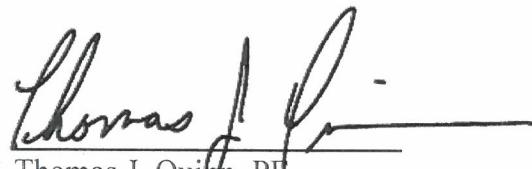


Stormwater Management Report

For

Tax Lot 2 Block 622
1008 – 1014 South Avenue
City of Plainfield
Union County, New Jersey

November 4, 2019
Revised: March 27, 2020



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NJ License No. 24GE04107200
EKA Associates, P.A.
Project No. 845985

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STORMWATER MANAGEMENT NARRATIVE

Introduction and Existing Conditions

The subject of this narrative is a 0.92 acre site located at 1008-1014 South Avenue in the City of Plainfield, Union County, New Jersey. The site is designated as Tax Lot 2 Block 622 in the City's TODN/TSC/PO2 Zones. The site currently features a 2 ½ story dwelling fronting on South Avenue with two detached garages and two sheds. The site comprises 0.49 acres of impervious cover, 0.09 acres of compacted dirt used for vehicle storage and 0.34 acres of open grassed areas. A portion of adjacent Lot 17 is being disturbed to provide an emergency fire access aisle connecting the new rear parking area to Woodland Avenue. This area of disturbance is included within the analysis area for an additional 0.08 acres of open grassed area. No other alterations or improvements are proposed on Lot 17.

The topography across the site varies from an elevation of 129 feet at the South Avenue street line to an elevation of 140.3 feet at the southeasterly corner of the site. The soils on site have been identified as Boonton-Urban Land and Urban Land per the USDA NRCS Web Soil Survey with a Hydrologic Soil Group 'C' rating.

The hydrologic analysis of the existing conditions was modeled using two drainage areas identified as ED-1 and ED-2, as shown on the enclosed Existing Drainage Area Map. The bulk of the stormwater runoff generated within ED-1 flows overland from the rear of the property towards South Avenue which is ultimately collected an existing storm sewer catch basin located in the intersection of South Avenue and Woodland Avenue identified as POA-1. A small portion of stormwater runoff from Lot 17 flows overland into Woodland Avenue where it is ultimately collected by the same offsite catch basin. Drainage area ED-2 represents a small portion of runoff which flows off-site toward adjacent residential Lot 7 identified as POA-2.

Proposed Conditions

Under proposed conditions, the existing dwelling fronting on South Avenue along with all ancillary garages, sheds and paved areas will be removed. The development plan proposes to construct a new 10,205 square foot 5-story multi-family building with retail space and garage parking on the ground floor fronting on South Avenue. In addition to the garage parking, a surface parking lot will be constructed at the rear of the new building with access from South Avenue. Per the manufacturer literature, the subsurface Grasspave porous grass pavers are rated for groundwater recharge and promote the infiltration of surface runoff, therefore, the emergency access aisles are analyzed as grassed areas in the proposed condition.

The proposed improvements will result in a total net increase in impervious coverage of 0.20 acres and a total disturbance of 1.05 acres. Based on disturbance area, the project is classified as a major development and is therefore subject to the enhanced stormwater management rules promulgated by N.J.A.C. 7:8 which require the development plan to address stormwater quantity control, water quality and groundwater recharge.

The project is exempt from the groundwater recharge requirements because it is located in a Metropolitan Planning Area (PA-1) redevelopment area and no wooded vegetated areas are being removed as a result of this project.

The water quality standards at N.J.A.C. 7:8-5.5 do not apply because the net increase in impervious coverage does not exceed 0.25 acres.

The hydrologic analysis of the proposed conditions was modeled using three drainage areas identified as PD-1D, PD-1U and PD-2. Drainage areas PD-1D and PD-1U are complimentary to ED-1 and all runoff from these areas ultimately flow towards POA-1. Drainage area PD-2 is complimentary to ED-2 and all runoff from this area flows towards POA-2. Drainage area PD-1D represents the bulk of the post-development stormwater runoff generated on site including the roof runoff from the new building and the runoff from the surface parking lot. All runoff generated in PD-1D is detained and attenuated before discharging from the site. Drainage area PD-1U represents the undetained portion of runoff, including a portion of the paved access drive to the west of the building and the grassed fire truck emergency access strip to the east of the new building where all runoff flows towards POA-1. Drainage area PD-1U also includes the bulk of the grassed emergency access aisle on Lot 2 which also drains undetained towards POA-1. Drainage area to POA-2 is reduced to a very small grassed strip to the east of the new parking lot.

Methodology & Quantity Control

The stormwater runoff associated with the existing and proposed conditions are calculated utilizing the rational method to determine the maximum pre- and post-development stormwater discharges. The pre-development peak discharges are reduced by 50, 25 and 20 percent for the 2, 10 and 100 year storm events, respectively, in accordance with N.J.A.C. 7:8. The modified rational method is used to generate an estimated storage volume requirement and to calculate the storm duration factors for the 2, 10 and 100 year storm events, which are then used as a guideline in determining the critical storm duration. The target discharges associated with the modified rational method were determined by subtracting the peak post-development undetained discharge rate from the peak pre-development reduced site discharge for like storm events. Peak discharges for the pre- and post-developed drainage areas were calculated using a minimum time of concentration of 6 minutes, where applicable, and the following runoff coefficients with respect to the soil types based on N.J.A.C. 5:21 Table 7.1:

Type of Surface	Hydrologic "C" Soils
Impervious	0.99
Grass/Open Space	0.51
Dirt	0.80

The required stormwater quantity reduction is achieved through the use of an underground detention basin and an outlet control structure (OCS). The detention basin consists of three rows of Cultec Chambers installed within a stone filled trench. The basin is connected to the OCS via 12-inch PVC pipe having the capacity to convey the full 100-year flow directed to the basin. The attenuated flow from the OCS is directed to a new

catch basin located at the driveway entrance in the South Avenue right-of-way via 12-inch concrete pipe also having the capacity to convey the full 100-year flow. In the event the lower orifices of the OCS are temporarily clogged due to debris then the emergency four foot weir would be activated and the OCS would convey the full 100-year flow through the downstream conveyance. The run of pipe immediately downstream of the OCS has been analyzed as part of the hydrograph routings to accurately model the effects of inlet versus outlet control. **The capacities of all other pipes downstream of the new basin were analyzed independently and the results are included in this report.**

The stormwater runoff directed to the proposed detention basin is hydraulically routed through the OCS utilizing the modified rational method with varying hydrographs representing varying storm durations using the calculated storm duration factors as guidance. Discharge values for the varying duration storms were calculated using IDF curves for each recurrence frequency. The analysis includes generated hydrographs for the next shortest and next longest duration surrounding the critical storm duration to ensure the peak discharge is properly bracketed.

The following tables summarize the pre- and post-development peak discharges to each point of analysis as well as for the overall site.

Summary of Peak Discharge Rates to POA-1

Storm Event	Peak Pre-Development Discharge (cfs)	Reduction Factor	Post-Development Target Discharge (cfs)	Post-Development Discharge (cfs)
2	2.922	0.50	1.460	1.428
10	3.884	0.75	2.910	2.468
100	5.024	0.80	4.020	4.016

Summary of Peak Discharge Rates to POA-2

Storm Event	Peak Pre-Development Discharge (cfs)	Reduction Factor	Post-Development Target Discharge (cfs)	Post-Development Discharge (cfs)
2	0.328	0.50	0.170	0.047
10	0.433	0.75	0.320	0.061
100	0.561	0.80	0.450	0.079

Summary of Peak Discharge for Overall Site

Storm Event	Peak Pre-Development Discharge (cfs)	Reduction Factor	Post-Development Target Discharge (cfs)	Post-Development Discharge (cfs)
2	3.141	0.50	1.570	1.458
10	4.173	0.75	3.130	2.507
100	5.398	0.80	4.320	4.066

FIGURES & REFERENCES

Prepared For:

Name	
Company Name	
Street Address	
City	
State	Zip
Phone	
Fax	
Email	

Project Information:

Name	
Street Address	
City	
State	Zip
Date:	(mm/dd)

Engineer:

Name	
Company Name	
Street Address	
City	
State	Zip
Phone	
Fax	
Email	

Calculations Performed By:

Name	
Company Name	
Street Address	
City	
State	Zip
Phone	
Fax	
Email	

Input Given Parameters

Unit of Measure
Select Model

Stone Porosity
Number of Header Systems
Stone Depth **Above** Chamber
Stone Depth **Below** Chamber

Workable Bed Depth
Max. Bed Width
Storage Volume Required

English
Recharger 280HD

40.0%
2 Header
6 inches
0 inches

5.00 feet
16.00 feet
1951.00 cu. feet



Chamber Specifications	
Height	26.5 inches
Width	47.00 inches
Length	8.00 feet
Installed Length	7.00 feet
Bare Chamber Volume	42.55 cu. feet
Installed Chamber Volume	58.39 cu. feet

Image for visual reference only. May not reflect selected model.

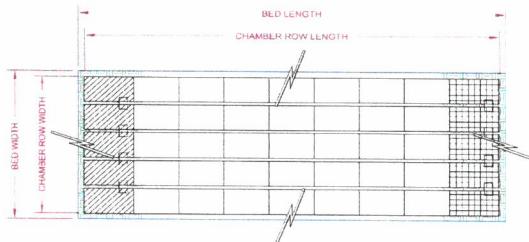
Bed Depth	3.63 feet
Bed Width	14.58 feet
Storage Volume Provided	2118.29 cu. feet

Materials List

Recharger 280HD - Stormwater System by CULTEC, Inc.	
Approx. Unit Count - not for construction	33 pieces
Actual Number of Chambers Required	33 pieces
Starter Chambers	3 pieces
Intermediate Chambers	27 pieces
End Chambers	3 pieces

HVLV FC-24 Feed Connector	4 pieces
CULTEC No. 410™ Filter Fabric	347.80 sq. yards
CULTEC No. 20L Polyethylene Liner	29.17 feet
Stone	64.29 cu. yards

Bed Detail



Bed detail for reference only. Not project specific. Not to scale. Use CULTEC StormGenie to output project specific detail.

Project Name: Name

Date: (mm/dd)

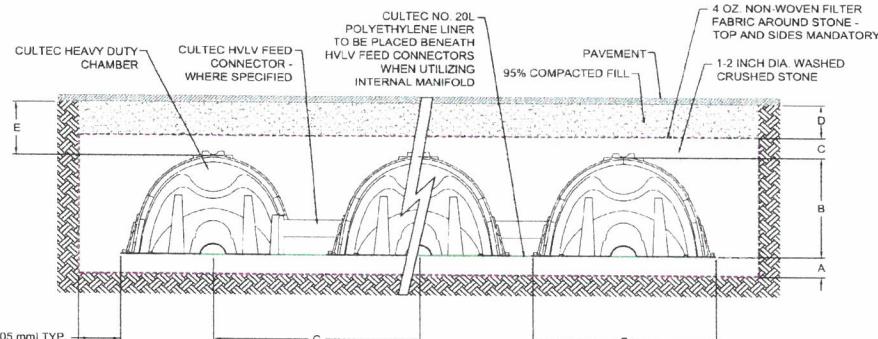
Cross Section Detail



Conceptual graphic only. Not job specific.

Recharger 280HD

Pavement	3 inches
95% Compacted Fill	8 inches
Stone Above	6 inches
Chamber Height	26.5 inches
Stone Below	0 inches
Effective Depth	32.5 inches
Bed Depth	43.5 inches



A	Depth of Stone Base	0.0 inches
B	Chamber Height	26.5 inches
C	Depth of Stone Above Units	6.0 inches
D	Depth of 95% Compacted Fill	8.0 inches
E	Max. Depth of Cover Allowed Above Crown of Chamber	12.0 feet
F	Chamber Width	47.0 inches
G	Center to Center Spacing	4.33 feet

Breakdown of Storage Provided by Recharger 280HD Stormwater System		
Chambers	1422.49 cu. feet	
Feed Connectors	1.52 cu. feet	
Stone	694.29 cu. feet	
Total Storage Provided	2118.29 cu. feet	



NOAA Atlas 14, Volume 2, Version 3
 Location name: Plainfield, New Jersey, USA*
 Latitude: 40.6278°, Longitude: -74.403°
 Elevation: 137.12 ft**
 * source: ESRI Maps
 ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerials](#)

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	4.02 (3.67-4.42)	4.79 (4.37-5.26)	5.66 (5.15-6.23)	8.30 (5.72-6.92)	7.07 (6.40-7.75)	7.81 (6.85-8.34)	8.15 (7.30-8.93)	8.62 (7.68-9.46)	9.22 (8.14-10.1)	9.85 (8.47-10.5)
10-min	3.20 (2.93-3.53)	3.83 (3.49-4.21)	4.54 (4.12-4.99)	5.93 (4.58-5.53)	5.83 (5.10-6.18)	8.08 (5.45-6.65)	8.47 (5.80-7.10)	8.83 (6.09-7.50)	7.29 (6.44-8.02)	7.80 (6.67-8.38)
15-min	2.57 (2.44-2.94)	3.20 (2.93-3.52)	3.82 (3.48-4.20)	4.24 (3.86-4.67)	4.76 (4.31-5.22)	5.12 (4.81-5.61)	5.45 (4.88-5.98)	5.75 (5.12-6.31)	6.12 (5.40-6.73)	6.38 (5.58-7.01)
30-min	1.83 (1.67-2.01)	2.21 (2.02-2.43)	2.72 (2.47-2.99)	3.08 (2.80-3.38)	3.53 (3.19-3.87)	3.85 (3.47-4.22)	4.17 (3.74-4.58)	4.47 (3.99-4.91)	4.87 (4.30-5.35)	5.15 (4.52-5.68)
60-min	1.14 (1.04-1.26)	1.39 (1.27-1.53)	1.74 (1.58-1.91)	2.00 (1.82-2.20)	2.35 (2.12-2.58)	2.61 (2.35-2.86)	2.88 (2.58-3.15)	3.14 (2.80-3.44)	3.49 (3.08-3.84)	3.76 (3.30-4.14)
2-hr	0.698 (0.632-0.774)	0.851 (0.772-0.942)	1.03 (0.976-1.20)	1.25 (1.13-1.39)	1.50 (1.35-1.66)	1.71 (1.52-1.88)	1.91 (1.69-2.11)	2.13 (1.87-2.35)	2.43 (2.11-2.70)	2.68 (2.30-2.97)
3-hr	0.519 (0.471-0.577)	0.632 (0.574-0.703)	0.803 (0.728-0.892)	0.936 (0.846-1.04)	1.12 (1.01-1.24)	1.27 (1.14-1.41)	1.43 (1.26-1.58)	1.59 (1.40-1.76)	1.81 (1.58-2.01)	2.00 (1.72-2.22)
6-hr	0.334 (0.303-0.372)	0.408 (0.369-0.451)	0.515 (0.465-0.570)	0.604 (0.544-0.666)	0.730 (0.652-0.804)	0.836 (0.741-0.918)	0.949 (0.834-1.04)	1.07 (0.932-1.18)	1.25 (1.07-1.37)	1.39 (1.18-1.53)
12-hr	0.208 (0.187-0.228)	0.250 (0.227-0.277)	0.318 (0.288-0.353)	0.376 (0.339-0.416)	0.461 (0.412-0.508)	0.535 (0.474-0.587)	0.615 (0.538-0.674)	0.703 (0.608-0.772)	0.835 (0.708-0.916)	0.947 (0.791-1.04)
24-hr	0.117 (0.108-0.127)	0.141 (0.131-0.154)	0.181 (0.168-0.197)	0.216 (0.198-0.234)	0.287 (0.244-0.290)	0.312 (0.283-0.338)	0.361 (0.324-0.392)	0.417 (0.370-0.453)	0.500 (0.436-0.545)	0.572 (0.491-0.626)
2-day	0.069 (0.063-0.075)	0.083 (0.076-0.091)	0.106 (0.097-0.116)	0.125 (0.115-0.137)	0.154 (0.140-0.168)	0.178 (0.161-0.194)	0.204 (0.183-0.223)	0.233 (0.206-0.255)	0.275 (0.240-0.303)	0.311 (0.268-0.344)
3-day	0.048 (0.044-0.053)	0.058 (0.054-0.064)	0.074 (0.068-0.081)	0.087 (0.080-0.095)	0.107 (0.097-0.116)	0.123 (0.111-0.134)	0.140 (0.126-0.153)	0.159 (0.142-0.174)	0.187 (0.164-0.205)	0.210 (0.182-0.232)
4-day	0.038 (0.035-0.042)	0.046 (0.043-0.050)	0.058 (0.054-0.064)	0.069 (0.063-0.075)	0.083 (0.076-0.090)	0.095 (0.087-0.104)	0.108 (0.098-0.118)	0.122 (0.109-0.134)	0.142 (0.125-0.156)	0.159 (0.139-0.176)
7-day	0.026 (0.024-0.028)	0.031 (0.029-0.033)	0.038 (0.036-0.041)	0.045 (0.041-0.048)	0.053 (0.049-0.058)	0.061 (0.055-0.066)	0.069 (0.062-0.074)	0.077 (0.069-0.083)	0.089 (0.079-0.097)	0.099 (0.086-0.108)
10-day	0.021 (0.019-0.022)	0.025 (0.023-0.028)	0.030 (0.028-0.032)	0.035 (0.032-0.037)	0.041 (0.038-0.044)	0.046 (0.042-0.050)	0.052 (0.047-0.056)	0.058 (0.052-0.062)	0.066 (0.059-0.072)	0.072 (0.064-0.079)
20-day	0.014 (0.013-0.015)	0.017 (0.016-0.018)	0.020 (0.018-0.021)	0.022 (0.021-0.024)	0.026 (0.024-0.027)	0.028 (0.026-0.030)	0.031 (0.029-0.033)	0.034 (0.031-0.036)	0.037 (0.034-0.040)	0.040 (0.036-0.043)
30-day	0.012 (0.011-0.012)	0.014 (0.013-0.014)	0.016 (0.015-0.017)	0.018 (0.017-0.019)	0.020 (0.019-0.021)	0.022 (0.020-0.023)	0.023 (0.022-0.025)	0.025 (0.023-0.027)	0.027 (0.025-0.029)	0.029 (0.026-0.031)
45-day	0.010 (0.009-0.010)	0.012 (0.011-0.012)	0.013 (0.013-0.014)	0.015 (0.014-0.015)	0.016 (0.015-0.017)	0.018 (0.017-0.019)	0.019 (0.018-0.020)	0.020 (0.019-0.021)	0.022 (0.020-0.023)	0.023 (0.021-0.024)
60-day	0.009 (0.008-0.009)	0.010 (0.010-0.011)	0.012 (0.011-0.012)	0.013 (0.012-0.014)	0.014 (0.014-0.015)	0.015 (0.014-0.016)	0.016 (0.015-0.017)	0.017 (0.016-0.018)	0.018 (0.017-0.019)	0.019 (0.018-0.020)

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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TABLE 7.1

TYPICAL RUNOFF COEFFICIENTS (C VALUES) FOR 100 YEAR FREQUENCY STORM

TABLE 7.1
TYPICAL RUNOFF COEFFICIENTS (C VALUES) FOR 100 YEAR FREQUENCY STORM

<u>Land Use Description</u>	<u>A</u>	Hydrologic Soil Group		
		<u>B</u>	<u>C</u>	<u>D</u>
Cultivated land:				
without conservation treatment	0.49	0.67	0.81	
with conservation treatment	0.27	0.43	0.61	0.88
Pasture or range land:				
poor condition	0.38	0.63	0.78	0.67
good condition	NA	0.25	0.51	0.84
Meadow: good condition	NA	NA	0.44	0.65
Wood or forest land:				
thin stand, poor cover, no mulch	NA	NA	0.59	0.61
good cover	NA	NA	0.45	0.79
Open spaces, lawns, parks, golf courses, cemeteries:				
good condition, grass cover on 75% or more of area	NA	0.25	0.51	0.59
fair condition, grass cover on 50-75% of area	NA	0.45	0.63	0.65
Commercial and business areas (85% impervious)	0.84	0.90	0.93	0.74
Industrial districts (72% impervious)	0.67	0.81	0.88	0.96
Residential:				
Average lot size	Average impervious			
½ acre	65%	0.59	0.76	
¾ acre	38%	0.25	0.53	0.90
½ acre	30%	NA	0.49	0.80
¼ acre	25%	NA	0.45	0.78
1 acre	20%	NA	0.41	0.76
Paved parking lots, roofs, driveways, etc.	0.99	0.99	0.99	0.99
Streets and roads:				
paved with curbs and storm sewers	0.99	0.99	0.99	
gravel	0.57	0.76	0.84	0.99
dirt	0.49	0.69	0.80	0.88

Note: NA denotes information is not available; design engineers should rely on another authoritative source.

Source: New Jersey Department of Environmental Protection, Technical Manual for Land Use Regulation Program, Bureaus of Inland and Coastal Regulations, Stream Encroachment Permits (Trenton, New Jersey: Department of Environmental Protection, Revised September 1995) p. 12.

Hydrologic Soil Group—Union County, New Jersey

Map Scale: 1:862 if printed on A-landscape (11" x 8.5") sheet.

0	10	20	40	60
				Meters
0	40	80		161

1314

Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

2/18/2019
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Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BhpBr	Birdsboro-Urban land complex, 0 to 6 percent slopes, rarely flooded	B	0.1	4.1%
BovB	Boonton-Urban land-Haledon complex, 0 to 8 percent slopes	C	0.9	69.9%
UR	Urban land		0.3	26.1%
Totals for Area of Interest			1.3	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.



HYDRAFLOW HYDROGRAPH CALCULATIONS

Hydrograph Return Period Recap

Hydraflow Hydrographs by Intelisolve v9.2

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	Rational	-----	-----	2.922	-----	-----	3.884	-----	-----	5.024	ED-1 (Total to POA-1)
2	Manual	-----	-----	1.460	-----	-----	2.910	-----	-----	4.020	ED-1 Reduction Target
3	Rational	-----	-----	0.328	-----	-----	0.433	-----	-----	0.561	ED-2 (Total to POA-2)
4	Manual	-----	-----	0.170	-----	-----	0.320	-----	-----	0.450	ED-2 Reduction Target
5	Combine	1, 3,	-----	3.141	-----	-----	4.173	-----	-----	5.398	Total Existing Site Runoff
6	Manual	-----	-----	1.570	-----	-----	3.130	-----	-----	4.320	Total Site Reduction Target
8	Mod. Rational	-----	-----	1.224	-----	-----	2.377	-----	-----	3.013	Req'd Volume Estimate
10	Rational	-----	-----	3.197	-----	-----	4.217	-----	-----	5.455	PD-1D (Tc Storm)
11	Manual	-----	-----	2.680	-----	-----	3.520	-----	-----	4.530	PD-1D (10 Min. Storm)
12	Manual	-----	-----	2.010	-----	-----	2.700	-----	-----	3.510	PD-1D (20 Min. Storm)
13	Manual	-----	-----	1.550	-----	-----	2.160	-----	-----	2.920	PD-1D (30 Min. Storm)
14	Reservoir	10	-----	0.793	-----	-----	0.961	-----	-----	1.185	Tc Storm to Basin
15	Reservoir	11	-----	0.944	-----	-----	1.169	-----	-----	2.155	10 Min. Storm to Basin
16	Reservoir	12	-----	1.093	-----	-----	2.093	-----	-----	3.366	20 Min. Storm to Basin
17	Reservoir	13	-----	1.071	-----	-----	1.989	-----	-----	2.914	30 Min. Storm to Basin
19	Rational	-----	-----	0.594	-----	-----	0.784	-----	-----	1.014	PD-1U (Tc Storm)
20	Manual	-----	-----	0.500	-----	-----	0.650	-----	-----	0.840	PD-1U (10 Min. Storm)
21	Manual	-----	-----	0.370	-----	-----	0.500	-----	-----	0.650	PD-1U (20 Min. Storm)
22	Manual	-----	-----	0.290	-----	-----	0.400	-----	-----	0.540	PD-1U (30 Min. Storm)
24	Combine	14, 19,	-----	1.158	-----	-----	1.462	-----	-----	1.822	Total Prop. to POA-1 (Tc Storm)
25	Combine	15, 20,	-----	1.328	-----	-----	1.642	-----	-----	2.645	Total Prop. to POA-1 (10 Min. Storm)
26	Combine	16, 21,	-----	1.428	-----	-----	2.468	-----	-----	4.016	Total Prop. to POA-1 (20 Min. Storm)
27	Combine	17, 22,	-----	1.348	-----	-----	2.389	-----	-----	3.454	Total Prop. to POA-1 (30 Min. Storm)
29	Rational	-----	-----	0.047	-----	-----	0.061	-----	-----	0.079	PD-2 (Tc Storm)
30	Manual	-----	-----	0.038	-----	-----	0.050	-----	-----	0.065	PD-2 (10 Min. Storm)
31	Manual	-----	-----	0.030	-----	-----	0.039	-----	-----	0.050	PD-2 (20 Min. Storm)
32	Manual	-----	-----	0.020	-----	-----	0.030	-----	-----	0.041	PD-2 (30 Min. Storm)
34	Combine	24, 29,	-----	1.199	-----	-----	1.524	-----	-----	1.901	Total Prop. Site Runoff (Tc Storm)
35	Combine	25, 30,	-----	1.366	-----	-----	1.692	-----	-----	2.685	Total Prop. Site Runoff (10 Min. Stor
36	Combine	26, 31,	-----	1.458	-----	-----	2.507	-----	-----	4.066	Total Prop. Site Runoff (20 Min. Stor
37	Combine	27, 32,	-----	1.368	-----	-----	2.419	-----	-----	3.495	Total Prop. Site Runoff (30 Min. Stor

Proj. file: Drainage Analysis R-4.gpw

Thursday, Apr 2, 2020

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

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	Rational	2.922	1	8	1,403	---	----	----	ED-1 (Total to POA-1)
2	Manual	1.460	1	8	704	---	----	----	ED-1 Reduction Target
3	Rational	0.328	1	6	118	---	----	----	ED-2 (Total to POA-2)
4	Manual	0.170	1	6	61	---	----	----	ED-2 Reduction Target
5	Combine	3.141	1	8	1,521	1, 3,	----	----	Total Existing Site Runoff
6	Manual	1.570	1	8	761	---	----	----	Total Site Reduction Target
8	Mod. Rational	1.224	1	6	3,173	---	----	----	Req'd Volume Estimate
10	Rational	3.197	1	6	1,151	---	----	----	PD-1D (Tc Storm)
11	Manual	2.680	2	6	1,598	---	----	----	PD-1D (10 Min. Storm)
12	Manual	2.010	2	6	2,405	---	----	----	PD-1D (20 Min. Storm)
13	Manual	1.550	2	6	2,778	---	----	----	PD-1D (30 Min. Storm)
14	Reservoir	0.793	1	11	1,150	10	126.69	845	Tc Storm to Basin
15	Reservoir	0.944	2	14	1,598	11	127.02	1,109	10 Min. Storm to Basin
16	Reservoir	1.093	2	22	2,404	12	127.41	1,408	20 Min. Storm to Basin
17	Reservoir	1.071	2	32	2,777	13	127.34	1,362	30 Min. Storm to Basin
19	Rational	0.594	1	6	214	---	----	----	PD-1U (Tc Storm)
20	Manual	0.500	2	6	300	---	----	----	PD-1U (10 Min. Storm)
21	Manual	0.370	2	6	442	---	----	----	PD-1U (20 Min. Storm)
22	Manual	0.290	2	6	524	---	----	----	PD-1U (30 Min. Storm)
24	Combine	1.158	1	7	1,364	14, 19,	----	----	Total Prop. to POA-1 (Tc Storm)
25	Combine	1.328	2	10	1,898	15, 20,	----	----	Total Prop. to POA-1 (10 Min. Storm)
26	Combine	1.428	2	20	2,846	16, 21,	----	----	Total Prop. to POA-1 (20 Min. Storm)
27	Combine	1.348	2	30	3,302	17, 22,	----	----	Total Prop. to POA-1 (30 Min. Storm)
29	Rational	0.047	1	6	17	---	----	----	PD-2 (Tc Storm)
30	Manual	0.038	2	6	23	---	----	----	PD-2 (10 Min. Storm)
31	Manual	0.030	2	6	36	---	----	----	PD-2 (20 Min. Storm)
32	Manual	0.020	2	6	36	---	----	----	PD-2 (30 Min. Storm)
34	Combine	1.199	1	6	1,381	24, 29,	----	----	Total Prop. Site Runoff (Tc Storm)
35	Combine	1.366	2	10	1,920	25, 30,	----	----	Total Prop. Site Runoff (10 Min. Stor
36	Combine	1.458	2	20	2,882	26, 31,	----	----	Total Prop. Site Runoff (20 Min. Stor
37	Combine	1.368	2	30	3,338	27, 32,	----	----	Total Prop. Site Runoff (30 Min. Stor

Drainage Analysis R-4.gpw

Return Period: 2 Year

Thursday, Apr 2, 2020

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Apr 2, 2020

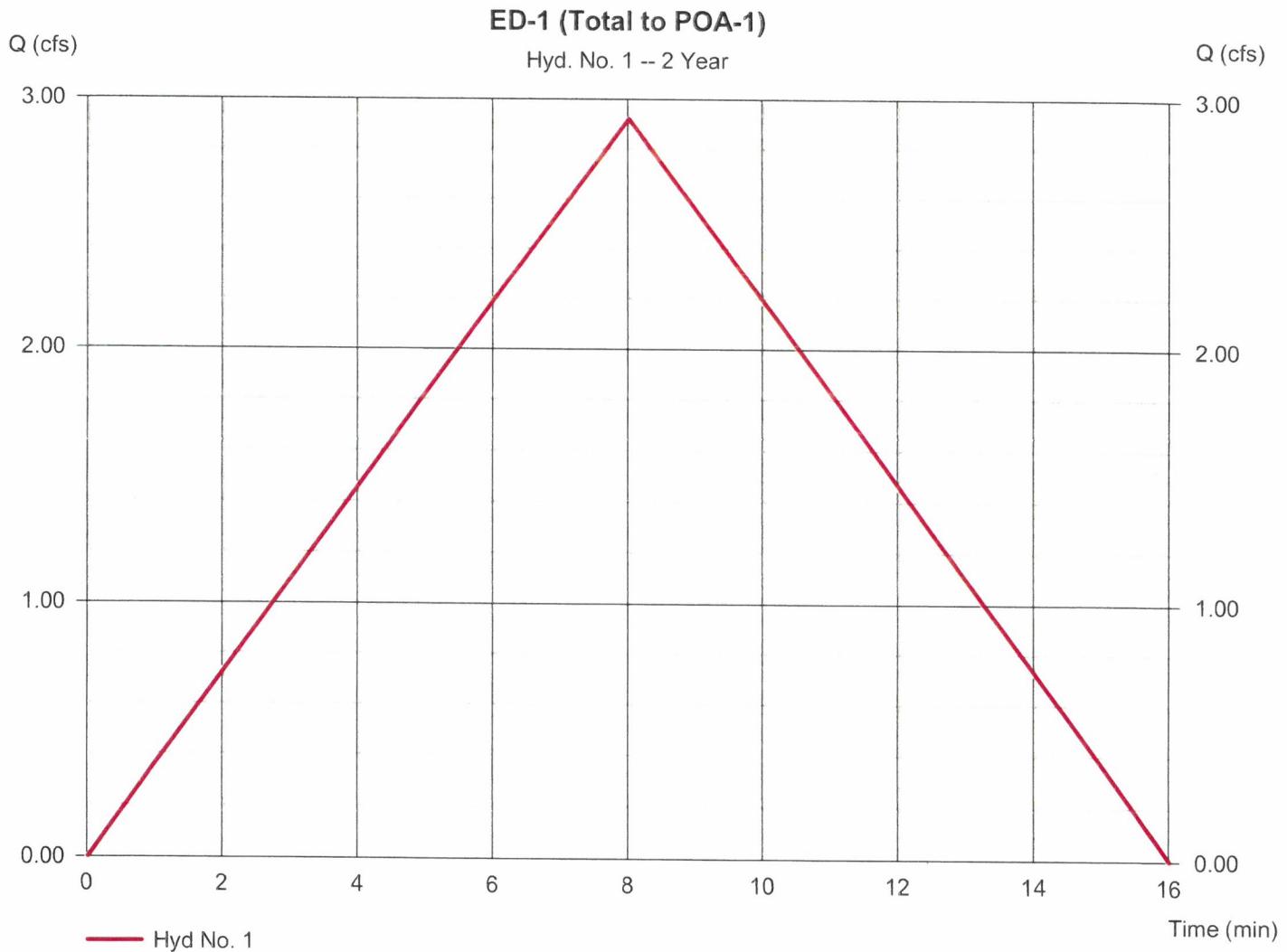
Hyd. No. 1

ED-1 (Total to POA-1)

Hydrograph type = Rational
 Storm frequency = 2 yrs
 Time interval = 1 min
 Drainage area = 0.910 ac
 Intensity = 4.171 in/hr
 IDF Curve = plainfield.IDF

Peak discharge = 2.922 cfs
 Time to peak = 8 min
 Hyd. volume = 1,403 cuft
 Runoff coeff. = 0.77*
 Tc by TR55 = 8.00 min
 Asc/Rec limb fact = 1/1

* Composite (Area/C) = [(0.490 x 0.99) + (0.420 x 0.51)] / 0.910



TR55 Tc Worksheet

Hydraflow Hydrographs by Intelisolve v9.2

Hyd. No. 1

ED-1 (Total to POA-1)

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>	
Sheet Flow					
Manning's n-value	= 0.011	0.150	0.011		
Flow length (ft)	= 65.0	35.0	0.0		
Two-year 24-hr precip. (in)	= 3.30	3.30	0.00		
Land slope (%)	= 1.30	1.30	0.00		
Travel Time (min)	= 1.00	+ 4.95	+ 0.00	=	5.95
Shallow Concentrated Flow					
Flow length (ft)	= 89.00	112.00	196.00		
Watercourse slope (%)	= 1.10	7.60	2.30		
Surface description	= Paved	Paved	Paved		
Average velocity (ft/s)	= 2.13	5.60	3.08		
Travel Time (min)	= 0.70	+ 0.33	+ 1.06	=	2.09
Channel Flow					
X sectional flow area (sqft)	= 0.00	0.00	0.00		
Wetted perimeter (ft)	= 0.00	0.00	0.00		
Channel slope (%)	= 0.00	0.00	0.00		
Manning's n-value	= 0.015	0.015	0.015		
Velocity (ft/s)	= 0.00	0.00	0.00		
Flow length (ft)	= 0.0	0.0	0.0		
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	=	0.00
Total Travel Time, Tc					8.00 min

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

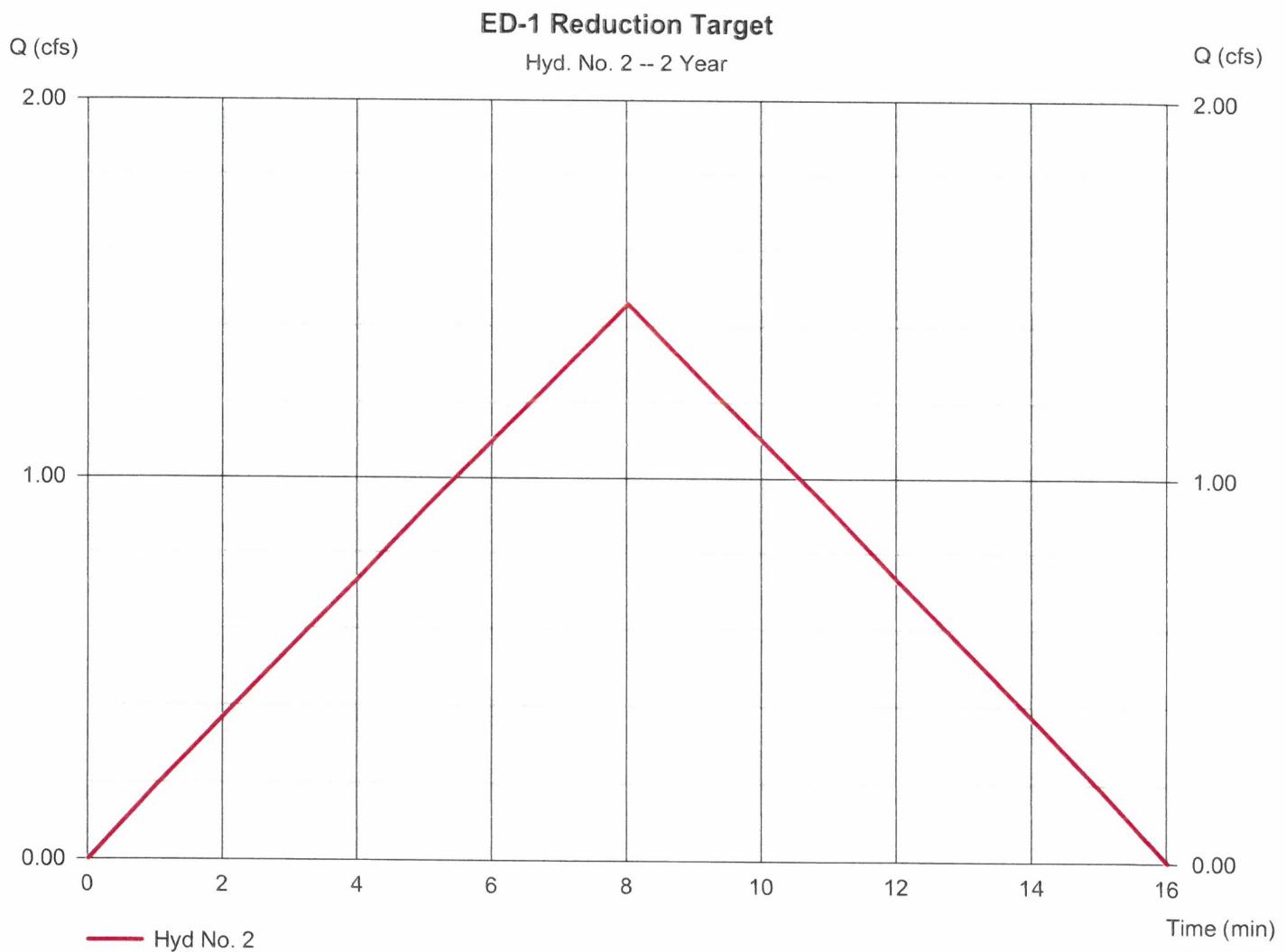
Thursday, Apr 2, 2020

Hyd. No. 2

ED-1 Reduction Target

Hydrograph type = Manual
Storm frequency = 2 yrs
Time interval = 1 min

Peak discharge = 1.460 cfs
Time to peak = 8 min
Hyd. volume = 704 cuft



Hydrograph Report

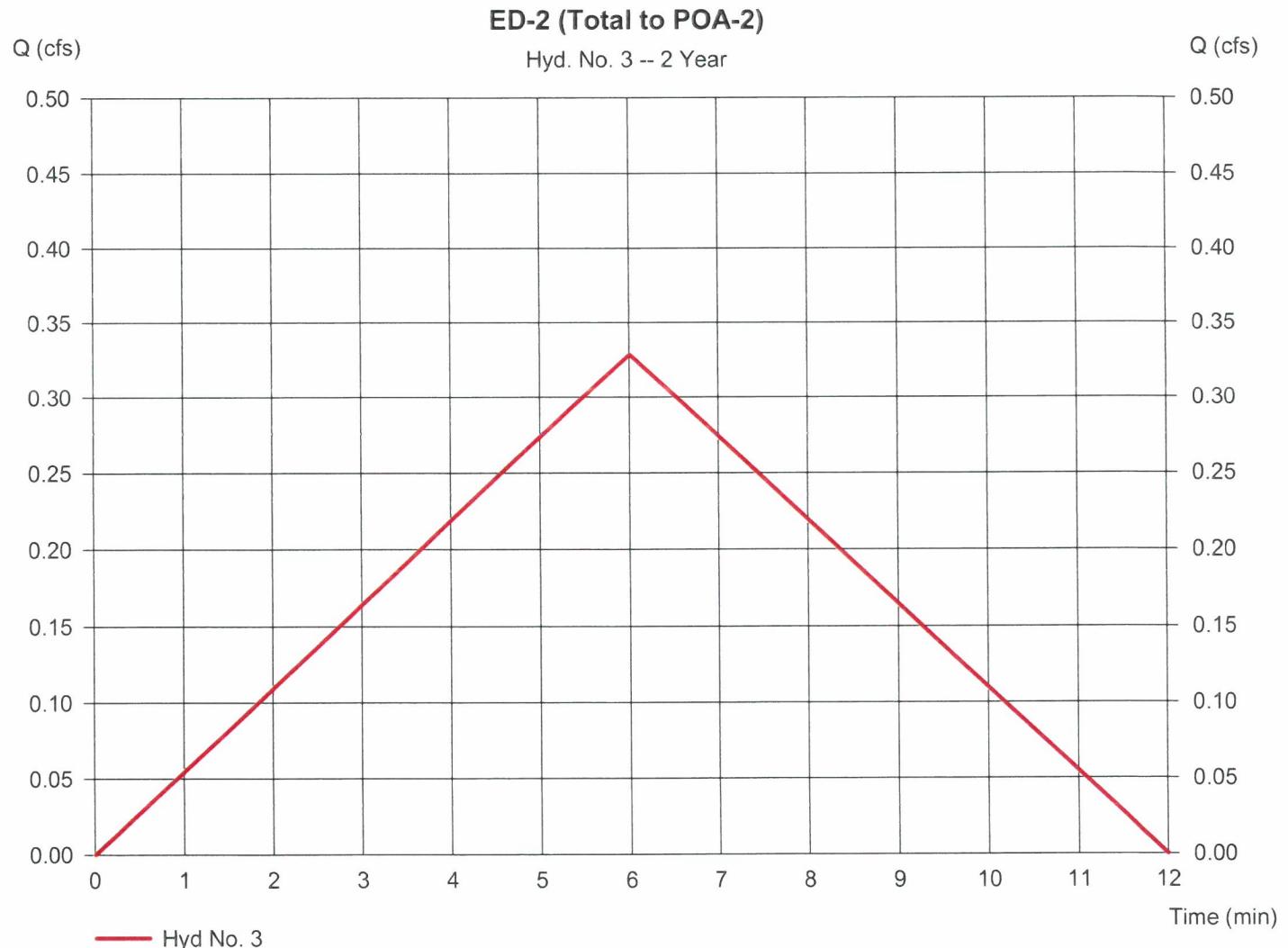
Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Apr 2, 2020

Hyd. No. 3

ED-2 (Total to POA-2)

Hydrograph type	= Rational	Peak discharge	= 0.328 cfs
Storm frequency	= 2 yrs	Time to peak	= 6 min
Time interval	= 1 min	Hyd. volume	= 118 cuft
Drainage area	= 0.090 ac	Runoff coeff.	= 0.8
Intensity	= 4.562 in/hr	Tc by User	= 6.00 min
IDF Curve	= plainfield.IDF	Asc/Rec limb fact	= 1/1



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

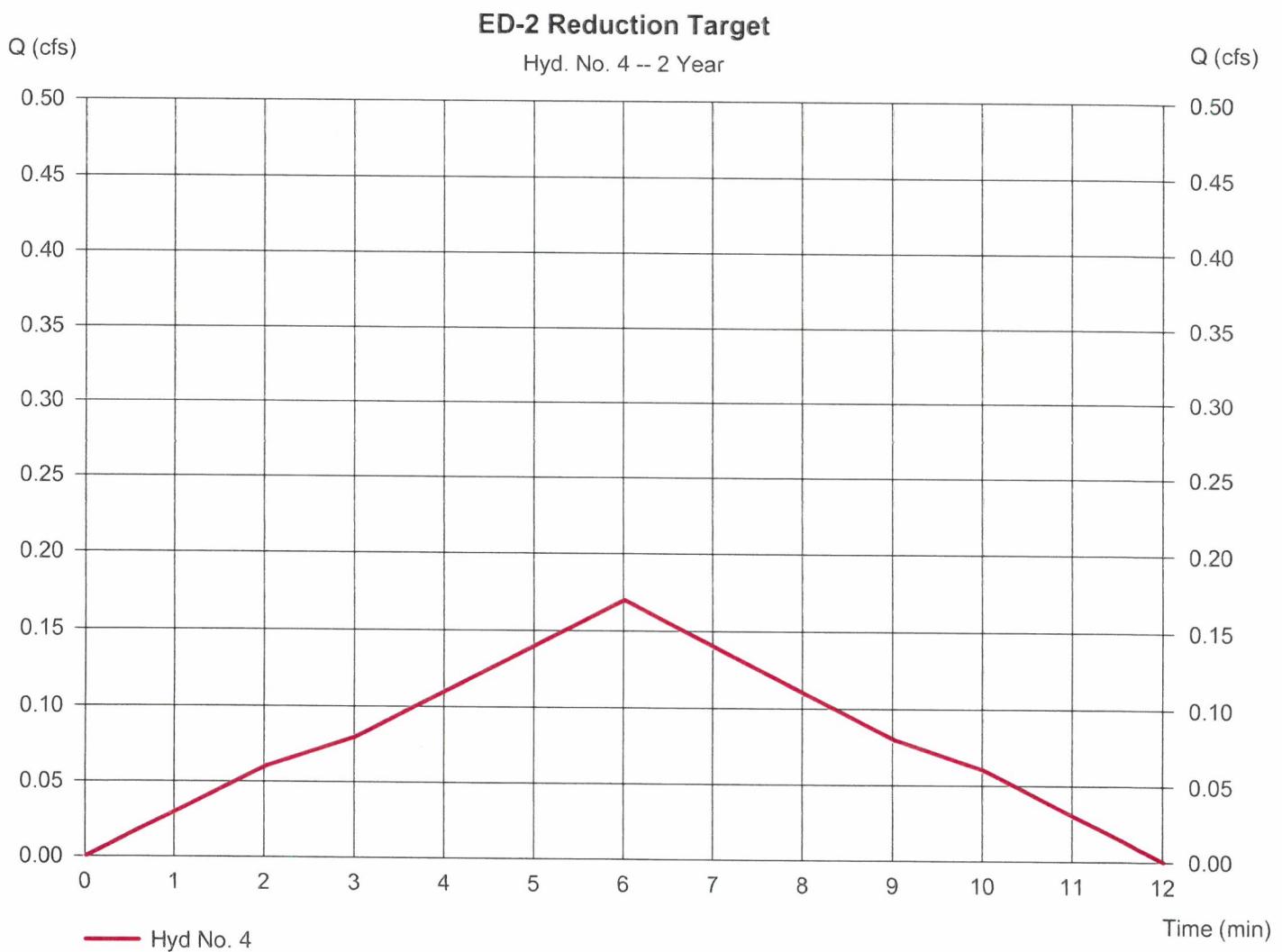
Thursday, Apr 2, 2020

Hyd. No. 4

ED-2 Reduction Target

Hydrograph type = Manual
Storm frequency = 2 yrs
Time interval = 1 min

Peak discharge = 0.170 cfs
Time to peak = 6 min
Hyd. volume = 61 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

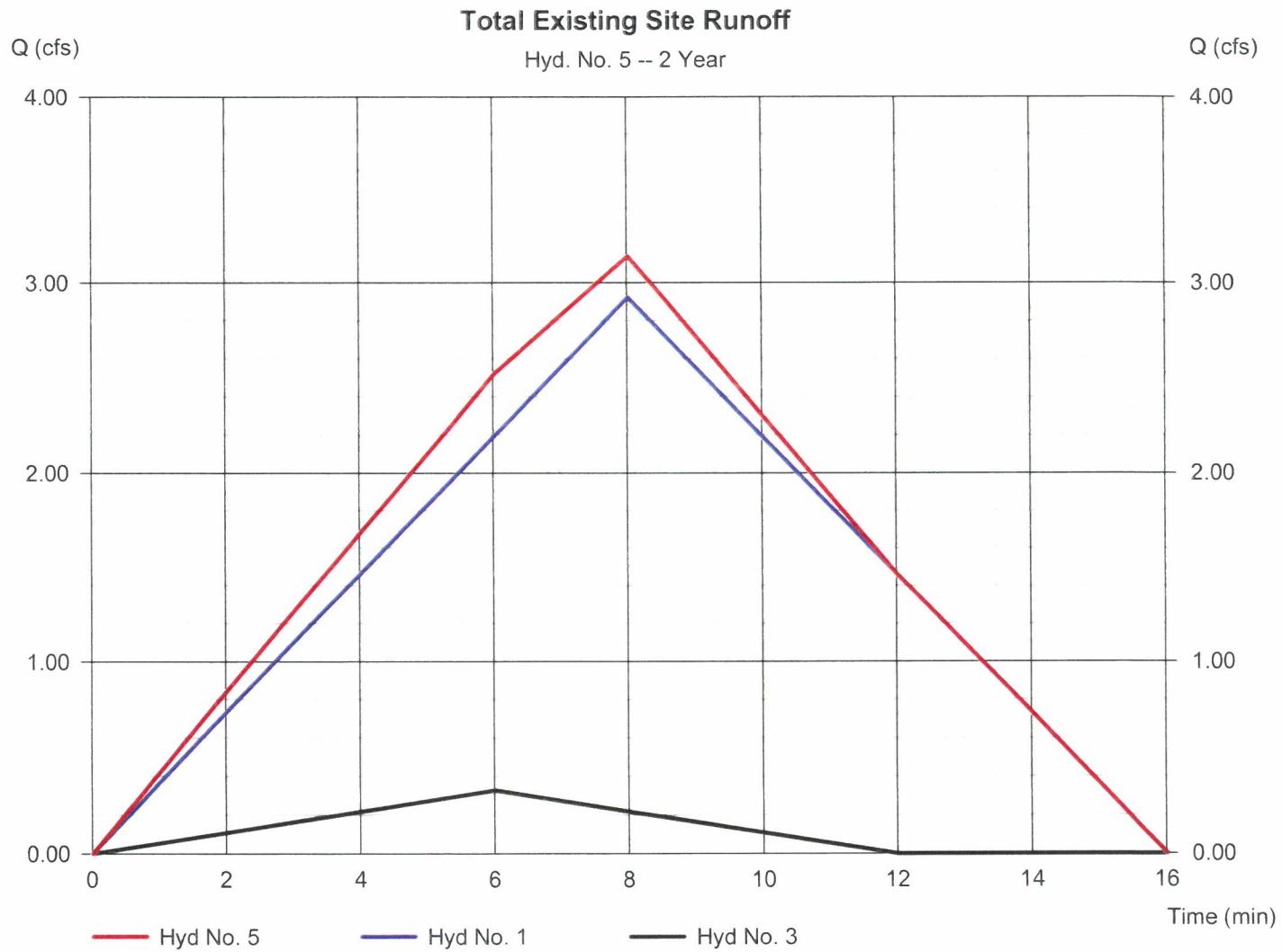
Thursday, Apr 2, 2020

Hyd. No. 5

Total Existing Site Runoff

Hydrograph type = Combine
 Storm frequency = 2 yrs
 Time interval = 1 min
 Inflow hyds. = 1, 3

Peak discharge = 3.141 cfs
 Time to peak = 8 min
 Hyd. volume = 1,521 cuft
 Contrib. drain. area = 1.000 ac



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

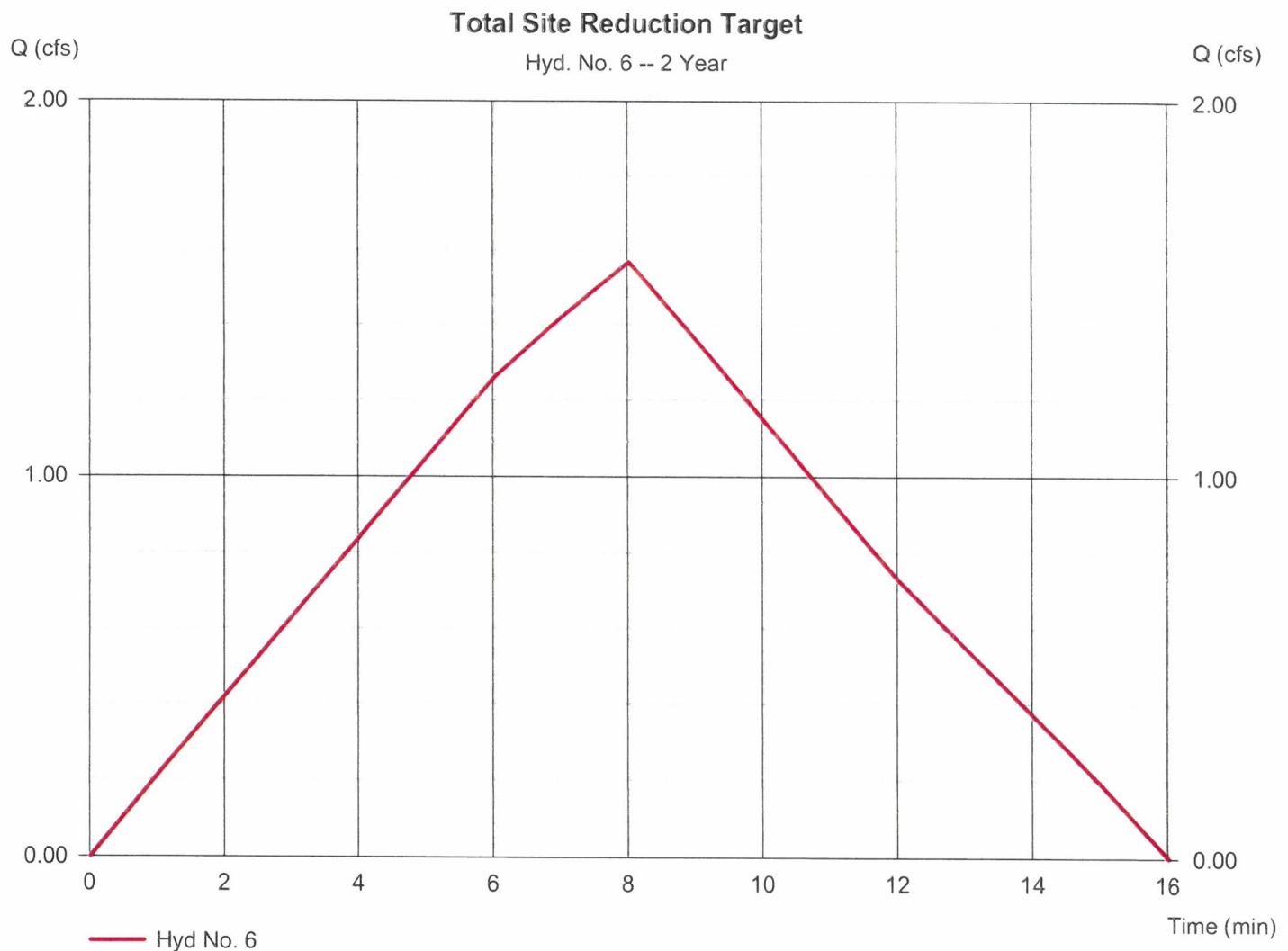
Thursday, Apr 2, 2020

Hyd. No. 6

Total Site Reduction Target

Hydrograph type = Manual
Storm frequency = 2 yrs
Time interval = 1 min

Peak discharge = 1.570 cfs
Time to peak = 8 min
Hyd. volume = 761 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Apr 2, 2020

