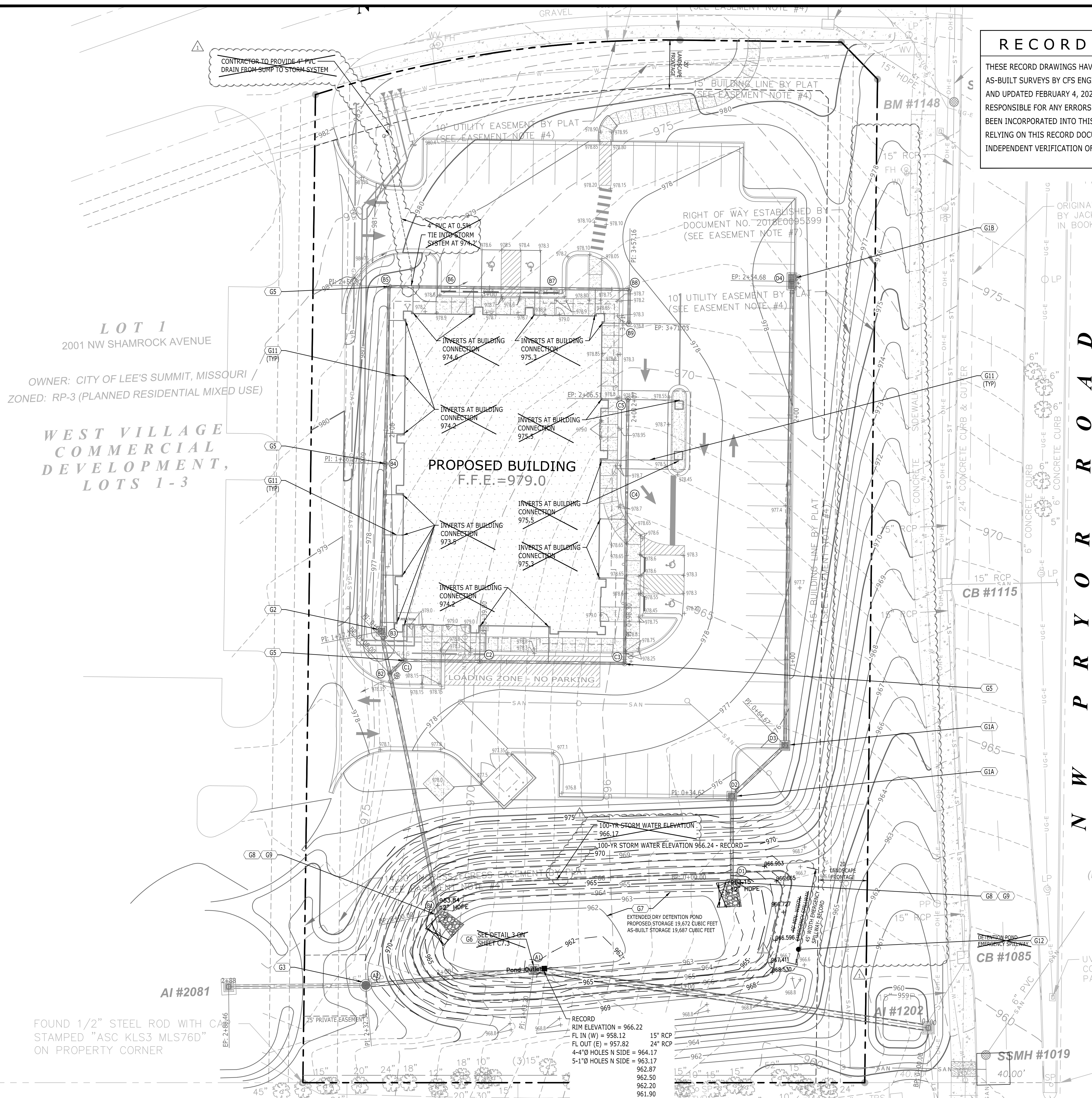




RECORD DRAWING

THESE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON AS-BUILT SURVEYS BY CFS ENGINEERS, DATED NOVEMBER 18, 2020 AND UPDATED FEBRUARY 4, 2021. CATALYST DESIGN GROUP IS NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THIS DOCUMENT AS A RESULT. THOSE RELYING ON THIS RECORD DOCUMENT ARE ADVISED TO OBTAIN INDEPENDENT VERIFICATION OF ITS ACCURACY.

GRADING & DRAINAGE KEYNOTES

CODE	DESCRIPTION	DET #/BHT #
G1A	SINGLE CURB INLET	7 / C7.1
G1B	DOUBLE CURB INLET	5 / C7.3
G2	CATCH BASIN	6 / C7.2
G3	JUNCTION MANHOLE	1, 2, 4 / C7.3
G5	CLEANOUT	8 / C7.1
G6	POND OUTLET STRUCTURE	3 / C7.3
G7	EXTENDED DRY DETENTION POND	-
G8	CONCRETE HEADWALL - WINGED	6 / C7.3
G9	RIP-RAP OUTLET PROTECTION	1 / C7.4
G11	6" BUILDING DOWNSPOUT CONNECTION	10 / C7.1
G12	DETENTION POND EMERGENCY SPILLWAY	-

STRUCTURE TABLE

CODE	DESCRIPTION	TOP GRATE
A1	POND OUTLET	966.22
A2	JUNCTION MANHOLE	971.49
B1	HEADWALL	NA
B2	CLEANOUT	978.70
B3	CATCH BASIN	977.41
B4	CLEANOUT	977.11
B5	CLEANOUT	979.00
B6	CLEANOUT	978.75
B7	CLEANOUT	978.40
B8	CLEANOUT	978.15
B9	CLEANOUT	978.30
C1	CLEANOUT	978.70
C2	CLEANOUT	978.28
C3	CLEANOUT	978.25
C4	CLEANOUT	978.67
C5	CLEANOUT	978.88
D1	HEADWALL	NA
D2	SINGLE CURB INLET	976.19
D3	SINGLE CURB INLET	976.30
D4	DOUBLE CURB INLET	976.15
EX AI #2081	EXISTING POND OUTLET	977.00
EX AI #1202	EXISTING CATCH BASIN	959.97

PIPE TABLE

FROM CODE	FROM INV.	TO CODE	TO INV.	GRADE (%)	SIZE (INCHES)	LENGTH (L.F.)	TYPE
A1	958.88	EX AI #1202	948.85	-5.41%	24"	163	RCP
A2	957.82	A1	949.17	-6.43%	15"	69	RCP
B2	962.79	B1	958.12	-6.31%	12"	74	RECORD HDPE
B3	971.31	B2	962.50	-7.64%	12"	18	HDPE
B4	973.39	B3	971.51	-1.00%	10"	69	HDPE
B5	974.11	B4	973.39	-1.00%	10"	73	HDPE
B6	974.36	B5	974.11	-1.00%	10"	25	HDPE
B7	974.57	B6	974.36	-1.00%	10"	41	HDPE
B8	975.09	B7	974.77	-1.00%	10"	32	HDPE
B9	975.23	B8	975.09	-1.00%	10"	14	HDPE
C1	973.31	B2	972.32	-12.63%	10"	8	HDPE
C2	973.62	C1	973.31	-1.00%	10"	31	HDPE
C3	974.22	C2	973.62	-1.00%	10"	59	HDPE
C4	974.92	C3	974.22	-1.00%	10"	70	HDPE
C5	975.30	C4	974.92	-1.00%	10"	38	HDPE
D2	963.50	D1	963.50	-15.26%	12"	35	HDPE
D3	970.60	D2	963.15	-15.26%	12"	30	HDPE
D4	973.50	D3	968.44	-5.54%	12"	39	RECORD HDPE
EX AI #2081	967.09	A2	971.00	-1.34%	15"	186	RECORD
			966.64	-0.01%		74	RECORD

NOTE:
AN AS-GRADED AND AS-BUILT DRAWING SHALL BE SUBMITTED TO THE CITY AND REVIEWED BY THE CITY FOR THE DETENTION BASIN. THIS SHALL BE REQUIRED PRIOR TO ISSUANCE OF A CERTIFICATE OF SUBSTANTIAL COMPLETION. ALL PRECAUTIONS SHOULD BE TAKEN TO ENSURE DETENTION POND AND OUTLET STRUCTURE ARE CONSTRUCTED PER PLANS, VOLUMES AND ELEVATIONS ARE CRITICAL FOR AS-BUILT APPROVAL. THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH AN AS-BUILT SURVEY OF THE DETENTION BASIN AND STORM SYSTEM A0-A2 AS WELL AS THE INVERTS AT B1 AND D1, STAMPED BY A MISSOURI LICENSED SURVEYOR.

NOTE:
CONTRACTOR TO CONSTRUCT STORMWATER MANAGEMENT FEATURES, SPECIFICALLY THOSE FEATURES RELATED TO DETENTION FACILITIES, AS SOON AS PRACTICALLY POSSIBLE DURING CONSTRUCTION AS NOT TO EFFECT DOWNSTREAM NEIGHBORS WITH UNDETAINED STORMWATER DISCHARGE.

SEWER LEGEND

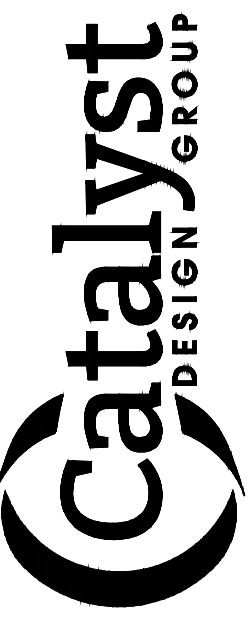
SSMH #1019
 TOP ELEVATION = 959.22
 F/L NORTHEAST 6° PVC = 947.82
 F/L SOUTH 6° PVC = 947.67

BENCHMARK LEGEND

BM #1148
 TOP ELEVATION RIM OF SWMH = 978.52
 DATUM = NAVD88

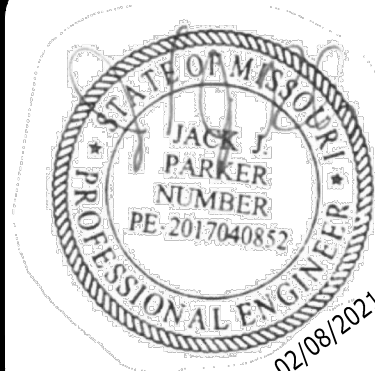
LEGEND

STORM PIPE & INLET	
SPOT ELEVATION	
PROPOSED CONTOUR ELEV.	
DRAINAGE STRUCTURE	



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 NASHVILLE, TN 37203
 615.327.3061



CONSTRUCTION DRAWINGS
DCI - LEE'S SUMMIT
 2001 NW SHAMROCK AVENUE
 LEE'S SUMMIT, MISSOURI, 64081
 JACKSON COUNTY

NO.	DATE	REVISIONS PER CITY COMMENTS
03/11/2020		STORM REVISIONS
01/09/2020		REVISIONS PER CITY COMMENTS

DRAWING TITLE
GRADING & DRAINAGE PLAN

RECORD

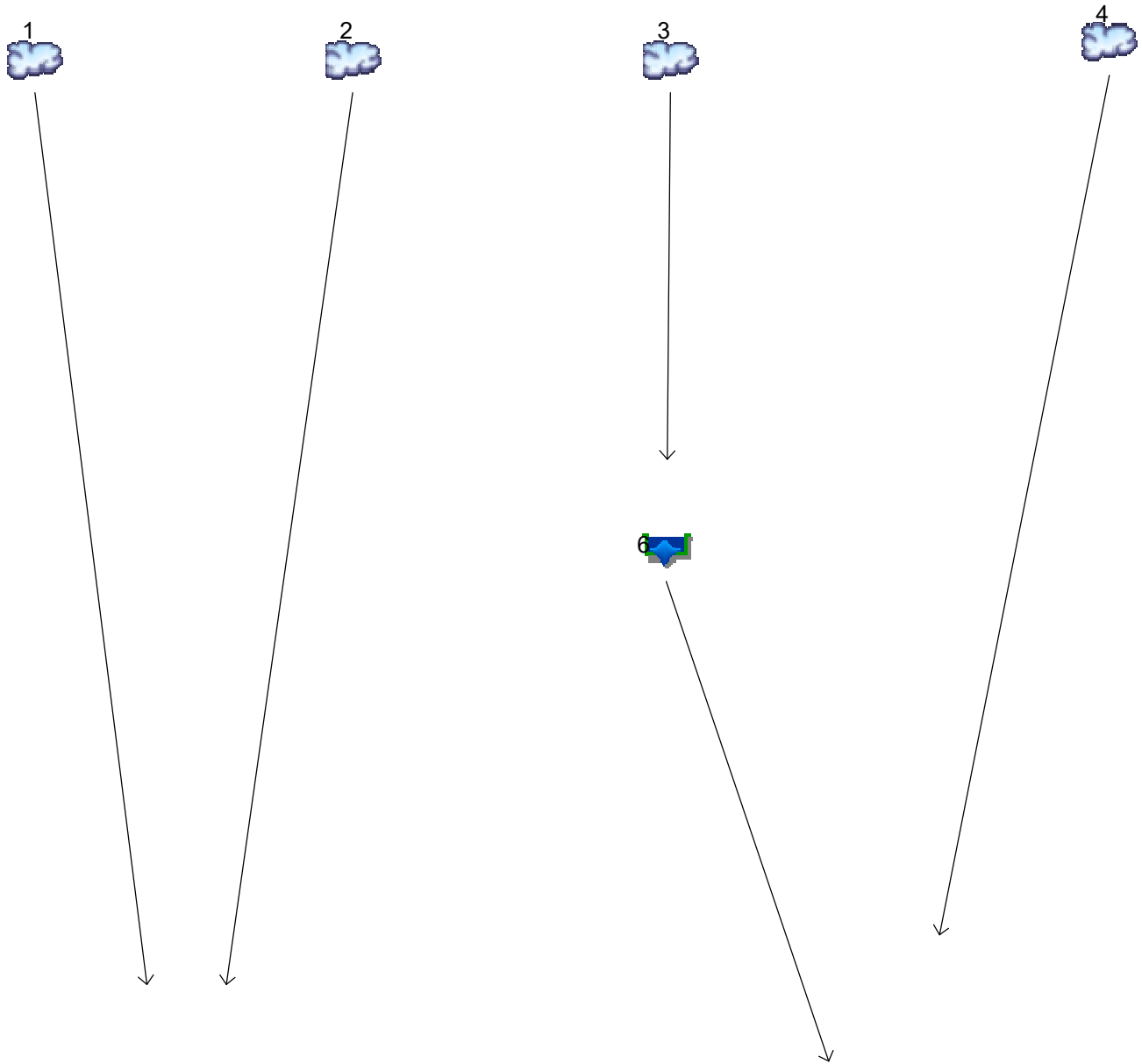
PROJECT NUMBER
 20180111

DRAWING NUMBER

C5.0

Watershed Model Schematic

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



Legend

Hyd. Origin

Description

1	SCS Runoff	EXISTING NORTH
2	SCS Runoff	EXISTING SOUTH
3	SCS Runoff	PROPOSED NORTH
4	SCS Runoff	PROPOSED BYPASS
5	Combine	EXISTING SITE
6	Reservoir	PROPOSED TO DET
7	Combine	PROPOSED SITE



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	5.952	2	718	13,637	-----	-----	-----	EXISTING NORTH
2	SCS Runoff	0.811	2	720	2,102	-----	-----	-----	EXISTING SOUTH
3	SCS Runoff	6.980	2	716	14,579	-----	-----	-----	PROPOSED NORTH
4	SCS Runoff	0.921	2	716	1,861	-----	-----	-----	PROPOSED BYPASS
5	Combine	6.704	2	718	15,739	1, 2,	-----	-----	EXISTING SITE
6	Reservoir	0.369	2	772	14,495	3	964.28	8,654	PROPOSED TO DET
7	Combine	1.083	2	718	16,356	4, 6	-----	-----	PROPOSED SITE
20180111_2021-02-08 ROUTING CALCULATION RECORD 2 year					THURSDAY, FEBRUARY 11, 2021			Thursday, 02 / 11 / 2021	

