



STORMWATER MANAGEMENT REPORT

Prepared for:
A&R SKYLINE LLC
704 Passaic Avenue
West Caldwell, NJ 07006

Regarding:

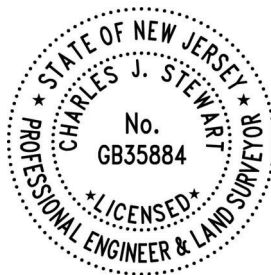
COMMONS AT VERONA
885 Bloomfield Avenue
Township of Verona
Essex County, New Jersey

Block 2205 Lots 6

Prepared by:

E2 Project Management, LLC
87 Hibernia Avenue
Rockaway, New Jersey 07866

August 25, 2026
E2PM PROJECT NO. P-25-55



Digitally signed
by Charles J.
Stewart
Date:
2026.08.25
15:49:39 -04'00'

Charles J. Stewart, P.E., P.L.S.
Professional Engineer
New Jersey License No. 24GB035884



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1. INTRODUCTION

A. Subject Property

This report has been prepared to present the design methodology and calculations for the management of stormwater runoff associated with the proposed project. The subject property located at 885 Bloomfield Avenue, known as Block 2205, Lot 6, as identified in the survey prepared by E2PM entitled “Boundary and Topographic Survey, ALL COUNTY-VERONA, 885 Bloomfield Avenue, Township of Verona, Essex County, New Jersey, Block 2205, Tax Lot 6”. The site is measured at approximately 1.66 Acres.

Lot 6 fronts on the South side of Bloomfield Avenue. Bloomfield Avenue is classified as CR-506 and has a 35 mph speed limit in this section of the road. To the west the property is adjacent to a townhouse development in Essex Fells. Along the southern property line there are residential family houses and a portion of Fells Road. To the east the property is adjacent to Fells Road.



Fig1- Verona Zoning Map

The New Jersey Planning Advocacy Locator Map classifies the subject property within the metropolitan planning area, placing it inside the urban redevelopment area. The current site use is undeveloped, vacated land, there's a Bus Stop for NJ Transit 29 & 105. There are no wetlands surrounding the existing property and Lot 6 is located outside of any FHA according to FEMA map 34013C0084F.

The property is steeply sloped inward towards the center where there is a 10' deep dry pond. Water from the neighboring southern lots is routed to this site and does not flow off-site. The site was previously used as an active rail bed for trains.



B. Proposed Development

The proposed activities on-site will consist of a 28 unit townhouse development with affordable housing. There will be two driveways to the site. The driveway between building #2 and building #3 has two-way access and the westerly driveway is a one-way entrance only. Landscaping, traffic signage, site lighting, and grading have been designed in accordance with local ordinance.

The proposed improvements will have stormwater conveyed with Stormwater management measures in accordance with the New Jersey Department of Environmental Protection Best Management Practices Manual.

C. Stormwater Management Requirements

Per N.J.A.C. 7:8-1.2, a Major Development is defined, in general, as any development that individually or collectively disturbs one or more acres of land, creates one-quarter acre or more of impervious surface or creates one-quarter acre or more of regulated motor vehicle surface. The proposed development of 28 townhouses lots and porous pavement create a disturbance of 1.92 acres, the creation of approximately 1.16 acres of impervious surface and the creation of approximately 0.51 acres of new regulated motor vehicle surface. Therefore, stormwater management facilities are required to comply with the groundwater recharge, runoff quantity and water quality standards as outlined in N.J.A.C. 7:8. The following sections detail how the proposed stormwater management system will comply with the requirements of N.J.A.C. 7:8, the Standards for Soil Erosion and Sediment Control in New Jersey, the Township of Verona's stormwater management ordinance and the New Jersey Stormwater Best Management Practices Manual (BMP Manual).

The stormwater management system contains Water Quality and Water Quantity treatment with Green Infrastructure for all proposed impervious surfaces.

D. Drainage Areas

i. Existing Drainage Area

Existing drainage conditions were analyzed under current on-site conditions for the subject property within the site property boundary (Appendix C). The Existing Lot Watershed, defined within the property boundary of Lot 6, consists of one drainage area. The runoff from existing drainage area one (E-DA1) flows towards the center of the property into a ditch. There are additional inflows from the neighbors along Fells Avenue that also discharge into the ditch. Because of the inward sloping lot, no water flows onto adjacent neighbors, Fells Road, or Bloomfield Avenue.

The point of analysis for the drainage area is located at points as shown on the Existing Drainage Area Map (Appendix C) on the stream in the southern portion of the property and is shown on the respective drainage area map. A majority of the surface area in E-DA1 is pervious lawn in good condition. Lot 6 is considered forested by NJGEOWEB.



The site is mostly forested with the ditch area containing scrub growth.

Table 1 – Existing Drainage Area

Drainage Area Name	Total Area (Acres)	Pervious Area (Acres)	Impervious Area (Acres)
E-DA1	1.661	1.655	0.006

ii. Proposed Drainage Area

The proposed Lot Watershed consists of two drainage areas with two subdrainage areas, totaling four. The proposed improvements are routed through Green SW measures that ultimately discharge into a municipal inlet near the southwestern property corner. Proposed sub-drainage area 1A and 1B (P-DA 1A/P-DA 1B) consist of the driveway and rear yard landscaping that are captured by . Proposed sub-drainage area 2A (P-DA 2A) consists of pervious area along the rear property line that is captured by a bypass drain and routed along the property line to the municipal storm sewer line. Proposed sub-drainage area 2B (P-DA 2B) consists of the area in the front yard of the townhouses that sheet flows into the sidewalk and ultimately a inlet located on Bloomfield Avenue.

The point of analysis for each drainage area is shown on the proposed drainage area map (Appendix C).

Table 2 – Proposed Drainage Area

Watershed Name	Total Area (Acres)	Total Pervious Area (Acres)	Total Impervious Area (Acres)
P-DA 1A	0.703	0.189	0.515
P-DA 1B	0.596	0.020	0.576
P-DA 2A	0.075	0.045	0.029
P-DA 2B	0.287	0.245	0.042

iii. Area of Disturbance

Because 100% of the site is being disturbed, the Area of Disturbance and the Proposed Drainage areas are the same.

E. Project Regulatory Overview

N.J.A.C.7:8-5.2(a)-(c) mandates that stormwater management measures for major developments shall be designed to provide minimum design and performance standards for erosion control, groundwater recharge, stormwater runoff quantity, and stormwater runoff quality at N.J.A.C. 7:8-5.4 and 5.5. The development must incorporate a maintenance plan under N.J.A.C. 7:8-5.8 for the management measures and the management measures must not negatively impact endangered species, specifically *Helonias Bullata* (swamp pink) and *Clemmys Muhlnebergi* (bog turtle).



Within the Township of Verona land use ordinance, Section 150-82.1- Stormwater Control states that “Flood control, groundwater recharge, and pollutant reduction shall be achieved through the use of stormwater management measures, including green infrastructure best management practices (GI BMPs) and nonstructural stormwater management strategies. GI BMP’s should be utilized to meet the goal of maintain natural hydrology to reduce stormwater runoff volume, reduce erosion, encourage infiltration and groundwater recharge, and reduce pollution. GI BMPs should be developed based upon physical site conditions and the origin, nature and the anticipated quantity, or amount of potential pollutants. Multiple stormwater management BMPs may be necessary to achieve the established performance standards for green infrastructure, water quality, quantity, and groundwater recharge.” The proposed project falls under the Borough definition of a residential major development in which ordinances §53-28 to §53-37 applies.

2. COMPUTATIONS

A. Stormwater Analysis Parameters

The 2-, 10-, and 100-year storm events were modeled to determine the overall stormwater runoff under the existing and proposed conditions for the current and projected storm rainfall amounts to the drainage system. The adjusted current and projected 2 year rainfall depths for a 24 hour storm were used to calculate the Times of Concentration. Times of Concentration were calculated using the Chapter 15 methodology from the NRCS National Engineering Handbook Part 630. Computations for the stormwater analysis and pipe flow capacity were performed with Hydraflow- Hydrographs Extension for Autodesk Civil 3D and Storm Sewer Analysis.

The current and future stormwater runoff rates were used to compare the preconstruction and post construction runoff for the 2-, 10- and 100-year storm events. The rainfall distribution is based upon the NOAA D distribution storm frequency. A comparison of the existing and proposed flows was performed and shown to comply with the 50%, 25%, and 20% reductions of N.J.A.C. 7:8-5.6(b)3.

The stormwater analysis for the water quality storm (NJAC 7:8-5.5) was computed utilizing the Soil Conservation Service (SCS) Technical Release 55 (TR-55) “Urban Hydrology for Small Watersheds,” revised June 1986 with a rainfall depth of 1.25”. The rainfall distribution is based upon the Water Quality 2-hour storm as provided in table 5-4 in NJAC 7:8.

For the purposes of this report, the drainage area being analyzed to meet the quality, quantity, and recharge requirements of NJAC 7:8 is within the Block 1303 Lot 12 boundary as shown in the minor subdivision plan prepared by E2PM entitled, “Minor Subdivision, Fernway Builders, Block 1303, Tax Lots 3 And 12 Township of Verona, Essex County, New Jersey”.

B. Rainfall Intensity

Rainfall depths used to determine peak flow rates were obtained from the NOAA Precipitation Frequency Data Server (PFDS) for the subject property and multiplied by the appropriate “Current Precipitation Adjustment Factor” and “Future Precipitation Change Factor”



for Middlesex County, NJ (see Appendix J). Precipitation frequencies and depths for the subject property were obtained from NOAA National Weather Service data.

N.J.A.C.7:8-5.7(c) requires the precipitation depths of the current 2-, 10- and 100-year storm events be determined by multiplying the NOAA rainfall data with the required precipitation adjustment factors in Table 5-5 at N.J.A.C.7:8-5.7(c)2. The required adjustment values for current and future precipitation from N.J.A.C.7:8-5.7(c) Table 5-5 and Table 5-6 and are shown in Table 4 below.

Table 4 – Precipitation Data

STORM TYPE	2-Year Storm	10-Year Storm	100-Year Storm
Precipitation Depth	3.44"	5.22"	8.71"
Current Adj. Factor	1.01	1.03	1.06
Current Rainfall	3.47"	5.38"	9.22"
Future Adj. Factor	1.19	1.22	1.33
Future Rainfall	4.09"	6.37"	11.58"

C. Soil Type & Curve Number

A geotechnical investigation report was prepared for the property by Geo-technology Associates, INC. on April 6, 2026 in which test pits were performed for hydrologic soil group analysis and Seasonal High Water Table(Appendix B). According to Web Soil Survey (Appendix B), the site has four soil types; Haledon-silt loam, Haledon- urban land, Boonton – urban land, and Boonton – loam. Test pit locations can be found on the Soil Profile Pit Location Plan in the soils report.

Five test pits were conducted to determine soil type, mapping areas, and hydrologic soil groups in accordance with Chapter 12 of the BMP Manual. All test pits taken within Lot 6 were excavated to a depth of refusal due to a combination of the dense glacial deposits, bedrock, and/or boulders. There was evidence of groundwater test pit #2 and test pit #3 at varying elevations.

Based on the findings of these logs, the use of stormwater infiltration can be designed as part of the management system within the footprint of Test pits #2-#4. Test pit #1 and #5 contained permeability rates of less than an inch. The Geotechnical report described the soil as gravelly sandy loam which matches the soil profile of Boonton. This agrees with the Web soil survey, thence a HSG value of C for the site can be used for analysis.

Runoff curve numbers used for the hydrology analysis from Chapter 9 of the Hydrology NEH handbook and are in Table 5 below. All HSG areas for the given drainage area maps are provided on the soil location map (Appendix B).

Table 5 – Runoff Curve Number

Land Use Type	Runoff Curve Number
	(HSG C)
Open Space/Lawn, Good Condition	74
Impervious areas: (paved lots, roofs)	98



D. Time of Concentration

With the current and future storms, there are 2 sets of calculations for the time of concentration (Appendix D). The current rainfall for the 2-yr storm is 3.47” and the future rainfall is 4.09”. The Hydraflow- Hydrographs Extension for Autodesk Civil 3D allows for a minimum time of concentration of 1.55 minutes. Times of Concentration were calculated using the velocity method in accordance with Chapter 15, in Part 630 of the National Engineering Handbook and provided in Appendix D.

Table 6 – Time(s) of Concentration

Drainage Area	Current (min)	Future (min)
Existing DA-1	21.3	20.59
Proposed DA-1A	8.88	8.39
Proposed DA-1B	1.15*	1.11*
Proposed DA-2A	0.19*	0.19*
Proposed DA-2B	8.70	8.33

* A Time of Concentration of 1.56 minutes is used for hydrologic analysis due to performance limitations

3. DESIGN CRITERIA

A. Stormwater Design Overview

The design of the stormwater collection and management system have been directed by the following guidelines:

1. New Jersey Administrative Code – Stormwater Management (N.J.A.C. 7:8), July 2023
2. New Jersey Stormwater Best Management Practices (BMP) Manual, July 2023.
3. Standards for Soil Erosion and Sediment Control in New Jersey, July 2017
4. New Jersey Residential Site Improvement Standards (RSIS), (N.J.A.C. 5:21).
5. USDA NRCS, Web Soil Survey for North Caldwell, Essex County
6. National Engineering Handbook, Part 630.
7. Township of Verona, Municipal Ordinance Chapter §150-25, Stormwater Management Controls and Requirements

B. Green Infrastructure Standards (N.J.A.C. 7:8-5.3)

In order to satisfy groundwater recharge, stormwater quality and stormwater quantity standards the use of green infrastructure (GI) BMPs identified in Table 5-1 at N.J.A.C. 7:8-5.2(f) and/or alternative stormwater management measure approved in accordance with N.J.A.C. 7:8-5.2(g). The following NJDEP approved green infrastructure materials have been used:

- Porous Pavement x2
- Green Infrastructure Manufactured Treatment Device x1



C. Groundwater Recharge Standards (N.J.A.C. 7:8-5.4)

The design engineer shall, using the assumptions and factors for stormwater runoff and groundwater recharge calculations at N.J.A.C. 7:8-5.7, either demonstrate through hydrologic and hydraulic analysis that the site and its stormwater management measures maintain 100 percent of the average annual pre-construction groundwater recharge volume for the site or demonstrate through hydrologic and hydraulic analysis that the increase of stormwater runoff volume from pre-construction to post-construction for the future two-year storm, as defined and determined pursuant to N.J.A.C. 7:8-5.7(d), is infiltrated. This groundwater recharge requirement does not apply to projects within the "urban redevelopment area" with previously disturbed vegetation or projects subject to N.J.A.C. 7:8-5.4.3.

D. Stormwater Quality Requirements (N.J.A.C. 7:8-5.5)

Stormwater management measures shall be designed to reduce the post-construction load of total suspended solids (TSS) in stormwater runoff generated from the water quality design storm. Eighty percent (80%) TSS removal of the anticipated load, expressed as an annual average shall be achieved for the stormwater runoff from the net increase of motor vehicle surface. If the surface is considered regulated motor vehicle surface because the water quality treatment for an area of motor vehicle surface that is currently receiving water quality treatment either by vegetation or soil, by an existing stormwater management measure, or by treatment at a wastewater treatment plant is to be modified or removed, the project shall maintain or increase the existing TSS removal of the anticipated load expressed as an annual average. More detailed requirements and additional requirements can be found in N.J.A.C. 7:8-5.5.

Stormwater management measures shall be designed to achieve retention of the water quality design storm by incorporating green infrastructure BMPs from Table 5-1 and Table 5-2

E. Stormwater Runoff Quantity Requirements (N.J.A.C. 7:8-5.6)

For projects that are identified as a major development the applicant shall design stormwater management measures so that the post-construction peak runoff rates for the current and projected 2-, 10-, and 100-year storm events, as defined and determined pursuant to NJAC 7:8-5.7(c) and (d), respectively, are 50, 75, and 80 percent, respectively, of the pre-construction peak runoff that is attributable to the portion of the site on which the proposed development or project is to be constructed.

Where an applicant demonstrates that compliance to retain the water quality storm is technically impracticable as set forth at N.J.A.C. 7:8-4.6(a)1, or the type of stormwater is subject to N.J.A.C. 7:8-5.4(b)3, a major development site shall instead meet the hydrograph requirements in the following manner:

1. The runoff peak flow rate of the water quality design storm from the site shall be less than the runoff peak flow rate of the water quality design storm from a drainage area equivalent to the size of the disturbed area of the major development, with a woods cover type, in good hydrologic condition and on Hydrologic Soil Group D soil



2. The runoff hydrograph duration of the water quality design storm from the site shall be greater than the runoff hydrograph duration of the water quality design storm from a drainage area equivalent to the size of disturbed areas of the major development, with a woods cover type, in good hydrologic condition, and on Hydrologic Soil Group D soil. For the purposes of this sub-subparagraph, “runoff hydrograph duration” means the duration between the time that the runoff flow rate starts to be greater than zero to the time that the runoff flow rate becomes zero.

F. Maintenance Requirements (N.J.A.C. 7:8-5.8)

For a major development a maintenance plan for the stormwater management measures shall be prepared. The maintenance plan shall contain specific preventative maintenance tasks and schedules; cost estimates, including estimated cost of sediment, debris, or trash removal; and the name, address, and telephone number of the person or persons responsible for preventative and corrective maintenance (including replacement). If the maintenance plan identifies a person other than the developer (for example, a public agency or homeowners' association) as having the responsibility for maintenance, the plan shall include documentation of such person's agreement to assume this responsibility, or of the developer's obligation to dedicate a stormwater management facility to such person under an applicable ordinance or regulation.

A Stormwater Maintenance Plan has been prepared in accordance with the Township of Verona Stormwater Control ordinance §150-25.12 and applicable chapters of the NJDEP Stormwater BMP Manual and is provided as a separate attachment. The site's stormwater management measures shall be maintained in accordance with the NJDEP Stormwater Management BMP Manual, the Standards for Soil Erosion and Sediment Control in New Jersey, and any manufacturer's specifications. Further, as required by NJAC 7:8, the maintenance manual will be made a part of the deed.

4. STORMWATER ANALYSIS

A. Stormwater Design

The Stormwater management system design for the proposed improvements consists of six (6) areas of porous pavement connected in series. These measures, collectively, will treat the water quality, water quantity, and groundwater recharge requirements. Roofs are not required to be treated for water quality, only water quantity.

The proposed drainage flow path departs drastically from the existing drainage area. All rainwater flows on-site and is contained on site in existing conditions. With this design, the stormwater is proposed to be routed into the municipal storm system. P DA-1 consists of runoff generated by buildings' #1-#4 and the asphalt driveway. P DA-1A is captured into the first porous pavement system which is then connected to the 2nd in series for P -DA-1B. The system outfalls into the municipal storm line in Essex Fells.

There is a trench drain on the westerly entrance aisle which captures impervious runoff that the porous pavement cannot receive due to the site topography. This runoff is treated through a GIMTD before entering the proposed storm pipe line on Bloomfield Avenue.



Off-site runoff that enters the site is captured by a series of bypass drains which wrap

B. Groundwater Recharge

The proposed project is considered a major development and is located in a Metropolitan Planning Area (PA-1), which is an urban redevelopment area, groundwater recharge for the site is only required for areas not classified as “previously disturbed”. According to NJGEOWEB, the entire site is classified as forested and approximately 1.92 acres is proposed to be permanently disturbed, (Appendix I) . An NJGRS worksheet has been prepared using the Haledon substratum for required recharge. The porous pavement storage capacity is modeled as 2’ deep at 12 inches below grade. A mounding analysis will be provided when the location of the SW system is approved, at which point soil testing 8’ below the bottom of system will be provided for each individual porous pavement area.

With the available subsoil permeability data, recharge is possible to design for. The lack of a groundwater table provides the opportunity to allow for some recharge. Geotechnical testing shows viability for infiltration for most of the site except for the perimeter .Additional soil testing is required to determine the transition area between soil permeability types.

C. Water Quality

The Water Quality Design Storm is treated with water quality storm measures. The parameters for the water quality treatment measures are identified in Table 6. The porous-pavement is designed to infiltrate at 0.93 in/hr due to permeability testing of 1.85 in/hr and greater in the area of proposed porous pavement. Appendix E contains hydrographs for the pre-construction & post-construction area, demonstrating a decrease in peak runoff and an increased hydrologic duration time in the post-construction area.

The Storm Water Management Best Management Practices from the NJDEP requires all measures to fully drain the Volume of the Water Quality Design Storm in less than 72 hours. The most hydraulically restrictive layer of soil must be used for the permeability rate. Drain times are determined using the hydrographs of the WQDS at the point of pond routing. See table 7 below.

Drain time = WQDS Runoff Volume*12[in/ft]/(Surface Area[feet]*(infiltration rate [in/hr])

Table 7 –Water Quality Measure Specifications

Stormwater Measure	Proposed WQDS peak Flow (cfs)	Proposed duration (min)	W.Q.D.S. Storage Volume. (cubic feet)	Outlet Control Structure Inv. (ft) (dia.)	W.Q.D.S Drain Time (hrs)
Porous Pavement #1	0.00	130	1,837	469.8 (2.5’)	8.84 hours
Porous Pavement #2	0.00	140	1,883	466.1 (2.5’)	6.60 hours

Each individual Porous Pavement Section has a contributory drainage area of less than 3:1 and the GI MTD is sized to treat the flow entering it for the WQDS.



D. Water Quantity

The HydraFlow Hydrographs program (Civil 3d extension) was used to determine the current and future peak flow rates with respect to the existing and proposed site conditions. The comparative peak flow rates for each storm event for existing and proposed conditions is summarized in the table below.

Table 8 –Peak Flow Reduction

Watershed Name	Precipitation Factor	2-Year Storm	10-Year Storm	100-Year Storm
Pre-Construction Site Flow	CURRENT	1.13 cfs	2.40 cfs	5.15 cfs
Post-Construction Site Flow		0.40 cfs	0.74 cfs	2.65 cfs
Reduction (%)		35.4%	30.8%	51.5%
Pre-Construction Site Flow	FUTURE	1.52 cfs	3.09 cfs	6.83 cfs
Post-Construction Site Flow		0.507 cfs	0.91 cfs	4.44 cfs
Reduction (%)		33.4%	29.4%	65.0%

As shown in Table 8, the proposed peak flow rates meet the required 50%, 25% and 20% reductions for the 2-, 10- and 100-year storm events for the Site.

E. Detention Routing

In order to meet the required reductions for the future & current 2, 10 and 100 year storm event, the bio retention basins are used to provide storage, controlling most of the runoff within the Area of Disturbance.

Table 9 – Water Quantity Storage Specification

Porous Pavement #1A Storage Volume (cubic feet)	Bottom of Storage	Top of Storage	Future 100 year Storm Elev.		Outlet Control Structure Inv.	
4,950	469.0	471.0	470.95		469.0	
Peak Storage Volume (cubic feet)	Future 2 year storm	4,075	Future 10 year Storm	4,401	Future 100 year Storm	4,824

Porous Pavement #1B Storage Volume (cubic feet)	Bottom of Storage	Top of Storage	Future 100 year Storm Elev.		Outlet Control Structure Inv.	
10,272	465.5	468.5	468.43		465.5	
Peak Storage Volume (cubic feet)	Future 2 year storm	4,326	Future 10 year Storm	7,412	Future 100 year Storm	10,023



F. Pipe Network Calculations & Conveyance

Pipe hydraulic computations were calculated utilizing Manning's Equation for the future 100 year storm. Contributory Drainage Area #2 is the largest on site area to be routed into a 6" PVC pipe @ 2%. CDA #6 is the largest on-site area to be conveyed to a 12" HDPE pipe @ 2%. Contributory Drainage Area #8 is the largest on site area to be routed into a 12" HDPE pipe @1%.

Table 10 –CDA Pipe Conveyance

CDA #	Material	Pipe Dia (in)	Roughness	Slope (%)	Full Flow Capacity (cfs)	Full Flow Velocity (ft/s)	100 yr CDA inflow (cfs)	100 yr CDA inflow (ft/s)
2	PVC	6	0.011	2	0.94	4.79	0.33	1.7
6	HDPE	12	0.012	2	5.47	6.97	2.82	3.6
8	HDPE	12	0.012	1	3.87	4.93	0.79	1.01

This CDA for the future 100 year storm dos not take into account off-site stormwater runoff.

All the pipe velocities for the future 100 year storm are between 1.0 to 10.0 ft/sec. All piping is capable of managing the full flow capacity of the ON-SITE future 100 year storm. The peak flows of each CDA are provided in Appendix H. There is a Contributory Drainage Area Map in Appendix C.

5. SOIL EROSION AND SEDIMENT CONTROL

The proposed development plans to disturb greater than 5,000 square feet of land, therefore, a Soil Erosion and Sediment Control (SESC) Plan has been developed and will be submitted for certification to the Hudson-Essex-Passaic Soil Conservation District (HEP-SCD), pursuant to the SESC Act, Chapter 251, P.L. 1975 as amended (N.J.S.A. 4:24-39 et. seq.). The proposed SESC measures have been designed in accordance with the Standards for SESC in New Jersey. Silt fence will be installed around the lowest elevated perimeters of the Limit of Disturbance. The proposed driveway areas will be stabilized with a crushed stone tracking pad. Inlet protection will be provided for all existing and proposed inlets. Tree protection fencing will be provided to all on-site trees deemed to be protected. Temporary soil stockpiles will be strategically placed with silt fence provided around the entire stockpile.

Stabilized Construction Access (SCA)

SCA is proposed for the site accesses along Palmer Road. The SCA will reduce the tracking of sediment onto the public roadway and mitigate the potential for sediment laden runoff to enter the municipal stormwater and adjacent waterways. All SCAs should be installed and maintenance in accordance with the Hudson-Essex-Passaic Soil Conservation District and SESC plan.



Silt Fence Perimeter Protection

Silt Fence (SF) perimeter controls shall be installed along the down gradient edge of the active construction site. Per the SESC standard, the fence posts shall be construction of a hardwood with minimum diameter of 1 ½ inches, spaced a minimum of 8-feet apart and extend a minimum of 2 feet above and below grade. The geotextile fabric shall be buried at least 6-inches below grade and extend at least 2 feet above grade. Metal fasteners and high strength reinforcement material shall be used to fasten the geotextile fabric to the posts in a manner that resists tearing away from the post. The fabric shall incorporate a drawstring in the top portion of the fence for added. The sediment barrier will intercept and detain small amounts of sediment from being discharged off-site. The silt fence perimeter controls shall be maintained in accordance with the SESC standards.

Stockpile Controls

Stockpile controls shall be placed around all stockpiles of fine materials that are inactive. See SESC notes. Stockpiles of suspect contaminated material should be placed on plastic sheeting and contained such that no potentially contaminated runoff can infiltrate the groundwater or flow off site.

Steep Slope Protection

Disturbed slopes shall be stabilized as soon as possible and slopes greater than 2:1 require steep slope stabilization per SCD. Stabilizations methods include temporary/permanent seeding, mulch, blankets and/or rolled products.

Inlet Protection

Existing and proposed inlets shall be protected per the SESC standards, which may include filter fabric with perimeter controls and/or inlet protection bags. The installation and maintenance of the inlet protection measures shall be in accordance with the SESC standards.

Dust Control

During demolition and construction activities, especially during dry conditions, a water truck shall be present on-site to mitigate the generation and release of fugitive dust and gaseous air pollutants. Areas of disturbed sediment and heavy traffic should be wetted regularly. Dust control shall be maintained, during demolition activities. The application of dust control polymers and/or perimeter screen fencing may be warranted depending on site conditions.

Concrete Truck Washout Areas

If on-site washout of the concrete trucks is proposed, a prefabricated washout container shall be delivered to the site. Per the SESC standards, the washout area shall not be located adjacent to identified surface drainage features or wetland areas. The washout container should be cleaned or changed when it is filled to 75% capacity.

Hazardous Material Storage and Spill Protection

All hazardous materials shall be properly stored and maintenance with appropriate spill protection measures.



HUDSON-ESSEX-PASSAOC SOIL EROSION AND SEDIMENT CONTROL NOTES

1. All soil erosion and sediment control practices on this plan will be constructed in accordance with the “new jersey standards for soil erosion and sediment control” last revised December 2017. These measures will be installed prior to any major soil disturbance or in their proper sequence and maintained until permanent protection is established.
 2. All soil to be exposed or stockpiled for a period of greater than 14 days, and not under active construction, will be temporarily seeded and hay mulched or otherwise provided with vegetative cover. This temporary cover shall be maintained until such time whereby permanent re-stabilization is established.
 3. Seeding dates: the following seeding dates are best recommended to establish permanent vegetative cover within most locations in the HEPSCD: spring - 3/1-5/15 and fall - 8/15 - 10/1
 4. Sediment fences are to be properly trenched and maintained until permanent vegetative cover is established
 5. All storm drainage inlets shall be protected by one of the practices accepted in the standards, and protection shall remain until permanent stabilization has been established. storm drainage outlet points shall be protected as required before they become functional.
 6. Mulch materials shall be un-rotted salt hay or small grain straw applied at the rate of 70-90 pounds per 1000 square feet and anchored with a mulch anchoring tool, liquid mulch binders or a netting tie down. other suitable materials may be used if approved by the soil conservation district.
 7. All erosion control devices shall be periodically inspected, maintained and corrected by the contractor. Any damage incurred by erosion shall be rectified immediately.
 8. The Township of Verona, department of engineering will be notified at least 48 hours prior to any soil disturbing activities. Email mcaggiano@boswellengineering.com.
 9. The applicant must obtain a district issued report-of-compliance prior to applying for the certificate of occupancy or temporary certificate of occupancy or temporary certificate of occupancy from the borough, NJ - DCA or any other controlling agency. Contact the town at 973-857-4773 or email mcaggiano@boswellengineering.com. to request a final inspection, giving advanced notice upon completion of the re-stabilization measures. A performance deposit may be posted with the district when winter weather or snow cover prohibits the proper application of seed, mulch, fertilizer or hydro-seed.
 10. Paved roadways must be kept clean at all times. do not utilize a fire or garden hose to clean roads unless the runoff is directed to a properly designed and functioning sediment basin. Water pumped out of the excavated areas contains sediments that must be removed prior to discharging to receiving bodies of water using removable pump stations, sump pits, portable sedimentation tanks and/or silt control bags.
 11. All surfaces having a lawn or landscaping as final cover are to be provided topsoil prior to re-seeding, sodding or planting. a depth of 5.0 inches, firmed in place, is required, as per the standards for topsoil and land grading, last revised December 2017.
 12. All plan revisions must be submitted to the district for proper review and approval.
-



13. A crushed stone wheel cleaning tracking-pad is to be installed at all site exits using 2 ½-1" crushed angular stone (ASTM 2 or 3) to a minimum length of 50 feet and minimum depth of 6". All driveways must be provided with crushed stone until paving is complete.

14. Steep slopes incurring disturbance may require additional stabilization measures. These "special" measures shall be designed by the applicant's engineer and be approved by the soil conservation district.

15. The Township of Verona department of engineering shall be notified, in writing, for the sale of any portion of the project or for the sale of individual lots. new owners' information shall be provided. additional measures deemed necessary by the borough officials shall be implemented as conditions warrant.

6. CONCLUSIONS

The proposed development of Block 2505, Lot 6 is considered a major development and requires Stormwater management measures to address the projected increase in stormwater runoff. To control the stormwater quantity and quality, the development is proposing porous pavement and to accommodate the stormwater generated from the improvements on the subject property. The development will satisfy the requirements of N.J.A.C 7:8-5 and Township of Verona Ordinance §150-25 by the following:

- Green infrastructure has been designed with the utilization of SWM BMP measures.
- The Groundwater Recharge requirements for the site has been met
- Water quality and TSS removal is compliant with the use of green infrastructure and volumetric reduction.
- The current and future 2, 10, and 100-year storms have been reduced by 50%, 75%, and 80%, respectively within the area of disturbance.
- All calculations have been performed in accordance with the appropriate methods.
- An operations and maintenance plan has been prepared for the designed stormwater measures.

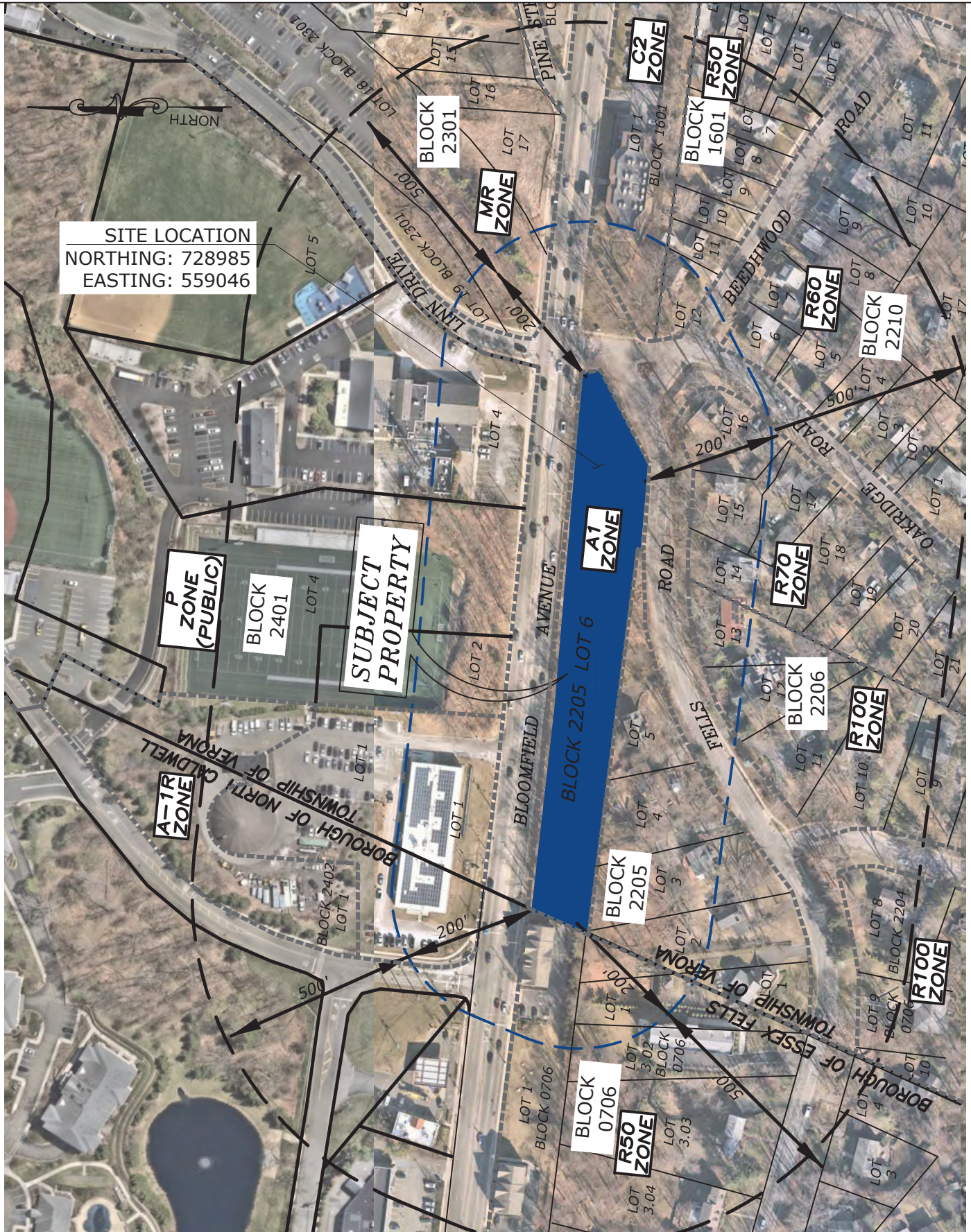


APPENDICES



Appendix A

- **Fig1-Site Location Map**
- **Fig2- USGS Topo Map**



SCALE: 1"=200'

TAKEN FROM :
TOWNSHIP TAX &
ZONING MAPPING
NEARMAP 2026



SUBJECT PROPERTY

200 FT RADIUS

LOT BOUNDARY

ZONE BOUNDARY

N.J. ENGINEERING CERTIFICATE OF
AUTHORIZATION No. 24GA28118200

E 2 PROJECT MANAGEMENT LLC

87 HIBERNIA AVENUE
ROCKAWAY, N.J. 07866
PHONE: (973) 299-5200
FAX: (973) 299-5059
www.E2Pm.com



THIS DRAWING DOES NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY. ALL CONSTRUCTION MUST BE DONE IN COMPLIANCE WITH THE OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970 AND ALL RULES AND REGULATIONS THEREOF. APPLICANT, THIS DRAWING AND THE DESIGN FEATURES OR CONSTRUCTION DISCLOSED ARE PROPRIETARY TO E2 PROJECT MANAGEMENT LLC AND SHALL NOT BE REPRODUCED, ALTERED OR COPIED WITHOUT WRITTEN PERMISSION. SHALL NOT BE USED IN ANY MANNER DETRIMENTAL TO ITS INTEREST AND SHALL BE RETURNED UPON REQUEST.

SITE LOCATION MAP

PROJECT NAME:
VERONA COMMONS
885 BLOOMFIELD AVENUE
TOWNSHIP OF VERONA
ESSEX COUNTY, NEW JERSEY
BLOCK 2205 LOT 6

FIRST ISSUE: 08/18/2026

DRAWN BY: RF

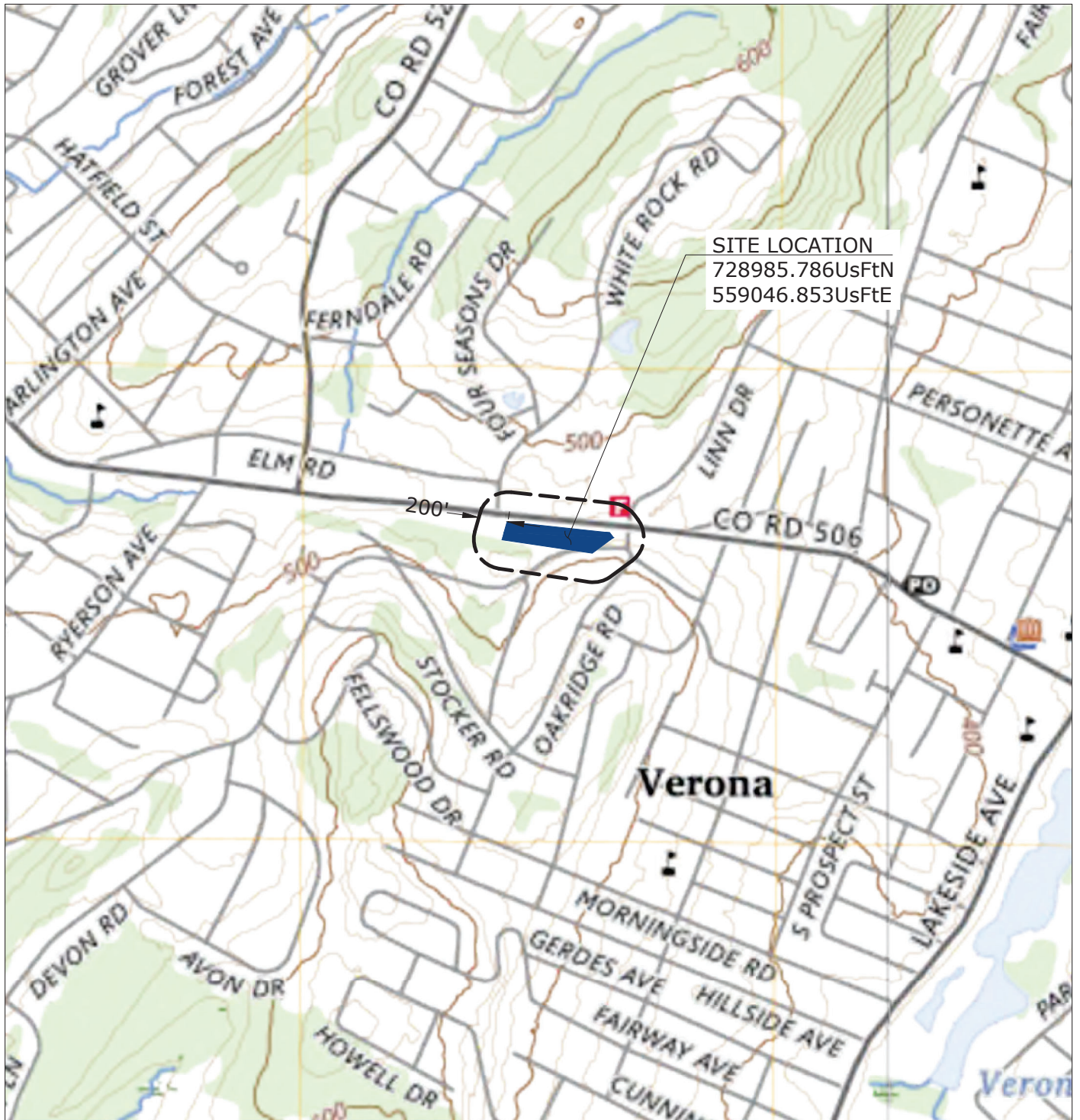
CHECKED BY: DC

DRAWING NO.

SCALE: AS SHOWN

PROJECT #: P-26-34

FIG-1



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84) Projection and
1 000-meter grid/Universal Transverse Mercator, Zone 18T
This map is not a legal document. Boundaries may be
generated for this map scale. Private lands within government
reservations may not be shown. Obtain permission before
entering private lands.

Imagery: N.A.P., August 2017 - November 2017
Roads: U.S. Census Bureau, 2014 - 2021
Names: GNS, 1979 - 2023
Hydrography: National Hydrography Dataset, 2002 - 2023
Contours: National Elevation Dataset, 2013
Boundaries: Multiple sources; see metadata file 2020 - 2022
Wetlands: FWS National Wetlands Inventory 2007 - 2011



1	2	3
4	*	5

- 1 Pompton Plains
- 2 Paterson
- 3 Hackensack
- 4 Caldwell
- 5 Weehawken
- * ORANGE



SCALE: 1"=1000'

CONTOUR INTERVAL 20 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988
This map was produced to conform with the
National Geospatial Program US Topo Product Standard.

N.J. ENGINEERING CERTIFICATE OF
AUTHORIZATION No. 24GA28118200

E 2 PROJECT MANAGEMENT LLC

87 HIBERNIA AVENUE
ROCKAWAY, N.J. 07866
PHONE: (973) 299-5200
FAX: (973) 299-5059
www.E2PM.com



THIS DRAWING DOES NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY. ALL
CONSTRUCTION MUST BE DONE IN COMPLIANCE WITH THE OCCUPATIONAL SAFETY AND HEALTH
ACT OF 1970 AND ALL RULES AND REGULATIONS THEREOF APPROPRIATE. THIS DRAWING AND THE
DESIGN FEATURES OR CONSTRUCTION DISCLOSED ARE PROPRIETARY TO E2 PROJECT MANAGEMENT
LLC AND SHALL NOT BE REPRODUCED, ALTERED OR COPIED WITHOUT WRITTEN PERMISSION. SHALL
NOT BE USED IN ANY MANNER DETRIMENTAL TO ITS INTEREST AND SHALL BE RETURNED UPON REQUEST.

USGS TOPO MAP

PROJECT NAME:
VERONA COMMONS
885 BLOOMFIELD AVENUE
TOWNSHIP OF VERONA
ESSEX COUNTY, NEW JERSEY
BLOCK 2205 LOT 6

FIRST ISSUE: 08/18/2026

DRAWN BY: RF

CHECKED BY: DC

DRAWING NO.

FIG-2

SCALE: AS SHOWN

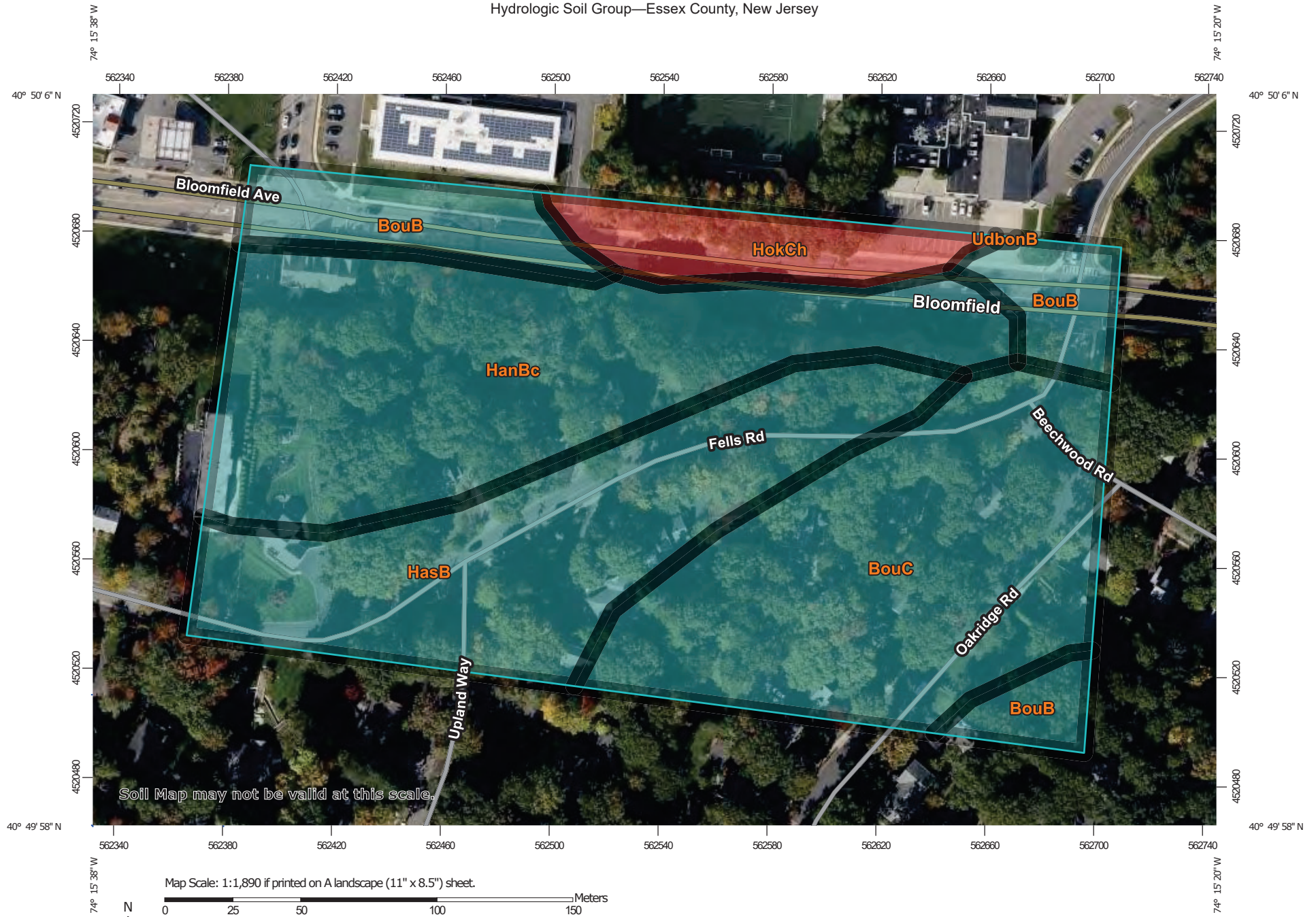
PROJECT #: P-26-34



Appendix B:

- **WSS Hydrologic Soil Group Map**
 - **Geotechnical Report**

Hydrologic Soil Group—Essex County, New Jersey



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points

 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available

Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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

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

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

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Essex County, New Jersey
 Survey Area Data: Version 21, Aug 28, 2025

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

Date(s) aerial images were photographed: Oct 10, 2022—Oct 16, 2022

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

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BouB	Boonton - Urban land, Boonton substratum complex, 0 to 8 percent slopes	C	1.7	11.5%
BouC	Boonton - Urban land, Boonton substratum complex, 8 to 15 percent slopes	C	4.0	27.7%
HanBc	Haledon silt loam, 0 to 8 percent slopes, extremely stony	C	4.5	31.0%
HasB	Haledon - Urban land, Haledon substratum complex, 0 to 8 percent slopes	C	3.5	23.7%
HokCh	Holyoke silt loam, 0 to 15 percent slopes, very rocky	D	0.9	6.1%
UdbonB	Udorthents, Boonton substratum, 0 to 8 percent slopes	A	0.0	0.0%
Totals for Area of Interest			14.6	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

GEO-TECHNOLOGY ASSOCIATES, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

A Practicing Geoprofessional Business Association Member Firm



April 6, 2026

A&R Skyline Properties Urban Renewal, LLC

885 Bloomfield Avenue
Verona, NJ 07044

Attn: Ray Rice

Re: Preliminary Stormwater Management Testing
Proposed Townhomes
Verona Township, Essex County, New Jersey

Dear Ray:

In accordance with our agreement dated January 16, 2026, and executed on February 12, 2026 Geo-Technology Associates, Inc. (GTA) has performed test pits and preliminary in-situ infiltration testing for the planning and design of stormwater management (SWM) facilities related to a proposed development to be constructed in Verona Township, Essex County, New Jersey. The site is located at 885 Bloomfield Avenue and is identified as Lot 6 in Block 2205 on the Verona Township tax map.

A "Boundary and Topographic Survey" prepared by E 2 Project Management, LLC dated 2023 and an undated and untitled concept plan were provided to GTA. The plans indicate the site boundaries, existing site features and topography, and the layout of the proposed site improvements. The proposed development will include 28 townhomes contained within 4 buildings. The concept plan was marked up to show the requested locations of 5 test pit excavations within the potential SWM basin areas.

Test Pit Exploration

On March 9, 2026, GTA observed and logged the excavation of 5 test pits and performed in-situ infiltration testing at or near the requested locations. The test pits were excavated by Geo Pro, Inc. using a CAT 313F excavator and extended to depths ranging from about 7 to 14 feet below the existing ground surface. Preliminary in-situ infiltration testing was performed adjacent to each of the test pits using a double-ring infiltrometer. The exploration locations were selected by the Client and located in the field by GTA using a hand-held GPS unit and the existing site features as reference. The approximate locations of the explorations performed for this study are shown on the attached Test Pit Location Plan. Detailed descriptions of the subsurface conditions encountered in the test pits are indicated on the

14 Worlds Fair Drive, Suite A, Somerset, NJ 08873 (732) 271-9301

◆ Abingdon, MD ◆ Baltimore, MD ◆ Laurel, MD ◆ Frederick, MD ◆ Waldorf, MD ◆ New Castle, DE ◆ Georgetown, DE
◆ Somerset, NJ ◆ NYC Metro ◆ Pittsburgh Metro ◆ Quakertown, PA ◆ Scranton/Wilkes-Barre, PA ◆ York, PA
◆ Northeastern, OH ◆ Sterling, VA ◆ Nashville, TN ◆ Charlotte, NC ◆ Raleigh, NC ◆ Orlando, FL

Visit us on the web at www.gtaeng.com

Logs of Test Pits, which are also attached. The ground surface elevations indicated on the logs were obtained from by interpolating between topographic contours indicated on the plan provided to us and should be considered approximate.

Existing Conditions

At the time GTA's exploration was performed, the site was predominantly wooded and was bounded by residential homes to the east, south and west and by Bloomfield Avenue to the north.

Subsurface Conditions

An approximately 4- to 24-inch-thick layer of topsoil was present at the ground surface in all the explorations. Test Pit TP-1 encountered boulders at the surface and beneath the topsoil. Beneath the surface materials, the native soils consisted predominantly of clayey soils (sandy clay, clay loam) soils overlying granular materials (sandy loam, loamy sand) with varying amounts of gravel, cobbles, and boulders. Test Pit TP-4 encountered highly-weathered rock at a depth of about 6 feet below the existing surface grade which is indicative of a scattered bedrock outcrop that is shown on publicly available geologic maps in this area. Refusal to further excavation was encountered in 4 of the 5 test pits at depths ranging from about 7 to 9 feet below the existing surface grades.

Groundwater was observed in Test Pits TP-2 and TP-3 at about 6 feet and 7 feet below the existing ground surface, respectively. Groundwater was not observed in the remaining test pits. Long-term groundwater readings were not obtained because the test pits were backfilled upon completion for safety considerations. The test pits were excavated during the "wet season" defined by the NJDEP as January through April. Therefore, we believe the depths to the observed groundwater is indicative of the seasonal high water table (SHWT) at the explored locations and that the SHWT is below the depths excavated in the tests pit where it was not observed.

Infiltration Testing

Preliminary in-situ infiltration tests were performed at each of the test pits using a double-ring infiltrometer in general accordance with Chapter 12 of the NJDEP Stormwater Best Management Practices Manual (Chapter 12). The results of the infiltration tests are summarized in the following table.

SUMMARY OF INFILTRATION TEST RESULTS

Test Pit Location	Approx. Test Depth (ft.)	Approx. Test Elevation (ft.)	USDA Classification	Measured Infiltration Rate (in/hr)
TP-1	5	464.5	Gravelly Clay Loam	0.0
TP-2	4	460.0	Sandy Loam	1.9

Test Pit Location	Approx. Test Depth (ft.)	Approx. Test Elevation (ft.)	USDA Classification	Measured Infiltration Rate (in/hr)
TP-3	5	455.0	Gravelly Sandy Loam	1.85
TP-4	4	471.0	Gravelly Sandy Loam	2.3
TP-5	5	484.5	Gravelly Sandy Loam	0.5

Note: A factor of safety of at least 2 should be applied to the measured infiltration rates for design purposes.

The primary conditions that affect the capacity of soil to infiltrate water are the soil gradation and density properties and the presence of hydraulically restrictive layers such as silt or clay (fines), rock, or groundwater, each of which would restrict the flow of water into the underlying aquifer. The subsurface profile at the site generally consisted of sandy clay, clay loam, sandy loam and loamy sand with varying amounts of gravel, cobbles, and boulders. The infiltration testing performed for this study resulted in measured infiltration rates ranging from 0.0 inches per hour to 2.3 inches per hour.

Please note that additional SWM testing will be required when plans are further developed. Additionally, if an infiltration basin is planned in the location of Test Pit TP-4, basin flood testing would be required to evaluate if the bedrock is suitable for infiltration per the guidance offered in Chapter 12. A basin flood test consists of excavating an approximately 50-square-foot basin into the bedrock and filling it with about 12 inches of water. The basin is checked 24 hours after filling and if it completely drains, it is filled again and checked after another 24-hour period. If water remains after 24-hours in either filling, the basin flood test is considered “failed” and will not be suitable for infiltration. If the basin drains completely after both 24-hour periods, it is considered a “pass” and the rock is considered a fractured substratum suitable for infiltration.

LIMITATIONS

This letter, including all supporting test pit logs, field data, and other documents prepared by GTA in connection with this project have been prepared for the exclusive use of A&R Skyline Properties Urban Renewal, LLC pursuant to the agreement between GTA and the Client. All terms and conditions set forth in the Agreement and the General Provisions attached thereto are incorporated herein by reference. No warranty, express or implied, is made herein. Use and reproduction of this letter by any other person without the expressed written permission of GTA and the Client is unauthorized and such use is at the sole risk of the user. Test pits indicate soil conditions only at specific locations and times and only at the depths penetrated. They do not necessarily reflect strata or variations that may exist between the exploration locations.

GTA is not responsible for any claims, damages, or liability associated with interpretation of subsurface data or reuse of the subsurface data without the expressed written authorization of Geo-Technology Associates, Inc.



This letter and the attached logs are instruments of service. The subject matter of this report is limited to the facts and matters stated herein. Absence of a reference to any other conditions or subject matter shall not be construed by the reader to imply approval by the writer.

GTA appreciates the opportunity to have been of assistance to you on this project. Please contact our office at (732) 271-9301 if you have questions or require additional information. Please note that, unless you make other arrangements, GTA will discard all soil samples obtained from the explorations 60 days after the date of this report.

Sincerely,

GEO-TECHNOLOGY ASSOCIATES, INC.



Kyle T. Plaza, P.E.
Associate



Robert Dykstra, P.E.
Vice President

Attachments:

Site Location Map

Test Pit Location Plan

Logs of Test Pits (5 pages)



Note: Site boundary is approximate.

SITE LOCATION MAP



GEO-TECHNOLOGY ASSOCIATES, INC.

14 Worlds Fair Drive, Suite A
Somerset, New Jersey 08873
(732) 271-9301
fax (732) 271-9306

PROPOSED TOWNHOMES

Verona Township,
Essex County, New Jersey

Prepared For: A&R Skyline Properties Urban Renewal,

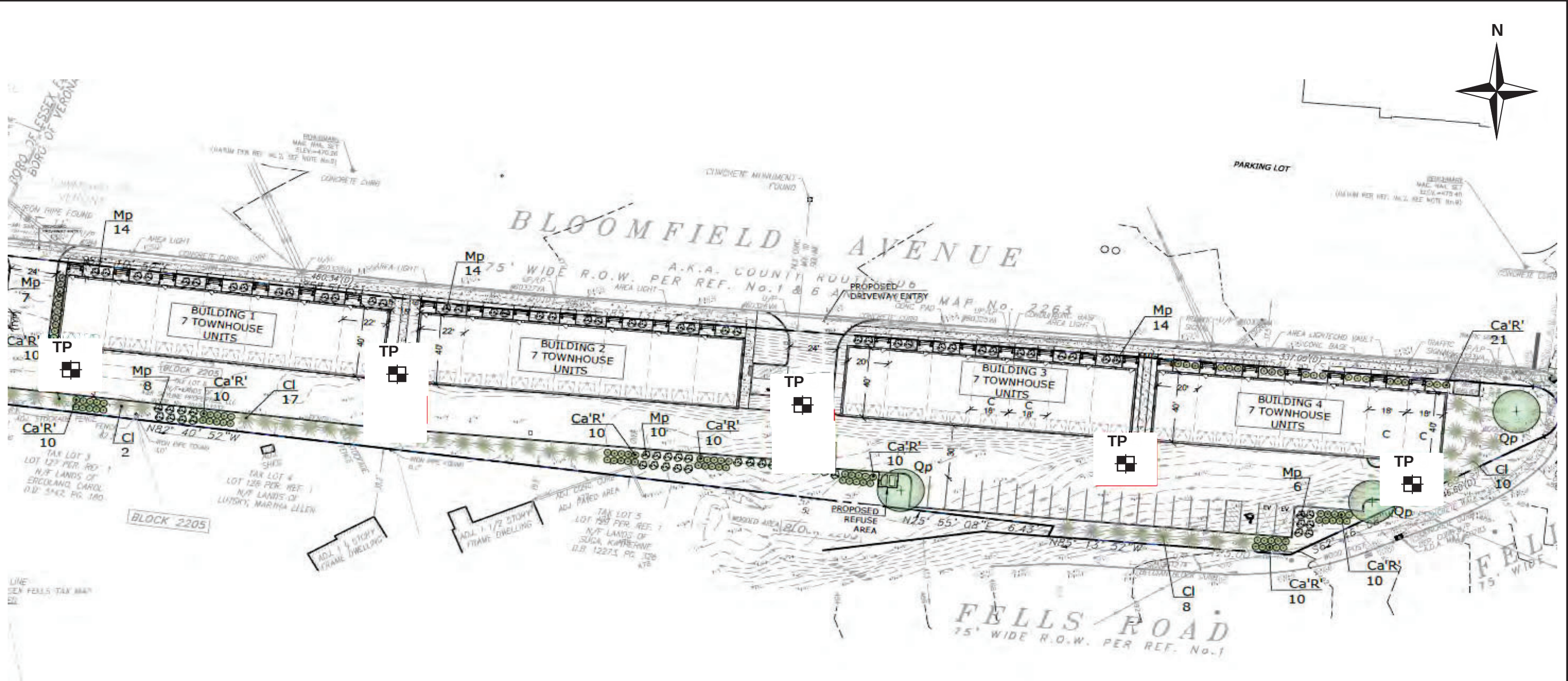
SOURCE: Google Maps

SCALE: NTS

DATE: APR. 2026

PROJECT#: 31260538

Figure 1



*Undated and untitled base plan provided to GTA.

LEGEND:
TP  Indicates the numbers and approximate locations of test pits performed by GTA for this study.

TEST PIT LOCATION PLAN		PROPOSED TOWNHOMES		
 GEO-TECHNOLOGY ASSOCIATES, INC.		Verona Township, Essex County, New Jersey		
		Prepared For: A&R Skyline Properties Urban Renewal, LLC		
		DESIGN BY: *	DRAWN BY: AFS	REVIEWED BY: KTP
		SCALE: NTS	DATE: MAR. 2026	PROJECT #: 31260538

Figure 2

LOG OF TEST PIT NO. TP-1

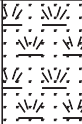
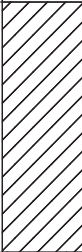
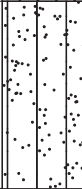
Sheet 1 of 1

PROJECT: **Proposed Townhomes**
 PROJECT LOCATION: **Verona Township, Essex County, New Jersey**
 CLIENT: **A&R Skyline Properties Urban Renewal, LLC**

PROJECT NO.: **31260538**

DATE STARTED: **3/9/2026**
 DATE COMPLETED: **3/9/2026**
 CONTRACTOR: **GeoPro, Inc.**
 EQUIPMENT: **CAT 313F**

GROUNDWATER ENCOUNTERED: **N/E**
 GROUND SURFACE ELEVATION: **469.5 Ft.**
 DATUM: **Topo**
 LOGGED BY: **CT**
 CHECKED BY: **AFS**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL		
				DESCRIPTION	REMARKS
467.5	0			24 In. of Topsoil	- Boulders at the surface and beneath the topsoil.
	2	CL		Yellow-brown (10YR 5/6), moist, 20% gravel, 10% cobbles, subangular blocky, friable, Gravelly Clay Loam	
463.5	6	SM		Dark yellow-brown (10YR 4/4), moist, 20% gravel, 10% cobbles, 5% boulders, single grain, loose, Gravelly Sandy Loam	- Infiltration rate = 0.0 in/hr at 5 Ft.
	8				
460.5	10			Test pit complete at 9 Ft. due to bucket refusal on boulders. Seasonal high groundwater table not encountered.	
	12				
	14				
	16				
	18				

NOTES: **Location and elevation are approximate.**
Backfilled on completion.



GEO-TECHNOLOGY ASSOCIATES, INC.

14 Worlds Fair Drive, Suite A
 Somerset, NJ 08873

LOG OF TEST PIT NO. TP-1

Sheet 1 of 1

LOG OF TEST PIT NO. TP-2

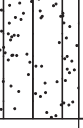
Sheet 1 of 1

PROJECT: **Proposed Townhomes**
 PROJECT LOCATION: **Verona Township, Essex County, New Jersey**
 CLIENT: **A&R Skyline Properties Urban Renewal, LLC**

PROJECT NO.: **31260538**

DATE STARTED: **3/9/2026**
 DATE COMPLETED: **3/9/2026**
 CONTRACTOR: **GeoPro, Inc.**
 EQUIPMENT: **CAT 313F**

GROUNDWATER ENCOUNTERED: **6 Ft.**
 GROUND SURFACE ELEVATION: **464 Ft.**
 DATUM: **Topo**
 LOGGED BY: **CT**
 CHECKED BY: **AFS**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL		
				DESCRIPTION	REMARKS
463.0	0			12 In. of Topsoil	- Infiltration rate = 1.9 in/hr at 4 Ft. 
	2	SM		Dark yellow-brown (10YR 4/4), moist, 10% gravel, single grain, loose, Sandy Loam	
459.0	6	SP-SM		Dark yellow-brown (10YR 3/4), moist, 25% gravel, 10% cobbles, 2% boulders, moist, single grain, loose, Gravelly Loamy Sand - wet at 6 Ft.	
457.0	8			Test pit complete at 7 Ft. due to bucket refusal on boulders and water seepage. Seasonal high groundwater table encountered at 6 Ft.	
	10				
	12				
	14				
	16				
	18				

NOTES: **Location and elevation are approximate.**
Backfilled on completion.



GEO-TECHNOLOGY ASSOCIATES, INC.

14 Worlds Fair Drive, Suite A
 Somerset, NJ 08873

LOG OF TEST PIT NO. TP-2

Sheet 1 of 1

LOG OF TEST PIT NO. TP-3

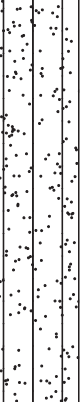
Sheet 1 of 1

PROJECT: **Proposed Townhomes**
 PROJECT LOCATION: **Verona Township, Essex County, New Jersey**
 CLIENT: **A&R Skyline Properties Urban Renewal, LLC**

PROJECT NO.: **31260538**

DATE STARTED: **3/9/2026**
 DATE COMPLETED: **3/9/2026**
 CONTRACTOR: **GeoPro, Inc.**
 EQUIPMENT: **CAT 313F**

GROUNDWATER ENCOUNTERED: **7 Ft.**
 GROUND SURFACE ELEVATION: **460 Ft.**
 DATUM: **Topo**
 LOGGED BY: **CT**
 CHECKED BY: **AFS**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL		
				DESCRIPTION	REMARKS
459.0	0			12 In. of Topsoil	
	2	SM		Dark yellow-brown (10YR 3/4), moist, 25% gravel, 10% cobbles, 3% boulders, single grain, loose, Gravelly Sandy Loam	
	4				
	6				- Infiltration rate = 1.85 in/hr at 5 Ft. 
452.5	8			- wet at 7 Ft. Test pit complete at 7-1/2 Ft. due to bucket refusal on boulders and water seepage. Seasonal high groundwater table encountered at 7 Ft.	
	10				
	12				
	14				
	16				
	18				

NOTES: **Location and elevation are approximate.**
Backfilled on completion.



GEO-TECHNOLOGY ASSOCIATES, INC.

14 Worlds Fair Drive, Suite A
 Somerset, NJ 08873

LOG OF TEST PIT NO. TP-3

Sheet 1 of 1

LOG OF TEST PIT NO. TP-4

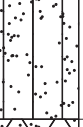
Sheet 1 of 1

PROJECT: **Proposed Townhomes**
 PROJECT LOCATION: **Verona Township, Essex County, New Jersey**
 CLIENT: **A&R Skyline Properties Urban Renewal, LLC**

PROJECT NO.: **31260538**

DATE STARTED: **3/9/2026**
 DATE COMPLETED: **3/9/2026**
 CONTRACTOR: **GeoPro, Inc.**
 EQUIPMENT: **CAT 313F**

GROUNDWATER ENCOUNTERED: **N/E**
 GROUND SURFACE ELEVATION: **475 Ft.**
 DATUM: **Topo**
 LOGGED BY: **CT**
 CHECKED BY: **AFS**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL		
				DESCRIPTION	REMARKS
474.7	0	CL		4 In. of Topsoil Yellow-brown (10YR 5/4), moist, subangular blocky, friable, Clay Loam	- Infiltration rate = 2.3 in/hr at 4 Ft.
	2				
471.0	4	SM		Dark yellow-brown (10YR 3/4), moist, 25% gravel, 10% cobbles, moist, single grain, loose, Gravelly Sandy Loam	
469.0	6	HW		Very dark gray (10YR 3/1), moist, Highly-weathered ROCK	
	8				
466.0	10			Test pit complete at 9 Ft. due to refusal on highly-weathered rock. Seasonal high groundwater table not encountered.	
	12				
	14				
	16				
	18				

NOTES: **Location and elevation are approximate.**
Backfilled on completion.



GEO-TECHNOLOGY ASSOCIATES, INC.

14 Worlds Fair Drive, Suite A
 Somerset, NJ 08873

LOG OF TEST PIT NO. TP-4

Sheet 1 of 1

LOG OF TEST PIT NO. TP-5

Sheet 1 of 1

PROJECT: **Proposed Townhomes**
 PROJECT LOCATION: **Verona Township, Essex County, New Jersey**
 CLIENT: **A&R Skyline Properties Urban Renewal, LLC**

PROJECT NO.: **31260538**

DATE STARTED: **3/9/2026**
 DATE COMPLETED: **3/9/2026**
 CONTRACTOR: **GeoPro, Inc.**
 EQUIPMENT: **CAT 313F**

GROUNDWATER ENCOUNTERED: **N/E**
 GROUND SURFACE ELEVATION: **489.5 Ft.**
 DATUM: **Topo**
 LOGGED BY: **CT**
 CHECKED BY: **AFS**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL		
				DESCRIPTION	REMARKS
487.5	0			24 In. of Topsoil	- Infiltration rate = 0.5 in/hr at 5 Ft.
	2	CL		Yellow-red (5YR 5/6), moist, subangular blocky, friable, Sandy Clay	
484.5	4				
	6	SM		Dark yellow-brown (10YR 3/4), moist, 15% gravel, 10% cobbles, 2% boulders, moist, single grain, loose, Gravelly Sandy Loam	
475.5	8				
	10			- with 5% boulders at 10 Ft.	
	12				
	14			Test pit complete at 14 Ft. Seasonal high groundwater table not encountered.	
	16				
	18				

NOTES: **Location and elevation are approximate.**
Backfilled on completion.



**GEO-TECHNOLOGY
 ASSOCIATES, INC.**

14 Worlds Fair Drive, Suite A
 Somerset, NJ 08873

LOG OF TEST PIT NO. TP-5

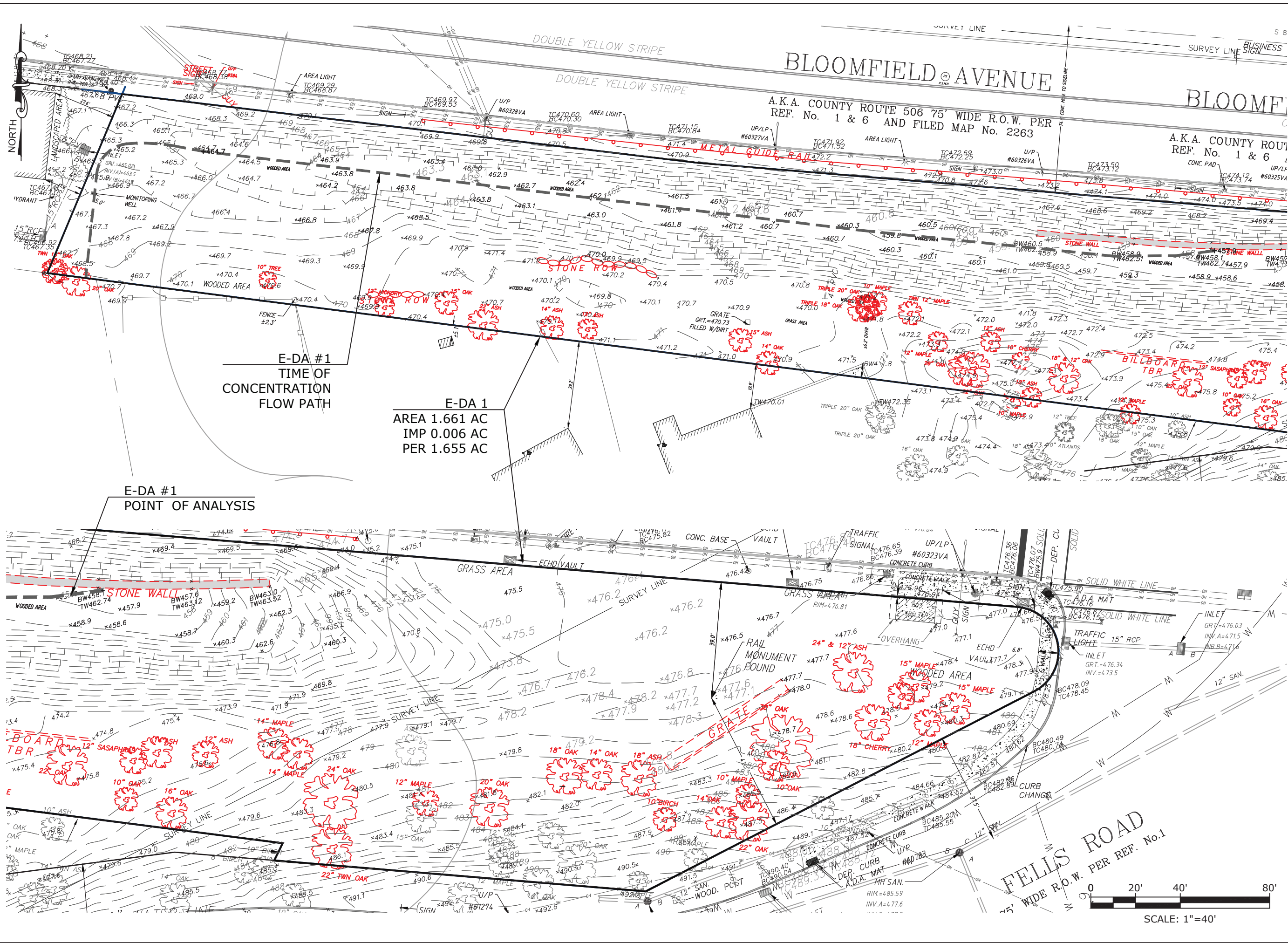
Sheet 1 of 1



Appendix C: Drainage Area Maps

- **DA-1 Existing Drainage Area Map**
- **DA-2 Proposed Drainage Area Map**
- **DA-3 Contributory Drainage Areas**

M:\PROJECTS\A&E SERVICES\ALL COUNTY - VERONA\1P-26-34\9.0 DRAWINGS\E2PM DRAWINGS\VERONA COMMONS REV-A.DWG

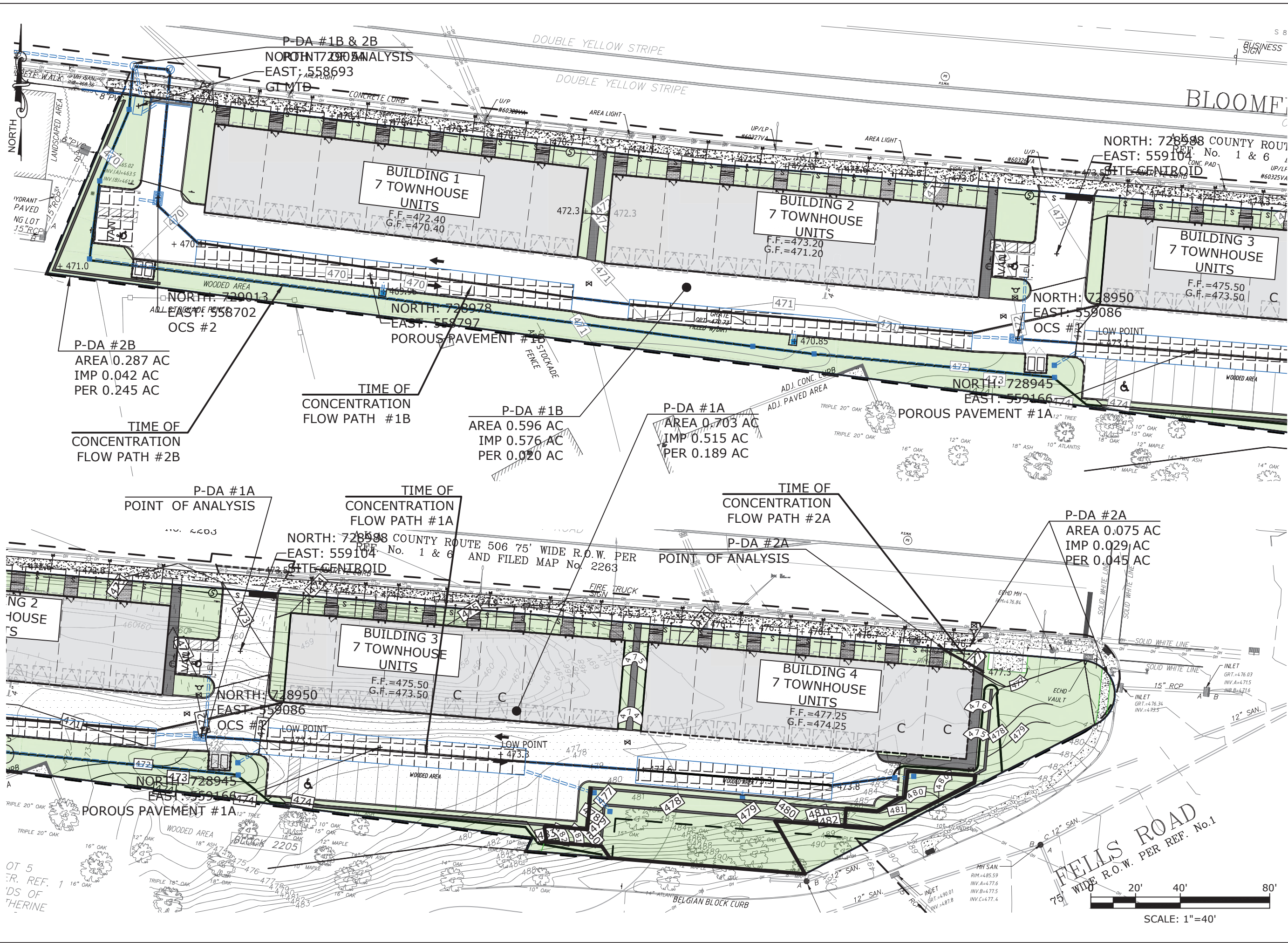


SCHEDULE OF REVISIONS					DRAWN BY		CHK BY	
REV.	DATE	DESCRIPTION OF CHANGES	BY	CHK	XX	XX	XX	XX
X	XX/XX/XX	XXXXX						

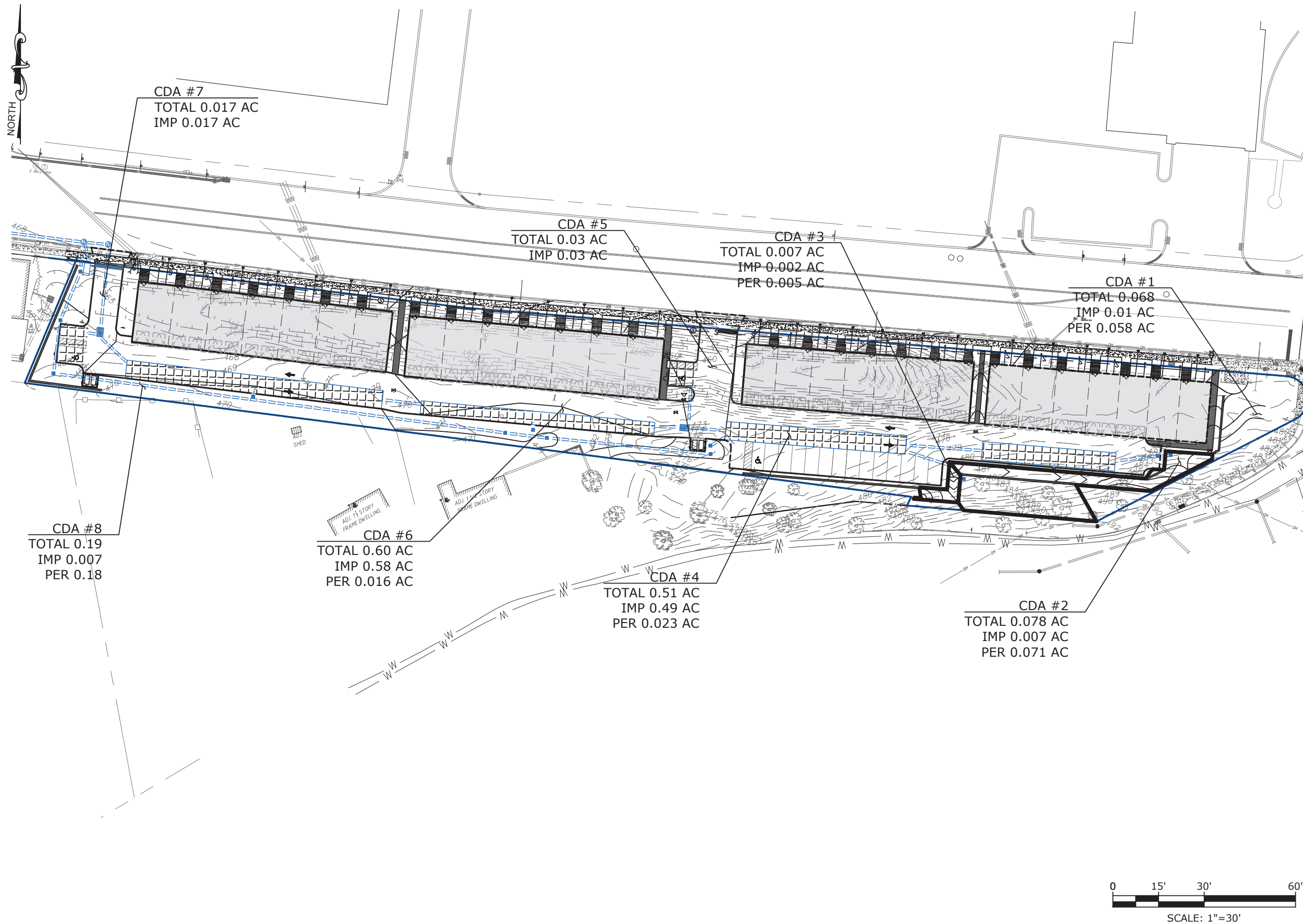
OWNER/APPLICANT	
A&R SKYLINE PROPERTIES URBAN RENEWAL LLC 704 PASSAIC AVENUE WEST CALDWELL, NJ 07006 201-919-6004	
ATTORNEY	
STEVEN G. MLENAK, ESQ., GREENBAUM, ROWE, SMITH & DAVIS LLP 75 LIVINGSTON AVE, SUITE 301 ROSELAND, NJ 07068 732-476-2526	
E 2 PROJECT MANAGEMENT LLC	
87 HIBERNIA AVENUE ROCKAWAY, N.J. 07866 PHONE: (973) 299-5200 FAX: (973) 299-5059 www.E2PM.com	
N.J. ENGINEERING CERTIFICATE OF AUTHORIZATION No. 24GA28118200	
I CERTIFY THAT THESE PLANS HAVE BEEN PREPARED UNDER MY SUPERVISION	
PROJECT NAME	
VERONA COMMONS 885 BLOOMFIELD AVENUE TOWNSHIP OF VERONA ESSEX COUNTY, NEW JERSEY	
BLOCK 2205 LOT 6	
DRAWING TITLE	
EXISTING DRAINAGE AREA	
CHECKED BY: DC	DRAWN BY: RF
SCALE: 1:60	SHEET NO: 1 OF 3
PROJECT #: P-26-34	FIRST ISSUE: 08/07/2026
DRAWING NO.	

