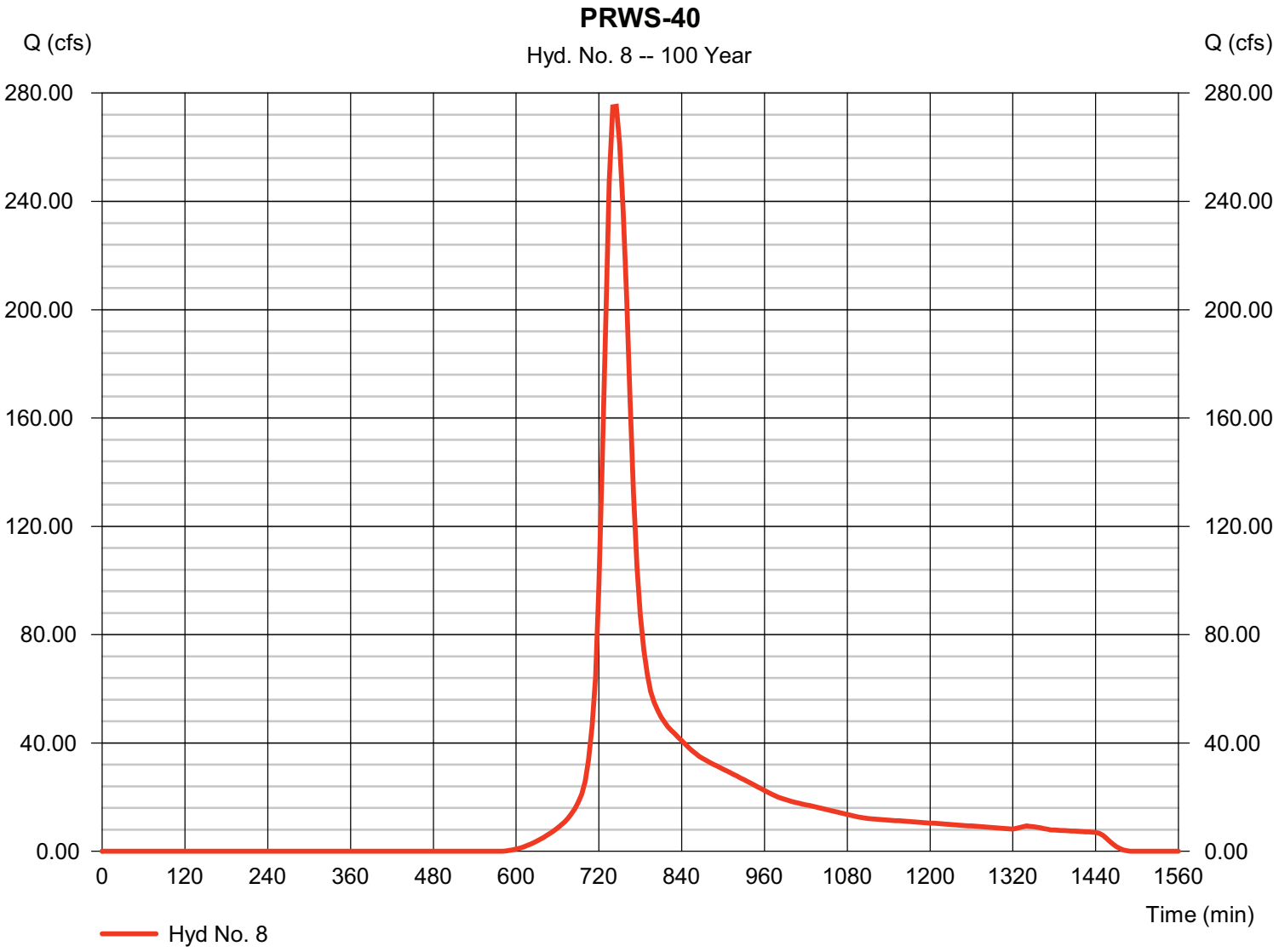
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 8

PRWS-40

Hydrograph type	=	SCS Runoff	Peak discharge	=	275.10 cfs
Storm frequency	=	100 yrs	Time to peak	=	745 min
Time interval	=	5 min	Hyd. volume	=	1,571,558 cuft
Drainage area	=	125.100 ac	Curve number	=	60
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	32.00 min
Total precip.	=	8.03 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

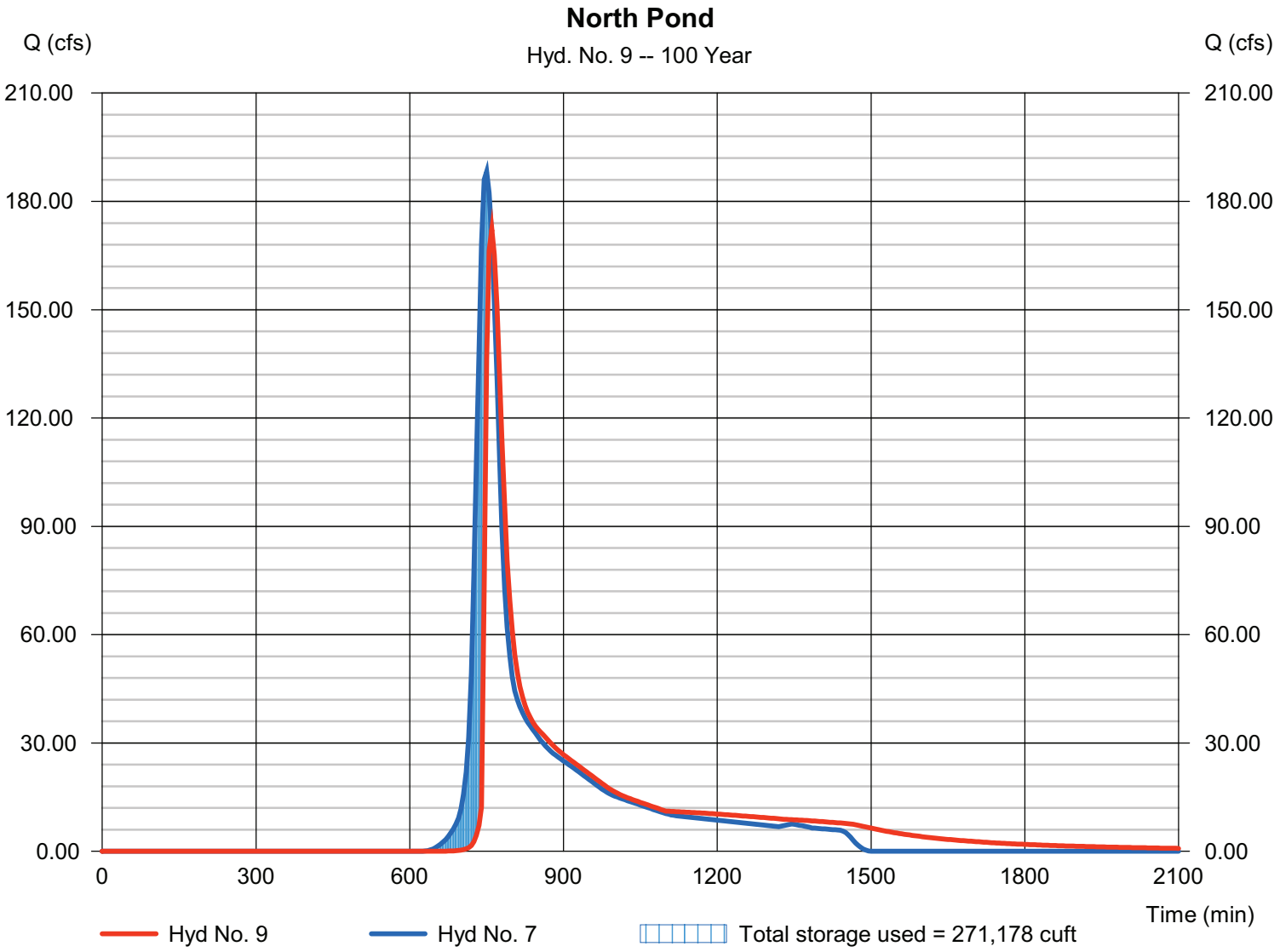
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 9

North Pond

Hydrograph type	=	Reservoir	Peak discharge	=	172.24 cfs
Storm frequency	=	100 yrs	Time to peak	=	760 min
Time interval	=	5 min	Hyd. volume	=	1,189,078 cuft
Inflow hyd. No.	=	7 - PRWS-30	Max. Elevation	=	325.37 ft
Reservoir name	=	North Pond	Max. Storage	=	271,178 cuft

Storage Indication method used. Wet pond routing start elevation = 324.15 ft.



