COMMERCE POINT

Commercial Development

Franklin, Indiana

NORTHPOINTE

ENGINEERING & SURVEYING, Inc.

WBE/DBE Certified

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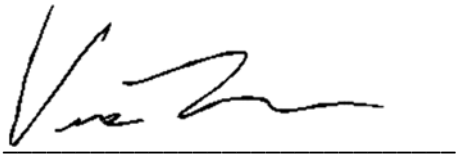
Commerce Point

Professional Certification

Commerce Point

The following report and accompanying computations have been developed by me or under my direct supervision.



Venus Thorne
Professional Engineer
Registration Number: 11200278

NORTHPOINTE ENGINEERING & SURVEYING, Inc.
WBE/DBE Certified

Drainage Summary

Commerce Point

Project Overview
The proposed project is a 6.4-acre commercial development located on Commerce Drive in Franklin, Johnson County.

Analytical Methodology:
The Huff rainfall distribution hydrographs were used to calculate the runoff rates with the analysis of all storm durations (1, 2, 3, 6, 12 and 24 hours). The input parameters needed for the calculation include the Curve Number (CN) and Time of Concentration (ToC). The CN was determined by the surface description and soil type for the watershed. The ToC was calculated using TR-55 methodology, considering the surface conditions and slope.

Existing Site Conditions / Site History
The parcel currently consists of buildings, with paved parking area and grass. The majority of the site contains B group soils with some C present as well. A soils map and existing site conditions map are enclosed for the site.

The site is zoned commercial. There are no zoning commitments that affect the drainage for the site.

The site is currently split into two watersheds. The west portion of the site (Basin 1) drains in a southwesterly direction to an existing drainage ditch and outlets to the west. The east portion of the site (Basin 2) drains in a southeasterly direction and outlets into the existing storm system along US 31.

Allowable Release Rates
Per the City of Franklin Subdivision Ordinance, the storm water detention designs shall outlet storm water at a 2-year pre-development rainfall event rate for a 10-year post-development storm and shall outlet at a 10-year pre-development rainfall event rate for a 100-year post-development storm.

Proposed Site
The proposed site will drain through a proposed storm system and outlet into 3 underground detention systems designed for the 6.4-acre development. Detention Area 1 will outlet into the existing storm located southwest of the site. The runoff from existing Basin 1 has been used to establish the allowable release rates for this Detention. Detentions 2 & 3 will outlet into the existing storm system located along US 31, which is part of the Basin 2 watershed in existing conditions. The allowable and proposed release rates for the development are as follows:

Basin 1

Storm Event	Allowable (cfs)	Proposed (cfs)
10-year	0.32	0.21
100-year	1.24	1.18

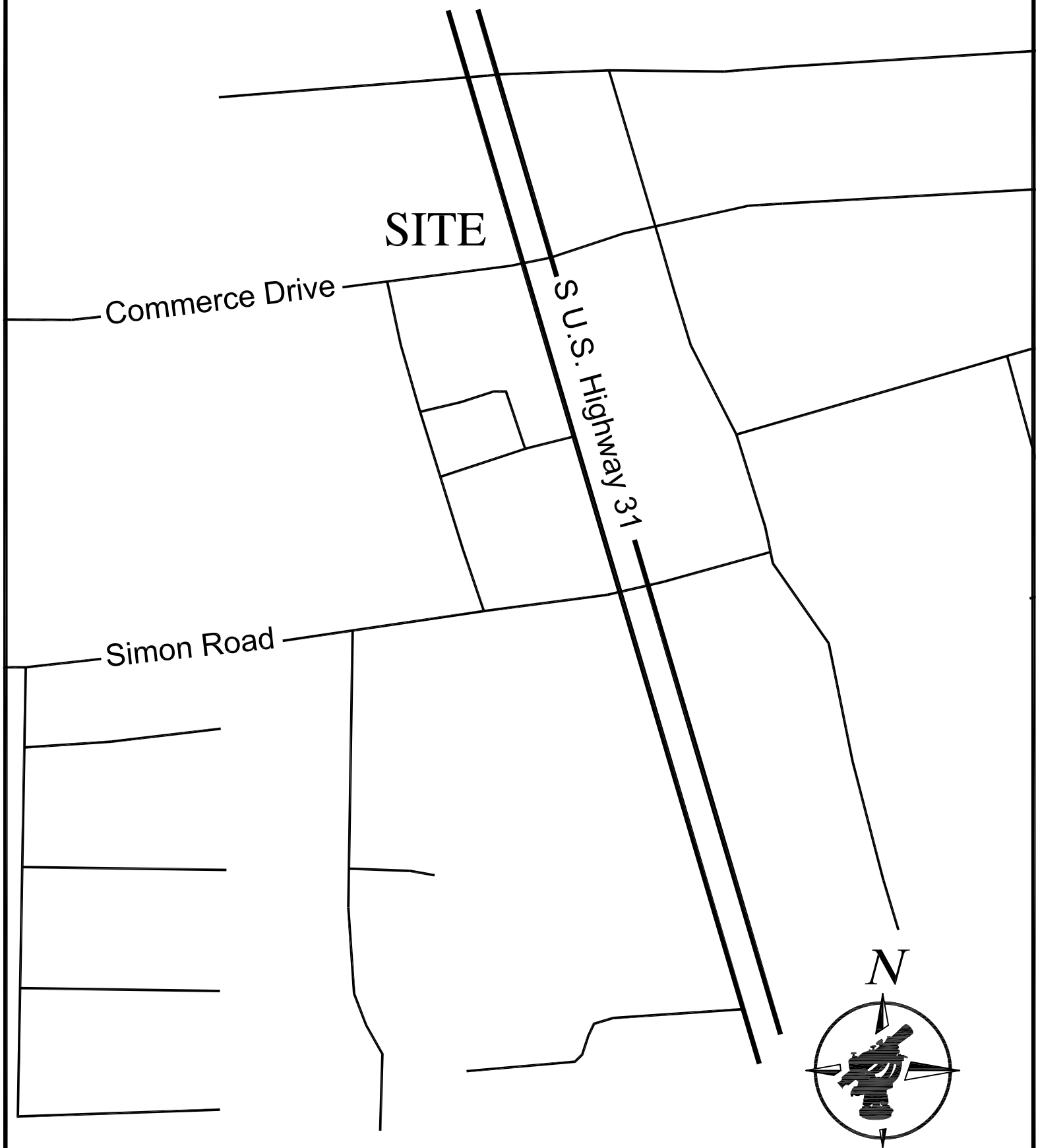
Basin 2

Storm Event	Allowable (cfs)	Proposed (cfs)
10-year	1.29	1.15
100-year	4.05	1.35

A map with the proposed detention areas and corresponding watersheds is included within this report.

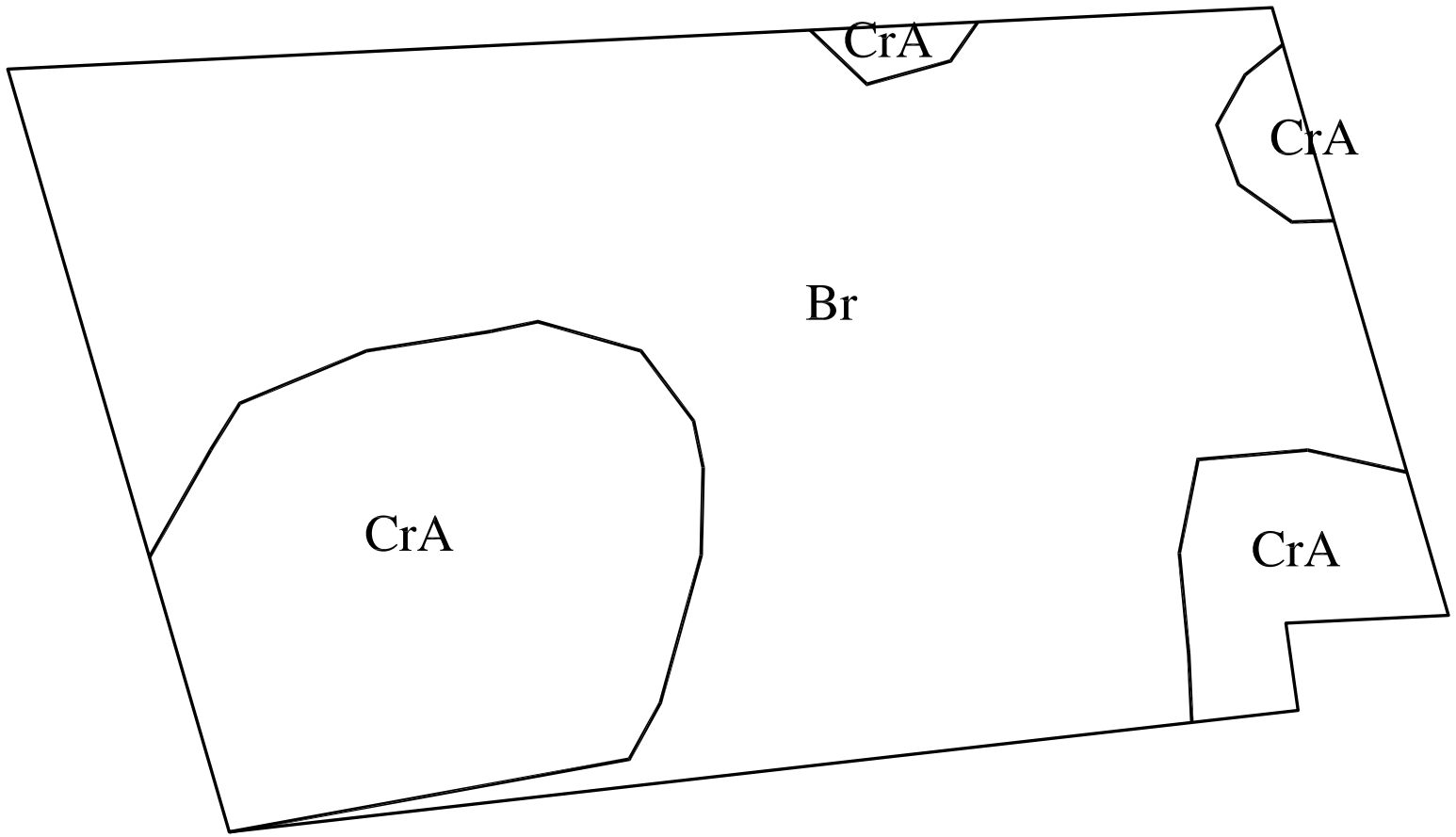
Water Quality
Water quality structures are proposed prior to the storm outletting into the underground detention areas. Calculations for the water quality structures will be performed and structures provided during the design of the construction plans.

