POST CONSTRUCTION STORMWATER MANAGEMENT REPORT

for

201 Pennsylvania Ave
Malvern Borough
Chester County, Pennsylvania

April 3, 2024

D.L. Howell Job# 4668

Prepared for:

E. Kahn Development
120 Pennsylvania Ave
Malvern PA, 19355

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID W. GIBBONS
ENGINEER
PE076444

Prepared by:
Howell Engineering
1250 Wrights Lane, West Chester, PA 19380
Phone: 610-918-9002 Fax: 610-918-9003

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1.0 INTRODUCTION

This Stormwater Management Report presents the temporary and permanent control measures/ facilities required to support construction activities for 201 Pennsylvania Ave. The 9.91 +/- acre tract is in Malvern Borough (Figure 1-1).

The proposed land development consists of constructing a building addition, parking lot/driveway, and stormwater management facilities.

This project is designed per the Malvern Borough Stormwater Management Act 167 Ordinance, adopted May 20th, 2014.

1.1 LAND USE/WATERSHED

The existing land is undeveloped and fully wooded. An Unnamed Tributary to Little Valley Creek roughly bisects the property down the middle in the north-south direction. The topography falls vertically ~60’ from the cul-de-sac of Pennsylvania Ave to the streambank. The topography then rises ~70’ to the only relatively flat portion of the site. The plan is to construct an embankment with a maximum height of ~40’ to cross the stream and develop the western portion of the property into a ~41,000 SF industrial building. The embankment is to be designed and certified by a professional geotechnical engineer. The western portion of the property will be padded, and the resulting spoils will be processed on site and used to construct the earthen embankment crossing the stream. A box culvert will be installed to convey the stream through the embankment. Due to the criticality of this crossing, the culvert will be designed to convey the 500 year peak flow and the PMF as described in the Stream Stats report in appendix L. The site has been layed out and graded in a way so that the spoils from excavating the western portion of the property can be used to construct the embankment. Preliminary geotechnical calculations indicate that the excavated material will be sufficient. The property is located within the Little Valley Creek Watershed. Per Pennsylvania Department of Environmental Protection, 25 Pa. Code, 93.9g “Water Quality Standards” the watershed is classified as Exceptional Value (EV) and Migratory Fishes (MF).

1.2 SITE SOILS

Soils information is provided by Penn State College of Agriculture Cooperative Extension, with support from the Natural Resources Conservation Service, United States Department of Agriculture and their Web Soil Survey. Soils attribute data is served from the websoilsurvey.nrcs.usda.gov. All the below mentioned soils are further evaluated in Appendix G.

MaB – Manor loam 3-8% slopes
MaE – Manor Load 25-35% slopes
MaF – Manor Load 35-60% slopes
MbF – Manor Loam 25-60% slopes
UugB – Urban land – udorthents, schist and gneiss complex 0-8% slopes
UugD – Urban land – udorthents, schist and gneiss complex 8-25% slopes.

1.3 SOIL LIMITATIONS:

Geologic formations/soil conditions that may have the potential to cause pollution:

A geotechnical investigation was conducted by Howell Engineering to determine the subsurface conditions during the sketch and preliminary phase of the project. Multiple test pits were excavated on the western portion of the property as well as the location of the crossing. Of the 3 proposed subsurface beds, Bed 1 is to be fully located within the rock, Bed 2 is going to be mostly located within rock, or have a limiting zone less than 2’, Bed 3 is going to be located majority in structural fill for the proposed embankment. Additionally, due to the steep topography of the site there are no other feasible locations for such facilities to be located.

Howell Engineering has taken into consideration these known geologic limitations when designing the treatment BMPs for the project. If during construction, any other soil limitation is discovered, the contractor is responsible for immediately contacting the site geo-technical engineer, design engineer, conservation district, and the township engineer for an appropriate solution. The site design drawings contain a pumped water filter bag detail which should be utilized if any excavations need to be dewatered due to high groundwater or excessive rainfall.

2.0 RUNOFF MANAGEMENT

The purpose of the stormwater management design is to quantify, and control stormwater runoff generated by the modifications of the ground surface conditions to the site. Post-development stormwater management is achieved at the site through three constructed filters with the Managed Release Concept (MRC) strategically placed on the site to control runoff. The MRC is proposed due to the presence of shallow rock as outlined in Appendix K. Most of the proposed development is controlled by the stormwater facilities, while minimal areas of lawn (mostly from the embankment) will flow off the site uncontrolled. All stormwater calculations were performed using design storms as determined by NOAA Atlas 14, Volume 2, Version 3 (Figure 2-1).

The stormwater analysis was conducted with three Discharge Points; POI 1, POI 2 and LOI 3.

POI 1 is located on the northern portion of the property where The UNT of Little Valley Creek leaves the property. POI 1 was analyzed using the Soils Conservation Service (SCS) method for rate control and an MRC system is proposed that will discharge to this POI. The system was designed to meet township and DEP rate reduction requirements. The conveyance system was designed to convey flows up to the 100 year storm event. Flows to the pipes were modeled using the Universal Rational method and pipes sized using Manning's Method and HGL calculations. The stormwater BMPs have been designed per PADEP's Managed Release Concept white paper dated May 15, 2019.

POI 2 is located on the western portion of the property where an existing defined channel, fed by sheet flow directs flow onto neighboring properties. Based on the PADEP PCSM spreadsheet (appendix G) there was a decrease in the Delta 2 Volume. Additionally, the peak rate for all design storms did not increase. Due to this, no additional stormwater measures have been implemented.

POI 3 is a line of interest along the northern property line approximately bordering the properties of 42-4Q-153, 42-4R-36, and 42-4R-37. Based on the PADEP PCSM spreadsheet (appendix G) there was a decrease in Delta 2 Volume. Additionally, the peak rate for all design storms did not increase. Due to this no additional stormwater measures have been implemented.

The stormwater conveyance system was designed to convey flows up to the 100-year storm event. Flows to the pipes were modeled using the Universal Rational Method and the pipes sized using Manning's Method and Hydraulic Grade Line calculations. The stormwater BMPs have been designed per PADEP's Managed Release Concept white paper dated May 15, 2019.

2.1 INFILTRATION COMPLIANCE

Infiltration is not proposed at this site due to underlying rock and bedrock throughout the site. Given these site conditions the stormwater management system was designed using the Managed Release Concept.

3.0 NPDES STORMWATER COMPLIANCE

As stated above, the stormwater facility with MRC has been designed per PADEP's Managed Release Concept white paper outlined in Section 3.1 of this report. This plan will further act to perform/provide the following:

- Preserve the integrity of stream channels and maintain and protect the physical, biological and chemical qualities of the receiving stream by utilizing several BMPs to handle the increase in runoff and volume prior to reaching the stream.
- Prevent an increase in the rate of stormwater runoff by utilizing BMPs to reduce the peak flow rate of all storm events up to the 100-year to below the equivalent storm in the pre-developed condition.
- Minimize any increase in stormwater runoff volume by utilizing BMPs with MRC which are designed and sized to manage the 2-year increase in volume.
- Minimize impervious areas by not constructing impervious surfaces throughout the entire property.
- Maximize the protection of existing drainage features and existing vegetation by capturing stormwater runoff from the proposed impervious areas and then conveying the flow to stormwater BMP facilities prior to any release to the existing UNT, thereby protecting it from any sediment.
- Minimize land clearing and grading by preserving existing trees along the perimeter of the property.
- Minimize soil compaction by specifying the installation of orange construction fencing to protect the areas of the proposed stormwater BMPs.
- Utilize other structural or nonstructural BMPs that prevent or minimize changes in stormwater runoff.

Howell Engineering has designed Best Management Practices (BMP's) consistent with Chapter 6 of the PA Stormwater Best Management Practices Manual within the stormwater collection and conveyance system.

<u>Mitigating Thermal Impacts:</u>
The potential thermal impacts to surface waters are mitigated by the proposed stormwater management system. The BMP facility is designed to manage the 2-year increase in volume using a constructed filter with MRC which will allow cooling prior to release. It is this "first flush" that carries the highest thermal impact, therefore through various filtering and slow release methods, the BMPs mitigate any thermal impacts to the stream by allowing managed runoff to cool prior to reaching surface waters.

3.1 <u>Managed Release Concept:</u>

A summary of all structural stormwater BMPs is provided below with each having an explanation as to why that individual BMP was or was not used as part of the stormwater design.

6.4.1 Porous Pavement – Due to the presence of rock throughout the site, porous pavement has been deemed to not provide any benefit.

6.4.2 Infiltration Basin – No area is available for an infiltration basin given the scope of the development.

6.4.3 Infiltration Bed - Due to the presence of shallow bedrock, an infiltration bed is infeasible.

6.4.4 Infiltration Trench - Due to the presence of shallow bedrock, an infiltration trench is infeasible.

6.4.5 Rain Garden/Bioretention – No area is available for a Rain Garden due to the scope of development.

6.4.6 Dry Well/Seepage Pit - Due to the presence of shallow bedrock, a dry well/seepage pit is infeasible.

6.4.7 Constructed Filter – A subsurface constructed filter with MRC is proposed with this application.

6.4.8 Vegetated Swale – No area is available for a swale due to the large-scale development

6.4.9 Vegetated Filter Strip – No area is available for a filter strip due to the large-scale development.

6.4.10 Infiltration Berm & Retentive Grading - Due to the presence of shallow bedrock and township regulations regarding steep slope disturbance, an infiltration berm is infeasible.

6.5.1 Vegetated Roof – The proposed building does not provide a vegetated roof.

6.5.2 Capture and Re-use – The proposed building does not include a system to utilize stormwater.

6.6.1 Constructed Wetlands – The proposed drainage area is less than the recommended area of 5 to 10 acres.

6.6.2 Wet Pond/Retention Basin – The proposed drainage area is less than the recommended area of 5 to 10 acres.

6.6.3 Dry Extended Detention Basin – Due to the topography of the site, a Dry Extended Detention Basin is infeasible

6.6.4 Water Quality Filters & Hydrodynamic Devices – Proposed Inlet Filter Bags are proposed. Details describing the specifications and maintenance are provided on sheet 6 of the plan set.

6.7.1 Riparian Buffer/Riparian Forest Buffer Restoration – The proposed controls do not provide riparian buffer/riparian forest buffer restoration.

6.7.2 Landscape Restoration/Reforestation – Landscape restoration is provided.

6.7.3 Soil Amendment & Restoration – The majority of the lot is going to be covered by impervious. Additionally, a majority of the site is situated in B soil, allowing for some infiltration of overland flow.

6.8.1 Level Spreader – The proposed MRC facilities discharge using bubble up level spreaders.

MRC Design Standards – Subsurface Constructed Filter with MRC 1, 2 and 3

1. Runoff Capture – The MRC facility has been designed to capture and manage the runoff volume generated by a 1.2"/ 2-hr storm for the entire drainage area conveyed to the MRC. Hydraflow Hydrographs Extension for Autodesk Civil 3D was used for the routing. The 3-year storm available in the program was customized for the 1.2"/2-hr storm.

2. Release Rate – The maximum allowed release rate was calculated conservatively using only the impervious area draining to the MRC. The impervious area draining to MRC 1, 2 and 3 is 2.35 acres. Therefore, the maximum allowed release rate is 0.023 cfs.

   The calculated flow conveyed through the orifice of the Constructed Filter with MRC during a 1.2"/2-hour storm is 0.023 cfs.

3. Internal Water Storage – All MRC facilities have been designed to provide one foot of internal water storage.

4. Peak Flow Attenuation – The MRC facility has been designed to reduce the peak flow leaving the site during a 2-year post-developed storm event to the 1-year pre-developed storm event, the post-developed 5 year storm has been reduced to the pre-developed 1-year storm and the post-developed 10-year storm has been reduced to the pre-developed 2 year storm. Additionally, the MRC facility has been designed to reduce the peak flow due to post developed conditions to less than the peak flow due to predeveloped conditions for the 25, 50, and 100-year storm events.

5. MRC BMP Selection

   a. Vegetated MRC – A vegetated MRC will not be able to be constructed due to the topography on site

   b. Non-vegetated MRC: Porous Pavement – Porous paving is not being proposed with this project.

   c. Non-vegetated MRC: Underground Storage Chambers – Three subsurface constructed filters with MRC is proposed.

6. Pre-Development Site Characterization and Assessment of Soil and Geology – Howell Engineering performed multiple test bore holes across the site to determine the subsurface conditions. During testing, rock was encountered throughout, hindering infiltration.

7. Separation Distance – No groundwater was encountered during infiltration testing and during the geotechnical investigation.

8. Ponding Depth & Drawdown Time – The calculated drawdown time for all systems does not exceed 7 days.

9. Soil Media

   MRC Bed 1 – 1' of #57 stone and 4' of stormtank. Total storage depth is 5'.
   MRC Bed 2 – 1' of #57 stone and 4' of stormtank. Total storage depth is 5'.
   MRC Bed 3 – 1' of #57 stone and 4' of stormtank. Total storage depth is 5'.

10. Underdrain Design – A detail of the proposed underdrain design has been included for all MRC Beds within the Land Development plan set. The underdrain will connect to an outlet structure with a small orifice which will control the rate of release from the facilities.

11. Discharge Flow Path – The system has been designed to sheet flow into the UNT of Little Valley Creek.

12. Antidegradation Requirements – The site is located within an EV watershed, as a result, bubble up level spreaders have been designed to reduce degradation due to overland flow.

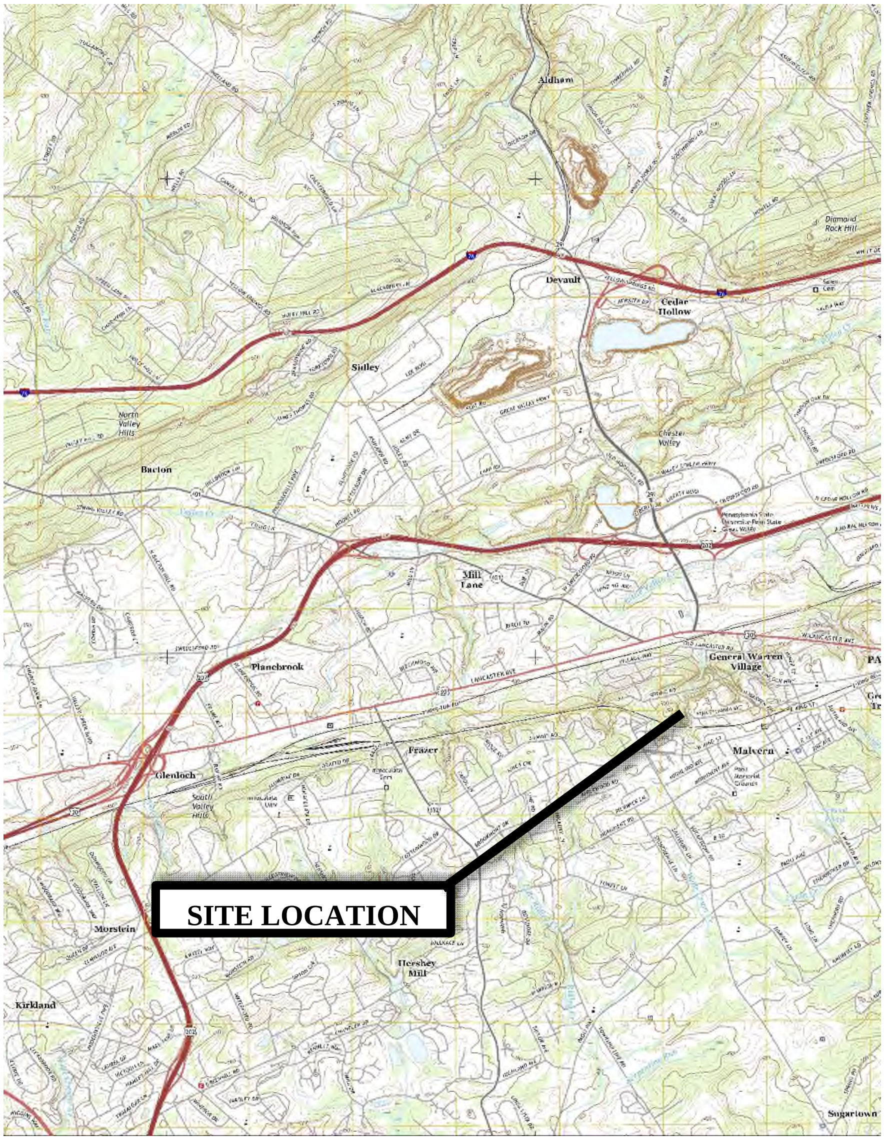
3.1 ADEQUACY OF DISCHARGE

Per the narrative provided in Appendix J, the applicant has the right to discharge. The discharge will follow existing flow paths and will not cause nuisance to downstream properties.

4.0 CONCLUSIONS

Howell Engineering has completed a stormwater engineering design for the proposed project in West Whiteland Township, Chester County, Pennsylvania. Using site-specific topography, soils, land cover, hydrologic data, and Municipality Ordinances, Howell Engineering designed the stormwater management system for the proposed facilities. The objective of the stormwater design was to develop site-specific stormwater management structures that reduce post-development runoff to pre-development runoff rates and provide volumetric storage per Municipality and PADEP NPDES requirements.

FIGURE 1-1



Source:
United States Department of the Interior Geological Survey
7.5 Minute Series (Topographic) Map
West Chester, Pennsylvania Quadrangle

HOWELL ENGINEERING Local Knowhow. Engineered.	**E.Khan Development** **201 Pennsylvania Ave** **Malvern Borough** **Chester County, Pennsylvania**	**Figure Number:** **FIGURE 1-1** **Title:** **SITE LOCATION MAP**

APPENDIX A

NPDES 2-YEAR INFILTRATION REQUIREMENT CALCULATIONS

General Information

Instructions | *General* | Volume | Rate | Quality

Project Name: **201 Pennsylvania Ave**

Application Type: **Individual NPDES Application**

County: **CHESTER**

Municipality: **Malvern Borough**

Project Type: **Commercial Building**

◉ New Project ○ Minor / Major Amendment

Area: **3.78** acres
(In Watershed)

Total Earth Disturbance: **3.70** acres
(In Watershed)

No. of Post-Construction Discharge Points: **1**

Start DP Numbering at: **001**

Discharge Point (DP) No.	Drainage Area (DA) (acres)	Earth Disturbance in DA (acres)	Existing Impervious in DA (acres)	Proposed Impervious in DA (acres)	Receiving Waters	Ch. 93 Class	Structural BMP(s)
001	3.06	0.00	0.00	0.00	Discharge to Non-Surface Waters	EV, MF	Yes
Undetained Areas	0.61	0.60	0.00	0.00	Discharge to Non-Surface Waters	EV, MF	
Totals:	**3.67**	**0.60**					

PROJECT SITE MEETS SMALL SITE EXCEPTION - RATE WORKSHEET NOT REQUIRED

Volume Management

Project: 201 Pennsylvania Ave

Instructions | General | *Volume* | Rate | Quality

2-Year / 24-Hour Storm Event (NOAA Atlas 14): **3.25** inches

Alternative 2-Year / 24-Hour Storm Event: inches

Alternative Source:

Pre-Construction Conditions: *No. Rows:* **1** ☐ *Exempt from Meadow in Good Condition* ☑ *Automatically Calculate CN, Ia, Runoff and Volume*

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)
Forested (Good Condition)	2.78	B	55	1.636	0.27	2,682
TOTAL (ACRES):	**2.78**				**TOTAL (CF):**	**2,682**

Post-Construction Conditions: *No. Rows:* **4**

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	1.28	B	61	1.279	0.46	2,159
Impervious Areas: Paved Parking Lots, Roofs, Driveways, Etc. (Excluding ROW)	2.39	N/A	98	0.041	3.02	26,177
TOTAL (ACRES):	**3.67**				**TOTAL (CF):**	**28,336**

NET CHANGE IN VOLUME TO MANAGE (CF): 25,653

Non-Structural BMP Volume Credits:

☐ Tree Planting Credit

☐ Other (attach calculations):

Structural BMP Volume Credits: *No. Structural BMPs:* **3** *Start BMP Numbering at:* **1**

DP No.	BMP No.	BMP Name	MRC?	Discharge	Incremental BMP DA (acres)	Volume Routed to BMP (CF)	Infiltration / Vegetated Area (SF)	Infiltration Rate (in/hr)	Infiltration Period (hrs)	Vegetated?	Media Depth (ft)	Storage Volume (CF)	Infiltration Credit (CF)	ET Credit (CF)
001	1	Constructed Filter	Y	to BMP No. 2	1.13	10,453	0	0.00	12	No	5.0	10,453	**0**	
001	2	Constructed Filter	Y	Off-Site	1.19	21,241	0	0.00	12	No	5.0	10,788	**0**	
001	3	Constructed Filter	Y	Off-Site	0.73	5,545	0	0.00	12	No	5.0	5,545	**0**	
												Totals:		

INFILTRATION & ET CREDITS (CF):

NET CHANGE IN VOLUME TO MANAGE (CF): 25,653

TOTAL CREDITS (CF): 26,786

VOLUME REQUIREMENT SATISFIED

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Rate Control

Project: 201 Pennsylvania Ave

Instructions | General | Volume | *Rate* | Quality

Precipitation Amounts:

NOAA 2-Year 24-Hour Storm Event (in):	**3.25**	Alternative 2-Year 24-Hour Storm Event (in):	
NOAA 10-Year 24-Hour Storm Event (in):	**4.6**	Alternative 10-Year 24-Hour Storm Event (in):	
NOAA 50-Year 24-Hour Storm Event (in):	**5.7**	Alternative 50-Year 24-Hour Storm Event (in):	
NOAA 100-Year 24-Hour Storm Event (in):	**7.2**	Alternative 100-Year 24-Hour Storm Event (in):	

☑ **Report Summary of Peak Rates Only**

Attach model input and output data or other calculations to support the rates reported below.

	Peak Discharge Rates (cfs)			
	Pre-Construction	**Post-Construction**	**Net Change**	
2-Year Storm:	**1.45**	**0.58**	**-0.87**	***Rate Control Satisfied***
10-Year Storm:	**4.39**	**2.94**	**-1.45**	***Rate Control Satisfied***
50-Year Storm:	**7.90**	**5.43**	**-2.47**	***Rate Control Satisfied***
100-Year Storm:	**12.94**	**12.70**	**-0.24**	***Rate Control Satisfied***

Water Quality

Project: 201 Pennsylvania Ave

PRINT

Instructions | General | Volume | Rate | *Quality*

Pre-Construction Pollutant Loads:

Land Cover (from Volume Worksheet)	Land Cover for Water Quality	Area (acres)	Soil Group	Runoff Volume (cf)	Pollutant Conc. (mg/L)			Pollutant Loads (lbs)		
					TSS	TP	TN	TSS	TP	TN
Forested (Good Condition)	Deciduous Forest/Evergreen Forest/Mixed Forest	2.78	B	2,682	45.0	0.13	1.05	7.54	0.02	0.18
	TOTAL (ACRES):	**2.78**				**TOTALS:**		**7.54**	**0.02**	**0.18**

Post-Construction Pollutant Loads (without BMPs):

Land Cover (from Volume Worksheet)	Land Cover for Water Quality	Area (acres)	Soil Group	Runoff Volume (cf)	Pollutant Conc. (mg/L)			Pollutant Loads (lbs)		
					TSS	TP	TN	TSS	TP	TN
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	Open Space	1.28	B	2,159	78.0	0.25	1.25	10.51	0.03	0.17
Impervious Areas: Paved Parking Lots, Roofs, Driveways, Etc. (Excluding ROW)	Residential	2.39	N/A	26,177	65.0	0.29	2.05	106.25	0.47	3.35
	TOTAL (ACRES):	**3.67**				**TOTALS:**		**116.76**	**0.51**	**3.52**

POLLUTANT LOAD REDUCTION REQUIREMENTS (LBS): 109.22 | 0.49 | 3.34

☑ **Characterize Undetained Areas (for Untreated Stormwater)** *No. Rows:* 1

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	**0.508**	**B**	**61**	**1.279**	**0.46**	**857**

Non-Structural BMP Water Quality Credits:

☐ Pervious Undetained Area Credit

☐ Other (attach calculations)

Structural BMP Water Quality Credits:

☑ *Use default BMP Outflows and Median BMP Outflow Concentrations*

DP No.	BMP No.	BMP Name	MRC?	BMP DA (acres)	Vol. Routed to BMP (CF)	Inf. & ET Credits (CF)	Capture & Buffer Credits (CF)	Outflow (CF)	Outflow Conc. (mg/L)			Pollutant Loads (lbs)		
									TSS	TP	TN	TSS	TP	TN
001	1	Constructed Filter	Y	1.13	10,453	0		10,453	-	-	-	-	-	-
001	2	Constructed Filter	Y	1.19	21,241	0		21,241	-	-	-	-	-	-
001	3	Constructed Filter	Y	0.73	5,545	0		5,545	-	-	-	-	-	-

	TSS	TP	TN
POLLUTANT LOADS FROM STRUCTURAL BMP (TREATED) OUTFLOWS (LBS):	**0.00**	**0.00**	**0.00**
POLLUTANT LOADS FROM UNTREATED STORMWATER (LBS):	**4.17**	**0.01**	**0.07**
NON-STRUCTURAL BMP WATER QUALITY CREDITS (LBS):			
NET POLLUTANT LOADS FROM SITE, POST-CONSTRUCTION (LBS):	**4.17**	**0.01**	**0.07**
POLLUTANT LOADS FROM SITE, PRE-CONSTRUCTION (LBS):	**7.54**	**0.02**	**0.18**

WATER QUALITY REQUIREMENT SATISFIED

CERTIFICATION

I certify under penalty of law and subject to the penalties of 18 Pa.C.S. § 4904 (relating to unsworn falsification to authorities) that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I further certify that the structure, function, and calculations contained in this spreadsheet have not been modified in comparison to the spreadsheet DEP has posted to its website or, if modifications were made, an explanation of the modifications made is attached to this spreadsheet.

Dave Gibbons, PE	1/24/2023
Spreadsheet User Name	Date

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

General Information

Instructions | *General* | Volume | Rate | Quality

Project Name: **201 Pennsylvania Ave**

Application Type: **Individual NPDES Application**

County: **Chester**

Municipality: **Malvern Borough**

Project Type: **Commercial Building**

● New Project ○ Minor / Major Amendment

Total Project Site Area: **3.78** acres
(In Watershed)

Total Earth Disturbance: **3.78** acres
(In Watershed)

No. of Post-Construction Discharge Points: **1**

Start DP Numbering at: **002**

Discharge Point (DP) No.	Drainage Area (DA) (acres)	Earth Disturbance in DA (acres)	Existing Impervious in DA (acres)	Proposed Impervious in DA (acres)	Receiving Waters	Ch. 93 Class	Structural BMP(s)
002	0.00	0.00	0.00	0.00	Discharge to Non-Surface Waters	EV, MF	No
Undetained Areas	0.09	0.09	0.00	0.00	Discharge to Non-Surface Waters	EV, MF	
Totals:	**0.09**	**0.09**					

PROJECT SITE MEETS SMALL SITE EXCEPTION - RATE WORKSHEET NOT REQUIRED

Volume Management

Project: 201 Pennsylvania Ave

Instructions | General | *Volume* | Rate | Quality

2-Year / 24-Hour Storm Event (NOAA Atlas 14): **3.25** inches   Alternative 2-Year / 24-Hour Storm Event: inches

Alternative Source:

Pre-Construction Conditions: *No. Rows:* **1**   ☐ *Exempt from Meadow in Good Condition*   ☑ *Automatically Calculate CN, Ia, Runoff and Volume*

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)
Forested (Good Condition)	0.64	B	55	1.636	0.27	618
TOTAL (ACRES):	**0.64**				**TOTAL (CF):**	**618**

Post-Construction Conditions: *No. Rows:* **1**

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	0.09	B	61	1.279	0.46	152
TOTAL (ACRES):	**0.09**				**TOTAL (CF):**	**152**

NET CHANGE IN VOLUME TO MANAGE (CF): -466

Non-Structural BMP Volume Credits:

☐ Tree Planting Credit

☐ Other (attach calculations):

Structural BMP Volume Credits: *No. Structural BMPs:*   *Start BMP Numbering at:*

DP No.	BMP No.	BMP Name	MRC?	Discharge	Incremental BMP DA (acres)	Volume Routed to BMP (CF)	Infiltration / Vegetated Area (SF)	Infiltration Rate (in/hr)	Infiltration Period (hrs)	Vegeta-ted?	Media Depth (ft)	Storage Volume (CF)	Infiltration Credit (CF)	ET Credit (CF)
												Totals:		

INFILTRATION & ET CREDITS (CF):

NET CHANGE IN VOLUME TO MANAGE (CF): -466

TOTAL CREDITS (CF):

VOLUME REQUIREMENT SATISFIED

Rate Control

Project: 201 Pennsylvania Ave

Instructions | General | Volume | *Rate* | Quality

SMALL SITE EXCEPTION SATISFIED: RATE CONTROL NOT REQUIRED

Precipitation Amounts:

NOAA 2-Year 24-Hour Storm Event (in):	**3.25**	Alternative 2-Year 24-Hour Storm Event (in):	
NOAA 10-Year 24-Hour Storm Event (in):		Alternative 10-Year 24-Hour Storm Event (in):	
NOAA 50-Year 24-Hour Storm Event (in):		Alternative 50-Year 24-Hour Storm Event (in):	
NOAA 100-Year 24-Hour Storm Event (in):		Alternative 100-Year 24-Hour Storm Event (in):	

☑ **Report Summary of Peak Rates Only**

Attach model input and output data or other calculations to support the rates reported below.

	Peak Discharge Rates (cfs)			
	Pre-Construction	**Post-Construction**	**Net Change**	
2-Year Storm:	**0.06**	**0.04**	-0.02	*Rate Control Satisfied*
10-Year Storm:	**0.53**	**0.17**	-0.36	*Rate Control Satisfied*
50-Year Storm:	**1.13**	**0.30**	-0.83	*Rate Control Satisfied*
100-Year Storm:	**2.02**	**0.49**	-1.53	*Rate Control Satisfied*

Water Quality

Project: 201 Pennsylvania Ave

PRINT

Instructions | General | Volume | Rate | *Quality*

Pre-Construction Pollutant Loads:

Land Cover (from Volume Worksheet)	Land Cover for Water Quality	Area (acres)	Soil Group	Runoff Volume (cf)	Pollutant Conc. (mg/L)			Pollutant Loads (lbs)		
					TSS	TP	TN	TSS	TP	TN
Forested (Good Condition)	Deciduous Forest/Evergreen Forest/Mixed Forest	0.64	B	618	45.0	0.13	1.05	1.74	0.01	0.04
	TOTAL (ACRES):	**0.64**					**TOTALS:**	**1.74**	**0.01**	**0.04**

Post-Construction Pollutant Loads (without BMPs):

Land Cover (from Volume Worksheet)	Land Cover for Water Quality	Area (acres)	Soil Group	Runoff Volume (cf)	Pollutant Conc. (mg/L)			Pollutant Loads (lbs)		
					TSS	TP	TN	TSS	TP	TN
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	Open Space	0.09	B	152	78.0	0.25	1.25	0.74	0.00	0.01
	TOTAL (ACRES):	**0.09**					**TOTALS:**	**0.74**	**0.00**	**0.01**

	TSS	TP	TN
POLLUTANT LOAD REDUCTION REQUIREMENTS (LBS):	0.00	0.00	0.00

☑ **Characterize Undetained Areas (for Untreated Stormwater)** *No. Rows:* **1**

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	**0.09**	**B**	**61**	**1.279**	**0.46**	**152**

Non-Structural BMP Water Quality Credits:

☐ Pervious Undetained Area Credit

☐ Other (attach calculations)

Structural BMP Water Quality Credits:

☑ *Use default BMP Outflows and Median BMP Outflow Concentrations*

DP No.	BMP No.	BMP Name	MRC?	BMP DA (acres)	Vol. Routed to BMP (CF)	Inf. & ET Credits (CF)	Capture & Buffer Credits (CF)	Outflow (CF)	Outflow Conc. (mg/L)			Pollutant Loads (lbs)		
									TSS	TP	TN	TSS	TP	TN

	TSS	TP	TN
POLLUTANT LOADS FROM STRUCTURAL BMP (TREATED) OUTFLOWS (LBS):	0.00	0.00	0.00
POLLUTANT LOADS FROM UNTREATED STORMWATER (LBS):	0.74	0.00	0.01
NON-STRUCTURAL BMP WATER QUALITY CREDITS (LBS):			
NET POLLUTANT LOADS FROM SITE, POST-CONSTRUCTION (LBS):	0.74	0.00	0.01
POLLUTANT LOADS FROM SITE, PRE-CONSTRUCTION (LBS):	1.74	0.01	0.04

WATER QUALITY REQUIREMENT SATISFIED

CERTIFICATION

I certify under penalty of law and subject to the penalties of 18 Pa.C.S. § 4904 (relating to unsworn falsification to authorities) that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I further certify that the structure, function, and calculations contained in this spreadsheet have not been modified in comparison to the spreadsheet DEP has posted to its website or, if modifications were made, an explanation of the modifications made is attached to this spreadsheet.

Dave Gibbons PE	2/28/2024
Spreadsheet User Name	Date

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

General Information

Instructions | *General* | Volume | Rate | Quality

Project Name: **201 Pennsylvania Ave**

Application Type: **Individual NPDES Application**

County: **Chester**

Municipality: **Malvern Borough**

Project Type: **Commercial Building**

◉ New Project ○ Minor / Major Amendment

Area: **3.78** acres
(In Watershed)

Total Earth Disturbance: **3.78** acres
(In Watershed)

No. of Post-Construction Discharge Points: **1**

Start DP Numbering at: **003**

Discharge Point (DP) No.	Drainage Area (DA) (acres)	Earth Disturbance in DA (acres)	Existing Impervious in DA (acres)	Proposed Impervious in DA (acres)	Receiving Waters	Ch. 93 Class	Structural BMP(s)
003	0.00	0.00	0.00	0.00	Discharge to Non-Surface Waters	EV, MF	No
Undetained Areas	0.02	0.02	0.00	0.00	Discharge to Non-Surface Waters	EV, MF	
Totals:	**0.02**	**0.02**					

PROJECT SITE MEETS SMALL SITE EXCEPTION - RATE WORKSHEET NOT REQUIRED

Volume Management

Project: 201 Pennsylvania Ave

Instructions | General | *Volume* | Rate | Quality

2-Year / 24-Hour Storm Event (NOAA Atlas 14): **3.25** inches   Alternative 2-Year / 24-Hour Storm Event: inches

Alternative Source:

Pre-Construction Conditions: *No. Rows:*   ☐ *Exempt from Meadow in Good Condition* ☑ *Automatically Calculate CN, Ia, Runoff and Volume*

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)
Forested (Good Condition)	0.37	B	55	1.636	0.27	357
TOTAL (ACRES):	**0.37**				**TOTAL (CF):**	**357**

Post-Construction Conditions: *No. Rows:*

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	0.02	B	61	1.279	0.46	34
TOTAL (ACRES):	**0.02**				**TOTAL (CF):**	**34**

IET CHANGE IN VOLUME TO MANAGE (CF): -323

Non-Structural BMP Volume Credits:

☐ Tree Planting Credit

☐ Other (attach calculations):

Structural BMP Volume Credits: *No. Structural BMPs:*   *Start BMP Numbering at:*

DP No.	BMP No.	BMP Name	MRC?	Discharge	Incremental BMP DA (acres)	Volume Routed to BMP (CF)	Infiltration / Vegetated Area (SF)	Infiltration Rate (in/hr)	Infiltration Period (hrs)	Vegeta-ted?	Media Depth (ft)	Storage Volume (CF)	Infiltration Credit (CF)	ET Credit (CF)
												Totals:		

INFILTRATION & ET CREDITS (CF):

NET CHANGE IN VOLUME TO MANAGE (CF): **-323**

TOTAL CREDITS (CF):

VOLUME REQUIREMENT SATISFIED

Rate Control

Project: 201 Pennsylvania Ave

Instructions | General | Volume | *Rate* | Quality

SMALL SITE EXCEPTION SATISFIED: RATE CONTROL NOT REQUIRED

Precipitation Amounts:

NOAA 2-Year 24-Hour Storm Event (in):	3.25	Alternative 2-Year 24-Hour Storm Event (in):	
NOAA 10-Year 24-Hour Storm Event (in):		Alternative 10-Year 24-Hour Storm Event (in):	
NOAA 50-Year 24-Hour Storm Event (in):		Alternative 50-Year 24-Hour Storm Event (in):	
NOAA 100-Year 24-Hour Storm Event (in):		Alternative 100-Year 24-Hour Storm Event (in):	

☑ **Report Summary of Peak Rates Only**

Attach model input and output data or other calculations to support the rates reported below.

	Peak Discharge Rates (cfs)			
	Pre-Construction	**Post-Construction**	**Net Change**	
2-Year Storm:	0.05	0.01	-0.04	*Rate Control Satisfied*
10-Year Storm:	0.45	0.05	-0.40	*Rate Control Satisfied*
50-Year Storm:	0.92	0.08	-0.84	*Rate Control Satisfied*
100-Year Storm:	1.61	0.13	-1.48	*Rate Control Satisfied*

Water Quality

Project: 201 Pennsylvania Ave

PRINT

Instructions | General | Volume | Rate | *Quality*

Pre-Construction Pollutant Loads:

Land Cover (from Volume Worksheet)	Land Cover for Water Quality	Area (acres)	Soil Group	Runoff Volume (cf)	Pollutant Conc. (mg/L)			Pollutant Loads (lbs)		
					TSS	TP	TN	TSS	TP	TN
Forested (Good Condition)	Deciduous Forest/Evergreen Forest/Mixed Forest	0.37	B	357	45.0	0.13	1.05	1.00	0.00	0.02
	TOTAL (ACRES):	**0.37**				**TOTALS:**		**1.00**	**0.00**	**0.02**

Post-Construction Pollutant Loads (without BMPs):

Land Cover (from Volume Worksheet)	Land Cover for Water Quality	Area (acres)	Soil Group	Runoff Volume (cf)	Pollutant Conc. (mg/L)			Pollutant Loads (lbs)		
					TSS	TP	TN	TSS	TP	TN
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	Open Space	0.02	B	34	78.0	0.25	1.25	0.16	0.00	0.00
	TOTAL (ACRES):	**0.02**				**TOTALS:**		**0.16**	**0.00**	**0.00**

POLLUTANT LOAD REDUCTION REQUIREMENTS (LBS): 0.00 | 0.00 | 0.00

☑ **Characterize Undetained Areas (for Untreated Stormwater)** *No. Rows:* 1

Land Cover	Area (acres)	Soil Group	CN	Ia (in)	Q Runoff (in)	Runoff Volume (cf)
Open Space (Lawns, Parks, Golf Courses, Cemeteries, Etc.) - Good Condition (Grass Cover > 75%)	**0.02**	**B**	**61**	**1.279**	**0.46**	**34**

Non-Structural BMP Water Quality Credits:

☐ Pervious Undetained Area Credit

☐ Other (attach calculations)

Structural BMP Water Quality Credits:

☑ *Use default BMP Outflows and Median BMP Outflow Concentrations*

DP No.	BMP No.	BMP Name	MRC?	BMP DA (acres)	Vol. Routed to BMP (CF)	Inf. & ET Credits (CF)	Capture & Buffer Credits (CF)	Outflow (CF)	Outflow Conc. (mg/L)			Pollutant Loads (lbs)		
									TSS	TP	TN	TSS	TP	TN

	TSS	TP	TN
POLLUTANT LOADS FROM STRUCTURAL BMP (TREATED) OUTFLOWS (LBS):	0.00	0.00	0.00
POLLUTANT LOADS FROM UNTREATED STORMWATER (LBS):	0.16	0.00	0.00
NON-STRUCTURAL BMP WATER QUALITY CREDITS (LBS):			
NET POLLUTANT LOADS FROM SITE, POST-CONSTRUCTION (LBS):	0.16	0.00	0.00
POLLUTANT LOADS FROM SITE, PRE-CONSTRUCTION (LBS):	1.00	0.00	0.02

WATER QUALITY REQUIREMENT SATISFIED

CERTIFICATION

I certify under penalty of law and subject to the penalties of 18 Pa.C.S. § 4904 (relating to unsworn falsification to authorities) that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I further certify that the structure, function, and calculations contained in this spreadsheet have not been modified in comparison to the spreadsheet DEP has posted to its website or, if modifications were made, an explanation of the modifications made is attached to this spreadsheet.

Dave Gibbons PE	2/28/2024
Spreadsheet User Name	Date

RUNOFF VOLUME FOR 2-YR STORM EVENT TO SELECTED BMPS

PROJECT: 201 PA AVE
2-Year Rainfall: 3.2 in

BMP: BMP001

Cover Type	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Impervious	**N/A**	41,037	0.94	98	0.2041	0.0408	2.97	10,148
Lawn	**B**	8,251	0.19	61	6.3934	1.2787	0.44	305
Woods	**B**	0	0.00	55	8.1818	1.6364	0.25	0
TOTAL:		**49,288**	**1.13**					**10,453**

BMP: BMP002

Cover Type	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Impervious	**N/A**	42,176	0.97	98	0.2041	0.0408	2.97	10,430
Lawn	**B**	9,695	0.22	61	6.3934	1.2787	0.44	359
Woods	**B**	0	0.00	55	8.1818	1.6364	0.25	0
TOTAL:		**51,871**	**1.19**					**10,788**

BMP: BMP003

Cover Type	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Impervious	**N/A**	20,777	0.48	98	0.2041	0.0408	2.97	5,138
Lawn	**B**	11,015	0.25	61	6.3934	1.2787	0.44	408
Woods	**B**	0	0.00	55	8.1818	1.6364	0.25	0
TOTAL:		**31,792**	**0.73**					**5,545**

APPENDIX B

FLOW REDUCTION SUMMARY

Stormwater Summary

Peak Flow Reduction Requirements

HOWELL ENGINEERING
Local Knowhow. Engineered.

DATE: 3/8/2024
BY: DH3
REV: 0

JOB NO.: 4668 **PROJECT:** 201 PA AVE **TOWNSHIP:** MALVERN BOROUGH
DESCRIPTION: Peak Flow Reduction POI 1

1-year	Pre-Developed	0.10 cfs	*Hydrograph 1*
1-year	Post-Developed	0.32 cfs	*Hydrograph 23*
1-year	Peak Flow (Outside LOD)[1]	1.05 cfs	*Hydrograph 5*
2-year	Pre-Developed	0.28 cfs	*Hydrograph 1*
2-year	Post-Developed	0.58 cfs	*Hydrograph 23*
2-year	Peak Flow (Outside LOD)[1]	1.33 cfs	*Hydrograph 5*
5-year	Pre-Developed	1.22 cfs	*Hydrograph 1*
5-year	Post-Developed	1.71 cfs	*Hydrograph 23*
5-year	Peak Flow (Outside LOD)[1]	2.07 cfs	*Hydrograph 5*
10-year	Pre-Developed	2.31 cfs	*Hydrograph 1*
10-year	Post-Developed	2.94 cfs	*Hydrograph 23*
10-year	Peak Flow (Outside LOD)[1]	2.69 cfs	*Hydrograph 5*
25-year	Pre-Developed	3.64 cfs	*Hydrograph 1*
25-year	Post-Developed	4.25 cfs	*Hydrograph 23*
25-year	Peak Flow (Outside LOD)[1]	3.31 cfs	*Hydrograph 5*
50-year	Pre-Developed	4.92 cfs	*Hydrograph 1*
50-year	Post-Developed	5.43 cfs	*Hydrograph 23*
50-year	Peak Flow (Outside LOD)[1]	3.86 cfs	*Hydrograph 5*
100-year	Pre-Developed	8.77 cfs	*Hydrograph 1*
100-year	Post-Developed	12.70 cfs	*Hydrograph 23*
100-year	Peak Flow (Outside LOD)[1]	5.36 cfs	*Hydrograph 5*

[1]This area is outside the regulated activity (ORA) (or outside the limit of disturbance (LOD)), therefore is not subject to peak flow rate control requirements. As such, the flow from the area outside the LOD is added to the Pre Developed flow that is within the regulated activity to determine the allowable post developed flow.

Post Developed 2 Year Flow =	**0.58**	**cfs**	COMPLIANT
Pre Developed 1 Year Flow + 2 Year Outside LOD =	**1.42**	**cfs**	
Post Developed 5 Year Flow =	**1.71**	**cfs**	COMPLIANT
Pre Developed 1 Year Flow + 5 Year Outside LOD =	**2.17**	**cfs**	
Post Developed 10 Year Flow =	**2.94**	**cfs**	COMPLIANT
Pre Developed 2 Year Flow + 10 Year Outside LOD =	**2.97**	**cfs**	
Post Developed 25 Year Flow =	**4.25**	**cfs**	COMPLIANT
Pre Developed 25 Year Flow + 25 Year Outside LOD =	**6.95**	**cfs**	
Post Developed 50 Year Flow =	**5.43**	**cfs**	COMPLIANT
Pre Developed 50 Year Flow + 50 Year Outside LOD =	**8.78**	**cfs**	
Post Developed 100 Year Flow =	**12.70**	**cfs**	COMPLIANT
Pre Developed 100 Year Flow + 100 Year Outside LOD =	**14.13**	**cfs**	

APPENDIX C

SCS CN RUNOFF CALCULATIONS

HOWELL ENGINEERING
Local Knowhow. Engineered.

SOIL CONSERVATION SERVICE
HYDROLOGIC DATA FOR WATERSHED
RUNOFF COMPUTATIONS

DATE: 3/8/2024
REV: 0
BY: DH3

JOB NO.: 4668 **PROJECT:** 201 PA AVE **TOWNSHIP:** MALVERN BOROUGH
DESCRIPTION: PREDEVELOPMENT

Total Area: 2.78 acres

POI 1

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
		B	WOODS	Good	55	2.78	152.91	Ex. WOODS
					Total Area	2.78	152.91	

Weighted Soil Complex Number $= \frac{152.91}{2.78} = \boxed{55.0}$

Total Area: 0.64 acres

POI 2

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
		B	WOODS	Good	55	0.64	35.20	Ex. WOODS
					Total Area	0.64	35.20	

Weighted Soil Complex Number $= \frac{35.20}{0.64} = \boxed{55.0}$

Total Area: 0.37 acres

LOI 3

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
		B	WOODS	Good	55	0.37	20.21	Ex. WOODS
					Total Area	0.37	20.21	

Weighted Soil Complex Number $= \frac{20.21}{0.37} = \boxed{55.0}$

SOIL CONSERVATION SERVICE
HYDROLOGIC DATA FOR WATERSHED
RUNOFF COMPUTATIONS

HOWELL ENGINEERING
Local Knowhow. Engineered.

DATE: 3/8/2024
REV: 0
BY: DH3

JOB NO.: 4668 **PROJECT:** 201 PA AVE **TOWNSHIP:** MALVERN BOROUGH
DESCRIPTION: Post to Bed Onsite

Total Area: 1.13 acres

ON SITE TO MRC BED 1

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
		B	Impervious	Good	98	0.94	92.32	
		B	Lawn	Good	61	0.19	11.55	
					Total Area	1.13	103.88	

Weighted Soil Complex Number $= \frac{103.88}{1.13} = \boxed{91.8}$

Total Area: 1.18 acres

ON SITE TO MRC BED 2

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
		B	Impervious	Good	98	0.97	94.87	
		B	Lawn	Good	61	0.21	12.76	
					Total Area	1.18	107.62	

Weighted Soil Complex Number $= \frac{107.62}{1.18} = \boxed{91.4}$

Total Area: 0.73 acres

ON SITE TO MRC BED 3

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
		B	Impervious	Good	98	0.48	46.74	
		B	Lawn	Good	61	0.25	15.43	
					Total Area	0.73	62.17	

Weighted Soil Complex Number $= \frac{62.17}{0.73} = \boxed{85.2}$

SOIL CONSERVATION SERVICE
HYDROLOGIC DATA FOR WATERSHED
RUNOFF COMPUTATIONS

HOWELL ENGINEERING
Local Knowhow. Engineered.

DATE: 3/8/2024
REV: 0
BY: DH3

JOB NO.: 4668 **PROJECT:** 201 PA AVE **TOWNSHIP:** MALVERN BOROUGH
DESCRIPTION: On Site Bypass

Total Area: 0.62 acres

DP001 BYPASS

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
		B	LAWN	Good	61	0.62	37.69	
		B	MEADOW	Good	58	0.00	0.00	
					Total Area	0.62	37.69	

Weighted Soil Complex Number $\frac{37.69}{0.62}$ = **61.0**

Total Area: 0.09 acres

DP002 BYPASS

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
		B	LAWN	Good	58	0.09	5.42	
		B	MEADOW	Good	58	0.00	0.00	
					Total Area	0.09	5.42	

Weighted Soil Complex Number $\frac{5.42}{0.09}$ = **58.0**

Total Area: 0.02 acres

DP003 BYPASS

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
		B	LAWN	Good	61	0.02	1.28	
		B	MEADOW	Good	58	0.00	0.00	
					Total Area	0.02	1.28	

Weighted Soil Complex Number $\frac{1.28}{0.02}$ = **61.0**

HOWELL ENGINEERING
Local Knowhow. Engineered.

SOIL CONSERVATION SERVICE
HYDROLOGIC DATA FOR WATERSHED
RUNOFF COMPUTATIONS

DATE: 3/8/2024
REV: 0
BY: DH3

JOB NO.: 4668 **PROJECT:** 201 PA AVE **TOWNSHIP:** MALVERN BOROUGH
DESCRIPTION: OFFSITE

Total Area: 0.62 acres

OFFSITE TO MRC BED 3

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
		C	Lawn	Good	74	0.02	1.21	
		B	Lawn	Good	61	0.27	16.43	
		n/a	Impervious	Good	98	0.33	32.64	
					Total Area	0.62	50.28	

Weighted Soil Complex Number $= \frac{50.28}{0.62} = \boxed{81.3}$

APPENDIX D

HYDRAFLOW HYDROGRAPH REPORTS

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	------	0.095	0.278	0.000	1.216	2.313	3.639	4.915	8.770	PRE POI 1
2	SCS Runoff	------	0.022	0.064	0.000	0.280	0.532	0.838	1.132	2.019	PRE POI 2
3	SCS Runoff	------	0.014	0.053	0.000	0.237	0.448	0.689	0.918	1.606	PRE LOI 3
5	SCS Runoff	------	1.046	1.329	0.000	2.073	2.689	3.313	3.863	5.360	OFFSITE TO BED 3
6	Combine	1, 5	1.067	1.446	0.000	2.844	4.387	6.189	7.897	12.94	TOTAL PRE TO POI1
8	SCS Runoff	------	3.826	4.475	0.000	6.084	7.361	8.630	9.736	12.72	ONSITE TO MRC BED 1
9	Reservoir	8	0.435	0.621	0.000	1.175	1.664	2.168	2.613	3.862	MRC BED 1 ROUTED
11	SCS Runoff	------	3.733	4.415	0.000	6.112	7.460	8.800	9.967	13.11	ONSITE TO MRC BED 2
12	Combine	9, 11	3.915	4.714	0.000	6.788	8.491	10.20	11.70	15.73	TOTAL TO BED 2
13	Reservoir	12	0.147	0.191	0.000	0.283	0.345	0.673	1.539	4.632	MRC BED 2 ROUTED
15	SCS Runoff	------	1.731	2.137	0.000	3.175	4.016	4.859	5.597	7.590	ONSITE TO BED 3
16	Combine	5, 15	2.676	3.333	0.000	5.032	6.420	7.819	9.047	12.37	TOTAL TO BED 3
17	Reservoir	16	0.259	0.482	0.000	1.288	2.083	2.946	4.231	9.535	MRC BED 3 ROUTED
19	SCS Runoff	------	0.242	0.427	0.000	0.975	1.480	2.027	2.532	3.987	DP001 BYPASS
20	SCS Runoff	------	0.021	0.040	0.000	0.106	0.168	0.236	0.299	0.485	DP002 BYPASS
21	SCS Runoff	------	0.007	0.012	0.000	0.030	0.046	0.064	0.080	0.127	DP003 BYPASS
23	Combine	13, 17, 19,	0.315	0.579	0.000	1.711	2.937	4.248	5.430	12.70	TOTAL POST POI 1
25	SCS Runoff	------	0.000	0.000	1.358	0.000	0.000	0.000	0.000	0.000	1.2 to MRC Bed 1
26	Reservoir	25	0.000	0.000	0.106	0.000	0.000	0.000	0.000	0.000	1.2 to MRC Bed 1 Rout
27	SCS Runoff	------	0.000	0.000	1.387	0.000	0.000	0.000	0.000	0.000	1.2 to MRC Bed 2
28	Combine	26, 27	0.000	0.000	1.400	0.000	0.000	0.000	0.000	0.000	1.2 Total to MRC Bed 2
29	Reservoir	28	0.000	0.000	0.018	0.000	0.000	0.000	0.000	0.000	1.2 to MRC Bed 2 Route
31	SCS Runoff	------	0.000	0.000	0.686	0.000	0.000	0.000	0.000	0.000	1.2 to MRC Bed 3
32	Reservoir	31	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	1.2 to MRC Bed 3 Route
34	Combine	29, 32,	0.000	0.000	0.023	0.000	0.000	0.000	0.000	0.000	Total 1.2

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	0.095	2	746	1,486	------	------	------	PRE POI 1
2	SCS Runoff	0.022	2	746	342	------	------	------	PRE POI 2
3	SCS Runoff	0.014	2	730	200	------	------	------	PRE LOI 3
5	SCS Runoff	1.046	2	722	2,739	------	------	------	OFFSITE TO BED 3
6	Combine	1.067	2	722	4,224	1, 5	------	------	TOTAL PRE TO POI1
8	SCS Runoff	3.826	2	716	8,149	------	------	------	ONSITE TO MRC BED 1
9	Reservoir	0.435	2	736	8,097	8	538.08	6,018	MRC BED 1 ROUTED
11	SCS Runoff	3.733	2	716	7,781	------	------	------	ONSITE TO MRC BED 2
12	Combine	3.915	2	716	15,877	9, 11	------	------	TOTAL TO BED 2
13	Reservoir	0.147	2	1058	12,491	12	536.29	16,727	MRC BED 2 ROUTED
15	SCS Runoff	1.731	2	716	3,498	------	------	------	ONSITE TO BED 3
16	Combine	2.676	2	718	6,236	5, 15	------	------	TOTAL TO BED 3
17	Reservoir	0.259	2	752	5,391	16	506.23	4,174	MRC BED 3 ROUTED
19	SCS Runoff	0.242	2	718	668	------	------	------	DP001 BYPASS
20	SCS Runoff	0.021	2	724	98	------	------	------	DP002 BYPASS
21	SCS Runoff	0.007	2	718	20	------	------	------	DP003 BYPASS
23	Combine	0.315	2	748	18,550	13, 17, 19,	------	------	TOTAL POST POI 1
25	SCS Runoff	0.000	2	n/a	0	------	------	------	1.2 to MRC Bed 1
26	Reservoir	0.000	2	n/a	0	25	537.00	1,660	1.2 to MRC Bed 1 Rout
27	SCS Runoff	0.000	2	n/a	0	------	------	------	1.2 to MRC Bed 2
28	Combine	0.000	2	n/a	0	26, 27	------	------	1.2 Total to MRC Bed 2
29	Reservoir	0.000	2	n/a	0	28	535.00	7,290	1.2 to MRC Bed 2 Route
31	SCS Runoff	0.000	2	n/a	0	------	------	------	1.2 to MRC Bed 3
32	Reservoir	0.000	2	n/a	0	31	505.00	1,056	1.2 to MRC Bed 3 Route
34	Combine	0.000	2	n/a	0	29, 32,	------	------	Total 1.2

hydraflow.gpw	Return Period: 1 Year	Friday, 04 / 5 / 2024

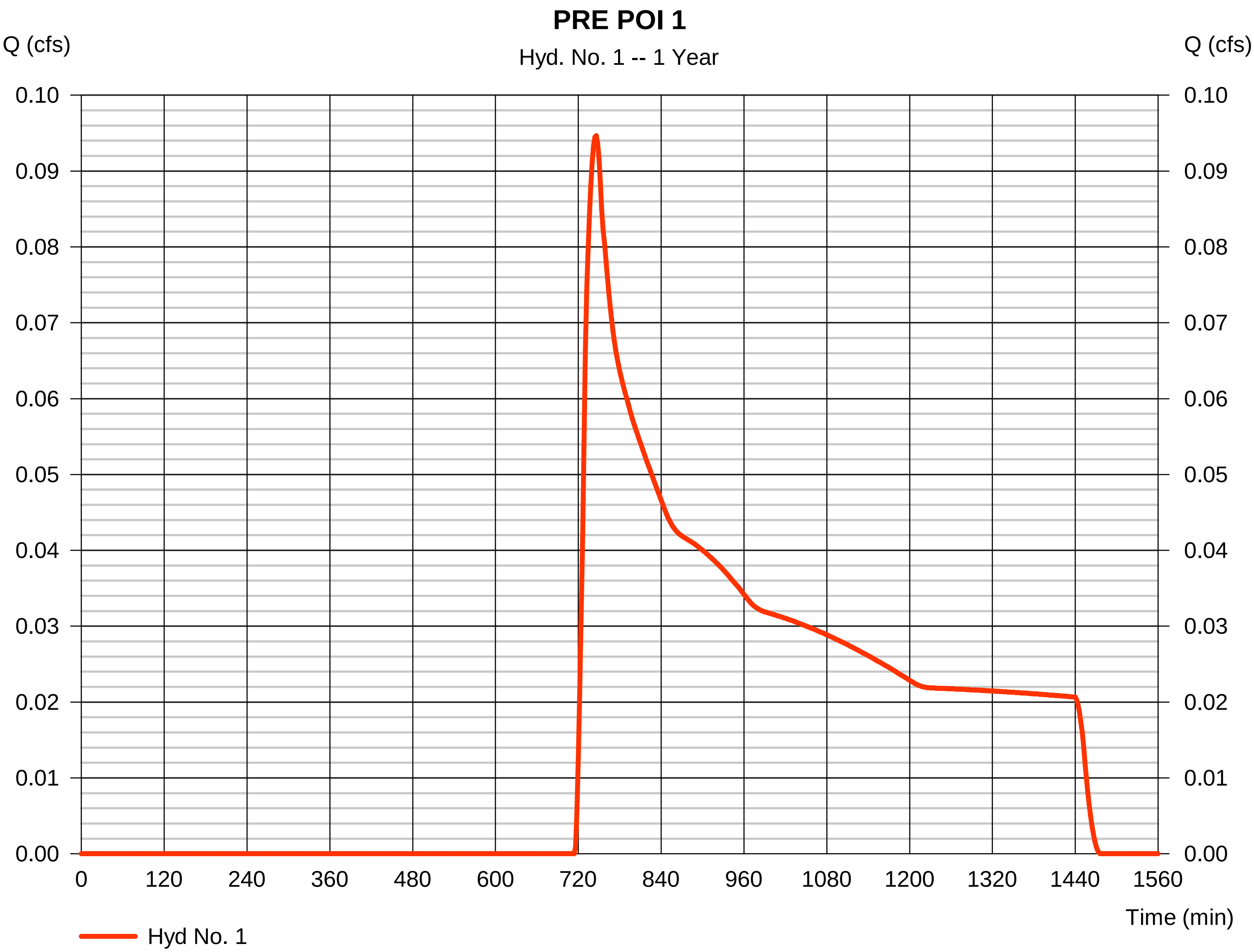
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 1

PRE POI 1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.095 cfs
Storm frequency	= 1 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 1,486 cuft
Drainage area	= 2.780 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 20.20 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 1

PRE POI 1

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.400		0.011		0.011		
Flow length (ft)	=	150.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.20		0.00		0.00		
Land slope (%)	=	6.10		0.00		0.00		
Travel Time (min)	**=**	**19.01**	**+**	**0.00**	**+**	**0.00**	**=**	**19.01**
Shallow Concentrated Flow								
Flow length (ft)	=	111.00		186.00		0.00		
Watercourse slope (%)	=	4.70		9.00		0.00		
Surface description	=	Unpaved		Unpaved		Unpaved		
Average velocity (ft/s)	=3.50			4.84		0.00		
Travel Time (min)	**=**	**0.53**	**+**	**0.64**	**+**	**0.00**	**=**	**1.17**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=0.00							
				0.00				
						0.00		
Flow length (ft)	({0})0.0			0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... 20.20 min

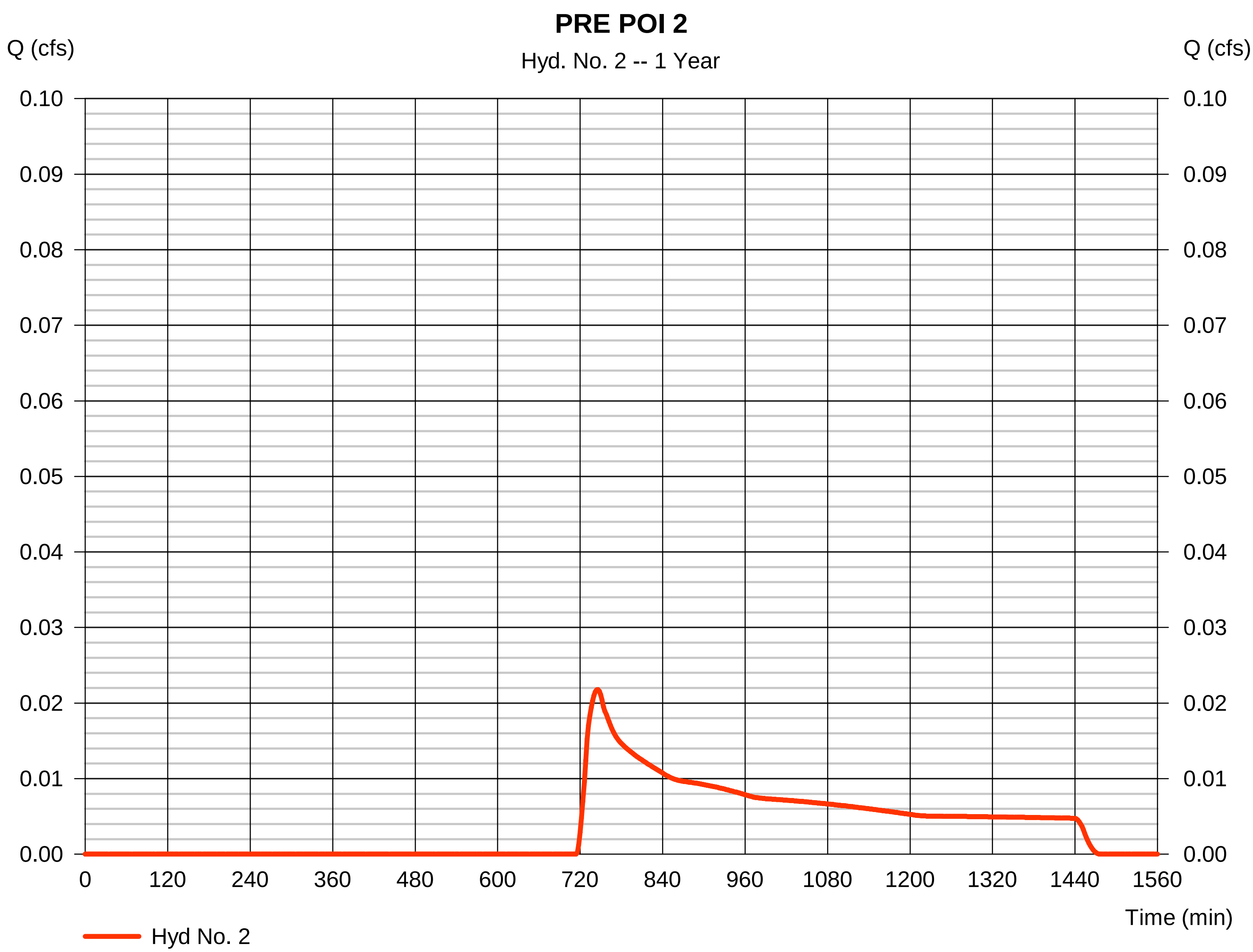
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 2

PRE POI 2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.022 cfs
Storm frequency	= 1 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 342 cuft
Drainage area	= 0.640 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 22.10 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 2

PRE POI 2

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.400		0.011		0.011		
Flow length (ft)	=	150.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	4.30		0.00		0.00		
Land slope (%)	=	3.00		0.00		0.00		
Travel Time (min)	**=**	**21.79**	**+**	**0.00**	**+**	**0.00**	**=**	**21.79**
Shallow Concentrated Flow								
Flow length (ft)	=	100.00		0.00		0.00		
Watercourse slope (%)	=	10.00		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)		=5.10		0.00		0.00		
Travel Time (min)	**=**	**0.33**	**+**	**0.00**	**+**	**0.00**	**=**	**0.33**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)		=0.00						
				0.00				
						0.00		
Flow length (ft)		({0})0.0		0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... 22.10 min

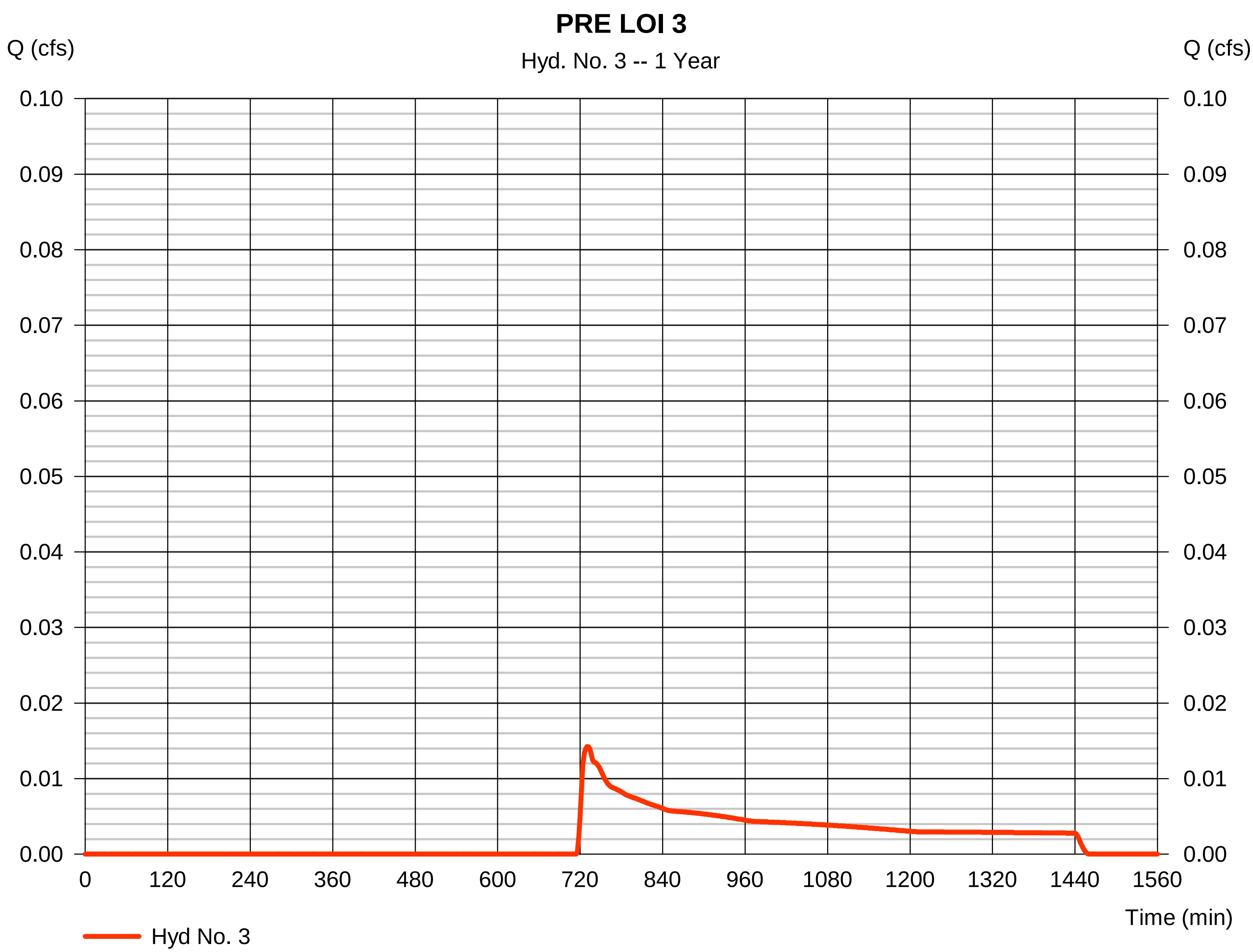
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Friday, 04 / 5 / 2024

Hyd. No. 3

PRE LOI 3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.014 cfs
Storm frequency	= 1 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 200 cuft
Drainage area	= 0.370 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.80 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 3

PRE LOI 3

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.400		0.011		0.011		
Flow length (ft)	=	64.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.20		0.00		0.00		
Land slope (%)	=	3.00		0.00		0.00		
Travel Time (min)	**=**	**12.78**	**+**	**0.00**	**+**	**0.00**	**=**	**12.78**
Shallow Concentrated Flow								
Flow length (ft)	=	0.00		0.00		0.00		
Watercourse slope (%)	=	0.00		0.00		0.00		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=0.00			0.00		0.00		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=0.00							
				0.00				
						0.00		
Flow length (ft)	({0})0.0			0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Total Travel Time, Tc								**12.80 min**

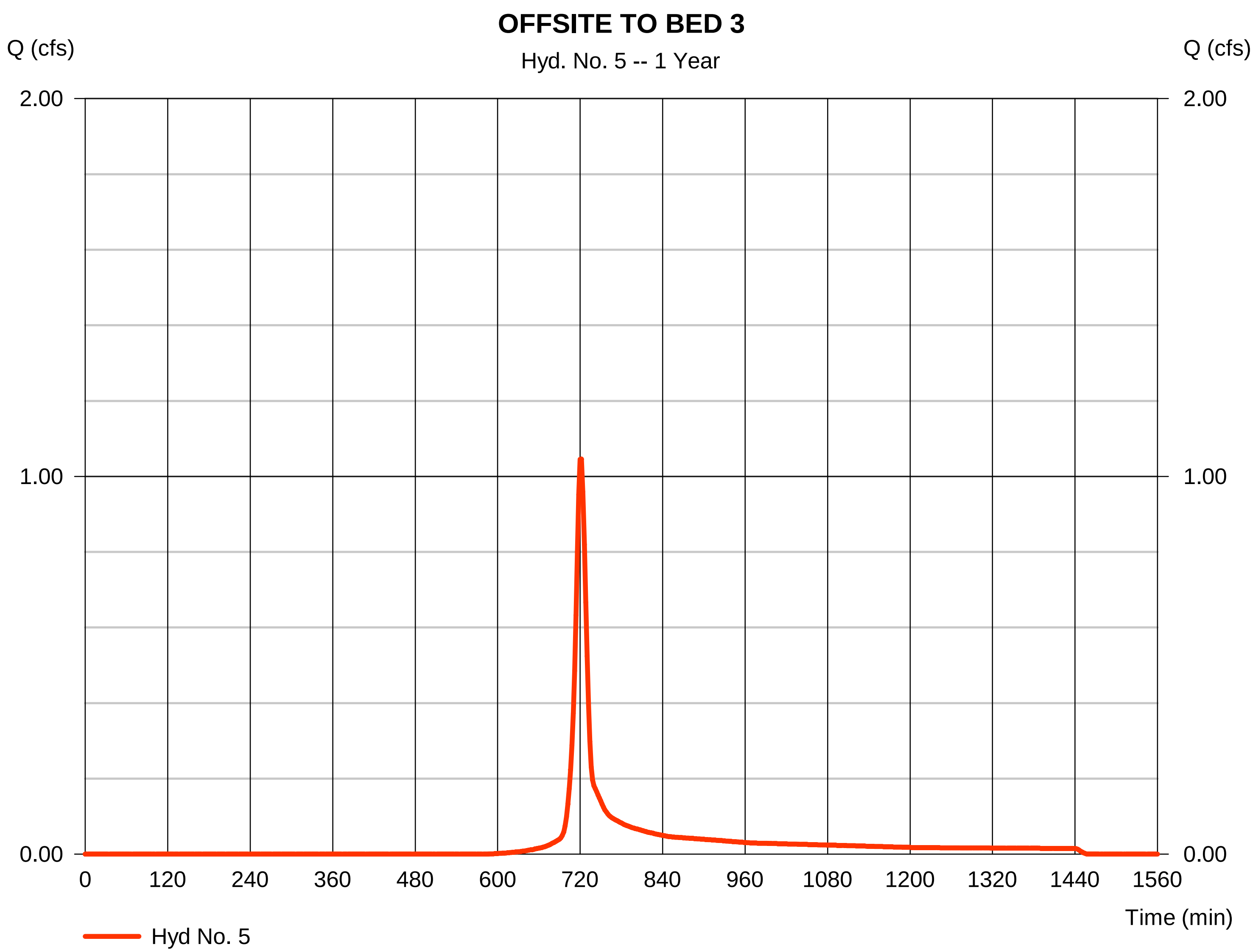
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 5

OFFSITE TO BED 3

Hydrograph type	= SCS Runoff	Peak discharge	= 1.046 cfs
Storm frequency	= 1 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 2,739 cuft
Drainage area	= 0.620 ac	Curve number	= 81.3
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.20 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 5

OFFSITE TO BED 3

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.011		0.240		0.011		
Flow length (ft)	=	50.0		108.0		0.0		
Two-year 24-hr precip. (in)	=	3.20		3.20		0.00		
Land slope (%)	=	2.00		5.70		0.00		
Travel Time (min)	**=**	**0.70**	**+**	**9.98**	**+**	**0.00**	**=**	**10.68**
Shallow Concentrated Flow								
Flow length (ft)	=	166.00		0.00		0.00		
Watercourse slope (%)	=	6.00		0.00		0.00		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=	4.98		0.00		0.00		
Travel Time (min)	**=**	**0.56**	**+**	**0.00**	**+**	**0.00**	**=**	**0.56**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00		0.00		0.00		
Flow length (ft)		({0})0.0		0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... 11.20 min

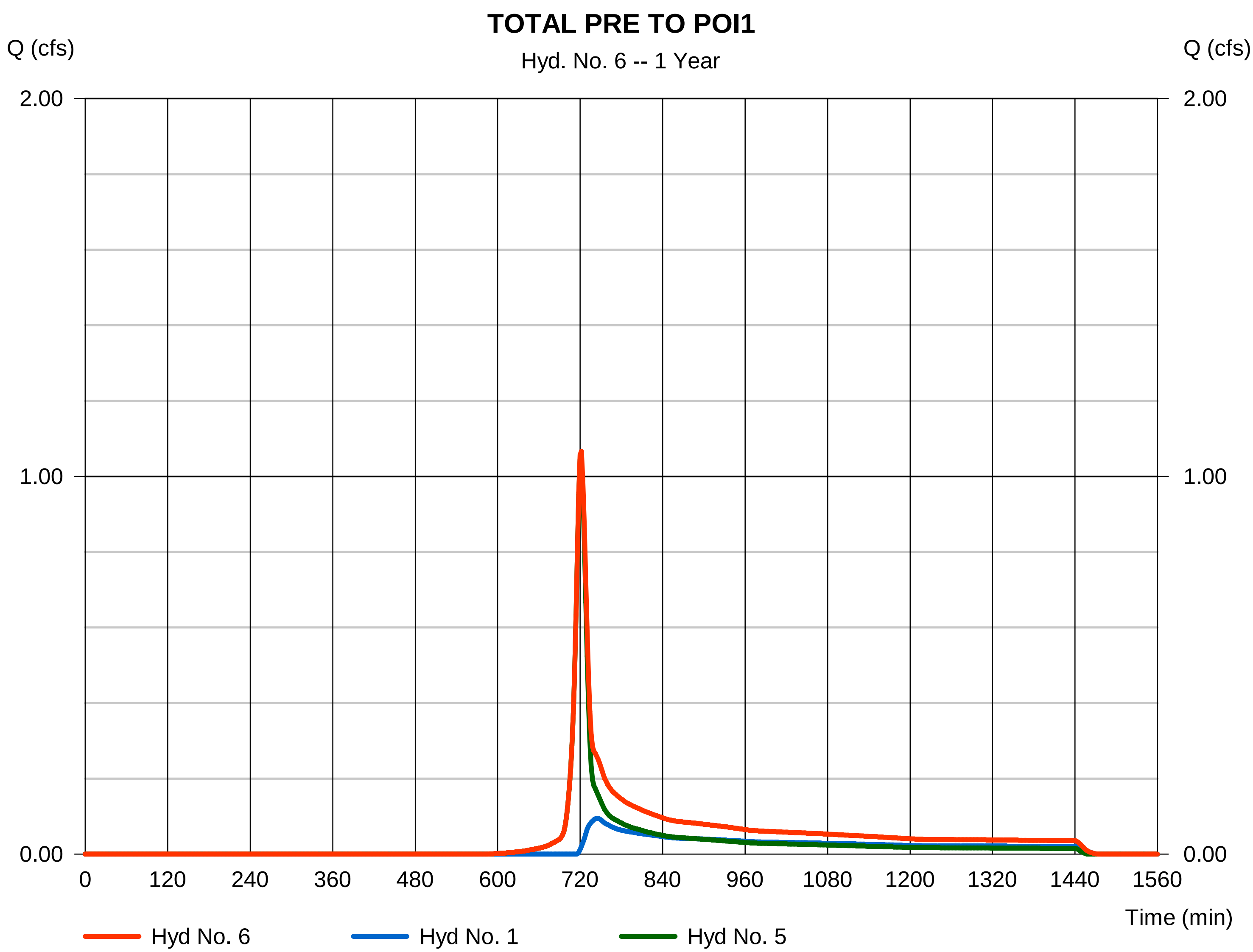
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Friday, 04 / 5 / 2024

Hyd. No. 6

TOTAL PRE TO POI1

Hydrograph type	= Combine	Peak discharge	= 1.067 cfs
Storm frequency	= 1 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 4,224 cuft
Inflow hyds.	= 1, 5	Contrib. drain. area	= 3.400 ac



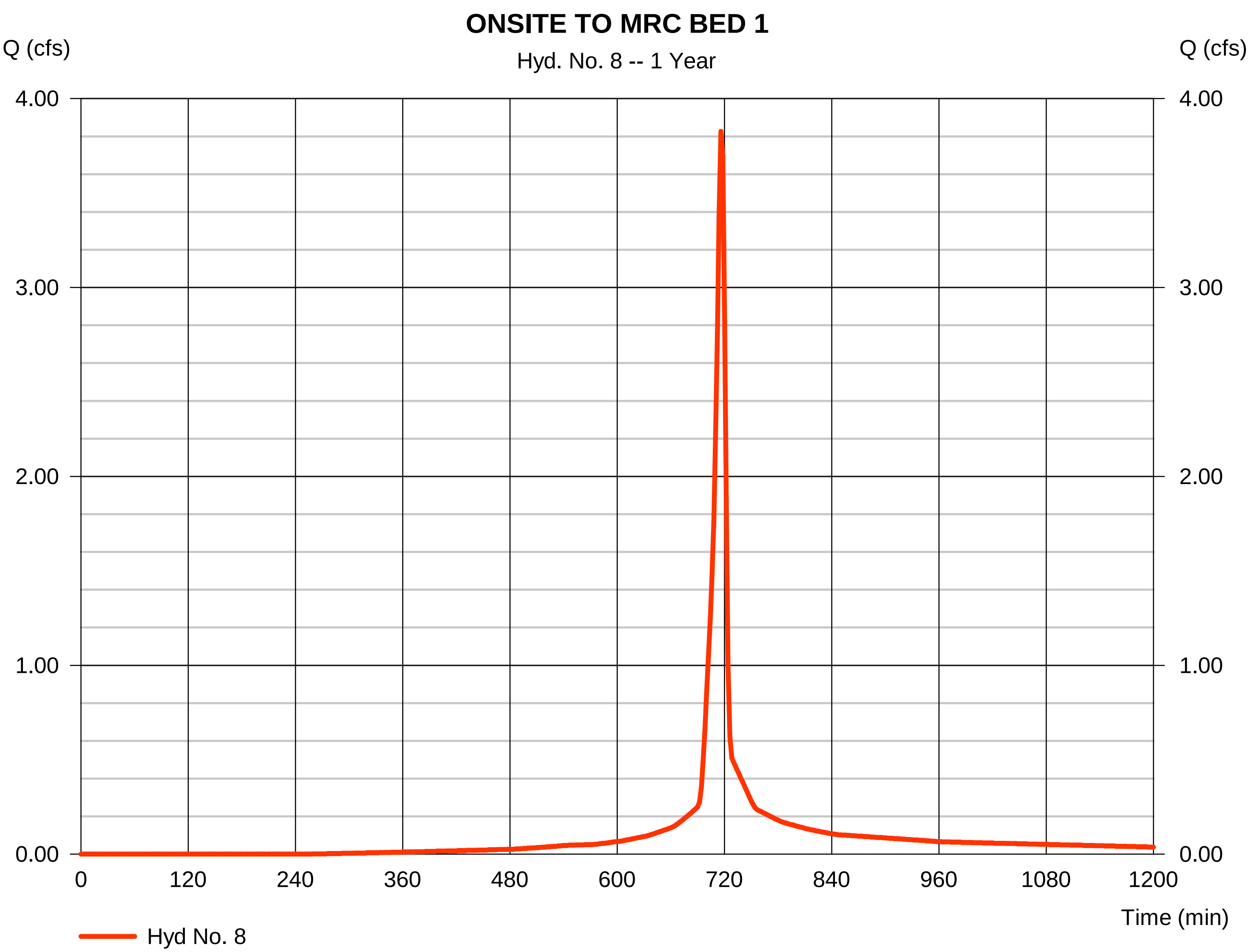
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 8

ONSITE TO MRC BED 1

Hydrograph type	= SCS Runoff	Peak discharge	= 3.826 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 8,149 cuft
Drainage area	= 1.130 ac	Curve number	= 93.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

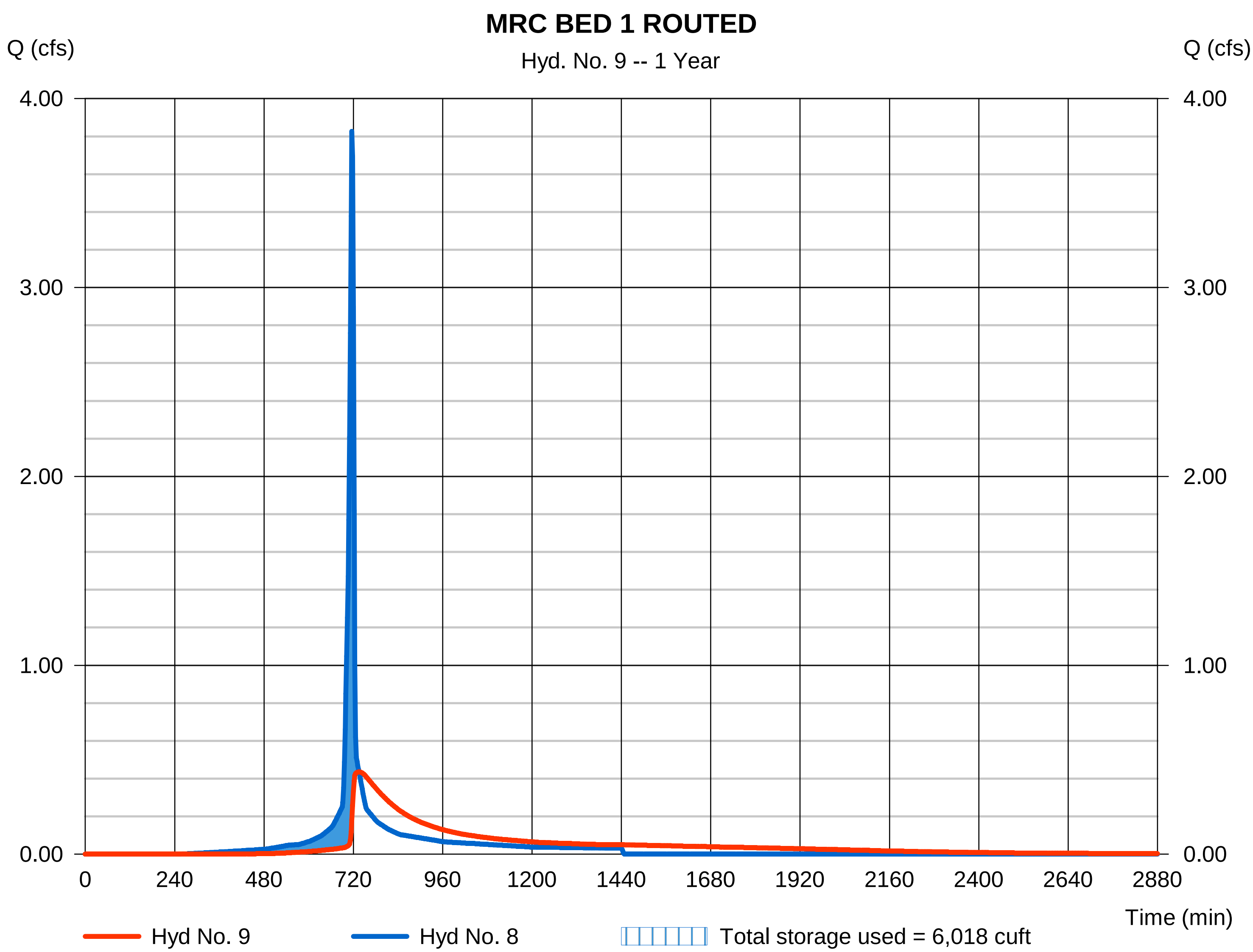
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 9

MRC BED 1 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 0.435 cfs
Storm frequency	= 1 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 8,097 cuft
Inflow hyd. No.	= 8 - ONSITE TO MRC BED 1	Max. Elevation	= 538.08 ft
Reservoir name	= MRC BED 1	Max. Storage	= 6,018 cuft

Storage Indication method used. Wet pond routing start elevation = 537.00 ft.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Pond No. 1 - MRC BED 1

Pond Data

UG Chambers -Invert elev. = 537.00 ft, Rise x Span = 4.00 x 48.00 ft, Barrel Len = 83.00 ft, No. Barrels = 1, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 536.00 ft, Width = 50.00 ft, Height = 5.00 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	536.00	n/a	0	0
0.50	536.50	n/a	830	830
1.00	537.00	n/a	830	1,660
1.50	537.50	n/a	2,026	3,686
2.00	538.00	n/a	2,026	5,712
2.50	538.50	n/a	2,026	7,737
3.00	539.00	n/a	2,026	9,763
3.50	539.50	n/a	2,026	11,788
4.00	540.00	n/a	2,026	13,814
4.50	540.50	n/a	2,026	15,840
5.00	541.00	n/a	2,026	17,865

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	1.75	0.00	0.00
Span (in)	= 18.00	1.75	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 537.00	537.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 5.00	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)	= 12.00	4.00	0.25	0.00
Crest El. (ft)	= 543.00	540.24	537.50	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	Rect	---
Multi-Stage	= Yes	Yes	Yes	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	536.00	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.05	83	536.05	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.10	166	536.10	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.15	249	536.15	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.20	332	536.20	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.25	415	536.25	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.30	498	536.30	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.35	581	536.35	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.40	664	536.40	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.45	747	536.45	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.50	830	536.50	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.55	913	536.55	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.60	996	536.60	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.65	1,079	536.65	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.70	1,162	536.70	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.75	1,245	536.75	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.80	1,328	536.80	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.85	1,411	536.85	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.90	1,494	536.90	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.95	1,577	536.95	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
1.00	1,660	537.00	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
1.05	1,863	537.05	0.00 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.004
1.10	2,065	537.10	0.01 ic	0.01 ic	---	---	0.00	0.00	0.00	---	---	---	0.013
1.15	2,268	537.15	0.02 ic	0.02 ic	---	---	0.00	0.00	0.00	---	---	---	0.022
1.20	2,471	537.20	0.03 ic	0.03 ic	---	---	0.00	0.00	0.00	---	---	---	0.029
1.25	2,673	537.25	0.04 ic	0.03 ic	---	---	0.00	0.00	0.00	---	---	---	0.033
1.30	2,876	537.30	0.04 ic	0.04 ic	---	---	0.00	0.00	0.00	---	---	---	0.038
1.35	3,078	537.35	0.04 ic	0.04 ic	---	---	0.00	0.00	0.00	---	---	---	0.041
1.40	3,281	537.40	0.05 ic	0.04 ic	---	---	0.00	0.00	0.00	---	---	---	0.045
1.45	3,483	537.45	0.05 ic	0.05 ic	---	---	0.00	0.00	0.00	---	---	---	0.048
1.50	3,686	537.50	0.05 ic	0.05 ic	---	---	0.00	0.00	0.00	---	---	---	0.051
1.55	3,888	537.55	0.06 ic	0.05 ic	---	---	0.00	0.00	0.01	---	---	---	0.063

Continues on next page...

MRC BED 1

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
1.60	4,091	537.60	0.08 ic	0.06 ic	---	---	0.00	0.00	0.03	---	---	---	0.082
1.65	4,294	537.65	0.11 ic	0.06 ic	---	---	0.00	0.00	0.05	---	---	---	0.106
1.70	4,496	537.70	0.14 ic	0.06 ic	---	---	0.00	0.00	0.07	---	---	---	0.134
1.75	4,699	537.75	0.17 ic	0.06 ic	---	---	0.00	0.00	0.10	---	---	---	0.165
1.80	4,901	537.80	0.20 ic	0.06 ic	---	---	0.00	0.00	0.14	---	---	---	0.200
1.85	5,104	537.85	0.24 ic	0.06 ic	---	---	0.00	0.00	0.17	---	---	---	0.237
1.90	5,306	537.90	0.29 ic	0.07 ic	---	---	0.00	0.00	0.21	---	---	---	0.276
1.95	5,509	537.95	0.33 ic	0.07 ic	---	---	0.00	0.00	0.25	---	---	---	0.319
2.00	5,712	538.00	0.36 ic	0.07 ic	---	---	0.00	0.00	0.29	---	---	---	0.363
2.05	5,914	538.05	0.41 ic	0.07 ic	---	---	0.00	0.00	0.34	---	---	---	0.410
2.10	6,117	538.10	0.46 ic	0.07 ic	---	---	0.00	0.00	0.39	---	---	---	0.459
2.15	6,319	538.15	0.52 ic	0.07 ic	---	---	0.00	0.00	0.44	---	---	---	0.510
2.20	6,522	538.20	0.58 ic	0.08 ic	---	---	0.00	0.00	0.49	---	---	---	0.563
2.25	6,724	538.25	0.62 ic	0.08 ic	---	---	0.00	0.00	0.54	---	---	---	0.617
2.30	6,927	538.30	0.69 ic	0.08 ic	---	---	0.00	0.00	0.60	---	---	---	0.674
2.35	7,129	538.35	0.73 ic	0.08 ic	---	---	0.00	0.00	0.65	---	---	---	0.732
2.40	7,332	538.40	0.80 ic	0.08 ic	---	---	0.00	0.00	0.71	---	---	---	0.792
2.45	7,535	538.45	0.88 ic	0.08 ic	---	---	0.00	0.00	0.77	---	---	---	0.853
2.50	7,737	538.50	0.93 ic	0.08 ic	---	---	0.00	0.00	0.83	---	---	---	0.916
2.55	7,940	538.55	0.98 ic	0.08 ic	---	---	0.00	0.00	0.90	---	---	---	0.980
2.60	8,142	538.60	1.06 ic	0.09 ic	---	---	0.00	0.00	0.96	---	---	---	1.047
2.65	8,345	538.65	1.11 ic	0.09 ic	---	---	0.00	0.00	1.03	---	---	---	1.114
2.70	8,547	538.70	1.21 ic	0.09 ic	---	---	0.00	0.00	1.09	---	---	---	1.183
2.75	8,750	538.75	1.26 ic	0.09 ic	---	---	0.00	0.00	1.16	---	---	---	1.253
2.80	8,953	538.80	1.32 ic	0.09 ic	---	---	0.00	0.00	1.23 s	---	---	---	1.324
2.85	9,155	538.85	1.42 ic	0.09 ic	---	---	0.00	0.00	1.30 s	---	---	---	1.396
2.90	9,358	538.90	1.48 ic	0.09 ic	---	---	0.00	0.00	1.38 s	---	---	---	1.470
2.95	9,560	538.95	1.54 ic	0.09 ic	---	---	0.00	0.00	1.45 s	---	---	---	1.544
3.00	9,763	539.00	1.65 ic	0.10 ic	---	---	0.00	0.00	1.52 s	---	---	---	1.619
3.05	9,965	539.05	1.71 ic	0.10 ic	---	---	0.00	0.00	1.60 s	---	---	---	1.696
3.10	10,168	539.10	1.77 ic	0.10 ic	---	---	0.00	0.00	1.67 s	---	---	---	1.774
3.15	10,370	539.15	1.85 ic	0.10 ic	---	---	0.00	0.00	1.75 s	---	---	---	1.851
3.20	10,573	539.20	1.97 ic	0.10 ic	---	---	0.00	0.00	1.83 s	---	---	---	1.930
3.25	10,776	539.25	2.03 ic	0.10 ic	---	---	0.00	0.00	1.91 s	---	---	---	2.011
3.30	10,978	539.30	2.10 ic	0.10 ic	---	---	0.00	0.00	1.99 s	---	---	---	2.094
3.35	11,181	539.35	2.18 ic	0.10 ic	---	---	0.00	0.00	2.07 s	---	---	---	2.175
3.40	11,383	539.40	2.30 ic	0.11 ic	---	---	0.00	0.00	2.15 s	---	---	---	2.258
3.45	11,586	539.45	2.37 ic	0.11 ic	---	---	0.00	0.00	2.24 s	---	---	---	2.343
3.50	11,788	539.50	2.44 ic	0.11 ic	---	---	0.00	0.00	2.32 s	---	---	---	2.430
3.55	11,991	539.55	2.52 ic	0.11 ic	---	---	0.00	0.00	2.41 s	---	---	---	2.517
3.60	12,193	539.60	2.60 ic	0.11 ic	---	---	0.00	0.00	2.49 s	---	---	---	2.603
3.65	12,396	539.65	2.73 ic	0.11 ic	---	---	0.00	0.00	2.58 s	---	---	---	2.692
3.70	12,599	539.70	2.80 ic	0.11 ic	---	---	0.00	0.00	2.67 s	---	---	---	2.782
3.75	12,801	539.75	2.88 ic	0.11 ic	---	---	0.00	0.00	2.76 s	---	---	---	2.873
3.80	13,004	539.80	2.96 ic	0.11 ic	---	---	0.00	0.00	2.85 s	---	---	---	2.963
3.85	13,206	539.85	3.11 ic	0.11 ic	---	---	0.00	0.00	2.94 s	---	---	---	3.054
3.90	13,409	539.90	3.18 ic	0.12 ic	---	---	0.00	0.00	3.03 s	---	---	---	3.148
3.95	13,611	539.95	3.26 ic	0.12 ic	---	---	0.00	0.00	3.13 s	---	---	---	3.243
4.00	13,814	540.00	3.34 ic	0.12 ic	---	---	0.00	0.00	3.22 s	---	---	---	3.339
4.05	14,017	540.05	3.43 ic	0.12 ic	---	---	0.00	0.00	3.31 s	---	---	---	3.433
4.10	14,219	540.10	3.57 ic	0.12 ic	---	---	0.00	0.00	3.41 s	---	---	---	3.530
4.15	14,422	540.15	3.64 ic	0.12 ic	---	---	0.00	0.00	3.51 s	---	---	---	3.629
4.20	14,624	540.20	3.73 ic	0.12 ic	---	---	0.00	0.00	3.61 s	---	---	---	3.727
4.25	14,827	540.25	3.88 ic	0.12 ic	---	---	0.00	0.01	3.70 s	---	---	---	3.837
4.30	15,029	540.30	4.11 ic	0.12 ic	---	---	0.00	0.20	3.79 s	---	---	---	4.113
4.35	15,232	540.35	4.50 ic	0.12 ic	---	---	0.00	0.49	3.88 s	---	---	---	4.488
4.40	15,434	540.40	4.94 ic	0.12 ic	---	---	0.00	0.85	3.96 s	---	---	---	4.935
4.45	15,637	540.45	5.44 ic	0.12 ic	---	---	0.00	1.28	4.04 s	---	---	---	5.441
4.50	15,840	540.50	6.00 ic	0.12 ic	---	---	0.00	1.77	4.11 s	---	---	---	5.998
4.55	16,042	540.55	6.61 ic	0.12 ic	---	---	0.00	2.30	4.17 s	---	---	---	6.593
4.60	16,245	540.60	7.22 ic	0.12 ic	---	---	0.00	2.88	4.22 s	---	---	---	7.219
4.65	16,447	540.65	7.87 ic	0.11 ic	---	---	0.00	3.50	4.26 s	---	---	---	7.867
4.70	16,650	540.70	8.54 ic	0.11 ic	---	---	0.00	4.16	4.27 s	---	---	---	8.542
4.75	16,852	540.75	9.23 ic	0.11 ic	---	---	0.00	4.85	4.27 s	---	---	---	9.231
4.80	17,055	540.80	9.93 ic	0.10 ic	---	---	0.00	5.58	4.25 s	---	---	---	9.934
4.85	17,257	540.85	10.64 ic	0.10 ic	---	---	0.00	6.34	4.20 s	---	---	---	10.64
4.90	17,460	540.90	11.35 ic	0.09 ic	---	---	0.00	7.14	4.11 s	---	---	---	11.35
4.95	17,663	540.95	12.05 ic	0.09 ic	---	---	0.00	7.97	3.99 s	---	---	---	12.05
5.00	17,865	541.00	12.74 ic	0.08 ic	---	---	0.00	8.83	3.83 s	---	---	---	12.74

...End

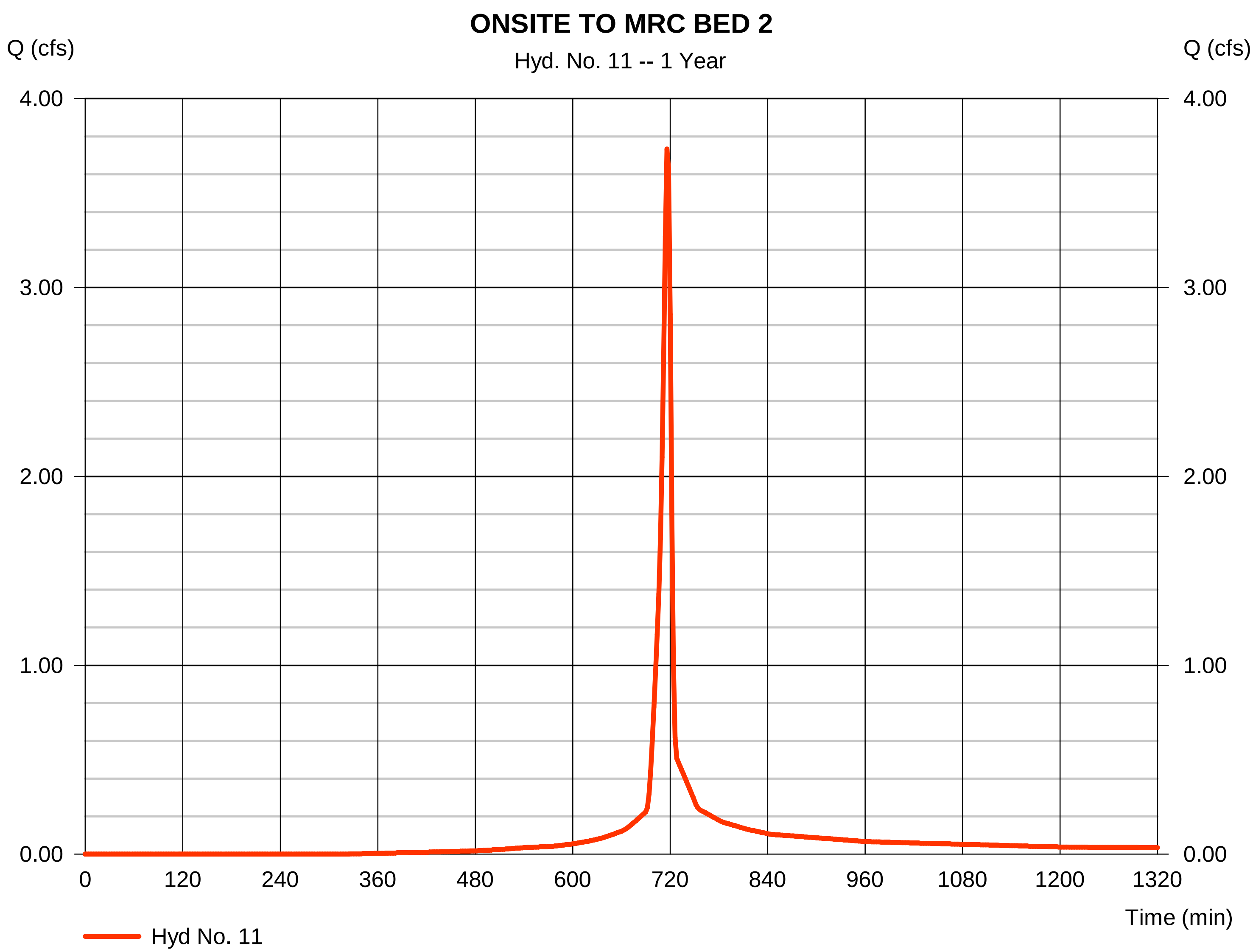
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 11

ONSITE TO MRC BED 2

Hydrograph type	= SCS Runoff	Peak discharge	= 3.733 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 7,781 cuft
Drainage area	= 1.180 ac	Curve number	= 91.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



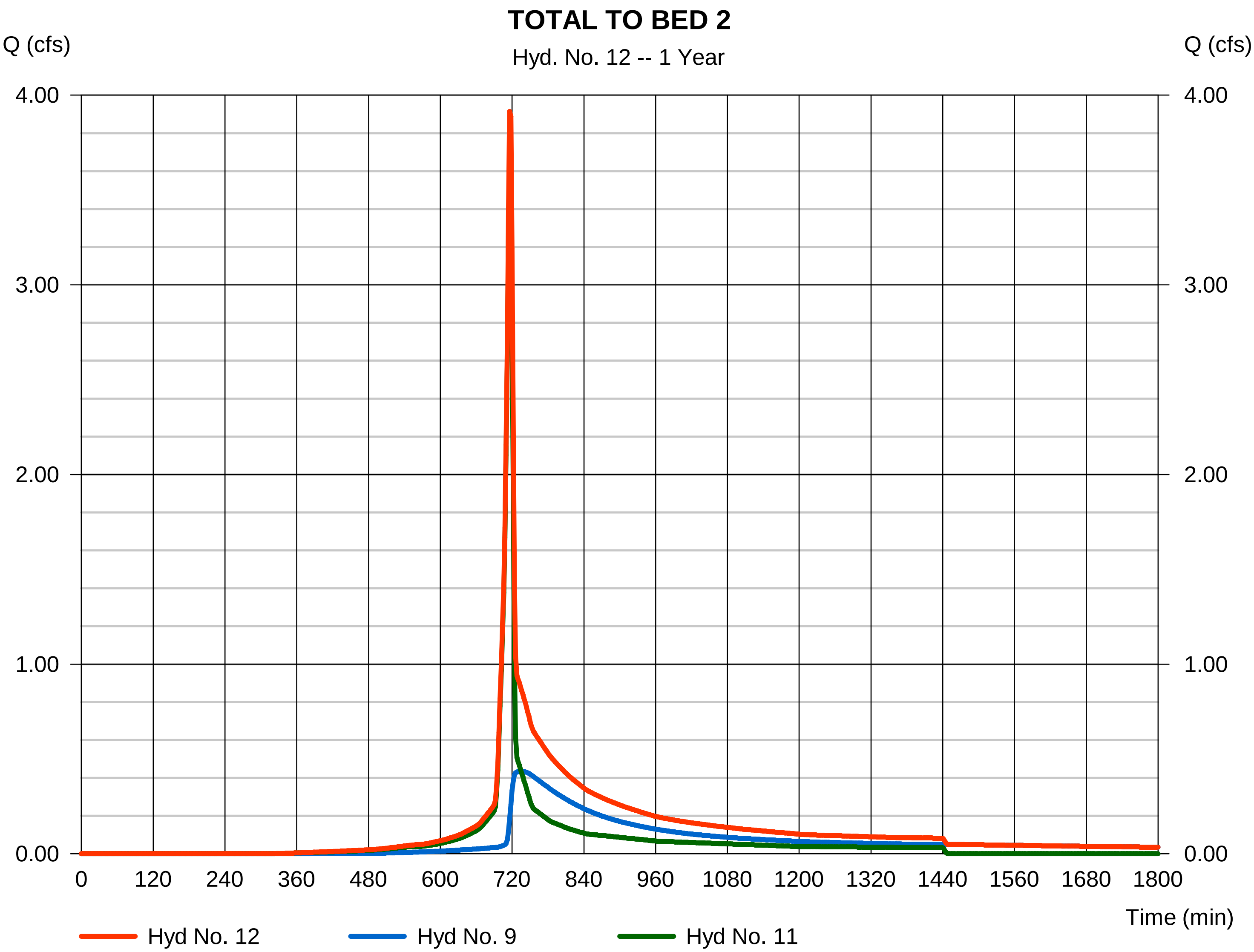
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 12

TOTAL TO BED 2

Hydrograph type	= Combine	Peak discharge	= 3.915 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 15,877 cuft
Inflow hyds.	= 9, 11	Contrib. drain. area	= 1.180 ac



Hydrograph Report

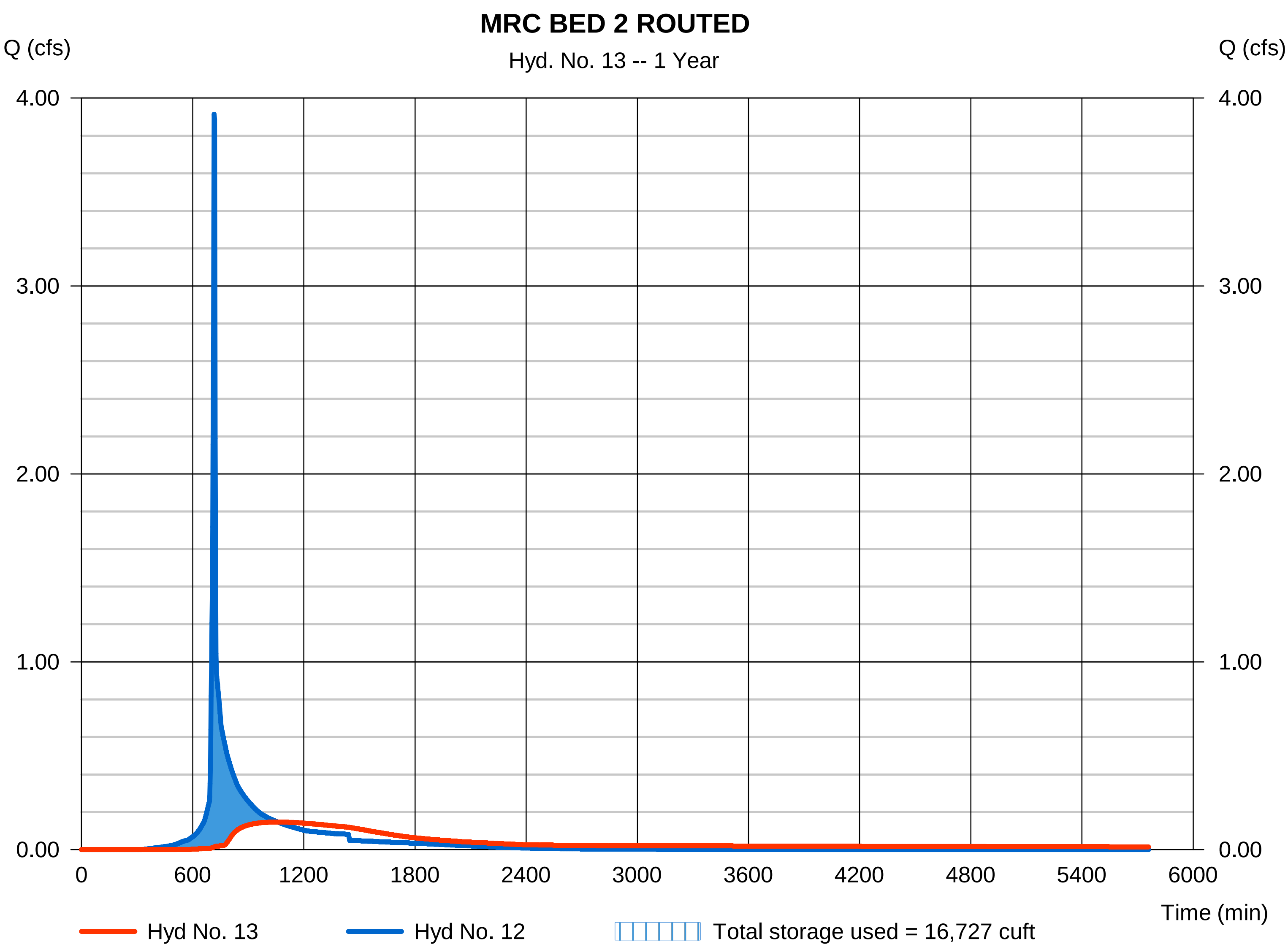
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 13

MRC BED 2 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 0.147 cfs
Storm frequency	= 1 yrs	Time to peak	= 1058 min
Time interval	= 2 min	Hyd. volume	= 12,491 cuft
Inflow hyd. No.	= 12 - TOTAL TO BED 2	Max. Elevation	= 536.29 ft
Reservoir name	= MRC BED 2	Max. Storage	= 16,727 cuft

Storage Indication method used. Wet pond routing start elevation = 535.00 ft.