DA-1

M:\PROJECTS\A&E SERVICES\ALL COUNTY - VERONA\A-P-26-34\9.0 DRAWINGS\E2PM DRAWINGS\VERONA COMMONS REV-A.DWG



SCHEDULE OF REVISIONS				
REV.	DATE	DESCRIPTION OF CHANGES	DRAWN BY	CHK. BY
X	XX/XX/XX	XXXXXX	XX	XX

[illegible]



Appendix D: Time of Concentration Calculations

TIME OF CONCENTRATION CALCULATIONS (CURRENT)

Drainage Area	E DA-1
Time of Concentration (minutes)	21.30

P DA-1A
9.67

1.01 Precipitation Factor

P DA-1B
1.15

P DA-2A
0.19

P DA-2B
8.70

SHEET FLOW SEGMENT	
High Point (ft)	470.1
Low Point (ft)	464.7
Length (ft)	100.0
Slope (ft/ft)	0.054
Land Cover	Woods Light underbrush
Manning's Rougness Coefficient	0.400
McCuen-Spiess Length Limit (ft)	58.1
P (2 Year -24 Hr rainfall) (in)	3.47
Sheet Flow Length (ft)	58.09
Travel Time (hours)	0.15
Travel Time (minutes)	8.97

480.3
474.6
100.0
0.057
Short-grass prairie
0.150
159.2
3.47
100.00
0.10
6.18

473.2
468.5
58.4
0.080
Smooth surface (concrete, asphalt, gravel, or bare soil)
0.011
2578.3
3.47
58.43
0.01
0.43

477.3
477.1
4.9
0.041
Smooth surface (concrete, asphalt, gravel, or bare soil)
0.011
1844.2
3.47
4.86
0.00
0.08

488
476.8
100.0
0.112
Short-grass prairie
0.150
223.1
3.47
100.00
0.08
4.72

SHALLOW CONCENTRATED FLOW SEGMENT

Segment ID	To Stone Wall
High Point (ft)	464.7
Low Point (ft)	457.9
Length (ft)	455
Slope (ft/ft)	0.01
Land Cover	Minimum tillage Cultivation, contour or strip-crop
Velocity	0.62
Travel Time (Hrs)	0.21
Travel Time (Minutes)	12.33

TO TC	TO INLET
474.6	474.5
474.5	474
15.3	5.8
0.01	0.09
Grassed waterways	Pavement and small upland gullies
1.30	1.64
0.00	0.00
0.20	0.06

TO END
477.1
476.8
15.54
0.02
Grassed waterways
2.24
0.00
0.12

TO Adrain
476.8
472.5
285.58
0.02
Grassed waterways
1.98
0.04
2.40

OPEN CHANNEL FLOW SEGMENT

Segment ID
Channel Type
Material Type (roughness)
Pipe Diameter (in)
Rectangular Base (ft)
Rectangular Height (ft)
High Invert
Low Invert
Length
Slope
Cross Sectional Area (ft^2)
Wetted Perimeter (ft)
Hydraulic Radius (ft)
Manning's Velocity
Travel Time (Hrs)
Travel Time (Minutes)

to B#4 PP	PP B#4	to Storm Tank B3	B3 Through	to OCS1
Circular	Rectangular	Circular	Rectangular	Circular
Polyvinyl Chloride	Reinforced Concrete	Polyvinyl Chloride	Reinforced Concrete	High Density Polyethylene
6		6		12
	12		12	
	2		2	
473	471.01	471	470.002	470
471	471	470.002	470	469.5
27.6	87.61	49.92	87.61	24.35
0.072463768	0.000114142	0.019991987	2.283E-05	0.020533881
0.20	24.00	0.20	24.00	0.79
1.57	16.00	1.57	16.00	3.14
0.13	1.50	0.13	1.50	0.25
9.11	1.60	4.78	0.72	7.06
0.00	0.02	0.00	0.03	0.00
0.05	0.91	0.17	2.03	0.06

through B2 Storm Tank	to B1 S Tank	B1 Through	to OCS#2	to SMH	to SMH
Rectangular	Circular	Rectangular	Circular	Circular	Circular
Reinforced Concrete	High Density Polyethylene	Reinforced Concrete Pipe	High Density Polyethylene	High Density Polyethylene	High Density Polyethylene
	12		12	12	12
8.9		11.7			
3		3			
468.5	466.5	465.99	465.5	465.0	463.6
466.5	465.99	465.5	465.0	463.6	463.3
153.364	25.47	169.65	24.58	60.04	15.86
0.01304087	0.020023557	0.002888299	0.020342	0.023318	0.018916
26.70	0.79	35.10	0.79	0.79	0.79
14.90	3.14	17.70	3.14	3.14	3.14
1.79	0.25	1.98	0.25	0.25	0.25
19.31	6.97	9.72	7.02	7.52	6.77
0.00	0.00	0.00	0.00	0.00	0.00
0.13	0.06	0.29	0.06	0.13	0.04

to SMH
Circular
High Density Polyethylene
12
469.9
463.3
522.39
0.012634
0.79
3.14
0.25
5.54
0.03
1.57

TIME OF CONCENTRATION CALCULATIONS (FUTURE)

Drainage Area	E DA-1	P DA-1A
Time of Concentration (minutes)	20.59	9.18

SHEET FLOW SEGMENT

High Point (ft)	470.1
Low Point (ft)	464.7
Length (ft)	100.0
Slope (ft/ft)	0.054
Land Cover	Woods Light underbrush
Manning's Roughness Coefficient	0.400
McCuen-Spiess Length Limit (ft)	58.1
P (2 Year -24 Hr rainfall) (in)	4.09
Sheet Flow Length (ft)	58.09
Travel Time (hours)	0.14
Travel Time (minutes)	8.26

SHALLOW CONCENTRATED FLOW SEGMENT

Segment ID	To Stone Wall
High Point (ft)	464.7
Low Point (ft)	457.9
Length (ft)	455
Slope (ft/ft)	0.01
Land Cover	Minimum tillage Cultivation, corn
Velocity	0.62
Travel Time (Hrs)	0.21
Travel Time (Minutes)	12.33

OPEN CHANNEL FLOW SEGMENT

Segment ID	
Channel Type	
Material Type (roughness)	
Pipe Diameter (in)	
Rectangular Base (ft)	
Rectangular Height (ft)	
High Invert	
Low Invert	
Length	
Slope	
Cross Sectional Area (ft^2)	
Wetted Perimeter (ft)	
Hydraulic Radius (ft)	
Manning's Velocity	
Travel Time (Hrs)	
Travel Time (Minutes)	

1.19 Precipitation Factor

P DA-1B
1.11

473.2
468.5
58.4
0.080
Smooth surface (concrete, asphalt, gravel, or bare soil)
0.011
2578.3
4.09
58.43
0.01
0.40

P DA-2A
0.19

477.3
477.1
4.9
0.041
Smooth surface (concrete, asphalt, gravel, or bare soil)
0.011
1844.2
4.09
4.86
0.00
0.07

P DA-2B
8.33

488
476.8
100.0
0.112
Short-grass prairie
0.150
223.1
4.09
100.00
0.07
4.35

TO TC	TO INLET
474.6	474.5
474.5	474
15.3	5.8
0.01	0.09
Grassed waterways	Pavement and small upland gullies
1.30	1.64
0.00	0.00
0.20	0.06

TO END	TO Adrain
477.1	476.8
476.8	472.5
15.54	285.58
0.02	0.02
Grassed waterways	Grassed waterways
2.24	1.98
0.00	0.04
0.12	2.40

to B#4 PP	PP B#4	to Storm Tank B3	B3 Through	to OCS1
Circular	Rectangular	Circular	Rectangular	Circular
Polyvinyl Chloride	Reinforced Concrete	Polyvinyl Chloride	Reinforced Concrete	High Density Polyethylene
6	12	6	12	12
	2		2	
473	471.01	471	470.002	470
471	471	470.002	470	469.5
27.6	87.61	49.92	87.61	24.35
0.072463768	0.000114142	0.019991987	2.283E-05	0.020533881
0.20	24.00	0.20	24.00	0.79
1.57	16.00	1.57	16.00	3.14
0.13	1.50	0.13	1.50	0.25
9.11	1.60	4.78	0.72	7.06
0.00	0.02	0.00	0.03	0.00
0.05	0.91	0.17	2.03	0.06

through B2 Storm Tank	to B1 S Tank	B1 Through	to OCS#2	to SMH	to SMH
Rectangular	Circular	Rectangular	Circular	Circular	Circular
Reinforced Concrete	High Density Polyethylene	Reinforced Concrete Pipe	High Density Polyethylene	High Density Polyethylene	High Density Polyethylene
8.9	12	11.7	12	12	12
3		3			
468.5	466.5	465.99	465.5	465.0	463.6
466.5	465.99	465.5	465.0	463.6	463.3
153.364	25.47	169.65	24.58	60.04	15.86
0.01304087	0.020023557	0.002888299	0.020342	0.023318	0.018916
26.70	0.79	35.10	0.79	0.79	0.79
14.90	3.14	17.70	3.14	3.14	3.14
1.79	0.25	1.98	0.25	0.25	0.25
19.31	6.97	9.72	7.02	7.52	6.77
0.00	0.00	0.00	0.00	0.00	0.00
0.13	0.06	0.29	0.06	0.13	0.04

to SMH
Circular
High Density Polyethylene
12
469.9
463.3
522.39
0.012634
0.79
3.14
0.25
5.54
0.03
1.57

TIME OF CONCENTRATION CALCULATIONS (FUTURE)

Drainage Area	E DA-1	P DA-1A
Time of Concentration (minutes)	20.59	9.18

SHEET FLOW SEGMENT

High Point (ft)	470.1
Low Point (ft)	464.7
Length (ft)	100.0
Slope (ft/ft)	0.054
Land Cover	Woods Light underbrush
Manning's Roughness Coefficient	0.400
McCuen-Spiess Length Limit (ft)	58.1
P (2 Year -24 Hr rainfall) (in)	4.09
Sheet Flow Length (ft)	58.09
Travel Time (hours)	0.14
Travel Time (minutes)	8.26

SHALLOW CONCENTRATED FLOW SEGMENT

Segment ID	To Stone Wall
High Point (ft)	464.7
Low Point (ft)	457.9
Length (ft)	455
Slope (ft/ft)	0.01
Land Cover	Minimum tillage Cultivation, corn
Velocity	0.62
Travel Time (Hrs)	0.21
Travel Time (Minutes)	12.33

OPEN CHANNEL FLOW SEGMENT

Segment ID	
Channel Type	
Material Type (roughness)	
Pipe Diameter (in)	
Rectangular Base (ft)	
Rectangular Height (ft)	
High Invert	
Low Invert	
Length	
Slope	
Cross Sectional Area (ft^2)	
Wetted Perimeter (ft)	
Hydraulic Radius (ft)	
Manning's Velocity	
Travel Time (Hrs)	
Travel Time (Minutes)	

1.19 Precipitation Factor

P DA-1B
1.11

473.2
468.5
58.4
0.080
Smooth surface (concrete, asphalt, gravel, or bare soil)
0.011
2578.3
4.09
58.43
0.01
0.40

P DA-2A
0.19

477.3
477.1
4.9
0.041
Smooth surface (concrete, asphalt, gravel, or bare soil)
0.011
1844.2
4.09
4.86
0.00
0.07

P DA-2B
8.33

488
476.8
100.0
0.112
Short-grass prairie
0.150
223.1
4.09
100.00
0.07
4.35

TO TC	TO INLET
474.6	474.5
474.5	474
15.3	5.8
0.01	0.09
Grassed waterways	Pavement and small upland gullies
1.30	1.64
0.00	0.00
0.20	0.06

TO END	TO Adrain
477.1	476.8
476.8	472.5
15.54	285.58
0.02	0.02
Grassed waterways	Grassed waterways
2.24	1.98
0.00	0.04
0.12	2.40

to B#4 PP	PP B#4	to Storm Tank B3	B3 Through	to OCS1
Circular	Rectangular	Circular	Rectangular	Circular
Polyvinyl Chloride	Reinforced Concrete	Polyvinyl Chloride	Reinforced Concrete	High Density Polyethylene
6	12	6	12	12
	2		2	
473	471.01	471	470.002	470
471	471	470.002	470	469.5
27.6	87.61	49.92	87.61	24.35
0.072463768	0.000114142	0.019991987	2.283E-05	0.020533881
0.20	24.00	0.20	24.00	0.79
1.57	16.00	1.57	16.00	3.14
0.13	1.50	0.13	1.50	0.25
9.11	1.60	4.78	0.72	7.06
0.00	0.02	0.00	0.03	0.00
0.05	0.91	0.17	2.03	0.06

through B2 Storm Tank	to B1 S Tank	B1 Through	to OCS#2	to SMH	to SMH
Rectangular	Circular	Rectangular	Circular	Circular	Circular
Reinforced Concrete	High Density Polyethylene	Reinforced Concrete Pipe	High Density Polyethylene	High Density Polyethylene	High Density Polyethylene
8.9	12	11.7	12	12	12
3		3			
468.5	466.5	465.99	465.5	465.0	463.6
466.5	465.99	465.5	465.0	463.6	463.3
153.364	25.47	169.65	24.58	60.04	15.86
0.01304087	0.020023557	0.002888299	0.020342	0.023318	0.018916
26.70	0.79	35.10	0.79	0.79	0.79
14.90	3.14	17.70	3.14	3.14	3.14
1.79	0.25	1.98	0.25	0.25	0.25
19.31	6.97	9.72	7.02	7.52	6.77
0.00	0.00	0.00	0.00	0.00	0.00
0.13	0.06	0.29	0.06	0.13	0.04

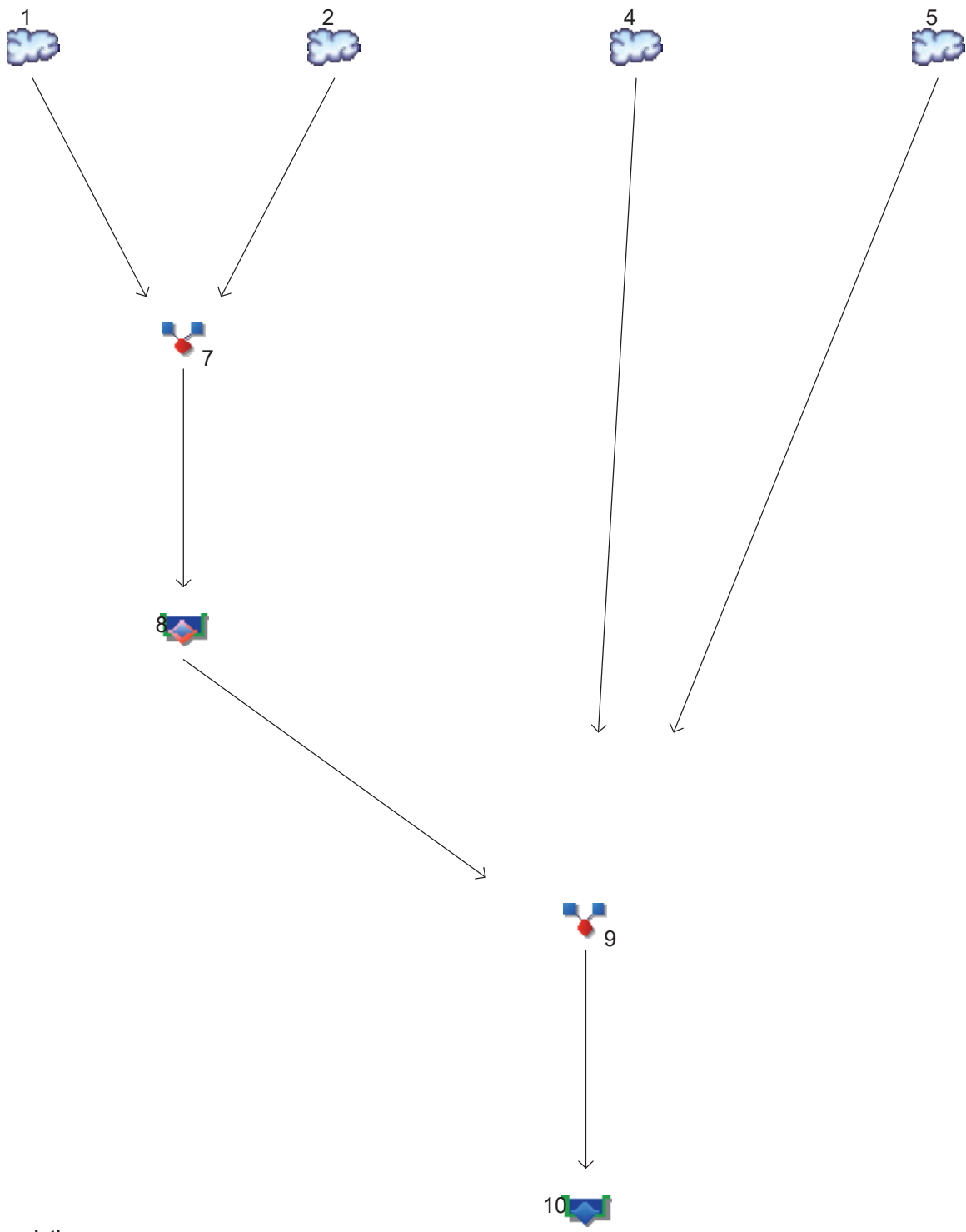
to SMH
Circular
High Density Polyethylene
12
469.9
463.3
522.39
0.012634
0.79
3.14
0.25
5.54
0.03
1.57



Appendix E: Water Quality Storm Hydrographs

Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024



Legend

Hyd.	Origin	Description
1	SCS Runoff	P-DA 1 PER
2	SCS Runoff	P-DA 1 IMP
4	SCS Runoff	P-DA 2 PER
5	SCS Runoff	P-DA 2 IMP
7	Combine	PAVEMENT 1 INFLOW
8	Reservoir(i)	PP#1 ROUTE
9	Combine	PAVEMENT 2 INFLOW
10	Reservoir	PP#2 2 ROUTE

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

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	-----	0.027	-----	-----	-----	-----	-----	-----	-----	P-DA 1 PER
2	SCS Runoff	-----	1.407	-----	-----	-----	-----	-----	-----	-----	P-DA 1 IMP
4	SCS Runoff	-----	0.004	-----	-----	-----	-----	-----	-----	-----	P-DA 2 PER
5	SCS Runoff	-----	1.662	-----	-----	-----	-----	-----	-----	-----	P-DA 2 IMP
7	Combine	1, 2,	1.417	-----	-----	-----	-----	-----	-----	-----	PAVEMENT 1 INFLOW
8	Reservoir(i)	7	0.000	-----	-----	-----	-----	-----	-----	-----	PP#1 ROUTE
9	Combine	4, 5, 8	1.665	-----	-----	-----	-----	-----	-----	-----	PAVEMENT 2 INFLOW
10	Reservoir	9	0.000	-----	-----	-----	-----	-----	-----	-----	PP#2 2 ROUTE
Proj. file: WQDS Rev A.gpw										Monday, 08 / 10 / 2026	

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

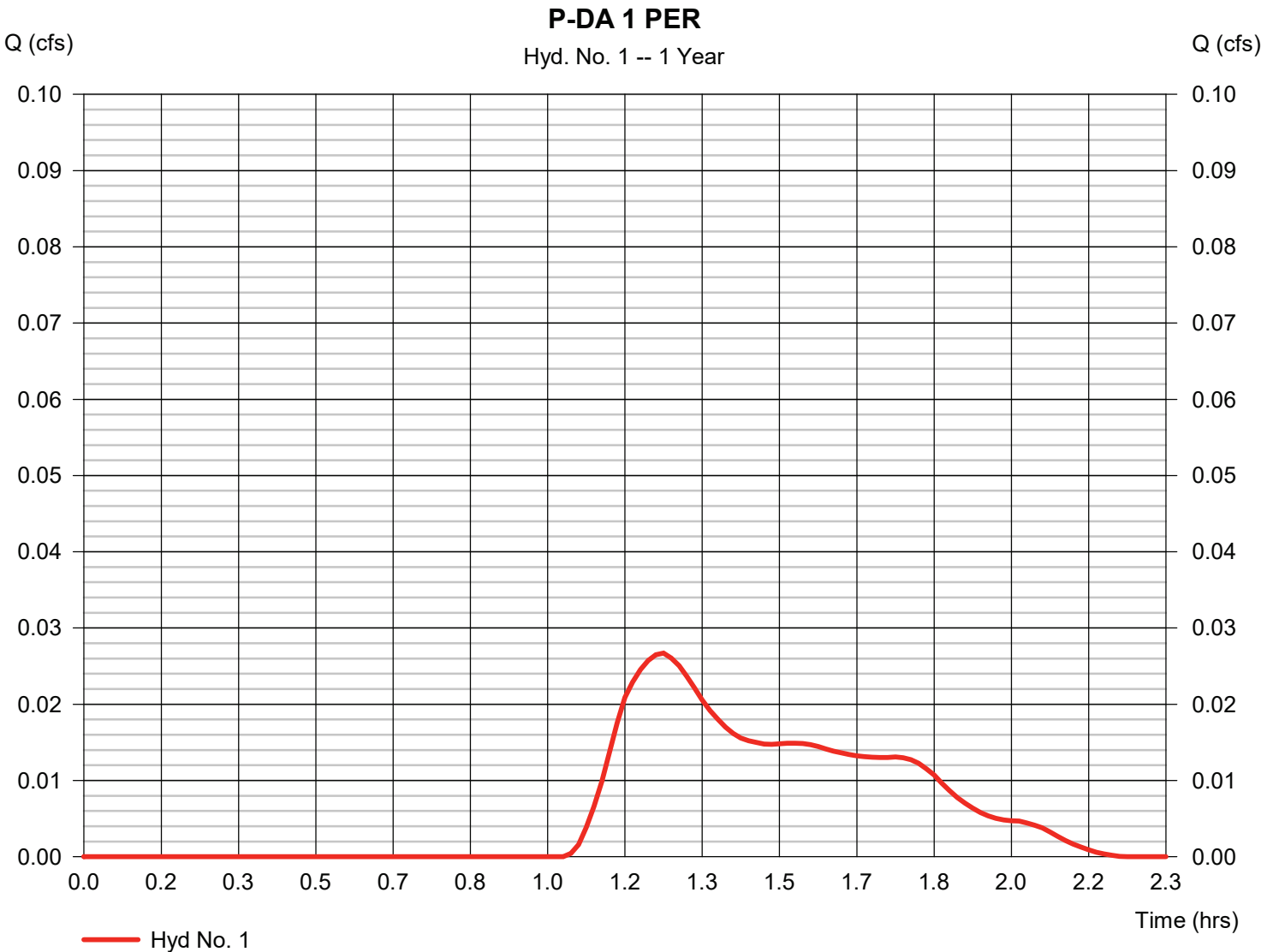
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.027	1	75	50	-----	-----	-----	P-DA 1 PER
2	SCS Runoff	1.407	1	67	1,934	-----	-----	-----	P-DA 1 IMP
4	SCS Runoff	0.004	1	66	5	-----	-----	-----	P-DA 2 PER
5	SCS Runoff	1.662	1	65	2,028	-----	-----	-----	P-DA 2 IMP
7	Combine	1.417	1	67	1,985	1, 2,	-----	-----	PAVEMENT 1 INFLOW
8	Reservoir(i)	0.000	1	n/a	0	7	469.74	1,837	PP#1 ROUTE
9	Combine	1.665	1	65	2,033	4, 5, 8	-----	-----	PAVEMENT 2 INFLOW
10	Reservoir	0.000	1	68	0	9	466.05	1,883	PP#2 2 ROUTE
WQDS Rev A.gpw					Return Period: 1 Year			Monday, 08 / 10 / 2026	

Hydrograph Report

Hyd. No. 1

P-DA 1 PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.027 cfs
Storm frequency	= 1 yrs	Time to peak	= 1.25 hrs
Time interval	= 1 min	Hyd. volume	= 50 cuft
Drainage area	= 0.189 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 9.18 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydraflow Storm.cds	Hydraflow Storm.cds	484

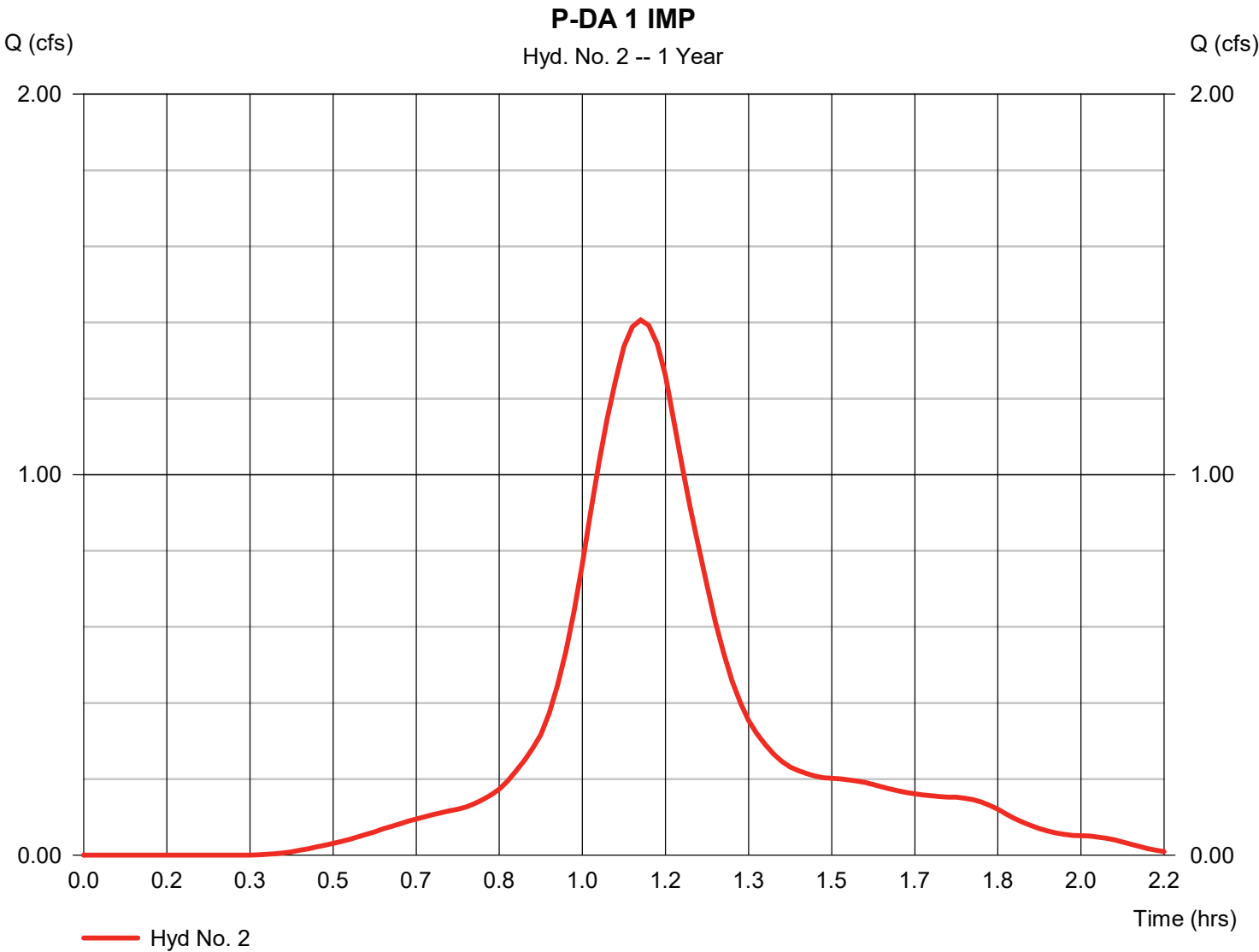


Hydrograph Report

Hyd. No. 2

P-DA 1 IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 1.407 cfs
Storm frequency	= 1 yrs	Time to peak	= 1.12 hrs
Time interval	= 1 min	Hyd. volume	= 1,934 cuft
Drainage area	= 0.515 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 9.18 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydraflow\Storm.cds	Hydraflow Storm.cds	484

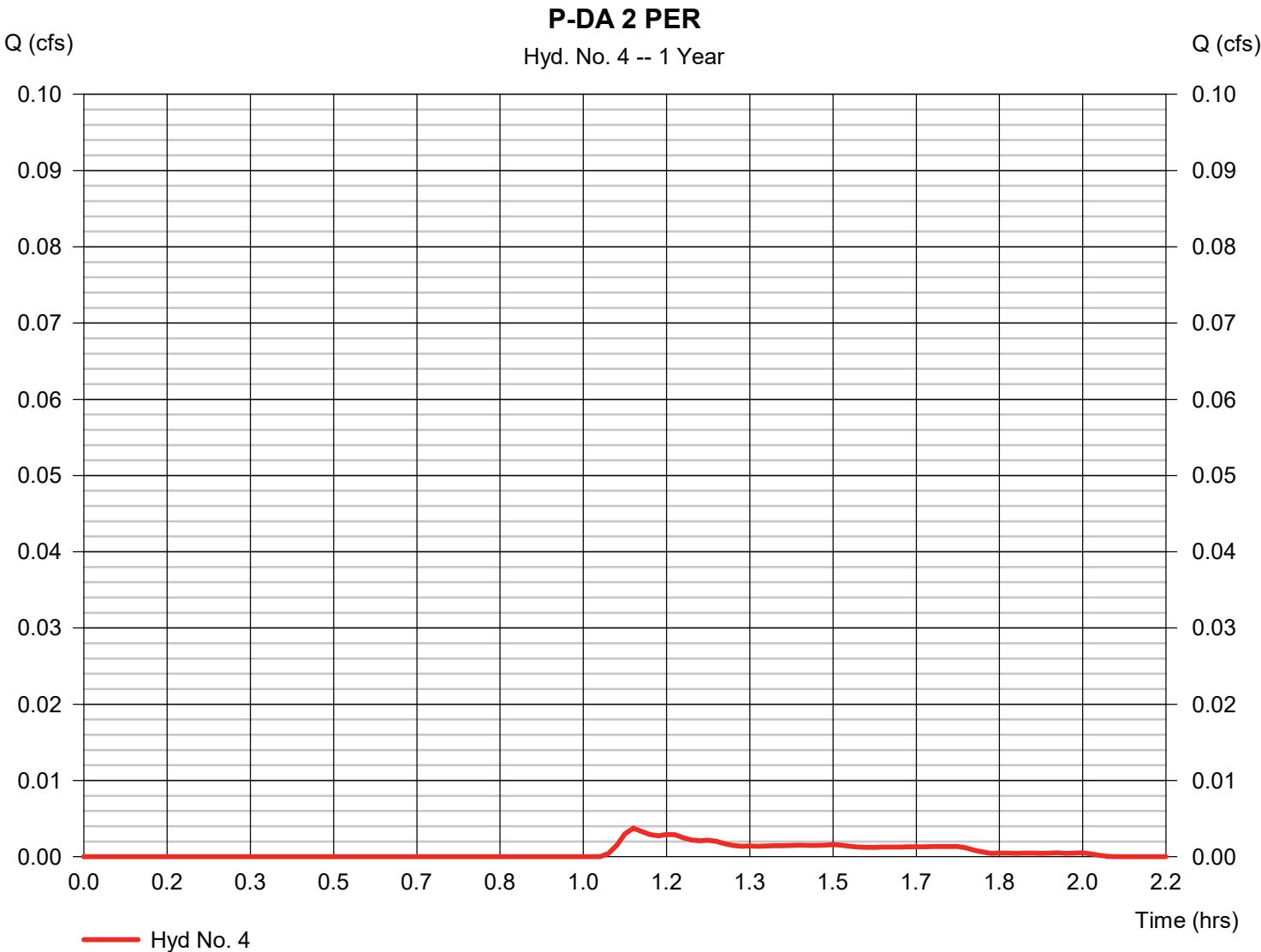


Hydrograph Report

Hyd. No. 4

P-DA 2 PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.004 cfs
Storm frequency	= 1 yrs	Time to peak	= 1.10 hrs
Time interval	= 1 min	Hyd. volume	= 5 cuft
Drainage area	= 0.020 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydroflow\Storm.cds	Hydroflow Storm.cds	484



Hydrograph Report

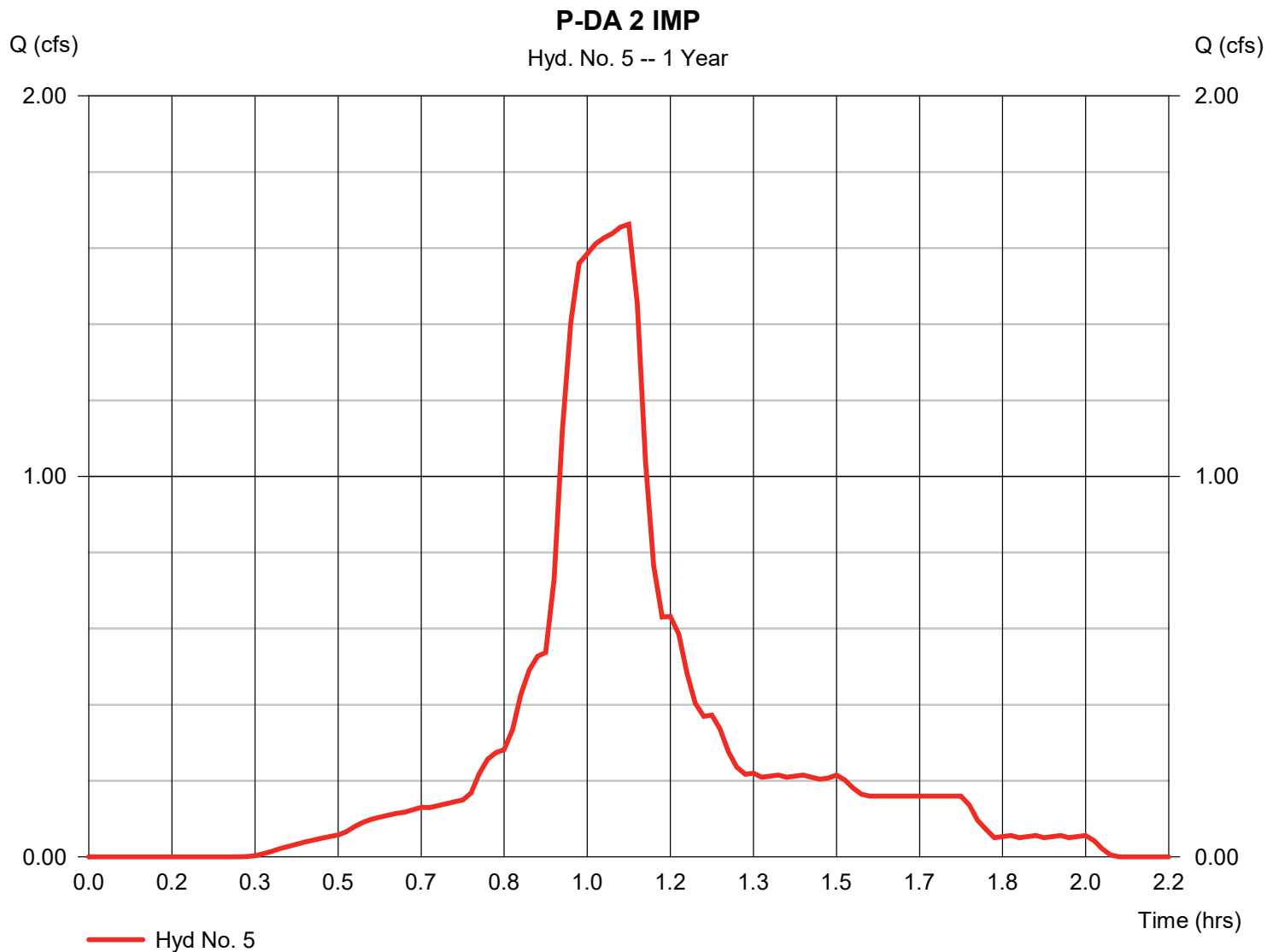
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 5

P-DA 2 IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 1.662 cfs
Storm frequency	= 1 yrs	Time to peak	= 1.08 hrs
Time interval	= 1 min	Hyd. volume	= 2,028 cuft
Drainage area	= 0.576 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 1.25 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydroflow\Storm.cds	Hydroflow Storm.cds	484

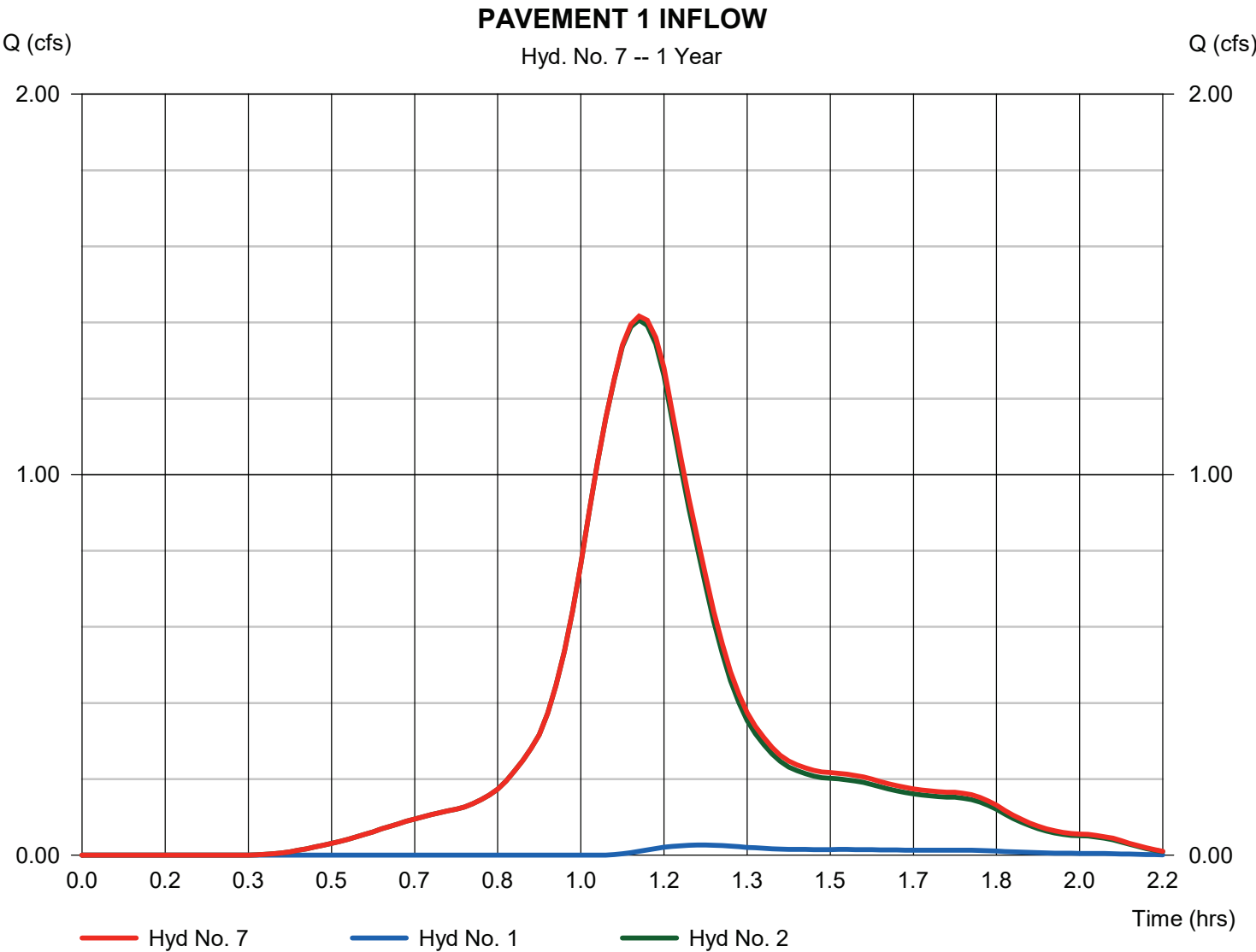


Hydrograph Report

Hyd. No. 7

PAVEMENT 1 INFLOW

Hydrograph type	= Combine	Peak discharge	= 1.417 cfs
Storm frequency	= 1 yrs	Time to peak	= 1.12 hrs
Time interval	= 1 min	Hyd. volume	= 1,985 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 0.704 ac



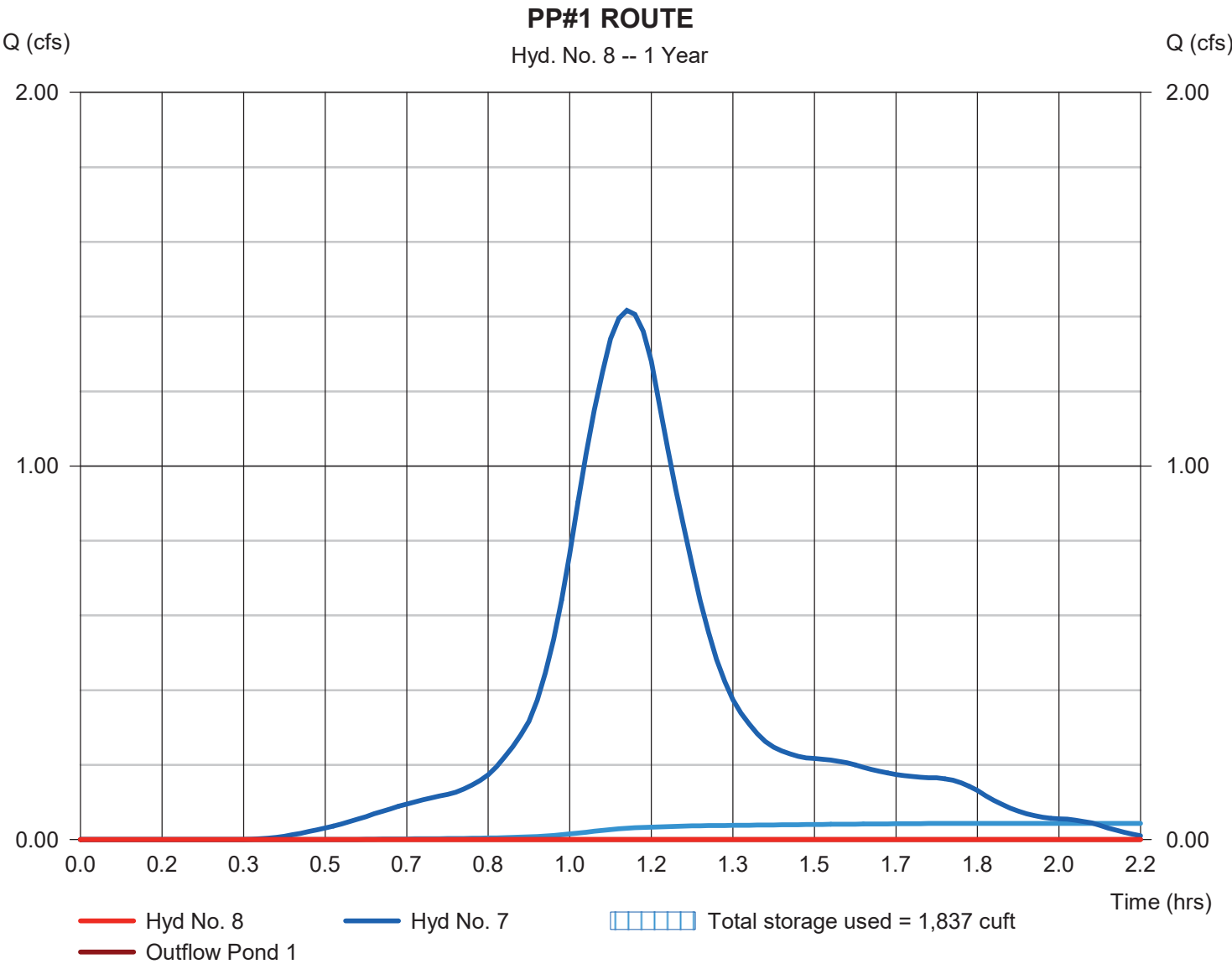
Hydrograph Report

Hyd. No. 8

PP#1 ROUTE

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 1 min	Hyd. volume	= 0 cuft
Upper Pond	= PP #1	Lower Pond	= PP #2
Inflow hyd.	= 7 - PAVEMENT 1 INFLOW	Other Inflow hyd.	= None
Max. Elevation	= 469.74 ft	Max. Elevation	= 465.50 ft
Max. Storage	= 1,837 cuft	Max. Storage	= 0 cuft

Interconnected Pond Routing. Storage Indication method used. Exfiltration extracted from Outflow.



Pond No. 1 - PP #1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 472.00 ft. Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	469.00	2,770	0	0
1.00	470.00	2,770	2,493	2,493
2.00	471.00	2,770	2,493	4,986

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 10.00	2.50	0.00	0.00
Span (in)	= 10.00	2.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 469.00	469.80	0.00	0.00
Length (ft)	= 26.00	0.50	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .012	.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)	= 3.00	0.00	0.00	0.00
Crest El. (ft)	= 470.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.900 (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	469.00	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
1.00	2,493	470.00	0.05 ic	0.05 ic	---	---	0.00	---	---	---	0.058	---	0.109
2.00	4,986	471.00	3.04 ic	0.08 ic	---	---	2.96 s	---	---	---	0.058	---	3.098

Pond No. 2 - PP #2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 465.50 ft. Voids = 90.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	465.50	3,806	0	0
1.00	466.50	3,806	3,425	3,425
2.00	467.50	3,806	3,425	6,850
3.00	468.50	3,806	3,425	10,275

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	2.50	0.00	0.00
Span (in)	= 12.00	2.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 465.50	466.10	0.00	0.00
Length (ft)	= 18.00	0.50	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	0.00	0.00	0.00
Crest El. (ft)	= 468.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.900 (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	465.50	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
1.00	3,425	466.50	0.09 ic	0.09 ic	---	---	0.00	---	---	---	0.079	---	0.169
2.00	6,850	467.50	0.19 ic	0.19 ic	---	---	0.00	---	---	---	0.079	---	0.266
3.00	10,275	468.50	3.73 ic	0.20 ic	---	---	3.53	---	---	---	0.079	---	3.814

Hydrograph Report

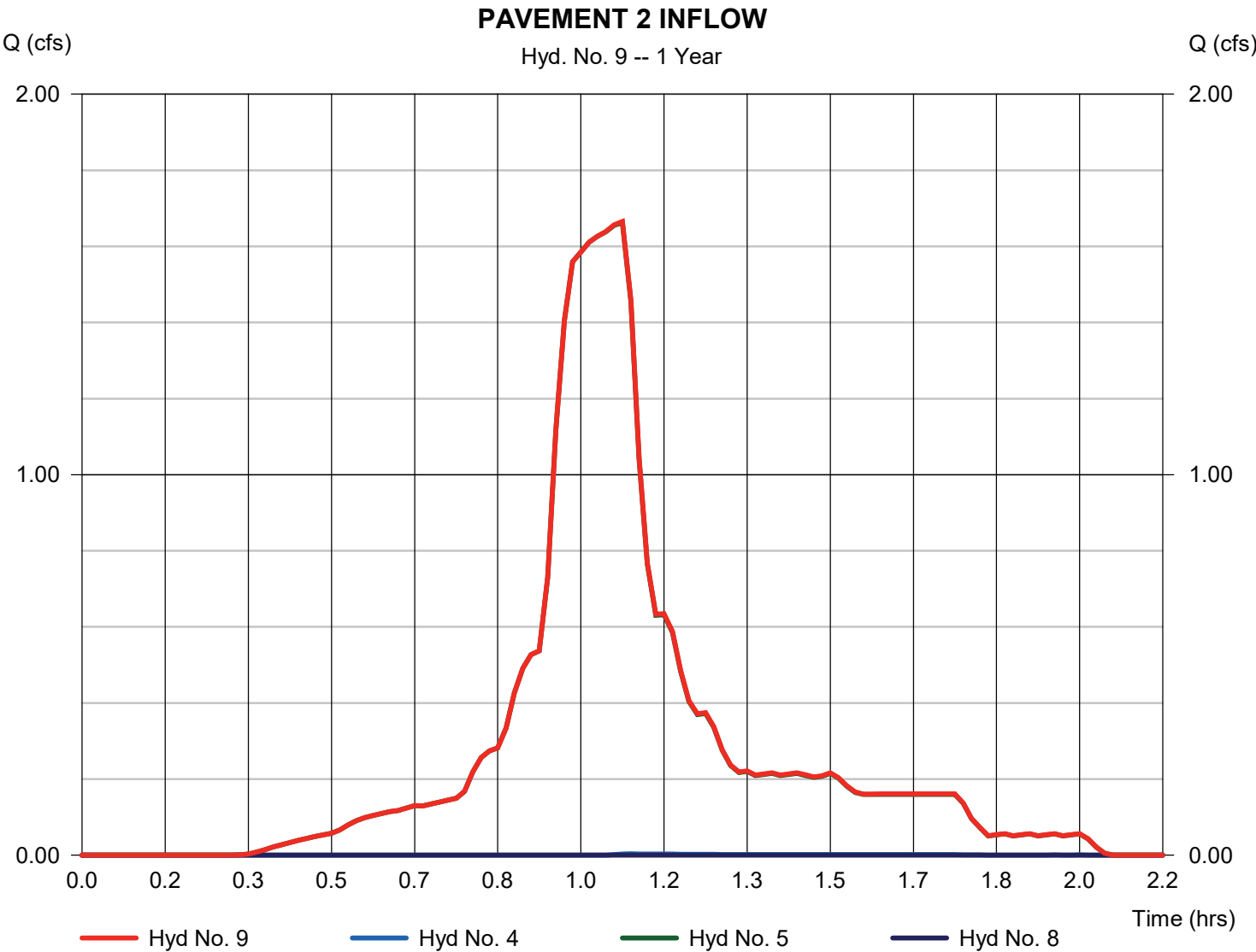
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 9

PAVEMENT 2 INFLOW

Hydrograph type	= Combine	Peak discharge	= 1.665 cfs
Storm frequency	= 1 yrs	Time to peak	= 1.08 hrs
Time interval	= 1 min	Hyd. volume	= 2,033 cuft
Inflow hyds.	= 4, 5, 8	Contrib. drain. area	= 0.596 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

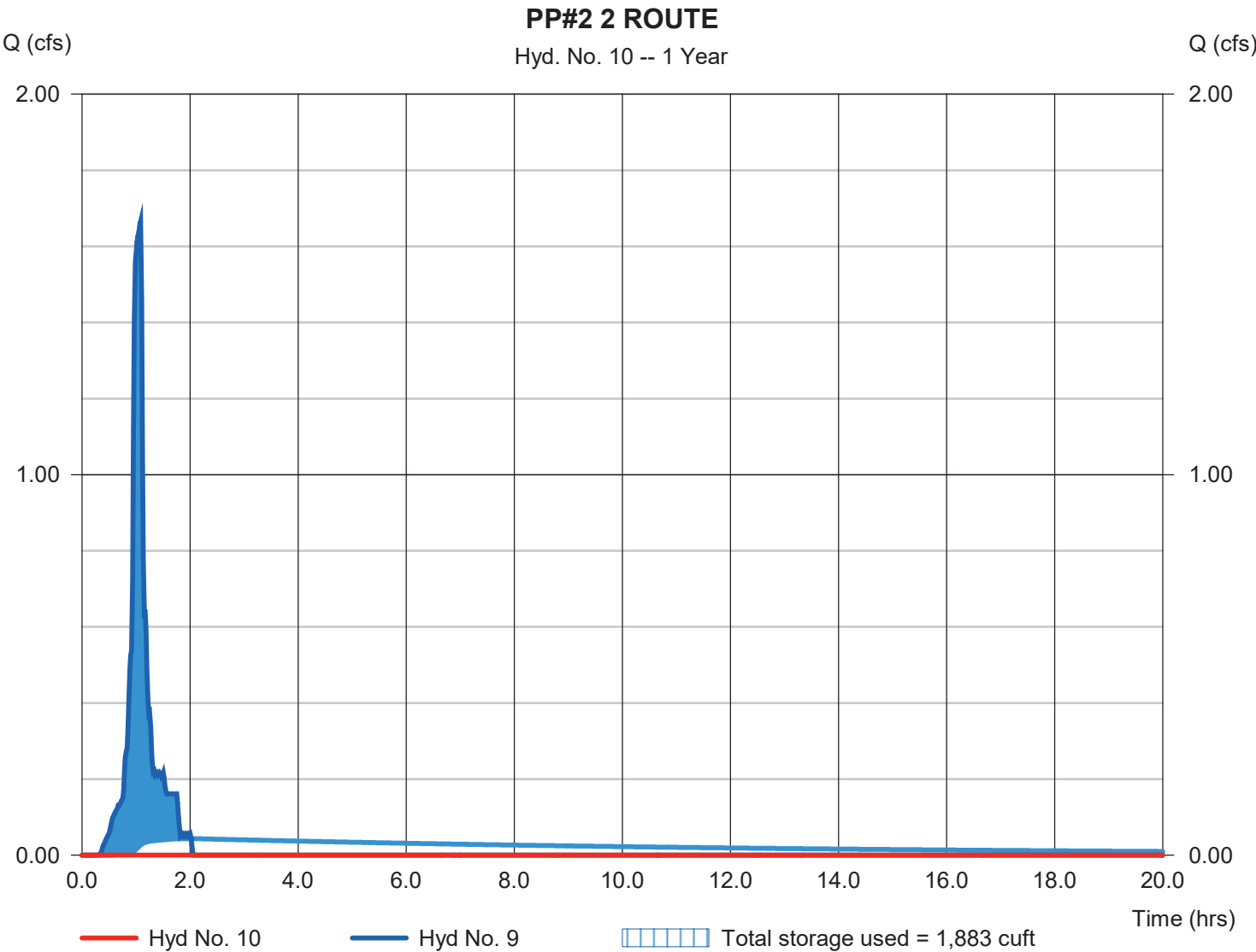
Monday, 08 / 10 / 2026

Hyd. No. 10

PP#2 2 ROUTE

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 1.13 hrs
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 9 - PAVEMENT 2 INFLOW	Max. Elevation	= 466.05 ft
Reservoir name	= PP #2	Max. Storage	= 1,883 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond No. 2 - PP #2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 465.50 ft. Voids = 90.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	465.50	3,806	0	0
1.00	466.50	3,806	3,425	3,425
2.00	467.50	3,806	3,425	6,850
3.00	468.50	3,806	3,425	10,275

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	2.50	0.00	0.00
Span (in)	= 12.00	2.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 465.50	466.10	0.00	0.00
Length (ft)	= 18.00	0.50	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	0.00	0.00	0.00
Crest El. (ft)	= 468.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.900 (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	465.50	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
1.00	3,425	466.50	0.09 ic	0.09 ic	---	---	0.00	---	---	---	0.079	---	0.169
2.00	6,850	467.50	0.19 ic	0.19 ic	---	---	0.00	---	---	---	0.079	---	0.266
3.00	10,275	468.50	3.73 ic	0.20 ic	---	---	3.53	---	---	---	0.079	---	3.814

Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	-----
2	62.7730	13.0000	0.8898	-----
3	0.0000	0.0000	0.0000	-----
5	0.0000	0.0000	0.0000	-----
10	60.0275	11.9000	0.7968	-----
25	0.0000	0.0000	0.0000	-----
50	49.0087	9.1000	0.6960	-----
100	46.1309	9.0000	0.6567	-----

File name: TrentonNJ.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	4.80	3.86	3.24	2.80	2.47	2.21	2.00	1.83	1.69	1.57	1.47	1.38
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	6.31	5.13	4.36	3.80	3.39	3.06	2.80	2.58	2.40	2.24	2.11	1.99
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	7.77	6.29	5.35	4.69	4.20	3.82	3.51	3.26	3.05	2.87	2.71	2.57
100	8.15	6.67	5.72	5.05	4.55	4.16	3.84	3.58	3.36	3.17	3.00	2.86

Tc = time in minutes. Values may exceed 60.

e: M:\Projects\A&E Services\Thatcher Duncan\611 Front Street\8.0 Reports\8.2 Stormwater Management\Plainfield.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.43	0.00	0.00	5.21	0.00	0.00	8.68
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	1.25	4.08	0.00	0.00	6.36	0.00	0.00	11.54

Watershed Model Schematic..... 1

Hydrograph Return Period Recap..... 2

1 - Year

Summary Report..... 3

Hydrograph Reports..... 4

 Hydrograph No. 1, SCS Runoff, P-DA 1 PER..... 4

 Hydrograph No. 2, SCS Runoff, P-DA 1 IMP..... 5

 Hydrograph No. 4, SCS Runoff, P-DA 2 PER..... 6

 Hydrograph No. 5, SCS Runoff, P-DA 2 IMP..... 7

 Hydrograph No. 7, Combine, PAVEMENT 1 INFLOW..... 8

 Hydrograph No. 8, Reservoir, PP#1 ROUTE..... 9

 Pond Report - PP #1..... 10

 Pond Report - PP #2..... 11

 Hydrograph No. 9, Combine, PAVEMENT 2 INFLOW..... 12

 Hydrograph No. 10, Reservoir, PP#2 2 ROUTE..... 13

 Pond Report - PP #2..... 14

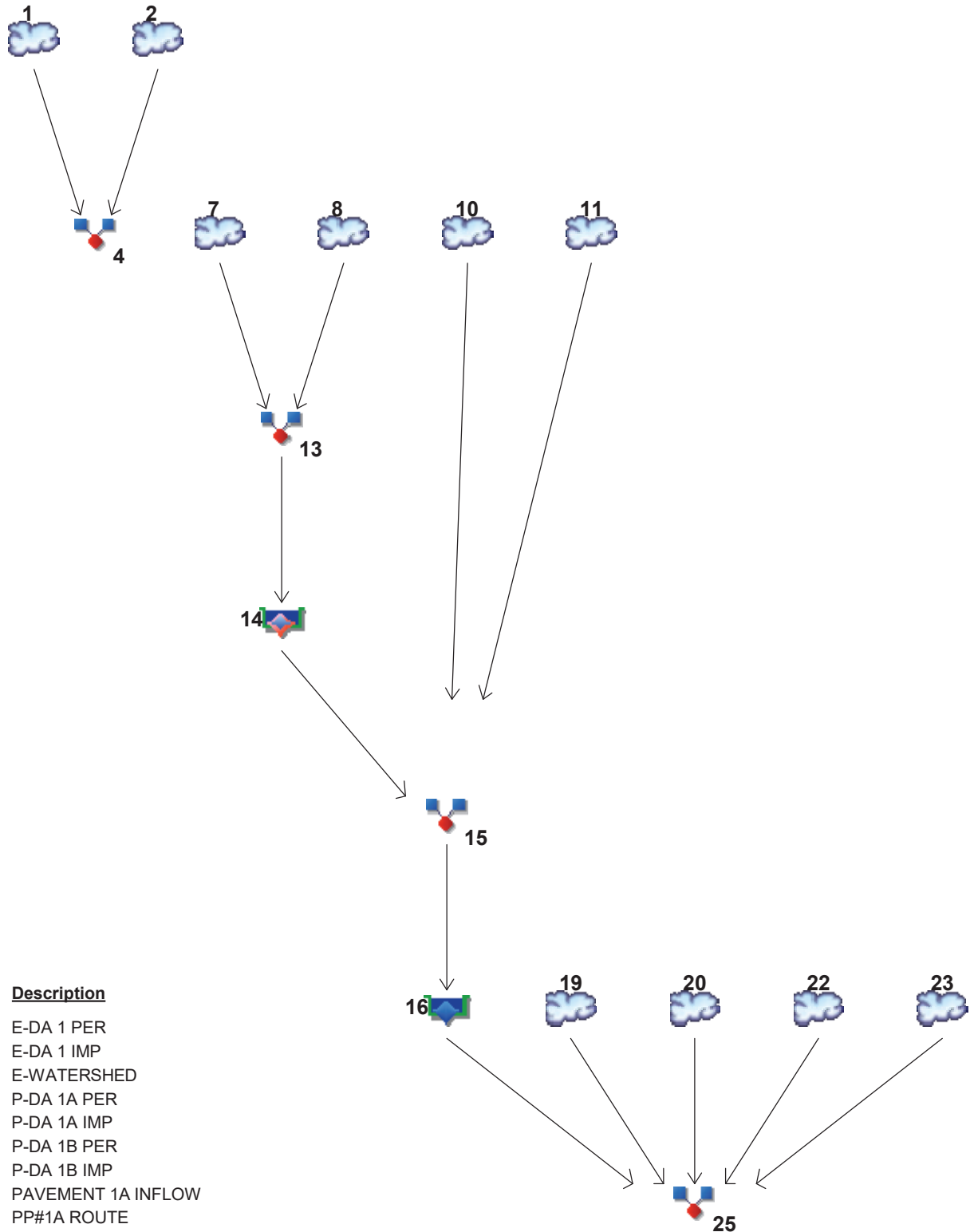
IDF Report..... 15



Appendix F: Current Rainfall Hydrographs

Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024



Legend

Hyd.	Origin	Description
1	SCS Runoff	E-DA 1 PER
2	SCS Runoff	E-DA 1 IMP
4	Combine	E-WATERSHED
7	SCS Runoff	P-DA 1A PER
8	SCS Runoff	P-DA 1A IMP
10	SCS Runoff	P-DA 1B PER
11	SCS Runoff	P-DA 1B IMP
13	Combine	PAVEMENT 1A INFLOW
14	Reservoir(i)	PP#1A ROUTE
15	Combine	PAVEMENT 1B INFLOW
16	Reservoir	PP# 1B ROUTE
19	SCS Runoff	P-DA 2A PER
20	SCS Runoff	P-DA 2A IMP
22	SCS Runoff	P-DA 2B PER
23	SCS Runoff	P-DA 2B IMP
25	Combine	P-WATERSHED

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

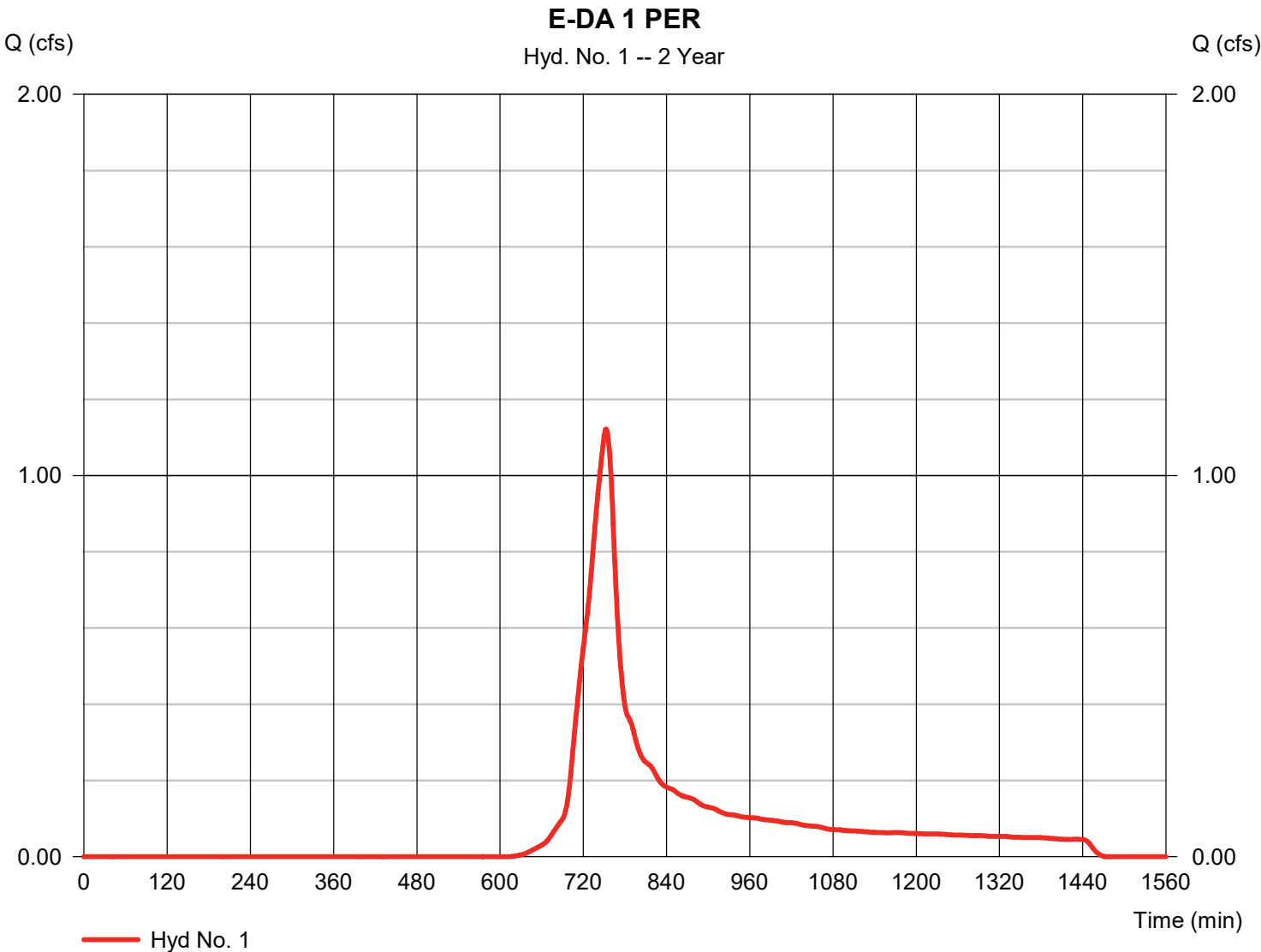
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.121	1	753	7,395	-----	-----	-----	E-DA 1 PER
2	SCS Runoff	0.009	1	750	71	-----	-----	-----	E-DA 1 IMP
4	Combine	1.130	1	753	7,466	1, 2,	-----	-----	E-WATERSHED
7	SCS Runoff	0.137	1	750	836	-----	-----	-----	P-DA 1A PER
8	SCS Runoff	0.729	1	750	6,051	-----	-----	-----	P-DA 1A IMP
10	SCS Runoff	0.014	1	750	83	-----	-----	-----	P-DA 1B PER
11	SCS Runoff	0.766	1	750	6,344	-----	-----	-----	P-DA 1B IMP
13	Combine	0.867	1	750	6,887	7, 8,	-----	-----	PAVEMENT 1A INFLOW
14	Reservoir(i)	0.000	1	1079	0	13	470.52	5,393	PP#1A ROUTE
15	Combine	0.780	1	750	6,427	10, 11, 14	-----	-----	PAVEMENT 1B INFLOW
16	Reservoir	0.099	1	782	1,589	15	466.57	3,657	PP# 1B ROUTE
19	SCS Runoff	0.032	1	750	187	-----	-----	-----	P-DA 2A PER
20	SCS Runoff	0.039	1	750	319	-----	-----	-----	P-DA 2A IMP
22	SCS Runoff	0.178	1	750	1,084	-----	-----	-----	P-DA 2B PER
23	SCS Runoff	0.059	1	750	493	-----	-----	-----	P-DA 2B IMP
25	Combine	0.401	1	750	3,673	16, 19, 20, 22, 23,	-----	-----	P-WATERSHED
M:\Projects\A&E Services\All County - Verona\2026\2026 Stormwater Hydrographs					2026-2026 Stormwater Hydrographs				M:\Projects\A&E Services\All County - Verona\2026\2026 Stormwater Hydrographs

Hydrograph Report

Hyd. No. 1

E-DA 1 PER

Hydrograph type	= SCS Runoff	Peak discharge	= 1.121 cfs
Storm frequency	= 2 yrs	Time to peak	= 753 min
Time interval	= 1 min	Hyd. volume	= 7,395 cuft
Drainage area	= 1.655 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.30 min
Total precip.	= 3.47 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		

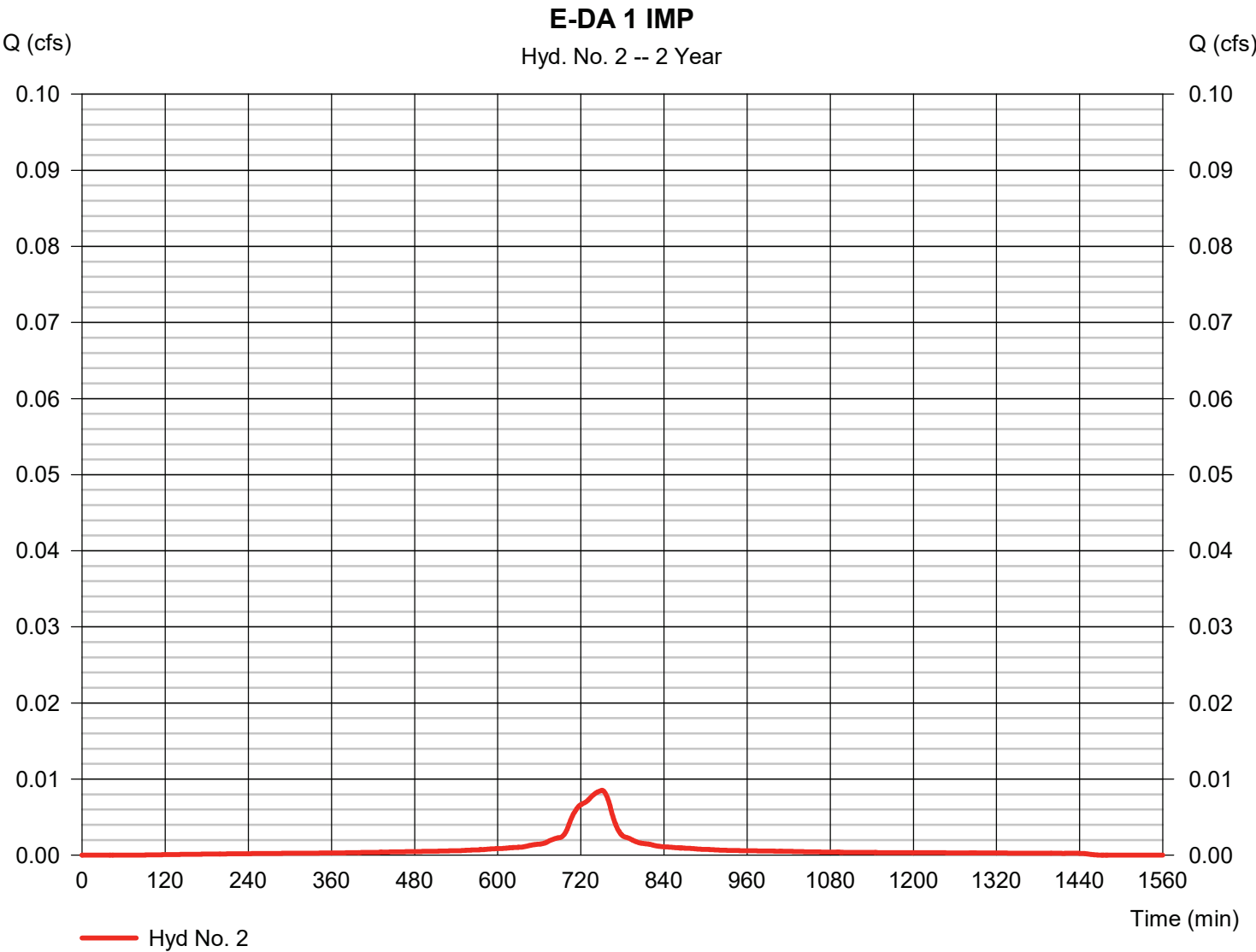


Hydrograph Report

Hyd. No. 2

E-DA 1 IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.009 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 71 cuft
Drainage area	= 0.006 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.30 min
Total precip.	= 3.47 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		

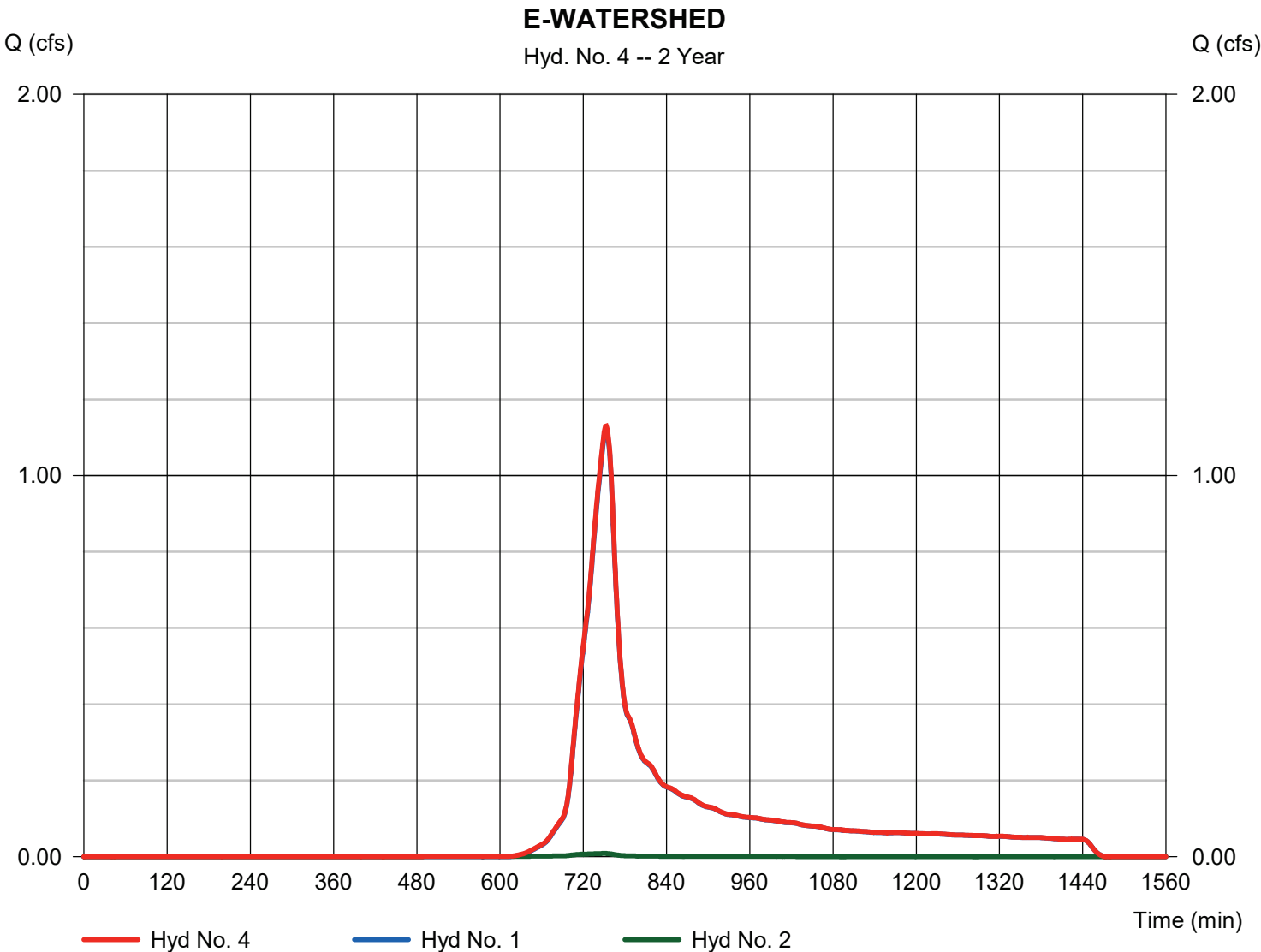


Hydrograph Report

Hyd. No. 4

E-WATERSHED

Hydrograph type	= Combine	Peak discharge	= 1.130 cfs
Storm frequency	= 2 yrs	Time to peak	= 753 min
Time interval	= 1 min	Hyd. volume	= 7,466 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 1.661 ac



Hydrograph Report

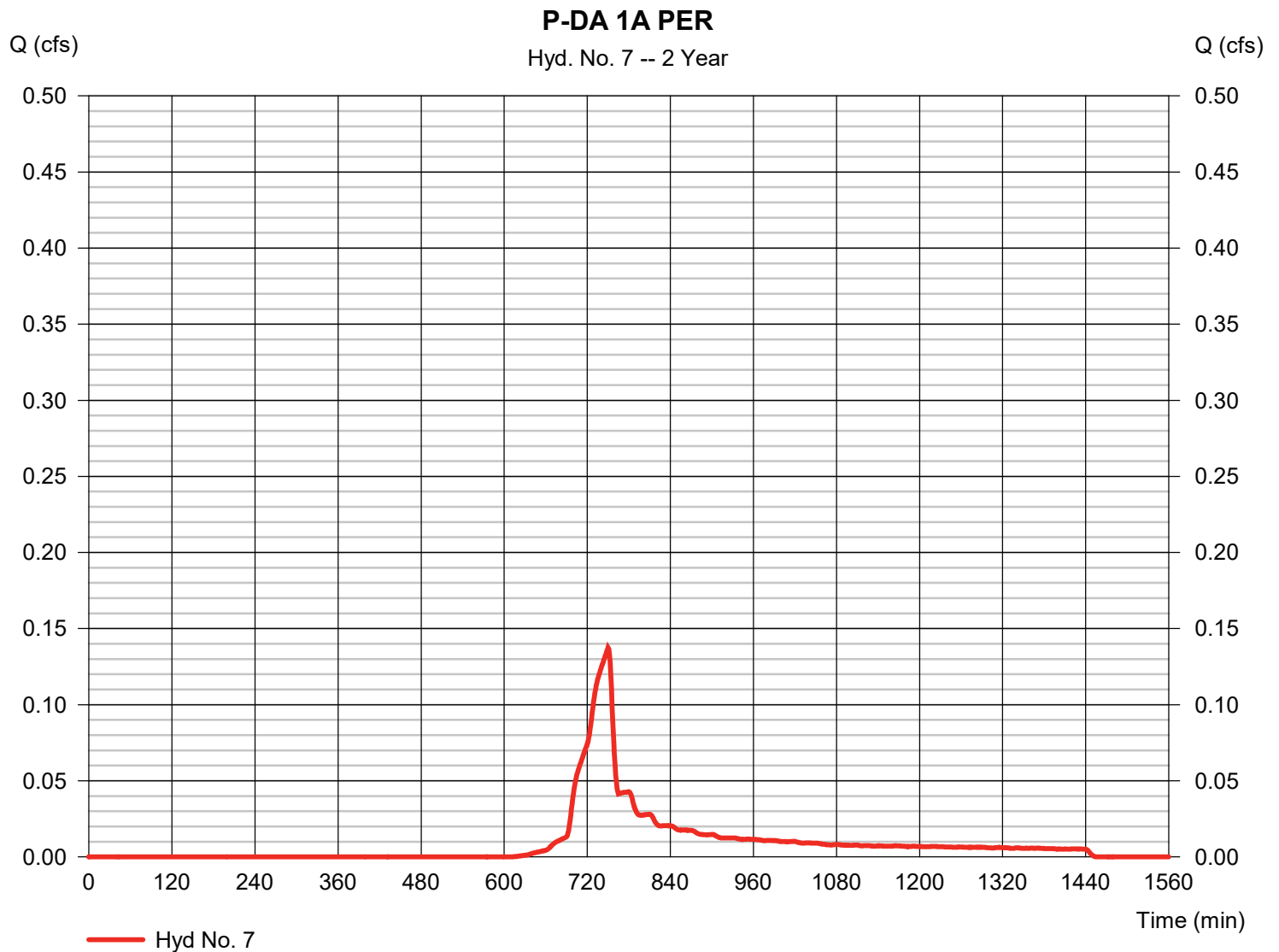
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 7