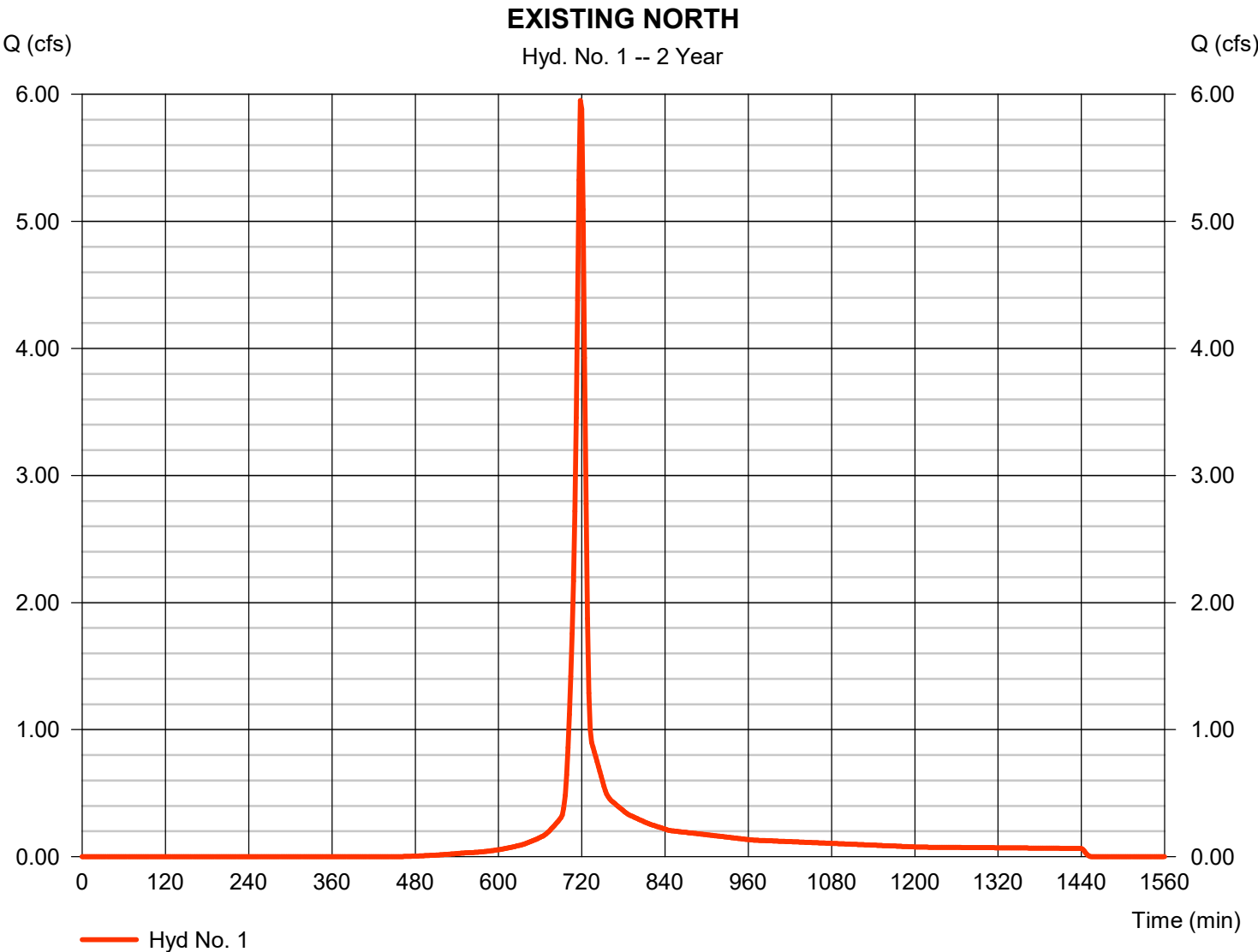
Hydrograph Report

Hyd. No. 1

EXISTING NORTH

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.952 cfs
Storm frequency	=	2 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	13,637 cuft
Drainage area	=	1.940 ac	Curve number	=	84*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	8.00 min
Total precip.	=	3.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.940 x 84)] / 1.940



TR55 Tc Worksheet

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

Hyd. No. 1

EXISTING NORTH

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
Sheet Flow				
Manning's n-value	= 0.150	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.50	0.00	0.00	
Land slope (%)	= 5.70	0.00	0.00	
Travel Time (min)	= 6.16	+	0.00	+
			0.00	= 6.16
Shallow Concentrated Flow				
Flow length (ft)	= 367.00	0.00	0.00	
Watercourse slope (%)	= 4.06	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	=3.25	0.00	0.00	
Travel Time (min)	= 1.88	+	0.00	+
			0.00	= 1.88
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				8.00 min

Hydrograph Report

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

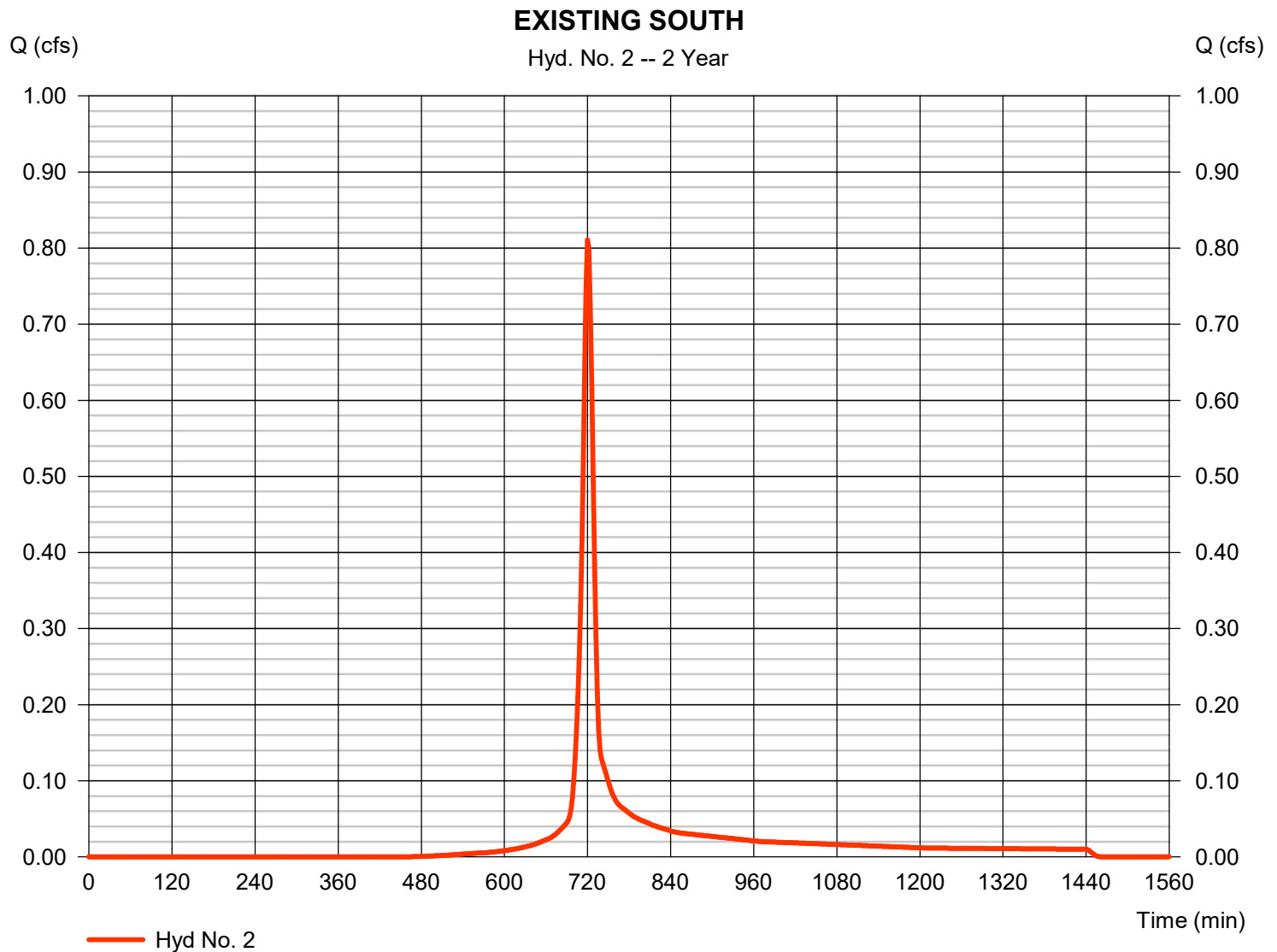
Thursday, 02 / 11 / 2021

Hyd. No. 2

EXISTING SOUTH

Hydrograph type	= SCS Runoff	Peak discharge	= 0.811 cfs
Storm frequency	= 2 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 2,102 cuft
Drainage area	= 0.290 ac	Curve number	= 84*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.10 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = $[(0.290 \times 84)] / 0.290$



TR55 Tc Worksheet

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

Hyd. No. 2

EXISTING SOUTH

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>			
Sheet Flow							
Manning's n-value	= 0.150	0.011	0.011				
Flow length (ft)	= 100.0	0.0	0.0				
Two-year 24-hr precip. (in)	= 3.50	0.00	0.00				
Land slope (%)	= 2.00	0.00	0.00				
Travel Time (min)	= 9.37	+	0.00	+	0.00	=	9.37
Shallow Concentrated Flow							
Flow length (ft)	= 206.00	0.00	0.00				
Watercourse slope (%)	= 7.52	0.00	0.00				
Surface description	= Unpaved	Paved	Paved				
Average velocity (ft/s)	=4.42	0.00	0.00				
Travel Time (min)	= 0.78	+	0.00	+	0.00	=	0.78
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				10.10 min			

Hydrograph Report

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

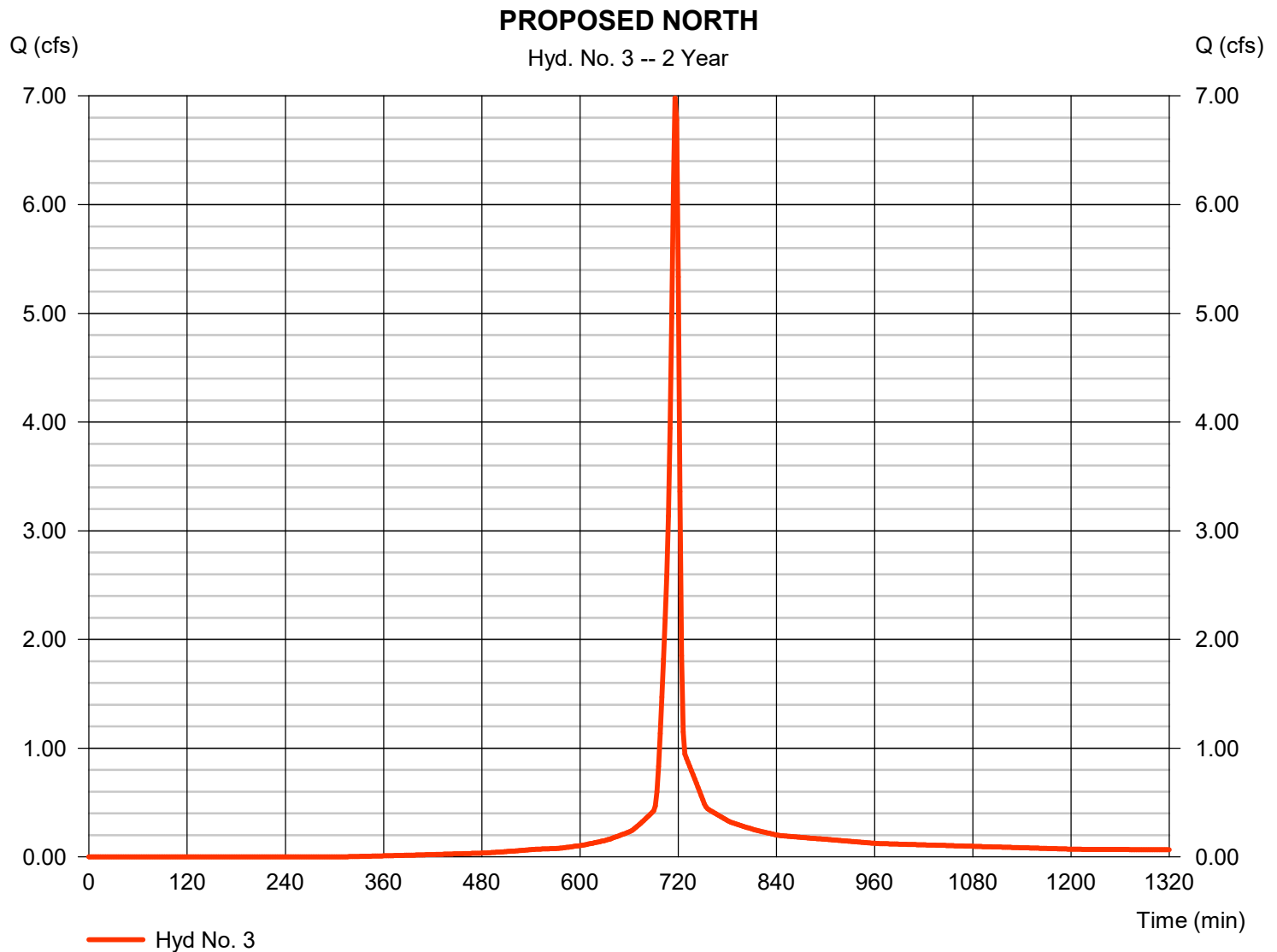
Thursday, 02 / 11 / 2021

Hyd. No. 3

PROPOSED NORTH

Hydrograph type	= SCS Runoff	Peak discharge	= 6.980 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 14,579 cuft
Drainage area	= 1.750 ac	Curve number	= 90*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = $[(0.780 \times 80) + (0.970 \times 98)] / 1.750$



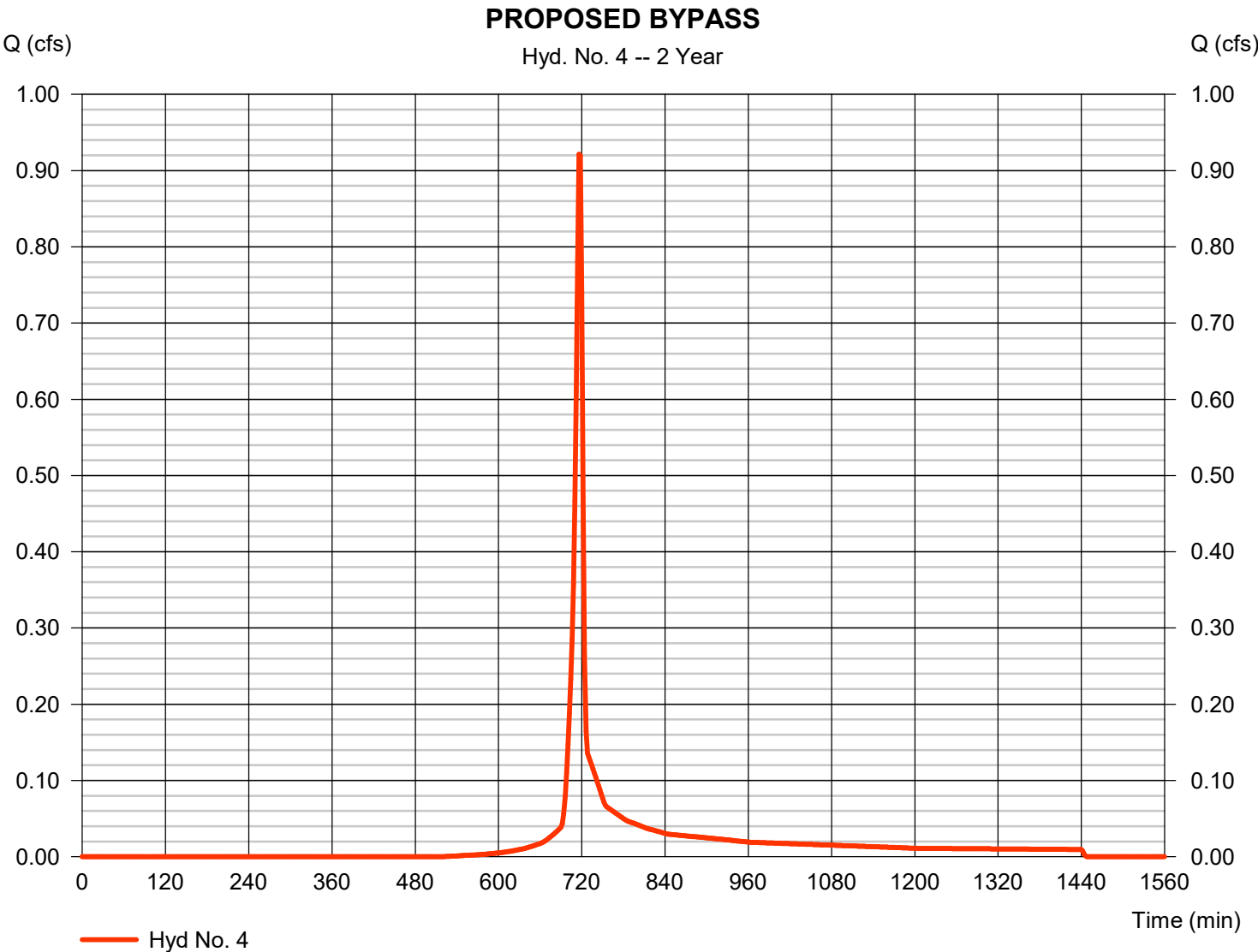
Hydrograph Report

Hyd. No. 4

PROPOSED BYPASS

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.921 cfs
Storm frequency	=	2 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	1,861 cuft
Drainage area	=	0.320 ac	Curve number	=	81*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.300 x 80) + (0.020 x 98)] / 0.320

