



May 30, 2023

Jason Pezzullo
Planning Director
Cranston City Hall
869 Park Avenue
Cranston, RI 02910

via Hand Delivery

Re: Development Plan Review Submission
A.P. 36, Lots 8 & 37
Plainfield Pike
Cranston, Rhode Island
MSE Project No. 22.393.704

Mr. Pezzullo:

The following documentation is submitted to you for the purpose of Development Plan Review. In addition to planning approval, this project will require RIDEM Wetlands approval and a RIDOT Physical Alteration Permit.

Enclosed herewith, please find the following:

1. One (1) original and six (6) copies of the completed Development Plan Review Application;
2. Six (6) copies of plans entitled, "Permitting Plans for Proposed Commercial Condominiums; A.P. 36, Lots 8 & 37; Plainfield Pike; Cranston, Rhode Island; Prepared for Haus 001, LLC" Prepared by Millstone Engineering, P.C., Dated June 2022; Revised December 13, 2022; Sheets 1 – 11 of 11.
3. Six (6) copies of plan entitled, "500' Locus Map for Proposed Commercial Condominiums; A.P. 36, Lots 8 & 37; Plainfield Pike; Cranston, Rhode Island; Prepared for Haus 001, LLC" Prepared by Millstone Engineering, P.C., Dated May 2023
4. Six (6) copies of the Project Narrative and Drainage Analysis dated June 2022; revised 12/13/22;
5. Six (6) copies of the Operation and Maintenance Plan / Pollution Prevention Plan dated June 2022; revised 12/13/22;
6. One (1) copy of the 200' Abutters List, dated May 2023.
7. A set of eight (8) stamped envelopes addressed to each abutter within 200'.
8. One (1) copy of the Municipal Lien Certificate showing that all taxes are current for the subject lots.



9. One (1) copy of RIDEM Wetlands Permit No. 22-0327.
10. Remittance of seven hundred (\$700.00) dollars (Check No. 1200).

Please call at your convenience should you have any questions or require any additional information.

Sincerely,

MILLSTONE ENGINEERING, P.C.


Benjamin J. Caito, P.E.
Senior Engineer

Enclosures

Cc: Robert Calise Jr., without enclosures

22.393.704 - DPR_2023-05-30-L.docx

**CRANSTON, RHODE ISLAND
APPLICATION FOR DEVELOPMENT PLAN REVIEW**

PROJECT NAME: Proposed Commercial Condominiums	
ADDRESS: Plainfield Pike	
ASSESSOR'S PLAT(s): 36	LOT(s): 8 & 37
ZONING: M-2 with Commercial Flex Space Overlay	AREA: 9.23 AC total (4.77 + 4.46)

OWNER: Haus 001, LLC	
ADDRESS: 81 Crest Drive Cranston, RI 02921	PHONE #: 401-477-4206
APPLICANT: Same as Owner (if different)	
ADDRESS:	PHONE #:
ATTORNEY: Louis A. DeQuattro, Jr., Esq., CPA	PHONE #: 401-578-6848
ENGINEER: Millstone Engineering, P.C.	PHONE #: 401-921-3344
SURVEYOR: Millstone Engineering, P.C.	PHONE #: 401-921-3344
LANDSCAPE ARCHITECT:	PHONE #:

PROJECT DESCRIPTION:

The development proposes a 13,200-square foot building, accommodating 11 commercial condominium units and a 2,250-square foot secondary building, housing an additional commercial condominium. A 24-foot driveway provides access to the site. The development will be serviced by public water and sewer, and has been designed with the appropriate measures to handle all stormwater on-site.

DOCUMENTS SUBMITTED:

See attached cover letter.


SIGNATURE OF OWNER (s)

5/25/2023
DATE

SIGNATURE OF APPLICANT (s)

DATE

ARCBUILD, LLC
81 CREST DR
CRANSTON, RI 02921-8313

04-20

1200

37-1/15 RI
10/62

PAY
TO THE
ORDER OF

City of Cranston

DATE

5/25/2023

\$ 1700.00

BANK OF AMERICA



DOLLARS



Mobile
Deposit
Checks on Back

ACH 001 011500010

FOR *Mr Application - 0 PLAINFIELD RUC*

⑆001200⑆

⑆011500010⑆

394009512263⑆

**ABUTTERS WITHIN 200' OF
Cranston, RI A.P. 36, Lots 8 & 37
Project File No. 22.393.704**

Research per City of Cranston GIS Database
Date of Research: May 26, 2023

Cranston Plat/Lot

Owner Name/Address

36/32	LORENZO DEBIASIO 2380 PLAINFIELD PIKE CRANSTON, RI 02921-2037
36/96	WESTERN IND COMPLEX INC ONE STAMP FARM EXETER, RI 02822
35/12	GEORGE O IANNELLI 2400 PLAINFIELD PIKE CRANSTON, RI 02921-2038
36/7	GOLDMAN PROPERTIES LLC 2 CIRCUIT DR CRANSTON, RI 02905

Johnston Plat/Lot

Owner Name/Address

30/99	GRASSETT GARY C & NANCY TE 185 PLAINFIELD PK NORTH SCITUATE, RI02857
30/18, 30/56	TWO SISTERS REALTY LLC 2208 PLAINFIELD PK JOHNSTON, RI 02919
30/30	KEEFE JOHN R 16 TAYLOR RD JOHNSTON, RI 02919
30/76, 30/102	2071 PROPERTIES LLC 2071 PLAINFIELD PK JOHNSTON, RI 02919



**Certificate of Municipal Liens
Under 44-7-11 of the
General Laws of Rhode Island**
Cranston City Hall
Tax Collections Dept
869 Park Avenue

CERTIFICATE NUMBER: 2022-1437835
ISSUED: 26-May-2023

**TAX RATE SUMMARY
FISCAL YEAR 2022**

Residential:	18.51
Open Space:	18.51
Commercial:	27.77
Industrial:	27.77
Total Value:	\$155,700

I certify from available information that all taxes, assessments and charges now payable that constitute liens as of the date of this certificate on the parcel of real estate specified in your application are listed below.

Maxwell Viana
250 CENTERVILLE RD. BUILDING E-12
WARWICK RI 02886

Parcel Id: 036-0037-000
Location: PLAINFIELD PIKE
Acreage: 4.45000
Legal Reference:
Assessed Owner(s): PEDROSO DINIS P
PEDROSO MARIA I T/E
Current Owner: PEDROSO DINIS P
PEDROSO MARIA I T/E

2022 Bill #1705140003 2021 Bill #1705140003 2020 Bill #1705140003 Prior to 2020

ASSESSMENTS	2022 Bill #1705140003	2021 Bill #1705140003	2020 Bill #1705140003	Prior to 2020				
Gross Tax	\$4,323.79	\$4,203.90	\$4,331.24	\$32,232.71				
Net Tax	\$4,323.79	\$4,203.90	\$4,331.24	\$32,232.71				
Total Net	\$4,323.79	\$4,203.90	\$4,331.24	\$32,232.71				
PAYMENTS								
Tax Payments	\$4,323.79	\$4,203.90	\$4,331.24	\$32,232.71				
OTHER								
Net Q1 RE Tax Due: 15-Jul-2022	\$1,080.94	\$1,050.97	\$1,082.81	\$8,058.16				
Net Q2 RE Tax Due: 17-Oct-2022	\$1,080.94	\$1,050.97	\$1,082.81	\$8,058.16				
Net Q3 RE Tax Due: 17-Jan-2023	\$1,080.94	\$1,050.97	\$1,082.81	\$8,058.16				
Net Q4 RE Tax Due: 17-Apr-2023	\$1,080.97	\$1,050.99	\$1,082.81	\$8,058.23				
UNPAID TAXES								
TOTAL UNPAID TAXES (PER DIEM)	\$0.00	\$0.00	\$0.00					
PAYMENT HISTORY	Date	Amount	Date	Amount	Date	Amount	Date	Amount
	4/3/2023	1,080.97	4/14/2022	1,050.99	4/14/2021	1,082.81	4/14/2020	1,082.81
	1/17/2023	1,080.94	1/10/2022	1,050.97	1/15/2021	1,082.81	1/16/2020	1,082.81
	10/6/2022	1,080.94	10/12/2021	1,050.97	10/9/2020	1,082.81	10/15/2019	1,082.81
	7/18/2022	1,080.94	7/12/2021	1,050.97	7/16/2020	1,082.81	7/11/2019	1,082.81
	-	-	-	-	-	-	3/25/2019	1,057.79
	-	-	-	-	-	-	1/14/2019	1,057.79
	-	-	-	-	-	-	10/18/2018	1,057.79
	-	-	-	-	-	-	7/16/2018	1,057.79
	-	-	-	-	-	-	4/17/2018	1,195.77
	-	-	-	-	-	-	1/10/2018	1,195.74

I HAVE NO KNOWLEDGE OF ANY OTHER LIENS OUTSTANDING AS OF THIS DATE: 5/26/2023

OTHER UNPAID BALANCES

DESCRIPTION	LAST READ	ACCOUNT #	BALANCE DUE	NOTES
Note:				WATER USE SEE PROVIDENCE

This is to certify that the above is true and correct. Said Certification is given in accordance with 44-7-11 of the General Laws of Rhode Island 1956 as of this day 26-May-2023

City Treasurer
City of Cranston



ORIGINAL

Certificate of Municipal Liens Under 44-7-11 of the General Laws of Rhode Island Cranston City Hall Tax Collections Dept 869 Park Avenue

CERTIFICATE NUMBER: 2022-1437835 ISSUED: 26-May-2023

TAX RATE SUMMARY FISCAL YEAR 2022

Table with 2 columns: Category (Residential, Open Space, Commercial, Industrial, Total Value) and Rate/Amount.

I certify from available information that all taxes, assessments and charges now payable that constitute liens as of the date of this certificate on the parcel of real estate specified in your application are listed below.

Maxwell Viana 250 CENTERVILLE RD. BUILDING E-12 WARWICK RI 02886

Parcel Id: 036-0037-000 Location: PLAINFIELD PIKE Acreage: 4.45000 Legal Reference: Assessed Owner(s): PEDROSO DINIS P PEDROSO MARIA I T/E Current Owner: PEDROSO DINIS P PEDROSO MARIA I T/E

2022 Bill #1705140003 2021 Bill #1705140003 2020 Bill #1705140003 Prior to 2020

Main table with columns for ASSESSMENTS, PAYMENTS, OTHER, UNPAID TAXES, and PAYMENT HISTORY. Includes sub-headers for 2022, 2021, 2020, and Prior to 2020.

I HAVE NO KNOWLEDGE OF ANY OTHER LIENS OUTSTANDING AS OF THIS DATE: 5/26/2023

OTHER UNPAID BALANCES

Table with columns: DESCRIPTION, LAST READ, ACCOUNT #, BALANCE DUE, NOTES. Includes a note about water use.

Handwritten signature of the City Treasurer, City of Cranston.

This is to certify that the above is true and correct. Said Certification is given in accordance with 44-7-11 of the General Laws of Rhode Island 1956 as of this day 26-May-2023



RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF WATER RESOURCES
235 Promenade Street
Providence, Rhode Island 02908

January 26, 2023

Dinis & Maria Pedroso
132 Harvard Street
Cranston, RI 02920

Insignificant Alteration – Permit

Re: Application No. 22-0327 in reference to the location below:

Approximately 75 feet south of Plainfield Pike (Route 14), opposite Utility Pole 399, approximately 300 feet southeast of its intersection with Everbloom Drive, Assessor's Plat 36, Lots 8 & 37, Cranston, RI.

Dear Mr. & Mrs. Pedroso:

Kindly be advised that the Department of Environmental Management's ("DEM") Freshwater Wetlands Program ("Program") has completed its review of your **Request for Preliminary Determination** application. This review included a site inspection of the above referenced property ("subject property") and an evaluation of the proposed construction of two (2) new commercial buildings with associated paved parking and driveway areas, retaining walls, and all associated stormwater practices as illustrated and detailed on site plans submitted with your application. These site plans were received by the DEM on December 14, 2022.

Our observations of the subject property, review of the site plans and evaluation of the proposed project reveals that alterations of freshwater wetlands are proposed. However, pursuant to 250-RICR-150-15-1.9 of the Rules and Regulations Governing the Administration and Enforcement of the Fresh Water Wetlands Act, 250-150-15-1, this project may be permitted as an **insignificant alteration** to freshwater wetlands under the following terms and conditions:

**Terms and Conditions for Wetlands Application No. 22-0327; RIPDES No. RIR102408;
Groundwater Discharge/UIC No. 002124:**

1. This letter is the DEM's permit for this project under the R.I. Fresh Water Wetlands Act, R.I. Gen. Laws § 2-1-18 et seq. This application review has also included review of any stormwater infiltration system subject to the DEM Groundwater Discharge Rules (Rules for the Discharge of Non-Sanitary Wastewater and Other Fluid to or Below the Ground Surface), 250-RICR-150-05-4.
2. This determination also includes your final authorization to discharge storm water associated with construction activity under the **2020 RIDPES General Permit for Stormwater Discharge During Construction Activity ("CGP")**. For future references and inquiry, your permit authorization number is RIPDES No. **RIR102408**.
3. This permit is specifically limited to the project, site alterations and limits of disturbance as detailed on the site plans submitted with your application and received by the DEM on

Telephone 401.222.4700 | www.dem.ri.gov | Rhode Island Relay 711

December 14, 2022. A copy of the site plans stamped approved by the DEM is enclosed. Changes or revisions to the project that would alter freshwater wetlands are not authorized without a permit from the DEM.

4. Where the terms and conditions of the permit conflict with the approved site plans, these terms and conditions shall be deemed to supersede the site plans.
5. You must notify this Program in writing of the anticipated start date, and of your contractor's contact information, by submitting the Notice of Start of Construction Form prior to commencement of any permitted site alterations or construction activity. You must also notify this Program in writing upon completion of the project, including submittal of the Notice of Termination Form. The Start of Construction Form and the Notice of Termination can be found on the webpage: dem.ri.gov/stormwaterconstruction
6. A copy of the stamped approved site plans and a copy of this permit must be kept at the site at all times during site preparation, construction, and final stabilization. Copies of this permit and the stamped approved plans must be made available for review by any DEM or city representative upon request.
7. Within ten (10) days of the receipt of this permit, you must record this permit in the land evidence records of the City of Cranston and supply this Program with written documentation obtained from the City showing this permit was recorded.
8. The effective date of this permit is the date this letter was issued. This permit expires four (4) years from the date of this letter unless renewed pursuant to the Rules.
9. Any material utilized in this project must be clean and free of matter that could pollute any freshwater wetland.
10. Prior to commencement of site alterations, you shall erect or post a sign resistant to the weather and at least twelve (12) inches wide and eighteen (18) inches long, which boldly identifies the initials "DEM" and the application number of this permit. This sign must be maintained at the site in a conspicuous location until such time that the project is complete.
11. Both the owner and the contractor retained to undertake the construction activity are required to comply with all terms and conditions of the CGP. This includes maintaining the Soil Erosion and Sediment Control (SESC) Plan, performing the required inspections and maintenance of the selected Best Management Practices (BMPs), and retaining inspection records. Further information on the requirements of the CGP is available at:
<http://www.dem.ri.gov/programs/benviron/water/permits/ripdes/pdfs/cgp092620.pdf>.
12. Temporary erosion and sediment controls detailed or described on the approved site plans shall be properly installed at the site prior to or commensurate with site alterations. Such controls shall be properly maintained, replaced, supplemented, or modified as necessary throughout the life of this project to minimize soil erosion and to prevent sediment from being deposited in any wetlands not subject to disturbance under this permit.
13. Upon permanent stabilization of all disturbed soils, temporary erosion and/or sediment controls must be removed.

14. You are responsible for the proper installation, operation, maintenance and stability of any mitigative features, stormwater treatment facilities, and systems of treatment and control that are installed or used in compliance with this permit to prevent harm to adjacent wetlands until documentation is provided that this responsibility has been assigned to another entity. The long-term operation and maintenance plan shall be strictly followed. The long-term O & M Plan shall be that entitled "Operation and Maintenance Plan, Pollution Prevention Plan, Commercial Condominiums, A. P. 36, Lots 8 and 37, Plainfield Pike, Cranston, RI; Prepared for: HAUS 001, LLC, Robert Calise, 81 Crest Drive, Cranston, RI 02921", bearing latest revision date of 12/13/2022, dated received 12/14/2022, indicated as Prepared by: Millstone Engineering, P.C., 250 Centerville Road, Building E-12, Warwick, Rhode Island 02886.
15. You are obligated to install, utilize and follow all best management practices detailed or described on the approved site plans in the construction of the project to minimize or prevent adverse impacts to any adjacent freshwater wetlands and the functions and values provided by such wetlands.
16. Artificial lighting must be directed away from all vegetated wetland areas. Where this is not possible, the use of deflectors to concentrate lighting away from vegetated wetlands must be employed.
17. You must provide written certification from a registered land surveyor or registered professional engineer that the stormwater drainage system including any and all basins, piping systems, catch basins, culverts, swales and any other stormwater management control features have been constructed/installed in accordance with the site plans approved by this permit. This written certification must be submitted to this Program within twenty (20) days of its request or upon completion of the project.

Pursuant to the provisions in 250-RICR-150-15-1.7(A)(9) and 250-RICR-150-15-1.11(D), as applicable, any properly recorded and valid permit is automatically transferred to the new owner upon sale of the property.

Please be aware that the RIDEM's Rules and Regulations Governing the Establishment of Various Fees (250-RICR-30-00-1) require that RIPDES CGP permit holders to pay an Annual Fee of \$100.00. An invoice will be sent to the owner on record in May/June of each year if the construction was still active as of December 31st of the previous year. The owner will be responsible for the Annual Fee until the construction activity has been completed, the site has been properly stabilized, and a completed Notice of Termination (NOT) has been received by the RIPDES Program.

You are required to comply with the terms and conditions of this permit and to carry out this project in compliance with the Rules at all times. Failure to do so may result in an enforcement action by this Department.

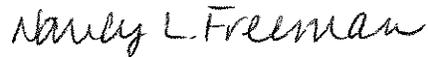
In permitting the proposed alterations, the DEM assumes no responsibility for damages resulting from faulty design or construction.

Kindly be advised that this permit is not equivalent to a verification of the type or extent of freshwater wetlands on site. Should you wish to have the types and extent of freshwater wetlands verified, you may submit the appropriate application in accordance with 250-RICR-150-15-1.8(C).

This permit does not remove your obligation to obtain any local, state, or federal approvals or permits required by ordinance or law and does not relieve you from any duties owed to adjacent landowners with specific reference to any changes in drainage.

Please contact Rene Legault of this office (telephone: 401-222-4700, ext. 2777732) should you have any questions regarding this letter.

Sincerely,



Nancy L. Freeman, Principal Environmental Scientist
Office of Water Resources
Freshwater Wetlands Program
NLF/RJL/rjl

Enclosure: Approved site plans

ec: Stanley Pikul, City of Cranston Alternate Building Official
Jeffrey C. Hanson, PE, Millstone Engineering P.C.
Neal Personeus, DEM Stormwater Program

REFERENCES:

1. PLAN - "SCHEMATIC DESIGN, ASSESSOR'S PLAT 36, LOTS 8 AND 37, PLAINFIELD PIKE (ROUTE 14), CRANSTON, RHODE ISLAND, PREPARED FOR DELFINO CORPORATION, PREPARED BY JOHN P. CAITO CORPORATION, JANUARY 2001
2. PLAN - "STATE HIGHWAY PLAT 1269" (PLAINFIELD PIKE)
3. PLAN - "FINAL SUBDIVISION PLAN WESTERN INDUSTRIAL COMPLEX SECTION 2, PHASE 1 ASSESSOR'S PLAT 36 LOT 83 AND PORTION OF LOT 96 SITUATED IN CRANSTON, RHODE ISLAND PREPARED FOR WILLIAM STAMP PREPARED BY JOHN P. CAITO CORPORATION NOVEMBER, 1996 SCALE: 1"=100'" (PLAT CARD 626, MAP 248)
4. DEED - BOOK 1246, PAGE 104: JOHN A. SCARALIA AND JUDITH A. DI BELLO TO DINIS P. PEDROSO AND MARIA I. PEDROSO
5. DEED - BOOK 1246, PAGE 107: JOHN A. SCARALIA TO DINIS P. PEDROSO AND MARIA I. PEDROSO
6. DEED - BOOK 562, PAGE 78: ANTONIO DIFAZIO AND JOSEPHINE DIFAZIO TO ALBERT SCARALIA AND BENJAMIN SCARALIA
7. DEED - BOOK 472, PAGE 865: GEORGE E. BROWN AND OLIVINE M. BROWN TO LORENZO D'ABASIO
8. DEED - BOOK 1062, PAGE 540: J.A.L.S.R. REALTY, INC. TO SUIZA GTL, LLC
9. EASEMENT DEED - BOOK 317, PAGE 252: GEORGE BROWN TO THE NARRAGANSETT ELECTRIC COMPANY
10. RIGHT OF WAY AGREEMENT - BOOK 741, PAGE 799: ALBERT SCARALIA AND BENJAMIN SCARALIA TO TENNESSEE GAS PIPELINE COMPANY

NOTES:

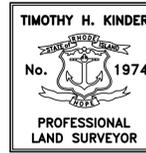
1. EXISTING UTILITIES PER PLAN BY TURNING POINT SURVEY CO., INC. LOCATION AND DEPTH OF EXISTING UTILITIES ARE APPROXIMATE AND HAVE BEEN PLOTTED FROM THE BEST AVAILABLE INFORMATION. THE CONTRACTOR SHALL CHECK AND VERIFY LOCATIONS OF ALL EXISTING UTILITIES BOTH UNDERGROUND AND OVERHEAD. ANY DAMAGE TO EXISTING UTILITIES AS SHOWN OR NOT SHOWN ON THE PLANS SHALL BE THE CONTRACTOR'S RESPONSIBILITY. COSTS OF SUCH DAMAGE SHALL BE BORNE BY THE CONTRACTOR. NO EXCAVATION SHALL BE DONE UNTIL ALL INVOLVED UTILITY COMPANIES ARE NOTIFIED 72-HOURS IN ADVANCE. THE CONTRACTOR SHALL BE RESPONSIBLE TO NOTIFY DIG-SAFE (1-888-344-7233) A MINIMUM OF 72 WORKING HOURS, EXCLUDING WEEKENDS AND HOLIDAYS, PRIOR TO THE START OF ANY EXCAVATION AND/OR BLASTING WORK. THE NAME OF THE COMPANY PERFORMING THE EXCAVATION AND/OR BLASTING WORK MUST BE SUPPLIED TO DIG-SAFE, IF IT IS DIFFERENT FROM THE CALLER.
2. PROPERTY LINE, EASEMENTS, AND WETLAND EDGE HAVE BEEN OBTAINED FROM REFERENCE 1.

PLAT INDEX:

THIS PLAN SHALL BE INDEXED BY THE FOLLOWING STREETS:
PLAINFIELD PIKE

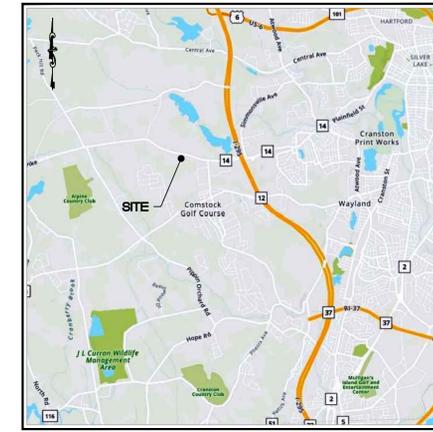
LEGEND:

- SUBJECT LOT LINE
- ABUTTING LOT LINE
- EASEMENT LINE
- BUILDING SETBACK LINE
- FLAGGED WETLAND EDGE
- 50' PERIMETER WETLAND SETBACK
- 200' RIVERBANK WETLAND
- TH-D1 ■ EXISTING TEST PIT LOCATION
- EXISTING BUILDING
- EXISTING EDGE OF PAVEMENT
- 350' EXISTING CONTOUR
- G — EXISTING GAS LINE
- S — EXISTING SEWER LINE
- OHW — EXISTING OVERHEAD WIRE
- ⊙ #1 EXISTING UTILITY POLE

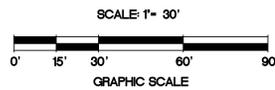
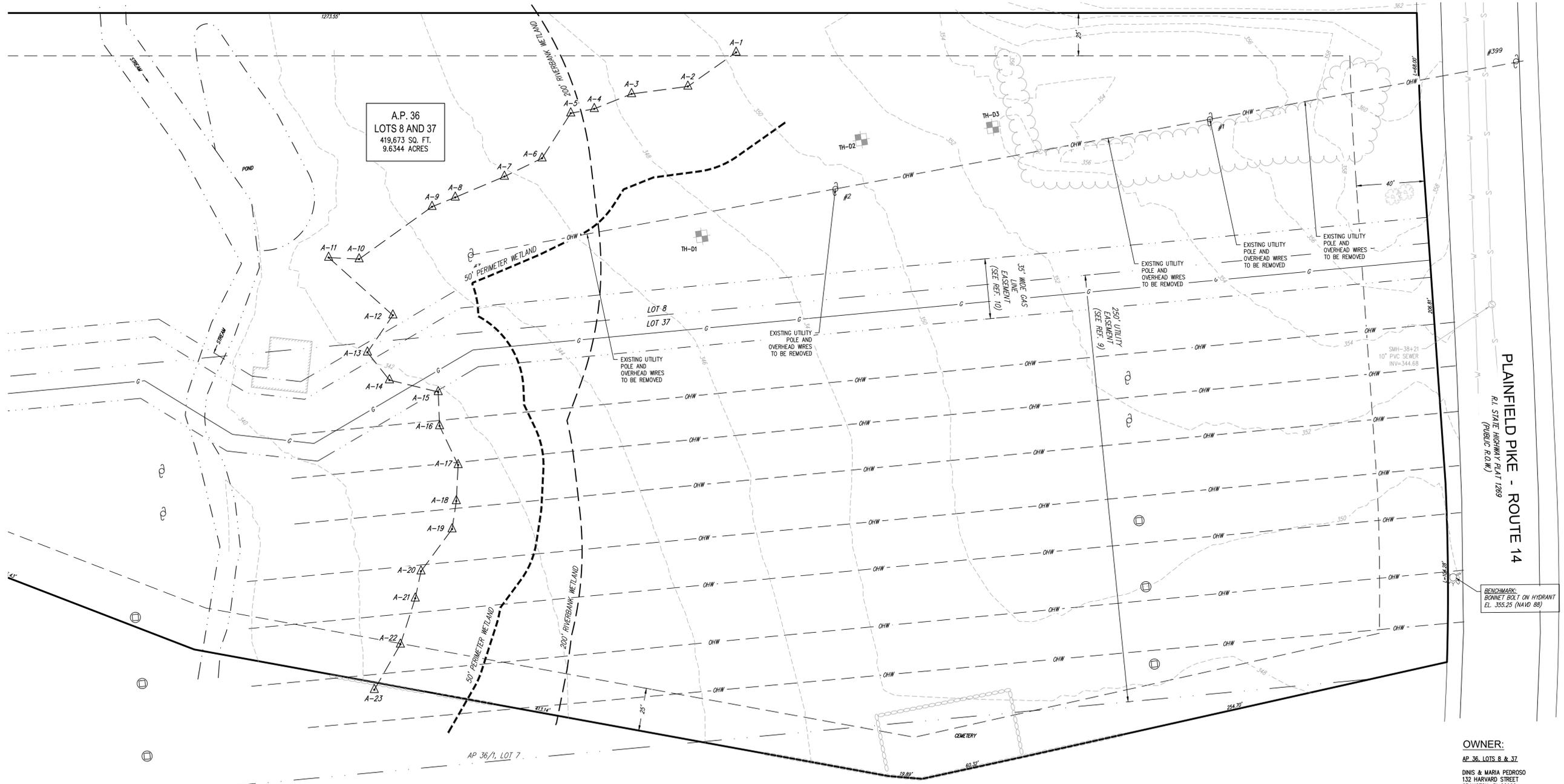


CERTIFICATION:

THIS SURVEY HAS BEEN CONDUCTED AND THE PLAN HAS BEEN PREPARED PURSUANT TO 435-RIGR-00-00-1.9 OF THE RULES AND REGULATIONS ADOPTED BY THE RHODE ISLAND STATE BOARD OF REGISTRATION FOR PROFESSIONAL LAND SURVEYORS ON APRIL 28, 2018, AS FOLLOWS:
TYPE OF BOUNDARY SURVEY: MEASUREMENT SPECIFICATION
COMPILATION MAP: IV
THE PURPOSE FOR THE CONDUCT OF THE SURVEY AND FOR THE PREPARATION OF THE PLAN IS AS FOLLOWS:
TO PROVIDE AN ACCURATE EXISTING CONDITIONS SURVEY PLAN.
BY: *[Signature]* 12/13/22
TIMOTHY H. KINDER, PLS LICENSE NO. 1974 CDA. NO. A-534 DATE



LOCATION MAP
NOT TO SCALE



PERMIT SET
NOT FOR CONSTRUCTION

OWNER:
AP 36, LOTS 8 & 37
DINIS & MARIA PEDROSO
132 HARVARD STREET
CRANSTON, RI 02920

APPLICANT:
HAUS 001, LLC
81 CREST DRIVE
CRANSTON, RI 02921

NO.	DATE	REVISION
1	12/13/22	RIDEM COMMENTS



MILLSTONE ENGINEERING, P.C.
CIVIL ENGINEERING • LAND PLANNING
250 Centerville Road, Building B, E-12
Warwick, Rhode Island 02886
www.MillstoneEng.com
P. (401) 921-3344 F. (401) 921-3303

EXISTING CONDITIONS PLAN

PROPOSED COMMERCIAL CONDOMINIUMS

AP 36, LOTS 8 AND 37
PLAINFIELD PIKE
CRANSTON, RI

PREPARED FOR:
HAUS 001, LLC

SCALE: 1" = 30'
JUNE 2022

Drawn By: BJC
Checked By: JCH
Sheet
2
of 11
FILE NO.: 22.393.704

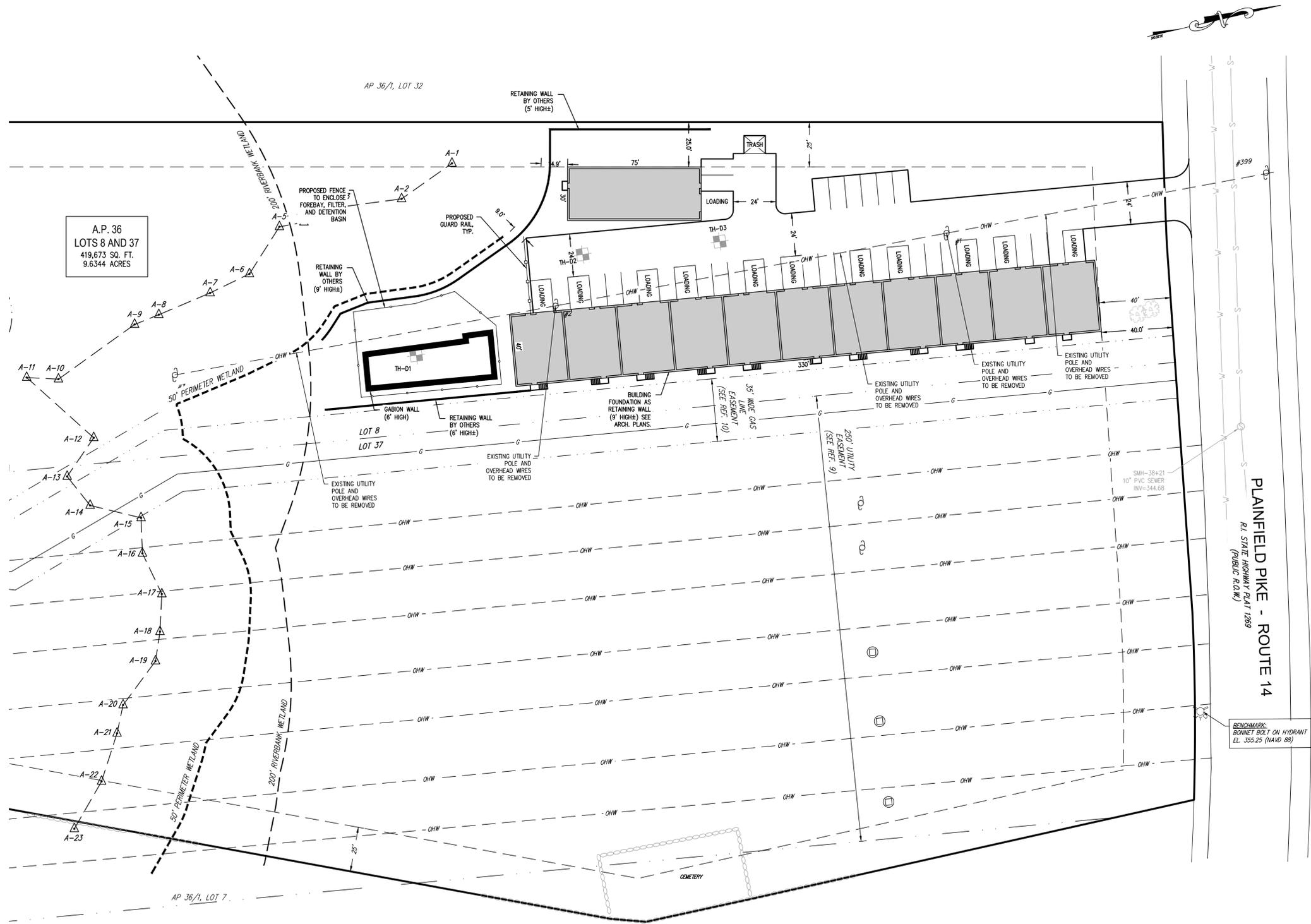
COPYRIGHT 2022
THIS DRAWING IS COPYRIGHTED AND SUBJECT TO COPYRIGHT PROTECTION. IT IS THE PROPERTY OF MILLSTONE ENGINEERING, P.C. AND SHALL NOT BE USED OR REPRODUCED WITHOUT THE WRITTEN CONSENT OF MILLSTONE ENGINEERING, P.C.

ZONING:

ZONE: INDUSTRIAL M-2 (GENERAL INDUSTRY)	REQUIRED	EXISTING	PROPOSED
MINIMUM LOT AREA	60,000 S.F.	419,670 S.F. ±	419,670 S.F. ±
MINIMUM LOT WIDTH AND FRONTAGE	200 FT.	379.1 FT.	379.1 FT.
MINIMUM FRONT YARD SETBACK	40 FT.	656.5 FT.	40.0 FT.
MINIMUM REAR YARD SETBACK	30 FT.	263.0 FT.	589.9 FT.
MINIMUM SIDE YARD SETBACK	25 FT.	188.9 FT.	25.0 FT.
MAXIMUM LOT COVERAGE	60%	0.5%	3.9%
MAXIMUM BUILDING HEIGHT	35 FT.	<35 FT.	<35 FT.

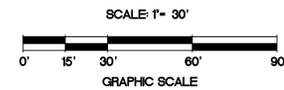
NOTES:

- SITE CONTRACTOR IS RESPONSIBLE FOR BRINGING UTILITIES WITHIN 5 FEET OF THE BUILDING.
- COORDINATE WITH ARCHITECTURAL DRAWINGS FOR LOCATIONS OF UTILITY CONNECTIONS.
- PROPERTY LINE, EASEMENTS, AND WETLAND EDGE HAVE BEEN OBTAINED FROM REFERENCE 1.
- TENANTS THAT WOULD PROMPT THE SITE TO BECOME A LAND USE OF HIGHER POTENTIAL POLLUTANT LOADING (LUPPL) AS CLASSIFIED IN TABLE 3-2 OF THE RHODE ISLAND STORMWATER DESIGN AND INSTALLATION STANDARDS MANUAL SHALL NOT BE PERMITTED TO OCCUPY UNITS ON THIS SITE.



LEGEND:

- SUBJECT LOT LINE
- ABUTTING LOT LINE
- EASEMENT LINE
- BUILDING SETBACK LINE
- FLAGGED WETLAND EDGE
- 50' PERIMETER WETLAND SETBACK
- 200' RIVERBANK WETLAND
- EXISTING TEST PIT LOCATION
- EXISTING BUILDING
- EXISTING GAS LINE
- EXISTING SEWER LINE
- EXISTING OVERHEAD WIRE
- EXISTING UTILITY POLE
- PROPOSED BUILDING



PERMIT SET
NOT FOR CONSTRUCTION

NO.	DATE	REVISION
1	12/13/22	RIDEM COMMENTS



MILLSTONE ENGINEERING, P.C.
 CIVIL ENGINEERING • LAND PLANNING
 250 Centerville Road, Building E-12
 Warwick, Rhode Island 02886
 www.MillstoneEng.com
 P. (401) 921-3344 F. (401) 921-3303

SITE LAYOUT PLAN
PROPOSED COMMERCIAL CONDOMINIUMS
 AP 36, LOTS 8 AND 37
 PLAINFIELD PIKE
 CRANSTON, RI
 PREPARED FOR:
HAUS 001, LLC
 SCALE: 1" = 30'
 JUNE 2022

Drawn By: BJC
 Checked By: JCH
 Sheet
3
 of 11
 FILE NO.: 22.393.704

OWNER:
 AP 36, LOTS 8 & 37
 DINIS & MARIA PEDROSO
 132 HARVARD STREET
 CRANSTON, RI 02920

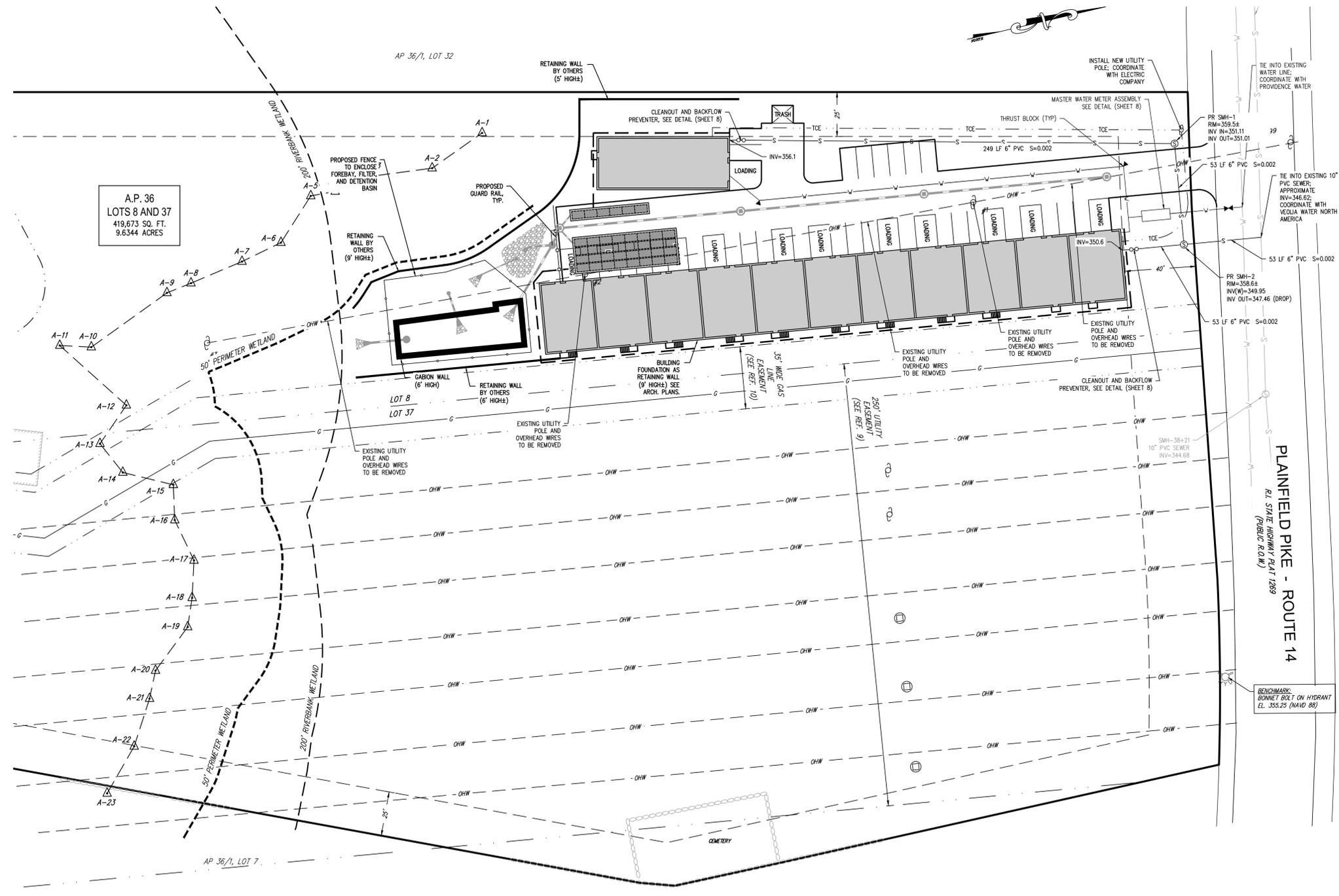
APPLICANT:
 HAUS 001, LLC
 81 CREST DRIVE
 CRANSTON, RI 02921

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NOTES:

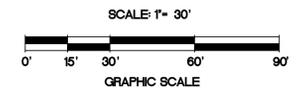
1. SITE CONTRACTOR IS RESPONSIBLE FOR BRINGING UTILITIES WITHIN 5 FEET OF THE BUILDING.
2. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR LOCATIONS OF UTILITY CONNECTIONS.
3. EXISTING UTILITIES PER PLAN BY TURNING POINT SURVEY CO., INC. LOCATION AND DEPTH OF EXISTING UTILITIES ARE APPROXIMATE AND HAVE BEEN PLOTTED FROM THE BEST AVAILABLE INFORMATION. THE CONTRACTOR SHALL CHECK AND VERIFY LOCATIONS OF ALL EXISTING UTILITIES BOTH UNDERGROUND AND OVERHEAD. ANY DAMAGE TO EXISTING UTILITIES AS SHOWN OR NOT SHOWN ON THE PLANS SHALL BE THE CONTRACTOR'S RESPONSIBILITY. COSTS OF SUCH DAMAGE SHALL BE BORNE BY THE CONTRACTOR. NO EXCAVATION SHALL BE DONE UNTIL ALL INVOLVED UTILITY COMPANIES ARE NOTIFIED 72-HOURS IN ADVANCE. THE CONTRACTOR SHALL BE RESPONSIBLE TO NOTIFY DIG-SAFE (1-888-344-7233) A MINIMUM OF 72 WORKING HOURS, EXCLUDING WEEKENDS AND HOLIDAYS, PRIOR TO THE START OF ANY EXCAVATION AND/OR BLASTING WORK. THE NAME OF THE COMPANY PERFORMING THE EXCAVATION AND/OR BLASTING WORK MUST BE SUPPLIED TO DIG-SAFE, IF IT IS DIFFERENT FROM THE CALLER.
4. PROPERTY LINE, EASEMENTS, AND WETLAND EDGE HAVE BEEN OBTAINED FROM REFERENCE 1.

NO.	DATE	REVISION
1	12/13/22	RIDEM COMMENTS



LEGEND:

	SUBJECT LOT LINE
	ABUTTING LOT LINE
	EASEMENT LINE
	BUILDING SETBACK LINE
	FLAGGED WETLAND EDGE
	50' PERIMETER WETLAND SETBACK
	200' RIVERBANK WETLAND
	EXISTING BUILDING
	EXISTING GAS LINE
	EXISTING SEWER LINE
	EXISTING OVERHEAD WIRE
	EXISTING UTILITY POLE
	PROPOSED BUILDING
	PROPOSED RETAINING WALL
	PROPOSED WATER
	PROPOSED WATER VALVE
	PROPOSED THRUST BLOCK
	PROPOSED SEWER
	PROPOSED DRAIN
	PROPOSED ROOF DRAIN
	PROPOSED UNDERGROUND TCE (TELEPHONE/COMMUNICATION/ELECTRIC)
	PROPOSED CATCH BASIN
	PROPOSED OUTLET CONTROL STRUCTURE
	PROPOSED FLARED END SECTION



PERMIT SET
NOT FOR CONSTRUCTION

OWNER:
AP 36, LOTS 8 & 37
DINIS & MARIA PEDROSO
132 HARVARD STREET
CRANSTON, RI 02920

APPLICANT:
HAUS 001, LLC
81 CREST DRIVE
CRANSTON, RI 02921

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UTILITY PLAN

PROPOSED COMMERCIAL CONDOMINIUMS

AP 36, LOTS 8 AND 37
PLAINFIELD PIKE
CRANSTON, RI

PREPARED FOR:
HAUS 001, LLC

SCALE: 1" = 30'
JUNE 2022

Drawn By: BJC
Checked By: JCH
Sheet

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of 11

FILE NO.: 22.393.704

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NO.	DATE	REVISION
1	12/13/22	RIDEM COMMENTS



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SOIL EROSION AND SEDIMENT CONTROL PLAN - 1

PROPOSED COMMERCIAL CONDOMINIUMS

AP 36, LOTS 8 AND 37
 PLAINFIELD PIKE
 CRANSTON, RI

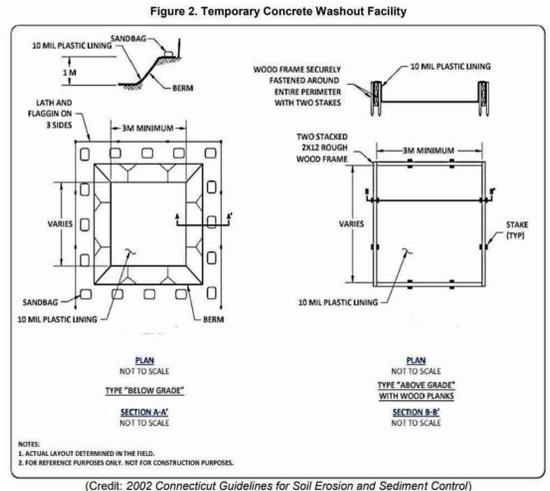
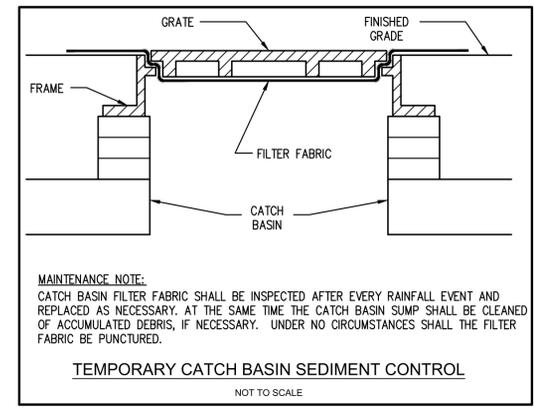
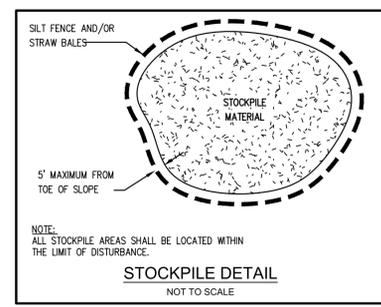
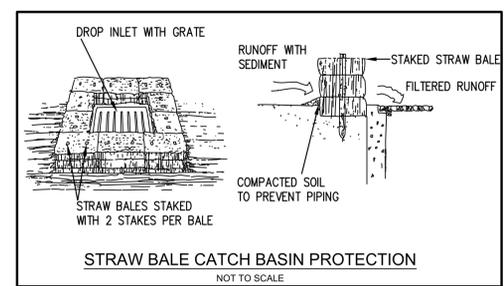
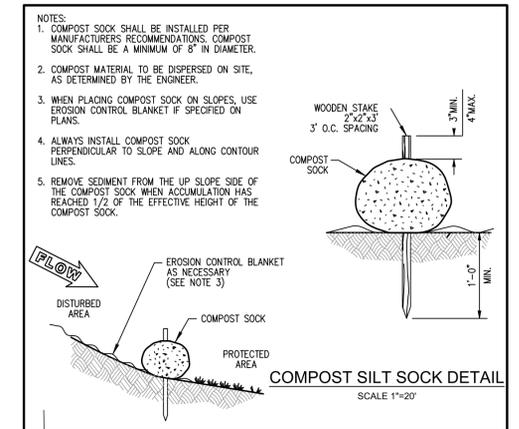
PREPARED FOR:
 HAUS 001, LLC

SCALE: 1" = 30'
 JUNE 2022

Drawn By: BJC
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 Sheet

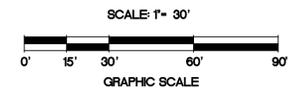
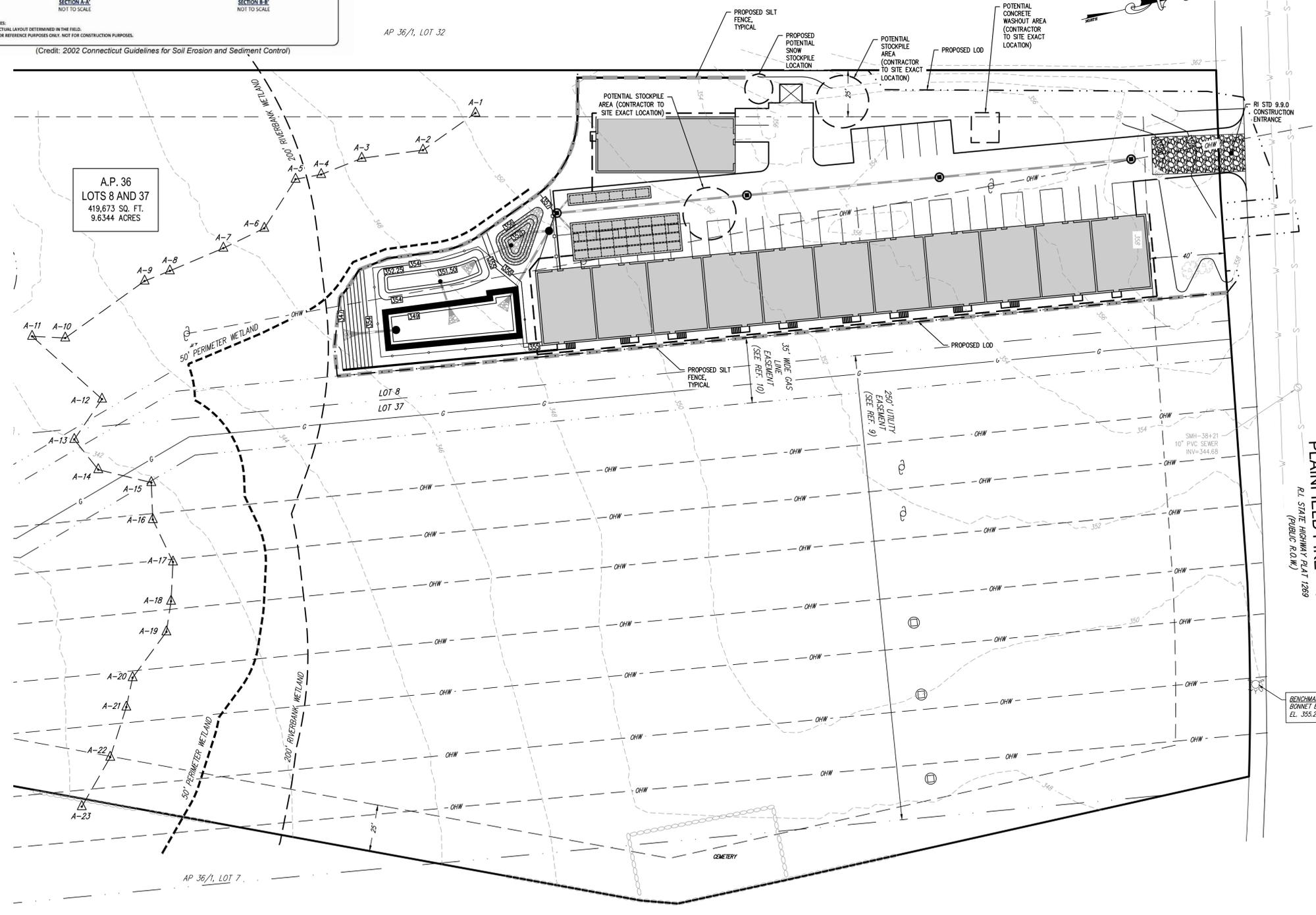
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 of 11

FILE NO.: 22.393.704



- LEGEND:**
- SUBJECT LOT LINE
 - ABUTTING LOT LINE
 - - - EASEMENT LINE
 - - - BUILDING SETBACK LINE
 - ▲ A-2 FLAGGED WETLAND EDGE
 - - - 50' PERIMETER WETLAND SETBACK
 - - - 200' RIVERBANK WETLAND
 - EXISTING BUILDING
 - EXISTING EDGE OF PAVEMENT
 - EXISTING CONTOUR
 - EXISTING GAS LINE
 - EXISTING SEWER LINE
 - OHW EXISTING OVERHEAD WIRE
 - EXISTING UTILITY POLE
 - PROPOSED BUILDING
 - PROPOSED EDGE OF PAVEMENT
 - - - PROPOSED LIMIT OF DISTURBANCE
 - - - PROPOSED SILT FENCE
 - PROPOSED DRAIN
 - PROPOSED CATCH BASIN
 - PROPOSED OUTLET CONTROL STRUCTURE
 - ▲ PROPOSED FLARED END SECTION
 - - - PROPOSED FENCE (RI STD. 31.2.0)
 - PROPOSED UNDERGROUND DETENTION

- NOTES:**
- SITE CONTRACTOR IS RESPONSIBLE FOR BRINGING UTILITIES WITHIN 5 FEET OF THE BUILDING.
 - COORDINATE WITH ARCHITECTURAL DRAWINGS FOR LOCATIONS OF UTILITY CONNECTIONS.
 - PROPERTY LINE, EASEMENTS, AND WETLAND EDGE HAVE BEEN OBTAINED FROM REFERENCE 1.



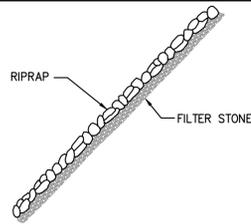
PLAINFIELD PIKE - ROUTE 14
 RI STATE HIGHWAY PLAT 1289 (PUBLIC ROW)

PERMIT SET
 NOT FOR CONSTRUCTION

OWNER:
 AP 36, LOTS 8 & 37
 DINIS & MARIA PEDROSO
 132 HARVARD STREET
 CRANSTON, RI 02920

APPLICANT:
 HAUS 001, LLC
 81 CREST DRIVE
 CRANSTON, RI 02921

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SLOPE CROSS-SECTION

NOTES:

- SEE SITE PLAN FOR CLASS OF RIP-RAP TO BE USED
- SEE FILTER STONE CHART FOR APPROPRIATE FILTER STONE TYPE AND DEPTH
- DIMENSIONS MAY BE MODIFIED BY ENGINEER TO MEET FIELD CONDITIONS.
- UNLESS OTHERWISE SPECIFIED, DUMPED RIP-RAP SHALL BE USED.

**ROCKFILL RIP-RAP
NOT TO SCALE**

RIPRAP	FILTER STONE	DEPTH
R-1	FS-1	6"
R-2	FS-2	6"
R-3	FS-2	6"
R-4	FS-3	7.5"
R-5	FS-3	7.5"
R-6	FS-2 and R-2	6"/ 6"
R-7	FS-3 and R-4	7.5"/21"
R-8	FS-3 and R-4	7.5"/21"

FILTER STONE CHART

SEDIMENTATION CONTROL PROGRAM:

- EXTREME CARE SHALL BE EXERCISED SO AS TO PREVENT ANY UNSUITABLE MATERIAL FROM ENTERING DOWNSTREAM WATERCOURSES AND STORMWATER DRAINAGE SYSTEMS.
- DURING CONSTRUCTION, THE CONTRACTOR AND/OR DEVELOPER SHALL BE RESPONSIBLE FOR MAINTAINING DRAINAGE AND RUN-OFF FLOW DURING STORMS AND PERIODS OF RAINFALL.
- SEDIMENTATION CONTROL DEVICES SHALL BE INSPECTED CLOSELY AND MAINTAINED PROMPTLY AFTER EACH RAINFALL.
- CARE SHALL BE TAKEN SO AS NOT TO PLACE "REMOVED SEDIMENTS" WITHIN THE PATH OF EXISTING, NEWLY CREATED (BOTH TEMPORARY AND PERMANENT) OR PROPOSED WATERCOURSES OR THOSE AREAS SUBJECTED TO STORMWATER FLOWAGE.
- SEDIMENTATION TRAPS SHALL BE PROVIDED AT ALL DRAINAGE STRUCTURES DURING CONSTRUCTION.
- EROSION AND SEDIMENTATION CONTROLS SHALL BE INSTALLED AT THE SITE PRIOR TO THE START OF CONSTRUCTION AND BE PROPERLY MAINTAINED UNTIL ALL DISTURBED AREAS ARE STABILIZED INCLUDING:
 - THE INSTALLATION OF A CONTINUOUS LINE OF STAKED STRAWBALES, SILT FENCE, OR SIMILAR IN ALL LOCATIONS SHOWN ON THE APPROVED SITE PLANS AND WHERE OTHERWISE NECESSARY TO PREVENT SEDIMENTS FROM ENTERING DOWNSTREAM WATERCOURSES AND STORMWATER DRAINAGE SYSTEMS.
 - ALL DISTURBED AREAS SHALL BE PERMANENTLY STABILIZED WITH APPROVED GROUND COVER PRIOR TO THE COMPLETION OF THE PROJECT. AREAS EXPOSED FOR EXTENDED PERIODS ARE TO BE COMPLETELY COVERED WITH SPREAD HAY MULCH.
 - CATCH BASINS SHALL BE PROTECTED WITH STRAWBALE OR SILT SACK FILTERS THROUGHOUT THE CONSTRUCTION PERIOD AND UNTIL ALL DISTURBED AREAS ARE THOROUGHLY STABILIZED. SUMPS ARE TO BE CLEANED IMMEDIATELY FOLLOWING INSTALLATION OF PERMANENT PAVEMENT.
 - OUTFALLS SHALL BE PROTECTED BY STRAWBALE FILTERS UNTIL DISTURBED AREAS ARE PERMANENTLY STABILIZED WITH APPROVED GROUND COVER.
 - ALL CONTROL MEASURES SHALL BE MAINTAINED IN EFFECTIVE CONDITION THROUGHOUT THE CONSTRUCTION PERIOD.
- THE LIMITS OF ALL CLEARING, GRADING AND DISTURBANCE SHALL BE KEPT TO A MINIMUM WITHIN THE PROPOSED AREA OF CONSTRUCTION. ALL AREAS OUTSIDE OF THE LIMITS OF DISTURBANCE SHALL REMAIN TOTALLY UNDISTURBED.
- IF AREAS OF 1-5 ACRES ARE TO BE DISTURBED AT ONE TIME, A TEMPORARY SEDIMENT TRAP SHALL BE DESIGNED AND SITED IN ACCORDANCE WITH THE RHODE ISLAND SOIL EROSION AND SEDIMENT CONTROL HANDBOOK, SECTION 6 AND SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO LAND DISTURBANCE.

POLLUTION PREVENTION PLAN:

GENERAL:
LONG-TERM MANAGEMENT OF THE POLLUTION PREVENTION PLAN SHALL BE THE RESPONSIBILITY OF THE OWNER / OPERATOR.

APPLICANT: HAUS 001, LLC
81 CREST DRIVE
CRANSTON, RI 02921

THE CONTRACTOR SHALL MANAGE THE POLLUTION PREVENTION PLAN DURING THE CONSTRUCTION PERIOD.

CONTRACTOR: TBD

SOLID WASTE CONTAINMENT:

- TRASH RACKS WHERE PRACTICAL SHALL BE INSTALLED AND MAINTAINED ON ALL INLET STRUCTURES WITHIN THE DRAINAGE SYSTEM. INSPECTIONS FOR TRASH SHOULD BE ON A WEEKLY BASIS.
- TRASH RECEPTACLES SHALL BE PROVIDED WHERE APPROPRIATE.
- STREET SWEEPING SHALL BE PERFORMED ON AN ANNUAL BASIS.
- PET WASTE DISPOSAL STATIONS SHALL BE PROVIDED WHERE APPLICABLE.

SNOW DISPOSAL AND DEICING:

- NO SAND AND DEICING MATERIALS SHALL BE STORED ON THE SITE
- SNOW REMOVAL SHALL BE PERFORMED IN ACCORDANCE WITH RIDEM'S SNOW DISPOSAL POLICY.

DRIVEWAY AND PARKING LOT SEALANTS:

- ON STANDARD ASPHALT AREAS, ONLY ASPHALT BASED SEALANTS ARE ALLOWED, NO COAL-TAR BASED SEALANTS SHALL BE USED ON THIS SITE.

HAZARDOUS MATERIALS CONTAINMENT:

- NO HAZARDOUS MATERIALS SHALL BE STORED OUTSIDE TO AVOID EXPOSURE TO STORMWATER.

LANDSCAPE MANAGEMENT:

- GRASS CLIPPINGS FROM LAWN CARE PROCEDURES IN AND AROUND THE STORMWATER FACILITY MUST BE COLLECTED AND DISPOSED OF OFF SITE.
- LAWN HEIGHTS WITHIN THE BMP'S SHALL BE KEPT AT A 4-6" HEIGHT.
- FERTILIZER AND WATERING DEMANDS SHOULD BE HAVE PROFESSIONAL OVERSIGHT AND BOTH USES MINIMIZED TO THE MAXIMUM EXTENT PRACTICAL.

BMP CONSTRUCTION SEQUENCES:

GENERAL:

GREAT CARE SHALL BE GIVEN TO THE AREAS WHERE STRUCTURES WHICH REQUIRE INFILTRATION AS A MECHANISM FOR STORMWATER TREATMENT AND/OR DISPOSAL ARE PROPOSED PRIOR TO THEIR CONSTRUCTION. NO INFILTRATION STRUCTURE SHALL BE CONSTRUCTED NOR ACCEPT RUNOFF UNTIL ALL UP-SLOPE AREAS OF THE WATERSHED HAVE BEEN BUILT AND FULLY STABILIZED SO AS TO HAVE NO POTENTIAL FOR SEDIMENT OR SILT DEPOSITION. ALSO, ONCE THE ENTIRE SITE IS STABILIZED ALL SEED MEASURES SHALL BE REMOVED.

THE DESIGN SEED MIX FOR ALL PERMANENT STORMWATER BASINS SHALL BE COMPRISED OF THE FOLLOWING AND PLANTED IN A MINIMUM OF A 6" DEPTH OF SANDY LOAM FREE OF SUBSIL MATERIAL, STONES, ROOTS, LUMPS OF SOIL, TREE LIMBS, TRASH OR CONSTRUCTION DEBRIS:

TYPE	% BY WEIGHT
CREeping RED FESCUE	70
KENTUCKY BLUEGRASS	15
TALL FESCUE	15

APPLICATION RATE 100 LBS/ACRE
LIMING AND FERTILIZING AS REQUIRED TO COMPLIMENT OR UPGRADE EXISTING CONDITIONS.

SAND FILTERS:

- EXCAVATE TO THE LINES AND GRADES OF THE DESIGN
- INSTALL 6" OF SAND AND ROTO-TILL TO MIX INTO THE SUBSIL INTERFACE
- SAND FILTER SAND SHALL BE ASTM C33 CONCRETE SAND
- INSTALL REMAINDER OF SAND
- INSTALL NON-WOVEN GEOTEXTILE
- INSTALL 6" WASHED CRUSHED STONE & PERFORATED DISBURSAL PIPING
- INSTALL NON-WOVEN GEOTEXTILE
- LOAM AND SEED PER DETAILS WITH PERMANENT SEED MIXTURE & DRAINS

DETENTION / INFILTRATION BASIN:

- EXCAVATE TO THE LINES AND GRADES OF THE DESIGN
- INSTALL OUTLET CONTROL STRUCTURE & LEVEL SPREADER
- LOAM AND SEED ACCORDINGLY WITH PERMANENT SEED MIXTURE

LEVEL SPREADER:

- EXCAVATE TO THE LINES AND GRADES OF THE DESIGN
- INSTALL CURBING SET LEVEL
- LOAM AND SEED PER DETAILS WITH PERMANENT SEED MIXTURE

EROSION CONTROL AND SOIL STABILIZATION PROGRAM:

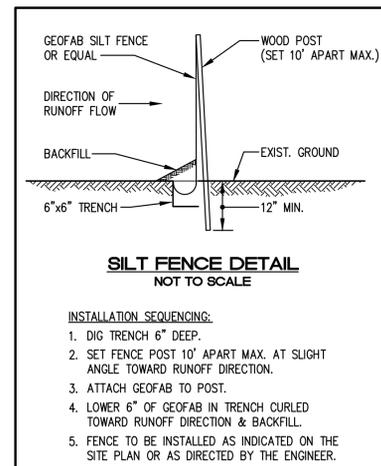
- DENUDED SLOPES SHALL NOT BE LEFT EXPOSED FOR EXCESSIVE PERIODS OF TIME, SUCH AS THE WINTER SEASONS.
- TEMPORARY TREATMENTS SHALL CONSIST OF STRAW, FIBER MULCH OR PROTECTIVE COVERS SUCH AS A MAT OR FIBER LINING (BURLAP, JUTE, FIBERGLASS NETTING, EXCELSIOR BLANKETS). THEY SHALL BE INCORPORATED INTO THE WORK AS WARRANTED OR AS ORDERED BY THE ENGINEER.
- STRAW APPLICATIONS SHOULD BE IN THE AMOUNT OF 2000 LBS/ACRE.
- ALL STRAWBALES OR TEMPORARY PROTECTION SHALL REMAIN IN-PLACE UNTIL AN ACCEPTABLE STAND OF GRASS, RIP-RAP OR APPROVED GROUND COVER IS ESTABLISHED.
- THE TOPSOIL SHALL HAVE A SANDY LOAM TEXTURE RELATIVELY FREE OF SUBSIL MATERIAL, STONES, ROOTS, LUMPS OF SOIL, TREE LIMBS, TRASH OR CONSTRUCTION DEBRIS AND SHALL CONFORM WITH RHODE ISLAND STANDARD SPECIFICATION M.18.02.
- THE DESIGN MIX UTILIZED IN ALL DISTURBED AREAS TO BE SEEDDED SHALL BE COMPRISED OF THE FOLLOWING:

TYPE	% BY WEIGHT
CREeping RED FESCUE	70
ASTORIA BENTGRASS	5
BIRDFOOT TREFOL	15
PERENNIAL RYEGRASS	10
APPLICATION RATE	100 LBS/ACRE
- THE CONTRACTOR MUST REPAIR AND/OR RESEED ANY AREAS THAT DO NOT DEVELOP WITHIN THE PERIOD OF ONE YEAR, AND SHALL DO SO AT NO ADDITIONAL EXPENSE.
- THE NORMAL ACCEPTABLE SEASONAL SEEDING DATES ARE APRIL 1ST THROUGH OCTOBER 15TH.
- STABILIZATION OF ONE FORM OR ANOTHER AS DESCRIBED ABOVE SHALL BE ACHIEVED WITHIN FIFTEEN (15) DAYS OF FINAL GRADING.
- STOCKPILES OF TOPSOIL AND EARTH MATERIALS SHALL NOT BE LOCATED NEAR WATERWAYS. THEY SHALL HAVE SIDE SLOPES NO GREATER THAN THIRTY PERCENT (30%), SHALL ALSO BE SEEDDED AND/OR STABILIZED AND SHALL BE COMPLETELY ENCRUILED WITH STAKED HAY BALES AND/OR SILT FENCE. (SEE DETAIL)
- ON BOTH STEEP AND LONG SLOPES, CONSIDERATION SHOULD BE GIVEN TO "CRIMPING" OR "TRACKING" TO TACK DOWN MULCH APPLICATIONS.
- TREES TO BE RETAINED SHALL BE FENCED OR ROPED OFF TO PROTECT THEM FROM CONSTRUCTION EQUIPMENT.
- ALL PROPOSED PLANTINGS AND PLACEMENT OF RIP-RAP MUST BE ACCOMPLISHED AS EARLY AS POSSIBLE UPON COMPLETION OF GRADING AND CONSTRUCTION, AND AT LEAST PRIOR TO ANY ON-SITE OCCUPANCY.
- ALL DISTURBED AREAS MUST BE SEEDDED, PLANTED OR RIP-RAPPED WITHIN THE CONSTRUCTION SEASON.
- TEMPORARY SEEDING MUST BE COMPLETED WITHIN ONE (1) MONTH AFTER DISTURBANCE.
- ALL DISTURBED AREAS MUST BE PERMANENTLY SEEDDED, PLANTED OR RIP-RAPPED BEFORE OCTOBER 1ST, IF NOT THEY MUST BE TEMPORARILY SEEDDED.

CONSTRUCTION MAINTENANCE:

THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSPECTION, MAINTENANCE AND REPAIR TO ALL DRAINAGE STRUCTURES AND RELATED APPURTENANCES ON THE SITE DURING CONSTRUCTION AND FOR A MAXIMUM OF ONE (1) YEAR FOLLOWING COMPLETION OF CONSTRUCTION, AT WHICH TIME THE DRAINAGE STRUCTURES AND APPURTENANCES ARE TO BE ACCEPTED BY THE ENGINEER AND THE OWNER, AS FOLLOWS:

- ALL CATCH BASINS AND STORM DRAIN PIPES SHALL BE CLEANED OF SEDIMENT. STORMWATER BASINS SHALL BE CLEANED OF SEDIMENT TO THE DESIGN GRADES INDICATED ON THE CONSTRUCTION DRAWINGS.
- INSPECTION OF THE BASINS AND ALL INLET AND OUTLET STRUCTURES SHALL BE PERFORMED ON A WEEKLY BASIS, PREFERABLY DURING A STORM EVENT TO INSPECT FOR PROPER FUNCTIONALITY OF THE FACILITY.
- GRASSES MUST BE PLANTED AROUND AND WITHIN THE STORMWATER BASIN IMMEDIATELY FOLLOWING CONSTRUCTION TO STABILIZE THE SLOPES AND PREVENT EROSION.
- SEDIMENTS SHALL BE REMOVED FROM DRAINAGE STRUCTURES AND THE STORMWATER BASINS IMMEDIATELY FOLLOWING SITE STABILIZATION AND DURING THE FIRST (INITIAL) YEAR OF OPERATION.
- ALL COSTS INCURRED FOR MAINTENANCE, CLEANING, AND INSPECTION ARE THE RESPONSIBILITY OF THE CONTRACTOR DURING CONSTRUCTION AND THE PROPERTY OWNER UPON ACCEPTANCE.
- ANY INADVERTENT OR DELIBERATE DISCHARGE OF WASTE OIL OR ANY OTHER POLLUTANT TO THE STORMWATER DISPOSAL SYSTEM REQUIRES IMMEDIATE NOTIFICATION OF THE RIDEM.
- ALL TRASH AND LITTER AND OTHER DEBRIS SHALL BE REMOVED FROM ANY STORMWATER FACILITY DAILY, INCLUDING INLET AND OUTLET STRUCTURES.
- REPAIRS OR REPLACEMENT OF INLET/OUTLET STRUCTURES, RIP-RAP CHANNELS, FENCES, OR OTHER ELEMENTS OF THE FACILITY DURING CONSTRUCTION SHALL BE DONE WITHIN 30 DAYS OF DEFICIENCY REPORTS.
- PAVEMENT SWEEPING SHALL BE PERFORMED UPON COMPLETION OF THE PROJECT.
- WATER SHALL BE USED TO MOISTEN EXPOSED SOIL SURFACES PERIODICALLY. AN ADEQUATE AMOUNT SHOULD BE USED TO CONTROL DUST.



**SILT FENCE DETAIL
NOT TO SCALE**

INSTALLATION SEQUENCING:

- DIG TRENCH 6" DEEP.
- SET FENCE POST 10' APART MAX. AT SLIGHT ANGLE TOWARD RUNOFF DIRECTION.
- ATTACH GEOFAB TO POST.
- LOWER 6" OF GEOFAB IN TRENCH CURLED TOWARD RUNOFF DIRECTION & BACKFILL.
- FENCE TO BE INSTALLED AS INDICATED ON THE SITE PLAN OR AS DIRECTED BY THE ENGINEER.

LONG-TERM MAINTENANCE SCHEDULE (O&M):

LONG-TERM MAINTENANCE OF THE DRAINAGE SYSTEM SHALL BE COMPLETED BY THE APPLICANT/OPERATOR UNDER A LEGALLY BINDING AND ENFORCEABLE MAINTENANCE AGREEMENT. THE CITY OF CRANSTON IS NOT RESPONSIBLE FOR MAINTENANCE OF THE BMP'S.

APPLICANT: HAUS 001, LLC
81 CREST DRIVE
CRANSTON, RI 02921

THE CONTRACTOR / OPERATOR SHALL MAINTAIN ALL DRAINAGE COMPONENTS DURING AND DIRECTLY AFTER CONSTRUCTION. ALL OPERATIONAL MAINTENANCE REQUIREMENTS WILL BE RECORDED ON THE TITLE.

OPERATOR / CONTRACTOR: DEFAULTS TO OWNER UNTIL HOMEOWNERS' ASSOCIATION HAS BEEN CREATED
THE ENTIRE STORMWATER SYSTEM SHALL BE INSPECTED THROUGHOUT THE CONSTRUCTION PROCESS AND REPORTED ON THE ATTACHED CONSTRUCTION INSPECTION REPORTING FORMS.

THE ENTIRE STORMWATER MANAGEMENT SYSTEM SHALL BE INSPECTED ON A BI-ANNUAL BASIS FOR GENERAL PROBLEMS AND TO ENSURE PROPER FUNCTION AND AFTER STORM EVENTS GREATER THAN OR EQUAL TO THE 1-YR, 24-HR TYPE III PRECIPITATION EVENT (2.7"). THESE INSPECTIONS SHALL BE REPORTED ON THE ATTACHED O&M INSPECTION REPORTING FORMS.

ALL INSPECTIONS REPORTS SHALL BE KEPT ON FILE WITH THE STORMWATER MANAGEMENT OPERATION AND MAINTENANCE PLAN.

SEDIMENT FOREBAY:

- THE SLOPES SHOULD BE INSPECTED FOR EROSION AND GULLIFYING
- RIPRAP SHOULD BE REINFORCED IF EROSION IS PRESENT AT OUTFALLS OR IF IT HAS BEEN COMPROMISED
- INSPECT ALL STRUCTURAL COMPONENTS SUCH AS TRASH RACKS, ACCESS GATES, VALVES, PIPES, WEIRS, WALLS, ORIFICE STRUCTURES AND SPILLWAY STRUCTURES FOR DEFECTS AND ANY MUST BE REPAIRED IMMEDIATELY
- INSPECT FOR SEDIMENT ACCUMULATION AND IT SHOULD BE REMOVED IF IT REACHES 9" OR 25% OF THE STORAGE VOLUME
- MOW GRASSES TO MAINTAIN A 4-6" STRONG STAND OF TURF AND MOW IMMEDIATELY SHOULD IT REACH 10". ALL CLIPPINGS SHALL BE COLLECTED AND DISPOSED OF PROPERLY
- NO WOODY GROWTH SHOULD EVER BE ALLOWED TO REMAIN IN AND AROUND THE FOREBAY
- AREAS OF EROSION OR DISTURBANCE SHALL BE RE-ESTABLISHED IMMEDIATELY INLETS AND OUTLETS SHALL BE CLEARED OF DEBRIS AS NEEDED

SAND FILTER:

- THE FACILITY SHOULD BE INSPECTED ANNUALLY TO ENSURE INFILTRATION RATES ARE BEING MET. IF STANDING WATER IS OBSERVED FOR MORE THAN 48 HRS AFTER A RAIN EVENT, THE TOP 6" SHOULD BE ROTOTILLED AND ANY COMPACTED REMOVED. IF THIS DOESN'T SOLVE THE PROBLEM, THE TOP 6" OF THE SAND FILTER SHALL BE REMOVED AND REPLACED.
- RIPRAP SHOULD BE REINFORCED IF EROSION IS PRESENT AT OUTFALLS OR IF IT HAS BEEN COMPROMISED
- MOW GRASSES TO MAINTAIN A 4-6" STRONG STAND OF TURF, ALL CLIPPINGS SHALL BE COLLECTED AND DISPOSED OF PROPERLY
- NO WOODY GROWTH SHOULD EVER BE ALLOWED TO REMAIN IN AND AROUND THE FOREBAYS
- AREAS OF EROSION OR DISTURBANCE SHALL BE RE-ESTABLISHED IMMEDIATELY
- INLETS AND OUTLETS SHALL BE CLEARED OF DEBRIS AS NEEDED

DETENTION / INFILTRATION BASIN:

- THE FACILITY SHOULD BE INSPECTED ANNUALLY TO ENSURE INFILTRATION RATES ARE BEING MET. IF STANDING WATER IS OBSERVED FOR MORE THAN 48 HRS AFTER A RAIN EVENT, THE TOP 6" SHOULD BE ROTOTILLED AND ANY COMPACTED REMOVED. IF THIS DOESN'T SOLVE THE PROBLEM, THE TOP 6" OF THE BASIN SHALL BE REMOVED AND REPLACED.
- THE FACILITY SHOULD BE INSPECTED ANNUALLY FOR EROSION, GULLIFYING OR DAMAGE AND CLEANED OF DEBRIS AND TRASH
- RIPRAP SHOULD BE REINFORCED IF EROSION IS PRESENT AT OUTFALLS OR IF IT HAS BEEN COMPROMISED
- MOW GRASSES TO MAINTAIN A 4-6" STRONG STAND OF TURF, ALL CLIPPINGS SHALL BE COLLECTED AND DISPOSED OF PROPERLY
- NO WOODY GROWTH SHOULD EVER BE ALLOWED TO REMAIN IN AND AROUND THE FOREBAYS
- AREAS OF EROSION OR DISTURBANCE SHALL BE RE-ESTABLISHED IMMEDIATELY
- INLETS AND OUTLETS SHALL BE CLEARED OF DEBRIS AS NEEDED

CATCH BASINS AND DRAINAGE SYSTEM:

- ALL CATCH BASINS AND STORM DRAIN PIPES SHALL BE ANNUALLY CHECKED FOR SEDIMENT AND DEBRIS AND CLEANED / JETTED AS NECESSARY.
- ALL COSTS INCURRED FOR MAINTENANCE, CLEANING, AND INSPECTION ARE THE RESPONSIBILITY OF THE PROPERTY OWNER UPON ACCEPTANCE.
- PAVEMENT SWEEPING SHALL BE PERFORMED ANNUALLY, PREFERABLY IN THE SPRING, AFTER ROADWAY SANDING IS COMPLETED FOR THE SEASON.

ESTIMATED O&M BUDGET & FUNDING SOURCE:

- THE PROJECT OPERATOR WILL BE THE OWNER, WHO SHALL BE RESPONSIBLE FOR FUNDING THE O&M BUDGET.

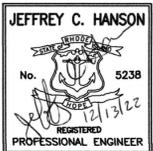
ESTIMATE OF O&M BUDGET:

BI-ANNUAL INSPECTIONS:	\$1000 EA x 2	\$2,000
BI-WEEKLY MOWING:	\$200 EA x 13	\$2,600
MISC. REPAIRS:	\$1,000	\$1,000
PAVEMENT SWEEPING	\$1,000	\$1,000
ADDITIONAL INSPECTIONS:	\$1,000 EA x 2	\$2,000
TOTAL ESTIMATE:		\$8,600 / YR

USE NOTE:

TENANTS THAT WOULD PROMPT THE SITE TO BECOME A LAND USE OF HIGHER POTENTIAL POLLUTANT LOADING (LHPLP) AS CLASSIFIED IN TABLE 3-2 OF THE RHODE ISLAND STORMWATER DESIGN AND INSTALLATION STANDARDS MANUAL SHALL NOT BE PERMITTED TO OCCUPY UNITS ON THIS SITE.

NO.	DATE	REVISION
1	12/18/22	RIDEM COMMENTS



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**SOIL EROSION AND
SEDIMENT CONTROL
PLAN - 2**

**PROPOSED
COMMERCIAL
CONDOMINIUMS**

AP 36, LOTS 8 AND 37
PLAINFIELD PIKE
CRANSTON, RI

PREPARED FOR:
HAUS 001, LLC

SCALE AS NOTED
JUNE 2022

OWNER:

AP 36, LOTS 8 & 37
DINIS & MARIA PEDROSO
132 HARVARD STREET
CRANSTON, RI 02920

APPLICANT:

HAUS 001, LLC
81 CREST DRIVE
CRANSTON, RI 02921

Drawn By: MBV

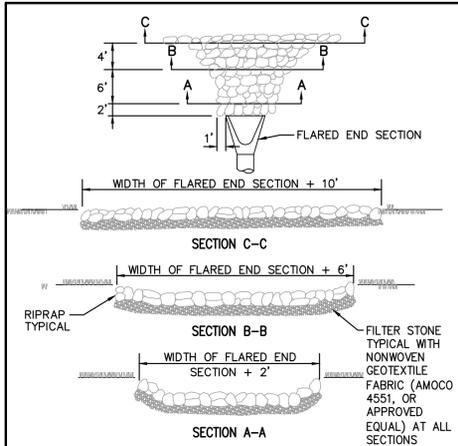
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of 11

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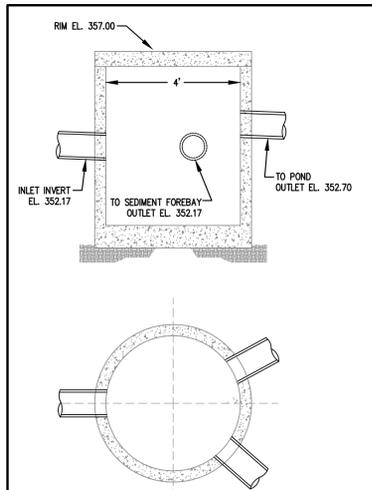


- NOTES:**
- SEE SITE PLAN FOR CLASS OF RIP-RAP TO BE USED
 - SEE FILTER STONE CHART FOR APPROPRIATE FILTER STONE TYPE AND DEPTH
 - DIMENSIONS MAY BE MODIFIED BY ENGINEER TO MEET FIELD CONDITIONS.
 - UNLESS OTHERWISE SPECIFIED, DUMPED RIP-RAP SHALL BE USED.

