



# **STORMWATER MANAGEMENT REPORT**

**FOR**

**PRELIMINARY & FINAL SITE PLAN**

**'DUNKIN'**

**LOT 64  
Block 28005**

**TOWNSHIP OF MONTGOMERY  
SOMERSET COUNTY, NEW JERSEY**

September 2021

Prepared by:

A handwritten signature in black ink, appearing to read 'Paul W. Ferriero'.

Paul W. Ferriero, P.E., CME  
N.J.P.E. Lic. No. 32978



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## **1. Project Description**

This project proposes the construction of a new Dunkin Coffee, Espresso and Donut shop within the Township of Montgomery at the northeastern quadrant of the intersections of Route 206 and the Georgetown-Franklin Turnpike. The site has been previously developed and consists of a boarded-up brick building, both pavement and concrete driveways, concrete islands and lighting. The site has not been in service for many years and is in disrepair. The proposed construction will provide for a new 1,830sf building, 11 parking spaces, room for stacking 16 vehicles for the drive-up window and related infrastructure. Per the NJDEP GEOWEB, there are no wetlands located within 300' of the parcel, there are no streams within 300' of the parcel and the parcel is located within Zone X, minimal flood area according to the FEMA flood map.

A copy of the USGS Quadrangle Map and FEMA map with the project area depicted on it has been included in Appendix A.

## **2. Soils**

The developable area of the subject parcel is characterized by soils identified by the United States Department of Agriculture natural Sources Conservation Service (NRCS) Web Soil Survey, as Birdsboro silt loam complex, 2 to 6 percent slopes. These soils are described in the survey as being well drained and have a Hydrologic Soil Group (HSG) classification of 'B'.

A copy of the NRCS Soil Survey Map with the area depicted on it has been included in Appendix A.

## **3. Stormwater Analysis Methodology**

The project results in a total disturbance of 0.62 acres and the construction of 0.039 acres (1,690 sf) new impervious coverage. The project does not meet the requirements of a "major development" as defined by NJAC 7:8. However, the project meets the definition of a Major Development, as defined in Section 16-5.2.f of the Montgomery Township Ordinance, for the disturbance exceeding 0.5 acres.

Stormwater runoff volumes and peak flow rates have been calculated using the NRCS Method and pipe flows have been calculated using the Rational Method for the existing and proposed conditions for the 2, 10, and 100-year storm events as outlined in Technical Release 55 (TR-55), Urban Hydrology for Small Watersheds. The stormwater analysis was performed utilizing Hydraflow Hydrographs Extension for AutoCAD Civil 3D (v10.3) based on the NOAA Type C IDF curves and coefficients. A minimum of 2 minutes time of concentration was utilized for the proposed hydrograph analyses in order to comply with the NOAA Type C storm events. The existing and proposed runoff conditions were determined through analysis of the change in land surface and applying the project disturbance limit as the drainage area boundary.

The project employs an underground detention system designed to retain the runoff from the site such that the reduction rates in the peak flow rate for the two-, ten- and 100-year storm events are met or exceeded as required by Section 16-5.2.n of the Montgomery Township Ordinance.

The stormwater management system on the site has been further designed to meet the Montgomery Township Ordinance requirements for stormwater runoff quality, contained in Section 16-5.2.k, through the use of Green Infrastructure Standards. The project proposes to meet the township standards through the use of a combination of manufactured treatment devices. The project employs the use of Filtterra basins and Stormfilter basins by Contech Stormwater Solutions, Inc., which are both certified to 80% removal of total suspended solids.

**Existing Condition:**

The area to be redeveloped consists of pavement, concrete, the existing structure and small disconnected grass/gravel areas. The property was previously used as a gas and service station. A composite curve number of 78 was estimated based on the land cover present within the 19,154 sf (0.520 Ac.) drainage area boundary utilized for the existing condition analysis. The existing Tc was analyzed using the Kirpich method to calculate the time of concentration (Tc) to analyze runoff from the pre-developed area.

**Proposed Condition:**

The project will result in the creation of 1,690 sf of new impervious coverage within the drainage area utilized for the analysis. Due to lot constraints, the proposed parking lot expansion is directly connected to the stormwater detention system. The increase in runoff resulting from the proposed construction will be mitigated through the use of a subsurface stormwater detention system. Stormwater runoff will be collected, stored, and discharged at a control rate before being conveyed to the existing stormwater conveyance system located within the NJDOT right-of-way for U.S. Route 206. Existing drainage patterns will be preserved, post-development peak runoff rates will be reduced, and the paved area will be surrounded by proposed landscaping which will serve as a buffer to the adjacent properties.

**4. Stormwater Quality:**

For developments which propose an increase of greater than 10,890 sf (0.25 acres) of impervious surfaces, the NJDEP Stormwater management rules require stormwater management measures designed to reduce the post-construction load of total suspended solids (TSS) from the Water Quality Storm (WQS) by 80% of the anticipated load from the developed site. This project proposes an increase in impervious surfaces of 1,690 sf (0.038 acres), and therefore the stormwater quality requirements of N.J.A.C. 7:8 are not applicable. Under Montgomery Township's Land Development Ordinance, Chapter 16, the Township has implemented Stormwater requirements for 'Minor' developments. Per subsection 16-5.2g7, "If the applicant is seeking subdivision or minor or major site plan approval, or approval for 'd' variances pursuant to N.J.S.A. 40:55D-70d or for 'c' variances for lot coverage", Stormwater Runoff Quality Standards apply. This project seeks site plan approval and disturbs an area greater than 0.50 acres, therefore township standards for Stormwater Runoff Quality apply.

Water quality will be improved by changing the type of 'Use' from a gas/service station use to a food service-oriented business. This project also proposes to treat the stormwater runoff quality through the use of a combination of manufactured treatment devices. The project employs the Stormfilter structures manufactured by Contech Engineered Solutions, LLC and the 'FILTERRA' Bioretention systems. Both devices are certified to meet the required 80% reduction in total suspended solids. In addition, the FILTERRA systems complies with the Green Infrastructure requirements stipulated by the Ordinance.

**5. Stormwater Recharge:**

For developments which propose an increase of greater than 0.25 acres of impervious surfaces or propose to disturb greater than 1-acre of land, the NJDEP Stormwater management rules require stormwater management measures designed to maintain 100% of the pre-development annual average groundwater recharge in the post-developed state. This project proposes less than 10,890 sf of new impervious surface and proposes to disturb less than 1-acre of land for the construction of the proposed improvements. The stormwater recharge requirements of N.J.A.C. 7:8 are not applicable. However, the Montgomery Townships Stormwater Rules require groundwater recharge for projects that disturb more than 0.50 acres of land. This project does not incorporate groundwater recharge as the site is located within an area listed with groundwater contamination.

## 6. Stormwater Quantity:

Post-construction peak runoff rate reductions of 50 percent for the 2-year storm, 75 percent for the 10-year storm, and 80 percent for the 100-year storm are required for projects considered a "major development" as defined by NJAC 7:8. Since this project is not considered a "major development" as defined by NJAC 7:8, the project is not subject to the rate reductions required by the rules. However, discharge of stormwater runoff from the site will be conveyed to the NJDOT stormwater facilities, and per the townships Stormwater Ordinance, this project proposes to reduce the stormwater runoff by 50% for the 2-year design storm, 75% for the 10-year design storm and 80% reduction for the 100-year design storm. In order to comply with Township's regulations, stormwater management measures have been designed for the project to reduce the predevelopment peak runoff rates stated above for the post-constructed condition.

As shown on the drainage area map in Appendix D, a total contributory drainage area of 0.520 acres was utilized for the pre-development and post-development peak flow rate analysis. Peak runoff rates from the area to be disturbed must be maintained or reduced in the post-developed condition. The runoff rates have changed due to the use of the NOAA Type C storm event. The existing peak runoff rates, required reductions and proposed discharges from the drainage areas analyzed are summarized as follows:

Storm Event	Pre-Development Peak Runoff (EDA) (cfs)	Reduction Factor	Required Reductions Peak Runoff (cfs)	Post-Development Peak Runoff (PDA) (cfs)
2 yr.	0.56	50%	0.28	0.17
10 yr.	1.48	75%	1.11	0.63
100 yr.	3.04	80%	2.43	2.11

## 7. Stormwater Collection System

Currently, runoff generated from the site flows un-detained, in a northeasterly direction to an inlet located along US Route 206. This inlet is a part of a NJDOT stormwater collection/conveyance system along US Route 206. The NJDOT stormwater conveyance system consists of 24" RCP with a slope of 3.5% where the proposed connection is located. The existing NJDOT conveyance system was previously analyzed which demonstrated that the runoff generated by this development will not greatly impact the system.

Calculations were performed for the proposed development which indicates the proposed onsite conveyance system is designed to adequately capture and convey the 2, 10 and 100 year storms safely. Four (4) inlets are proposed to capture the onsite stormwater runoff, while roof leaders will convey roof runoff directly to the proposed underground detention system. 12" RCP is specified for a portion of the onsite conveyance system due to burial constraints, the proposed pavement box depth and invert elevations to the proposed detention system. The detention system consists of 4 rows of 36" HDPE pipe and manhole OS-1, an outfall structure. The outfall structure is designed to reduce flow rates per the Town's Stormwater Ordinance of 50% for the 2-year design storm, 75% for the 10-year design storm and 80% for the 100-year design storm.

## 8. Summary and Conclusions:

The stormwater management controls for the project have been designed to mitigate the effects of the proposed construction on lot 64 in block 28010 through storage, discharge control and mitigation for TSS removal of runoff collected from the proposed development. The proposed stormwater underground detention system will result in the reduction of pre-construction runoff rates from the project area based on the analysis of the 2yr, 10yr, and 100yr storm events. The proposed stormwater controls ensure that there will be

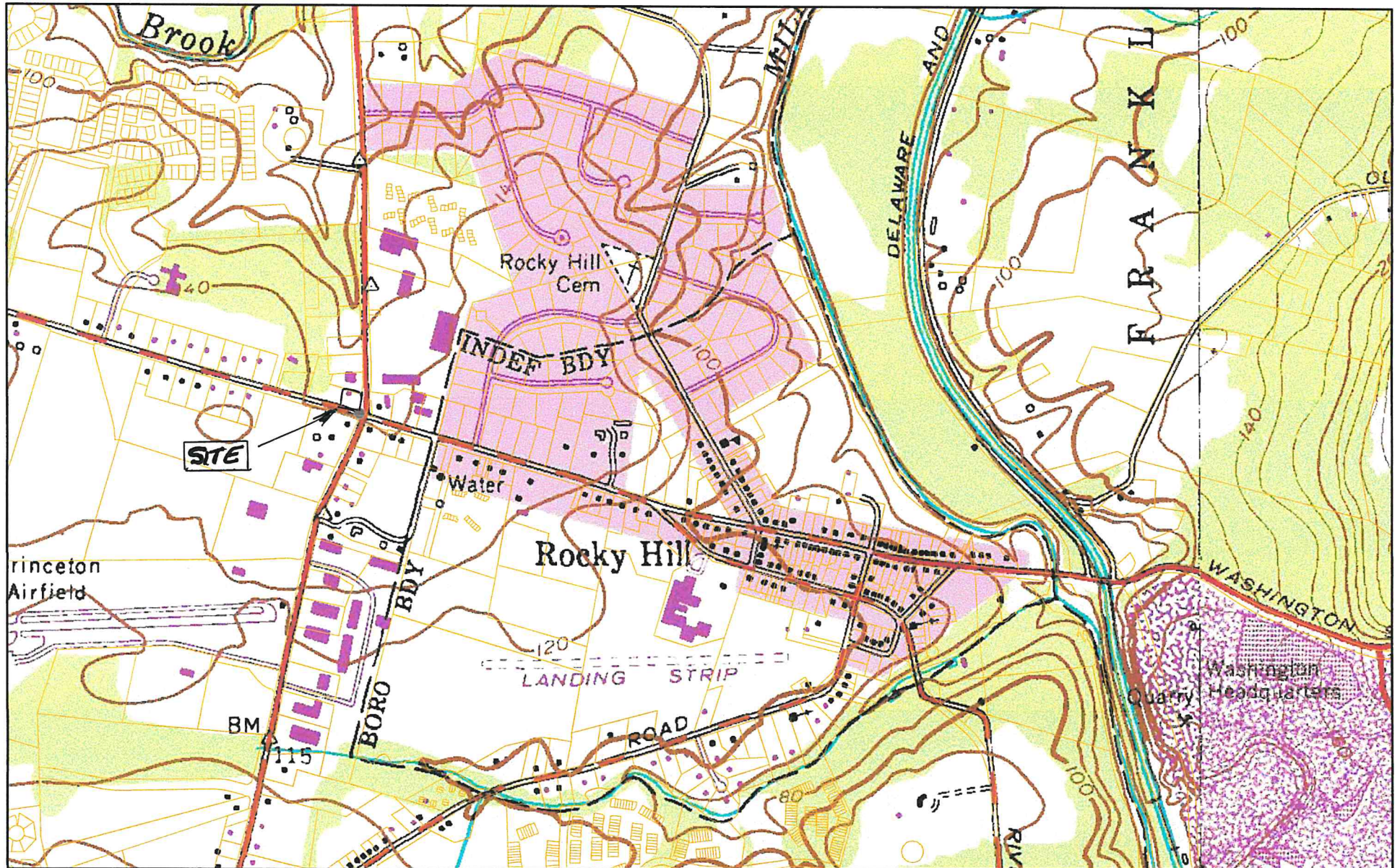
no negative downstream impacts with respect to runoff quantity and suspended solids as a result of the proposed construction. The calculations indicate that the drainage system as designed does have adequate capacity to convey all of the storm events including the 100-year storm.

## **APPENDIX A**



**USGS MAP  
USDA SOILS MAP  
FEMA MAP**



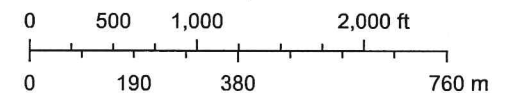
# 1270 US Route 206, Skillman, NJ



10/14/2020, 6:15:56 AM

-  County Boundaries
-  Parcels Data (Block and Lot)

1:18,056



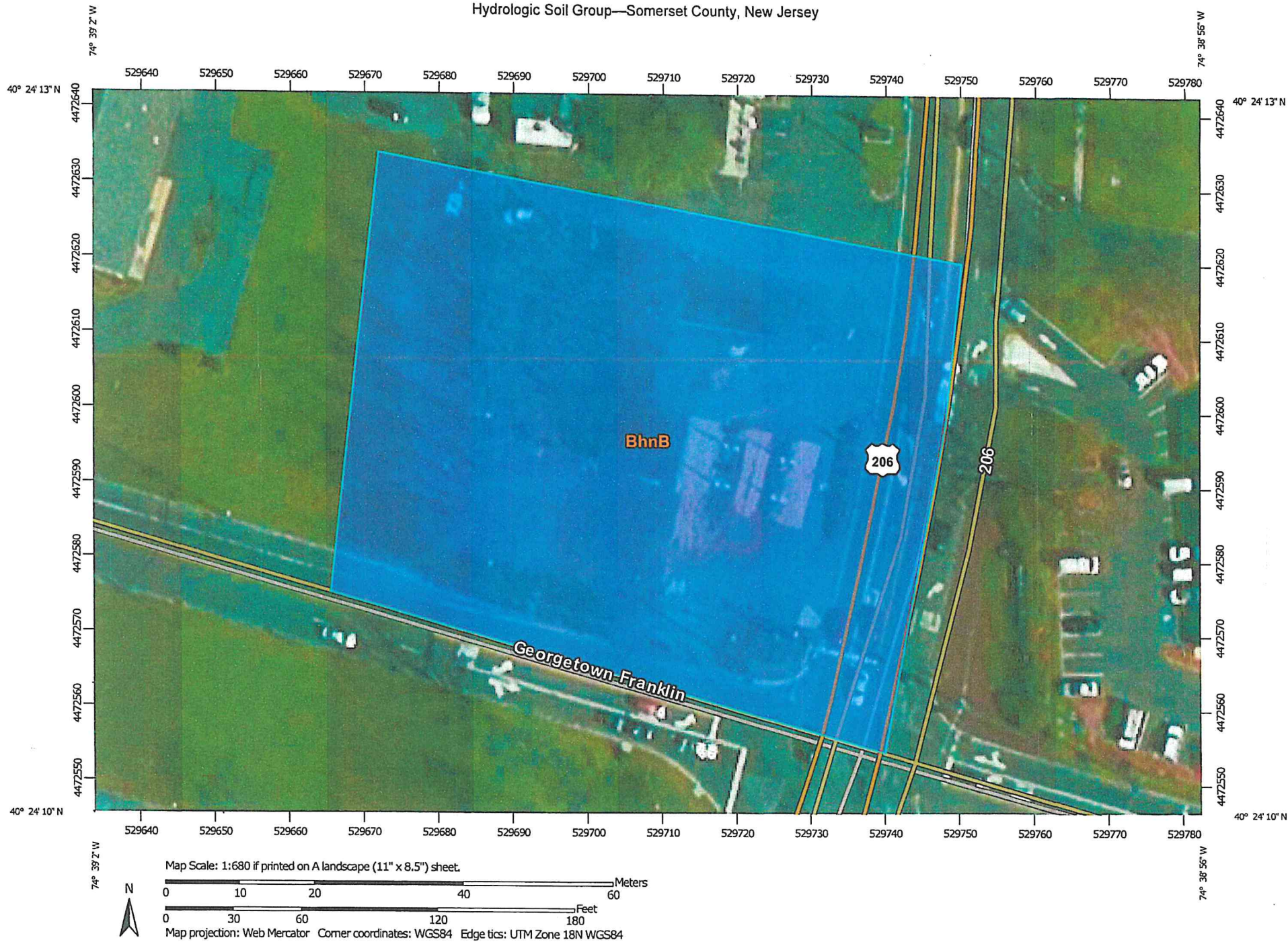
Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap

New Jersey Department of Environmental Protection

Esri Community Maps Contributors, Somerset County, NJ, State of New Jersey, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA | NJDEP | NJDEP, Bureau of Energy and Sustainability Edition 20190327 |



# Hydrologic Soil Group—Somerset County, New Jersey



































Natural Resources  
Conservation Service

Web Soil Survey  
National Cooperative Soil Survey

1/14/2015  
Page 1 of 4

## MAP LEGEND

<b>Area of Interest (AOI)</b>		 C	C
 Area of Interest (AOI)		 C/D	C/D
<b>Soils</b>		 D	D
<b>Soil Rating Polygons</b>		 Not rated or not available	Not rated or not available
 A	A	<b>Water Features</b>	
 A/D	A/D	 Streams and Canals	Streams and Canals
 B	B	<b>Transportation</b>	
 B/D	B/D	 Rails	Rails
 C	C	 Interstate Highways	Interstate Highways
 C/D	C/D	 US Routes	US Routes
 D	D	 Major Roads	Major Roads
 Not rated or not available	Not rated or not available	 Local Roads	Local Roads
<b>Soil Rating Lines</b>		<b>Background</b>	
 A	A	 Aerial Photography	Aerial Photography
 A/D	A/D		
 B	B		
 B/D	B/D		
 C	C		
 C/D	C/D		
 D	D		
 Not rated or not available	Not rated or not available		
<b>Soil Rating Points</b>			
 A	A		
 A/D	A/D		
 B	B		
 B/D	B/D		

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>  
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Somerset County, New Jersey  
Survey Area Data: Version 12, Sep 24, 2014

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

Date(s) aerial images were photographed: Mar 19, 2011—May 1, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.



## Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Somerset County, New Jersey (NJ035)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BhnB	Birdsboro silt loam, 2 to 6 percent slopes	B	1.2	100.0%
Totals for Area of Interest			1.2	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.

### Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* None Specified

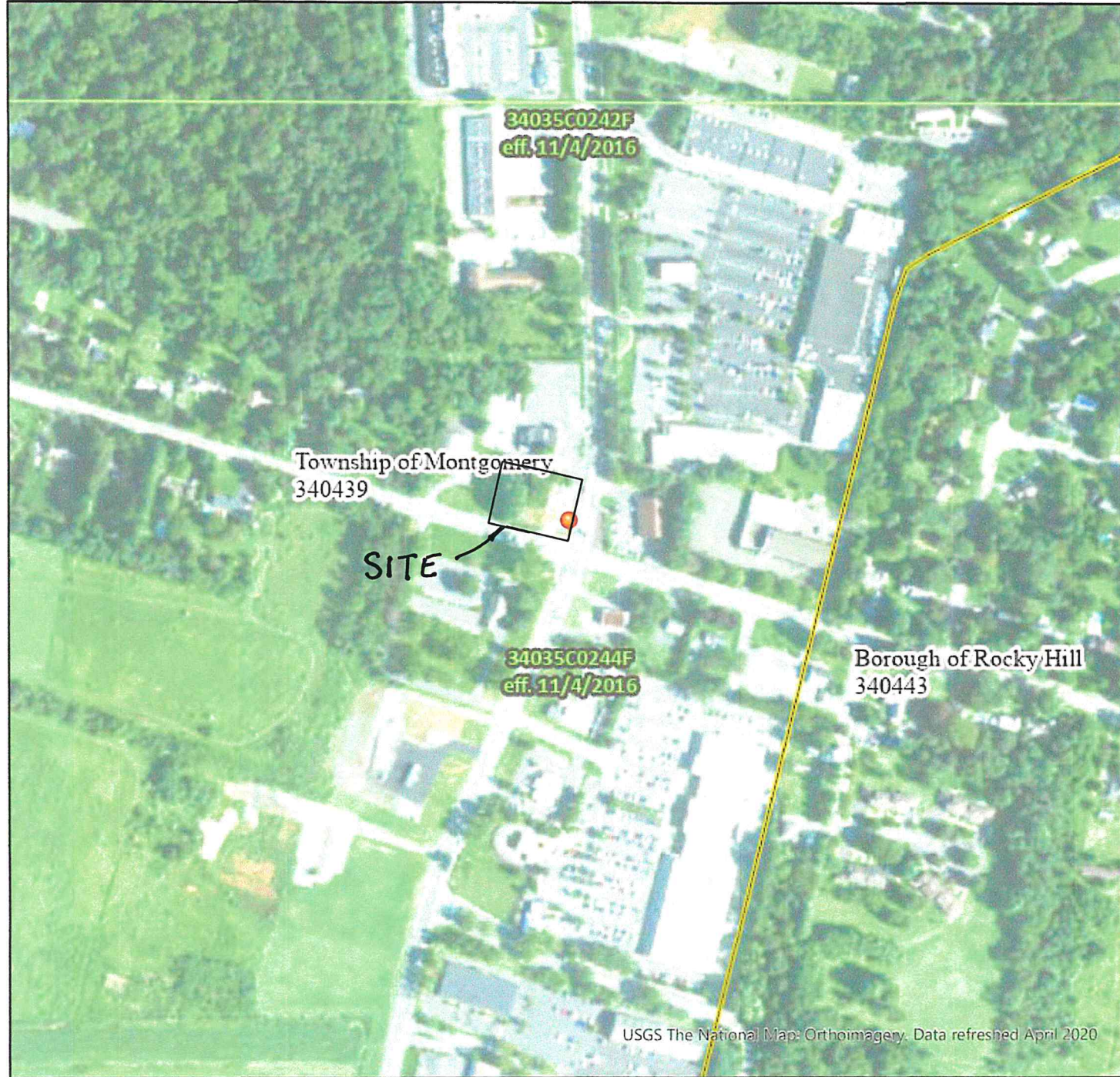
*Tie-break Rule:* Higher



# National Flood Hazard Layer FIRMette



74°39'17"W 40°24'25"N



USGS The National Map: Orthoimagery. Data refreshed April 2020

0 250 500 1,000 1,500 2,000 Feet 1:6,000

74°38'40"W 40°23'58"N

## Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
OTHER AREAS OF FLOOD HAZARD		Regulatory Floodway
		0.2% Annual Chance Flood Hazard, Area of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
OTHER AREAS		Area with Flood Risk due to Levee Zone E
		NO SCREEN Area of Minimal Flood Hazard Zone X
GENERAL STRUCTURES		Effective LOMRs
		Area of Undetermined Flood Hazard Zone
OTHER FEATURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
MAP PANELS		Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Digital Data Available
		No Digital Data Available
		Unmapped

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **10/14/2020 at 6:28 AM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

**APPENDIX B**

**PRE-DEVELOPED CONDITIONS**  
**HYDROGRAPHS**



	fair	----- 35	----- 56	----- 70	----- 77
	good	----- 30	----- 48	----- 65	----- 73
Woods - grass combination	poor	----- 57	----- 73	----- 82	----- 86
	fair	----- 43	----- 65	----- 76	----- 82
	good	----- 32	----- 58	----- 72	----- 79
Woods	poor	----- 45	----- 66	----- 77	----- 83
	fair	----- 36	----- 60	----- 73	----- 79
	good	----- 30	----- 55	----- 70	----- 77
Farmsteads	----	----- 59	----- 74	----- 82	----- 86
FULLY DEVELOPED URBAN AREAS (Veg Established)					
Open space (Lawns, parks etc.)					
	Poor condition; grass cover < 50%	----- 68	----- 79	----- 86	----- 89
	Fair condition; grass cover 50% to 75 %	----- 49	----- 69	----- 79	----- 84
	Good condition; grass cover > 75%	----- 39	----- 61	----- 74	----- 80
Impervious Areas					
	Paved parking lots, roofs, driveways	----- 98	----- 98	----- 98	----- 98
	Streets and roads				
	Paved; curbs and storm sew	----- 98	----- 98	----- 98	----- 98
	Paved; open ditches (w/right-of-way)	----- 83	----- 89	----- 92	----- 93
	Gravel (w/ right-of-way)	----- 76	----- 85	----- 89	----- 91
	Dirt (w/ right-of-way)	----- 72	----- 82	----- 87	----- 89
Urban Districts					
	Avg % impervious				
	Commercial & business	----- 89	----- 92	----- 94	----- 95
	Industrial	----- 81	----- 88	----- 91	----- 93
Residential districts by average lot size					
	Avg % impervious				
	1/8 acre (town houses)	----- 77	----- 85	----- 90	----- 92
	1/4 acre	----- 61	----- 75	----- 83	----- 87
	1/3 acre	----- 57	----- 72	----- 81	----- 86
	1/2 acre	----- 54	----- 70	----- 80	----- 85
	1 acre	----- 51	----- 68	----- 79	----- 84
	2 acre	----- 46	----- 65	----- 77	----- 82
	User defined urban	----- **	----- **	----- **	----- **
DEVELOPING URBAN AREA (No Vegetation)					
	Newly graded area (pervious or	----- 77	----- 86	----- 91	----- 94

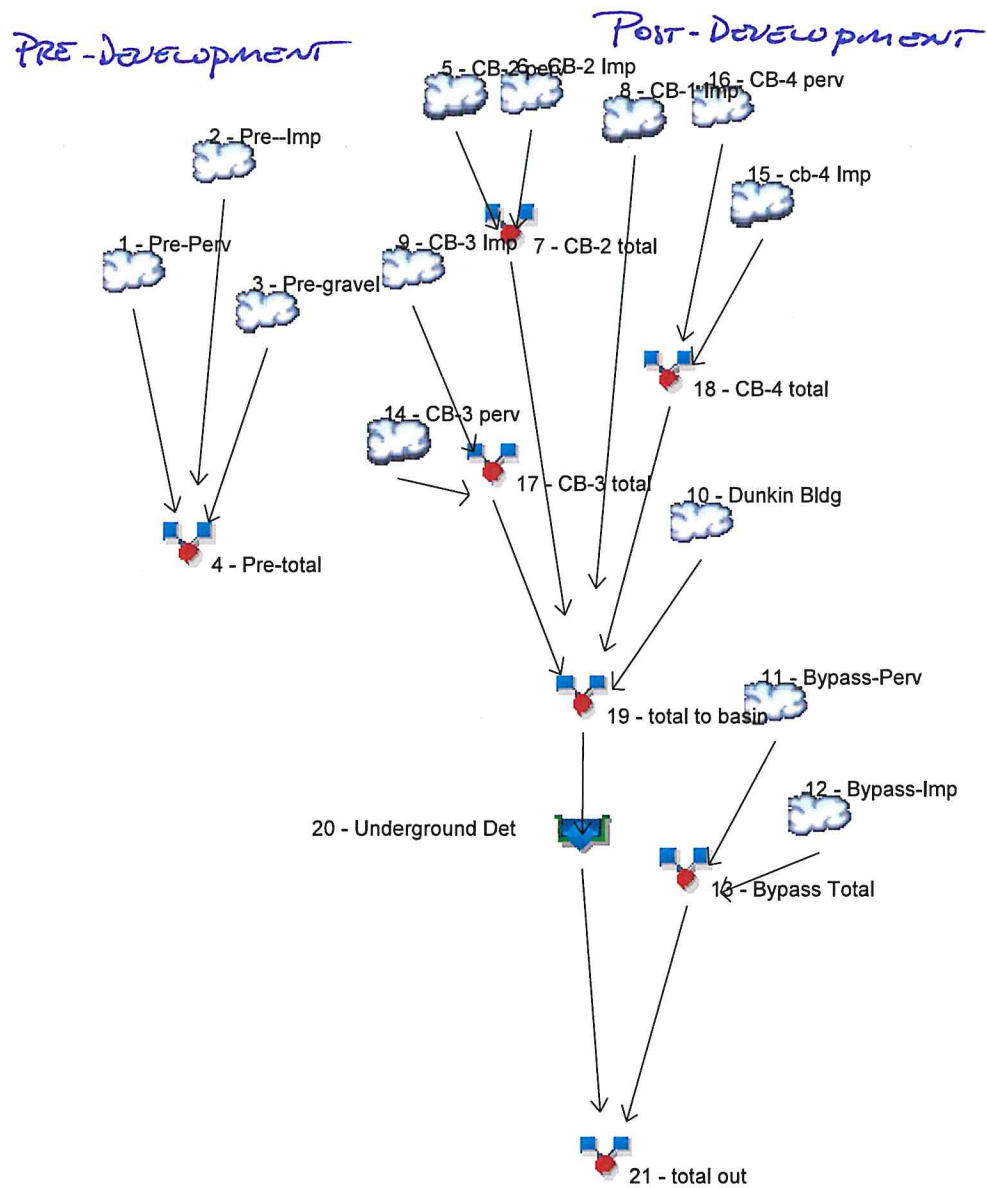
0 0 0 0

**Total Acres 0**

**Weighted Runoff Curve Number (RCN) 0**

# Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021



# Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	----	----	0.001	----	----	0.106	0.236	----	0.450	Pre-Perv
2	SCS Runoff	----	----	0.501	----	----	1.150	1.554	----	2.106	Pre-Imp
3	SCS Runoff	----	----	0.059	----	----	0.228	0.341	----	0.496	Pre-gravel
4	Combine	1, 2, 3	----	0.560	----	----	1.475	2.122	----	3.039	Pre-total
5	SCS Runoff	----	----	0.000	----	----	0.010	0.021	----	0.039	CB-2 perv
6	SCS Runoff	----	----	0.243	----	----	0.555	0.750	----	1.016	CB-2 Imp
7	Combine	5, 6	----	0.243	----	----	0.565	0.771	----	1.055	CB-2 total
8	SCS Runoff	----	----	0.056	----	----	0.128	0.173	----	0.234	CB-1 Imp
9	SCS Runoff	----	----	0.131	----	----	0.299	0.404	----	0.547	CB-3 Imp
10	SCS Runoff	----	----	0.065	----	----	0.148	0.201	----	0.272	Dunkin Bldg
11	SCS Runoff	----	----	0.000	----	----	0.080	0.177	----	0.336	Bypass-Perv
12	SCS Runoff	----	----	0.037	----	----	0.085	0.115	----	0.156	Bypass-Imp
13	Combine	11, 12	----	0.037	----	----	0.153	0.275	----	0.467	Bypass Total
14	SCS Runoff	----	----	0.000	----	----	0.010	0.021	----	0.040	CB-3 perv
15	SCS Runoff	----	----	0.187	----	----	0.427	0.577	----	0.781	cb-4 Imp
16	SCS Runoff	----	----	0.000	----	----	0.008	0.018	----	0.034	CB-4 perv
17	Combine	9, 14,	----	0.131	----	----	0.308	0.425	----	0.587	CB-3 total
18	Combine	15, 16,	----	0.187	----	----	0.434	0.593	----	0.813	CB-4 total
19	Combine	7, 8, 10, 17, 18	----	0.676	----	----	1.573	2.147	----	2.941	total to basin
20	Reservoir	19	----	0.147	----	----	0.540	0.984	----	1.678	Underground Det
21	Combine	13, 20	----	0.169	----	----	0.629	1.210	----	2.105	total out
Proj. file: SCS Dunkin 9-1-2021.gpw										Thursday, 09 / 16 / 2021	

# Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.001	1	868	16	---	---	---	Pre-Perv
2	SCS Runoff	0.501	1	727	1,621	---	---	---	Pre-Imp
3	SCS Runoff	0.059	1	728	175	---	---	---	Pre-gravel
4	Combine	0.560	1	728	1,812	1, 2, 3	---	---	Pre-total
5	SCS Runoff	0.000	1	863	1	---	---	---	CB-2 perv
6	SCS Runoff	0.243	1	726	675	---	---	---	CB-2 Imp
7	Combine	0.243	1	726	677	5, 6	---	---	CB-2 total
8	SCS Runoff	0.056	1	726	156	---	---	---	CB-1 Imp
9	SCS Runoff	0.131	1	726	364	---	---	---	CB-3 Imp
10	SCS Runoff	0.065	1	728	222	---	---	---	Dunkin Bldg
11	SCS Runoff	0.000	1	871	11	---	---	---	Bypass-Perv
12	SCS Runoff	0.037	1	726	104	---	---	---	Bypass-Imp
13	Combine	0.037	1	726	115	11, 12	---	---	Bypass Total
14	SCS Runoff	0.000	1	865	1	---	---	---	CB-3 perv
15	SCS Runoff	0.187	1	726	520	---	---	---	cb-4 Imp
16	SCS Runoff	0.000	1	871	1	---	---	---	CB-4 perv
17	Combine	0.131	1	726	365	9, 14,	---	---	CB-3 total
18	Combine	0.187	1	726	521	15, 16,	---	---	CB-4 total
19	Combine	0.676	1	726	1,940	7, 8, 10, 17, 18	---	---	total to basin
20	Reservoir	0.147	1	741	1,939	19	123.00	536	Underground Det
21	Combine	0.169	1	726	2,054	13, 20	---	---	total out
SCS Dunkin 9-1-2021.gpw					Return Period: 2 Year			Thursday, 09 / 16 / 2021	



# Hydrograph Report

4

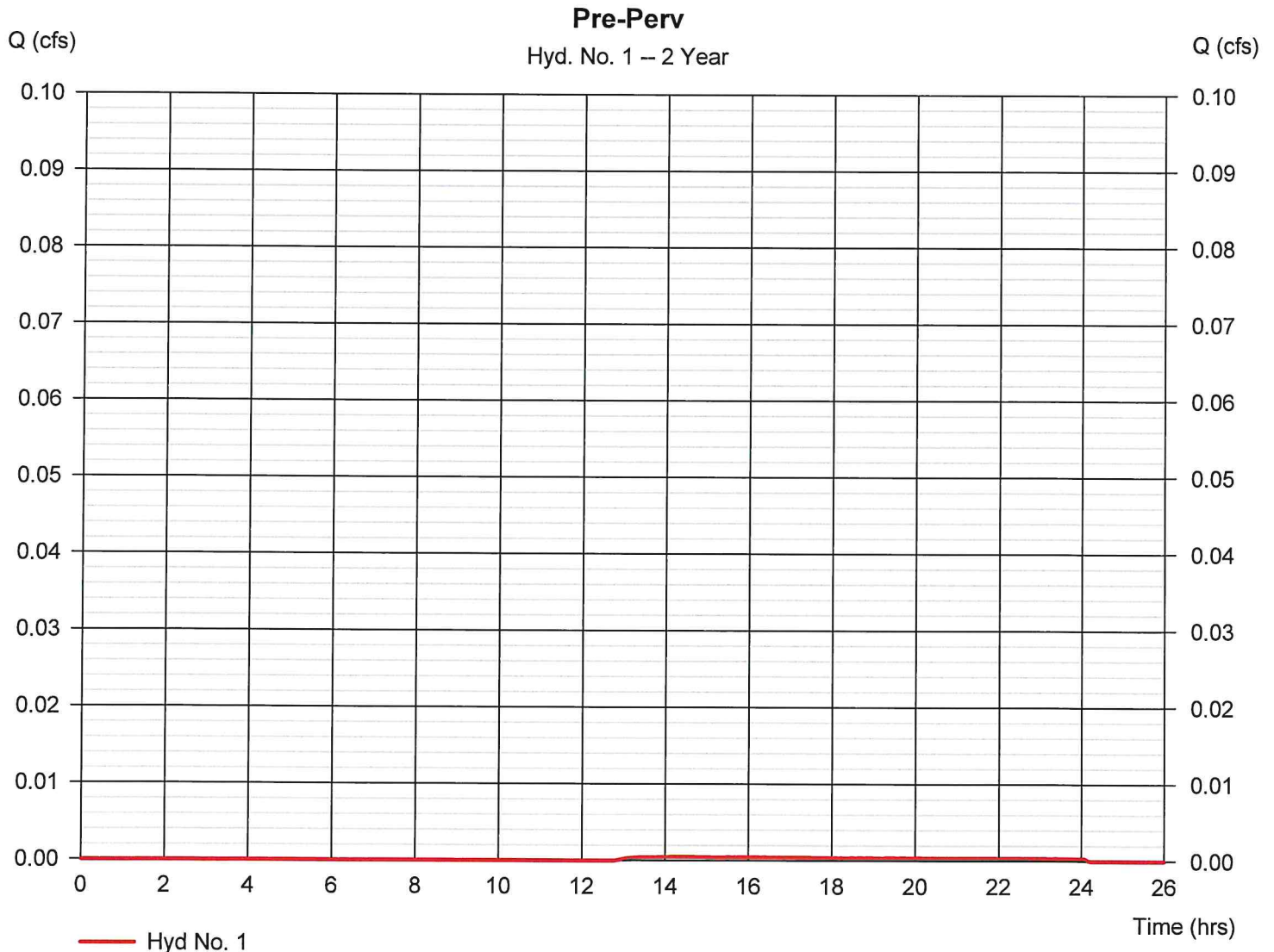
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Hyd. No. 1

Pre-Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.001 cfs
Storm frequency	= 2 yrs	Time to peak	= 14.47 hrs
Time interval	= 1 min	Hyd. volume	= 16 cuft
Drainage area	= 0.140 ac	Curve number	= 61
Basin Slope	= 0.1 %	Hydraulic length	= 198 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 8.54 min
Total precip.	= 1.75 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



# Hydrograph Report

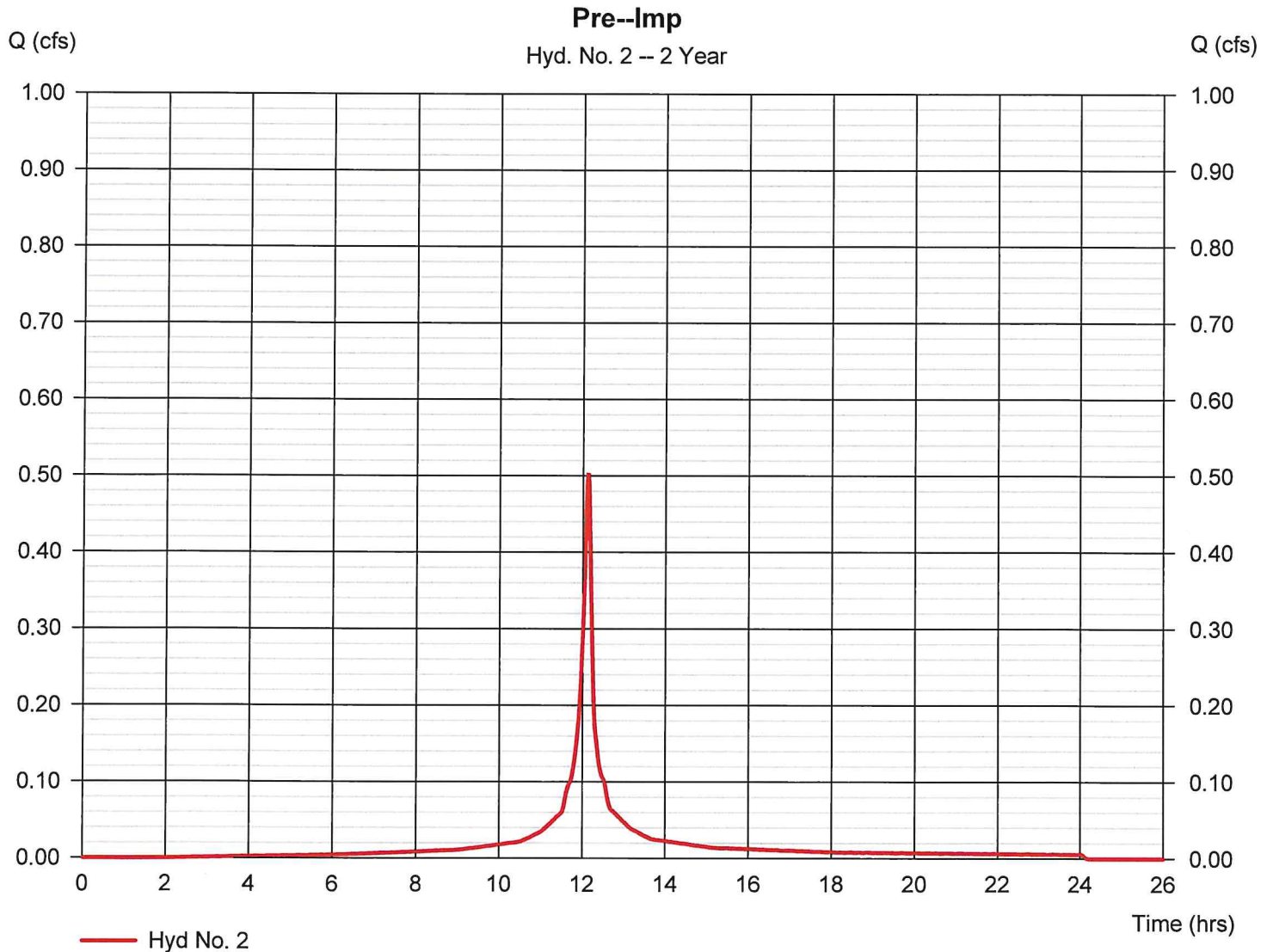
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Hyd. No. 2

Pre--Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 0.501 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.12 hrs
Time interval	= 1 min	Hyd. volume	= 1,621 cuft
Drainage area	= 0.300 ac	Curve number	= 98
Basin Slope	= 0.1 %	Hydraulic length	= 178 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 7.87 min
Total precip.	= 1.75 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



# Hydrograph Report

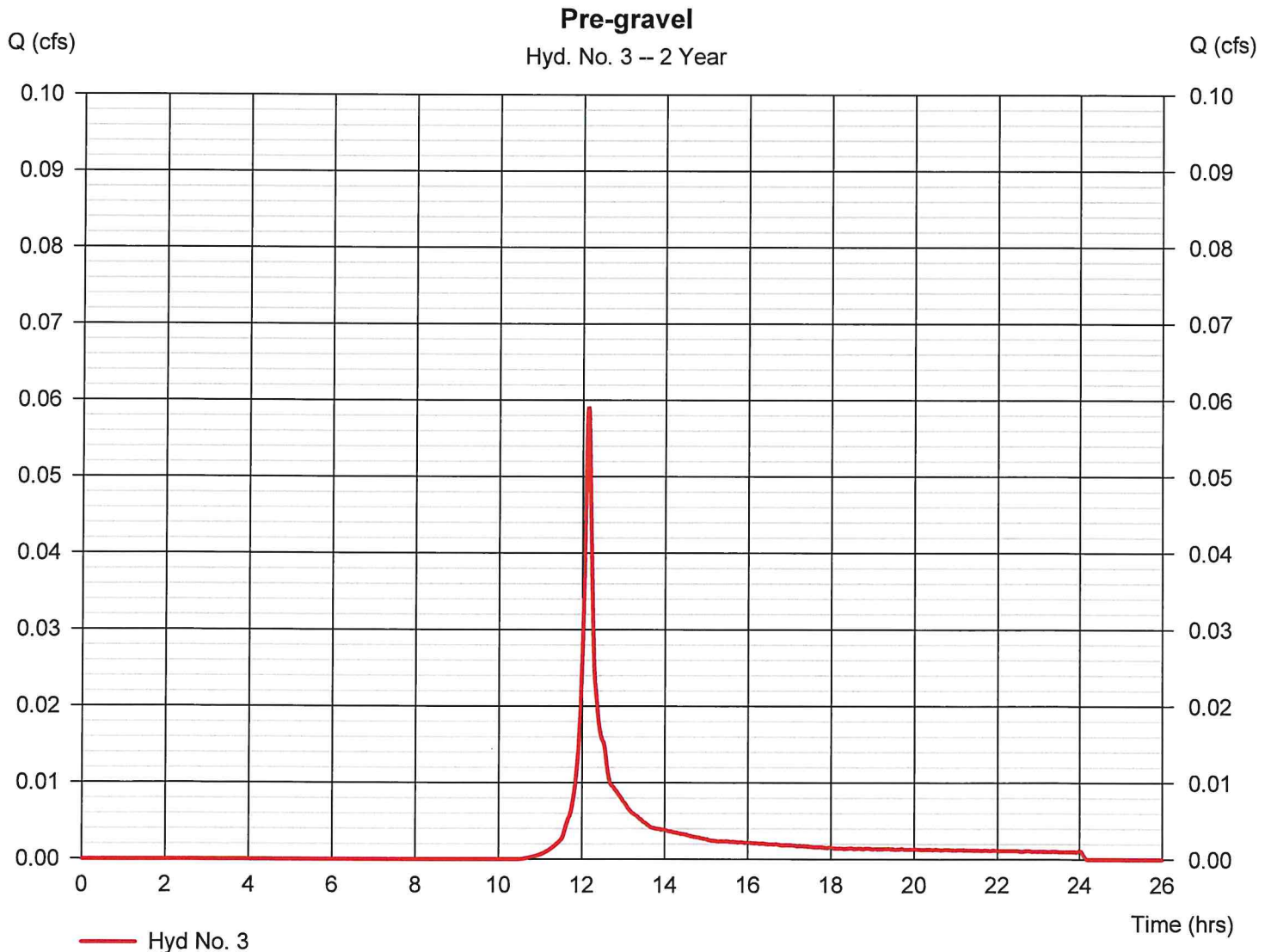
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Hyd. No. 3

Pre-gravel

Hydrograph type	= SCS Runoff	Peak discharge	= 0.059 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 175 cuft
Drainage area	= 0.080 ac	Curve number	= 85
Basin Slope	= 0.1 %	Hydraulic length	= 178 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 7.87 min
Total precip.	= 1.75 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



# Hydrograph Report

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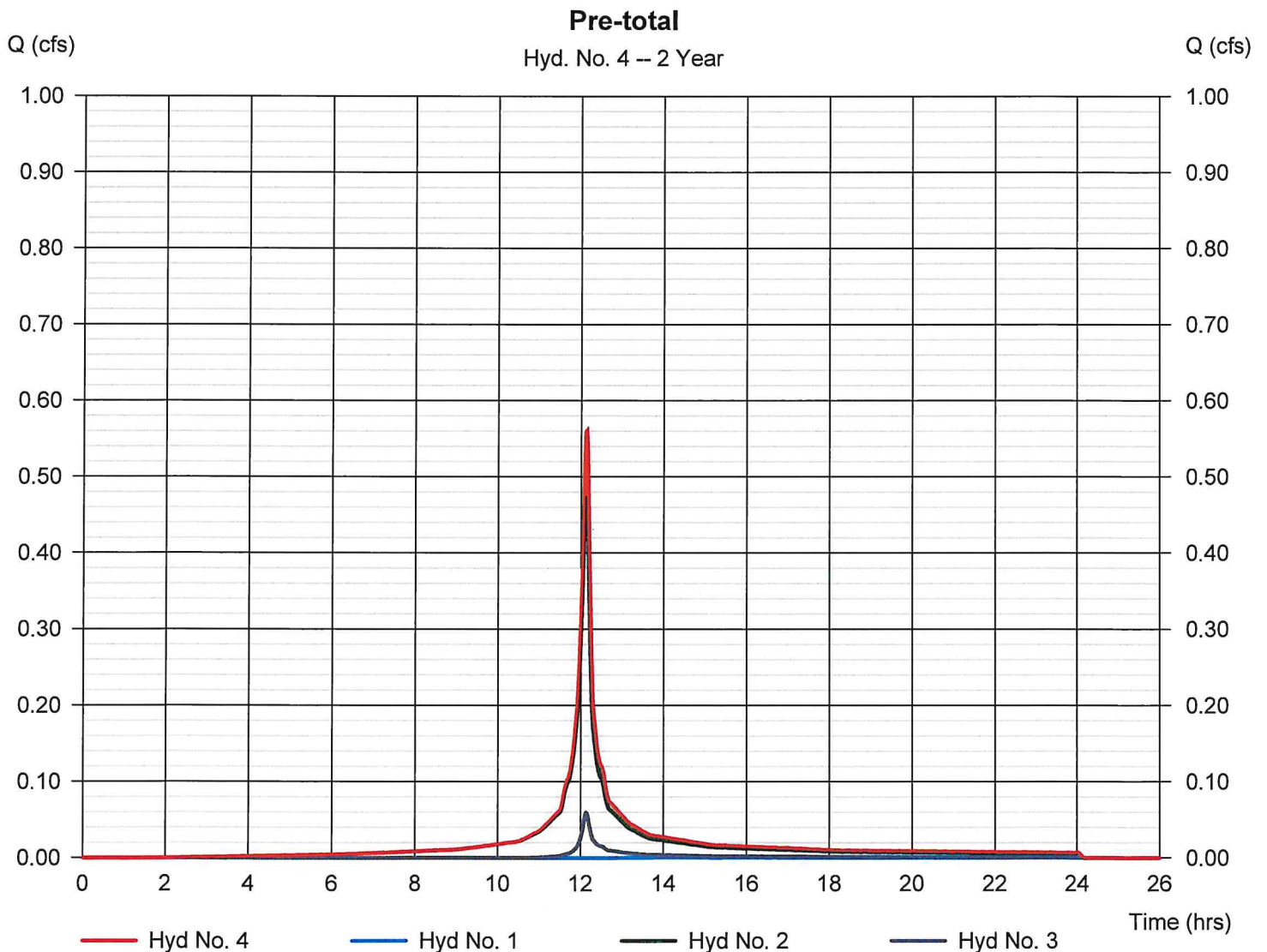
Thursday, 09 / 16 / 2021

## Hyd. No. 4

Pre-total

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

Peak discharge = 0.560 cfs  
 Time to peak = 12.13 hrs  
 Hyd. volume = 1,812 cuft  
 Contrib. drain. area = 0.520 ac