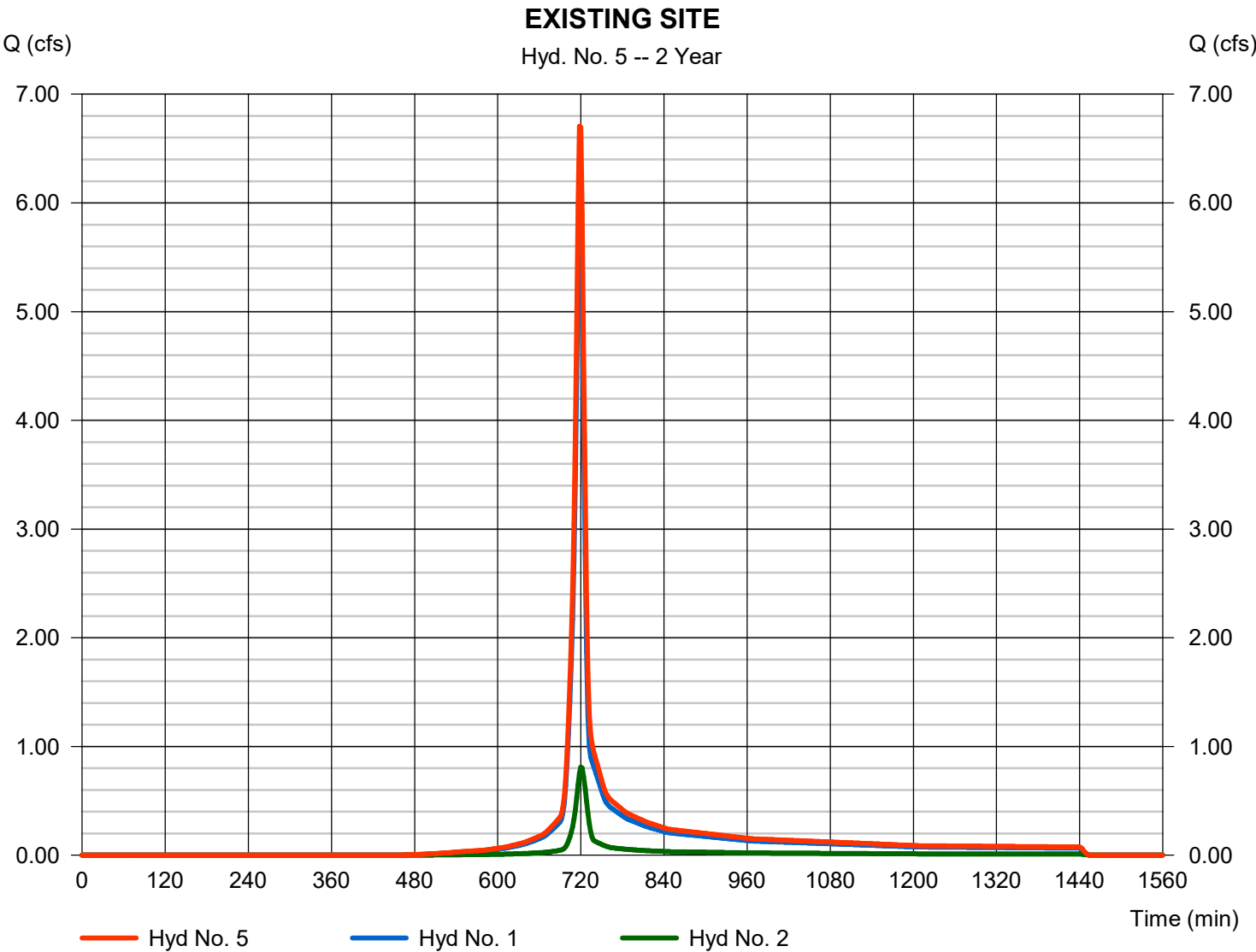


Hydrograph Report

Hyd. No. 5

EXISTING SITE

Hydrograph type	= Combine	Peak discharge	= 6.704 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 15,739 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 2.230 ac



Hydrograph Report

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

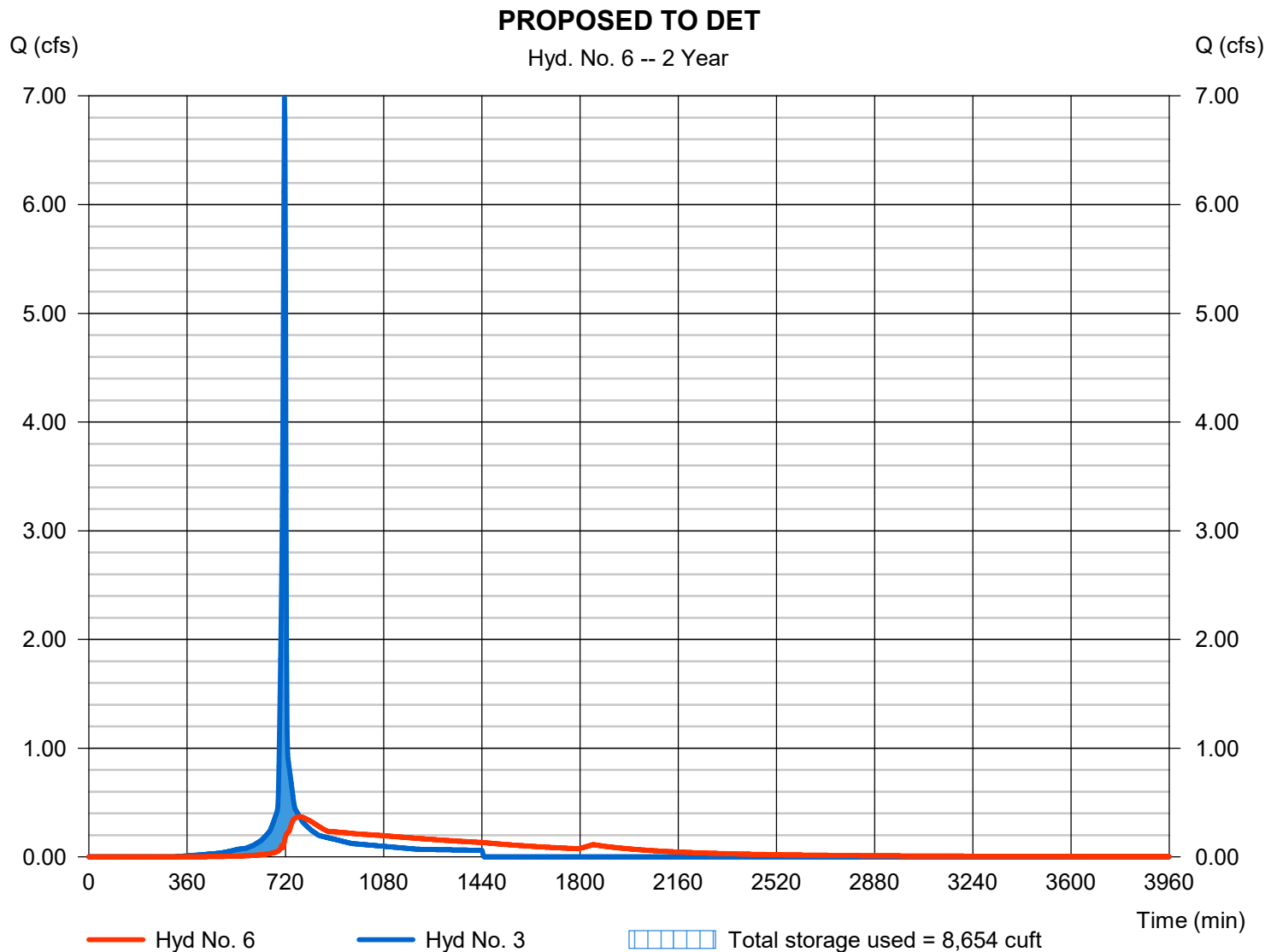
Thursday, 02 / 11 / 2021

Hyd. No. 6

PROPOSED TO DET

Hydrograph type	= Reservoir	Peak discharge	= 0.369 cfs
Storm frequency	= 2 yrs	Time to peak	= 772 min
Time interval	= 2 min	Hyd. volume	= 14,495 cuft
Inflow hyd. No.	= 3 - PROPOSED NORTH	Max. Elevation	= 964.28 ft
Reservoir name	= Detention Pond	Max. Storage	= 8,654 cuft

Storage Indication method used.



Pond Report

12

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

Thursday, 02 / 11 / 2021

Pond No. 1 - Detention Pond

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Beginning Elevation = 961.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	961.50	10	0	0
0.50	962.00	352	91	91
2.00	963.00	3,691	3,032	3,123
3.00	964.00	4,554	4,123	7,245
4.00	965.00	5,400	4,977	12,222
5.00	966.00	6,307	5,854	18,076
5.50	967.00	7,267	3,394	21,469

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	4.00	Inactive	1.00
Span (in)	= 24.00	4.00	0.00	1.00
No. Barrels	= 1	4	1	5
Invert El. (ft)	= 957.82	964.17	0.00	961.90
Length (ft)	= 160.00	1.00	0.00	1.35
Slope (%)	= 5.41	0.10	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	Yes

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 16.00	Inactive	Inactive	Inactive
Crest El. (ft)	= 966.22	0.00	0.00	0.00
Weir Coeff.	= 2.60	2.60	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= Yes	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).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	961.50	0.00	0.00	---	0.00	0.00	---	---	---	---	---	0.000
0.05	9	961.55	24.76 ic	0.00	---	0.00	0.00	---	---	---	---	---	0.000
0.10	18	961.60	24.76 ic	0.00	---	0.00	0.00	---	---	---	---	---	0.000
0.15	27	961.65	24.76 ic	0.00	---	0.00	0.00	---	---	---	---	---	0.000
0.20	36	961.70	24.76 ic	0.00	---	0.00	0.00	---	---	---	---	---	0.000
0.25	45	961.75	24.76 ic	0.00	---	0.00	0.00	---	---	---	---	---	0.000
0.30	54	961.80	24.76 ic	0.00	---	0.00	0.00	---	---	---	---	---	0.000
0.35	63	961.85	24.76 ic	0.00	---	0.00	0.00	---	---	---	---	---	0.000
0.40	72	961.90	24.76 ic	0.00	---	0.00	0.00	---	---	---	---	---	0.000
0.45	81	961.95	24.76 ic	0.00	---	0.00	0.00	---	---	---	---	---	0.001
0.50	91	962.00	24.76 ic	0.00	---	0.00	0.00	---	---	---	---	---	0.002
0.65	394	962.15	24.76 ic	0.00	---	0.01	0.00	---	---	---	---	---	0.008
0.80	697	962.30	24.76 ic	0.00	---	0.02	0.00	---	---	---	---	---	0.016
0.95	1,000	962.45	24.76 ic	0.00	---	0.03	0.00	---	---	---	---	---	0.026
1.10	1,303	962.60	24.76 ic	0.00	---	0.04	0.00	---	---	---	---	---	0.038
1.25	1,607	962.75	24.76 ic	0.00	---	0.05	0.00	---	---	---	---	---	0.051
1.40	1,910	962.90	24.76 ic	0.00	---	0.06	0.00	---	---	---	---	---	0.065
1.55	2,213	963.05	24.76 ic	0.00	---	0.08	0.00	---	---	---	---	---	0.080
1.70	2,516	963.20	24.76 ic	0.00	---	0.10	0.00	---	---	---	---	---	0.096
1.85	2,820	963.35	24.76 ic	0.00	---	0.11	0.00	---	---	---	---	---	0.113
2.00	3,123	963.00	24.76 ic	0.00	---	0.07	0.00	---	---	---	---	---	0.075
2.10	3,535	963.10	24.76 ic	0.00	---	0.09	0.00	---	---	---	---	---	0.085
2.20	3,947	963.20	24.76 ic	0.00	---	0.10	0.00	---	---	---	---	---	0.096
2.30	4,360	963.30	24.76 ic	0.00	---	0.11	0.00	---	---	---	---	---	0.107
2.40	4,772	963.40	24.76 ic	0.00	---	0.12	0.00	---	---	---	---	---	0.119
2.50	5,184	963.50	24.76 ic	0.00	---	0.13	0.00	---	---	---	---	---	0.131
2.60	5,596	963.60	24.76 ic	0.00	---	0.14	0.00	---	---	---	---	---	0.144
2.70	6,009	963.70	24.76 ic	0.00	---	0.16	0.00	---	---	---	---	---	0.157
2.80	6,421	963.80	24.76 ic	0.00	---	0.17	0.00	---	---	---	---	---	0.170
2.90	6,833	963.90	24.76 ic	0.00	---	0.18	0.00	---	---	---	---	---	0.183
3.00	7,245	964.00	24.76 ic	0.00	---	0.20	0.00	---	---	---	---	---	0.197
3.10	7,743	964.10	24.76 ic	0.00	---	0.21	0.00	---	---	---	---	---	0.212
3.20	8,241	964.20	24.76 ic	0.01 ic	---	0.23	0.00	---	---	---	---	---	0.235
3.30	8,738	964.30	24.76 ic	0.16 ic	---	0.24	0.00	---	---	---	---	---	0.396
3.40	9,236	964.40	24.76 ic	0.42 ic	---	0.26	0.00	---	---	---	---	---	0.677
3.50	9,734	964.50	24.76 ic	0.68 ic	---	0.27	0.00	---	---	---	---	---	0.953

Continues on next page...

Detention Pond

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
3.60	10,231	964.60	24.76 ic	0.86 ic	---	0.29	0.00	---	---	---	---	---	1.150
3.70	10,729	964.70	24.76 ic	1.01 ic	---	0.30	0.00	---	---	---	---	---	1.317
3.80	11,227	964.80	24.76 ic	1.14 ic	---	0.32	0.00	---	---	---	---	---	1.464
3.90	11,725	964.90	24.76 ic	1.26 ic	---	0.34	0.00	---	---	---	---	---	1.598
4.00	12,222	965.00	24.76 ic	1.37 ic	---	0.35	0.00	---	---	---	---	---	1.723
4.10	12,808	965.10	24.76 ic	1.47 ic	---	0.37	0.00	---	---	---	---	---	1.839
4.20	13,393	965.20	24.76 ic	1.56 ic	---	0.39	0.00	---	---	---	---	---	1.950
4.30	13,978	965.30	24.76 ic	1.65 ic	---	0.41	0.00	---	---	---	---	---	2.056
4.40	14,564	965.40	24.76 ic	1.73 ic	---	0.42	0.00	---	---	---	---	---	2.157
4.50	15,149	965.50	24.76 ic	1.81 ic	---	0.44	0.00	---	---	---	---	---	2.255
4.60	15,734	965.60	24.76 ic	1.89 ic	---	0.46	0.00	---	---	---	---	---	2.350
4.70	16,320	965.70	24.76 ic	1.96 ic	---	0.48	0.00	---	---	---	---	---	2.442
4.80	16,905	965.80	24.76 ic	2.03 ic	---	0.50	0.00	---	---	---	---	---	2.532
4.90	17,490	965.90	24.76 ic	2.10 ic	---	0.52	0.00	---	---	---	---	---	2.620
5.00	18,076	966.00	24.76 ic	2.17 ic	---	0.54	0.00	---	---	---	---	---	2.706
5.05	18,415	966.05	24.76 ic	2.20 ic	---	0.55	0.00	---	---	---	---	---	2.748
5.10	18,754	966.10	24.76 ic	2.23 ic	---	0.56	0.00	---	---	---	---	---	2.790
5.15	19,094	966.15	24.76 ic	2.26 ic	---	0.57	0.00	---	---	---	---	---	2.831
5.20	19,433	966.20	24.76 ic	2.29 ic	---	0.58	0.00	---	---	---	---	---	2.872
5.25	19,772	966.25	24.76 ic	2.32 ic	---	0.59	0.22	---	---	---	---	---	3.129
5.30	20,112	966.30	24.76 ic	2.35 ic	---	0.60	0.94	---	---	---	---	---	3.894
5.35	20,451	966.35	24.76 ic	2.38 ic	---	0.61	1.95	---	---	---	---	---	4.942
5.40	20,791	966.40	24.76 ic	2.41 ic	---	0.62	3.18	---	---	---	---	---	6.208
5.45	21,130	966.45	24.76 ic	2.44 ic	---	0.63	4.59	---	---	---	---	---	7.658
5.50	21,469	967.00	31.87 ic	2.74 ic	---	0.47	28.66	---	---	---	---	---	31.87

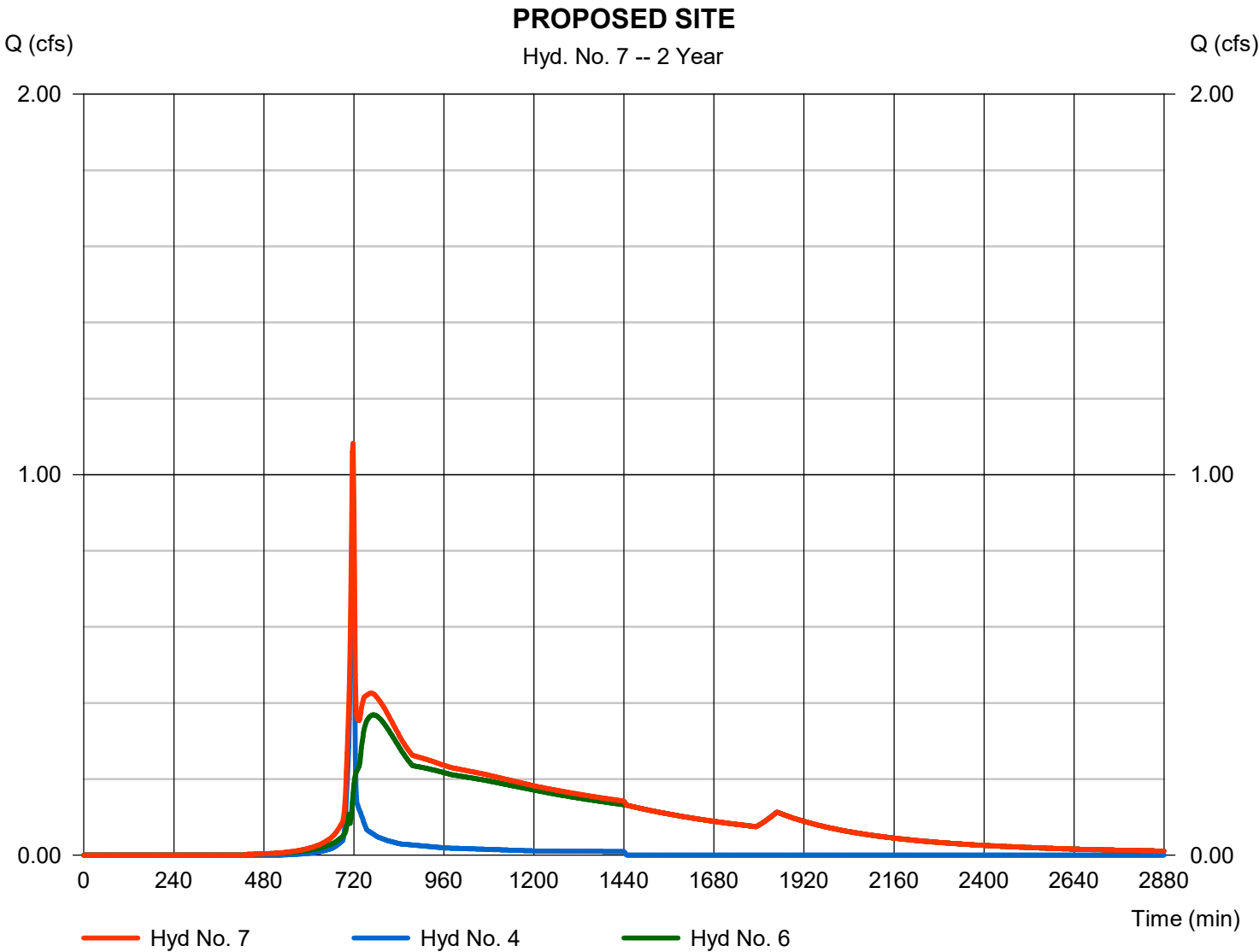
...End

Hydrograph Report

Hyd. No. 7

PROPOSED SITE

Hydrograph type	= Combine	Peak discharge	= 1.083 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 16,356 cuft
Inflow hyds.	= 4, 6	Contrib. drain. area	= 0.320 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	10.72	2	718	24,971	-----	-----	-----	EXISTING NORTH
2	SCS Runoff	1.466	2	720	3,849	-----	-----	-----	EXISTING SOUTH
3	SCS Runoff	11.51	2	716	24,811	-----	-----	-----	PROPOSED NORTH
4	SCS Runoff	1.731	2	716	3,541	-----	-----	-----	PROPOSED BYPASS
5	Combine	12.09	2	718	28,821	1, 2,	-----	-----	EXISTING SITE
6	Reservoir	1.871	2	726	24,728	3	965.13	12,977	PROPOSED TO DET
7	Combine	3.089	2	718	28,269	4, 6	-----	-----	PROPOSED SITE
20180111_2021-02-08 ROUTING CALCULATION RECORD 10 Year					THURSDAY, FEBRUARY 11, 2021			Thursday, 02 / 11 / 2021	