ROCKFILL RIP-RAP AT FLARED END SECTION
NOT TO SCALE

RIP-RAP	FILTER STONE	DEPTH
R-1	FS-1	6"
R-2	FS-2	6"
R-3	FS-2	6"
R-4	FS-3	7.5"
R-5	FS-3	7.5"
R-6	FS-2 and R-2	6" / 6"
R-7	FS-3 and R-4	7.5" / 21"
R-8	FS-3 and R-4	7.5" / 21"

FILTER STONE CHART

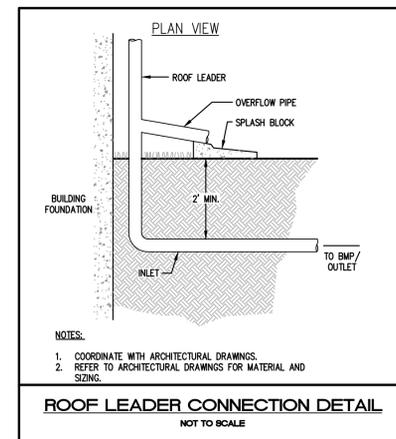
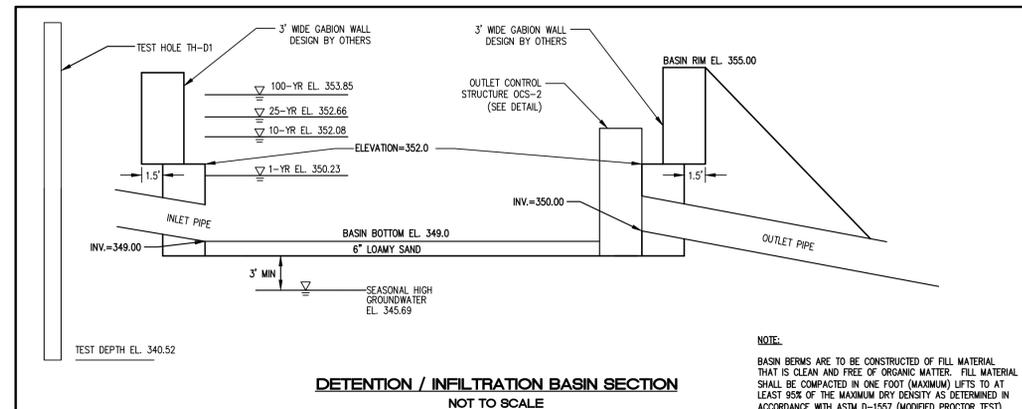
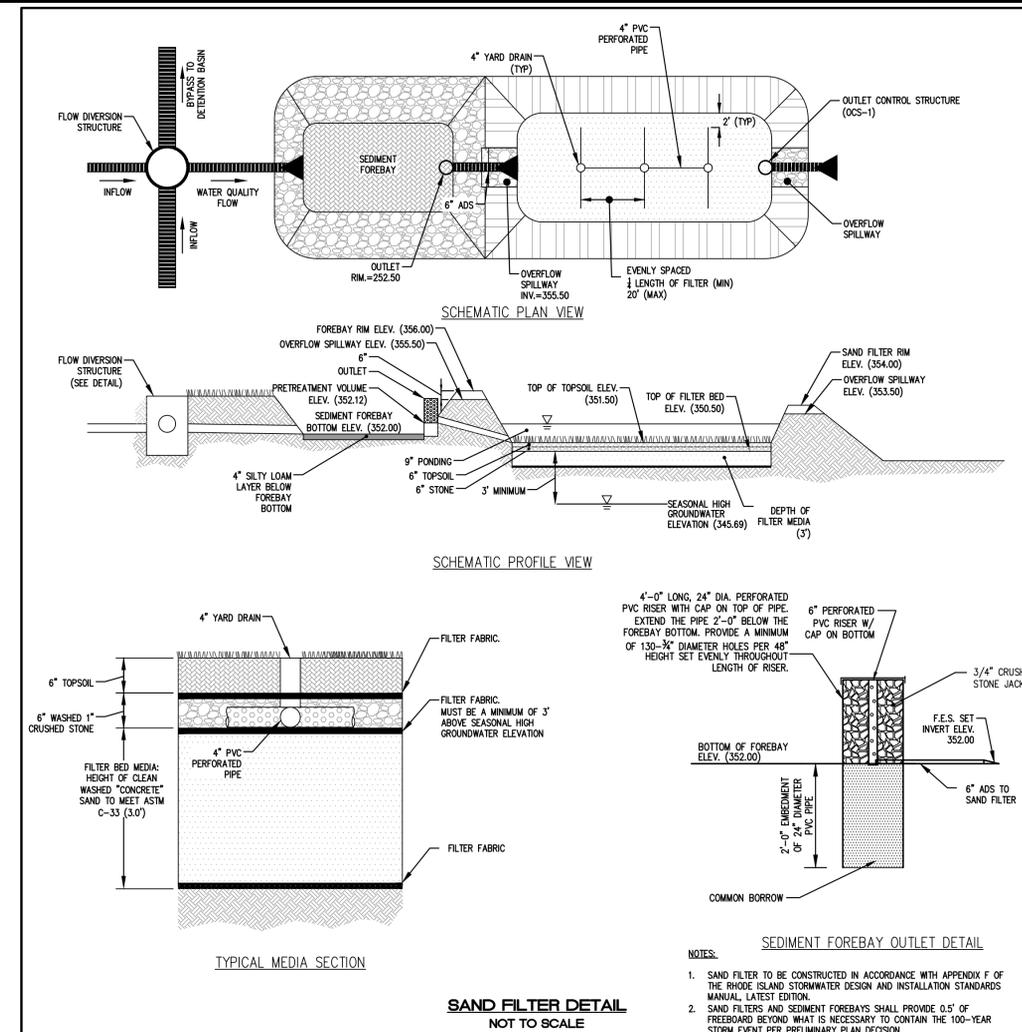
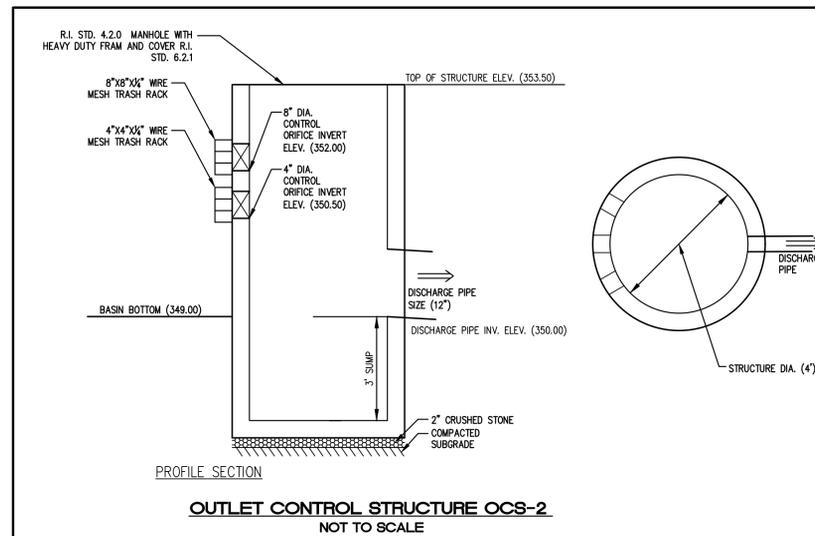
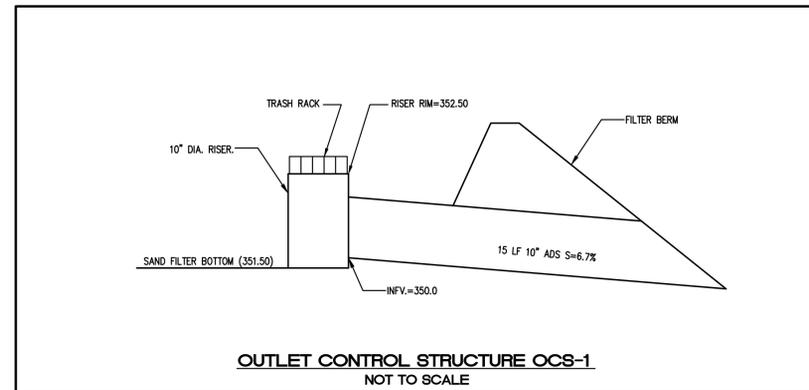


- NOTES:**
- STRUCTURE TO BE UTILIZED AS A DIVERSION CHAMBER.
 - REFER TO TRENCH INSTALLATION DETAIL.
 - REFER TO RHODE ISLAND STANDARD DETAILS 4.4.0 AND 6.3.2
 - OUTLET TO SEDIMENT FOREBAY SHALL REMAIN PLUGGED UNTIL THE SOILS OF THE CONTRIBUTING AREA HAVE BEEN STABILIZED.

DIVERSION STRUCTURE DETAIL
NOT TO SCALE

NOTES:

- REFER TO APPENDIX F OF THE RHODE ISLAND STORMWATER DESIGN AND INSTALLATION STANDARDS MANUAL, MARCH 2015: GUIDANCE ON BMP CONSTRUCTION SPECIFICATIONS FOR SPECIFICATIONS OF MATERIALS TO BE USED IN CONSTRUCTING THE BMP'S.
- CONSTRUCTION VEHICLES SHALL NOT BE ALLOWED TO DRIVE OVER THE BMP'S DURING CONSTRUCTION. IF THE AREA BECOMES COMPACTED, SOIL MUST BE SUITABLY AMENDED, TILLED, AND REVEGETATED ONCE CONSTRUCTION IS COMPLETE TO RESTORE INFILTRATION CAPACITY.

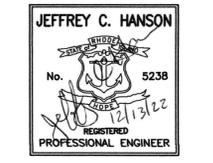


OWNER:
AP 36, LOTS 8 & 37
DINS & MARIA PEDROSO
132 HARVARD STREET
CRANSTON, RI 02920

APPLICANT:
HAUS 001, LLC
81 CREST DRIVE
CRANSTON, RI 02921

PERMIT SET
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NO.	DATE	REVISION
1	12/10/22	RIDEM COMMENTS



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f. (401) 921-3344

DETAILS - 1

PROPOSED COMMERCIAL CONDOMINIUMS

AP 36, LOTS 8 AND 37
PLAINFIELD PIKE
CRANSTON, RI

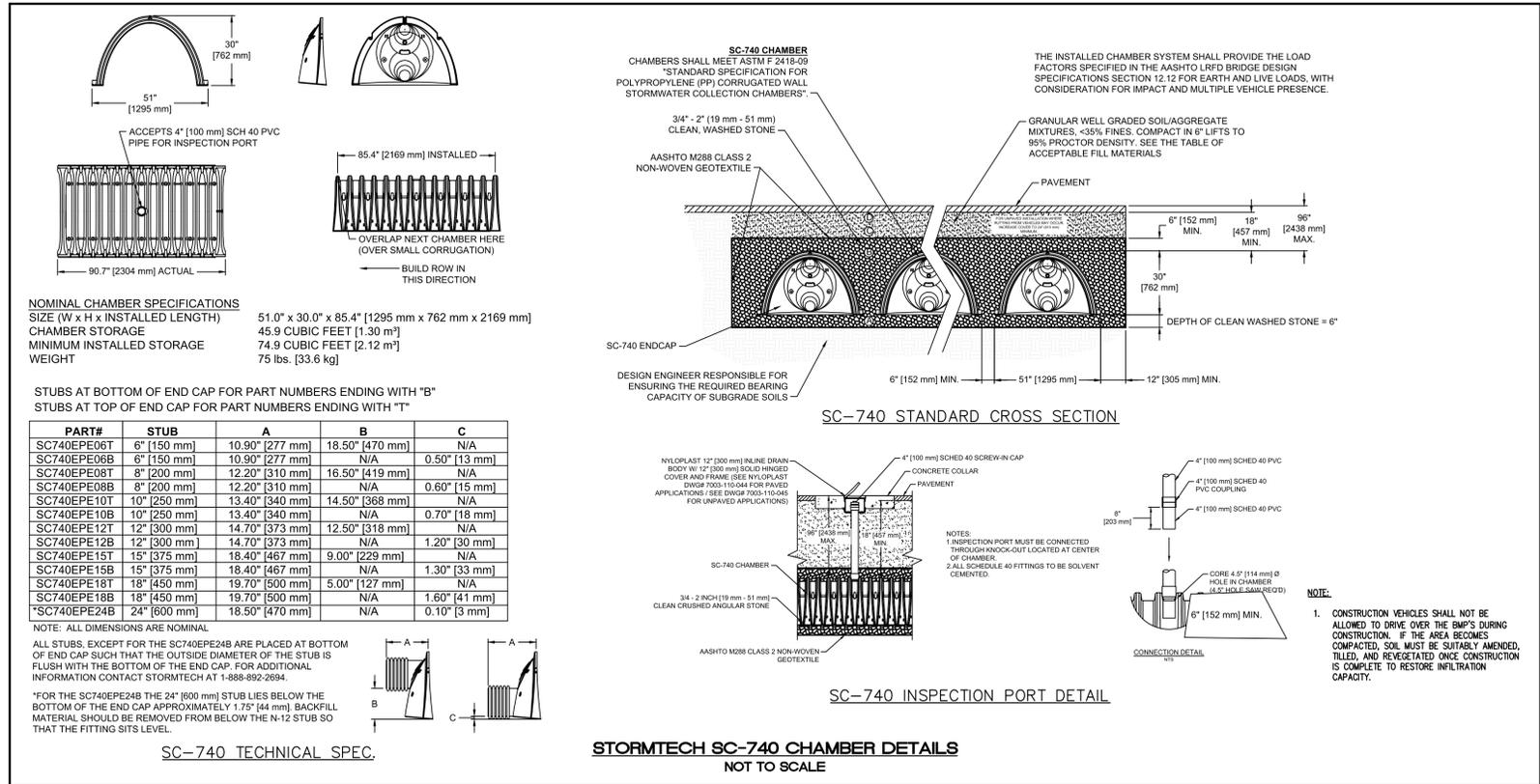
PREPARED FOR:
HAUS 001, LLC

SCALE AS NOTED
JUNE 2022

Drawn By: MBV
Checked By: BJC
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FILE NO.: 22.393.705



NOMINAL CHAMBER SPECIFICATIONS
SIZE (W x H x INSTALLED LENGTH) 51.0" x 30.0" x 85.4" [1295 mm x 762 mm x 2169 mm]
CHAMBER STORAGE 45.9 CUBIC FEET [1.30 m³]
MINIMUM INSTALLED STORAGE 74.9 CUBIC FEET [2.12 m³]
WEIGHT 75 lbs. [33.6 kg]

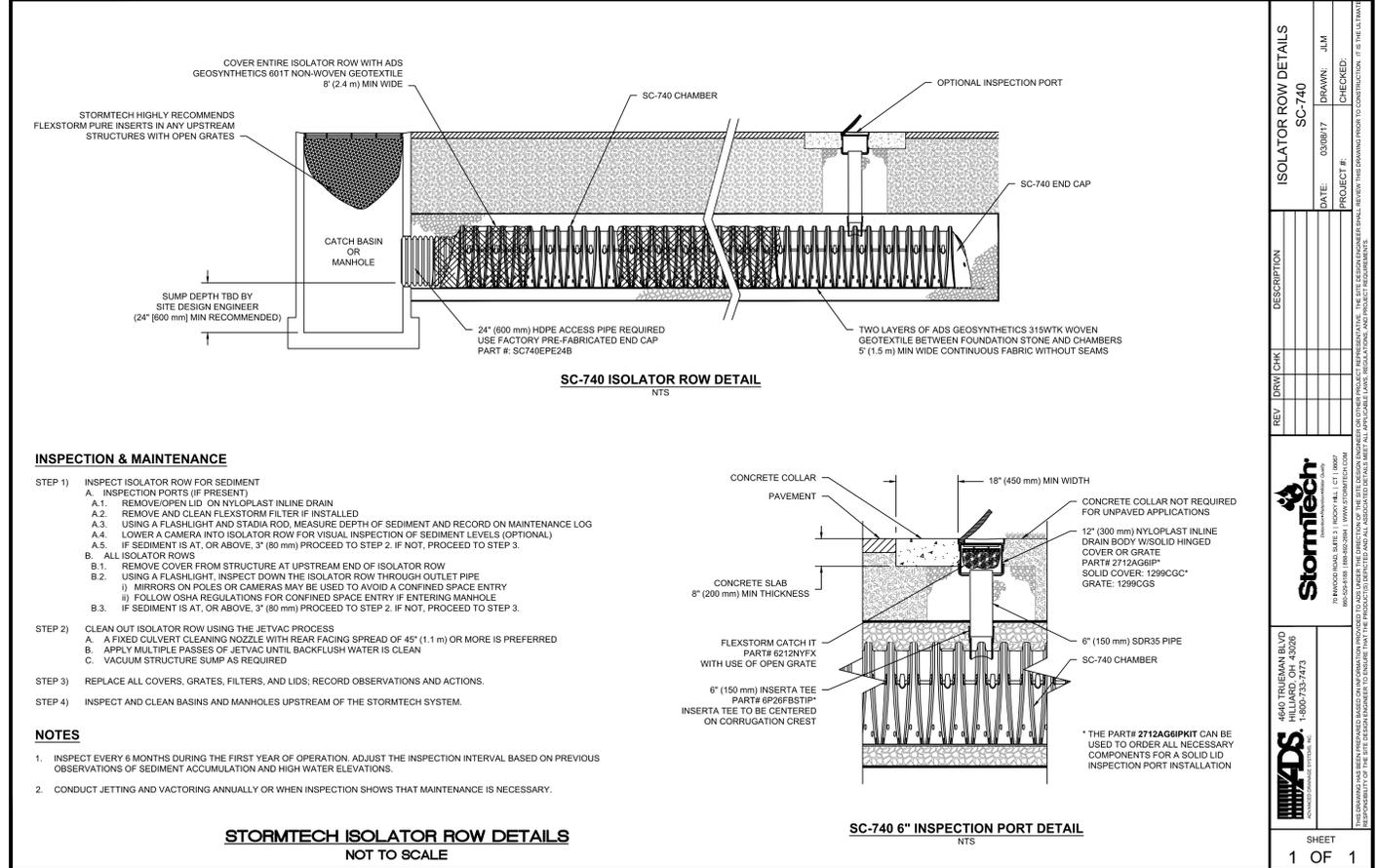
STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"

PART#	STUB	A	B	C
SC740EPE06T	6" [150 mm]	10.90" [277 mm]	18.50" [470 mm]	N/A
SC740EPE06B	6" [150 mm]	10.90" [277 mm]	N/A	0.50" [13 mm]
SC740EPE08T	8" [200 mm]	12.20" [310 mm]	16.50" [419 mm]	N/A
SC740EPE08B	8" [200 mm]	12.20" [310 mm]	N/A	0.60" [15 mm]
SC740EPE10T	10" [250 mm]	13.40" [340 mm]	14.50" [368 mm]	N/A
SC740EPE10B	10" [250 mm]	13.40" [340 mm]	N/A	0.70" [18 mm]
SC740EPE12T	12" [300 mm]	14.70" [373 mm]	12.50" [318 mm]	N/A
SC740EPE12B	12" [300 mm]	14.70" [373 mm]	N/A	1.20" [30 mm]
SC740EPE15T	15" [375 mm]	18.40" [467 mm]	9.00" [229 mm]	N/A
SC740EPE15B	15" [375 mm]	18.40" [467 mm]	N/A	1.30" [33 mm]
SC740EPE18T	18" [450 mm]	19.70" [500 mm]	5.00" [127 mm]	N/A
SC740EPE18B	18" [450 mm]	19.70" [500 mm]	N/A	1.60" [41 mm]
SC740EPE24B	24" [600 mm]	18.50" [470 mm]	N/A	0.10" [3 mm]

NOTE: ALL DIMENSIONS ARE NOMINAL.
ALL STUBS, EXCEPT FOR THE SC740EPE24B ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.
*FOR THE SC740EPE24B THE 24" [600 mm] STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" [44 mm]. BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

SC-740 TECHNICAL SPEC.

STORMTECH SC-740 CHAMBER DETAILS
NOT TO SCALE



- INSPECTION & MAINTENANCE**
- STEP 1) INSPECT ISOLATOR ROW FOR SEDIMENT
- INSPECTION PORTS (IF PRESENT)
 - REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
 - REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
 - USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
 - LOWER A CAMERA INTO ISOLATOR ROW FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
 - IF SEDIMENT IS AT OR ABOVE 3" (80 mm) PROCEED TO STEP 2; IF NOT, PROCEED TO STEP 3.
 - ALL ISOLATOR ROWS
 - REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
 - USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW THROUGH OUTLET PIPE
 - MIRRORS OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
 - FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
 - IF SEDIMENT IS AT OR ABOVE 3" (80 mm) PROCEED TO STEP 2; IF NOT, PROCEED TO STEP 3.
- STEP 2) CLEAN OUT ISOLATOR ROW USING THE JETVAC PROCESS
- A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
 - APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
 - VACUUM STRUCTURE SUMP AS REQUIRED
- STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.
- STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

- NOTES**
- INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
 - CONDUCT JETTING AND VACUUMING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

STORMTECH ISOLATOR ROW DETAILS
NOT TO SCALE

SC-740 6" INSPECTION PORT DETAIL
NTS

REV	DATE	DESCRIPTION
1	03/08/17	ISOLATOR ROW DETAILS SC-740
2		
3		
4		
5		
6		
7		
8		
9		
10		

DATE: 03/08/17 DRAWN: JLM CHECKED: [Signature]
PROJECT #:
PROJECT NAME:
DRAWN BY: [Signature]
CHECKED BY: [Signature]
DATE: 03/08/17
PROJECT #:
PROJECT NAME:
DRAWN BY: [Signature]
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ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

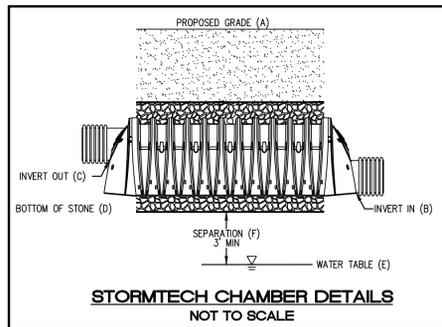
MATERIAL LOCATION	DESCRIPTION	AASHTO M43 DESIGNATION ¹	COMPACTION/DENSITY REQUIREMENT
① FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF THE FLEXIBLE PAVEMENT OR UNPAVED FRESH GRADE ABOVE. NOTE: THAT PAVEMENT SUBGRADE MAY BE PART OF THIS LAYER.	ANY SOLID ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRONGER MATERIAL AND PREPARATION REQUIREMENTS.
② FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE EMBEDMENT STONE (IF LAYERS TO 10" [250 mm] ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBGRADE MAY BE PART OF THIS LAYER.	GRANULAR WELL-GRADED SOIL-AGGREGATE MIXTURES - 30% FINES. MOST PAVEMENT SUB-BASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	3. 307.4, 487.5, 56.07, 6. 67, 62. 7, 75. 9, 89.9, 19	BEGIN COMPACTION AFTER 12" [305 mm] OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACTION ADDITIONAL LAYERS IN 6" [150 mm] LIFTS TO A MIN. 96% STANDARD PROCTOR DENSITY. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs [53 kN] DYNAMIC FORCE NOT TO EXCEED 20,000 lbs [91 kN].
③ EMBEDMENT STONE SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE (A LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE. NOMINAL SIZE 3/8" [9.5 mm] BETWEEN 3/4" - 2" [19 - 51 mm]	3. 307.4, 487.5, 56.07	NO COMPACTION REQUIRED.
④ FOUNDATION STONE BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE. NOMINAL SIZE 3/8" [9.5 mm] BETWEEN 3/4" - 2" [19 - 51 mm]	3. 307.4, 487.5, 56.07	FLATE COMPACT OR ROLL TO ACHIEVE A 95% STANDARD PROCTOR DENSITY ¹ .

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE."
2. AS AN ALTERNATE TO PROCTOR TESTING AND FIELD DENSITY MEASUREMENTS ON OPEN GRADED STONE, STORMTECH COMPACTION REQUIREMENTS ARE MET FOR A LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" [150 mm] MAXIMUM LIFTS USING TWO FULL COVERAGES WITH AN APPROPRIATE COMPACTOR.

STORMTECH ACCEPTABLE FILL MATERIALS

- ALL DESIGN SPECIFICATIONS FOR STORMTECH CHAMBERS SHALL BE IN ACCORDANCE WITH THE STORMTECH DESIGN MANUAL.
- THE INSTALLATION OF STORMTECH CHAMBERS SHALL BE IN ACCORDANCE WITH THE LATEST STORMTECH INSTALLATION INSTRUCTIONS.
- THE CONTRACTOR IS ADVISED TO REVIEW AND UNDERSTAND THE INSTALLATION INSTRUCTIONS PRIOR TO BEGINNING SYSTEM INSTALLATION. CALL 1-888-892-2694 OR VISIT WWW.STORMTECH.COM TO RECEIVE A COPY OF THE LATEST STORMTECH INSTALLATION INSTRUCTIONS.
- CHAMBERS SHALL MEET THE DESIGN REQUIREMENTS AND LOAD FACTORS SPECIFIED IN SECTION 12.12 OF THE LATEST EDITION OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

STORMTECH CHAMBER NOTES



CHAMBER	TEST PIT NUMBER	PROPOSED GRADE AT LOWEST POINT (A)	INVERT IN ELEVATION (B)	INVERT OUT ELEVATION (C)	BOTTOM OF STONE ELEVATION (D)	SEASONAL HIGH GROUNDWATER ELEVATION (E)	SEPARATION FROM GROUNDWATER, FT. (F)
UG-1	TH-D2	357.00	352.17	354.35	351.67	348.67	3.00'
UG-2	TH-D2	357.20	352.17	354.40	351.67	348.67	3.00'

STORMTECH CHAMBER DETAILS
NOT TO SCALE

OWNER:
AP 36, LOTS 8 & 37
DINIS & MARIA PEDROSO
132 HARVARD STREET
CRANSTON, RI 02920

APPLICANT:
HAUS 001, LLC
81 CREST DRIVE
CRANSTON, RI 02921

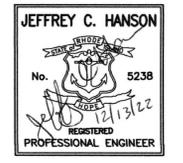
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- NOTES:**
- REFER TO APPENDIX F OF THE RHODE ISLAND STORMWATER DESIGN AND INSTALLATION STANDARDS MANUAL, MARCH 2015; GUIDANCE ON BMP CONSTRUCTION SPECIFICATIONS FOR SPECIFICATIONS OF MATERIALS TO BE USED IN CONSTRUCTING THE BMP'S.
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SHEET 1 OF 1

NO.	DATE	REVISION
1	12/10/22	RIDEM COMMENTS



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DETAILS - 2

PROPOSED COMMERCIAL CONDOMINIUMS

AP 36, LOTS 8 AND 37
PLAINFIELD PIKE
CRANSTON, RI

PREPARED FOR:
HAUS 001, LLC

SCALE AS NOTED
JUNE 2022

Drawn By: MBV
Checked By: BJC
Sheet 10 of 11
FILE NO.: 22.393.705

REVISIONS

NO.	BY	DATE
1	M.P.	Mar. 05

RHODE ISLAND DEPARTMENT OF TRANSPORTATION
PRECAST CONCRETE CURB
 R.I. STANDARD 7.1.0
 DATE: JUNE 15, 1998

REVISIONS

NO.	BY	DATE
1	M.P.	Mar. 05

RHODE ISLAND DEPARTMENT OF TRANSPORTATION
6'-0" PRECAST CONCRETE TRANSITION CURB
 R.I. STANDARD 7.1.2
 DATE: JUNE 15, 1998

REVISIONS

NO.	BY	DATE
1	M.P.	Mar. 05

RHODE ISLAND DEPARTMENT OF TRANSPORTATION
CURB SETTING DETAIL
 R.I. STANDARD 7.6.0
 DATE: JUNE 15, 1998

REVISIONS

NO.	BY	DATE
1	M.P.	Mar. 05
2	M.P.	09/21/05

RHODE ISLAND DEPARTMENT OF TRANSPORTATION
CEMENT CONCRETE SIDEWALK
 R.I. STANDARD 43.1.0
 DATE: JUNE 15, 1998

TRANSITION LENGTH (FT.)	BATTER (IN.)
6.0	1.5
8.0	1.5
10.0	1.5
12.0	1.5
14.0	1.5
16.0	1.5
18.0	1.5

REVISIONS

NO.	BY	DATE
1	M.P.	Mar. 05

RHODE ISLAND DEPARTMENT OF TRANSPORTATION
PRECAST CONCRETE WHEELCHAIR RAMP TRANSITION CURB
 R.I. STANDARD 7.1.3
 DATE: JUNE 15, 1998

OWNER:
 AP 36, LOTS 8 & 37
 DINIS & MARIA PEDROSO
 132 HARVARD STREET
 CRANSTON, RI 02920

APPLICANT:
 HAUS 001, LLC
 81 CREST DRIVE
 CRANSTON, RI 02921

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1	M.P.	Mar. 05

RHODE ISLAND DEPARTMENT OF TRANSPORTATION
DETECTABLE WARNING PANEL PLACEMENT
 R.I. STANDARD 48.1.0
 DATE: JUNE 15, 1998

REVISIONS

NO.	BY	DATE
1	M.P.	Mar. 05

RHODE ISLAND DEPARTMENT OF TRANSPORTATION
PRECAST 4'-0", 5'-0", OR 6'-0" ROUND CATCH BASIN
 R.I. STANDARD 4.4.0
 DATE: JUNE 15, 1998

REVISIONS

NO.	BY	DATE
1	M.P.	Mar. 05

RHODE ISLAND DEPARTMENT OF TRANSPORTATION
PRECAST 4'-0" ROUND MANHOLE
 R.I. STANDARD 4.2.0
 DATE: JUNE 15, 1998

REVISIONS

NO.	BY	DATE
1	M.P.	Mar. 05

RHODE ISLAND DEPARTMENT OF TRANSPORTATION
WHEELCHAIR RAMP
 R.I. STANDARD 43.5.0
 DATE: JUNE 15, 1998

REVISIONS

NO.	BY	DATE
1	M.P.	Mar. 05

RHODE ISLAND DEPARTMENT OF TRANSPORTATION
PRECAST CONCRETE SLOPED FACE TRANSITION CURB
 R.I. STANDARD 7.2.1
 DATE: JUNE 15, 1998

REVISIONS

NO.	BY	DATE
1	M.P.	Mar. 05

RHODE ISLAND DEPARTMENT OF TRANSPORTATION
BITUMINOUS BERM
 R.I. STANDARD 7.5.1
 DATE: JUNE 15, 1998

TRENCH INSTALLATION DETAIL

NOTES:

- FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH A FOUNDATION OF CLASS I OR II MATERIAL AS DEFINED IN ASTM D2321, "STANDARD PRACTICE FOR INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY-FLOW APPLICATIONS," LATEST EDITION; AS AN ALTERNATE AND AT THE DISCRETION OF THE ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING A WOVEN GEOTEXTILE FABRIC.
- BEDDING: SUITABLE MATERIAL SHALL BE CLASS I, II OR III AND INSTALLED AS REQUIRED IN ASTM D2321, LATEST EDITION. UNLESS OTHERWISE SPECIFIED BY THE ENGINEER, MINIMUM BEDDING THICKNESS SHALL BE 4" (100mm) FOR 4"-24" (100-600mm) CORRUGATED POLYETHYLENE PIPE (CPEP); 6" (150mm) FOR 30"-60" (750-1500mm) CPEP.
- HAUNCHING AND INITIAL BACKFILL: SUITABLE MATERIAL SHALL BE CLASS I, II OR III AND INSTALLED AS REQUIRED IN ASTM D2321, LATEST EDITION.
- UNLESS OTHERWISE SPECIFIED BY THE ENGINEER, MINIMUM TRENCH WIDTHS SHALL BE AS FOLLOWS:

NOMINAL Ø	MIN. TRENCH WIDTH	MIN. RECOMMENDED TRENCH WIDTH
4 (100)	21 (530)	21 (530)
6 (150)	23 (580)	23 (580)
8 (200)	25 (630)	25 (630)
10 (250)	28 (710)	28 (710)
12 (300)	31 (790)	31 (790)
15 (375)	34 (860)	34 (860)
18 (450)	39 (990)	39 (990)
24 (600)	48 (1200)	48 (1200)
30 (750)	66 (1680)	66 (1680)
36 (900)	78 (1980)	78 (1980)
42 (1050)	83 (2110)	83 (2110)
48 (1200)	89 (2260)	89 (2260)
60 (1500)	102 (2590)	102 (2590)

5. MINIMUM COVER: MINIMUM RECOMMENDED DEPTHS OF COVER FOR VARIOUS LIVE LOADING CONDITIONS ARE SUMMARIZED IN THE FOLLOWING TABLE. UNLESS OTHERWISE NOTED, ALL DIMENSIONS ARE TAKEN FROM THE TOP OF PIPE TO THE GROUND SURFACE.

SURFACE LIVE LOADING CONDITION	MINIMUM RECOMMENDED COVER, in. (mm)
H25 (FLEXIBLE PAVEMENT)	12 (300), 24 (600) FOR 60" (1500) PIPE
H25 (RIGID PAVEMENT)	12 (300), 24 (600) FOR 60" (1500) PIPE
EBO RAILWAY	24 (600)
HEAVY CONSTRUCTION	48 (1200)

*TOP OF PIPE TO BOTTOM OF BITUMINOUS PAVEMENT SECTION

NOTE TO THE ENGINEER: WHEN THIS DETAIL IS TO BE INCORPORATED INTO CONTRACT DOCUMENTS, PLEASE REFERENCE SECTION X-2, "RECOMMENDATIONS FOR INCORPORATION INTO CONTRACT DOCUMENTS" OF ASTM SPECIFICATION D2321, "STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY-FLOW APPLICATIONS" SO THAT APPROPRIATE MODIFICATIONS CAN BE MADE TO ACCOMMODATE SITE SPECIFIC NEEDS.

ADS STANDARD DETAILS DISCLAIMER: "ADVANCED DRAINAGE SYSTEMS, INC. (ADS)" HAS PREPARED THIS STANDARD DETAIL TO DEMONSTRATE ADS' RECOMMENDED INSTALLATION OF ITS PRODUCTS FOR THE DEPICTED APPLICATION. IN ADDITION TO ADS' RECOMMENDATIONS, THERE MAY BE OTHER NATIONAL, STATE OR LOCAL SPECIFICATIONS THAT ARE PERTINENT TO THIS APPLICATION. ADS' STANDARD DETAIL IS NOT INTENDED TO SUPERSEDE ANY NATIONAL, STATE OR LOCAL SPECIFICATIONS, AND ADS RECOMMENDS THAT THOSE REQUIREMENTS BE REVIEWED AND CONSULTED PRIOR TO THE INSTALLATION OF ADS' PRODUCTS. ADS HAS NOT AUTHORIZED, AND IT BEARS NO RESPONSIBILITY FOR, ANY REVISIONS, ALTERATIONS OR DEVIATIONS FROM THIS STANDARD DETAIL."

REVISIONS

NO.	BY	DATE
1	M.P.	Mar. 05

RHODE ISLAND DEPARTMENT OF TRANSPORTATION
SQUARE FRAME AND GRATE (BICYCLE SAFE)
 R.I. STANDARD 6.3.2
 DATE: JUNE 15, 1998

REVISIONS

NO.	BY	DATE
1	M.P.	Mar. 05

RHODE ISLAND DEPARTMENT OF TRANSPORTATION
HEAVY-DUTY ROUND FRAME AND COVER
 R.I. STANDARD 6.2.1
 DATE: JUNE 15, 1998

REVISIONS

NO.	BY	DATE
1	M.P.	Mar. 05

RHODE ISLAND DEPARTMENT OF TRANSPORTATION
TRANSVERSE PAVEMENT CUT AND MATCH
 R.I. STANDARD 47.1.1
 DATE: JUNE 15, 1998

REVISIONS

NO.	BY	DATE
1	M.P.	Mar. 05

RHODE ISLAND DEPARTMENT OF TRANSPORTATION
TRANSVERSE PAVEMENT CUT AND MATCH
 R.I. STANDARD 47.1.1
 DATE: JUNE 15, 1998

REVISIONS

NO.	BY	DATE
1	M.P.	Mar. 05

RHODE ISLAND DEPARTMENT OF TRANSPORTATION
HEAVY-DUTY ROUND FRAME AND COVER
 R.I. STANDARD 6.2.1
 DATE: JUNE 15, 1998

REVISIONS

NO.	BY	DATE
1	M.P.	Mar. 05

RHODE ISLAND DEPARTMENT OF TRANSPORTATION
TRANSVERSE PAVEMENT CUT AND MATCH
 R.I. STANDARD 47.1.1
 DATE: JUNE 15, 1998

NO.	DATE	REVISION

ILLSTONE ENGINEERING, P.C.
 CIVIL ENGINEERING • LAND PLANNING
 250 Centerville Road, Building E-12
 Warwick, Rhode Island 02886
 www.IllstoneEng.com
 T. (401) 921-3344
 F. (401) 921-3303

ILLSTONE ENGINEERING, P.C.
 CIVIL ENGINEERING • LAND PLANNING
 250 Centerville Road, Building E-12
 Warwick, Rhode Island 02886
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 F. (401) 921-3303

DETAILS - 3

PROPOSED COMMERCIAL CONDOMINIUMS

AP 36, LOTS 8 AND 37
 PLAINFIELD PIKE
 CRANSTON, RI

PREPARED FOR:
 HAUS 001, LLC

SCALE AS NOTED
 JUNE 2022

Drawn By: MBV
 Checked By: BJC
 Sheet

11
 of 11

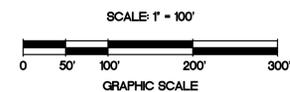
FILE NO.: 22.393.705

REFERENCES:

1. CITY OF CRANSTON GIS.
2. TOWN OF JOHNSTON GIS.

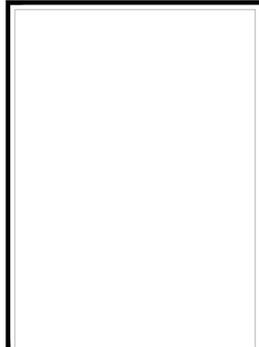
LEGEND:

- ZONING DISTRICT BOUNDARY
- TOWN/CITY LINE



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500' LOCUS MAP

PROPOSED COMMERCIAL CONDOMINIUMS

AP 36, LOTS 8 AND 37
 PLAINFIELD PIKE
 CRANSTON, RI

PREPARED FOR:
HAUS 001, LLC

SCALE: 1" = 100'
 MAY 2023

Drawn By: MBV
 Checked By: BJC
 Sheet

1
 of 1

APPLICANT:
 HAUS 001, LLC
 81 GRESTY DRIVE
 CRANSTON, RI 02921

FILE NO: 22.393.704

Commercial Condominiums

A.P. 36, Lots 8 and 37
Plainfield Pike
Cranston, RI

Operation and Maintenance Plan Pollution Prevention Plan

Prepared for:
HAUS 001, LLC
Robert Calise
81 Crest Drive
Cranston, RI 02921

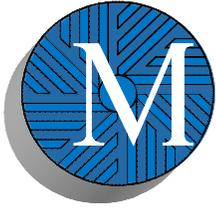


Prepared by:



250 Centerville Road, Building E-12 790 Aquidneck Avenue, Building B
Warwick, Rhode Island 02886 Middletown, Rhode Island 02842
p. (401) 921-3344 f. (401) 921-3303
www.MillstoneEng.com

June 2022
Revised 12/13/2022



STORMWATER MANAGEMENT OPERATION AND MAINTENANCE PLAN

Long-term maintenance of the drainage system shall be completed by the applicant/operator under a legally binding and enforceable maintenance agreement. The City of Cranston is NOT responsible for maintenance of the BMPs.

APPLICANT:

HAUS 001, LLC
Robert Calise
81 Crest Drive
Cranston, RI 02921

The contractor / operator shall maintain all drainage components during and directly after construction. All operational maintenance requirements will be recorded on the title.

OPERATOR / CONTRACTOR:

TBD

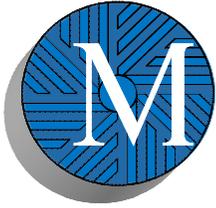
The entire stormwater system shall be inspected throughout the construction process and reported on the attached construction inspection reporting forms.

The entire stormwater management system shall be inspected on a bi-annual basis for general problems and to ensure proper function as well as after storm events greater than or equal to the 1-yr, 24-hr Type III precipitation event (2.7"). These inspections shall be reported on the attached O&M inspection reporting forms.

All inspections reports shall be kept on file with the Stormwater Management Operation and Maintenance Plan.

GENERAL FOR ALL BMP'S:

1. A legally binding and enforceable maintenance agreement shall be executed by the applicant to ensure the following:
2. The contractor shall be responsible for inspection, maintenance and repair to all drainage structures and related appurtenances on the site during construction and for a maximum of one (1) year following completion of construction, at which time the drainage structures and appurtenances are accepted by the engineer and the applicant.
3. Following acceptance, the long-term maintenance shall be the responsibility of the applicant until it is decided to another responsible entity.
4. All costs incurred for maintenance, cleaning, and inspection are the responsibility of the applicant and/or responsible party. In certain cases, the appropriate DEM program may require documentation of maintenance.
5. Inspection of the BMPs and all inlet and outlet structures shall be performed after storms equal to or greater than the 1-year, 24-hour Type III storm (2.7" event) and at least once annually, preferably during a storm event to inspect for proper functioning of the facility. During the first 6 months of



operation, BMPs shall be inspected at least during the first two precipitation events of at least 1.0-inches of rainfall.

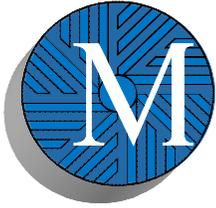
6. Any inadvertent or deliberate discharge of waste oil or any other pollutant to the stormwater disposal system requires immediate notification of the DEM Oil Pollution Control Program at 222-2284, per Oil Pollution Control Regulations. During non-working hours, notification of spills can be made to the DEM division of enforcement at 222-3070, the 24-hour emergency response phone number.
7. All trash, litter and other debris shall be removed from any stormwater facility including inlet and outlet structures. This must be accomplished at least twice per year, preferably in the spring and fall.
8. Repairs or replacement of inlet/outlet structures, rip-rap channels, fences, or other elements of the facility shall be completed within 30 days of deficiency reports. If an emergency is imminent, then repair/replacement must be completed immediately.

SEDIMENT FOREBAY O&M:

1. The slopes must be inspected for erosion and gullyng.
2. Stone shall be reinforced if erosion is present at outfalls or if it has been compromised.
3. Inspect all structural components, such as trash racks, access gates, valves, pipes, weirs, walls, orifice structures and spillway structures for defects. If any are found, they must be repaired immediately.
4. Inspect for sediment accumulation and it must be removed if it reaches 2.20-ft or 25% of the storage volume.
5. Mow grasses to maintain a 4-6" strong stand of turf and should the grasses reach 10", mowing must be done immediately. All clippings shall be collected and disposed of properly.
6. No woody growth shall ever be allowed to remain in and around the forebay.
7. Areas of erosion or disturbance shall be re-established immediately.
8. Inlets and outlets shall be cleared of debris as needed.

SAND FILTER O&M:

1. The facility shall be inspected annually to ensure filtration rates are being met. If standing water is observed for more than 48 hours after a rain event, the top 6 inches must be rototilled, and any compacted soils must be removed. If this does not solve the problem, the top 6 inches of the sand filter shall be removed and replaced.
2. Riprap must be reinforced if erosion is present at outfalls or if it has been compromised.
3. Mow grasses to maintain a 4-6" strong stand of turf. All clippings shall be collected and disposed of immediately.
4. No woody growth shall ever be allowed to remain in and around the filter.



5. Areas of erosion or disturbance shall be reestablished immediately.
6. Inlets and outlets shall be cleared of debris as needed.

UNDERGROUND STORAGE/DETENTION O&M:

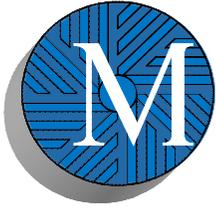
1. The system must be inspected at a minimum of one time a year or after major rain events if necessary.
2. Locate the inspection ports of the system and remove the lid from the riser.
3. Measure the sediment buildup at each port. Only certified confined space entry personnel having appropriate equipment shall be permitted to enter the system.
4. Inspect each manifold, all laterals, and outlet pipes for sediment buildup, obstructions, or other problems.
5. If measured sediment buildup is between 0.6" to 2.4", cleaning shall be considered; if sediment buildup exceeds 2.4", cleaning must be performed at the earliest opportunity. A thorough cleaning of the system (manifolds and laterals) shall be performed by either manual methods or by a vacuum truck.

DETENTION / INFILTRATION BASIN O&M:

1. The facility shall be inspected annually to ensure it is draining. If standing water is observed for more than 48 hours after a rain event the top 6" must be rototilled and any compacted removed. If this doesn't solve the problem the top 6" of the basin shall be removed and replaced.
2. The facility must be inspected annually for erosion, gullyng, or damage.
3. Riprap must be reinforced if erosion is present at outfalls or if it has been compromised.
4. Mow grasses to maintain a 4-6" strong stand of turf. All clippings shall be collected and disposed of immediately.
5. No woody growth shall ever be allowed to remain in and around the basin.
6. Areas of erosion or disturbance shall be reestablished immediately.
7. Inlets and outlets shall be cleared of debris and trash as needed (minimally, once a year).

DRAINAGE SYSTEM O&M:

1. All storm drainpipes shall be annually checked for sediment and debris and cleaned / jetted as necessary.
2. All costs incurred for maintenance, cleaning, and inspection are the responsibility of the applicant upon acceptance.



3. Pavement sweeping shall be performed annually, preferably in the spring, after roadway sanding is completed for the season.

ESTIMATED O&M BUDGET & FUNDING SOURCE:

- The project operator is still to be determined, but until its creation the applicant shall be responsible for funding the O&M budget.

Estimate of O&M budget:

Bi-annual inspections:	\$1,000 ea x 2	\$2,000
Bi-weekly mowing:	\$200 ea x 13	\$2,600
Misc. Repairs:	\$1,000	<u>\$1,000</u>

TOTAL ESTIMATE: \$5,600 / YR

POLLUTION PREVENTION PLAN:

Long-term management of the pollution prevention plan shall be the responsibility of the applicant / operator until the responsibility is turned over to another responsible entity.

Note: Tenants that would prompt the site to become a land use of higher potential pollutant loading (LUHPPL) as classified in Table 3-2 of the Rhode Island Stormwater Design and Installation Standards Manual shall not be permitted to occupy units on this site.

APPLICANT:

HAUS 001, LLC
Robert Calise
81 Crest Drive
Cranston, RI 02921

The contractor shall manage the pollution prevention plan during the construction process.

CONTRACTOR:

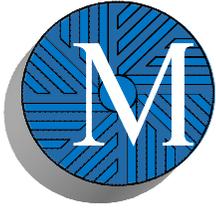
TBD

SOLID WASTE CONTAINMENT:

1. Where practical, trash racks shall be installed and maintained on all inlet structures within the drainage system.

SNOW DISPOSAL AND DEICING:

1. Sand and deicing materials shall be stored under-cover whether on or offsite to prevent exposure to stormwater.
2. Snow removal shall be performed in accordance with RIDEM's snow removal/disposal policy.



HAZARDOUS MATERIALS CONTAINMENT:

1. No hazardous materials shall be stored outside to avoid exposure to stormwater.

LANDSCAPE MANAGEMENT:

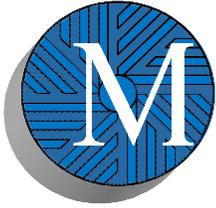
1. Grass clippings from lawn care procedures performed in and around the stormwater facility must be collected.
2. General lawn heights (excluding stormwater basins) onsite shall be kept at a 4-6" height.
3. Fertilizer and watering demands shall have professional oversight, and both uses shall be minimized to the maximum extent practical.

APPENDIX

Appendix A: Reduced Site Plan

Appendix B: Inspection Forms and Checklists

Appendix C: Sample O&M Agreement

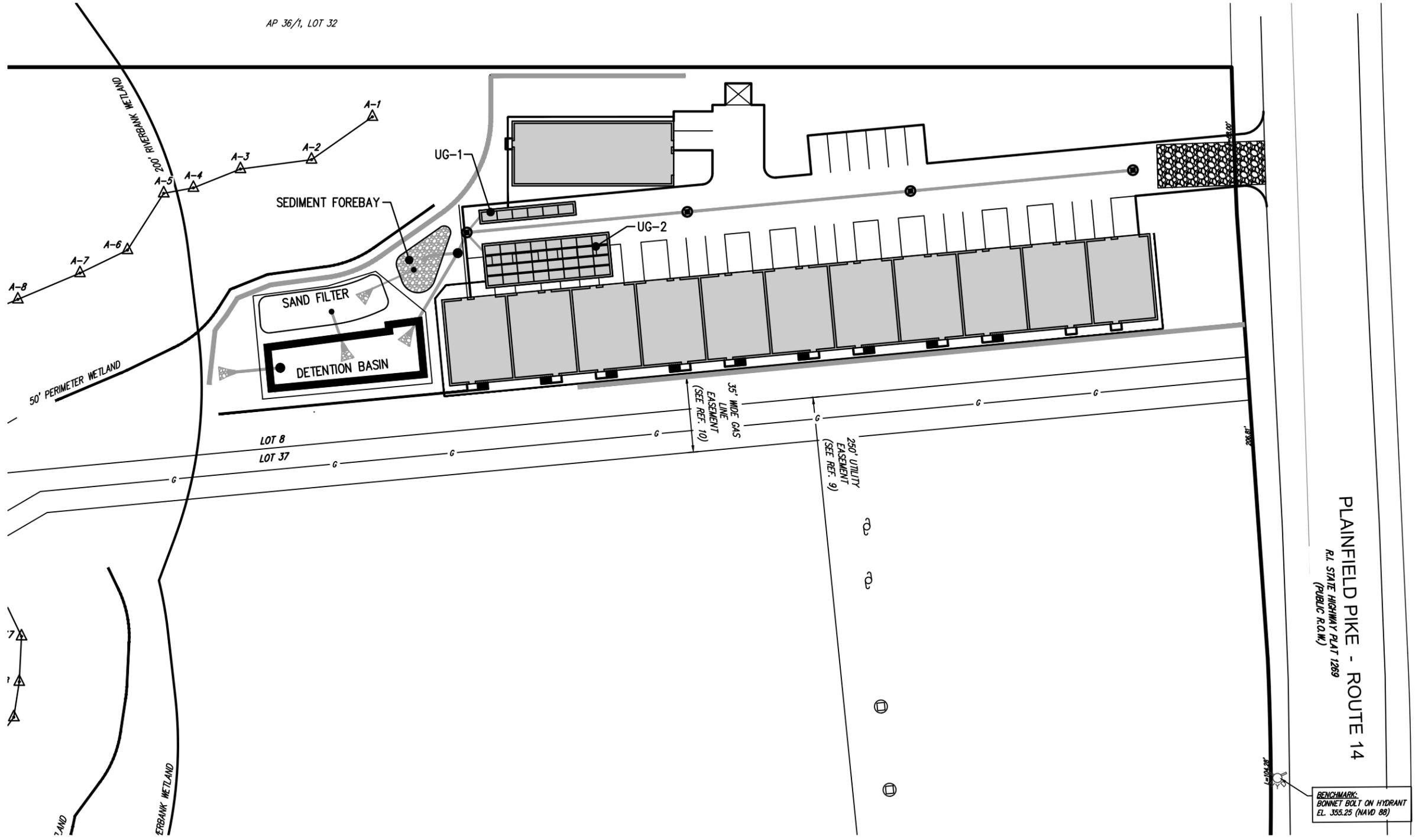


Commercial Condominiums
A.P. 36, Lots 8 and 37
Cranston, RI
Operation & Maintenance Plan
Revised 12/13/2022

Appendix A:
Reduced Site Plan



AP 36/1, LOT 32



PLAINFIELD PIKE - ROUTE 14
 R.I. STATE HIGHWAY PLAT 1269
 (PUBLIC R.O.M.)

BENCHMARK:
 BONNET BOLT ON HYDRANT
 EL. 355.25 (NAVD 88)

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 WARWICK, RI 02886

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STORMWATER MANAGEMENT PRACTICE LOCATION MAP
PROPOSED COMMERCIAL CONDOMINIUMS
 A.P. 36, LOTS 8 & 37
 PLAINFIELD PIKE
 Prepared for:
HAUS 001, LLC

Date: 12/13/2022
 Scale: 1" = 50'
 Drawn By: JSC
 Checked By: BJC

Sheet
1
 of 1

FILE NO.: 22.393.704



Commercial Condominiums
A.P. 36, Lots 8 and 37
Cranston, RI
Operation & Maintenance Plan
Revised 12/13/2022

Appendix B:

Inspection Forms and Checklists

Table F-1 Stormwater Basin/Shallow WVTS Construction Inspection Checklist

Project:

Location:

Site Status:

Date:

Time:

Inspector:

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
1. Pre-Construction/Materials and Equipment		
Pre-construction meeting		
Pipe and appurtenances on-site prior to construction and dimensions checked		
1. Material (including protective coating, if specified)		
2. Diameter		
3. Dimensions of metal riser or pre-cast concrete outlet structure		
4. Required dimensions between water control structures (orifices, weirs, etc.) are in accordance with approved plans		
5. Barrel stub for prefabricated pipe structures at proper angle for design barrel slope		
6. Number and dimensions of prefabricated anti-seep collars		

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
7. Watertight connectors and gaskets		
8. Outlet drain valve		
Project benchmark near basin site		
Equipment for temporary de-watering		
2. Subgrade Preparation		
Area beneath embankment stripped of all vegetation, topsoil, and organic matter		
3. Pipe Installation		
Method of installation detailed on plans		
A. Bed preparation		
Basin/WVTS excavated with specified side slopes		
Stable, uniform, dry subgrade of relatively impervious material (If subgrade is wet, contractor shall have defined steps before proceeding with installation)		
Invert at proper elevation and grade		
B. Pipe placement		
Metal/plastic pipe		
1. Watertight connectors and gaskets properly installed		
2. Anti-seep collars properly spaced and having watertight connections to pipe		

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
3. Backfill placed and tamped by hand under “haunches” of pipe		
4. Remaining backfill placed in max. 8 inch lifts using small power tamping equipment until 2 ft cover over pipe is reached		
Concrete pipe		
1. Pipe set on blocks or concrete slab for pouring of low cradle		
2. Pipe installed with rubber gasket joints with no spalling in gasket interface area		
3. Excavation for lower half of anti-seep collar(s) with reinforcing steel set		
4. Entire area where anti-seep collar(s) will come in contact with pipe coated with mastic or other approved waterproof sealant		
5. Low cradle and bottom half of anti-seep collar installed as monolithic pour and of an approved mix		
6. Upper half of anti-seep collar(s) formed with reinforcing steel set		
7. Concrete for collar of an approved mix and vibrated into place		
8. Forms stripped and collar inspected for honeycomb prior to backfilling. Parge if necessary.		
C. Backfilling		

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
Fill placed in maximum 8-in lifts		
Backfill taken minimum 2 ft above top of anti-seep collar elevation before traversing with heavy equipment		
4. Riser / Outlet Structure Installation		
Riser located within embankment		
A. Metal riser		
Riser base excavated or formed on stable subgrade to design dimensions		
Set on blocks to design elevations and plumbed		
Reinforcing bars placed at right angles and projecting into sides of riser		
Concrete poured so as to fill inside of riser to invert of barrel		
B. Pre-cast concrete structure		
Dry and stable subgrade		
Riser base set to design elevation		
If more than one section, no spalling in gasket interface area; gasket or approved caulking material placed securely		
Watertight and structurally sound collar or gasket joint where structure connects to pipe spillway		
C. Poured concrete structure		

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
Footing excavated or formed on stable subgrade, to design dimensions with reinforcing steel set		
Structure formed to design dimensions, with reinforcing steel set as per plan		
Concrete of an approved mix and vibrated into place		
Forms stripped & inspected for "honeycomb" prior to backfilling; parge if necessary		
5. Embankment Construction		
Fill material		
Compaction		
Embankment		
1. Fill placed in specified lifts and compacted with appropriate equipment		
2. Constructed to design cross-section, side slopes and top width		
3. Constructed to design elevation plus allowance for settlement		
6. Impounded Area Construction		
Excavated / graded to design contours and side slopes		
Inlet pipes have adequate outfall protection		
Forebay(s)		
Basin benches		

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
7. Earth Emergency Spillway Construction		
Spillway located in cut or structurally stabilized with riprap, gabions, concrete, etc.		
Excavated to proper cross-section, side slopes and bottom width		
Entrance channel, crest, and exit channel constructed to design grades and elevations		
8. Outlet Protection		
A. End section		
Securely in place and properly backfilled		
B. Endwall		
Footing excavated or formed on stable subgrade, to design dimensions and reinforcing steel set, if specified		
Endwall formed to design dimensions with reinforcing steel set as per plan		
Concrete of an approved mix and vibrated into place		
Forms stripped and structure inspected for "honeycomb" prior to backfilling; parge if necessary		
C. Riprap apron / channel		
Apron / channel excavated to design cross-section with proper transition to existing ground		

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
Filter fabric in place		
Stone sized as per plan and uniformly place at the thickness specified		
9. Vegetative Stabilization		
Approved seed mixture		
Proper surface preparation and required soil amendments		
Excelsior mat or other stabilization, as per plan		
10. Miscellaneous		
Drain for basins having a permanent pool		
Trash rack / anti-vortex device secured to outlet structure		
Trash protection for low flow pipes, orifices, etc.		
Fencing (when required)		
Access road		
Set aside for clean-out maintenance		
11. Shallow WWTSS		
Adequate water balance		
Variety of depth zones present		
Approved pondscaping plan in place and budget for additional plantings		

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
Plants and materials ordered 6 months prior to construction		
Construction planned to allow for adequate planting and establishment of plant community		
Shallow WVTS setback area preserved to maximum extent possible		

Comments:

Actions to be Taken:

E.2 Best Management Practices Operation, Maintenance, and Inspection Checklists

This section includes sample checklists that can be used during maintenance inspections to ensure that all aspects of a constructed BMP are inspected. These checklists should be modified for a specific BMP that may or may not need all of the maintenance items shown here.

Stormwater Basin/WVTS Operation, Maintenance, and Management Inspection Checklist

Project

Location:

Site Status:

Date:

Time:

Inspector:

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
1. Embankment and emergency spillway (Annual, After Major Storms)		
1. Vegetation and ground cover adequate		
2. Embankment erosion		
3. Animal burrows		
4. Unauthorized planting		
5. Cracking, bulging, or sliding of dam		
a. Upstream face		
b. Downstream face		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
c. At or beyond toe		
downstream		
upstream		
d. Emergency spillway		
6. Basin, toe & chimney drains clear and functioning		
7. Seeps/leaks on downstream face		
8. Slope protection or riprap failure		
9. Vertical/horizontal alignment of top of dam "As-Built"		
10. Emergency spillway clear of obstructions and debris		
2. Riser and principal spillway (Annual, After Major Storms)		
Type: Reinforced concrete _____ Corrugated pipe _____ Masonry _____ 1. Low-flow orifice obstructed		
2. Low-flow trash rack. a. Debris removal necessary		
b. Corrosion control		
3. Weir trash rack maintenance a. Debris removal necessary		
b. corrosion control		
4. Excessive sediment accumulation inside riser		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
5. Concrete/masonry condition riser and barrels a. cracks or displacement		
b. Minor spalling (<1")		
c. Major spalling (rebars exposed)		
d. Joint failures		
e. Water tightness		
6. Metal pipe condition		
7. Control valve a. Operational/exercised		
b. Chained and locked		
8. Basin drain valve a. Operational/exercised		
b. Chained and locked		
9. Outfall channels functioning		
3. Permanent Pool (WVTS/Wet Basins) (Semi-annually)		
1. Undesirable vegetative growth		
2. Floating or floatable debris removal required		
3. Visible pollution		
4. Shoreline problem		
5. Other (specify)		
4. Sediment Forebays (Semi-annually)		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
1. Sedimentation noted		
2. Sediment cleanout when depth < 50% design depth		
5. Dry Basin Areas (Annual, After Major Storms)		
1. Vegetation adequate		
2. Undesirable vegetative growth		
3. Undesirable woody vegetation		
4. Low-flow channels clear of obstructions		
5. Standing water or wet spots		
6. Sediment and/or trash accumulation		
6. Condition of Outfalls (Annual , After Major Storms)		
1. Riprap failures		
2. Slope erosion		
3. Storm drain pipes		
4. Endwalls / Headwalls		
5. Other (specify)		
7. Other (Semi-annually)		
1. Encroachment on basin, WVTS or easement area		
2. Complaints from residents		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
3. Aesthetics a. Grass growing required		
b. Graffiti removal needed		
c. Other (specify)		
4. Conditions of maintenance access routes		
5. Signs of hydrocarbon build-up		
6. Any public hazards (specify)		
8. Emergent Vegetation (Annual)		
1. Vegetation healthy and growing WVTS maintaining 50% surface area coverage of emergent plants after the second growing season. (If unsatisfactory, reinforcement plantings needed)		
2. Dominant emergent plants: Survival of desired emergent plant species Distribution according to planting plan?		
3. Evidence of invasive species		
4. Maintenance of adequate water depths for desired emergent plant species		
5. Harvesting of emergent plantings needed		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
6. Have sediment accumulations reduced pool volume significantly or are plants “choked” with sediment		
7. Eutrophication level of the WVTS		

Comments:

Actions to be Taken:

Table F-4 Infiltration Trench/Chamber Construction Inspection Checklist

Project:

Location:

Site Status:

Date:

Time:

Inspector:

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
1. Pre-Construction		
Pre-construction meeting		
Runoff diverted		
Soil permeability tested		
Groundwater / bedrock sufficient at depth		
2. Excavation		
Size and location		
Side slopes stable		
Excavation does not compact subsoils		
3. Filter Fabric Placement		
Fabric specifications		
Placed on bottom, sides, and top		

CONSTRUCTION SEQUENCE	SATISFACTORY/ UNSATISFACTORY	COMMENTS
4. Aggregate Material		
Size as specified		
Clean / washed material		
Placed properly		
5. Observation Well		
Pipe size		
Removable cap / footplate		
Initial depth = _____ feet		
6. Final Inspection		
Pretreatment facility in place		
Contributing watershed stabilized prior to flow diversion		
Outlet		

Comments:

Actions to be Taken:

Infiltration System Operation, Maintenance, and Management Inspection Checklist

Project:

Location:

Site Status:

Date:

Time:

Inspector:

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
1. Debris Cleanout (Annual)		
Trench/chamber or basin surface clear of debris		
Inflow pipes clear of debris		
Overflow spillway clear of debris		
Inlet area clear of debris		
2. Sediment Traps or Forebays (Annual)		
Obviously trapping sediment		
Greater than 50% of storage volume remaining		
3. Dewatering (Annual)		
Trench/chamber or basin dewateres between storms		
4. Sediment Cleanout of Trench/Chamber or Basin (Annual)		

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
No evidence of sedimentation in trench/chamber or basin		
Sediment accumulation doesn't yet require cleanout		
5. Inlets (Annual)		
Good condition		
No evidence of erosion		
6. Outlet/Overflow Spillway (Annual)		
Good condition, no need for repair		
No evidence of erosion		
7. Aggregate Repairs (Annual)		
Surface of aggregate clean		
Top layer of stone does not need replacement		
Trench/Chamber or basin does not need rehabilitation		

Comments:

Actions to be Taken:

Table F-17 Sand/Organic Filter System Construction Inspection Checklist

Project:

Location:

Site Status:

Date:

Time:

Inspector:

CONSTRUCTION SEQUENCE	SATISFACTORY / UNSATISFACTORY	COMMENTS
1. Pre-construction		
Pre-construction meeting		
Runoff diverted		
Facility area cleared		
Facility location staked out		
2. Excavation		
Size and location		
Side slopes stable		
Foundation cleared of debris		
If designed as exfilter, excavation does not compact subsoils		
Foundation area compacted		
3. Structural Components		
Dimensions and materials		
Forms adequately sized		

CONSTRUCTION SEQUENCE	SATISFACTORY / UNSATISFACTORY	COMMENTS
Concrete meets standards		
Prefabricated joints sealed		
Underdrains (size, materials)		
4. Completed Facility Components		
24-hour water filled test		
Contributing area stabilized		
Filter material per specification		
Underdrains installed to grade		
Flow diversion structure properly installed		
Pretreatment devices properly installed		
Level overflow weirs, multiple orifices, distribution slots		
5. Final Inspection		
Dimensions		
Surface completely level		
Structural components		
Proper outlet		
Ensure that site is properly stabilized before flow is directed to the structure.		

Comments:

Actions to be Taken:

Table F-17 Sand/Organic Filter System Construction Inspection Checklist

Project:

Location:

Site Status:

Date:

Time:

Inspector:

CONSTRUCTION SEQUENCE	SATISFACTORY / UNSATISFACTORY	COMMENTS
1. Pre-construction		
Pre-construction meeting		
Runoff diverted		
Facility area cleared		
Facility location staked out		
2. Excavation		
Size and location		
Side slopes stable		
Foundation cleared of debris		
If designed as exfilter, excavation does not compact subsoils		
Foundation area compacted		
3. Structural Components		
Dimensions and materials		
Forms adequately sized		

CONSTRUCTION SEQUENCE	SATISFACTORY / UNSATISFACTORY	COMMENTS
Concrete meets standards		
Prefabricated joints sealed		
Underdrains (size, materials)		
4. Completed Facility Components		
24-hour water filled test		
Contributing area stabilized		
Filter material per specification		
Underdrains installed to grade		
Flow diversion structure properly installed		
Pretreatment devices properly installed		
Level overflow weirs, multiple orifices, distribution slots		
5. Final Inspection		
Dimensions		
Surface completely level		
Structural components		
Proper outlet		
Ensure that site is properly stabilized before flow is directed to the structure.		

Comments:

Actions to be Taken:

F.5.2 Construction Specifications for Bioretention Systems

F.5.2.1 Material Specifications

The allowable materials to be used in bioretention area are detailed in Table F-18.

F.5.2.2 Bioretention Soil

The soil should be a uniform mix, free of stones, stumps, roots or other similar objects larger than two inches. No other materials or substances should be mixed or dumped within the bioretention area that may be harmful to plant growth, or prove a hindrance to the planting or maintenance operations. The bioretention soil should be free of noxious weeds.

The bioretention system shall utilize planting soil having a composition as follows:

Sand: 85-88%

Soil fines: 8 to 12% (no more than 2% clay)

Organic Matter*: 3 to 5%

*Note: For bioretention applications with a soil depth of less than 4 feet, add 20% (by volume) of well aged (3 months), well aerated, leaf compost (or approved equivalent) to the above planting soil mixture. Where soil fines content is less than 12%, add a corresponding % of leaf compost.

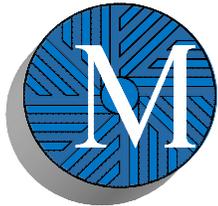
A textural analysis is required to ensure the bioretention soil meets the specification listed above. The bioretention soil should also be tested for the following criteria:

pH range	5.2 - 7.0
magnesium	not to exceed 32 ppm
phosphorus P ₂ O ₅	not to exceed 69 ppm
potassium K ₂ O	not to exceed 78 ppm
soluble salts	not to exceed 500 ppm

All bioretention areas should have a minimum of one test. Each test should consist of both the standard soil test for pH, phosphorus, and potassium and additional tests of organic matter, and soluble salts.

Since different labs calibrate their testing equipment differently, all testing results should come from the same testing facility.

Should the pH fall out of the acceptable range, it may be modified (higher) with lime or (lower) with iron sulfate plus sulfur.



Commercial Condominiums
A.P. 36, Lots 8 and 37
Cranston, RI
Operation & Maintenance Plan
Revised 12/13/2022

Appendix C:
Sample O&M Agreement

Sample Stormwater Facility Maintenance Agreement

THIS AGREEMENT, made and entered into this ____ day of _____, 20____, by and between (Insert Full Name of Owner)

_____ hereinafter called the "Landowner", and the [Local Jurisdiction], hereinafter called the "[Town/City]".

WITNESSETH, that WHEREAS, the Landowner is the owner of certain real property described as (Tax Map/Parcel Identification Number) _____

as recorded by deed in the land records of [Local Jurisdiction] Deed Book _____ Page _____, hereinafter called the "Property".

WHEREAS, the Landowner is proceeding to build on and develop the property; and WHEREAS, the Site Plan/Subdivision Plan known as

_____, (Name of Plan/Development) hereinafter called the "Plan", which is expressly made a part hereof, as approved or to be approved by the [Town/City], provides for detention of stormwater within the confines of the property; and

WHEREAS, the [Town/City] and the Landowner, its successors and assigns, including any homeowners association, agree that the health, safety, and welfare of the residents of [Local Jurisdiction] require that on-site stormwater management facilities be constructed and maintained on the Property; and

WHEREAS, the [Town/City] requires that on-site stormwater management facilities as shown on the Plan be constructed and adequately maintained by the Landowner, its successors and assigns, including any homeowners association.

NOW, THEREFORE, in consideration of the foregoing premises, the mutual covenants contained herein, and the following terms and conditions, the parties hereto agree as follows:

1. The on-site stormwater management facilities shall be constructed by the Landowner, its successors and assigns, in accordance with the plans and specifications identified in the Plan.
2. The Landowner, its successors and assigns, including any homeowners association, shall adequately maintain the stormwater management facilities in accordance with the required Operation and Maintenance Plan. This includes all pipes, channels or other conveyances built to convey stormwater to the facility, as well as all structures, improvements, and vegetation provided to control the quantity and quality of the stormwater. Adequate maintenance is herein defined as good working condition so that these facilities are performing their design functions. The Stormwater Best Management Practices Operation, Maintenance and Management Checklists are to be used to establish what good working condition is acceptable to the [Town/City].

-
3. The Landowner, its successors and assigns, shall inspect the stormwater management facility and submit an inspection report annually. The purpose of the inspection is to assure safe and proper functioning of the facilities. The inspection shall cover the entire facilities, berms, outlet structure, basin areas, access roads, etc. Deficiencies shall be noted in the inspection report.
 4. The Landowner, its successors and assigns, hereby grant permission to the [Town/City], its authorized agents and employees, to enter upon the Property and to inspect the stormwater management facilities whenever the [Town/City] deems necessary. The purpose of inspection is to follow-up on reported deficiencies and/or to respond to citizen complaints. The [Town/City] shall provide the Landowner, its successors and assigns, copies of the inspection findings and a directive to commence with the repairs if necessary.
 5. In the event the Landowner, its successors and assigns, fails to maintain the stormwater management facilities in good working condition acceptable to the [Town/City], the [Town/City] may enter upon the Property and take whatever steps necessary to correct deficiencies identified in the inspection report and to charge the costs of such repairs to the Landowner, its successors and assigns. This provision shall not be construed to allow the [Town/City] to erect any structure of permanent nature on the land of the Landowner outside of the easement for the stormwater management facilities. It is expressly understood and agreed that the [Town/City] is under no obligation to routinely maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation on the [Town/City].
 6. The Landowner, its successors and assigns, will perform the work necessary to keep these facilities in good working order as appropriate. In the event a maintenance schedule for the stormwater management facilities (including sediment removal) is outlined on the approved plans, the schedule will be followed.
 7. In the event the [Town/City] pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials, and the like, the Landowner, its successors and assigns, shall reimburse the [Town/City] upon demand, within thirty (30) days of receipt thereof for all actual costs incurred by the [Town/City] hereunder.
 8. This Agreement imposes no liability of any kind whatsoever on the [Town/City] and the Landowner agrees to hold the [Town/City] harmless from any liability in the event the stormwater management facilities fail to operate properly.
 9. This Agreement shall be recorded among the land records of [Local Jurisdiction] and shall constitute a covenant running with the land, and shall be binding on the Landowner, its administrators, executors, assigns, heirs and any other successors in interests, including any homeowners association.

WITNESS the following signatures and seals:

Company/Corporation/Partnership Name (Seal)

By: _____

(Type Name and Title)

The foregoing Agreement was acknowledged before me this ____ day of _____, 20____, by

_____.

NOTARY PUBLIC

My Commission Expires: _____

By: _____

(Type Name and Title)

The foregoing Agreement was acknowledged before me this ____ day of _____, 20____, by

_____.

NOTARY PUBLIC

My Commission Expires: _____

Approved as to Form:

[Town/City] Attorney Date

Commercial Condominiums

A.P. 36, Lots 8 and 37
Plainfield Pike
Cranston, RI

Project Narrative and Drainage Analysis

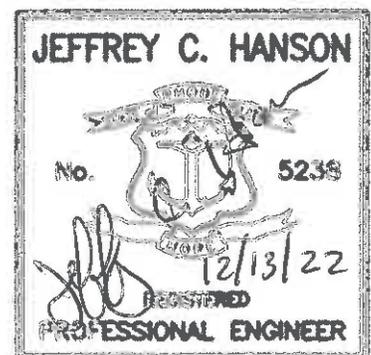
Prepared for:
HAUS 001, LLC
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Cranston, RI 02921



Prepared by:



260 Centerville Road, Building E-12 780 Aquidneck Avenue, Building B
Warwick, Rhode Island 02886 Middletown, Rhode Island 02842
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www.MillstoneEng.com



Project Number: 22.393.704

June 2022
Revised 12/13/2022



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Appendix A – Stormwater Management Checklist

Appendix B – Reduced Project Watershed Maps (8.5x11)

Appendix C – Existing Conditions Hydraflow Modeling Printouts

Appendix D – Proposed Conditions Hydraflow Modeling Printouts

Appendix E – BMP Sizing Calculation Worksheets

Appendix F – Water Quality Hydraflow Modeling Printouts

Appendix G – Pipe Sizing Calculations

Appendix H – Groundwater Mounding Analysis

Appendix I – Stormwater Management Operation and Maintenance Plan

Appendix J – Supporting Documentation

- Rainfall data
- Soils Data & Evaluation Forms

Folder at the end of the report holds the full-size Project Watershed Maps (24x36)



I. INTRODUCTION

This Stormwater Management Plan is prepared in support of a proposed development consisting of three 16,000-square foot commercial condominium units located on Ten Rod Road on North Kingstown's Tax Assessor's Plat 113, Lot 20. A 24-foot driveway provides access to the site and parking has been provided. The buildings will be served by public water, natural gas, electric, telecommunications, and on-site wastewater treatment systems.

The project sits on approximately 5.1 acres and is zoned General Business, GB. The existing site consists of some existing buildings that will remain, hardpacked gravel, grass, and wooded areas. The proposed development will disturb approximately 3.8 acres of the subject property.

There are several areas with significant slopes on the site. According to RIDEM mapping, the site does not lie within any natural heritage or groundwater protection areas.

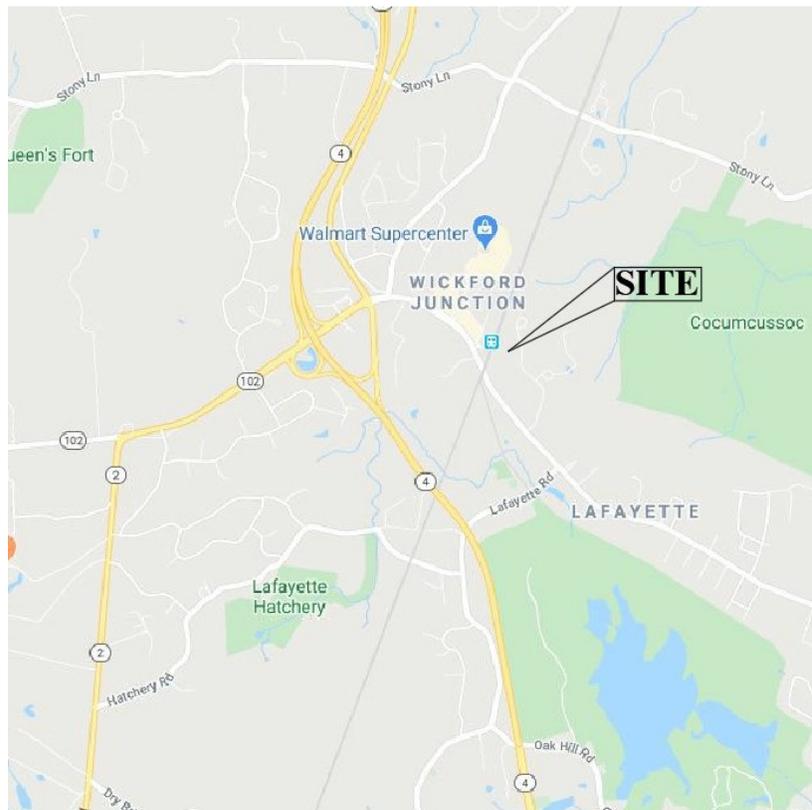


Figure 1: Site Locus
Reference: Google Maps

SOILS

The soils within the subject project are defined by the Soil Survey of Rhode Island and are comprised of the following soils with their associated Hydrologic Soil Group (HSG):

- Hinckley loamy sand (HkD) / HSG A
- Quonset gravelly sandy loam (QoC) / HSG A

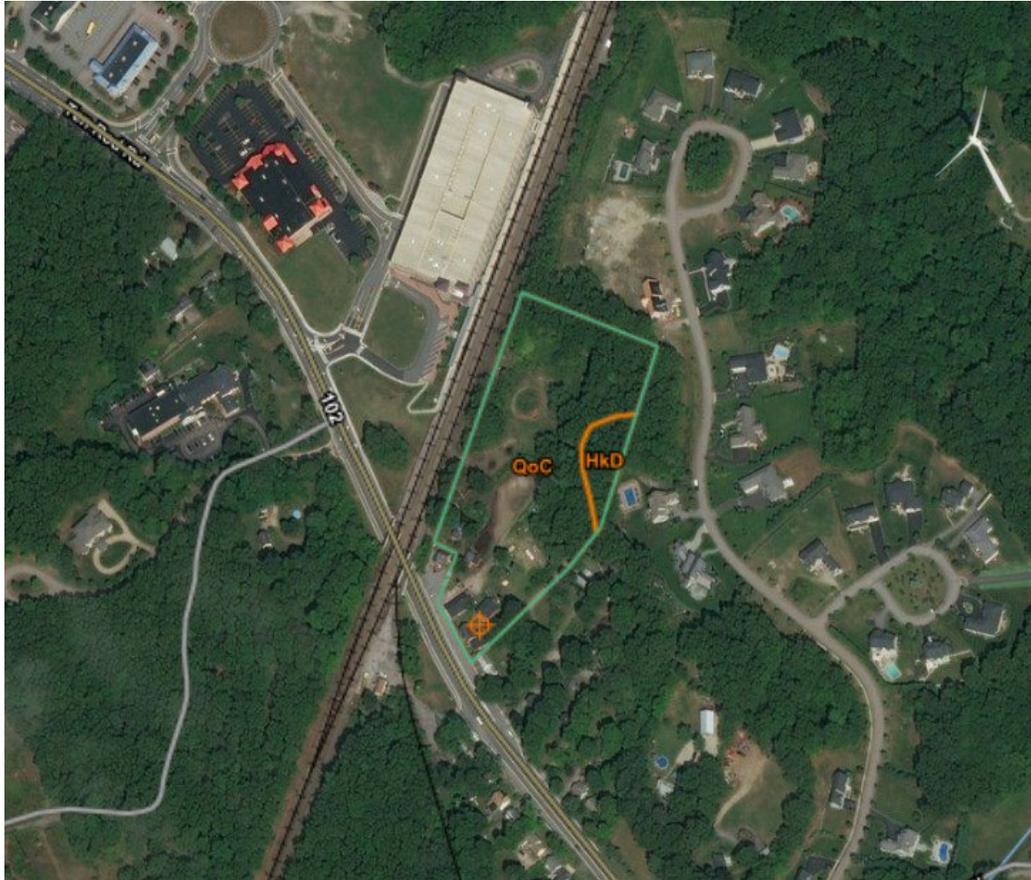
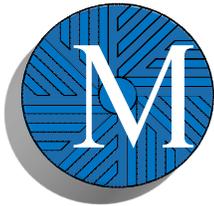


Figure 2: Soils Map

Reference: Soil Survey of Rhode Island United States Department of Agriculture Soil Conservation Service in cooperation with Rhode Island Agricultural Experiment Station, Issued July 1981

RAINFALL

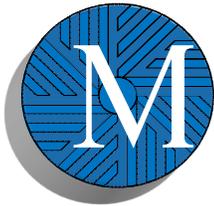
For this study, the storm events utilize the NRCS Type III precipitation distribution for a 24-hour duration storm for Washington County (Table 1). Additional information about the soils and rainfall can be found in Appendix J.

Storm Frequency	1-yr	10-yr	25-yr	100-yr
Rainfall Amount (in)	2.80	4.90	6.10	8.50

Table 1. Design Rainfall Amounts

TEST HOLES

Four test holes were prepared and analyzed for the site. The seasonal high groundwater is estimated to be between 5 to 8 feet below the surface of the original grade of the test hole locations. No ledge was encountered on the site. Detailed results of the test holes are in Appendix J.



FLOOD ZONE

The entire site is located within a Zone X flood zone, which is an area considered to be outside the 0.2% annual chance floodplain. (Figure 3: The National Flood Insurance Program Flood Insurance Rate Map (FIRM), Map Number 44009C0103H, effective date October 19, 2010.)

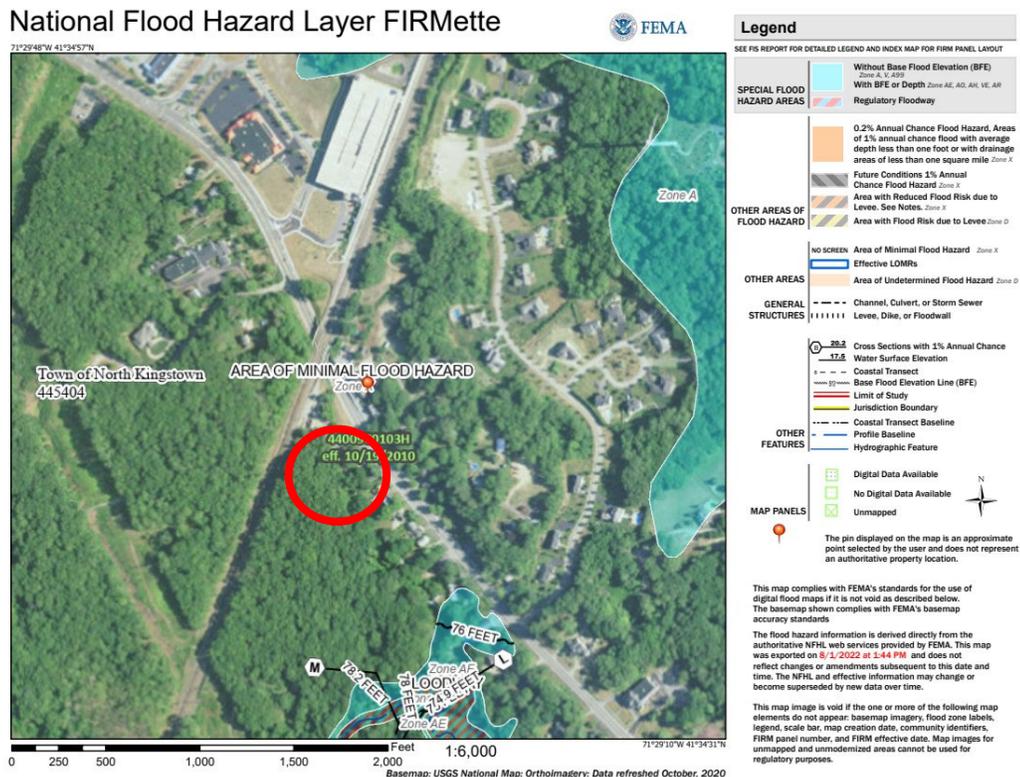


Figure 3: FEMA Firmette

II. EXISTING CONDITIONS

Under existing conditions, the project site consists of existing buildings that will remain, hardpacked gravel, grass, and wooded areas. The site was delineated into four watersheds, EX-A, EX-B, EX-C, and EX-d, which each drain to a unique design point, POS-A, POS-B, POS-C, and POS-D, respectively.

Watershed EX-A consists of the southern 0.64 acres of the site. Stormwater flows overland in a southeasterly direction from the gravel driveway at the westernmost corner to an existing depression, located just off-site.

Watershed EX-B consists of 3.69 acres of the western portion of the site. Stormwater flows from the southeastern side to an existing depression in the northern portion of the watershed area.

Watershed EX-C consists of the easternmost 1.45 acres of the site. Stormwater flows in an easterly direction to an existing depression in the middle of the watershed area.

Watershed EX-D consist of the remaining 0.25 acre of site along the northernmost edge of the watershed. Stormwater flows to an existing depression located in the middle of the watershed area.



Hydraflow Hydrograph Extension for AutoCAD 2019, a TR-55 stormwater-based analysis for AutoCAD software was used to demonstrate the proposed peak runoff flows using the Runoff Curve Numbers (CN), times of concentration (Tc), watershed areas and rainfall distribution. The details for the analysis are provided in Appendix C and a summary is provided below.

Watershed ID	Land Cover	Area (ac)	CN
EX-A	Grass	0.44	39
	Impervious roof	0.11	98
	Impervious gravel / paved	0.09	98
	Total / Composite CN	0.64	57
	Tc (min)	9.2	
EX-B	Woods	1.72	32
	Grass	1.32	39
	Impervious roof	0.04	98
	Impervious gravel / paved	0.61	98
	Total / Composite CN	3.69	46
	Tc (min)	13.8	
EX-C	Woods	0.44	32
	Grass	1.00	39
	Impervious roof	0.001	98
	Impervious gravel / paved	0.001	98
	Total / Composite CN	1.44	37
	Tc (min)	12.3	
EX-D	Woods	0.18	32
	Grass	0.08	39
	Total / Composite CN	0.26	34
	Tc (min)	13.3	

Table 2. Existing Watershed Description

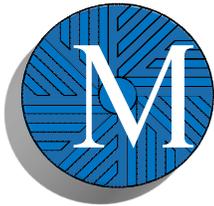
Existing Peak Runoff (cfs)				
Storm Frequency	1-year	10-year	25-year	100-year
EX-A	0.04	0.60	1.08	2.23
EX-B	0.01	0.74	2.03	6.01
EX-C	0.00	0.02	0.17	1.07
EX-D	0.00	0.002	0.01	0.12

Table 3. Existing Peak Runoff Summary

III. PROPOSED CONDITIONS

For proposed conditions, the site was delineated into eight watersheds. The same design points were used for proposed conditions in order to compare existing and proposed conditions.

Watershed PR-A consists of the southeastern 0.60 acres of the site, which will mostly remain undisturbed in proposed conditions. There are some very minor grading modifications that have been proposed within the watershed to allow for the proposed access driveway. Stormwater generally matches existing conditions and flows overland in a southern direction toward POS-A.



Watershed PR-B consists of the western 1.71 acres of the site. There are existing buildings and driveways that will remain in proposed conditions. This portion of the watershed is where the proposed on-site wastewater treatment areas (OWTS) have been proposed. However, no additional impervious area has been proposed.

Watershed PR-C makes up 0.80 acres of the eastern portion of the site. The watershed is mostly pervious area with proposed grading modifications to accommodate the development, including the proposed sand filters used for stormwater treatment.

Watershed PR-D matches existing watershed EX-D. There is no proposed development for the watershed.

Watersheds PR-E, -F, -G, and -H consist of the remaining 2.68 acres of the site. The proposed development includes three 16,000-square foot buildings, the paved access driveway and paved parking lot and access around the buildings. Stormwater is collected in off-line catch basin and pipe systems. The stormwater is directed into underground diversion structures that are fitted with sediment traps. A pipe from each of the diversion structures directs the water quality flow into an underground sand filter that allows the stormwater to filter through media before being exfiltrated into the ground. An overflow pipe allows for additional stormwater to be directed into underground storage units that allow the stormwater to exfiltrate into the ground. The sand filters are also fitted with overflow pipes into the underground storage units. All stormwater generated by the 2- through 100-year storms is exfiltrated into the ground.

Hydraflow Hydrograph Extension for AutoCAD 2019, a TR-55 stormwater-based analysis for AutoCAD software was used to demonstrate the proposed peak runoff flows using the Runoff Curve Numbers (CN), times of concentration (Tc), watershed areas and rainfall distribution. The details for the analysis are provided in Appendix D and a summary is provided below.