P-DA 1A PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.137 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 836 cuft
Drainage area	= 0.189 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 9.67 min
Total precip.	= 3.47 in	Distribution	= Custom
Storm duration	= M:\Projects_CAD Standards\Hydroflow\NOAA_D 1 min.484		



Hydrograph Report

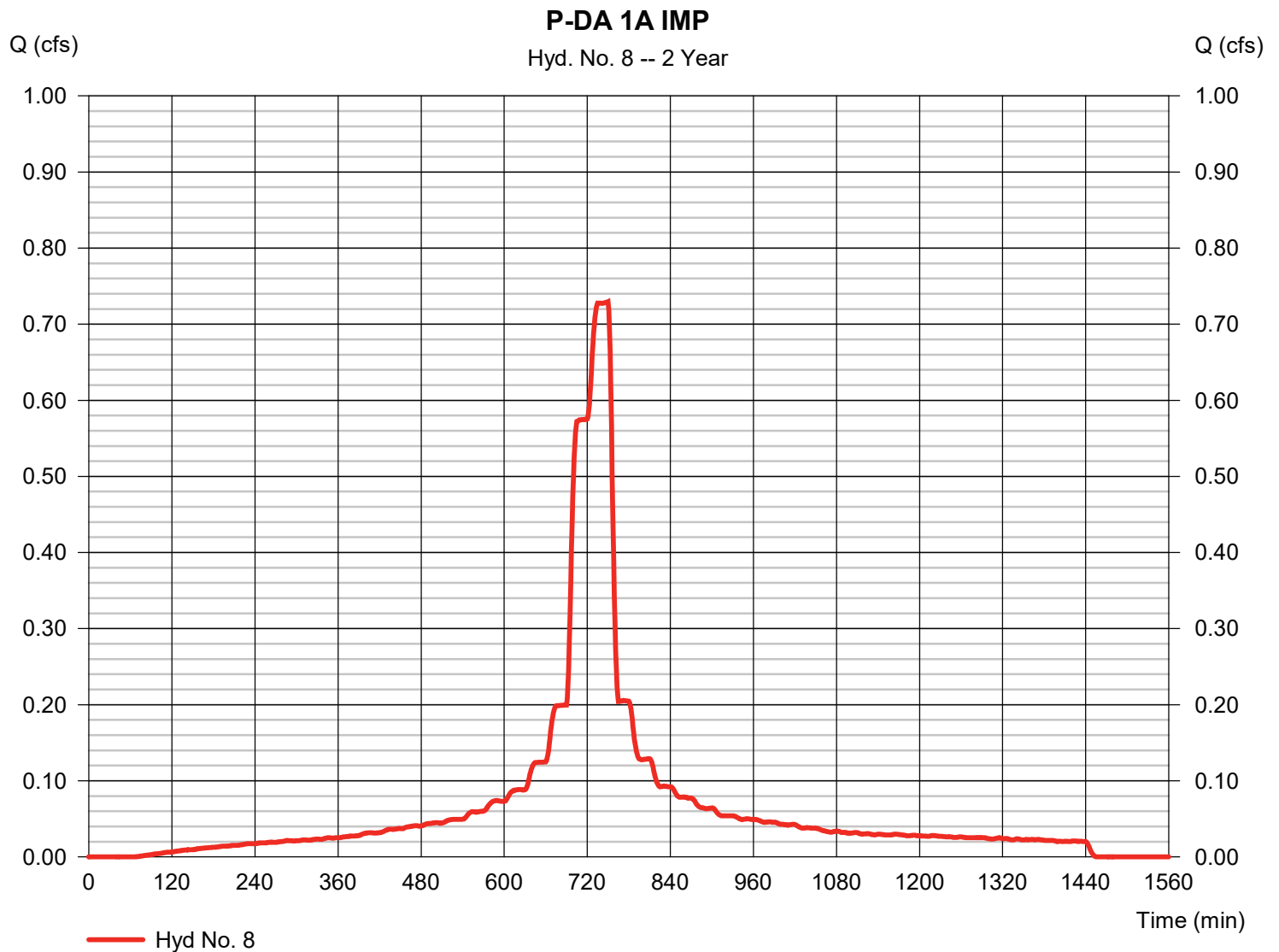
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 8

P-DA 1A IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.729 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 6,051 cuft
Drainage area	= 0.515 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 9.67 min
Total precip.	= 3.47 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\AA_D 1 min.484		

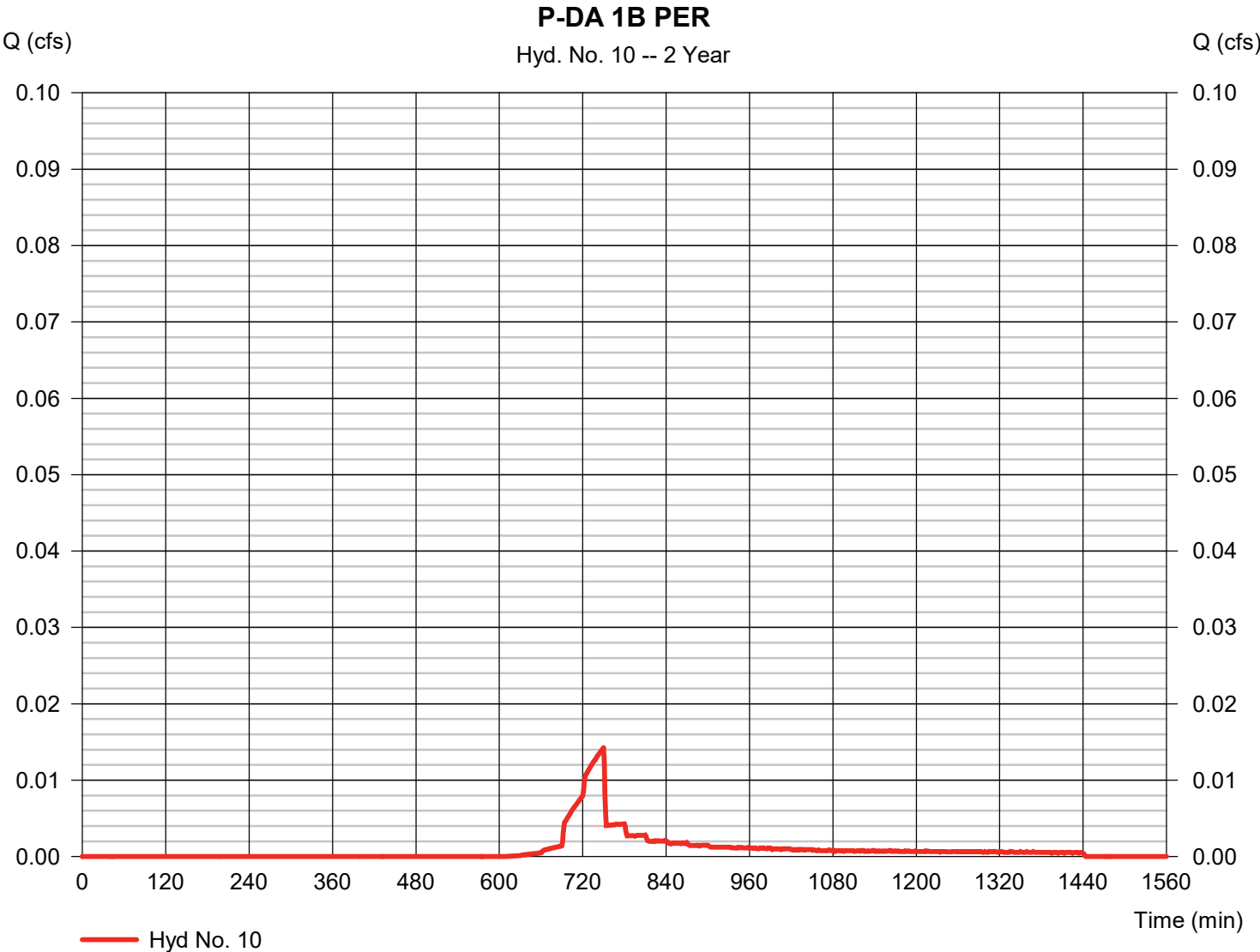


Hydrograph Report

Hyd. No. 10

P-DA 1B PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.014 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 83 cuft
Drainage area	= 0.020 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 3.47 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

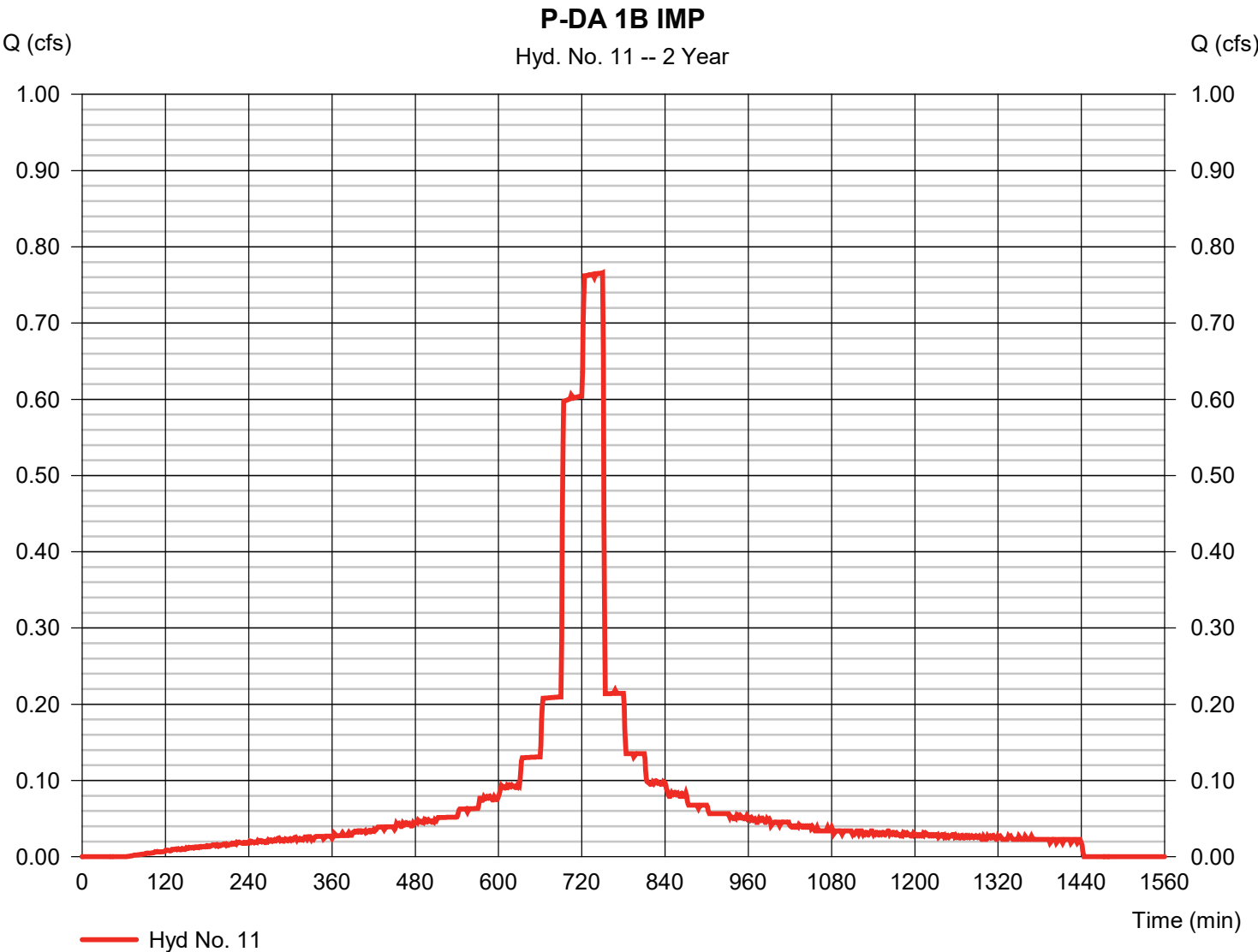
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 11

P-DA 1B IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.766 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 6,344 cuft
Drainage area	= 0.576 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 3.47 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		

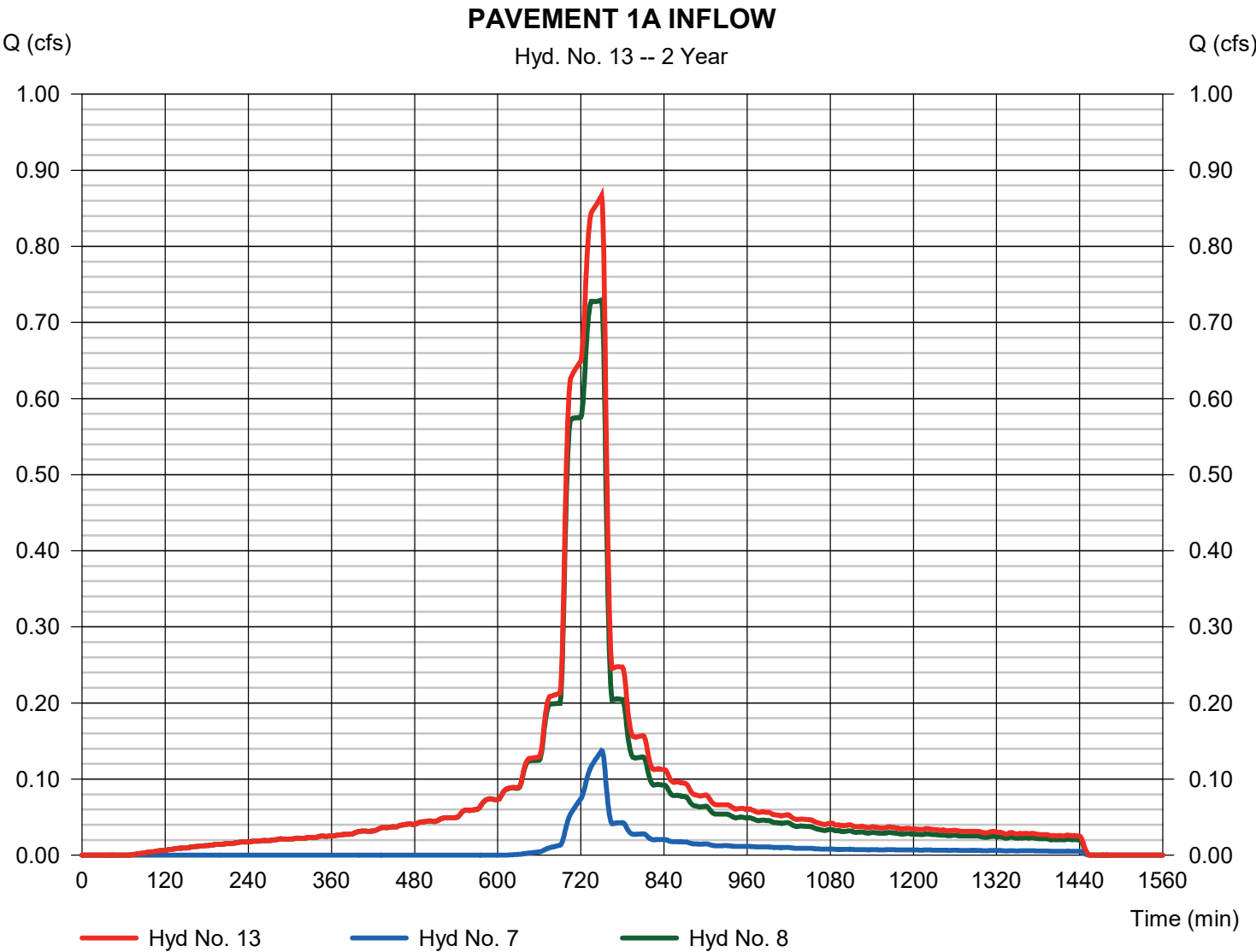


Hydrograph Report

Hyd. No. 13

PAVEMENT 1A INFLOW

Hydrograph type	= Combine	Peak discharge	= 0.867 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 6,887 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 0.704 ac



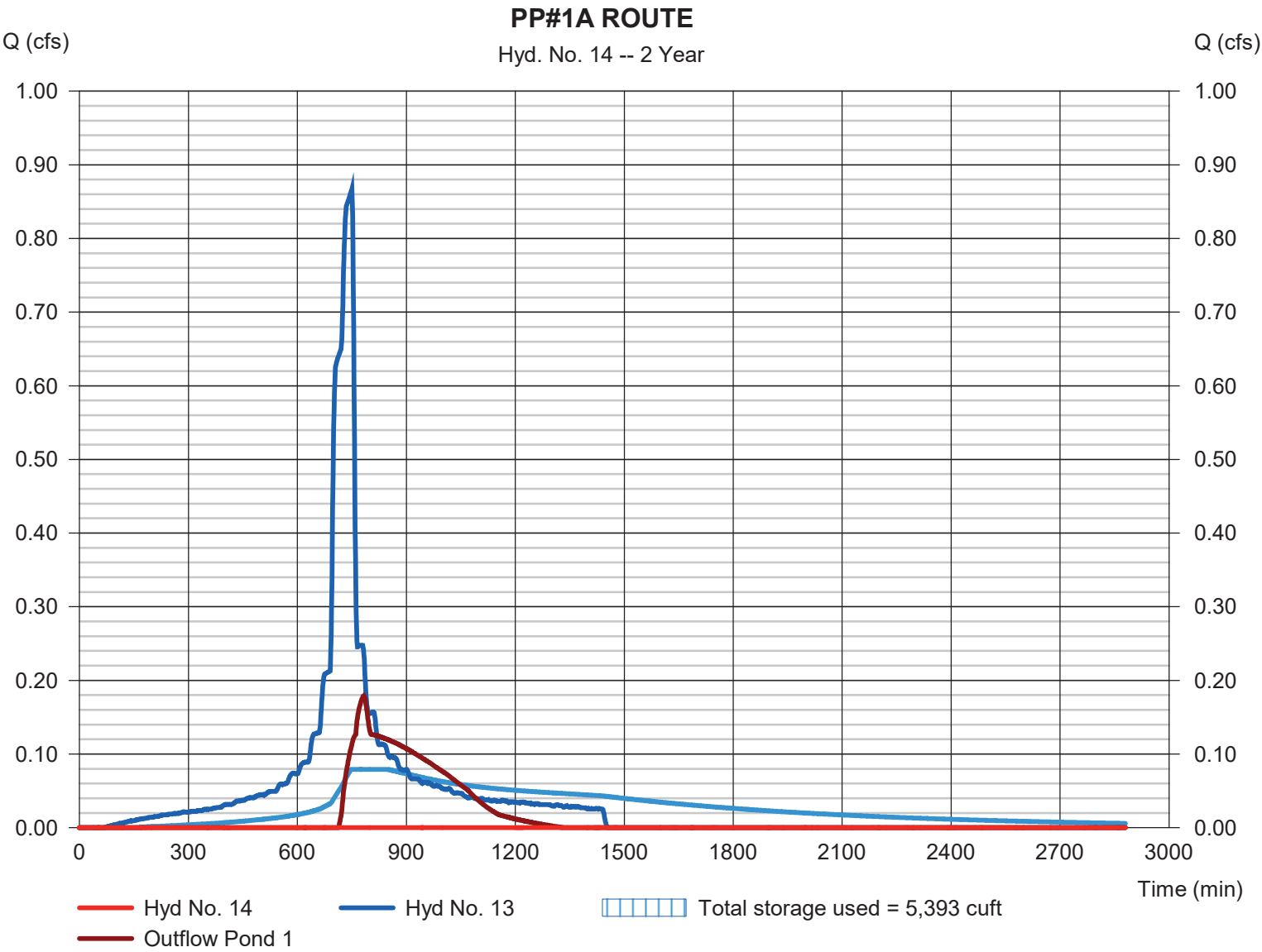
Hydrograph Report

Hyd. No. 14

PP#1A ROUTE

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 1079 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Open Pond	= PP #1	Open Pond	= PP #2
Inflow hyd.	= 13 - PAVEMENT 1A INFLOW	Other Inflow hyd.	= None
Max. Elevation	= 470.52 ft	Max. Elevation	= 465.98 ft
Max. Storage	= 3,752 cuft	Max. Storage	= 1,641 cuft

Interconnected Pond Routing. Storage Indication method used. Exfiltration extracted from Outflow.



Pond No. 1 - PP #1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 469.00 ft. Voids = 90.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	469.00	2,750	0	0
1.00	470.00	2,750	2,475	2,475
2.00	471.00	2,750	2,475	4,950

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	2.50	0.00	0.00
Span (in)	= 12.00	2.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 469.00	469.80	0.00	0.00
Length (ft)	= 26.00	0.50	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .012	.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)	= 3.00	0.00	0.00	0.00
Crest El. (ft)	= 470.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.900 (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	469.00	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
1.00	2,475	470.00	0.05 ic	0.05 ic	---	---	0.00	---	---	---	0.057	---	0.109
2.00	4,950	471.00	3.66 ic	0.12 ic	---	---	3.53	---	---	---	0.057	---	3.713

Pond No. 2 - PP #2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 465.50 ft. Voids = 90.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	465.50	3,805	0	0
1.00	466.50	3,805	3,424	3,424
2.00	467.50	3,805	3,424	6,848
3.00	468.50	3,805	3,424	10,272

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 14.00	2.50	0.00	0.00
Span (in)	= 14.00	2.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 465.50	466.10	0.00	0.00
Length (ft)	= 18.00	0.50	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	0.00	0.00	0.00
Crest El. (ft)	= 468.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.900 (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	465.50	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
1.00	3,424	466.50	0.09 ic	0.09 ic	---	---	0.00	---	---	---	0.079	---	0.169
2.00	6,848	467.50	0.19 ic	0.19 ic	---	---	0.00	---	---	---	0.079	---	0.266
3.00	10,272	468.50	3.75 oc	0.22 ic	---	---	3.53	---	---	---	0.079	---	3.833

Hydrograph Report

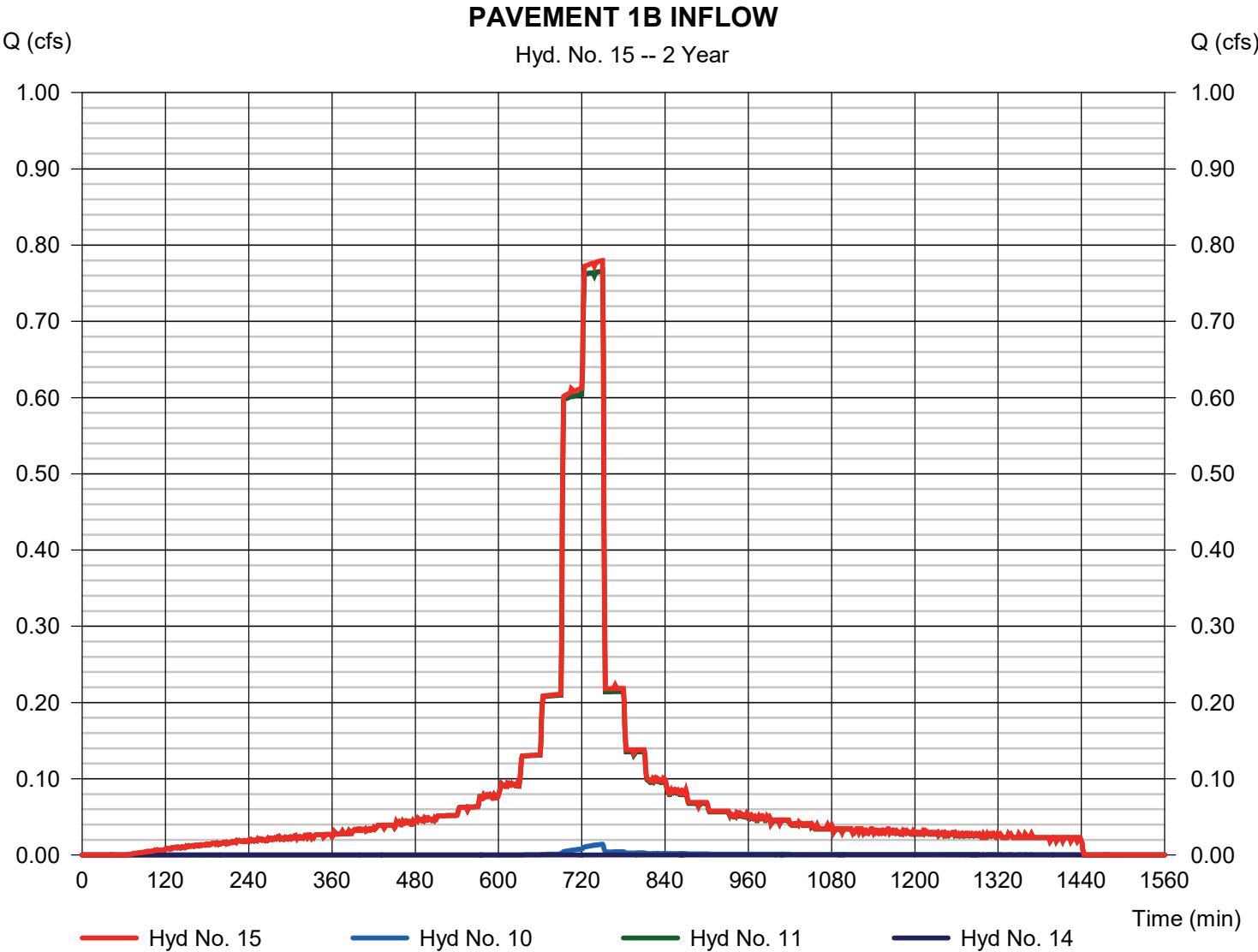
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 15

PAVEMENT 1B INFLOW

Hydrograph type	= Combine	Peak discharge	= 0.780 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 6,427 cuft
Inflow hyds.	= 10, 11, 14	Contrib. drain. area	= 0.596 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

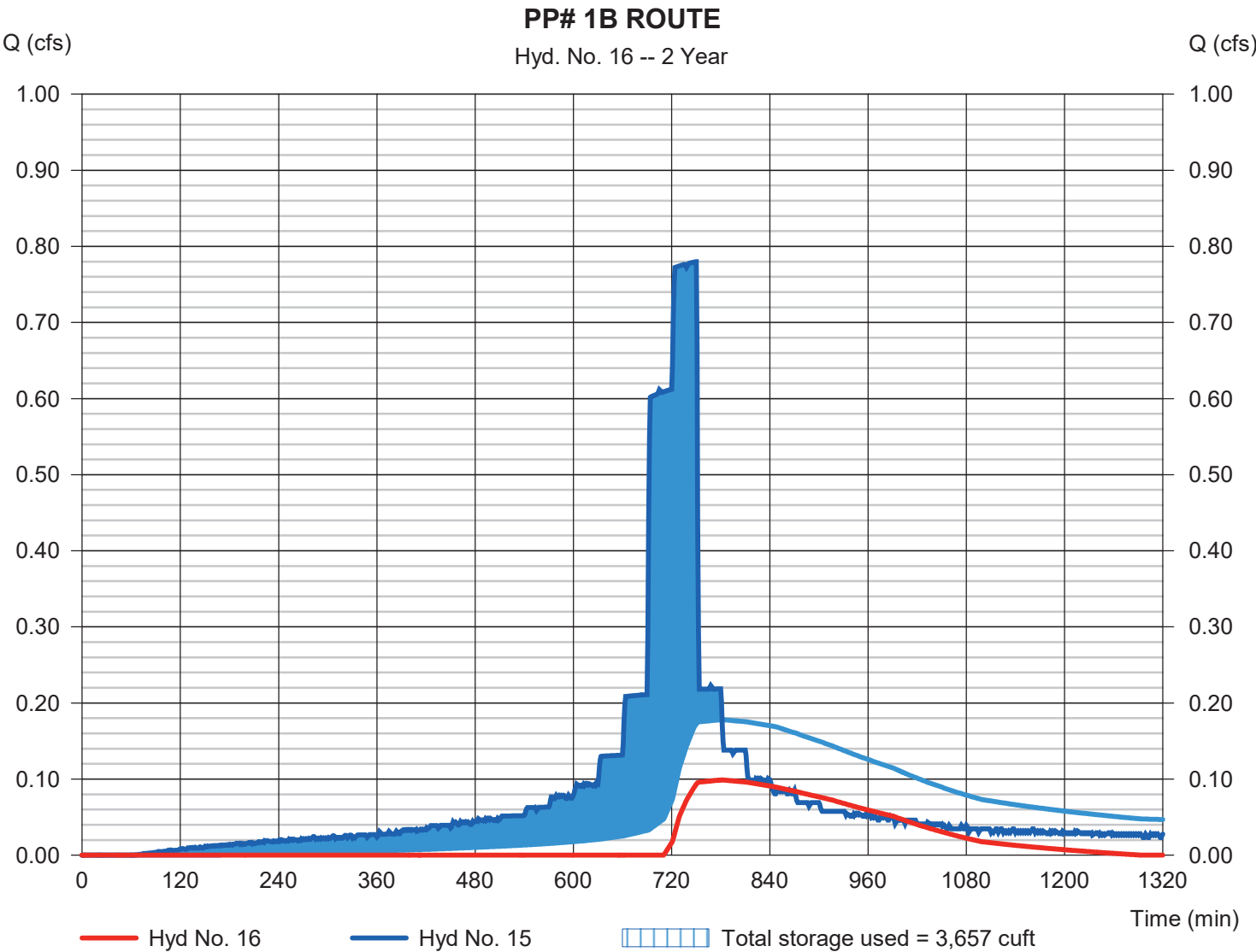
Monday, 08 / 10 / 2026

Hyd. No. 16

PP# 1B ROUTE

Hydrograph type	= Reservoir	Peak discharge	= 0.099 cfs
Storm frequency	= 2 yrs	Time to peak	= 782 min
Time interval	= 1 min	Hyd. volume	= 1,589 cuft
Inflow hyd. No.	= 15 - PAVEMENT 1B INFLOW	Max. Elevation	= 466.57 ft
Reservoir name	= PP #2	Max. Storage	= 3,657 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond No. 2 - PP #2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 465.50 ft. Voids = 90.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	465.50	3,805	0	0
1.00	466.50	3,805	3,424	3,424
2.00	467.50	3,805	3,424	6,848
3.00	468.50	3,805	3,424	10,272

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 14.00	2.50	0.00	0.00
Span (in)	= 14.00	2.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 465.50	466.10	0.00	0.00
Length (ft)	= 18.00	0.50	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	0.00	0.00	0.00
Crest El. (ft)	= 468.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.900 (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

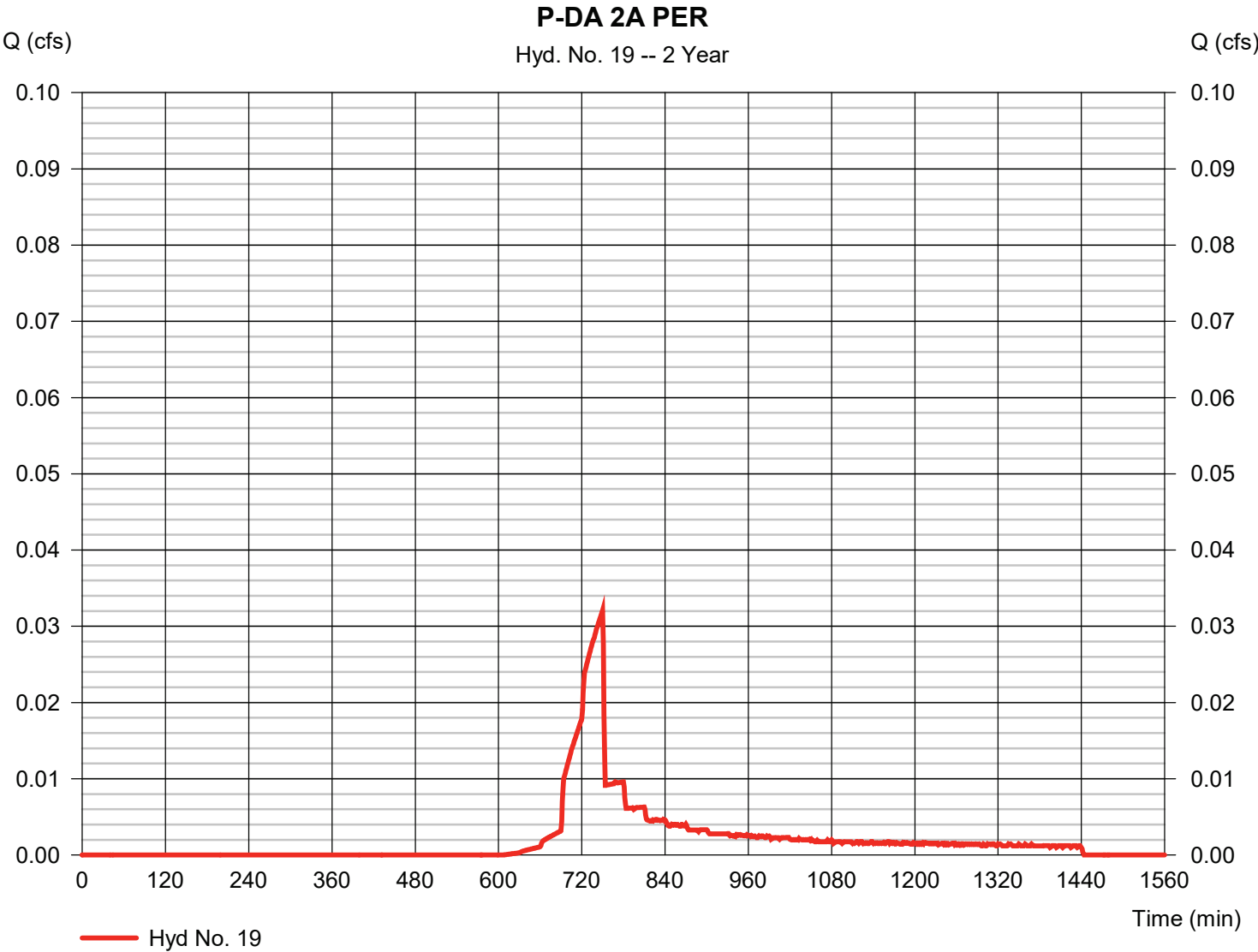
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	465.50	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
1.00	3,424	466.50	0.09 ic	0.09 ic	---	---	0.00	---	---	---	0.079	---	0.169
2.00	6,848	467.50	0.19 ic	0.19 ic	---	---	0.00	---	---	---	0.079	---	0.266
3.00	10,272	468.50	3.75 oc	0.22 ic	---	---	3.53	---	---	---	0.079	---	3.833

Hydrograph Report

Hyd. No. 19

P-DA 2A PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.032 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 187 cuft
Drainage area	= 0.045 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 3.47 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		

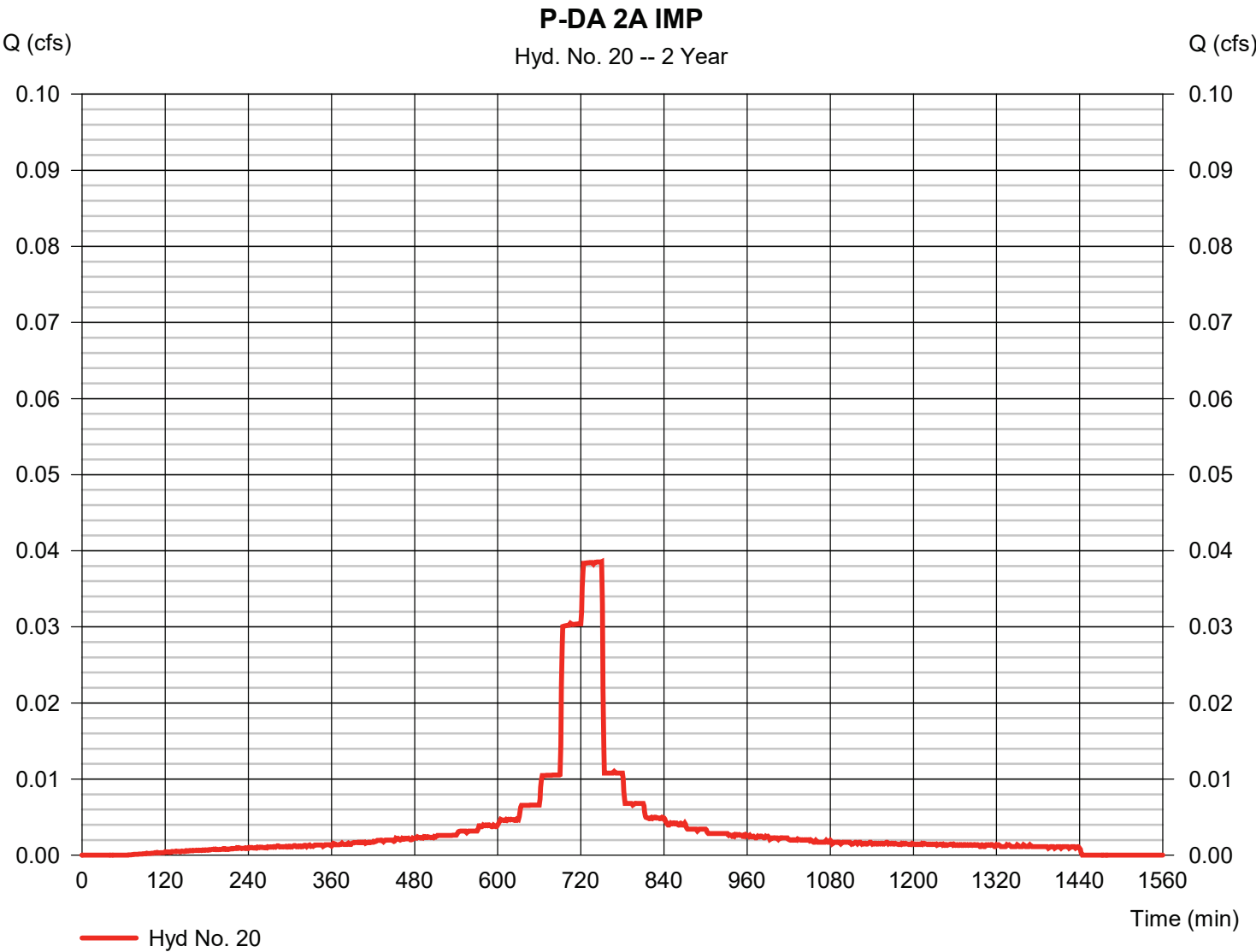


Hydrograph Report

Hyd. No. 20

P-DA 2A IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.039 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 319 cuft
Drainage area	= 0.029 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 3.47 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.464		



Hydrograph Report

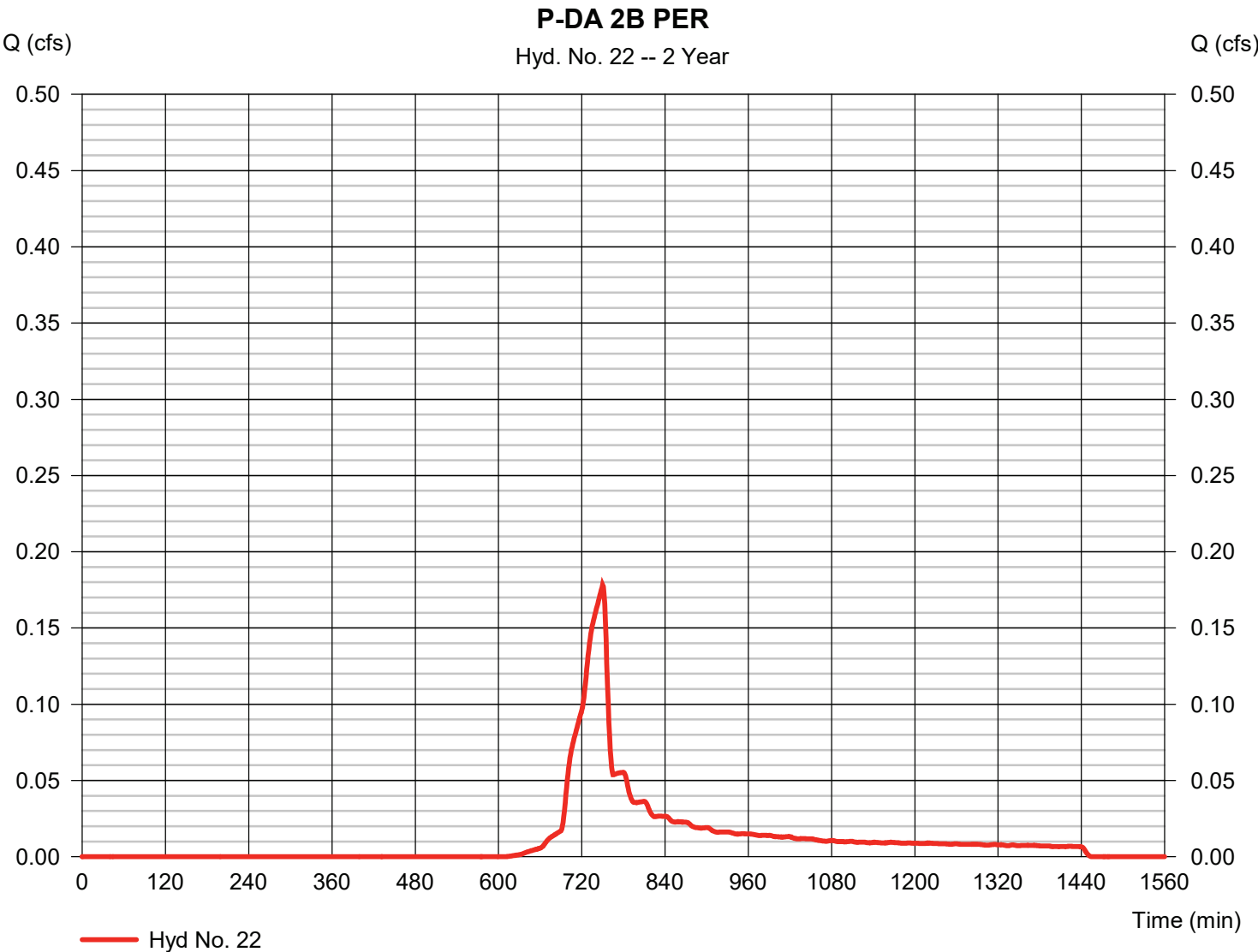
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Monday, 08 / 10 / 2026

Hyd. No. 22

P-DA 2B PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.178 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 1,084 cuft
Drainage area	= 0.245 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 8.70 min
Total precip.	= 3.47 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

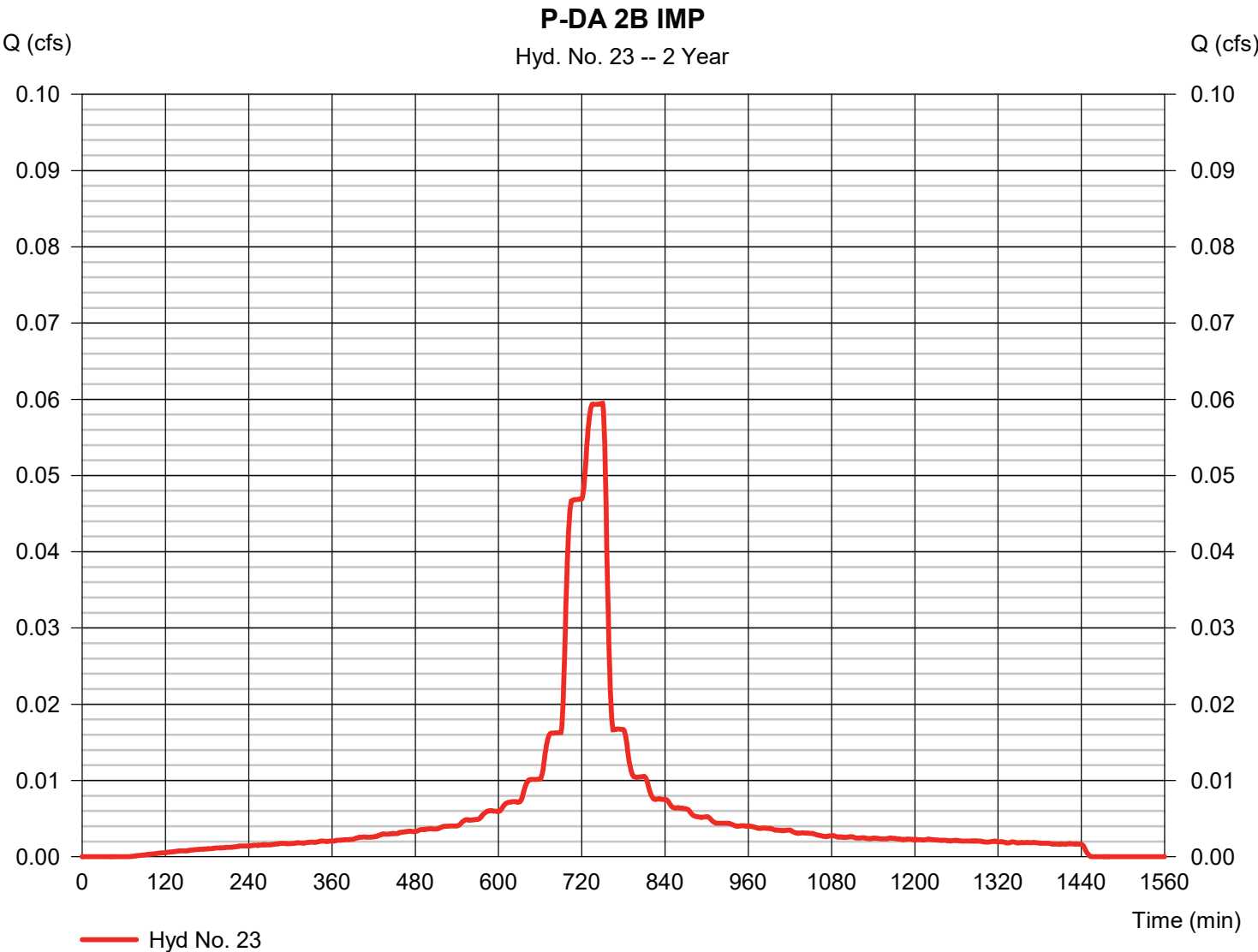
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 23

P-DA 2B IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.059 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 493 cuft
Drainage area	= 0.042 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 8.70 min
Total precip.	= 3.47 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

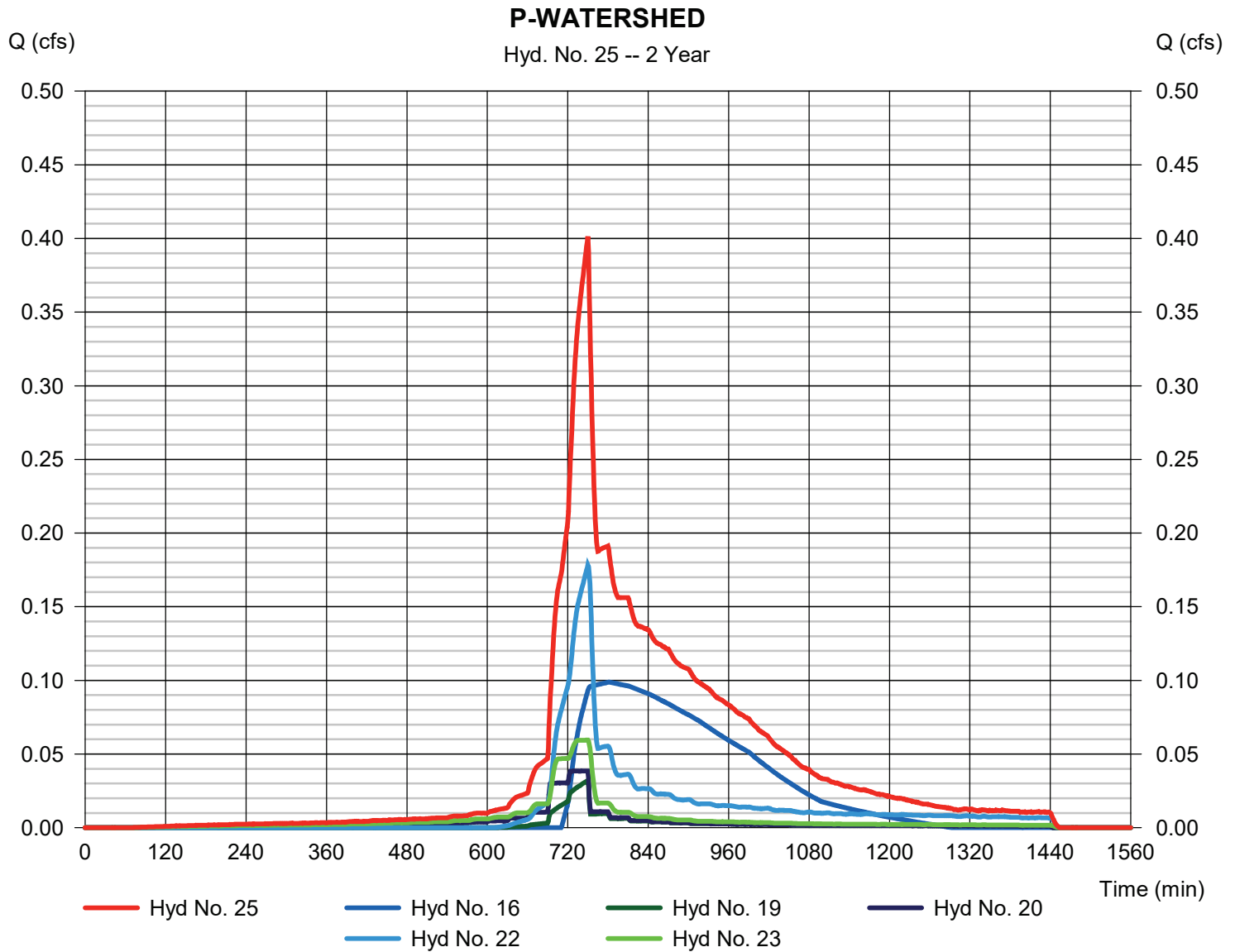
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Monday, 08 / 10 / 2026

Hyd. No. 25

P-WATERSHED

Hydrograph type	= Combine	Peak discharge	= 0.401 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 3,673 cuft
Inflow hyds.	= 16, 19, 20, 22, 23	Contrib. drain. area	= 0.361 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

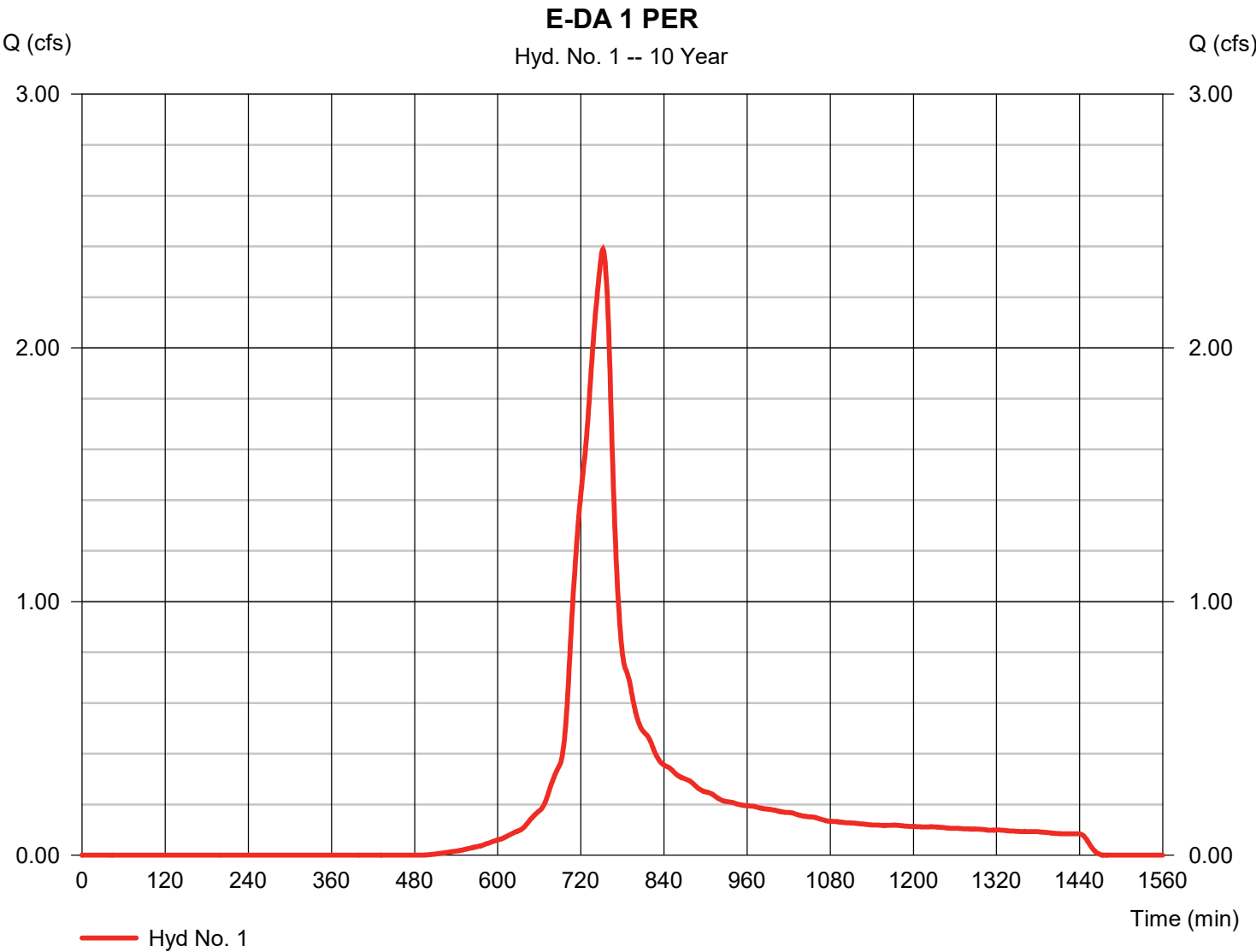
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	2.389	1	752	16,200	-----	-----	-----	E-DA 1 PER
2	SCS Runoff	0.013	1	750	113	-----	-----	-----	E-DA 1 IMP
4	Combine	2.402	1	752	16,313	1, 2,	-----	-----	E-WATERSHED
7	SCS Runoff	0.285	1	750	1,832	-----	-----	-----	P-DA 1A PER
8	SCS Runoff	1.136	1	750	9,614	-----	-----	-----	P-DA 1A IMP
10	SCS Runoff	0.029	1	750	182	-----	-----	-----	P-DA 1B PER
11	SCS Runoff	1.192	1	750	10,081	-----	-----	-----	P-DA 1B IMP
13	Combine	1.421	1	750	11,446	7, 8,	-----	-----	PAVEMENT 1A INFLOW
14	Reservoir(i)	0.083	1	830	1,799	13	470.74	7,594	PP#1A ROUTE
15	Combine	1.221	1	750	12,062	10, 11, 14	-----	-----	PAVEMENT 1B INFLOW
16	Reservoir	0.167	1	813	5,576	15	467.24	5,954	PP# 1B ROUTE
19	SCS Runoff	0.065	1	750	409	-----	-----	-----	P-DA 2A PER
20	SCS Runoff	0.060	1	750	508	-----	-----	-----	P-DA 2A IMP
22	SCS Runoff	0.370	1	750	2,375	-----	-----	-----	P-DA 2B PER
23	SCS Runoff	0.093	1	750	784	-----	-----	-----	P-DA 2B IMP
25	Combine	0.744	1	750	9,652	16, 19, 20, 22, 23,	-----	-----	P-WATERSHED

Hydrograph Report

Hyd. No. 1

E-DA 1 PER

Hydrograph type	= SCS Runoff	Peak discharge	= 2.389 cfs
Storm frequency	= 10 yrs	Time to peak	= 752 min
Time interval	= 1 min	Hyd. volume	= 16,200 cuft
Drainage area	= 1.655 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.30 min
Total precip.	= 5.38 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

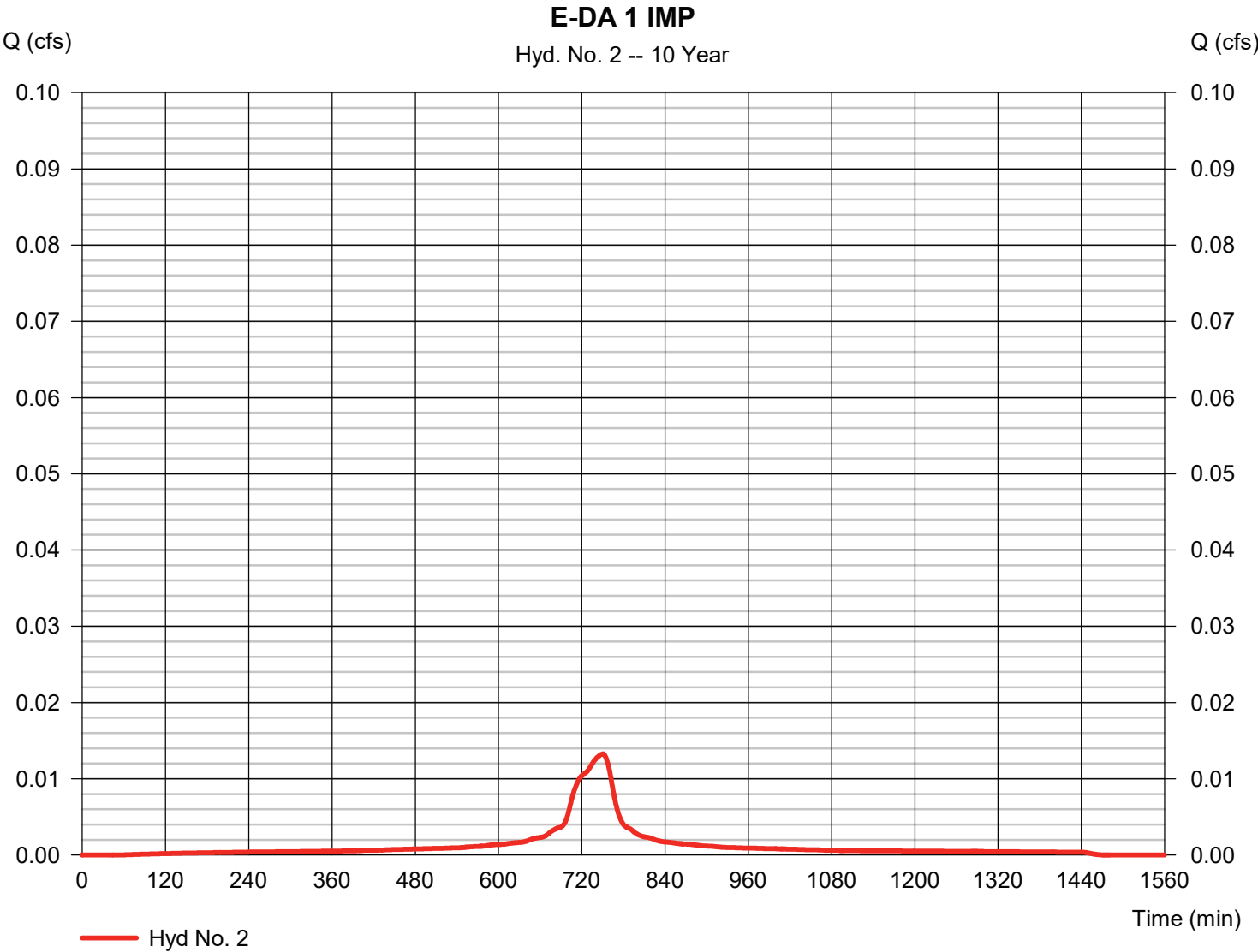
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Hyd. No. 2

E-DA 1 IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.013 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 113 cuft
Drainage area	= 0.006 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.30 min
Total precip.	= 5.38 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		

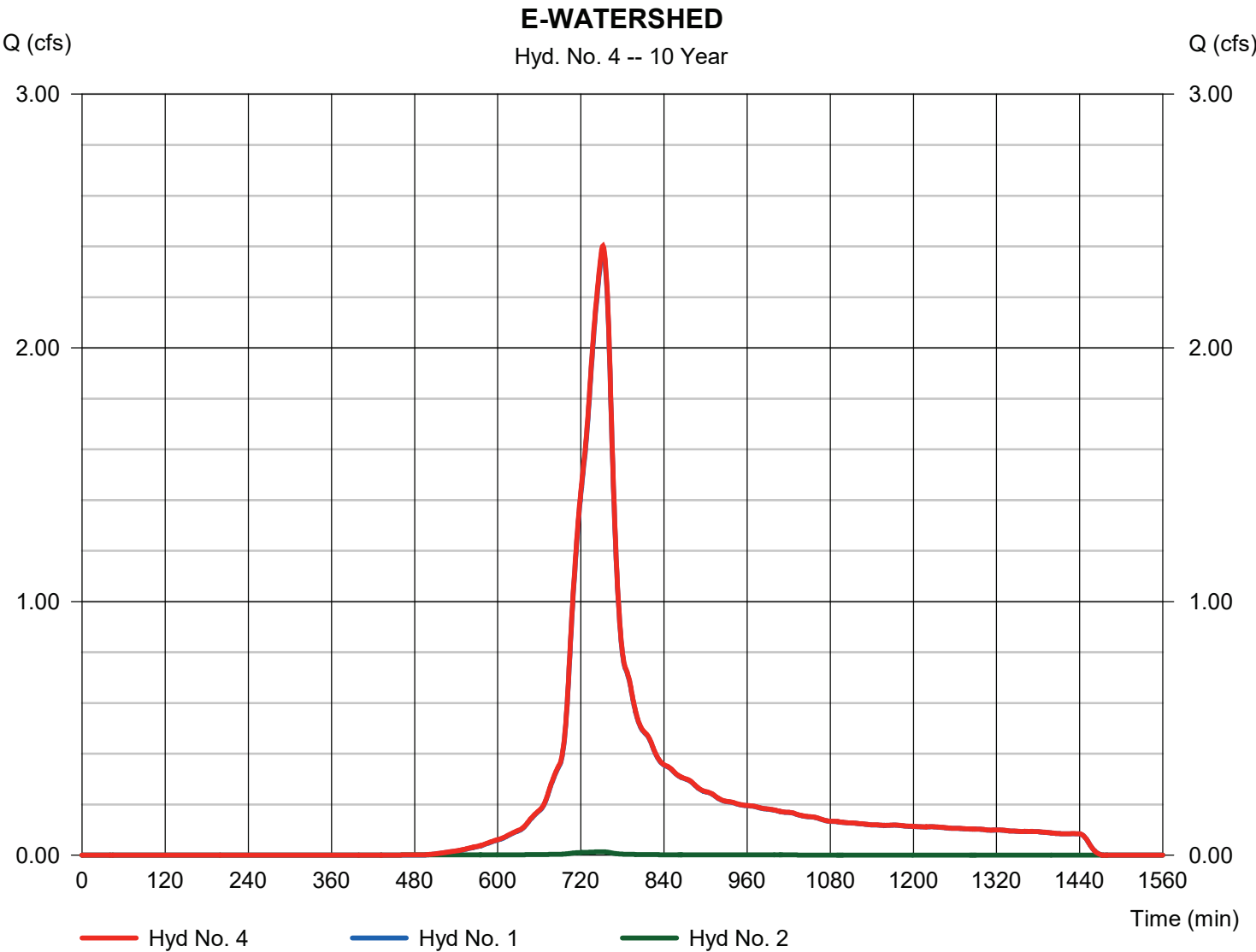


Hydrograph Report

Hyd. No. 4

E-WATERSHED

Hydrograph type	= Combine	Peak discharge	= 2.402 cfs
Storm frequency	= 10 yrs	Time to peak	= 752 min
Time interval	= 1 min	Hyd. volume	= 16,313 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 1.661 ac



Hydrograph Report

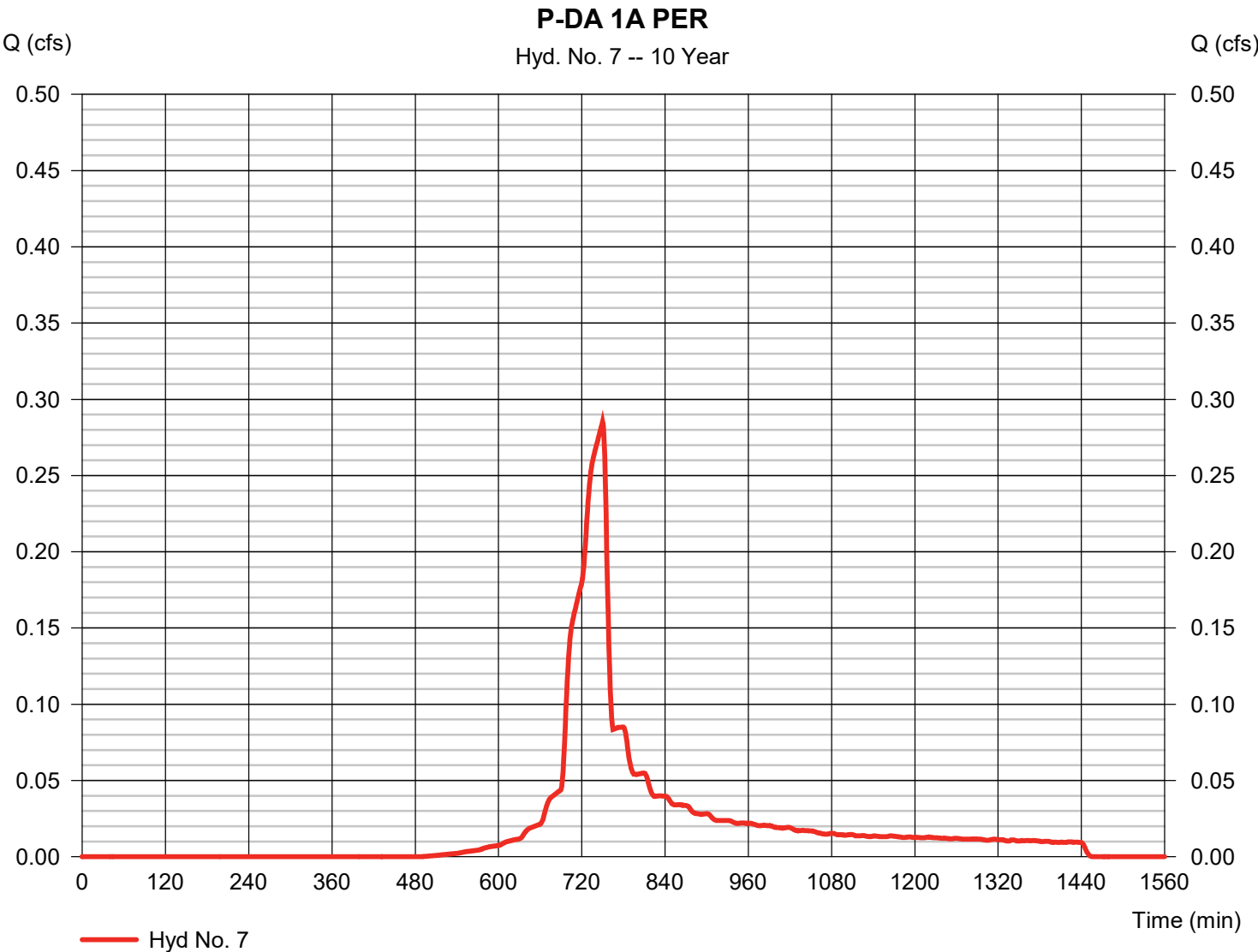
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Monday, 08 / 10 / 2026

Hyd. No. 7

P-DA 1A PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.285 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 1,832 cuft
Drainage area	= 0.189 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 9.67 min
Total precip.	= 5.38 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydroflow\NOAA_D 1 min.484		



Hydrograph Report

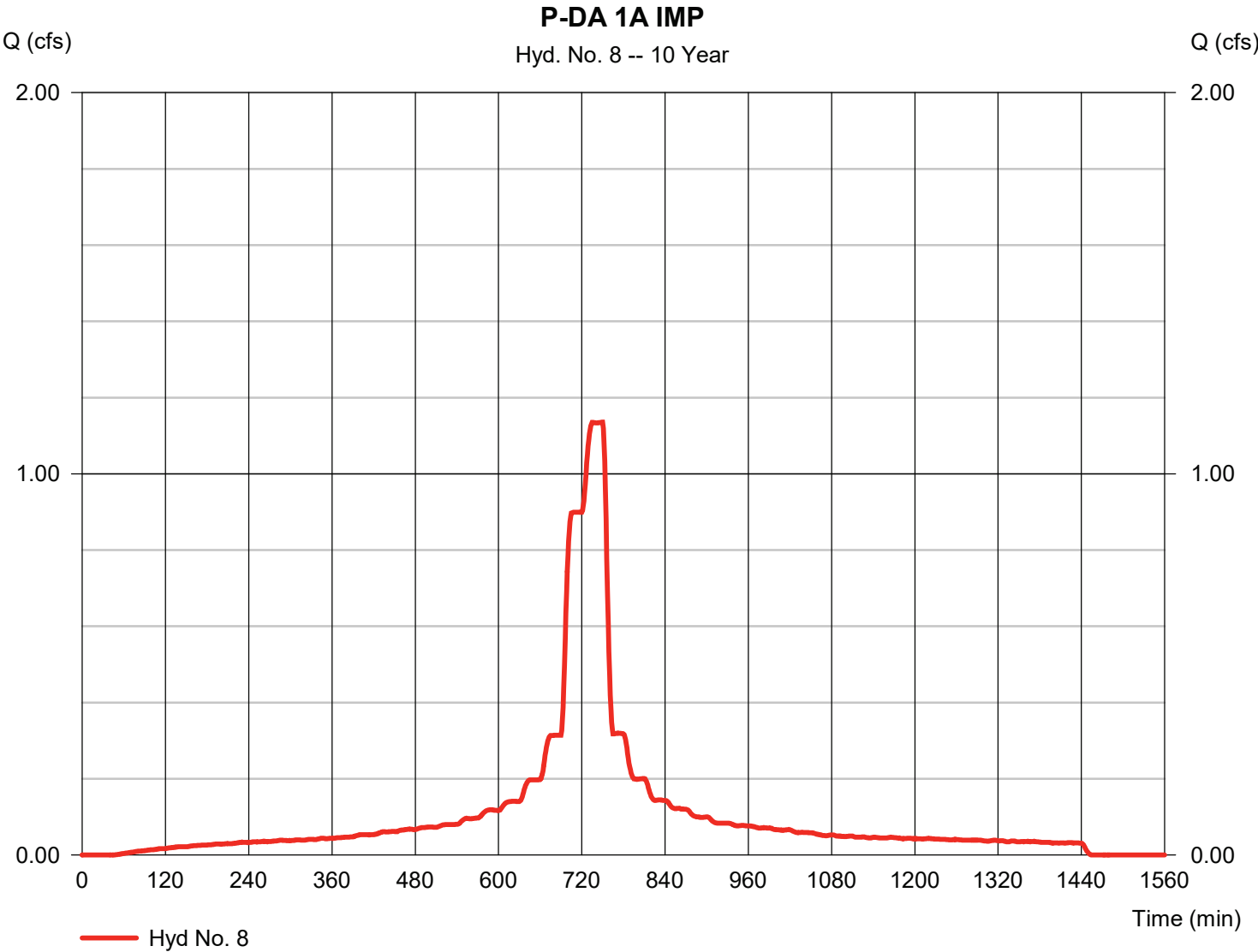
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 8

P-DA 1A IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 1.136 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 9,614 cuft
Drainage area	= 0.515 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 9.67 min
Total precip.	= 5.38 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

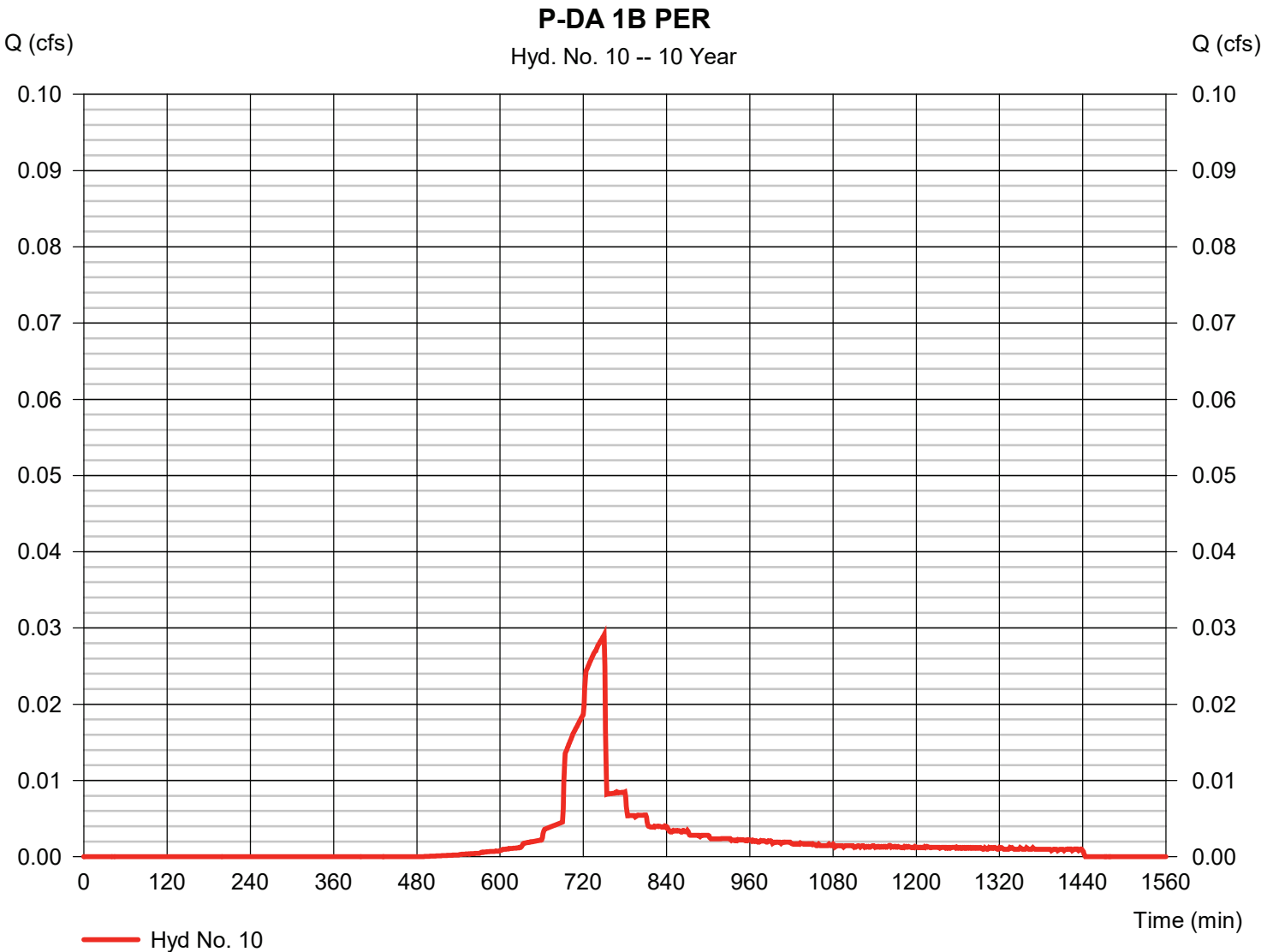
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Monday, 08 / 10 / 2026

Hyd. No. 10

P-DA 1B PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.029 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 182 cuft
Drainage area	= 0.020 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 5.38 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

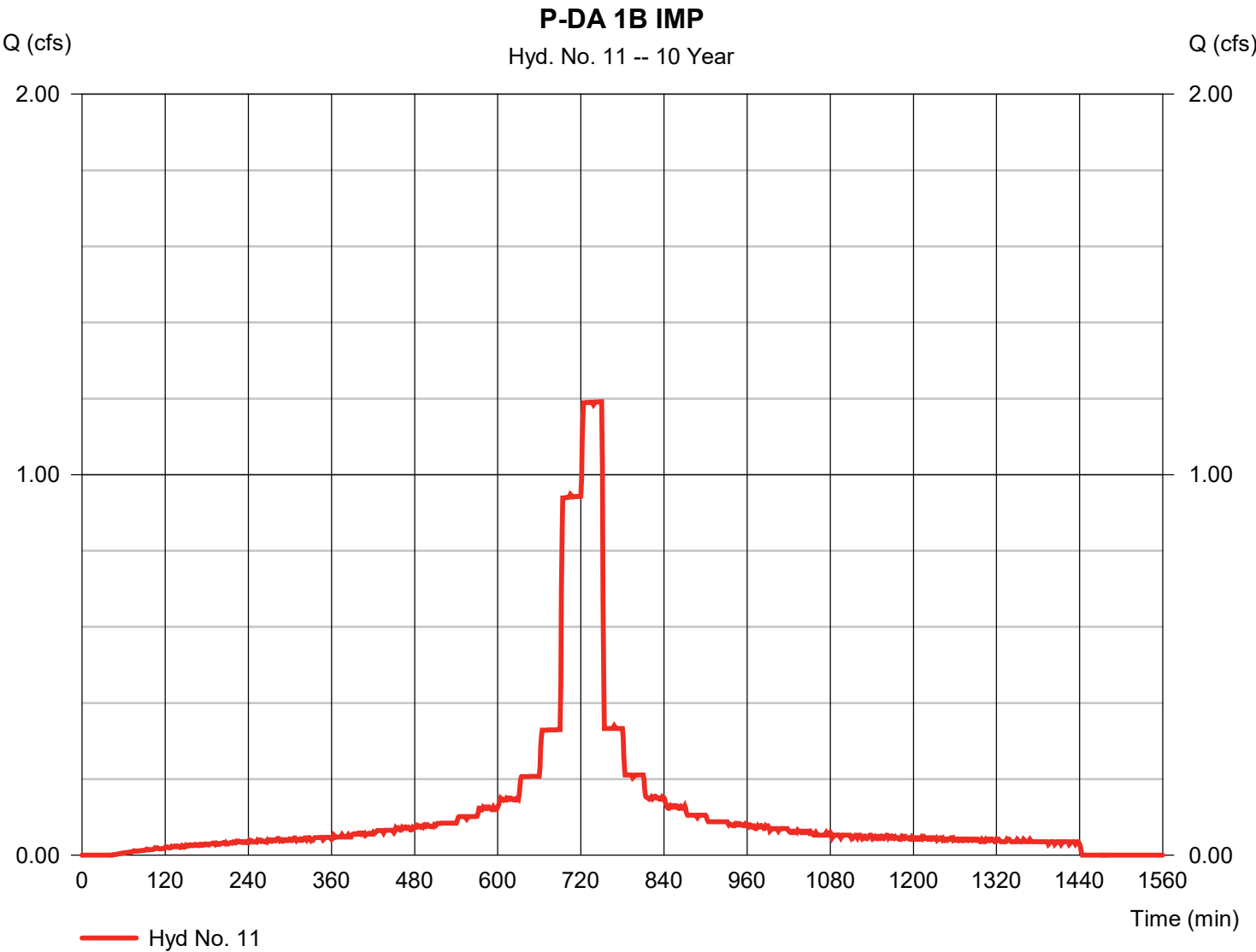
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 11