Area Map



Scale: NTS

Soils Map

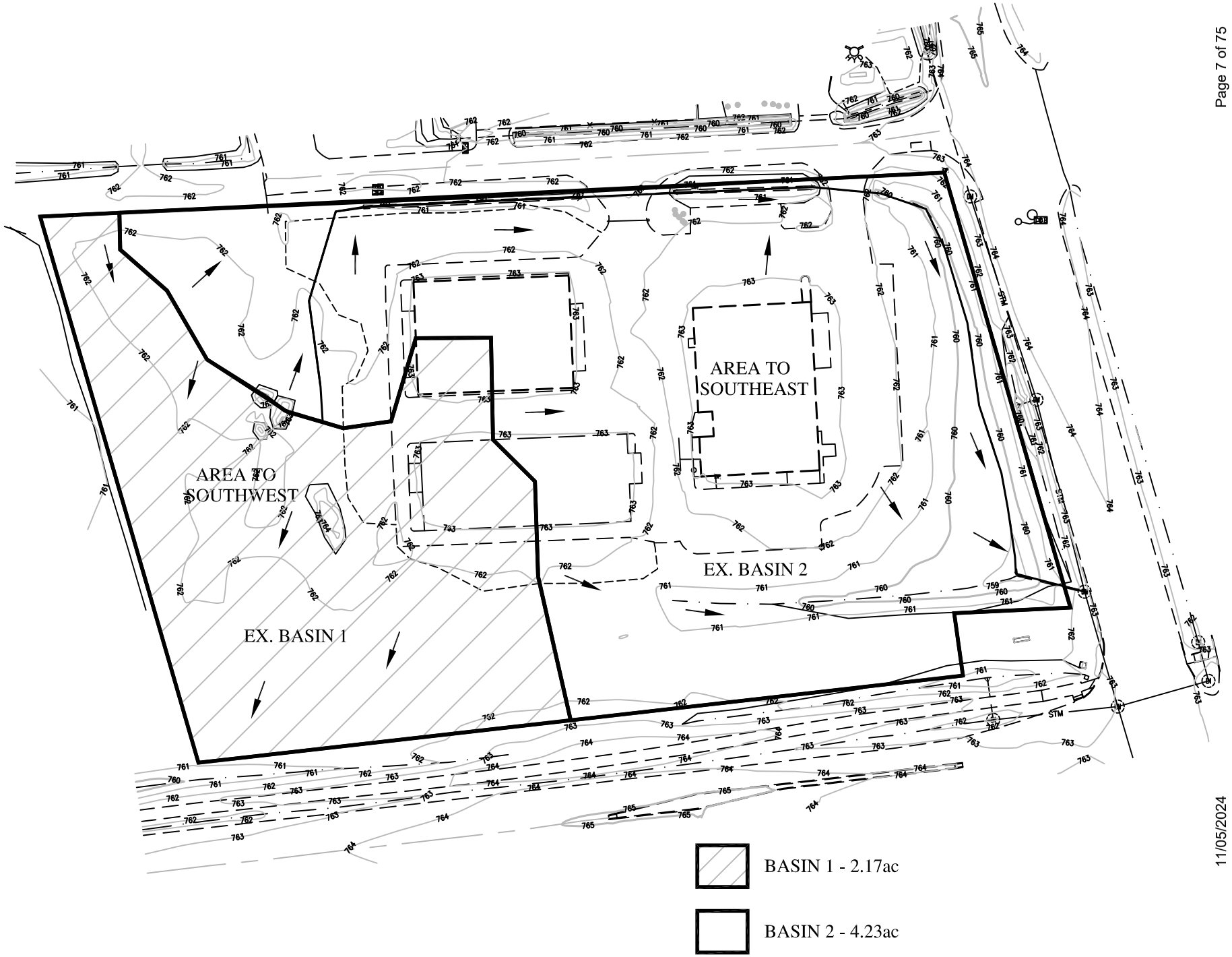


NORTH

Scale: 1"=100'

11/05/2024

Existing Site Conditions



11/05/2024

Runoff Coeffient

Project	Commerce Point	By	VT	Date	11/5/2024
Location	Indianapolis Marion County	Checked	DJS	Date	11/5/2024

X	Present		Developed

	Cover Description	CN	Area (ac)	Product
Br - B	Good Condition Grass Cover	61	0.61	37.21
CrA - C	Good Condition Grass Cover	74	1.12	82.88
Br | CrA - B | C	Impervous Surface	98	0.44	43.12
		Totals =	2.17	163.21

CN =	75.2

TR55 Tc Worksheet

Hyd. No. 1

Basin 1 1HR

Description	A		B		C		Totals
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)	= 2.64		0.00		0.00		
Land slope (%)	= 2.75		0.00		0.00		
Travel Time (min)	**= 9.50**	**+**	**0.00**	**+**	**0.00**	**=**	**9.50**
Shallow Concentrated Flow							
Flow length (ft)	= 182.00		0.00		0.00		
Watercourse slope (%)	= 0.50		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.14		0.00		0.00		
Travel Time (min)	**= 2.66**	**+**	**0.00**	**+**	**0.00**	**=**	**2.66**
Channel Flow							
X sectional flow area (sqft)	= 8.50		0.00		0.00		
Wetted perimeter (ft)	= 11.00		0.00		0.00		
Channel slope (%)	= 0.60		0.00		0.00		
Manning's n-value	= 0.030		0.015		0.015		
Velocity (ft/s)	=3.24						
			0.00				
					0.00		
Flow length (ft)	({0})574.0		0.0		0.0		
Travel Time (min)	**= 2.96**	**+**	**0.00**	**+**	**0.00**	**=**	**2.96**

Total Travel Time, Tc ..... 15.11 min

Hydrograph Summary Report

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

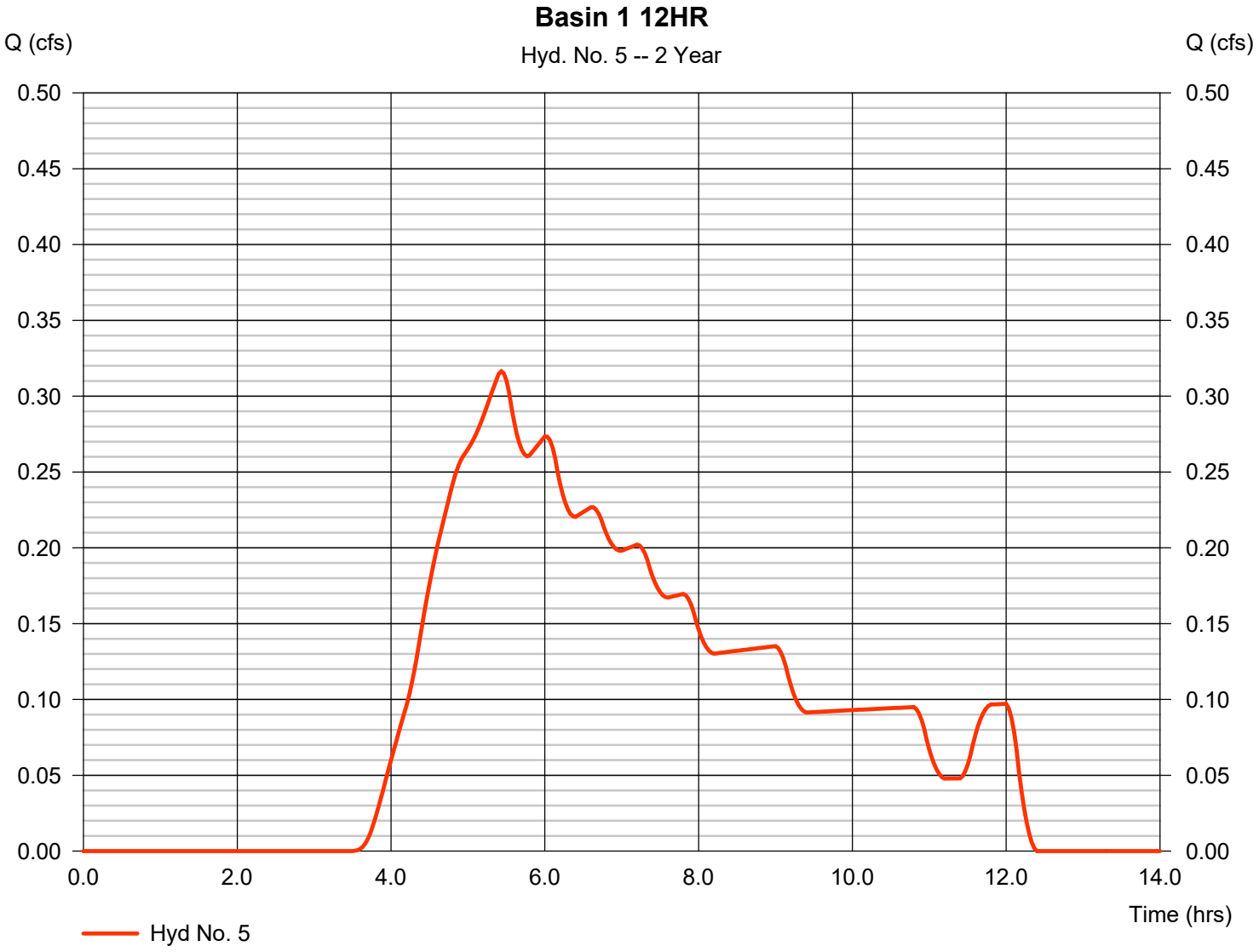
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.278	2	36	688	------	------	------	Basin 1 1HR
2	SCS Runoff	0.310	2	50	1,367	------	------	------	Basin 1 2HR
3	SCS Runoff	0.295	2	62	1,852	------	------	------	Basin 1 3HR
4	SCS Runoff	0.256	2	96	2,899	------	------	------	Basin 1 6HR
5	SCS Runoff	0.316	2	326	4,617	------	------	------	Basin 1 12HR
6	SCS Runoff	0.273	2	936	5,707	------	------	------	Basin 1 24HR

Hydrograph Report

Hyd. No. 5

Basin 1 12HR

Hydrograph type	= SCS Runoff	Peak discharge	= 0.316 cfs
Storm frequency	= 2 yrs	Time to peak	= 5.43 hrs
Time interval	= 2 min	Hyd. volume	= 4,617 cuft
Drainage area	= 2.170 ac	Curve number	= 75.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.10 min
Total precip.	= 2.40 in	Distribution	= Huff-2nd
Storm duration	= 12.00 hrs	Shape factor	= 484



Hydrograph Summary Report

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

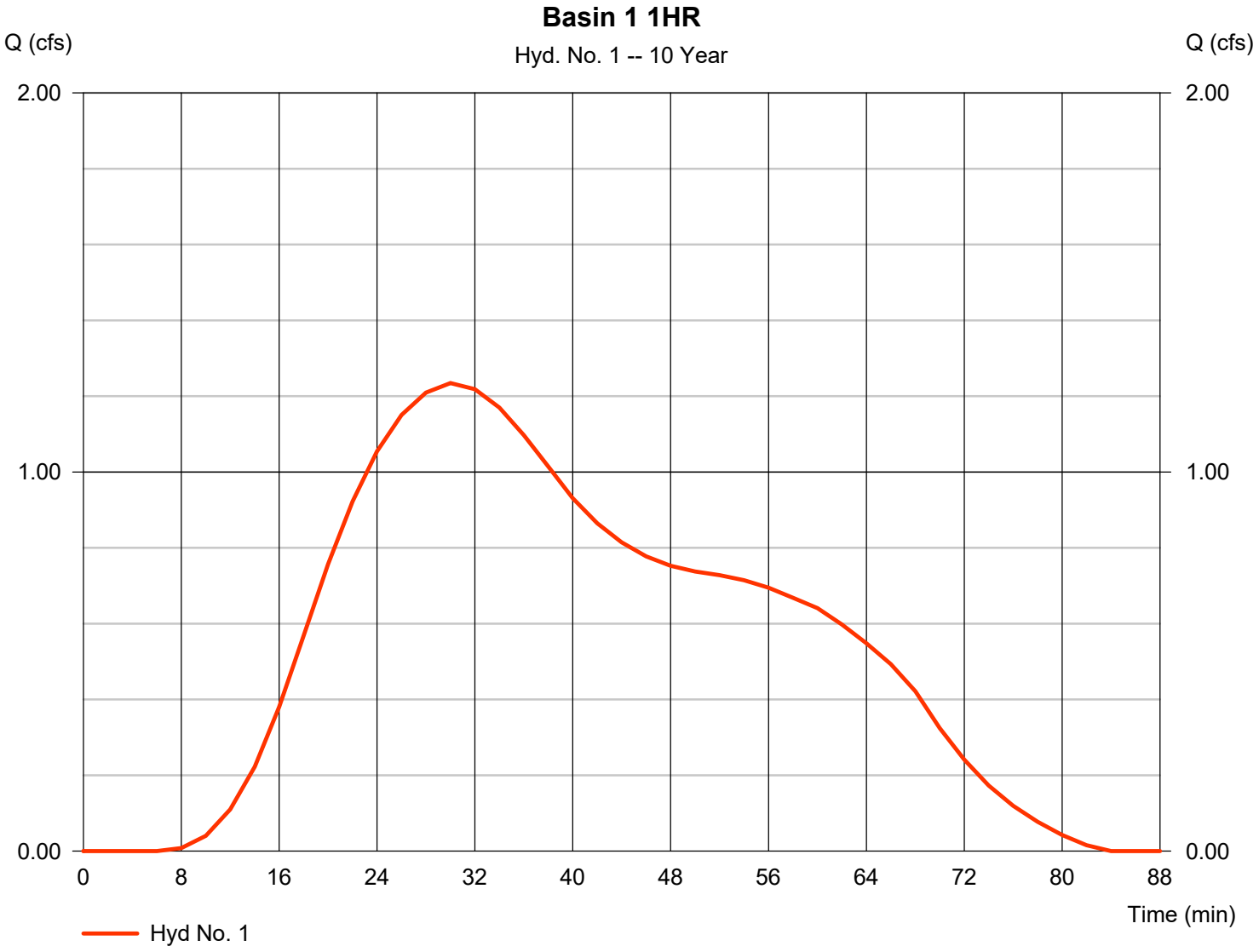
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.235	2	30	2,824	------	------	------	Basin 1 1HR
2	SCS Runoff	1.170	2	38	4,617	------	------	------	Basin 1 2HR
3	SCS Runoff	1.024	2	52	5,706	------	------	------	Basin 1 3HR
4	SCS Runoff	0.769	2	92	8,074	------	------	------	Basin 1 6HR
5	SCS Runoff	0.729	2	324	10,644	------	------	------	Basin 1 12HR
6	SCS Runoff	0.593	2	936	13,374	------	------	------	Basin 1 24HR