Pond No. 2 - MRC BED 2

Pond Data

UG Chambers -Invert elev. = 534.00 ft, Rise x Span = 4.00 x 54.00 ft, Barrel Len = 133.00 ft, No. Barrels = 1, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 534.00 ft, Width = 56.00 ft, Height = 5.00 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	534.00	n/a	0	0
0.50	534.50	n/a	3,645	3,645
1.00	535.00	n/a	3,645	7,290
1.50	535.50	n/a	3,645	10,935
2.00	536.00	n/a	3,645	14,580
2.50	536.50	n/a	3,645	18,225
3.00	537.00	n/a	3,645	21,870
3.50	537.50	n/a	3,645	25,515
4.00	538.00	n/a	3,645	29,159
4.50	538.50	n/a	1,490	30,649
5.00	539.00	n/a	1,490	32,139

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	0.94	3.00	0.00
Span (in)	= 24.00	0.94	3.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 535.00	535.00	535.90	0.00
Length (ft)	= 63.00	0.00	0.00	0.00
Slope (%)	= 5.00	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	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	4.00	Inactive	0.00
Crest El. (ft)	= 545.00	538.40	536.60	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	Rect	---
Multi-Stage	= Yes	Yes	Yes	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

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

Stage / 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	534.00	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.05	364	534.05	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.10	729	534.10	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.15	1,093	534.15	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.20	1,458	534.20	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.25	1,822	534.25	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.30	2,187	534.30	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.35	2,551	534.35	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.40	2,916	534.40	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.45	3,280	534.45	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.50	3,645	534.50	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.55	4,009	534.55	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.60	4,374	534.60	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.65	4,738	534.65	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.70	5,103	534.70	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.75	5,467	534.75	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.80	5,832	534.80	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.85	6,196	534.85	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.90	6,561	534.90	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.95	6,925	534.95	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
1.00	7,290	535.00	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
1.05	7,654	535.05	0.00 ic	0.00 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.002
1.10	8,019	535.10	0.01 ic	0.01 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.006
1.15	8,383	535.15	0.01 ic	0.01 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.008
1.20	8,748	535.20	0.01 ic	0.01 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.009
1.25	9,112	535.25	0.01 ic	0.01 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.011
1.30	9,477	535.30	0.01 ic	0.01 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.012
1.35	9,841	535.35	0.01 ic	0.01 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.013
1.40	10,206	535.40	0.01 ic	0.01 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.014
1.45	10,570	535.45	0.01 ic	0.01 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.015
1.50	10,935	535.50	0.02 ic	0.02 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.015
1.55	11,299	535.55	0.02 ic	0.02 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.016

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MRC BED 2

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
1.60	11,664	535.60	0.02 ic	0.02 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.017
1.65	12,028	535.65	0.02 ic	0.02 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.018
1.70	12,393	535.70	0.02 ic	0.02 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.019
1.75	12,757	535.75	0.02 ic	0.02 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.019
1.80	13,122	535.80	0.02 ic	0.02 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.020
1.85	13,486	535.85	0.02 ic	0.02 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.021
1.90	13,851	535.90	0.02 ic	0.02 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.021
1.95	14,215	535.95	0.03 ic	0.02 ic	0.01 ic	---	0.00	0.00	0.00	---	---	---	0.027
2.00	14,580	536.00	0.04 ic	0.02 ic	0.02 ic	---	0.00	0.00	0.00	---	---	---	0.042
2.05	14,944	536.05	0.06 ic	0.02 ic	0.04 ic	---	0.00	0.00	0.00	---	---	---	0.063
2.10	15,309	536.10	0.09 ic	0.02 ic	0.06 ic	---	0.00	0.00	0.00	---	---	---	0.087
2.15	15,673	536.15	0.11 ic	0.02 ic	0.08 ic	---	0.00	0.00	0.00	---	---	---	0.107
2.20	16,038	536.20	0.13 ic	0.02 ic	0.10 ic	---	0.00	0.00	0.00	---	---	---	0.123
2.25	16,402	536.25	0.15 ic	0.02 ic	0.11 ic	---	0.00	0.00	0.00	---	---	---	0.136
2.30	16,767	536.30	0.15 ic	0.02 ic	0.12 ic	---	0.00	0.00	0.00	---	---	---	0.149
2.35	17,131	536.35	0.16 ic	0.03 ic	0.13 ic	---	0.00	0.00	0.00	---	---	---	0.160
2.40	17,496	536.40	0.18 ic	0.03 ic	0.14 ic	---	0.00	0.00	0.00	---	---	---	0.170
2.45	17,860	536.45	0.18 ic	0.03 ic	0.15 ic	---	0.00	0.00	0.00	---	---	---	0.180
2.50	18,225	536.50	0.20 ic	0.03 ic	0.16 ic	---	0.00	0.00	0.00	---	---	---	0.189
2.55	18,589	536.55	0.20 ic	0.03 ic	0.17 ic	---	0.00	0.00	0.00	---	---	---	0.198
2.60	18,954	536.60	0.22 ic	0.03 ic	0.18 ic	---	0.00	0.00	0.00	---	---	---	0.207
2.65	19,318	536.65	0.22 ic	0.03 ic	0.19 ic	---	0.00	0.00	0.00	---	---	---	0.215
2.70	19,683	536.70	0.22 ic	0.03 ic	0.19 ic	---	0.00	0.00	0.00	---	---	---	0.223
2.75	20,047	536.75	0.24 ic	0.03 ic	0.20 ic	---	0.00	0.00	0.00	---	---	---	0.230
2.80	20,412	536.80	0.24 ic	0.03 ic	0.21 ic	---	0.00	0.00	0.00	---	---	---	0.237
2.85	20,776	536.85	0.24 ic	0.03 ic	0.21 ic	---	0.00	0.00	0.00	---	---	---	0.244
2.90	21,141	536.90	0.27 ic	0.03 ic	0.22 ic	---	0.00	0.00	0.00	---	---	---	0.251
2.95	21,505	536.95	0.27 ic	0.03 ic	0.23 ic	---	0.00	0.00	0.00	---	---	---	0.258
3.00	21,870	537.00	0.27 ic	0.03 ic	0.23 ic	---	0.00	0.00	0.00	---	---	---	0.264
3.05	22,234	537.05	0.27 ic	0.03 ic	0.24 ic	---	0.00	0.00	0.00	---	---	---	0.271
3.10	22,599	537.10	0.29 ic	0.03 ic	0.25 ic	---	0.00	0.00	0.00	---	---	---	0.277
3.15	22,963	537.15	0.29 ic	0.03 ic	0.25 ic	---	0.00	0.00	0.00	---	---	---	0.283
3.20	23,328	537.20	0.29 ic	0.03 ic	0.26 ic	---	0.00	0.00	0.00	---	---	---	0.289
3.25	23,692	537.25	0.29 ic	0.03 ic	0.26 ic	---	0.00	0.00	0.00	---	---	---	0.294
3.30	24,057	537.30	0.32 ic	0.03 ic	0.27 ic	---	0.00	0.00	0.00	---	---	---	0.300
3.35	24,421	537.35	0.32 ic	0.03 ic	0.27 ic	---	0.00	0.00	0.00	---	---	---	0.306
3.40	24,786	537.40	0.32 ic	0.03 ic	0.28 ic	---	0.00	0.00	0.00	---	---	---	0.311
3.45	25,150	537.45	0.32 ic	0.03 ic	0.28 ic	---	0.00	0.00	0.00	---	---	---	0.317
3.50	25,515	537.50	0.32 ic	0.03 ic	0.29 ic	---	0.00	0.00	0.00	---	---	---	0.322
3.55	25,879	537.55	0.35 ic	0.04 ic	0.29 ic	---	0.00	0.00	0.00	---	---	---	0.327
3.60	26,243	537.60	0.35 ic	0.04 ic	0.30 ic	---	0.00	0.00	0.00	---	---	---	0.332
3.65	26,608	537.65	0.35 ic	0.04 ic	0.30 ic	---	0.00	0.00	0.00	---	---	---	0.337
3.70	26,972	537.70	0.35 ic	0.04 ic	0.31 ic	---	0.00	0.00	0.00	---	---	---	0.342
3.75	27,337	537.75	0.35 ic	0.04 ic	0.31 ic	---	0.00	0.00	0.00	---	---	---	0.347
3.80	27,701	537.80	0.35 ic	0.04 ic	0.31 ic	---	0.00	0.00	0.00	---	---	---	0.352
3.85	28,066	537.85	0.38 ic	0.04 ic	0.32 ic	---	0.00	0.00	0.00	---	---	---	0.357
3.90	28,430	537.90	0.38 ic	0.04 ic	0.32 ic	---	0.00	0.00	0.00	---	---	---	0.361
3.95	28,795	537.95	0.38 ic	0.04 ic	0.33 ic	---	0.00	0.00	0.00	---	---	---	0.366
4.00	29,159	538.00	0.38 ic	0.04 ic	0.33 ic	---	0.00	0.00	0.00	---	---	---	0.370
4.05	29,308	538.05	0.38 ic	0.04 ic	0.34 ic	---	0.00	0.00	0.00	---	---	---	0.375
4.10	29,457	538.10	0.38 ic	0.04 ic	0.34 ic	---	0.00	0.00	0.00	---	---	---	0.379
4.15	29,606	538.15	0.38 ic	0.04 ic	0.34 ic	---	0.00	0.00	0.00	---	---	---	0.384
4.20	29,755	538.20	0.41 ic	0.04 ic	0.35 ic	---	0.00	0.00	0.00	---	---	---	0.388
4.25	29,904	538.25	0.41 ic	0.04 ic	0.35 ic	---	0.00	0.00	0.00	---	---	---	0.392
4.30	30,053	538.30	0.41 ic	0.04 ic	0.36 ic	---	0.00	0.00	0.00	---	---	---	0.397
4.35	30,202	538.35	0.41 ic	0.04 ic	0.36 ic	---	0.00	0.00	0.00	---	---	---	0.401
4.40	30,351	538.40	0.41 ic	0.04 ic	0.36 ic	---	0.00	0.00	0.00	---	---	---	0.405
4.45	30,500	538.45	0.56 ic	0.04 ic	0.37 ic	---	0.00	0.15	0.00	---	---	---	0.557
4.50	30,649	538.50	0.84 ic	0.04 ic	0.37 ic	---	0.00	0.42	0.00	---	---	---	0.834
4.55	30,798	538.55	1.20 ic	0.04 ic	0.38 ic	---	0.00	0.77	0.00	---	---	---	1.190
4.60	30,947	538.60	1.64 ic	0.04 ic	0.38 ic	---	0.00	1.19	0.00	---	---	---	1.611
4.65	31,096	538.65	2.09 ic	0.04 ic	0.38 ic	---	0.00	1.66	0.00	---	---	---	2.088
4.70	31,245	538.70	2.62 ic	0.04 ic	0.39 ic	---	0.00	2.19	0.00	---	---	---	2.615
4.75	31,394	538.75	3.27 ic	0.04 ic	0.39 ic	---	0.00	2.76	0.00	---	---	---	3.186
4.80	31,543	538.80	3.80 ic	0.04 ic	0.39 ic	---	0.00	3.37	0.00	---	---	---	3.802
4.85	31,692	538.85	4.46 ic	0.04 ic	0.40 ic	---	0.00	4.02	0.00	---	---	---	4.456
4.90	31,841	538.90	5.16 ic	0.04 ic	0.40 ic	---	0.00	4.71	0.00	---	---	---	5.148
4.95	31,990	538.95	5.91 ic	0.04 ic	0.40 ic	---	0.00	5.43	0.00	---	---	---	5.873
5.00	32,139	539.00	6.69 ic	0.04 ic	0.40 ic	---	0.00	6.19	0.00	---	---	---	6.630

...End

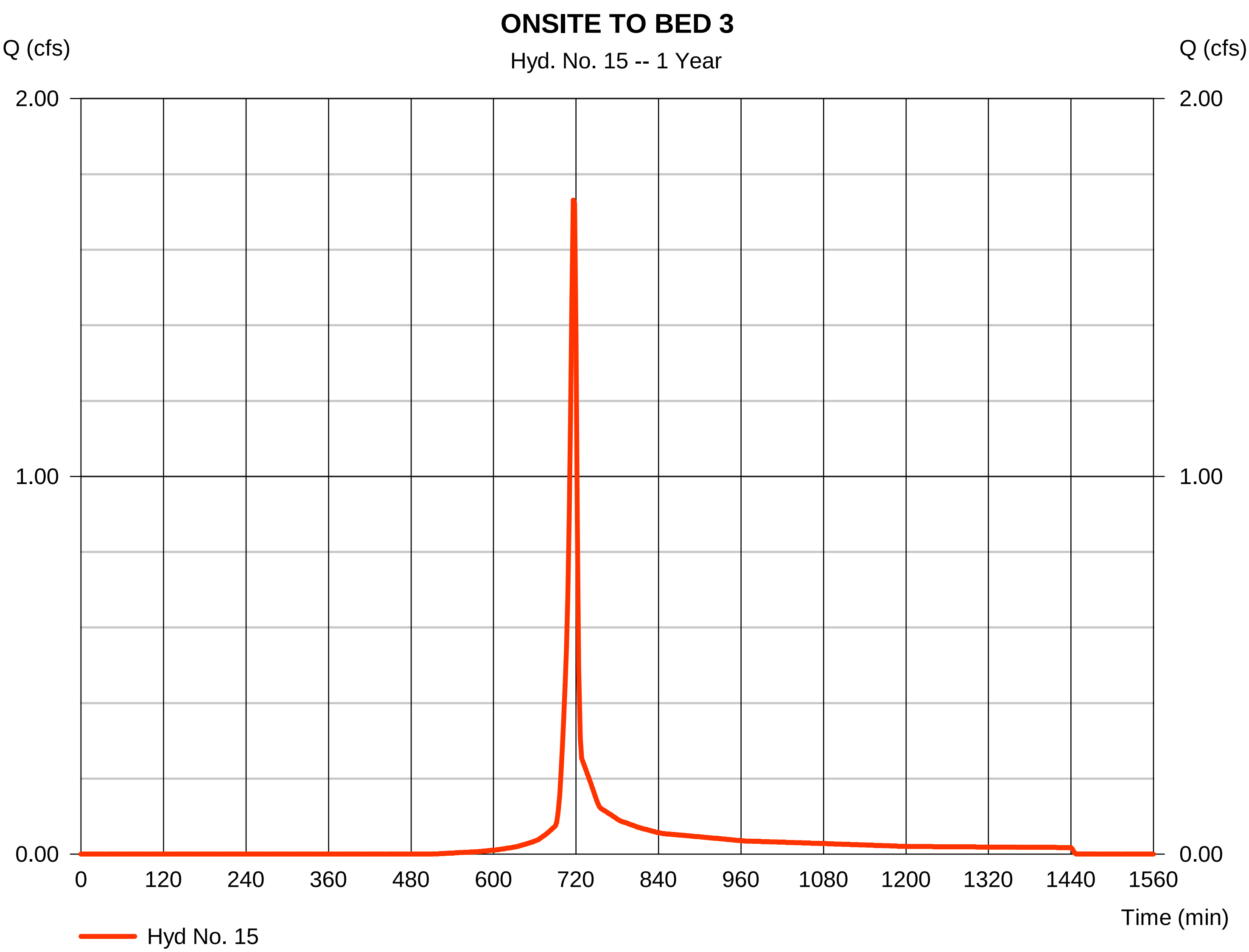
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 15

ONSITE TO BED 3

Hydrograph type	= SCS Runoff	Peak discharge	= 1.731 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 3,498 cuft
Drainage area	= 0.730 ac	Curve number	= 84.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



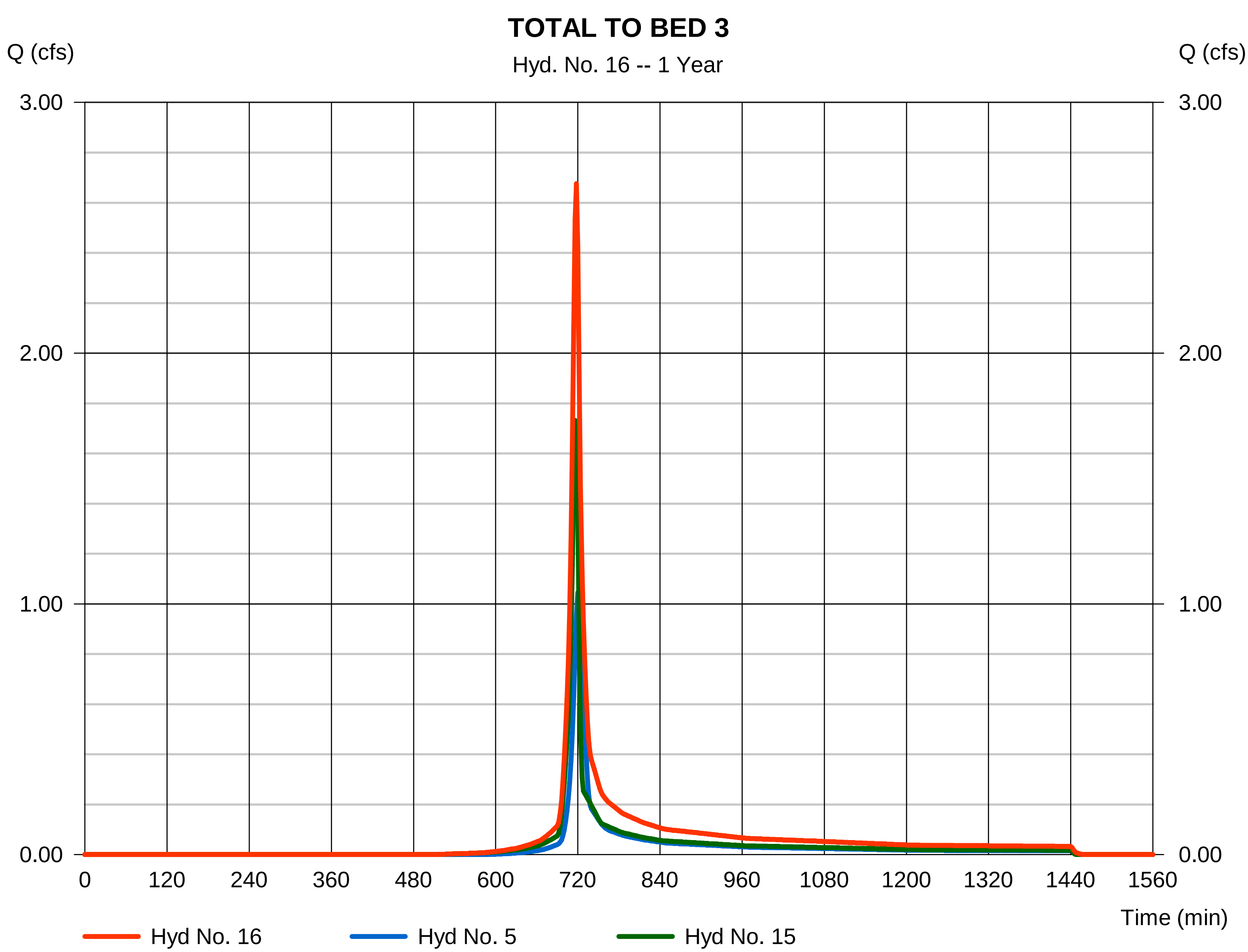
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Friday, 04 / 5 / 2024

Hyd. No. 16

TOTAL TO BED 3

Hydrograph type	= Combine	Peak discharge	= 2.676 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 6,236 cuft
Inflow hyds.	= 5, 15	Contrib. drain. area	= 1.350 ac



Hydrograph Report

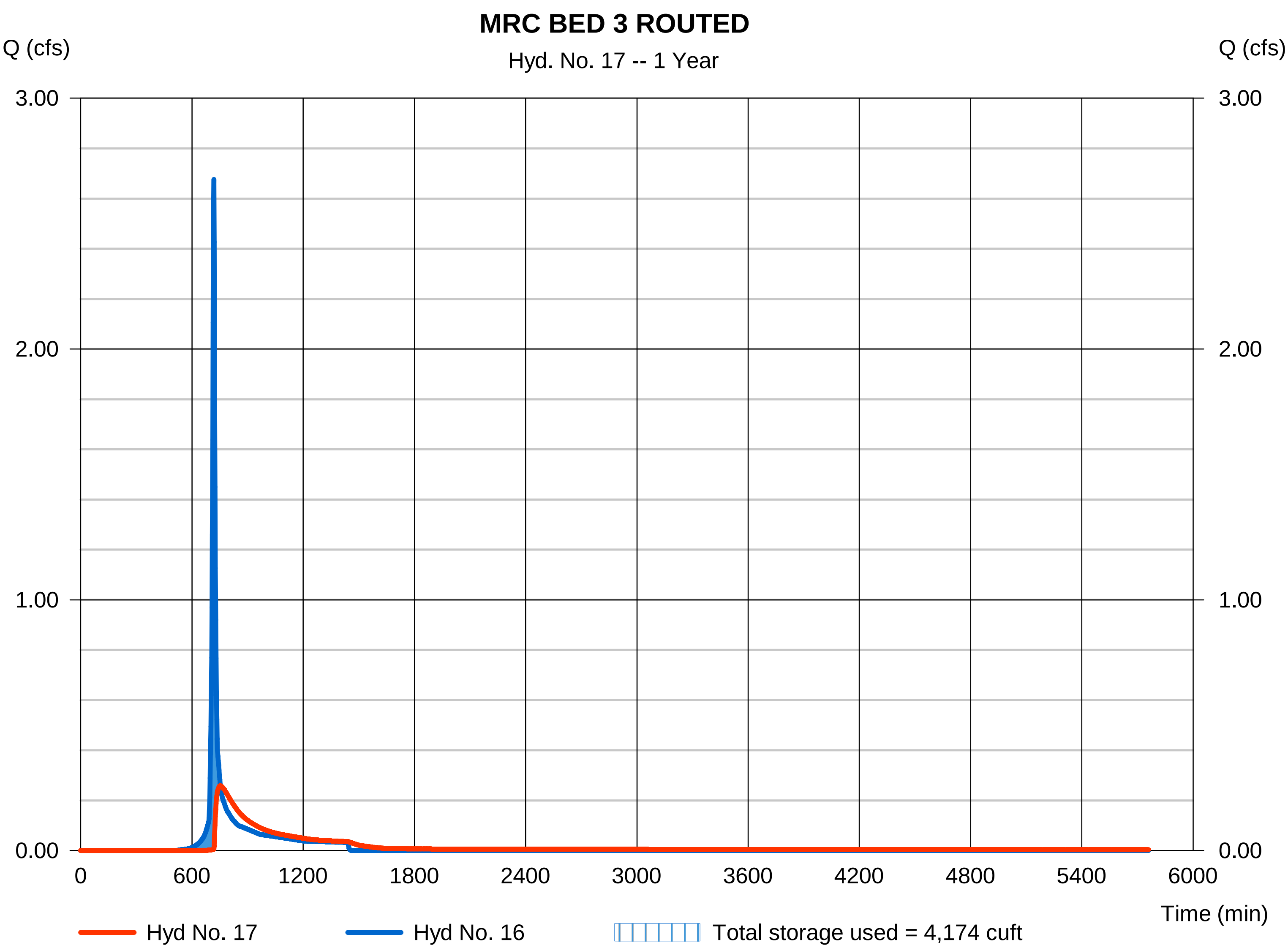
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 17

MRC BED 3 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 0.259 cfs
Storm frequency	= 1 yrs	Time to peak	= 752 min
Time interval	= 2 min	Hyd. volume	= 5,391 cuft
Inflow hyd. No.	= 16 - TOTAL TO BED 3	Max. Elevation	= 506.23 ft
Reservoir name	= MRC BED 3	Max. Storage	= 4,174 cuft

Storage Indication method used. Wet pond routing start elevation = 505.00 ft.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Pond No. 3 - MRC BED 3

Pond Data

UG Chambers -Invert elev. = 505.00 ft, Rise x Span = 4.00 x 28.00 ft, Barrel Len = 88.00 ft, No. Barrels = 1, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 504.00 ft, Width = 30.00 ft, Height = 5.00 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	504.00	n/a	0	0
0.50	504.50	n/a	528	528
1.00	505.00	n/a	528	1,056
1.50	505.50	n/a	1,267	2,324
2.00	506.00	n/a	1,267	3,591
2.50	506.50	n/a	1,267	4,859
3.00	507.00	n/a	1,267	6,126
3.50	507.50	n/a	1,267	7,393
4.00	508.00	n/a	1,267	8,661
4.50	508.50	n/a	1,267	9,928
5.00	509.00	n/a	1,267	11,196

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 30.00	0.50	0.00	0.00
Span (in)	= 30.00	0.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 504.00	505.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	3.00	0.25	0.00
Crest El. (ft)	= 510.50	508.30	505.78	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	Rect	---
Multi-Stage	= Yes	Yes	Yes	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

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

Stage / 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	504.00	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.05	53	504.05	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.10	106	504.10	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.15	158	504.15	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.20	211	504.20	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.25	264	504.25	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.30	317	504.30	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.35	370	504.35	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.40	422	504.40	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.45	475	504.45	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.50	528	504.50	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.55	581	504.55	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.60	634	504.60	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.65	687	504.65	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.70	739	504.70	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.75	792	504.75	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.80	845	504.80	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.85	898	504.85	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.90	951	504.90	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.95	1,003	504.95	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
1.00	1,056	505.00	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
1.05	1,183	505.05	0.00 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.001
1.10	1,310	505.10	0.00 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.002
1.15	1,436	505.15	0.00 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.002
1.20	1,563	505.20	0.00 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.003
1.25	1,690	505.25	0.00 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.003
1.30	1,817	505.30	0.00 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.003
1.35	1,943	505.35	0.00 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.004
1.40	2,070	505.40	0.00 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.004
1.45	2,197	505.45	0.00 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.004
1.50	2,324	505.50	0.00 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.005
1.55	2,450	505.55	0.00 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.005

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MRC BED 3
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
1.60	2,577	505.60	0.01 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.005
1.65	2,704	505.65	0.01 ic	0.01 ic	---	---	0.00	0.00	0.00	---	---	---	0.005
1.70	2,831	505.70	0.01 ic	0.01 ic	---	---	0.00	0.00	0.00	---	---	---	0.005
1.75	2,957	505.75	0.01 ic	0.01 ic	---	---	0.00	0.00	0.00	---	---	---	0.006
1.80	3,084	505.80	0.01 ic	0.01 ic	---	---	0.00	0.00	0.00	---	---	---	0.008
1.85	3,211	505.85	0.02 ic	0.01 ic	---	---	0.00	0.00	0.02	---	---	---	0.021
1.90	3,338	505.90	0.04 ic	0.01 ic	---	---	0.00	0.00	0.03	---	---	---	0.041
1.95	3,464	505.95	0.07 ic	0.01 ic	---	---	0.00	0.00	0.06	---	---	---	0.065
2.00	3,591	506.00	0.10 ic	0.01 ic	---	---	0.00	0.00	0.09	---	---	---	0.092
2.05	3,718	506.05	0.13 ic	0.01 ic	---	---	0.00	0.00	0.12	---	---	---	0.123
2.10	3,845	506.10	0.16 ic	0.01 ic	---	---	0.00	0.00	0.15	---	---	---	0.158
2.15	3,971	506.15	0.21 ic	0.01 ic	---	---	0.00	0.00	0.19	---	---	---	0.194
2.20	4,098	506.20	0.23 ic	0.01 ic	---	---	0.00	0.00	0.23	---	---	---	0.234
2.25	4,225	506.25	0.29 ic	0.01 ic	---	---	0.00	0.00	0.27	---	---	---	0.275
2.30	4,352	506.30	0.32 ic	0.01 ic	---	---	0.00	0.00	0.31	---	---	---	0.320
2.35	4,478	506.35	0.39 ic	0.01 ic	---	---	0.00	0.00	0.36	---	---	---	0.366
2.40	4,605	506.40	0.43 ic	0.01 ic	---	---	0.00	0.00	0.41	---	---	---	0.414
2.45	4,732	506.45	0.47 ic	0.01 ic	---	---	0.00	0.00	0.46	---	---	---	0.464
2.50	4,859	506.50	0.52 ic	0.01 ic	---	---	0.00	0.00	0.51	---	---	---	0.517
2.55	4,985	506.55	0.61 ic	0.01 ic	---	---	0.00	0.00	0.56	---	---	---	0.571
2.60	5,112	506.60	0.66 ic	0.01 ic	---	---	0.00	0.00	0.62	---	---	---	0.626
2.65	5,239	506.65	0.72 ic	0.01 ic	---	---	0.00	0.00	0.68	---	---	---	0.684
2.70	5,366	506.70	0.77 ic	0.01 ic	---	---	0.00	0.00	0.73	---	---	---	0.743
2.75	5,492	506.75	0.84 ic	0.01 ic	---	---	0.00	0.00	0.80	---	---	---	0.804
2.80	5,619	506.80	0.90 ic	0.01 ic	---	---	0.00	0.00	0.86	---	---	---	0.866
2.85	5,746	506.85	0.97 ic	0.01 ic	---	---	0.00	0.00	0.92	---	---	---	0.930
2.90	5,873	506.90	1.04 ic	0.01 ic	---	---	0.00	0.00	0.99	---	---	---	0.996
2.95	5,999	506.95	1.12 ic	0.01 ic	---	---	0.00	0.00	1.05	---	---	---	1.063
3.00	6,126	507.00	1.13 ic	0.01 ic	---	---	0.00	0.00	1.12	---	---	---	1.131
3.05	6,253	507.05	1.20 ic	0.01 ic	---	---	0.00	0.00	1.19	---	---	---	1.201
3.10	6,380	507.10	1.28 ic	0.01 ic	---	---	0.00	0.00	1.26	---	---	---	1.272
3.15	6,506	507.15	1.37 ic	0.01 ic	---	---	0.00	0.00	1.33	---	---	---	1.345
3.20	6,633	507.20	1.46 ic	0.01 ic	---	---	0.00	0.00	1.41	---	---	---	1.418
3.25	6,760	507.25	1.55 ic	0.01 ic	---	---	0.00	0.00	1.48	---	---	---	1.493
3.30	6,886	507.30	1.57 ic	0.01 ic	---	---	0.00	0.00	1.56	---	---	---	1.570
3.35	7,013	507.35	1.65 ic	0.01 ic	---	---	0.00	0.00	1.64	---	---	---	1.648
3.40	7,140	507.40	1.76 ic	0.01 ic	---	---	0.00	0.00	1.72	---	---	---	1.727
3.45	7,267	507.45	1.86 ic	0.01 ic	---	---	0.00	0.00	1.80	---	---	---	1.807
3.50	7,393	507.50	1.89 ic	0.01 ic	---	---	0.00	0.00	1.88	---	---	---	1.888
3.55	7,520	507.55	1.97 ic	0.01 ic	---	---	0.00	0.00	1.96	---	---	---	1.971
3.60	7,647	507.60	2.09 ic	0.01 ic	---	---	0.00	0.00	2.04	---	---	---	2.055
3.65	7,774	507.65	2.21 ic	0.01 ic	---	---	0.00	0.00	2.13	---	---	---	2.139
3.70	7,900	507.70	2.23 ic	0.01 ic	---	---	0.00	0.00	2.21	---	---	---	2.226
3.75	8,027	507.75	2.33 ic	0.01 ic	---	---	0.00	0.00	2.30	---	---	---	2.313
3.80	8,154	507.80	2.46 ic	0.01 ic	---	---	0.00	0.00	2.39	---	---	---	2.401
3.85	8,281	507.85	2.49 ic	0.01 ic	---	---	0.00	0.00	2.48	---	---	---	2.490
3.90	8,407	507.90	2.59 ic	0.01 ic	---	---	0.00	0.00	2.57	---	---	---	2.581
3.95	8,534	507.95	2.73 ic	0.01 ic	---	---	0.00	0.00	2.66	---	---	---	2.672
4.00	8,661	508.00	2.77 ic	0.01 ic	---	---	0.00	0.00	2.75	---	---	---	2.765
4.05	8,788	508.05	2.87 ic	0.01 ic	---	---	0.00	0.00	2.85	---	---	---	2.859
4.10	8,914	508.10	3.02 ic	0.01 ic	---	---	0.00	0.00	2.94	---	---	---	2.953
4.15	9,041	508.15	3.05 ic	0.01 ic	---	---	0.00	0.00	3.04	---	---	---	3.049
4.20	9,168	508.20	3.17 ic	0.01 ic	---	---	0.00	0.00	3.13	---	---	---	3.146
4.25	9,295	508.25	3.32 ic	0.01 ic	---	---	0.00	0.00	3.23	---	---	---	3.243
4.30	9,421	508.30	3.34 ic	0.01 ic	---	---	0.00	0.00	3.33	---	---	---	3.342
4.35	9,548	508.35	3.64 ic	0.01 ic	---	---	0.00	0.11	3.43	---	---	---	3.553
4.40	9,675	508.40	3.98 ic	0.01 ic	---	---	0.00	0.32	3.53	---	---	---	3.858
4.45	9,802	508.45	4.34 ic	0.01 ic	---	---	0.00	0.58	3.63	---	---	---	4.224
4.50	9,928	508.50	4.71 ic	0.01 ic	---	---	0.00	0.89	3.73	---	---	---	4.640
4.55	10,055	508.55	5.10 ic	0.01 ic	---	---	0.00	1.25	3.84	---	---	---	5.099
4.60	10,182	508.60	5.71 ic	0.01 ic	---	---	0.00	1.64	3.94	---	---	---	5.596
4.65	10,309	508.65	6.14 ic	0.01 ic	---	---	0.00	2.07	4.05	---	---	---	6.129
4.70	10,435	508.70	6.82 ic	0.01 ic	---	---	0.00	2.53	4.15	---	---	---	6.694
4.75	10,562	508.75	7.29 ic	0.01 ic	---	---	0.00	3.01	4.26	---	---	---	7.288
4.80	10,689	508.80	8.00 ic	0.01 ic	---	---	0.00	3.53	4.37	---	---	---	7.913
4.85	10,816	508.85	8.56 ic	0.01 ic	---	---	0.00	4.07	4.48	---	---	---	8.564
4.90	10,942	508.90	9.27 ic	0.01 ic	---	---	0.00	4.64	4.59	---	---	---	9.242
4.95	11,069	508.95	10.06 ic	0.01 ic	---	---	0.00	5.23	4.70	---	---	---	9.945
5.00	11,196	509.00	10.86 ic	0.01 ic	---	---	0.00	5.85	4.81	---	---	---	10.67

...End

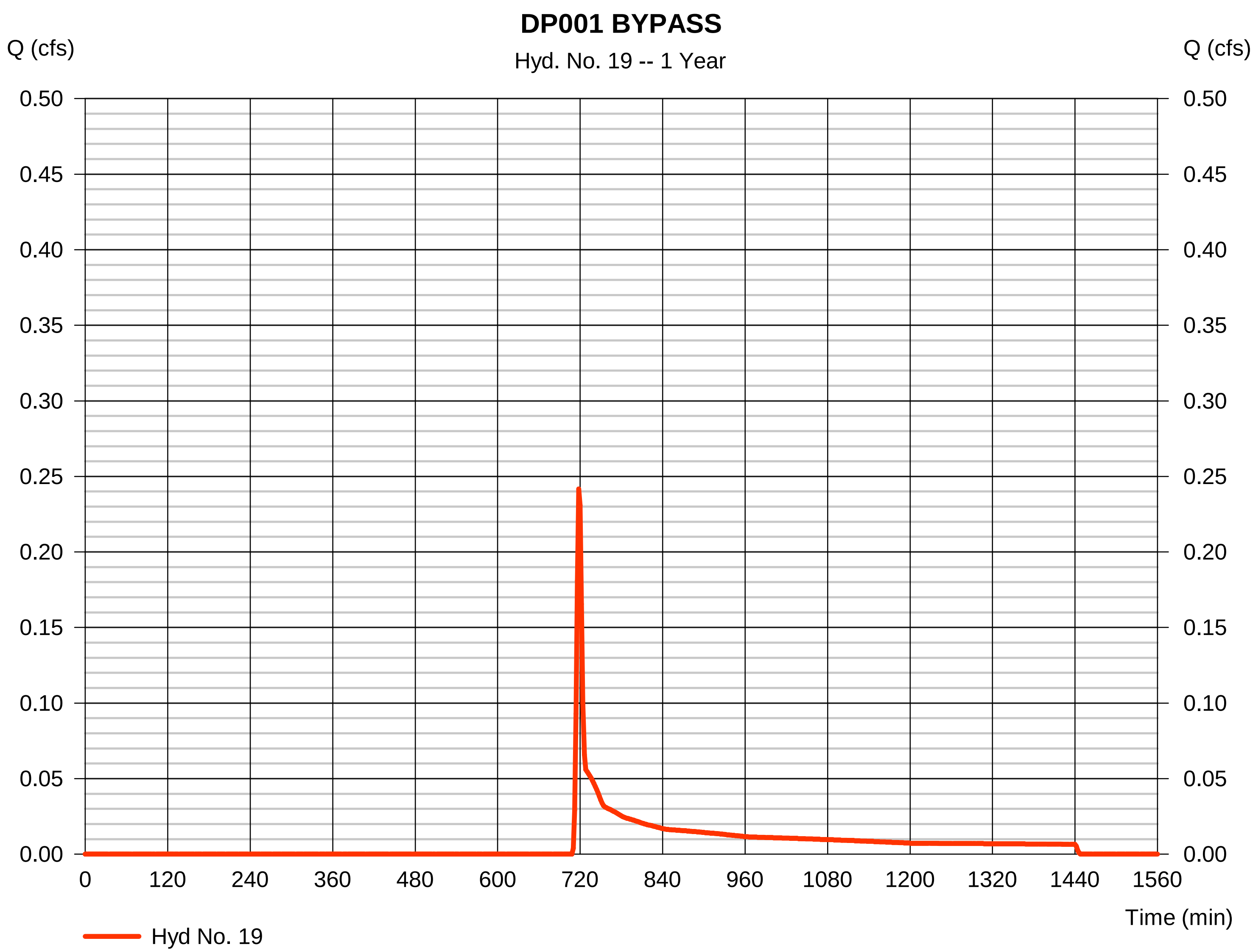
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 | Friday, 04 / 5 / 2024

Hyd. No. 19

DP001 BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.242 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 668 cuft
Drainage area	= 0.610 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



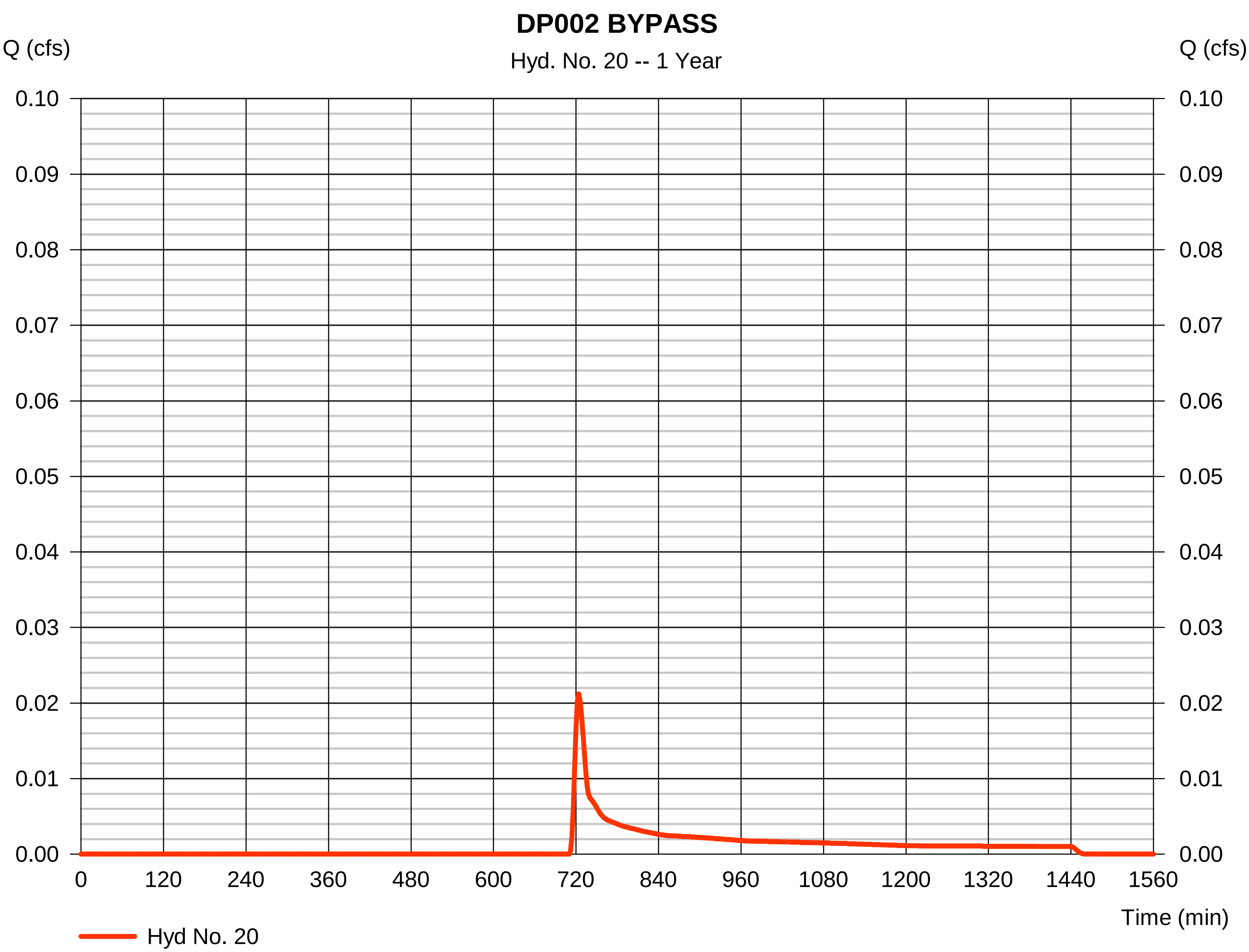
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 20

DP002 BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.021 cfs
Storm frequency	= 1 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 98 cuft
Drainage area	= 0.090 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.50 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 20

DP002 BYPASS

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.240		0.240		0.011		
Flow length (ft)	=	87.0		19.0		0.0		
Two-year 24-hr precip. (in)	=	3.20		3.20		3.20		
Land slope (%)	=	5.50		29.00		0.00		
Travel Time (min)	**=**	**8.52**	**+**	**1.30**	**+**	**0.00**	**=**	**9.81**
Shallow Concentrated Flow								
Flow length (ft)	=	361.00		0.00		0.00		
Watercourse slope (%)	=	5.00		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=3.61			0.00		0.00		
Travel Time (min)	**=**	**1.67**	**+**	**0.00**	**+**	**0.00**	**=**	**1.67**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=0.00			0.00		0.00		
Flow length (ft)	({0})0.0			0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... 11.50 min

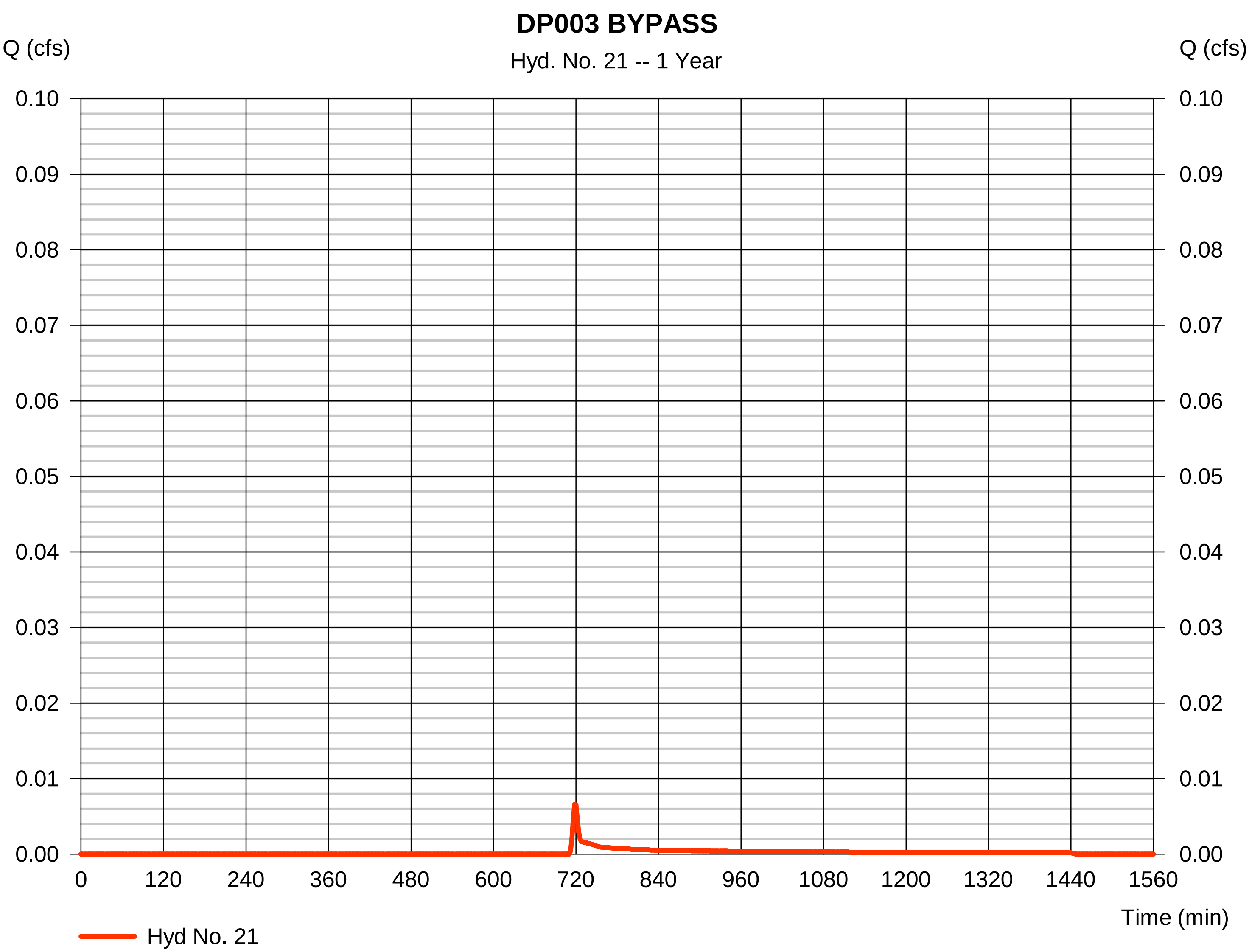
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 21

DP003 BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.007 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 20 cuft
Drainage area	= 0.020 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



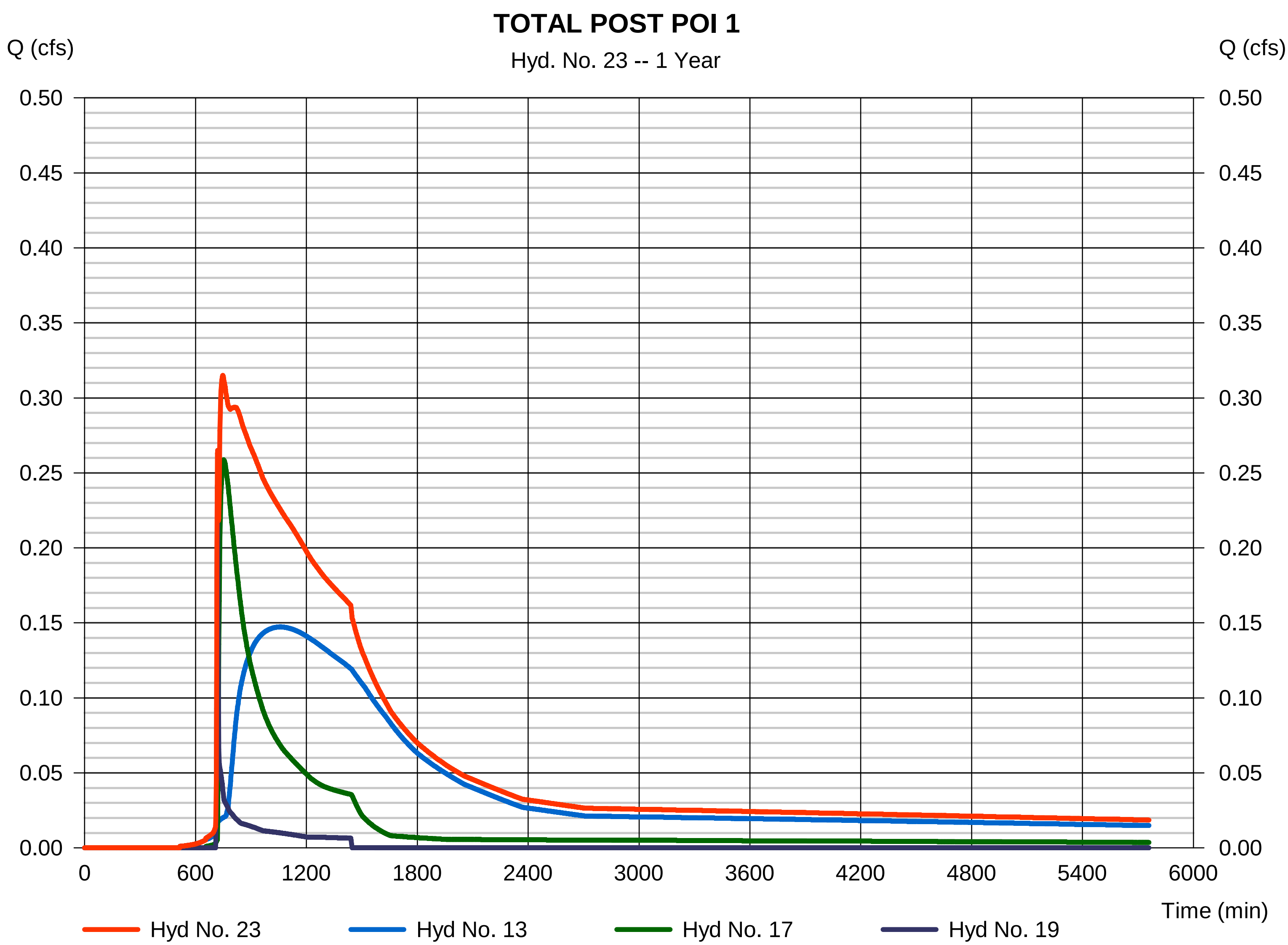
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 | Friday, 04 / 5 / 2024

Hyd. No. 23

TOTAL POST POI 1

Hydrograph type	= Combine	Peak discharge	= 0.315 cfs
Storm frequency	= 1 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 18,550 cuft
Inflow hyds.	= 13, 17, 19	Contrib. drain. area	= 0.610 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	0.278	2	734	2,577	------	------	------	PRE POI 1
2	SCS Runoff	0.064	2	734	593	------	------	------	PRE POI 2
3	SCS Runoff	0.053	2	724	347	------	------	------	PRE LOI 3
5	SCS Runoff	1.329	2	720	3,457	------	------	------	OFFSITE TO BED 3
6	Combine	1.446	2	722	6,034	1, 5	------	------	TOTAL PRE TO POI1
8	SCS Runoff	4.475	2	716	9,630	------	------	------	ONSITE TO MRC BED 1
9	Reservoir	0.621	2	728	9,577	8	538.25	6,738	MRC BED 1 ROUTED
11	SCS Runoff	4.415	2	716	9,290	------	------	------	ONSITE TO MRC BED 2
12	Combine	4.714	2	716	18,867	9, 11	------	------	TOTAL TO BED 2
13	Reservoir	0.191	2	1012	15,433	12	536.51	18,297	MRC BED 2 ROUTED
15	SCS Runoff	2.137	2	716	4,329	------	------	------	ONSITE TO BED 3
16	Combine	3.333	2	718	7,786	5, 15	------	------	TOTAL TO BED 3
17	Reservoir	0.482	2	738	6,936	16	506.47	4,775	MRC BED 3 ROUTED
19	SCS Runoff	0.427	2	718	998	------	------	------	DP001 BYPASS
20	SCS Runoff	0.040	2	724	150	------	------	------	DP002 BYPASS
21	SCS Runoff	0.012	2	718	30	------	------	------	DP003 BYPASS
23	Combine	0.579	2	738	23,368	13, 17, 19,	------	------	TOTAL POST POI 1
25	SCS Runoff	0.000	2	n/a	0	------	------	------	1.2 to MRC Bed 1
26	Reservoir	0.000	2	n/a	0	25	537.00	1,660	1.2 to MRC Bed 1 Rout
27	SCS Runoff	0.000	2	n/a	0	------	------	------	1.2 to MRC Bed 2
28	Combine	0.000	2	n/a	0	26, 27	------	------	1.2 Total to MRC Bed 2
29	Reservoir	0.000	2	n/a	0	28	535.00	7,290	1.2 to MRC Bed 2 Route
31	SCS Runoff	0.000	2	n/a	0	------	------	------	1.2 to MRC Bed 3
32	Reservoir	0.000	2	n/a	0	31	505.00	1,056	1.2 to MRC Bed 3 Route
34	Combine	0.000	2	n/a	0	29, 32,	------	------	Total 1.2

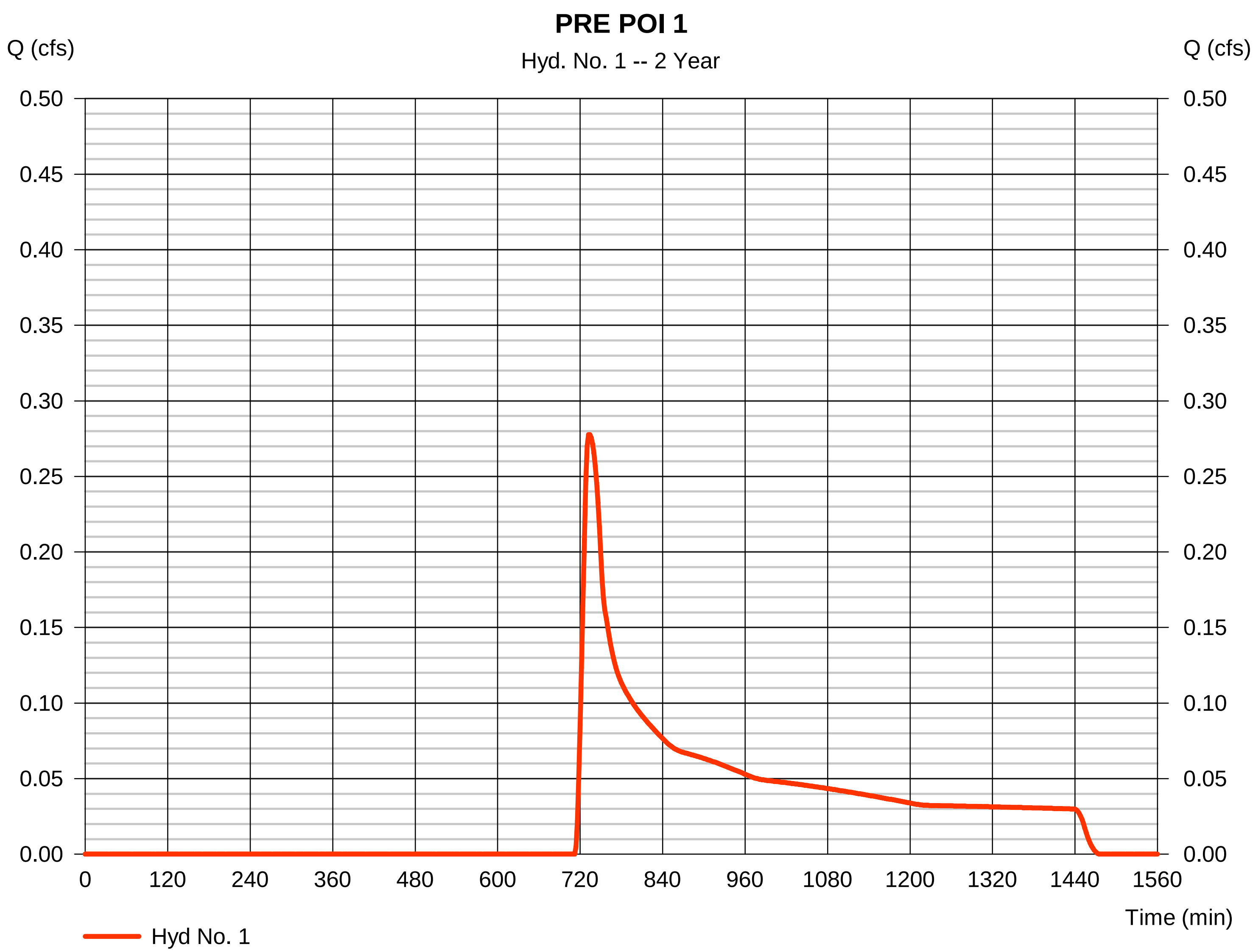
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 1

PRE POI 1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.278 cfs
Storm frequency	= 2 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 2,577 cuft
Drainage area	= 2.780 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 20.20 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



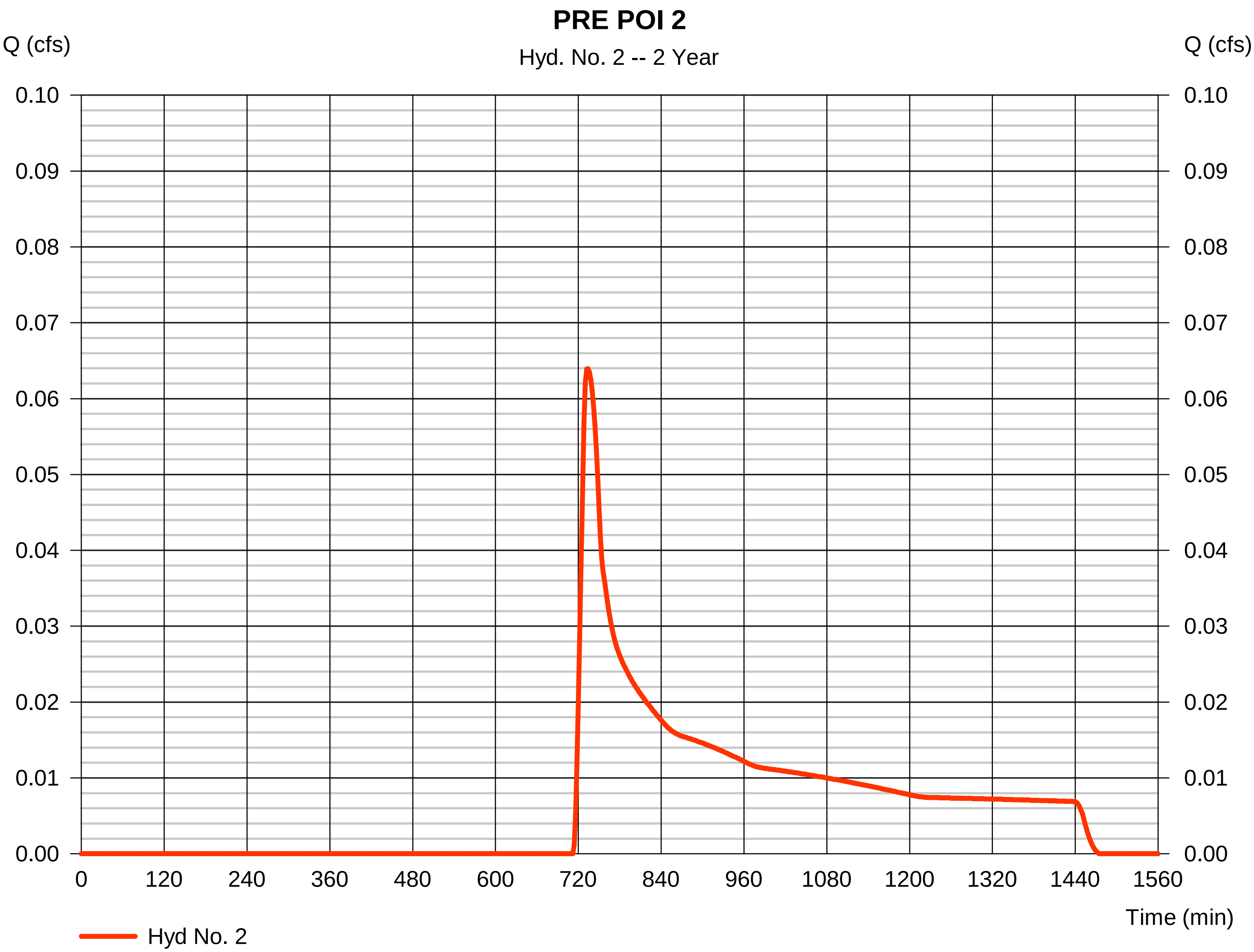
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 2

PRE POI 2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.064 cfs
Storm frequency	= 2 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 593 cuft
Drainage area	= 0.640 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 22.10 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



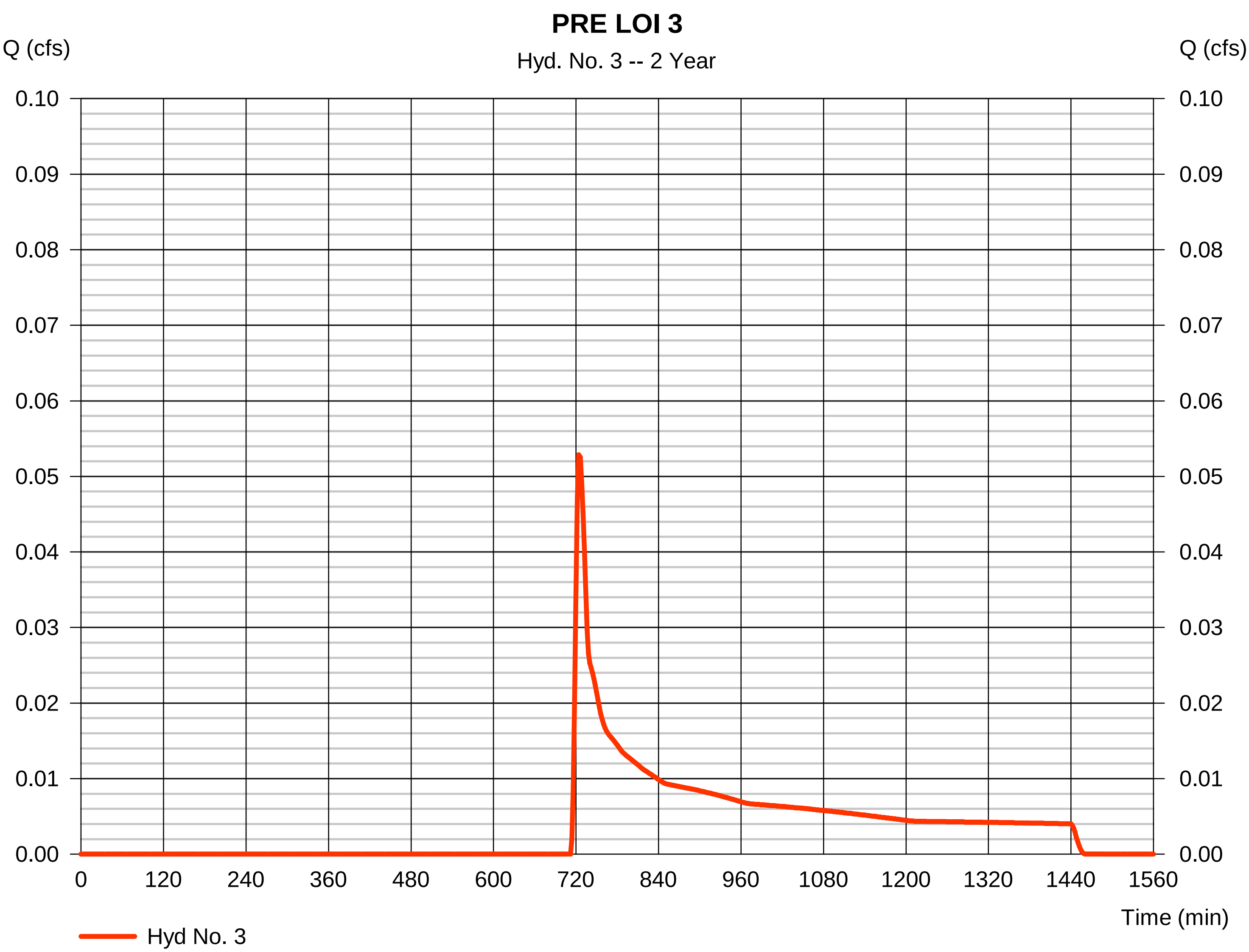
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 3

PRE LOI 3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.053 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 347 cuft
Drainage area	= 0.370 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.80 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



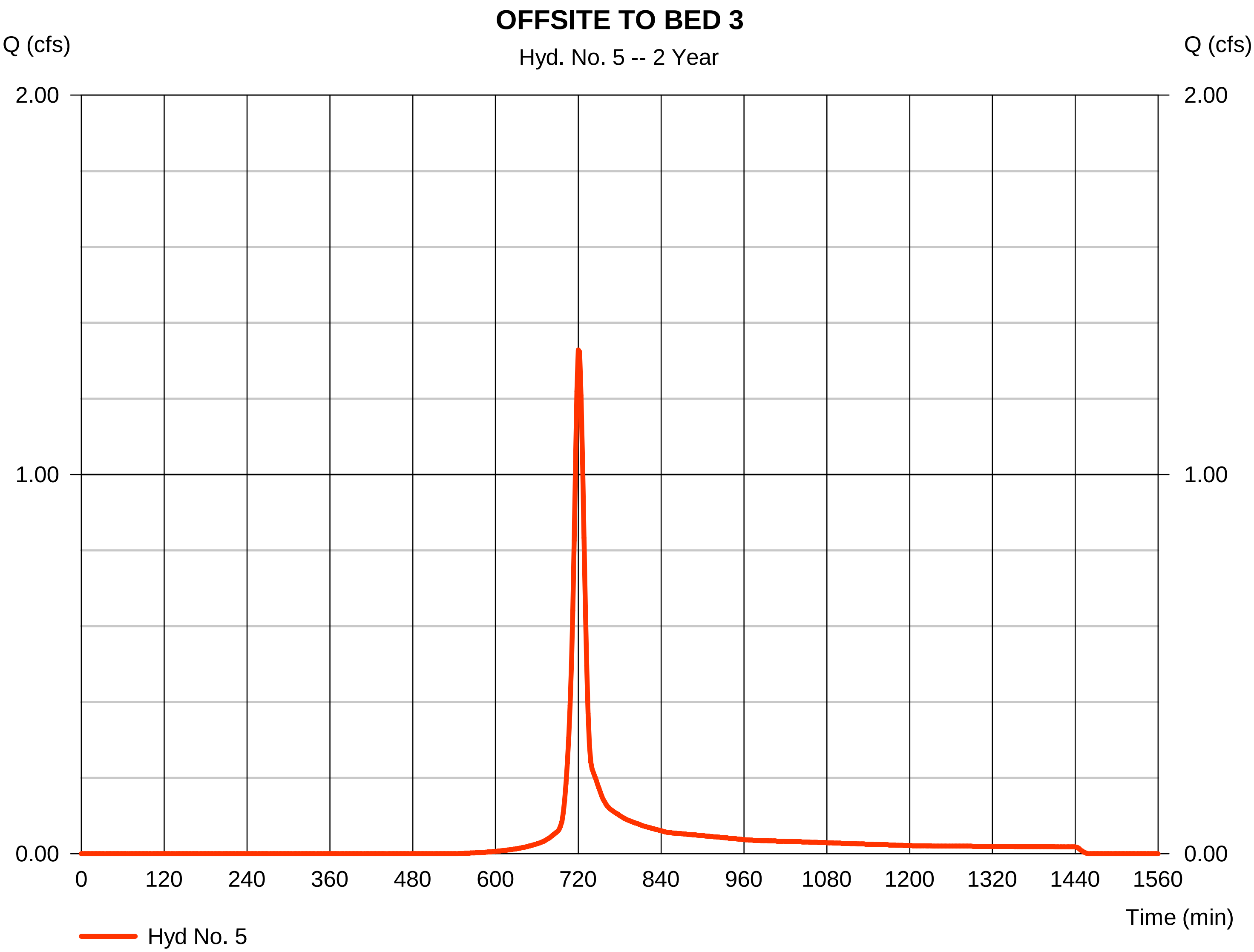
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Friday, 04 / 5 / 2024

Hyd. No. 5

OFFSITE TO BED 3

Hydrograph type	= SCS Runoff	Peak discharge	= 1.329 cfs
Storm frequency	= 2 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 3,457 cuft
Drainage area	= 0.620 ac	Curve number	= 81.3
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.20 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



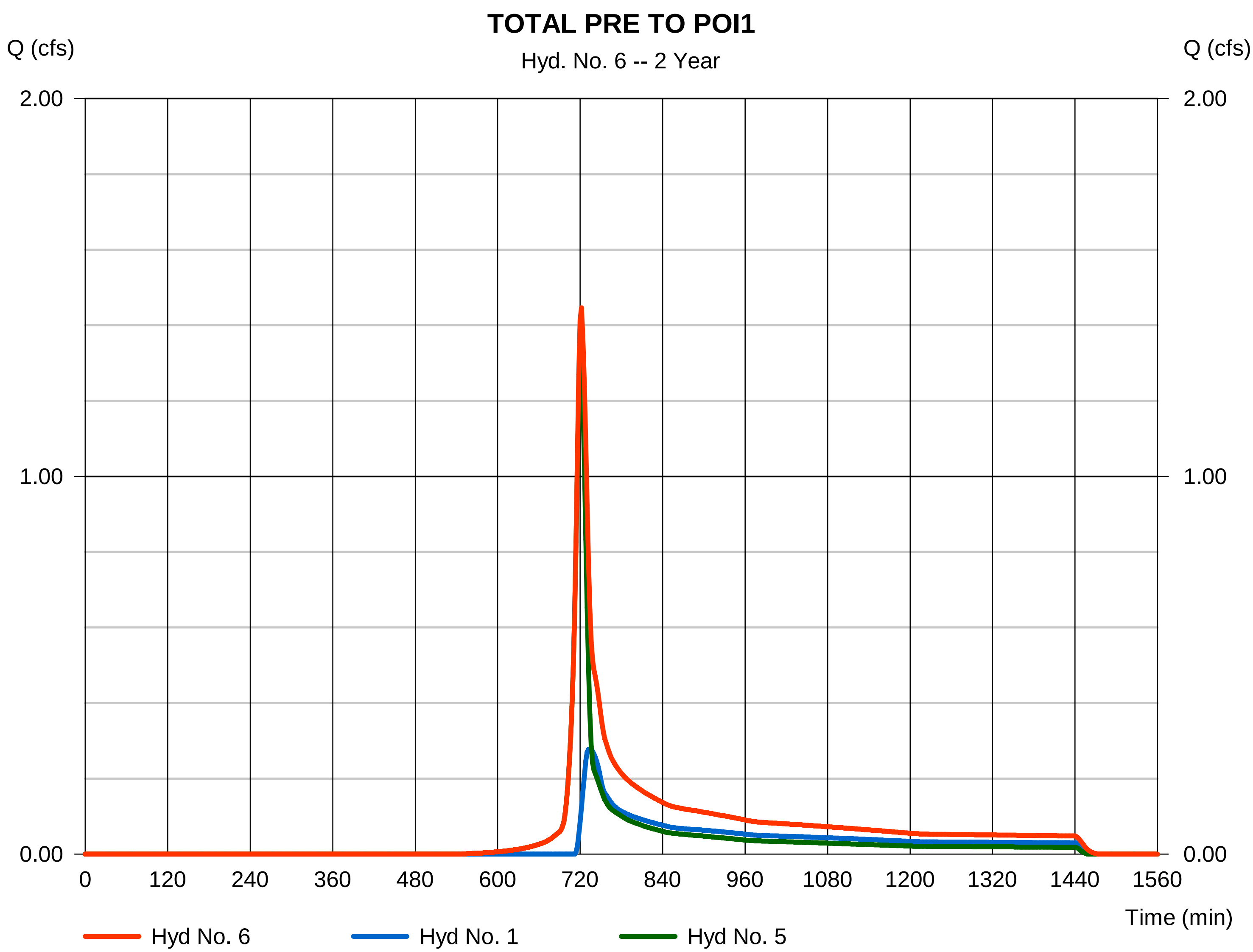
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 6

TOTAL PRE TO POI1

Hydrograph type	= Combine	Peak discharge	= 1.446 cfs
Storm frequency	= 2 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 6,034 cuft
Inflow hyds.	= 1, 5	Contrib. drain. area	= 3.400 ac



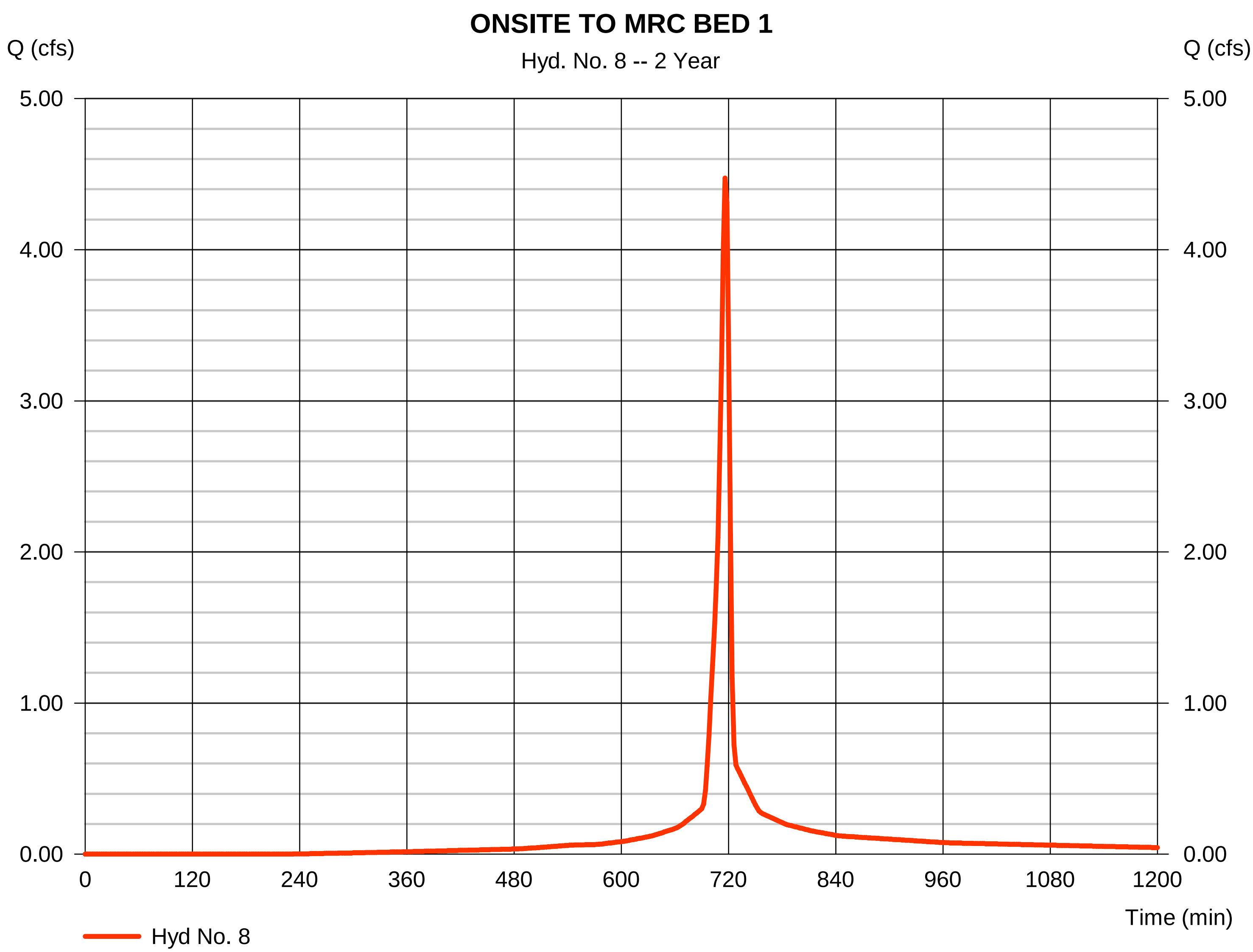
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 8

ONSITE TO MRC BED 1

Hydrograph type	= SCS Runoff	Peak discharge	= 4.475 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 9,630 cuft
Drainage area	= 1.130 ac	Curve number	= 93.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

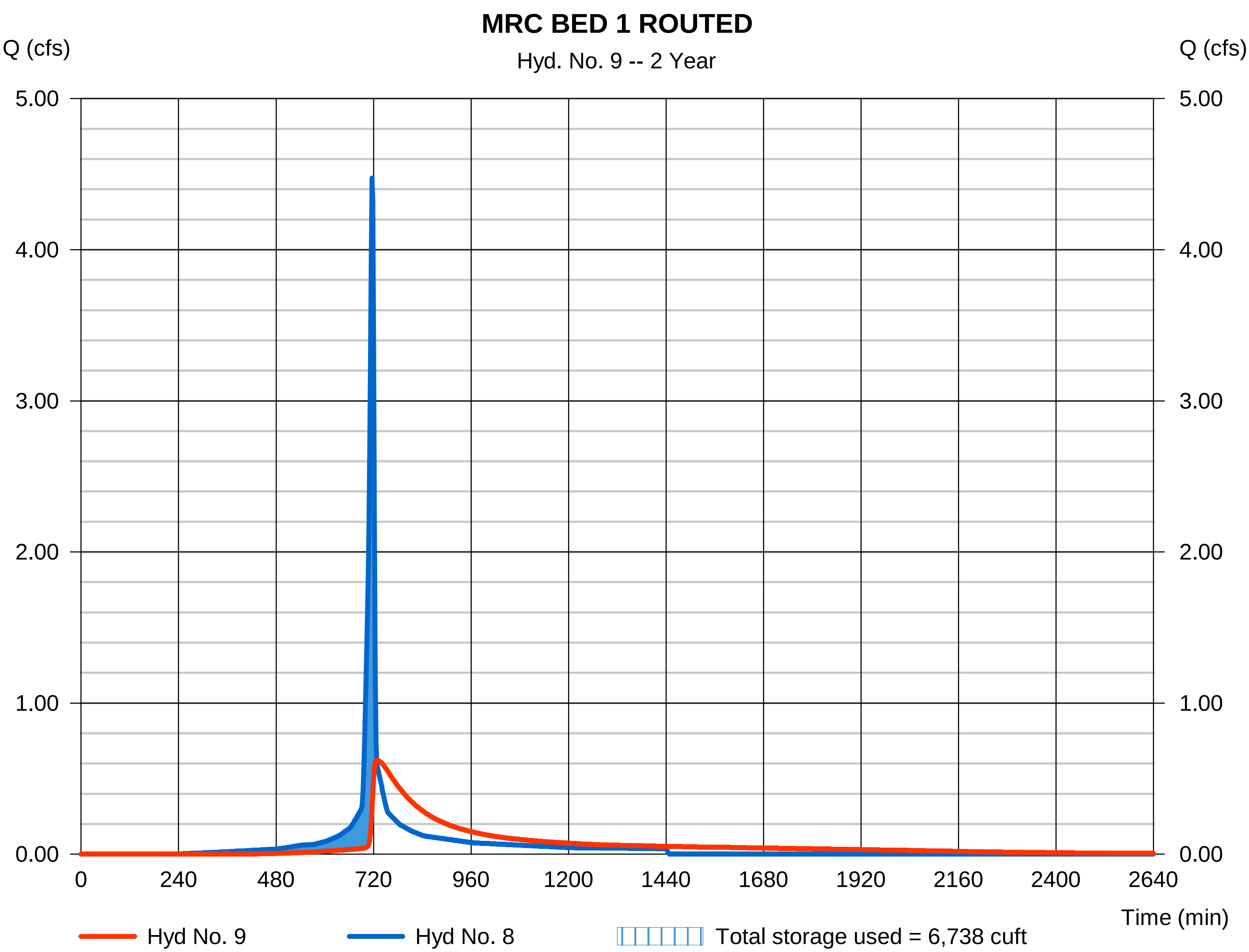
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 9

MRC BED 1 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 0.621 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 9,577 cuft
Inflow hyd. No.	= 8 - ONSITE TO MRC BED 1	Max. Elevation	= 538.25 ft
Reservoir name	= MRC BED 1	Max. Storage	= 6,738 cuft

Storage Indication method used. Wet pond routing start elevation = 537.00 ft.

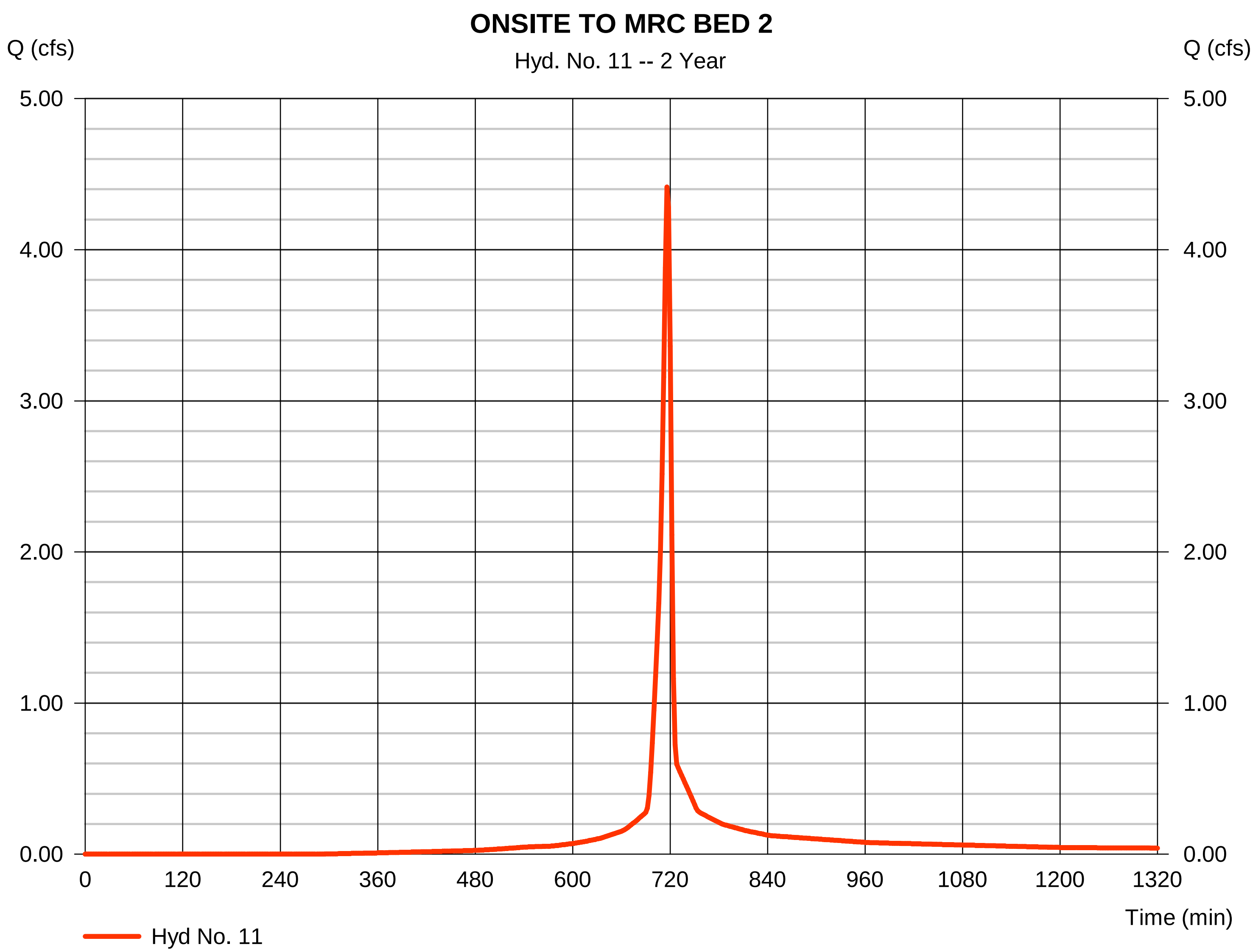


Hydrograph Report

Hyd. No. 11

ONSITE TO MRC BED 2

Hydrograph type	= SCS Runoff	Peak discharge	= 4.415 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 9,290 cuft
Drainage area	= 1.180 ac	Curve number	= 91.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

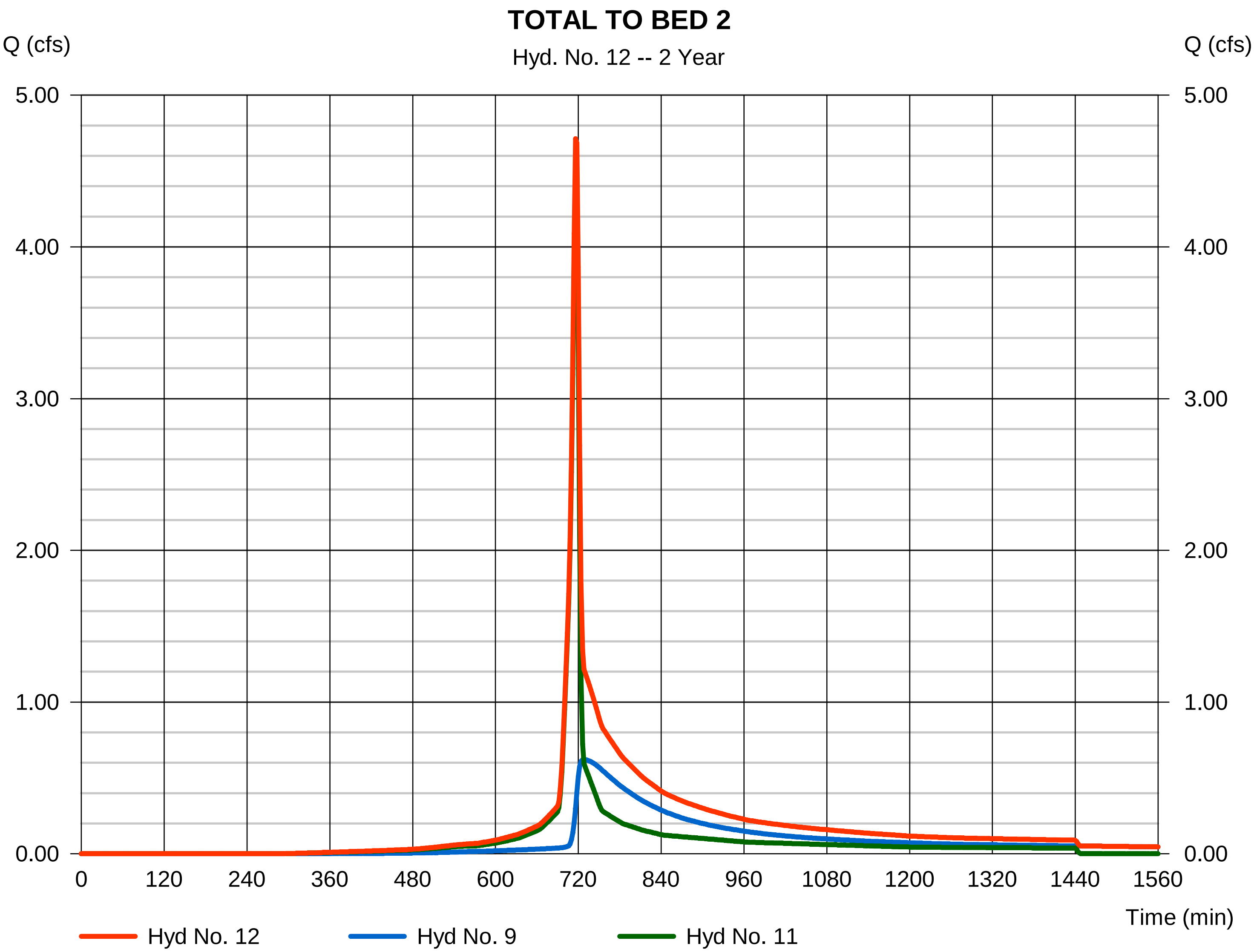


Hydrograph Report

Hyd. No. 12

TOTAL TO BED 2

Hydrograph type	= Combine	Peak discharge	= 4.714 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 18,867 cuft
Inflow hyds.	= 9, 11	Contrib. drain. area	= 1.180 ac



Hydrograph Report

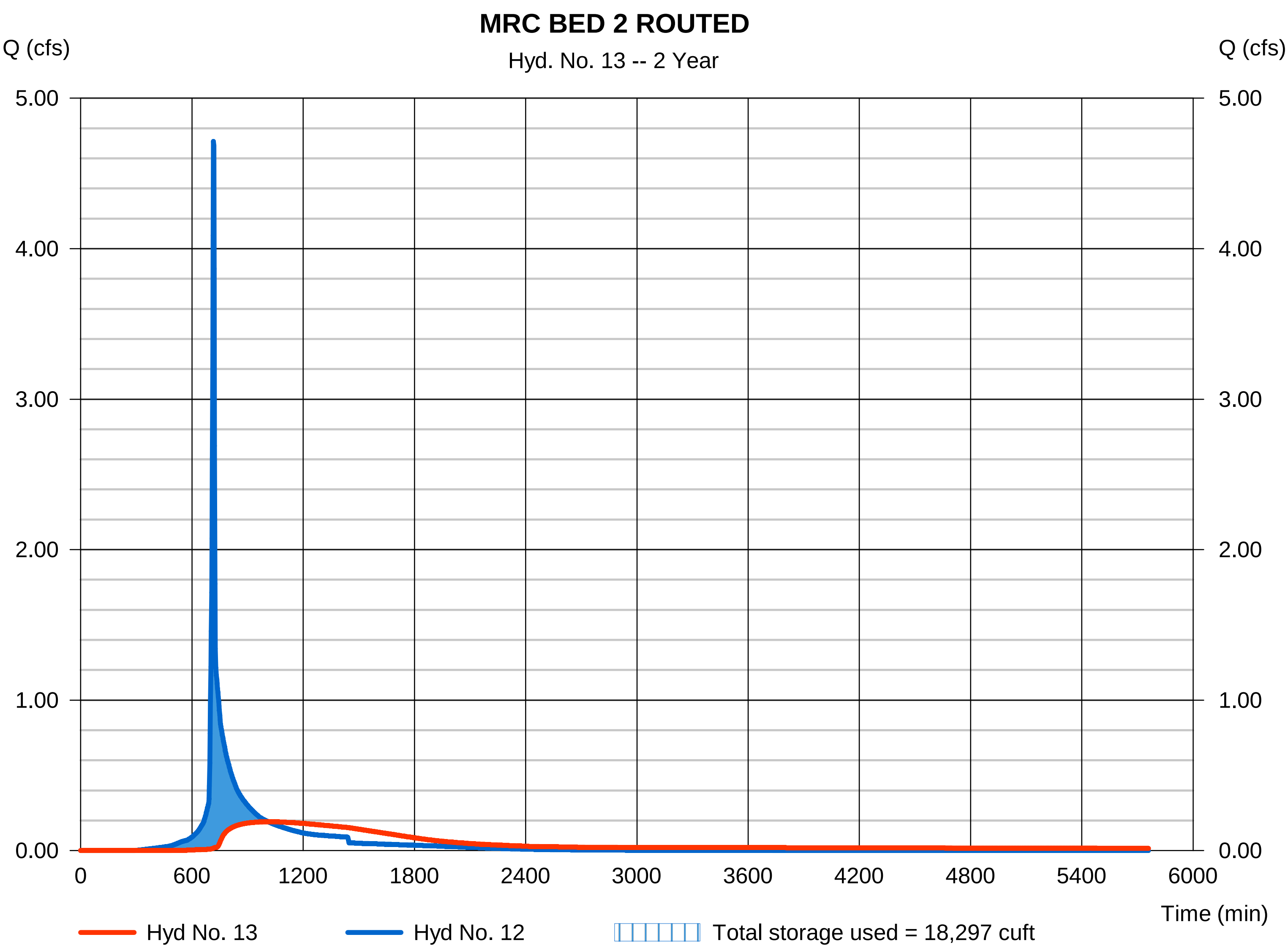
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Friday, 04 / 5 / 2024

Hyd. No. 13

MRC BED 2 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 0.191 cfs
Storm frequency	= 2 yrs	Time to peak	= 1012 min
Time interval	= 2 min	Hyd. volume	= 15,433 cuft
Inflow hyd. No.	= 12 - TOTAL TO BED 2	Max. Elevation	= 536.51 ft
Reservoir name	= MRC BED 2	Max. Storage	= 18,297 cuft

Storage Indication method used. Wet pond routing start elevation = 535.00 ft.



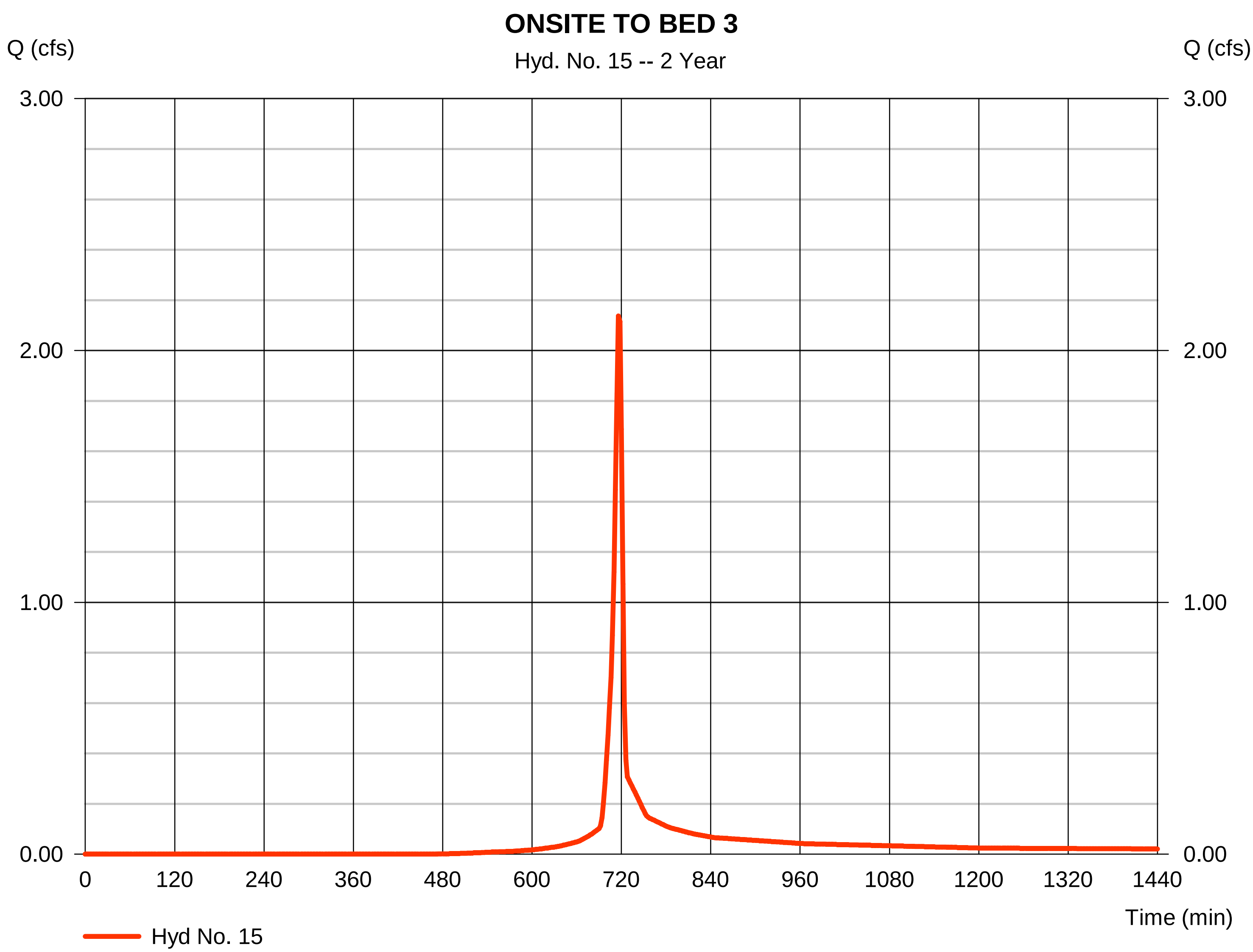
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 15

ONSITE TO BED 3

Hydrograph type	= SCS Runoff	Peak discharge	= 2.137 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 4,329 cuft
Drainage area	= 0.730 ac	Curve number	= 84.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



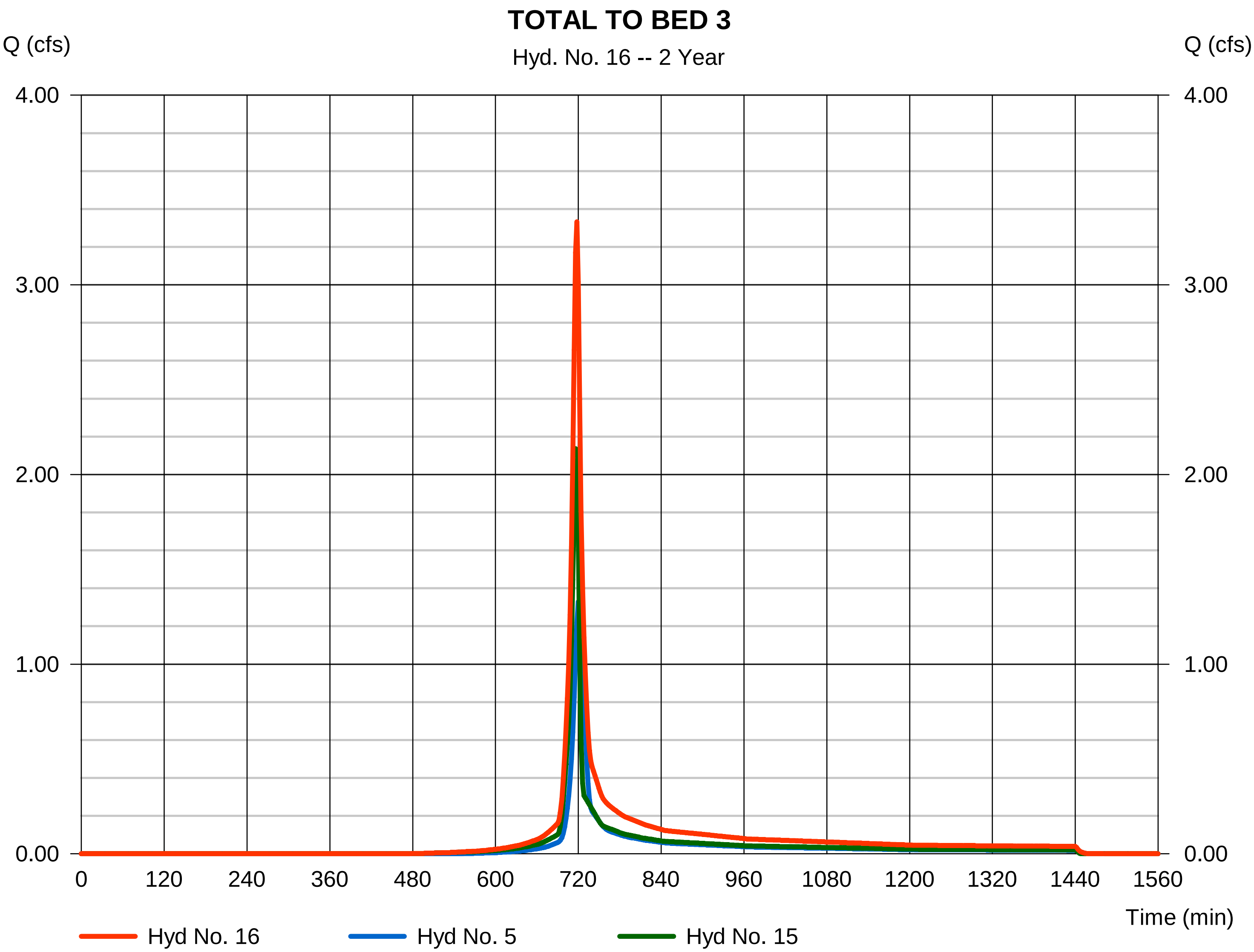
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 16

TOTAL TO BED 3

Hydrograph type	= Combine	Peak discharge	= 3.333 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 7,786 cuft
Inflow hyds.	= 5, 15	Contrib. drain. area	= 1.350 ac



Hydrograph Report

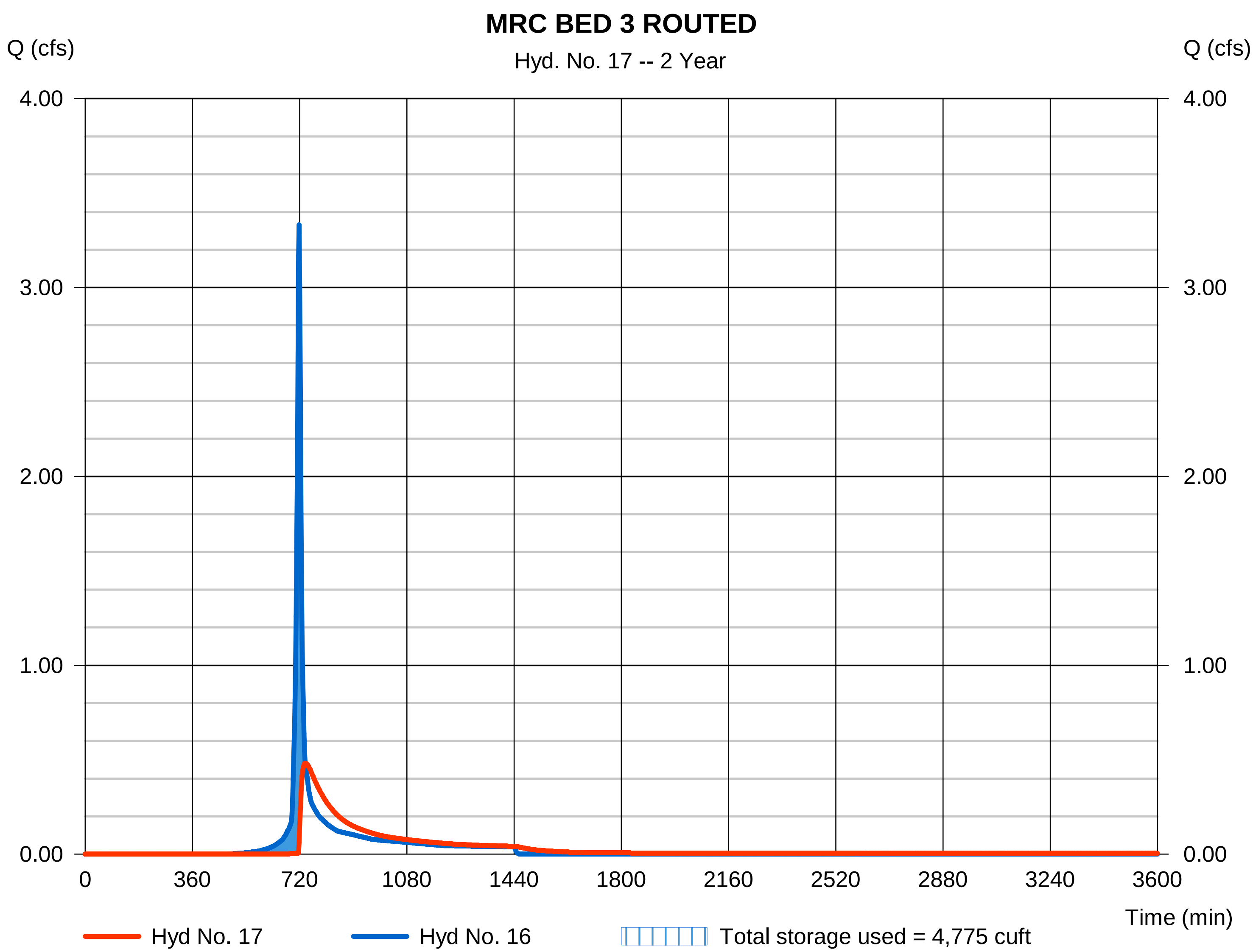
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 17

MRC BED 3 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 0.482 cfs
Storm frequency	= 2 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 6,936 cuft
Inflow hyd. No.	= 16 - TOTAL TO BED 3	Max. Elevation	= 506.47 ft
Reservoir name	= MRC BED 3	Max. Storage	= 4,775 cuft

Storage Indication method used. Wet pond routing start elevation = 505.00 ft.