# Hydrograph Report

35

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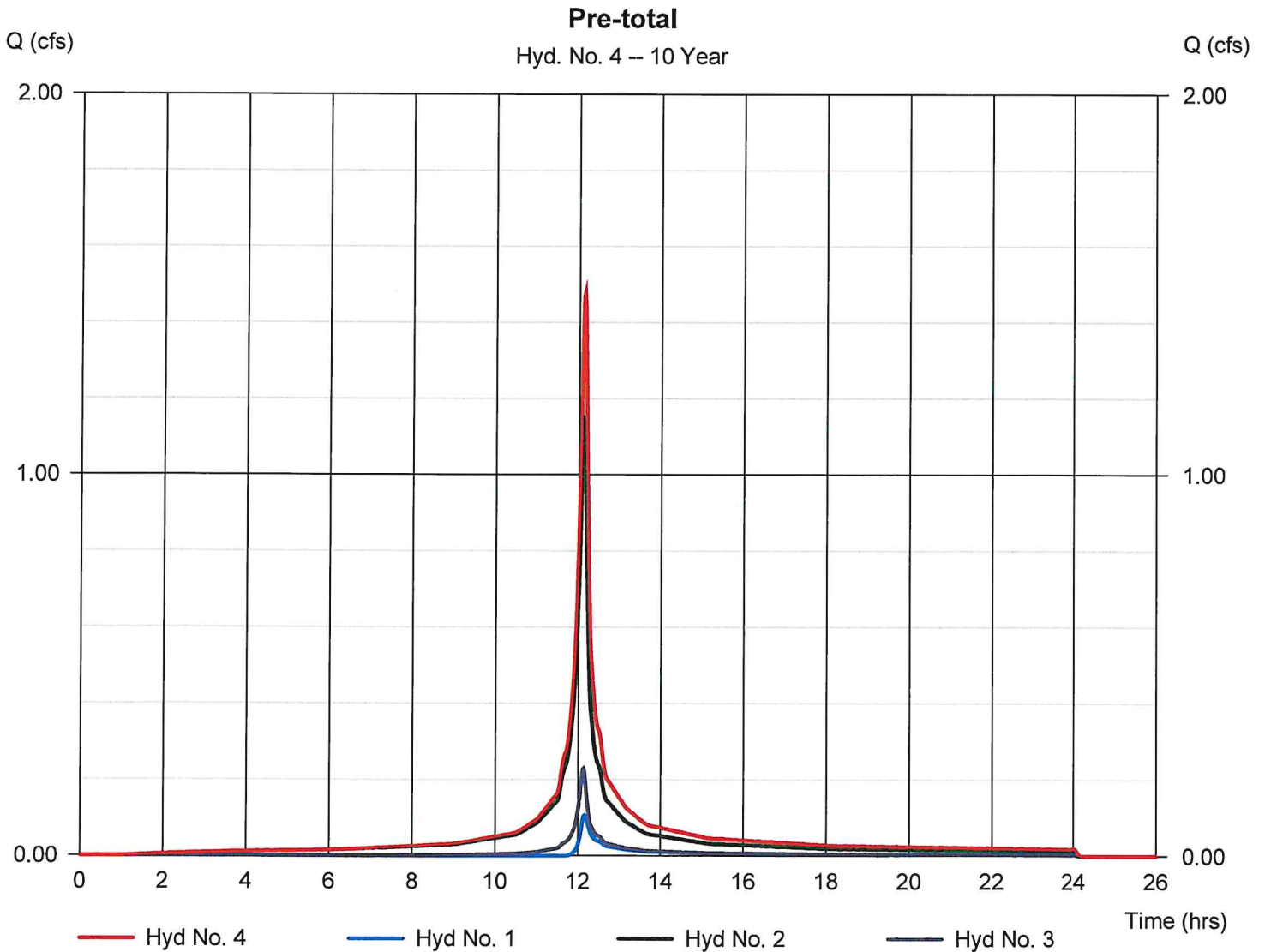
Thursday, 09 / 16 / 2021

## Hyd. No. 4

Pre-total

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Time interval = 1 min  
Inflow hyds. = 1, 2, 3

Peak discharge = 1.475 cfs  
Time to peak = 12.13 hrs  
Hyd. volume = 4,950 cuft  
Contrib. drain. area = 0.520 ac





# Hydrograph Report

57

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

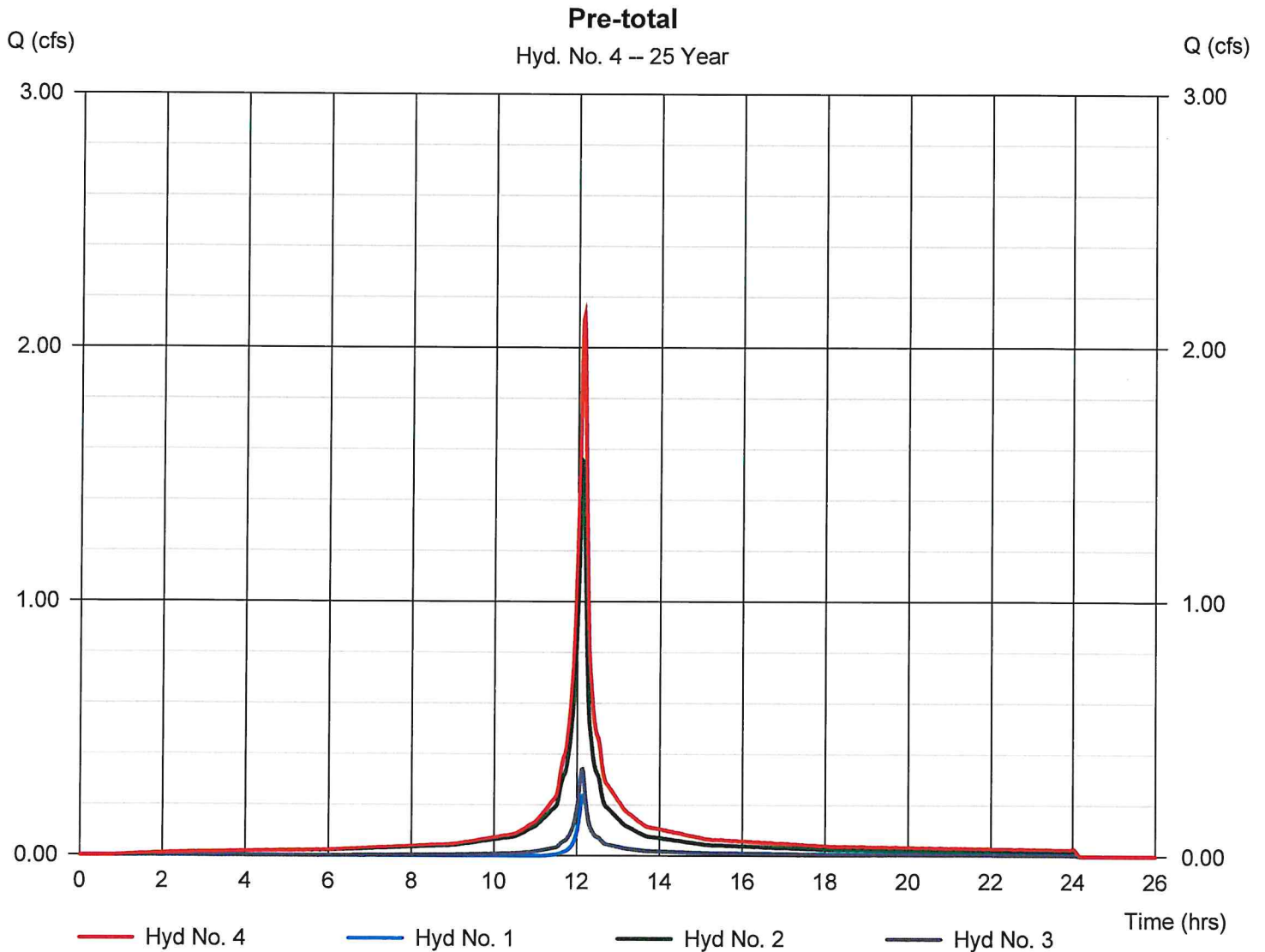
Thursday, 09 / 16 / 2021

## Hyd. No. 4

### Pre-total

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Time interval = 1 min  
Inflow hyds. = 1, 2, 3

Peak discharge = 2.122 cfs  
Time to peak = 12.13 hrs  
Hyd. volume = 7,115 cuft  
Contrib. drain. area = 0.520 ac



# Hydrograph Report

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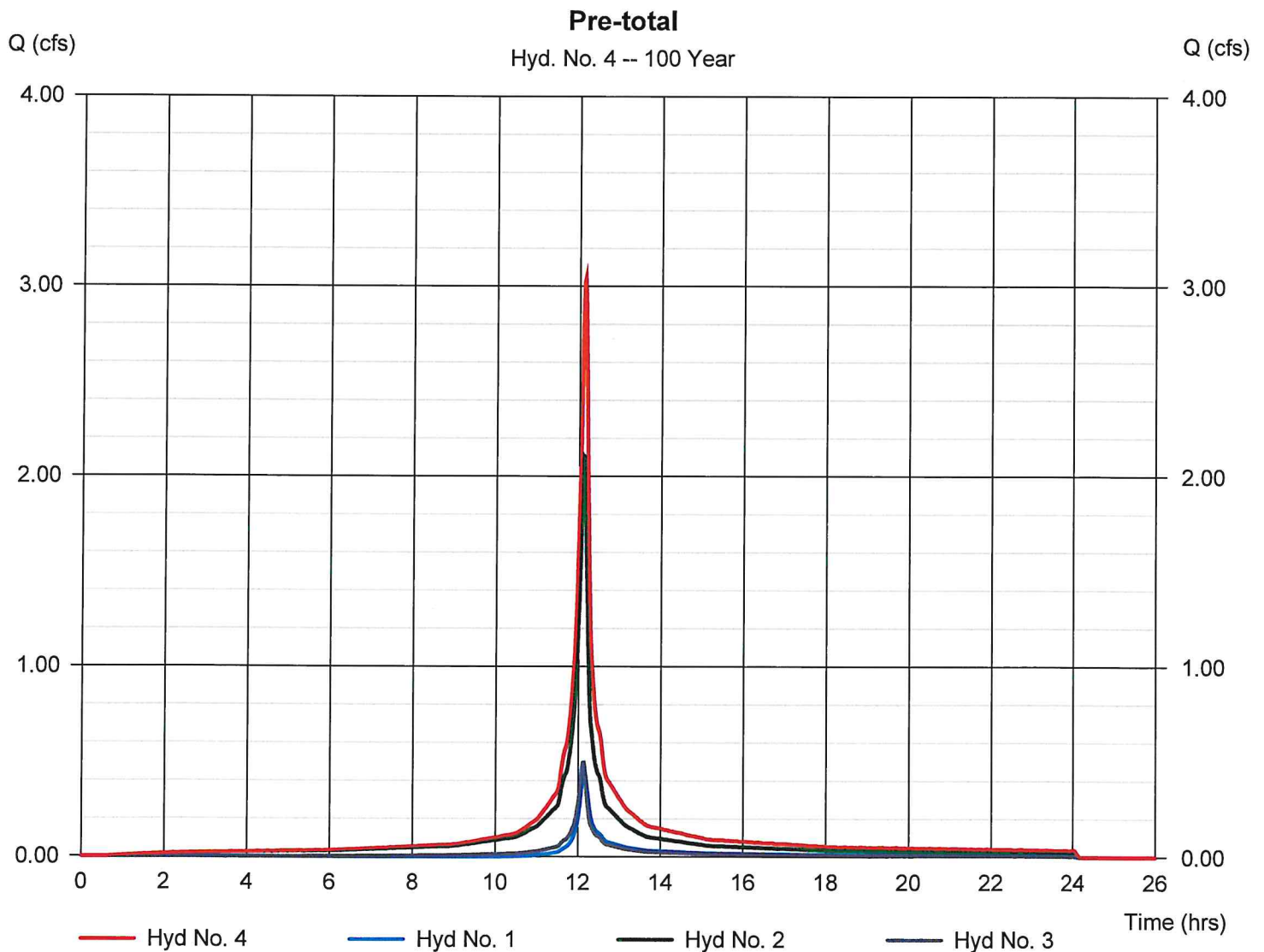
Thursday, 09 / 16 / 2021

## Hyd. No. 4

Pre-total

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Time interval = 1 min  
Inflow hyds. = 1, 2, 3

Peak discharge = 3.039 cfs  
Time to peak = 12.13 hrs  
Hyd. volume = 10,209 cuft  
Contrib. drain. area = 0.520 ac



## **APPENDIX C**

### **PEAK FLOW RATE REDUCTION CALCULATIONS**





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Robert C. Brightly, PE, PP, CME

Steven B. Bolio, PE, CME  
Mark S. Denisiuk, PE CME, LEED AP  
Joseph S. Kosinski, PG, CFM, LEED AP  
C. Richard Quamme, PE, CME  
Jess H. Symonds, PE

September 16, 2021

### Montgomery 'Dunkin'

#### PEAK FLOW RATE REDUCTION CALCULATIONS

##### Analysis Point #1

###### 2 Year Storm Event

Drainage Area =	0.52	acres
Disturbed Area =	0.51	acres
Undisturbed Area =	0.01	acres
Reduction Required =	0.5	(50%)
2 YR Peak Flowrate =	0.56	cfs
Target Flowrate =	<b>0.28</b>	cfs

###### 10 Year Storm Event

Drainage Area =	0.52	acres
Disturbed Area =	0.51	acres
Undisturbed Area =	0.01	acres
Reduction Required =	0.75	(25%)
10 YR Peak Flowrate =	1.48	cfs
Target Flowrate =	<b>1.11</b>	cfs

###### 100 Year Storm Event

Drainage Area =	0.52	acres
Disturbed Area =	0.51	acres
Undisturbed Area =	0.01	acres
Reduction Required =	0.8	(20%)
100 YR Peak Flowrate =	3.04	cfs
Target Flowrate =	<b>2.28</b>	cfs

• • •

**APPENDIX D**

**POST-DEVELOPED CONDITIONS**  
**HYDROGRAPHS**

	fair	----- 35	----- 56	----- 70	----- 77
	good	----- 30	----- 48	----- 65	----- 73
Woods - grass combination	poor	----- 57	----- 73	----- 82	----- 86
	fair	----- 43	----- 65	----- 76	----- 82
	good	----- 32	----- 58	----- 72	----- 79
Woods	poor	----- 45	----- 66	----- 77	----- 83
	fair	----- 36	----- 60	----- 73	----- 79
	good	----- 30	----- 55	----- 70	----- 77
Farmsteads	----	----- 59	----- 74	----- 82	----- 86
FULLY DEVELOPED URBAN AREAS (Veg Established)					
Open space (Lawns, parks etc.)					
	Poor condition; grass cover < 50%	----- 68	----- 79	----- 86	----- 89
	Fair condition; grass cover 50% to 75 %	----- 49	----- 69	----- 79	----- 84
	Good condition; grass cover > 75%	----- 39	----- 61	----- 74	----- 80
Impervious Areas					
	Paved parking lots, roofs, driveways	----- 98	----- 98	----- 98	----- 98
	Streets and roads				
	Paved; curbs and storm sew	----- 98	----- 98	----- 98	----- 98
	Paved; open ditches (w/right-of-way)	----- 83	----- 89	----- 92	----- 93
	Gravel (w/ right-of-way)	----- 76	----- 85	----- 89	----- 91
	Dirt (w/ right-of-way)	----- 72	----- 82	----- 87	----- 89
Urban Districts					
	Avg % impervious				
	Commercial & business	----- 89	----- 92	----- 94	----- 95
	Industrial	----- 81	----- 88	----- 91	----- 93
Residential districts by average lot size					
	Avg % impervious				
	1/8 acre (town houses)	----- 77	----- 85	----- 90	----- 92
	1/4 acre	----- 61	----- 75	----- 83	----- 87
	1/3 acre	----- 57	----- 72	----- 81	----- 86
	1/2 acre	----- 54	----- 70	----- 80	----- 85
	1 acre	----- 51	----- 68	----- 79	----- 84
	2 acre	----- 46	----- 65	----- 77	----- 82
	User defined urban	----- **	----- **	----- **	----- **
DEVELOPING URBAN AREA (No Vegetation)					
	Newly graded area (pervious or	----- 77	----- 86	----- 91	----- 94

0 0 0 0

**Total Acres 0**

**Weighted Runoff Curve Number (RCN) 0**

# Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

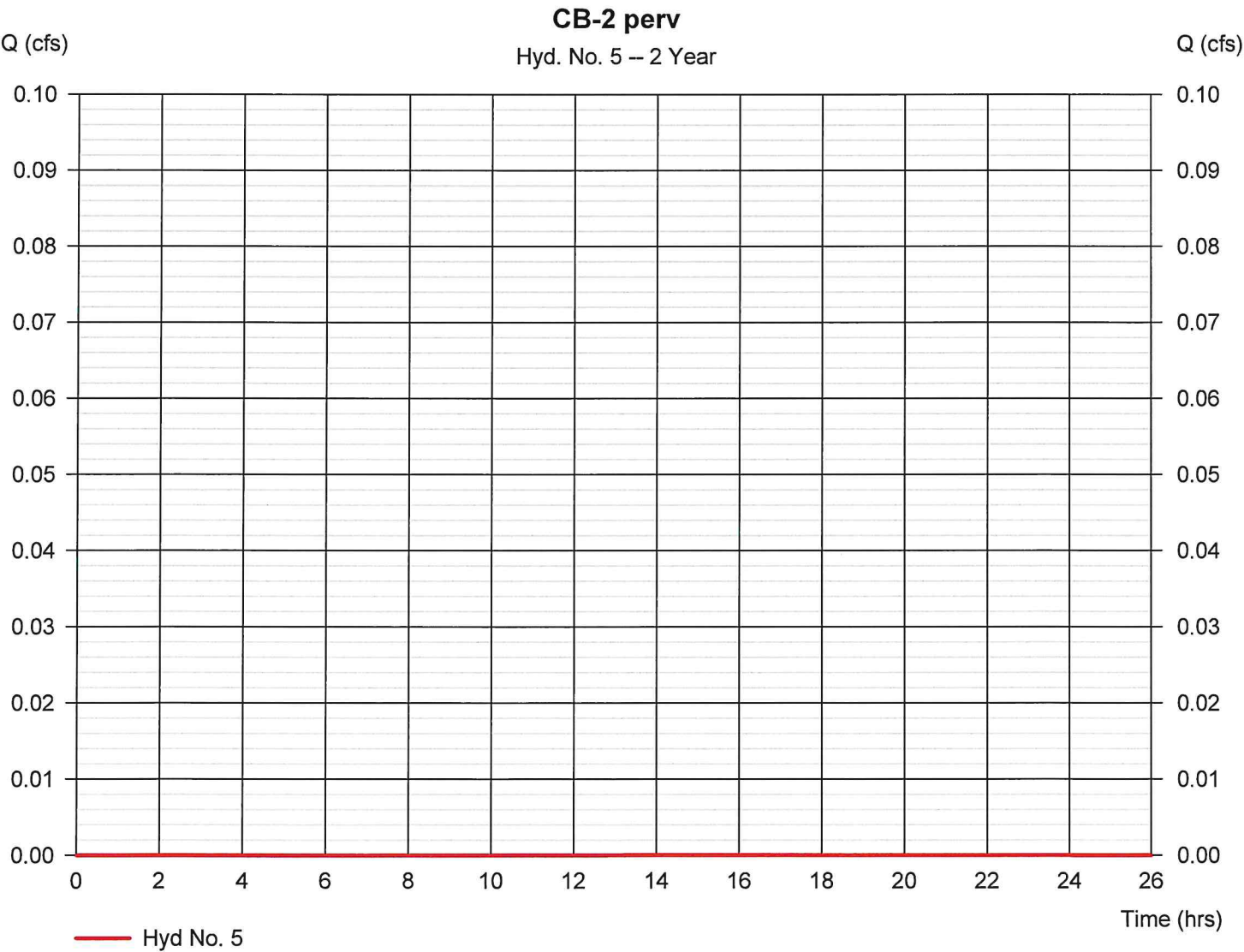
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.001	1	868	16	----	----	----	Pre-Perv
2	SCS Runoff	0.501	1	727	1,621	----	----	----	Pre-Imp
3	SCS Runoff	0.059	1	728	175	----	----	----	Pre-gravel
4	Combine	0.560	1	728	1,812	1, 2, 3	----	----	Pre-total
5	SCS Runoff	0.000	1	863	1	----	----	----	CB-2 perv
6	SCS Runoff	0.243	1	726	675	----	----	----	CB-2 Imp
7	Combine	0.243	1	726	677	5, 6	----	----	CB-2 total
8	SCS Runoff	0.056	1	726	156	----	----	----	CB-1 Imp
9	SCS Runoff	0.131	1	726	364	----	----	----	CB-3 Imp
10	SCS Runoff	0.065	1	728	222	----	----	----	Dunkin Bldg
11	SCS Runoff	0.000	1	871	11	----	----	----	Bypass-Perv
12	SCS Runoff	0.037	1	726	104	----	----	----	Bypass-Imp
13	Combine	0.037	1	726	115	11, 12	----	----	Bypass Total
14	SCS Runoff	0.000	1	865	1	----	----	----	CB-3 perv
15	SCS Runoff	0.187	1	726	520	----	----	----	cb-4 Imp
16	SCS Runoff	0.000	1	871	1	----	----	----	CB-4 perv
17	Combine	0.131	1	726	365	9, 14,	----	----	CB-3 total
18	Combine	0.187	1	726	521	15, 16,	----	----	CB-4 total
19	Combine	0.676	1	726	1,940	7, 8, 10, 17, 18	----	----	total to basin
20	Reservoir	0.147	1	741	1,939	19	123.00	536	Underground Det
21	Combine	0.169	1	726	2,054	13, 20	----	----	total out
SCS Dunkin 9-1-2021.gpw					Return Period: 2 Year			Thursday, 09 / 16 / 2021	

# Hydrograph Report

## Hyd. No. 5

CB-2 perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 14.38 hrs
Time interval	= 1 min	Hyd. volume	= 1 cuft
Drainage area	= 0.010 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.83 min
Total precip.	= 1.75 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



# TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

## Hyd. No. 5

CB-2 perv

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>			
<b>Sheet Flow</b>							
Manning's n-value	= 0.240	0.013	0.013				
Flow length (ft)	= 16.0	0.0	0.0				
Two-year 24-hr precip. (in)	= 3.34	0.00	0.00				
Land slope (%)	= 4.00	0.00	0.00				
<b>Travel Time (min)</b>	<b>= 2.44</b>	<b>+</b>	<b>0.00</b>	<b>+</b>	<b>0.00</b>	<b>=</b>	<b>2.44</b>
<b>Shallow Concentrated Flow</b>							
Flow length (ft)	= 81.00	0.00	0.00				
Watercourse slope (%)	= 3.00	0.00	0.00				
Surface description	= Paved	Paved	Paved				
Average velocity (ft/s)	=3.52	0.00	0.00				
<b>Travel Time (min)</b>	<b>= 0.38</b>	<b>+</b>	<b>0.00</b>	<b>+</b>	<b>0.00</b>	<b>=</b>	<b>0.38</b>
<b>Channel Flow</b>							
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				
<b>Travel Time (min)</b>	<b>= 0.00</b>	<b>+</b>	<b>0.00</b>	<b>+</b>	<b>0.00</b>	<b>=</b>	<b>0.00</b>
<b>Total Travel Time, Tc .....</b>				<b>2.83 min</b>			

# Hydrograph Report

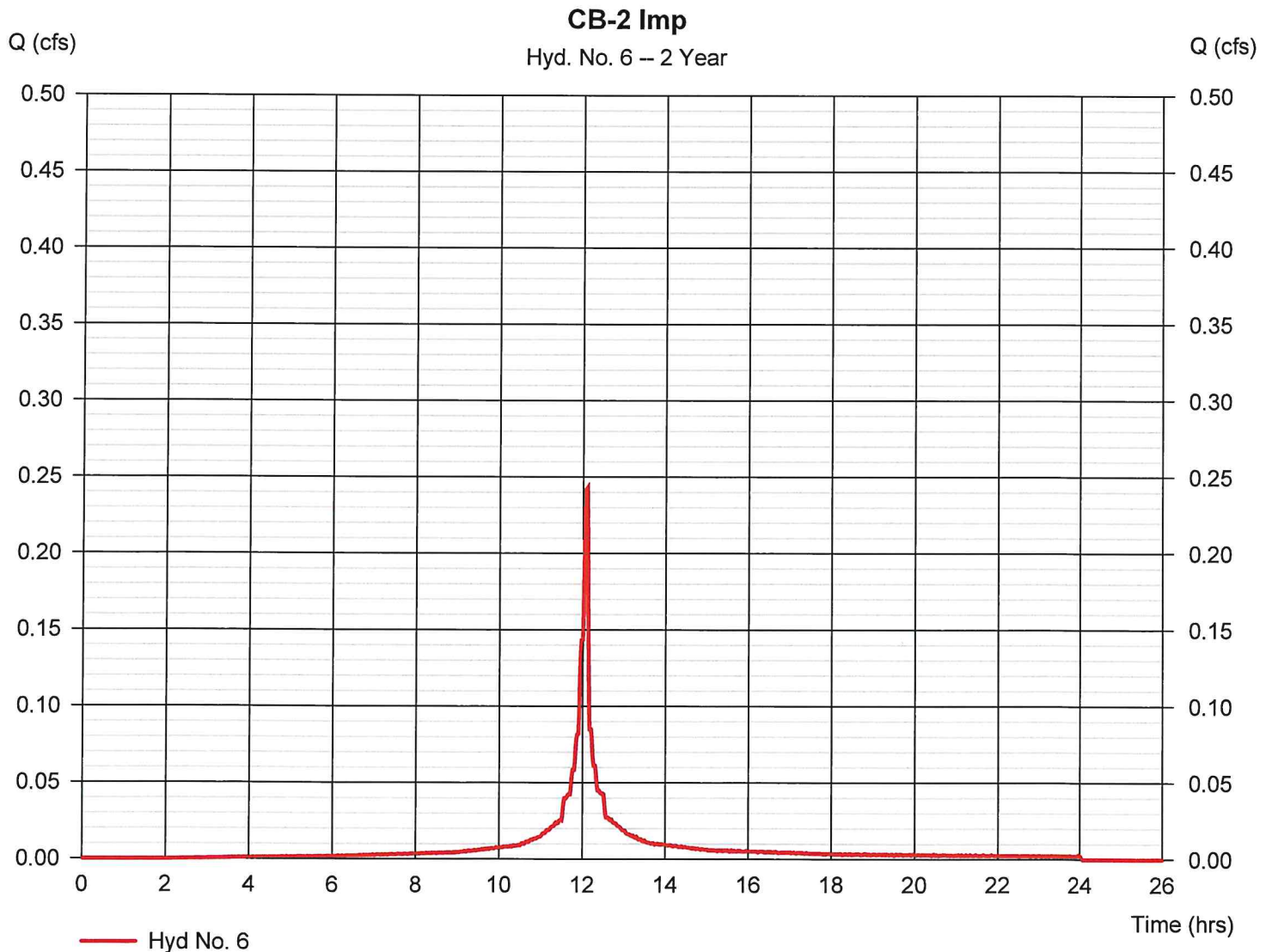
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Hyd. No. 6

CB-2 Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 0.243 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 675 cuft
Drainage area	= 0.130 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 2.00 min
Total precip.	= 1.75 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484





# Hydrograph Report

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Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

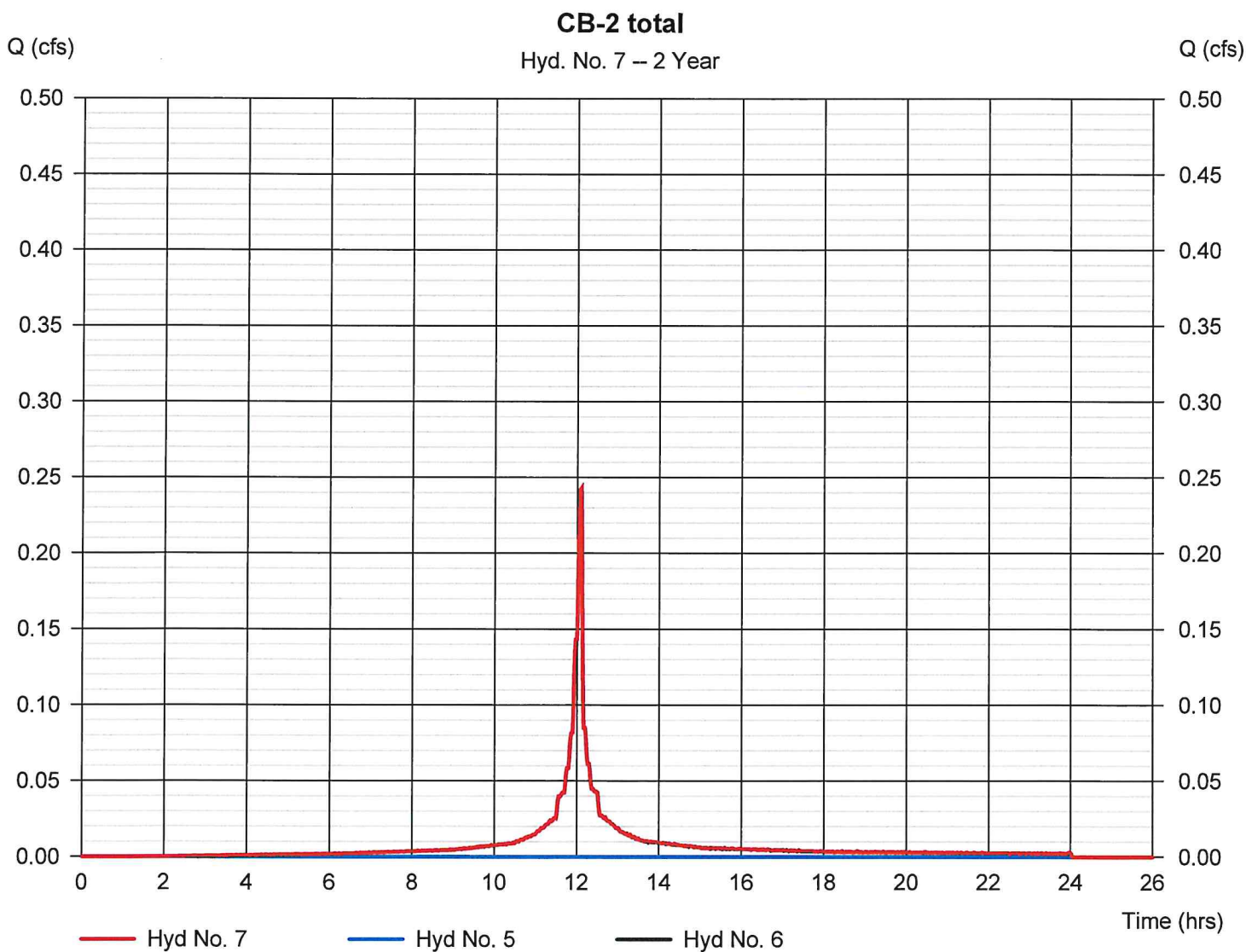
Thursday, 09 / 16 / 2021

## Hyd. No. 7

CB-2 total

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Time interval = 1 min  
Inflow hyds. = 5, 6

Peak discharge = 0.243 cfs  
Time to peak = 12.10 hrs  
Hyd. volume = 677 cuft  
Contrib. drain. area = 0.140 ac





# Hydrograph Report

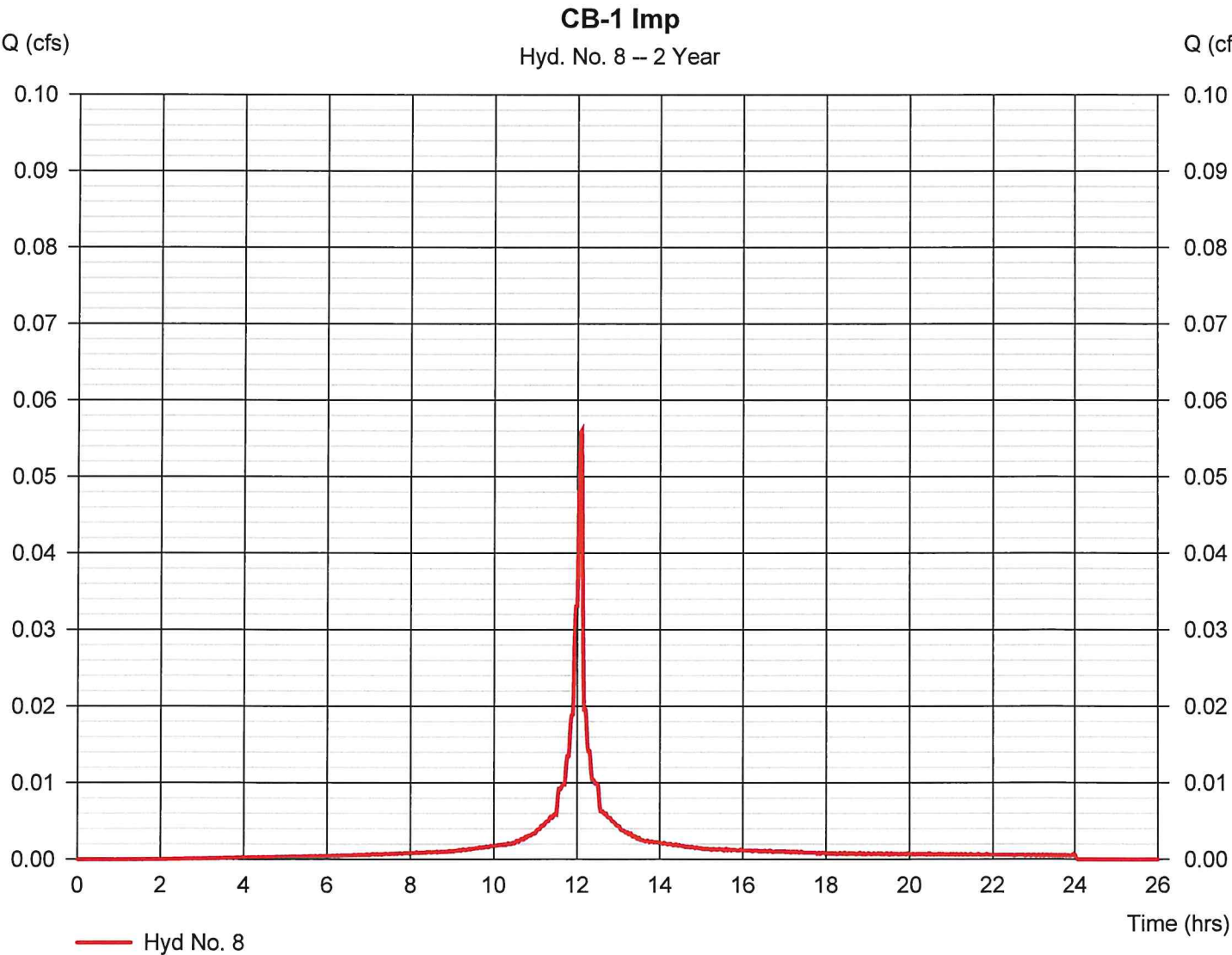
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Hyd. No. 8

CB-1 Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 0.056 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 156 cuft
Drainage area	= 0.030 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.00 min
Total precip.	= 1.75 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Slope factor	= 484



# TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

## Hyd. No. 8

CB-1 Imp

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>			
<b>Sheet Flow</b>							
Manning's n-value	= 0.013	0.013	0.011				
Flow length (ft)	= 15.0	0.0	0.0				
Two-year 24-hr precip. (in)	= 3.34	0.00	0.00				
Land slope (%)	= 1.00	0.00	0.00				
<b>Travel Time (min)</b>	<b>= 0.39</b>	<b>+</b>	<b>0.00</b>	<b>+</b>	<b>0.00</b>	<b>=</b>	<b>0.39</b>
<b>Shallow Concentrated Flow</b>							
Flow length (ft)	= 196.00	0.00	0.00				
Watercourse slope (%)	= 1.00	0.00	0.00				
Surface description	= Paved	Paved	Paved				
Average velocity (ft/s)	=2.03	0.00	0.00				
<b>Travel Time (min)</b>	<b>= 1.61</b>	<b>+</b>	<b>0.00</b>	<b>+</b>	<b>0.00</b>	<b>=</b>	<b>1.61</b>
<b>Channel Flow</b>							
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	0.0				
<b>Travel Time (min)</b>	<b>= 0.00</b>	<b>+</b>	<b>0.00</b>	<b>+</b>	<b>0.00</b>	<b>=</b>	<b>0.00</b>
<b>Total Travel Time, Tc .....</b>				<b>2.00 min</b>			

# Hydrograph Report

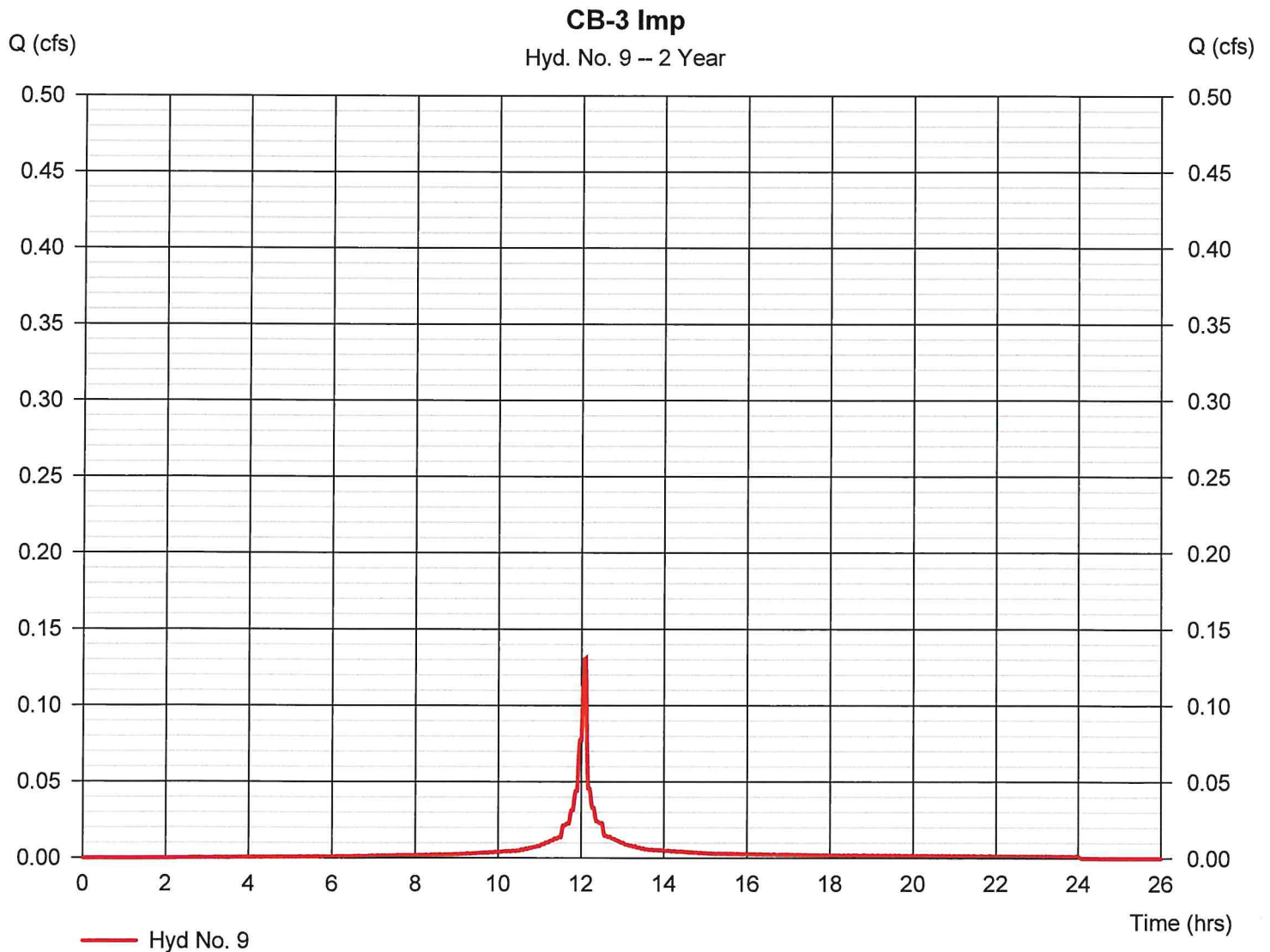
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Thursday, 09 / 16 / 2021

## Hyd. No. 9

CB-3 Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 0.131 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 364 cuft
Drainage area	= 0.070 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 2.00 min
Total precip.	= 1.75 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484

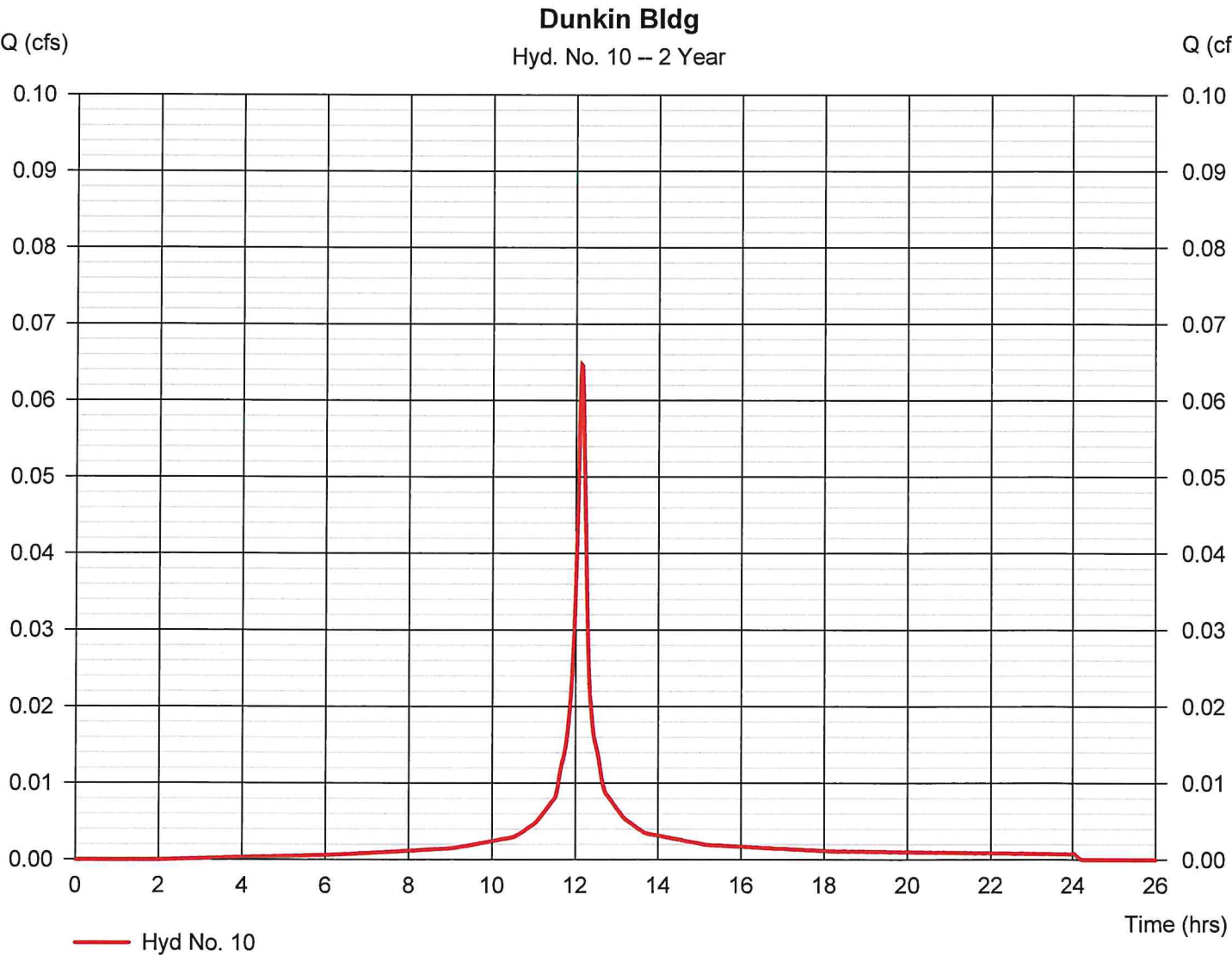


# Hydrograph Report

## Hyd. No. 10

Dunkin Bldg

Hydrograph type	= SCS Runoff	Peak discharge	= 0.065 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 222 cuft
Drainage area	= 0.040 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 1.75 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



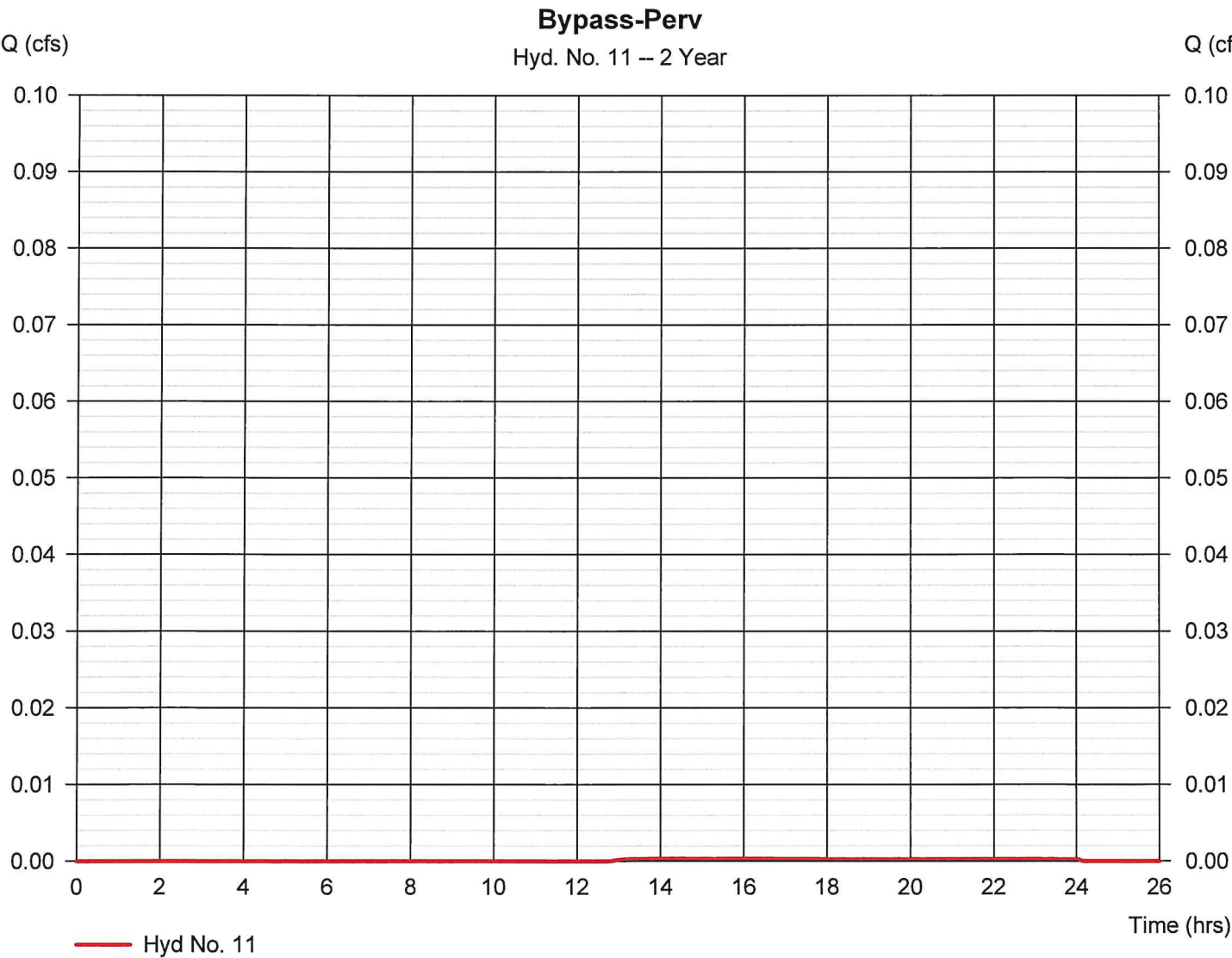


# Hydrograph Report

## Hyd. No. 11

Bypass-Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 14.52 hrs
Time interval	= 1 min	Hyd. volume	= 11 cuft
Drainage area	= 0.100 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 7.80 min
Total precip.	= 1.75 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



# TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

## Hyd. No. 11

Bypass-Perv

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
<b>Sheet Flow</b>				
Manning's n-value	= 0.240	0.011	0.011	
Flow length (ft)	= 77.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.34	0.00	0.00	
Land slope (%)	= 5.20	0.00	0.00	
<b>Travel Time (min)</b>	<b>= 7.73</b>	<b>+</b>	<b>0.00</b>	<b>+</b>
<b>Shallow Concentrated Flow</b>				
Flow length (ft)	= 20.00	0.00	0.00	
Watercourse slope (%)	= 21.00	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	=7.39	0.00	0.00	
<b>Travel Time (min)</b>	<b>= 0.05</b>	<b>+</b>	<b>0.00</b>	<b>+</b>
<b>Channel Flow</b>				
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	
<b>Travel Time (min)</b>	<b>= 0.00</b>	<b>+</b>	<b>0.00</b>	<b>+</b>
<b>Total Travel Time, Tc .....</b>				<b>7.80 min</b>

# Hydrograph Report

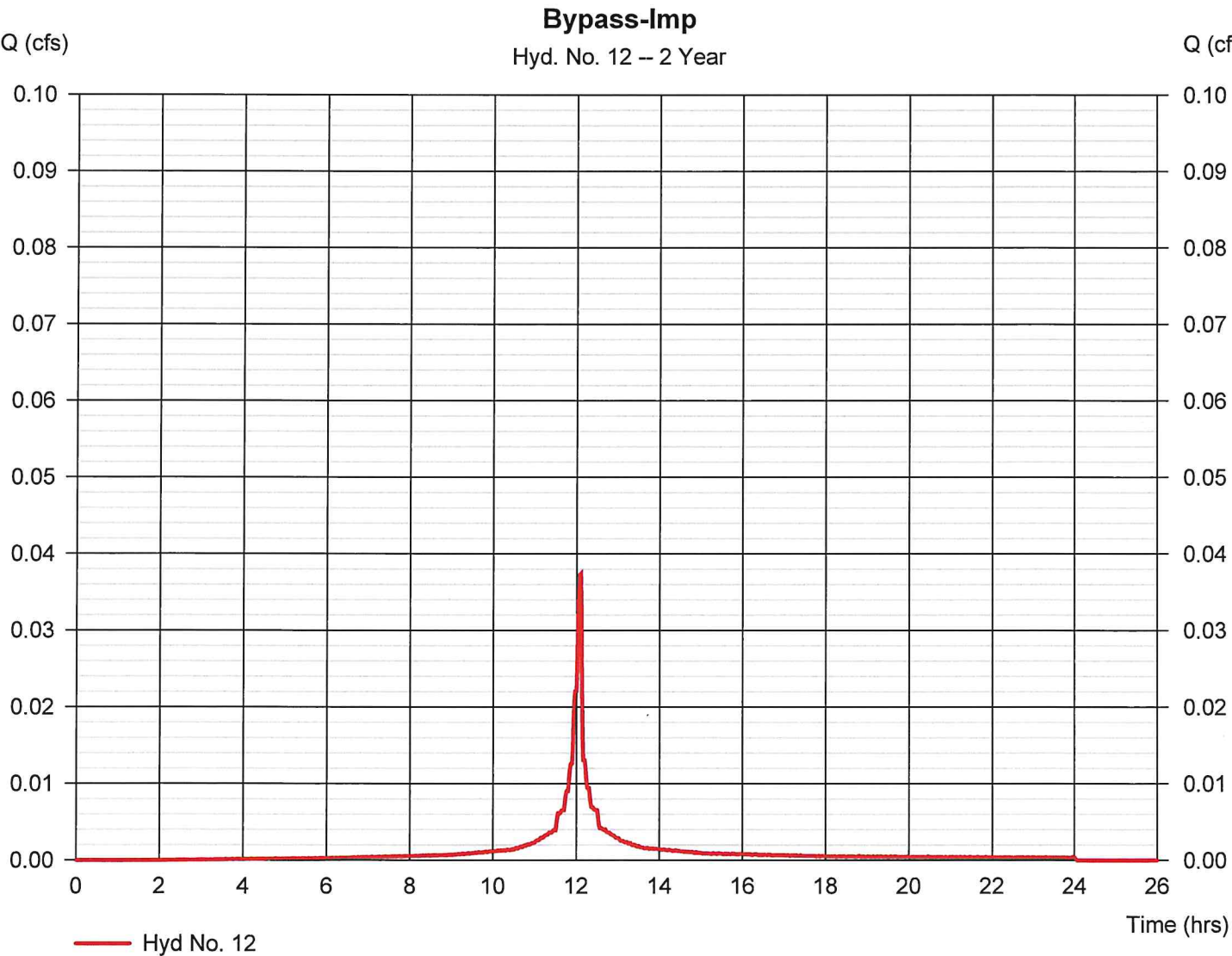
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Thursday, 09 / 16 / 2021

## Hyd. No. 12

### Bypass-Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 0.037 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 104 cuft
Drainage area	= 0.020 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 2.00 min
Total precip.	= 1.75 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



# Hydrograph Report

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Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