P-DA 1B IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 1.192 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 10,081 cuft
Drainage area	= 0.576 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 5.38 in	Distribution	= Custom
Storm duration	= M:\Projects_CAD Standards\Hydrographs\NOAA_D 1 min.484		

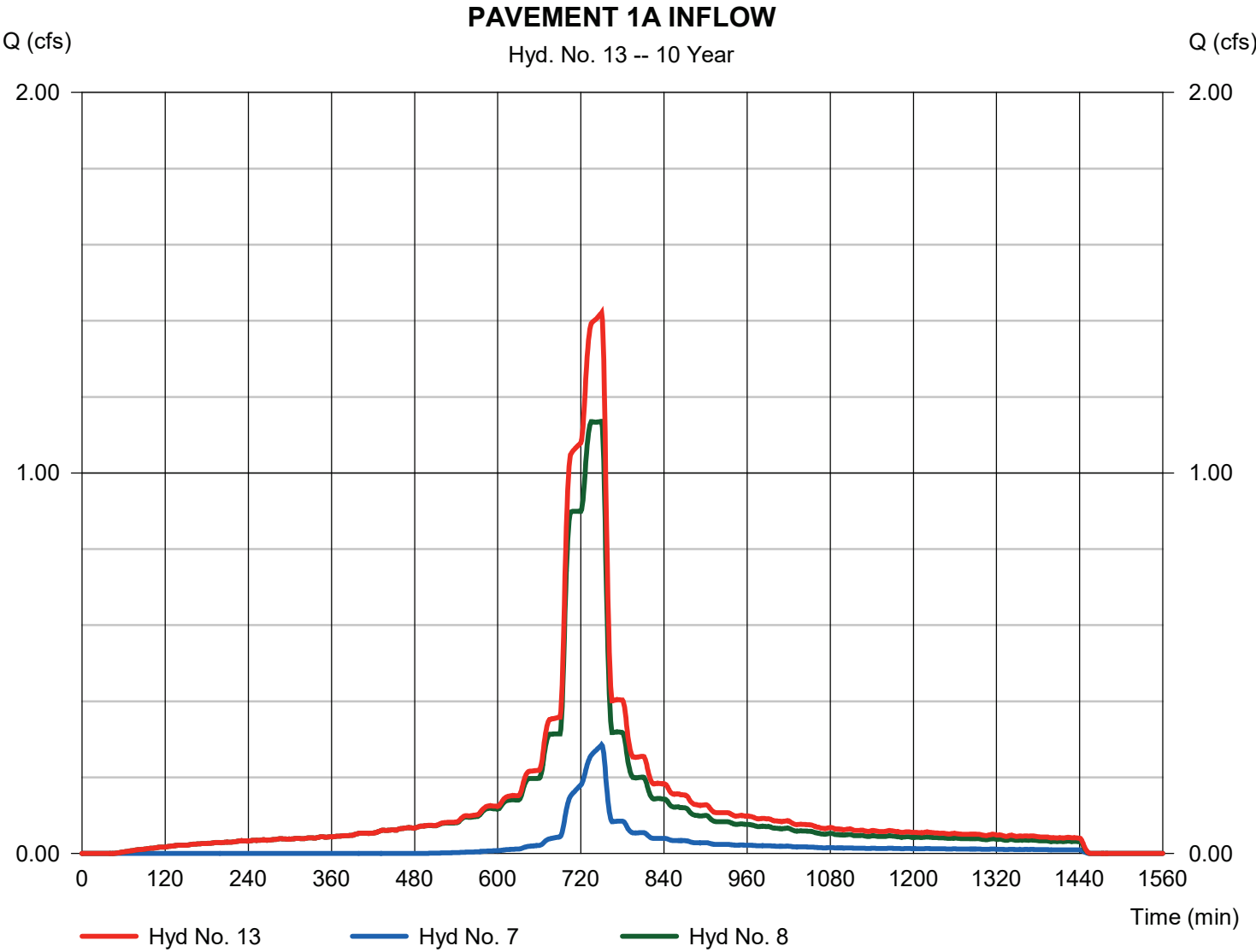


Hydrograph Report

Hyd. No. 13

PAVEMENT 1A INFLOW

Hydrograph type	= Combine	Peak discharge	= 1.421 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 11,446 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 0.704 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

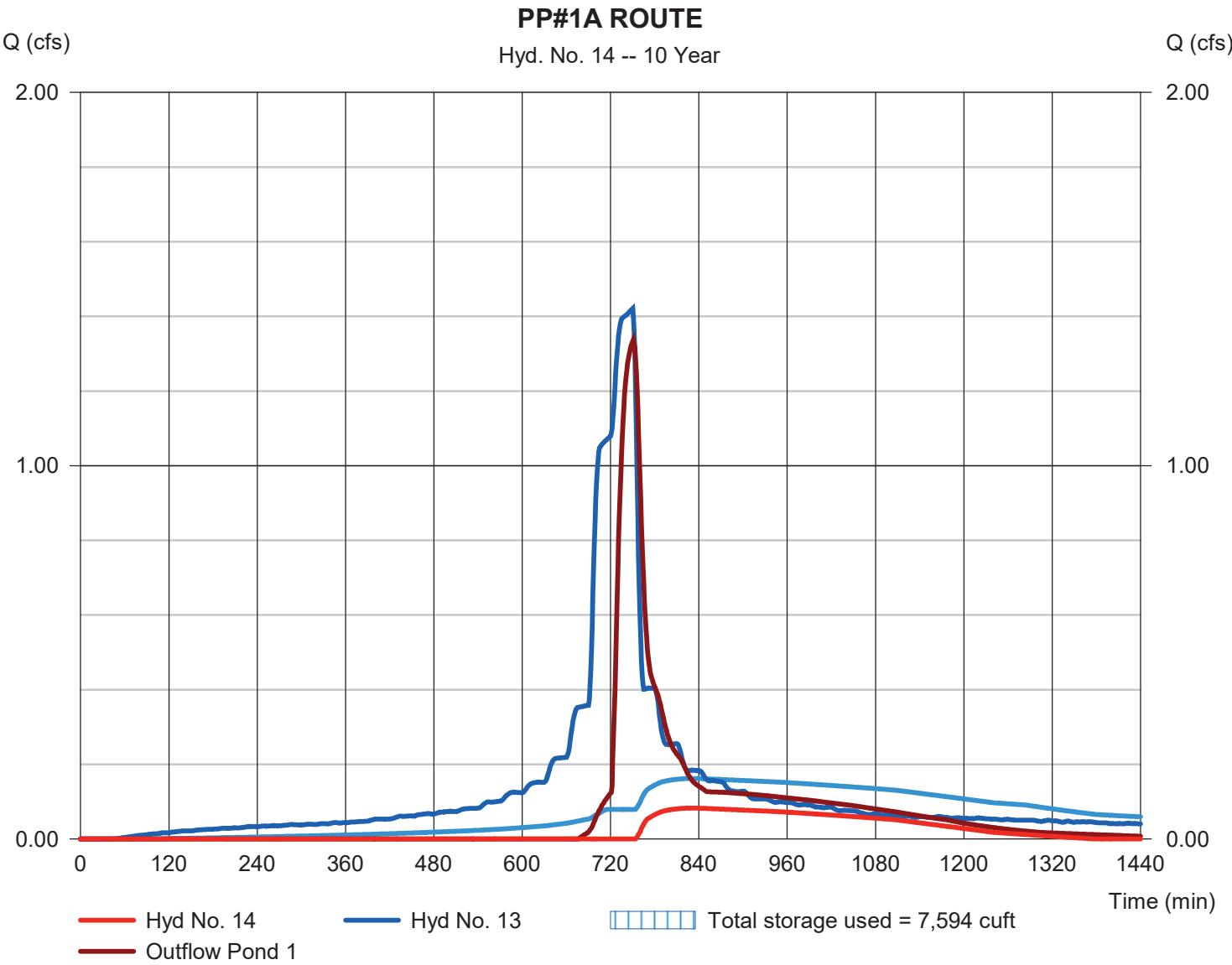
Monday, 08 / 10 / 2026

Hyd. No. 14

PP#1A ROUTE

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 0.083 cfs
Storm frequency	= 10 yrs	Time to peak	= 830 min
Time interval	= 1 min	Hyd. volume	= 1,799 cuft
Upper Pond	= PP #1	Lower Pond	= PP #2
Inflow hyd.	= 13 - PAVEMENT 1A INFLOW	Other Inflow hyd.	= None
Max. Elevation	= 470.74 ft	Max. Elevation	= 466.46 ft
Max. Storage	= 4,304 cuft	Max. Storage	= 3,290 cuft

Interconnected Pond Routing. Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

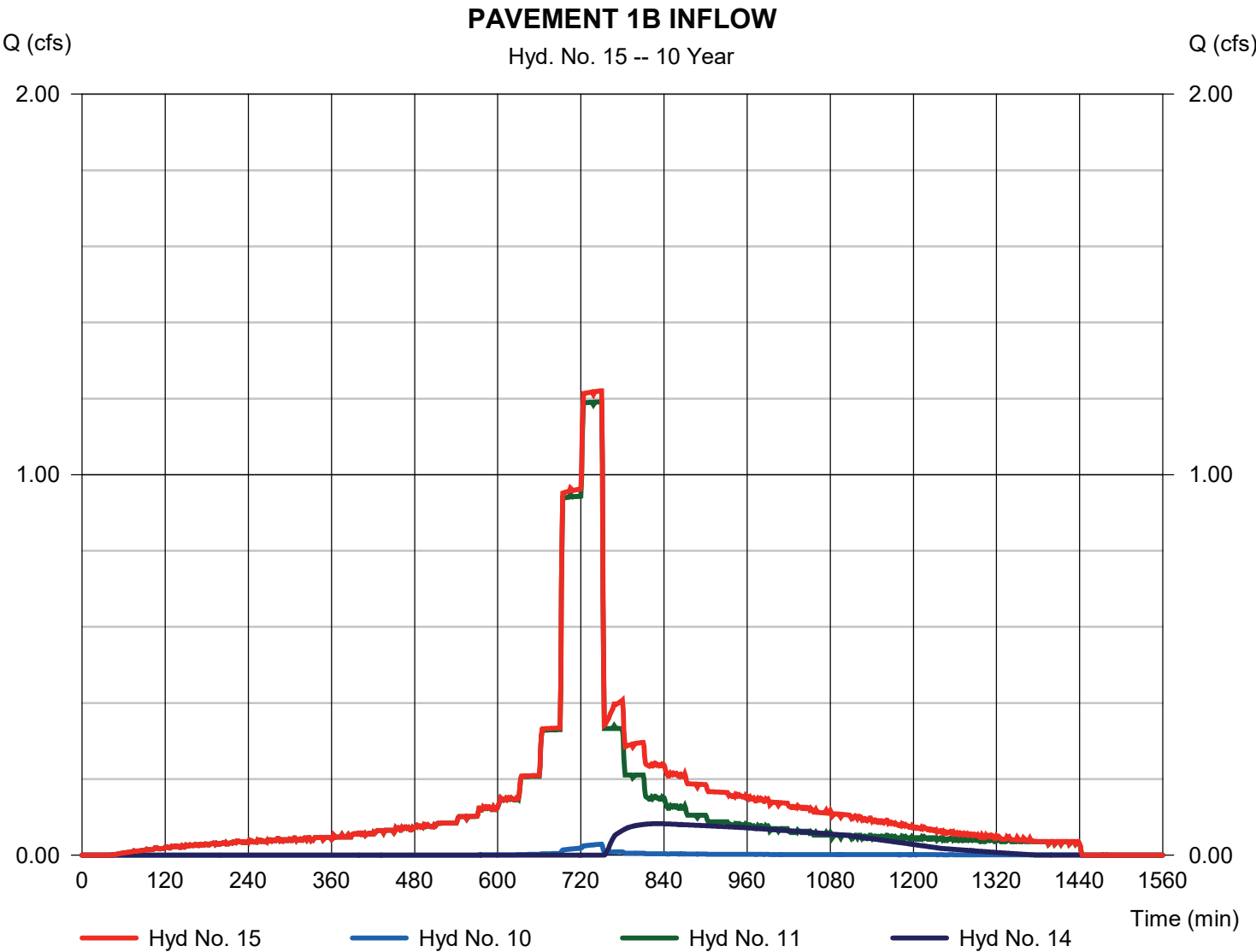
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 15

PAVEMENT 1B INFLOW

Hydrograph type	= Combine	Peak discharge	= 1.221 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 12,062 cuft
Inflow hyds.	= 10, 11, 14	Contrib. drain. area	= 0.596 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

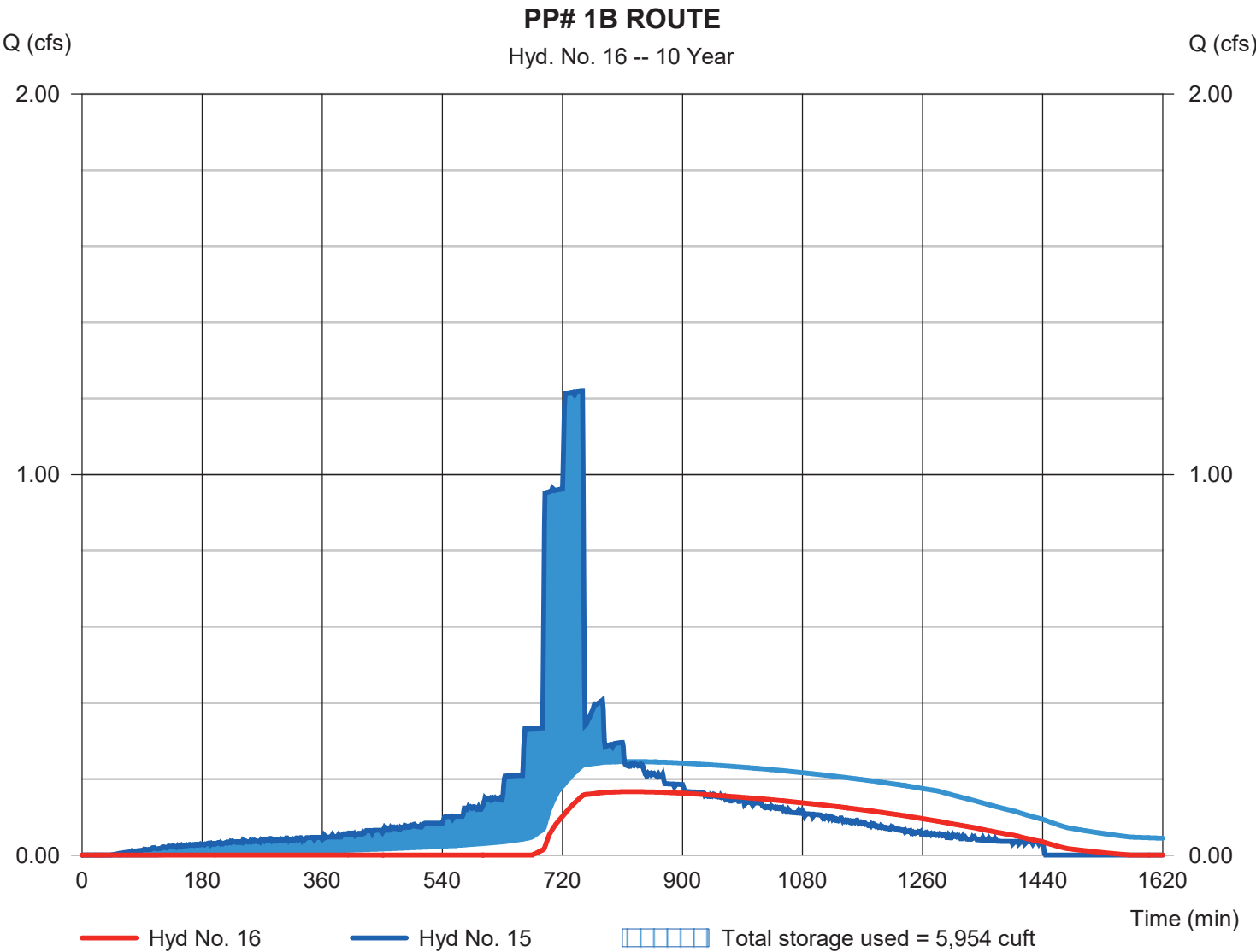
Monday, 08 / 10 / 2026

Hyd. No. 16

PP# 1B ROUTE

Hydrograph type	= Reservoir	Peak discharge	= 0.167 cfs
Storm frequency	= 10 yrs	Time to peak	= 813 min
Time interval	= 1 min	Hyd. volume	= 5,576 cuft
Inflow hyd. No.	= 15 - PAVEMENT 1B INFLOW	Max. Elevation	= 467.24 ft
Reservoir name	= PP #2	Max. Storage	= 5,954 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

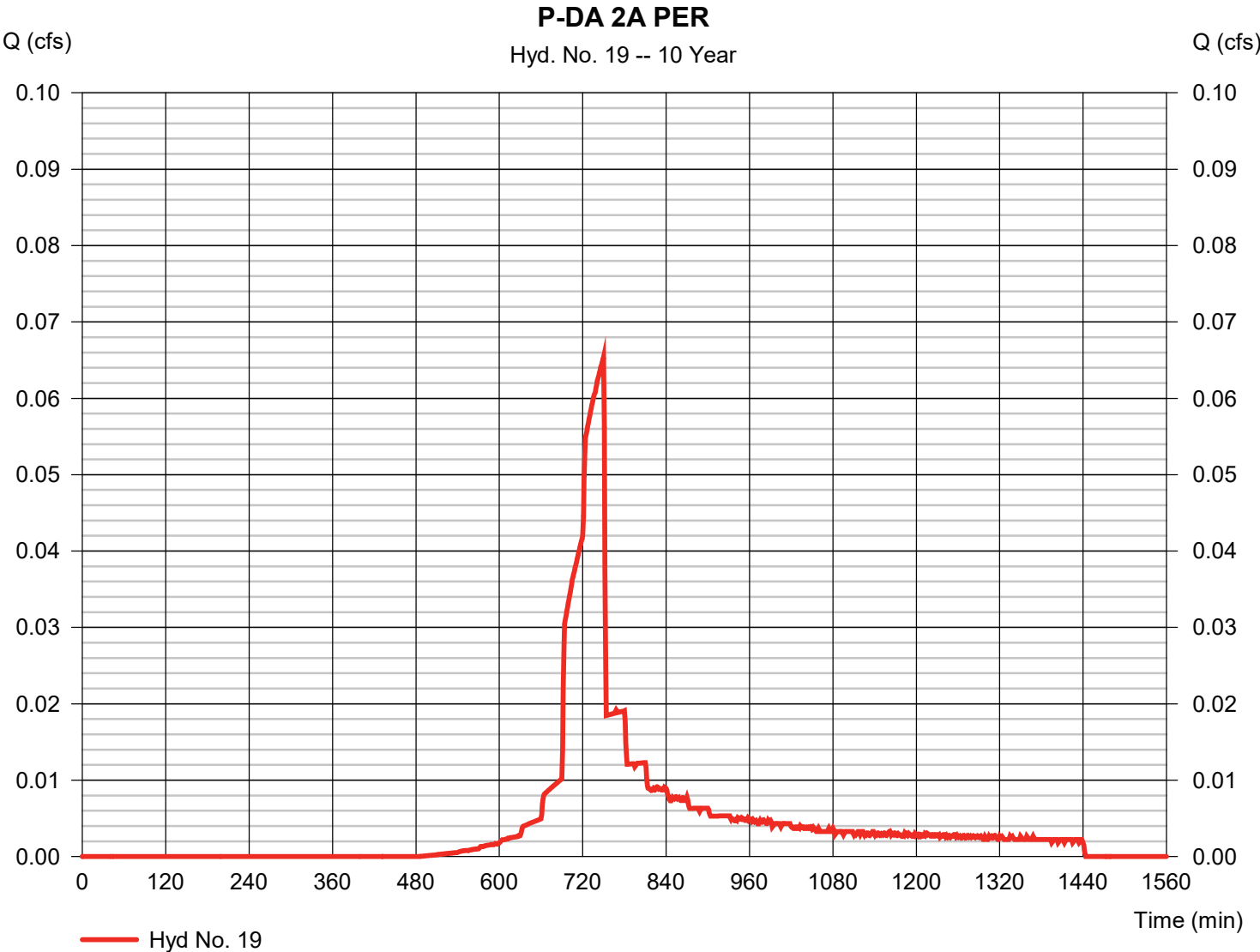
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 19

P-DA 2A PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.065 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 409 cuft
Drainage area	= 0.045 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 5.38 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

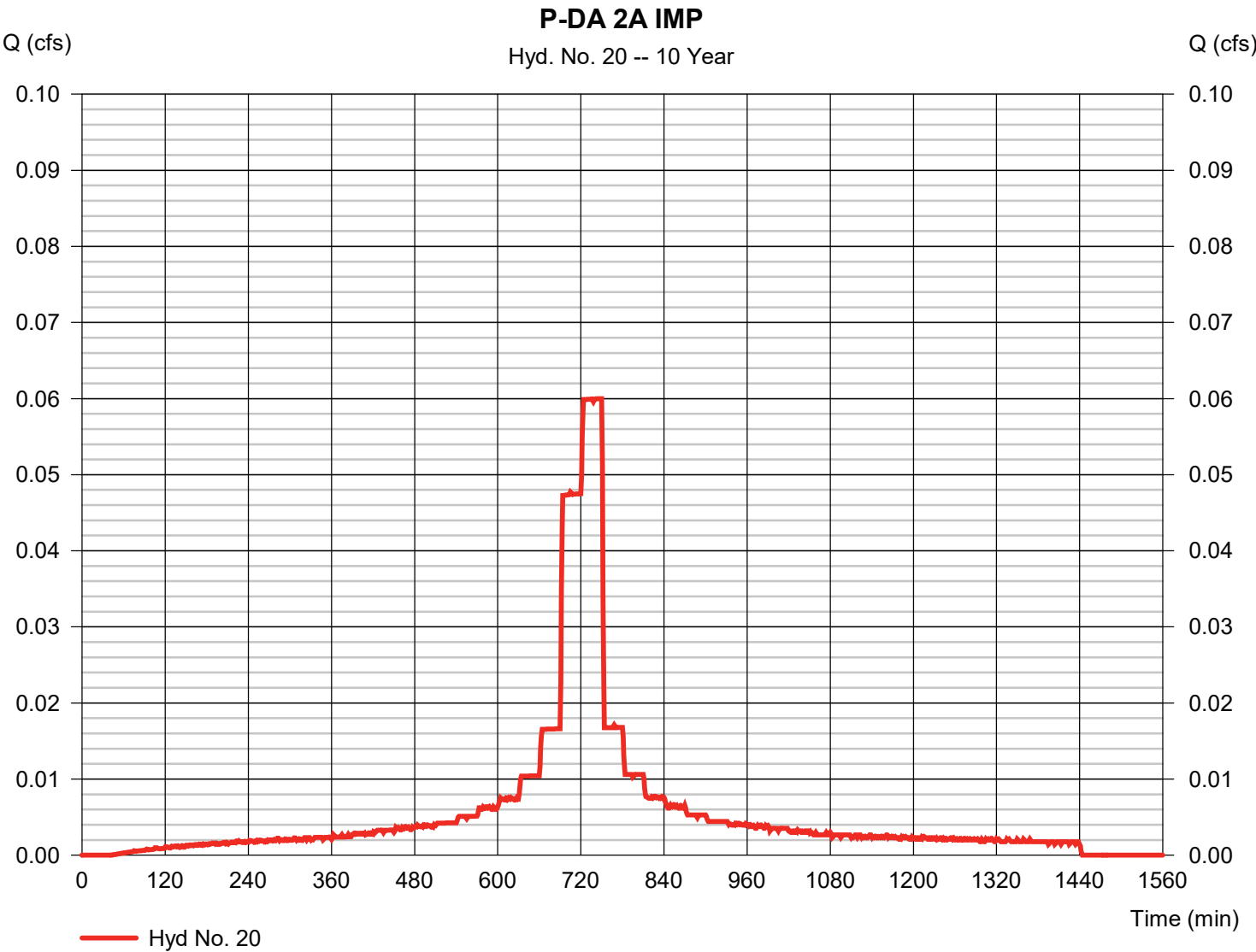
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 20

P-DA 2A IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.060 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 508 cuft
Drainage area	= 0.029 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 5.38 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

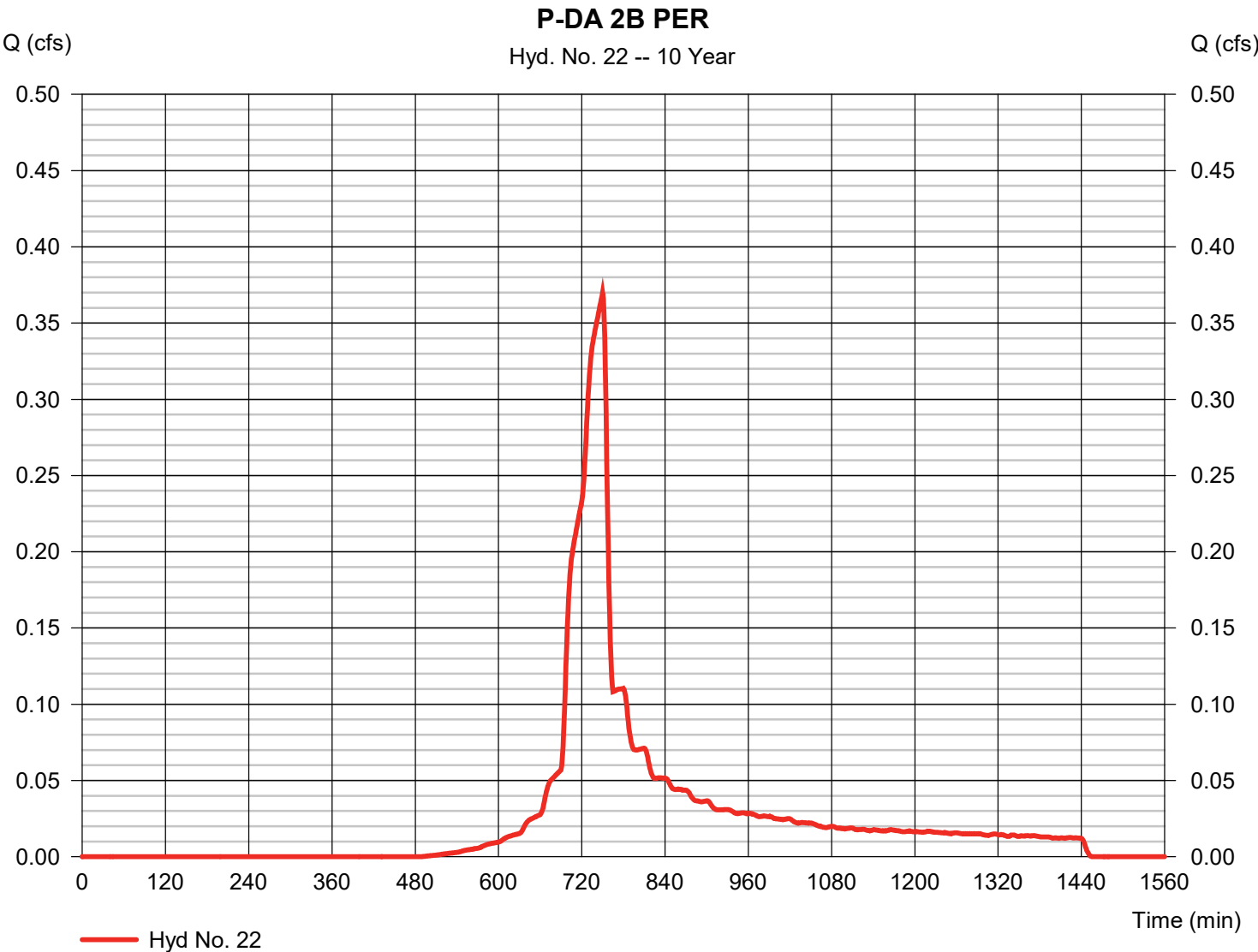
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 22

P-DA 2B PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.370 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 2,375 cuft
Drainage area	= 0.245 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 8.70 min
Total precip.	= 5.38 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

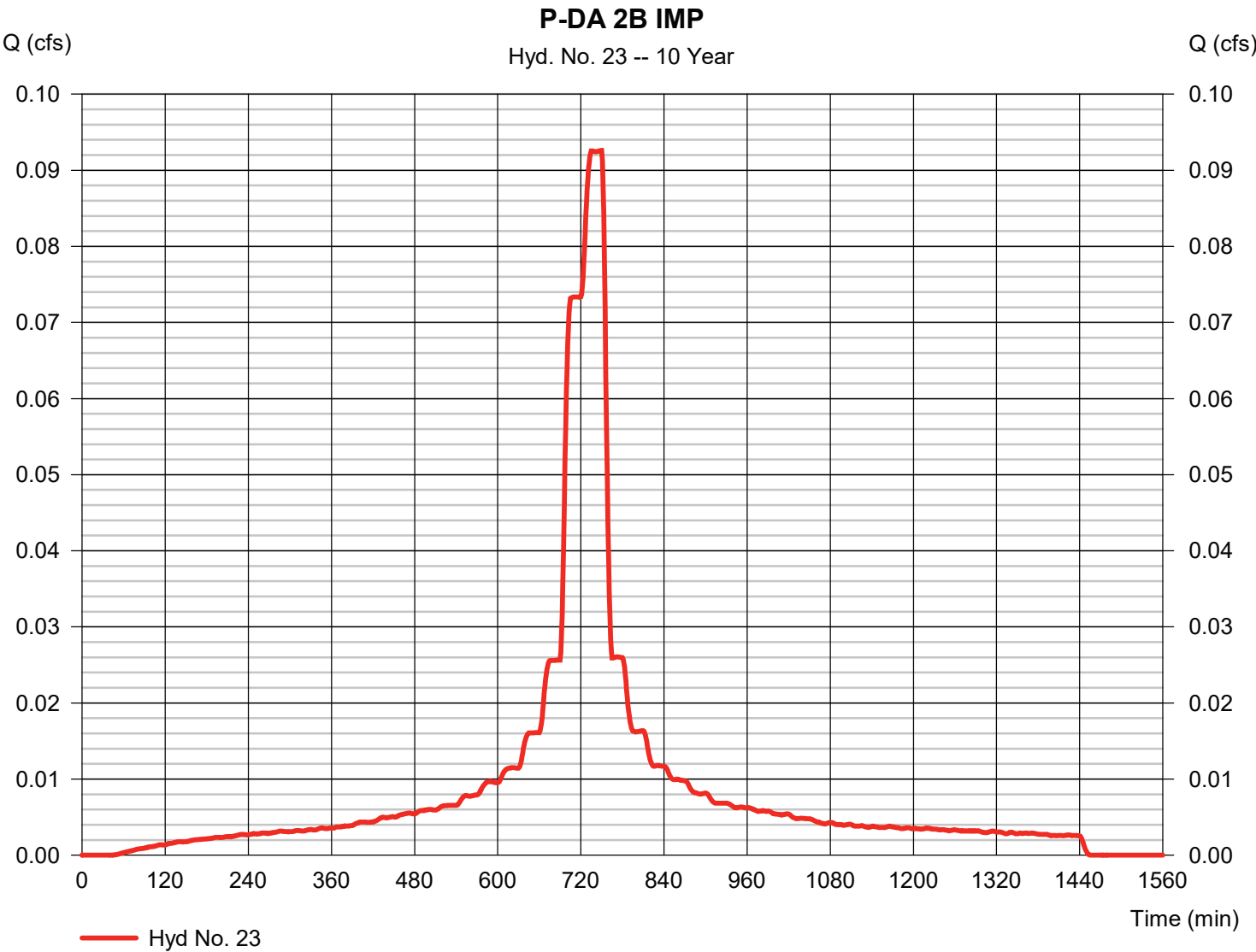
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 23

P-DA 2B IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.093 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 784 cuft
Drainage area	= 0.042 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 8.70 min
Total precip.	= 5.38 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

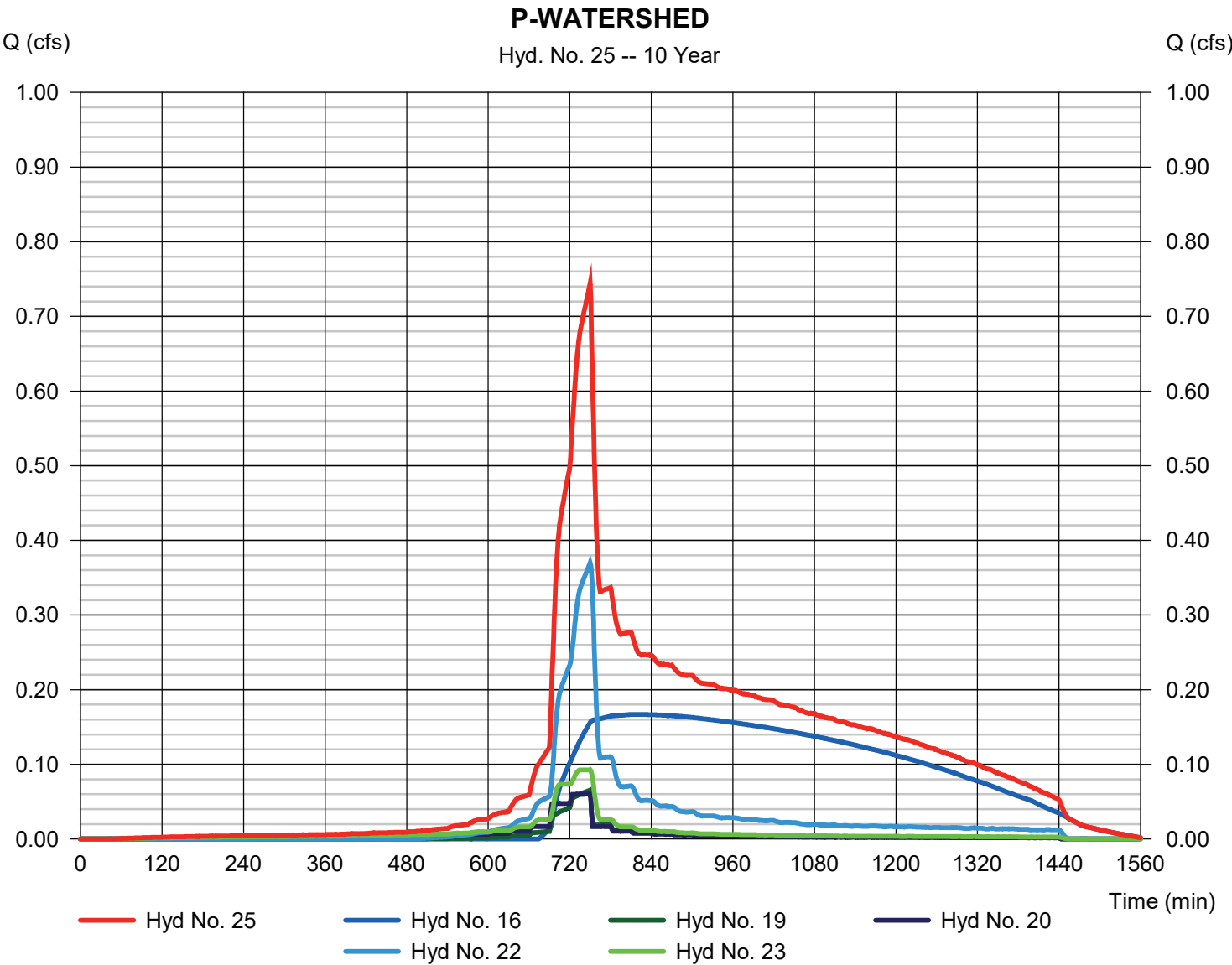
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 25

P-WATERSHED

Hydrograph type	= Combine	Peak discharge	= 0.744 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 9,652 cuft
Inflow hyds.	= 16, 19, 20, 22, 23	Contrib. drain. area	= 0.361 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

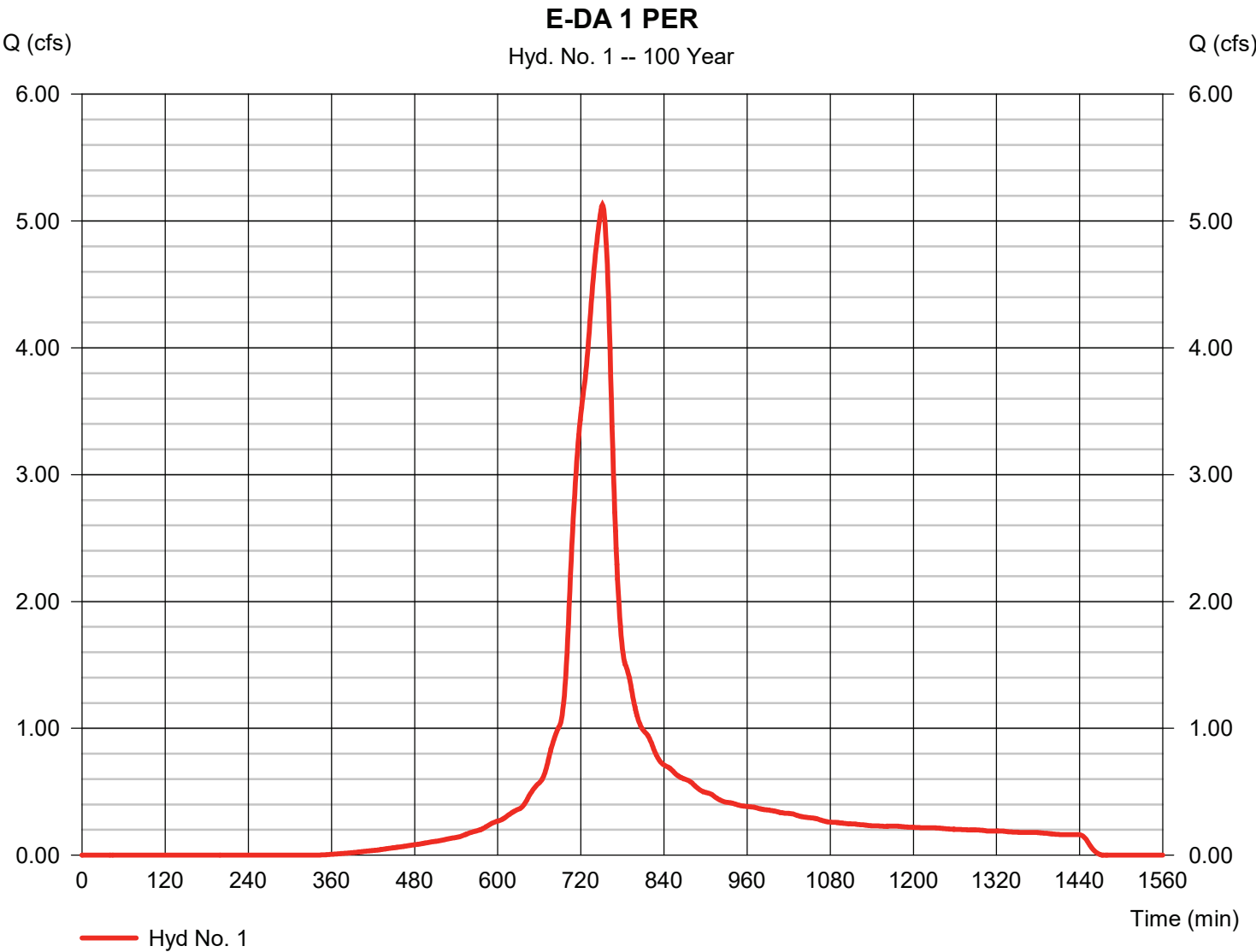
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	5.127	1	751	36,574	-----	-----	-----	E-DA 1 PER
2	SCS Runoff	0.023	1	750	197	-----	-----	-----	E-DA 1 IMP
4	Combine	5.150	1	751	36,771	1, 2,	-----	-----	E-WATERSHED
7	SCS Runoff	0.599	1	750	4,137	-----	-----	-----	P-DA 1A PER
8	SCS Runoff	1.950	1	750	16,787	-----	-----	-----	P-DA 1A IMP
10	SCS Runoff	0.060	1	750	410	-----	-----	-----	P-DA 1B PER
11	SCS Runoff	2.046	1	750	17,602	-----	-----	-----	P-DA 1B IMP
13	Combine	2.549	1	750	20,924	7, 8,	-----	-----	PAVEMENT 1A INFLOW
14	Reservoir(i)	0.333	1	813	8,451	13	470.88	13,325	PP#1A ROUTE
15	Combine	2.283	1	750	26,463	10, 11, 14	-----	-----	PAVEMENT 1B INFLOW
16	Reservoir	1.530	1	752	17,388	15	468.25	9,429	PP# 1B ROUTE
19	SCS Runoff	0.136	1	750	923	-----	-----	-----	P-DA 2A PER
20	SCS Runoff	0.103	1	750	886	-----	-----	-----	P-DA 2A IMP
22	SCS Runoff	0.776	1	750	5,363	-----	-----	-----	P-DA 2B PER
23	SCS Runoff	0.159	1	750	1,369	-----	-----	-----	P-DA 2B IMP
25	Combine	2.649	1	751	25,929	16, 19, 20, 22, 23,	-----	-----	P-WATERSHED

Hydrograph Report

Hyd. No. 1

E-DA 1 PER

Hydrograph type	= SCS Runoff	Peak discharge	= 5.127 cfs
Storm frequency	= 100 yrs	Time to peak	= 751 min
Time interval	= 1 min	Hyd. volume	= 36,574 cuft
Drainage area	= 1.655 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.30 min
Total precip.	= 9.22 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

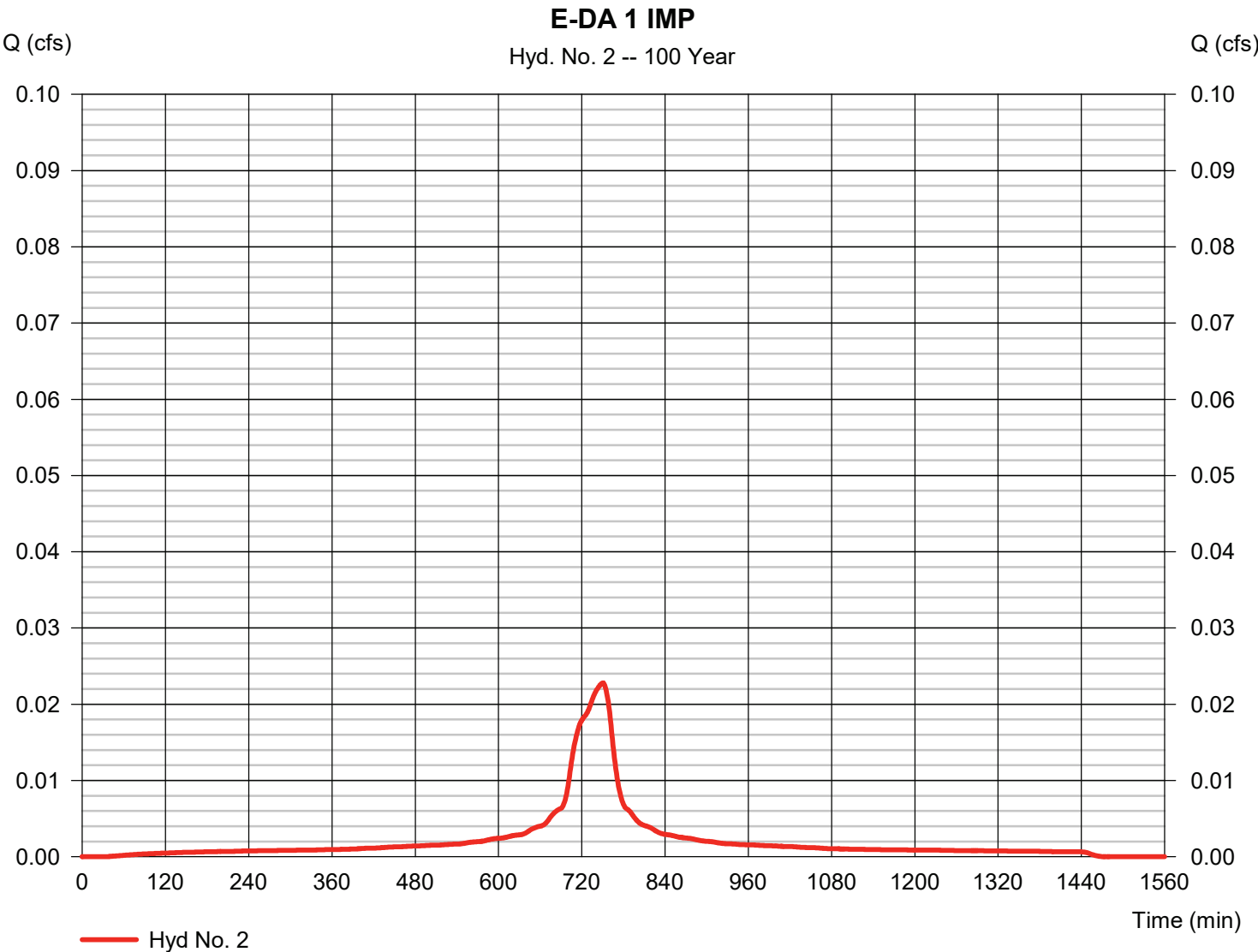
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 2

E-DA 1 IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.023 cfs
Storm frequency	= 100 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 197 cuft
Drainage area	= 0.006 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.30 min
Total precip.	= 9.22 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		

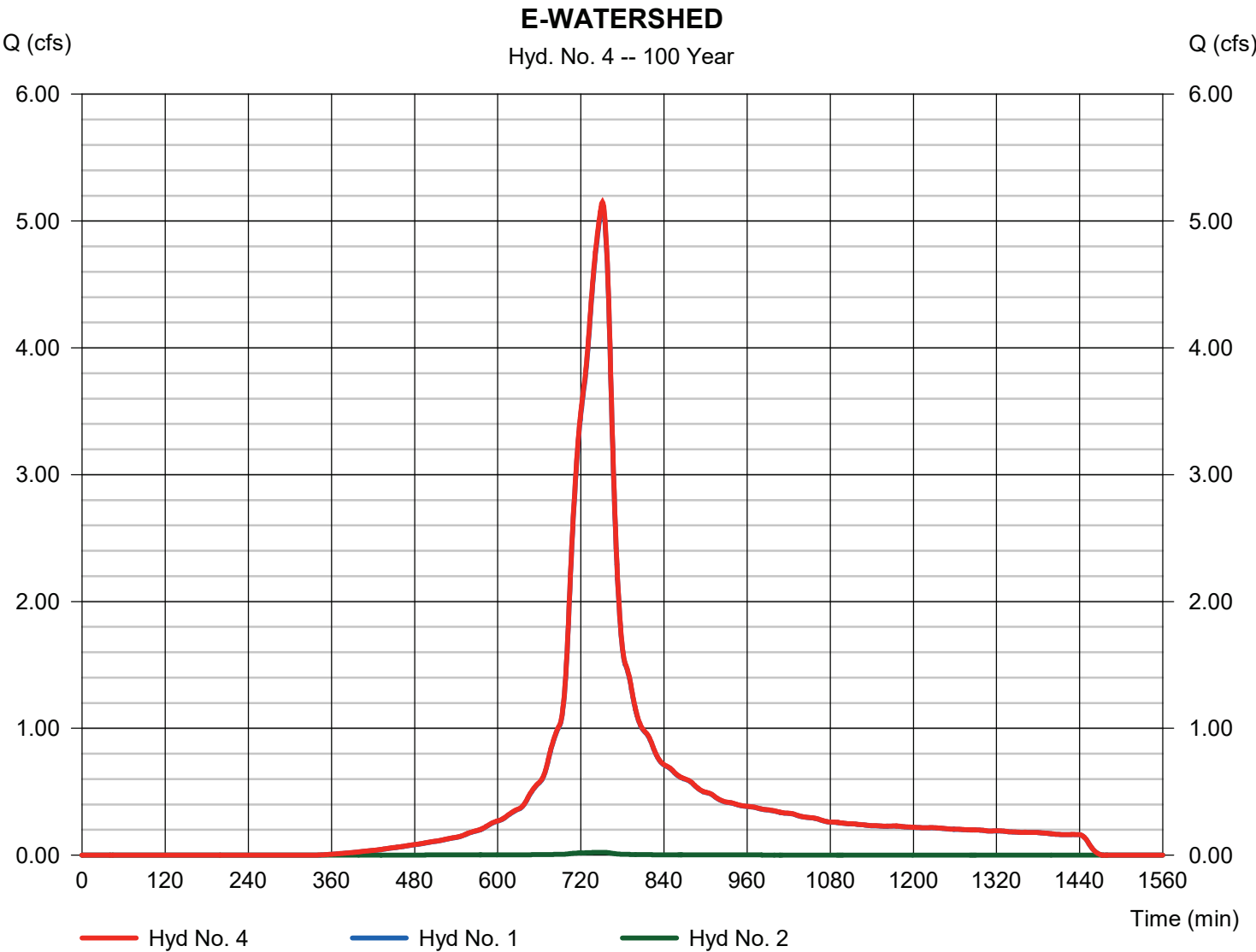


Hydrograph Report

Hyd. No. 4

E-WATERSHED

Hydrograph type	= Combine	Peak discharge	= 5.150 cfs
Storm frequency	= 100 yrs	Time to peak	= 751 min
Time interval	= 1 min	Hyd. volume	= 36,771 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 1.661 ac



Hydrograph Report

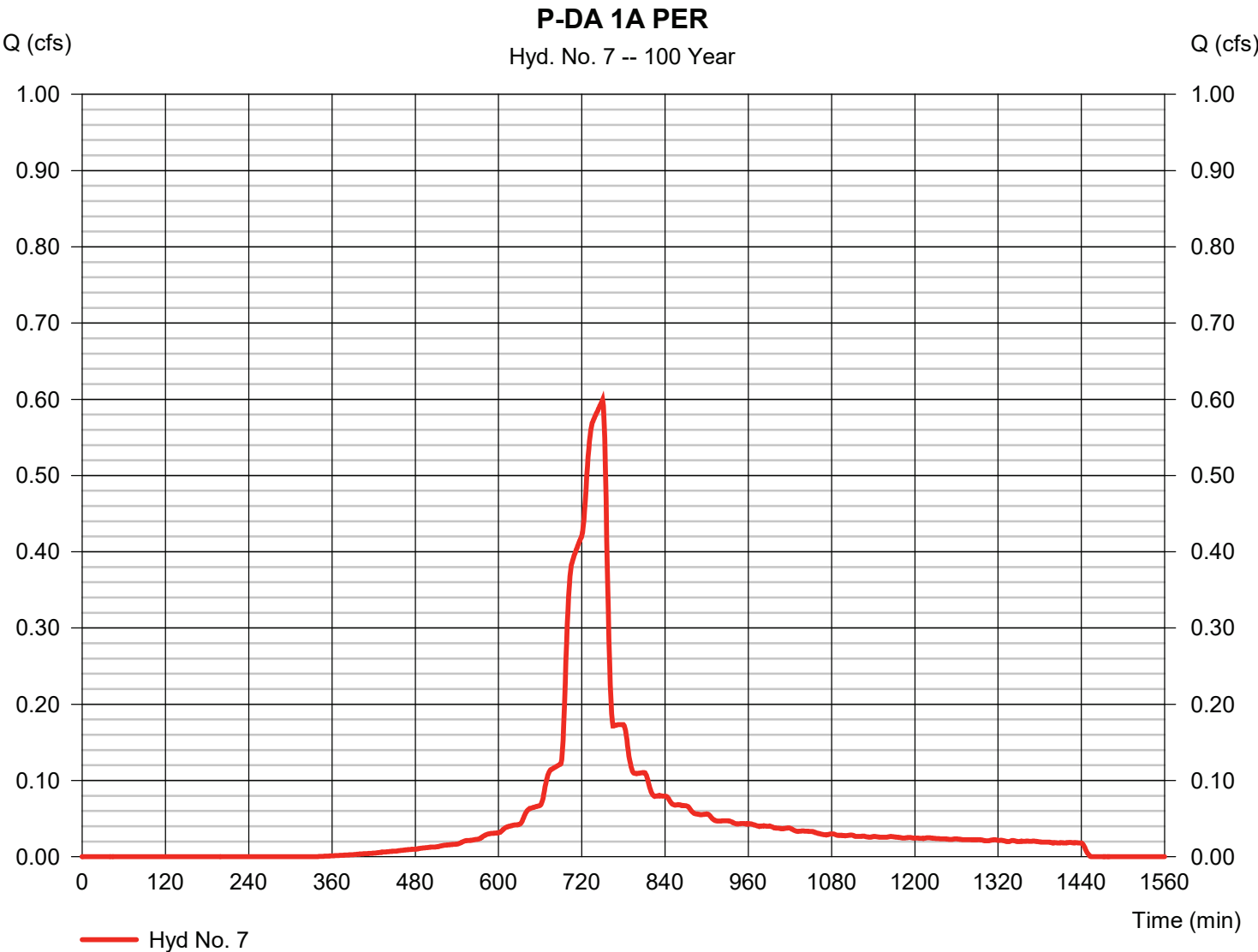
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 7

P-DA 1A PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.599 cfs
Storm frequency	= 100 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 4,137 cuft
Drainage area	= 0.189 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 9.67 min
Total precip.	= 9.22 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

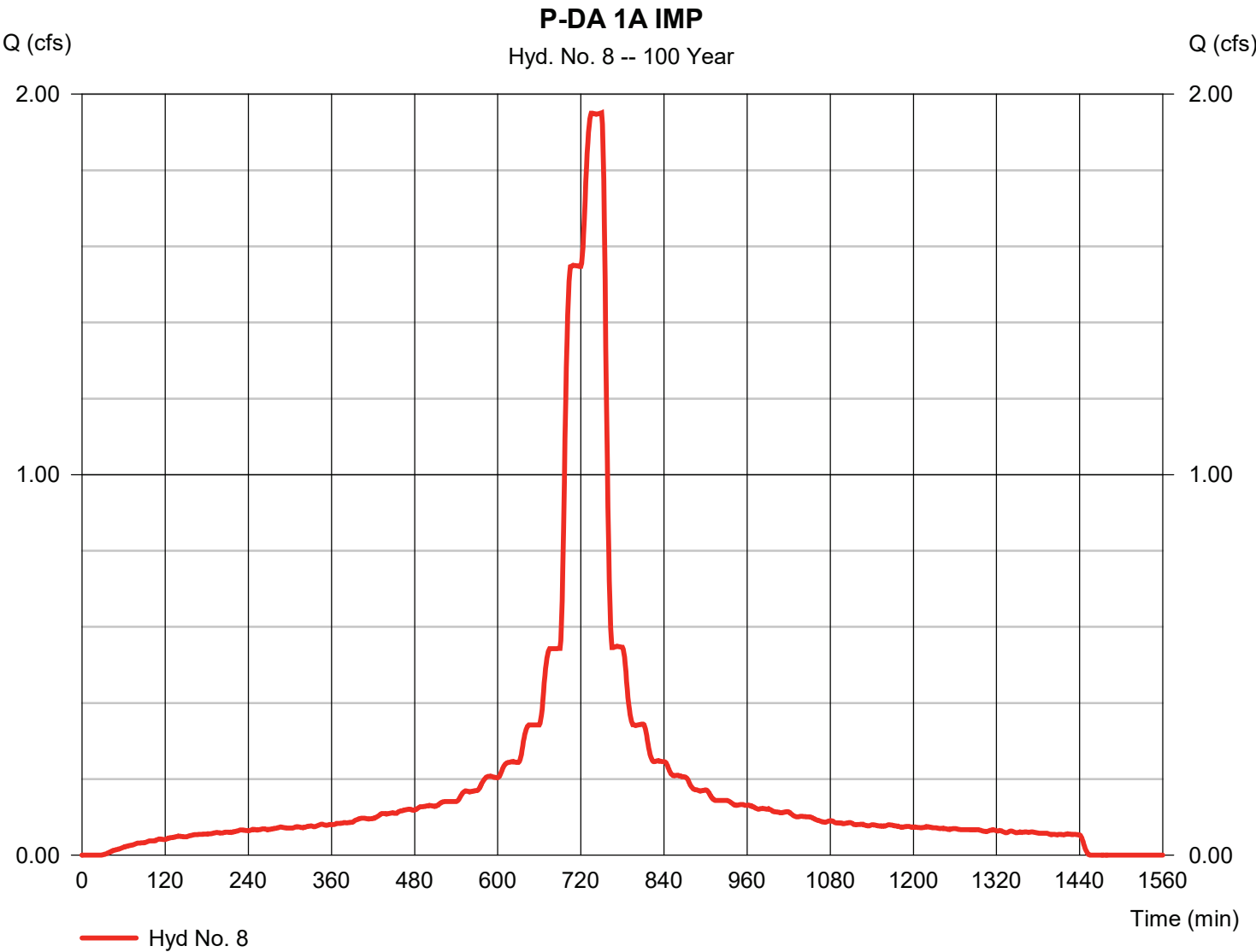
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 8

P-DA 1A IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 1.950 cfs
Storm frequency	= 100 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 16,787 cuft
Drainage area	= 0.515 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 9.67 min
Total precip.	= 9.22 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

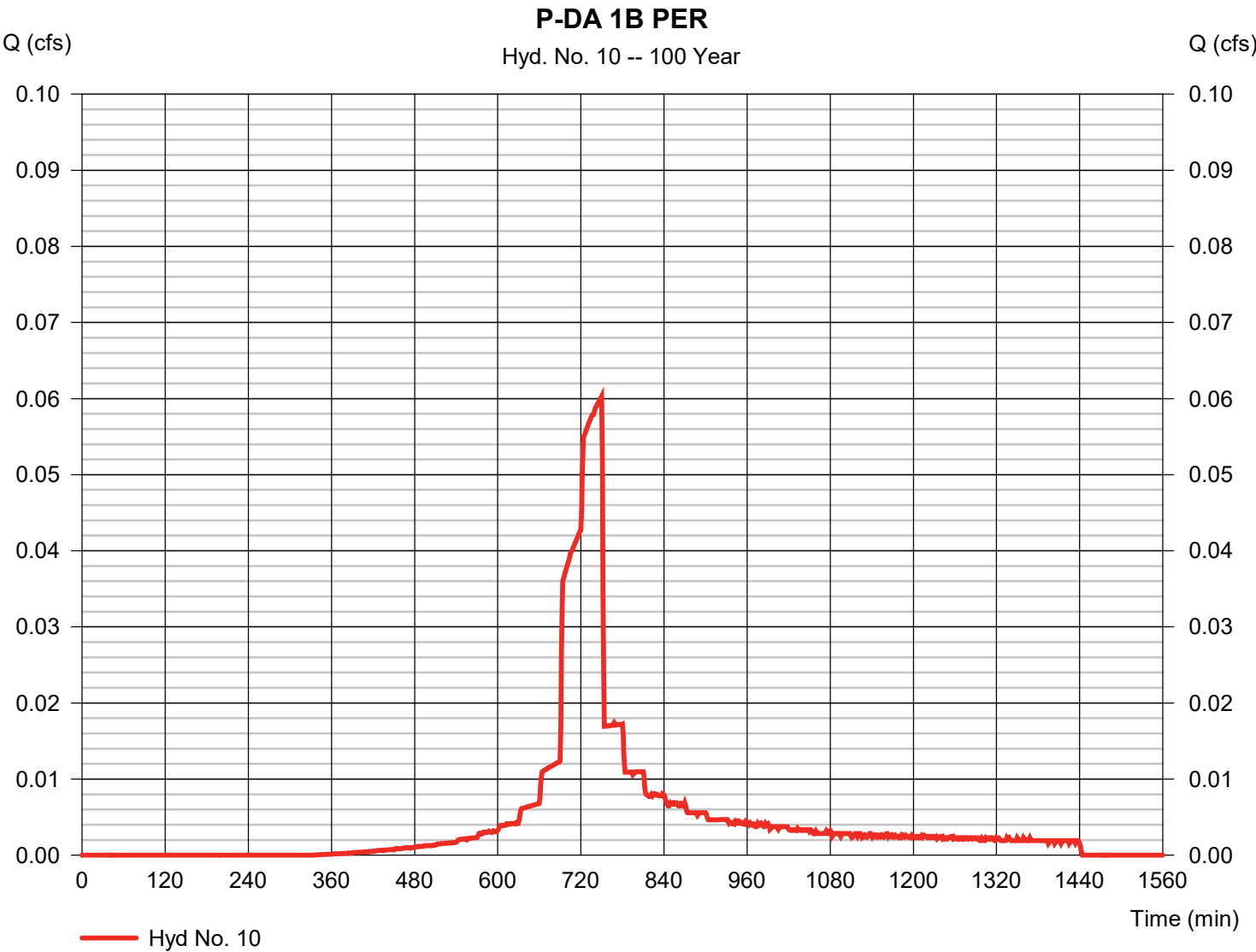
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 10

P-DA 1B PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.060 cfs
Storm frequency	= 100 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 410 cuft
Drainage area	= 0.020 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 9.22 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		

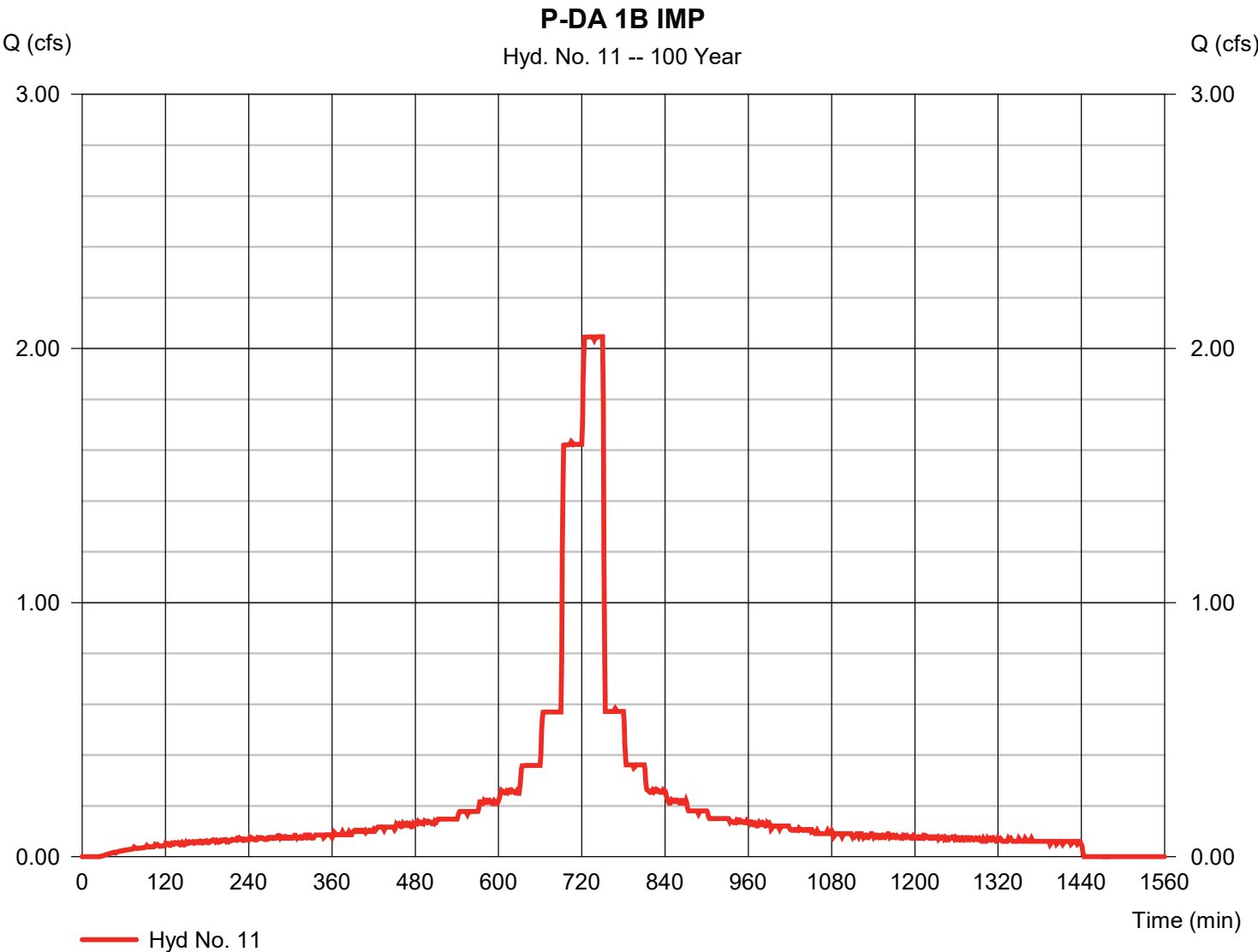


Hydrograph Report

Hyd. No. 11

P-DA 1B IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 2.046 cfs
Storm frequency	= 100 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 17,602 cuft
Drainage area	= 0.576 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 9.22 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

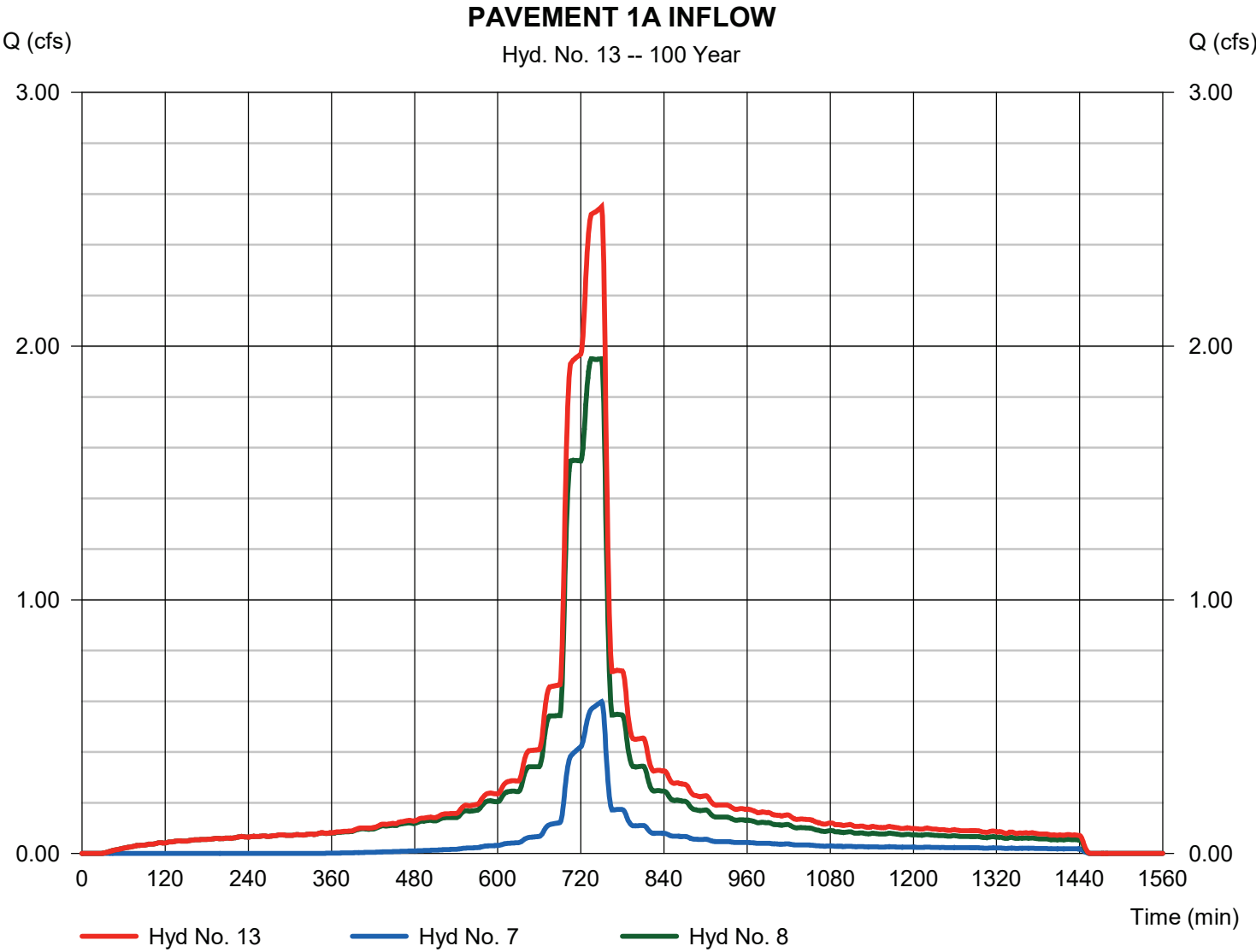
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 13

PAVEMENT 1A INFLOW

Hydrograph type	= Combine	Peak discharge	= 2.549 cfs
Storm frequency	= 100 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 20,924 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 0.704 ac



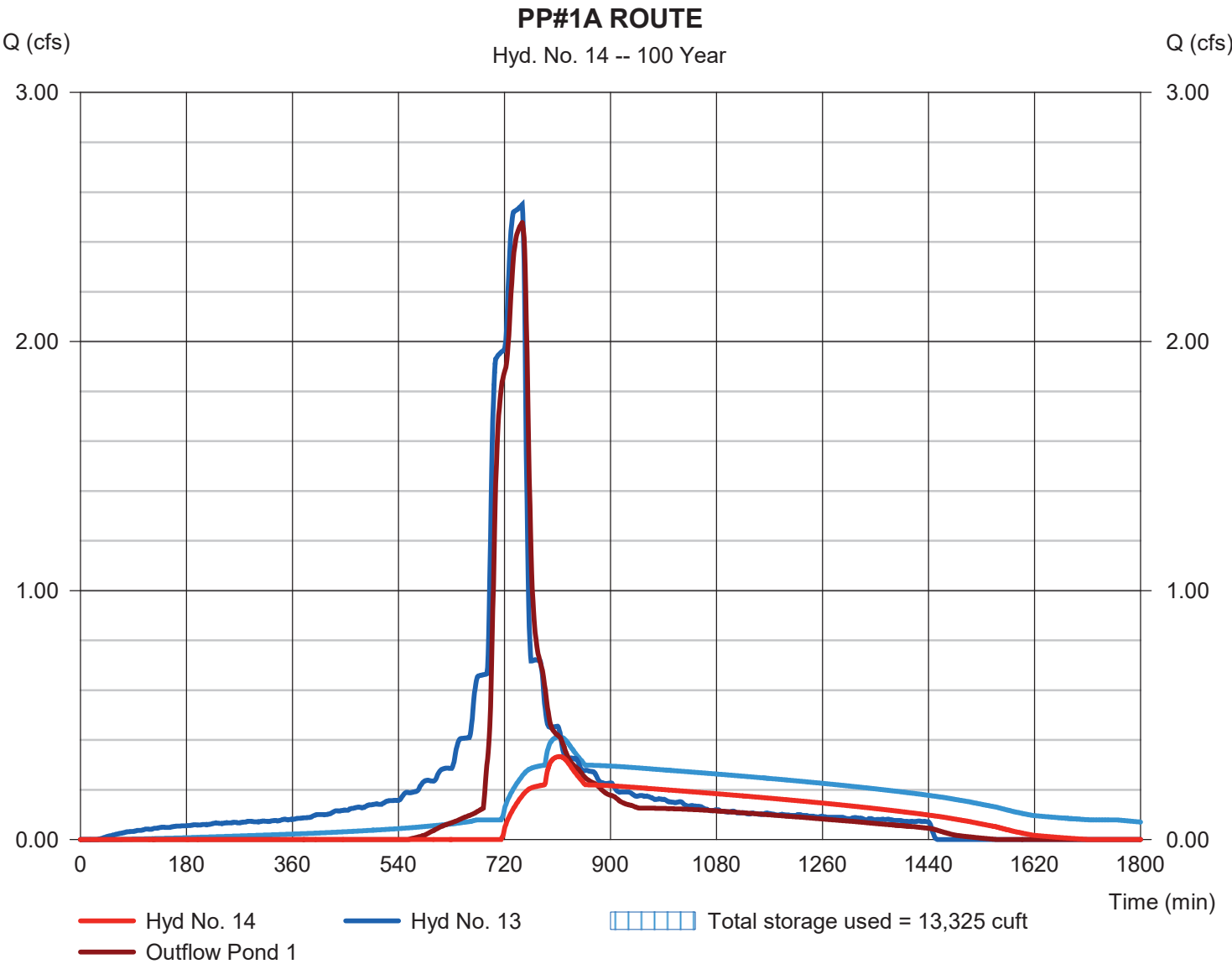
Hydrograph Report

Hyd. No. 14

PP#1A ROUTE

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 0.333 cfs
Storm frequency	= 100 yrs	Time to peak	= 813 min
Time interval	= 1 min	Hyd. volume	= 8,451 cuft
Upper Pond	= PP #1	Lower Pond	= PP #2
Inflow hyd.	= 13 - PAVEMENT 1A INFLOW	Other Inflow hyd.	= None
Max. Elevation	= 470.88 ft	Max. Elevation	= 468.04 ft
Max. Storage	= 4,644 cuft	Max. Storage	= 8,681 cuft

Interconnected Pond Routing. Storage Indication method used. Exfiltration extracted from Outflow.