Hydrograph Report

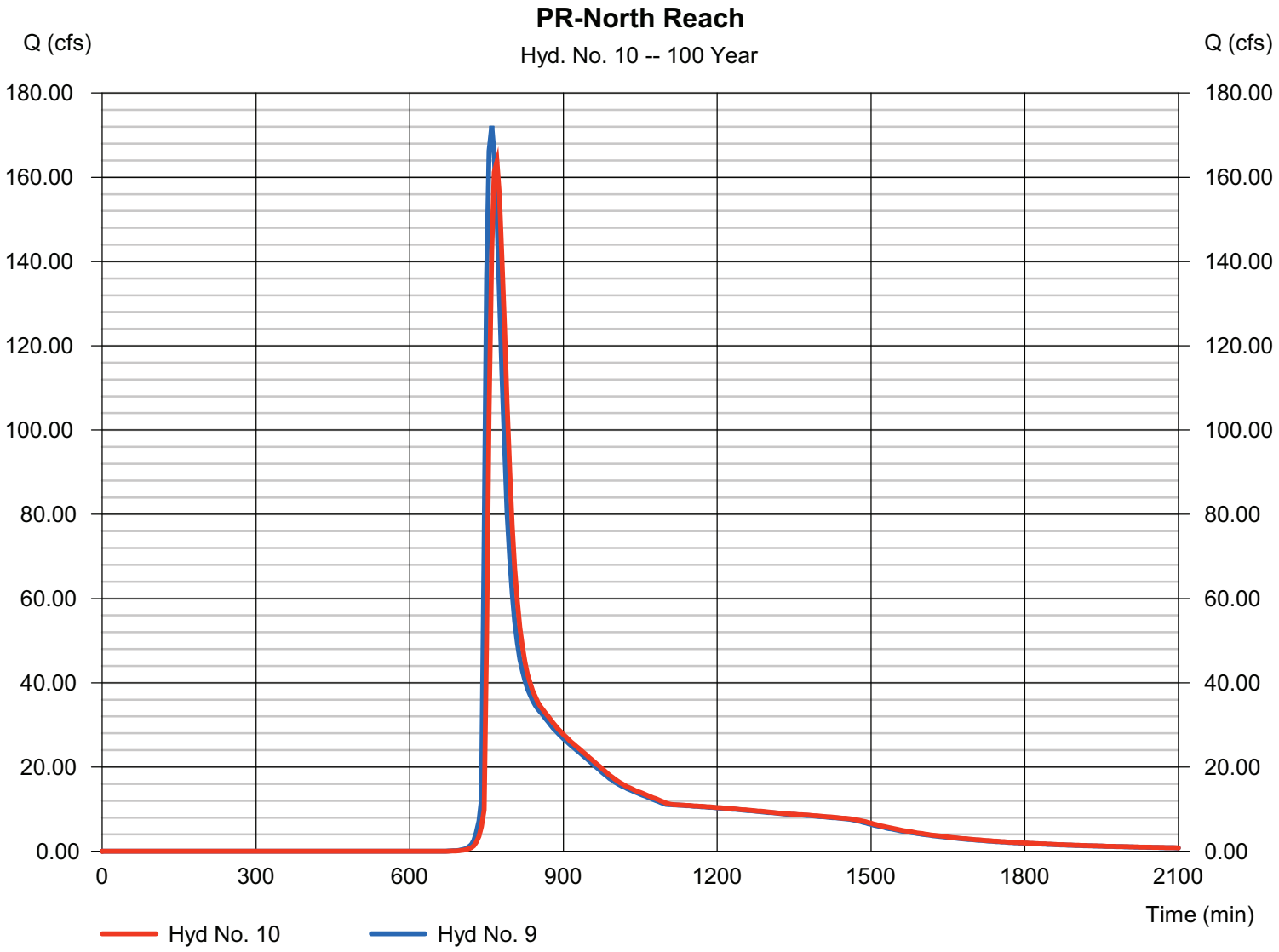
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 10

PR-North Reach

Hydrograph type	= Reach	Peak discharge	= 163.74 cfs
Storm frequency	= 100 yrs	Time to peak	= 770 min
Time interval	= 5 min	Hyd. volume	= 1,188,403 cuft
Inflow hyd. No.	= 9 - North Pond	Section type	= Trapezoidal
Reach length	= 2800.0 ft	Channel slope	= 4.8 %
Manning's n	= 0.050	Bottom width	= 5.0 ft
Side slope	= 3.0:1	Max. depth	= 3.0 ft
Rating curve x	= 2.232	Rating curve m	= 1.321
Ave. velocity	= 6.41 ft/s	Routing coeff.	= 0.6243

Modified Att-Kin routing method used.



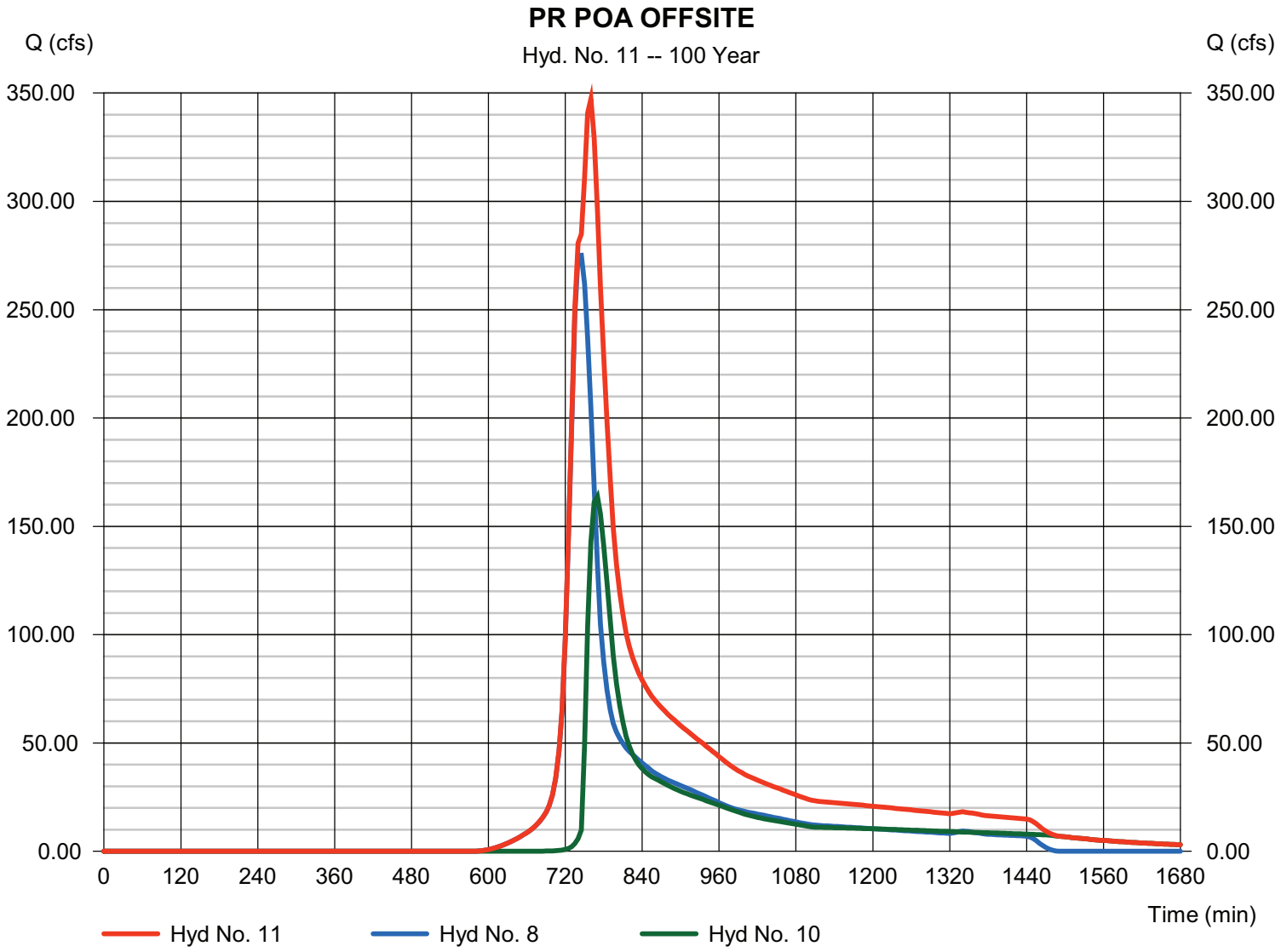
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 11