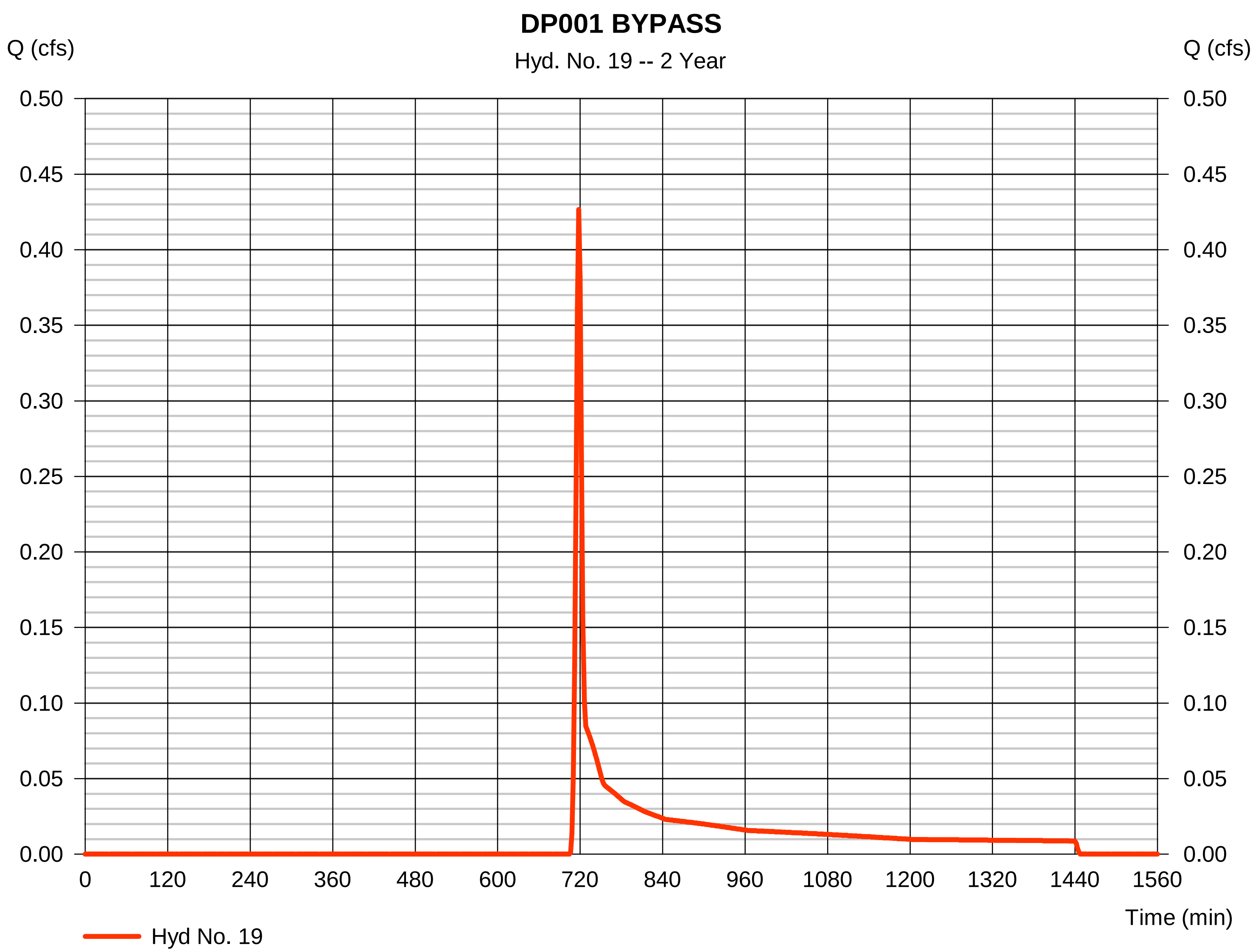
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 | Friday, 04 / 5 / 2024

Hyd. No. 19

DP001 BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.427 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 998 cuft
Drainage area	= 0.610 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



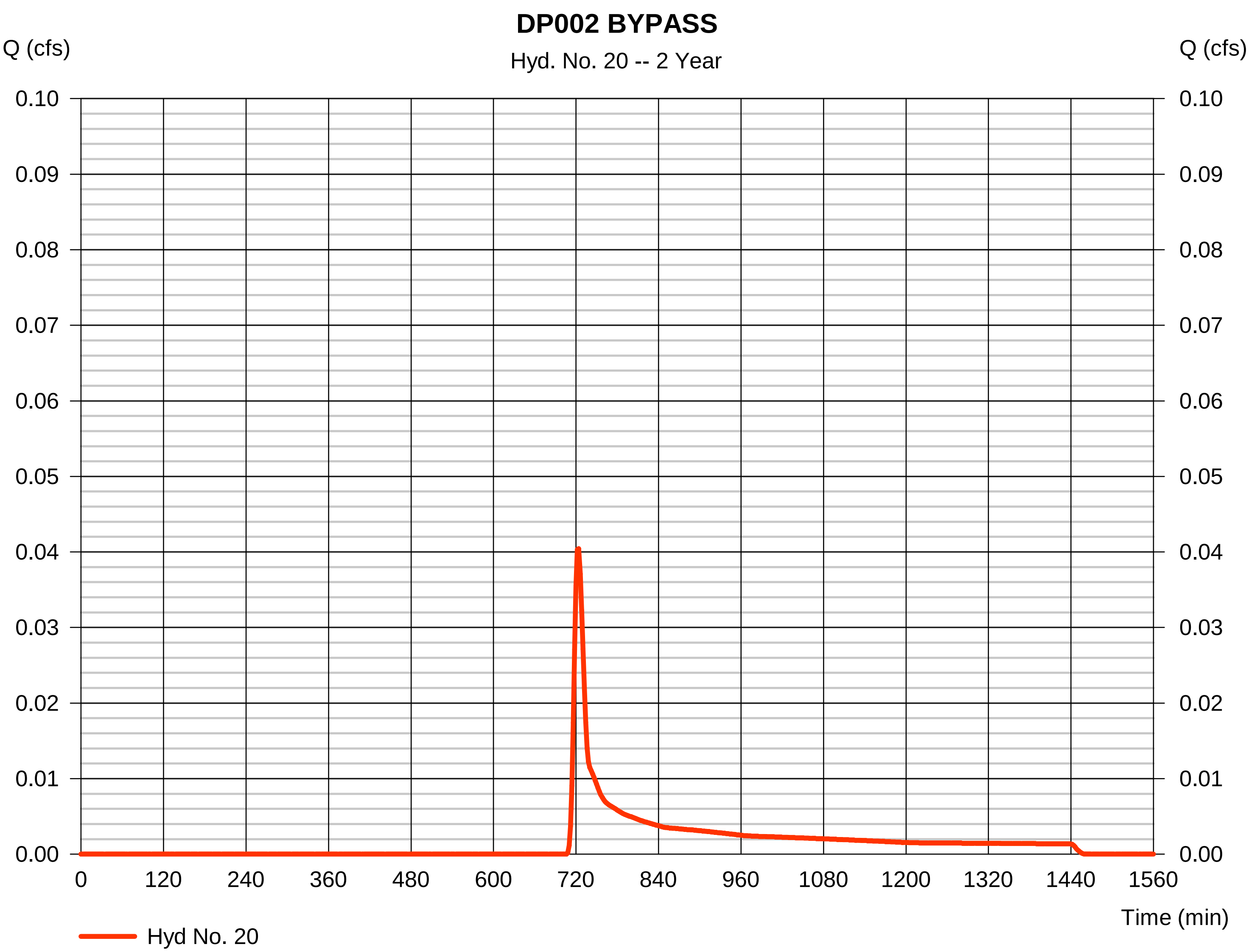
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 | Friday, 04 / 5 / 2024

Hyd. No. 20

DP002 BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.040 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 150 cuft
Drainage area	= 0.090 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.50 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



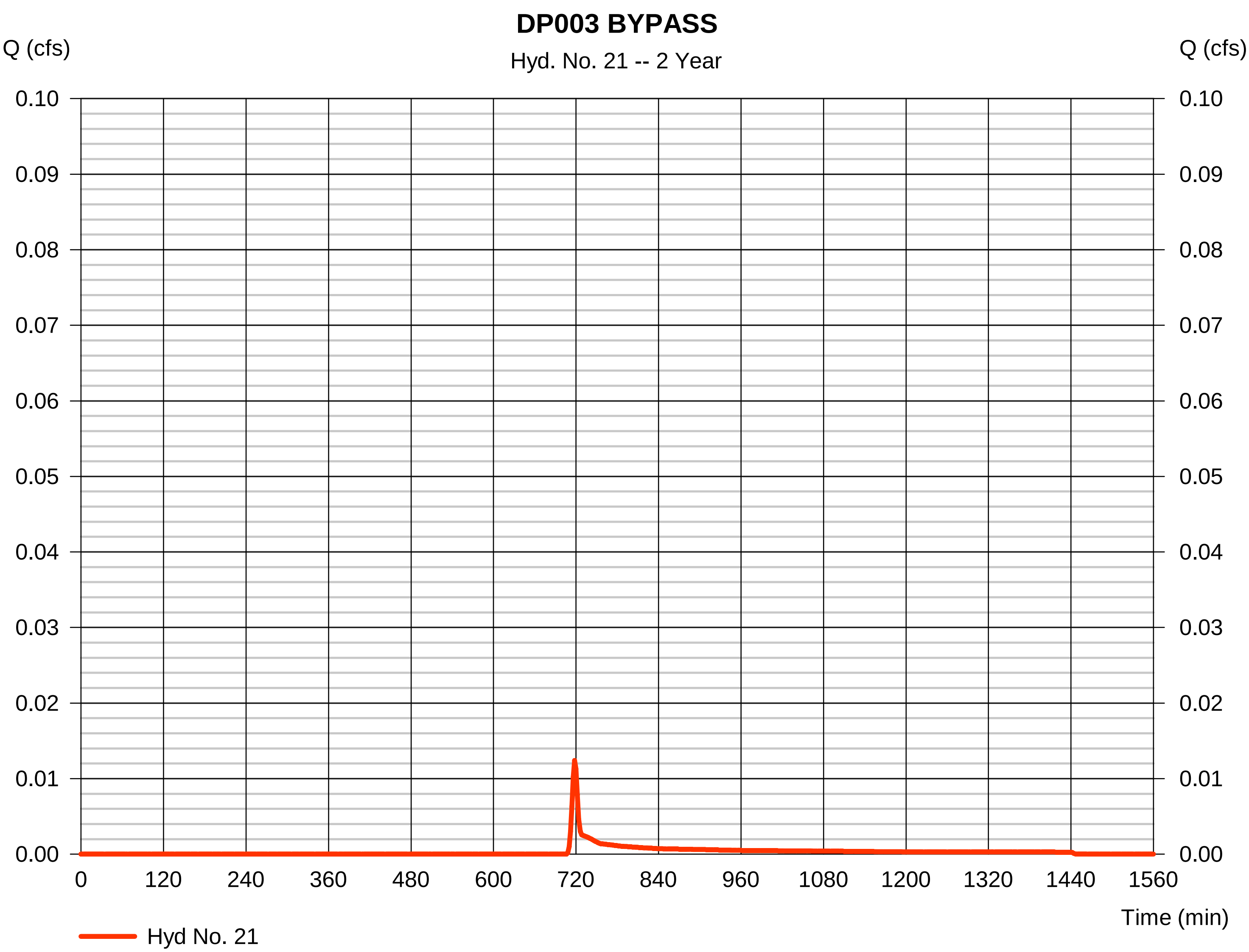
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 21

DP003 BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.012 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 30 cuft
Drainage area	= 0.020 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



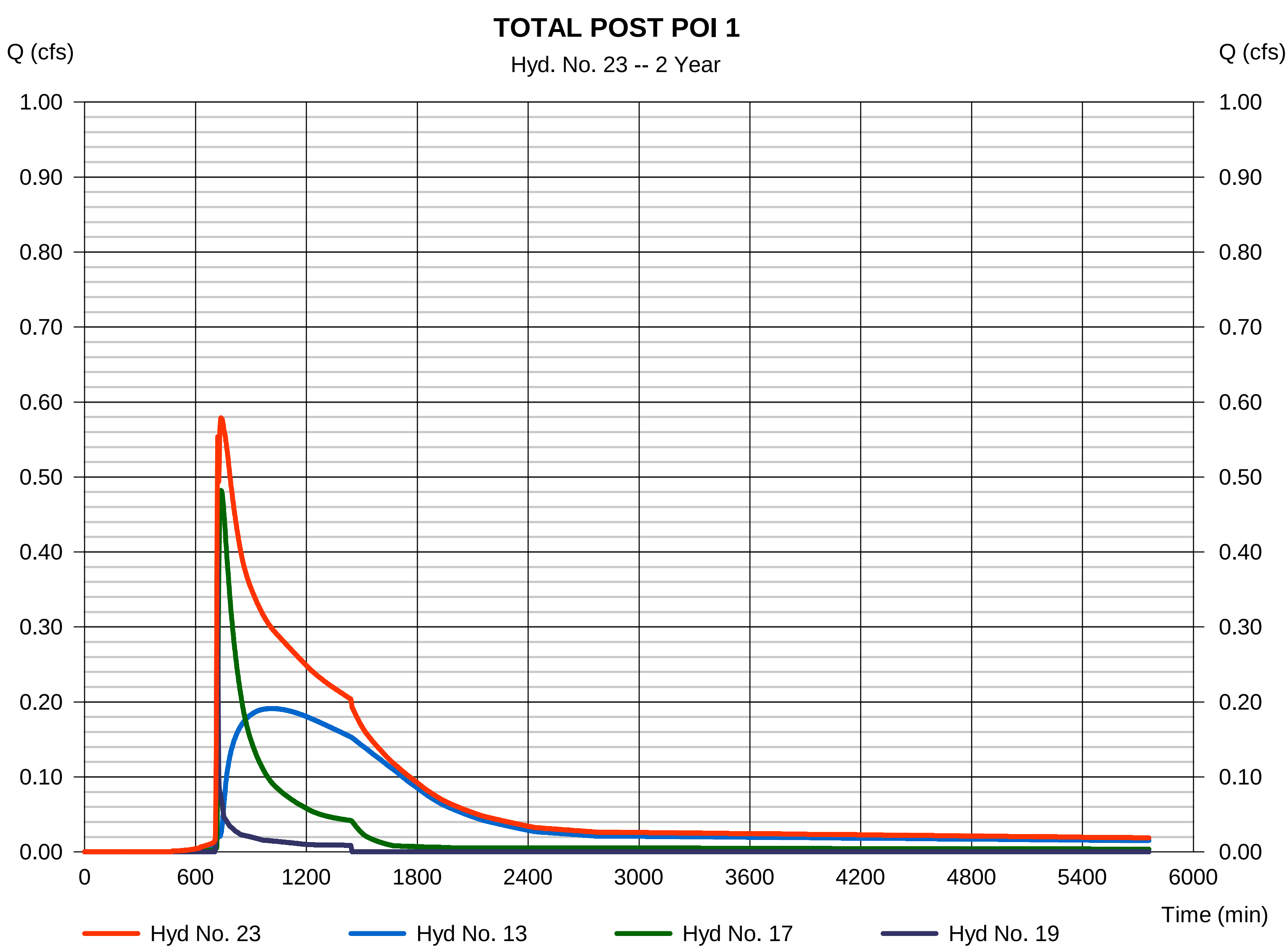
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 23

TOTAL POST POI 1

Hydrograph type	= Combine	Peak discharge	= 0.579 cfs
Storm frequency	= 2 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 23,368 cuft
Inflow hyds.	= 13, 17, 19	Contrib. drain. area	= 0.610 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	1.216	2	730	6,280	------	------	------	PRE POI 1
2	SCS Runoff	0.280	2	730	1,446	------	------	------	PRE POI 2
3	SCS Runoff	0.237	2	722	847	------	------	------	PRE LOI 3
5	SCS Runoff	2.073	2	720	5,375	------	------	------	OFFSITE TO BED 3
6	Combine	2.844	2	722	11,655	1, 5	------	------	TOTAL PRE TO POI1
8	SCS Runoff	6.084	2	716	13,375	------	------	------	ONSITE TO MRC BED 1
9	Reservoir	1.175	2	726	13,322	8	538.69	8,524	MRC BED 1 ROUTED
11	SCS Runoff	6.112	2	716	13,131	------	------	------	ONSITE TO MRC BED 2
12	Combine	6.788	2	716	26,453	9, 11	------	------	TOTAL TO BED 2
13	Reservoir	0.283	2	972	22,891	12	537.16	23,001	MRC BED 2 ROUTED
15	SCS Runoff	3.175	2	716	6,507	------	------	------	ONSITE TO BED 3
16	Combine	5.032	2	718	11,882	5, 15	------	------	TOTAL TO BED 3
17	Reservoir	1.288	2	730	11,026	16	507.11	6,407	MRC BED 3 ROUTED
19	SCS Runoff	0.975	2	718	2,017	------	------	------	DP001 BYPASS
20	SCS Runoff	0.106	2	722	309	------	------	------	DP002 BYPASS
21	SCS Runoff	0.030	2	718	62	------	------	------	DP003 BYPASS
23	Combine	1.711	2	720	35,934	13, 17, 19,	------	------	TOTAL POST POI 1
25	SCS Runoff	0.000	2	n/a	0	------	------	------	1.2 to MRC Bed 1
26	Reservoir	0.000	2	n/a	0	25	537.00	1,660	1.2 to MRC Bed 1 Rout
27	SCS Runoff	0.000	2	n/a	0	------	------	------	1.2 to MRC Bed 2
28	Combine	0.000	2	n/a	0	26, 27	------	------	1.2 Total to MRC Bed 2
29	Reservoir	0.000	2	n/a	0	28	535.00	7,290	1.2 to MRC Bed 2 Route
31	SCS Runoff	0.000	2	n/a	0	------	------	------	1.2 to MRC Bed 3
32	Reservoir	0.000	2	n/a	0	31	505.00	1,056	1.2 to MRC Bed 3 Route
34	Combine	0.000	2	n/a	0	29, 32,	------	------	Total 1.2

hydraflow.gpw	Return Period: 5 Year	Friday, 04 / 5 / 2024

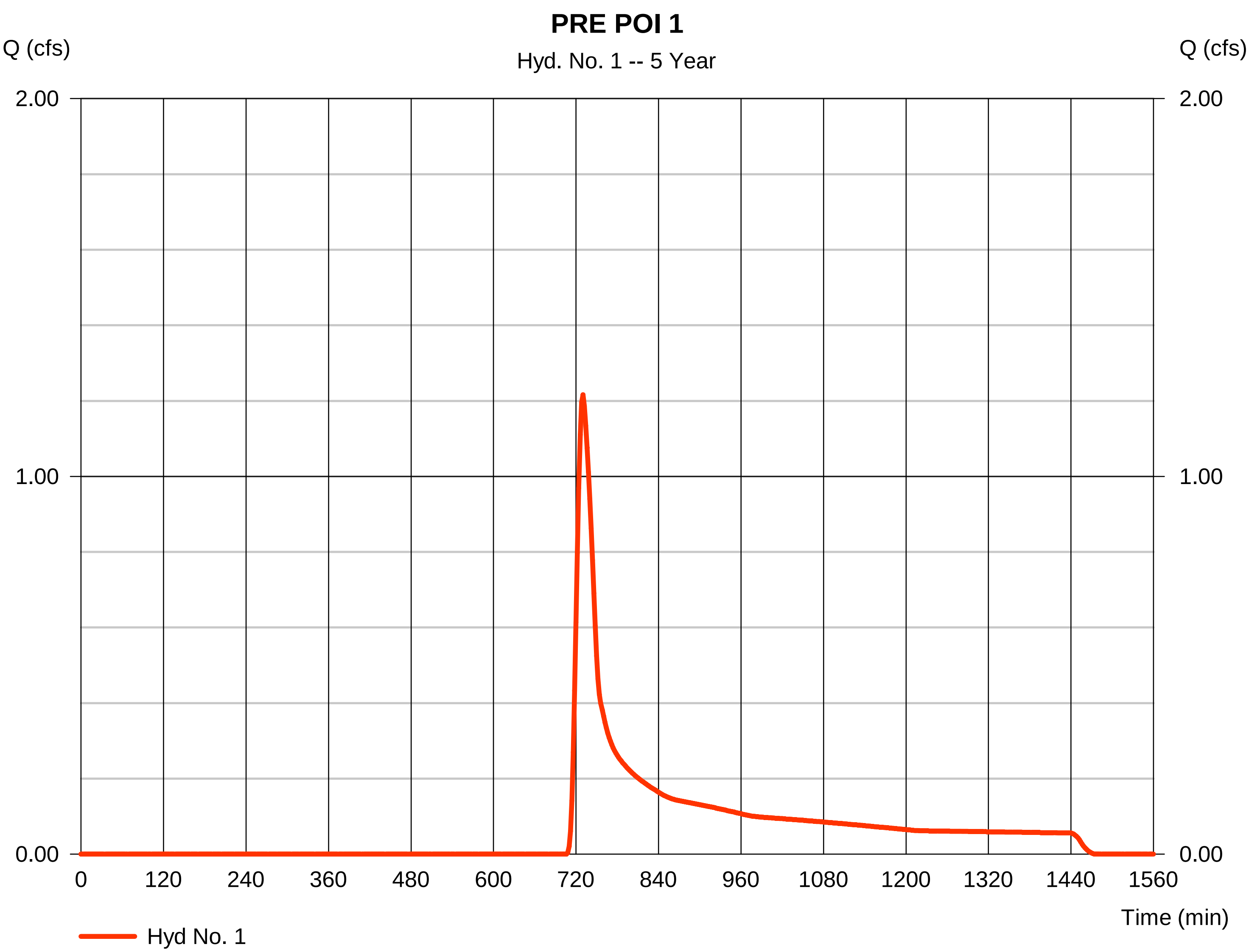
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 1

PRE POI 1

Hydrograph type	= SCS Runoff	Peak discharge	= 1.216 cfs
Storm frequency	= 5 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 6,280 cuft
Drainage area	= 2.780 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 20.20 min
Total precip.	= 4.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



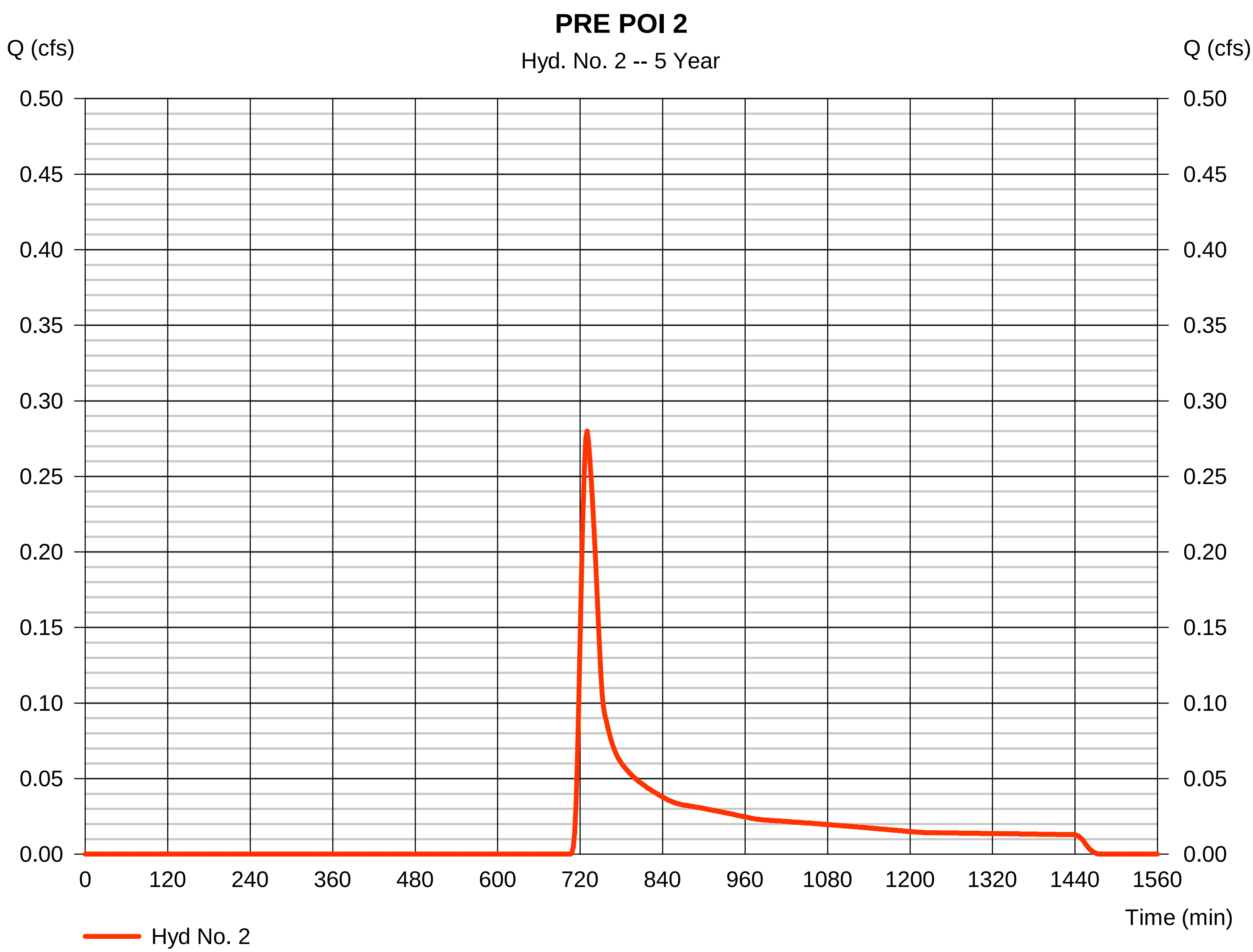
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 2

PRE POI 2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.280 cfs
Storm frequency	= 5 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 1,446 cuft
Drainage area	= 0.640 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 22.10 min
Total precip.	= 4.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



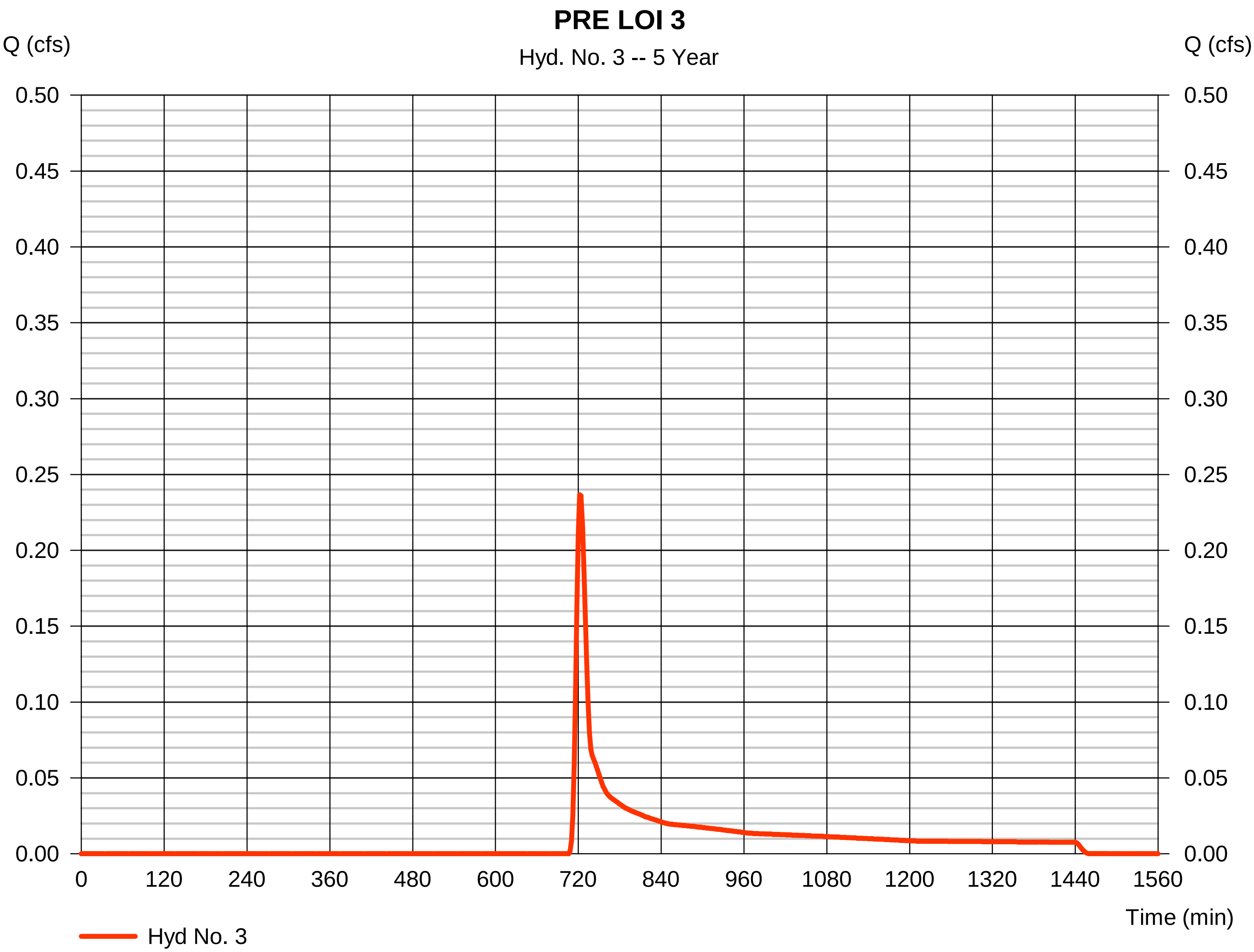
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 3

PRE LOI 3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.237 cfs
Storm frequency	= 5 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 847 cuft
Drainage area	= 0.370 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.80 min
Total precip.	= 4.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



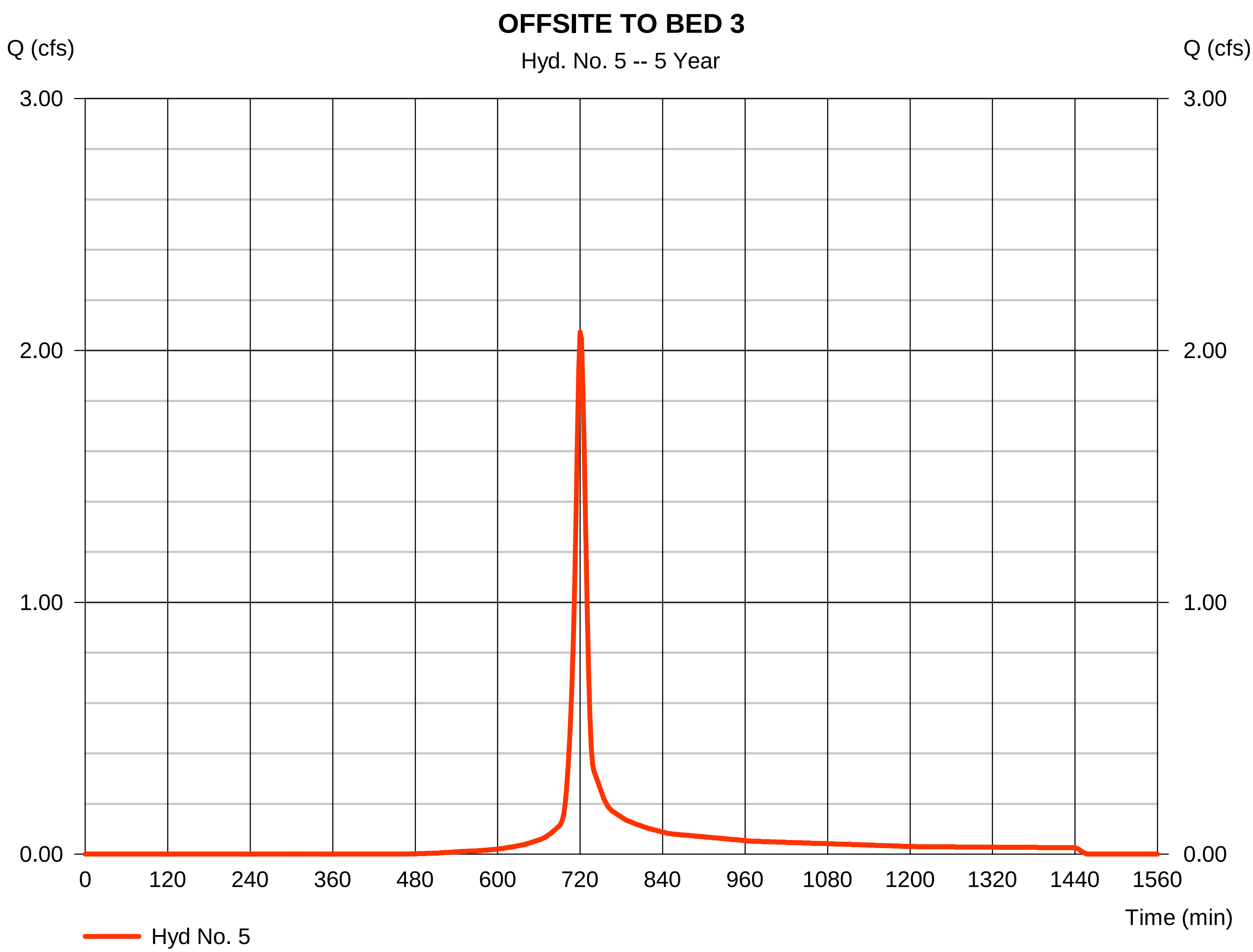
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 5

OFFSITE TO BED 3

Hydrograph type	= SCS Runoff	Peak discharge	= 2.073 cfs
Storm frequency	= 5 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 5,375 cuft
Drainage area	= 0.620 ac	Curve number	= 81.3
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.20 min
Total precip.	= 4.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

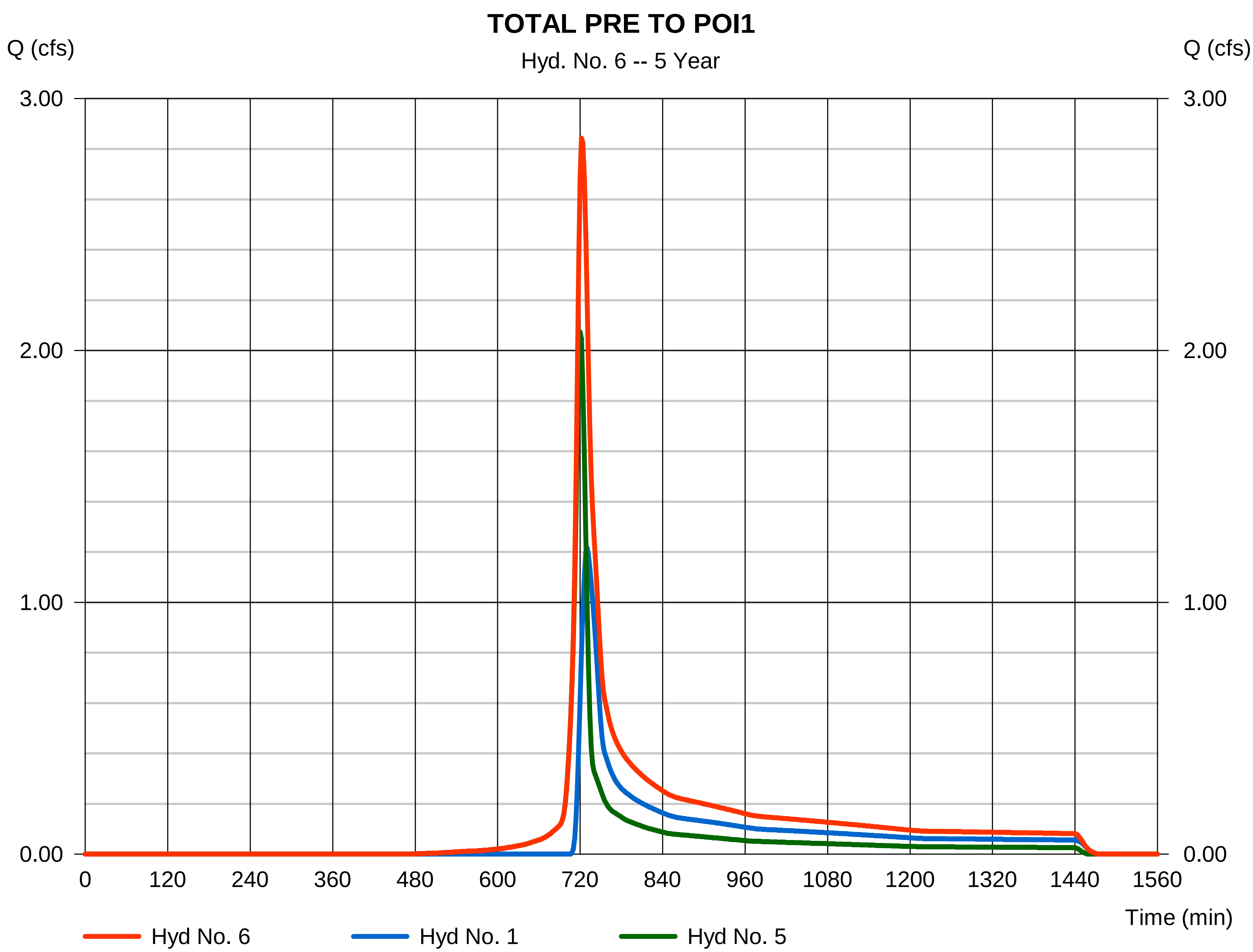


Hydrograph Report

Hyd. No. 6

TOTAL PRE TO POI1

Hydrograph type	= Combine	Peak discharge	= 2.844 cfs
Storm frequency	= 5 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 11,655 cuft
Inflow hyds.	= 1, 5	Contrib. drain. area	= 3.400 ac

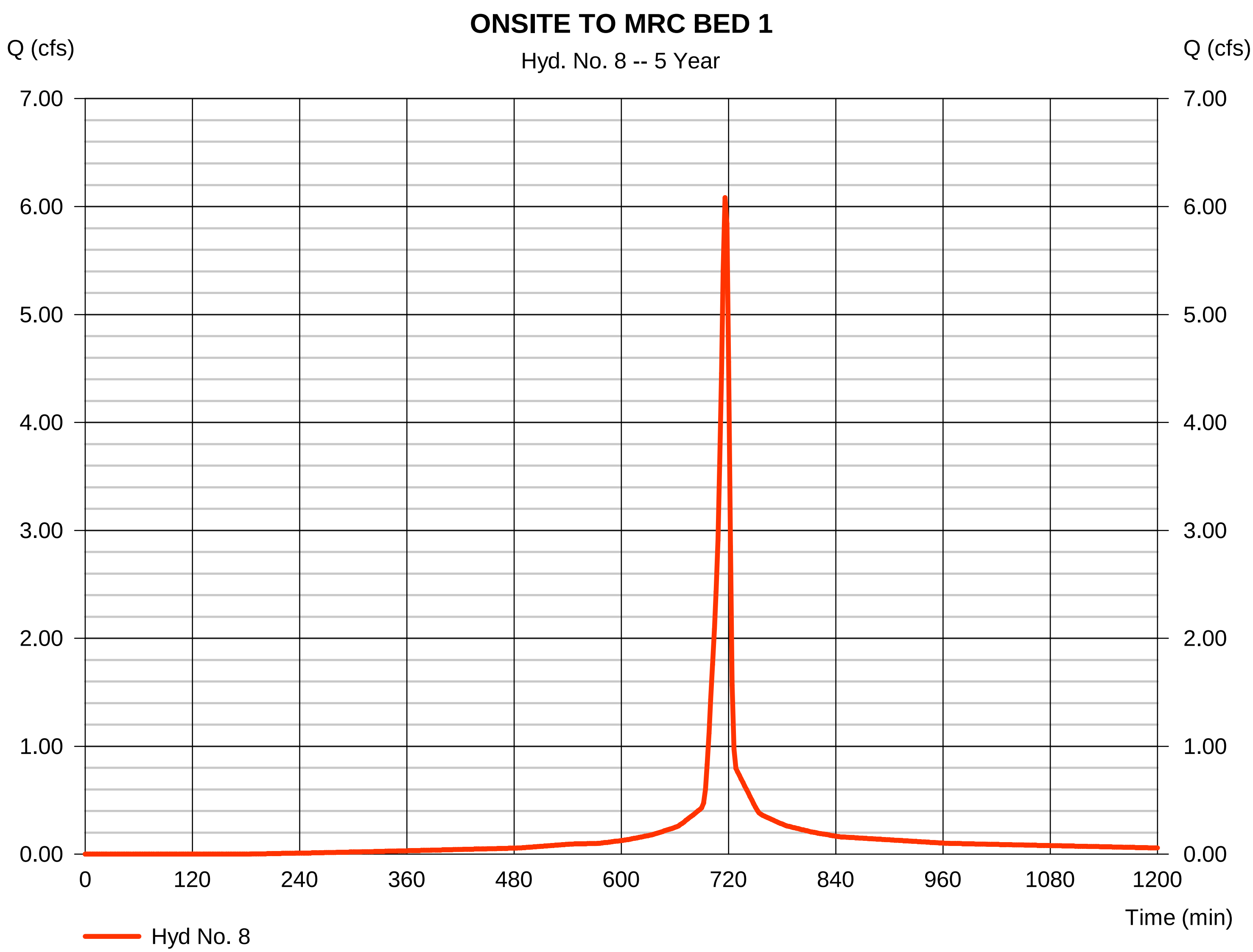


Hydrograph Report

Hyd. No. 8

ONSITE TO MRC BED 1

Hydrograph type	= SCS Runoff	Peak discharge	= 6.084 cfs
Storm frequency	= 5 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 13,375 cuft
Drainage area	= 1.130 ac	Curve number	= 93.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



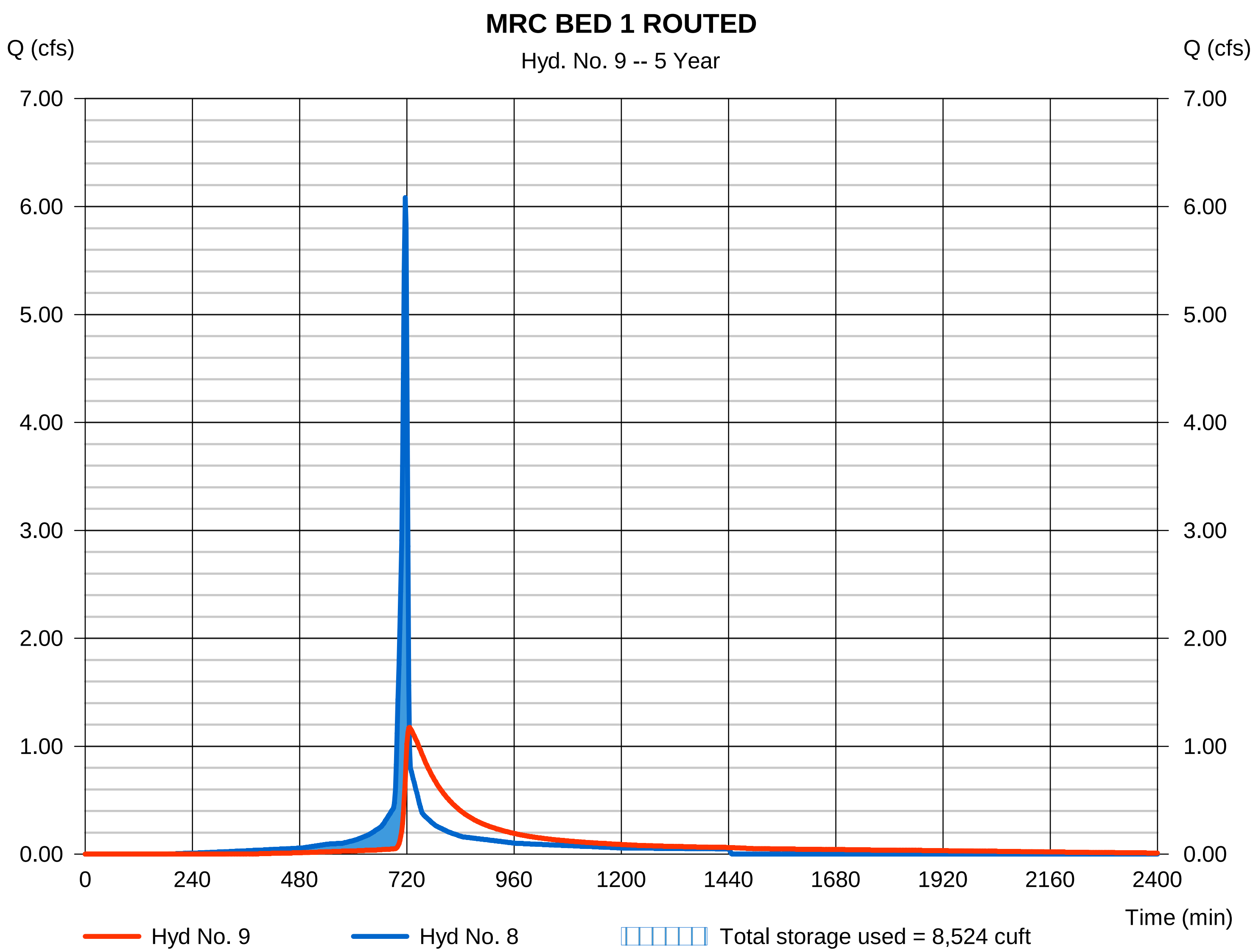
Hydrograph Report

Hyd. No. 9

MRC BED 1 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 1.175 cfs
Storm frequency	= 5 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 13,322 cuft
Inflow hyd. No.	= 8 - ONSITE TO MRC BED 1	Max. Elevation	= 538.69 ft
Reservoir name	= MRC BED 1	Max. Storage	= 8,524 cuft

Storage Indication method used. Wet pond routing start elevation = 537.00 ft.



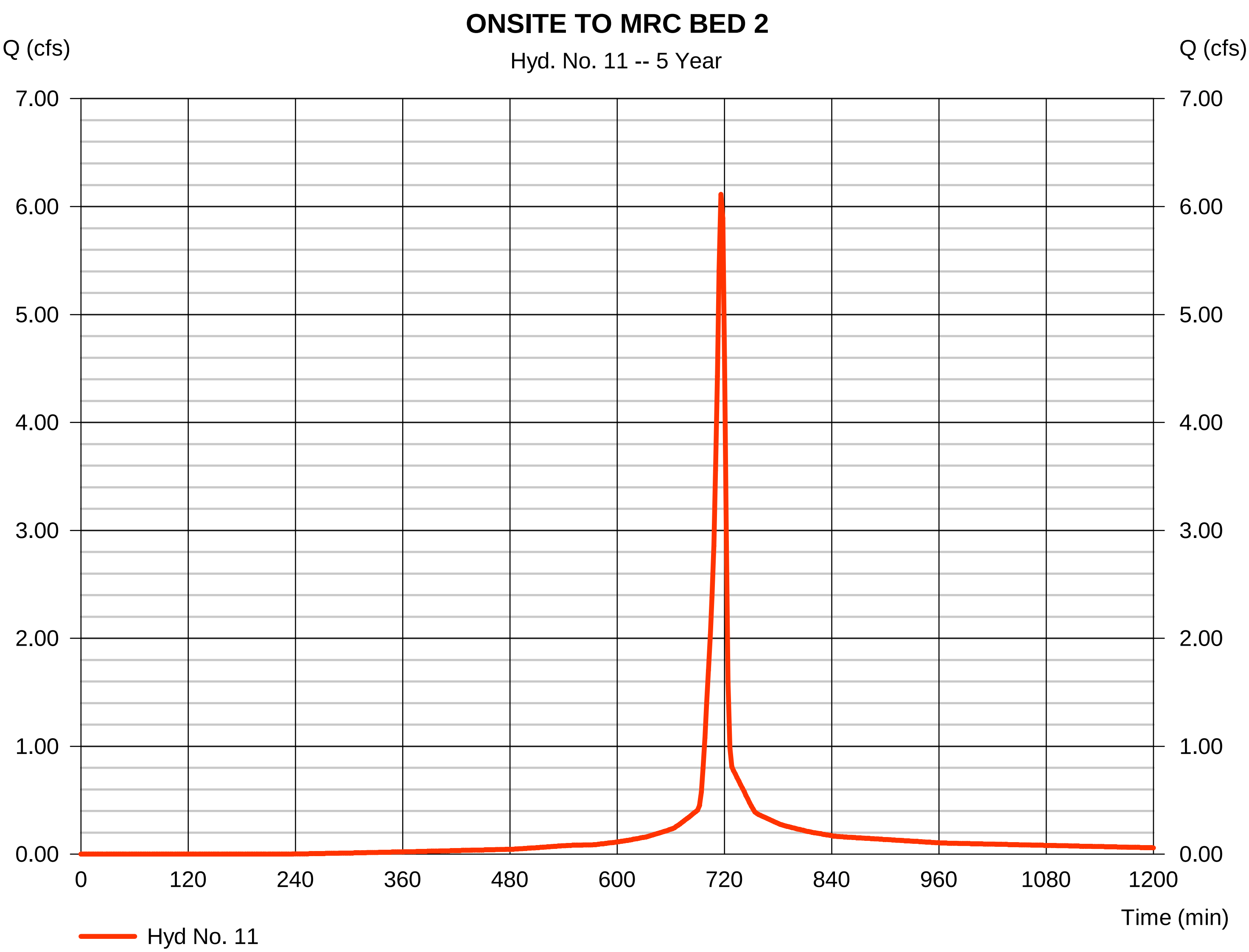
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 11

ONSITE TO MRC BED 2

Hydrograph type	= SCS Runoff	Peak discharge	= 6.112 cfs
Storm frequency	= 5 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 13,131 cuft
Drainage area	= 1.180 ac	Curve number	= 91.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



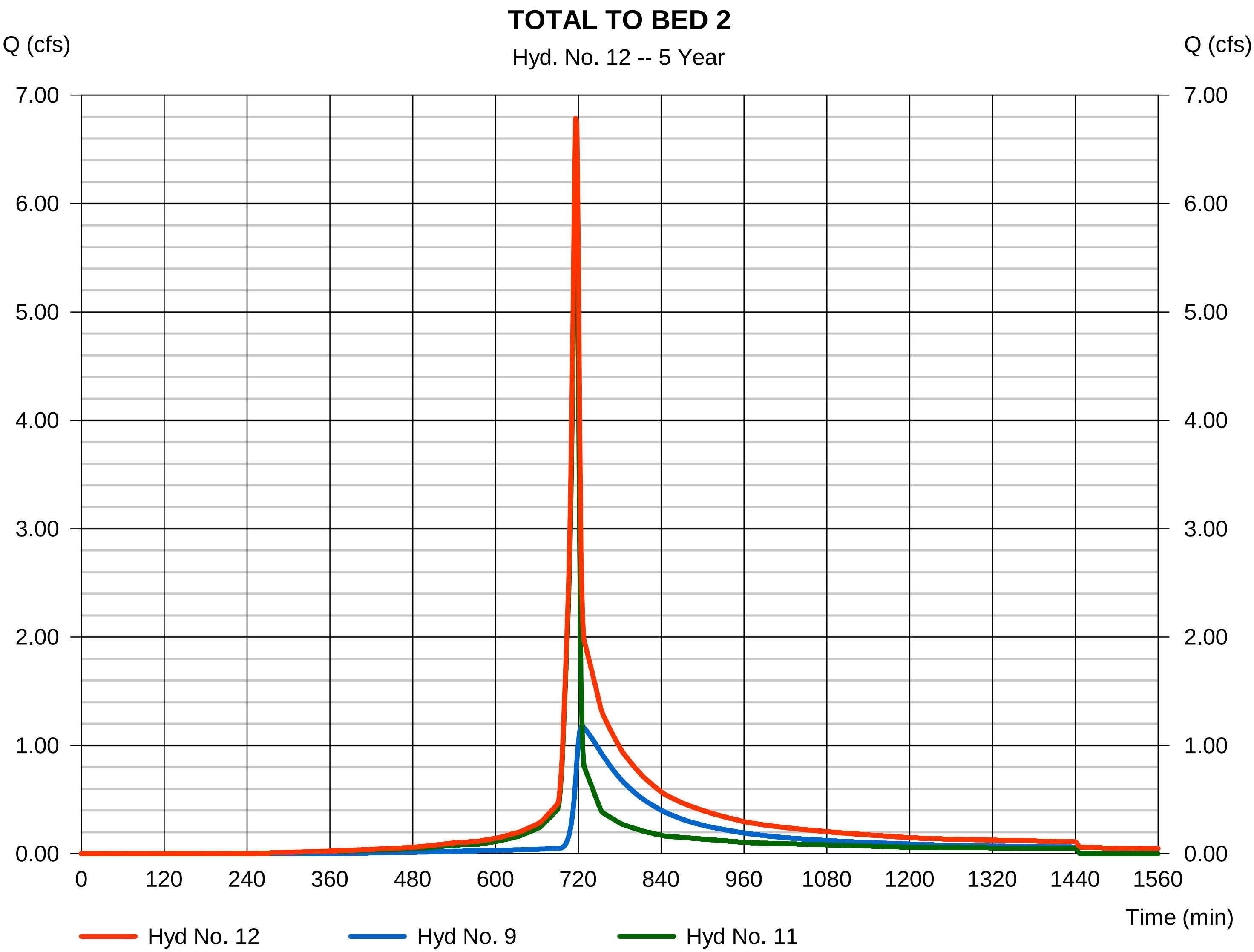
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 12

TOTAL TO BED 2

Hydrograph type	= Combine	Peak discharge	= 6.788 cfs
Storm frequency	= 5 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 26,453 cuft
Inflow hyds.	= 9, 11	Contrib. drain. area	= 1.180 ac



Hydrograph Report

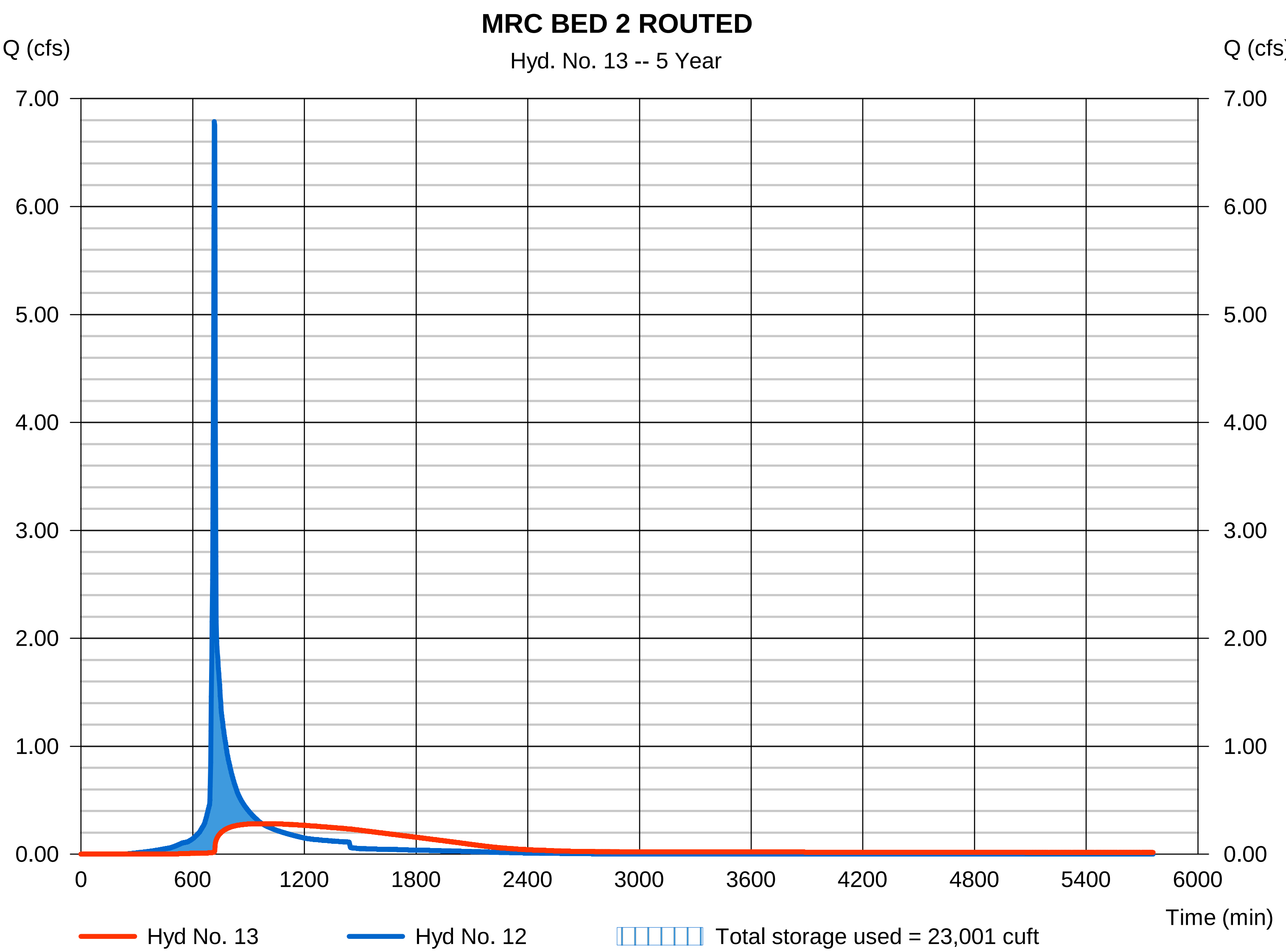
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 13

MRC BED 2 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 0.283 cfs
Storm frequency	= 5 yrs	Time to peak	= 972 min
Time interval	= 2 min	Hyd. volume	= 22,891 cuft
Inflow hyd. No.	= 12 - TOTAL TO BED 2	Max. Elevation	= 537.16 ft
Reservoir name	= MRC BED 2	Max. Storage	= 23,001 cuft

Storage Indication method used. Wet pond routing start elevation = 535.00 ft.



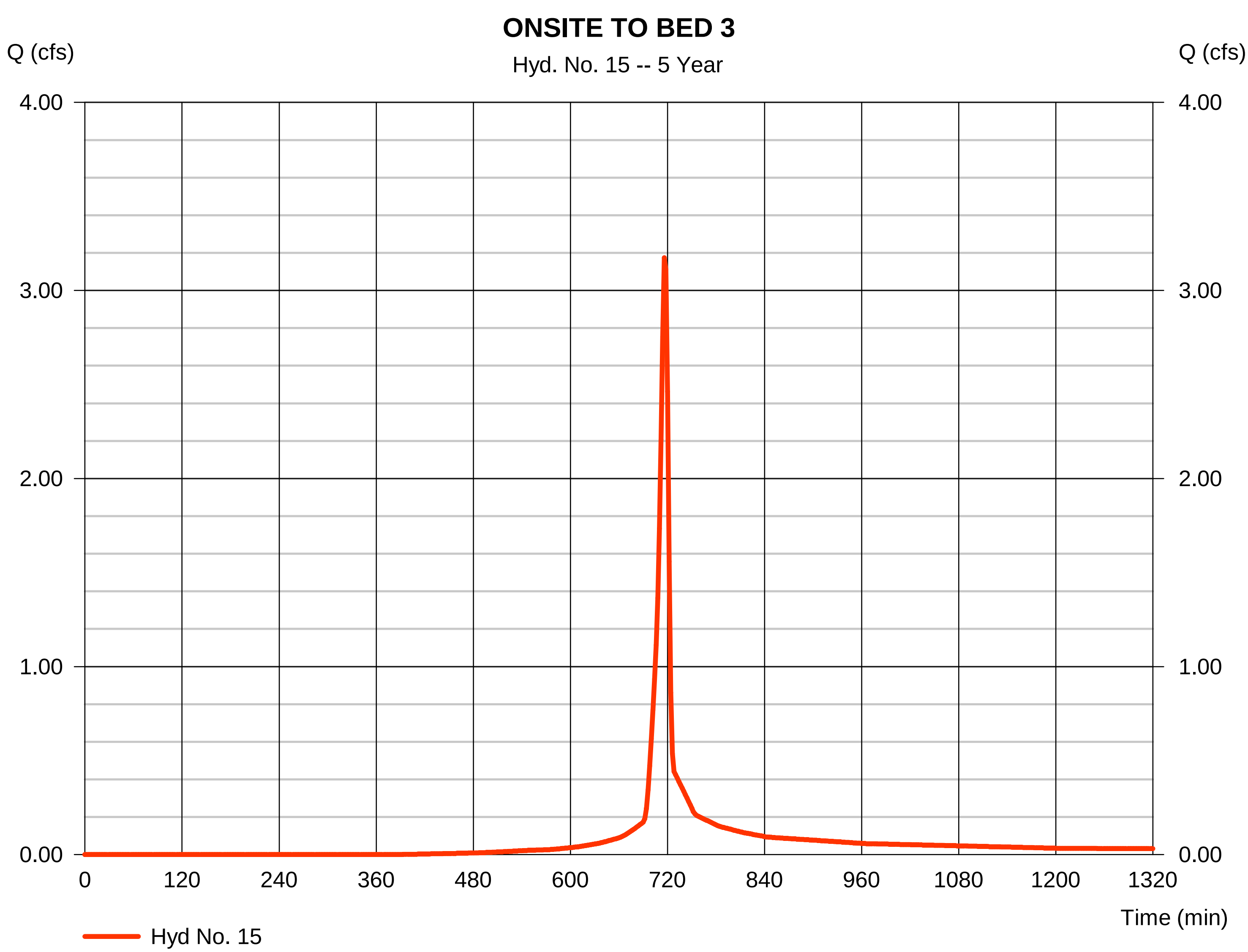
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Friday, 04 / 5 / 2024

Hyd. No. 15

ONSITE TO BED 3

Hydrograph type	= SCS Runoff	Peak discharge	= 3.175 cfs
Storm frequency	= 5 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 6,507 cuft
Drainage area	= 0.730 ac	Curve number	= 84.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



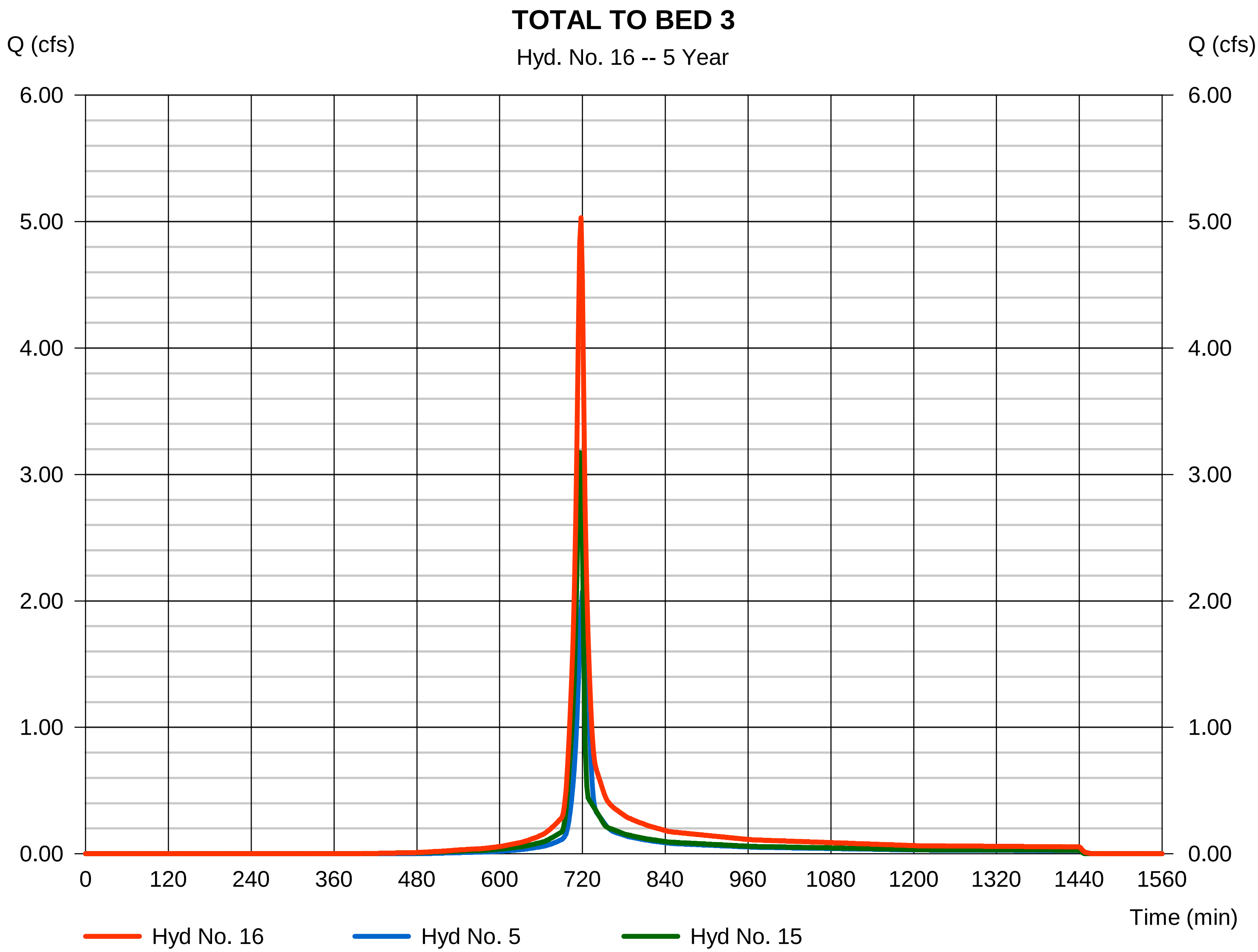
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 16

TOTAL TO BED 3

Hydrograph type	= Combine	Peak discharge	= 5.032 cfs
Storm frequency	= 5 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 11,882 cuft
Inflow hyds.	= 5, 15	Contrib. drain. area	= 1.350 ac



Hydrograph Report

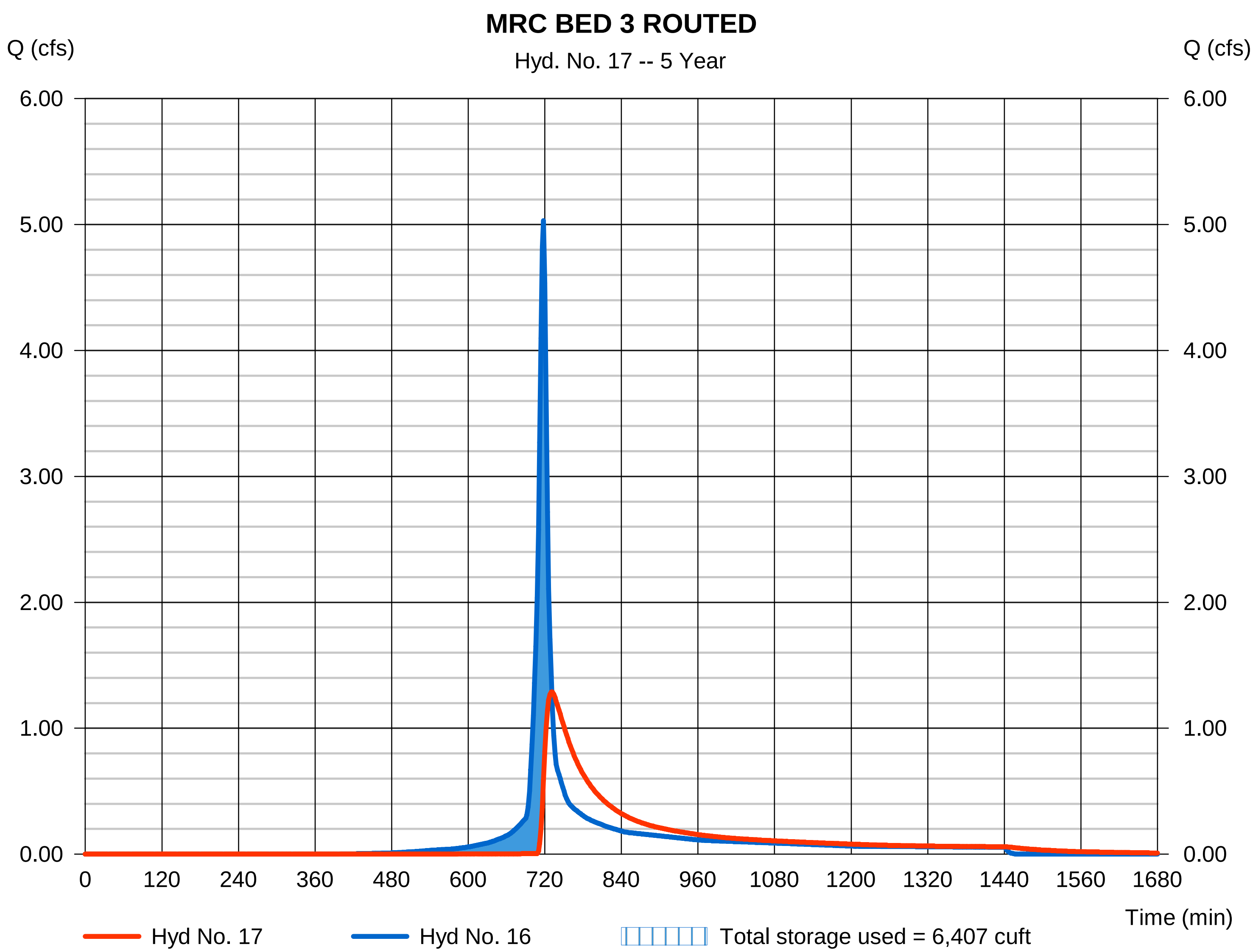
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 17

MRC BED 3 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 1.288 cfs
Storm frequency	= 5 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 11,026 cuft
Inflow hyd. No.	= 16 - TOTAL TO BED 3	Max. Elevation	= 507.11 ft
Reservoir name	= MRC BED 3	Max. Storage	= 6,407 cuft

Storage Indication method used. Wet pond routing start elevation = 505.00 ft.



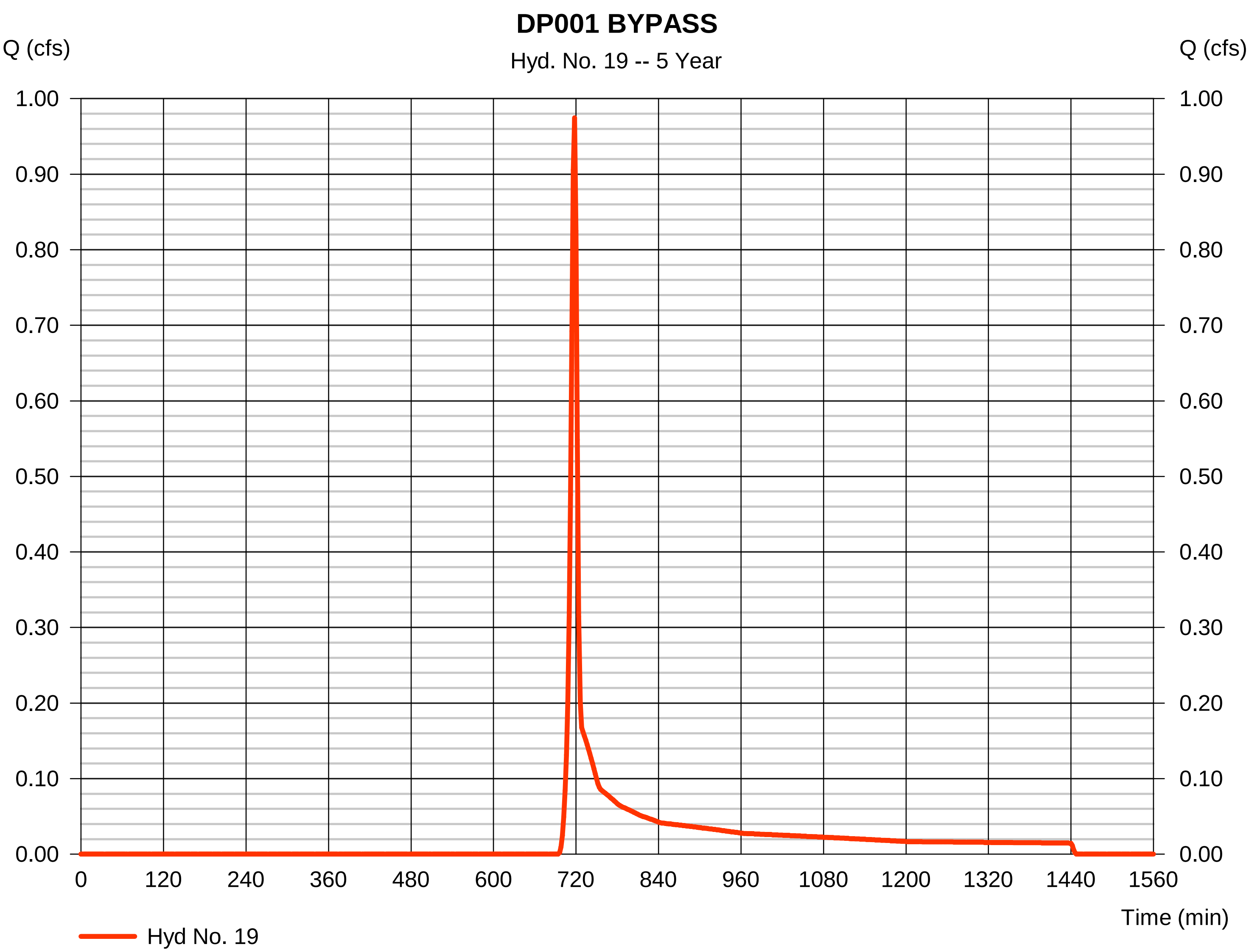
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 19

DP001 BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.975 cfs
Storm frequency	= 5 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 2,017 cuft
Drainage area	= 0.610 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

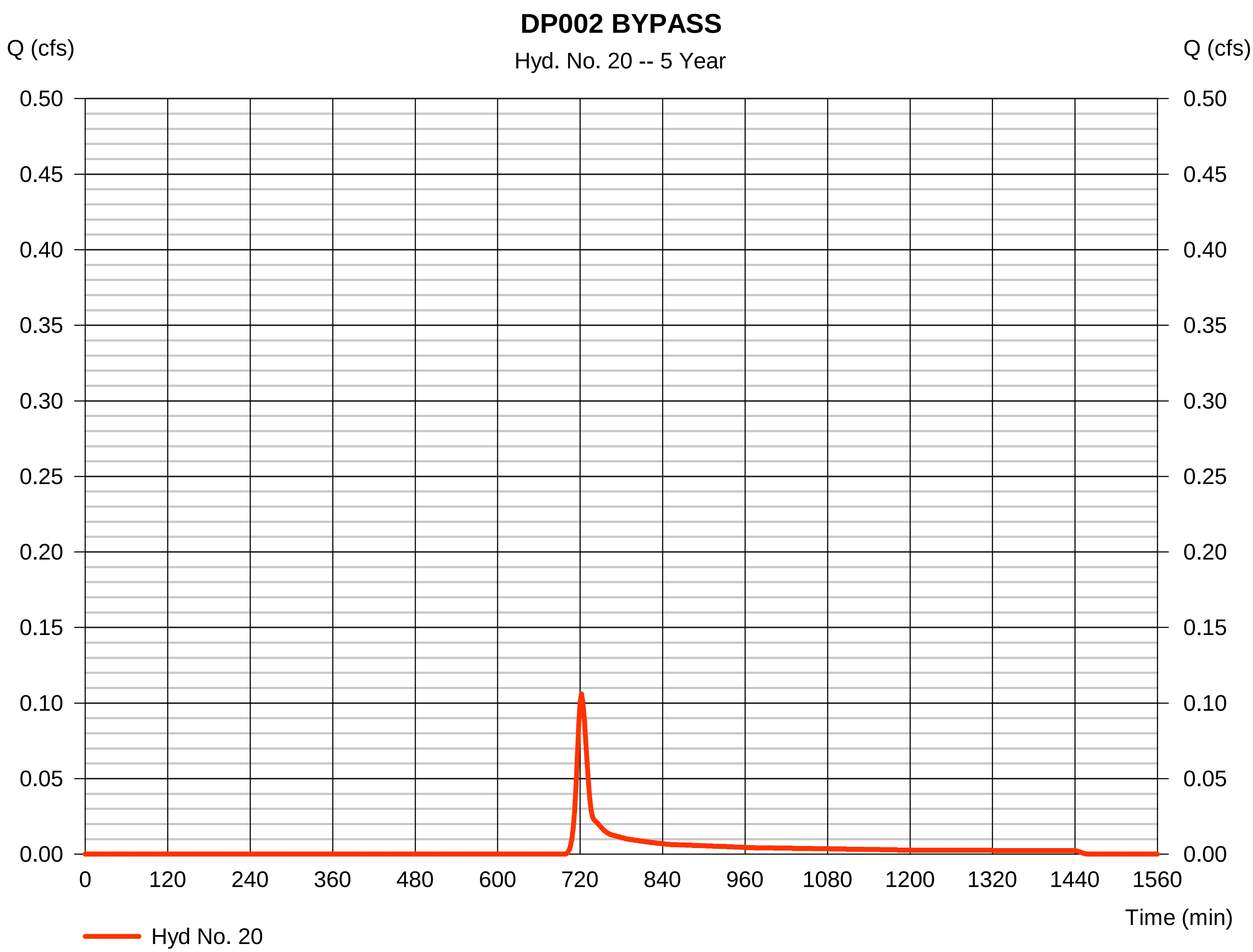


Hydrograph Report

Hyd. No. 20

DP002 BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.106 cfs
Storm frequency	= 5 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 309 cuft
Drainage area	= 0.090 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.50 min
Total precip.	= 4.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



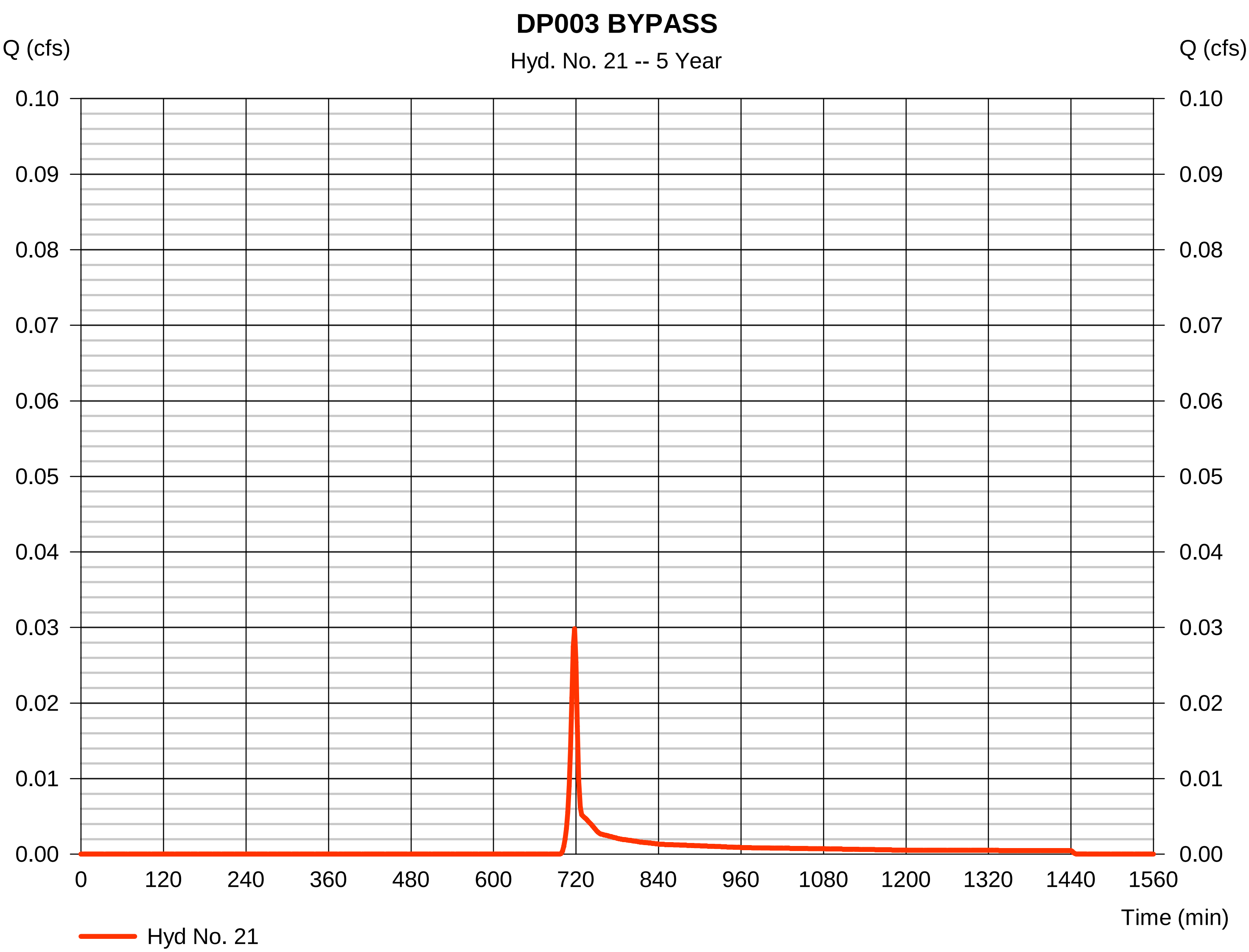
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 21

DP003 BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.030 cfs
Storm frequency	= 5 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 62 cuft
Drainage area	= 0.020 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



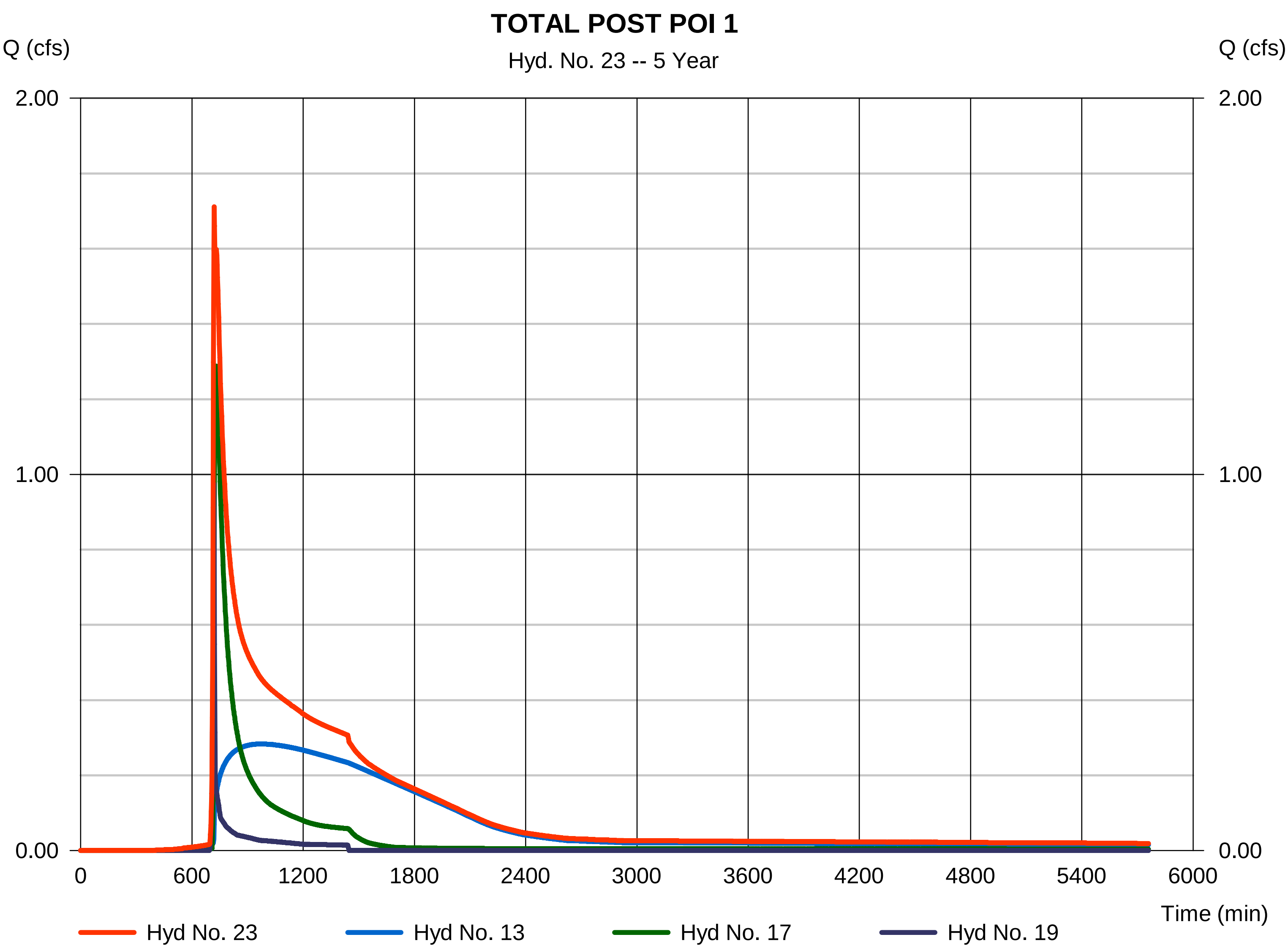
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 23

TOTAL POST POI 1

Hydrograph type	= Combine	Peak discharge	= 1.711 cfs
Storm frequency	= 5 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 35,934 cuft
Inflow hyds.	= 13, 17, 19	Contrib. drain. area	= 0.610 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	2.313	2	728	10,064	------	------	------	PRE POI 1
2	SCS Runoff	0.532	2	728	2,317	------	------	------	PRE POI 2
3	SCS Runoff	0.448	2	722	1,357	------	------	------	PRE LOI 3
5	SCS Runoff	2.689	2	720	6,994	------	------	------	OFFSITE TO BED 3
6	Combine	4.387	2	724	17,058	1, 5	------	------	TOTAL PRE TO POI1
8	SCS Runoff	7.361	2	716	16,396	------	------	------	ONSITE TO MRC BED 1
9	Reservoir	1.664	2	724	16,344	8	539.03	9,882	MRC BED 1 ROUTED
11	SCS Runoff	7.460	2	716	16,248	------	------	------	ONSITE TO MRC BED 2
12	Combine	8.491	2	716	32,592	9, 11	------	------	TOTAL TO BED 2
13	Reservoir	0.345	2	962	28,915	12	537.73	27,192	MRC BED 2 ROUTED
15	SCS Runoff	4.016	2	716	8,318	------	------	------	ONSITE TO BED 3
16	Combine	6.420	2	718	15,312	5, 15	------	------	TOTAL TO BED 3
17	Reservoir	2.083	2	728	14,453	16	507.62	7,690	MRC BED 3 ROUTED
19	SCS Runoff	1.480	2	718	2,986	------	------	------	DP001 BYPASS
20	SCS Runoff	0.168	2	722	461	------	------	------	DP002 BYPASS
21	SCS Runoff	0.046	2	718	93	------	------	------	DP003 BYPASS
23	Combine	2.937	2	720	46,354	13, 17, 19,	------	------	TOTAL POST POI 1
25	SCS Runoff	0.000	2	n/a	0	------	------	------	1.2 to MRC Bed 1
26	Reservoir	0.000	2	n/a	0	25	537.00	1,660	1.2 to MRC Bed 1 Rout
27	SCS Runoff	0.000	2	n/a	0	------	------	------	1.2 to MRC Bed 2
28	Combine	0.000	2	n/a	0	26, 27	------	------	1.2 Total to MRC Bed 2
29	Reservoir	0.000	2	n/a	0	28	535.00	7,290	1.2 to MRC Bed 2 Route
31	SCS Runoff	0.000	2	n/a	0	------	------	------	1.2 to MRC Bed 3
32	Reservoir	0.000	2	n/a	0	31	505.00	1,056	1.2 to MRC Bed 3 Route
34	Combine	0.000	2	n/a	0	29, 32,	------	------	Total 1.2

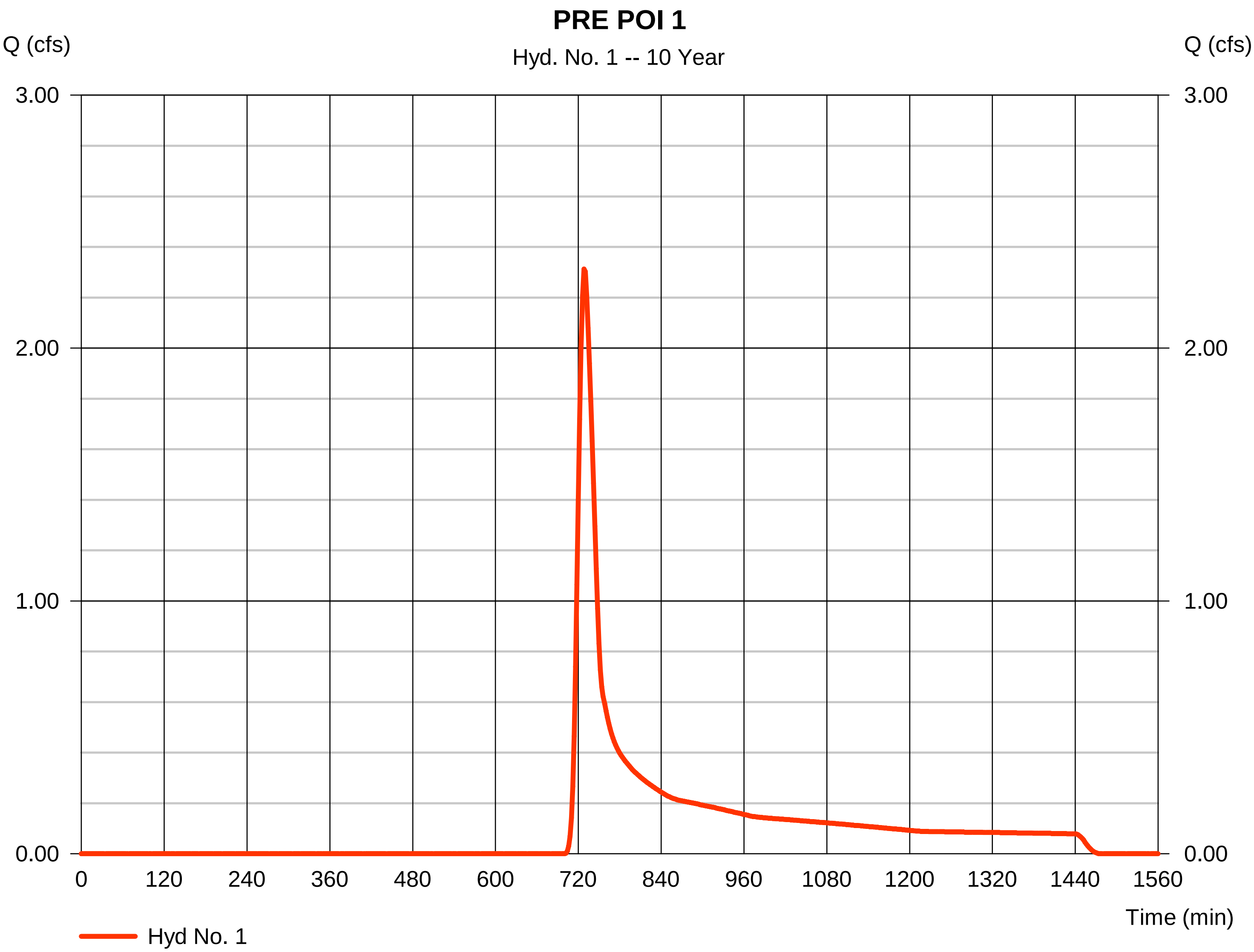
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 1

PRE POI 1

Hydrograph type	= SCS Runoff	Peak discharge	= 2.313 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 10,064 cuft
Drainage area	= 2.780 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 20.20 min
Total precip.	= 5.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



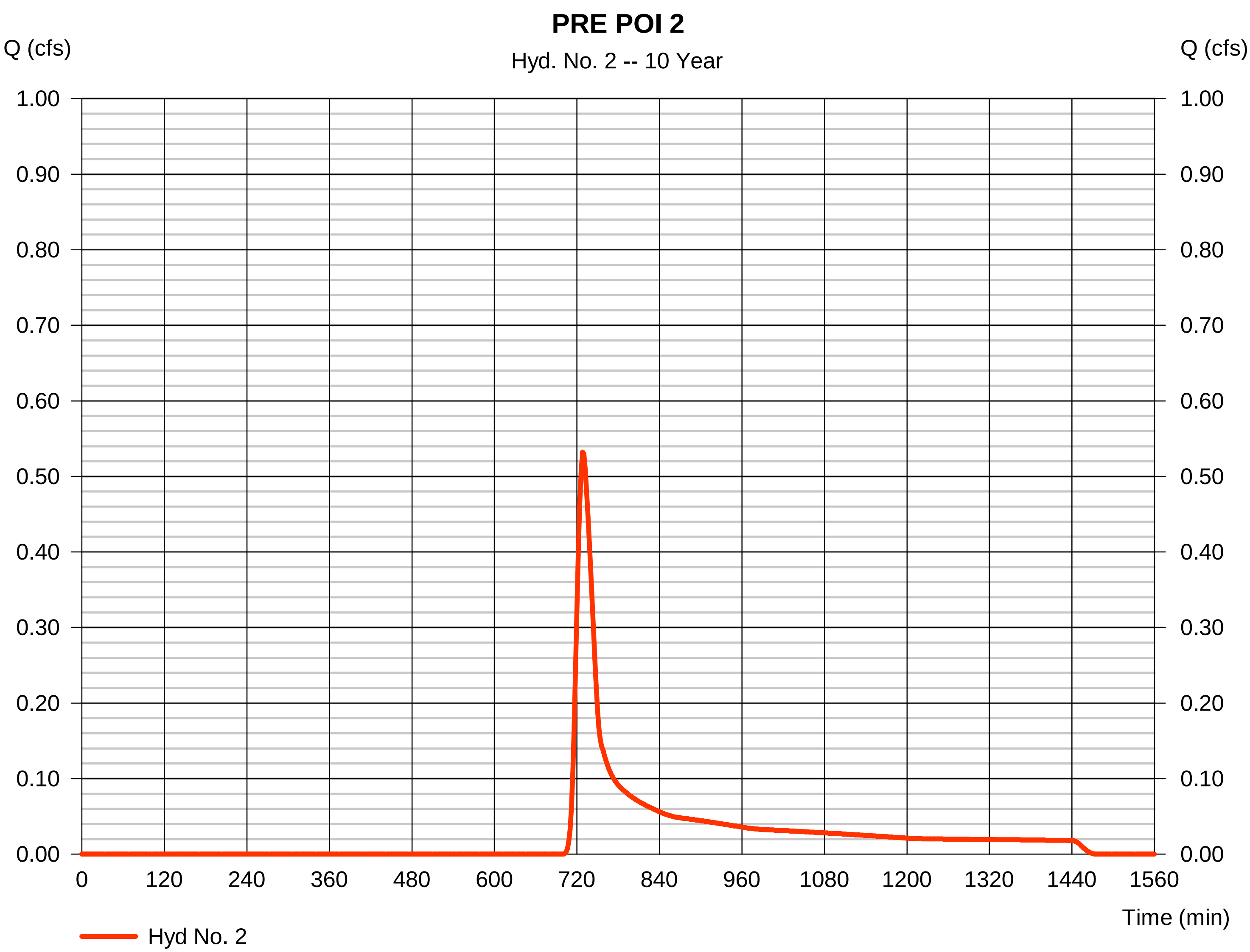
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 2

PRE POI 2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.532 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 2,317 cuft
Drainage area	= 0.640 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 22.10 min
Total precip.	= 5.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



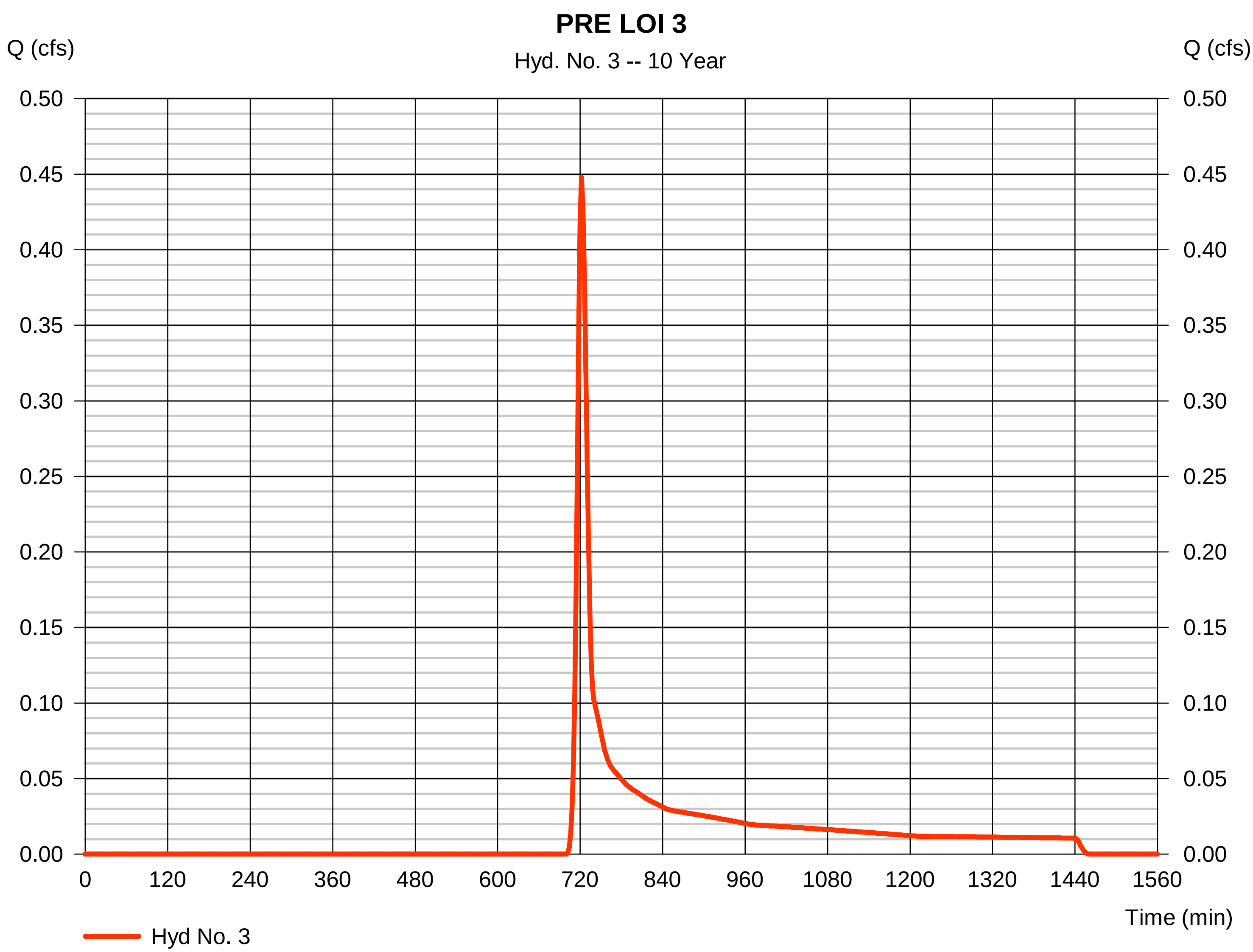
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Friday, 04 / 5 / 2024

Hyd. No. 3

PRE LOI 3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.448 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 1,357 cuft
Drainage area	= 0.370 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.80 min
Total precip.	= 5.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



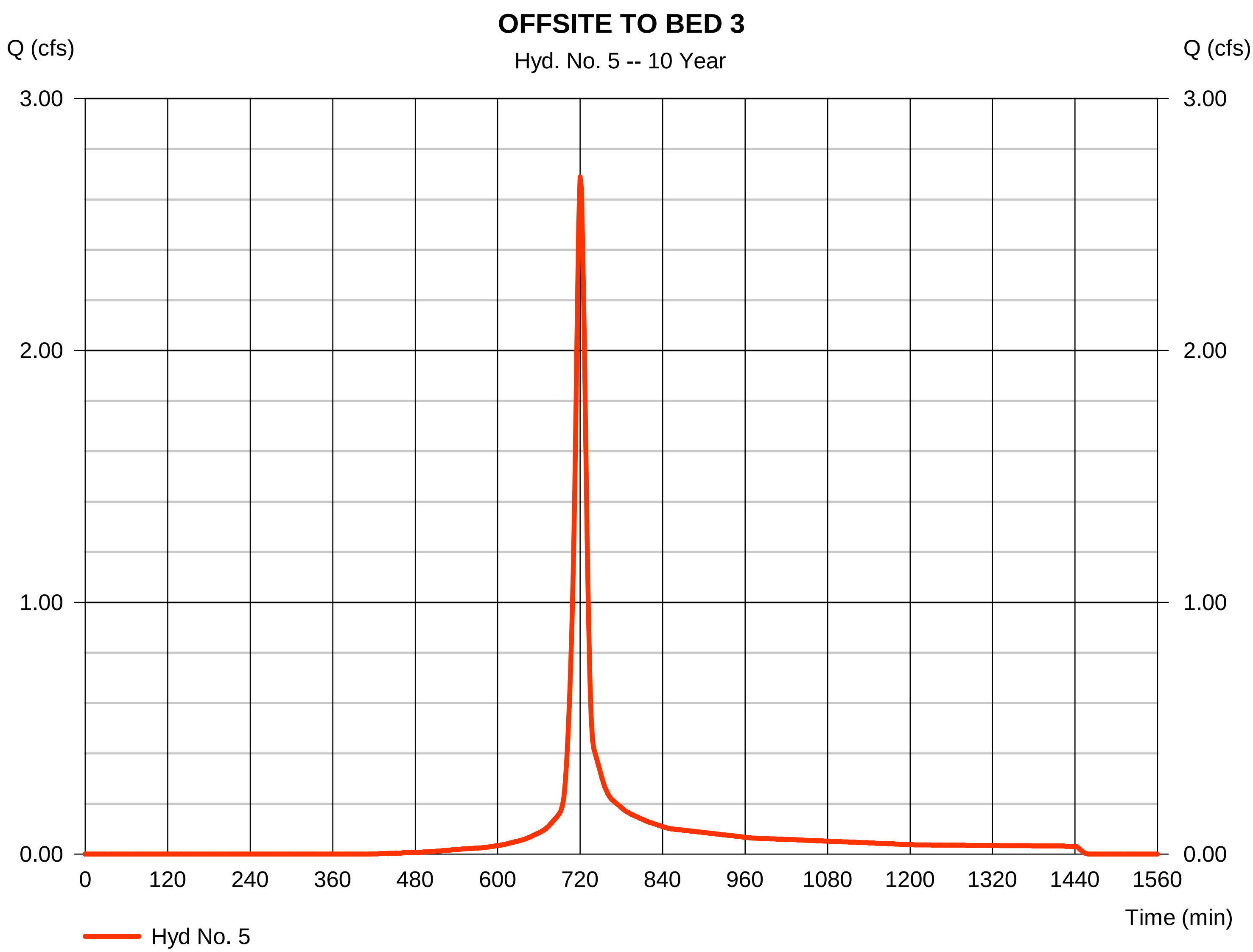
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 5

OFFSITE TO BED 3

Hydrograph type	= SCS Runoff	Peak discharge	= 2.689 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 6,994 cuft
Drainage area	= 0.620 ac	Curve number	= 81.3
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.20 min
Total precip.	= 5.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



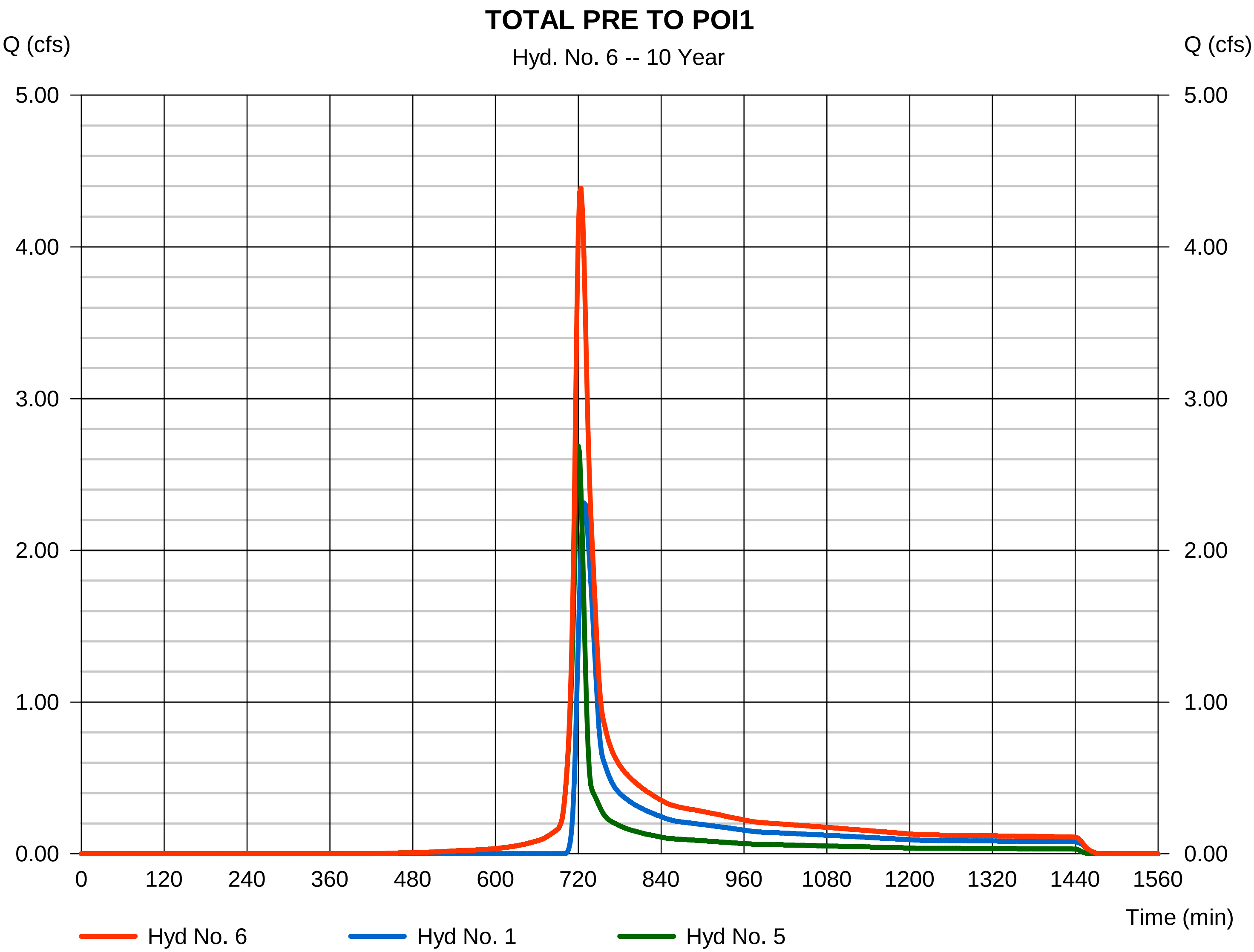
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 6

TOTAL PRE TO POI1

Hydrograph type	= Combine	Peak discharge	= 4.387 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 17,058 cuft
Inflow hyds.	= 1, 5	Contrib. drain. area	= 3.400 ac



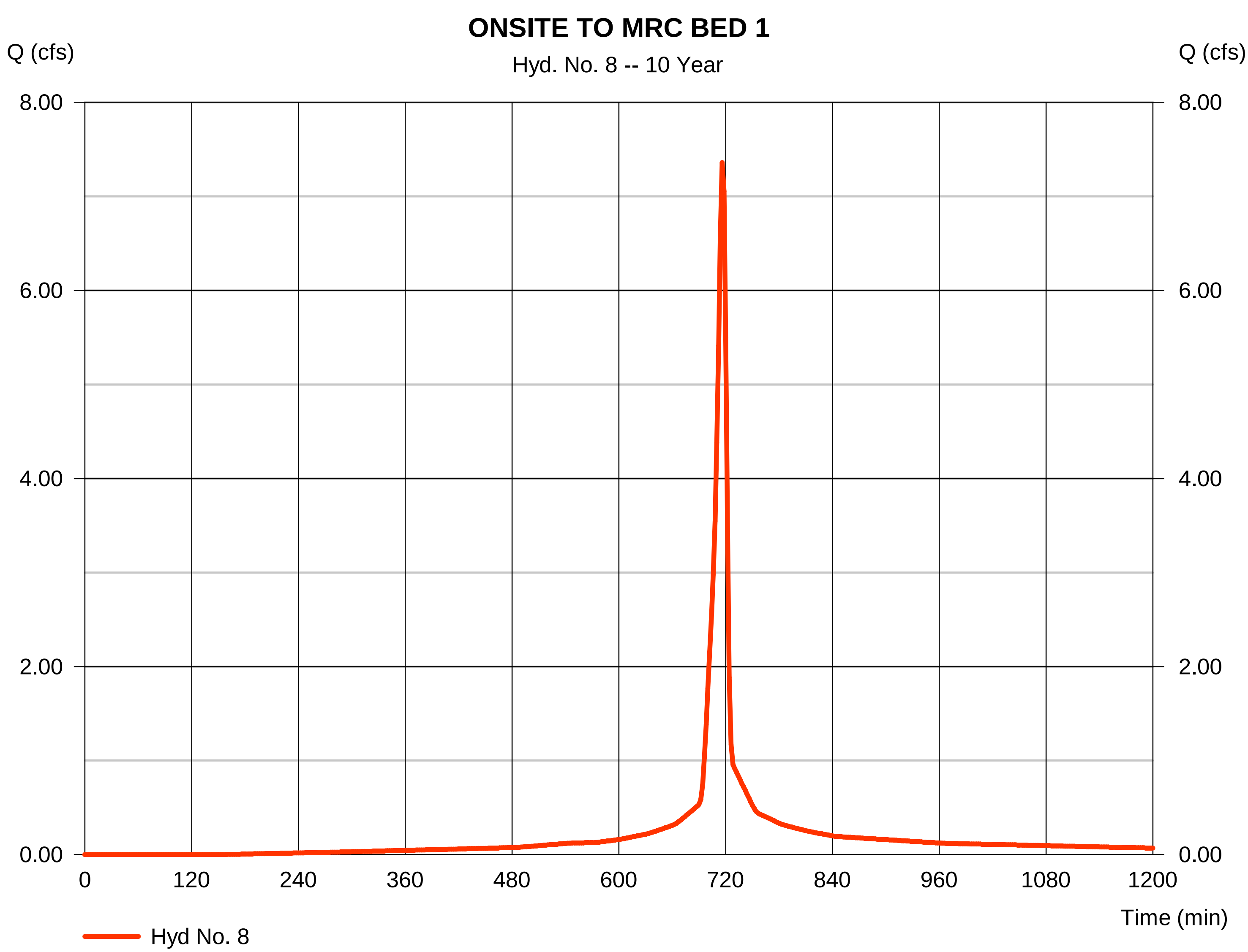
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 8

ONSITE TO MRC BED 1

Hydrograph type	= SCS Runoff	Peak discharge	= 7.361 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 16,396 cuft
Drainage area	= 1.130 ac	Curve number	= 93.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

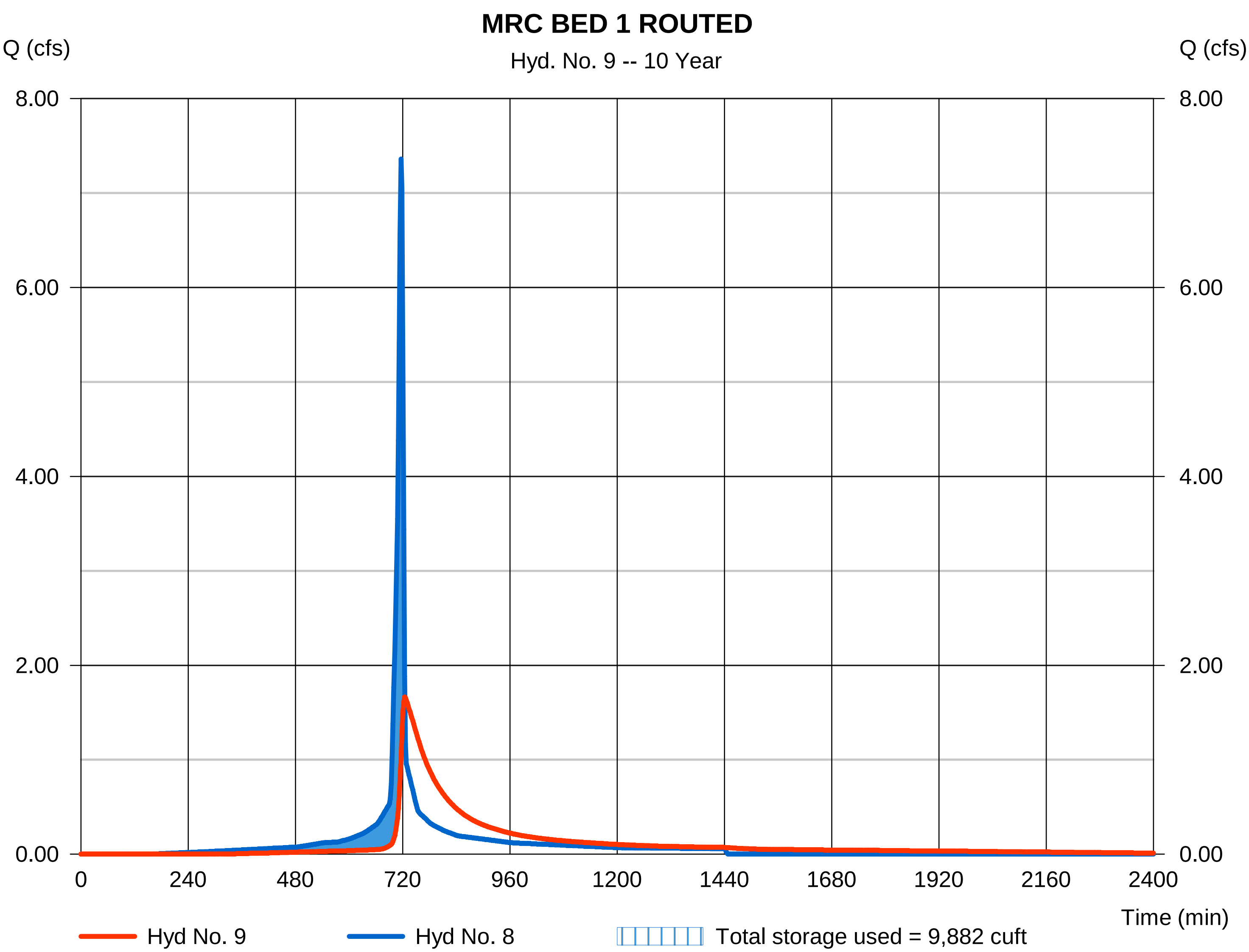
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 9

MRC BED 1 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 1.664 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 16,344 cuft
Inflow hyd. No.	= 8 - ONSITE TO MRC BED 1	Max. Elevation	= 539.03 ft
Reservoir name	= MRC BED 1	Max. Storage	= 9,882 cuft

Storage Indication method used. Wet pond routing start elevation = 537.00 ft.



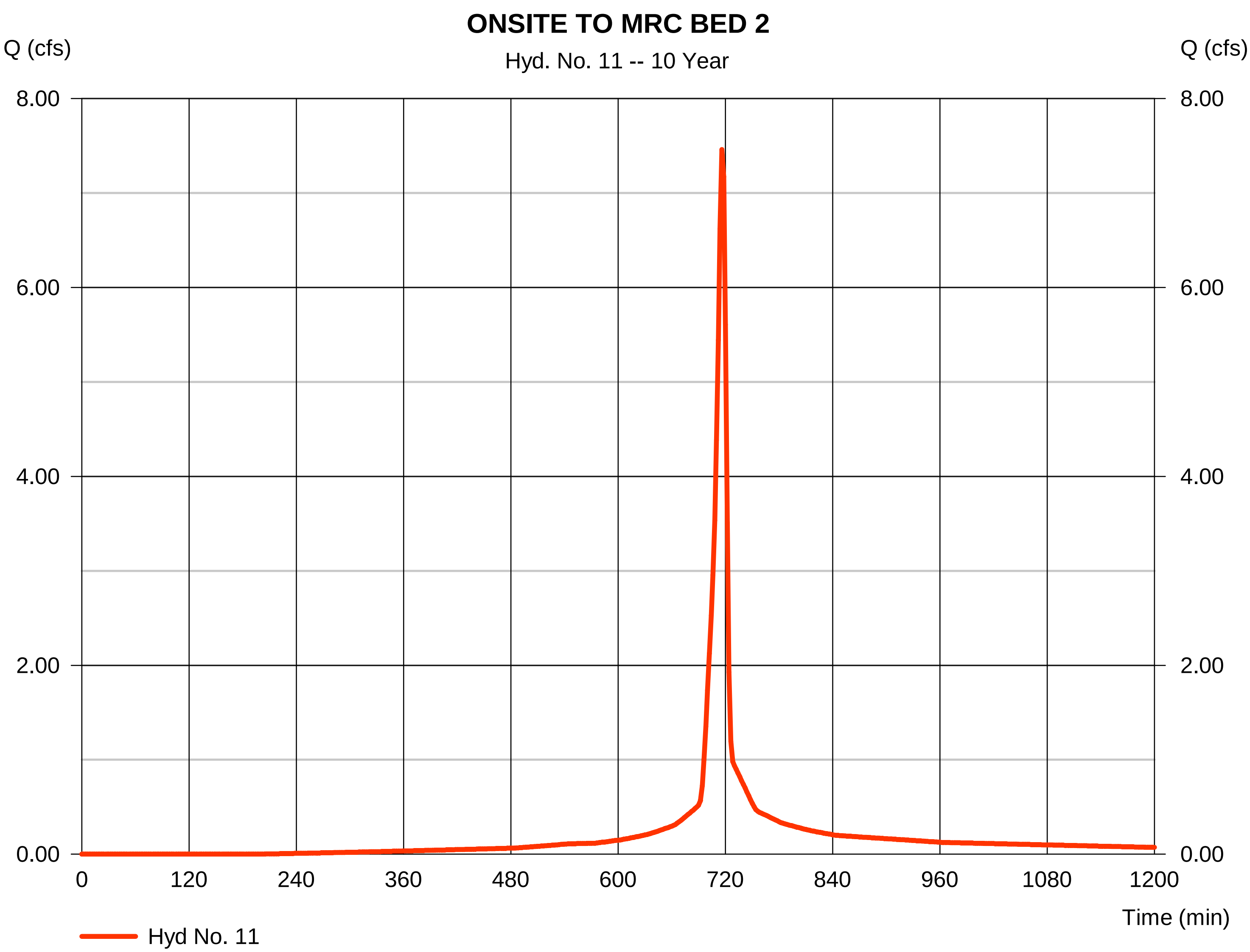
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 11

ONSITE TO MRC BED 2

Hydrograph type	= SCS Runoff	Peak discharge	= 7.460 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 16,248 cuft
Drainage area	= 1.180 ac	Curve number	= 91.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



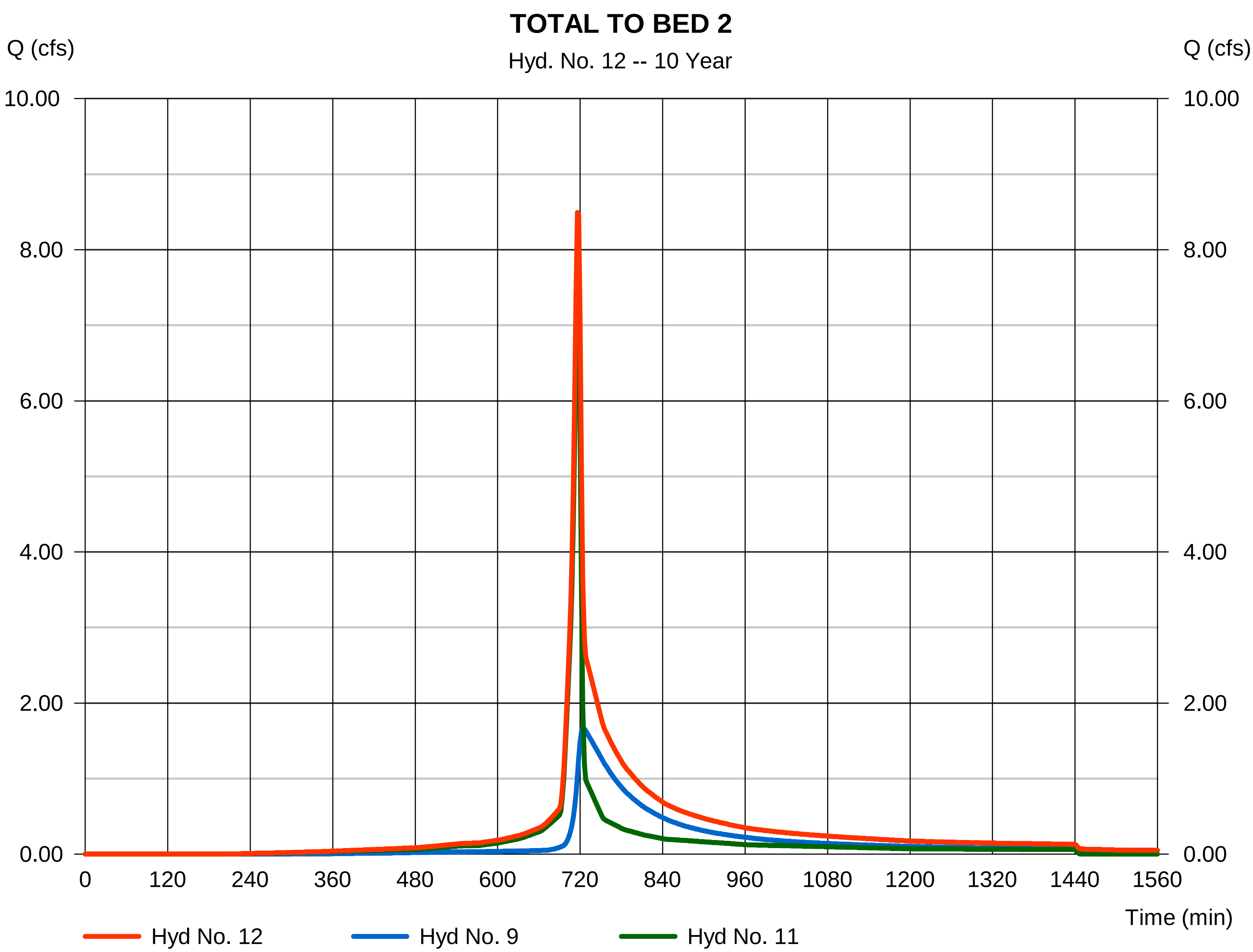
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 12

TOTAL TO BED 2

Hydrograph type	= Combine	Peak discharge	= 8.491 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 32,592 cuft
Inflow hyds.	= 9, 11	Contrib. drain. area	= 1.180 ac



Hydrograph Report

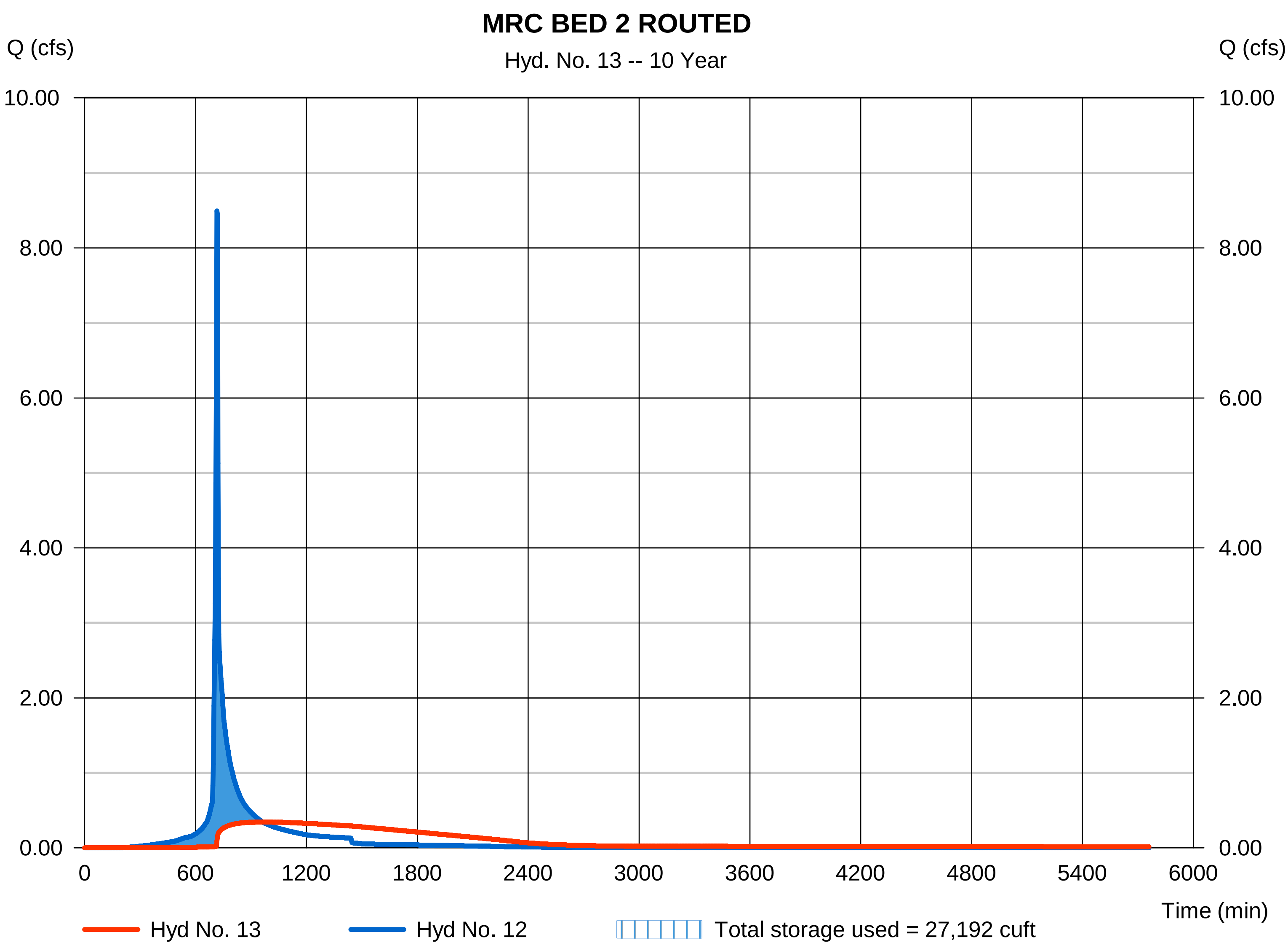
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 13

MRC BED 2 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 0.345 cfs
Storm frequency	= 10 yrs	Time to peak	= 962 min
Time interval	= 2 min	Hyd. volume	= 28,915 cuft
Inflow hyd. No.	= 12 - TOTAL TO BED 2	Max. Elevation	= 537.73 ft
Reservoir name	= MRC BED 2	Max. Storage	= 27,192 cuft

Storage Indication method used. Wet pond routing start elevation = 535.00 ft.