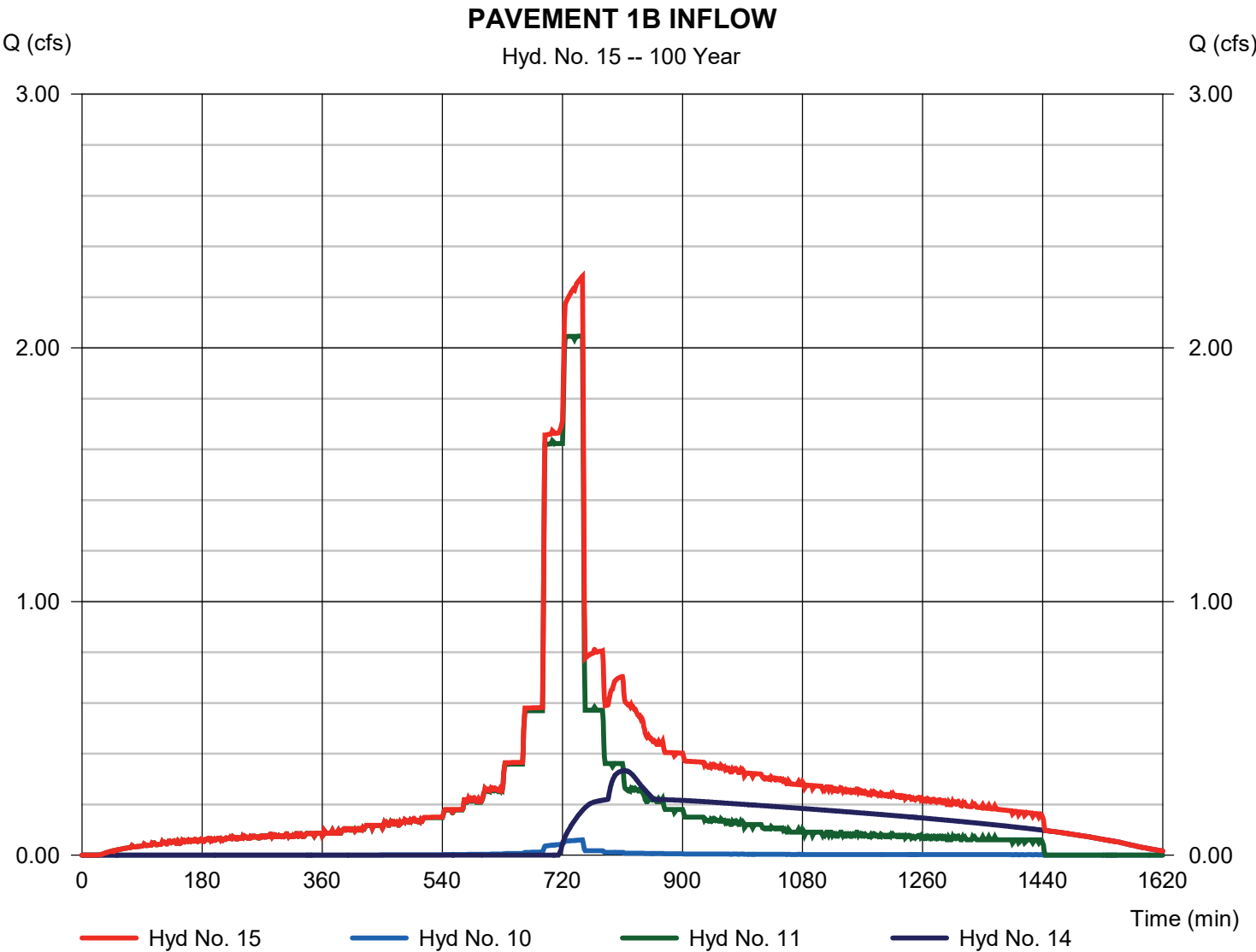


Hydrograph Report

Hyd. No. 15

PAVEMENT 1B INFLOW

Hydrograph type	= Combine	Peak discharge	= 2.283 cfs
Storm frequency	= 100 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 26,463 cuft
Inflow hyds.	= 10, 11, 14	Contrib. drain. area	= 0.596 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

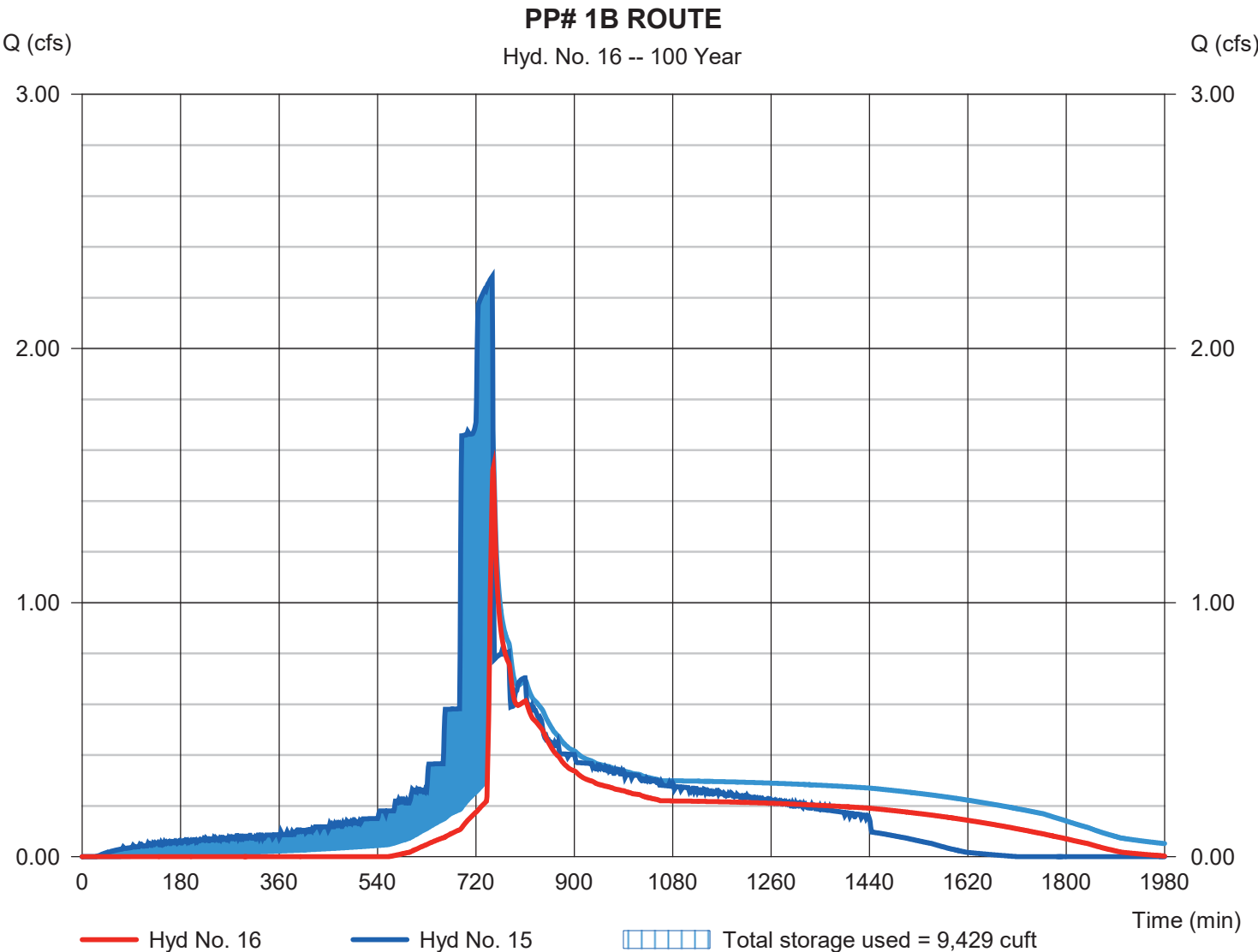
Monday, 08 / 10 / 2026

Hyd. No. 16

PP# 1B ROUTE

Hydrograph type	= Reservoir	Peak discharge	= 1.530 cfs
Storm frequency	= 100 yrs	Time to peak	= 752 min
Time interval	= 1 min	Hyd. volume	= 17,388 cuft
Inflow hyd. No.	= 15 - PAVEMENT 1B INFLOW	Max. Elevation	= 468.25 ft
Reservoir name	= PP #2	Max. Storage	= 9,429 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

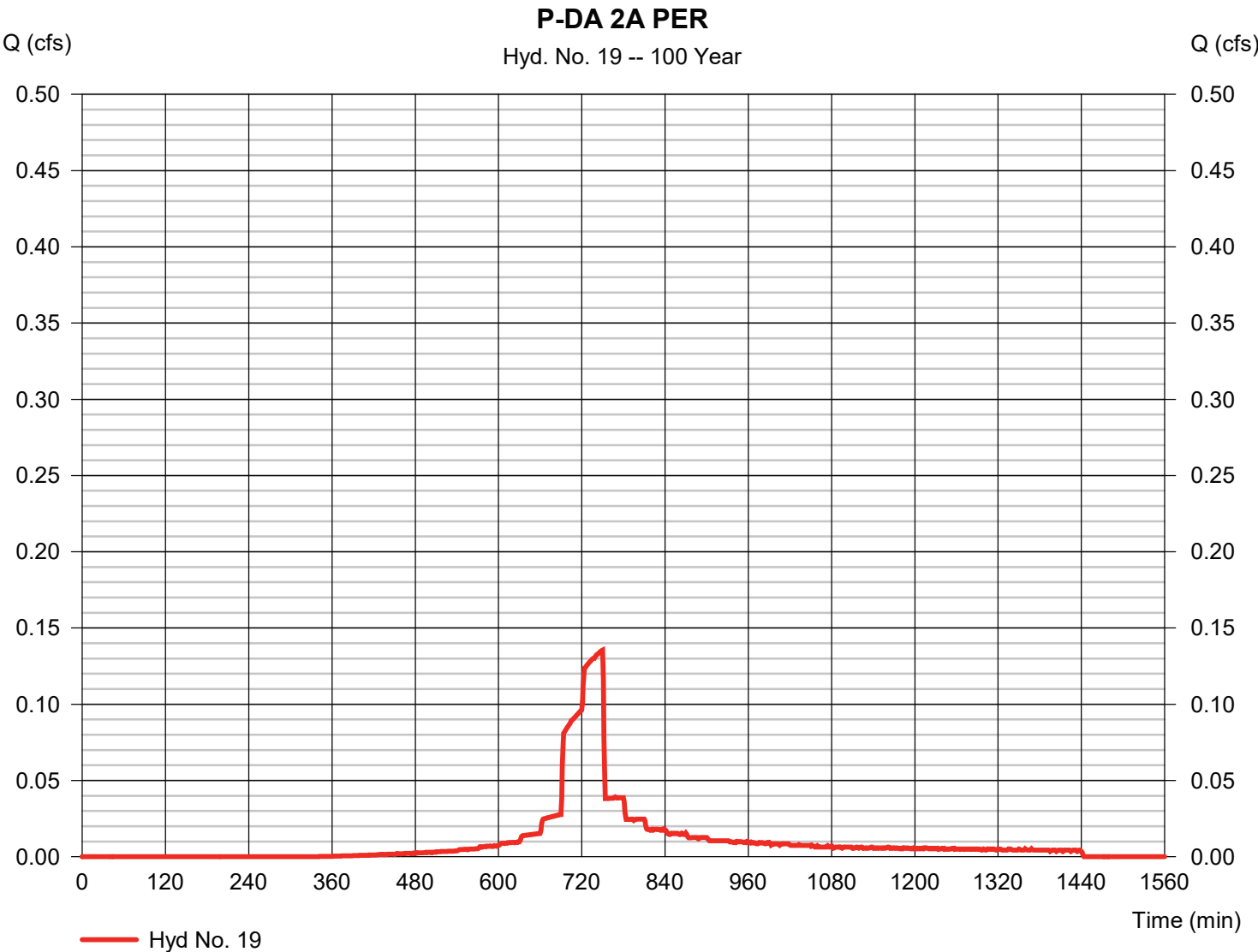
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 19

P-DA 2A PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.136 cfs
Storm frequency	= 100 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 923 cuft
Drainage area	= 0.045 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 9.22 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydroflow\NOAA_D 1 min.484		



Hydrograph Report

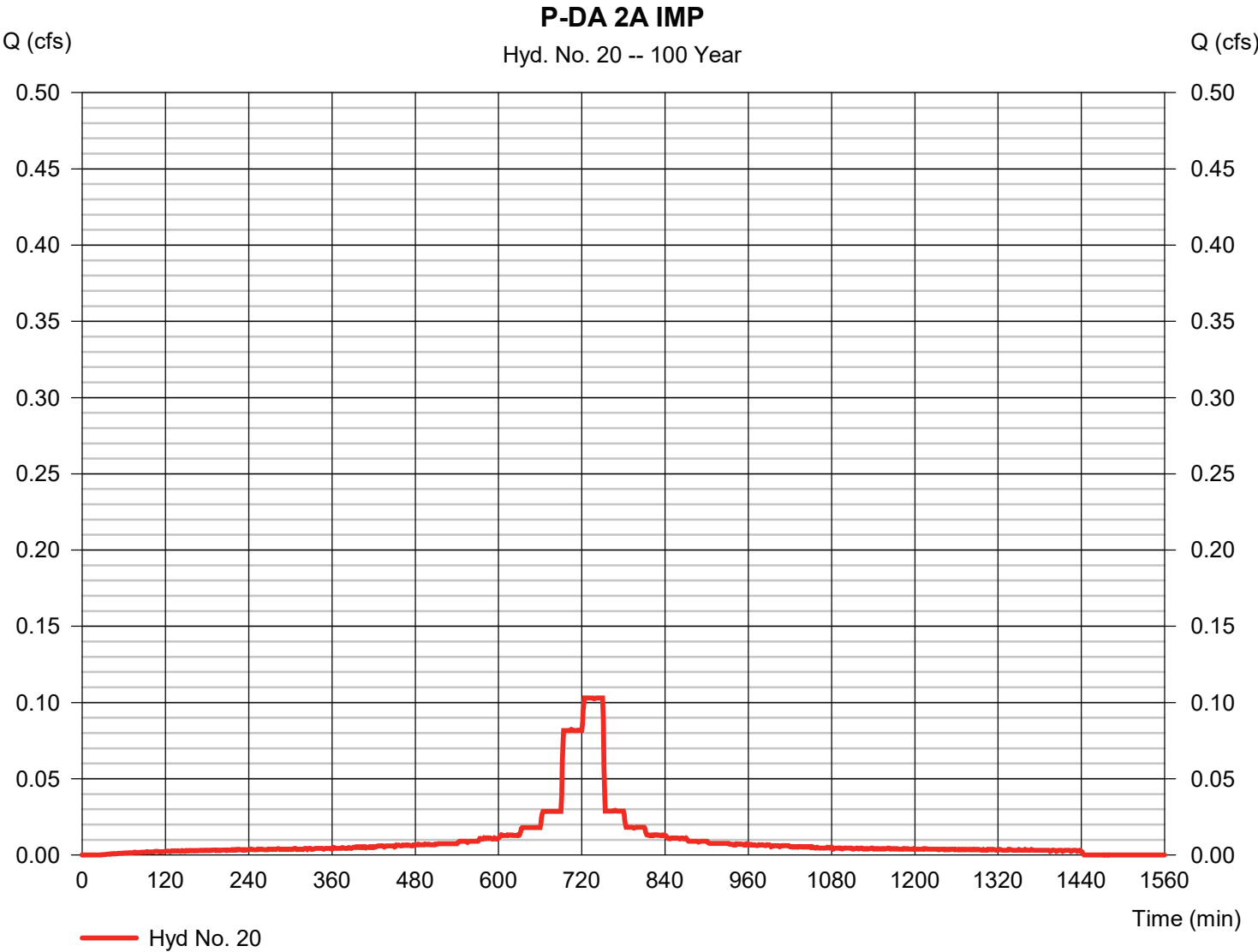
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 20

P-DA 2A IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.103 cfs
Storm frequency	= 100 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 886 cuft
Drainage area	= 0.029 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 9.22 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydroflow\NOAA_D 1 min.484		



Hydrograph Report

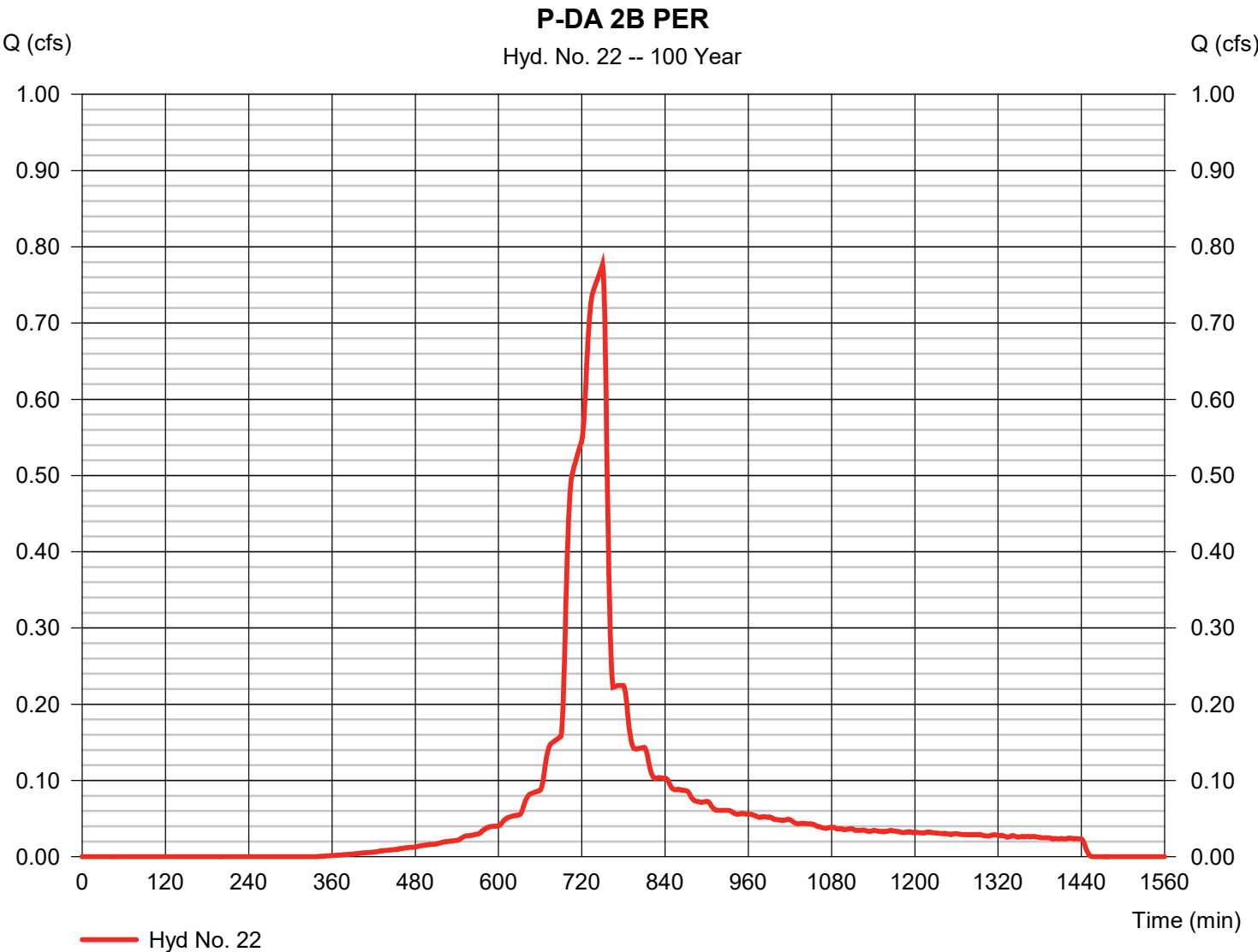
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 22

P-DA 2B PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.776 cfs
Storm frequency	= 100 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 5,363 cuft
Drainage area	= 0.245 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 8.70 min
Total precip.	= 9.22 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

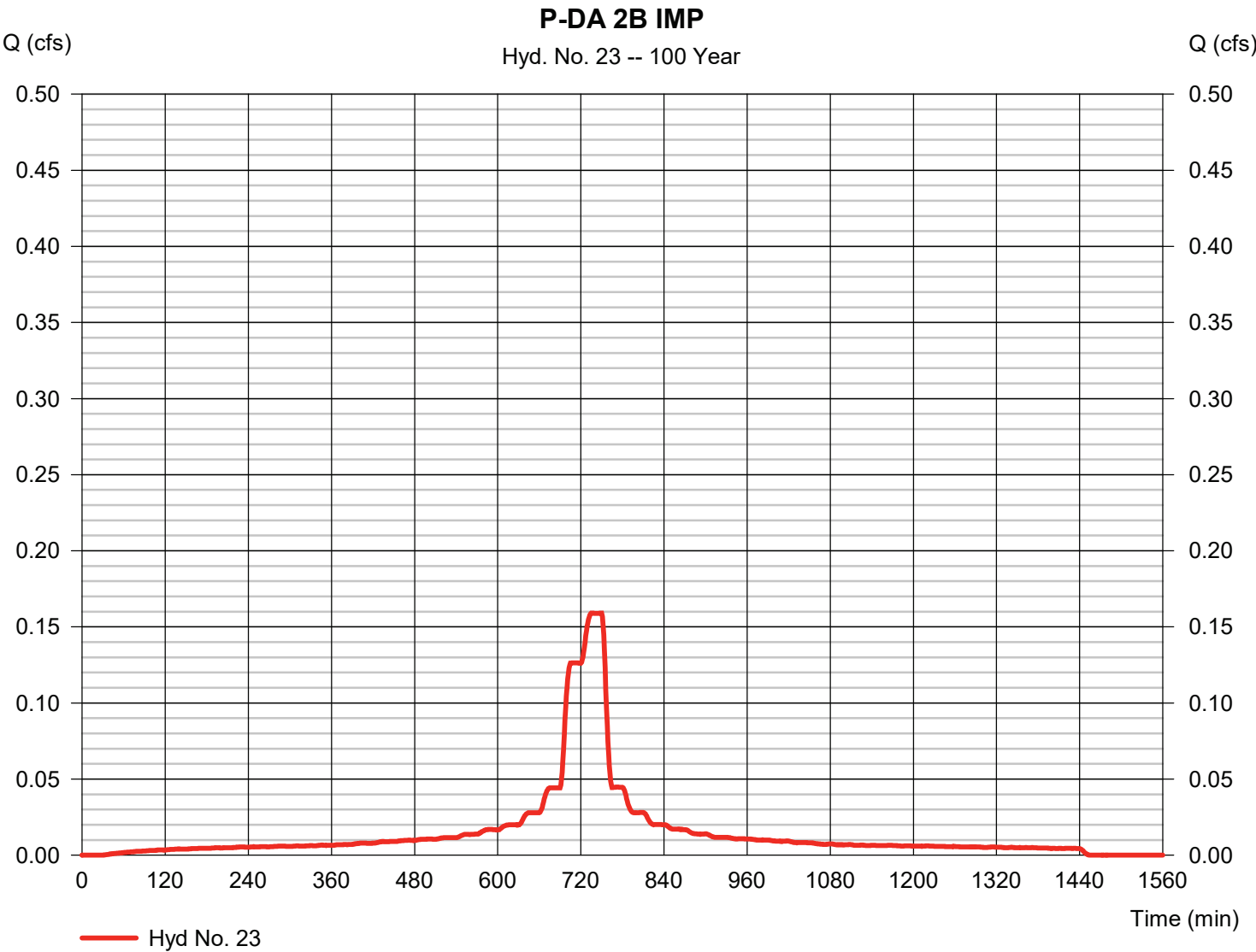
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 23

P-DA 2B IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.159 cfs
Storm frequency	= 100 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 1,369 cuft
Drainage area	= 0.042 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 8.70 min
Total precip.	= 9.22 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

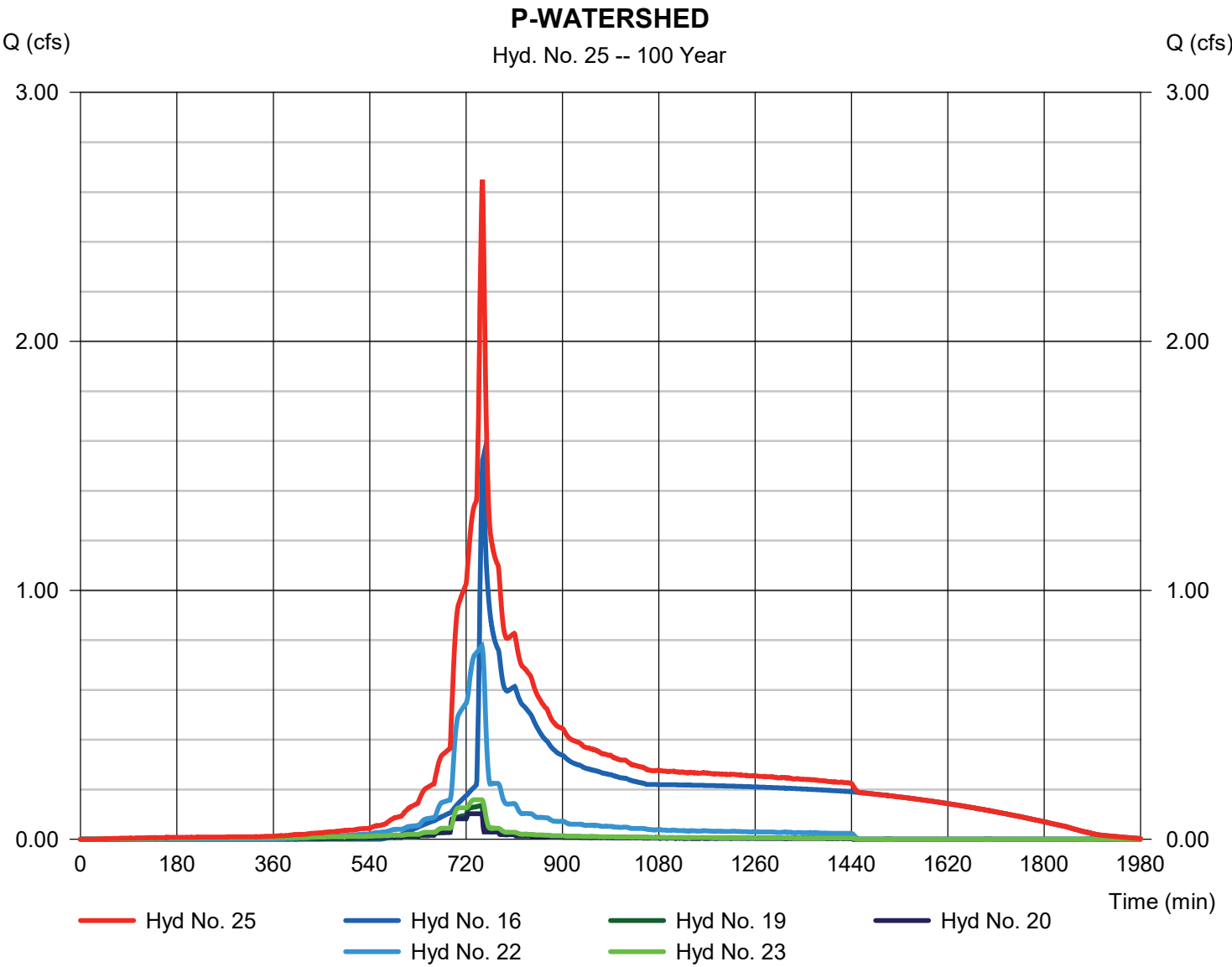
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 25

P-WATERSHED

Hydrograph type	= Combine	Peak discharge	= 2.649 cfs
Storm frequency	= 100 yrs	Time to peak	= 751 min
Time interval	= 1 min	Hyd. volume	= 25,929 cuft
Inflow hyds.	= 16, 19, 20, 22, 23	Contrib. drain. area	= 0.361 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	-----
2	58.9762	12.5000	0.8783	-----
3	0.0000	0.0000	0.0000	-----
5	0.0000	0.0000	0.0000	-----
10	62.0328	12.1000	0.8064	-----
25	0.0000	0.0000	0.0000	-----
50	49.0087	9.1000	0.6960	-----
100	45.9676	8.8000	0.6580	-----

File name: 175 S 10TH ST.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	4.77	3.83	3.21	2.77	2.44	2.19	1.99	1.82	1.68	1.56	1.46	1.37
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	6.29	5.11	4.34	3.78	3.37	3.04	2.78	2.56	2.38	2.22	2.09	1.97
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	7.77	6.29	5.35	4.69	4.20	3.82	3.51	3.26	3.05	2.87	2.71	2.57
100	8.17	6.67	5.71	5.04	4.53	4.14	3.82	3.56	3.34	3.15	2.98	2.84

Tc = time in minutes. Values may exceed 60.

e: M:\Projects\A&E Services\Thatcher Duncan\611 Front Street\8.0 Reports\8.2 Stormwater Management\Plainfield.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.43	0.00	0.00	5.21	0.00	0.00	8.68
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	1.25	3.47	0.00	0.00	5.38	0.00	0.00	9.22

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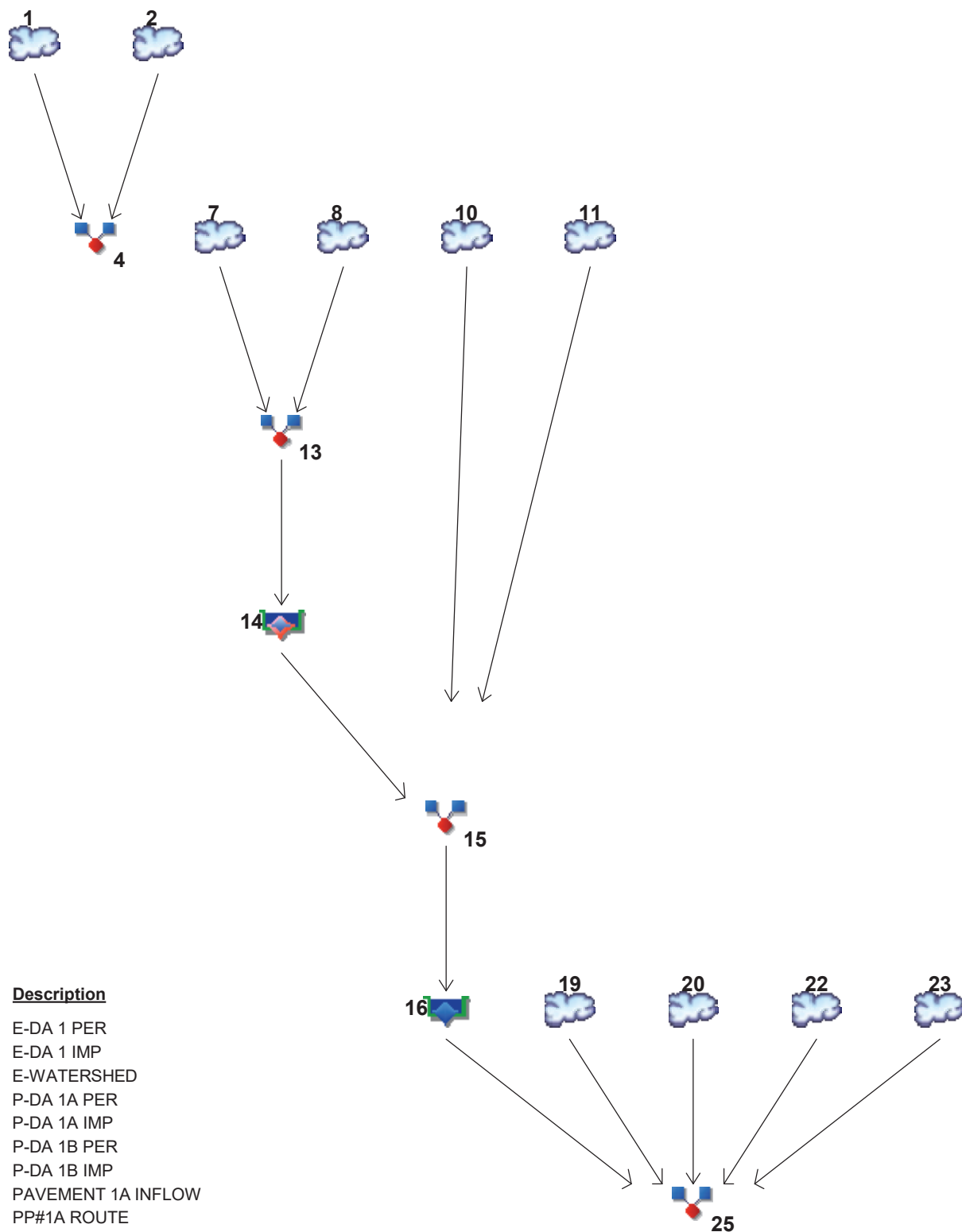
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Appendix G: Future Rainfall Hydrographs

Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024



Legend

Hyd.	Origin	Description
1	SCS Runoff	E-DA 1 PER
2	SCS Runoff	E-DA 1 IMP
4	Combine	E-WATERSHED
7	SCS Runoff	P-DA 1A PER
8	SCS Runoff	P-DA 1A IMP
10	SCS Runoff	P-DA 1B PER
11	SCS Runoff	P-DA 1B IMP
13	Combine	PAVEMENT 1A INFLOW
14	Reservoir(i)	PP#1A ROUTE
15	Combine	PAVEMENT 1B INFLOW
16	Reservoir	PP# 1B ROUTE
19	SCS Runoff	P-DA 2A PER
20	SCS Runoff	P-DA 2A IMP
22	SCS Runoff	P-DA 2B PER
23	SCS Runoff	P-DA 2B IMP
25	Combine	P-WATERSHED

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

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	-----	-----	1.510	-----	-----	3.075	-----	-----	6.800	E-DA 1 PER
2	SCS Runoff	-----	-----	0.010	-----	-----	0.016	-----	-----	0.029	E-DA 1 IMP
4	Combine	1, 2,	-----	1.520	-----	-----	3.091	-----	-----	6.829	E-WATERSHED
7	SCS Runoff	-----	-----	0.183	-----	-----	0.364	-----	-----	0.789	P-DA 1A PER
8	SCS Runoff	-----	-----	0.859	-----	-----	1.344	-----	-----	2.443	P-DA 1A IMP
10	SCS Runoff	-----	-----	0.019	-----	-----	0.037	-----	-----	0.079	P-DA 1B PER
11	SCS Runoff	-----	-----	0.902	-----	-----	1.410	-----	-----	2.562	P-DA 1B IMP
13	Combine	7, 8,	-----	1.043	-----	-----	1.708	-----	-----	3.232	PAVEMENT 1A INFLOW
14	Reservoir(i)	13	-----	0.012	-----	-----	0.131	-----	-----	2.226	PP#1A ROUTE
15	Combine	10, 11, 14	-----	0.921	-----	-----	1.508	-----	-----	3.678	PAVEMENT 1B INFLOW
16	Reservoir	15	-----	0.123	-----	-----	0.198	-----	-----	3.030	PP# 1B ROUTE
19	SCS Runoff	-----	-----	0.042	-----	-----	0.083	-----	-----	0.178	P-DA 2A PER
20	SCS Runoff	-----	-----	0.045	-----	-----	0.071	-----	-----	0.129	P-DA 2A IMP
22	SCS Runoff	-----	-----	0.234	-----	-----	0.464	-----	-----	1.001	P-DA 2B PER
23	SCS Runoff	-----	-----	0.068	-----	-----	0.107	-----	-----	0.194	P-DA 2B IMP
25	Combine	16, 19, 20, 22, 23,	-----	0.507	-----	-----	0.905	-----	-----	4.435	P-WATERSHED
Proj. file: Future Rev A.gpw										Monday, 08 / 10 / 2026	

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

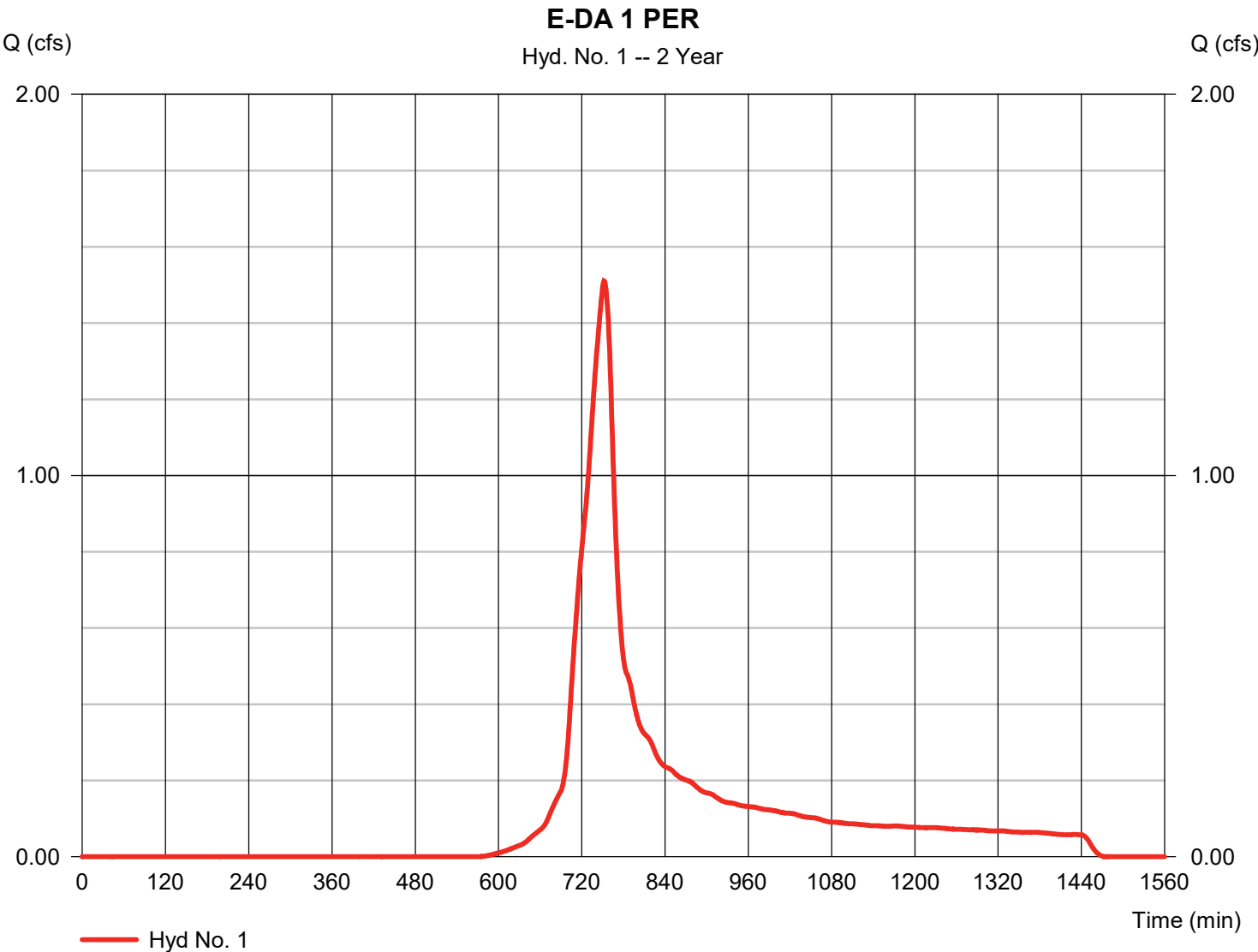
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.510	1	752	10,040	-----	-----	-----	E-DA 1 PER
2	SCS Runoff	0.010	1	750	85	-----	-----	-----	E-DA 1 IMP
4	Combine	1.520	1	752	10,124	1, 2,	-----	-----	E-WATERSHED
7	SCS Runoff	0.183	1	750	1,136	-----	-----	-----	P-DA 1A PER
8	SCS Runoff	0.859	1	750	7,188	-----	-----	-----	P-DA 1A IMP
10	SCS Runoff	0.019	1	750	113	-----	-----	-----	P-DA 1B PER
11	SCS Runoff	0.902	1	750	7,537	-----	-----	-----	P-DA 1B IMP
13	Combine	1.043	1	750	8,324	7, 8,	-----	-----	PAVEMENT 1A INFLOW
14	Reservoir(i)	0.012	1	1064	142	13	470.65	6,361	PP#1A ROUTE
15	Combine	0.921	1	750	7,792	10, 11, 14	-----	-----	PAVEMENT 1B INFLOW
16	Reservoir	0.123	1	782	2,469	15	466.76	4,326	PP# 1B ROUTE
19	SCS Runoff	0.042	1	750	253	-----	-----	-----	P-DA 2A PER
20	SCS Runoff	0.045	1	750	379	-----	-----	-----	P-DA 2A IMP
22	SCS Runoff	0.234	1	750	1,435	-----	-----	-----	P-DA 2B PER
23	SCS Runoff	0.068	1	750	572	-----	-----	-----	P-DA 2B IMP
25	Combine	0.507	1	750	5,109	16, 19, 20, 22, 23,	-----	-----	P-WATERSHED
Future Rev A.gpw					Return Period: 2 Year			Monday, 08 / 10 / 2026	

Hydrograph Report

Hyd. No. 1

E-DA 1 PER

Hydrograph type	= SCS Runoff	Peak discharge	= 1.510 cfs
Storm frequency	= 2 yrs	Time to peak	= 752 min
Time interval	= 1 min	Hyd. volume	= 10,040 cuft
Drainage area	= 1.655 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 20.59 min
Total precip.	= 4.08 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		

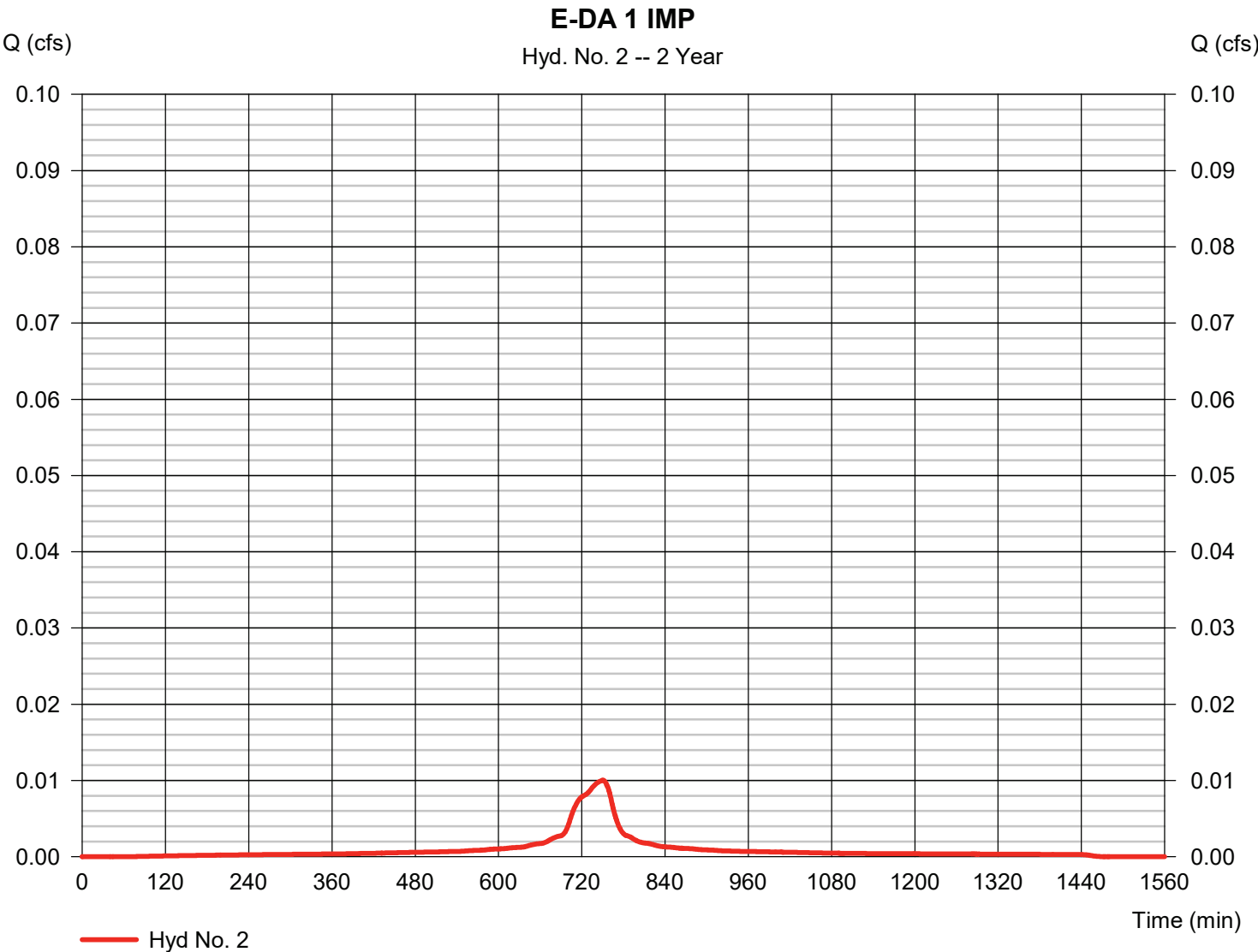


Hydrograph Report

Hyd. No. 2

E-DA 1 IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.010 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 85 cuft
Drainage area	= 0.006 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 20.59 min
Total precip.	= 4.08 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydroflow\NOAA_D 1 min.484		

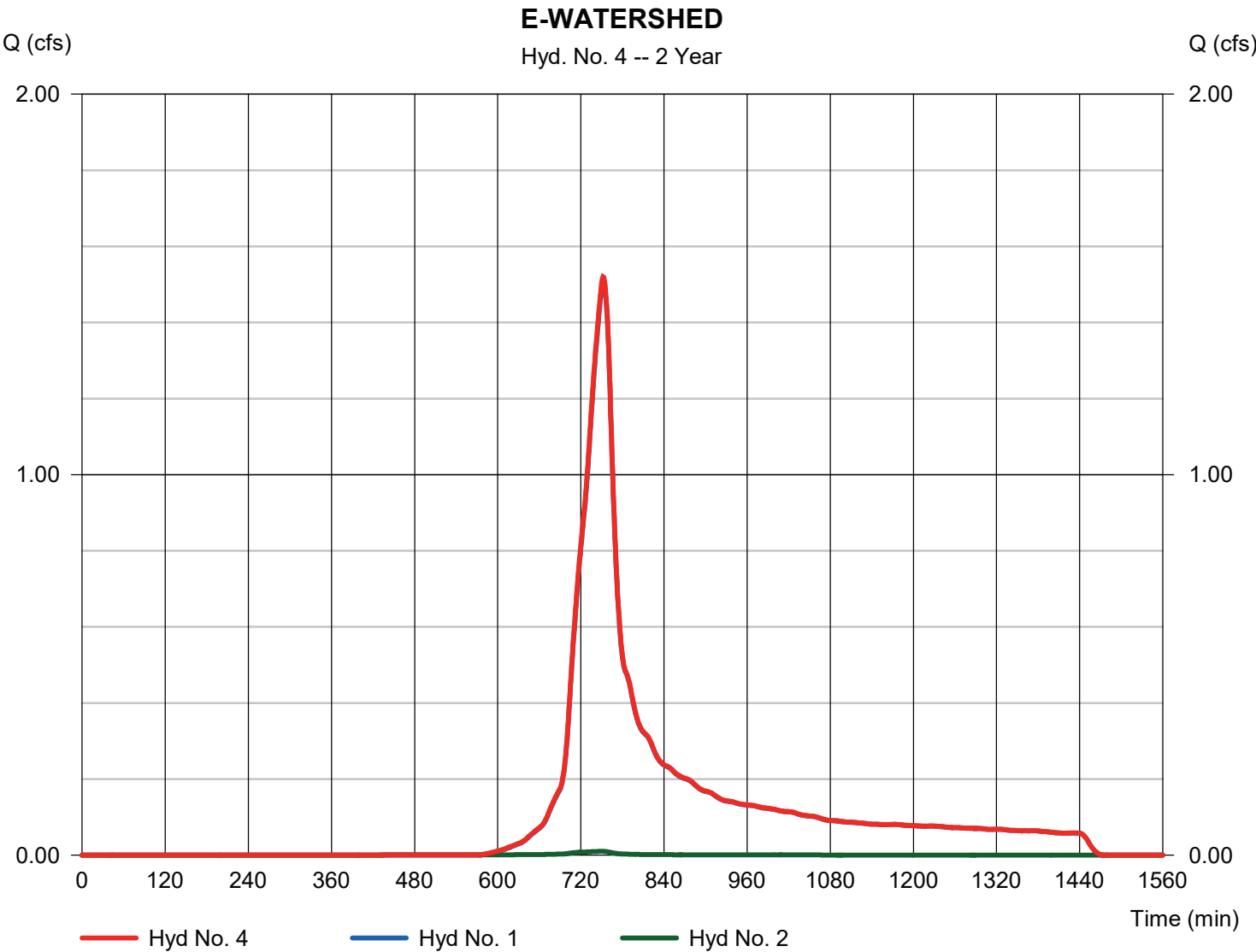


Hydrograph Report

Hyd. No. 4

E-WATERSHED

Hydrograph type	= Combine	Peak discharge	= 1.520 cfs
Storm frequency	= 2 yrs	Time to peak	= 752 min
Time interval	= 1 min	Hyd. volume	= 10,124 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 1.661 ac



Hydrograph Report

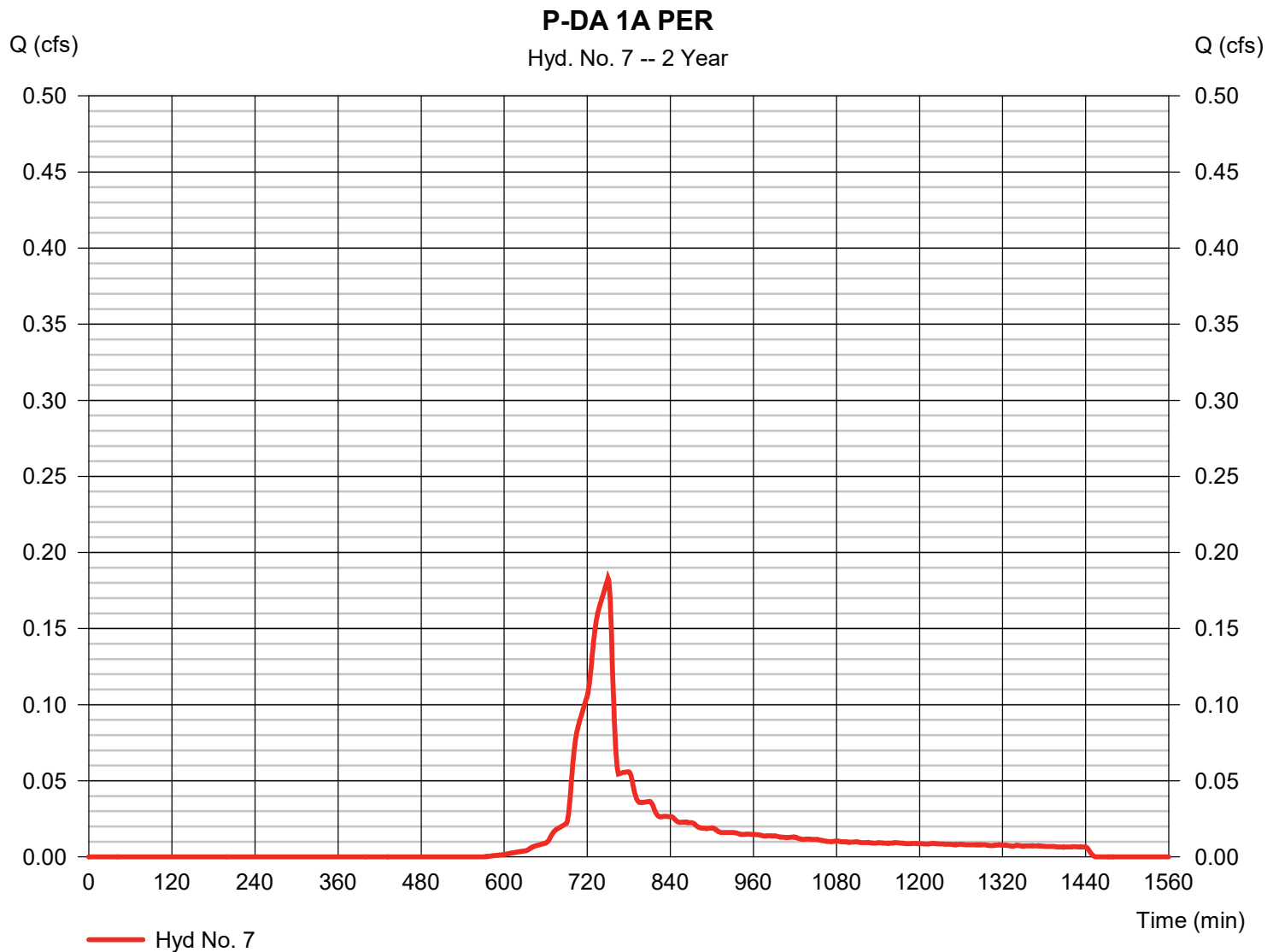
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Hyd. No. 7

P-DA 1A PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.183 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 1,136 cuft
Drainage area	= 0.189 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 9.18 min
Total precip.	= 4.08 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrology\NOAA_D 1 min.484		

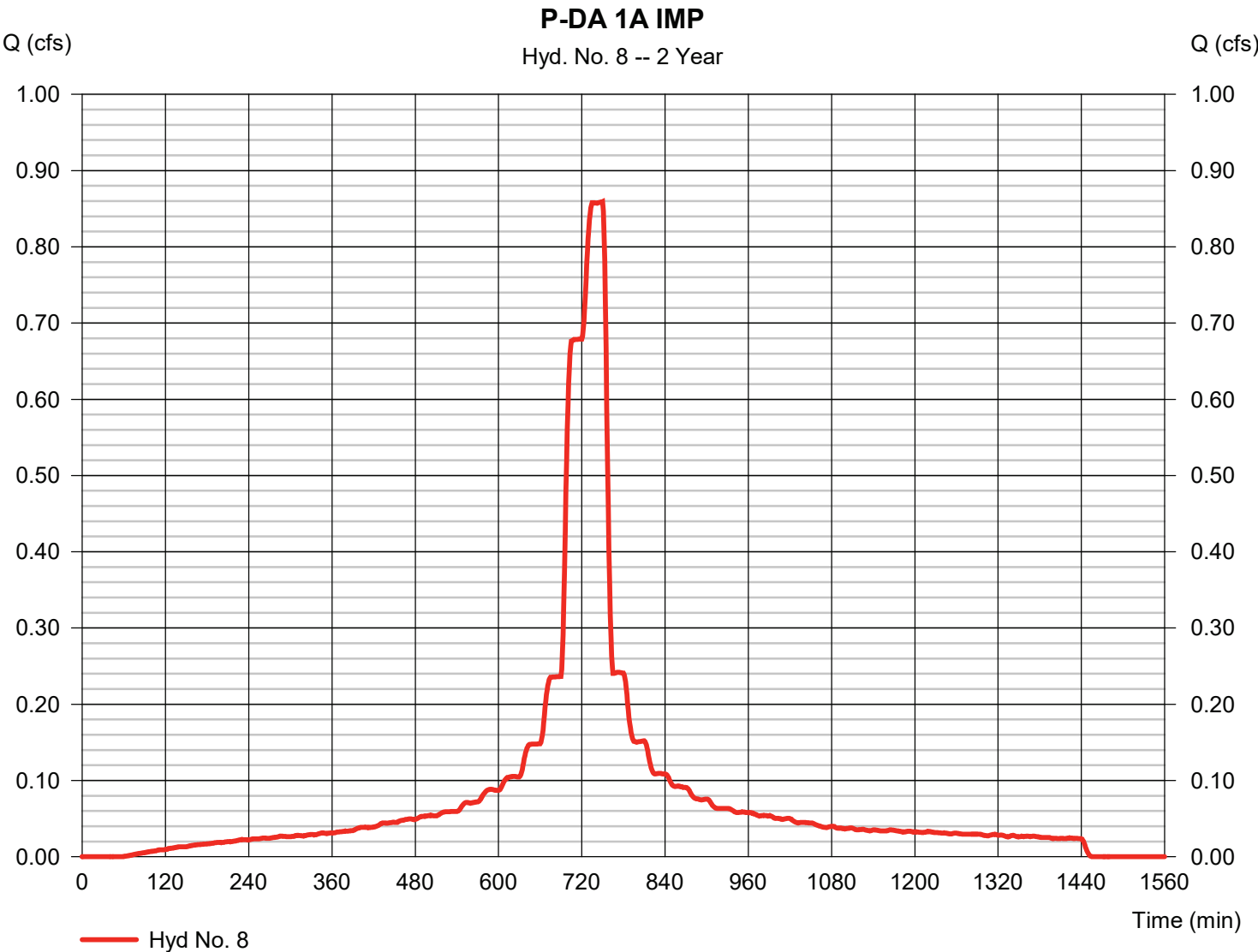


Hydrograph Report

Hyd. No. 8

P-DA 1A IMP

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.859 cfs
Storm frequency	=	2 yrs	Time to peak	=	750 min
Time interval	=	1 min	Hyd. volume	=	7,188 cuft
Drainage area	=	0.515 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	9.18 min
Total precip.	=	4.08 in	Distribution	=	Custom
Storm duration	=	M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484			

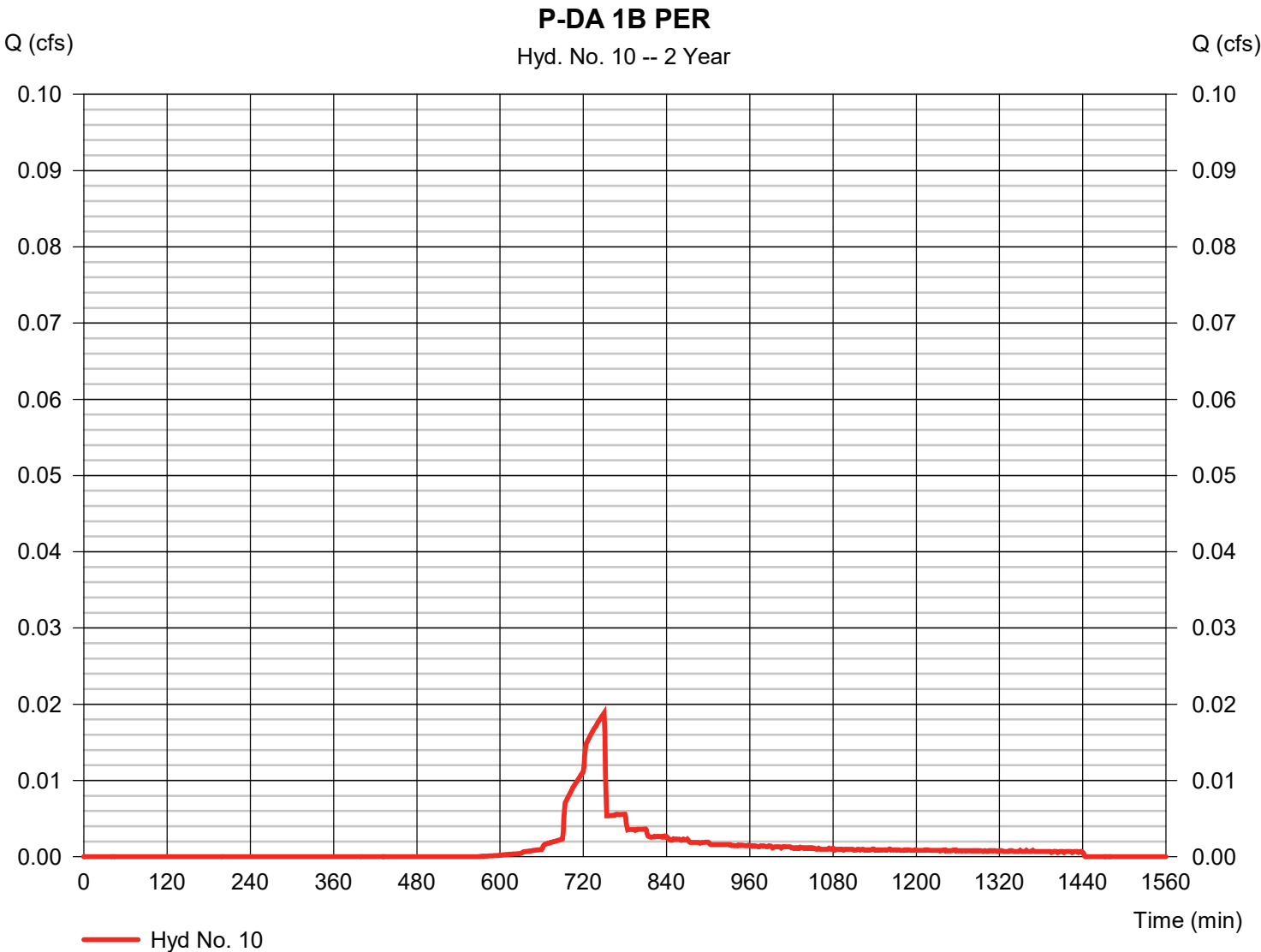


Hydrograph Report

Hyd. No. 10

P-DA 1B PER

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.019 cfs
Storm frequency	=	2 yrs	Time to peak	=	750 min
Time interval	=	1 min	Hyd. volume	=	113 cuft
Drainage area	=	0.020 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	1.60 min
Total precip.	=	4.08 in	Distribution	=	Custom
Storm duration	=	M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484			



Hydrograph Report

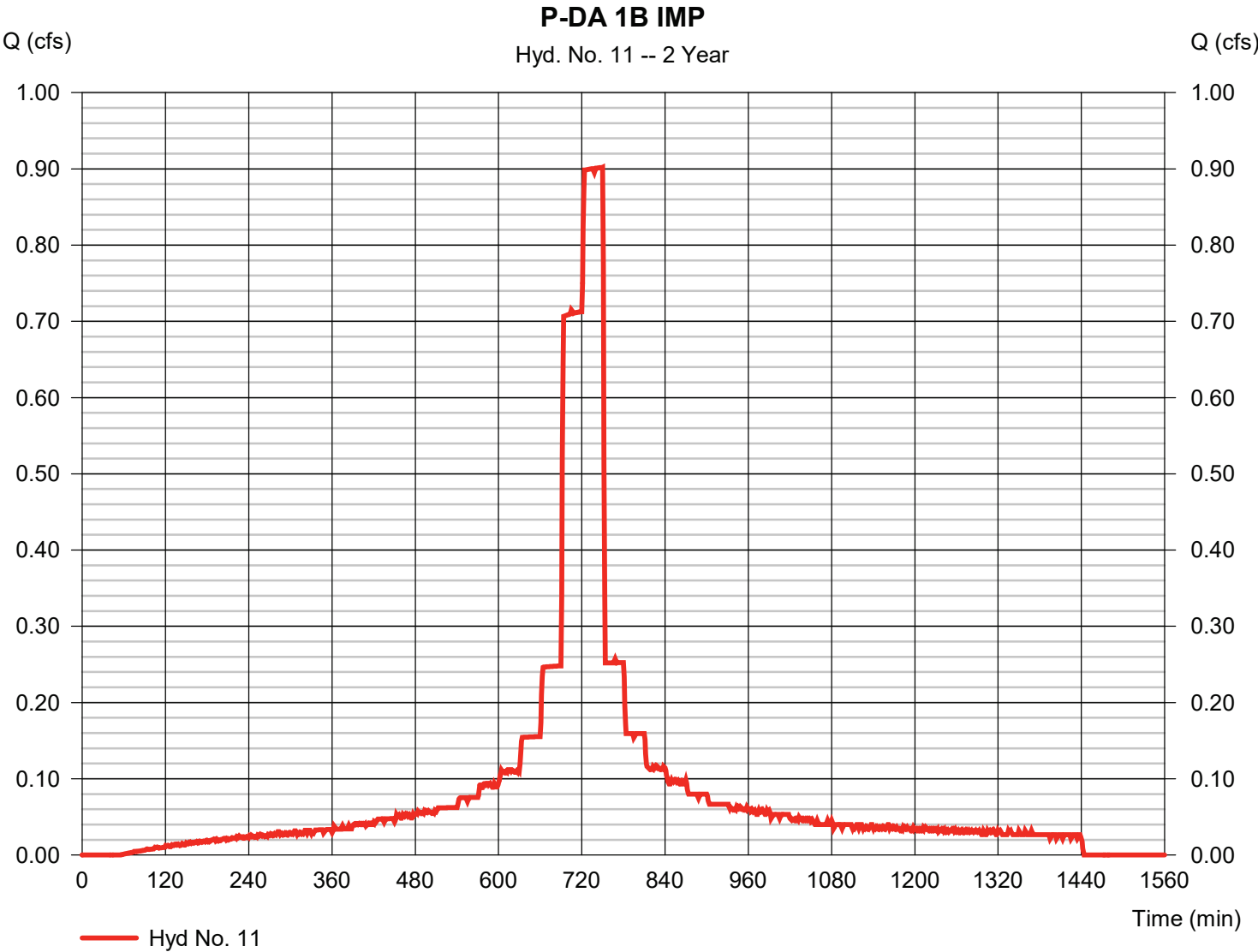
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Monday, 08 / 10 / 2026

Hyd. No. 11

P-DA 1B IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.902 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 7,537 cuft
Drainage area	= 0.576 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 4.08 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

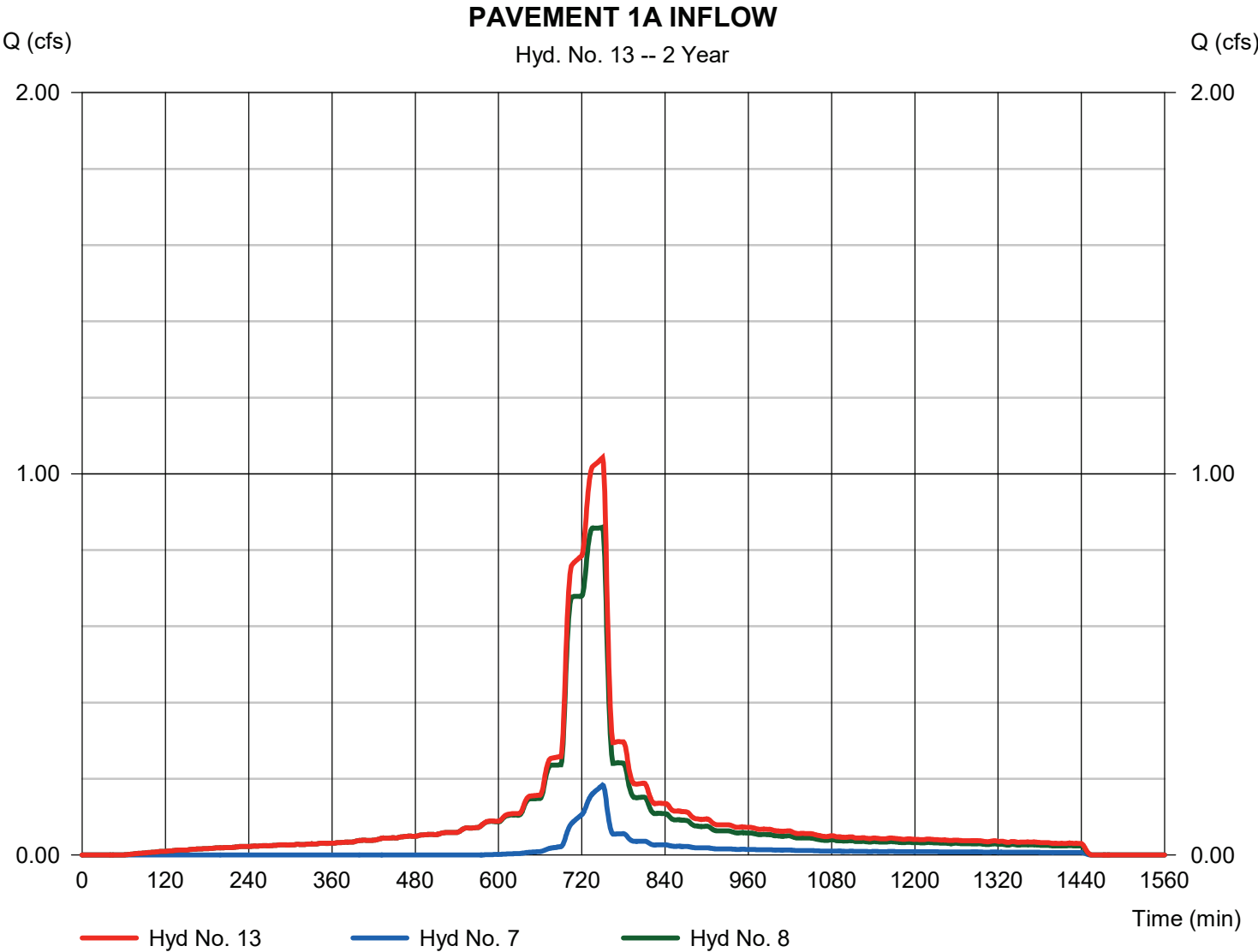
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Monday, 08 / 10 / 2026

Hyd. No. 13

PAVEMENT 1A INFLOW

Hydrograph type	= Combine	Peak discharge	= 1.043 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 8,324 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 0.704 ac



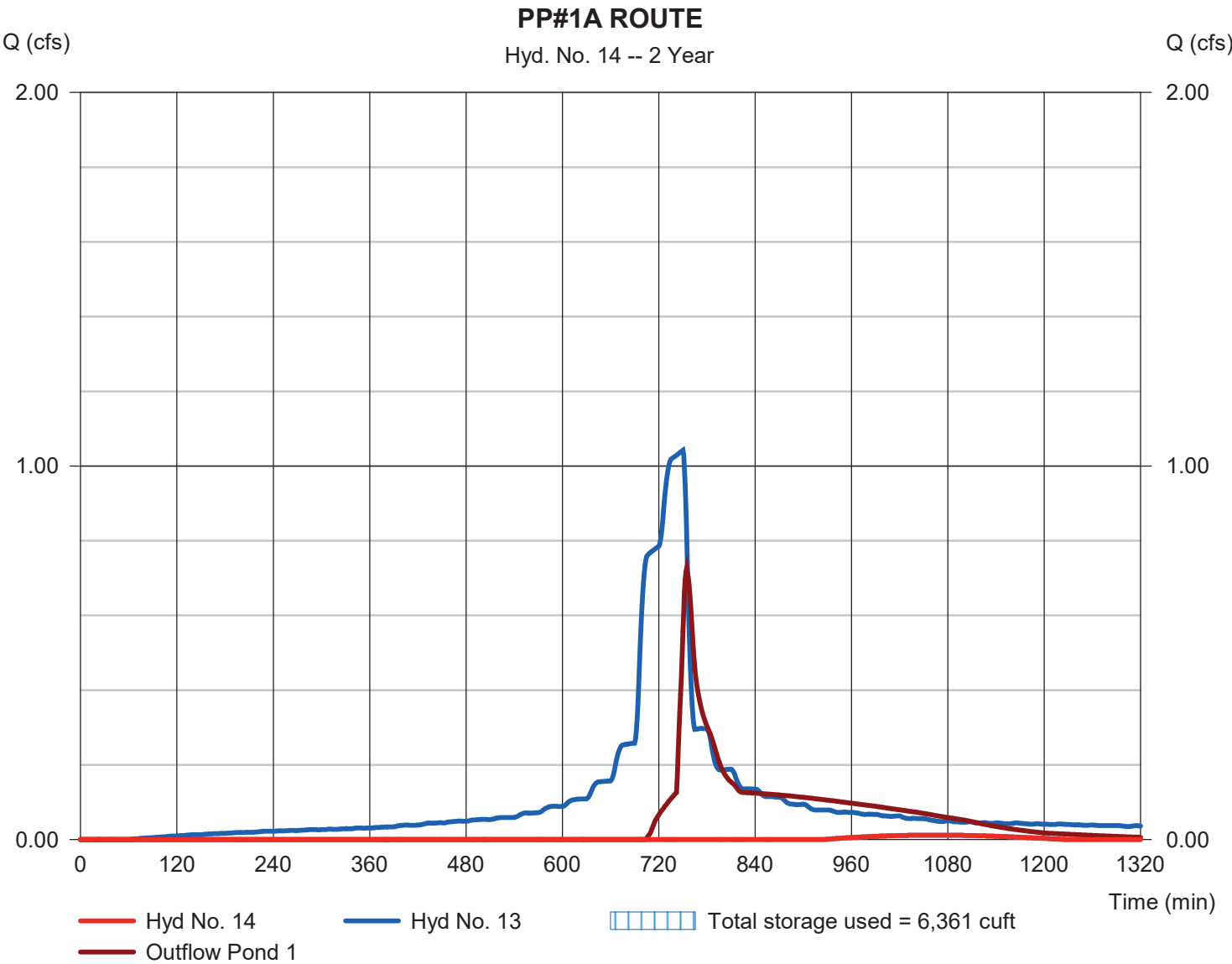
Hydrograph Report

Hyd. No. 14

PP#1A ROUTE

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 0.012 cfs
Storm frequency	= 2 yrs	Time to peak	= 1064 min
Time interval	= 1 min	Hyd. volume	= 142 cuft
Upper Pond	= PP #1	Lower Pond	= PP #2
Inflow hyd.	= 13 - PAVEMENT 1A INFLOW	Other Inflow hyd.	= None
Max. Elevation	= 470.65 ft	Max. Elevation	= 466.17 ft
Max. Storage	= 4,075 cuft	Max. Storage	= 2,286 cuft

Interconnected Pond Routing. Storage Indication method used. Exfiltration extracted from Outflow.



Pond No. 1 - PP #1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 469.00 ft. Voids = 90.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	469.00	2,750	0	0
1.00	470.00	2,750	2,475	2,475
2.00	471.00	2,750	2,475	4,950

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	2.50	0.00	0.00
Span (in)	= 12.00	2.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 469.00	469.80	0.00	0.00
Length (ft)	= 26.00	0.50	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .012	.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)	= 3.00	0.00	0.00	0.00
Crest El. (ft)	= 470.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.900 (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	469.00	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
1.00	2,475	470.00	0.05 ic	0.05 ic	---	---	0.00	---	---	---	0.057	---	0.109
2.00	4,950	471.00	3.66 ic	0.12 ic	---	---	3.53	---	---	---	0.057	---	3.713

Pond No. 2 - PP #2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 465.50 ft. Voids = 90.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	465.50	3,805	0	0
1.00	466.50	3,805	3,424	3,424
2.00	467.50	3,805	3,424	6,848
3.00	468.50	3,805	3,424	10,272

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 14.00	2.50	0.00	0.00
Span (in)	= 14.00	2.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 465.50	466.10	0.00	0.00
Length (ft)	= 18.00	0.50	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	0.00	0.00	0.00
Crest El. (ft)	= 468.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.900 (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	465.50	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
1.00	3,424	466.50	0.09 ic	0.09 ic	---	---	0.00	---	---	---	0.079	---	0.169
2.00	6,848	467.50	0.19 ic	0.19 ic	---	---	0.00	---	---	---	0.079	---	0.266
3.00	10,272	468.50	3.75 oc	0.22 ic	---	---	3.53	---	---	---	0.079	---	3.833

Hydrograph Report

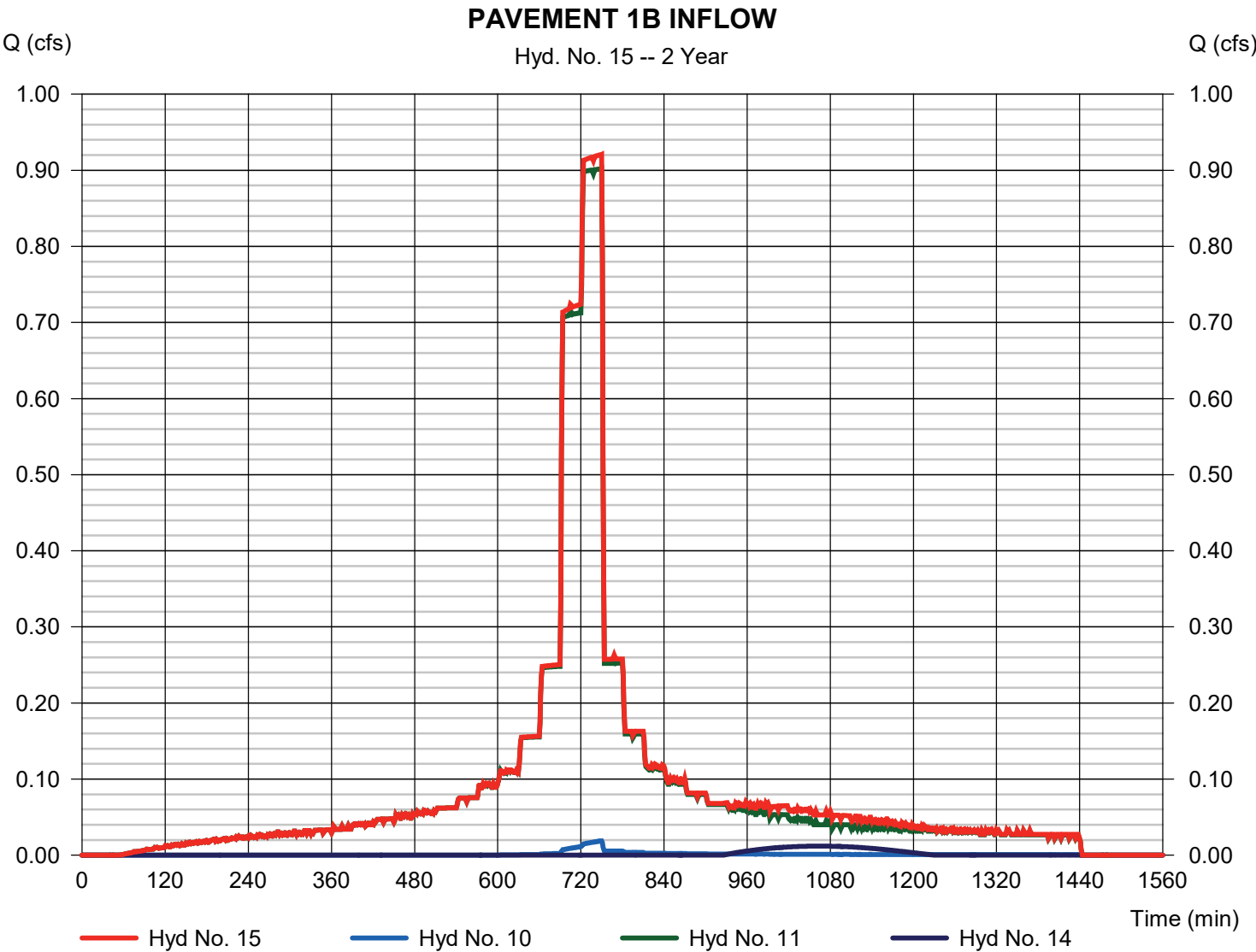
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 15

PAVEMENT 1B INFLOW

Hydrograph type	= Combine	Peak discharge	= 0.921 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 7,792 cuft
Inflow hyds.	= 10, 11, 14	Contrib. drain. area	= 0.596 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

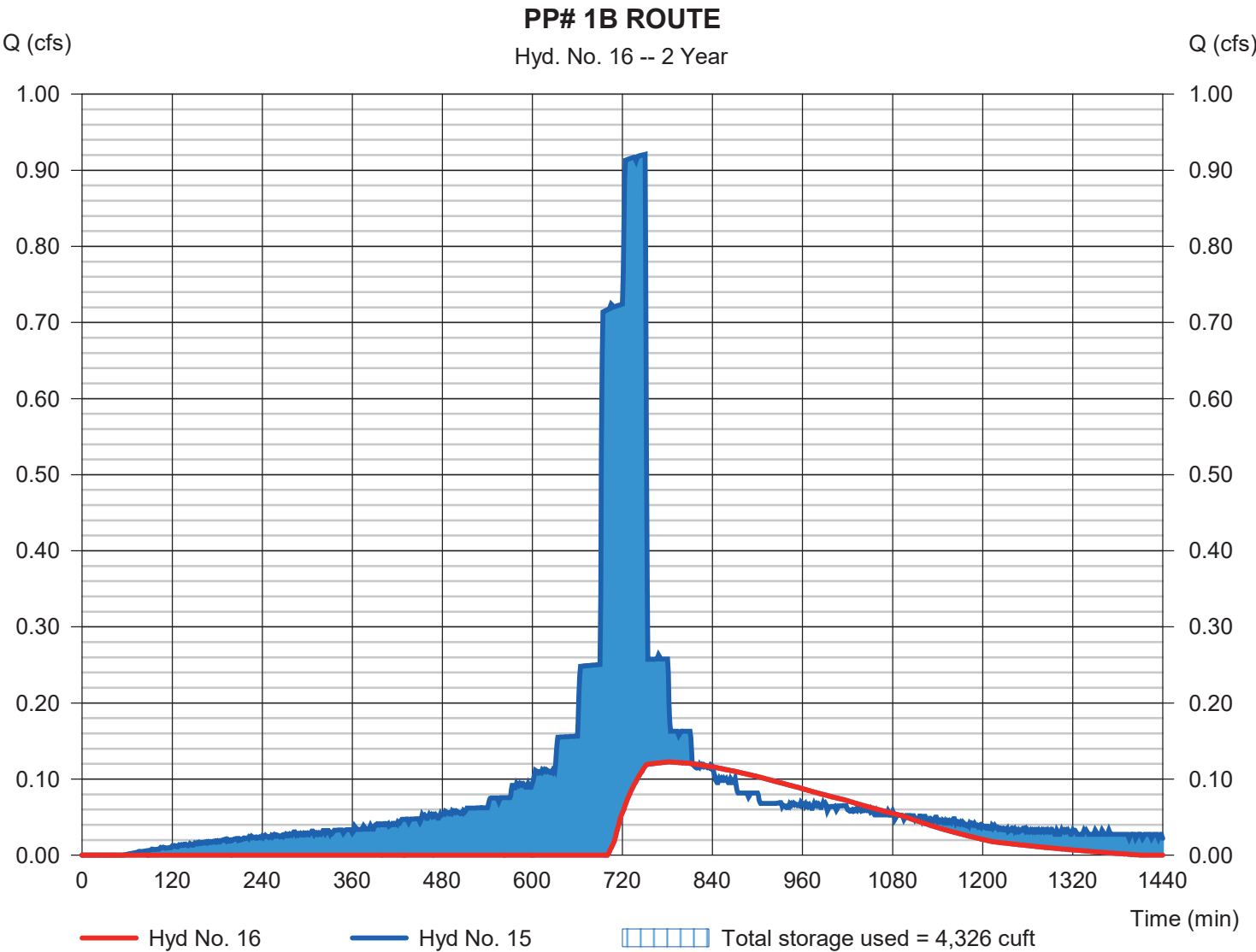
Monday, 08 / 10 / 2026

Hyd. No. 16

PP# 1B ROUTE

Hydrograph type	= Reservoir	Peak discharge	= 0.123 cfs
Storm frequency	= 2 yrs	Time to peak	= 782 min
Time interval	= 1 min	Hyd. volume	= 2,469 cuft
Inflow hyd. No.	= 15 - PAVEMENT 1B INFLOW	Max. Elevation	= 466.76 ft
Reservoir name	= PP #2	Max. Storage	= 4,326 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond No. 2 - PP #2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Beginning Elevation = 465.50 ft. Voids = 90.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	465.50	3,805	0	0
1.00	466.50	3,805	3,424	3,424
2.00	467.50	3,805	3,424	6,848
3.00	468.50	3,805	3,424	10,272

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 14.00	2.50	0.00	0.00
Span (in)	= 14.00	2.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 465.50	466.10	0.00	0.00
Length (ft)	= 18.00	0.50	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	0.00	0.00	0.00
Crest El. (ft)	= 468.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.900 (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	465.50	0.00	0.00	---	---	0.00	---	---	---	0.000	---	0.000
1.00	3,424	466.50	0.09 ic	0.09 ic	---	---	0.00	---	---	---	0.079	---	0.169
2.00	6,848	467.50	0.19 ic	0.19 ic	---	---	0.00	---	---	---	0.079	---	0.266
3.00	10,272	468.50	3.75 oc	0.22 ic	---	---	3.53	---	---	---	0.079	---	3.833