PR POA OFFSITE

Hydrograph type	=	Combine	Peak discharge	=	347.29 cfs
Storm frequency	=	100 yrs	Time to peak	=	760 min
Time interval	=	5 min	Hyd. volume	=	2,759,959 cuft
Inflow hyds.	=	8, 10	Contrib. drain. area	=	125.100 ac



Hydrograph Report

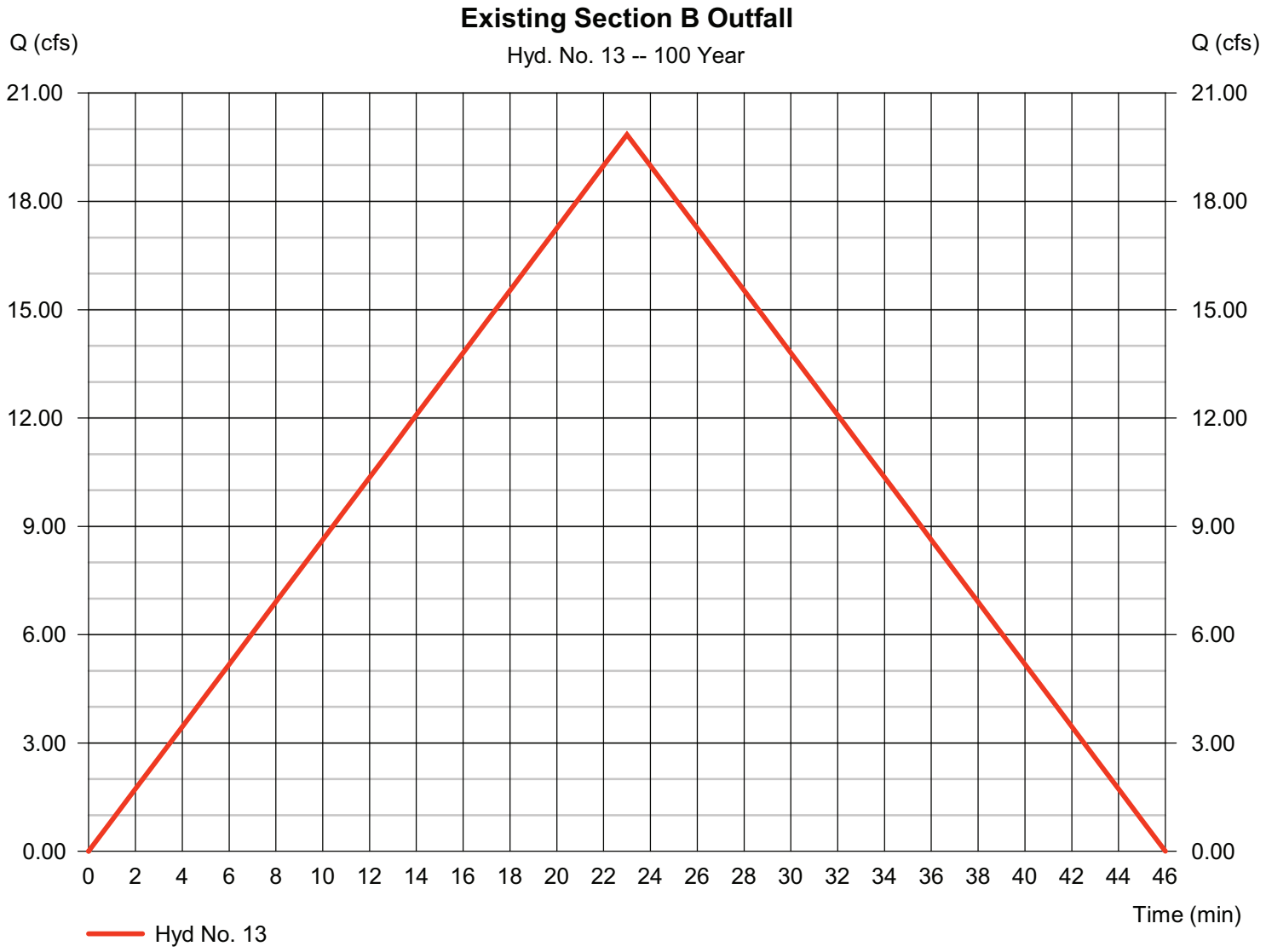
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 13

Existing Section B Outfall

Hydrograph type	= Rational	Peak discharge	= 19.85 cfs
Storm frequency	= 100 yrs	Time to peak	= 23 min
Time interval	= 1 min	Hyd. volume	= 27,391 cuft
Drainage area	= 7.230 ac	Runoff coeff.	= 0.56*
Intensity	= 4.902 in/hr	Tc by User	= 23.00 min
IDF Curve	= Middlesex.idf	Asc/Rec limb fact	= 1/1

* Composite (Area/C) = [(3.150 x 0.90) + (4.080 x 0.30)] / 7.230



Hydrograph Report

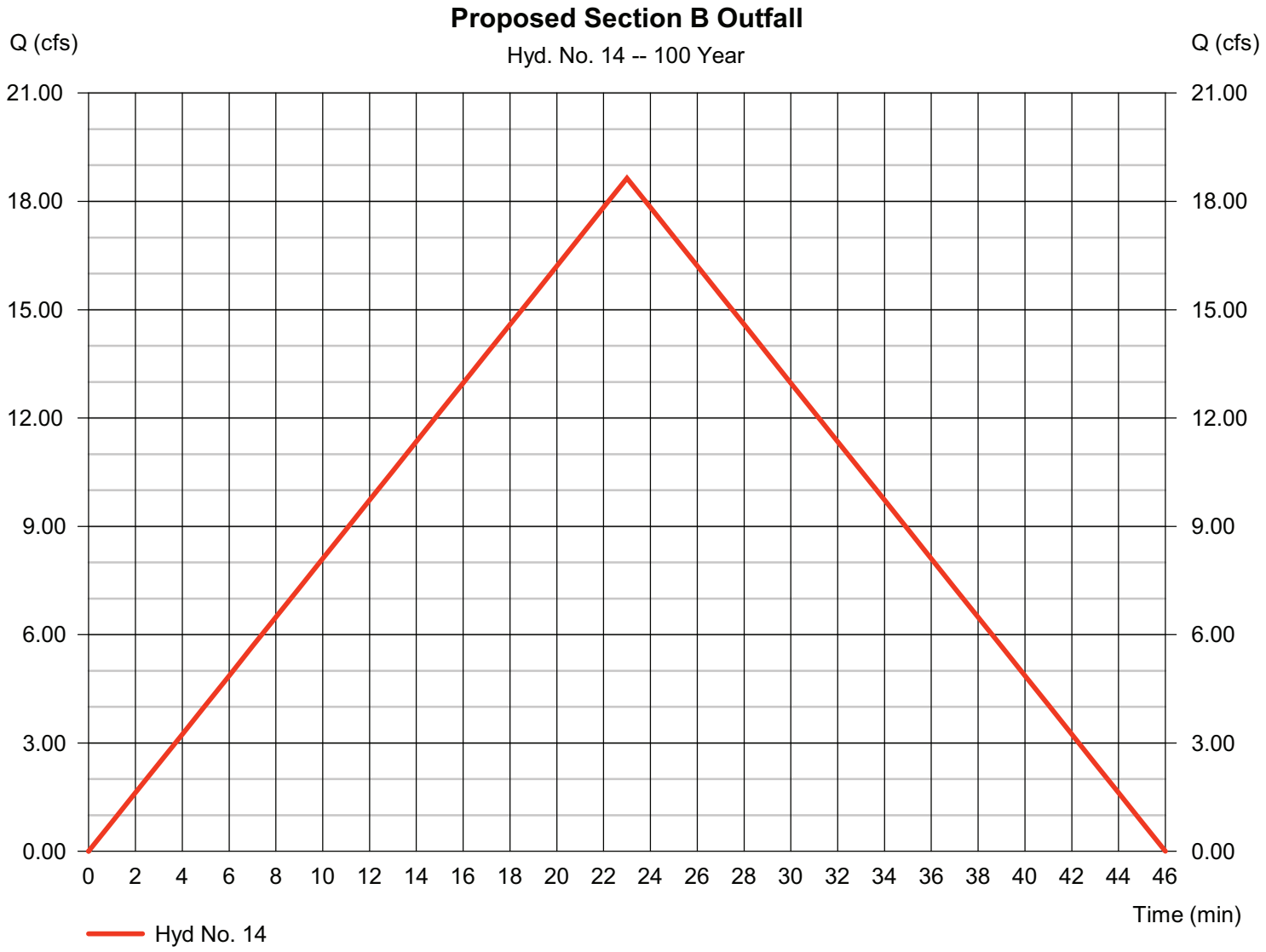
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 22 / 2021