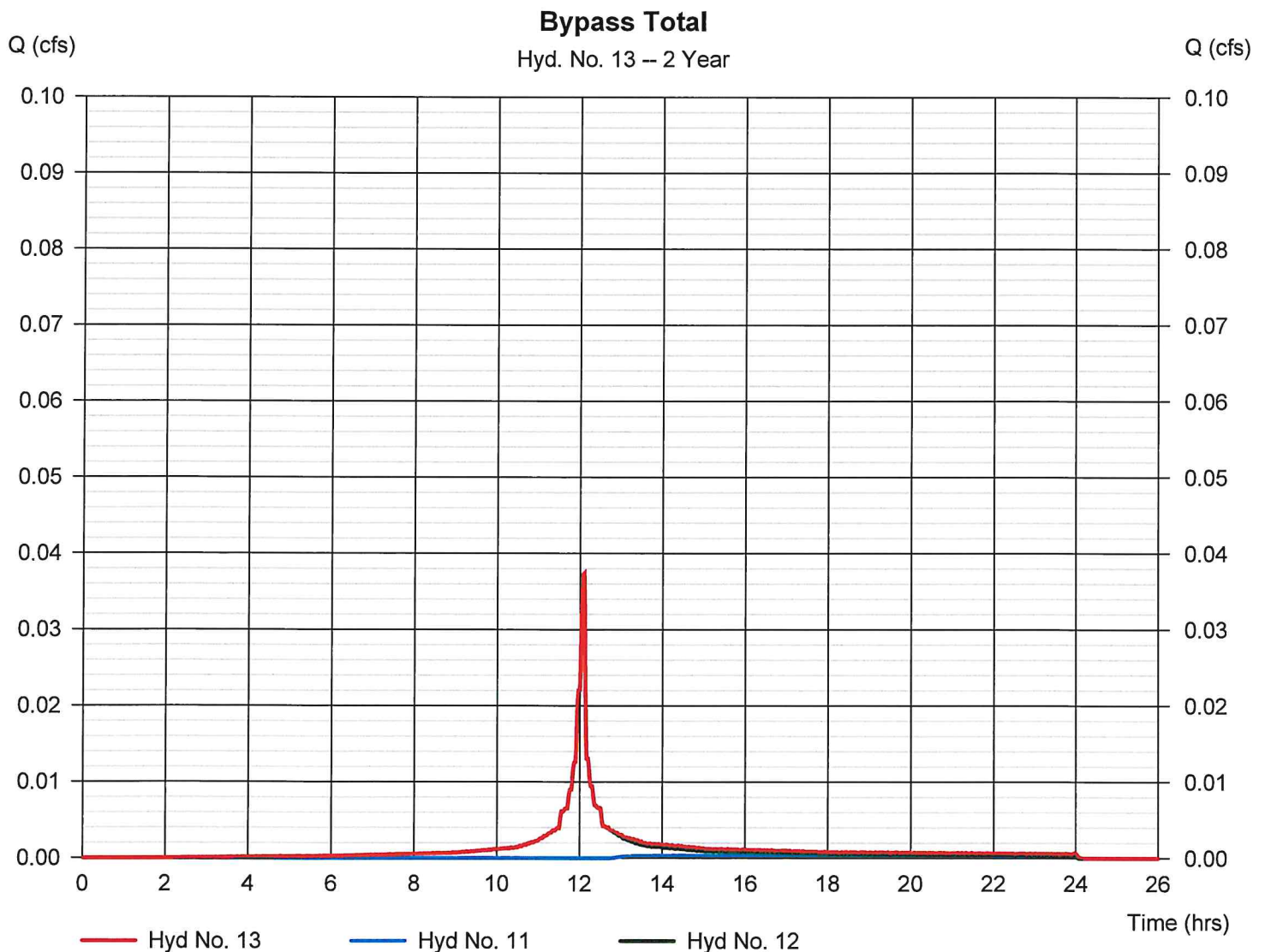
Thursday, 09 / 16 / 2021

## Hyd. No. 13

### Bypass Total

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Time interval = 1 min  
Inflow hyds. = 11, 12

Peak discharge = 0.037 cfs  
Time to peak = 12.10 hrs  
Hyd. volume = 115 cuft  
Contrib. drain. area = 0.120 ac





# Hydrograph Report

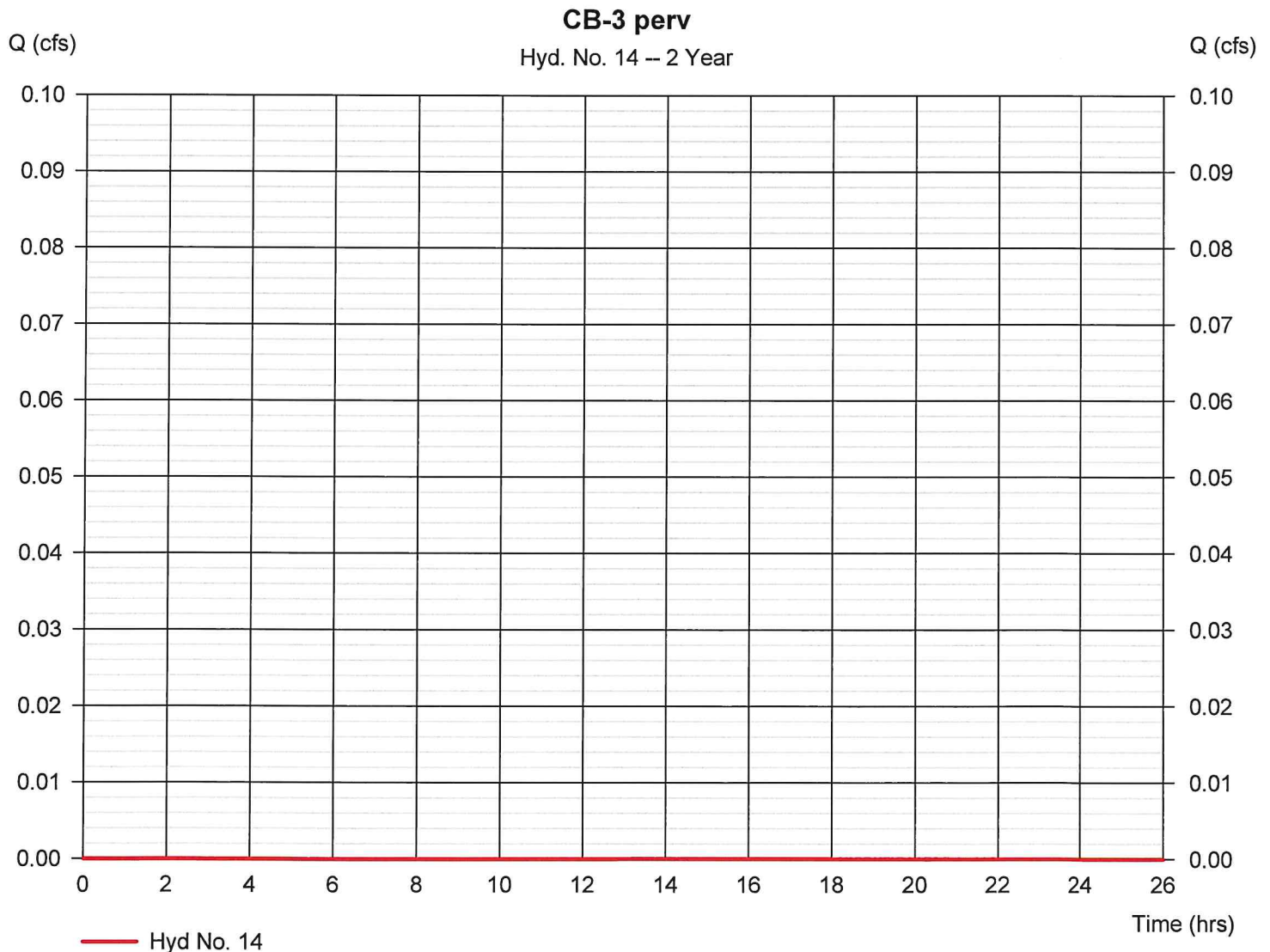
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Hyd. No. 14

CB-3 perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 14.42 hrs
Time interval	= 1 min	Hyd. volume	= 1 cuft
Drainage area	= 0.010 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.80 min
Total precip.	= 1.75 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



# TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

## Hyd. No. 14

CB-3 perv

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>			
<b>Sheet Flow</b>							
Manning's n-value	= 0.240	0.013	0.011				
Flow length (ft)	= 19.0	20.0	0.0				
Two-year 24-hr precip. (in)	= 3.34	3.34	0.00				
Land slope (%)	= 3.00	2.00	0.00				
<b>Travel Time (min)</b>	<b>= 3.15</b>	<b>+</b>	<b>0.37</b>	<b>+</b>	<b>0.00</b>	<b>=</b>	<b>3.52</b>
<b>Shallow Concentrated Flow</b>							
Flow length (ft)	= 38.00	0.00	0.00				
Watercourse slope (%)	= 1.30	0.00	0.00				
Surface description	= Paved	Paved	Paved				
Average velocity (ft/s)	=2.32	0.00	0.00				
<b>Travel Time (min)</b>	<b>= 0.27</b>	<b>+</b>	<b>0.00</b>	<b>+</b>	<b>0.00</b>	<b>=</b>	<b>0.27</b>
<b>Channel Flow</b>							
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				
<b>Travel Time (min)</b>	<b>= 0.00</b>	<b>+</b>	<b>0.00</b>	<b>+</b>	<b>0.00</b>	<b>=</b>	<b>0.00</b>
<b>Total Travel Time, Tc .....</b>				<b>3.80 min</b>			

# Hydrograph Report

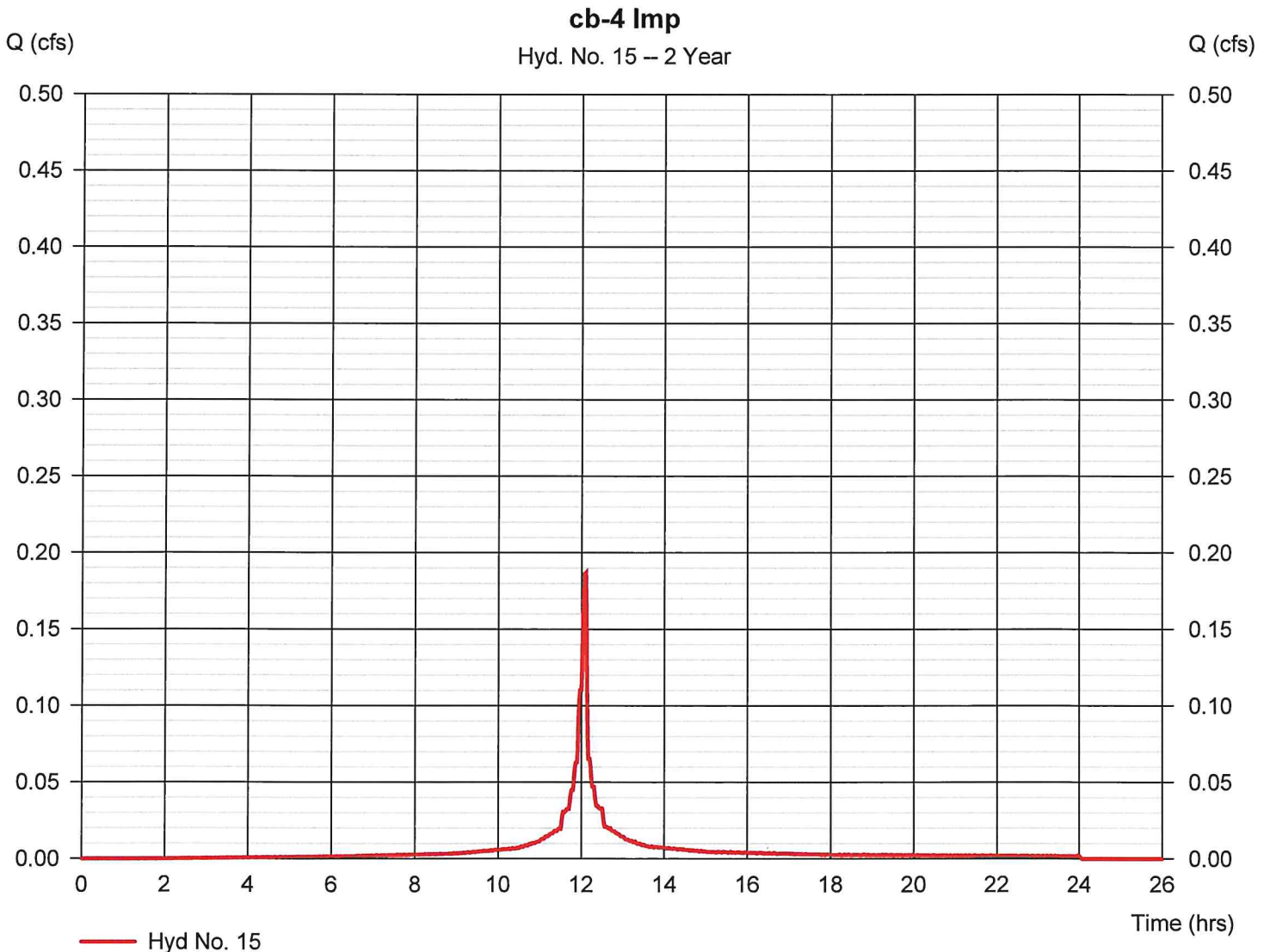
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Hyd. No. 15

cb-4 Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 0.187 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 520 cuft
Drainage area	= 0.100 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 2.00 min
Total precip.	= 1.75 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484

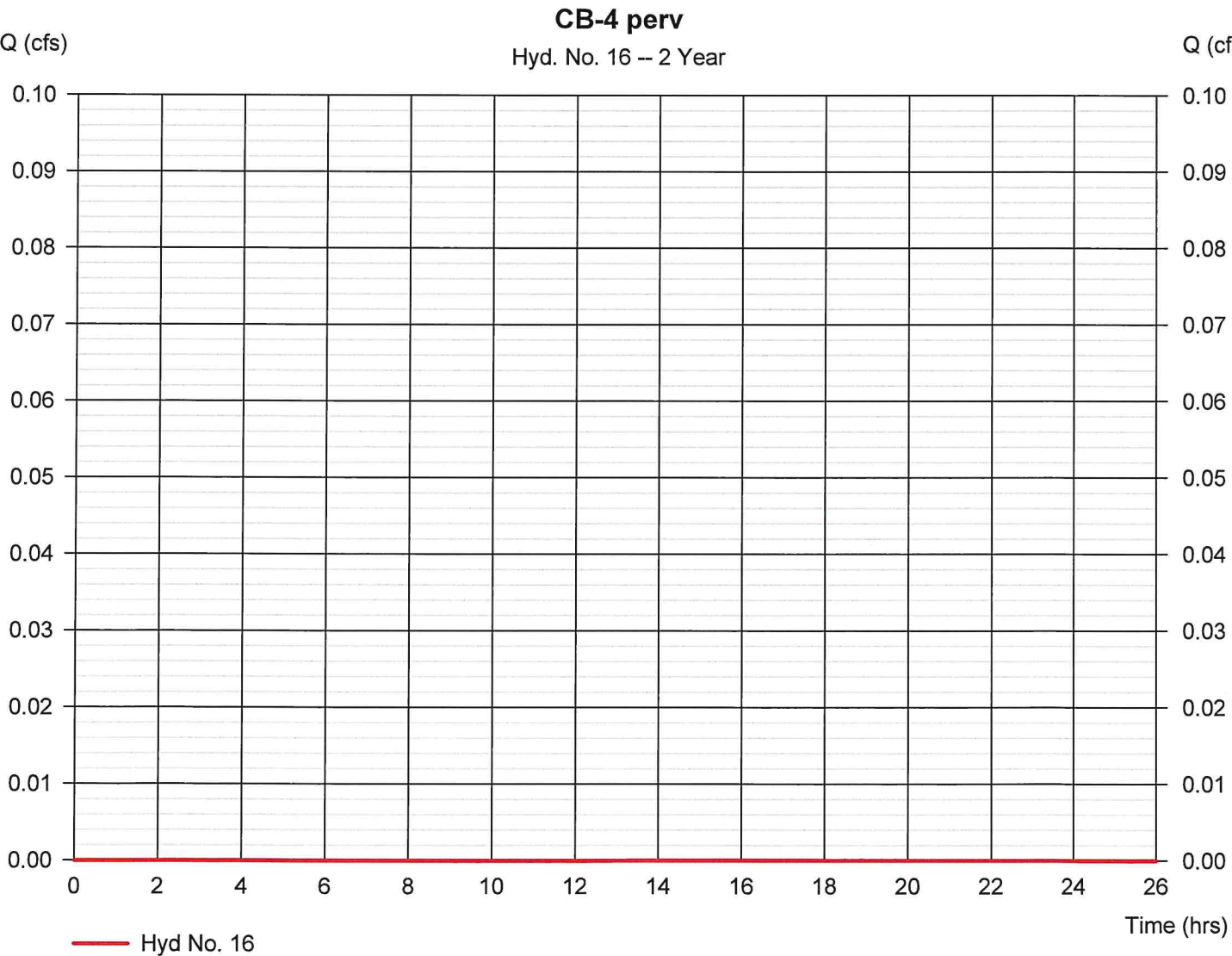


# Hydrograph Report

## Hyd. No. 16

CB-4 perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 14.52 hrs
Time interval	= 1 min	Hyd. volume	= 1 cuft
Drainage area	= 0.010 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 7.70 min
Total precip.	= 1.75 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484





# TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

## Hyd. No. 16

CB-4 perv

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>			
<b>Sheet Flow</b>							
Manning's n-value	= 0.240	0.011	0.011				
Flow length (ft)	= 62.0	0.0	0.0				
Two-year 24-hr precip. (in)	= 3.34	0.00	0.00				
Land slope (%)	= 3.80	0.00	0.00				
<b>Travel Time (min)</b>	<b>= 7.37</b>	<b>+</b>	<b>0.00</b>	<b>+</b>	<b>0.00</b>	<b>=</b>	<b>7.37</b>
<b>Shallow Concentrated Flow</b>							
Flow length (ft)	= 57.00	0.00	0.00				
Watercourse slope (%)	= 2.30	0.00	0.00				
Surface description	= Paved	Paved	Paved				
Average velocity (ft/s)	=3.08	0.00	0.00				
<b>Travel Time (min)</b>	<b>= 0.31</b>	<b>+</b>	<b>0.00</b>	<b>+</b>	<b>0.00</b>	<b>=</b>	<b>0.31</b>
<b>Channel Flow</b>							
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				
<b>Travel Time (min)</b>	<b>= 0.00</b>	<b>+</b>	<b>0.00</b>	<b>+</b>	<b>0.00</b>	<b>=</b>	<b>0.00</b>
<b>Total Travel Time, Tc .....</b>				<b>7.70 min</b>			

# Hydrograph Report

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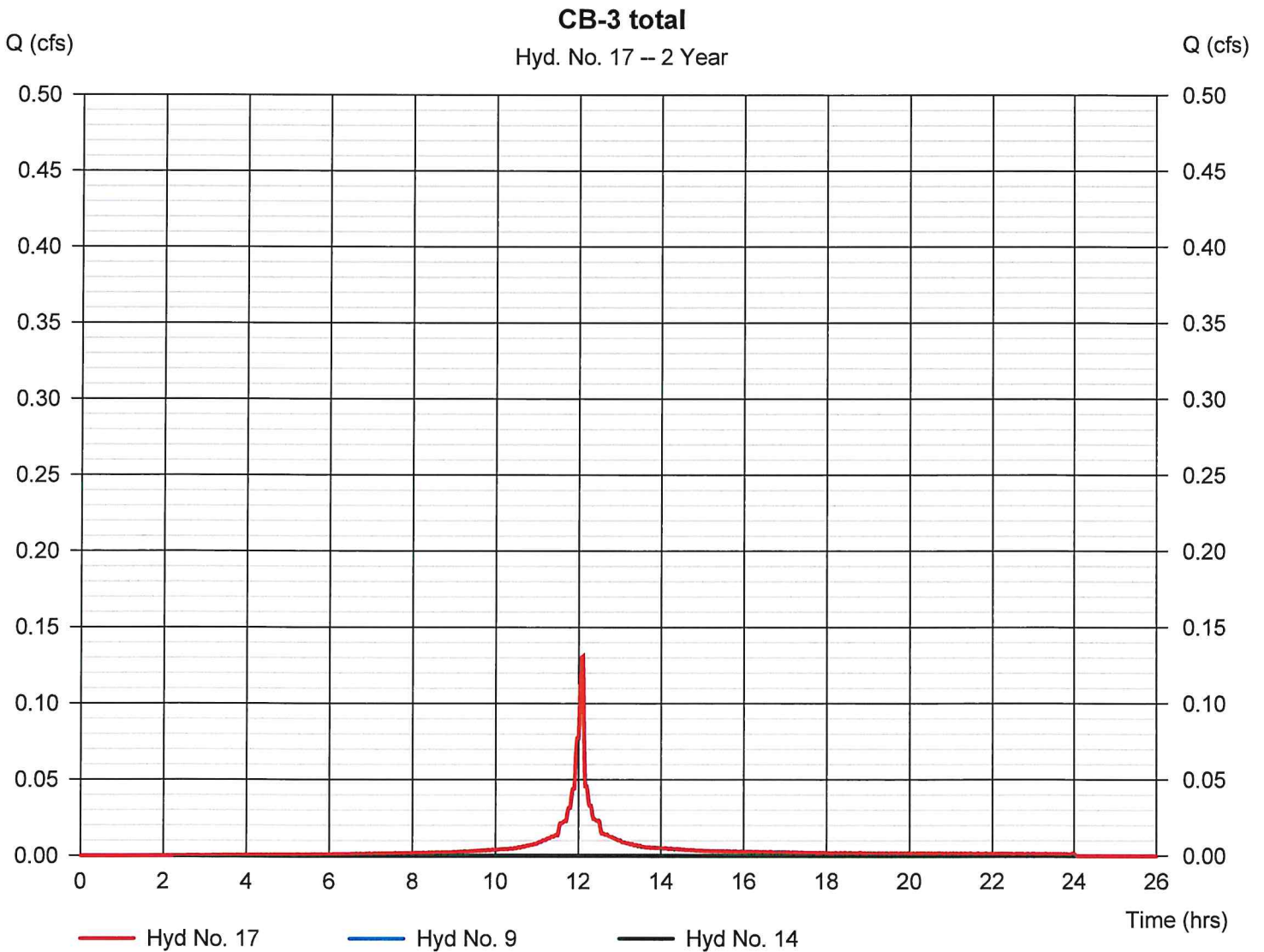
Thursday, 09 / 16 / 2021

## Hyd. No. 17

CB-3 total

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Time interval = 1 min  
Inflow hyds. = 9, 14

Peak discharge = 0.131 cfs  
Time to peak = 12.10 hrs  
Hyd. volume = 365 cuft  
Contrib. drain. area = 0.080 ac



# Hydrograph Report

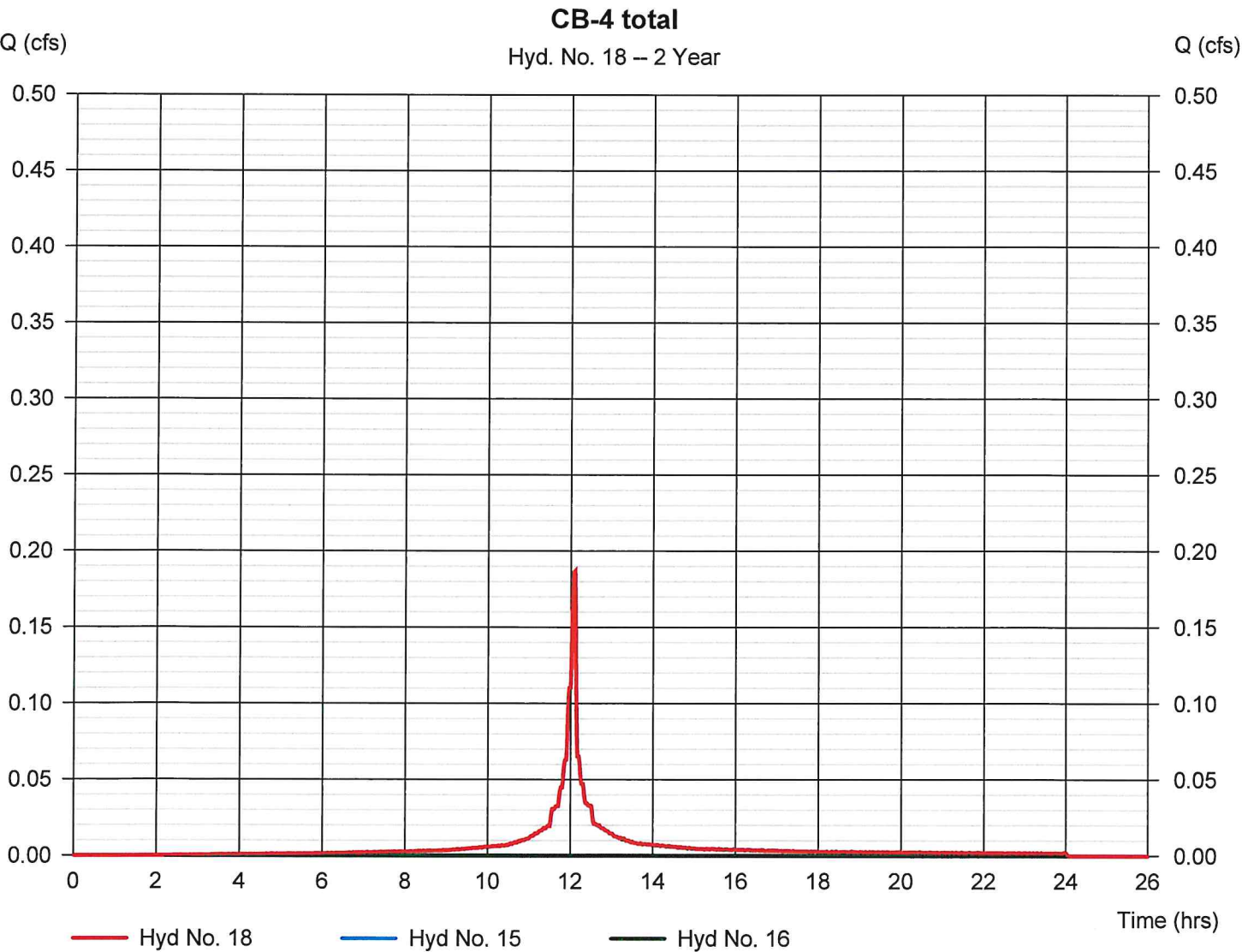
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Thursday, 09 / 16 / 2021

## Hyd. No. 18

CB-4 total

Hydrograph type	= Combine	Peak discharge	= 0.187 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 521 cuft
Inflow hyds.	= 15, 16	Contrib. drain. area	= 0.110 ac



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

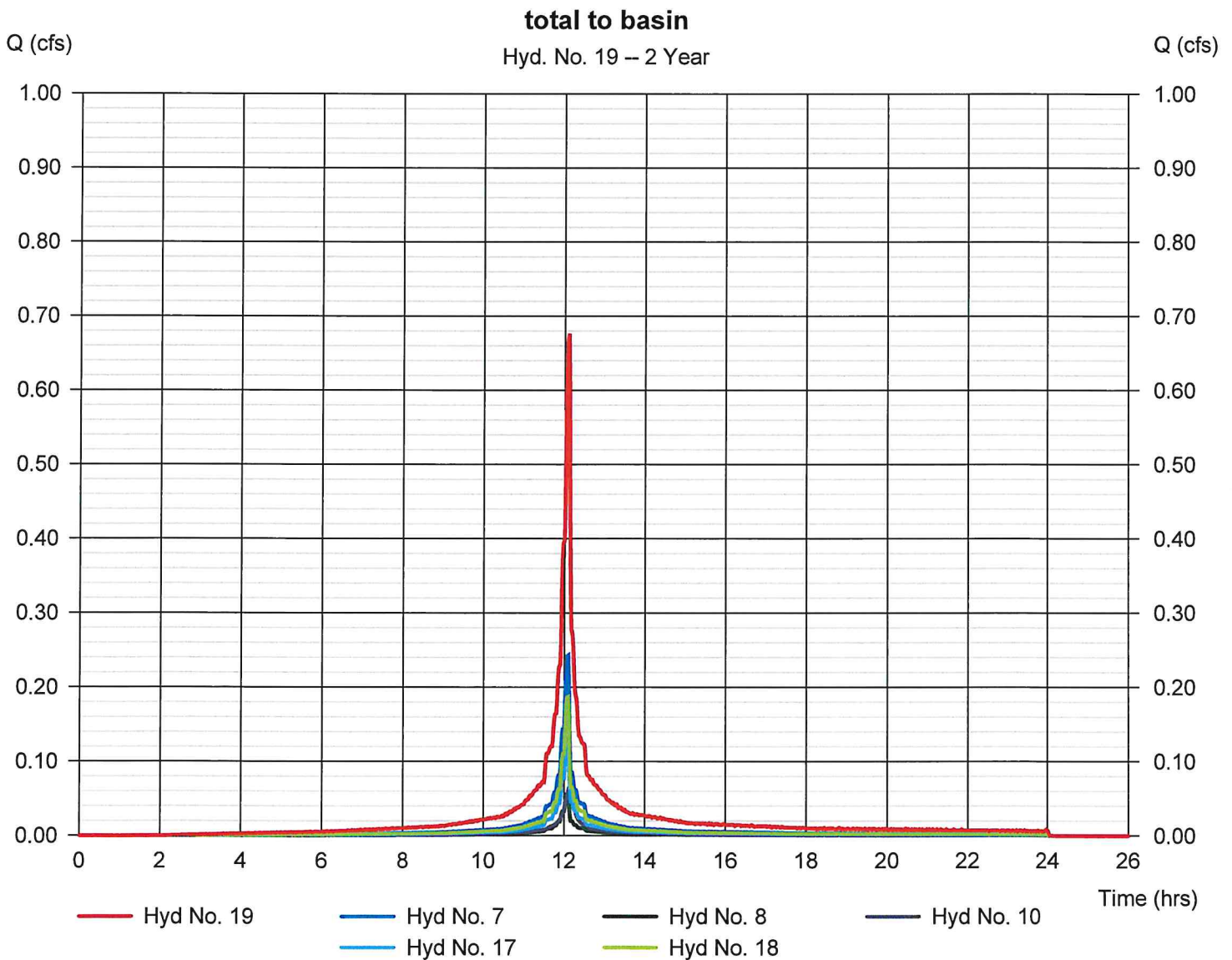
Thursday, 09 / 16 / 2021

## Hyd. No. 19

total to basin

Hydrograph type = Combine  
 Storm frequency = 2 yrs  
 Time interval = 1 min  
 Inflow hyds. = 7, 8, 10, 17, 18

Peak discharge = 0.676 cfs  
 Time to peak = 12.10 hrs  
 Hyd. volume = 1,940 cuft  
 Contrib. drain. area = 0.070 ac





# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

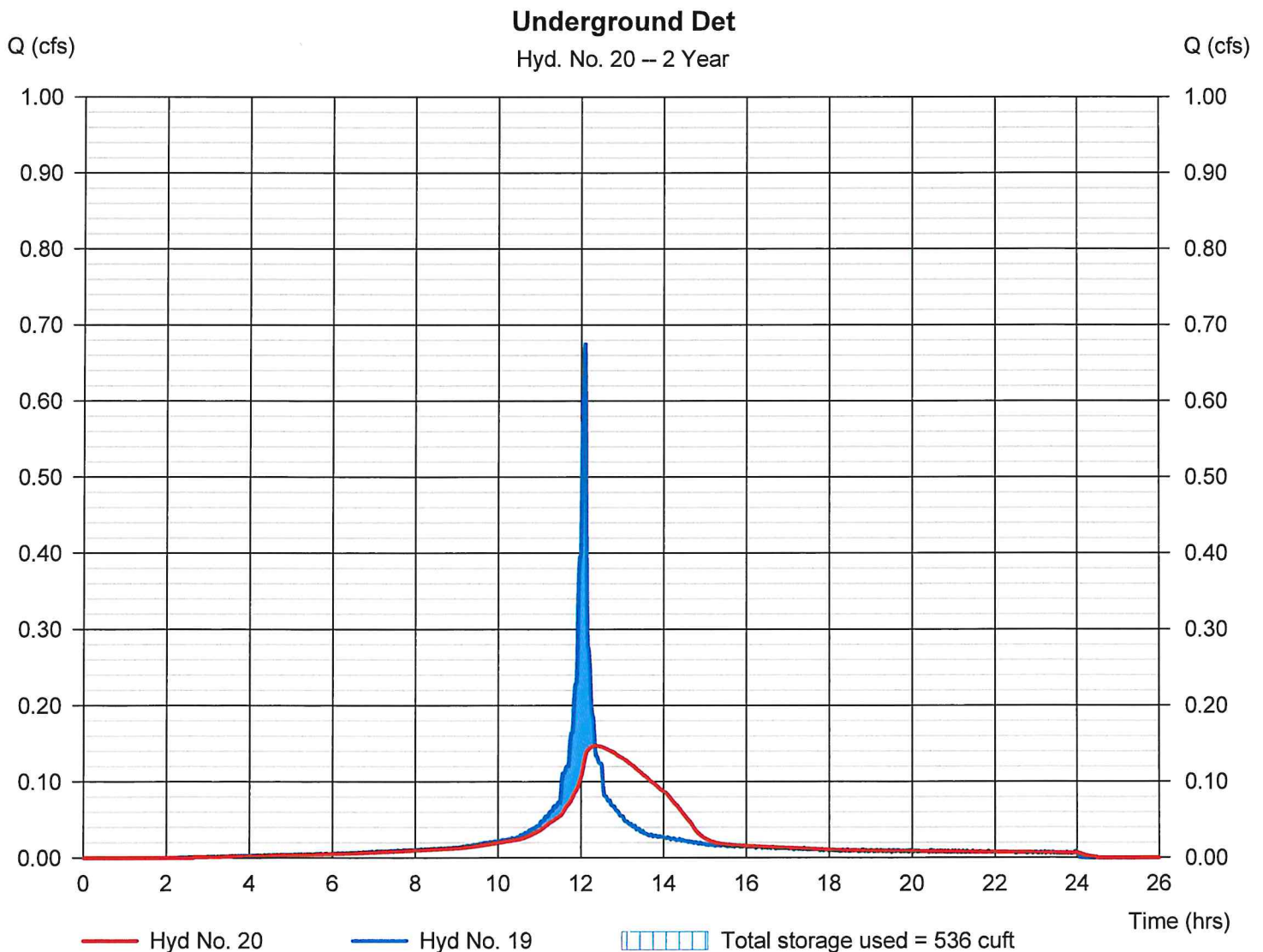
Thursday, 09 / 16 / 2021

## Hyd. No. 20

Underground Det

Hydrograph type	= Reservoir	Peak discharge	= 0.147 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.35 hrs
Time interval	= 1 min	Hyd. volume	= 1,939 cuft
Inflow hyd. No.	= 19 - total to basin	Max. Elevation	= 123.00 ft
Reservoir name	= Det Basin	Max. Storage	= 536 cuft

Storage Indication method used.



# Pond Report

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Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Pond No. 1 - Det Basin

### Pond Data

UG Chambers -Invert elev. = 122.20 ft, Rise x Span = 3.00 x 3.00 ft, Barrel Len = 80.00 ft, No. Barrels = 4, Slope = 0.00%, Headers = Yes

### Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	122.20	n/a	0	0
0.30	122.50	n/a	130	130
0.60	122.80	n/a	225	356
0.90	123.10	n/a	274	630
1.20	123.40	n/a	302	932
1.50	123.70	n/a	316	1,248
1.80	124.00	n/a	316	1,564
2.10	124.30	n/a	302	1,866
2.40	124.60	n/a	274	2,140
2.70	124.90	n/a	225	2,366
3.00	125.20	n/a	130	2,496

### Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	3.00	0.00	0.00
Span (in)	= 15.00	3.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 121.90	122.13	0.00	0.00
Length (ft)	= 7.00	0.00	0.00	0.00
Slope (%)	= 0.01	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)	= 0.25	5.00	Inactive	0.00
Crest El. (ft)	= 123.20	124.80	0.00	0.00
Weir Coeff.	= 3.33	2.60	2.60	3.33
Weir Type	= Rect	Broad	Broad	—
Multi-Stage	= Yes	Yes	No	No
Exfil.(in/hr)	= 0.000 (by Contour)			
TW Elev. (ft)	= 0.00			

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

### Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	122.20	0.00	0.00	—	—	0.00	0.00	—	—	—	—	0.000
0.30	130	122.50	0.09 oc	0.09 ic	—	—	0.00	0.00	—	—	—	—	0.085
0.60	356	122.80	0.13 oc	0.12 ic	—	—	0.00	0.00	—	—	—	—	0.124
0.90	630	123.10	0.16 oc	0.16 ic	—	—	0.00	0.00	—	—	—	—	0.158
1.20	932	123.40	0.23 oc	0.15 ic	—	—	0.07	0.00	—	—	—	—	0.229
1.50	1,248	123.70	0.47 oc	0.17 ic	—	—	0.29	0.00	—	—	—	—	0.469
1.80	1,564	124.00	0.82 oc	0.22 ic	—	—	0.60	0.00	—	—	—	—	0.812
2.10	1,866	124.30	1.21 oc	0.25 ic	—	—	0.96	0.00	—	—	—	—	1.211
2.40	2,140	124.60	1.66 oc	0.28 ic	—	—	1.38	0.00	—	—	—	—	1.659
2.70	2,366	124.90	2.56 oc	0.30 ic	—	—	1.84 s	0.41	—	—	—	—	2.554
3.00	2,496	125.20	5.80 oc	0.29 ic	—	—	2.23 s	3.29	—	—	—	—	5.803

# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

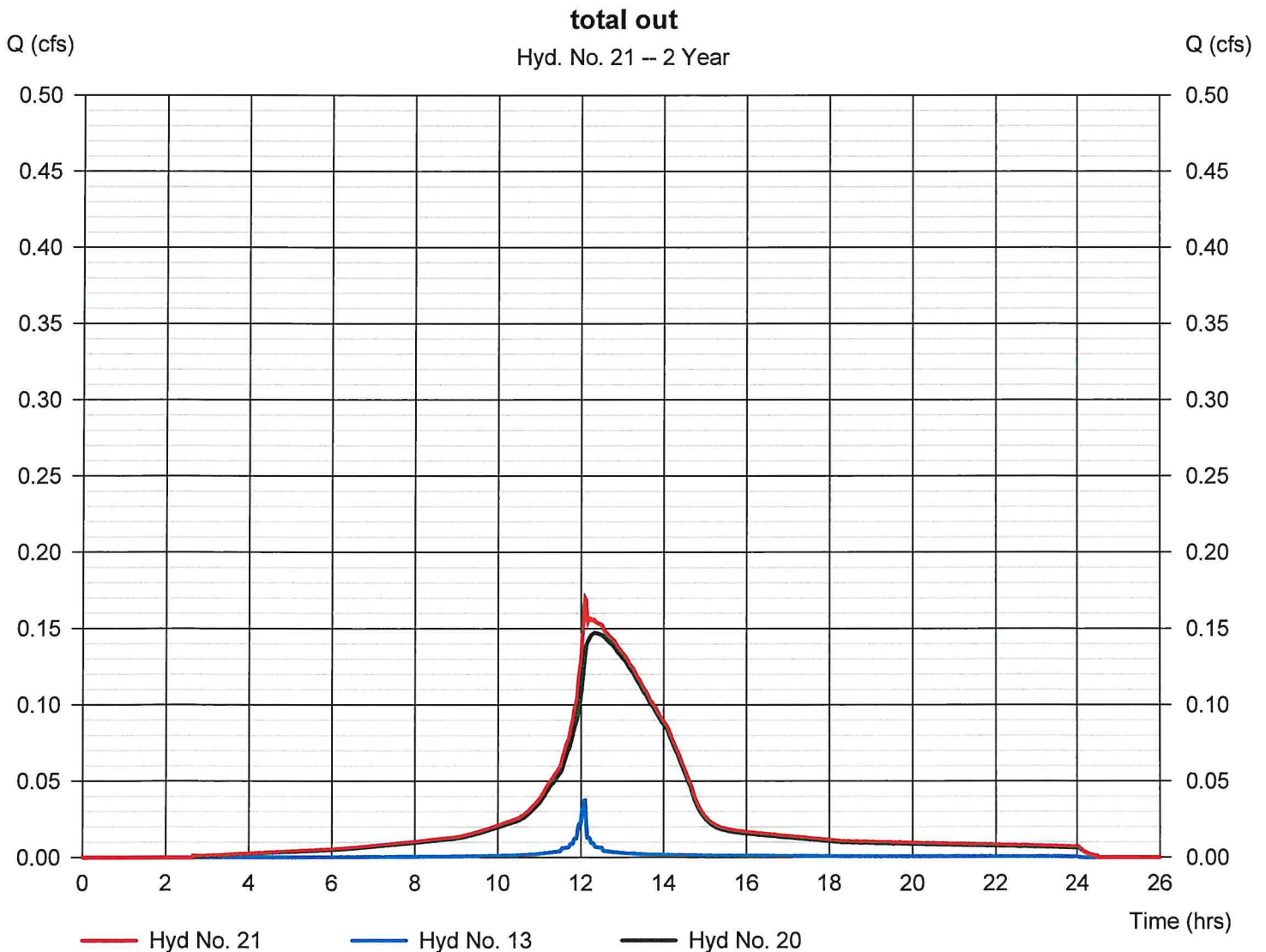
Thursday, 09 / 16 / 2021

## Hyd. No. 21

total out

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Time interval = 1 min  
Inflow hyds. = 13, 20

Peak discharge = 0.169 cfs  
Time to peak = 12.10 hrs  
Hyd. volume = 2,054 cuft  
Contrib. drain. area = 0.000 ac



# Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.106	1	730	387	----	----	----	Pre-Perv
2	SCS Runoff	1.150	1	727	3,892	----	----	----	Pre-Imp
3	SCS Runoff	0.228	1	728	671	----	----	----	Pre-gravel
4	Combine	1.475	1	728	4,950	1, 2, 3	----	----	Pre-total
5	SCS Runoff	0.010	1	726	26	----	----	----	CB-2 perv
6	SCS Runoff	0.555	1	726	1,622	----	----	----	CB-2 Imp
7	Combine	0.565	1	726	1,648	5, 6	----	----	CB-2 total
8	SCS Runoff	0.128	1	726	374	----	----	----	CB-1 Imp
9	SCS Runoff	0.299	1	726	873	----	----	----	CB-3 Imp
10	SCS Runoff	0.148	1	728	532	----	----	----	Dunkin Bldg
11	SCS Runoff	0.080	1	729	270	----	----	----	Bypass-Perv
12	SCS Runoff	0.085	1	726	249	----	----	----	Bypass-Imp
13	Combine	0.153	1	726	519	11, 12	----	----	Bypass Total
14	SCS Runoff	0.010	1	727	28	----	----	----	CB-3 perv
15	SCS Runoff	0.427	1	726	1,247	----	----	----	cb-4 Imp
16	SCS Runoff	0.008	1	729	27	----	----	----	CB-4 perv
17	Combine	0.308	1	726	901	9, 14,	----	----	CB-3 total
18	Combine	0.434	1	726	1,274	15, 16,	----	----	CB-4 total
19	Combine	1.573	1	726	4,729	7, 8, 10, 17, 18	----	----	total to basin
20	Reservoir	0.540	1	734	4,728	19	123.77	1,318	Underground Det
21	Combine	0.629	1	732	5,248	13, 20	----	----	total out
SCS Dunkin 9-1-2021.gpw					Return Period: 10 Year			Thursday, 09 / 16 / 2021	

# Hydrograph Report

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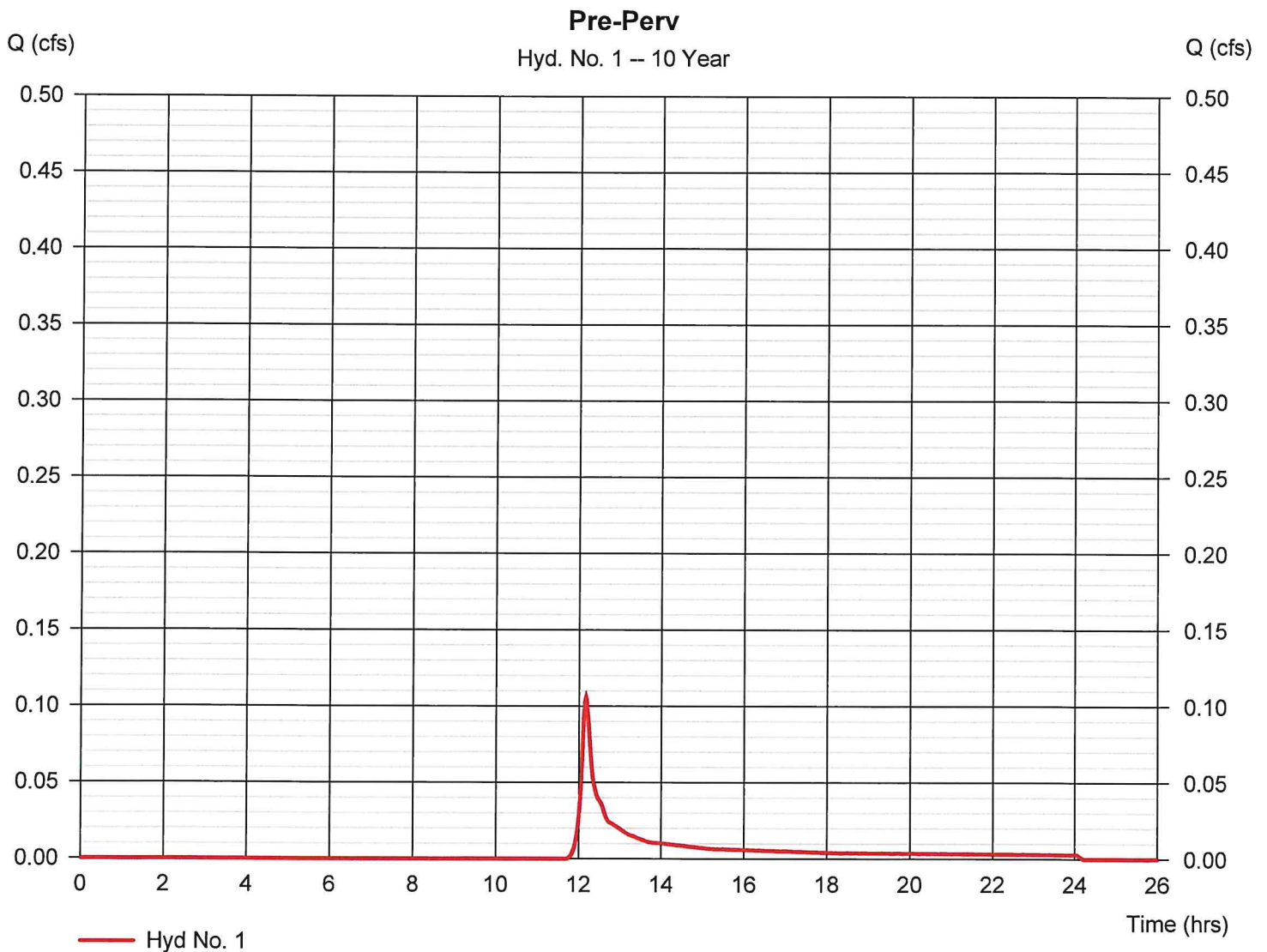
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Hyd. No. 1

### Pre-Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.106 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 1 min	Hyd. volume	= 387 cuft
Drainage area	= 0.140 ac	Curve number	= 61
Basin Slope	= 0.1 %	Hydraulic length	= 198 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 8.54 min
Total precip.	= 3.90 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



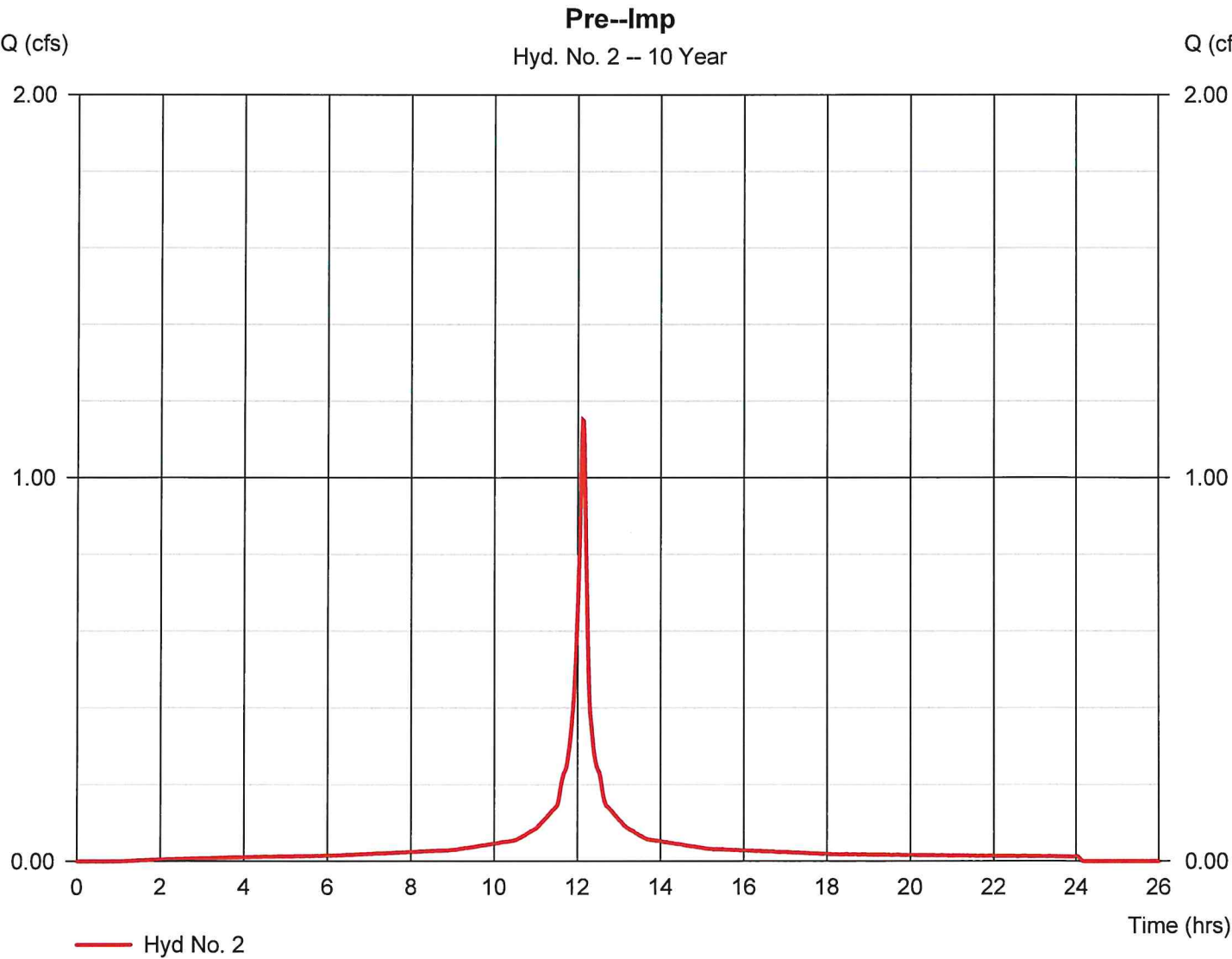


# Hydrograph Report

## Hyd. No. 2

Pre--Imp

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.150 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.12 hrs
Time interval	=	1 min	Hyd. volume	=	3,892 cuft
Drainage area	=	0.300 ac	Curve number	=	98
Basin Slope	=	0.1 %	Hydraulic length	=	178 ft
Tc method	=	KIRPICH	Time of conc. (Tc)	=	7.87 min
Total precip.	=	3.90 in	Distribution	=	Custom
Storm duration	=	Z:\Stormwater\NOAA_C_1-MIN	Shape factor	=	484