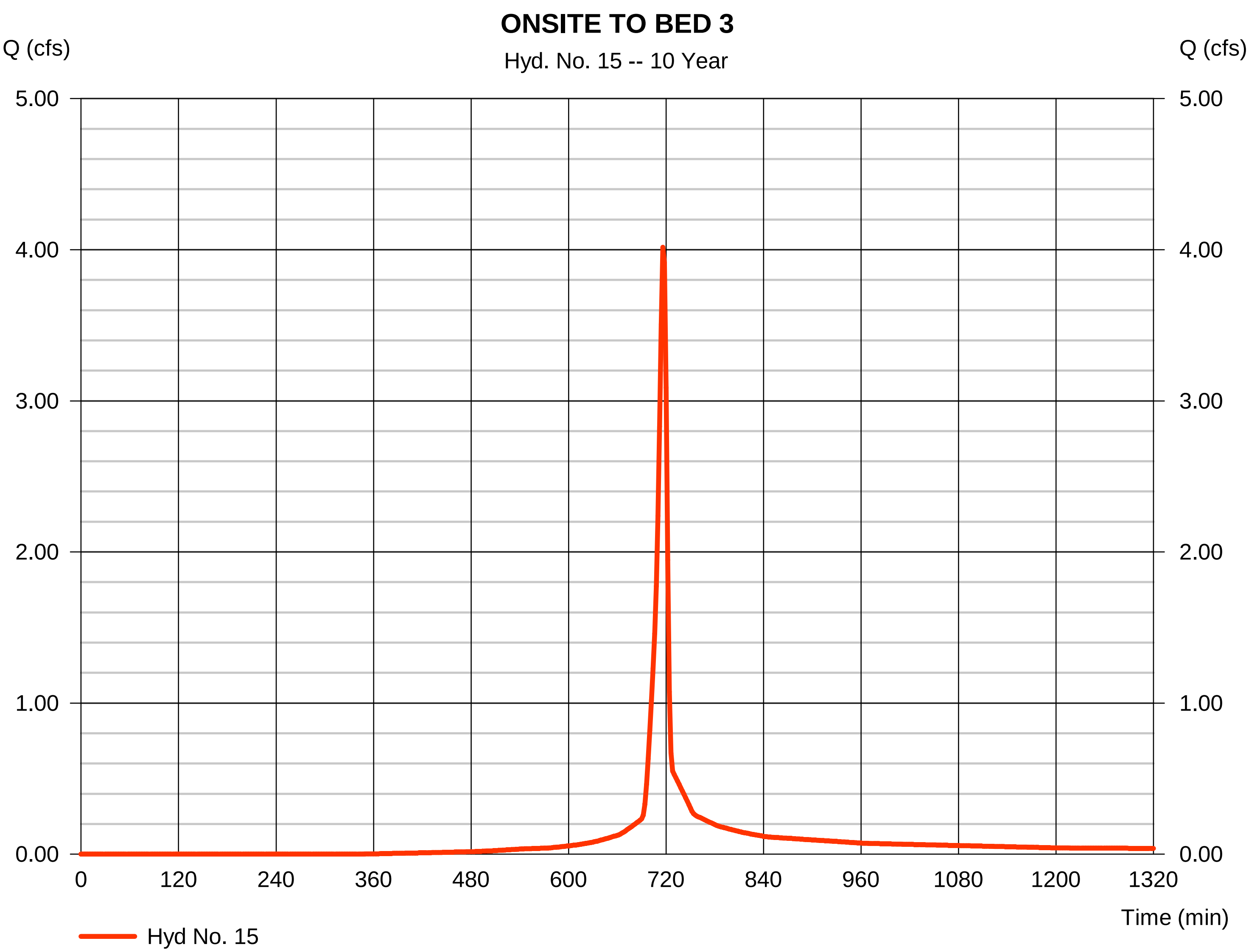
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 15

ONSITE TO BED 3

Hydrograph type	= SCS Runoff	Peak discharge	= 4.016 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 8,318 cuft
Drainage area	= 0.730 ac	Curve number	= 84.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

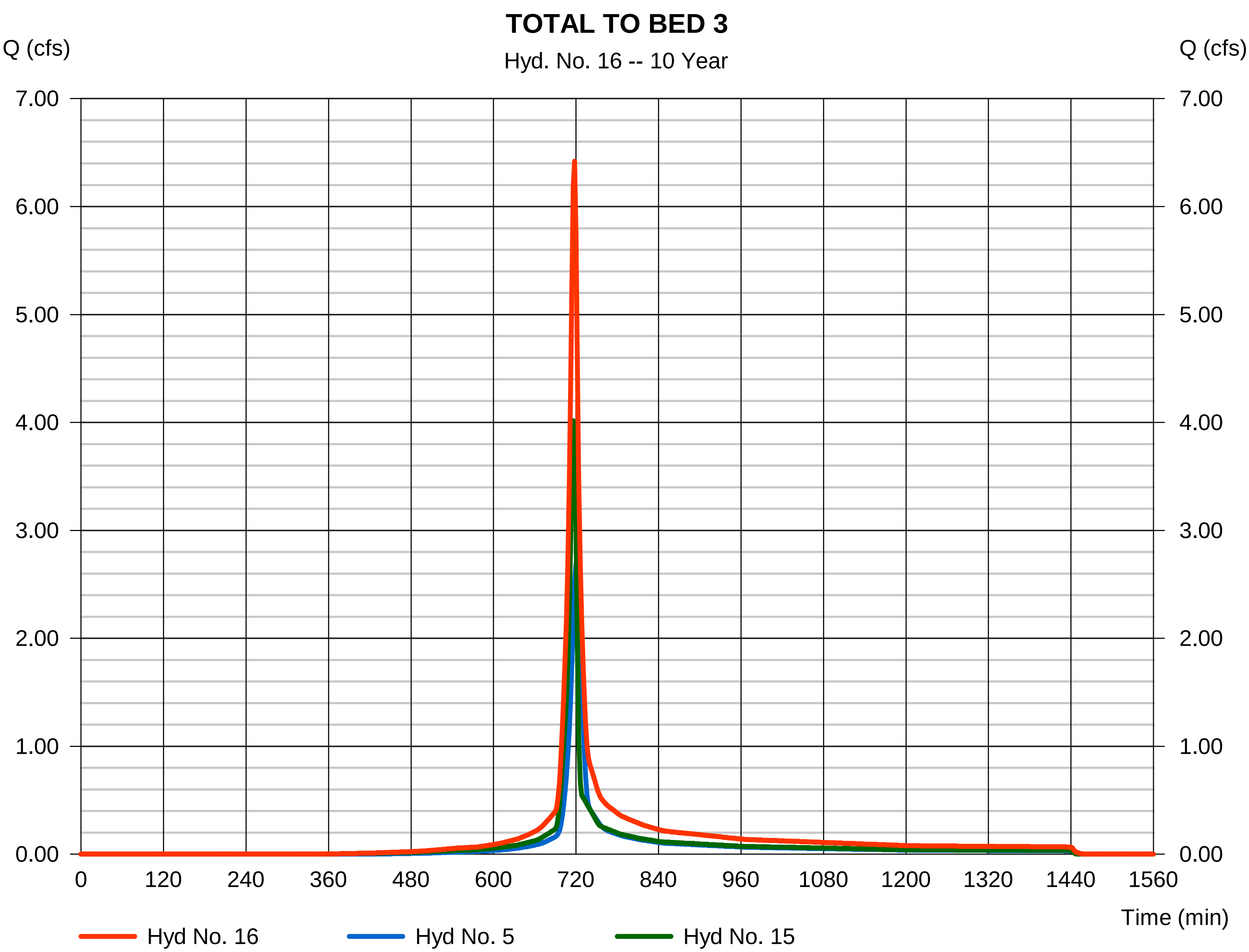


Hydrograph Report

Hyd. No. 16

TOTAL TO BED 3

Hydrograph type	= Combine	Peak discharge	= 6.420 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 15,312 cuft
Inflow hyds.	= 5, 15	Contrib. drain. area	= 1.350 ac



Hydrograph Report

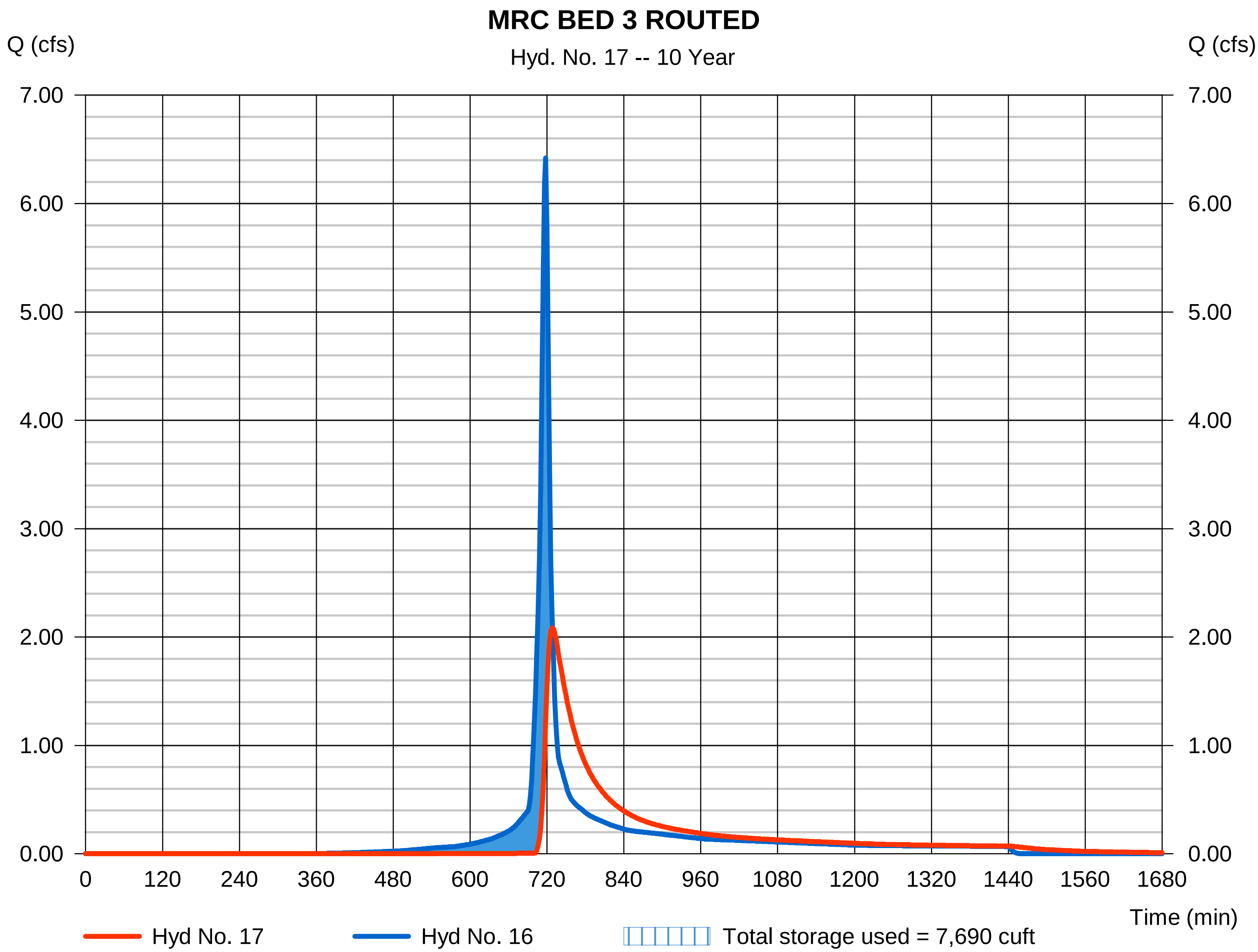
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 17

MRC BED 3 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 2.083 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 14,453 cuft
Inflow hyd. No.	= 16 - TOTAL TO BED 3	Max. Elevation	= 507.62 ft
Reservoir name	= MRC BED 3	Max. Storage	= 7,690 cuft

Storage Indication method used. Wet pond routing start elevation = 505.00 ft.



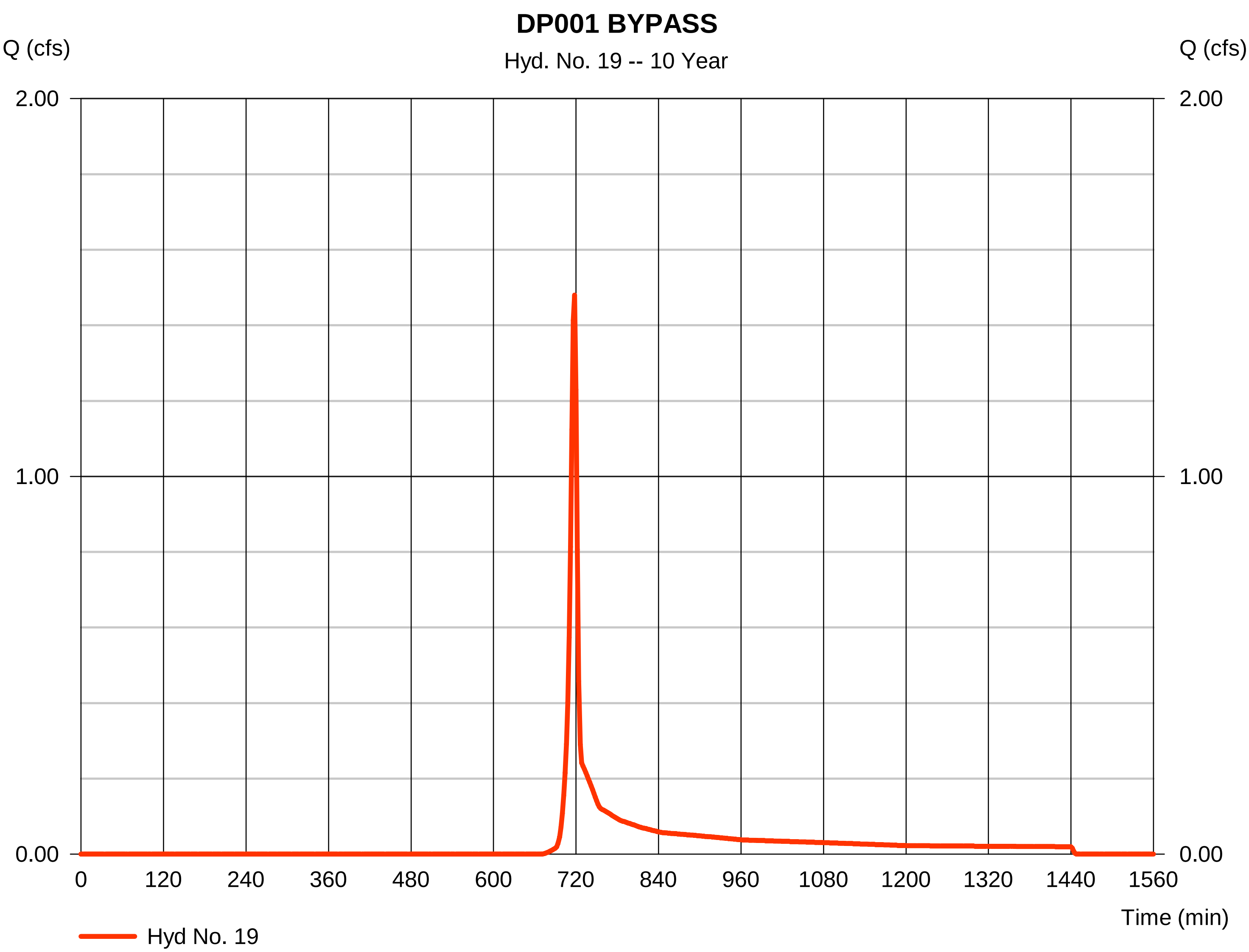
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 19

DP001 BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 1.480 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 2,986 cuft
Drainage area	= 0.610 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

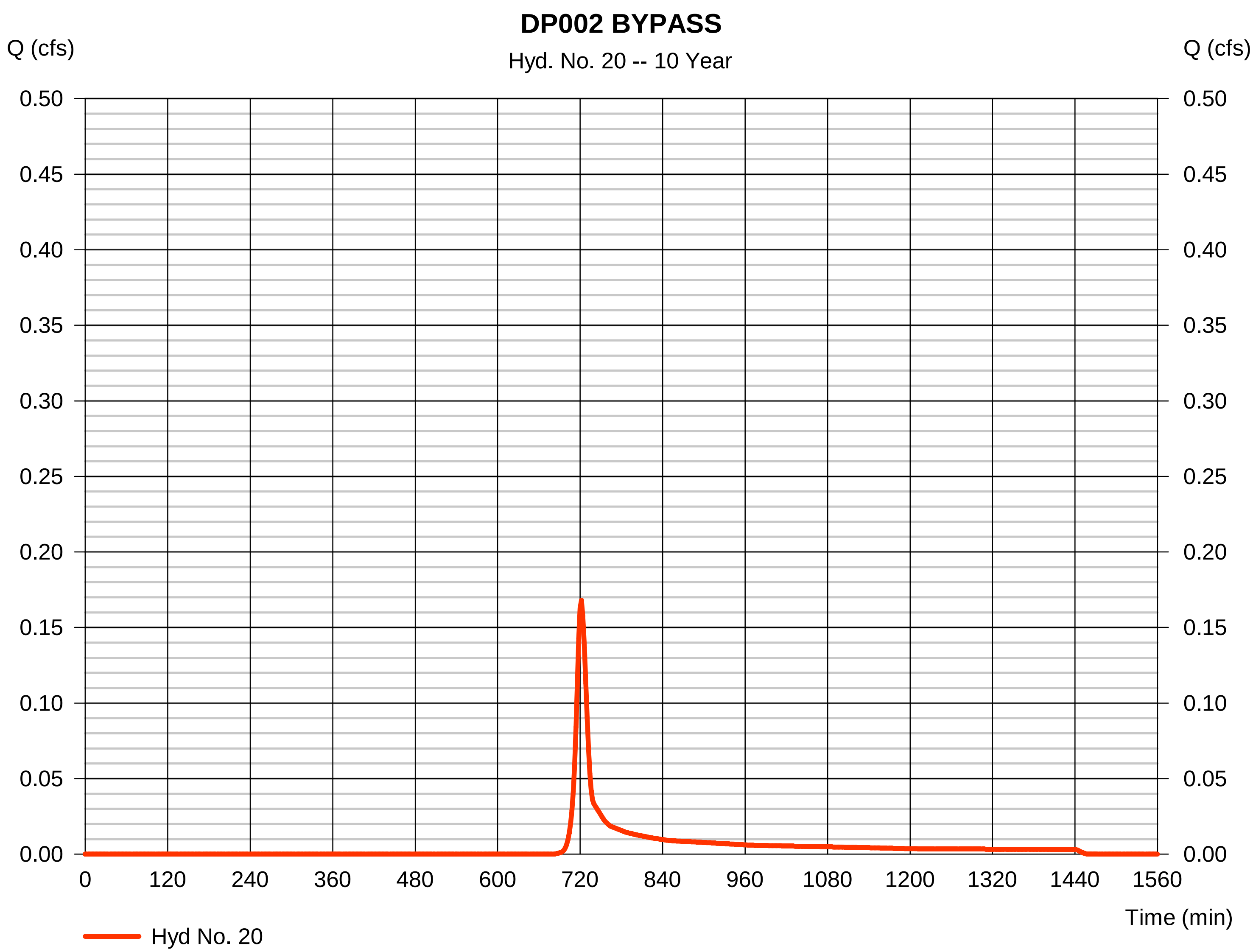


Hydrograph Report

Hyd. No. 20

DP002 BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.168 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 461 cuft
Drainage area	= 0.090 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.50 min
Total precip.	= 5.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



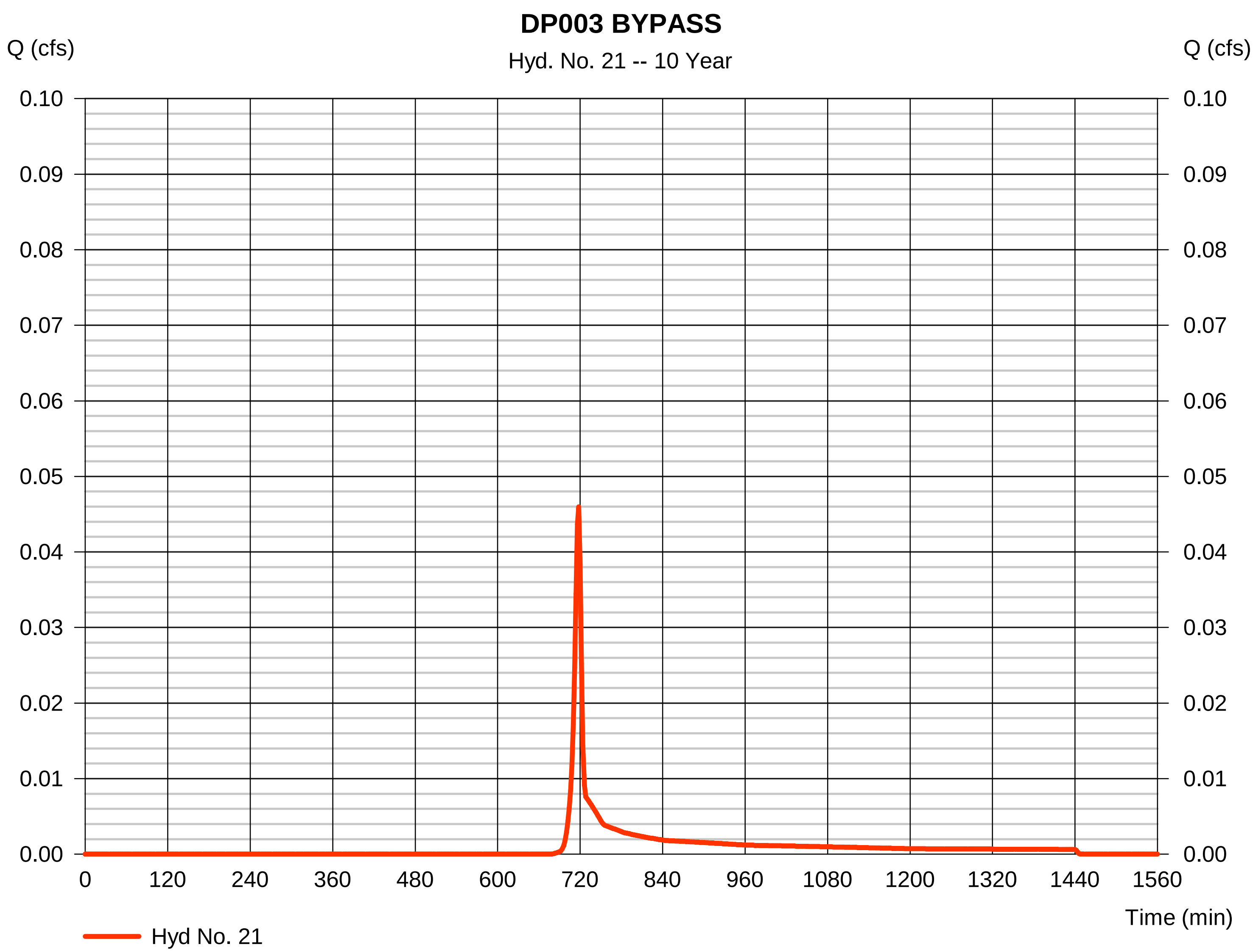
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 21

DP003 BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.046 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 93 cuft
Drainage area	= 0.020 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



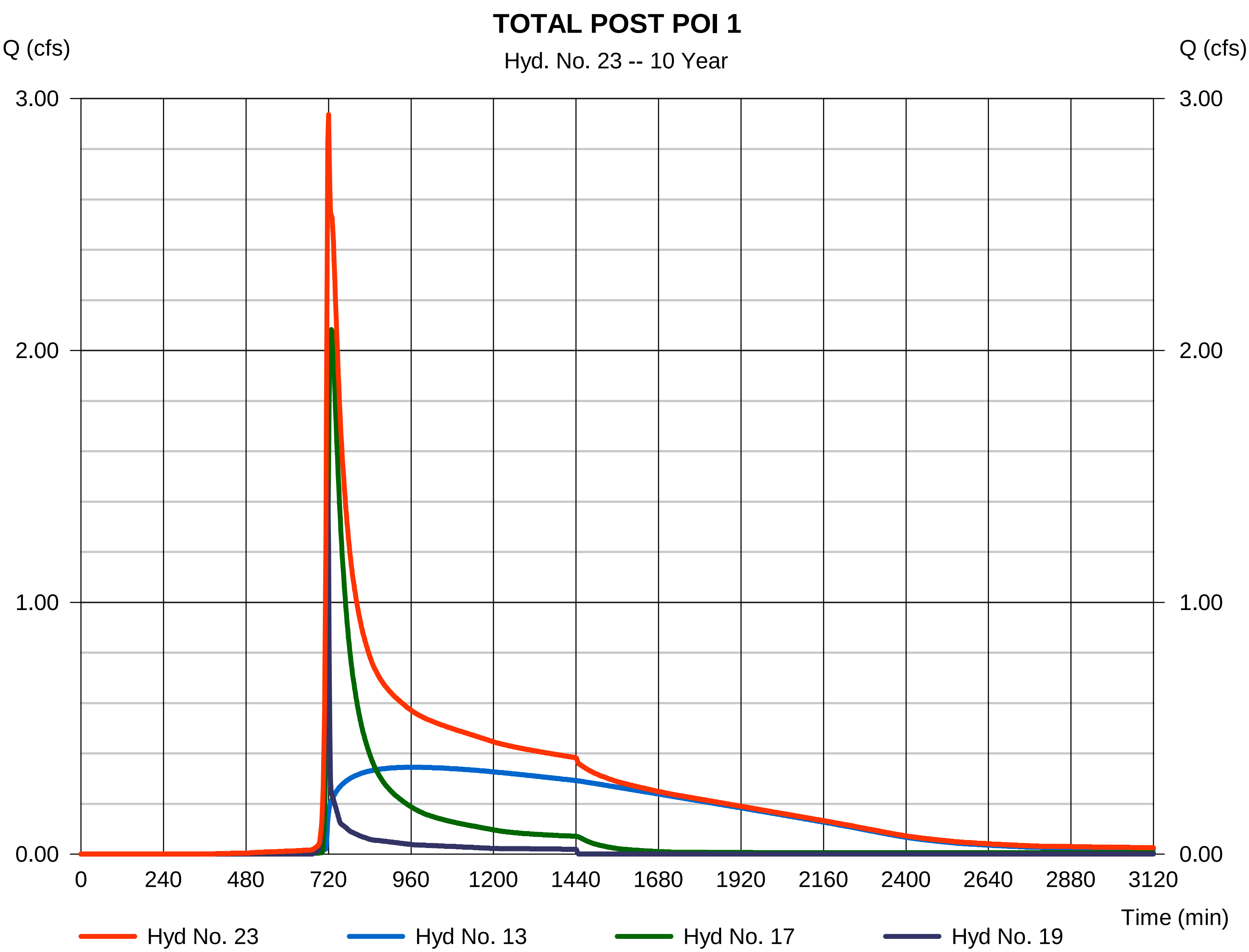
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 23

TOTAL POST POI 1

Hydrograph type	= Combine	Peak discharge	= 2.937 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 46,354 cuft
Inflow hyds.	= 13, 17, 19	Contrib. drain. area	= 0.610 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	3.639	2	728	14,424	------	------	------	PRE POI 1
2	SCS Runoff	0.838	2	728	3,321	------	------	------	PRE POI 2
3	SCS Runoff	0.689	2	722	1,945	------	------	------	PRE LOI 3
5	SCS Runoff	3.313	2	720	8,662	------	------	------	OFFSITE TO BED 3
6	Combine	6.189	2	724	23,086	1, 5	------	------	TOTAL PRE TO POI1
8	SCS Runoff	8.630	2	716	19,432	------	------	------	ONSITE TO MRC BED 1
9	Reservoir	2.168	2	724	19,379	8	539.35	11,163	MRC BED 1 ROUTED
11	SCS Runoff	8.800	2	716	19,389	------	------	------	ONSITE TO MRC BED 2
12	Combine	10.20	2	716	38,768	9, 11	------	------	TOTAL TO BED 2
13	Reservoir	0.673	2	864	34,998	12	538.47	30,563	MRC BED 2 ROUTED
15	SCS Runoff	4.859	2	716	10,169	------	------	------	ONSITE TO BED 3
16	Combine	7.819	2	718	18,831	5, 15	------	------	TOTAL TO BED 3
17	Reservoir	2.946	2	728	17,969	16	508.10	8,905	MRC BED 3 ROUTED
19	SCS Runoff	2.027	2	718	4,058	------	------	------	DP001 BYPASS
20	SCS Runoff	0.236	2	722	631	------	------	------	DP002 BYPASS
21	SCS Runoff	0.064	2	718	127	------	------	------	DP003 BYPASS
23	Combine	4.248	2	720	57,024	13, 17, 19,	------	------	TOTAL POST POI 1
25	SCS Runoff	0.000	2	n/a	0	------	------	------	1.2 to MRC Bed 1
26	Reservoir	0.000	2	n/a	0	25	537.00	1,660	1.2 to MRC Bed 1 Rout
27	SCS Runoff	0.000	2	n/a	0	------	------	------	1.2 to MRC Bed 2
28	Combine	0.000	2	n/a	0	26, 27	------	------	1.2 Total to MRC Bed 2
29	Reservoir	0.000	2	n/a	0	28	535.00	7,290	1.2 to MRC Bed 2 Route
31	SCS Runoff	0.000	2	n/a	0	------	------	------	1.2 to MRC Bed 3
32	Reservoir	0.000	2	n/a	0	31	505.00	1,056	1.2 to MRC Bed 3 Route
34	Combine	0.000	2	n/a	0	29, 32,	------	------	Total 1.2

hydraflow.gpw	Return Period: 25 Year	Friday, 04 / 5 / 2024

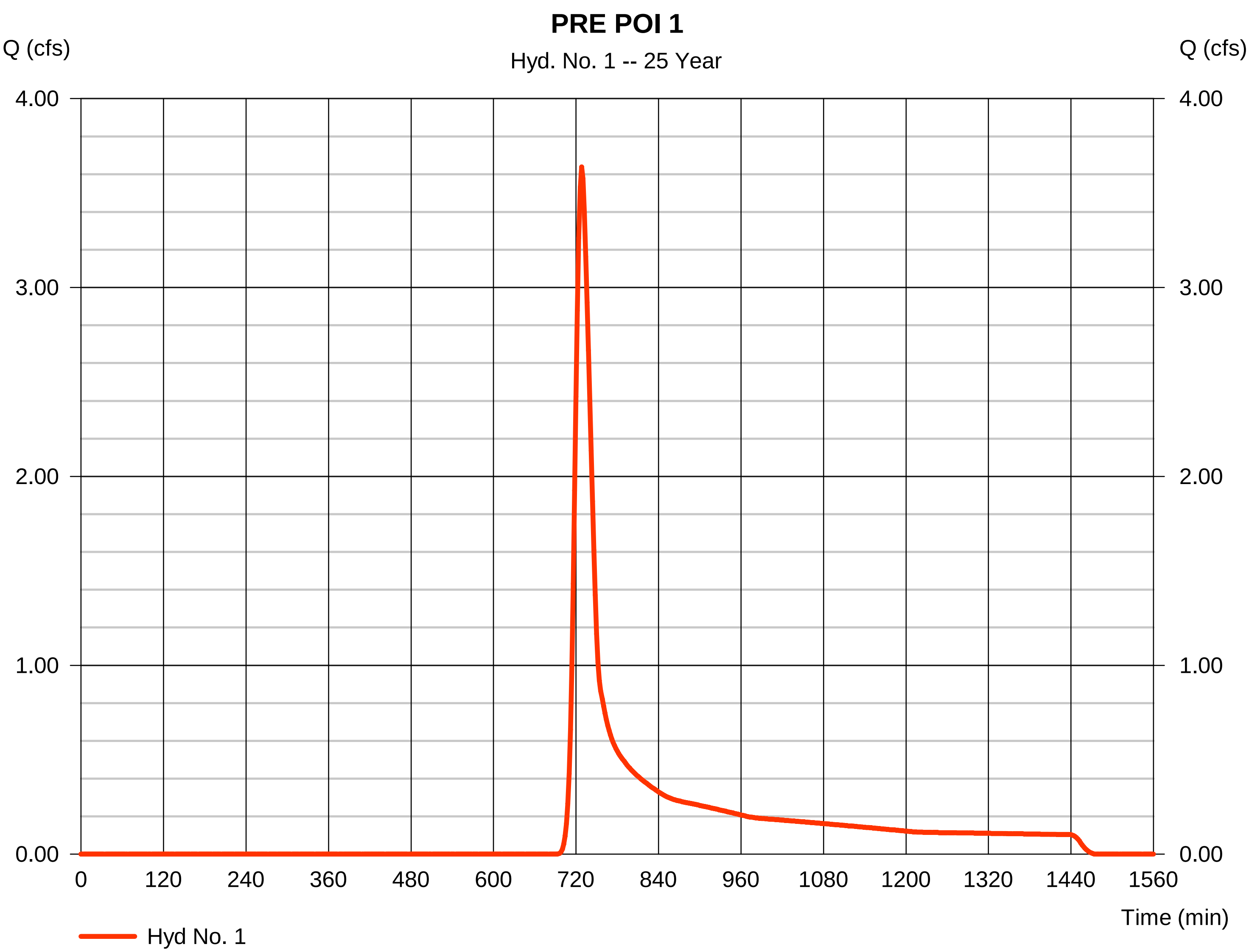
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 1

PRE POI 1

Hydrograph type	= SCS Runoff	Peak discharge	= 3.639 cfs
Storm frequency	= 25 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 14,424 cuft
Drainage area	= 2.780 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 20.20 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



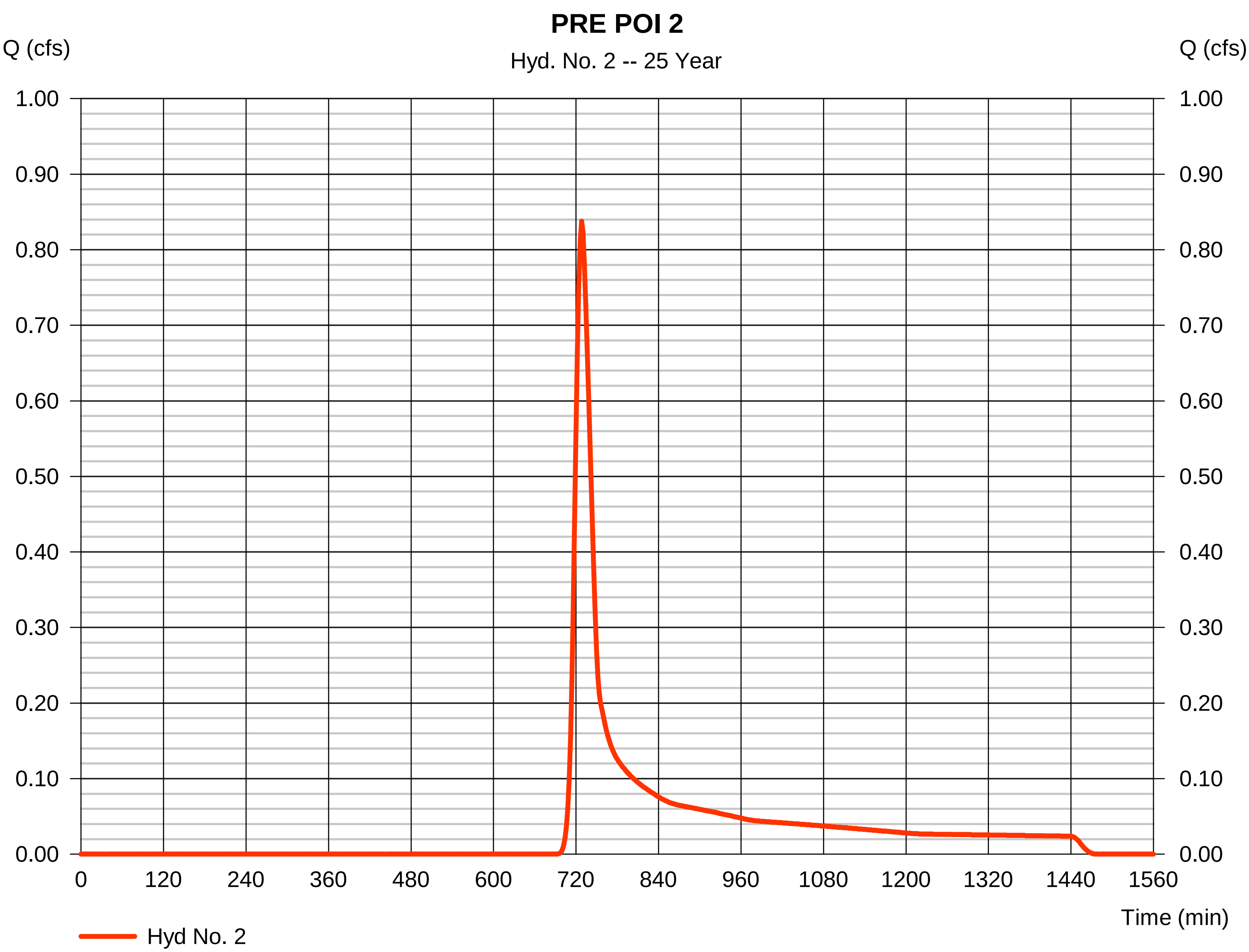
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 | Friday, 04 / 5 / 2024

Hyd. No. 2

PRE POI 2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.838 cfs
Storm frequency	= 25 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 3,321 cuft
Drainage area	= 0.640 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 22.10 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



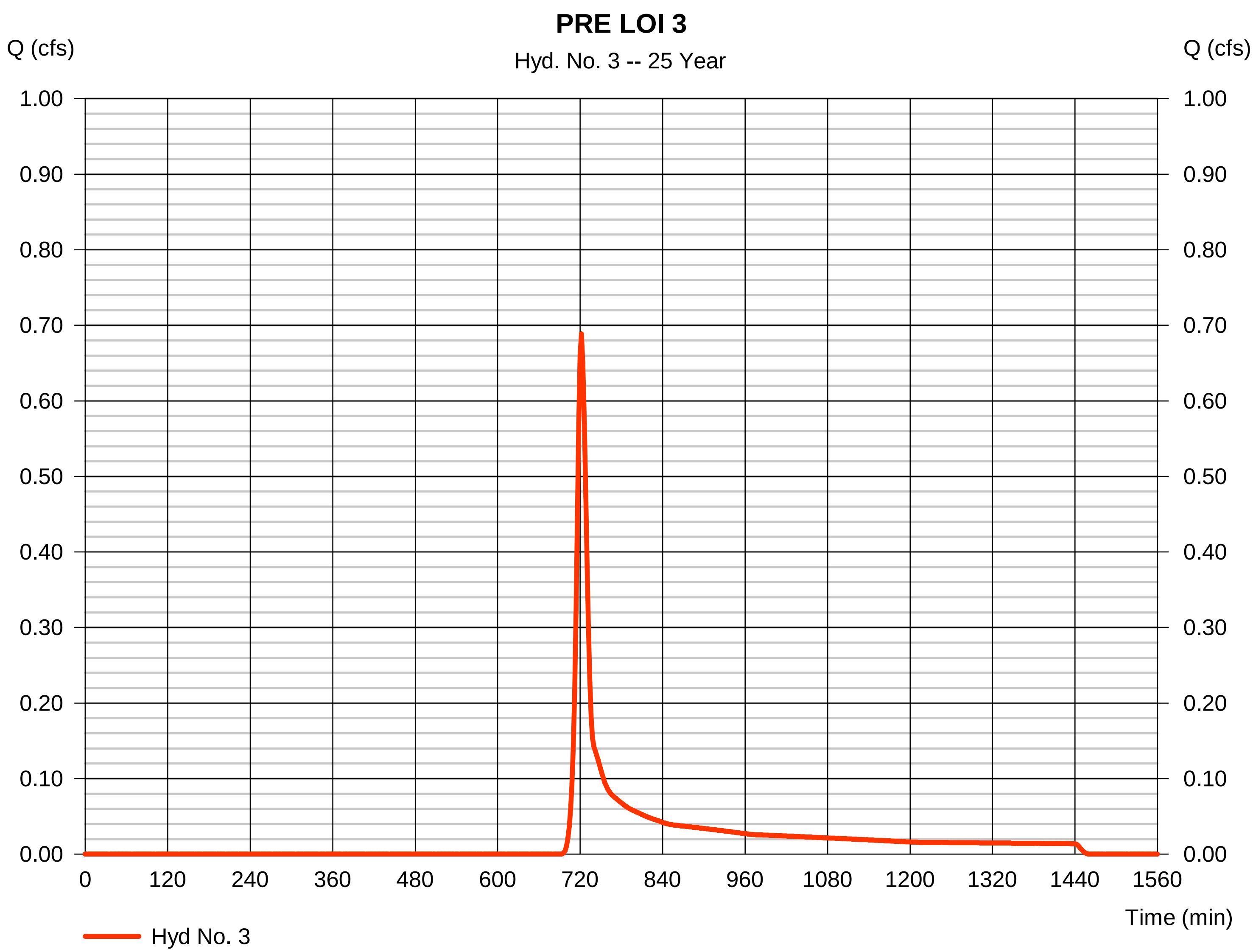
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Friday, 04 / 5 / 2024

Hyd. No. 3

PRE LOI 3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.689 cfs
Storm frequency	= 25 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 1,945 cuft
Drainage area	= 0.370 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.80 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



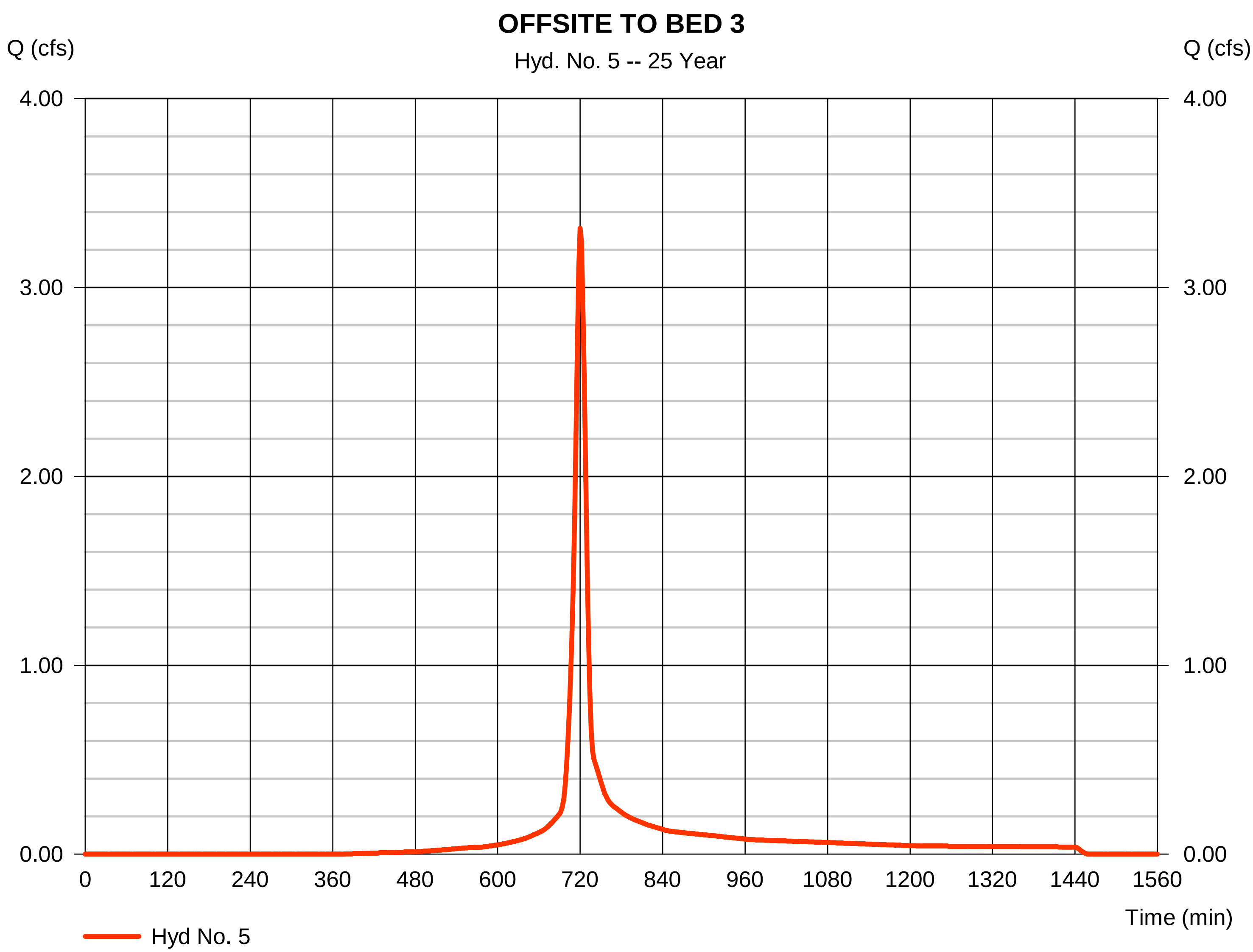
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Friday, 04 / 5 / 2024

Hyd. No. 5

OFFSITE TO BED 3

Hydrograph type	= SCS Runoff	Peak discharge	= 3.313 cfs
Storm frequency	= 25 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 8,662 cuft
Drainage area	= 0.620 ac	Curve number	= 81.3
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.20 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



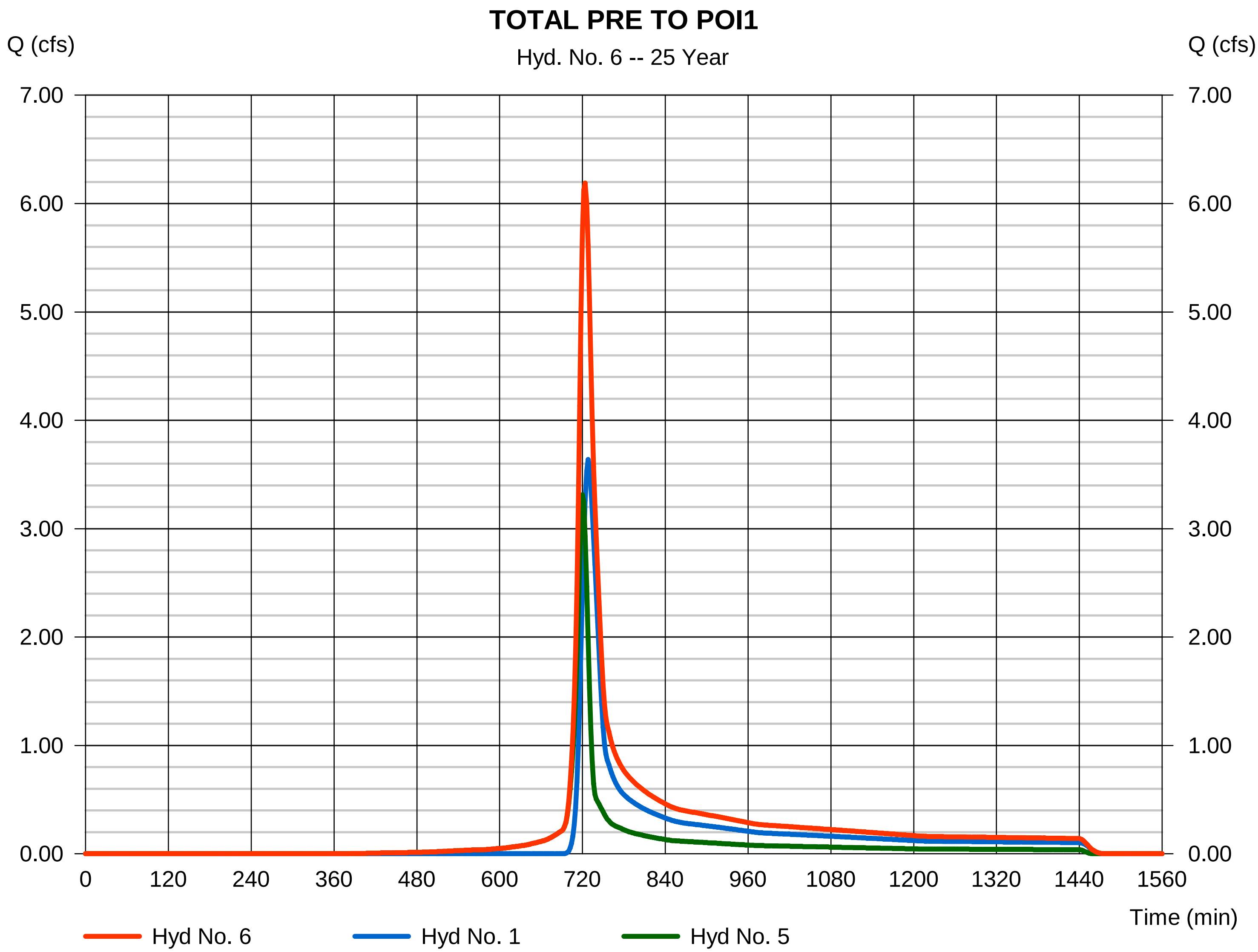
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 6

TOTAL PRE TO POI1

Hydrograph type	= Combine	Peak discharge	= 6.189 cfs
Storm frequency	= 25 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 23,086 cuft
Inflow hyds.	= 1, 5	Contrib. drain. area	= 3.400 ac



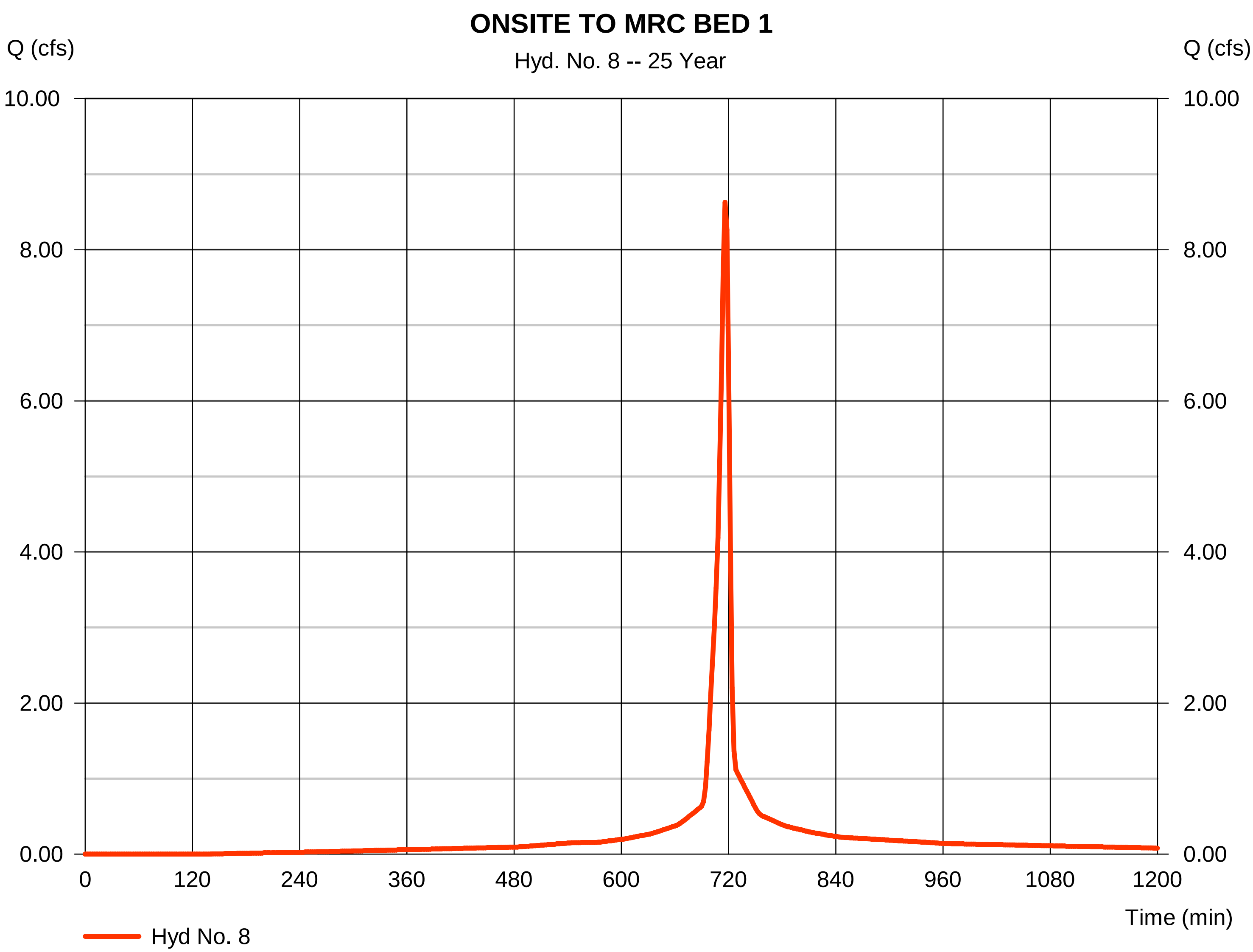
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 8

ONSITE TO MRC BED 1

Hydrograph type	= SCS Runoff	Peak discharge	= 8.630 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 19,432 cuft
Drainage area	= 1.130 ac	Curve number	= 93.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

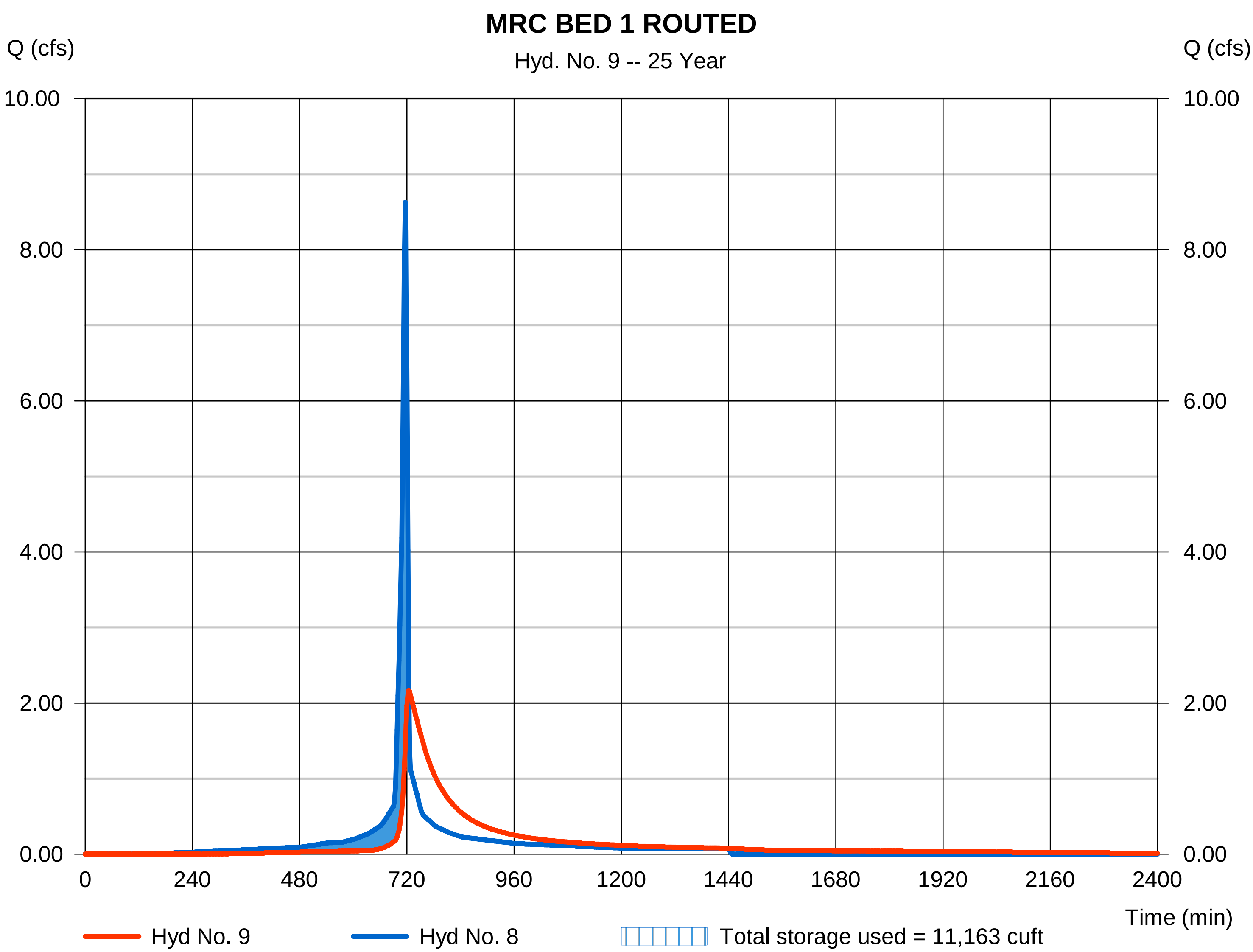
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 9

MRC BED 1 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 2.168 cfs
Storm frequency	= 25 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 19,379 cuft
Inflow hyd. No.	= 8 - ONSITE TO MRC BED 1	Max. Elevation	= 539.35 ft
Reservoir name	= MRC BED 1	Max. Storage	= 11,163 cuft

Storage Indication method used. Wet pond routing start elevation = 537.00 ft.



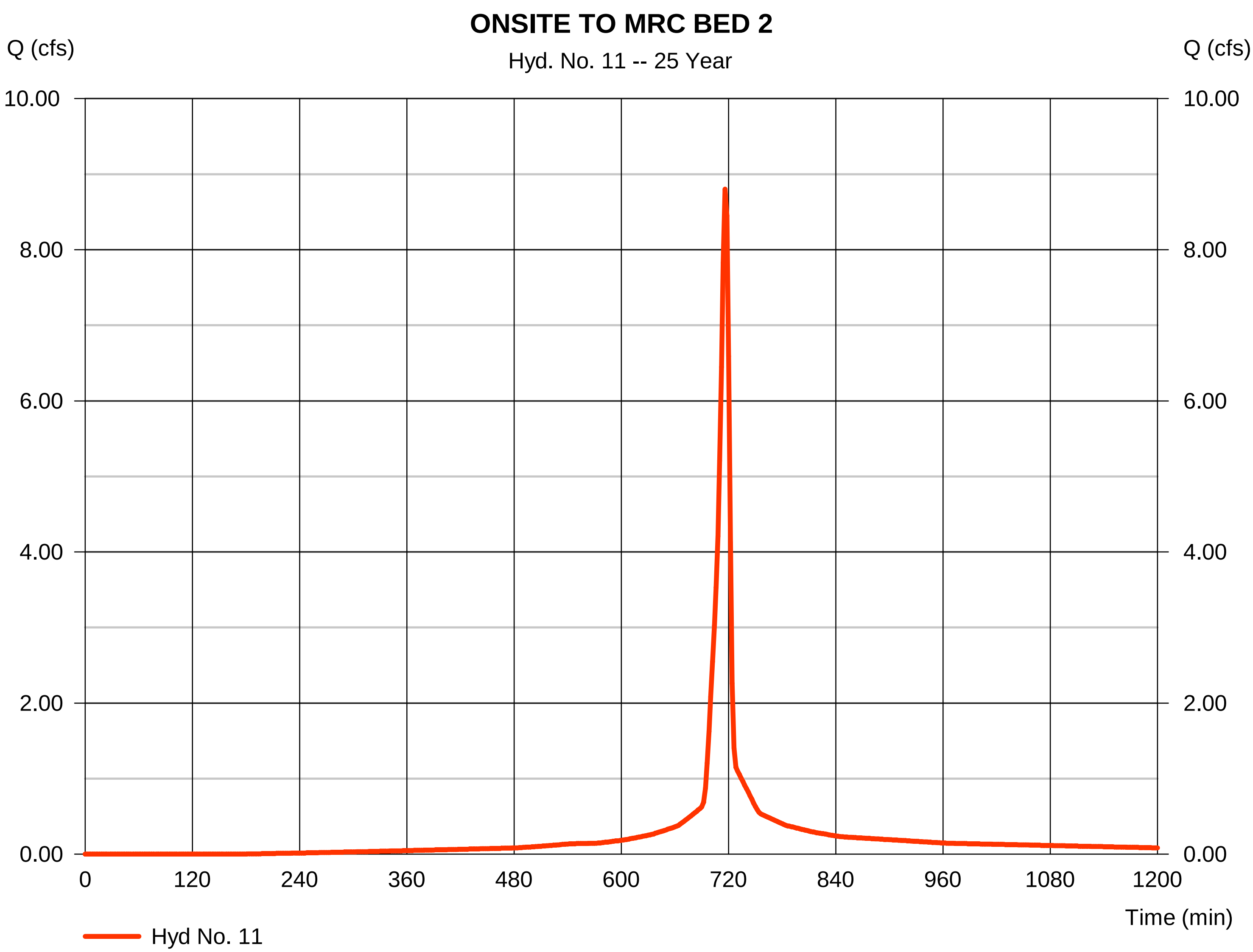
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 11

ONSITE TO MRC BED 2

Hydrograph type	= SCS Runoff	Peak discharge	= 8.800 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 19,389 cuft
Drainage area	= 1.180 ac	Curve number	= 91.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



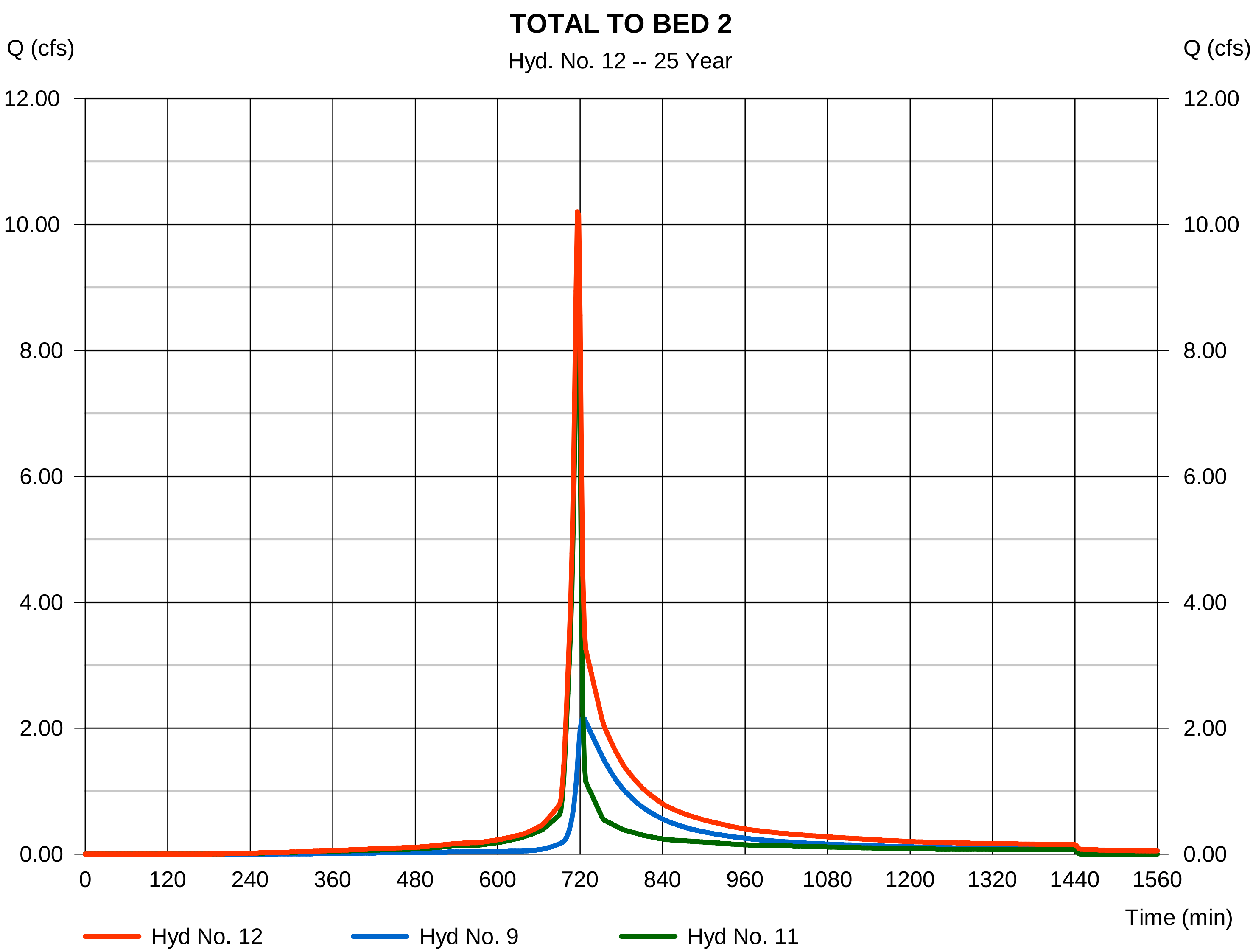
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 12

TOTAL TO BED 2

Hydrograph type	= Combine	Peak discharge	= 10.20 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 38,768 cuft
Inflow hyds.	= 9, 11	Contrib. drain. area	= 1.180 ac



Hydrograph Report

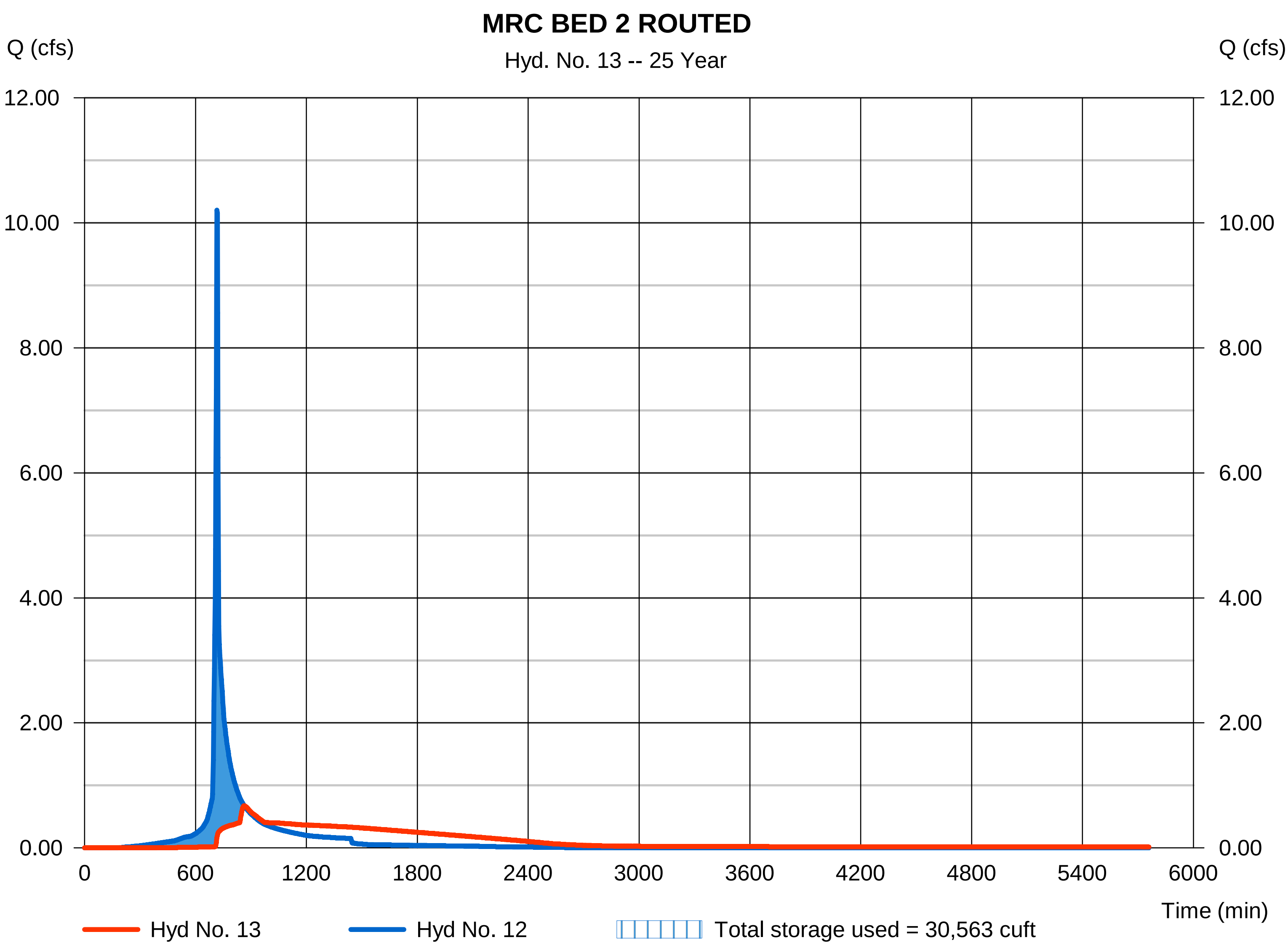
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 13

MRC BED 2 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 0.673 cfs
Storm frequency	= 25 yrs	Time to peak	= 864 min
Time interval	= 2 min	Hyd. volume	= 34,998 cuft
Inflow hyd. No.	= 12 - TOTAL TO BED 2	Max. Elevation	= 538.47 ft
Reservoir name	= MRC BED 2	Max. Storage	= 30,563 cuft

Storage Indication method used. Wet pond routing start elevation = 535.00 ft.



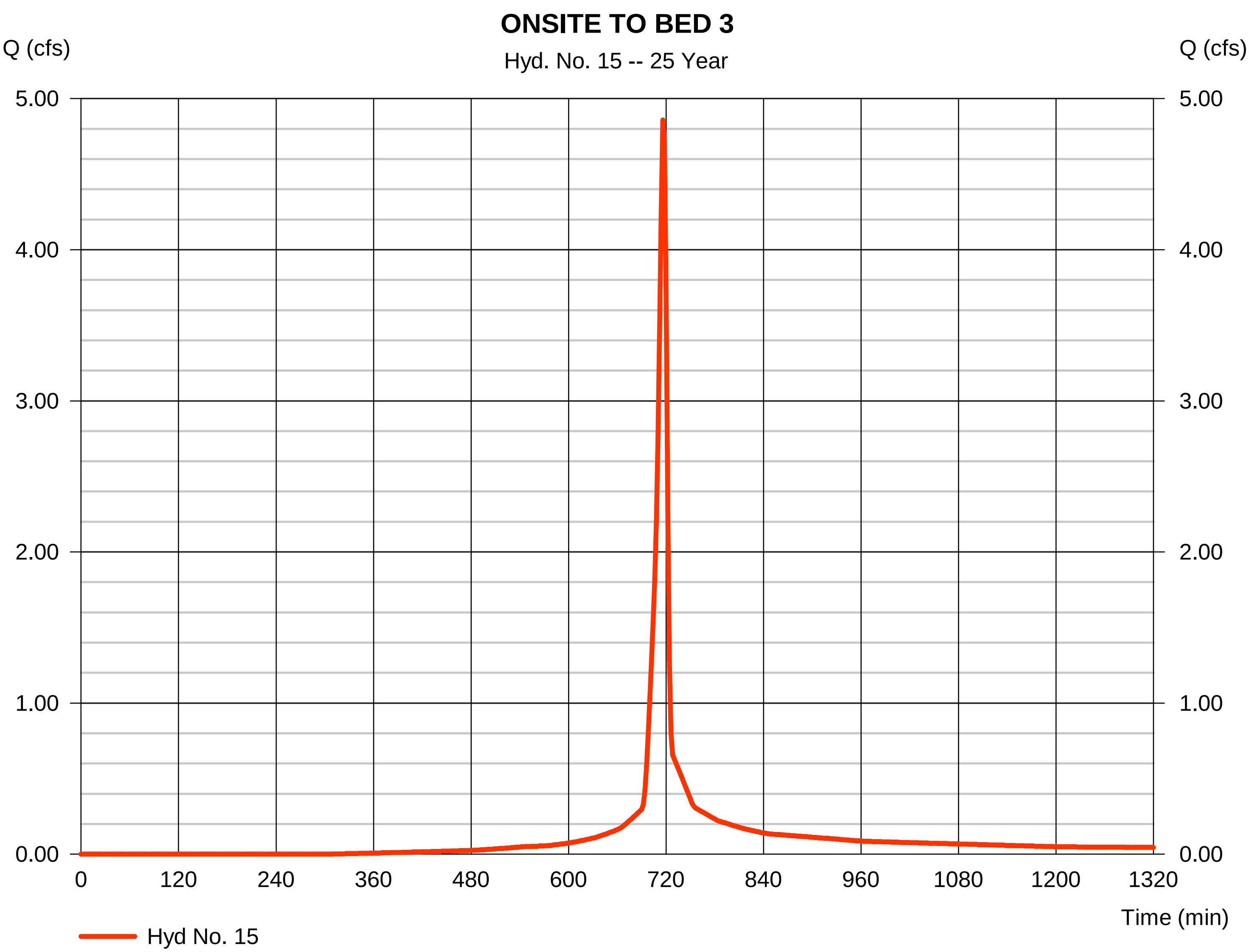
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 15

ONSITE TO BED 3

Hydrograph type	= SCS Runoff	Peak discharge	= 4.859 cfs
Storm frequency	= 25 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 10,169 cuft
Drainage area	= 0.730 ac	Curve number	= 84.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



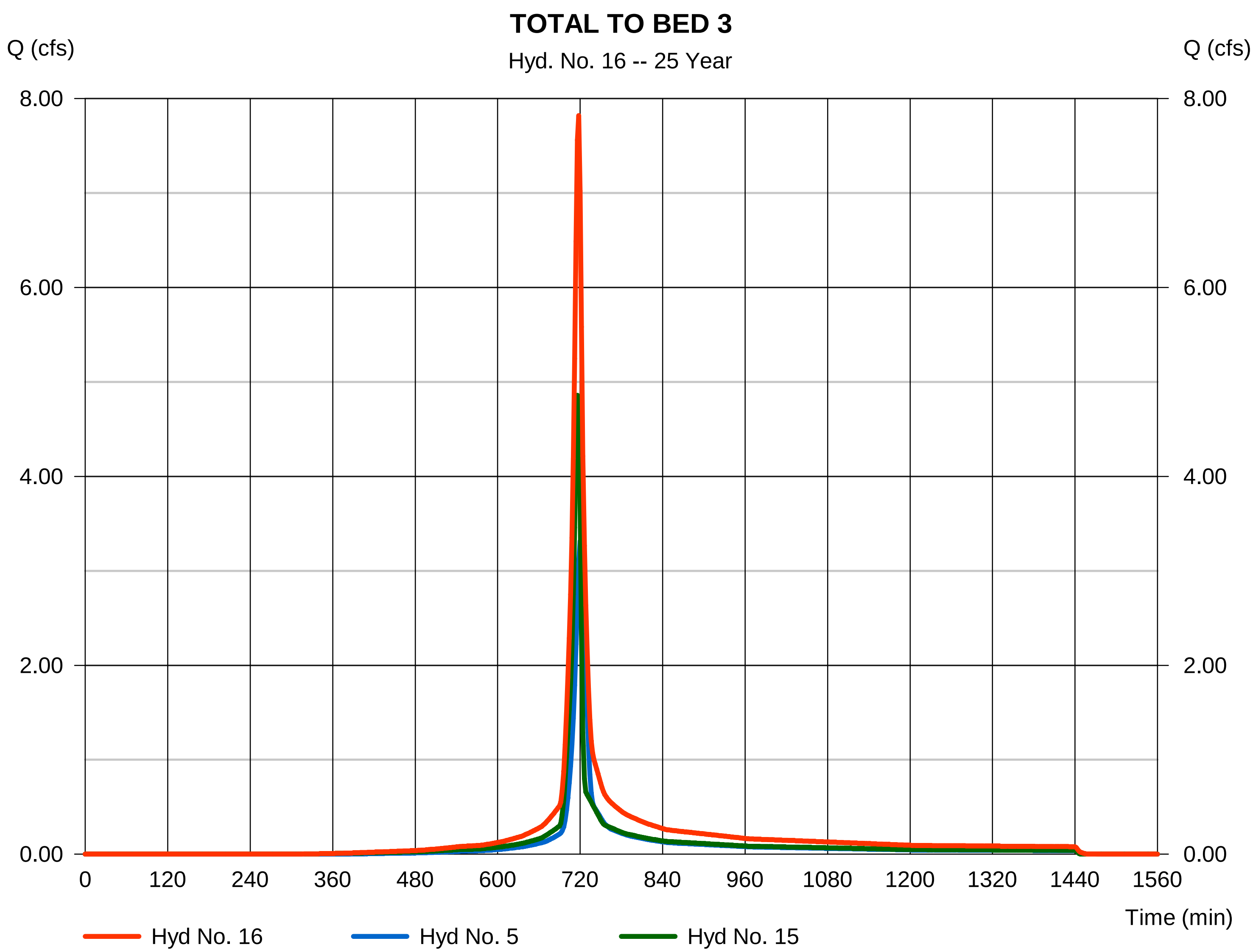
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 16

TOTAL TO BED 3

Hydrograph type	= Combine	Peak discharge	= 7.819 cfs
Storm frequency	= 25 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 18,831 cuft
Inflow hyds.	= 5, 15	Contrib. drain. area	= 1.350 ac



Hydrograph Report

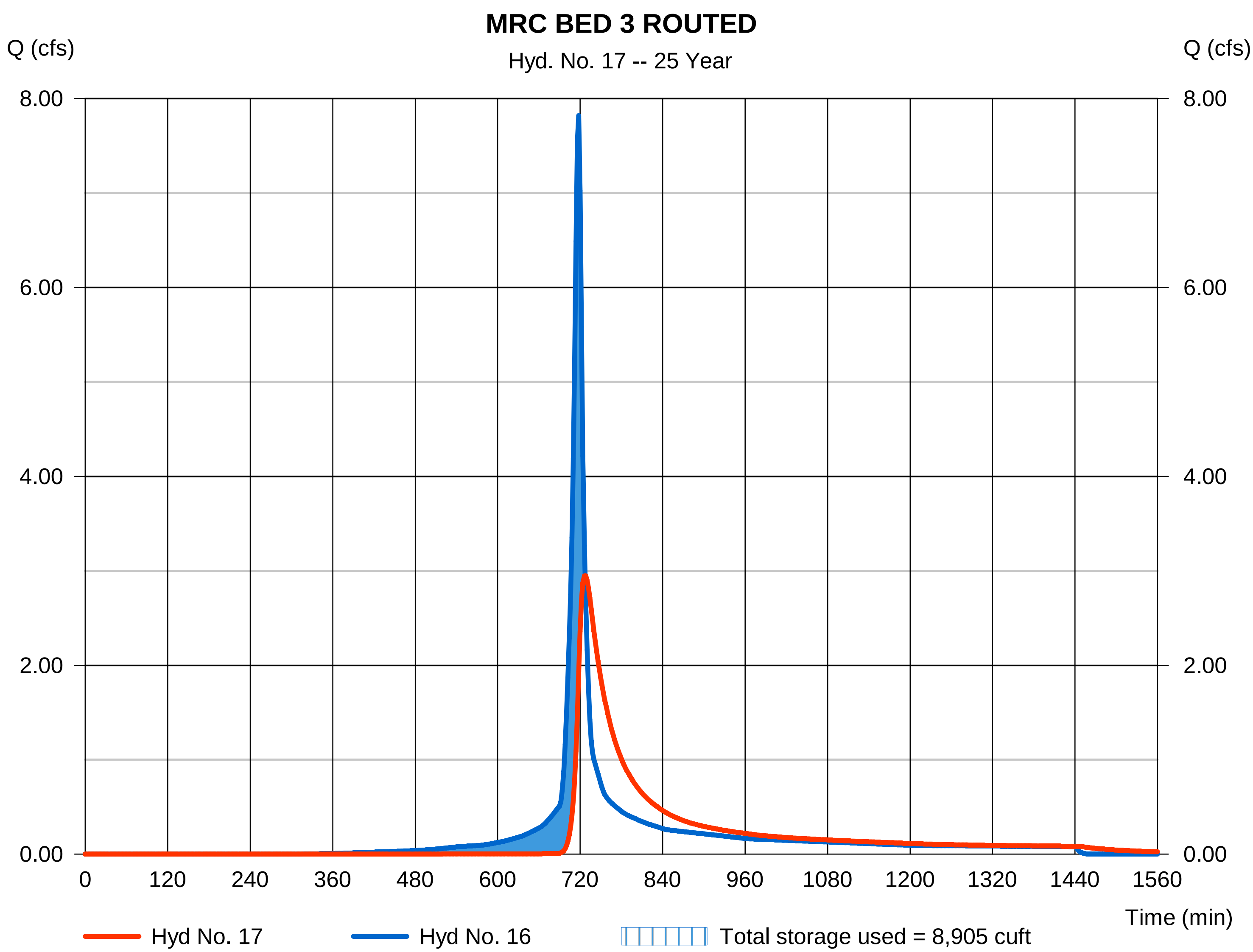
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Friday, 04 / 5 / 2024

Hyd. No. 17

MRC BED 3 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 2.946 cfs
Storm frequency	= 25 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 17,969 cuft
Inflow hyd. No.	= 16 - TOTAL TO BED 3	Max. Elevation	= 508.10 ft
Reservoir name	= MRC BED 3	Max. Storage	= 8,905 cuft

Storage Indication method used. Wet pond routing start elevation = 505.00 ft.



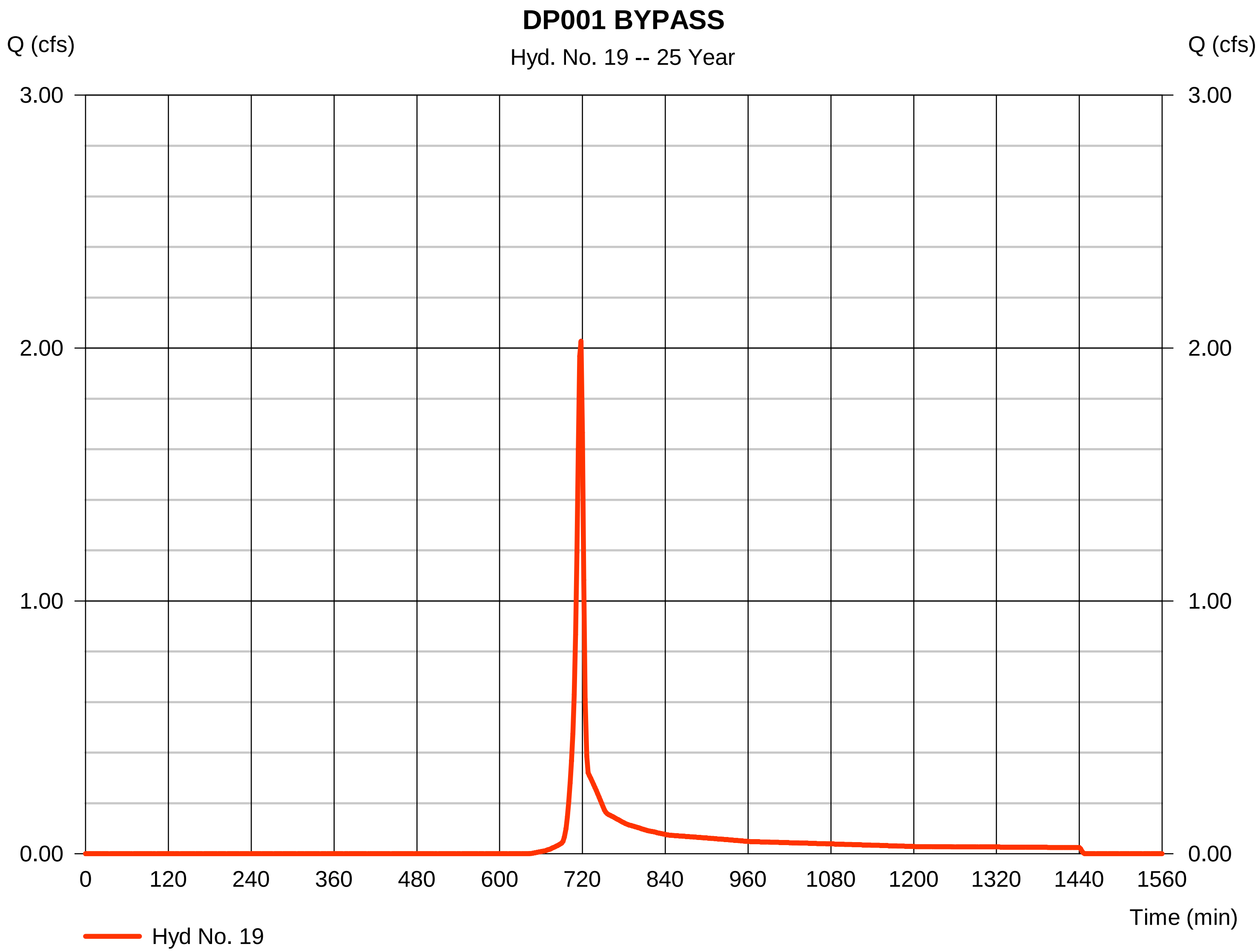
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 19

DP001 BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 2.027 cfs
Storm frequency	= 25 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 4,058 cuft
Drainage area	= 0.610 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



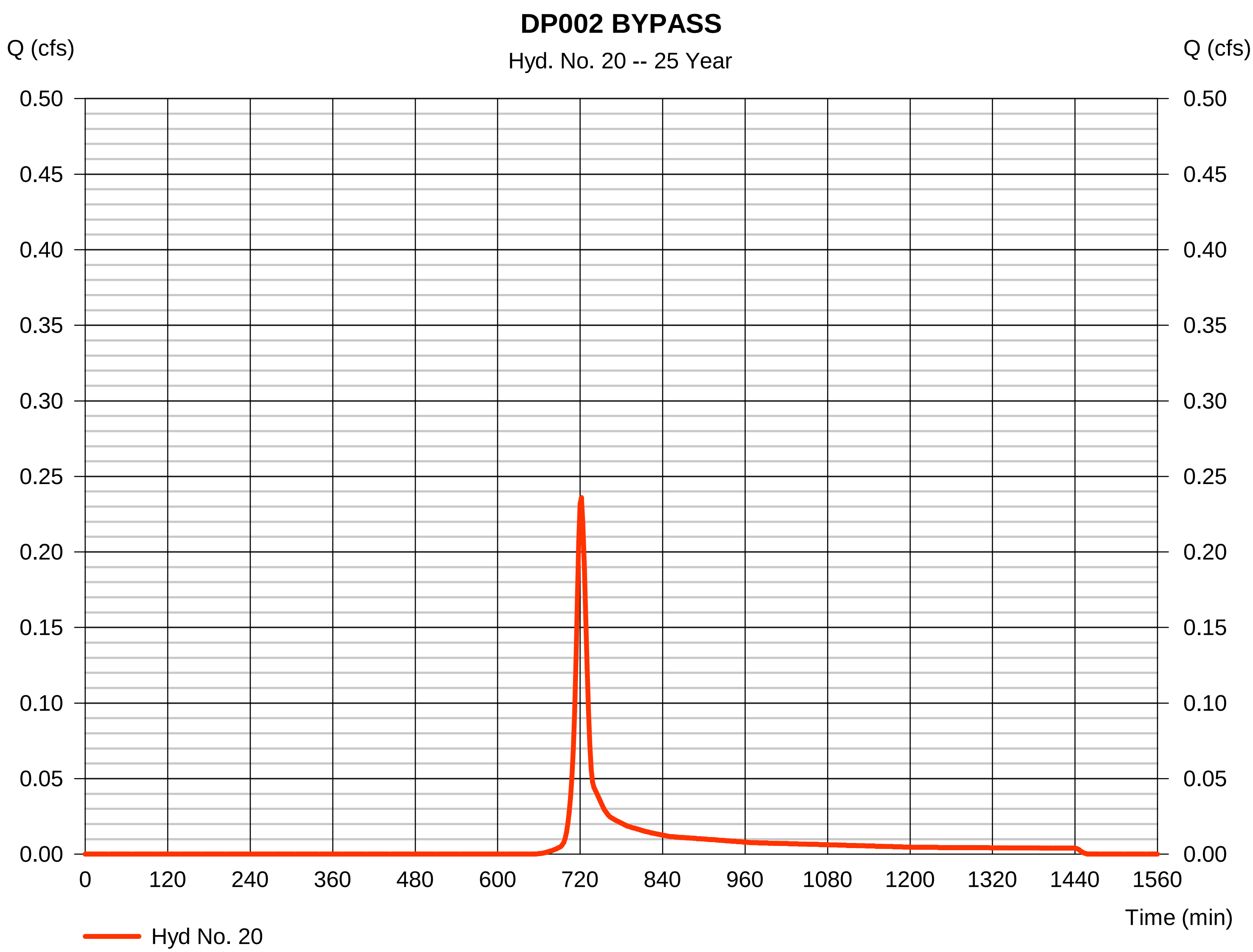
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 20

DP002 BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.236 cfs
Storm frequency	= 25 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 631 cuft
Drainage area	= 0.090 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.50 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



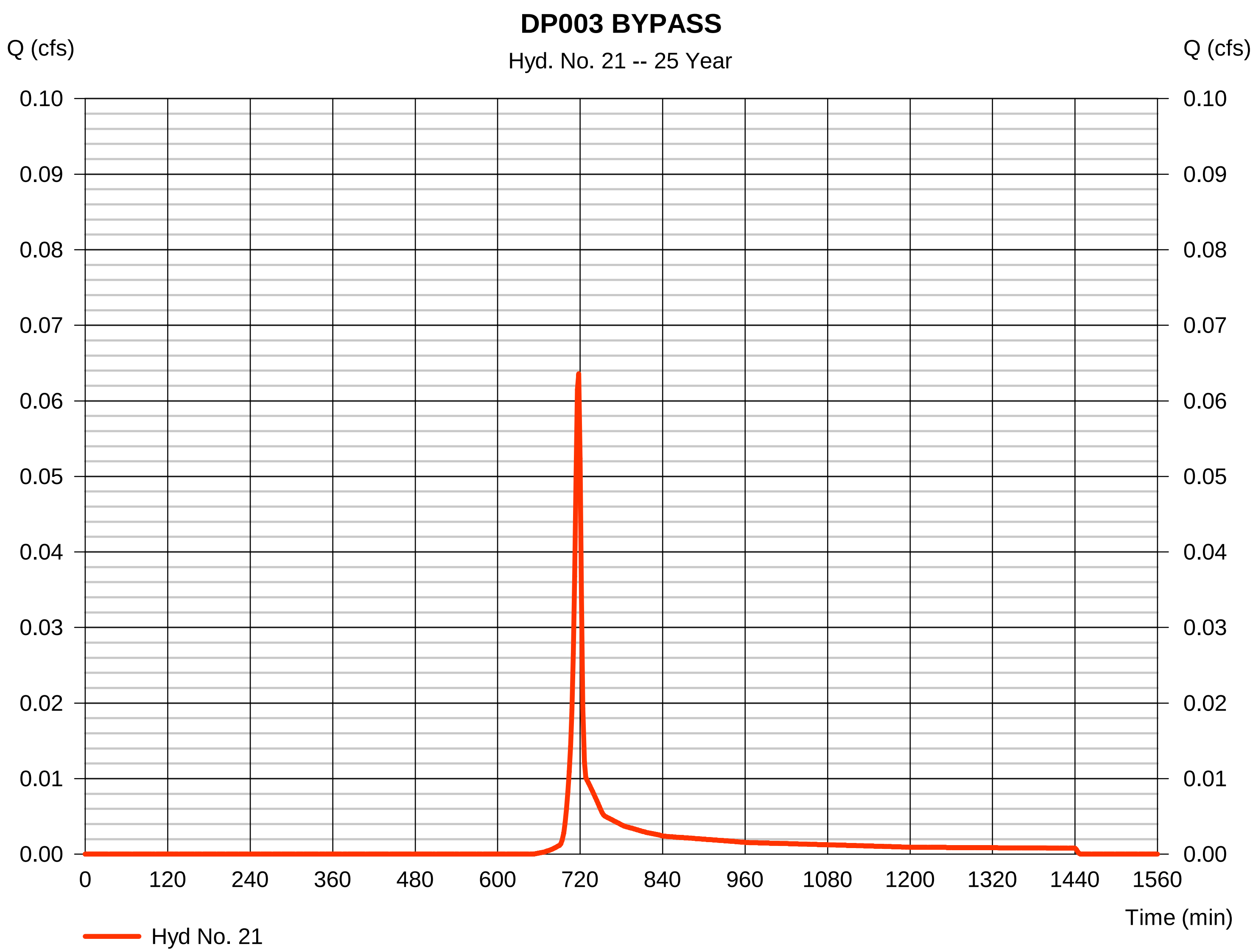
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 21

DP003 BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.064 cfs
Storm frequency	= 25 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 127 cuft
Drainage area	= 0.020 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



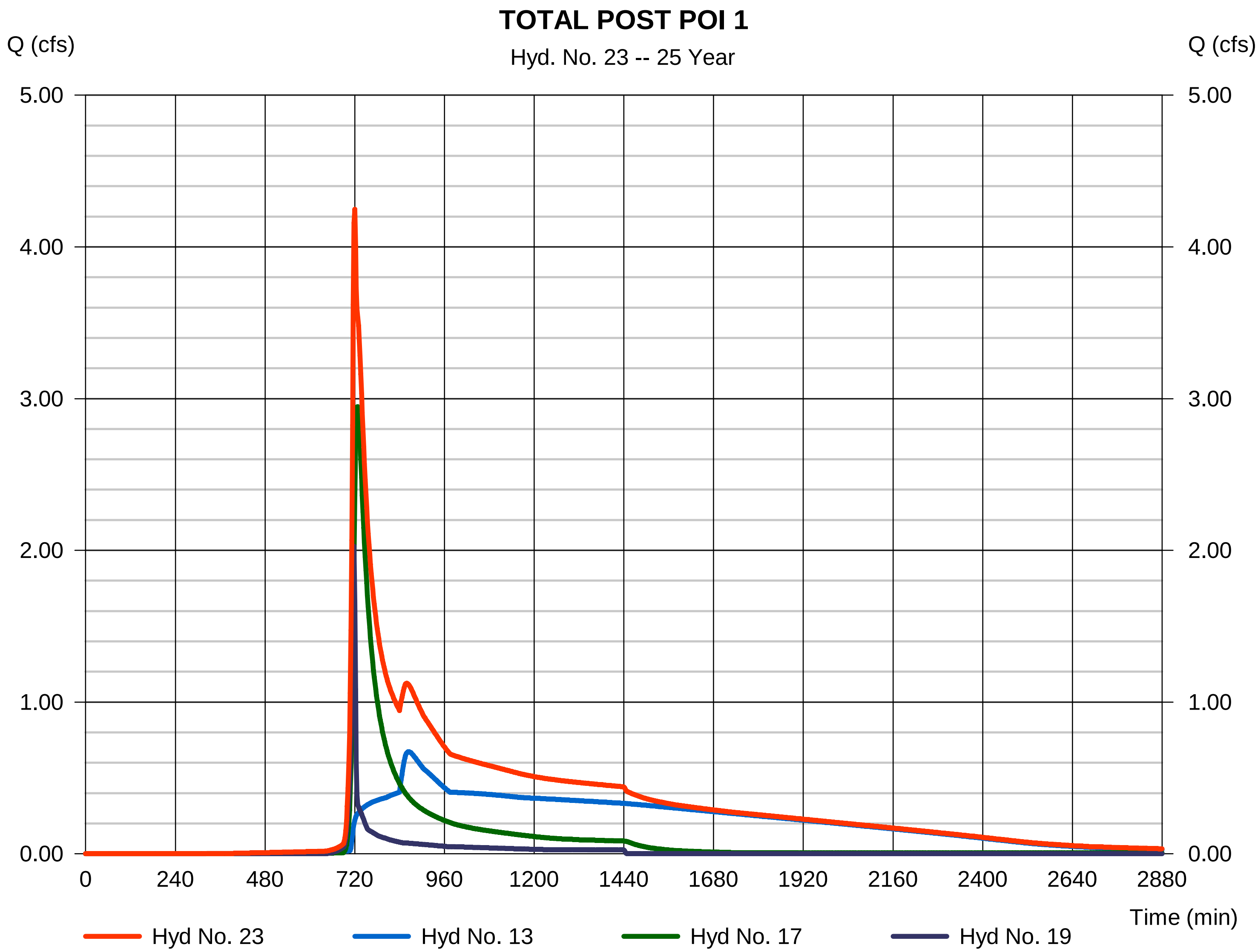
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 23

TOTAL POST POI 1

Hydrograph type	= Combine	Peak discharge	= 4.248 cfs
Storm frequency	= 25 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 57,024 cuft
Inflow hyds.	= 13, 17, 19	Contrib. drain. area	= 0.610 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	4.915	2	728	18,625	------	------	------	PRE POI 1
2	SCS Runoff	1.132	2	728	4,288	------	------	------	PRE POI 2
3	SCS Runoff	0.918	2	722	2,512	------	------	------	PRE LOI 3
5	SCS Runoff	3.863	2	720	10,152	------	------	------	OFFSITE TO BED 3
6	Combine	7.897	2	724	28,777	1, 5	------	------	TOTAL PRE TO POI1
8	SCS Runoff	9.736	2	716	22,096	------	------	------	ONSITE TO MRC BED 1
9	Reservoir	2.613	2	724	22,043	8	539.61	12,218	MRC BED 1 ROUTED
11	SCS Runoff	9.967	2	716	22,150	------	------	------	ONSITE TO MRC BED 2
12	Combine	11.70	2	716	44,193	9, 11	------	------	TOTAL TO BED 2
13	Reservoir	1.539	2	786	40,399	12	538.59	30,922	MRC BED 2 ROUTED
15	SCS Runoff	5.597	2	716	11,810	------	------	------	ONSITE TO BED 3
16	Combine	9.047	2	718	21,963	5, 15	------	------	TOTAL TO BED 3
17	Reservoir	4.231	2	726	21,098	16	508.45	9,804	MRC BED 3 ROUTED
19	SCS Runoff	2.532	2	718	5,064	------	------	------	DP001 BYPASS
20	SCS Runoff	0.299	2	722	791	------	------	------	DP002 BYPASS
21	SCS Runoff	0.080	2	718	160	------	------	------	DP003 BYPASS
23	Combine	5.430	2	720	66,561	13, 17, 19,	------	------	TOTAL POST POI 1
25	SCS Runoff	0.000	2	n/a	0	------	------	------	1.2 to MRC Bed 1
26	Reservoir	0.000	2	n/a	0	25	537.00	1,660	1.2 to MRC Bed 1 Rout
27	SCS Runoff	0.000	2	n/a	0	------	------	------	1.2 to MRC Bed 2
28	Combine	0.000	2	n/a	0	26, 27	------	------	1.2 Total to MRC Bed 2
29	Reservoir	0.000	2	n/a	0	28	535.00	7,290	1.2 to MRC Bed 2 Route
31	SCS Runoff	0.000	2	n/a	0	------	------	------	1.2 to MRC Bed 3
32	Reservoir	0.000	2	n/a	0	31	505.00	1,056	1.2 to MRC Bed 3 Route
34	Combine	0.000	2	n/a	0	29, 32,	------	------	Total 1.2

hydraflow.gpw	Return Period: 50 Year	Friday, 04 / 5 / 2024

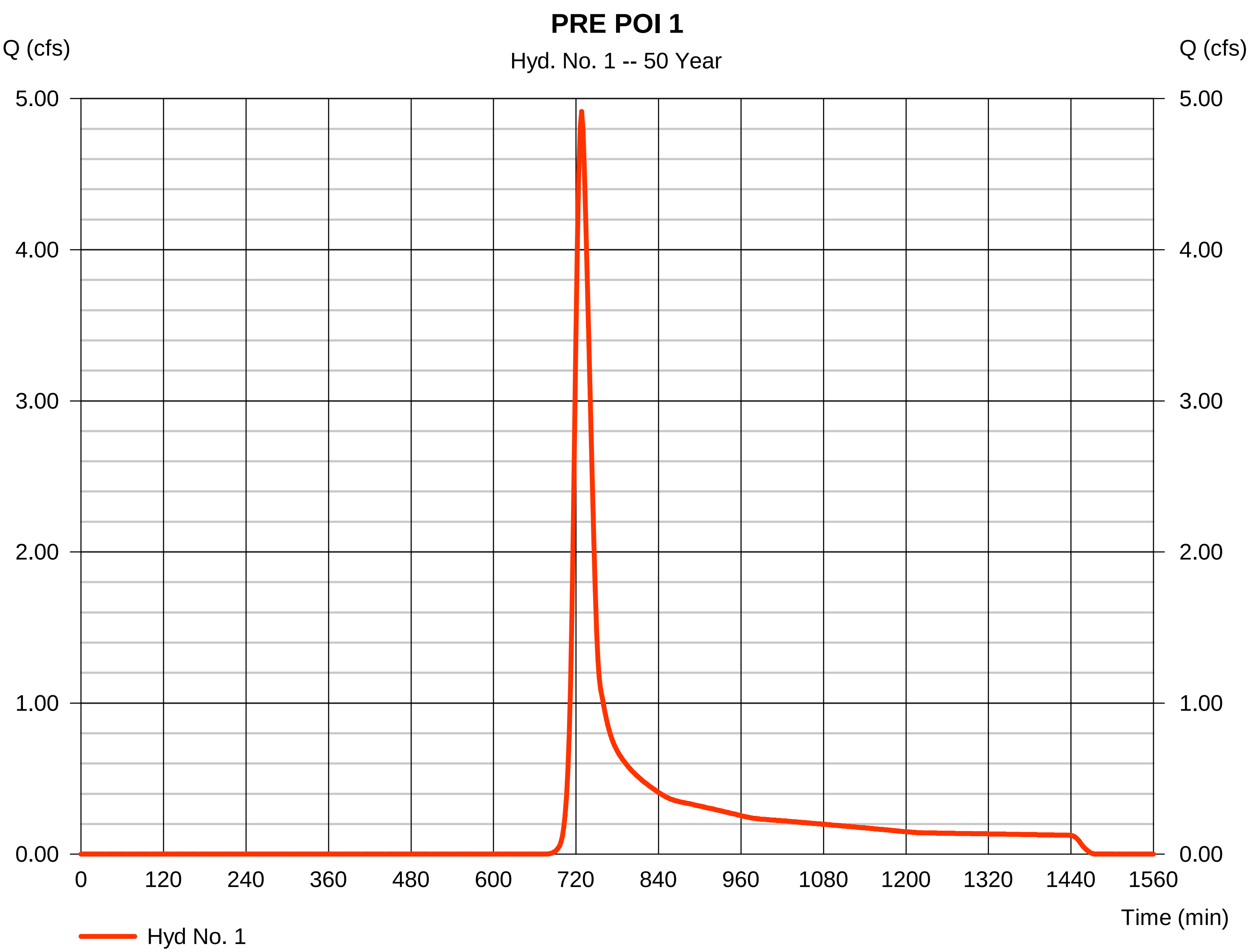
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 1

PRE POI 1

Hydrograph type	= SCS Runoff	Peak discharge	= 4.915 cfs
Storm frequency	= 50 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 18,625 cuft
Drainage area	= 2.780 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 20.20 min
Total precip.	= 6.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



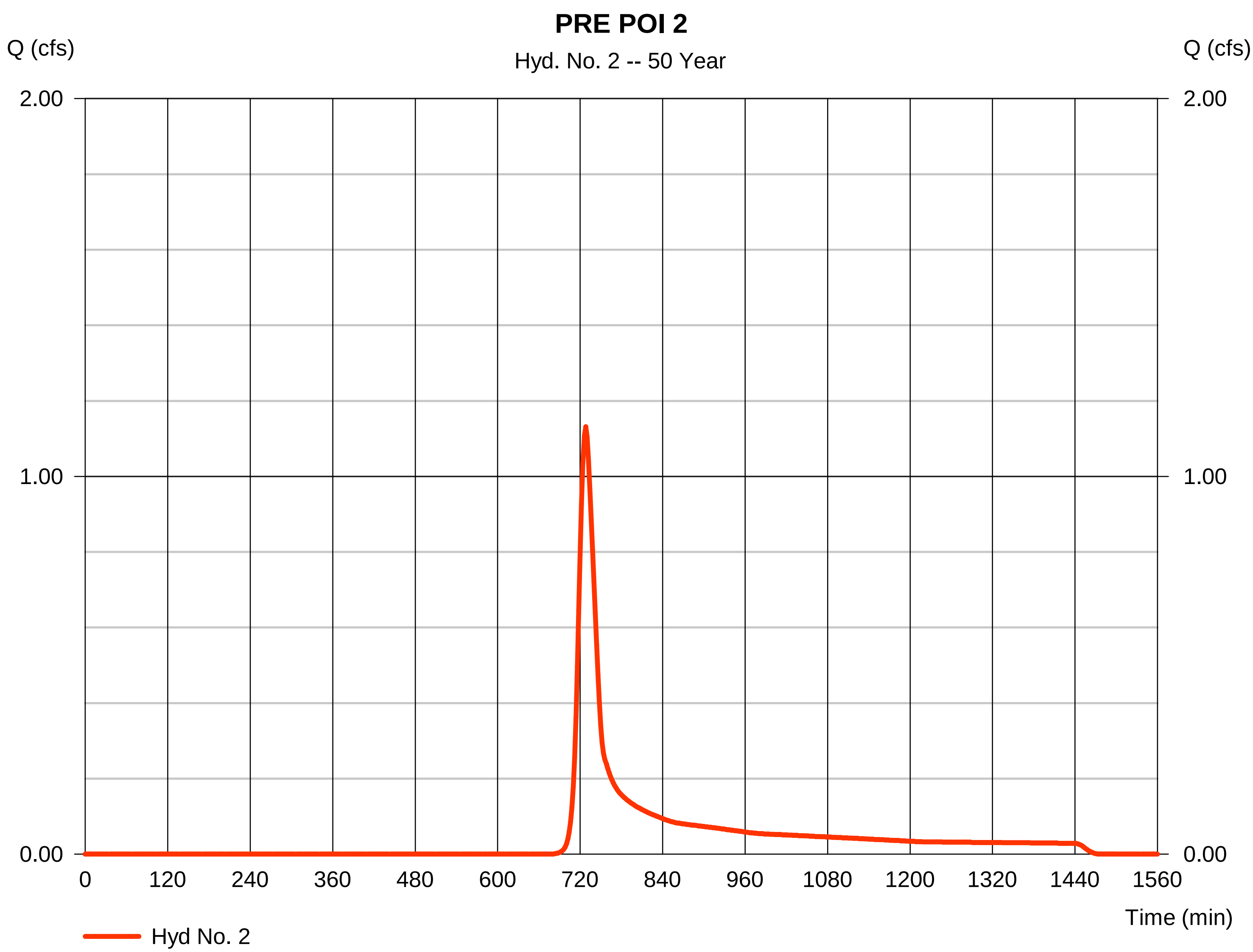
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 2