Watershed ID	Land Cover	Area (ac)	CN
PR-A	Grass	0.43	39
	Impervious existing / undisturbed roof	0.11	98
	Impervious existing / undisturbed gravel / paved	0.60	98
	Total / Composite CN	0.60	56
	Tc (min)	5.0	
PR-B	Woods	0.30	32
	Grass	1.21	39
	Impervious existing / undisturbed roof	0.04	98
	Impervious existing / undisturbed gravel / paved	0.16	98
	Total / Composite CN	1.71	45
	Tc (min)	11.9	
PR-C	Woods	0.34	32
	Grass	0.46	39
	Impervious existing / undisturbed roof	0.001	98
	Total / Composite CN	0.80	36
	Tc (min)	9.7	
PR-D	Woods	0.18	32
	Grass	0.08	39
	Total / Composite CN	0.26	34
	Tc (min)	13.3	
PR-E	Grass	0.07	39
	Impervious roof	0.18	98



	Impervious paved	0.33	98
	Total / Composite CN	0.58	91
	Tc (min)	5.0	
PR-F	Grass	0.03	39
	Impervious roof	0.37	98
	Impervious paved	0.50	98
	Total / Composite CN	0.90	96
	Tc (min)	5.0	
PR-G	Impervious roof	0.37	98
	Impervious paved	0.44	98
	Total / Composite CN	0.81	98
	Tc (min)	5.0	
PR-H	Grass	0.04	39
	Impervious roof	0.18	98
	Impervious paved	0.17	98
	Total / Composite CN	0.39	92
	Tc (min)	5.0	

Table 4. Proposed Watershed Description

Proposed Peak Runoff (cfs)				
Storm Frequency	1-year	10-year	25-year	100-year
PR-A	0.03	0.54	1.03	2.17
PR-B	0.003	0.31	0.91	2.91
PR-C	0.00	0.01	0.07	0.54
PR-D	0.00	0.002	0.01	0.12
PR-E	1.23	2.45	3.14	4.50
PR-F	2.25	4.09	5.13	7.20
PR-G	2.12	3.74	4.67	6.52
PR-H	0.86	1.68	2.14	3.05

Table 5. Proposed Peak Runoff Summary

IV. EXISTING VS PROPOSED PEAK RUNOFF AND VOLUME COMPARISON

The Hydraflow analysis has shown that peak runoff flowrates and volumes have been reduced between the existing and proposed conditions at the design points for the 1- through 100-year storms. The details for this analysis have been provided in Appendices C and D and a summary is provided below.



Storm Frequency	1-yr		10-yr		25-yr		100-yr	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
POS-A	0.04	0.03	0.60	0.54	1.08	1.03	2.23	2.17
Difference (cfs)	-0.01		-0.05		-0.05		-0.06	
% Reduction	-30%		-9%		-5%		-3%	
POS-B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Difference (cfs)	0.00		0.00		0.00		0.00	
% Reduction	N/A		N/A		N/A		N/A	
POS-C	0.00	0.00	0.02	0.01	0.17	0.07	1.07	0.54
Difference (cfs)	0.00		-0.01		-0.10		-0.54	
% Reduction	N/A		-58%		-59%		-50%	
POS-D	0.00	0.00	0.00	0.00	0.01	0.01	0.12	0.12
Difference (cfs)	0.00		0.00		0.00		0.00	
% Reduction	N/A		0%		0%		0%	

Table 6. Existing vs. Proposed Peak Runoff Summary

Storm Frequency	1-yr		10-yr		25-yr		100-yr	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
POS-A	438	339	2,443	2,022	4,036	3,381	7,812	6,629
Difference (cf)	-99		-421		-655		-1,183	
% Reduction	-23%		-17%		-16%		-15%	
POS-B	0	0	0	0	0	0	0	0
Difference (cf)	0		0		0		0	
% Reduction	N/A		N/A		N/A		N/A	
POS-C	0	0	650	274	1,984	925	6,325	3,124
Difference (cf)	0		-376		-1,059		-3,201	
% Reduction	N/A		-58%		-53%		-51%	
POS-D	0	0	49	49	221	221	863	863
Difference (cf)	0		0		0		0	
% Reduction	N/A		0%		0%		0%	

Table 7. Existing vs. Proposed Volume Summary



V. STORMWATER QUALITY AND BMPS

The proposed project maximizes water quality and quantity management for the proposed increase in impervious areas using a sediment forebay, sand filter, underground detention/infiltration and at-grade detention/infiltration system. The system provides water quality volume and recharge volume in excess of the requirements.

Water Quality Volume (cf)	
Required	Provided
6,912	7,034

Table 8. Water Quality Volume

Recharge Volume (cf)	
Required	Provided
5,529	8,690

Table 9. Recharge Volume

VI. MINIMUM STORMWATER MANAGEMENT STANDARDS

The Rhode Island Stormwater Design and Installation Standards Manual (RISDISM) defines eleven (11) minimum design standards for stormwater management. Please refer to Appendix A for the completed Stormwater Management Checklist. Below is a summary of how this project addresses each of the design standards.

Standard 1: LID Site Planning and Design Strategies

The site utilizes diversion structures fitted with sediment traps, underground sand filters, and underground infiltration for stormwater quality and quantity management.

Standard 2: Groundwater Recharge

The recharge volume for the site is achieved using sand filters and underground infiltration systems to exceed the requirements.

Standard 3: Water Quality

The stormwater quality for the site is achieved using sediment traps, underground sand filters and underground infiltration. The provided volume exceeds the required water quality volume for the site.

Standard 4: Conveyance and Natural Channel Protection

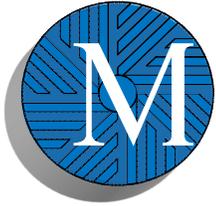
This standard requires that open drainage and pipe conveyance systems provide for at least the peak flow from the 10-year, 24-hour storm. For this project, the system has been designed for the peak 100-year storm.

Standard 5: Overbank Flood Protection

The underground infiltration systems were designed to reduce the peak flowrates for the 1- through 100-year peak discharge rates.

Standard 6: Redevelopment and Infill Projects

This standard is not applicable to this project.



Standard 7: Pollution Prevention

A Pollution Prevention Plan has been provided as part of the Operation and Maintenance Plan (Appendix I).

Standard 8: LUHPPLs

This standard is not applicable to this project.

Standard 9: Illicit Discharges

No illicit discharges exist or are proposed.

Standard 10: Construction Erosion and Sediment Control

Please refer to the site plans for the short and long term SESC maintenance requirements. A stand-alone Soil Erosion and Sediment Control Plan is also provided.

Standard 11: Stormwater Management Operation and Maintenance

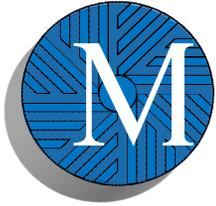
Please refer to Appendix G for the Stormwater Management Operation and Maintenance Plan.

VII. GROUNDWATER MOUNDING

Groundwater mounding is not anticipated to impact the proposed development. See the Groundwater mounding analysis found in Appendix I.

VIII. CONCLUSION

The stormwater design proposed for this development is in conformance with the Rhode Island Stormwater Design and Installation Standards Manual. Stormwater runoff will be reduced from existing conditions for all require design storms. Impacts of the proposed development to neighboring properties will be mitigated by the stormwater measures proposed by the project. The BMPs throughout the site provide excess of the required recharge and stormwater quality. This development provides a sound and safe stormwater design.



IX. APPENDICES

- Appendix A – Stormwater Management Checklist
- Appendix B – Reduced Project Watershed Map (8.5x11)
- Appendix C – Existing Stormwater Modeling Printouts
- Appendix D – Proposed Stormwater Modeling Printouts
- Appendix E – BMP Sizing Calculation Worksheets
- Appendix F – Hydraflow Water Quality Modeling Printouts
- Appendix G – Appendix H – Groundwater Mounding Analysis
- Appendix I – Stormwater Management Operation and Maintenance Plan
- Appendix J – Supporting Documentation
 - Rainfall data
 - Soils Data & Evaluation Forms

Folder at rear holds the full-size Project Watershed Map (24x36)



Commercial Condominiums
A.P. 36, Lots 8 and 37
Cranston, RI
Stormwater Management Plan
Revised 12/13/2022

Appendix A

Stormwater Management Checklist

APPENDIX A: STORMWATER MANAGEMENT PLAN CHECKLIST AND LID PLANNING REPORT – STORMWATER DESIGN SUMMARY

PROJECT NAME Commercial Condominiums	(RIDEM USE ONLY)
TOWN Cranston	STW/WQC File #:
BRIEF PROJECT DESCRIPTION: Proposed commercial condominium development located on Plainfield Pike. Two buildings are proposed – one is 13,200-square feet, housing 11 commercial condos and the second is a 2,250-square foot commercial condo building. A 24-foot driveway and the associated parking and loading spaces have also been provided on the site.	Date Received:

Stormwater Management Plan (SMP) Elements – Minimum Standards

Submit **four separately bound** documents: Appendix A Checklist; Stormwater Site Planning, Analysis and Design Report with Plan Set/Drawings; Soil Erosion and Sediment Control (SESC) Plan, and Post Construction Operations and Maintenance (O&M) Plan. Please refer to [Suggestions to Promote Brevity](#).

Note: All stormwater construction projects **must submit** a Stormwater Management Plan (SMP). However, not every element listed below is required per the [RIDEM Stormwater Rules](#) and the [RIPDES Construction General Permit \(CGP\)](#). This checklist will help identify the required elements to be submitted with an Application for Stormwater Construction Permit & Water Quality Certification.

PART 1. PROJECT AND SITE INFORMATION

PROJECT TYPE (Check all that apply)

<input type="checkbox"/> Residential	<input checked="" type="checkbox"/> Commercial	<input type="checkbox"/> Federal	<input type="checkbox"/> Retrofit	<input type="checkbox"/> Restoration
<input type="checkbox"/> Road	<input type="checkbox"/> Utility	<input type="checkbox"/> Fill	<input type="checkbox"/> Dredge	<input type="checkbox"/> Mine
<input type="checkbox"/> Other (specify):				

SITE INFORMATION

Vicinity Map

INITIAL DISCHARGE LOCATION(S): The WQv discharges to: (You may choose more than one answer if several discharge points are associated with the project.) See [Guidance to identify receiving waters](#).

<input checked="" type="checkbox"/> Groundwater	<input checked="" type="checkbox"/> Surface Water	<input type="checkbox"/> MS4
<input type="checkbox"/> GAA	<input checked="" type="checkbox"/> Isolated Wetland	<input type="checkbox"/> RIDOT
<input checked="" type="checkbox"/> GA	<input type="checkbox"/> Named Waterbody	<input type="checkbox"/> RIDOT Alteration Permit is Approved
<input type="checkbox"/> GB	<input type="checkbox"/> Unnamed Waterbody Connected to Named Waterbody	<input type="checkbox"/> Town
		<input type="checkbox"/> Other (specify):

ULTIMATE RECEIVING WATERBODY LOCATION(S): Include pertinent information that applies to both WQv and flow from larger storm events including overflows. Choose all that apply, and repeat table for each waterbody.

<input checked="" type="checkbox"/> Groundwater or Disconnected Wetland	<input type="checkbox"/> SRWP
<input checked="" type="checkbox"/> Waterbody Name: Pocasset River Watershed	<input type="checkbox"/> Coldwater <input type="checkbox"/> Warmwater <input type="checkbox"/> Unassessed
<input checked="" type="checkbox"/> Waterbody ID: RI0006018R-05	<input type="checkbox"/> 4 th order stream of pond 50 acres or more
<input type="checkbox"/> TMDL for:	<input checked="" type="checkbox"/> Watershed of flood prone river (e.g., Pocasset River)
<input type="checkbox"/> Contributes to a priority outfall listed in the TMDL	<input type="checkbox"/> Contributes stormwater to a public beach
<input type="checkbox"/> 303(d) list – Impairment(s) for:	<input type="checkbox"/> Contributes to shell fishing grounds

PROJECT HISTORY		
<input type="checkbox"/> RIDEM Pre- Application Meeting	Meeting Date:	<input type="checkbox"/> Minutes Attached
<input type="checkbox"/> Municipal Master Plan Approval	Approval Date:	<input type="checkbox"/> Minutes Attached
<input type="checkbox"/> Subdivision Suitability Required	Approval #:	
<input type="checkbox"/> Previous Enforcement Action has been taken on the property	Enforcement #:	
FLOODPLAIN & FLOODWAY See Guidance Pertaining to Floodplain and Floodways		
<input type="checkbox"/> Riverine 100-year floodplain: FEMA FLOODPLAIN FIRMETTE has been reviewed and the 100-year floodplain is on site		
<input type="checkbox"/> Delineated from FEMA Maps		
NOTE: Per Rule 250-RICR-150-10-8-1.1(B)(5)(d)(3), provide volumetric floodplain compensation calculations for cut and fill/displacement calculated by qualified professional		
<input type="checkbox"/> Calculated by Professional Engineer		
<input type="checkbox"/> Calculations are provided for cut vs. fill/displacement volumes proposed within the 100-year floodplain	Amount of Fill (CY):	
	Amount of Cut (CY):	
<input type="checkbox"/> Restrictions or modifications are proposed to the flow path or velocities in a floodway		
<input type="checkbox"/> Floodplain storage capacity is impacted		
<input checked="" type="checkbox"/> Project area is not within 100-year floodplain as defined by RIDEM		
CRMC JURISDICTION		
<input type="checkbox"/> CRMC Assent required		
<input type="checkbox"/> Property subject to a Special Area Management Plan (SAMP). If so, specify which SAMP:		
<input type="checkbox"/> Sea level rise mitigation has been designed into this project		
LUHPPL IDENTIFICATION - MINIMUM STANDARD 8:		
1. OFFICE OF WASTE MANAGEMENT (OWM)		
<input type="checkbox"/> Known or suspected releases of HAZARDOUS MATERIAL are present at the site (Hazardous Material is defined in Rule 1.4(A)(33) of 250-140-30-1 of the RIDEM Rules and Regulations for Investigation and Remediation of Hazardous Materials (the Remediation Regulations))		RIDEM CONTACT:
<input type="checkbox"/> Known or suspected releases of PETROLEUM PRODUCT are present at the site (Petroleum Product as defined in Rule 1.5(A)(84) of 250-140-25-1 of the RIDEM Rules and Regulations for Underground Storage Facilities Used for Regulated Substances and Hazardous Materials)		
<input type="checkbox"/> This site is identified on the RIDEM Environmental Resources Map as one of the following regulated facilities		SITE ID#:
<input type="checkbox"/> CERCLIS/Superfund (NPL)		
<input type="checkbox"/> State Hazardous Waste Site (SHWS)		
<input type="checkbox"/> Environmental Land Usage Restriction (ELUR)		
<input type="checkbox"/> Leaking Underground Storage Tank (LUST)		
<input type="checkbox"/> Closed Landfill		
Note: If any boxes in 1 above are checked, the applicant must contact the RIDEM OWM Project Manager associated with the Site to determine if subsurface infiltration of stormwater is allowable for the project. Indicate if the infiltration corresponds to "Red," "Yellow" or "Green" as described in Section 3.2.8 of the RISDISM Guidance (Subsurface Contamination Guidance). Also, note and reference approval in PART 3, Minimum Standard 2: Groundwater Recharge/Infiltration.		
2. PER MINIMUM STANDARD 8 of RICR 8.14.C.1-6 "LUHPPLS," THE SITE IS/HAS:		
<input type="checkbox"/> Industrial Site with RIPDES MSGP, except where No Exposure Certification exists. http://www.dem.ri.gov/programs/water/permits/ripdes/stormwater/status.php		
<input type="checkbox"/> Auto Fueling Facility (e.g., gas station)		
<input type="checkbox"/> Exterior Vehicles Service, Maintenance, or Equipment Cleaning Area		
<input type="checkbox"/> Road Salt Storage and Loading Areas (exposed to rainwater)		
<input type="checkbox"/> Outdoor Storage and Loading/Unloading of Hazardous Substances		

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

3. STORMWATER INDUSTRIAL PERMITTING		
<input type="checkbox"/>	The site is associated with existing or proposed activities that are considered Land Uses with Higher Potential Pollutant Loads (LUHPPLS) (see RICR 8.14.C)	Activities: Sector:
<input type="checkbox"/>	Construction is proposed on a site that is subject to THE MULTI-SECTOR GENERAL PERMIT (MSGP) UNDER RULE 31(B)15 OF THE RIPDES REGULATIONS.	MSGP permit #
<input type="checkbox"/>	Additional stormwater treatment is required by the MSGP Explain:	
REDEVELOPMENT STANDARD – MINIMUM STANDARD 6		
<input type="checkbox"/> Pre-Construction Impervious Area – Not applicable, TIA = 0		
0.00 ac	<input checked="" type="checkbox"/> Total Pre-Construction Impervious Area (TIA)	
	<input type="checkbox"/> Total Site Area (TSA)	
	<input type="checkbox"/> Jurisdictional Wetlands (JW)	
	<input type="checkbox"/> Conservation Land (CL)	
<input type="checkbox"/> Calculate the Site Size (defined as contiguous properties under same ownership)		
	<input type="checkbox"/> Site Size (SS) = (TSA) – (JW) – (CL)	
	<input type="checkbox"/> (TIA) / (SS)	<input type="checkbox"/> (TIA) / (SS) >0.4?
<input type="checkbox"/> YES, Redevelopment		
PART 2. LOW IMPACT DEVELOPMENT ASSESSMENT – MINIMUM STANDARD 1 (NOT REQUIRED FOR REDEVELOPMENT OR RETROFITS) This section may be deleted if not required.		
Note: A written description must be provided specifying why each method is not being used or is not applicable at the Site. Appropriate answers may include:		
<ul style="list-style-type: none"> • Town requires ... (state the specific local requirement) • Meets Town’s dimensional requirement of ... • Not practical for site because ... • Applying for waiver/variance to achieve this (pending/approved/denied) • Applying for wavier/variance to seek relief from this (pending/approved/denied) 		
A) PRESERVATION OF UNDISTURBED AREAS, BUFFERS, AND FLOODPLAINS <input checked="" type="checkbox"/> Sensitive resource areas and site constraints are identified (required) <input checked="" type="checkbox"/> Local development regulations have been reviewed (required) <input checked="" type="checkbox"/> All vegetated buffers and coastal and freshwater wetlands will be protected during and after construction <input type="checkbox"/> Conservation Development or another site design technique has been incorporated to protect open space and pre-development hydrology. Note: If Conservation Development has been used, check box and skip to Subpart C <input checked="" type="checkbox"/> As much natural vegetation and pre-development hydrology as possible has been maintained		IF NOT IMPLEMENTED, EXPLAIN HERE

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

<p>B) LOCATE DEVELOPMENT IN LESS SENSITIVE AREAS AND WORK WITH THE NATURAL LANDSCAPE CONDITIONS, HYDROLOGY, AND SOILS</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Development sites and building envelopes have been appropriately distanced from wetlands and waterbodies <input checked="" type="checkbox"/> Development and stormwater systems have been located in areas with greatest infiltration capacity (e.g., soil groups A and B) <input type="checkbox"/> Plans show measures to prevent soil compaction in areas designated as Qualified Pervious Areas (QPA's) <input checked="" type="checkbox"/> Development sites and building envelopes have been positioned outside of floodplains <input checked="" type="checkbox"/> Site design positions buildings, roadways and parking areas in a manner that avoids impacts to surface water features <input checked="" type="checkbox"/> Development sites and building envelopes have been located to minimize impacts to steep slopes ($\geq 15\%$) <input type="checkbox"/> Other (describe): 	
<p>C) MINIMIZE CLEARING AND GRADING</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Site clearing has been restricted to <u>minimum area needed</u> for building footprints, development activities, construction access, and safety. <input checked="" type="checkbox"/> Site has been designed to position buildings, roadways, and parking areas in a manner that minimizes grading (cut and fill quantities) <input type="checkbox"/> Protection for stands of trees and individual trees and their root zones to be preserved has been specified, and such protection extends at least to the tree canopy drip line(s) <input checked="" type="checkbox"/> Plan notes specify that public trees removed or damaged during construction shall be replaced with equivalent 	<p>Site clearing will be required. The project has been sited to be outside of the wetland areas, and the easements that are present on the site. Therefore, the buildings, access drive, and parking areas have been located in the appropriate space on the site. No public trees will be removed due to the site construction.</p>
<p>D) REDUCE IMPERVIOUS COVER</p> <ul style="list-style-type: none"> <input type="checkbox"/> Reduced roadway widths (≤ 22 feet for ADT ≤ 400; ≤ 26 feet for ADT 400 - 2,000) <input type="checkbox"/> Reduced driveway areas (length minimized via reduced ROW width (≤ 45 ft.) and/or reduced (or absolute minimum) front yard setback; width minimized to ≤ 9 ft. wide one lane; ≤ 18 ft. wide two lanes; shared driveways; pervious surface) <input type="checkbox"/> Reduced building footprint: Explain approach: <input type="checkbox"/> Reduced sidewalk area (≤ 4 ft. wide; one side of the street; unpaved path; pervious surface) <input type="checkbox"/> Reduced cul-de-sacs (radius < 45 ft; vegetated island; alternative turn-around) <input type="checkbox"/> Reduced parking lot area: Explain approach <input type="checkbox"/> Use of pervious surfaces for driveways, sidewalks, parking areas/overflow parking areas, etc. <input type="checkbox"/> Minimized impervious surfaces (project meets or is less than maximum specified by Zoning Ordinance) <input checked="" type="checkbox"/> Other (describe): 	<p>The driveway and parking areas have been designed to meet the requirements and provide a safe and sound design for circulating around the site.</p>
<p>E) DISCONNECT IMPERVIOUS AREA</p> <ul style="list-style-type: none"> <input type="checkbox"/> Impervious surfaces have been disconnected, and runoff has been diverted to QPAs to the maximum extent possible <input type="checkbox"/> Residential street edges allow side-of-the-road drainage into vegetated open swales <input type="checkbox"/> Parking lot landscaping breaks up impervious expanse AND accepts runoff <input checked="" type="checkbox"/> Other (describe): 	<p>Roof runoff will be directed into underground detention/infiltration. Stormwater will be collected and treated in a forebay, sand filter, and detention/infiltration basin.</p>

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

<p>F) MITIGATE RUNOFF AT THE POINT OF GENERATION</p> <p><input checked="" type="checkbox"/> Small-scale BMPs have been designated to treat runoff as close as possible to the source</p>	<p>A sediment forebay, sand filter, underground detention/infiltration and at-grade detention/infiltration have been proposed to collect stormwater from the proposed impervious areas.</p>
<p>G) PROVIDE LOW-MAINTENANCE NATIVE VEGETATION</p> <p><input checked="" type="checkbox"/> Low-maintenance landscaping has been proposed using native species and cultivars</p> <p><input type="checkbox"/> Plantings of native trees and shrubs in areas previously cleared of native vegetation are shown on site plan</p> <p><input type="checkbox"/> Lawn areas have been limited/minimized, and yards have been kept undisturbed to the maximum extent practicable on residential lots</p>	<p>Grass; a native seed mix has been specified.</p>
<p>H) RESTORE STREAMS/WETLANDS</p> <p><input type="checkbox"/> Historic drainage patterns have been restored by removing closed drainage systems, daylighting buried streams, and/or restoring degraded stream channels and/or wetlands</p> <p><input type="checkbox"/> Removal of invasive species</p> <p><input type="checkbox"/> Other</p>	<p>N/A</p>

PART 3. SUMMARY OF REMAINING STANDARDS

GROUNDWATER RECHARGE – MINIMUM STANDARD 2

YES	NO	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	The project has been designed to meet the groundwater recharge standard.
<input type="checkbox"/>	<input type="checkbox"/>	If “No,” the justification for groundwater recharge criterion waiver has been explained in the Narrative (e.g., threat of groundwater contamination or physical limitation), if applicable (see RICR 8.8.D);
<input type="checkbox"/>	<input type="checkbox"/>	Your waiver request has been explained in the Narrative, if applicable.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this site identified as a Regulated Facility in Part 1, Minimum Standard 8: LUHPPL Identification?
<input type="checkbox"/>	<input type="checkbox"/>	If “Yes,” has approval for infiltration by the Office of Waste Management Site Project Manager, per Part 1, Minimum Standard 8, been requested?

TABLE 2-1: Summary of Recharge (see RISDISM Section 3.3.2)
(Add or Subtract Rows as Necessary)

Design Point	Impervious Area Treated (sq ft)	Total Re _v Required (cu ft)	LID Stormwater Credits (see RISDISM Section 4.6.1)	Recharge Required by Remaining BMPs (cu ft)	Recharge Provided by BMPs (cu ft)
			Portion of Re _v directed to a QPA (cu ft)		
TOTALS (POS-B)	30,379	808		808	2,613

- Only BMPs listed in RISDISM Table 3-5 “List of BMPs Acceptable for Recharge” may be used to meet the recharge requirement.
- Recharge requirement must be satisfied for each waterbody ID.

Indicate where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.):

Commercial Condos Project Narrative and Drainage Analysis, Section V & Appendix F

WATER QUALITY – MINIMUM STANDARD 3

YES	NO	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Does this project meet or exceed the required water quality volume WQ _v (see RICR 8.9.E-I)?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is the proposed final impervious cover greater than 20% of the disturbed area (see RICR 8.9.E-I)?

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

<input checked="" type="checkbox"/>	<input type="checkbox"/>	If "Yes," either the Modified Curve Number Method or the Split Pervious/Impervious method in Hydro-CAD was used to calculate WQv; or,
<input checked="" type="checkbox"/>	<input type="checkbox"/>	If "Yes," either TR-55 or TR-20 was used to calculate WQv; and,
<input type="checkbox"/>	<input type="checkbox"/>	If "No," the project meets the minimum WQv of 0.2 watershed inches over the entire disturbed area.
<input type="checkbox"/>	<input type="checkbox"/>	Not Applicable
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Does this project meet or exceed the ability to treat required water quality flow WQf (see RICR 8.9.I.1-3)?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Does this project propose an increase of impervious cover to a receiving water body with impairments? If "Yes," please indicate below the method that was used to address the water quality requirements of no further degradation to a low-quality water.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	RICR 8.36. A Pollutant Loading Analysis is needed and has been completed.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	The Water Quality Guidance Document (Water Quality Goals and Pollutant Loading Analysis Guidance for Discharges to Impaired Waters) has been followed as applicable.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	BMPs are proposed that are on the approved technology list . If "Yes," please provide all required worksheets from the manufacturer.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Additional pollutant-specific requirements and/or pollutant removal efficiencies are applicable to the site as the result of a TMDL, SAMP, or other watershed-specific requirements. If "Yes," please describe:

TABLE 3-1: Summary of Water Quality (see RICR 8.9)

Design Point and WB ID	Impervious area treated (sq ft)	Total WQv Required (cu ft)	LID Stormwater Credits (see RICR 8.18)	Water Quality Treatment Remaining (cu ft)	Water Quality Provided by BMPs (cu ft)
			WQv directed to a QPA (cu ft)		
TOTALS: (POS-B)	30,379	2,361		2,361	3,937

Notes:

- Only BMPs listed in RICR 8.20 and 8.25 or the Approved Technologies List of BMPs is Acceptable for Water Quality treatment.
- For each Design Point, the Water Quality Volume Standard must be met for each Waterbody ID.

<input checked="" type="checkbox"/> YES	This project has met the setback requirements for each BMP.
<input type="checkbox"/> NO	If "No," please explain:

Indicate where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.):

Commercial Condo Project Narrative and Drainage Analysis, Section V, Appendix E, Appendix F

CONVEYANCE AND NATURAL CHANNEL PROTECTION (RICR 8.10) – MINIMUM STANDARD 4

YES	NO	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this standard waived? If "Yes," please indicate one or more of the reasons below:
	<input type="checkbox"/>	The project directs discharge to a large river (i.e., 4th-order stream or larger. See RISDISM Appendix I for State-wide list and map of stream orders), bodies of water >50.0 acres in surface area (i.e., lakes, ponds, reservoirs), or tidal waters.
	<input checked="" type="checkbox"/>	The project directs is a small facility with impervious cover of less than or equal to 1 acre.
	<input checked="" type="checkbox"/>	The project has a post-development peak discharge rate from the facility that is less than 2 cfs for the 1-year, 24-hour Type III design storm event (prior to any attenuation). (<u>Note:</u> LID design strategies can greatly reduce the peak discharge rate).
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Conveyance and natural channel protection for the site have been met. If "No," explain why:

TABLE 4-1: Summary of Channel Protection Volumes (see RICR 8.10)

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

Design Point	Receiving Water Body Name (Block Island Sound)	Coldwater Fishery? (Y/N)	Total CPv Required (cu ft)	Total CPv Provided (cu ft)	Average Release Rate Modeled in the 1-yr storm (cfs)
The project has a proposed peak discharge rate less than 2 cfs. In addition, the project proposes less than 1 acre of impervious area.					
<u>Note:</u> The Channel Protection Volume Standard must be met in each waterbody ID.					
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	The CPv is released at roughly a uniform rate over a 24-hour duration (see examples of sizing calculations in Appendix D of the RISDISM). Infiltration is the first source of discharge for the BMPs.				
<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	Do additional design restrictions apply resulting from any discharge to cold-water fisheries; If "Yes," please indicate restrictions and solutions below.				
<input checked="" type="checkbox"/> Indicate below where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.). N/A					
OVERBANK FLOOD PROTECTION (RICR 8.11) AND OTHER POTENTIAL HIGH FLOWS – MINIMUM STANDARD 5					
YES	NO				
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this standard waived? If yes, please indicate one or more of the reasons below:			
		<input type="checkbox"/>	The project directs discharge to a large river (i.e., 4th-order stream or larger. See Appendix I for state-wide list and map of stream orders), bodies of water >50.0 acres in surface area (i.e., lakes, ponds, reservoirs), or tidal waters.		
		<input type="checkbox"/>	A Downstream Analysis (see RICR 8.11.D and E) indicates that peak discharge control would not be beneficial or would exacerbate peak flows in a downstream tributary of a particular site (e.g., through coincident peaks).		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Does the project flow to an MS4 system or subject to other stormwater requirements? If "Yes," indicate as follows:			
		<input type="checkbox"/>	RIDOT		
		<input type="checkbox"/>	Other (specify):		
<u>Note:</u> The project could be approved by RIDEM but not meet RIDOT or Town standards. RIDOT's regulations indicate that post-volumes must be less than pre-volumes for the 10-yr storm at the design point entering the RIDOT system. If you have not already received approval for the discharge to an MS4, please explain below your strategy to comply with RIDEM and the MS4.					
		Indicate below which model was used for your analysis. <input checked="" type="checkbox"/> TR-55 <input type="checkbox"/> TR-20 <input type="checkbox"/> HydroCAD <input type="checkbox"/> Bentley/Haestad <input type="checkbox"/> Intellisolve <input checked="" type="checkbox"/> Other (Specify): Hydraflow Hydrograph Extension for AutoCAD			
YES	NO				
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Does the drainage design demonstrate that flows from the 100-year storm event through a BMP will safely manage and convey the 100-year storm? If "No," please explain briefly below and reference where in the application further documentation can be found (i.e., name of report/document, page numbers, appendices, etc.):			
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Do off-site areas contribute to the sub-watersheds and design points? If "Yes,"			
<input type="checkbox"/>	<input type="checkbox"/>	Are the areas modeled as "present condition" for both pre- and post-development analysis?			
<input type="checkbox"/>	<input type="checkbox"/>	Are the off-site areas shown on the subwatershed maps?			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Does the drainage design confirm safe passage of the 100-year flow through the site for off-site runoff?			
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is a Downstream Analysis required (see RICR 8.11.E.1)?			
<input type="checkbox"/>	<input type="checkbox"/>	Calculate the following:			
1.28	<input checked="" type="checkbox"/>	Area of disturbance within the sub-watershed (areas)			
55%	<input checked="" type="checkbox"/>	Impervious cover (%)			
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is a dam breach analysis required (earthen embankments over six (6) feet in height, or a capacity of 15 acre-feet or more, and contributes to a significant or high hazard dam)?			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Does this project meet the overbank flood protection standard?			
Table 5-1 Hydraulic Analysis Summary					

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

Subwatershed (Design Point)	1.2" Peak Flow (cfs) **		1-yr Peak Flow (cfs)		10-yr Peak Flow (cfs)		100-yr Peak Flow (cfs)	
	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)
POS-A	0.00	0.00	0.01	0.01	0.53	0.45	3.28	3.01
POS-B	0.00	0.00	0.15	0.10	2.38	1.95	9.25	8.67

** Utilize modified curve number method or split pervious/impervious method in HydroCAD.

Note: The hydraulic analysis must demonstrate no impact to each individual subwatershed DP unless each DP discharges to the same wetland or water resource.

Indicate as follows where the pertinent calculations and/or information for the items above are provided	Name of report/document, page numbers, appendices, etc.
Existing conditions analysis for each subwatershed, including curve numbers, times of concentration, runoff rates, volumes, and water surface elevations showing methodologies used and supporting calculations.	Commercial Condominiums Project Narrative and Drainage Analysis, Section II and Appendix C
Proposed conditions analysis for each subwatershed, including curve numbers, times of concentration, runoff rates, volumes, water surface elevations, and routing showing the methodologies used and supporting calculations.	Commercial Condominiums Project Narrative and Drainage Analysis, Section III and Appendix D
Final sizing calculations for structural stormwater BMPs, including contributing drainage area, storage, and outlet configuration.	Commercial Condominiums Project Narrative and Drainage Analysis, Section V and Appendix E
Stage-storage, inflow and outflow hydrographs for storage facilities (e.g., detention, retention, or infiltration facilities).	Commercial Condominiums Project Narrative and Drainage Analysis, Appendix D

Table 5-2 Summary of Best Management Practices

BMP ID	DP #	BMP Type (e.g., bioretention, tree filter)	BMP Functions					Bypass Type	Horizontal Setback Criteria are met per RICR 8.21.B.10, 8.22.D.11, and 8.35.B.4		
			Pre-Treatment (Y/N/NA)	R _e _v (c f)	WQ _v (cf)	CP _v (Y/N/NA)	Overbank Flood Reduction (Y/N/NA)		External (E) Internal (I) or NA	Y/N	Technical Justification (Design Report page number)
Sand Filter	POS-B	Sand filter	Y	Y	Y	NA	NA	E	Y	NA – slab is above ponding elevation	NA
Underground detention/infiltration (Roof)	POS-B	Detention/infiltration	N/A	Y	Y	NA	Y	E	Y	NA – slab is above ponding elevation	NA
At-grade detention/infiltration	POS-B	Detention/infiltration	Y	NA	NA	Y	Y	E	Y	NA – slab is above ponding elevation	NA

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

Table 5.3 Summary of Soils to Evaluate Each BMP									
DP #	BMP ID	BMP Type (e.g., bioretention, tree filter)	Soils Analysis for Each BMP						
			Test Pit ID# and Ground Elevation		SHWT Elevation (ft)	Bottom of Practice Elevation* (ft)	Separation Distance Provided (ft)	Hydrologic Soil Group (A, B, C, D)	Exfil- tration Rate Applied (in/hr)
			Primary	Secondary					
POS-B	Sand Filter	Sand Filter	TP-D1		345.69	347.50	4.81	C	2.41
POS-B	Underground detention/ infiltration (Roof)	Detention/ infiltration	TP-D2		348.67	351.67	3.0	B	2.41
POS-B	At-grade detention/ infiltration	Detention/ infiltration	TP-D1		345.69	351.67	3.0	C	2.41

* For underground infiltration systems (UICs) bottom equals bottom of stone, for surface infiltration basins bottom equals bottom of basin, for filters bottom equals interface of storage and top of filter layer

LAND USES WITH HIGHER POTENTIAL POLLUTANTS LOADS (LUHPPLs) – MINIMUM STANDARD 8

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Describe any LUHPPLs identified in Part 1, Minimum Standard 8, Section 2. If not applicable, continue to Minimum Standard 9.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are these activities already covered under an MSGP? If “No,” please explain if you have applied for an MSGP or intend to do so?
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	List the specific BMPs that are proposed for this project that receive stormwater from LUHPPL drainage areas. These BMP types must be listed in RISDISM Table 3-3, “Acceptable BMPs for Use at LUHPPLs.” Please list BMPs:
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Additional BMPs, or additional pretreatment BMP’s if any, that meet RIPDES MSGP requirements; Please list BMPs:
			Indicate below where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.).

ILLICIT DISCHARGES – MINIMUM STANDARD 9

Illicit discharges are defined as unpermitted discharges to Waters of the State that do not consist entirely of stormwater or uncontaminated groundwater, except for certain discharges identified in the RIPDES Phase II Stormwater General Permit.

YES	NO	N/A	
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Have you checked for illicit discharges?
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Have any been found and/or corrected? If “Yes,” please identify.
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Does your report explain preventative measures that keep non-stormwater discharges out of the Waters of the State (during and after construction)?

SOIL EROSION AND SEDIMENT CONTROL (SESC) – MINIMUM STANDARD 10

YES	NO	N/A	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Have you included a Soil Erosion and Sediment Control Plan Set and/or Complete Construction Plan Set?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Have you provided a separately-bound document based upon the SESC Template ? If yes, proceed to Minimum Standard 11 (the following items can be assumed to be addressed).
			If “No,” include a document with your submittal that addresses the following elements of an SESC Plan:
		<input type="checkbox"/>	Soil Erosion and Sediment Control Plan Project Narrative, including a description of how the fifteen (15) Performance Criteria have been met:
		<input type="checkbox"/>	Provide Natural Buffers and Maintain Existing Vegetation
		<input type="checkbox"/>	Minimize Area of Disturbance
		<input type="checkbox"/>	Minimize the Disturbance of Steep Slopes
		<input type="checkbox"/>	Preserve Topsoil

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

<input type="checkbox"/>	Stabilize Soils
<input type="checkbox"/>	Protect Storm Drain Inlets
<input type="checkbox"/>	Protect Storm Drain Outlets
<input type="checkbox"/>	Establish Temporary Controls for the Protection of Post-Construction Stormwater Control Measures
<input type="checkbox"/>	Establish Perimeter Controls and Sediment Barriers
<input type="checkbox"/>	Divert or Manage Run-On from Up-Gradient Areas
<input type="checkbox"/>	Properly Design Constructed Stormwater Conveyance Channels
<input type="checkbox"/>	Retain Sediment On-Site
<input type="checkbox"/>	Control Temporary Increases in Stormwater Velocity, Volume, and Peak Flows
<input type="checkbox"/>	Apply Construction Activity Pollution Prevention Control Measures
<input type="checkbox"/>	Install, Inspect, and Maintain Control Measures and Take Corrective Actions
<input type="checkbox"/>	Qualified SESC Plan Preparer's Information and Certification
<input type="checkbox"/>	Operator's Information and Certification; if not known at the time of application, the Operator must certify the SESC Plan upon selection and prior to initiating site activities
<input type="checkbox"/>	Description of Control Measures, such as Temporary Sediment Trapping and Conveyance Practices, including design calculations and supporting documentation, as required

STORMWATER MANAGEMENT SYSTEM OPERATION, MAINTENANCE, AND POLLUTION PREVENTION PLAN – MINIMUM STANDARDS 7 AND 9

Operation and Maintenance Section

YES	NO	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Have you minimized all sources of pollutant contact with stormwater runoff, to the maximum extent practicable?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Have you provided a separately-bound Operation and Maintenance Plan for the site and for all of the BMPs, and does it address each element of RICR 8.17 and RISDISM Appendix C and E?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Lawn, Garden, and Landscape Management meet the requirements of RISDISM Section G.7? If "No," why not?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is the property owner or homeowner's association responsible for the stormwater maintenance of all BMP's? If "No," you must provide a legally binding and enforceable maintenance agreement (see RISDISM Appendix E, page 26) that identifies the entity that will be responsible for maintenance of the stormwater. Indicate where this agreement can be found in your report (i.e., name of report/document, page numbers, appendices, etc.).
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Do you anticipate that you will need legal agreements related to the stormwater structures? (e.g. off-site easements, deed restrictions, covenants, or ELUR per the Remediation Regulations). If "Yes," have you obtained them? Or please explain your plan to obtain them:
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is stormwater being directed from public areas to private property? If "Yes," note the following: <u>Note:</u> This is not allowed unless a funding mechanism is in place to provide the finances for the long-term maintenance of the BMP and drainage, or a funding mechanism is demonstrated that can guarantee the long-term maintenance of a stormwater BMP by an individual homeowner.

Pollution Prevention Section

<input checked="" type="checkbox"/>	<input type="checkbox"/>	Designated snow stockpile locations?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Trash racks to prevent floatables, trash, and debris from discharging to Waters of the State?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Asphalt-only based sealants?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Pet waste stations? (<u>Note:</u> If a receiving water has a bacterial impairment, and the project involves housing units, then this could be an important part of your pollution prevention plan). N/A
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Regular sweeping? Please describe: Street sweeping shall be performed on an annual basis and when the project is completed.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	De-icing specifications, in accordance with RISDISM Appendix G. (NOTE: If the groundwater is GAA, or this area contributes to a drinking water supply, then this could be an important part of your pollution prevention plan).
<input checked="" type="checkbox"/>	<input type="checkbox"/>	A prohibition of phosphate-based fertilizers? (<u>Note:</u> If the site discharges to a phosphorus impaired waterbody, then this could be an important part of your pollution prevention plan).

PART 4. SUBWATERSHED MAPPING AND SITE-PLAN DETAILS

Existing and Proposed Subwatershed Mapping (REQUIRED)

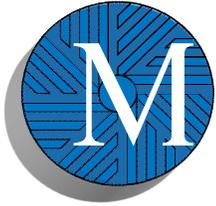
YES	NO	
-----	----	--

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

<input checked="" type="checkbox"/>	<input type="checkbox"/>	Existing and proposed drainage area delineations		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Locations of all streams and drainage swales		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Drainage flow paths, mapped according to the DEM <i>Guidance for Preparation of Drainage Area Maps</i> (included in RISDISM Appendix K)		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Complete drainage area boundaries; include off-site areas in both mapping and analyses, as applicable		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Logs of borings and/or test pit investigations along with supporting soils/geotechnical report		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Mapped seasonal high-water-table test pit locations		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Mapped locations of the site-specific borings and/or test pits and soils information from the test pits at the locations of the BMPs		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Mapped locations of the BMPs, with the BMPs consistently identified on the Site Construction Plans		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Mapped bedrock outcrops adjacent to any infiltration BMP		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Soils were logged by a:		
	<input checked="" type="checkbox"/>	DEM-licensed Class IV soil evaluator Name: Kevin Fetzer		
	<input type="checkbox"/>	RI-registered P.E. Name:		
Subwatershed and Impervious Area Summary				
Subwatershed (area to each design point)	First Receiving Water ID or MS4	Area Disturbed (units)	Existing Impervious (units)	Proposed Impervious (units)
PR-A	Wetland	0.02 ac	0	0
PR-B	Wetland	0.10 ac	0	0.01 ac
PR-C	Groundwater / Wetland	0.78 ac	0	0.39 ac
PR-C Roof-1	Groundwater / Wetland	0.05 ac	0	0.05 ac
PR-C Roof-2	Groundwater / Wetland	0.30 ac	0	0.30 ac
Site Construction Plans (Indicate that the following applicable specifications are provided)				
YES	NO			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Existing and proposed plans (scale not greater than 1" = 40') with North arrow		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Existing and proposed site topography (with 1 or 2-foot contours); 10-foot contours accepted for off-site areas		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Boundaries of existing predominant vegetation and proposed limits of clearing		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Site Location clarification		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Location and field-verified boundaries of resource protection areas such as: <ul style="list-style-type: none"> ▶ freshwater and coastal wetlands, including lakes and ponds ▶ coastal shoreline features Perennial and intermittent streams, in addition to Areas Subject to Storm Flowage (ASSFs)		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	All required setbacks (e.g., buffers, water-supply wells, septic systems)		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Representative cross-section and profile drawings, and notes and details of structural stormwater management practices and conveyances (i.e., storm drains, open channels, swales, etc.), which include: <ul style="list-style-type: none"> ▶ Location and size of the stormwater treatment practices (type of practice, depth, area). Stormwater treatment practices (BMPs) must have labels that correspond to RISDISM Table 5-2; ▶ Design water surface elevations (applicable storms); ▶ Structural details of outlet structures, embankments, spillways, stilling basins, grade-control structures, conveyance channels, etc.; ▶ Existing and proposed structural elevations (e.g., inverts of pipes, manholes, etc.); ▶ Location of floodplain and, if applicable, floodway limits and relationship of site to upstream and downstream properties or drainage that could be affected by work in the floodplain; ▶ Planting plans for structural stormwater BMPs, including species, size, planting methods, and maintenance requirements of proposed planting 		

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

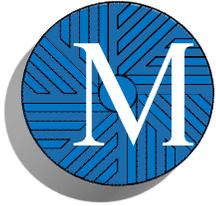
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Logs of borings and/or test pit investigations along with supporting soils/geotechnical report and corresponding water tables
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Mapping of any OWM-approved remedial actions/systems (including ELURs)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Location of existing and proposed roads, buildings, and other structures including limits of disturbance; <ul style="list-style-type: none"> ▶ Existing and proposed utilities (e.g., water, sewer, gas, electric) and easements; ▶ Location of existing and proposed conveyance systems, such as grass channels, swales, and storm drains, and location(s) of final discharge point(s) (wetland, waterbody, etc.); ▶ Cross sections of roadways, with edge details such as curbs and sidewalks; ▶ Location and dimensions of channel modifications, such as bridge or culvert crossings
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Locations, cross sections, and profiles of all stream or wetland crossings and their method of stabilization



Commercial Condominiums
A.P. 36, Lots 8 and 37
Cranston, RI
Stormwater Management Plan
Revised 12/13/2022

Appendix B

Reduced Project Watershed Maps (8.5x11)



Commercial Condominiums
A.P. 36, Lots 8 and 37
Cranston, RI
Stormwater Management Plan
Revised 12/13/2022

Appendix C

Existing Stormwater Modeling Printouts

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Watershed Model Schematic

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



Legend

<u>Hyd.</u>	<u>Origin</u>	<u>Description</u>
1	SCS Runoff	EX-A / POS-A
2	SCS Runoff	EX-B / POS-B

Hydrograph Return Period Recap

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

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	-----	0.008	-----	-----	-----	0.534	1.239	-----	3.275	EX-A / POS-A
2	SCS Runoff	-----	0.153	-----	-----	-----	2.375	4.284	-----	9.253	EX-B / POS-B

Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.008	2	910	228	----	----	----	EX-A / POS-A
2	SCS Runoff	0.153	2	752	1,928	----	----	----	EX-B / POS-B
22.393.704 Commercial Condos - Calise - Existing Drainage.gpj									Thursday, 06 / 30 / 2022

Hydrograph Report

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

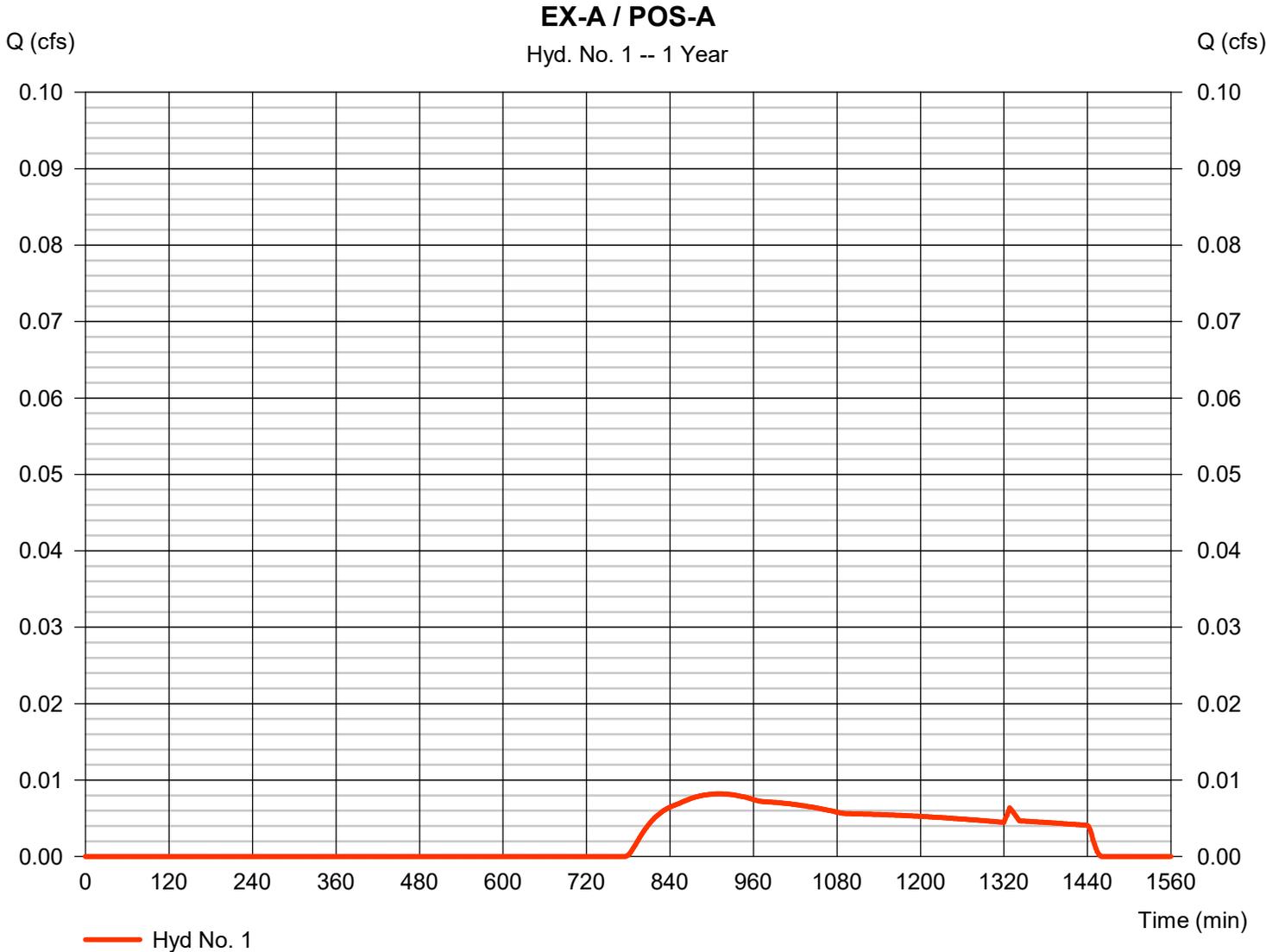
Thursday, 06 / 30 / 2022

Hyd. No. 1

EX-A / POS-A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.008 cfs
Storm frequency	= 1 yrs	Time to peak	= 910 min
Time interval	= 2 min	Hyd. volume	= 228 cuft
Drainage area	= 1.330 ac	Curve number	= 50*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.20 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.010 x 70) + (0.300 x 55) + (1.020 x 48)] / 1.330



TR55 Tc Worksheet

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

Hyd. No. 1

EX-A / POS-A

<u>Description</u>	<u>A</u>		<u>B</u>		<u>C</u>		<u>Totals</u>
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.30		0.00		0.00		
Land slope (%)	= 4.90		0.00		0.00		
Travel Time (min)	= 9.82	+	0.00	+	0.00	=	9.82
Shallow Concentrated Flow							
Flow length (ft)	= 285.00		0.00		0.00		
Watercourse slope (%)	= 4.40		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=3.38		0.00		0.00		
Travel Time (min)	= 1.40	+	0.00	+	0.00	=	1.40
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. v2020

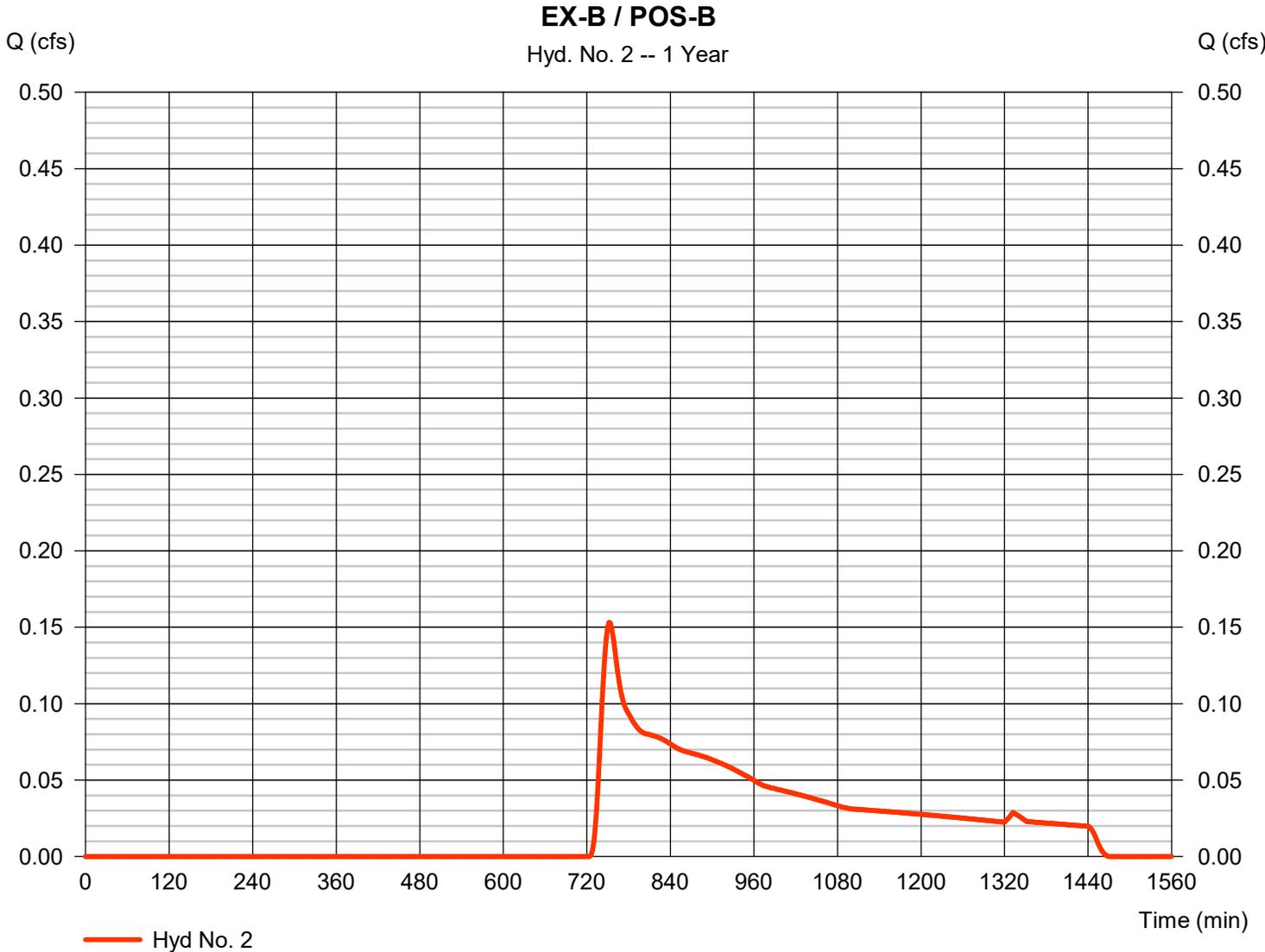
Thursday, 06 / 30 / 2022

Hyd. No. 2

EX-B / POS-B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.153 cfs
Storm frequency	= 1 yrs	Time to peak	= 752 min
Time interval	= 2 min	Hyd. volume	= 1,928 cuft
Drainage area	= 3.270 ac	Curve number	= 57*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 17.31 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.120 x 55) + (0.180 x 70) + (1.000 x 48) + (0.970 x 65)] / 3.270



TR55 Tc Worksheet

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

Hyd. No. 2

EX-B / POS-B

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.30	0.00	0.00	
Land slope (%)	= 5.70	0.00	0.00	
Travel Time (min)	= 13.91	+ 0.00	+ 0.00	= 13.91
Shallow Concentrated Flow				
Flow length (ft)	= 442.00	0.00	0.00	
Watercourse slope (%)	= 1.80	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	=2.16	0.00	0.00	
Travel Time (min)	= 3.40	+ 0.00	+ 0.00	= 3.40
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				17.31 min

Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.534	2	734	3,245	-----	-----	-----	EX-A / POS-A
2	SCS Runoff	2.375	2	736	12,484	-----	-----	-----	EX-B / POS-B
22.393.704 Commercial Condos - Calise - Existing Drainage - 10 Year						Thursday, 06 / 30 / 2022			

Hydrograph Report

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

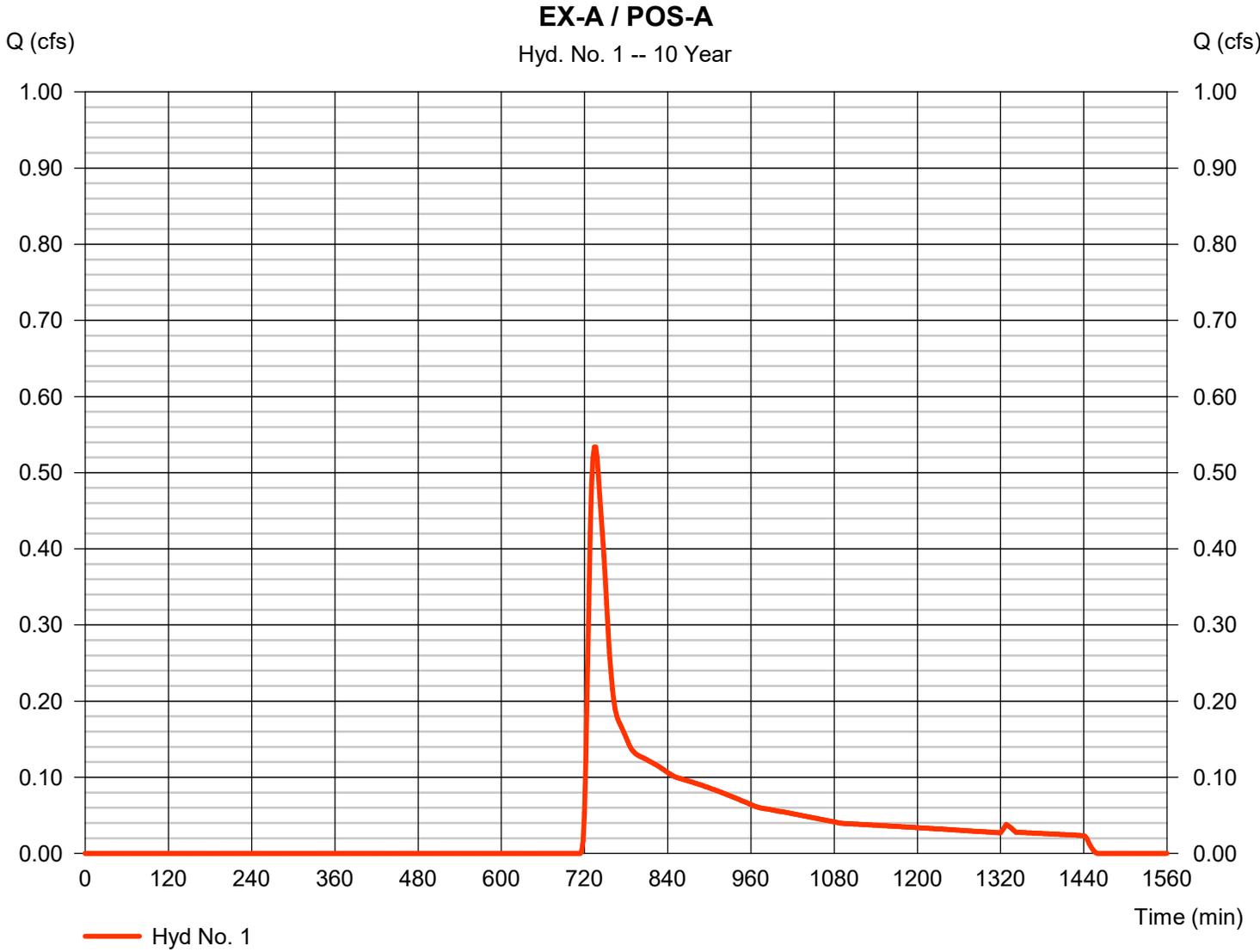
Thursday, 06 / 30 / 2022

Hyd. No. 1

EX-A / POS-A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.534 cfs
Storm frequency	= 10 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 3,245 cuft
Drainage area	= 1.330 ac	Curve number	= 50*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.20 min
Total precip.	= 4.90 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.010 x 70) + (0.300 x 55) + (1.020 x 48)] / 1.330



Hydrograph Report

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

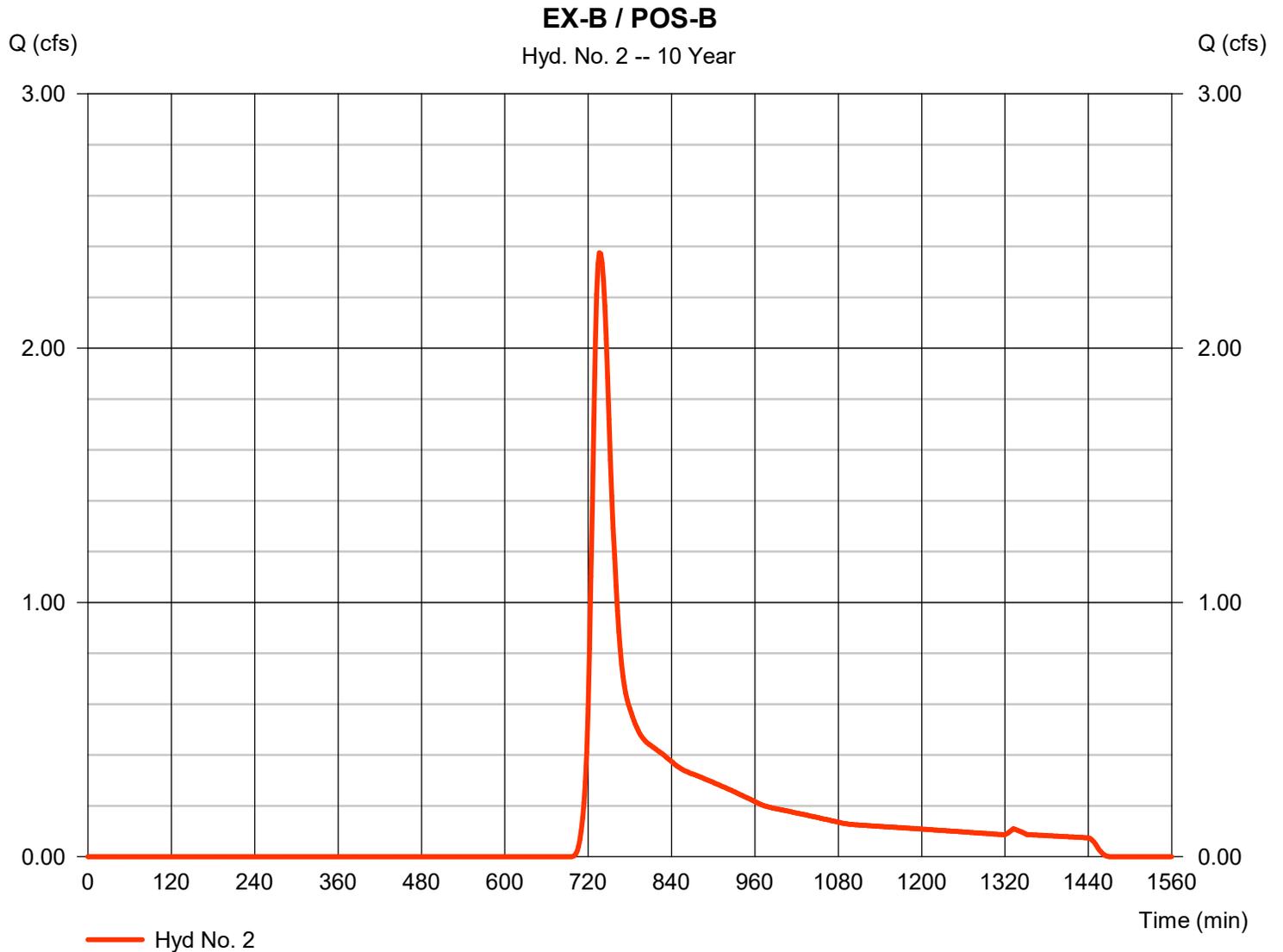
Thursday, 06 / 30 / 2022

Hyd. No. 2

EX-B / POS-B

Hydrograph type	= SCS Runoff	Peak discharge	= 2.375 cfs
Storm frequency	= 10 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 12,484 cuft
Drainage area	= 3.270 ac	Curve number	= 57*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 17.31 min
Total precip.	= 4.90 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.120 x 55) + (0.180 x 70) + (1.000 x 48) + (0.970 x 65)] / 3.270



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.239	2	732	5,936	----	----	----	EX-A / POS-A
2	SCS Runoff	4.284	2	736	20,619	----	----	----	EX-B / POS-B
22.393.704 Commercial Condos - Calise - Existing Drainage - 25 Year						Thursday, 06 / 30 / 2022			

Hydrograph Report

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

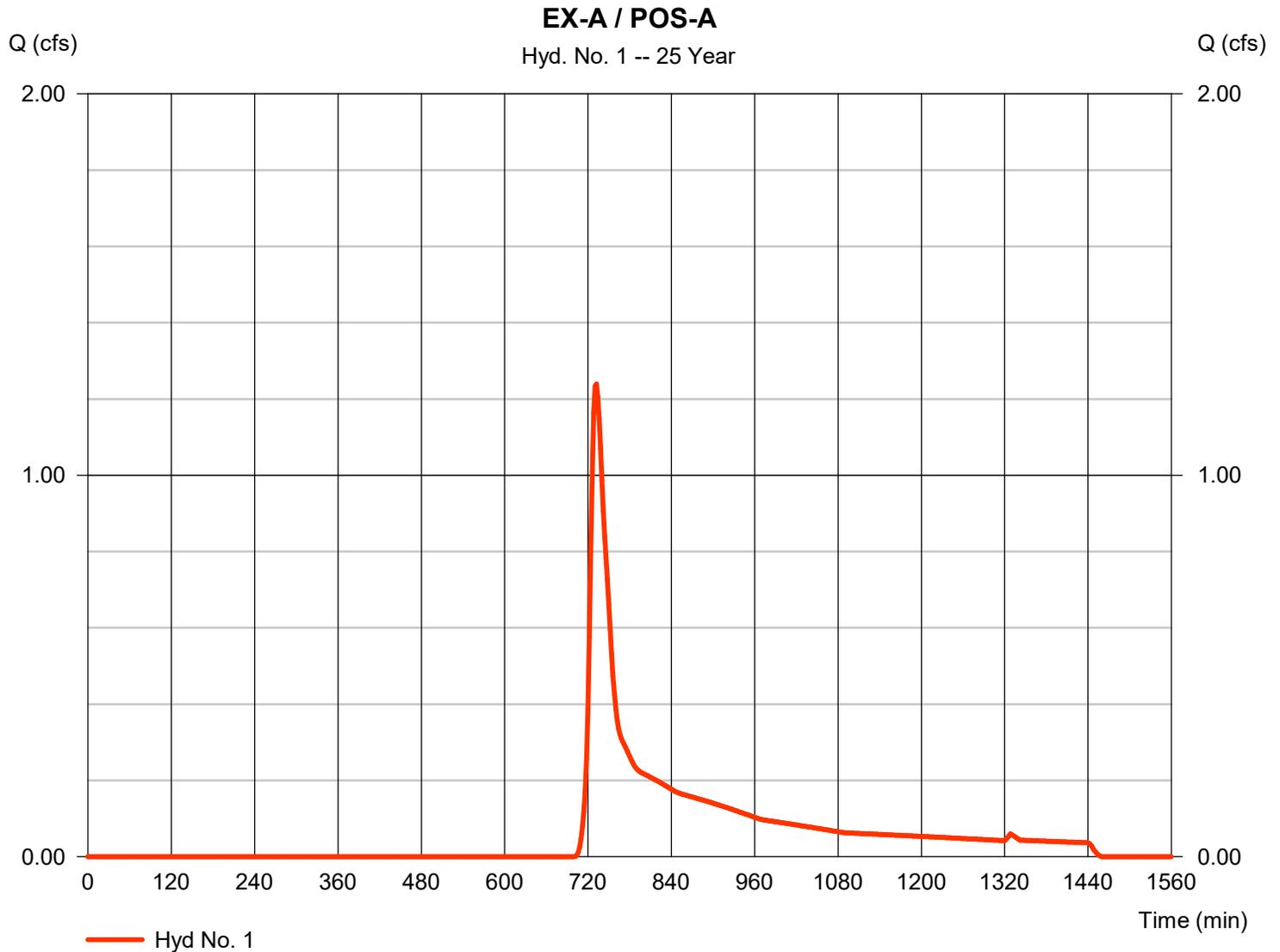
Thursday, 06 / 30 / 2022

Hyd. No. 1

EX-A / POS-A

Hydrograph type	= SCS Runoff	Peak discharge	= 1.239 cfs
Storm frequency	= 25 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 5,936 cuft
Drainage area	= 1.330 ac	Curve number	= 50*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.20 min
Total precip.	= 6.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.010 x 70) + (0.300 x 55) + (1.020 x 48)] / 1.330



Hydrograph Report

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

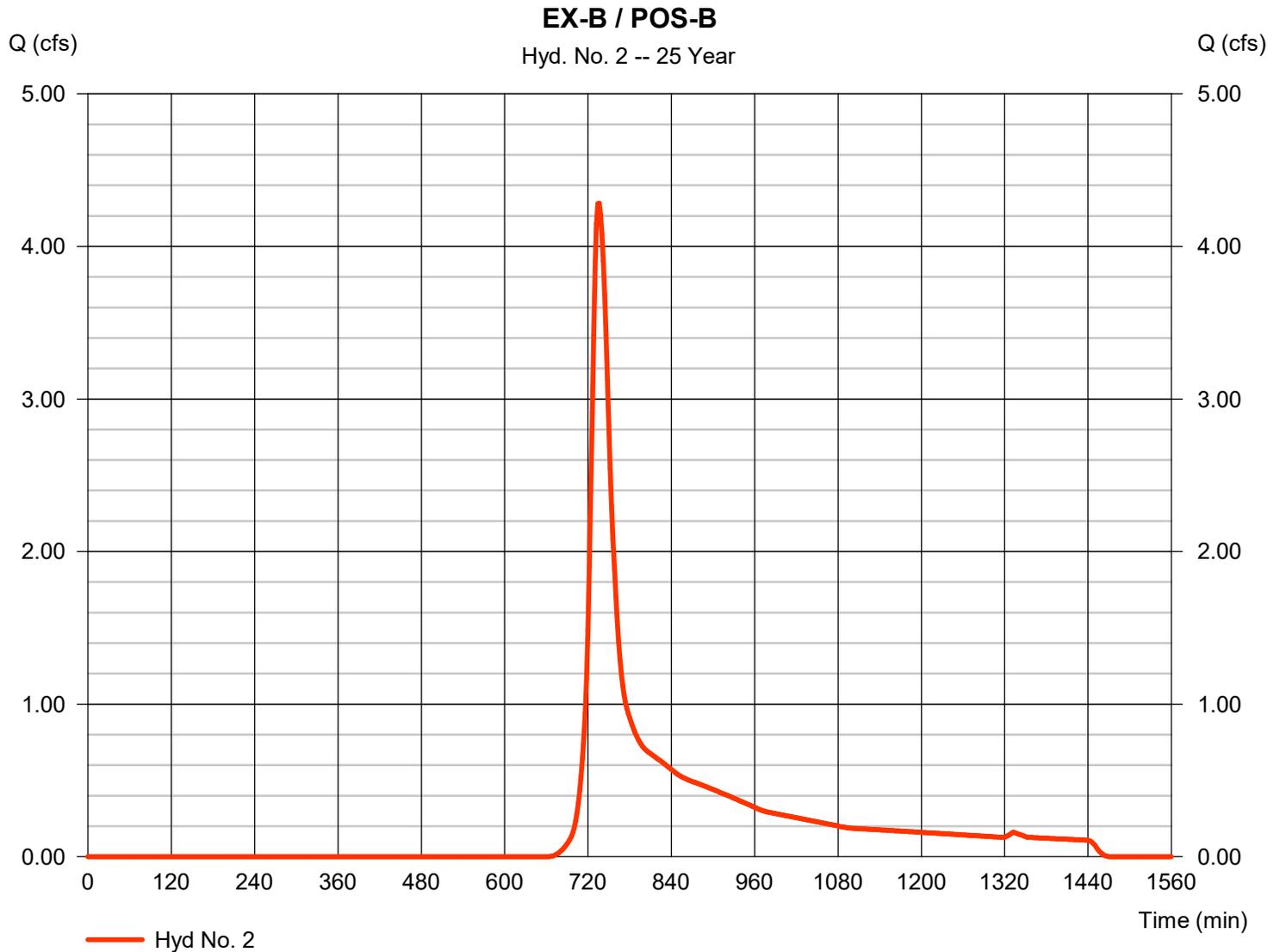
Thursday, 06 / 30 / 2022

Hyd. No. 2

EX-B / POS-B

Hydrograph type	= SCS Runoff	Peak discharge	= 4.284 cfs
Storm frequency	= 25 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 20,619 cuft
Drainage area	= 3.270 ac	Curve number	= 57*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 17.31 min
Total precip.	= 6.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.120 x 55) + (0.180 x 70) + (1.000 x 48) + (0.970 x 65)] / 3.270



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.275	2	730	13,383	----	----	----	EX-A / POS-A
2	SCS Runoff	9.253	2	734	41,659	----	----	----	EX-B / POS-B

Hydrograph Report

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

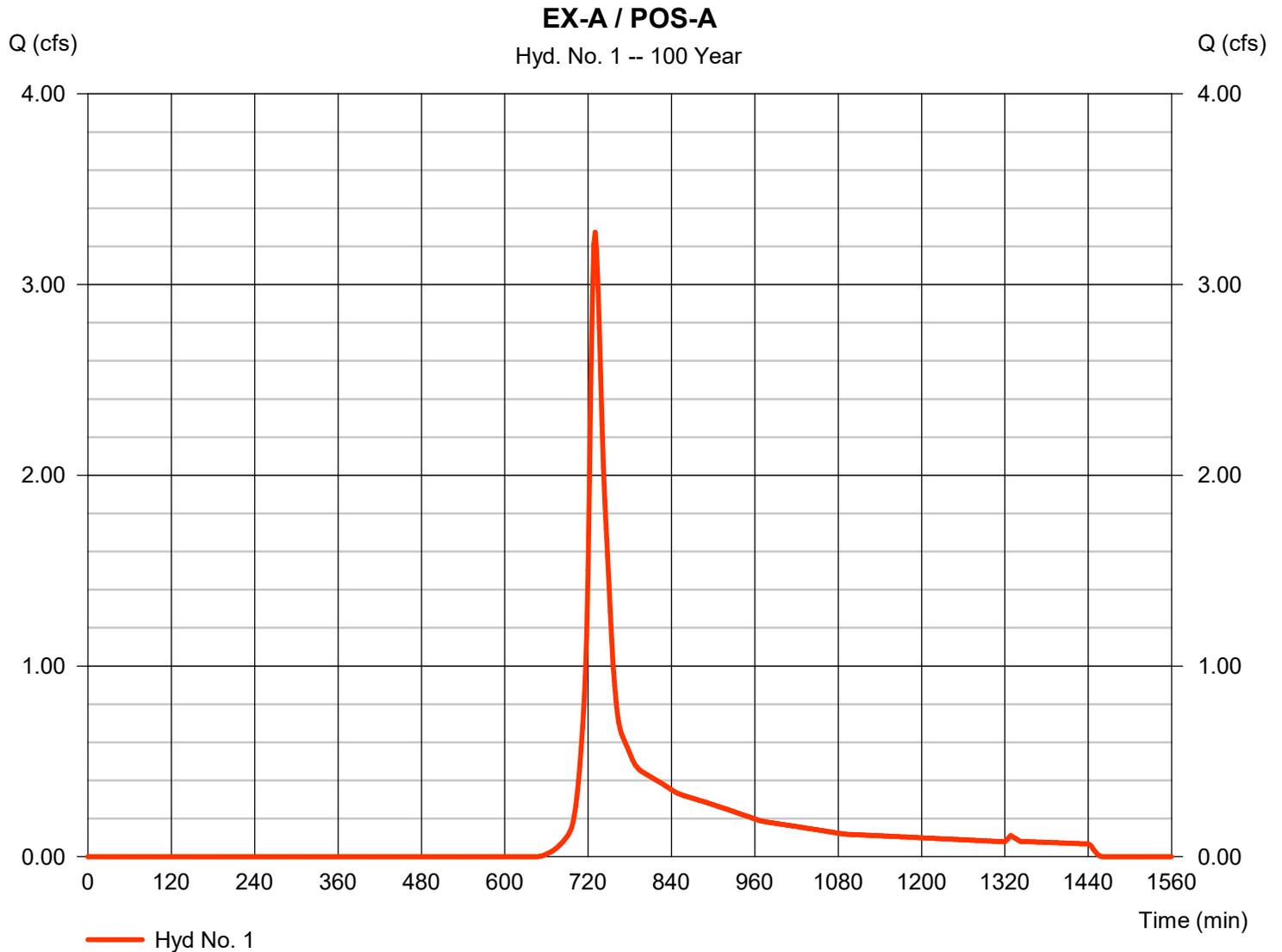
Thursday, 06 / 30 / 2022

Hyd. No. 1

EX-A / POS-A

Hydrograph type	= SCS Runoff	Peak discharge	= 3.275 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 13,383 cuft
Drainage area	= 1.330 ac	Curve number	= 50*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.20 min
Total precip.	= 8.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.010 x 70) + (0.300 x 55) + (1.020 x 48)] / 1.330



Hydrograph Report

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

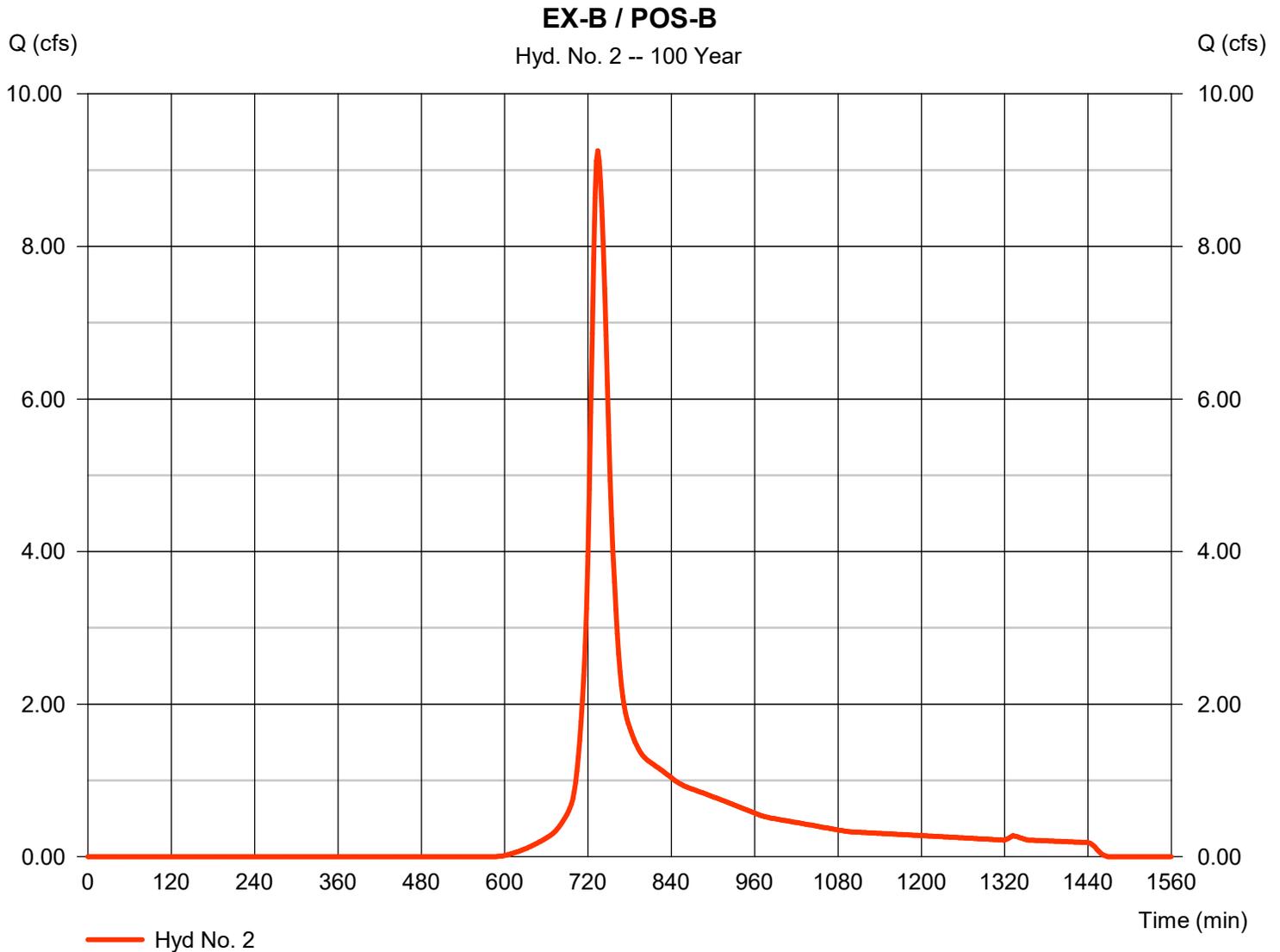
Thursday, 06 / 30 / 2022

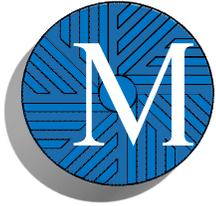
Hyd. No. 2

EX-B / POS-B

Hydrograph type	= SCS Runoff	Peak discharge	= 9.253 cfs
Storm frequency	= 100 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 41,659 cuft
Drainage area	= 3.270 ac	Curve number	= 57*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 17.31 min
Total precip.	= 8.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.120 x 55) + (0.180 x 70) + (1.000 x 48) + (0.970 x 65)] / 3.270





Commercial Condominiums
A.P. 36, Lots 8 and 37
Cranston, RI
Stormwater Management Plan
Revised 12/13/2022

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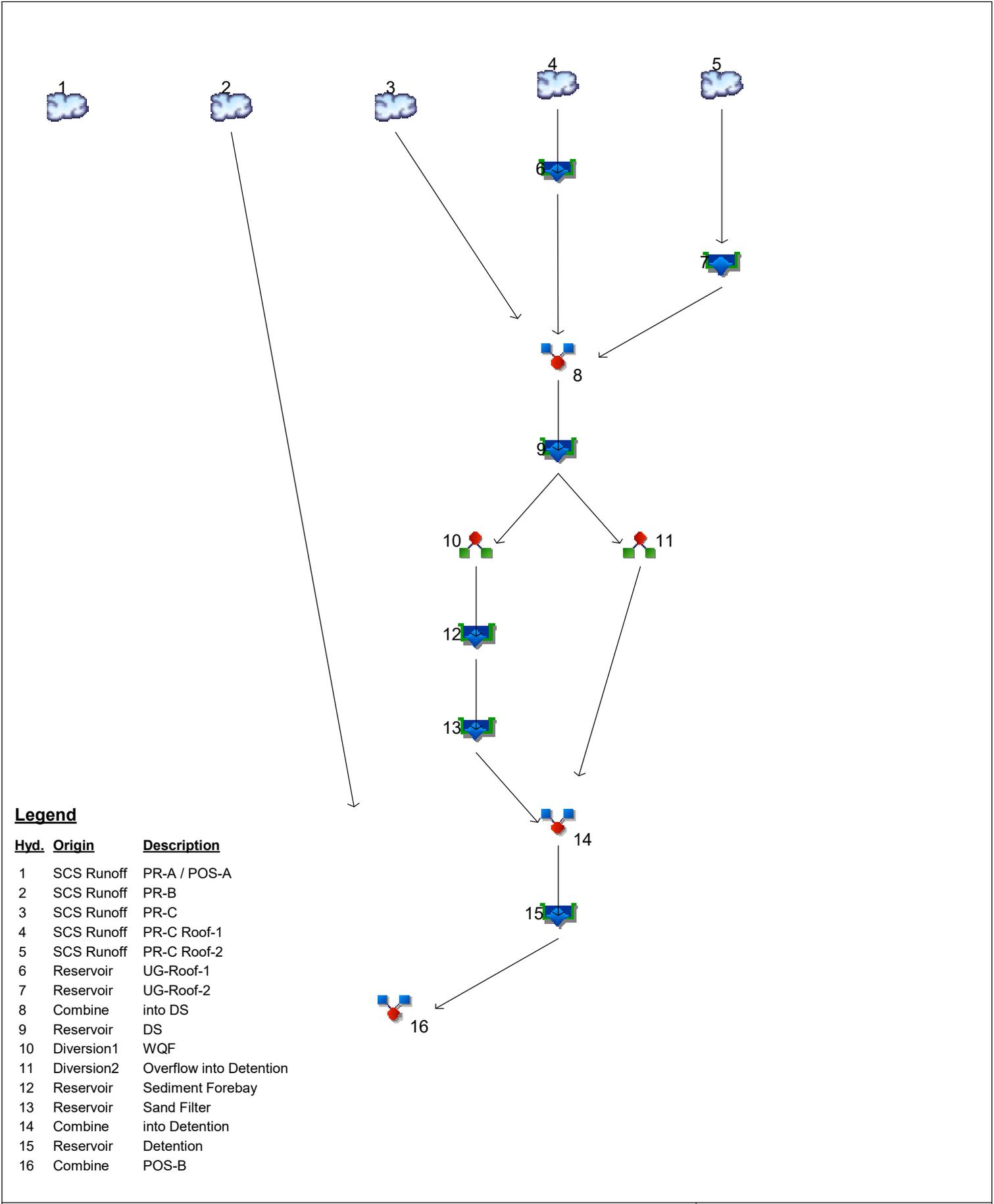
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Watershed Model Schematic

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



Legend

Hyd.	Origin	Description
1	SCS Runoff	PR-A / POS-A
2	SCS Runoff	PR-B
3	SCS Runoff	PR-C
4	SCS Runoff	PR-C Roof-1
5	SCS Runoff	PR-C Roof-2
6	Reservoir	UG-Roof-1
7	Reservoir	UG-Roof-2
8	Combine	into DS
9	Reservoir	DS
10	Diversion1	WQF
11	Diversion2	Overflow into Detention
12	Reservoir	Sediment Forebay
13	Reservoir	Sand Filter
14	Combine	into Detention
15	Reservoir	Detention
16	Combine	POS-B