# Hydrograph Report

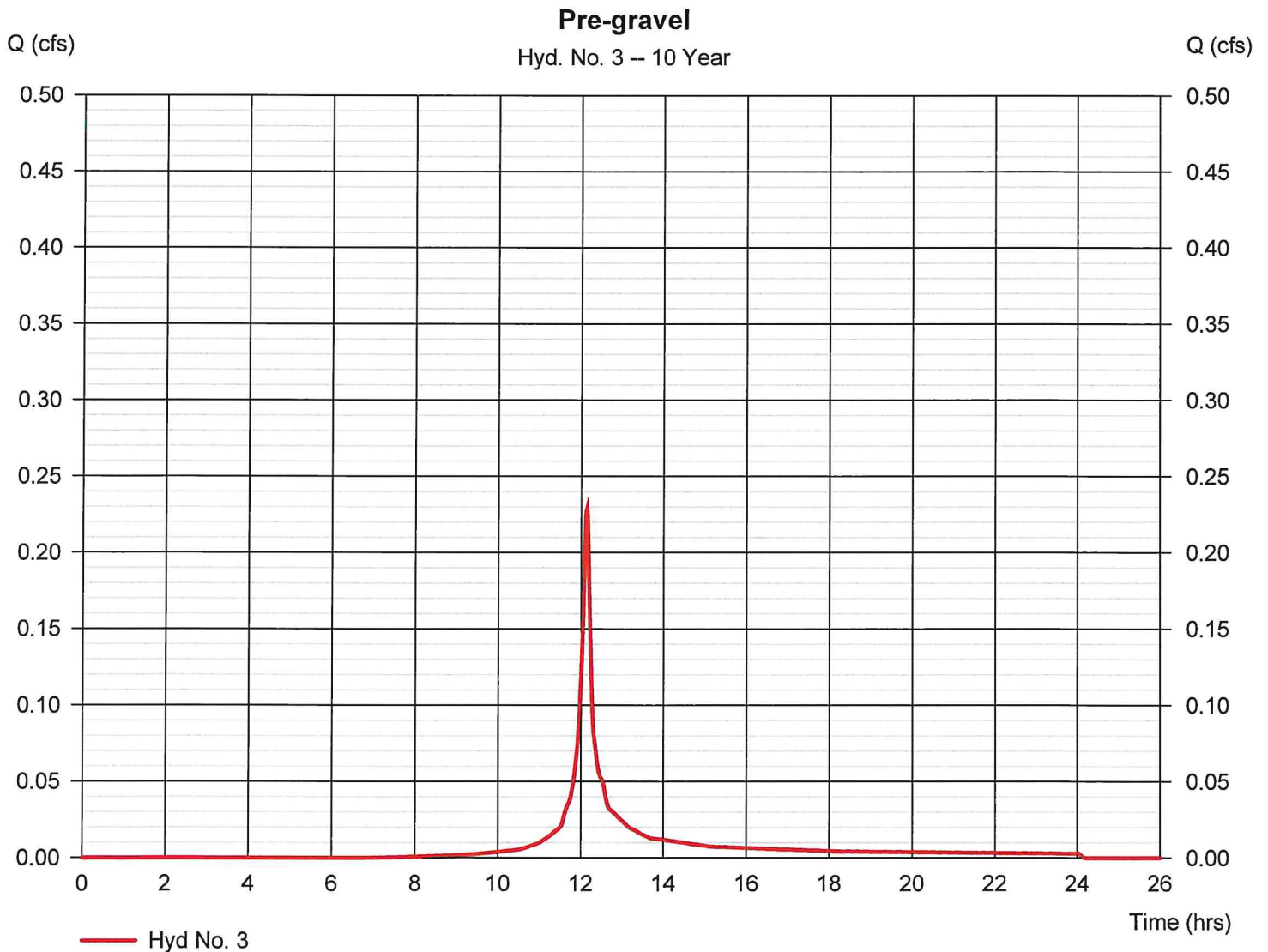
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Hyd. No. 3

Pre-gravel

Hydrograph type	= SCS Runoff	Peak discharge	= 0.228 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 671 cuft
Drainage area	= 0.080 ac	Curve number	= 85
Basin Slope	= 0.1 %	Hydraulic length	= 178 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 7.87 min
Total precip.	= 3.90 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



# Hydrograph Report

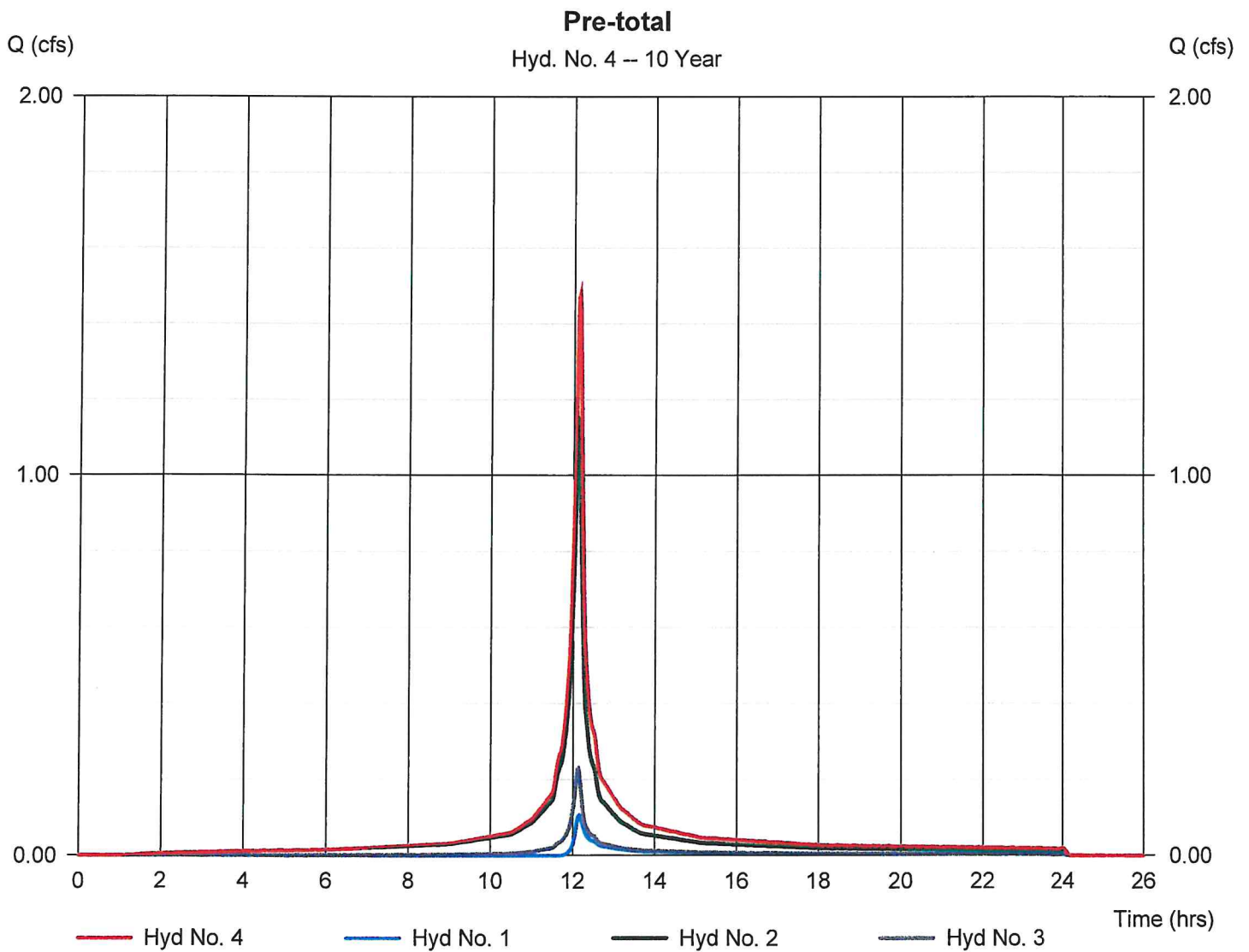
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Hyd. No. 4

### Pre-total

Hydrograph type	= Combine	Peak discharge	= 1.475 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 4,950 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 0.520 ac



# Hydrograph Report

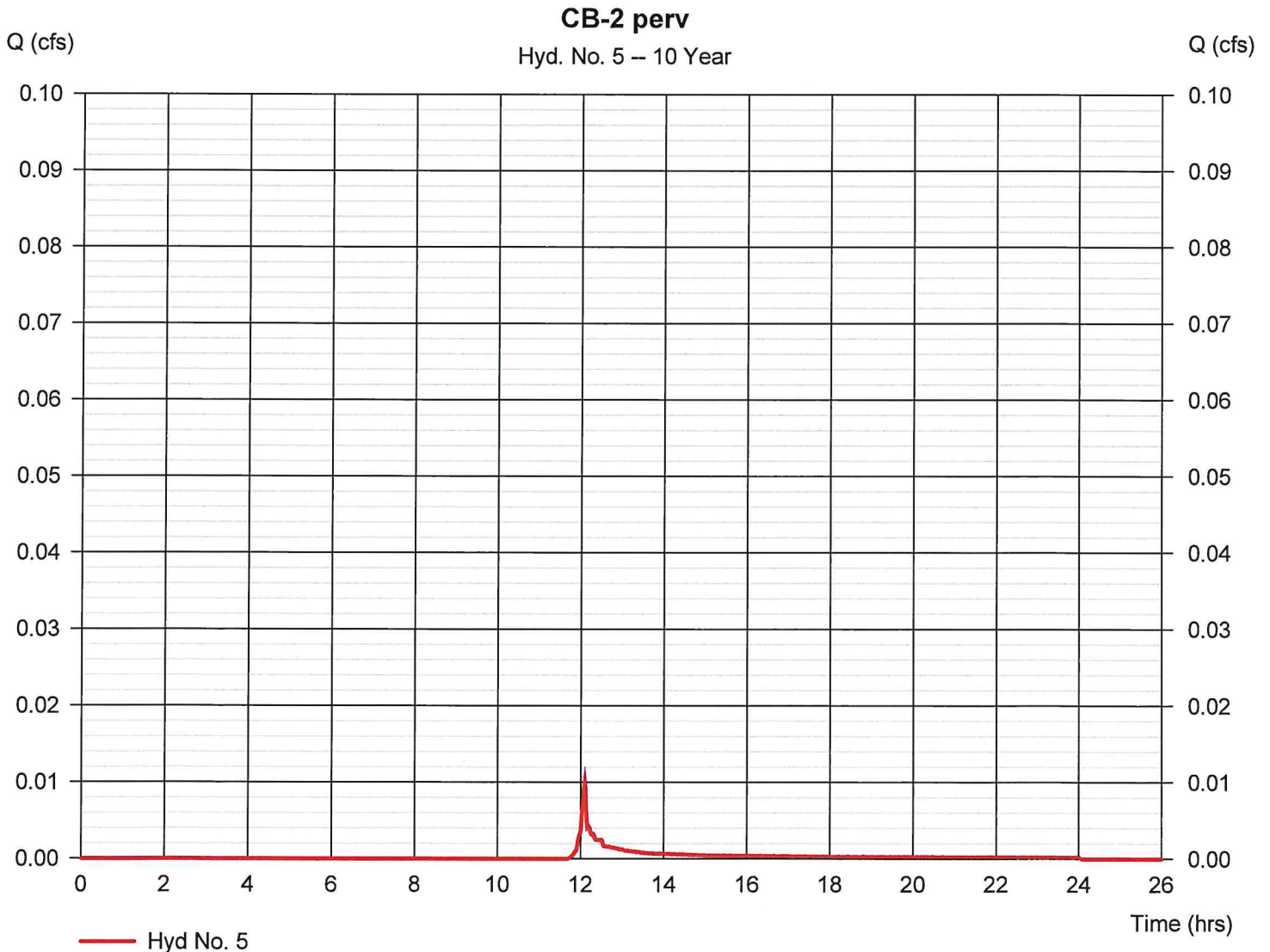
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Hyd. No. 5

CB-2 perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.010 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 26 cuft
Drainage area	= 0.010 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.83 min
Total precip.	= 3.90 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



# Hydrograph Report

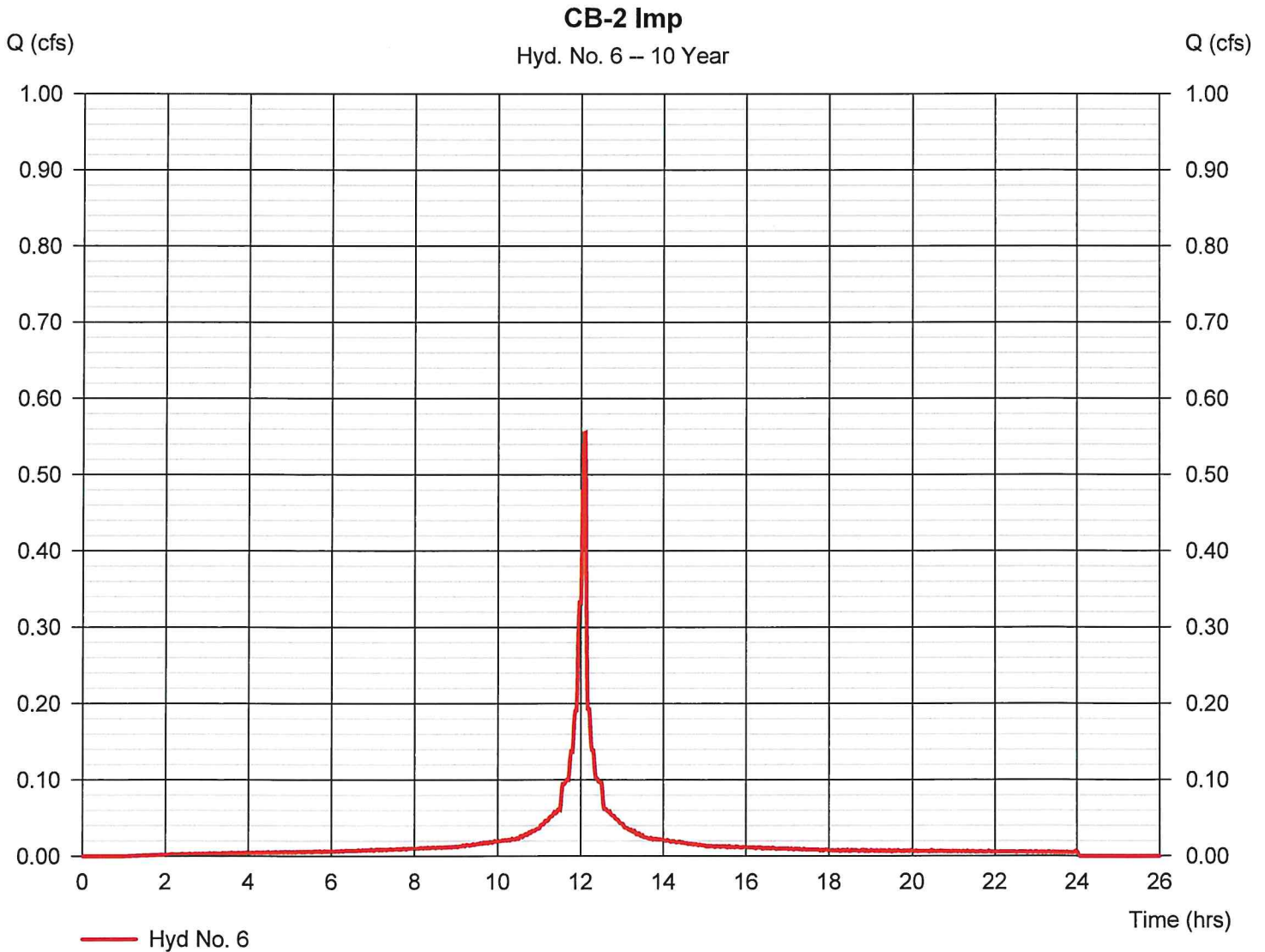
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Hyd. No. 6

CB-2 Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 0.555 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 1,622 cuft
Drainage area	= 0.130 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 2.00 min
Total precip.	= 3.90 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



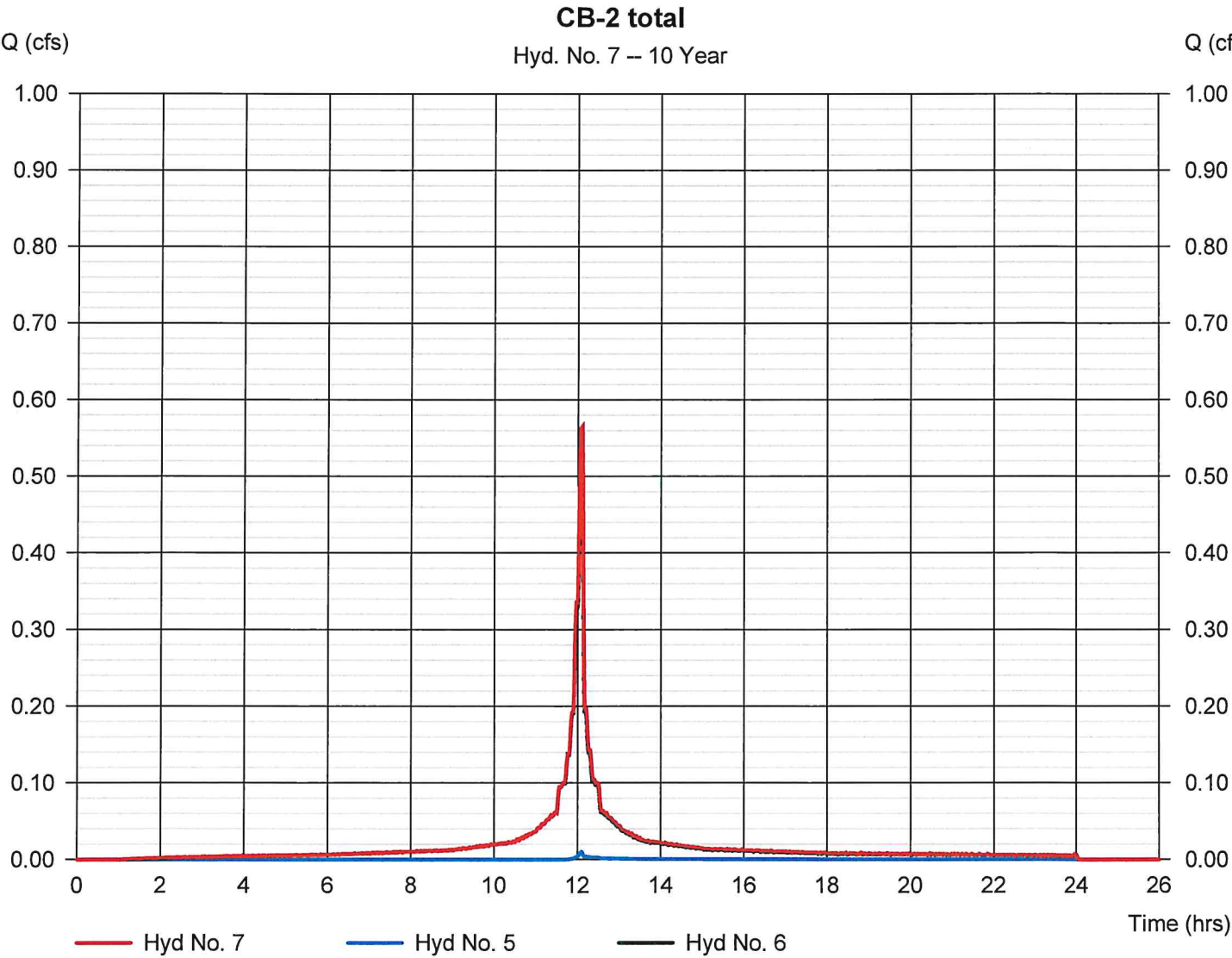


# Hydrograph Report

## Hyd. No. 7

CB-2 total

Hydrograph type	= Combine	Peak discharge	= 0.565 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 1,648 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 0.140 ac



# Hydrograph Report

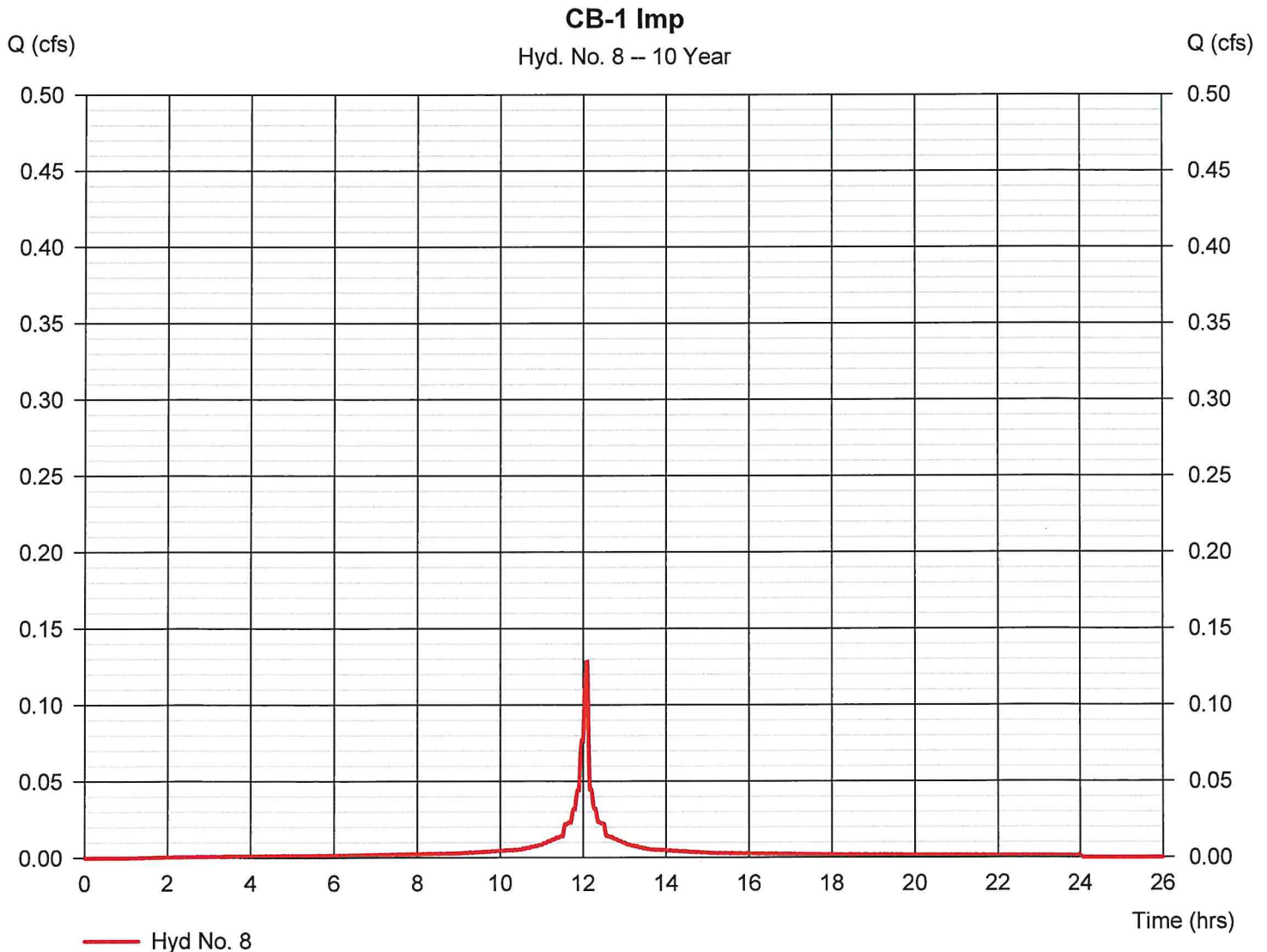
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Hyd. No. 8

CB-1 Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 0.128 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 374 cuft
Drainage area	= 0.030 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.00 min
Total precip.	= 3.90 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Slope factor	= 484



# Hydrograph Report

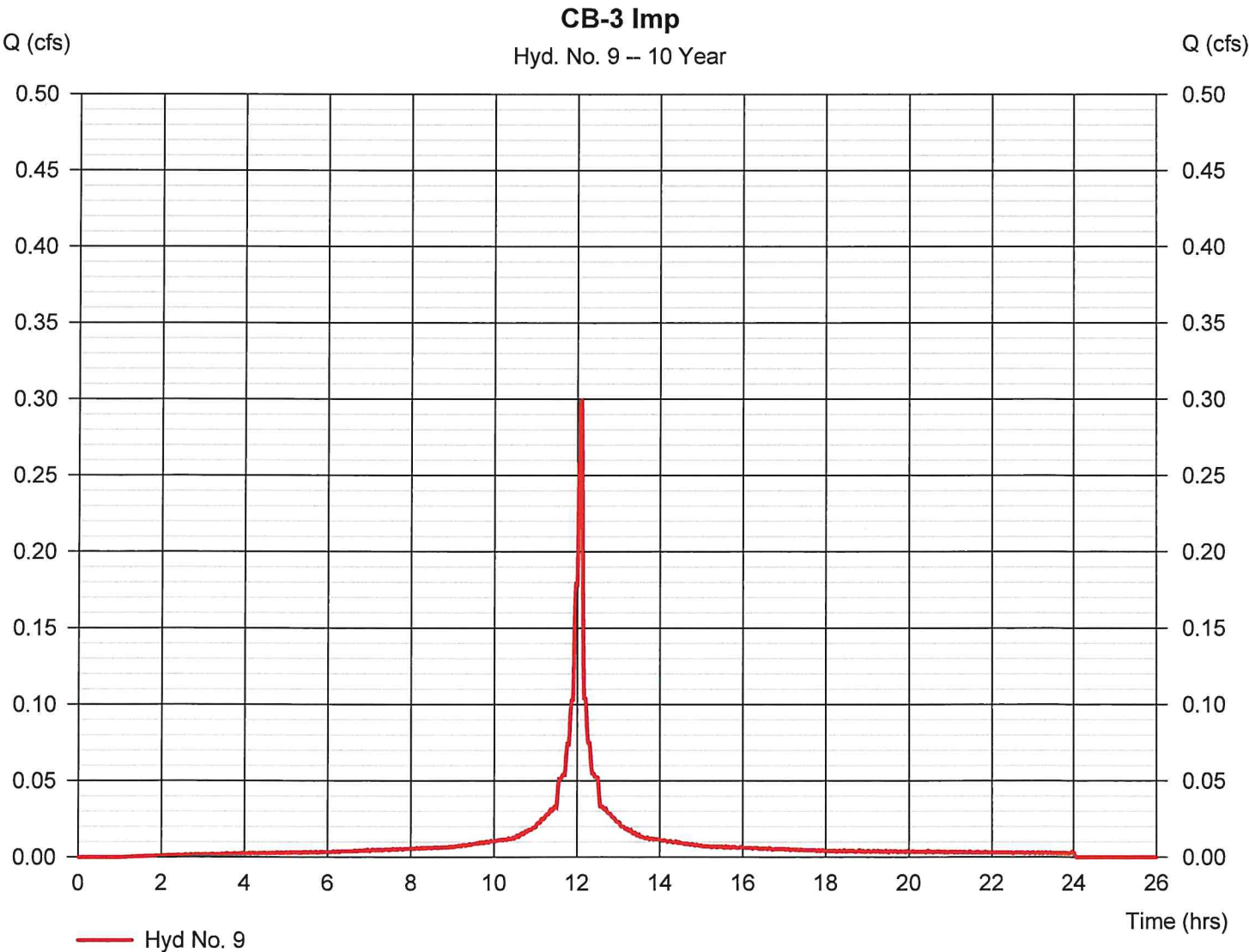
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Hyd. No. 9

CB-3 Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 0.299 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 873 cuft
Drainage area	= 0.070 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 2.00 min
Total precip.	= 3.90 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Slope factor	= 484

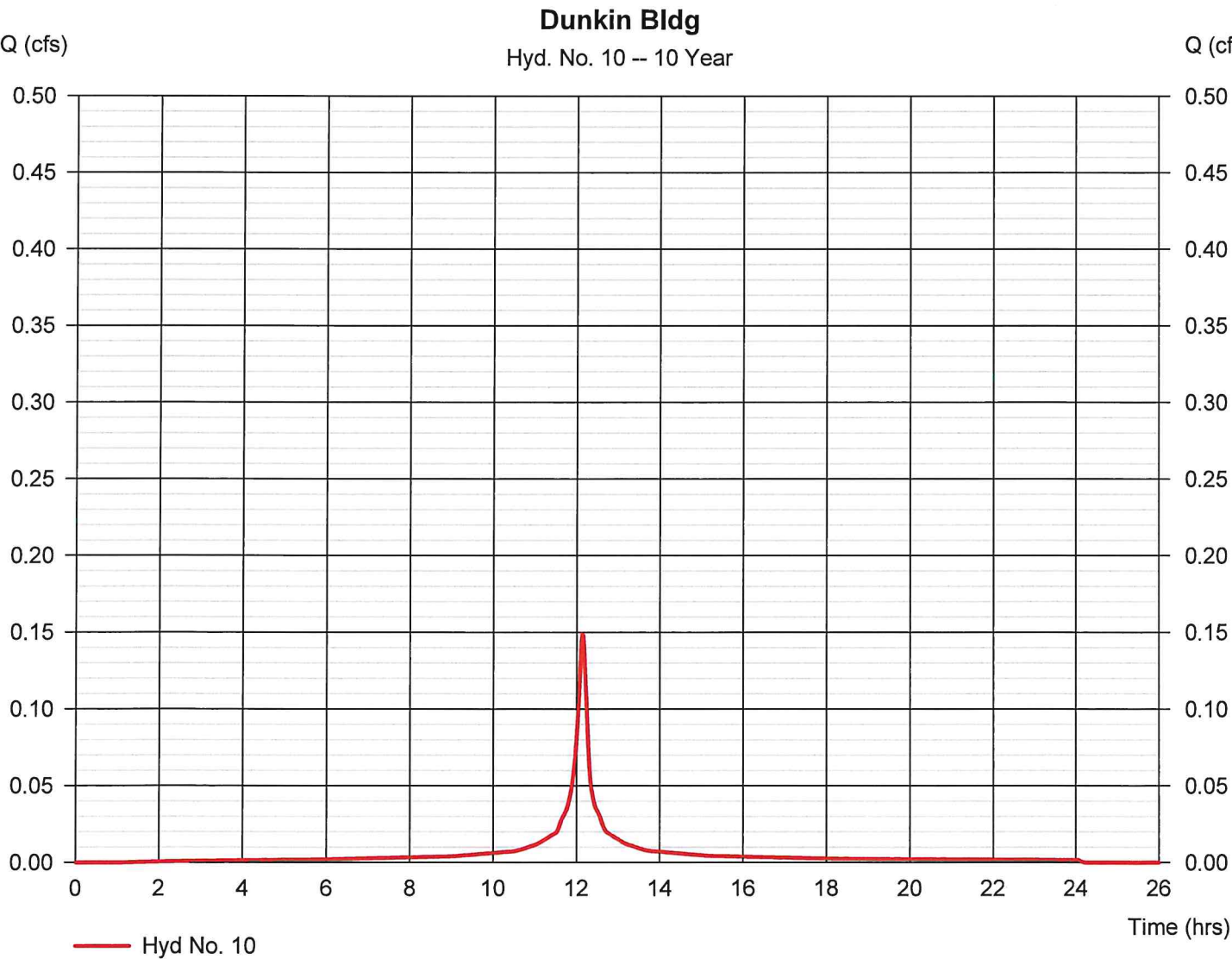


# Hydrograph Report

## Hyd. No. 10

Dunkin Bldg

Hydrograph type	= SCS Runoff	Peak discharge	= 0.148 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 532 cuft
Drainage area	= 0.040 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.90 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



# Hydrograph Report

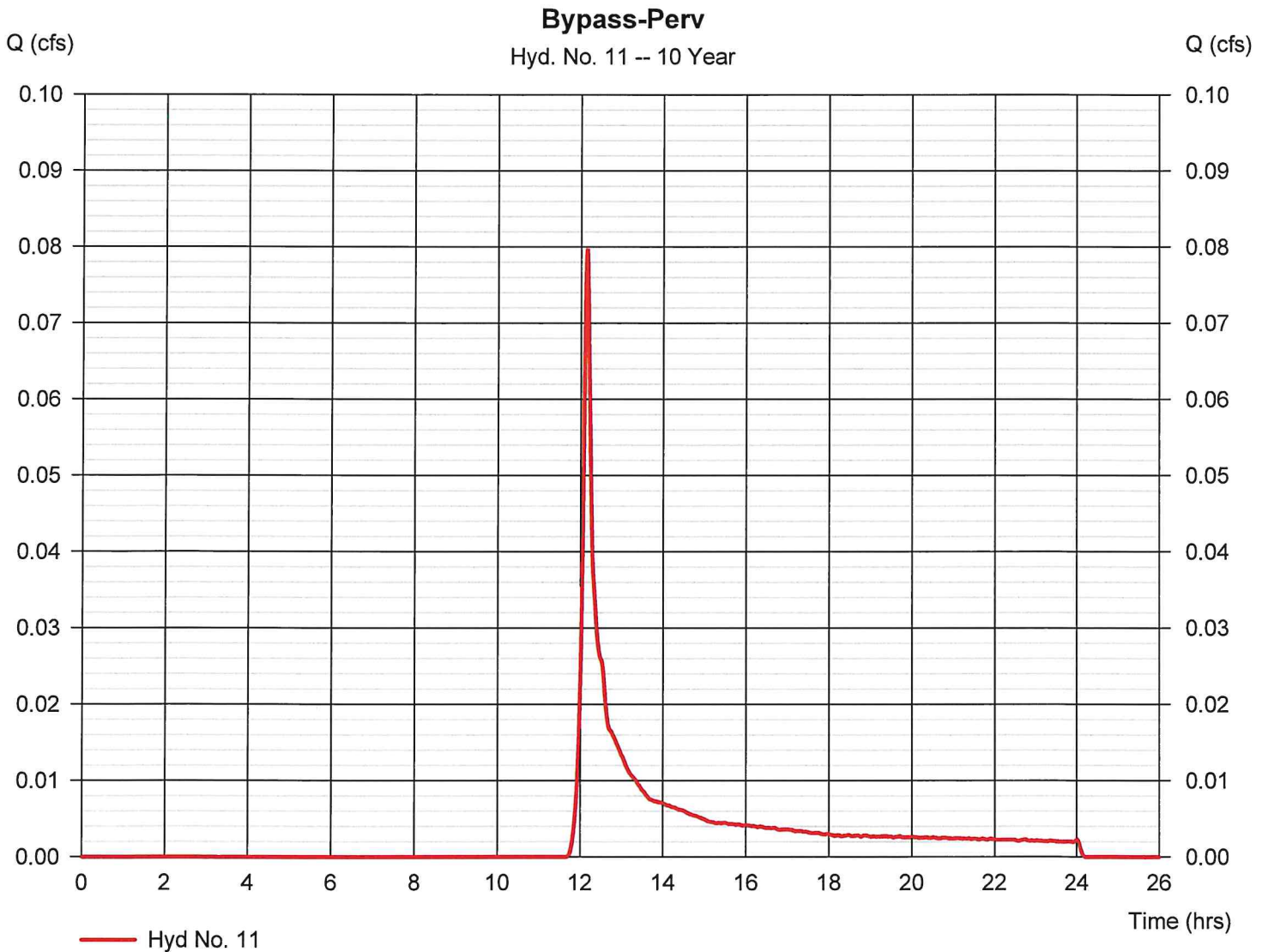
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Hyd. No. 11

### Bypass-Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.080 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.15 hrs
Time interval	= 1 min	Hyd. volume	= 270 cuft
Drainage area	= 0.100 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 7.80 min
Total precip.	= 3.90 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484





# Hydrograph Report

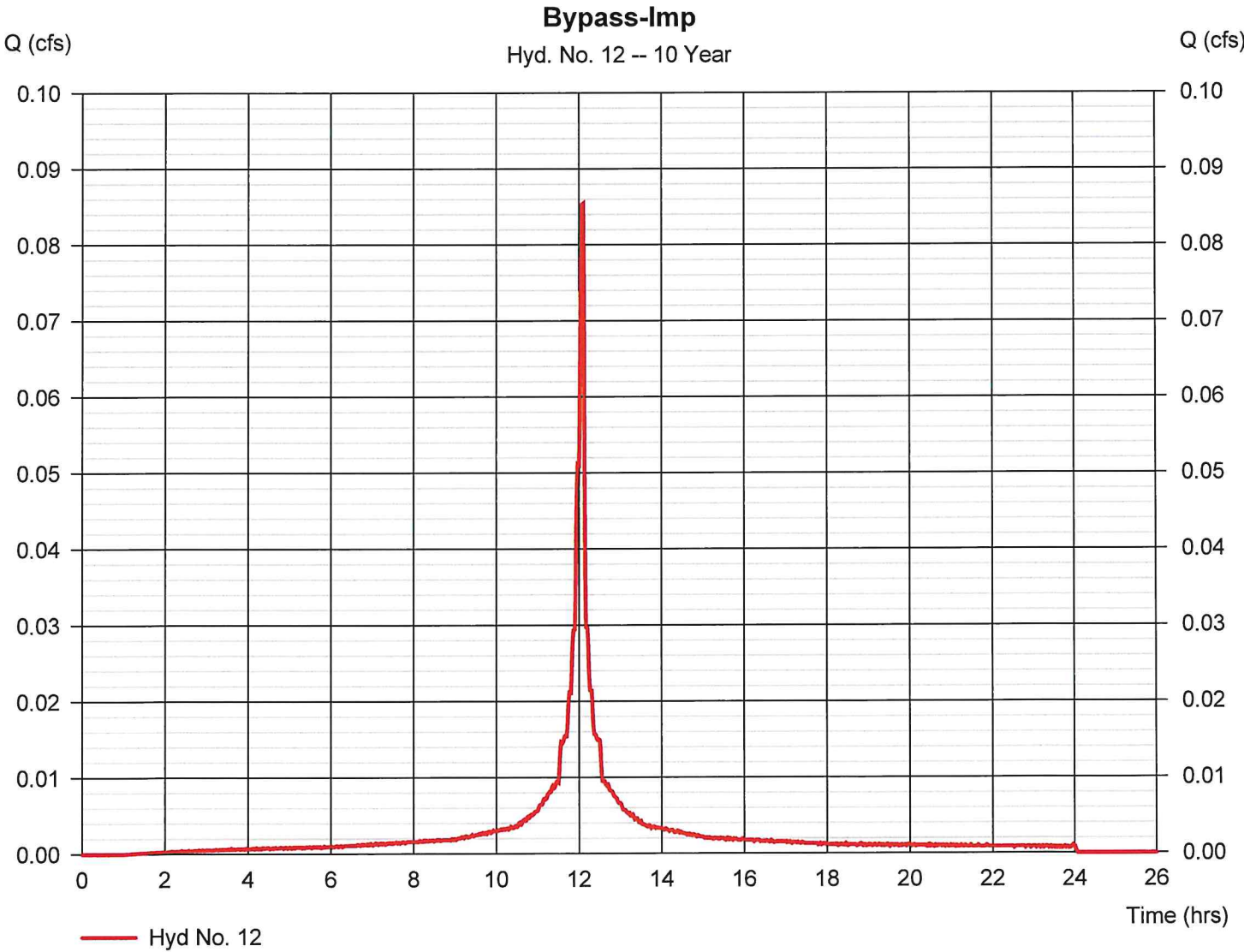
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Hyd. No. 12

### Bypass-Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 0.085 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 249 cuft
Drainage area	= 0.020 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 2.00 min
Total precip.	= 3.90 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Slope factor	= 484



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

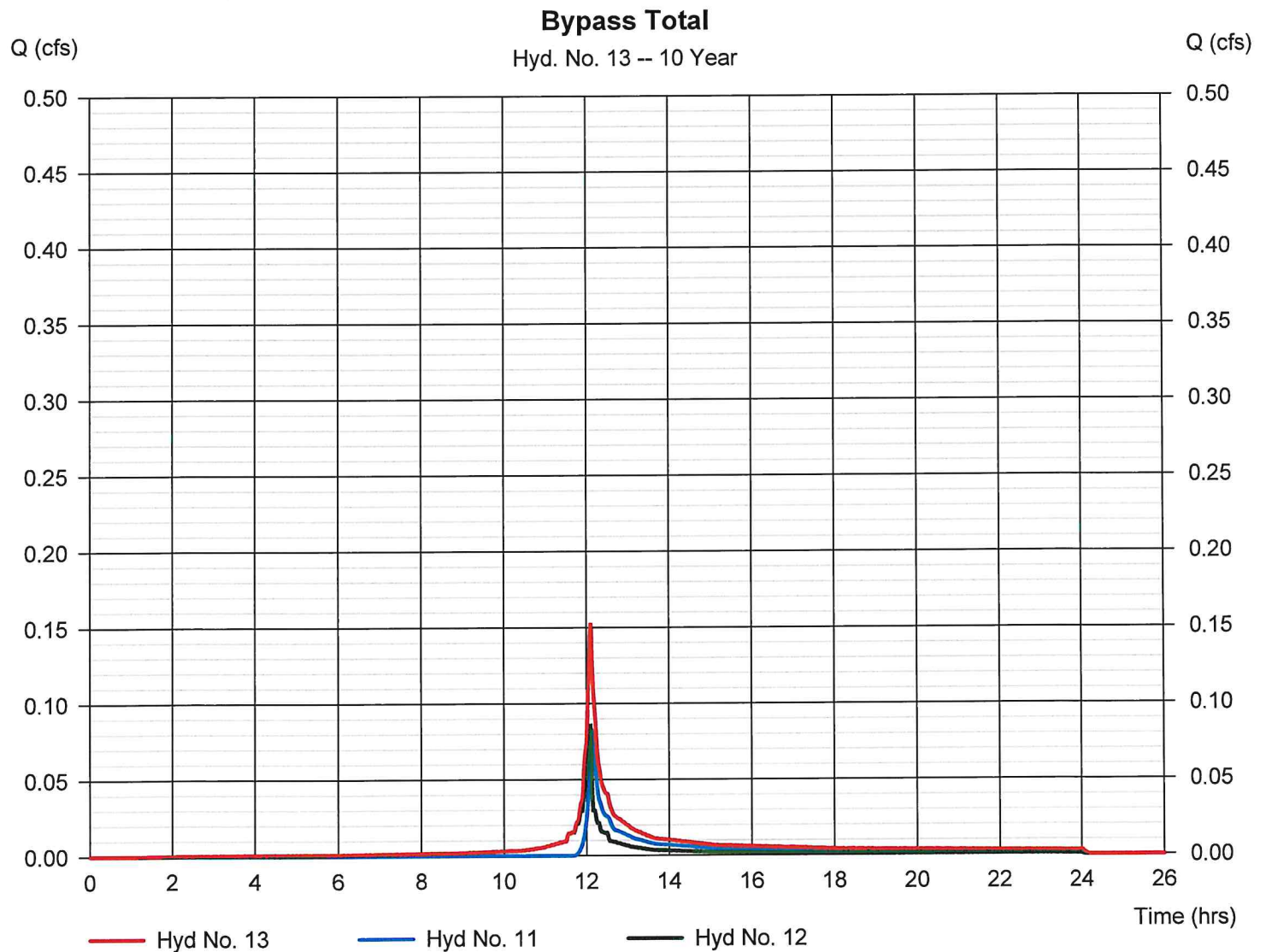
Thursday, 09 / 16 / 2021

## Hyd. No. 13

### Bypass Total

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Time interval = 1 min  
Inflow hyds. = 11, 12

Peak discharge = 0.153 cfs  
Time to peak = 12.10 hrs  
Hyd. volume = 519 cuft  
Contrib. drain. area = 0.120 ac



# Hydrograph Report

45

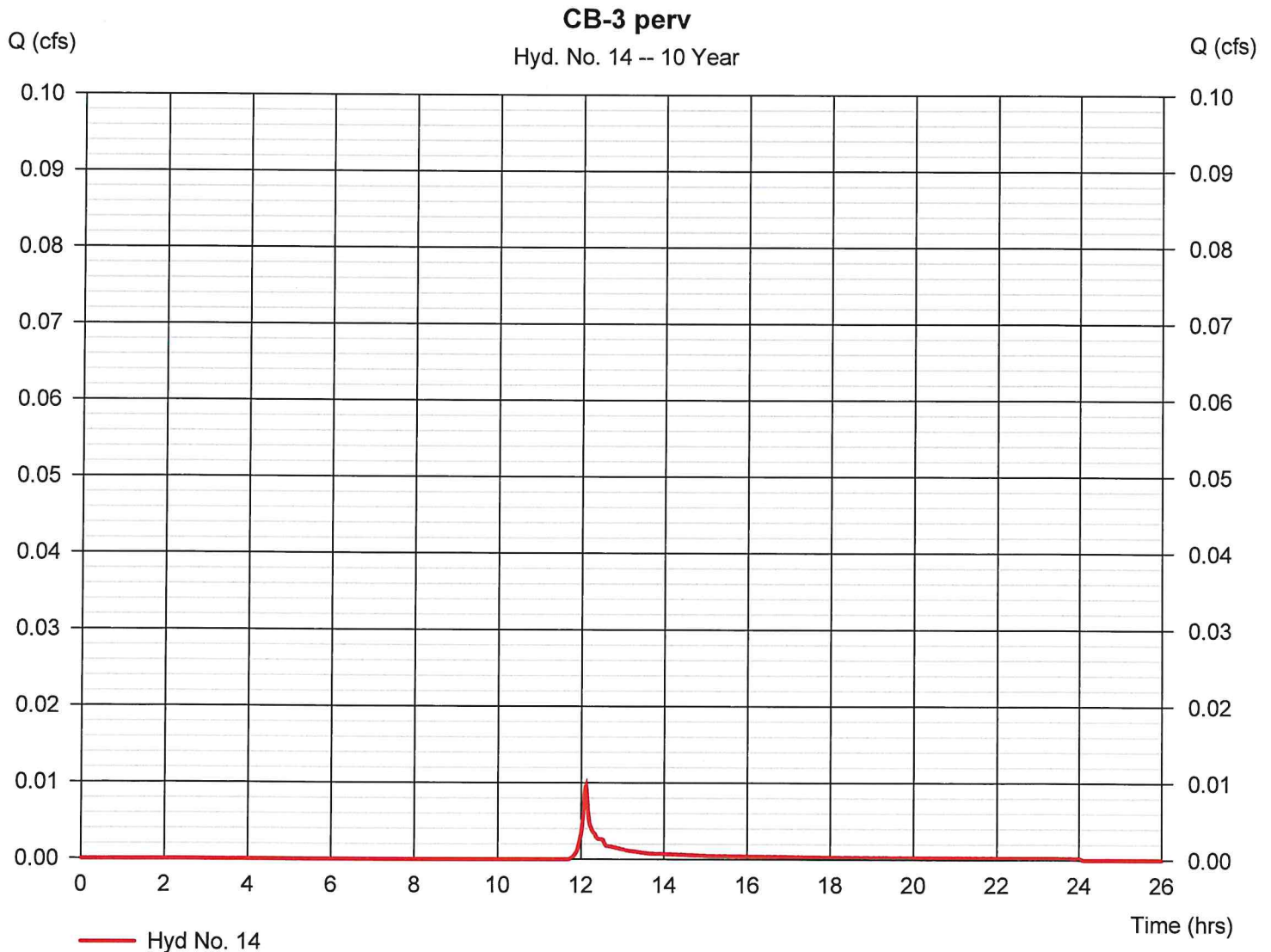
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## Hyd. No. 14

CB-3 perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.010 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.12 hrs
Time interval	= 1 min	Hyd. volume	= 28 cuft
Drainage area	= 0.010 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.80 min
Total precip.	= 3.90 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484

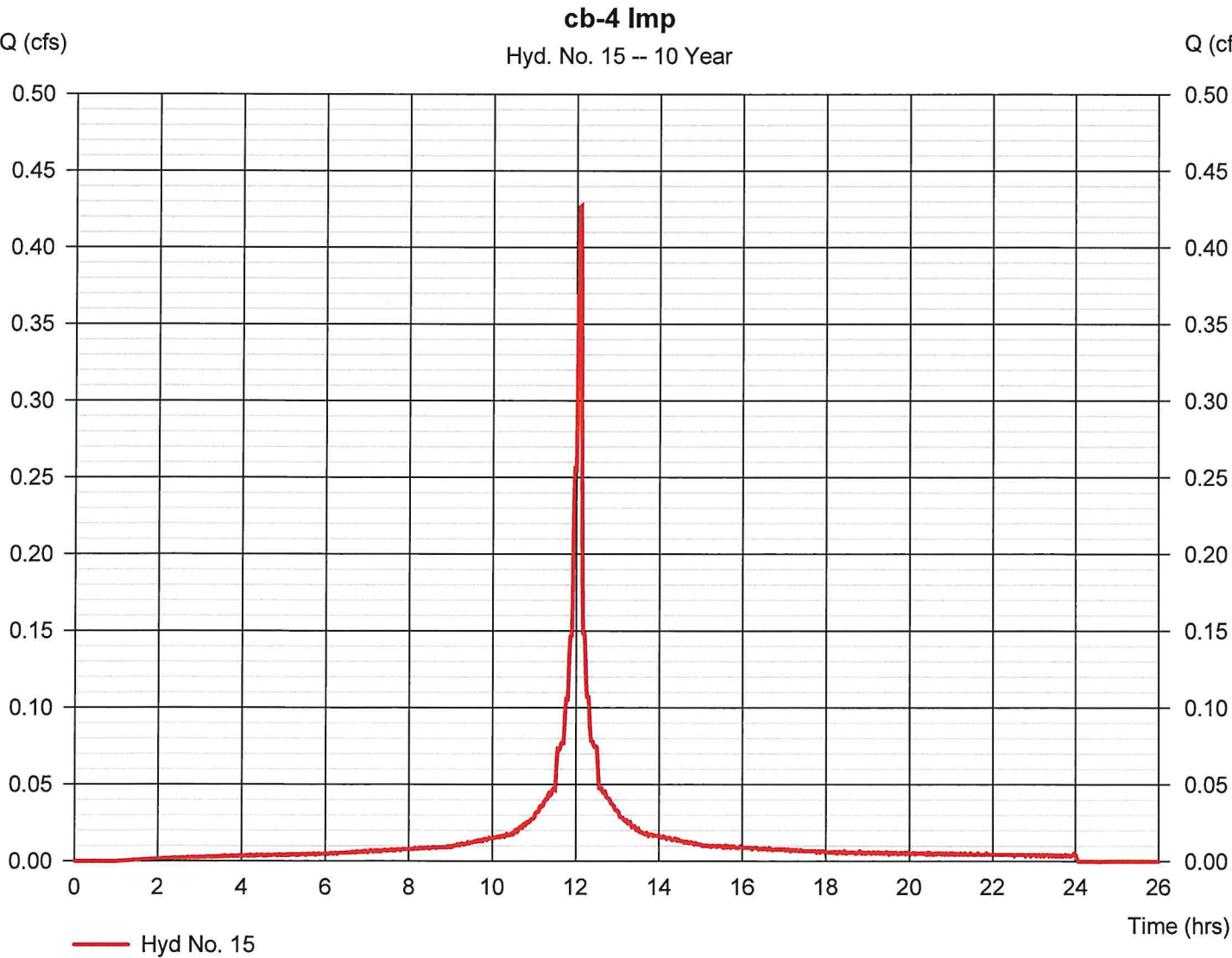


# Hydrograph Report

## Hyd. No. 15

cb-4 Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 0.427 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 1,247 cuft
Drainage area	= 0.100 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 2.00 min
Total precip.	= 3.90 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484