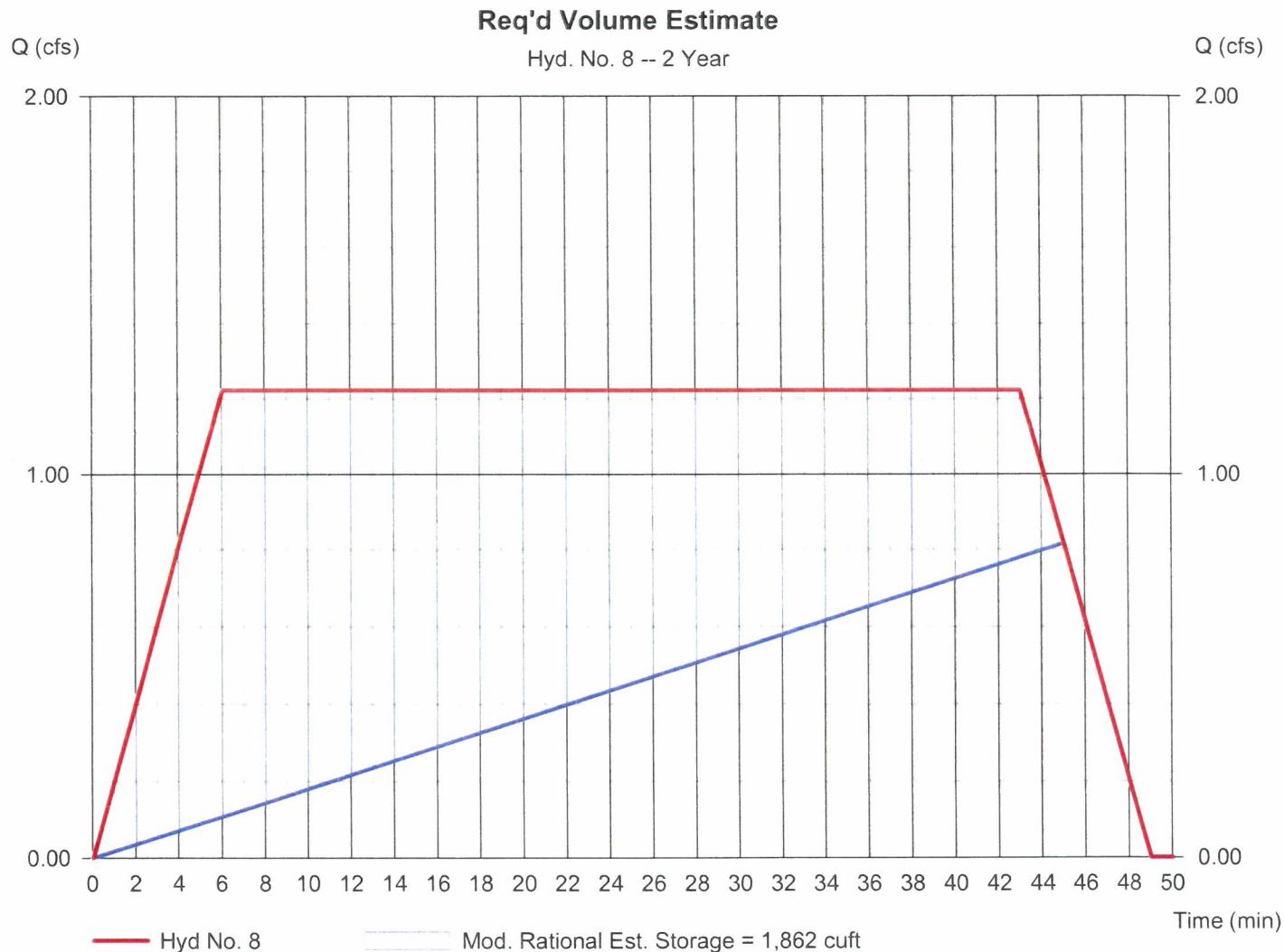
Hyd. No. 8

Req'd Volume Estimate

Hydrograph type = Mod. Rational
 Storm frequency = 2 yrs
 Time interval = 1 min
 Drainage area = 0.770 ac
 Intensity = 1.747 in/hr
 IDF Curve = plainfield.IDF
 Target Q = 0.870 cfs

Peak discharge = 1.224 cfs
 Time to peak = 6 min
 Hyd. volume = 3,173 cuft
 Runoff coeff. = 0.91*
 Tc by User = 6.00 min
 Storm duration = 7.2 x Tc
 Est. Req'd Storage = 1,862 cuft

* Composite (Area/C) = [(0.640 x 0.99) + (0.130 x 0.51)] / 0.770



Hydrograph Report

Hydraflow Hydrographs by Intelsolve v9.2

Thursday, Apr 2, 2020

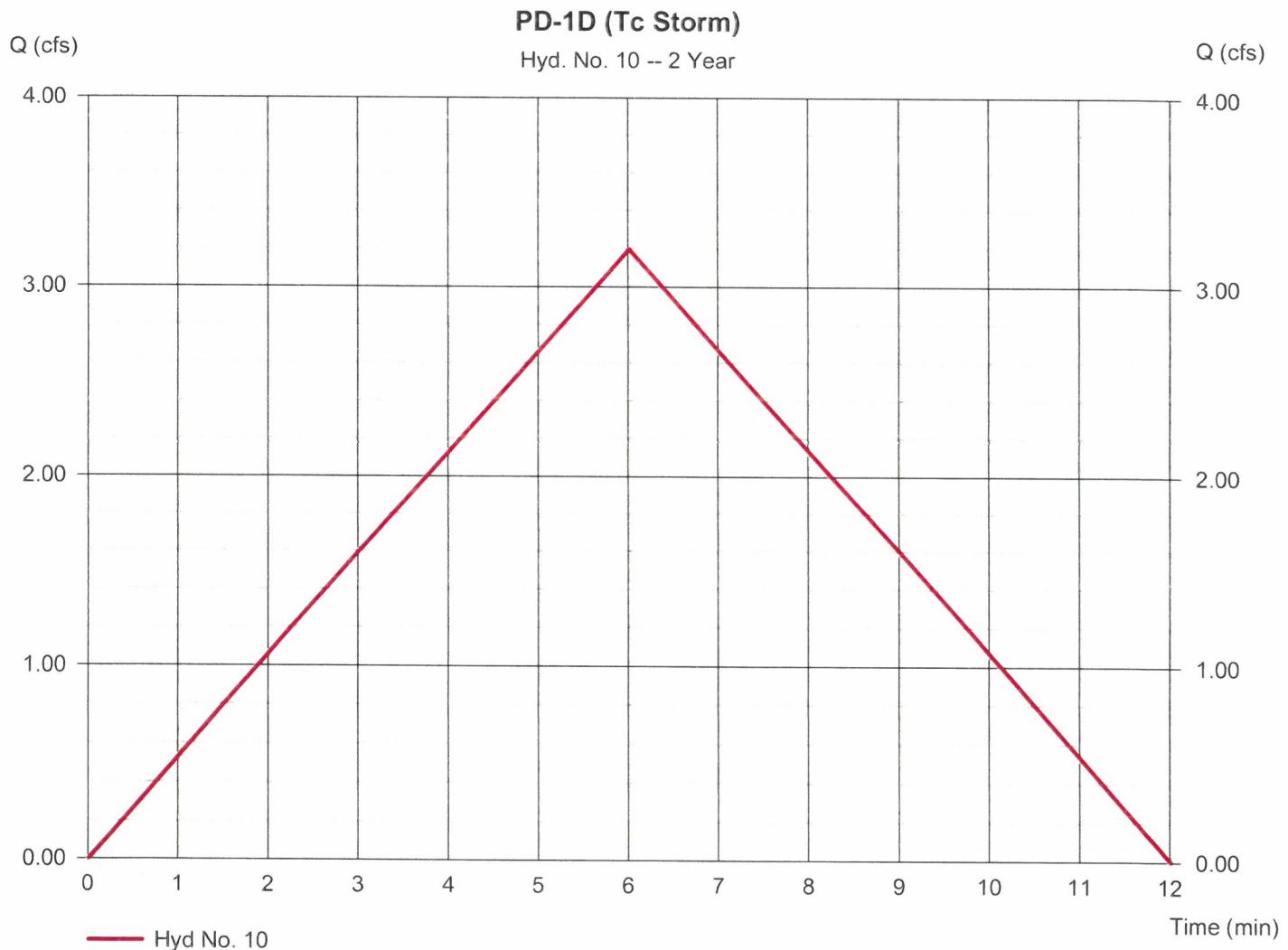
Hyd. No. 10

PD-1D (Tc Storm)

Hydrograph type = Rational
 Storm frequency = 2 yrs
 Time interval = 1 min
 Drainage area = 0.770 ac
 Intensity = 4.562 in/hr
 IDF Curve = plainfield.IDF

Peak discharge = 3.197 cfs
 Time to peak = 6 min
 Hyd. volume = 1,151 cuft
 Runoff coeff. = 0.91*
 Tc by User = 6.00 min
 Asc/Rec limb fact = 1/1

* Composite (Area/C) = $[(0.640 \times 0.99) + (0.130 \times 0.51)] / 0.770$



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

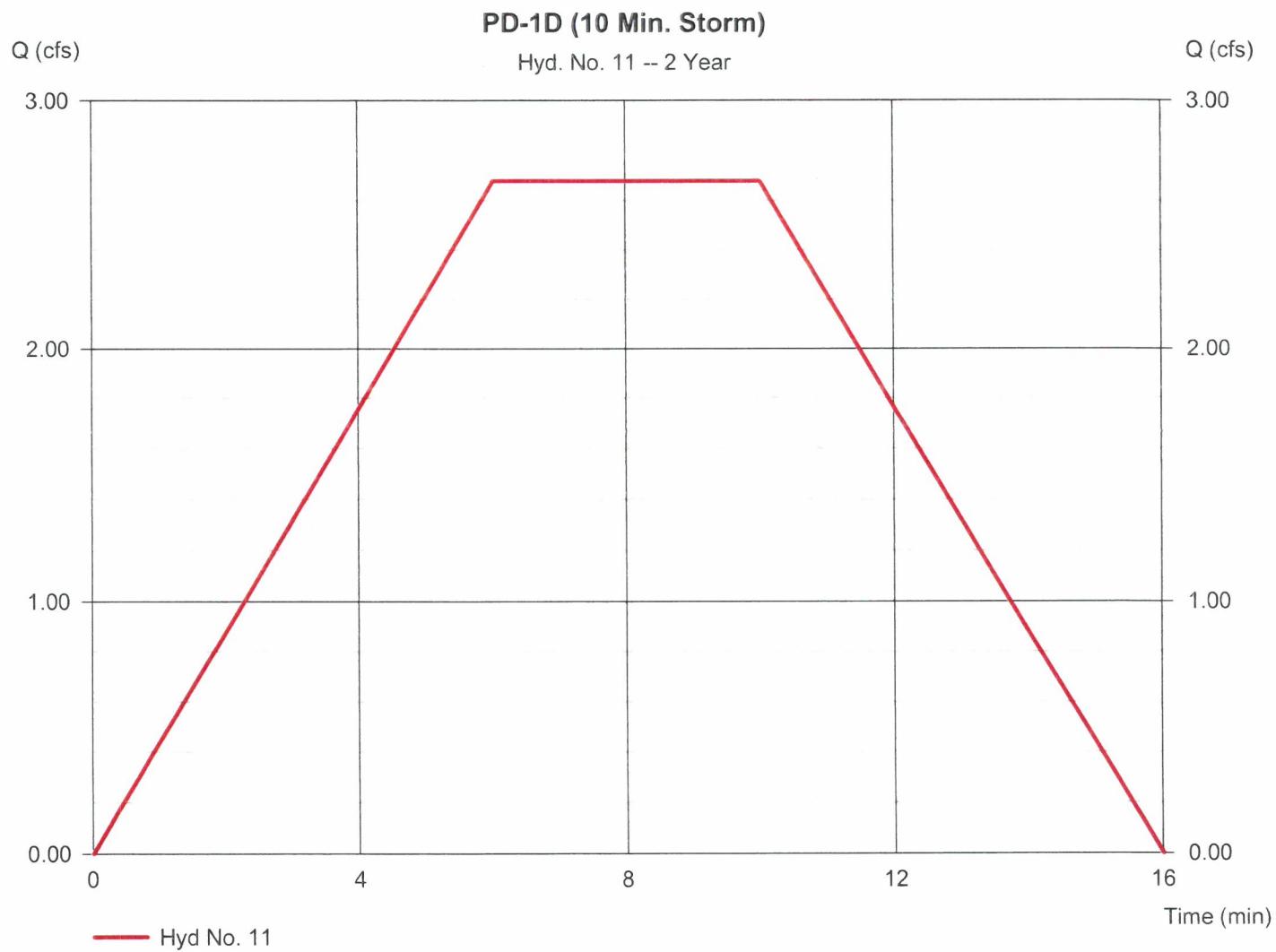
Thursday, Apr 2, 2020

Hyd. No. 11

PD-1D (10 Min. Storm)

Hydrograph type = Manual
Storm frequency = 2 yrs
Time interval = 2 min

Peak discharge = 2.680 cfs
Time to peak = 6 min
Hyd. volume = 1,598 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

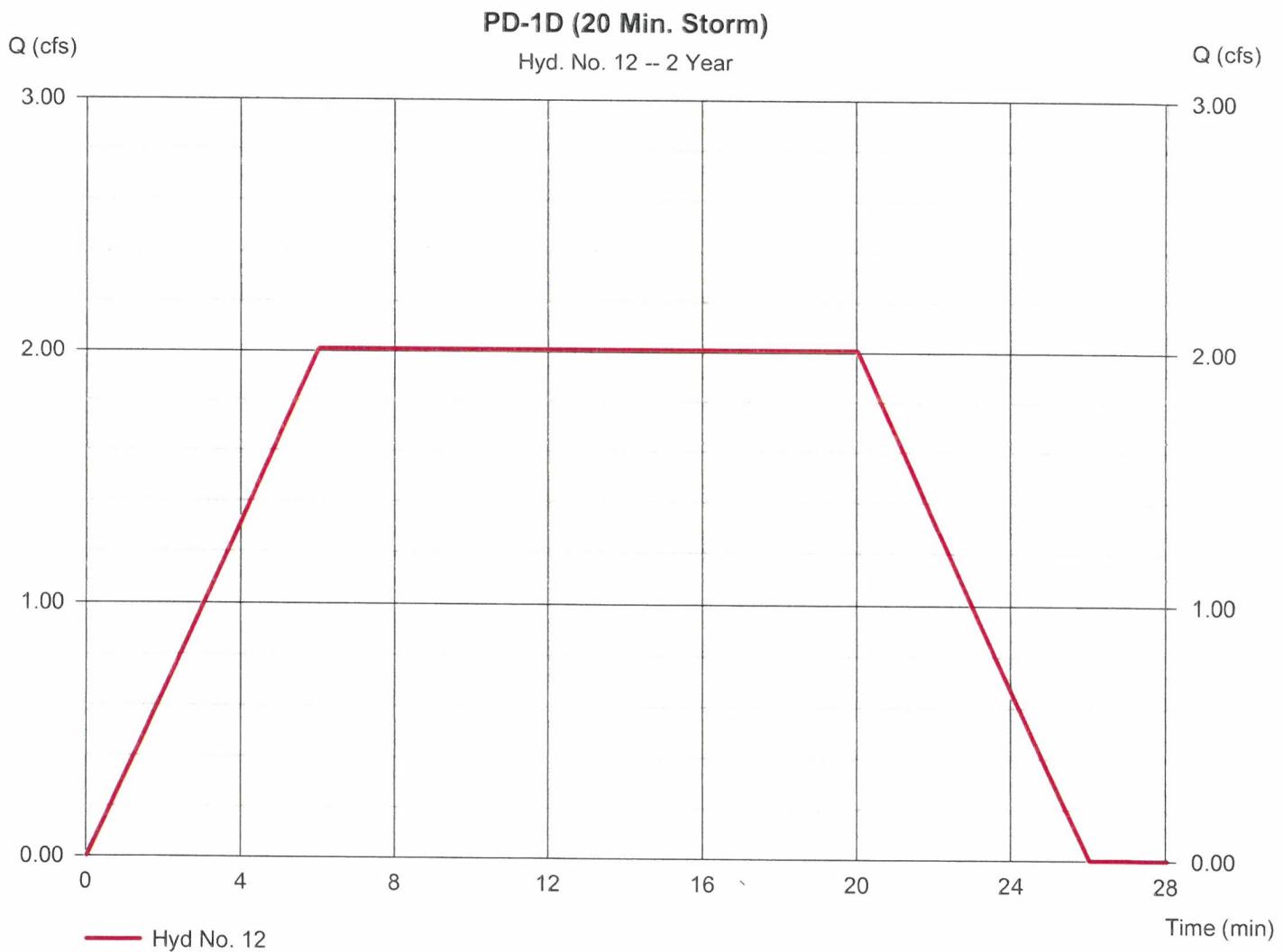
Thursday, Apr 2, 2020

Hyd. No. 12

PD-1D (20 Min. Storm)

Hydrograph type = Manual
Storm frequency = 2 yrs
Time interval = 2 min

Peak discharge = 2.010 cfs
Time to peak = 6 min
Hyd. volume = 2,405 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

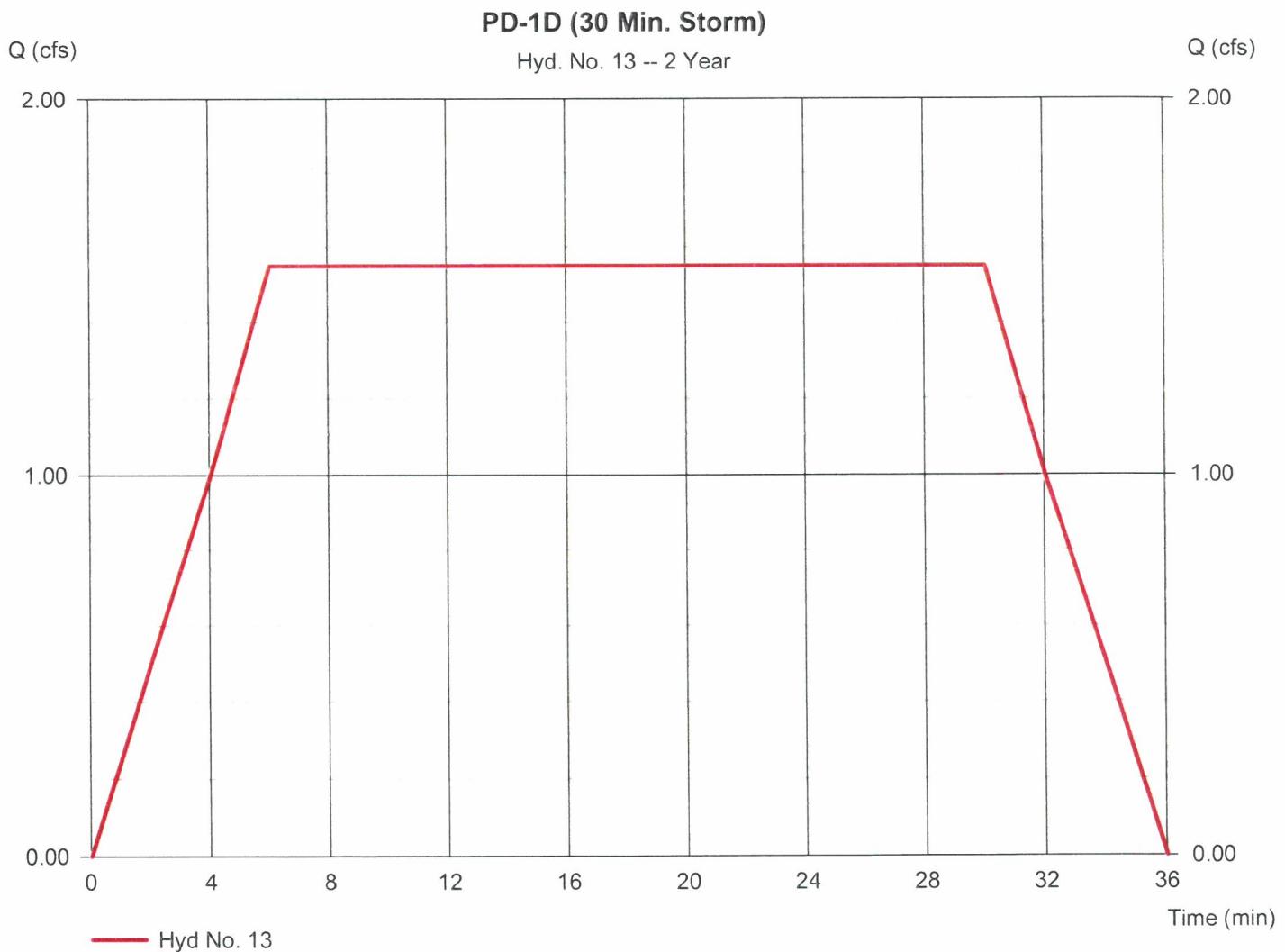
Thursday, Apr 2, 2020

Hyd. No. 13

PD-1D (30 Min. Storm)

Hydrograph type = Manual
Storm frequency = 2 yrs
Time interval = 2 min

Peak discharge = 1.550 cfs
Time to peak = 6 min
Hyd. volume = 2,778 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Apr 2, 2020

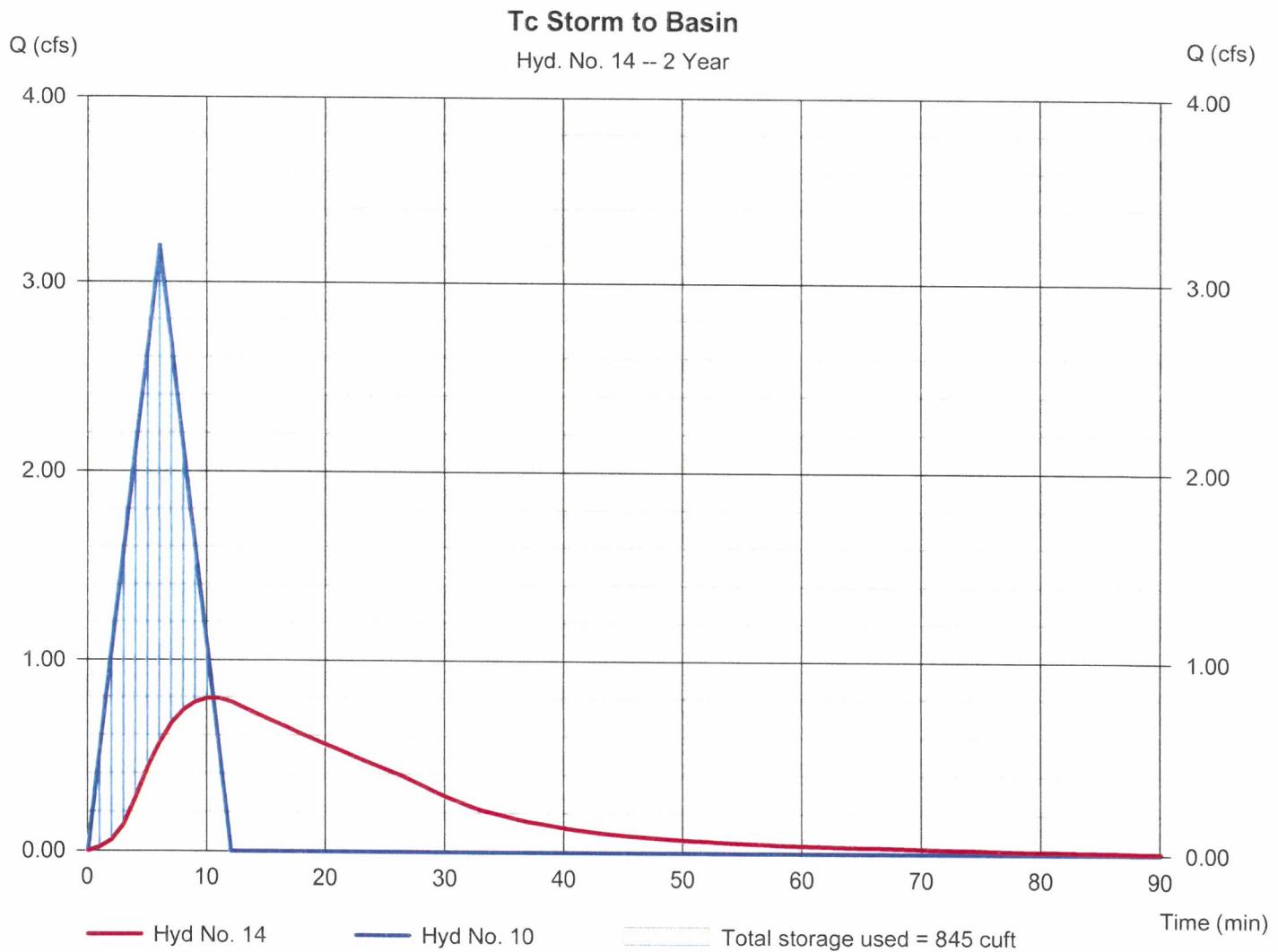
Hyd. No. 14

Tc Storm to Basin

Hydrograph type = Reservoir
 Storm frequency = 2 yrs
 Time interval = 1 min
 Inflow hyd. No. = 10 - PD-1D (Tc Storm)
 Reservoir name = Cultec Detention Basin

Peak discharge = 0.793 cfs
 Time to peak = 11 min
 Hyd. volume = 1,150 cuft
 Max. Elevation = 126.69 ft
 Max. Storage = 845 cuft

Storage Indication method used.



Pond Report

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Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Apr 2, 2020

Pond No. 1 - Cultec Detention Basin

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	125.60	n/a	0	0
0.15	125.75	n/a	118	118
0.40	126.00	n/a	196	314
0.65	126.25	n/a	196	510
0.90	126.50	n/a	196	706
1.15	126.75	n/a	196	902
1.40	127.00	n/a	196	1,098
1.65	127.25	n/a	196	1,294
1.90	127.50	n/a	196	1,490
2.15	127.75	n/a	196	1,686
2.40	128.00	n/a	196	1,882
2.65	128.25	n/a	196	2,078
2.70	128.30	n/a	40	2,118

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	6.00	0.00	0.00
Span (in)	= 12.00	6.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 125.52	125.52	0.00	0.00
Length (ft)	= 154.00	0.00	0.00	0.00
Slope (%)	= 2.22	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

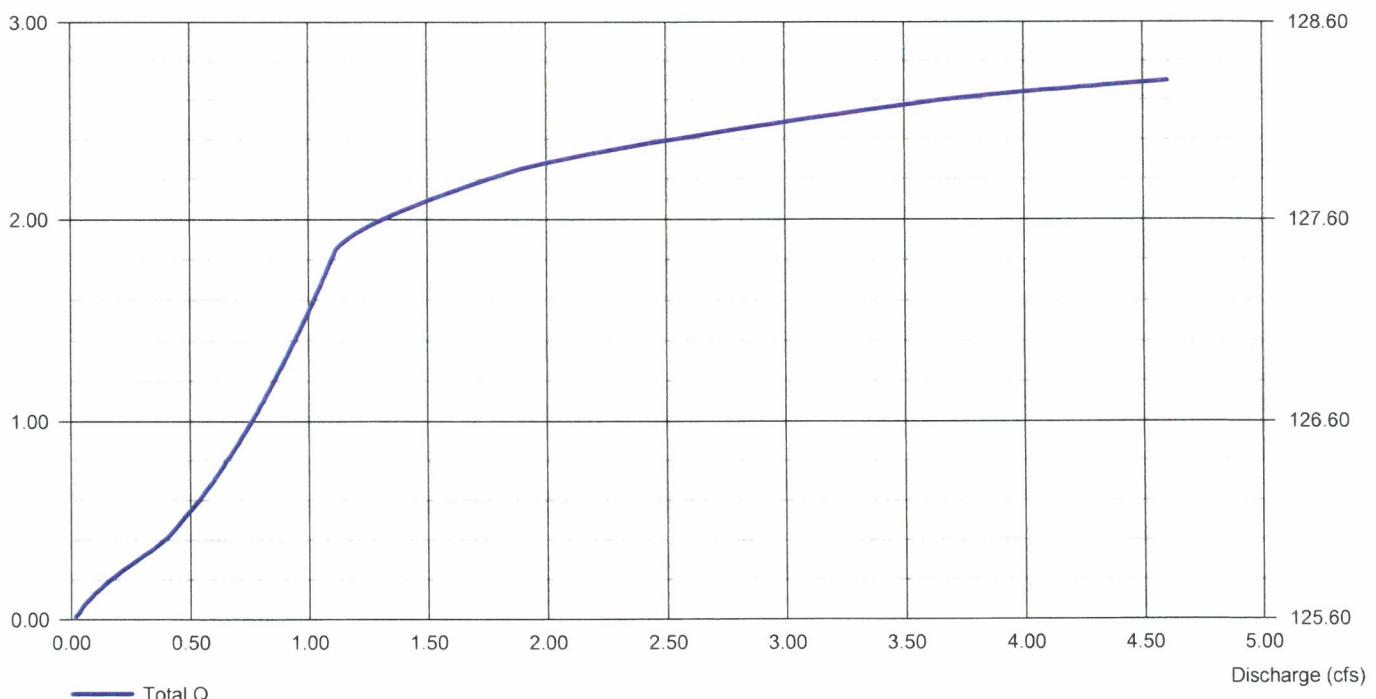
	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.83	1.17	4.00	0.00
Crest El. (ft)	= 127.45	127.85	128.20	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	Rect	Rect	---
Multi-Stage	= Yes	Yes	Yes	No
Exfil.(in/hr)				= 0.000 (by Wet area)
TW Elev. (ft)				= 0.00

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

Stage (ft)

Stage / Discharge

Elev (ft)



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Apr 2, 2020

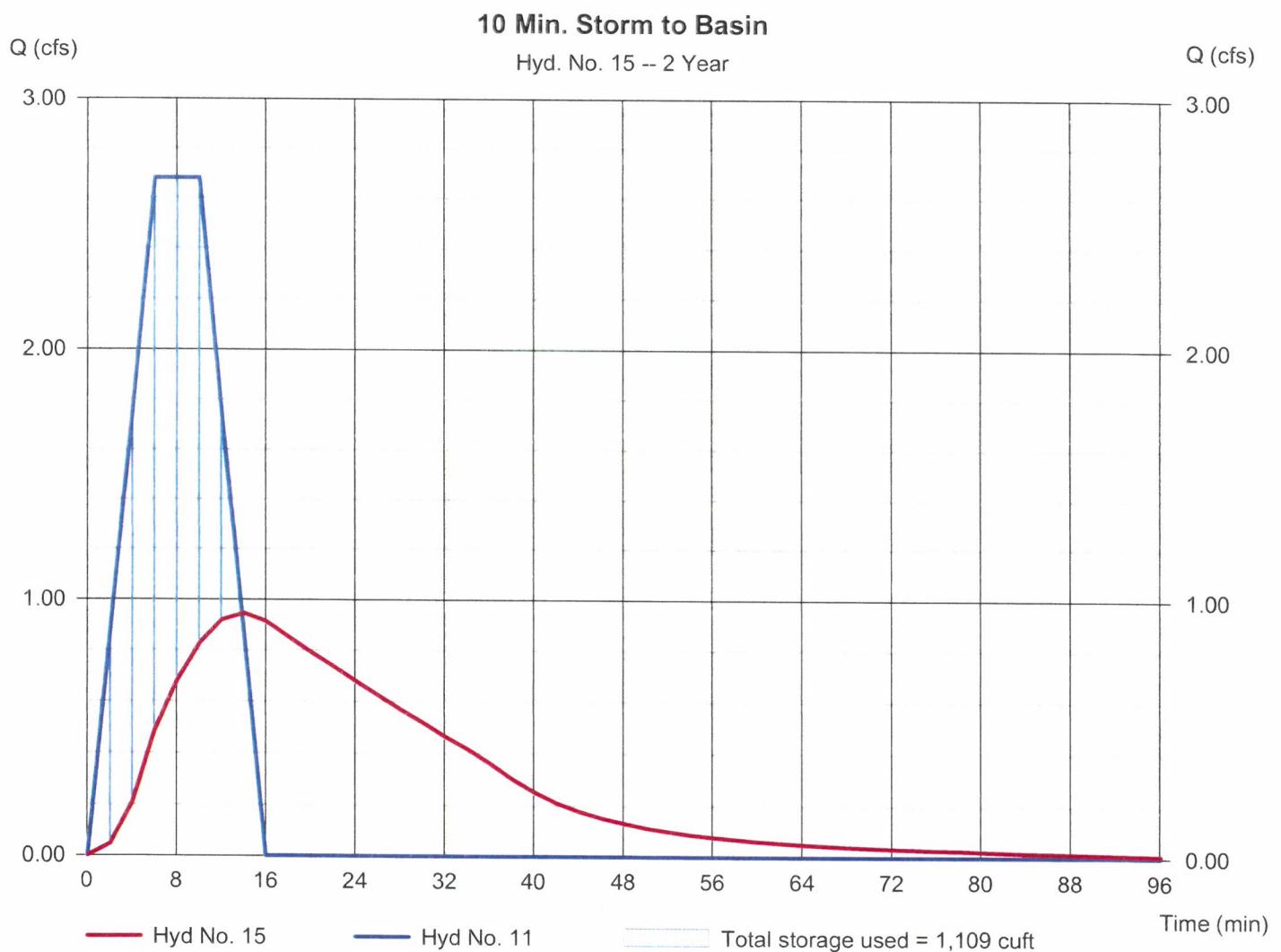
Hyd. No. 15

10 Min. Storm to Basin

Hydrograph type = Reservoir
 Storm frequency = 2 yrs
 Time interval = 2 min
 Inflow hyd. No. = 11 - PD-1D (10 Min. Storm)
 Reservoir name = Cultec Detention Basin

Peak discharge = 0.944 cfs
 Time to peak = 14 min
 Hyd. volume = 1,598 cuft
 Max. Elevation = 127.02 ft
 Max. Storage = 1,109 cuft

Storage Indication method used.



Pond Report

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Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Apr 2, 2020

Pond No. 1 - Cultec Detention Basin

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	125.60	n/a	0	0
0.15	125.75	n/a	118	118
0.40	126.00	n/a	196	314
0.65	126.25	n/a	196	510
0.90	126.50	n/a	196	706
1.15	126.75	n/a	196	902
1.40	127.00	n/a	196	1,098
1.65	127.25	n/a	196	1,294
1.90	127.50	n/a	196	1,490
2.15	127.75	n/a	196	1,686
2.40	128.00	n/a	196	1,882
2.65	128.25	n/a	196	2,078
2.70	128.30	n/a	40	2,118

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	6.00	0.00	0.00
Span (in)	= 12.00	6.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 125.52	125.52	0.00	0.00
Length (ft)	= 154.00	0.00	0.00	0.00
Slope (%)	= 2.22	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

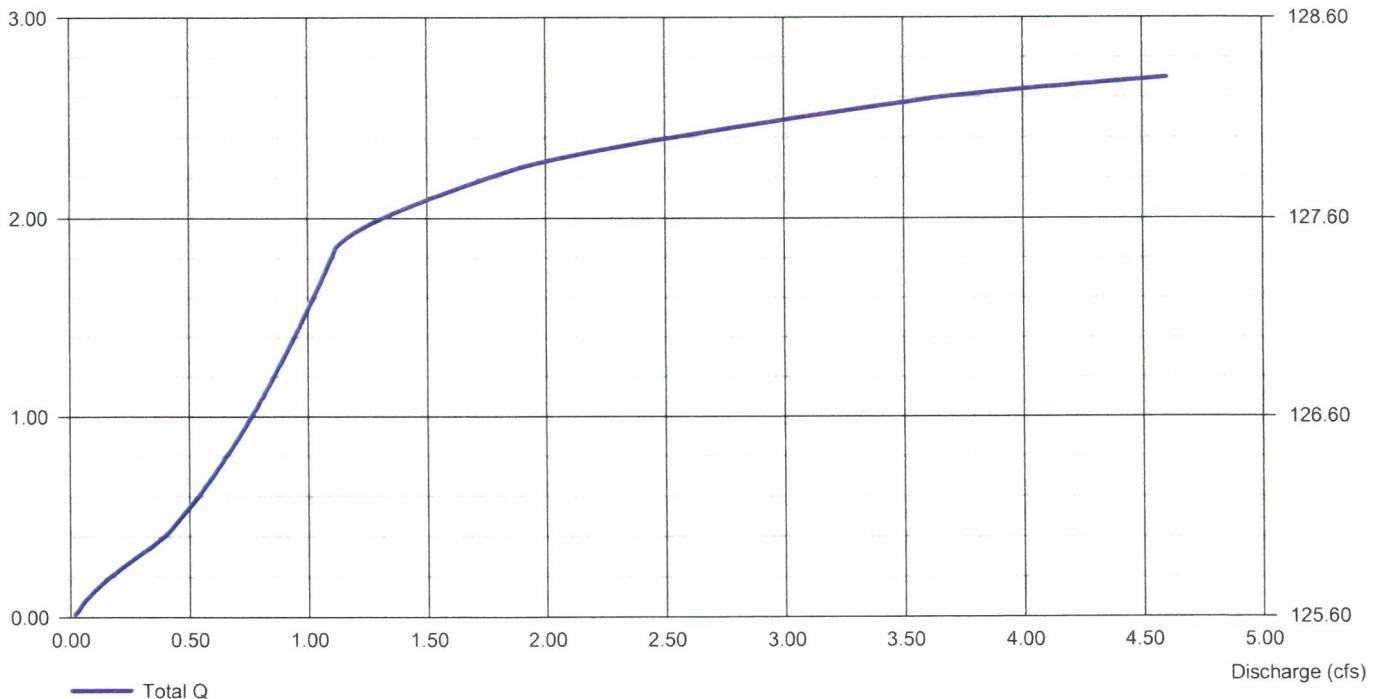
	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.83	1.17	4.00	0.00
Crest El. (ft)	= 127.45	127.85	128.20	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	Rect	Rect	---
Multi-Stage	= Yes	Yes	Yes	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

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

Stage (ft)

Stage / Discharge

Elev (ft)



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Apr 2, 2020

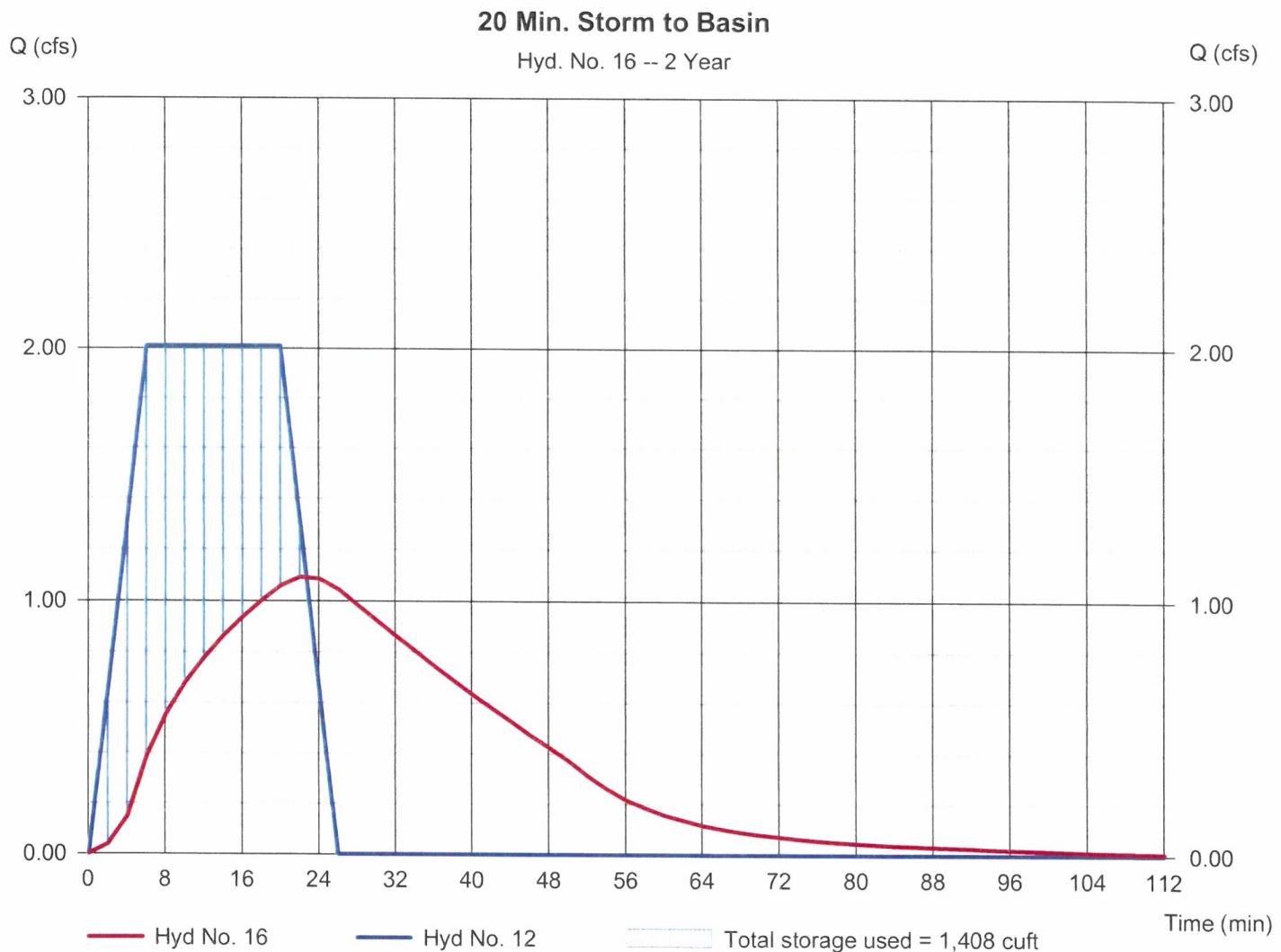
Hyd. No. 16

20 Min. Storm to Basin

Hydrograph type = Reservoir
 Storm frequency = 2 yrs
 Time interval = 2 min
 Inflow hyd. No. = 12 - PD-1D (20 Min. Storm)
 Reservoir name = Cultec Detention Basin

Peak discharge = 1.093 cfs
 Time to peak = 22 min
 Hyd. volume = 2,404 cuft
 Max. Elevation = 127.41 ft
 Max. Storage = 1,408 cuft

Storage Indication method used.



Pond Report

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Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Apr 2, 2020

Pond No. 1 - Cultec Detention Basin

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	125.60	n/a	0	0
0.15	125.75	n/a	118	118
0.40	126.00	n/a	196	314
0.65	126.25	n/a	196	510
0.90	126.50	n/a	196	706
1.15	126.75	n/a	196	902
1.40	127.00	n/a	196	1,098
1.65	127.25	n/a	196	1,294
1.90	127.50	n/a	196	1,490
2.15	127.75	n/a	196	1,686
2.40	128.00	n/a	196	1,882
2.65	128.25	n/a	196	2,078
2.70	128.30	n/a	40	2,118

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	6.00	0.00	0.00
Span (in)	= 12.00	6.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 125.52	125.52	0.00	0.00
Length (ft)	= 154.00	0.00	0.00	0.00
Slope (%)	= 2.22	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

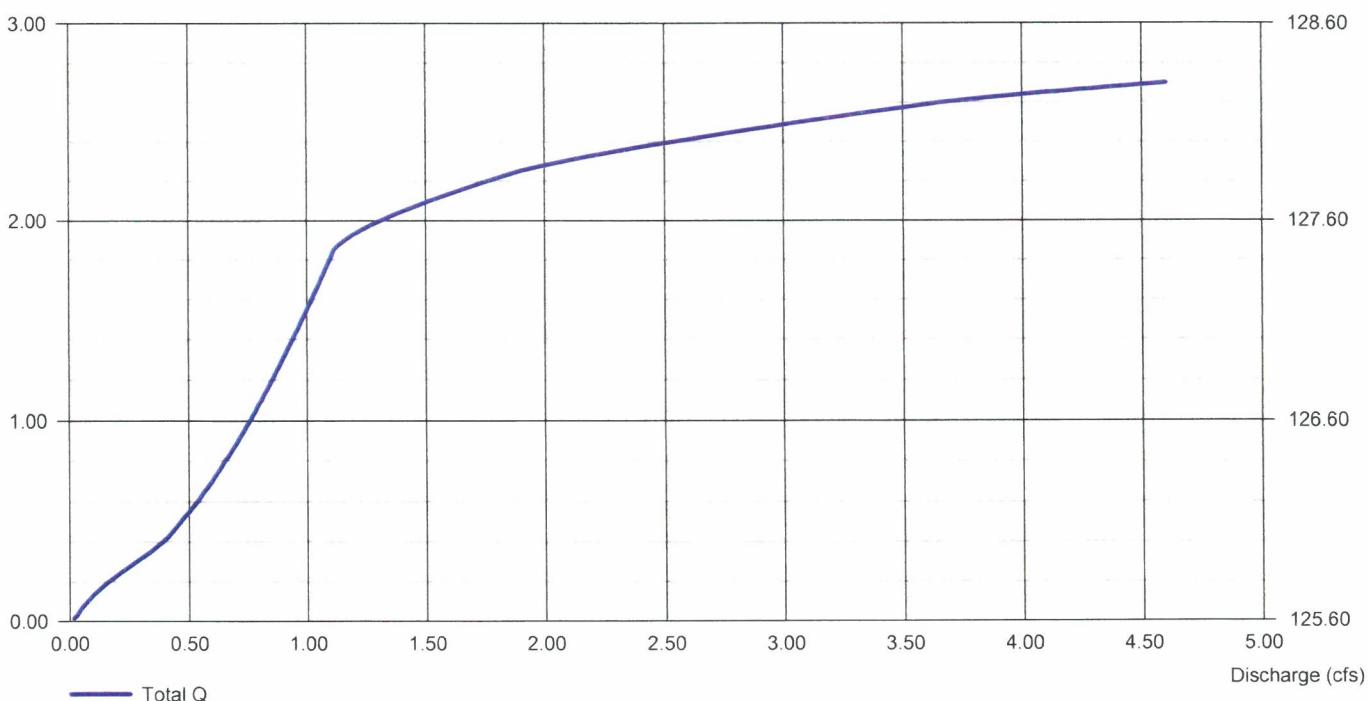
	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.83	1.17	4.00	0.00
Crest El. (ft)	= 127.45	127.85	128.20	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	Rect	Rect	---
Multi-Stage	= Yes	Yes	Yes	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

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

Stage (ft)

Stage / Discharge

Elev (ft)



Hydrograph Report

Hydraflow Hydrographs by Intelsolve v9.2

Thursday, Apr 2, 2020

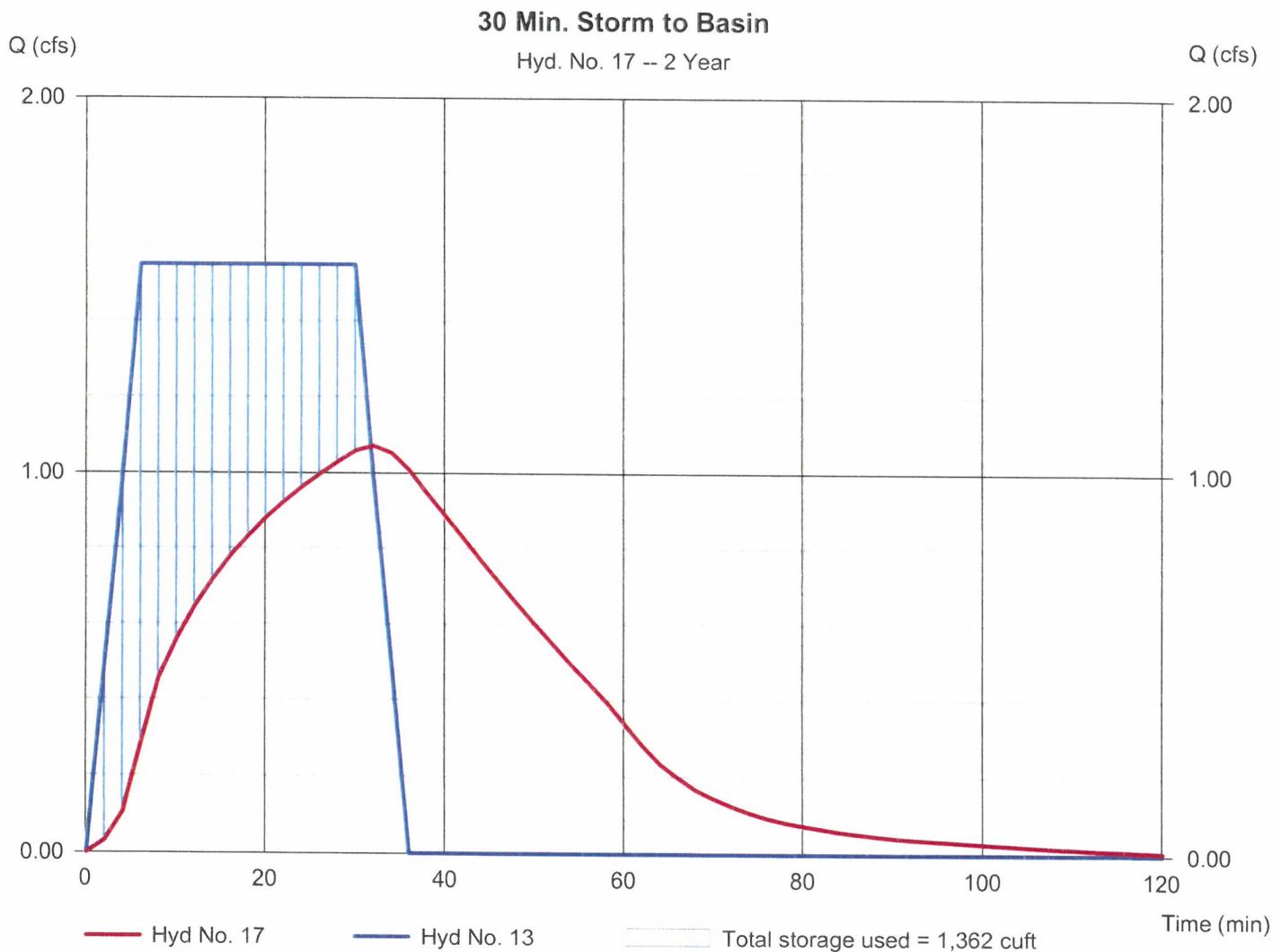
Hyd. No. 17

30 Min. Storm to Basin

Hydrograph type = Reservoir
 Storm frequency = 2 yrs
 Time interval = 2 min
 Inflow hyd. No. = 13 - PD-1D (30 Min. Storm)
 Reservoir name = Cultec Detention Basin

Peak discharge = 1.071 cfs
 Time to peak = 32 min
 Hyd. volume = 2,777 cuft
 Max. Elevation = 127.34 ft
 Max. Storage = 1,362 cuft

Storage Indication method used.