Hydrograph Return Period Recap

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

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	-----	0.006	-----	-----	-----	0.451	1.095	-----	3.010	PR-A / POS-A
2	SCS Runoff	-----	0.100	-----	-----	-----	1.547	2.791	-----	6.027	PR-B
3	SCS Runoff	-----	0.771	-----	-----	-----	2.228	3.088	-----	4.989	PR-C
4	SCS Runoff	-----	0.126	-----	-----	-----	0.231	0.288	-----	0.412	PR-C Roof-1
5	SCS Runoff	-----	0.754	-----	-----	-----	1.386	1.729	-----	2.470	PR-C Roof-2
6	Reservoir	4	0.000	-----	-----	-----	0.000	0.000	-----	0.000	UG-Roof-1
7	Reservoir	5	0.000	-----	-----	-----	0.000	0.000	-----	0.094	UG-Roof-2
8	Combine	3, 6, 7	0.771	-----	-----	-----	2.228	3.088	-----	4.989	into DS
9	Reservoir	8	0.772	-----	-----	-----	2.225	3.083	-----	4.989	DS
10	Diversion1	9	0.772	-----	-----	-----	1.677	2.145	-----	3.110	WQF
11	Diversion2	9	0.000	-----	-----	-----	0.548	0.938	-----	1.879	Overflow into Detention
12	Reservoir	10	0.772	-----	-----	-----	1.652	2.115	-----	2.955	Sediment Forebay
13	Reservoir	12	0.645	-----	-----	-----	1.612	2.070	-----	2.906	Sand Filter
14	Combine	11, 13	0.645	-----	-----	-----	2.133	2.976	-----	4.662	into Detention
15	Reservoir	14	0.000	-----	-----	-----	0.573	1.549	-----	2.865	Detention
16	Combine	2, 15	0.100	-----	-----	-----	1.951	4.155	-----	8.672	POS-B

Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
1	SCS Runoff	0.006	2	928	167	-----	-----	-----	PR-A / POS-A	
2	SCS Runoff	0.100	2	752	1,256	-----	-----	-----	PR-B	
3	SCS Runoff	0.771	2	730	3,063	-----	-----	-----	PR-C	
4	SCS Runoff	0.126	2	724	420	-----	-----	-----	PR-C Roof-1	
5	SCS Runoff	0.754	2	724	2,521	-----	-----	-----	PR-C Roof-2	
6	Reservoir	0.000	2	714	0	4	352.01	38.1	UG-Roof-1	
7	Reservoir	0.000	2	n/a	0	5	352.22	331	UG-Roof-2	
8	Combine	0.771	2	730	3,063	3, 6, 7	-----	-----	into DS	
9	Reservoir	0.772	2	730	3,063	8	352.58	7.67	DS	
10	Diversion1	0.772	2	730	3,063	9	-----	-----	WQF	
11	Diversion2	0.000	2	726	0	9	-----	-----	Overflow into Detention	
12	Reservoir	0.772	2	730	3,063	10	352.66	21.0	Sediment Forebay	
13	Reservoir	0.645	2	736	1,470	12	352.60	580	Sand Filter	
14	Combine	0.645	2	736	1,470	11, 13	-----	-----	into Detention	
15	Reservoir	0.000	2	760	0	14	350.23	1,188	Detention	
16	Combine	0.100	2	752	1,256	2, 15	-----	-----	POS-B	
22.393.704 Commercial Condos - Calise - Project					Period - Year			11.30.gpw		Tuesday, 12 / 13 / 2022

Hydrograph Report

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

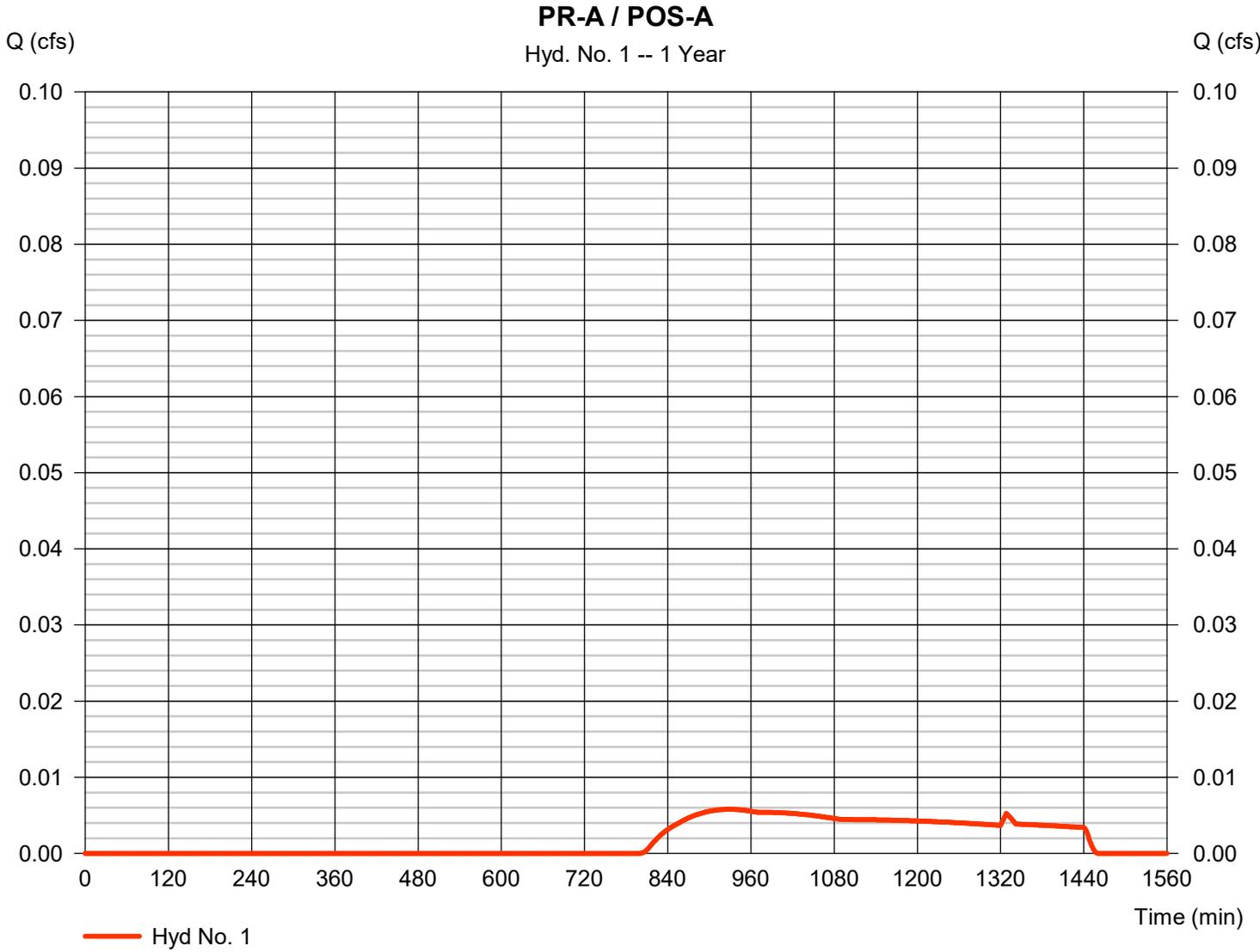
Tuesday, 12 / 13 / 2022

Hyd. No. 1

PR-A / POS-A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.006 cfs
Storm frequency	= 1 yrs	Time to peak	= 928 min
Time interval	= 2 min	Hyd. volume	= 167 cuft
Drainage area	= 1.290 ac	Curve number	= 49*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.10 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.010 x 70) + (0.230 x 55) + (1.050 x 48)] / 1.290



Hydrograph Report

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

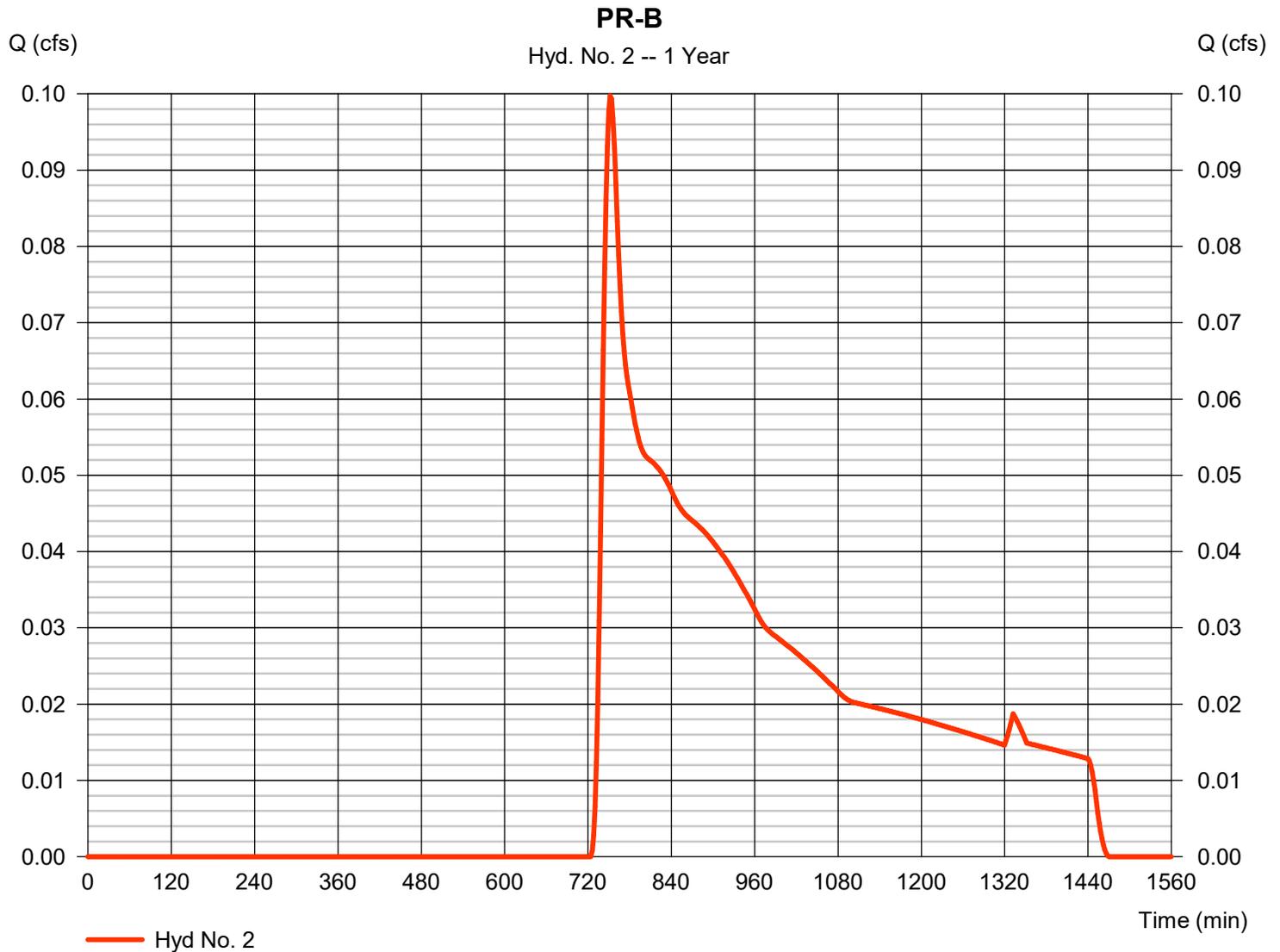
Tuesday, 12 / 13 / 2022

Hyd. No. 2

PR-B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.100 cfs
Storm frequency	= 1 yrs	Time to peak	= 752 min
Time interval	= 2 min	Hyd. volume	= 1,256 cuft
Drainage area	= 2.130 ac	Curve number	= 57*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 18.70 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.050 x 55) + (1.000 x 48) + (0.970 x 65) + (0.030 x 61) + (0.070 x 74) + (0.010 x 98)] / 2.130



Hydrograph Report

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

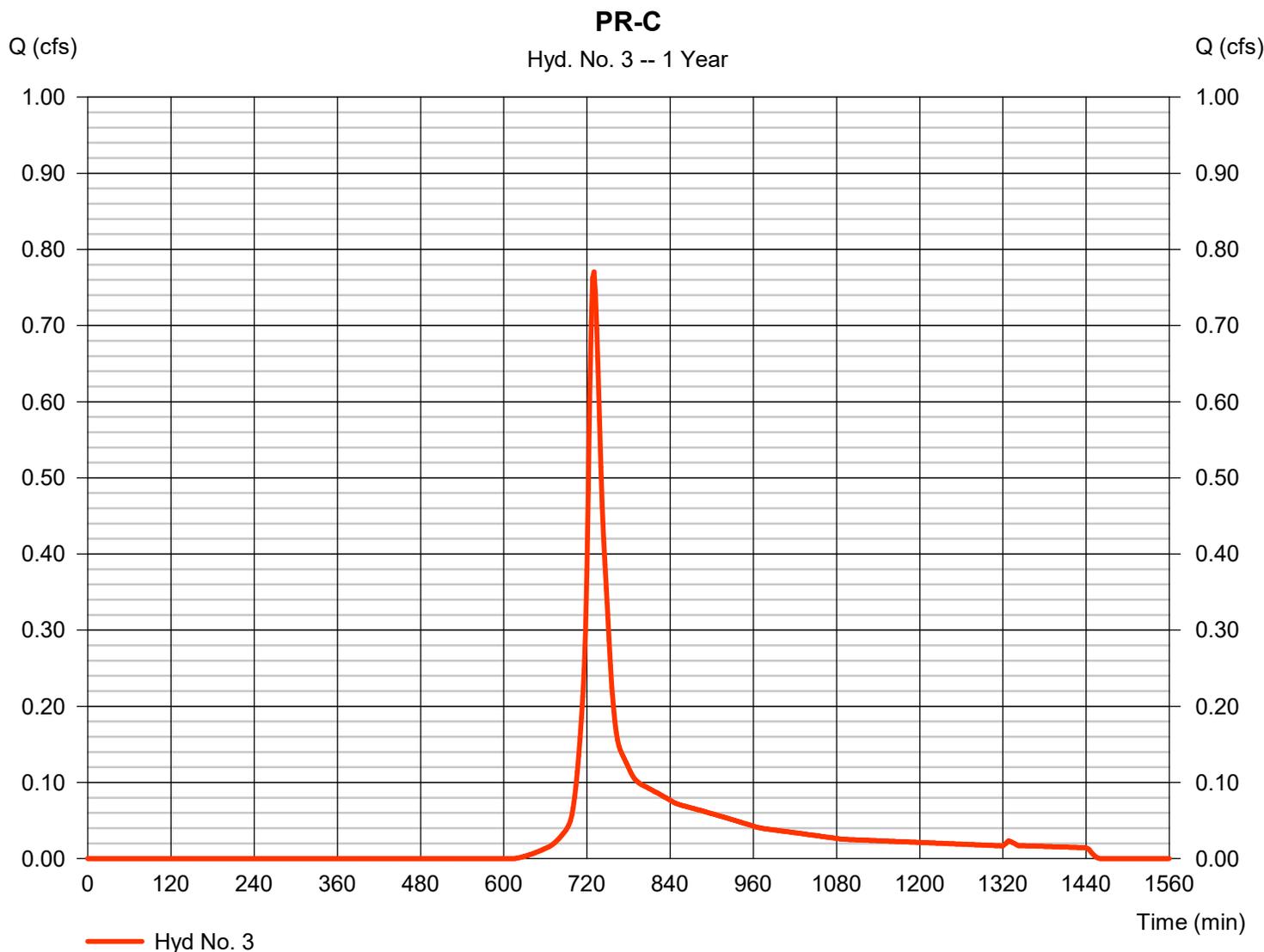
Tuesday, 12 / 13 / 2022

Hyd. No. 3

PR-C

Hydrograph type	= SCS Runoff	Peak discharge	= 0.771 cfs
Storm frequency	= 1 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 3,063 cuft
Drainage area	= 0.840 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.20 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.370 x 61) + (0.080 x 74) + (0.390 x 98)] / 0.840



Hydrograph Report

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

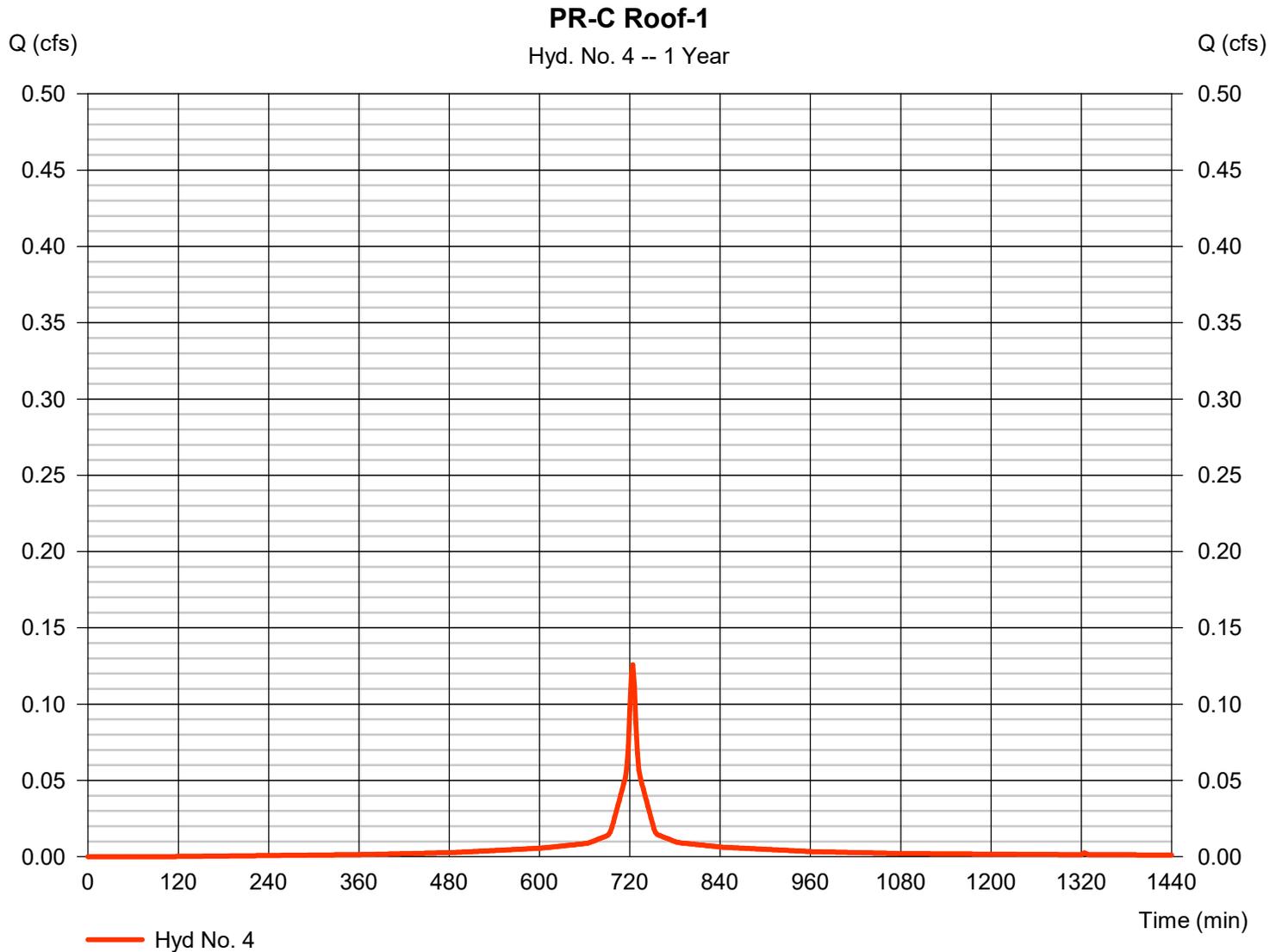
Tuesday, 12 / 13 / 2022

Hyd. No. 4

PR-C Roof-1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.126 cfs
Storm frequency	= 1 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 420 cuft
Drainage area	= 0.050 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.050 x 98)] / 0.050



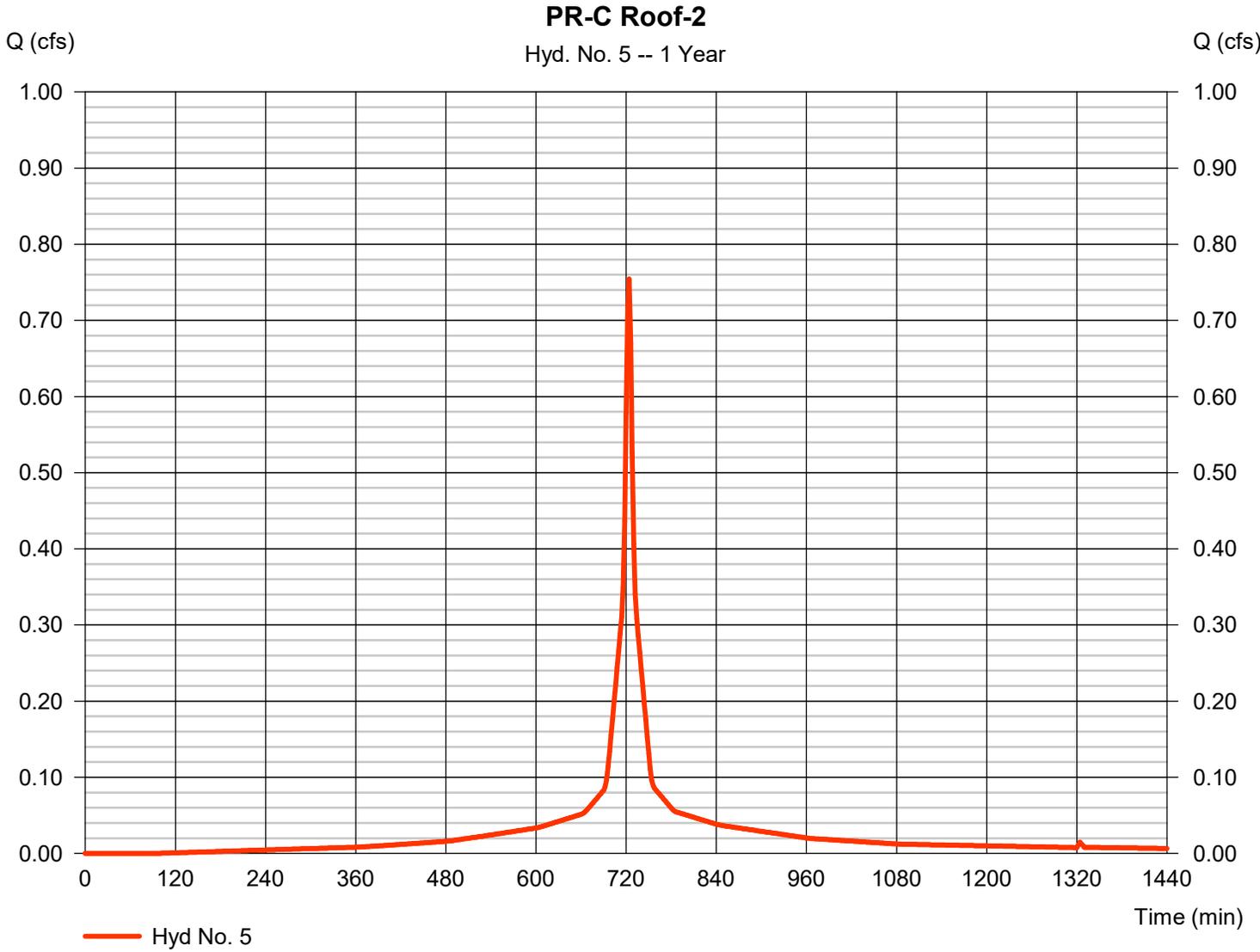
Hydrograph Report

Hyd. No. 5

PR-C Roof-2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.754 cfs
Storm frequency	= 1 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 2,521 cuft
Drainage area	= 0.300 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.300 x 98)] / 0.300



Hydrograph Report

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

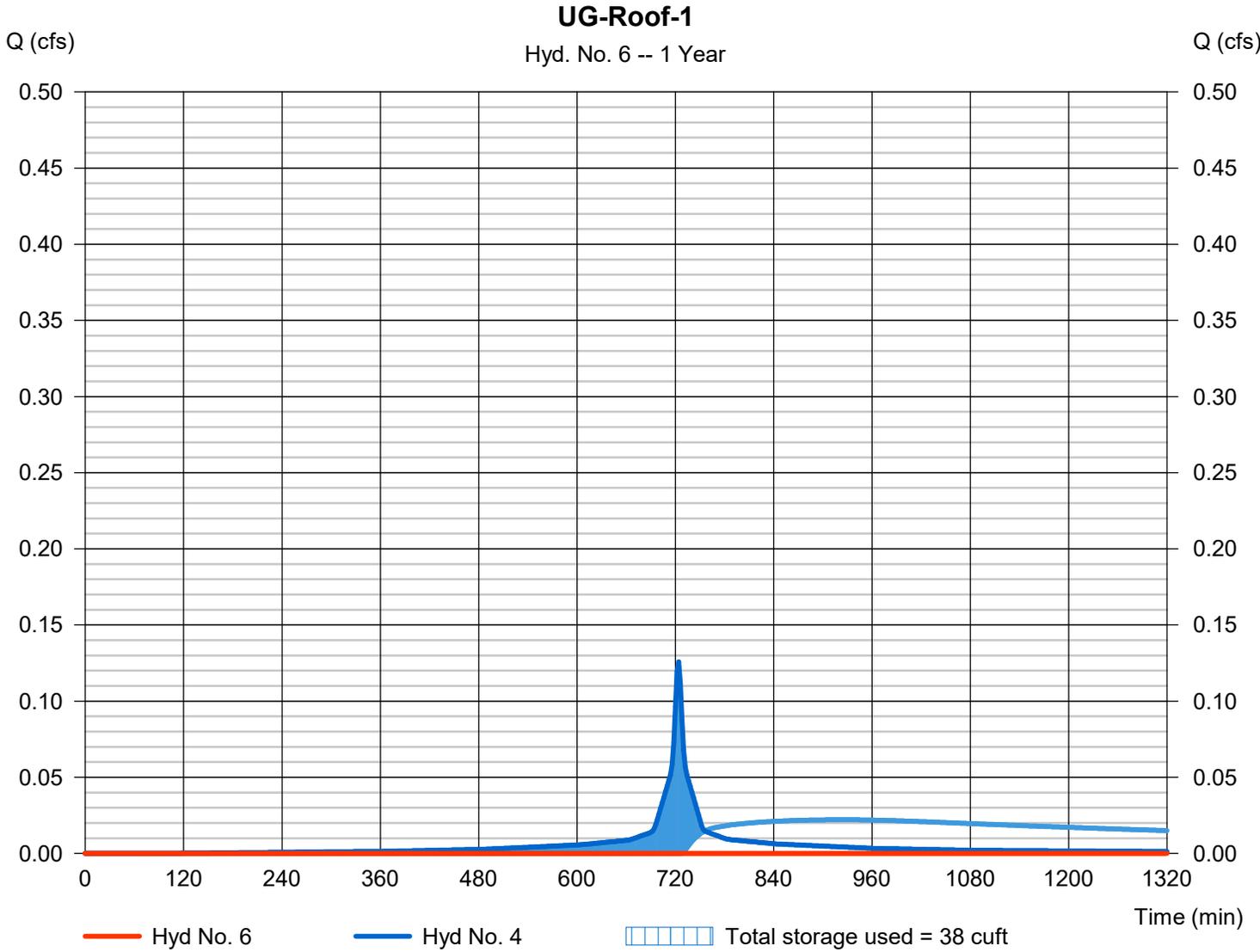
Tuesday, 12 / 13 / 2022

Hyd. No. 6

UG-Roof-1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 714 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 4 - PR-C Roof-1	Max. Elevation	= 352.01 ft
Reservoir name	= UG-Roof-1	Max. Storage	= 38 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond No. 5 - UG-Roof-1

Pond Data

UG Chambers -Invert elev. = 352.17 ft, Rise x Span = 2.05 x 4.00 ft, Barrel Len = 7.12 ft, No. Barrels = 6, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 351.67 ft, Width = 6.55 ft, Height = 3.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	351.67	n/a	0	0
0.35	352.02	n/a	39	39
0.70	352.37	n/a	60	99
1.05	352.72	n/a	74	173
1.40	353.07	n/a	73	246
1.75	353.42	n/a	70	316
2.10	353.77	n/a	65	381
2.45	354.12	n/a	57	437
2.80	354.47	n/a	41	479
3.15	354.82	n/a	39	518
3.50	355.17	n/a	39	557

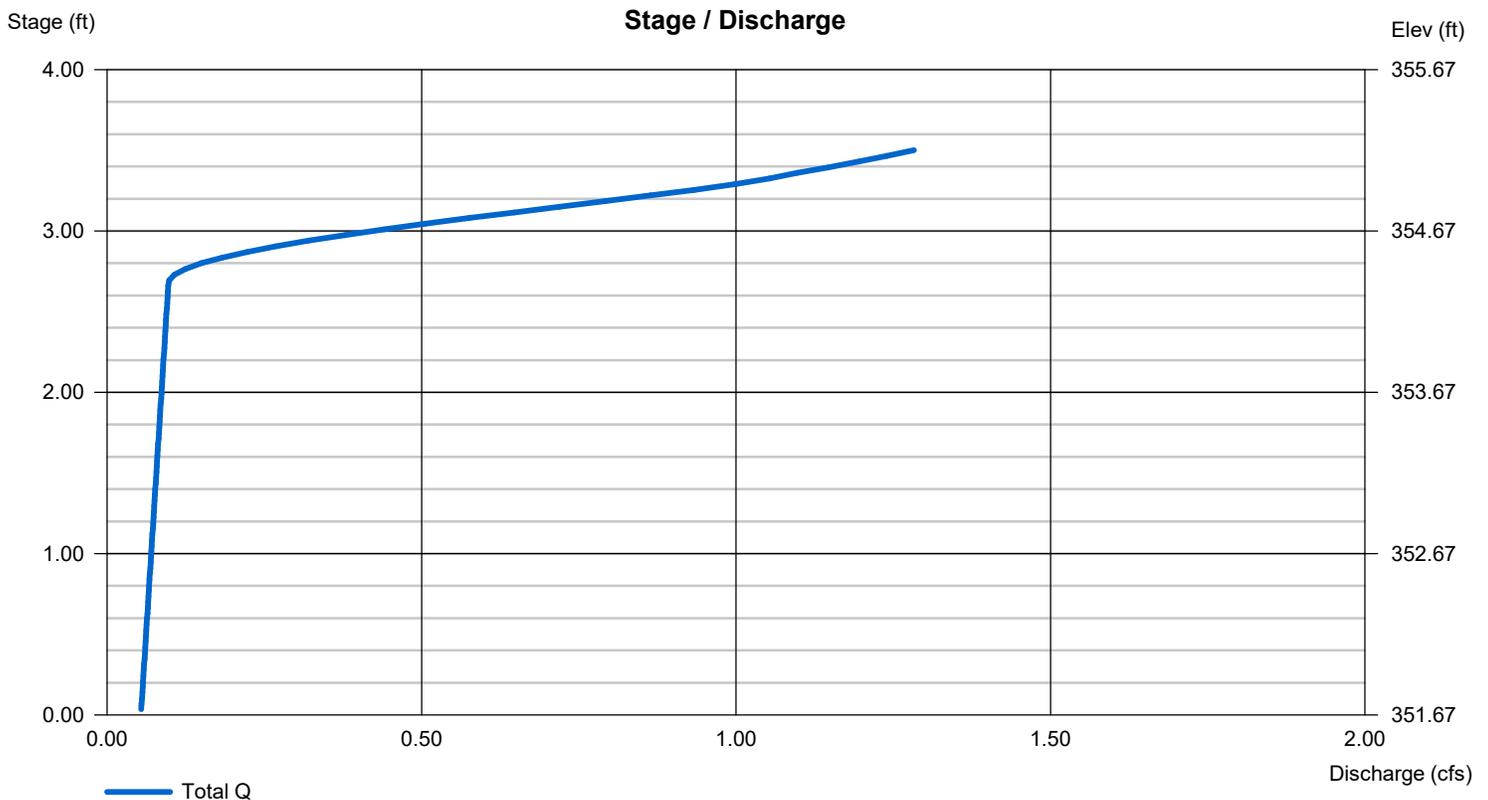
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 8.00	0.00	0.00	0.00
Span (in)	= 8.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 354.35	0.00	0.00	0.00
Length (ft)	= 7.00	0.00	0.00	0.00
Slope (%)	= 5.00	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 8.270 (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).



Hydrograph Report

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

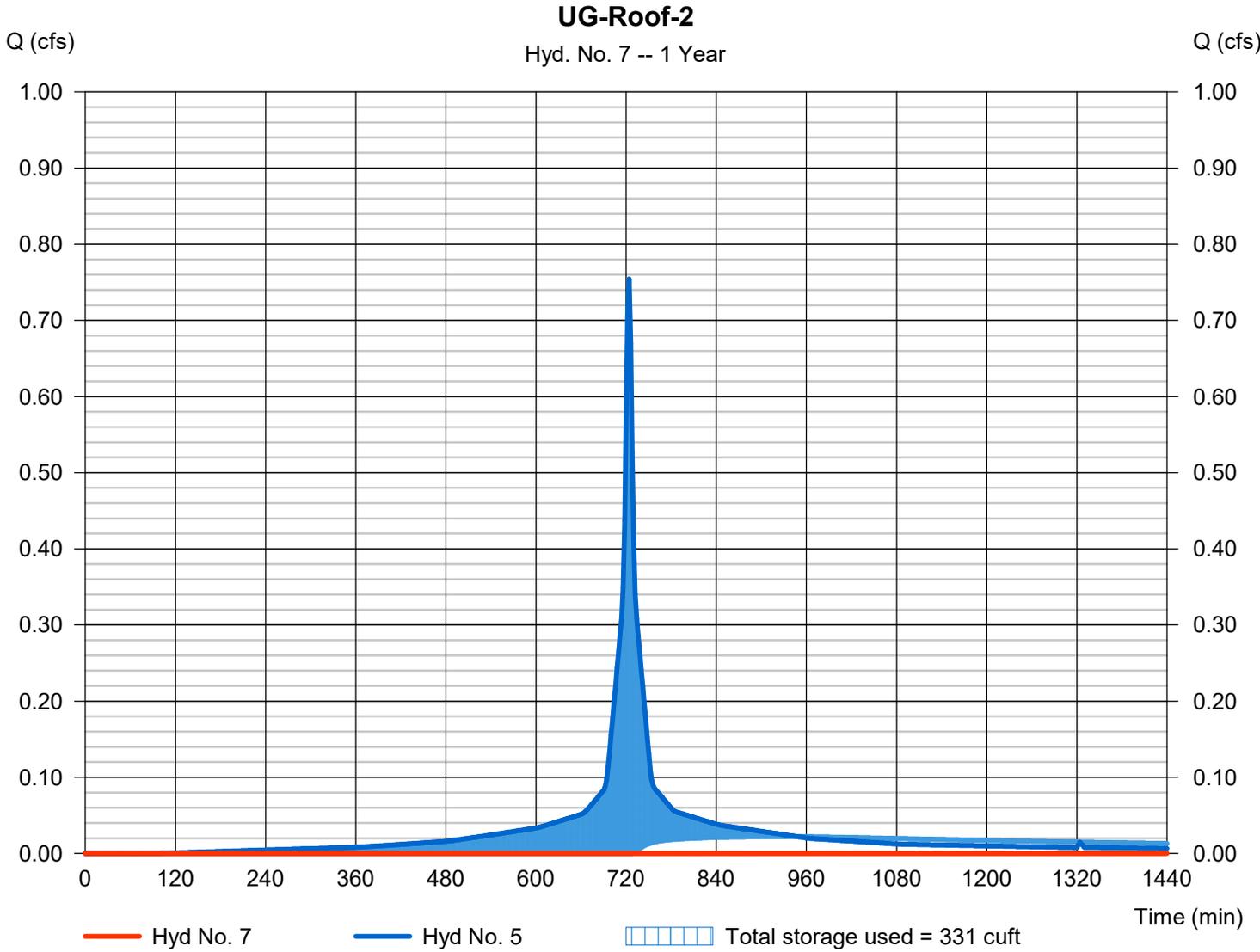
Tuesday, 12 / 13 / 2022

Hyd. No. 7

UG-Roof-2

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 5 - PR-C Roof-2	Max. Elevation	= 352.22 ft
Reservoir name	= UG-Roof-2	Max. Storage	= 331 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond No. 6 - UG-Roof-2

Pond Data

UG Chambers -Invert elev. = 352.17 ft, Rise x Span = 2.05 x 4.00 ft, Barrel Len = 7.12 ft, No. Barrels = 32, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 351.67 ft, Width = 5.31 ft, Height = 3.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	351.67	n/a	0	0
0.35	352.02	n/a	169	169
0.70	352.37	n/a	279	448
1.05	352.72	n/a	357	805
1.40	353.07	n/a	348	1,154
1.75	353.42	n/a	332	1,486
2.10	353.77	n/a	306	1,792
2.45	354.12	n/a	263	2,055
2.80	354.47	n/a	181	2,236
3.15	354.82	n/a	169	2,405
3.50	355.17	n/a	169	2,575

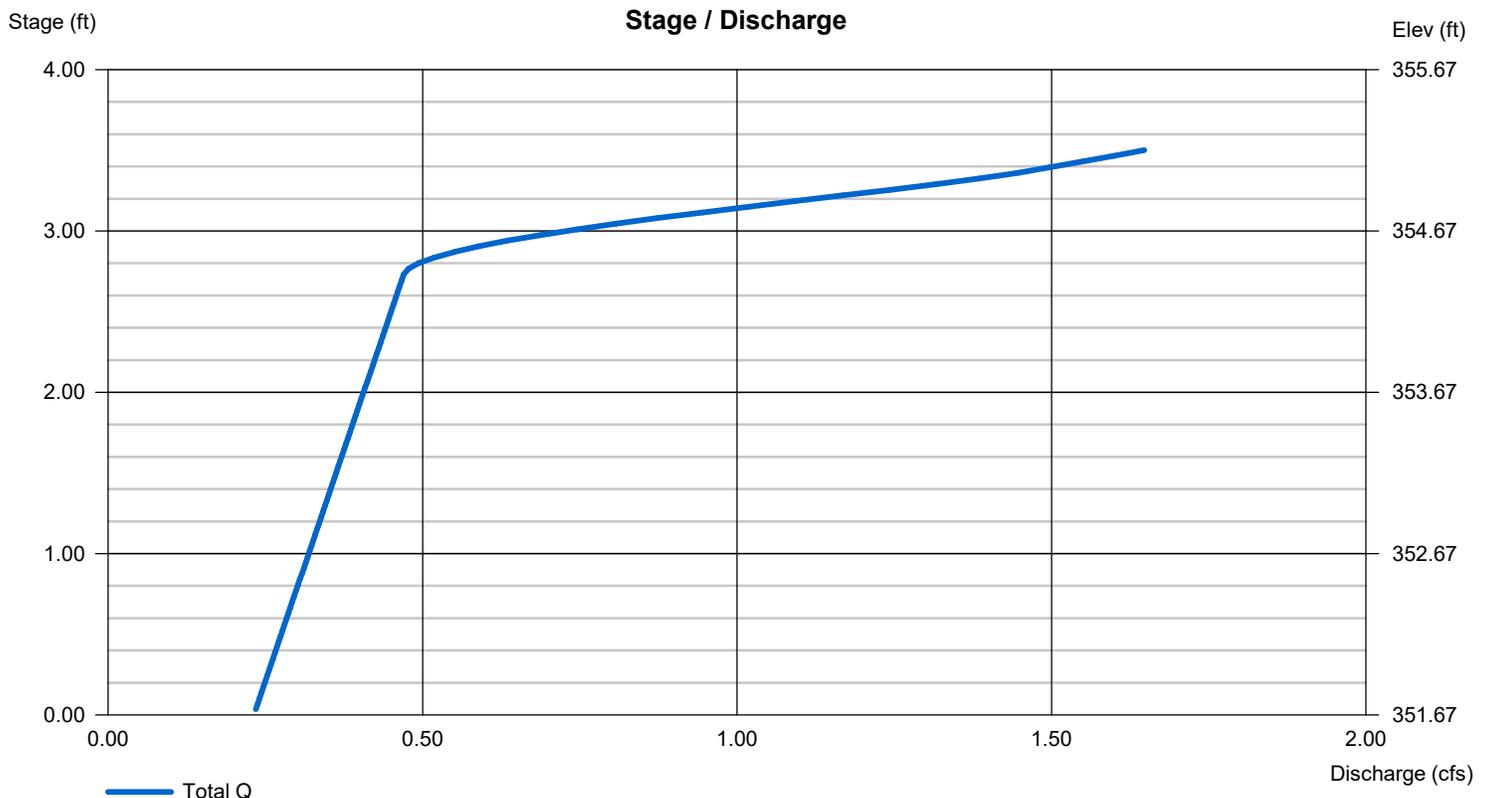
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 8.00	0.00	0.00	0.00
Span (in)	= 8.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 354.40	0.00	0.00	0.00
Length (ft)	= 9.00	0.00	0.00	0.00
Slope (%)	= 10.00	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 8.270	(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).



Hydrograph Report

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

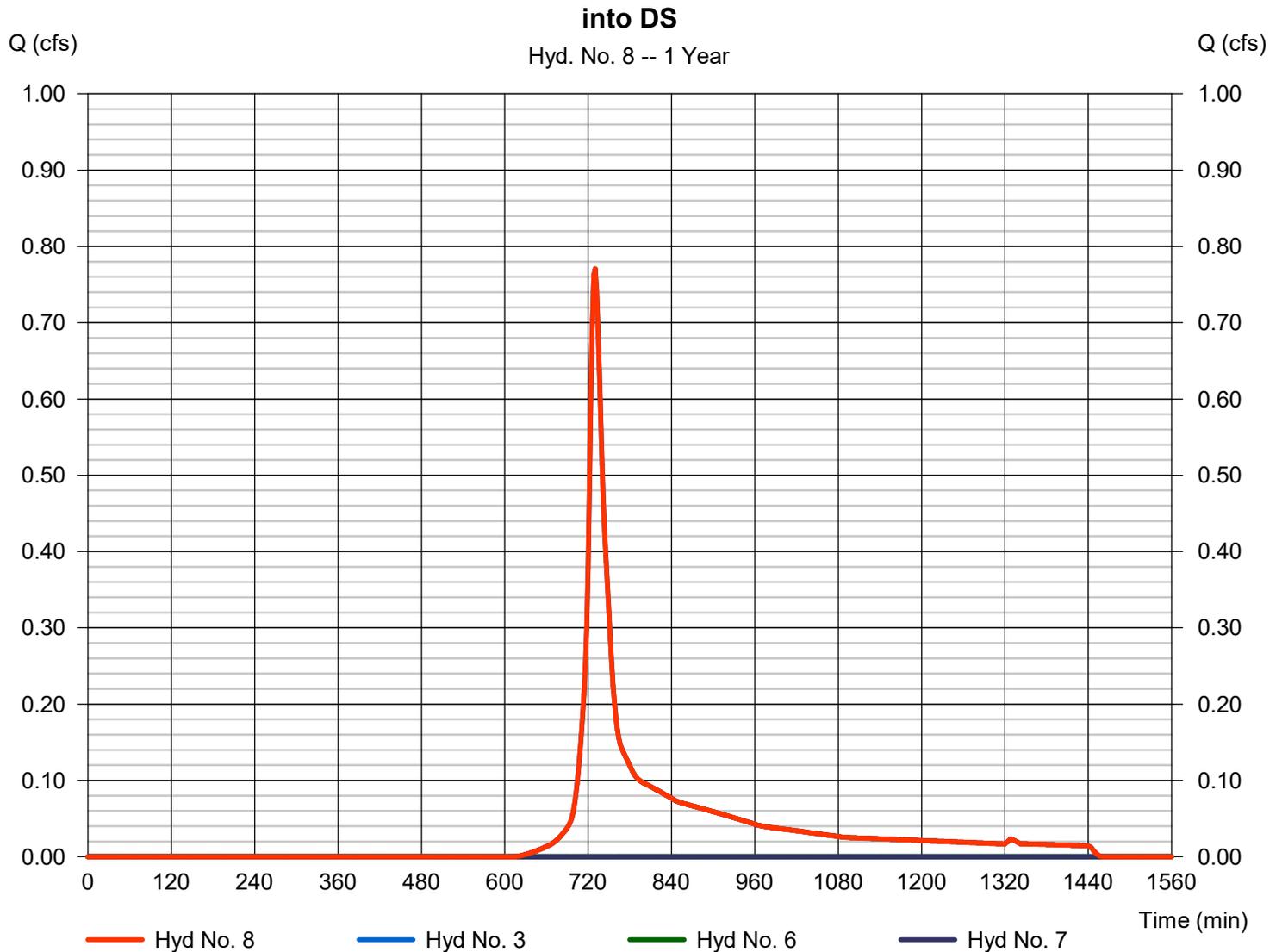
Tuesday, 12 / 13 / 2022

Hyd. No. 8

into DS

Hydrograph type = Combine
Storm frequency = 1 yrs
Time interval = 2 min
Inflow hyds. = 3, 6, 7

Peak discharge = 0.771 cfs
Time to peak = 730 min
Hyd. volume = 3,063 cuft
Contrib. drain. area = 0.840 ac



Hydrograph Report

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

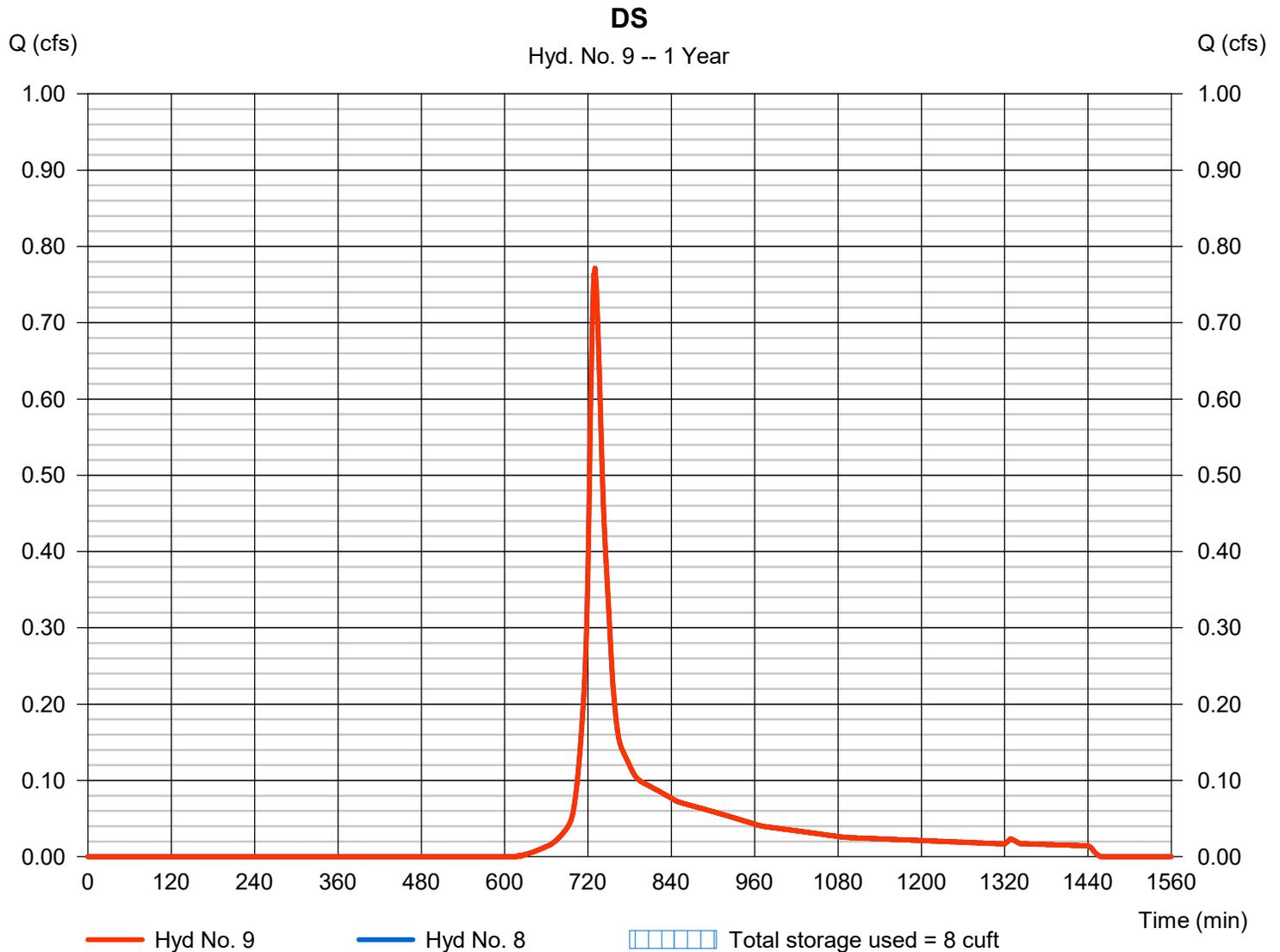
Tuesday, 12 / 13 / 2022

Hyd. No. 9

DS

Hydrograph type	= Reservoir	Peak discharge	= 0.772 cfs
Storm frequency	= 1 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 3,063 cuft
Inflow hyd. No.	= 8 - into DS	Max. Elevation	= 352.58 ft
Reservoir name	= DS	Max. Storage	= 8 cuft

Storage Indication method used.



Pond No. 1 - DS

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 352.16 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	352.16	18	0	0
4.84	357.00	18	89	89

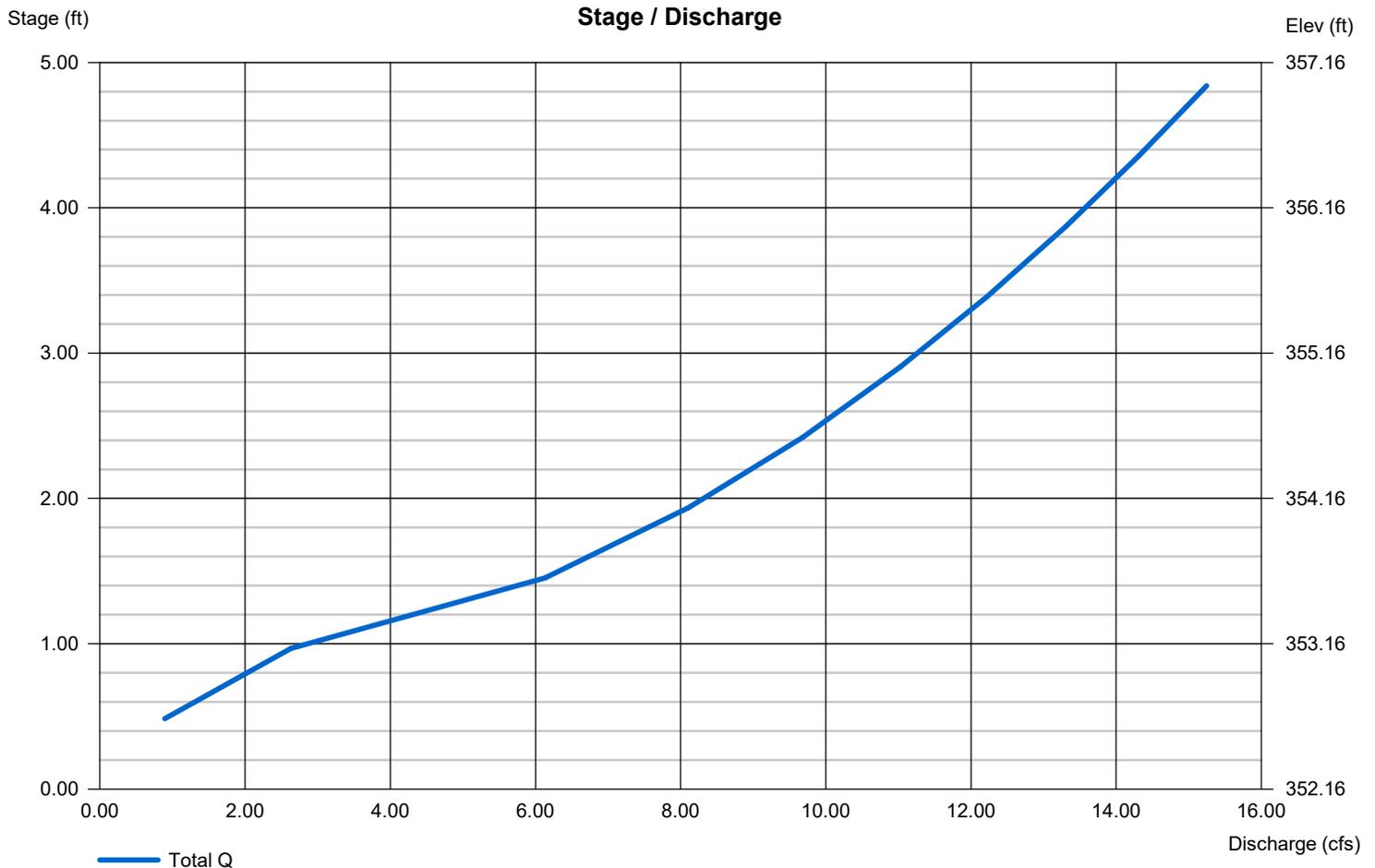
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	12.00	0.00	0.00
Span (in)	= 12.00	12.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 352.70	352.16	0.00	0.00
Length (ft)	= 39.00	11.00	0.00	0.00
Slope (%)	= 9.50	1.50	0.00	n/a
N-Value	= .012	.012	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000 (by Contour)			
TW Elev. (ft)	= 0.00			

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



Hydrograph Report

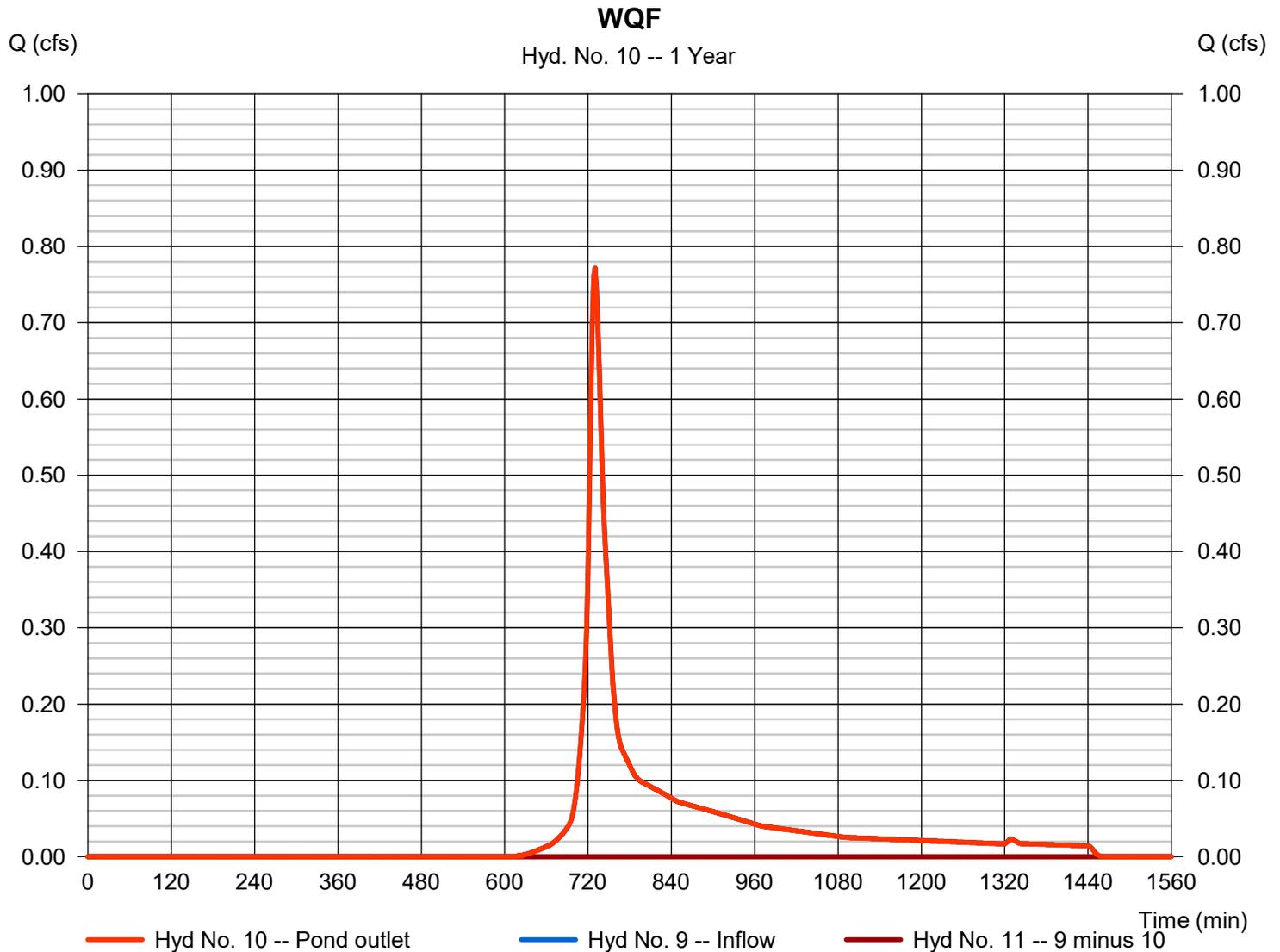
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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Hyd. No. 10

WQF

Hydrograph type	= Diversion1	Peak discharge	= 0.772 cfs
Storm frequency	= 1 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 3,063 cuft
Inflow hydrograph	= 9 - DS	2nd diverted hyd.	= 11
Diversion method	= Pond - DS	Pond structure	= Culv/Orf B



Hydrograph Report

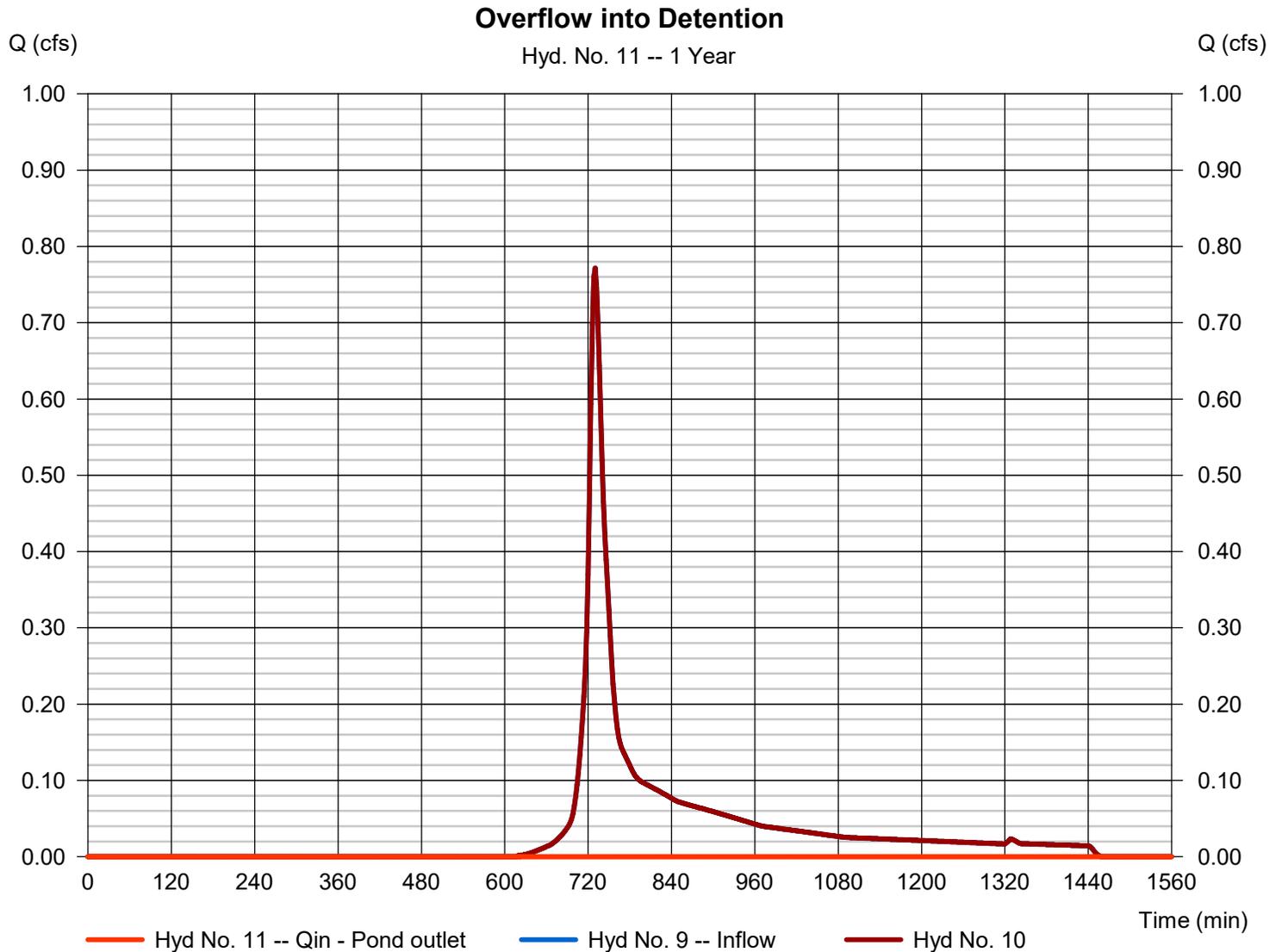
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

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Hyd. No. 11

Overflow into Detention

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 9 - DS	2nd diverted hyd.	= 10
Diversion method	= Pond - DS	Pond structure	= Culv/Orf B



Hydrograph Report

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

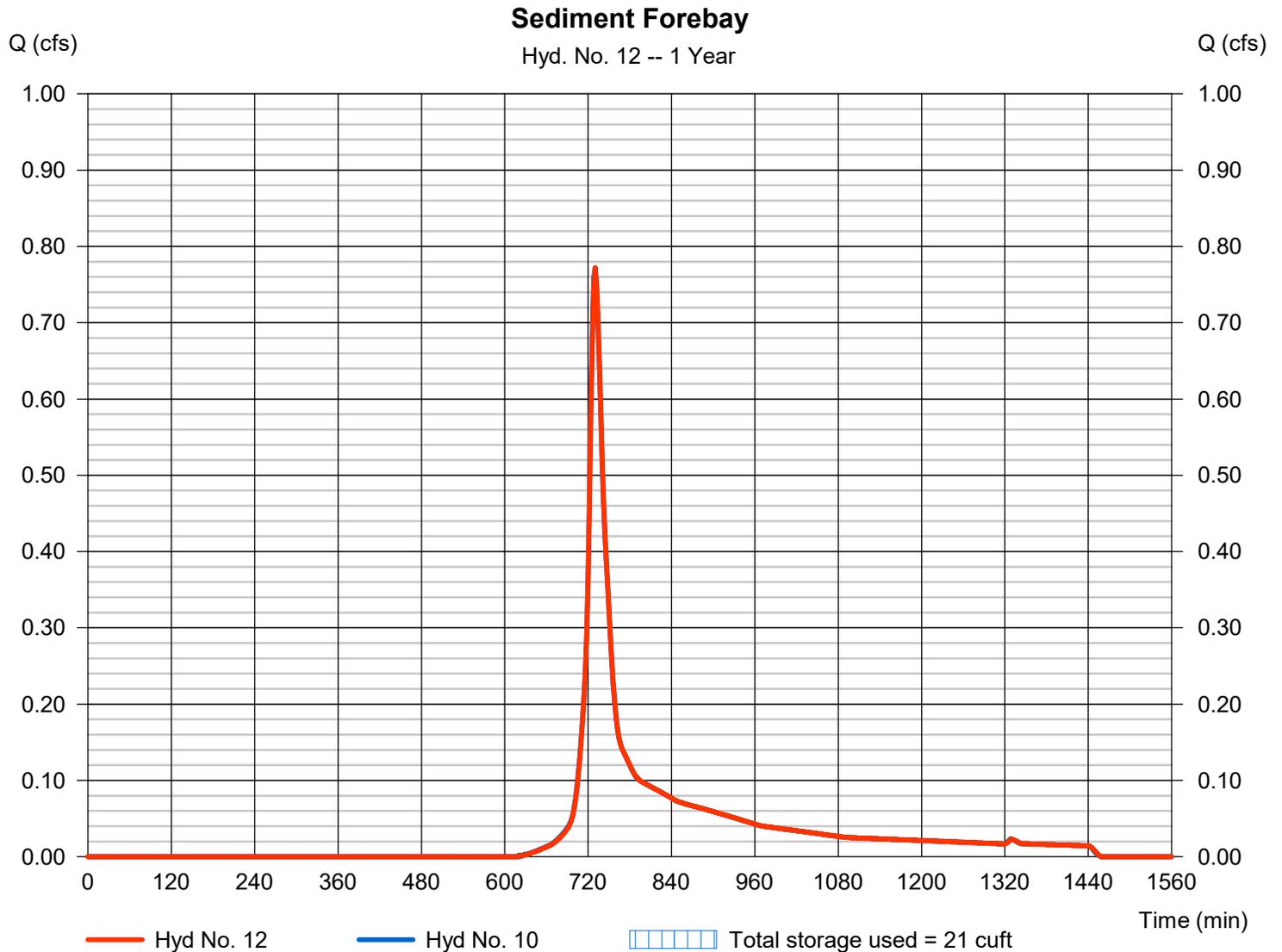
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Hyd. No. 12

Sediment Forebay

Hydrograph type	= Reservoir	Peak discharge	= 0.772 cfs
Storm frequency	= 1 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 3,063 cuft
Inflow hyd. No.	= 10 - WQF	Max. Elevation	= 352.66 ft
Reservoir name	= Sediment Forebay	Max. Storage	= 21 cuft

Storage Indication method used.



Pond No. 2 - Sediment Forebay

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 352.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	352.00	10	0	0
1.00	353.00	62	32	32
2.00	354.00	157	106	138
3.00	355.00	291	221	358
4.00	356.00	450	368	726

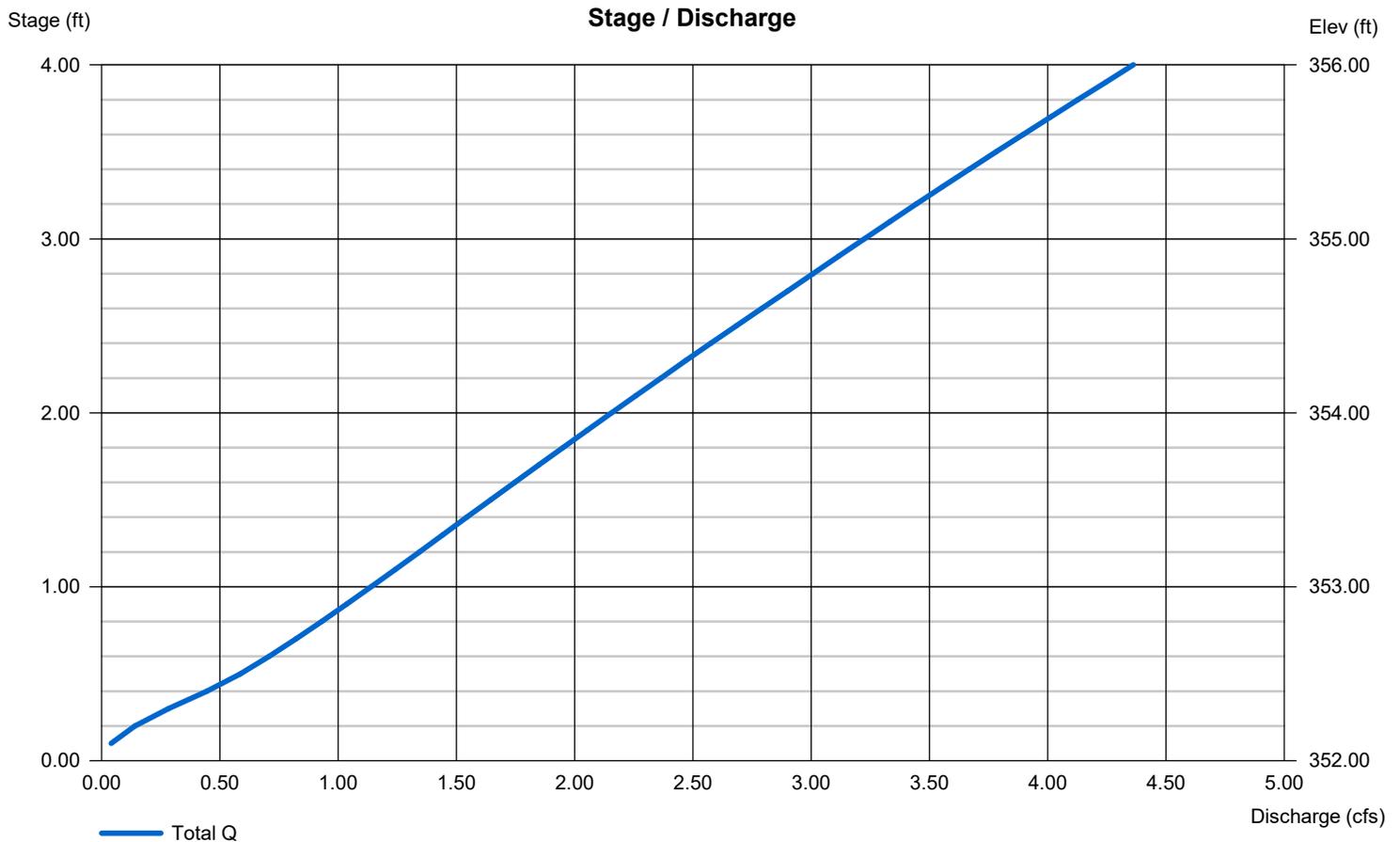
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	0.00	0.00	0.75
Span (in)	= 6.00	0.00	0.00	0.75
No. Barrels	= 1	0	0	130
Invert El. (ft)	= 352.00	0.00	0.00	352.00
Length (ft)	= 20.00	0.00	0.00	4.00
Slope (%)	= 2.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	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).



Hydrograph Report

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

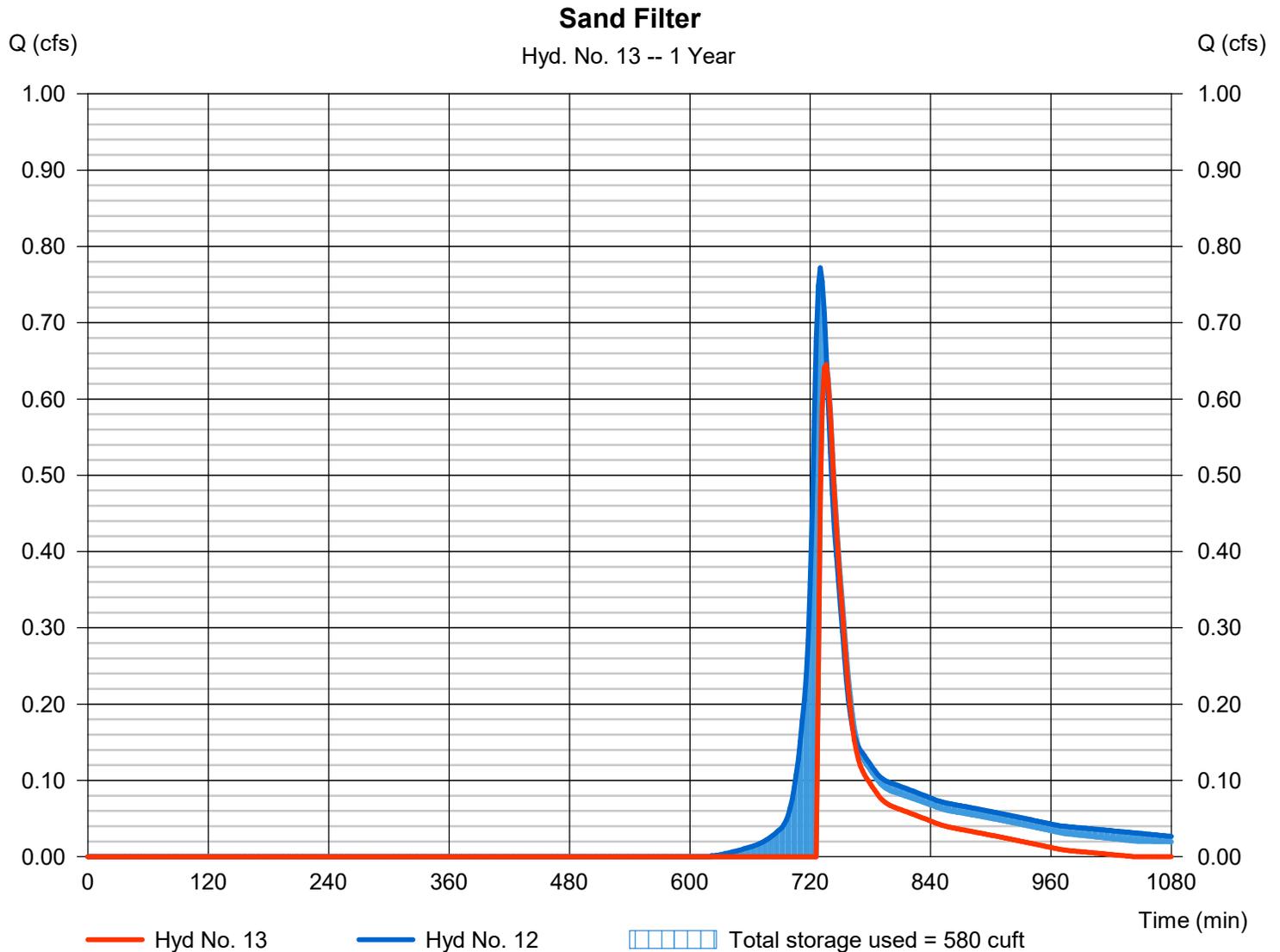
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Hyd. No. 13

Sand Filter

Hydrograph type	= Reservoir	Peak discharge	= 0.645 cfs
Storm frequency	= 1 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 1,470 cuft
Inflow hyd. No.	= 12 - Sediment Forebay	Max. Elevation	= 352.60 ft
Reservoir name	= Sand Filter	Max. Storage	= 580 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond No. 3 - Sand Filter

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 351.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	351.50	345	0	0
0.75	352.25	520	322	322
2.50	354.00	996	1,304	1,626

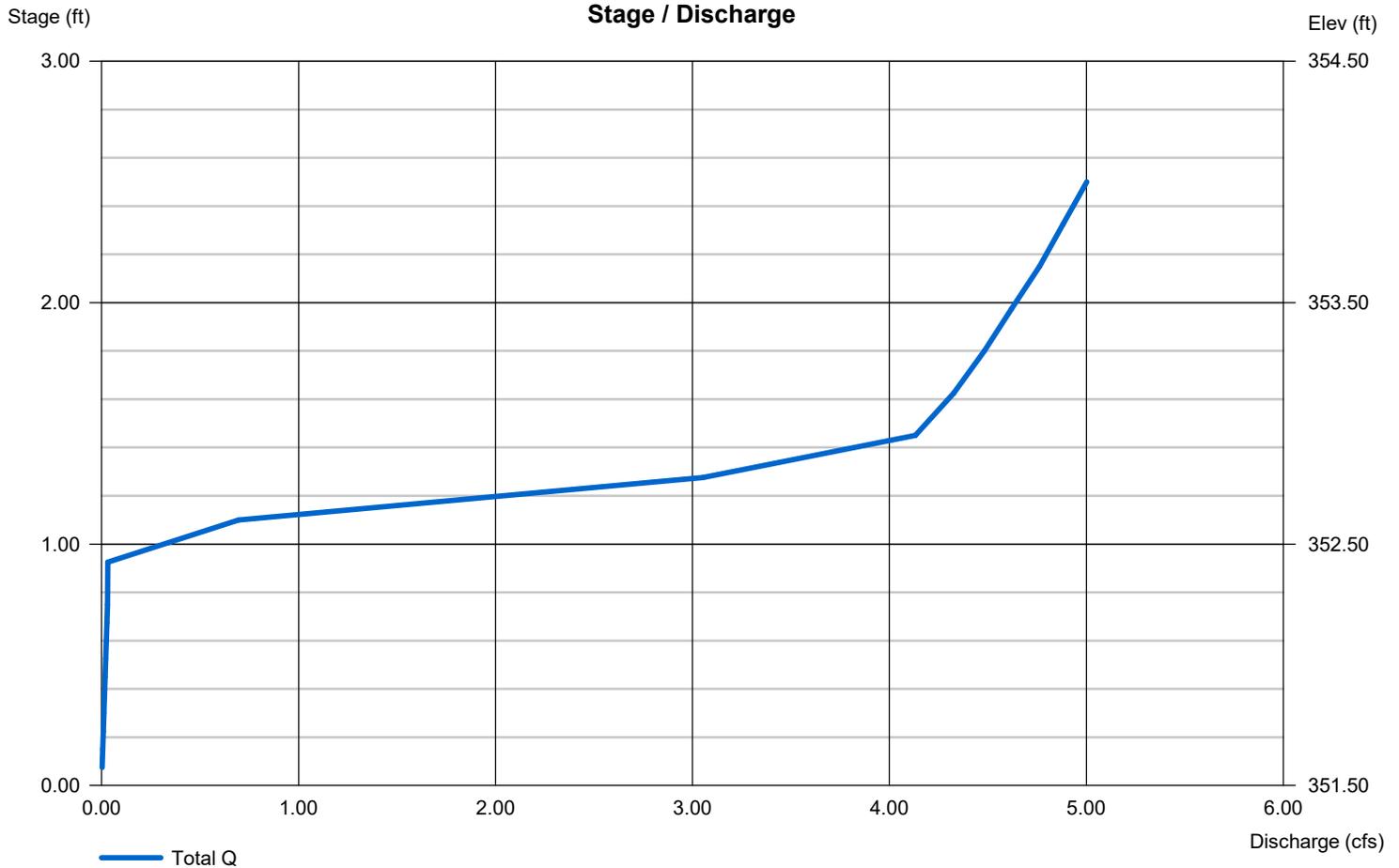
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 10.00	0.00	0.00	0.00
Span (in)	= 10.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 350.00	0.00	0.00	0.00
Length (ft)	= 15.00	0.00	0.00	0.00
Slope (%)	= 6.70	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 6.28	0.00	0.00	0.00
Crest El. (ft)	= 352.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 2.410 (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).



Hydrograph Report

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

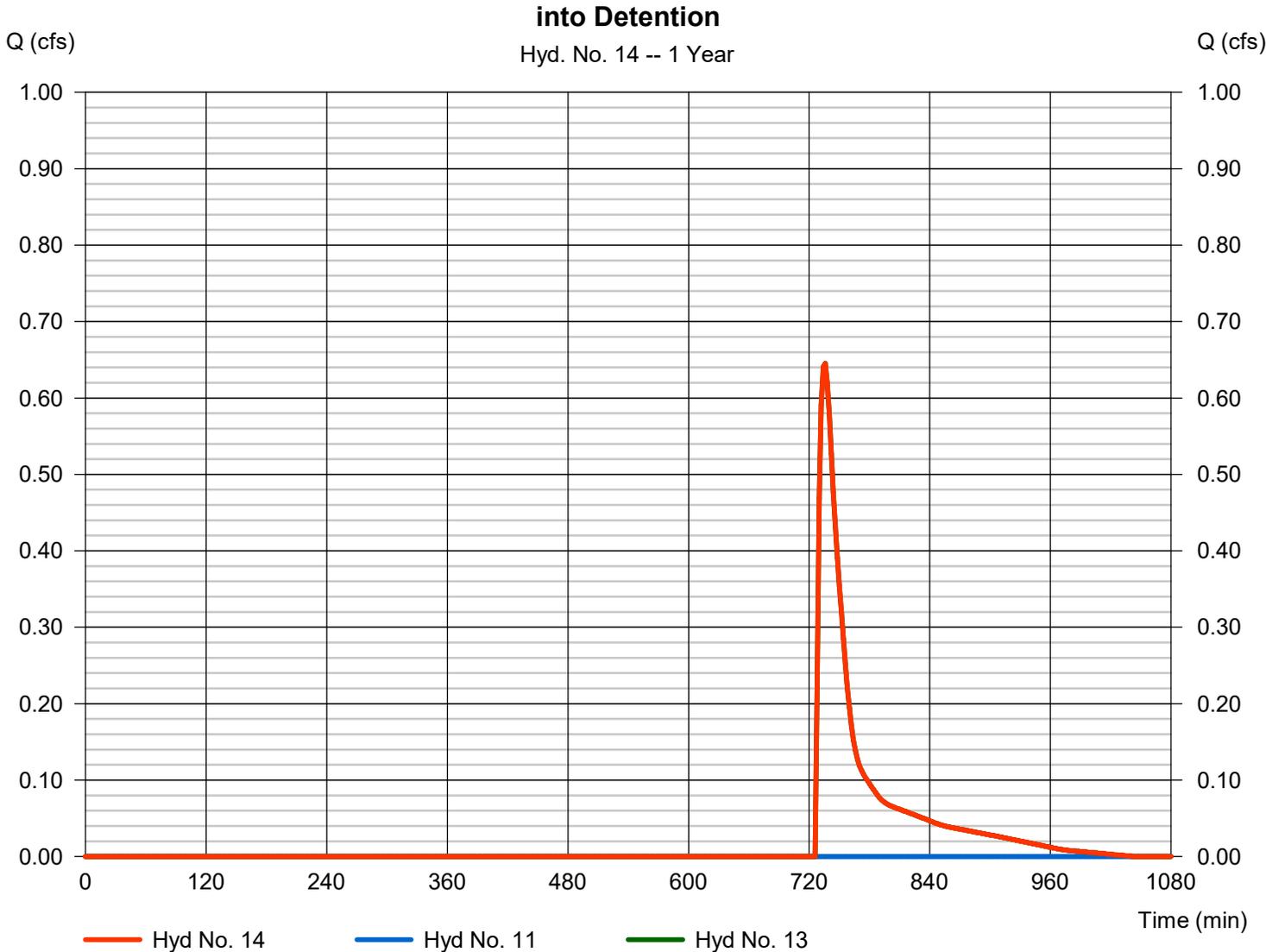
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Hyd. No. 14

into Detention

Hydrograph type = Combine
Storm frequency = 1 yrs
Time interval = 2 min
Inflow hyds. = 11, 13

Peak discharge = 0.645 cfs
Time to peak = 736 min
Hyd. volume = 1,470 cuft
Contrib. drain. area = 0.000 ac



Hydrograph Report

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

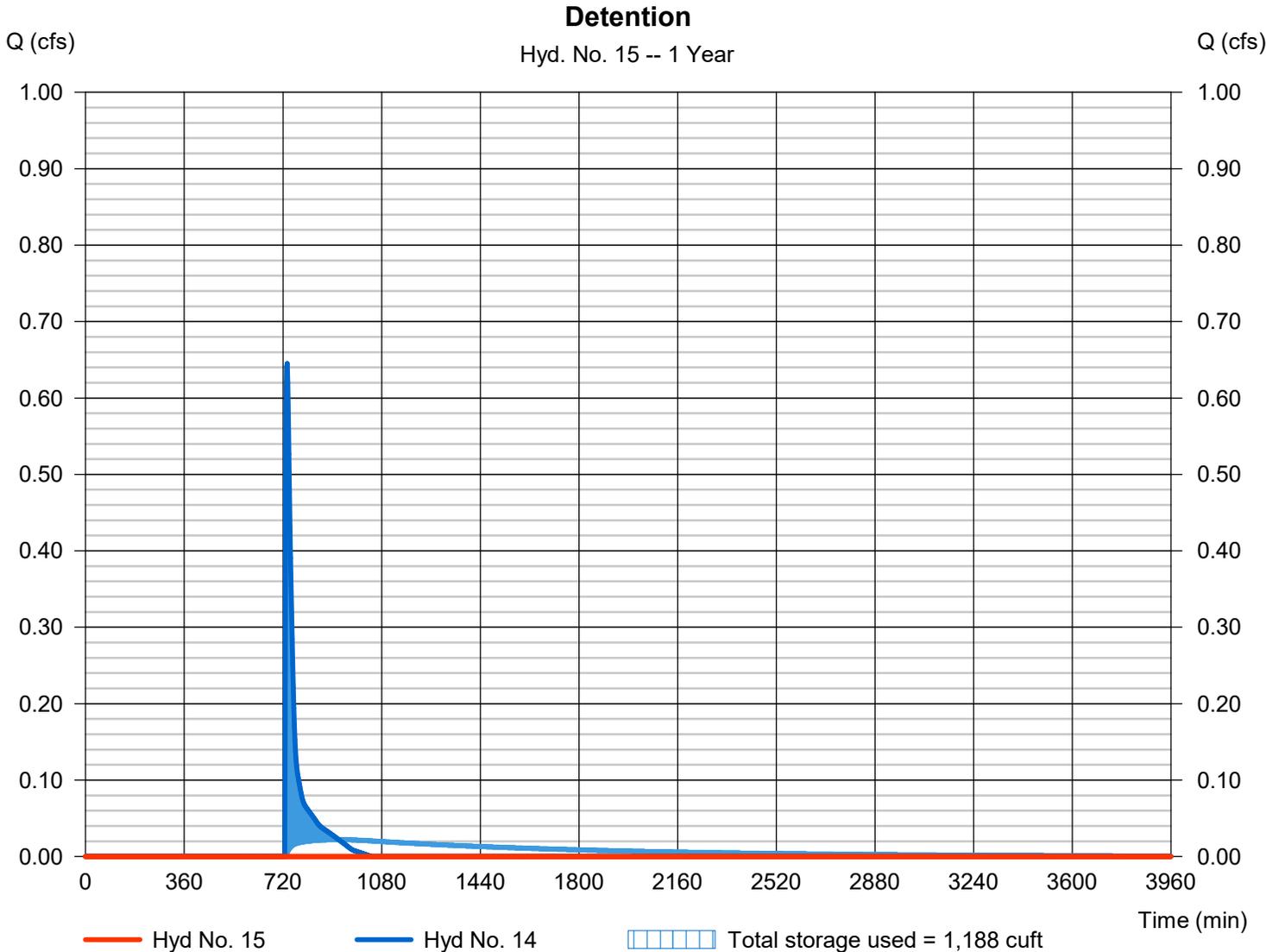
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Hyd. No. 15

Detention

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 760 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 14 - into Detention	Max. Elevation	= 350.23 ft
Reservoir name	= Detention	Max. Storage	= 1,188 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond No. 4 - Detention

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 349.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	349.00	966	0	0
3.00	352.00	967	2,899	2,899
3.01	352.01	1,223	11	2,910
6.00	355.00	1,224	3,658	6,568

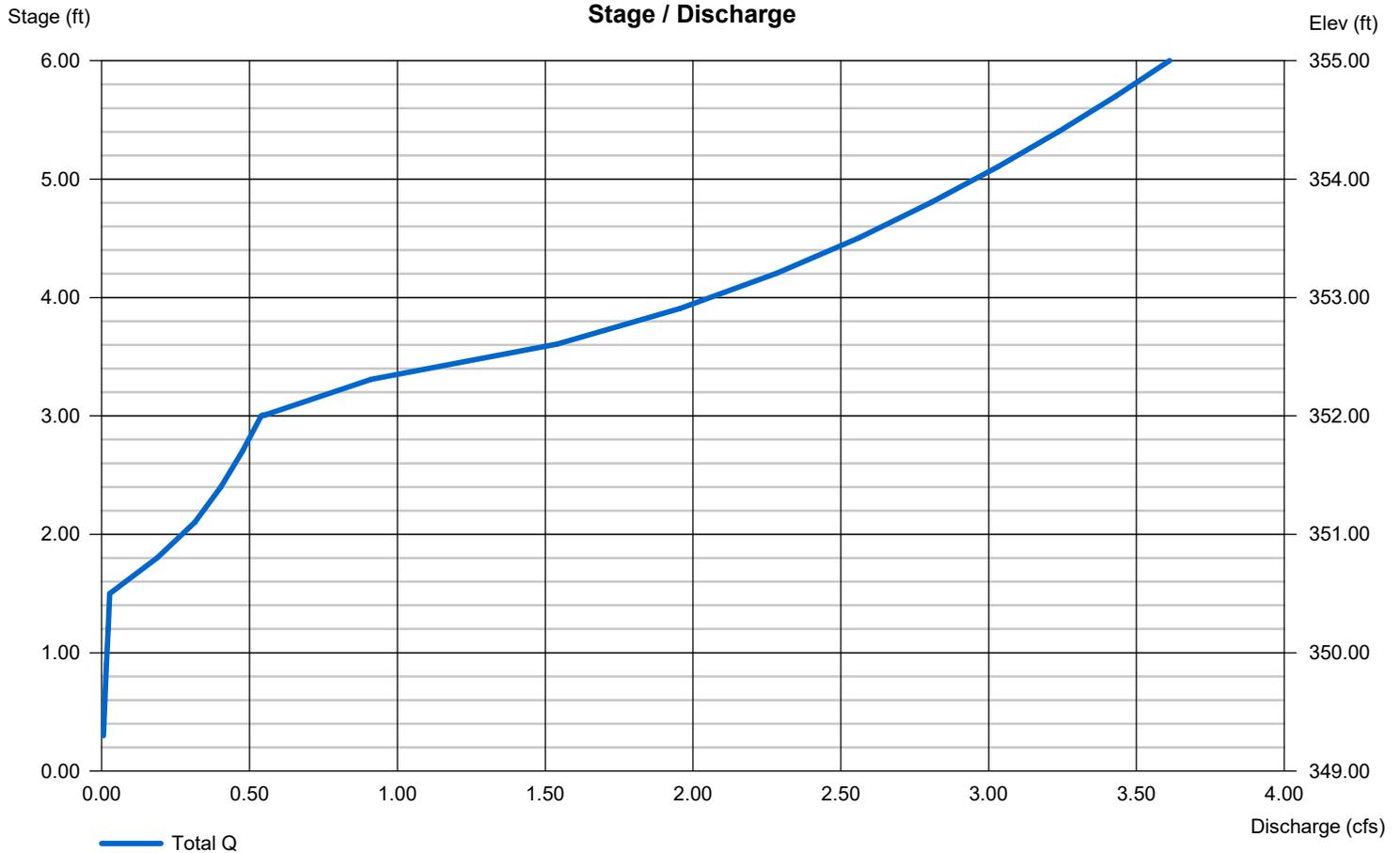
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	4.00	8.00	0.00
Span (in)	= 12.00	4.00	8.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 350.00	350.50	352.00	0.00
Length (ft)	= 23.00	0.00	0.00	0.00
Slope (%)	= 4.30	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 2.410 (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).