Hydrograph Report

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

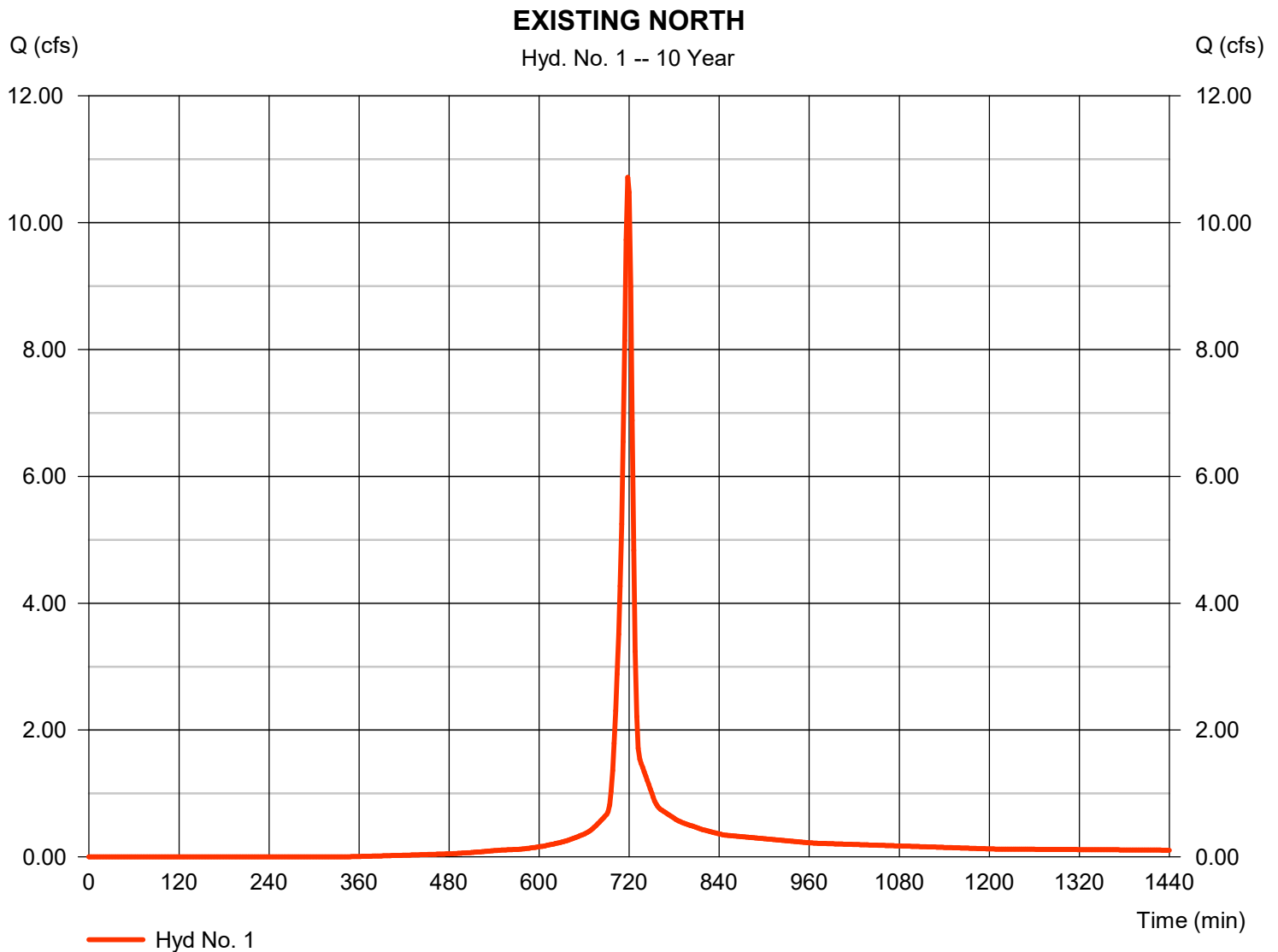
Thursday, 02 / 11 / 2021

Hyd. No. 1

EXISTING NORTH

Hydrograph type	= SCS Runoff	Peak discharge	= 10.72 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 24,971 cuft
Drainage area	= 1.940 ac	Curve number	= 84*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 8.00 min
Total precip.	= 5.30 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = $[(1.940 \times 84)] / 1.940$



Hydrograph Report

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

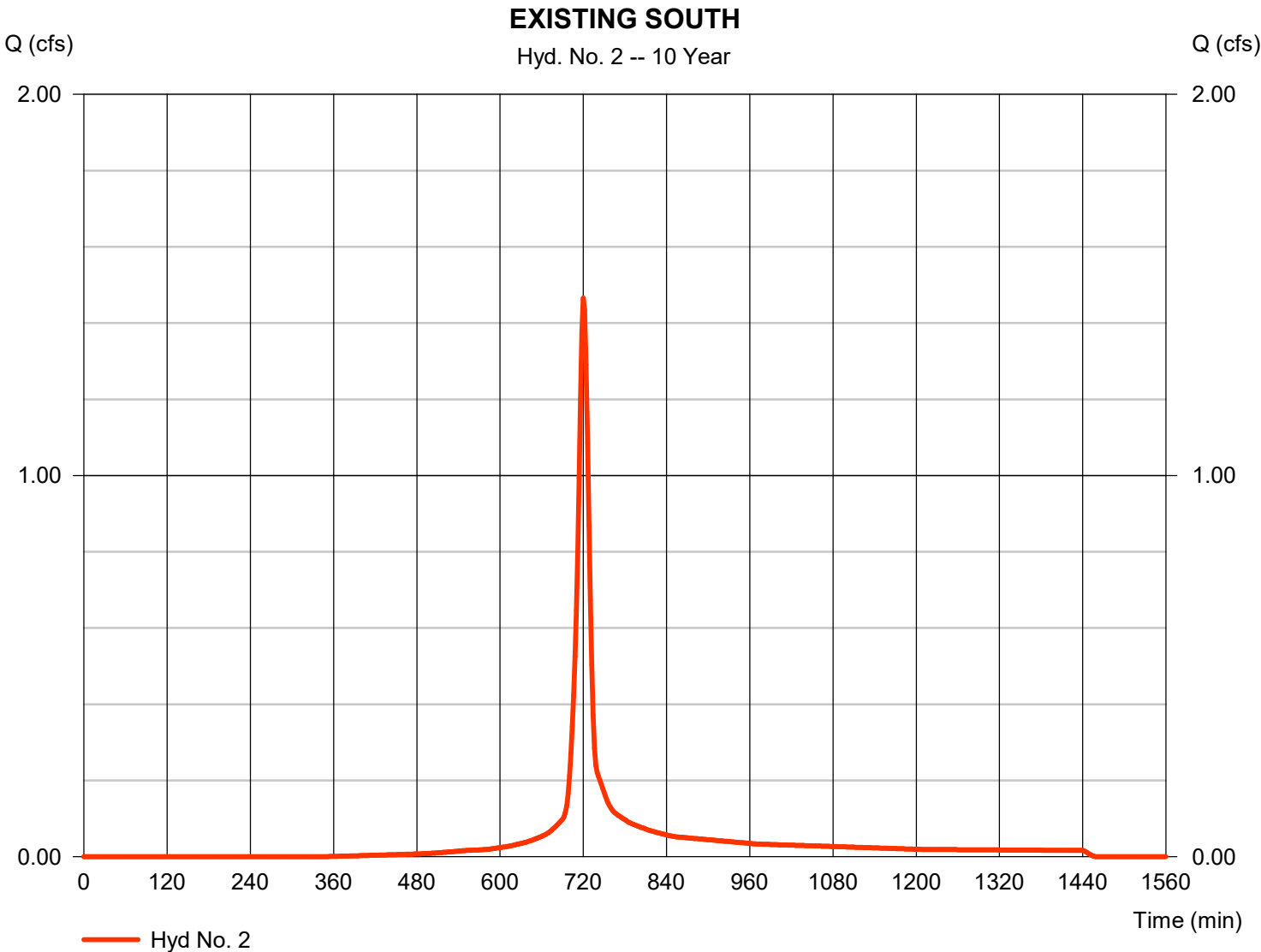
Thursday, 02 / 11 / 2021

Hyd. No. 2

EXISTING SOUTH

Hydrograph type	= SCS Runoff	Peak discharge	= 1.466 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 3,849 cuft
Drainage area	= 0.290 ac	Curve number	= 84*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.10 min
Total precip.	= 5.30 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.290 x 84)] / 0.290



Hydrograph Report

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

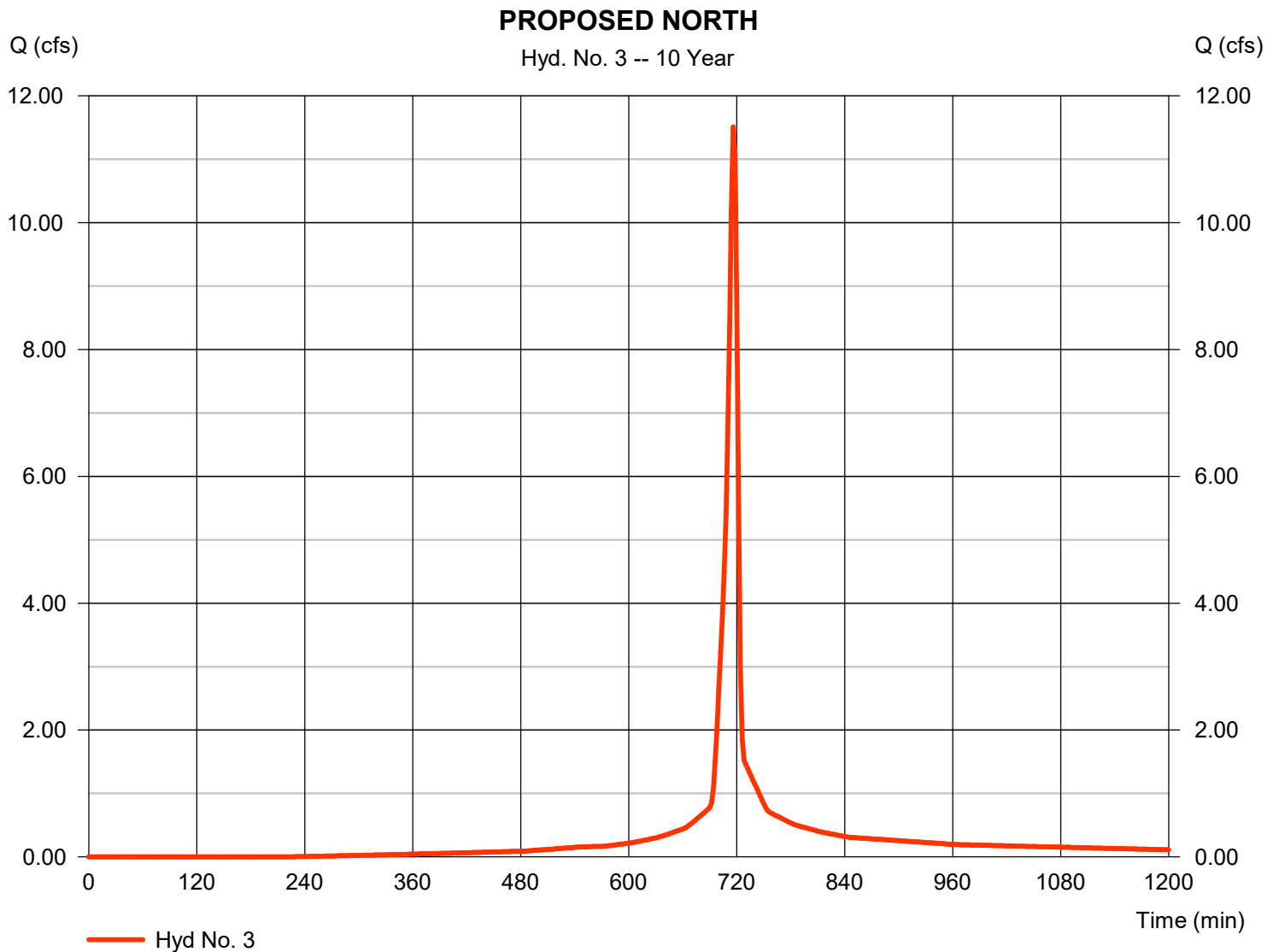
Thursday, 02 / 11 / 2021

Hyd. No. 3

PROPOSED NORTH

Hydrograph type	= SCS Runoff	Peak discharge	= 11.51 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 24,811 cuft
Drainage area	= 1.750 ac	Curve number	= 90*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.30 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = $[(0.780 \times 80) + (0.970 \times 98)] / 1.750$



Hydrograph Report

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

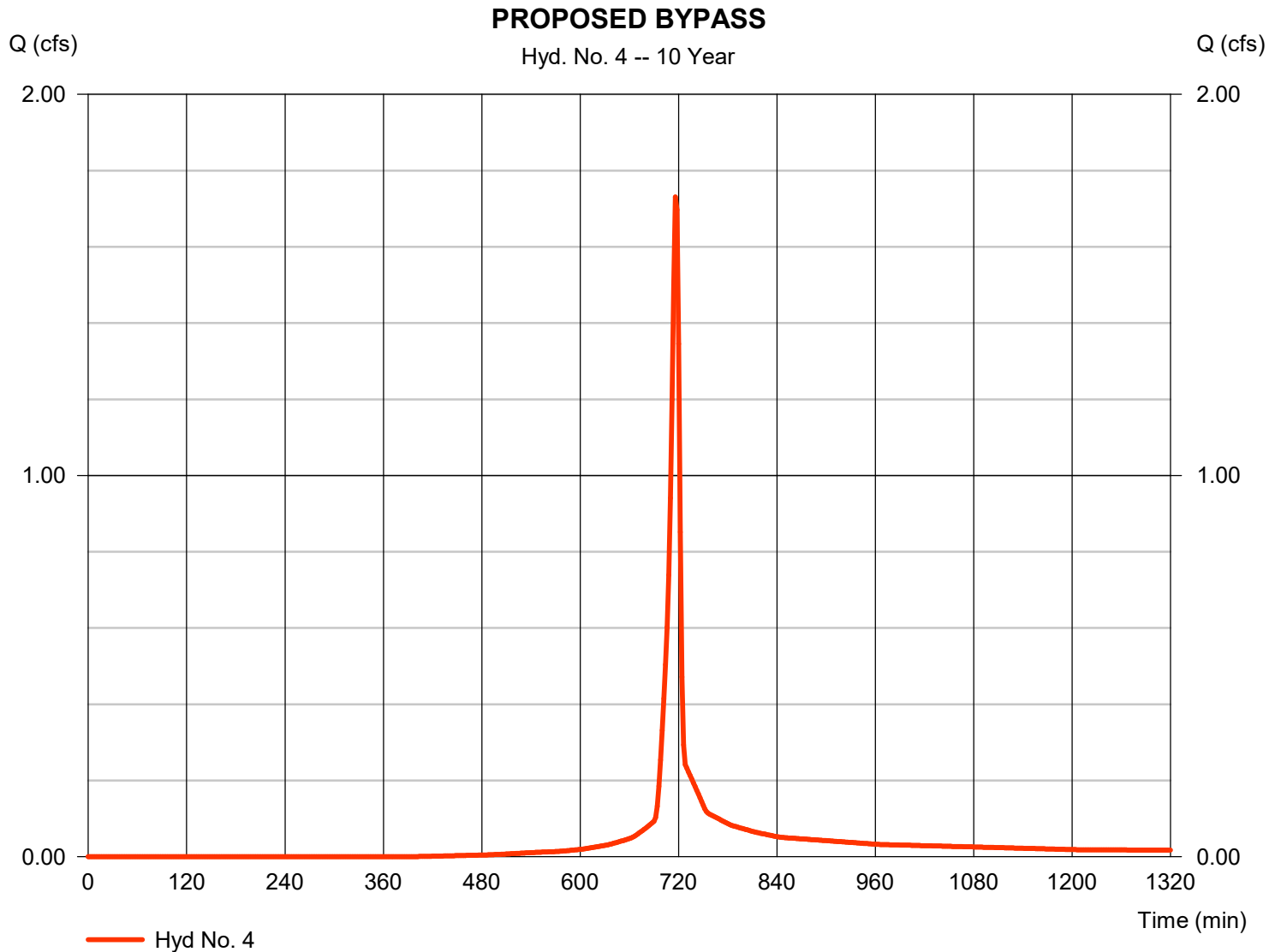
Thursday, 02 / 11 / 2021

Hyd. No. 4

PROPOSED BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 1.731 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 3,541 cuft
Drainage area	= 0.320 ac	Curve number	= 81*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.30 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = $[(0.300 \times 80) + (0.020 \times 98)] / 0.320$