# Hydrograph Report

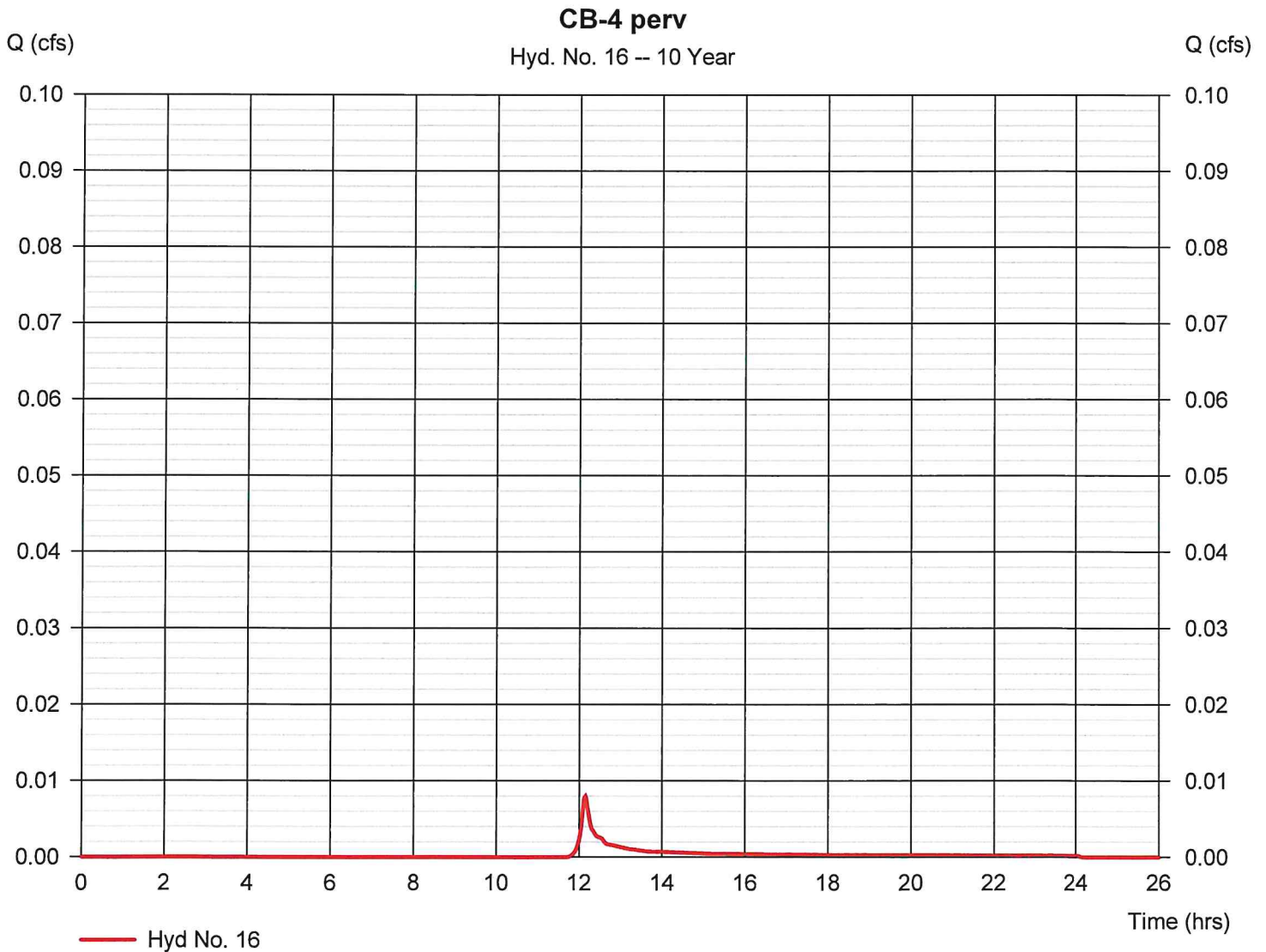
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

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## Hyd. No. 16

CB-4 perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.008 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.15 hrs
Time interval	= 1 min	Hyd. volume	= 27 cuft
Drainage area	= 0.010 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 7.70 min
Total precip.	= 3.90 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484





# Hydrograph Report

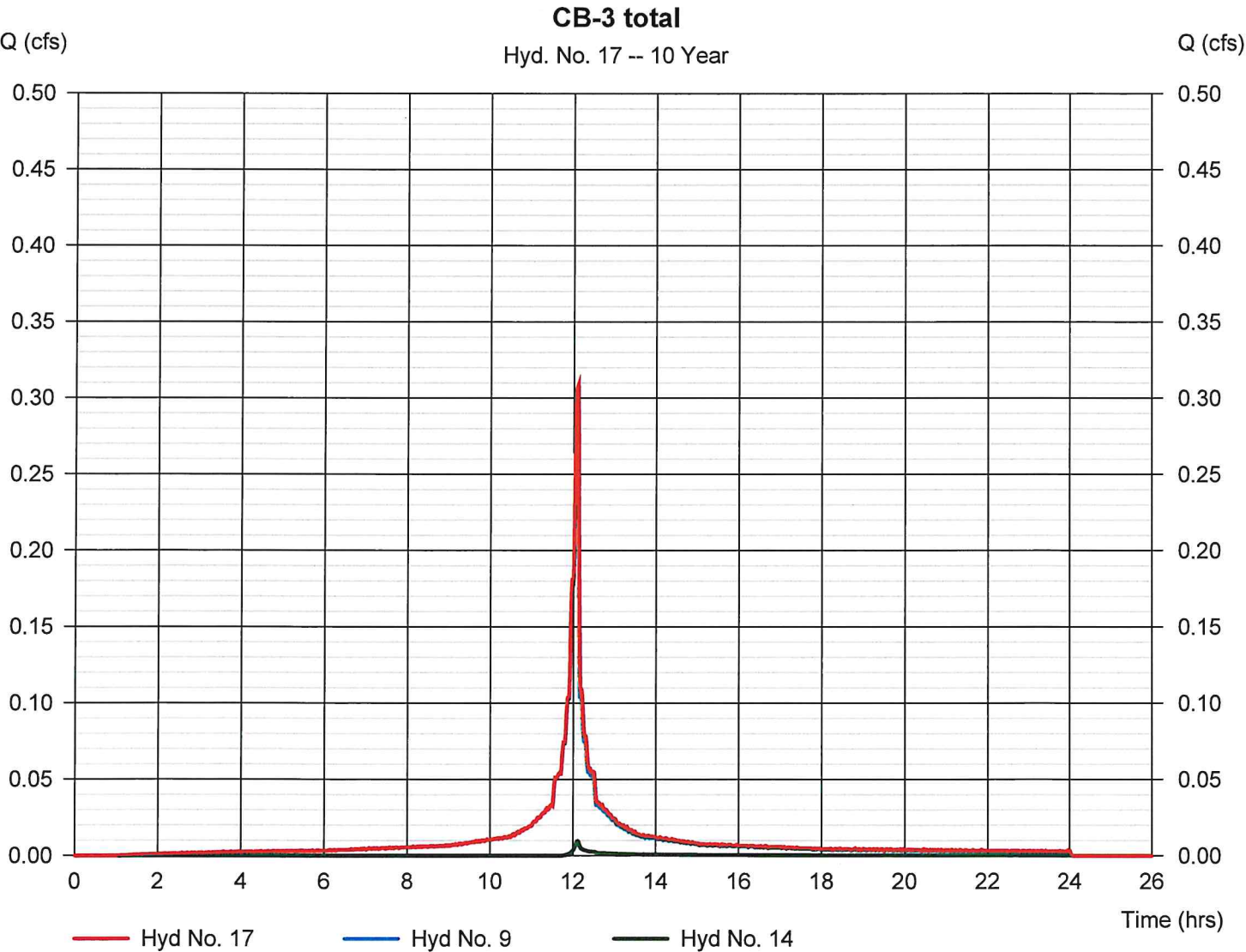
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## Hyd. No. 17

CB-3 total

Hydrograph type	= Combine	Peak discharge	= 0.308 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 901 cuft
Inflow hyds.	= 9, 14	Contrib. drain. area	= 0.080 ac



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

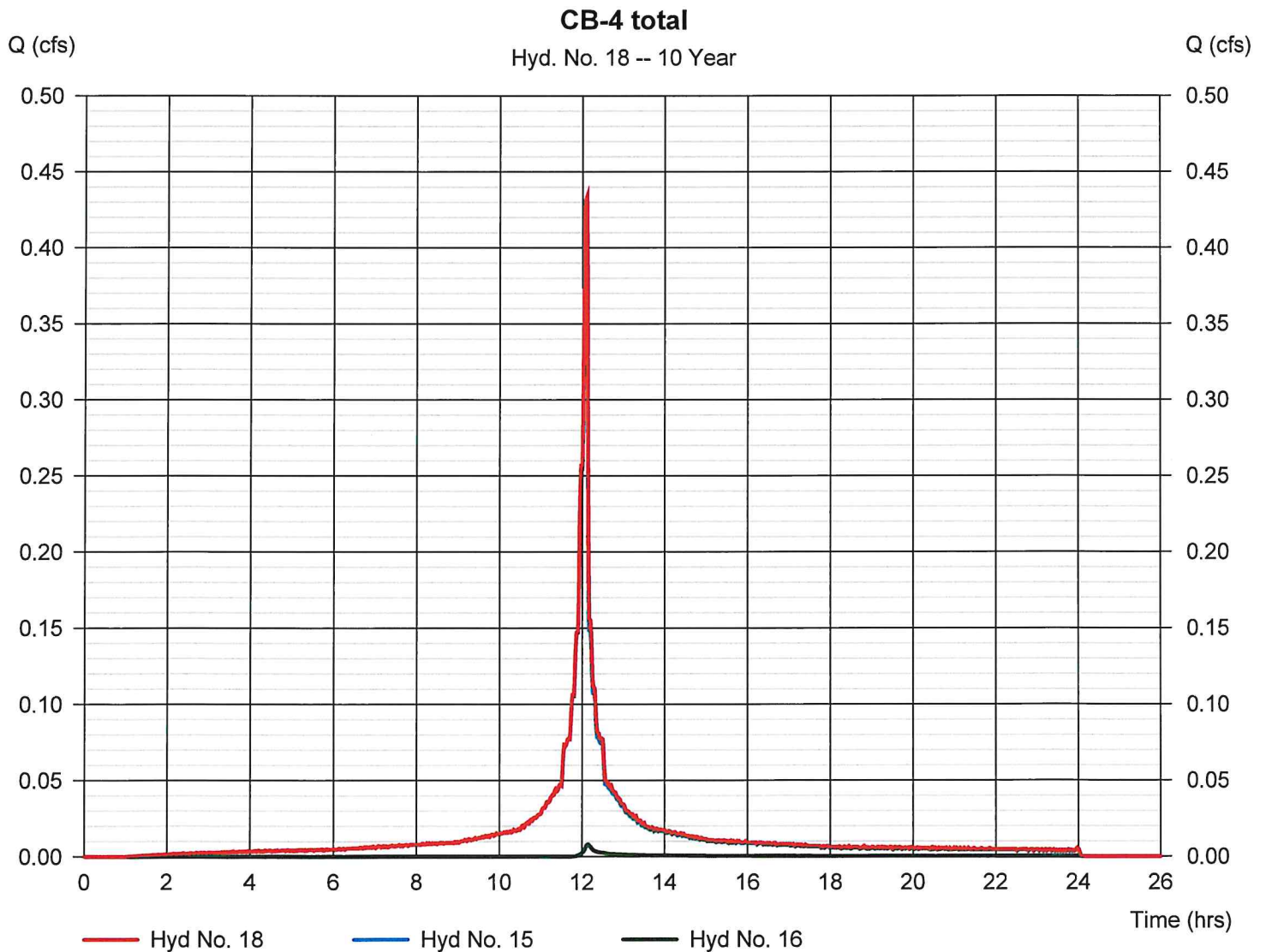
Thursday, 09 / 16 / 2021

## Hyd. No. 18

CB-4 total

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Time interval = 1 min  
Inflow hyds. = 15, 16

Peak discharge = 0.434 cfs  
Time to peak = 12.10 hrs  
Hyd. volume = 1,274 cuft  
Contrib. drain. area = 0.110 ac

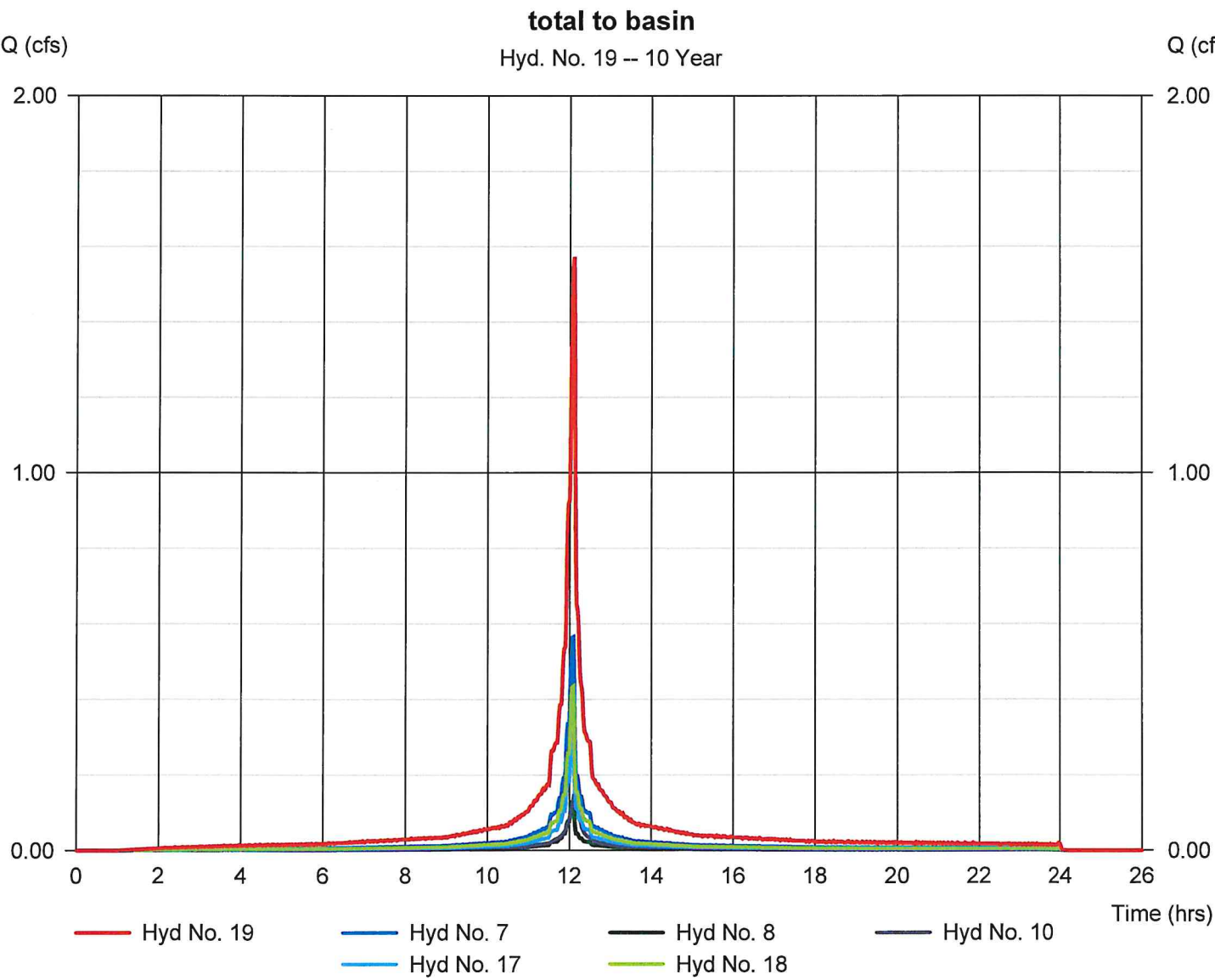


# Hydrograph Report

## Hyd. No. 19

total to basin

Hydrograph type	= Combine	Peak discharge	= 1.573 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 4,729 cuft
Inflow hydys.	= 7, 8, 10, 17, 18	Contrib. drain. area	= 0.070 ac



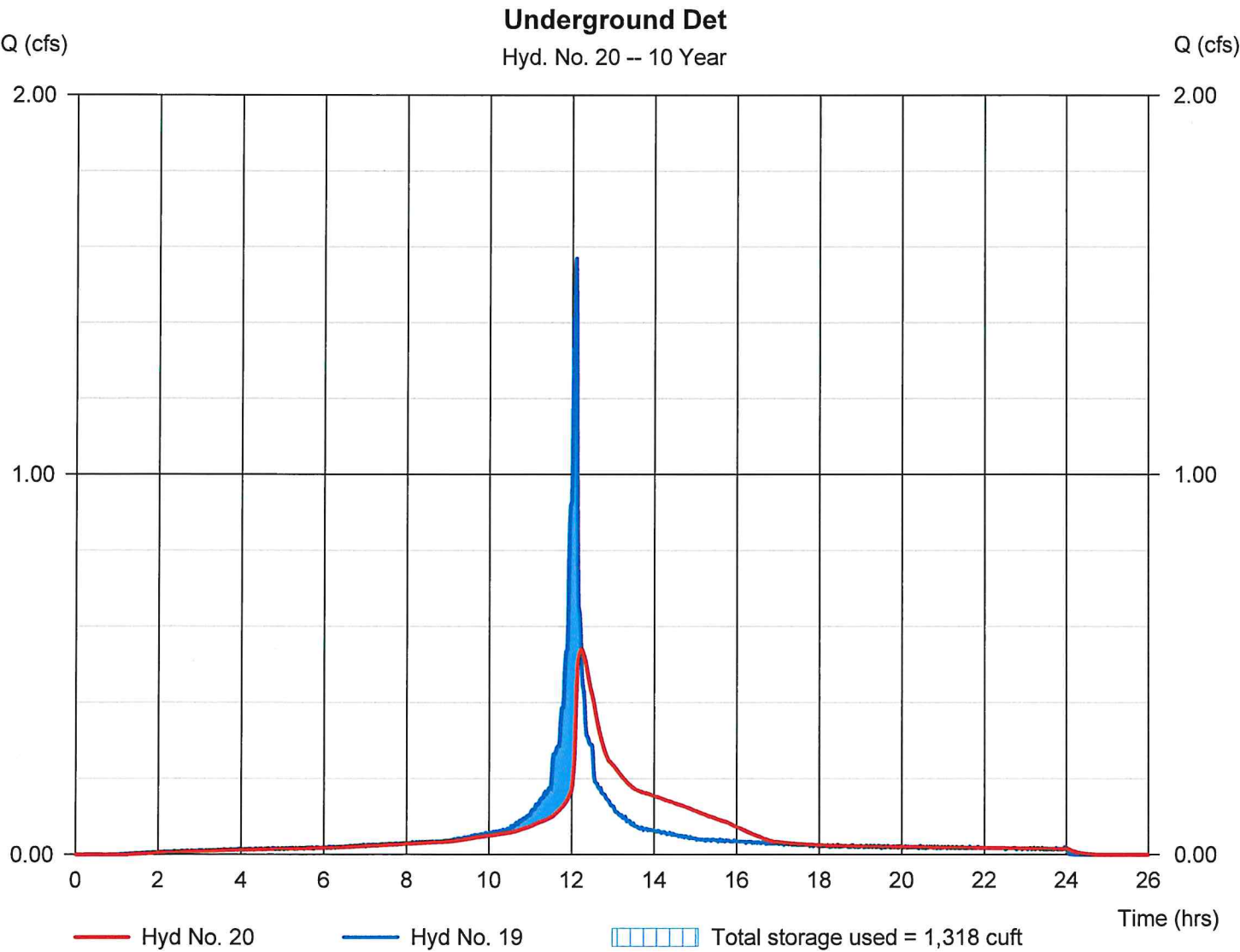
# Hydrograph Report

## Hyd. No. 20

Underground Det

Hydrograph type	= Reservoir	Peak discharge	= 0.540 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.23 hrs
Time interval	= 1 min	Hyd. volume	= 4,728 cuft
Inflow hyd. No.	= 19 - total to basin	Max. Elevation	= 123.77 ft
Reservoir name	= Det Basin	Max. Storage	= 1,318 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

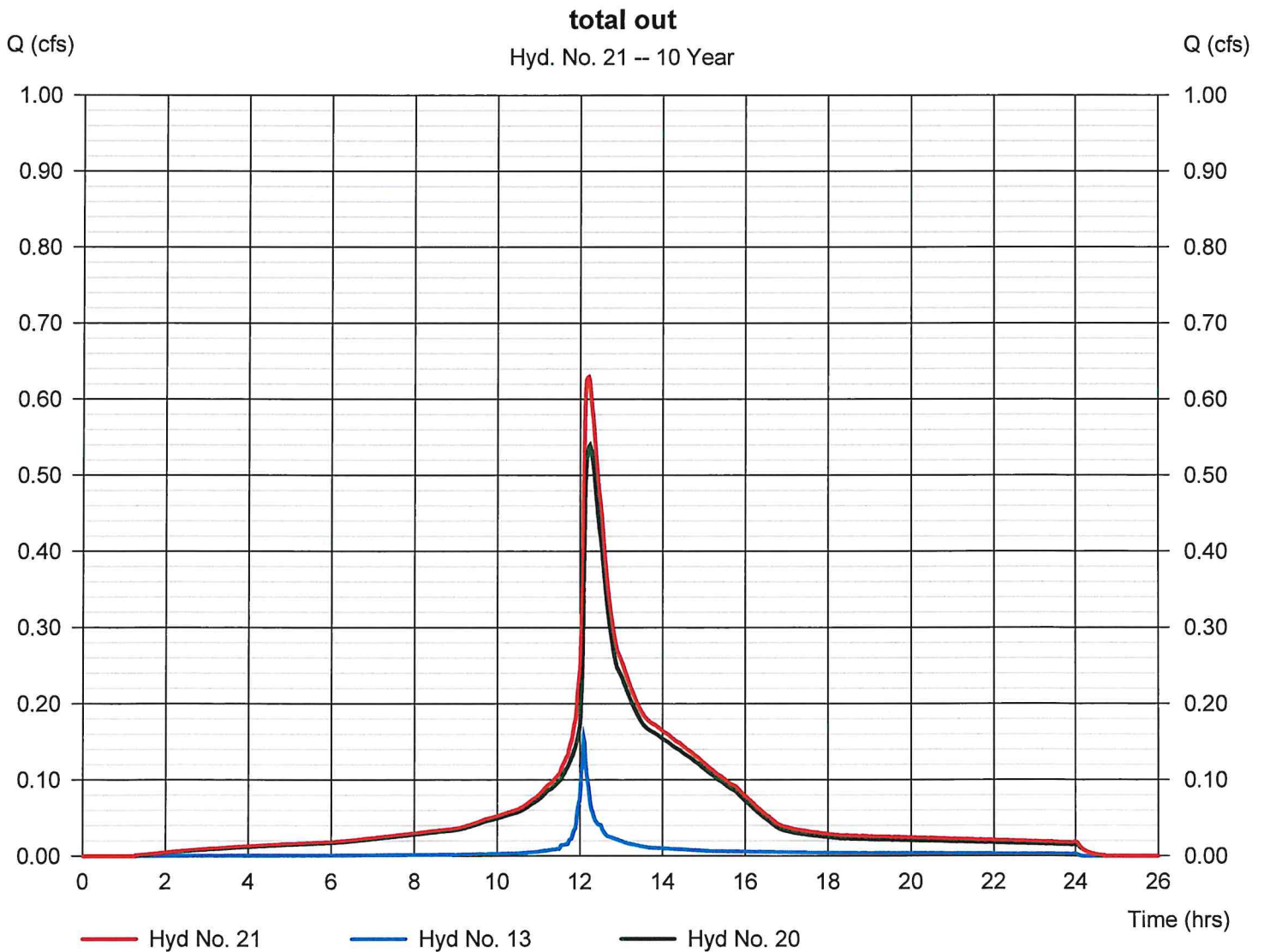
Thursday, 09 / 16 / 2021

## Hyd. No. 21

total out

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Time interval = 1 min  
Inflow hyds. = 13, 20

Peak discharge = 0.629 cfs  
Time to peak = 12.20 hrs  
Hyd. volume = 5,248 cuft  
Contrib. drain. area = 0.000 ac





# Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

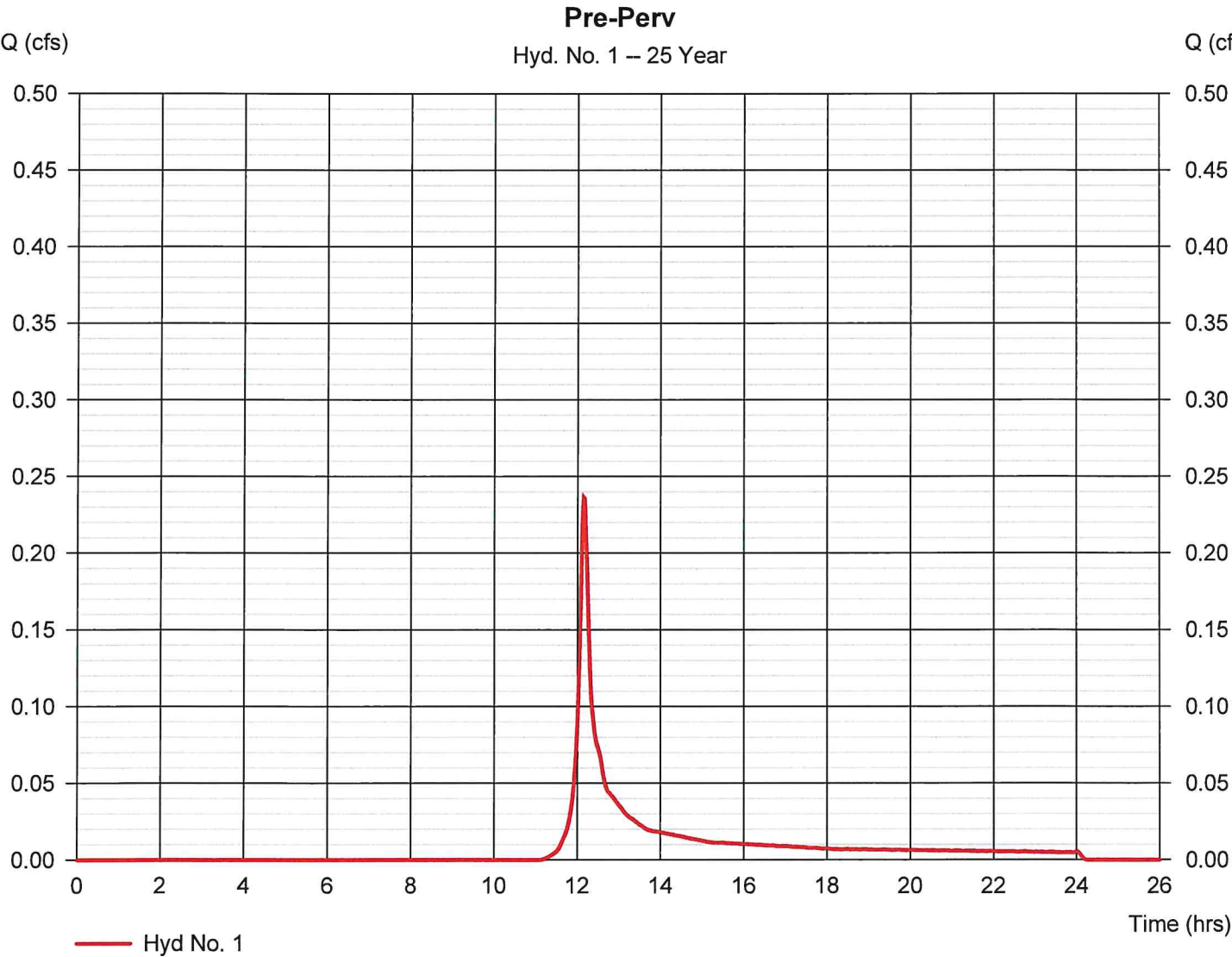
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.236	1	729	773	----	----	----	Pre-Perv
2	SCS Runoff	1.554	1	727	5,322	----	----	----	Pre-Imp
3	SCS Runoff	0.341	1	728	1,019	----	----	----	Pre-gravel
4	Combine	2.122	1	728	7,115	1, 2, 3	----	----	Pre-total
5	SCS Runoff	0.021	1	726	52	----	----	----	CB-2 perv
6	SCS Runoff	0.750	1	726	2,218	----	----	----	CB-2 Imp
7	Combine	0.771	1	726	2,269	5, 6	----	----	CB-2 total
8	SCS Runoff	0.173	1	726	512	----	----	----	CB-1 Imp
9	SCS Runoff	0.404	1	726	1,194	----	----	----	CB-3 Imp
10	SCS Runoff	0.201	1	728	728	----	----	----	Dunkin Bldg
11	SCS Runoff	0.177	1	728	539	----	----	----	Bypass-Perv
12	SCS Runoff	0.115	1	726	341	----	----	----	Bypass-Imp
13	Combine	0.275	1	726	880	11, 12	----	----	Bypass Total
14	SCS Runoff	0.021	1	726	55	----	----	----	CB-3 perv
15	SCS Runoff	0.577	1	726	1,706	----	----	----	cb-4 Imp
16	SCS Runoff	0.018	1	728	54	----	----	----	CB-4 perv
17	Combine	0.425	1	726	1,249	9, 14,	----	----	CB-3 total
18	Combine	0.593	1	726	1,760	15, 16,	----	----	CB-4 total
19	Combine	2.147	1	726	6,518	7, 8, 10, 17, 18	----	----	total to basin
20	Reservoir	0.984	1	729	6,517	19	124.13	1,699	Underground Det
21	Combine	1.210	1	728	7,397	13, 20	----	----	total out
SCS Dunkin 9-1-2021.gpw					Return Period: 25 Year			Thursday, 09 / 16 / 2021	

# Hydrograph Report

## Hyd. No. 1

Pre-Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.236 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.15 hrs
Time interval	= 1 min	Hyd. volume	= 773 cuft
Drainage area	= 0.140 ac	Curve number	= 61
Basin Slope	= 0.1 %	Hydraulic length	= 198 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 8.54 min
Total precip.	= 5.25 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Slope factor	= 484



# Hydrograph Report

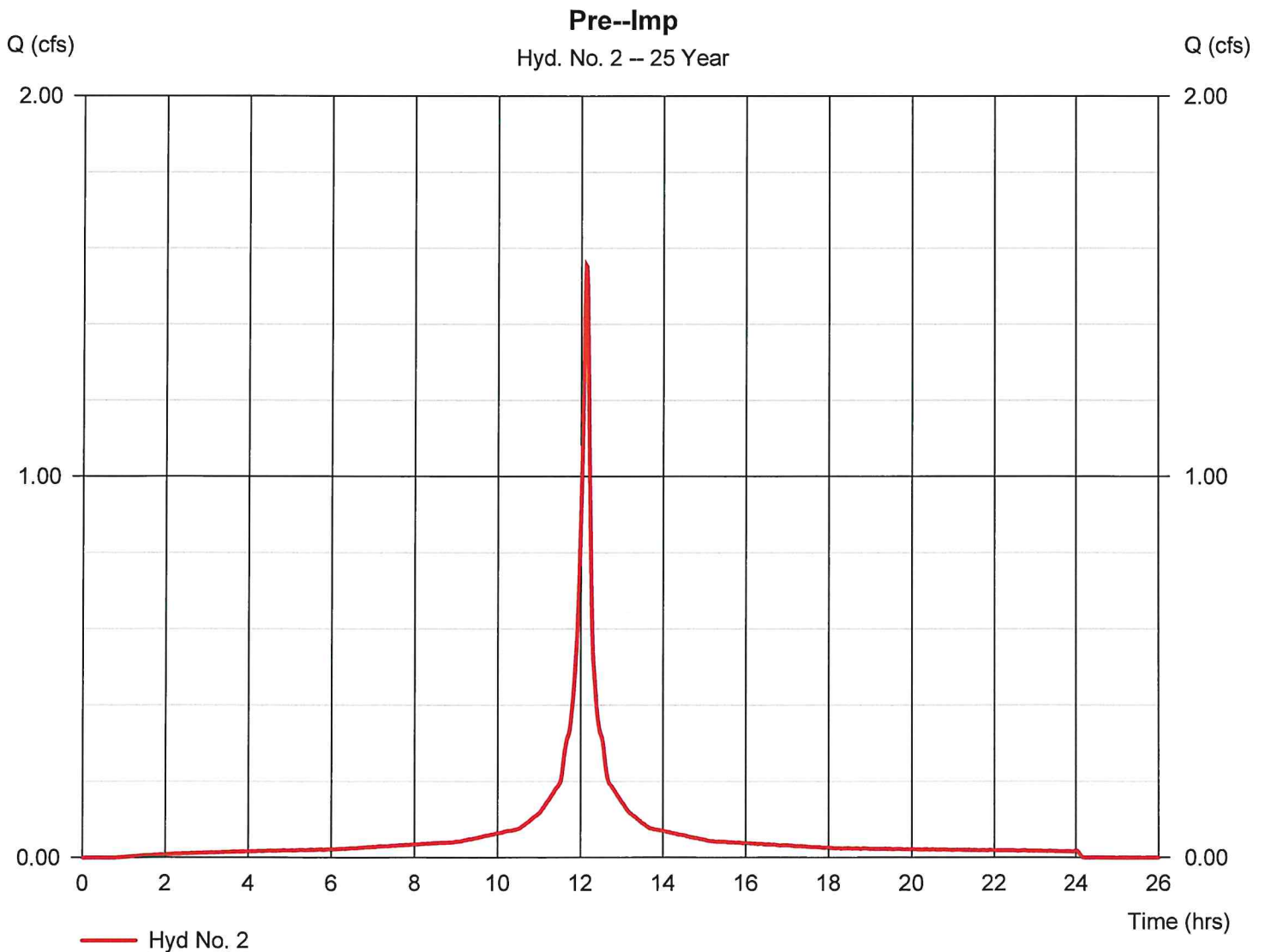
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

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## Hyd. No. 2

Pre--Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 1.554 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.12 hrs
Time interval	= 1 min	Hyd. volume	= 5,322 cuft
Drainage area	= 0.300 ac	Curve number	= 98
Basin Slope	= 0.1 %	Hydraulic length	= 178 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 7.87 min
Total precip.	= 5.25 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



# Hydrograph Report

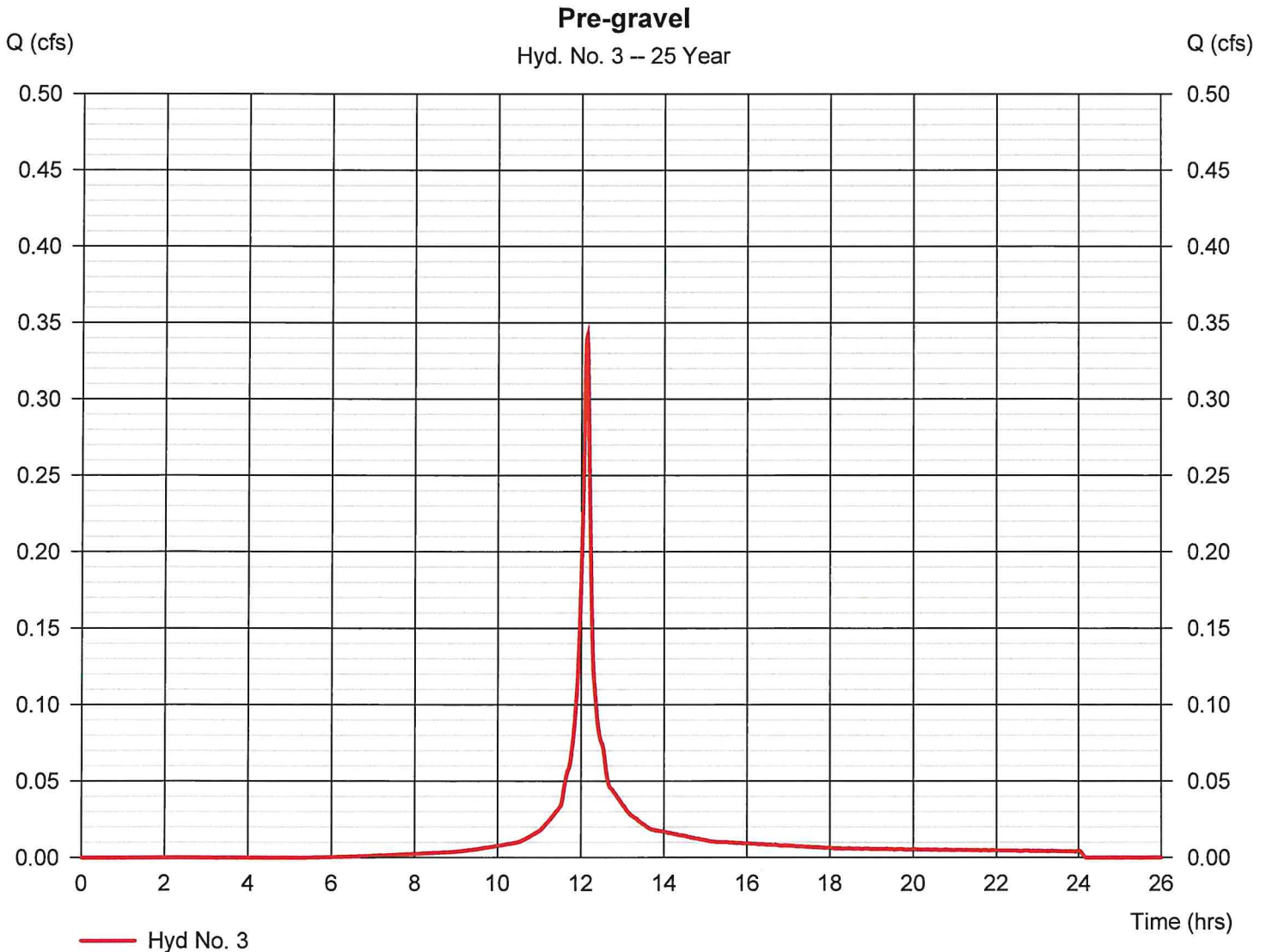
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

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## Hyd. No. 3

Pre-gravel

Hydrograph type	= SCS Runoff	Peak discharge	= 0.341 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 1,019 cuft
Drainage area	= 0.080 ac	Curve number	= 85
Basin Slope	= 0.1 %	Hydraulic length	= 178 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 7.87 min
Total precip.	= 5.25 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



# Hydrograph Report

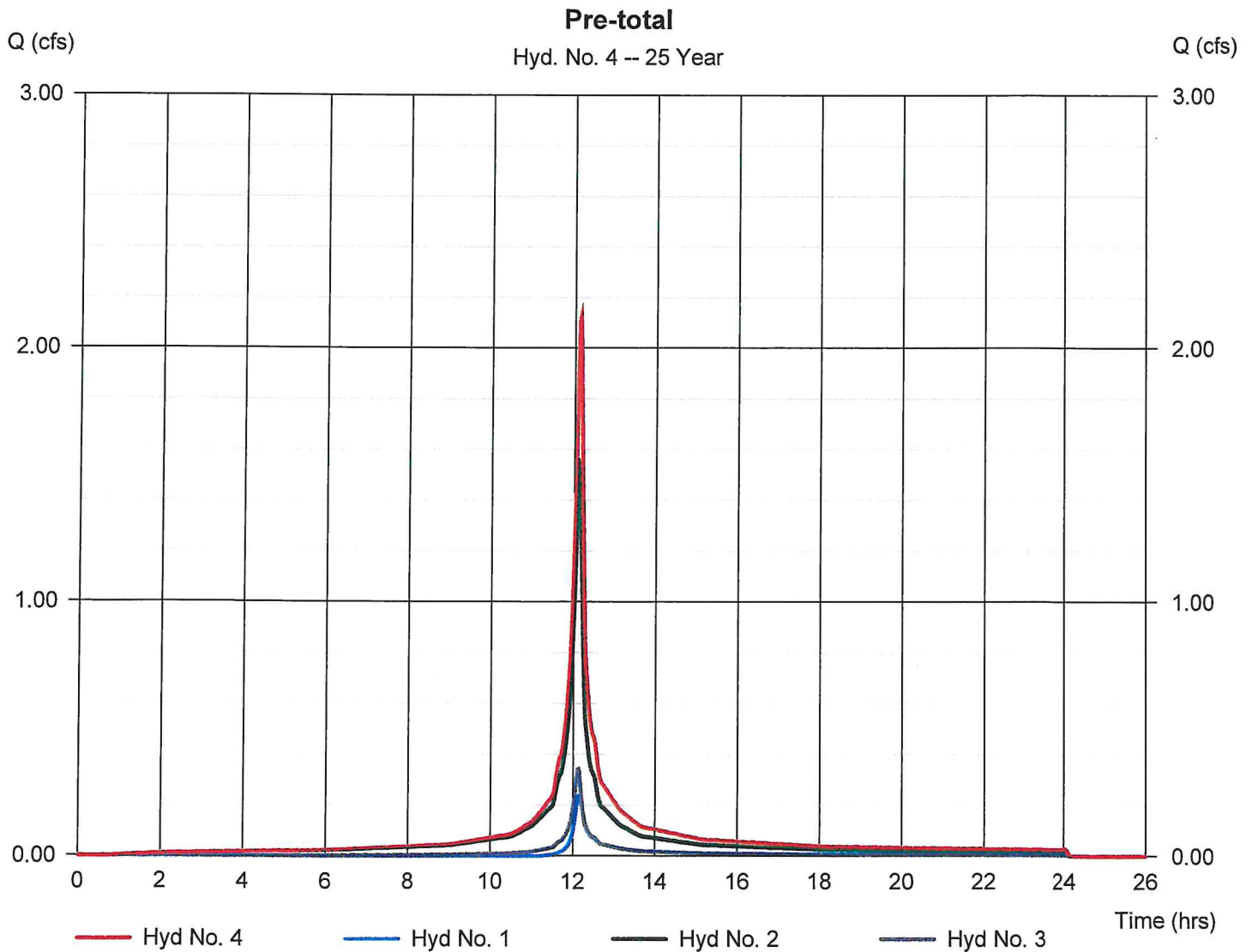
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

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## Hyd. No. 4

Pre-total

Hydrograph type	= Combine	Peak discharge	= 2.122 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 7,115 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 0.520 ac





# Hydrograph Report

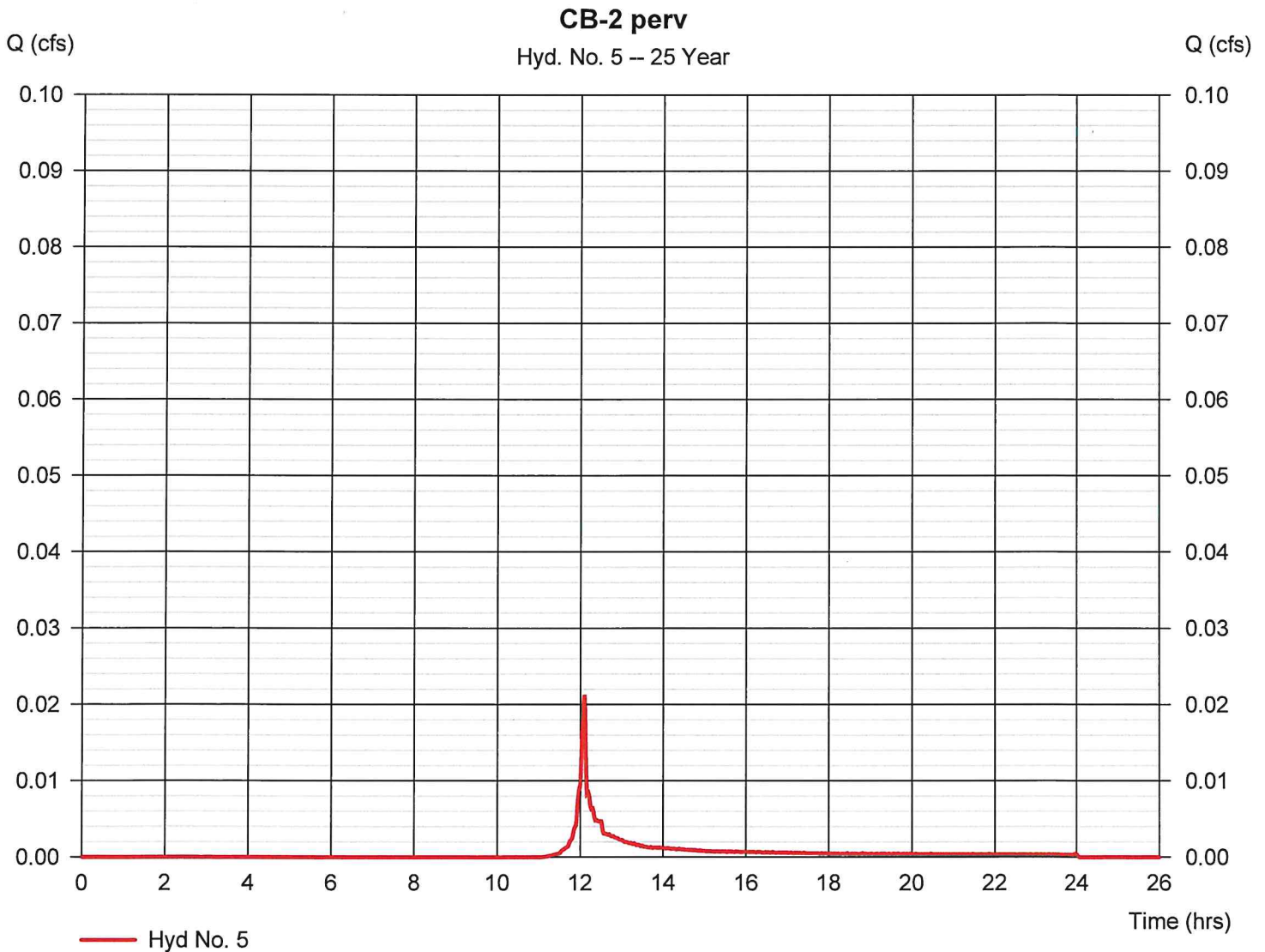
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

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## Hyd. No. 5

CB-2 perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.021 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 52 cuft
Drainage area	= 0.010 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.83 min
Total precip.	= 5.25 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



# Hydrograph Report

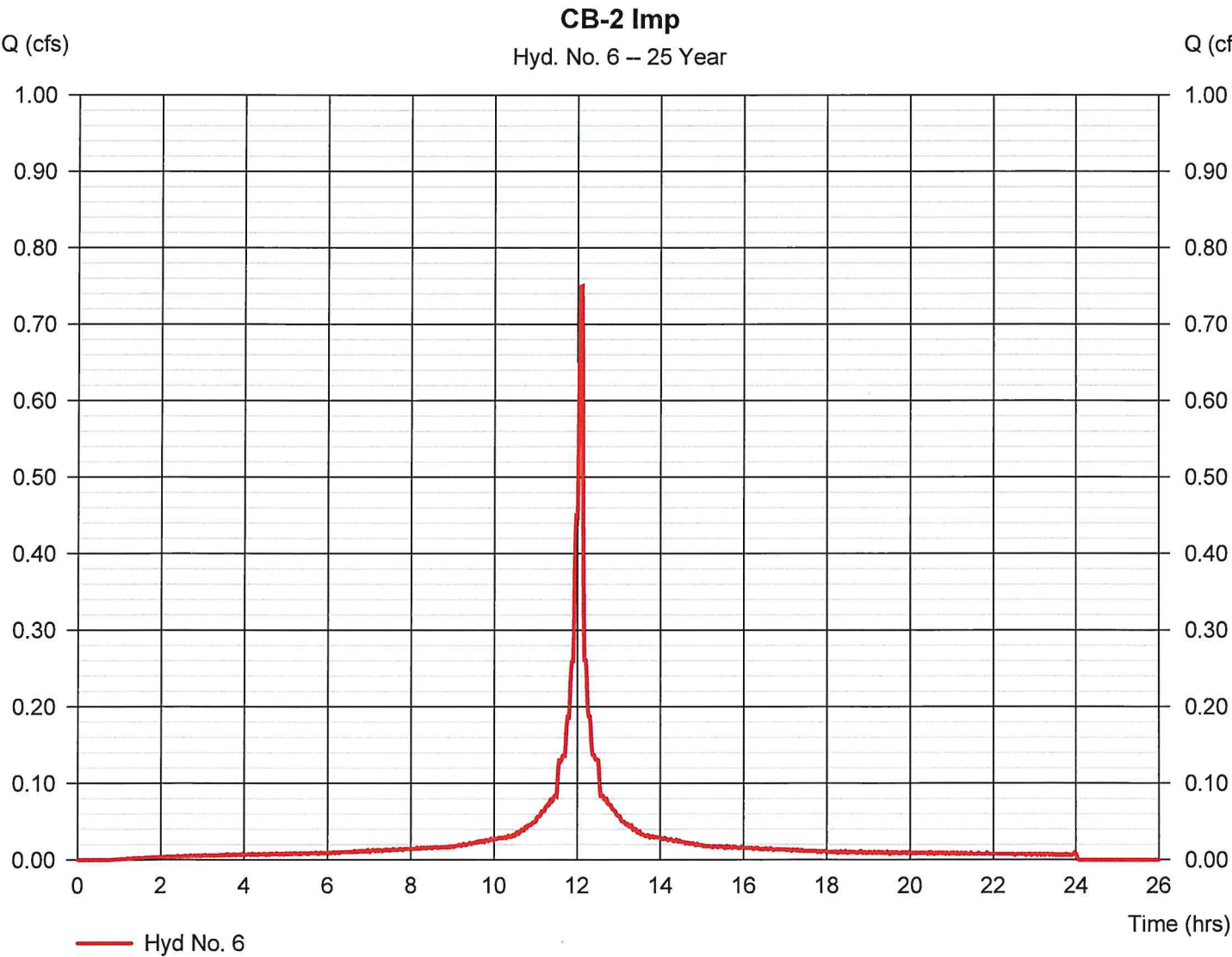
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

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## Hyd. No. 6

CB-2 Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 0.750 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 2,218 cuft
Drainage area	= 0.130 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 2.00 min
Total precip.	= 5.25 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484

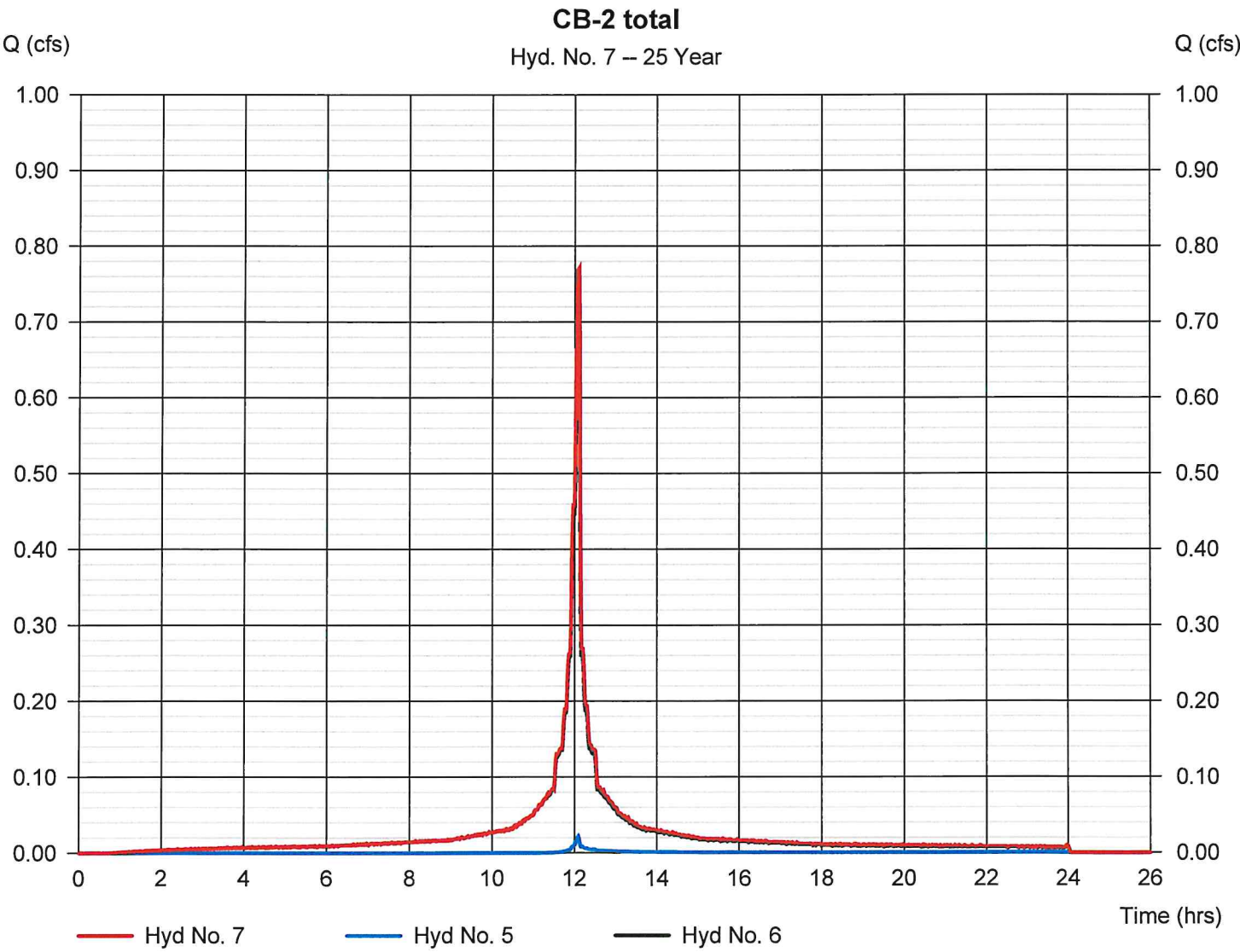


# Hydrograph Report

## Hyd. No. 7

CB-2 total

Hydrograph type	= Combine	Peak discharge	= 0.771 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 2,269 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 0.140 ac