Pond Report

22

Hydraflow Hydrographs by InteliSolve v9.2

Thursday, Apr 2, 2020

Pond No. 1 - Cultec Detention Basin

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	125.60	n/a	0	0
0.15	125.75	n/a	118	118
0.40	126.00	n/a	196	314
0.65	126.25	n/a	196	510
0.90	126.50	n/a	196	706
1.15	126.75	n/a	196	902
1.40	127.00	n/a	196	1,098
1.65	127.25	n/a	196	1,294
1.90	127.50	n/a	196	1,490
2.15	127.75	n/a	196	1,686
2.40	128.00	n/a	196	1,882
2.65	128.25	n/a	196	2,078
2.70	128.30	n/a	40	2,118

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	6.00	0.00	0.00
Span (in)	= 12.00	6.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 125.52	125.52	0.00	0.00
Length (ft)	= 154.00	0.00	0.00	0.00
Slope (%)	= 2.22	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

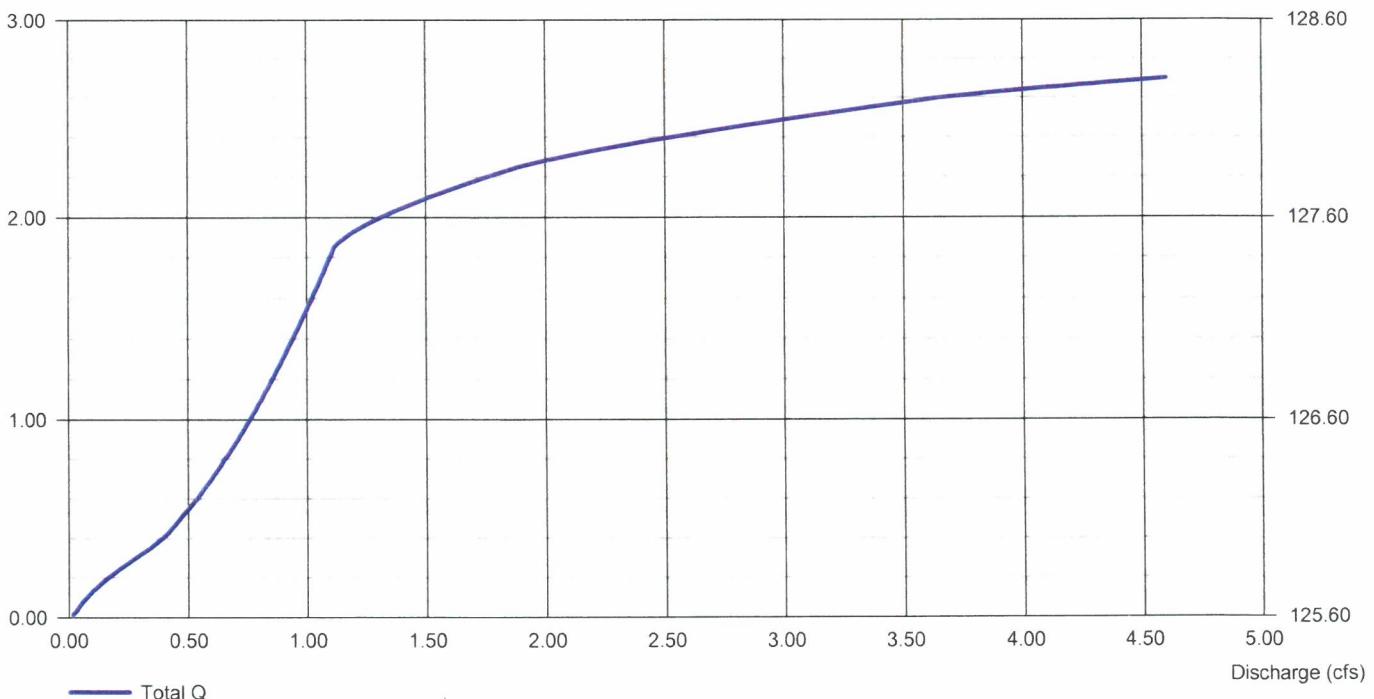
	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.83	1.17	4.00	0.00
Crest El. (ft)	= 127.45	127.85	128.20	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	Rect	Rect	---
Multi-Stage	= Yes	Yes	Yes	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

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

Stage (ft)

Stage / Discharge

Elev (ft)



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Apr 2, 2020

Hyd. No. 19

PD-1U (Tc Storm)

Hydrograph type = Rational
 Storm frequency = 2 yrs
 Time interval = 1 min
 Drainage area = 0.210 ac
 Intensity = 4.562 in/hr
 IDF Curve = plainfield.IDF

Peak discharge = 0.594 cfs
 Time to peak = 6 min
 Hyd. volume = 214 cuft
 Runoff coeff. = 0.62*
 Tc by User = 6.00 min
 Asc/Rec limb fact = 1/1

* Composite (Area/C) = [(0.050 x 0.99) + (0.160 x 0.51)] / 0.210



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

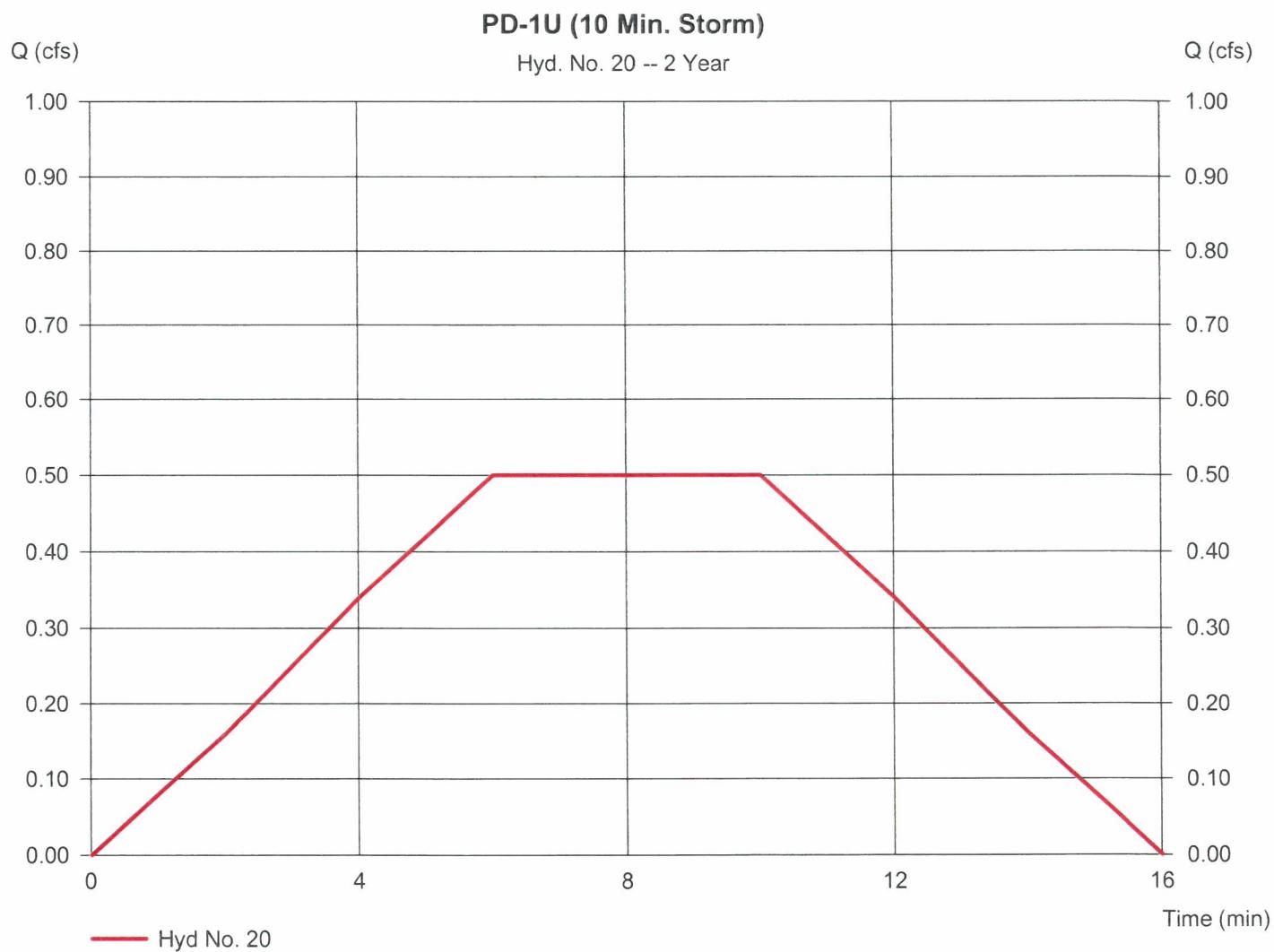
Thursday, Apr 2, 2020

Hyd. No. 20

PD-1U (10 Min. Storm)

Hydrograph type = Manual
Storm frequency = 2 yrs
Time interval = 2 min

Peak discharge = 0.500 cfs
Time to peak = 6 min
Hyd. volume = 300 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

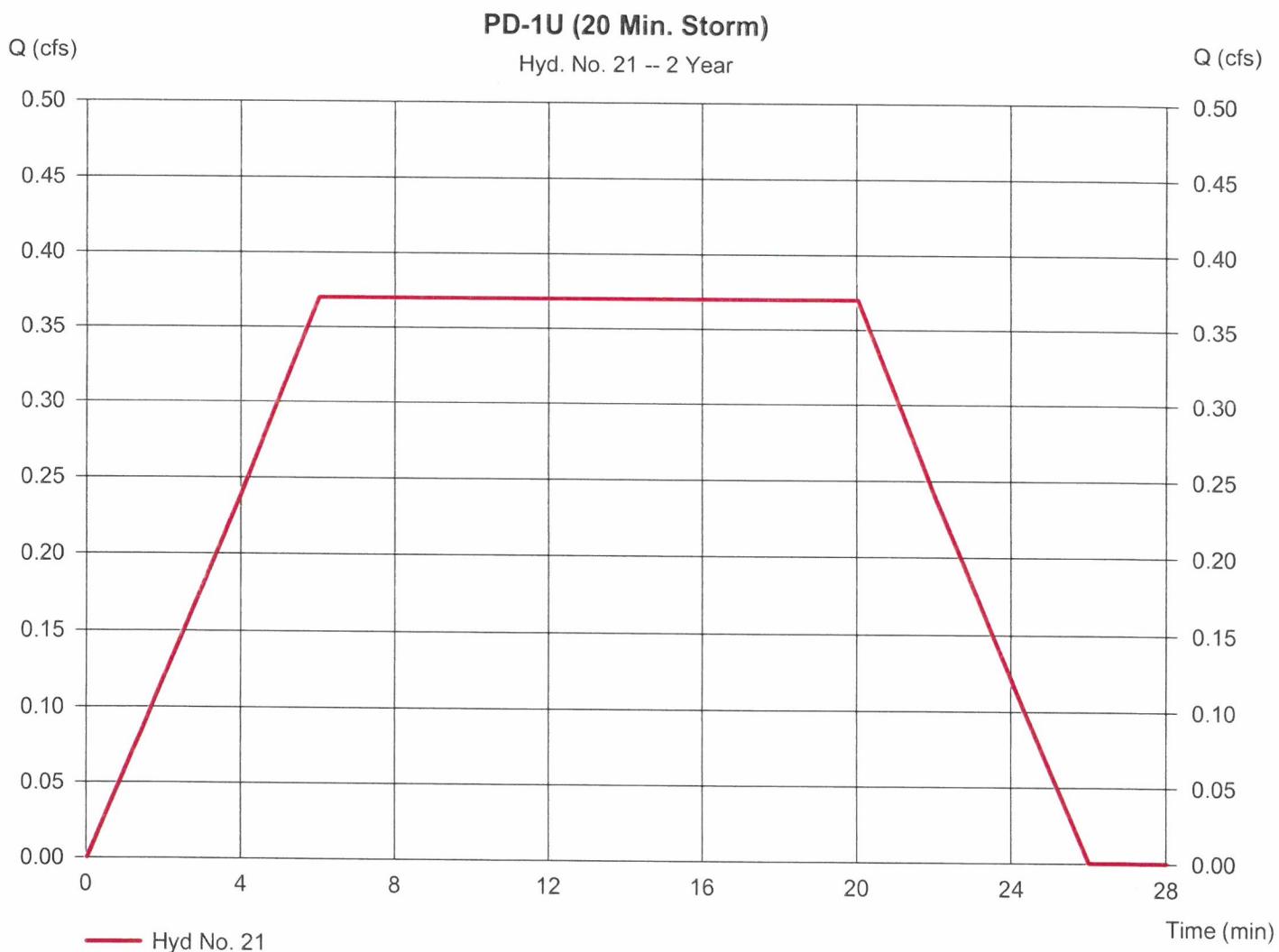
Thursday, Apr 2, 2020

Hyd. No. 21

PD-1U (20 Min. Storm)

Hydrograph type = Manual
Storm frequency = 2 yrs
Time interval = 2 min

Peak discharge = 0.370 cfs
Time to peak = 6 min
Hyd. volume = 442 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

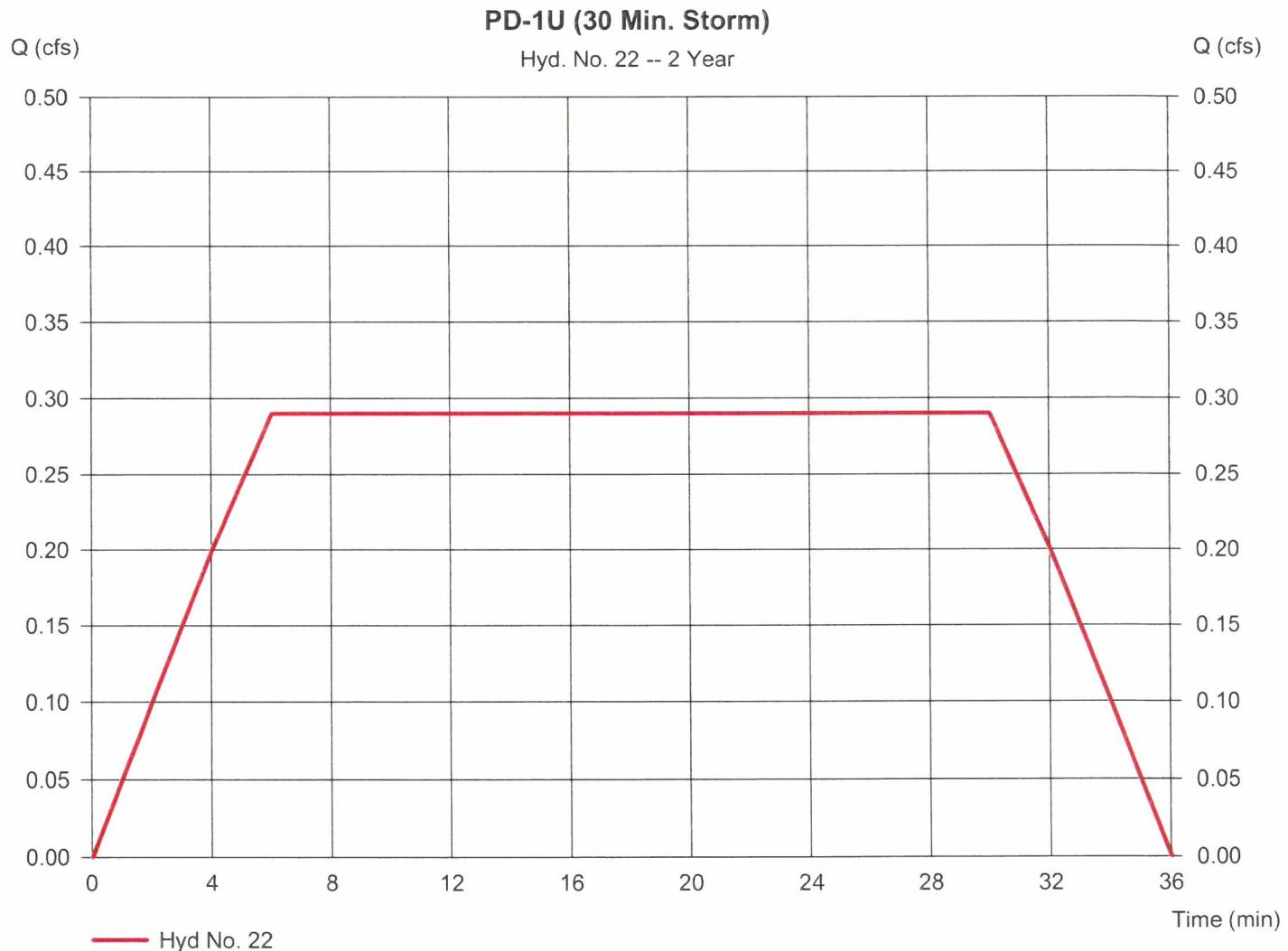
Thursday, Apr 2, 2020

Hyd. No. 22

PD-1U (30 Min. Storm)

Hydrograph type = Manual
Storm frequency = 2 yrs
Time interval = 2 min

Peak discharge = 0.290 cfs
Time to peak = 6 min
Hyd. volume = 524 cuft



Hydrograph Report

Hydraflow Hydrographs by InteliSolve v9.2

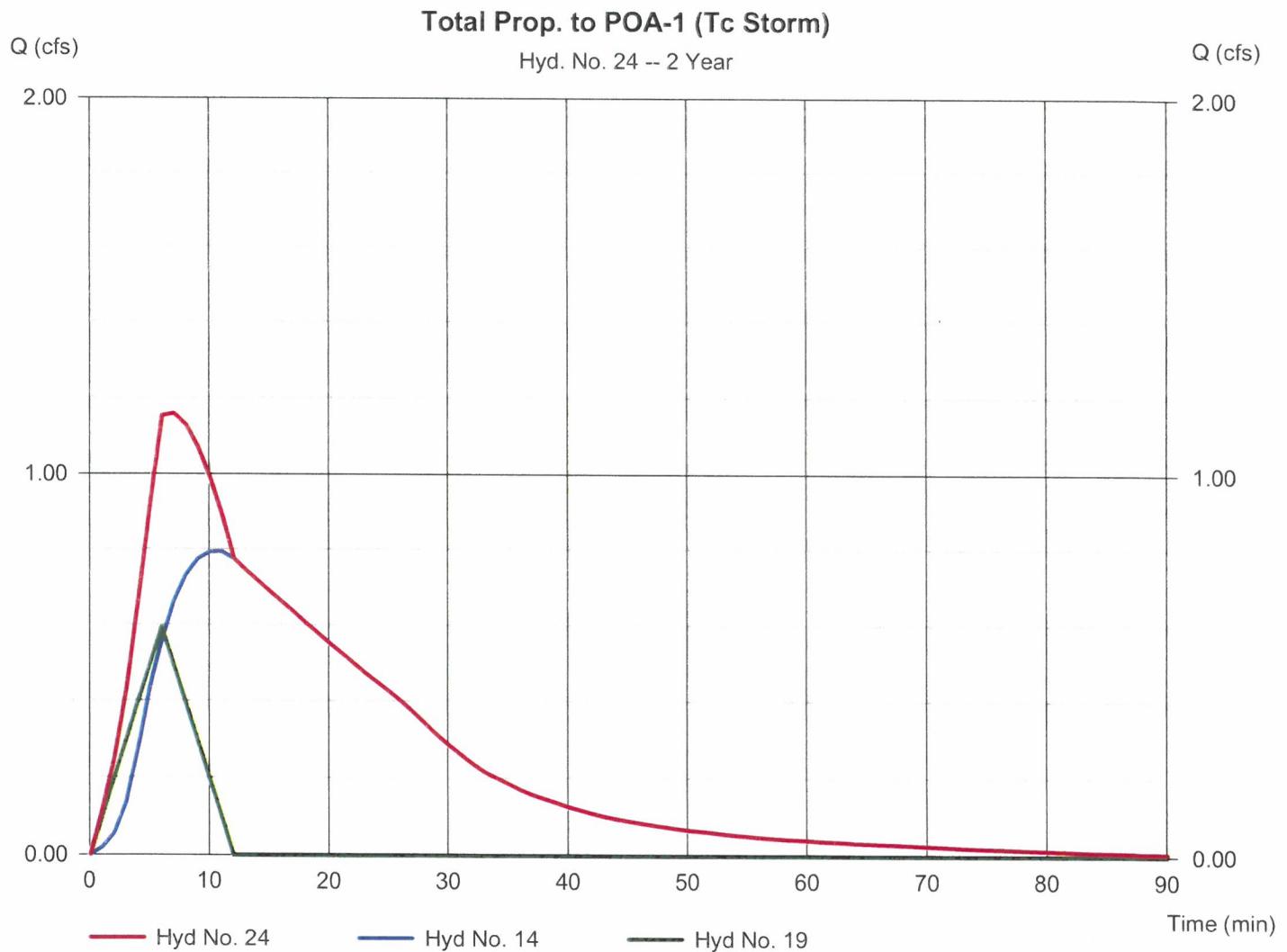
Thursday, Apr 2, 2020

Hyd. No. 24

Total Prop. to POA-1 (Tc Storm)

Hydrograph type = Combine
 Storm frequency = 2 yrs
 Time interval = 1 min
 Inflow hyds. = 14, 19

Peak discharge = 1.158 cfs
 Time to peak = 7 min
 Hyd. volume = 1,364 cuft
 Contrib. drain. area = 0.210 ac



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

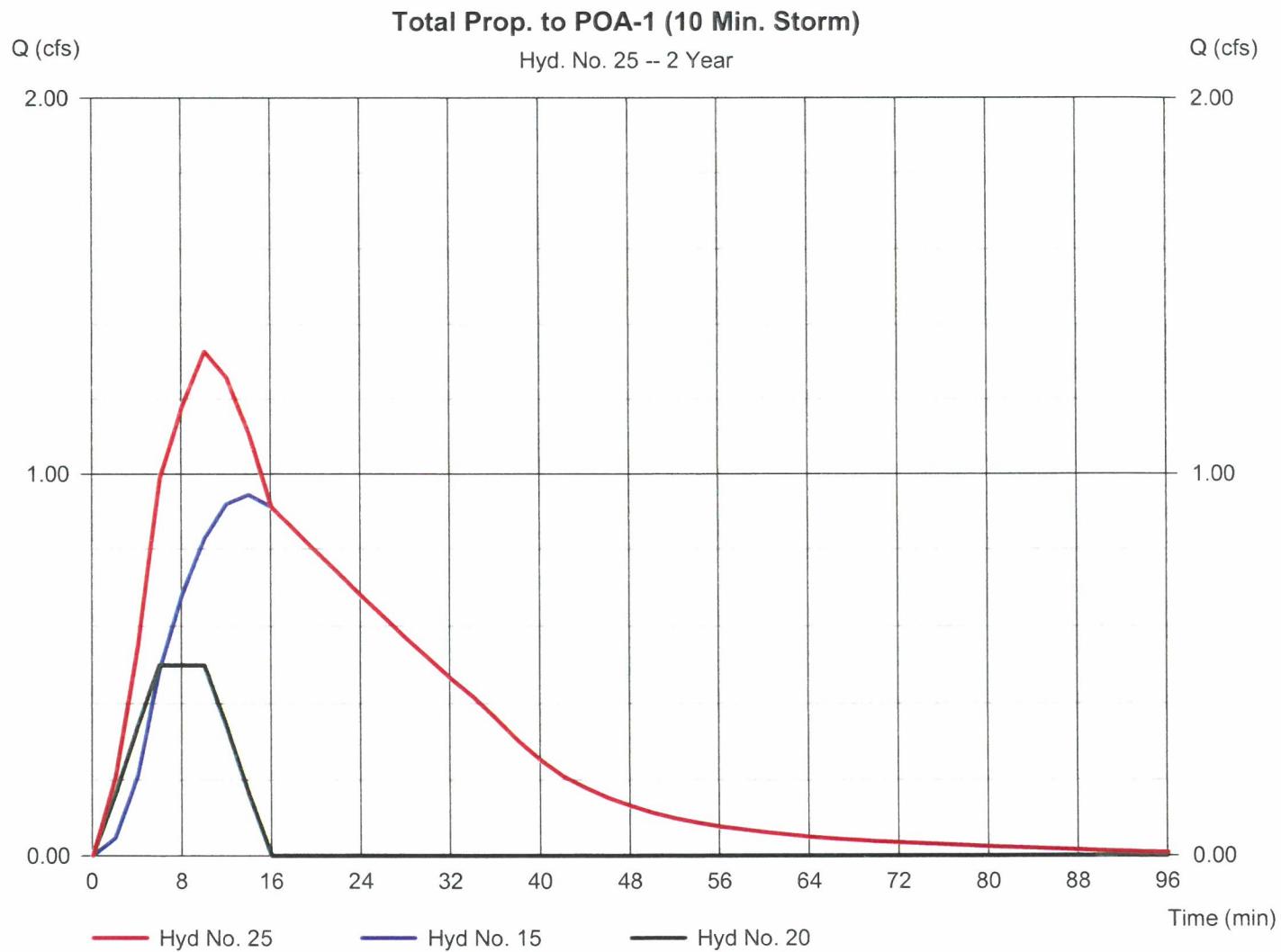
Thursday, Apr 2, 2020

Hyd. No. 25

Total Prop. to POA-1 (10 Min. Storm)

Hydrograph type = Combine
 Storm frequency = 2 yrs
 Time interval = 2 min
 Inflow hyds. = 15, 20

Peak discharge = 1.328 cfs
 Time to peak = 10 min
 Hyd. volume = 1,898 cuft
 Contrib. drain. area = 0.000 ac



Hydrograph Report

Hydraflow Hydrographs by Intelsolve v9.2

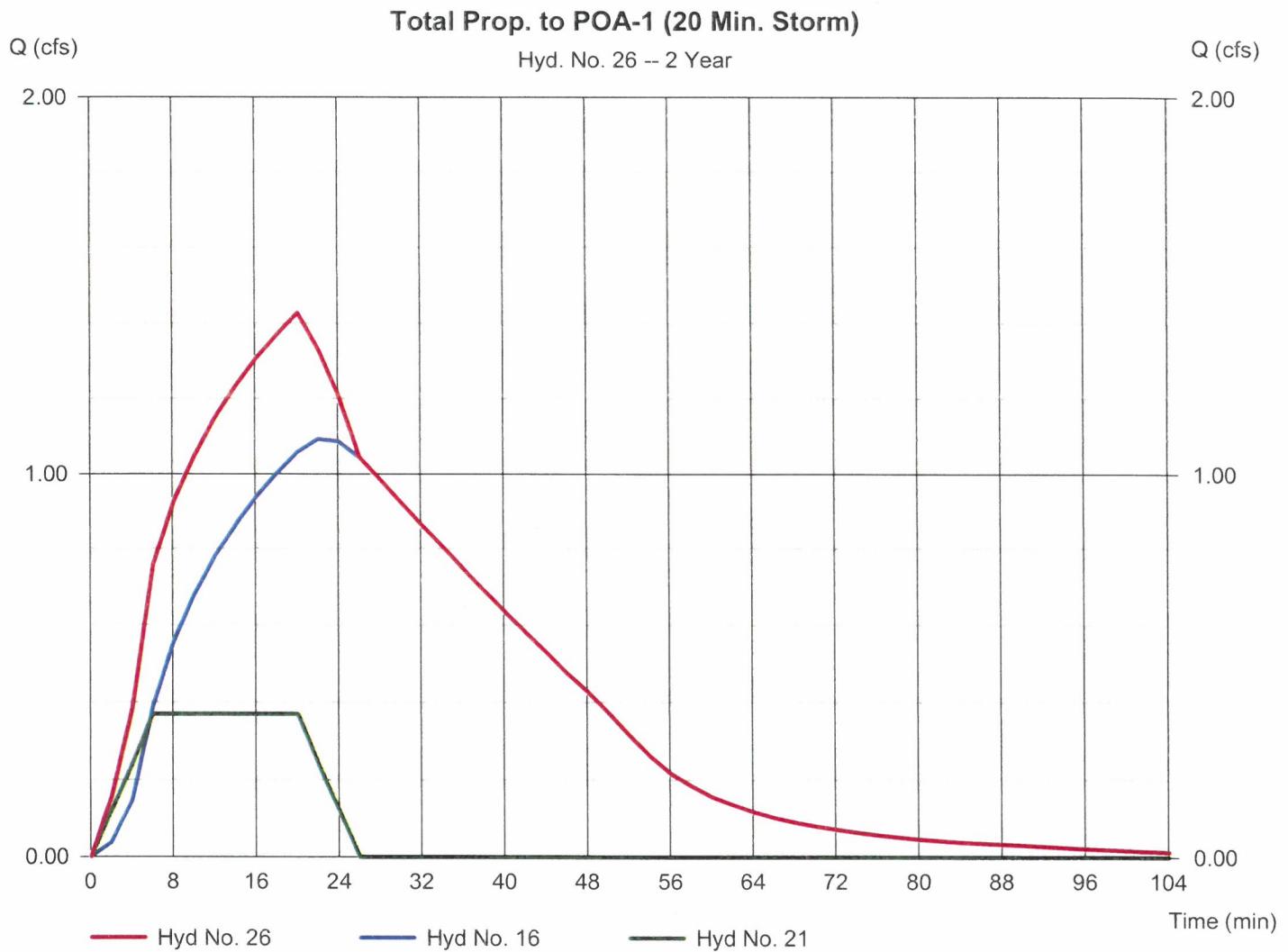
Thursday, Apr 2, 2020

Hyd. No. 26

Total Prop. to POA-1 (20 Min. Storm)

Hydrograph type = Combine
 Storm frequency = 2 yrs
 Time interval = 2 min
 Inflow hyds. = 16, 21

Peak discharge = 1.428 cfs
 Time to peak = 20 min
 Hyd. volume = 2,846 cuft
 Contrib. drain. area = 0.000 ac



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

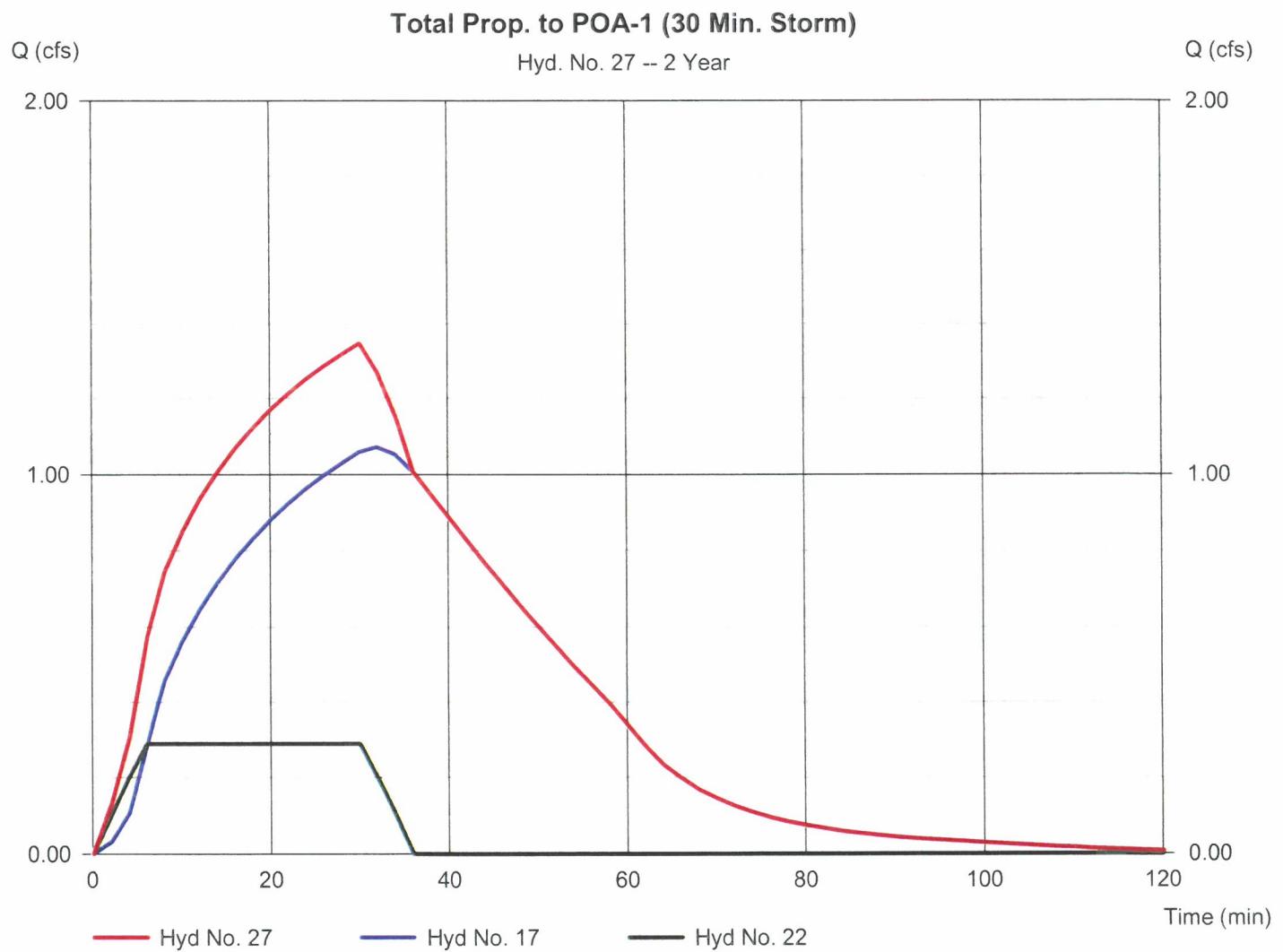
Thursday, Apr 2, 2020

Hyd. No. 27

Total Prop. to POA-1 (30 Min. Storm)

Hydrograph type = Combine
 Storm frequency = 2 yrs
 Time interval = 2 min
 Inflow hyds. = 17, 22

Peak discharge = 1.348 cfs
 Time to peak = 30 min
 Hyd. volume = 3,302 cuft
 Contrib. drain. area = 0.000 ac



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

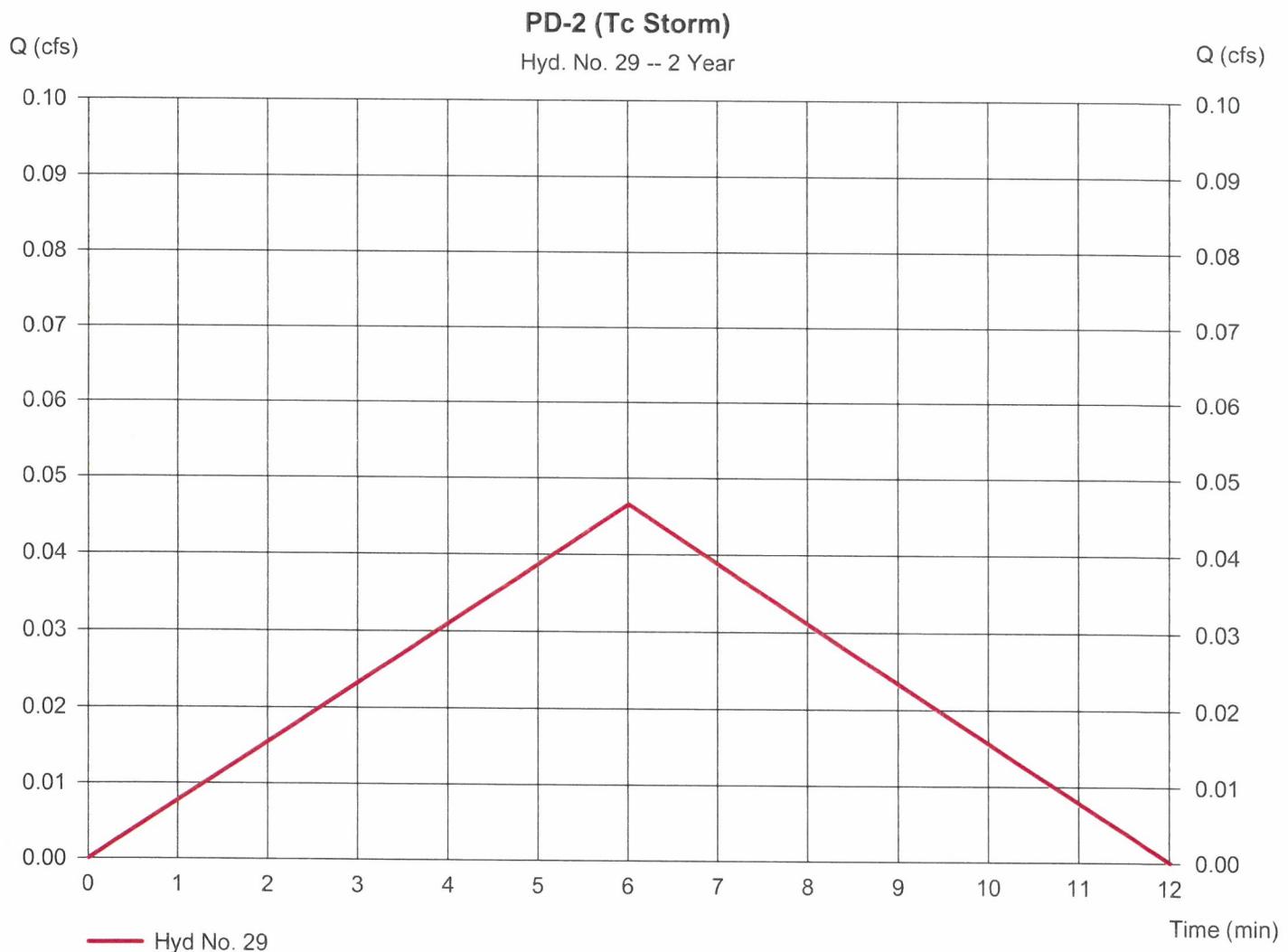
Thursday, Apr 2, 2020

Hyd. No. 29

PD-2 (Tc Storm)

Hydrograph type = Rational
 Storm frequency = 2 yrs
 Time interval = 1 min
 Drainage area = 0.020 ac
 Intensity = 4.562 in/hr
 IDF Curve = plainfield.IDF

Peak discharge = 0.047 cfs
 Time to peak = 6 min
 Hyd. volume = 17 cuft
 Runoff coeff. = 0.51
 Tc by User = 6.00 min
 Asc/Rec limb fact = 1/1



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

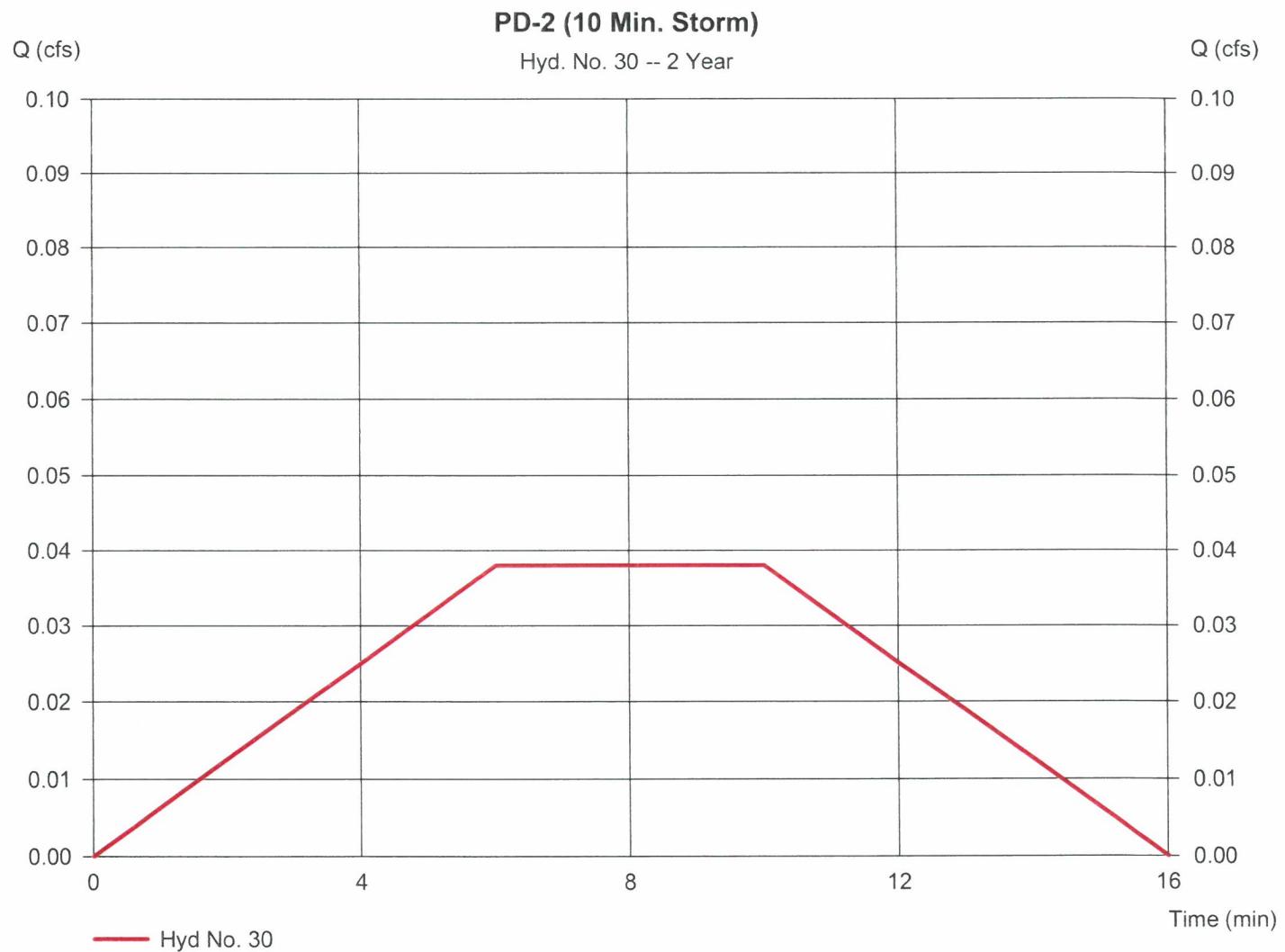
Thursday, Apr 2, 2020

Hyd. No. 30

PD-2 (10 Min. Storm)

Hydrograph type = Manual
Storm frequency = 2 yrs
Time interval = 2 min

Peak discharge = 0.038 cfs
Time to peak = 6 min
Hyd. volume = 23 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

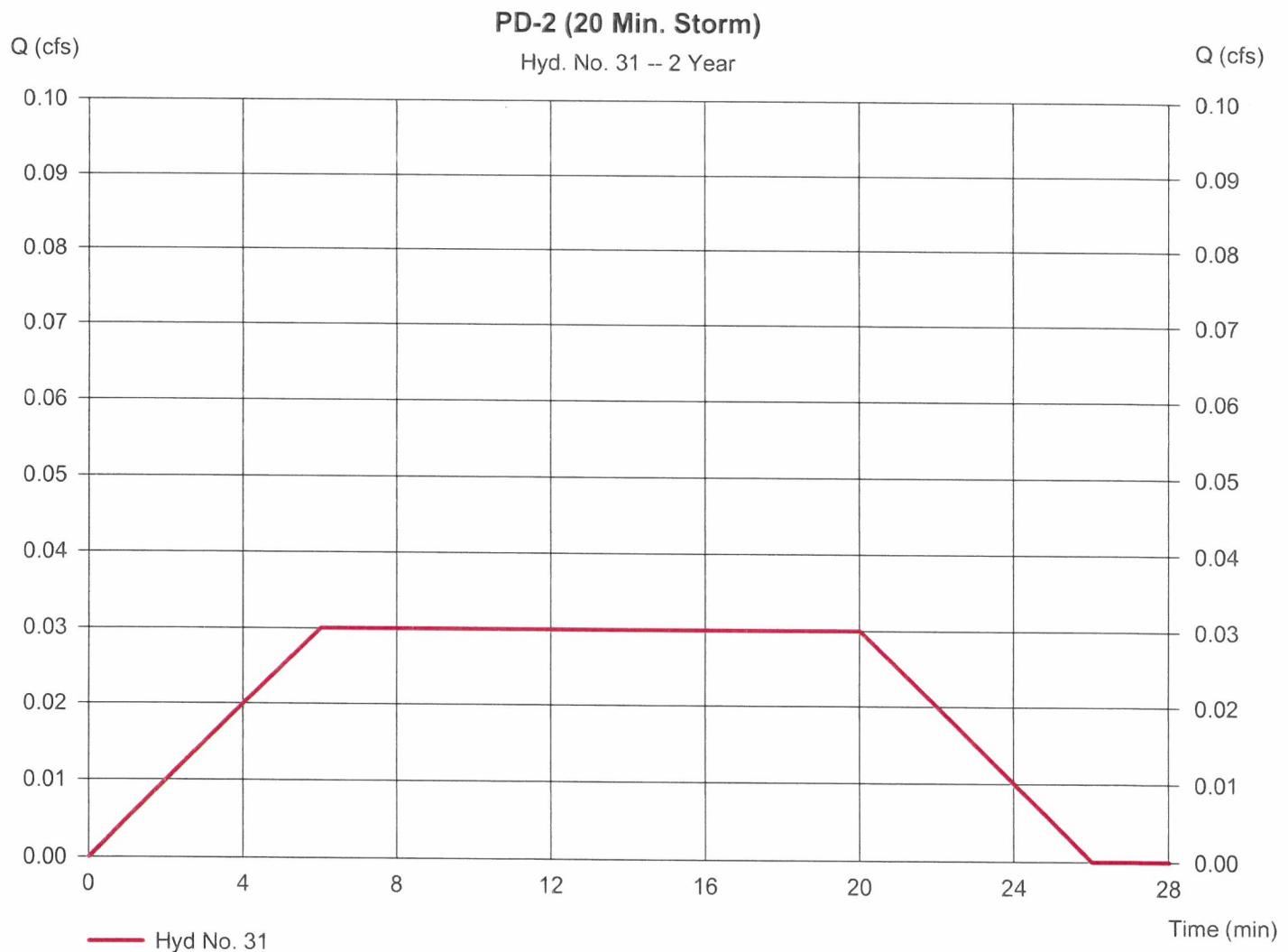
Thursday, Apr 2, 2020

Hyd. No. 31

PD-2 (20 Min. Storm)

Hydrograph type = Manual
Storm frequency = 2 yrs
Time interval = 2 min

Peak discharge = 0.030 cfs
Time to peak = 6 min
Hyd. volume = 36 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

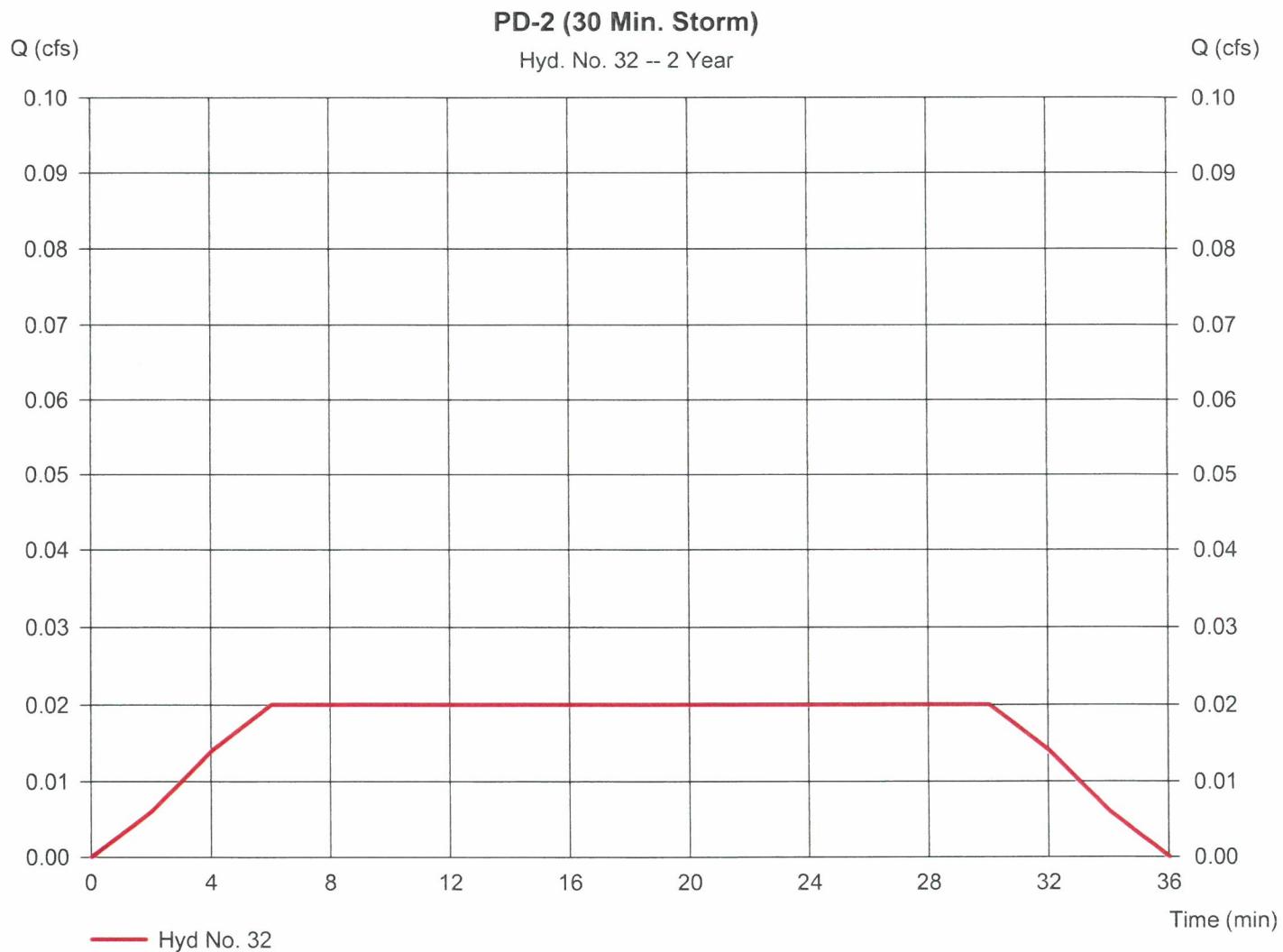
Thursday, Apr 2, 2020

Hyd. No. 32

PD-2 (30 Min. Storm)

Hydrograph type = Manual
Storm frequency = 2 yrs
Time interval = 2 min

Peak discharge = 0.020 cfs
Time to peak = 6 min
Hyd. volume = 36 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

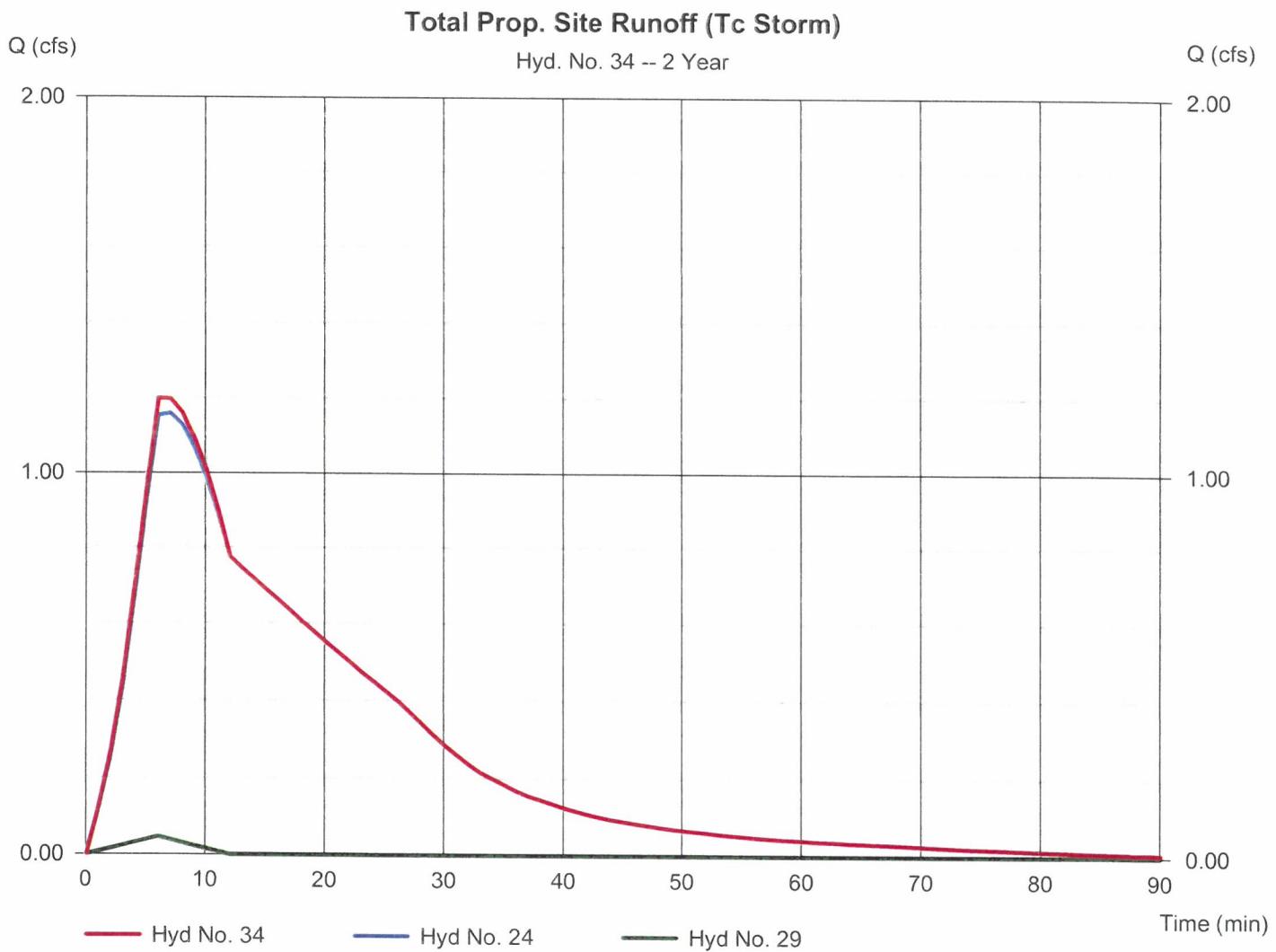
Thursday, Apr 2, 2020

Hyd. No. 34

Total Prop. Site Runoff (Tc Storm)

Hydrograph type = Combine
 Storm frequency = 2 yrs
 Time interval = 1 min
 Inflow hyds. = 24, 29

Peak discharge = 1.199 cfs
 Time to peak = 6 min
 Hyd. volume = 1,381 cuft
 Contrib. drain. area = 0.020 ac



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

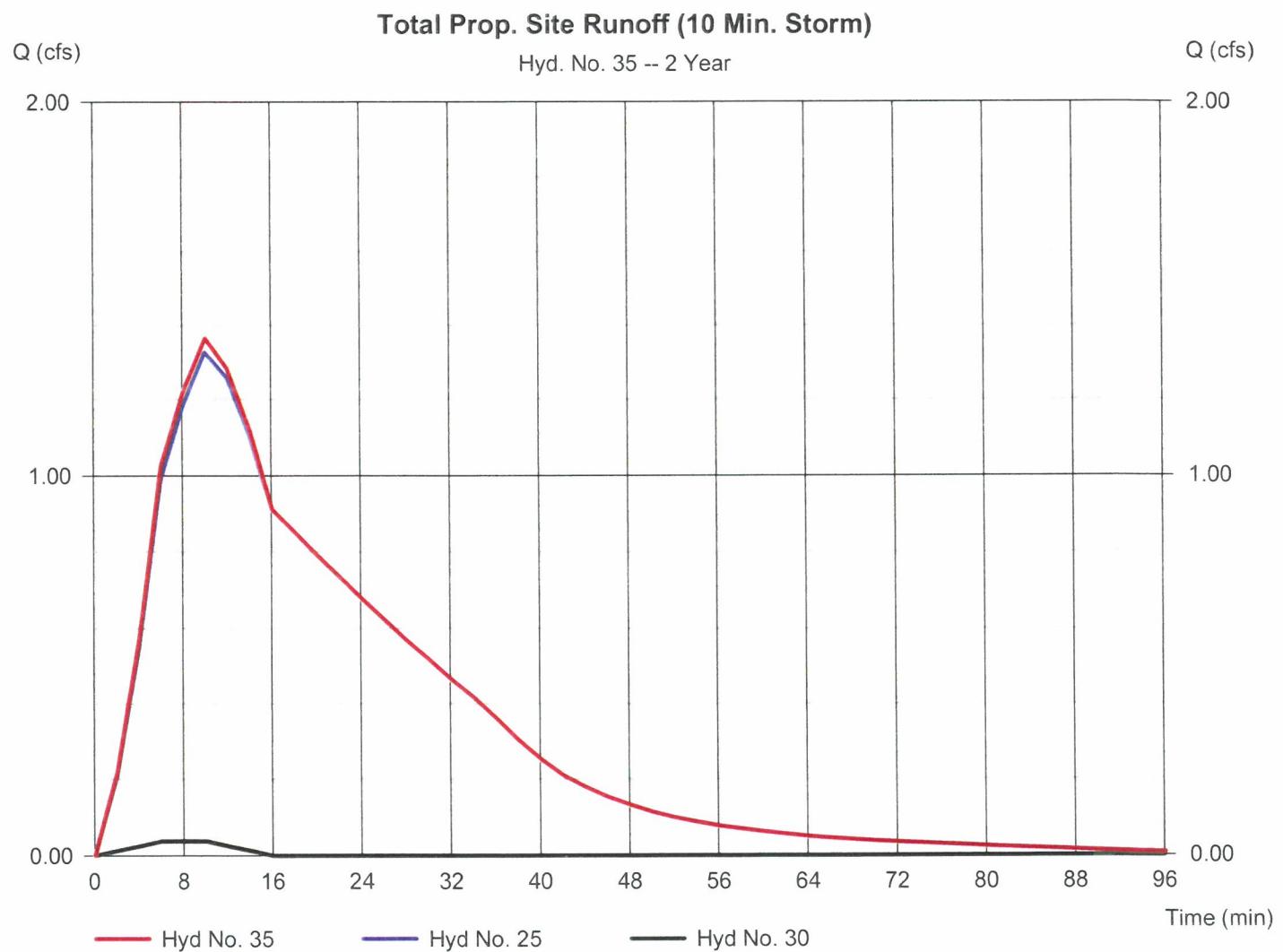
Thursday, Apr 2, 2020

Hyd. No. 35

Total Prop. Site Runoff (10 Min. Storm)