Hydrograph Report

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

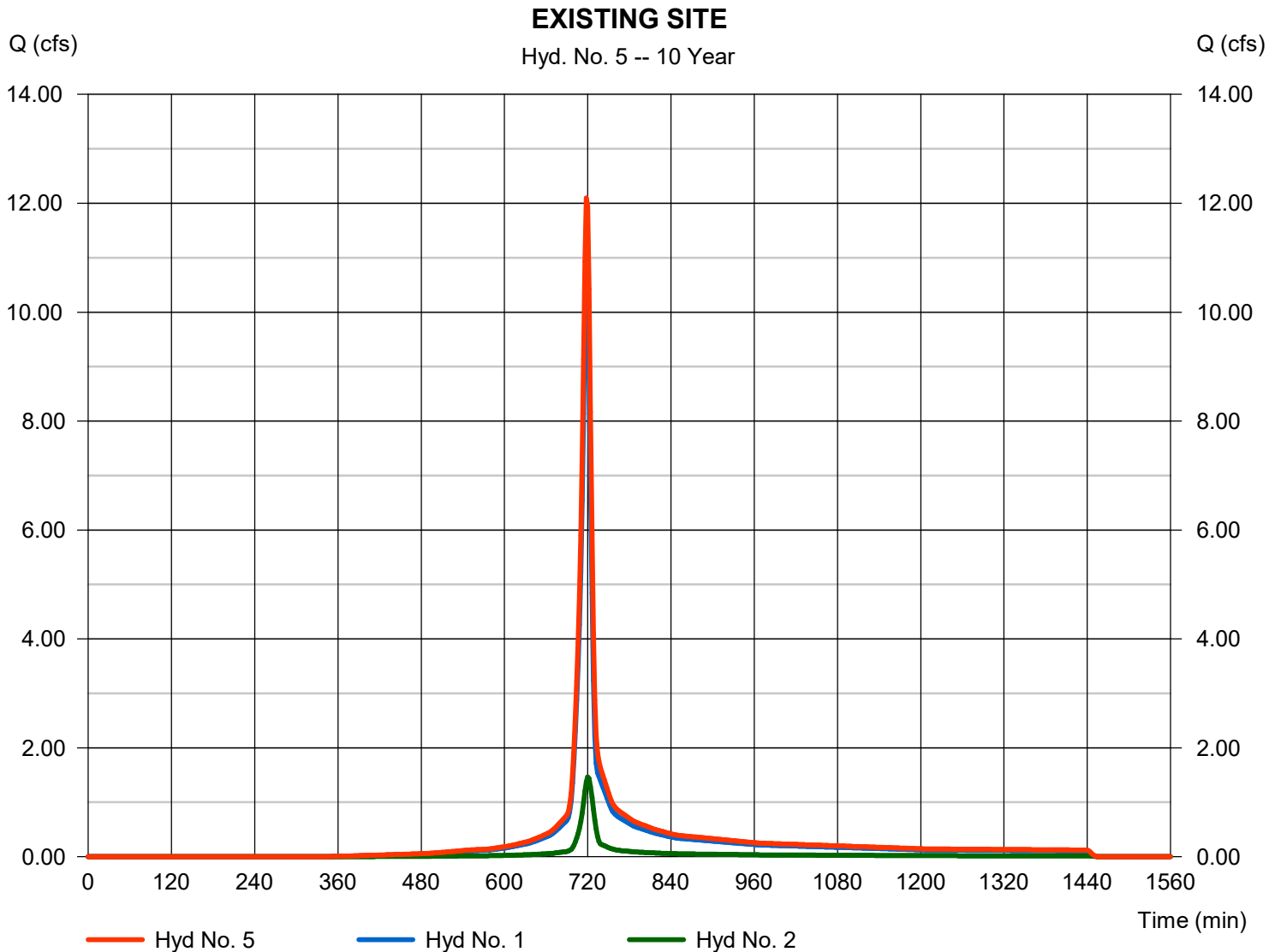
Thursday, 02 / 11 / 2021

Hyd. No. 5

EXISTING SITE

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

Peak discharge = 12.09 cfs
 Time to peak = 718 min
 Hyd. volume = 28,821 cuft
 Contrib. drain. area = 2.230 ac



Hydrograph Report

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

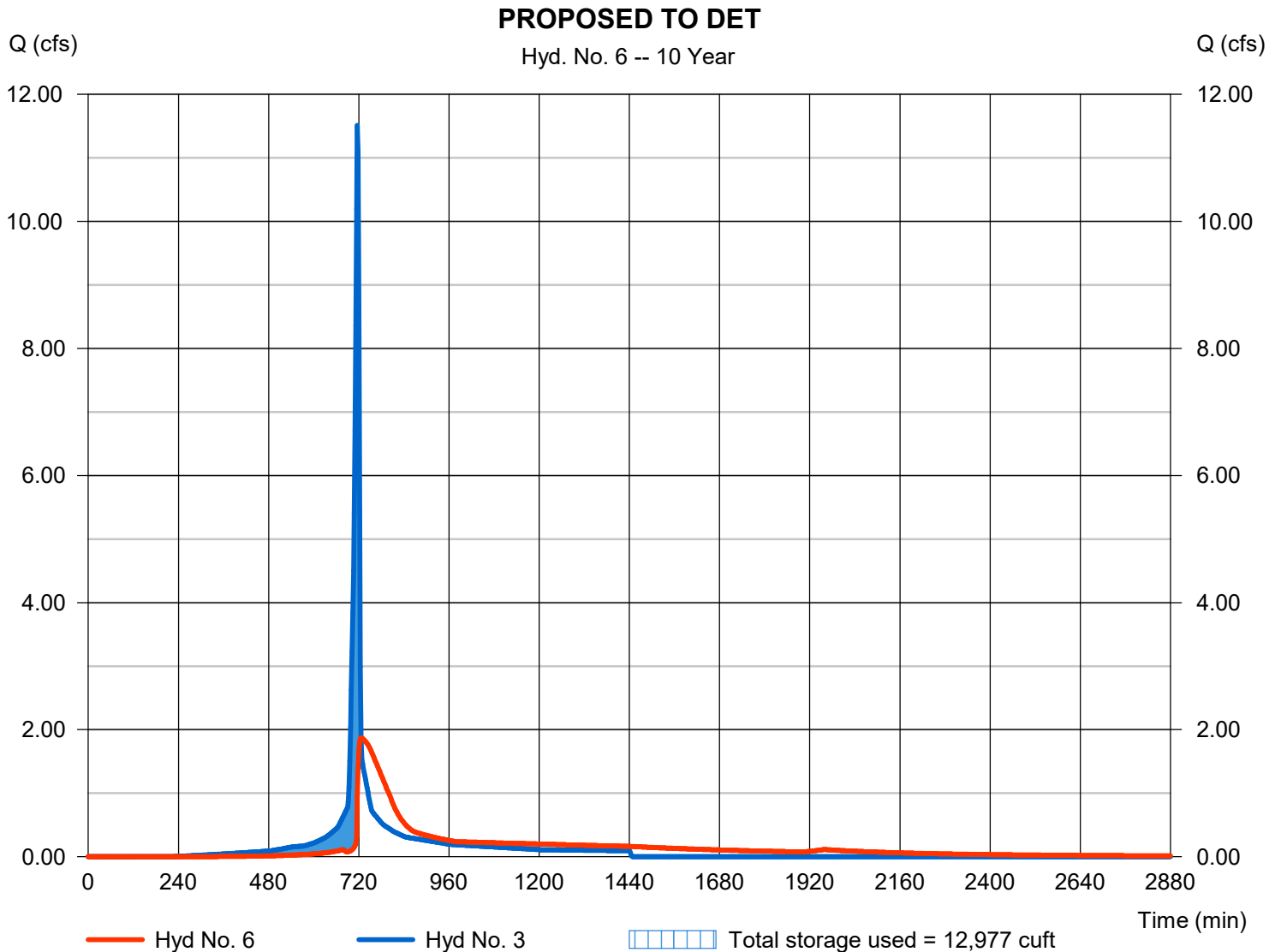
Thursday, 02 / 11 / 2021

Hyd. No. 6

PROPOSED TO DET

Hydrograph type	= Reservoir	Peak discharge	= 1.871 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 24,728 cuft
Inflow hyd. No.	= 3 - PROPOSED NORTH	Max. Elevation	= 965.13 ft
Reservoir name	= Detention Pond	Max. Storage	= 12,977 cuft

Storage Indication method used.



Hydrograph Report

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

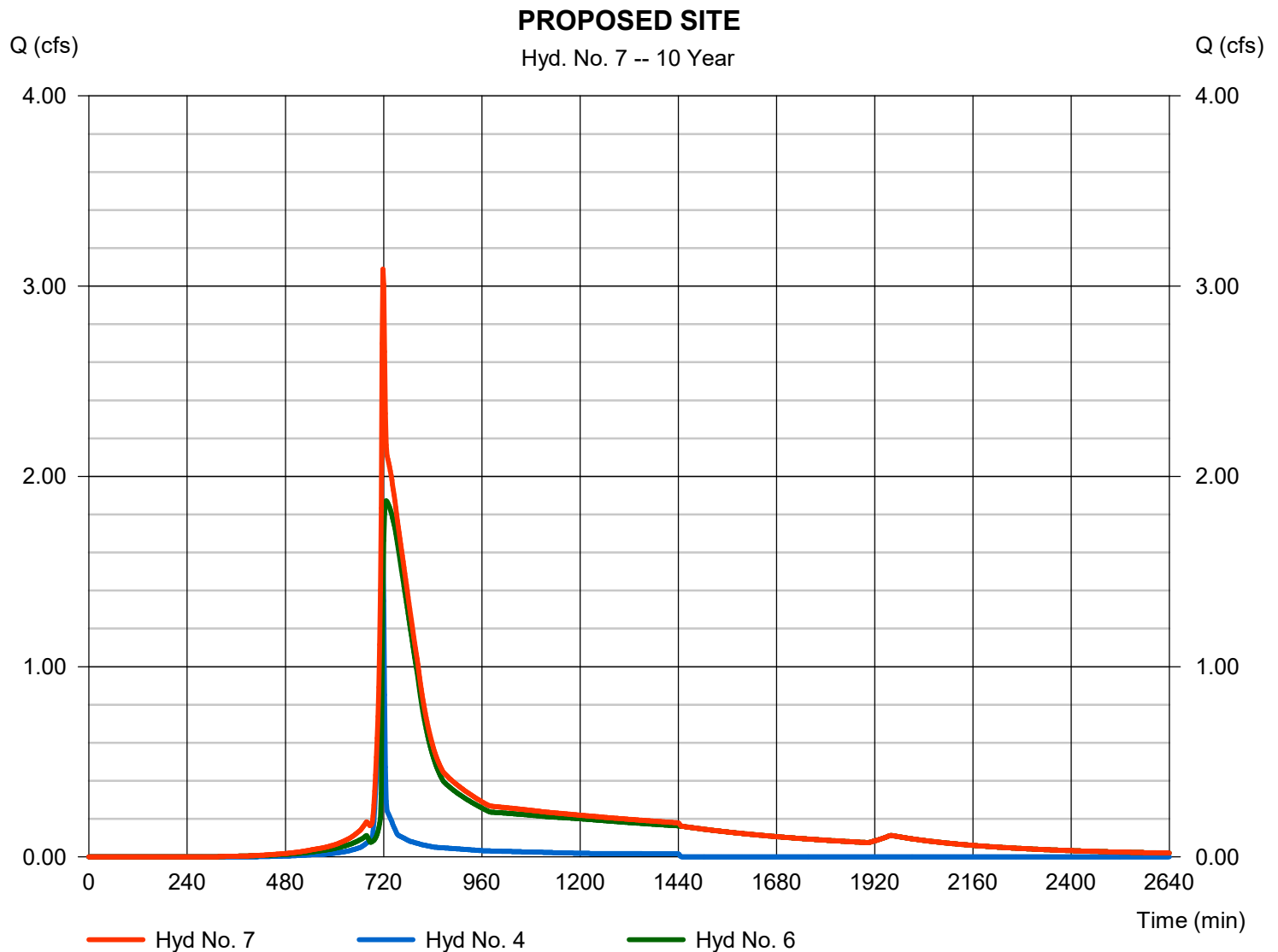
Thursday, 02 / 11 / 2021

Hyd. No. 7

PROPOSED SITE

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 2 min
 Inflow hyds. = 4, 6

Peak discharge = 3.089 cfs
 Time to peak = 718 min
 Hyd. volume = 28,269 cuft
 Contrib. drain. area = 0.320 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	17.14	2	718	40,898	-----	-----	-----	EXISTING NORTH
2	SCS Runoff	2.350	2	720	6,305	-----	-----	-----	EXISTING SOUTH
3	SCS Runoff	17.48	2	716	38,772	-----	-----	-----	PROPOSED NORTH
4	SCS Runoff	2.838	2	716	5,946	-----	-----	-----	PROPOSED BYPASS
5	Combine	19.36	2	718	47,203	1, 2,	-----	-----	EXISTING SITE
6	Reservoir	3.387	2	726	38,689	3	966.27	19,887	PROPOSED TO DET
7	Combine	5.310	2	718	44,635	4, 6	-----	-----	PROPOSED SITE
20180111_2021-02-08 ROUTING CALCULATION RECORD 100 Year					THURSDAY, FEBRUARY 11, 2021			Thursday, 02 / 11 / 2021	

Hydrograph Report

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

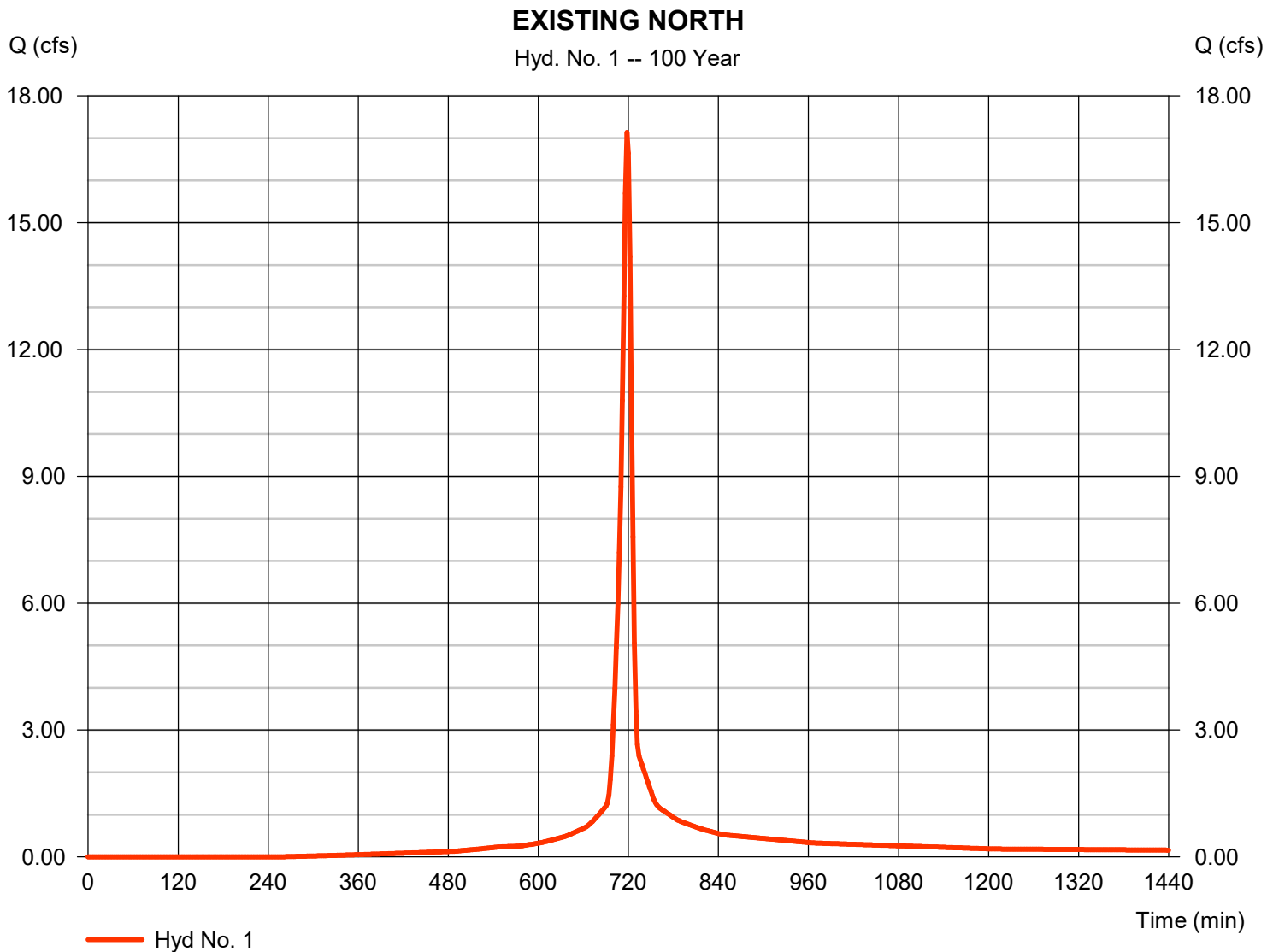
Thursday, 02 / 11 / 2021

Hyd. No. 1

EXISTING NORTH

Hydrograph type	= SCS Runoff	Peak discharge	= 17.14 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 40,898 cuft
Drainage area	= 1.940 ac	Curve number	= 84*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 8.00 min
Total precip.	= 7.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = $[(1.940 \times 84)] / 1.940$