Hydrograph Report

Hyd. No. 1

Basin 1 1HR

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.235 cfs
Storm frequency	=	10 yrs	Time to peak	=	30 min
Time interval	=	2 min	Hyd. volume	=	2,824 cuft
Drainage area	=	2.170 ac	Curve number	=	75.2
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	15.10 min
Total precip.	=	1.96 in	Distribution	=	Huff-1st
Storm duration	=	1.00 hrs	Shape factor	=	484



Hydrograph Summary Report

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

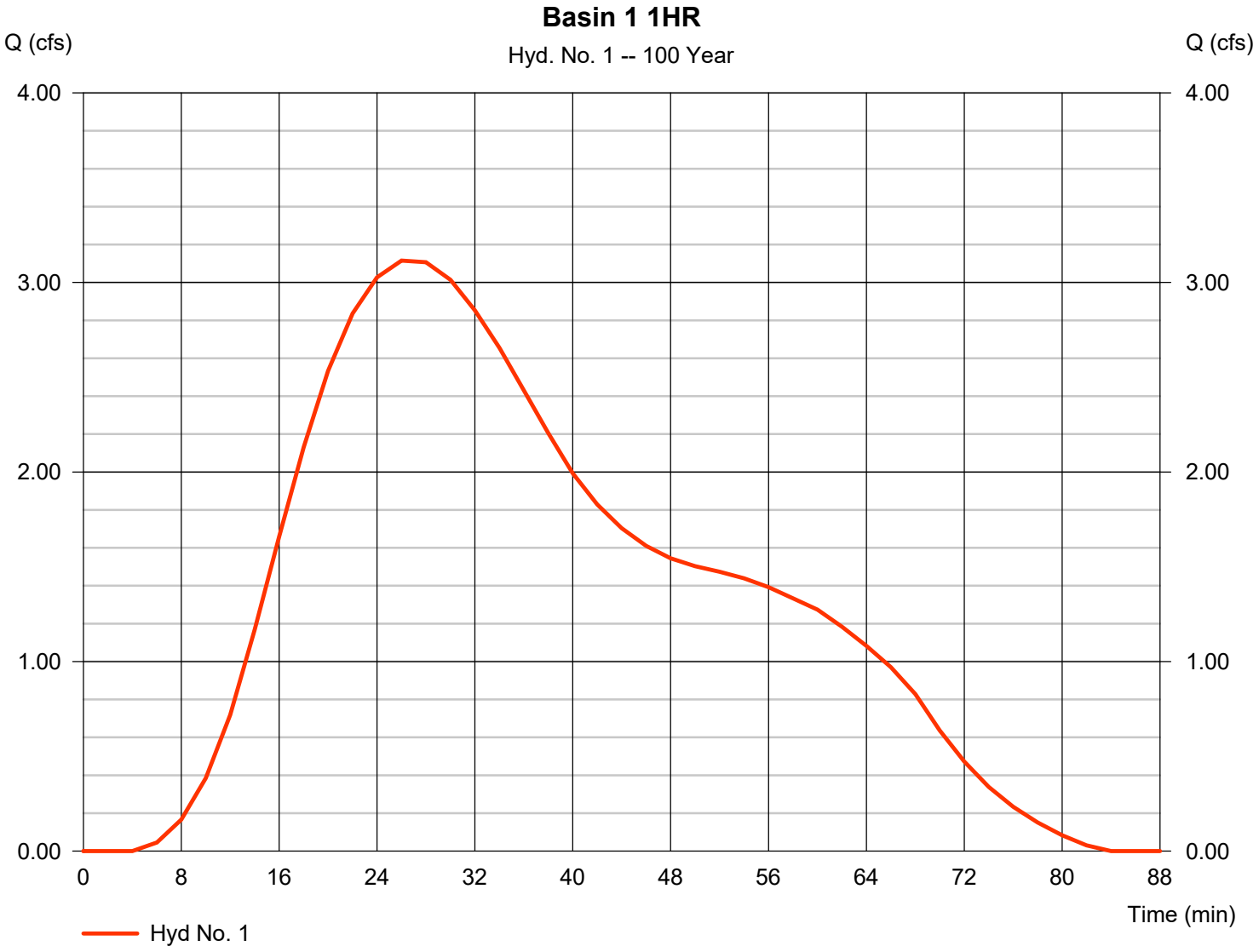
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.115	2	26	6,859	------	------	------	Basin 1 1HR
2	SCS Runoff	2.713	2	36	10,073	------	------	------	Basin 1 2HR
3	SCS Runoff	2.274	2	48	12,160	------	------	------	Basin 1 3HR
4	SCS Runoff	1.521	2	80	15,868	------	------	------	Basin 1 6HR
5	SCS Runoff	1.334	2	324	19,947	------	------	------	Basin 1 12HR
6	SCS Runoff	1.053	2	936	25,357	------	------	------	Basin 1 24HR

Hydrograph Report

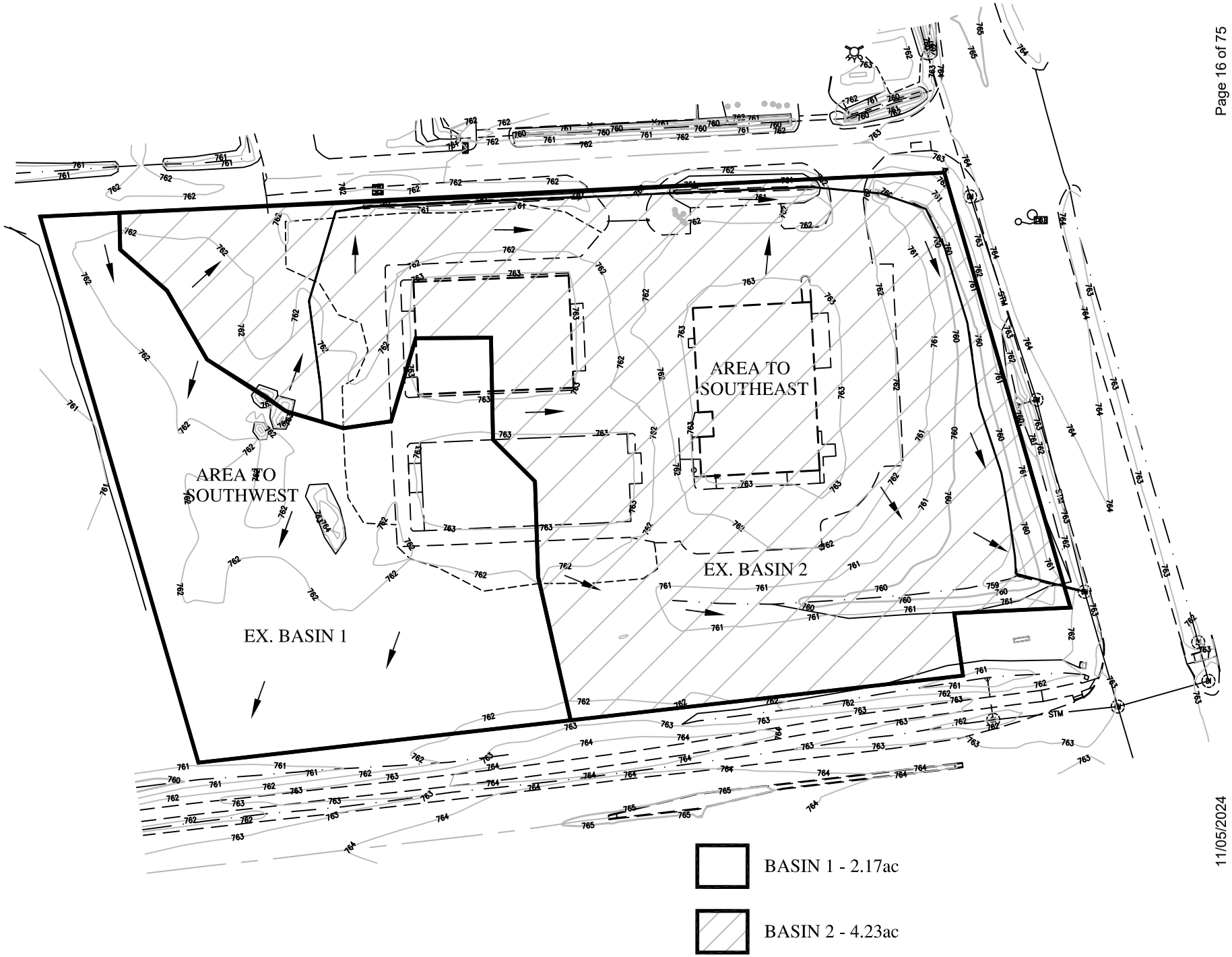
Hyd. No. 1

Basin 1 1HR

Hydrograph type	= SCS Runoff	Peak discharge	= 3.115 cfs
Storm frequency	= 100 yrs	Time to peak	= 26 min
Time interval	= 2 min	Hyd. volume	= 6,859 cuft
Drainage area	= 2.170 ac	Curve number	= 75.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.10 min
Total precip.	= 2.88 in	Distribution	= Huff-1st
Storm duration	= 1.00 hrs	Shape factor	= 484



Existing Site Conditions



11/05/2024

Runoff Coeffient

Project	Commerce Pointe	By	VT	Date	11/5/2024
Location	Fanklin Johnson County	Checked	DJS	Date	11/5/2024

X	Present		Developed

Basin 2

	Cover Description	CN	Area (ac)	Product
Br - B	Good Condition Grass Cover	61	1.56	95.16
CrA - C	Good Condition Grass Cover	74	0.47	34.78
Br | CrA - B | C	Impervous Surface	98	2.2	215.6
		Totals =	4.23	345.54