# Hydrograph Report

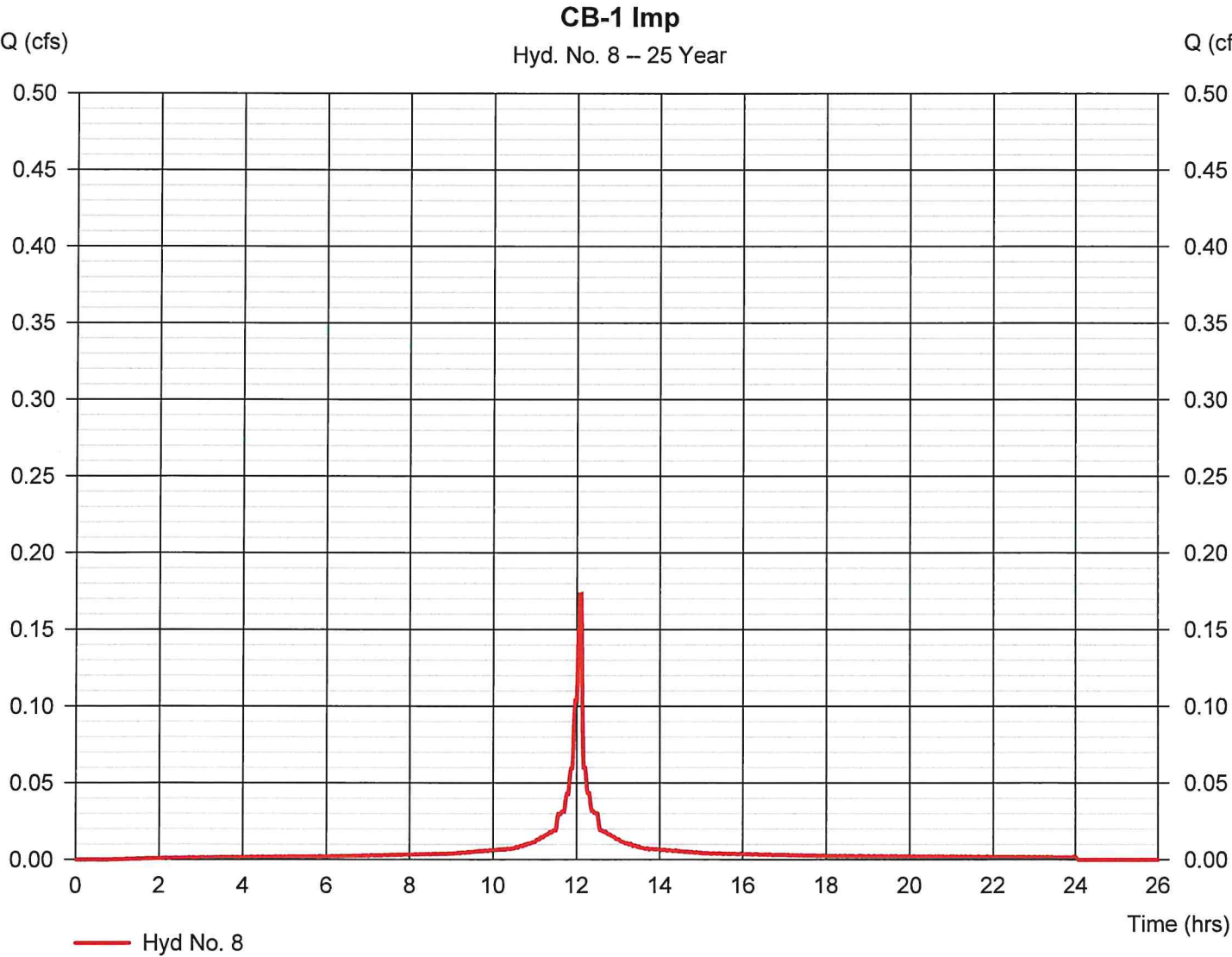
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## Hyd. No. 8

CB-1 Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 0.173 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 512 cuft
Drainage area	= 0.030 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.00 min
Total precip.	= 5.25 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



# Hydrograph Report

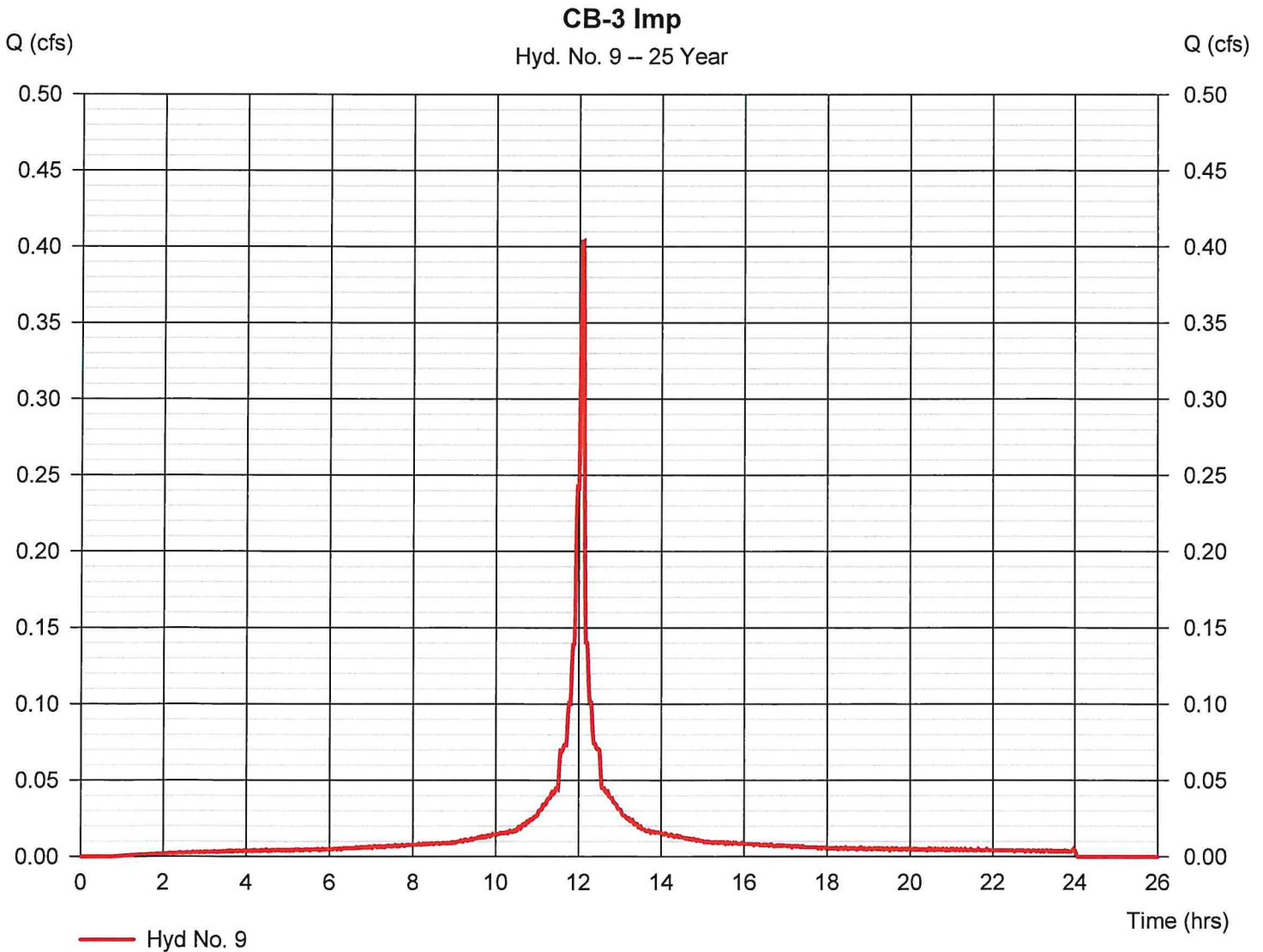
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## Hyd. No. 9

CB-3 Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 0.404 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 1,194 cuft
Drainage area	= 0.070 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 2.00 min
Total precip.	= 5.25 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484





# Hydrograph Report

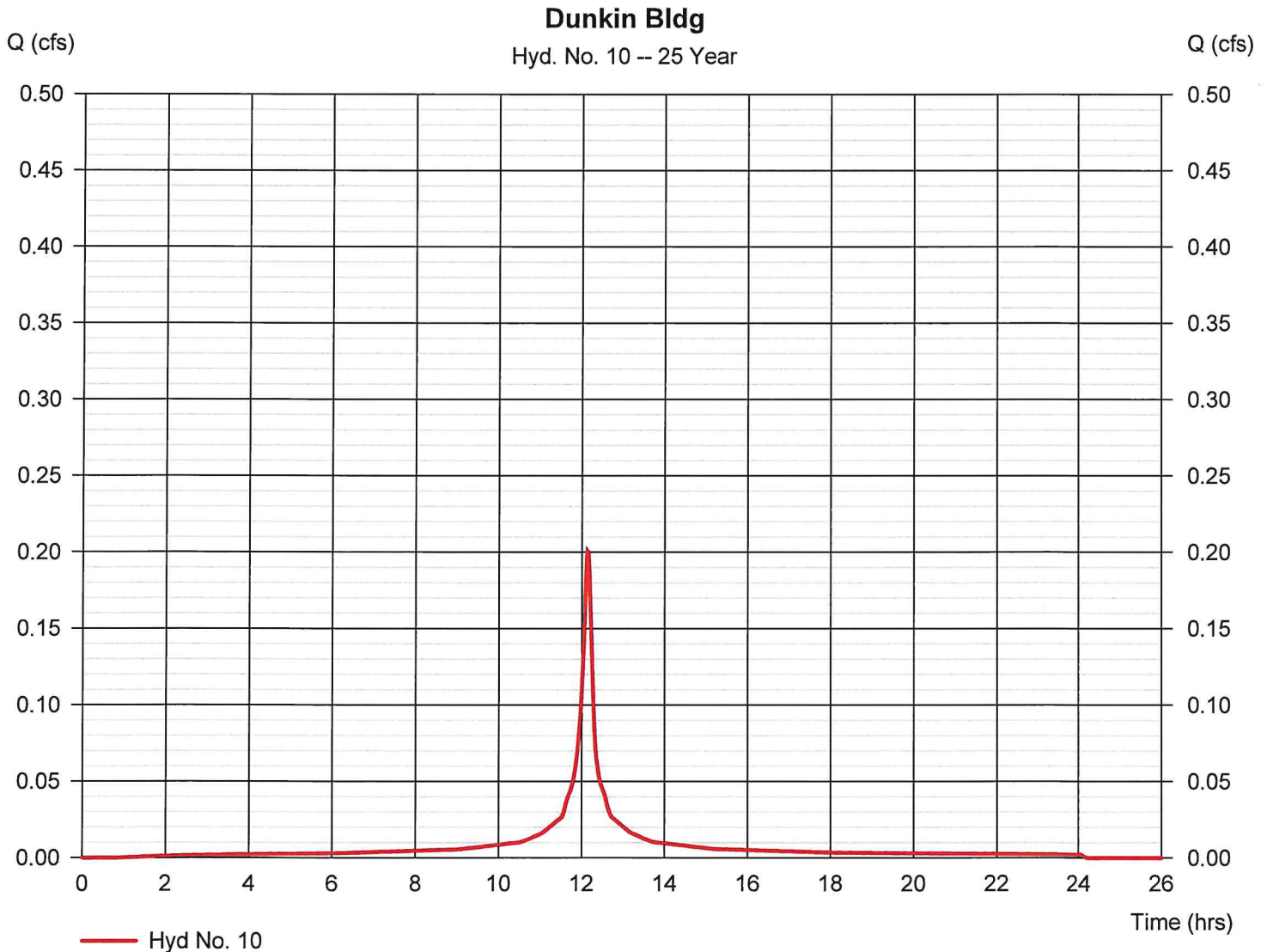
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## Hyd. No. 10

Dunkin Bldg

Hydrograph type	= SCS Runoff	Peak discharge	= 0.201 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 728 cuft
Drainage area	= 0.040 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.25 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484

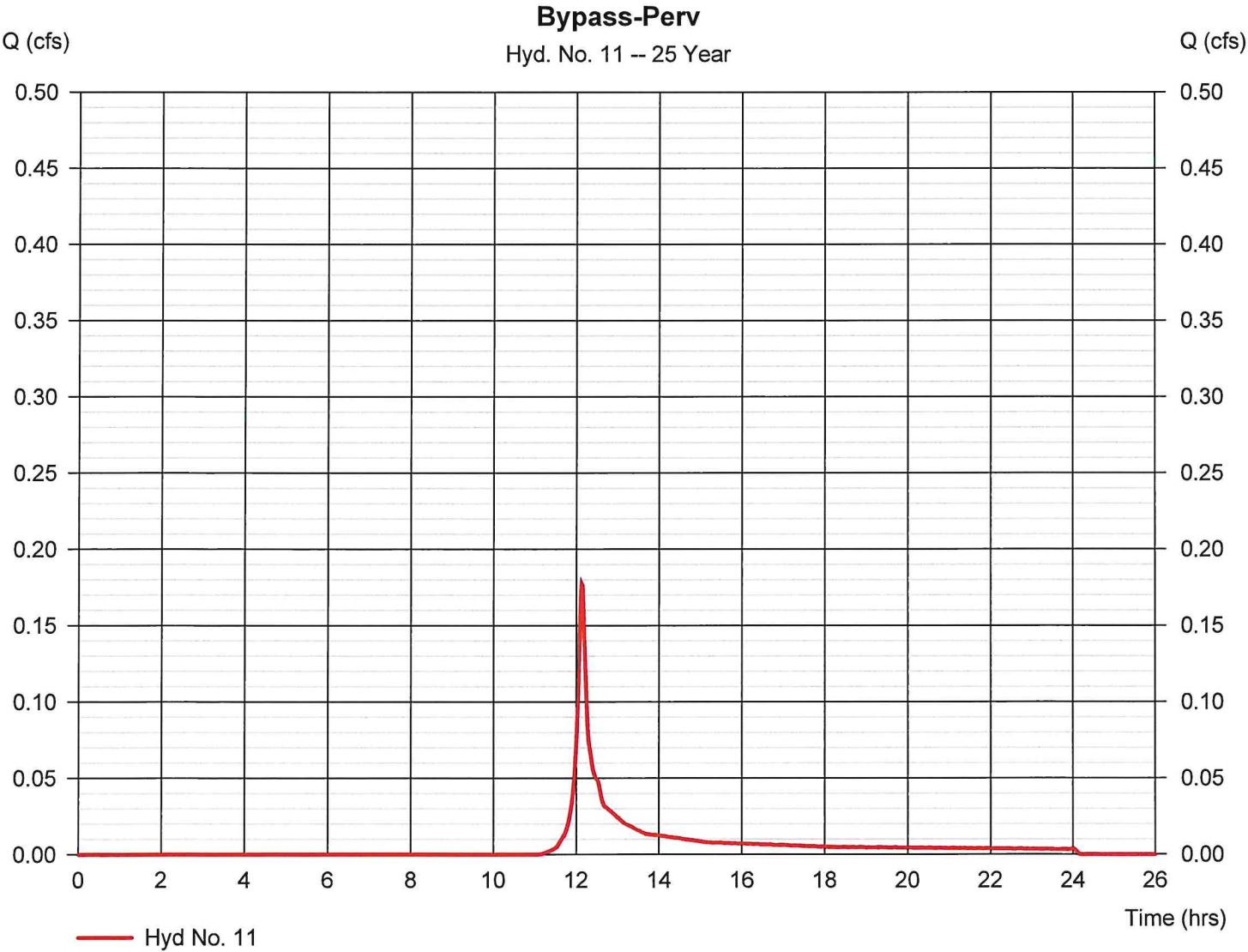


# Hydrograph Report

## Hyd. No. 11

### Bypass-Perv

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.177 cfs
Storm frequency	=	25 yrs	Time to peak	=	12.13 hrs
Time interval	=	1 min	Hyd. volume	=	539 cuft
Drainage area	=	0.100 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.80 min
Total precip.	=	5.25 in	Distribution	=	Custom
Storm duration	=	Z:\Stormwater\NOAA_C_1-MIN	Shape factor	=	484



# Hydrograph Report

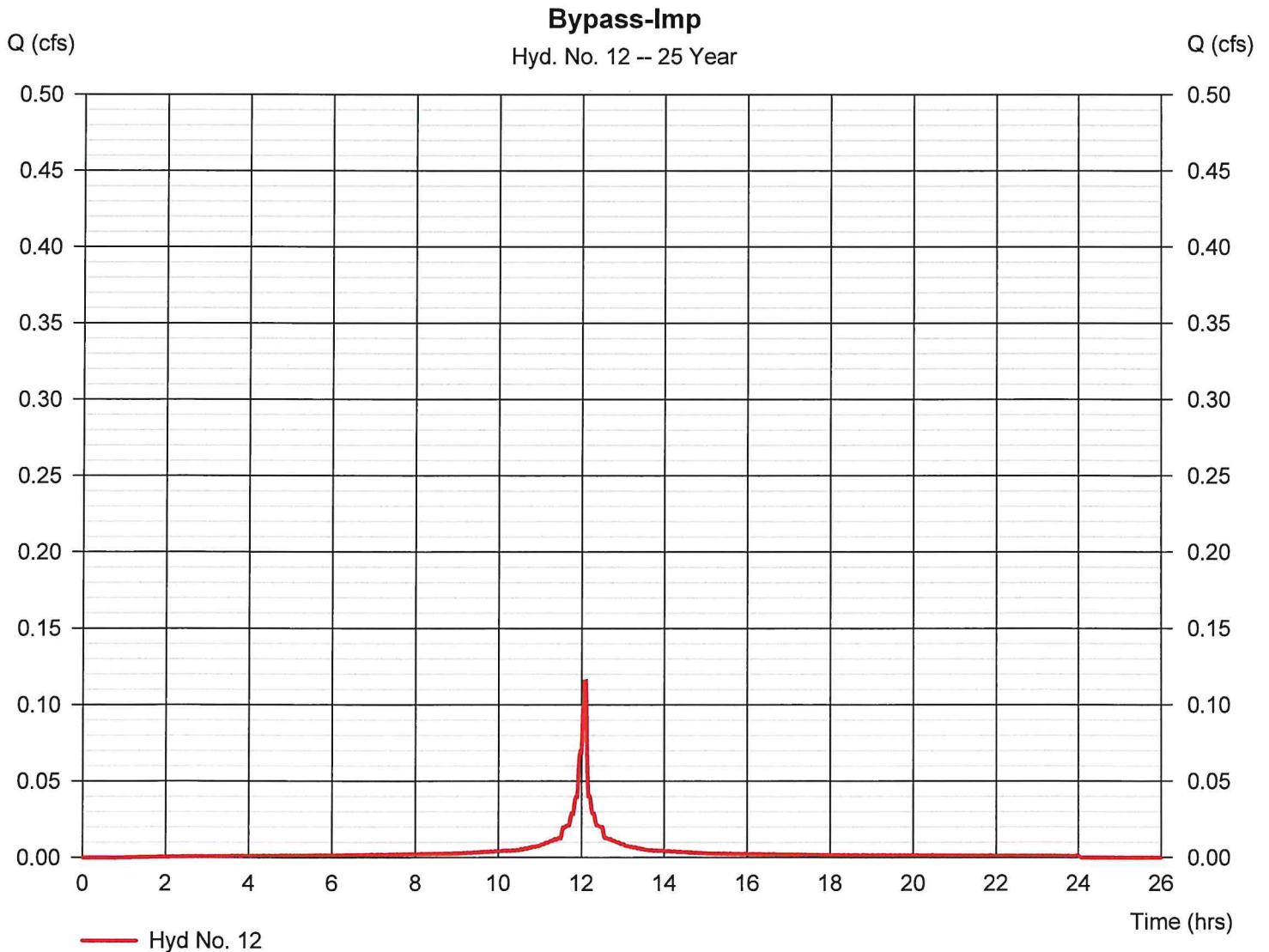
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## Hyd. No. 12

### Bypass-Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 0.115 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 341 cuft
Drainage area	= 0.020 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 2.00 min
Total precip.	= 5.25 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

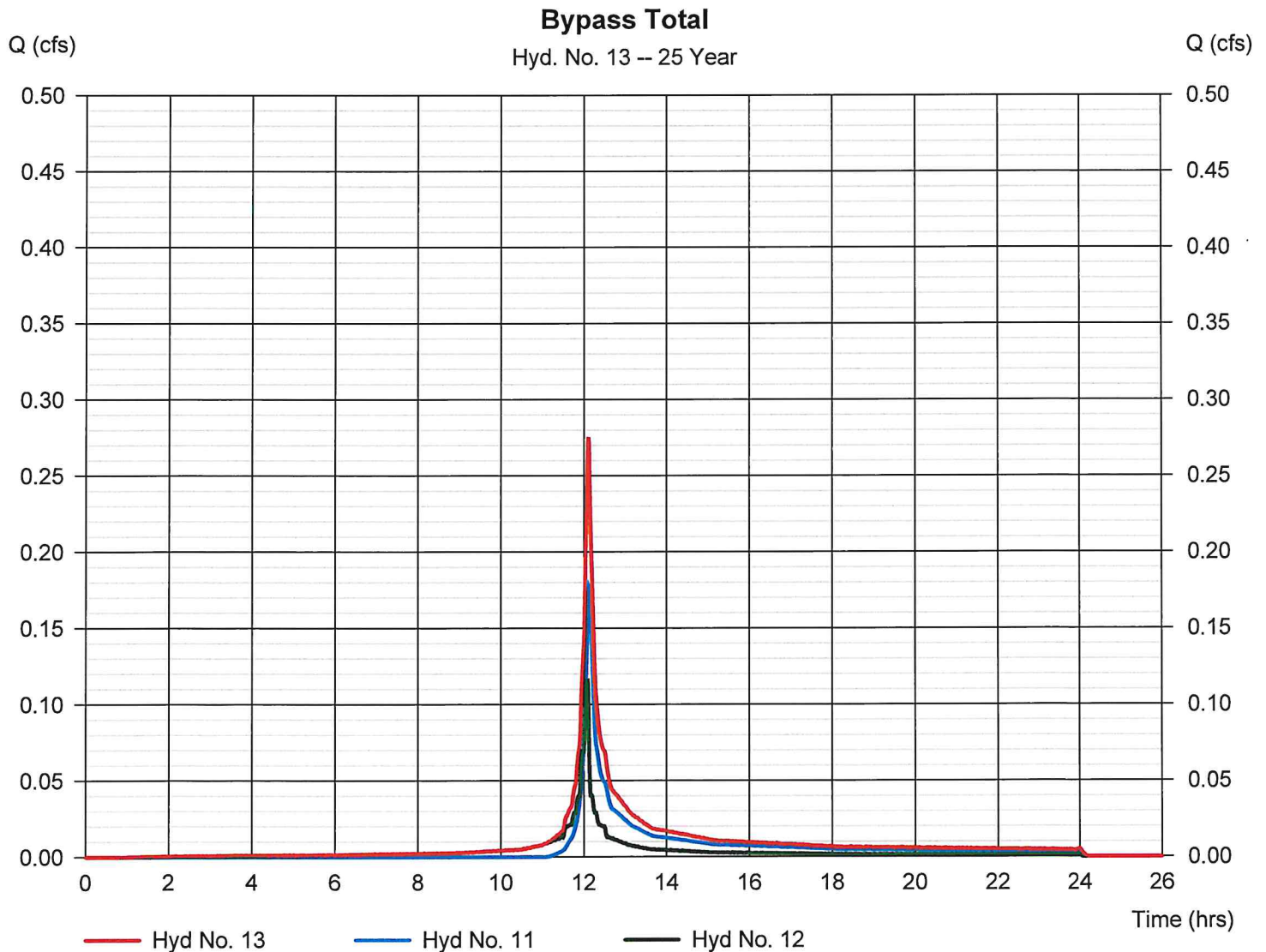
Thursday, 09 / 16 / 2021

## Hyd. No. 13

### Bypass Total

Hydrograph type = Combine  
 Storm frequency = 25 yrs  
 Time interval = 1 min  
 Inflow hyds. = 11, 12

Peak discharge = 0.275 cfs  
 Time to peak = 12.10 hrs  
 Hyd. volume = 880 cuft  
 Contrib. drain. area = 0.120 ac



# Hydrograph Report

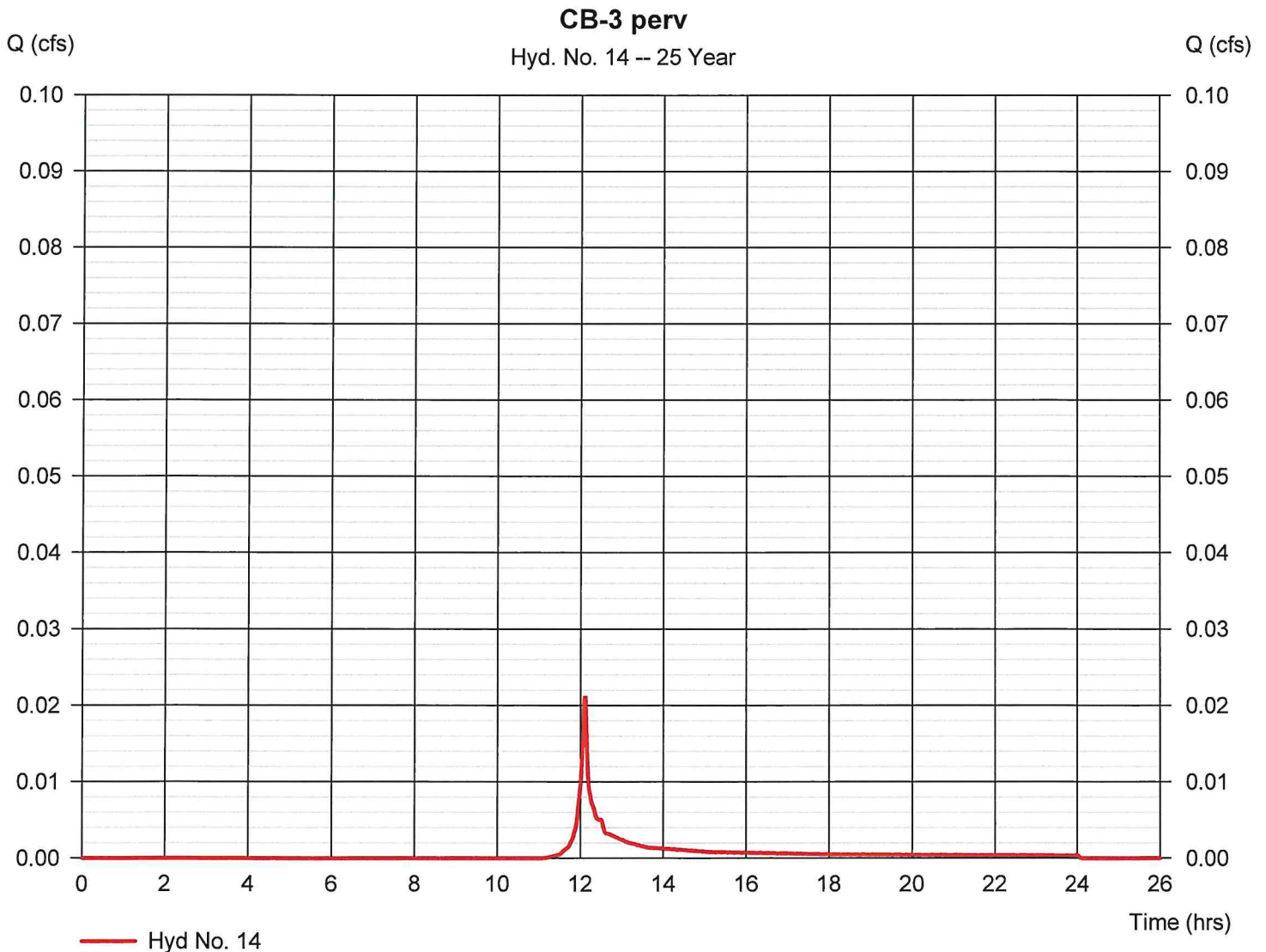
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

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## Hyd. No. 14

CB-3 perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.021 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 55 cuft
Drainage area	= 0.010 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 3.80 min
Total precip.	= 5.25 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484





# Hydrograph Report

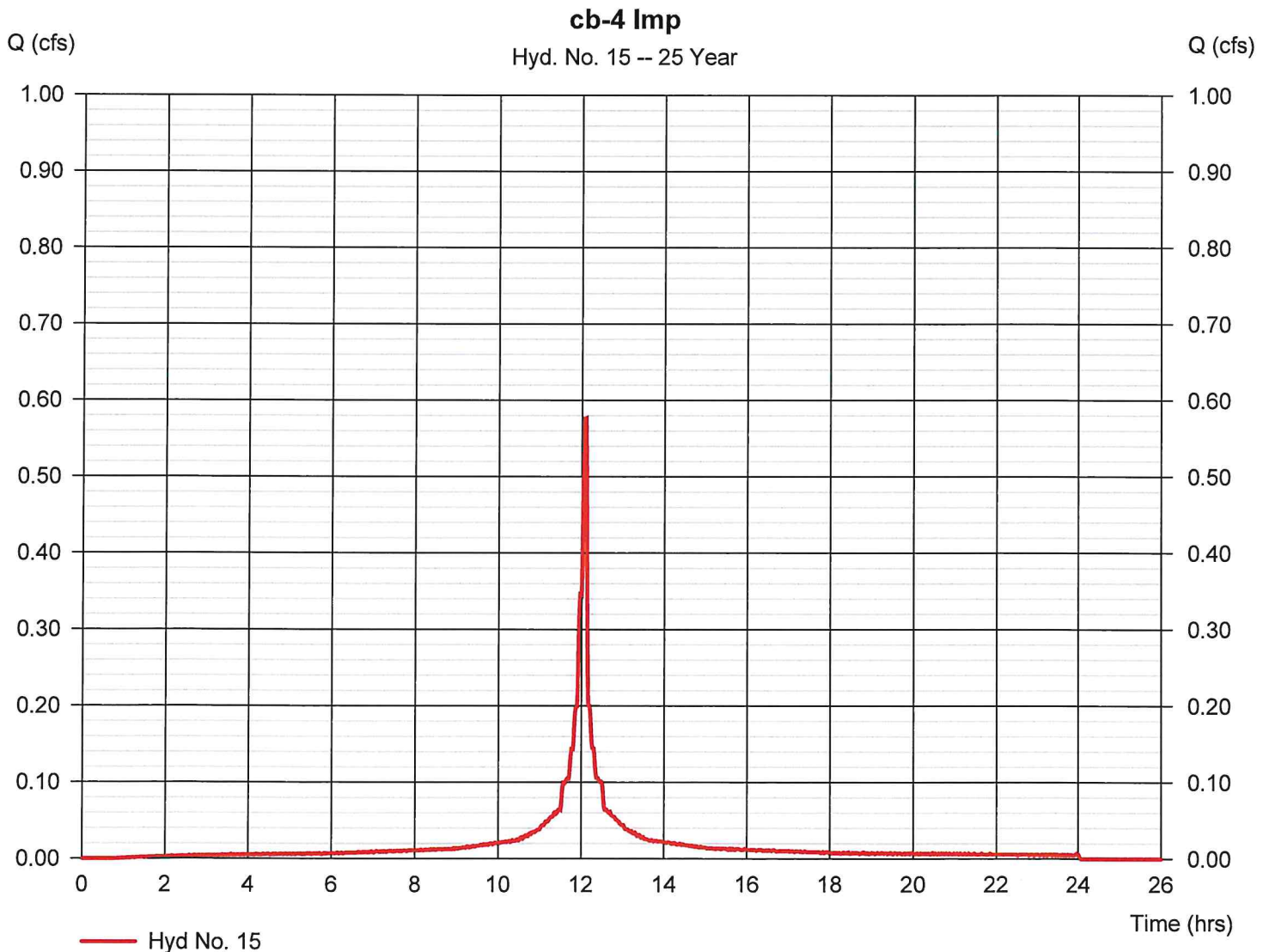
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

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## Hyd. No. 15

cb-4 Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 0.577 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 1,706 cuft
Drainage area	= 0.100 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 2.00 min
Total precip.	= 5.25 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484

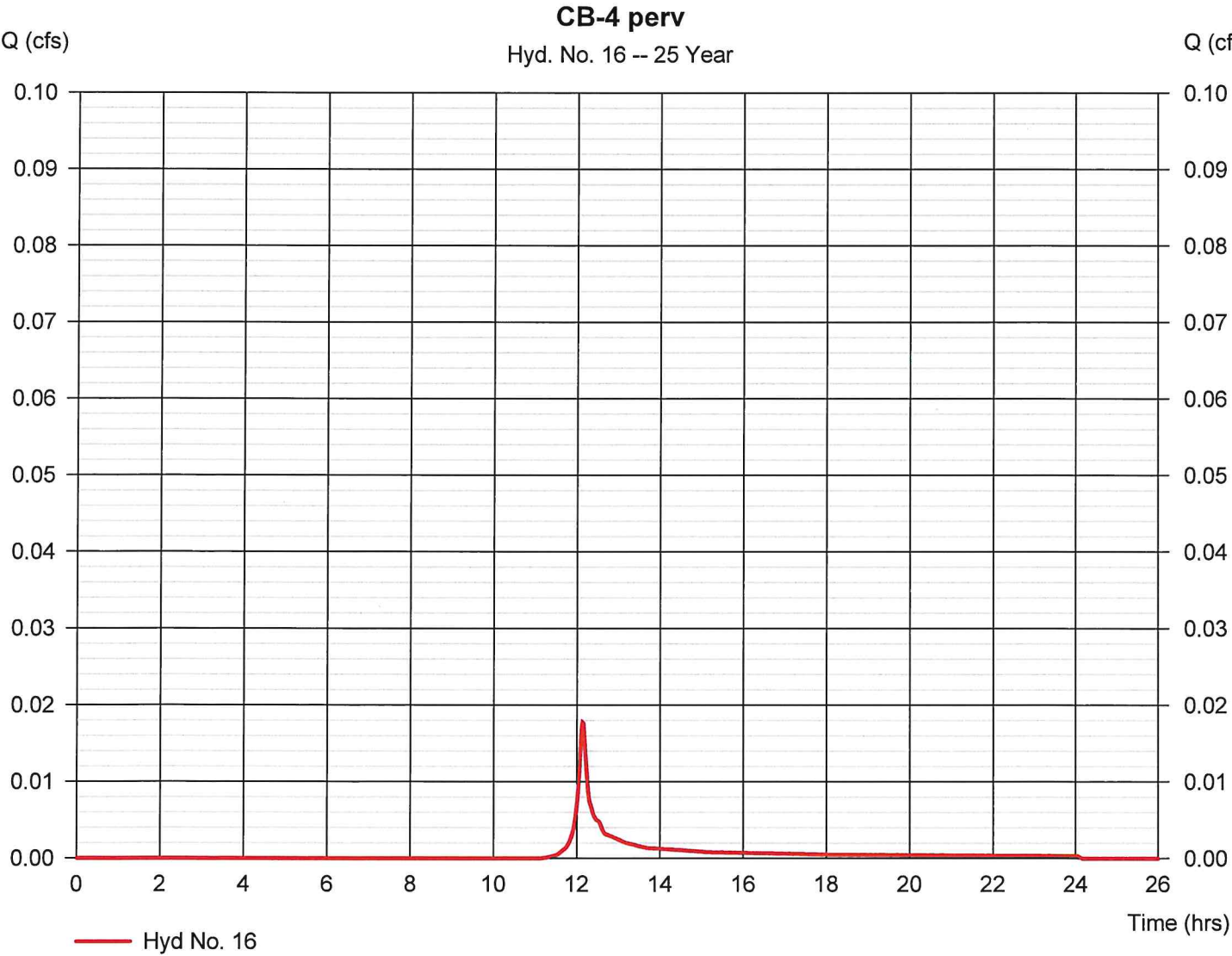


# Hydrograph Report

## Hyd. No. 16

CB-4 perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.018 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 54 cuft
Drainage area	= 0.010 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 7.70 min
Total precip.	= 5.25 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

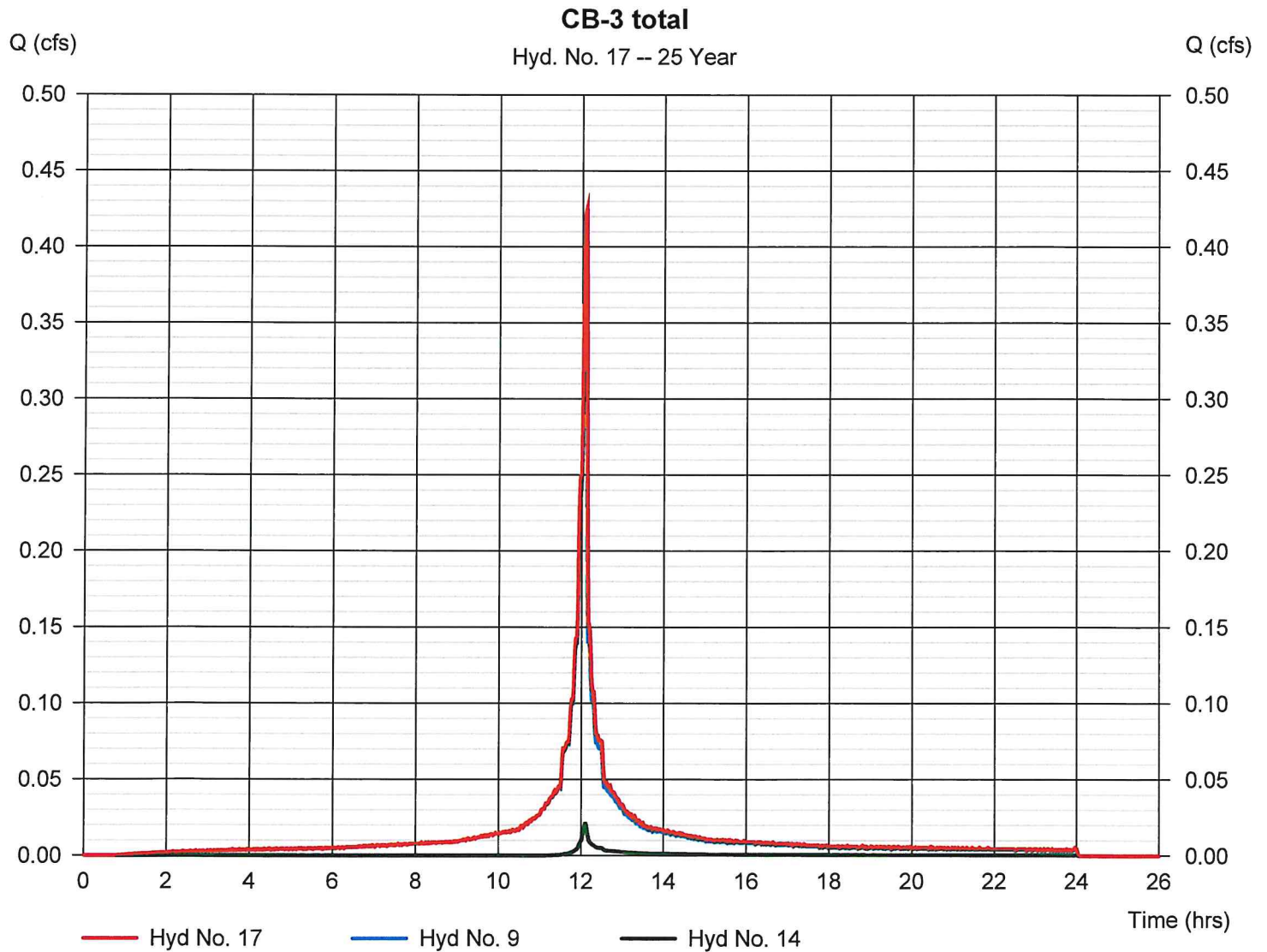
Thursday, 09 / 16 / 2021

## Hyd. No. 17

CB-3 total

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Time interval = 1 min  
Inflow hyds. = 9, 14

Peak discharge = 0.425 cfs  
Time to peak = 12.10 hrs  
Hyd. volume = 1,249 cuft  
Contrib. drain. area = 0.080 ac



# Hydrograph Report

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Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

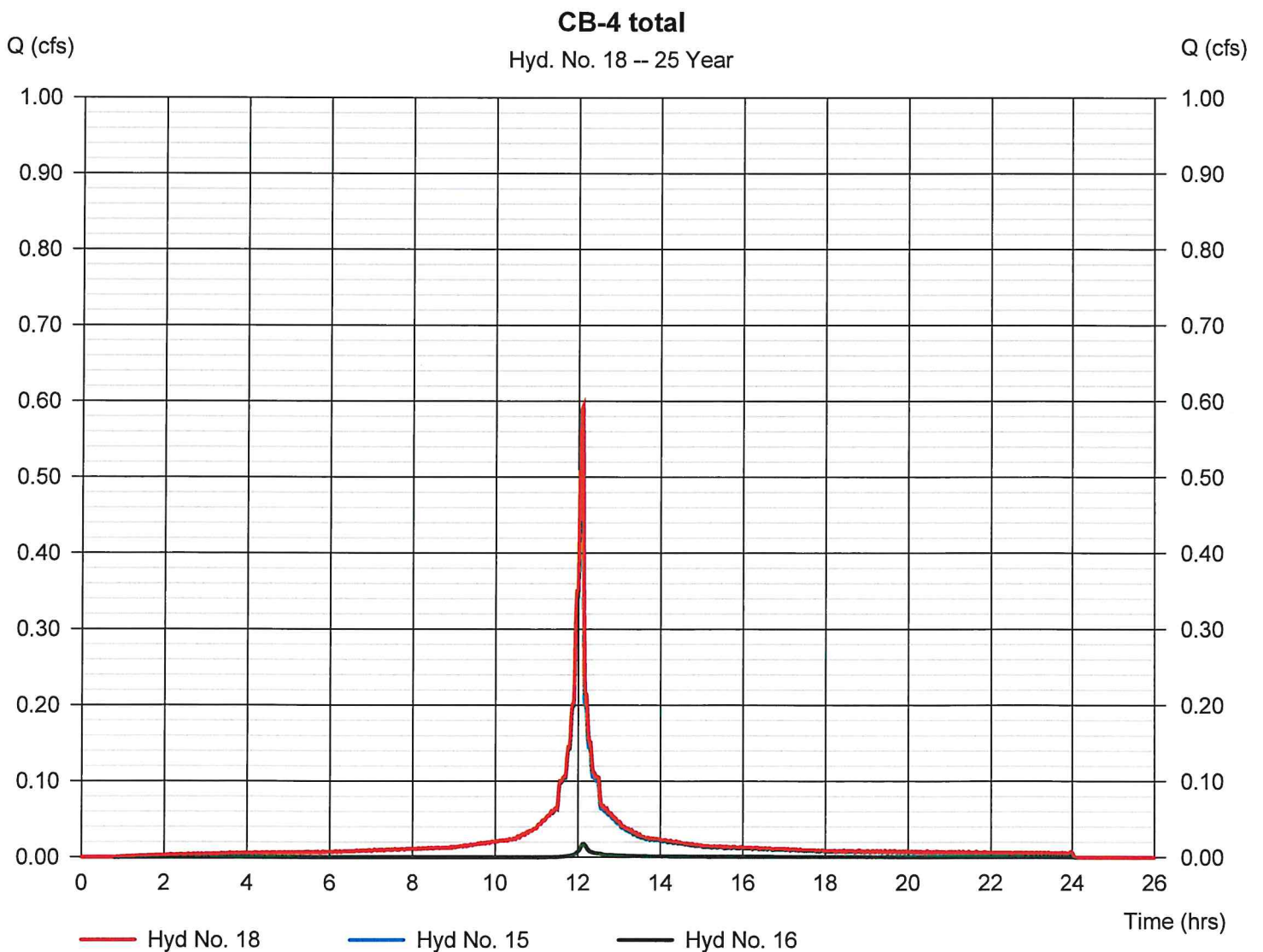
Thursday, 09 / 16 / 2021

## Hyd. No. 18

CB-4 total

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Time interval = 1 min  
Inflow hyds. = 15, 16

Peak discharge = 0.593 cfs  
Time to peak = 12.10 hrs  
Hyd. volume = 1,760 cuft  
Contrib. drain. area = 0.110 ac



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

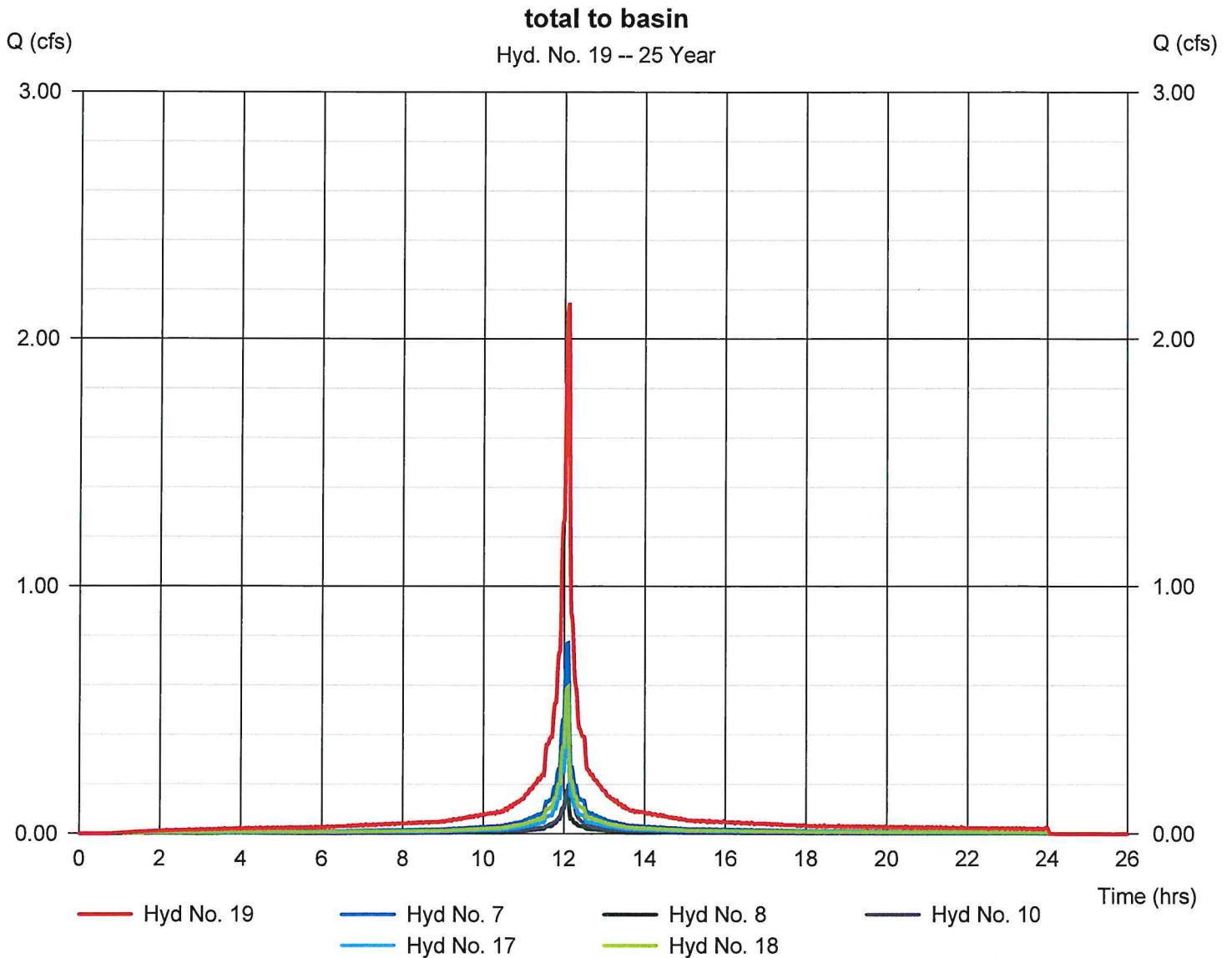
Thursday, 09 / 16 / 2021

## Hyd. No. 19

total to basin

Hydrograph type = Combine  
 Storm frequency = 25 yrs  
 Time interval = 1 min  
 Inflow hyds. = 7, 8, 10, 17, 18

Peak discharge = 2.147 cfs  
 Time to peak = 12.10 hrs  
 Hyd. volume = 6,518 cuft  
 Contrib. drain. area = 0.070 ac





# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

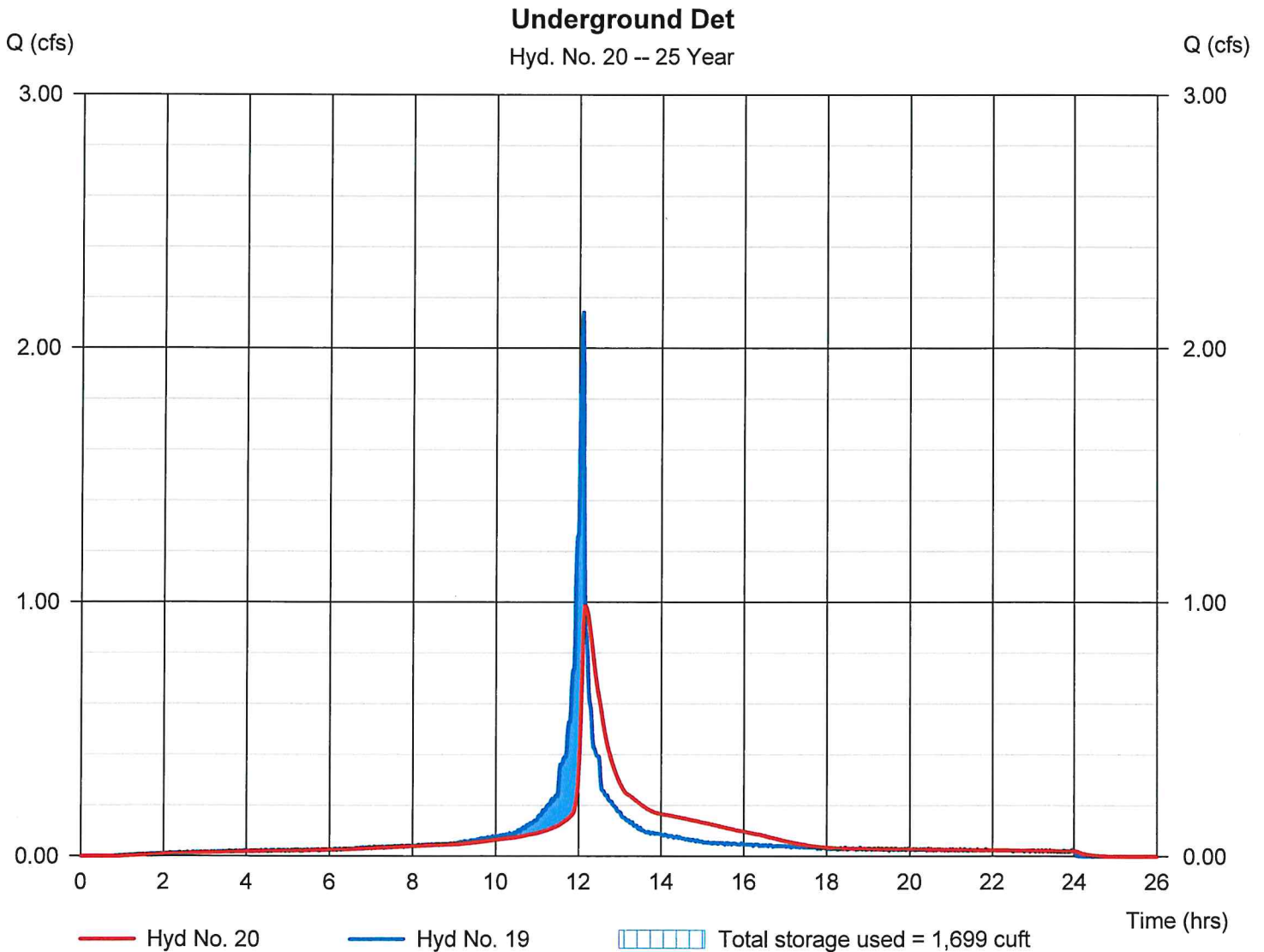
Thursday, 09 / 16 / 2021

## Hyd. No. 20

Underground Det

Hydrograph type	= Reservoir	Peak discharge	= 0.984 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.15 hrs
Time interval	= 1 min	Hyd. volume	= 6,517 cuft
Inflow hyd. No.	= 19 - total to basin	Max. Elevation	= 124.13 ft
Reservoir name	= Det Basin	Max. Storage	= 1,699 cuft

Storage Indication method used.