Hydrograph Report

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

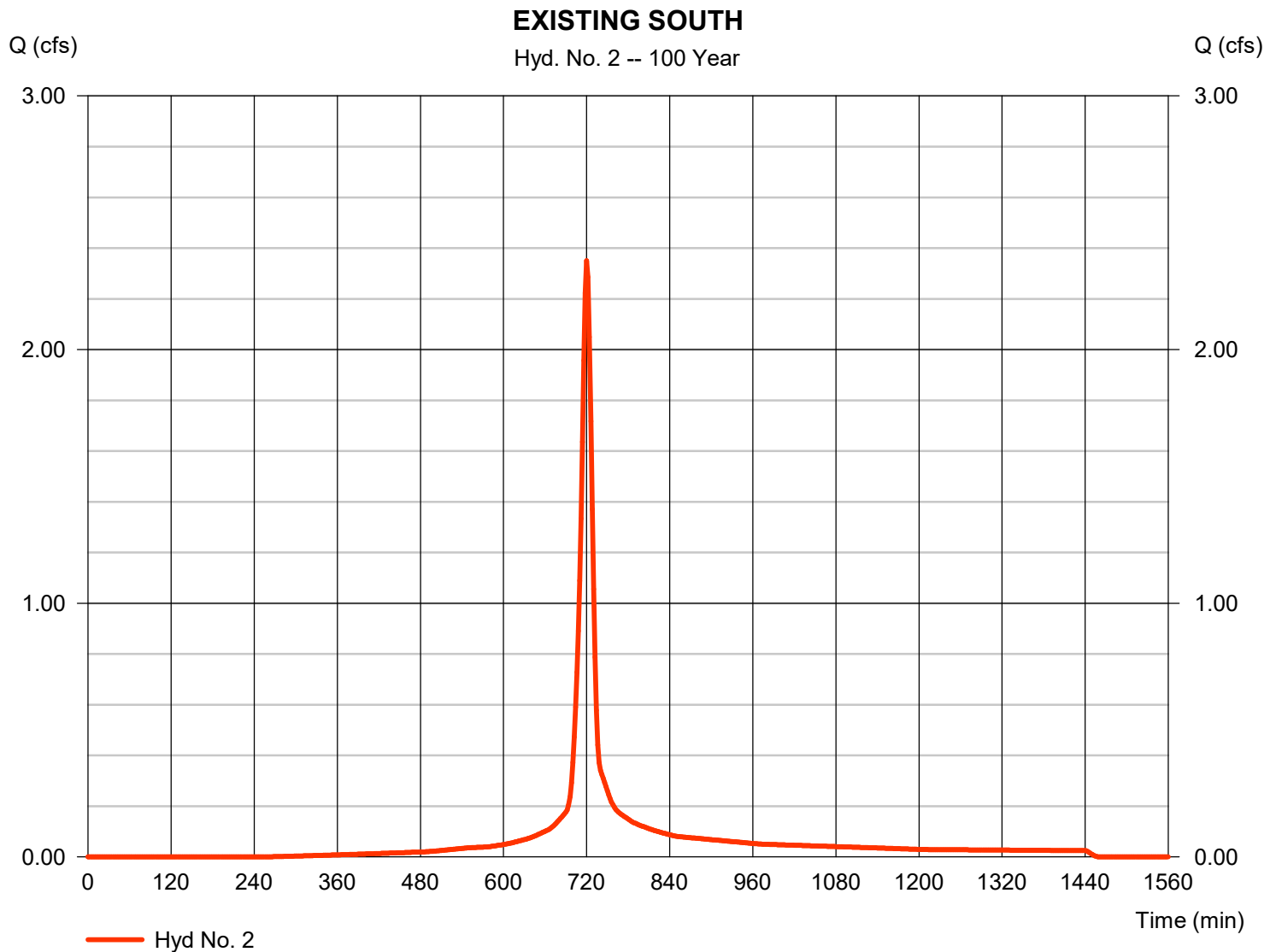
Thursday, 02 / 11 / 2021

Hyd. No. 2

EXISTING SOUTH

Hydrograph type	= SCS Runoff	Peak discharge	= 2.350 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 6,305 cuft
Drainage area	= 0.290 ac	Curve number	= 84*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.10 min
Total precip.	= 7.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = $[(0.290 \times 84)] / 0.290$



Hydrograph Report

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

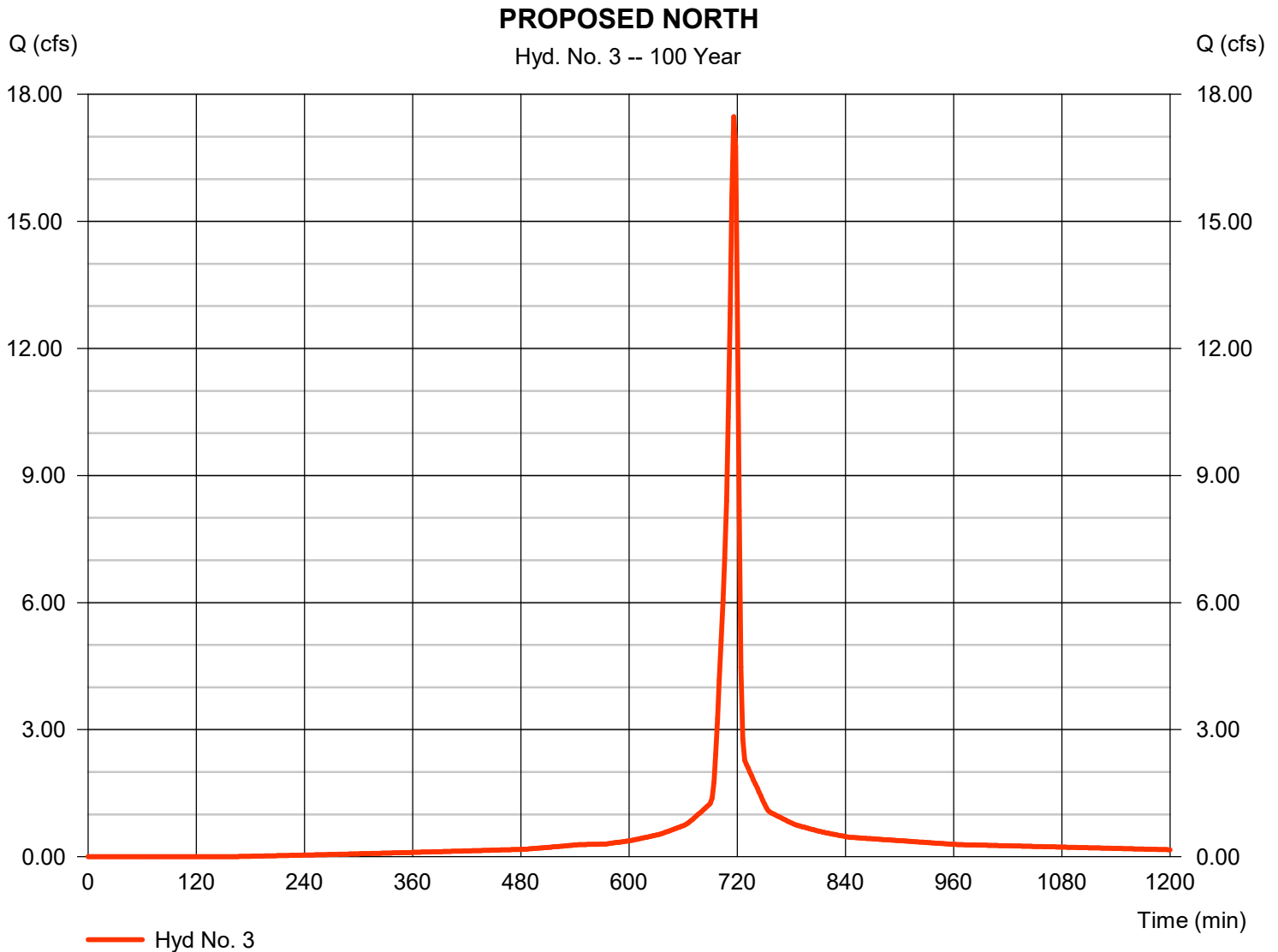
Thursday, 02 / 11 / 2021

Hyd. No. 3

PROPOSED NORTH

Hydrograph type	= SCS Runoff	Peak discharge	= 17.48 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 38,772 cuft
Drainage area	= 1.750 ac	Curve number	= 90*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = $[(0.780 \times 80) + (0.970 \times 98)] / 1.750$



Hydrograph Report

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

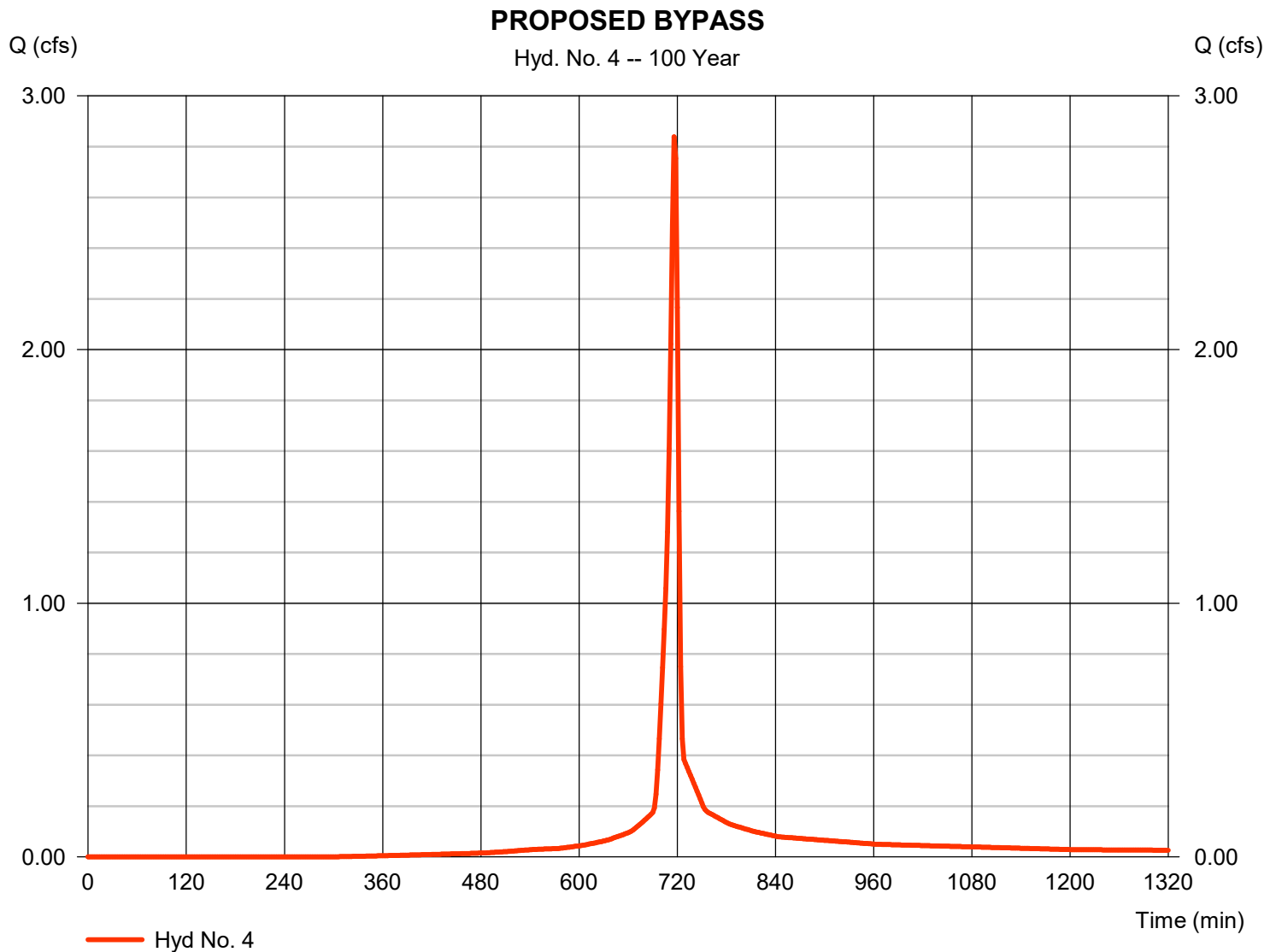
Thursday, 02 / 11 / 2021

Hyd. No. 4

PROPOSED BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 2.838 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 5,946 cuft
Drainage area	= 0.320 ac	Curve number	= 81*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = $[(0.300 \times 80) + (0.020 \times 98)] / 0.320$



Hydrograph Report

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

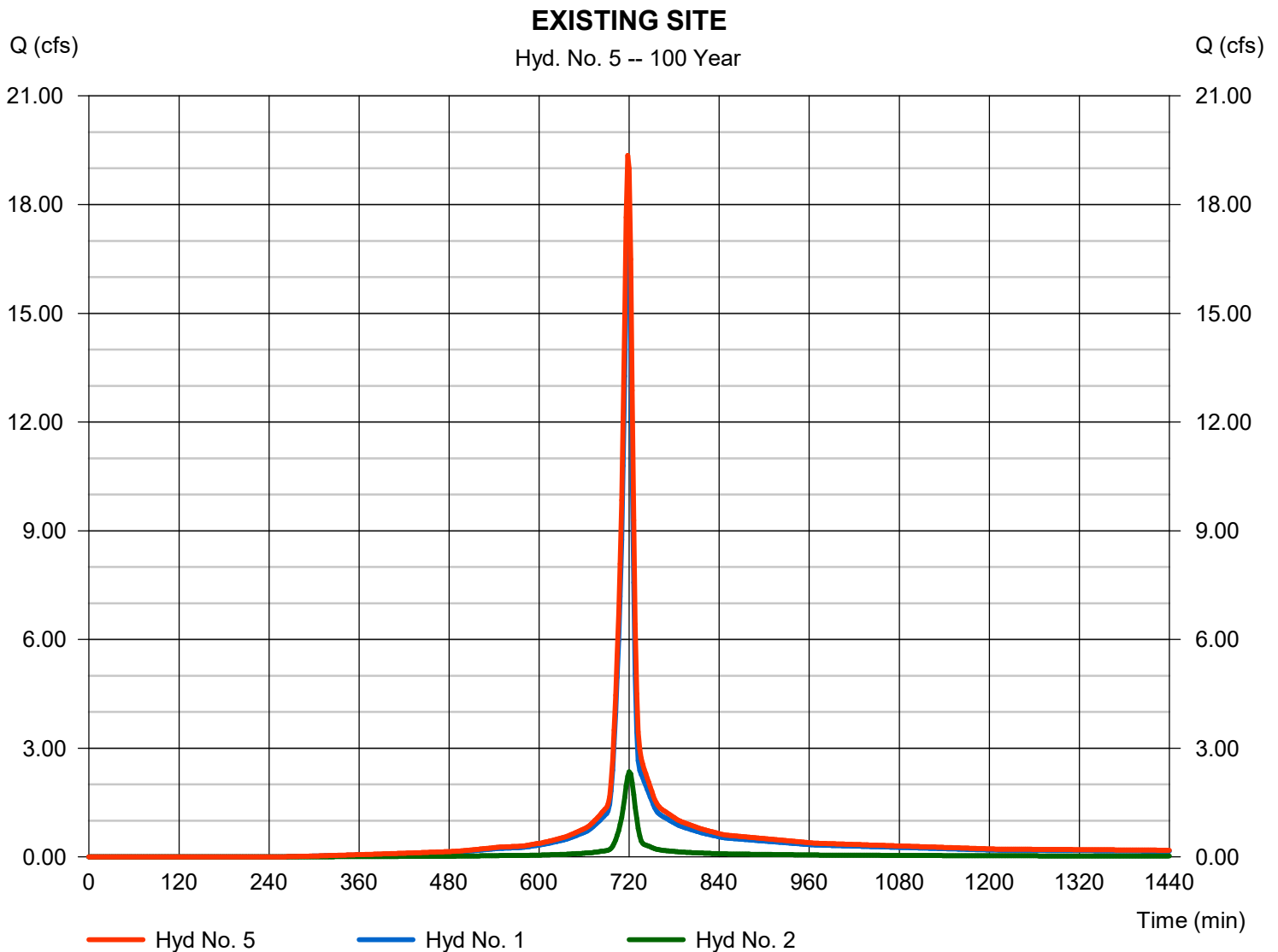
Thursday, 02 / 11 / 2021

Hyd. No. 5

EXISTING SITE

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

Peak discharge = 19.36 cfs
 Time to peak = 718 min
 Hyd. volume = 47,203 cuft
 Contrib. drain. area = 2.230 ac



Hydrograph Report

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

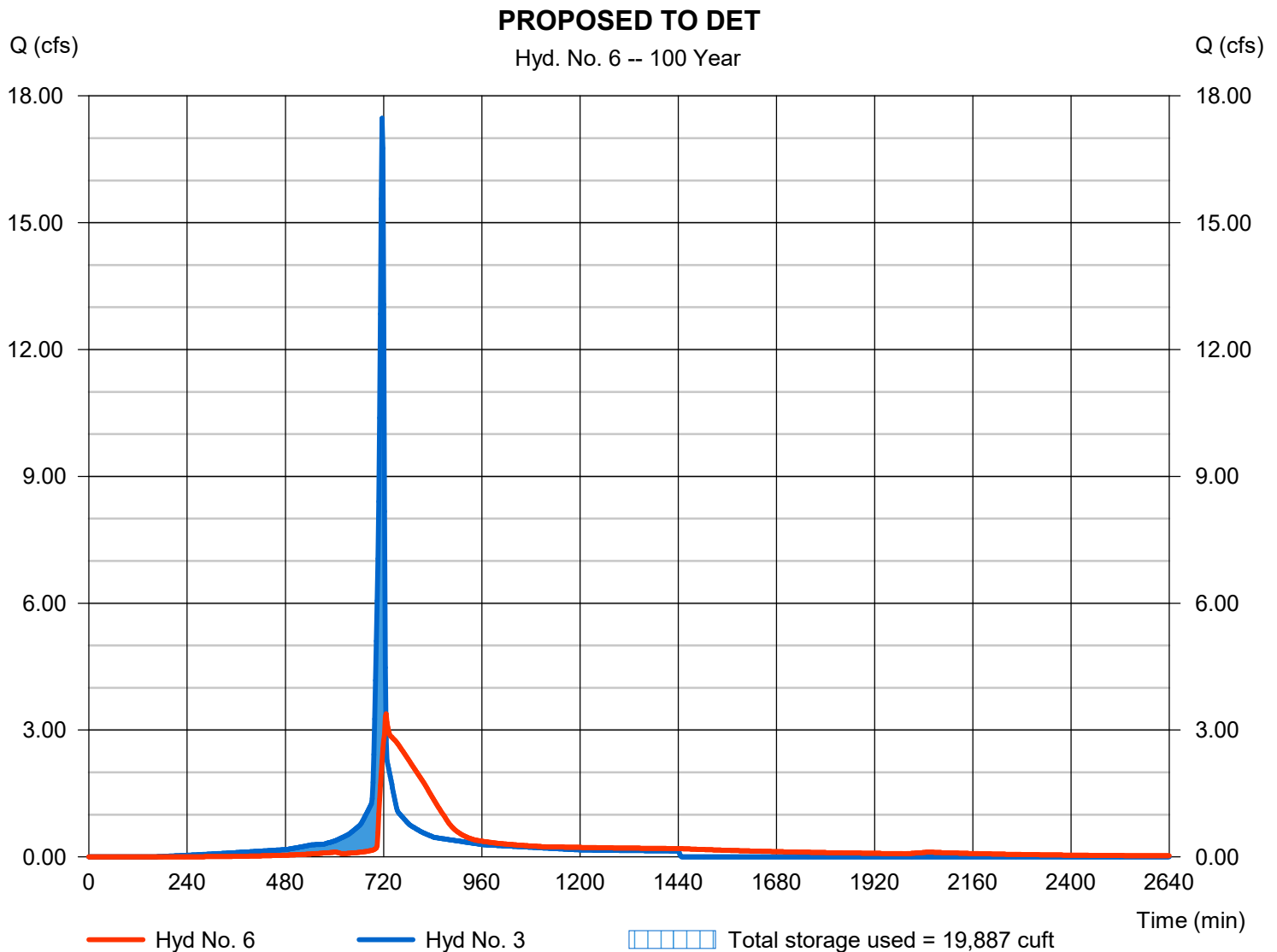
Thursday, 02 / 11 / 2021

Hyd. No. 6

PROPOSED TO DET

Hydrograph type	= Reservoir	Peak discharge	= 3.387 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 38,689 cuft
Inflow hyd. No.	= 3 - PROPOSED NORTH	Max. Elevation	= 966.27 ft
Reservoir name	= Detention Pond	Max. Storage	= 19,887 cuft

Storage Indication method used.