CN = 81.7

TR55 Tc Worksheet

Hyd. No. 1

Basin 2 1HR

Description	A		B		C		Totals
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)	= 2.64		0.00		0.00		
Land slope (%)	= 2.00		0.00		0.00		
Travel Time (min)	**= 10.79**	**+**	**0.00**	**+**	**0.00**	**=**	**10.79**
Shallow Concentrated Flow							
Flow length (ft)	= 376.00		0.00		0.00		
Watercourse slope (%)	= 0.40		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.02		0.00		0.00		
Travel Time (min)	**= 6.14**	**+**	**0.00**	**+**	**0.00**	**=**	**6.14**
Channel Flow							
X sectional flow area (sqft)	= 8.50		0.00		0.00		
Wetted perimeter (ft)	= 11.00		0.00		0.00		
Channel slope (%)	= 0.60		0.00		0.00		
Manning's n-value	= 0.030		0.015		0.015		
Velocity (ft/s)	=3.24						
			0.00				
					0.00		
Flow length (ft)	({0})574.0		0.0		0.0		
Travel Time (min)	**= 2.96**	**+**	**0.00**	**+**	**0.00**	**=**	**2.96**

Total Travel Time, Tc ..... 19.88 min

Hydrograph Summary Report

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

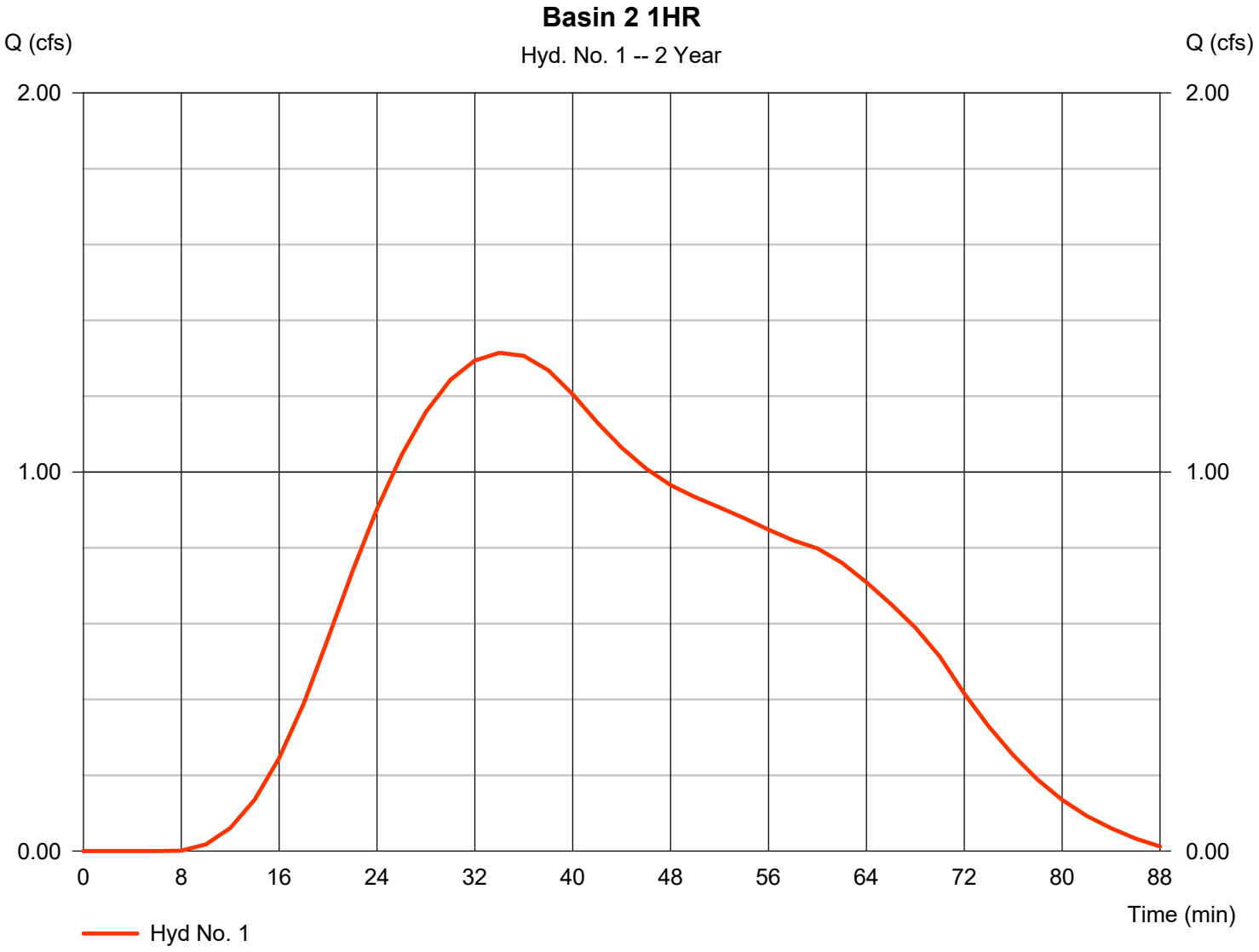
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.314	2	34	3,238	------	------	------	Basin 2 1HR
2	SCS Runoff	1.296	2	44	5,321	------	------	------	Basin 2 2HR
3	SCS Runoff	1.169	2	54	6,710	------	------	------	Basin 2 3HR
4	SCS Runoff	0.899	2	94	9,552	------	------	------	Basin 2 6HR
5	SCS Runoff	0.948	2	326	13,957	------	------	------	Basin 2 12HR
6	SCS Runoff	0.741	2	936	16,647	------	------	------	Basin 2 24HR

Hydrograph Report

Hyd. No. 1

Basin 2 1HR

Hydrograph type	= SCS Runoff	Peak discharge	= 1.314 cfs
Storm frequency	= 2 yrs	Time to peak	= 34 min
Time interval	= 2 min	Hyd. volume	= 3,238 cuft
Drainage area	= 4.230 ac	Curve number	= 81.7
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.90 min
Total precip.	= 1.25 in	Distribution	= Huff-1st
Storm duration	= 1.00 hrs	Shape factor	= 484



Hydrograph Summary Report

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

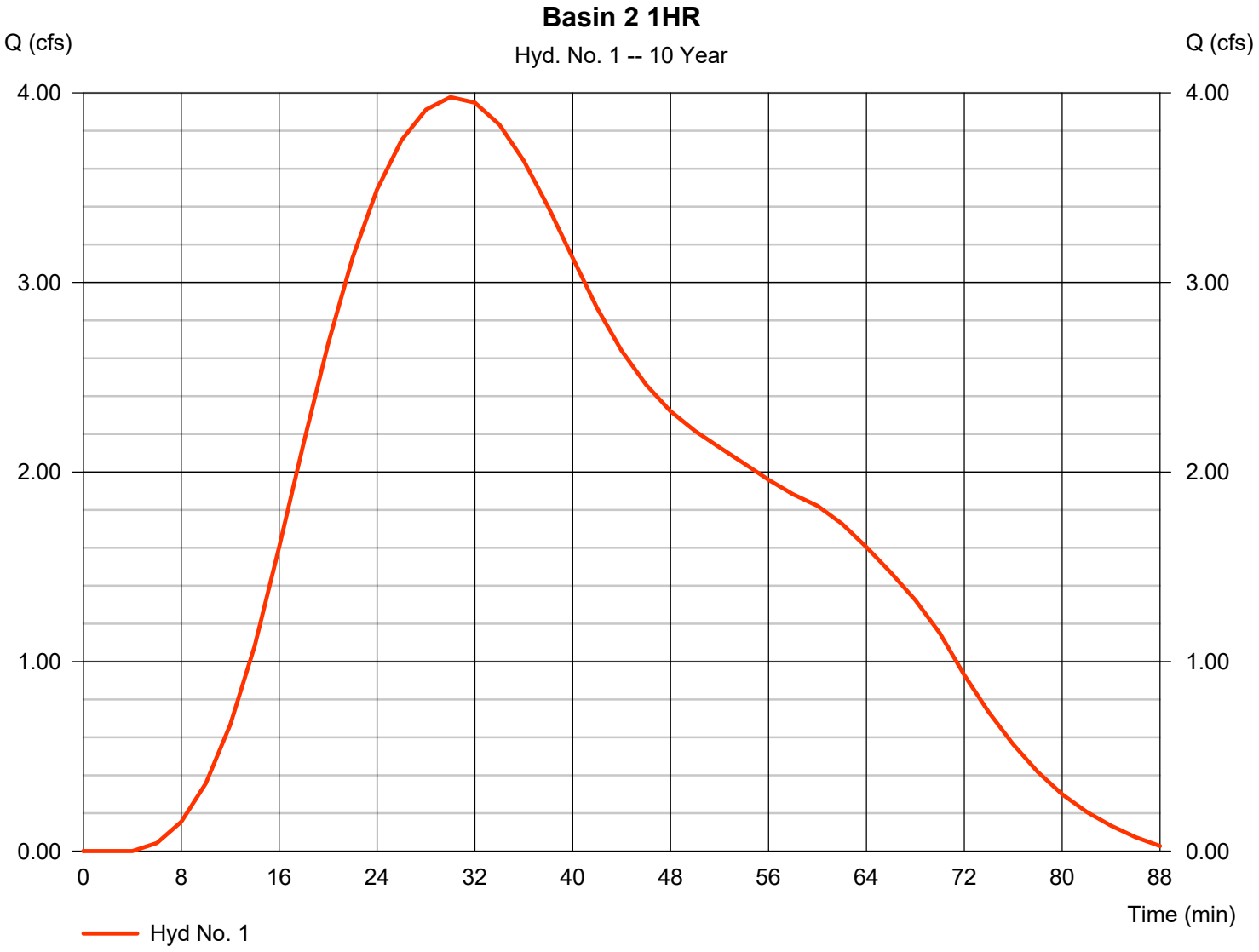
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.977	2	30	9,353	------	------	------	Basin 2 1HR
2	SCS Runoff	3.663	2	38	13,928	------	------	------	Basin 2 2HR
3	SCS Runoff	3.068	2	50	16,643	------	------	------	Basin 2 3HR
4	SCS Runoff	2.133	2	90	22,319	------	------	------	Basin 2 6HR
5	SCS Runoff	1.873	2	324	28,293	------	------	------	Basin 2 12HR
6	SCS Runoff	1.428	2	936	34,496	------	------	------	Basin 2 24HR

Hydrograph Report

Hyd. No. 1

Basin 2 1HR

Hydrograph type	= SCS Runoff	Peak discharge	= 3.977 cfs
Storm frequency	= 10 yrs	Time to peak	= 30 min
Time interval	= 2 min	Hyd. volume	= 9,353 cuft
Drainage area	= 4.230 ac	Curve number	= 81.7
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.90 min
Total precip.	= 1.96 in	Distribution	= Huff-1st
Storm duration	= 1.00 hrs	Shape factor	= 484