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 2 min
Inflow hyds. = 25, 30

Peak discharge = 1.366 cfs
Time to peak = 10 min
Hyd. volume = 1,920 cuft
Contrib. drain. area = 0.000 ac



Hydrograph Report

37

Hydraflow Hydrographs by Intelisolve v9.2

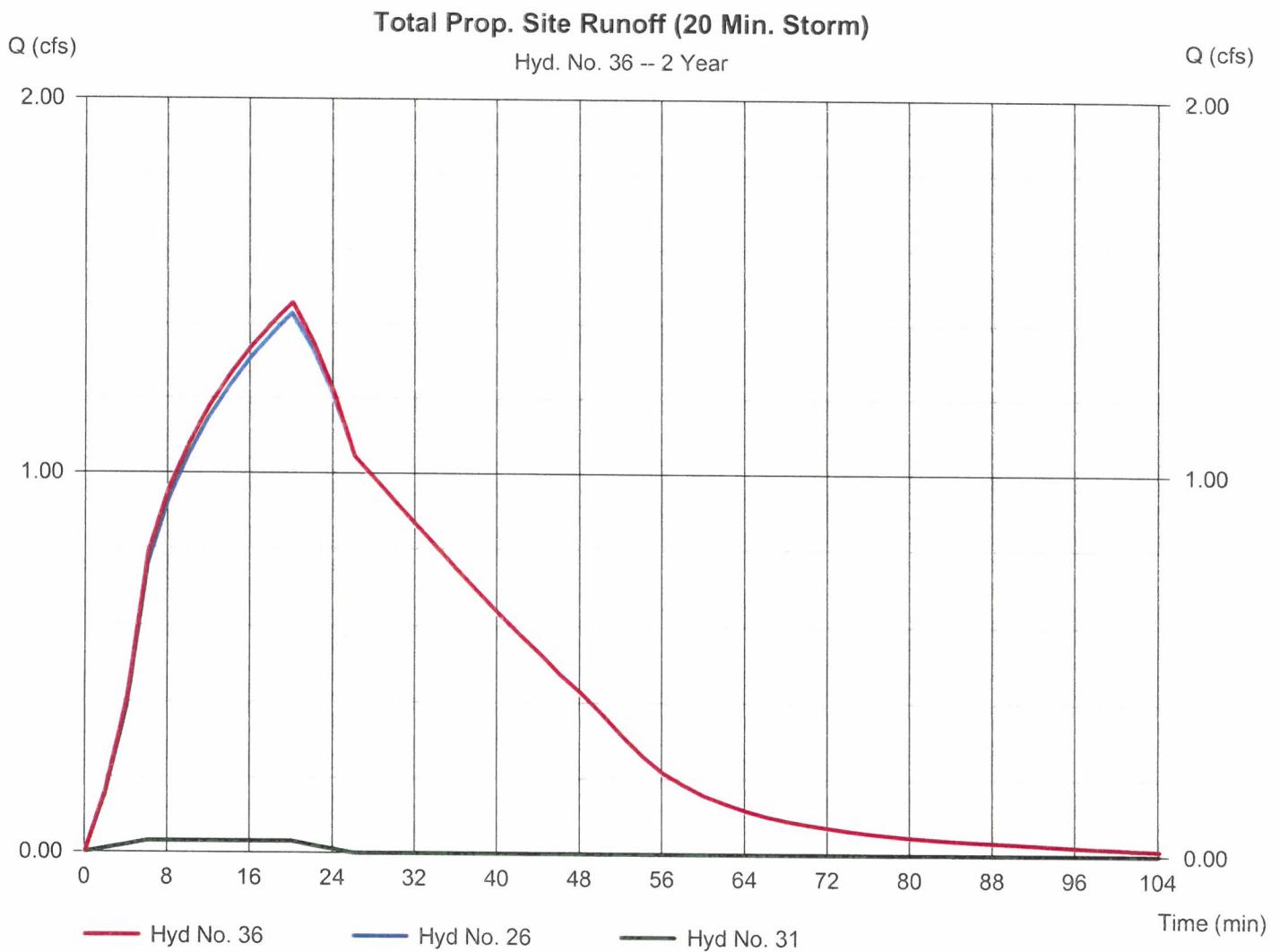
Thursday, Apr 2, 2020

Hyd. No. 36

Total Prop. Site Runoff (20 Min. Storm)

Hydrograph type = Combine
 Storm frequency = 2 yrs
 Time interval = 2 min
 Inflow hyds. = 26, 31

Peak discharge = 1.458 cfs
 Time to peak = 20 min
 Hyd. volume = 2,882 cuft
 Contrib. drain. area = 0.000 ac



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

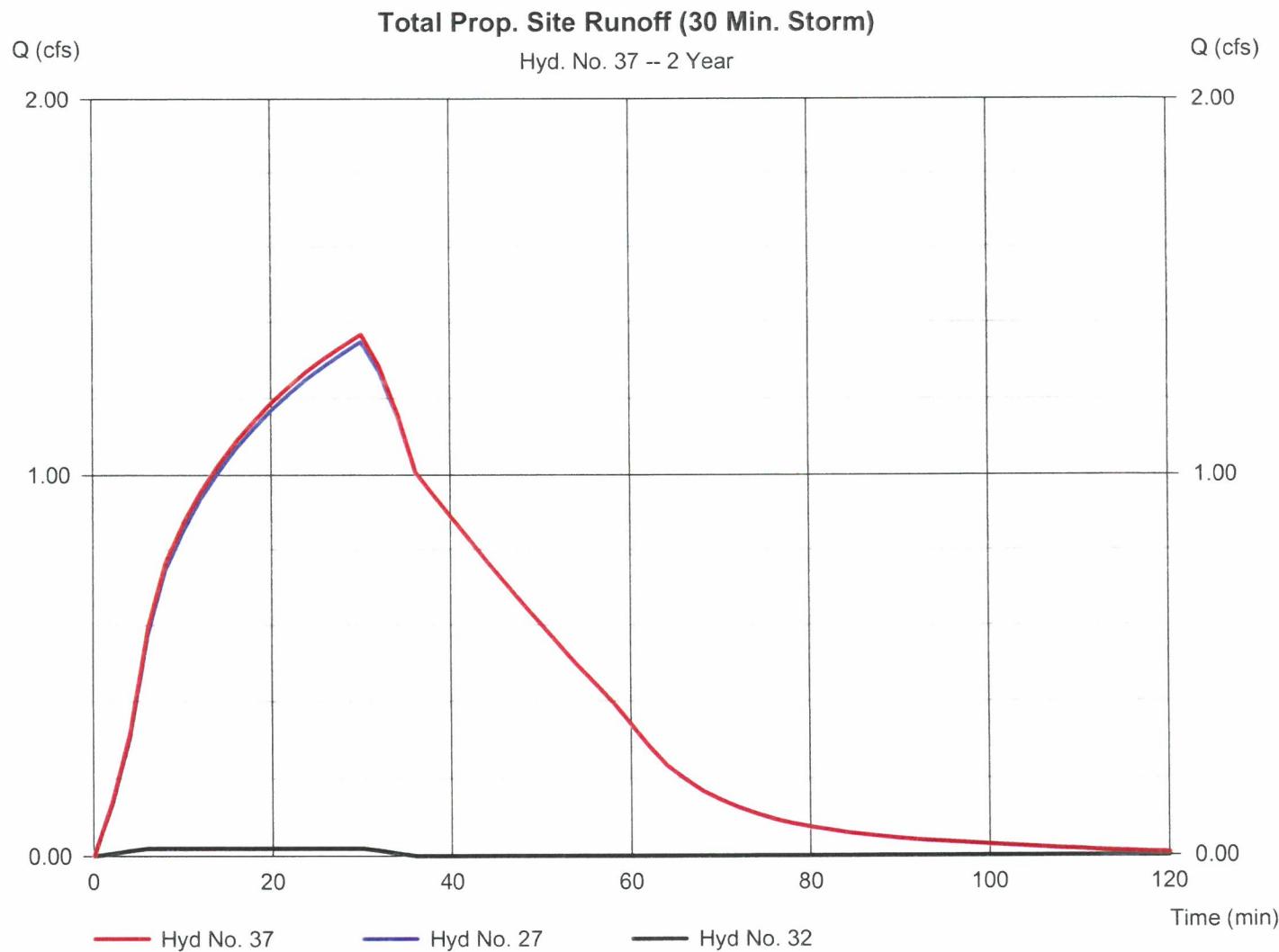
Thursday, April 2, 2020

Hyd. No. 37

Total Prop. Site Runoff (30 Min. Storm)

Hydrograph type = Combine
 Storm frequency = 2 yrs
 Time interval = 2 min
 Inflow hyds. = 27, 32

Peak discharge = 1.368 cfs
 Time to peak = 30 min
 Hyd. volume = 3,338 cuft
 Contrib. drain. area = 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.2

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	Rational	3.884	1	8	1,864	---	----	----	ED-1 (Total to POA-1)
2	Manual	2.910	1	8	1,400	---	----	----	ED-1 Reduction Target
3	Rational	0.433	1	6	156	---	----	----	ED-2 (Total to POA-2)
4	Manual	0.320	1	6	118	---	----	----	ED-2 Reduction Target
5	Combine	4.173	1	8	2,020	1, 3,	----	----	Total Existing Site Runoff
6	Manual	3.130	1	8	1,517	---	----	----	Total Site Reduction Target
8	Mod. Rational	2.377	1	6	3,595	---	----	----	Req'd Volume Estimate
10	Rational	4.217	1	6	1,518	---	----	----	PD-1D (Tc Storm)
11	Manual	3.520	2	6	2,100	---	----	----	PD-1D (10 Min. Storm)
12	Manual	2.700	2	6	3,230	---	----	----	PD-1D (20 Min. Storm)
13	Manual	2.160	2	6	3,874	---	----	----	PD-1D (30 Min. Storm)
14	Reservoir	0.961	1	11	1,518	10	127.06	1,141	Tc Storm to Basin
15	Reservoir	1.169	2	14	2,099	11	127.51	1,497	10 Min. Storm to Basin
16	Reservoir	2.093	2	22	3,230	12	127.93	1,809	20 Min. Storm to Basin
17	Reservoir	1.989	2	30	3,873	13	127.89	1,788	30 Min. Storm to Basin
19	Rational	0.784	1	6	282	---	----	----	PD-1U (Tc Storm)
20	Manual	0.650	2	6	392	---	----	----	PD-1U (10 Min. Storm)
21	Manual	0.500	2	6	600	---	----	----	PD-1U (20 Min. Storm)
22	Manual	0.400	2	6	720	---	----	----	PD-1U (30 Min. Storm)
24	Combine	1.462	1	6	1,800	14, 19,	----	----	Total Prop. to POA-1 (Tc Storm)
25	Combine	1.642	2	10	2,492	15, 20,	----	----	Total Prop. to POA-1 (10 Min. Storm)
26	Combine	2.468	2	20	3,830	16, 21,	----	----	Total Prop. to POA-1 (20 Min. Storm)
27	Combine	2.389	2	30	4,593	17, 22,	----	----	Total Prop. to POA-1 (30 Min. Storm)
29	Rational	0.061	1	6	22	---	----	----	PD-2 (Tc Storm)
30	Manual	0.050	2	6	30	---	----	----	PD-2 (10 Min. Storm)
31	Manual	0.039	2	6	47	---	----	----	PD-2 (20 Min. Storm)
32	Manual	0.030	2	6	54	---	----	----	PD-2 (30 Min. Storm)
34	Combine	1.524	1	6	1,822	24, 29,	----	----	Total Prop. Site Runoff (Tc Storm)
35	Combine	1.692	2	10	2,522	25, 30,	----	----	Total Prop. Site Runoff (10 Min. Stor
36	Combine	2.507	2	20	3,876	26, 31,	----	----	Total Prop. Site Runoff (20 Min. Stor
37	Combine	2.419	2	30	4,647	27, 32,	----	----	Total Prop. Site Runoff (30 Min. Stor

Drainage Analysis R-4.gpw

Return Period: 10 Year

Thursday, Apr 2, 2020

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

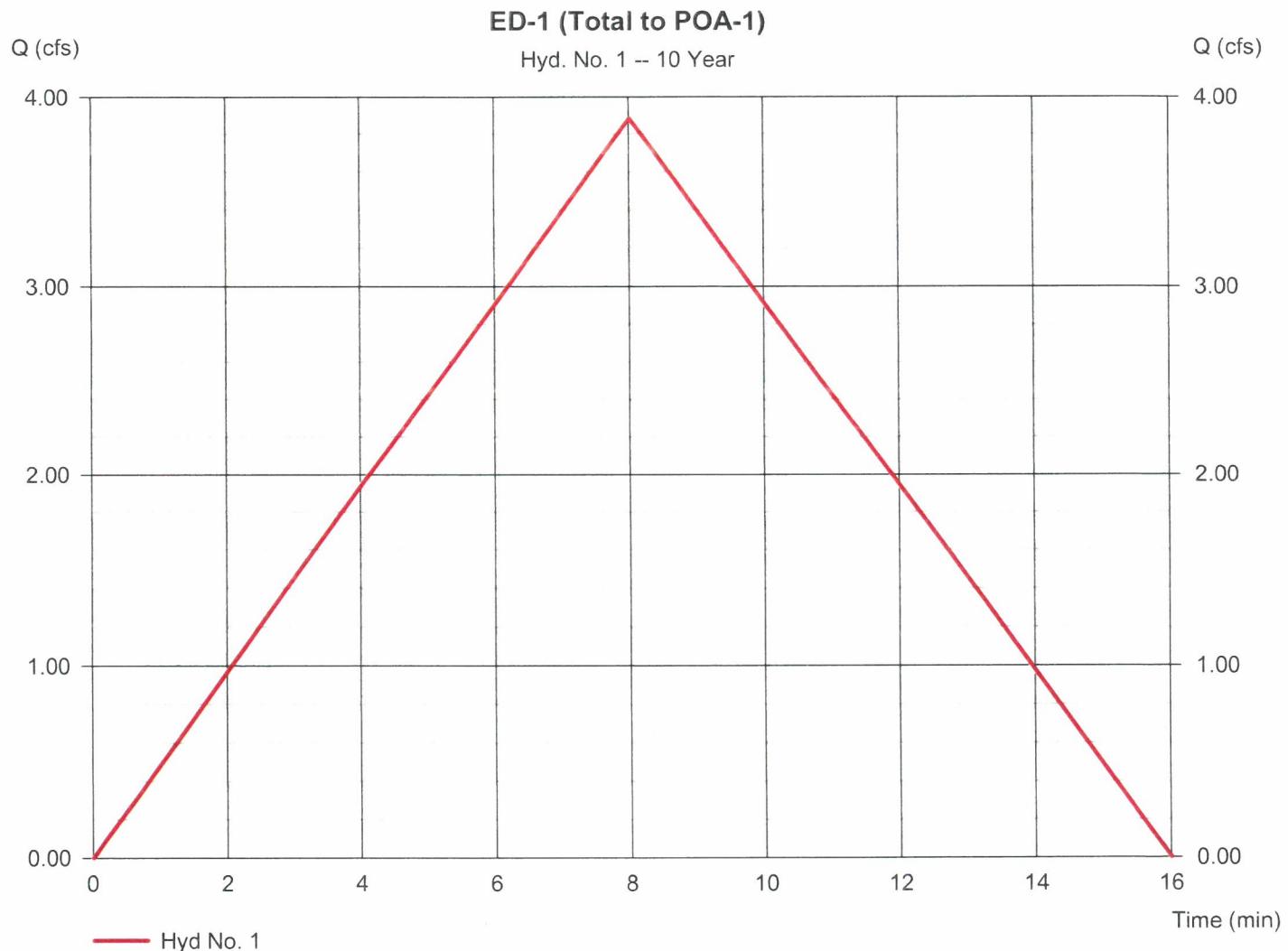
Thursday, Apr 2, 2020

Hyd. No. 1

ED-1 (Total to POA-1)

Hydrograph type	= Rational	Peak discharge	= 3.884 cfs
Storm frequency	= 10 yrs	Time to peak	= 8 min
Time interval	= 1 min	Hyd. volume	= 1,864 cuft
Drainage area	= 0.910 ac	Runoff coeff.	= 0.77*
Intensity	= 5.542 in/hr	Tc by TR55	= 8.00 min
IDF Curve	= plainfield.IDF	Asc/Rec limb fact	= 1/1

* Composite (Area/C) = [(0.490 x 0.99) + (0.420 x 0.51)] / 0.910



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

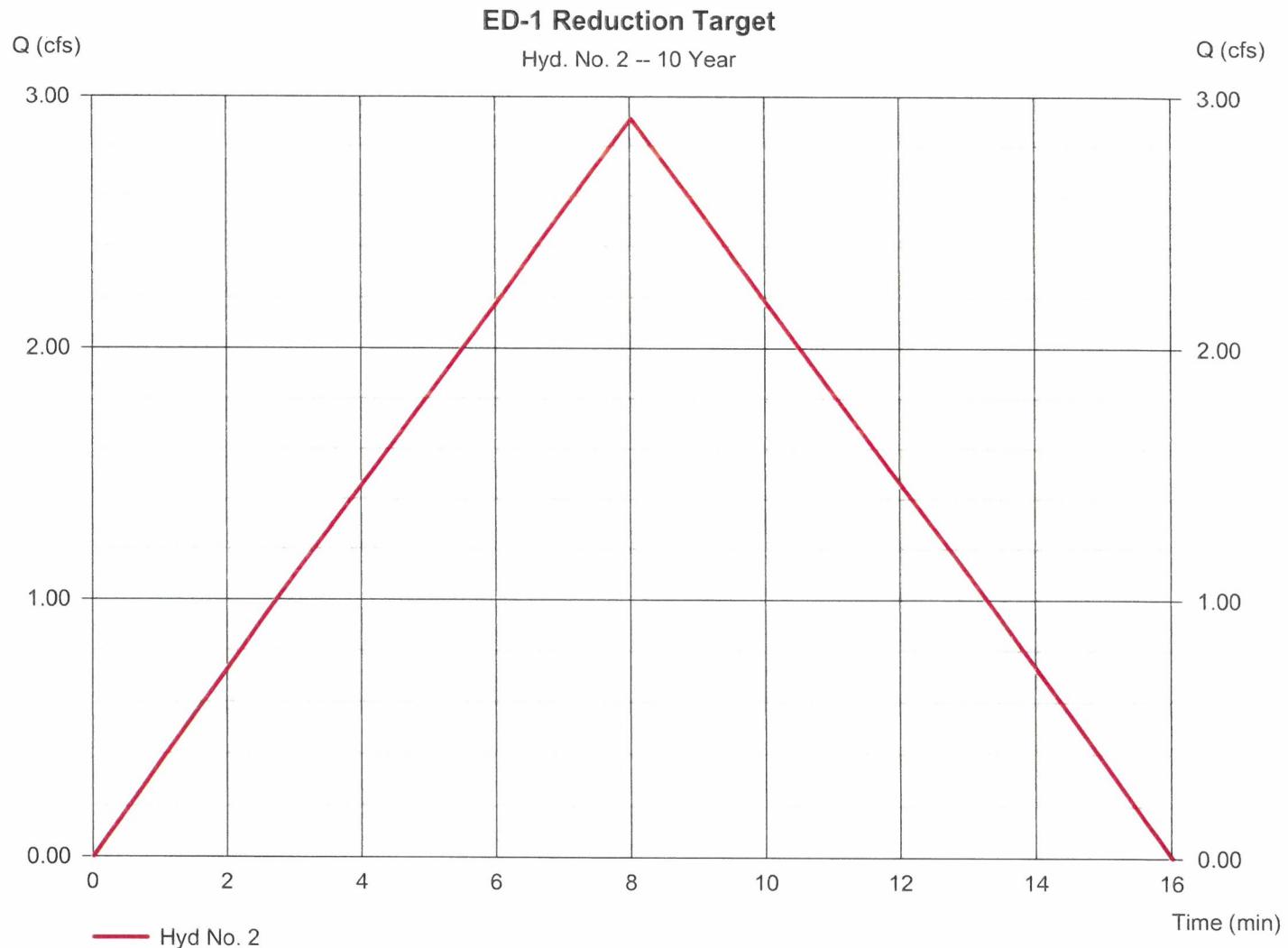
Thursday, Apr 2, 2020

Hyd. No. 2

ED-1 Reduction Target

Hydrograph type = Manual
 Storm frequency = 10 yrs
 Time interval = 1 min

Peak discharge = 2.910 cfs
 Time to peak = 8 min
 Hyd. volume = 1,400 cuft



Hydrograph Report

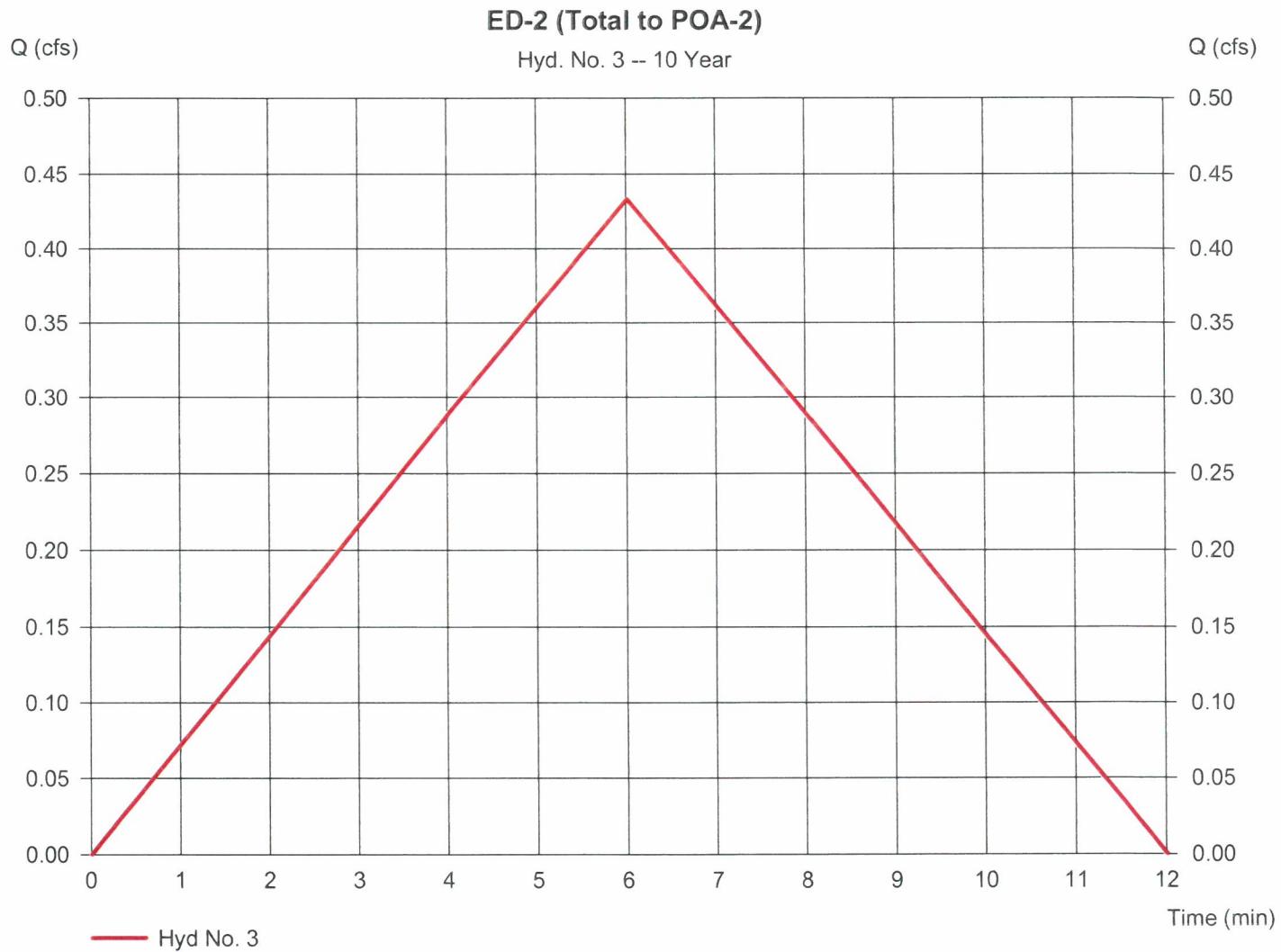
Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Apr 2, 2020

Hyd. No. 3

ED-2 (Total to POA-2)

Hydrograph type	= Rational	Peak discharge	= 0.433 cfs
Storm frequency	= 10 yrs	Time to peak	= 6 min
Time interval	= 1 min	Hyd. volume	= 156 cuft
Drainage area	= 0.090 ac	Runoff coeff.	= 0.8
Intensity	= 6.019 in/hr	Tc by User	= 6.00 min
IDF Curve	= plainfield.IDF	Asc/Rec limb fact	= 1/1



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

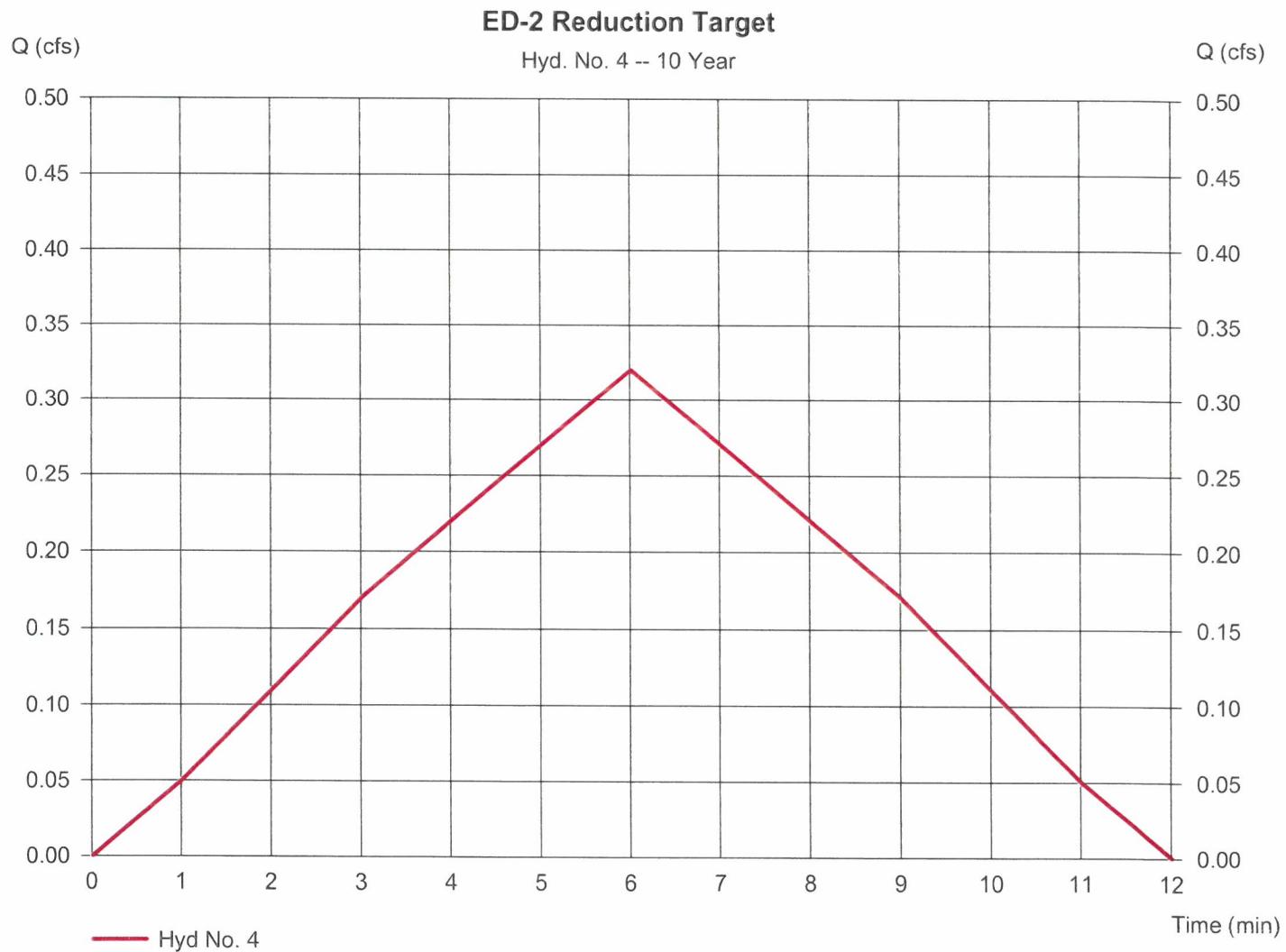
Thursday, Apr 2, 2020

Hyd. No. 4

ED-2 Reduction Target

Hydrograph type = Manual
 Storm frequency = 10 yrs
 Time interval = 1 min

Peak discharge = 0.320 cfs
 Time to peak = 6 min
 Hyd. volume = 118 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

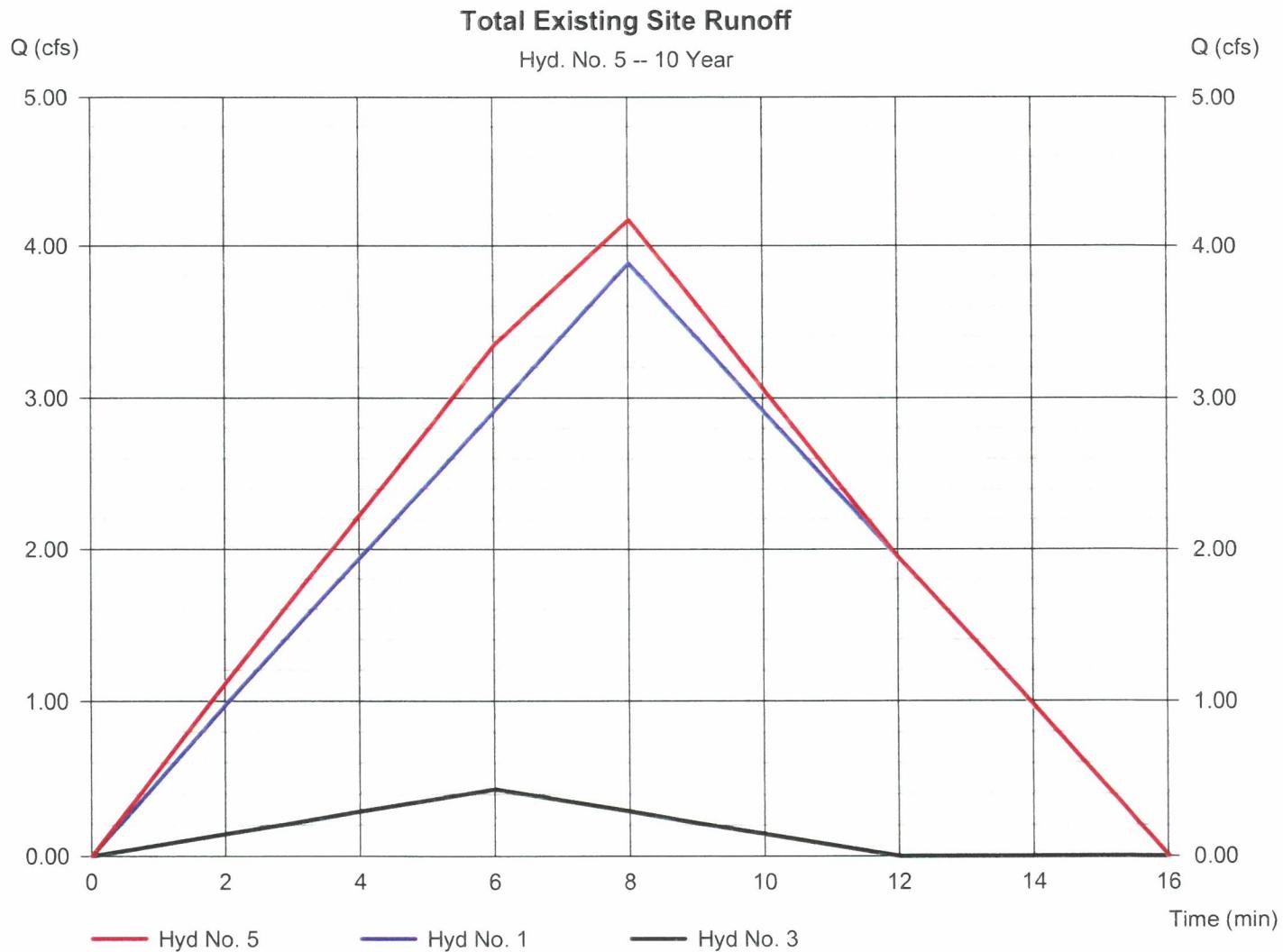
Thursday, Apr 2, 2020

Hyd. No. 5

Total Existing Site Runoff

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 1 min
 Inflow hyds. = 1, 3

Peak discharge = 4.173 cfs
 Time to peak = 8 min
 Hyd. volume = 2,020 cuft
 Contrib. drain. area = 1.000 ac



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

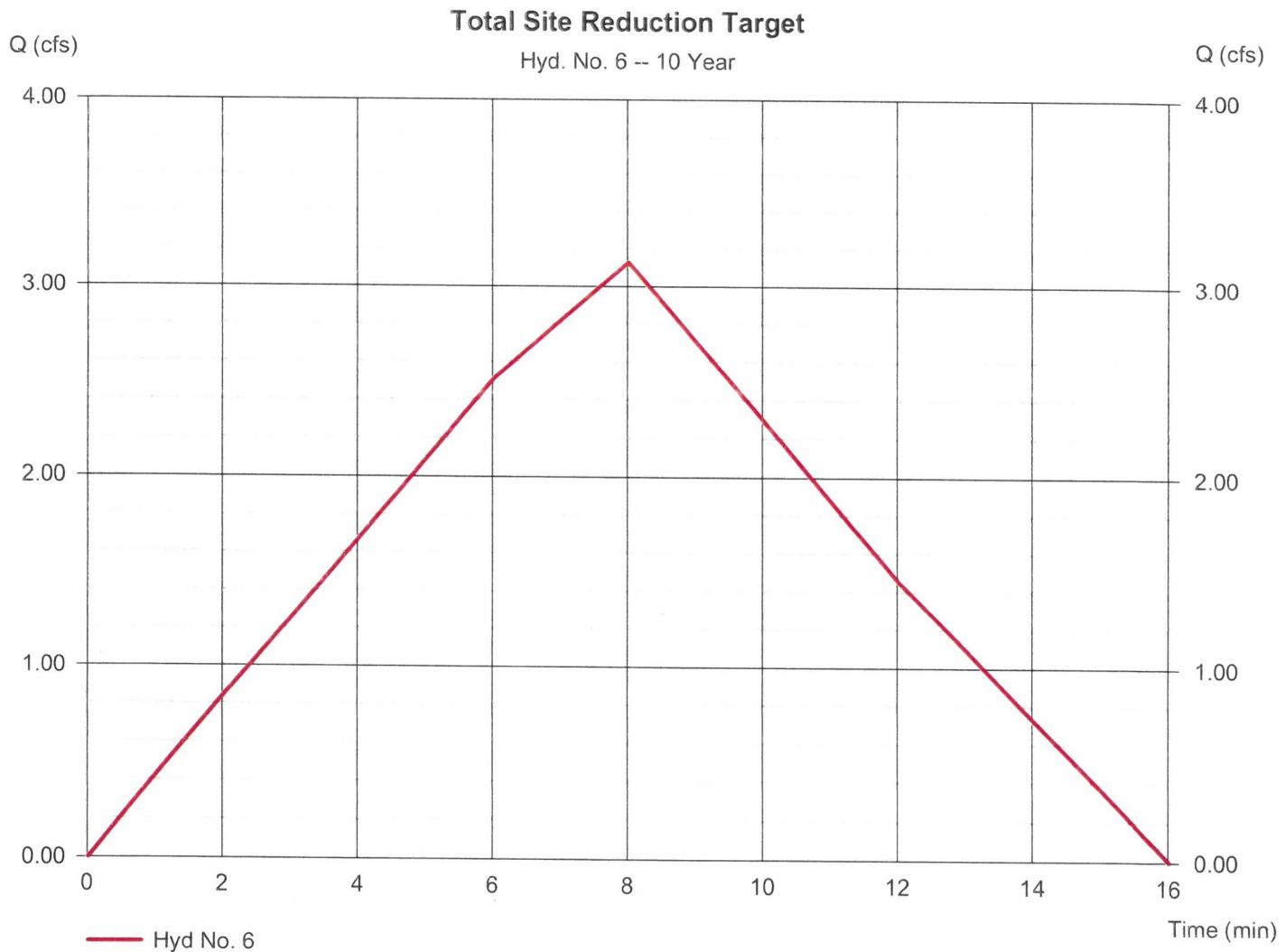
Thursday, Apr 2, 2020

Hyd. No. 6

Total Site Reduction Target

Hydrograph type = Manual
Storm frequency = 10 yrs
Time interval = 1 min

Peak discharge = 3.130 cfs
Time to peak = 8 min
Hyd. volume = 1,517 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Apr 2, 2020

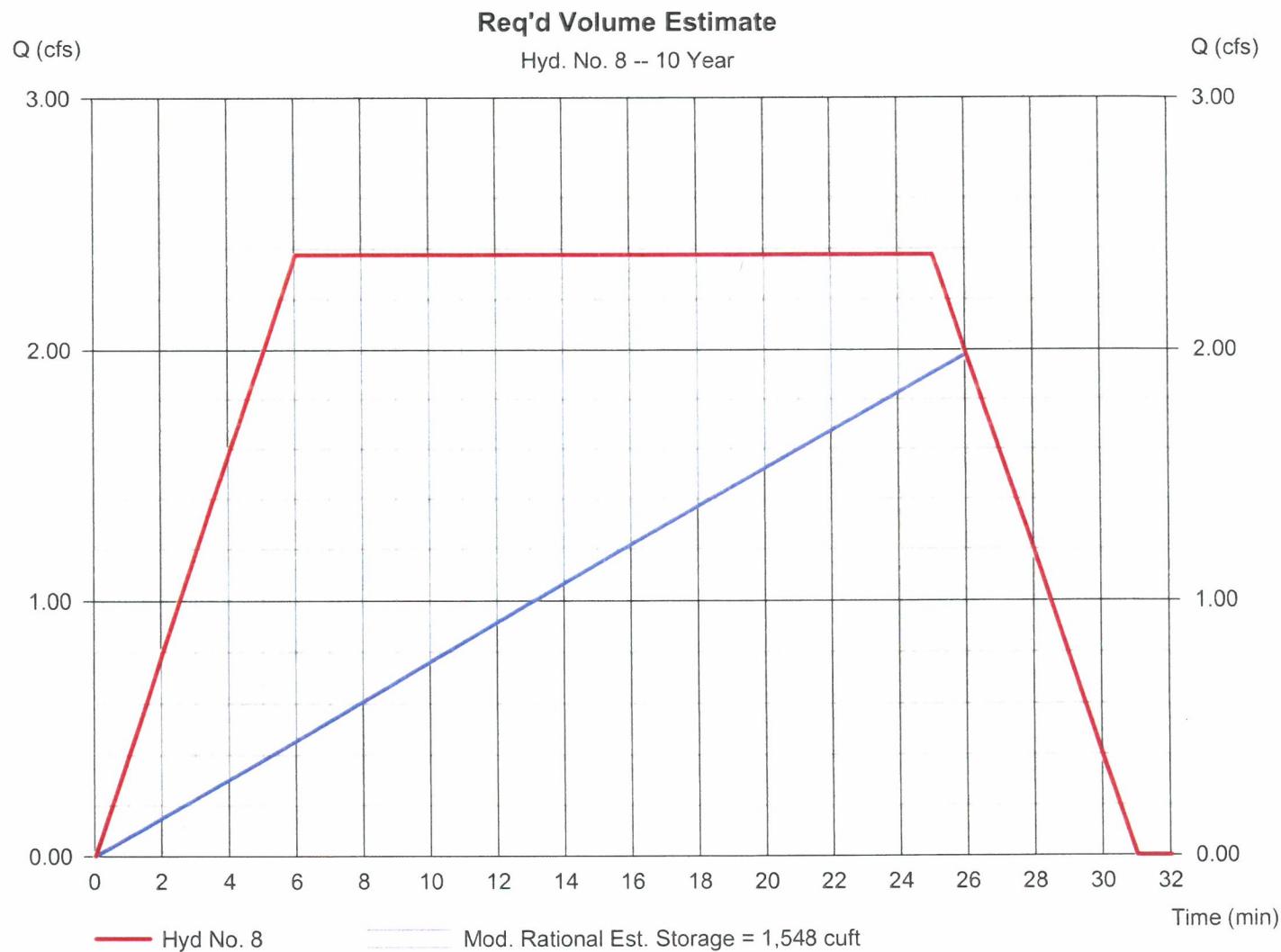
Hyd. No. 8

Req'd Volume Estimate

Hydrograph type = Mod. Rational
 Storm frequency = 10 yrs
 Time interval = 1 min
 Drainage area = 0.770 ac
 Intensity = 3.393 in/hr
 IDF Curve = plainfield.IDF
 Target Q = 2.130 cfs

Peak discharge = 2.377 cfs
 Time to peak = 6 min
 Hyd. volume = 3,595 cuft
 Runoff coeff. = 0.91*
 Tc by User = 6.00 min
 Storm duration = 4.2 x Tc
 Est. Req'd Storage = 1,548 cuft

* Composite (Area/C) = [(0.640 x 0.99) + (0.130 x 0.51)] / 0.770



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Apr 2, 2020

Hyd. No. 10

PD-1D (Tc Storm)

Hydrograph type = Rational
 Storm frequency = 10 yrs
 Time interval = 1 min
 Drainage area = 0.770 ac
 Intensity = 6.019 in/hr
 IDF Curve = plainfield.IDF

Peak discharge = 4.217 cfs
 Time to peak = 6 min
 Hyd. volume = 1,518 cuft
 Runoff coeff. = 0.91*
 Tc by User = 6.00 min
 Asc/Rec limb fact = 1/1

* Composite (Area/C) = $[(0.640 \times 0.99) + (0.130 \times 0.51)] / 0.770$



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

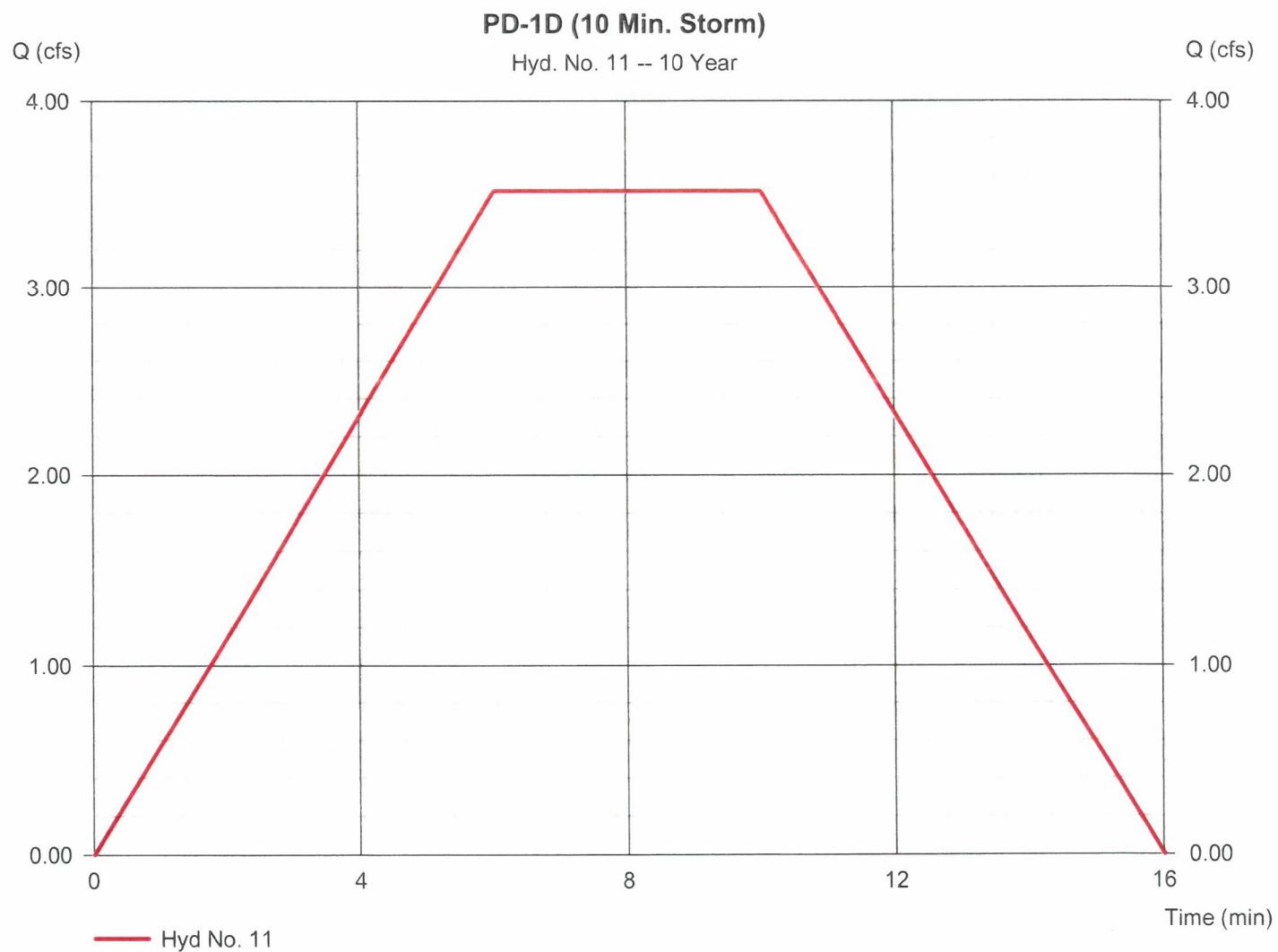
Thursday, Apr 2, 2020

Hyd. No. 11

PD-1D (10 Min. Storm)

Hydrograph type = Manual
Storm frequency = 10 yrs
Time interval = 2 min

Peak discharge = 3.520 cfs
Time to peak = 6 min
Hyd. volume = 2,100 cuft



Hydrograph Report

Hydraflow Hydrographs by InteliSolve v9.2

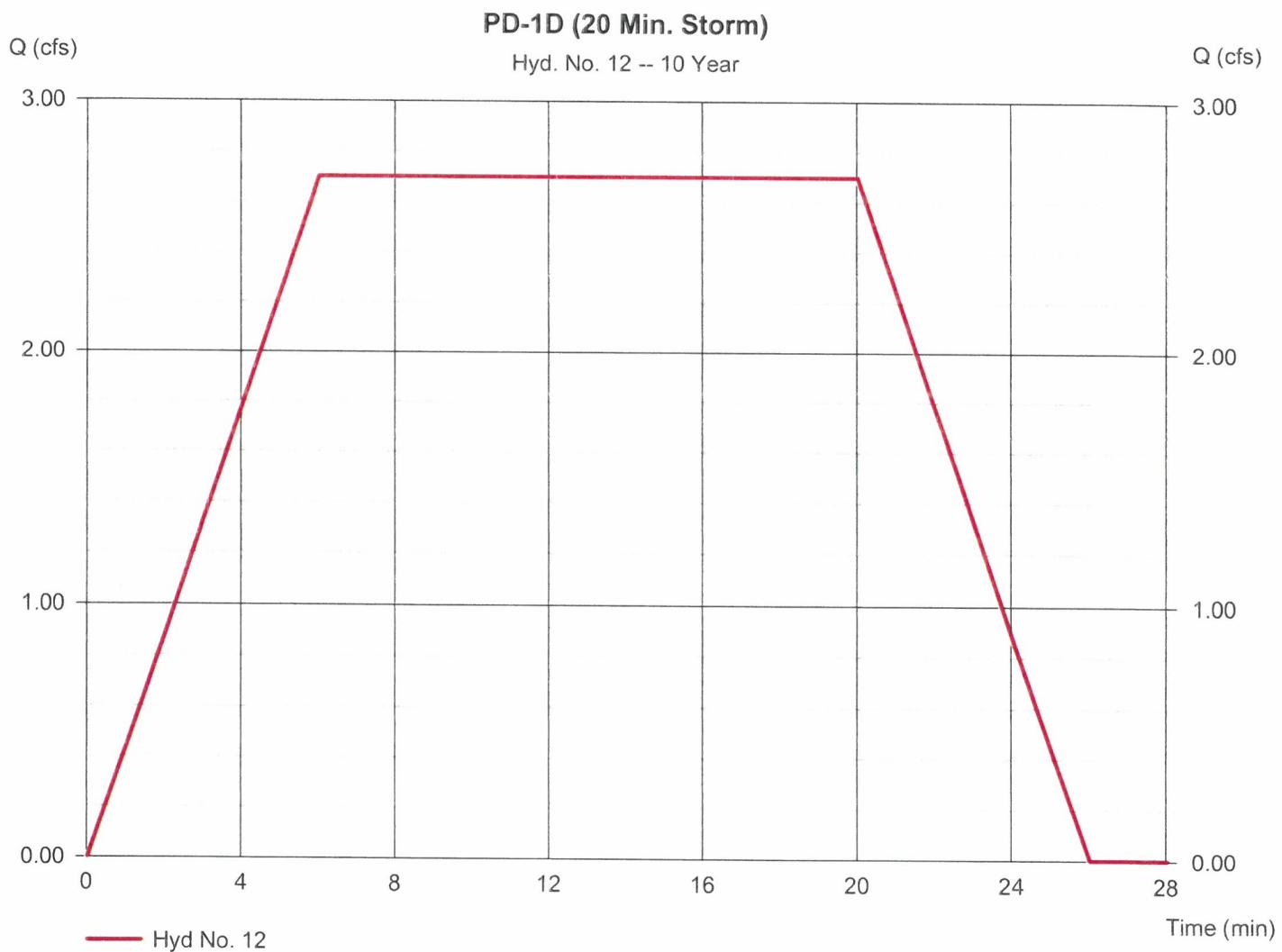
Thursday, Apr 2, 2020

Hyd. No. 12

PD-1D (20 Min. Storm)

Hydrograph type = Manual
Storm frequency = 10 yrs
Time interval = 2 min

Peak discharge = 2.700 cfs
Time to peak = 6 min
Hyd. volume = 3,230 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

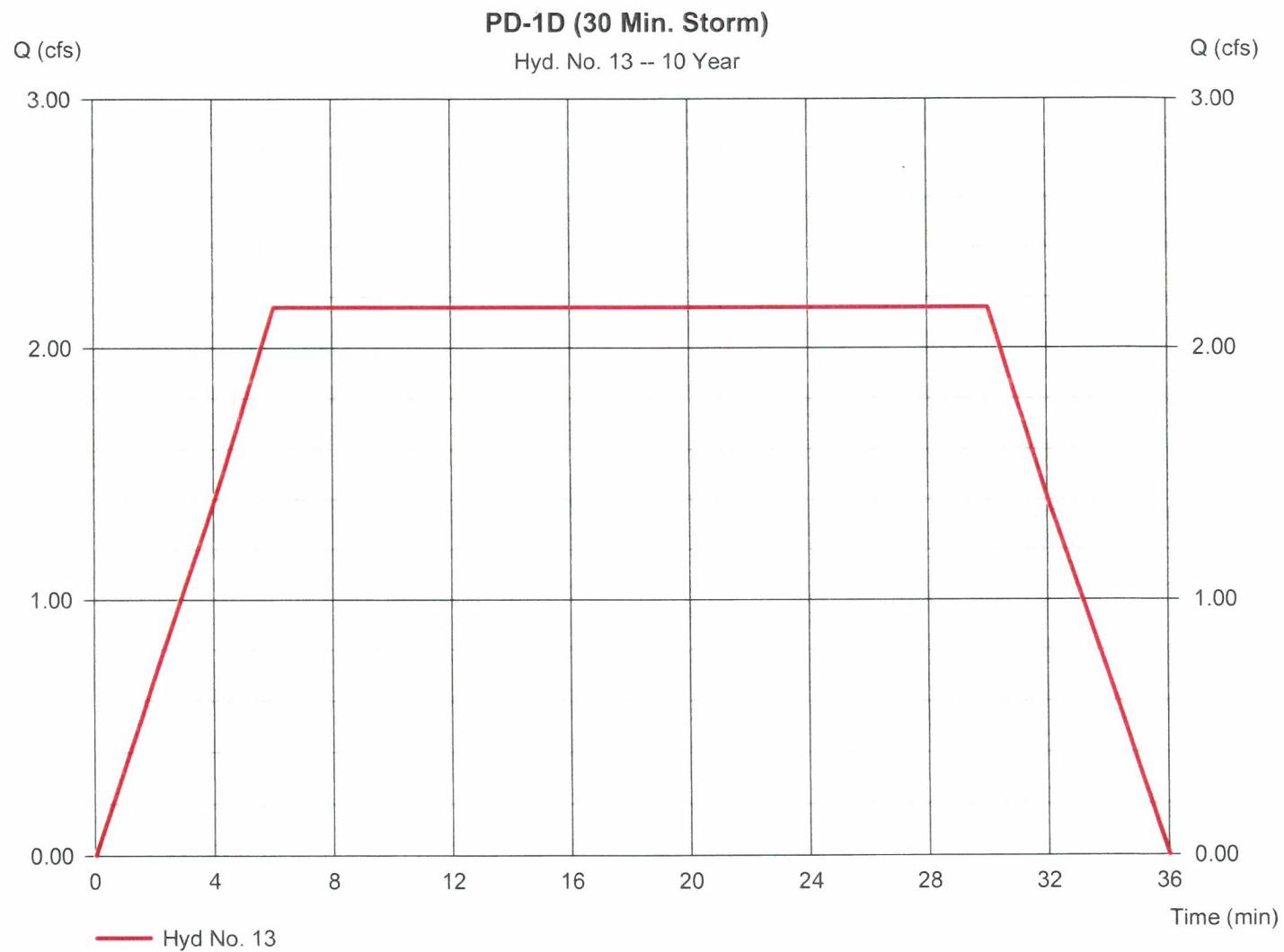
Thursday, Apr 2, 2020

Hyd. No. 13

PD-1D (30 Min. Storm)