Hyd. No. 14

Proposed Section B Outfall

Hydrograph type	=	Rational	Peak discharge	=	18.64 cfs
Storm frequency	=	100 yrs	Time to peak	=	23 min
Time interval	=	1 min	Hyd. volume	=	25,724 cuft
Drainage area	=	6.790 ac	Runoff coeff.	=	0.56*
Intensity	=	4.902 in/hr	Tc by User	=	23.00 min
IDF Curve	=	Middlesex.idf	Asc/Rec limb fact	=	1/1

* Composite (Area/C) = [(2.950 x 0.90) + (3.840 x 0.30)] / 6.790



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	22.4465	3.7000	0.7111	--------
3	0.0000	0.0000	0.0000	--------
5	75.4607	12.3000	0.9153	--------
10	41.9134	5.0000	0.7581	--------
25	38.1345	3.2000	0.6935	--------
50	39.3485	2.6000	0.6731	--------
100	38.4123	1.8000	0.6412	--------

File name: Middlesex.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	4.82	3.49	2.80	2.36	2.06	1.84	1.67	1.53	1.42	1.32	1.24	1.17
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	5.55	4.40	3.66	3.14	2.75	2.45	2.21	2.02	1.86	1.72	1.60	1.50
10	7.32	5.38	4.33	3.65	3.18	2.83	2.56	2.34	2.16	2.01	1.88	1.77
25	8.86	6.37	5.10	4.31	3.76	3.36	3.05	2.80	2.59	2.42	2.28	2.15
50	10.05	7.15	5.71	4.82	4.22	3.77	3.42	3.15	2.92	2.73	2.57	2.43
100	11.24	7.89	6.29	5.32	4.66	4.18	3.81	3.51	3.26	3.06	2.88	2.73

Tc = time in minutes. Values may exceed 60.

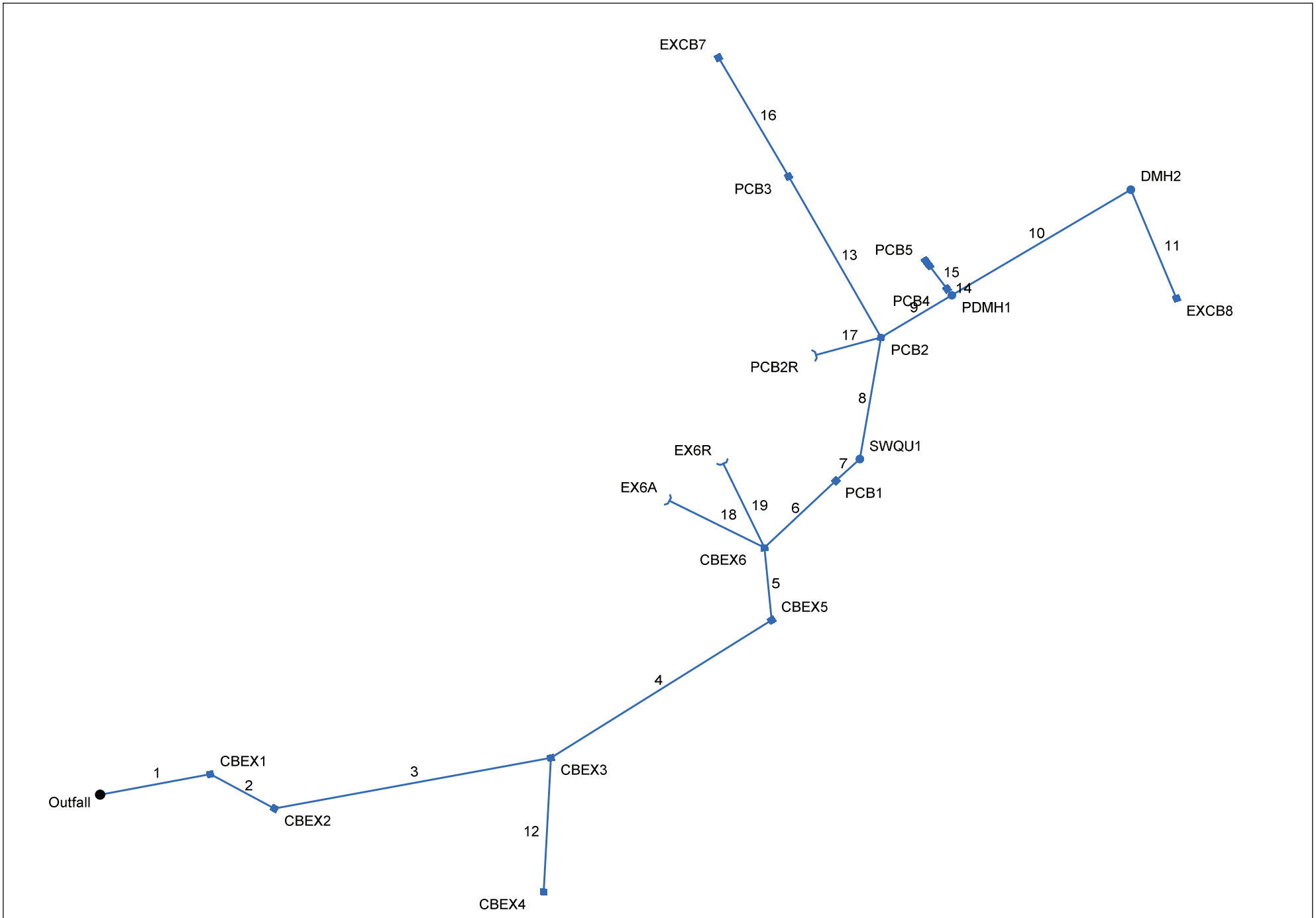
Precip. file name: Middlesex.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.42	0.00	4.40	5.21	6.32	7.14	8.03
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

APPENDIX D

HYDRAFLOW MODEL RESULTS

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: Proposed Pinehurst Section B.stm	Number of lines: 19	Date: 6/22/2021 D-1