Hydrograph Summary Report

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

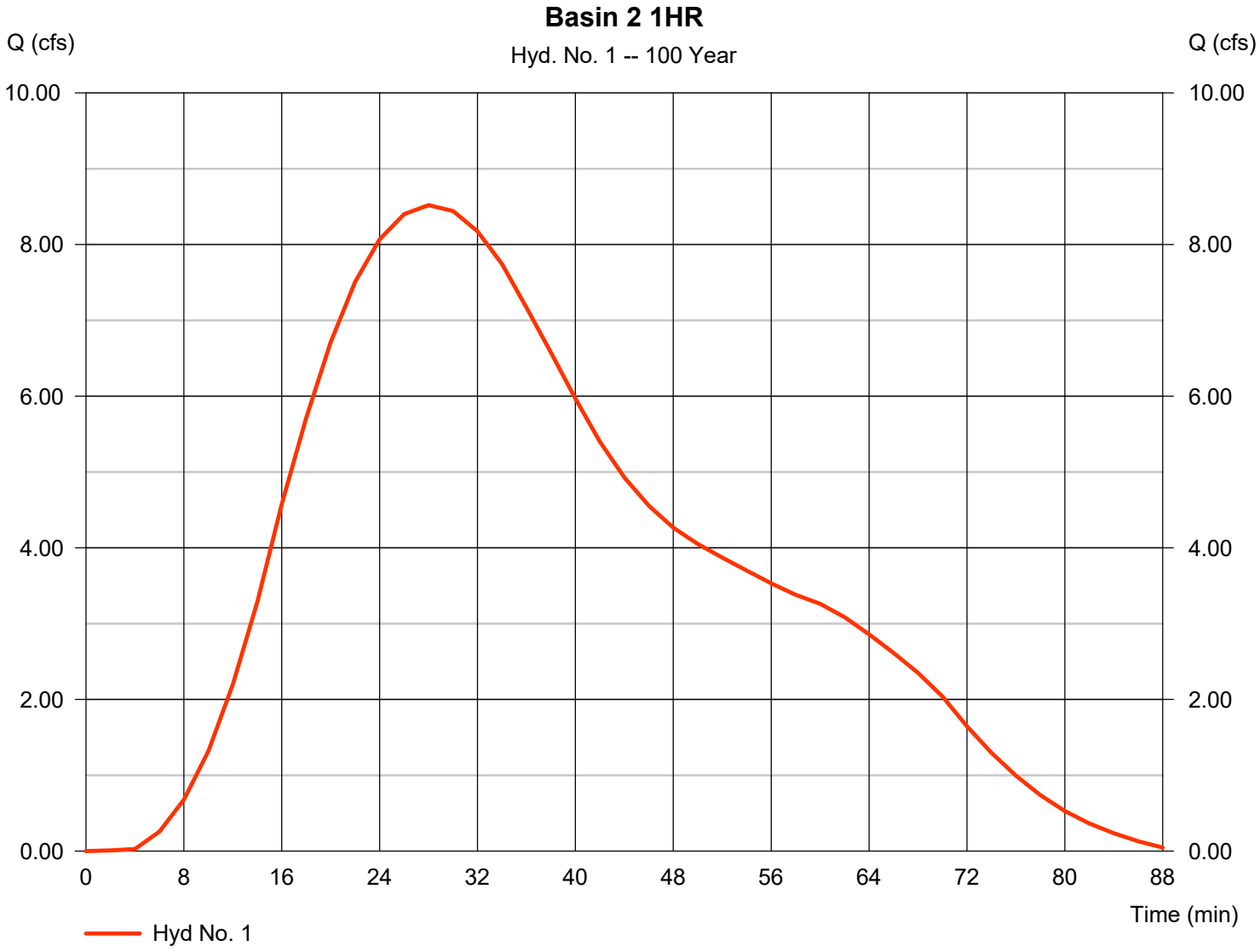
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	8.520	2	28	19,346	------	------	------	Basin 2 1HR
2	SCS Runoff	7.458	2	36	26,988	------	------	------	Basin 2 2HR
3	SCS Runoff	6.107	2	42	31,749	------	------	------	Basin 2 3HR
4	SCS Runoff	4.297	2	46	40,062	------	------	------	Basin 2 6HR
5	SCS Runoff	3.166	2	294	49,041	------	------	------	Basin 2 12HR
6	SCS Runoff	2.365	2	936	60,744	------	------	------	Basin 2 24HR

Hydrograph Report

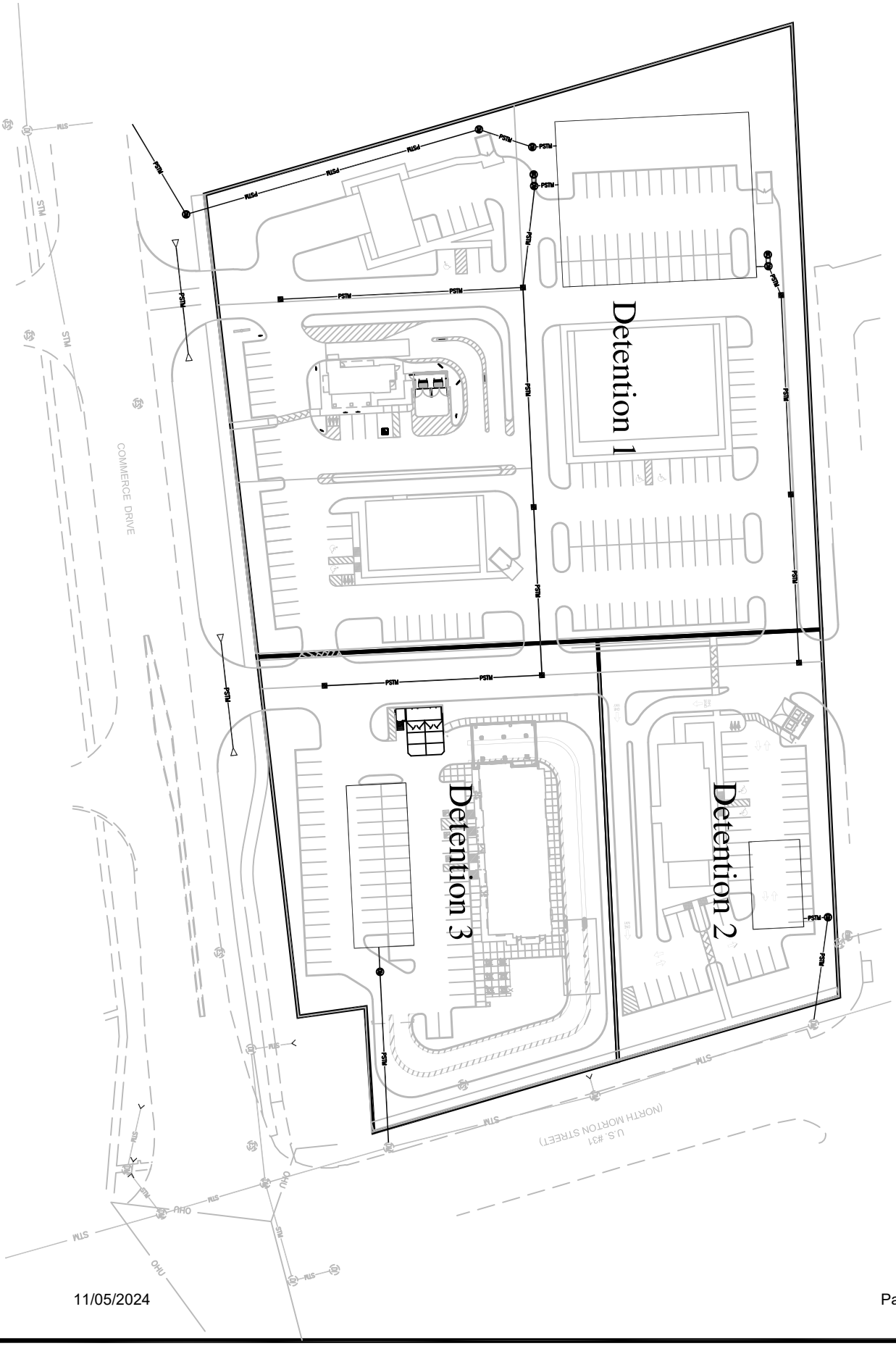
Hyd. No. 1

Basin 2 1HR

Hydrograph type	= SCS Runoff	Peak discharge	= 8.520 cfs
Storm frequency	= 100 yrs	Time to peak	= 28 min
Time interval	= 2 min	Hyd. volume	= 19,346 cuft
Drainage area	= 4.230 ac	Curve number	= 81.7
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.90 min
Total precip.	= 2.88 in	Distribution	= Huff-1st
Storm duration	= 1.00 hrs	Shape factor	= 484



Proposed Detention Areas



Detention Area 1 Summary

Commerce Point

Analytical Methodology:
Detention Area 1 serves the west side of the development. The drainage area to this detention contains 3.69 acres. The proposed runoff and underground detention were sized using Hydraflow Hydrographs. Per the design calculations the site requires 35,982 cubic feet (cuft) of storage. A Contech underground detention system is proposed for the site. The system provides 36,256 cuft of storage.

Runoff Coeffient

Detention Area 1

Project	Commerce Point	By	VT	Date	11/5/2024
Location	Franklin Johnson County	Checked	DJS	Date	11/5/2024

	Present	X	Developed

	Cover Description	CN	Area (ac)	Product
B | C	Impervious	98	2.50	245
Br - B	Good Condition Grass Cover	61	0.60	36.6
CrA - C	Good Condition Grass Cover	74	0.59	43.66
		Totals =	3.69	325.26

CN = 88.1

TR55 Tc Worksheet

Hyd. No. 1

West 1HR

Description	A		B		C		Totals
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)	= 2.64		0.00		0.00		
Land slope (%)	= 1.50		0.00		0.00		
Travel Time (min)	**= 12.10**	**+**	**0.00**	**+**	**0.00**	**=**	**12.10**
Shallow Concentrated Flow							
Flow length (ft)	= 278.00		0.00		0.00		
Watercourse slope (%)	= 1.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=2.03		0.00		0.00		
Travel Time (min)	**= 2.28**	**+**	**0.00**	**+**	**0.00**	**=**	**2.28**
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 ..... 14.38 min

Hydrograph Summary Report

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

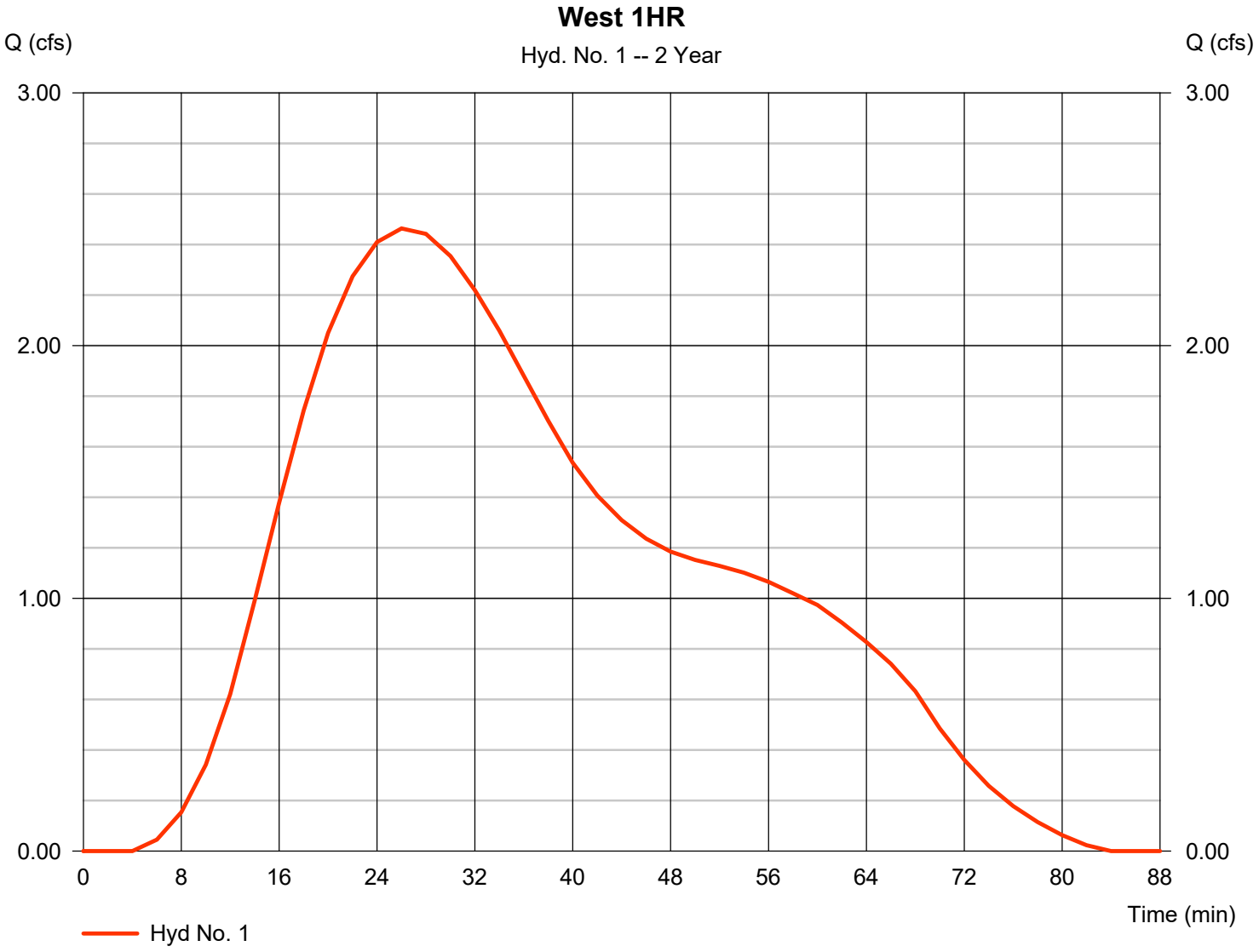
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	2.464	2	26	5,380	------	------	------	West 1HR
2	SCS Runoff	2.122	2	34	7,838	------	------	------	West 2HR
3	SCS Runoff	1.767	2	46	9,395	------	------	------	West 3 Hour
4	SCS Runoff	1.200	2	78	12,474	------	------	------	West 6 Hour
5	SCS Runoff	1.125	2	324	17,021	------	------	------	West 12 Hour
6	SCS Runoff	0.809	2	936	19,714	------	------	------	West 24 Hour
7	Reservoir	0.049	2	80	3,027	1	759.87	5,288	1 HR
8	Reservoir	0.092	2	138	5,421	2	759.98	7,471	2 HR
9	Reservoir	0.110	2	196	6,947	3	760.04	8,705	3 HR
10	Reservoir	0.126	2	374	9,968	4	760.11	10,687	6 HR
11	Reservoir	0.145	2	730	14,412	5	760.20	13,621	12 HR
12	Reservoir	0.150	2	1448	16,961	6	760.23	14,468	24 Hr