Hydrograph type = Manual
Storm frequency = 10 yrs
Time interval = 2 min

Peak discharge = 2.160 cfs
Time to peak = 6 min
Hyd. volume = 3,874 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Apr 2, 2020

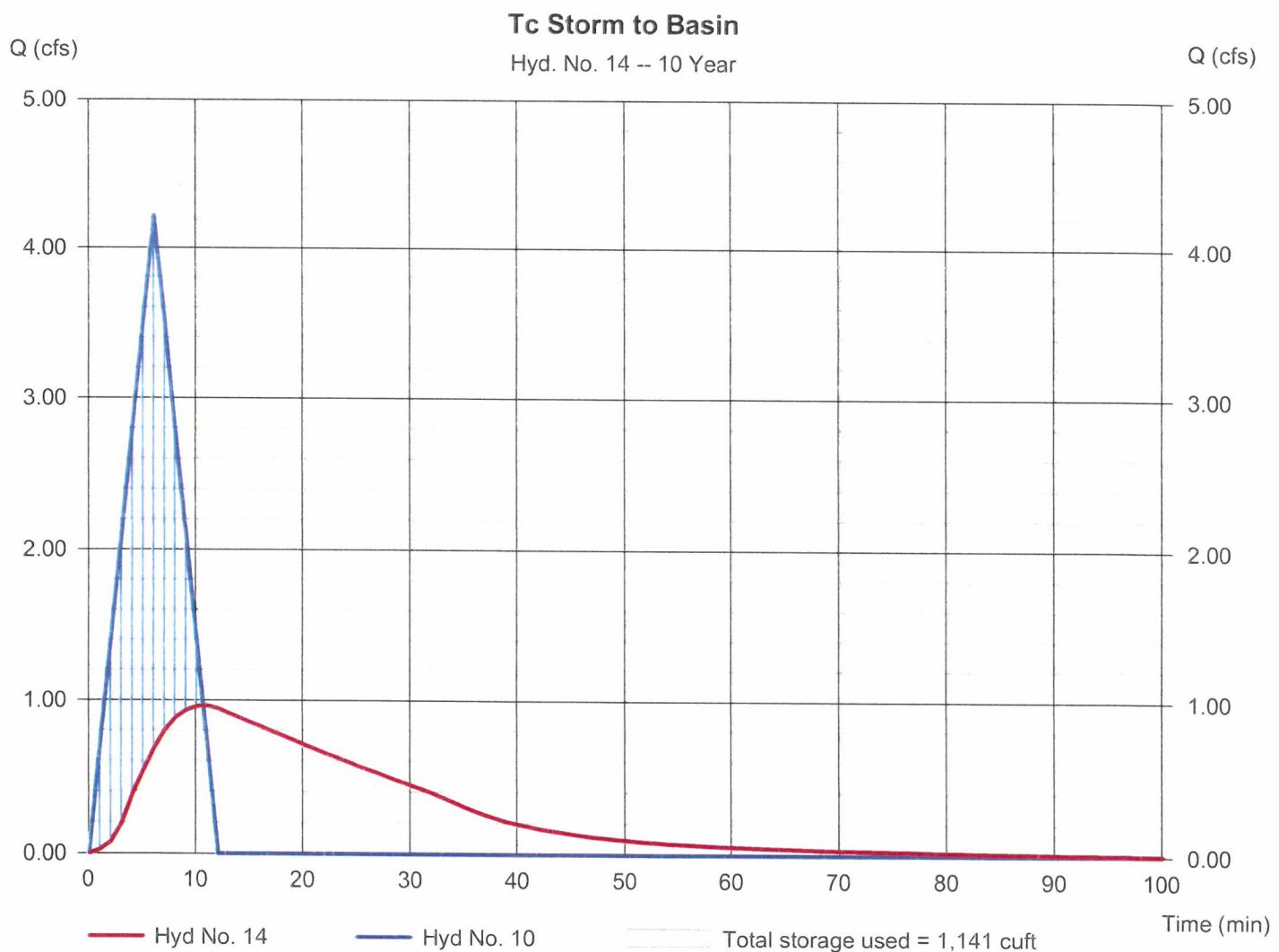
Hyd. No. 14

Tc Storm to Basin

Hydrograph type = Reservoir
 Storm frequency = 10 yrs
 Time interval = 1 min
 Inflow hyd. No. = 10 - PD-1D (Tc Storm)
 Reservoir name = Cultec Detention Basin

Peak discharge = 0.961 cfs
 Time to peak = 11 min
 Hyd. volume = 1,518 cuft
 Max. Elevation = 127.06 ft
 Max. Storage = 1,141 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs by InteliSolve v9.2

Thursday, Apr 2, 2020

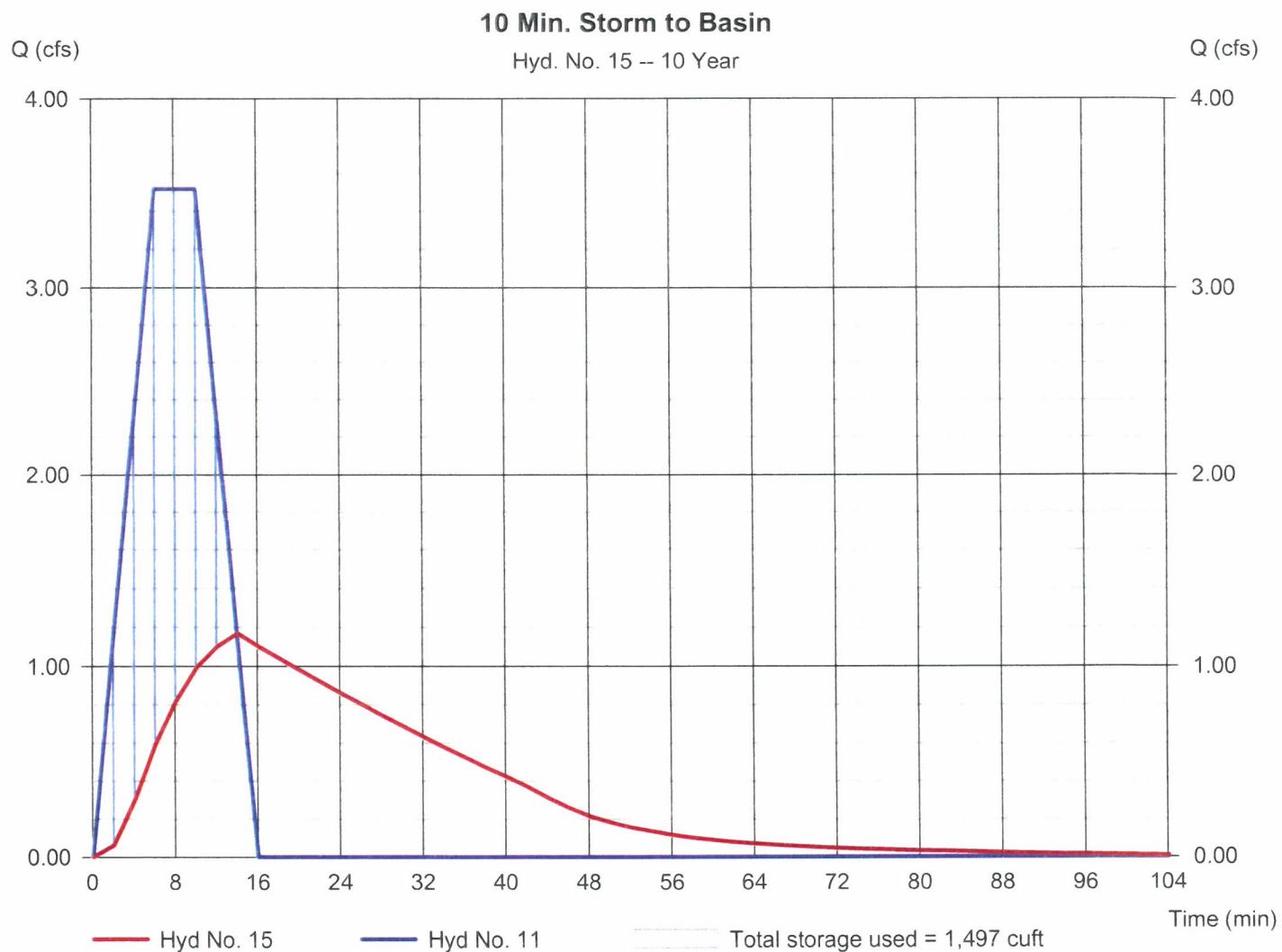
Hyd. No. 15

10 Min. Storm to Basin

Hydrograph type = Reservoir
 Storm frequency = 10 yrs
 Time interval = 2 min
 Inflow hyd. No. = 11 - PD-1D (10 Min. Storm)
 Reservoir name = Cultec Detention Basin

Peak discharge = 1.169 cfs
 Time to peak = 14 min
 Hyd. volume = 2,099 cuft
 Max. Elevation = 127.51 ft
 Max. Storage = 1,497 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Apr 2, 2020

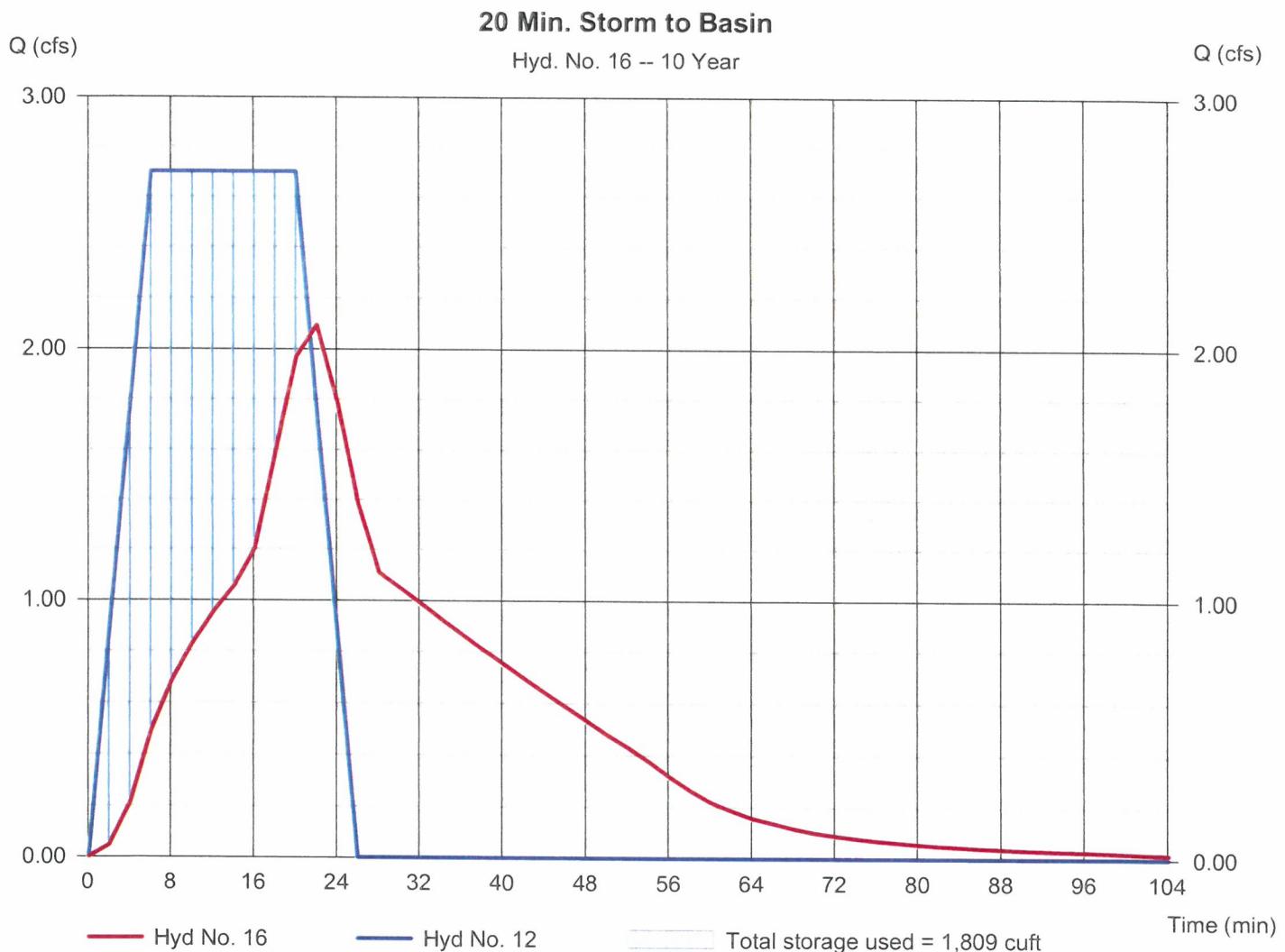
Hyd. No. 16

20 Min. Storm to Basin

Hydrograph type = Reservoir
 Storm frequency = 10 yrs
 Time interval = 2 min
 Inflow hyd. No. = 12 - PD-1D (20 Min. Storm)
 Reservoir name = Cultec Detention Basin

Peak discharge = 2.093 cfs
 Time to peak = 22 min
 Hyd. volume = 3,230 cuft
 Max. Elevation = 127.93 ft
 Max. Storage = 1,809 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Apr 2, 2020

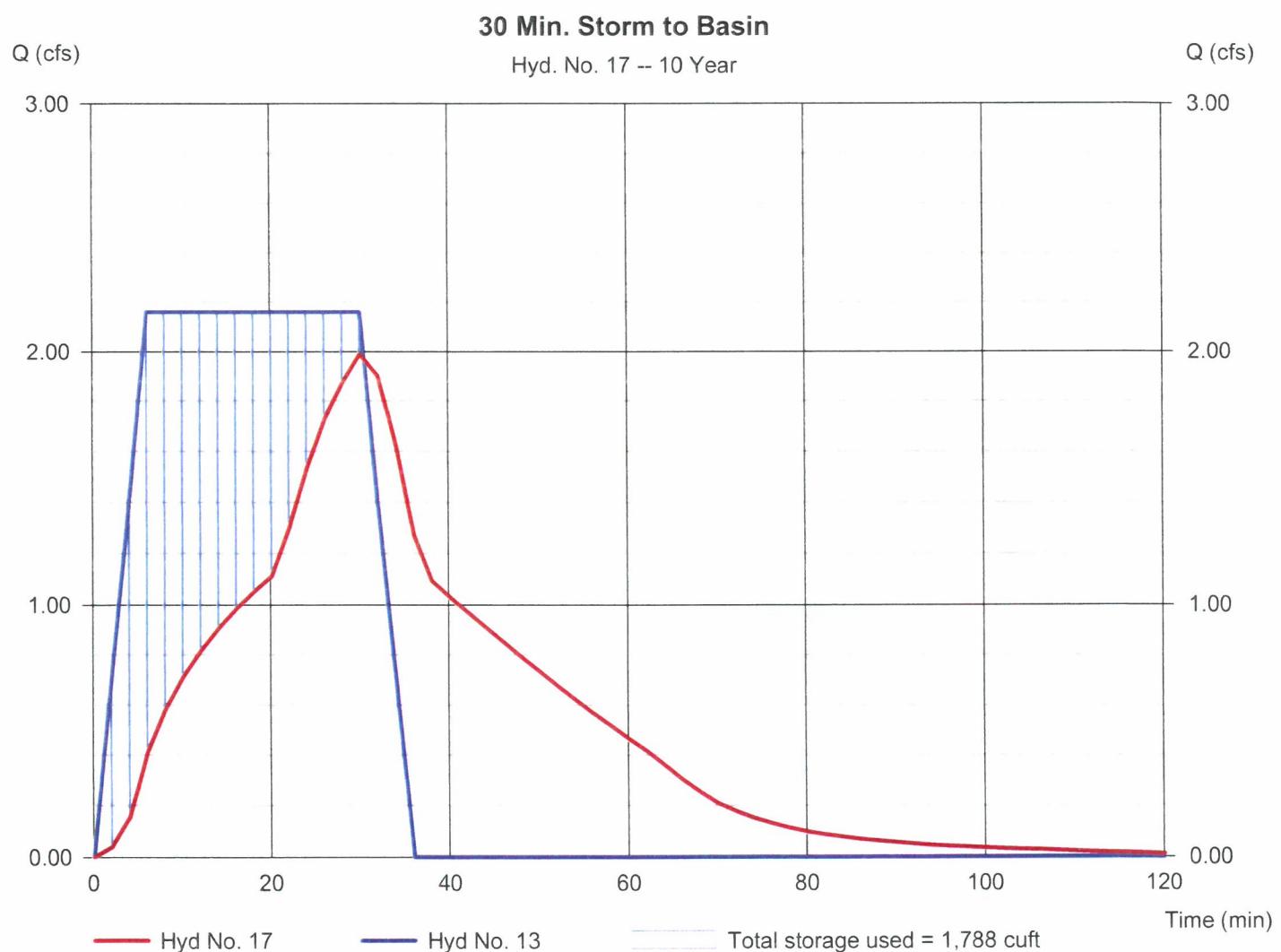
Hyd. No. 17

30 Min. Storm to Basin

Hydrograph type = Reservoir
 Storm frequency = 10 yrs
 Time interval = 2 min
 Inflow hyd. No. = 13 - PD-1D (30 Min. Storm)
 Reservoir name = Cultec Detention Basin

Peak discharge = 1.989 cfs
 Time to peak = 30 min
 Hyd. volume = 3,873 cuft
 Max. Elevation = 127.89 ft
 Max. Storage = 1,788 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Apr 2, 2020

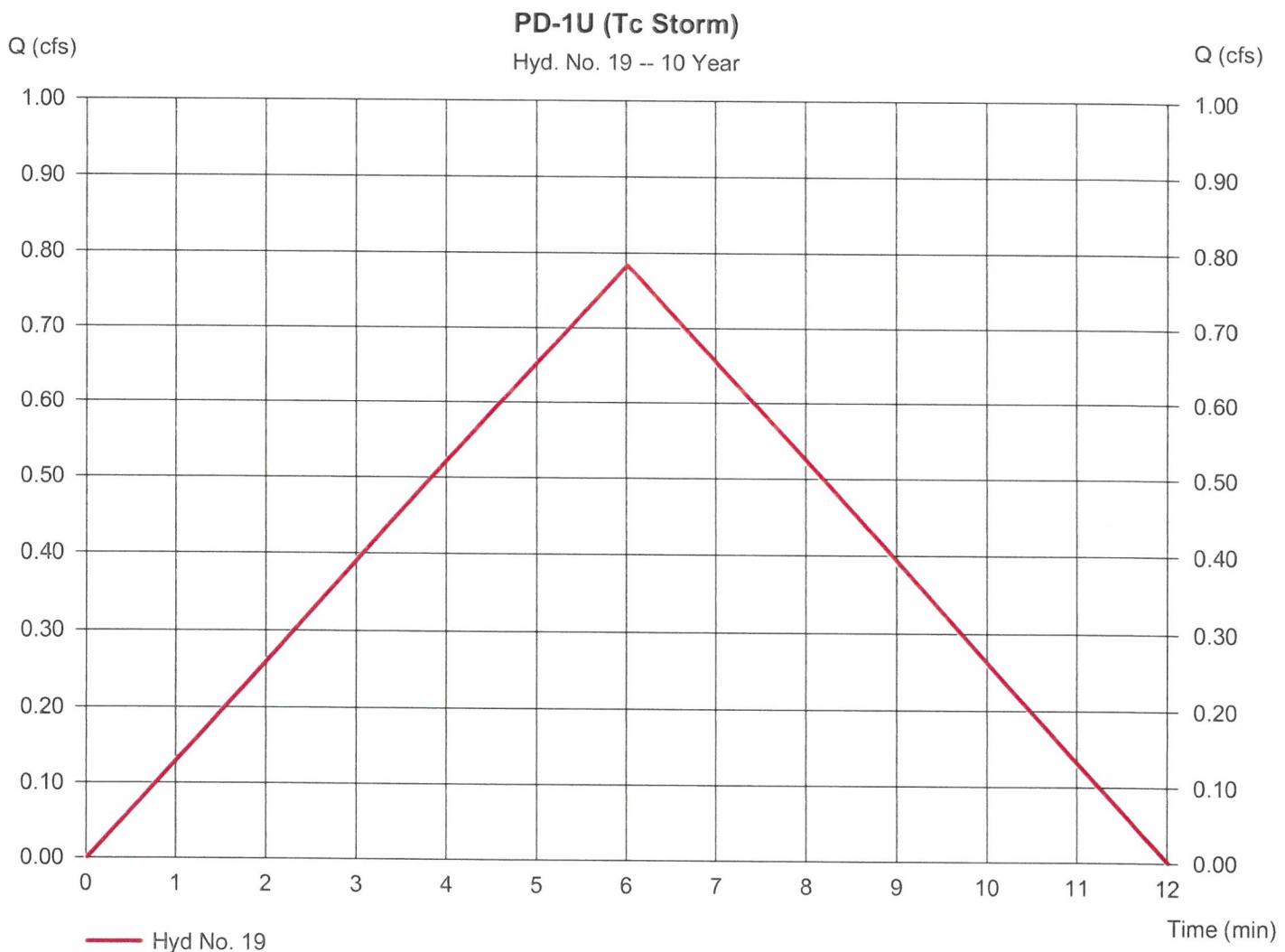
Hyd. No. 19

PD-1U (Tc Storm)

Hydrograph type = Rational
 Storm frequency = 10 yrs
 Time interval = 1 min
 Drainage area = 0.210 ac
 Intensity = 6.019 in/hr
 IDF Curve = plainfield.IDF

Peak discharge = 0.784 cfs
 Time to peak = 6 min
 Hyd. volume = 282 cuft
 Runoff coeff. = 0.62*
 Tc by User = 6.00 min
 Asc/Rec limb fact = 1/1

* Composite (Area/C) = $[(0.050 \times 0.99) + (0.160 \times 0.51)] / 0.210$



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

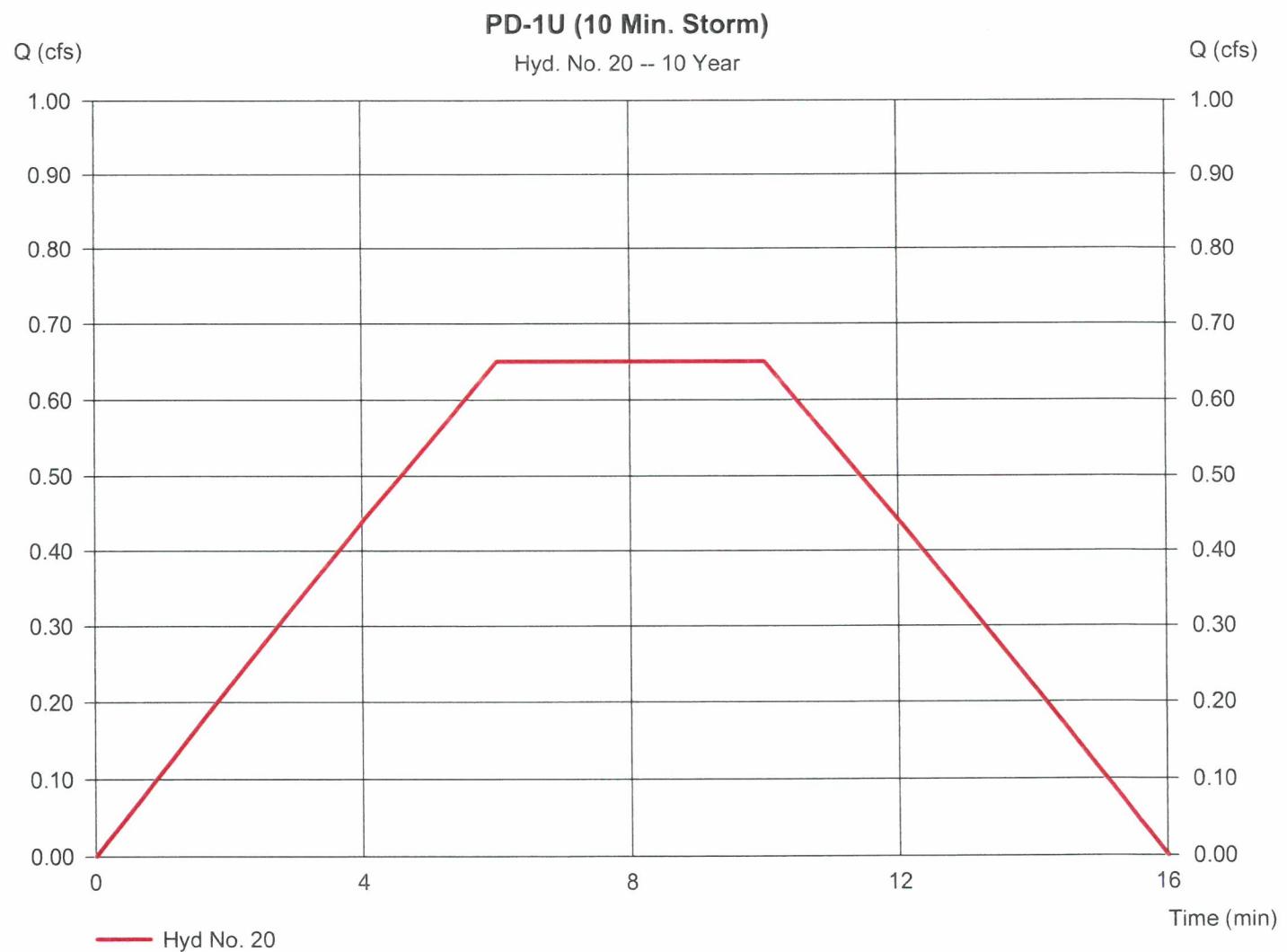
Thursday, Apr 2, 2020

Hyd. No. 20

PD-1U (10 Min. Storm)

Hydrograph type = Manual
Storm frequency = 10 yrs
Time interval = 2 min

Peak discharge = 0.650 cfs
Time to peak = 6 min
Hyd. volume = 392 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

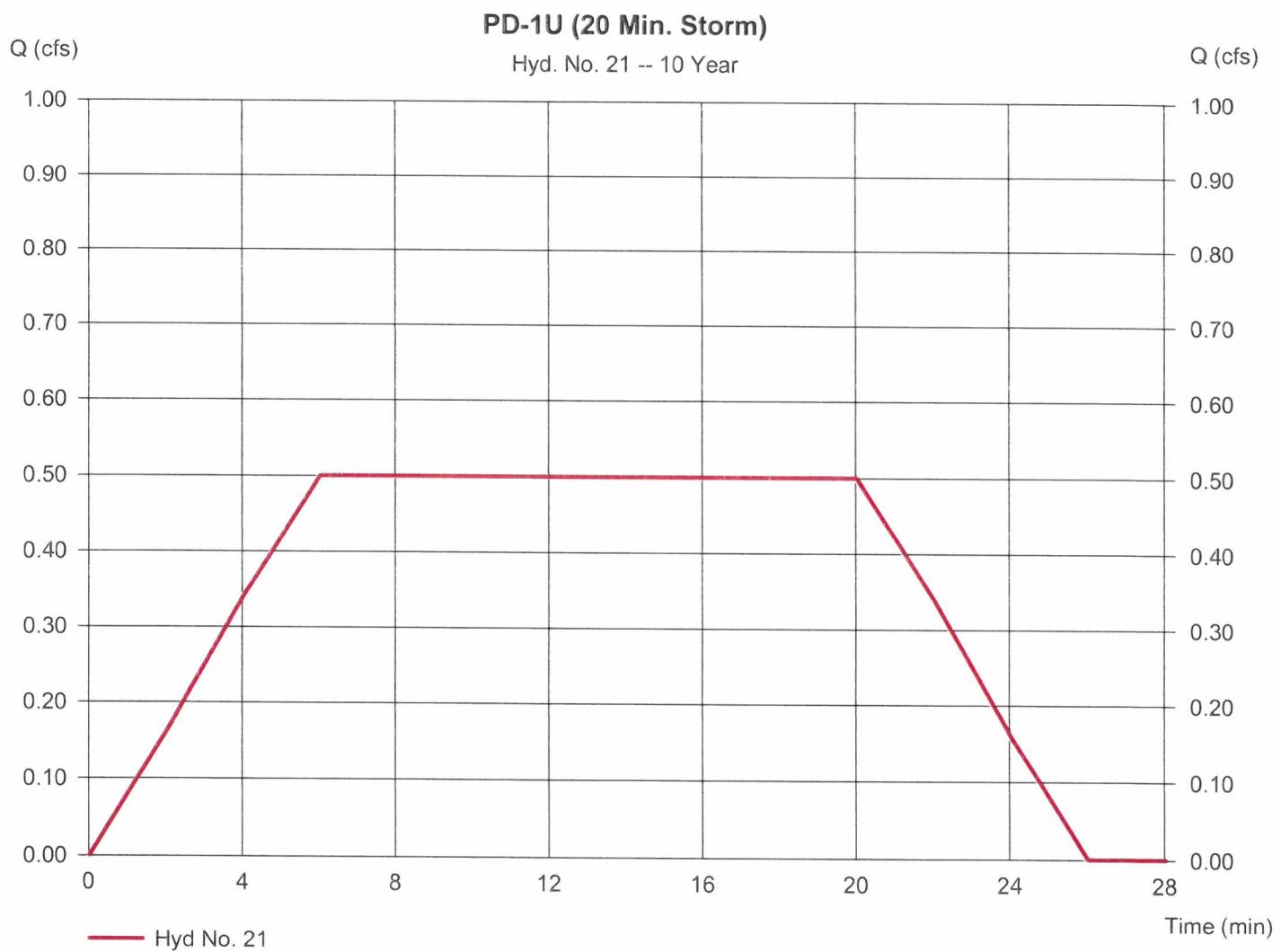
Thursday, Apr 2, 2020

Hyd. No. 21

PD-1U (20 Min. Storm)

Hydrograph type = Manual
Storm frequency = 10 yrs
Time interval = 2 min

Peak discharge = 0.500 cfs
Time to peak = 6 min
Hyd. volume = 600 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

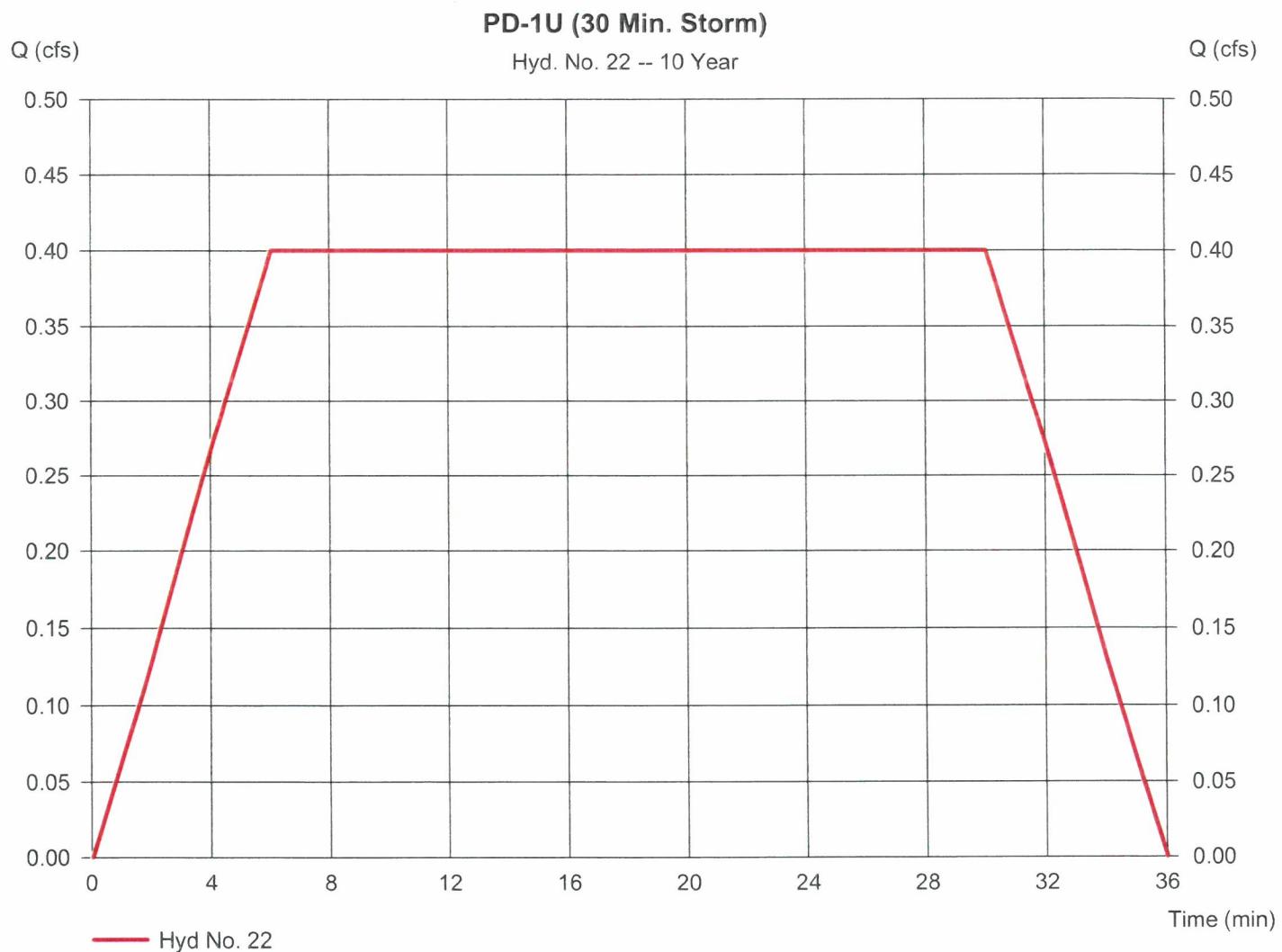
Thursday, Apr 2, 2020

Hyd. No. 22

PD-1U (30 Min. Storm)

Hydrograph type = Manual
Storm frequency = 10 yrs
Time interval = 2 min

Peak discharge = 0.400 cfs
Time to peak = 6 min
Hyd. volume = 720 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

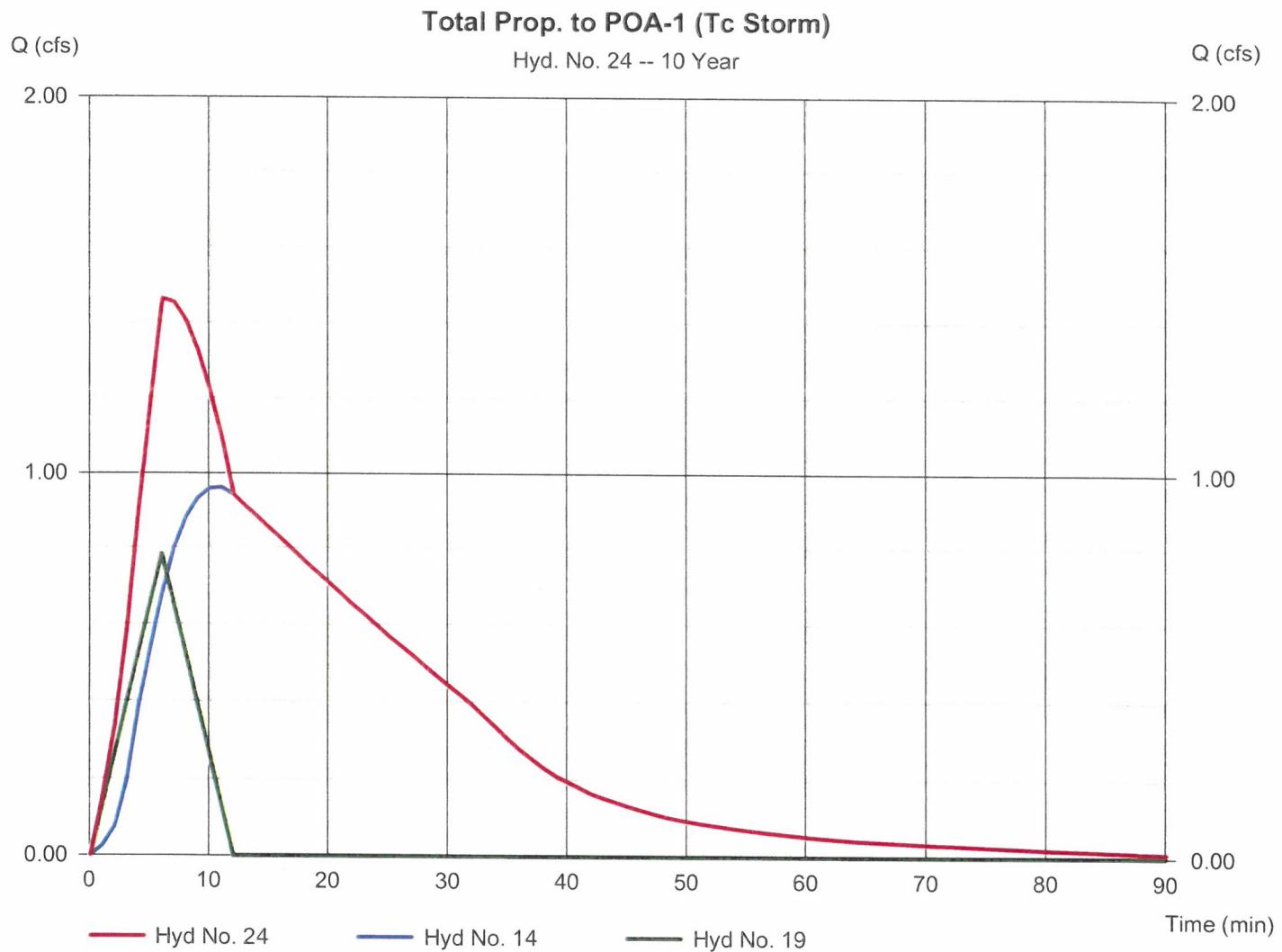
Thursday, Apr 2, 2020

Hyd. No. 24

Total Prop. to POA-1 (Tc Storm)

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 1 min
 Inflow hyds. = 14, 19

Peak discharge = 1.462 cfs
 Time to peak = 6 min
 Hyd. volume = 1,800 cuft
 Contrib. drain. area = 0.210 ac



Hydrograph Report

Hydraflow Hydrographs by InteliSolve v9.2

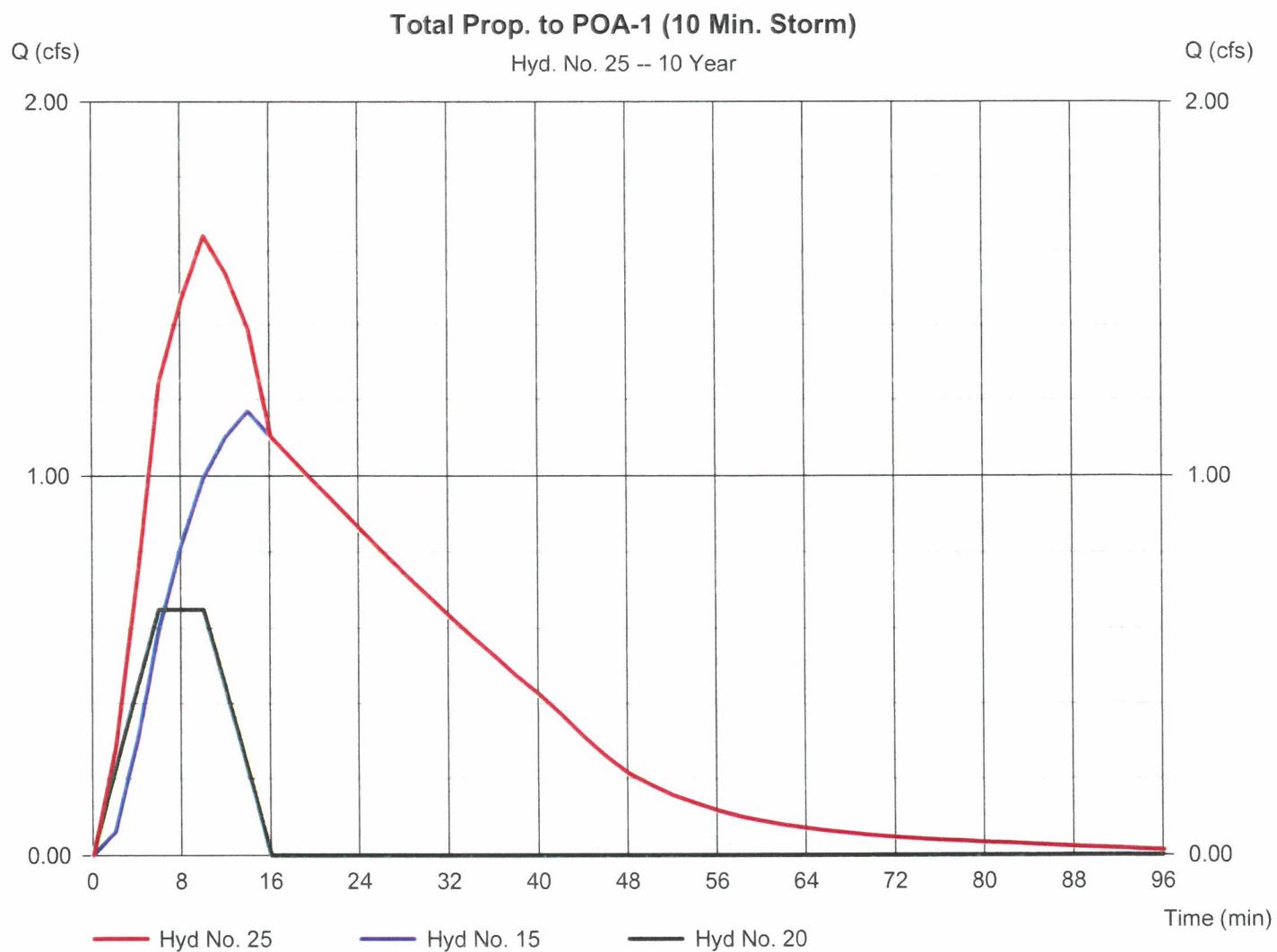
Thursday, Apr 2, 2020

Hyd. No. 25

Total Prop. to POA-1 (10 Min. Storm)

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 2 min
 Inflow hyds. = 15, 20

Peak discharge = 1.642 cfs
 Time to peak = 10 min
 Hyd. volume = 2,492 cuft
 Contrib. drain. area = 0.000 ac



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

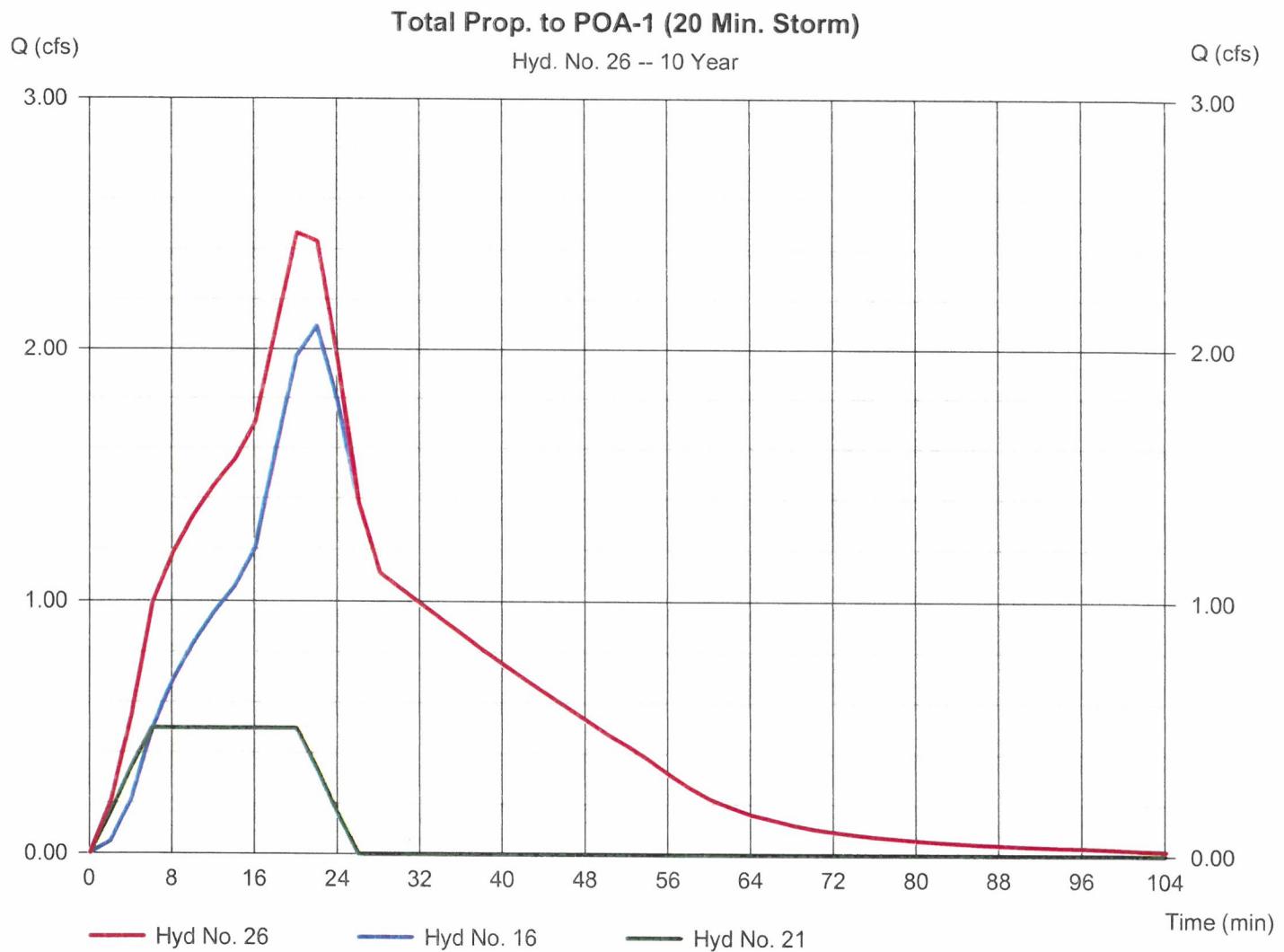
Thursday, Apr 2, 2020

Hyd. No. 26

Total Prop. to POA-1 (20 Min. Storm)

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 2 min
 Inflow hyds. = 16, 21

Peak discharge = 2.468 cfs
 Time to peak = 20 min
 Hyd. volume = 3,830 cuft
 Contrib. drain. area = 0.000 ac



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

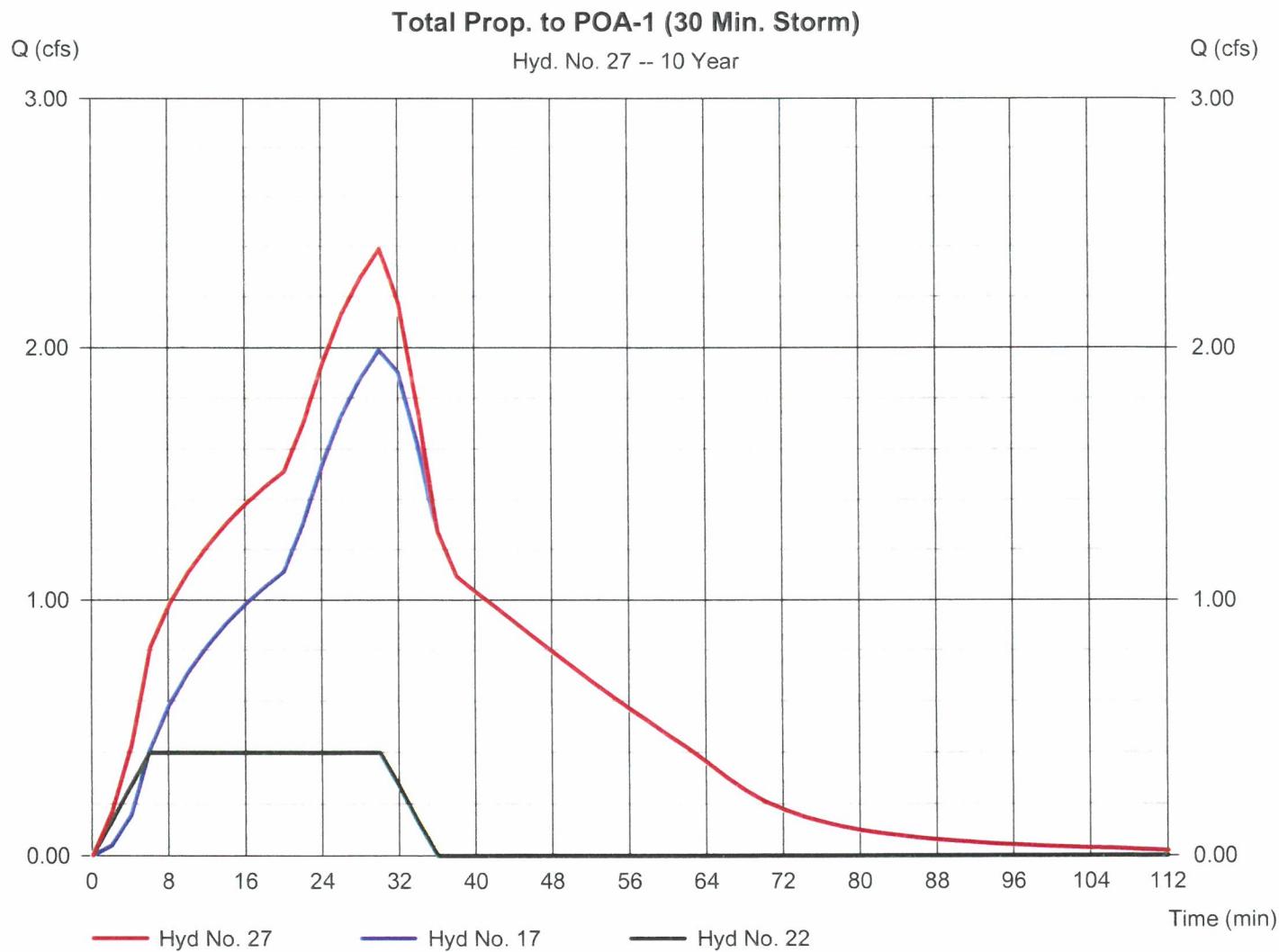
Thursday, Apr 2, 2020

Hyd. No. 27

Total Prop. to POA-1 (30 Min. Storm)

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 2 min
 Inflow hyds. = 17, 22

Peak discharge = 2.389 cfs
 Time to peak = 30 min
 Hyd. volume = 4,593 cuft
 Contrib. drain. area = 0.000 ac



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Apr 2, 2020

Hyd. No. 29

PD-2 (Tc Storm)

Hydrograph type = Rational
 Storm frequency = 10 yrs
 Time interval = 1 min
 Drainage area = 0.020 ac
 Intensity = 6.019 in/hr
 IDF Curve = plainfield.IDF

Peak discharge = 0.061 cfs
 Time to peak = 6 min
 Hyd. volume = 22 cuft
 Runoff coeff. = 0.51
 Tc by User = 6.00 min
 Asc/Rec limb fact = 1/1



Hydrograph Report

Hydraflow Hydrographs by InteliSolve v9.2

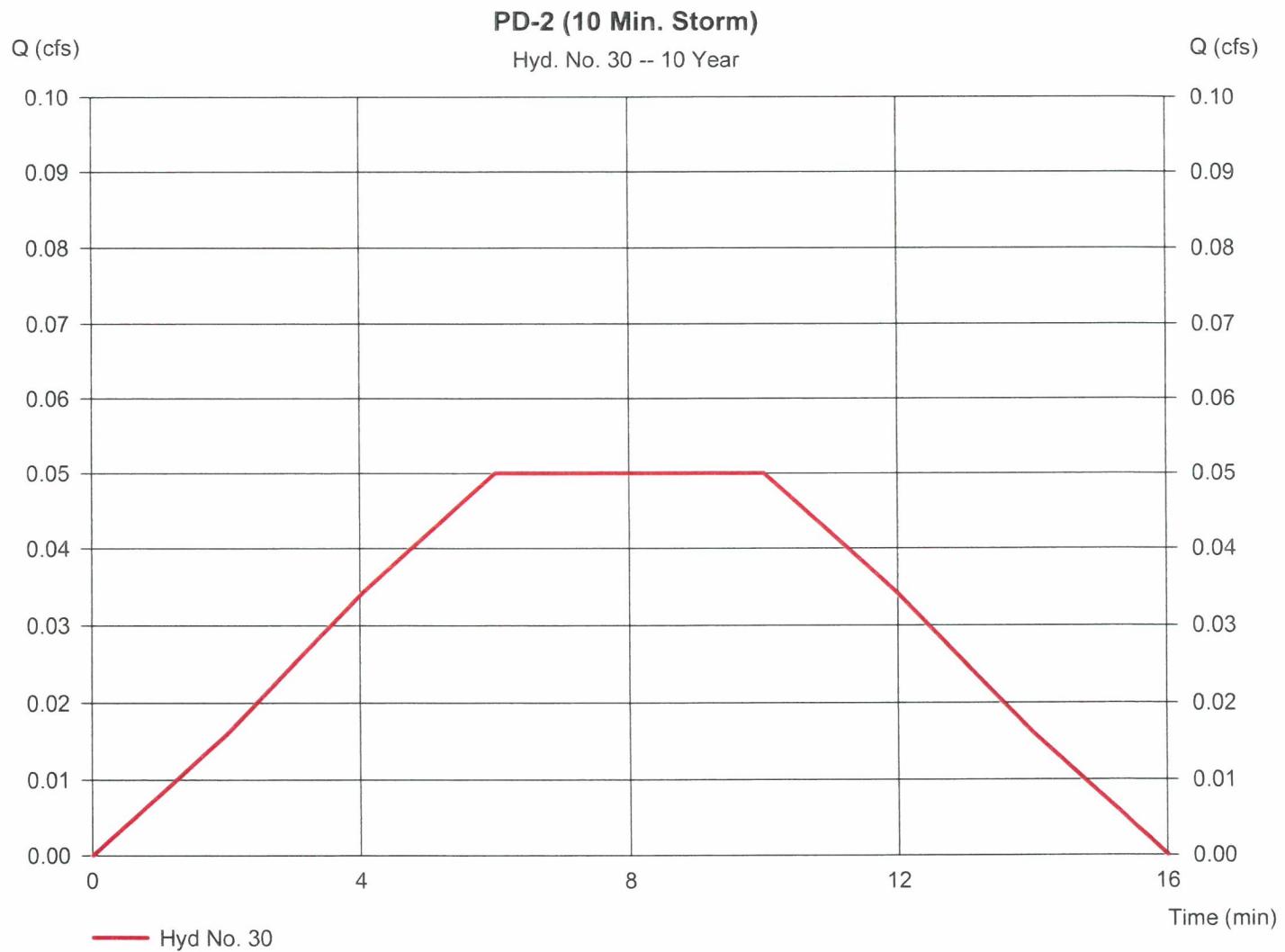
Thursday, Apr 2, 2020

Hyd. No. 30

PD-2 (10 Min. Storm)