Hydrograph Report

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

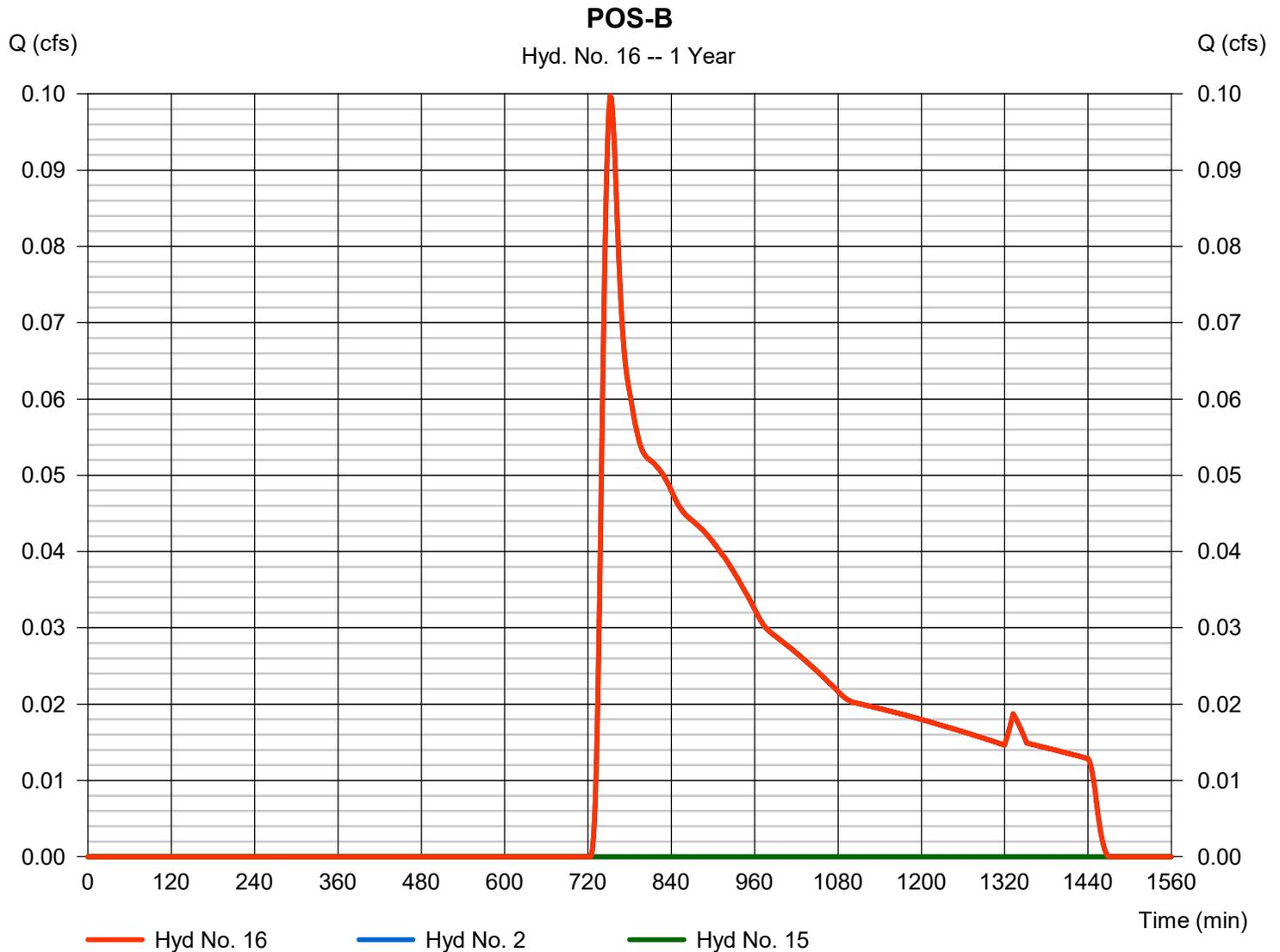
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Hyd. No. 16

POS-B

Hydrograph type = Combine
Storm frequency = 1 yrs
Time interval = 2 min
Inflow hyds. = 2, 15

Peak discharge = 0.100 cfs
Time to peak = 752 min
Hyd. volume = 1,256 cuft
Contrib. drain. area = 2.130 ac



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.451	2	736	2,899	-----	-----	-----	PR-A / POS-A
2	SCS Runoff	1.547	2	736	8,132	-----	-----	-----	PR-B
3	SCS Runoff	2.228	2	728	8,540	-----	-----	-----	PR-C
4	SCS Runoff	0.231	2	724	793	-----	-----	-----	PR-C Roof-1
5	SCS Runoff	1.386	2	724	4,761	-----	-----	-----	PR-C Roof-2
6	Reservoir	0.000	2	618	0	4	352.55	137	UG-Roof-1
7	Reservoir	0.000	2	n/a	0	5	352.93	1,011	UG-Roof-2
8	Combine	2.228	2	728	8,540	3, 6, 7	-----	-----	into DS
9	Reservoir	2.225	2	728	8,540	8	353.01	15.7	DS
10	Diversion1	1.677	2	728	8,009	9	-----	-----	WQF
11	Diversion2	0.548	2	728	531	9	-----	-----	Overflow into Detention
12	Reservoir	1.652	2	730	8,009	10	353.51	85.6	Sediment Forebay
13	Reservoir	1.612	2	732	5,953	12	352.67	636	Sand Filter
14	Combine	2.133	2	730	6,484	11, 13	-----	-----	into Detention
15	Reservoir	0.573	2	756	3,966	14	352.08	2,999	Detention
16	Combine	1.951	2	740	12,098	2, 15	-----	-----	POS-B

Hydrograph Report

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

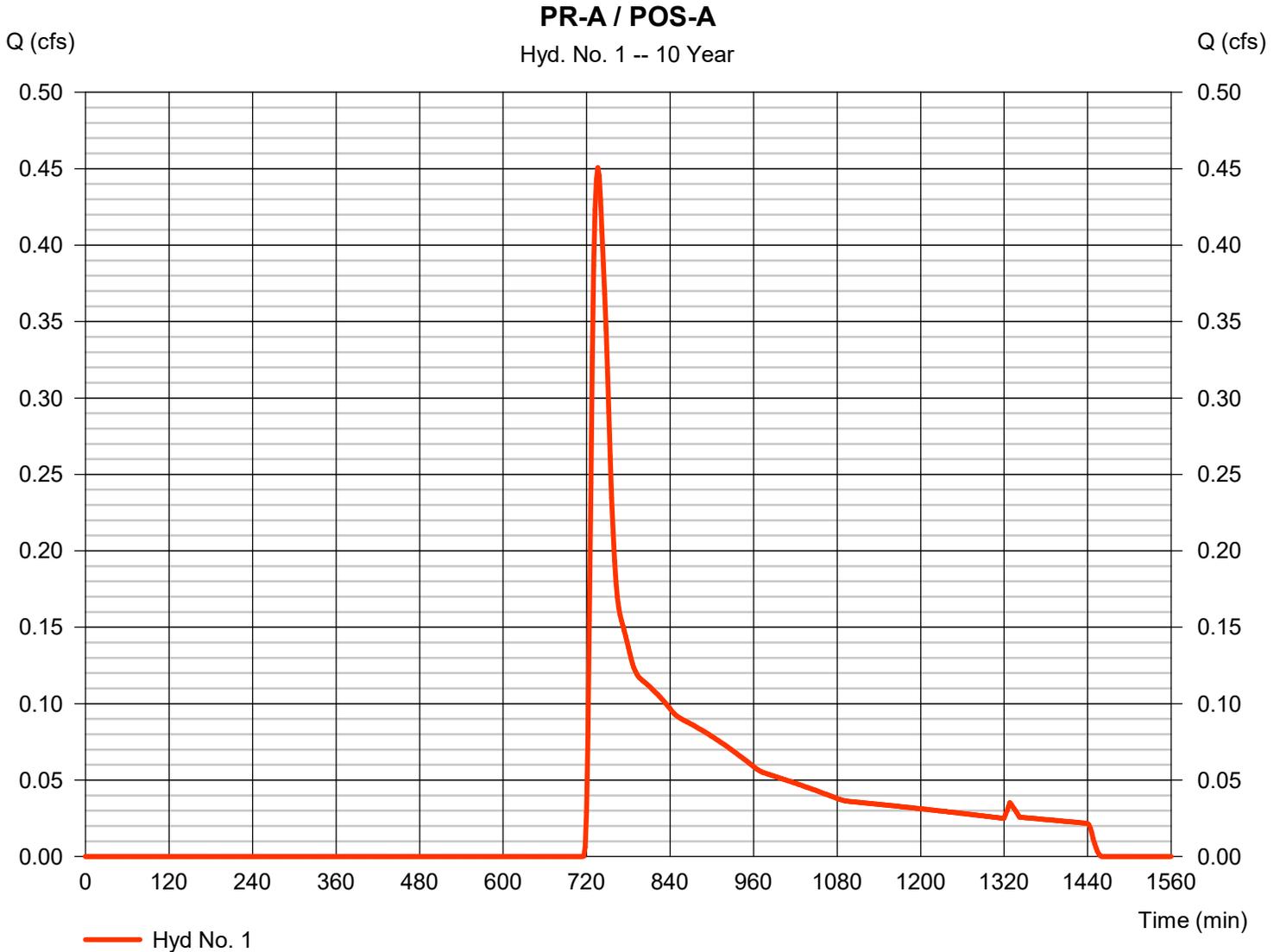
Tuesday, 12 / 13 / 2022

Hyd. No. 1

PR-A / POS-A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.451 cfs
Storm frequency	= 10 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 2,899 cuft
Drainage area	= 1.290 ac	Curve number	= 49*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.10 min
Total precip.	= 4.90 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.010 x 70) + (0.230 x 55) + (1.050 x 48)] / 1.290



Hydrograph Report

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

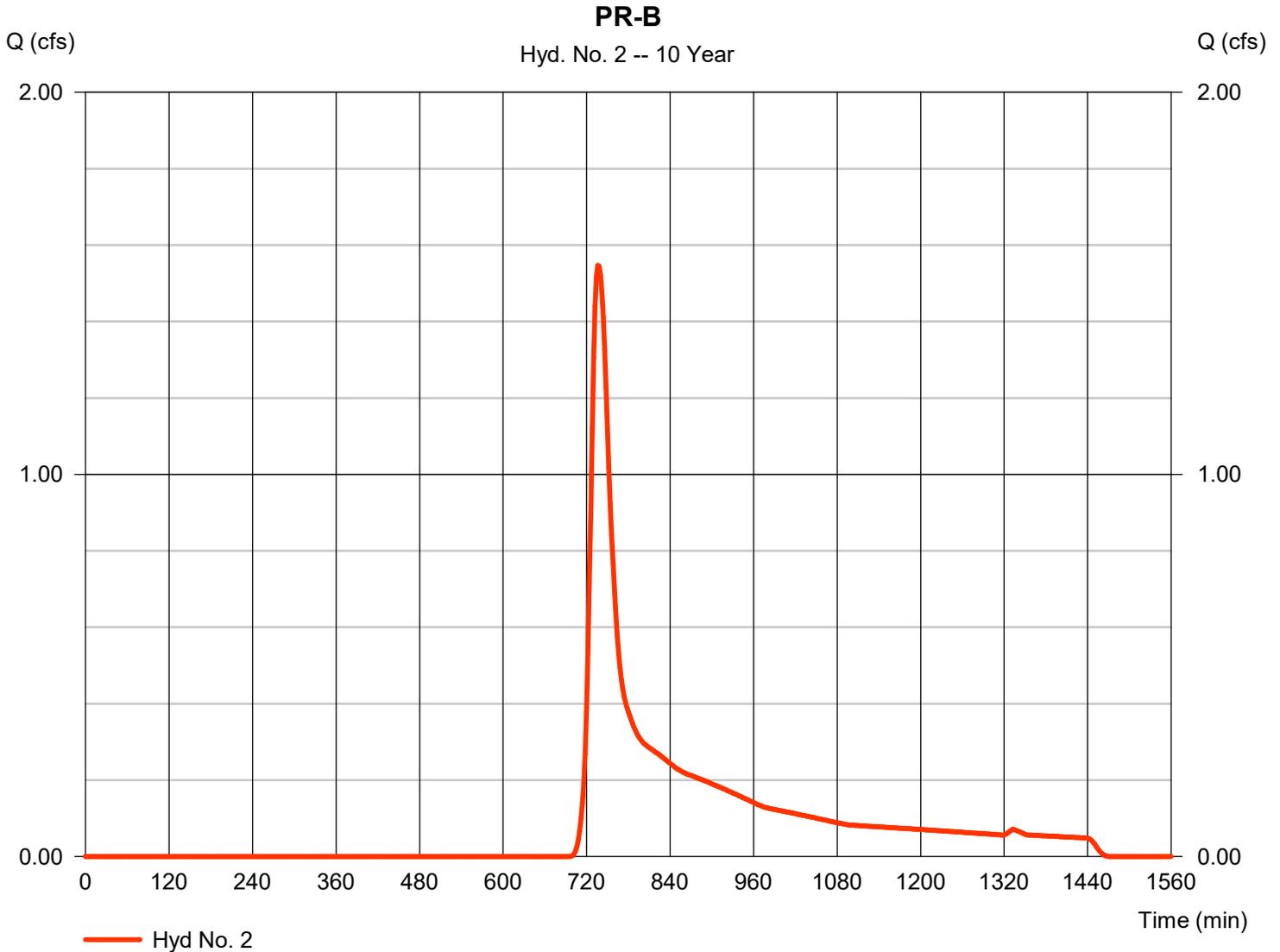
Tuesday, 12 / 13 / 2022

Hyd. No. 2

PR-B

Hydrograph type	= SCS Runoff	Peak discharge	= 1.547 cfs
Storm frequency	= 10 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 8,132 cuft
Drainage area	= 2.130 ac	Curve number	= 57*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 18.70 min
Total precip.	= 4.90 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.050 x 55) + (1.000 x 48) + (0.970 x 65) + (0.030 x 61) + (0.070 x 74) + (0.010 x 98)] / 2.130



Hydrograph Report

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

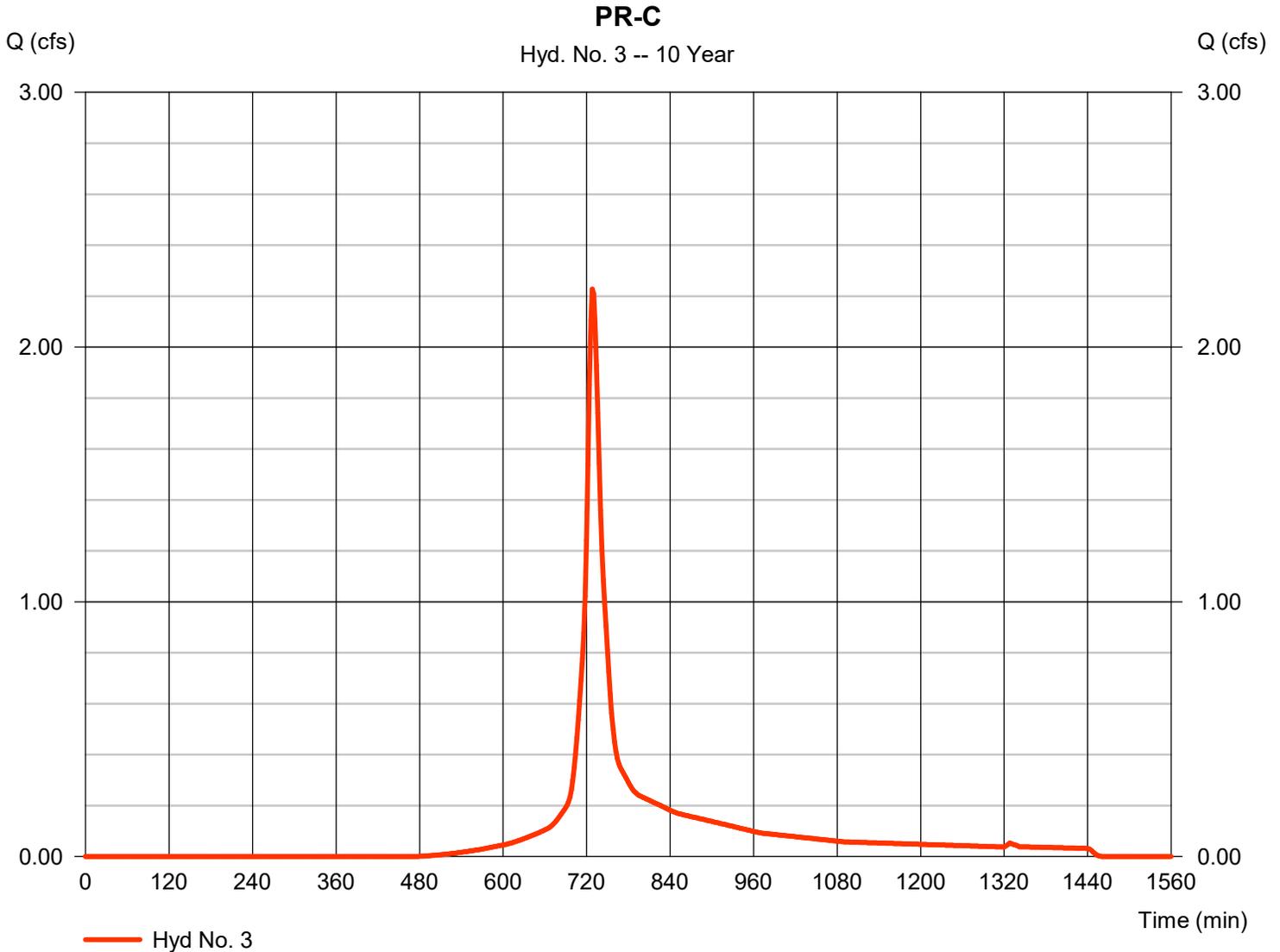
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Hyd. No. 3

PR-C

Hydrograph type	= SCS Runoff	Peak discharge	= 2.228 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 8,540 cuft
Drainage area	= 0.840 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.20 min
Total precip.	= 4.90 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.370 x 61) + (0.080 x 74) + (0.390 x 98)] / 0.840



Hydrograph Report

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

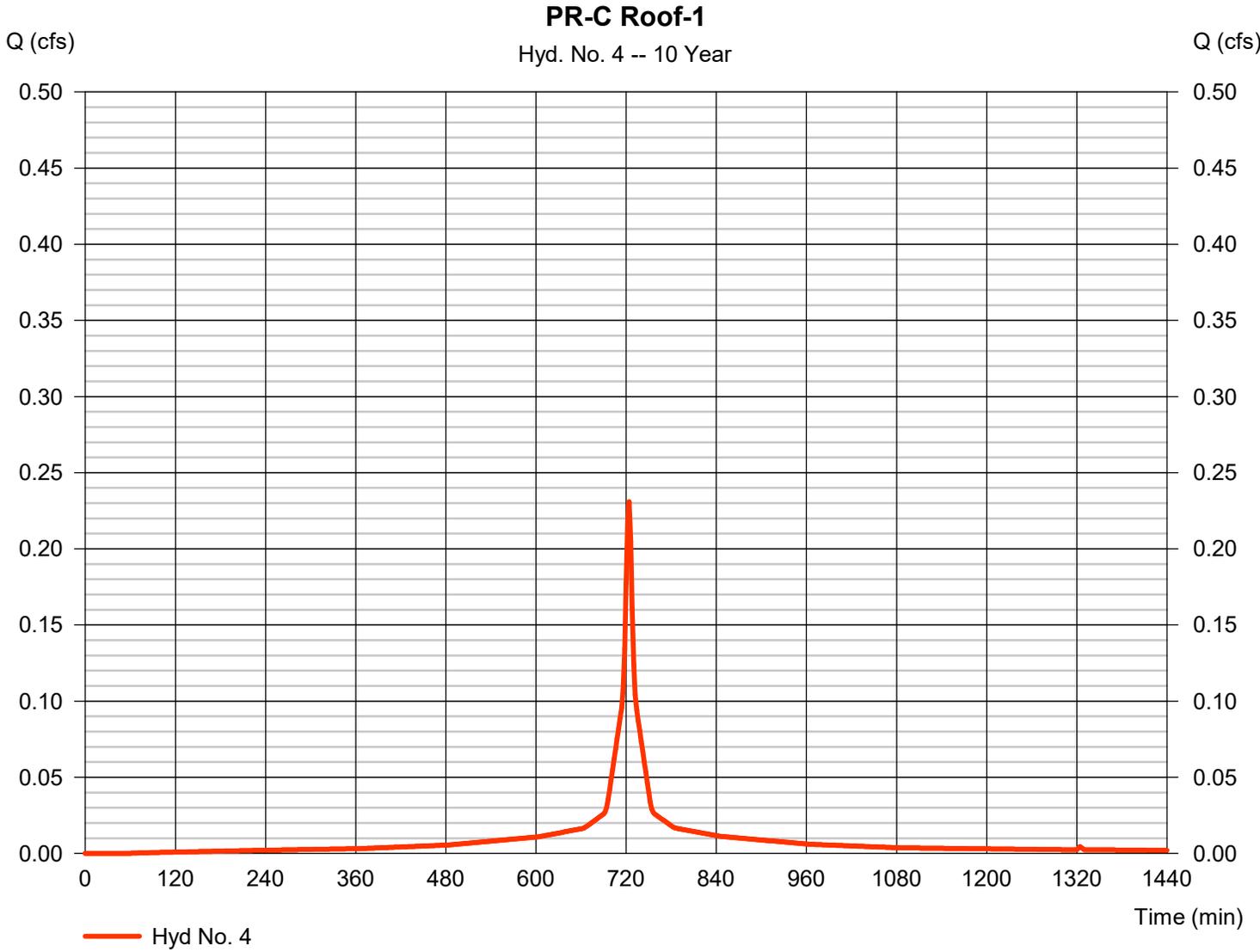
Tuesday, 12 / 13 / 2022

Hyd. No. 4

PR-C Roof-1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.231 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 793 cuft
Drainage area	= 0.050 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.90 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.050 x 98)] / 0.050



Hydrograph Report

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

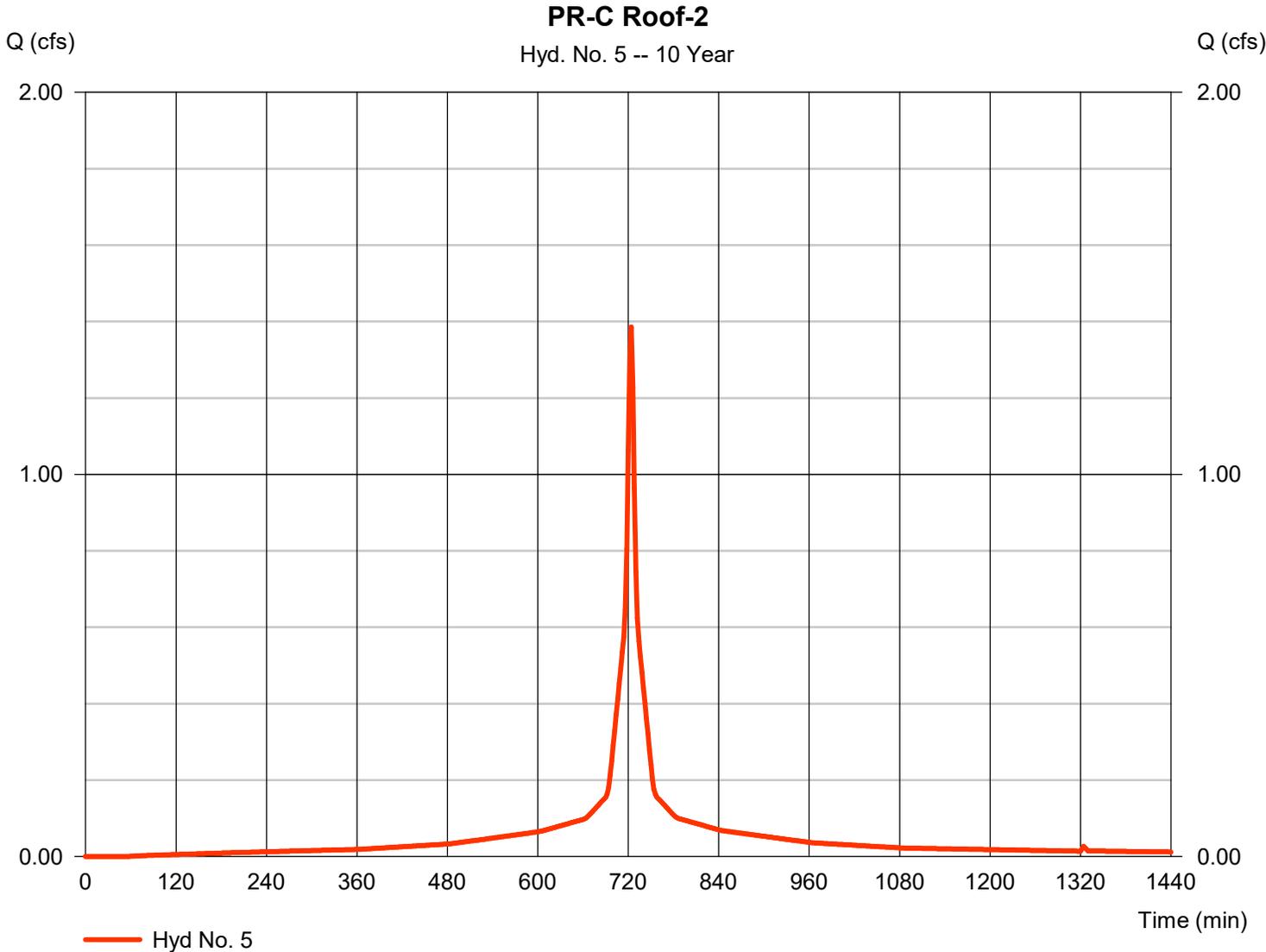
Tuesday, 12 / 13 / 2022

Hyd. No. 5

PR-C Roof-2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.386 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 4,761 cuft
Drainage area	= 0.300 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.90 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.300 x 98)] / 0.300



Hydrograph Report

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

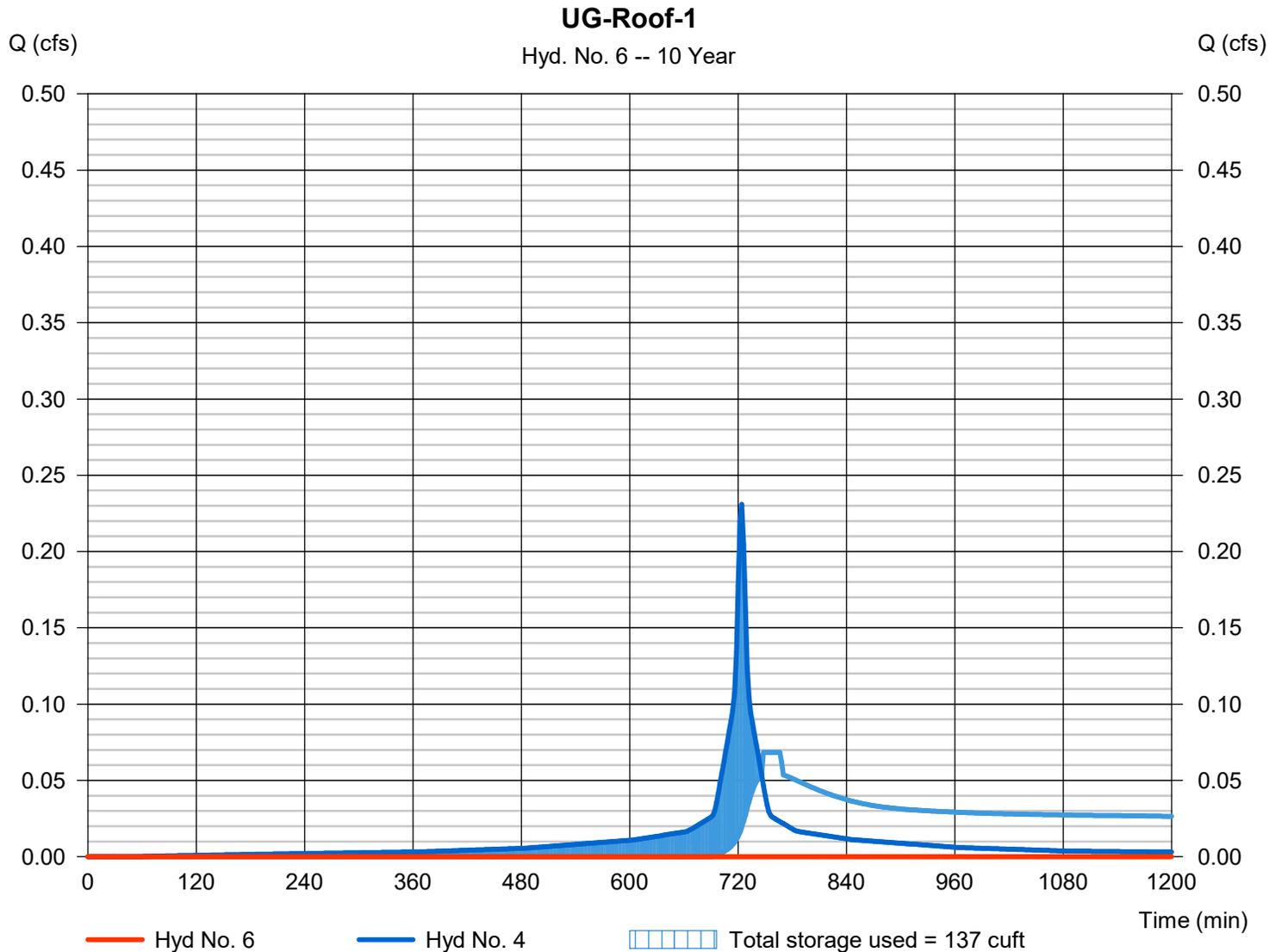
Tuesday, 12 / 13 / 2022

Hyd. No. 6

UG-Roof-1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 618 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 4 - PR-C Roof-1	Max. Elevation	= 352.55 ft
Reservoir name	= UG-Roof-1	Max. Storage	= 137 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

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

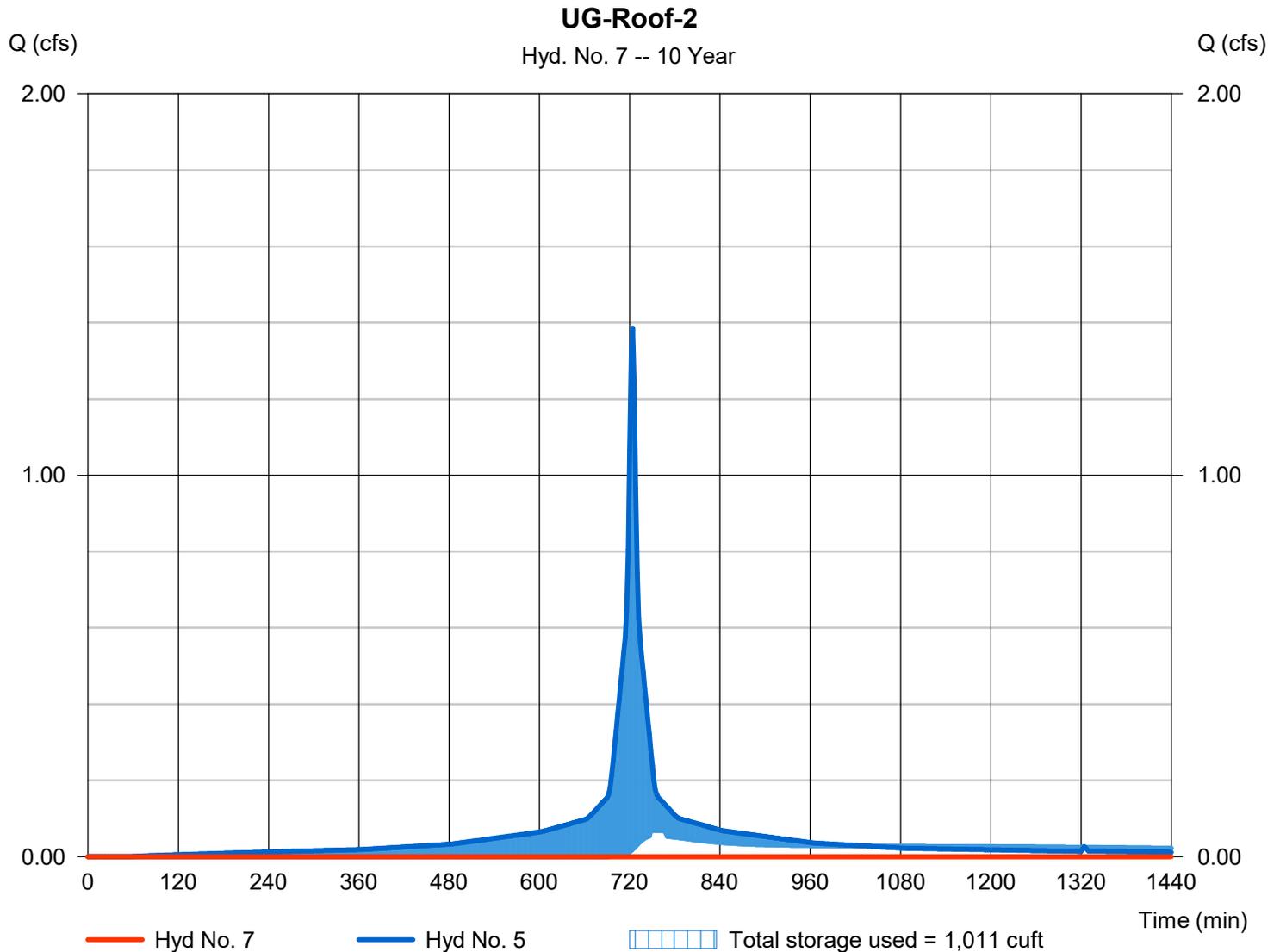
Tuesday, 12 / 13 / 2022

Hyd. No. 7

UG-Roof-2

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 5 - PR-C Roof-2	Max. Elevation	= 352.93 ft
Reservoir name	= UG-Roof-2	Max. Storage	= 1,011 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

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

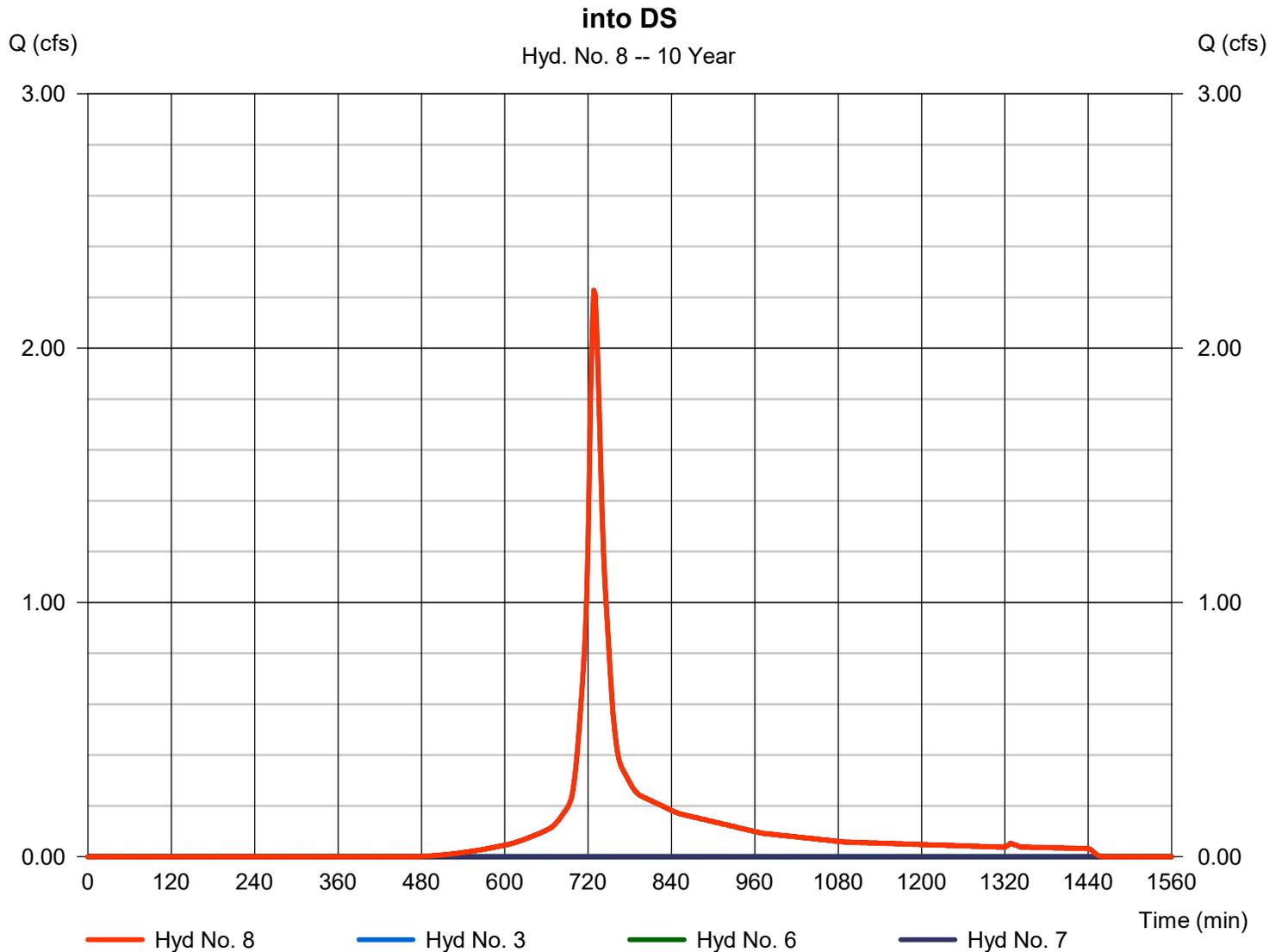
Tuesday, 12 / 13 / 2022

Hyd. No. 8

into DS

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 2 min
Inflow hyds. = 3, 6, 7

Peak discharge = 2.228 cfs
Time to peak = 728 min
Hyd. volume = 8,540 cuft
Contrib. drain. area = 0.840 ac



Hydrograph Report

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

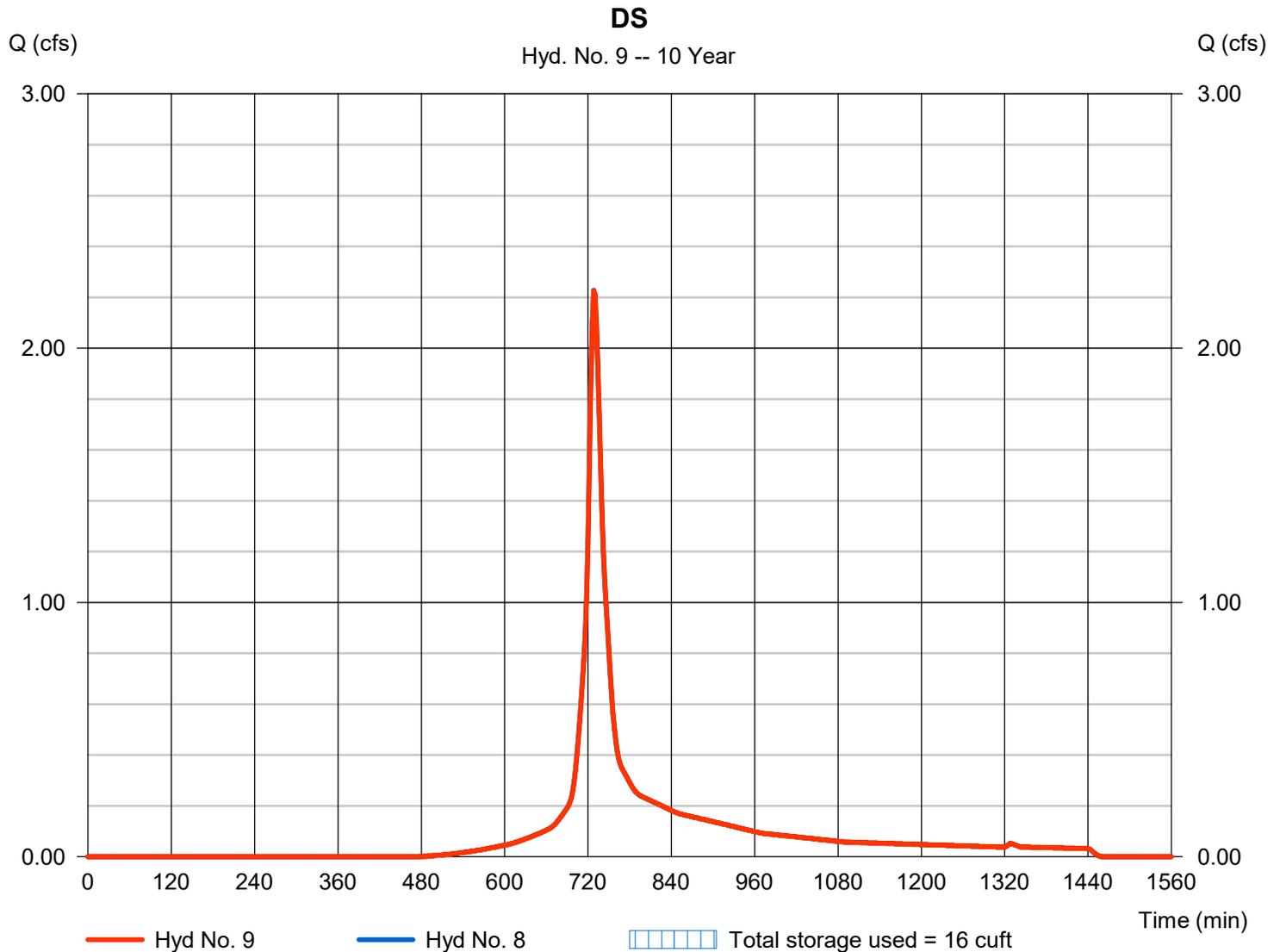
Tuesday, 12 / 13 / 2022

Hyd. No. 9

DS

Hydrograph type	= Reservoir	Peak discharge	= 2.225 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 8,540 cuft
Inflow hyd. No.	= 8 - into DS	Max. Elevation	= 353.01 ft
Reservoir name	= DS	Max. Storage	= 16 cuft

Storage Indication method used.



Hydrograph Report

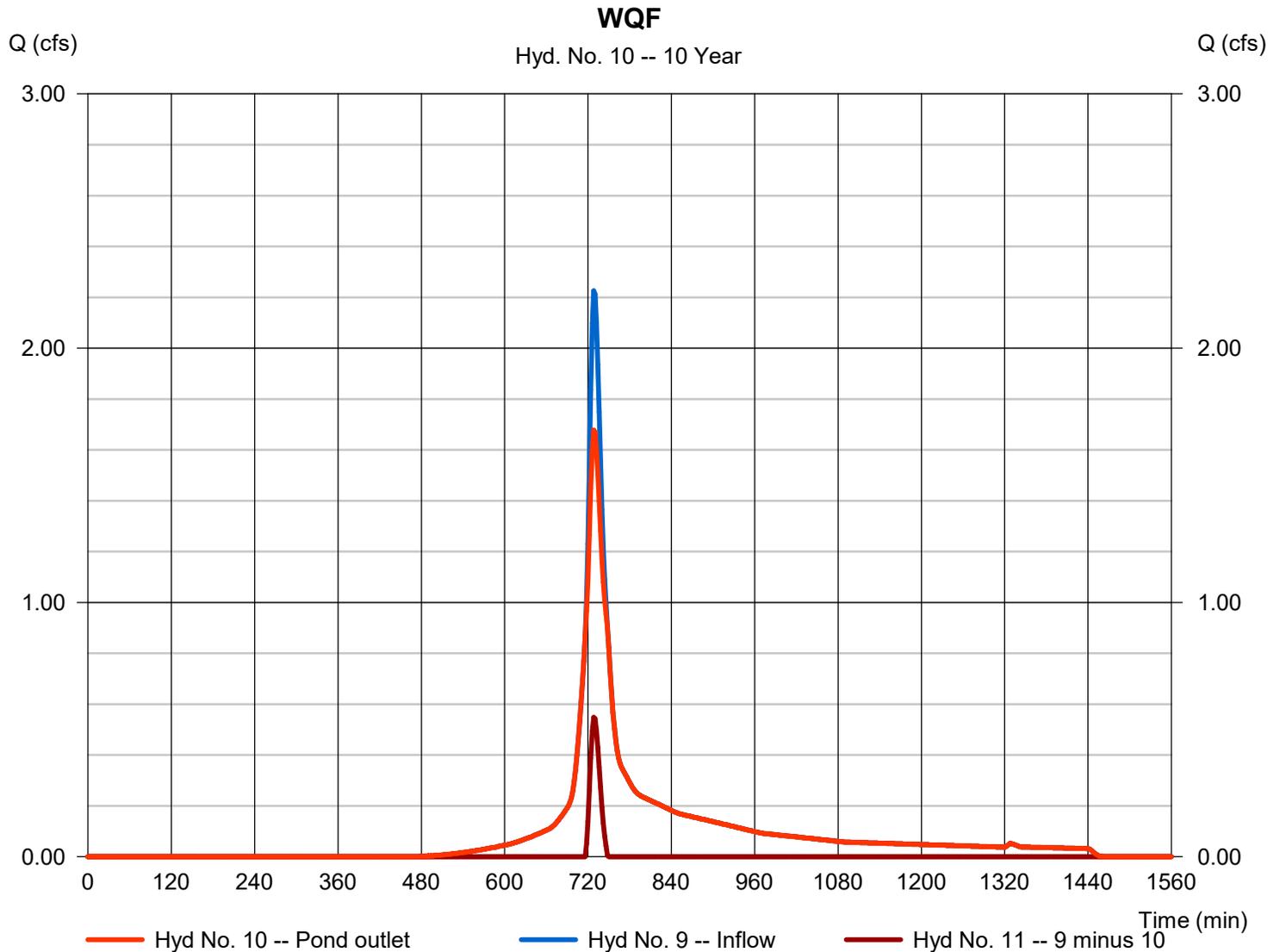
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Tuesday, 12 / 13 / 2022

Hyd. No. 10

WQF

Hydrograph type	= Diversion1	Peak discharge	= 1.677 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 8,009 cuft
Inflow hydrograph	= 9 - DS	2nd diverted hyd.	= 11
Diversion method	= Pond - DS	Pond structure	= Culv/Orf B



Hydrograph Report

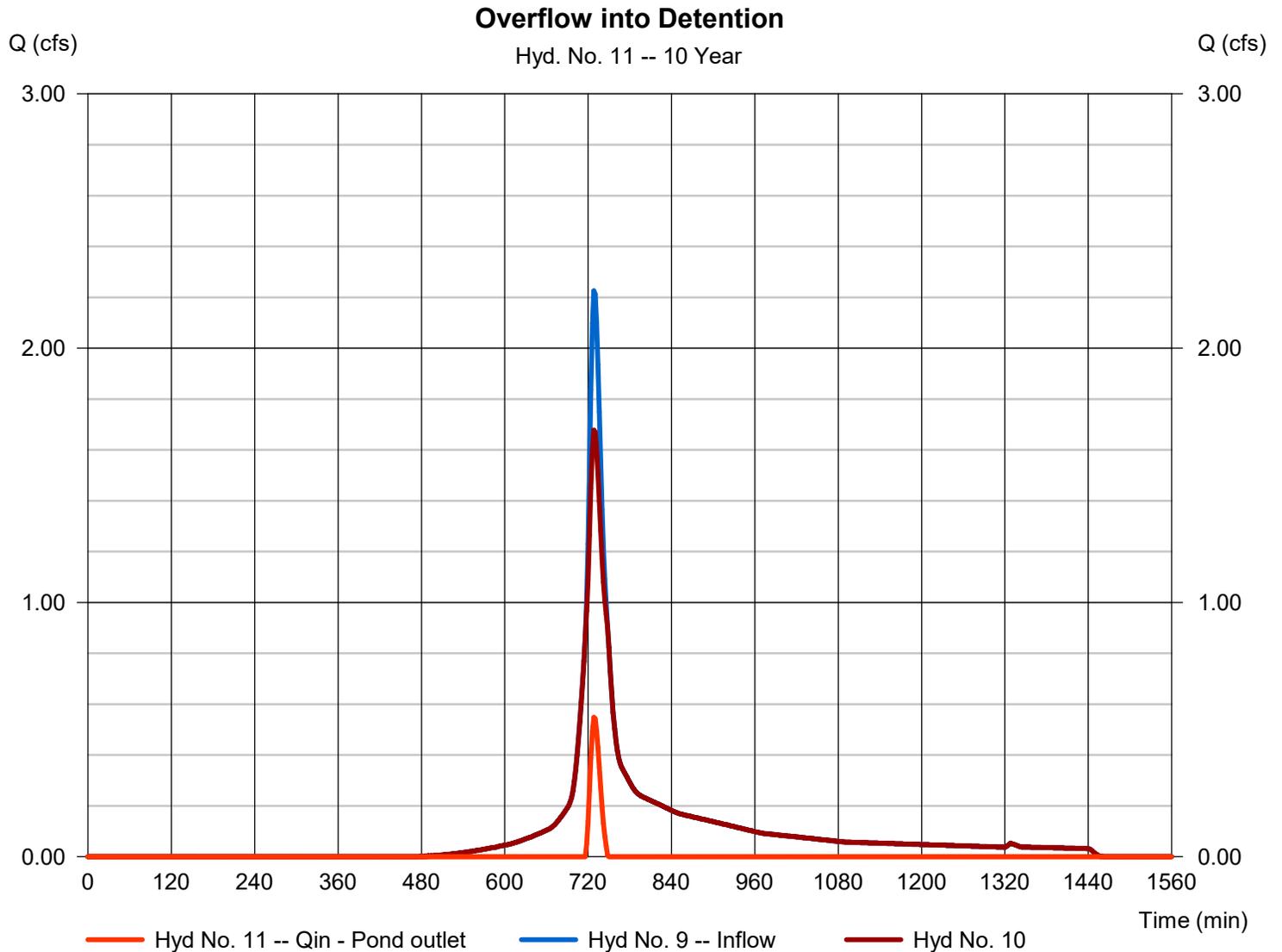
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Tuesday, 12 / 13 / 2022

Hyd. No. 11

Overflow into Detention

Hydrograph type	= Diversion2	Peak discharge	= 0.548 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 531 cuft
Inflow hydrograph	= 9 - DS	2nd diverted hyd.	= 10
Diversion method	= Pond - DS	Pond structure	= Culv/Orf B



Hydrograph Report

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

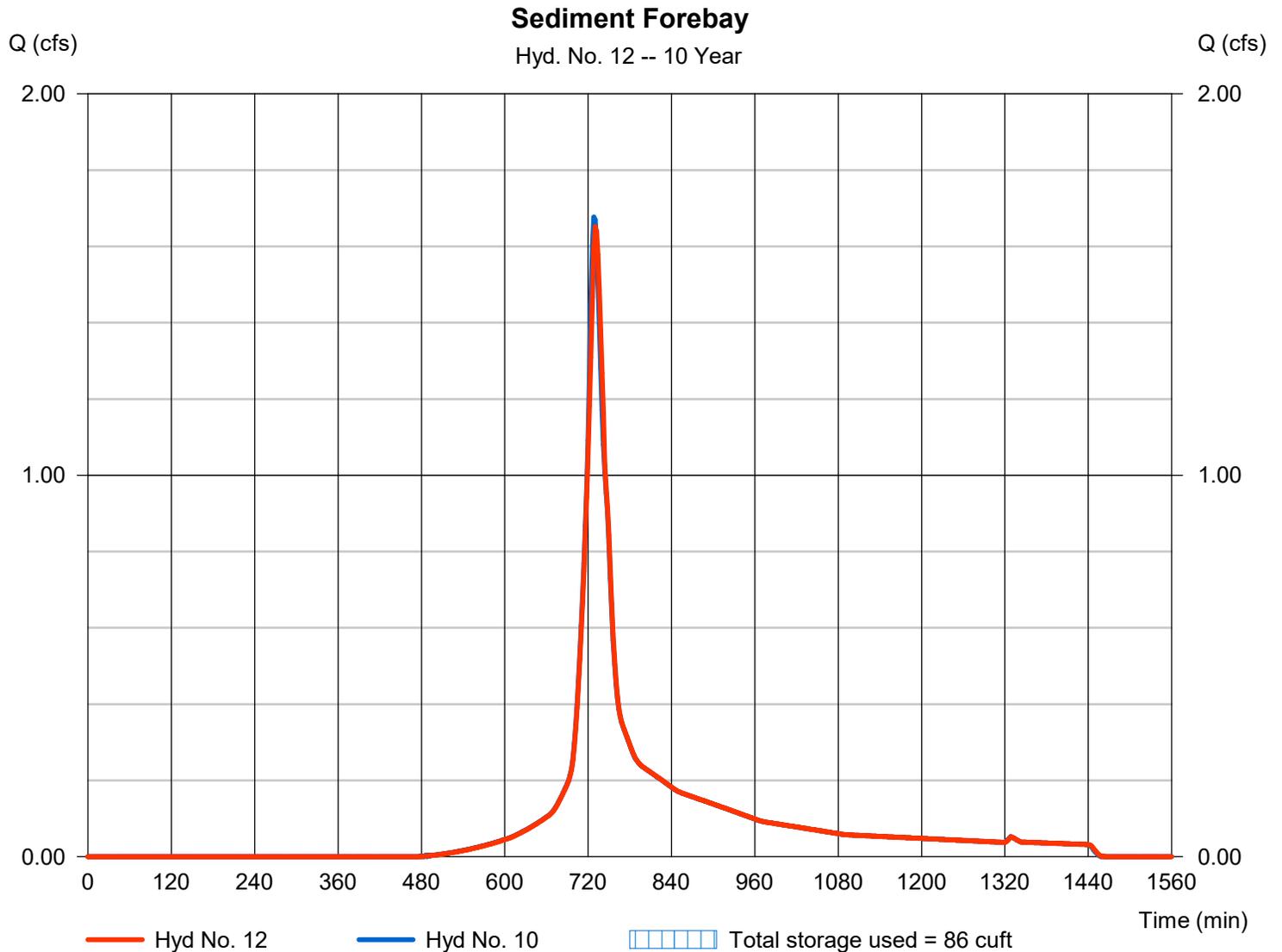
Tuesday, 12 / 13 / 2022

Hyd. No. 12

Sediment Forebay

Hydrograph type	= Reservoir	Peak discharge	= 1.652 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 8,009 cuft
Inflow hyd. No.	= 10 - WQF	Max. Elevation	= 353.51 ft
Reservoir name	= Sediment Forebay	Max. Storage	= 86 cuft

Storage Indication method used.



Hydrograph Report

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

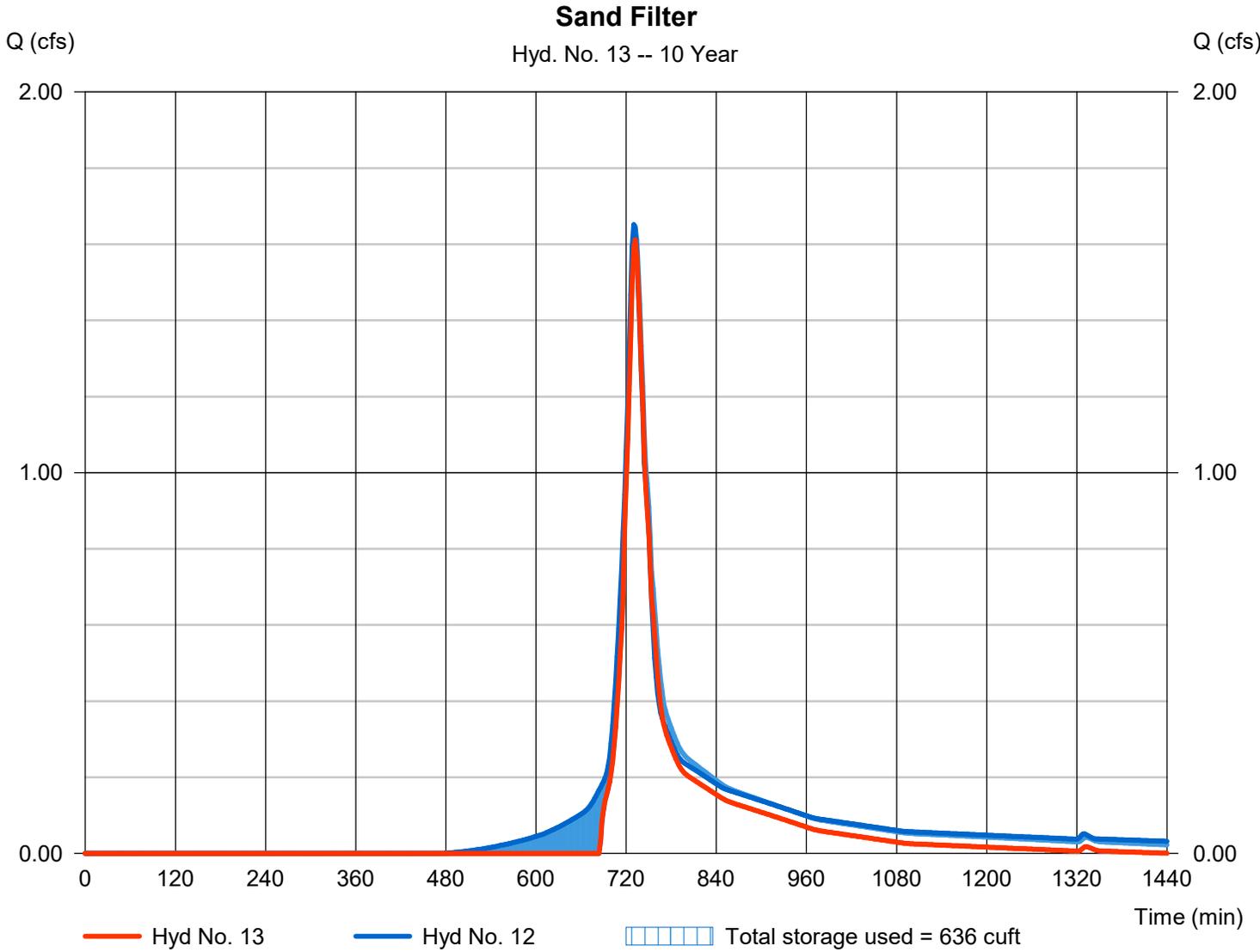
Tuesday, 12 / 13 / 2022

Hyd. No. 13

Sand Filter

Hydrograph type	= Reservoir	Peak discharge	= 1.612 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 5,953 cuft
Inflow hyd. No.	= 12 - Sediment Forebay	Max. Elevation	= 352.67 ft
Reservoir name	= Sand Filter	Max. Storage	= 636 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

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

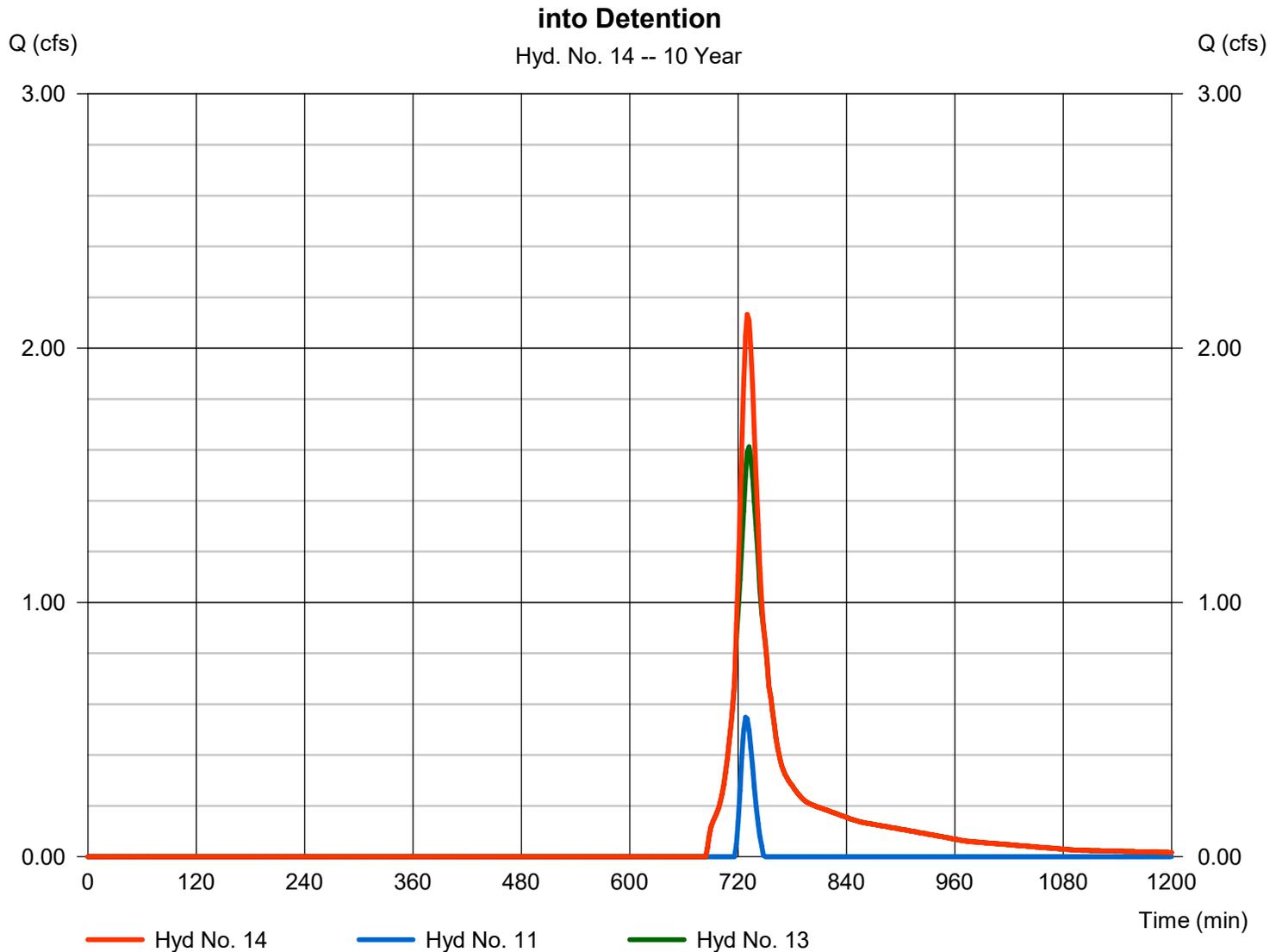
Tuesday, 12 / 13 / 2022

Hyd. No. 14

into Detention

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 2 min
Inflow hyds. = 11, 13

Peak discharge = 2.133 cfs
Time to peak = 730 min
Hyd. volume = 6,484 cuft
Contrib. drain. area = 0.000 ac



Hydrograph Report

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

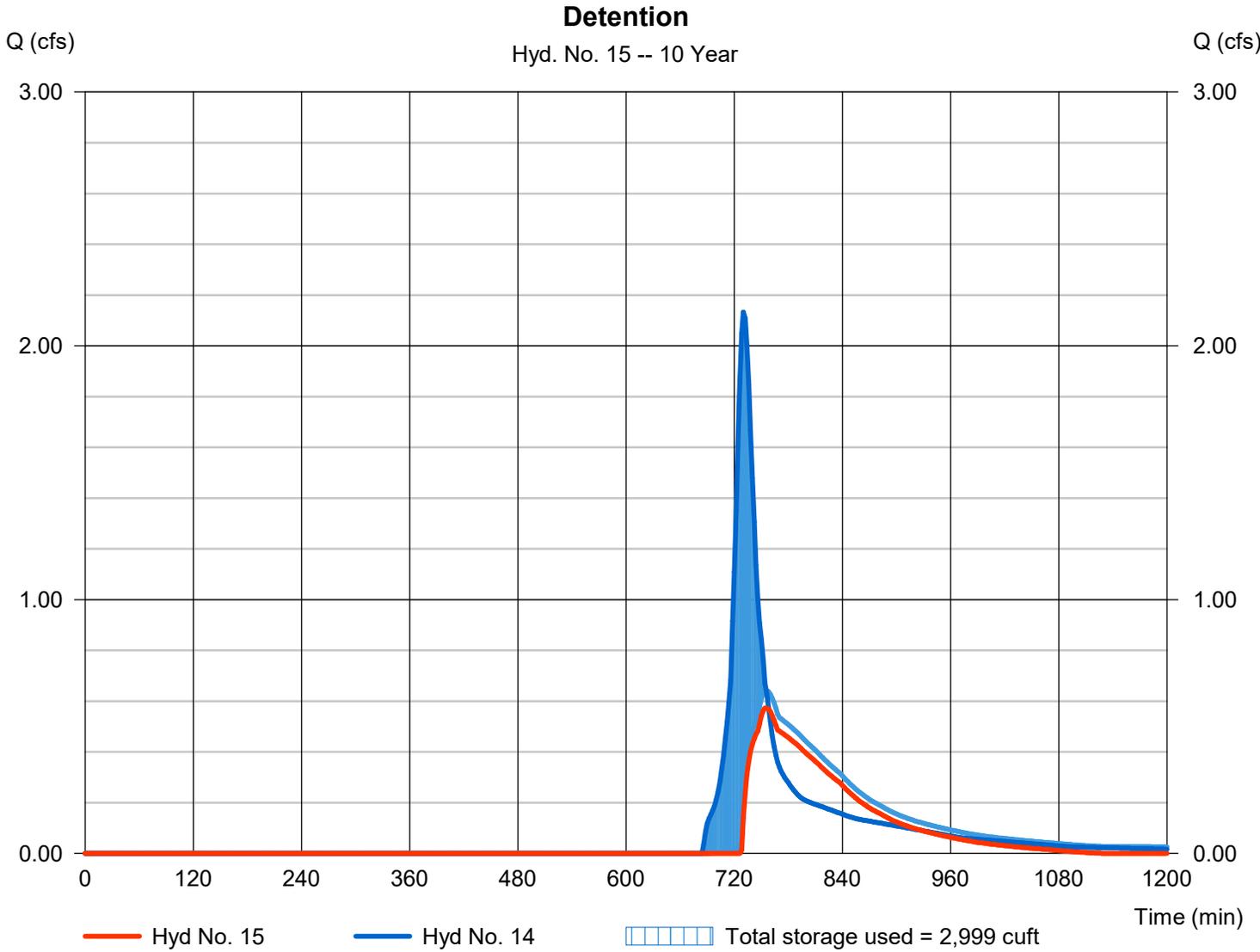
Tuesday, 12 / 13 / 2022

Hyd. No. 15

Detention

Hydrograph type	= Reservoir	Peak discharge	= 0.573 cfs
Storm frequency	= 10 yrs	Time to peak	= 756 min
Time interval	= 2 min	Hyd. volume	= 3,966 cuft
Inflow hyd. No.	= 14 - into Detention	Max. Elevation	= 352.08 ft
Reservoir name	= Detention	Max. Storage	= 2,999 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

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

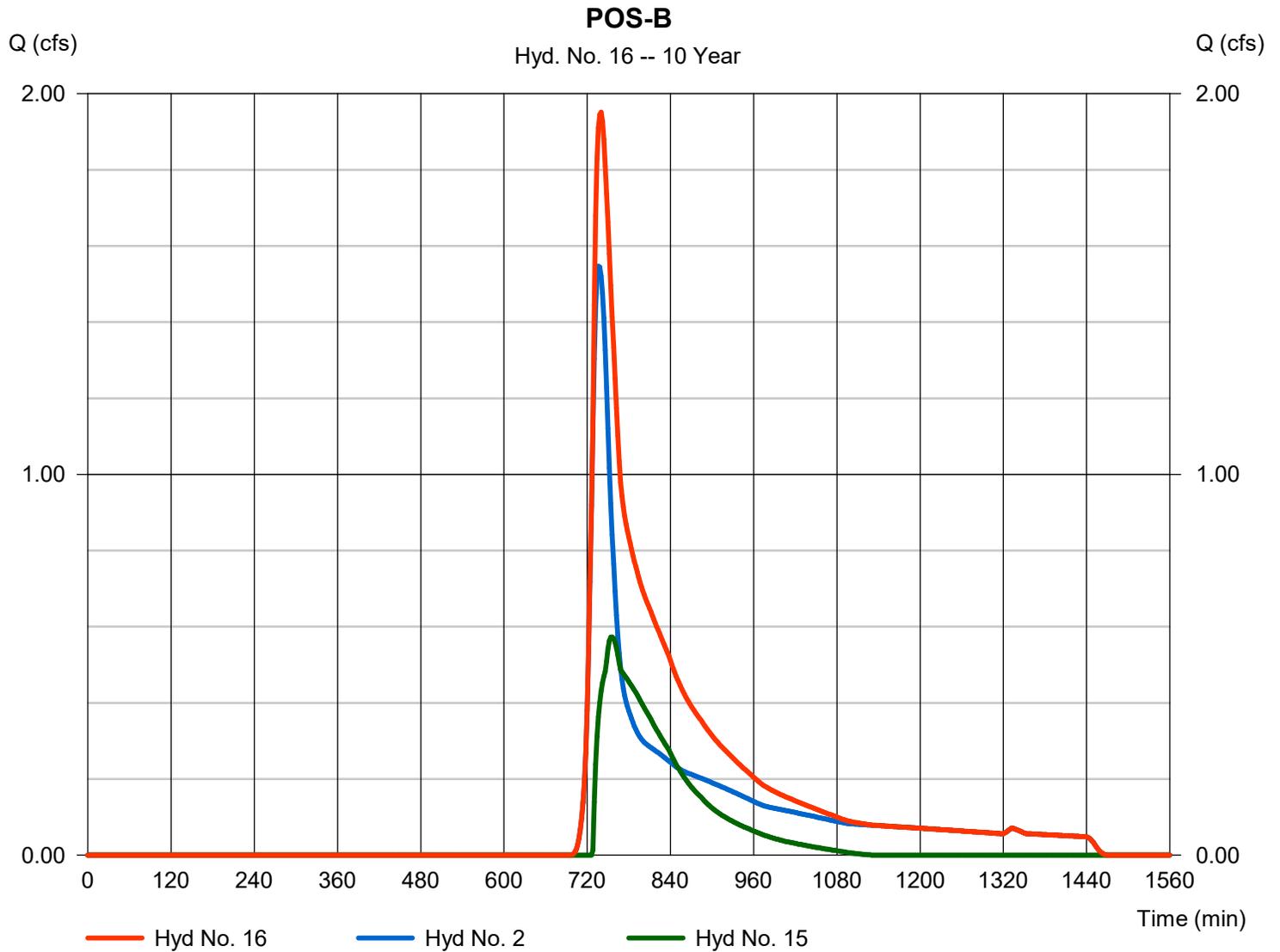
Tuesday, 12 / 13 / 2022

Hyd. No. 16

POS-B

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

Peak discharge = 1.951 cfs
Time to peak = 740 min
Hyd. volume = 12,098 cuft
Contrib. drain. area = 2.130 ac



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.095	2	732	5,405	-----	-----	-----	PR-A / POS-A
2	SCS Runoff	2.791	2	736	13,431	-----	-----	-----	PR-B
3	SCS Runoff	3.088	2	728	11,852	-----	-----	-----	PR-C
4	SCS Runoff	0.288	2	724	997	-----	-----	-----	PR-C Roof-1
5	SCS Runoff	1.729	2	724	5,984	-----	-----	-----	PR-C Roof-2
6	Reservoir	0.000	2	684	0	4	352.86	201	UG-Roof-1
7	Reservoir	0.000	2	n/a	0	5	353.35	1,417	UG-Roof-2
8	Combine	3.088	2	728	11,852	3, 6, 7	-----	-----	into DS
9	Reservoir	3.083	2	728	11,852	8	353.19	18.9	DS
10	Diversion1	2.145	2	728	10,789	9	-----	-----	WQF
11	Diversion2	0.938	2	728	1,063	9	-----	-----	Overflow into Detention
12	Reservoir	2.115	2	730	10,789	10	353.96	134	Sediment Forebay
13	Reservoir	2.070	2	732	8,627	12	352.70	661	Sand Filter
14	Combine	2.976	2	730	9,690	11, 13	-----	-----	into Detention
15	Reservoir	1.549	2	744	6,845	14	352.66	3,708	Detention
16	Combine	4.155	2	740	20,276	2, 15	-----	-----	POS-B

Hydrograph Report

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

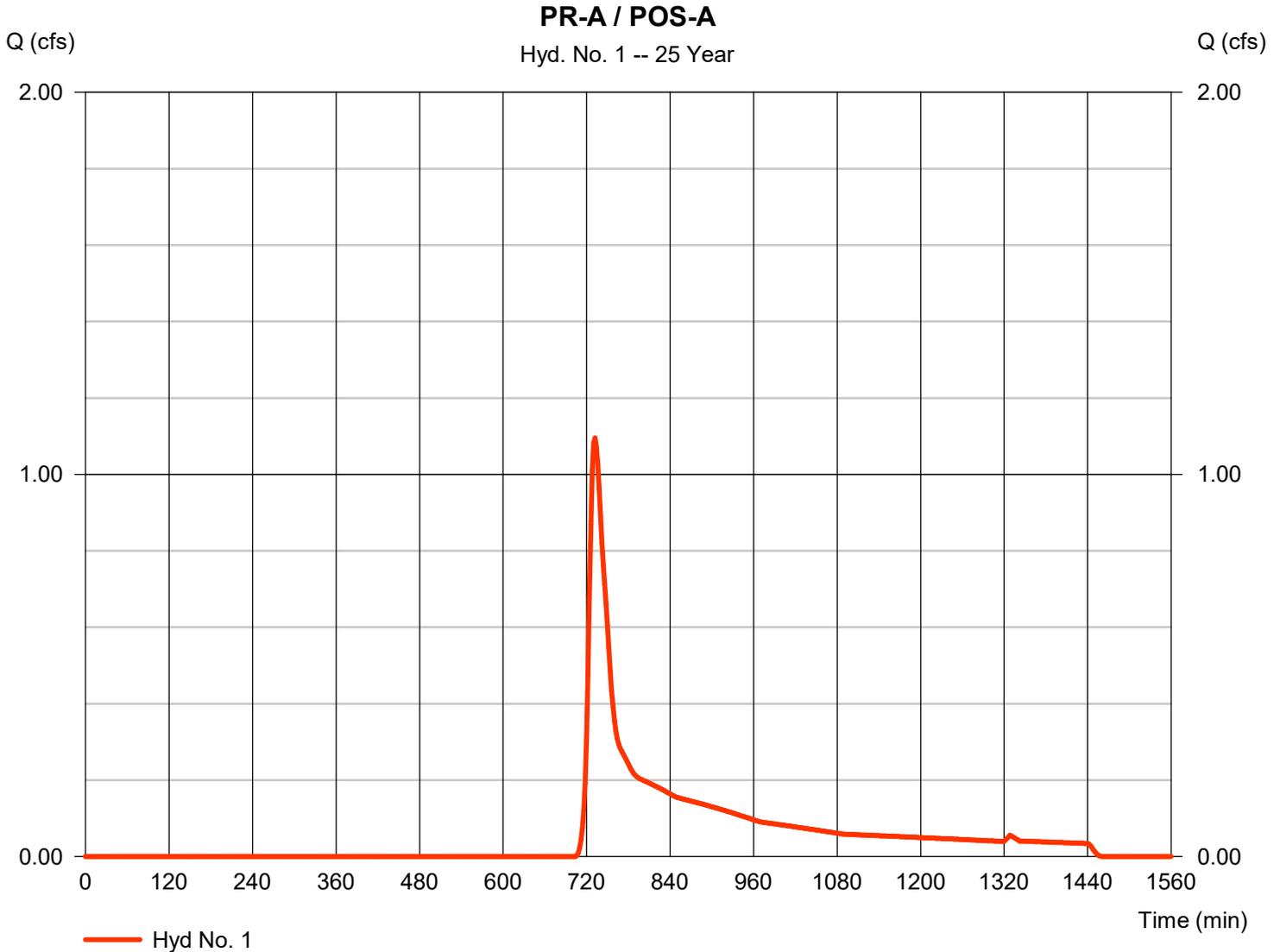
Tuesday, 12 / 13 / 2022

Hyd. No. 1

PR-A / POS-A

Hydrograph type	= SCS Runoff	Peak discharge	= 1.095 cfs
Storm frequency	= 25 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 5,405 cuft
Drainage area	= 1.290 ac	Curve number	= 49*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.10 min
Total precip.	= 6.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.010 x 70) + (0.230 x 55) + (1.050 x 48)] / 1.290



Hydrograph Report

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

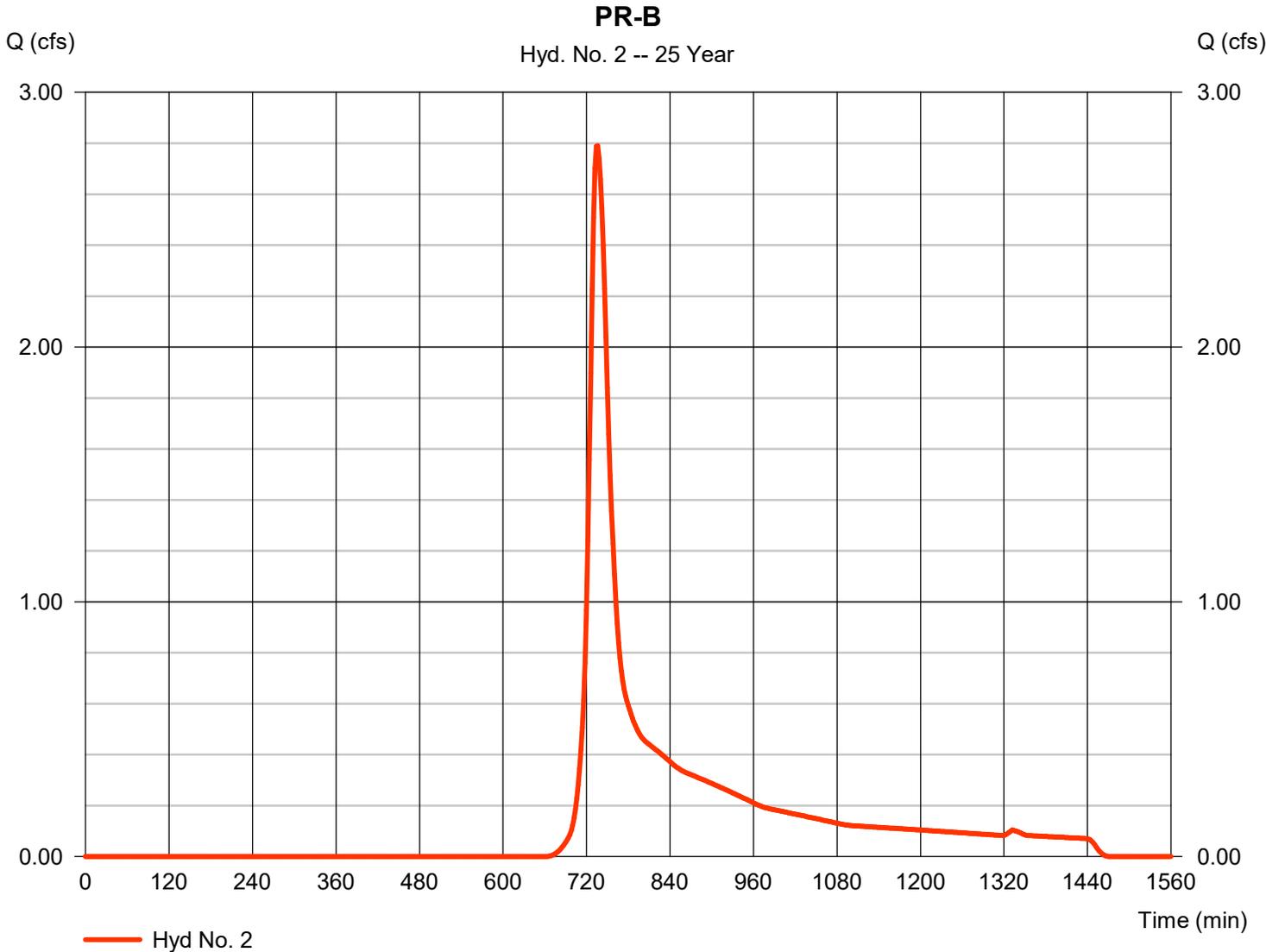
Tuesday, 12 / 13 / 2022

Hyd. No. 2

PR-B

Hydrograph type	= SCS Runoff	Peak discharge	= 2.791 cfs
Storm frequency	= 25 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 13,431 cuft
Drainage area	= 2.130 ac	Curve number	= 57*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 18.70 min
Total precip.	= 6.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.050 x 55) + (1.000 x 48) + (0.970 x 65) + (0.030 x 61) + (0.070 x 74) + (0.010 x 98)] / 2.130