PRE POI 2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.132 cfs
Storm frequency	= 50 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 4,288 cuft
Drainage area	= 0.640 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 22.10 min
Total precip.	= 6.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



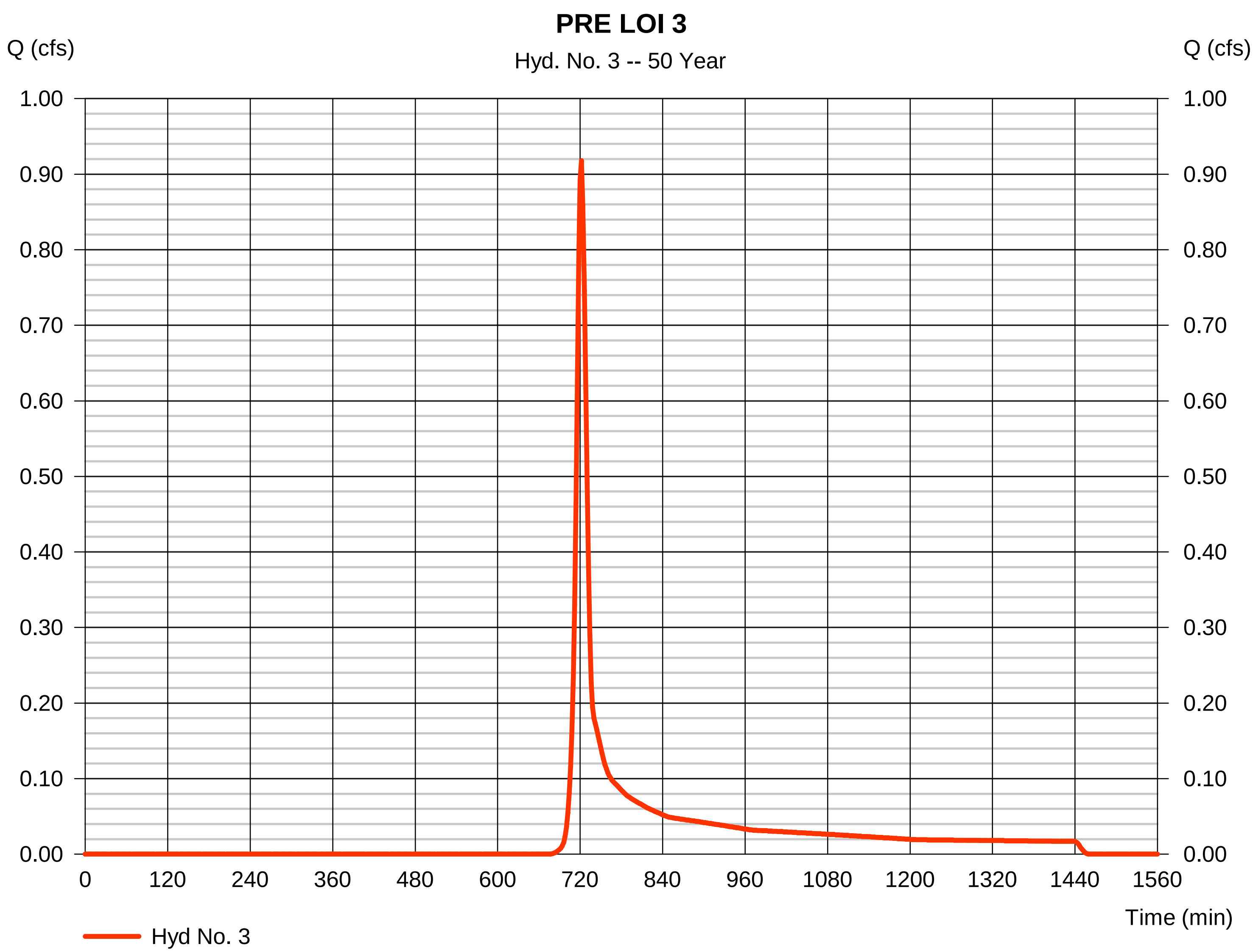
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 3

PRE LOI 3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.918 cfs
Storm frequency	= 50 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 2,512 cuft
Drainage area	= 0.370 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.80 min
Total precip.	= 6.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



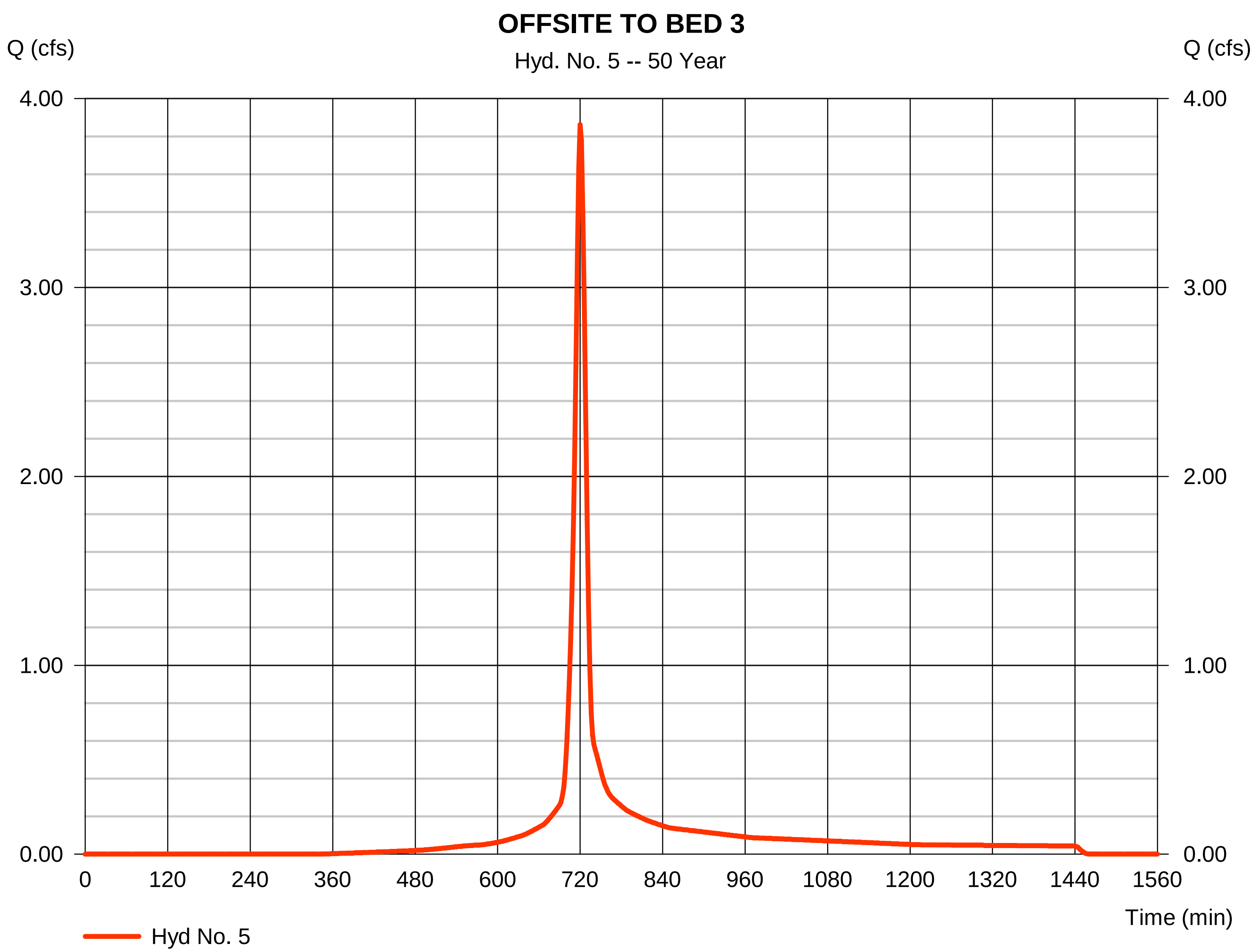
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 5

OFFSITE TO BED 3

Hydrograph type	= SCS Runoff	Peak discharge	= 3.863 cfs
Storm frequency	= 50 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 10,152 cuft
Drainage area	= 0.620 ac	Curve number	= 81.3
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.20 min
Total precip.	= 6.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



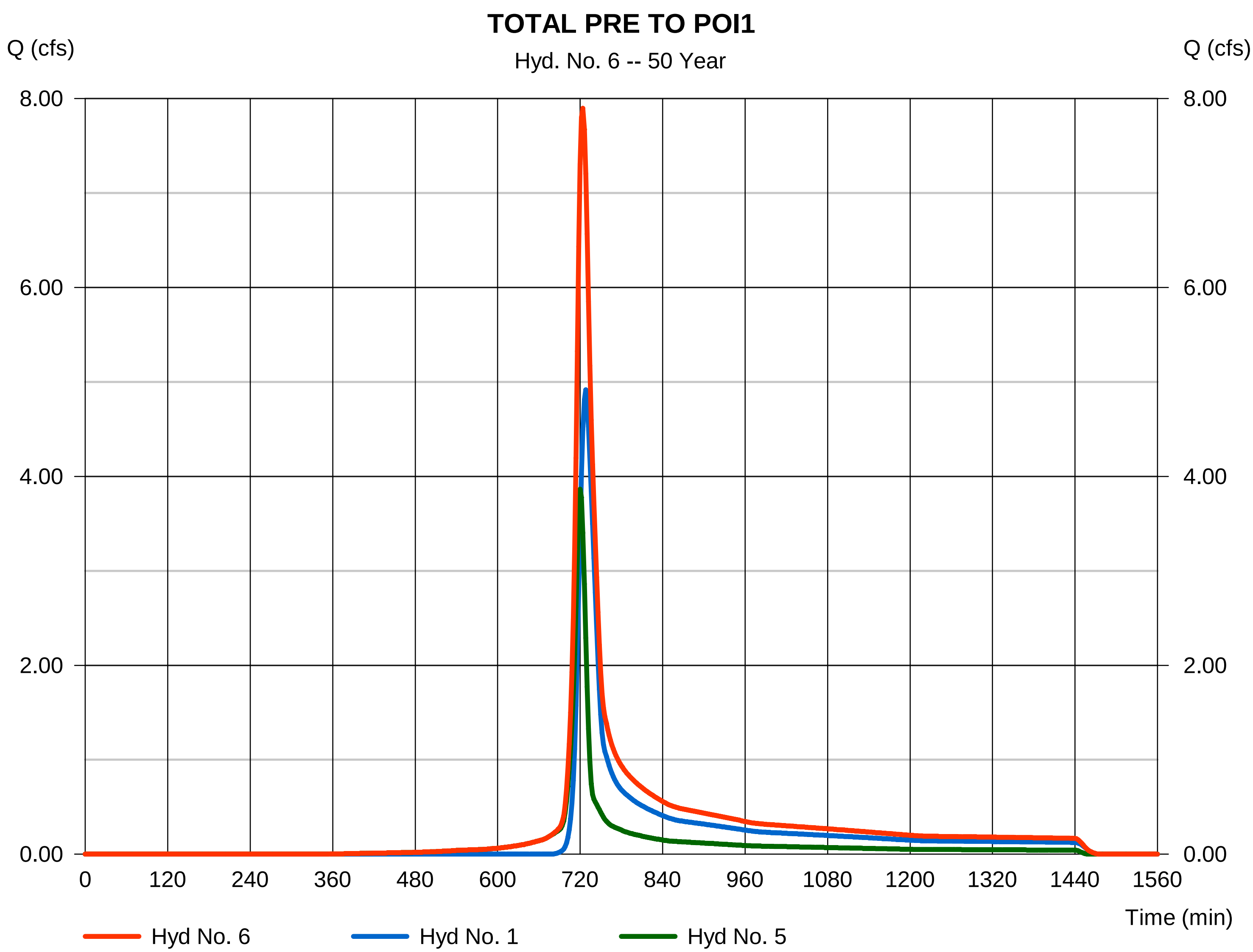
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 6

TOTAL PRE TO POI1

Hydrograph type	= Combine	Peak discharge	= 7.897 cfs
Storm frequency	= 50 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 28,777 cuft
Inflow hyds.	= 1, 5	Contrib. drain. area	= 3.400 ac



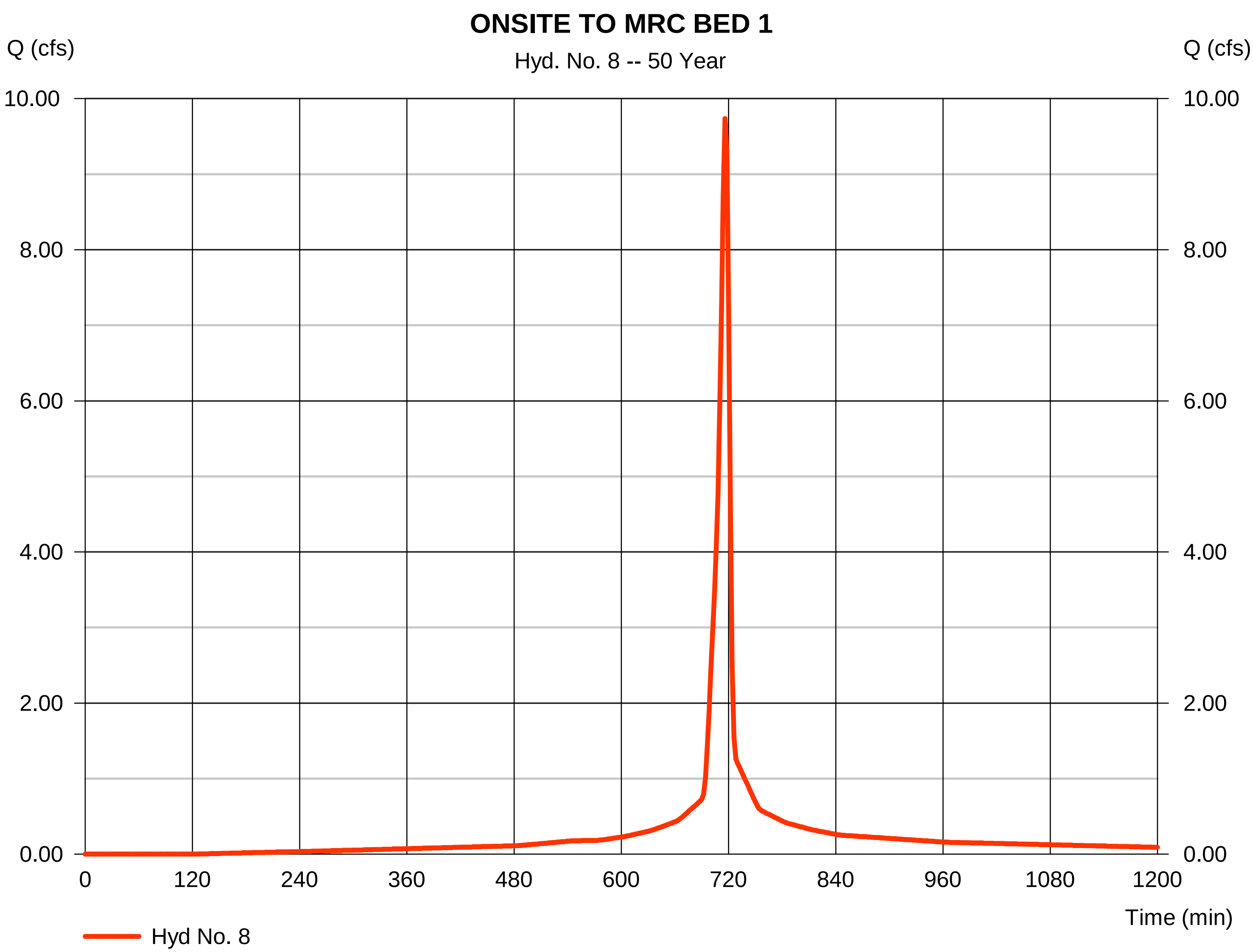
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 8

ONSITE TO MRC BED 1

Hydrograph type	= SCS Runoff	Peak discharge	= 9.736 cfs
Storm frequency	= 50 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 22,096 cuft
Drainage area	= 1.130 ac	Curve number	= 93.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

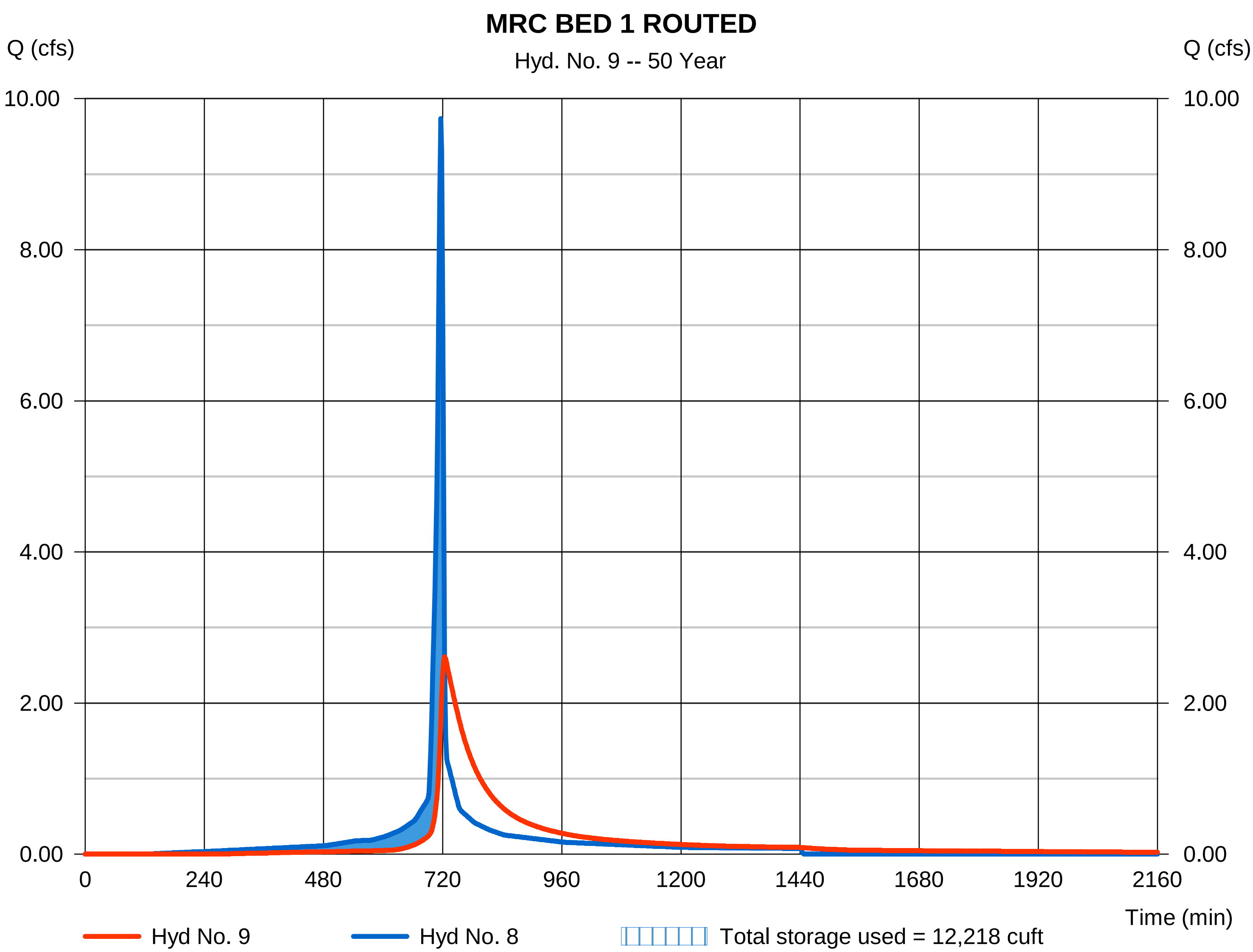
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 9

MRC BED 1 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 2.613 cfs
Storm frequency	= 50 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 22,043 cuft
Inflow hyd. No.	= 8 - ONSITE TO MRC BED 1	Max. Elevation	= 539.61 ft
Reservoir name	= MRC BED 1	Max. Storage	= 12,218 cuft

Storage Indication method used. Wet pond routing start elevation = 537.00 ft.



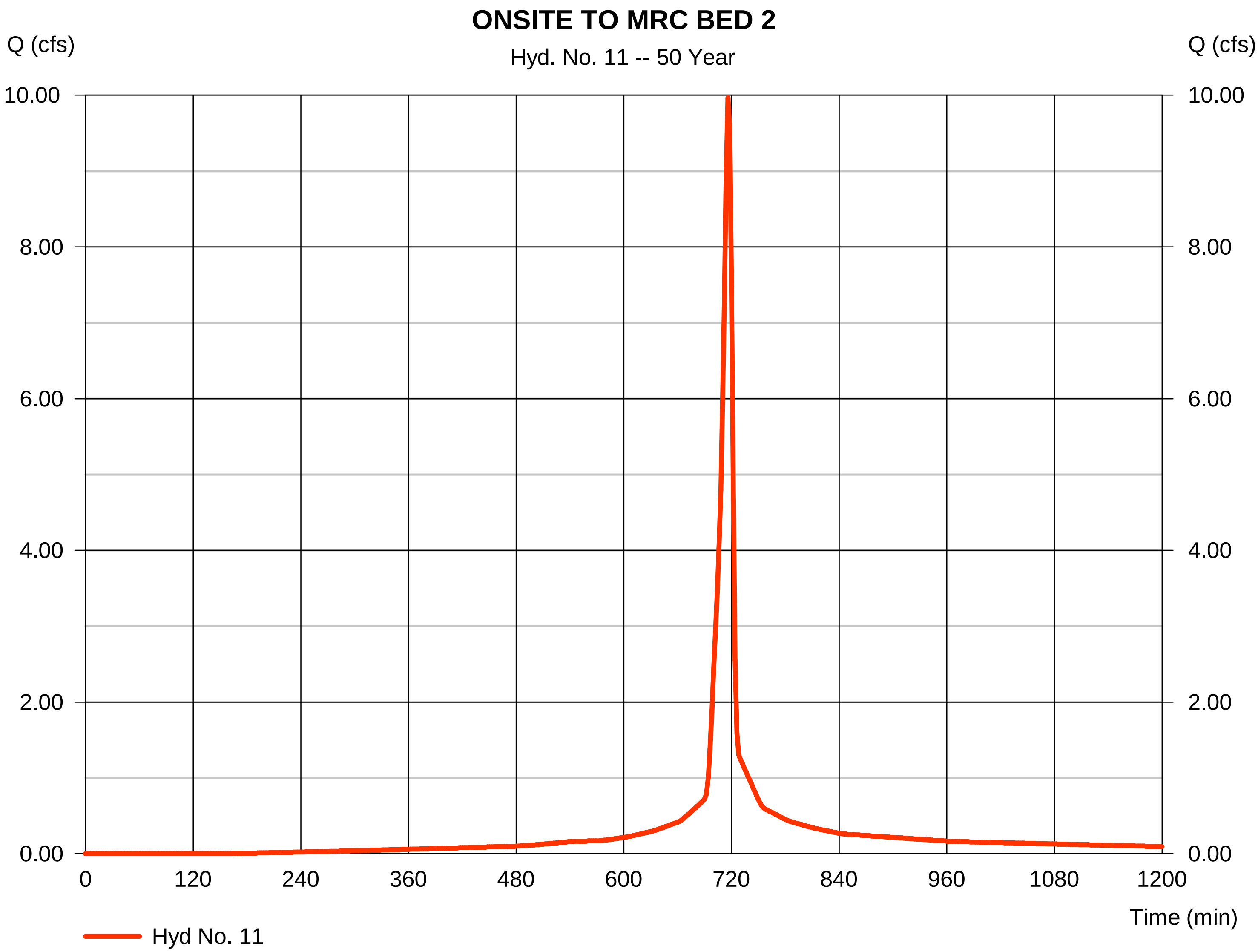
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 11

ONSITE TO MRC BED 2

Hydrograph type	= SCS Runoff	Peak discharge	= 9.967 cfs
Storm frequency	= 50 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 22,150 cuft
Drainage area	= 1.180 ac	Curve number	= 91.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



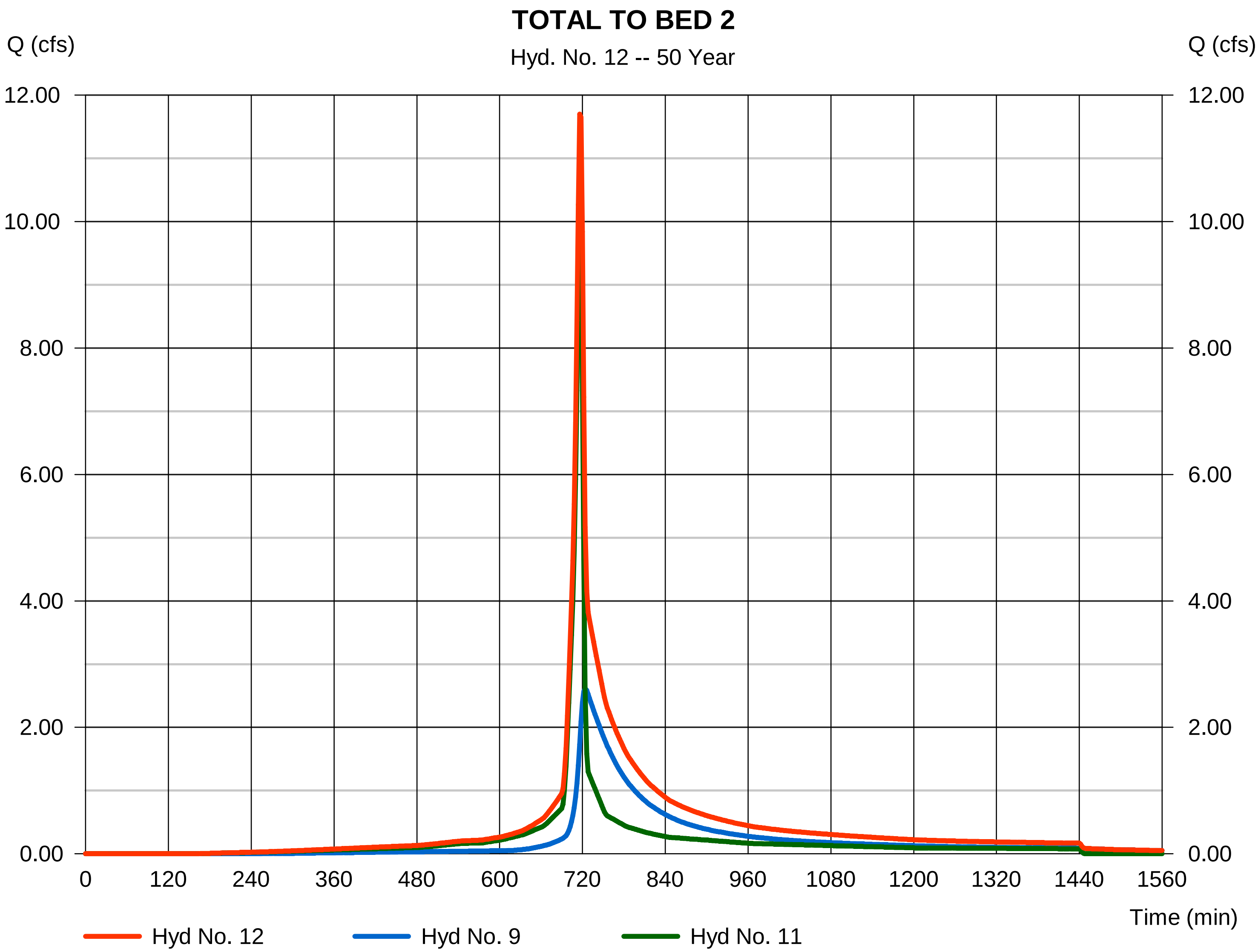
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 12

TOTAL TO BED 2

Hydrograph type	= Combine	Peak discharge	= 11.70 cfs
Storm frequency	= 50 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 44,193 cuft
Inflow hyds.	= 9, 11	Contrib. drain. area	= 1.180 ac



Hydrograph Report

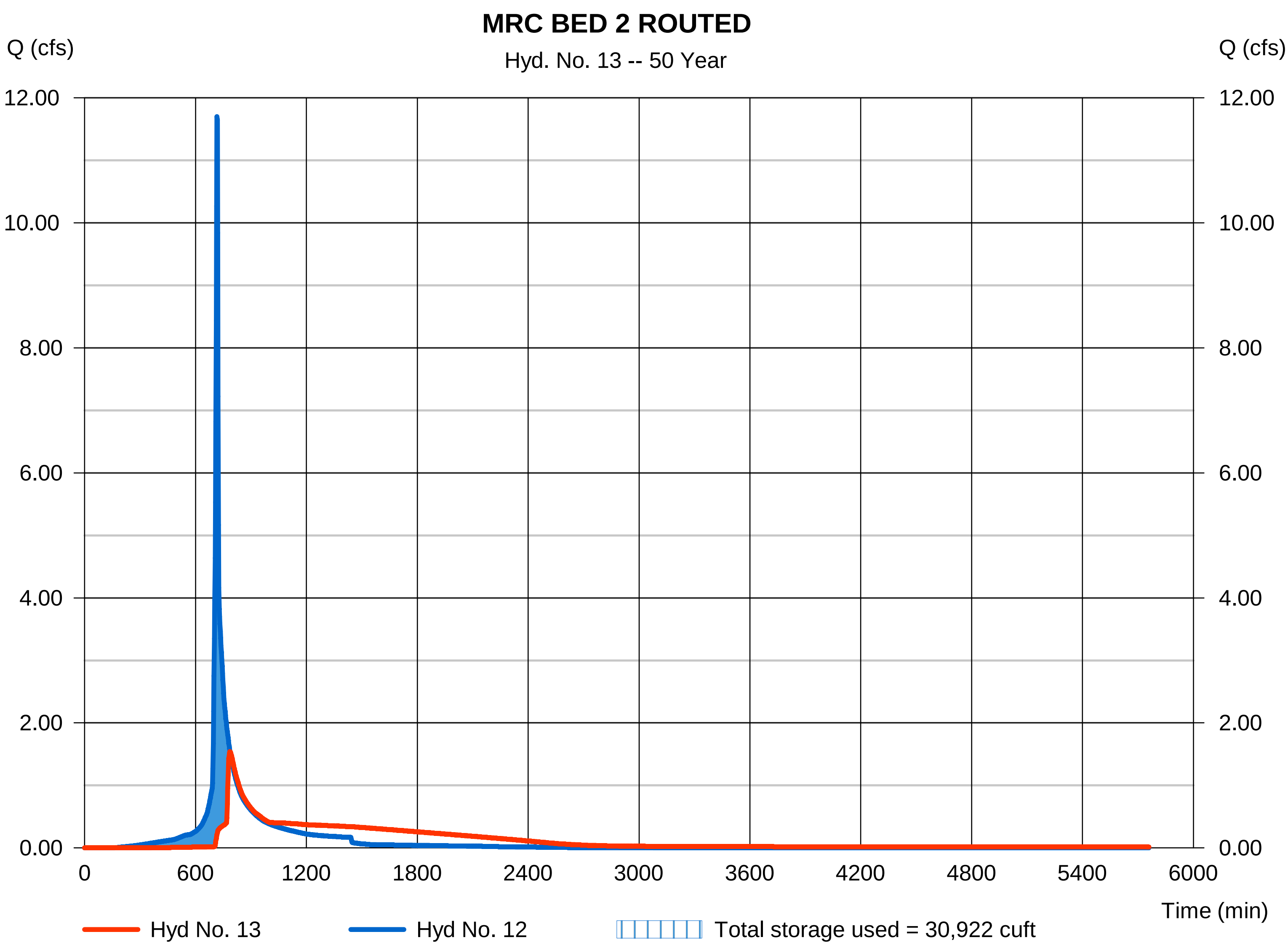
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 13

MRC BED 2 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 1.539 cfs
Storm frequency	= 50 yrs	Time to peak	= 786 min
Time interval	= 2 min	Hyd. volume	= 40,399 cuft
Inflow hyd. No.	= 12 - TOTAL TO BED 2	Max. Elevation	= 538.59 ft
Reservoir name	= MRC BED 2	Max. Storage	= 30,922 cuft

Storage Indication method used. Wet pond routing start elevation = 535.00 ft.



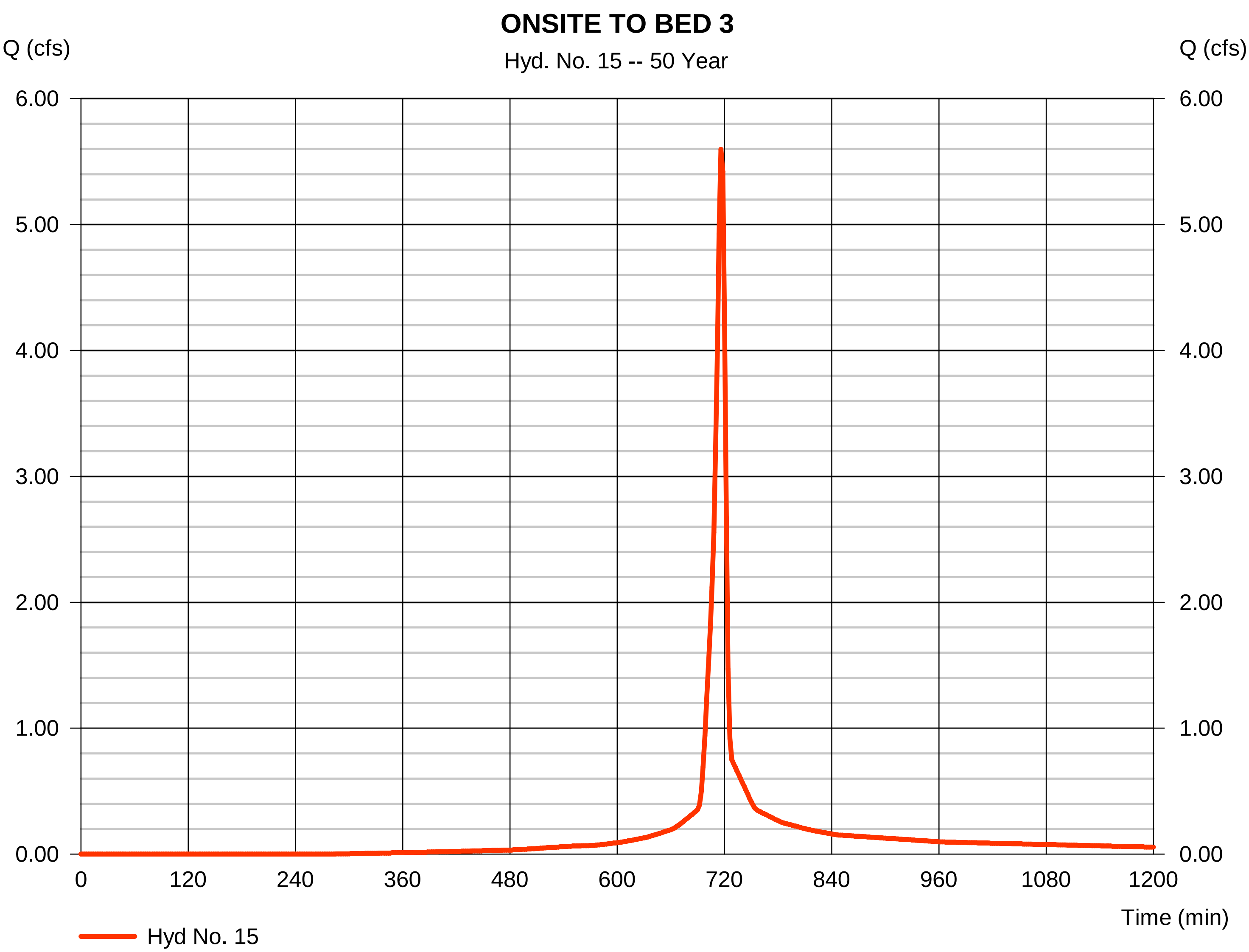
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 15

ONSITE TO BED 3

Hydrograph type	= SCS Runoff	Peak discharge	= 5.597 cfs
Storm frequency	= 50 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 11,810 cuft
Drainage area	= 0.730 ac	Curve number	= 84.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



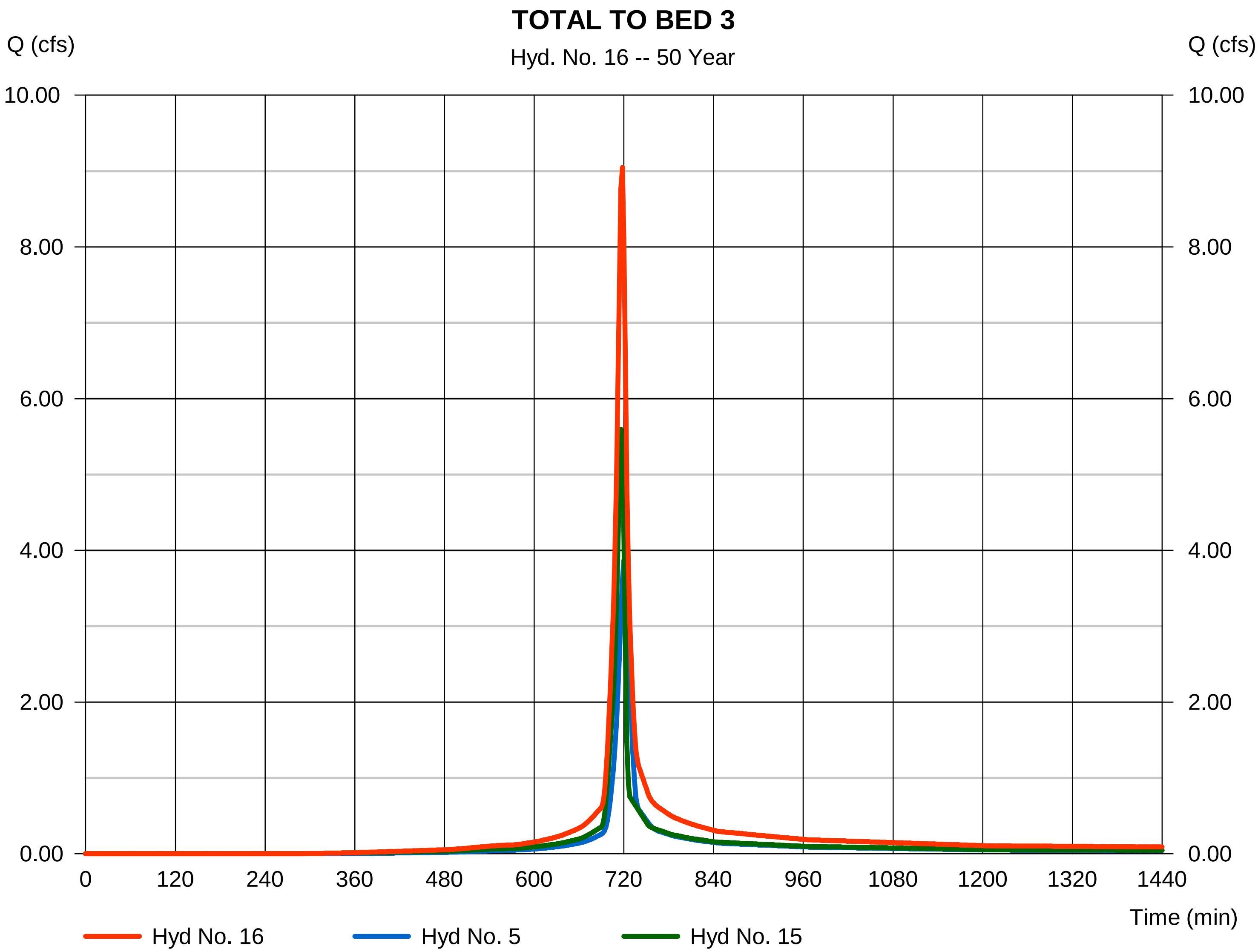
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 16

TOTAL TO BED 3

Hydrograph type	= Combine	Peak discharge	= 9.047 cfs
Storm frequency	= 50 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 21,963 cuft
Inflow hyds.	= 5, 15	Contrib. drain. area	= 1.350 ac



Hydrograph Report

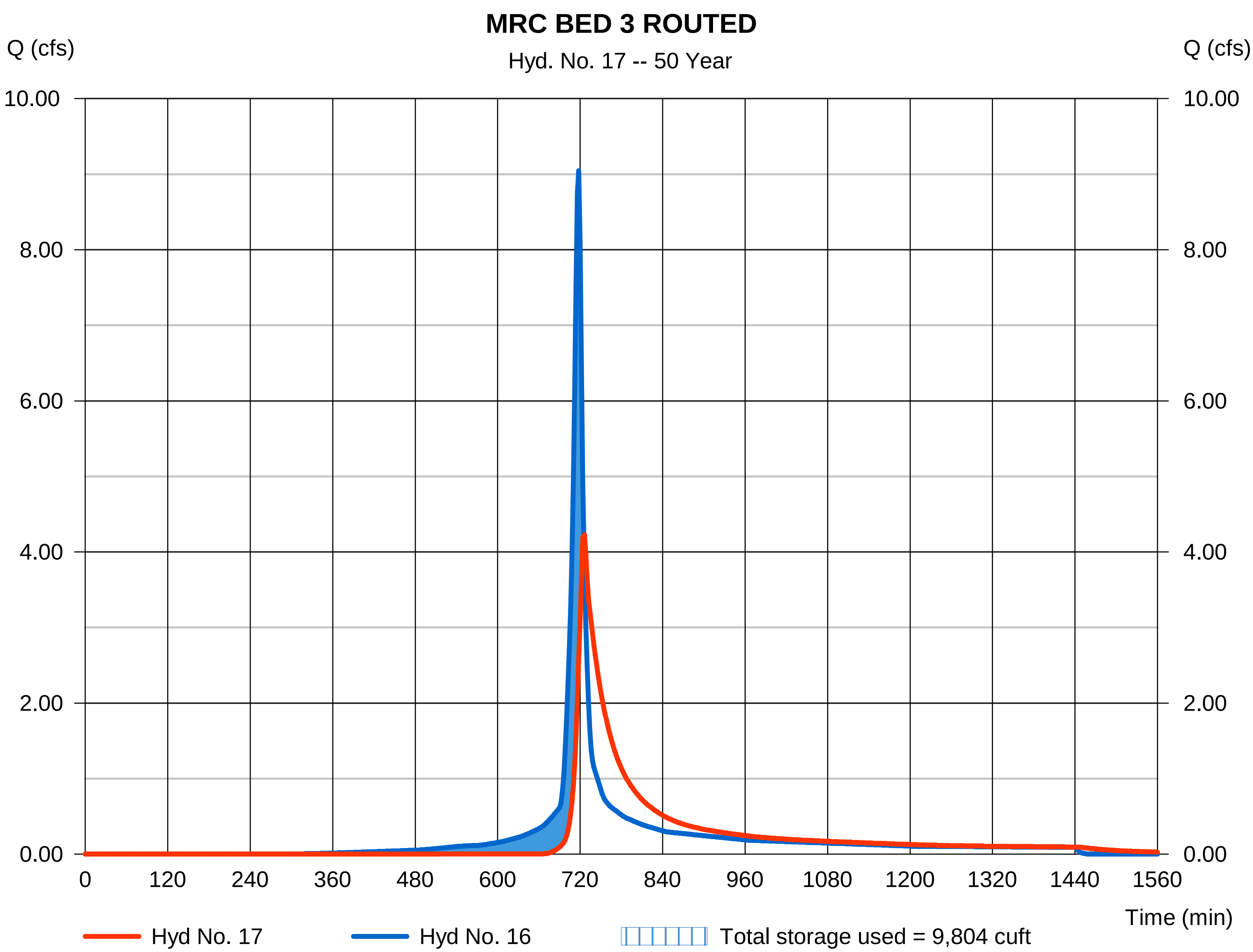
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 17

MRC BED 3 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 4.231 cfs
Storm frequency	= 50 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 21,098 cuft
Inflow hyd. No.	= 16 - TOTAL TO BED 3	Max. Elevation	= 508.45 ft
Reservoir name	= MRC BED 3	Max. Storage	= 9,804 cuft

Storage Indication method used. Wet pond routing start elevation = 505.00 ft.



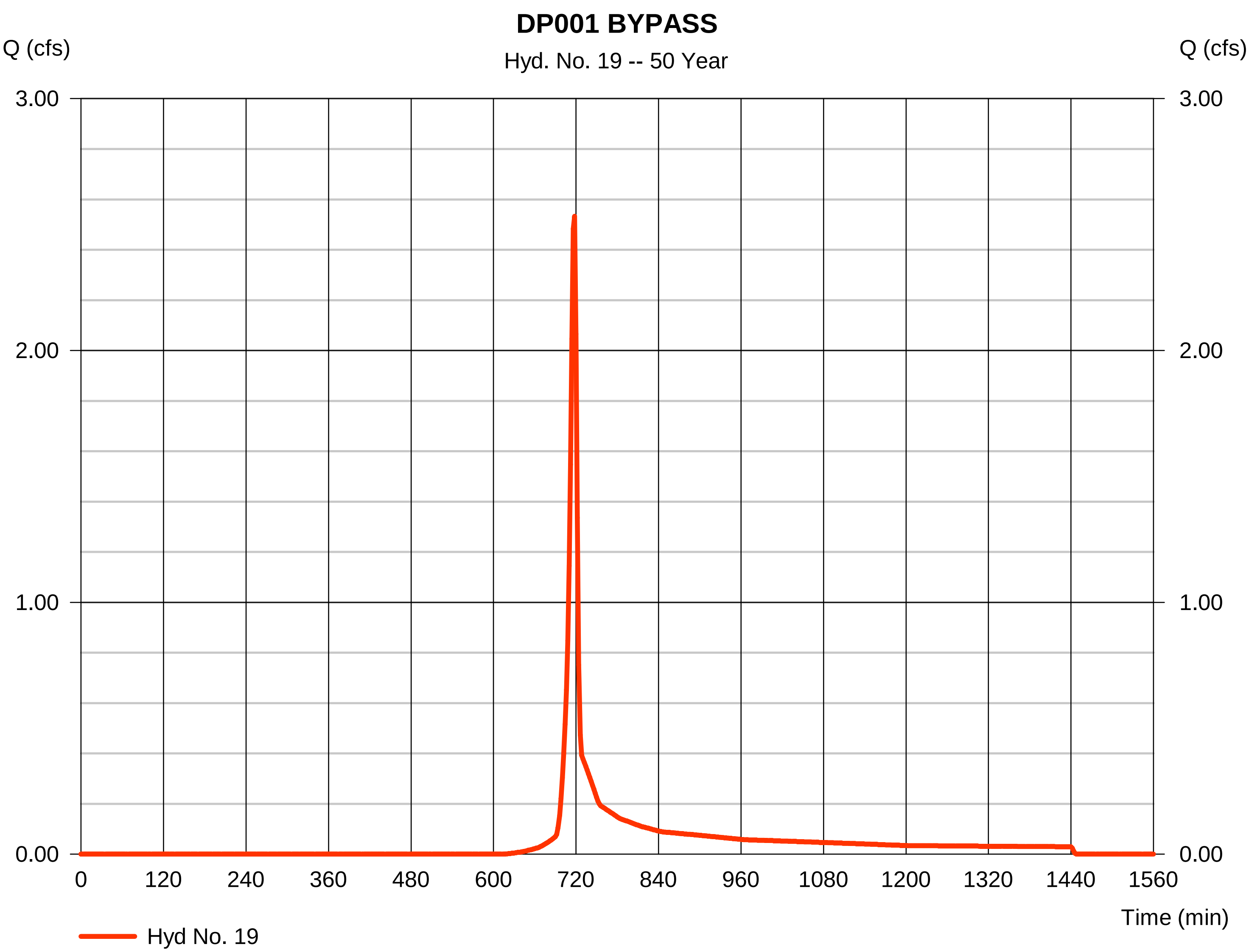
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 19

DP001 BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 2.532 cfs
Storm frequency	= 50 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 5,064 cuft
Drainage area	= 0.610 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



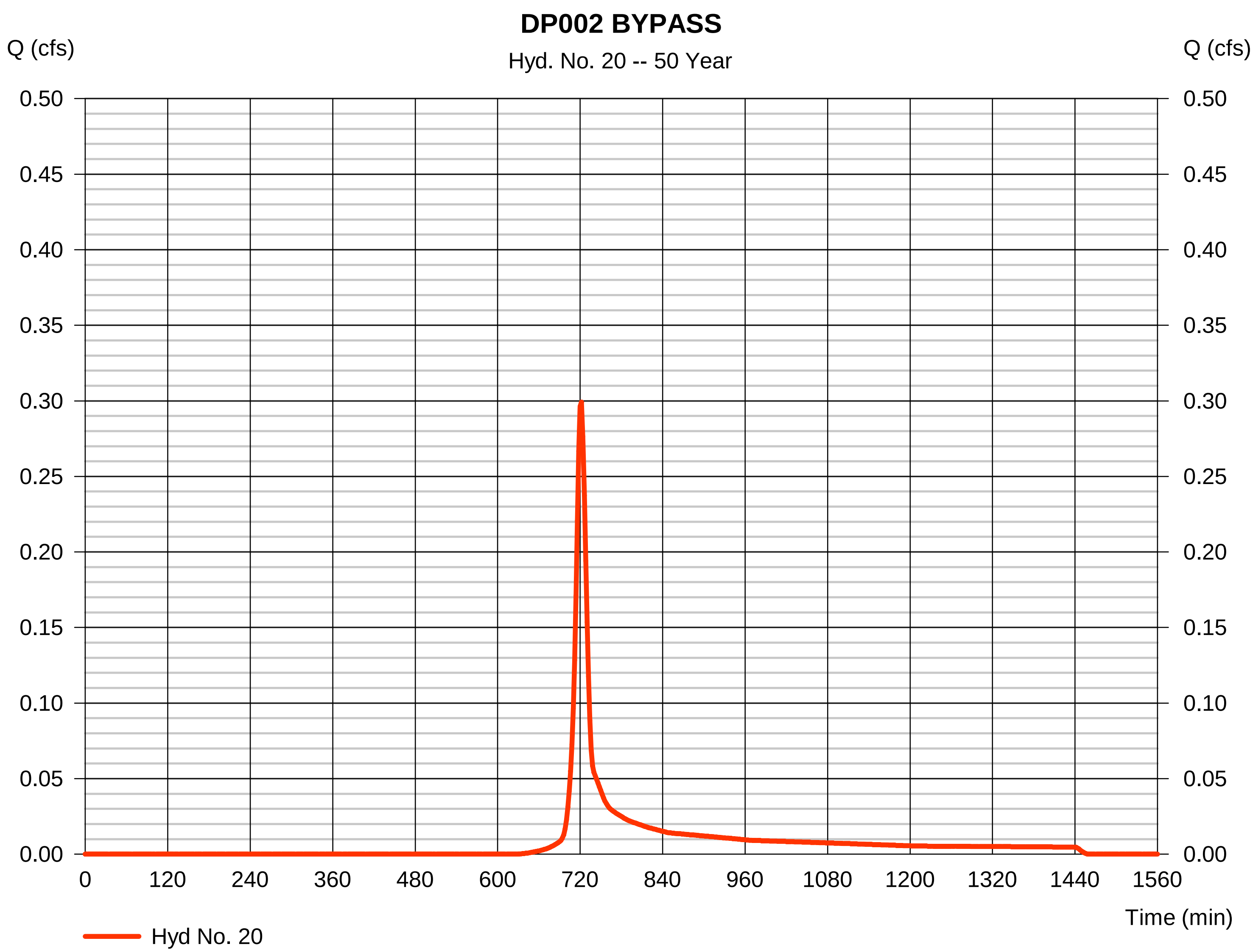
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 20

DP002 BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.299 cfs
Storm frequency	= 50 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 791 cuft
Drainage area	= 0.090 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.50 min
Total precip.	= 6.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

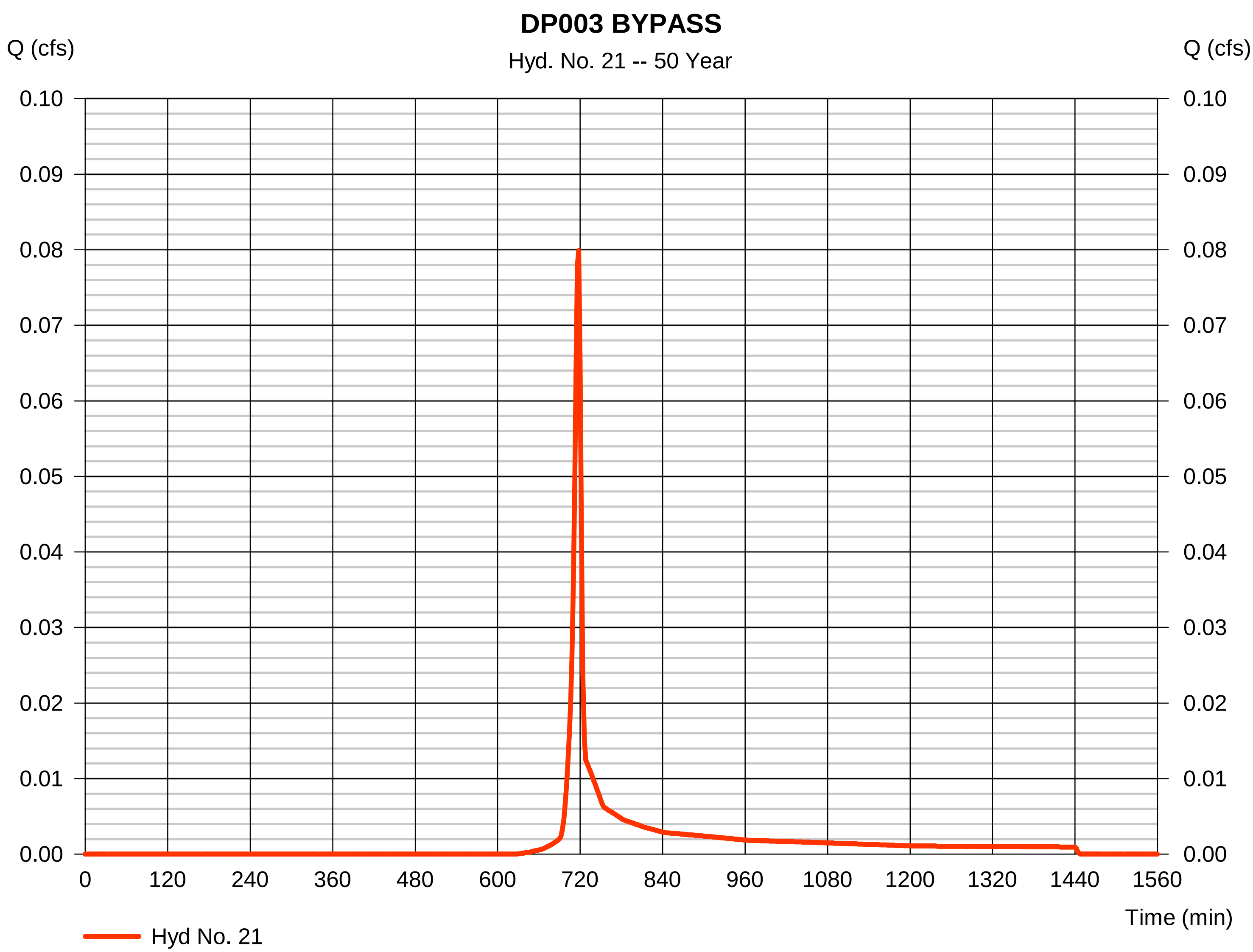


Hydrograph Report

Hyd. No. 21

DP003 BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.080 cfs
Storm frequency	= 50 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 160 cuft
Drainage area	= 0.020 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



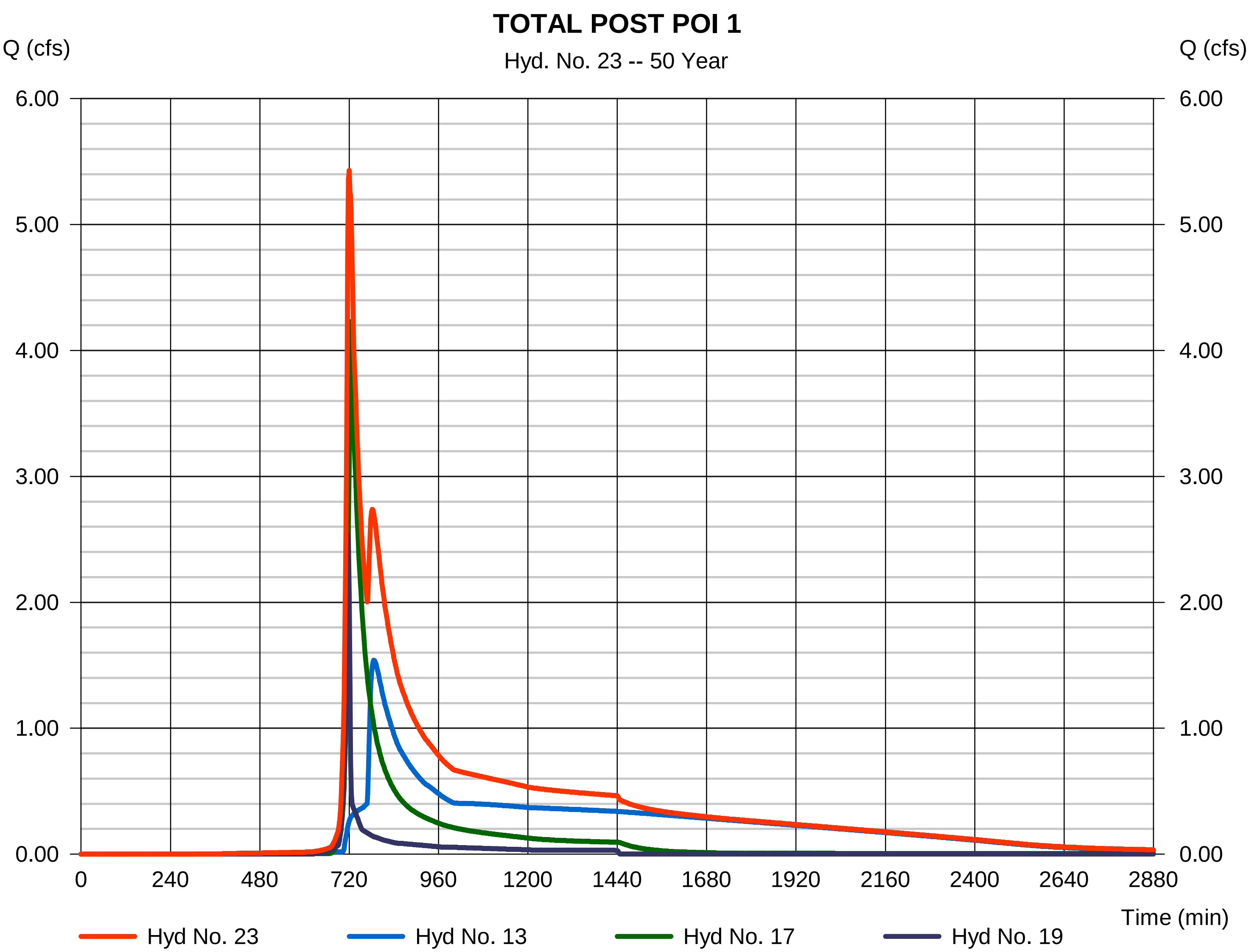
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 23

TOTAL POST POI 1

Hydrograph type	= Combine	Peak discharge	= 5.430 cfs
Storm frequency	= 50 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 66,561 cuft
Inflow hyds.	= 13, 17, 19	Contrib. drain. area	= 0.610 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	8.770	2	728	31,440	------	------	------	PRE POI 1
2	SCS Runoff	2.019	2	728	7,238	------	------	------	PRE POI 2
3	SCS Runoff	1.606	2	722	4,240	------	------	------	PRE LOI 3
5	SCS Runoff	5.360	2	720	14,289	------	------	------	OFFSITE TO BED 3
6	Combine	12.94	2	724	45,729	1, 5	------	------	TOTAL PRE TO POI1
8	SCS Runoff	12.72	2	716	29,348	------	------	------	ONSITE TO MRC BED 1
9	Reservoir	3.862	2	724	29,295	8	540.25	14,845	MRC BED 1 ROUTED
11	SCS Runoff	13.11	2	716	29,682	------	------	------	ONSITE TO MRC BED 2
12	Combine	15.73	2	716	58,978	9, 11	------	------	TOTAL TO BED 2
13	Reservoir	4.632	2	736	55,131	12	538.86	31,730	MRC BED 2 ROUTED
15	SCS Runoff	7.590	2	716	16,336	------	------	------	ONSITE TO BED 3
16	Combine	12.37	2	718	30,625	5, 15	------	------	TOTAL TO BED 3
17	Reservoir	9.535	2	722	29,756	16	508.92	10,995	MRC BED 3 ROUTED
19	SCS Runoff	3.987	2	718	8,032	------	------	------	DP001 BYPASS
20	SCS Runoff	0.485	2	720	1,264	------	------	------	DP002 BYPASS
21	SCS Runoff	0.127	2	718	255	------	------	------	DP003 BYPASS
23	Combine	12.70	2	720	92,919	13, 17, 19,	------	------	TOTAL POST POI 1
25	SCS Runoff	0.000	2	n/a	0	------	------	------	1.2 to MRC Bed 1
26	Reservoir	0.000	2	n/a	0	25	537.00	1,660	1.2 to MRC Bed 1 Rout
27	SCS Runoff	0.000	2	n/a	0	------	------	------	1.2 to MRC Bed 2
28	Combine	0.000	2	n/a	0	26, 27	------	------	1.2 Total to MRC Bed 2
29	Reservoir	0.000	2	n/a	0	28	535.00	7,290	1.2 to MRC Bed 2 Route
31	SCS Runoff	0.000	2	n/a	0	------	------	------	1.2 to MRC Bed 3
32	Reservoir	0.000	2	n/a	0	31	505.00	1,056	1.2 to MRC Bed 3 Route
34	Combine	0.000	2	n/a	0	29, 32,	------	------	Total 1.2

hydraflow.gpw	Return Period: 100 Year	Friday, 04 / 5 / 2024

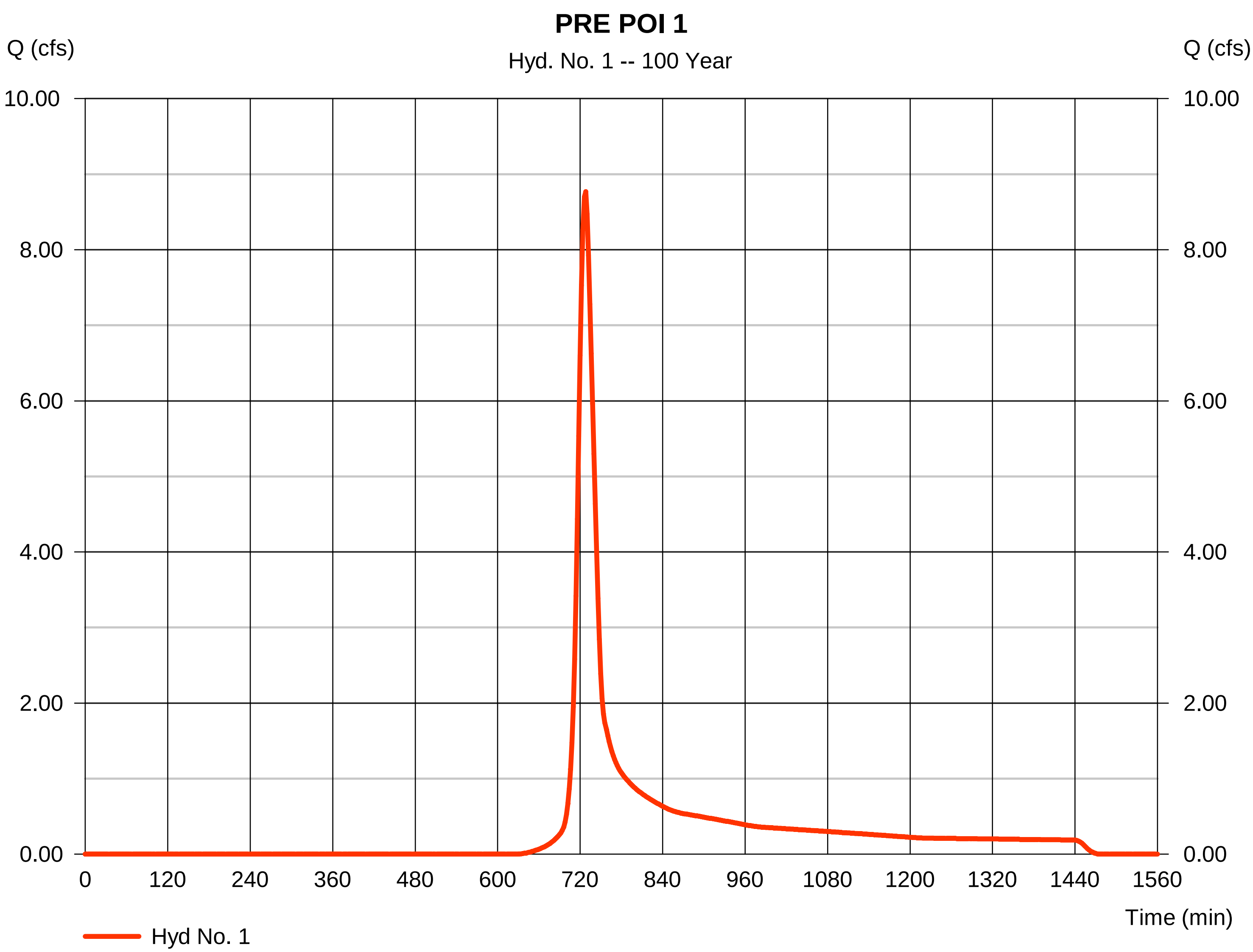
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 | Friday, 04 / 5 / 2024

Hyd. No. 1

PRE POI 1

Hydrograph type	= SCS Runoff	Peak discharge	= 8.770 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 31,440 cuft
Drainage area	= 2.780 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 20.20 min
Total precip.	= 8.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



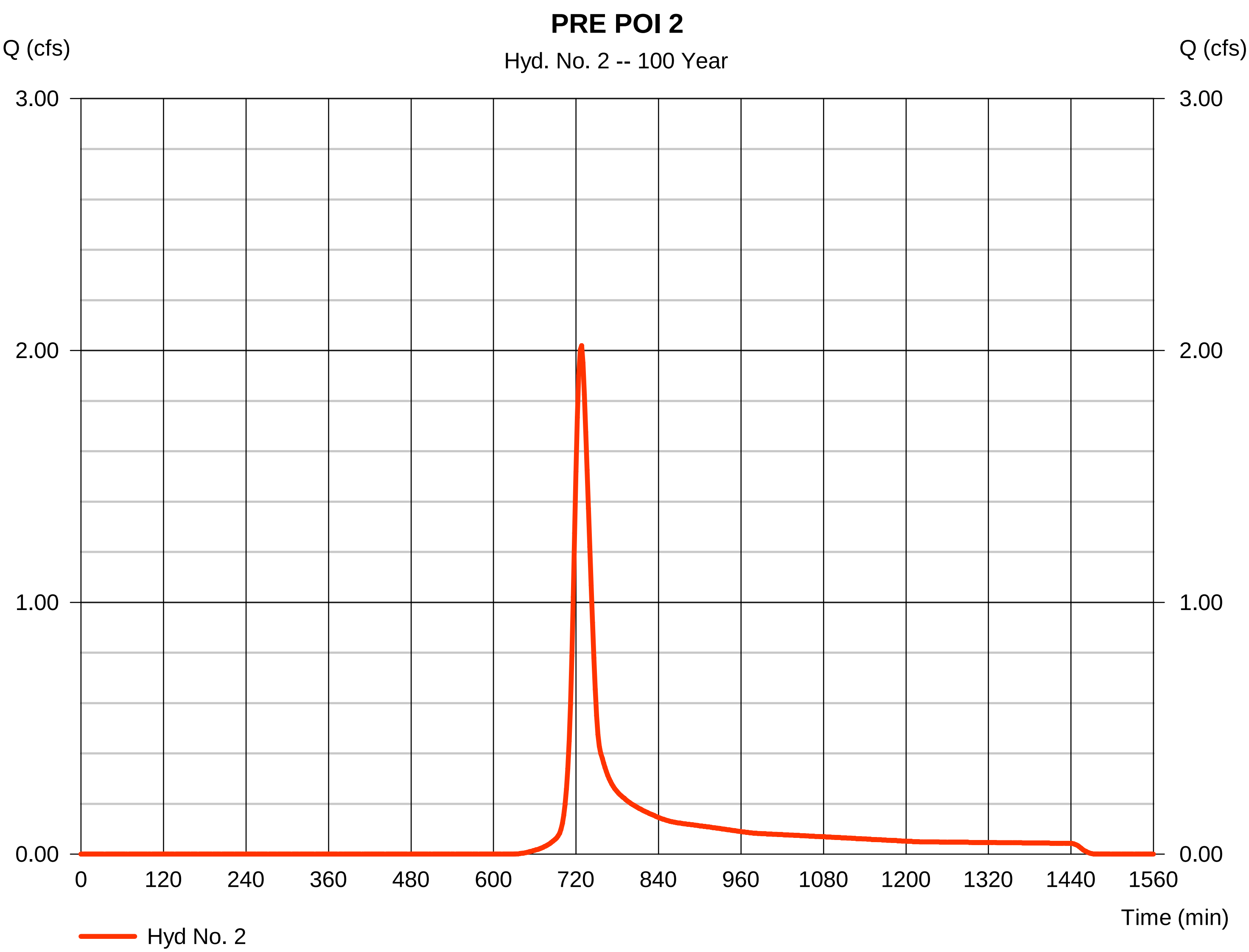
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 2

PRE POI 2

Hydrograph type	= SCS Runoff	Peak discharge	= 2.019 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 7,238 cuft
Drainage area	= 0.640 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 22.10 min
Total precip.	= 8.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



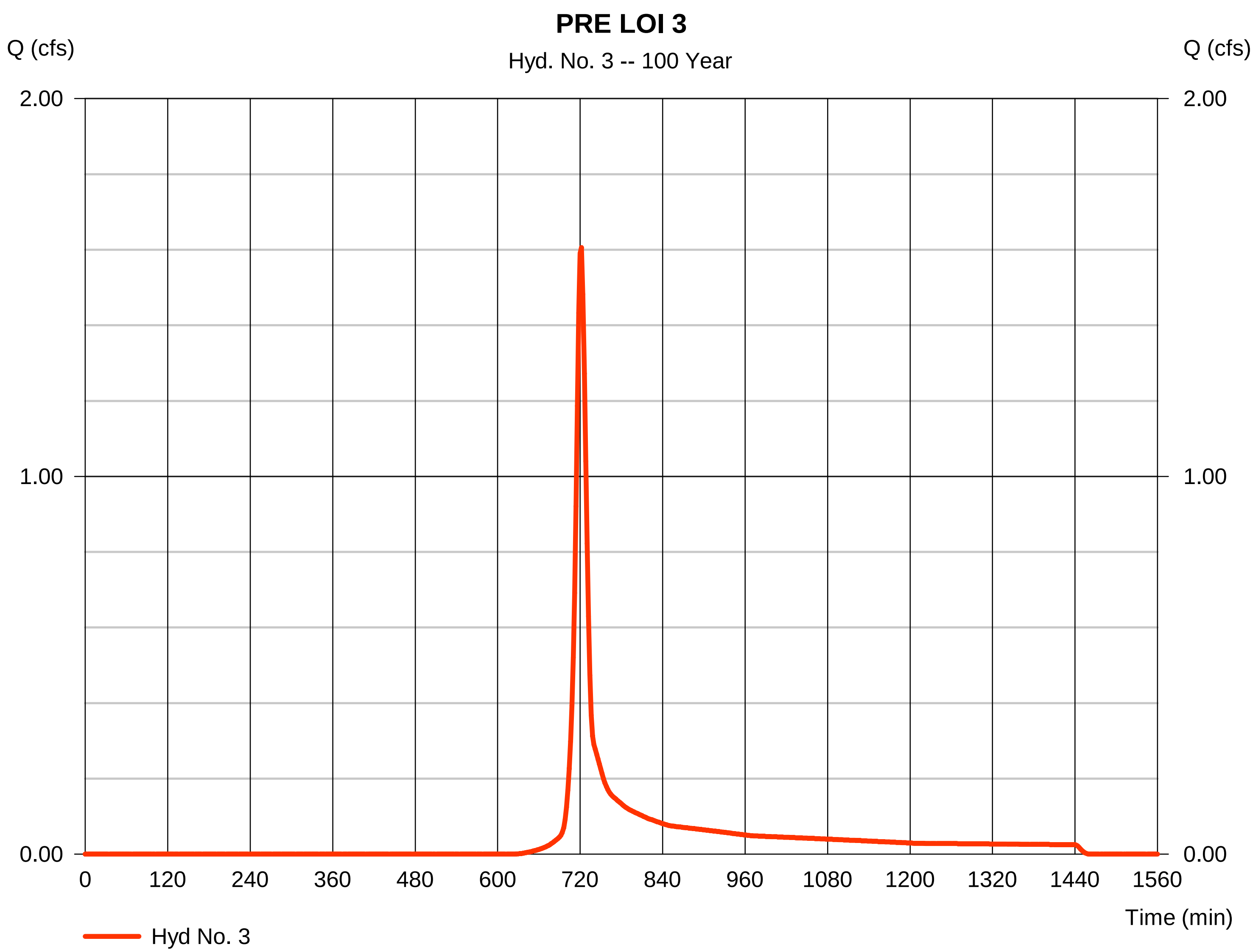
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 3

PRE LOI 3

Hydrograph type	= SCS Runoff	Peak discharge	= 1.606 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 4,240 cuft
Drainage area	= 0.370 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.80 min
Total precip.	= 8.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

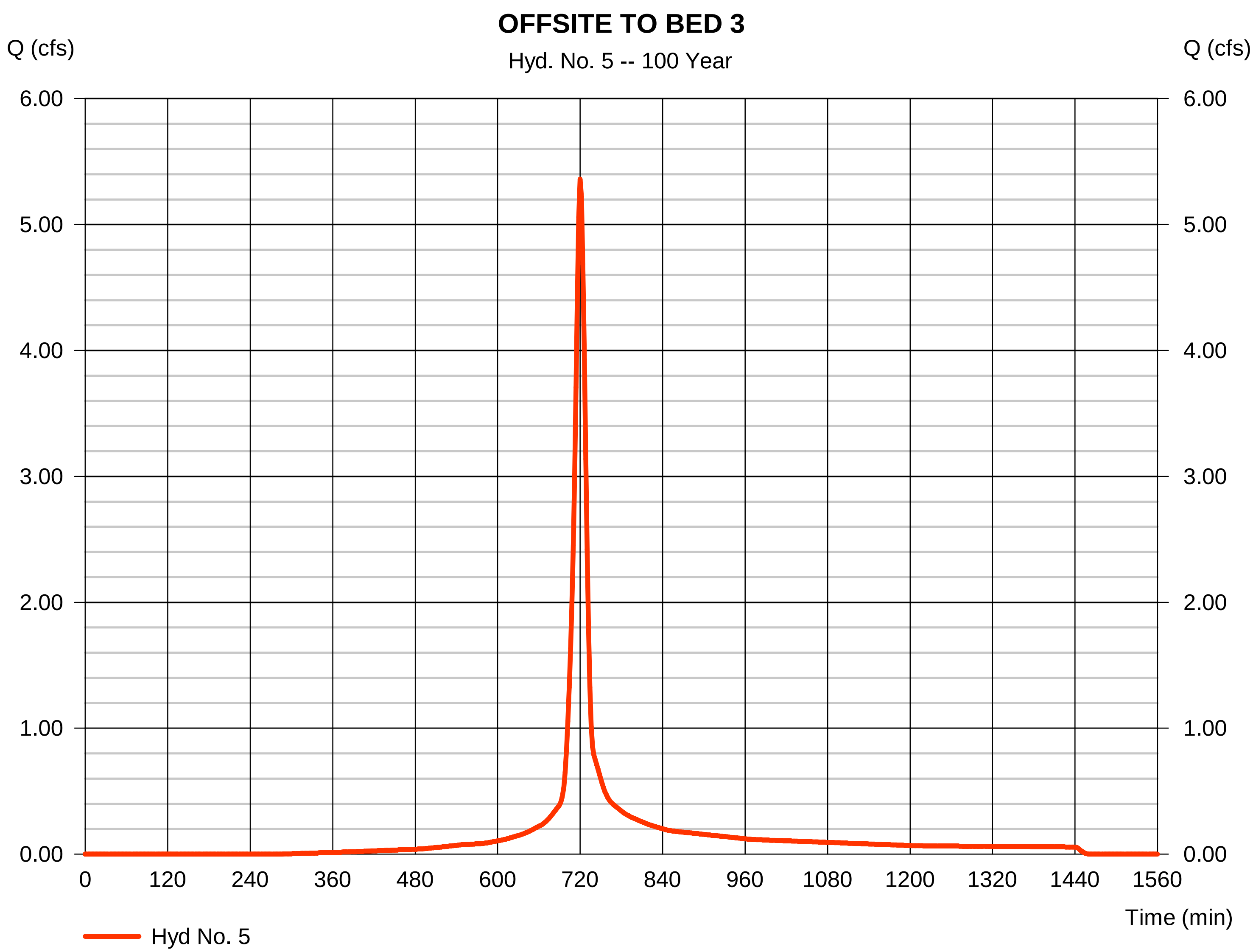


Hydrograph Report

Hyd. No. 5

OFFSITE TO BED 3

Hydrograph type	= SCS Runoff	Peak discharge	= 5.360 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 14,289 cuft
Drainage area	= 0.620 ac	Curve number	= 81.3
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.20 min
Total precip.	= 8.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

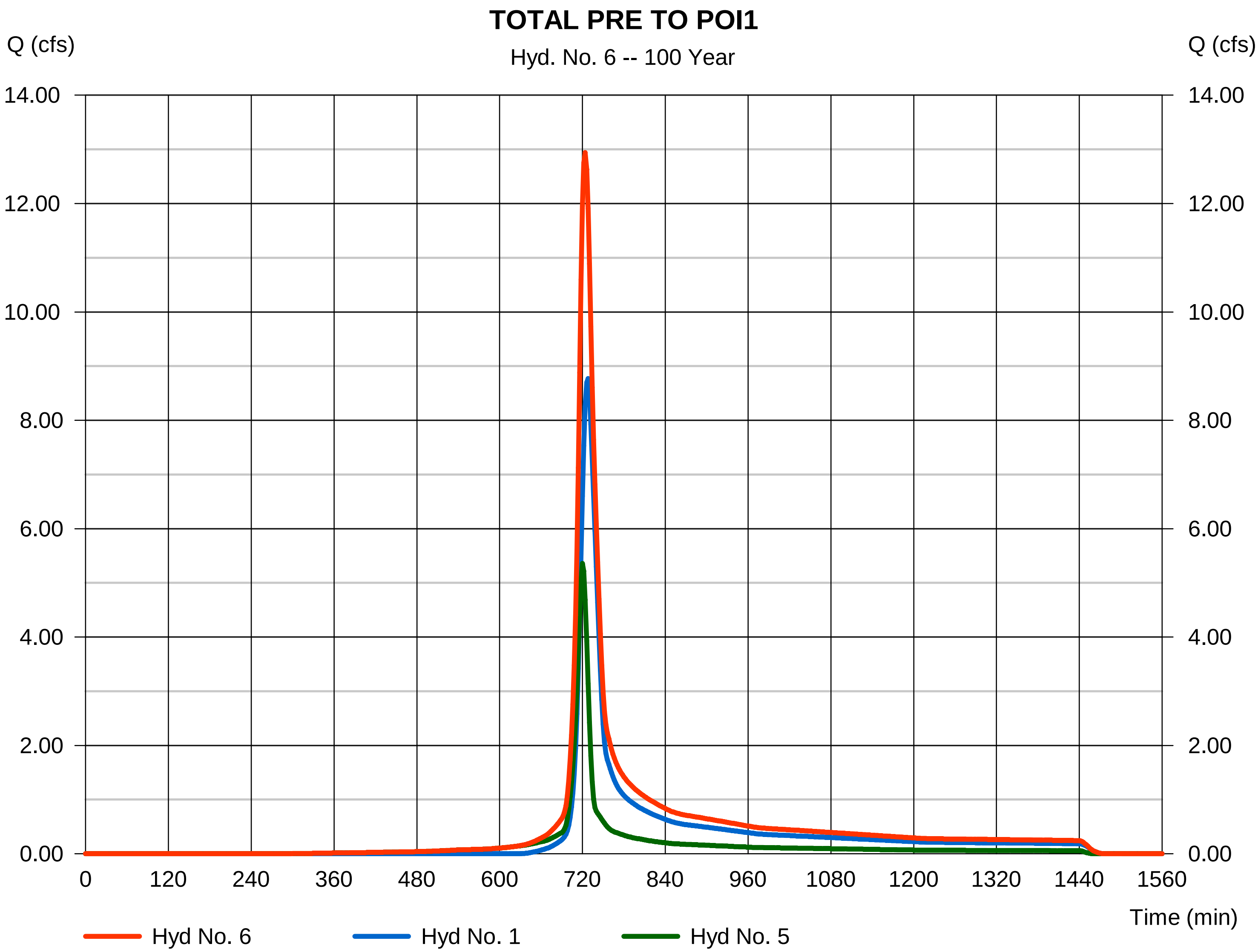


Hydrograph Report

Hyd. No. 6

TOTAL PRE TO POI1

Hydrograph type	= Combine	Peak discharge	= 12.94 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 45,729 cuft
Inflow hyds.	= 1, 5	Contrib. drain. area	= 3.400 ac



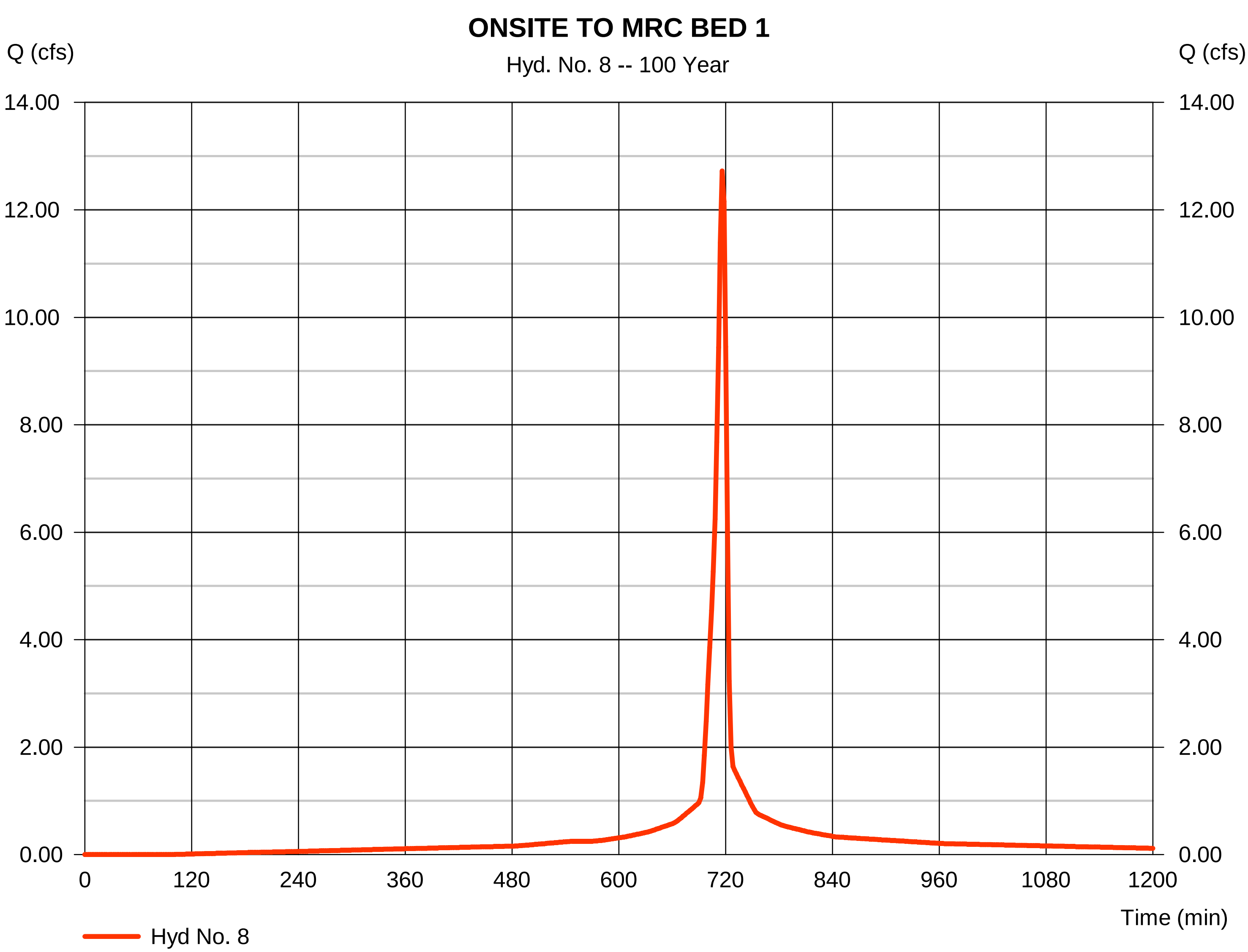
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 | Friday, 04 / 5 / 2024

Hyd. No. 8

ONSITE TO MRC BED 1

Hydrograph type	= SCS Runoff	Peak discharge	= 12.72 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 29,348 cuft
Drainage area	= 1.130 ac	Curve number	= 93.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

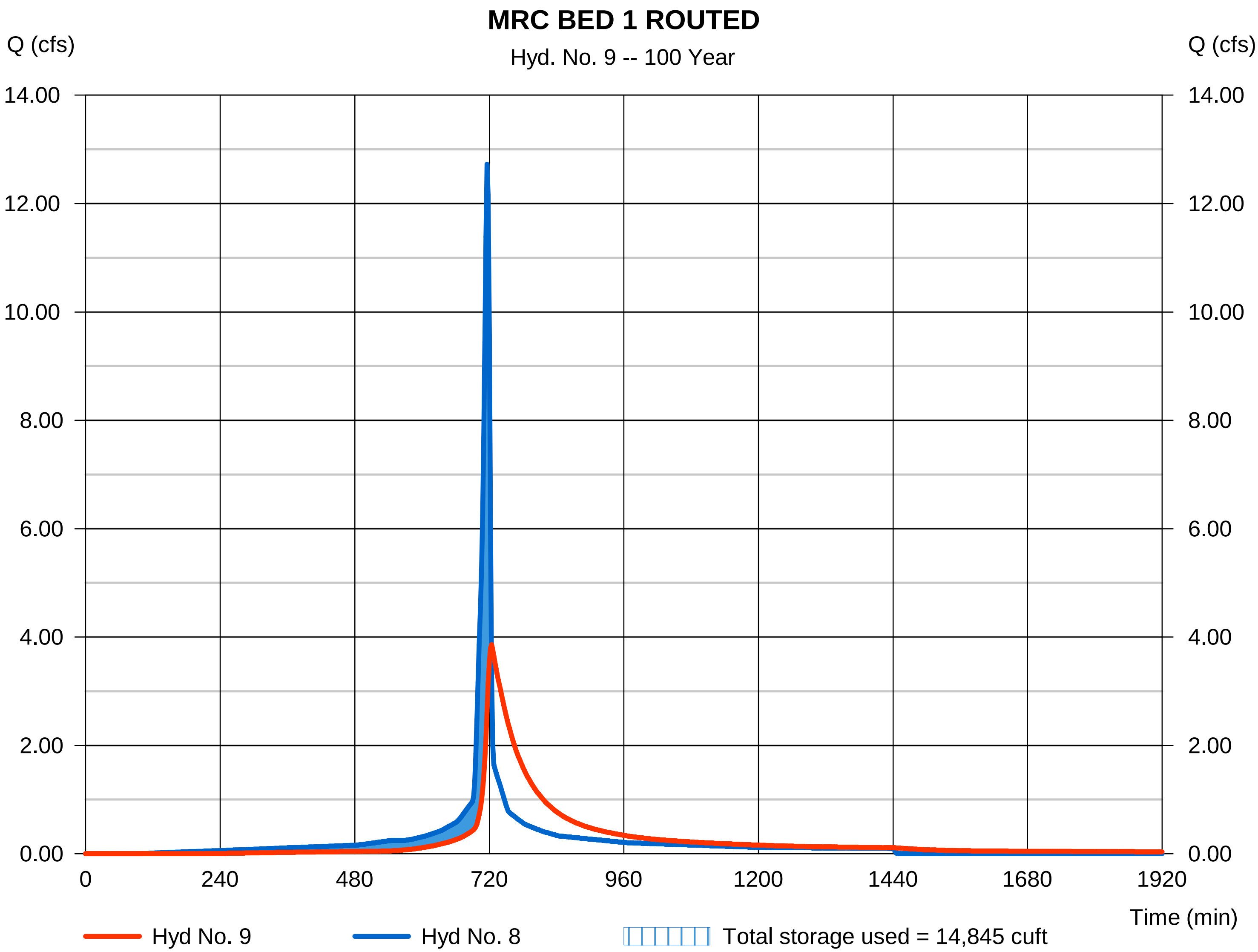
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 9

MRC BED 1 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 3.862 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 29,295 cuft
Inflow hyd. No.	= 8 - ONSITE TO MRC BED 1	Max. Elevation	= 540.25 ft
Reservoir name	= MRC BED 1	Max. Storage	= 14,845 cuft

Storage Indication method used. Wet pond routing start elevation = 537.00 ft.



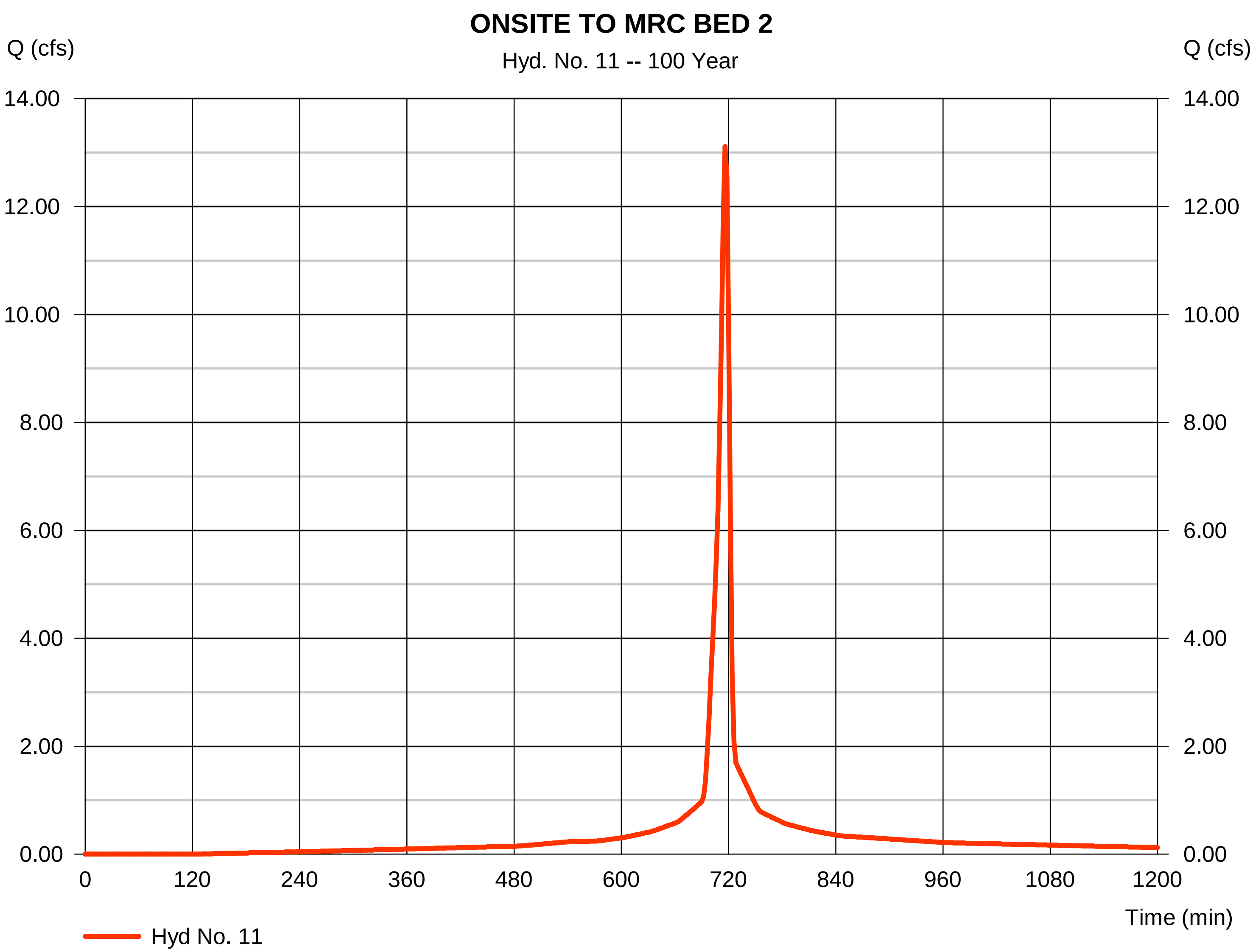
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 11

ONSITE TO MRC BED 2

Hydrograph type	= SCS Runoff	Peak discharge	= 13.11 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 29,682 cuft
Drainage area	= 1.180 ac	Curve number	= 91.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



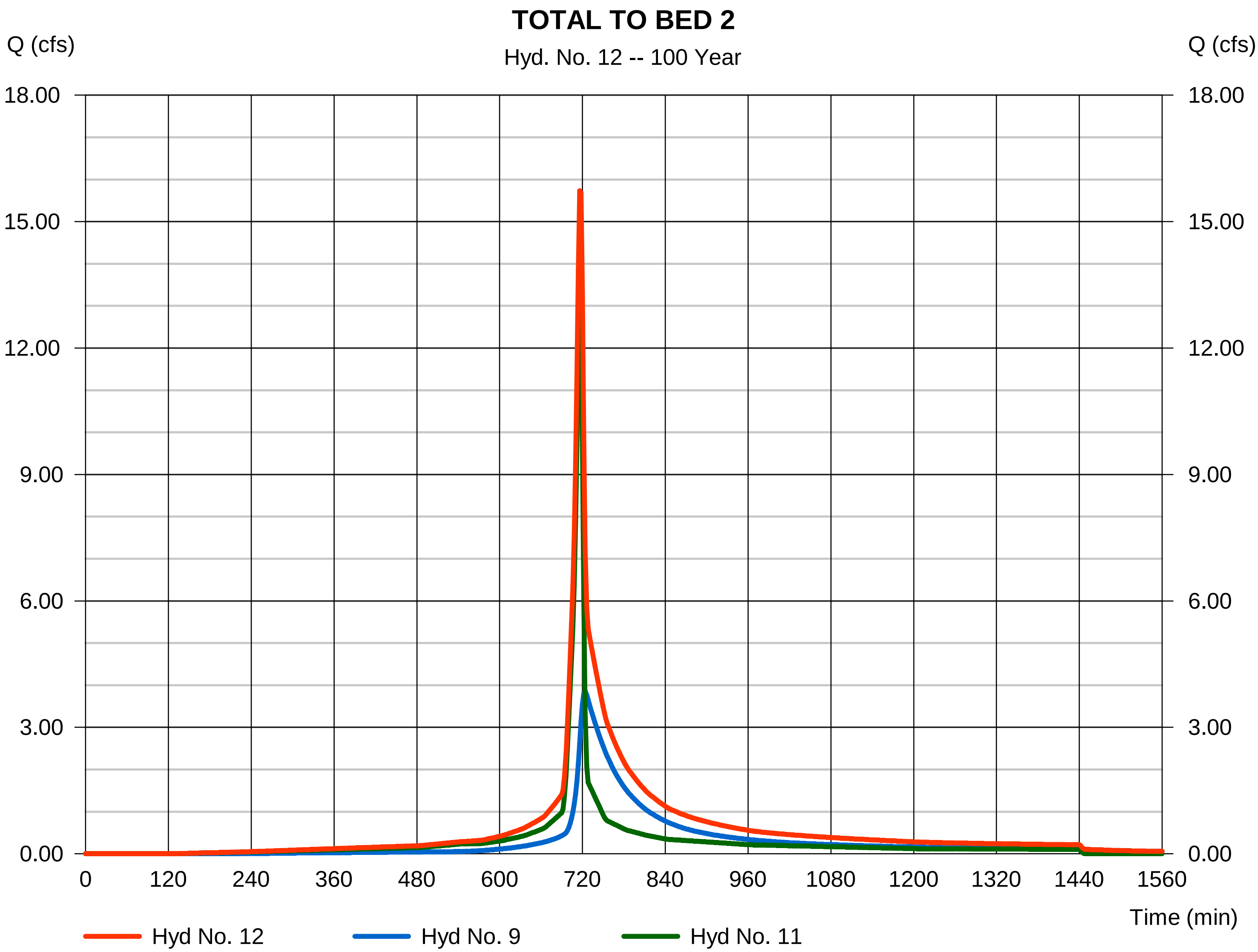
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 12

TOTAL TO BED 2

Hydrograph type	= Combine	Peak discharge	= 15.73 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 58,978 cuft
Inflow hyds.	= 9, 11	Contrib. drain. area	= 1.180 ac



Hydrograph Report

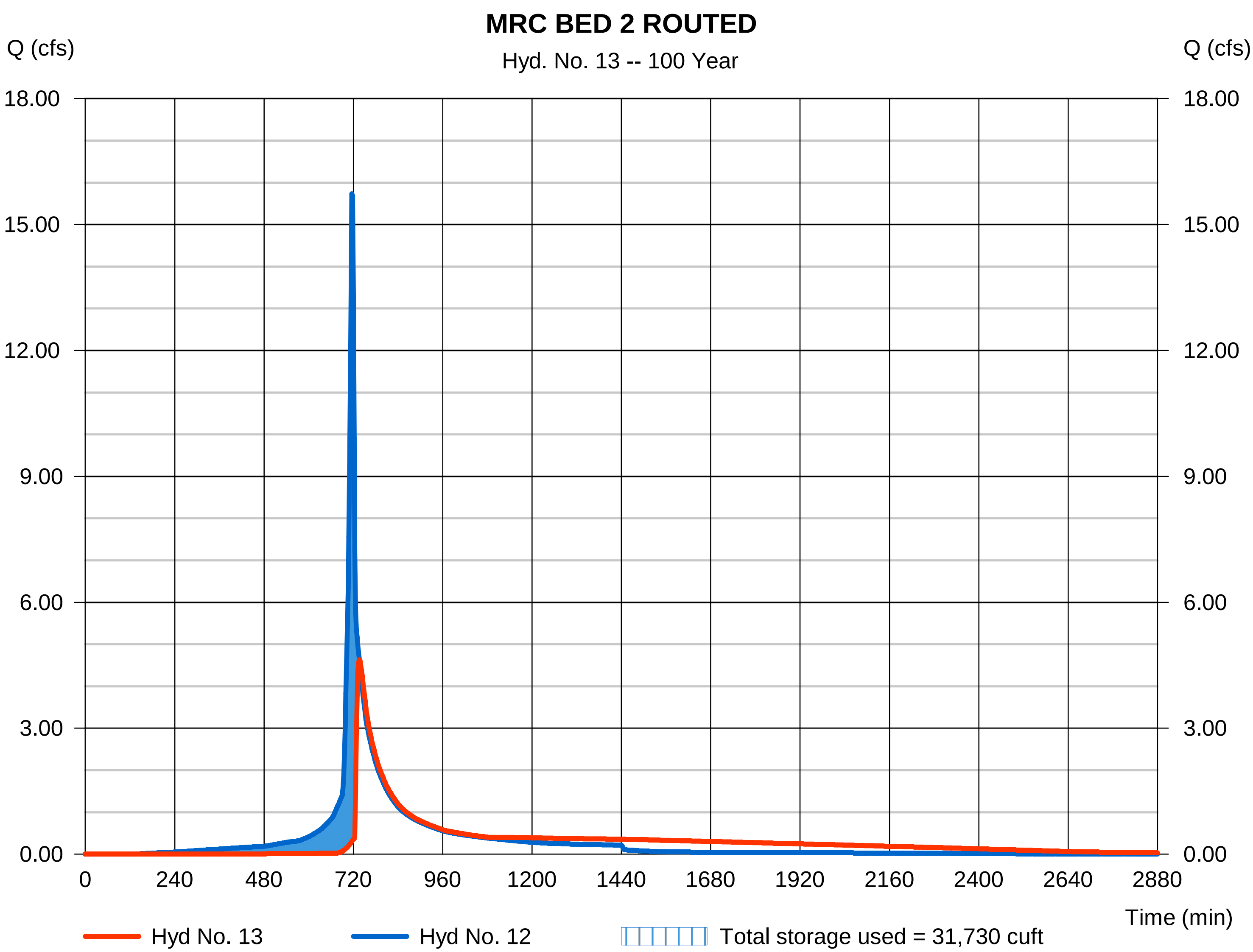
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 13

MRC BED 2 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 4.632 cfs
Storm frequency	= 100 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 55,131 cuft
Inflow hyd. No.	= 12 - TOTAL TO BED 2	Max. Elevation	= 538.86 ft
Reservoir name	= MRC BED 2	Max. Storage	= 31,730 cuft

Storage Indication method used. Wet pond routing start elevation = 535.00 ft.



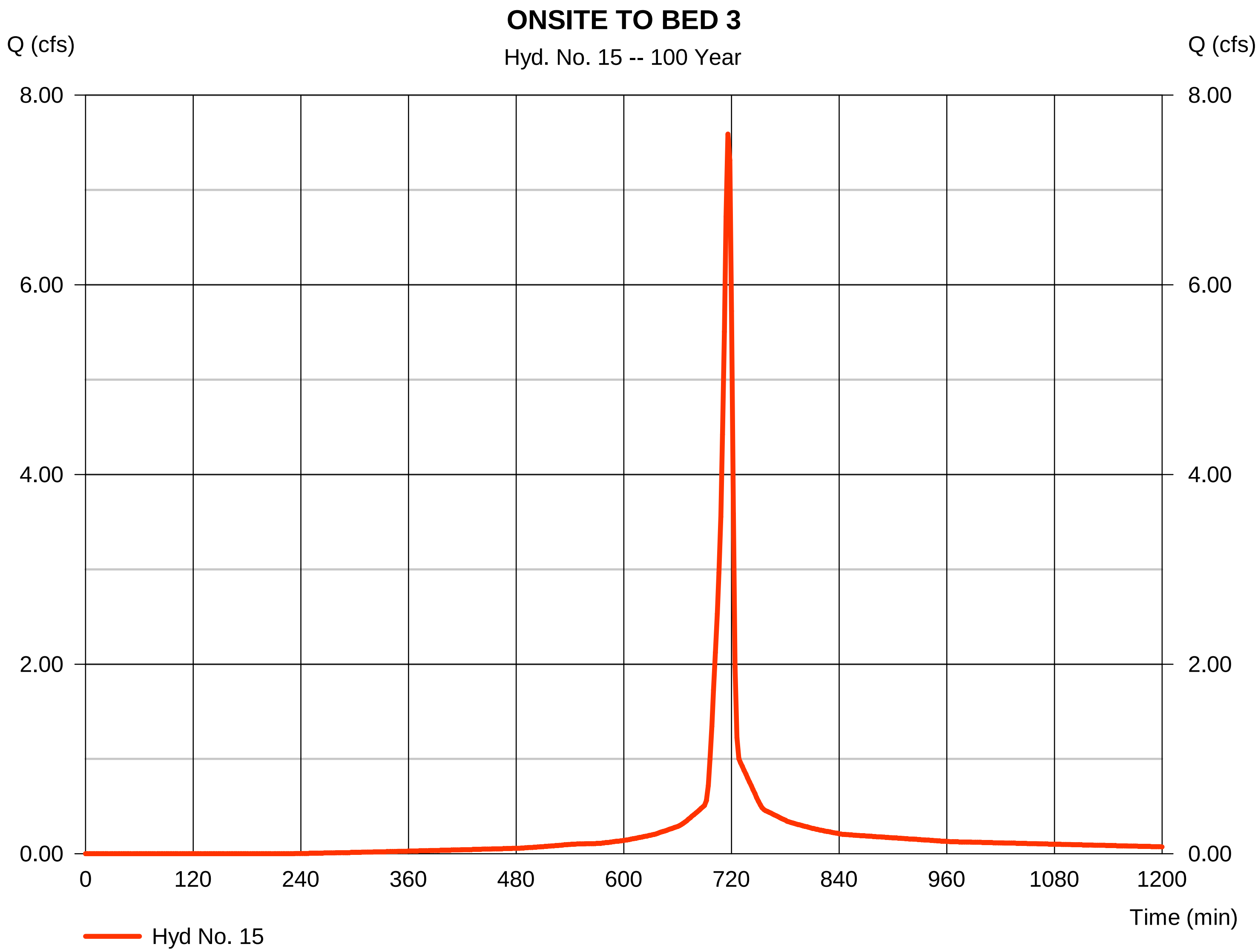
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 15

ONSITE TO BED 3

Hydrograph type	= SCS Runoff	Peak discharge	= 7.590 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 16,336 cuft
Drainage area	= 0.730 ac	Curve number	= 84.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



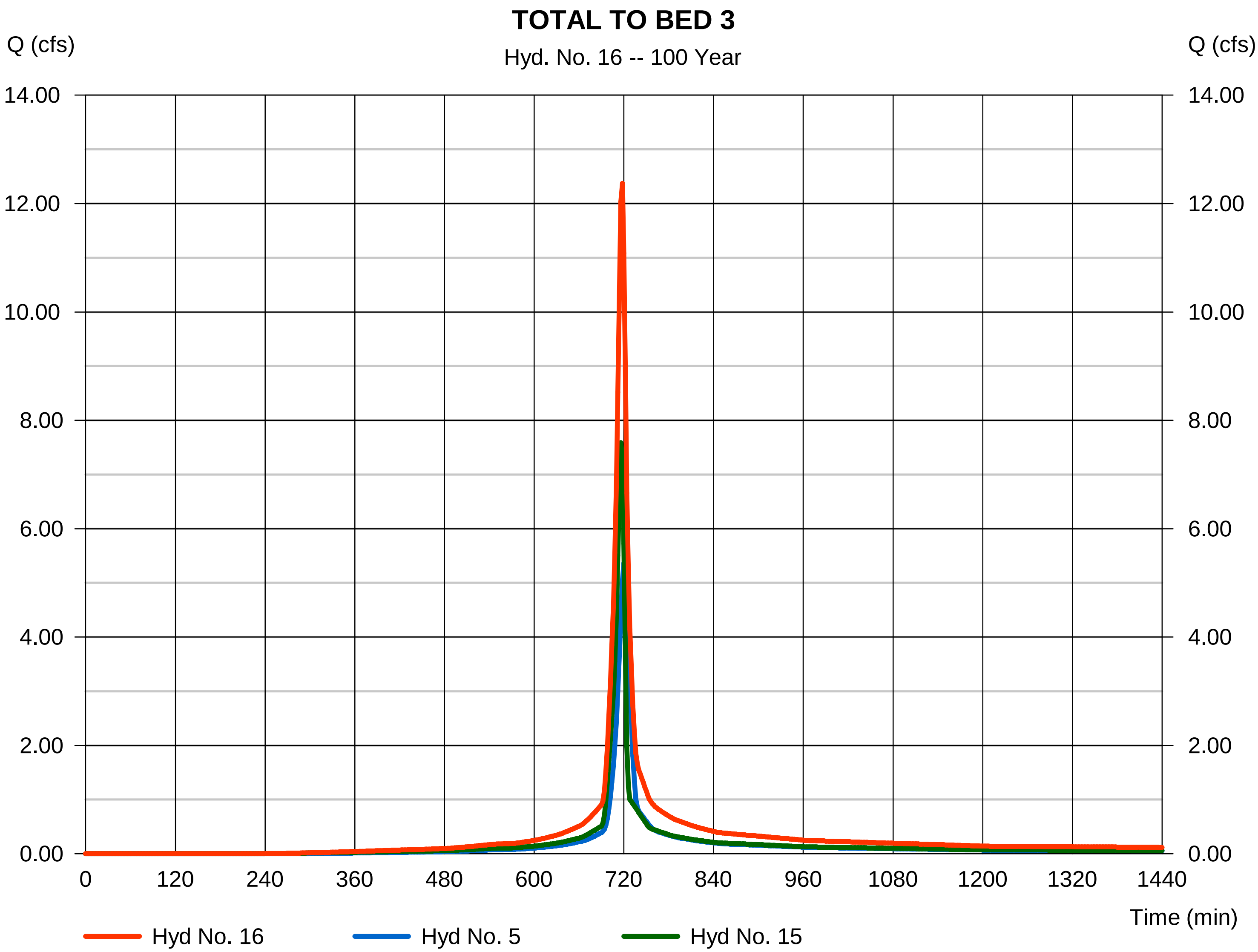
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 16

TOTAL TO BED 3

Hydrograph type	= Combine	Peak discharge	= 12.37 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 30,625 cuft
Inflow hyds.	= 5, 15	Contrib. drain. area	= 1.350 ac



Hydrograph Report

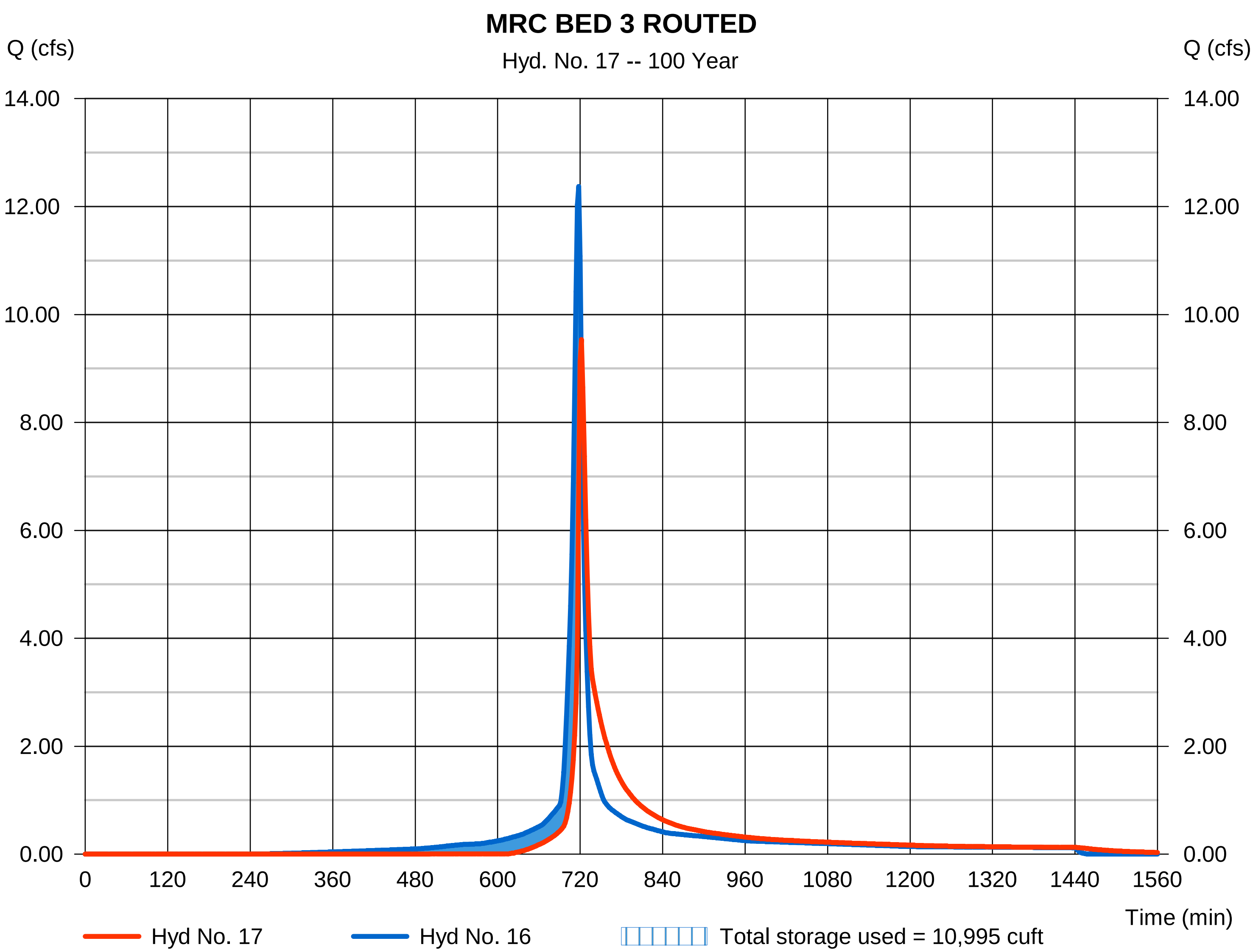
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Friday, 04 / 5 / 2024

Hyd. No. 17

MRC BED 3 ROUTED

Hydrograph type	= Reservoir	Peak discharge	= 9.535 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 29,756 cuft
Inflow hyd. No.	= 16 - TOTAL TO BED 3	Max. Elevation	= 508.92 ft
Reservoir name	= MRC BED 3	Max. Storage	= 10,995 cuft

Storage Indication method used. Wet pond routing start elevation = 505.00 ft.