Hydrograph Report

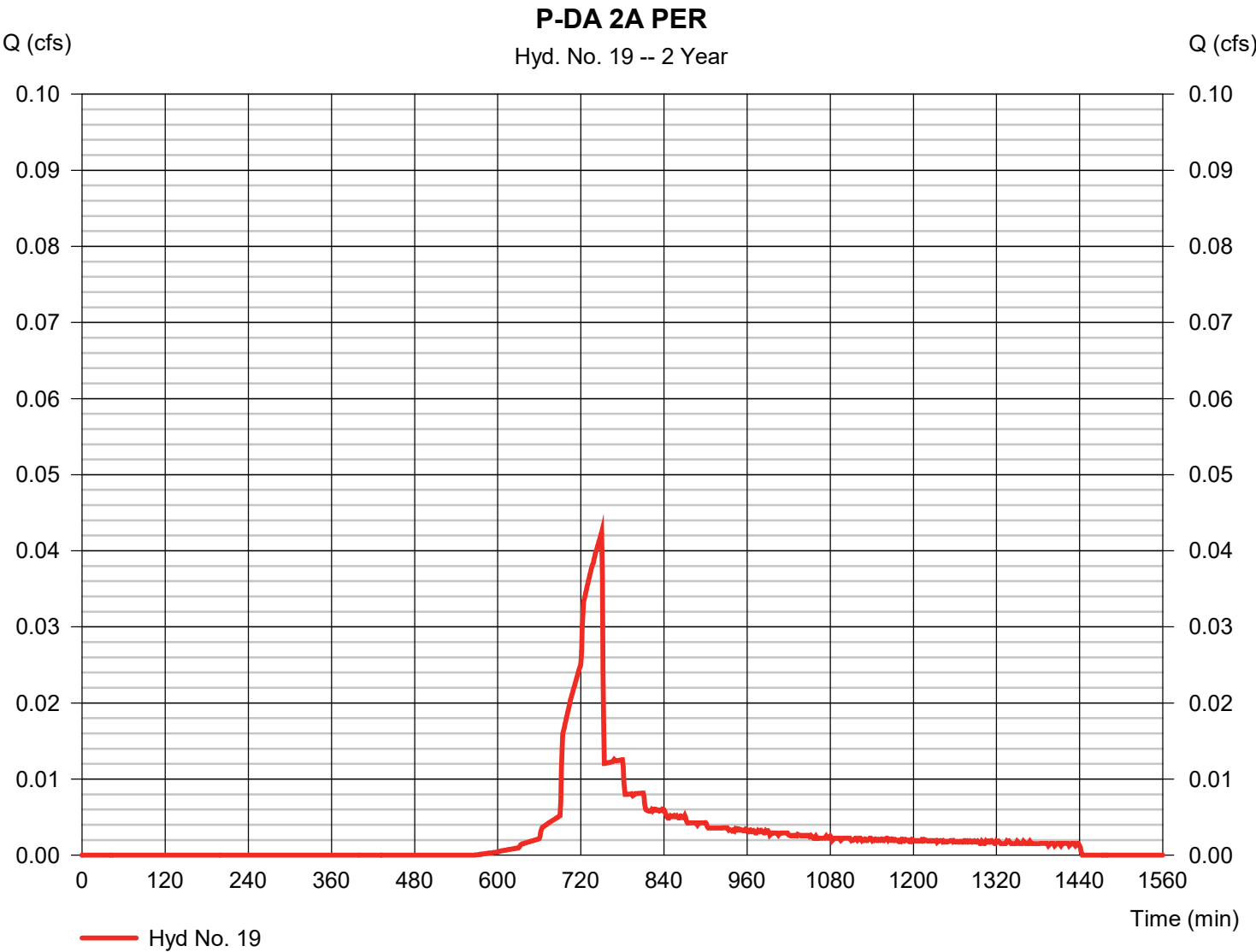
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 19

P-DA 2A PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.042 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 253 cuft
Drainage area	= 0.045 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 4.08 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydroflow\NOAA_D 1 min.484		



Hydrograph Report

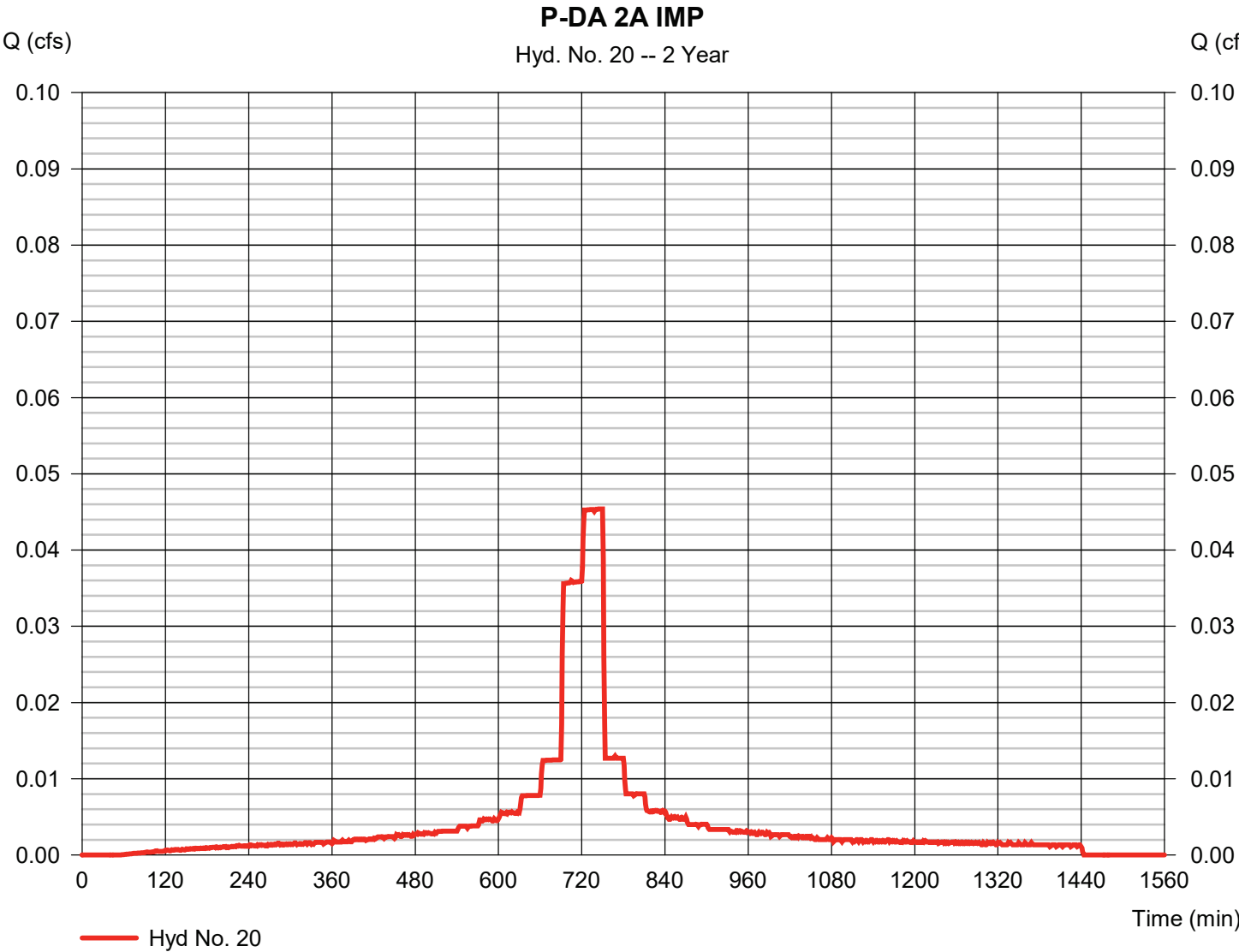
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 20

P-DA 2A IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.045 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 379 cuft
Drainage area	= 0.029 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 4.08 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

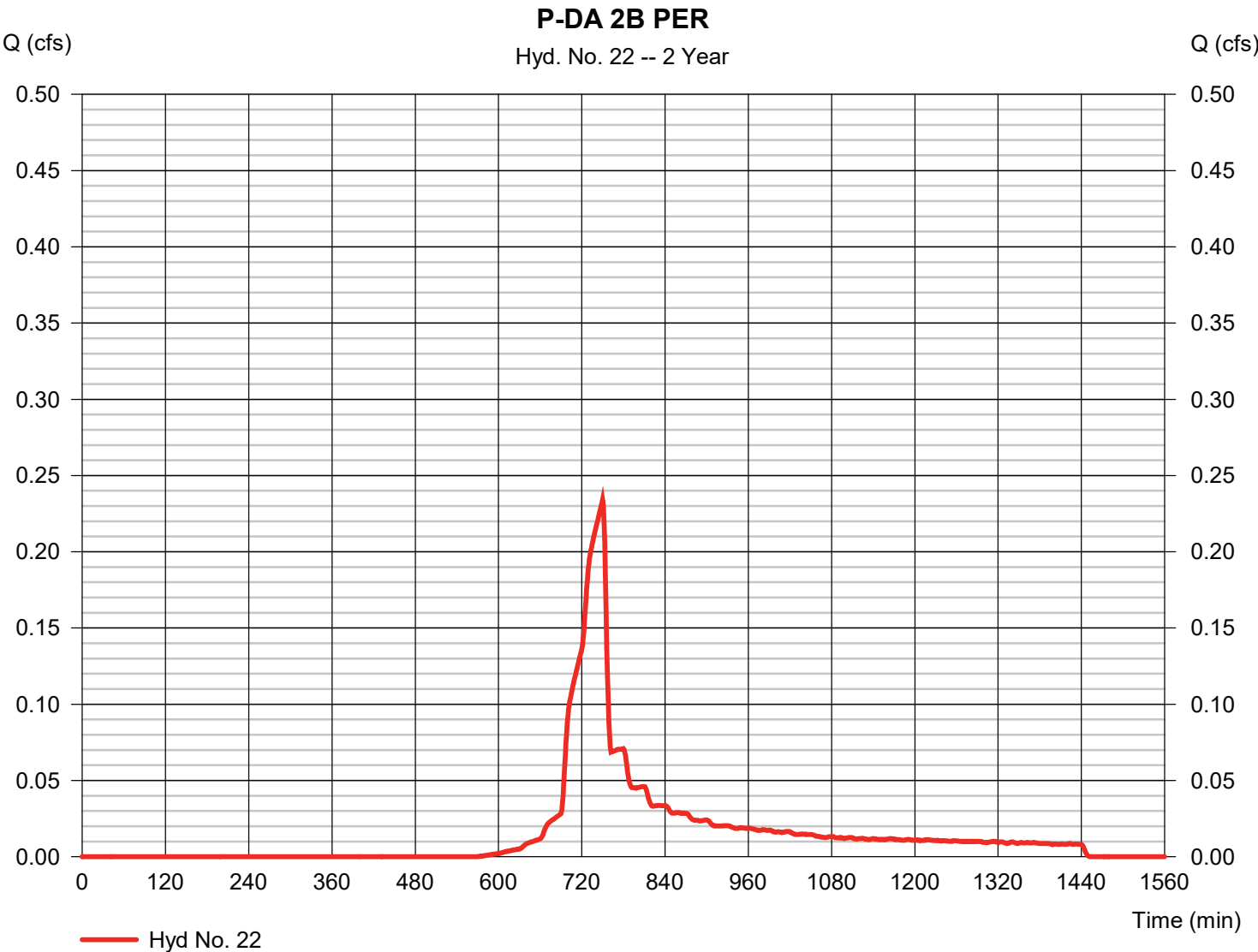
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 22

P-DA 2B PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.234 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 1,435 cuft
Drainage area	= 0.245 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 8.33 min
Total precip.	= 4.08 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

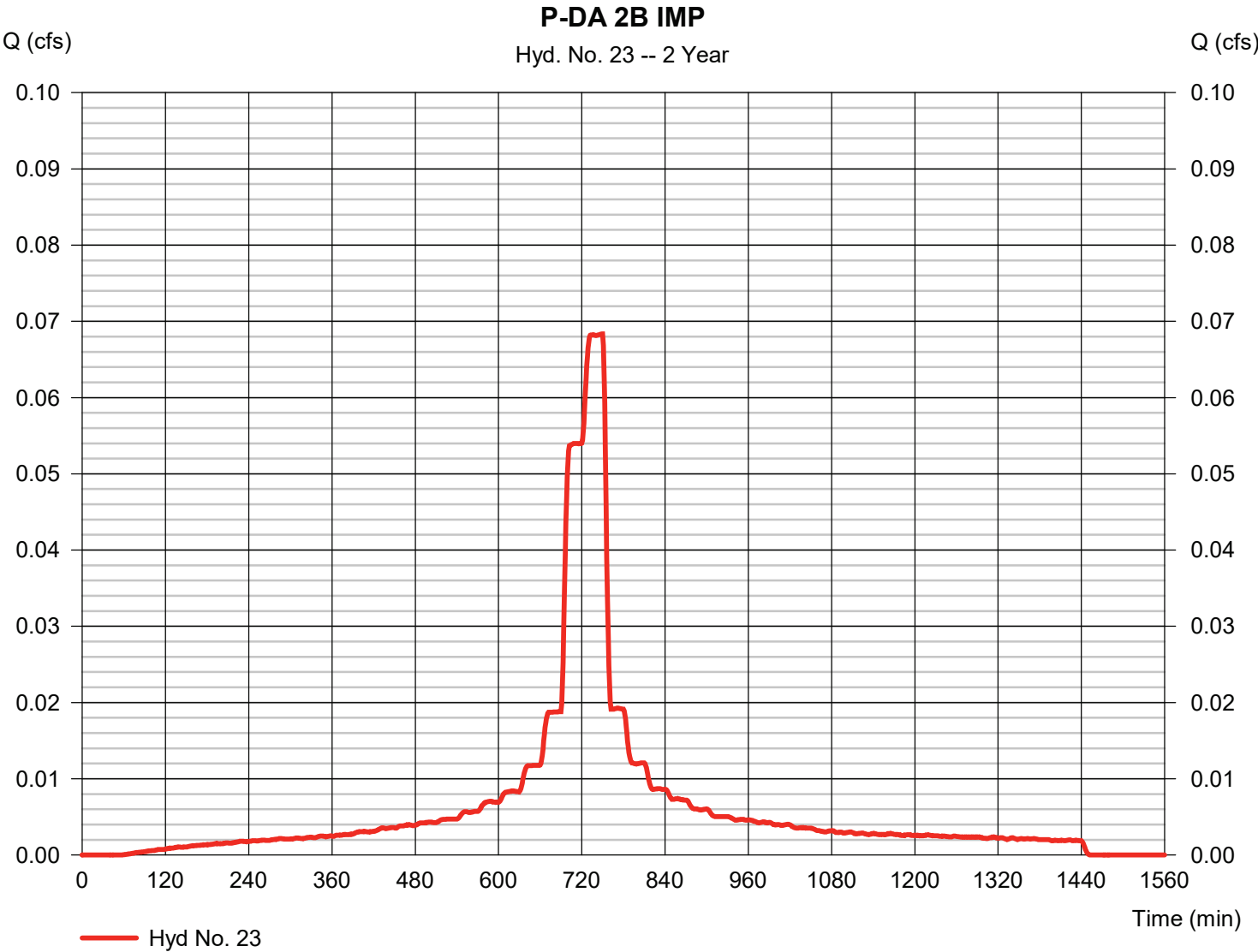
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 23

P-DA 2B IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.068 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 572 cuft
Drainage area	= 0.042 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 8.33 min
Total precip.	= 4.08 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrology\NOAA_D 1 min.484		



Hydrograph Report

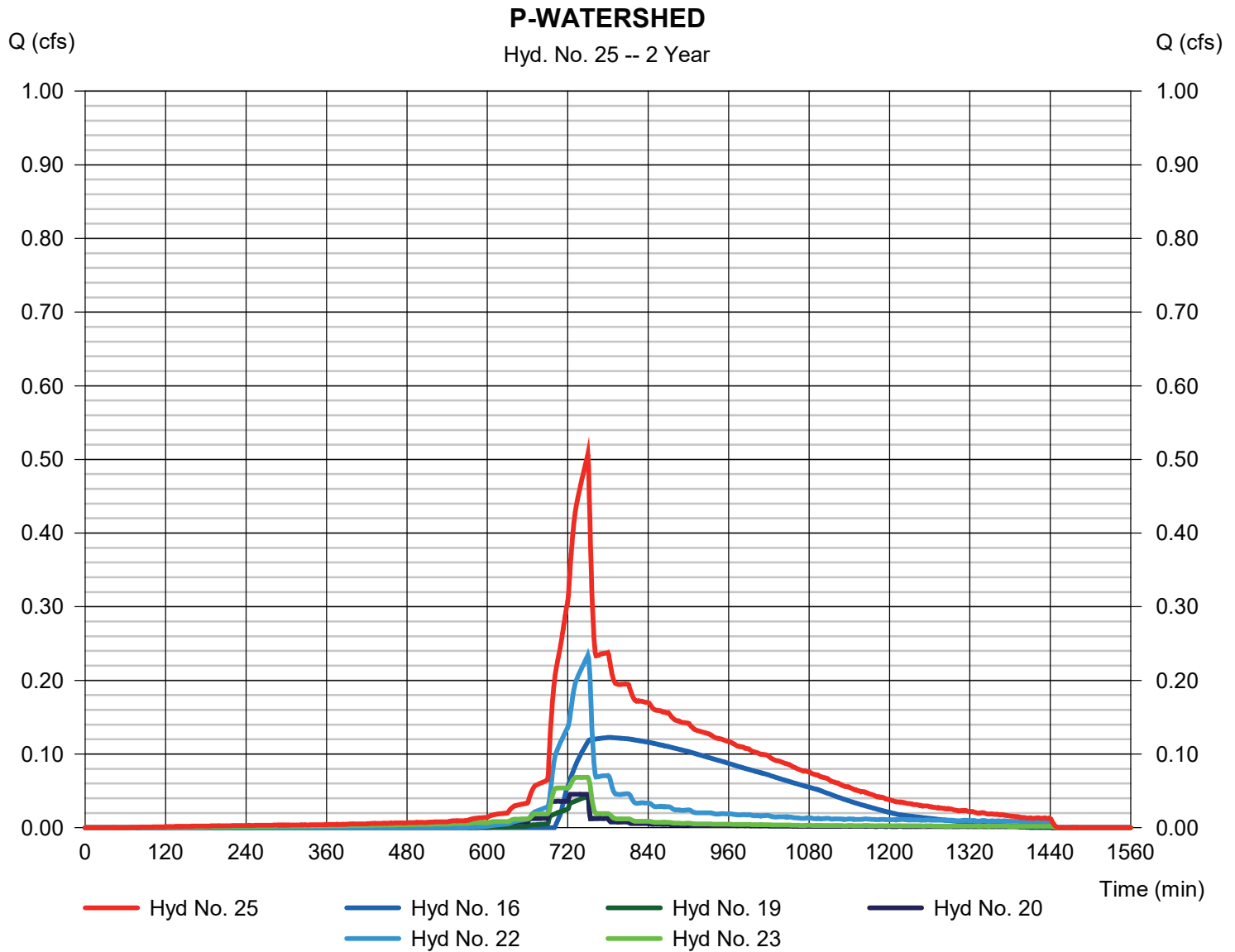
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Monday, 08 / 10 / 2026

Hyd. No. 25

P-WATERSHED

Hydrograph type	= Combine	Peak discharge	= 0.507 cfs
Storm frequency	= 2 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 5,109 cuft
Inflow hyds.	= 16, 19, 20, 22, 23	Contrib. drain. area	= 0.361 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

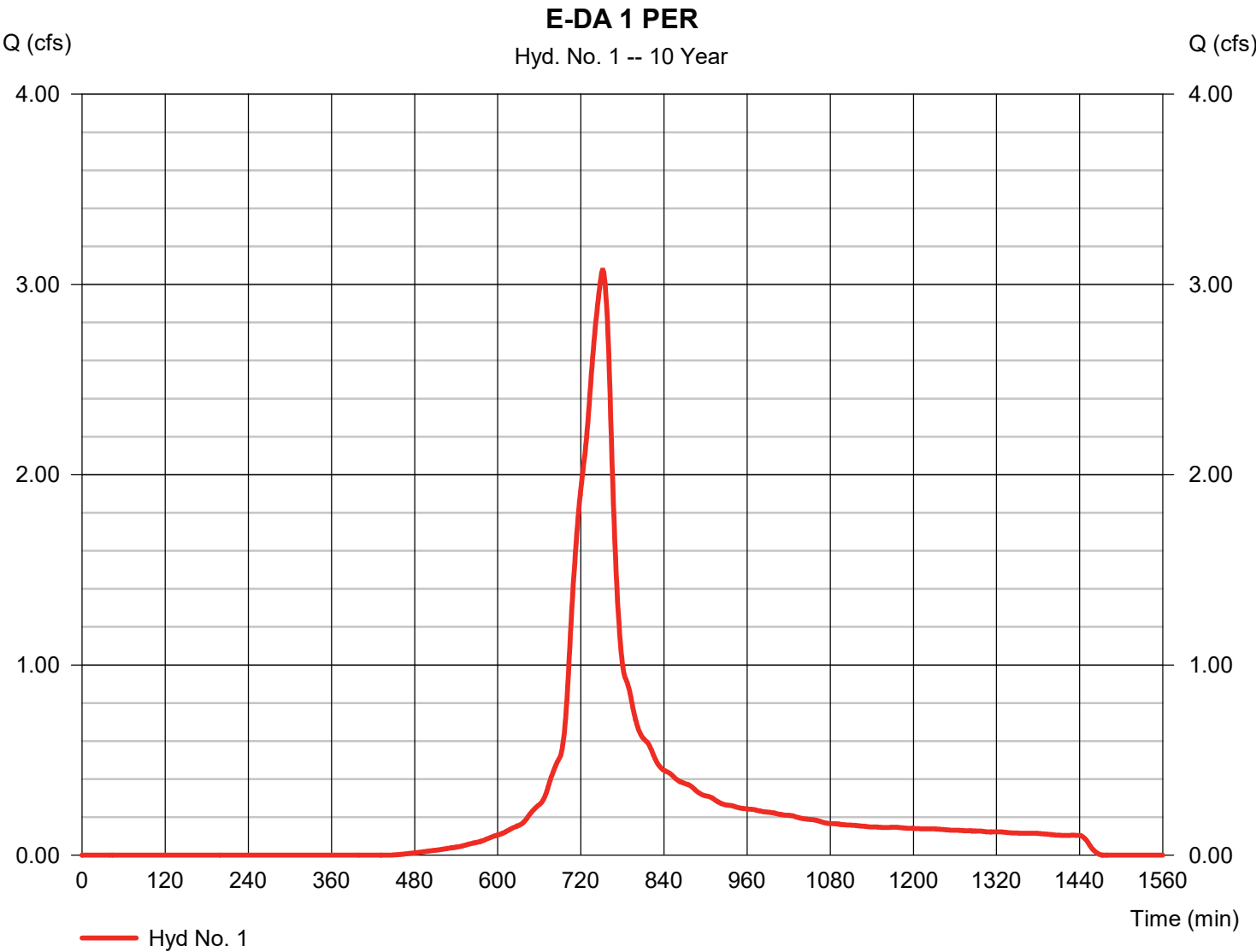
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.075	1	752	21,168	-----	-----	-----	E-DA 1 PER
2	SCS Runoff	0.016	1	750	135	-----	-----	-----	E-DA 1 IMP
4	Combine	3.091	1	752	21,302	1, 2,	-----	-----	E-WATERSHED
7	SCS Runoff	0.364	1	750	2,394	-----	-----	-----	P-DA 1A PER
8	SCS Runoff	1.344	1	750	11,444	-----	-----	-----	P-DA 1A IMP
10	SCS Runoff	0.037	1	750	238	-----	-----	-----	P-DA 1B PER
11	SCS Runoff	1.410	1	750	11,999	-----	-----	-----	P-DA 1B IMP
13	Combine	1.708	1	750	13,838	7, 8,	-----	-----	PAVEMENT 1A INFLOW
14	Reservoir(i)	0.131	1	827	3,305	13	470.78	8,997	PP#1A ROUTE
15	Combine	1.508	1	750	15,542	10, 11, 14	-----	-----	PAVEMENT 1B INFLOW
16	Reservoir	0.198	1	871	8,207	15	467.66	7,412	PP# 1B ROUTE
19	SCS Runoff	0.083	1	750	534	-----	-----	-----	P-DA 2A PER
20	SCS Runoff	0.071	1	750	604	-----	-----	-----	P-DA 2A IMP
22	SCS Runoff	0.464	1	750	3,026	-----	-----	-----	P-DA 2B PER
23	SCS Runoff	0.107	1	750	910	-----	-----	-----	P-DA 2B IMP
25	Combine	0.905	1	750	13,282	16, 19, 20, 22, 23,	-----	-----	P-WATERSHED
Future Rev A.gpw					Return Period: 10 Year			Monday, 08 / 10 / 2026	

Hydrograph Report

Hyd. No. 1

E-DA 1 PER

Hydrograph type	= SCS Runoff	Peak discharge	= 3.075 cfs
Storm frequency	= 10 yrs	Time to peak	= 752 min
Time interval	= 1 min	Hyd. volume	= 21,168 cuft
Drainage area	= 1.655 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 20.59 min
Total precip.	= 6.36 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		

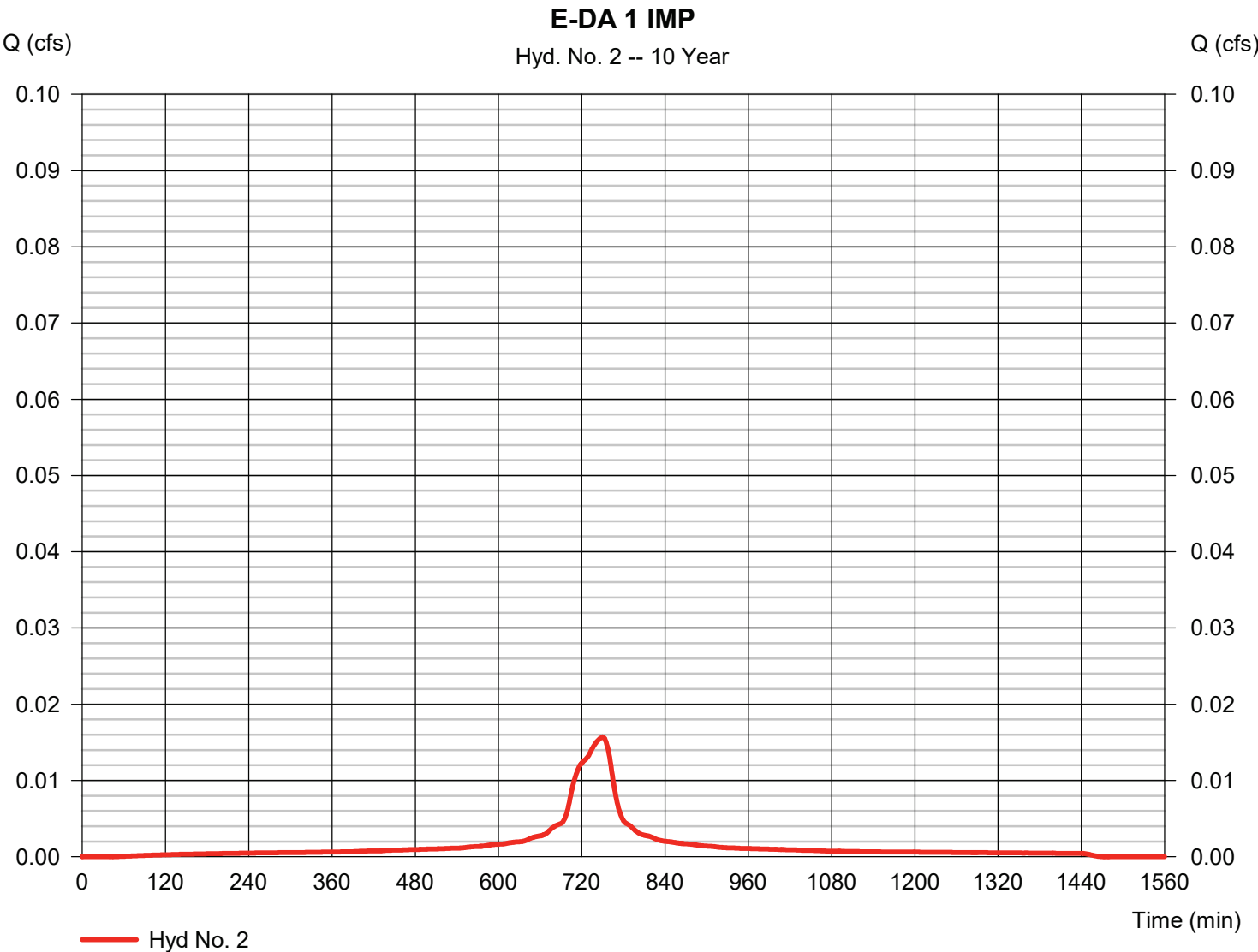


Hydrograph Report

Hyd. No. 2

E-DA 1 IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.016 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 135 cuft
Drainage area	= 0.006 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 20.59 min
Total precip.	= 6.36 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		

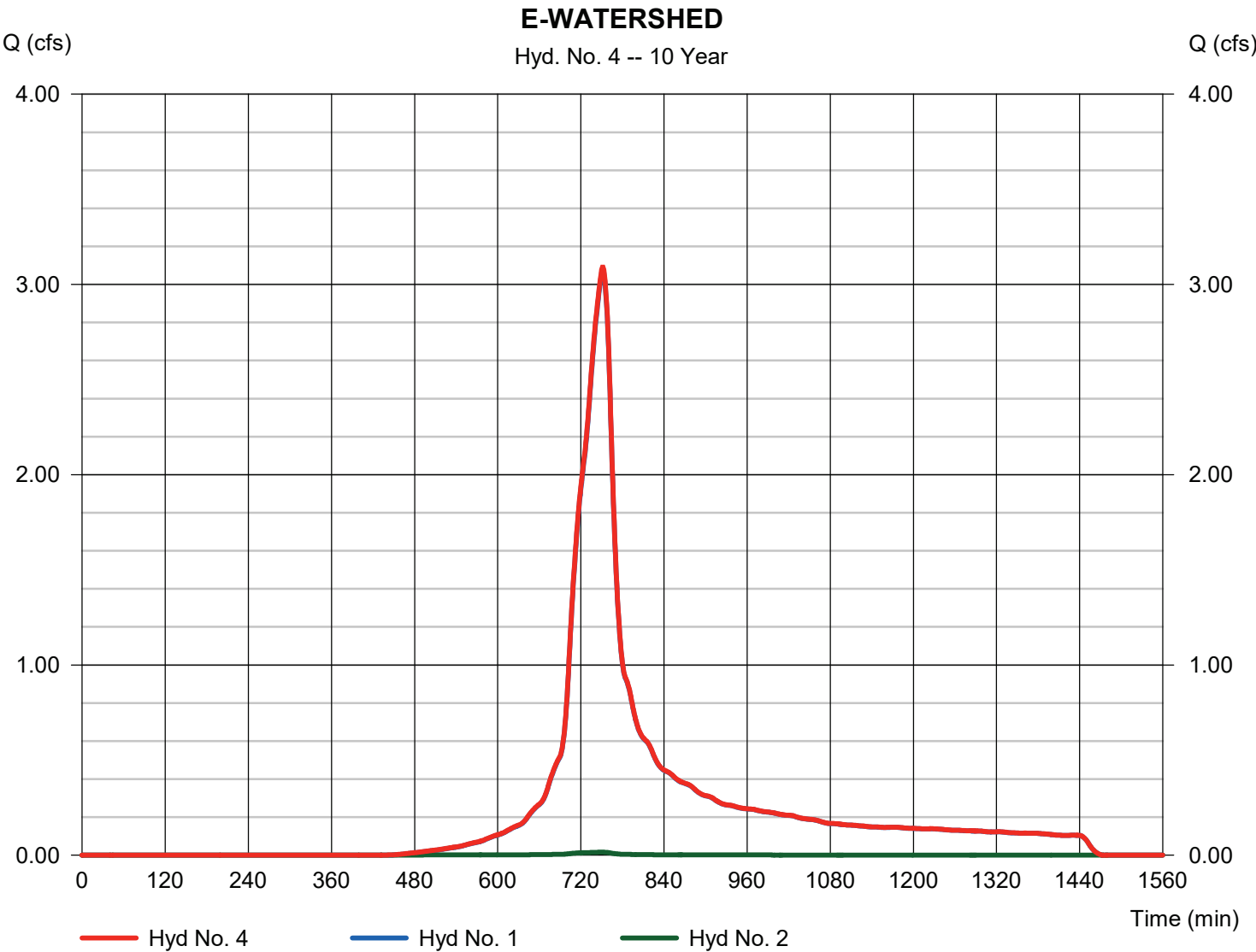


Hydrograph Report

Hyd. No. 4

E-WATERSHED

Hydrograph type	= Combine	Peak discharge	= 3.091 cfs
Storm frequency	= 10 yrs	Time to peak	= 752 min
Time interval	= 1 min	Hyd. volume	= 21,302 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 1.661 ac



Hydrograph Report

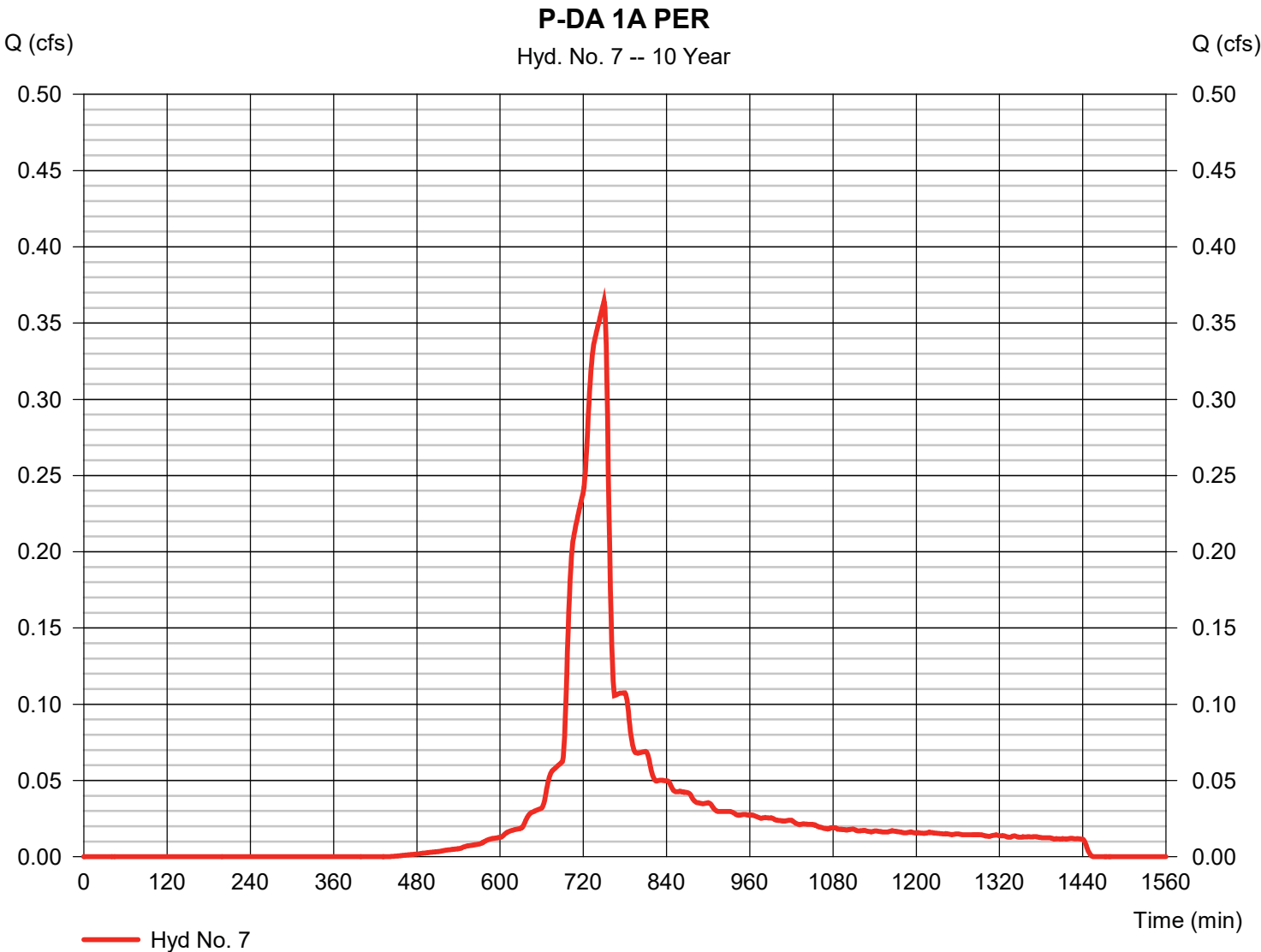
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 7

P-DA 1A PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.364 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 2,394 cuft
Drainage area	= 0.189 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 9.18 min
Total precip.	= 6.36 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

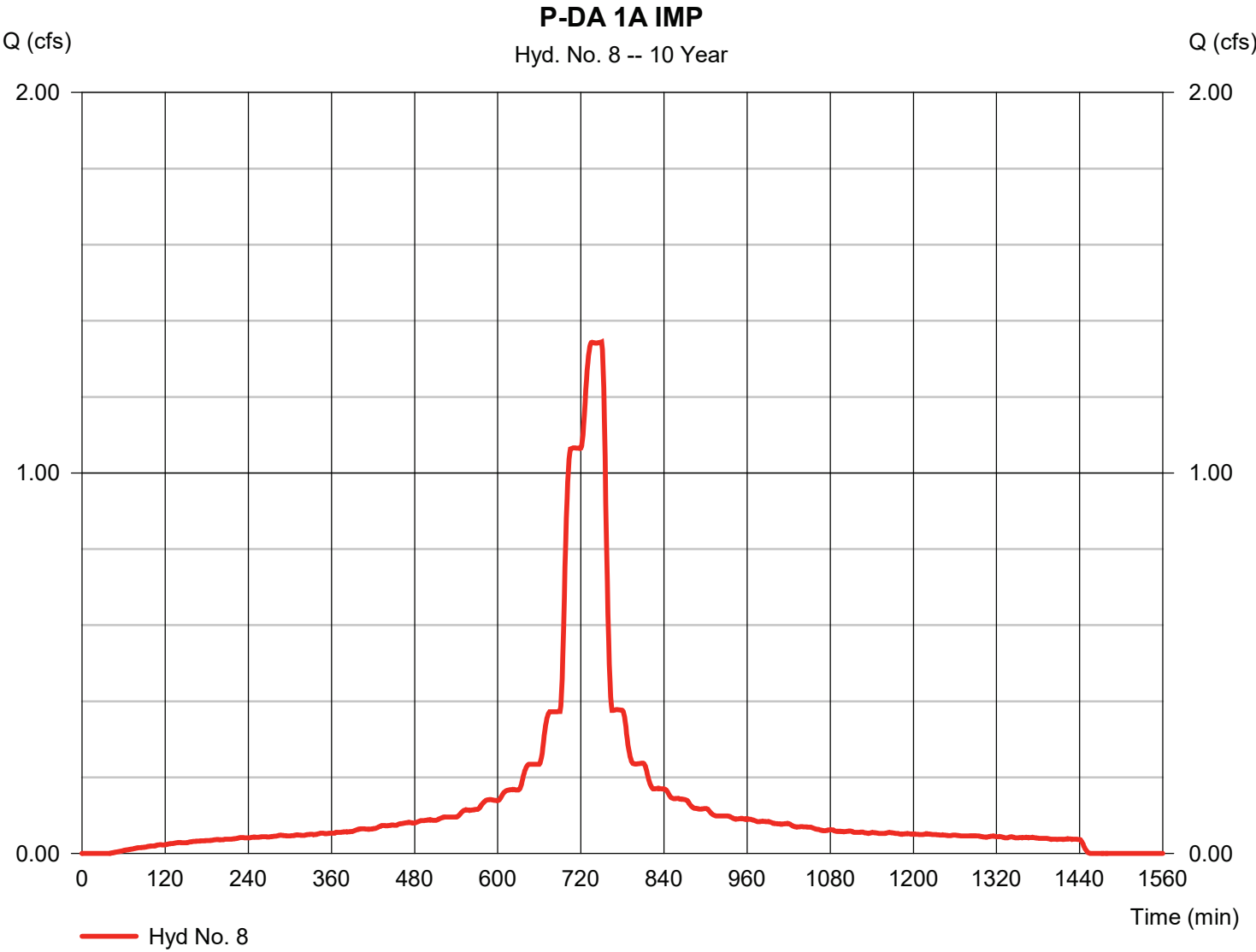
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 8

P-DA 1A IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 1.344 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 11,444 cuft
Drainage area	= 0.515 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 9.18 min
Total precip.	= 6.36 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

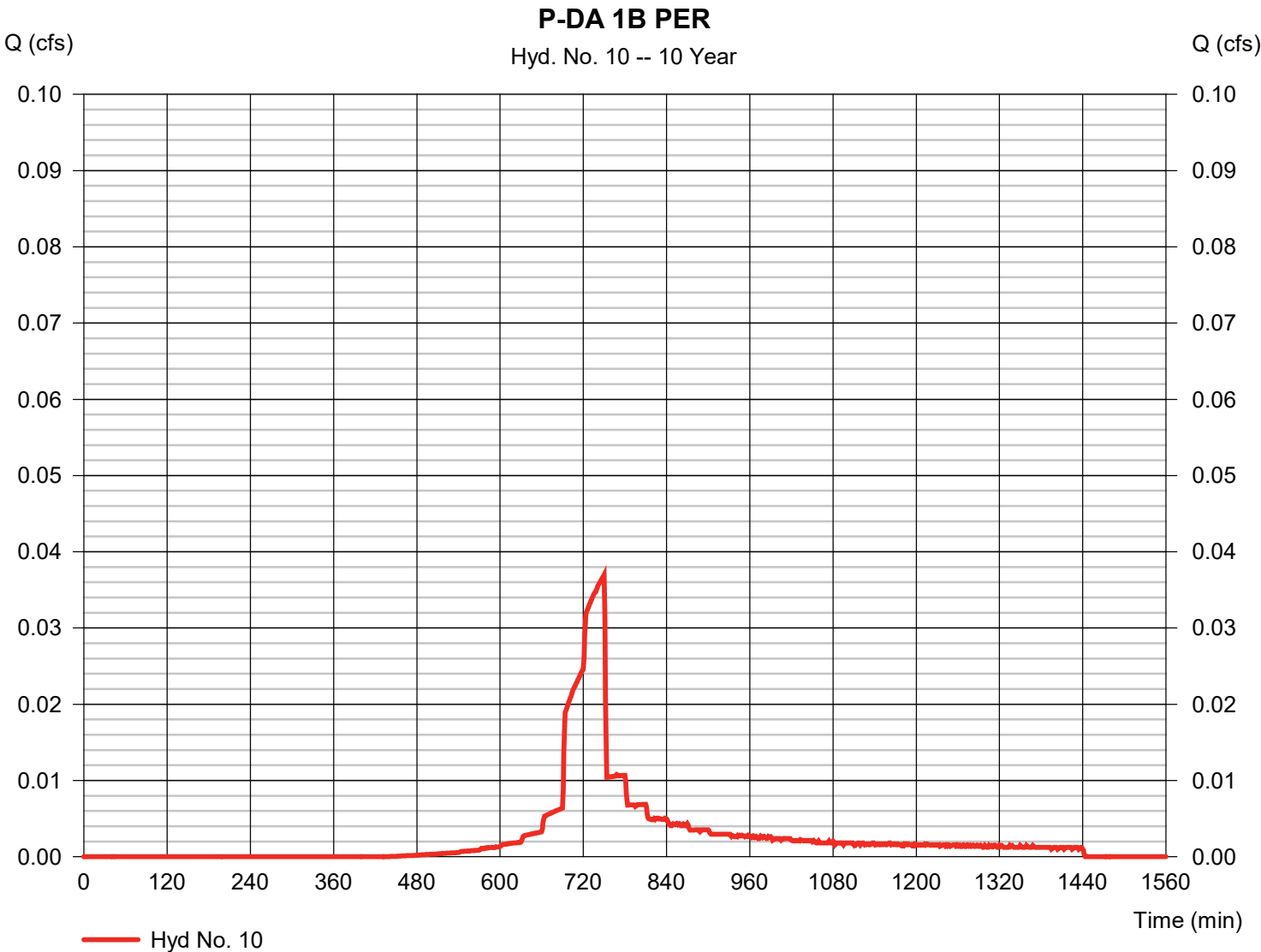
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 10

P-DA 1B PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.037 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 238 cuft
Drainage area	= 0.020 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 6.36 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

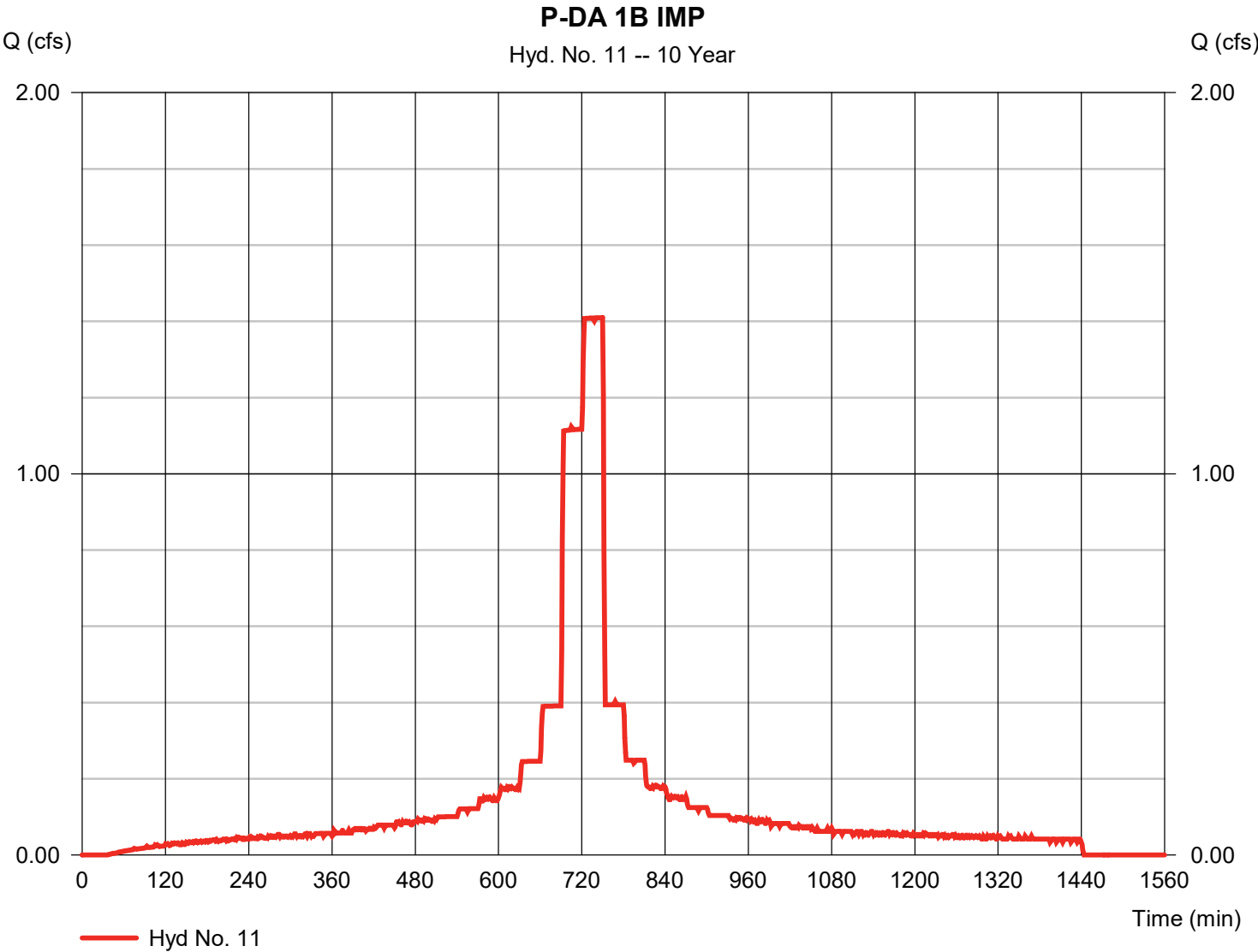
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Monday, 08 / 10 / 2026

Hyd. No. 11

P-DA 1B IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 1.410 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 11,999 cuft
Drainage area	= 0.576 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 6.36 in	Distribution	= Custom
Storm duration	= M:\Projects_CAD Standards\Hydroflow\NOAA_D 1 min.484		



Hydrograph Report

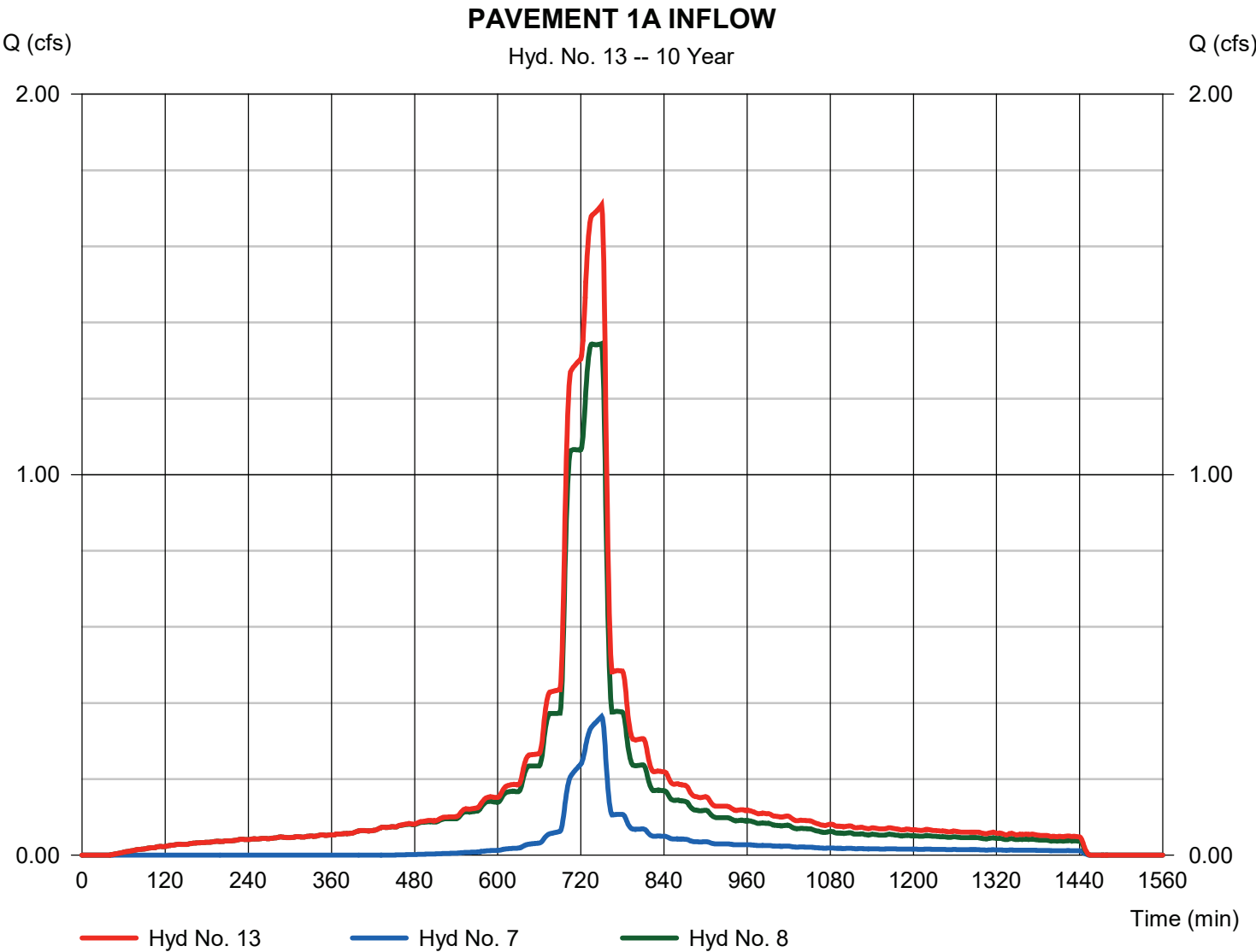
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 13

PAVEMENT 1A INFLOW

Hydrograph type	= Combine	Peak discharge	= 1.708 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 13,838 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 0.704 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

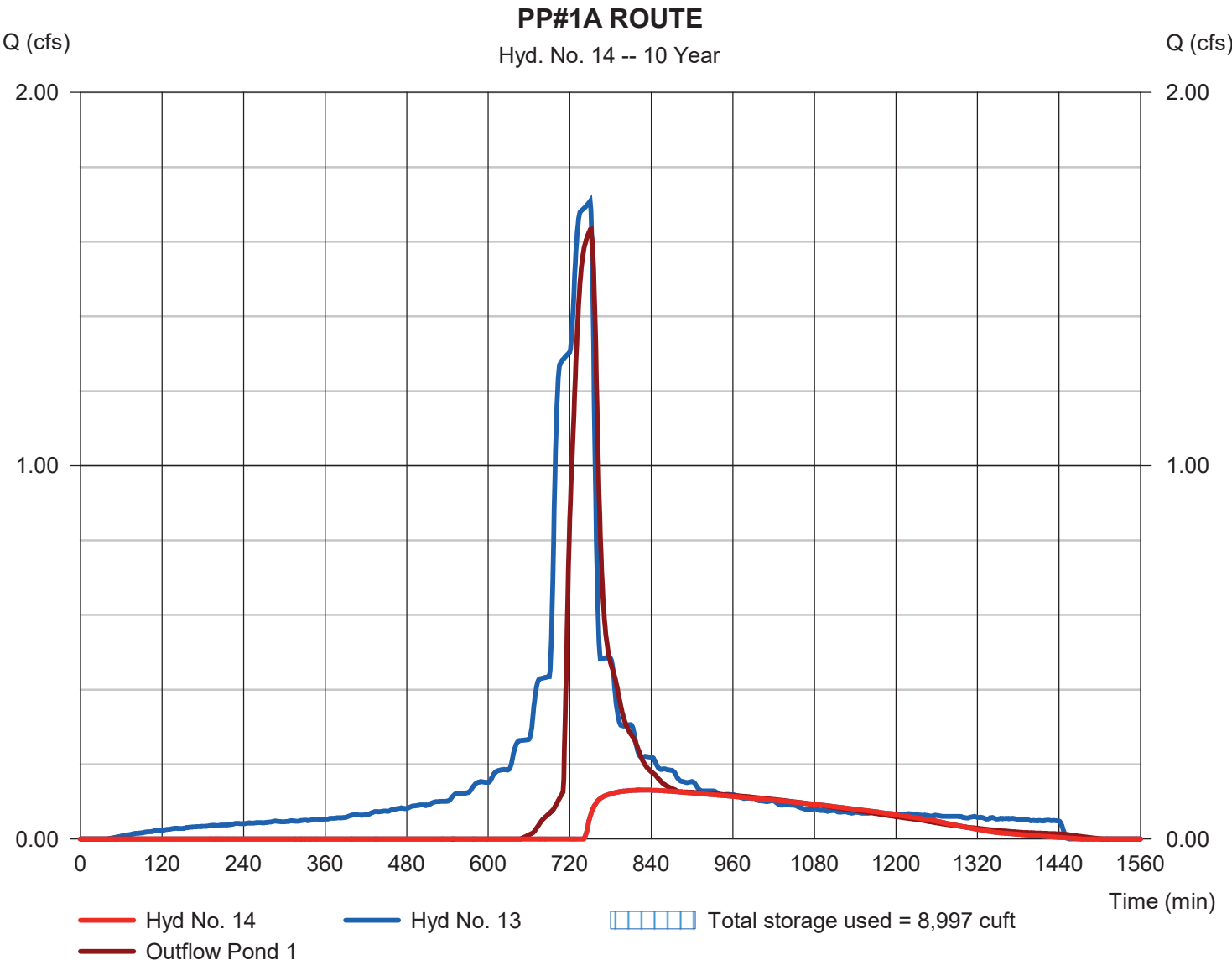
Monday, 08 / 10 / 2026

Hyd. No. 14

PP#1A ROUTE

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 0.131 cfs
Storm frequency	= 10 yrs	Time to peak	= 827 min
Time interval	= 1 min	Hyd. volume	= 3,305 cuft
Upper Pond	= PP #1	Lower Pond	= PP #2
Inflow hyd.	= 13 - PAVEMENT 1A INFLOW	Other Inflow hyd.	= None
Max. Elevation	= 470.78 ft	Max. Elevation	= 466.84 ft
Max. Storage	= 4,401 cuft	Max. Storage	= 4,596 cuft

Interconnected Pond Routing. Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

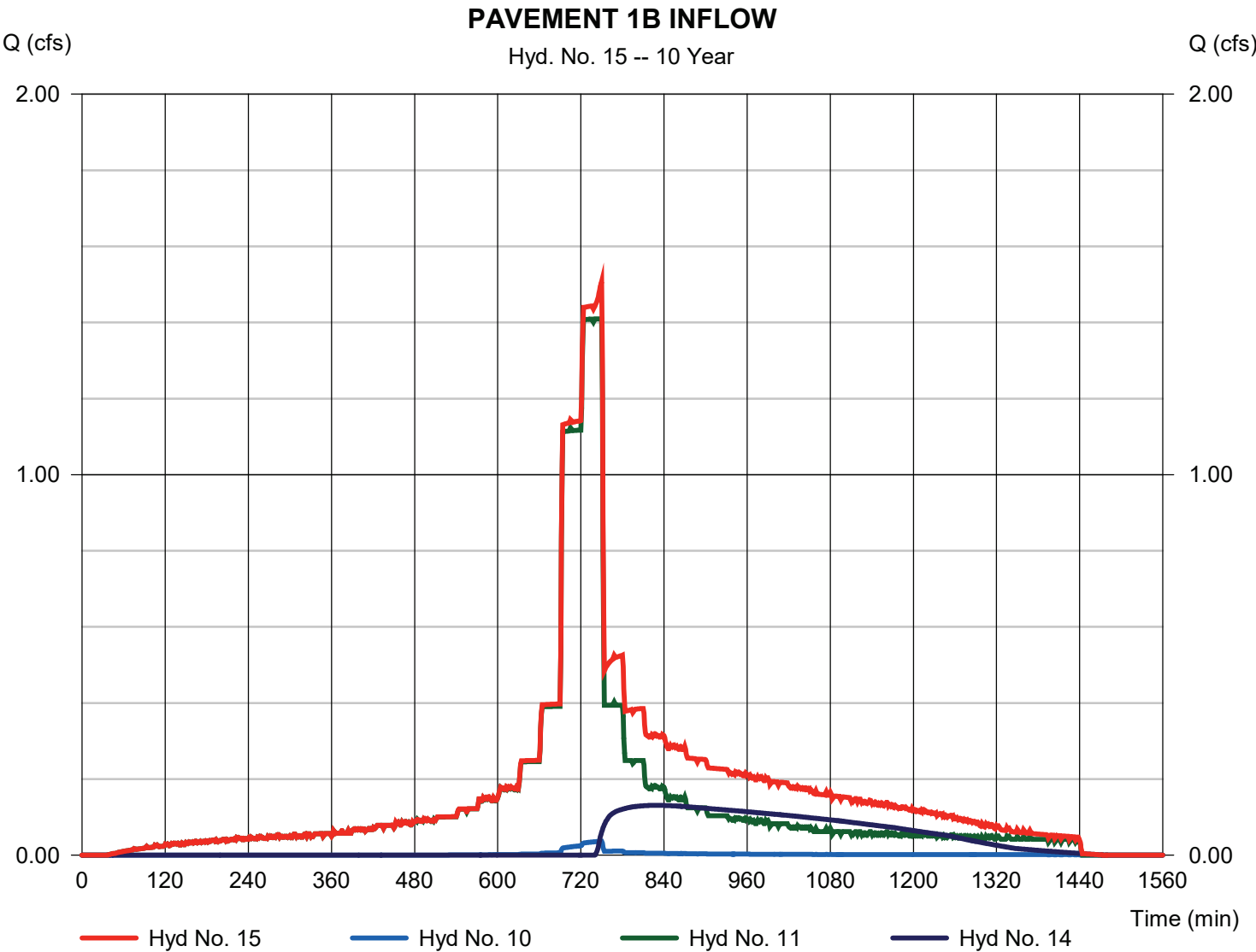
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 15

PAVEMENT 1B INFLOW

Hydrograph type	= Combine	Peak discharge	= 1.508 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 15,542 cuft
Inflow hyds.	= 10, 11, 14	Contrib. drain. area	= 0.596 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

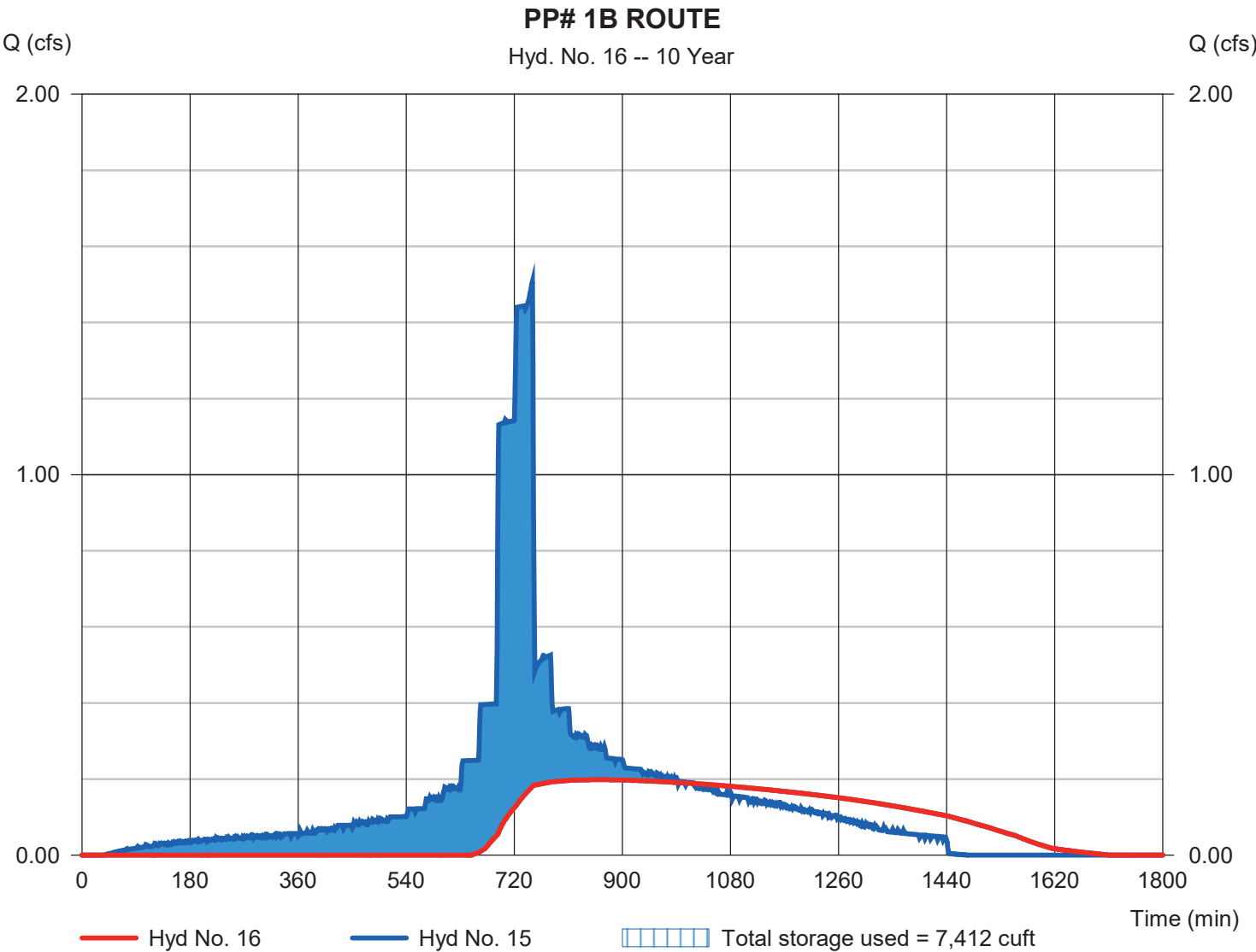
Monday, 08 / 10 / 2026

Hyd. No. 16

PP# 1B ROUTE

Hydrograph type	= Reservoir	Peak discharge	= 0.198 cfs
Storm frequency	= 10 yrs	Time to peak	= 871 min
Time interval	= 1 min	Hyd. volume	= 8,207 cuft
Inflow hyd. No.	= 15 - PAVEMENT 1B INFLOW	Max. Elevation	= 467.66 ft
Reservoir name	= PP #2	Max. Storage	= 7,412 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

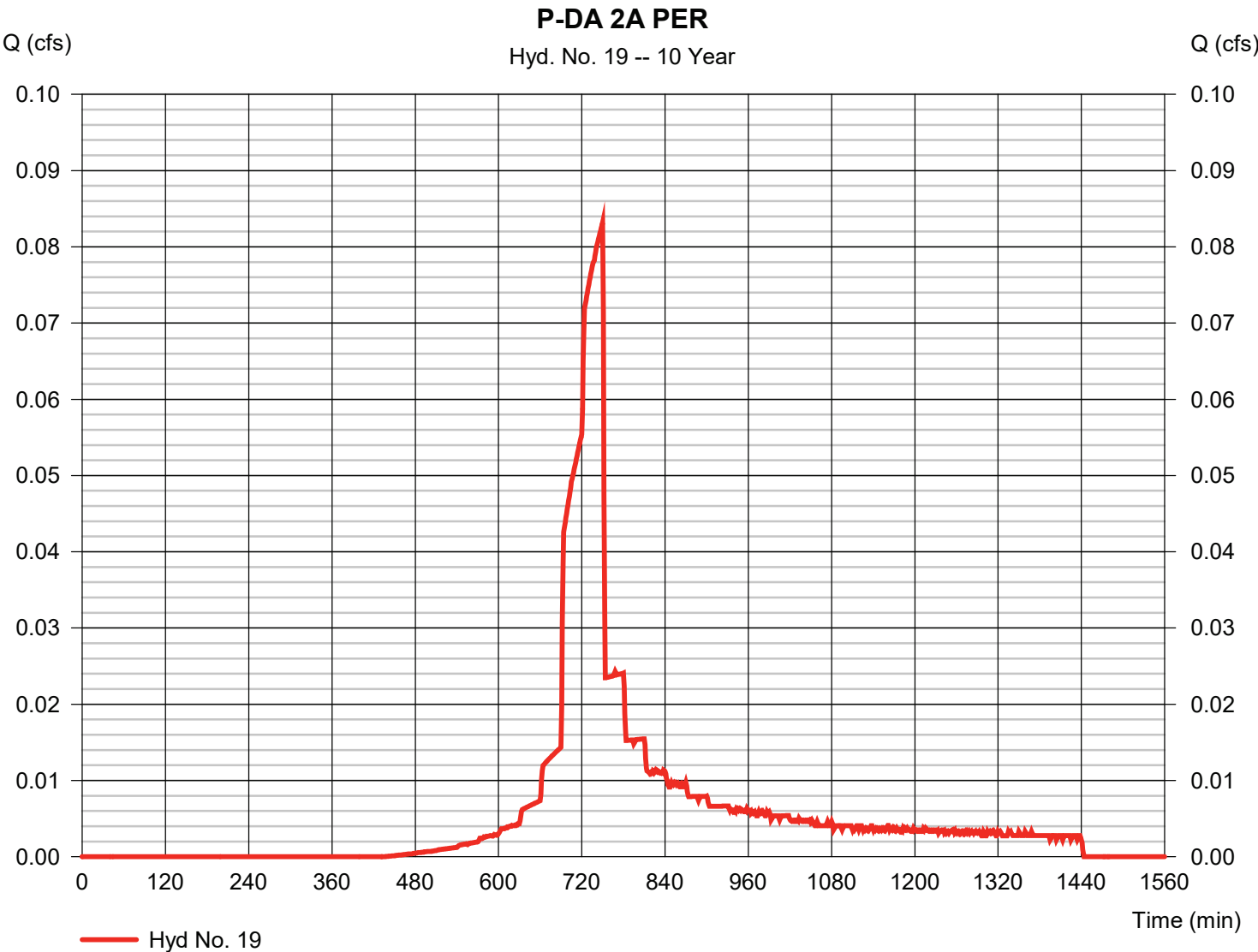
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Monday, 08 / 10 / 2026

Hyd. No. 19

P-DA 2A PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.083 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 534 cuft
Drainage area	= 0.045 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 6.36 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

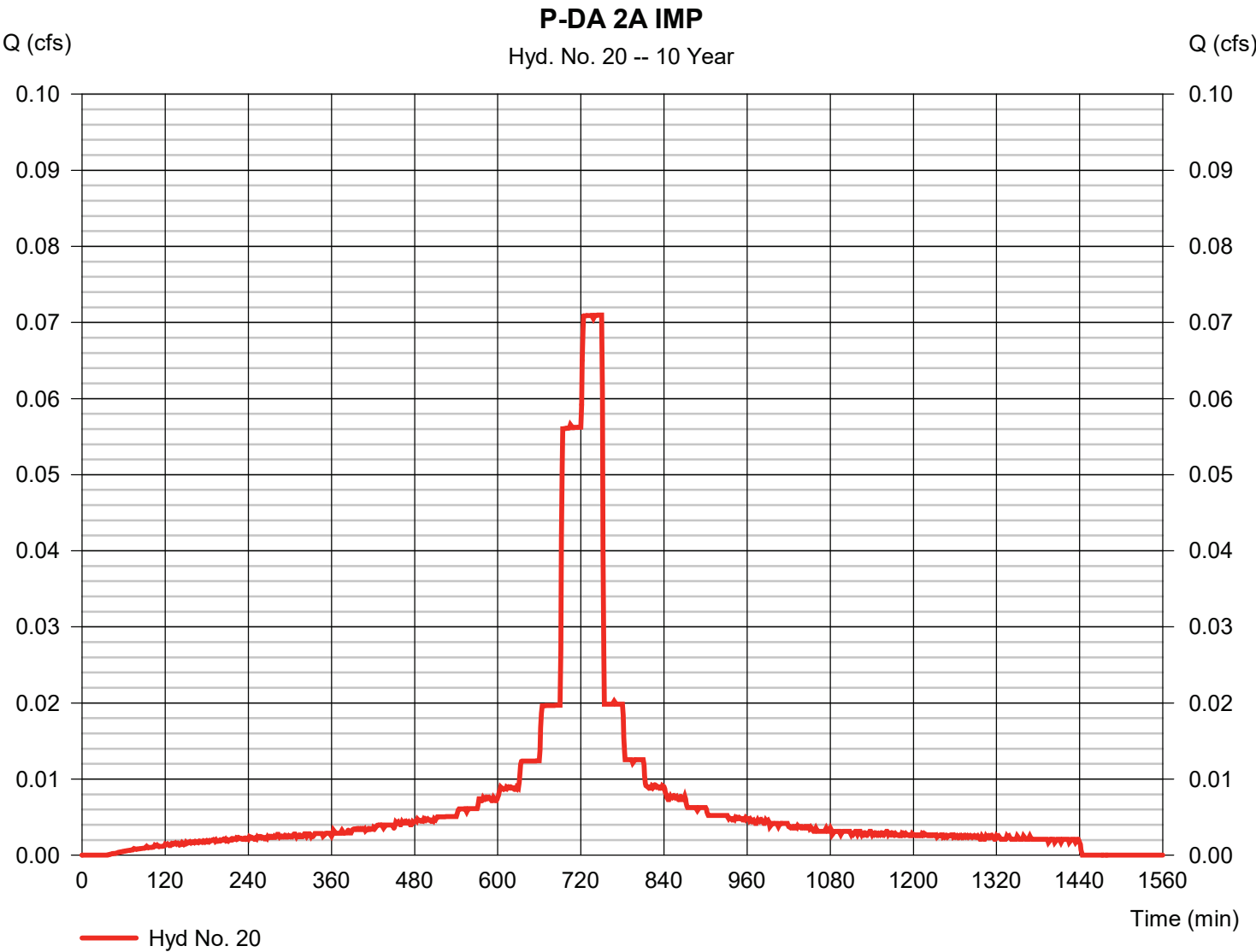
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 20

P-DA 2A IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.071 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 604 cuft
Drainage area	= 0.029 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 6.36 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydroflow\NOAA_D 1 min.484		



Hydrograph Report

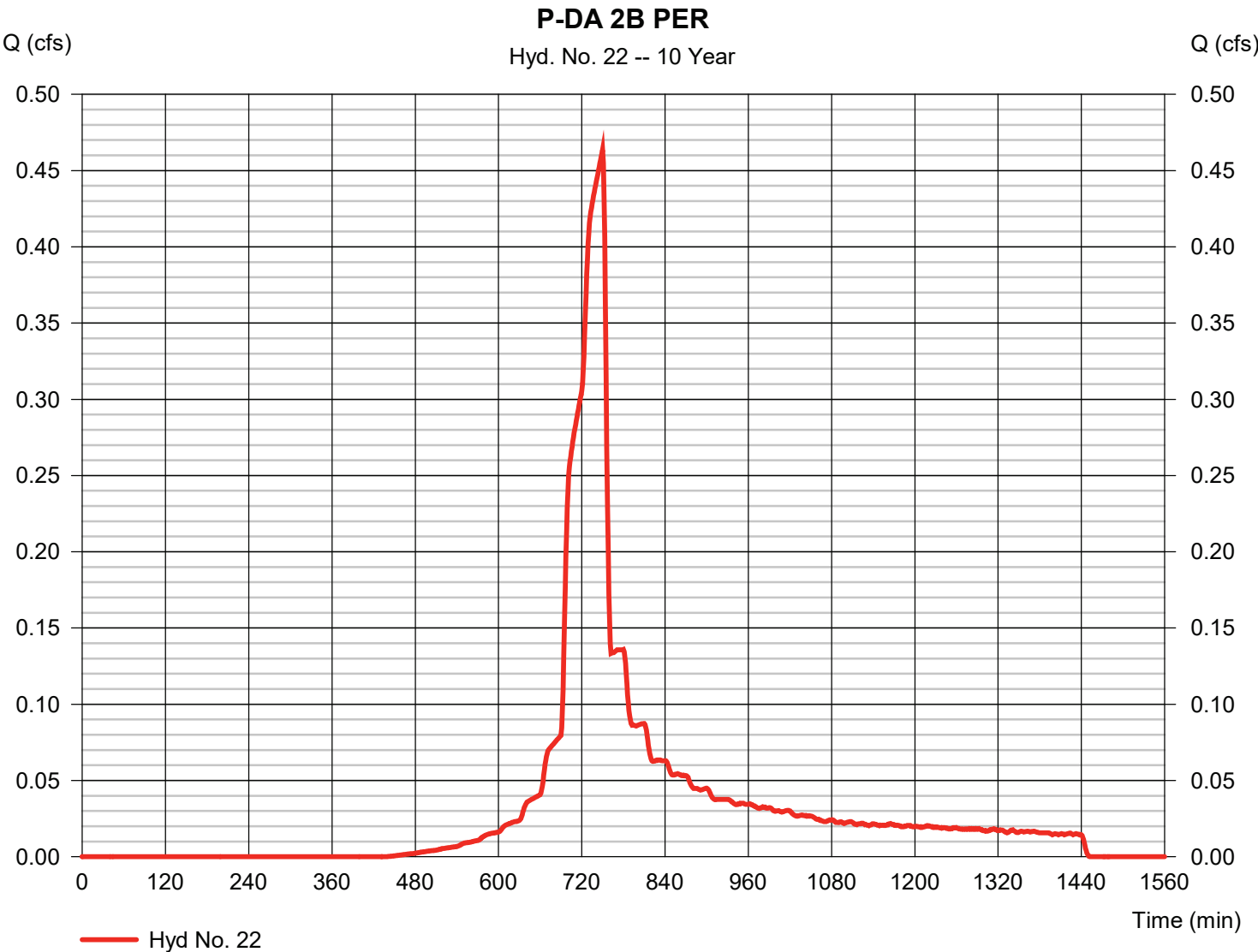
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 22

P-DA 2B PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.464 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 3,026 cuft
Drainage area	= 0.245 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 8.33 min
Total precip.	= 6.36 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydroflow\NOAA_D 1 min.484		



Hydrograph Report

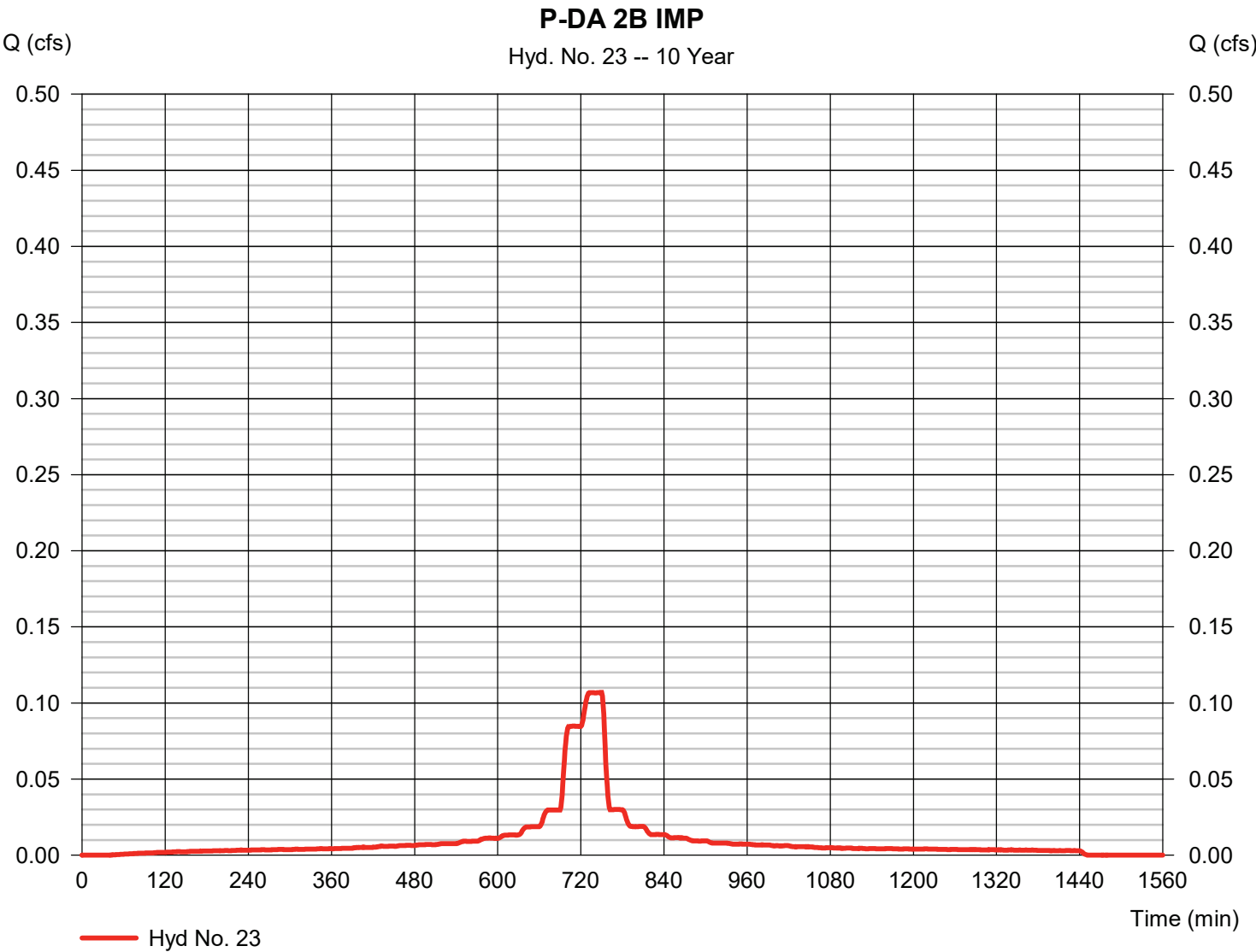
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 23

P-DA 2B IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.107 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 910 cuft
Drainage area	= 0.042 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 8.33 min
Total precip.	= 6.36 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