Hydrograph Report

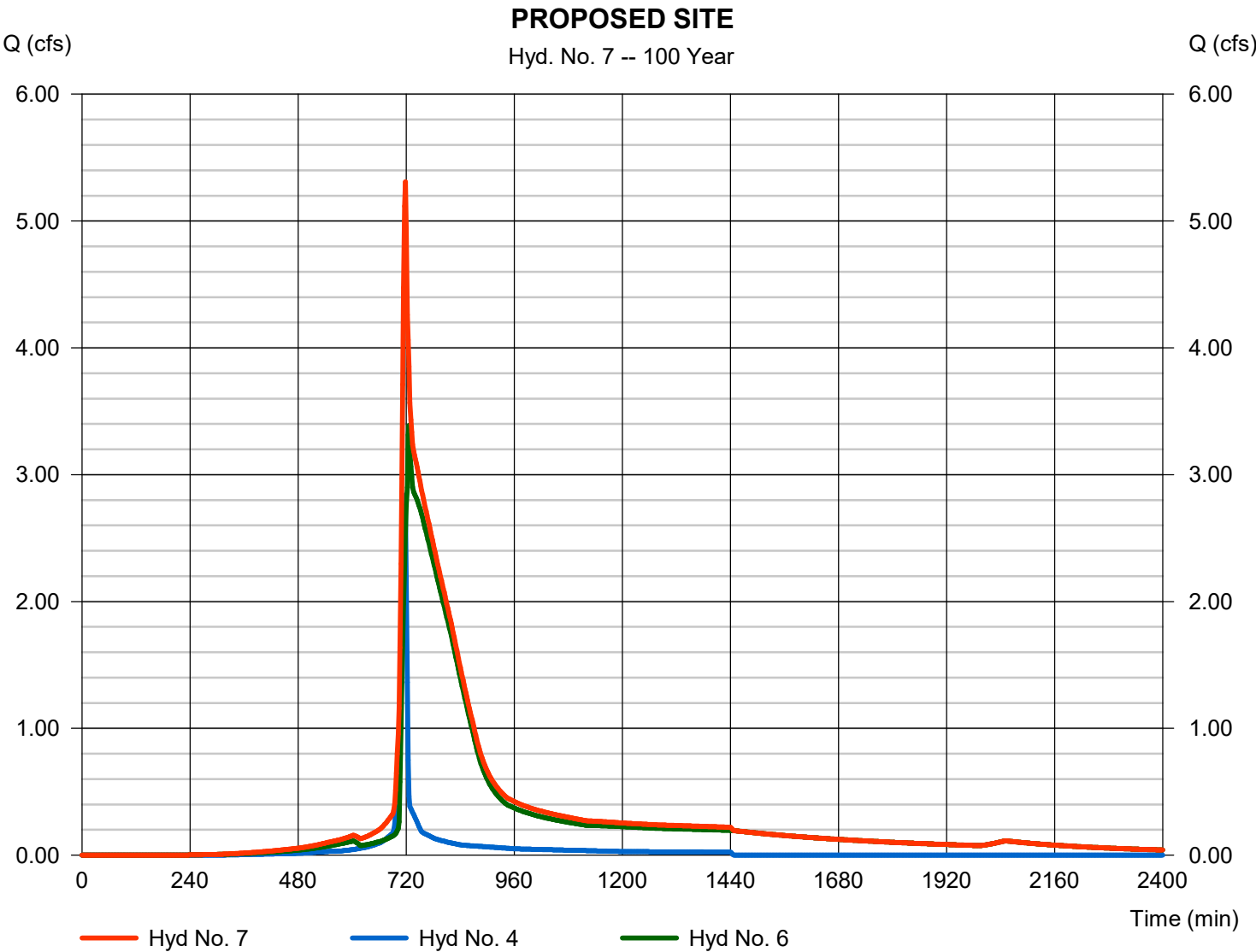
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Thursday, 02 / 11 / 2021

Hyd. No. 7

PROPOSED SITE

Hydrograph type	= Combine	Peak discharge	= 5.310 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 44,635 cuft
Inflow hyds.	= 4, 6	Contrib. drain. area	= 0.320 ac



Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	-----
2	26.1250	4.3000	0.6753	-----
3	0.0000	0.0000	0.0000	-----
5	32.4010	4.4000	0.6735	-----
10	37.8784	4.5000	0.6734	-----
25	42.5803	4.1000	0.6577	-----
50	45.8000	3.8000	0.6449	-----
100	48.9298	3.5000	0.6340	-----

File name: Lee's Summit IDF.IDF

$$\text{Intensity} = B / (T_c + D)^E$$

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.79	4.33	3.54	3.03	2.67	2.40	2.19	2.02	1.88	1.76	1.66	1.57
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	7.16	5.38	4.40	3.77	3.32	2.99	2.73	2.52	2.34	2.20	2.07	1.96
10	8.32	6.26	5.12	4.39	3.88	3.49	3.19	2.94	2.74	2.57	2.42	2.29
25	9.97	7.47	6.12	5.25	4.64	4.18	3.82	3.53	3.29	3.09	2.91	2.76
50	11.27	8.43	6.90	5.93	5.24	4.73	4.33	4.00	3.73	3.50	3.31	3.14
100	12.60	9.39	7.69	6.61	5.85	5.28	4.83	4.47	4.18	3.92	3.71	3.52

Tc = time in minutes. Values may exceed 60.

Precip. file name: P:\2018\20180111\Engineering\Hydraflow\Lee's Summit Precipitation.pcp

[illegible]

Watershed Model Schematic.....	1
Hydrograph Return Period Recap.....	2
2 - Year	
Summary Report.....	3
Hydrograph Reports.....	4
Hydrograph No. 1, SCS Runoff, EXISTING NORTH.....	4
TR-55 Tc Worksheet.....	5
Hydrograph No. 2, SCS Runoff, EXISTING SOUTH.....	6
TR-55 Tc Worksheet.....	7
Hydrograph No. 3, SCS Runoff, PROPOSED NORTH.....	8
Hydrograph No. 4, SCS Runoff, PROPOSED BYPASS.....	9
Hydrograph No. 5, Combine, EXISTING SITE.....	10
Hydrograph No. 6, Reservoir, PROPOSED TO DET.....	11
Pond Report - Detention Pond.....	12
Hydrograph No. 7, Combine, PROPOSED SITE.....	14
10 - Year	
Summary Report.....	15
Hydrograph Reports.....	16
Hydrograph No. 1, SCS Runoff, EXISTING NORTH.....	16
Hydrograph No. 2, SCS Runoff, EXISTING SOUTH.....	17
Hydrograph No. 3, SCS Runoff, PROPOSED NORTH.....	18
Hydrograph No. 4, SCS Runoff, PROPOSED BYPASS.....	19
Hydrograph No. 5, Combine, EXISTING SITE.....	20
Hydrograph No. 6, Reservoir, PROPOSED TO DET.....	21
Hydrograph No. 7, Combine, PROPOSED SITE.....	22
100 - Year	
Summary Report.....	23
Hydrograph Reports.....	24
Hydrograph No. 1, SCS Runoff, EXISTING NORTH.....	24
Hydrograph No. 2, SCS Runoff, EXISTING SOUTH.....	25
Hydrograph No. 3, SCS Runoff, PROPOSED NORTH.....	26
Hydrograph No. 4, SCS Runoff, PROPOSED BYPASS.....	27
Hydrograph No. 5, Combine, EXISTING SITE.....	28
Hydrograph No. 6, Reservoir, PROPOSED TO DET.....	29
Hydrograph No. 7, Combine, PROPOSED SITE.....	30
IDF Report.....	31

Channel Report

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

Monday, Feb 8 2021

Emergency Spillway-RECORD

User-defined

Invert Elev (ft) = 966.60
Slope (%) = 1.00
N-Value = 0.150

Calculations

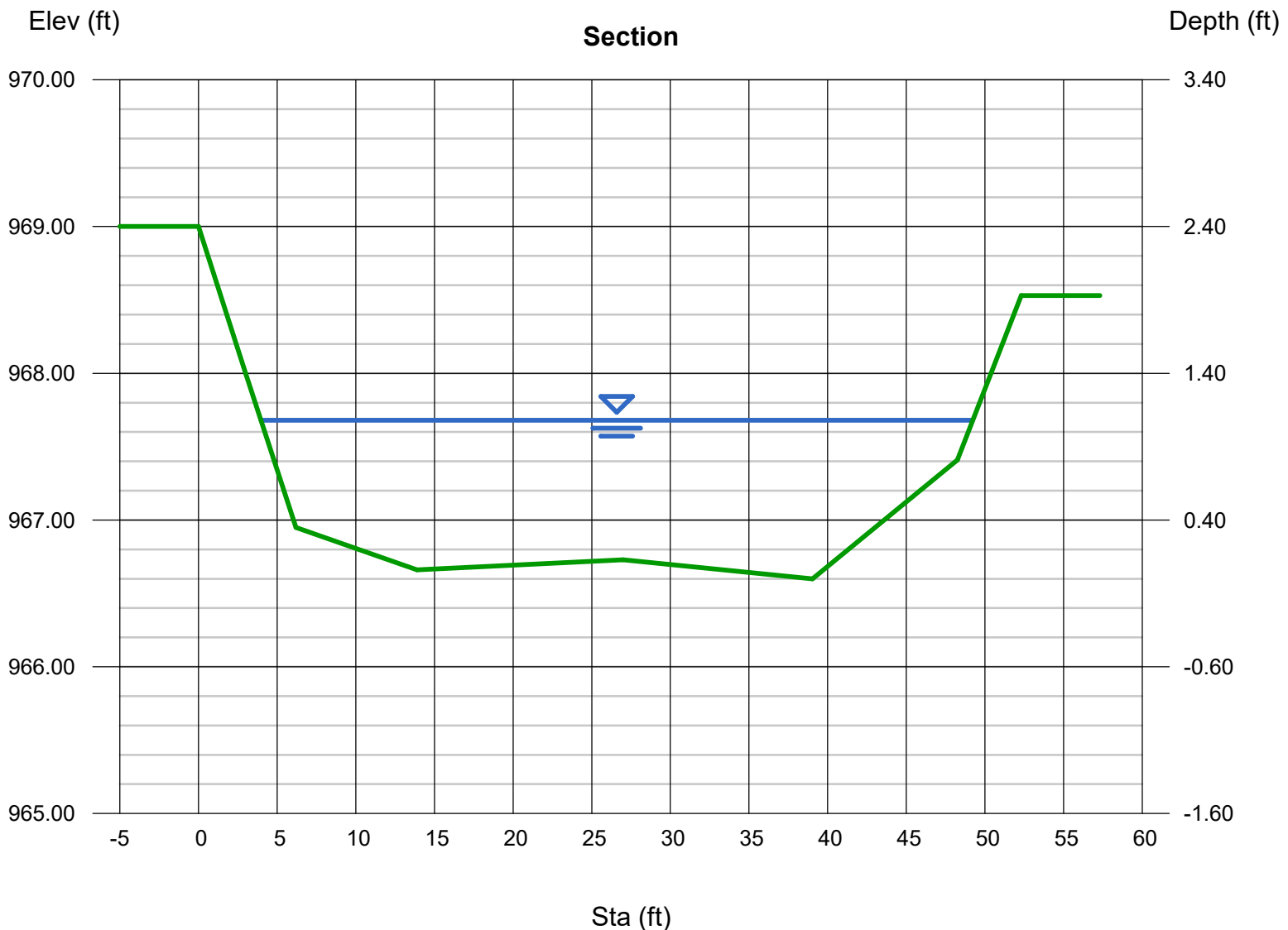
Compute by: Known Q
Known Q (cfs) = 34.51

Highlighted

Depth (ft) = 1.08
Q (cfs) = 34.51
Area (sqft) = 39.02
Velocity (ft/s) = 0.88
Wetted Perim (ft) = 45.44
Crit Depth, Yc (ft) = 0.42
Top Width (ft) = 45.24
EGL (ft) = 1.09

(Sta, El, n)-(Sta, El, n)...

(0.00, 969.00)-(3.00, 968.00, 0.150)-(6.20, 966.95, 0.150)-(13.90, 966.66, 0.150)-(26.99, 966.73, 0.150)-(39.04, 966.60, 0.150)-(48.24, 967.41, 0.150)
-(52.30, 968.53, 0.150)



Date: 2/8/2021

AS-BUILT CALCULATIONS

Proposed Conditions

Drainage Area	Pervious Area (ac)	Impervious Area (ac)	Total Area, DA (ac)	Total Area, DA (sf)	Percent Site Impervious, I	Volumetric Runoff Coefficient, Rv = .05+.009I	Required WQ Treatment Volume, WQv=P(Rv) (in)	Required WQ Treatment Volume, WQv=P(Rv)(DA) (cf)
North	0.78	0.97	1.75	76,330	56.0%	0.554	0.759	4,827.75
Bypass	0.36	0.02	0.38	16,756	5.3%	0.098	0.134	186.90
Sum=							5014.64	

Extended Dry Detention Pond

Elevation-Area-Volume Table		
Elevation	Area (sf)	Volume (cf)
961	10	0
962	352	90.5
963	3,691	3,123
963.5	4,123	5,184
964	4,554	7,245
965	5,400	12,222
966	6,307	18,076
966.2	6,499	18,755

*WQv elevation

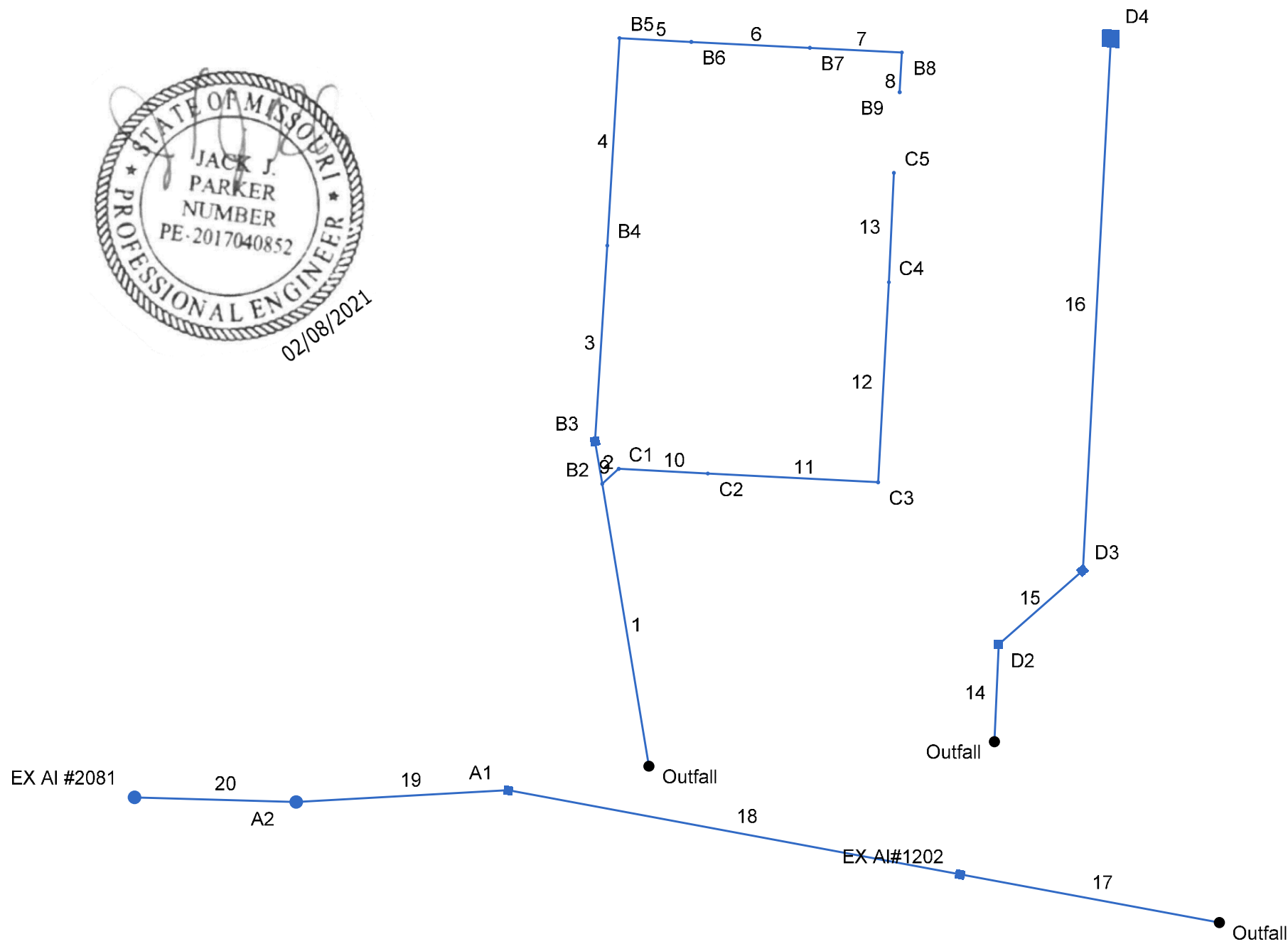
Extended Dry Detention Pond	Return Event (years)	Max Water Surface Elevation (ft)	Freeboard (ft)
	2	964.26	4.44
	10	965.08	3.62
	100	966.24	2.46