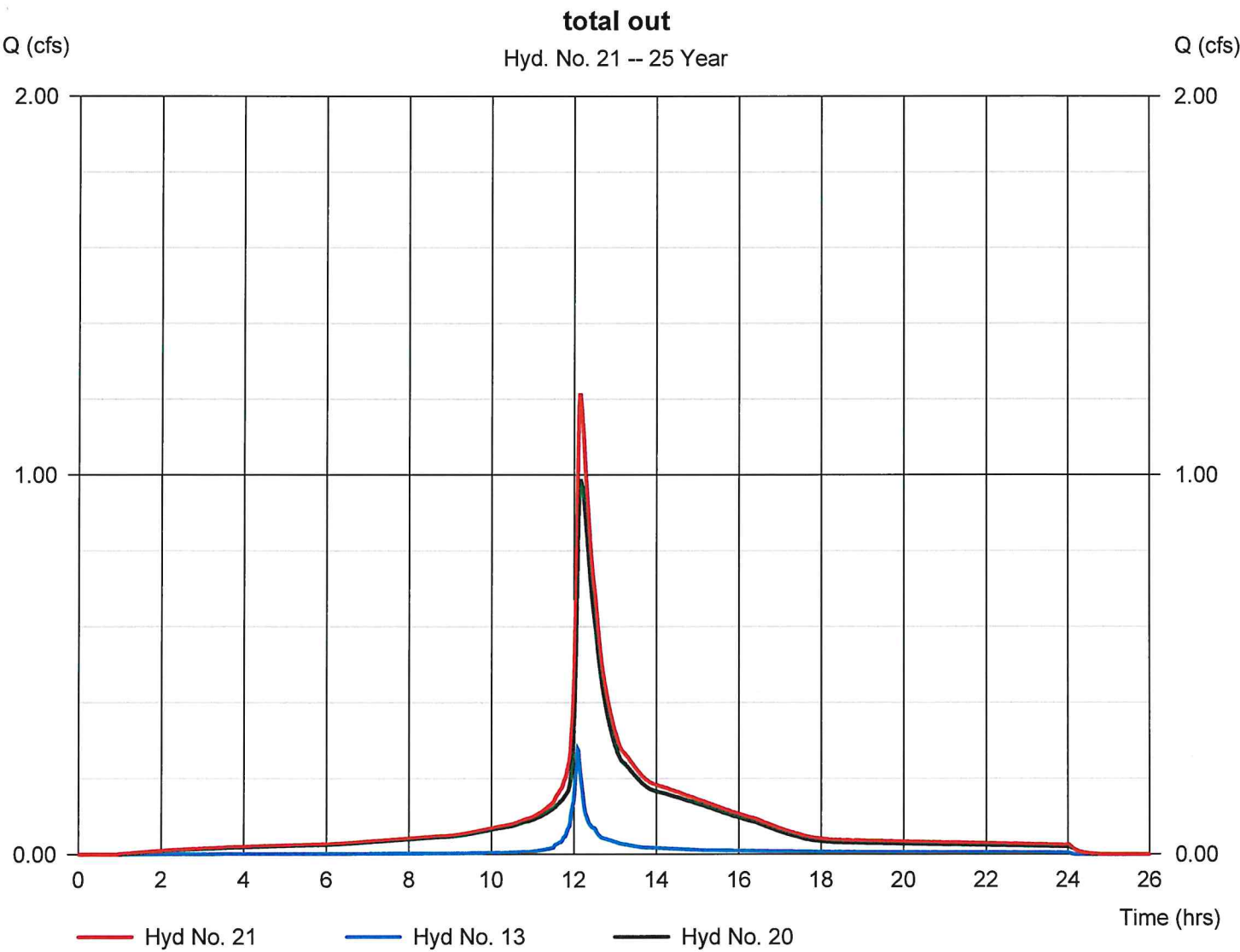


# Hydrograph Report

## Hyd. No. 21

total out

Hydrograph type	= Combine	Peak discharge	= 1.210 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 7,397 cuft
Inflow hyds.	= 13, 20	Contrib. drain. area	= 0.000 ac



# Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.450	1	729	1,410	----	----	----	Pre-Perv
2	SCS Runoff	2.106	1	727	7,285	----	----	----	Pre-Imp
3	SCS Runoff	0.496	1	728	1,514	----	----	----	Pre-gravel
4	Combine	3.039	1	728	10,209	1, 2, 3	----	----	Pre-total
5	SCS Runoff	0.039	1	726	94	----	----	----	CB-2 perv
6	SCS Runoff	1.016	1	726	3,035	----	----	----	CB-2 Imp
7	Combine	1.055	1	726	3,130	5, 6	----	----	CB-2 total
8	SCS Runoff	0.234	1	726	700	----	----	----	CB-1 Imp
9	SCS Runoff	0.547	1	726	1,634	----	----	----	CB-3 Imp
10	SCS Runoff	0.272	1	728	996	----	----	----	Dunkin Bldg
11	SCS Runoff	0.336	1	728	982	----	----	----	Bypass-Perv
12	SCS Runoff	0.156	1	726	467	----	----	----	Bypass-Imp
13	Combine	0.467	1	726	1,449	11, 12	----	----	Bypass Total
14	SCS Runoff	0.040	1	726	101	----	----	----	CB-3 perv
15	SCS Runoff	0.781	1	726	2,335	----	----	----	cb-4 Imp
16	SCS Runoff	0.034	1	728	98	----	----	----	CB-4 perv
17	Combine	0.587	1	726	1,735	9, 14,	----	----	CB-3 total
18	Combine	0.813	1	726	2,433	15, 16,	----	----	CB-4 total
19	Combine	2.941	1	726	8,994	7, 8, 10, 17, 18	----	----	total to basin
20	Reservoir	1.678	1	729	8,994	19	124.61	2,149	Underground Det
21	Combine	2.105	1	728	10,442	13, 20	----	----	total out
SCS Dunkin 9-1-2021.gpw					Return Period: 100 Year			Thursday, 09 / 16 / 2021	

# Hydrograph Report

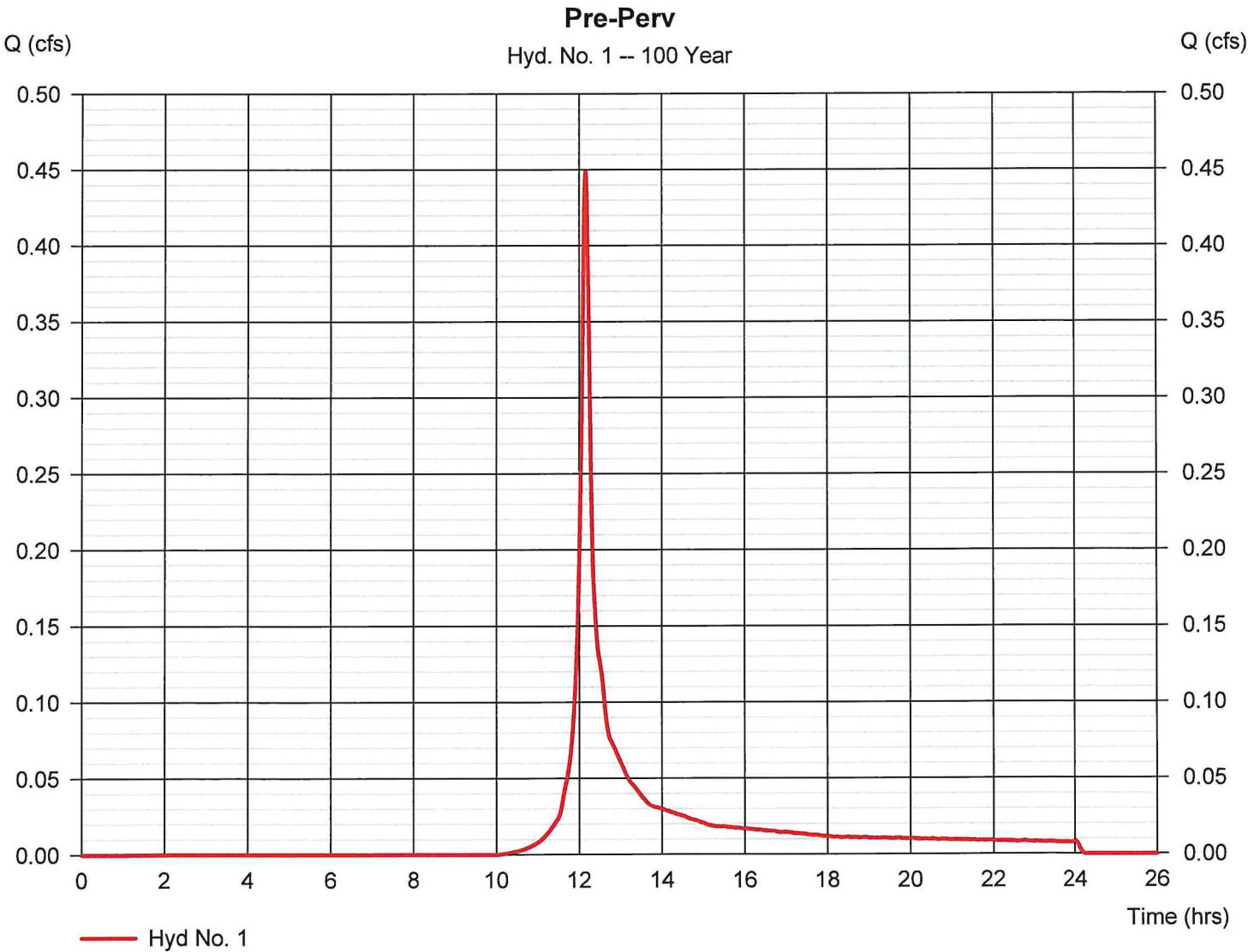
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Hyd. No. 1

Pre-Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.450 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.15 hrs
Time interval	= 1 min	Hyd. volume	= 1,410 cuft
Drainage area	= 0.140 ac	Curve number	= 61
Basin Slope	= 0.1 %	Hydraulic length	= 198 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 8.54 min
Total precip.	= 7.10 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



# Hydrograph Report

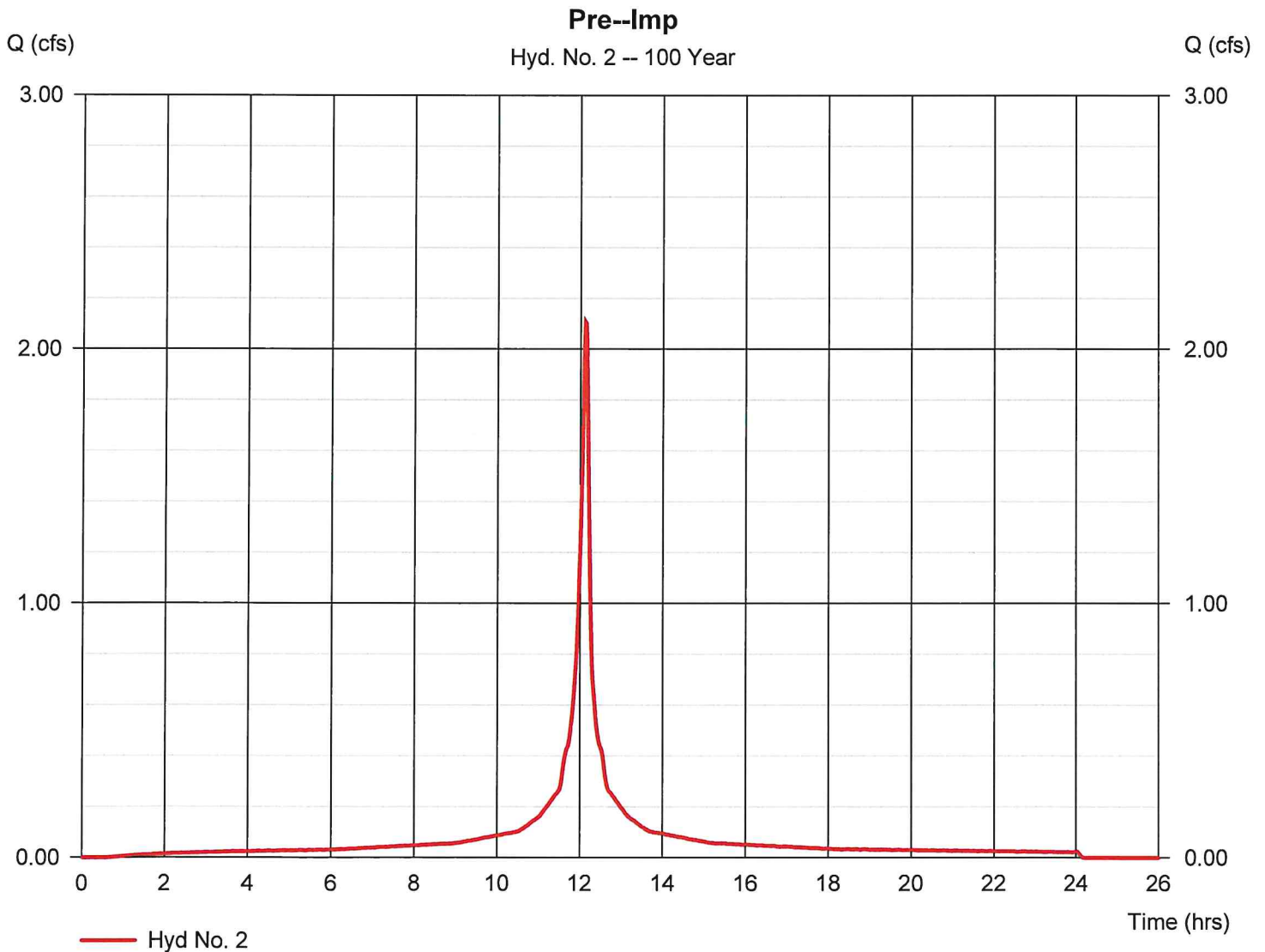
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Hyd. No. 2

Pre--Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 2.106 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.12 hrs
Time interval	= 1 min	Hyd. volume	= 7,285 cuft
Drainage area	= 0.300 ac	Curve number	= 98
Basin Slope	= 0.1 %	Hydraulic length	= 178 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 7.87 min
Total precip.	= 7.10 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484





# Hydrograph Report

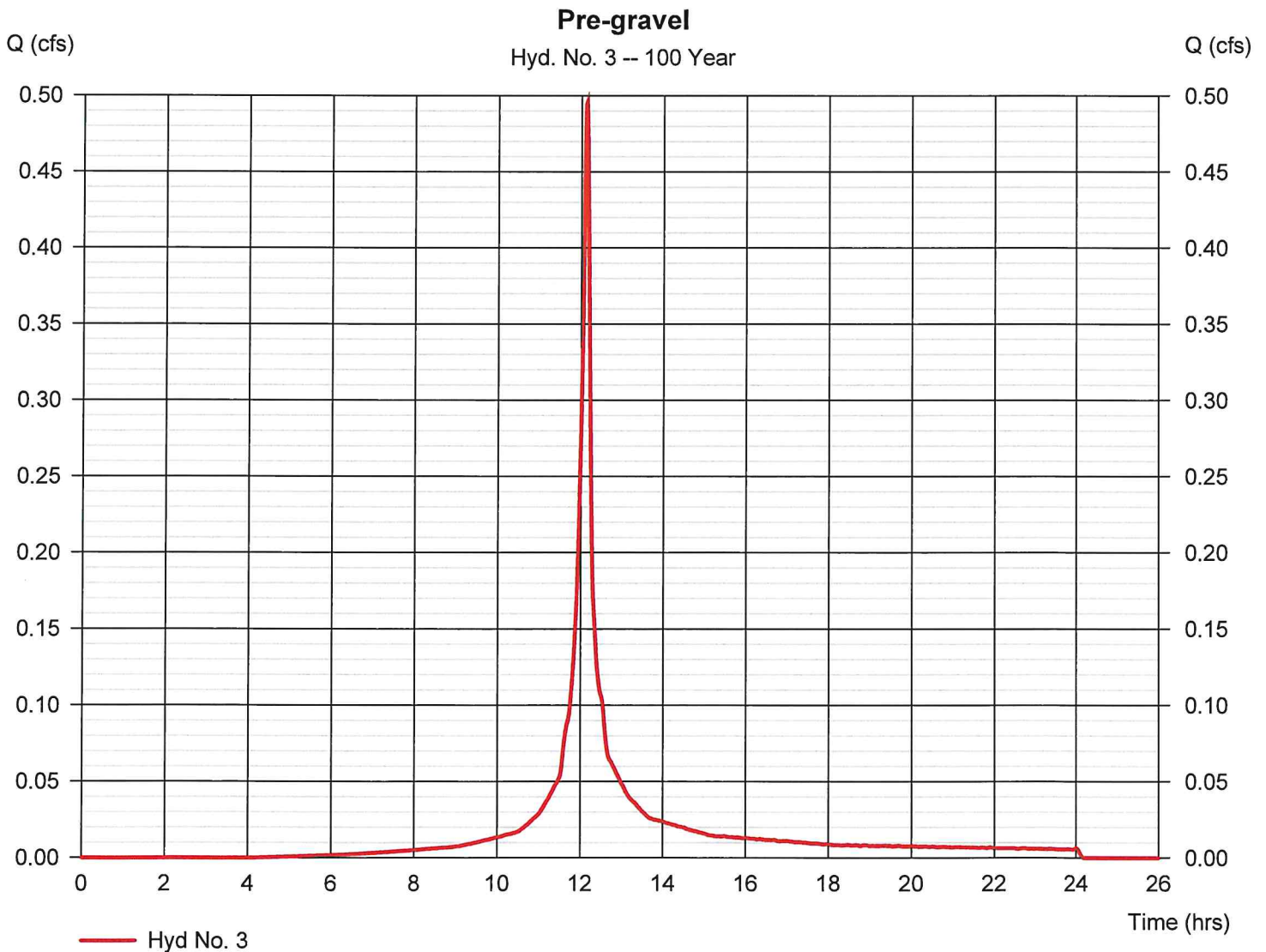
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Hyd. No. 3

Pre-gravel

Hydrograph type	= SCS Runoff	Peak discharge	= 0.496 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 1,514 cuft
Drainage area	= 0.080 ac	Curve number	= 85
Basin Slope	= 0.1 %	Hydraulic length	= 178 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 7.87 min
Total precip.	= 7.10 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



# Hydrograph Report

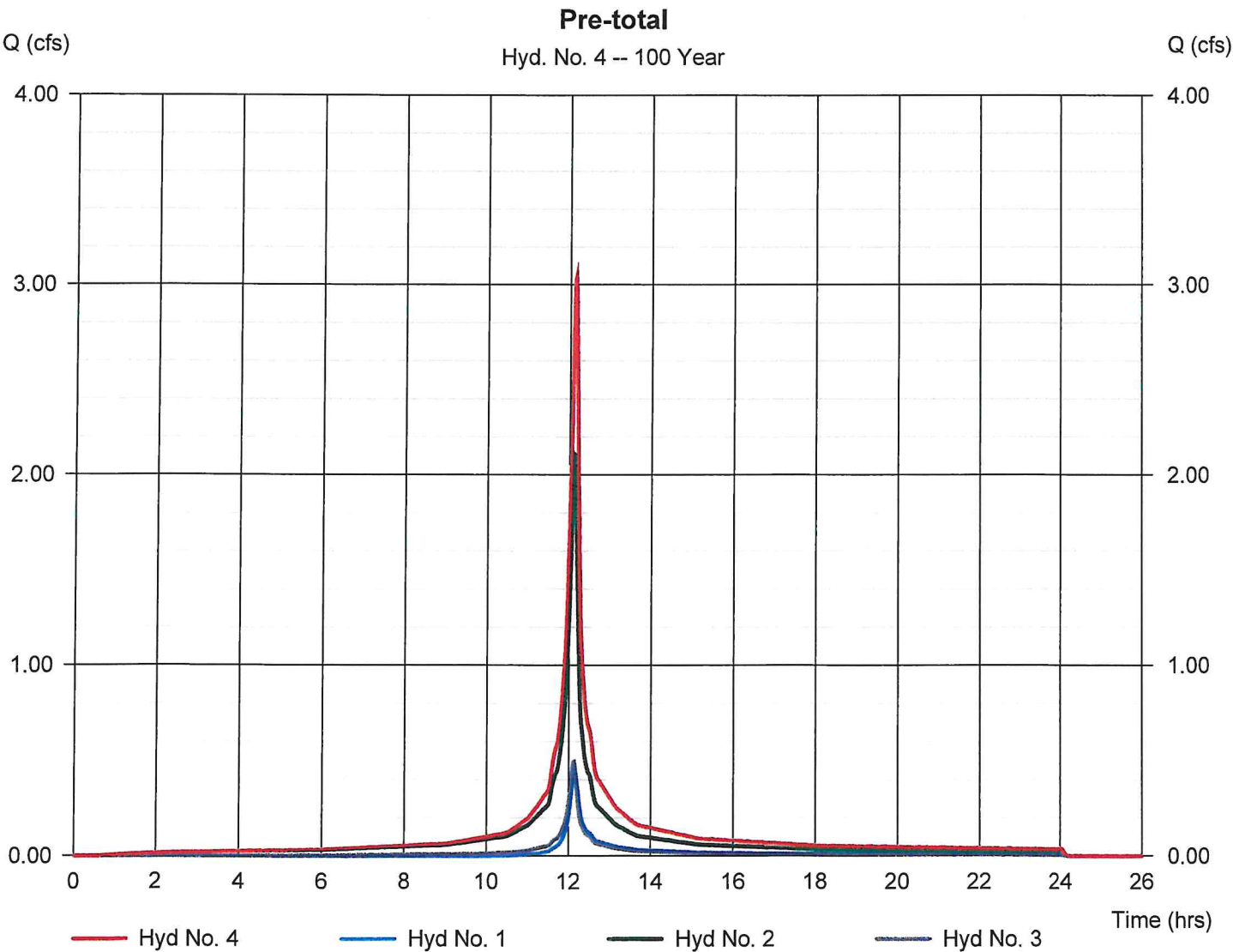
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Hyd. No. 4

### Pre-total

Hydrograph type	= Combine	Peak discharge	= 3.039 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 10,209 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 0.520 ac



# Hydrograph Report

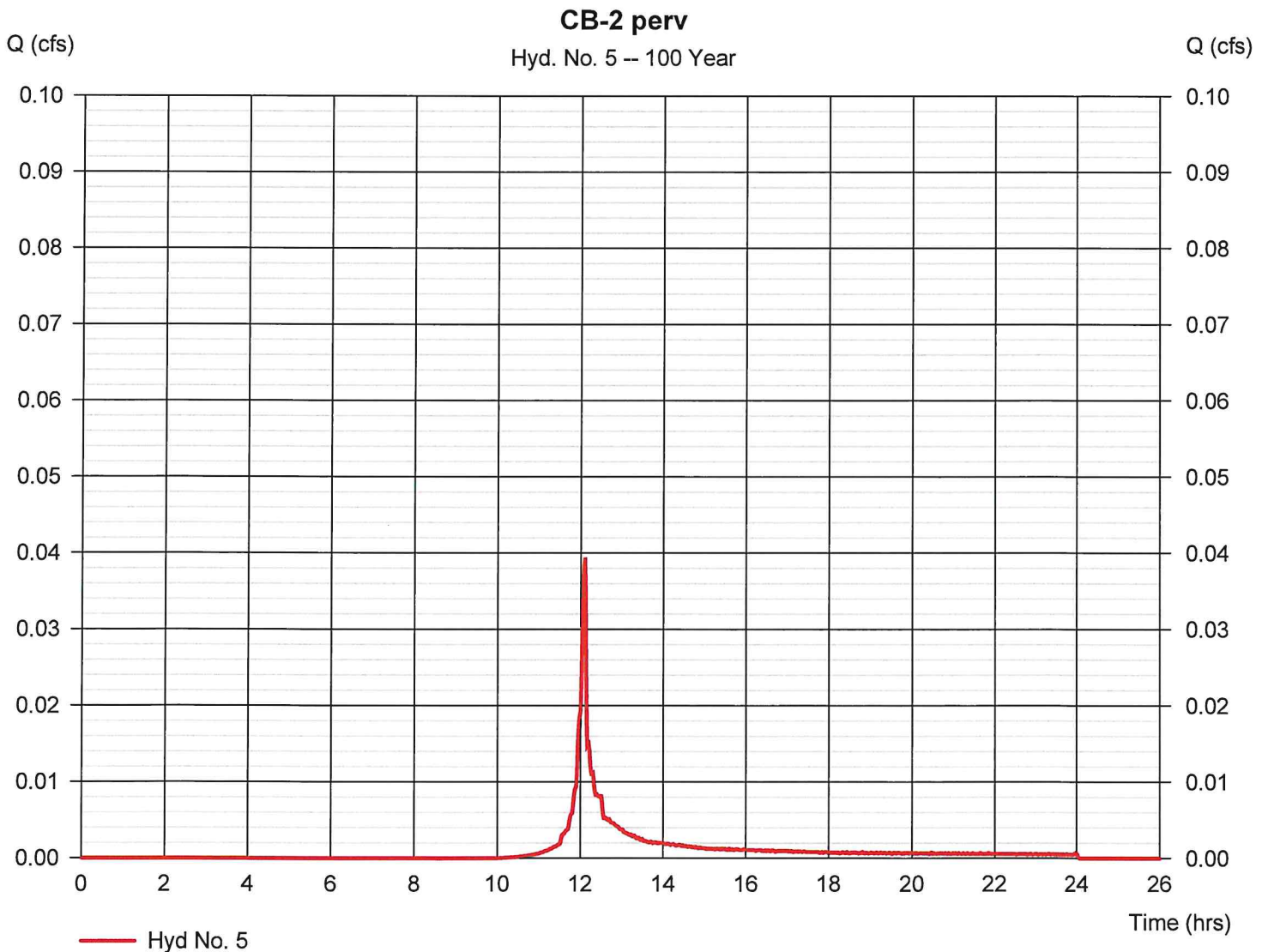
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Hyd. No. 5

CB-2 perv

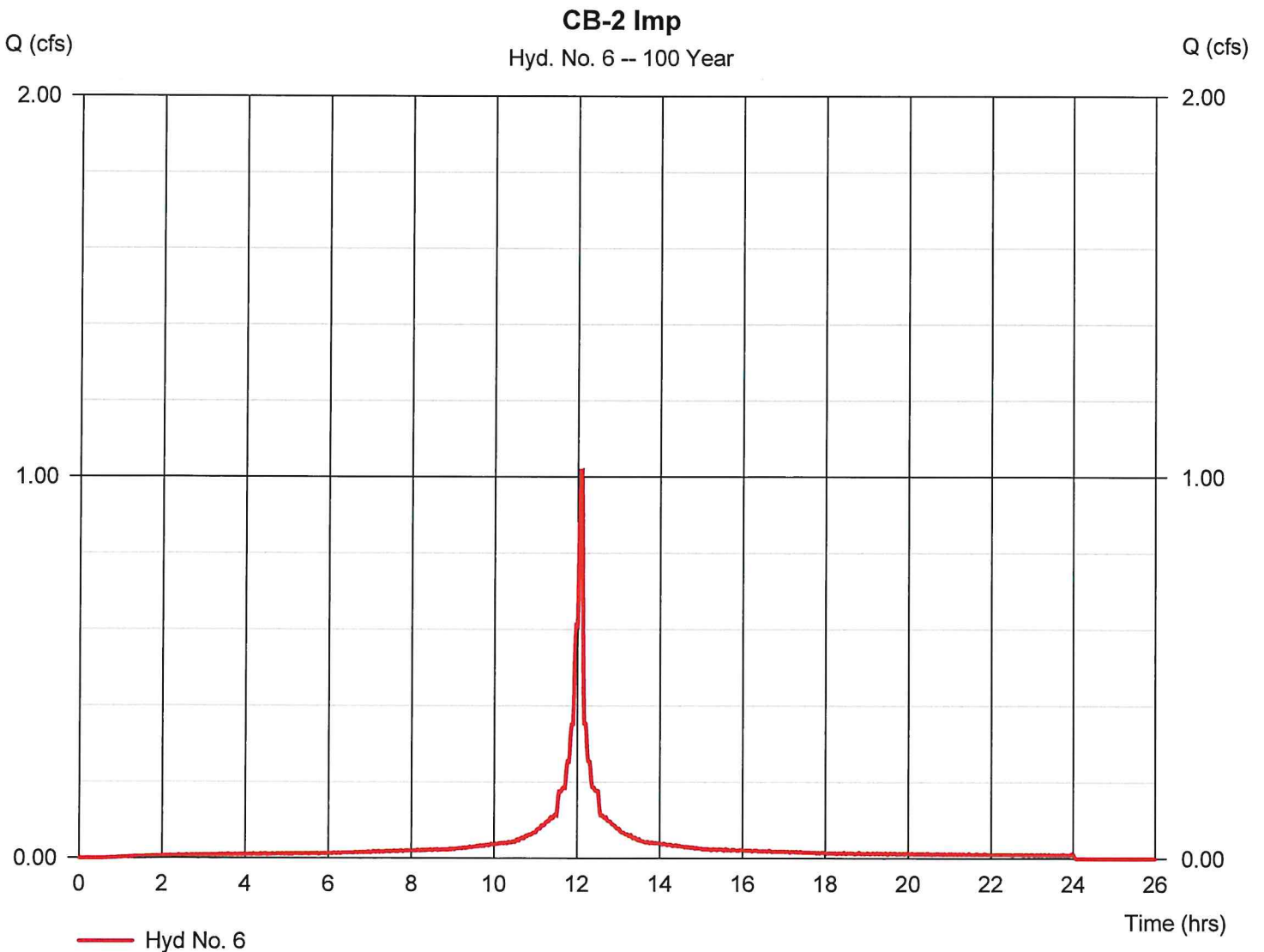
Hydrograph type	= SCS Runoff	Peak discharge	= 0.039 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 94 cuft
Drainage area	= 0.010 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.83 min
Total precip.	= 7.10 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



## Hyd. No. 6

### CB-2 Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 1.016 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 3,035 cuft
Drainage area	= 0.130 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 2.00 min
Total precip.	= 7.10 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



# Hydrograph Report

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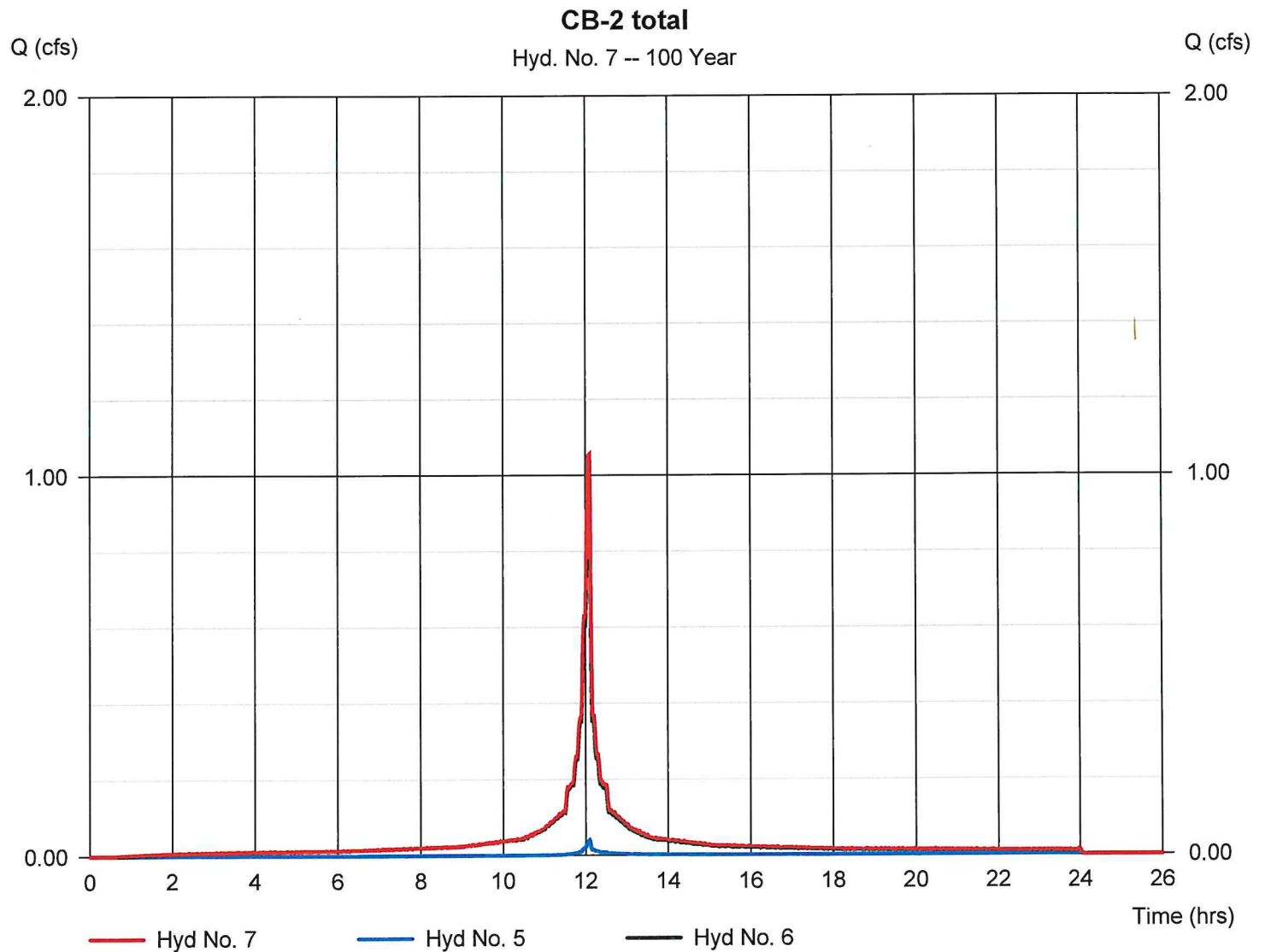
Thursday, 09 / 16 / 2021

## Hyd. No. 7

CB-2 total

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Time interval = 1 min  
Inflow hyds. = 5, 6

Peak discharge = 1.055 cfs  
Time to peak = 12.10 hrs  
Hyd. volume = 3,130 cuft  
Contrib. drain. area = 0.140 ac





# Hydrograph Report

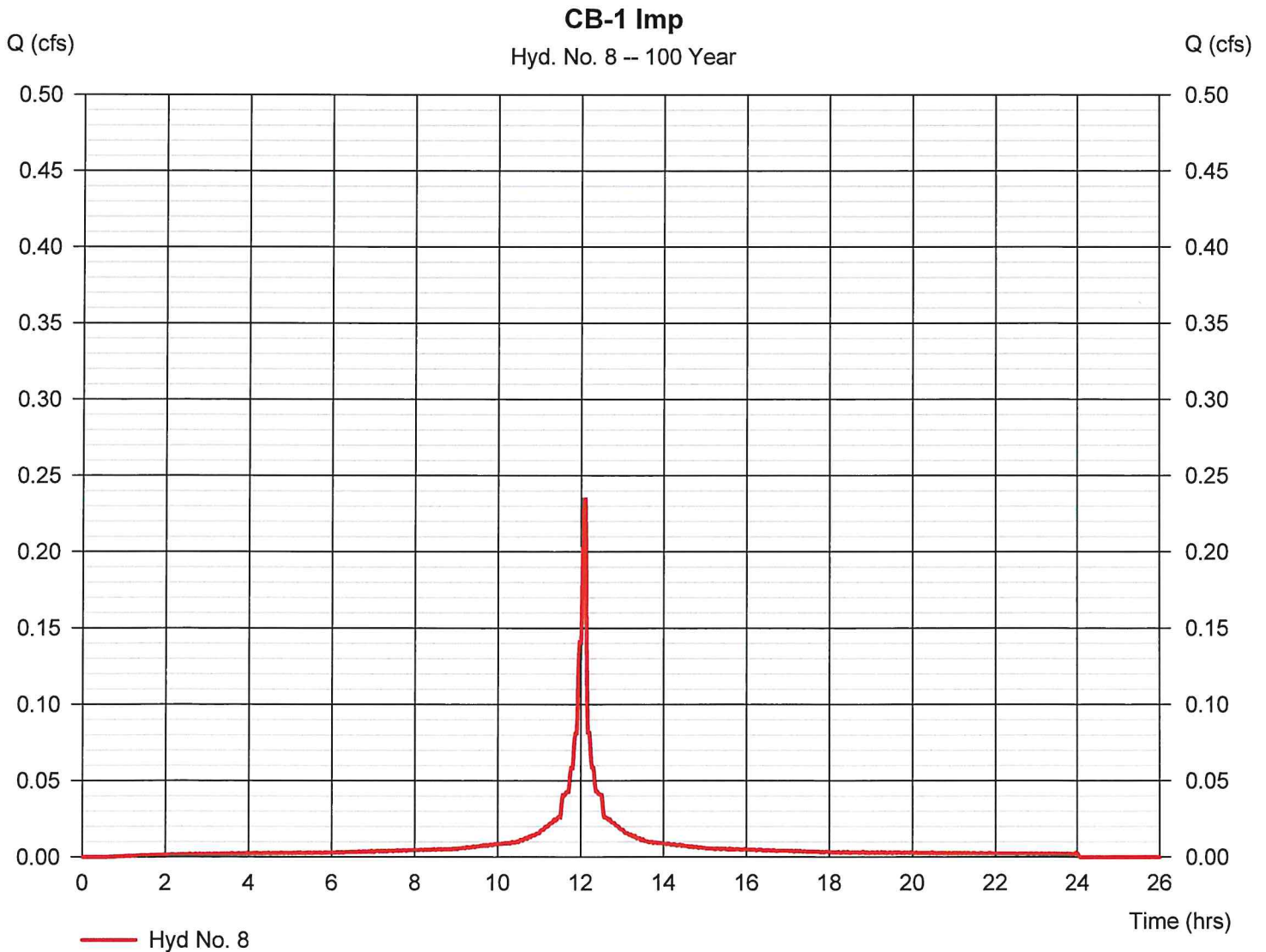
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Hyd. No. 8

CB-1 Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 0.234 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 700 cuft
Drainage area	= 0.030 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.00 min
Total precip.	= 7.10 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484

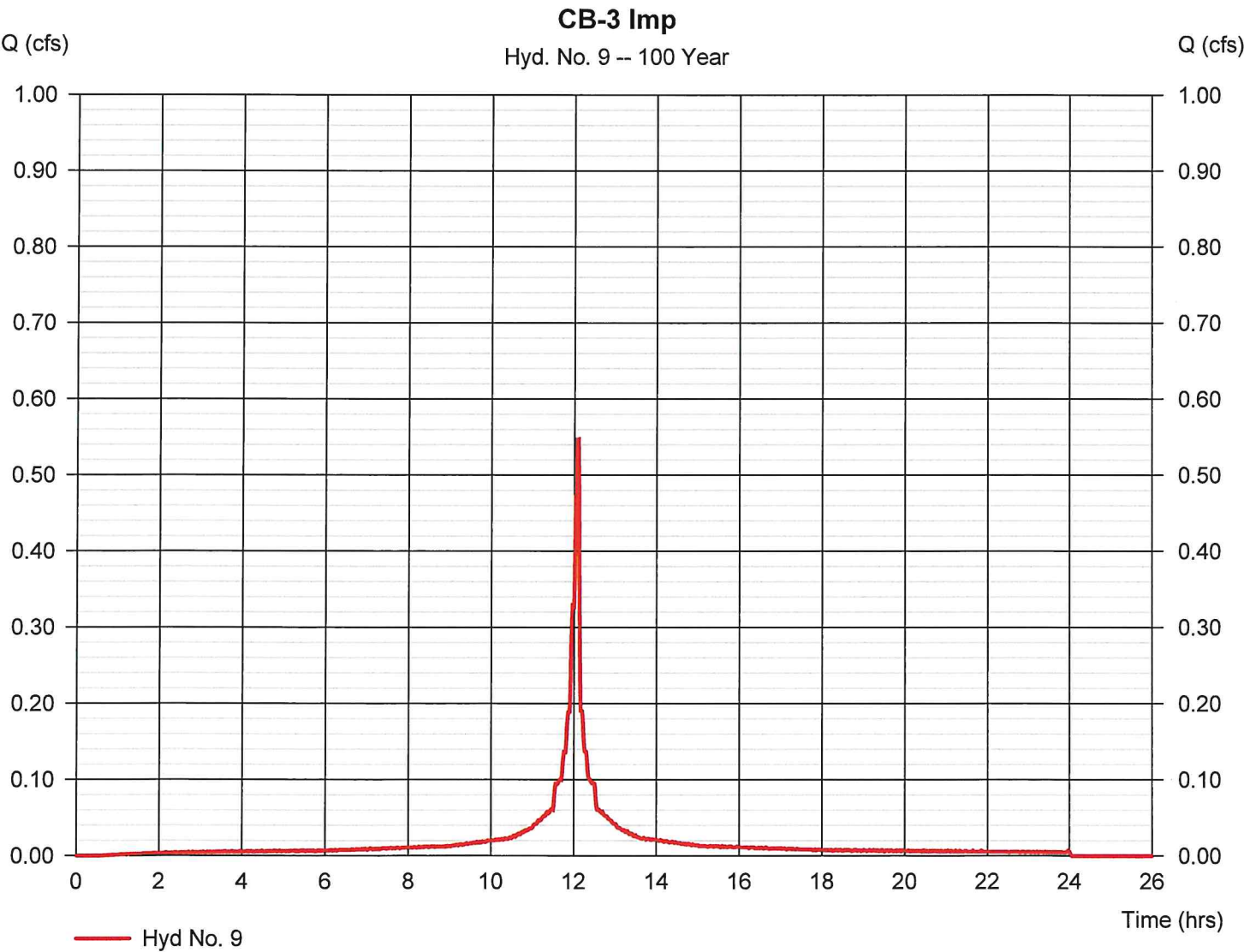


# Hydrograph Report

## Hyd. No. 9

CB-3 Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 0.547 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 1,634 cuft
Drainage area	= 0.070 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 2.00 min
Total precip.	= 7.10 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



# Hydrograph Report

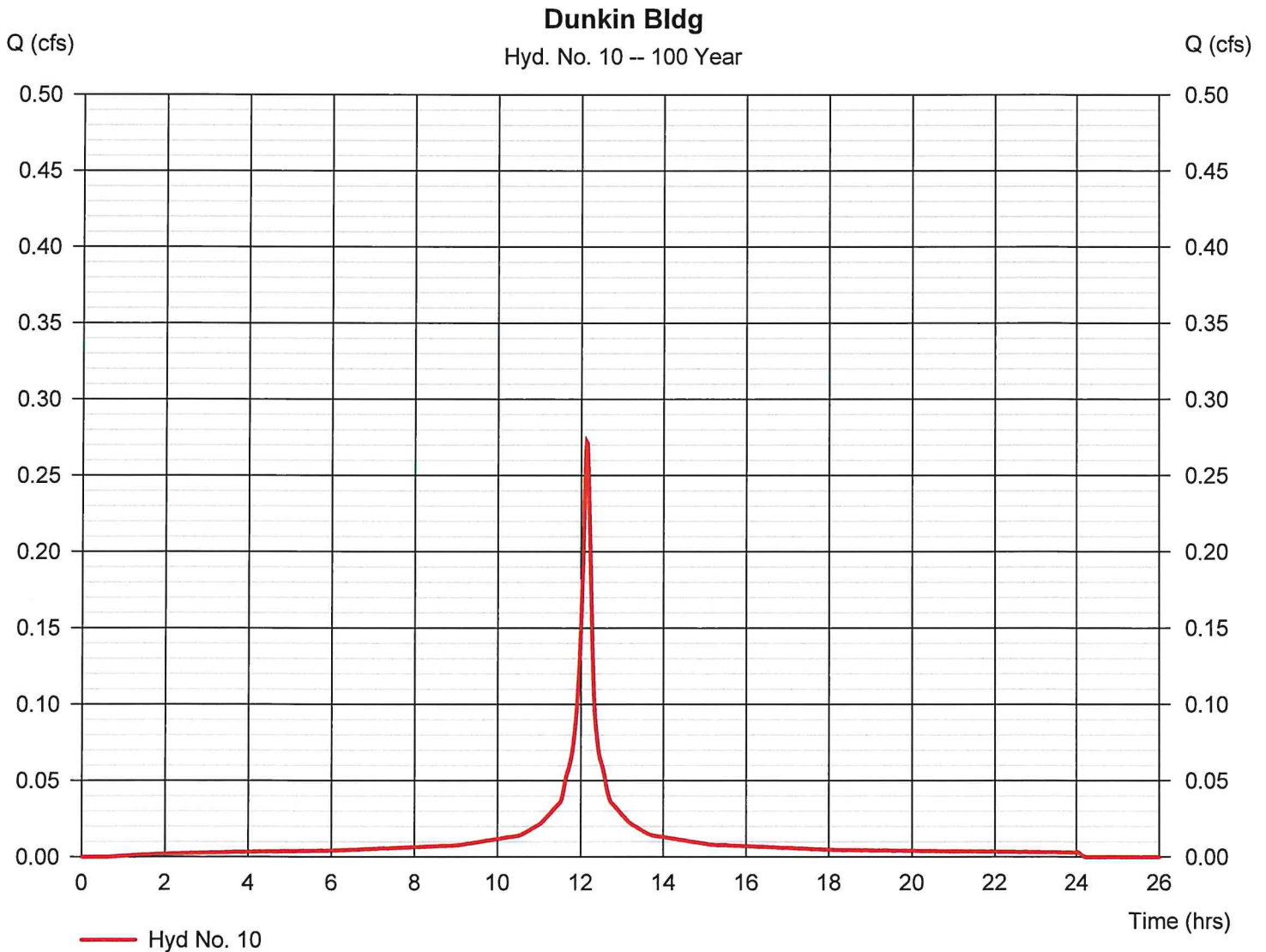
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Hyd. No. 10

Dunkin Bldg

Hydrograph type	= SCS Runoff	Peak discharge	= 0.272 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 996 cuft
Drainage area	= 0.040 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 7.10 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



# Hydrograph Report

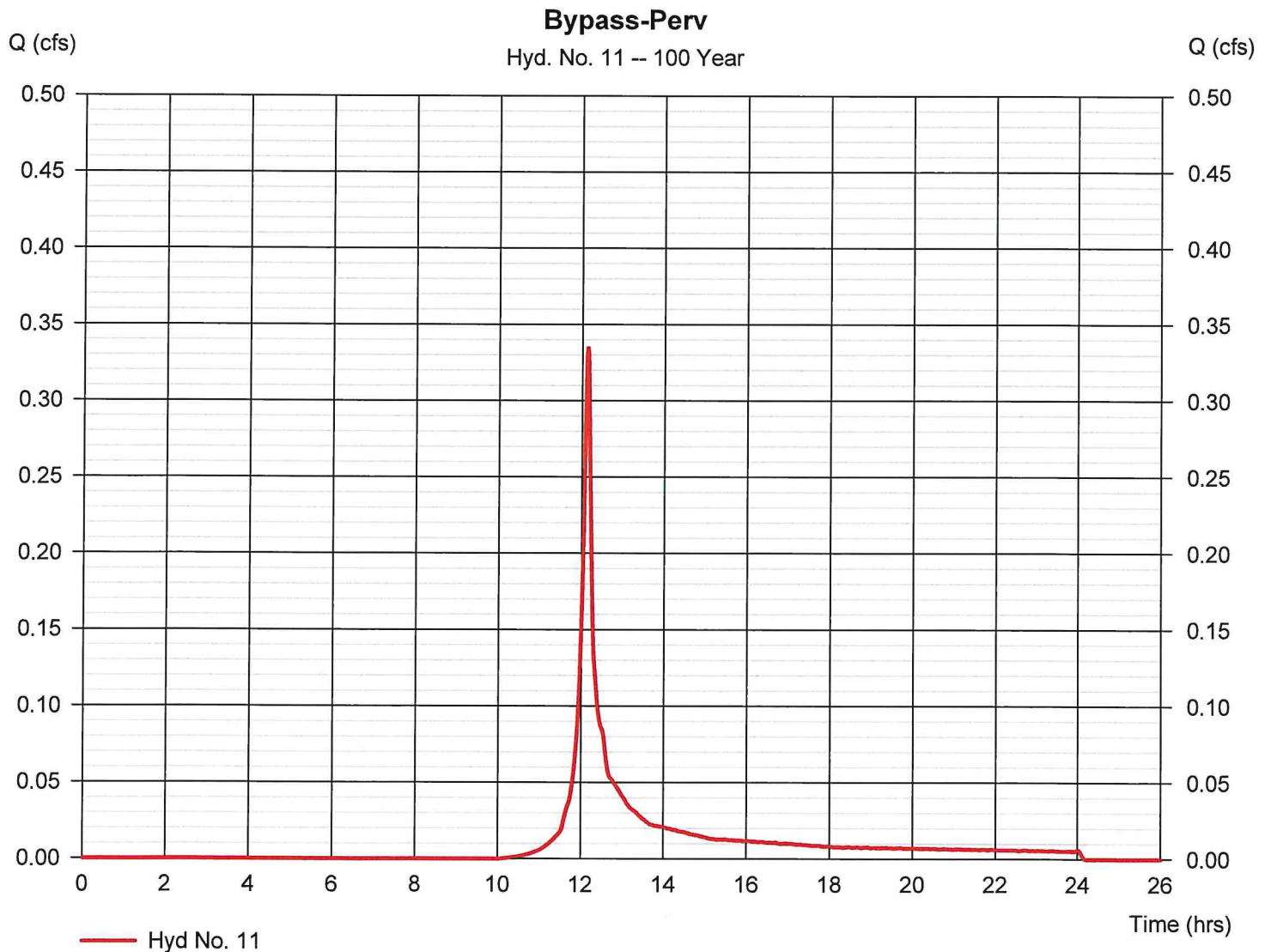
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Hyd. No. 11

### Bypass-Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.336 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 982 cuft
Drainage area	= 0.100 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 7.80 min
Total precip.	= 7.10 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484