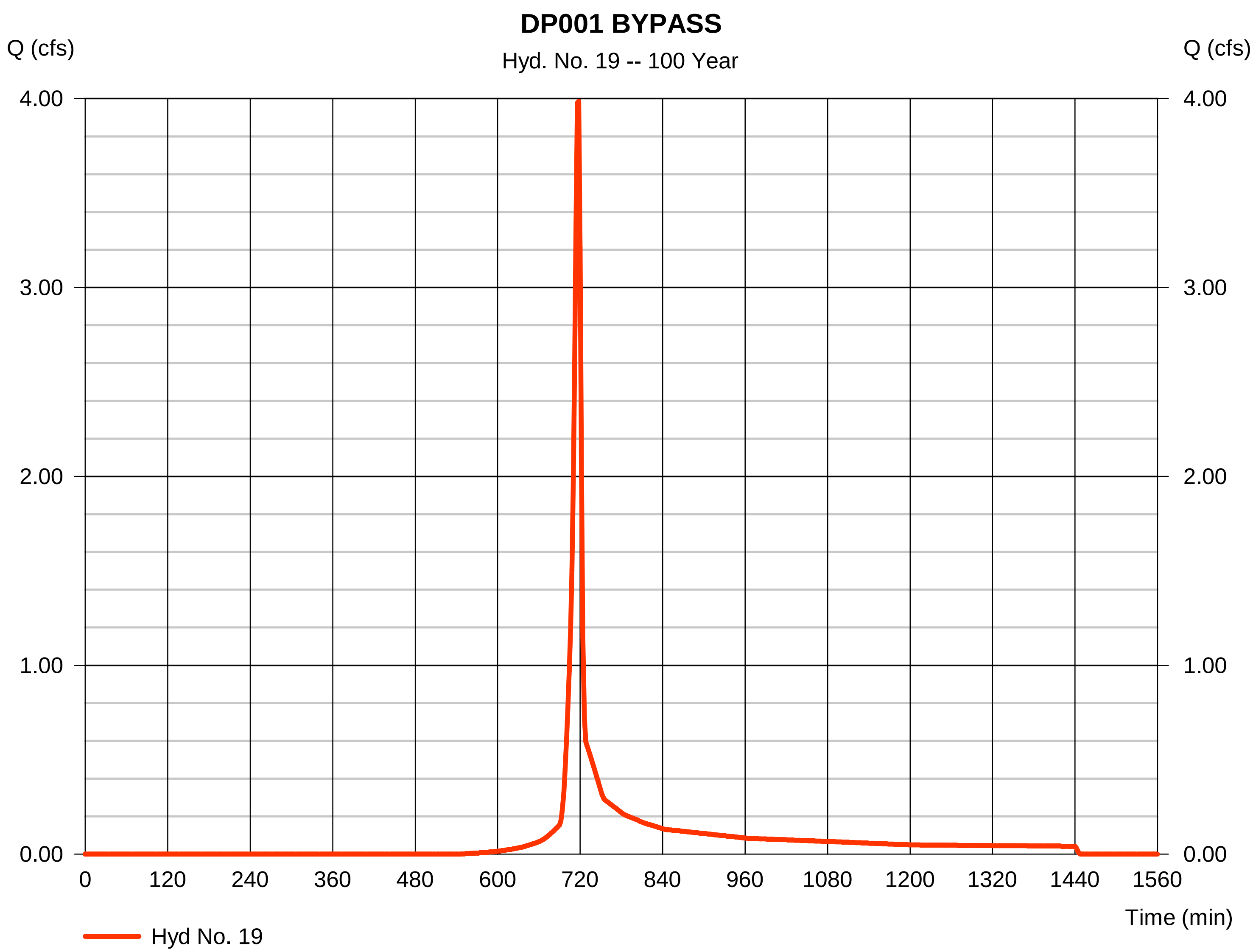
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 19

DP001 BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 3.987 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 8,032 cuft
Drainage area	= 0.610 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



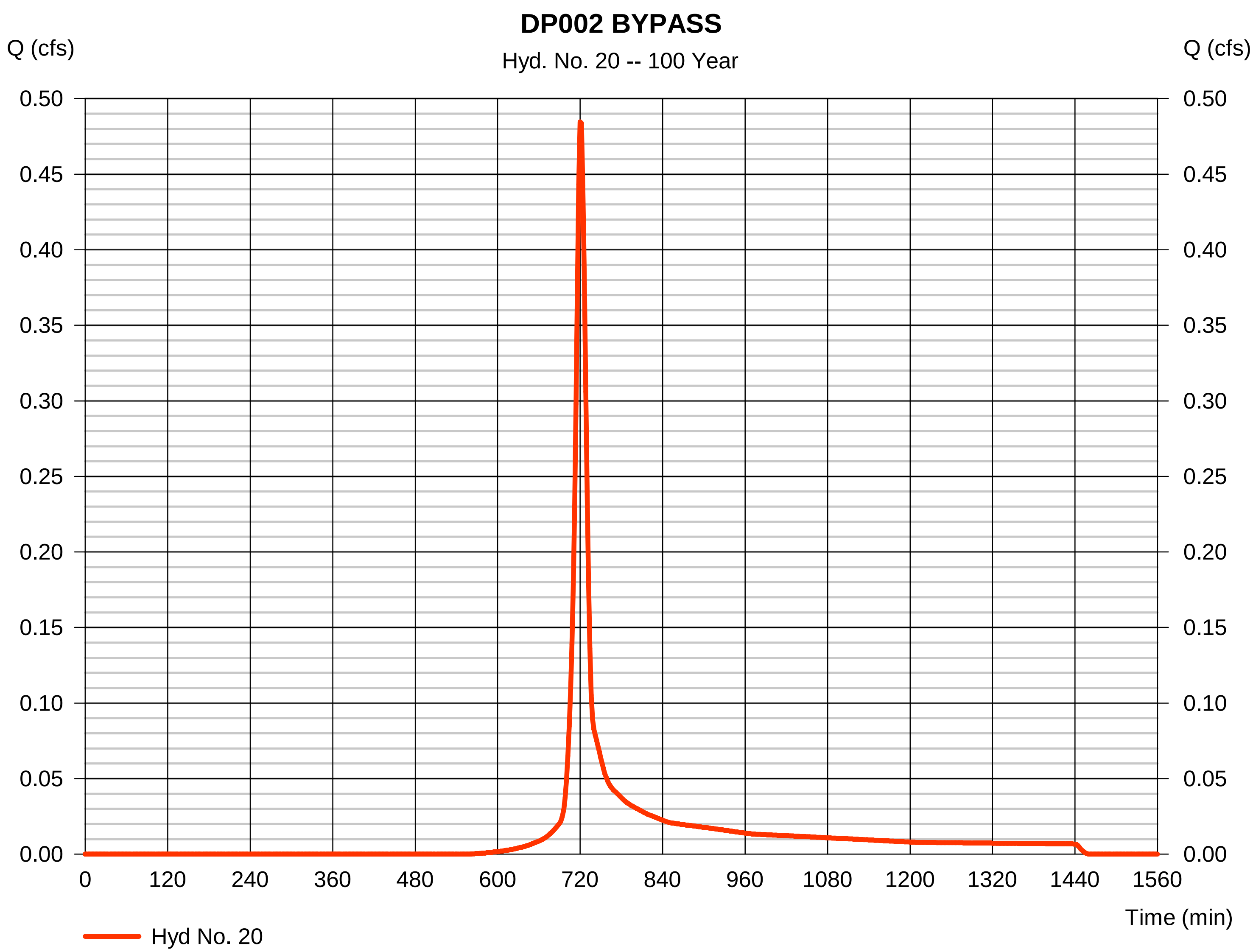
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 20

DP002 BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.485 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 1,264 cuft
Drainage area	= 0.090 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.50 min
Total precip.	= 8.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



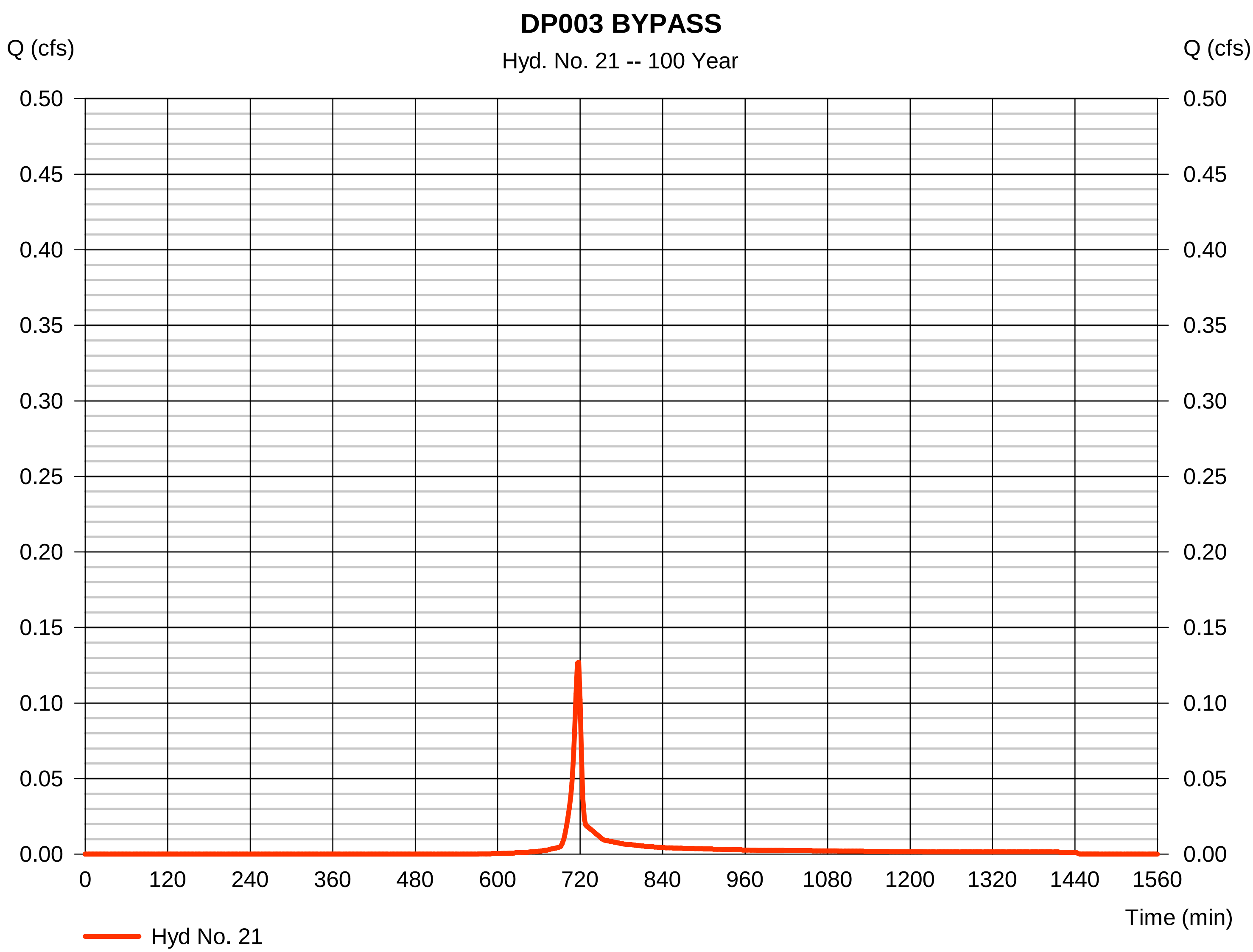
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Friday, 04 / 5 / 2024

Hyd. No. 21

DP003 BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 0.127 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 255 cuft
Drainage area	= 0.020 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.40 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 | Friday, 04 / 5 / 2024

Hyd. No. 23

TOTAL POST POI 1

Hydrograph type	= Combine	Peak discharge	= 12.70 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 92,919 cuft
Inflow hyds.	= 13, 17, 19	Contrib. drain. area	= 0.610 ac

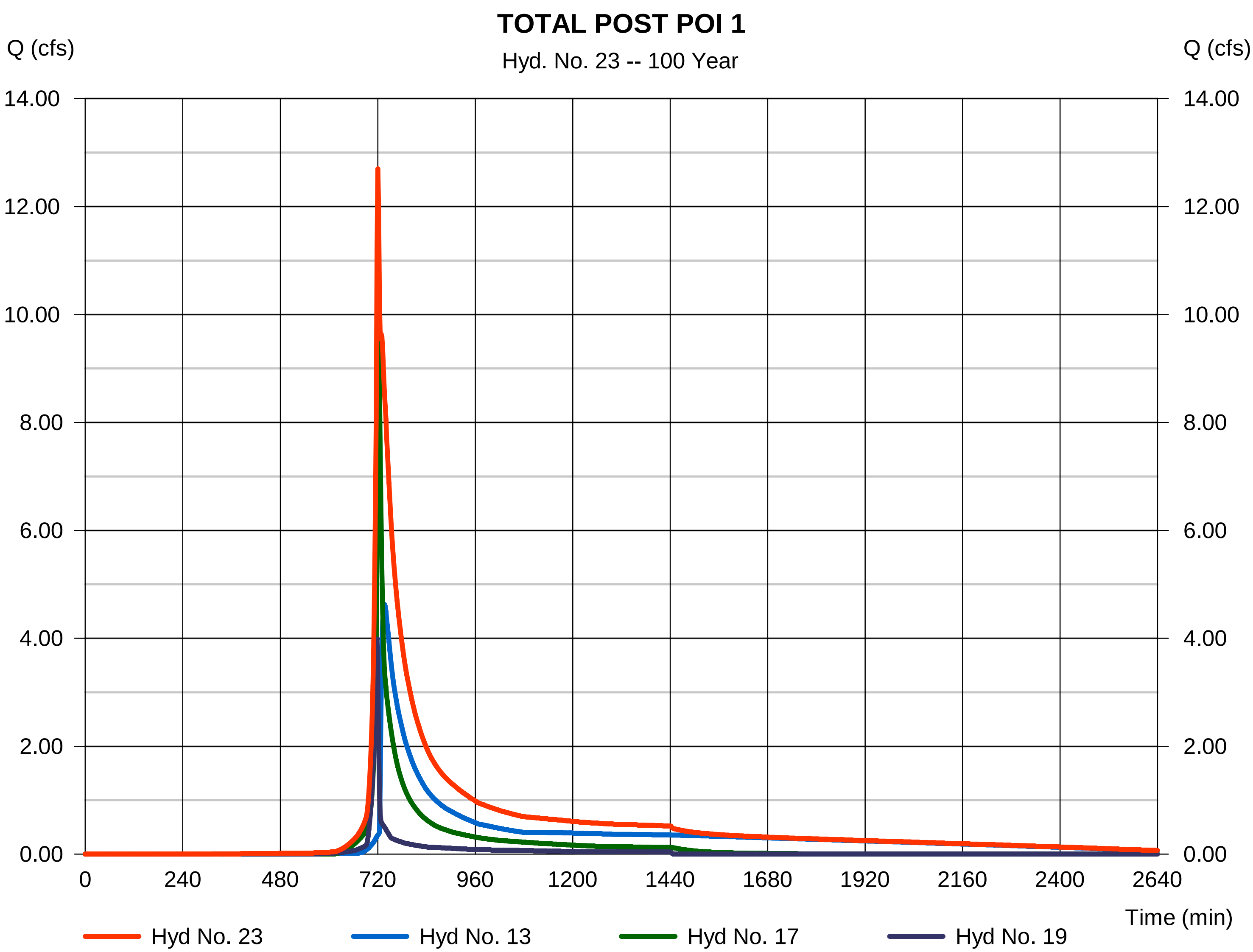


FIGURE 2-1

NOAA Atlas 14, Volume 2, Version 3
Location name: Malvern, Pennsylvania, USA*
Latitude: 40.0364°, Longitude: -75.5238°
Elevation: 539 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.350 (0.322-0.381)	0.418 (0.384-0.455)	0.488 (0.447-0.531)	0.537 (0.492-0.584)	0.594 (0.541-0.646)	0.632 (0.572-0.687)	0.669 (0.604-0.729)	0.701 (0.629-0.765)	0.737 (0.655-0.806)	0.762 (0.673-0.838)
10-min	0.559 (0.515-0.609)	0.668 (0.614-0.727)	0.781 (0.717-0.851)	0.859 (0.786-0.934)	0.946 (0.862-1.03)	1.01 (0.911-1.10)	1.06 (0.960-1.16)	1.11 (0.997-1.21)	1.16 (1.04-1.28)	1.20 (1.06-1.32)
15-min	0.699 (0.644-0.762)	0.840 (0.771-0.914)	0.988 (0.906-1.08)	1.09 (0.994-1.18)	1.20 (1.09-1.30)	1.27 (1.15-1.39)	1.34 (1.21-1.46)	1.40 (1.26-1.53)	1.47 (1.30-1.60)	1.51 (1.33-1.66)
30-min	0.958 (0.882-1.04)	1.16 (1.07-1.26)	1.40 (1.29-1.53)	1.57 (1.44-1.71)	1.78 (1.62-1.93)	1.92 (1.74-2.09)	2.06 (1.86-2.24)	2.18 (1.96-2.38)	2.33 (2.07-2.55)	2.44 (2.16-2.68)
60-min	1.20 (1.10-1.30)	1.46 (1.34-1.58)	1.80 (1.65-1.96)	2.05 (1.88-2.23)	2.36 (2.16-2.57)	2.60 (2.36-2.83)	2.84 (2.56-3.09)	3.06 (2.75-3.34)	3.35 (2.98-3.66)	3.56 (3.15-3.91)
2-hr	1.43 (1.30-1.57)	1.73 (1.58-1.90)	2.15 (1.96-2.37)	2.48 (2.25-2.72)	2.90 (2.62-3.18)	3.23 (2.90-3.54)	3.56 (3.18-3.90)	3.89 (3.45-4.27)	4.34 (3.79-4.77)	4.67 (4.05-5.16)
3-hr	1.55 (1.42-1.71)	1.88 (1.72-2.07)	2.34 (2.13-2.58)	2.70 (2.45-2.96)	3.17 (2.86-3.47)	3.53 (3.16-3.87)	3.90 (3.47-4.27)	4.27 (3.77-4.69)	4.76 (4.15-5.24)	5.14 (4.44-5.67)
6-hr	1.92 (1.75-2.12)	2.32 (2.12-2.56)	2.88 (2.62-3.18)	3.33 (3.02-3.67)	3.96 (3.56-4.35)	4.46 (3.98-4.90)	4.99 (4.42-5.47)	5.54 (4.85-6.08)	6.29 (5.42-6.94)	6.90 (5.86-7.62)
12-hr	2.33 (2.12-2.60)	2.81 (2.56-3.13)	3.51 (3.19-3.91)	4.09 (3.70-4.55)	4.93 (4.41-5.46)	5.63 (4.99-6.22)	6.38 (5.59-7.06)	7.19 (6.22-7.96)	8.36 (7.08-9.26)	9.32 (7.76-10.3)
24-hr	2.69 (2.46-2.95)	3.24 (2.96-3.55)	4.06 (3.71-4.46)	4.75 (4.32-5.20)	5.74 (5.20-6.27)	6.57 (5.92-7.18)	7.47 (6.70-8.14)	8.43 (7.52-9.19)	9.84 (8.68-10.7)	11.0 (9.61-12.0)
2-day	3.10 (2.83-3.42)	3.75 (3.42-4.12)	4.71 (4.29-5.18)	5.49 (4.99-6.03)	6.60 (5.98-7.24)	7.52 (6.78-8.24)	8.49 (7.62-9.31)	9.53 (8.50-10.4)	11.0 (9.74-12.1)	12.2 (10.7-13.4)
3-day	3.28 (2.99-3.61)	3.95 (3.61-4.35)	4.95 (4.52-5.44)	5.76 (5.25-6.33)	6.91 (6.27-7.59)	7.86 (7.10-8.62)	8.88 (7.97-9.73)	9.95 (8.88-10.9)	11.5 (10.2-12.6)	12.7 (11.2-14.0)
4-day	3.45 (3.15-3.80)	4.15 (3.80-4.58)	5.19 (4.74-5.72)	6.03 (5.50-6.64)	7.23 (6.56-7.94)	8.22 (7.42-9.01)	9.26 (8.33-10.1)	10.4 (9.27-11.4)	11.9 (10.6-13.1)	13.2 (11.6-14.5)
7-day	4.02 (3.71-4.39)	4.82 (4.44-5.26)	5.96 (5.49-6.51)	6.89 (6.34-7.52)	8.23 (7.53-8.97)	9.33 (8.50-10.2)	10.5 (9.52-11.4)	11.7 (10.6-12.8)	13.5 (12.1-14.7)	15.0 (13.3-16.3)
10-day	4.57 (4.23-4.94)	5.46 (5.05-5.91)	6.65 (6.16-7.20)	7.61 (7.03-8.23)	8.95 (8.24-9.67)	10.0 (9.20-10.8)	11.2 (10.2-12.0)	12.3 (11.2-13.3)	13.9 (12.6-15.1)	15.2 (13.7-16.5)
20-day	6.17 (5.75-6.64)	7.32 (6.82-7.87)	8.73 (8.13-9.39)	9.84 (9.16-10.6)	11.3 (10.5-12.2)	12.5 (11.6-13.4)	13.7 (12.6-14.7)	14.9 (13.7-16.0)	16.5 (15.1-17.7)	17.7 (16.1-19.1)
30-day	7.68 (7.22-8.16)	9.05 (8.51-9.61)	10.6 (9.92-11.2)	11.7 (11.0-12.4)	13.2 (12.4-14.1)	14.4 (13.5-15.3)	15.5 (14.5-16.5)	16.7 (15.5-17.7)	18.1 (16.8-19.3)	19.2 (17.7-20.5)
45-day	9.73 (9.22-10.3)	11.4 (10.8-12.1)	13.1 (12.4-13.9)	14.4 (13.6-15.3)	16.1 (15.2-17.0)	17.3 (16.3-18.3)	18.4 (17.3-19.5)	19.5 (18.3-20.6)	20.8 (19.5-22.1)	21.8 (20.4-23.1)
60-day	11.7 (11.1-12.3)	13.7 (13.0-14.4)	15.6 (14.8-16.4)	17.0 (16.1-17.9)	18.8 (17.8-19.8)	20.1 (19.0-21.2)	21.3 (20.2-22.5)	22.5 (21.2-23.7)	23.8 (22.5-25.2)	24.8 (23.3-26.2)

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

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

Please refer to NOAA Atlas 14 document for more information.

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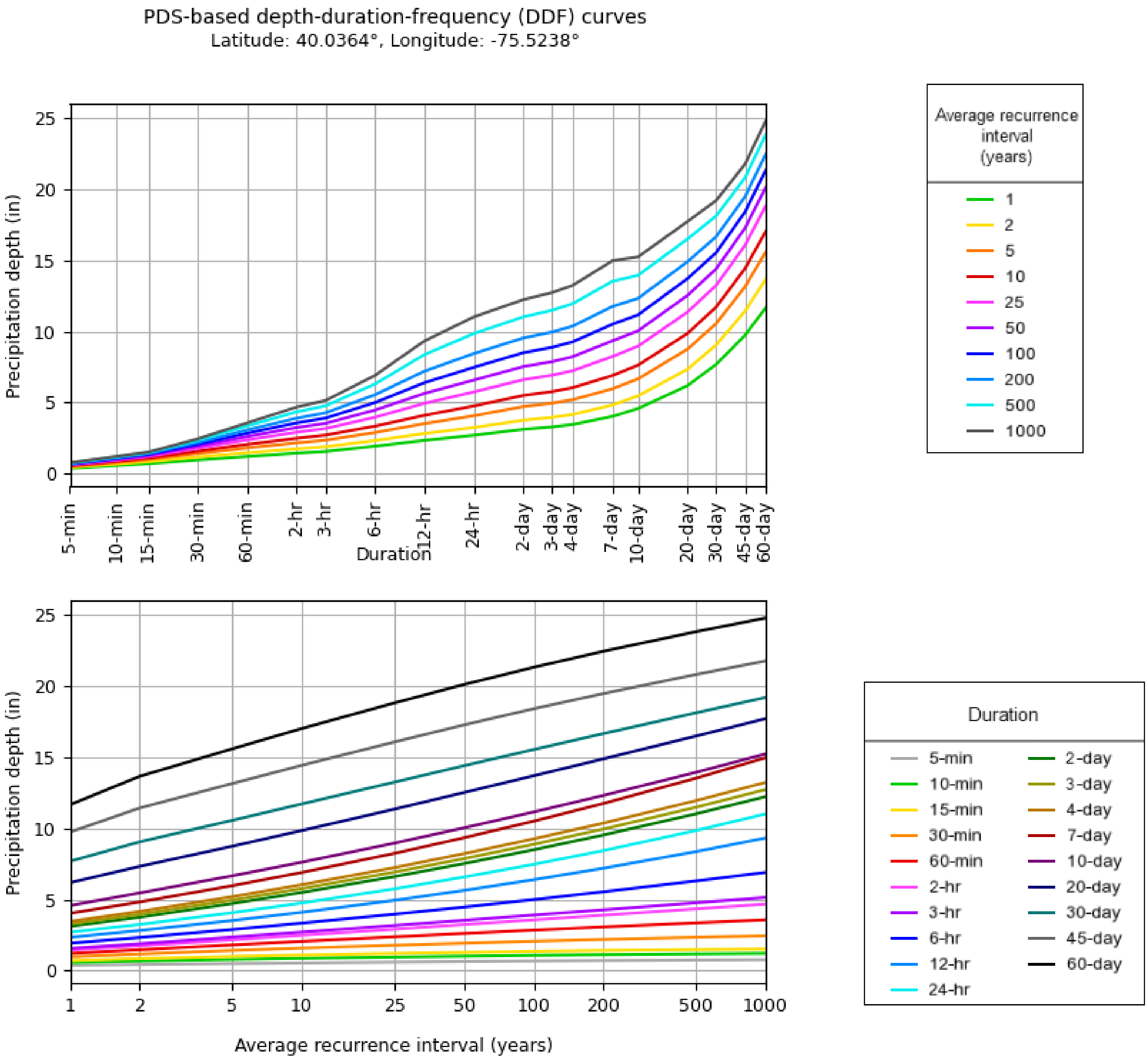
PF graphical



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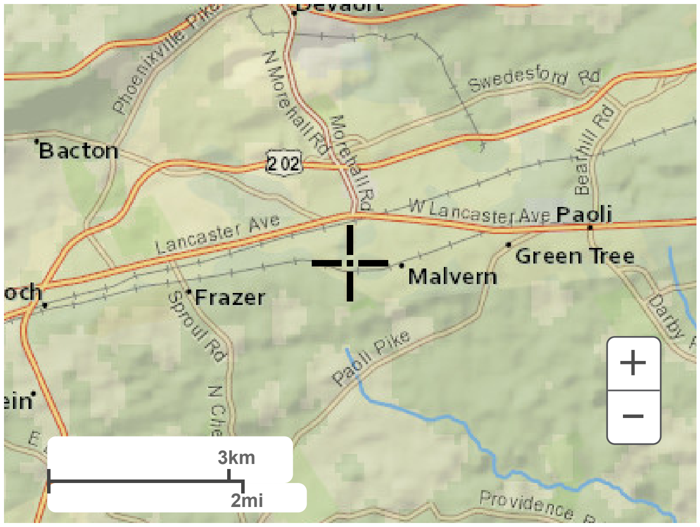
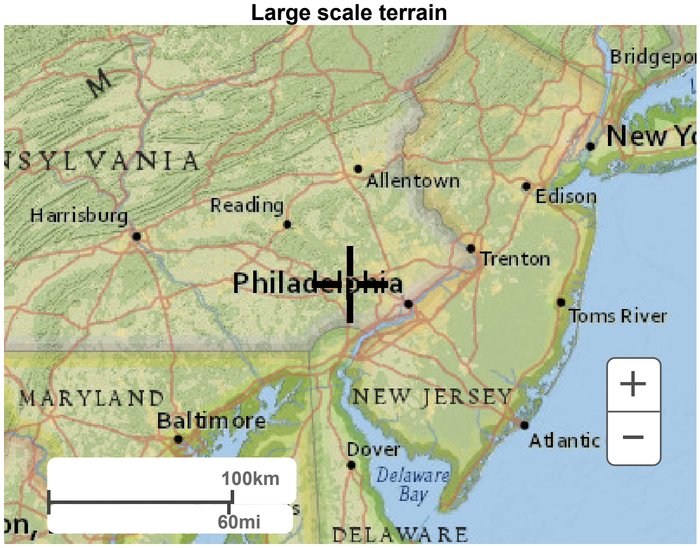
Maps & aerials

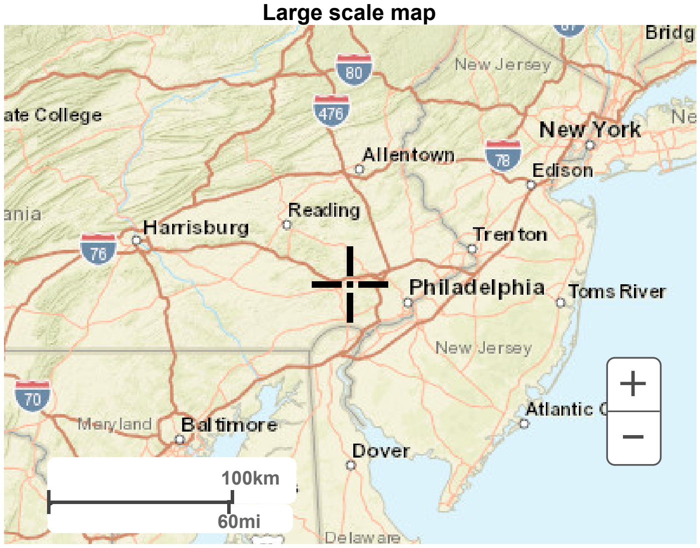
Small scale terrain



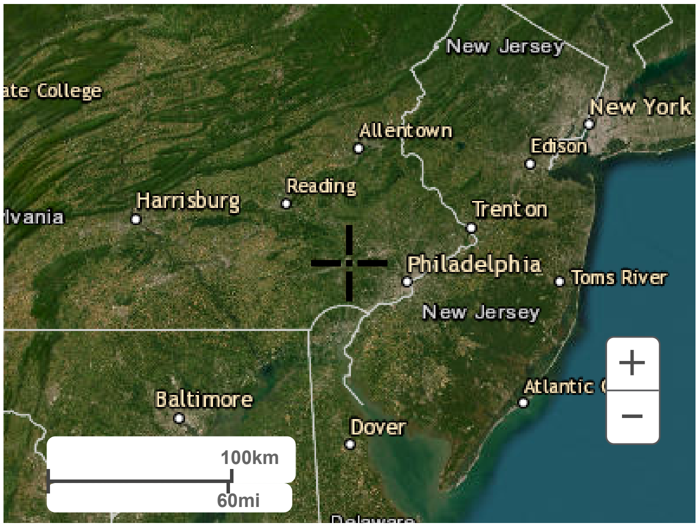
Large scale terrain



Large scale map



Large scale aerial



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

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APPENDIX E

STORMWATER CONVEYANCE CALCULATIONS

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	23.735	-17.273	Comb	0.00	0.03	0.25	5.0	504.94	2.65	505.57	18	Cir	0.012	1.50	509.54	2 to Bed 3
2	1	21.751	-89.711	Comb	0.00	0.17	0.69	5.0	505.77	1.06	506.00	18	Cir	0.012	1.50	509.54	2 to 3
3	2	156.363	95.811	Comb	0.00	0.06	0.74	5.0	506.20	3.13	511.09	18	Cir	0.012	1.50	517.33	3 to 4
4	3	146.273	4.359	Comb	0.00	0.04	0.78	5.0	513.89	8.92	526.94	18	Cir	0.012	1.50	534.63	6 to 4
5	4	100.486	13.285	Comb	0.00	0.00	0.00	0.0	531.19	6.83	538.05	18	Cir	0.012	1.43	542.95	8 to 6
6	5	26.027	70.047	Comb	5.36	0.00	0.00	0.0	539.77	5.03	541.08	18	Cir	0.012	1.00	543.99	9 to 8
7	4	21.742	89.186	Comb	0.00	0.06	0.74	5.0	531.87	1.56	532.21	18	Cir	0.012	1.00	534.66	7 to 6
8	3	21.743	93.433	Comb	0.00	0.04	0.79	5.0	514.84	0.51	514.95	18	Cir	0.012	1.00	517.39	23 to 20
9	End	75.200	-172.351	MH	0.00	0.00	0.00	0.0	535.00	1.70	536.28	24	Cir	0.012	0.20	545.54	23 to 22
10	9	82.280	9.465	MH	0.00	0.00	0.00	0.0	536.28	0.51	536.70	24	Cir	0.012	0.71	541.61	24 to 23
11	10	107.451	41.703	MH	0.00	0.00	0.00	0.0	536.70	0.50	537.24	24	Cir	0.012	0.96	541.88	25 to 24
12	11	11.006	71.457	Comb	12.72	0.00	0.00	0.0	537.24	0.45	537.29	24	Cir	0.012	1.00	540.29	26 to 25
13	End	7.380	-169.689	Comb	0.00	0.19	0.95	5.0	534.75	1.08	534.83	18	Cir	0.012	0.78	541.39	17 to Bed 2
14	13	22.070	-27.474	Comb	0.00	0.03	0.99	5.0	535.64	1.13	535.89	18	Cir	0.012	0.73	541.40	18 to 17
15	14	20.995	-18.946	Comb	0.00	0.41	0.90	5.0	536.08	0.86	536.26	18	Cir	0.012	0.98	539.12	19 to 18
16	15	21.740	-36.778	Comb	0.00	0.05	0.83	5.0	536.46	0.83	536.64	18	Cir	0.012	1.00	539.14	20 to 19
17	14	50.846	25.705	MH	3.86	0.00	0.00	0.0	536.49	1.00	537.00	18	Cir	0.012	1.00	542.19	21 to 18
18	End	8.874	98.004	Comb	0.00	0.11	0.72	5.0	535.00	5.41	535.48	18	Cir	0.012	1.50	539.54	15 to Bed 2
19	18	19.231	-88.224	Comb	0.00	0.49	0.76	5.0	535.68	2.24	536.11	18	Cir	0.012	1.00	539.54	16 to 15
20	End	45.476	-171.066	MH	4.63	0.00	0.00	0.0	530.46	2.13	531.43	18	Cir	0.012	1.00	543.89	14-OUTFALL
21	End	26.336	160.884	Comb	0.00	0.07	0.67	5.0	507.00	6.99	508.84	18	Cir	0.012	1.50	516.35	10 to Bed 3
22	21	137.883	1.702	Comb	0.00	0.07	0.65	5.0	513.75	6.59	522.83	18	Cir	0.012	1.50	531.67	12 to 10
23	22	21.740	104.362	Comb	0.00	0.31	0.92	5.0	528.46	2.81	529.07	18	Cir	0.012	1.00	531.66	13 to 12

Project File: storm sewers.stm	Number of lines: 25	Date: 3/4/2024

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
24	21	21.741	89.186	Comb	0.00	0.05	0.84	5.0	512.89	4.55	513.88	18	Cir	0.012	1.00	516.33	11 to 10
25	End	39.788	93.787	MH	9.85	0.00	0.00	0.0	503.07	4.85	505.00	18	Cir	0.012	1.00	511.01	1-OUTFALL

Project File: storm sewers.stm	Number of lines: 25	Date: 3/4/2024

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	2	Combination	509.54	Cir	4.00	4.00	18	Cir	505.57	18	Cir	505.77
2	3	Combination	509.54	Rect	4.00	2.00	18	Cir	506.00	18	Cir	506.20
3	4	Combination	517.33	Rect	4.00	2.00	18	Cir	511.09	18 18	Cir Cir	513.89 514.84
4	6	Combination	534.63	Rect	4.00	2.00	18	Cir	526.94	18 18	Cir Cir	531.19 531.87
5	8	Combination	542.95	Rect	4.00	2.00	18	Cir	538.05	18	Cir	539.77
6	9	Combination	543.99	Rect	4.00	2.00	18	Cir	541.08			
7	7	Combination	534.66	Rect	4.00	2.00	18	Cir	532.21			
8	5	Combination	517.39	Rect	4.00	2.00	18	Cir	514.95			
9	23	Manhole	545.54	Rect	4.00	2.00	24	Cir	536.28	24	Cir	536.28
10	24	Manhole	541.61	Rect	4.00	2.00	24	Cir	536.70	24	Cir	536.70
11	25	Manhole	541.88	Rect	4.00	2.00	24	Cir	537.24	24	Cir	537.24
12	26	Combination	540.29	Rect	4.00	2.00	24	Cir	537.29			
13	17	Combination	541.39	Rect	4.00	2.00	18	Cir	534.83	18	Cir	535.64
14	18	Combination	541.40	Rect	4.00	2.00	18	Cir	535.89	18 18	Cir Cir	536.08 536.49
15	19	Combination	539.12	Rect	4.00	2.00	18	Cir	536.26	18	Cir	536.46
16	20	Combination	539.14	Rect	4.00	2.00	18	Cir	536.64			
17	21	Manhole	542.19	Rect	4.00	2.00	18	Cir	537.00			
18	15	Combination	539.54	Rect	4.00	2.00	18	Cir	535.48	18	Cir	535.68
19	16	Combination	539.54	Rect	4.00	2.00	18	Cir	536.11			
20	14	Manhole	543.89	Rect	4.00	2.00	18	Cir	531.43			
21	10	Combination	516.35	Rect	4.00	2.00	18	Cir	508.84	18 18	Cir Cir	513.75 512.89

Project File: storm sewers.stm	Number of Structures: 25	Run Date: 3/4/2024

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
22	12	Combination	531.67	Rect	4.00	2.00	18	Cir	522.83	18	Cir	528.46
23	13	Combination	531.66	Rect	4.00	2.00	18	Cir	529.07			
24	11	Combination	516.33	Rect	4.00	2.00	18	Cir	513.88			
25	1	Manhole	511.01	Rect	4.00	2.00	18	Cir	505.00			

Project File: storm sewers.stm	Number of Structures: 25	Run Date: 3/4/2024

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	2 to Bed 3	7.82	18	Cir	23.735	504.94	505.57	2.654	506.02	506.65	0.76	506.65	End	Combination
2	2 to 3	7.76	18	Cir	21.751	505.77	506.00	1.057	506.66	507.08	n/a	507.08	1	Combination
3	3 to 4	6.74	18	Cir	156.363	506.20	511.09	3.127	507.08	512.09	0.67	512.09	2	Combination
4	6 to 4	6.07	18	Cir	146.273	513.89	526.94	8.922	514.32	527.89	n/a	527.89	3	Combination
5	8 to 6	5.36	18	Cir	100.486	531.19	538.05	6.827	531.62	538.94	0.53	538.94	4	Combination
6	9 to 8	5.36	18	Cir	26.027	539.77	541.08	5.033	540.24	541.97	0.37	541.97	5	Combination
7	7 to 6	0.44	18	Cir	21.742	531.87	532.21	1.564	532.05	532.45	0.08	532.45	4	Combination
8	23 to 20	0.31	18	Cir	21.743	514.84	514.95	0.507	515.04	515.16	n/a	515.16	3	Combination
9	23 to 22	12.72	24	Cir	75.200	535.00	536.28	1.702	537.09	537.56	n/a	537.56 j	End	Manhole
10	24 to 23	12.72	24	Cir	82.280	536.28	536.70	0.510	537.56	537.98	n/a	537.98	9	Manhole
11	25 to 24	12.72	24	Cir	107.451	536.70	537.24	0.503	537.98	538.52	n/a	538.52	10	Manhole
12	26 to 25	12.72	24	Cir	11.006	537.24	537.29	0.454	538.56	538.60	0.52	539.13	11	Combination
13	17 to Bed 2	9.59	18	Cir	7.380	534.75	534.83	1.084	535.94	536.03	n/a	536.03	End	Combination
14	18 to 17	7.94	18	Cir	22.070	535.64	535.89	1.131	536.53	536.98	0.38	536.98	13	Combination
15	19 to 18	3.82	18	Cir	20.995	536.08	536.26	0.856	536.98	537.01	n/a	537.01 j	14	Combination
16	20 to 19	0.41	18	Cir	21.740	536.46	536.64	0.828	537.01	536.88	0.08	536.88	15	Combination
17	21 to 18	3.86	18	Cir	50.846	536.49	537.00	1.003	537.09	537.75	n/a	537.75	14	Manhole
18	15 to Bed 2	4.42	18	Cir	8.874	535.00	535.48	5.409	535.81	536.29	n/a	536.29 j	End	Combination
19	16 to 15	3.66	18	Cir	19.231	535.68	536.11	2.236	536.29	536.84	0.29	536.84	18	Combination
20	14-OUTFALL	4.63	18	Cir	45.476	530.46	531.43	2.133	531.29	532.26	n/a	532.26 j	End	Manhole
21	10 to Bed 3	3.91	18	Cir	26.336	507.00	508.84	6.987	507.76	509.60	n/a	509.60 j	End	Combination
22	12 to 10	3.23	18	Cir	137.883	513.75	522.83	6.585	514.09	523.51	n/a	523.51	21	Combination
23	13 to 12	2.80	18	Cir	21.740	528.46	529.07	2.806	528.85	529.71	n/a	529.71	22	Combination
24	11 to 10	0.41	18	Cir	21.741	512.89	513.88	4.553	513.03	514.12	n/a	514.12	21	Combination

Project File: storm sewers.stm	Number of lines: 25	Run Date: 3/4/2024

NOTES: Return period = 100 Yrs. ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
25	1-OUTFALL	9.85	18	Cir	39.788	503.07	505.00	4.850	504.28	506.21	0.65	506.21	End	Manhole

Project File: storm sewers.stm	Number of lines: 25	Run Date: 3/4/2024

NOTES: Return period = 100 Yrs. ; j - Line contains hyd. jump.

Storm Sewer Tabulation

Station Line	Station To Line	Len (ft)	Drng Area Incr (ac)	Drng Area Total (ac)	Rnoff coeff (C)	Area x C Incr	Area x C Total	Tc Inlet (min)	Tc Syst (min)	Rain (I) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe Size (in)	Pipe Slope (%)	Invert Elev Dn (ft)	Invert Elev Up (ft)	HGL Elev Dn (ft)	HGL Elev Up (ft)	Grnd / Rim Elev Dn (ft)	Grnd / Rim Elev Up (ft)	Line ID
1	End	23.735	0.03	0.40	0.25	0.01	0.28	5.0	7.9	8.9	7.82	18.53	5.73	18	2.65	504.94	505.57	506.02	506.65	0.00	509.54	2 to Bed 3
2	1	21.751	0.17	0.37	0.69	0.12	0.27	5.0	7.9	8.9	7.76	11.70	6.39	18	1.06	505.77	506.00	506.66	507.08	509.54	509.54	2 to 3
3	2	156.363	0.06	0.20	0.74	0.04	0.15	5.0	7.2	9.1	6.74	20.12	5.82	18	3.13	506.20	511.09	507.08	512.09	509.54	517.33	3 to 4
4	3	146.273	0.04	0.10	0.78	0.03	0.08	5.0	6.5	9.3	6.07	33.98	9.83	18	8.92	513.89	526.94	514.32	527.89	517.33	534.63	6 to 4
5	4	100.486	0.00	0.00	0.00	0.00	0.00	0.0	0.1	0.0	5.36	29.72	8.82	18	6.83	531.19	538.05	531.62	538.94	534.63	542.95	8 to 6
6	5	26.027	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	5.36	25.52	8.16	18	5.03	539.77	541.08	540.24	541.97	542.95	543.99	9 to 8
7	4	21.742	0.06	0.06	0.74	0.04	0.04	5.0	5.0	9.8	0.44	14.23	2.98	18	1.56	531.87	532.21	532.05	532.45	534.63	534.66	7 to 6
8	3	21.743	0.04	0.04	0.79	0.03	0.03	5.0	5.0	9.8	0.31	8.10	2.17	18	0.51	514.84	514.95	515.04	515.16	517.33	517.39	23 to 20
9	End	75.200	0.00	0.00	0.00	0.00	0.00	0.0	0.8	0.0	12.72	31.97	5.02	24	1.70	535.00	536.28	537.09	537.56	544.70	545.54	23 to 22
10	9	82.280	0.00	0.00	0.00	0.00	0.00	0.0	0.5	0.0	12.72	17.51	5.98	24	0.51	536.28	536.70	537.56	537.98	545.54	541.61	24 to 23
11	10	107.451	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	12.72	17.37	5.98	24	0.50	536.70	537.24	537.98	538.52	541.61	541.88	25 to 24
12	11	11.006	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	12.72	16.51	5.80	24	0.45	537.24	537.29	538.56	538.60	541.88	540.29	26 to 25
13	End	7.380	0.19	0.68	0.95	0.18	0.62	5.0	6.8	9.2	9.59	11.85	6.37	18	1.08	534.75	534.83	535.94	536.03	0.00	541.39	17 to Bed 2
14	13	22.070	0.03	0.49	0.99	0.03	0.44	5.0	6.7	9.3	7.94	12.10	6.54	18	1.13	535.64	535.89	536.53	536.98	541.39	541.40	18 to 17
15	14	20.995	0.41	0.46	0.90	0.37	0.41	5.0	6.6	9.3	3.82	10.53	3.90	18	0.86	536.08	536.26	536.98	537.01	541.40	539.12	19 to 18
16	15	21.740	0.05	0.05	0.83	0.04	0.04	5.0	5.0	9.8	0.41	10.35	1.50	18	0.83	536.46	536.64	537.01	536.88	539.12	539.14	20 to 19
17	14	50.846	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	3.86	11.39	5.09	18	1.00	536.49	537.00	537.09	537.75	541.40	542.19	21 to 18
18	End	8.874	0.11	0.60	0.72	0.08	0.45	5.0	5.2	9.8	4.42	26.46	4.55	18	5.41	535.00	535.48	535.81	536.29	0.00	539.54	15 to Bed 2
19	18	19.231	0.49	0.49	0.76	0.37	0.37	5.0	5.0	9.8	3.66	17.01	4.88	18	2.24	535.68	536.11	536.29	536.84	539.54	539.54	16 to 15
20	End	45.476	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	4.63	16.61	4.63	18	2.13	530.46	531.43	531.29	532.26	0.00	543.89	14-OUTFALL
21	End	26.336	0.07	0.50	0.67	0.05	0.42	5.0	6.6	9.3	3.91	30.07	4.37	18	6.99	507.00	508.84	507.76	509.60	0.00	516.35	10 to Bed 3
22	21	137.883	0.07	0.38	0.65	0.05	0.33	5.0	5.2	9.8	3.23	29.19	7.49	18	6.59	513.75	522.83	514.09	523.51	516.35	531.67	12 to 10

Project File: storm sewers.stm | Number of lines: 25 | Run Date: 3/4/2024

NOTES:Intensity = 127.16 / (Inlet time + 17.80) ^ 0.82; Return period =Yrs. 100 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
23	22	21.740	0.31	0.31	0.92	0.29	0.29	5.0	5.0	9.8	2.80	19.06	5.83	18	2.81	528.46	529.07	528.85	529.71	531.67	531.66	13 to 12
24	21	21.741	0.05	0.05	0.84	0.04	0.04	5.0	5.0	9.8	0.41	24.27	3.73	18	4.55	512.89	513.88	513.03	514.12	516.35	516.33	11 to 10
25	End	39.788	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	9.85	25.05	6.45	18	4.85	503.07	505.00	504.28	506.21	0.00	511.01	1-OUTFALL

Project File: storm sewers.stm | Number of lines: 25 | Run Date: 3/4/2024

NOTES:Intensity = 127.16 / (Inlet time + 17.80) ^ 0.82; Return period =Yrs. 100 ; c = cir e = ellip b = box

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	2	0.07	3.99	4.06	0.00	Comb	4.0	4.00	2.00	2.00	2.00	Sag	2.00	0.050	0.020	0.013	0.31	12.64	0.31	12.64	0.0	Off
2	3	1.15	-nan(ind)	-nan(ind)	0.00	Comb	4.0	0.12	0.48	0.12	4.00	Sag	2.00	0.050	0.020	0.013	5.05	249.50	5.05	249.50	0.0	Off
3	4	0.44	-nan(ind)	-nan(ind)	-nan(ind)	Comb	4.0	1.00	0.00	1.00	2.00	0.110	2.00	0.050	0.020	0.013	5.00	247.00	5.00	247.00	0.0	2
4	6	0.31	-nan(ind)	-nan(ind)	-nan(ind)	Comb	4.0	1.00	0.00	1.00	2.00	0.110	2.00	0.050	0.020	0.013	5.00	247.00	5.00	247.00	0.0	3
5	8	0.00	0.00	-nan(ind)	-nan(ind)	Comb	4.0	1.00	0.00	1.00	2.00	0.050	2.00	0.050	0.020	0.013	0.00	0.00	5.00	247.00	0.0	4
6	9	5.36*	0.00	3.99	1.37	Comb	4.0	8.70	0.00	8.70	2.00	0.050	2.00	0.050	0.020	0.013	0.23	8.70	0.15	4.59	0.0	7
7	7	0.44	1.37	-4.62	6.43	Comb	4.0	1.00	0.00	1.00	2.00	11.000	2.00	0.050	0.020	0.013	0.06	1.26	0.10	2.09	0.0	8
8	5	0.31	6.43	2.75	3.99	Comb	4.0	1.00	0.00	1.00	2.00	0.110	2.00	0.050	0.020	0.013	0.22	8.11	0.19	6.42	0.0	1
9	23	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.013	0.00	0.00	0.00	0.00	0.0	Off
10	24	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.013	0.00	0.00	0.00	0.00	0.0	Off
11	25	0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.013	0.00	0.00	0.00	0.00	0.0	Off
12	26	12.72*	0.00	12.72	0.00	Comb	4.0	15.85	8.00	4.00	2.00	Sag	2.00	0.050	0.020	0.013	-0.34	1.59	1.66	1.59	24.0	Off
13	17	1.77	0.00	1.41	0.36	Comb	4.0	3.09	0.00	3.09	2.00	0.033	2.00	0.050	0.020	0.013	0.18	5.82	0.10	2.16	0.0	23
14	18	0.29	0.00	0.29	0.00	Comb	4.0	1.00	0.00	1.00	2.00	0.033	2.00	0.050	0.020	0.013	0.09	1.90	0.00	0.00	0.0	23
15	19	3.63	0.00	2.72	0.91	Comb	4.0	6.34	0.00	6.34	2.00	0.050	2.00	0.050	0.020	0.013	0.21	7.35	0.13	3.62	0.0	Off
16	20	0.41	0.00	0.41	0.00	Comb	4.0	1.00	0.00	1.00	2.00	0.050	2.00	0.050	0.020	0.013	0.10	1.99	0.00	0.00	0.0	22
17	21	3.86*	0.00	0.00	3.86	MH	0.0	0.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.013	0.00	0.00	0.00	0.00	0.0	Off
18	15	0.78	0.00	0.72	0.06	Comb	4.0	0.62	0.00	0.62	2.00	0.030	2.00	0.050	0.020	0.013	0.14	3.86	0.05	1.04	0.0	23
19	16	3.66	0.00	2.72	0.95	Comb	4.0	6.40	0.00	6.40	2.00	0.030	2.00	0.050	0.020	0.013	0.22	8.25	0.15	4.31	0.0	23
20	14	4.63*	0.00	0.00	4.63	MH	0.0	0.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.013	0.00	0.00	0.00	0.00	0.0	Off
21	10	0.46	0.00	0.46	0.00	Comb	4.0	1.00	0.00	1.00	2.00	0.110	2.00	0.050	0.020	0.013	0.09	1.80	0.01	0.15	0.0	1
22	12	0.45	0.00	0.45	0.00	Comb	4.0	1.00	0.00	1.00	2.00	0.110	2.00	0.050	0.020	0.013	0.09	1.78	0.00	0.00	0.0	21
23	13	2.80	1.37	3.10	1.07	Comb	4.0	5.03	0.00	5.03	2.00	0.110	2.00	0.050	0.020	0.013	0.19	6.55	0.12	3.12	0.0	24

Project File: storm sewers.stm	Number of lines: 25	Run Date: 3/4/2024

NOTES: Inlet N-Values = 0.016; Intensity = 127.16 / (Inlet time + 17.80) ^ 0.82; Return period = 100 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
24	11	0.41	1.07	1.20	0.28	Comb	4.0	1.00	0.00	1.00	2.00	0.110	2.00	0.050	0.020	0.013	0.14	3.84	0.07	1.50	0.0	2
25	1	9.85*	0.00	0.00	9.85	MH	0.0	0.00	0.00	0.00	0.00	Sag	2.00	0.050	0.020	0.013	0.00	0.00	0.00	0.00	0.0	Off

Project File: storm sewers.stm | Number of lines: 25 | Run Date: 3/4/2024

NOTES: Inlet N-Values = 0.016; Intensity = 127.16 / (Inlet time + 17.80) ^ 0.82; Return period = 100 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

FL-DOT Report

Date: 3/4/2024
Frequency: 100 yrs
Proj: storm sewers.stm

Drainage Area: C1 = 0.2, C2 = 0.25, C3 = 0.99

Elev of HGL / Elev of Crown / Elev of Invert

Line No	To Line	Type of struc	n - Value	Len (ft)	Drainage Area Incre-ment (ac)	Drainage Area Sub-Total (ac)	Drainage Area Sum CA	Time of conc (min)	Time of Flow in sect (min)	Inten (I) (in/hr)	Total CA	Add Q / Total Flow Q (cfs)	Inlet elev (ft)	Up (ft)	Down (ft)	Fall (ft)	Rise / Span / Size (in)	HGL / Pipe Slope (%)	ADD / Full Flow Vel (ft/s)	Cap (cfs)	Line description
1	End	Comb	0.012	23.735	0.00	0.00	0.00	7.93	0.09	8.91	0.28	0.00	509.54	506.65	506.02	0.63	18	2.67	5.73	7.82	2 to Bed 3
					0.03	0.13	0.03					7.82		507.07	506.44		18	2.65	10.49	18.53	
					0.00	0.23	0.23							505.57	504.94	0.63	Cir				
2	1	Comb	0.012	21.751	0.00	0.00	0.00	7.85	0.08	8.93	0.27	0.00	509.54	507.08	506.66	0.42	18	1.91	6.39	7.76	2 to 3
					0.04	0.10	0.03					7.76		507.50	507.27		18	1.06	6.62	11.70	
					0.10	0.23	0.23							506.00	505.77	0.23	Cir				
3	2	Comb	0.012	156.363	0.00	0.00	0.00	7.17	0.68	9.13	0.15	0.00	517.33	512.09	507.08	5.02	18	3.21	5.82	6.74	3 to 4
					0.02	0.06	0.02					6.74		512.59	507.70		18	3.13	11.38	20.12	
					0.04	0.13	0.13							511.09	506.20	4.89	Cir				
4	3	Comb	0.012	146.273	0.00	0.00	0.00	6.47	0.71	9.34	0.08	0.00	534.63	527.89	514.32	13.57	18	9.28	9.83	6.07	6 to 4
					0.01	0.03	0.01					6.07		528.44	515.39		18	8.92	19.23	33.98	
					0.03	0.07	0.06							526.94	513.89	13.05	Cir				
5	4	Comb	0.012	100.486	0.00	0.00	0.00	0.14	0.55	0.00	0.00	0.00	542.95	538.94	531.62	7.32	18	7.28	8.82	5.36	8 to 6
					0.00	0.00	0.00					5.36		539.55	532.69		18	6.83	16.82	29.72	
					0.00	0.00	0.00							538.05	531.19	6.86	Cir				
6	5	Comb	0.012	26.027	0.00	0.00	0.00	0.00	0.14	0.00	0.00	5.36	543.99	541.97	540.24	1.73	18	6.66	8.16	5.36	9 to 8
					0.00	0.00	0.00					5.36		542.58	541.27		18	5.03	14.44	25.52	
					0.00	0.00	0.00							541.08	539.77	1.31	Cir				
7	4	Comb	0.012	21.742	0.00	0.00	0.00	5.00	1.47	9.83	0.04	0.00	534.66	532.45	532.05	0.40	18	1.86	2.98	0.44	7 to 6
					0.02	0.02	0.01					0.44		533.71	533.37		18	1.56	8.05	14.23	
					0.04	0.04	0.04							532.21	531.87	0.34	Cir				
8	3	Comb	0.012	21.743	0.00	0.00	0.00	5.00	2.06	9.83	0.03	0.00	517.39	515.16	515.04	0.11	18	0.53	2.17	0.31	23 to 20
					0.01	0.01	0.00					0.31		516.45	516.34		18	0.51	4.58	8.10	
					0.03	0.03	0.03							514.95	514.84	0.11	Cir				
9	End	MH	0.012	75.200	0.00	0.00	0.00	0.83	0.31	0.00	0.00	0.00	545.54	537.56	537.09	0.47	24	0.63	5.02	12.72	23 to 22
					0.00	0.00	0.00					12.72		538.28	537.00		24	1.70	10.18	31.97	
					0.00	0.00	0.00							536.28	535.00	1.28	Cir				
10	9	MH	0.012	82.280	0.00	0.00	0.00	0.49	0.34	0.00	0.00	0.00	541.61	537.98	537.56	0.42	24	0.51	5.98	12.72	24 to 23
					0.00	0.00	0.00					12.72		538.70	538.28		24	0.51	5.57	17.51	
					0.00	0.00	0.00							536.70	536.28	0.42	Cir				

NOTES: Intensity = 127.16 / (Inlet time + 17.80) ^ 0.82 (in/hr) ; Time of flow in section is based on full flow.

Project File: storm sewers.stm

FL-DOT Report

Date: 3/4/2024
Frequency: 100 yrs
Proj: storm sewers.stm

Drainage Area: C1 = 0.2, C2 = 0.25, C3 = 0.99

Line No	To Line	Type of struc	n - Value	Len (ft)	Drainage Area Incre-ment (ac)	Drainage Area Sub-Total (ac)	Drainage Area Sum CA	Time of conc (min)	Time of Flow in sect (min)	Inten (I) (in/hr)	Total CA	Add Q / Total Flow / Q (cfs)	Inlet elev (ft)	Elev of HGL / Elev of Crown / Elev of Invert: Up (ft)	Down (ft)	Fall (ft)	Rise / Span / Size (in)	HGL / Pipe / Slope (%)	ADD / Full Flow: Vel (ft/s)	Cap (cfs)	Line description
11	10	MH	0.012	107.451	0.00	0.00	0.00	0.05	0.44	0.00	0.00	0.00	541.88	538.52	537.98	0.54	24	0.50	5.98	12.72	25 to 24
					0.00	0.00	0.00					12.72		539.24	538.70		24	0.50	5.53	17.37	
					0.00	0.00	0.00							537.24	536.70	0.54	Cir				
12	11	Comb	0.012	11.006	0.00	0.00	0.00	0.00	0.05	0.00	0.00	12.72	540.29	538.60	538.56	0.05	24	0.43	5.80	12.72	26 to 25
					0.00	0.00	0.00					12.72		539.29	539.24		24	0.45	5.26	16.51	
					0.00	0.00	0.00							537.29	537.24	0.05	Cir				
13	End	Comb	0.012	7.380	0.00	0.00	0.00	6.80	0.02	9.24	0.62	0.00	541.39	536.03	535.94	0.08	18	1.15	6.37	9.59	17 to Bed 2
					0.01	0.07	0.02					9.59		536.33	536.25		18	1.08	6.70	11.85	
					0.18	0.60	0.59							534.83	534.75	0.08	Cir				
14	13	Comb	0.012	22.070	0.00	0.00	0.00	6.72	0.08	9.26	0.44	0.00	541.40	536.98	536.53	0.45	18	2.06	6.54	7.94	18 to 17
					0.00	0.06	0.02					7.94		537.39	537.14		18	1.13	6.85	12.10	
					0.03	0.42	0.42							535.89	535.64	0.25	Cir				
15	14	Comb	0.012	20.995	0.00	0.00	0.00	6.57	0.15	9.31	0.41	0.00	539.12	537.01	536.98	0.03	18	0.12	3.90	3.82	19 to 18
					0.05	0.06	0.02					3.82		537.76	537.58		18	0.86	5.96	10.53	
					0.36	0.40	0.39							536.26	536.08	0.18	Cir				
16	15	Comb	0.012	21.740	0.00	0.00	0.00	5.00	1.57	9.83	0.04	0.00	539.14	536.88	537.01	-0.13	18	-0.60	1.50	0.41	20 to 19
					0.01	0.01	0.00					0.41		538.14	537.96		18	0.83	5.86	10.35	
					0.04	0.04	0.03							536.64	536.46	0.18	Cir				
17	14	MH	0.012	50.846	0.00	0.00	0.00	0.00	0.39	0.00	0.00	3.86	542.19	537.75	537.09	0.66	18	1.30	5.09	3.86	21 to 18
					0.00	0.00	0.00					3.86		538.50	537.99		18	1.00	6.45	11.39	
					0.00	0.00	0.00							537.00	536.49	0.51	Cir				
18	End	Comb	0.012	8.874	0.00	0.00	0.00	5.15	0.06	9.78	0.45	0.00	539.54	536.29	535.81	0.48	18	5.36	4.55	4.42	15 to Bed 2
					0.04	0.19	0.05					4.42		536.98	536.50		18	5.41	14.97	26.46	
					0.07	0.41	0.41							535.48	535.00	0.48	Cir				
19	18	Comb	0.012	19.231	0.00	0.00	0.00	5.00	0.15	9.83	0.37	0.00	539.54	536.84	536.29	0.55	18	2.88	4.88	3.66	16 to 15
					0.15	0.15	0.04					3.66		537.61	537.18		18	2.24	9.63	17.01	
					0.34	0.34	0.34							536.11	535.68	0.43	Cir				
20	End	MH	0.012	45.476	0.00	0.00	0.00	0.00	0.29	0.00	0.00	4.63	543.89	532.26	531.29	0.97	18	2.12	4.63	4.63	14-OUTFALL
					0.00	0.00	0.00					4.63		532.93	531.96		18	2.13	9.40	16.61	
					0.00	0.00	0.00							531.43	530.46	0.97	Cir				

NOTES: Intensity = 127.16 / (Inlet time + 17.80) ^ 0.82 (in/hr) ; Time of flow in section is based on full flow.

Project File: storm sewers.stm

FL-DOT Report

Line No	To Line	Type of struc	n - Value	Len (ft)	Drainage Area (C1 = 0.2, C2 = 0.25, C3 = 0.99) Increment (ac)	Sub-Total (ac)	Sum CA	Time of conc (min)	Time of Flow in sect (min)	Inten (I) (in/hr)	Total CA	Add Q / Total Flow / Q (cfs)	Inlet elev (ft)	Elev of HGL / Elev of Crown / Elev of Invert — Up (ft)	Down (ft)	Fall (ft)	Rise / Span / Size (in)	HGL / Pipe / Slope (%)	ADD / Full Flow — Vel (ft/s)	Cap (cfs)	Date: 3/4/2024 / Frequency: 100 yrs / Proj: storm sewers.stm / Line description
21	End	Comb	0.012	26.336	0.00 0.03 0.04	0.00 0.10 0.39	0.00 0.03 0.39	6.55	0.19	9.32	0.42	0.00 3.91	516.35	509.60 510.34 508.84	507.76 508.50 507.00	1.84 1.84	18 18 Cir	6.97 6.99	4.37 17.02	3.91 30.07	10 to Bed 3
22	21	Comb	0.012	137.883	0.00 0.03 0.04	0.00 0.06 0.32	0.00 0.02 0.31	5.23	1.25	9.75	0.33	0.00 3.23	531.67	523.51 524.33 522.83	514.09 515.25 513.75	9.43 9.08	18 18 Cir	6.84 6.59	7.49 16.52	3.23 29.19	12 to 10
23	22	Comb	0.012	21.740	0.00 0.03 0.28	0.00 0.03 0.28	0.00 0.01 0.28	5.00	0.23	9.83	0.29	0.00 2.80	531.66	529.71 530.57 529.07	528.85 529.96 528.46	0.86 0.61	18 18 Cir	3.94 2.81	5.83 10.78	2.80 19.06	13 to 12
24	21	Comb	0.012	21.741	0.00 0.01 0.04	0.00 0.01 0.04	0.00 0.00 0.04	5.00	1.55	9.83	0.04	0.00 0.41	516.33	514.12 515.38 513.88	513.03 514.39 512.89	1.09 0.99	18 18 Cir	5.02 4.55	3.73 13.74	0.41 24.27	11 to 10
25	End	MH	0.012	39.788	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00 0.00	0.00	0.12	0.00	0.00	9.85 9.85	511.01	506.21 506.50 505.00	504.28 504.57 503.07	1.93 1.93	18 18 Cir	4.85 4.85	6.45 14.18	9.85 25.05	1-OUTFALL

NOTES: Intensity = 127.16 / (Inlet time + 17.80) ^ 0.82 (in/hr) ; Time of flow in section is based on full flow.

Project File: storm sewers.stm

MyReport

Line No.	Area Dn (sqft)	Area Up (sqft)	Byp Ln No	Coeff C1 (C)	Coeff C2 (C)	Coeff C3 (C)	Capac Full (cfs)	Crit Depth (ft)	Cross Sl, Sw (ft/ft)	Cross Sl, Sx (ft/ft)	Curb Len (ft)	Defl Ang (Deg)	Depth Dn (ft)	Depth Up (ft)	DnStm Ln No	Drng Area (ac)	Easting X (ft)	EGL Dn (ft)	EGL Up (ft)	Energy Loss (ft)
1	1.36	1.37	Sag	0.20	0.25	0.99	18.53	1.08	0.050	0.020	4.00	-17.273	1.08	1.08**	Outfall	0.03	2591441.79	506.53	507.16	0.000
2	1.10	1.36	Sag	0.20	0.25	0.99	11.70	1.08	0.050	0.020	0.12	-89.711	0.89	1.08**	1	0.17	2591435.43	507.17	507.58	0.000
3	1.08	1.26	2	0.20	0.25	0.99	20.12	1.00	0.050	0.020	1.00	95.811	0.88	1.00**	2	0.06	2591588.83	507.53	512.54	0.000
4	0.42	1.18	3	0.20	0.25	0.99	33.98	0.95	0.050	0.020	1.00	4.359	0.43	0.95**	3	0.04	2591734.07	514.73	528.30	0.000
5	0.42	1.09	4	0.20	0.25	0.99	29.72	0.89	0.050	0.020	1.00	13.285	0.43	0.89**	4	0.00	2591833.92	531.99	539.31	0.000
6	0.47	1.09	7	0.20	0.25	0.99	25.52	0.89	0.050	0.020	8.70	70.047	0.47	0.89**	5	0.00	2591839.99	540.61	542.34	0.000
7	0.12	0.19	8	0.20	0.25	0.99	14.23	0.24	0.050	0.020	1.00	89.186	0.18	0.24**	4	0.06	2591736.96	532.14	532.54	0.000
8	0.14	0.15	1	0.20	0.25	0.99	8.10	0.21	0.050	0.020	1.00	93.433	0.20	0.21**	3	0.04	2591591.76	515.11	515.23	0.000
9	2.13	2.13	n/a	0.20	0.25	0.99	31.97	1.28	....	....	....	-172.351	2.00	1.28**	Outfall	0.00	2590895.62	537.35	538.12	0.286
10	2.13	2.13	n/a	0.20	0.25	0.99	17.51	1.28	....	....	....	9.465	1.28	1.28**	9	0.00	2590816.98	538.12	538.54	0.000
11	2.13	2.13	n/a	0.20	0.25	0.99	17.37	1.28	....	....	....	41.703	1.28	1.28**	10	0.00	2590761.34	538.54	539.08	0.000
12	2.19	2.19	Sag	0.20	0.25	0.99	16.51	1.28	0.050	0.020	15.85	71.457	1.32	1.31	11	0.00	2590768.46	539.08	539.13	0.050
13	1.50	1.51	23	0.20	0.25	0.99	11.85	1.19	0.050	0.020	3.09	-169.689	1.19	1.19**	Outfall	0.19	2591095.69	536.57	536.65	0.000
14	1.09	1.38	23	0.20	0.25	0.99	12.10	1.09	0.050	0.020	1.00	-27.474	0.89	1.09**	13	0.03	2591074.60	537.04	537.50	0.000
15	0.88	0.88	Offsite	0.20	0.25	0.99	10.53	0.75	0.050	0.020	6.34	-18.946	0.90	0.75**	14	0.41	2591057.64	537.27	537.30	0.000
16	0.18	0.18	22	0.20	0.25	0.99	10.35	0.24	0.050	0.020	1.00	-36.778	0.55	0.24**	15	0.05	2591051.24	537.09	536.96	0.000
17	0.66	0.88	n/a	0.20	0.25	0.99	11.39	0.75	....	....	....	25.705	0.60	0.75**	14	0.00	2591024.32	537.39	538.05	0.000
18	0.97	0.97	23	0.20	0.25	0.99	26.46	0.81	0.050	0.020	0.62	98.004	0.81	0.81**	Outfall	0.11	2591121.80	536.13	536.61	0.000
19	0.67	0.85	23	0.20	0.25	0.99	17.01	0.73	0.050	0.020	6.40	-88.224	0.61	0.73**	18	0.49	2591140.75	536.57	537.13	0.000
20	1.00	1.00	n/a	0.20	0.25	0.99	16.61	0.83	....	....	....	-171.066	0.83	0.83**	Outfall	0.00	2591177.09	531.63	532.59	0.000
21	0.89	0.89	1	0.20	0.25	0.99	30.07	0.76	0.050	0.020	1.00	160.884	0.76	0.76**	Outfall	0.07	2591308.30	508.06	509.89	0.000
22	0.30	0.78	21	0.20	0.25	0.99	29.19	0.68	0.050	0.020	1.00	1.702	0.34	0.68**	21	0.07	2591176.74	514.35	523.78	0.000
23	0.36	0.71	24	0.20	0.25	0.99	19.06	0.64	0.050	0.020	5.03	104.362	0.39	0.64**	22	0.31	2591175.58	529.09	529.95	0.000

Project File: storm sewers.stm | Number of lines: 25 | Date: 3/4/2024

NOTES: ** Critical depth

MyReport

Line No.	Area Dn (sqft)	Area Up (sqft)	Byp Ln No	Coeff C1 (C)	Coeff C2 (C)	Coeff C3 (C)	Capac Full (cfs)	Crit Depth (ft)	Cross Sl, Sw (ft/ft)	Cross Sl, Sx (ft/ft)	Curb Len (ft)	Defl Ang (Deg)	Depth Dn (ft)	Depth Up (ft)	DnStm Ln No	Drng Area (ac)	Easting X (ft)	EGL Dn (ft)	EGL Up (ft)	Energy Loss (ft)
24	0.08	0.18	2	0.20	0.25	0.99	24.27	0.24	0.050	0.020	1.00	89.186	0.14	0.24**	21	0.05	2591300.89	513.11	514.20	0.000
25	1.53	1.53	n/a	0.20	0.25	0.99	25.05	1.21	....	....	....	93.787	1.21	1.21**	Outfall	0.00	2591371.91	504.93	506.86	0.000

Project File: storm sewers.stm	Number of lines: 25	Date: 3/4/2024

NOTES: ** Critical depth

MyReport

Flow Rate (cfs)	Sf Ave (ft/ft)	Sf Dn (ft/ft)	Grate Area (sqft)	Grate Len (ft)	Grate Width (ft)	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)	Gutter Depth (ft)	Gutter Slope (ft/ft)	Gutter Spread (ft)	Gutter Width (ft)	HGL Dn (ft)	HGL Up (ft)	HGL Jnct (ft)	HGL Jmp Dn (ft)	HGL Jmp Up (ft)	Incr CxA	Incr Q (cfs)	Inlet Depth (ft)
7.82	0.000	0.000	2.00	2.00	2.00	0.00	509.54	0.31	Sag	12.64	2.00	506.02	506.65	506.65	....	....	0.01	0.07	0.31
7.76	0.000	0.000	0.48	0.12	4.00	509.54	509.54	5.05	Sag	249.50	2.00	506.66	507.08	507.08	....	....	0.12	1.15	5.05
6.74	0.000	0.000	....	1.00	2.00	509.54	517.33	5.00	0.110	247.00	2.00	507.08	512.09	512.09	....	....	0.04	0.44	5.00
6.07	0.000	0.000	....	1.00	2.00	517.33	534.63	5.00	0.110	247.00	2.00	514.32	527.89	527.89	....	....	0.03	0.31	5.00
5.36	0.000	0.000	....	1.00	2.00	534.63	542.95	0.00	0.050	0.00	2.00	531.62	538.94	538.94	....	....	0.00	0.00	0.00
5.36	0.000	0.000	....	8.70	2.00	542.95	543.99	0.23	0.050	8.70	2.00	540.24	541.97	541.97	....	....	0.00	5.36	0.23
0.44	0.000	0.000	....	1.00	2.00	534.63	534.66	0.06	11.000	1.26	2.00	532.05	532.45	532.45	....	....	0.04	0.44	0.06
0.31	0.000	0.000	....	1.00	2.00	517.33	517.39	0.22	0.110	8.11	2.00	515.04	515.16	515.16	....	....	0.03	0.31	0.22
12.72	0.380	0.270	....	....	....	544.70	545.54	....	....	....	....	537.09	537.56 j	537.56	537.11	536.33	0.00	0.00	....
12.72	0.000	0.000	....	....	....	545.54	541.61	....	....	....	....	537.56	537.98	537.98	....	....	0.00	0.00	....
12.72	0.000	0.000	....	....	....	541.61	541.88	....	....	....	....	537.98	538.52	538.52	....	....	0.00	0.00	....
12.72	0.455	0.454	8.00	4.00	2.00	541.88	540.29	-0.34	Sag	1.59	2.00	538.56	538.60	539.13	....	....	0.00	12.72	1.66
9.59	0.000	0.000	....	3.09	2.00	0.00	541.39	0.18	0.033	5.82	2.00	535.94	536.03	536.03	....	....	0.18	1.77	0.18
7.94	0.000	0.000	....	1.00	2.00	541.39	541.40	0.09	0.033	1.90	2.00	536.53	536.98	536.98	....	....	0.03	0.29	0.09
3.82	0.000	0.000	....	6.34	2.00	541.40	539.12	0.21	0.050	7.35	2.00	536.98	537.01 j	537.01	536.97	536.78	0.37	3.63	0.21
0.41	0.000	0.000	....	1.00	2.00	539.12	539.14	0.10	0.050	1.99	2.00	537.01	536.88	536.88	....	....	0.04	0.41	0.10
3.86	0.000	0.000	....	....	....	541.40	542.19	....	....	....	....	537.09	537.75	537.75	....	....	0.00	3.86	....
4.42	0.000	0.000	....	0.62	2.00	0.00	539.54	0.14	0.030	3.86	2.00	535.81	536.29 j	536.29	535.86	535.96	0.08	0.78	0.14
3.66	0.000	0.000	....	6.40	2.00	539.54	539.54	0.22	0.030	8.25	2.00	536.29	536.84	536.84	....	....	0.37	3.66	0.22
4.63	0.000	0.000	....	....	....	0.00	543.89	....	....	....	....	531.29	532.26 j	532.26	531.38	531.33	0.00	4.63	....
3.91	0.000	0.000	....	1.00	2.00	0.00	516.35	0.09	0.110	1.80	2.00	507.76	509.60 j	509.60	507.94	508.01	0.05	0.46	0.09
3.23	0.000	0.000	....	1.00	2.00	516.35	531.67	0.09	0.110	1.78	2.00	514.09	523.51	523.51	....	....	0.05	0.45	0.09
2.80	0.000	0.000	....	5.03	2.00	531.67	531.66	0.19	0.110	6.55	2.00	528.85	529.71	529.71	....	....	0.29	2.80	0.19

Project File: storm sewers.stm | Number of lines: 25 | Date: 3/4/2024

NOTES: ** Critical depth

MyReport

Flow Rate (cfs)	Sf Ave (ft/ft)	Sf Dn (ft/ft)	Grate Area (sqft)	Grate Len (ft)	Grate Width (ft)	Gnd/Rim El Dn (ft)	Gnd/Rim El Up (ft)	Gutter Depth (ft)	Gutter Slope (ft/ft)	Gutter Spread (ft)	Gutter Width (ft)	HGL Dn (ft)	HGL Up (ft)	HGL Jnct (ft)	HGL Jmp Dn (ft)	HGL Jmp Up (ft)	Incr CxA	Incr Q (cfs)	Inlet Depth (ft)	
0.41	0.000	0.000	....	1.00	2.00	516.35	516.33	0.14	0.110	3.84	2.00	513.03	514.12	514.12	....	....	0.04	0.41	0.14	
9.85	0.000	0.000	....	....	....	0.00	511.01	....	....	....	....	504.28	506.21	506.21	....	....	0.00	9.85	....	

Project File: storm sewers.stm	Number of lines: 25	Date: 3/4/2024

NOTES: ** Critical depth

MyReport

Inlet Eff (%)	Inlet ID	Inlet Loc	(ft)	Inlet Time (min)	i Sys (in/hr)	i Inlet (in/hr)	Invert Dn (ft)	Invert Up (ft)	Jump Loc (ft)	Jump Len (ft)	Vel Hd Jmp Dn (ft)	Vel Hd Jmp Up (ft)	J-Loss Coeff	Junct Type	Known Q (cfs)	Cost RCP	Cost CMP	Cost PVC	
100	2	Sag		5.0	8.91	9.83	504.94	505.57	....	....	0.00	0.00	1.50 z	Comb.	0.00	852	767	724	
-nan(ind)	3	Sag		5.0	8.93	9.83	505.77	506.00	....	....	0.00	0.00	1.50 z	Comb.	0.00	788	709	670	
-nan(ind)	4	On Grade		5.0	9.13	9.83	506.20	511.09	....	....	0.00	0.00	1.50 z	Comb.	0.00	6,151	5,536	5,228	
-nan(ind)	6	On Grade		5.0	9.34	9.83	513.89	526.94	....	....	0.00	0.00	1.50 z	Comb.	0.00	6,108	5,497	5,192	
0	8	On Grade		0.0	0.00	0.00	531.19	538.05	....	....	0.00	0.00	1.43 z	Comb.	0.00	3,812	3,431	3,240	
74	9	On Grade		0.0	0.00	0.00	539.77	541.08	....	....	0.00	0.00	1.00 z	Comb.	5.36	932	839	792	
-256	7	On Grade		5.0	9.83	9.83	531.87	532.21	....	....	0.00	0.00	1.00 z	Comb.	0.00	788	709	670	
41	5	On Grade		5.0	9.83	9.83	514.84	514.95	....	....	0.00	0.00	1.00 z	Comb.	0.00	788	709	670	
....	23	Sag		0.0	0.00	0.00	535.00	536.28	15.04	9.27	0.27	1.27	0.20 z	MH	0.00	4,640	4,176	3,944	
....	24	Sag		0.0	0.00	0.00	536.28	536.70	....	....	0.00	0.00	0.71 z	MH	0.00	4,408	3,967	3,747	
....	25	Sag		0.0	0.00	0.00	536.70	537.24	....	....	0.00	0.00	0.96 z	MH	0.00	4,828	4,345	4,104	
100	26	Sag		0.0	0.00	0.00	537.24	537.29	....	....	0.00	0.00	1.00	Comb.	12.72	528	475	449	
79	17	On Grade		5.0	9.24	9.83	534.75	534.83	....	....	0.00	0.00	0.78 z	Comb.	0.00	354	319	301	
100	18	On Grade		5.0	9.26	9.83	535.64	535.89	....	....	0.00	0.00	0.73 z	Comb.	0.00	1,000	900	850	
75	19	On Grade		5.0	9.31	9.83	536.08	536.26	2.10	4.37	0.20	0.43	0.98 z	Comb.	0.00	844	760	717	
100	20	On Grade		5.0	9.83	9.83	536.46	536.64	....	....	0.00	0.00	1.00 z	Comb.	0.00	788	709	670	
....	21	Sag		0.0	0.00	0.00	536.49	537.00	....	....	0.00	0.00	1.00 z	MH	3.86	2,140	1,926	1,819	
93	15	On Grade		5.0	9.78	9.83	535.00	535.48	0.89	4.05	0.32	0.48	1.50 z	Comb.	0.00	392	353	333	
74	16	On Grade		5.0	9.83	9.83	535.68	536.11	....	....	0.00	0.00	1.00 z	Comb.	0.00	708	637	602	
....	14	Sag		0.0	0.00	0.00	530.46	531.43	4.55	4.13	0.34	0.55	1.00 z	MH	4.63	1,607	1,446	1,366	
100	10	On Grade		5.0	9.32	9.83	507.00	508.84	2.63	3.78	0.30	0.66	1.50 z	Comb.	0.00	962	866	818	
100	12	On Grade		5.0	9.75	9.83	513.75	522.83	....	....	0.00	0.00	1.50 z	Comb.	0.00	5,801	5,221	4,931	
74	13	On Grade		5.0	9.83	9.83	528.46	529.07	....	....	0.00	0.00	1.00 z	Comb.	0.00	788	709	670	

Project File: storm sewers.stm	Number of lines: 25	Date: 3/4/2024

NOTES: Intensity = 127.16 / (Inlet time + 17.80) ^ 0.82 -- Return period = 100 Yrs. ; ** Critical depth

MyReport

Inlet Eff (%)	Inlet ID	Inlet Loc	(ft)	Inlet Time (min)	i Sys (in/hr)	i Inlet (in/hr)	Invert Dn (ft)	Invert Up (ft)	Jump Loc (ft)	Jump Len (ft)	Vel Hd Jmp Dn (ft)	Vel Hd Jmp Up (ft)	J-Loss Coeff	Junct Type	Known Q (cfs)	Cost RCP	Cost CMP	Cost PVC	
81	11	On Grade		5.0	9.83	9.83	512.89	513.88	....	....	0.00	0.00	1.00 z	Comb.	0.00	788	709	670	
....	1	Sag		0.0	0.00	0.00	503.07	505.00	....	....	0.00	0.00	1.00 z	MH	9.85	1,394	1,255	1,185	

Project File: storm sewers.stm	Number of lines: 25	Date: 3/4/2024

NOTES: Intensity = 127.16 / (Inlet time + 17.80) ^ 0.82 -- Return period = 100 Yrs. ; ** Critical depth

MyReport

Line ID	Line Length (ft)	Line Size (in)	Line Slope (%)	Line Type	Local Depr (in)	n-val Gutter	n-val Pipe	Minor Loss (ft)	Northing Y (ft)	Pipe Travel (min)	Q Byp (cfs)	Q Capt (cfs)	Q Carry (cfs)	Line Rise (in)	Runoff Coeff (C)	Line Span (in)	Area A1 (ac)	Area A2 (ac)
2 to Bed 3	23.735	18	2.65	Cir	0.0	....	0.012	0.76	263898.50	0.09	0.00	4.06	3.99	18	0.25	18	0.00	0.03
2 to 3	21.751	18	1.06	Cir	0.0	....	0.012	n/a	263919.30	0.08	0.00	-nan(ind).00	-nan(ind).00	18	0.69	18	0.00	0.04
3 to 4	156.363	18	3.13	Cir	0.0	0.013	0.012	0.67	263949.60	0.68	-nan(ind).00	-nan(ind).00	-nan(ind).00	18	0.74	18	0.00	0.02
6 to 4	146.273	18	8.92	Cir	0.0	0.013	0.012	n/a	263966.95	0.71	-nan(ind).00	-nan(ind).00	-nan(ind).00	18	0.78	18	0.00	0.01
8 to 6	100.486	18	6.83	Cir	0.0	0.013	0.012	0.53	263955.63	0.55	-nan(ind).00	-nan(ind).00	0.00	18	0.00	18	0.00	0.00
9 to 8	26.027	18	5.03	Cir	0.0	0.013	0.012	0.37	263930.32	0.14	1.37	3.99	0.00	18	0.00	18	0.00	0.00
7 to 6	21.742	18	1.56	Cir	0.0	0.013	0.012	0.08	263945.40	1.47	6.43	-4.62	1.37	18	0.74	18	0.00	0.02
23 to 20	21.743	18	0.51	Cir	0.0	0.013	0.012	n/a	263928.05	2.06	3.99	2.75	6.43	18	0.79	18	0.00	0.01
23 to 22	75.200	24	1.70	Cir	....	....	0.012	n/a	263903.01	0.31	....	....	....	24	0.00	24	0.00	0.00
24 to 23	82.280	24	0.51	Cir	....	....	0.012	n/a	263927.22	0.34	....	....	....	24	0.00	24	0.00	0.00
25 to 24	107.451	24	0.50	Cir	....	....	0.012	n/a	264019.15	0.44	....	....	....	24	0.00	24	0.00	0.00
26 to 25	11.006	24	0.45	Cir	24.0	....	0.012	0.52	264027.55	0.05	0.00	12.72	0.00	24	0.00	24	0.00	0.00
17 to Bed 2	7.380	18	1.08	Cir	0.0	0.013	0.012	n/a	263882.67	0.02	0.36	1.41	0.00	18	0.95	18	0.00	0.01
18 to 17	22.070	18	1.13	Cir	0.0	0.013	0.012	0.38	263876.16	0.08	0.00	0.29	0.00	18	0.99	18	0.00	0.00
19 to 18	20.995	18	0.86	Cir	0.0	0.013	0.012	n/a	263863.79	0.15	0.91	2.72	0.00	18	0.90	18	0.00	0.05
20 to 19	21.740	18	0.83	Cir	0.0	0.013	0.012	0.08	263843.01	1.57	0.00	0.41	0.00	18	0.83	18	0.00	0.01
21 to 18	50.846	18	1.00	Cir	....	....	0.012	n/a	263883.71	0.39	....	....	....	18	0.00	18	0.00	0.00
15 to Bed 2	8.874	18	5.41	Cir	0.0	0.013	0.012	n/a	263858.89	0.06	0.06	0.72	0.00	18	0.72	18	0.00	0.04
16 to 15	19.231	18	2.24	Cir	0.0	0.013	0.012	0.29	263855.63	0.15	0.95	2.72	0.00	18	0.76	18	0.00	0.15
14-OUTFALL	45.476	18	2.13	Cir	....	....	0.012	n/a	263964.24	0.29	....	....	....	18	0.00	18	0.00	0.00
10 to Bed 3	26.336	18	6.99	Cir	0.0	0.013	0.012	n/a	263856.10	0.19	0.00	0.46	0.00	18	0.67	18	0.00	0.03
12 to 10	137.883	18	6.59	Cir	0.0	0.013	0.012	n/a	263814.83	1.25	0.00	0.45	0.00	18	0.65	18	0.00	0.03
13 to 12	21.740	18	2.81	Cir	0.0	0.013	0.012	n/a	263836.54	0.23	1.07	3.10	1.37	18	0.92	18	0.00	0.03

Project File: storm sewers.stm | Number of lines: 25 | Date: 3/4/2024

NOTES: ** Critical depth

MyReport

Line ID	Line Length (ft)	Line Size (in)	Line Slope (%)	Line Type	Local Depr (in)	n-val Gutter	n-val Pipe	Minor Loss (ft)	Northing Y (ft)	Pipe Travel (min)	Q Byp (cfs)	Q Capt (cfs)	Q Carry (cfs)	Line Rise (in)	Runoff Coeff (C)	Line Span (in)	Area A1 (ac)	Area A2 (ac)
11 to 10	21.741	18	4.55	Cir	0.0	0.013	0.012	n/a	263876.54	1.55	0.28	1.20	1.07	18	0.84	18	0.00	0.01
1-OUTFALL	39.788	18	4.85	Cir	....	....	0.012	0.65	263906.98	0.12	....	....	....	18	0.00	18	0.00	0.00

Project File: storm sewers.stm | Number of lines: 25 | Date: 3/4/2024

NOTES: ** Critical depth

MyReport

Area A3 (ac)	Tc (min)	Throat Ht (in)	Total Area (ac)	Total CxA	Total Runoff (cfs)	Vel Ave (ft/s)	Vel Dn (ft/s)	Vel Hd Dn (ft)	Vel Hd Up (ft)	Vel Up (ft/s)	Cover Dn (ft)	Cover Up (ft)	Storage (cft)
0.00	7.9	4.0	0.40	0.28	2.46	5.73	5.74	0.51	0.51	5.73	n/a	2.47	32.37
0.10	7.9	4.0	0.37	0.27	2.40	6.39	7.08	0.51	0.51	5.71	2.27	2.04	26.75
0.04	7.2	4.0	0.20	0.15	1.38	5.82	6.27	0.45	0.45	5.36	1.84	4.74	182.46
0.03	6.5	4.0	0.10	0.08	0.71	9.83	14.53	0.41	0.41	5.14	1.94	6.19	116.34
0.00	0.1	4.0	0.00	0.00	0.00	8.82	12.75	0.37	0.37	4.90	1.94	3.40	75.67
0.00	0.0	4.0	0.00	0.00	0.00	8.16	11.43	0.37	0.37	4.90	1.68	1.41	20.27
0.04	5.0	4.0	0.06	0.04	0.44	2.98	3.62	0.08	0.08	2.33	1.26	0.95	3.33
0.03	5.0	4.0	0.04	0.03	0.31	2.17	2.21	0.07	0.07	2.14	0.99	0.94	3.11
0.00	0.8	....	0.00	0.00	0.00	5.02	4.05	0.25	0.56	5.98	7.70	7.26	207.65
0.00	0.5	....	0.00	0.00	0.00	5.98	5.98	0.56	0.56	5.98	7.26	2.91	174.91
0.00	0.0	....	0.00	0.00	0.00	5.98	5.98	0.56	0.56	5.98	2.91	2.64	228.43
0.00	0.0	4.0	0.00	0.00	0.00	5.80	5.80	0.52	0.52	5.81	2.64	1.00	24.12
0.18	6.8	4.0	0.68	0.62	5.73	6.37	6.38	0.63	0.63	6.36	n/a	5.06	11.12
0.03	6.7	4.0	0.49	0.44	4.08	6.54	7.30	0.52	0.52	5.77	4.25	4.01	27.23
0.36	6.6	4.0	0.46	0.41	3.82	3.90	3.45	0.29	0.29	4.35	3.82	1.36	20.86
0.04	5.0	4.0	0.05	0.04	0.41	1.50	0.70	0.08	0.08	2.29	1.16	1.00	8.07
0.00	0.0	....	0.00	0.00	0.00	5.09	5.82	0.30	0.30	4.37	3.41	3.69	39.31
0.07	5.2	4.0	0.60	0.45	4.42	4.55	4.54	0.32	0.32	4.57	n/a	2.56	8.61
0.34	5.0	4.0	0.49	0.37	3.66	4.88	5.48	0.29	0.29	4.29	2.36	1.93	14.63
0.00	0.0	....	0.00	0.00	0.00	4.63	4.61	0.34	0.34	4.64	n/a	10.96	45.48
0.04	6.6	4.0	0.50	0.42	3.91	4.37	4.35	0.30	0.30	4.38	n/a	6.01	23.58
0.04	5.2	4.0	0.38	0.33	3.23	7.49	10.86	0.26	0.26	4.11	1.10	7.34	73.55
0.28	5.0	4.0	0.31	0.29	2.80	5.83	7.71	0.24	0.24	3.94	1.71	1.09	11.62

Project File: storm sewers.stm	Number of lines: 25	Date: 3/4/2024

NOTES: ** Critical depth

MyReport

Area A3 (ac)	Tc (min)	Throat Ht (in)	Total Area (ac)	Total CxA	Total Runoff (cfs)	Vel Ave (ft/s)	Vel Dn (ft/s)	Vel Hd Dn (ft)	Vel Hd Up (ft)	Vel Up (ft/s)	Cover Dn (ft)	Cover Up (ft)	Storage (cft)
0.04	5.0	4.0	0.05	0.04	0.41	3.73	5.17	0.08	0.08	2.30	1.96	0.95	2.78
0.00	0.0	....	0.00	0.00	0.00	6.45	6.45	0.65	0.65	6.45	n/a	4.51	60.76

Project File: storm sewers.stm	Number of lines: 25	Date: 3/4/2024

NOTES: ** Critical depth

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
1	18	7.82	504.94	506.02	1.08	1.36	5.74	0.51	506.53	0.000	23.735	505.57	506.65	1.08**	1.37	5.73	0.51	507.16	0.000	0.000	n/a	1.50	0.76
2	18	7.76	505.77	506.66	0.89*	1.10	7.08	0.51	507.17	0.000	21.751	506.00	507.08	1.08**	1.36	5.71	0.51	507.58	0.000	0.000	n/a	1.50	n/a
3	18	6.74	506.20	507.08	0.88	1.08	6.27	0.45	507.53	0.000	156.363	511.09	512.09	1.00**	1.26	5.36	0.45	512.54	0.000	0.000	n/a	1.50	0.67
4	18	6.07	513.89	514.32	0.43*	0.42	14.53	0.41	514.73	0.000	146.273	526.94	527.89	0.95**	1.18	5.14	0.41	528.30	0.000	0.000	n/a	1.50	n/a
5	18	5.36	531.19	531.62	0.43*	0.42	12.75	0.37	531.99	0.000	100.486	538.05	538.94	0.89**	1.09	4.90	0.37	539.31	0.000	0.000	n/a	1.43	0.53
6	18	5.36	539.77	540.24	0.47*	0.47	11.43	0.37	540.61	0.000	26.027	541.08	541.97	0.89**	1.09	4.90	0.37	542.34	0.000	0.000	n/a	1.00	0.37
7	18	0.44	531.87	532.05	0.18*	0.12	3.62	0.08	532.14	0.000	21.742	532.21	532.45	0.24**	0.19	2.33	0.08	532.54	0.000	0.000	n/a	1.00	0.08
8	18	0.31	514.84	515.04	0.20*	0.14	2.21	0.07	515.11	0.000	21.743	514.95	515.16	0.21**	0.15	2.14	0.07	515.23	0.000	0.000	n/a	1.00	n/a
9	24	12.72	535.00	537.09	2.00	2.13	4.05	0.25	537.35	0.270	75.200	536.28	537.56 j	1.28**	2.13	5.98	0.56	538.12	0.491	0.380	n/a	0.20	n/a
10	24	12.72	536.28	537.56	1.28*	2.13	5.98	0.56	538.12	0.000	82.280	536.70	537.98	1.28**	2.13	5.98	0.56	538.54	0.000	0.000	n/a	0.71	n/a
11	24	12.72	536.70	537.98	1.28	2.13	5.98	0.56	538.54	0.000	107.451	537.24	538.52	1.28**	2.13	5.98	0.56	539.08	0.000	0.000	n/a	0.96	n/a
12	24	12.72	537.24	538.56	1.32*	2.19	5.80	0.52	539.08	0.454	11.006	537.29	538.60	1.31	2.19	5.81	0.52	539.13	0.456	0.455	0.050	1.00	0.52
13	18	9.59	534.75	535.94	1.19	1.50	6.38	0.63	536.57	0.000	7.380	534.83	536.03	1.19**	1.51	6.36	0.63	536.65	0.000	0.000	n/a	0.78	n/a
14	18	7.94	535.64	536.53	0.89*	1.09	7.30	0.52	537.04	0.000	22.070	535.89	536.98	1.09**	1.38	5.77	0.52	537.50	0.000	0.000	n/a	0.73	0.38
15	18	3.82	536.08	536.98	0.90	0.88	3.45	0.29	537.27	0.000	20.995	536.26	537.01 j	0.75**	0.88	4.35	0.29	537.30	0.000	0.000	n/a	0.98	0.29
16	18	0.41	536.46	537.01	0.55	0.18	0.70	0.08	537.09	0.000	21.740	536.64	536.88	0.24**	0.18	2.29	0.08	536.96	0.000	0.000	n/a	1.00	0.08
17	18	3.86	536.49	537.09	0.60*	0.66	5.82	0.30	537.39	0.000	50.846	537.00	537.75	0.75**	0.88	4.37	0.30	538.05	0.000	0.000	n/a	1.00	n/a
18	18	4.42	535.00	535.81	0.81	0.97	4.54	0.32	536.13	0.000	8.874	535.48	536.29 j	0.81**	0.97	4.57	0.32	536.61	0.000	0.000	n/a	1.50	0.49
19	18	3.66	535.68	536.29	0.61	0.67	5.48	0.29	536.57	0.000	19.231	536.11	536.84	0.73**	0.85	4.29	0.29	537.13	0.000	0.000	n/a	1.00	0.29
20	18	4.63	530.46	531.29	0.83	1.00	4.61	0.34	531.63	0.000	45.476	531.43	532.26 j	0.83**	1.00	4.64	0.34	532.59	0.000	0.000	n/a	1.00	n/a
21	18	3.91	507.00	507.76	0.76	0.89	4.35	0.30	508.06	0.000	26.336	508.84	509.60 j	0.76**	0.89	4.38	0.30	509.89	0.000	0.000	n/a	1.50	0.45

Project File: storm sewers.stm | Number of lines: 25 | Run Date: 3/4/2024

Notes: * Normal depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
22	18	3.23	513.75	514.09	0.34*	0.30	10.86	0.26	514.35	0.000	137.883	522.83	523.51	0.68**	0.78	4.11	0.26	523.78	0.000	0.000	n/a	1.50	n/a
23	18	2.80	528.46	528.85	0.39*	0.36	7.71	0.24	529.09	0.000	21.740	529.07	529.71	0.64**	0.71	3.94	0.24	529.95	0.000	0.000	n/a	1.00	n/a
24	18	0.41	512.89	513.03	0.14*	0.08	5.17	0.08	513.11	0.000	21.741	513.88	514.12	0.24**	0.18	2.30	0.08	514.20	0.000	0.000	n/a	1.00	n/a
25	18	9.85	503.07	504.28	1.21	1.53	6.45	0.65	504.93	0.000	39.788	505.00	506.21	1.21**	1.53	6.45	0.65	506.86	0.000	0.000	n/a	1.00	0.65

Project File: storm sewers.stm | Number of lines: 25 | Run Date: 3/4/2024

Notes: * Normal depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Hydraflow HGL Computation Procedure

General Procedure:

Hydraflow computes the HGL using the Bernoulli energy equation. Manning's equation is used to determine energy losses due to pipe friction. In a standard step, iterative procedure, Hydraflow assumes upstream HGLs until the energy equation balances. If the energy equation cannot balance, supercritical flow exists and critical depth is temporarily assumed at the upstream end. A supercritical flow Profile is then computed using the same procedure in a downstream direction using momentum principles.

Col. 1 The line number being computed. Calculations begin at Line 1 and proceed upstream.

Col. 2 The line size. In the case of non-circular pipes, the line rise is printed above the span.

Col. 3 Total flow rate in the line.

Col. 4 The elevation of the downstream invert.

Col. 5 Elevation of the hydraulic grade line at the downstream end. This is computed as the upstream HGL + Minor loss of this line's downstream line.

Col. 6 The downstream depth of flow inside the pipe (HGL - Invert elevation) but not greater than the line size.

Col. 7 Cross-sectional area of the flow at the downstream end.

Col. 8 The velocity of the flow at the downstream end, (Col. 3 / Col. 7).

Col. 9 Velocity head (Velocity squared / 2g).

Col. 10 The elevation of the energy grade line at the downstream end, HGL + Velocity head, (Col. 5 + Col. 9).

Col. 11 The friction slope at the downstream end (the S or Slope term in Manning's equation).

Col. 12 The line length.

Col. 13 The elevation of the upstream invert.

Col. 14 Elevation of the hydraulic grade line at the upstream end.

Col. 15 The upstream depth of flow inside the pipe (HGL - Invert elevation) but not greater than the line size.

Col. 16 Cross-sectional area of the flow at the upstream end.

Col. 17 The velocity of the flow at the upstream end, (Col. 3 / Col. 16).

Col. 18 Velocity head (Velocity squared / 2g).

Col. 19 The elevation of the energy grade line at the upstream end, HGL + Velocity head, (Col. 14 + Col. 18) .

Col. 20 The friction slope at the upstream end (the S or Slope term in Manning's equation).

Col. 21 The average of the downstream and upstream friction slopes.

Col. 22 Energy loss. Average Sf/100 x Line Length (Col. 21/100 x Col. 12). Equals (EGL upstream - EGL downstream) +/- tolerance.

Col. 23 The junction loss coefficient (K).

Col. 24 Minor loss. (Col. 23 x Col. 18). Is added to upstream HGL and used as the starting HGL for the next upstream line(s).

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Mar 4 2024

CROSSING CULVERT

Invert Elev Dn (ft)	=	470.30
Pipe Length (ft)	=	130.00
Slope (%)	=	6.46
Invert Elev Up (ft)	=	478.70
Rise (in)	=	60.0
Shape	=	Box
Span (in)	=	96.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Flared Wingwalls
Culvert Entrance	=	30D to 75D wingwall flares
Coeff. K,M,c,Y,k	=	0.026, 1, 0.0347, 0.81, 0.4

Embankment

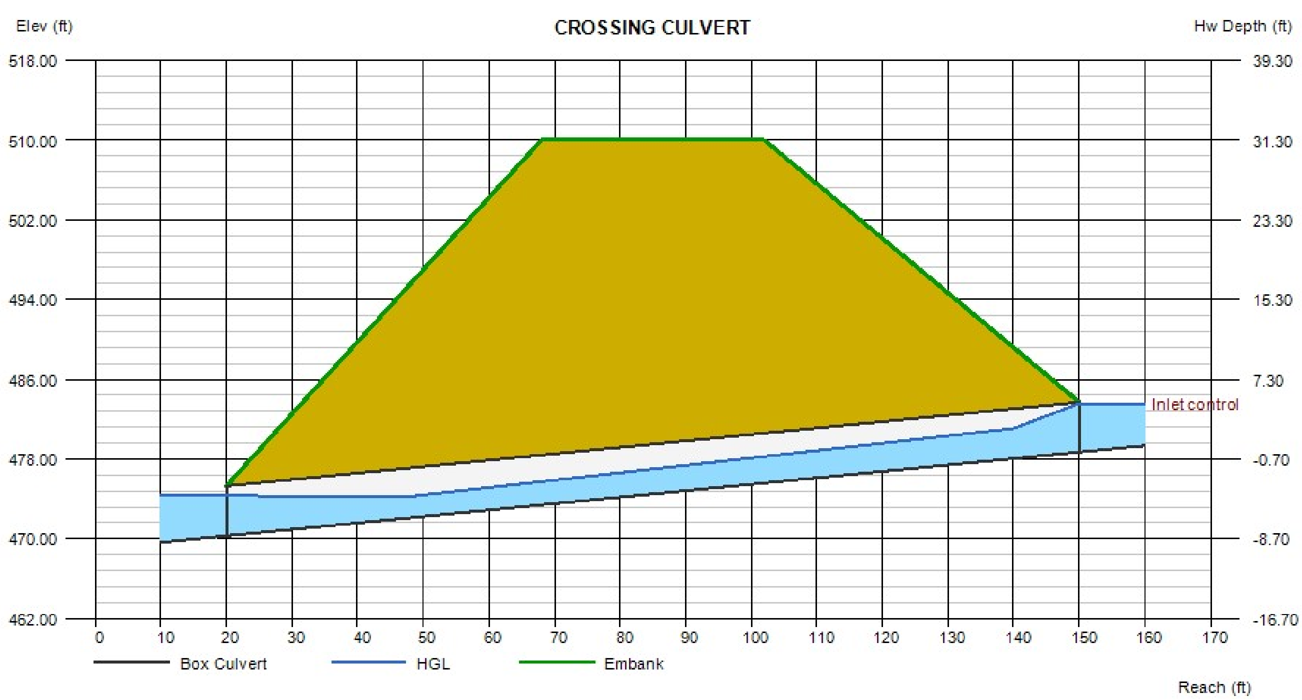
Top Elevation (ft)	=	510.00
Top Width (ft)	=	34.00
Crest Width (ft)	=	250.00

Calculations

Qmin (cfs)	=	200.00
Qmax (cfs)	=	250.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	250.00
Qpipe (cfs)	=	250.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	7.70
Veloc Up (ft/s)	=	10.03
HGL Dn (ft)	=	474.36
HGL Up (ft)	=	481.82
Hw Elev (ft)	=	483.58
Hw/D (ft)	=	0.98
Flow Regime	=	Inlet Control



Channel Report

REAR BUILDING SWALE

Trapezoidal

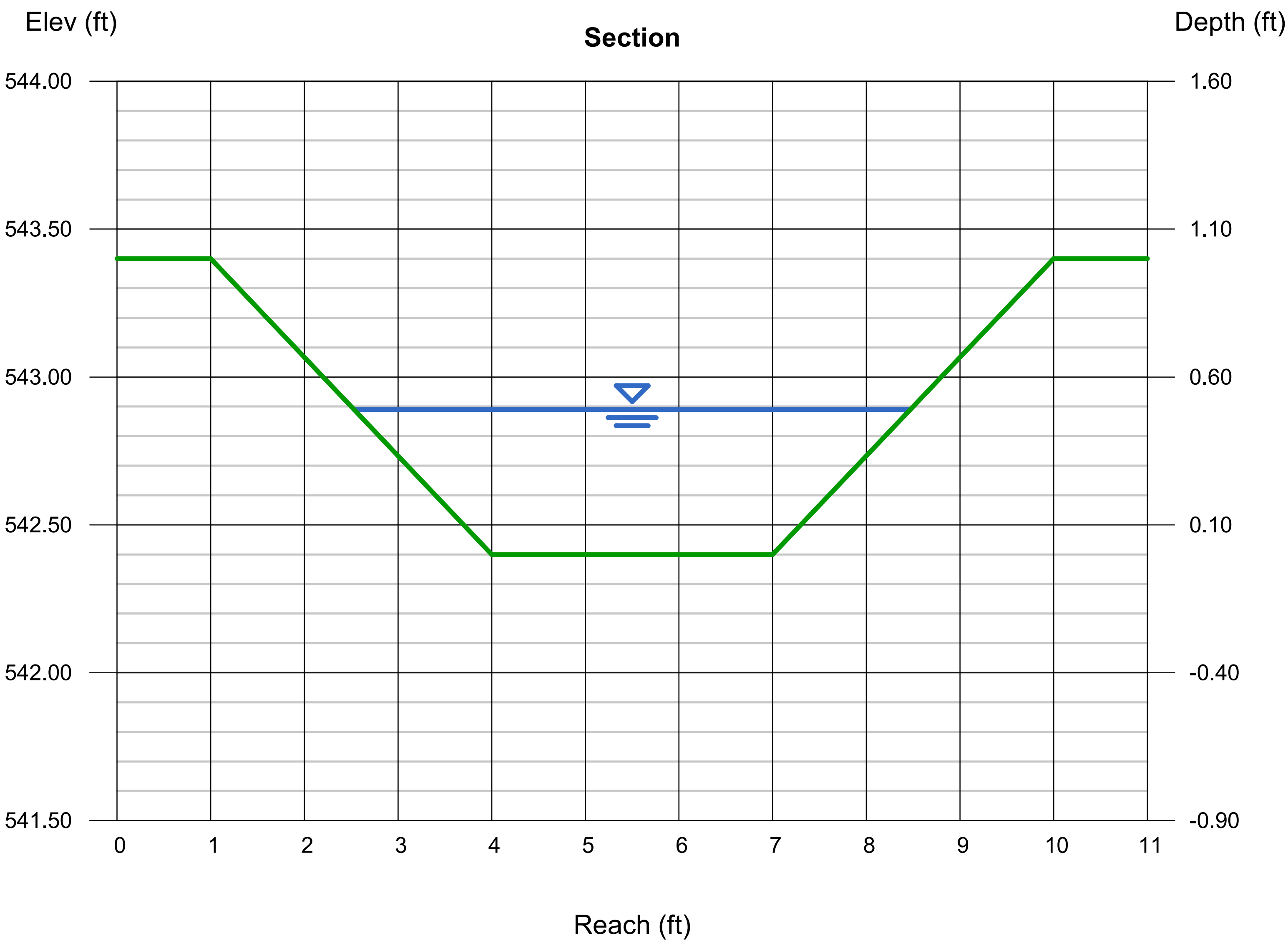
Bottom Width (ft)	= 3.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 542.40
Slope (%)	= 3.88
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cfs)	= 12.72

Highlighted

Depth (ft)	= 0.49
Q (cfs)	= 12.72
Area (sqft)	= 2.19
Velocity (ft/s)	= 5.81
Wetted Perim (ft)	= 6.10
Crit Depth, Yc (ft)	= 0.66
Top Width (ft)	= 5.94
EGL (ft)	= 1.01



HOWELL ENGINEERING
Local Knowhow. Engineered.

Perforated HDPE Pipe Level Spreader Calculation
Calculations per PaDEP BMP Manual, dated December 30, 2006, Chapter 6 - BMP 6.8.1: Level Spreader

JOB NUMBER: 4668 **PROJECT:** 201 Pennsylvania Ave
MUNICIPALITY: Malvern Borough
PREPARED BY: DH3 **DATE:** 3/4/2024 **REVISION:** 0

BMP: BASIN 1-2

$Q_{100(BASIN\ OUT)}$= 2.605 cfs
100-Year Water Surface Elevation= 537.5
Level Spreader Invert= 532

Level Spreader Pipe Info:
Pipe Diameter: 12
Perf. Type: CIRCULAR
Perf. Length: - in
Perf. Width: - in
Perf. Diameter: 0.313 in
Longitudinal Spacing between Holes: 1.940 in
Perforations per Foot: 37.113

Calculate the Minimum Level Spreader Length:

L (Minimum Length of Level Spreader) = Q/Q_L

Where:

Q_L (discharge per linear foot) = Q_O* No. of perforations per linear foot of pipe (per manufacturer spec.)