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	67.000	-11.183	Grate	0.00	0.52	0.54	15.0	309.70	18.78	322.28	18	Cir	0.013	1.05	331.18	CBEX1 TO OUTFALL
2	1	44.000	40.767	Grate	0.00	1.59	0.50	20.0	323.18	1.34	323.77	15	Cir	0.013	1.05	331.97	CBEX2 TO CBEX1
3	2	168.000	-40.592	Comb	0.00	0.37	0.62	10.0	328.37	2.08	331.87	15	Cir	0.013	1.50	336.07	CBEX3 TO CBEX2
4	3	158.000	-22.513	Comb	0.00	0.06	0.67	5.0	332.17	5.05	340.15	15	Cir	0.013	1.35	340.15	CBEX5 TO CBEX3
5	4	46.000	-61.894	Grate	0.00	0.35	0.66	10.0	336.05	1.41	336.70	15	Cir	0.013	1.30	339.70	CBEX6 TO CBEX5
6	5	60.000	50.593	Comb	0.00	0.40	0.57	10.0	337.00	2.50	338.50	15	Cir	0.013	0.50	343.70	PCB1 TO CBEX6
7	6	20.000	0.865	MH	0.00	0.00	0.00	0.0	338.50	3.35	339.17	15	Cir	0.012	0.65	344.50	SWQU1 TO PCB1
8	7	78.000	-36.733	Comb	0.00	0.16	0.64	5.0	339.17	5.81	343.70	15	Cir	0.013	1.50	347.50	PCB2 TO SWQU1
9	8	50.000	48.378	MH	0.00	0.00	0.00	0.0	343.80	1.20	344.40	15	Cir	0.013	1.00	349.50	PDMH1 TO PCB2
10	9	126.000	0.243	MH	0.00	0.00	0.00	0.0	344.40	1.32	346.06	15	Cir	0.013	1.00	352.50	DMH2 TO PDMH1
11	10	74.000	100.465	Grate	0.00	0.05	0.30	10.0	346.06	1.68	347.30	15	Cir	0.013	1.00	350.40	EXCB8 TO DMH2
12	3	85.000	103.858	Grate	0.00	0.78	0.62	15.0	332.07	0.86	332.80	15	Cir	0.013	1.00	336.80	CBEX4 TO CBEX3
13	8	116.000	-37.719	Comb	0.00	0.45	0.34	20.0	343.70	0.95	344.80	15	Cir	0.013	0.50	349.60	PCB3 TO PCB2
14	9	5.000	-93.379	Comb	0.00	0.40	0.54	10.0	344.40	2.00	344.50	15	Cir	0.011	0.50	349.00	PCB4 TO PDMH1
15	14	20.000	0.233	Comb	0.00	0.45	0.65	10.0	344.50	2.50	345.00	15	Cir	0.012	1.00	348.70	PCB5 TO PCB4
16	13	86.000	-0.630	Grate	0.00	0.58	0.30	20.0	344.80	0.81	345.50	15	Cir	0.013	1.00	350.00	EXCB7 TO PCB3
17	8	40.371	-115.203	Hdwl	0.00	0.15	0.90	5.0	343.70	2.01	344.51	6	Cir	0.011	1.00	348.00	PCB2R TO PCB2
18	5	63.974	-56.897	Hdwl	0.00	0.34	0.70	5.0	336.70	2.00	337.98	6	Cir	0.011	1.00	340.00	EX6A TO CBEX6
19	5	58.616	-19.285	Hdwl	0.00	0.15	0.90	5.0	336.70	2.00	337.87	6	Cir	0.011	1.00	340.00	EX6R TO CBEX6

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	CBEX1 TO OUTFALL	12.51	18	Cir	67.000	309.70	322.28	18.776	311.12	323.61	n/a	323.61 j	End	Grate
2	CBEX2 TO CBEX1	11.60	15	Cir	44.000	323.18	323.77	1.341	324.43*	325.85*	1.46	327.31	1	Grate
3	CBEX3 TO CBEX2	9.02	15	Cir	168.000	328.37	331.87	2.083	329.36	333.03	n/a	333.03	2	Combination
4	CBEX5 TO CBEX3	6.69	15	Cir	158.000	332.17	340.15	5.051	333.03	341.19	0.79	341.19	3	Combination
5	CBEX6 TO CBEX5	6.58	15	Cir	46.000	336.05	336.70	1.413	341.19*	341.67*	0.58	342.25	4	Grate
6	PCB1 TO CBEX6	4.54	15	Cir	60.000	337.00	338.50	2.500	342.25*	342.54*	0.11	342.65	5	Combination
7	SWQU1 TO PCB1	3.77	15	Cir	20.000	338.50	339.17	3.350	342.65*	342.71*	0.10	342.80	6	Manhole
8	PCB2 TO SWQU1	3.80	15	Cir	78.000	339.17	343.70	5.808	342.80	344.49	n/a	344.49 j	7	Combination
9	PDMH1 TO PCB2	2.42	15	Cir	50.000	343.80	344.40	1.200	344.49	345.02	n/a	345.02 j	8	Manhole
10	DMH2 TO PDMH1	0.08	15	Cir	126.000	344.40	346.06	1.317	345.02	346.17	n/a	346.17 j	9	Manhole
11	EXCB8 TO DMH2	0.08	15	Cir	74.000	346.06	347.30	1.676	346.17	347.41	n/a	347.41	10	Grate
12	CBEX4 TO CBEX3	2.09	15	Cir	85.000	332.07	332.80	0.859	333.03	333.38	n/a	333.38 j	3	Grate
13	PCB3 TO PCB2	1.17	15	Cir	116.000	343.70	344.80	0.948	344.49	345.23	n/a	345.23 j	8	Combination
14	PCB4 TO PDMH1	2.72	15	Cir	5.000	344.40	344.50	2.000	345.02	345.16	0.13	345.16	9	Combination
15	PCB5 TO PCB4	1.57	15	Cir	20.000	344.50	345.00	2.500	345.16	345.50	n/a	345.50 j	14	Combination
16	EXCB7 TO PCB3	0.64	15	Cir	86.000	344.80	345.50	0.814	345.23	345.81	n/a	345.81 j	13	Grate
17	PCB2R TO PCB2	0.99	6	Cir	40.371	343.70	344.51	2.006	344.49*	345.38*	0.39	345.78	8	OpenHeadwall
18	EX6A TO CBEX6	1.74	6	Cir	63.974	336.70	337.98	2.001	342.25*	346.66*	1.22	347.89	5	OpenHeadwall
19	EX6R TO CBEX6	0.99	6	Cir	58.616	336.70	337.87	1.996	342.25*	343.55*	0.39	343.94	5	OpenHeadwall

Project File: Proposed Pinehurst Section B.stm | Number of lines: 19 | Run Date: 6/22/2021

NOTES: Return period = 10 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	67.000	0.52	6.80	0.54	0.28	3.75	15.0	23.2	3.3	12.51	45.50	7.39	18	18.78	309.70	322.28	311.12	323.61	312.00	331.18	CBEX1 TO OUTF
2	1	44.000	1.59	6.28	0.50	0.80	3.47	20.0	23.1	3.3	11.60	7.48	9.45	15	1.34	323.18	323.77	324.43	325.85	331.18	331.97	CBEX2 TO CBEX
3	2	168.000	0.37	4.69	0.62	0.23	2.67	10.0	22.7	3.4	9.02	9.32	8.13	15	2.08	328.37	331.87	329.36	333.03	331.97	336.07	CBEX3 TO CBEX
4	3	158.000	0.06	3.54	0.67	0.04	1.96	5.0	22.3	3.4	6.69	14.51	6.80	15	5.05	332.17	340.15	333.03	341.19	336.07	340.15	CBEX5 TO CBEX
5	4	46.000	0.35	3.48	0.66	0.23	1.92	10.0	22.2	3.4	6.58	7.68	5.36	15	1.41	336.05	336.70	341.19	341.67	340.15	339.70	CBEX6 TO CBEX
6	5	60.000	0.40	2.64	0.57	0.23	1.32	10.0	21.9	3.5	4.54	10.21	3.70	15	2.50	337.00	338.50	342.25	342.54	339.70	343.70	PCB1 TO CBEX6
7	6	20.000	0.00	2.24	0.00	0.00	1.09	0.0	21.8	3.5	3.77	12.80	3.07	15	3.35	338.50	339.17	342.65	342.71	343.70	344.50	SWQU1 TO PCB1
8	7	78.000	0.16	2.24	0.64	0.10	1.09	5.0	21.5	3.5	3.80	15.56	3.88	15	5.81	339.17	343.70	342.80	344.49	344.50	347.50	PCB2 TO SWQU1
9	8	50.000	0.00	0.90	0.00	0.00	0.52	0.0	13.3	4.6	2.42	7.07	3.73	15	1.20	343.80	344.40	344.49	345.02	347.50	349.50	PDMH1 TO PCB2
10	9	126.000	0.00	0.05	0.00	0.00	0.02	0.0	10.8	5.2	0.08	7.41	0.83	15	1.32	344.40	346.06	345.02	346.17	349.50	352.50	DMH2 TO PDMH
11	10	74.000	0.05	0.05	0.30	0.02	0.02	10.0	10.0	5.4	0.08	8.36	1.57	15	1.68	346.06	347.30	346.17	347.41	352.50	350.40	EXCB8 TO DMH2
12	3	85.000	0.78	0.78	0.62	0.48	0.48	15.0	15.0	4.3	2.09	5.98	2.93	15	0.86	332.07	332.80	333.03	333.38	336.07	336.80	CBEX4 TO CBEX
13	8	116.000	0.45	1.03	0.34	0.15	0.33	20.0	20.7	3.6	1.17	6.29	2.30	15	0.95	343.70	344.80	344.49	345.23	347.50	349.60	PCB3 TO PCB2
14	9	5.000	0.40	0.85	0.54	0.22	0.51	10.0	10.1	5.3	2.72	10.79	4.29	15	2.00	344.40	344.50	345.02	345.16	349.50	349.00	PCB4 TO PDMH1
15	14	20.000	0.45	0.45	0.65	0.29	0.29	10.0	10.0	5.4	1.57	11.06	2.93	15	2.50	344.50	345.00	345.16	345.50	349.00	348.70	PCB5 TO PCB4
16	13	86.000	0.58	0.58	0.30	0.17	0.17	20.0	20.0	3.7	0.64	5.83	2.19	15	0.81	344.80	345.50	345.23	345.81	349.60	350.00	EXCB7 TO PCB3
17	8	40.371	0.15	0.15	0.90	0.14	0.14	5.0	5.0	7.3	0.99	0.94	5.03	6	2.01	343.70	344.51	344.49	345.38	347.50	348.00	PCB2R TO PCB2
18	5	63.974	0.34	0.34	0.70	0.24	0.24	5.0	5.0	7.3	1.74	0.94	8.87	6	2.00	336.70	337.98	342.25	346.66	339.70	340.00	EX6A TO CBEX6
19	5	58.616	0.15	0.15	0.90	0.14	0.14	5.0	5.0	7.3	0.99	0.94	5.03	6	2.00	336.70	337.87	342.25	343.55	339.70	340.00	EX6R TO CBEX6