Perforated Riser

WQv Treatment Depth Above Lowest Orifice, Zwq	2.5 ft
Water Quality Volume	5,184 cf
Water Quality Volume	0.119 ac-ft
Recommended Max Outlet Area per Row, Ao	1.37 sq. in
$A_o = \frac{WQ_v}{(0.013(Z_{wq})^2 + 0.22(Z_{wq}) - 0.10)}$	
Number of columns, nc	1 column
Design circular perforation diameter, Dperf	1 in
Number of rows (4" vertical spacing), nr	5 rows
Perforation 1 Elevation	961.9
Perforation 2 Elevation	962.2
Perforation 3 Elevation	962.5
Perforation 4 Elevation	962.87
Perforation 5 Elevation	963.17



Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	B2-B1	2.29	12	Cir	99.986	963.84	970.33	6.491	964.66	970.98	n/a	970.98 j	End	Manhole
2	B3-B2	1.23	12	Cir	15.014	970.33	971.31	6.527	970.98	971.78	n/a	971.78 j	1	Grate
3	B4-B3	0.69	10	Cir	68.549	971.51	973.39	2.743	971.78	973.76	0.02	973.76	2	Manhole
4	B5-B4	0.36	10	Cir	72.548	973.39	974.11	0.992	973.76	974.37	n/a	974.37 j	3	Manhole
5	B6-B5	0.29	10	Cir	25.084	974.11	974.36	0.997	974.37	974.59	n/a	974.59 j	4	Manhole
6	B7-B6	0.09	10	Cir	41.250	974.36	974.77	0.994	974.59	974.90	n/a	974.90 j	5	Manhole
7	B8-B7	0.03	10	Cir	32.000	974.77	975.09	1.000	974.90	975.16	n/a	975.16 j	6	Manhole
8	B9-B8	0.03	10	Cir	13.875	975.09	975.23	1.009	975.16	975.30	n/a	975.30	7	Manhole
9	C1-B2	1.06	10	Cir	7.838	972.32	973.31	12.631	972.53	973.77	n/a	973.77	1	Manhole
10	C2-C1	0.99	10	Cir	31.160	973.31	973.62	0.995	973.77	974.06	n/a	974.06 j	9	Manhole
11	C3-C2	0.79	10	Cir	59.298	973.62	974.22	1.012	974.06	974.61	n/a	974.61 j	10	Manhole
12	C4-C3	0.53	10	Cir	70.000	974.22	974.92	1.000	974.61	975.24	n/a	975.24 j	11	Manhole
13	C5-C4	0.26	10	Cir	38.214	974.92	975.30	0.994	975.24	975.52	n/a	975.52 j	12	Manhole
14	D2-D1	4.67	12	Cir	34.000	963.15	968.34	15.265	964.10	969.24	n/a	969.24 j	End	Combination
15	D3-D2	3.54	12	Cir	39.000	968.44	970.60	5.538	969.24	971.40	n/a	971.40	14	Combination
16	D4-D3	2.55	12	Cir	186.000	971.00	973.50	1.344	971.57	974.18	n/a	974.18	15	Combination
17	EX AL#1202-OUTFALL	8.09	24	Cir	91.740	947.73	948.65	1.003	949.24	949.66	n/a	949.66 j	End	Grate
18	A1-EX AL#1202	5.25	24	Cir	160.000	949.17	957.82	5.406	949.66	958.63	0.15	958.63	17	Grate
19	A2-A1	2.16	15	Cir	74.000	958.12	962.79	6.311	958.63	963.38	n/a	963.38	18	Manhole
20	EX A3-A2	2.16	15	Cir	56.151	966.64	967.09	0.801	967.17	967.68	n/a	967.68	19	Grate

Project File: 20180111_2020-11-24 Storm Sewers-RECORD.stm

Number of lines: 20

Run Date: 2/11/2021

NOTES: Return period = 10 Yrs. ; j - Line contains hyd. jump.

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (l)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID	
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up		
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		
1	End	99.986	0.00	0.39	0.00	0.00	0.33	0.0	5.0	7.0	2.29	9.07	3.79	12	6.49	963.84	970.33	964.66	970.98	965.10	978.70	B2-B1	
2	1	15.014	0.13	0.23	0.60	0.08	0.18	5.0	5.0	7.0	1.23	9.10	2.85	12	6.53	970.33	971.31	970.98	971.78	978.70	976.41	B3-B2	
3	2	68.549	0.05	0.10	0.95	0.05	0.10	5.0	5.0	7.0	0.69	3.63	3.77	10	2.74	971.51	973.39	971.78	973.76	976.41	977.10	B4-B3	
4	3	72.548	0.01	0.05	0.95	0.01	0.05	5.0	5.0	7.0	0.36	2.18	2.01	10	0.99	973.39	974.11	973.76	974.37	977.10	979.00	B5-B4	
5	4	25.084	0.03	0.04	0.95	0.03	0.04	5.0	5.0	7.0	0.29	2.19	2.16	10	1.00	974.11	974.36	974.37	974.59	979.00	978.75	B6-B5	
6	5	41.250	0.01	0.01	0.95	0.01	0.01	5.0	5.0	7.0	0.09	2.18	1.22	10	0.99	974.36	974.77	974.59	974.90	978.75	978.40	B7-B6	
7	6	32.000	0.00	0.00	0.00	0.00	0.00	0.0	5.0	7.0	0.03	2.19	0.86	10	1.00	974.77	975.09	974.90	975.16	978.40	978.15	B8-B7	
8	7	13.875	0.00	0.00	0.95	0.00	0.00	5.0	5.0	7.0	0.03	2.20	1.23	10	1.01	975.09	975.23	975.16	975.30	978.15	978.30	B9-B8	
9	1	7.838	0.01	0.16	0.95	0.01	0.15	5.0	5.0	7.0	1.06	7.78	6.72	10	12.63	972.32	973.31	972.53	973.77	978.70	978.70	C1-B2	
10	9	31.160	0.03	0.15	0.95	0.03	0.14	5.0	5.0	7.0	0.99	2.18	3.31	10	0.99	973.31	973.62	973.77	974.06	978.70	978.28	C2-C1	
11	10	59.298	0.04	0.12	0.95	0.04	0.11	5.0	5.0	7.0	0.79	2.20	2.92	10	1.01	973.62	974.22	974.06	974.61	978.28	978.25	C3-C2	
12	11	70.000	0.04	0.08	0.95	0.04	0.08	5.0	5.0	7.0	0.53	2.19	2.43	10	1.00	974.22	974.92	974.61	975.24	978.25	978.67	C4-C3	
13	12	38.214	0.04	0.04	0.95	0.04	0.04	5.0	5.0	7.0	0.26	2.18	1.82	10	0.99	974.92	975.30	975.24	975.52	978.67	978.80	C5-C4	
14	End	34.000	0.17	0.93	0.95	0.16	0.67	5.0	5.0	7.0	4.67	13.91	6.18	12	15.26	963.15	968.34	964.10	969.24	965.60	976.19	D2-D1	
15	14	39.000	0.15	0.76	0.95	0.14	0.51	5.0	5.0	7.0	3.54	8.38	5.26	12	5.54	968.44	970.60	969.24	971.40	976.19	976.15	D3-D2	
16	15	186.000	0.61	0.61	0.60	0.37	0.37	5.0	5.0	7.0	2.55	4.13	5.00	12	1.34	971.00	973.50	971.57	974.18	976.15	977.00	D4-D3	
17	End	91.740	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	8.09	22.65	4.13	24	1.00	947.73	948.65	949.24	949.66	950.00	959.97	EX AL#1202-OUT	
18	17	160.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	5.25	52.59	6.59	24	5.41	949.17	957.82	949.66	958.63	959.97	966.22	A1-EX AL#1202	
19	18	74.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	2.16	16.22	4.22	15	6.31	958.12	962.79	958.63	963.38	966.22	971.49	A2-A1	
20	19	56.151	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	2.16	5.78	4.09	15	0.80	966.64	967.09	967.17	967.68	971.49	973.94	EX A3-A2	
Project File: 20180111_2020-11-24 Storm Sewers-RECORD.stm																Number of lines: 20				Run Date: 2/11/2021			
NOTES:Intensity = 66.71 / (Inlet time + 12.50) ^ 0.79; Return period =Yrs. 10 ; Pipe travel time suppressed. ; c = cir e = ellip b = box																							

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	B2-B1	3.20	12	Cir	99.986	963.84	970.33	6.491	964.72	971.10	n/a	971.10 j	End	Manhole
2	B3-B2	1.72	12	Cir	15.014	970.33	971.31	6.527	971.10	971.87	n/a	971.87 j	1	Grate
3	B4-B3	0.96	10	Cir	68.549	971.51	973.39	2.743	971.87	973.82	0.03	973.82	2	Manhole
4	B5-B4	0.50	10	Cir	72.548	973.39	974.11	0.992	973.82	974.42	n/a	974.42 j	3	Manhole
5	B6-B5	0.41	10	Cir	25.084	974.11	974.36	0.997	974.42	974.64	n/a	974.64 j	4	Manhole
6	B7-B6	0.13	10	Cir	41.250	974.36	974.77	0.994	974.64	974.92	n/a	974.92 j	5	Manhole
7	B8-B7	0.04	10	Cir	32.000	974.77	975.09	1.000	974.92	975.17	n/a	975.17 j	6	Manhole
8	B9-B8	0.04	10	Cir	13.875	975.09	975.23	1.009	975.17	975.31	0.03	975.31	7	Manhole
9	C1-B2	1.48	10	Cir	7.838	972.32	973.31	12.631	972.57	973.85	n/a	973.85	1	Manhole
10	C2-C1	1.38	10	Cir	31.160	973.31	973.62	0.995	973.85	974.15	n/a	974.15 j	9	Manhole
11	C3-C2	1.11	10	Cir	59.298	973.62	974.22	1.012	974.15	974.69	n/a	974.69 j	10	Manhole
12	C4-C3	0.74	10	Cir	70.000	974.22	974.92	1.000	974.69	975.30	n/a	975.30 j	11	Manhole
13	C5-C4	0.37	10	Cir	38.214	974.92	975.30	0.994	975.30	975.56	n/a	975.56 j	12	Manhole
14	D2-D1	6.51	12	Cir	34.000	963.15	968.34	15.265	964.13	969.31	n/a	969.31 j	End	Combination
15	D3-D2	4.94	12	Cir	39.000	968.44	970.60	5.538	969.31	971.51	0.76	971.51	14	Combination
16	D4-D3	3.56	12	Cir	186.000	971.00	973.50	1.344	971.72	974.30	n/a	974.30	15	Combination
17	EX AL#1202-OUTFALL	11.53	24	Cir	91.740	947.73	948.65	1.003	949.34	949.87	n/a	949.87 j	End	Grate
18	A1-EX AL#1202	8.69	24	Cir	160.000	949.17	957.82	5.406	949.87	958.87	0.21	958.87	17	Grate
19	A2-A1	3.38	15	Cir	74.000	958.12	962.79	6.311	958.87	963.53	n/a	963.53 j	18	Manhole
20	EX A3-A2	3.38	15	Cir	56.151	966.64	967.09	0.801	967.33	967.83	n/a	967.83	19	Grate

Project File: 20180111_2020-11-24 Storm Sewers-RECORD.stm

Number of lines: 20

Run Date: 2/11/2021

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

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (l)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID	
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up		
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)		
1	End	99.986	0.00	0.39	0.00	0.00	0.33	0.0	5.0	9.7	3.20	9.07	4.66	12	6.49	963.84	970.33	964.72	971.10	965.10	978.70	B2-B1	
2	1	15.014	0.13	0.23	0.60	0.08	0.18	5.0	5.0	9.7	1.72	9.10	3.24	12	6.53	970.33	971.31	971.10	971.87	978.70	976.41	B3-B2	
3	2	68.549	0.05	0.10	0.95	0.05	0.10	5.0	5.0	9.7	0.96	3.63	3.82	10	2.74	971.51	973.39	971.87	973.82	976.41	977.10	B4-B3	
4	3	72.548	0.01	0.05	0.95	0.01	0.05	5.0	5.0	9.7	0.50	2.18	2.22	10	0.99	973.39	974.11	973.82	974.42	977.10	979.00	B5-B4	
5	4	25.084	0.03	0.04	0.95	0.03	0.04	5.0	5.0	9.7	0.41	2.19	2.38	10	1.00	974.11	974.36	974.42	974.64	979.00	978.75	B6-B5	
6	5	41.250	0.01	0.01	0.95	0.01	0.01	5.0	5.0	9.7	0.13	2.18	1.34	10	0.99	974.36	974.77	974.64	974.92	978.75	978.40	B7-B6	
7	6	32.000	0.00	0.00	0.00	0.00	0.00	0.0	5.0	9.7	0.04	2.19	0.94	10	1.00	974.77	975.09	974.92	975.17	978.40	978.15	B8-B7	
8	7	13.875	0.00	0.00	0.95	0.00	0.00	5.0	5.0	9.7	0.04	2.20	1.34	10	1.01	975.09	975.23	975.17	975.31	978.15	978.30	B9-B8	
9	1	7.838	0.01	0.16	0.95	0.01	0.15	5.0	5.0	9.7	1.48	7.78	7.45	10	12.63	972.32	973.31	972.57	973.85	978.70	978.70	C1-B2	
10	9	31.160	0.03	0.15	0.95	0.03	0.14	5.0	5.0	9.7	1.38	2.18	3.75	10	0.99	973.31	973.62	973.85	974.15	978.70	978.28	C2-C1	
11	10	59.298	0.04	0.12	0.95	0.04	0.11	5.0	5.0	9.7	1.11	2.20	3.28	10	1.01	973.62	974.22	974.15	974.69	978.28	978.25	C3-C2	
12	11	70.000	0.04	0.08	0.95	0.04	0.08	5.0	5.0	9.7	0.74	2.19	2.70	10	1.00	974.22	974.92	974.69	975.30	978.25	978.67	C4-C3	
13	12	38.214	0.04	0.04	0.95	0.04	0.04	5.0	5.0	9.7	0.37	2.18	2.01	10	0.99	974.92	975.30	975.30	975.56	978.67	978.80	C5-C4	
14	End	34.000	0.17	0.93	0.95	0.16	0.67	5.0	5.0	9.7	6.51	13.91	8.35	12	15.26	963.15	968.34	964.13	969.31	965.60	976.19	D2-D1	
15	14	39.000	0.15	0.76	0.95	0.14	0.51	5.0	5.0	9.7	4.94	8.38	6.70	12	5.54	968.44	970.60	969.31	971.51	976.19	976.15	D3-D2	
16	15	186.000	0.61	0.61	0.60	0.37	0.37	5.0	5.0	9.7	3.56	4.13	5.58	12	1.34	971.00	973.50	971.72	974.30	976.15	977.00	D4-D3	
17	End	91.740	0.00	0.00	0.00	0.00	0.00	5.0	5.0	0.0	11.53	22.65	5.01	24	1.00	947.73	948.65	949.34	949.87	950.00	959.97	EX AL#1202-OUT	
18	17	160.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	8.69	52.59	7.05	24	5.41	949.17	957.82	949.87	958.87	959.97	966.22	A1-EX AL#1202	
19	18	74.000	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	3.38	16.22	4.43	15	6.31	958.12	962.79	958.87	963.53	966.22	971.49	A2-A1	
20	19	56.151	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	3.38	5.78	4.68	15	0.80	966.64	967.09	967.33	967.83	971.49	973.94	EX A3-A2	
Project File: 20180111_2020-11-24 Storm Sewers-RECORD.stm																Number of lines: 20				Run Date: 2/11/2021			
NOTES:Intensity = 170.80 / (Inlet time + 18.20) ^ 0.91; Return period =Yrs. 100 ; Pipe travel time suppressed. ; c = cir e = ellip b = box																							

Storm Sewer Profile

Proj. file: 20180111_2020-11-24 Storm Sewers-RECORD.stm

100-YR Hydraulic Profile

Existing Pond to Existing Outlet Through Proposed Pond - RECORD