Hydrograph type = Manual
Storm frequency = 10 yrs
Time interval = 2 min

Peak discharge = 0.050 cfs
Time to peak = 6 min
Hyd. volume = 30 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

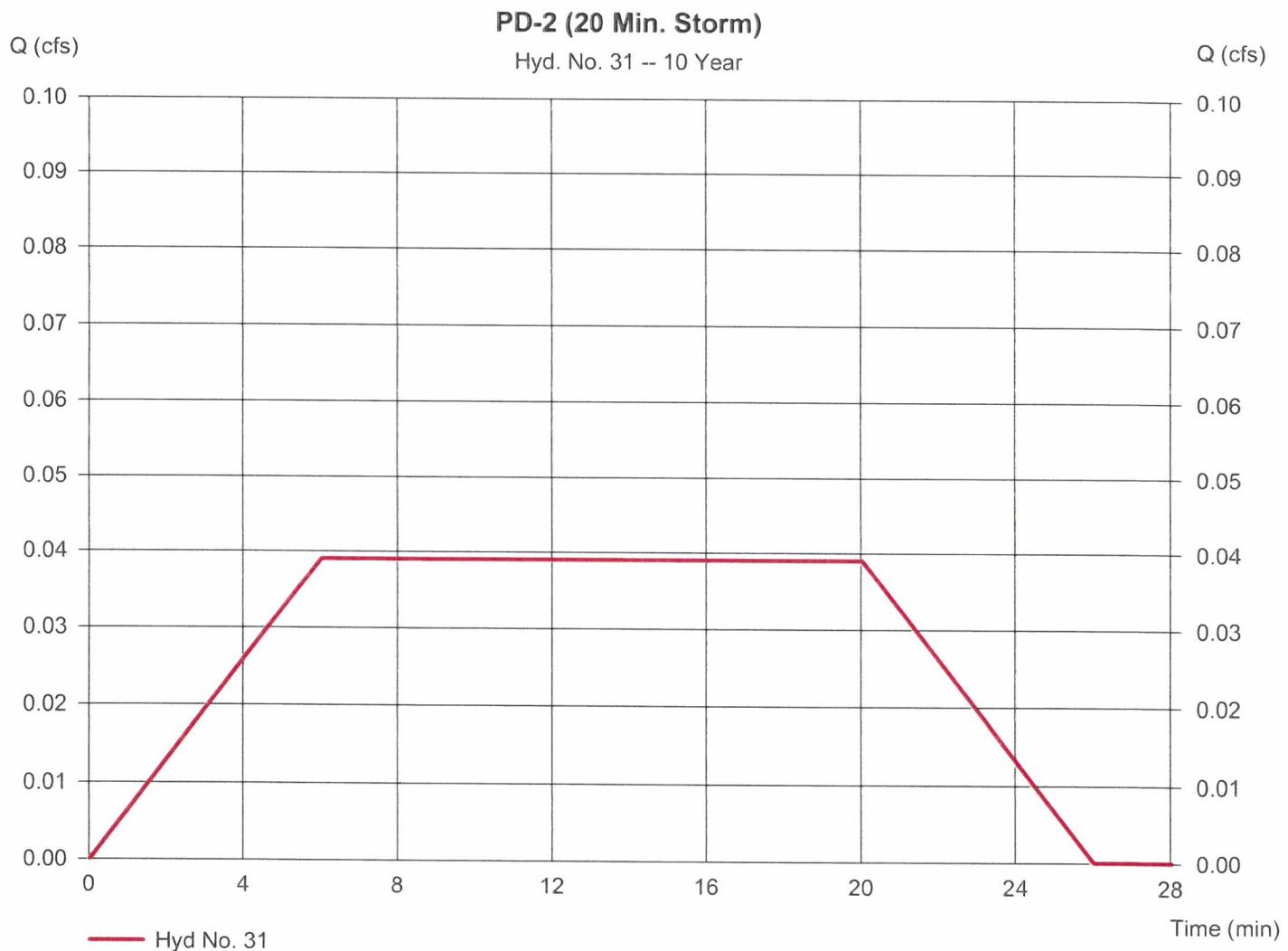
Thursday, Apr 2, 2020

Hyd. No. 31

PD-2 (20 Min. Storm)

Hydrograph type = Manual
Storm frequency = 10 yrs
Time interval = 2 min

Peak discharge = 0.039 cfs
Time to peak = 6 min
Hyd. volume = 47 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

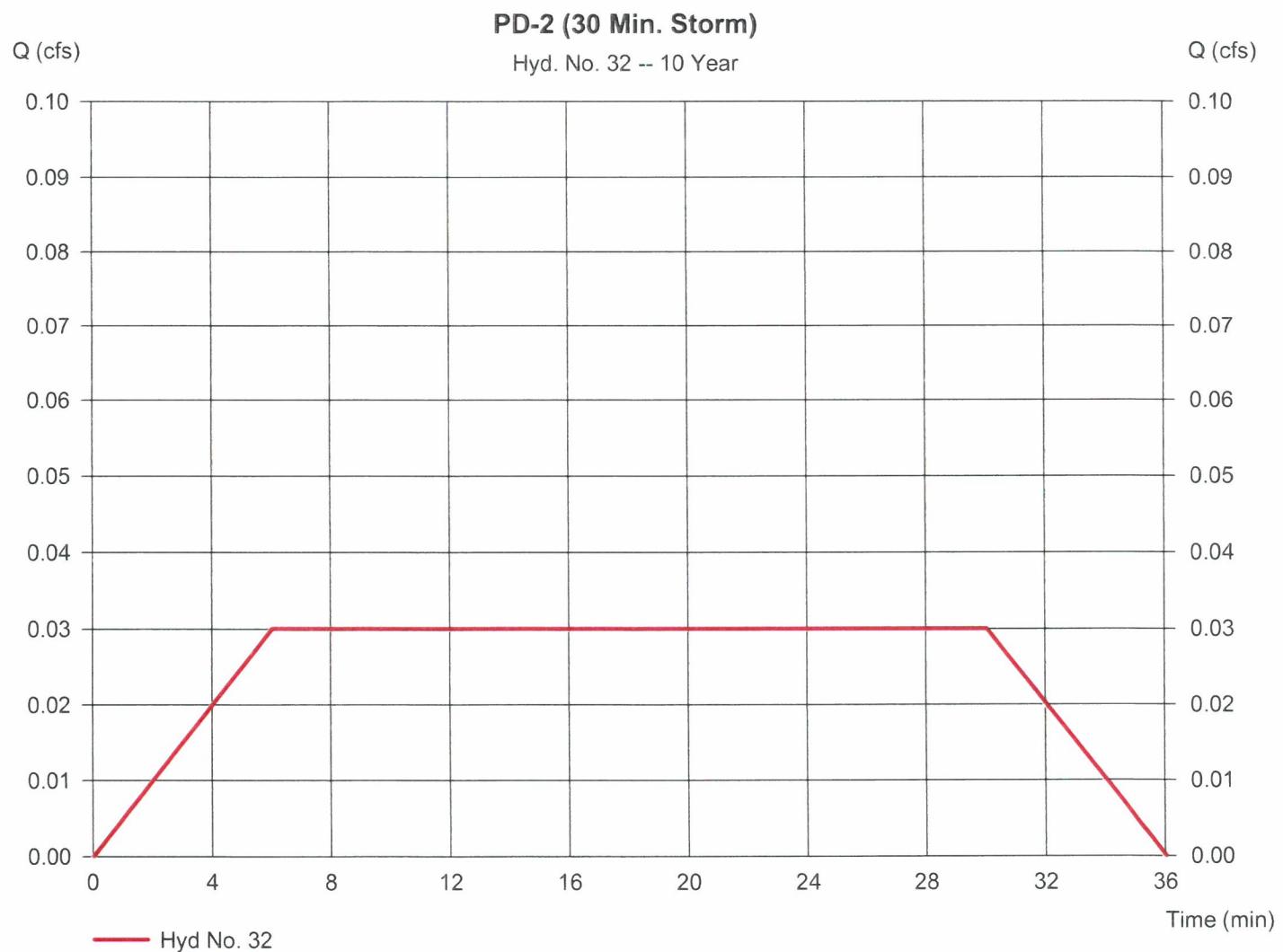
Thursday, Apr 2, 2020

Hyd. No. 32

PD-2 (30 Min. Storm)

Hydrograph type = Manual
Storm frequency = 10 yrs
Time interval = 2 min

Peak discharge = 0.030 cfs
Time to peak = 6 min
Hyd. volume = 54 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

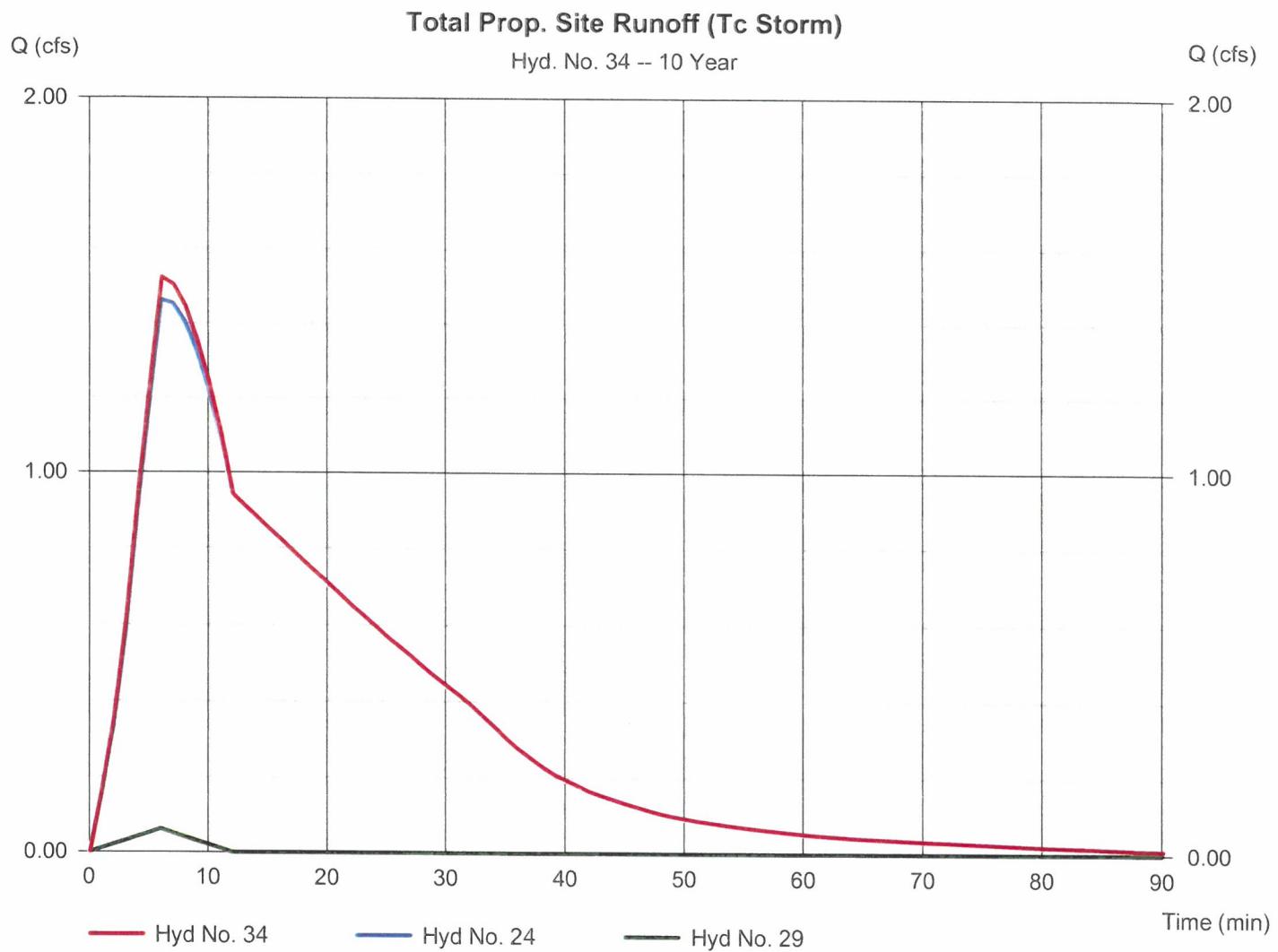
Thursday, Apr 2, 2020

Hyd. No. 34

Total Prop. Site Runoff (Tc Storm)

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 1 min
 Inflow hyds. = 24, 29

Peak discharge = 1.524 cfs
 Time to peak = 6 min
 Hyd. volume = 1,822 cuft
 Contrib. drain. area = 0.020 ac



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

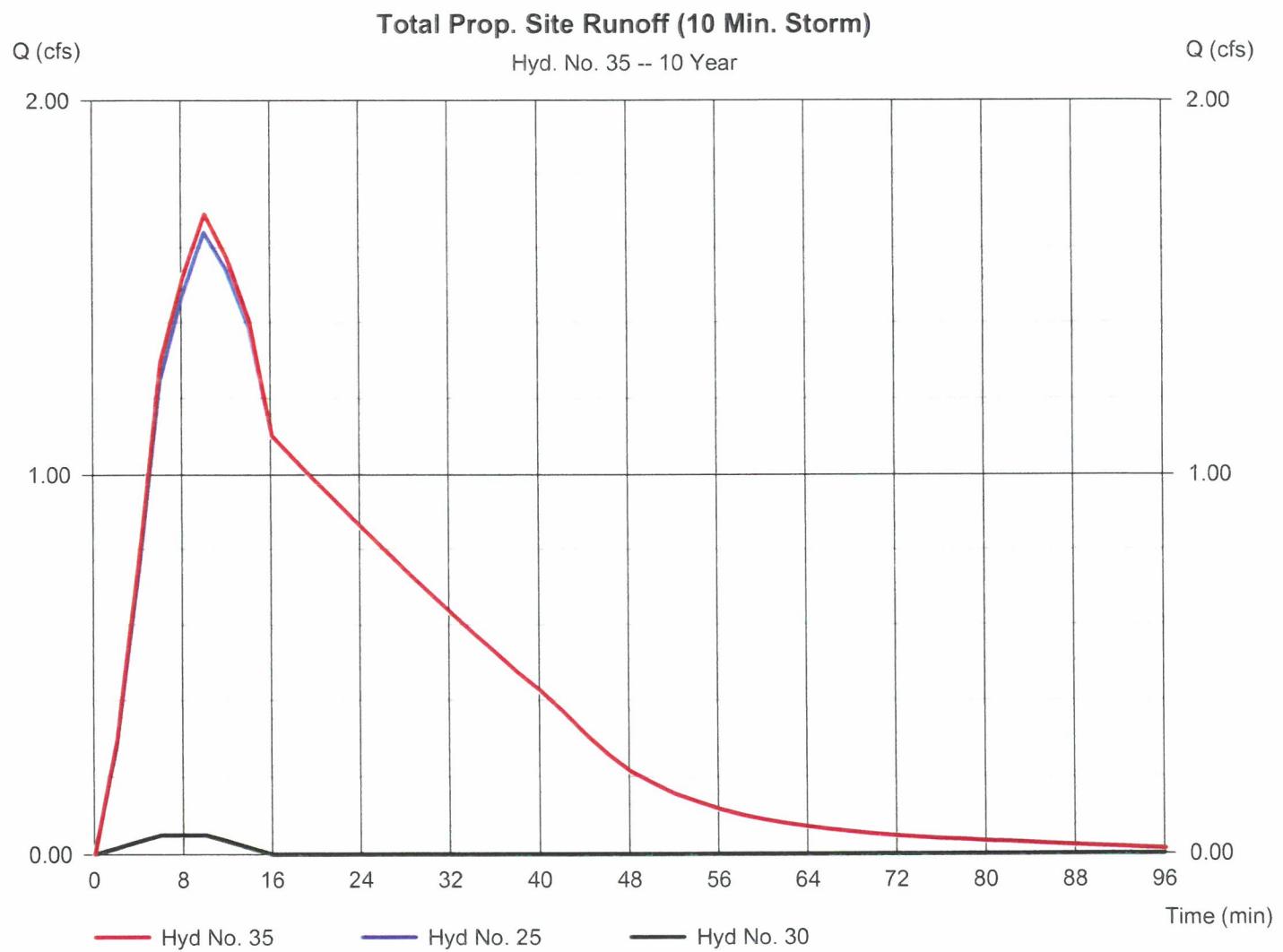
Thursday, Apr 2, 2020

Hyd. No. 35

Total Prop. Site Runoff (10 Min. Storm)

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 2 min
 Inflow hyds. = 25, 30

Peak discharge = 1.692 cfs
 Time to peak = 10 min
 Hyd. volume = 2,522 cuft
 Contrib. drain. area = 0.000 ac



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

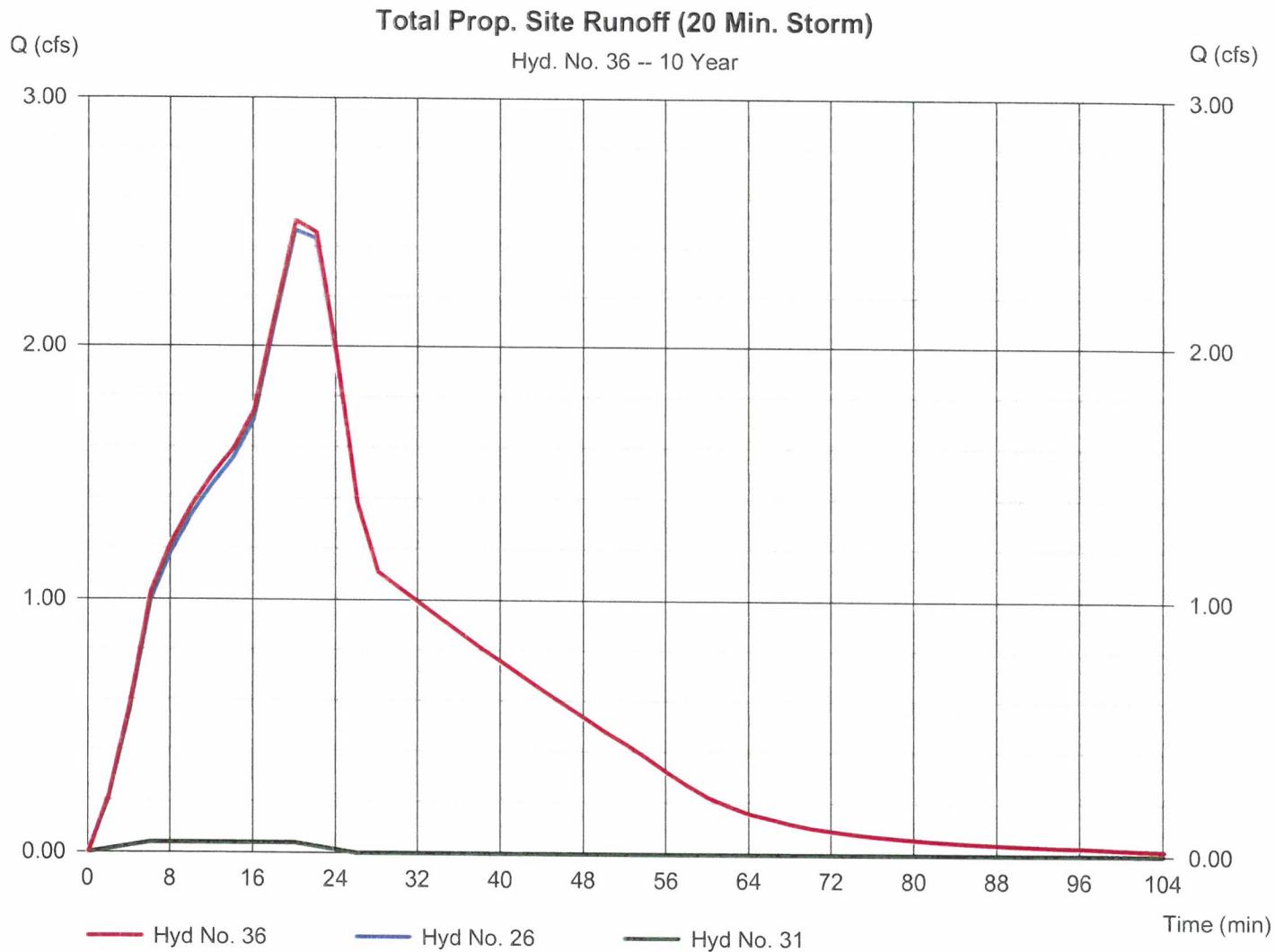
Thursday, Apr 2, 2020

Hyd. No. 36

Total Prop. Site Runoff (20 Min. Storm)

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 2 min
 Inflow hyds. = 26, 31

Peak discharge = 2.507 cfs
 Time to peak = 20 min
 Hyd. volume = 3,876 cuft
 Contrib. drain. area = 0.000 ac



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

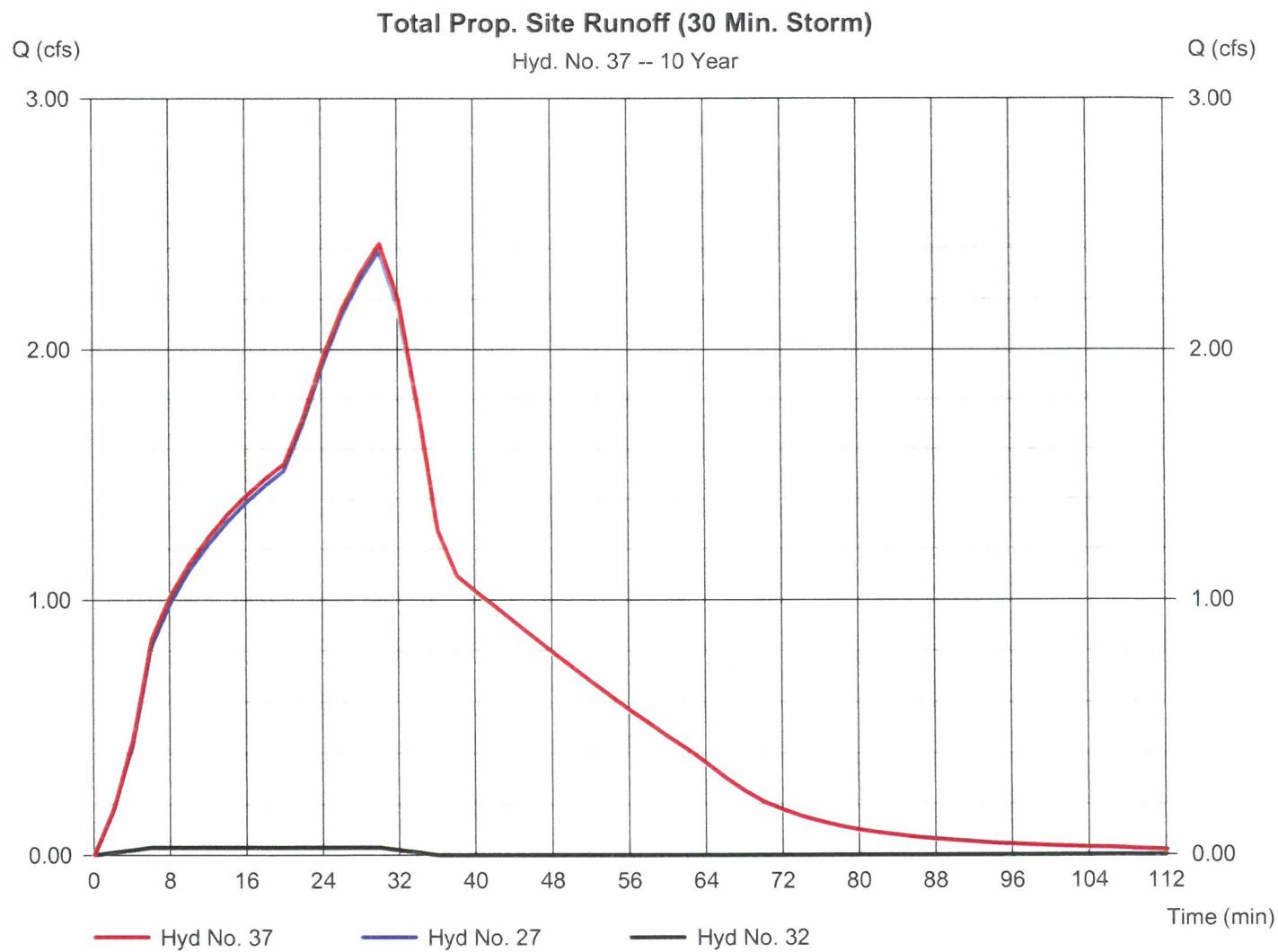
Thursday, Apr 2, 2020

Hyd. No. 37

Total Prop. Site Runoff (30 Min. Storm)

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 2 min
 Inflow hyds. = 27, 32

Peak discharge = 2.419 cfs
 Time to peak = 30 min
 Hyd. volume = 4,647 cuft
 Contrib. drain. area = 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs by InteliSolve v9.2

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	Rational	5.024	1	8	2,412	----	----	----	ED-1 (Total to POA-1)
2	Manual	4.020	1	8	1,930	----	----	----	ED-1 Reduction Target
3	Rational	0.561	1	6	202	----	----	----	ED-2 (Total to POA-2)
4	Manual	0.450	1	6	161	----	----	----	ED-2 Reduction Target
5	Combine	5.398	1	8	2,613	1, 3,	----	----	Total Existing Site Runoff
6	Manual	4.320	1	8	2,090	----	----	----	Total Site Reduction Target
8	Mod. Rational	3.013	1	6	5,098	----	----	----	Req'd Volume Estimate
10	Rational	5.455	1	6	1,964	----	----	----	PD-1D (Tc Storm)
11	Manual	4.530	2	6	2,701	----	----	----	PD-1D (10 Min. Storm)
12	Manual	3.510	2	6	4,200	----	----	----	PD-1D (20 Min. Storm)
13	Manual	2.920	2	6	5,251	----	----	----	PD-1D (30 Min. Storm)
14	Reservoir	1.185	1	11	1,963	10	127.53	1,507	Tc Storm to Basin
15	Reservoir	2.155	2	14	2,700	11	127.97	1,820	10 Min. Storm to Basin
16	Reservoir	3.366	2	20	4,199	12	128.16	2,001	20 Min. Storm to Basin
17	Reservoir	2.914	2	30	5,250	13	128.07	1,940	30 Min. Storm to Basin
19	Rational	1.014	1	6	365	----	----	----	PD-1U (Tc Storm)
20	Manual	0.840	2	6	504	----	----	----	PD-1U (10 Min. Storm)
21	Manual	0.650	2	6	782	----	----	----	PD-1U (20 Min. Storm)
22	Manual	0.540	2	6	972	----	----	----	PD-1U (30 Min. Storm)
24	Combine	1.822	1	6	2,328	14, 19,	----	----	Total Prop. to POA-1 (Tc Storm)
25	Combine	2.645	2	12	3,204	15, 20,	----	----	Total Prop. to POA-1 (10 Min. Storm)
26	Combine	4.016	2	20	4,982	16, 21,	----	----	Total Prop. to POA-1 (20 Min. Storm)
27	Combine	3.454	2	30	6,222	17, 22,	----	----	Total Prop. to POA-1 (30 Min. Storm)
29	Rational	0.079	1	6	29	----	----	----	PD-2 (Tc Storm)
30	Manual	0.065	2	6	38	----	----	----	PD-2 (10 Min. Storm)
31	Manual	0.050	2	6	60	----	----	----	PD-2 (20 Min. Storm)
32	Manual	0.041	2	6	74	----	----	----	PD-2 (30 Min. Storm)
34	Combine	1.901	1	6	2,357	24, 29,	----	----	Total Prop. Site Runoff (Tc Storm)
35	Combine	2.685	2	12	3,242	25, 30,	----	----	Total Prop. Site Runoff (10 Min. Stor
36	Combine	4.066	2	20	5,042	26, 31,	----	----	Total Prop. Site Runoff (20 Min. Stor
37	Combine	3.495	2	30	6,296	27, 32,	----	----	Total Prop. Site Runoff (30 Min. Stor
Drainage Analysis R-4.gpw					Return Period: 100 Year			Thursday, Apr 2, 2020	

Hydrograph Report

Hydraflow Hydrographs by Intelsolve v9.2

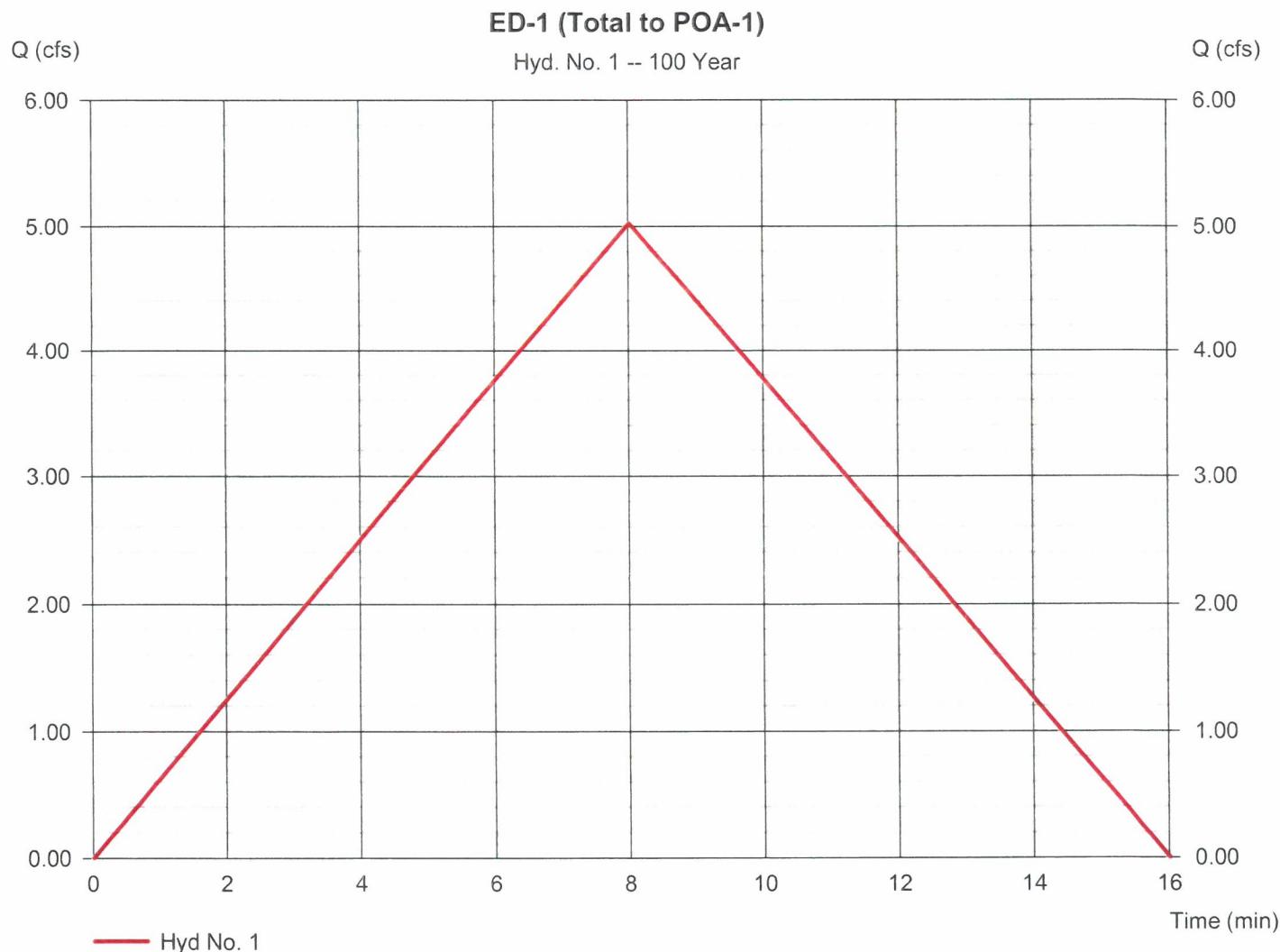
Thursday, Apr 2, 2020

Hyd. No. 1

ED-1 (Total to POA-1)

Hydrograph type	= Rational	Peak discharge	= 5.024 cfs
Storm frequency	= 100 yrs	Time to peak	= 8 min
Time interval	= 1 min	Hyd. volume	= 2,412 cuft
Drainage area	= 0.910 ac	Runoff coeff.	= 0.77*
Intensity	= 7.170 in/hr	Tc by TR55	= 8.00 min
IDF Curve	= plainfield.IDF	Asc/Rec limb fact	= 1/1

* Composite (Area/C) = [(0.490 x 0.99) + (0.420 x 0.51)] / 0.910



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

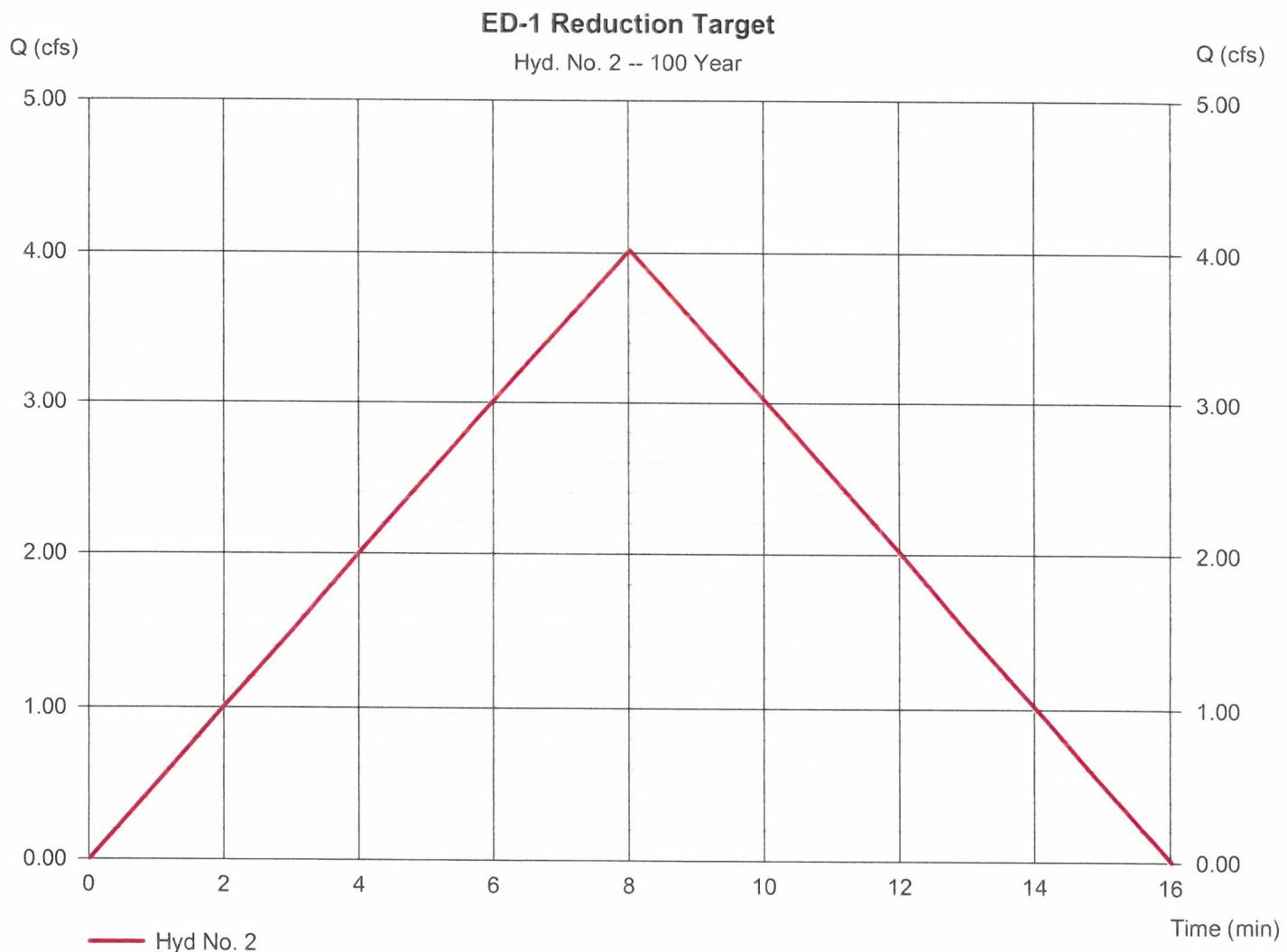
Thursday, Apr 2, 2020

Hyd. No. 2

ED-1 Reduction Target

Hydrograph type = Manual
Storm frequency = 100 yrs
Time interval = 1 min

Peak discharge = 4.020 cfs
Time to peak = 8 min
Hyd. volume = 1,930 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Apr 2, 2020

Hyd. No. 3

ED-2 (Total to POA-2)

Hydrograph type = Rational
 Storm frequency = 100 yrs
 Time interval = 1 min
 Drainage area = 0.090 ac
 Intensity = 7.785 in/hr
 IDF Curve = plainfield.IDF

Peak discharge = 0.561 cfs
 Time to peak = 6 min
 Hyd. volume = 202 cuft
 Runoff coeff. = 0.8
 Tc by User = 6.00 min
 Asc/Rec limb fact = 1/1



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

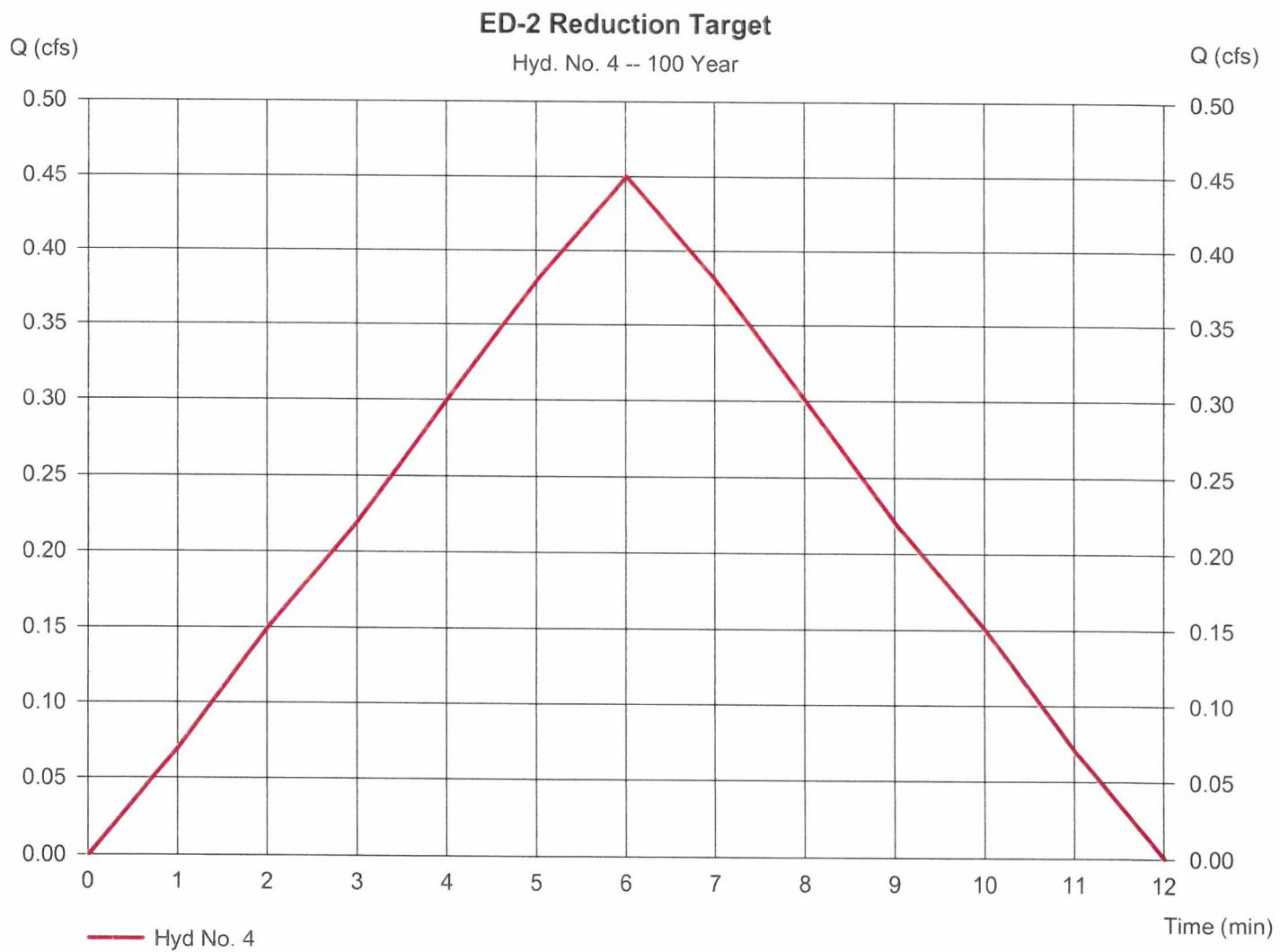
Thursday, Apr 2, 2020

Hyd. No. 4

ED-2 Reduction Target

Hydrograph type = Manual
Storm frequency = 100 yrs
Time interval = 1 min

Peak discharge = 0.450 cfs
Time to peak = 6 min
Hyd. volume = 161 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

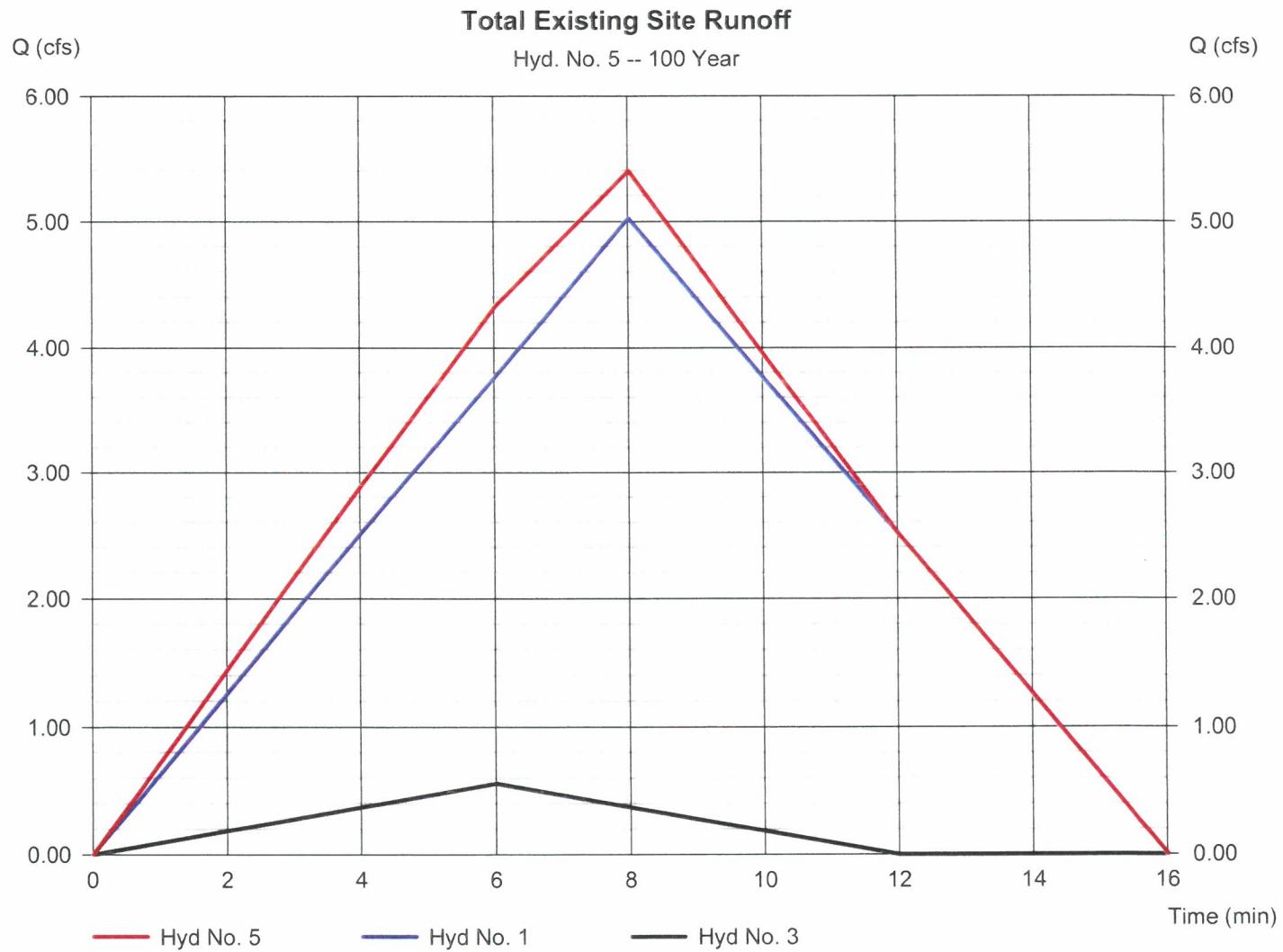
Thursday, Apr 2, 2020

Hyd. No. 5

Total Existing Site Runoff

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 1 min
 Inflow hyds. = 1, 3

Peak discharge = 5.398 cfs
 Time to peak = 8 min
 Hyd. volume = 2,613 cuft
 Contrib. drain. area = 1.000 ac



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

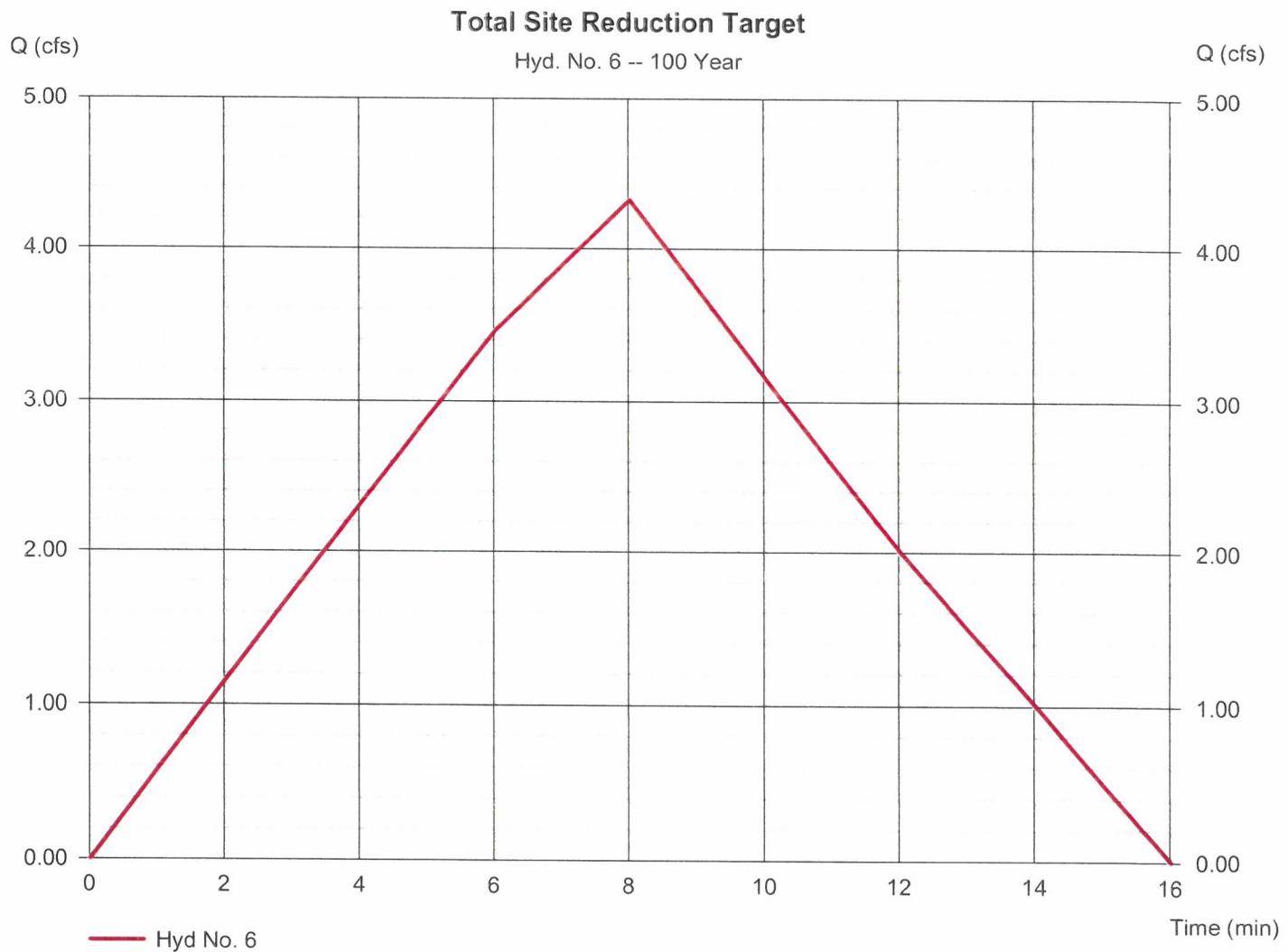
Thursday, Apr 2, 2020

Hyd. No. 6

Total Site Reduction Target

Hydrograph type = Manual
Storm frequency = 100 yrs
Time interval = 1 min

Peak discharge = 4.320 cfs
Time to peak = 8 min
Hyd. volume = 2,090 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Apr 2, 2020

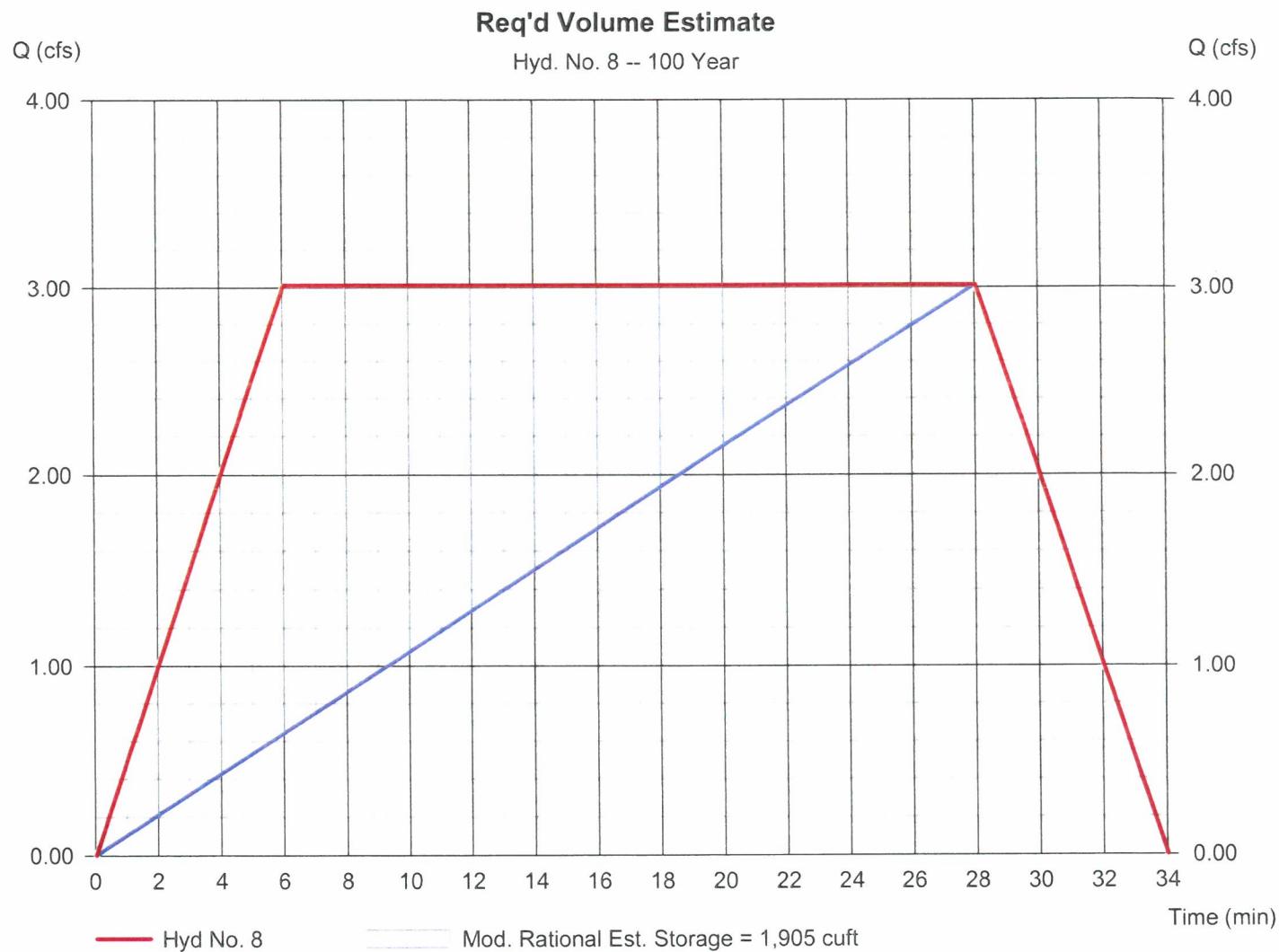
Hyd. No. 8

Req'd Volume Estimate

Hydrograph type = Mod. Rational
 Storm frequency = 100 yrs
 Time interval = 1 min
 Drainage area = 0.770 ac
 Intensity = 4.300 in/hr
 IDF Curve = plainfield.IDF
 Target Q = 3.006 cfs