Q_O (perforation flow rate) = $C_d * A * (2*g*H)^{0.5}$

Coefficient of discharge, C_d = 0.6
Cross Sectional Area of Single Perforation, A = 0.000533 ft^2 (*Per Manufacturer Specifications)
g= 32.2 ft/s^2
H= 4.5000 ft

Q_O (perforation flow rate) = 0.00544 ft^3/s
Q_L (discharge per linear foot) = 0.20191 ft^3/s

Minimum Level Spreader Length = 12.90 ft

Provided Level Spreader Length = 13 ft

AASHTO M252 CLASS 2 SLOTTED PERFORATIONS FOR SINGLE-WALL (CP) AND DOUBLE-WALL (SP) PIPE

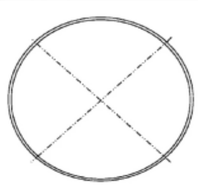
Type CP Class 2 Slotted Perforations

D	P	n	l	w	WIA
4	0.645	4	0.783	0.069	4.02
6	0.824	4	0.769	0.055	2.46
8	1.02	4	0.759	0.050	1.79

Type SP Class 2 Slotted Perforations

D	P	n	l	w	WIA
6	0.773	4	0.769	0.055	2.63
8	0.975	4	0.759	0.050	1.87
10	1.525	4	0.779	0.054	1.32

D = Nominal pipe diameter (in)
P = Period of Corrugations (in)
n = number of slots per corrugation valley
l = average length of slotted perforation (in)
w = average width of slotted perforation (in)
WIA = Water inlet area (in^2/ft)



Summary description

Class 2 slotted perforations includes a total of four equally spaced slots in each corrugation valley as shown by the black centerlines at right.

AASHTO M294 CLASS 2 SLOTTED PERFORATIONS FOR DOUBLE-WALL (SP) PIPE

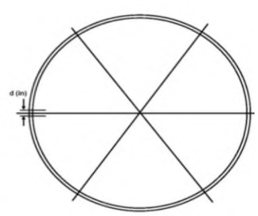
Type SP Class 2 Perforations

D	d	L	WIA
12	0.3125	1.94	2.85
15	0.3125	2.62	2.11
18	0.3125	2.96	1.87

D = Nominal pipe diameter (in)
d = diameter of circular perforation (in)
L = Longitudinal spacing between holes (in)
WIA = Water inlet area (in^2/ft)

Summary description

Class 2 perforations for 12", 15" and 18" HDPE pipes include a total of six equally spaced 5/16" diameter holes in each corrugation valley as shown at right.



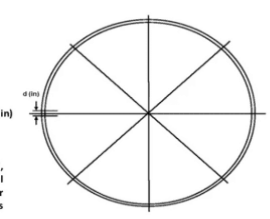
Type SP Class 2 Perforations

D	d	L	WIA
24	0.3750	3.95	2.68
30	0.3750	4.01	2.64
36	0.3750	4.06	2.61
42	0.3750	5.38	1.97
48	0.3750	5.37	1.97

D = Nominal pipe diameter (in)
d = diameter of circular perforation (in)
L = Longitudinal spacing between holes (in)
WIA = Water inlet area (in^2/ft)

Summary description

Class 2 perforations for 24", 30", 36", 42" and 48" HDPE pipes include a total of eight equally spaced 3/8" diameter holes in each corrugation valley as shown at right.



Check Maximum Velocity:

Q = $CLH^{1.5}$ **v=** $\frac{Q}{A}$

C = 3.0
L = 13 ft
H= 0.165 ft

A= 2.140 ft
V= 1.217 ft/s

Ground Cover Type: Grass
Max. Permissable Velocity: 4 ft/s

Velocity Check: OK

Ground Cover	Allowable Velocity
Grass*	4 fps
Gravel	5 fps
Mulch	1-2 fps

HOWELL ENGINEERING
Local Knowhow. Engineered.

Perforated HDPE Pipe Level Spreader Calculation
Calculations per PaDEP BMP Manual, dated December 30, 2006, Chapter 6 - BMP 6.8.1: Level Spreader

JOB NUMBER: *4668* **PROJECT:** *201 Pennsylvania Ave*
MUNICIPALITY: *Malvern Borough*
PREPARED BY: *DH3* **DATE:** *3/4/2024* **REVISION:** *0*

BMP: Basin 3

$Q_{100(BASIN\ OUT)}$= 10.11 cfs
100-Year Water Surface Elevation= 508.98
Level Spreader Invert= 501

Level Spreader Pipe Info:

Pipe Diameter:	12	
Perf. Type:	CIRCULAR	
Perf. Length:	-	in
Perf. Width:	-	in
Perf. Diameter:	0.313	in
Longitudinal Spacing between Holes:	1.940	in
Perforations per Foot:	37.113	

Calculate the Minimum Level Spreader Length:

L (Minimum Length of Level Spreader) = Q/Q_L

Where:

Q_L (discharge per linear foot) = Q_O* No. of perforations per linear foot of pipe (per manufacturer spec.)

Q_O (perforation flow rate) = $C_d * A * (2*g*H)^{0.5}$

Coefficient of discharge, C_d = 0.6
Cross Sectional Area of Single Perforation, A = 0.000533 ft^2 (*Per Manufacturer Specifications)
g= 32.2 ft/s^2
H= 6.9800 ft

Q_O (perforation flow rate) = 0.00678 ft^3/s
Q_L (discharge per linear foot) = 0.25147 ft^3/s

Minimum Level Spreader Length = 40.20 ft

Provided Level Spreader Length = 41 ft

AASHTO M252 CLASS 2 SLOTTED PERFORATIONS FOR SINGLE-WALL (CP) AND DOUBLE-WALL (SP) PIPE

Type CP Class 2 Slotted Perforations

D	P	n	l	w	WIA
4	0.645	4	0.783	0.069	4.02
6	0.824	4	0.769	0.055	2.46
8	1.02	4	0.759	0.050	1.79

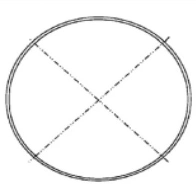
Type SP Class 2 Slotted Perforations

D	P	n	l	w	WIA
6	0.773	4	0.769	0.055	2.63
8	0.975	4	0.759	0.050	1.87
10	1.525	4	0.779	0.054	1.32

D = Nominal pipe diameter (in)
P = Period of Corrugations (in)
n = number of slots per corrugation valley
l = average length of slotted perforation (in)
w = average width of slotted perforation (in)
WIA = Water inlet area (in^2/ft)

Summary description

Class 2 slotted perforations includes a total of four equally spaced slots in each corrugation valley as shown by the black centerlines at right.



AASHTO M294 CLASS 2 SLOTTED PERFORATIONS FOR DOUBLE-WALL (SP) PIPE

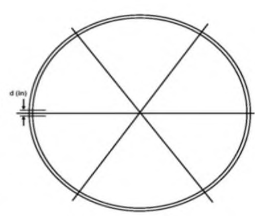
Type SP Class 2 Perforations

D	d	L	WIA
12	0.3125	1.94	2.85
15	0.3125	2.62	2.11
18	0.3125	2.96	1.87

D = Nominal pipe diameter (in)
d = diameter of circular perforation (in)
L = Longitudinal spacing between holes (in)
WIA = Water inlet area (in^2/ft)

Summary description

Class 2 perforations for 12", 15" and 18" HDPE pipes include a total of six equally spaced 5/16" diameter holes in each corrugation valley as shown at right.



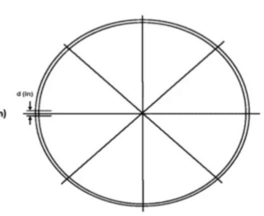
Type SP Class 2 Perforations

D	d	L	WIA
24	0.3750	3.95	2.68
30	0.3750	4.01	2.64
36	0.3750	4.06	2.61
42	0.3750	5.38	1.97
48	0.3750	5.37	1.97

D = Nominal pipe diameter (in)
d = diameter of circular perforation (in)
L = Longitudinal spacing between holes (in)
WIA = Water inlet area (in^2/ft)

Summary description

Class 2 perforations for 24", 30", 36", 42" and 48" HDPE pipes include a total of eight equally spaced 3/8" diameter holes in each corrugation valley as shown at right.



Check Maximum Velocity:

Q = $CLH^{1.5}$ v= $\frac{Q}{A}$

C = 3.0
L = 41 ft
H= 0.189 ft

A= 7.751 ft
V= 1.304 ft/s

Ground Cover Type: Grass
Max. Permissable Velocity: 4 ft/s

Velocity Check: OK

Ground Cover	Allowable Velocity
Grass*	4 fps
Gravel	5 fps
Mulch	1-2 fps

APPENDIX F

DEWATERING CALCULATIONS

HOWELL ENGINEERING
Local Knowhow. Engineered.

STORMWATER STRUCTURE DEWATERING CALCULATIONS

DATE: 3/8/2024
BY: DH3

REV: 0

JOB NO.: 4668 **PROJECT:** 201 PA AVE
DESCRIPTION: DEWATERING CALCULATION 2 YEAR STORM
Municipality: MALVERN BOROUGH

Constructed Filter w/ MRC: 1

Time (hrs)	Elev (ft)
44.07	537.06
44.10	537.06
44.13	537.05
44.17	537.05
44.20	537.05
44.23	537.05
44.27	537.05
44.30	537.05
44.33	537.05
44.37	537.05
44.40	537.05
44.43	537.05
44.47	537.05
44.50	537.05
44.53	537.05
44.57	537.05
44.60	537.05
44.63	537.05
44.67	537.05
44.70	537.05
44.73	537.05
44.77	537.05
44.80	537.05
44.83	537.05
44.87	537.05
44.90	537.05

	Water Surface Surface Elevation (ft)	Time
	537.05	44.13
	537.04	47
Extrapolated Value	537.00	58.48

Therefore total dewatering time from peak elevation to top of IWS is 58.48 **HRS**
= 2.44 **DAYS**

HOWELL ENGINEERING
Local Knowhow. Engineered.

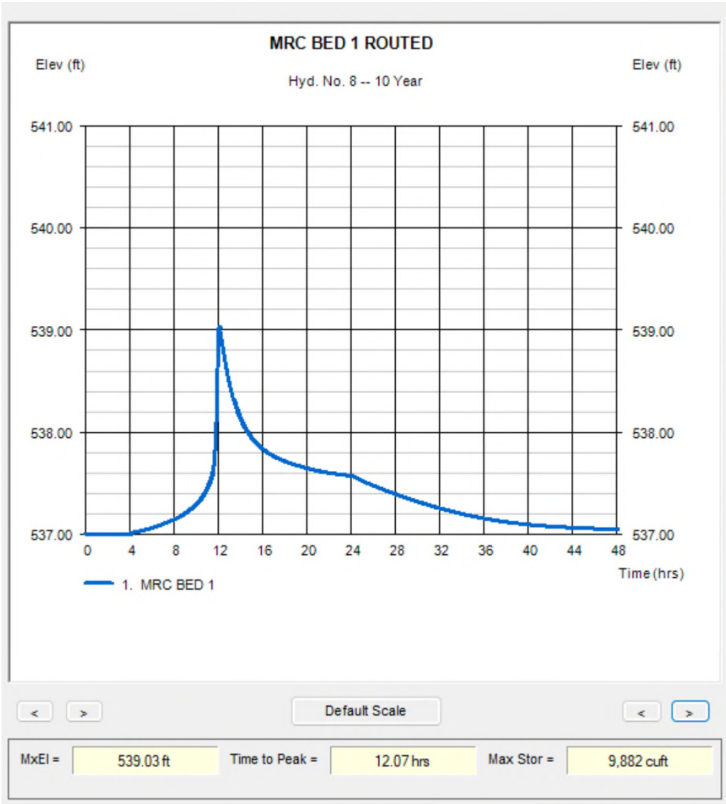
STORMWATER STRUCTURE DEWATERING CALCULATIONS

DATE: 3/8/2024
BY: DH3

REV: 0

JOB NO.: 4668 **PROJECT:** 201 PA AVE
DESCRIPTION: DEWATERING CALCULATION 10 YEAR STORM
Municipality: MALVERN BOROUGH

Constructed Filter w/ MRC: 1



Time (hrs)	Elev (ft)
41.90	537.08
41.93	537.08
41.97	537.07
42.00	537.07
42.03	537.07
42.07	537.07
42.10	537.07
42.13	537.07
42.17	537.07
42.20	537.07
42.23	537.07
42.27	537.07
42.30	537.07
42.33	537.07
42.37	537.07
42.40	537.07
42.43	537.07
42.47	537.07
42.50	537.07
42.53	537.07
42.57	537.07
42.60	537.07
42.63	537.07
42.67	537.07
42.70	537.07
42.73	537.07

	Water Surface Surface Elevation (ft)	Time
	537.07	41.97
	537.06	43.47
Extrapolated Value	537.00	52.47

Therefore total dewatering time from peak elevation to top of IWS is 52.47 **HRS**
= 2.19 **DAYS**

STORMWATER STRUCTURE
DEWATERING CALCULATIONS

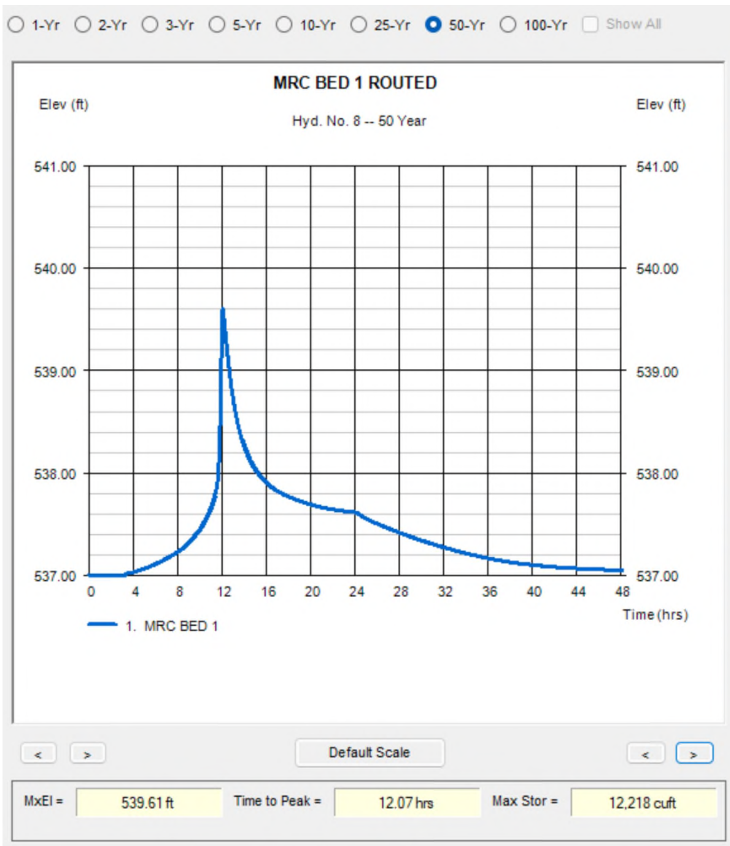
HOWELL ENGINEERING
Local Knowhow. Engineered.

DATE: 3/8/2024
BY: DH3

REV: 0

JOB NO.: 4668 **PROJECT:** 201 PA AVE
DESCRIPTION: DEWATERING CALCULATION 50 YEAR STORM
Municipality: MALVERN BOROUGH

Constructed Filter w/ MRC: 1



Time (hrs)	Elev (ft)
47.17	537.05
47.20	537.05
47.23	537.05
47.27	537.05
47.30	537.05
47.33	537.05
47.37	537.05
47.40	537.05
47.43	537.05
47.47	537.05
47.50	537.05
47.53	537.05
47.57	537.05
47.60	537.05
47.63	537.05
47.67	537.05
47.70	537.05
47.73	537.05
47.77	537.05
47.80	537.05
47.83	537.05
47.87	537.05
47.90	537.05
47.93	537.05
47.97	537.05
48.00	537.05

	Water Surface Surface Elevation (ft)	Time
	537.07	44.03
	537.06	46
Extrapolated Value	537.00	57.82

Therefore total dewatering time from peak elevation to top of IWS is 57.82 **HRS**
= 2.41 **DAYS**

HOWELL ENGINEERING
Local Knowhow. Engineered.

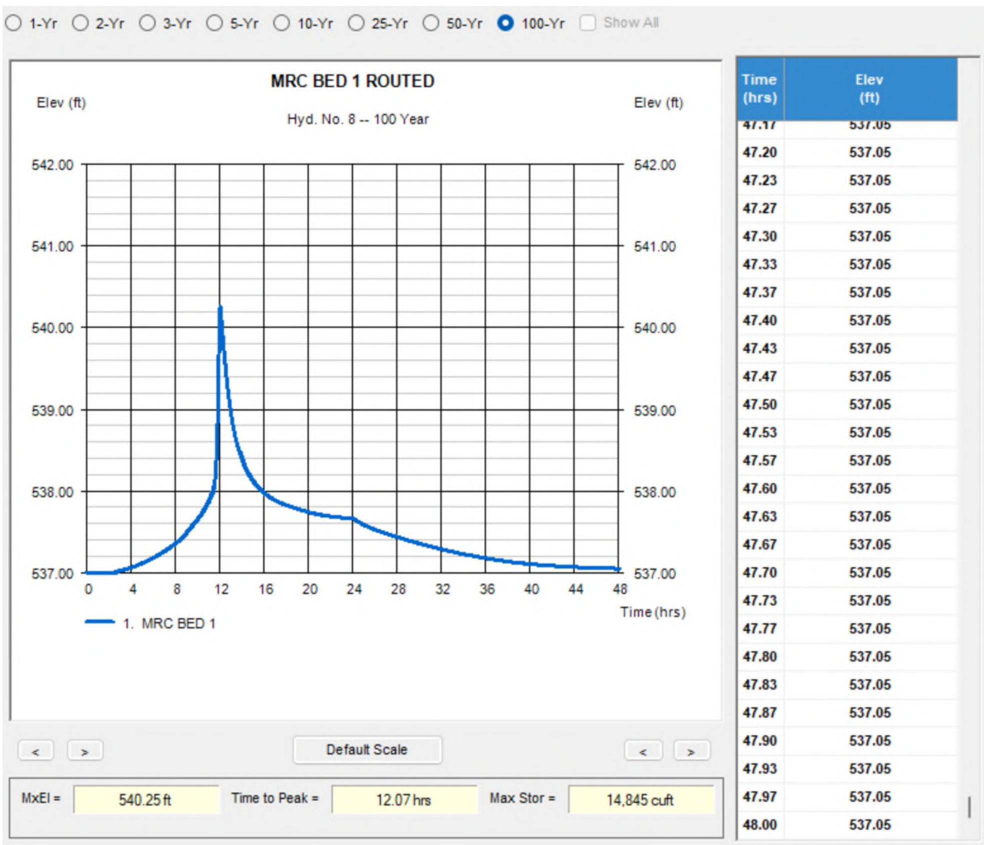
STORMWATER STRUCTURE DEWATERING CALCULATIONS

DATE: 3/8/2024
BY: DH3

REV: 0

JOB NO.: 4668 **PROJECT:** 201 PA AVE
DESCRIPTION: DEWATERING CALCULATION 100 YEAR STORM
Municipality: MALVERN BOROUGH

Constructed Filter w/ MRC: 1



Time (hrs)	Elev (ft)
47.17	537.05
47.20	537.05
47.23	537.05
47.27	537.05
47.30	537.05
47.33	537.05
47.37	537.05
47.40	537.05
47.43	537.05
47.47	537.05
47.50	537.05
47.53	537.05
47.57	537.05
47.60	537.05
47.63	537.05
47.67	537.05
47.70	537.05
47.73	537.05
47.77	537.05
47.80	537.05
47.83	537.05
47.87	537.05
47.90	537.05
47.93	537.05
47.97	537.05
48.00	537.05

	Water Surface Surface Elevation (ft)	Time
	537.07	43.1
	537.06	44.6
Extrapolated Value	537.00	53.60

Therefore total dewatering time from peak elevation to top of IWS is 53.60 **HRS**
= 2.23 **DAYS**

STORMWATER STRUCTURE
DEWATERING CALCULATIONS

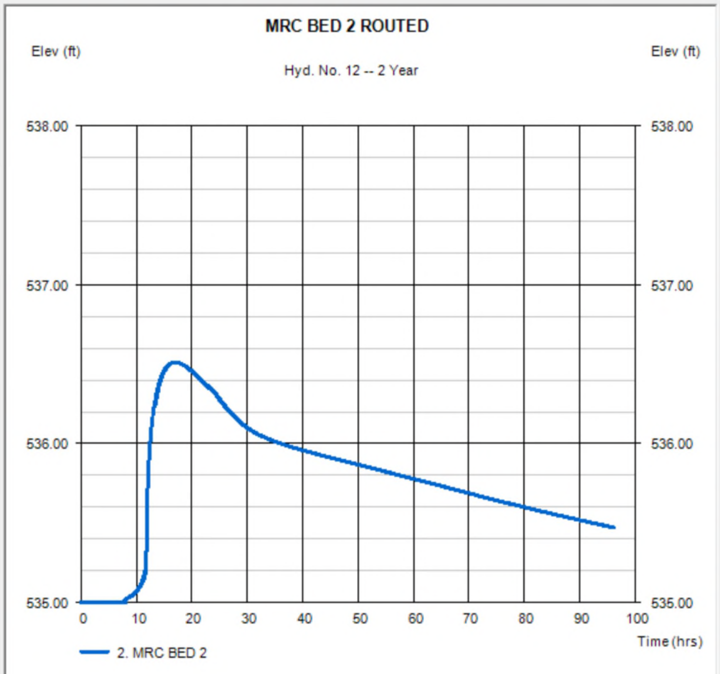
DATE: 3/8/2024
BY: DH3

REV: 0

JOB NO.: 4668 **PROJECT:** 201 PA AVE
DESCRIPTION: DEWATERING CALCULATION 2 YEAR STORM
Municipality: MALVERN BOROUGH

Constructed Filter w/ MRC: 2

1-Yr ◉ 2-Yr 3-Yr 5-Yr 10-Yr 25-Yr 50-Yr 100-Yr Show All



< > Default Scale < >

MxEl = 536.51 ft Time to Peak = 16.87 hrs Max Stor = 18,297 cuft

Time (hrs)	Elev (ft)
94.10	535.49
94.13	535.49
94.17	535.48
94.20	535.48
94.23	535.48
94.27	535.48
94.30	535.48
94.33	535.48
94.37	535.48
94.40	535.48
94.43	535.48
94.47	535.48
94.50	535.48
94.53	535.48
94.57	535.48
94.60	535.48
94.63	535.48
94.67	535.48
94.70	535.48
94.73	535.48
94.77	535.48
94.80	535.48
94.83	535.48
94.87	535.48
94.90	535.48
94.93	535.48
94.97	535.48

	Water Surface Surface Elevation (ft)	Time
	535.49	94.13
	535.48	95.47
Extrapolated Value	535.00	159.79

Therefore total dewatering time from peak elevation to top of IWS is 159.79 **HRS**
= 6.66 **DAYS**

STORMWATER STRUCTURE
DEWATERING CALCULATIONS

HOWELL ENGINEERING
Local Knowhow. Engineered.

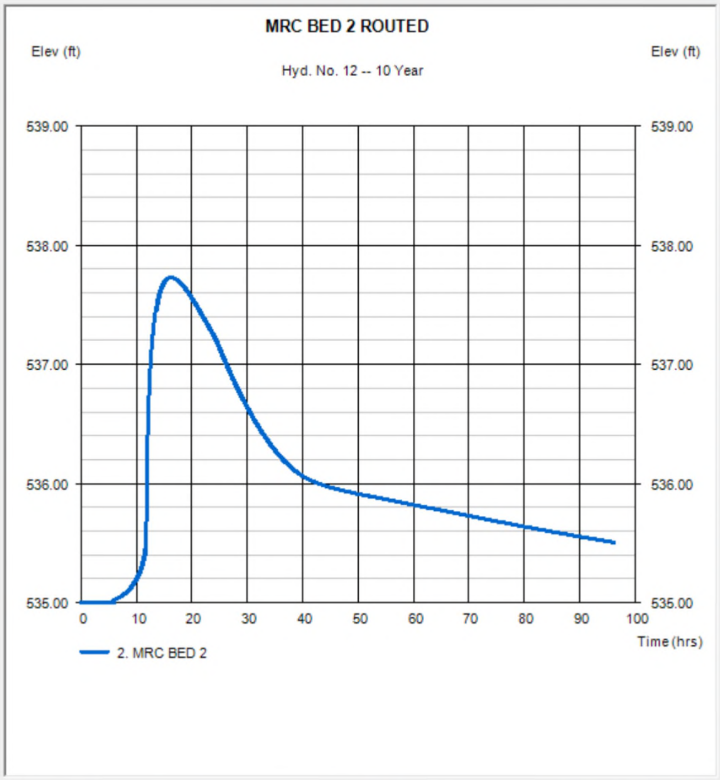
DATE: 3/8/2024
BY: DH3

REV: 0

JOB NO.: 4668 **PROJECT:** 201 PA AVE
DESCRIPTION: DEWATERING CALCULATION 10 YEAR STORM
Municipality: MALVERN BOROUGH

Constructed Filter w/ MRC: 2

1-Yr 2-Yr 3-Yr 5-Yr 10-Yr 25-Yr 50-Yr 100-Yr Show All



< > Default Scale < >

MxEl = 537.73 ft Time to Peak = 16.03 hrs Max Stor = 27,192 cuft

Time (hrs)	Elev (ft)
95.13	535.51
95.17	535.51
95.20	535.51
95.23	535.51
95.27	535.51
95.30	535.51
95.33	535.51
95.37	535.51
95.40	535.51
95.43	535.51
95.47	535.51
95.50	535.51
95.53	535.51
95.57	535.51
95.60	535.51
95.63	535.51
95.67	535.51
95.70	535.51
95.73	535.51
95.77	535.51
95.80	535.51
95.83	535.51
95.87	535.51
95.90	535.51
95.93	535.51
95.97	535.50
96.00	535.50

	Water Surface Surface Elevation (ft)	Time
	535.51	94.63
	535.50	95.93
Extrapolated Value	535.00	160.93

Therefore total dewatering time from peak elevation to top of IWS is 160.93 **HRS**
= 6.71 **DAYS**

ENGINEERING

Local Knowhow. Engineered.

STORMWATER STRUCTURE DEWATERING CALCULATIONS

DATE: 3/8/2024

BY: DH3

REV: 0

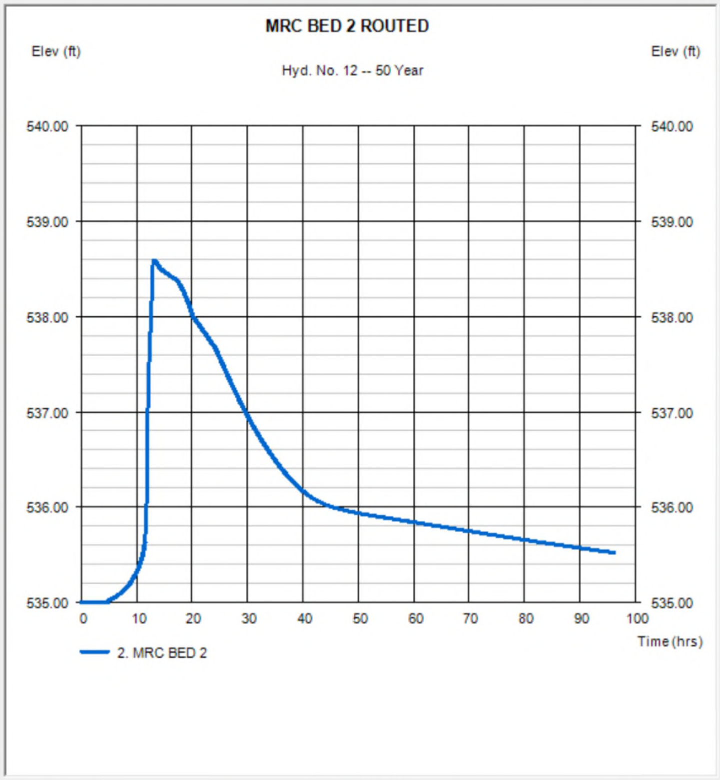
JOB NO.: 4668 **PROJECT:** 201 PA AVE

DESCRIPTION: DEWATERING CALCULATION 50 YEAR STORM

Municipality: MALVERN BOROUGH

Constructed Filter w/ MRC: 2

1-Yr 2-Yr 3-Yr 5-Yr 10-Yr 25-Yr 50-Yr 100-Yr Show All



Time (hrs)	Elev (ft)
94.73	535.53
94.77	535.53
94.80	535.53
94.83	535.53
94.87	535.53
94.90	535.53
94.93	535.53
94.97	535.53
95.00	535.53
95.03	535.53
95.07	535.53
95.10	535.53
95.13	535.53
95.17	535.53
95.20	535.53
95.23	535.53
95.27	535.53
95.30	535.53
95.33	535.53
95.37	535.53
95.40	535.53
95.43	535.53
95.47	535.52
95.50	535.52
95.53	535.52
95.57	535.52
95.60	535.52

< > Default Scale < >

MxEl = 538.59 ft Time to Peak = 13.10 hrs Max Stor = 30,922 cuft

	Water Surface Surface Elevation (ft)	Time
	535.53	94.2
	535.52	95.47
Extrapolated Value	535.00	161.51

Therefore total dewatering time from peak elevation to top of IWS is 161.51 **HRS**

= 6.73 **DAYS**

STORMWATER STRUCTURE
DEWATERING CALCULATIONS

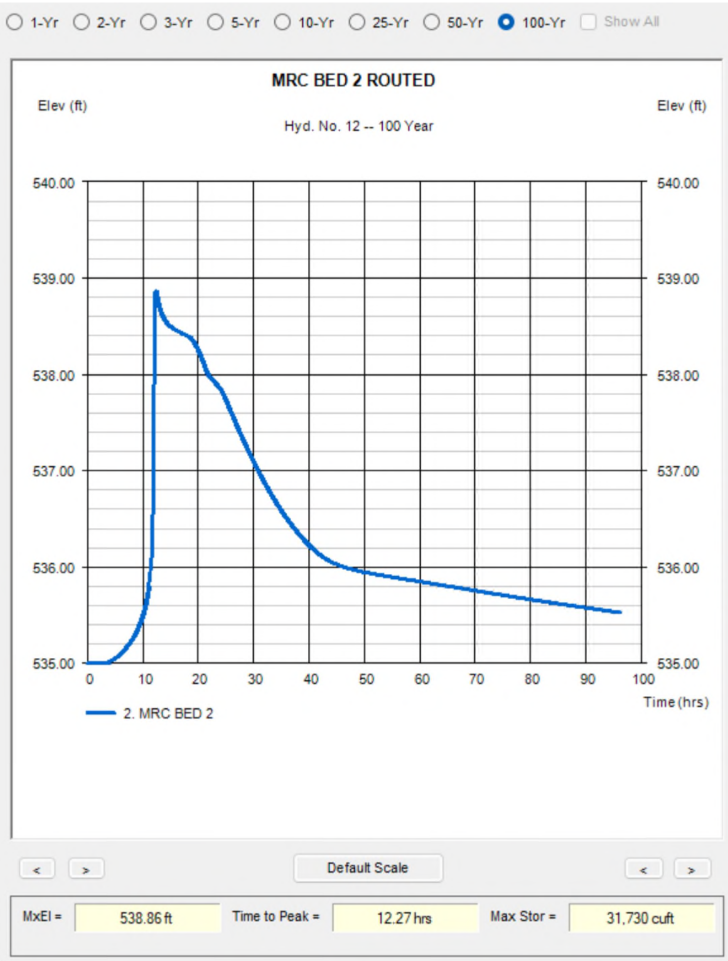
HOWELL ENGINEERING
Local Knowhow. Engineered.

DATE: 3/8/2024
BY: DH3

REV: 0

JOB NO.: 4668 **PROJECT:** 201 PA AVE
DESCRIPTION: DEWATERING CALCULATION 100 YEAR STORM
Municipality: MALVERN BOROUGH

Constructed Filter w/ MRC: 2



Time (hrs)	Elev (ft)
93.07	535.55
93.10	535.55
93.13	535.55
93.17	535.55
93.20	535.55
93.23	535.55
93.27	535.55
93.30	535.55
93.33	535.55
93.37	535.55
93.40	535.55
93.43	535.55
93.47	535.55
93.50	535.55
93.53	535.55
93.57	535.55
93.60	535.55
93.63	535.55
93.67	535.55
93.70	535.55
93.73	535.55
93.77	535.55
93.80	535.55
93.83	535.55
93.87	535.54
93.90	535.54
93.93	535.54

	Water Surface Surface Elevation (ft)	Time
	535.55	92.6
	535.54	93.87
Extrapolated Value	535.00	162.45

Therefore total dewatering time from peak elevation to top of IWS is 162.45 **HRS**
= 6.77 **DAYS**

HOWELL ENGINEERING
Local Knowhow. Engineered.

STORMWATER STRUCTURE DEWATERING CALCULATIONS

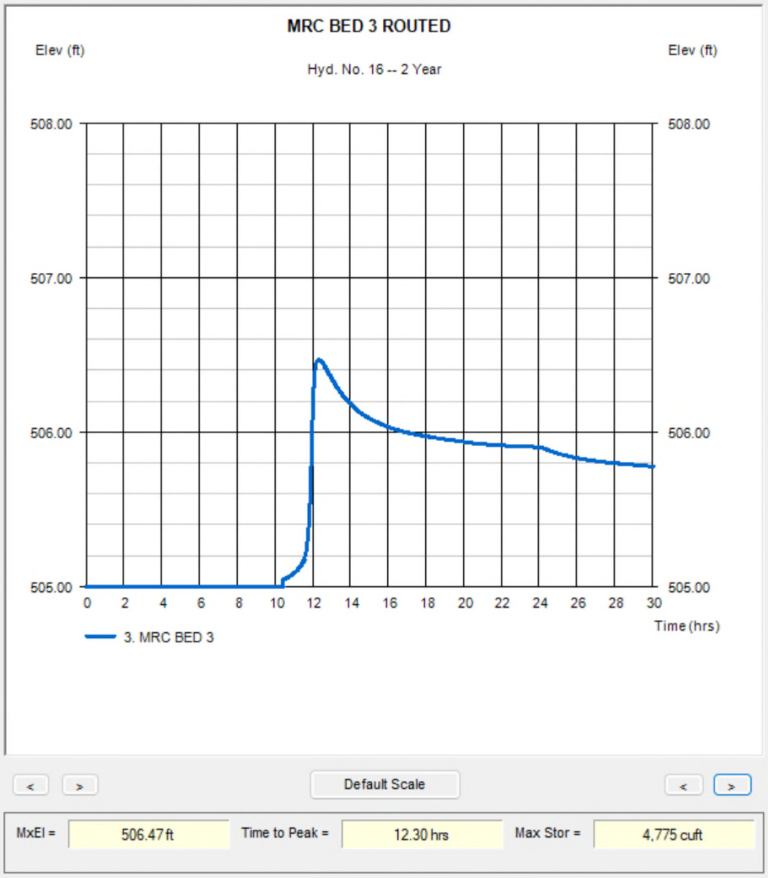
DATE: 3/8/2024
BY: DH3

REV: 0

JOB NO.: 4668 **PROJECT:** 201 PA AVE
DESCRIPTION: DEWATERING CALCULATION 2 YEAR STORM
Municipality: MALVERN BOROUGH

Constructed Filter w/ MRC: 3

1-Yr 2-Yr 3-Yr 5-Yr 10-Yr 25-Yr 50-Yr 100-Yr Show All



Time (hrs)	Elev (ft)
29.13	505.79
29.17	505.79
29.20	505.79
29.23	505.79
29.27	505.78
29.30	505.78
29.33	505.78
29.37	505.78
29.40	505.78
29.43	505.78
29.47	505.78
29.50	505.78
29.53	505.78
29.57	505.78
29.60	505.78
29.63	505.78
29.67	505.78
29.70	505.78
29.73	505.78
29.77	505.78
29.80	505.78
29.83	505.78
29.87	505.78
29.90	505.78
29.93	505.78
29.97	505.78
30.00	505.78

	Water Surface Surface Elevation (ft)	Time
	505.80	28.3
	505.79	29.23
Extrapolated Value	505.00	102.70

Therefore total dewatering time from peak elevation to top of IWS is 102.70 **HRS**
= 4.28 **DAYS**

STORMWATER STRUCTURE
DEWATERING CALCULATIONS

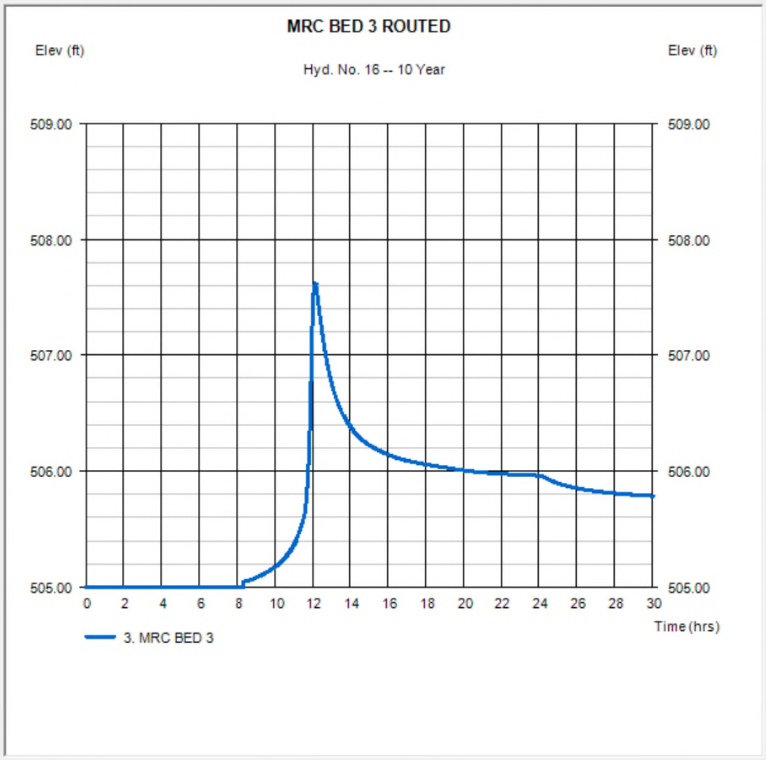
DATE: 3/8/2024
BY: DH3

REV: 0

JOB NO.: 4668 **PROJECT:** 201 PA AVE
DESCRIPTION: DEWATERING CALCULATION 10 YEAR STORM
Municipality: MALVERN BOROUGH

Constructed Filter w/ MRC: 3

1-Yr 2-Yr 3-Yr 5-Yr 10-Yr 25-Yr 50-Yr 100-Yr Show All



Time (hrs)	Elev (ft)
29.13	505.79
29.17	505.79
29.20	505.79
29.23	505.79
29.27	505.79
29.30	505.79
29.33	505.79
29.37	505.79
29.40	505.79
29.43	505.79
29.47	505.79
29.50	505.79
29.53	505.79
29.57	505.79
29.60	505.79
29.63	505.79
29.67	505.79
29.70	505.79
29.73	505.79
29.77	505.79
29.80	505.79
29.83	505.79
29.87	505.79
29.90	505.79
29.93	505.79
29.97	505.79
30.00	505.78

Default Scale

MxEl = 507.62 ft Time to Peak = 12.13 hrs Max Stor = 7,690 cuft

	Water Surface Surface Elevation (ft)	Time
	505.80	29.07
	505.79	29.97
Extrapolated Value	505.00	101.07

Therefore total dewatering time from peak elevation to top of IWS is 101.07 **HRS**
= 4.21 **DAYS**

HOWELL ENGINEERING
Local Knowhow. Engineered.

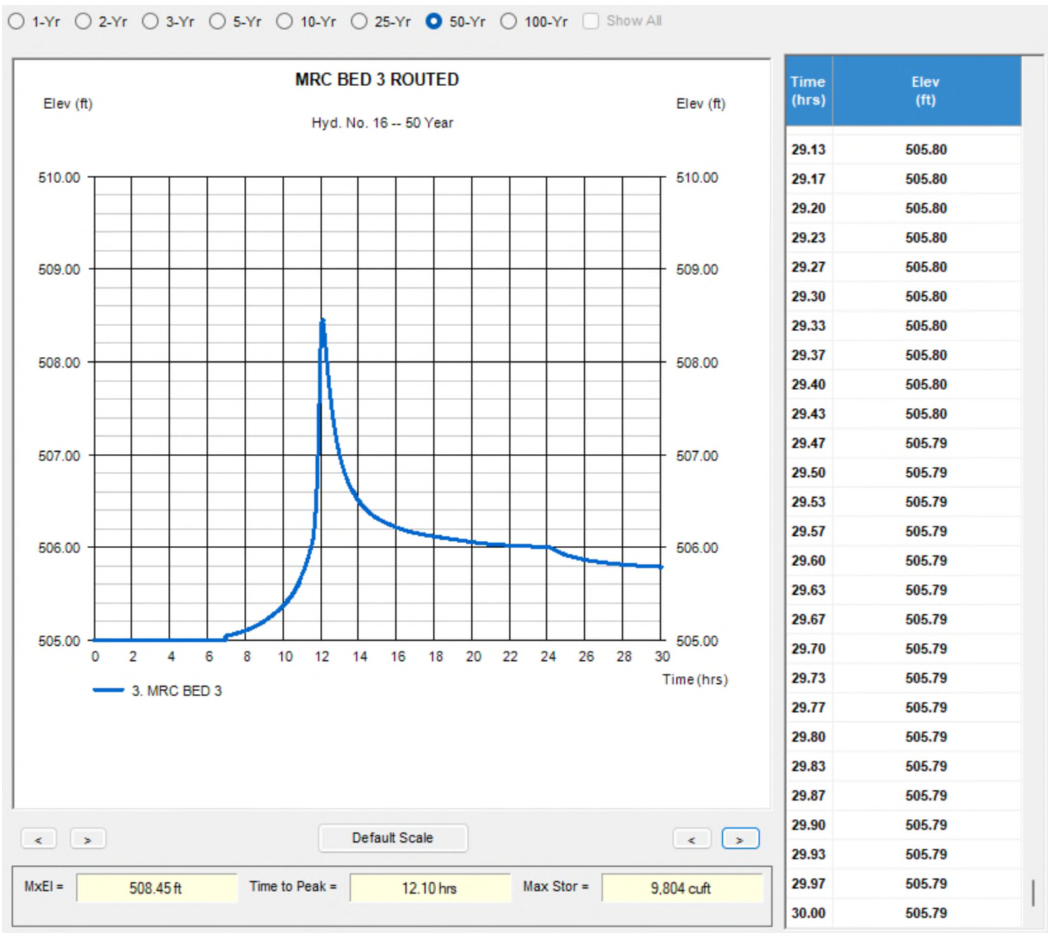
STORMWATER STRUCTURE DEWATERING CALCULATIONS

DATE: 3/8/2024
BY: DH3

REV: 0

JOB NO.: 4668 **PROJECT:** 201 PA AVE
DESCRIPTION: DEWATERING CALCULATION 50 YEAR STORM
Municipality: MALVERN BOROUGH

Constructed Filter w/ MRC: 3



	Water Surface Surface Elevation (ft)	Time
	505.81	28.57
	505.80	29.43
Extrapolated Value	505.00	98.23

Therefore total dewatering time from peak elevation to top of IWS is 98.23 **HRS**
= 4.09 **DAYS**

STORMWATER STRUCTURE
DEWATERING CALCULATIONS

HOWELL ENGINEERING
Local Knowhow. Engineered.

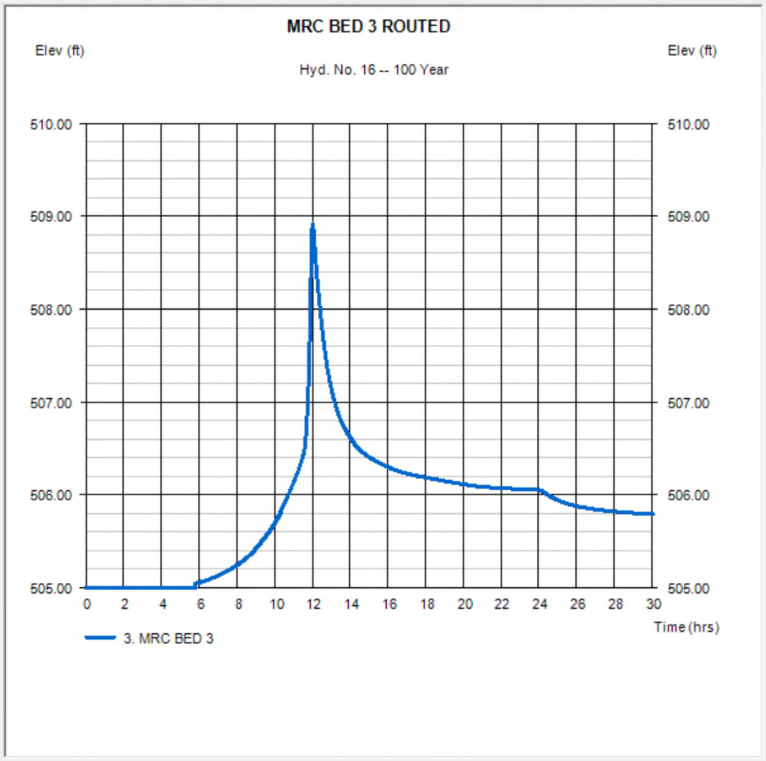
DATE: 3/8/2024
BY: DH3

REV: 0

JOB NO.: 4668 **PROJECT:** 201 PA AVE
DESCRIPTION: DEWATERING CALCULATION 100 YEAR STORM
Municipality: MALVERN BOROUGH

Constructed Filter w/ MRC: 3

1-Yr 2-Yr 3-Yr 5-Yr 10-Yr 25-Yr 50-Yr 100-Yr Show All



Time (hrs)	Elev (ft)
29.13	505.80
29.17	505.80
29.20	505.80
29.23	505.80
29.27	505.80
29.30	505.80
29.33	505.80
29.37	505.80
29.40	505.80
29.43	505.80
29.47	505.80
29.50	505.80
29.53	505.80
29.57	505.80
29.60	505.80
29.63	505.80
29.67	505.80
29.70	505.80
29.73	505.80
29.77	505.79
29.80	505.79
29.83	505.79
29.87	505.79
29.90	505.79
29.93	505.79
29.97	505.79
30.00	505.79

< > Default Scale < >

MxEl = 508.92 ft Time to Peak = 12.03 hrs Max Stor = 10,995 cuft

	Water Surface Surface Elevation (ft)	Time
	505.81	28.9
	505.80	29.73
Extrapolated Value	505.00	96.13

Therefore total dewatering time from peak elevation to top of IWS is 96.13 **HRS**
= 4.01 **DAYS**

APPENDIX G

MANAGED RELEASE CONCEPT (MRC) CALCULATIONS

HOWELL ENGINEERING
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EQUIVALENT IMPERVIOUS AREA CALCULATION

PROJECT: 201 PA AVE
2-Year Rainfall: 1.2 **in**

$$\frac{\text{Total Volume of 1.2-in/2-hr Storm Inflow (cubic feet)}}{0.0833 \text{ feet} * 43560 \text{ square feet/acre}} = \text{Equivalent Impervious Area}$$

BMP: BED 1

Cover Type	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Impervious	**N/A**	41,037	0.94	98	0.2041	0.0408	0.99	3,371
Lawn	**B**	8,251	0.19	61	6.3934	1.2787	0.00	1
Woods	**B**	0	0.00	55	8.1818	1.6364	0.02	0
TOTAL:		**49,288**	**1.13**					**3,371**

EQUIVALENT IMPERVIOUS AREA: **0.93** **ACRES**

BMP: BED 2

Cover Type	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2]
Impervious	**N/A**	41,823	0.96	98	0.2041	0.0408	0.99	3,435
Lawn	**B**	10,217	0.23	61	6.3934	1.2787	0.00	1
Woods	**B**	0	0.00	55	8.1818	1.6364	0.02	0
TOTAL:		**52,040**	**1.19**					**3,436**

EQUIVALENT IMPERVIOUS AREA: **0.95** **ACRES**

BMP: BED 3

Cover Type	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2]
Impervious	**N/A**	20,777	0.48	98	0.2041	0.0408	0.99	1,707
Lawn	**B**	10,105	0.23	61	6.3934	1.2787	0.00	1
Woods	**B**	0	0.00	55	8.1818	1.6364	0.02	0
TOTAL:		**30,882**	**0.71**					**1,707**

EQUIVALENT IMPERVIOUS AREA: **0.47** **ACRES**

SUMMARY		
Total Equivilant Impervious Area	2.35	Acres
Allowable Discharge Rate	0.01	CFS/Equivalent Impervious Area
Maximum Discharge	0.023	CFS
Proposed Discharge	0.02	CFS

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BUREAU OF CLEAN WATER

MANAGED RELEASE CONCEPT (MRC) DESIGN SUMMARY

Complete One Design Summary Sheet for Each BMP Designed for MRC

GENERAL INFORMATION

Applicant Name: **E. Khan Development** Project Name: **201 Pennsylvania Ave**

Applicant Address: **210 Pennsylvania Ave** Municipality: **Malvern Borough**

City, State, Zip: Malvern PA, 19355 County: **Chester**

Permit Type: ☐ NPDES PAG-02 ☒ NPDES IP ☐ ESCGP ☐ ESP

	Pre-Development	Post-Development	Change
Impervious Area (acres):	0	2.39	+2.39

MRC BMP INFORMATION

MRC BMP Type: **Constructed Filter w/ MRC 1** Stormwater BMP Manual Section: **6.4.7**

Will the BMP Include Vegetation? ☐ Yes ☒ No

If Yes, Identify Proposed Vegetation: __________

For Non-Vegetated BMPs Will There Be Pre- or Post-Treatment? ☐ Yes (Pre-) ☒ Yes (Post-) ☐ No

If Yes, Identify Proposed Pre- or Post-Treatment: **Water Quality Inlets**

Name of Surface Water to Receive MRC BMP Discharges: **Little Valley Creek**

Designated Use of Surface Water: **MF, EV** Existing Use of Surface Water (if different): __________

Is the Surface Water Impaired? ☒ Yes ☐ No

If Yes, Identify Cause(s): **PCBS, Pathogens, Siltation, Metals**

Will the BMP Have a Liner? ☒ Yes ☐ No

If Yes, Identify the Type or Liner Material: **PVC Liner**

BMP Media Description: **#57 stone**

Are Any Deviations from MRC Design Standards Proposed? ☐ Yes ☒ No

If Yes, Identify Deviations: __________

MRC BMP DESIGN VALUES AND STANDARDS

Parameter	Design Value	Design Standard
Actual Contributing Impervious Area to BMP (acres)	**0.94**	
Equivalent Contributing Impervious Area to BMP (acres)	**0.93**	
MRC BMP Release Rate (cfs)	**0.106 (into to BMP002)**	*No greater than 0.01 cfs / acre of equivalent contributing impervious*
BMP Footprint Area (ft^2)	**4250**	
Total Drainage Area to BMP (acres)	**1.13**	
Bottom BMP Elevation (ft)	**536.00**	

MRC BMP Design Summary

Parameter	Design Value	Design Standard
2-Yr/24-Hr Storm Ponding Depth (ft)	**1.25**	*1 ft (recommended) (2 ft max)*
Max. Ponding Depth (ft)	**4**	*4 ft (max)*
Overflow Bypass Elevation (ft)	**537.50**	
Media Depth (ft)	**4**	*2 ft (min) – 4 ft (max)*
Media Void Space (%)	**98**	
Internal Water Storage (IWS) Depth (ft)	**1**	
Top of IWS Elevation (ft)	**537.00**	
Underdrain Pipe Diameter (in)	**4”**	
Underdrain Orifice Diameter (in)	**1 3/4”**	
Underdrain Outlet Elevation (ft)	**537.00**	
IWS Used for Routing (%)	**0%**	*50% max*
Separation Distance (Groundwater) (ft)	**> 2**	*1 ft (min) (2 ft recommended)*
Infiltration Rate (in/hr)	**N/A**	
1-Yr/24-Hr **Pre**-Development Peak Rate (cfs)	**1.067**	
2-Yr/24-Hr **Post**-Development Peak Rate (cfs)	**0.579**	*1-Yr/24-Hr Pre-Development Peak Rate (or per approved Act 167 Plan)*
10-Yr/24-Hr **Post**-Development Peak Rate (cfs)	**2.937**	*10-Yr/24-Hr Pre-Development Peak Rate*
50-Yr/24-Hr **Post**-Development Peak Rate (cfs)	**5.430**	*50-Yr/24-Hr Pre-Development Peak Rate*
100-Yr/24-Hr **Post**-Development Peak Rate (cfs)	**12.70**	*100-Yr/24-Hr Pre-Development Peak Rate*
a. Total 2-Yr/24-Hr Runoff Volume Managed by BMP (cf)	**10,543**	
b. Total 1.2-inch/2-Hr Runoff Vol. Permanently Removed (cf)	**3,371**	
c. 2-Yr/24-Hr Volume Managed (cf)	**7,172**	*Difference of a. and b.*
Ponding Time @ 2-Yr/24-Hr Storm (hrs)	**58.48 hrs/2.44 days**	*72 hrs max/ 7 Days Sub. Surface*
Ponding Time @ 10-Yr/24-Hr Storm (hrs)	**52.47 hrs/2.19 days**	*72 hrs max/ 7 Days Sub. Surface*
Ponding Time @ 50-Yr/24-Hr Storm (hrs)	**57.82 hrs/2.41 days**	*72 hrs max/ 7 Days Sub. Surface*
Ponding Time @ 100-Yr/24-Hr Storm (hrs)	**53.60 hrs/2.23 days**	*72 hrs max/ 7 Days Sub. Surface*

Dave Gibbons

Licensed P.E. Name

Licensed P.E. Signature

License No.

Date

Licensed Professional's Seal

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DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

MANAGED RELEASE CONCEPT (MRC) DESIGN SUMMARY

Complete One Design Summary Sheet for Each BMP Designed for MRC

GENERAL INFORMATION

Applicant Name: **E. Khan Development** Project Name: **201 Pennsylvania Ave**

Applicant Address: **210 Pennsylvania Ave** Municipality: **Malvern Borough**

City, State, Zip: Malvern PA, 19355 County: **Chester**

Permit Type: ☐ NPDES PAG-02 ☒ NPDES IP ☐ ESCGP ☐ ESP

	Pre-Development	Post-Development	Change
Impervious Area (acres):	0	2.39	+2.39

MRC BMP INFORMATION

MRC BMP Type: **Constructed Filter w/ MRC 2** Stormwater BMP Manual Section: **6.4.7**

Will the BMP Include Vegetation? ☐ Yes ☒ No

If Yes, Identify Proposed Vegetation:

For Non-Vegetated BMPs Will There Be Pre- or Post-Treatment? ☐ Yes (Pre-) ☒ Yes (Post-) ☐ No

If Yes, Identify Proposed Pre- or Post-Treatment: **Water Quality Inlets**

Name of Surface Water to Receive MRC BMP Discharges: **Little Valley Creek**

Designated Use of Surface Water: **MF, EV** Existing Use of Surface Water (if different):

Is the Surface Water Impaired? ☒ Yes ☐ No

If Yes, Identify Cause(s): **PCBS, Pathogens, Siltation, Metals**

Will the BMP Have a Liner? ☒ Yes ☐ No

If Yes, Identify the Type or Liner Material: **PVC Liner**

BMP Media Description: **#57 stone**

Are Any Deviations from MRC Design Standards Proposed? ☐ Yes ☒ No

If Yes, Identify Deviations:

MRC BMP DESIGN VALUES AND STANDARDS

Parameter	Design Value	Design Standard
Actual Contributing Impervious Area to BMP (acres)	**0.97**	
Equivalent Contributing Impervious Area to BMP (acres)	**0.95**	
MRC BMP Release Rate (cfs)	**0.018**	*No greater than 0.01 cfs / acre of equivalent contributing impervious*
BMP Footprint Area (ft^2)	**7560**	
Total Drainage Area to BMP (acres)	**2.32**	
Bottom BMP Elevation (ft)	**534.00**	

Parameter	Design Value	Design Standard
2-Yr/24-Hr Storm Ponding Depth (ft)	**1.51**	*1 ft (recommended) (2 ft max)*
Max. Ponding Depth (ft)	**4**	*4 ft (max)*
Overflow Bypass Elevation (ft)	**537.50**	
Media Depth (ft)	**4**	*2 ft (min) – 4 ft (max)*
Media Void Space (%)	**98**	
Internal Water Storage (IWS) Depth (ft)	**1**	
Top of IWS Elevation (ft)	**537.00**	
Underdrain Pipe Diameter (in)	**4"**	
Underdrain Orifice Diameter (in)	**15/16"**	
Underdrain Outlet Elevation (ft)	**535.00**	
IWS Used for Routing (%)	**0%**	*50% max*
Separation Distance (Groundwater) (ft)	**> 2**	*1 ft (min) (2 ft recommended)*
Infiltration Rate (in/hr)	**N/A**	
1-Yr/24-Hr **Pre**-Development Peak Rate (cfs)	**1.067**	
2-Yr/24-Hr **Post**-Development Peak Rate (cfs)	**0.579**	*1-Yr/24-Hr Pre-Development Peak Rate (or per approved Act 167 Plan)*
10-Yr/24-Hr **Post**-Development Peak Rate (cfs)	**2.937**	*10-Yr/24-Hr Pre-Development Peak Rate*
50-Yr/24-Hr **Post**-Development Peak Rate (cfs)	**5.430**	*50-Yr/24-Hr Pre-Development Peak Rate*
100-Yr/24-Hr **Post**-Development Peak Rate (cfs)	**12.70**	*100-Yr/24-Hr Pre-Development Peak Rate*
a. Total 2-Yr/24-Hr Runoff Volume Managed by BMP (cf)	**10,788**	
b. Total 1.2-inch/2-Hr Runoff Vol. Permanently Removed (cf)	**3,465**	
c. 2-Yr/24-Hr Volume Managed (cf)	**7,323**	*Difference of a. and b.*
Ponding Time @ 2-Yr/24-Hr Storm (hrs)	**159.79 hrs/6.66 days**	*72 hrs max/ 7 Days Sub. Surface*
Ponding Time @ 10-Yr/24-Hr Storm (hrs)	**160.93 hrs/6.71 days**	*72 hrs max/ 7 Days Sub. Surface*
Ponding Time @ 50-Yr/24-Hr Storm (hrs)	**161.51 hrs/6.73 days**	*72 hrs max/ 7 Days Sub. Surface*
Ponding Time @ 100-Yr/24-Hr Storm (hrs)	**162.45 hrs/6.77 days**	*72 hrs max/ 7 Days Sub. Surface*

Dave Gibbons

Licensed P.E. Name

Licensed P.E. Signature

License No.

Date

Licensed Professional's Seal

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

MANAGED RELEASE CONCEPT (MRC) DESIGN SUMMARY

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Applicant Address: **210 Pennsylvania Ave** Municipality: **Malvern Borough**

City, State, Zip: Malvern PA, 19355 County: **Chester**

Permit Type: ☐ NPDES PAG-02 ☒ NPDES IP ☐ ESCGP ☐ ESP

	Pre-Development	Post-Development	Change
Impervious Area (acres):	0	2.39	+2.39

MRC BMP INFORMATION

MRC BMP Type: **Constructed Filter w/ MRC 3** Stormwater BMP Manual Section: **6.4.7**

Will the BMP Include Vegetation? ☐ Yes ☒ No

If Yes, Identify Proposed Vegetation: ______

For Non-Vegetated BMPs Will There Be Pre- or Post-Treatment? ☐ Yes (Pre-) ☒ Yes (Post-) ☐ No

If Yes, Identify Proposed Pre- or Post-Treatment: **Water Quality Inlets**

Name of Surface Water to Receive MRC BMP Discharges: **Little Valley Creek**

Designated Use of Surface Water: **MF, EV** Existing Use of Surface Water (if different): ______

Is the Surface Water Impaired? ☒ Yes ☐ No

If Yes, Identify Cause(s): **PCBS, Pathogens, Siltation, Metals**

Will the BMP Have a Liner? ☒ Yes ☐ No

If Yes, Identify the Type or Liner Material: **PVC Liner**

BMP Media Description: **#57 stone**

Are Any Deviations from MRC Design Standards Proposed? ☐ Yes ☒ No

If Yes, Identify Deviations: ______

MRC BMP DESIGN VALUES AND STANDARDS

Parameter	Design Value	Design Standard
Actual Contributing Impervious Area to BMP (acres)	**0.81**	
Equivalent Contributing Impervious Area to BMP (acres)	**0.47**	
MRC BMP Release Rate (cfs)	**0.005**	*No greater than 0.01 cfs / acre of equivalent contributing impervious*
BMP Footprint Area (ft^2)	**2700**	
Total Drainage Area to BMP (acres)	**1.35**	
Bottom BMP Elevation (ft)	**504.00**	

MRC BMP Design Summary

Parameter	Design Value	Design Standard
2-Yr/24-Hr Storm Ponding Depth (ft)	**1.47**	*1 ft (recommended) (2 ft max)*
Max. Ponding Depth (ft)	**4**	*4 ft (max)*
Overflow Bypass Elevation (ft)	**505.78**	
Media Depth (ft)	**4**	*2 ft (min) – 4 ft (max)*
Media Void Space (%)	**98**	
Internal Water Storage (IWS) Depth (ft)	**1**	
Top of IWS Elevation (ft)	**505.00**	
Underdrain Pipe Diameter (in)	**4”**	
Underdrain Orifice Diameter (in)	**1/2”**	
Underdrain Outlet Elevation (ft)	**505.00**	
IWS Used for Routing (%)	**0%**	*50% max*
Separation Distance (Groundwater) (ft)	**> 2**	*1 ft (min) (2 ft recommended)*
Infiltration Rate (in/hr)	**N/A**	
1-Yr/24-Hr **Pre**-Development Peak Rate (cfs)	**1.067**	
2-Yr/24-Hr **Post**-Development Peak Rate (cfs)	**0.579**	*1-Yr/24-Hr Pre-Development Peak Rate (or per approved Act 167 Plan)*
10-Yr/24-Hr **Post**-Development Peak Rate (cfs)	**2.937**	*10-Yr/24-Hr Pre-Development Peak Rate*
50-Yr/24-Hr **Post**-Development Peak Rate (cfs)	**5.430**	*50-Yr/24-Hr Pre-Development Peak Rate*
100-Yr/24-Hr **Post**-Development Peak Rate (cfs)	**12.70**	*100-Yr/24-Hr Pre-Development Peak Rate*
a. Total 2-Yr/24-Hr Runoff Volume Managed by BMP (cf)	**10,788**	
b. Total 1.2-inch/2-Hr Runoff Vol. Permanently Removed (cf)	**3,465**	
c. 2-Yr/24-Hr Volume Managed (cf)	**7,323**	*Difference of a. and b.*
Ponding Time @ 2-Yr/24-Hr Storm (hrs)	**102.70 hrs/4.28 days**	*72 hrs max/ 7 Days Sub. Surface*
Ponding Time @ 10-Yr/24-Hr Storm (hrs)	**101.07 hrs/4.21 days**	*72 hrs max/ 7 Days Sub. Surface*
Ponding Time @ 50-Yr/24-Hr Storm (hrs)	**98.23 hrs/4.09 days**	*72 hrs max/ 7 Days Sub. Surface*
Ponding Time @ 100-Yr/24-Hr Storm (hrs)	**96.13 hrs/4.01 days**	*72 hrs max/ 7 Days Sub. Surface*

Dave Gibbons

Licensed P.E. Name

Licensed P.E. Signature

License No.

Date

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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	------	0.095	0.278	0.000	1.216	2.313	3.639	4.915	8.770	PRE POI 1
2	SCS Runoff	------	0.022	0.064	0.000	0.280	0.532	0.838	1.132	2.019	PRE POI 2
3	SCS Runoff	------	0.019	0.079	0.000	0.324	0.577	0.860	1.129	1.927	PRE LOI 3
5	SCS Runoff	------	1.046	1.329	0.000	2.073	2.689	3.313	3.863	5.360	OFFSITE TO BED 3
6	Combine	1, 5	1.067	1.446	0.000	2.844	4.387	6.189	7.897	12.94	TOTAL PRE TO POI1
8	SCS Runoff	------	3.826	4.475	0.000	6.084	7.361	8.630	9.736	12.72	ONSITE TO MRC BED 1
9	Reservoir	8	0.435	0.621	0.000	1.175	1.664	2.168	2.613	3.862	MRC BED 1 ROUTED
11	SCS Runoff	------	3.733	4.415	0.000	6.112	7.460	8.800	9.967	13.11	ONSITE TO MRC BED 2
12	Combine	9, 11	3.915	4.714	0.000	6.788	8.491	10.20	11.70	15.73	TOTAL TO BED 2
13	Reservoir	12	0.147	0.191	0.000	0.283	0.345	0.673	1.539	4.632	MRC BED 2 ROUTED
15	SCS Runoff	------	1.731	2.137	0.000	3.175	4.016	4.859	5.597	7.590	ONSITE TO BED 3
16	Combine	5, 15	2.676	3.333	0.000	5.032	6.420	7.819	9.047	12.37	TOTAL TO BED 3
17	Reservoir	16	0.259	0.482	0.000	1.288	2.083	2.946	4.231	9.535	MRC BED 3 ROUTED
19	SCS Runoff	------	0.242	0.427	0.000	0.975	1.480	2.027	2.532	3.987	DP001 BYPASS
20	SCS Runoff	------	0.021	0.040	0.000	0.106	0.168	0.236	0.299	0.485	DP002 BYPASS
21	SCS Runoff	------	0.007	0.012	0.000	0.030	0.046	0.064	0.080	0.127	DP003 BYPASS
23	Combine	13, 17, 19,	0.315	0.579	0.000	1.711	2.937	4.248	5.430	12.70	TOTAL POST POI 1
25	SCS Runoff	------	0.000	0.000	1.358	0.000	0.000	0.000	0.000	0.000	1.2 to MRC Bed 1
26	Reservoir	25	0.000	0.000	0.106	0.000	0.000	0.000	0.000	0.000	1.2 to MRC Bed 1 Rout
27	SCS Runoff	------	0.000	0.000	1.387	0.000	0.000	0.000	0.000	0.000	1.2 to MRC Bed 2
28	Combine	26, 27	0.000	0.000	1.400	0.000	0.000	0.000	0.000	0.000	1.2 Total to MRC Bed 2
29	Reservoir	28	0.000	0.000	0.018	0.000	0.000	0.000	0.000	0.000	1.2 to MRC Bed 2 Route
31	SCS Runoff	------	0.000	0.000	0.686	0.000	0.000	0.000	0.000	0.000	1.2 to MRC Bed 3
32	Reservoir	31	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	1.2 to MRC Bed 3 Route
34	Combine	29, 32,	0.000	0.000	0.023	0.000	0.000	0.000	0.000	0.000	Total 1.2

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	0.000	2	n/a	0	------	------	------	PRE POI 1
2	SCS Runoff	0.000	2	n/a	0	------	------	------	PRE POI 2
3	SCS Runoff	0.000	2	n/a	0	------	------	------	PRE LOI 3
5	SCS Runoff	0.000	2	n/a	0	------	------	------	OFFSITE TO BED 3
6	Combine	0.000	2	n/a	0	1, 5	------	------	TOTAL PRE TO POI1
8	SCS Runoff	0.000	2	n/a	0	------	------	------	ONSITE TO MRC BED 1
9	Reservoir	0.000	2	n/a	0	8	537.00	1,660	MRC BED 1 ROUTED
11	SCS Runoff	0.000	2	n/a	0	------	------	------	ONSITE TO MRC BED 2
12	Combine	0.000	2	n/a	0	9, 11	------	------	TOTAL TO BED 2
13	Reservoir	0.000	2	n/a	0	12	535.00	7,290	MRC BED 2 ROUTED
15	SCS Runoff	0.000	2	n/a	0	------	------	------	ONSITE TO BED 3
16	Combine	0.000	2	n/a	0	5, 15	------	------	TOTAL TO BED 3
17	Reservoir	0.000	2	n/a	0	16	505.00	1,056	MRC BED 3 ROUTED
19	SCS Runoff	0.000	2	n/a	0	------	------	------	DP001 BYPASS
20	SCS Runoff	0.000	2	n/a	0	------	------	------	DP002 BYPASS
21	SCS Runoff	0.000	2	n/a	0	------	------	------	DP003 BYPASS
23	Combine	0.000	2	n/a	0	13, 17, 19,	------	------	TOTAL POST POI 1
25	SCS Runoff	1.358	2	12	3,120	------	------	------	1.2 to MRC Bed 1
26	Reservoir	0.106	2	124	3,067	25	537.65	4,295	1.2 to MRC Bed 1 Rout
27	SCS Runoff	1.387	2	12	3,187	------	------	------	1.2 to MRC Bed 2
28	Combine	1.400	2	12	6,253	26, 27	------	------	1.2 Total to MRC Bed 2
29	Reservoir	0.018	2	990	4,918	28	535.66	12,106	1.2 to MRC Bed 2 Route
31	SCS Runoff	0.686	2	12	1,577	------	------	------	1.2 to MRC Bed 3
32	Reservoir	0.005	2	128	1,247	31	505.61	2,603	1.2 to MRC Bed 3 Route
34	Combine	0.023	2	904	6,165	29, 32,	------	------	Total 1.2

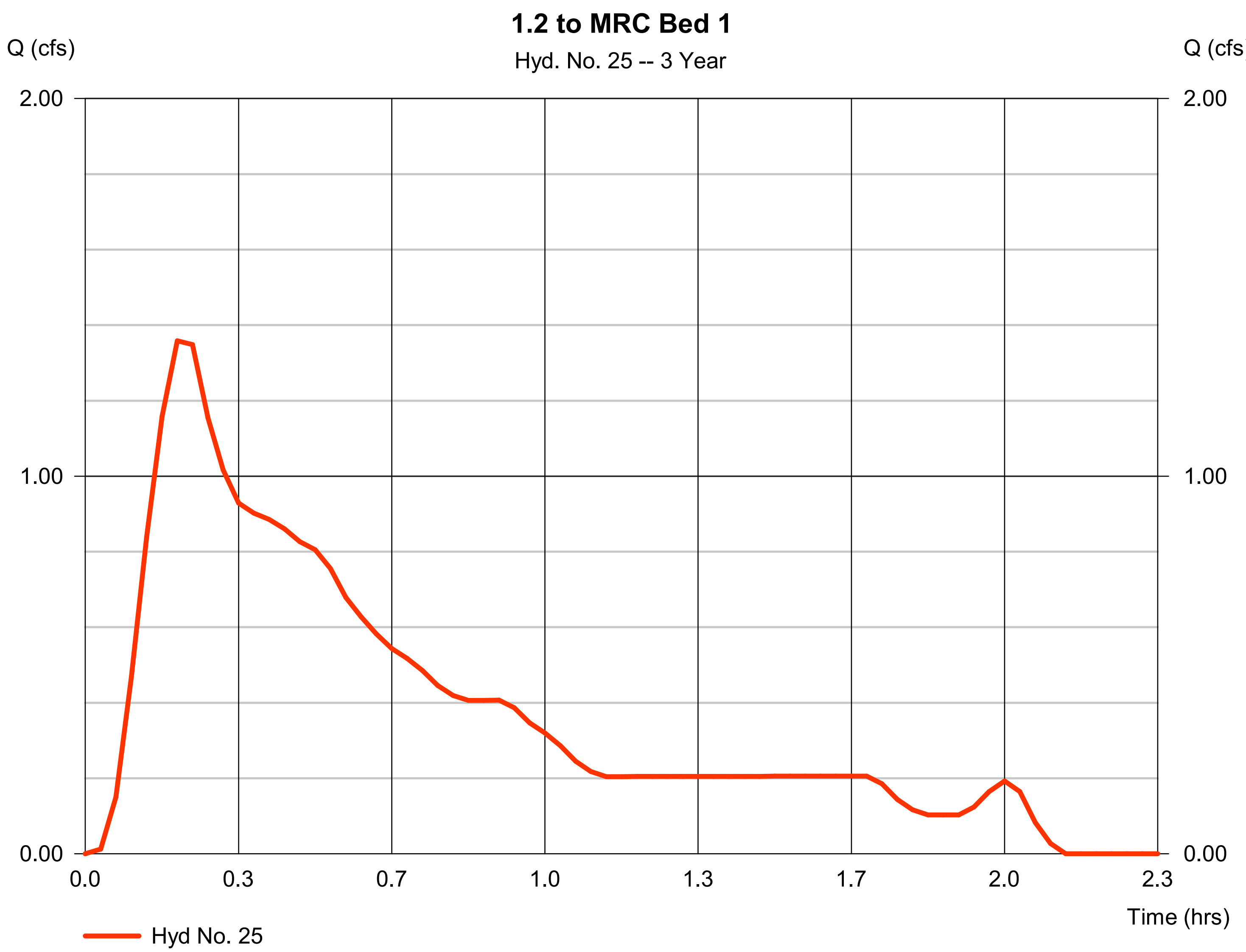
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Monday, 03 / 4 / 2024

Hyd. No. 25

1.2 to MRC Bed 1

Hydrograph type	= SCS Runoff	Peak discharge	= 1.358 cfs
Storm frequency	= 3 yrs	Time to peak	= 0.20 hrs
Time interval	= 2 min	Hyd. volume	= 3,120 cuft
Drainage area	= 0.930 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.20 in	Distribution	= Huff-1st
Storm duration	= 2.00 hrs	Shape factor	= 484



Hydrograph Report

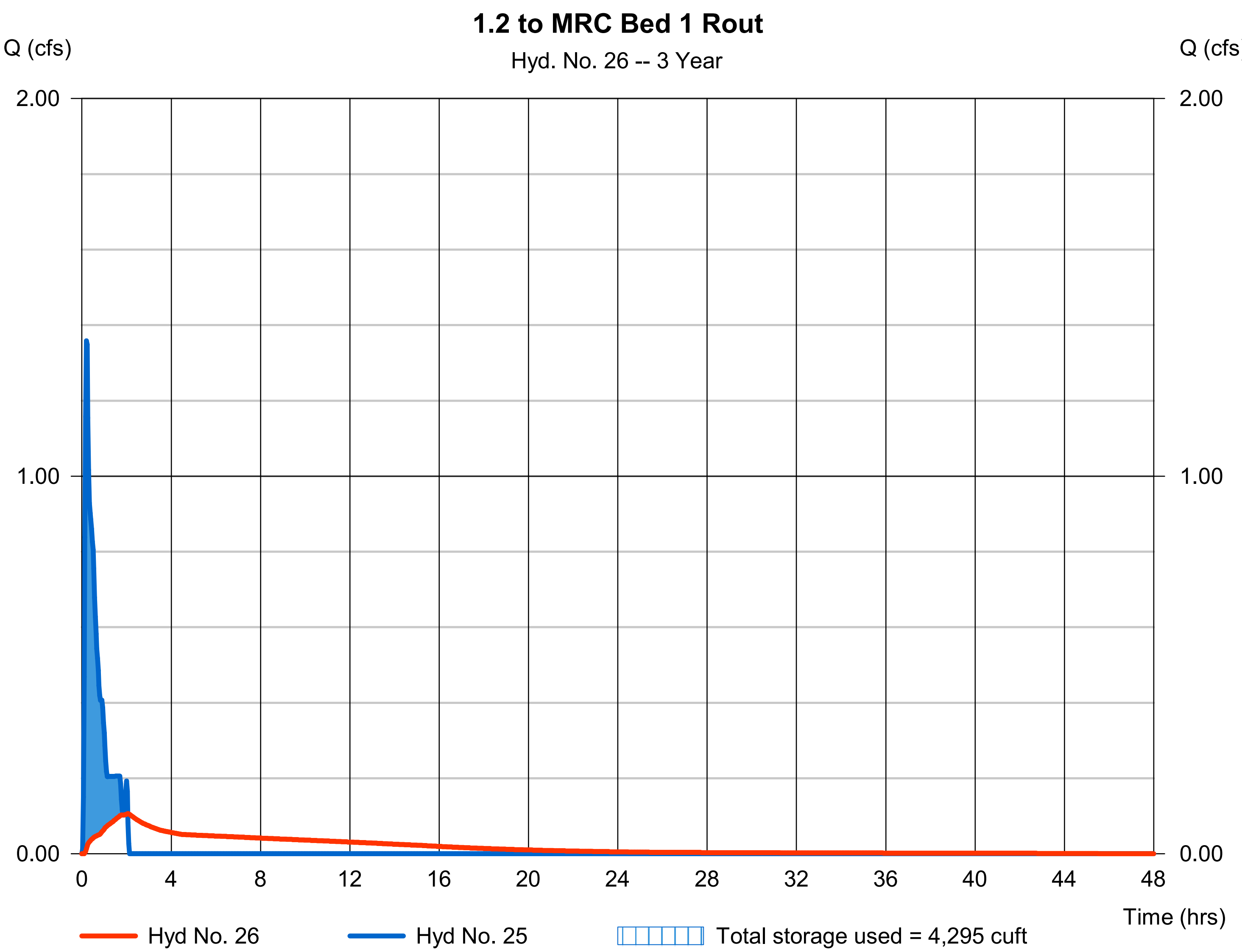
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Monday, 03 / 4 / 2024

Hyd. No. 26

1.2 to MRC Bed 1 Rout

Hydrograph type	= Reservoir	Peak discharge	= 0.106 cfs
Storm frequency	= 3 yrs	Time to peak	= 2.07 hrs
Time interval	= 2 min	Hyd. volume	= 3,067 cuft
Inflow hyd. No.	= 25 - 1.2 to MRC Bed 1	Max. Elevation	= 537.65 ft
Reservoir name	= MRC BED 1	Max. Storage	= 4,295 cuft

Storage Indication method used. Wet pond routing start elevation = 537.00 ft.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Monday, 03 / 4 / 2024

Pond No. 1 - MRC BED 1

Pond Data

UG Chambers -Invert elev. = 537.00 ft, Rise x Span = 4.00 x 48.00 ft, Barrel Len = 83.00 ft, No. Barrels = 1, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 536.00 ft, Width = 50.00 ft, Height = 5.00 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	536.00	n/a	0	0
0.50	536.50	n/a	830	830
1.00	537.00	n/a	830	1,660
1.50	537.50	n/a	2,026	3,686
2.00	538.00	n/a	2,026	5,712
2.50	538.50	n/a	2,026	7,737
3.00	539.00	n/a	2,026	9,763
3.50	539.50	n/a	2,026	11,788
4.00	540.00	n/a	2,026	13,814
4.50	540.50	n/a	2,026	15,840
5.00	541.00	n/a	2,026	17,865

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	1.75	0.00	0.00
Span (in)	= 18.00	1.75	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 537.00	537.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 5.00	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)	= 12.00	4.00	0.25	0.00
Crest El. (ft)	= 543.00	540.24	537.50	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	Rect	---
Multi-Stage	= Yes	Yes	Yes	No

Exfil.(in/hr) = 0.000 (by Contour)
TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	536.00	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.05	83	536.05	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.10	166	536.10	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.15	249	536.15	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.20	332	536.20	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.25	415	536.25	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.30	498	536.30	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.35	581	536.35	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.40	664	536.40	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.45	747	536.45	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.50	830	536.50	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.55	913	536.55	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.60	996	536.60	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.65	1,079	536.65	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.70	1,162	536.70	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.75	1,245	536.75	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.80	1,328	536.80	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.85	1,411	536.85	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.90	1,494	536.90	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.95	1,577	536.95	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
1.00	1,660	537.00	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
1.05	1,863	537.05	0.00 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.004
1.10	2,065	537.10	0.01 ic	0.01 ic	---	---	0.00	0.00	0.00	---	---	---	0.013
1.15	2,268	537.15	0.02 ic	0.02 ic	---	---	0.00	0.00	0.00	---	---	---	0.022
1.20	2,471	537.20	0.03 ic	0.03 ic	---	---	0.00	0.00	0.00	---	---	---	0.029
1.25	2,673	537.25	0.04 ic	0.03 ic	---	---	0.00	0.00	0.00	---	---	---	0.033
1.30	2,876	537.30	0.04 ic	0.04 ic	---	---	0.00	0.00	0.00	---	---	---	0.038
1.35	3,078	537.35	0.04 ic	0.04 ic	---	---	0.00	0.00	0.00	---	---	---	0.041
1.40	3,281	537.40	0.05 ic	0.04 ic	---	---	0.00	0.00	0.00	---	---	---	0.045
1.45	3,483	537.45	0.05 ic	0.05 ic	---	---	0.00	0.00	0.00	---	---	---	0.048
1.50	3,686	537.50	0.05 ic	0.05 ic	---	---	0.00	0.00	0.00	---	---	---	0.051
1.55	3,888	537.55	0.06 ic	0.05 ic	---	---	0.00	0.00	0.01	---	---	---	0.063

Continues on next page...

MRC BED 1

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
1.60	4,091	537.60	0.08 ic	0.06 ic	---	---	0.00	0.00	0.03	---	---	---	0.082
1.65	4,294	537.65	0.11 ic	0.06 ic	---	---	0.00	0.00	0.05	---	---	---	0.106
1.70	4,496	537.70	0.14 ic	0.06 ic	---	---	0.00	0.00	0.07	---	---	---	0.134
1.75	4,699	537.75	0.17 ic	0.06 ic	---	---	0.00	0.00	0.10	---	---	---	0.165
1.80	4,901	537.80	0.20 ic	0.06 ic	---	---	0.00	0.00	0.14	---	---	---	0.200
1.85	5,104	537.85	0.24 ic	0.06 ic	---	---	0.00	0.00	0.17	---	---	---	0.237
1.90	5,306	537.90	0.29 ic	0.07 ic	---	---	0.00	0.00	0.21	---	---	---	0.276
1.95	5,509	537.95	0.33 ic	0.07 ic	---	---	0.00	0.00	0.25	---	---	---	0.319
2.00	5,712	538.00	0.36 ic	0.07 ic	---	---	0.00	0.00	0.29	---	---	---	0.363
2.05	5,914	538.05	0.41 ic	0.07 ic	---	---	0.00	0.00	0.34	---	---	---	0.410
2.10	6,117	538.10	0.46 ic	0.07 ic	---	---	0.00	0.00	0.39	---	---	---	0.459
2.15	6,319	538.15	0.52 ic	0.07 ic	---	---	0.00	0.00	0.44	---	---	---	0.510
2.20	6,522	538.20	0.58 ic	0.08 ic	---	---	0.00	0.00	0.49	---	---	---	0.563
2.25	6,724	538.25	0.62 ic	0.08 ic	---	---	0.00	0.00	0.54	---	---	---	0.617
2.30	6,927	538.30	0.69 ic	0.08 ic	---	---	0.00	0.00	0.60	---	---	---	0.674
2.35	7,129	538.35	0.73 ic	0.08 ic	---	---	0.00	0.00	0.65	---	---	---	0.732
2.40	7,332	538.40	0.80 ic	0.08 ic	---	---	0.00	0.00	0.71	---	---	---	0.792
2.45	7,535	538.45	0.88 ic	0.08 ic	---	---	0.00	0.00	0.77	---	---	---	0.853
2.50	7,737	538.50	0.93 ic	0.08 ic	---	---	0.00	0.00	0.83	---	---	---	0.916
2.55	7,940	538.55	0.98 ic	0.08 ic	---	---	0.00	0.00	0.90	---	---	---	0.980
2.60	8,142	538.60	1.06 ic	0.09 ic	---	---	0.00	0.00	0.96	---	---	---	1.047
2.65	8,345	538.65	1.11 ic	0.09 ic	---	---	0.00	0.00	1.03	---	---	---	1.114
2.70	8,547	538.70	1.21 ic	0.09 ic	---	---	0.00	0.00	1.09	---	---	---	1.183
2.75	8,750	538.75	1.26 ic	0.09 ic	---	---	0.00	0.00	1.16	---	---	---	1.253
2.80	8,953	538.80	1.32 ic	0.09 ic	---	---	0.00	0.00	1.23 s	---	---	---	1.324
2.85	9,155	538.85	1.42 ic	0.09 ic	---	---	0.00	0.00	1.30 s	---	---	---	1.396
2.90	9,358	538.90	1.48 ic	0.09 ic	---	---	0.00	0.00	1.38 s	---	---	---	1.470
2.95	9,560	538.95	1.54 ic	0.09 ic	---	---	0.00	0.00	1.45 s	---	---	---	1.544
3.00	9,763	539.00	1.65 ic	0.10 ic	---	---	0.00	0.00	1.52 s	---	---	---	1.619
3.05	9,965	539.05	1.71 ic	0.10 ic	---	---	0.00	0.00	1.60 s	---	---	---	1.696
3.10	10,168	539.10	1.77 ic	0.10 ic	---	---	0.00	0.00	1.67 s	---	---	---	1.774
3.15	10,370	539.15	1.85 ic	0.10 ic	---	---	0.00	0.00	1.75 s	---	---	---	1.851
3.20	10,573	539.20	1.97 ic	0.10 ic	---	---	0.00	0.00	1.83 s	---	---	---	1.930
3.25	10,776	539.25	2.03 ic	0.10 ic	---	---	0.00	0.00	1.91 s	---	---	---	2.011
3.30	10,978	539.30	2.10 ic	0.10 ic	---	---	0.00	0.00	1.99 s	---	---	---	2.094
3.35	11,181	539.35	2.18 ic	0.10 ic	---	---	0.00	0.00	2.07 s	---	---	---	2.175
3.40	11,383	539.40	2.30 ic	0.11 ic	---	---	0.00	0.00	2.15 s	---	---	---	2.258
3.45	11,586	539.45	2.37 ic	0.11 ic	---	---	0.00	0.00	2.24 s	---	---	---	2.343
3.50	11,788	539.50	2.44 ic	0.11 ic	---	---	0.00	0.00	2.32 s	---	---	---	2.430
3.55	11,991	539.55	2.52 ic	0.11 ic	---	---	0.00	0.00	2.41 s	---	---	---	2.517
3.60	12,193	539.60	2.60 ic	0.11 ic	---	---	0.00	0.00	2.49 s	---	---	---	2.603
3.65	12,396	539.65	2.73 ic	0.11 ic	---	---	0.00	0.00	2.58 s	---	---	---	2.692
3.70	12,599	539.70	2.80 ic	0.11 ic	---	---	0.00	0.00	2.67 s	---	---	---	2.782
3.75	12,801	539.75	2.88 ic	0.11 ic	---	---	0.00	0.00	2.76 s	---	---	---	2.873
3.80	13,004	539.80	2.96 ic	0.11 ic	---	---	0.00	0.00	2.85 s	---	---	---	2.963
3.85	13,206	539.85	3.11 ic	0.11 ic	---	---	0.00	0.00	2.94 s	---	---	---	3.054
3.90	13,409	539.90	3.18 ic	0.12 ic	---	---	0.00	0.00	3.03 s	---	---	---	3.148
3.95	13,611	539.95	3.26 ic	0.12 ic	---	---	0.00	0.00	3.13 s	---	---	---	3.243
4.00	13,814	540.00	3.34 ic	0.12 ic	---	---	0.00	0.00	3.22 s	---	---	---	3.339
4.05	14,017	540.05	3.43 ic	0.12 ic	---	---	0.00	0.00	3.31 s	---	---	---	3.433
4.10	14,219	540.10	3.57 ic	0.12 ic	---	---	0.00	0.00	3.41 s	---	---	---	3.530
4.15	14,422	540.15	3.64 ic	0.12 ic	---	---	0.00	0.00	3.51 s	---	---	---	3.629
4.20	14,624	540.20	3.73 ic	0.12 ic	---	---	0.00	0.00	3.61 s	---	---	---	3.727
4.25	14,827	540.25	3.88 ic	0.12 ic	---	---	0.00	0.01	3.70 s	---	---	---	3.837
4.30	15,029	540.30	4.11 ic	0.12 ic	---	---	0.00	0.20	3.79 s	---	---	---	4.113
4.35	15,232	540.35	4.50 ic	0.12 ic	---	---	0.00	0.49	3.88 s	---	---	---	4.488
4.40	15,434	540.40	4.94 ic	0.12 ic	---	---	0.00	0.85	3.96 s	---	---	---	4.935
4.45	15,637	540.45	5.44 ic	0.12 ic	---	---	0.00	1.28	4.04 s	---	---	---	5.441
4.50	15,840	540.50	6.00 ic	0.12 ic	---	---	0.00	1.77	4.11 s	---	---	---	5.998
4.55	16,042	540.55	6.61 ic	0.12 ic	---	---	0.00	2.30	4.17 s	---	---	---	6.593
4.60	16,245	540.60	7.22 ic	0.12 ic	---	---	0.00	2.88	4.22 s	---	---	---	7.219
4.65	16,447	540.65	7.87 ic	0.11 ic	---	---	0.00	3.50	4.26 s	---	---	---	7.867
4.70	16,650	540.70	8.54 ic	0.11 ic	---	---	0.00	4.16	4.27 s	---	---	---	8.542
4.75	16,852	540.75	9.23 ic	0.11 ic	---	---	0.00	4.85	4.27 s	---	---	---	9.231
4.80	17,055	540.80	9.93 ic	0.10 ic	---	---	0.00	5.58	4.25 s	---	---	---	9.934
4.85	17,257	540.85	10.64 ic	0.10 ic	---	---	0.00	6.34	4.20 s	---	---	---	10.64
4.90	17,460	540.90	11.35 ic	0.09 ic	---	---	0.00	7.14	4.11 s	---	---	---	11.35
4.95	17,663	540.95	12.05 ic	0.09 ic	---	---	0.00	7.97	3.99 s	---	---	---	12.05
5.00	17,865	541.00	12.74 ic	0.08 ic	---	---	0.00	8.83	3.83 s	---	---	---	12.74

...End

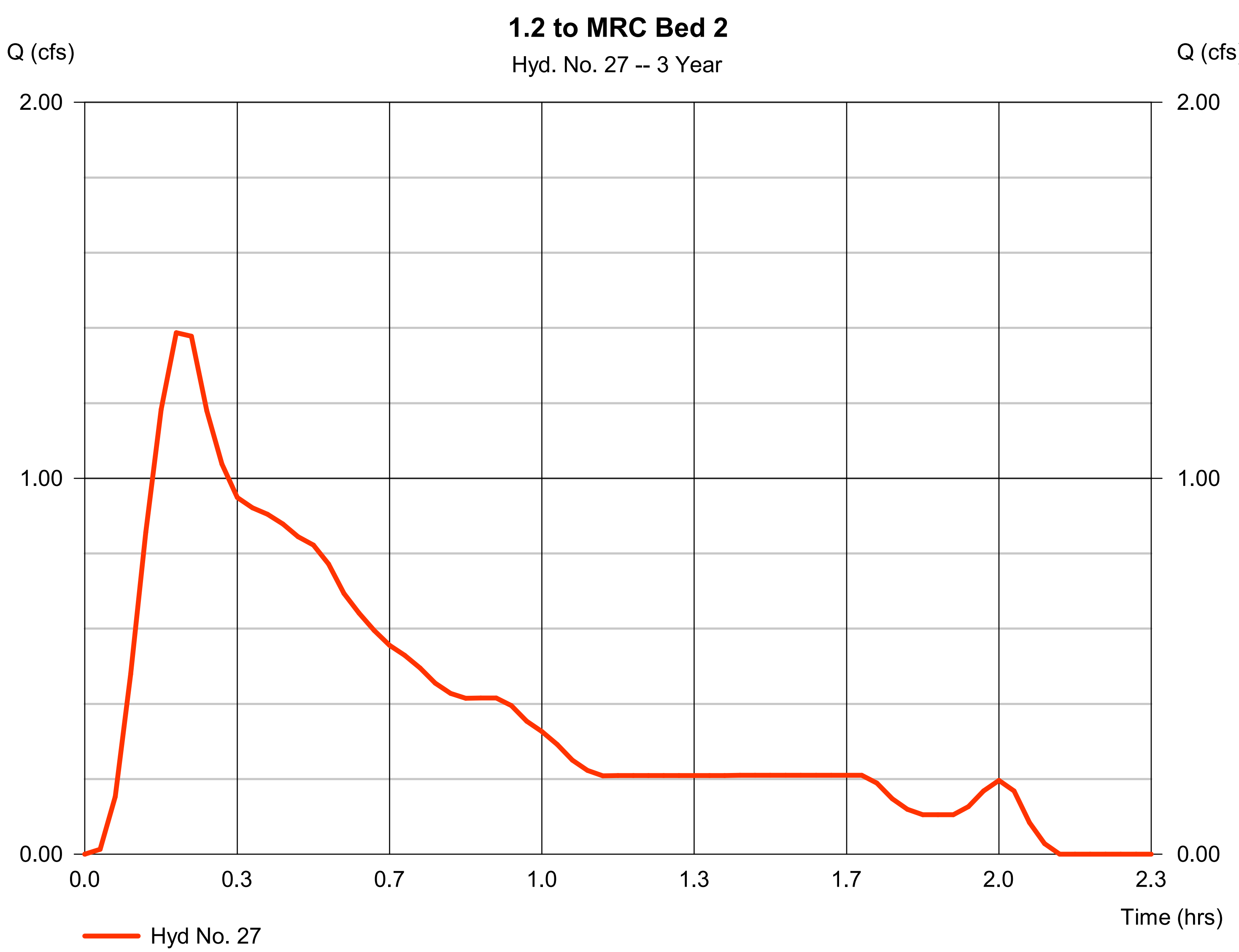
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Monday, 03 / 4 / 2024

Hyd. No. 27

1.2 to MRC Bed 2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.387 cfs
Storm frequency	= 3 yrs	Time to peak	= 0.20 hrs
Time interval	= 2 min	Hyd. volume	= 3,187 cuft
Drainage area	= 0.950 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.20 in	Distribution	= Huff-1st
Storm duration	= 2.00 hrs	Shape factor	= 484



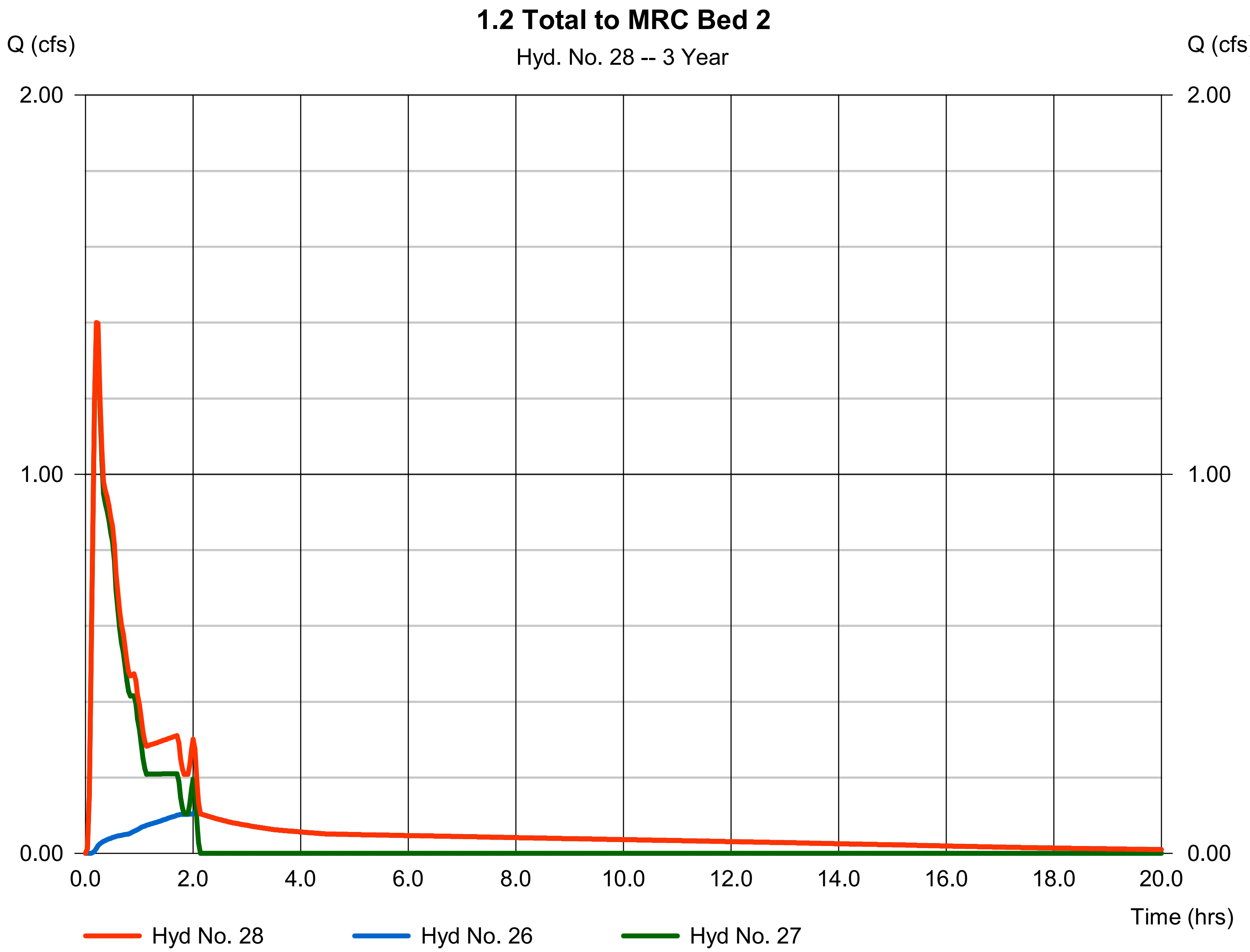
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Monday, 03 / 4 / 2024

Hyd. No. 28

1.2 Total to MRC Bed 2

Hydrograph type	= Combine	Peak discharge	= 1.400 cfs
Storm frequency	= 3 yrs	Time to peak	= 0.20 hrs
Time interval	= 2 min	Hyd. volume	= 6,253 cuft
Inflow hyds.	= 26, 27	Contrib. drain. area	= 0.950 ac



Hydrograph Report

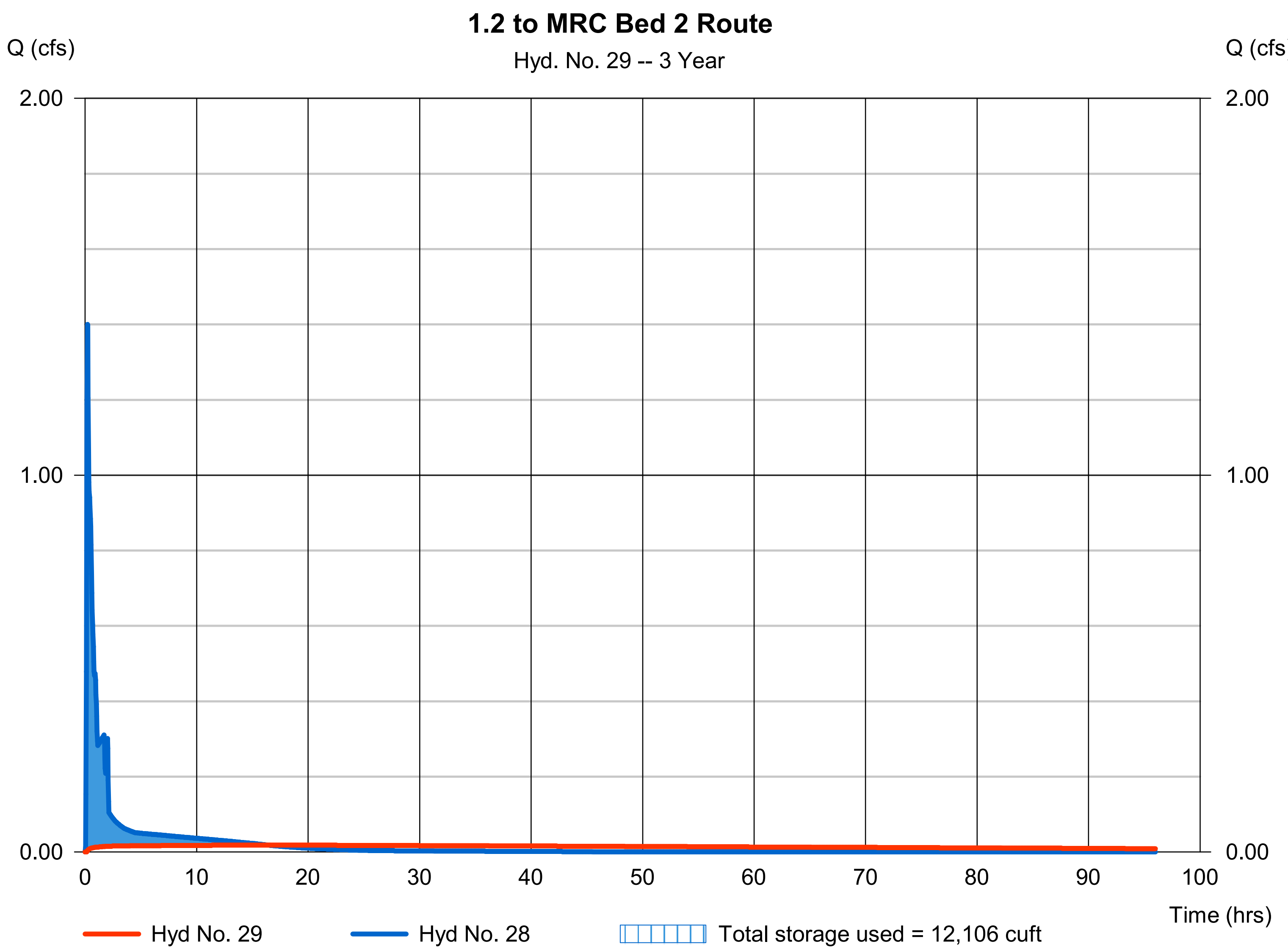
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 | Monday, 03 / 4 / 2024

Hyd. No. 29

1.2 to MRC Bed 2 Route

Hydrograph type	= Reservoir	Peak discharge	= 0.018 cfs
Storm frequency	= 3 yrs	Time to peak	= 16.50 hrs
Time interval	= 2 min	Hyd. volume	= 4,918 cuft
Inflow hyd. No.	= 28 - 1.2 Total to MRC Bed 2	Max. Elevation	= 535.66 ft
Reservoir name	= MRC BED 2	Max. Storage	= 12,106 cuft

Storage Indication method used. Wet pond routing start elevation = 535.00 ft.