Project File: Proposed Pinehurst Section B.stm | Number of lines: 19 | Run Date: 6/22/2021

NOTES:Intensity = 41.91 / (Inlet time + 5.00) ^ 0.76; Return period =Yrs. 10 ; c = cir e = ellip b = box

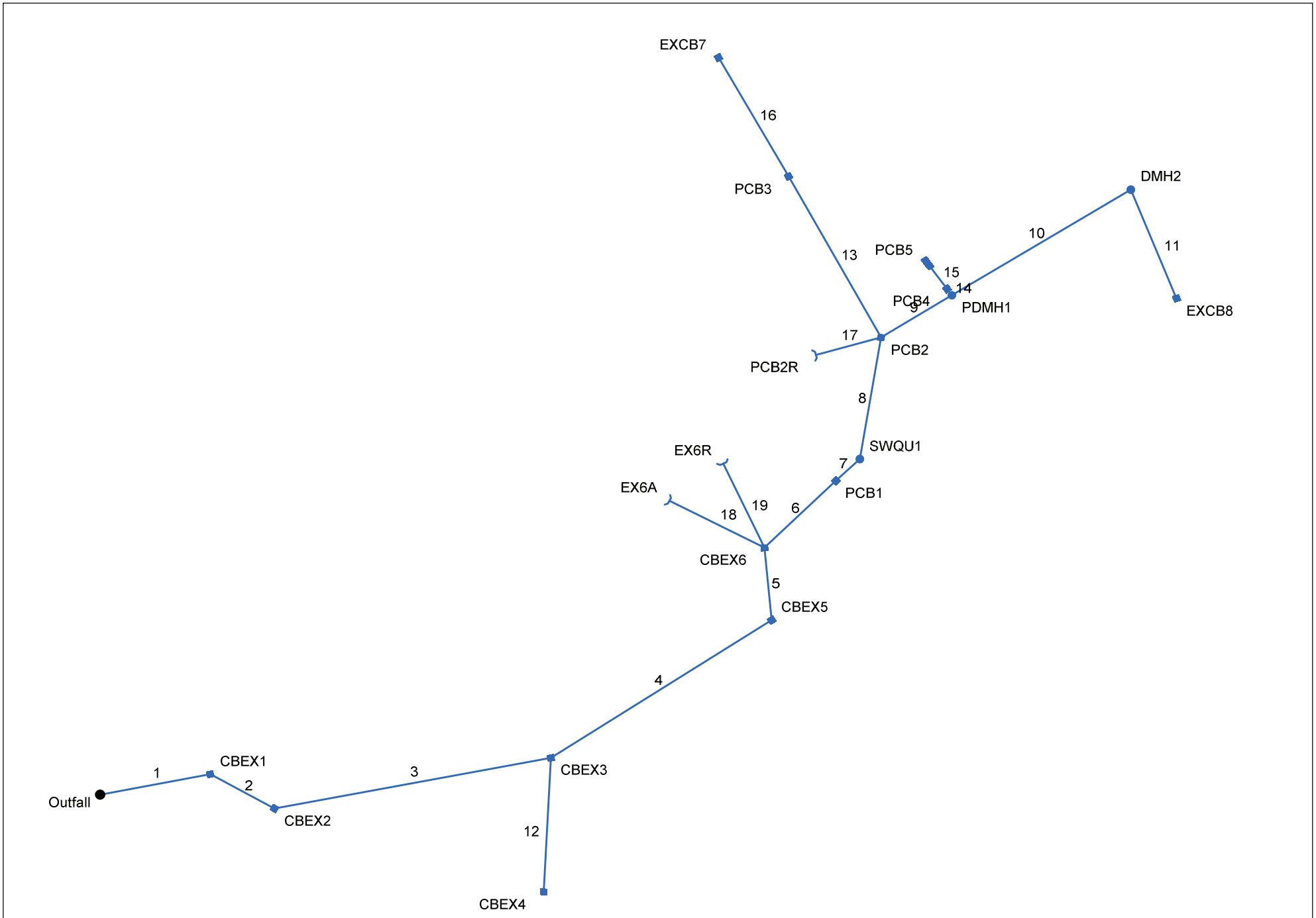
Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	CBEX1	1.21	0.00	1.21	0.00	Grate	0.0	0.00	3.11	2.30	1.35	Sag	2.00	0.020	0.050	0.013	0.09	3.00	0.26	3.00	2.0	Off
2	CBEX2	2.90	0.46	3.36	0.00	Grate	0.0	0.00	3.11	2.30	1.35	Sag	2.00	0.030	0.030	0.013	0.28	9.29	0.45	9.29	2.0	1
3	CBEX3	1.23	0.05	0.82	0.46	Comb	6.0	2.30	0.00	2.30	1.35	0.050	2.00	0.030	0.030	0.013	0.13	4.20	0.25	2.87	2.0	2
4	CBEX5	0.29	0.00	0.25	0.05	Comb	6.0	2.30	0.00	2.30	1.35	0.040	2.00	0.030	0.030	0.013	0.08	2.52	0.21	1.28	2.0	3
5	CBEX6	1.24	0.00	1.24	0.00	Grate	0.0	0.00	3.11	2.30	1.35	Sag	2.00	0.020	0.020	0.013	0.09	4.65	0.26	4.65	2.0	4
6	PCB1	1.23	0.31	1.54	0.00	Comb	6.0	2.30	3.11	2.30	1.35	Sag	2.00	0.030	0.030	0.013	0.17	5.52	0.33	5.52	2.0	5
7	SWQU1	0.00	0.31	0.00	0.31	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	6
8	PCB2	0.75	0.00	0.44	0.31	Comb	6.0	2.30	0.00	2.30	1.35	0.020	2.00	0.020	0.020	0.013	0.11	5.26	0.24	3.78	2.0	7
9	PDMH1	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	8
10	DMH2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	9
11	EXCB8	0.08	0.00	0.08	0.00	Grate	0.0	0.00	0.00	2.30	1.35	0.040	2.00	0.040	0.040	0.013	0.05	1.30	0.00	0.00	0.0	Off
12	CBEX4	2.09	0.00	2.09	0.00	Grate	0.0	0.00	3.11	2.30	1.35	Sag	2.00	0.030	0.030	0.013	0.18	5.95	0.35	5.95	2.0	3
13	PCB3	0.56	0.00	0.56	0.00	Comb	6.0	2.30	3.11	2.30	1.35	Sag	2.00	0.030	0.030	0.013	0.06	1.97	0.22	1.97	2.0	8
14	PCB4	1.16	0.00	1.16	0.00	Comb	6.0	2.30	3.11	2.30	1.35	Sag	2.00	0.040	0.050	0.013	0.14	3.17	0.31	3.17	2.0	9
15	PCB5	1.57	0.00	1.57	0.00	Comb	6.0	4.60	6.21	4.60	1.35	Sag	2.00	0.040	0.040	0.013	0.13	3.24	0.30	3.24	2.0	14
16	EXCB7	0.64	0.00	0.64	0.00	Grate	0.0	0.00	3.11	2.30	1.35	Sag	5.00	0.050	0.050	0.013	0.16	3.10	0.16	3.10	0.0	13
17	PCB2R	0.99	0.00	0.99	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.013	0.00	0.00	0.00	0.00	0.0	8
18	EX6A	1.74	0.00	1.74	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.013	0.00	0.00	0.00	0.00	0.0	5
19	EX6R	0.99	0.00	0.99	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.013	0.00	0.00	0.00	0.00	0.0	5