Hydrograph Report

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

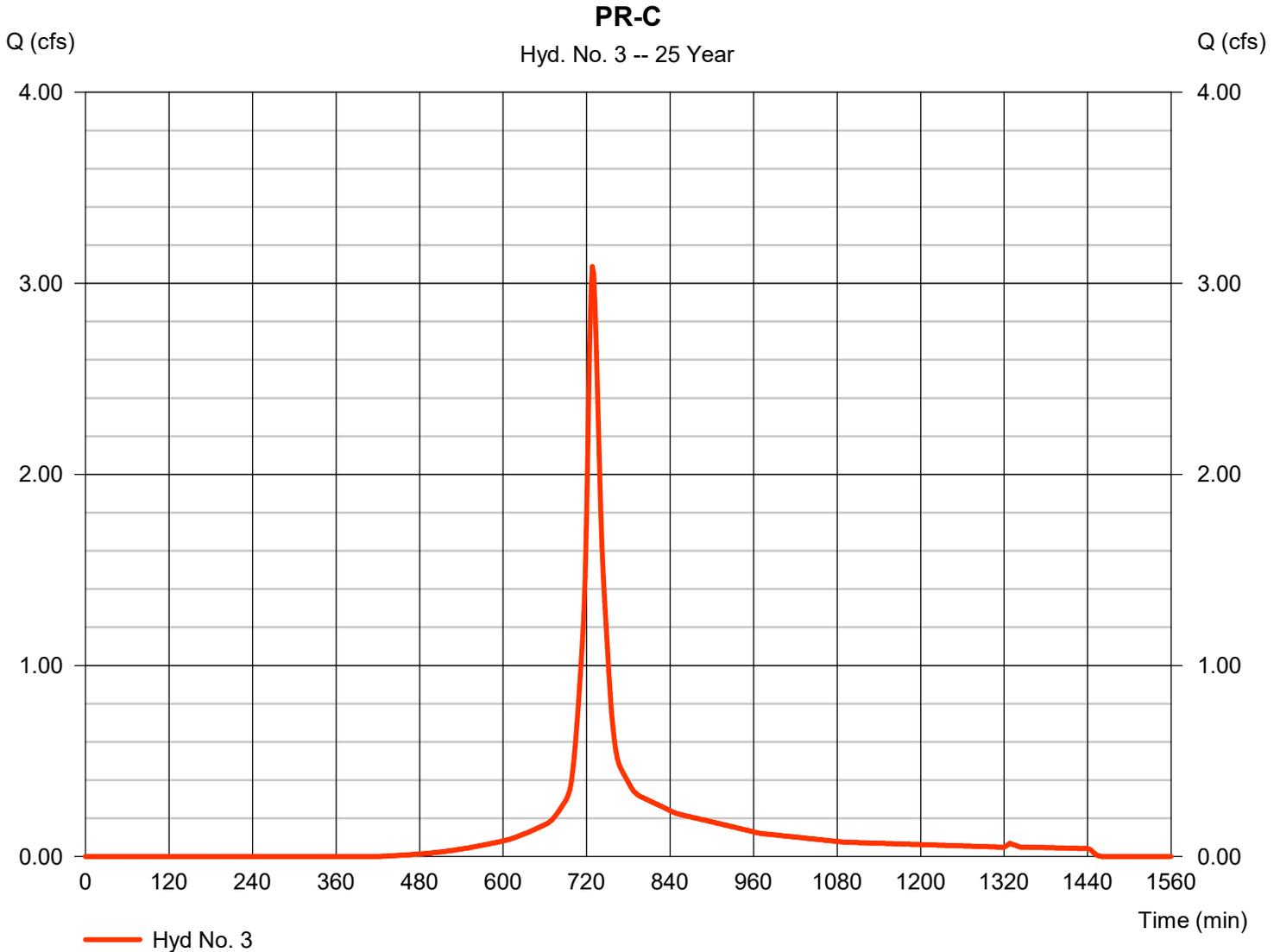
Tuesday, 12 / 13 / 2022

Hyd. No. 3

PR-C

Hydrograph type	= SCS Runoff	Peak discharge	= 3.088 cfs
Storm frequency	= 25 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 11,852 cuft
Drainage area	= 0.840 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.20 min
Total precip.	= 6.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.370 x 61) + (0.080 x 74) + (0.390 x 98)] / 0.840



Hydrograph Report

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

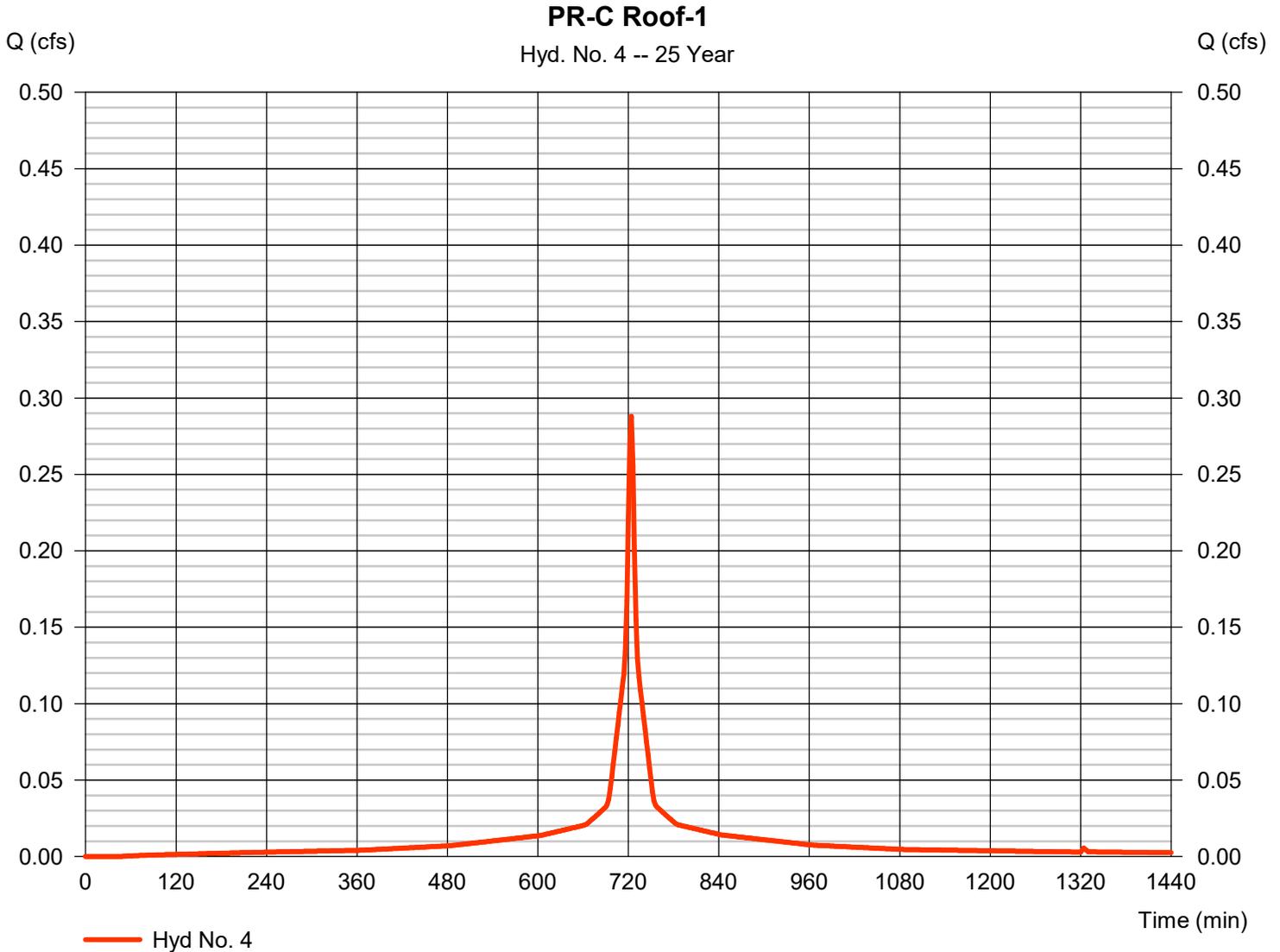
Tuesday, 12 / 13 / 2022

Hyd. No. 4

PR-C Roof-1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.288 cfs
Storm frequency	= 25 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 997 cuft
Drainage area	= 0.050 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.050 x 98)] / 0.050



Hydrograph Report

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

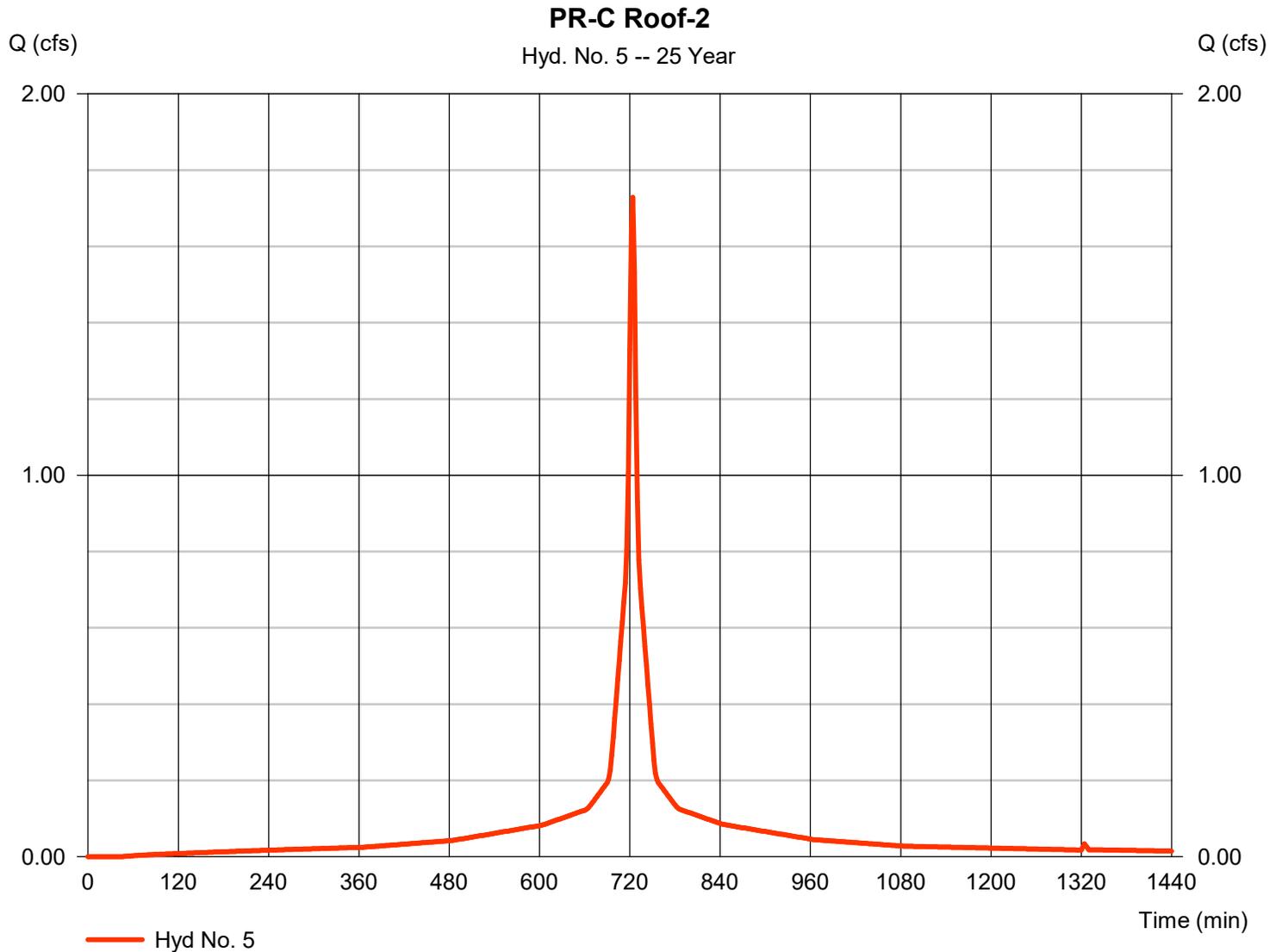
Tuesday, 12 / 13 / 2022

Hyd. No. 5

PR-C Roof-2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.729 cfs
Storm frequency	= 25 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 5,984 cuft
Drainage area	= 0.300 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.10 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.300 x 98)] / 0.300



Hydrograph Report

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

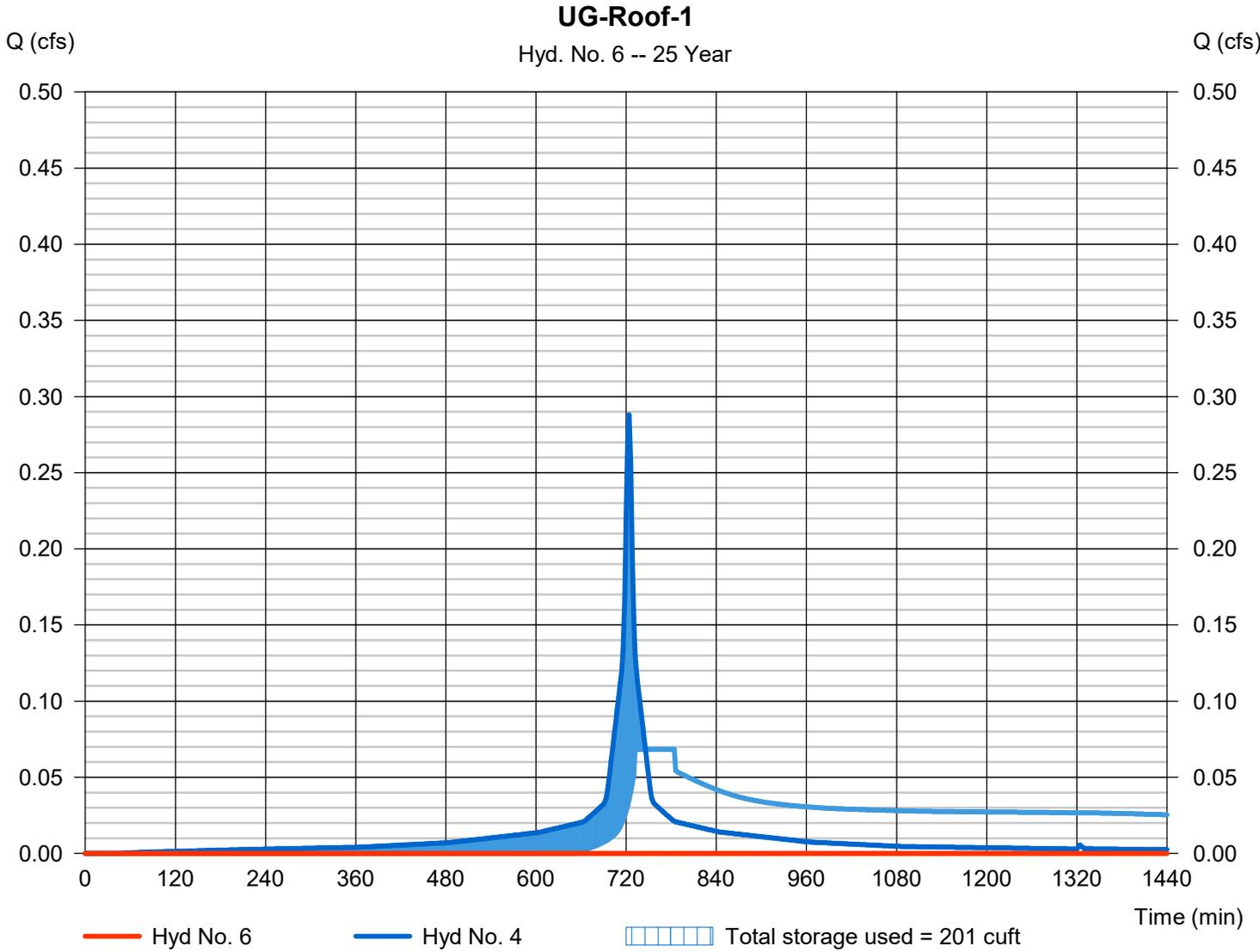
Tuesday, 12 / 13 / 2022

Hyd. No. 6

UG-Roof-1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= 684 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 4 - PR-C Roof-1	Max. Elevation	= 352.86 ft
Reservoir name	= UG-Roof-1	Max. Storage	= 201 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

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

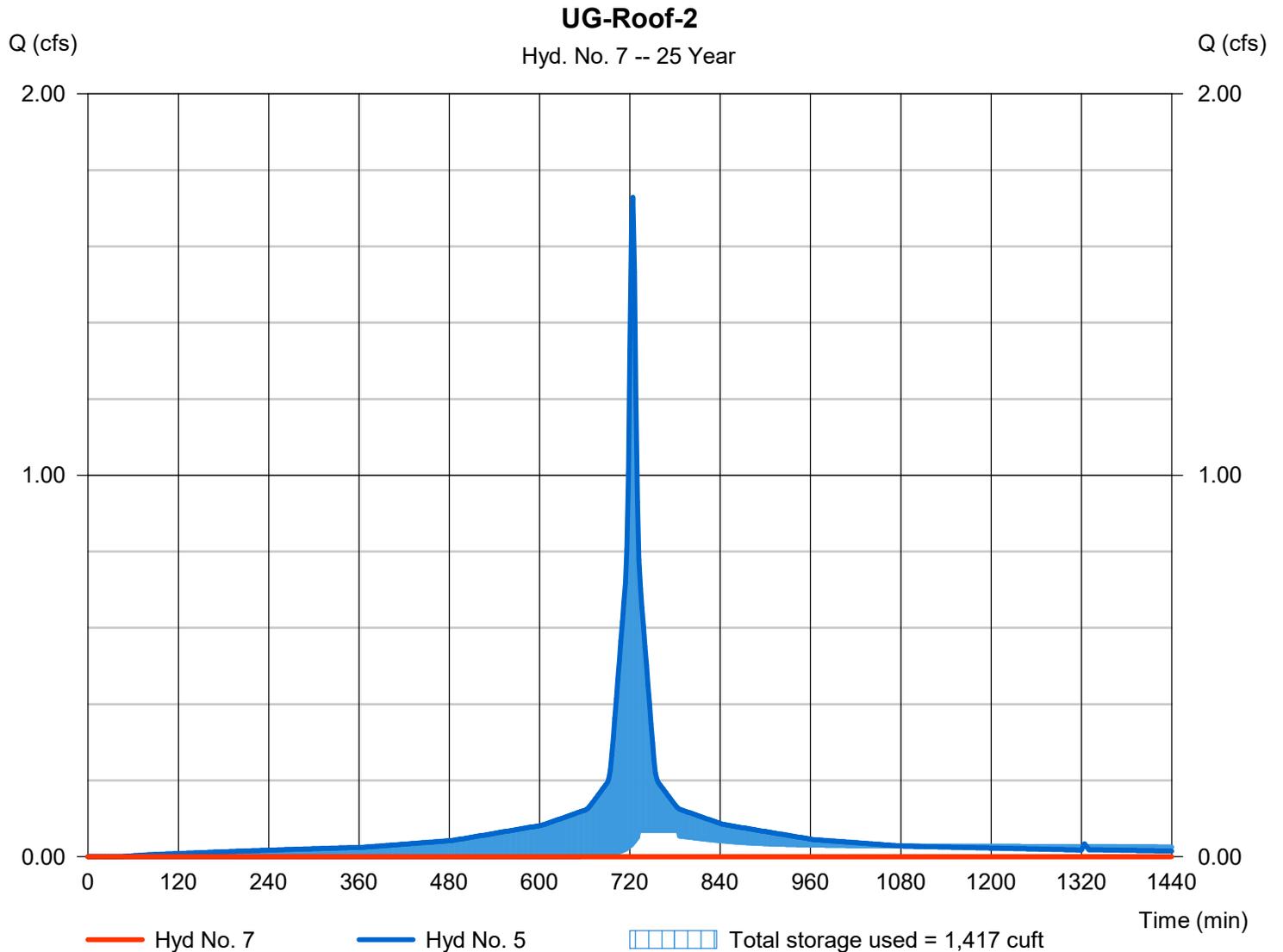
Tuesday, 12 / 13 / 2022

Hyd. No. 7

UG-Roof-2

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 5 - PR-C Roof-2	Max. Elevation	= 353.35 ft
Reservoir name	= UG-Roof-2	Max. Storage	= 1,417 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

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

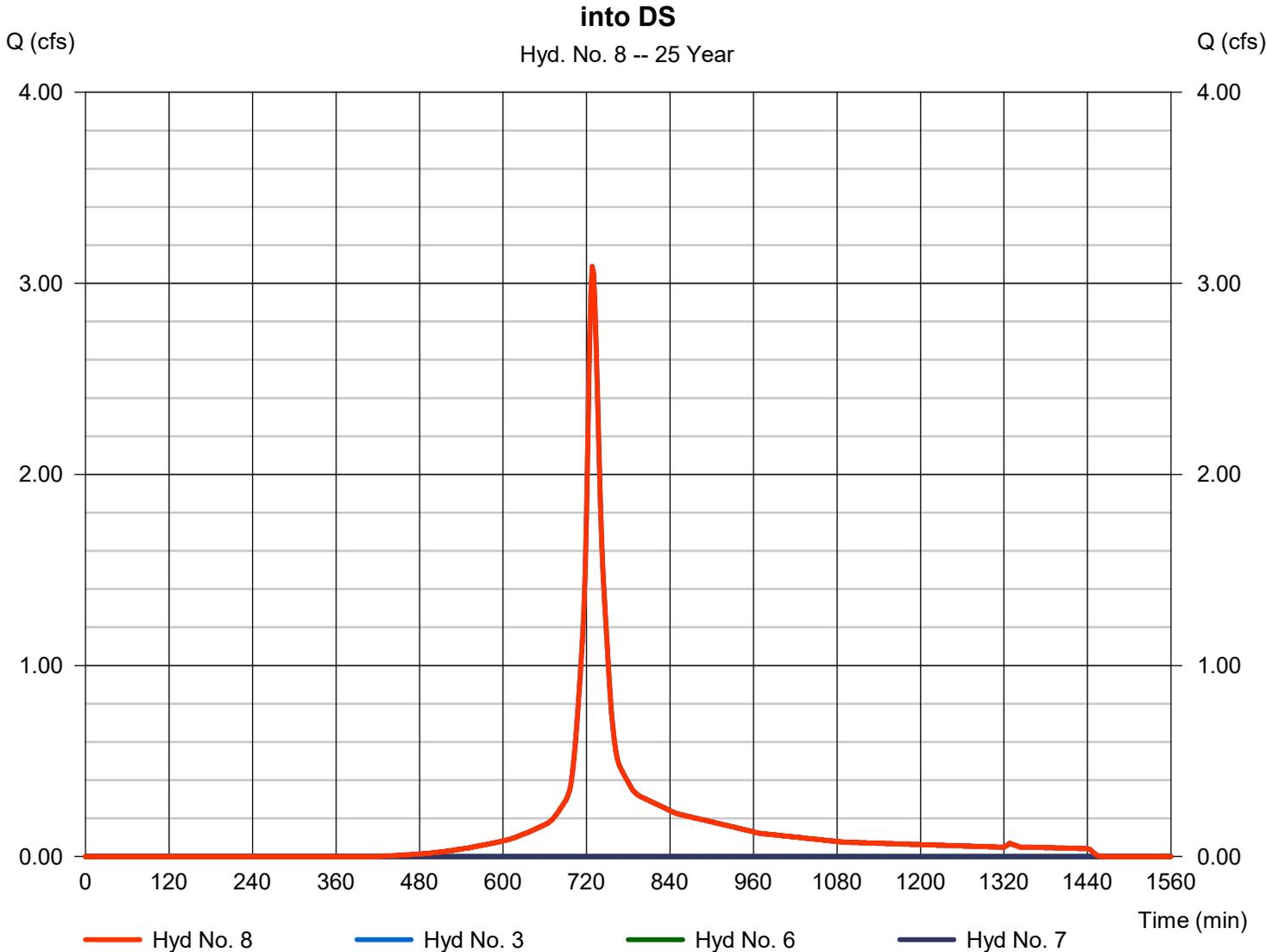
Tuesday, 12 / 13 / 2022

Hyd. No. 8

into DS

Hydrograph type = Combine
Storm frequency = 25 yrs
Time interval = 2 min
Inflow hyds. = 3, 6, 7

Peak discharge = 3.088 cfs
Time to peak = 728 min
Hyd. volume = 11,852 cuft
Contrib. drain. area = 0.840 ac



Hydrograph Report

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

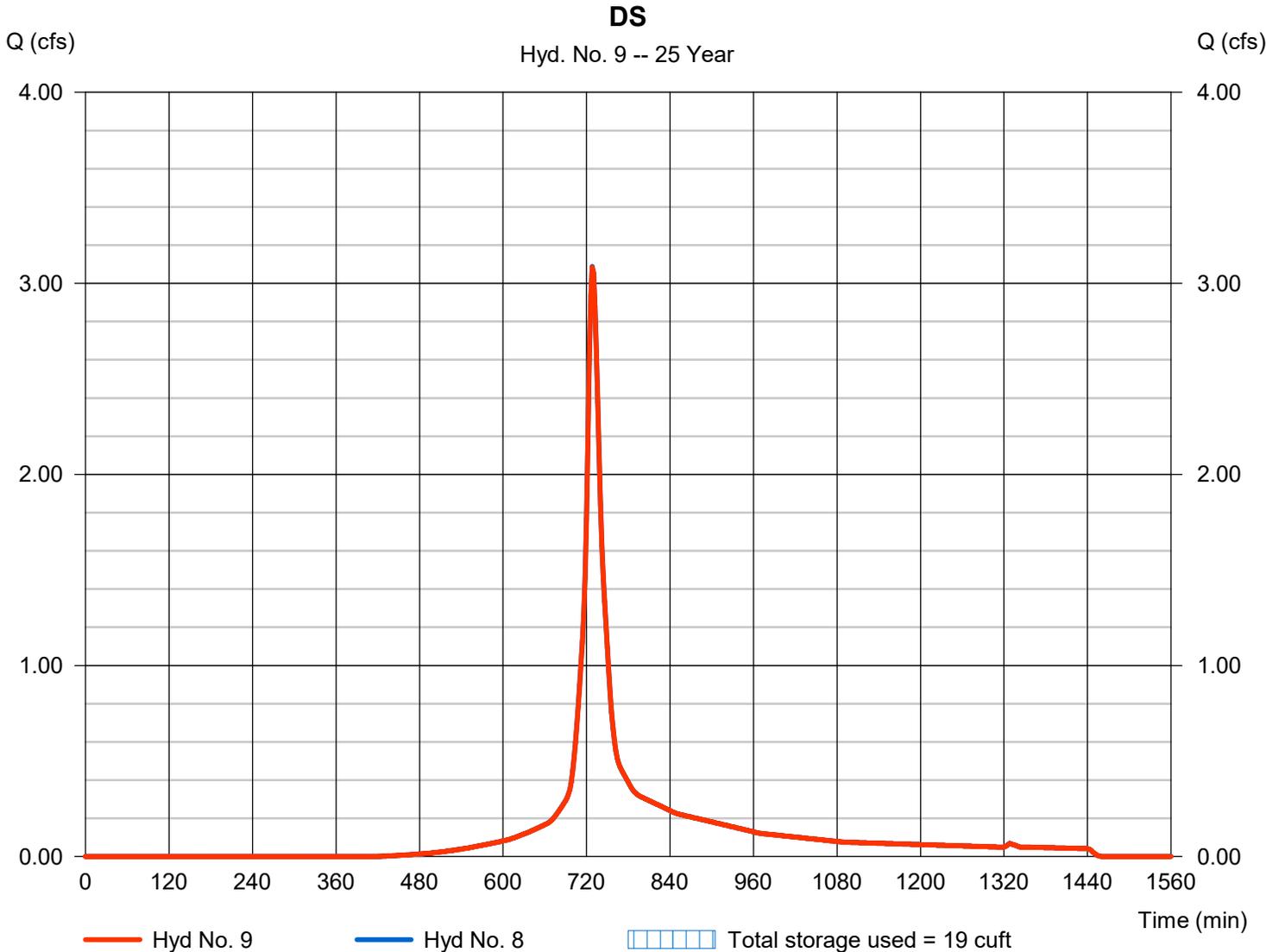
Tuesday, 12 / 13 / 2022

Hyd. No. 9

DS

Hydrograph type	= Reservoir	Peak discharge	= 3.083 cfs
Storm frequency	= 25 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 11,852 cuft
Inflow hyd. No.	= 8 - into DS	Max. Elevation	= 353.19 ft
Reservoir name	= DS	Max. Storage	= 19 cuft

Storage Indication method used.



Hydrograph Report

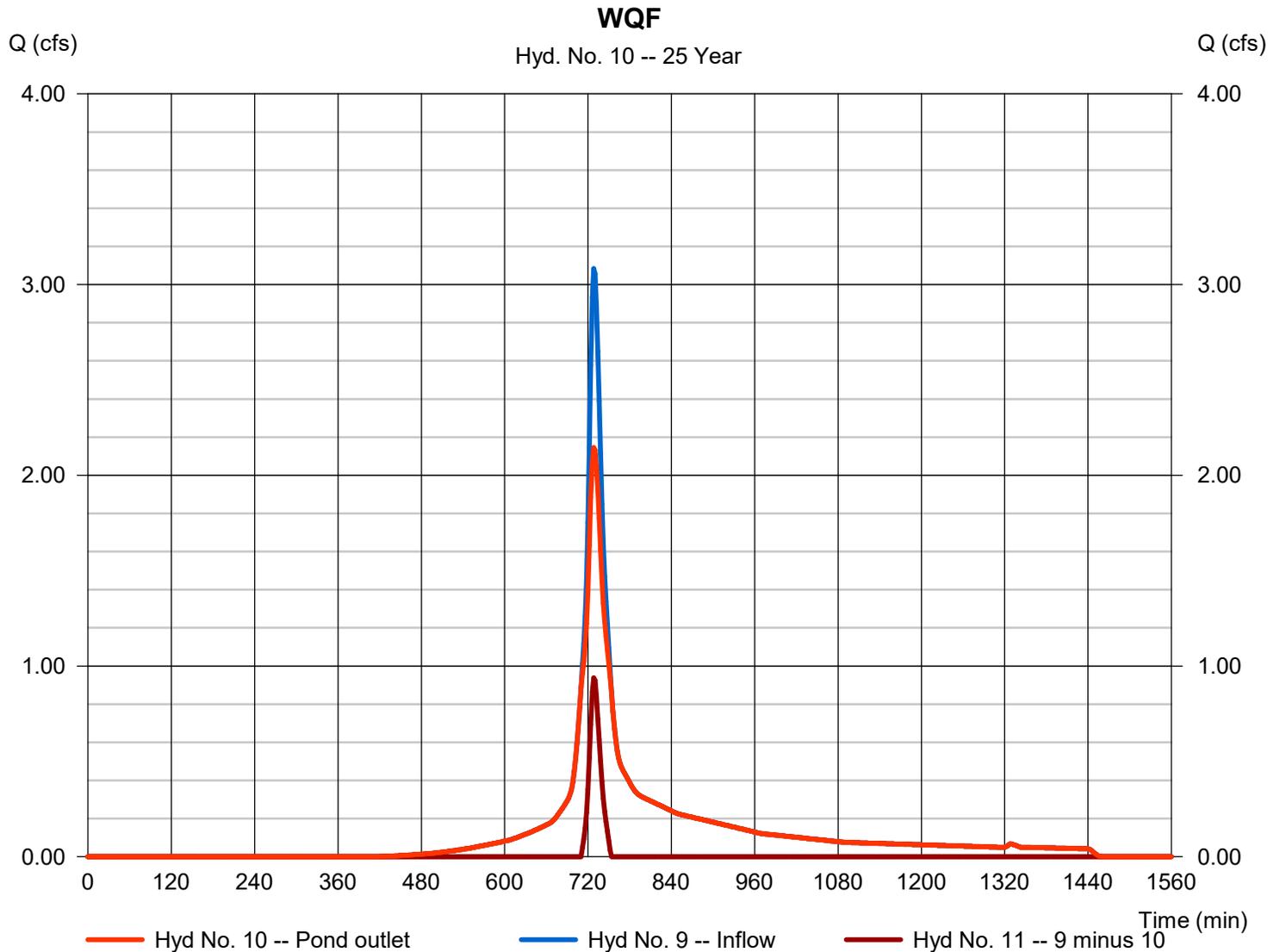
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Tuesday, 12 / 13 / 2022

Hyd. No. 10

WQF

Hydrograph type	= Diversion1	Peak discharge	= 2.145 cfs
Storm frequency	= 25 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 10,789 cuft
Inflow hydrograph	= 9 - DS	2nd diverted hyd.	= 11
Diversion method	= Pond - DS	Pond structure	= Culv/Orf B



Hydrograph Report

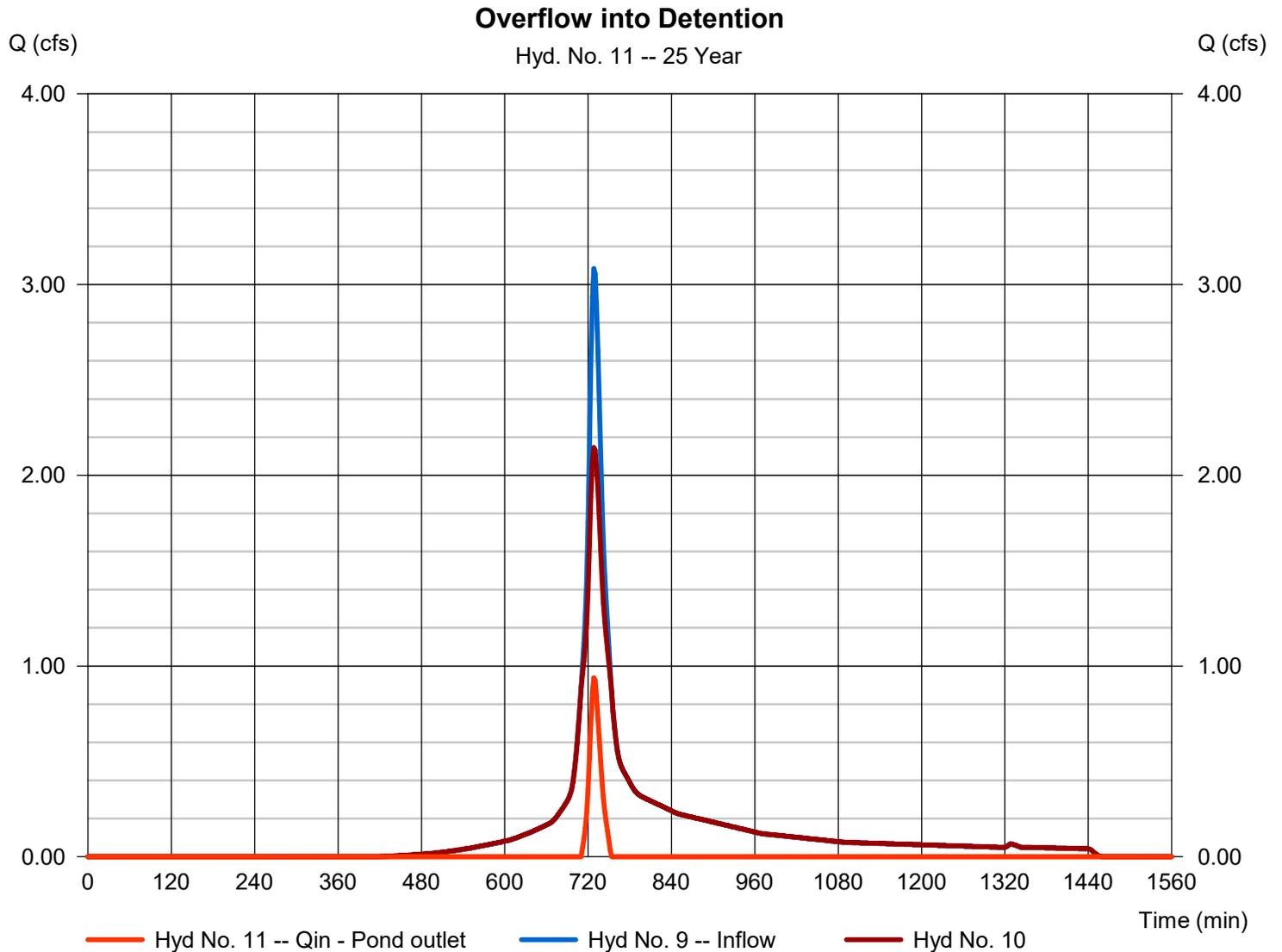
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Tuesday, 12 / 13 / 2022

Hyd. No. 11

Overflow into Detention

Hydrograph type	= Diversion2	Peak discharge	= 0.938 cfs
Storm frequency	= 25 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 1,063 cuft
Inflow hydrograph	= 9 - DS	2nd diverted hyd.	= 10
Diversion method	= Pond - DS	Pond structure	= Culv/Orf B



Hydrograph Report

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

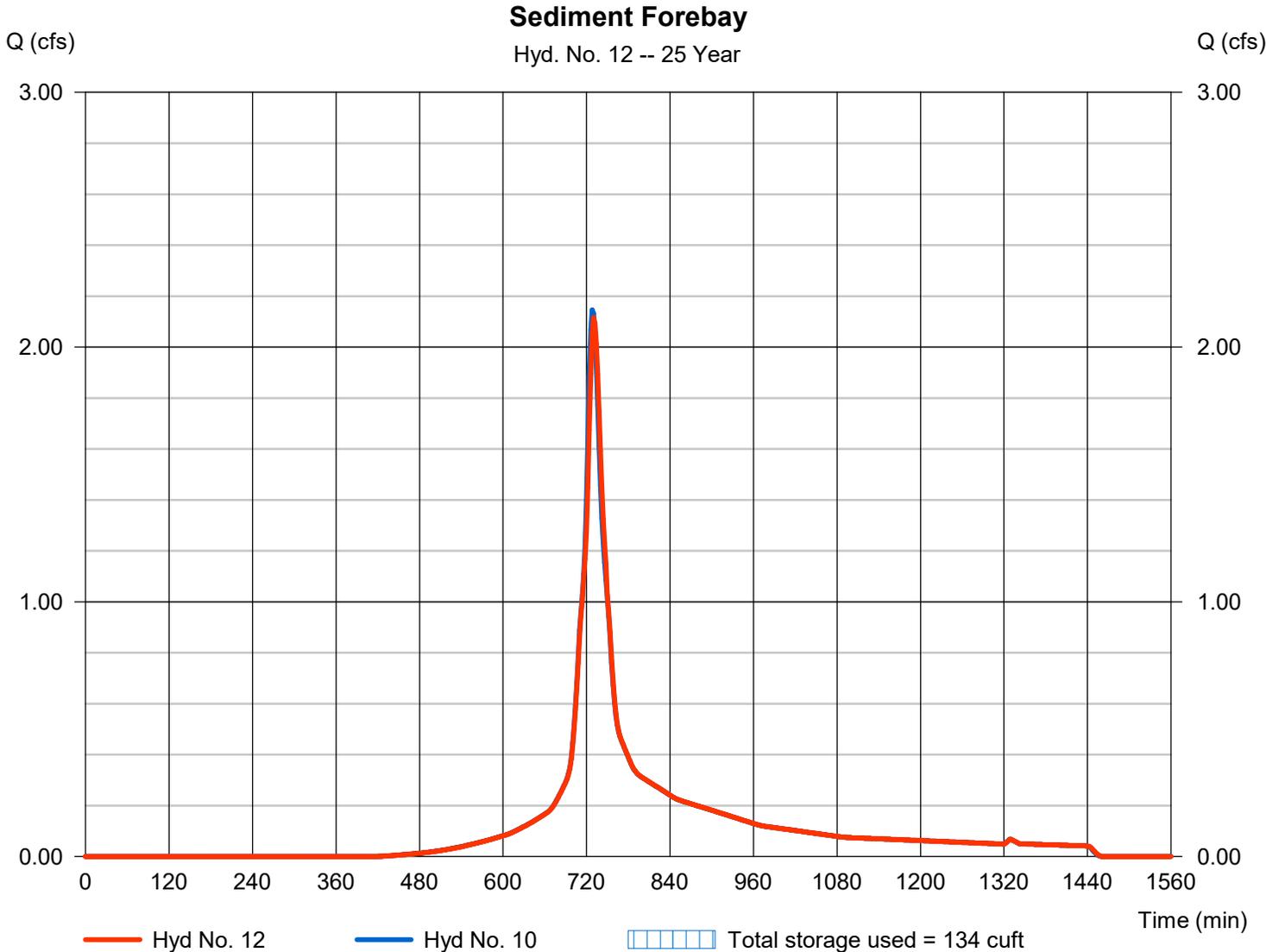
Tuesday, 12 / 13 / 2022

Hyd. No. 12

Sediment Forebay

Hydrograph type	= Reservoir	Peak discharge	= 2.115 cfs
Storm frequency	= 25 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 10,789 cuft
Inflow hyd. No.	= 10 - WQF	Max. Elevation	= 353.96 ft
Reservoir name	= Sediment Forebay	Max. Storage	= 134 cuft

Storage Indication method used.



Hydrograph Report

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

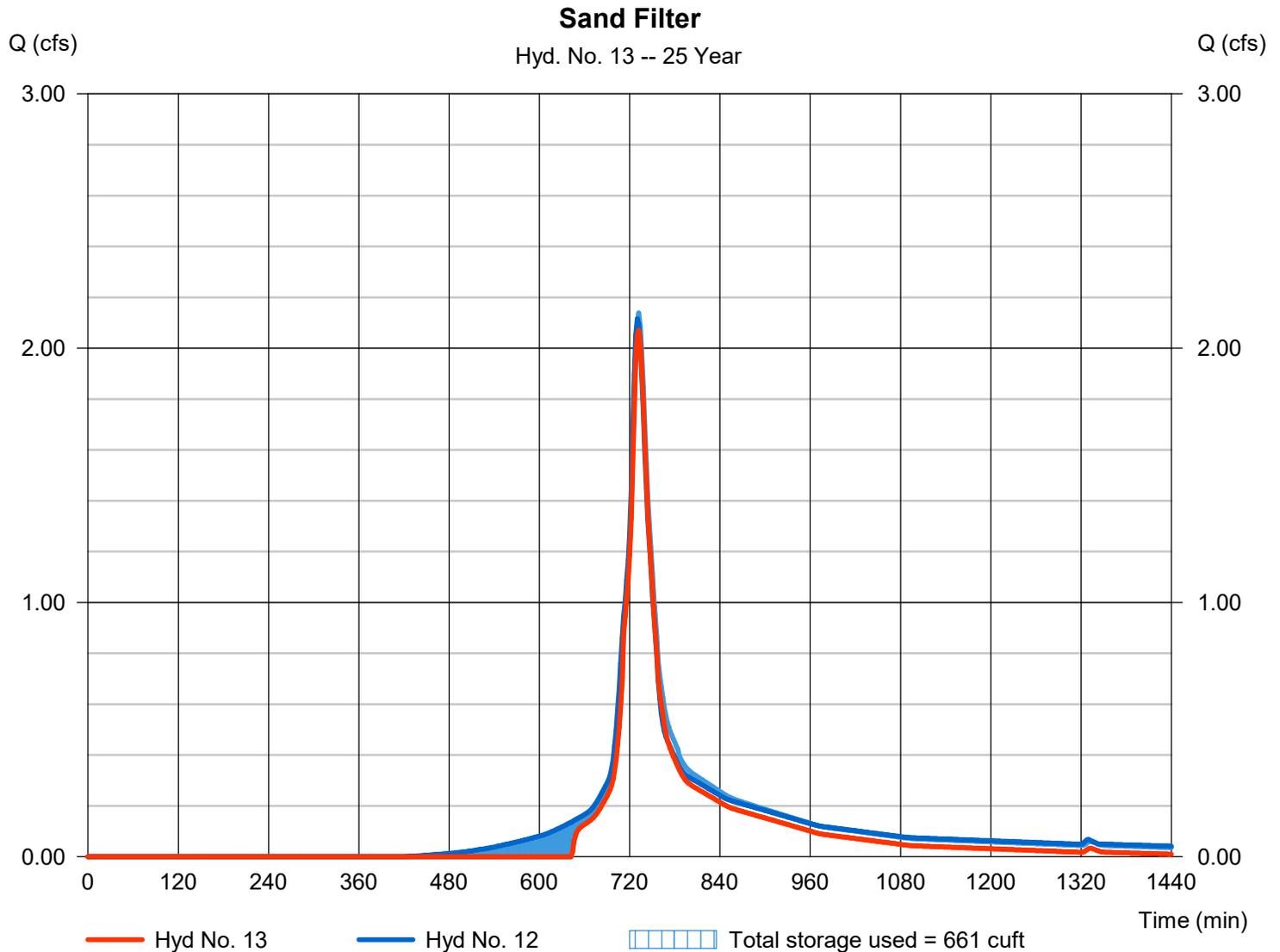
Tuesday, 12 / 13 / 2022

Hyd. No. 13

Sand Filter

Hydrograph type	= Reservoir	Peak discharge	= 2.070 cfs
Storm frequency	= 25 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 8,627 cuft
Inflow hyd. No.	= 12 - Sediment Forebay	Max. Elevation	= 352.70 ft
Reservoir name	= Sand Filter	Max. Storage	= 661 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

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

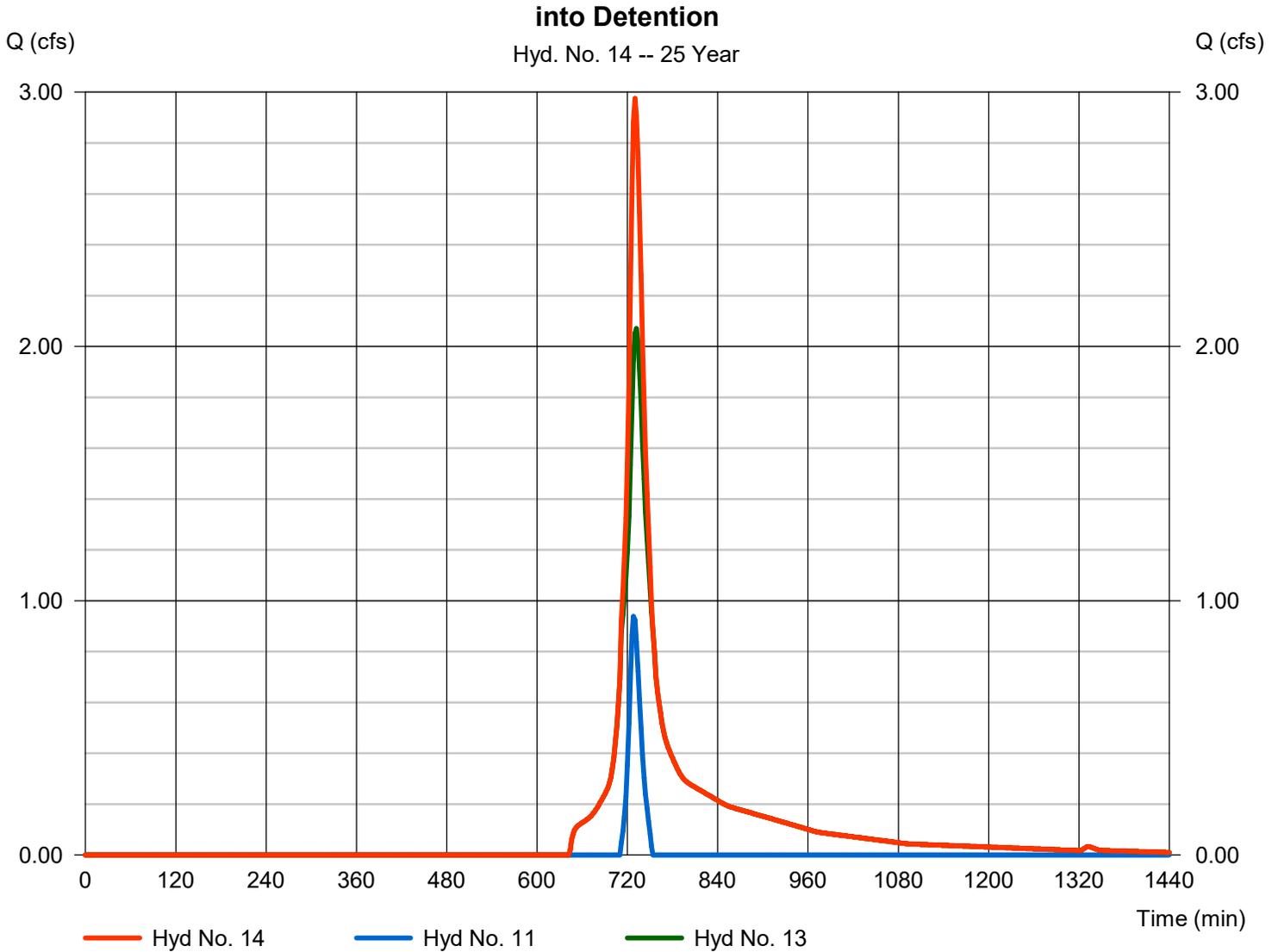
Tuesday, 12 / 13 / 2022

Hyd. No. 14

into Detention

Hydrograph type = Combine
Storm frequency = 25 yrs
Time interval = 2 min
Inflow hyds. = 11, 13

Peak discharge = 2.976 cfs
Time to peak = 730 min
Hyd. volume = 9,690 cuft
Contrib. drain. area = 0.000 ac



Hydrograph Report

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

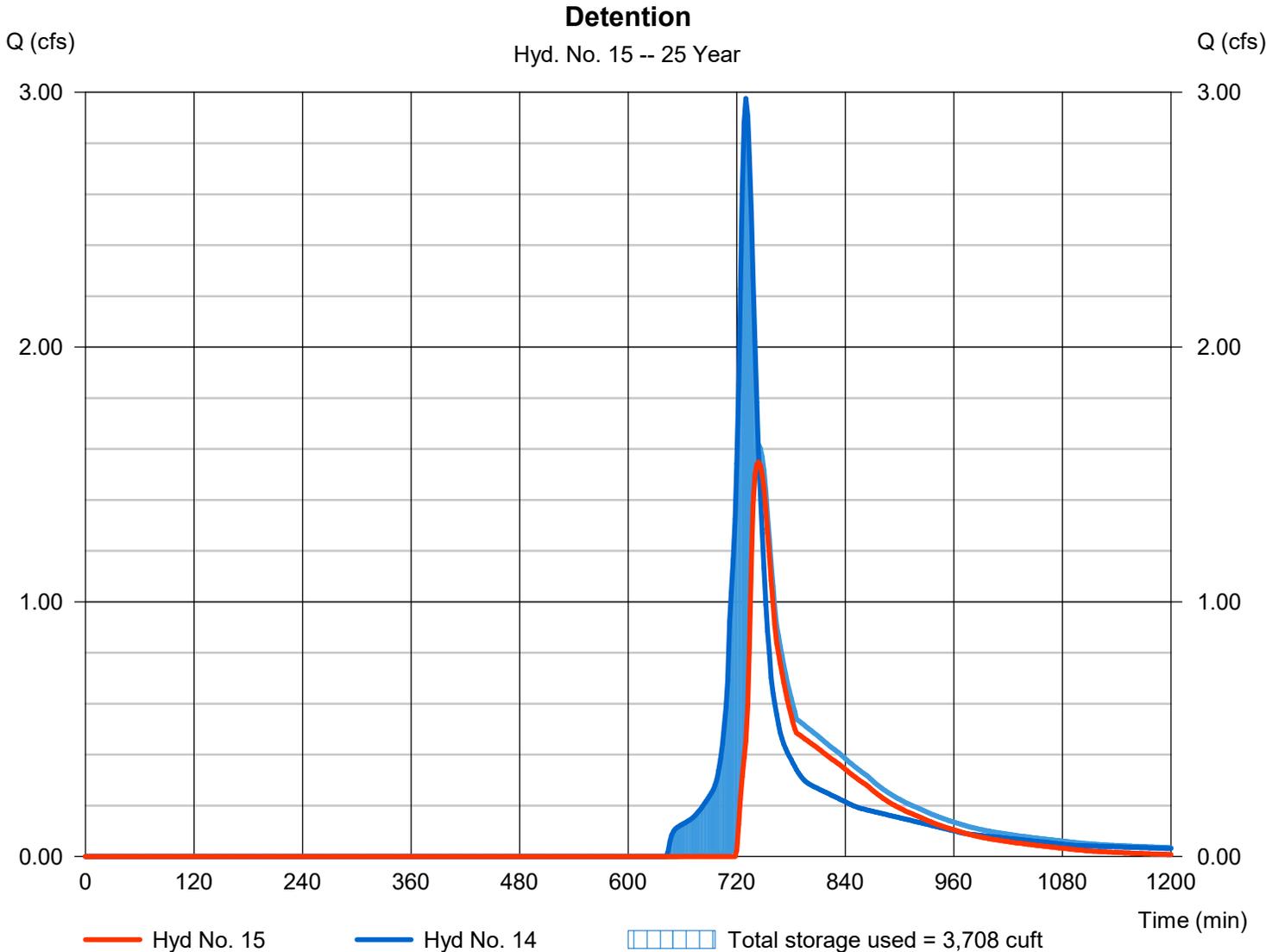
Tuesday, 12 / 13 / 2022

Hyd. No. 15

Detention

Hydrograph type	= Reservoir	Peak discharge	= 1.549 cfs
Storm frequency	= 25 yrs	Time to peak	= 744 min
Time interval	= 2 min	Hyd. volume	= 6,845 cuft
Inflow hyd. No.	= 14 - into Detention	Max. Elevation	= 352.66 ft
Reservoir name	= Detention	Max. Storage	= 3,708 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

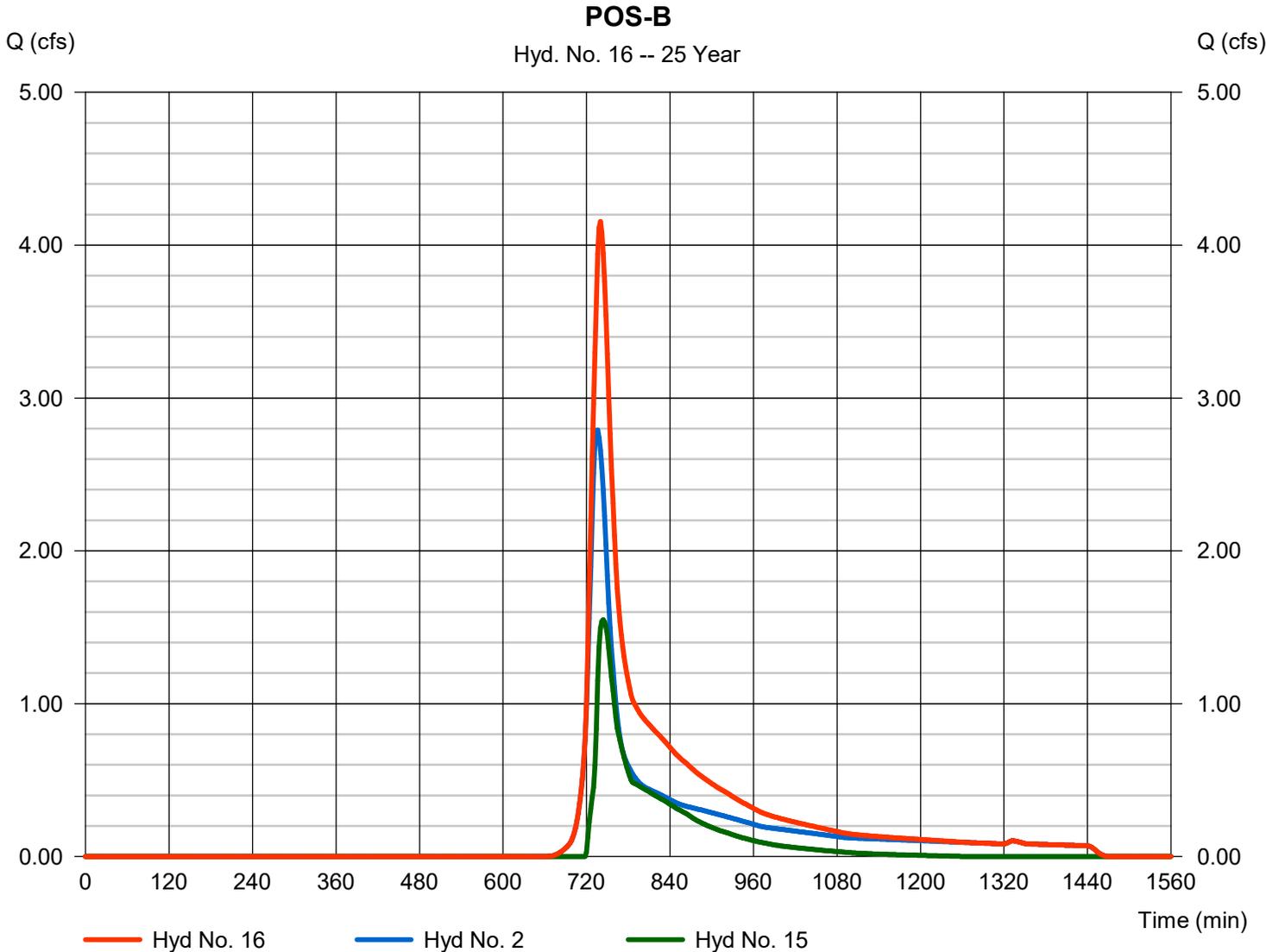
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Tuesday, 12 / 13 / 2022

Hyd. No. 16

POS-B

Hydrograph type	= Combine	Peak discharge	= 4.155 cfs
Storm frequency	= 25 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 20,276 cuft
Inflow hyds.	= 2, 15	Contrib. drain. area	= 2.130 ac



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.010	2	730	12,423	-----	-----	-----	PR-A / POS-A
2	SCS Runoff	6.027	2	734	27,136	-----	-----	-----	PR-B
3	SCS Runoff	4.989	2	728	19,379	-----	-----	-----	PR-C
4	SCS Runoff	0.412	2	724	1,439	-----	-----	-----	PR-C Roof-1
5	SCS Runoff	2.470	2	724	8,637	-----	-----	-----	PR-C Roof-2
6	Reservoir	0.000	2	516	0	4	353.60	349	UG-Roof-1
7	Reservoir	0.094	2	746	54	5	354.56	2,282	UG-Roof-2
8	Combine	4.989	2	728	19,433	3, 6, 7	-----	-----	into DS
9	Reservoir	4.989	2	728	19,433	8	353.45	23.7	DS
10	Diversion1	3.110	2	728	16,881	9	-----	-----	WQF
11	Diversion2	1.879	2	728	2,551	9	-----	-----	Overflow into Detention
12	Reservoir	2.955	2	732	16,881	10	354.75	304	Sediment Forebay
13	Reservoir	2.906	2	732	14,536	12	352.77	707	Sand Filter
14	Combine	4.662	2	730	17,087	11, 13	-----	-----	into Detention
15	Reservoir	2.865	2	742	13,874	14	353.97	5,312	Detention
16	Combine	8.672	2	736	41,009	2, 15	-----	-----	POS-B

Hydrograph Report

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

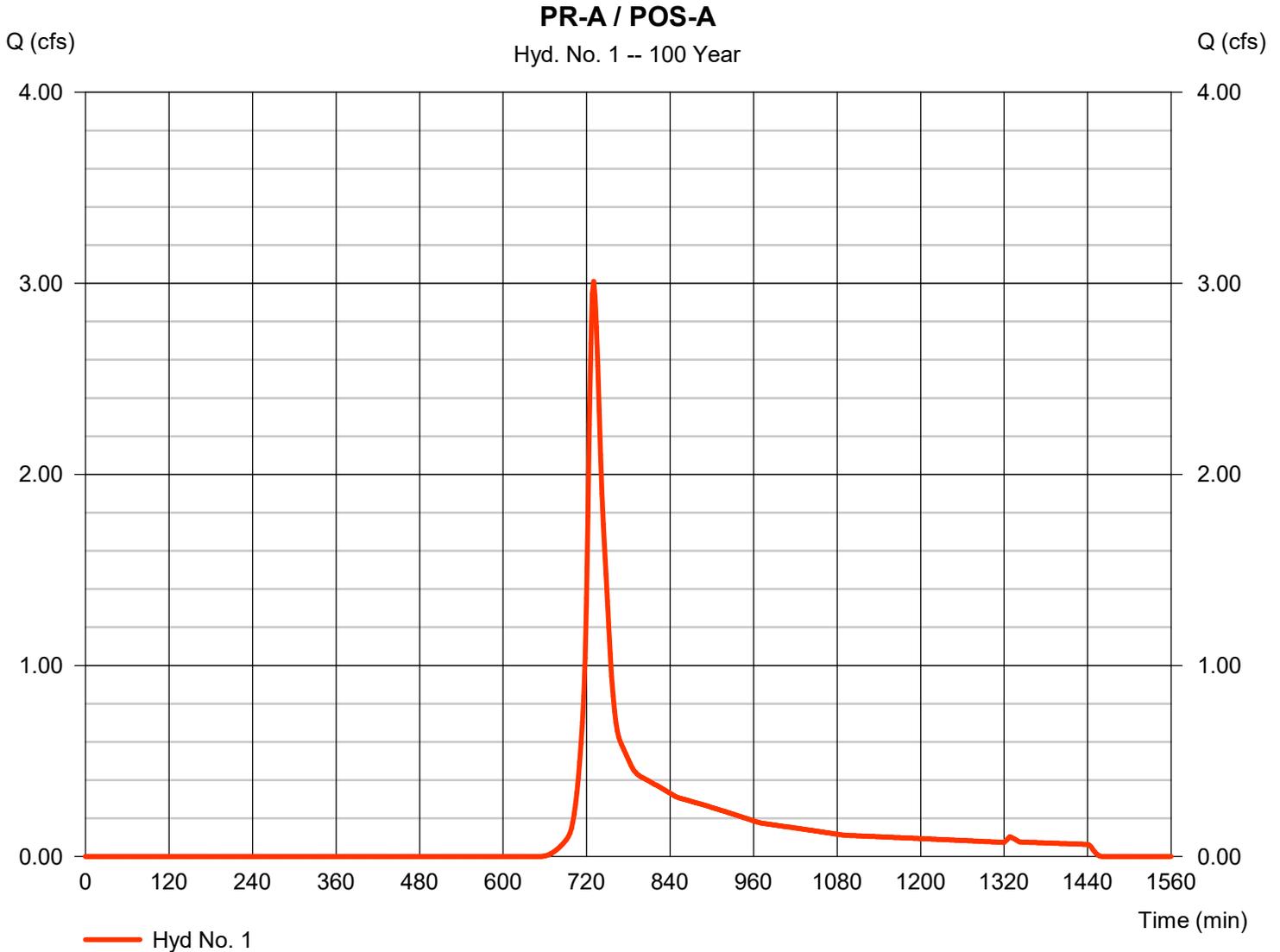
Tuesday, 12 / 13 / 2022

Hyd. No. 1

PR-A / POS-A

Hydrograph type	= SCS Runoff	Peak discharge	= 3.010 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 12,423 cuft
Drainage area	= 1.290 ac	Curve number	= 49*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.10 min
Total precip.	= 8.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.010 x 70) + (0.230 x 55) + (1.050 x 48)] / 1.290



Hydrograph Report

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

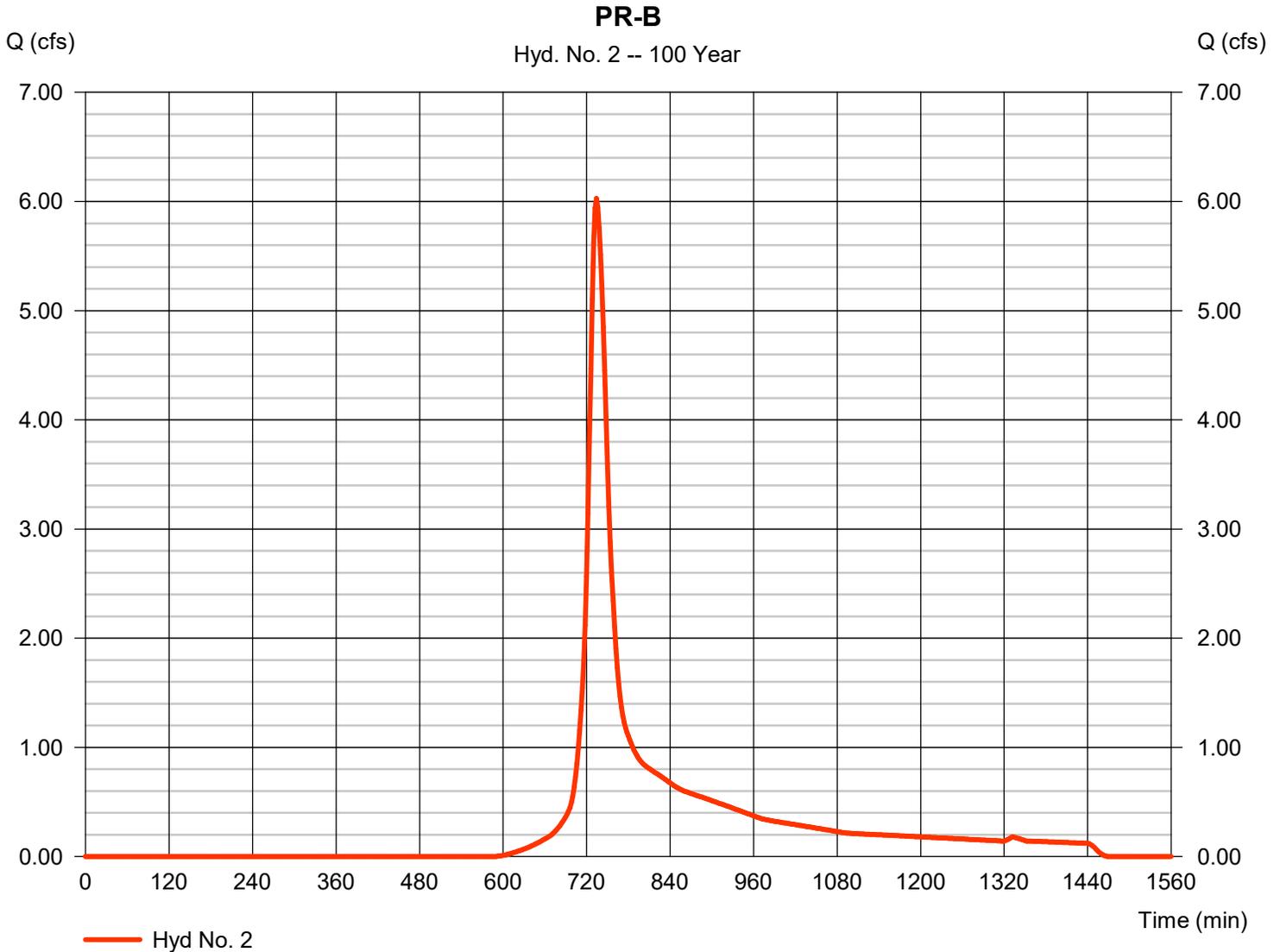
Tuesday, 12 / 13 / 2022

Hyd. No. 2

PR-B

Hydrograph type	= SCS Runoff	Peak discharge	= 6.027 cfs
Storm frequency	= 100 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 27,136 cuft
Drainage area	= 2.130 ac	Curve number	= 57*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 18.70 min
Total precip.	= 8.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.050 x 55) + (1.000 x 48) + (0.970 x 65) + (0.030 x 61) + (0.070 x 74) + (0.010 x 98)] / 2.130



Hydrograph Report

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

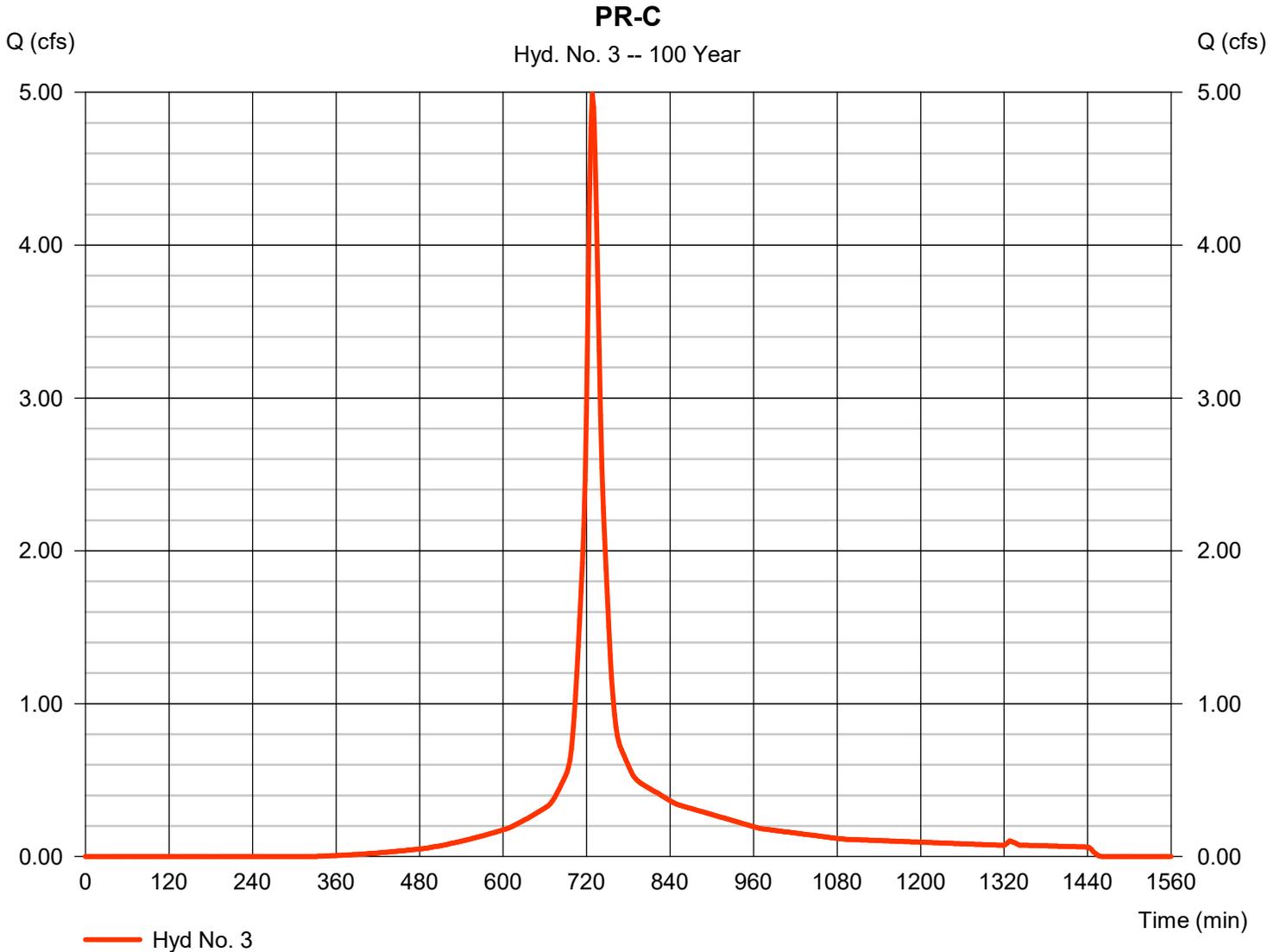
Tuesday, 12 / 13 / 2022

Hyd. No. 3

PR-C

Hydrograph type	= SCS Runoff	Peak discharge	= 4.989 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 19,379 cuft
Drainage area	= 0.840 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.20 min
Total precip.	= 8.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.370 x 61) + (0.080 x 74) + (0.390 x 98)] / 0.840



Hydrograph Report

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

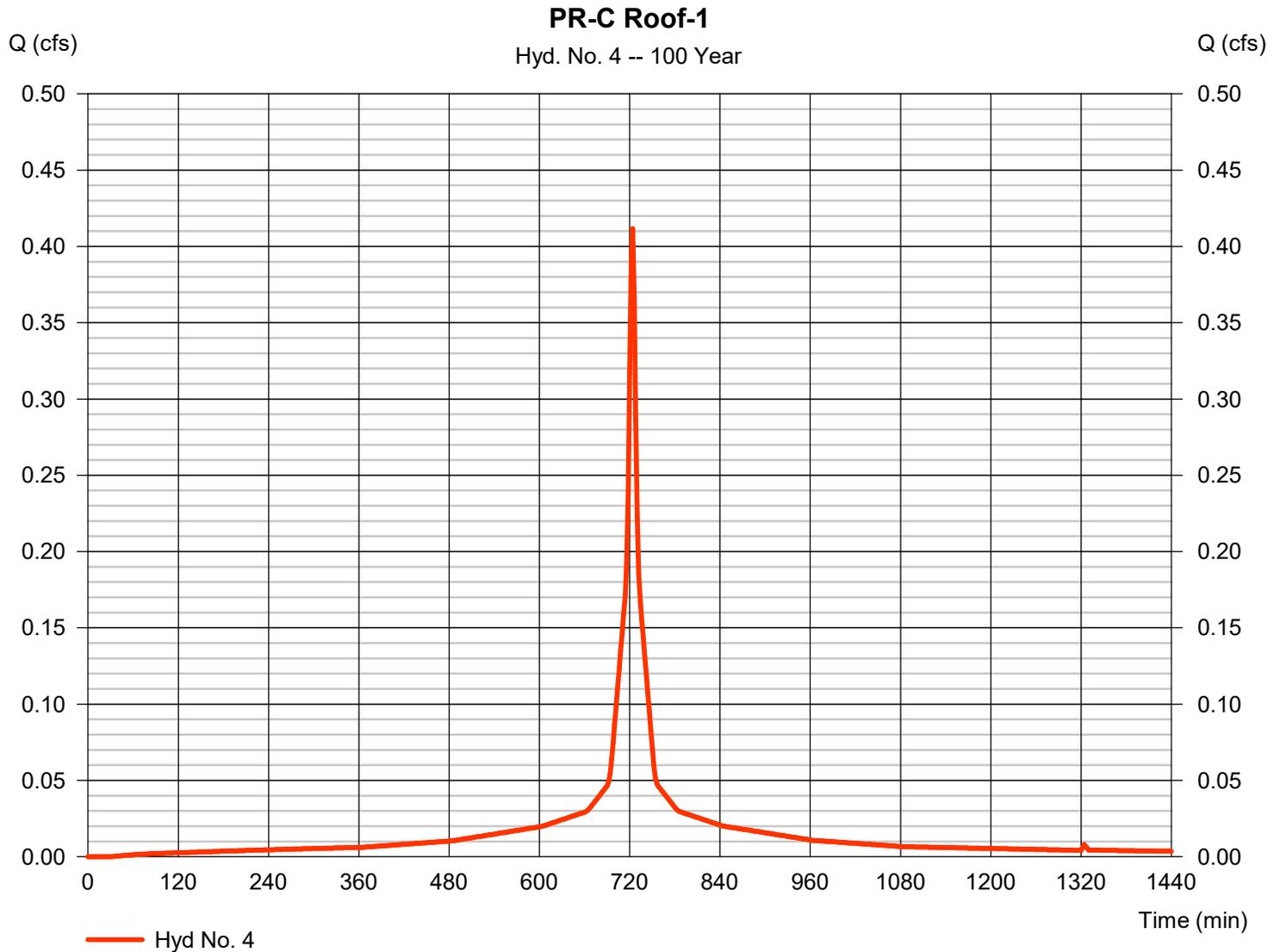
Tuesday, 12 / 13 / 2022

Hyd. No. 4

PR-C Roof-1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.412 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,439 cuft
Drainage area	= 0.050 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.050 x 98)] / 0.050



Hydrograph Report

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

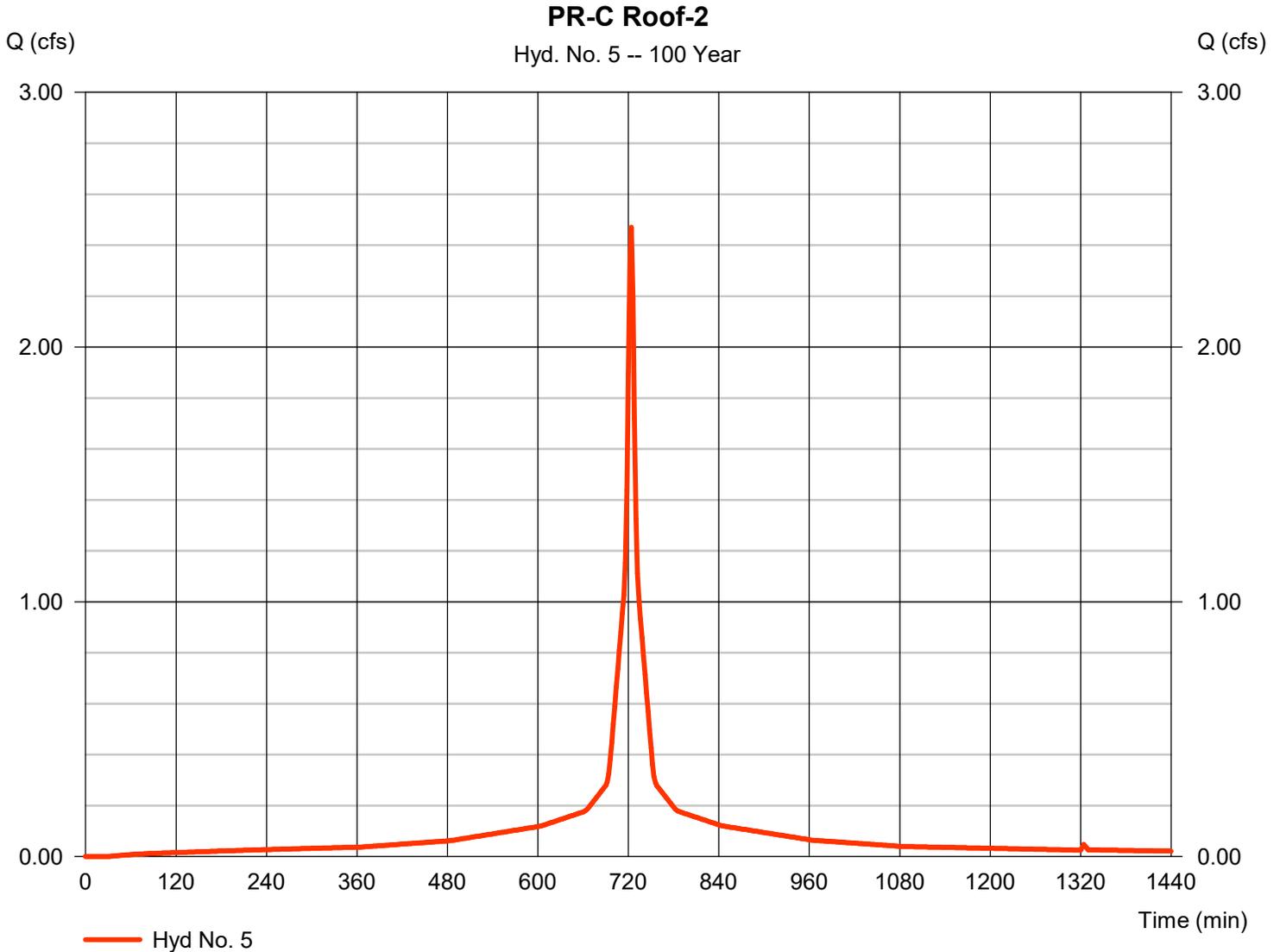
Tuesday, 12 / 13 / 2022

Hyd. No. 5

PR-C Roof-2

Hydrograph type	= SCS Runoff	Peak discharge	= 2.470 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 8,637 cuft
Drainage area	= 0.300 ac	Curve number	= 98*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.300 x 98)] / 0.300



Hydrograph Report

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

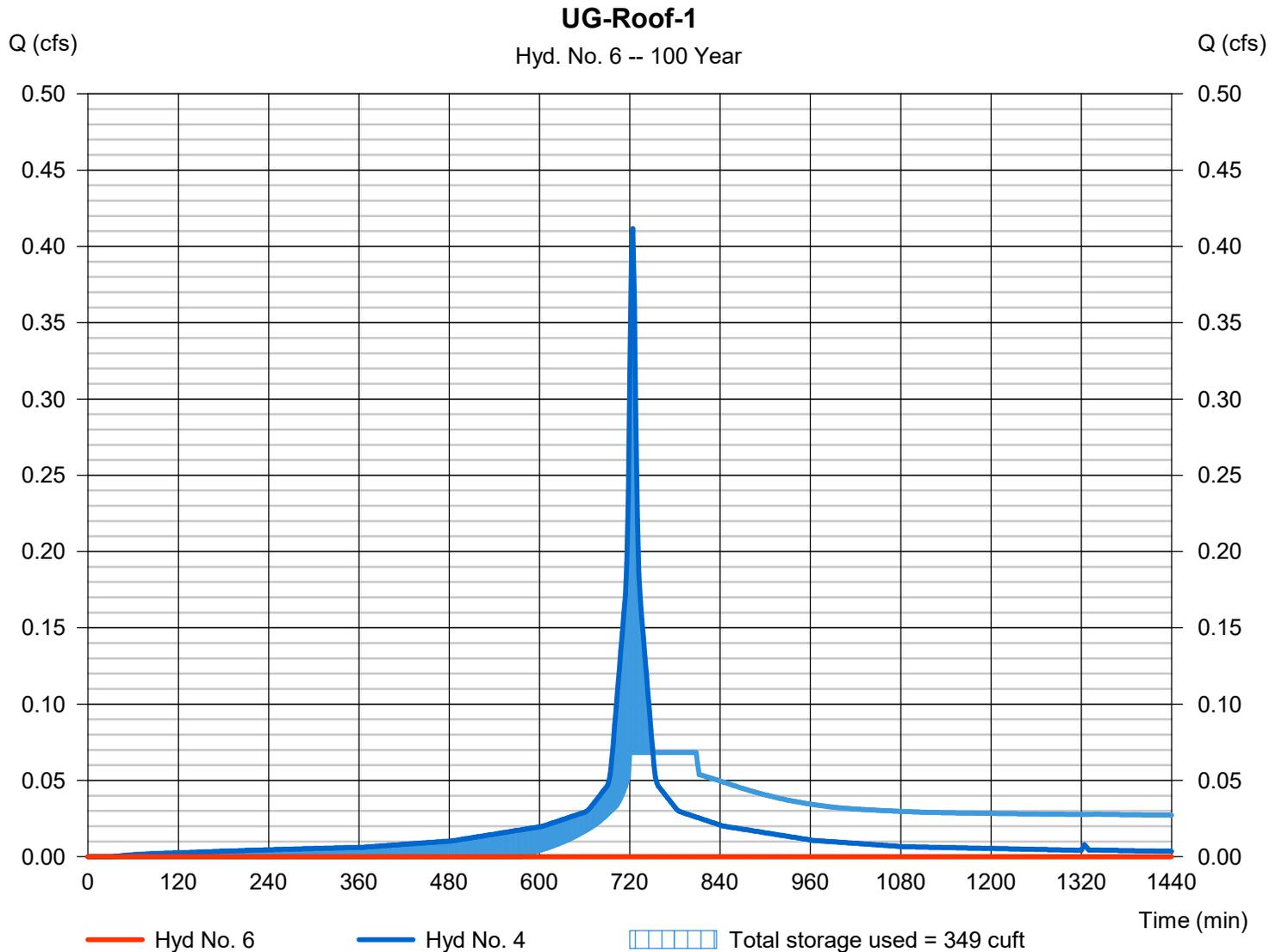
Tuesday, 12 / 13 / 2022

Hyd. No. 6

UG-Roof-1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= 516 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 4 - PR-C Roof-1	Max. Elevation	= 353.60 ft
Reservoir name	= UG-Roof-1	Max. Storage	= 349 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

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

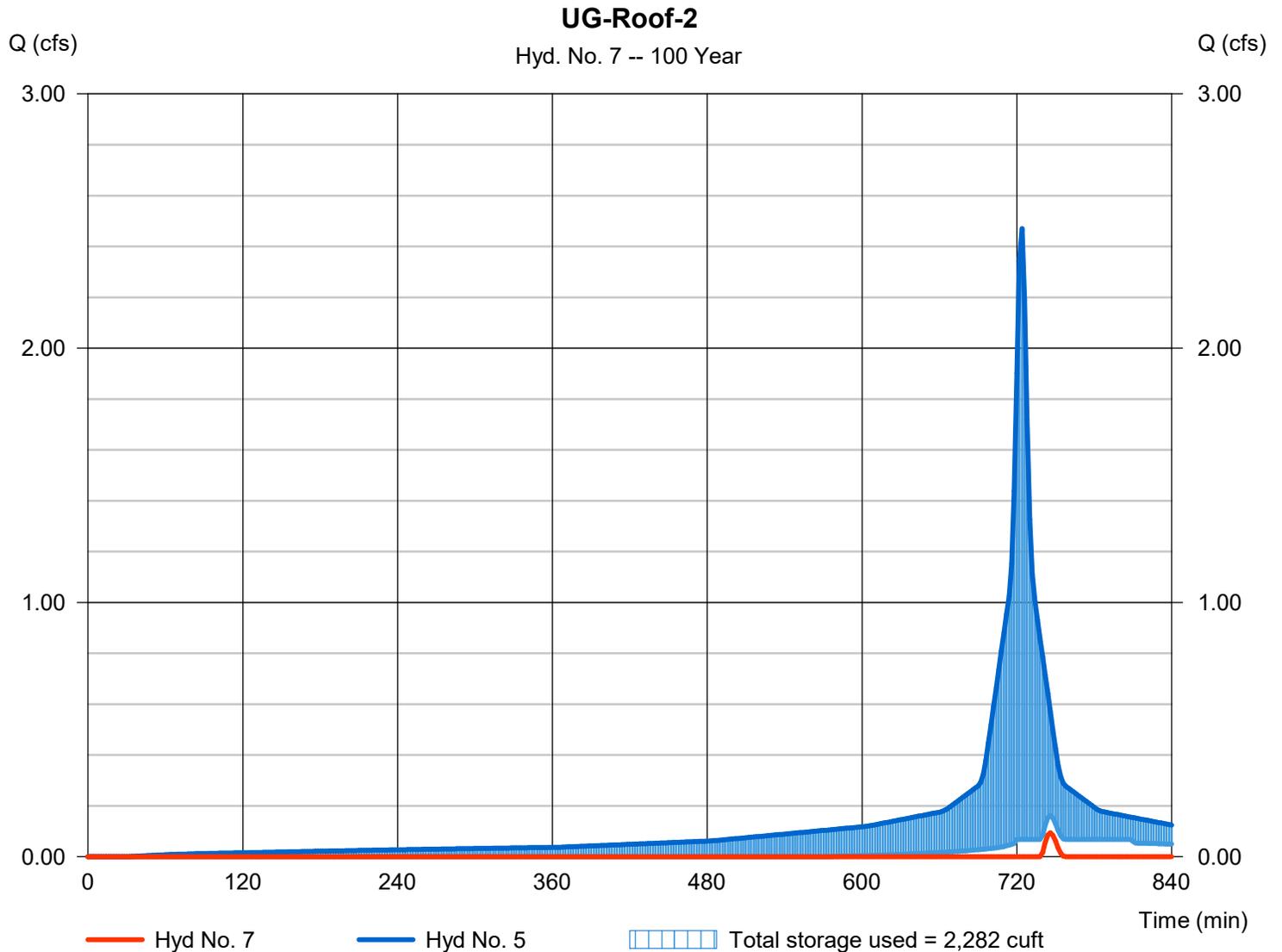
Tuesday, 12 / 13 / 2022

Hyd. No. 7

UG-Roof-2

Hydrograph type	= Reservoir	Peak discharge	= 0.094 cfs
Storm frequency	= 100 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 54 cuft
Inflow hyd. No.	= 5 - PR-C Roof-2	Max. Elevation	= 354.56 ft
Reservoir name	= UG-Roof-2	Max. Storage	= 2,282 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

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

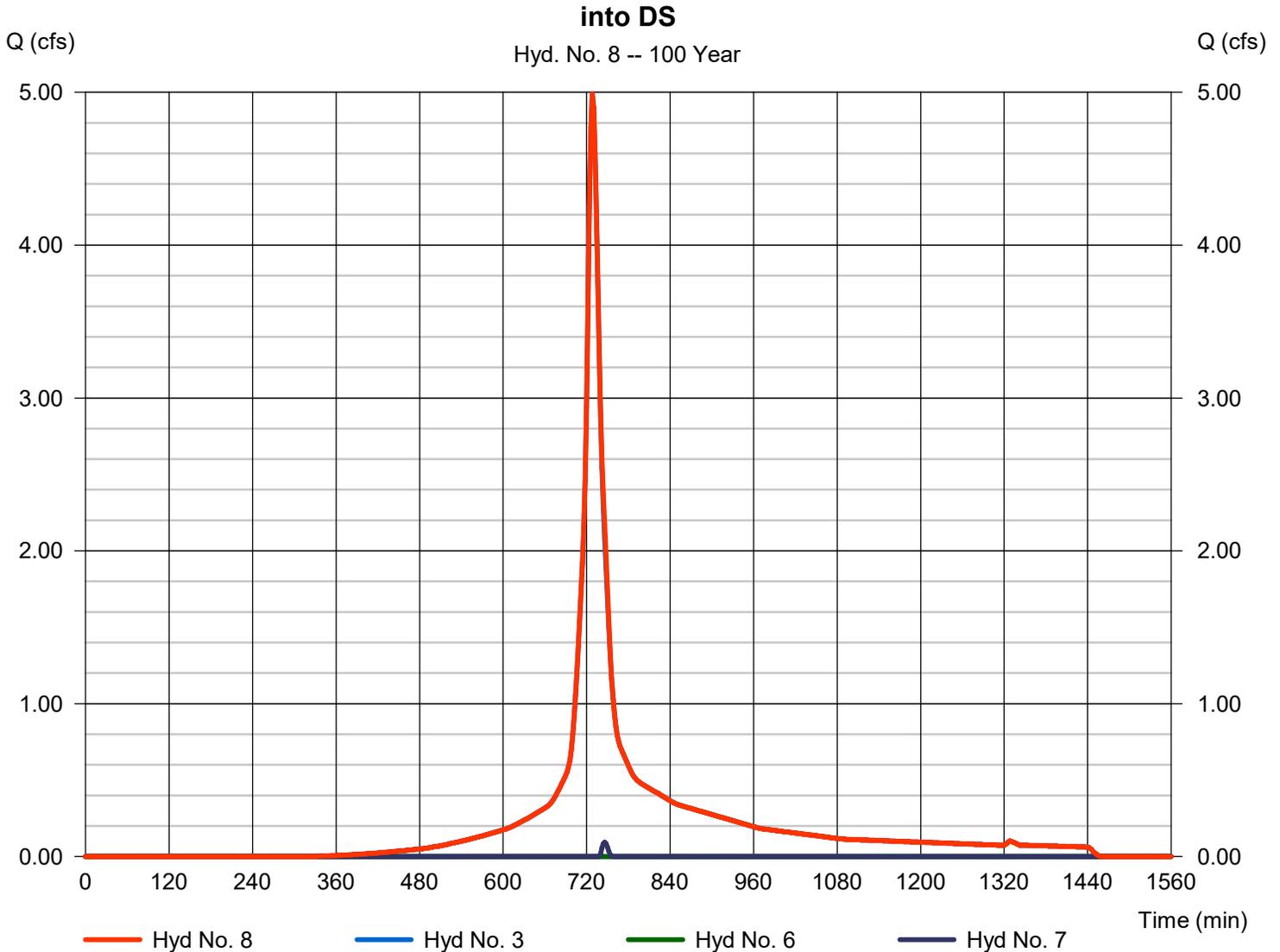
Tuesday, 12 / 13 / 2022

Hyd. No. 8

into DS

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 2 min
Inflow hyds. = 3, 6, 7

Peak discharge = 4.989 cfs
Time to peak = 728 min
Hyd. volume = 19,433 cuft
Contrib. drain. area = 0.840 ac



Hydrograph Report

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

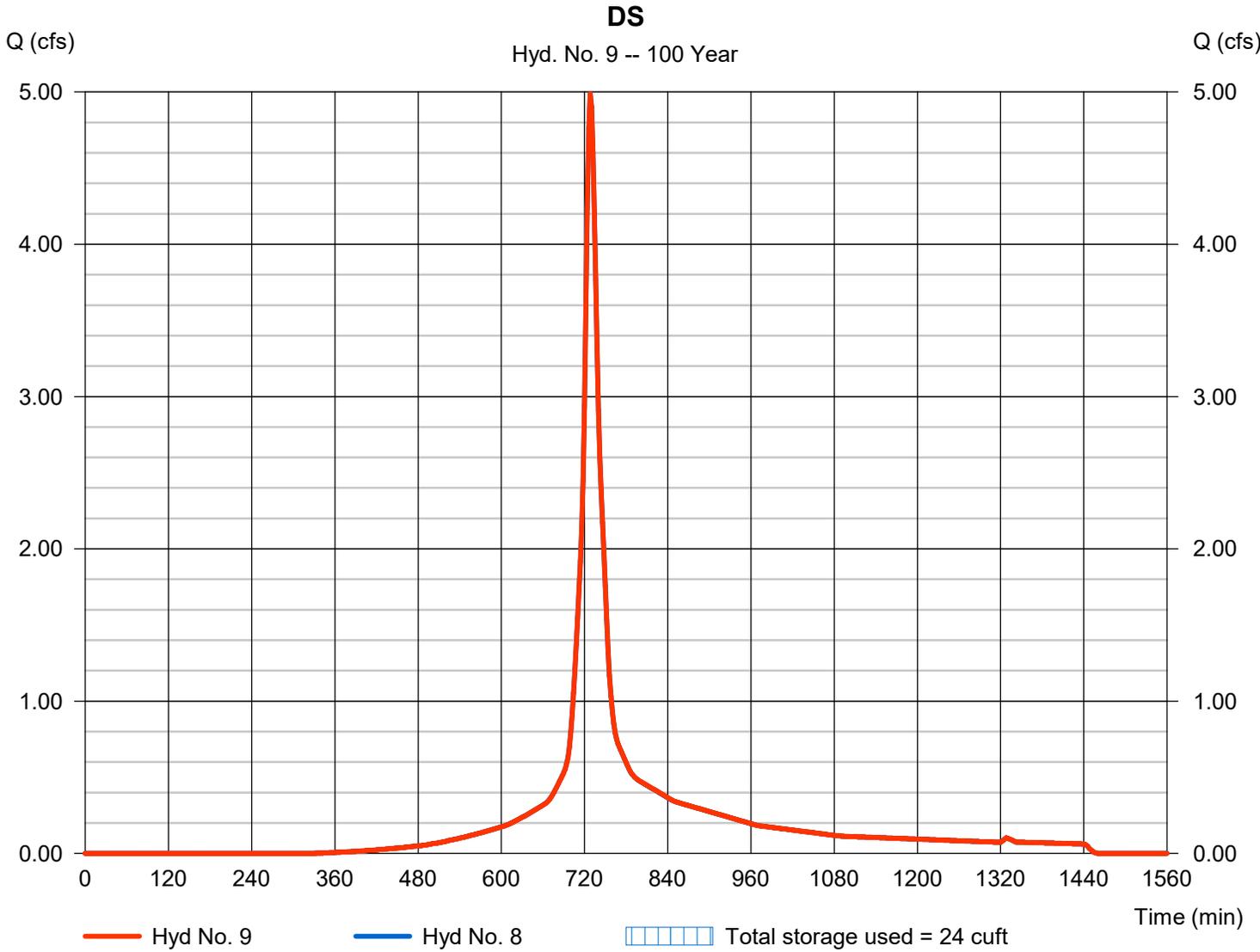
Tuesday, 12 / 13 / 2022

Hyd. No. 9

DS

Hydrograph type	= Reservoir	Peak discharge	= 4.989 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 19,433 cuft
Inflow hyd. No.	= 8 - into DS	Max. Elevation	= 353.45 ft
Reservoir name	= DS	Max. Storage	= 24 cuft

Storage Indication method used.