Peak discharge = 3.013 cfs
 Time to peak = 6 min
 Hyd. volume = 5,098 cuft
 Runoff coeff. = 0.91*
 Tc by User = 6.00 min
 Storm duration = 4.7 x Tc
 Est. Req'd Storage = 1,905 cuft

* Composite (Area/C) = [(0.640 x 0.99) + (0.130 x 0.51)] / 0.770



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Apr 2, 2020

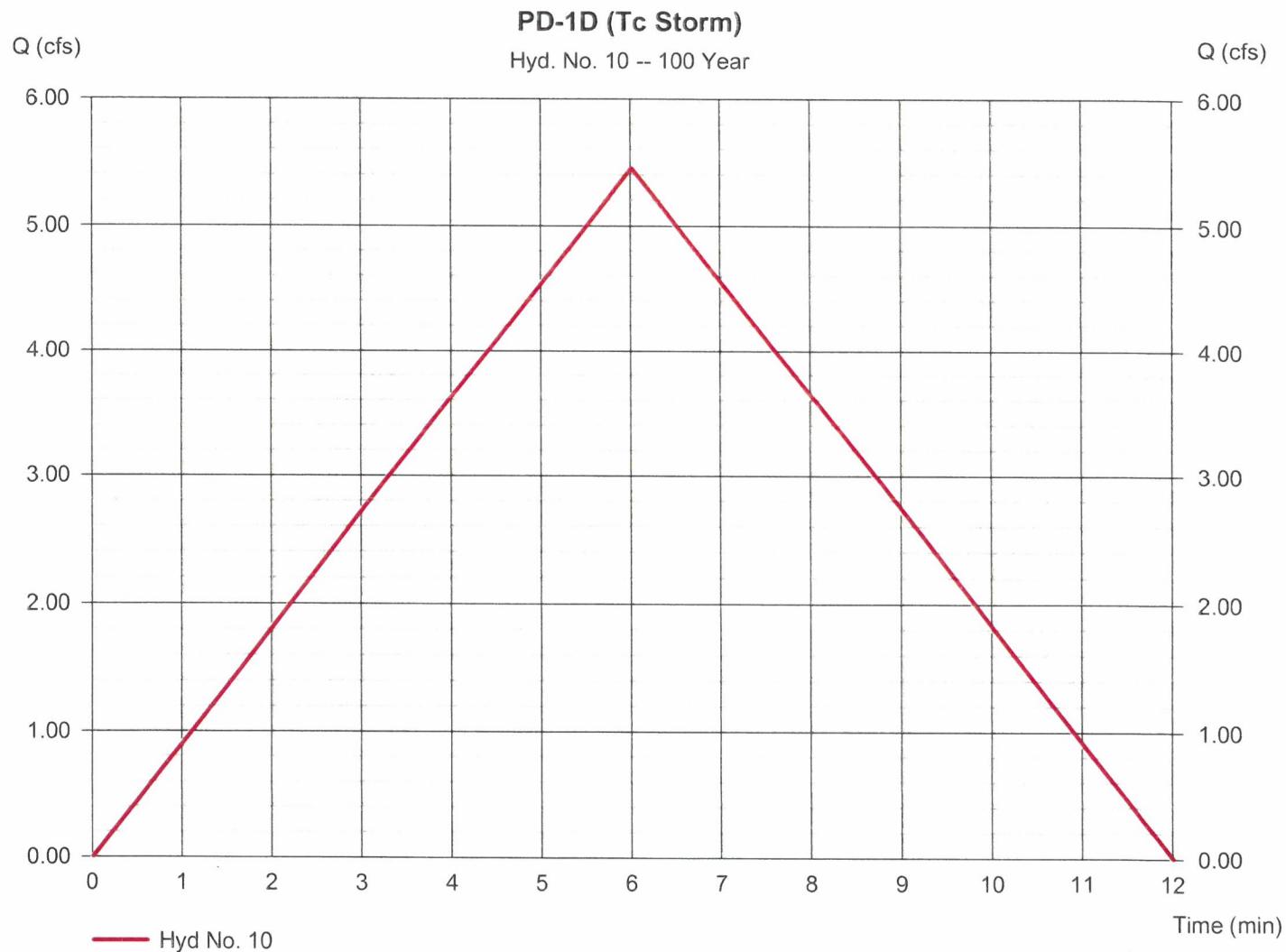
Hyd. No. 10

PD-1D (Tc Storm)

Hydrograph type = Rational
 Storm frequency = 100 yrs
 Time interval = 1 min
 Drainage area = 0.770 ac
 Intensity = 7.785 in/hr
 IDF Curve = plainfield.IDF

Peak discharge = 5.455 cfs
 Time to peak = 6 min
 Hyd. volume = 1,964 cuft
 Runoff coeff. = 0.91*
 Tc by User = 6.00 min
 Asc/Rec limb fact = 1/1

* Composite (Area/C) = $[(0.640 \times 0.99) + (0.130 \times 0.51)] / 0.770$



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

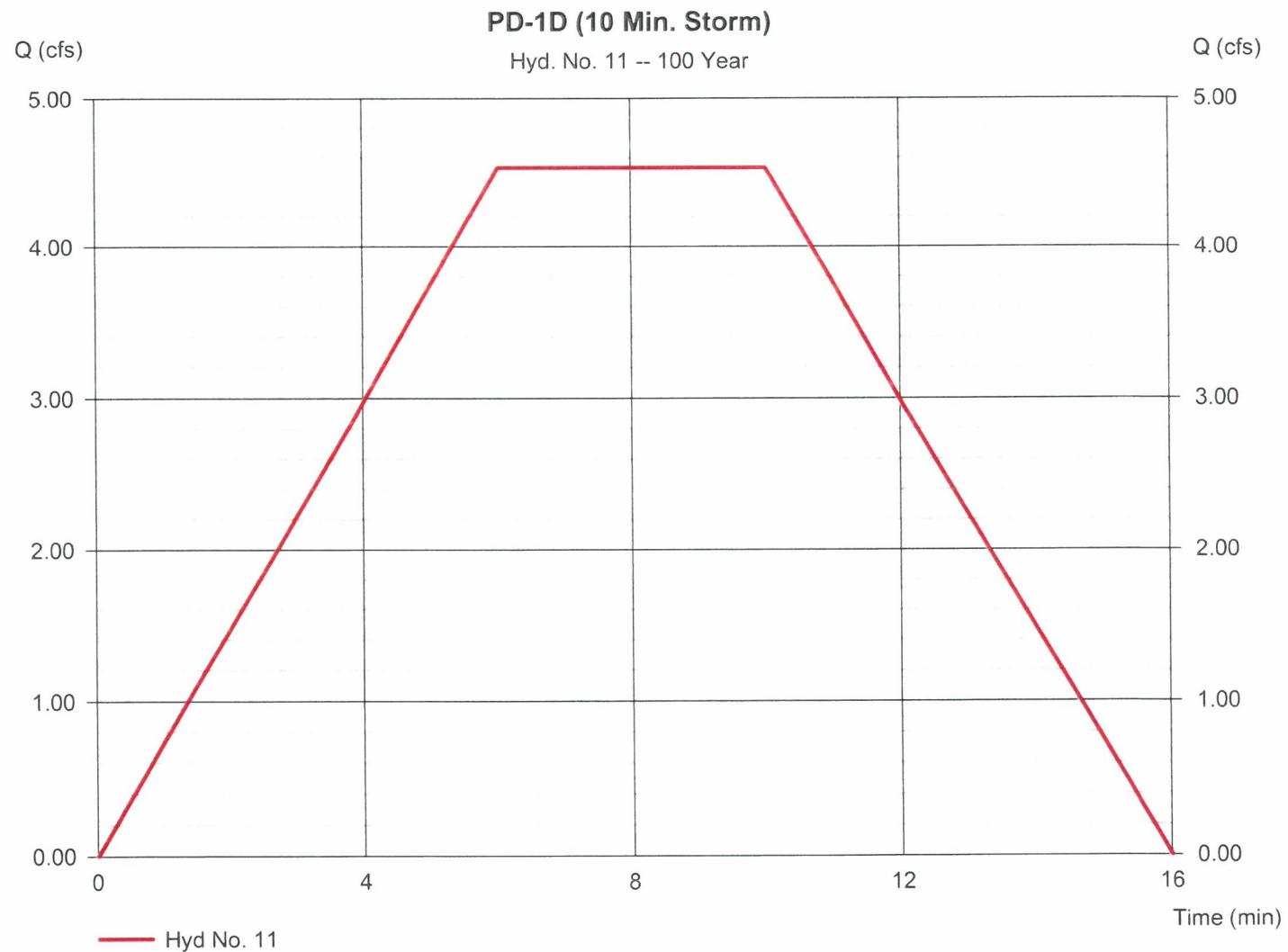
Thursday, Apr 2, 2020

Hyd. No. 11

PD-1D (10 Min. Storm)

Hydrograph type = Manual
Storm frequency = 100 yrs
Time interval = 2 min

Peak discharge = 4.530 cfs
Time to peak = 6 min
Hyd. volume = 2,701 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

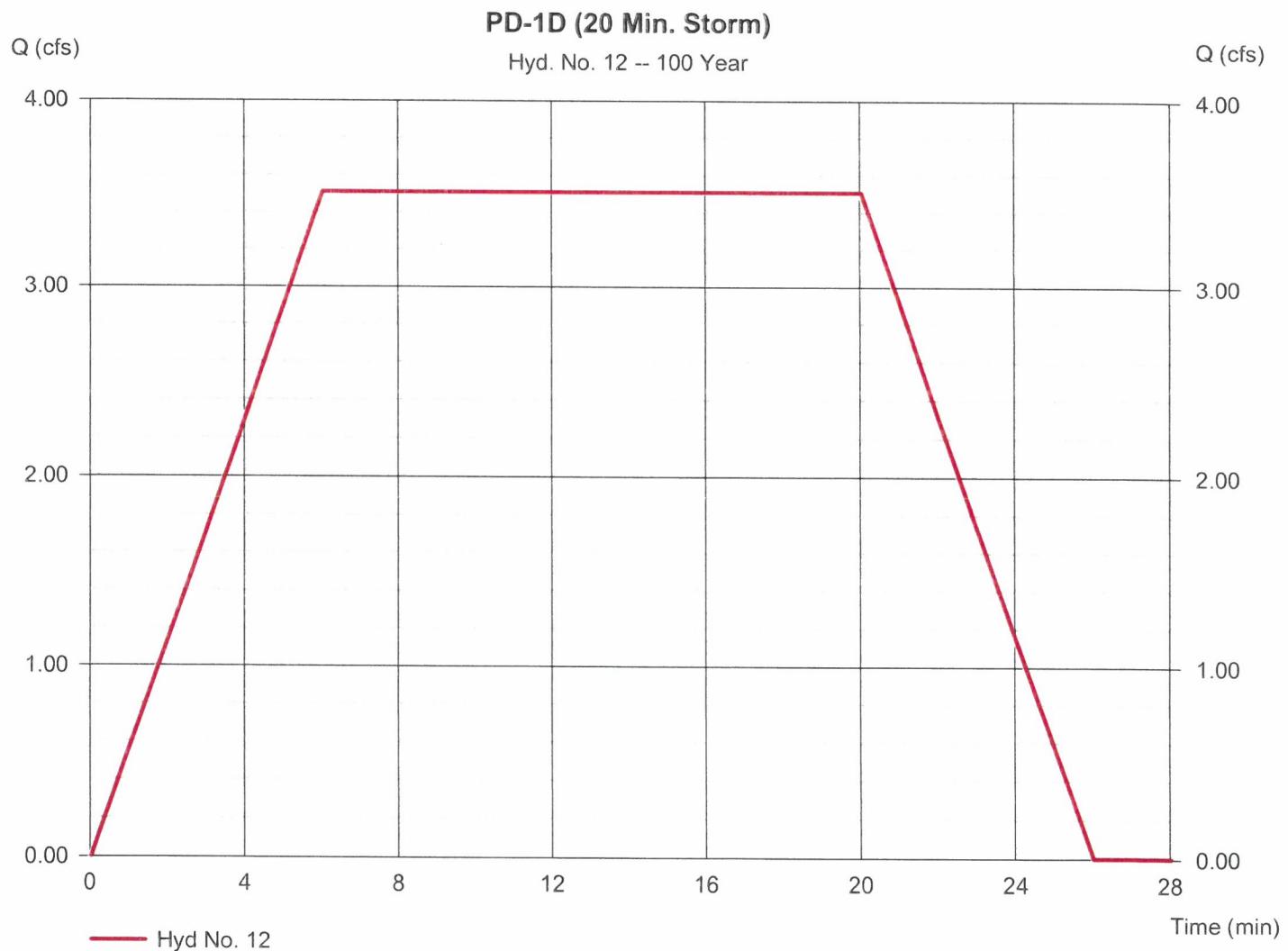
Thursday, Apr 2, 2020

Hyd. No. 12

PD-1D (20 Min. Storm)

Hydrograph type = Manual
Storm frequency = 100 yrs
Time interval = 2 min

Peak discharge = 3.510 cfs
Time to peak = 6 min
Hyd. volume = 4,200 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

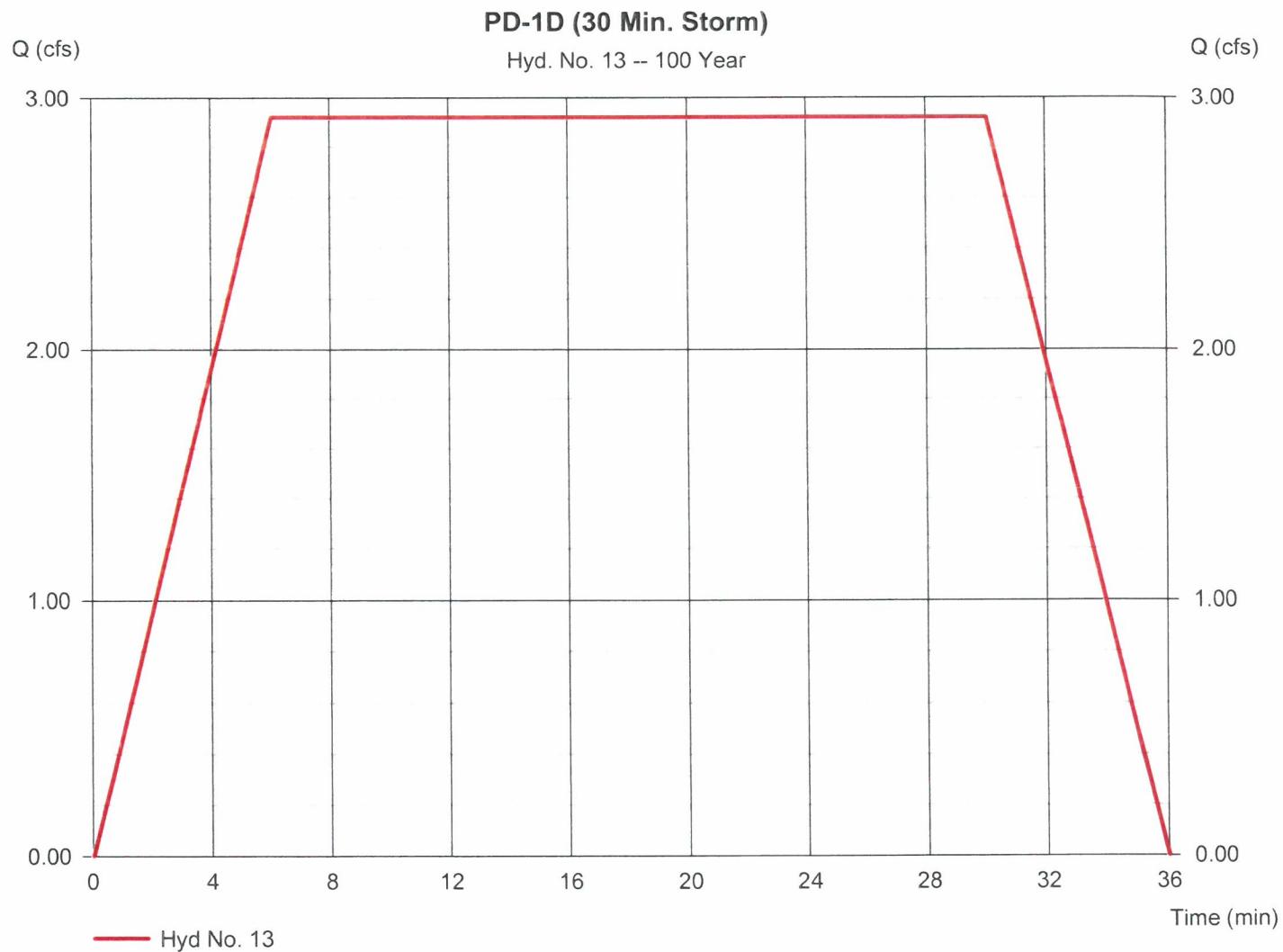
Thursday, Apr 2, 2020

Hyd. No. 13

PD-1D (30 Min. Storm)

Hydrograph type = Manual
Storm frequency = 100 yrs
Time interval = 2 min

Peak discharge = 2.920 cfs
Time to peak = 6 min
Hyd. volume = 5,251 cuft



Hydrograph Report

Hydraflow Hydrographs by InteliSolve v9.2

Thursday, Apr 2, 2020

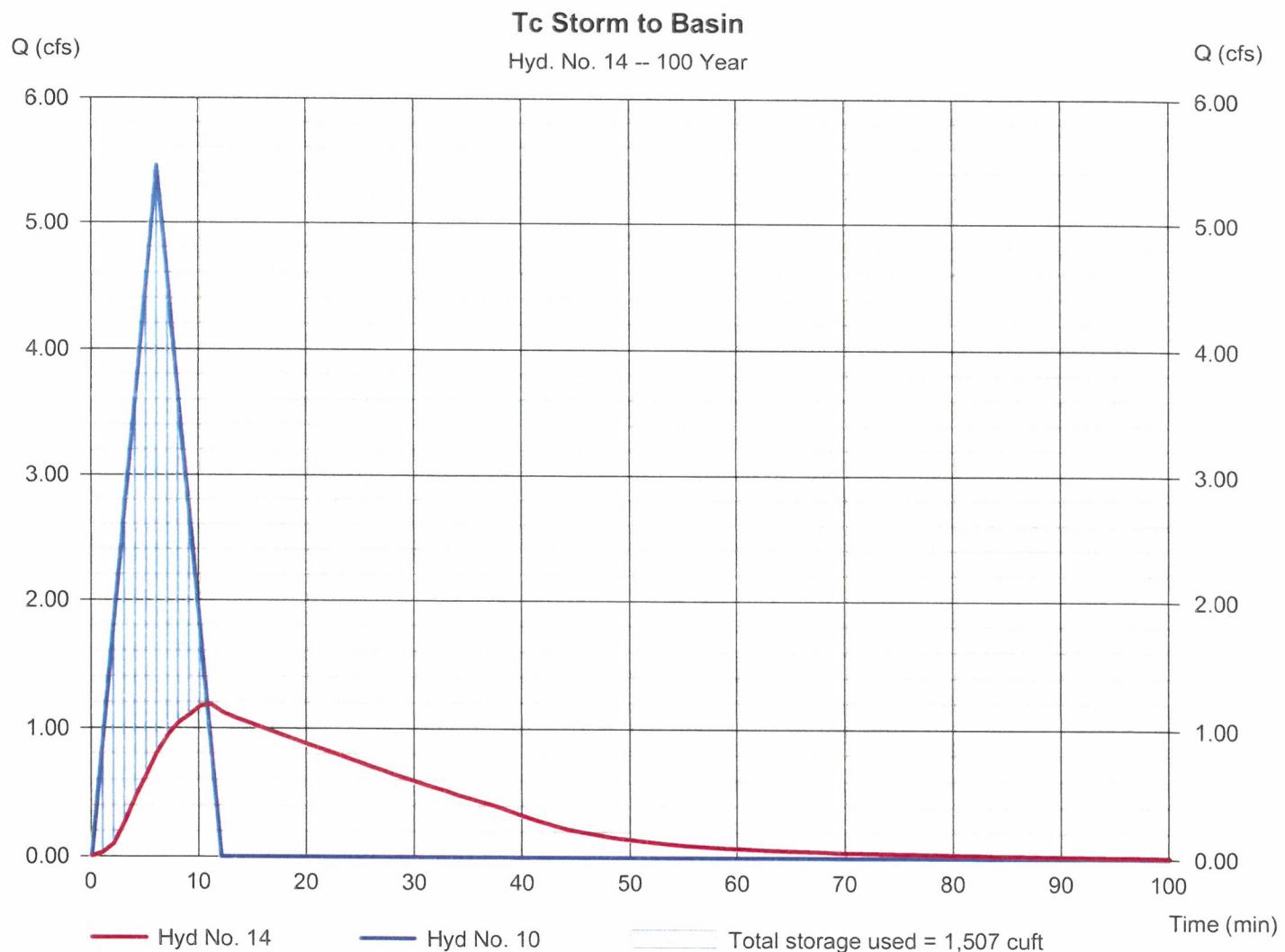
Hyd. No. 14

Tc Storm to Basin

Hydrograph type = Reservoir
 Storm frequency = 100 yrs
 Time interval = 1 min
 Inflow hyd. No. = 10 - PD-1D (Tc Storm)
 Reservoir name = Cultec Detention Basin

Peak discharge = 1.185 cfs
 Time to peak = 11 min
 Hyd. volume = 1,963 cuft
 Max. Elevation = 127.53 ft
 Max. Storage = 1,507 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

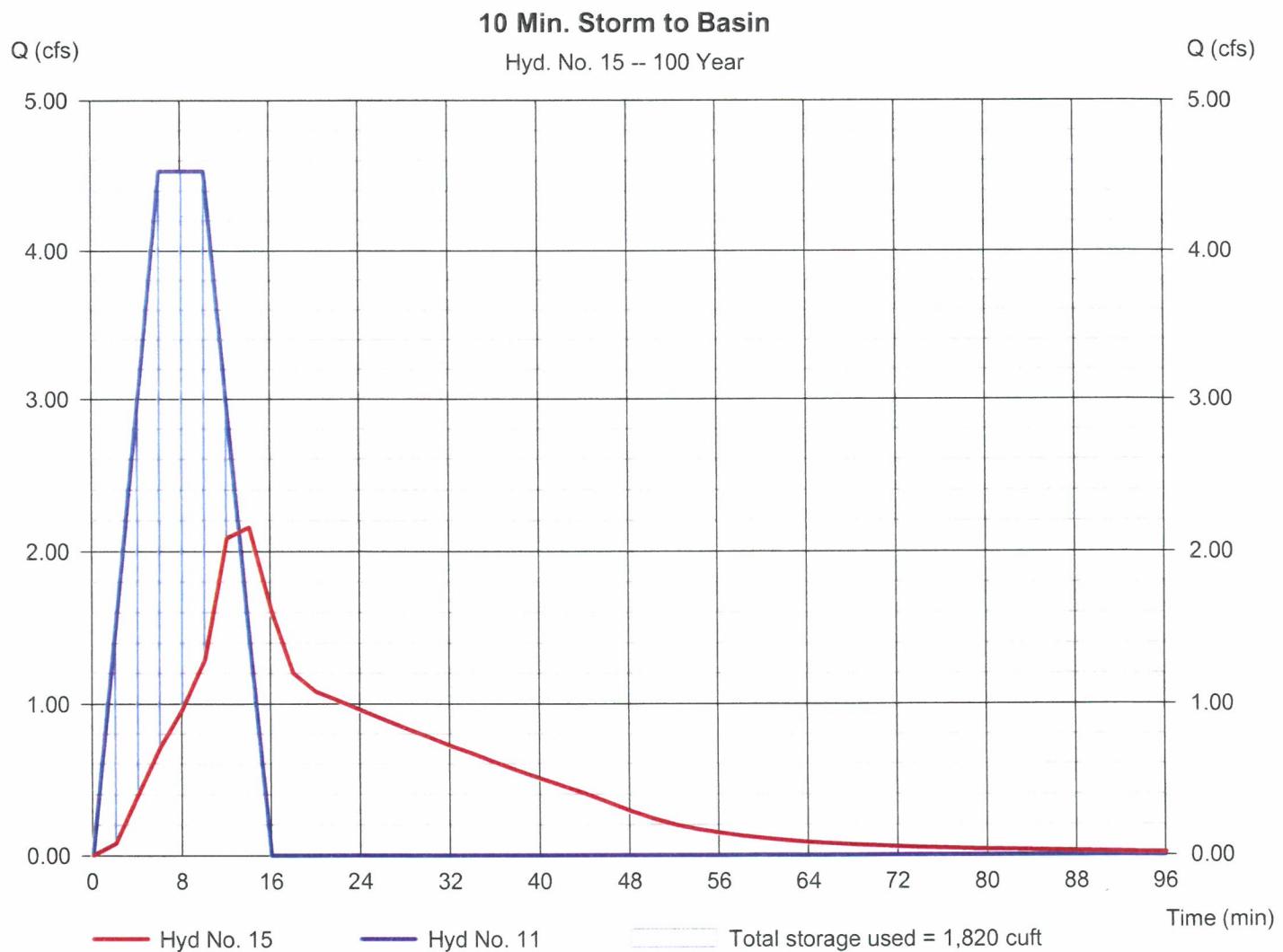
Thursday, Apr 2, 2020

Hyd. No. 15

10 Min. Storm to Basin

Hydrograph type	= Reservoir	Peak discharge	= 2.155 cfs
Storm frequency	= 100 yrs	Time to peak	= 14 min
Time interval	= 2 min	Hyd. volume	= 2,700 cuft
Inflow hyd. No.	= 11 - PD-1D (10 Min. Storm)	Max. Elevation	= 127.97 ft
Reservoir name	Cultec Detention Basin	Max. Storage	= 1,820 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Apr 2, 2020

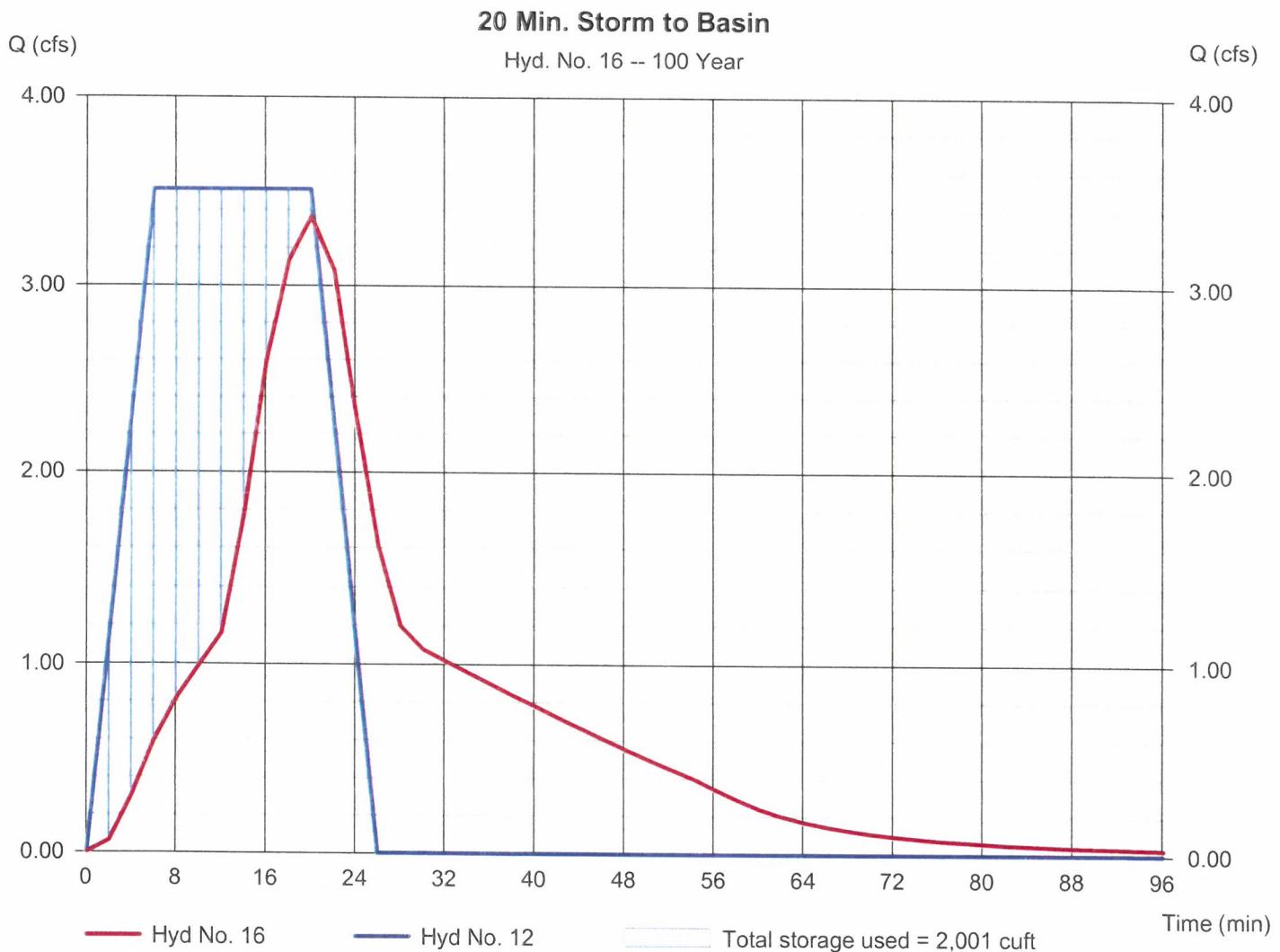
Hyd. No. 16

20 Min. Storm to Basin

Hydrograph type = Reservoir
 Storm frequency = 100 yrs
 Time interval = 2 min
 Inflow hyd. No. = 12 - PD-1D (20 Min. Storm)
 Reservoir name = Cultec Detention Basin

Peak discharge = 3.366 cfs
 Time to peak = 20 min
 Hyd. volume = 4,199 cuft
 Max. Elevation = 128.16 ft
 Max. Storage = 2,001 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

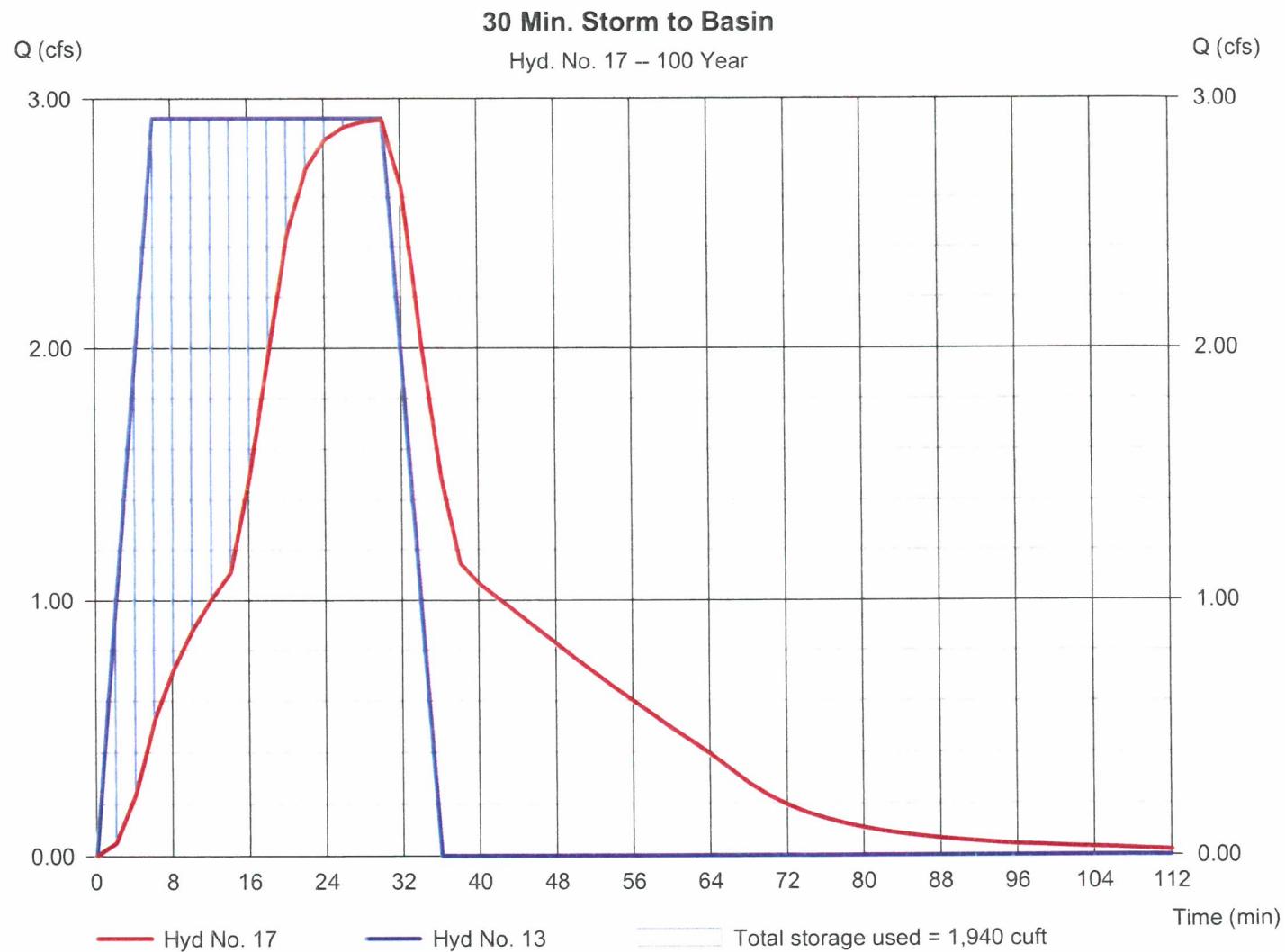
Thursday, Apr 2, 2020

Hyd. No. 17

30 Min. Storm to Basin

Hydrograph type	= Reservoir	Peak discharge	= 2.914 cfs
Storm frequency	= 100 yrs	Time to peak	= 30 min
Time interval	= 2 min	Hyd. volume	= 5,250 cuft
Inflow hyd. No.	= 13 - PD-1D (30 Min. Storm)	Max. Elevation	= 128.07 ft
Reservoir name	Cultec Detention Basin	Max. Storage	= 1,940 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

Thursday, Apr 2, 2020

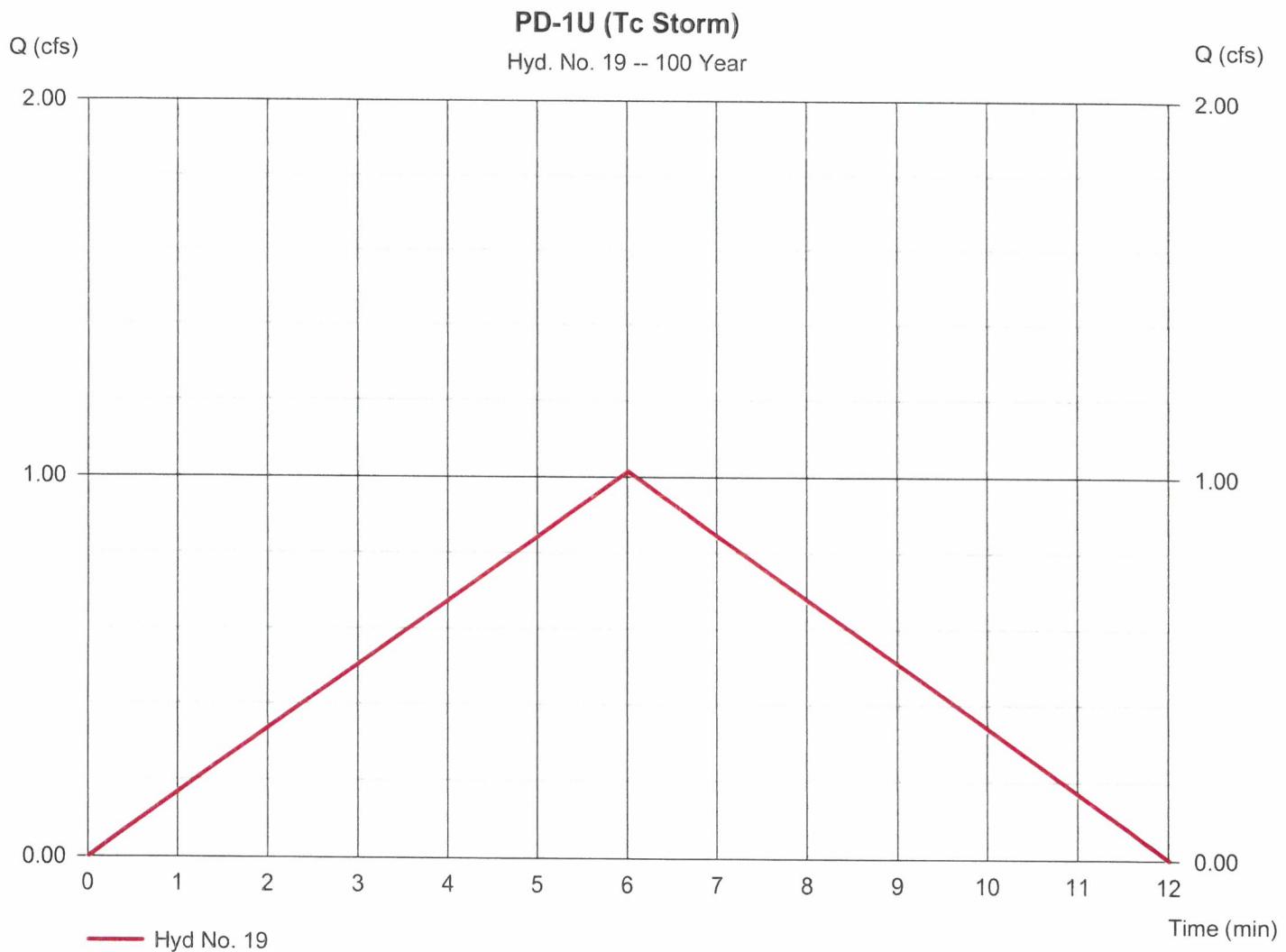
Hyd. No. 19

PD-1U (Tc Storm)

Hydrograph type = Rational
 Storm frequency = 100 yrs
 Time interval = 1 min
 Drainage area = 0.210 ac
 Intensity = 7.785 in/hr
 IDF Curve = plainfield.IDF

Peak discharge = 1.014 cfs
 Time to peak = 6 min
 Hyd. volume = 365 cuft
 Runoff coeff. = 0.62*
 Tc by User = 6.00 min
 Asc/Rec limb fact = 1/1

* Composite (Area/C) = [(0.050 x 0.99) + (0.160 x 0.51)] / 0.210



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

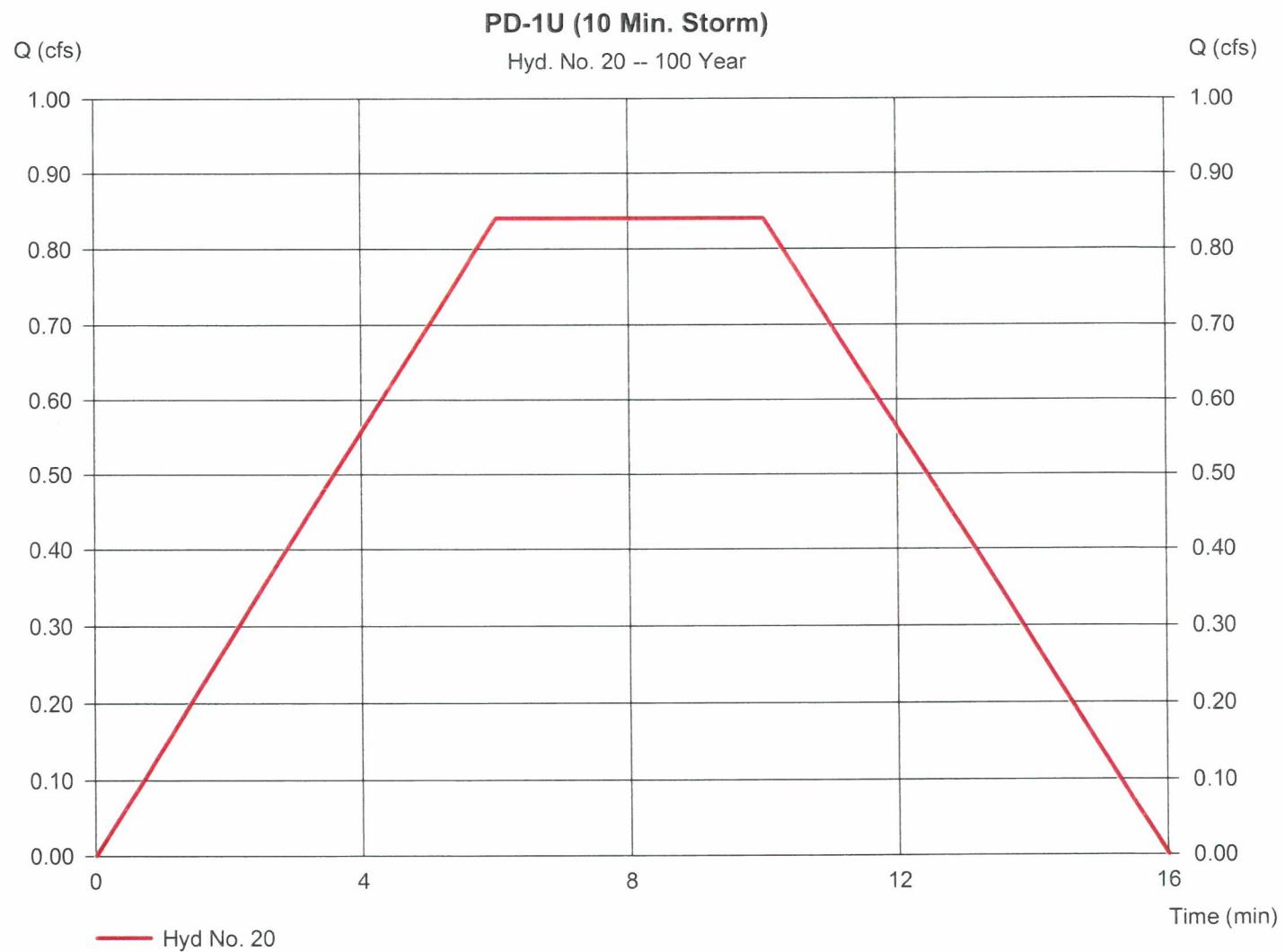
Thursday, Apr 2, 2020

Hyd. No. 20

PD-1U (10 Min. Storm)

Hydrograph type = Manual
Storm frequency = 100 yrs
Time interval = 2 min

Peak discharge = 0.840 cfs
Time to peak = 6 min
Hyd. volume = 504 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

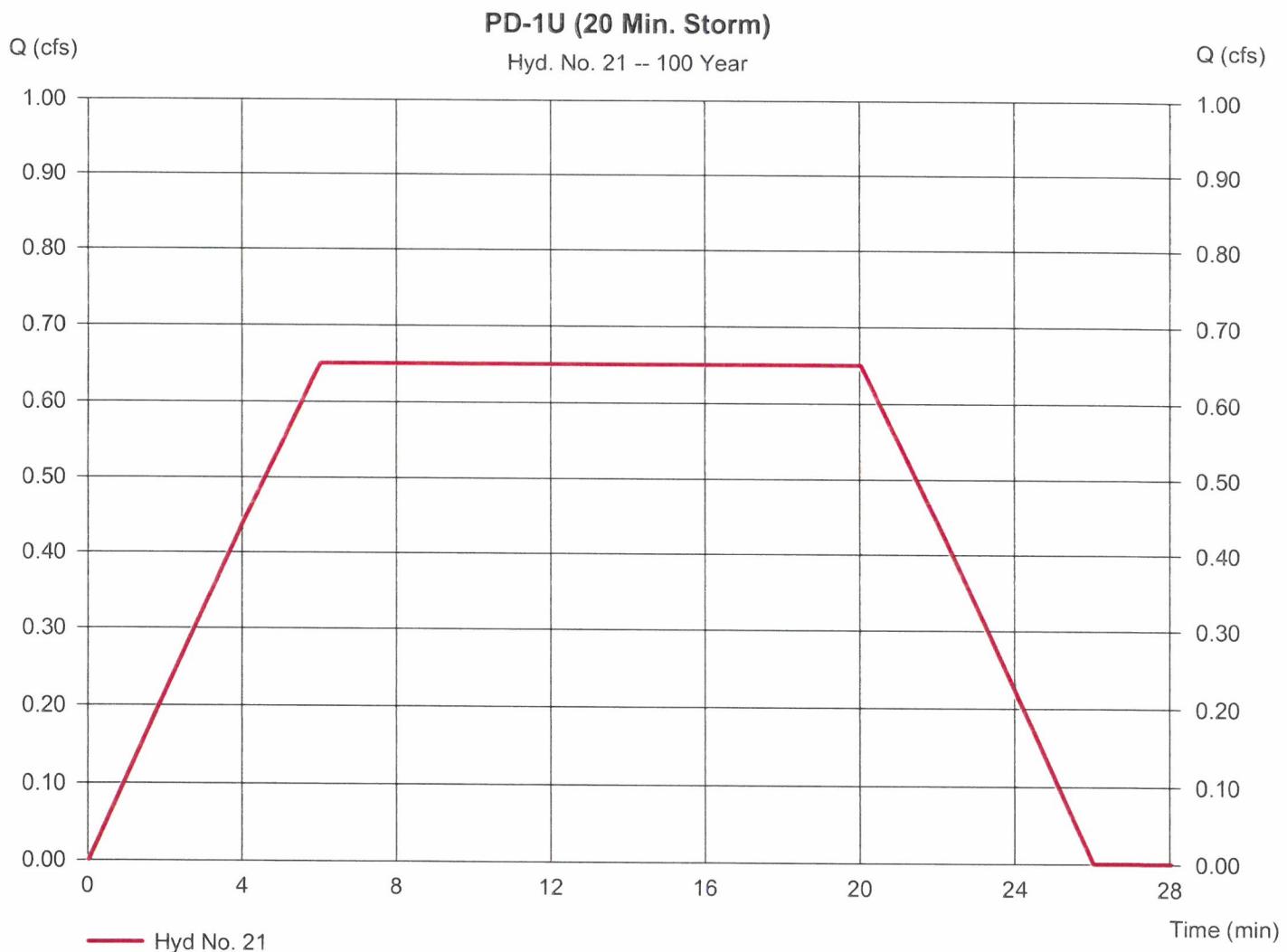
Thursday, Apr 2, 2020

Hyd. No. 21

PD-1U (20 Min. Storm)

Hydrograph type = Manual
Storm frequency = 100 yrs
Time interval = 2 min

Peak discharge = 0.650 cfs
Time to peak = 6 min
Hyd. volume = 782 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

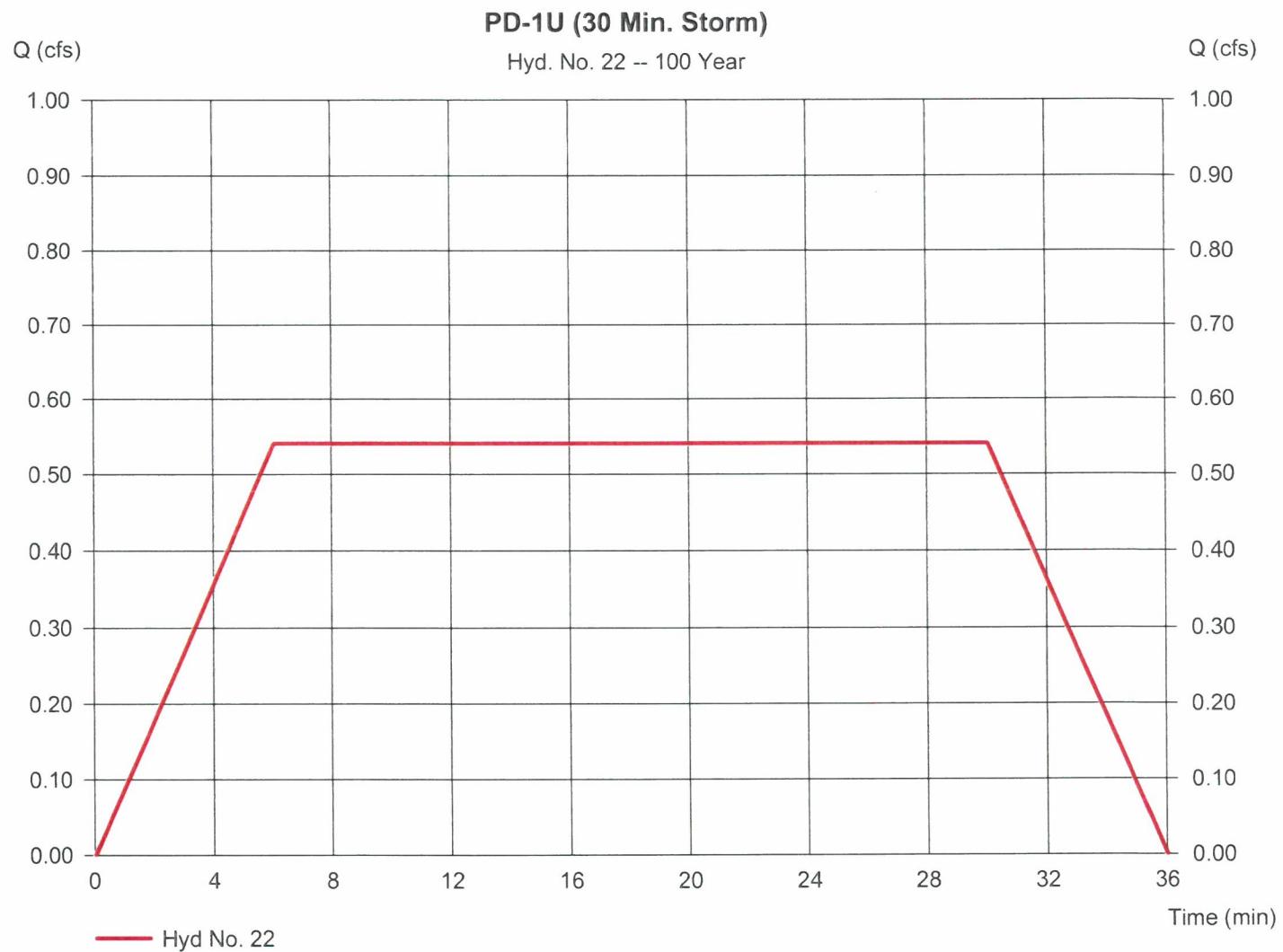
Thursday, Apr 2, 2020

Hyd. No. 22

PD-1U (30 Min. Storm)

Hydrograph type = Manual
Storm frequency = 100 yrs
Time interval = 2 min

Peak discharge = 0.540 cfs
Time to peak = 6 min
Hyd. volume = 972 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

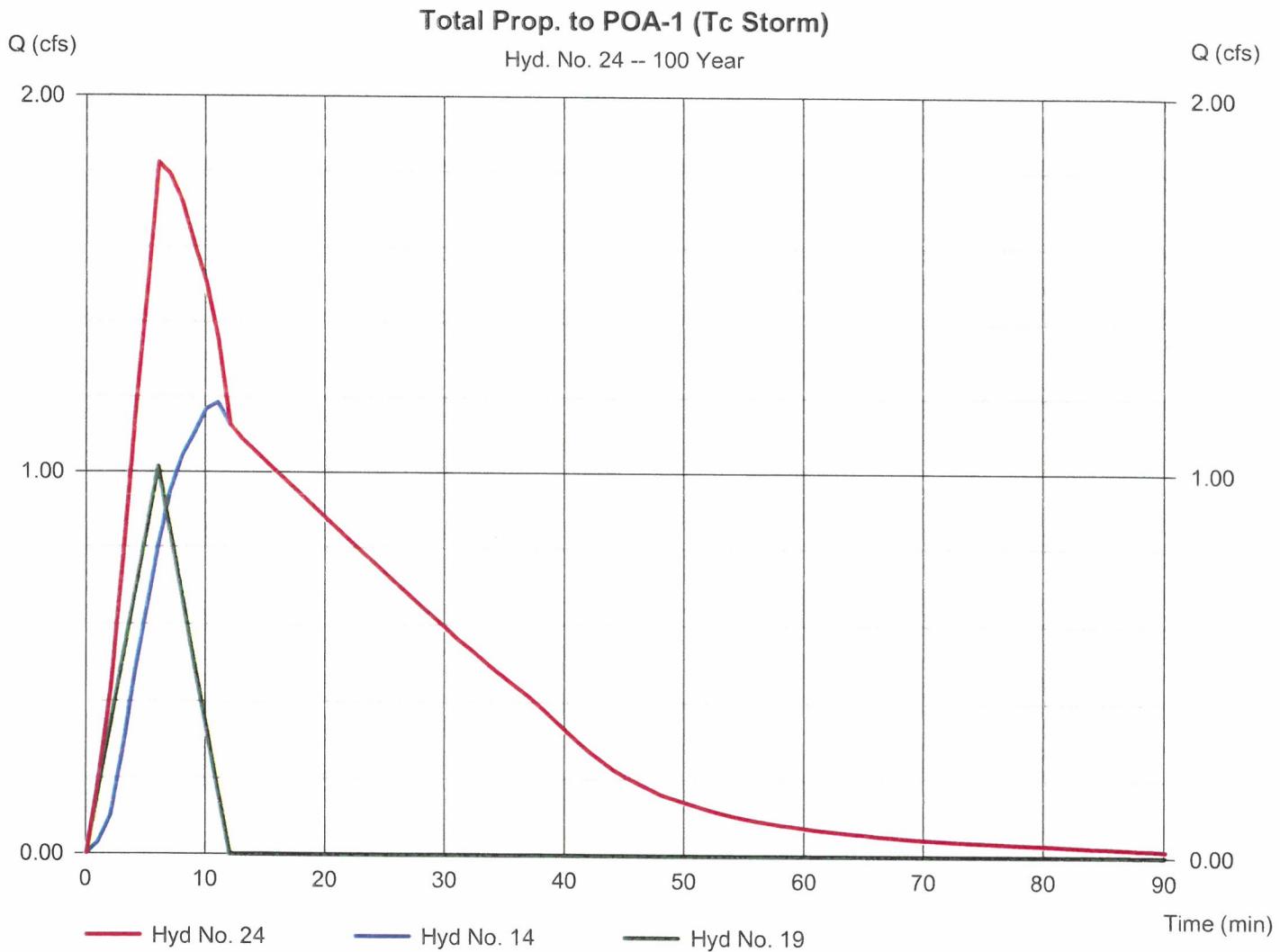
Thursday, Apr 2, 2020

Hyd. No. 24

Total Prop. to POA-1 (Tc Storm)