Project File: Proposed Pinehurst Section B.stm | Number of lines: 19 | Run Date: 6/22/2021

NOTES: Inlet N-Values = 0.016; Intensity = 41.91 / (Inlet time + 5.00) ^ 0.76; Return period = 10 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Project File: Proposed Pinehurst Section B.stm	Number of lines: 19	Date: 6/22/2021 D-6

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	67.000	-11.183	Grate	0.00	0.52	0.54	15.0	309.70	18.78	322.28	18	Cir	0.013	1.05	331.18	CBEX1 TO OUTFALL
2	1	44.000	40.767	Grate	0.00	1.59	0.50	20.0	323.18	1.34	323.77	15	Cir	0.013	1.05	331.97	CBEX2 TO CBEX1
3	2	168.000	-40.592	Comb	0.00	0.37	0.62	10.0	328.37	2.08	331.87	15	Cir	0.013	1.50	336.07	CBEX3 TO CBEX2
4	3	158.000	-22.513	Comb	0.00	0.06	0.67	5.0	332.17	5.05	340.15	15	Cir	0.013	1.35	340.15	CBEX5 TO CBEX3
5	4	46.000	-61.894	Grate	0.00	0.35	0.66	10.0	336.05	1.41	336.70	15	Cir	0.013	1.30	339.70	CBEX6 TO CBEX5
6	5	60.000	50.593	Comb	0.00	0.40	0.57	10.0	337.00	2.50	338.50	15	Cir	0.013	0.50	343.70	PCB1 TO CBEX6
7	6	20.000	0.865	MH	0.00	0.00	0.00	0.0	338.50	3.35	339.17	15	Cir	0.012	0.65	344.50	SWQU1 TO PCB1
8	7	78.000	-36.733	Comb	0.00	0.16	0.64	5.0	339.17	5.81	343.70	15	Cir	0.013	1.50	347.50	PCB2 TO SWQU1
9	8	50.000	48.378	MH	0.00	0.00	0.00	0.0	343.80	1.20	344.40	15	Cir	0.013	1.00	349.50	PDMH1 TO PCB2
10	9	126.000	0.243	MH	0.00	0.00	0.00	0.0	344.40	1.32	346.06	15	Cir	0.013	1.00	352.50	DMH2 TO PDMH1
11	10	74.000	100.465	Grate	0.00	0.05	0.30	10.0	346.06	1.68	347.30	15	Cir	0.013	1.00	350.40	EXCB8 TO DMH2
12	3	85.000	103.858	Grate	0.00	0.78	0.62	15.0	332.07	0.86	332.80	15	Cir	0.013	1.00	336.80	CBEX4 TO CBEX3
13	8	116.000	-37.719	Comb	0.00	0.45	0.34	20.0	343.70	0.95	344.80	15	Cir	0.013	0.50	349.60	PCB3 TO PCB2
14	9	5.000	-93.379	Comb	0.00	0.40	0.54	10.0	344.40	2.00	344.50	15	Cir	0.011	0.50	349.00	PCB4 TO PDMH1
15	14	20.000	0.233	Comb	0.00	0.45	0.65	10.0	344.50	2.50	345.00	15	Cir	0.012	1.00	348.70	PCB5 TO PCB4
16	13	86.000	-0.630	Grate	0.00	0.58	0.30	20.0	344.80	0.81	345.50	15	Cir	0.013	1.00	350.00	EXCB7 TO PCB3
17	8	40.371	-115.203	Hdwl	0.00	0.15	0.90	5.0	343.70	2.01	344.51	6	Cir	0.011	1.00	348.00	PCB2R TO PCB2
18	5	63.974	-56.897	Hdwl	0.00	0.34	0.70	5.0	336.70	2.00	337.98	6	Cir	0.011	1.00	340.00	EX6A TO CBEX6
19	5	58.616	-19.285	Hdwl	0.00	0.15	0.90	5.0	336.70	2.00	337.87	6	Cir	0.011	1.00	340.00	EX6R TO CBEX6

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	CBEX1 TO OUTFALL	14.87	18	Cir	67.000	309.70	322.28	18.776	311.15	323.68	n/a	323.68 j	End	Grate
2	CBEX2 TO CBEX1	13.78	15	Cir	44.000	323.18	323.77	1.341	324.43*	326.43*	2.06	328.49	1	Grate
3	CBEX3 TO CBEX2	10.71	15	Cir	168.000	328.37	331.87	2.083	329.62*	334.24*	1.78	336.02	2	Combination
4	CBEX5 TO CBEX3	7.94	15	Cir	158.000	332.17	340.15	5.051	336.02	341.26	n/a	341.26 j	3	Combination
5	CBEX6 TO CBEX5	7.80	15	Cir	46.000	336.05	336.70	1.413	341.26*	341.93*	0.82	342.75	4	Grate
6	PCB1 TO CBEX6	5.38	15	Cir	60.000	337.00	338.50	2.500	342.75*	343.17*	0.15	343.32	5	Combination
7	SWQU1 TO PCB1	4.46	15	Cir	20.000	338.50	339.17	3.350	343.32*	343.40*	0.13	343.53	6	Manhole
8	PCB2 TO SWQU1	4.50	15	Cir	78.000	339.17	343.70	5.808	343.53	344.56	n/a	344.56 j	7	Combination
9	PDMH1 TO PCB2	2.87	15	Cir	50.000	343.80	344.40	1.200	344.56	345.08	n/a	345.08 j	8	Manhole
10	DMH2 TO PDMH1	0.09	15	Cir	126.000	344.40	346.06	1.317	345.08	346.18	n/a	346.18 j	9	Manhole
11	EXCB8 TO DMH2	0.10	15	Cir	74.000	346.06	347.30	1.676	346.18	347.42	n/a	347.42	10	Grate
12	CBEX4 TO CBEX3	2.47	15	Cir	85.000	332.07	332.80	0.859	336.02*	336.15*	0.06	336.21	3	Grate
13	PCB3 TO PCB2	1.38	15	Cir	116.000	343.70	344.80	0.948	344.56	345.26	n/a	345.26 j	8	Combination
14	PCB4 TO PDMH1	3.22	15	Cir	5.000	344.40	344.50	2.000	345.08	345.22	n/a	345.22	9	Combination
15	PCB5 TO PCB4	1.86	15	Cir	20.000	344.50	345.00	2.500	345.22	345.54	n/a	345.54 j	14	Combination
16	EXCB7 TO PCB3	0.75	15	Cir	86.000	344.80	345.50	0.814	345.26	345.84	n/a	345.84 j	13	Grate
17	PCB2R TO PCB2	1.20	6	Cir	40.371	343.70	344.51	2.006	344.56*	345.88*	0.58	346.45	8	OpenHeadwall
18	EX6A TO CBEX6	2.11	6	Cir	63.974	336.70	337.98	2.001	342.75*	349.23*	1.79	351.03	5	OpenHeadwall
19	EX6R TO CBEX6	1.20	6	Cir	58.616	336.70	337.87	1.996	342.75*	344.66*	0.58	345.24	5	OpenHeadwall

Project File: Proposed Pinehurst Section B.stm | Number of lines: 19 | Run Date: 6/22/2021