Pond No. 2 - MRC BED 2

Pond Data

UG Chambers -Invert elev. = 534.00 ft, Rise x Span = 4.00 x 54.00 ft, Barrel Len = 133.00 ft, No. Barrels = 1, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 534.00 ft, Width = 56.00 ft, Height = 5.00 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	534.00	n/a	0	0
0.50	534.50	n/a	3,645	3,645
1.00	535.00	n/a	3,645	7,290
1.50	535.50	n/a	3,645	10,935
2.00	536.00	n/a	3,645	14,580
2.50	536.50	n/a	3,645	18,225
3.00	537.00	n/a	3,645	21,870
3.50	537.50	n/a	3,645	25,515
4.00	538.00	n/a	3,645	29,159
4.50	538.50	n/a	1,490	30,649
5.00	539.00	n/a	1,490	32,139

Culvert / Orifice Structures

		[A]	[B]	[C]	[PrfRsr]
Rise (in)	=	24.00	0.94	3.00	0.00
Span (in)	=	24.00	0.94	3.00	0.00
No. Barrels	=	1	1	1	0
Invert El. (ft)	=	535.00	535.00	535.90	0.00
Length (ft)	=	63.00	0.00	0.00	0.00
Slope (%)	=	5.00	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	Yes	No

Weir Structures

		[A]	[B]	[C]	[D]
Crest Len (ft)	=	12.00	4.00	Inactive	0.00
Crest El. (ft)	=	545.00	538.40	536.60	0.00
Weir Coeff.	=	3.33	3.33	3.33	3.33
Weir Type	=	1	Rect	Rect	---
Multi-Stage	=	Yes	Yes	Yes	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

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

Stage / 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	534.00	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.05	364	534.05	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.10	729	534.10	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.15	1,093	534.15	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.20	1,458	534.20	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.25	1,822	534.25	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.30	2,187	534.30	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.35	2,551	534.35	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.40	2,916	534.40	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.45	3,280	534.45	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.50	3,645	534.50	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.55	4,009	534.55	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.60	4,374	534.60	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.65	4,738	534.65	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.70	5,103	534.70	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.75	5,467	534.75	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.80	5,832	534.80	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.85	6,196	534.85	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.90	6,561	534.90	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
0.95	6,925	534.95	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
1.00	7,290	535.00	0.00	0.00	0.00	---	0.00	0.00	0.00	---	---	---	0.000
1.05	7,654	535.05	0.00 ic	0.00 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.002
1.10	8,019	535.10	0.01 ic	0.01 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.006
1.15	8,383	535.15	0.01 ic	0.01 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.008
1.20	8,748	535.20	0.01 ic	0.01 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.009
1.25	9,112	535.25	0.01 ic	0.01 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.011
1.30	9,477	535.30	0.01 ic	0.01 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.012
1.35	9,841	535.35	0.01 ic	0.01 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.013
1.40	10,206	535.40	0.01 ic	0.01 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.014
1.45	10,570	535.45	0.01 ic	0.01 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.015
1.50	10,935	535.50	0.02 ic	0.02 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.015
1.55	11,299	535.55	0.02 ic	0.02 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.016

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MRC BED 2

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
1.60	11,664	535.60	0.02 ic	0.02 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.017
1.65	12,028	535.65	0.02 ic	0.02 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.018
1.70	12,393	535.70	0.02 ic	0.02 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.019
1.75	12,757	535.75	0.02 ic	0.02 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.019
1.80	13,122	535.80	0.02 ic	0.02 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.020
1.85	13,486	535.85	0.02 ic	0.02 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.021
1.90	13,851	535.90	0.02 ic	0.02 ic	0.00	---	0.00	0.00	0.00	---	---	---	0.021
1.95	14,215	535.95	0.03 ic	0.02 ic	0.01 ic	---	0.00	0.00	0.00	---	---	---	0.027
2.00	14,580	536.00	0.04 ic	0.02 ic	0.02 ic	---	0.00	0.00	0.00	---	---	---	0.042
2.05	14,944	536.05	0.06 ic	0.02 ic	0.04 ic	---	0.00	0.00	0.00	---	---	---	0.063
2.10	15,309	536.10	0.09 ic	0.02 ic	0.06 ic	---	0.00	0.00	0.00	---	---	---	0.087
2.15	15,673	536.15	0.11 ic	0.02 ic	0.08 ic	---	0.00	0.00	0.00	---	---	---	0.107
2.20	16,038	536.20	0.13 ic	0.02 ic	0.10 ic	---	0.00	0.00	0.00	---	---	---	0.123
2.25	16,402	536.25	0.15 ic	0.02 ic	0.11 ic	---	0.00	0.00	0.00	---	---	---	0.136
2.30	16,767	536.30	0.15 ic	0.02 ic	0.12 ic	---	0.00	0.00	0.00	---	---	---	0.149
2.35	17,131	536.35	0.16 ic	0.03 ic	0.13 ic	---	0.00	0.00	0.00	---	---	---	0.160
2.40	17,496	536.40	0.18 ic	0.03 ic	0.14 ic	---	0.00	0.00	0.00	---	---	---	0.170
2.45	17,860	536.45	0.18 ic	0.03 ic	0.15 ic	---	0.00	0.00	0.00	---	---	---	0.180
2.50	18,225	536.50	0.20 ic	0.03 ic	0.16 ic	---	0.00	0.00	0.00	---	---	---	0.189
2.55	18,589	536.55	0.20 ic	0.03 ic	0.17 ic	---	0.00	0.00	0.00	---	---	---	0.198
2.60	18,954	536.60	0.22 ic	0.03 ic	0.18 ic	---	0.00	0.00	0.00	---	---	---	0.207
2.65	19,318	536.65	0.22 ic	0.03 ic	0.19 ic	---	0.00	0.00	0.00	---	---	---	0.215
2.70	19,683	536.70	0.22 ic	0.03 ic	0.19 ic	---	0.00	0.00	0.00	---	---	---	0.223
2.75	20,047	536.75	0.24 ic	0.03 ic	0.20 ic	---	0.00	0.00	0.00	---	---	---	0.230
2.80	20,412	536.80	0.24 ic	0.03 ic	0.21 ic	---	0.00	0.00	0.00	---	---	---	0.237
2.85	20,776	536.85	0.24 ic	0.03 ic	0.21 ic	---	0.00	0.00	0.00	---	---	---	0.244
2.90	21,141	536.90	0.27 ic	0.03 ic	0.22 ic	---	0.00	0.00	0.00	---	---	---	0.251
2.95	21,505	536.95	0.27 ic	0.03 ic	0.23 ic	---	0.00	0.00	0.00	---	---	---	0.258
3.00	21,870	537.00	0.27 ic	0.03 ic	0.23 ic	---	0.00	0.00	0.00	---	---	---	0.264
3.05	22,234	537.05	0.27 ic	0.03 ic	0.24 ic	---	0.00	0.00	0.00	---	---	---	0.271
3.10	22,599	537.10	0.29 ic	0.03 ic	0.25 ic	---	0.00	0.00	0.00	---	---	---	0.277
3.15	22,963	537.15	0.29 ic	0.03 ic	0.25 ic	---	0.00	0.00	0.00	---	---	---	0.283
3.20	23,328	537.20	0.29 ic	0.03 ic	0.26 ic	---	0.00	0.00	0.00	---	---	---	0.289
3.25	23,692	537.25	0.29 ic	0.03 ic	0.26 ic	---	0.00	0.00	0.00	---	---	---	0.294
3.30	24,057	537.30	0.32 ic	0.03 ic	0.27 ic	---	0.00	0.00	0.00	---	---	---	0.300
3.35	24,421	537.35	0.32 ic	0.03 ic	0.27 ic	---	0.00	0.00	0.00	---	---	---	0.306
3.40	24,786	537.40	0.32 ic	0.03 ic	0.28 ic	---	0.00	0.00	0.00	---	---	---	0.311
3.45	25,150	537.45	0.32 ic	0.03 ic	0.28 ic	---	0.00	0.00	0.00	---	---	---	0.317
3.50	25,515	537.50	0.32 ic	0.03 ic	0.29 ic	---	0.00	0.00	0.00	---	---	---	0.322
3.55	25,879	537.55	0.35 ic	0.04 ic	0.29 ic	---	0.00	0.00	0.00	---	---	---	0.327
3.60	26,243	537.60	0.35 ic	0.04 ic	0.30 ic	---	0.00	0.00	0.00	---	---	---	0.332
3.65	26,608	537.65	0.35 ic	0.04 ic	0.30 ic	---	0.00	0.00	0.00	---	---	---	0.337
3.70	26,972	537.70	0.35 ic	0.04 ic	0.31 ic	---	0.00	0.00	0.00	---	---	---	0.342
3.75	27,337	537.75	0.35 ic	0.04 ic	0.31 ic	---	0.00	0.00	0.00	---	---	---	0.347
3.80	27,701	537.80	0.35 ic	0.04 ic	0.31 ic	---	0.00	0.00	0.00	---	---	---	0.352
3.85	28,066	537.85	0.38 ic	0.04 ic	0.32 ic	---	0.00	0.00	0.00	---	---	---	0.357
3.90	28,430	537.90	0.38 ic	0.04 ic	0.32 ic	---	0.00	0.00	0.00	---	---	---	0.361
3.95	28,795	537.95	0.38 ic	0.04 ic	0.33 ic	---	0.00	0.00	0.00	---	---	---	0.366
4.00	29,159	538.00	0.38 ic	0.04 ic	0.33 ic	---	0.00	0.00	0.00	---	---	---	0.370
4.05	29,308	538.05	0.38 ic	0.04 ic	0.34 ic	---	0.00	0.00	0.00	---	---	---	0.375
4.10	29,457	538.10	0.38 ic	0.04 ic	0.34 ic	---	0.00	0.00	0.00	---	---	---	0.379
4.15	29,606	538.15	0.38 ic	0.04 ic	0.34 ic	---	0.00	0.00	0.00	---	---	---	0.384
4.20	29,755	538.20	0.41 ic	0.04 ic	0.35 ic	---	0.00	0.00	0.00	---	---	---	0.388
4.25	29,904	538.25	0.41 ic	0.04 ic	0.35 ic	---	0.00	0.00	0.00	---	---	---	0.392
4.30	30,053	538.30	0.41 ic	0.04 ic	0.36 ic	---	0.00	0.00	0.00	---	---	---	0.397
4.35	30,202	538.35	0.41 ic	0.04 ic	0.36 ic	---	0.00	0.00	0.00	---	---	---	0.401
4.40	30,351	538.40	0.41 ic	0.04 ic	0.36 ic	---	0.00	0.00	0.00	---	---	---	0.405
4.45	30,500	538.45	0.56 ic	0.04 ic	0.37 ic	---	0.00	0.15	0.00	---	---	---	0.557
4.50	30,649	538.50	0.84 ic	0.04 ic	0.37 ic	---	0.00	0.42	0.00	---	---	---	0.834
4.55	30,798	538.55	1.20 ic	0.04 ic	0.38 ic	---	0.00	0.77	0.00	---	---	---	1.190
4.60	30,947	538.60	1.64 ic	0.04 ic	0.38 ic	---	0.00	1.19	0.00	---	---	---	1.611
4.65	31,096	538.65	2.09 ic	0.04 ic	0.38 ic	---	0.00	1.66	0.00	---	---	---	2.088
4.70	31,245	538.70	2.62 ic	0.04 ic	0.39 ic	---	0.00	2.19	0.00	---	---	---	2.615
4.75	31,394	538.75	3.27 ic	0.04 ic	0.39 ic	---	0.00	2.76	0.00	---	---	---	3.186
4.80	31,543	538.80	3.80 ic	0.04 ic	0.39 ic	---	0.00	3.37	0.00	---	---	---	3.802
4.85	31,692	538.85	4.46 ic	0.04 ic	0.40 ic	---	0.00	4.02	0.00	---	---	---	4.456
4.90	31,841	538.90	5.16 ic	0.04 ic	0.40 ic	---	0.00	4.71	0.00	---	---	---	5.148
4.95	31,990	538.95	5.91 ic	0.04 ic	0.40 ic	---	0.00	5.43	0.00	---	---	---	5.873
5.00	32,139	539.00	6.69 ic	0.04 ic	0.40 ic	---	0.00	6.19	0.00	---	---	---	6.630

...End

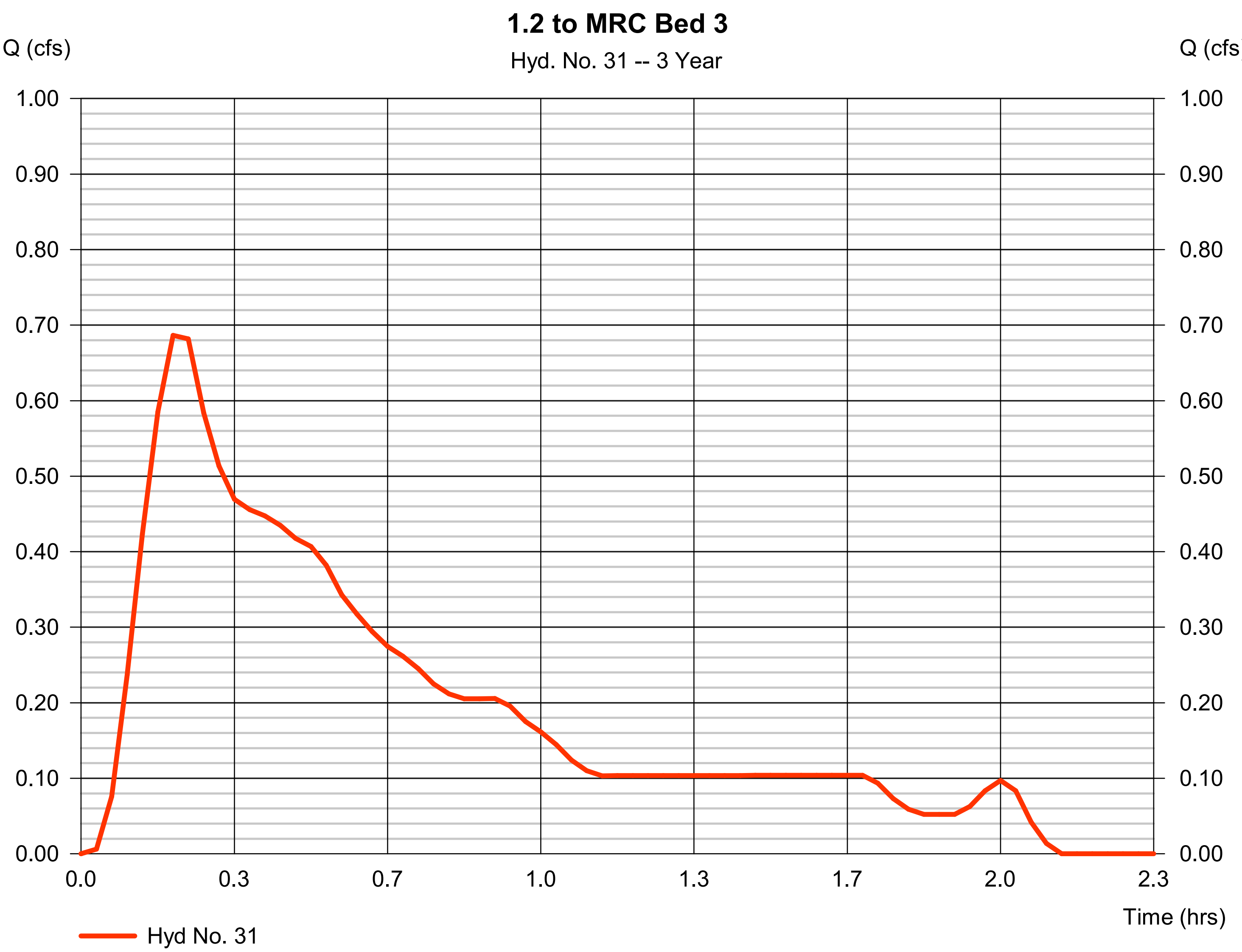
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Monday, 03 / 4 / 2024

Hyd. No. 31

1.2 to MRC Bed 3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.686 cfs
Storm frequency	= 3 yrs	Time to peak	= 0.20 hrs
Time interval	= 2 min	Hyd. volume	= 1,577 cuft
Drainage area	= 0.470 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.20 in	Distribution	= Huff-1st
Storm duration	= 2.00 hrs	Shape factor	= 484



Hydrograph Report

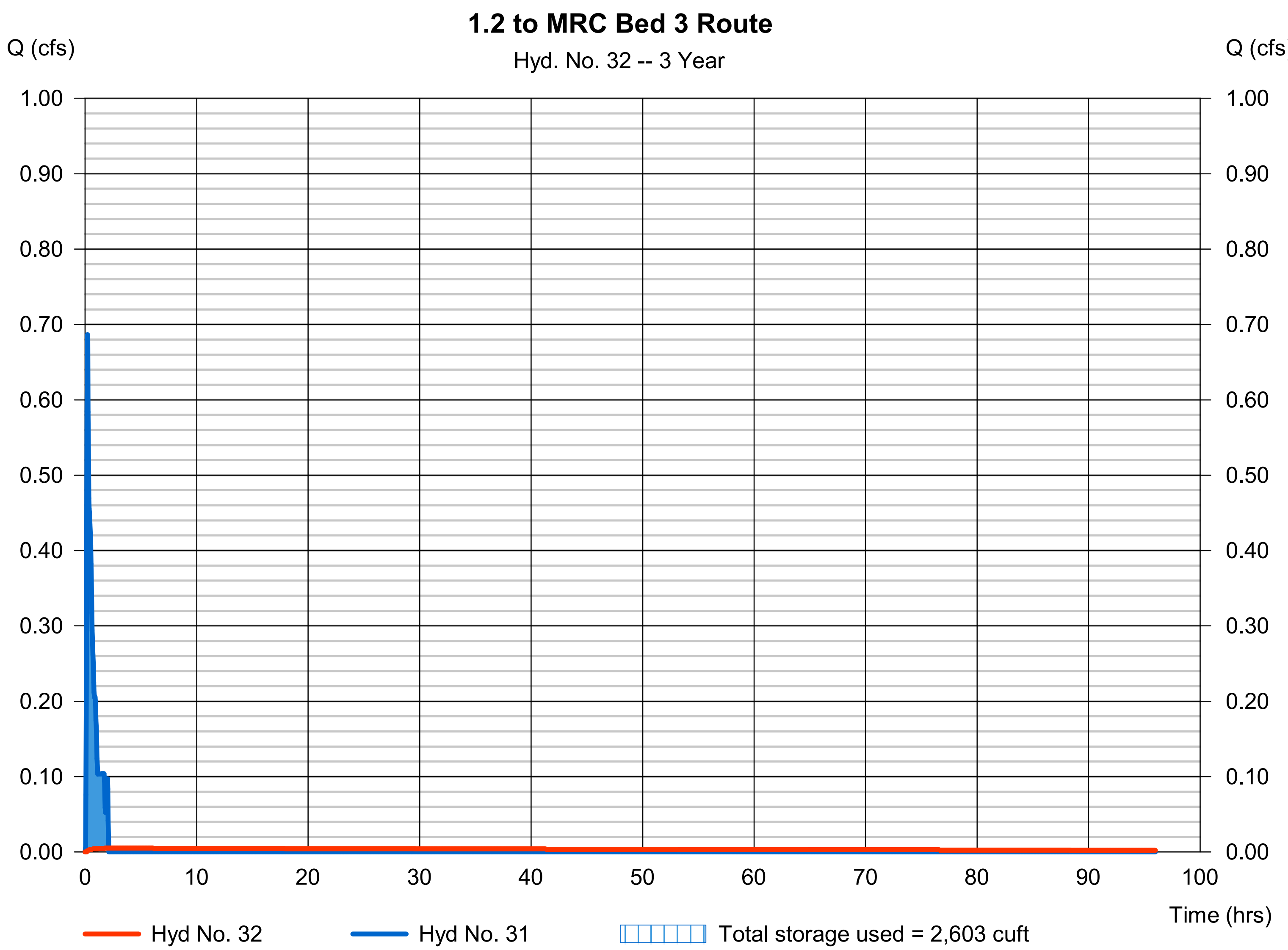
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Monday, 03 / 4 / 2024

Hyd. No. 32

1.2 to MRC Bed 3 Route

Hydrograph type	= Reservoir	Peak discharge	= 0.005 cfs
Storm frequency	= 3 yrs	Time to peak	= 2.13 hrs
Time interval	= 2 min	Hyd. volume	= 1,247 cuft
Inflow hyd. No.	= 31 - 1.2 to MRC Bed 3	Max. Elevation	= 505.61 ft
Reservoir name	= MRC BED 3	Max. Storage	= 2,603 cuft

Storage Indication method used. Wet pond routing start elevation = 505.00 ft.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Monday, 03 / 4 / 2024

Pond No. 3 - MRC BED 3

Pond Data

UG Chambers -Invert elev. = 505.00 ft, Rise x Span = 4.00 x 28.00 ft, Barrel Len = 88.00 ft, No. Barrels = 1, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 504.00 ft, Width = 30.00 ft, Height = 5.00 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	504.00	n/a	0	0
0.50	504.50	n/a	528	528
1.00	505.00	n/a	528	1,056
1.50	505.50	n/a	1,267	2,324
2.00	506.00	n/a	1,267	3,591
2.50	506.50	n/a	1,267	4,859
3.00	507.00	n/a	1,267	6,126
3.50	507.50	n/a	1,267	7,393
4.00	508.00	n/a	1,267	8,661
4.50	508.50	n/a	1,267	9,928
5.00	509.00	n/a	1,267	11,196

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 30.00	0.50	0.00	0.00
Span (in)	= 30.00	0.50	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 504.00	505.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	3.00	0.25	0.00
Crest El. (ft)	= 510.50	508.30	505.78	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	Rect	---
Multi-Stage	= Yes	Yes	Yes	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

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

Stage / 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	504.00	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.05	53	504.05	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.10	106	504.10	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.15	158	504.15	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.20	211	504.20	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.25	264	504.25	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.30	317	504.30	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.35	370	504.35	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.40	422	504.40	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.45	475	504.45	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.50	528	504.50	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.55	581	504.55	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.60	634	504.60	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.65	687	504.65	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.70	739	504.70	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.75	792	504.75	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.80	845	504.80	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.85	898	504.85	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.90	951	504.90	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
0.95	1,003	504.95	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
1.00	1,056	505.00	0.00	0.00	---	---	0.00	0.00	0.00	---	---	---	0.000
1.05	1,183	505.05	0.00 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.001
1.10	1,310	505.10	0.00 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.002
1.15	1,436	505.15	0.00 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.002
1.20	1,563	505.20	0.00 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.003
1.25	1,690	505.25	0.00 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.003
1.30	1,817	505.30	0.00 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.003
1.35	1,943	505.35	0.00 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.004
1.40	2,070	505.40	0.00 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.004
1.45	2,197	505.45	0.00 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.004
1.50	2,324	505.50	0.00 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.005
1.55	2,450	505.55	0.00 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.005

Continues on next page...

MRC BED 3

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
1.60	2,577	505.60	0.01 ic	0.00 ic	---	---	0.00	0.00	0.00	---	---	---	0.005
1.65	2,704	505.65	0.01 ic	0.01 ic	---	---	0.00	0.00	0.00	---	---	---	0.005
1.70	2,831	505.70	0.01 ic	0.01 ic	---	---	0.00	0.00	0.00	---	---	---	0.005
1.75	2,957	505.75	0.01 ic	0.01 ic	---	---	0.00	0.00	0.00	---	---	---	0.006
1.80	3,084	505.80	0.01 ic	0.01 ic	---	---	0.00	0.00	0.00	---	---	---	0.008
1.85	3,211	505.85	0.02 ic	0.01 ic	---	---	0.00	0.00	0.02	---	---	---	0.021
1.90	3,338	505.90	0.04 ic	0.01 ic	---	---	0.00	0.00	0.03	---	---	---	0.041
1.95	3,464	505.95	0.07 ic	0.01 ic	---	---	0.00	0.00	0.06	---	---	---	0.065
2.00	3,591	506.00	0.10 ic	0.01 ic	---	---	0.00	0.00	0.09	---	---	---	0.092
2.05	3,718	506.05	0.13 ic	0.01 ic	---	---	0.00	0.00	0.12	---	---	---	0.123
2.10	3,845	506.10	0.16 ic	0.01 ic	---	---	0.00	0.00	0.15	---	---	---	0.158
2.15	3,971	506.15	0.21 ic	0.01 ic	---	---	0.00	0.00	0.19	---	---	---	0.194
2.20	4,098	506.20	0.23 ic	0.01 ic	---	---	0.00	0.00	0.23	---	---	---	0.234
2.25	4,225	506.25	0.29 ic	0.01 ic	---	---	0.00	0.00	0.27	---	---	---	0.275
2.30	4,352	506.30	0.32 ic	0.01 ic	---	---	0.00	0.00	0.31	---	---	---	0.320
2.35	4,478	506.35	0.39 ic	0.01 ic	---	---	0.00	0.00	0.36	---	---	---	0.366
2.40	4,605	506.40	0.43 ic	0.01 ic	---	---	0.00	0.00	0.41	---	---	---	0.414
2.45	4,732	506.45	0.47 ic	0.01 ic	---	---	0.00	0.00	0.46	---	---	---	0.464
2.50	4,859	506.50	0.52 ic	0.01 ic	---	---	0.00	0.00	0.51	---	---	---	0.517
2.55	4,985	506.55	0.61 ic	0.01 ic	---	---	0.00	0.00	0.56	---	---	---	0.571
2.60	5,112	506.60	0.66 ic	0.01 ic	---	---	0.00	0.00	0.62	---	---	---	0.626
2.65	5,239	506.65	0.72 ic	0.01 ic	---	---	0.00	0.00	0.68	---	---	---	0.684
2.70	5,366	506.70	0.77 ic	0.01 ic	---	---	0.00	0.00	0.73	---	---	---	0.743
2.75	5,492	506.75	0.84 ic	0.01 ic	---	---	0.00	0.00	0.80	---	---	---	0.804
2.80	5,619	506.80	0.90 ic	0.01 ic	---	---	0.00	0.00	0.86	---	---	---	0.866
2.85	5,746	506.85	0.97 ic	0.01 ic	---	---	0.00	0.00	0.92	---	---	---	0.930
2.90	5,873	506.90	1.04 ic	0.01 ic	---	---	0.00	0.00	0.99	---	---	---	0.996
2.95	5,999	506.95	1.12 ic	0.01 ic	---	---	0.00	0.00	1.05	---	---	---	1.063
3.00	6,126	507.00	1.13 ic	0.01 ic	---	---	0.00	0.00	1.12	---	---	---	1.131
3.05	6,253	507.05	1.20 ic	0.01 ic	---	---	0.00	0.00	1.19	---	---	---	1.201
3.10	6,380	507.10	1.28 ic	0.01 ic	---	---	0.00	0.00	1.26	---	---	---	1.272
3.15	6,506	507.15	1.37 ic	0.01 ic	---	---	0.00	0.00	1.33	---	---	---	1.345
3.20	6,633	507.20	1.46 ic	0.01 ic	---	---	0.00	0.00	1.41	---	---	---	1.418
3.25	6,760	507.25	1.55 ic	0.01 ic	---	---	0.00	0.00	1.48	---	---	---	1.493
3.30	6,886	507.30	1.57 ic	0.01 ic	---	---	0.00	0.00	1.56	---	---	---	1.570
3.35	7,013	507.35	1.65 ic	0.01 ic	---	---	0.00	0.00	1.64	---	---	---	1.648
3.40	7,140	507.40	1.76 ic	0.01 ic	---	---	0.00	0.00	1.72	---	---	---	1.727
3.45	7,267	507.45	1.86 ic	0.01 ic	---	---	0.00	0.00	1.80	---	---	---	1.807
3.50	7,393	507.50	1.89 ic	0.01 ic	---	---	0.00	0.00	1.88	---	---	---	1.888
3.55	7,520	507.55	1.97 ic	0.01 ic	---	---	0.00	0.00	1.96	---	---	---	1.971
3.60	7,647	507.60	2.09 ic	0.01 ic	---	---	0.00	0.00	2.04	---	---	---	2.055
3.65	7,774	507.65	2.21 ic	0.01 ic	---	---	0.00	0.00	2.13	---	---	---	2.139
3.70	7,900	507.70	2.23 ic	0.01 ic	---	---	0.00	0.00	2.21	---	---	---	2.226
3.75	8,027	507.75	2.33 ic	0.01 ic	---	---	0.00	0.00	2.30	---	---	---	2.313
3.80	8,154	507.80	2.46 ic	0.01 ic	---	---	0.00	0.00	2.39	---	---	---	2.401
3.85	8,281	507.85	2.49 ic	0.01 ic	---	---	0.00	0.00	2.48	---	---	---	2.490
3.90	8,407	507.90	2.59 ic	0.01 ic	---	---	0.00	0.00	2.57	---	---	---	2.581
3.95	8,534	507.95	2.73 ic	0.01 ic	---	---	0.00	0.00	2.66	---	---	---	2.672
4.00	8,661	508.00	2.77 ic	0.01 ic	---	---	0.00	0.00	2.75	---	---	---	2.765
4.05	8,788	508.05	2.87 ic	0.01 ic	---	---	0.00	0.00	2.85	---	---	---	2.859
4.10	8,914	508.10	3.02 ic	0.01 ic	---	---	0.00	0.00	2.94	---	---	---	2.953
4.15	9,041	508.15	3.05 ic	0.01 ic	---	---	0.00	0.00	3.04	---	---	---	3.049
4.20	9,168	508.20	3.17 ic	0.01 ic	---	---	0.00	0.00	3.13	---	---	---	3.146
4.25	9,295	508.25	3.32 ic	0.01 ic	---	---	0.00	0.00	3.23	---	---	---	3.243
4.30	9,421	508.30	3.34 ic	0.01 ic	---	---	0.00	0.00	3.33	---	---	---	3.342
4.35	9,548	508.35	3.64 ic	0.01 ic	---	---	0.00	0.11	3.43	---	---	---	3.553
4.40	9,675	508.40	3.98 ic	0.01 ic	---	---	0.00	0.32	3.53	---	---	---	3.858
4.45	9,802	508.45	4.34 ic	0.01 ic	---	---	0.00	0.58	3.63	---	---	---	4.224
4.50	9,928	508.50	4.71 ic	0.01 ic	---	---	0.00	0.89	3.73	---	---	---	4.640
4.55	10,055	508.55	5.10 ic	0.01 ic	---	---	0.00	1.25	3.84	---	---	---	5.099
4.60	10,182	508.60	5.71 ic	0.01 ic	---	---	0.00	1.64	3.94	---	---	---	5.596
4.65	10,309	508.65	6.14 ic	0.01 ic	---	---	0.00	2.07	4.05	---	---	---	6.129
4.70	10,435	508.70	6.82 ic	0.01 ic	---	---	0.00	2.53	4.15	---	---	---	6.694
4.75	10,562	508.75	7.29 ic	0.01 ic	---	---	0.00	3.01	4.26	---	---	---	7.288
4.80	10,689	508.80	8.00 ic	0.01 ic	---	---	0.00	3.53	4.37	---	---	---	7.913
4.85	10,816	508.85	8.56 ic	0.01 ic	---	---	0.00	4.07	4.48	---	---	---	8.564
4.90	10,942	508.90	9.27 ic	0.01 ic	---	---	0.00	4.64	4.59	---	---	---	9.242
4.95	11,069	508.95	10.06 ic	0.01 ic	---	---	0.00	5.23	4.70	---	---	---	9.945
5.00	11,196	509.00	10.86 ic	0.01 ic	---	---	0.00	5.85	4.81	---	---	---	10.67

...End

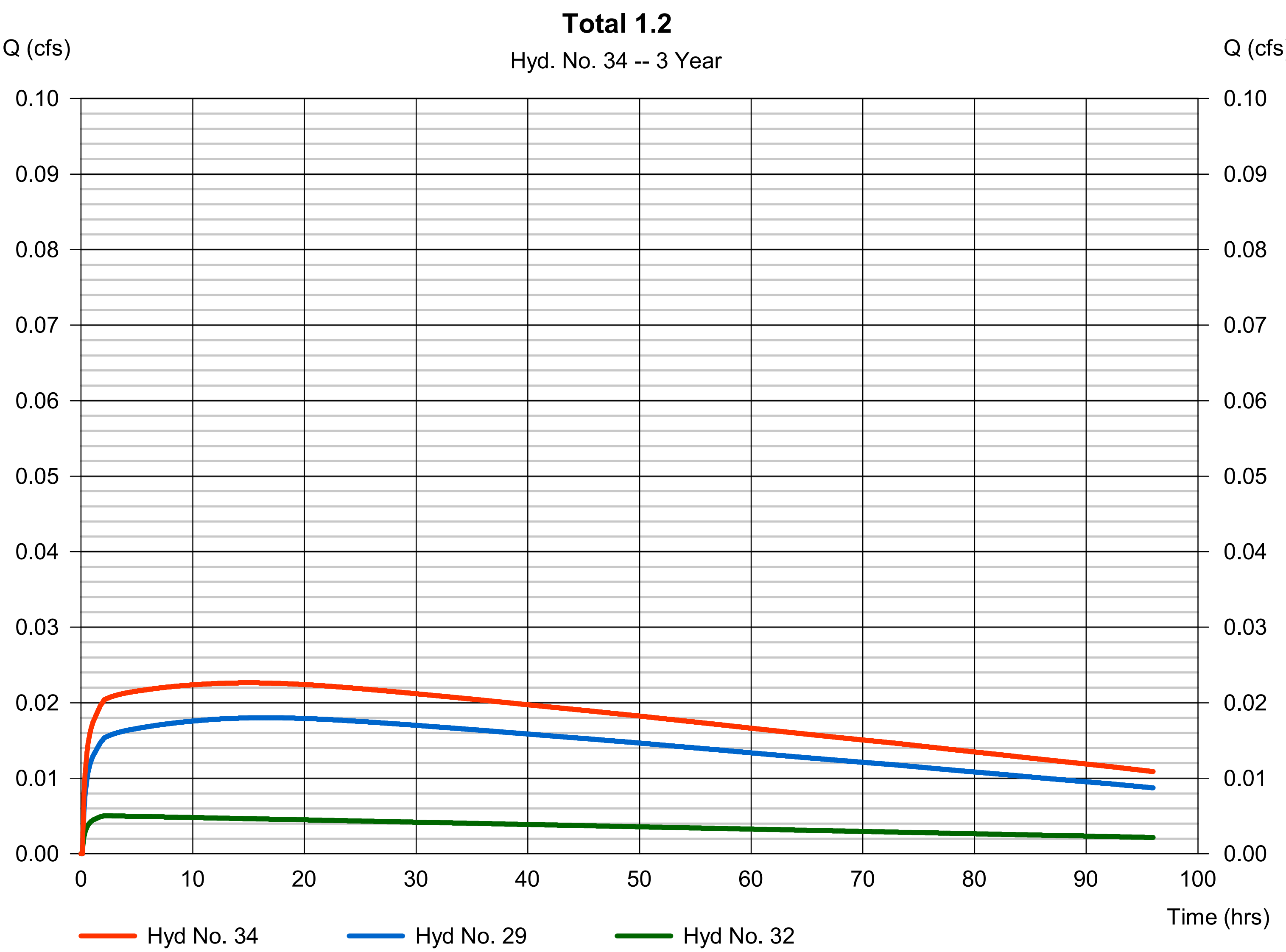
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Monday, 03 / 4 / 2024

Hyd. No. 34

Total 1.2

Hydrograph type	= Combine	Peak discharge	= 0.023 cfs
Storm frequency	= 3 yrs	Time to peak	= 15.07 hrs
Time interval	= 2 min	Hyd. volume	= 6,165 cuft
Inflow hyds.	= 29, 32	Contrib. drain. area	= 0.000 ac



Hydraflow Rainfall Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 — Monday, 03 / 4 / 2024

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	44.9138	10.2000	0.8092	--------
3	0.0000	0.0000	0.0000	--------
5	42.7303	10.1000	0.7524	--------
10	43.3692	10.1000	0.7278	--------
25	45.7490	10.1000	0.7048	--------
50	48.3169	10.2000	0.6929	--------
100	51.0070	10.3000	0.6833	--------

File name: Region 5 NOAA Atlas 14.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	4.97	3.95	3.30	2.85	2.52	2.26	2.06	1.89	1.75	1.63	1.53	1.44
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	5.54	4.47	3.78	3.30	2.94	2.66	2.43	2.25	2.09	1.96	1.85	1.75
10	6.01	4.88	4.15	3.64	3.25	2.95	2.71	2.51	2.34	2.20	2.08	1.97
25	6.75	5.52	4.72	4.15	3.73	3.39	3.12	2.90	2.71	2.55	2.41	2.29
50	7.33	6.02	5.17	4.56	4.10	3.74	3.45	3.20	3.00	2.83	2.67	2.54
100	7.91	6.52	5.61	4.96	4.47	4.08	3.77	3.51	3.29	3.10	2.93	2.79

Tc = time in minutes. Values may exceed 60.

Precip. file name: Y:\Calculations and Data Files\Hydraflow Data Files\LowerMerionTownship.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	2.80	3.20	0.00	4.20	5.00	5.80	6.50	8.40
SCS 6-Hr	0.00	1.80	0.00	0.00	2.60	0.00	0.00	4.00
Huff-1st	0.00	0.00	1.20	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	3.20	0.00	4.20	5.00	5.60	6.30	7.20
Custom	0.00	3.20	0.00	4.20	5.00	5.60	6.30	7.20

Hydraflow Table of Contents

APPENDIX H

NRCS SOILS REPORT

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Chester County, Pennsylvania

February 6, 2024

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:3,090 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 45, 90, 180, 270

Feet: 0, 150, 300, 600, 900

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
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: Chester County, Pennsylvania
Survey Area Data: Version 16, Sep 4, 2023

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

Date(s) aerial images were photographed: Jun 3, 2022—Jul 20, 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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
MaB	Manor loam, 3 to 8 percent slopes	7.6	34.4%
MaE	Manor loam, 25 to 35 percent slopes	1.2	5.3%
MaF	Manor loam, 35 to 60 percent slopes	2.6	11.7%
MbF	Manor loam, 25 to 60 percent slopes, very stony	3.8	17.5%
UugB	Urban land-Udorthents, schist and gneiss complex, 0 to 8 percent slopes	6.0	27.4%
UugD	Urban land-Udorthents, schist and gneiss complex, 8 to 25 percent slopes	0.8	3.8%
Totals for Area of Interest		**22.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Chester County, Pennsylvania

MaB—Manor loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2z1vg
Elevation: 250 to 1,000 feet
Mean annual precipitation: 37 to 46 inches
Mean annual air temperature: 45 to 55 degrees F
Frost-free period: 145 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Manor and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Manor

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit, backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from mica schist

Typical profile

A1 - 0 to 2 inches: loam
A2 - 2 to 6 inches: sandy loam
Bw1 - 6 to 13 inches: fine sandy loam
Bw2 - 13 to 22 inches: fine sandy loam
C1 - 22 to 30 inches: fine sandy loam
C2 - 30 to 44 inches: channery sand
C3 - 44 to 53 inches: loamy sand
C4 - 53 to 83 inches: channery loamy sand
Cr - 83 to 108 inches: bedrock
R - 108 to 138 inches: bedrock

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: 60 to 100 inches to paralithic bedrock; 100 to 128 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.07 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F148XY024PA - Moist, Piedmont - felsic, Upland, Mixed Oak - Hardwood - Conifer Forest
Hydric soil rating: No

Minor Components

Glenelg

Percent of map unit: 10 percent
Landform: Hillslopes, interfluves
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Glenville

Percent of map unit: 5 percent
Landform: Drainageways, swales
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Base slope, head slope, interfluve
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

MaE—Manor loam, 25 to 35 percent slopes

Map Unit Setting

National map unit symbol: 2yh2z
Elevation: 250 to 1,000 feet
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 48 to 57 degrees F
Frost-free period: 150 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Manor and similar soils: 98 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Manor

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Residuum weathered from mica schist

Typical profile

A1 - 0 to 2 inches: loam
A2 - 2 to 6 inches: sandy loam
Bw1 - 6 to 13 inches: fine sandy loam
Bw2 - 13 to 22 inches: fine sandy loam
C1 - 22 to 30 inches: fine sandy loam
C2 - 30 to 44 inches: channery sand
C3 - 44 to 53 inches: loamy sand
C4 - 53 to 83 inches: channery loamy sand
Cr - 83 to 108 inches: bedrock
R - 108 to 138 inches: bedrock

Properties and qualities

Slope: 25 to 35 percent
Depth to restrictive feature: 60 to 100 inches to paralithic bedrock; 100 to 128 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.07 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: F148XY024PA - Moist, Piedmont - felsic, Upland, Mixed Oak - Hardwood - Conifer Forest
Hydric soil rating: No

Minor Components

Glenville, moderately wel drainedl

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

MaF—Manor loam, 35 to 60 percent slopes

Map Unit Setting

National map unit symbol: pjlf
Elevation: 250 to 1,000 feet
Mean annual precipitation: 35 to 50 inches

Mean annual air temperature: 48 to 57 degrees F
Frost-free period: 150 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Manor and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Manor

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Residuum weathered from mica schist

Typical profile

A - 0 to 3 inches: channery loam
Bw - 3 to 22 inches: channery loam
C - 22 to 60 inches: very fine sandy loam

Properties and qualities

Slope: 35 to 60 percent
Depth to restrictive feature: 72 to 99 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: F148XY024PA - Moist, Piedmont - felsic, Upland, Mixed Oak - Hardwood - Conifer Forest
Hydric soil rating: No

MbF—Manor loam, 25 to 60 percent slopes, very stony

Map Unit Setting

National map unit symbol: pjlj
Elevation: 250 to 1,000 feet
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 48 to 57 degrees F
Frost-free period: 150 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Manor, very stony, and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Manor, Very Stony

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Residuum weathered from mica schist

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 3 inches: loam
Bw - 3 to 26 inches: channery loam
C - 26 to 60 inches: very fine sandy loam

Properties and qualities

Slope: 25 to 60 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 72 to 99 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F148XY024PA - Moist, Piedmont - felsic, Upland, Mixed Oak - Hardwood - Conifer Forest
Hydric soil rating: No

UugB—Urban land-Udorthents, schist and gneiss complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: pjny
Elevation: 200 to 2,000 feet
Mean annual precipitation: 35 to 55 inches
Mean annual air temperature: 45 to 61 degrees F
Frost-free period: 110 to 235 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 80 percent
Udorthents, schist and gneiss, and similar soils: 15 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Pavement, buildings and other artifically covered areas

Typical profile

C - 0 to 6 inches: variable

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 10 to 99 inches to lithic bedrock
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Description of Udorthents, Schist And Gneiss

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Graded areas of schist and/or gneiss

Typical profile

Ap - 0 to 6 inches: loam
C - 6 to 40 inches: silty clay loam
R - 40 to 60 inches: bedrock

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 20 to 70 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 60 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Gladstone

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Nose slope, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Baile

Percent of map unit: 1 percent
Landform: Depressions
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Glenelg

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Glenville

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

Edgemont

Percent of map unit: 1 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Mountaintop
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

UugD—Urban land-Udorthents, schist and gneiss complex, 8 to 25 percent slopes

Map Unit Setting

National map unit symbol: pjnz
Elevation: 200 to 2,000 feet
Mean annual precipitation: 35 to 55 inches
Mean annual air temperature: 45 to 61 degrees F
Frost-free period: 110 to 235 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 80 percent
Udorthents, schist and gneiss, and similar soils: 15 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Pavement, buildings and other artifically covered areas

Typical profile

C - 0 to 6 inches: variable

Properties and qualities

Slope: 8 to 25 percent
Depth to restrictive feature: 10 to 99 inches to lithic bedrock
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Description of Udorthents, Schist And Gneiss

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Graded areas of schist and/or gneiss

Typical profile

Ap - 0 to 6 inches: loam
C - 6 to 40 inches: silty clay loam
R - 40 to 60 inches: bedrock

Properties and qualities

Slope: 8 to 25 percent
Depth to restrictive feature: 20 to 70 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 60 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Gladstone

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Nose slope, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Glenelg

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Baile

Percent of map unit: 1 percent
Landform: Depressions
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Edgemont

Percent of map unit: 1 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Mountaintop

Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Hydric soil rating: No

Glenville

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: No

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APPENDIX I

ADEQUACY OF DISCHARGE

ADEQUACY OF DISCHARGE

The during construction and post-development discharge for the proposed improvements associated with the development at 201 Pennsylvania Ave was analyzed at three (3) Discharge Points (DP). Analyses were conducted to ensure that the site discharge during construction and after construction follows the existing flow paths offsite and that the rate control requirements were met per Malvern Borough's Stormwater Management Ordinance. The existing/proposed drainage conditions and paths for DP 001-003 are provided below.

DP 001 (POI 1):

Existing Condition – The runoff generated from the property (consisting of only woods) flows uncontrolled via sheet flow into the UNT of Little Valley Creek.

During Construction – The runoff generated during construction will be in a sheet flow condition and will be conveyed through multiple compost filter socks located throughout the downslope portions of the disturbed area. The filtered runoff will then be conveyed to the UNT of Valley Creek.

Post-Development Condition – All of the runoff from the proposed impervious surfaces will flow into the MRC Beds for water quality treatment and released at the required rates into the UNT of Little Valley Creek. The uncontrolled flow will only consist of lawn area and will sheet flow into UNT of Little Valley Creek

The post-developed runoff peak rate to DP 001 is being reduced to 95% of the pre-developed runoff peak rate for the 100-year, 24-hour storm event.

The runoff volume (pre-developed to post-developed condition) for the 2-year, 24-hour storm event to DP 001 was calculated as being an increase in runoff volume.

DP 002 (POI 2):

Existing Condition – The runoff generated from the property currently across the existing wooded area into an existing defined channel on to UPI 42-4Q-152. This channel ultimately connects to the UNT of Little Valley Creek

During Construction – The runoff generated during construction will be in a sheet flow condition and will be conveyed through 12-inch compost filter socks located downslope of the disturbed area and into the existing defined channel on to UPI 42-4Q-152

Post-Development Condition – In the post developed condition, the line of interest between 321 and 319 Pottstown Pike and the drainage area towards DP002 has been reduced. Water will sheet flow towards DP002 through a lawn area.

The runoff volume (pre-developed to post-developed condition) for the 2-year, 24-hour storm event to DP 002 was calculated as being a decrease in runoff volume.

DP 003 (LOI 3):

Existing Condition – The runoff generated from the property currently across the existing wooded area into an existing defined channel on to UPIs 42-4Q-153, 42-4R-36, 42-4R-37, 42-4R-38, and 42-4R-38.1

During Construction – The runoff generated during construction will be in a sheet flow condition and due to the proposed design, no sediment laden flow will flow towards these properties.

Post-Development Condition – In the post developed condition, the line of interest between the subject property and UPIs 42-4Q-153, 42-4R-36, 42-4R-37, 42-4R-38, and 42-4R-38.1 will continue to receive sheet flow form the subject property..

The runoff volume (pre-developed to post-developed condition) for the 2-year, 24-hour storm event to DP 003 was calculated as being a decrease in runoff volume.

APPENDIX J

GEOTECHNICAL REPORT

REPORT OF PRELIMINARYT GEOTECHNICAL ENGINEERING STUDY

PREPARED FOR:

E. KAHN DEVELOPMENT
120 PENNSYLVANIA AVENUE
MALVERN, PENNSYLVANIA 19355

PROJECT:

PROPOSED INDUSTRIAL DEVELOPMENT
201 PENNSYLVANIA AVENUE
MALVERN BOROUGH,
CHESTER COUNTY, PENNSYLVANIA 19465

MARCH 28, 2024

JOB NO.: 1033E

1250 Wrights Lane, West Chester, PA 19380 | PHONE 610 918 9004 | FAX 610 918 9003

HOWELL ENVIRONMENTAL
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March 28, 2024

Mr. Eli Kahn
E. Kahn Development
120 Pennsylvania Avenue
Malvern, PA 19355

Project No. 1033E

Reference: Report of Preliminary Geotechnical Engineering Study
201 Pennsylvania Avenue
Malvern Borough, Chester County, PA

Dear Mr. Kahn:

Howell Environmental, LLC (Howell) is pleased to present this preliminary geotechnical engineering report for the above-referenced project. Our services were performed in general accordance with our proposal dated October 25, 2023, which included a subsurface exploration program, laboratory testing, and preparation of this report. Our exploration program and the recommendations provided herein were developed based upon limited project information. This report presents our findings from the limited field investigation, a generalized subsurface characterization of the site, and our preliminary recommendations related to design of the proposed industrial development.

We appreciate the opportunity to assist during this phase of the project and would like to continue providing our services throughout the design process as well as for oversight and material testing during construction. Should you have any questions concerning the information contained herein, or if we can be of further assistance to you, please contact us.

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
NICHOLAS RALPH ENRICO CALVANESE
ENGINEER
PE090431

Respectfully,
Howell Environmental, LLC

Nathaniel Maute, EIT
Staff Engineer

Nicholas R. Calvanese, P.E.
Geotechnical Department Manager

TABLE OF CONTENTS

1250 Wrights Lane, West Chester, PA 19380 | PHONE 610 918 9004 | FAX 610 918 9003

LIST OF APPENDICES

EXECUTIVE SUMMARY

This geotechnical engineering study was performed for a proposed site development considered for construction at a site in Malvern Borough, PA. The existing property address is 201 Pennsylvania Avenue which is currently occupied by heavy wooded areas with steep slopes forming a valley with a stream and wetlands running through the property. The proposed construction consists of an industrial building with drive lanes, parking areas, and landscaped islands. An embankment will be needed to cross the existing ravine and access the site from Pennsylvania Avenue. The following summarizes the findings from our field investigation and our recommendations for design and construction:

Exploration & Testing

- This study included 13 test pits extending to termination or refusal at depths ranging from ±2.5 to ±9.0 feet below the existing ground surface (feet-bgs).
- Topsoil was encountered at the ground surface ranging from 6 to 12 inches thick in all test pits.
- Natural residual soils were encountered below the surficial topsoil and consisted of granular soils with occasional fine-grained soils interbedded.
- Bedrock, identified by bucket refusal, was encountered in 12 of the 13 test pits performed for this preliminary study at depths ranging from ±2.5 to ±9.0 feet-bgs.
- Groundwater was encountered in 2 of the 13 test pits (TP-06 and TP-07) at depths of ±5.2 to ±5.5 feet-bgs, respectively. Groundwater levels can fluctuate seasonally and during high rates of precipitation.
- Laboratory testing was performed on representative samples obtained from the test pits.

Preliminary Recommendations

- The proposed embankment is technically feasible, however; additional testing and investigation will be needed to complete design and determine costs associated with frequency of reinforcing.
- Use of cut soils/rock as structural fill for embankment is feasible but will require extensive quality control to ensure material is suitable.
- Use of infiltration facilities for site stormwater management is not recommended due to shallow rock and steep slopes at the site.
- Proposed buildings can be constructed as a slab-on-grade with shallow spread footings and *preliminarily* designed for a net allowable bearing capacity of 3,000 psf.

Please refer to the body of the report for further details on subsurface conditions encountered within the completed test pits and for our specific geotechnical engineering recommendations for the project.

INTRODUCTION

This report presents the results of a preliminary geotechnical engineering study performed for a proposed industrial building considered for construction in Malvern Borough, Chester County, Pennsylvania. The project site is located at 201 Pennsylvania Avenue and is accessible from Pennsylvania Ave via property easement.

The provided conceptual site plan entitled "GRADING AND SITE LAYOUT SKETCH," prepared by Howell Engineering, dated February 3, 2023, was used as the basis for developing the subsurface exploration program. Preparation of this report was also based on the set of PRELIMINARY MAJOR LAND DEVELOPMENT PLANS, prepared by Howell Engineering, dated March 27, 2024.

The scope of this study included the following services:

- Develop and execute a subsurface exploration program consisting of 13 test pits.
- Perform laboratory testing of representative soil samples obtained from the explorations to characterize engineering properties of the subsurface materials.
- Prepare this report, which includes our findings and opinions regarding:
    - Feasibility of a reinforced steep slope (RSS) embankment for site ingress/egress;
    - Suitability of cut soils/bedrock for reuse as structural fill, specifically for use in constructing the proposed RSS embankment;
    - Preliminary building foundation recommendations; and,
    - Feasibility of utilizing infiltration facilities related to design of site stormwater management.

PROJECT INFORMATION

Site Conditions

The project site is currently undeveloped and densely to moderately wooded with moderate vegetation throughout. The subject property is accessible from an easement located in the southeast corner of the site at the western end of Pennsylvania Ave and is bounded to the south/southwest by a utility easement followed by railroad line (Amtrak); to the north/northwest by residential properties; to the northeast by wooded areas; and to the east/southeast by commercial properties.

Based on elevation contours shown on the aforementioned land development plans and observations made during our field investigation, the eastern part of the site contains a ravine, steeply sloped from east to west with a regulated stream (designated wetlands) flowing from south to north at the ravine bottom. The ravine slopes down steeply from Pennsylvania Ave (EL ±544 feet) to the streambed (EL ±468 feet) and then steeply up toward the western part of the site which begins to level-off at approximately EL ±546 feet. The western part of the site is relatively flatter with the ground surface generally sloping down from north to south and elevations ranging from EL ±558 feet to EL ±542 feet. Additionally, the western corner of the site contains steep slopes with regulated waters; however, this portion of the property is outside the limit of disturbance for the proposed development.

Proposed Construction

Based on the aforementioned conceptual site plan, the proposed site development includes a 41,038 SF industrial building surrounded by parking areas, drive lanes, and landscape islands and a loading dock located at the northwest building corner. The building will be established at EL 547.23 feet; as such, we anticipate mass cuts up to ±11 feet below existing ground surface (feet-bgs) and mass fills up to ±5 feet will be required to achieve proposed grades. Three (3) Stormtank MRC Bed facilities are proposed below pavements for site stormwater management. Based upon the limited project information available, we assume the building will be a one-story warehouse and include steel framing with masonry block walls. Based on similar projects, we estimate maximum design loads for columns, walls, and floors will be on the order of 150 kips, 4 kips per lineal foot, and 600 psf, respectively.

Due to geographical constraints, the only viable ingress/egress to the property is located in the southeast corner of the site at the western end of Pennsylvania Avenue. As such, the access road to the building must cross over the ravine and regulated stream, which will require a additional structural design to achieve. Currently, a reinforced soil slope (RSS) embankment with segmental retaining walls and a 6'x8' box culvert through the embankment is proposed to cross the ravine. The proposed roadway supported by the embankment will be established at EL 544 feet on the eastern extent of the ravine near Pennsylvania Avenue and slope down to EL 510 feet on the western extent of the ravine. As such, mass fills up to ±44 feet at its highest point above the streambed will be required to construct the embankment.

Geology

According to the Bedrock Geologic Map of Pennsylvania (1980) the subject site is underlain by bedrock of the *Octoraro Formation (Xo)* which is mapped to consist of phyllite that contains some schist, hornblende gneiss, and granitized members. Approximately 1,700 feet north of the site is the *Conestoga Formation (Occ)* which is mapped as medium-gray impure limestone with black graphitic shale partings. Approximately 3,300 feet south of the project site is contact with the *'Glenarm Wissahickon' Formation (Xgw)* which is mapped to consist of schist metamorphosed to greenschist facies. See Figure 2– Soil Survey Map and Figure 3– Bedrock Geology Map provided in Appendix A for more details regarding site geology.

EXPLORATION & TESTING

Subsurface Exploration

Our subsurface exploration program was completed on October 25, 2023 and included thirteen (13) test pits labeled TP-01 through TP-13 as shown on Figure 4 - Exploration Location Plan provided in Appendix A. Test pits TP-01 through TP-09 were located within limits of the proposed embankment, and Test pits TP-11 through TP-14 were performed within cut areas of the proposed industrial building to evaluate depth to bedrock and suitability for use as structural fill. Test pits were completed using a mini-excavator with 12-inch bucket. It should be noted that five (5) test pits were conducted during a previous feasibility study performed by Howell Engineering on January 25, 2023; locations of which are shown on the base plan used for Figure 4 - Exploration Location Plan and are labeled Test Pit 1 through Test Pit 5 with the approx. elevation at which bedrock was encountered using a relatively larger excavator. The test pit locations performed for this study were determined by measuring from the proposed road center line points, which were surveyed in the field prior to our arrival onsite and/or by mobile GPS data and should be considered approximate.

Prior to mobilizing to the project site, Howell requested public utility location services via Pennsylvania One Call. Upon completion, test pits were backfilled with excavated soils. Soils encountered from test pit explorations were visually classified using the Unified Soil Classification System (USCS) in general accordance with ATM D2488 – *Standard Practice for Description and Identification of Soils (Visual-Manual Procedures)*. The samples were then grouped into designated strata as noted on the Test Pit Logs provided in Appendix B. Dual-mass dynamic cone penetrometer (DCP) testing was conducted at each of the test pits to estimate bearing capacity and relative soil strength. Results of the DCP testing indicate a range of soil bearing capacities which were used to estimate bearing values for the proposed building, and eventually in design of the proposed RSS embankment at a later date.

Divisions between soil strata shown on the logs are approximate and actual transitions may be gradual. Ground surface elevations indicated on the individual logs, were estimated from ground contours shown on the aforementioned development plans and should be considered approximate. The test pits extended to refusal or termination depths ranging from 2.5 to 9.0 feet below the existing ground surface (feet-bgs). A summary of the test pit explorations with bottom depths and corresponding elevations is provided in the following table:

Table 1 – Summary of Subsurface Explorations

Test Pit No.	Ex. Ground Surface Elevation[1](ft)	Bottom of Test Pit		Notes
		Depth (ft)	Elev. (ft)	
TP-01	525.0	8.5	516.5	Bucket refusal at test pit termination.
TP-02	511.0	9.0	502.0	Bucket refusal at test pit termination.
TP-03	499.0	4.7	494.3	Bucket refusal at test pit termination.
TP-04	483.0	2.5	480.5	Bucket refusal at test pit termination.
TP-05	482.0	9.0	473.0	Test pit terminated at target depth.
TP-06	479.0	5.5	473.5	Bucket refusal at test pit termination.
TP-07	477.0	5.5	471.5	Bucket refusal at test pit termination.
TP-08	482.0	3.0	479.0	Bucket refusal at test pit termination.
TP-09	517.0	6.8	510.2	Bucket refusal at test pit termination.
TP-10	555.0	3.0	552.0	Bucket refusal at test pit termination.
TP-11	558.0	2.5	555.5	Bucket refusal at test pit termination.
TP-12	553.0	3.5	549.5	Bucket refusal at test pit termination.
TP-13	550.0	5.0	545.0	Bucket refusal at test pit termination.

Notes: (1) Ground surface elevations were interpolated between ground contours obtained from the Land Development Plans prepared by Howell Engineering, and should be considered approximate.

Subsurface Characterization

The subsurface conditions encountered were generally consistent with the published geologic maps available for the general site vicinity. Below is a generalized characterization subsurface conditions at the project site. For additional details refer to the individual Test Pit Logs and Soil Survey Map provided in Appendix B and Appendix A, respectively.

Surface Cover
A topsoil layer, ranging from approximately 6 to 12 inches thick, was encountered at the ground surface of all test pits performed for this study. Topsoil thickness varied throughout each individual test pit. Topsoil was generally described as black to dark brown with abundant roots and organic material.

Stratum 1 – Residual Soils
Residual soils identified as residual soils, which are derived from complete weathering of the parent bedrock, were encountered below surficial topsoil in all test pits performed for this study. Stratum 1 generally consisted of coarse-grained soils including Silty Gravel, Silty Gravel with Sand (USCS: GM), Silty Sand with Gravel (USCS: SM), Well-Graded Sand with Silt and Gravel (USCS: SW-SM), and Well-Graded Gravel with Silt and Sand (USCS: GW-GM) and were generally described as damp to moist. Predominantly fine-grained soils were occasionally encountered in Stratum 1 and generally consisted of Sandy Silt and Sandy Silt with Gravel (USCS: ML) were described as moist and only found in test pits TP-03 and TP-13. Stratum 1 extended to test pit termination at a depth of 9.0 feet-bgs in TP-05 and to bucket refusal in all other test pits.

Stratum 2 – Bedrock
Bedrock was encountered in 12 of the 13 test pits performed for this study at depths ranging from 2.5 to 9.0 feet-bgs. Bedrock was identified visually in the test pit and by failure to advance the excavator bucket (bucket refusal) to the target depth. Bedrock consisted primarily of phyllite which is consistent with the mapped geology, and was generally hard and exhibited a platy structure (RD=0°) with relatively thin bedding.

Groundwater

All test pits were dry upon completion except for test pits TP-06 encountered at 5.2 ft-bgs (EL 473.8) and TP-07 encountered at 5.5 ft-bgs (EL 471.5). The water table encountered was consistent with that of the adjacent stream flowing along the base of the ravine. It is important to note that variations in the long-term water table may occur because of changes in precipitation, evaporation, surface water runoff, construction activities, and other factors.

Laboratory Testing

Representative soil samples obtained from the explorations were subjected to laboratory testing to supplement the visual classification of the soils. The testing performed for this study included natural moisture content, particle (grain) size analyses, Atterberg (liquid and plastic) limits, and a standard proctor analysis. Tests were completed in general accordance with their respective ASTM standards. A summary of the test results and plotted graphs from the particle size analysis are included in Appendix C.

PRELIMINARY RECCOMENDATIONS

Embankment Feasibility & Cut Material Suitability

Based on the results of this study, it is our opinion that construction of the RSS embankment using the currently proposed grading scheme is technically feasible; however, additional testing and field investigation is necessary to complete the RSS design. The amount of grid reinforcing needed, which will directly correlate to the project cost, will depend on a thorough subsurface investigation comprised of test borings to obtain undisturbed samples for laboratory tests needed to determine lateral soil strength parameters for design of the slope. Additionally, in-situ testing, (i.e. pressuremeter testing), may be recommended. The supplemental investigation will require specialized drilling equipment capable of drilling on steep slopes and in wetland conditions.

Based on the test pits and results of the proctor test, use of the material cut from the building area may be used to construct the RSS, provided extensive quality control is implemented during processing of the rock/soil spoils. While phyllitic rock is not ideal due to its platy structure, additional processing/crushing and testing of the fill material will be necessary to ensure elongated particles are not present in the fill material. As previously stated, extensive quality controls will be needed to ensure processed soil/rock is suitable for use in constructing the RSS embankment.

Stormwater Management

Based on the proposed grading scheme and conditions encountered during our investigation, we do not recommend utilizing infiltration facilities for site stormwater management. Due to the presence of relatively shallow bedrock (limiting zone) across the site, infiltration capacity is vertically limited. Additionally, steep slopes associated with the adjacent ravine combined with the platy structure of the bedrock would likely lead to undesirable horizontal movement of concentrated groundwater infiltration and as a result could cause erosion and slope instability issues in other portions of the site. Therefore, the use of managed release concepts (MRC) as currently proposed is ideal for the proposed site grading.

Foundation Support

Provided subgrades and structural fills are properly prepared, the proposed industrial building can be supported by shallow foundations including column footings and continuous wall footings. Footings bearing on Stratum 1 residual soils or new structural fill can be ***preliminarily*** designed for a maximum net allowable bearing pressure of 3,000 psf. Exterior footings should extend a minimum of 36 inches below exterior finished grade for frost protection. Additional testing, including test borings should be conducted for final design.

It should be noted that footings may not bear directly on exposed weathered/intact bedrock in order to prevent point loads that exude added stress on footings. Where encountered below footings, rock (weathered or intact) should be over excavated a minimum of 12 inches below bottom of footing and backfilled with approved structural fill.

LIMITATIONS

This preliminary geotechnical investigation has been performed in accordance with generally accepted engineering practice. This report and all supporting documentation have been prepared exclusively for the use of our client. No warranty, express or implied, is made herein.

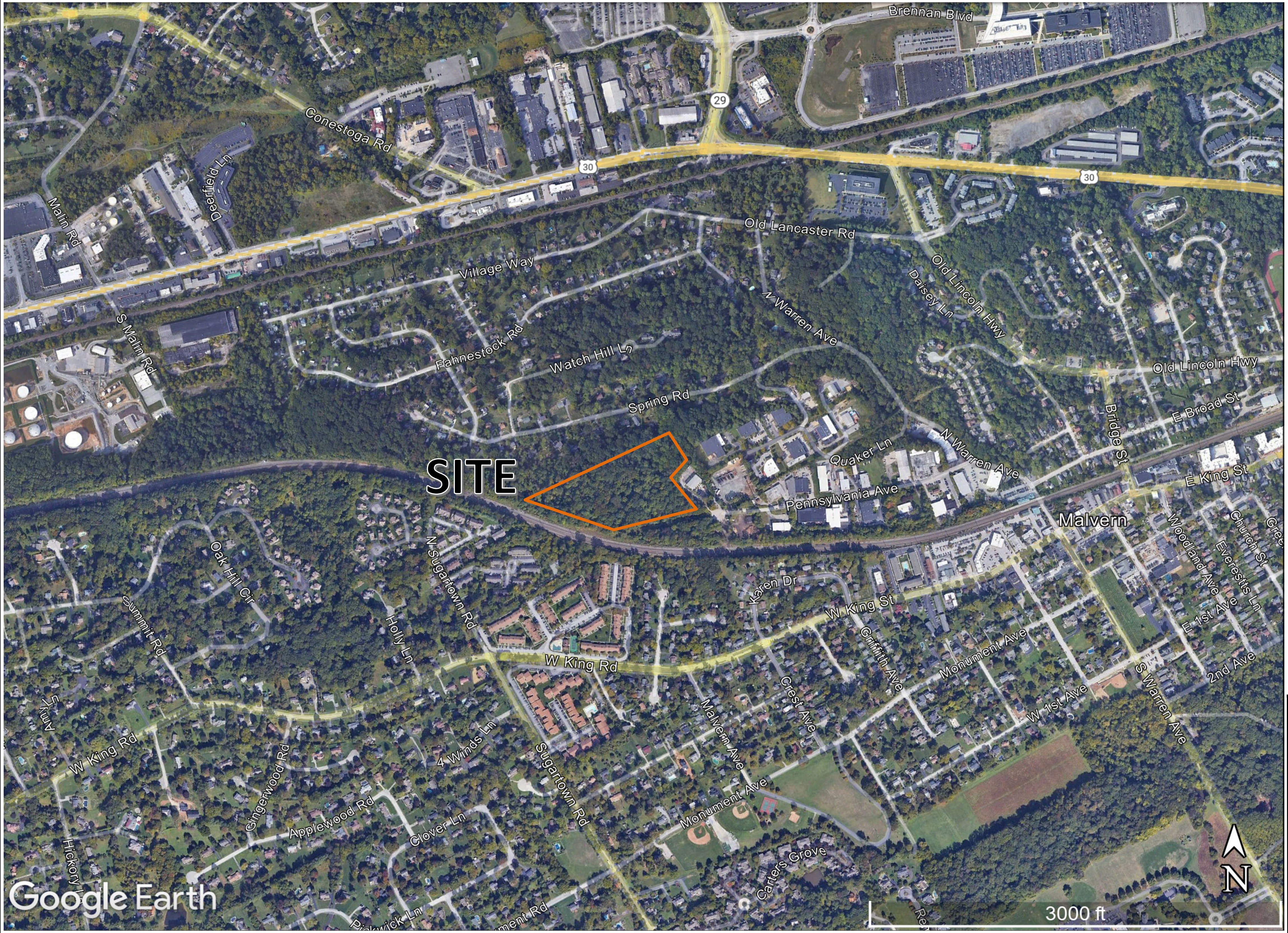
The findings, conclusions, and recommendations contained in this report are based on data revealed by limited exploration and testing of the subsurface at the referenced project site. The explorations indicate subsurface conditions at the specific locations, depths, and times explored. Should deviations from the described subsurface conditions be encountered at any time prior to or during construction, Howell should be notified to determine whether the findings necessitate modification of our recommendations.

This report is applicable only to the contemplated site design described herein; any changes in the design should be brought to our attention so that we may evaluate whether our recommendations will be affected. Howell is not responsible for any claims, damages, or liability associated with interpretation of subsurface data or reuse of the subsurface data or engineering analysis without the expressed written authorization of Howell. As such, the conclusions and recommendations contained in this report are pending our review of final plans and specifications, and verification of subsurface conditions by direct observation at the time of construction.

This report and supporting documentation are instruments of service. The subject matter of this report is limited to the facts and matters stated herein.

The scope of this geotechnical study did not include investigation or evaluation of any environmental issues, such as wetlands, or hazardous or toxic materials on, below, or in the vicinity of the subject site. Any statements in this report or supporting documentation regarding odors or unusual or suspicious items or conditions observed are strictly for the information of our Client.

APPENDIX A



SOURCE:

(1) "Bing Maps in Google Earth." *GE Map Overlays*, n.d., http://ge-map-overlays.appspot.com/bing-maps/road. Accessed 10 Jul. 2023.

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TITLE:	SITE LOCATION PLAN
PROJECT:	**PROPOSED INDUSTRIAL DEVELOPMENT** 201 PENNSYLVANIA AVENUE MALVERN BOROUGH CHESTER COUNTY, PA 19355

PROFESSIONAL ENGINEER: NICHOLAS R. CALVANESE, P.E.		LICENSE NO.: PE090431
DRAWN BY: NRM	CHECKED BY: NRC	PROJECT NO.: 1033E
SCALE: AS SHOWN	DATE: 3/12/2024	FIGURE NO.: 1 of 4

MAP KEY

MaB - Manor loam, 3 to 8% slopes
Residuum weathered from mica schist

MaC- Manor loam, 8 to 15% slopes
Residuum weathered from mica schist

MaD - Manor loam, 15 to 25% slopes
Residuum weathered from mica schist.

MaE - Manor loam, 25 to 35% slopes
Residuum weathered from mica schist.

MaF - Penn silt loam, 35 to 60% slopes
Residuum weathered from mica schist.

MbF - Manor loam, 25 to 60% slopes, very stony
Residuum weathered from mica schist.

GgB - Glenelg silt loam, 3 to 8% slopes
Residuum weathered from mica schist.

GIB - Glenville silt loam, 3 to 8% slopes
Colluvium derived from metamorphic rock over schist, gneiss, or phyllite residuum.

UugB - Urban land-Udorthents, schist and gneiss complex, 0 to 8% slopes
Pavement, buildings, and other artificially covered areas.

UugD - Urban land-Udorthents, schist and gneiss complex, 8 to 25% slopes
Pavement, buildings, and other artificially covered areas.

N
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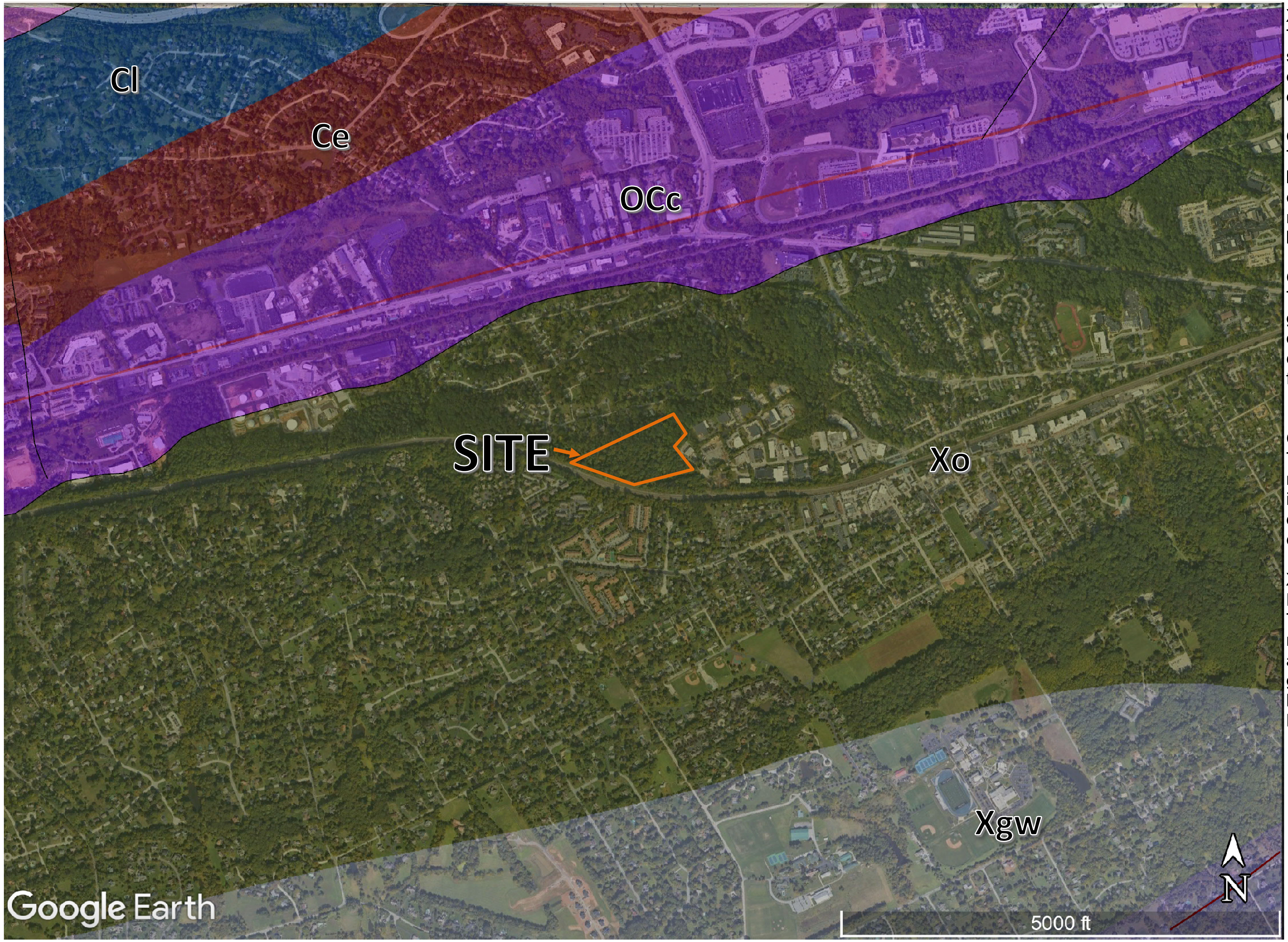
TITLE:
SOIL SURVEY MAP

PROJECT:
PROPOSED INDUSTRIAL DEVELOPMENT
201 PENNSYLVANIA AVENUE
MALVERN BOROUGH
CHESTER COUNTY, PA 19355

PROFESSIONAL ENGINEER: NICHOLAS R. CALVANESE, P.E.		LICENSE NO.: PE090431
DRAWN BY: NRM	CHECKED BY: NRC	PROJECT NO.: 1033E
SCALE: N.T.S.	DATE: 3/12/2024	FIGURE NO.: 2 of 4

SOURCES:
(1) "Web Soil Survey." *Web Soil Survey*, USDA, websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Accessed 7 Nov. 2023.



MAP KEY

Xo, *Octoraro Formation* (Probably Lower Paleozoic):
The Octoraro Formation is a phyllite that contains some schist, hornblende gneiss, and granitized members. It has quartz-albite-muscovite-chlorite assemblages. (Berg and others, 1980; Kauffman, 1999).

OCc, *Conestoga Formation* (Ordovician and Cambrian):
The Conestoga Formation consists of medium-gray, impure limestone with black, graphitic shale partings. It is conglomeratic at the base. In Chester County, it includes micaceous limestone, phyllite, and alternating dolomite and limestone. (Geyer and Wilshusen, 1982).

Ce, *Elbrook Formation* (Cambrian):
The Elbrook Formation consists of light-gray to yellowish-gray, finely laminated siliceous limestone having interbeds of dolomite, calcareous shale, and silty limestone. It is cherty and well bedded. The beds are mostly thick, but flaggy and massive beds also occur. (Geyer and Wilshusen, 1982).

Cl, *Ledger Formation* (Cambrian):
The Ledger Formation is a light-gray, locally mottled, massive, pure, coarsely crystalline dolomite that is siliceous in the middle part. The beds, which are moderately well developed and massive, weather to rust-stained, granular, cherty layers. (Geyer and Wilshusen, 1982).

Xgw, *'Glenarm Wissahickon' Formation* (Probably Lower Paleozoic):
The "Glenarm Wissahickon" Formation is a schist metamorphosed to greenschist facies. Major constituents are quartz, albite, muscovite, and chlorite. It also includes gneiss, hornblende gneiss, and lenticular amphibolite bodies having ocean-floor basalt chemistry. (Berg and others, 1980; Kauffman, 1999).

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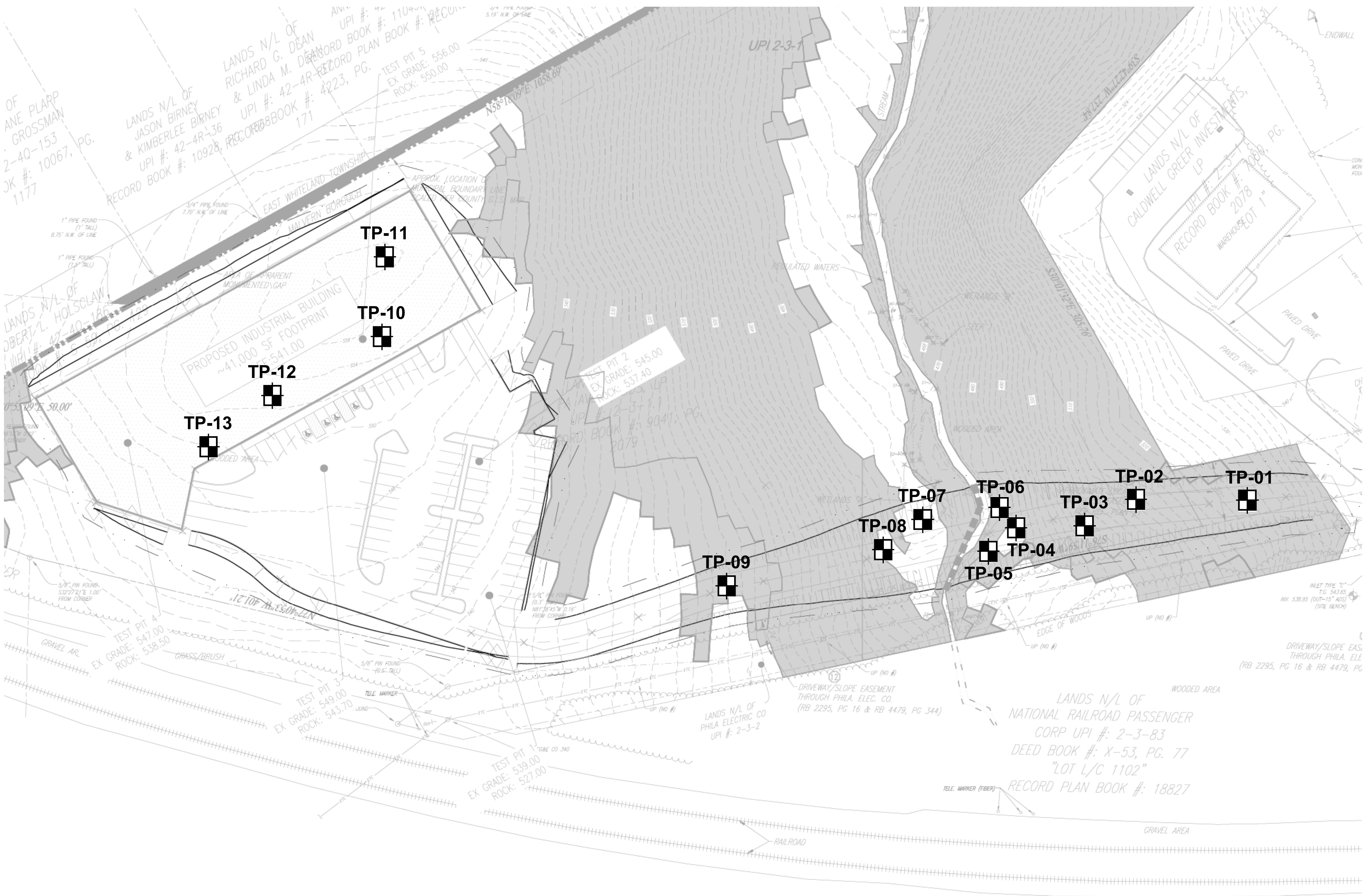
TITLE: BEDROCK GEOLOGY MAP

PROJECT:
PROPOSED INDUSTRIAL DEVELOPMENT
201 PENNSYLVANIA AVENUE
MALVERN BOROUGH
CHESTER COUNTY, PA 19355

PROFESSIONAL ENGINEER: NICHOLAS R. CALVANESE, P.E.	LICENSE NO.: PE090431
DRAWN BY: NRM	CHECKED BY: NRC
PROJECT NO.: 1033E	SCALE: AS SHOWN
DATE: 3/12/2024	FIGURE NO.: 3 of 4

SOURCES:
(1) "Bing Maps in Google Earth." *GE Map Overlays*, n.d., http://ge-map-overlays.appspot.com/bing-maps/road. Accessed 10 Jul. 2023.
(2) "Pennsylvania Geologic Map Data." *USGS*, n.d., http://mrdata.usgs.gov/geology/state/state.php?state=PA. Accessed 10 Jul. 2023.
(3) "PaGEODE - Pennsylvania GEOlogic Data Exploration." *PADCNR*, n.d., https://www.gis.dcnr.state.pa.us/pageode/. Accessed 10 Jul. 2023.



LEGEND

INDICATES THE NUMBERS AND APPROXIMATE LOCATIONS OF TEST PITS PERFORMED FOR THIS STUDY.

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TITLE:

EXPLORATION LOCATION PLAN

PROJECT:

PROPOSED INDUSTRIAL DEVELOPMENT
201 PENNSYLVANIA AVENUE
MALVERN BOROUGH
CHESTER COUNTY, PA 19355

PROFESSIONAL ENGINEER:		LICENSE NO.:
NICHOLAS R. CALVANESE, P.E.		PE090431
DRAWN BY: NRM	CHECKED BY: NRC	PROJECT NO.: 1033E
SCALE: N.T.S	DATE: 3/12/2024	FIGURE NO.: 4 of 4

NOTES:

(1) Base plan obtained from Grading and Site Layout Sketch prepared by Howell Engineering, dated February 3, 2023 and plotted on July 28, 2023.
(2) Test pits were located after excavation using a combination of mobile GPS data and measurements from surveyed center lines and should be considered approximate.
(3) Test Pit locations 1 through 5, as shown on base plan, were perfomed by Howell Engineering on January 25, 2023, for a stormwater infiltration feasibility study.

APPENDIX B

HOWELL ENVIRONMENTAL
Local Knowhow. Engineered.

TEST PIT LOG

TEST PIT: TP-01
PAGE: **1** of **1**
DATE: **10/25/2023**

Project Name: **201 Pennsylvania Avenue** Project Number: **1033E**
Location **201 Pennsylvania Ave** Twp. **Malvern** County **Chester** State **PA**
Coordinates Elevation (ft) **525.0'**
Driller/Company **Howell Environmental** Rig Type **Howell Environmental**
Water Depth **Not Encountered** Logged By: **NM** Checked By: **NRC**

Elevation (ft)	Depth (ft)	USCS	Symbol	Material Description	Strength (tsf)	Remarks
				TOPSOIL, dark brown, damp to moist. (0.7')		
524		GM		Orangey brown, SILTY GRAVEL with SAND (GM), moist. (4.5')		Trace roots to 2.0'.
522	2, 4					
520		GM		Reddish brown, SILTY GRAVEL with SAND (GM), moist (WEATHERED ROCK).		
518	6, 8					
516				Bucket Refusal 8.5'.		

Notes: Test pit location and elevation were measured off surveyed centerlines for the proposed embankment. Location and elevation should be considered approximate.

HOWELL ENVIRONMENTAL
Local Knowhow. Engineered.

TEST PIT LOG

TEST PIT: TP-02

DATE: **10/25/2023**

Project Name: **201 Pennsylvania Avenue** Project Number: **1033E**
Location **201 Pennsylvania Ave** Twp. **Malvern** County **Chester** State **PA**
Coordinates Elevation (ft) **511.0'**
Driller/Company **Howell Environmental** Rig Type **Howell Environmental**
Water Depth **Not Encountered** Logged By: **NM** Checked By: **NRC**

Elevation (ft)	Depth (ft)	USCS	Symbol	Material Description	Strength (tsf)	Remarks
				TOPSOIL, black, damp to moist. Thickness ranges from 6" to 12". (0.7')		
510		SM		Light brown, SILTY SAND with GRAVEL (coarse to cobbles) (SM), moist. (2.7')		Trace roots to 1.5'.
508	2					
506	4	SM		Orangey brown, SILTY SAND with GRAVEL (coarse to cobbles) (SM), moist. High gravelly zones 2.7'-4.0' and 7.5' to 8.5'. (9.0')		
504	6					
502	8			Bucket Refusal 9'.		

Notes: Test pit location and elevation were measured off surveyed centerlines for the proposed embankment. Location and elevation should be considered approximate.

TEST PIT LOG

HOWELL ENVIRONMENTAL
Local Knowhow. Engineered.

TEST PIT: TP-03
PAGE: **1** of **1**
DATE: **10/25/2023**

Project Name: **201 Pennsylvania Avenue** Project Number: **1033E**
Location **201 Pennsylvania Ave** Twp. **Malvern** County **Chester** State **PA**
Coordinates Elevation (ft) **499.0'**
Driller/Company **Howell Environmental** Rig Type **Howell Environmental**
Water Depth **Not Encountered** Logged By: **NM** Checked By: **NRC**

Elevation (ft)	Depth (ft)	USCS	Symbol	Material Description	Strength (tsf)	Remarks
				TOPSOIL, black, moist. (0.5')		
498	2	ML		Light brown, SANDY SILT with GRAVEL (coarse to cobbles) (ML), moist. (3.0')		Trace roots to 1.5'.
496	4	GM		Reddish brown, SILTY GRAVEL (coarse to cobbles) with SAND (GM), moist (WEATHERED ROCK). (4.7')		
494, 492, 490	6, 8			Bucket Refusal 4.7'.		

Notes: Test pit location and elevation were measured off surveyed centerlines for the proposed embankment. Location and elevation should be considered approximate.

TEST PIT LOG

TEST PIT: TP-04
PAGE: **1** of **1**
DATE: **10/25/2023**

Project Name: **201 Pennsylvania Avenue** Project Number: **1033E**
Location **201 Pennsylvania Ave** Twp. **Malvern** County **Chester** State **PA**
Coordinates Elevation (ft) **483.0'**
Driller/Company **Howell Environmental** Rig Type **Howell Environmental**
Water Depth **Not Encountered** Logged By: **NM** Checked By: **NRC**

Elevation (ft)	Depth (ft)	USCS	Symbol	Material Description	Strength (tsf)	Remarks
				TOPSOIL, dark brown, moist. (1.0')		
482		GM		Light brown, SILTY GRAVEL (coarse to cobbles) with SAND (GM), moist to very moist. (2.5')		Trace roots to 1.5'.
	2					
480				Bucket Refusal 2.5'.		
	4					
478						
	6					
476						
	8					
474						

Notes: Test pit location and elevation were measured off surveyed centerlines for the proposed embankment. Location and elevation should be considered approximate.

TEST PIT LOG

HOWELL ENVIRONMENTAL
Local Knowhow. Engineered.

TEST PIT: TP-05
PAGE: **1** of **1**
DATE: **10/25/2023**

Project Name: **201 Pennsylvania Avenue** Project Number: **1033E**
Location **201 Pennsylvania Ave** Twp. **Malvern** County **Chester** State **PA**
Coordinates Elevation (ft) **482.0'**
Driller/Company **Howell Environmental** Rig Type **Howell Environmental**
Water Depth **Not Encountered** Logged By: **NM** Checked By: **NRC**

Elevation (ft)	Depth (ft)	USCS	Symbol	Material Description	Strength (tsf)	Remarks
				TOPSOIL, black, moist. (1.0')		Trace roots to 2.0'.
480	2			Light brown, SILTY SAND with GRAVEL (coarse to cobbles) (SM), moist to very moist.		
478	4	SM				
476	6			(6.0')		
		GM		Orangey brown, SILTY GRAVEL with SAND (GM), very moist to wet.		
474	8			(9.0')		
				Bottom of Test Pit 9'.		

Notes: Test pit location and elevation were measured off surveyed centerlines for the proposed embankment. Location and elevation should be considered approximate.

TEST PIT LOG

HOWELL ENVIRONMENTAL
Local Knowhow. Engineered.

DATE: **10/25/2023**

Project Name: **201 Pennsylvania Avenue** Project Number: **1033E**
Location **201 Pennsylvania Ave** Twp. **Malvern** County **Chester** State **PA**
Coordinates Elevation (ft) **479.0'**
Driller/Company **Howell Environmental** Rig Type **Howell Environmental**
Water Depth ∇ **5.2' on 10/25/2023** Logged By: **NM** Checked By: **NRC**

Elevation (ft)	Depth (ft)	USCS	Symbol	Material Description	Strength (tsf)	Remarks
				TOPSOIL, dark brown, moist. (1.0')		
478		GM		Light brown, SILTY GRAVEL with SAND (GM), moist. (4.0')		Trace roots to 1.5'.
476	2					
	4	GM		Dark brown, SILTY GRAVEL with SAND (GM), very moist to wet. (5.5')		
474						∇ Water encountered 5.2'.
	6			Bucket Refusal 5.5'.		
472	8					
470						

Notes: Test pit location and elevation were measured off surveyed centerlines for the proposed embankment. Location and elevation should be considered approximate.

HOWELL ENVIRONMENTAL
Local Knowhow. Engineered.

TEST PIT LOG

TEST PIT: TP-07
PAGE: **1** of **1**
DATE: **10/25/2023**

Project Name: **201 Pennsylvania Avenue** Project Number: **1033E**
Location **201 Pennsylvania Ave** Twp. **Malvern** County **Chester** State **PA**
Coordinates Elevation (ft) **477.0'**
Driller/Company **Howell Environmental** Rig Type **Howell Environmental**
Water Depth ▽ **5.5' on 10/25/2023** Logged By: **NM** Checked By: **NRC**

Elevation (ft)	Depth (ft)	USCS	Symbol	Material Description	Strength (tsf)	Remarks
	0–1.0			TOPSOIL, black, moist. (1.0')		
476–471.5	1.0–5.5	SW-SM		Light brown, WELL-GRADED SAND with SILT and GRAVEL (SW-SM), very moist to wet. (5.5')		▽ Water encountered 5.5'.
	5.5			Bucket Refusal 5.5'.		

Notes: Test pit location and elevation were measured off surveyed centerlines for the proposed embankment. Location and elevation should be considered approximate.

TEST PIT LOG

HOWELL ENVIRONMENTAL
Local Knowhow. Engineered.

TEST PIT: TP-08
PAGE: **1** of **1**
DATE: **10/25/2023**

Project Name: **201 Pennsylvania Avenue** Project Number: **1033E**
Location **201 Pennsylvania Ave** Twp. **Malvern** County **Chester** State **PA**
Coordinates Elevation (ft) **482.0'**
Driller/Company **Howell Environmental** Rig Type **Howell Environmental**
Water Depth **Not Encountered** Logged By: **NM** Checked By: **NRC**

Elevation (ft)	Depth (ft)	USCS	Symbol	Material Description	Strength (tsf)	Remarks
				TOPSOIL, dark brown, moist. (1.0')		Trace roots to 1.0'.
480	2	SM		Light brown, SILTY SAND with GRAVEL (SM), moist. (3.0')		
				Bucket Refusal 3'.		
478	4					
476	6					
474	8					

Notes: Test pit location and elevation were measured off surveyed centerlines for the proposed embankment. Location and elevation should be considered approximate.

TEST PIT LOG

HOWELL ENVIRONMENTAL
Local Knowhow. Engineered.

TEST PIT: TP-09
PAGE: **1** of **1**
DATE: **10/25/2023**

Project Name: **201 Pennsylvania Avenue** Project Number: **1033E**
Location **201 Pennsylvania Ave** Twp. **Malvern** County **Chester** State **PA**
Coordinates Elevation (ft) **517.0'**
Driller/Company **Howell Environmental** Rig Type **Howell Environmental**
Water Depth **Not Encountered** Logged By: **NM** Checked By: **NRC**

Elevation (ft)	Depth (ft)	USCS	Symbol	Material Description	Strength (tsf)	Remarks
				TOPSOIL, black, moist. (0.7')		
516, 514, 512	2, 4, 6	GW-GM		Light brown, WELL-GRADED GRAVEL with SILT and SAND (GW-GM), moist.		
510, 508	8			Bucket Refusal 6.8'.		

Notes: Test pit location and elevation were measured off surveyed centerlines for the proposed embankment. Location and elevation should be considered approximate.

HOWELL ENVIRONMENTAL
Local Knowhow. Engineered.

TEST PIT LOG

TEST PIT: TP-10
PAGE: **1** of **1**
DATE: **10/25/2023**

Project Name: **201 Pennsylvania Avenue** Project Number: **1033E**
Location **201 Pennsylvania Ave** Twp. **Malvern** County **Chester** State **PA**
Coordinates Elevation (ft) **555.0'**
Driller/Company **Howell Environmental** Rig Type **Howell Environmental**
Water Depth **Not Encountered** Logged By: **NM** Checked By: **NRC**

Elevation (ft)	Depth (ft)	USCS	Symbol	Material Description	Strength (tsf)	Remarks
				TOPSOIL, black, moist. (0.5')		
554		GW-GM		Grayish brown, WELL-GRADED GRAVEL with SILT and SAND (GW-GM), damp to moist. (3.0')		Trace roots to 2.0'.
	2					
552				Bucket Refusal 3'.		
	4					
550						
	6					
548						
	8					
546						

Notes: Test pit location and elevation were measured off surveyed centerlines for the proposed embankment. Location and elevation should be considered approximate.

TEST PIT LOG

HOWELL ENVIRONMENTAL
Local Knowhow. Engineered.

TEST PIT: TP-11
PAGE: **1** of **1**
DATE: **10/25/2023**

Project Name: **201 Pennsylvania Avenue** Project Number: **1033E**
Location **201 Pennsylvania Ave** Twp. **Malvern** County **Chester** State **PA**
Coordinates Elevation (ft) **558.0'**
Driller/Company **Howell Environmental** Rig Type **Howell Environmental**
Water Depth **Not Encountered** Logged By: **NM** Checked By: **NRC**

Elevation (ft)	Depth (ft)	USCS	Symbol	Material Description	Strength (tsf)	Remarks
				TOPSOIL, black, moist. (0.7')		
556	2	GM		Light brown, SILTY GRAVEL with SAND (GM), moist. (2.5')		
554	4			Bucket Refusal 2.5'.		
552	6					
550	8					

Notes: Test pit location and elevation were measured off surveyed centerlines for the proposed embankment. Location and elevation should be considered approximate.

HOWELL ENVIRONMENTAL
Local Knowhow. Engineered.

TEST PIT LOG

TEST PIT: TP-12
PAGE: **1** of **1**
DATE: **10/25/2023**

Project Name: **201 Pennsylvania Avenue** Project Number: **1033E**
Location **201 Pennsylvania Ave** Twp. **Malvern** County **Chester** State **PA**
Coordinates Elevation (ft) **553.0'**
Driller/Company **Howell Environmental** Rig Type **Howell Environmental**
Water Depth **Not Encountered** Logged By: **NM** Checked By: **NRC**

Elevation (ft)	Depth (ft)	USCS	Symbol	Material Description	Strength (tsf)	Remarks
				TOPSOIL, black, moist. (0.5')		
552				Light brown, SILTY SAND with GRAVEL (SM), moist.		Trace roots to 1.5'.
	2	SM				
550				(3.5')		
				Bucket Refusal 3.5'.		
	4					
548						
	6					
546						
	8					
544						

Notes: Test pit location and elevation were measured off surveyed centerlines for the proposed embankment. Location and elevation should be considered approximate.

TEST PIT LOG

TEST PIT: TP-13
PAGE: **1** of **1**
DATE: **10/25/2023**

Project Name: **201 Pennsylvania Avenue** Project Number: **1033E**
Location **201 Pennsylvania Ave** Twp. **Malvern** County **Chester** State **PA**
Coordinates Elevation (ft) **550.0'**
Driller/Company **Howell Environmental** Rig Type **Howell Environmental**
Water Depth **Not Encountered** Logged By: **NM** Checked By: **NRC**

Elevation (ft)	Depth (ft)	USCS	Symbol	Material Description	Strength (tsf)	Remarks
				TOPSOIL, black, moist. Thickness ranges from 8" to 12". (1.0')		Trace roots to 1.5'.
548	2	ML		Light brown, SANDY SILT (ML), moist. (2.0')		
546	4	SM		Reddish brown, SILTY SAND with GRAVEL (SM), moist.		
544	6			Bucket Refusal 5'.		
542	8					

Notes: Test pit location and elevation were measured off surveyed centerlines for the proposed embankment. Location and elevation should be considered approximate.

APPENDIX C

HOWELL ENVIRONMENTAL
Local Knowhow. Engineered.

SUMMARY OF LABORATORY RESULTS

CLIENT E. Kahn Development **PROJECT NAME** 201 Pennsylvania Avenue

PROJECT NUMBER 1033E **PROJECT LOCATION** 201 Pennsylvania Avenue, Malvern, Chester, PA

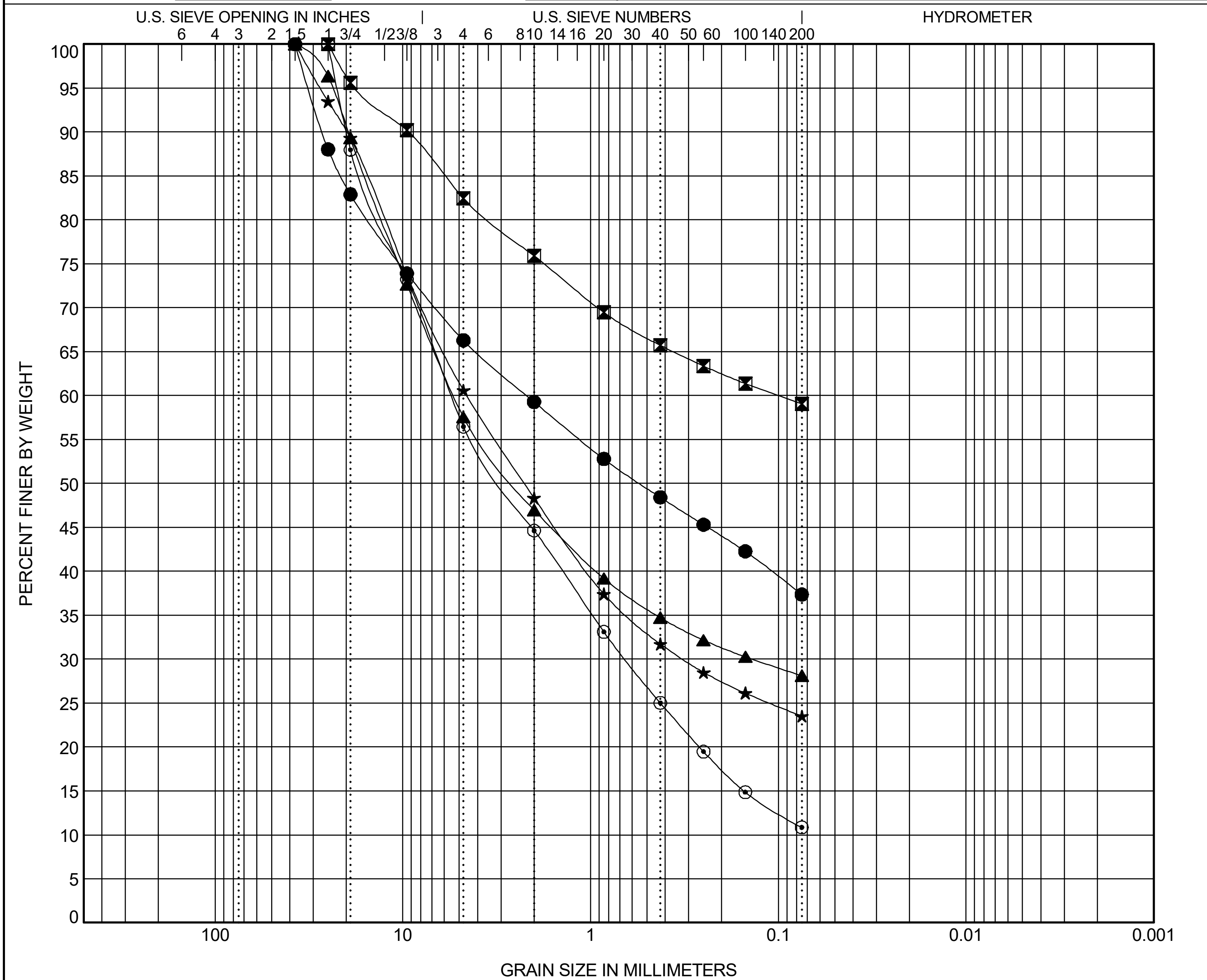
Borehole	Depth	Sample Number	Liquid Limit	Plastic Limit	Plasticity Index	%<#200 Sieve	Class-ification	Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Void Ratio
Composite	1.0' - 3.0'					18					
TP-01	2.0' - 4.0'					37					
TP-03	1.5' - 3.5'		42	28	14	59	ML				
TP-05	2.0' - 4.0'					28					
TP-06	2.0' - 4.0'		NP	NP		24	GM				
TP-07	2.0' - 4.0'					11					
TP-08	2.0' - 4.0'		NP	NP		38	SM				
TP-09	3.0' - 5.0'					11					
TP-10	2.0' - 4.0'					12					
TP-11	1.5' - 3.5'		41	33	8	19	GM				
TP-13	1.5' - 3.5'					21					

GRAIN SIZE DISTRIBUTION

HOWELL ENVIRONMENTAL
Local Knowhow. Engineered.

CLIENT E. Kahn Development **PROJECT NAME** 201 Pennsylvania Avenue

PROJECT NUMBER 1033E **PROJECT LOCATION** 201 Pennsylvania Ave, Malvern, Chester, PA



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**TP-01**	**3.0**	**SILTY GRAVEL with SAND(GM)**					
⧗	**TP-03**	**2.5**	**SANDY SILT with GRAVEL(ML)**	**42**	**28**	**14**		
▲	**TP-05**	**3.0**	**SILTY GRAVEL with SAND(GM)**					
★	**TP-06**	**3.0**	**SILTY GRAVEL with SAND(GM)**	**NP**	**NP**			
⊙	**TP-07**	**3.0**	**WELL-GRADED SAND with SILT and GRAVEL(SW-SM)**				**1.2**	**84.9**

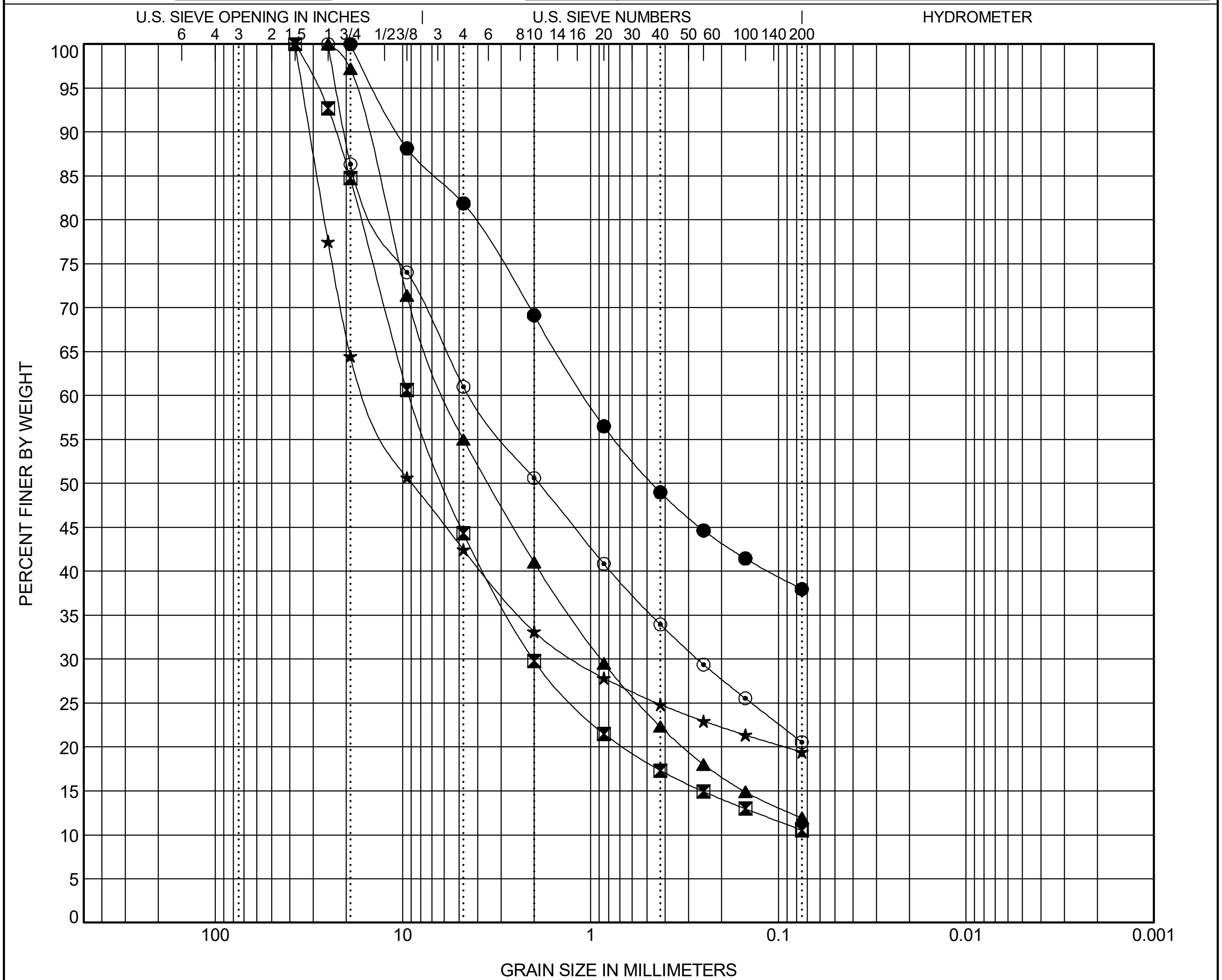
	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**TP-01**	**3.0**	**37.5**	**2.186**			**33.7**	**28.9**	**37.4**	
⧗	**TP-03**	**2.5**	**25**	**0.1**			**17.5**	**23.4**	**59.0**	
▲	**TP-05**	**3.0**	**37.5**	**5.316**	**0.138**		**42.5**	**29.4**	**28.1**	
★	**TP-06**	**3.0**	**37.5**	**4.549**	**0.32**		**39.4**	**37.1**	**23.5**	
⊙	**TP-07**	**3.0**	**25**	**5.498**	**0.651**		**43.5**	**45.6**	**10.8**	

GRAIN SIZE - GINT STD US LAB.GDT - 10/31/23 14:04 - G:\SOFTWARE\GINT\PROJECTS\1033E - 201 PENNSYLVANIA AVE - TEST PITS.GPJ

GRAIN SIZE DISTRIBUTION

CLIENT E. Kahn Development **PROJECT NAME** 201 Pennsylvania Avenue

PROJECT NUMBER 1033E **PROJECT LOCATION** 201 Pennsylvania Ave, Malvern, Chester, PA



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

BOREHOLE		DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**TP-08**	**3.0**	**SILTY SAND with GRAVEL(SM)**	**NP**	**NP**			
⊠	**TP-09**	**4.0**	**WELL-GRADED GRAVEL with SILT and SAND(GW-GM)**				**6.8**	**143.4**
▲	**TP-10**	**3.0**	**WELL-GRADED GRAVEL with SILT and SAND(GW-GM)**				**2.8**	**122.5**
★	**TP-11**	**2.5**	**SILTY GRAVEL with SAND(GM)**	**41**	**33**	**8**		
⊙	**TP-13**	**2.5**	**SILTY SAND with GRAVEL(SM)**					

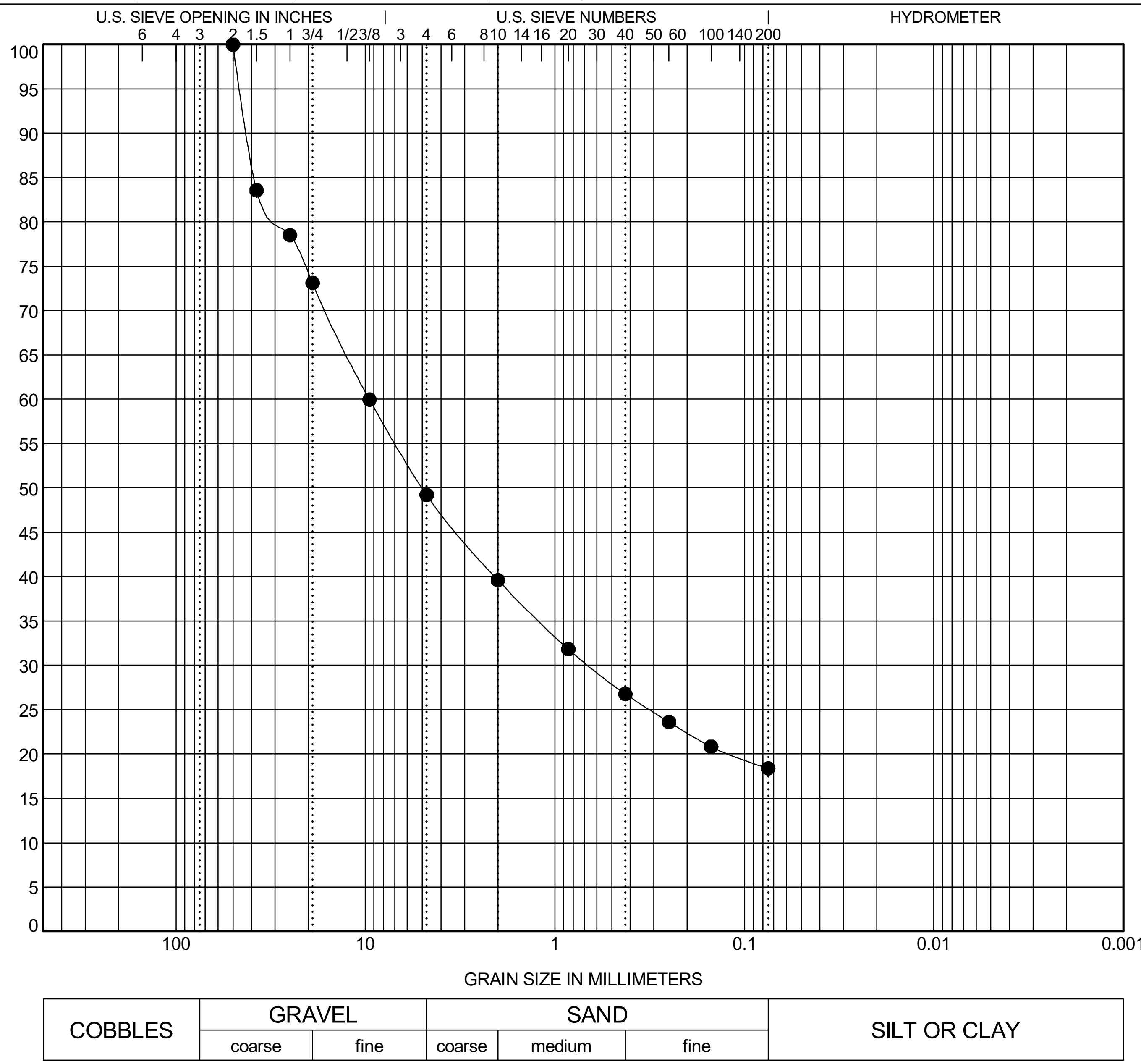
BOREHOLE		DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**TP-08**	**3.0**	**19**	**1.077**			**18.1**	**43.9**	**38.0**	
⊠	**TP-09**	**4.0**	**37.5**	**9.257**	**2.022**		**55.7**	**33.8**	**10.5**	
▲	**TP-10**	**3.0**	**25**	**5.868**	**0.88**		**45.0**	**43.1**	**11.9**	
★	**TP-11**	**2.5**	**37.5**	**15.174**	**1.205**		**57.5**	**23.0**	**19.4**	
⊙	**TP-13**	**2.5**	**25**	**4.371**	**0.269**		**39.0**	**40.5**	**20.5**	

GRAIN SIZE DISTRIBUTION

HOWELL ENVIRONMENTAL
Local Knowhow. Engineered.

CLIENT E. Kahn Development **PROJECT NAME** 201 Pennsylvania Avenue

PROJECT NUMBER 1033E **PROJECT LOCATION** 201 Pennsylvania Ave, Malvern, Chester, PA



BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● **TP-10&11**	**0.0-2.0**	**SILTY GRAVEL with SAND(GM)**					
(PROCTOR)							

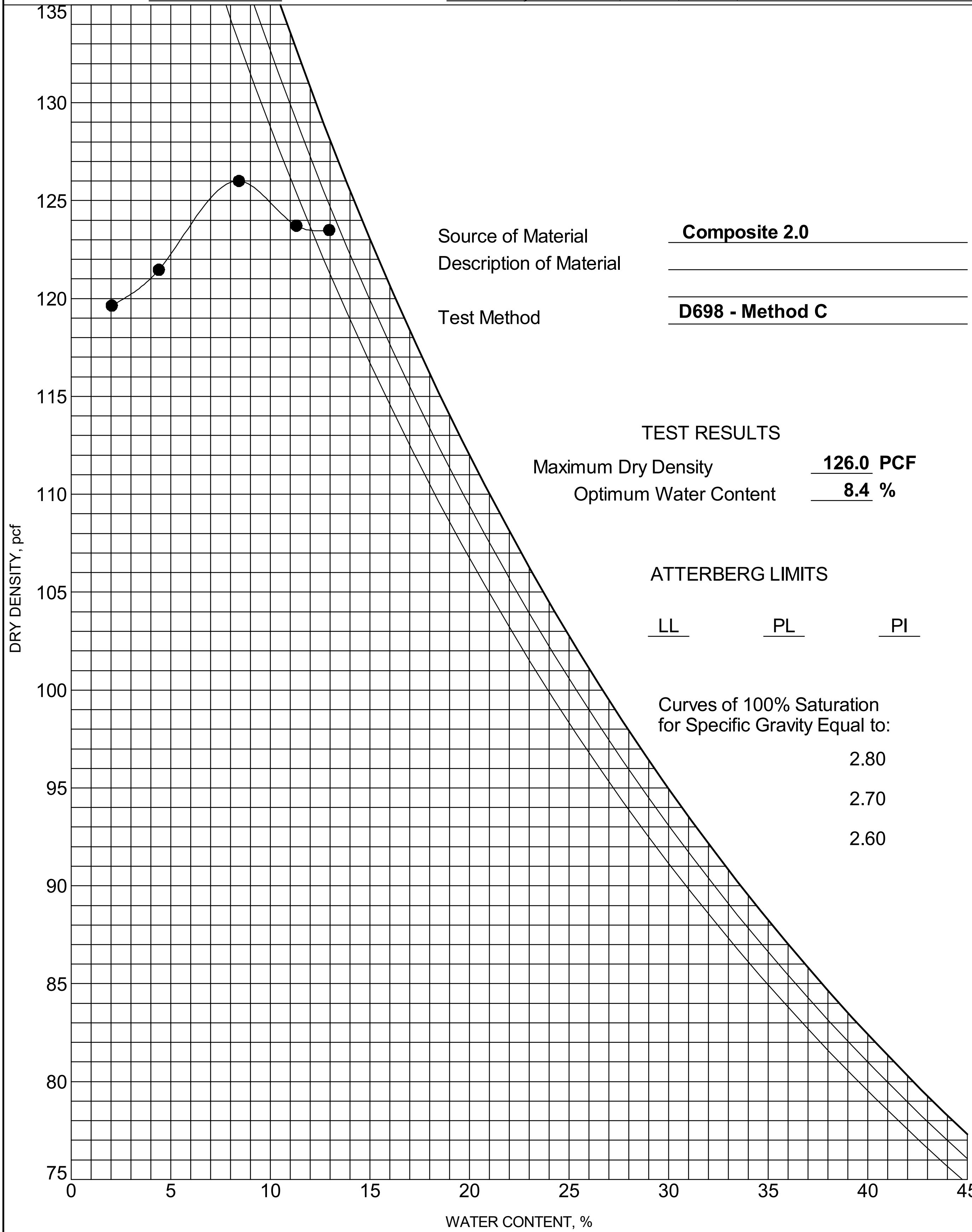
BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **TP-13**	**3.0**	**50**	**9.518**	**0.662**		**50.8**	**30.8**	**18.4**	

HOWELL ENVIRONMENTAL
Local Knowhow. Engineered.

MOISTURE-DENSITY RELATIONSHIP

CLIENT E. Kahn Development **PROJECT NAME** 201 Pennsylvania Avenue

PROJECT NUMBER 1033E **PROJECT LOCATION** 201 Pennsylvania Avenue, Malvern, Chester, PA



Source of Material **Composite 2.0**

Description of Material

Test Method **D698 - Method C**

TEST RESULTS

Maximum Dry Density **126.0 PCF**

Optimum Water Content **8.4 %**

ATTERBERG LIMITS

LL	PL	PI

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

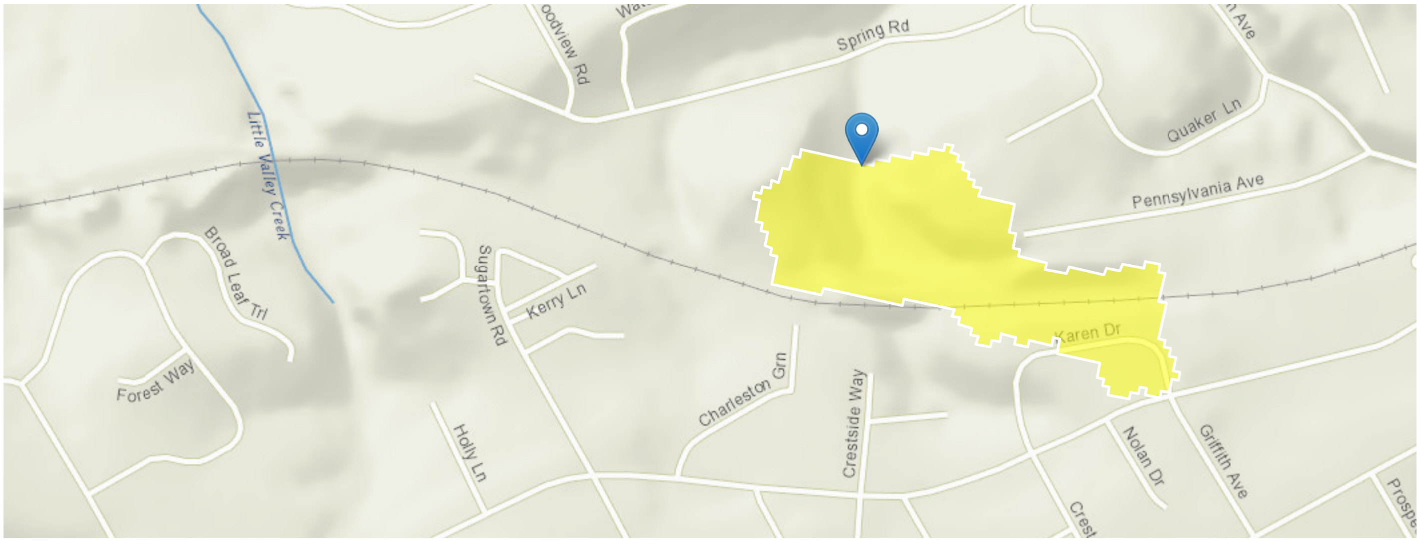
2.60

APPENDIX K

STREAM STATS REPORT

StreamStats Report

Region ID: PA
Workspace ID: PA20240227134427691000
Clicked Point (Latitude, Longitude): 40.03728, -75.52500
Time: 2024-02-27 08:44:49 -0500



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
CARBON	Percentage of area of carbonate rock	0	percent
DRNAREA	Area that drains to a point on a stream	0.0365	square miles

Peak-Flow Statistics

Peak-Flow Statistics Parameters [Peak Flow Region 4 SIR 2019 5094]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0365	square miles	1.2	512
CARBON	Percent Carbonate	0	percent	0	68.5

Peak-Flow Statistics Disclaimers [Peak Flow Region 4 SIR 2019 5094]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Peak-Flow Statistics Flow Report [Peak Flow Region 4 SIR 2019 5094]

Statistic	Value	Unit
50-percent AEP flood	22.6	ft^3/s
20-percent AEP flood	43.9	ft^3/s
10-percent AEP flood	63	ft^3/s
4-percent AEP flood	92.1	ft^3/s
2-percent AEP flood	117	ft^3/s
1-percent AEP flood	145	ft^3/s

Statistic	Value	Unit
0.5-percent AEP flood	176	ft^3/s
0.2-percent AEP flood	222	ft^3/s

Peak-Flow Statistics Citations

Roland, M.A., and Stuckey, M.H.,2019, Development of regression equations for the estimation of flood flows at ungaged streams in Pennsylvania: U.S. Geological Survey Scientific Investigations Report 2019–5094, 36 p. (https://doi.org/10.3133/sir20195094)

Maximum Probable Flood Statistics

Maximum Probable Flood Statistics Parameters [Crippen Bue Region 4]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.0365	square miles	0.1	10000

Maximum Probable Flood Statistics Disclaimers [Crippen Bue Region 4]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Maximum Probable Flood Statistics Flow Report [Crippen Bue Region 4]

Statistic	Value	Unit
Maximum Flood Crippen Bue Regional	215	ft^3/s

Maximum Probable Flood Statistics Citations

Crippen, J.R. and Bue, Conrad D.1977, Maximum Floodflows in the Conterminous United States, Geological Survey Water-Supply Paper 1887, 52p. (https://pubs.usgs.gov/wsp/1887/report.pdf)

Application Version: 4.19.4
StreamStats Services Version: 1.2.22
NSS Services Version: 2.2.1