Hydrograph Report

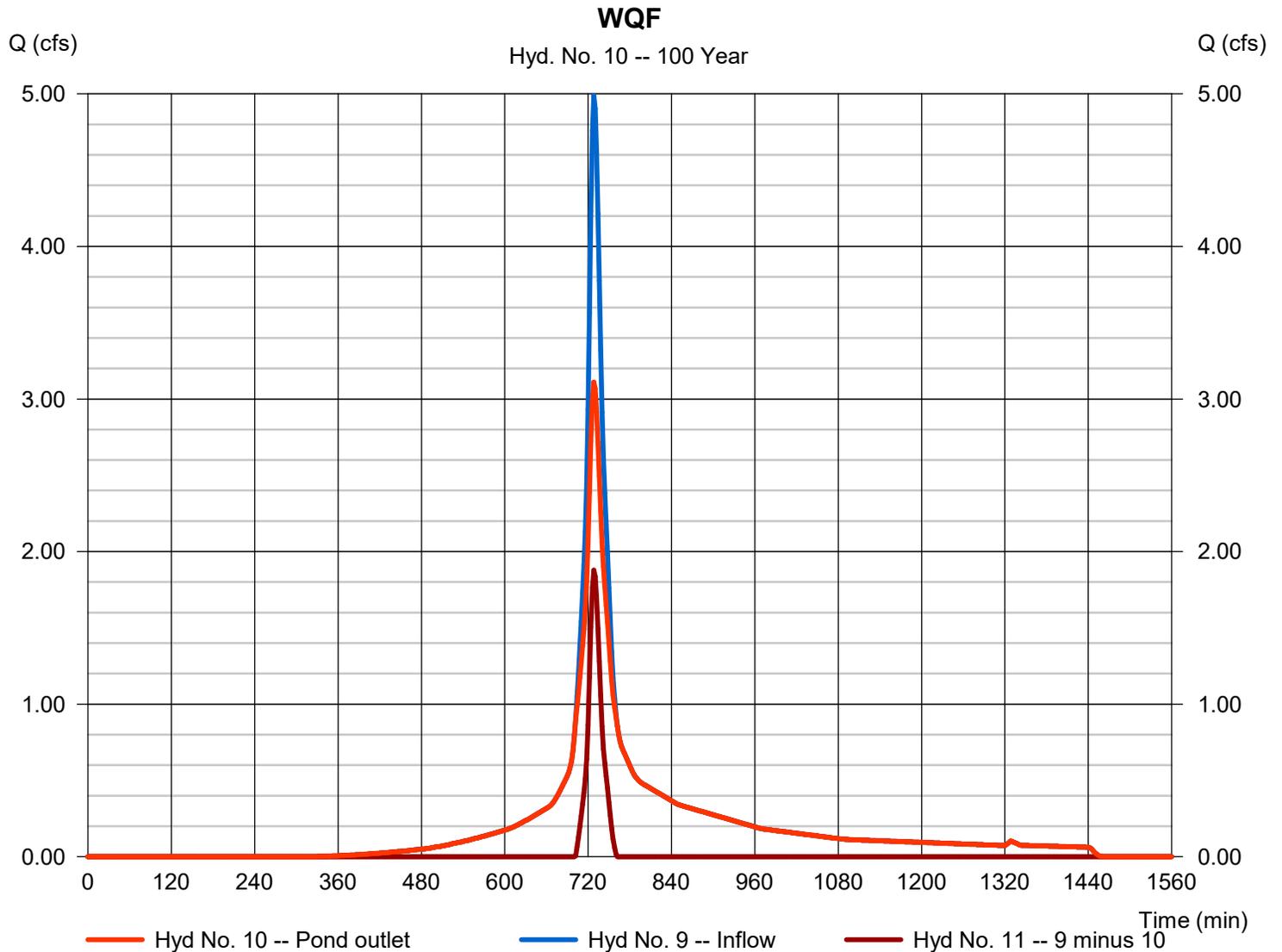
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Tuesday, 12 / 13 / 2022

Hyd. No. 10

WQF

Hydrograph type	= Diversion1	Peak discharge	= 3.110 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 16,881 cuft
Inflow hydrograph	= 9 - DS	2nd diverted hyd.	= 11
Diversion method	= Pond - DS	Pond structure	= Culv/Orf B



Hydrograph Report

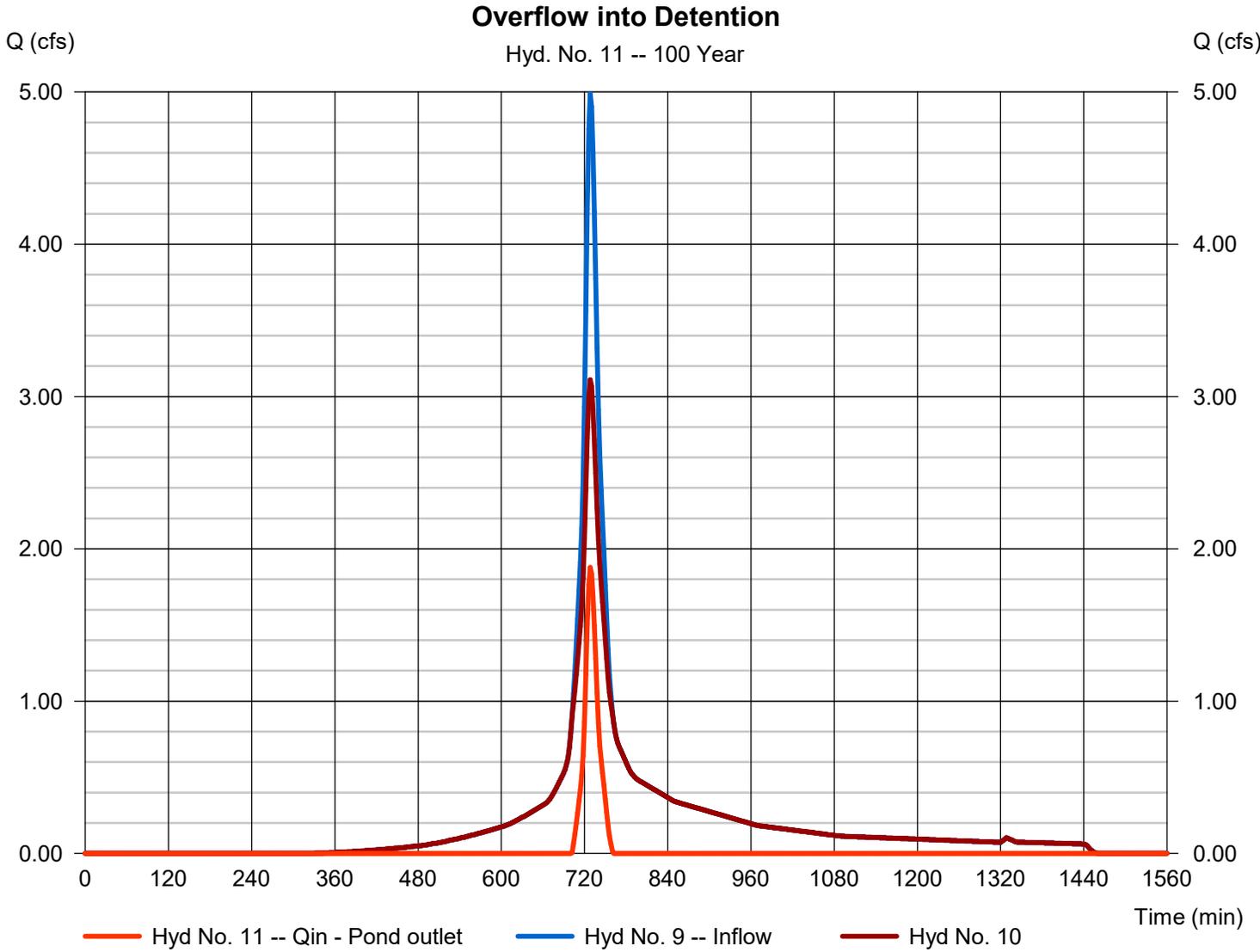
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Tuesday, 12 / 13 / 2022

Hyd. No. 11

Overflow into Detention

Hydrograph type	= Diversion2	Peak discharge	= 1.879 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 2,551 cuft
Inflow hydrograph	= 9 - DS	2nd diverted hyd.	= 10
Diversion method	= Pond - DS	Pond structure	= Culv/Orf B



Hydrograph Report

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

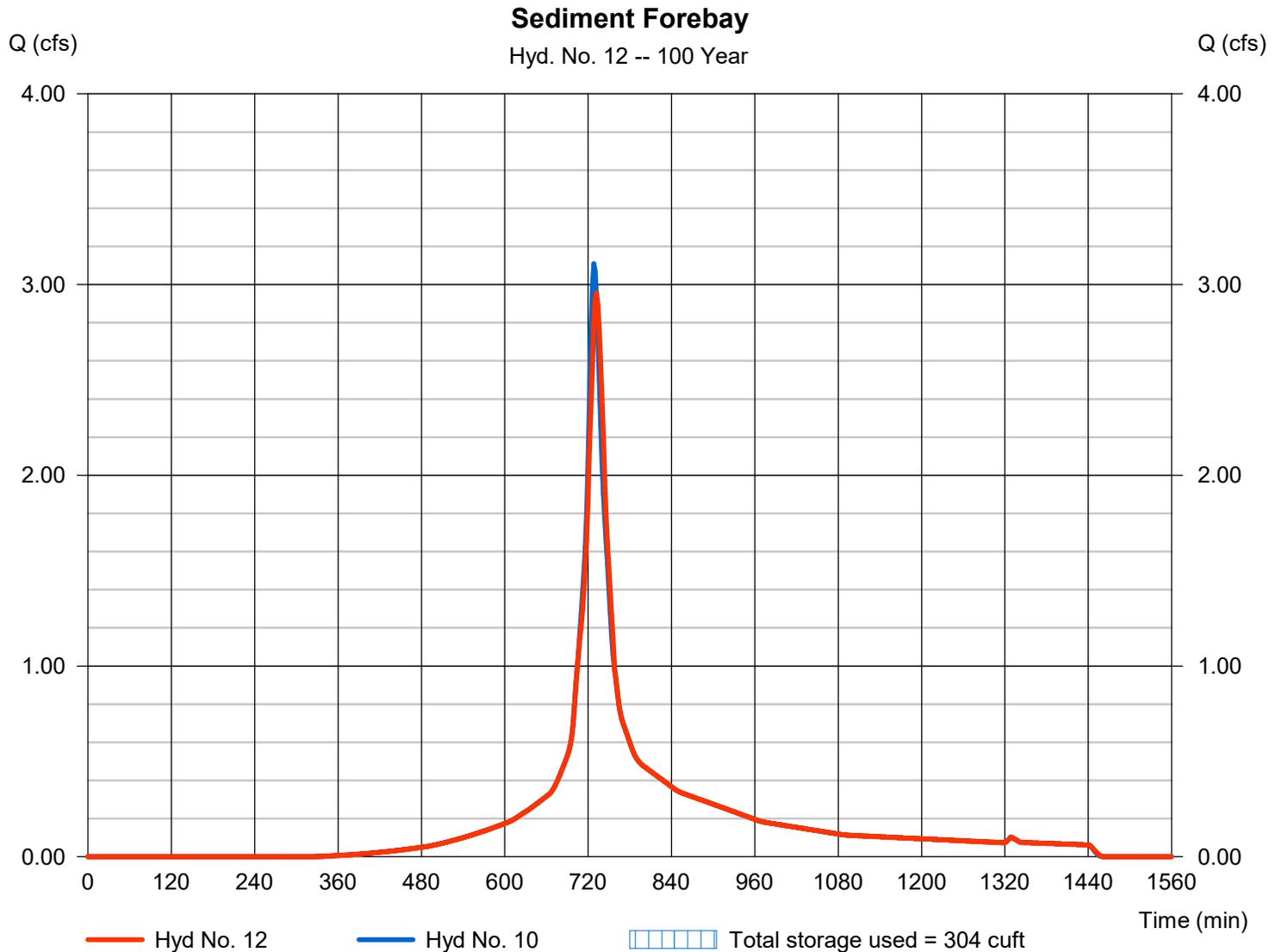
Tuesday, 12 / 13 / 2022

Hyd. No. 12

Sediment Forebay

Hydrograph type	= Reservoir	Peak discharge	= 2.955 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 16,881 cuft
Inflow hyd. No.	= 10 - WQF	Max. Elevation	= 354.75 ft
Reservoir name	= Sediment Forebay	Max. Storage	= 304 cuft

Storage Indication method used.



Hydrograph Report

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

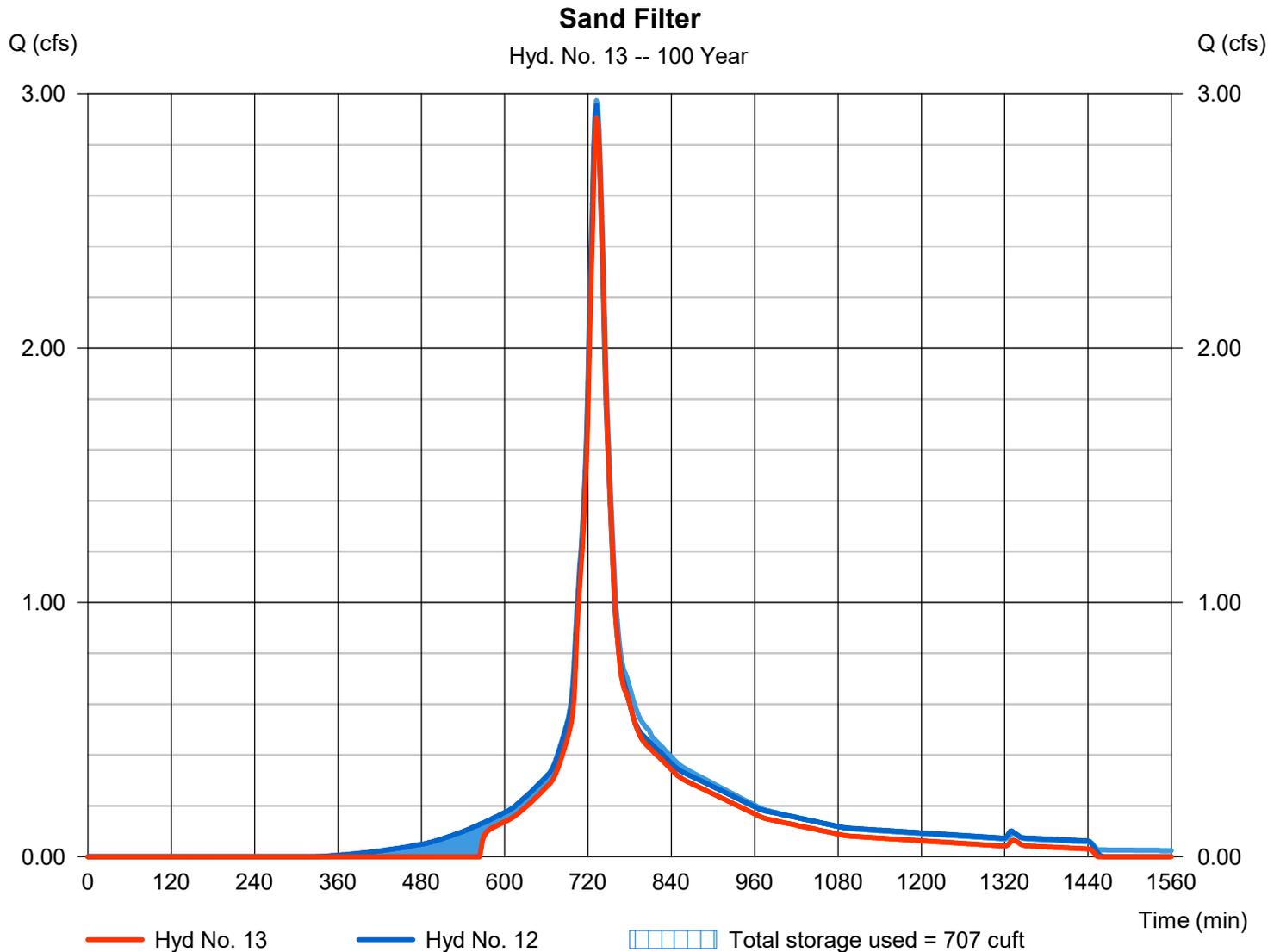
Tuesday, 12 / 13 / 2022

Hyd. No. 13

Sand Filter

Hydrograph type	= Reservoir	Peak discharge	= 2.906 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 14,536 cuft
Inflow hyd. No.	= 12 - Sediment Forebay	Max. Elevation	= 352.77 ft
Reservoir name	= Sand Filter	Max. Storage	= 707 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

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

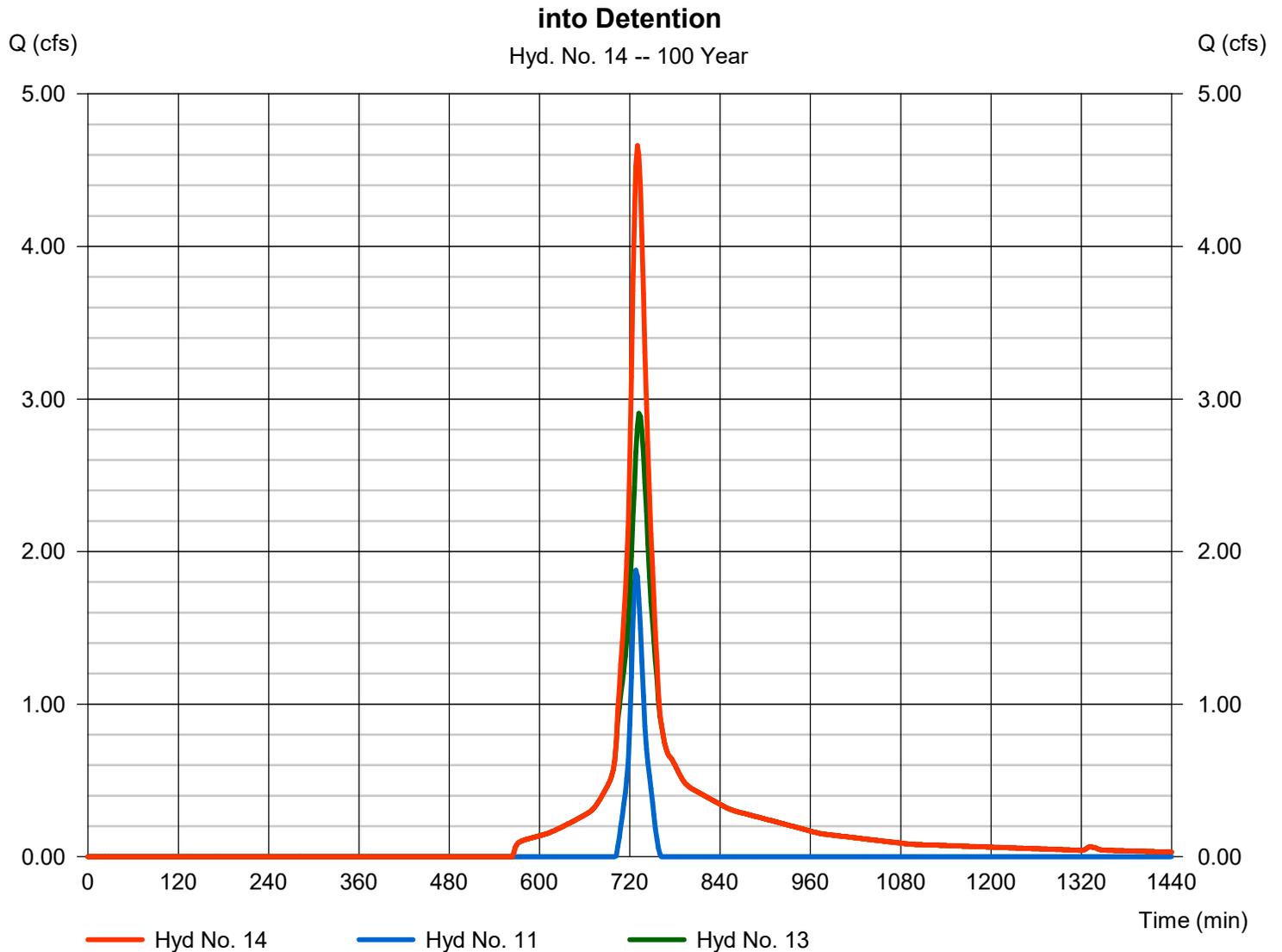
Tuesday, 12 / 13 / 2022

Hyd. No. 14

into Detention

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 2 min
Inflow hyds. = 11, 13

Peak discharge = 4.662 cfs
Time to peak = 730 min
Hyd. volume = 17,087 cuft
Contrib. drain. area = 0.000 ac



Hydrograph Report

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

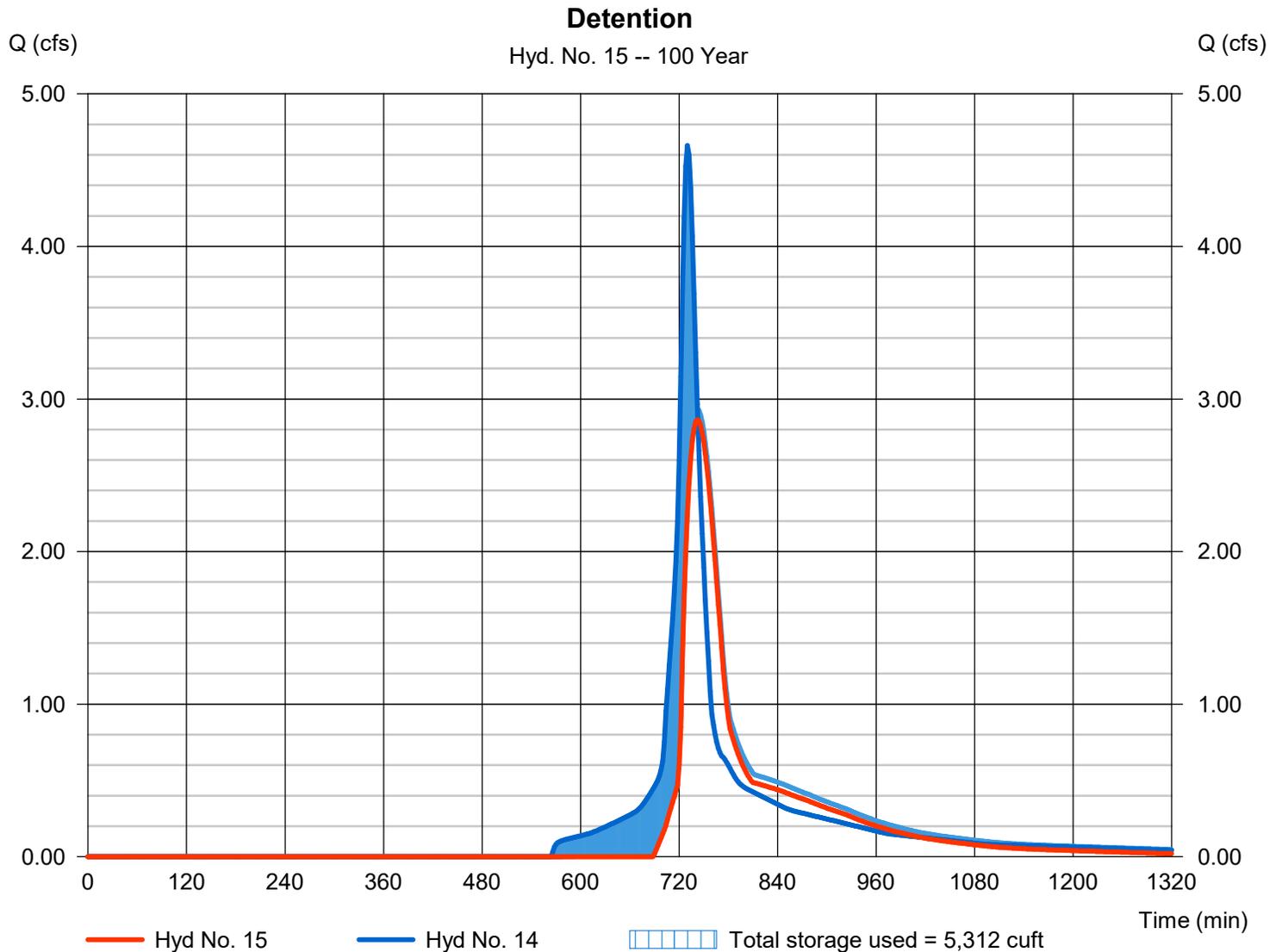
Tuesday, 12 / 13 / 2022

Hyd. No. 15

Detention

Hydrograph type	= Reservoir	Peak discharge	= 2.865 cfs
Storm frequency	= 100 yrs	Time to peak	= 742 min
Time interval	= 2 min	Hyd. volume	= 13,874 cuft
Inflow hyd. No.	= 14 - into Detention	Max. Elevation	= 353.97 ft
Reservoir name	= Detention	Max. Storage	= 5,312 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

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

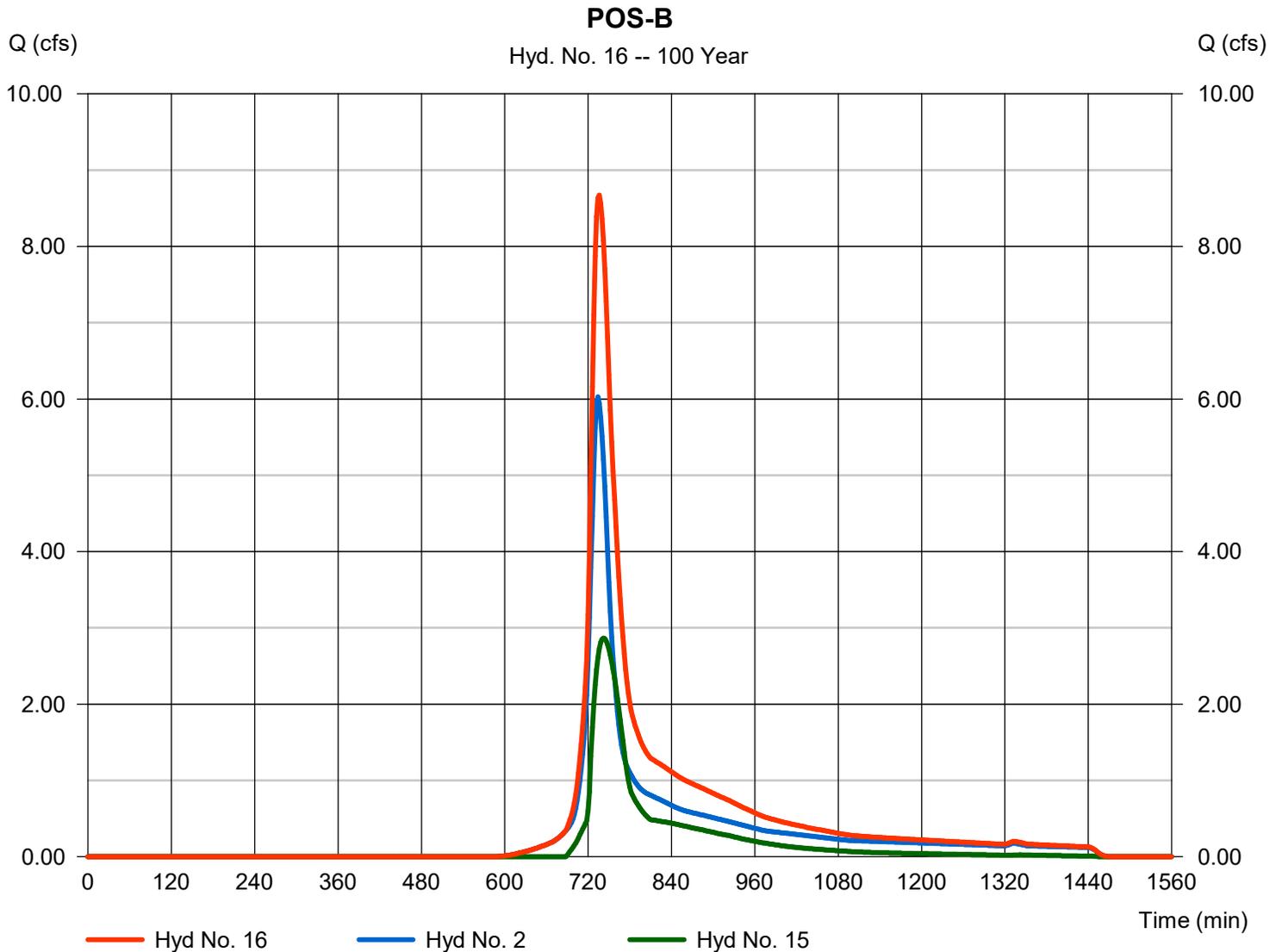
Tuesday, 12 / 13 / 2022

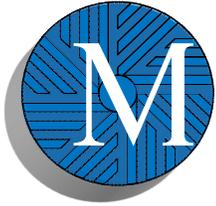
Hyd. No. 16

POS-B

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

Peak discharge = 8.672 cfs
 Time to peak = 736 min
 Hyd. volume = 41,009 cuft
 Contrib. drain. area = 2.130 ac





Commercial Condominiums
A.P. 36, Lots 8 and 37
Cranston, RI
Stormwater Management Plan
Revised 12/13/2022

Appendix E

BMP Sizing Calculation Worksheets

Watershed:	PR-C	
Soils:	C	
BMP:	Sediment Forebay / Sand Filter	
Total Area (A, sf):	36,335	sf
Total Area (A, ac):	0.83	ac
Total Impervious Treatment Areas (sf):	17,180	sf
Total Impervious Area (ac):	0.39	ac

Recharge Volume Calculation (Re_v)

Re _v = (1")(F)(I)/12	F = 0.25	
Where:	I = 0.39	ac
Re _v = groundwater recharge volume (ac-ft)	Re _v = 0.01	ac-ft
F = recharge factor	Required Re _v = 358	ft ³
I = impervious area (ac)	Total Re _v = 1422	ft ³

Recharge volume requirements have been met!

1422 cf > 358 cf

Water Quality Volume Calculation (WQ_v)

WQ _v = (1")(I)/12	I = 0.39	ac
Where:	WQ _v = 0.033	ac-ft
WQ _v = water quality volume (ac-ft)	WQ _v = 1,432	ft ³

Sediment Forebay Pretreatment (25% of WQ_v required) - not including roof

A _s = 5,750*Q	Required Pretreatment Volume = 358	ft ³
Where:	Q = 0.004	cfs
A _s = sedimentation surface area (ft ²)	Minimum Surface Area (A _s) = 23.82	ft ²
Q = discharge from drainage area = %WQ _v / 86400 sec (cfs)	Depth of forebay provided = 3.00	ft
	Pretreatment volume provided = 358	ft ³

Pretreatment volume provided is equal to or greater than required!

358 cf >= 358 cf

Sand Filter Sizing (75% of WQ_v required, including forebay)

A _f = WQ _v (d _f) / [(k) (h _f +d _f) (t _f)]	WQ _v = 1074	ft ³
Where:	d _f = 3.00	ft
A _f = Surface area of filter bed (ft ²)	k = 3.50	ft/day
d _f = Filter bed depth (ft) - minimum of 18 in for Sand Filter	h _f = 0.38	ft
k = Coefficient of permeability of filter media (ft/day)	t _f = 2	days
h _f = Average height of water above surface of practice	A _f required = 136	ft ²
t _f = Design filter bed drain time (days)	A _f provided = 345	ft ²

Filter surface area provided is greater than required!

345 sf > 136 sf

System Total WQ_v Provided

System must provide 75% of WQ _v :	1074	ft ³
Pretreatment:	358	ft ³
Sand Filter Ponding (volume taken from Hydraflow):	322	ft ³
Volume in Stone:	69	
Volume in Filter Media:	342	ft ³
Total WQ _v provided:	1090	ft ³

Required WQ_v has been met!

1090 cf > 1074 cf

Modified CN Calculation

$$CN = 1000 / [10 + 5P + 10Q - 10(Q^2 + 1.25 QP)^{1/2}]$$

Where:

P = rainfall, in inches

Q = runoff volume (WQ_v / total watershed area)

$$P = 1.2 \text{ in}$$

$$Q = 0.473 \text{ in}$$

$$CN = 90.33$$

$$\text{Use CN} = 90$$

Watershed:

Soils:

BMP:

Total Area (A, sf):

Total Area (A, ac):

Total Impervious Treatment Areas (sf):

Total Impervious Area (ac):

PR-C Roofs
B
Sediment Forebay / Sand Filter
2,249
0.05
2,249
0.05

sf

ac

sf

ac

Recharge Volume Calculation (Re_v)

Re_v = (1")(F)(I)/12

Where:

Re_v = groundwater recharge volume (ac-ft)

F = recharge factor

I = impervious area (ac)

F = 0.35

I = 0.05 ac

Re_v = 0.00 ac-ft

Required Re_v = 66 ft³

Total Re_v = 168 ft³

Recharge volume requirements have been met!

168 cf > 66 cf

Water Quality Volume Calculation (WQ_v)

WQ_v = (1")(I)/12

Where:

WQ_v = water quality volume (ac-ft)

I = 0.05 ac

WQ_v = 0.004 ac-ft

WQ_v = 187 ft³

Underground Roof Treatment

Stormtech SC-740 Chamber

chambers provided = 6

Volume of single chamber with 6-inch stone bed = 74.90 ft³

Total volume provided = 449 ft³

Required WQ_v has been met!

449 cf > 187 cf

Modified CN Calculation

$$CN = 1000 / [10 + 5P + 10Q - 10(Q^2 + 1.25 QP)^{1/2}]$$

Where:

P = rainfall, in inches

Q = runoff volume (WQ_v / total watershed area)

$$P = 1.2 \text{ in}$$

$$Q = 1.000 \text{ in}$$

$$CN = 98.15$$

$$\text{Use CN} = 98$$

Watershed:

Soils:

BMP:

Total Area (A, sf):

Total Area (A, ac):

Total Impervious Treatment Areas (sf):

Total Impervious Area (ac):

PR-C Roofs
B
Sediment Forebay / Sand Filter
13,199
0.30
13,199
0.30

sf

ac

sf

ac

Recharge Volume Calculation (Re_v)

Re_v = (1")(F)(I)/12

Where:

Re_v = groundwater recharge volume (ac-ft)

F = recharge factor

I = impervious area (ac)

F = 0.35

I = 0.30 ac

Re_v = 0.01 ac-ft

Required Re_v = 385 ft³

Total Re_v = 1006 ft³

Recharge volume requirements have been met!

1006 cf > 385 cf

Water Quality Volume Calculation (WQ_v)

WQ_v = (1")(I)/12

Where:

WQ_v = water quality volume (ac-ft)

I = 0.30 ac

WQ_v = 0.025 ac-ft

WQ_v = 1,100 ft³

Underground Roof Treatment

Stormtech SC-740 Chamber

chambers provided = 32

Volume of single chamber with 6-inch stone bed = 74.90 ft³

Total volume provided = 2,397 ft³

Required WQ_v has been met!

2397 cf > 1100 cf

Modified CN Calculation

$$CN = 1000 / [10 + 5P + 10Q - 10(Q^2 + 1.25 QP)^{1/2}]$$

Where:

P = rainfall, in inches

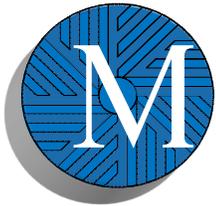
Q = runoff volume (WQ_v / total watershed area)

$$P = 1.2 \text{ in}$$

$$Q = 1.000 \text{ in}$$

$$CN = 98.15$$

$$\text{Use CN} = 98$$



Commercial Condominiums
A.P. 36, Lots 8 and 37
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Revised 12/13/2022

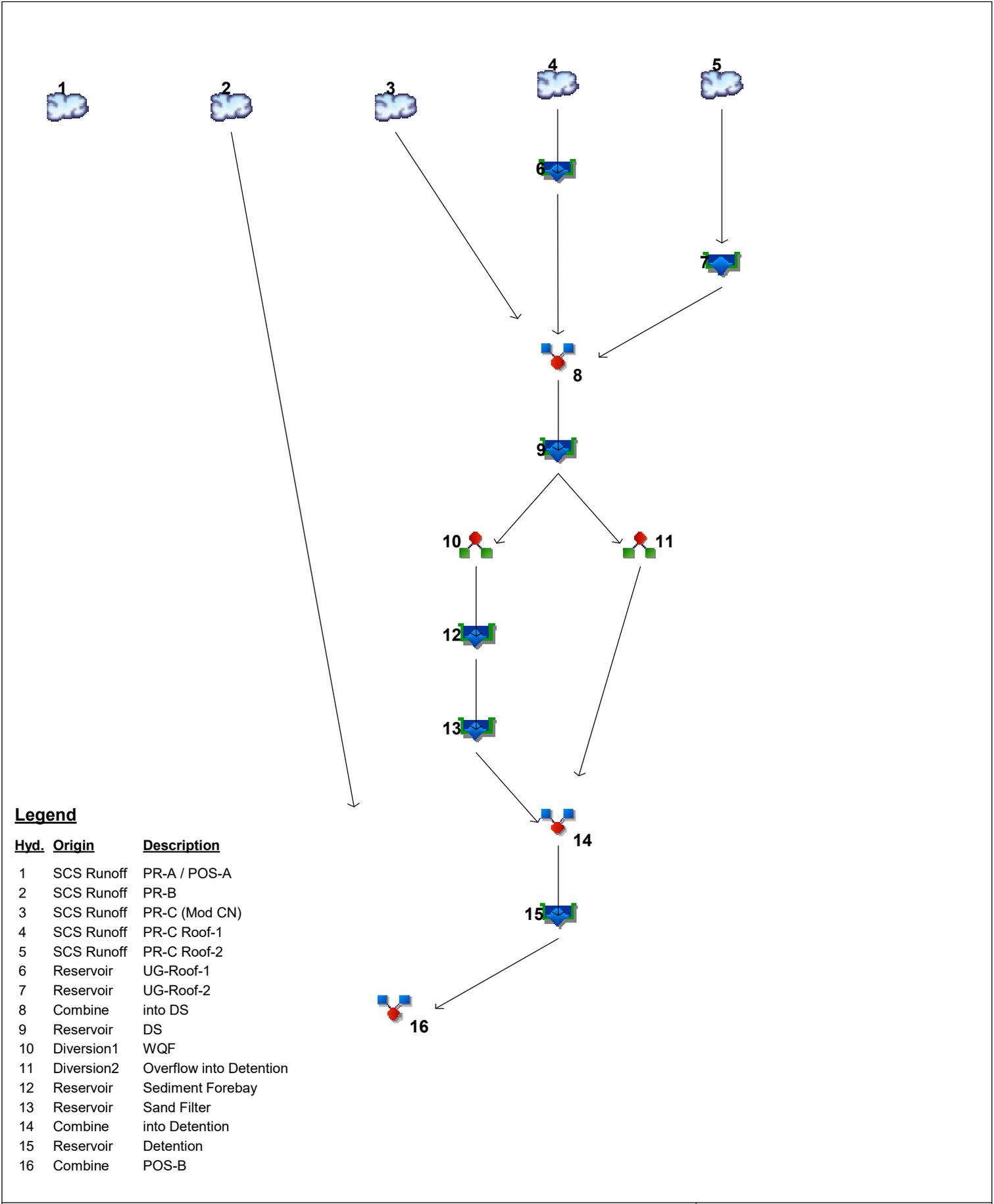
Appendix F

Hydraflow Water Quality Modeling Printouts

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Watershed Model Schematic

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



Legend

Hyd.	Origin	Description
1	SCS Runoff	PR-A / POS-A
2	SCS Runoff	PR-B
3	SCS Runoff	PR-C (Mod CN)
4	SCS Runoff	PR-C Roof-1
5	SCS Runoff	PR-C Roof-2
6	Reservoir	UG-Roof-1
7	Reservoir	UG-Roof-2
8	Combine	into DS
9	Reservoir	DS
10	Diversion1	WQF
11	Diversion2	Overflow into Detention
12	Reservoir	Sediment Forebay
13	Reservoir	Sand Filter
14	Combine	into Detention
15	Reservoir	Detention
16	Combine	POS-B

Hydrograph Return Period Recap

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

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	----	----	----	0.000	----	----	----	----	----	PR-A / POS-A
2	SCS Runoff	----	----	----	0.000	----	----	----	----	----	PR-B
3	SCS Runoff	----	----	----	0.365	----	----	----	----	----	PR-C (Mod CN)
4	SCS Runoff	----	----	----	0.053	----	----	----	----	----	PR-C Roof-1
5	SCS Runoff	----	----	----	0.317	----	----	----	----	----	PR-C Roof-2
6	Reservoir	4	----	----	0.000	----	----	----	----	----	UG-Roof-1
7	Reservoir	5	----	----	0.000	----	----	----	----	----	UG-Roof-2
8	Combine	3, 6, 7	----	----	0.365	----	----	----	----	----	into DS
9	Reservoir	8	----	----	0.365	----	----	----	----	----	DS
10	Diversion1	9	----	----	0.365	----	----	----	----	----	WQF
11	Diversion2	9	----	----	0.000	----	----	----	----	----	Overflow into Detention
12	Reservoir	10	----	----	0.366	----	----	----	----	----	Sediment Forebay
13	Reservoir	12	----	----	0.154	----	----	----	----	----	Sand Filter
14	Combine	11, 13	----	----	0.154	----	----	----	----	----	into Detention
15	Reservoir	14	----	----	0.000	----	----	----	----	----	Detention
16	Combine	2, 15	----	----	0.000	----	----	----	----	----	POS-B

Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.000	2	n/a	0	-----	-----	-----	PR-A / POS-A
2	SCS Runoff	0.000	2	n/a	0	-----	-----	-----	PR-B
3	SCS Runoff	0.365	2	730	1,439	-----	-----	-----	PR-C (Mod CN)
4	SCS Runoff	0.053	2	724	168	-----	-----	-----	PR-C Roof-1
5	SCS Runoff	0.317	2	724	1,006	-----	-----	-----	PR-C Roof-2
6	Reservoir	0.000	2	n/a	0	4	351.70	3.67	UG-Roof-1
7	Reservoir	0.000	2	n/a	0	5	351.75	38.8	UG-Roof-2
8	Combine	0.365	2	730	1,439	3, 6, 7	-----	-----	into DS
9	Reservoir	0.365	2	730	1,439	8	352.36	3.63	DS
10	Diversion1	0.365	2	730	1,439	9	-----	-----	WQF
11	Diversion2	0.000	2	726	0	9	-----	-----	Overflow into Detention
12	Reservoir	0.366	2	730	1,439	10	352.35	11.3	Sediment Forebay
13	Reservoir	0.154	2	746	247	12	352.47	483	Sand Filter
14	Combine	0.154	2	746	247	11, 13	-----	-----	into Detention
15	Reservoir	0.000	2	756	0	14	349.23	224	Detention
16	Combine	0.000	2	756	0	2, 15	-----	-----	POS-B

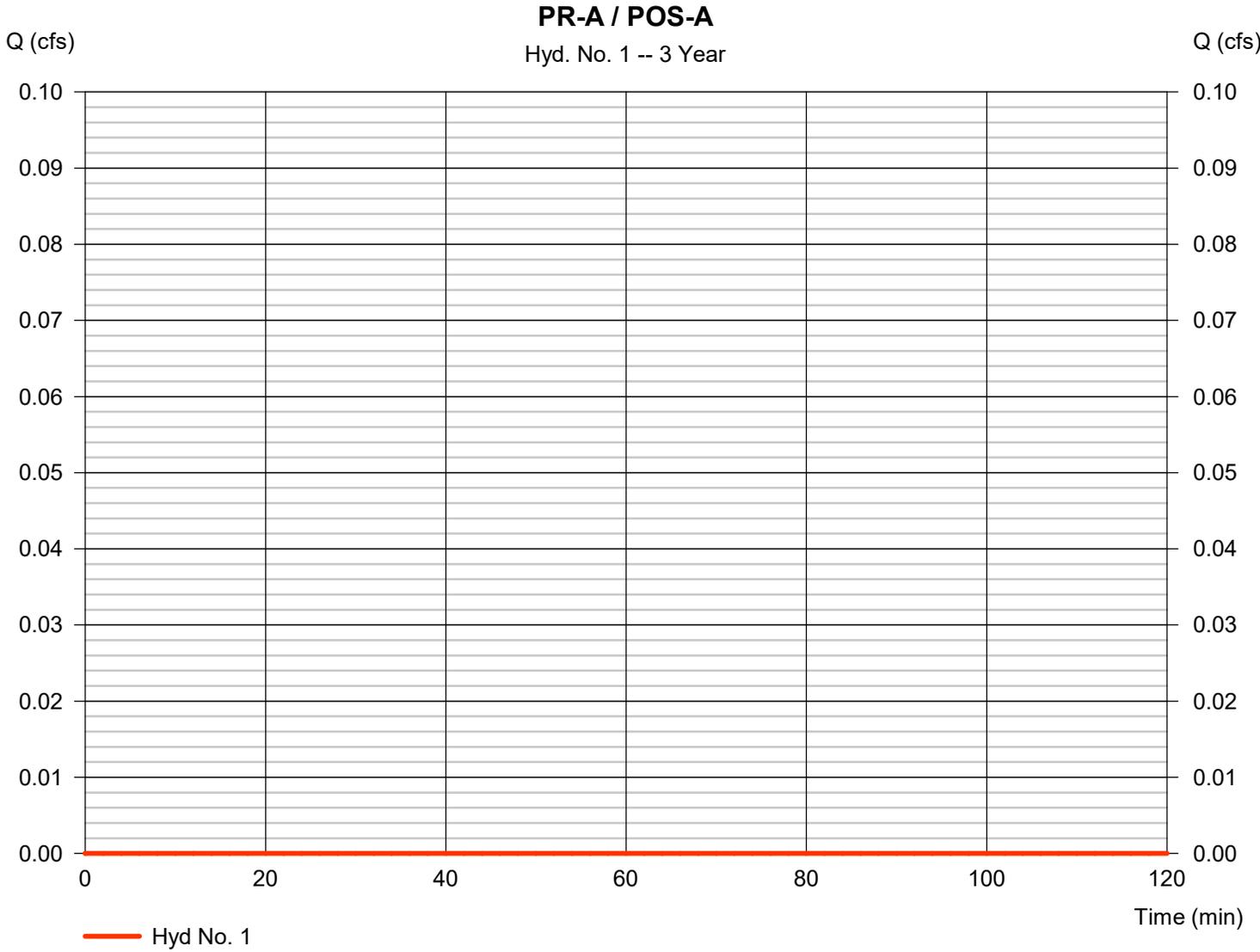
Hydrograph Report

Hyd. No. 1

PR-A / POS-A

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 1.290 ac	Curve number	= 49*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.10 min
Total precip.	= 1.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.010 x 70) + (0.230 x 55) + (1.050 x 48)] / 1.290



TR55 Tc Worksheet

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

Hyd. No. 1

PR-A / POS-A

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.240	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.30	0.00	0.00	
Land slope (%)	= 3.60	0.00	0.00	
Travel Time (min)	= 11.11	+ 0.00	+ 0.00	= 11.11
Shallow Concentrated Flow				
Flow length (ft)	= 217.00	0.00	0.00	
Watercourse slope (%)	= 5.10	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	=3.64	0.00	0.00	
Travel Time (min)	= 0.99	+ 0.00	+ 0.00	= 0.99
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				12.10 min

Hydrograph Report

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

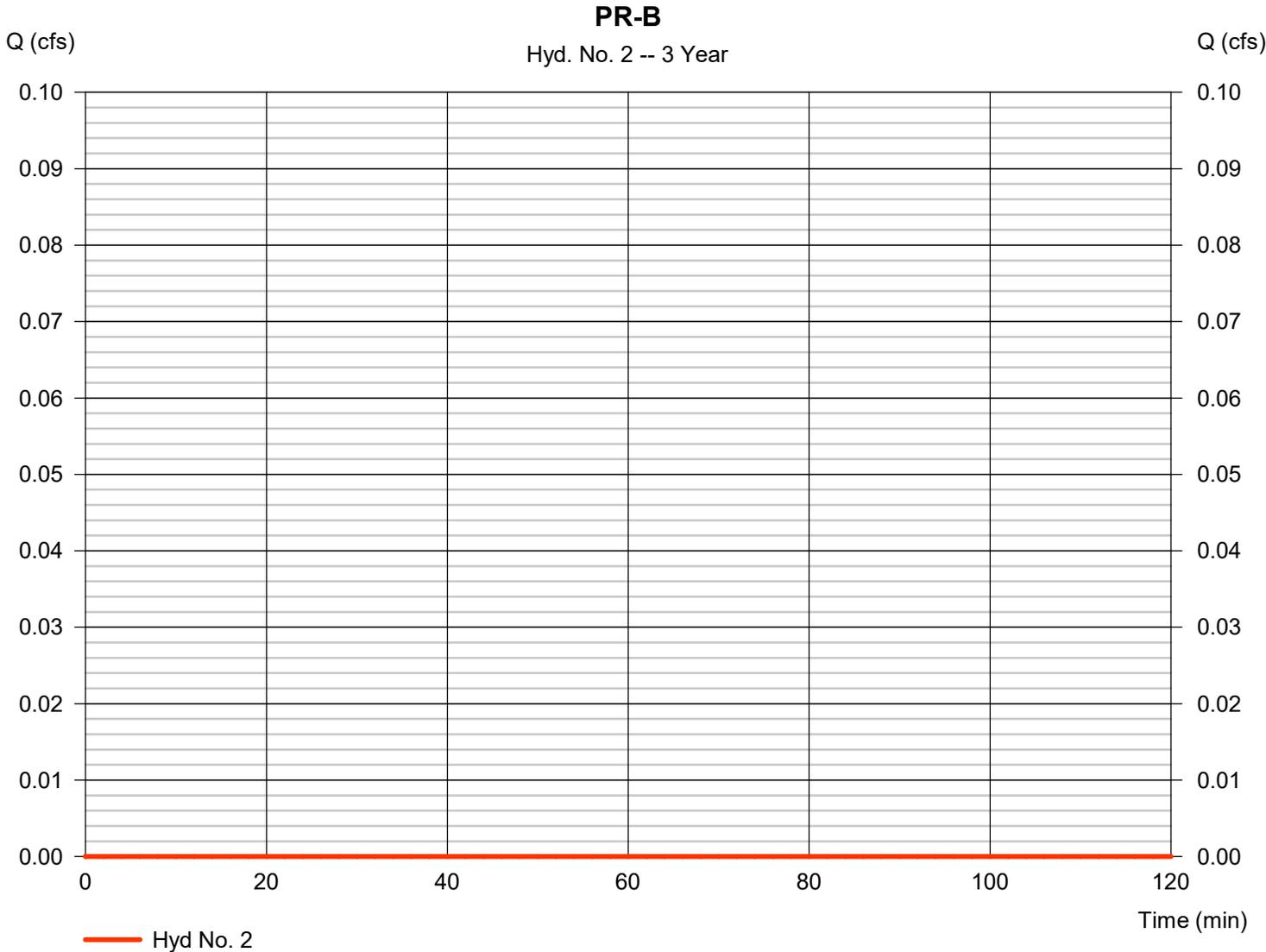
Thursday, 06 / 30 / 2022

Hyd. No. 2

PR-B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 2.130 ac	Curve number	= 57*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 18.70 min
Total precip.	= 1.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.050 x 55) + (1.000 x 48) + (0.970 x 65) + (0.030 x 61) + (0.070 x 74) + (0.010 x 98)] / 2.130



TR55 Tc Worksheet

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

Hyd. No. 2

PR-B

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.400	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.30	0.00	0.00	
Land slope (%)	= 4.30	0.00	0.00	
Travel Time (min)	= 15.57	+ 0.00	+ 0.00	= 15.57
Shallow Concentrated Flow				
Flow length (ft)	= 474.00	0.00	0.00	
Watercourse slope (%)	= 2.50	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	=2.55	0.00	0.00	
Travel Time (min)	= 3.10	+ 0.00	+ 0.00	= 3.10
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	=0.00	0.00	0.00	
Flow length (ft)	0.0	0.0	0.0	
Travel Time (min)	= 0.00	+ 0.00	+ 0.00	= 0.00
Total Travel Time, Tc				18.70 min

Hydrograph Report

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

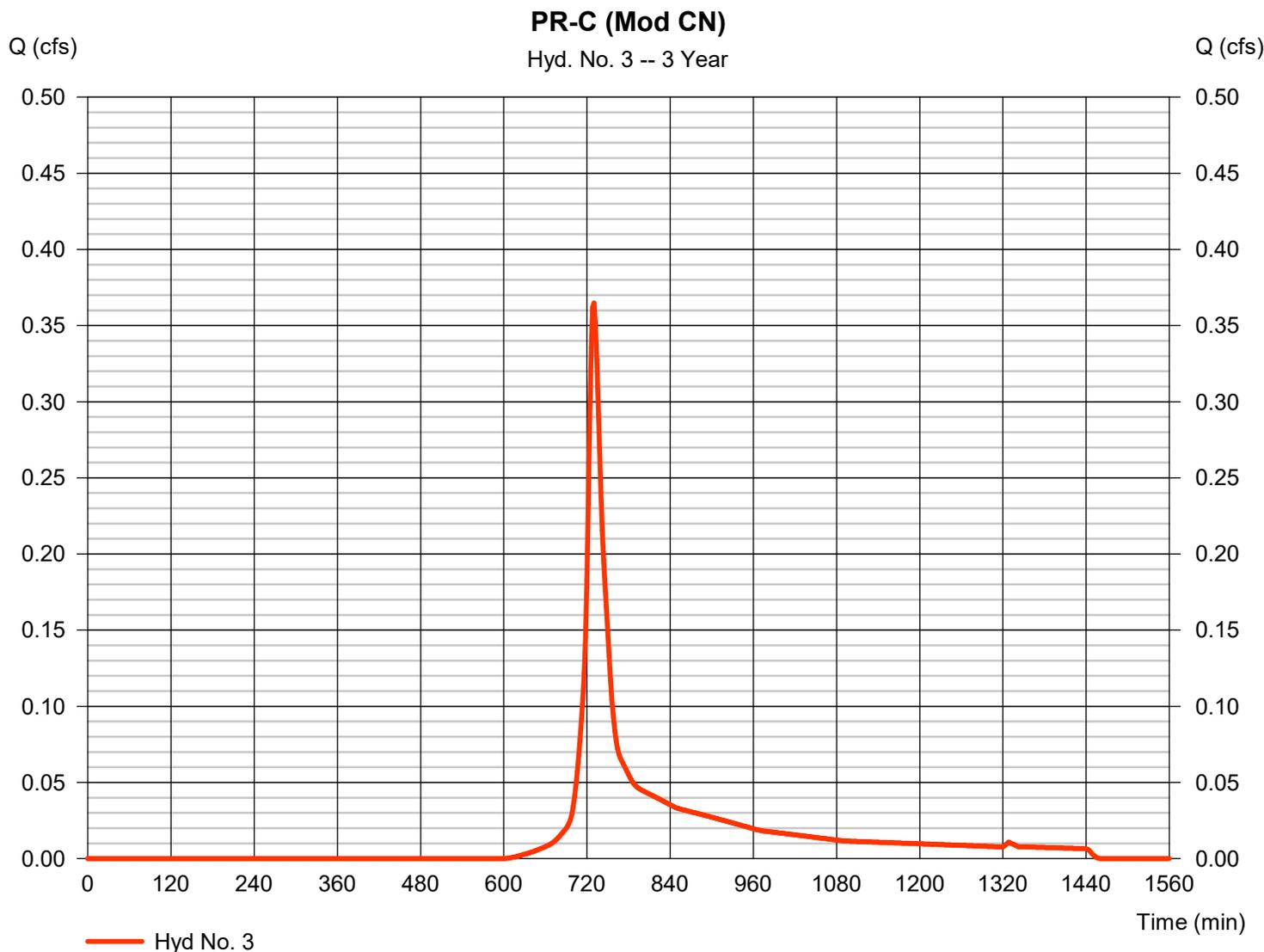
Thursday, 06 / 30 / 2022

Hyd. No. 3

PR-C (Mod CN)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.365 cfs
Storm frequency	= 3 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 1,439 cuft
Drainage area	= 0.840 ac	Curve number	= 90*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 12.20 min
Total precip.	= 1.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.370 x 61) + (0.080 x 74) + (0.390 x 98)] / 0.840



TR55 Tc Worksheet

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

Hyd. No. 3

PR-C (Mod CN)

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.240	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.30	0.00	0.00	
Land slope (%)	= 4.00	0.00	0.00	
Travel Time (min)	= 10.65	+ 0.00	+ 0.00	= 10.65
Shallow Concentrated Flow				
Flow length (ft)	= 61.00	0.00	0.00	
Watercourse slope (%)	= 0.80	0.00	0.00	
Surface description	= Paved	Paved	Paved	
Average velocity (ft/s)	=1.82	0.00	0.00	
Travel Time (min)	= 0.56	+ 0.00	+ 0.00	= 0.56
Channel Flow				
X sectional flow area (sqft)	= 0.79	0.79	0.79	
Wetted perimeter (ft)	= 3.14	3.14	3.14	
Channel slope (%)	= 0.60	1.50	6.30	
Manning's n-value	= 0.012	0.012	0.012	
Velocity (ft/s)	=3.82	6.03	12.36	
Flow length (ft)	198.0	25.0	10.0	
Travel Time (min)	= 0.86	+ 0.07	+ 0.01	= 0.95
Total Travel Time, Tc				12.20 min

Hydrograph Report

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

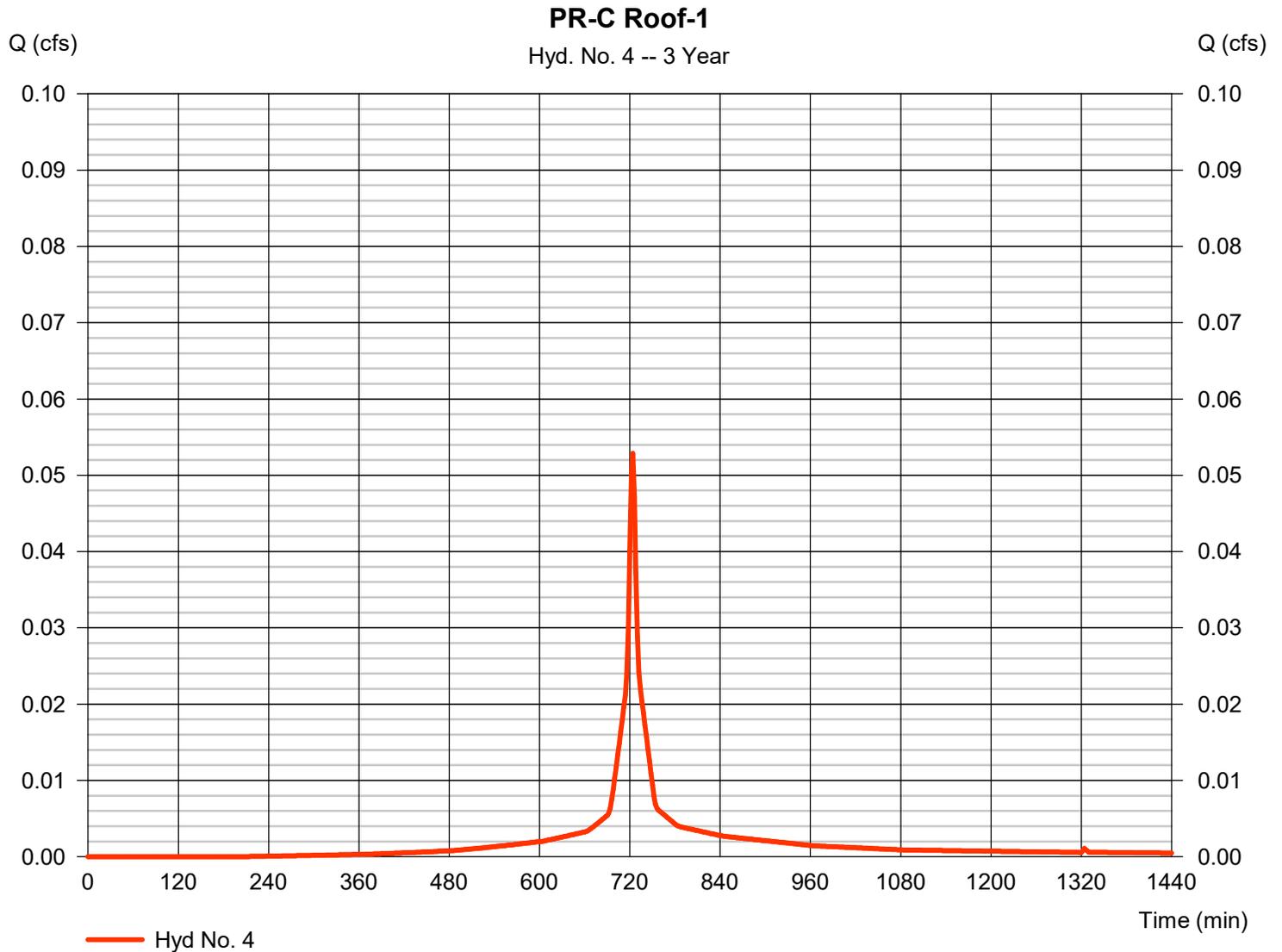
Thursday, 06 / 30 / 2022

Hyd. No. 4

PR-C Roof-1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.053 cfs
Storm frequency	= 3 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 168 cuft
Drainage area	= 0.050 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	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.050 x 98)] / 0.050



Hydrograph Report

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

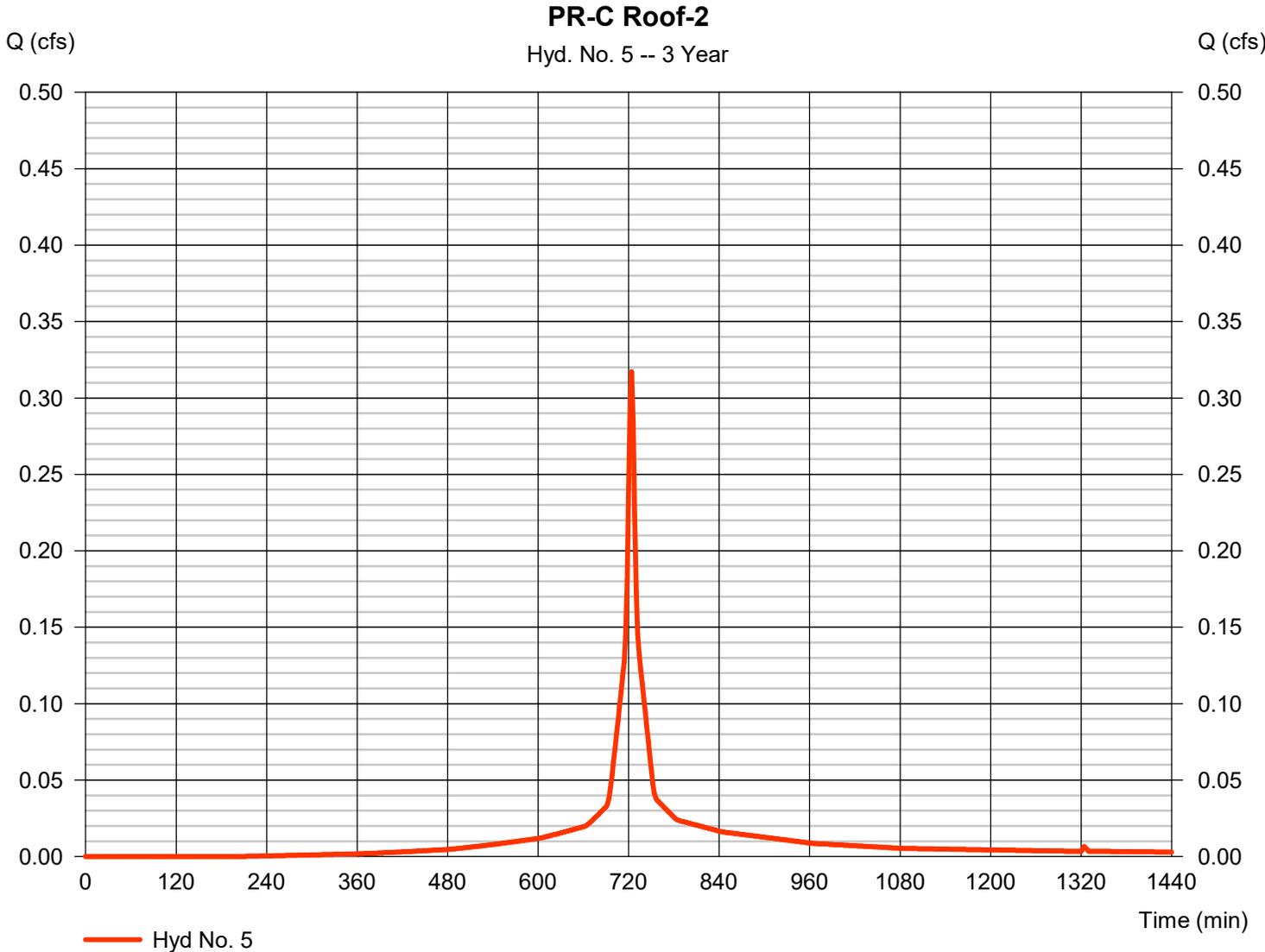
Thursday, 06 / 30 / 2022

Hyd. No. 5

PR-C Roof-2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.317 cfs
Storm frequency	= 3 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,006 cuft
Drainage area	= 0.300 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	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.300 x 98)] / 0.300



Hydrograph Report

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

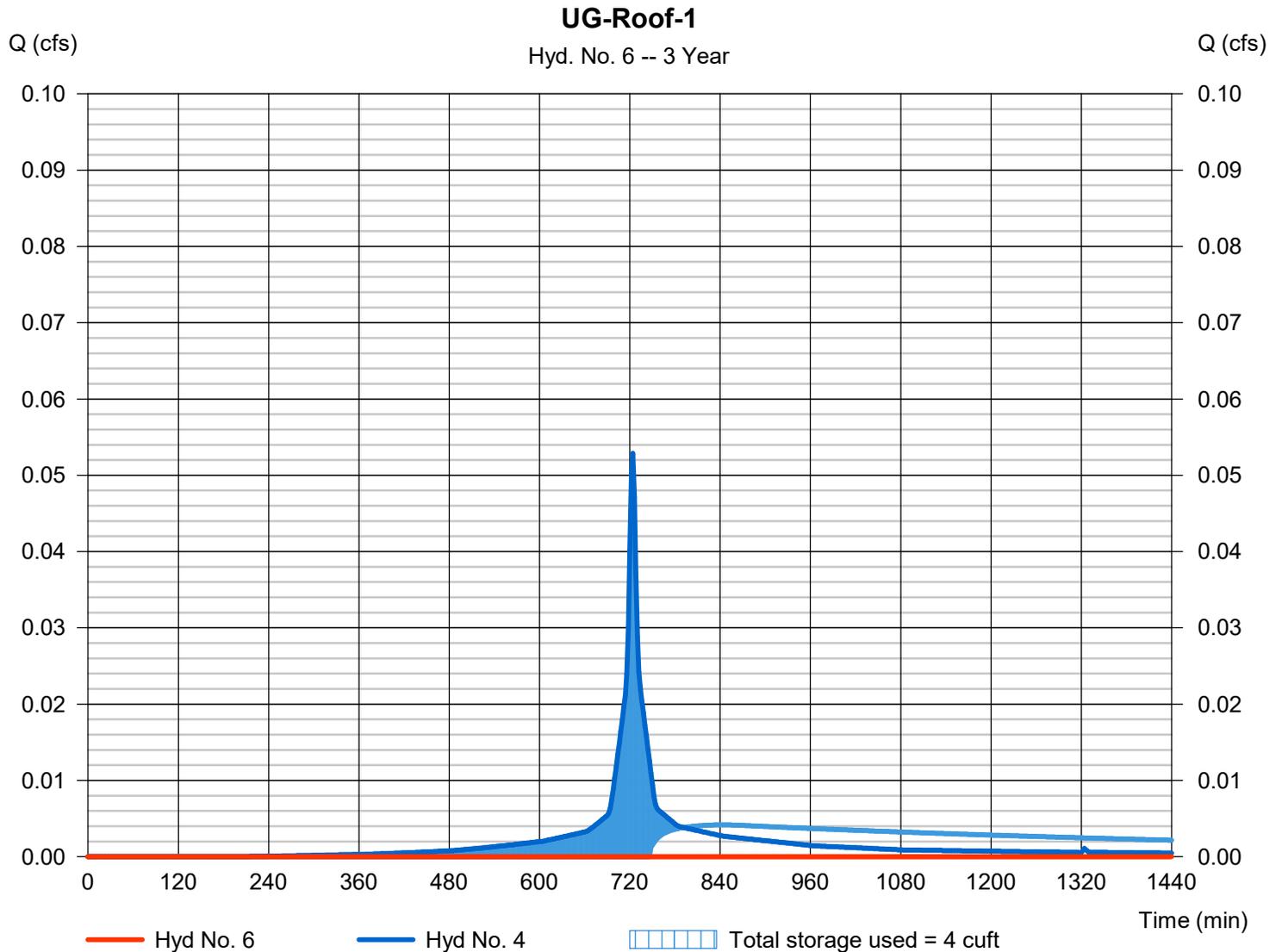
Thursday, 06 / 30 / 2022

Hyd. No. 6

UG-Roof-1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 4 - PR-C Roof-1	Max. Elevation	= 351.70 ft
Reservoir name	= UG-Roof-1	Max. Storage	= 4 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond No. 5 - UG-Roof-1

Pond Data

UG Chambers -Invert elev. = 352.17 ft, Rise x Span = 2.05 x 4.00 ft, Barrel Len = 7.12 ft, No. Barrels = 6, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 351.67 ft, Width = 6.55 ft, Height = 3.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	351.67	n/a	0	0
0.35	352.02	n/a	39	39
0.70	352.37	n/a	60	99
1.05	352.72	n/a	74	173
1.40	353.07	n/a	73	246
1.75	353.42	n/a	70	316
2.10	353.77	n/a	65	381
2.45	354.12	n/a	57	437
2.80	354.47	n/a	41	479
3.15	354.82	n/a	39	518
3.50	355.17	n/a	39	557

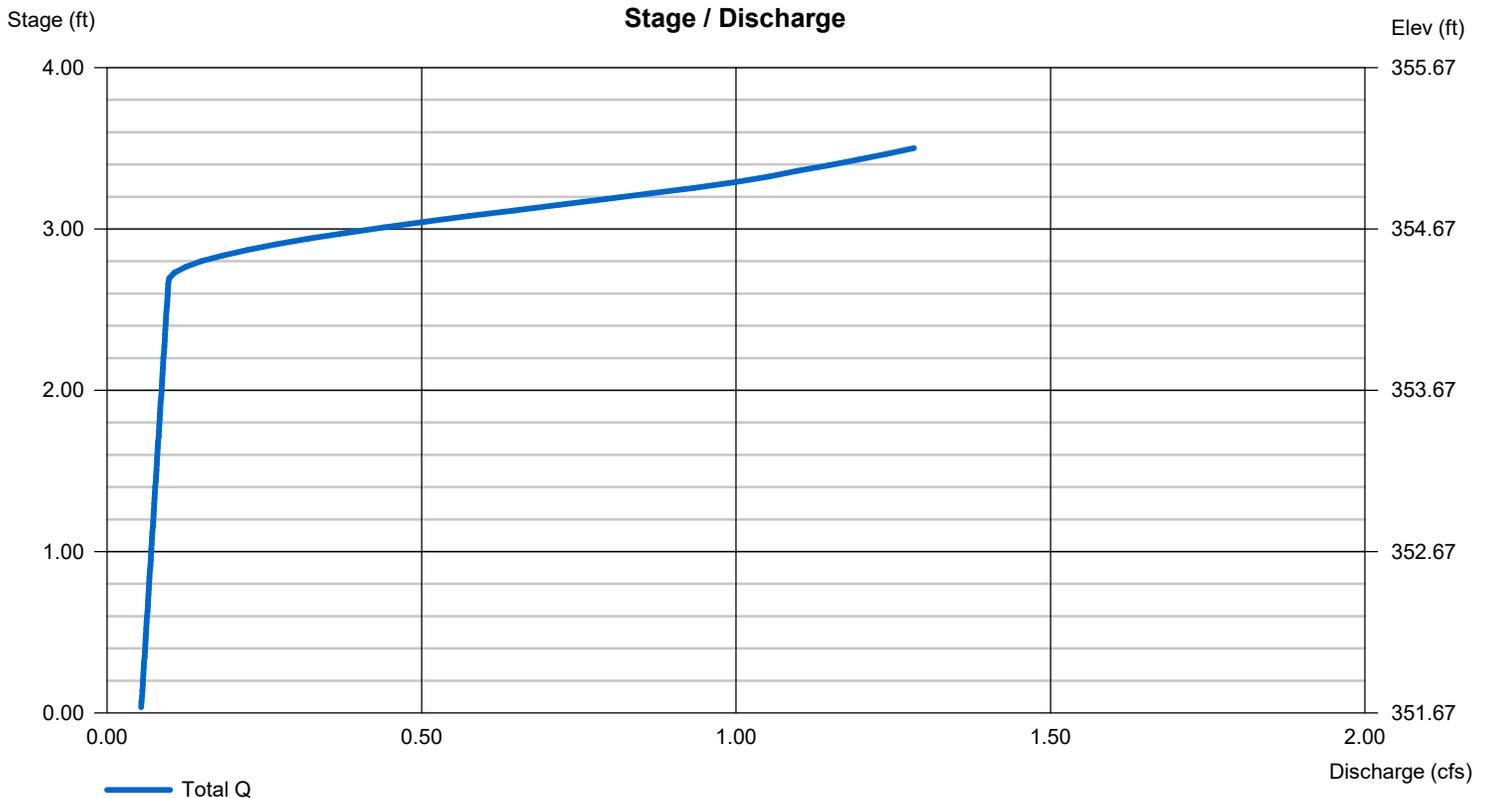
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 8.00	0.00	0.00	0.00
Span (in)	= 8.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 354.35	0.00	0.00	0.00
Length (ft)	= 7.00	0.00	0.00	0.00
Slope (%)	= 5.00	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 8.270 (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).