NOTES: Return period = 25 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	67.000	0.52	6.80	0.54	0.28	3.75	15.0	22.9	4.0	14.87	45.50	8.58	18	18.78	309.70	322.28	311.15	323.68	312.00	331.18	CBEX1 TO OUTF
2	1	44.000	1.59	6.28	0.50	0.80	3.47	20.0	22.9	4.0	13.78	7.48	11.23	15	1.34	323.18	323.77	324.43	326.43	331.18	331.97	CBEX2 TO CBEX
3	2	168.000	0.37	4.69	0.62	0.23	2.67	10.0	22.6	4.0	10.71	9.32	8.73	15	2.08	328.37	331.87	329.62	334.24	331.97	336.07	CBEX3 TO CBEX
4	3	158.000	0.06	3.54	0.67	0.04	1.96	5.0	22.2	4.1	7.94	14.51	6.68	15	5.05	332.17	340.15	336.02	341.26	336.07	340.15	CBEX5 TO CBEX
5	4	46.000	0.35	3.48	0.66	0.23	1.92	10.0	22.0	4.1	7.80	7.68	6.36	15	1.41	336.05	336.70	341.26	341.93	340.15	339.70	CBEX6 TO CBEX
6	5	60.000	0.40	2.64	0.57	0.23	1.32	10.0	21.8	4.1	5.38	10.21	4.39	15	2.50	337.00	338.50	342.75	343.17	339.70	343.70	PCB1 TO CBEX6
7	6	20.000	0.00	2.24	0.00	0.00	1.09	0.0	21.7	4.1	4.46	12.80	3.63	15	3.35	338.50	339.17	343.32	343.40	343.70	344.50	SWQU1 TO PCB1
8	7	78.000	0.16	2.24	0.64	0.10	1.09	5.0	21.4	4.1	4.50	15.56	4.34	15	5.81	339.17	343.70	343.53	344.56	344.50	347.50	PCB2 TO SWQU1
9	8	50.000	0.00	0.90	0.00	0.00	0.52	0.0	13.2	5.5	2.87	7.07	3.95	15	1.20	343.80	344.40	344.56	345.08	347.50	349.50	PDMH1 TO PCB2
10	9	126.000	0.00	0.05	0.00	0.00	0.02	0.0	10.8	6.1	0.09	7.41	0.87	15	1.32	344.40	346.06	345.08	346.18	349.50	352.50	DMH2 TO PDMH
11	10	74.000	0.05	0.05	0.30	0.02	0.02	10.0	10.0	6.4	0.10	8.36	1.64	15	1.68	346.06	347.30	346.18	347.42	352.50	350.40	EXCB8 TO DMH2
12	3	85.000	0.78	0.78	0.62	0.48	0.48	15.0	15.0	5.1	2.47	5.98	2.01	15	0.86	332.07	332.80	336.02	336.15	336.07	336.80	CBEX4 TO CBEX
13	8	116.000	0.45	1.03	0.34	0.15	0.33	20.0	20.6	4.2	1.38	6.29	2.44	15	0.95	343.70	344.80	344.56	345.26	347.50	349.60	PCB3 TO PCB2
14	9	5.000	0.40	0.85	0.54	0.22	0.51	10.0	10.1	6.3	3.22	10.79	4.55	15	2.00	344.40	344.50	345.08	345.22	349.50	349.00	PCB4 TO PDMH1
15	14	20.000	0.45	0.45	0.65	0.29	0.29	10.0	10.0	6.4	1.86	11.06	3.09	15	2.50	344.50	345.00	345.22	345.54	349.00	348.70	PCB5 TO PCB4
16	13	86.000	0.58	0.58	0.30	0.17	0.17	20.0	20.0	4.3	0.75	5.83	2.30	15	0.81	344.80	345.50	345.26	345.84	349.60	350.00	EXCB7 TO PCB3
17	8	40.371	0.15	0.15	0.90	0.14	0.14	5.0	5.0	8.9	1.20	0.94	6.09	6	2.01	343.70	344.51	344.56	345.88	347.50	348.00	PCB2R TO PCB2
18	5	63.974	0.34	0.34	0.70	0.24	0.24	5.0	5.0	8.9	2.11	0.94	10.74	6	2.00	336.70	337.98	342.75	349.23	339.70	340.00	EX6A TO CBEX6
19	5	58.616	0.15	0.15	0.90	0.14	0.14	5.0	5.0	8.9	1.20	0.94	6.09	6	2.00	336.70	337.87	342.75	344.66	339.70	340.00	EX6R TO CBEX6

Project File: Proposed Pinehurst Section B.stm

Number of lines: 19

Run Date: 6/22/2021

NOTES:Intensity = 38.13 / (Inlet time + 3.20) ^ 0.69; Return period =Yrs. 25 ; c = cir e = ellip b = box

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	CBEX1	1.43	0.00	1.43	0.00	Grate	0.0	0.00	3.11	2.30	1.35	Sag	2.00	0.020	0.050	0.013	0.11	3.44	0.28	3.44	2.0	Off
2	CBEX2	3.42	0.59	4.02	0.00	Grate	0.0	0.00	3.11	2.30	1.35	Sag	2.00	0.030	0.030	0.013	0.33	10.83	0.49	10.83	2.0	1
3	CBEX3	1.46	0.07	0.94	0.59	Comb	6.0	2.30	0.00	2.30	1.35	0.050	2.00	0.030	0.030	0.013	0.13	4.49	0.26	3.14	2.0	2
4	CBEX5	0.36	0.00	0.29	0.07	Comb	6.0	2.30	0.00	2.30	1.35	0.040	2.00	0.030	0.030	0.013	0.08	2.71	0.21	1.45	2.0	3
5	CBEX6	1.47	0.00	1.47	0.00	Grate	0.0	0.00	3.11	2.30	1.35	Sag	2.00	0.020	0.020	0.013	0.12	5.78	0.28	5.78	2.0	4
6	PCB1	1.45	0.40	1.85	0.00	Comb	6.0	2.30	3.11	2.30	1.35	Sag	2.00	0.030	0.030	0.013	0.19	6.49	0.36	6.49	2.0	5
7	SWQU1	0.00	0.40	0.00	0.40	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	6
8	PCB2	0.91	0.00	0.51	0.40	Comb	6.0	2.30	0.00	2.30	1.35	0.020	2.00	0.020	0.020	0.013	0.11	5.65	0.25	4.16	2.0	7
9	PDMH1	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	8
10	DMH2	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	9
11	EXCB8	0.10	0.00	0.10	0.00	Grate	0.0	0.00	0.00	2.30	1.35	0.040	2.00	0.040	0.040	0.013	0.06	1.38	0.00	0.00	0.0	Off
12	CBEX4	2.47	0.00	2.47	0.00	Grate	0.0	0.00	3.11	2.30	1.35	Sag	2.00	0.030	0.030	0.013	0.21	6.99	0.38	6.99	2.0	3
13	PCB3	0.66	0.00	0.66	0.00	Comb	6.0	2.30	3.11	2.30	1.35	Sag	2.00	0.030	0.030	0.013	0.07	2.38	0.24	2.38	2.0	8
14	PCB4	1.38	0.00	1.38	0.00	Comb	6.0	2.30	3.11	2.30	1.35	Sag	2.00	0.040	0.050	0.013	0.16	3.60	0.33	3.60	2.0	9
15	PCB5	1.86	0.00	1.86	0.00	Comb	6.0	4.60	6.21	4.60	1.35	Sag	2.00	0.040	0.040	0.013	0.15	3.75	0.32	3.75	2.0	14
16	EXCB7	0.75	0.00	0.75	0.00	Grate	0.0	0.00	3.11	2.30	1.35	Sag	5.00	0.050	0.050	0.013	0.17	3.39	0.17	3.39	0.0	13
17	PCB2R	1.20	0.00	1.20	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.013	0.00	0.00	0.00	0.00	0.0	8
18	EX6A	2.11	0.00	2.11	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.013	0.00	0.00	0.00	0.00	0.0	5
19	EX6R	1.20	0.00	1.20	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.013	0.00	0.00	0.00	0.00	0.0	5

Project File: Proposed Pinehurst Section B.stm | Number of lines: 19 | Run Date: 6/22/2021

NOTES: Inlet N-Values = 0.016; Intensity = 38.13 / (Inlet time + 3.20) ^ 0.69; Return period = 25 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.