# Hydrograph Report

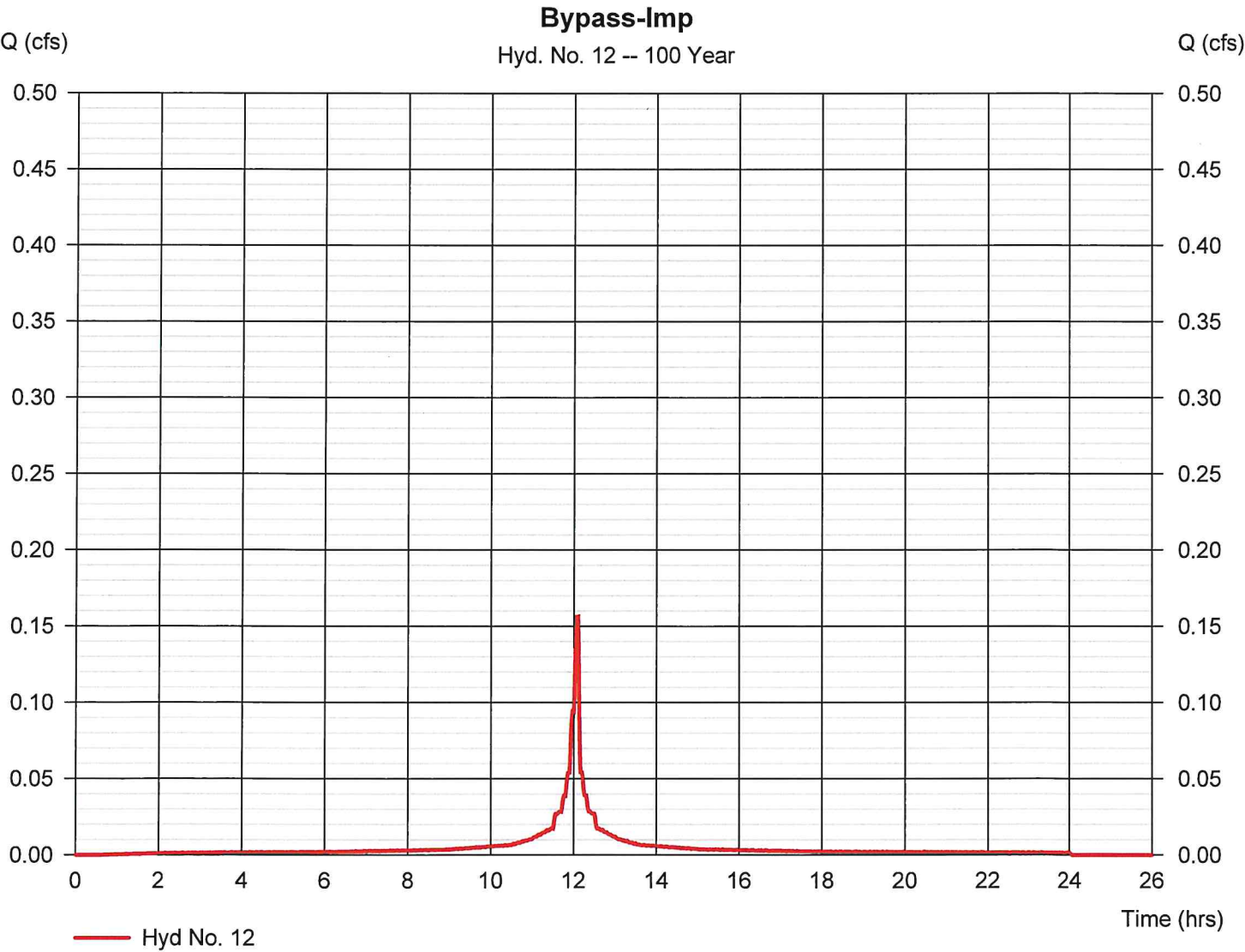
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Hyd. No. 12

### Bypass-Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 0.156 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 467 cuft
Drainage area	= 0.020 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 2.00 min
Total precip.	= 7.10 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484





# Hydrograph Report

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Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

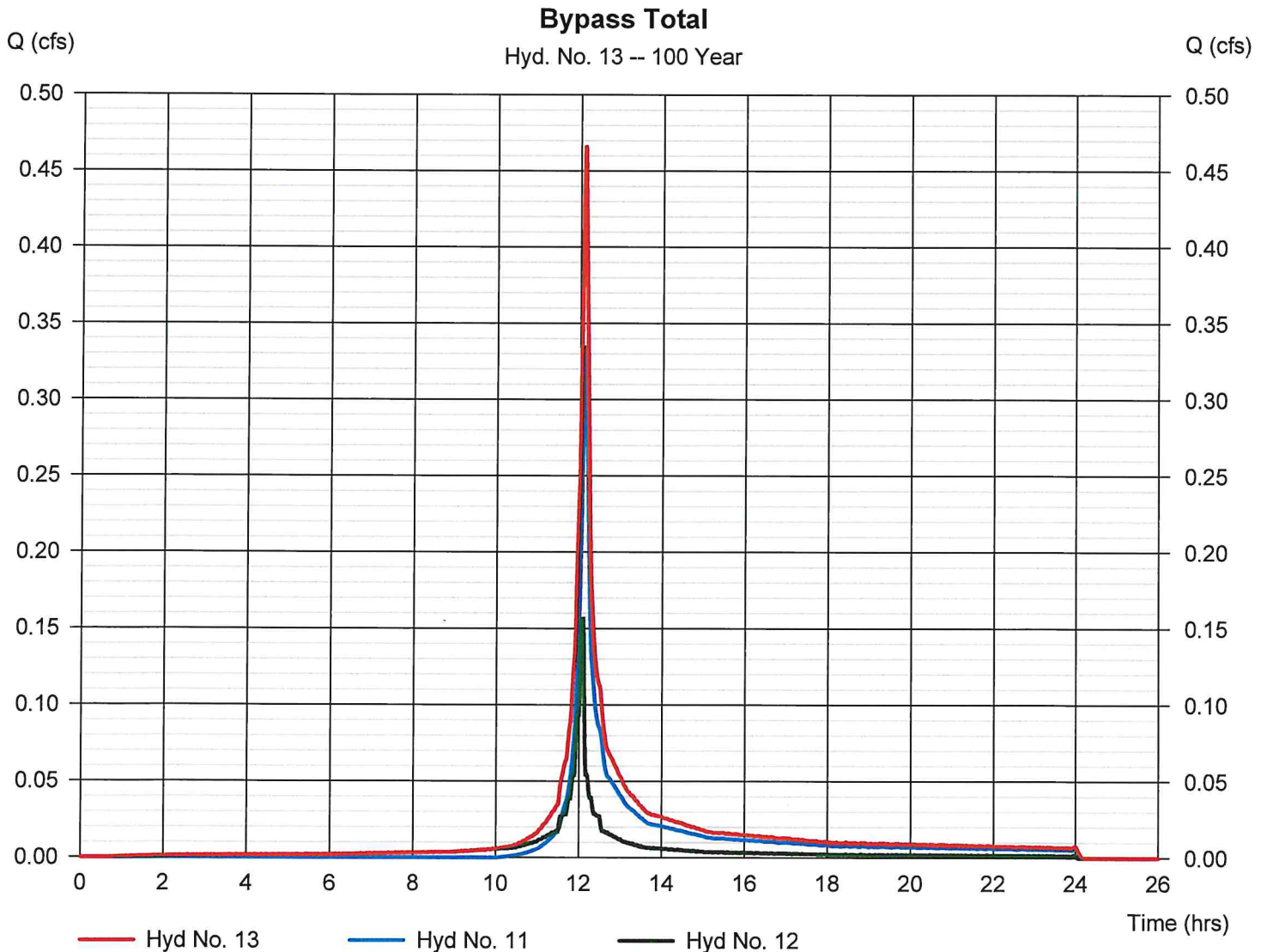
Thursday, 09 / 16 / 2021

## Hyd. No. 13

### Bypass Total

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Time interval = 1 min  
Inflow hyds. = 11, 12

Peak discharge = 0.467 cfs  
Time to peak = 12.10 hrs  
Hyd. volume = 1,449 cuft  
Contrib. drain. area = 0.120 ac

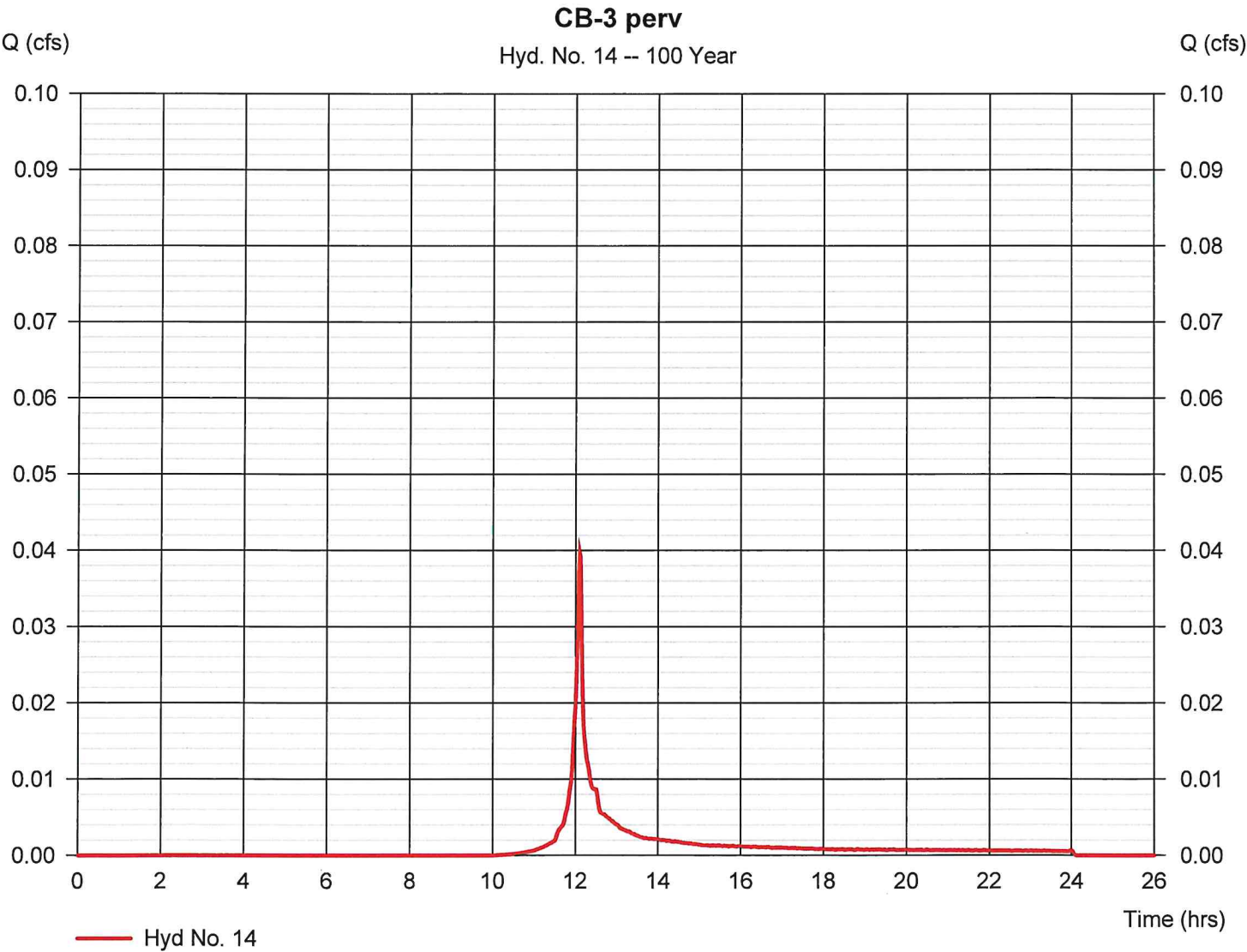


# Hydrograph Report

## Hyd. No. 14

CB-3 perv

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.040 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.10 hrs
Time interval	=	1 min	Hyd. volume	=	101 cuft
Drainage area	=	0.010 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	3.80 min
Total precip.	=	7.10 in	Distribution	=	Custom
Storm duration	=	Z:\Stormwater\NOAA_C_1-MIN	Slope factor	=	484

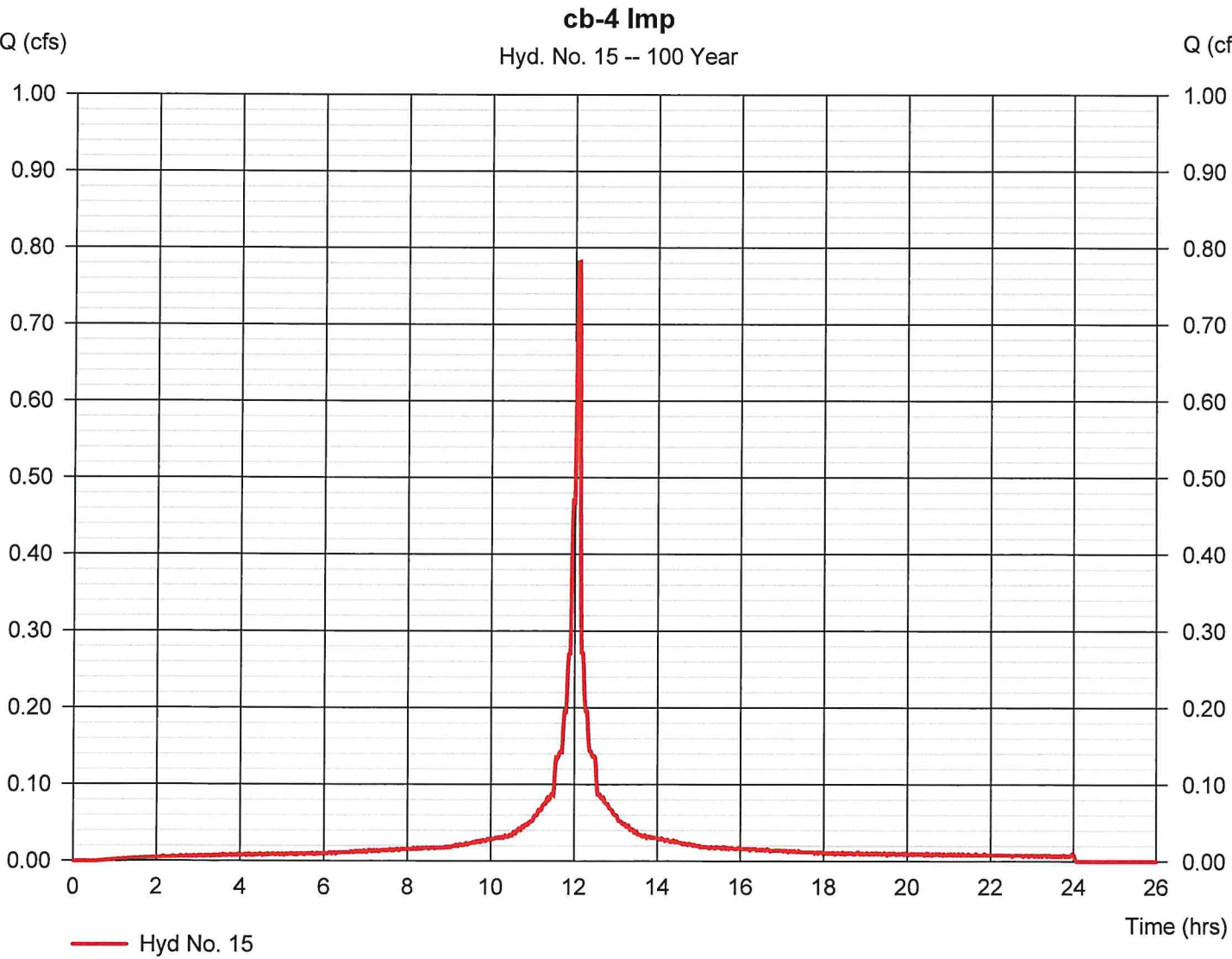


# Hydrograph Report

## Hyd. No. 15

cb-4 Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 0.781 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 2,335 cuft
Drainage area	= 0.100 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 2.00 min
Total precip.	= 7.10 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



# Hydrograph Report

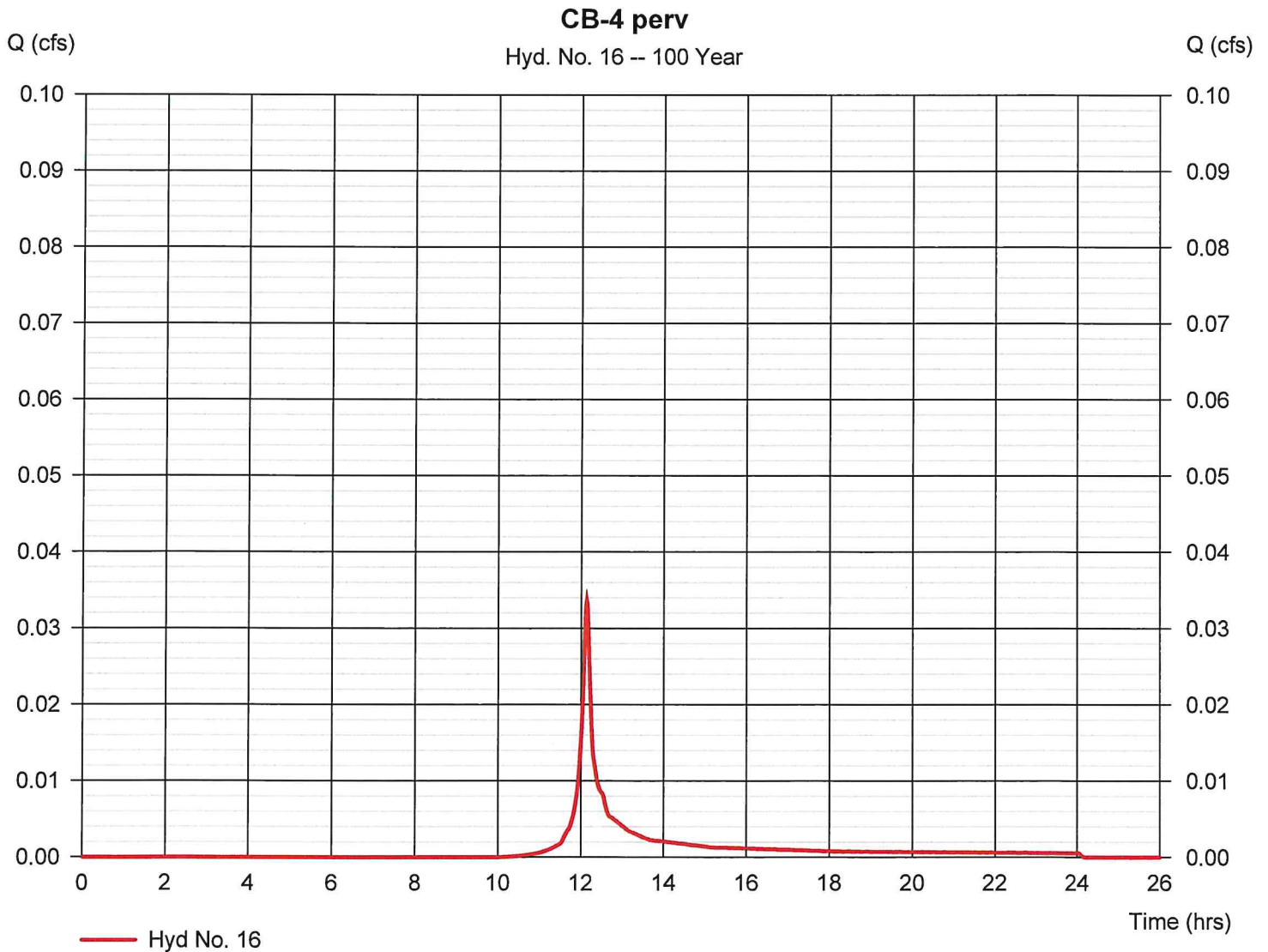
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Thursday, 09 / 16 / 2021

## Hyd. No. 16

CB-4 perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.034 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 98 cuft
Drainage area	= 0.010 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 7.70 min
Total precip.	= 7.10 in	Distribution	= Custom
Storm duration	= Z:\Stormwater\NOAA_C_1-MIN	Shape factor	= 484



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

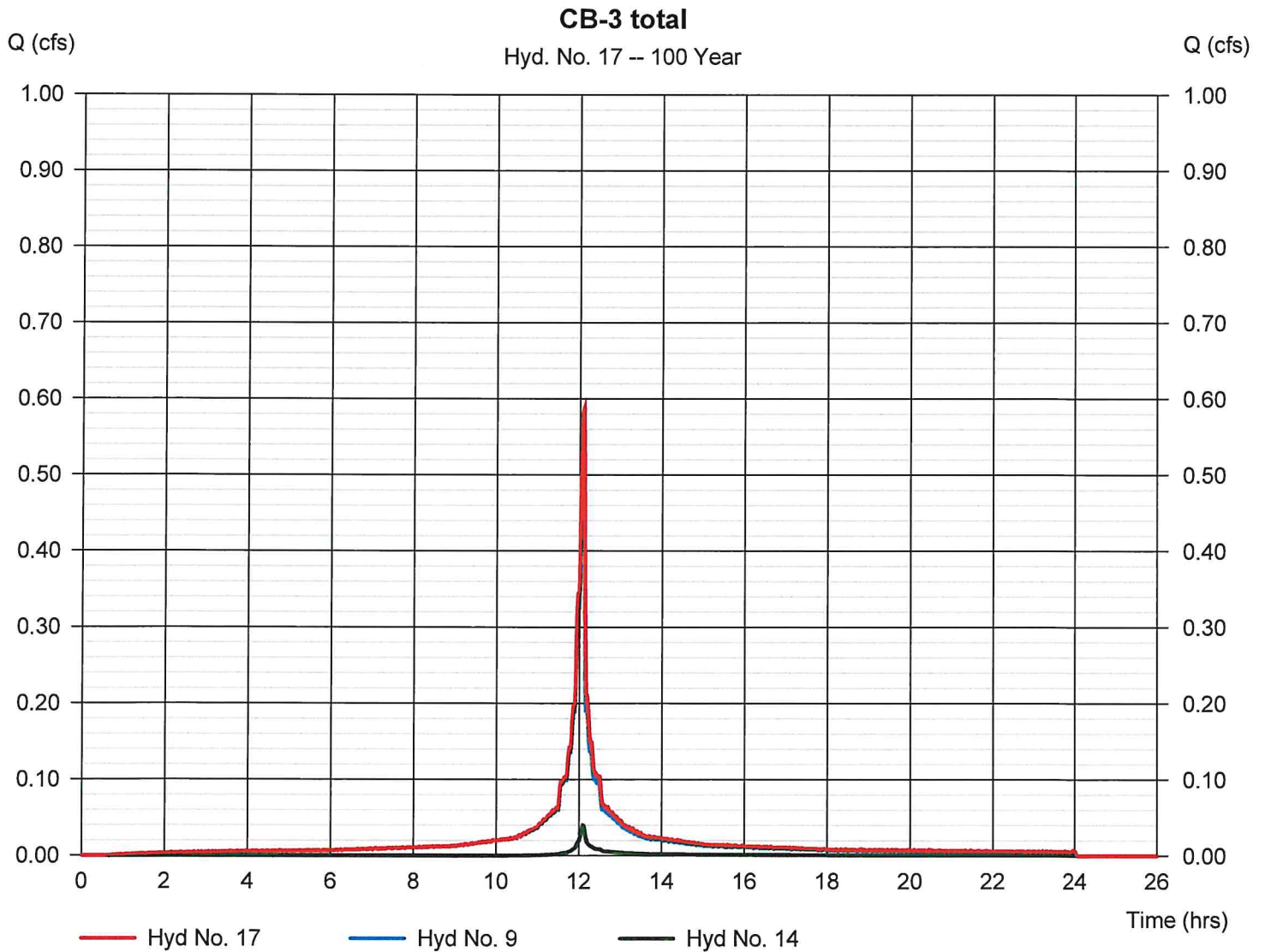
Thursday, 09 / 16 / 2021

## Hyd. No. 17

CB-3 total

Hydrograph type = Combine  
 Storm frequency = 100 yrs  
 Time interval = 1 min  
 Inflow hyds. = 9, 14

Peak discharge = 0.587 cfs  
 Time to peak = 12.10 hrs  
 Hyd. volume = 1,735 cuft  
 Contrib. drain. area = 0.080 ac





# Hydrograph Report

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Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

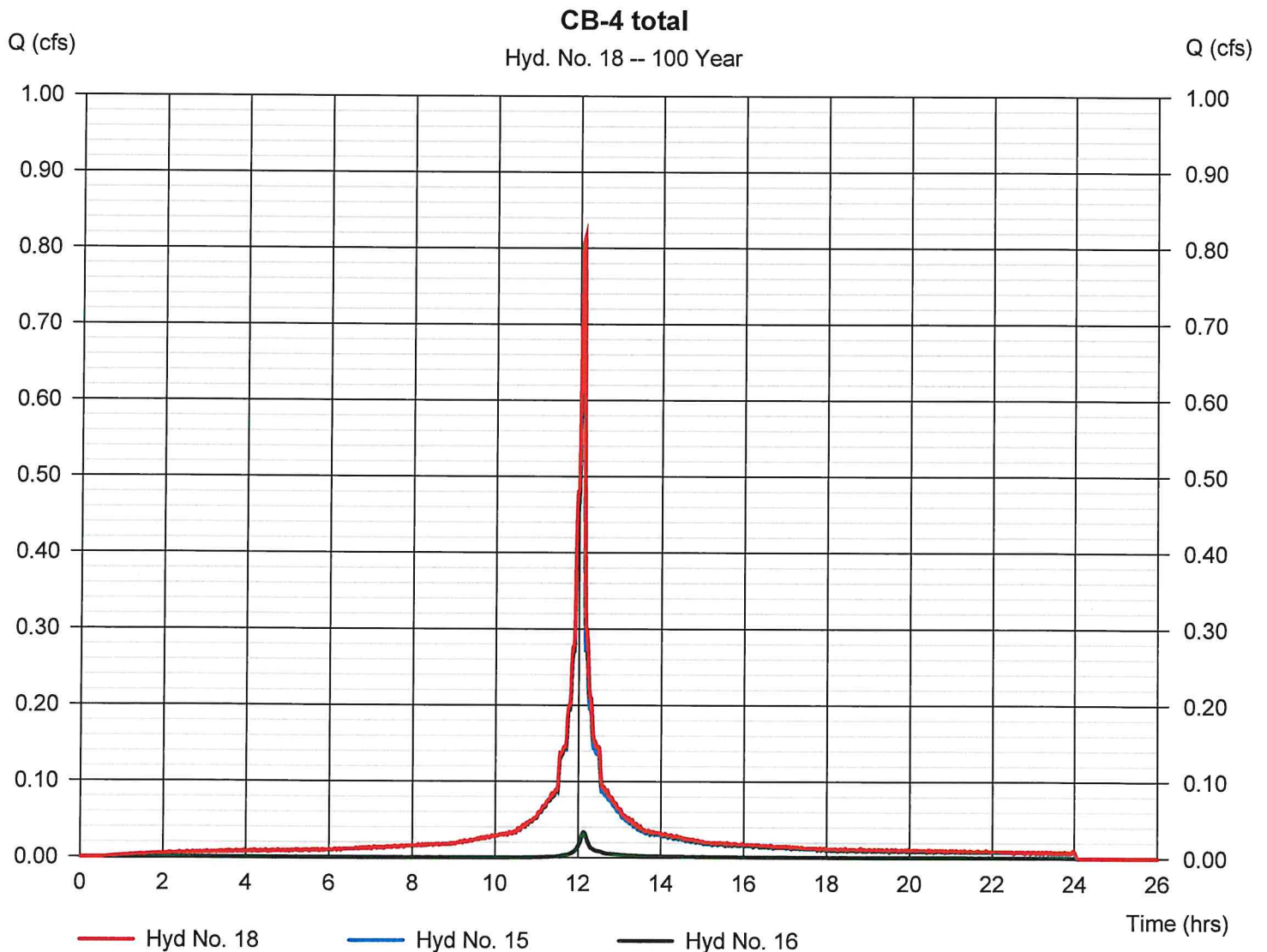
Thursday, 09 / 16 / 2021

## Hyd. No. 18

CB-4 total

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Time interval = 1 min  
Inflow hyds. = 15, 16

Peak discharge = 0.813 cfs  
Time to peak = 12.10 hrs  
Hyd. volume = 2,433 cuft  
Contrib. drain. area = 0.110 ac

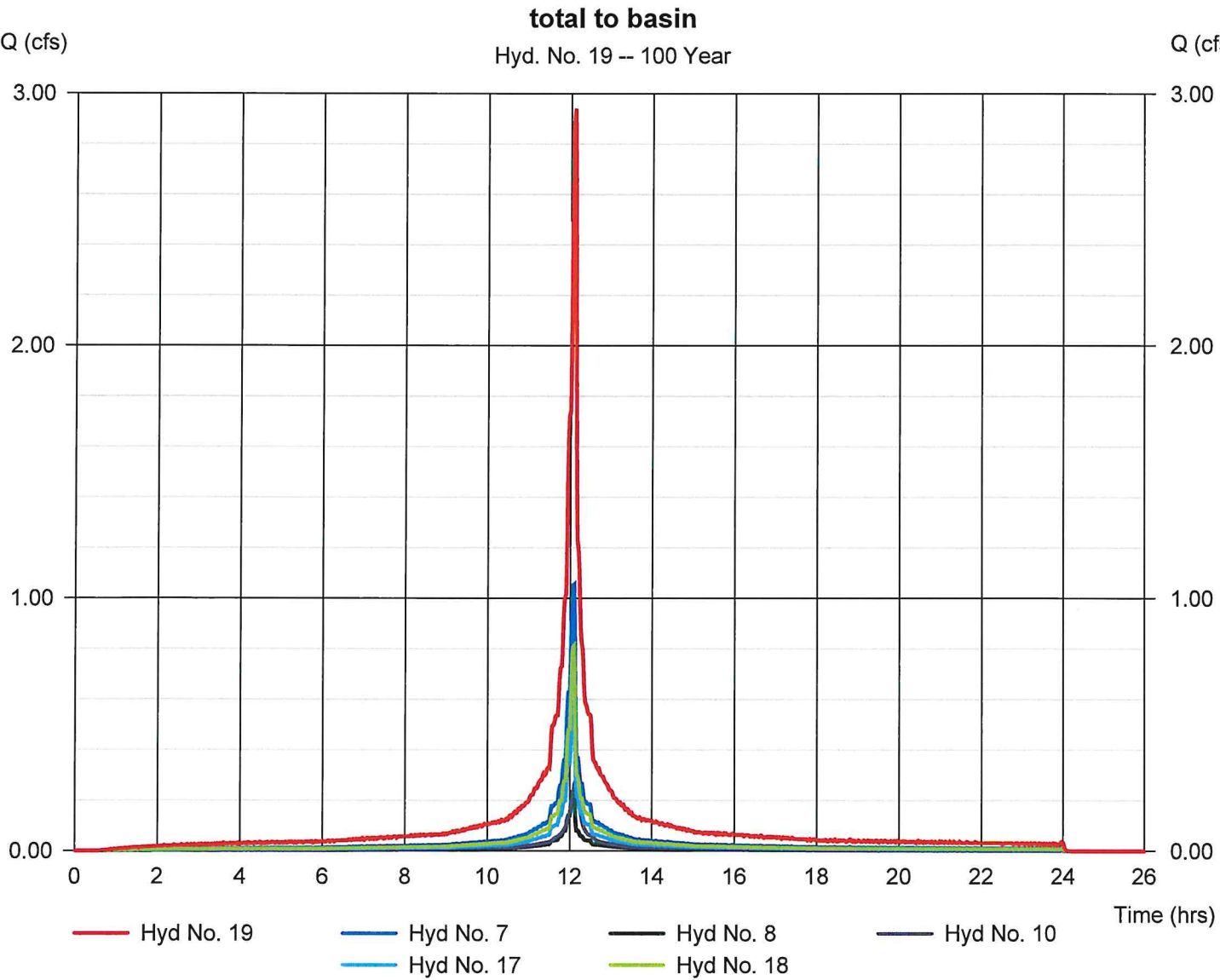


# Hydrograph Report

## Hyd. No. 19

total to basin

Hydrograph type	= Combine	Peak discharge	= 2.941 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 8,994 cuft
Inflow hyds.	= 7, 8, 10, 17, 18	Contrib. drain. area	= 0.070 ac



# Hydrograph Report

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Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

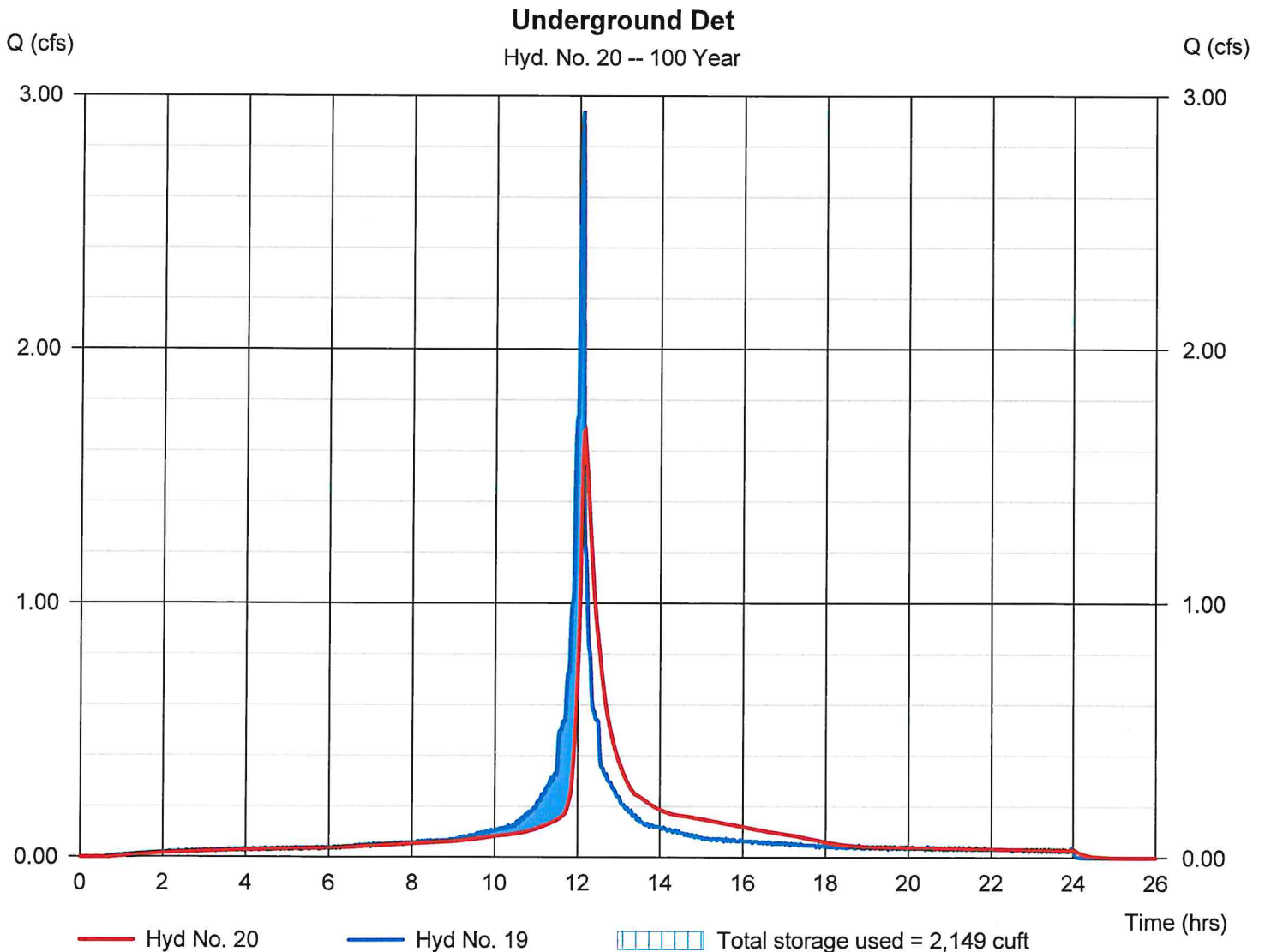
Thursday, 09 / 16 / 2021

## Hyd. No. 20

Underground Det

Hydrograph type	= Reservoir	Peak discharge	= 1.678 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.15 hrs
Time interval	= 1 min	Hyd. volume	= 8,994 cuft
Inflow hyd. No.	= 19 - total to basin	Max. Elevation	= 124.61 ft
Reservoir name	= Det Basin	Max. Storage	= 2,149 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

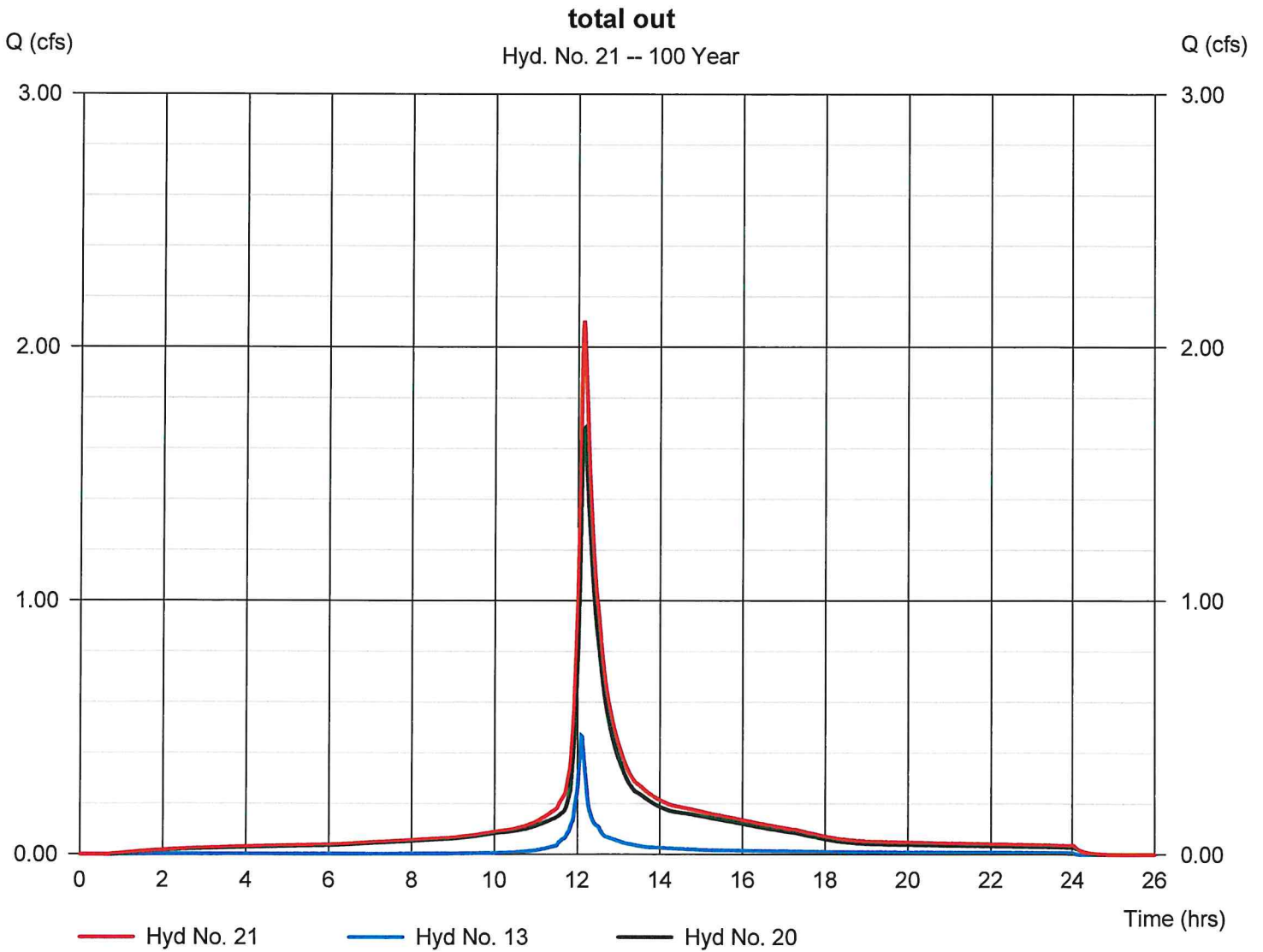
Thursday, 09 / 16 / 2021

## Hyd. No. 21

total out

Hydrograph type = Combine  
 Storm frequency = 100 yrs  
 Time interval = 1 min  
 Inflow hyds. = 13, 20

Peak discharge = 2.105 cfs  
 Time to peak = 12.13 hrs  
 Hyd. volume = 10,442 cuft  
 Contrib. drain. area = 0.000 ac



**APPENDIX E**

**BASIN ROUTING ANALYSIS**



# Pond Report

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Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Thursday, 09 / 16 / 2021

## Pond No. 1 - Det Basin

### Pond Data

UG Chambers -Invert elev. = 122.20 ft, Rise x Span = 3.00 x 3.00 ft, Barrel Len = 80.00 ft, No. Barrels = 4, Slope = 0.00%, Headers = Yes

### Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	122.20	n/a	0	0
0.30	122.50	n/a	130	130
0.60	122.80	n/a	225	356
0.90	123.10	n/a	274	630
1.20	123.40	n/a	302	932
1.50	123.70	n/a	316	1,248
1.80	124.00	n/a	316	1,564
2.10	124.30	n/a	302	1,866
2.40	124.60	n/a	274	2,140
2.70	124.90	n/a	225	2,366
3.00	125.20	n/a	130	2,496

### Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	3.00	0.00	0.00
Span (in)	= 15.00	3.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 121.90	122.13	0.00	0.00
Length (ft)	= 7.00	0.00	0.00	0.00
Slope (%)	= 0.01	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)	= 0.25	5.00	Inactive	0.00
Crest El. (ft)	= 123.20	124.80	0.00	0.00
Weir Coeff.	= 3.33	2.60	2.60	3.33
Weir Type	= Rect	Broad	Broad	---
Multi-Stage	= Yes	Yes	No	No
Exfil.(in/hr)	= 0.000 (by Contour)			
TW Elev. (ft)	= 0.00			

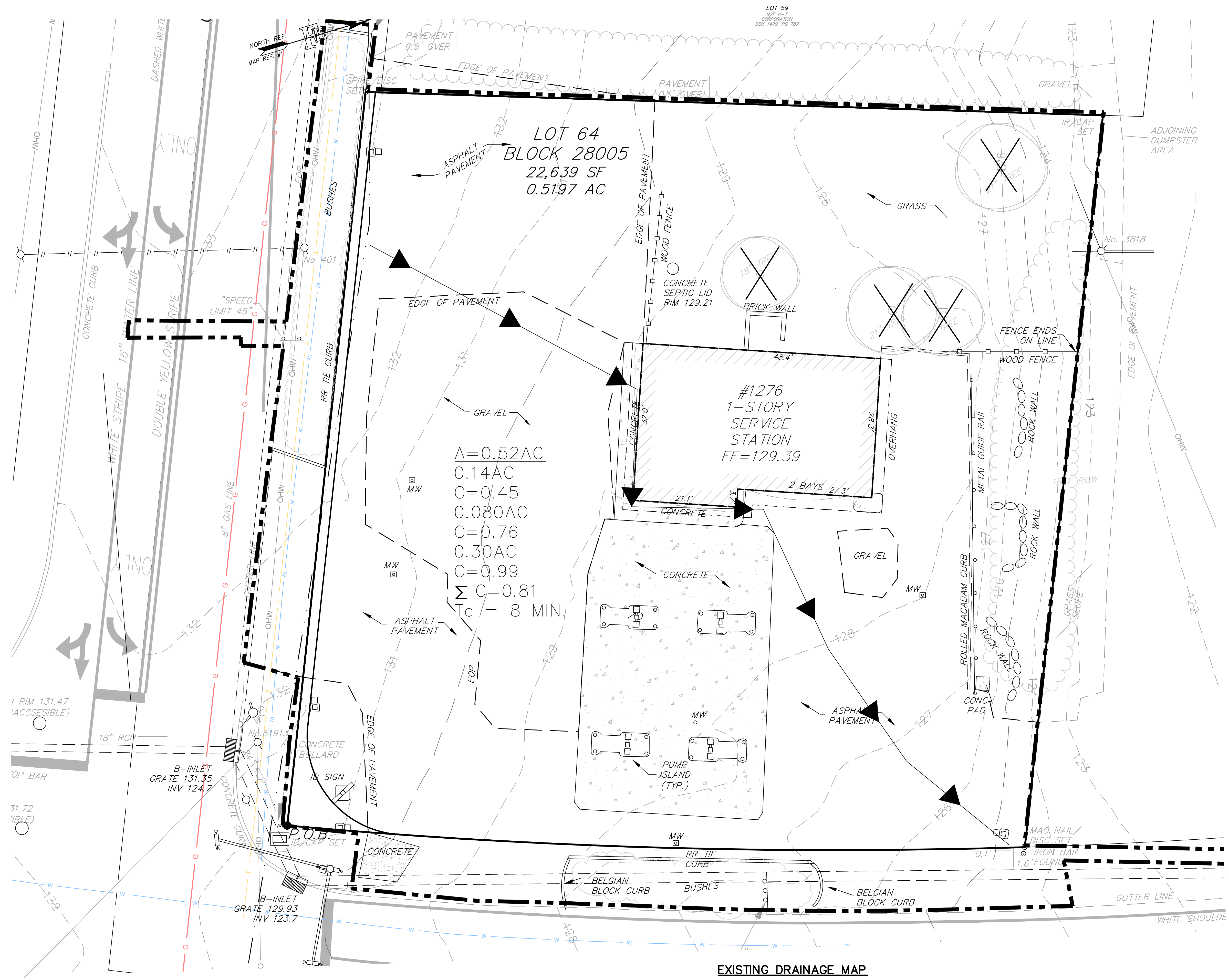
Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

### Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	122.20	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
0.30	130	122.50	0.09 oc	0.09 ic	---	---	0.00	0.00	---	---	---	---	0.085
0.60	356	122.80	0.13 oc	0.12 ic	---	---	0.00	0.00	---	---	---	---	0.124
0.90	630	123.10	0.16 oc	0.16 ic	---	---	0.00	0.00	---	---	---	---	0.158
1.20	932	123.40	0.23 oc	0.15 ic	---	---	0.07	0.00	---	---	---	---	0.229
1.50	1,248	123.70	0.47 oc	0.17 ic	---	---	0.29	0.00	---	---	---	---	0.469
1.80	1,564	124.00	0.82 oc	0.22 ic	---	---	0.60	0.00	---	---	---	---	0.812
2.10	1,866	124.30	1.21 oc	0.25 ic	---	---	0.96	0.00	---	---	---	---	1.211
2.40	2,140	124.60	1.66 oc	0.28 ic	---	---	1.38	0.00	---	---	---	---	1.659
2.70	2,366	124.90	2.56 oc	0.30 ic	---	---	1.84 s	0.41	---	---	---	---	2.554
3.00	2,496	125.20	5.80 oc	0.29 ic	---	---	2.23 s	3.29	---	---	---	---	5.803

## **APPENDIX F**

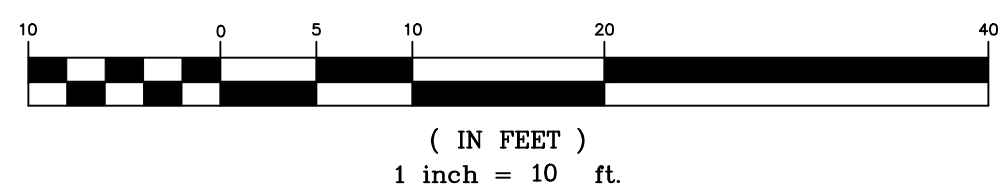
### **DRAINAGE AREA MAPS**



- LEGEND**
- 540 --- EXISTING CONTOUR LINE
  - 520 --- PROPOSED CONTOUR LINE
  - 516.3 EXISTING SPOT GRADE
  - + 640.00 PROPOSED SPOT GRADE
  - EXISTING CURB LINE
  - PROPOSED CURB LINE
  - EXISTING INLET
  - PROPOSED INLET
  - EXISTING STORM/SAN PIPE
  - PROPOSED STORM SEWER
  - EXISTING SITE LIGHT
  - PROPOSED SITE LIGHT
  - EXISTING GAS LINE
  - EXISTING WATER LINE
  - EXISTING OVERHEAD WIRE
  - EXISTING UTILITY POLE
  - EXISTING STONE WALL
  - EXISTING FENCE
  - PROPOSED CONCRETE
  - EXISTING SITE LIGHT
  - PROPOSED SITE LIGHT

A=0.52AC  
0.14AC  
C=0.45  
0.080AC  
C=0.76  
0.30AC  
C=0.99  
Σ C=0.81  
Tc = 8 MIN.

EXISTING DRAINAGE MAP  
GRAPHIC SCALE

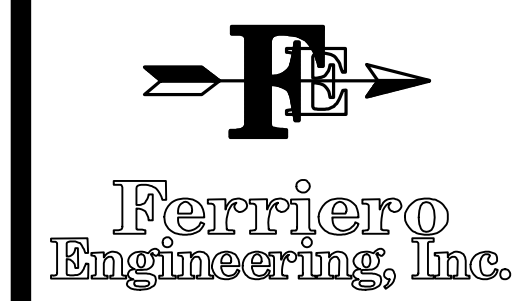


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PAUL W. FERRIERO  
N.J. PROFESSIONAL ENGINEER  
NO. GE32978



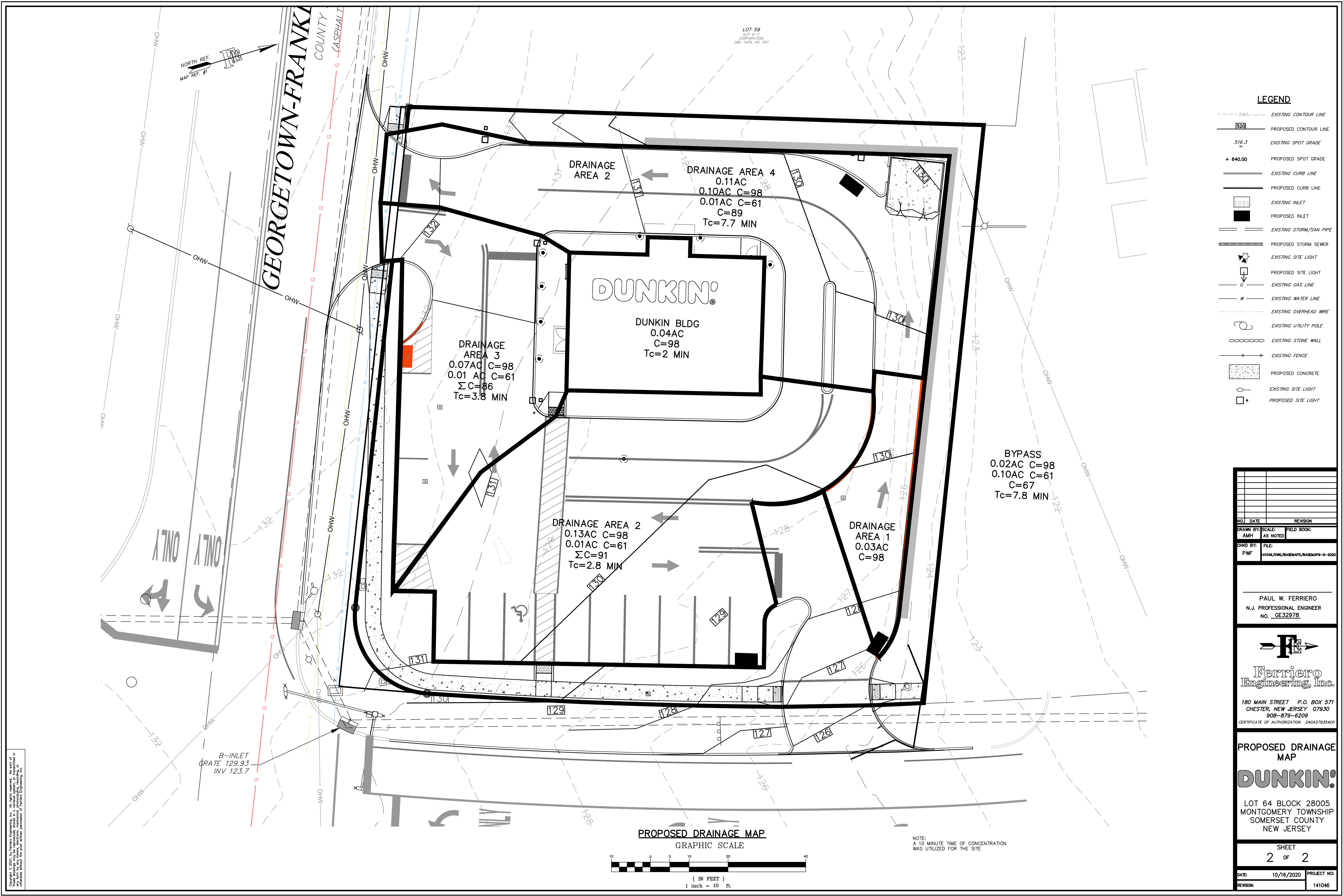
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CERTIFICATE OF AUTHORIZATION 240A27935400

EXISTING DRAINAGE  
MAP

**DUNKIN'**

LOT 64 BLOCK 28005  
MONTGOMERY TOWNSHIP  
SOMERSET COUNTY  
NEW JERSEY





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**PROPOSED DRAINAGE MAP**

**DUNKIN'**

LOT 64 BLOCK 28005  
MONTGOMERY TOWNSHIP  
SOMERSET COUNTY  
NEW JERSEY

SHEET  
2 OF 2

DATE: 10/16/2020 PROJECT NO:  
REVISION: 141046