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 1 min
 Inflow hyds. = 14, 19

Peak discharge = 1.822 cfs
 Time to peak = 6 min
 Hyd. volume = 2,328 cuft
 Contrib. drain. area = 0.210 ac



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

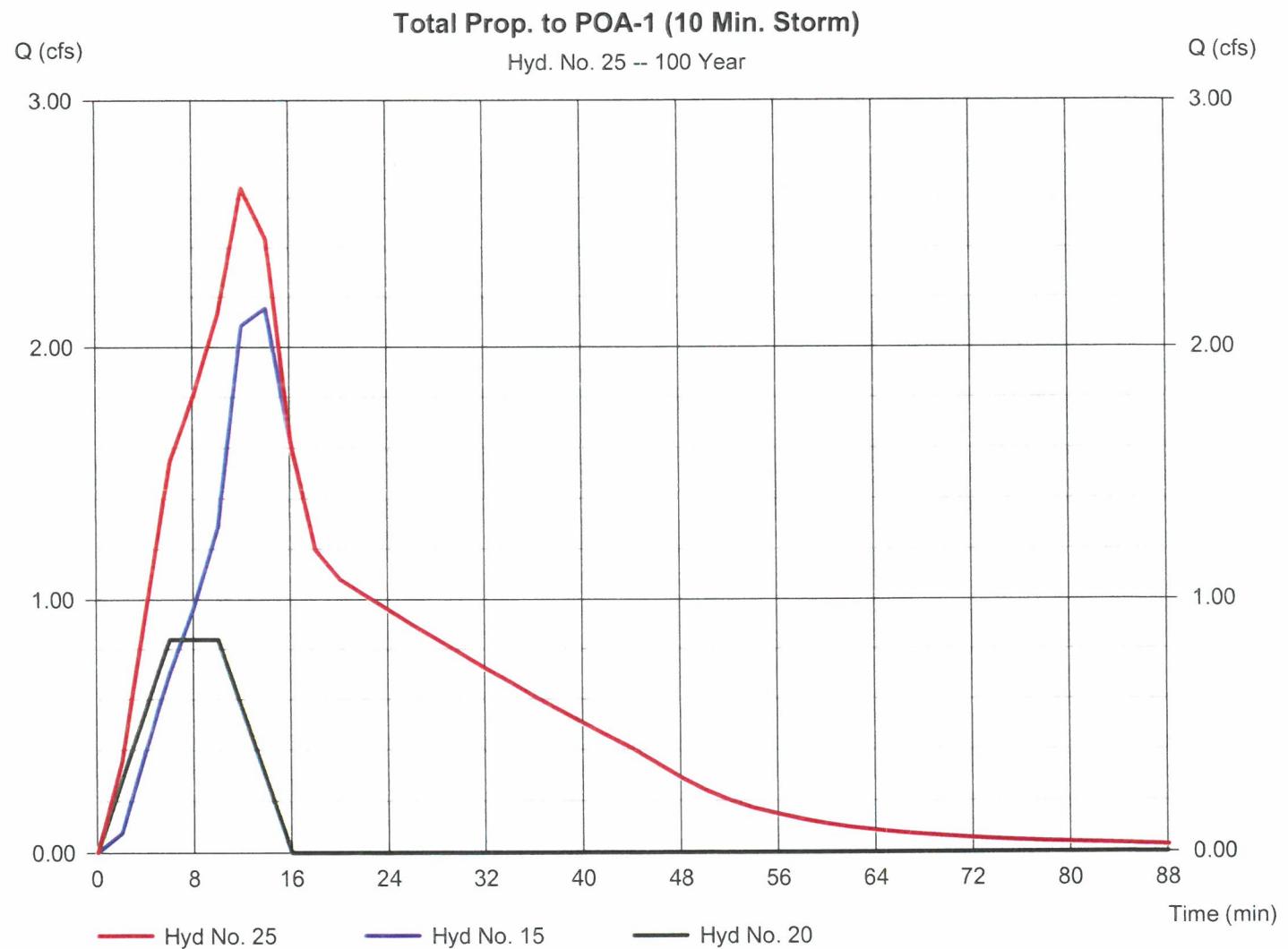
Thursday, Apr 2, 2020

Hyd. No. 25

Total Prop. to POA-1 (10 Min. Storm)

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 2 min
 Inflow hyds. = 15, 20

Peak discharge = 2,645 cfs
 Time to peak = 12 min
 Hyd. volume = 3,204 cuft
 Contrib. drain. area = 0.000 ac



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

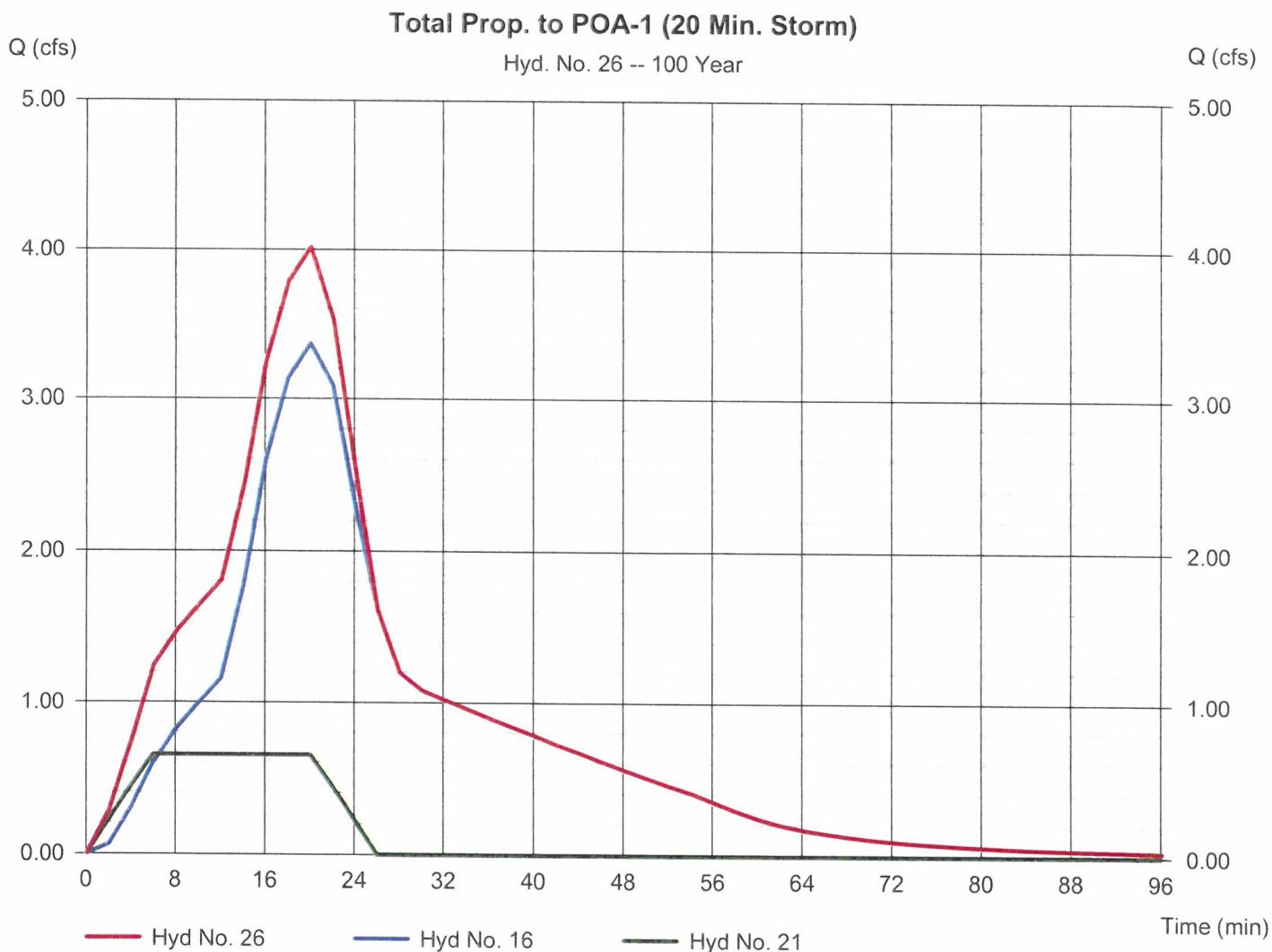
Thursday, Apr 2, 2020

Hyd. No. 26

Total Prop. to POA-1 (20 Min. Storm)

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 2 min
 Inflow hyds. = 16, 21

Peak discharge = 4.016 cfs
 Time to peak = 20 min
 Hyd. volume = 4,982 cuft
 Contrib. drain. area = 0.000 ac



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

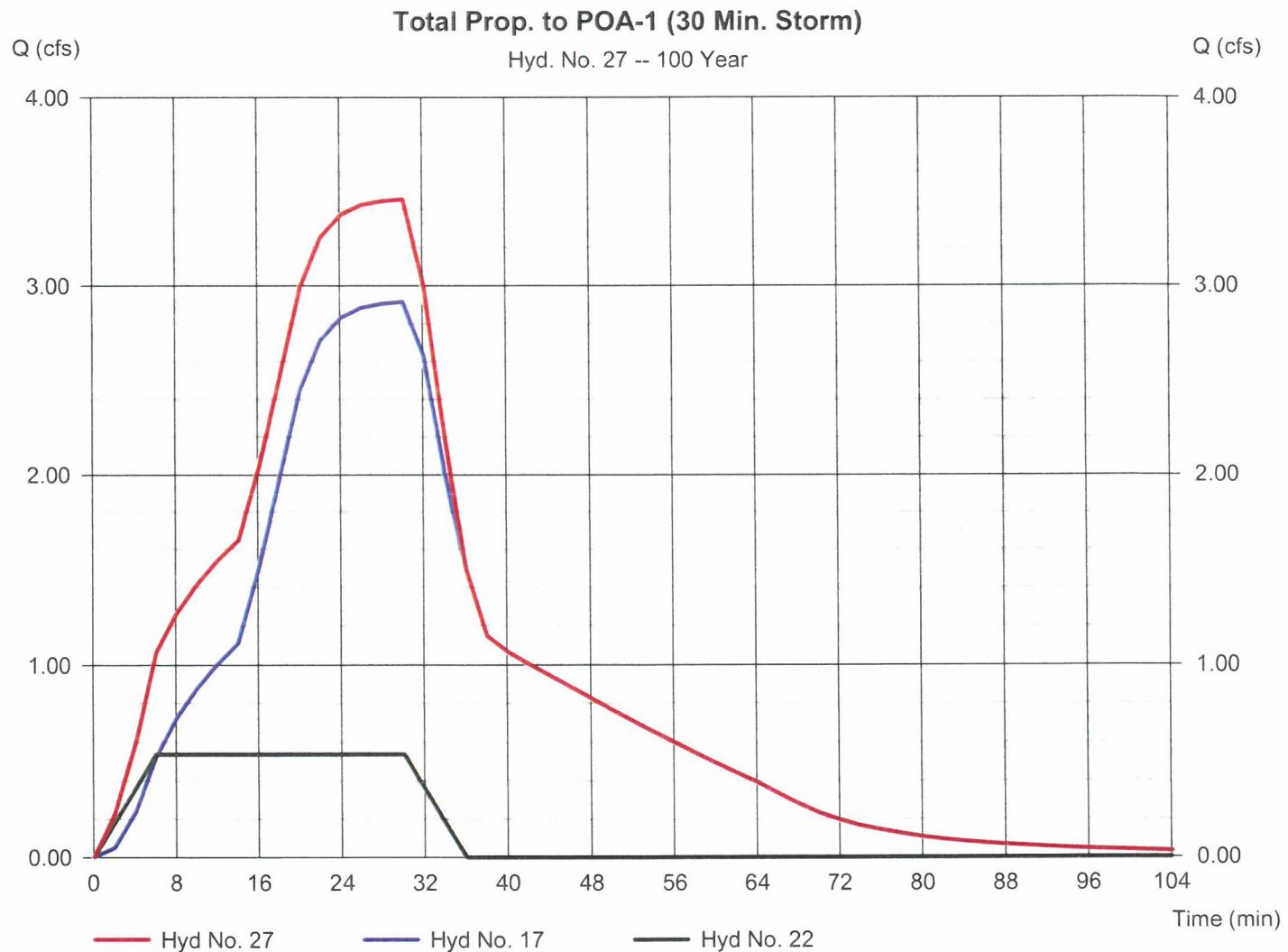
Thursday, Apr 2, 2020

Hyd. No. 27

Total Prop. to POA-1 (30 Min. Storm)

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 2 min
 Inflow hyds. = 17, 22

Peak discharge = 3.454 cfs
 Time to peak = 30 min
 Hyd. volume = 6,222 cuft
 Contrib. drain. area = 0.000 ac



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

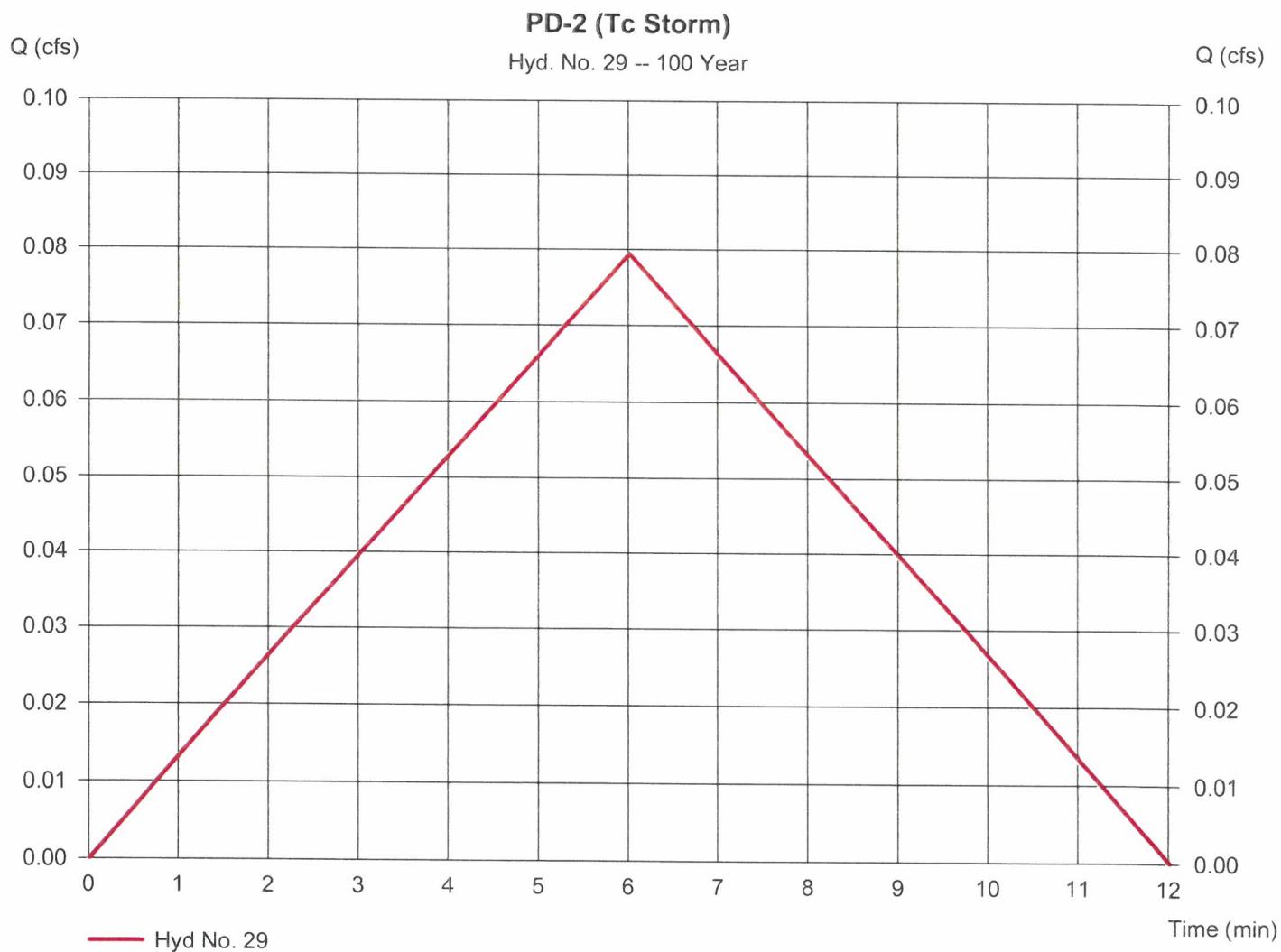
Thursday, Apr 2, 2020

Hyd. No. 29

PD-2 (Tc Storm)

Hydrograph type = Rational
 Storm frequency = 100 yrs
 Time interval = 1 min
 Drainage area = 0.020 ac
 Intensity = 7.785 in/hr
 IDF Curve = plainfield.IDF

Peak discharge = 0.079 cfs
 Time to peak = 6 min
 Hyd. volume = 29 cuft
 Runoff coeff. = 0.51
 Tc by User = 6.00 min
 Asc/Rec limb fact = 1/1



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

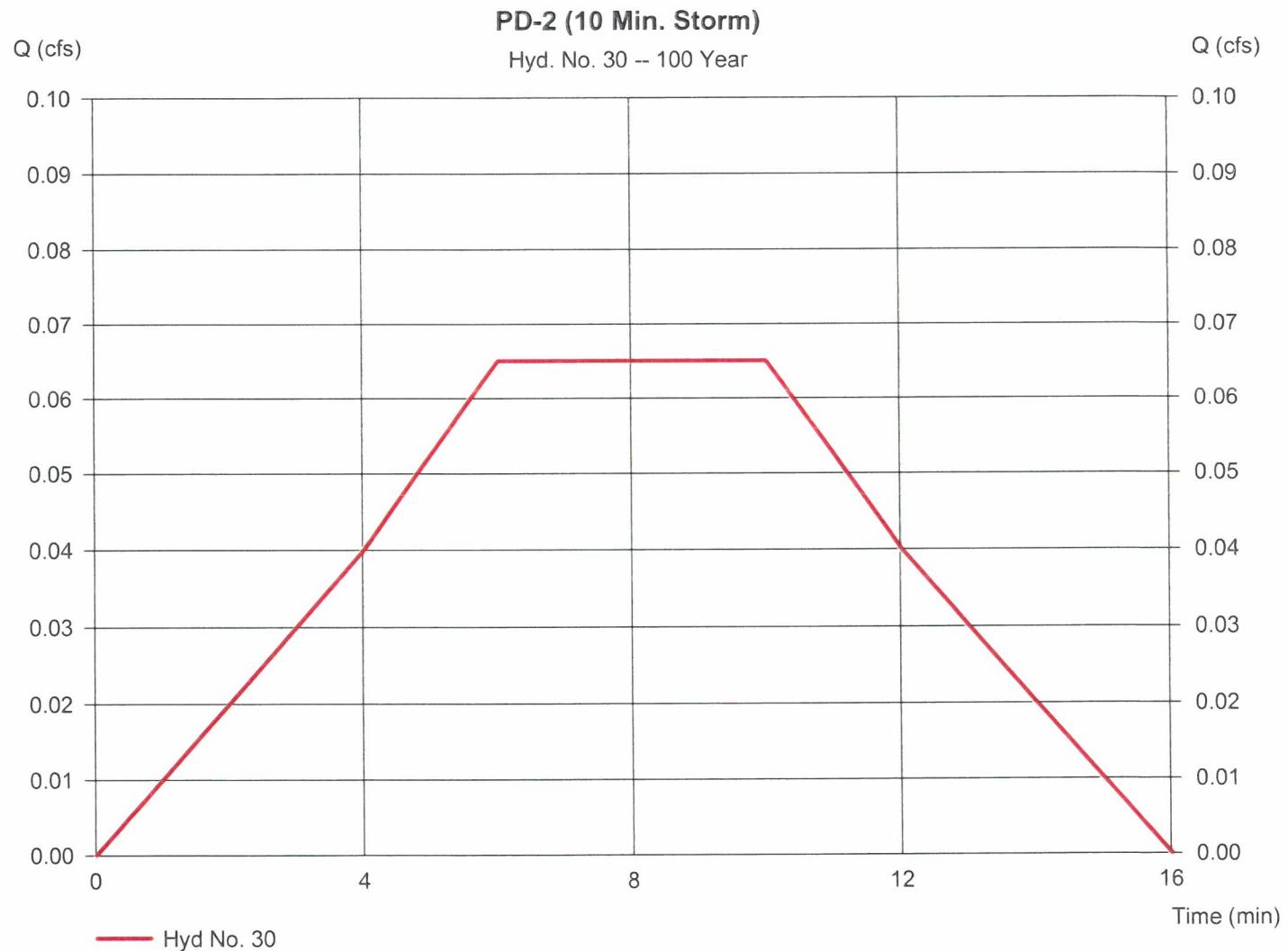
Thursday, Apr 2, 2020

Hyd. No. 30

PD-2 (10 Min. Storm)

Hydrograph type = Manual
Storm frequency = 100 yrs
Time interval = 2 min

Peak discharge = 0.065 cfs
Time to peak = 6 min
Hyd. volume = 38 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

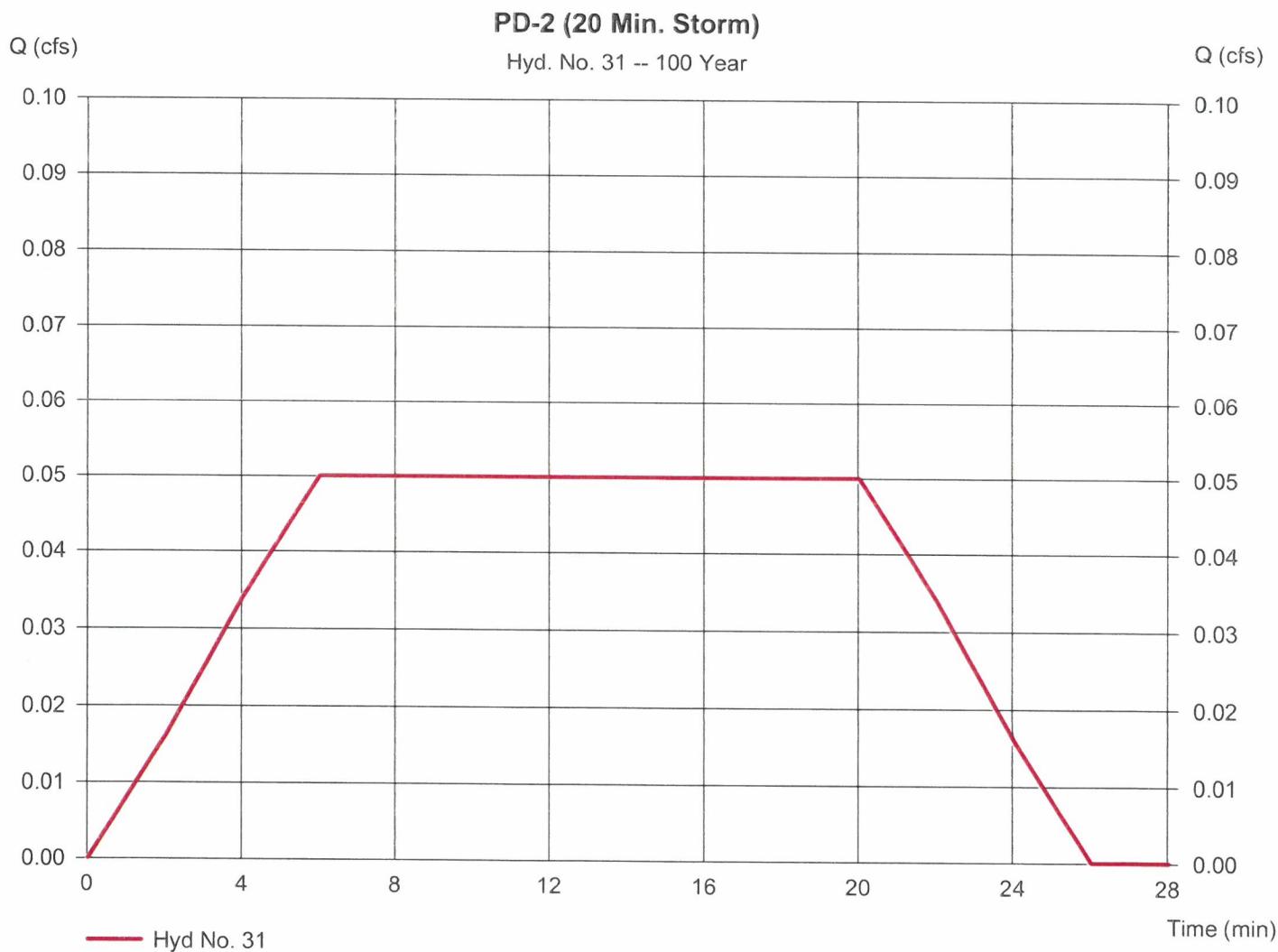
Thursday, Apr 2, 2020

Hyd. No. 31

PD-2 (20 Min. Storm)

Hydrograph type = Manual
Storm frequency = 100 yrs
Time interval = 2 min

Peak discharge = 0.050 cfs
Time to peak = 6 min
Hyd. volume = 60 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

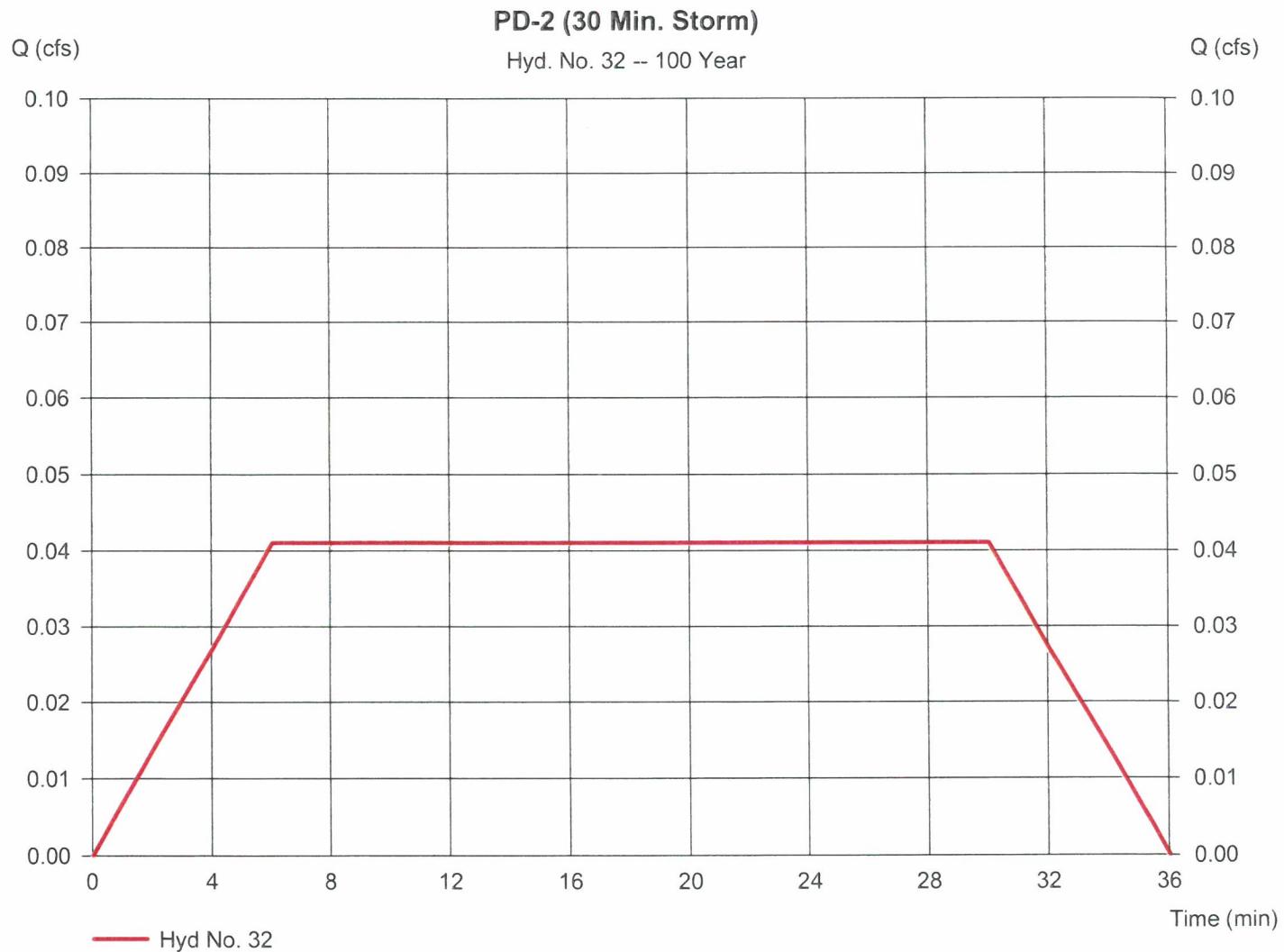
Thursday, Apr 2, 2020

Hyd. No. 32

PD-2 (30 Min. Storm)

Hydrograph type = Manual
Storm frequency = 100 yrs
Time interval = 2 min

Peak discharge = 0.041 cfs
Time to peak = 6 min
Hyd. volume = 74 cuft



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

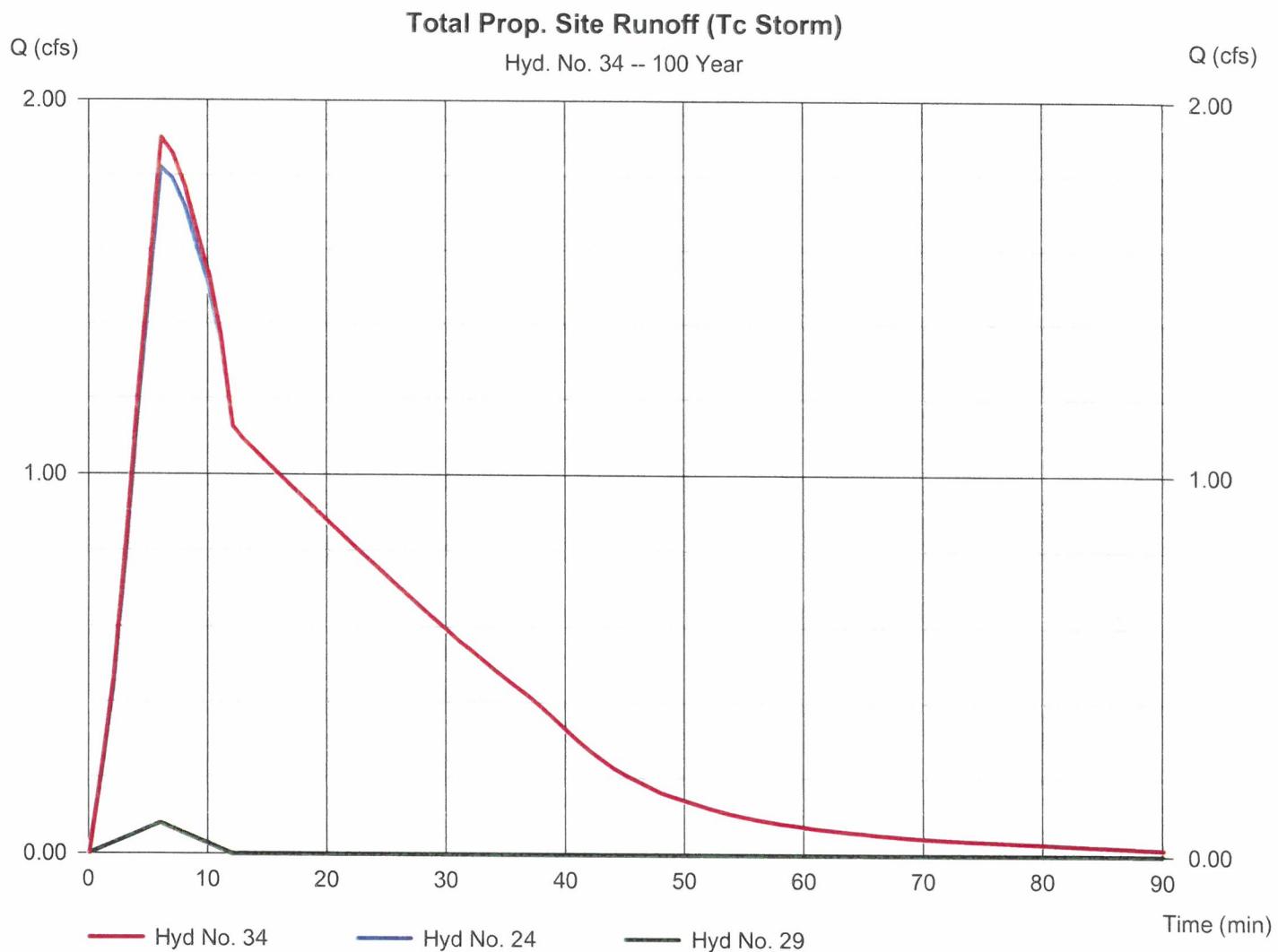
Thursday, Apr 2, 2020

Hyd. No. 34

Total Prop. Site Runoff (Tc Storm)

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyds. = 24, 29

Peak discharge = 1.901 cfs
Time to peak = 6 min
Hyd. volume = 2,357 cuft
Contrib. drain. area = 0.020 ac



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

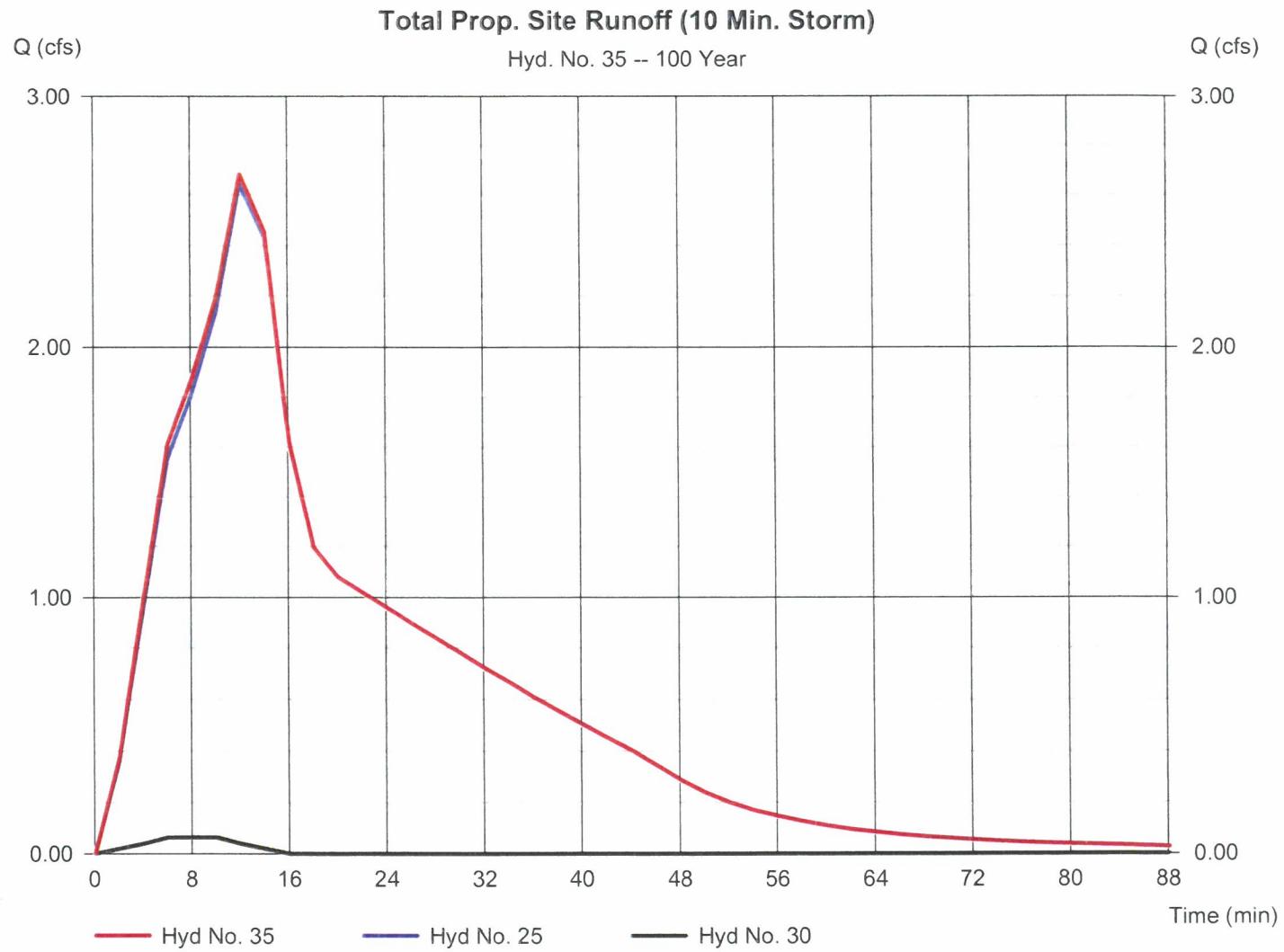
Thursday, Apr 2, 2020

Hyd. No. 35

Total Prop. Site Runoff (10 Min. Storm)

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 2 min
 Inflow hyds. = 25, 30

Peak discharge = 2.685 cfs
 Time to peak = 12 min
 Hyd. volume = 3,242 cuft
 Contrib. drain. area = 0.000 ac



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

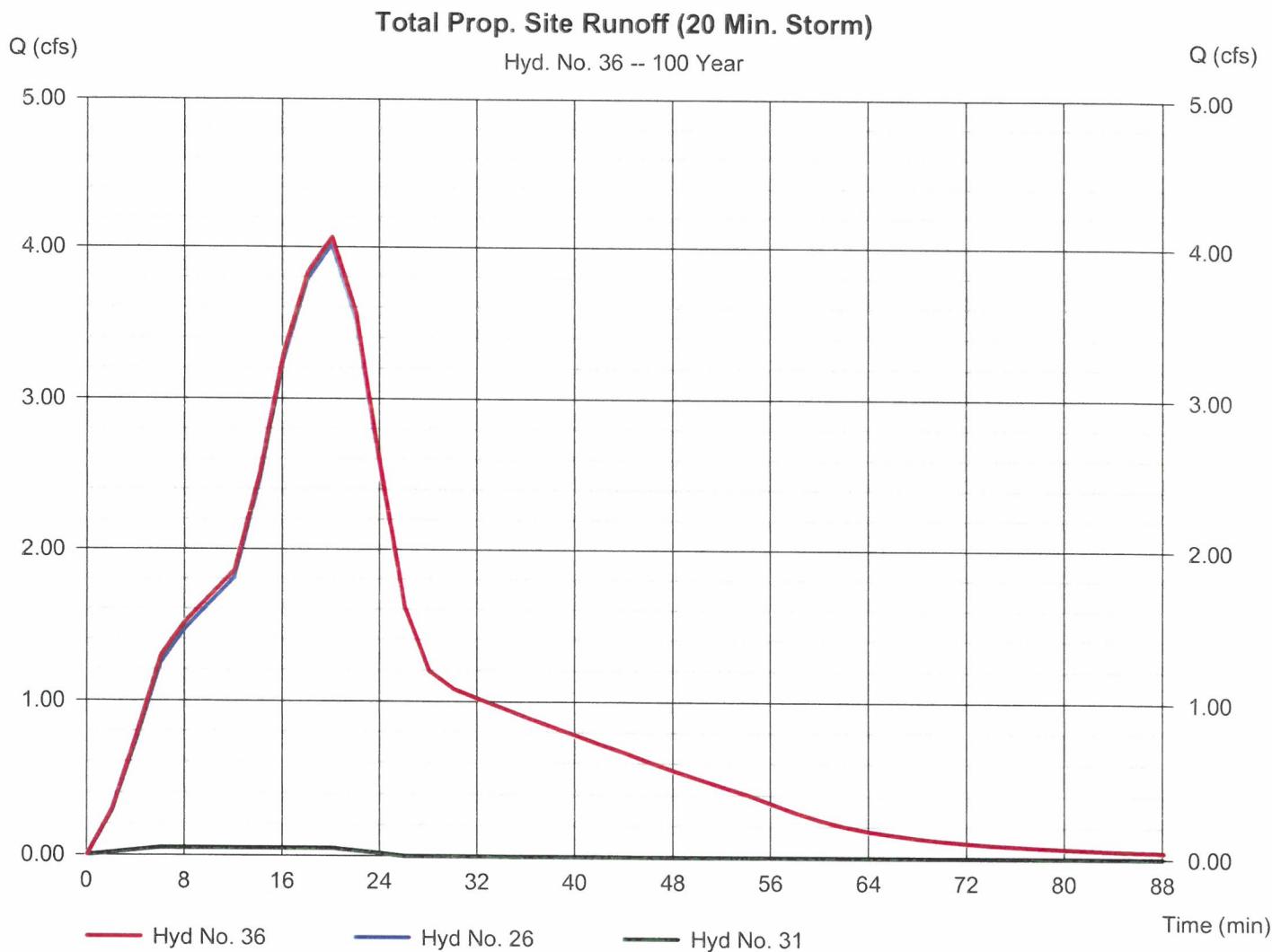
Thursday, Apr 2, 2020

Hyd. No. 36

Total Prop. Site Runoff (20 Min. Storm)

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 2 min
 Inflow hyds. = 26, 31

Peak discharge = 4.066 cfs
 Time to peak = 20 min
 Hyd. volume = 5,042 cuft
 Contrib. drain. area = 0.000 ac



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.2

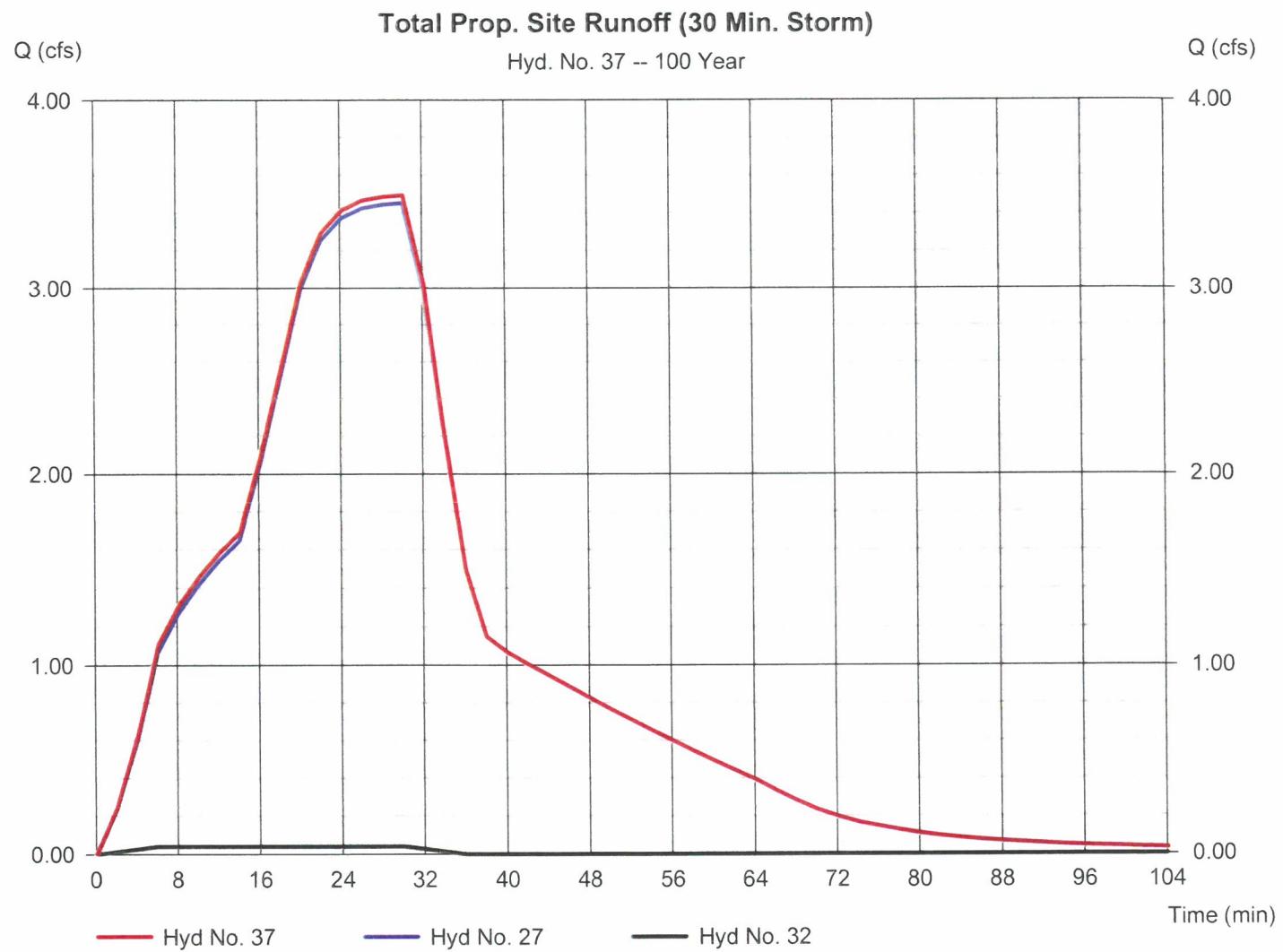
Thursday, Apr 2, 2020

Hyd. No. 37

Total Prop. Site Runoff (30 Min. Storm)

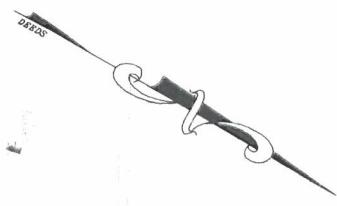
Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 2 min
Inflow hyds. = 27, 32

Peak discharge = 3.495 cfs
Time to peak = 30 min
Hyd. volume = 6,296 cuft
Contrib. drain. area = 0.000 ac



DRAINAGE AREA MAPS

WOODLAND AVENUE
(50' RIGHT OF WAY)

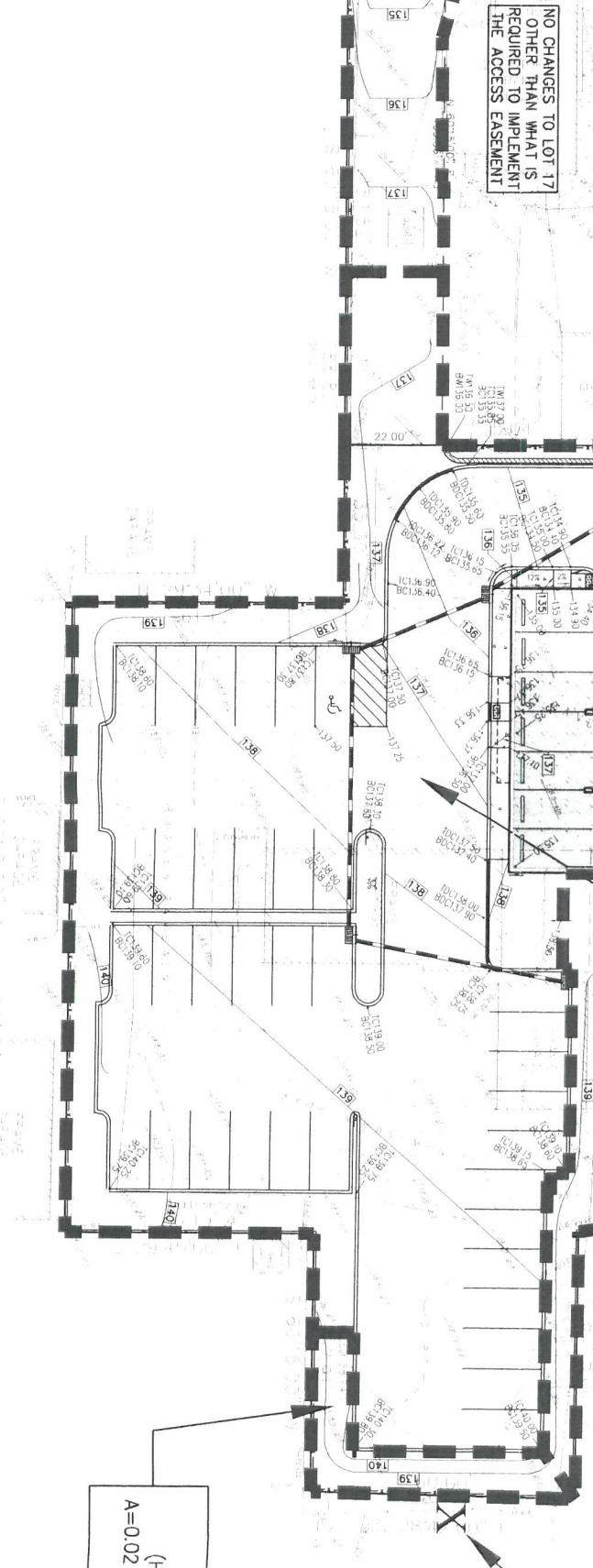


POA-1

SOUTH AVENUE
(NEW JERSEY STATE HIGHWAY ROUTE No. 28)

PD-1U
A=0.21 AC. C=0.62 (SHADeD AREA)
IMPERVIOUS: A=0.05 AC. C=0.99
Pervious(GRASS): A=0.16 AC. C=0.51
(Tc=6 MIN.)

PD-1D
A=0.77 AC. C=0.91 (UNSHADeD AREA)
IMPERVIOUS: A=0.64 AC. C=0.99
Pervious(GRASS): A=0.13 AC. C=0.51
(Tc=6 MIN.)



PD-2
(Hatched Area)
A=0.02 AC. C=0.51 (GRASS)
(Tc=6 MIN.)

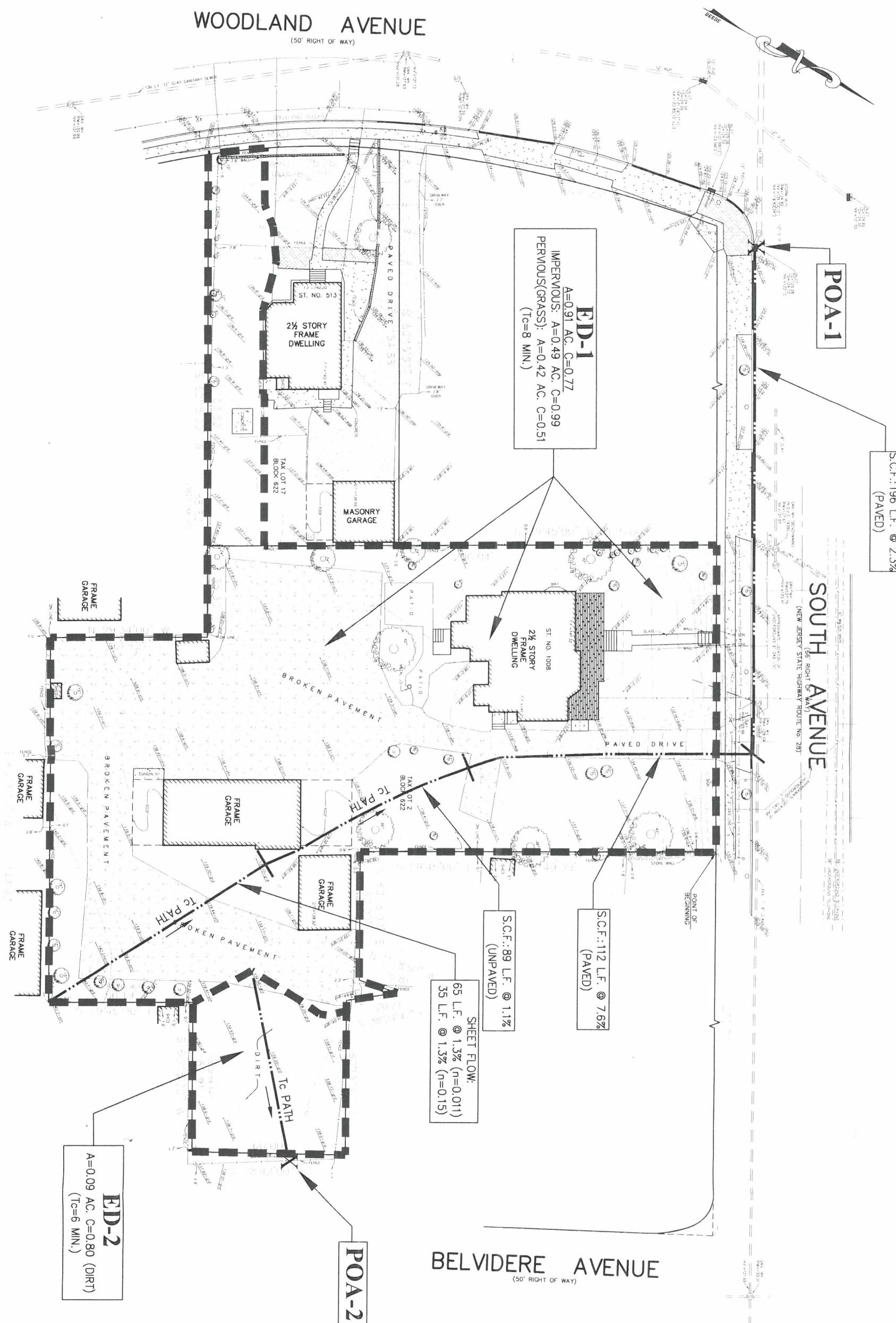
POA-2

BELVIDERE AVENUE
(50' RIGHT OF WAY)

PROPOSED DRAINAGE AREA MAP
TAX LOT 2, BLOCK 622
CITY OF PLAINFIELD, UNION COUNTY, NEW JERSEY

EKA ASSOCIATES, P.A.
Engineers • Surveyors • Planners
328 Park Avenue, Scotch Plains, N.J. 07076
908-322-2030

Job No. 845985	Date 2/19/19	Scale 1"=40'	Drawn SK	Map No.	Sheet 1 of 1
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EXISTING DRAINAGE AREA MAP
TAX LOT 2 BLOCK 622
CITY OF PLAINFIELD, UNION COUNTY, NEW JERSEY

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908-322-2030