Hydrograph Report

Hyd. No. 1

West 1HR

Hydrograph type	= SCS Runoff	Peak discharge	= 2.464 cfs
Storm frequency	= 2 yrs	Time to peak	= 26 min
Time interval	= 2 min	Hyd. volume	= 5,380 cuft
Drainage area	= 3.690 ac	Curve number	= 88.1
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.38 min
Total precip.	= 1.25 in	Distribution	= Huff-1st
Storm duration	= 1.00 hrs	Shape factor	= 484



Hydrograph Summary Report

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

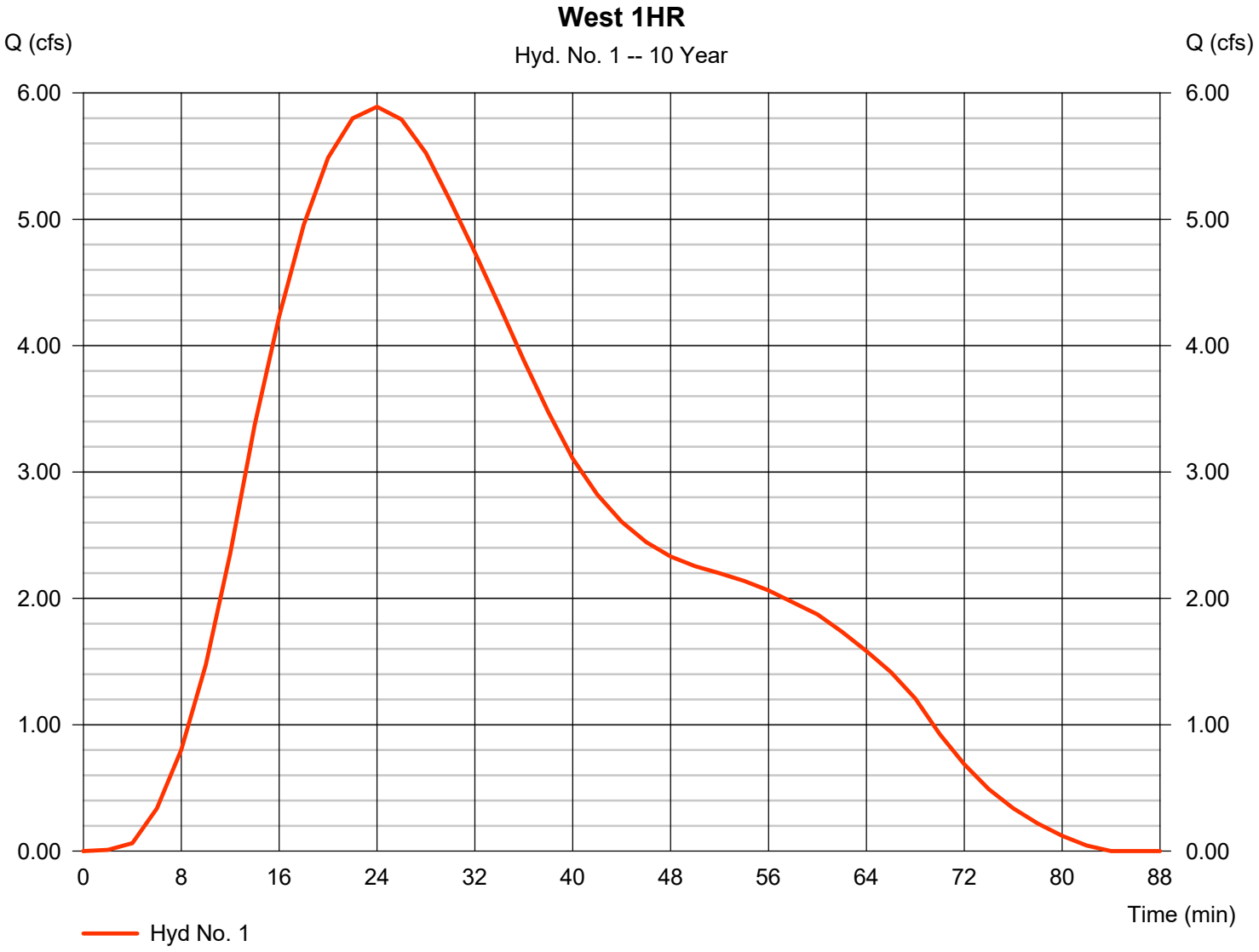
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	5.890	2	24	12,265	------	------	------	West 1HR
2	SCS Runoff	4.905	2	30	17,019	------	------	------	West 2HR
3	SCS Runoff	3.909	2	34	19,712	------	------	------	West 3 Hour
4	SCS Runoff	3.009	2	42	25,250	------	------	------	West 6 Hour
5	SCS Runoff	2.002	2	290	30,938	------	------	------	West 12 Hour
6	SCS Runoff	1.407	2	936	36,733	------	------	------	West 24 Hour
7	Reservoir	0.134	2	80	9,778	1	760.15	11,885	1 HR
8	Reservoir	0.160	2	138	14,457	2	760.28	16,143	2 HR
9	Reservoir	0.172	2	196	17,110	3	760.35	18,316	3 HR
10	Reservoir	0.190	2	374	22,563	4	760.48	22,126	6 HR
11	Reservoir	0.204	2	730	28,099	5	760.58	25,712	12 HR
12	Reservoir	0.213	2	1448	33,524	6	760.65	28,161	24 Hr

Hydrograph Report

Hyd. No. 1

West 1HR

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.890 cfs
Storm frequency	=	10 yrs	Time to peak	=	24 min
Time interval	=	2 min	Hyd. volume	=	12,265 cuft
Drainage area	=	3.690 ac	Curve number	=	88.1
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	14.38 min
Total precip.	=	1.96 in	Distribution	=	Huff-1st
Storm duration	=	1.00 hrs	Shape factor	=	484



Hydrograph Summary Report

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

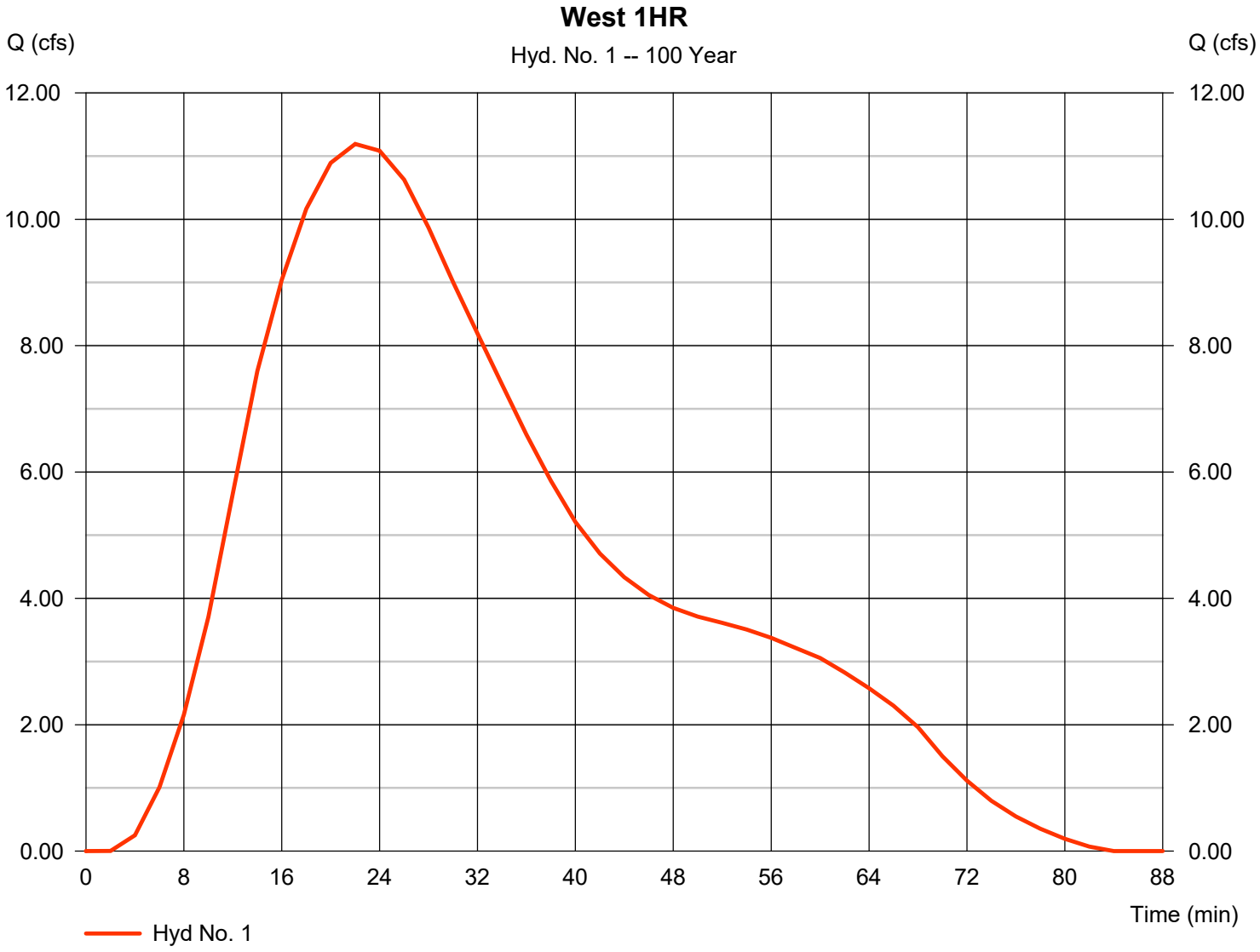
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	11.19	2	22	22,460	------	------	------	West 1HR
2	SCS Runoff	9.001	2	28	29,695	------	------	------	West 2HR
3	SCS Runoff	7.455	2	30	34,186	------	------	------	West 3 Hour
4	SCS Runoff	5.599	2	40	41,861	------	------	------	West 6 Hour
5	SCS Runoff	3.195	2	290	50,038	------	------	------	West 12 Hour
6	SCS Runoff	2.196	2	936	60,556	------	------	------	West 24 Hour
7	Reservoir	0.189	2	80	19,826	1	760.47	21,854	1 HR
8	Reservoir	0.214	2	138	26,952	2	760.66	28,416	2 HR
9	Reservoir	0.420	2	194	31,375	3	760.76	31,907	3 HR
10	Reservoir	0.758	2	316	38,983	4	760.82	33,978	6 HR
11	Reservoir	0.929	2	484	47,040	5	760.84	34,818	12 HR
12	Reservoir	1.181	2	1022	57,190	6	760.88	35,982	24 Hr