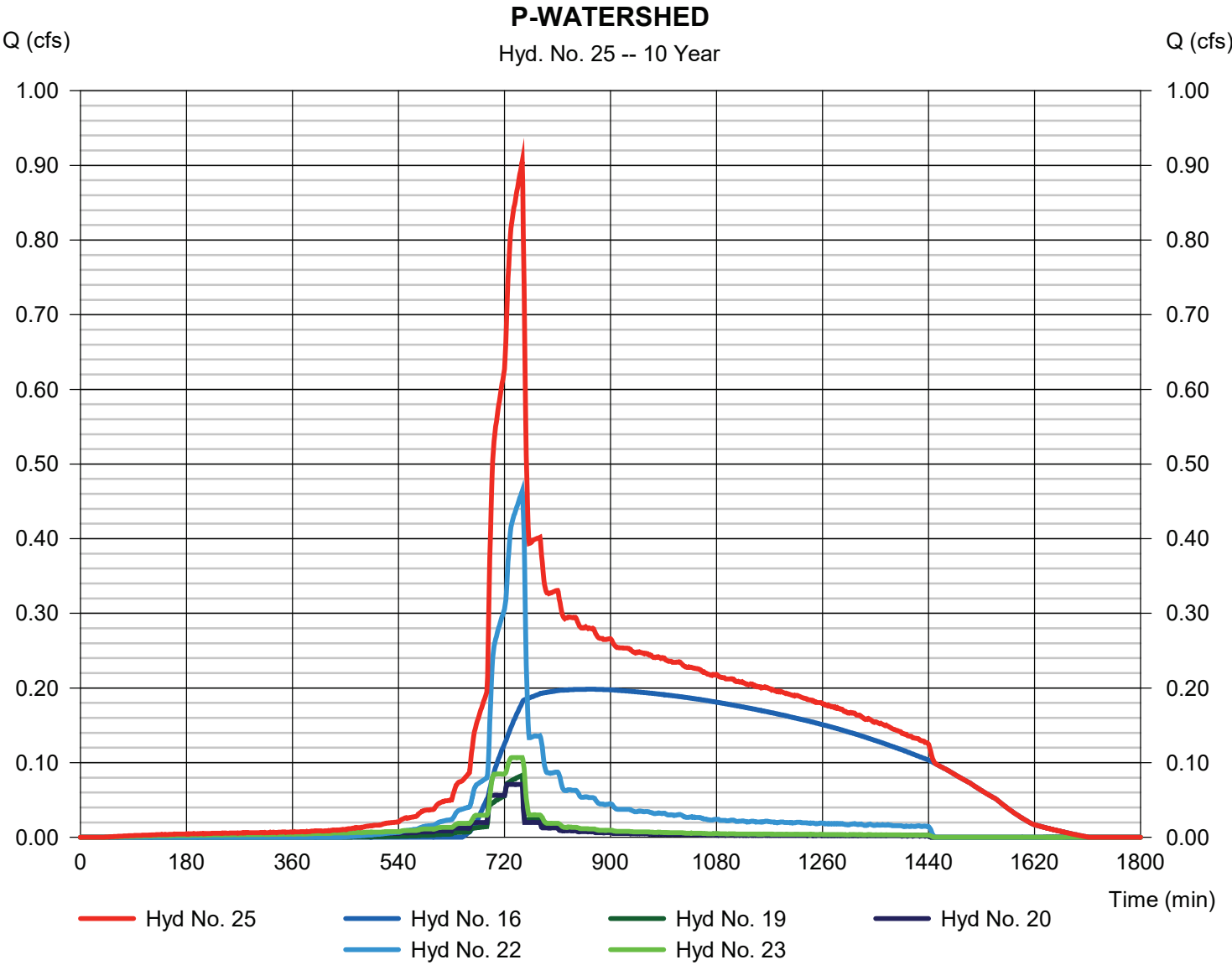
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 25

P-WATERSHED

Hydrograph type	= Combine	Peak discharge	= 0.905 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 13,282 cuft
Inflow hyds.	= 16, 19, 20, 22, 23	Contrib. drain. area	= 0.361 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

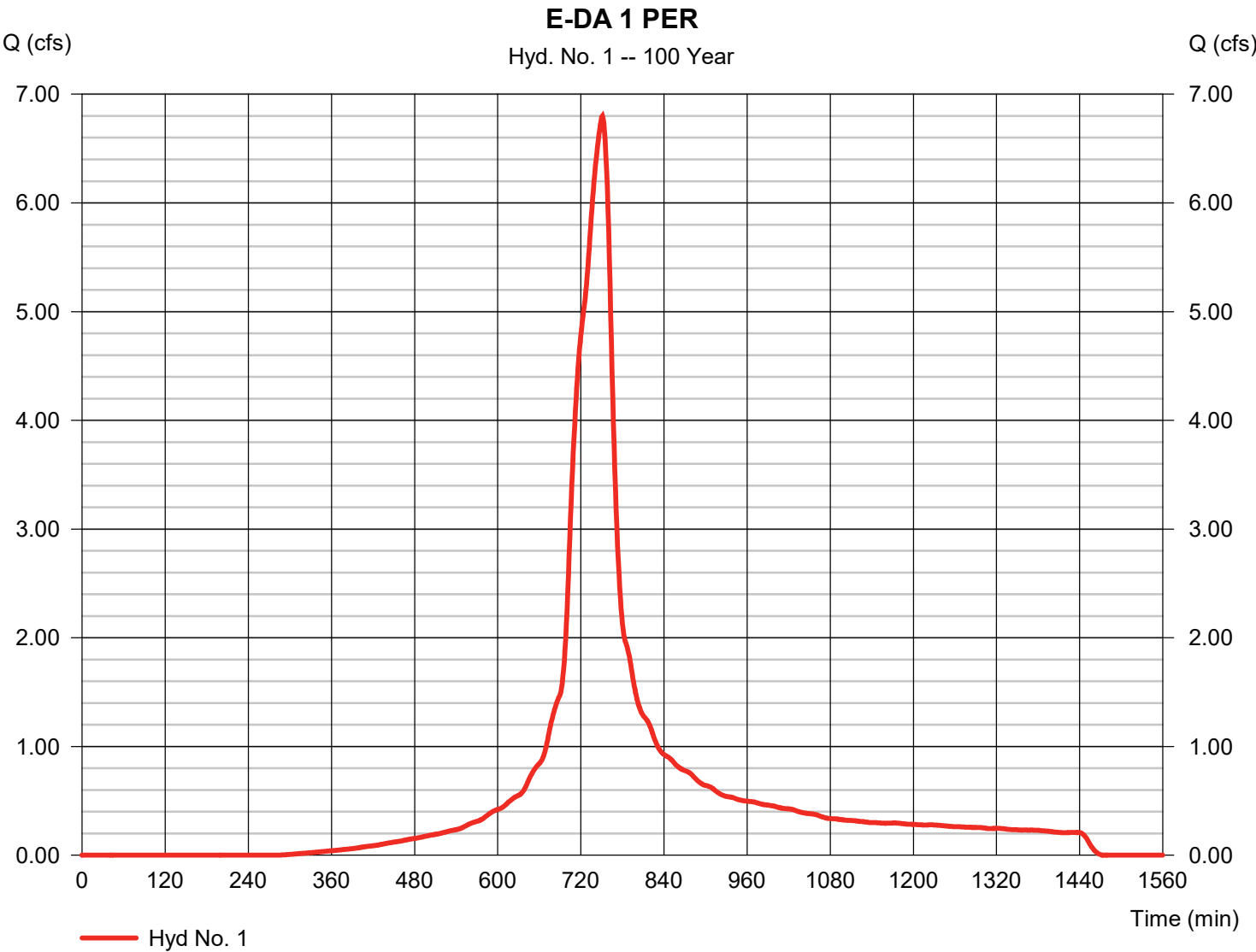
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	6.800	1	751	49,639	-----	-----	-----	E-DA 1 PER
2	SCS Runoff	0.029	1	750	248	-----	-----	-----	E-DA 1 IMP
4	Combine	6.829	1	751	49,888	1, 2,	-----	-----	E-WATERSHED
7	SCS Runoff	0.789	1	750	5,615	-----	-----	-----	P-DA 1A PER
8	SCS Runoff	2.443	1	736	21,122	-----	-----	-----	P-DA 1A IMP
10	SCS Runoff	0.079	1	750	557	-----	-----	-----	P-DA 1B PER
11	SCS Runoff	2.562	1	750	22,148	-----	-----	-----	P-DA 1B IMP
13	Combine	3.232	1	750	26,737	7, 8,	-----	-----	PAVEMENT 1A INFLOW
14	Reservoir(i)	2.226	1	759	13,495	13	470.95	14,546	PP#1A ROUTE
15	Combine	3.678	1	750	36,200	10, 11, 14	-----	-----	PAVEMENT 1B INFLOW
16	Reservoir	3.030	1	752	26,581	15	468.43	10,023	PP# 1B ROUTE
19	SCS Runoff	0.178	1	750	1,253	-----	-----	-----	P-DA 2A PER
20	SCS Runoff	0.129	1	750	1,115	-----	-----	-----	P-DA 2A IMP
22	SCS Runoff	1.001	1	750	7,096	-----	-----	-----	P-DA 2B PER
23	SCS Runoff	0.194	1	750	1,680	-----	-----	-----	P-DA 2B IMP
25	Combine	4.435	1	751	37,725	16, 19, 20, 22, 23,	-----	-----	P-WATERSHED
Future Rev A.gpw					Return Period: 100 Year			Monday, 08 / 10 / 2026	

Hydrograph Report

Hyd. No. 1

E-DA 1 PER

Hydrograph type	= SCS Runoff	Peak discharge	= 6.800 cfs
Storm frequency	= 100 yrs	Time to peak	= 751 min
Time interval	= 1 min	Hyd. volume	= 49,639 cuft
Drainage area	= 1.655 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 20.59 min
Total precip.	= 11.54 in	Distribution	= Custom
Storm duration	= M:\Projects_CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

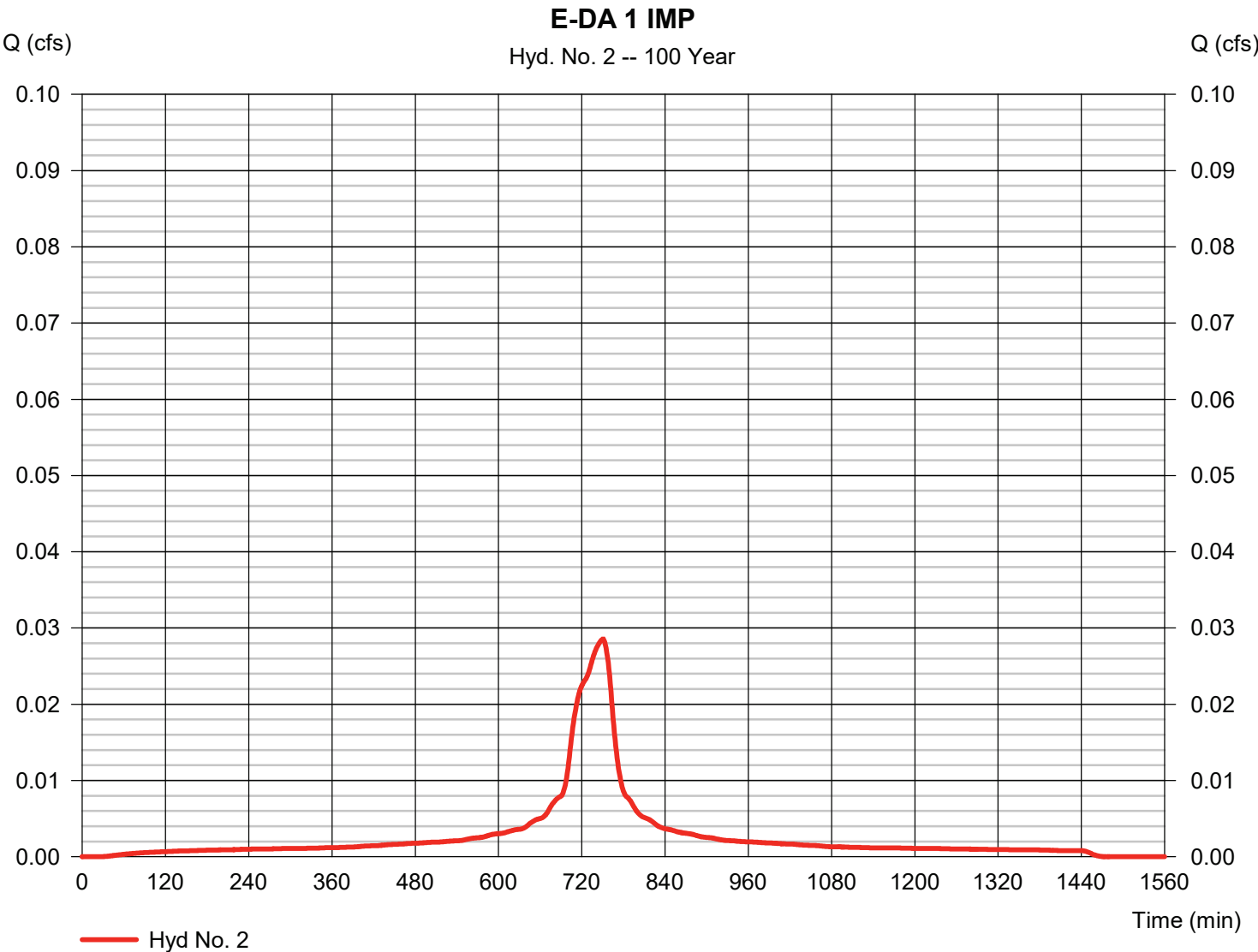
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Monday, 08 / 10 / 2026

Hyd. No. 2

E-DA 1 IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.029 cfs
Storm frequency	= 100 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 248 cuft
Drainage area	= 0.006 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 20.59 min
Total precip.	= 11.54 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		

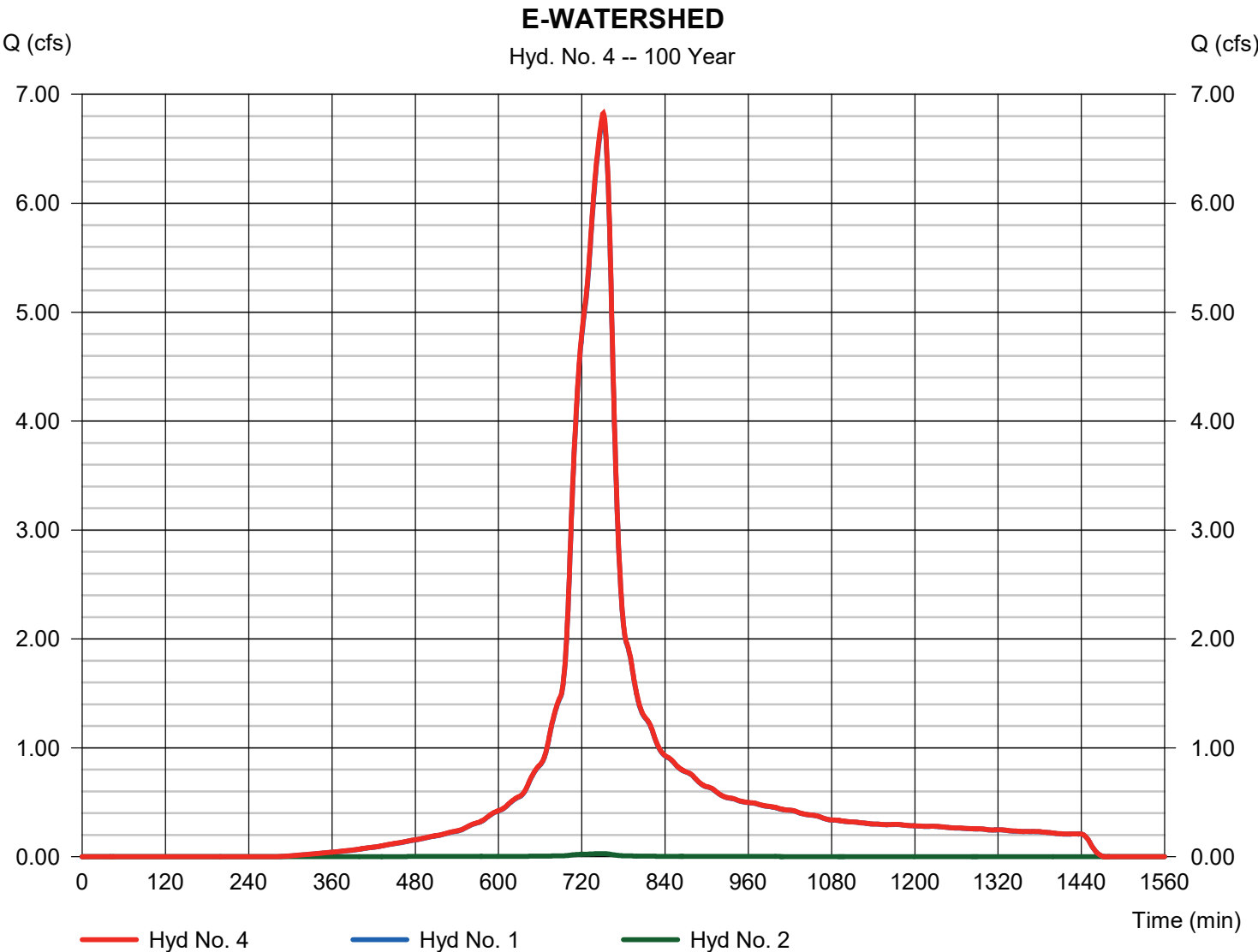


Hydrograph Report

Hyd. No. 4

E-WATERSHED

Hydrograph type	= Combine	Peak discharge	= 6.829 cfs
Storm frequency	= 100 yrs	Time to peak	= 751 min
Time interval	= 1 min	Hyd. volume	= 49,888 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 1.661 ac



Hydrograph Report

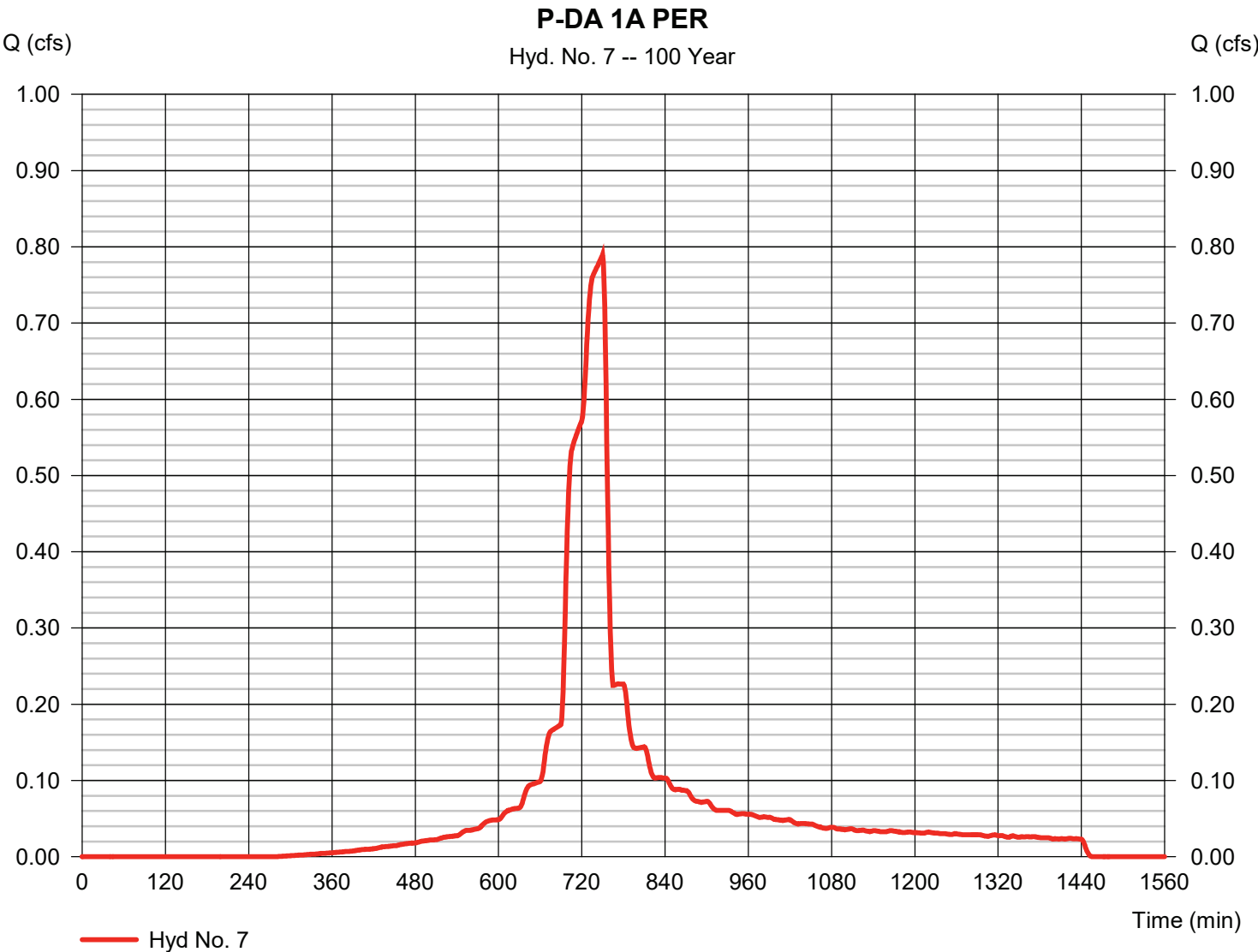
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Monday, 08 / 10 / 2026

Hyd. No. 7

P-DA 1A PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.789 cfs
Storm frequency	= 100 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 5,615 cuft
Drainage area	= 0.189 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 9.18 min
Total precip.	= 11.54 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		

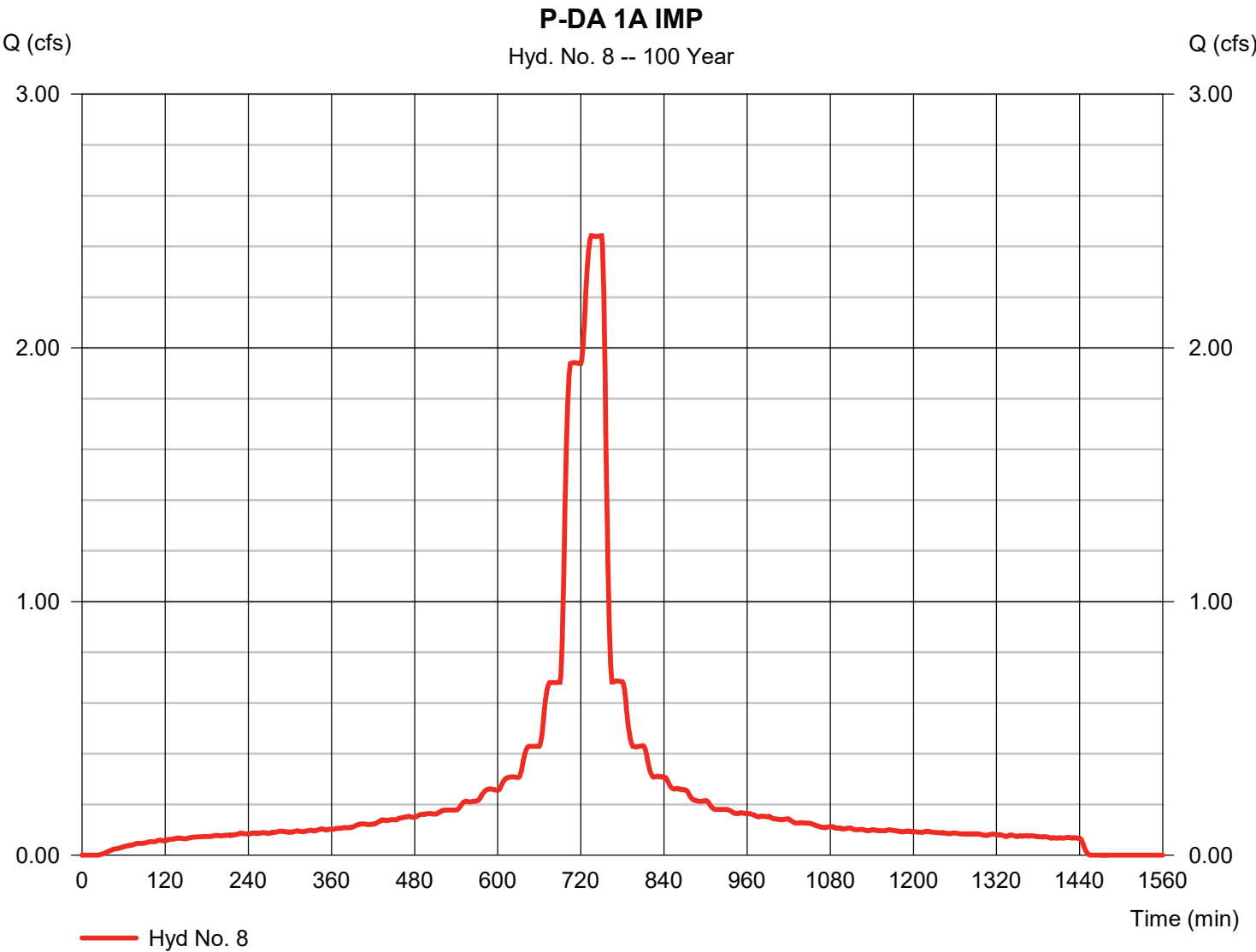


Hydrograph Report

Hyd. No. 8

P-DA 1A IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 2.443 cfs
Storm frequency	= 100 yrs	Time to peak	= 736 min
Time interval	= 1 min	Hyd. volume	= 21,122 cuft
Drainage area	= 0.515 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 9.18 min
Total precip.	= 11.54 in	Distribution	= Custom
Storm duration	= M:\Projects_CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

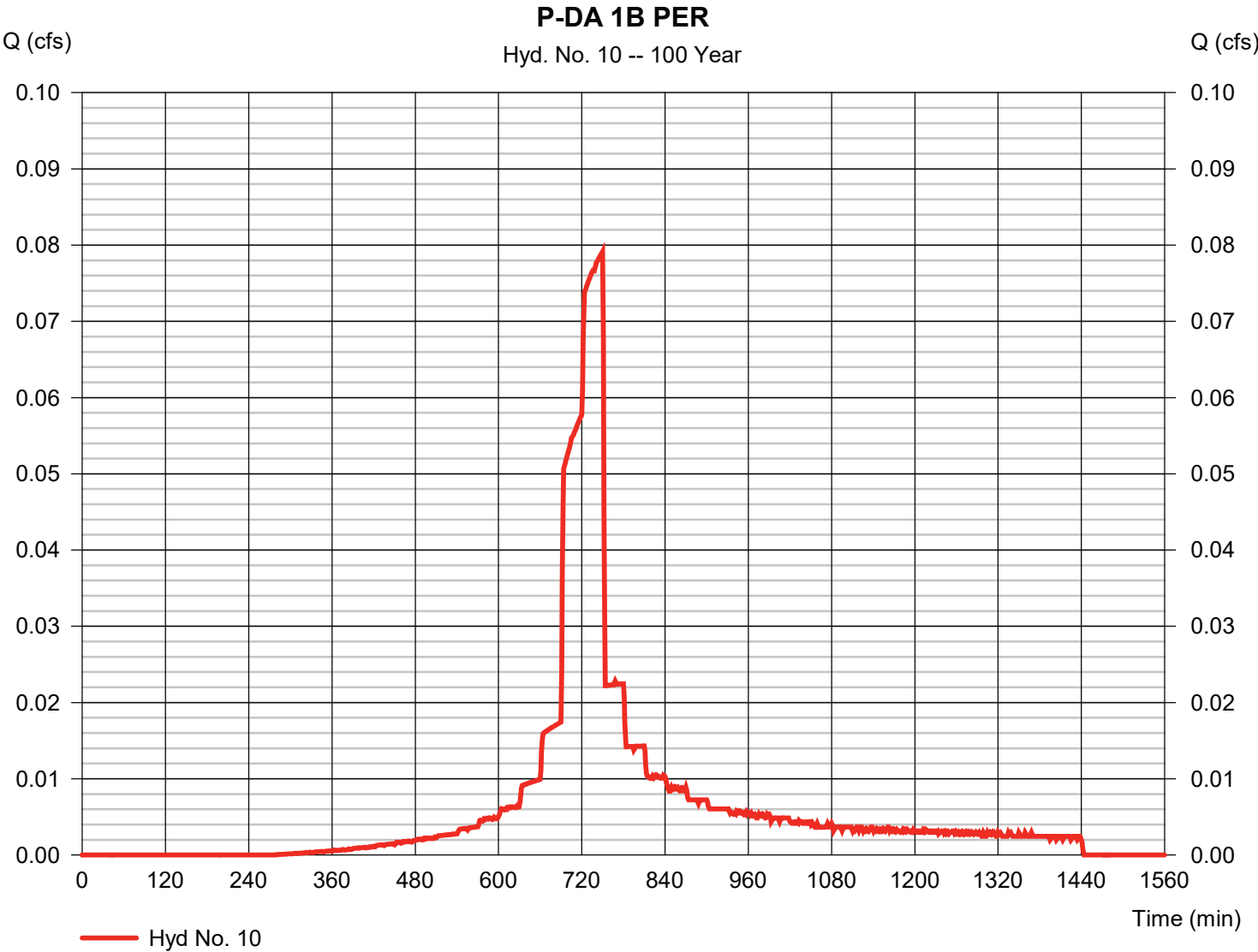
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Monday, 08 / 10 / 2026

Hyd. No. 10

P-DA 1B PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.079 cfs
Storm frequency	= 100 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 557 cuft
Drainage area	= 0.020 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 11.54 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

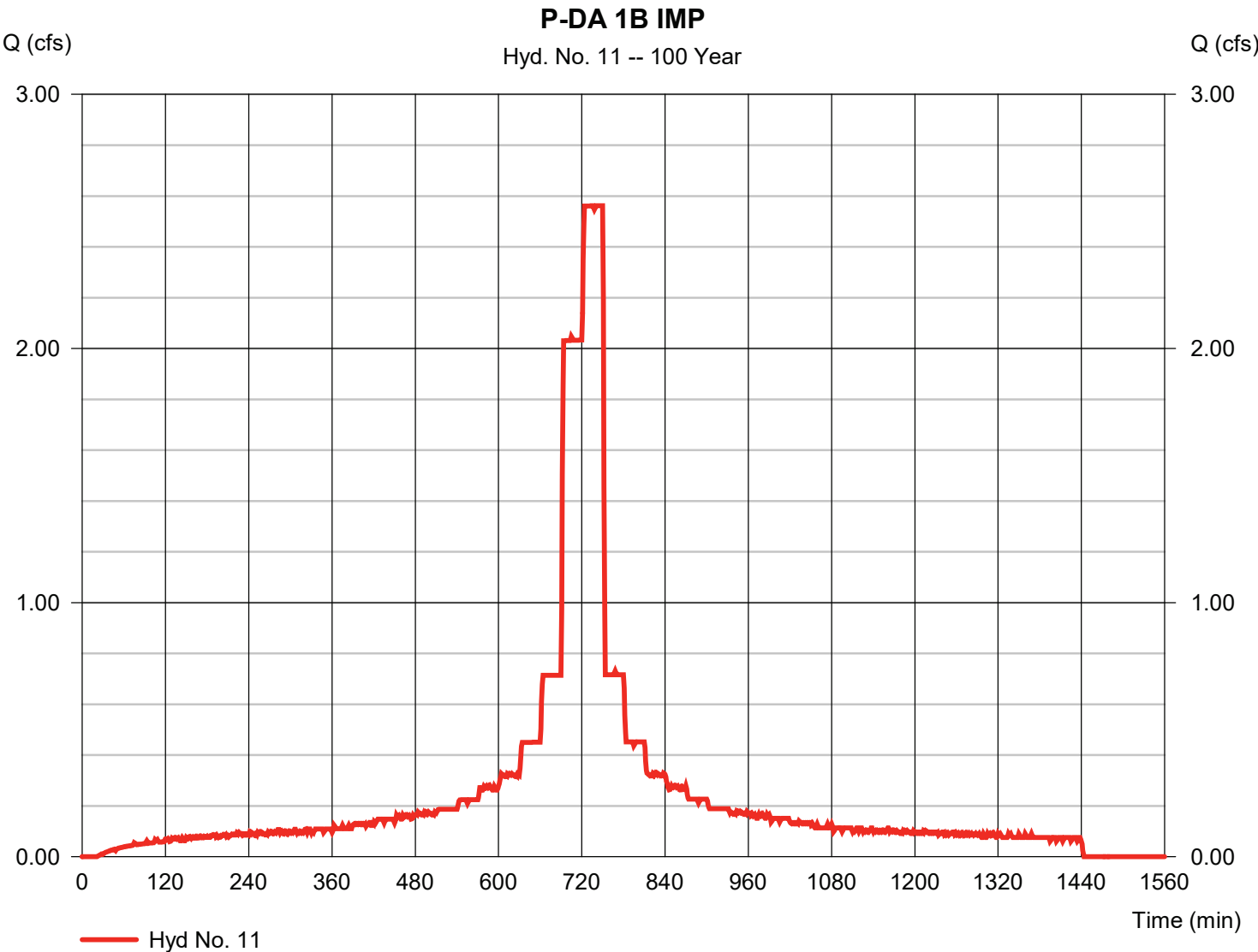
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Monday, 08 / 10 / 2026

Hyd. No. 11

P-DA 1B IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 2.562 cfs
Storm frequency	= 100 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 22,148 cuft
Drainage area	= 0.576 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 11.54 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

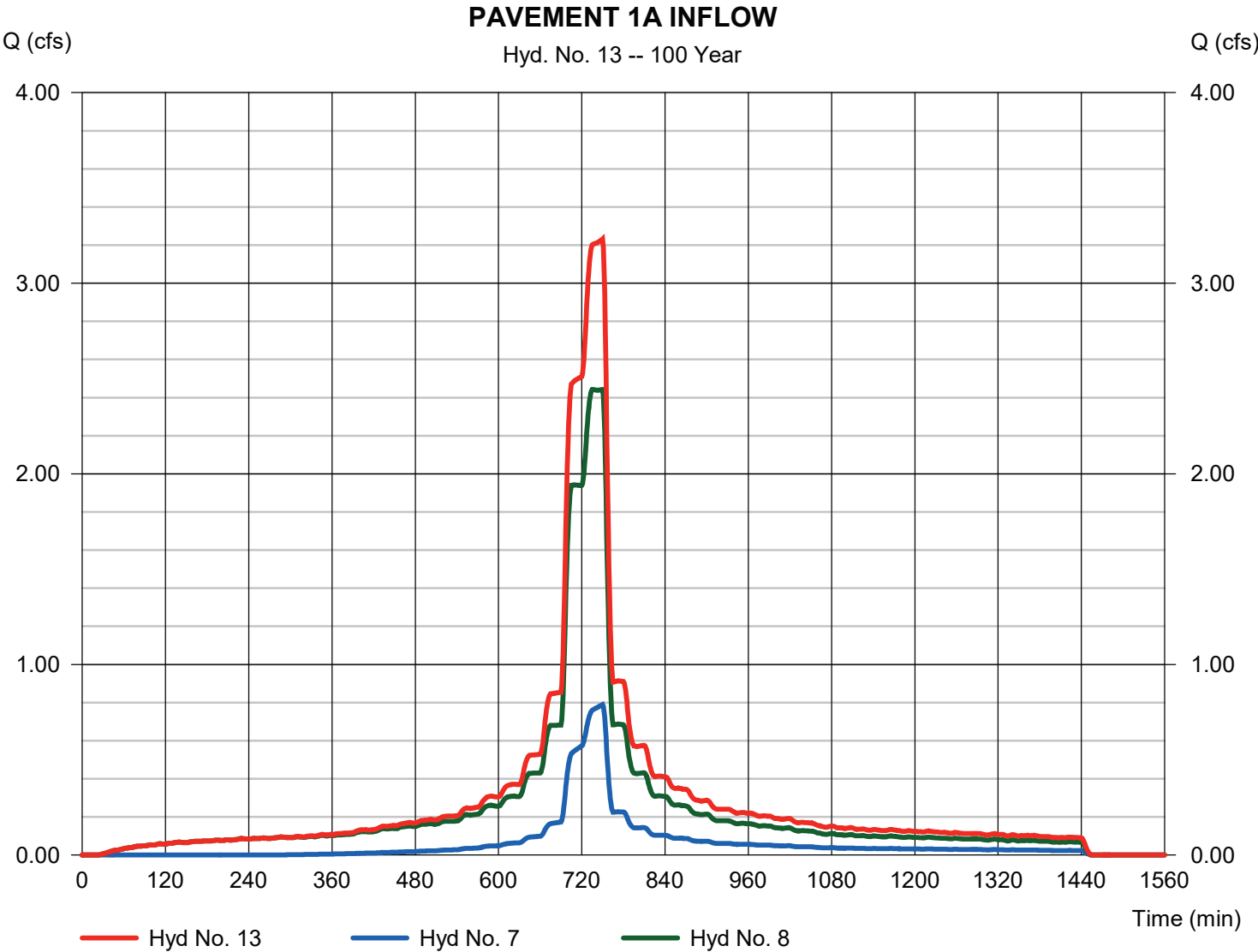
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Monday, 08 / 10 / 2026

Hyd. No. 13

PAVEMENT 1A INFLOW

Hydrograph type	= Combine	Peak discharge	= 3.232 cfs
Storm frequency	= 100 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 26,737 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 0.704 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

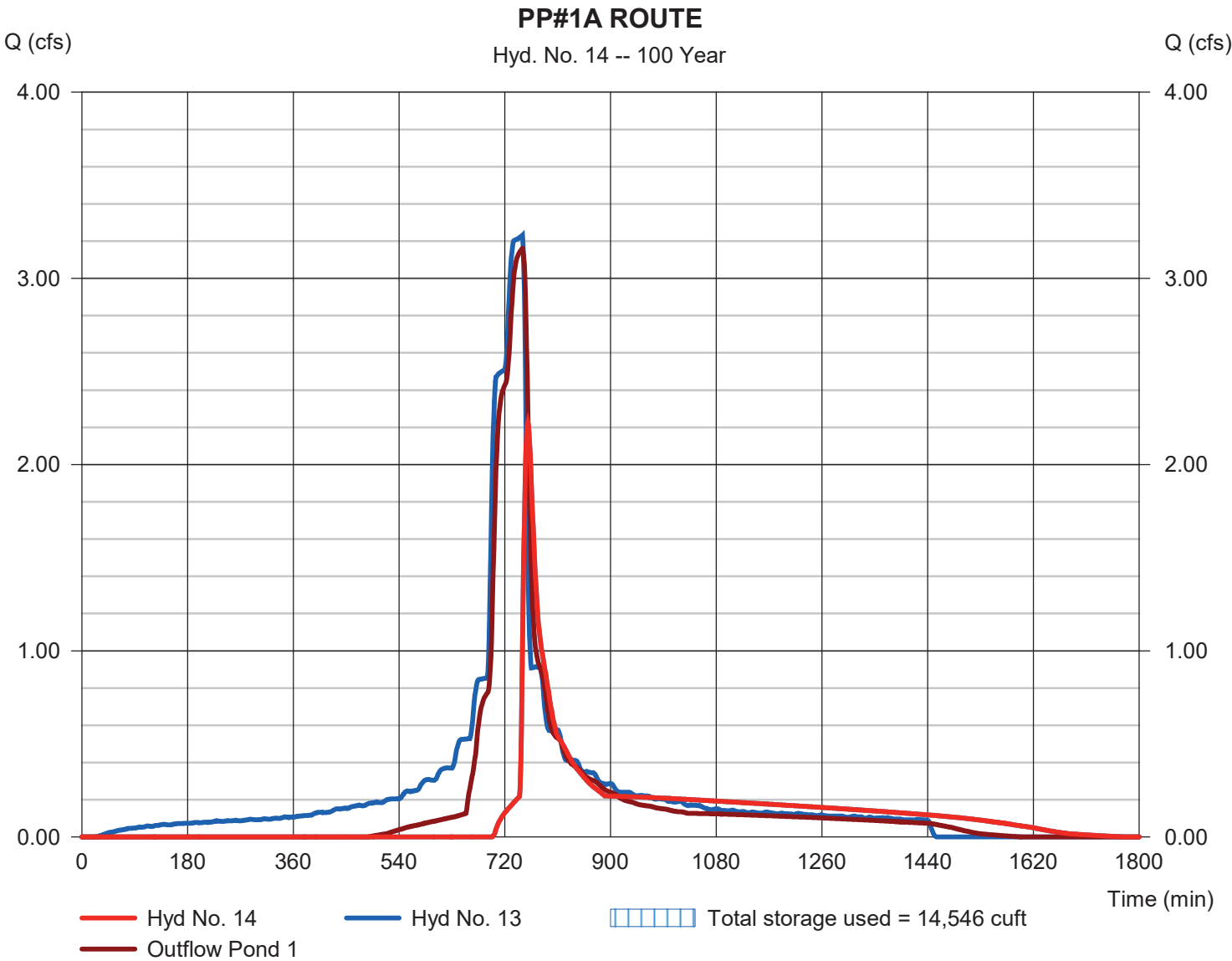
Monday, 08 / 10 / 2026

Hyd. No. 14

PP#1A ROUTE

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 2.226 cfs
Storm frequency	= 100 yrs	Time to peak	= 759 min
Time interval	= 1 min	Hyd. volume	= 13,495 cuft
Open Pond	= PP #1	Open Pond	= PP #2
Inflow hyd.	= 13 - PAVEMENT 1A INFLOW	Other Inflow hyd.	= None
Max. Elevation	= 470.95 ft	Max. Elevation	= 468.34 ft
Max. Storage	= 4,824 cuft	Max. Storage	= 9,722 cuft

Interconnected Pond Routing. Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

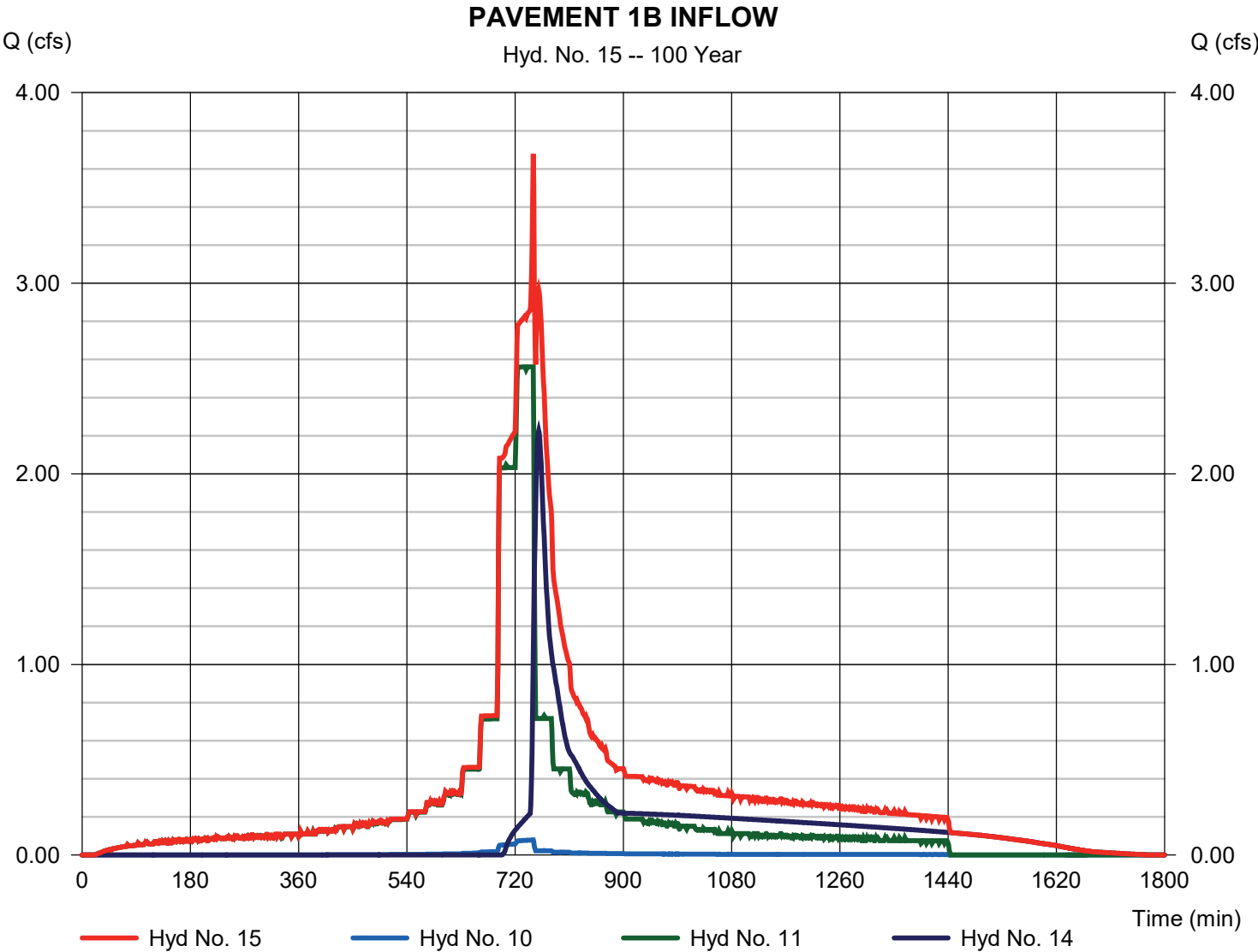
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Monday, 08 / 10 / 2026

Hyd. No. 15

PAVEMENT 1B INFLOW

Hydrograph type	= Combine	Peak discharge	= 3.678 cfs
Storm frequency	= 100 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 36,200 cuft
Inflow hyds.	= 10, 11, 14	Contrib. drain. area	= 0.596 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

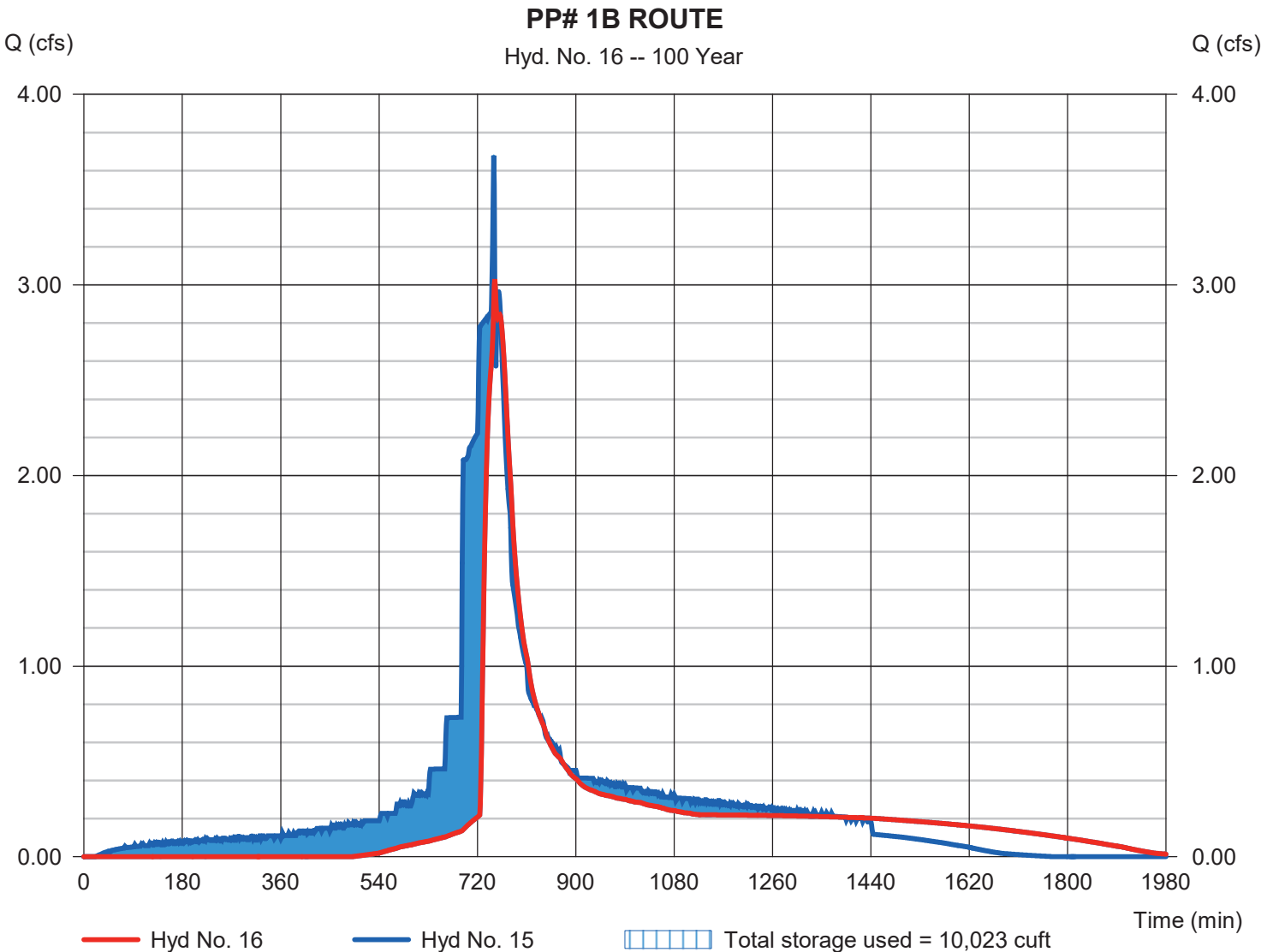
Monday, 08 / 10 / 2026

Hyd. No. 16

PP# 1B ROUTE

Hydrograph type	= Reservoir	Peak discharge	= 3.030 cfs
Storm frequency	= 100 yrs	Time to peak	= 752 min
Time interval	= 1 min	Hyd. volume	= 26,581 cuft
Inflow hyd. No.	= 15 - PAVEMENT 1B INFLOW	Max. Elevation	= 468.43 ft
Reservoir name	= PP #2	Max. Storage	= 10,023 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

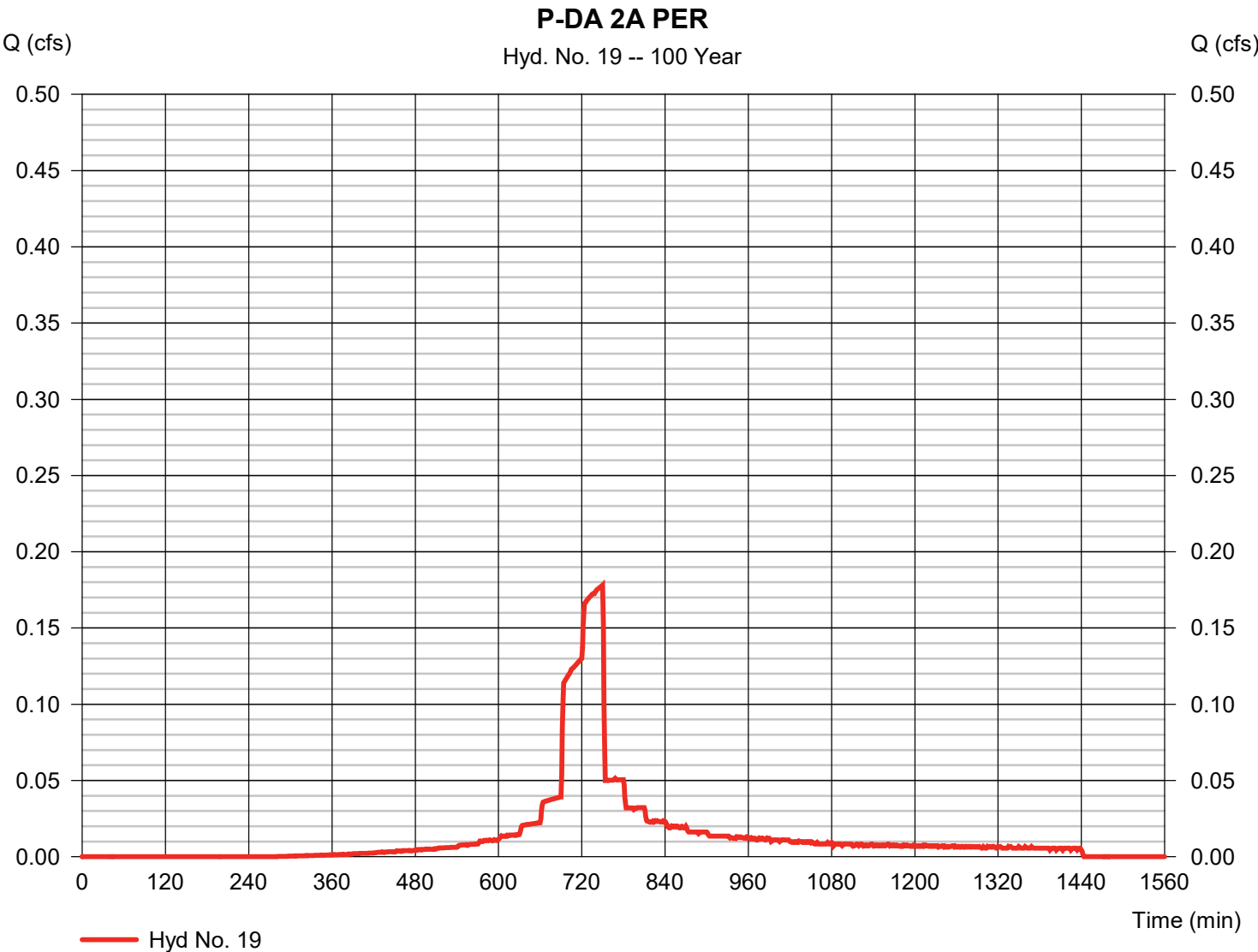
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Monday, 08 / 10 / 2026

Hyd. No. 19

P-DA 2A PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.178 cfs
Storm frequency	= 100 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 1,253 cuft
Drainage area	= 0.045 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 11.54 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		

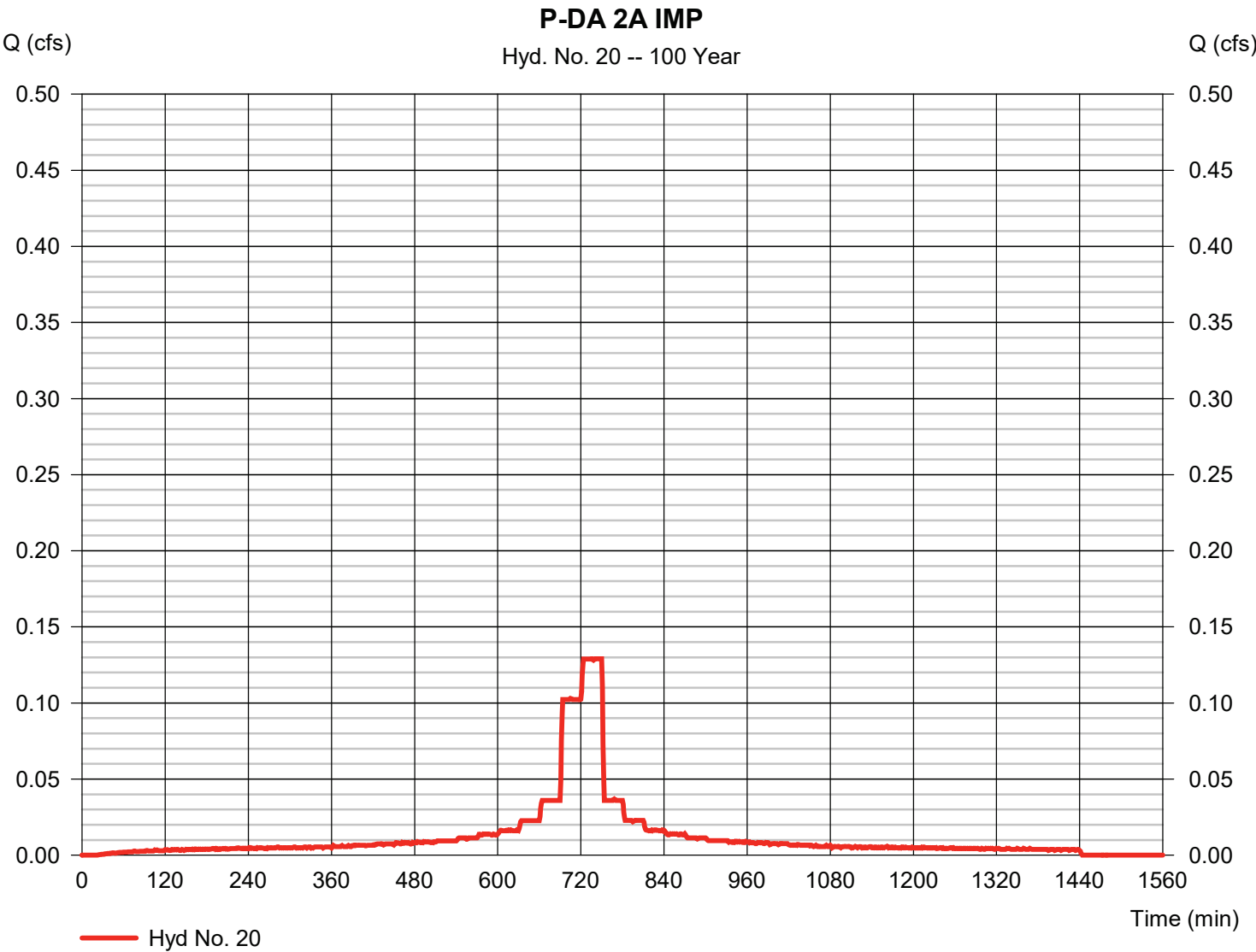


Hydrograph Report

Hyd. No. 20

P-DA 2A IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.129 cfs
Storm frequency	= 100 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 1,115 cuft
Drainage area	= 0.029 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 1.60 min
Total precip.	= 11.54 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

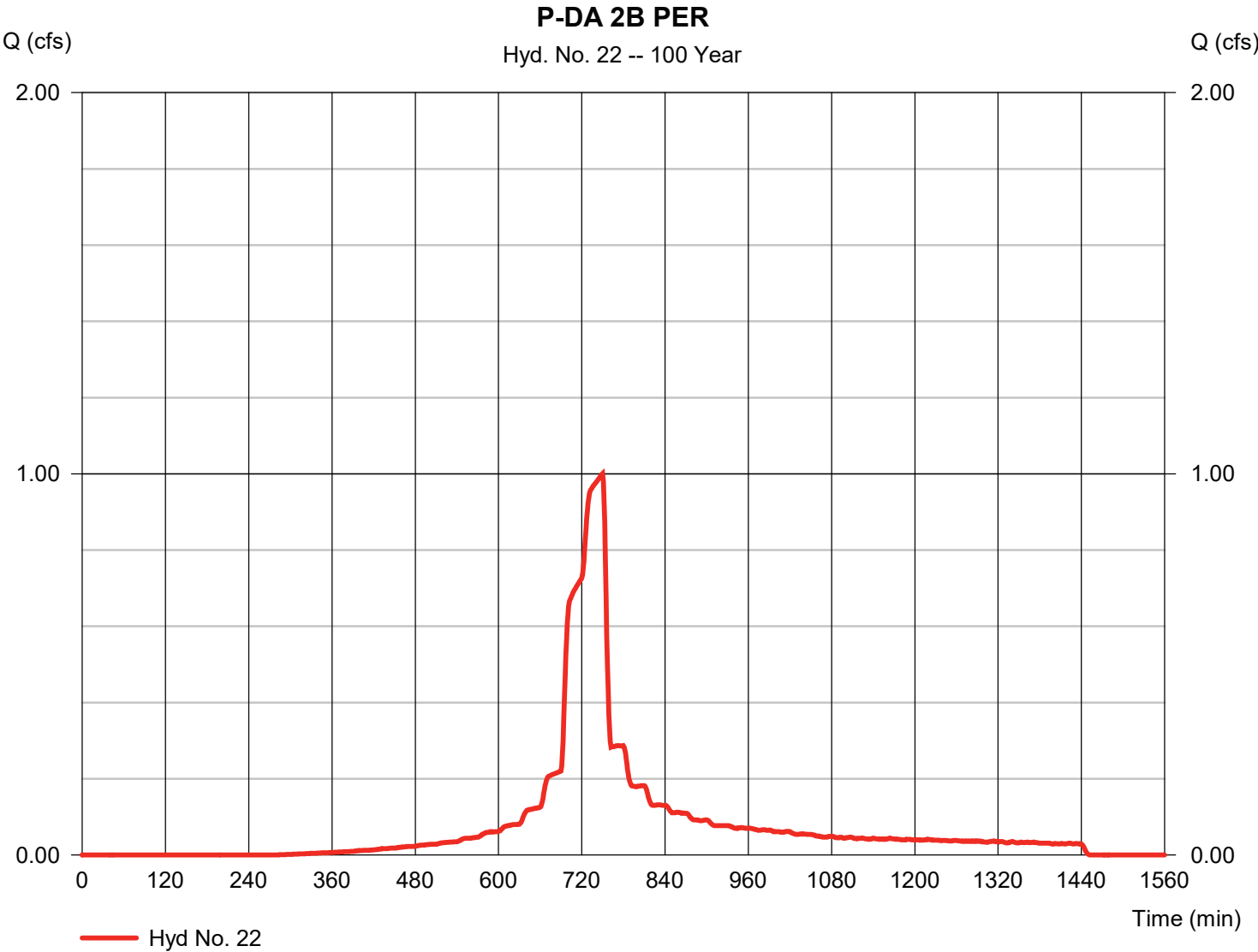
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Monday, 08 / 10 / 2026

Hyd. No. 22

P-DA 2B PER

Hydrograph type	= SCS Runoff	Peak discharge	= 1.001 cfs
Storm frequency	= 100 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 7,096 cuft
Drainage area	= 0.245 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 8.33 min
Total precip.	= 11.54 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

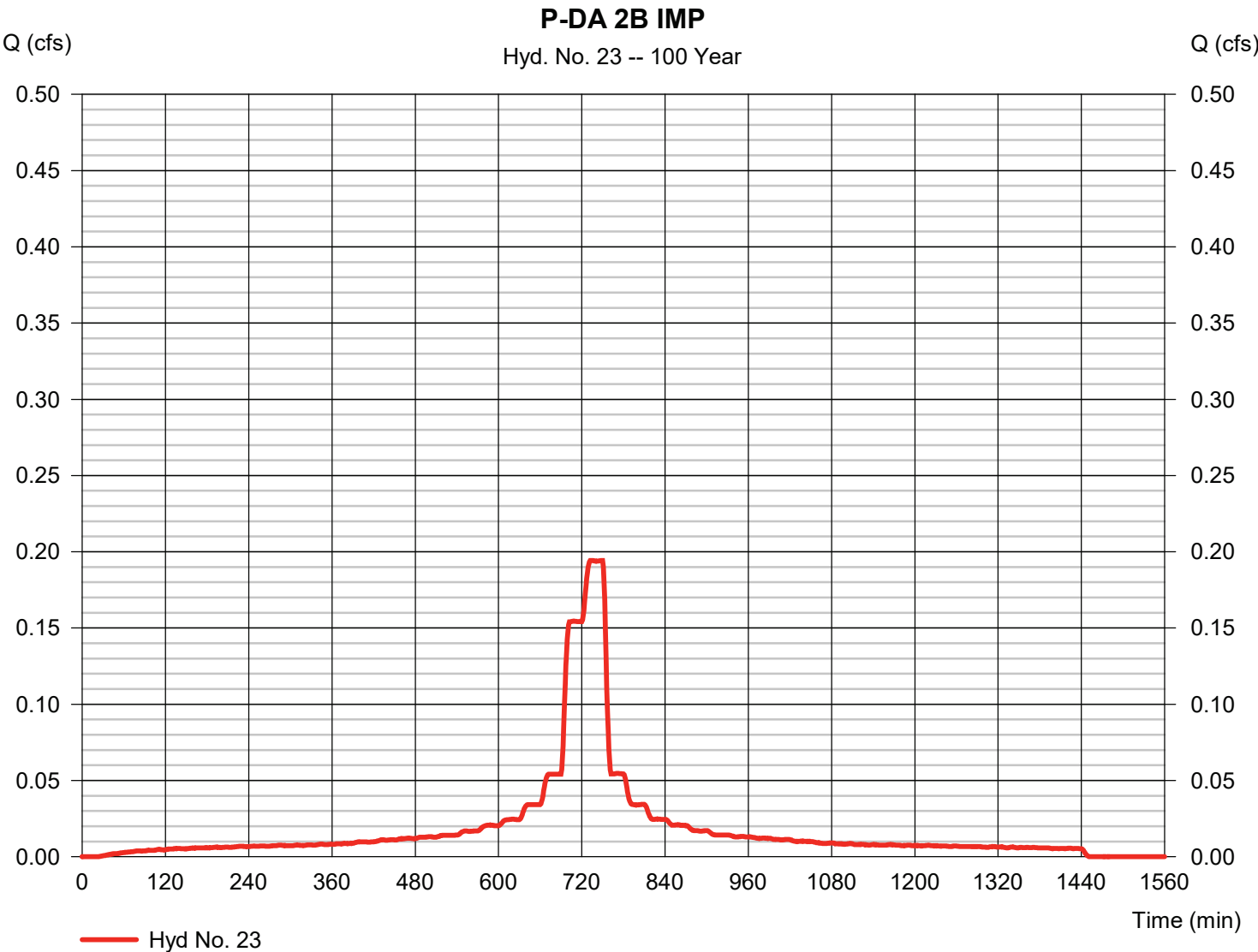
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 10 / 2026

Hyd. No. 23

P-DA 2B IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.194 cfs
Storm frequency	= 100 yrs	Time to peak	= 750 min
Time interval	= 1 min	Hyd. volume	= 1,680 cuft
Drainage area	= 0.042 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 8.33 min
Total precip.	= 11.54 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

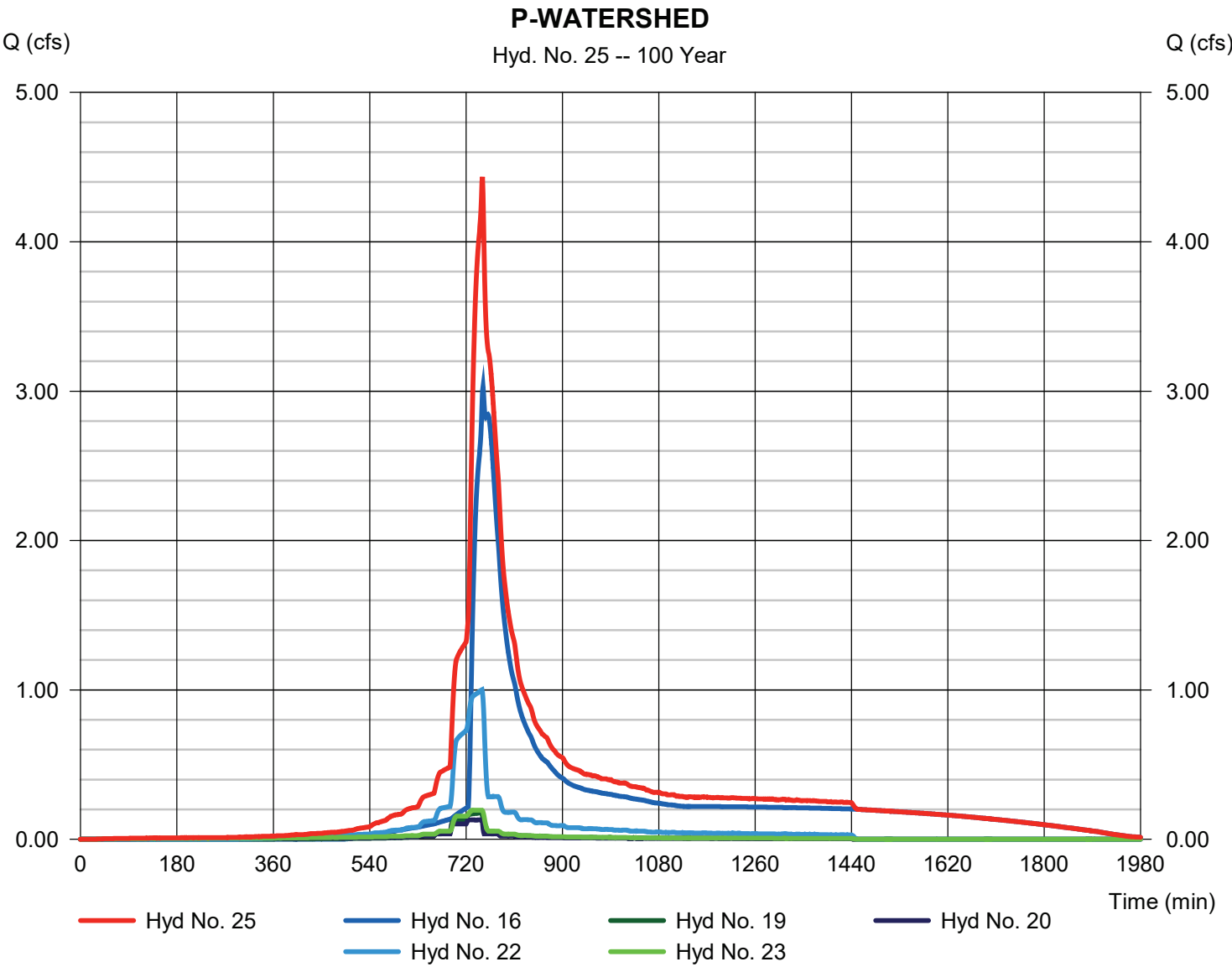
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Monday, 08 / 10 / 2026

Hyd. No. 25

P-WATERSHED

Hydrograph type	= Combine	Peak discharge	= 4.435 cfs
Storm frequency	= 100 yrs	Time to peak	= 751 min
Time interval	= 1 min	Hyd. volume	= 37,725 cuft
Inflow hyds.	= 16, 19, 20, 22, 23	Contrib. drain. area	= 0.361 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	-----
2	58.9762	12.5000	0.8783	-----
3	0.0000	0.0000	0.0000	-----
5	0.0000	0.0000	0.0000	-----
10	62.0328	12.1000	0.8064	-----
25	0.0000	0.0000	0.0000	-----
50	49.0087	9.1000	0.6960	-----
100	45.9676	8.8000	0.6580	-----

File name: 175 S 10TH ST.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	4.77	3.83	3.21	2.77	2.44	2.19	1.99	1.82	1.68	1.56	1.46	1.37
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	6.29	5.11	4.34	3.78	3.37	3.04	2.78	2.56	2.38	2.22	2.09	1.97
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	7.77	6.29	5.35	4.69	4.20	3.82	3.51	3.26	3.05	2.87	2.71	2.57
100	8.17	6.67	5.71	5.04	4.53	4.14	3.82	3.56	3.34	3.15	2.98	2.84

Tc = time in minutes. Values may exceed 60.

e: M:\Projects\A&E Services\Thatcher Duncan\611 Front Street\8.0 Reports\8.2 Stormwater Management\Plainfield.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.43	0.00	0.00	5.21	0.00	0.00	8.68
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	1.25	4.08	0.00	0.00	6.36	0.00	0.00	11.54

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100 - Year

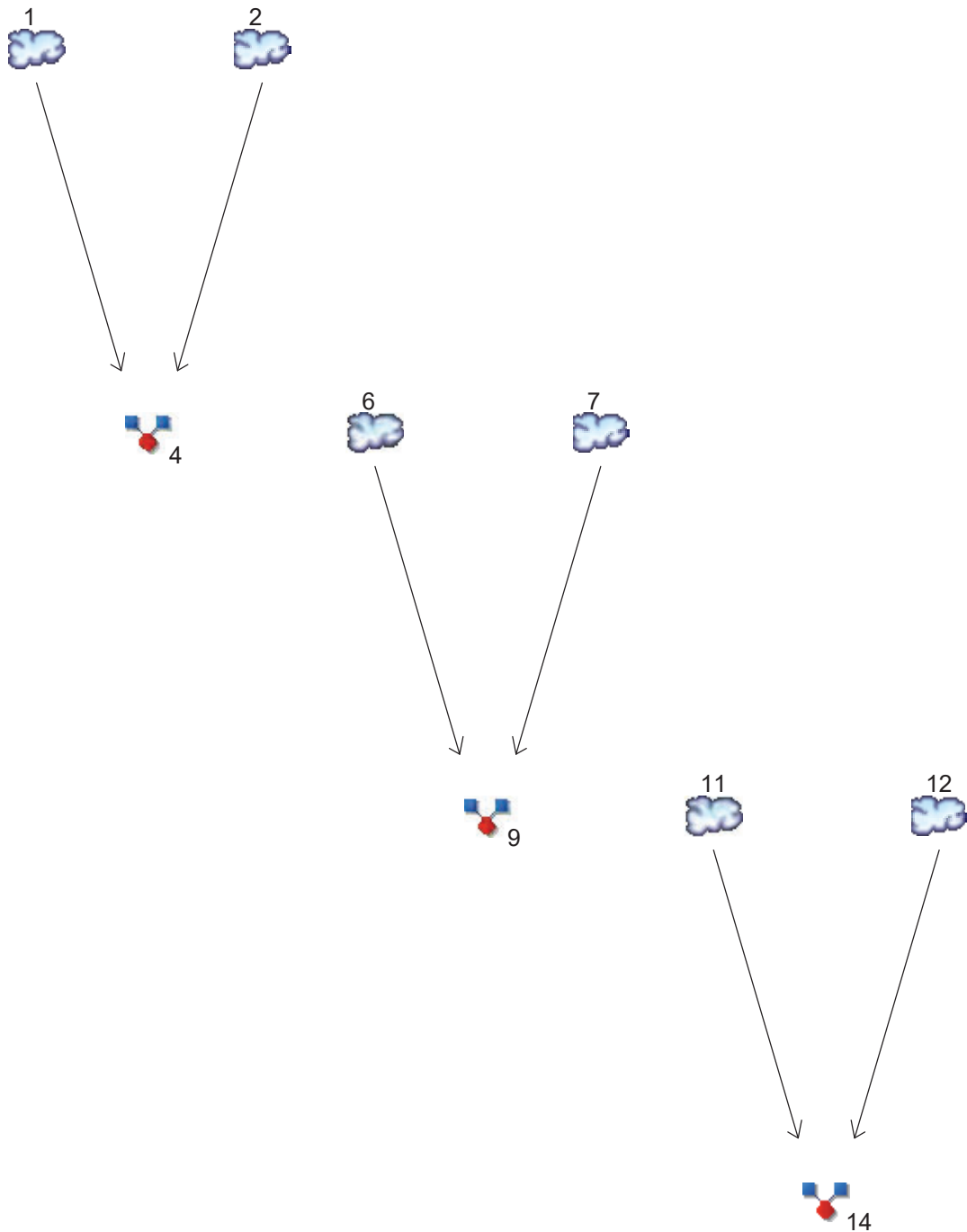
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Appendix H: Pipe Conveyance Calculations

Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024



Legend

Hyd.	Origin	Description
1	SCS Runoff	CDA 2 PER
2	SCS Runoff	CDA 2 IMP
4	Combine	CDA 2
6	SCS Runoff	CDA 6 PER
7	SCS Runoff	CDA 6 IMP
9	Combine	CDA 6
11	SCS Runoff	CDA 8 PER
12	SCS Runoff	CDA 8 IMP
14	Combine	CDA 8

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

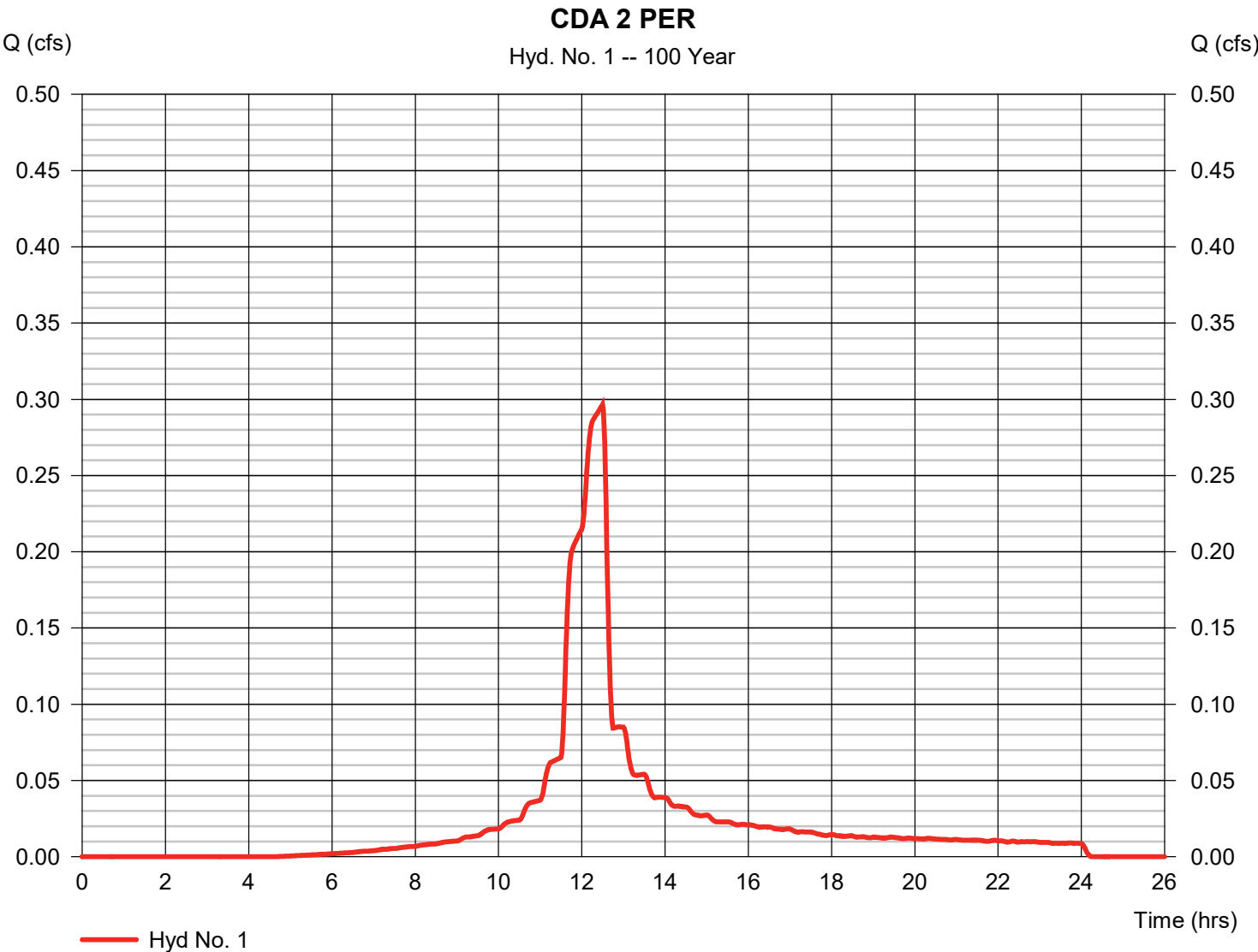
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.297	1	750	2,109	-----	-----	-----	CDA 2 PER
2	SCS Runoff	0.033	1	736	287	-----	-----	-----	CDA 2 IMP
4	Combine	0.330	1	750	2,396	1, 2,	-----	-----	CDA 2
6	SCS Runoff	0.067	1	750	475	-----	-----	-----	CDA 6 PER
7	SCS Runoff	2.751	1	736	23,788	-----	-----	-----	CDA 6 IMP
9	Combine	2.817	1	750	24,264	6, 7,	-----	-----	CDA 6
11	SCS Runoff	0.752	1	750	5,347	-----	-----	-----	CDA 8 PER
12	SCS Runoff	0.033	1	736	287	-----	-----	-----	CDA 8 IMP
14	Combine	0.785	1	750	5,635	11, 12,	-----	-----	CDA 8
M:\Projects\A&E Services\All County - Verona\26-34-Per-100-Yr Stormwater Hydrog_					26-34-Per-100-Yr Stormwater Hydrog_				26-34-Per-100-Yr Stormwater Hydrog_

Hydrograph Report

Hyd. No. 1

CDA 2 PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.297 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.50 hrs
Time interval	= 1 min	Hyd. volume	= 2,109 cuft
Drainage area	= 0.071 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 11.54 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydroflow\NOAA_D 1 min.484		