Hydrograph Report

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

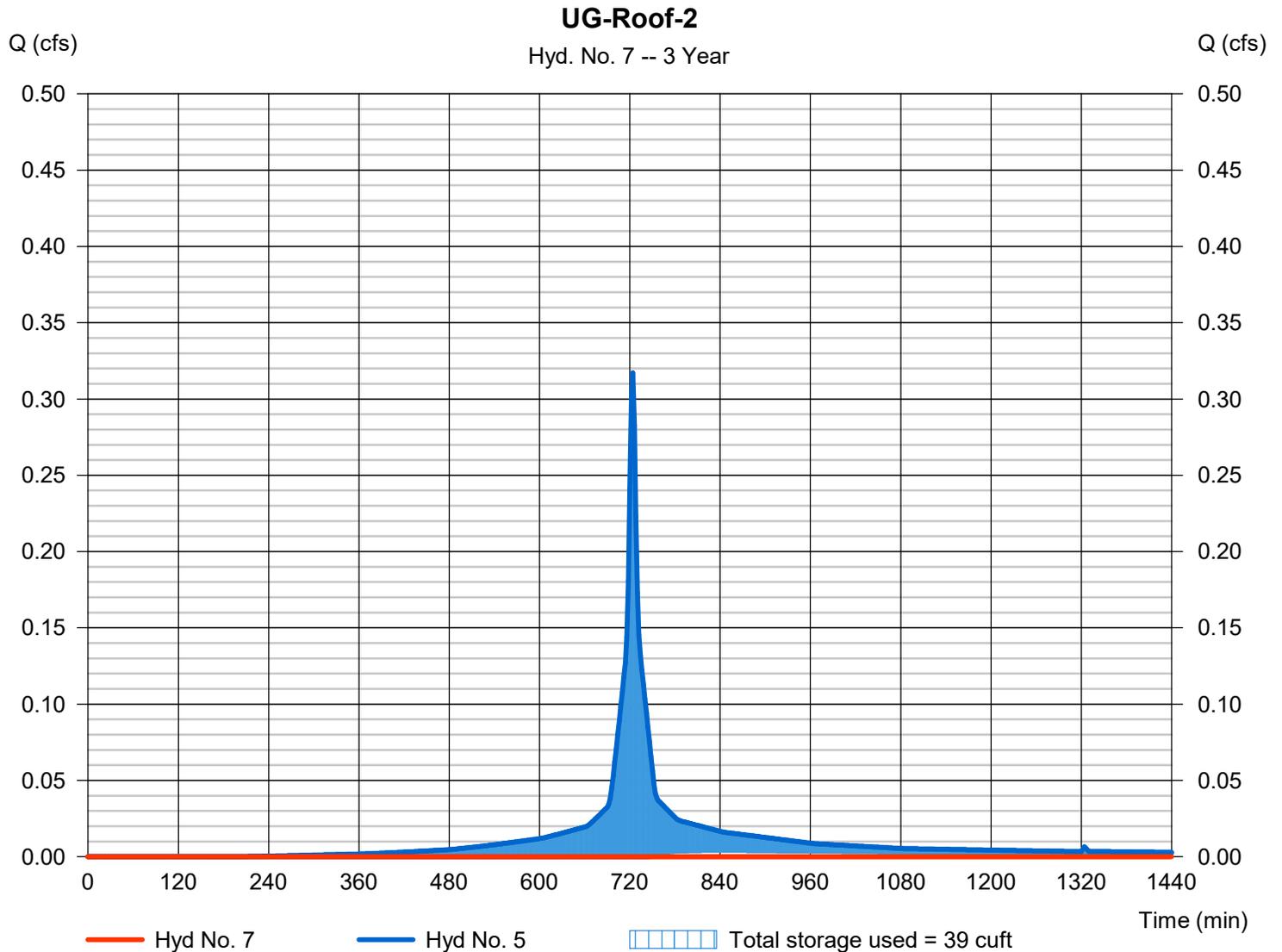
Thursday, 06 / 30 / 2022

Hyd. No. 7

UG-Roof-2

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 5 - PR-C Roof-2	Max. Elevation	= 351.75 ft
Reservoir name	= UG-Roof-2	Max. Storage	= 39 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond No. 6 - UG-Roof-2

Pond Data

UG Chambers -Invert elev. = 352.17 ft, Rise x Span = 2.05 x 4.00 ft, Barrel Len = 7.12 ft, No. Barrels = 32, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 351.67 ft, Width = 5.31 ft, Height = 3.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	351.67	n/a	0	0
0.35	352.02	n/a	169	169
0.70	352.37	n/a	279	448
1.05	352.72	n/a	357	805
1.40	353.07	n/a	348	1,154
1.75	353.42	n/a	332	1,486
2.10	353.77	n/a	306	1,792
2.45	354.12	n/a	263	2,055
2.80	354.47	n/a	181	2,236
3.15	354.82	n/a	169	2,405
3.50	355.17	n/a	169	2,575

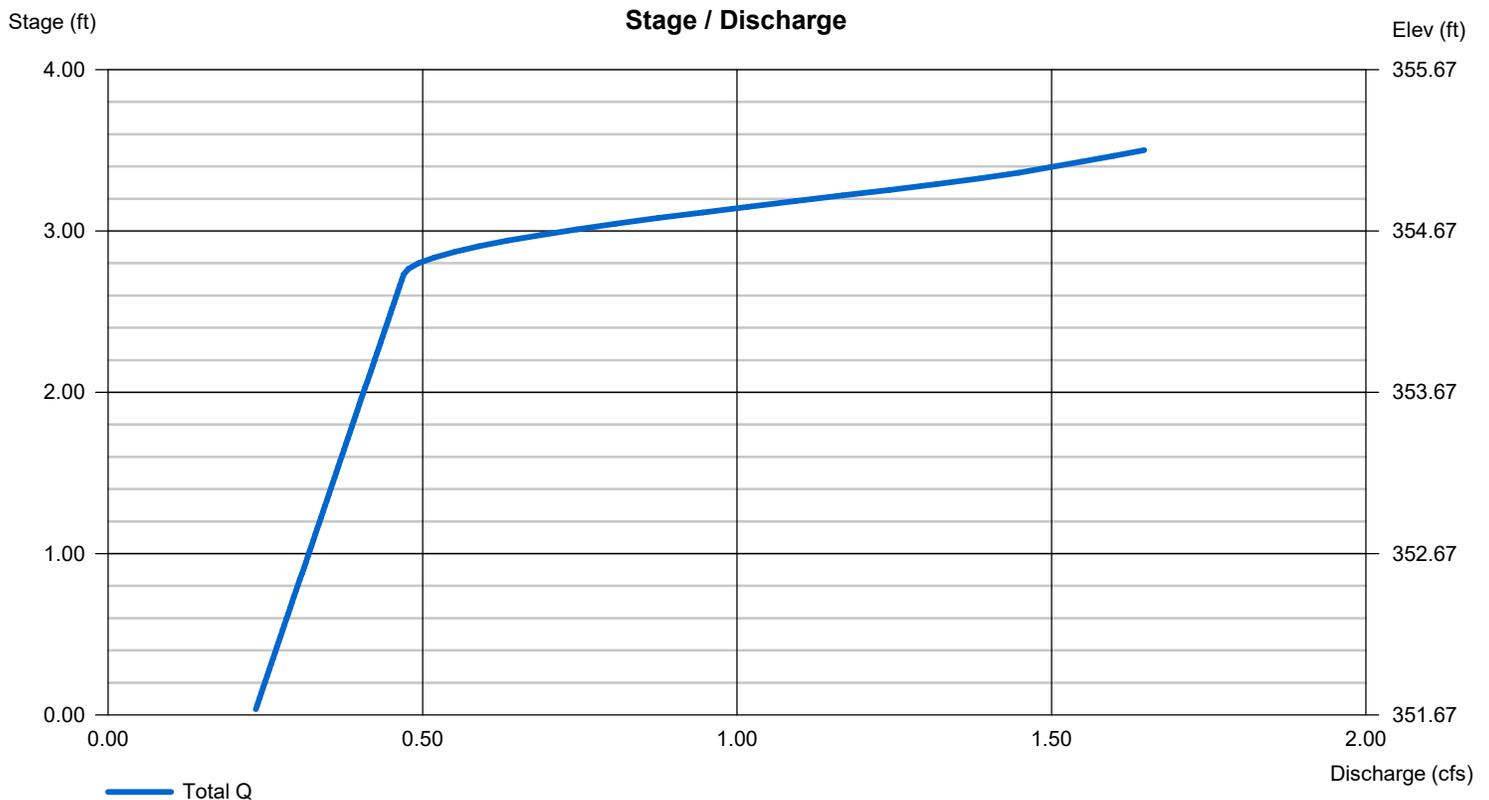
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 8.00	0.00	0.00	0.00
Span (in)	= 8.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 354.40	0.00	0.00	0.00
Length (ft)	= 9.00	0.00	0.00	0.00
Slope (%)	= 10.00	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 8.270	(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).



Hydrograph Report

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

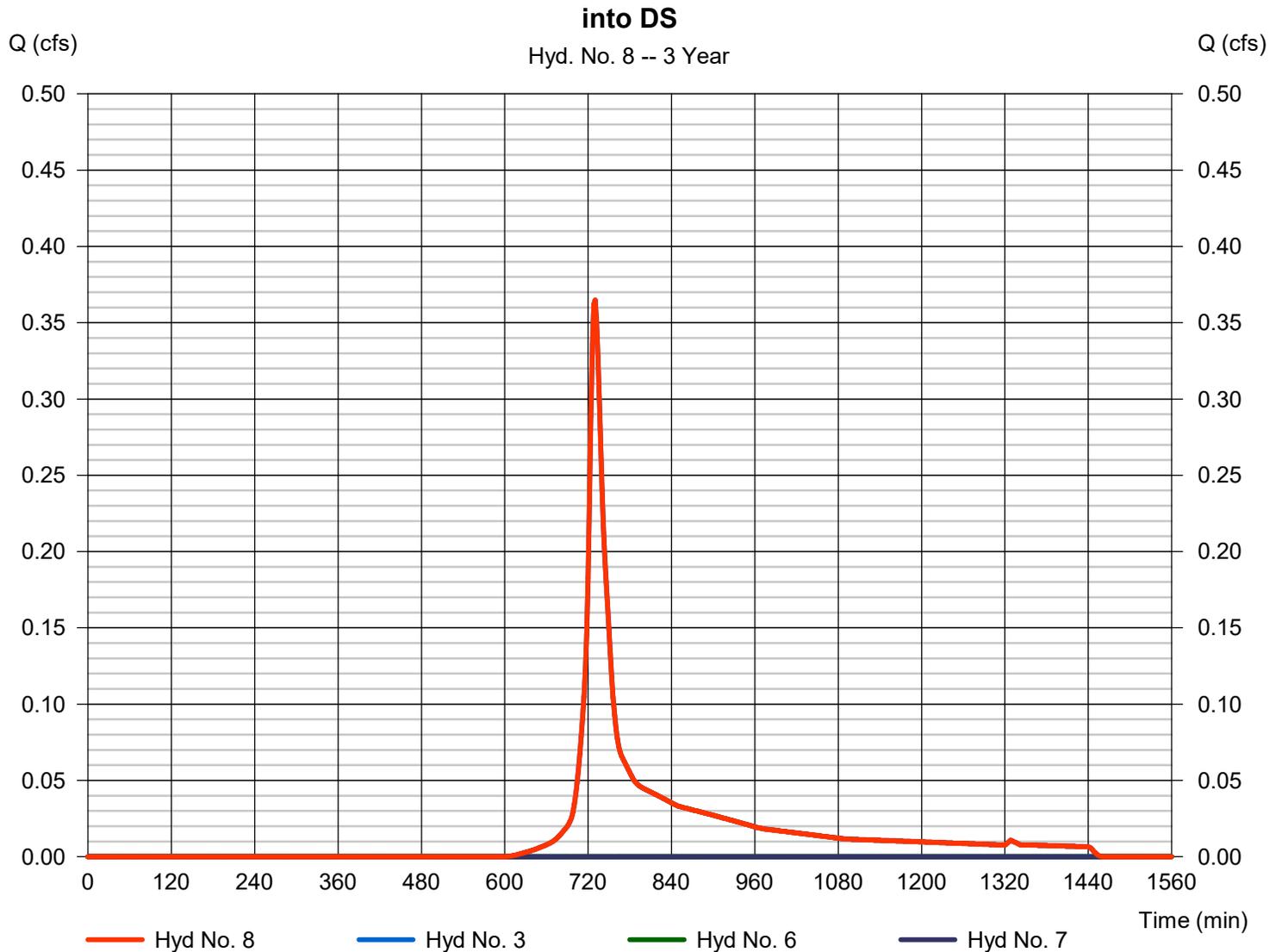
Thursday, 06 / 30 / 2022

Hyd. No. 8

into DS

Hydrograph type = Combine
Storm frequency = 3 yrs
Time interval = 2 min
Inflow hyds. = 3, 6, 7

Peak discharge = 0.365 cfs
Time to peak = 730 min
Hyd. volume = 1,439 cuft
Contrib. drain. area = 0.840 ac



Hydrograph Report

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

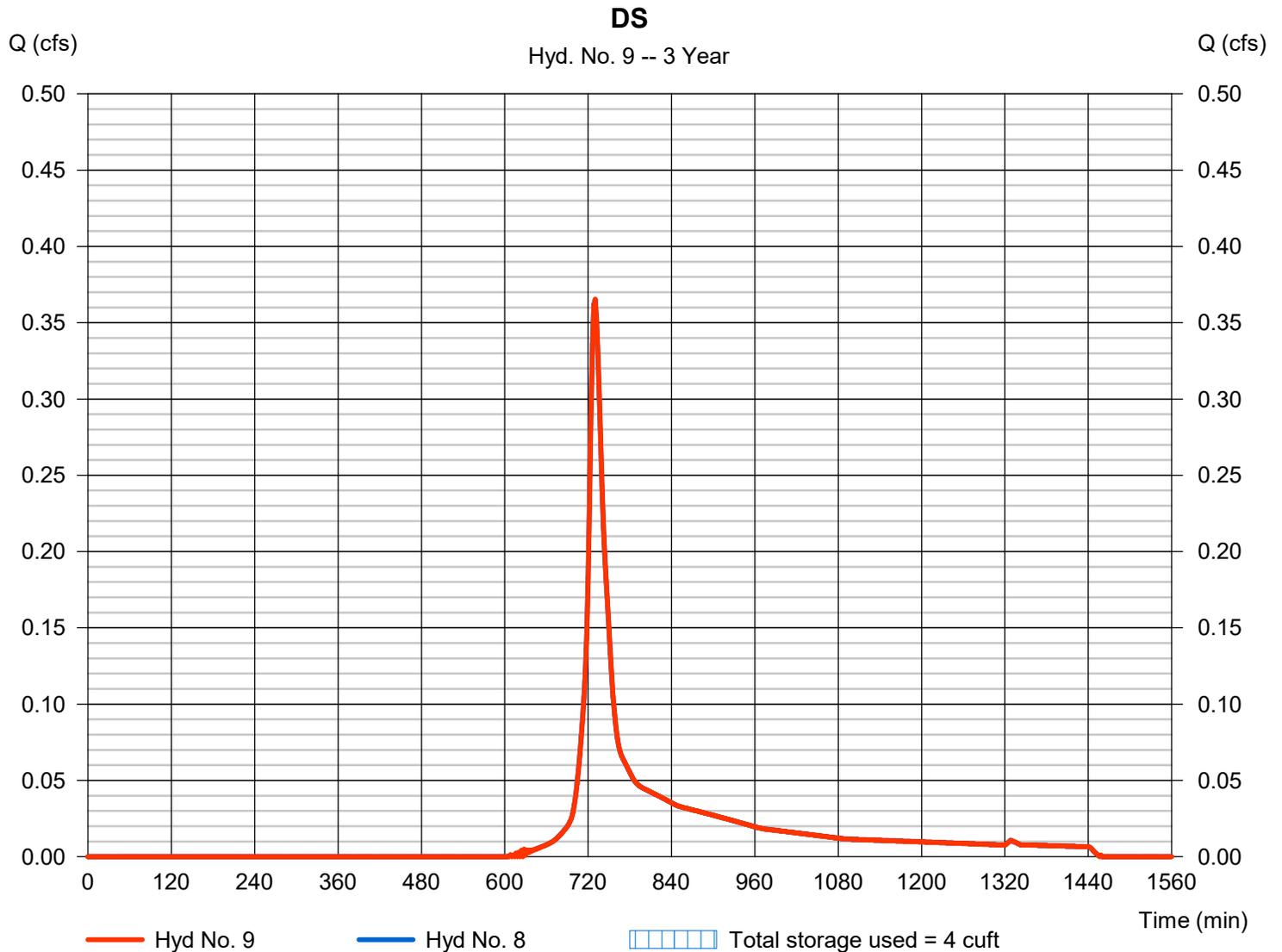
Thursday, 06 / 30 / 2022

Hyd. No. 9

DS

Hydrograph type	= Reservoir	Peak discharge	= 0.365 cfs
Storm frequency	= 3 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 1,439 cuft
Inflow hyd. No.	= 8 - into DS	Max. Elevation	= 352.36 ft
Reservoir name	= DS	Max. Storage	= 4 cuft

Storage Indication method used.



Pond No. 1 - DS

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 352.16 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	352.16	18	0	0
4.84	357.00	18	89	89

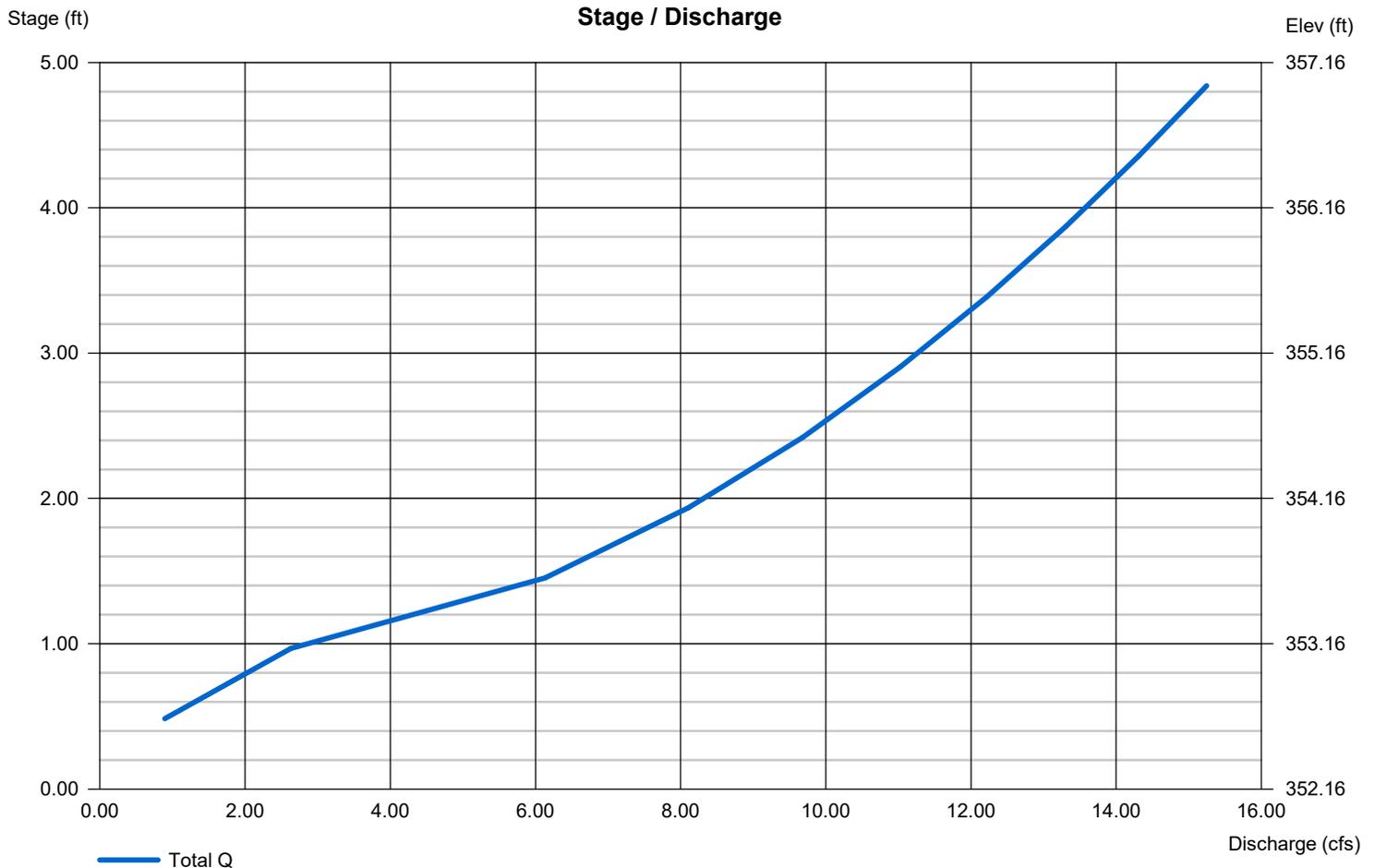
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	12.00	0.00	0.00
Span (in)	= 12.00	12.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 352.70	352.16	0.00	0.00
Length (ft)	= 39.00	11.00	0.00	0.00
Slope (%)	= 9.50	1.50	0.00	n/a
N-Value	= .012	.012	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000 (by Contour)			
TW Elev. (ft)	= 0.00			

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



Hydrograph Report

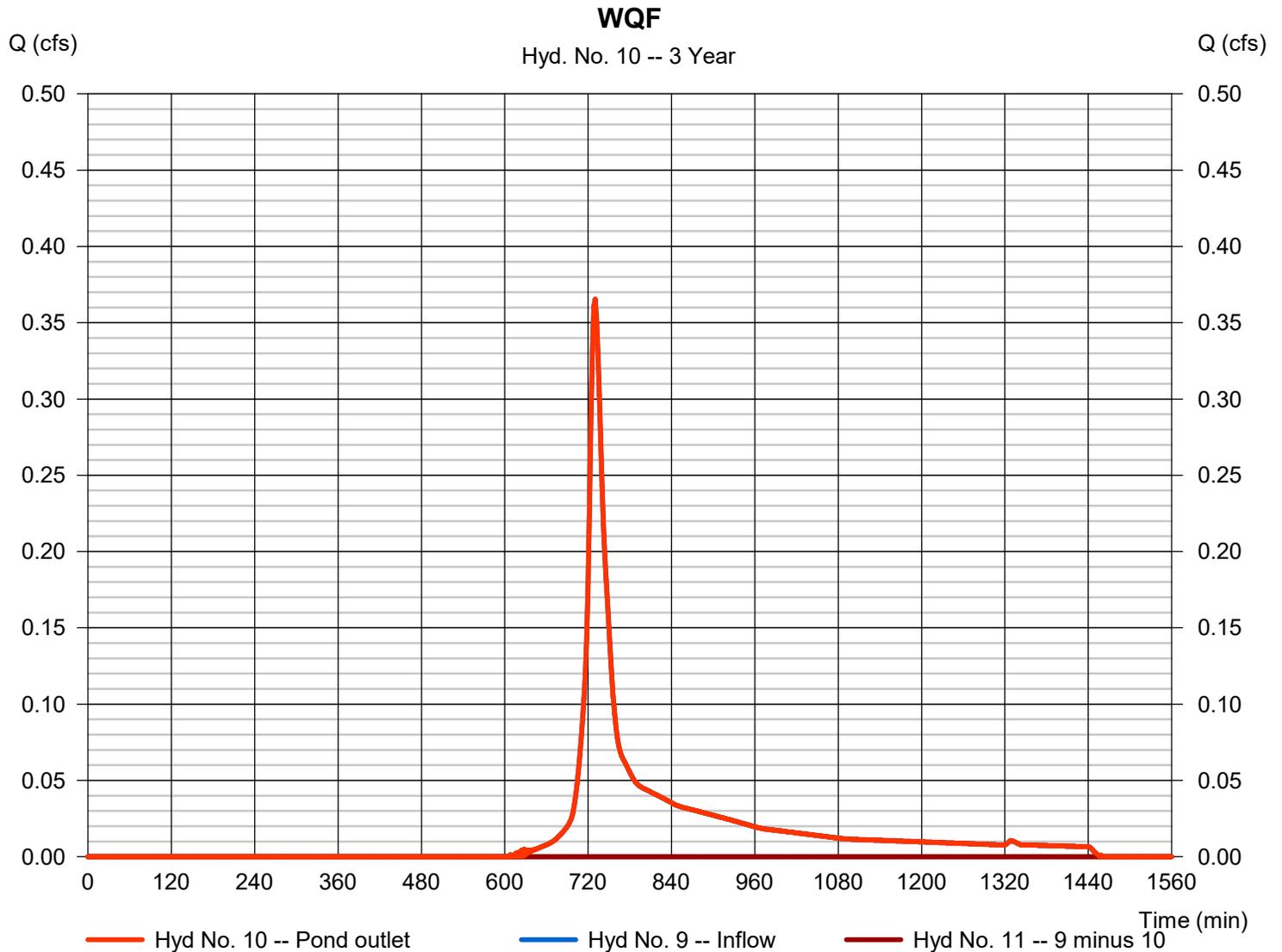
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Thursday, 06 / 30 / 2022

Hyd. No. 10

WQF

Hydrograph type	= Diversion1	Peak discharge	= 0.365 cfs
Storm frequency	= 3 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 1,439 cuft
Inflow hydrograph	= 9 - DS	2nd diverted hyd.	= 11
Diversion method	= Pond - DS	Pond structure	= Culv/Orf B



Hydrograph Report

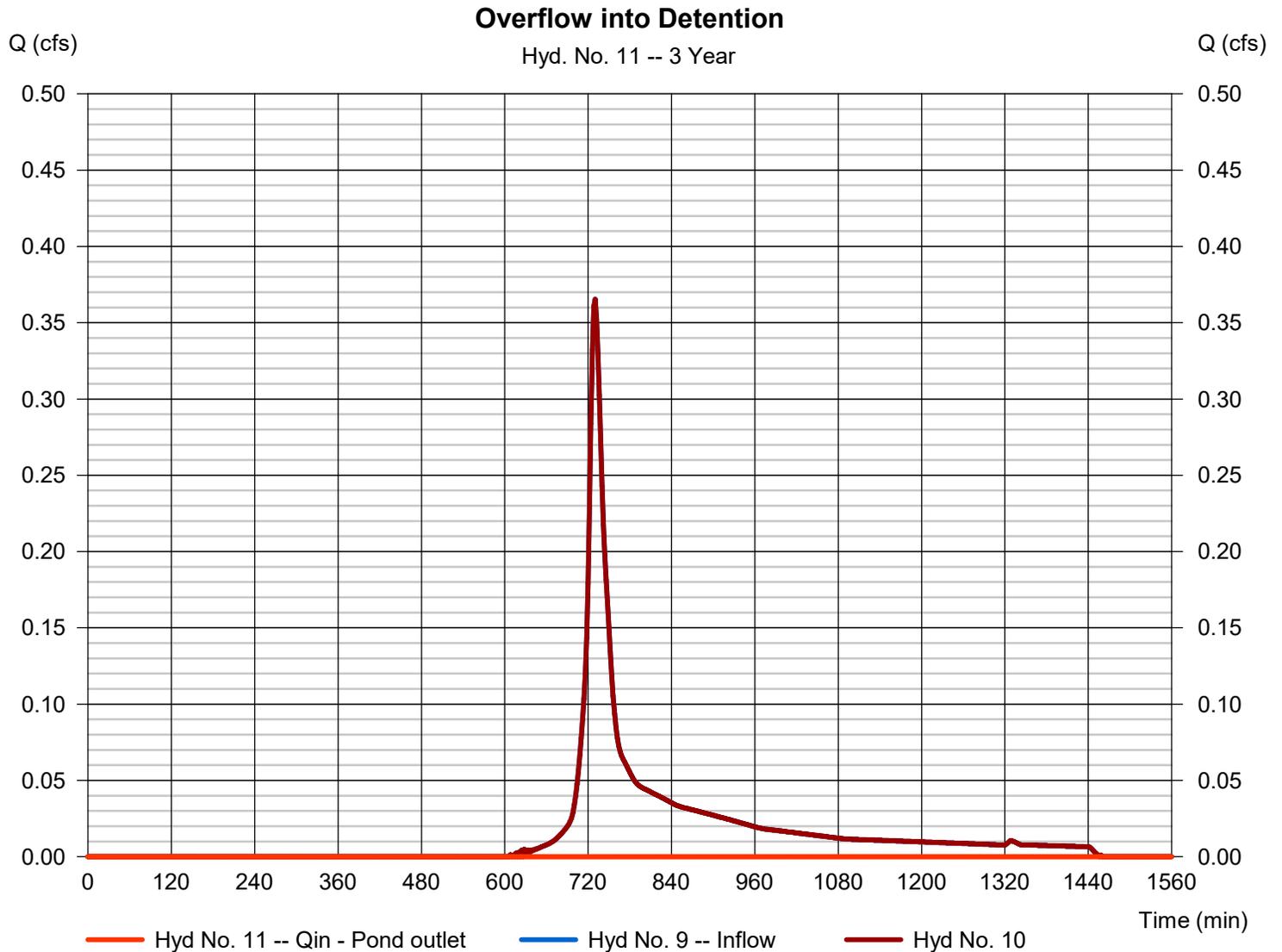
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Thursday, 06 / 30 / 2022

Hyd. No. 11

Overflow into Detention

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 9 - DS	2nd diverted hyd.	= 10
Diversion method	= Pond - DS	Pond structure	= Culv/Orf B



Hydrograph Report

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

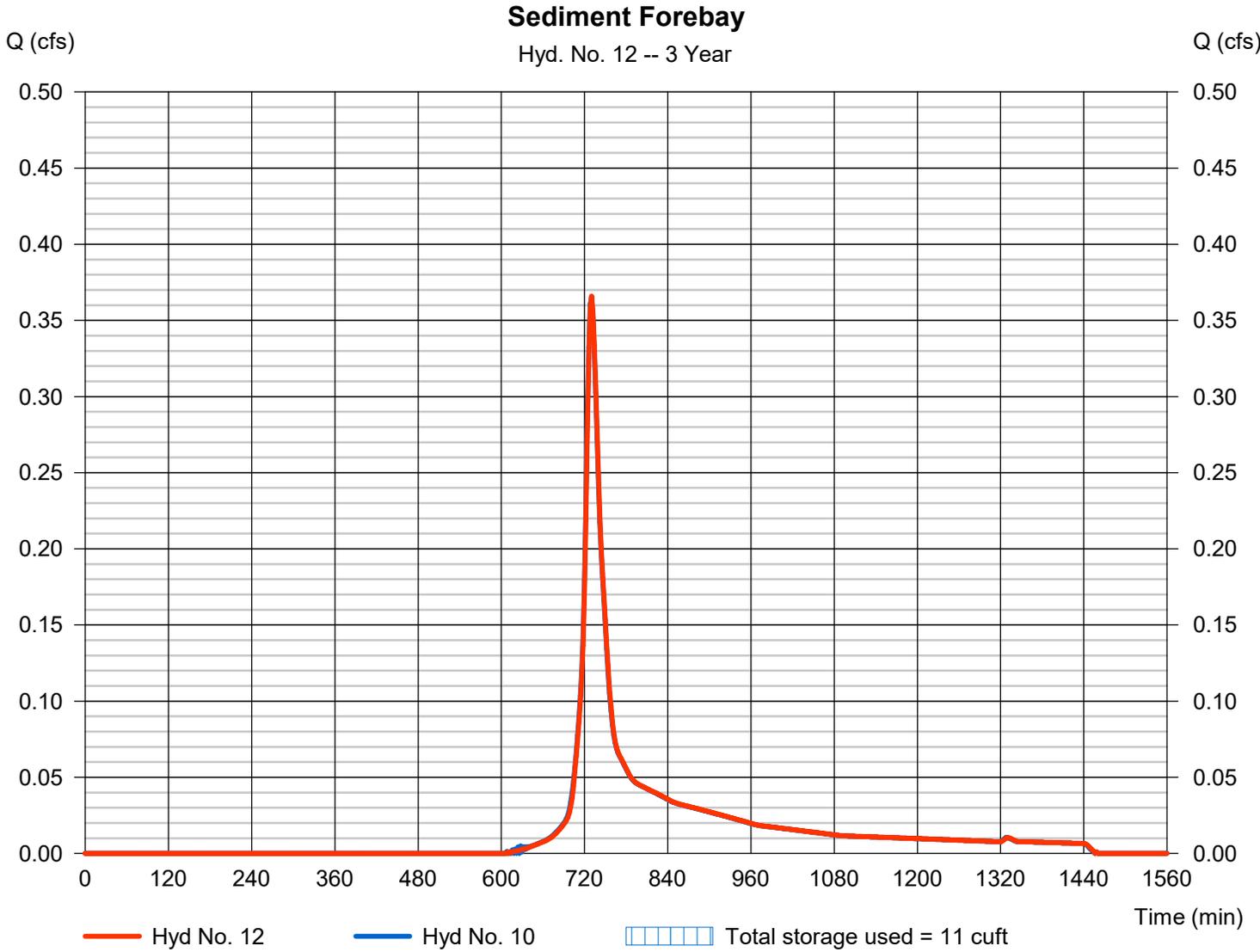
Thursday, 06 / 30 / 2022

Hyd. No. 12

Sediment Forebay

Hydrograph type	= Reservoir	Peak discharge	= 0.366 cfs
Storm frequency	= 3 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 1,439 cuft
Inflow hyd. No.	= 10 - WQF	Max. Elevation	= 352.35 ft
Reservoir name	= Sediment Forebay	Max. Storage	= 11 cuft

Storage Indication method used.



Pond No. 2 - Sediment Forebay

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 352.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	352.00	10	0	0
1.00	353.00	62	32	32
2.00	354.00	157	106	138
3.00	355.00	291	221	358
4.00	356.00	450	368	726

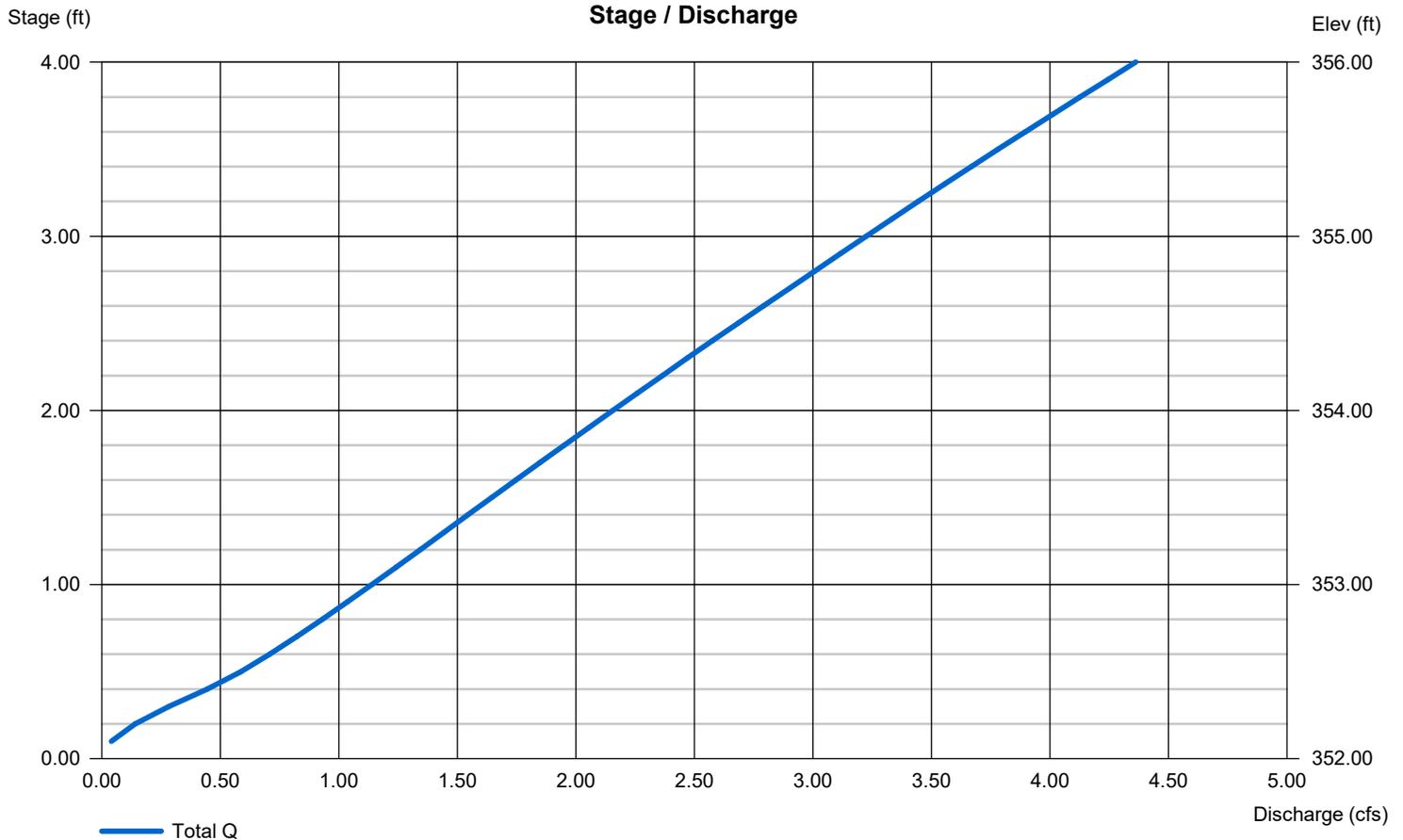
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	0.00	0.00	0.75
Span (in)	= 6.00	0.00	0.00	0.75
No. Barrels	= 1	0	0	130
Invert El. (ft)	= 352.00	0.00	0.00	352.00
Length (ft)	= 20.00	0.00	0.00	4.00
Slope (%)	= 2.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	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).



Hydrograph Report

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

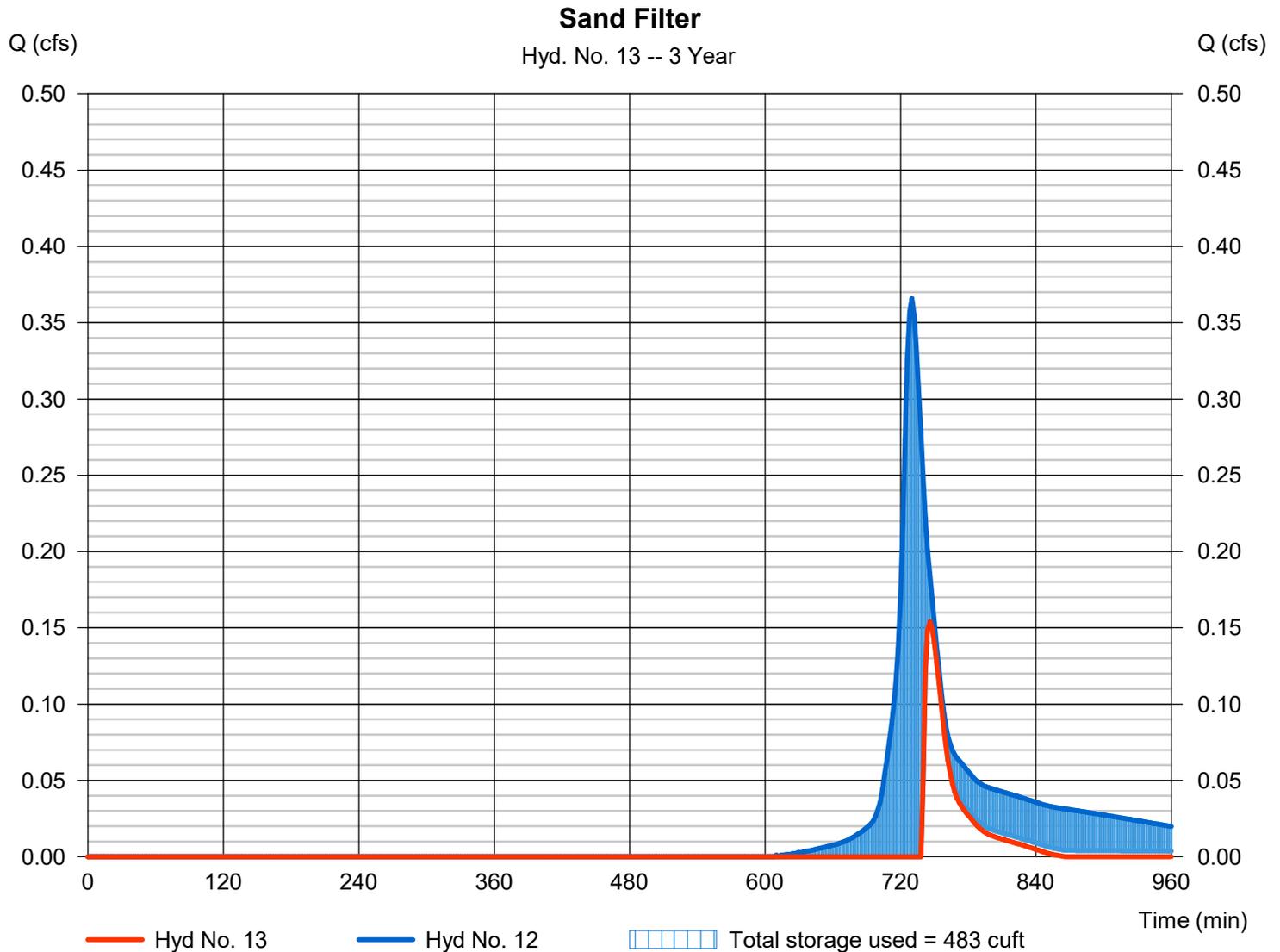
Thursday, 06 / 30 / 2022

Hyd. No. 13

Sand Filter

Hydrograph type	= Reservoir	Peak discharge	= 0.154 cfs
Storm frequency	= 3 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 247 cuft
Inflow hyd. No.	= 12 - Sediment Forebay	Max. Elevation	= 352.47 ft
Reservoir name	= Sand Filter	Max. Storage	= 483 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond No. 3 - Sand Filter

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 351.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	351.50	345	0	0
0.75	352.25	520	322	322
2.50	354.00	996	1,304	1,626

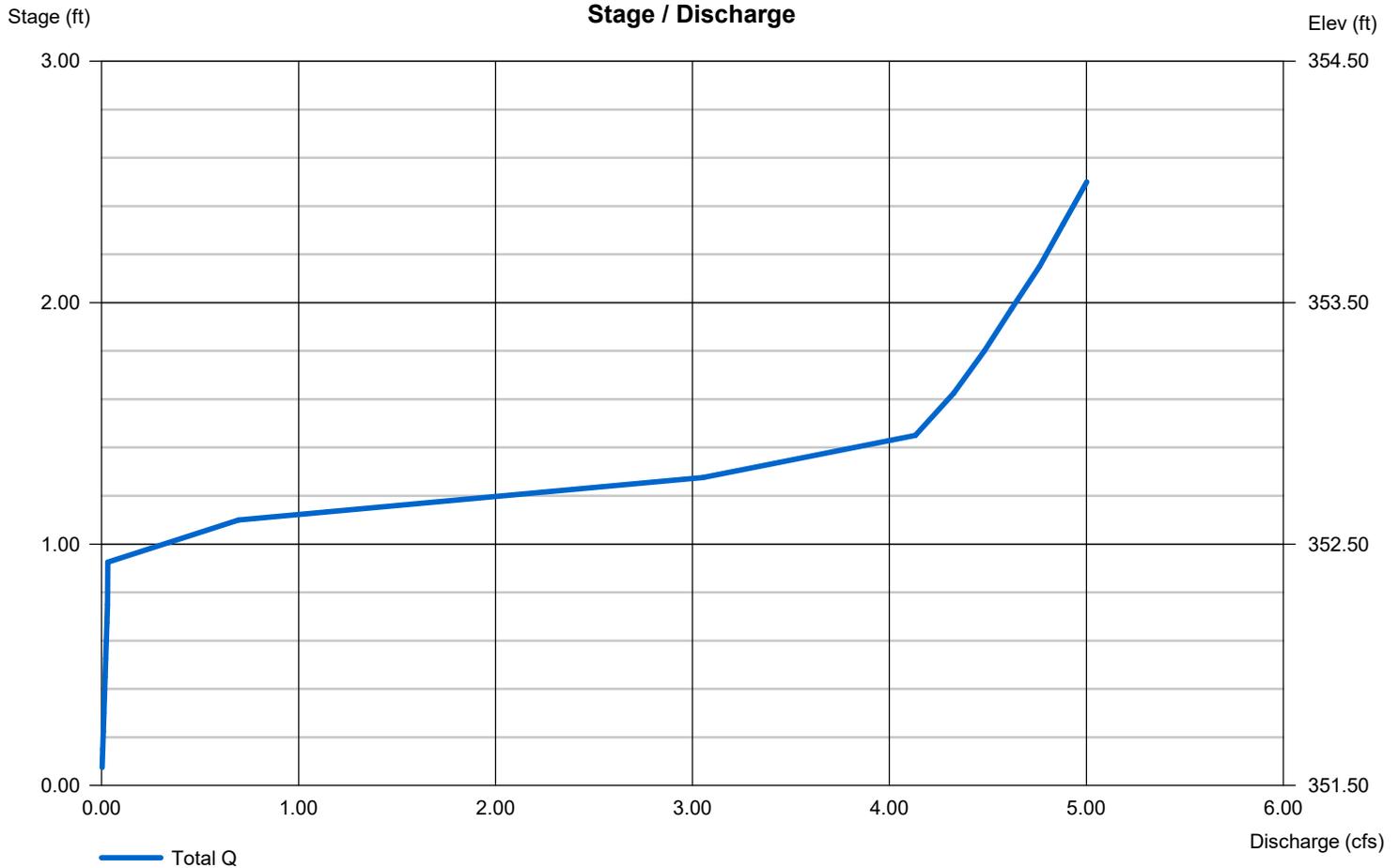
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 10.00	0.00	0.00	0.00
Span (in)	= 10.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 350.00	0.00	0.00	0.00
Length (ft)	= 15.00	0.00	0.00	0.00
Slope (%)	= 6.70	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 6.28	0.00	0.00	0.00
Crest El. (ft)	= 352.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 2.410 (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).



Hydrograph Report

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

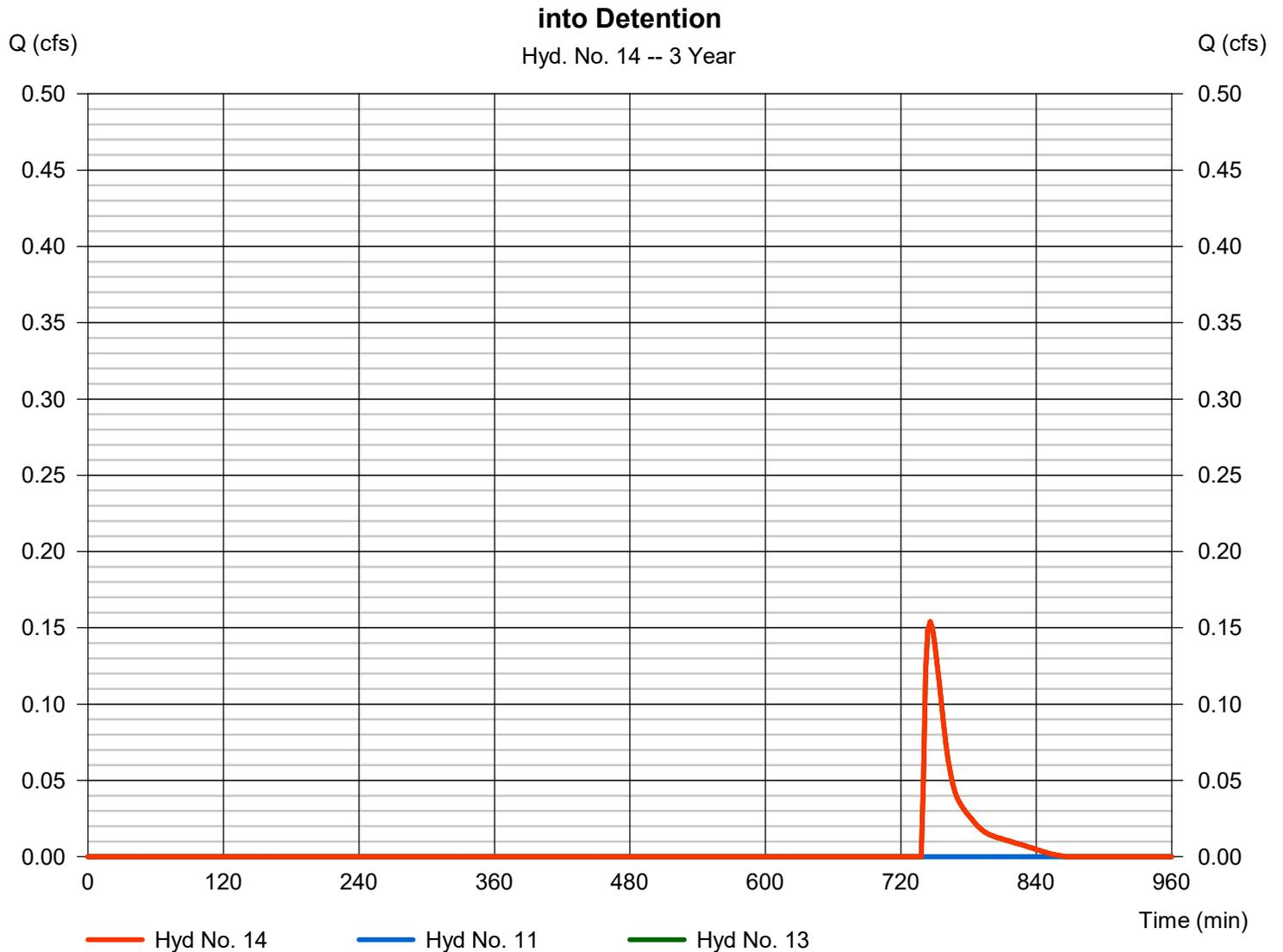
Thursday, 06 / 30 / 2022

Hyd. No. 14

into Detention

Hydrograph type = Combine
Storm frequency = 3 yrs
Time interval = 2 min
Inflow hyds. = 11, 13

Peak discharge = 0.154 cfs
Time to peak = 746 min
Hyd. volume = 247 cuft
Contrib. drain. area = 0.000 ac



Hydrograph Report

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

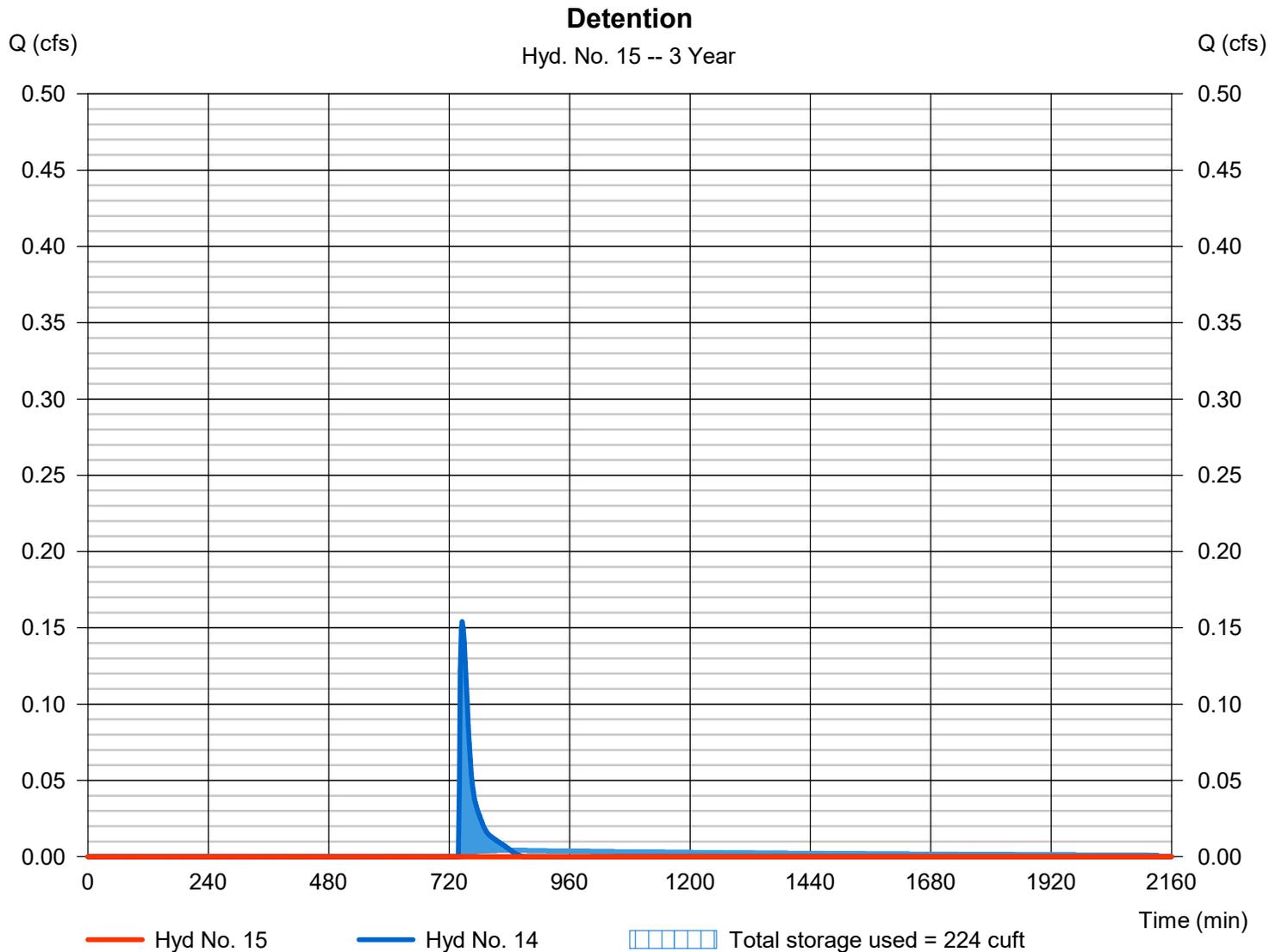
Thursday, 06 / 30 / 2022

Hyd. No. 15

Detention

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= 756 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 14 - into Detention	Max. Elevation	= 349.23 ft
Reservoir name	= Detention	Max. Storage	= 224 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond No. 4 - Detention

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 349.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	349.00	966	0	0
3.00	352.00	967	2,899	2,899
3.01	352.01	1,223	11	2,910
6.00	355.00	1,224	3,658	6,568

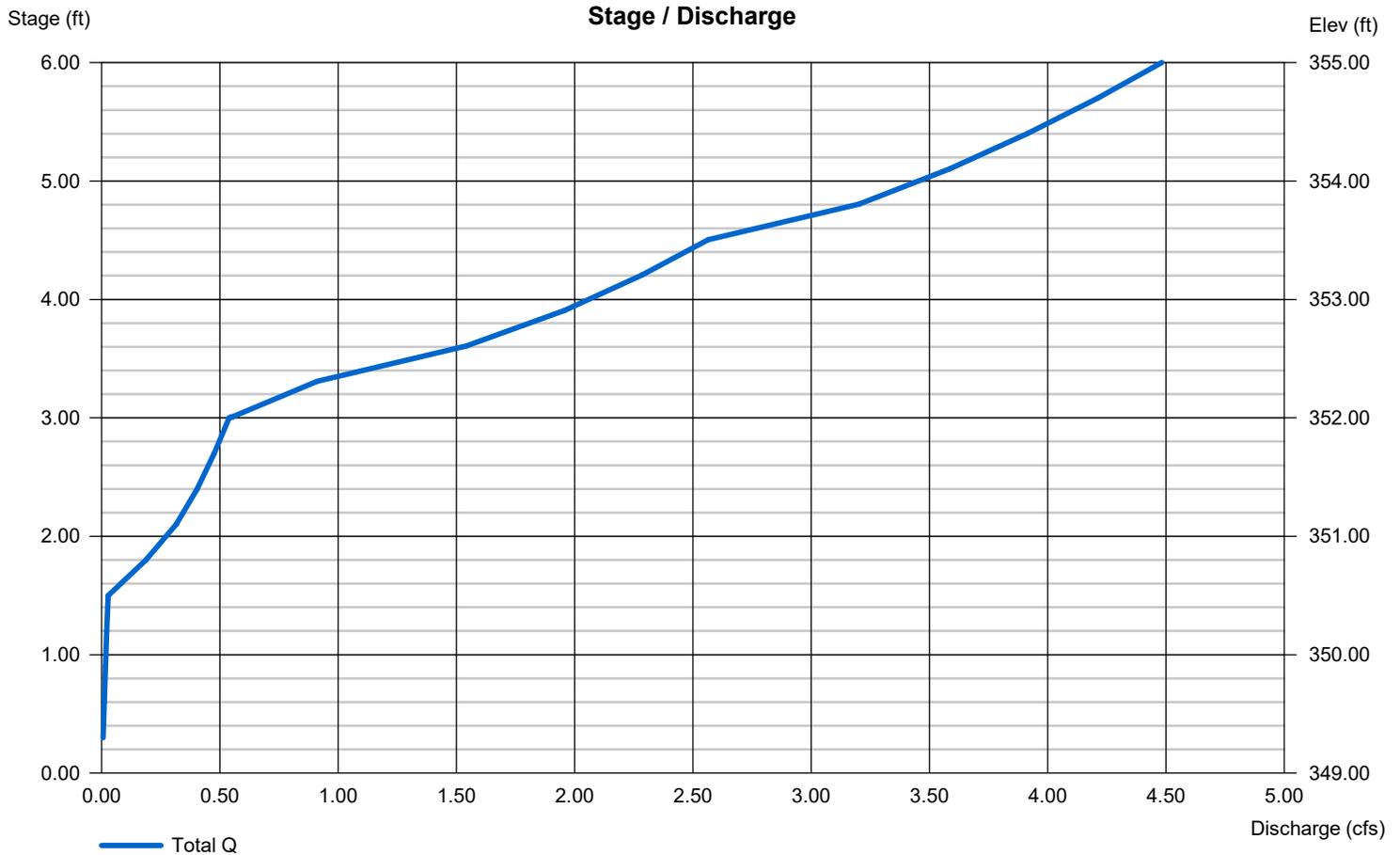
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	4.00	8.00	0.00
Span (in)	= 12.00	4.00	8.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 350.00	350.50	352.00	0.00
Length (ft)	= 23.00	0.00	0.00	0.00
Slope (%)	= 4.30	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 1.50	0.00	0.00	0.00
Crest El. (ft)	= 353.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 2.410 (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).



Hydrograph Report

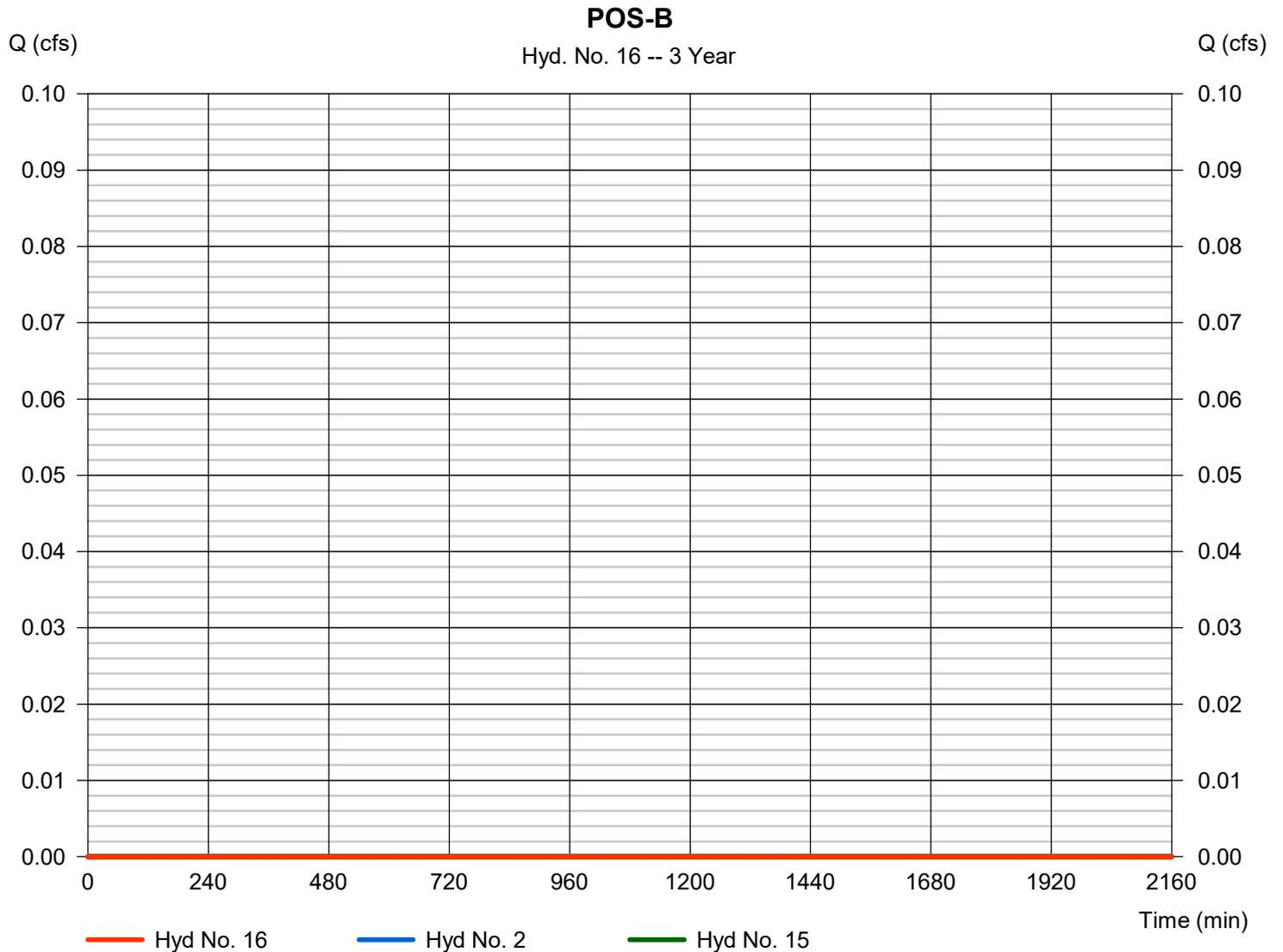
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

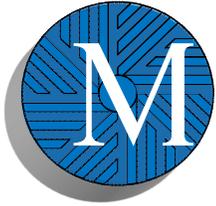
Thursday, 06 / 30 / 2022

Hyd. No. 16

POS-B

Hydrograph type	= Combine	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= 756 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyds.	= 2, 15	Contrib. drain. area	= 2.130 ac



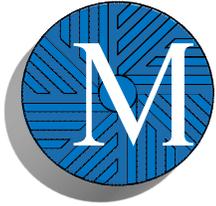


Commercial Condominiums
A.P. 36, Lots 8 and 37
Cranston, RI
Stormwater Management Plan
Revised 12/13/2022

Appendix G

Pipe Sizing Worksheet

From	To	Ai (sf)	Ai (ac)	Ap (sf)	Ap (ac)	Atotal (ac)	C _i	C _p	C _{weighted}	Tc (min)	Q _{actual} (cfs)	Length (ft)	Pipe Dia. (in)	Wall Thickness (in)	n	U/S Invert Elev (ft)	D/S Invert Elev (ft)	Pipe Slope	V _{capacity} (fps)	Q _{capacity} (cfs)	Pipe Size Check	"To" Rim Elev (ft)	Cover Check
																						357.00	2.00
CB-1	CB-2	3,716.00	0.09	5,995.00	0.14	0.22	0.90	0.18	0.46	5.90	0.76	99.00	12	1.25	0.012	353.79	353.30	0.005	3.47	2.73	OK	357.00	2.49
CB-2	CB-3	9,029.00	0.21	9,849.00	0.23	0.43	0.90	0.18	0.52	6.38	1.67	99.00	12	1.25	0.012	353.30	352.80	0.005	3.47	2.73	OK	357.00	2.99
CB-3	CB-4	15,908.00	0.37	12,255.00	0.28	0.65	0.90	0.18	0.59	6.85	2.74	98.00	12	1.25	0.012	352.80	352.21	0.006	3.80	2.99	OK	357.00	3.58
CB-4	DS	19,232.00	0.44	14,032.00	0.32	0.76	0.90	0.18	0.60	7.28	3.23	6.00	12	1.25	0.012	352.21	352.17	0.008	4.39	3.45	OK	357.00	3.63
UG-Roof-1	CB-4											7.00	8	0.55	0.012	354.35	354.00	0.050				357.11	2.00
UG-Roof-2	CB-4											9.00	8	0.55	0.012	354.40	353.50	0.100				357.20	2.04
DS	Forebay											11.00	12	1.25	0.012	352.17	352.00	0.015				357.00	3.63
DS	Detention											39.00	12	1.25	0.012	352.70	349.00	0.095				357.00	3.09
Forebay	Filter											20.00	6	0.45	0.012	352.00	351.50	0.025					
Filter	Detention											15.00	10	0.70	0.012	350.00	349.00	0.067					
Detention	Outlet											23.00	12	1.25	0.012	350.00	349.00	0.043					

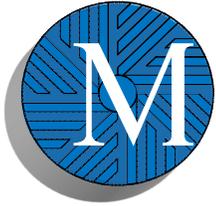


Commercial Condominiums
A.P. 36, Lots 8 and 37
Cranston, RI
Stormwater Management Plan
Revised 12/13/2022

Appendix H

Stormwater Management Operation and Maintenance Plan

(See Stand-Alone O&M Plan)



Appendix I

Supporting Documentation

- Rainfall data
- Soils Data & Evaluation Forms

Table 3-1 Design Rainfall Amounts for Rhode Island

RI County	24-hour (Type III) Rainfall Amount (inches)*									
	1-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year			
Providence County	2.7	3.3	4.1	4.9	6.1	7.3	8.7			
Bristol County	2.8	3.3	4.1	4.9	6.1	7.3	8.6			
Newport County	2.8	3.3	4.1	4.9	6.1	7.3	8.6			
Kent County	2.7	3.3	4.1	4.8	6.2	7.3	8.7			
Washington County	2.8	3.3	4.1	4.9	6.1	7.2	8.5			

*All Rhode Island County rainfall values were obtained from the Northeast Regional Climate Center (NRCC) using regional rainfall data processed by NRCC from the period of record through December 2008. The NRCC in collaboration with the Natural Resource Conservation Service has under development an interactive web tool at www.precip.net for analysis of precipitation events based on long-term, station-specific data. Applicants may elect to use site-specific data derived from this web tool once the beta site becomes final rather than the RI County values in Table 3-1.



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Environmental Management

Office of Water Resources



Site Evaluation Form
Part A - Soil Profile Description

Application Number DRAINAGE

Property Owner: Dinis and Maria Pedroso

Property Location: Plainfield Pike, AP 36 Lot 8, Cranston

Date of Test Hole: June 17, 2022

Soil Evaluator: Kevin Fetzer License Number: D-4029

Weather: Sunny Shaded: Yes [X] No [] Time: 1200

Table with 12 columns: TH Horizon, Depth, Horizon Boundaries (Dist, Topo), Soil Colors (Matrix, Re-Dox Features), Re-Dox Description (Ab., S., Con.), Texture, Structure, Consistence, in/hr ft/min. Contains data for TH D-1 and TH D-2 profiles.

Soil Class: Ablation Till

Total Depth of each Test Hole: 84" - 84"

Depth to Groundwater Seepage: None Encountered

Depth to Impervious or Limiting Layer: None Encountered

Estimated Seasonal High Water Table: 22" OG - 28" OG

Comments: EG = Existing Grade - OG = Original Grade

Part B

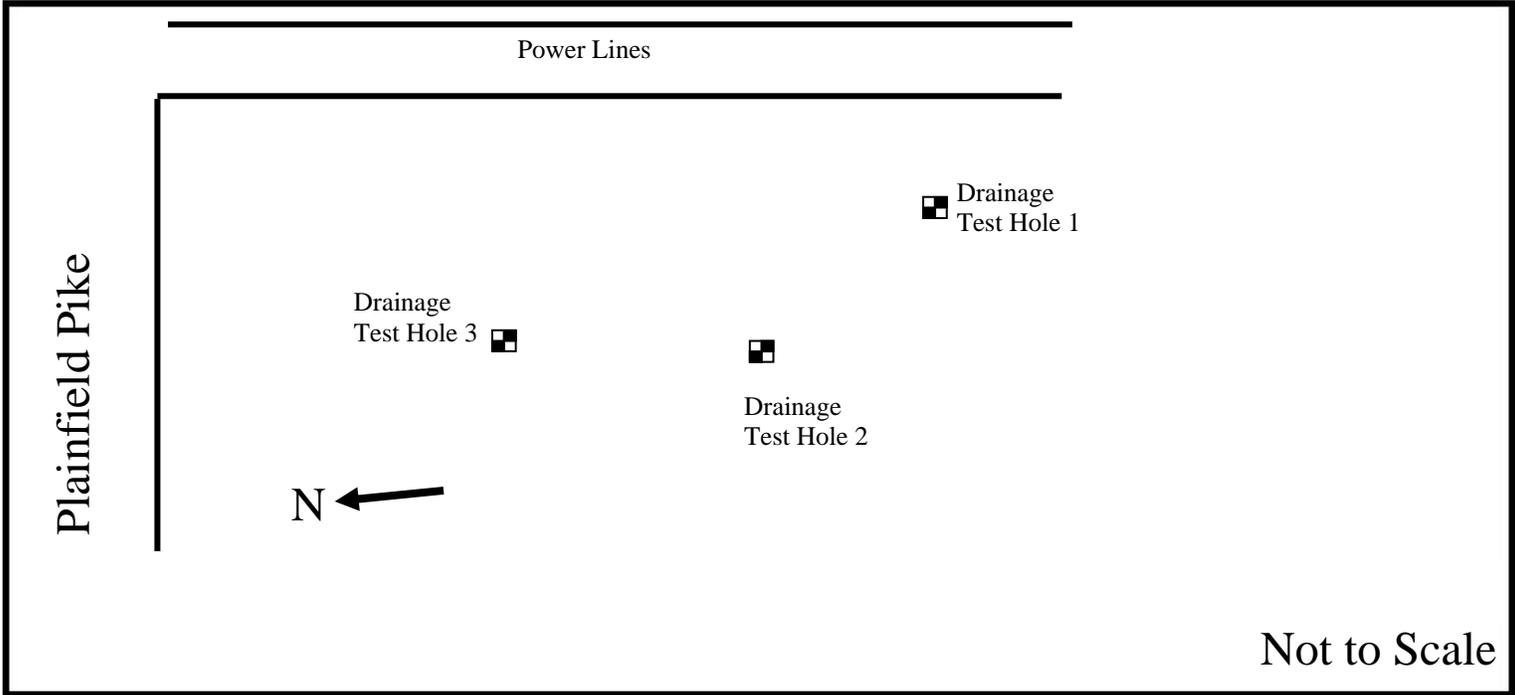
Site Evaluation - to be completed by Class II or III Designer or Soil Evaluator

Please use the area below to locate:

1. Test holes
2. Approximate direction of due north
3. Offsets from test holes to fixed points such as street, utility pole, or other permanent, marked object

Key:

	Approximate location of test holes
	Estimated gradient and direction of slope
	Approximate direction of due north



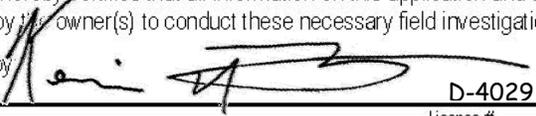
1. Relief and Slope: _____
2. Presence of any watercourse, wetlands or surface water bodies, within 200 feet of test holes: YES NO If yes, locate on above sketch.
3. Presence of existing or proposed private drinking water wells within 200 feet of test holes: YES NO If yes, locate on above sketch.
4. Public drinking water wells within 500 feet of test holes: YES NO If yes, locate on above sketch.
5. Is site within the watershed of a public drinking water reservoir or other critical area defined in SD 19.00? YES NO
6. Has soil been excavated from or fill deposited on site? YES NO If yes, locate on above sketch
7. Site's potential for flooding or ponding: NONE SLIGHT MODERATE SEVERE
8. Landscape position: _____
9. Vegetation: _____
10. Indicate approximate location of property lines and roadways.
11. Additional comments, site constraints or additional information regarding site: _____

Soil Evaluations for drainage design

The soil evaluation results will provide soil texture and the estimated depth to the Seasonal High Water Table (SHWT) based upon qualitative field assessment techniques. No lab analysis of soil material is proposed to verify qualitative estimates in the field. To definitively determine the actual depth to the SHWT, it is necessary to install monitoring wells/pipes and record water level fluctuations over a long time period. No long-term monitoring is proposed. Original soil texture and SHWT estimates may need to be revised based upon additional information from other soil evaluations, excavations, and/or bottom inspections prior to the OWTS installation or drainage structure installation. Soil evaluations for septic system design only, not for foundation elevation.

Certification

The undersigned hereby certifies that all information on this application and accompanying forms, submittals and sketches are true and accurate and that I have been authorized by the owner(s) to conduct these necessary field investigations and submit this request.

Part A prepared by:  License # **D-4029**

Part B prepared by: _____ Signature _____ License # _____

FOR OFFICE USE ONLY

Decision: Approved Disclaimed

Comments: _____

Signature Authorized Agent _____ Date _____



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Environmental Management

Office of Water Resources



Site Evaluation Form

Part A - Soil Profile Description

Application Number

DRAINAGE

Property Owner: Dinis and Maria Pedroso

Property Location: Plainfield Pike, AP 36 Lot 8, Cranston

Date of Test Hole: June 17, 2022

Soil Evaluator: Kevin Fetzer

License Number: D-4029

Weather: Sunny

Shaded: Yes

No

Time: 1200

TH <u>D-3</u> Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	in/hr ft/min
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				
A	0 - 6	a	s	10YR 3/4					sil	1 sbk f	fr	0.27 0.0004
Bw ₁	6 - 12	c	s	10YR 4/6					sil	1 sbk f	fr	0.27 0.0004
Bw ₂	12 - 20	a	w	10YR 3/6					sil	1 sbk f	fr	0.27 0.0004
2C	20 - 60	a	s	2.5Y 5/3					ls	O - m	fr	2.41 0.0033
TH _____ Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox Description			Texture	Structure	Consistence	in/hr ft/min
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Con.				

Soil Class: Ablation Till

Total Depth of each Test Hole: 60"

Depth to Groundwater Seepage: None Encountered

Depth to Impervious or Limiting Layer: 60"

Estimated Seasonal High Water Table: 60" OG

Comments: EG = Existing Grade - OG = Original Grade

Part B

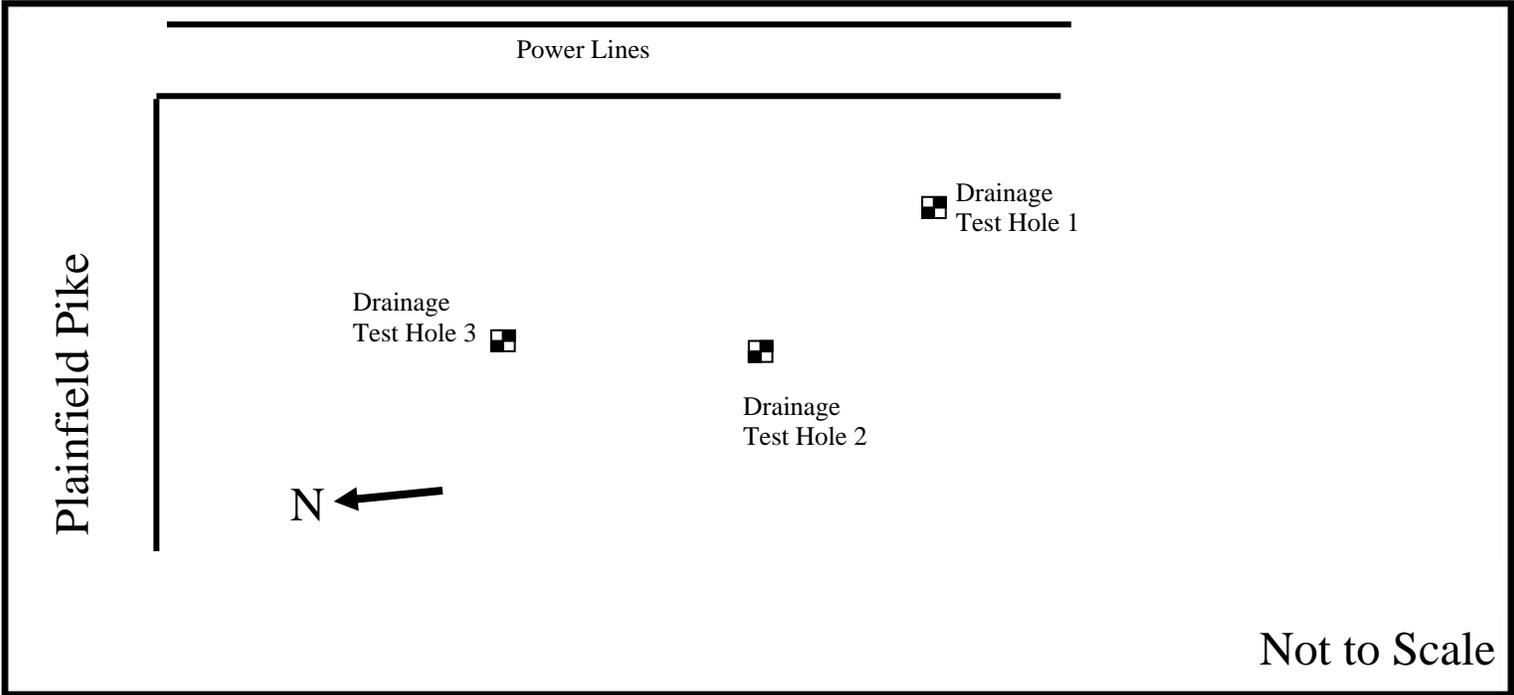
Site Evaluation - to be completed by Class II or III Designer or Soil Evaluator

Please use the area below to locate:

1. Test holes
2. Approximate direction of due north
3. Offsets from test holes to fixed points such as street, utility pole, or other permanent, marked object

Key:

	Approximate location of test holes
	Estimated gradient and direction of slope
	Approximate direction of due north



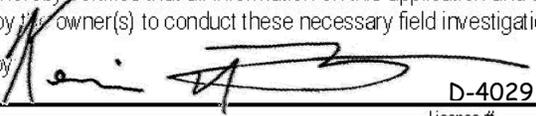
1. Relief and Slope: _____
2. Presence of any watercourse, wetlands or surface water bodies, within 200 feet of test holes: YES NO If yes, locate on above sketch.
3. Presence of existing or proposed private drinking water wells within 200 feet of test holes: YES NO If yes, locate on above sketch.
4. Public drinking water wells within 500 feet of test holes: YES NO If yes, locate on above sketch.
5. Is site within the watershed of a public drinking water reservoir or other critical area defined in SD 19.00? YES NO
6. Has soil been excavated from or fill deposited on site? YES NO If yes, locate on above sketch
7. Site's potential for flooding or ponding: NONE SLIGHT MODERATE SEVERE
8. Landscape position: _____
9. Vegetation: _____
10. Indicate approximate location of property lines and roadways.
11. Additional comments, site constraints or additional information regarding site: _____

Soil Evaluations for drainage design

The soil evaluation results will provide soil texture and the estimated depth to the Seasonal High Water Table (SHWT) based upon qualitative field assessment techniques. No lab analysis of soil material is proposed to verify qualitative estimates in the field. To definitively determine the actual depth to the SHWT, it is necessary to install monitoring wells/pipes and record water level fluctuations over a long time period. No long-term monitoring is proposed. Original soil texture and SHWT estimates may need to be revised based upon additional information from other soil evaluations, excavations, and/or bottom inspections prior to the OWTS installation or drainage structure installation. Soil evaluations for septic system design only, not for foundation elevation.

Certification

The undersigned hereby certifies that all information on this application and accompanying forms, submittals and sketches are true and accurate and that I have been authorized by the owner(s) to conduct these necessary field investigations and submit this request.

Part A prepared by:  License # **D-4029**

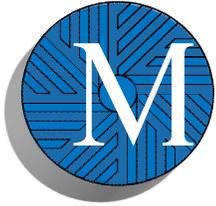
Part B prepared by: _____ Signature _____ License # _____

FOR OFFICE USE ONLY

Decision: Approved Disclaimed

Comments: _____

Signature Authorized Agent _____ Date _____



Commercial Condominiums
A.P. 36, Lots 8 and 37
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Stormwater Management Plan
Revised 12/13/2022

Appendix J

Groundwater Mounding Analysis

Input Parameters for Hantush Analytical Model for Groundwater Mounding (USGS Spreadsheet)

**Commercial Condos
Coventry, RI**

December 1, 2022

Input Parameter
 Calculated Result

Variable	Description	Unit	UG-1	UG-2	Resource
	BMP Length (Rounded)	ft	45	59	AutoCAD Drawing
	BMP Width (Rounded)	ft	6	21	AutoCAD Drawing
x	One-Half of BMP Length	ft	22.4	29.5	
y	One-Half of BMP Width	ft	3.1	10.3	
A	Area of Infiltration (Bottom of BMP, Rounded)	ft ²	280	1,209	AutoCAD Drawing
	Test Hole Used		D2	D2	AutoCAD Drawing
	Top of Facility Elevation (Spillway for Basins)		355.17	355.17	Hydraflow
	Bottom of Facility Elevation		351.67	351.67	Hydraflow
	Seasonal High Groundwater Elevation (SHGWT)		348.67	348.67	AutoCAD Drawing
h_i	Initial Thickness of Saturated Zone	ft	6.50	6.50	
	Design Storm Analyzed		100-yr	100-yr	
	Volume of Runoff without Exfiltration	ft ³	1,439	8,637	Hydraflow
	Volume of Runoff with Exfiltration	ft ³	0	54	Hydraflow
V	Infiltration Volume	ft ³	1,439	8,583	
I	Infiltration Rate Used (Restrictive Layer)	in/hr	8.27	8.27	RISDISM Table 5-3
R	Recharge Rate (Same as Infiltration Rate from RISDISM)	in/hr	8.27	8.27	Can be adjusted to decrease groundwater mound
		ft/day	16.54	16.54	
t	Duration of Infiltration Period				
	$t=[V \text{ (ft}^3\text{)} \times 12 \text{ (in/ft)}] / A \text{ (ft}^2\text{)} \times R \text{ (ft/day)}$	hr	7.47	10.30	
		day	0.31	0.43	Must be ≤ 2 (48 hours or less)
	Material below BMP		Gravelly Sand	Gravelly Sand	Soil Evaluation
S_y	Specific Yield	%	0.25	0.25	Per Reference 1
K	Hydraulic Conductivity	ft / day	165	165	Per Reference 2
Δh (max)	Maximum Groundwater Mounding at Center	ft	1.154	3.849	USGS Hantush Spreadsheet
	Groundwater mound does not break out above land?		OK	OK	RISDISM 5.3.1

References

1. Geological Survey Water Supply Paper 1662-D. Specific Yield--Compilation of Specific Yields for Various Materials. U.S. Department of the Interior.
2. Todd, D.K (1980). Groundwater Hydrology, Second Edition. John Wiles & Sons.
3. Rhode Island Stormwater Design and Installation Standards Manual, Amended March 2015.

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

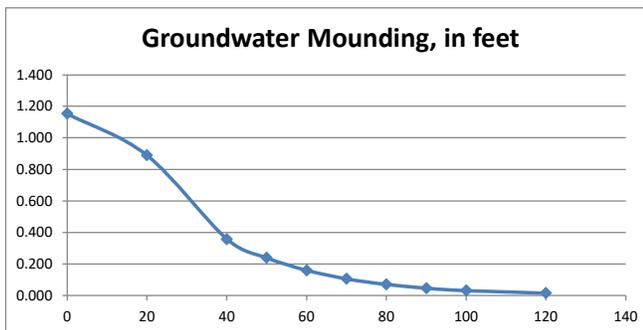
The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0)), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.

Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. **The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed** otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

Input Values		use consistent units (e.g. feet & days or inches & hours)	Conversion Table	
			inch/hour	feet/day
16.5400	R	Recharge (infiltration) rate (feet/day)	0.67	1.33
0.250	Sy	Specific yield, Sy (dimensionless, between 0 and 1)		
165.00	K	Horizontal hydraulic conductivity, Kh (feet/day)*	2.00	4.00
22.400	x	1/2 length of basin (x direction, in feet)		
3.100	y	1/2 width of basin (y direction, in feet)	hours	days
0.310	t	duration of infiltration period (days)	36	1.50
6.500	hi(0)	initial thickness of saturated zone (feet)		
7.654	h(max)	maximum thickness of saturated zone (beneath center of basin at end of infiltration period)		
1.154	Δh(max)	maximum groundwater mounding (beneath center of basin at end of infiltration period)		
Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet			



1.154	0
0.889	20
0.357	40
0.239	50
0.160	60
0.106	70
0.070	80
0.046	90
0.031	100
0.015	120



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.

Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. **The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed** otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

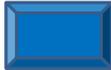
Input Values		use consistent units (e.g. feet & days or inches & hours)	Conversion Table	
			inch/hour	feet/day
16.5400	R	Recharge (infiltration) rate (feet/day)	0.67	1.33
0.250	Sy	Specific yield, Sy (dimensionless, between 0 and 1)		
165.00	K	Horizontal hydraulic conductivity, Kh (feet/day)*	2.00	4.00
29.500	x	1/2 length of basin (x direction, in feet)		
10.300	y	1/2 width of basin (y direction, in feet)	hours	days
0.430	t	duration of infiltration period (days)	36	1.50
6.500	hi(0)	initial thickness of saturated zone (feet)		
10.349	h(max)	maximum thickness of saturated zone (beneath center of basin at end of infiltration period)		
3.849	Δh(max)	maximum groundwater mounding (beneath center of basin at end of infiltration period)		

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

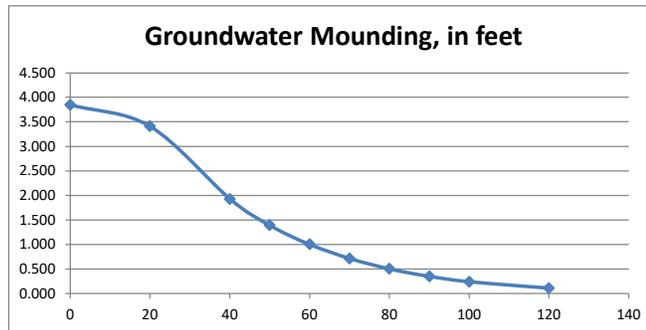
Ground-water Mounding, in feet

Distance from center of basin in x direction, in feet

3.849	0
3.410	20
1.928	40
1.392	50
1.001	60
0.714	70
0.502	80
0.349	90
0.240	100
0.110	120



Re-Calculate Now



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