Hydrograph Report

Hyd. No. 1

West 1HR

Hydrograph type	= SCS Runoff	Peak discharge	= 11.19 cfs
Storm frequency	= 100 yrs	Time to peak	= 22 min
Time interval	= 2 min	Hyd. volume	= 22,460 cuft
Drainage area	= 3.690 ac	Curve number	= 88.1
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.38 min
Total precip.	= 2.88 in	Distribution	= Huff-1st
Storm duration	= 1.00 hrs	Shape factor	= 484



Pond Report

Pond No. 2 - Detention 1

Pond Data

UG Chambers -Invert elev. = 759.60 ft, Rise x Span = 2.50 x 2.50 ft, Barrel Len = 140.00 ft, No. Barrels = 37, Slope = 0.00%, Headers = Yes
Encasement -Invert elev. = 759.60 ft, Width = 108.00 ft, Height = 4.50 ft, Voids = 0.15%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	759.60	n/a	0	0
0.45	760.05	n/a	8,869	8,869
0.90	760.50	n/a	13,997	22,865
1.35	760.95	n/a	15,587	38,452
1.80	761.40	n/a	15,157	53,610
2.25	761.85	n/a	12,402	66,012
2.70	762.30	n/a	4,316	70,328
3.15	762.75	n/a	960	71,288
3.60	763.20	n/a	960	72,249
4.05	763.65	n/a	960	73,209
4.50	764.10	n/a	960	74,169

Culvert / Orifice Structures

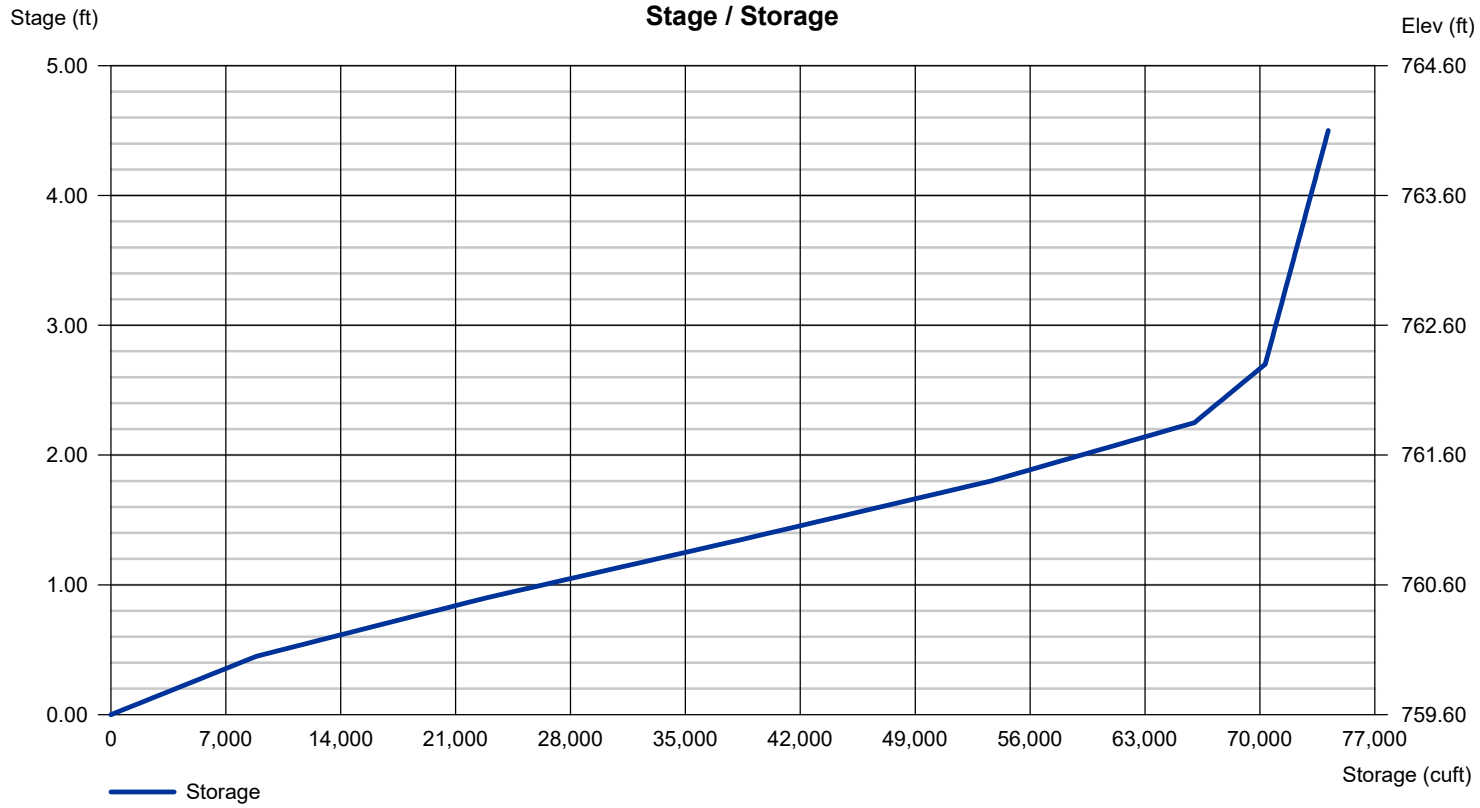
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	3.00	0.00	0.00
Span (in)	= 12.00	3.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 759.60	759.70	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 0.30	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	0.00	0.00	0.00
Crest El. (ft)	= 760.70	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (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 Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	2.464	2	26	5,380	------	------	------	West 1HR
2	SCS Runoff	2.122	2	34	7,838	------	------	------	West 2HR
3	SCS Runoff	1.767	2	46	9,395	------	------	------	West 3 Hour
4	SCS Runoff	1.200	2	78	12,474	------	------	------	West 6 Hour
5	SCS Runoff	1.125	2	324	17,021	------	------	------	West 12 Hour
6	SCS Runoff	0.809	2	936	19,714	------	------	------	West 24 Hour
7	Reservoir	0.049	2	80	3,027	1	759.87	5,288	1 HR
8	Reservoir	0.092	2	138	5,421	2	759.98	7,471	2 HR
9	Reservoir	0.110	2	196	6,947	3	760.04	8,705	3 HR
10	Reservoir	0.126	2	374	9,968	4	760.11	10,687	6 HR
11	Reservoir	0.145	2	730	14,412	5	760.20	13,621	12 HR
12	Reservoir	0.150	2	1448	16,961	6	760.23	14,468	24 Hr

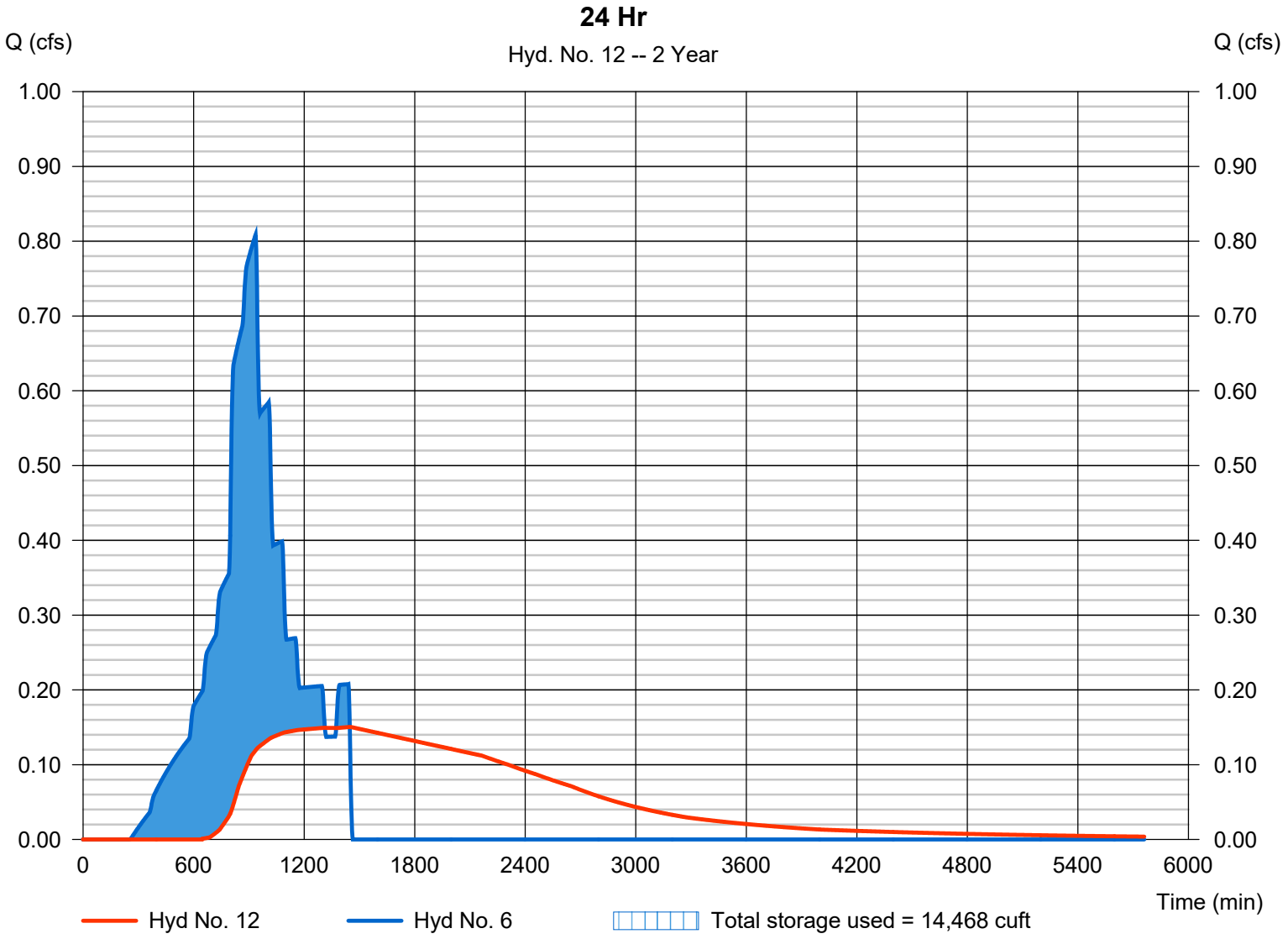
Hydrograph Report

Hyd. No. 12

24 Hr

Hydrograph type	=	Reservoir	Peak discharge	=	0.150 cfs
Storm frequency	=	2 yrs	Time to peak	=	1448 min
Time interval	=	2 min	Hyd. volume	=	16,961 cuft
Inflow hyd. No.	=	6 - West 24 Hour	Max. Elevation	=	760.23 ft
Reservoir name	=	Detention 1	Max. Storage	=	14,468 cuft

Storage Indication method used.