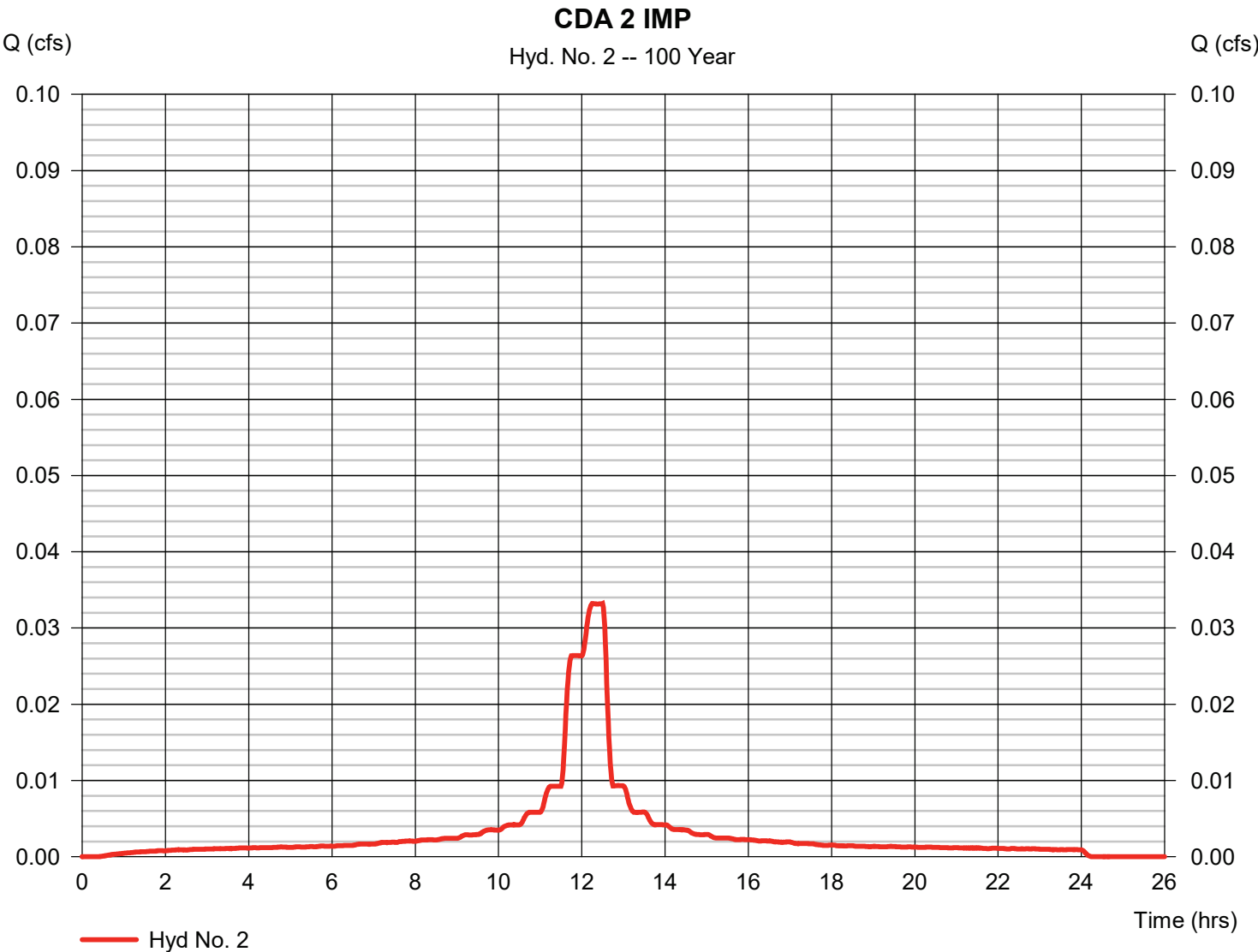


Hydrograph Report

Hyd. No. 2

CDA 2 IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.033 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.27 hrs
Time interval	= 1 min	Hyd. volume	= 287 cuft
Drainage area	= 0.007 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 11.54 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

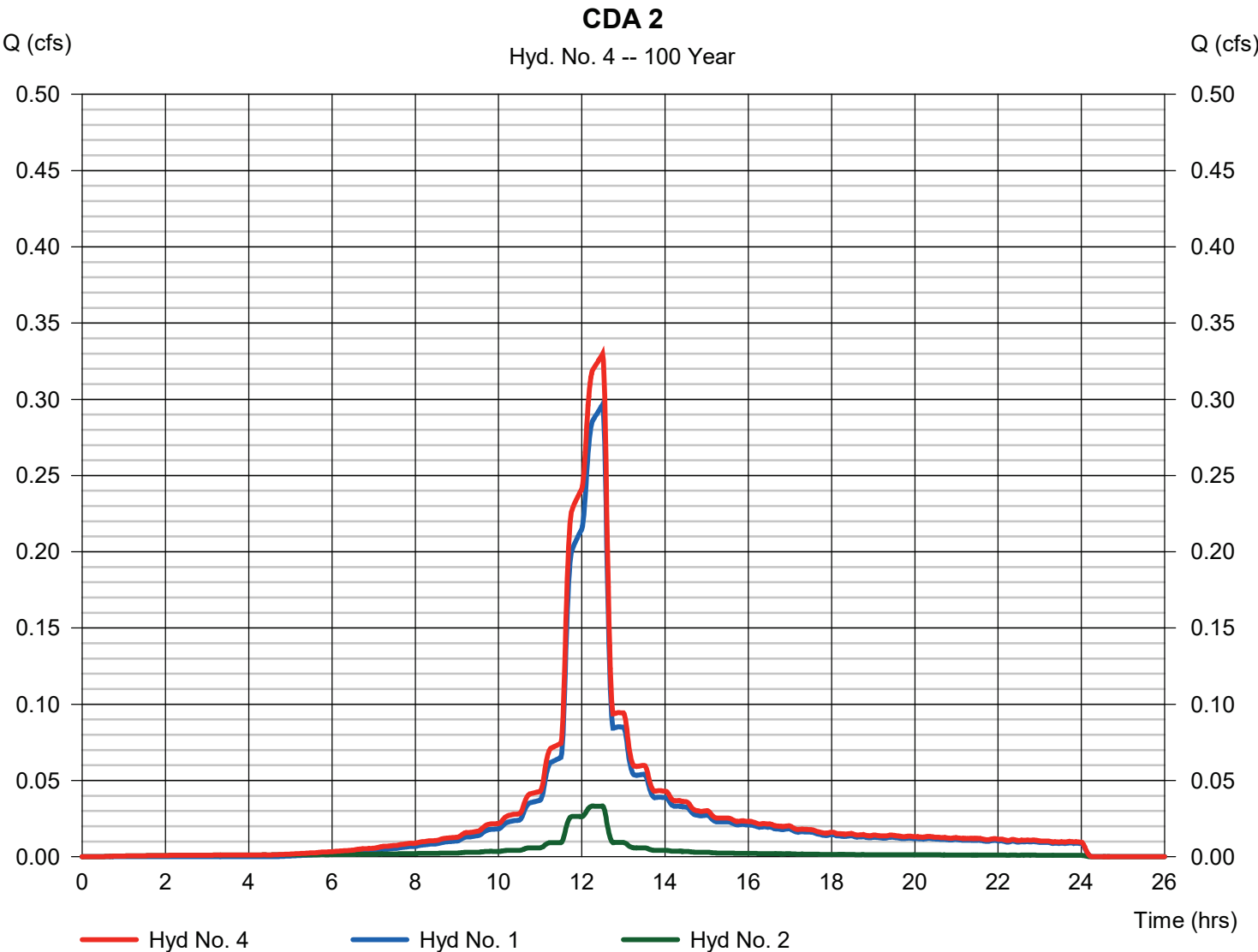
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 17 / 2026

Hyd. No. 4

CDA 2

Hydrograph type	= Combine	Peak discharge	= 0.330 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.50 hrs
Time interval	= 1 min	Hyd. volume	= 2,396 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 0.078 ac



Hydrograph Report

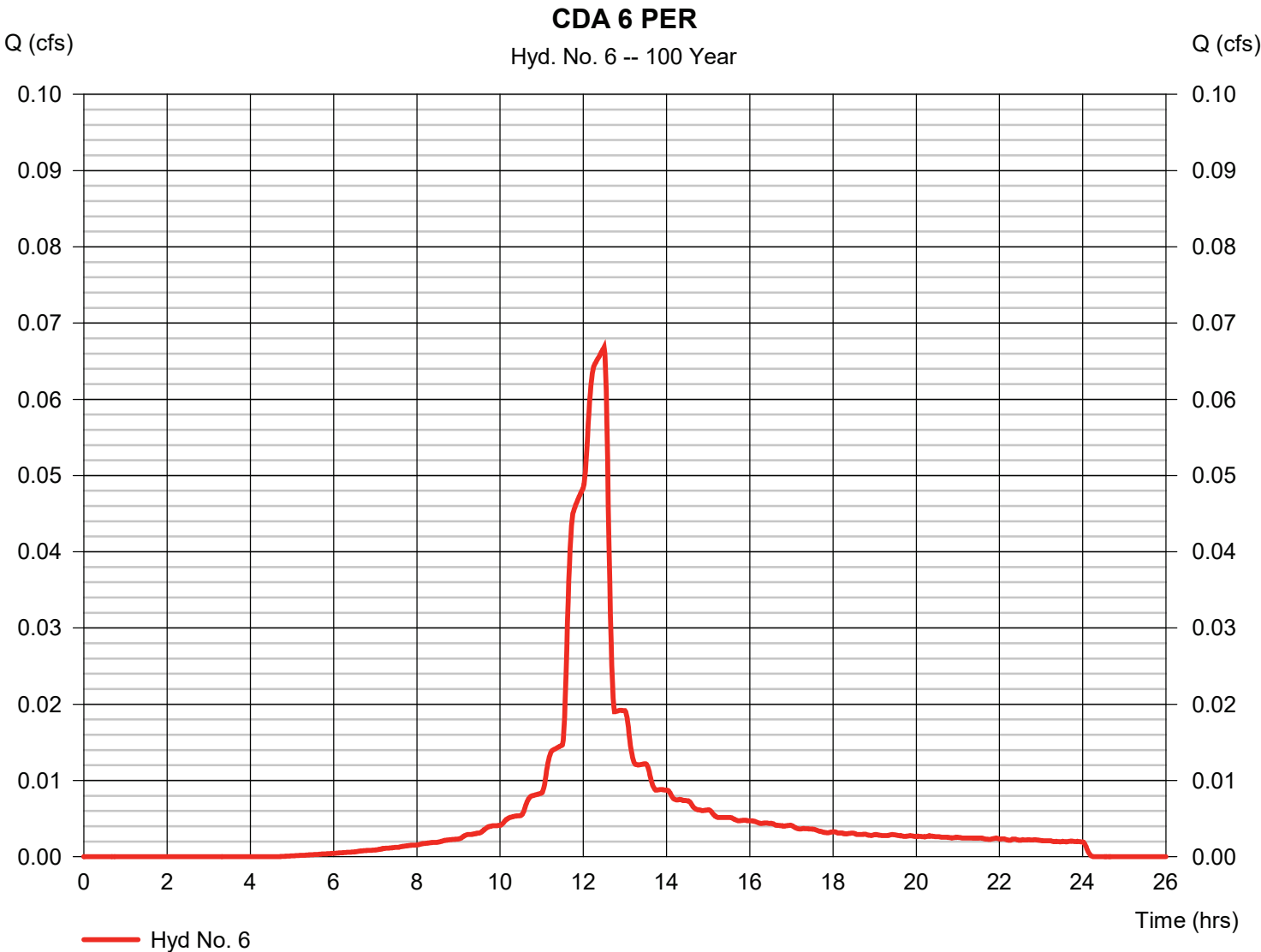
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 17 / 2026

Hyd. No. 6

CDA 6 PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.067 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.50 hrs
Time interval	= 1 min	Hyd. volume	= 475 cuft
Drainage area	= 0.016 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 11.54 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

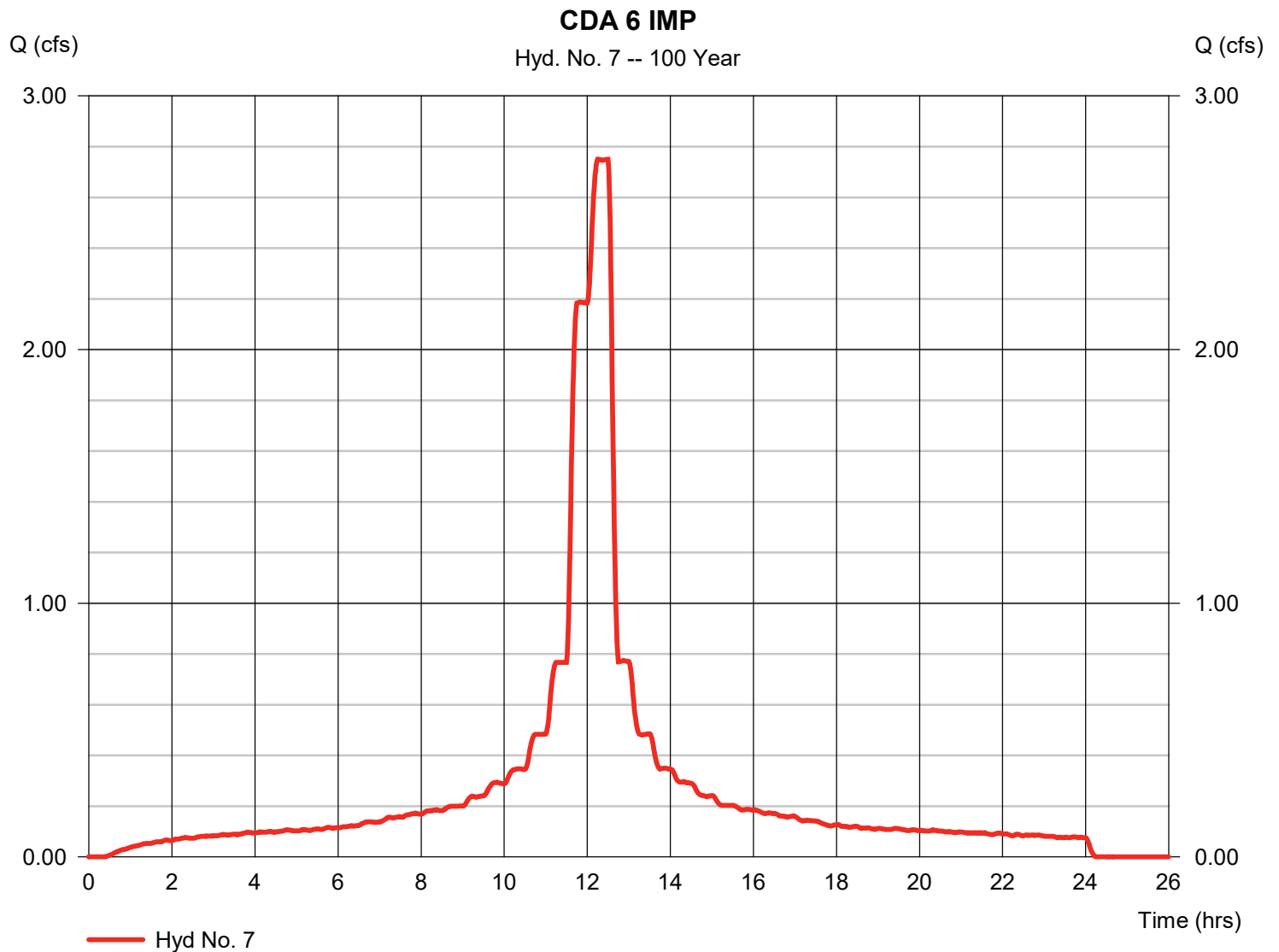
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 17 / 2026

Hyd. No. 7

CDA 6 IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 2.751 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.27 hrs
Time interval	= 1 min	Hyd. volume	= 23,788 cuft
Drainage area	= 0.580 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 11.54 in	Distribution	= Custom
Storm duration	= M:\Projects_CAD Standards\Hydrographs\NOAA_D 1 min.484		

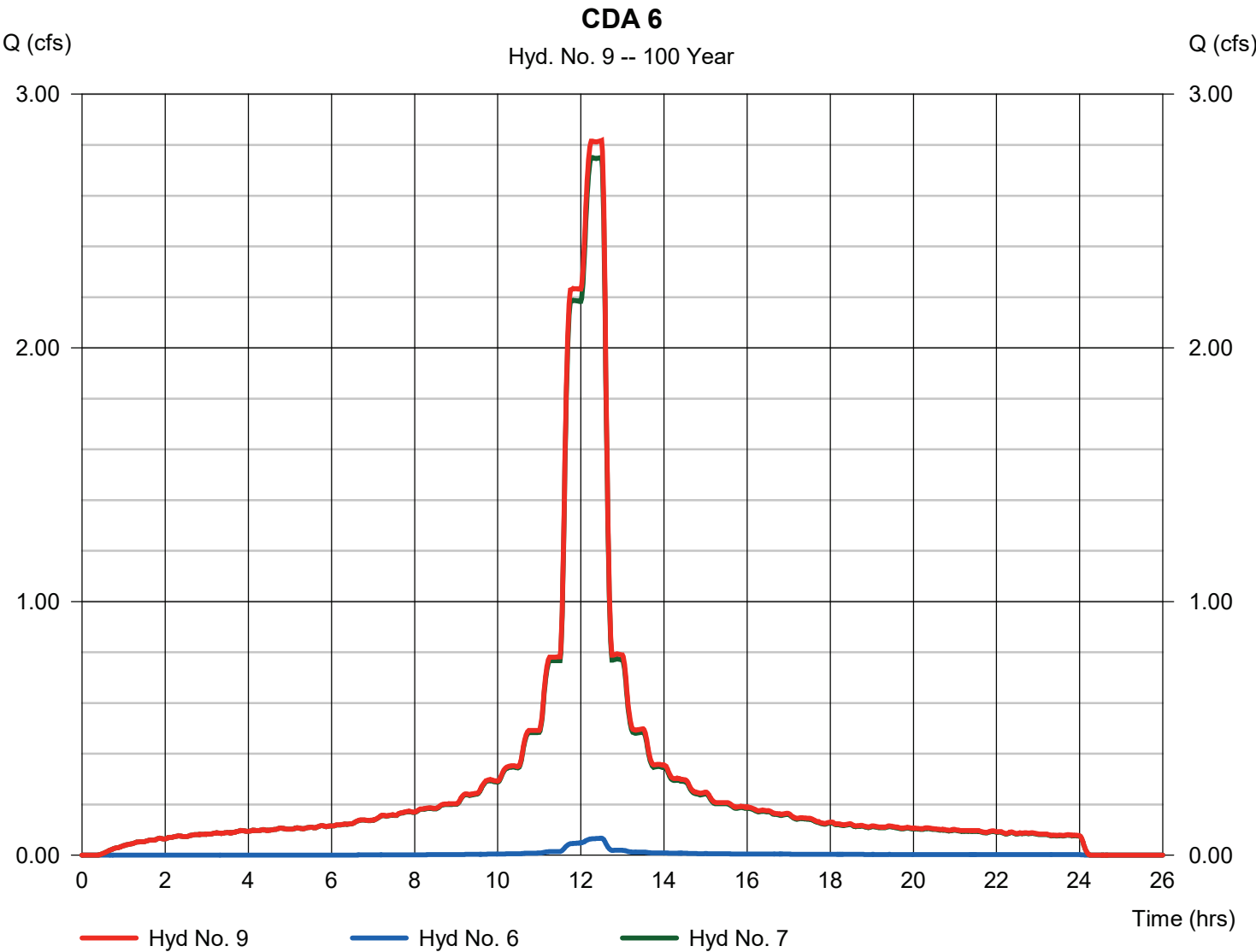


Hydrograph Report

Hyd. No. 9

CDA 6

Hydrograph type	= Combine	Peak discharge	= 2.817 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.50 hrs
Time interval	= 1 min	Hyd. volume	= 24,264 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 0.596 ac

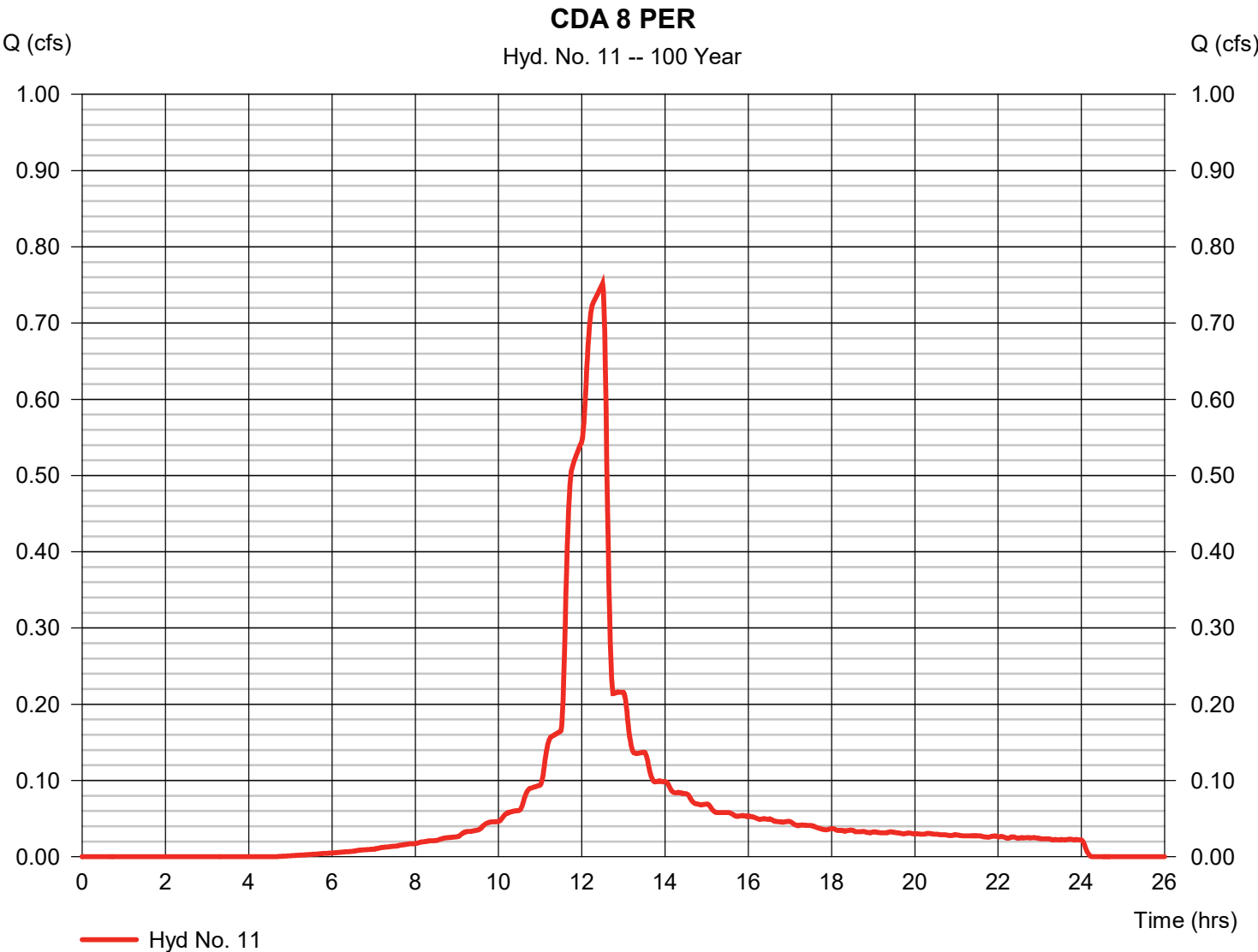


Hydrograph Report

Hyd. No. 11

CDA 8 PER

Hydrograph type	= SCS Runoff	Peak discharge	= 0.752 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.50 hrs
Time interval	= 1 min	Hyd. volume	= 5,347 cuft
Drainage area	= 0.180 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 11.54 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		

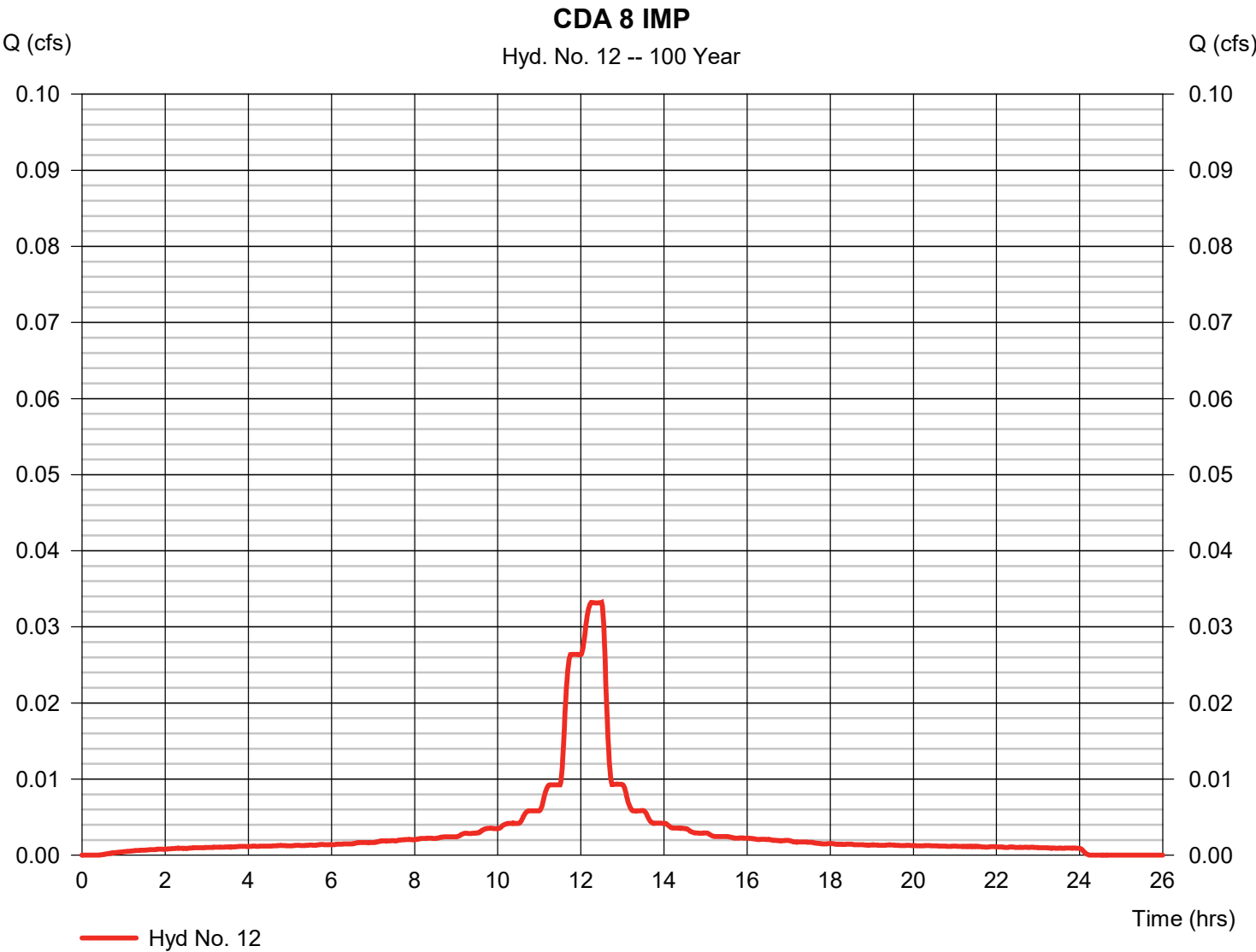


Hydrograph Report

Hyd. No. 12

CDA 8 IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.033 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.27 hrs
Time interval	= 1 min	Hyd. volume	= 287 cuft
Drainage area	= 0.007 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 11.54 in	Distribution	= Custom
Storm duration	= M:\Projects\CAD Standards\Hydrographs\NOAA_D 1 min.484		



Hydrograph Report

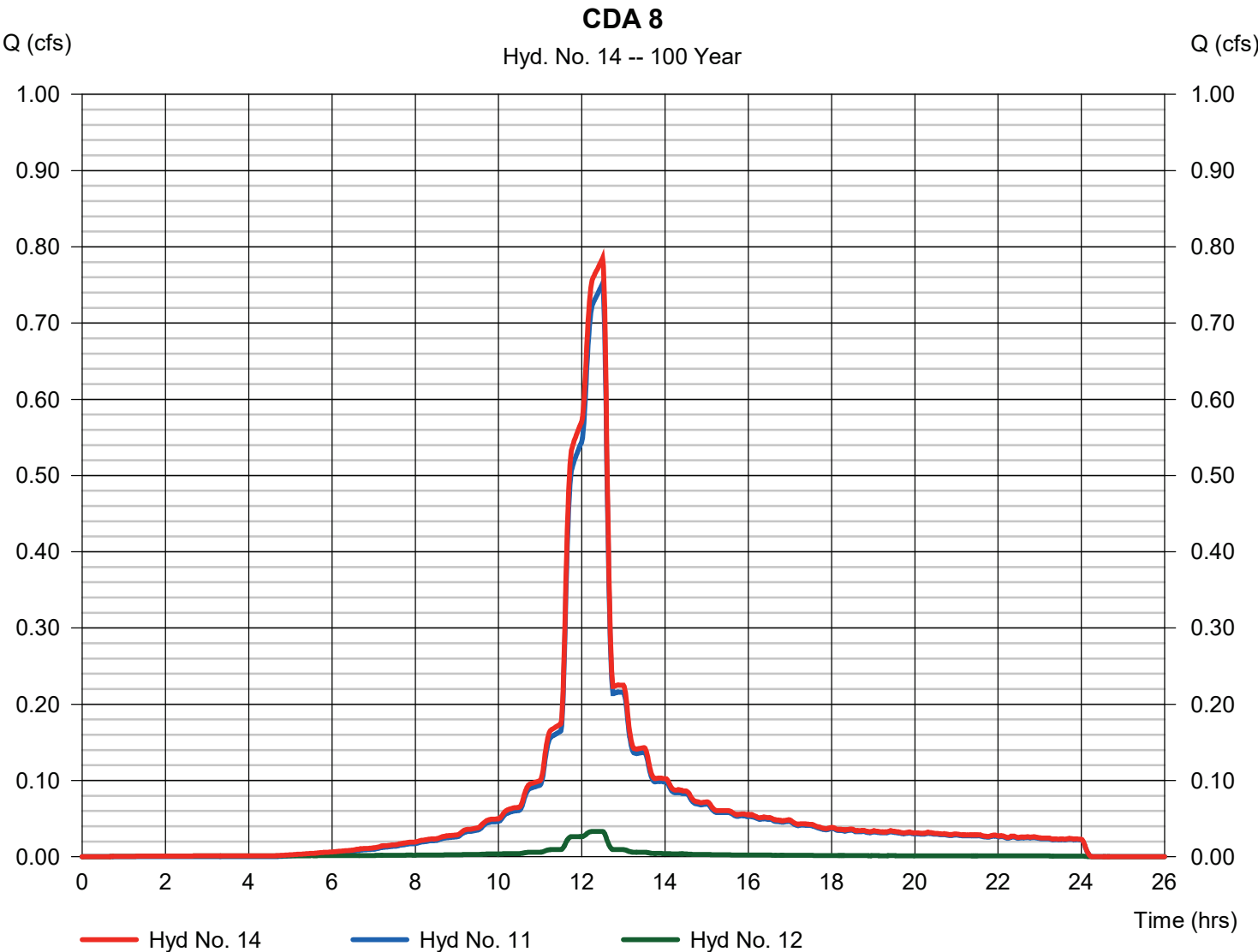
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Monday, 08 / 17 / 2026

Hyd. No. 14

CDA 8

Hydrograph type	= Combine	Peak discharge	= 0.785 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.50 hrs
Time interval	= 1 min	Hyd. volume	= 5,635 cuft
Inflow hyds.	= 11, 12	Contrib. drain. area	= 0.187 ac



Appendix I: Groundwater Mounding Analysis

M:\PROJECTS\A&E SERVICES\ALL COUNTY - VERONA\A-P-26-34\9.0 DRAWINGS\E2PM DRAWINGS\VERONA COMMONS REV-A.DWG



SCHEDULE OF REVISIONS				
REV.	DATE	DESCRIPTION OF CHANGES	DRAWN BY	CHK. BY
X	XX/XX/XX	XXXXXX	XX	XX

Project Name	Description	Analysis Date	BMP or LID Type
885 Bloomfield Ave Verona	RECHARGE OF PP	08/10/26	2' deep porous pavement system #1 & #2 12" below grade

Recharge BMP Input Parameters				Root Zone Water capacity Calculated Parameters				Recharge Design Parameters			
Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit
BMP Area	ABMP	6576.0	sq.ft	Empty Portion of RWC under Post-D Natural Recharge	ERWC	0.65	in	Inches of Runoff to capture	Qdesign	3.04	in
BMP Effective Depth, this is the design variable	dBMP	24.0	in	ERWC Modified to consider dEXC	EDRWC	0.06	in	Inches of Rainfall to capture	Pdesign	3.27	in
Upper level of the BMP surface (negative if above ground)	dBMPu	12.0	in	Empty Portion of RWC under Infiltr. BMP	RERWC	0.04	in	Recharge Provided Avg. over Imp. Area		37.9	in
Depth of lower surface of BMP, must be >= dBMPu	dEXC	36.0	in					Runoff Captured Avg. over imp. Area		38.4	in
Post-development Land Segment Location of BMP, Input Zero if Location is distributed or undetermined	SegBMP	0	unitless								

BMP Calculated Size Parameters				CALCULATION CHECK MESSAGES	
ABMP/Aimp	Aratio	0.13	unitless	Volume Balance-->	Solve Problem to satisfy Annual Recharge
BMP Volume	VBMP	13,152	cu.ft	dBMP Check-->	OK
				dEXC Check-->	OK
				BMP Location-->	Location is selected as distributed or undetermined

Parameters from Annual Recharge Worksheet				System Performance Calculated Parameters			
Post-D Deficit Recharge (or desired recharge volume)	Vdef	68,821	cu.ft	Annual BMP Recharge Volume		160,020	cu.ft
Post-D Impervious Area (or target Impervious Area)	Aimp	50,617	sq.ft	Avg BMP Recharge Efficiency		98.8%	Represents % Infiltration Recharged
Root Zone Water Capacity	RWC	3.95	in	%Rainfall became Runoff		78.5%	%
RWC Modified to consider dEXC	DRWC	0.34	in	%Runoff Infiltrated		100.0%	%
Climatic Factor	C-factor	1.67	no units	%Runoff Recharged		98.8%	%
Average Annual P	Pavg	48.9	in	%Rainfall Recharged		77.6%	%
Recharge Requirement over Imp. Area	dr	16.3	in				

OTHER NOTES

Pdesign is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensitive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.

How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement assuming the runoff from entire impervious area is available to the BMP. To solve for a smaller BMP or a LID-IMP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration click the "Default Vdef & Aimp" button.

Annual Groundwater Recharge Analysis (based on GSR-32)

Select Township ↓	Average Annual P (in)	Climatic Factor
ESSEX CO., VERONA BORO	48.9	1.67

Project Name:	885 Bloomfield Ave Verona
Description:	RECHARGE OF PP
Analysis Date:	08/10/26

Pre-Developed Conditions					
Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	1.655	Woods-grass combination	Haledon	16.0	95,897
2	0.006	Impervious areas	Haledon	0.0	-
3	0				
4	0				
5	0				
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	1.7			Total Annual Recharge (in)	Total Annual Recharge (cu-ft)
				15.9	95,897

Post-Developed Conditions					
Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	1.162	Impervious areas	Haledon	0.0	-
2	0.499	Open space	Boonton	14.9	27,077
3					
4					
5	0				
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	1.7			Total Annual Recharge (in)	Total Annual Recharge (cu.ft)
				4.5	27,077

Procedure to fill the Pre-Development and Post-Development Conditions Tables

For each land segment, first enter the area, then select TR-55 Land Cover, then select Soil. Start from the top of the table and proceed downward. Don't leave blank rows (with A=0) in between your segment entries. Rows with A=0 will not be displayed or used in calculations. For impervious areas outside of standard lots select "Impervious Areas" as the Land Cover. Soil type for impervious areas are only required if an infiltration facility will be built within these areas.

Annual Recharge Requirements Calculation ↓			
% of Pre-Developed Annual Recharge to Preserve =	100%	Total Impervious Area (sq.ft)	50,617
Post-Development Annual Recharge Deficit=		68,821	(cubic feet)
Recharge Efficiency Parameters Calculations (area averages)			
RWC=	3.95	(in)	DRWC= 0.34 (in)
ERWC =	0.65	(in)	EDRWC= 0.06 (in)

Appendix J: Reference Material



State of New Jersey

PHILIP D. MURPHY
Governor

SHEILA Y. OLIVER
Lt. Governor

Division of Water Quality
Bureau of Nonpoint Pollution Control
401 East State Street
P.O. Box 420 Mail Code 401-02B
Trenton, New Jersey 08625-0420
Phone: 609-633-7021 / Fax: 609-777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

CATHERINE R. McCABE
Commissioner

August 3, 2020

Jeremy Fink, P.E.
Hydro International (Stormwater)
94 Hutchins Drive
Portland, ME 04102

Re: MTD Lab Certification
StormScape Filter
Off-line Installation

TSS Removal Rate 80%

Dear Mr. Fink:

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7(c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Hydro International has requested a Laboratory Certification for the StormScape Filter (StormScape).

The project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Department of Environmental Protection Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the aforementioned protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report with the Verification Appendix (dated June 2020) for this device is published online at <http://www.njcat.org/verification-process/technology-verification-database.html>.

The NJDEP certifies the use of the StormScape stormwater treatment unit by Hydro International at a TSS removal rate of 80% when designed, operated, and maintained in accordance with the information provided in the Verification Appendix and the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5. The MTFR is calculated based on a verified loading rate of 1.46 gpm/ft² of effective filtration treatment area.
2. The StormScape stormwater treatment unit shall be installed using the same configuration reviewed by NJCAT, and sized in accordance with the criteria specified in item 7 below.
3. This device cannot be used in series with another MTD or a media filter (such as a sand filter) to achieve an enhanced removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.
4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual, which can be found online at www.njstormwater.org.
5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the StormScape. A copy of the maintenance plan is attached to this certification. However, it is recommended to review the maintenance website at https://hydro-int.com/sites/default/files/stomscape_install_and_maintenance.pdf for any changes to the maintenance requirements.
6. For an MTD to be considered “green infrastructure” in accordance with the March 2, 2020 amendments to the Stormwater Management rules at N.J.A.C. 7:8, the MTD must meet the GI definition noted at amended N.J.A.C. 7:8-1.2. Specifically, the MTD shall (1) infiltrate into the subsoil; and/or (2) treat stormwater runoff through filtration by vegetation or soil.

The StormScape is a stormwater treatment system that filters polluted stormwater in a downward flow, horizontal media bed. Each StormScape consists of an array of surface pavers that protect a bed of engineered filtration media. There are two options of installation available for the StormScape. In the “underdrain” option, the system is installed directly in a rough excavation with no enclosing box or liner, but with an underdrain comprised of a perforated discharge pipe embedded in coarse stone. The discharge pipe is installed with an unperforated riser that acts as both a bypass and as an inspection port. This arrangement needs to meet the NJDEP Stormwater BMP Manual condition of having at least one foot of separation from the seasonal high water table measured from the bottom of the stone bed where the underdrain is set. In another arrangement, if surrounding soils allow for infiltration, the open structure of the system allows for installation as a “stand-alone” MTD that encourages stormwater infiltration and runoff volume reduction by maximizing contact with native soils. This arrangement needs to meet the NJDEP Stormwater BMP Manual conditions of having the most hydraulically restrictive soil layer below the MTD meet the minimum tested infiltration rate of one inch per hour, have at least two feet of separation from the seasonal high water table measured from the lowest point of the system, and infiltrate into the subsoil.

7. Sizing Requirement:

The example below demonstrates the sizing procedure for the StormScape:

Example: A 0.25-acre impervious site is to be treated to 80% TSS removal using StormScape. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs or 354.58 gpm.

The selection of the appropriate model of StormScape is based upon both the maximum inflow drainage area and the MTFR. It is necessary to calculate the required model using both methods and to use the largest model determined by the two methods.

Inflow Drainage Area Evaluation:

The drainage area to the StormScape in this example is 0.25 acres. Based upon the information in Table 1 below, the 4 x 12, 6 x 8, 6 x 10 and 6 x 12 StormScape models would be able to treat runoff without exceeding the maximum allowable drainage area.

Maximum Treatment Flow Rate (MTFR) Evaluation:

The site runoff (Q) was based on the following:

time of concentration = 10 minutes

$i = 3.2$ in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)

$c = 0.99$ (runoff coefficient for impervious)

$Q = ciA = 0.99 \times 3.2 \times 0.25 = 0.79$ cfs (354.58 gpm)

(Note: 1 cfs = 448.83 gpm)

Given the site runoff is 0.79 cfs (354.58 gpm) and based on Table 1 below, it would require four 6 x 12 units to treat the impervious area without exceeding the MTFR. The units should be configured such that the flowrate to each unit does not exceed 105 gpm and the entire 0.25 acre area is treated.

Example: four 6 x 12 units at 105 gpm (MTFR) = 420 gpm

The MTFR evaluation results will be used since that method results in the highest minimum configuration determined by the two methods.

The sizing table corresponding to the available system models is noted below:

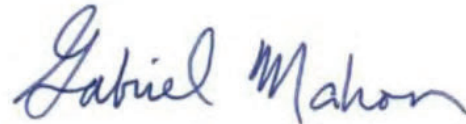
Table 1. StormScape MTFRs and Maximum Allowable Drainage Area.

Filter Size (ft)	MTFR (gpm)	MTFR (cfs)	Maximum Allowable Drainage Area (ac)
4 x 6	35	0.078	0.147
4.38 x 6.58	42	0.094	0.176
4 x 8	47	0.105	0.196
4 x 10	58	0.129	0.244
4 x 12	70	0.156	0.293
6 x 6	53	0.118	0.220
6 x 8	70	0.156	0.293
6 x 10	87	0.194	0.367
6 x 12	105	0.234	0.440

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must also include all of the items identified in N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Brian Salvo of my office at (609) 633-7021.

Sincerely,



Gabriel Mahon, Chief
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan

cc: Chron File
Richard Magee, NJCAT
Vince Mazzei, NJDEP - DLUR
Jim Murphy, NJDEP - BNPC
Brian Salvo, NJDEP – BNPC



NOAA Atlas 14, Volume 2, Version 3
Location name: Verona, New Jersey, USA*
Latitude: 40.8346°, Longitude: -74.2584°
Elevation: 471 ft**
* source: ESRI Maps
** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

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

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	4.06 (3.71-4.45)	4.84 (4.43-5.32)	5.72 (5.22-6.29)	6.36 (5.78-6.97)	7.18 (6.50-7.86)	7.73 (6.97-8.46)	8.27 (7.43-9.05)	8.80 (7.86-9.62)	9.41 (8.33-10.3)	9.85 (8.65-10.8)
10-min	3.22 (2.93-3.53)	3.85 (3.52-4.22)	4.55 (4.15-5.00)	5.06 (4.60-5.54)	5.66 (5.13-6.20)	6.08 (5.50-6.67)	6.50 (5.84-7.11)	6.88 (6.15-7.54)	7.34 (6.50-8.06)	7.65 (6.73-8.42)
15-min	2.67 (2.44-2.93)	3.21 (2.93-3.52)	3.82 (3.48-4.20)	4.24 (3.86-4.65)	4.76 (4.32-5.22)	5.12 (4.62-5.60)	5.46 (4.91-5.98)	5.76 (5.15-6.31)	6.14 (5.44-6.75)	6.39 (5.62-7.03)
30-min	1.82 (1.66-2.00)	2.20 (2.01-2.42)	2.70 (2.46-2.96)	3.05 (2.77-3.34)	3.50 (3.17-3.83)	3.82 (3.45-4.18)	4.14 (3.72-4.53)	4.43 (3.96-4.85)	4.82 (4.27-5.29)	5.10 (4.48-5.61)
60-min	1.13 (1.03-1.24)	1.38 (1.26-1.51)	1.72 (1.57-1.89)	1.98 (1.80-2.17)	2.32 (2.10-2.54)	2.57 (2.32-2.82)	2.84 (2.55-3.10)	3.09 (2.76-3.38)	3.44 (3.04-3.77)	3.70 (3.25-4.07)
2-hr	0.692 (0.632-0.759)	0.843 (0.771-0.927)	1.07 (0.974-1.17)	1.24 (1.13-1.36)	1.49 (1.34-1.63)	1.69 (1.51-1.84)	1.89 (1.68-2.07)	2.10 (1.86-2.30)	2.40 (2.10-2.63)	2.64 (2.29-2.89)
3-hr	0.516 (0.472-0.566)	0.628 (0.575-0.690)	0.796 (0.728-0.874)	0.928 (0.845-1.02)	1.11 (1.00-1.21)	1.26 (1.13-1.38)	1.41 (1.26-1.54)	1.57 (1.39-1.71)	1.79 (1.57-1.96)	1.97 (1.71-2.15)
6-hr	0.334 (0.307-0.366)	0.406 (0.373-0.444)	0.514 (0.470-0.561)	0.602 (0.548-0.655)	0.727 (0.657-0.790)	0.831 (0.747-0.902)	0.942 (0.839-1.02)	1.06 (0.936-1.15)	1.23 (1.07-1.34)	1.38 (1.18-1.49)
12-hr	0.207 (0.189-0.228)	0.252 (0.230-0.277)	0.320 (0.292-0.353)	0.378 (0.343-0.415)	0.463 (0.416-0.505)	0.536 (0.477-0.583)	0.614 (0.542-0.668)	0.701 (0.611-0.763)	0.830 (0.709-0.903)	0.940 (0.790-1.02)
24-hr	0.118 (0.109-0.128)	0.143 (0.132-0.155)	0.183 (0.169-0.199)	0.217 (0.200-0.236)	0.269 (0.245-0.291)	0.313 (0.284-0.339)	0.362 (0.325-0.393)	0.417 (0.371-0.453)	0.500 (0.436-0.545)	0.572 (0.492-0.625)
2-day	0.069 (0.064-0.075)	0.084 (0.078-0.091)	0.107 (0.099-0.117)	0.127 (0.117-0.138)	0.155 (0.142-0.169)	0.180 (0.163-0.195)	0.206 (0.186-0.224)	0.235 (0.210-0.256)	0.277 (0.244-0.304)	0.313 (0.272-0.345)
3-day	0.048 (0.045-0.053)	0.059 (0.054-0.064)	0.075 (0.069-0.081)	0.088 (0.081-0.095)	0.107 (0.098-0.116)	0.123 (0.113-0.134)	0.141 (0.128-0.153)	0.160 (0.143-0.174)	0.188 (0.166-0.205)	0.211 (0.184-0.232)
4-day	0.038 (0.035-0.041)	0.046 (0.043-0.050)	0.058 (0.054-0.063)	0.069 (0.063-0.074)	0.083 (0.077-0.090)	0.095 (0.087-0.103)	0.108 (0.098-0.117)	0.123 (0.110-0.133)	0.143 (0.127-0.156)	0.160 (0.140-0.175)
7-day	0.026	0.031	0.038	0.045	0.054	0.061	0.069	0.077	0.089	0.099

	(0.024-0.028)	(0.029-0.033)	(0.036-0.041)	(0.041-0.048)	(0.049-0.058)	(0.056-0.066)	(0.063-0.074)	(0.070-0.084)	(0.079-0.097)	(0.087-0.109)
10-day	0.020 (0.019-0.022)	0.025 (0.023-0.026)	0.030 (0.028-0.032)	0.035 (0.032-0.037)	0.041 (0.038-0.044)	0.046 (0.043-0.050)	0.052 (0.048-0.056)	0.058 (0.053-0.062)	0.066 (0.059-0.072)	0.073 (0.065-0.079)
20-day	0.014 (0.013-0.015)	0.016 (0.015-0.017)	0.020 (0.018-0.021)	0.022 (0.021-0.024)	0.026 (0.024-0.027)	0.028 (0.026-0.030)	0.031 (0.029-0.033)	0.034 (0.031-0.036)	0.037 (0.034-0.040)	0.040 (0.036-0.044)
30-day	0.011 (0.011-0.012)	0.013 (0.013-0.014)	0.016 (0.015-0.017)	0.017 (0.016-0.019)	0.020 (0.019-0.021)	0.022 (0.020-0.023)	0.023 (0.022-0.025)	0.025 (0.023-0.027)	0.027 (0.025-0.029)	0.029 (0.026-0.031)
45-day	0.009 (0.009-0.010)	0.011 (0.011-0.012)	0.013 (0.012-0.014)	0.014 (0.014-0.015)	0.016 (0.015-0.017)	0.017 (0.016-0.018)	0.019 (0.017-0.020)	0.020 (0.019-0.021)	0.021 (0.020-0.023)	0.022 (0.021-0.024)
60-day	0.008 (0.008-0.009)	0.010 (0.009-0.011)	0.011 (0.011-0.012)	0.013 (0.012-0.013)	0.014 (0.013-0.015)	0.015 (0.014-0.016)	0.016 (0.015-0.017)	0.017 (0.016-0.018)	0.018 (0.017-0.019)	0.019 (0.017-0.020)

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

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

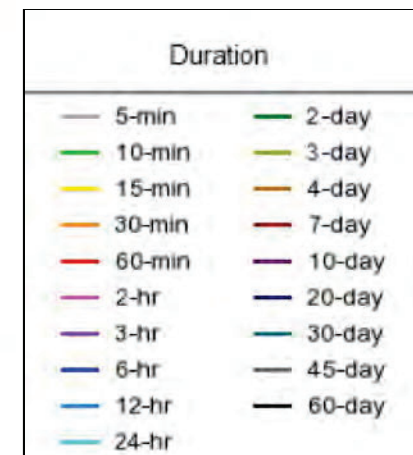
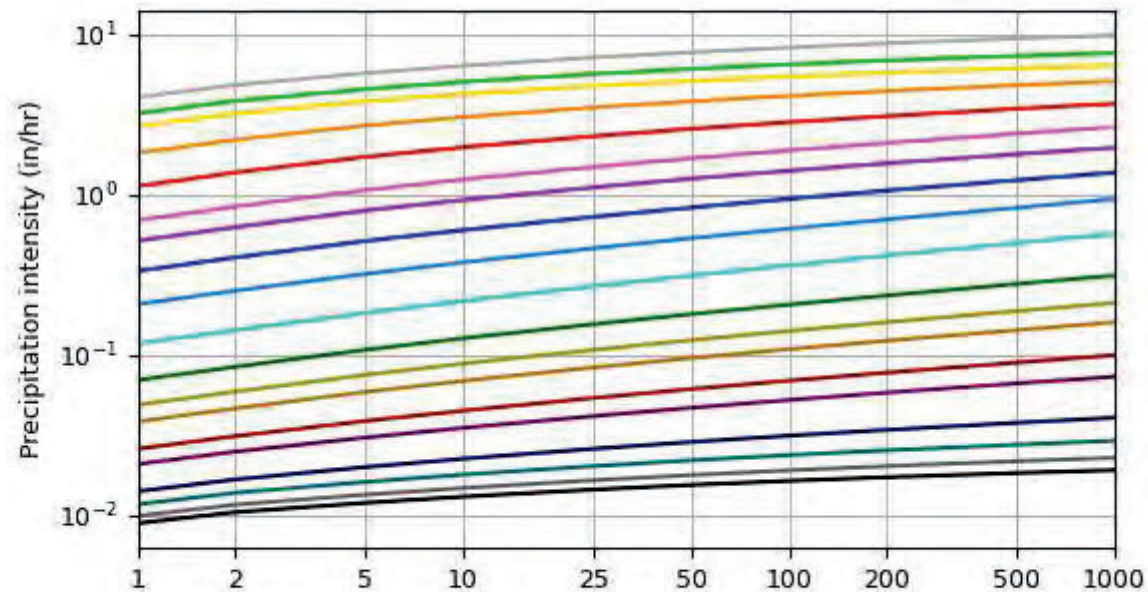
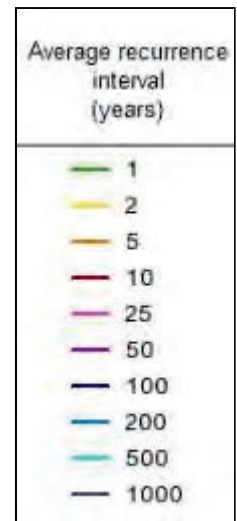
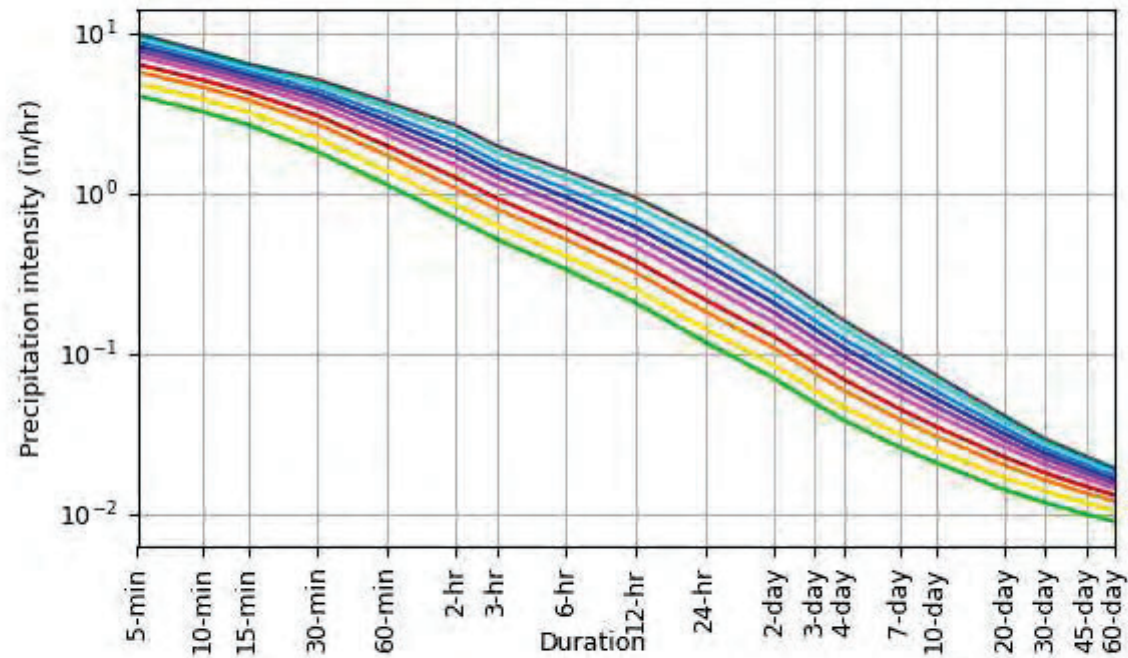
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PF graphical

PDS-based intensity-duration-frequency (IDF) curves

Latitude: 40.8346°, Longitude: -74.2584°



Average recurrence interval (years)

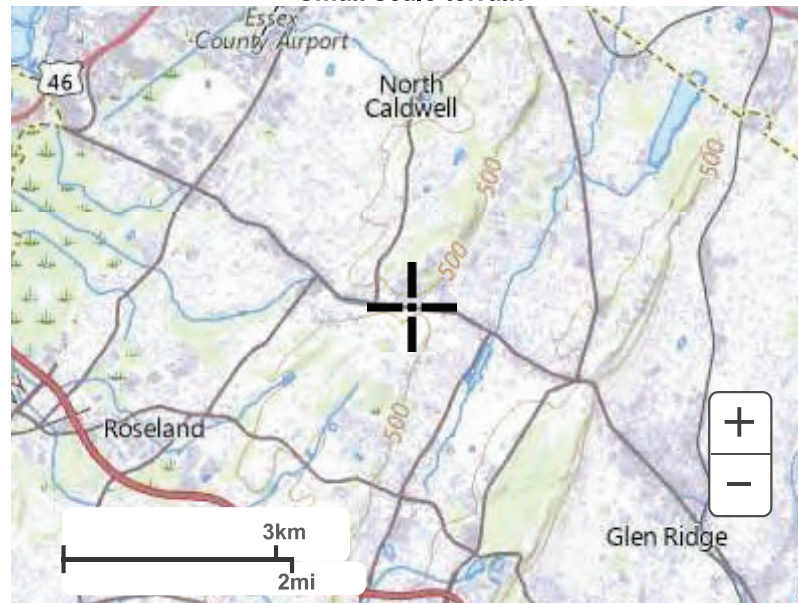
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Location name: Verona, New Jersey, USA*
Latitude: 40.8346°, Longitude: -74.2584°
Elevation: 471 ft**
* source: ESRI Maps
** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

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PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.338 (0.309-0.371)	0.403 (0.369-0.443)	0.477 (0.435-0.524)	0.530 (0.482-0.581)	0.598 (0.542-0.655)	0.644 (0.581-0.705)	0.689 (0.619-0.754)	0.733 (0.655-0.802)	0.784 (0.694-0.860)	0.821 (0.721-0.903)
10-min	0.536 (0.489-0.588)	0.641 (0.586-0.704)	0.759 (0.692-0.833)	0.843 (0.766-0.924)	0.943 (0.855-1.03)	1.01 (0.916-1.11)	1.08 (0.973-1.18)	1.15 (1.02-1.26)	1.22 (1.08-1.34)	1.28 (1.12-1.40)
15-min	0.668 (0.610-0.733)	0.802 (0.733-0.881)	0.956 (0.871-1.05)	1.06 (0.964-1.16)	1.19 (1.08-1.30)	1.28 (1.16-1.40)	1.37 (1.23-1.50)	1.44 (1.29-1.58)	1.54 (1.36-1.69)	1.60 (1.40-1.76)
30-min	0.910 (0.831-0.999)	1.10 (1.01-1.21)	1.35 (1.23-1.48)	1.52 (1.39-1.67)	1.75 (1.59-1.92)	1.91 (1.72-2.09)	2.07 (1.86-2.26)	2.22 (1.98-2.43)	2.41 (2.13-2.64)	2.55 (2.24-2.81)
60-min	1.13 (1.03-1.24)	1.38 (1.26-1.51)	1.72 (1.57-1.89)	1.98 (1.80-2.17)	2.32 (2.10-2.54)	2.57 (2.32-2.82)	2.84 (2.55-3.10)	3.09 (2.76-3.38)	3.44 (3.04-3.77)	3.70 (3.25-4.07)
2-hr	1.38 (1.26-1.52)	1.69 (1.54-1.85)	2.14 (1.95-2.34)	2.49 (2.26-2.73)	2.97 (2.69-3.26)	3.37 (3.03-3.69)	3.78 (3.37-4.13)	4.21 (3.72-4.60)	4.80 (4.20-5.26)	5.28 (4.57-5.79)
3-hr	1.55 (1.42-1.70)	1.89 (1.73-2.07)	2.39 (2.19-2.63)	2.79 (2.54-3.05)	3.33 (3.02-3.65)	3.78 (3.40-4.13)	4.24 (3.79-4.63)	4.72 (4.18-5.15)	5.38 (4.72-5.88)	5.91 (5.14-6.47)
6-hr	2.00 (1.84-2.20)	2.44 (2.23-2.66)	3.08 (2.82-3.36)	3.60 (3.29-3.93)	4.35 (3.94-4.73)	4.98 (4.47-5.40)	5.64 (5.03-6.12)	6.36 (5.61-6.89)	7.38 (6.42-8.02)	8.23 (7.08-8.95)
12-hr	2.50 (2.29-2.76)	3.04 (2.78-3.35)	3.87 (3.52-4.25)	4.56 (4.14-5.00)	5.58 (5.02-6.09)	6.46 (5.76-7.03)	7.40 (6.53-8.05)	8.45 (7.37-9.20)	10.0 (8.55-10.9)	11.3 (9.53-12.3)
24-hr	2.84 (2.63-3.09)	3.44 (3.18-3.74)	4.40 (4.06-4.78)	5.22 (4.80-5.67)	6.46 (5.90-7.00)	7.52 (6.83-8.15)	8.71 (7.82-9.44)	10.0 (8.90-10.9)	12.0 (10.5-13.1)	13.7 (11.8-15.0)
2-day	3.36 (3.10-3.64)	4.06 (3.76-4.42)	5.18 (4.79-5.63)	6.11 (5.64-6.64)	7.48 (6.85-8.12)	8.65 (7.87-9.39)	9.92 (8.95-10.8)	11.3 (10.1-12.3)	13.3 (11.7-14.6)	15.1 (13.1-16.6)
3-day	3.52 (3.27-3.82)	4.26 (3.96-4.62)	5.42 (5.02-5.87)	6.37 (5.89-6.90)	7.76 (7.12-8.40)	8.92 (8.14-9.66)	10.2 (9.22-11.0)	11.6 (10.4-12.6)	13.6 (12.0-14.8)	15.2 (13.3-16.7)
4-day	3.70 (3.44-3.99)	4.47 (4.16-4.83)	5.66 (5.25-6.11)	6.63 (6.14-7.17)	8.04 (7.40-8.67)	9.20 (8.42-9.94)	10.5 (9.49-11.3)	11.8 (10.6-12.8)	13.8 (12.2-15.0)	15.4 (13.5-16.9)
7-day	4.37	5.25	6.52	7.57	9.07	10.3	11.6	13.1	15.1	16.8

	(4.08-4.71)	(4.90-5.66)	(6.07-7.02)	(7.03-8.14)	(8.38-9.76)	(9.47-11.1)	(10.6-12.6)	(11.8-14.1)	(13.4-16.4)	(14.7-18.3)
10-day	5.02 (4.70-5.39)	6.00 (5.62-6.44)	7.35 (6.87-7.87)	8.44 (7.87-9.04)	9.99 (9.27-10.7)	11.3 (10.4-12.1)	12.6 (11.5-13.5)	14.0 (12.7-15.1)	16.0 (14.4-17.3)	17.6 (15.6-19.2)
20-day	6.79 (6.39-7.23)	8.06 (7.58-8.58)	9.62 (9.04-10.2)	10.8 (10.2-11.5)	12.5 (11.7-13.3)	13.8 (12.8-14.7)	15.1 (14.0-16.1)	16.4 (15.1-17.6)	18.2 (16.6-19.6)	19.6 (17.7-21.1)
30-day	8.46 (8.00-8.94)	9.98 (9.44-10.6)	11.7 (11.0-12.3)	13.0 (12.2-13.7)	14.6 (13.8-15.5)	15.9 (14.9-16.9)	17.2 (16.1-18.2)	18.4 (17.1-19.5)	19.9 (18.4-21.3)	21.1 (19.4-22.6)
45-day	10.7 (10.2-11.3)	12.6 (12.0-13.3)	14.6 (13.8-15.3)	16.0 (15.2-16.9)	17.9 (16.9-18.9)	19.3 (18.2-20.4)	20.7 (19.4-21.8)	21.9 (20.6-23.2)	23.6 (22.0-25.0)	24.8 (23.0-26.3)
60-day	12.9 (12.2-13.6)	15.1 (14.4-15.9)	17.3 (16.4-18.2)	18.9 (17.9-19.9)	20.9 (19.8-22.0)	22.3 (21.1-23.5)	23.7 (22.4-25.0)	25.0 (23.5-26.4)	26.5 (24.9-28.1)	27.6 (25.8-29.3)

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

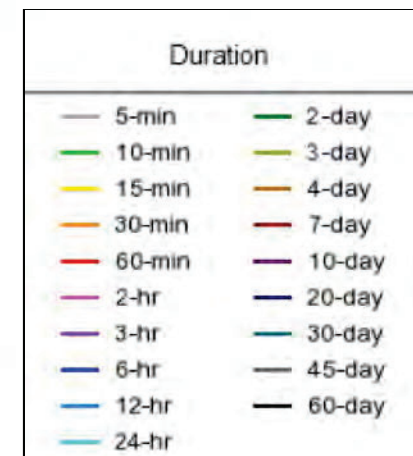
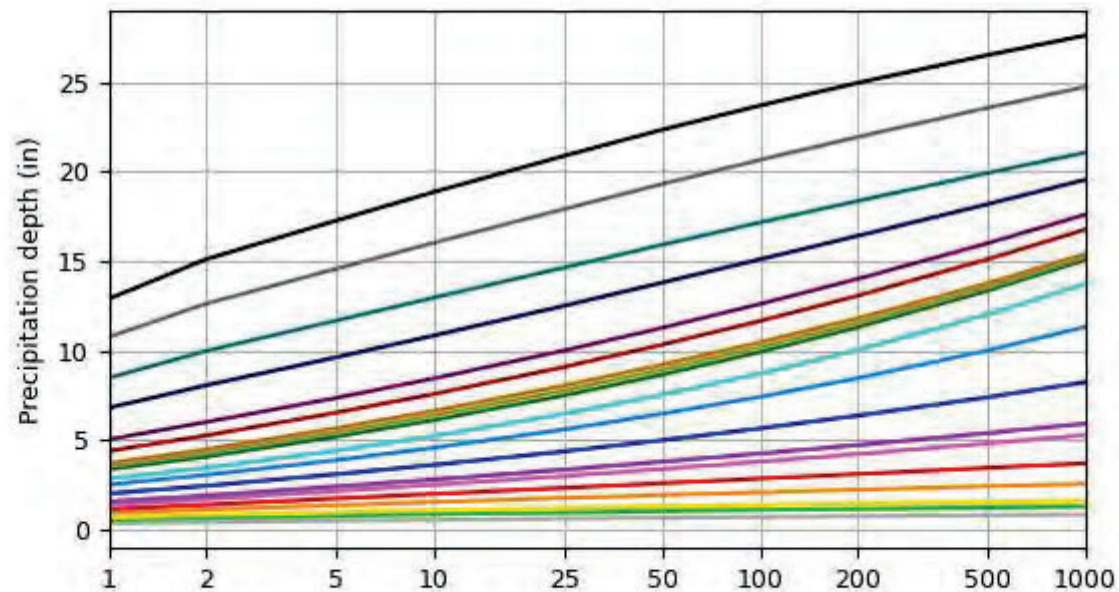
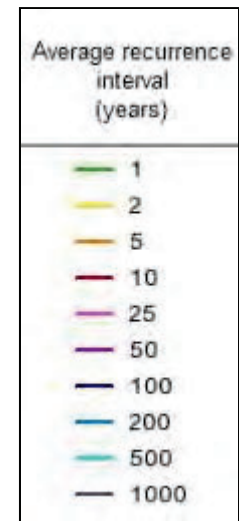
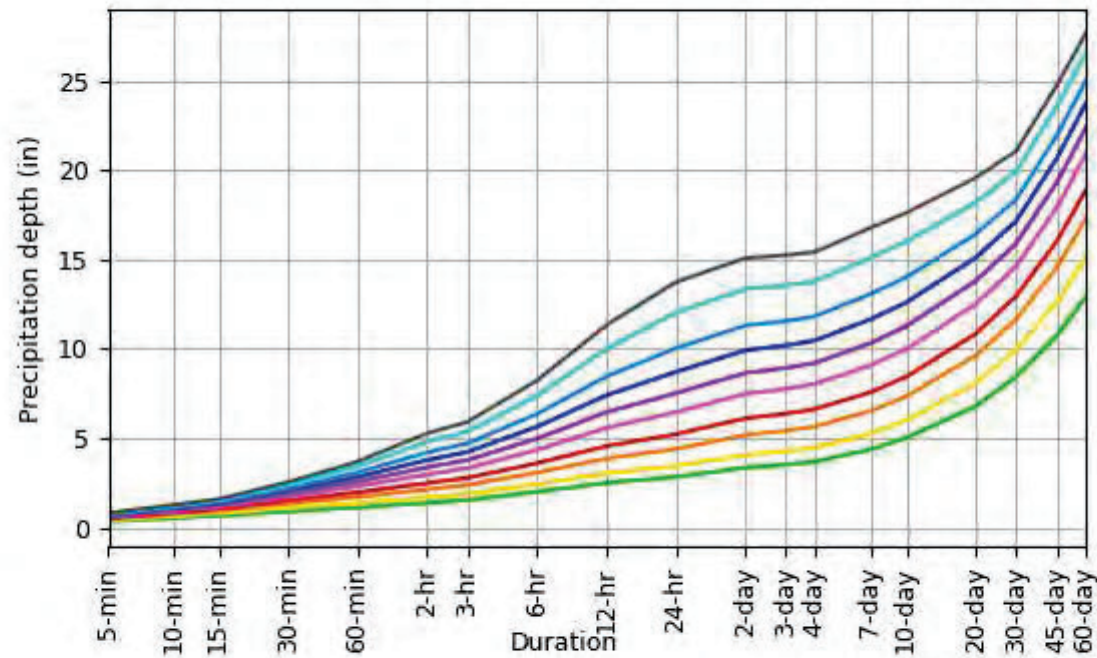
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

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PF graphical

PDS-based depth-duration-frequency (DDF) curves
 Latitude: 40.8346°, Longitude: -74.2584°



Average recurrence interval (years)

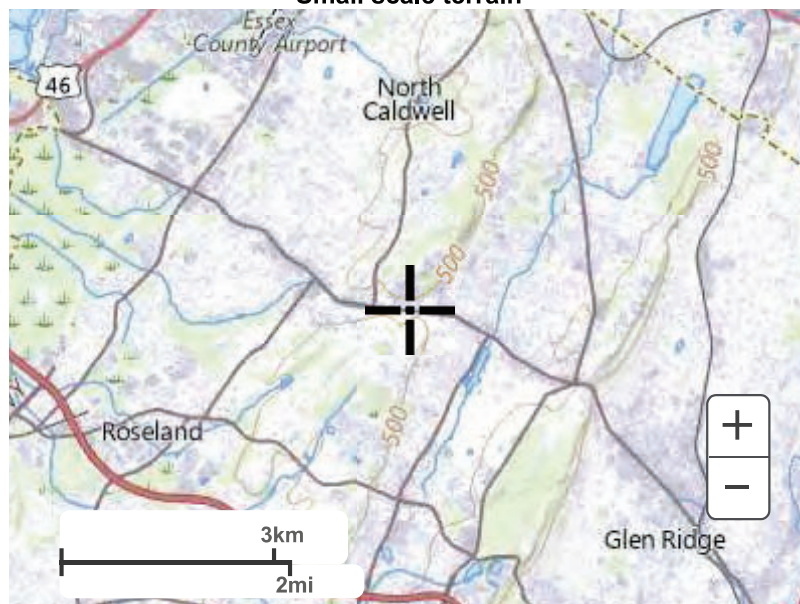
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Future Precipitation Change Factors at N.J.A.C. 7:8-5.7(d) as Table 5-6

County	Future Precipitation Change Factors		
	2-year Design Storm	10-year Design Storm	100-year Design Storm
Atlantic	1.22	1.24	1.39
Bergen	1.20	1.23	1.37
Burlington	1.17	1.18	1.32
Camden	1.18	1.22	1.39
Cape May	1.21	1.24	1.32
Cumberland	1.20	1.21	1.39
Essex	1.19	1.22	1.33
Gloucester	1.19	1.23	1.41
Hudson	1.19	1.19	1.23
Hunterdon	1.19	1.23	1.42
Mercer	1.16	1.17	1.36
Middlesex	1.19	1.21	1.33
Monmouth	1.19	1.19	1.26
Morris	1.23	1.28	1.46
Ocean	1.18	1.19	1.24
Passaic	1.21	1.27	1.50
Salem	1.20	1.23	1.32
Somerset	1.19	1.24	1.48
Sussex	1.24	1.29	1.50
Union	1.20	1.23	1.35
Warren	1.20	1.25	1.37

Table 9-1 Runoff curve numbers for agricultural lands ^{1/} — Continued

covert type	Cover description treatment ^{2/}	hydrologic condition ^{3/}	-- CN for hydrologic soil group --			
			A	B	C	D
Pasture, grassland, or range- continuous forage for grazing ^{4/}		Poor	68	79	86	89
		Fair	49	69	79	84
		Good	39	61	74	80
Meadow-continuous grass, protected from grazing and generally mowed for hay		Good	30	58	71	78
Brush-brush-forbs-grass mixture with brush the major element ^{5/}		Poor	48	67	77	83
		Fair	35	56	70	77
		Good	30 ^{6/}	48	65	73
Woods-grass combination (orchard or tree farm) ^{7/}		Poor	57	73	82	86
		Fair	43	65	76	82
		Good	32	58	72	79
Woods ^{8/}		Poor	45	66	77	83
		Fair	36	60	73	79
		Good	30	55	70	77
Farmstead—buildings, lanes, driveways, and surrounding lots		---	59	74	82	86
Roads (including right-of-way):						
Dirt		---	72	82	87	89
Gravel		---	76	85	89	91

1/ Average runoff condition, and $I_a = 0.2s$.

2/ Crop residue cover applies only if residue is on at least 5 percent of the surface throughout the year.

3/ Hydrologic condition is based on combinations of factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good $\geq 20\%$), and (e) degree of surface toughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

For conservation tillage poor hydrologic condition, 5 to 20 percent of the surface is covered with residue (less than 750 pounds per acre for row crops or 300 pounds per acre for small grain).

For conservation tillage good hydrologic condition, more than 20 percent of the surface is covered with residue (greater than 750 pounds per acre for row crops or 300 pounds per acre for small grain).

4/ Poor: < 50% ground cover or heavily grazed with no mulch.

Fair: 50 to 75% ground cover and not heavily grazed.

Good: > 75% ground cover and lightly or only occasionally grazed.

5/ Poor: < 50% ground cover.

Fair: 50 to 75% ground cover.

Good: > 75% ground cover.

6/ If actual curve number is less than 30, use CN = 30 for runoff computation.

7/ CNs shown were computed for areas with 50 percent woods and 50 percent grass (pasture) cover. Other combinations of conditions may be computed from the CNs for woods and pasture.

8/ Poor: Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.

Fair: Woods are grazed, but not burned, and some forest litter covers the soil.

Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Table 9-5 Runoff curve numbers for urban areas ^{1/}

Cover description cover type and hydrologic condition	Average percent impervious area ^{2/}	-- CN for hydrologic soil group --			
		A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) ^{3/}					
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, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) ^{4/}		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)		77	86	91	94

1/ Average runoff condition, and $I_a = 0.2S$.

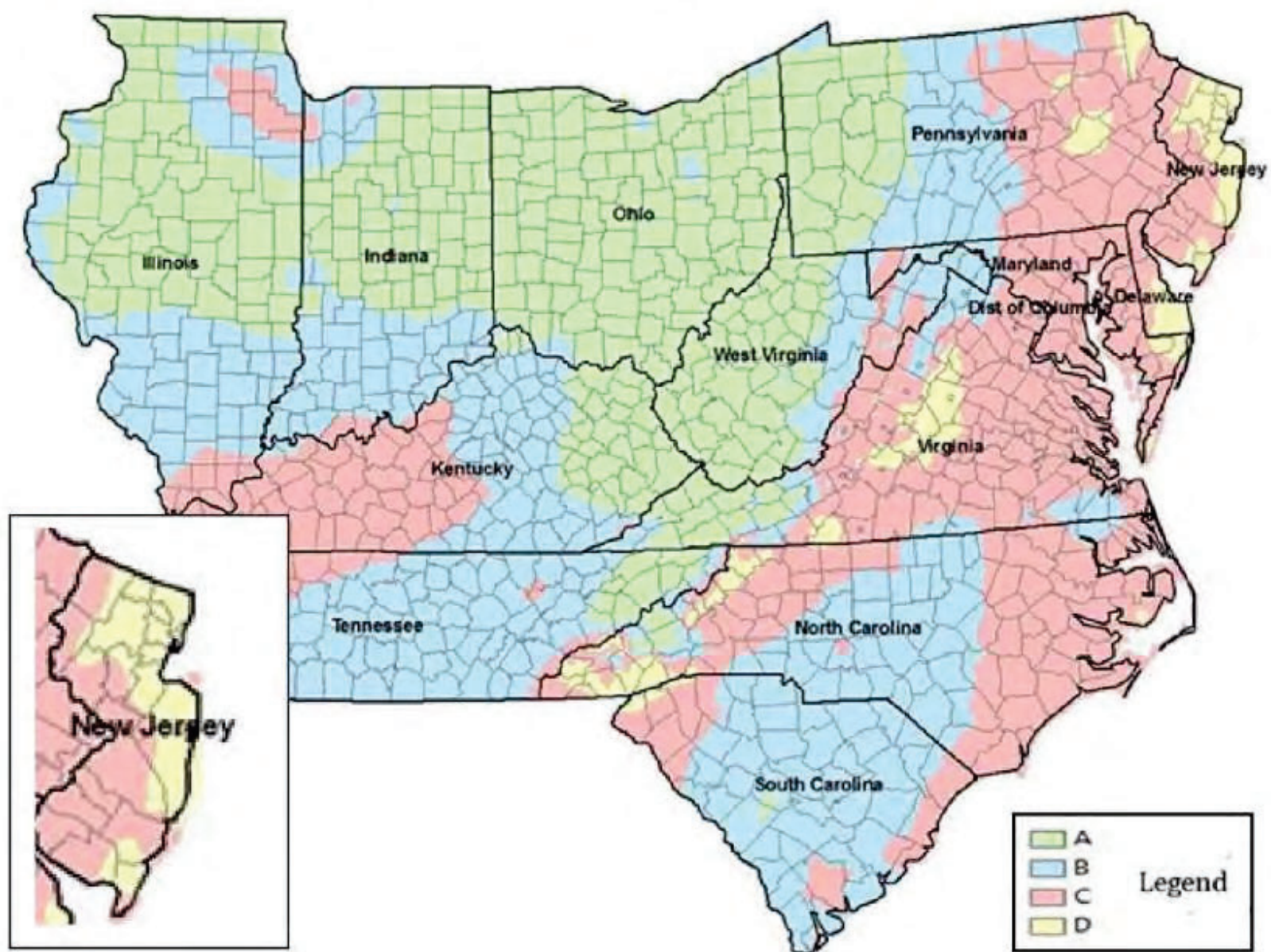
2/ The average percent impervious area shown was used to develop the composite CNs. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition.

3/ CNs shown are equivalent to those of pasture. Composite CNs may be computed for other combinations of open space type.

4/ Composite CNs for natural desert landscaping should be computed using figures 9-3 or 9-4 based on the impervious area percentage (CN=98) and the pervious area CN. The pervious area CNs are assumed equivalent to desert shrub in poor hydrologic condition.

Figure 5-9: NJ Locations of Regions C and D

Figure 4-71: NOAA Atlas 14 Volume 2 Region, Rainfall Distribution Regions



- b. N.J.A.C.7:8-5.7(c) requires the precipitation depths of the current 2-, 10- and 100-year storm events be determined by multiplying the NOAA rainfall data with the current precipitation adjustment factors in Table 5-5 at N.J.A.C.7:8-5.7(c)2. N.J.A.C.7:8-5.7(d) requires the precipitation depths of the projected 2-, 10- and 100-year storm events be determined by multiplying the NOAA rainfall data with the future precipitation change factors in Table 5-6 at N.J.A.C.7:8-5.7(d). Table 5-5 and Table 5-6 from the Rules are reproduced below.

Current Precipitation Adjustment Factors at N.J.A.C. 7:8-5.7(c) as Table 5-5

County	Current Precipitation Adjustment Factors		
	2-year Design Storm	10-year Design Storm	100-year Design Storm
Atlantic	1.01	1.02	1.03
Bergen	1.01	1.03	1.06
Burlington	0.99	1.01	1.04
Camden	1.03	1.04	1.05
Cape May	1.03	1.03	1.04
Cumberland	1.03	1.03	1.01
Essex	1.01	1.03	1.06
Gloucester	1.05	1.06	1.06
Hudson	1.03	1.05	1.09
Hunterdon	1.02	1.05	1.13
Mercer	1.01	1.02	1.04
Middlesex	1.00	1.01	1.03
Monmouth	1.00	1.01	1.02
Morris	1.01	1.03	1.06
Ocean	1.00	1.01	1.03
Passaic	1.00	1.02	1.05
Salem	1.02	1.03	1.03
Somerset	1.00	1.03	1.09
Sussex	1.03	1.04	1.07
Union	1.01	1.03	1.06
Warren	1.02	1.07	1.15