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	5.890	2	24	12,265	------	------	------	West 1HR
2	SCS Runoff	4.905	2	30	17,019	------	------	------	West 2HR
3	SCS Runoff	3.909	2	34	19,712	------	------	------	West 3 Hour
4	SCS Runoff	3.009	2	42	25,250	------	------	------	West 6 Hour
5	SCS Runoff	2.002	2	290	30,938	------	------	------	West 12 Hour
6	SCS Runoff	1.407	2	936	36,733	------	------	------	West 24 Hour
7	Reservoir	0.134	2	80	9,778	1	760.15	11,885	1 HR
8	Reservoir	0.160	2	138	14,457	2	760.28	16,143	2 HR
9	Reservoir	0.172	2	196	17,110	3	760.35	18,316	3 HR
10	Reservoir	0.190	2	374	22,563	4	760.48	22,126	6 HR
11	Reservoir	0.204	2	730	28,099	5	760.58	25,712	12 HR
12	Reservoir	0.213	2	1448	33,524	6	760.65	28,161	24 Hr

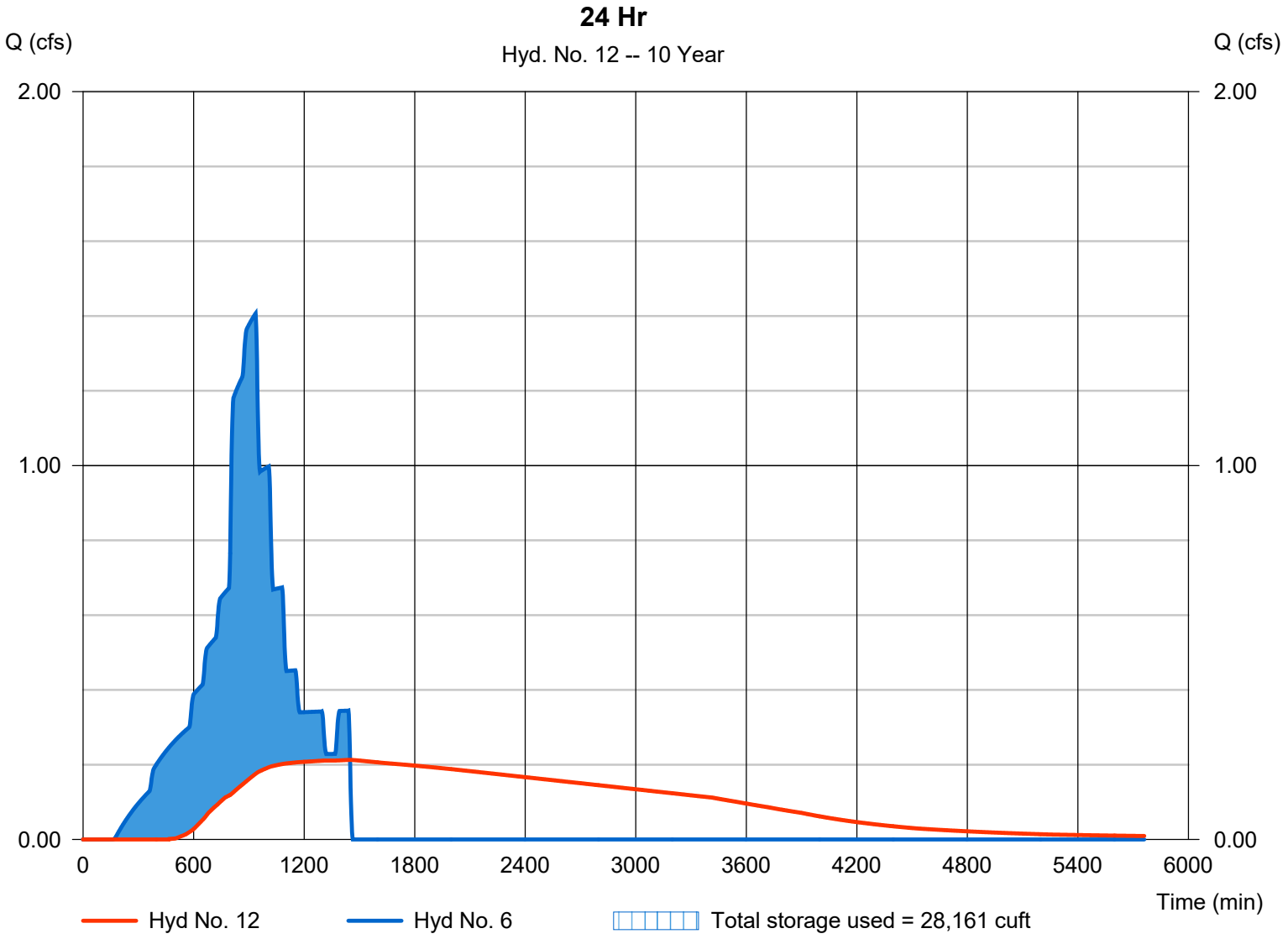
Hydrograph Report

Hyd. No. 12

24 Hr

Hydrograph type	=	Reservoir	Peak discharge	=	0.213 cfs
Storm frequency	=	10 yrs	Time to peak	=	1448 min
Time interval	=	2 min	Hyd. volume	=	33,524 cuft
Inflow hyd. No.	=	6 - West 24 Hour	Max. Elevation	=	760.65 ft
Reservoir name	=	Detention 1	Max. Storage	=	28,161 cuft

Storage Indication method used.



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	11.19	2	22	22,460	------	------	------	West 1HR
2	SCS Runoff	9.001	2	28	29,695	------	------	------	West 2HR
3	SCS Runoff	7.455	2	30	34,186	------	------	------	West 3 Hour
4	SCS Runoff	5.599	2	40	41,861	------	------	------	West 6 Hour
5	SCS Runoff	3.195	2	290	50,038	------	------	------	West 12 Hour
6	SCS Runoff	2.196	2	936	60,556	------	------	------	West 24 Hour
7	Reservoir	0.189	2	80	19,826	1	760.47	21,854	1 HR
8	Reservoir	0.214	2	138	26,952	2	760.66	28,416	2 HR
9	Reservoir	0.420	2	194	31,375	3	760.76	31,907	3 HR
10	Reservoir	0.758	2	316	38,983	4	760.82	33,978	6 HR
11	Reservoir	0.929	2	484	47,040	5	760.84	34,818	12 HR
12	Reservoir	1.181	2	1022	57,190	6	760.88	35,982	24 Hr

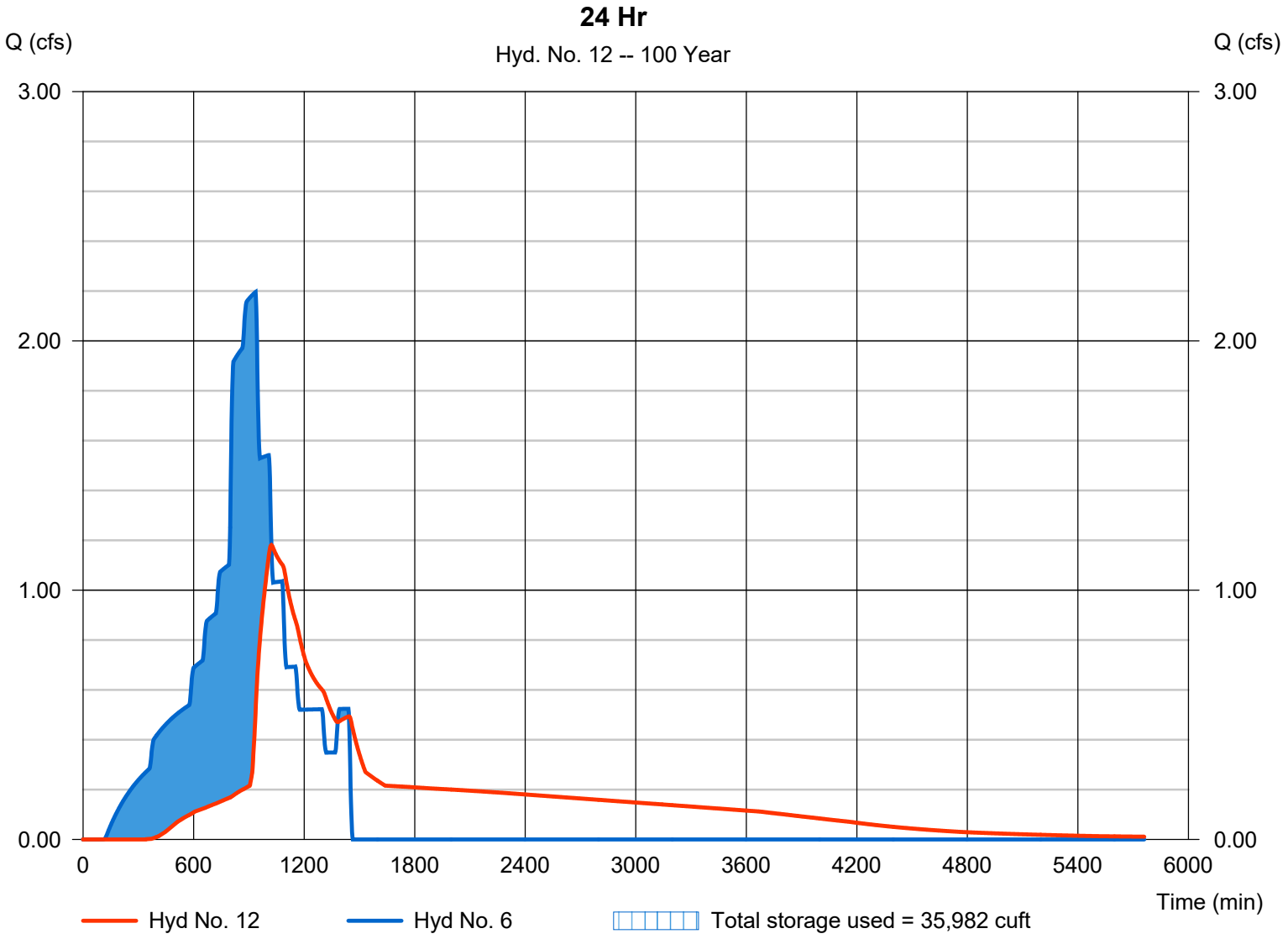
Hydrograph Report

Hyd. No. 12

24 Hr

Hydrograph type	=	Reservoir	Peak discharge	=	1.181 cfs
Storm frequency	=	100 yrs	Time to peak	=	1022 min
Time interval	=	2 min	Hyd. volume	=	57,190 cuft
Inflow hyd. No.	=	6 - West 24 Hour	Max. Elevation	=	760.88 ft
Reservoir name	=	Detention 1	Max. Storage	=	35,982 cuft

Storage Indication method used.

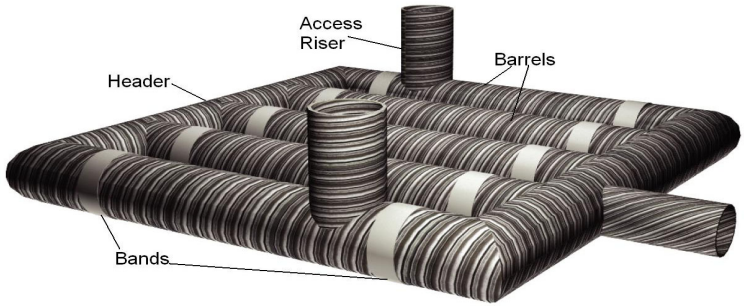


DYODS™
Design Your Own Detention System

CONTECH CMP DETENTION SYSTEMS

CONTECH STORMWATER SOLUTIONS INC.

For design assistance, drawings,
and pricing send completed worksheet to:
dyods@contech-cpi.com



Project Summary

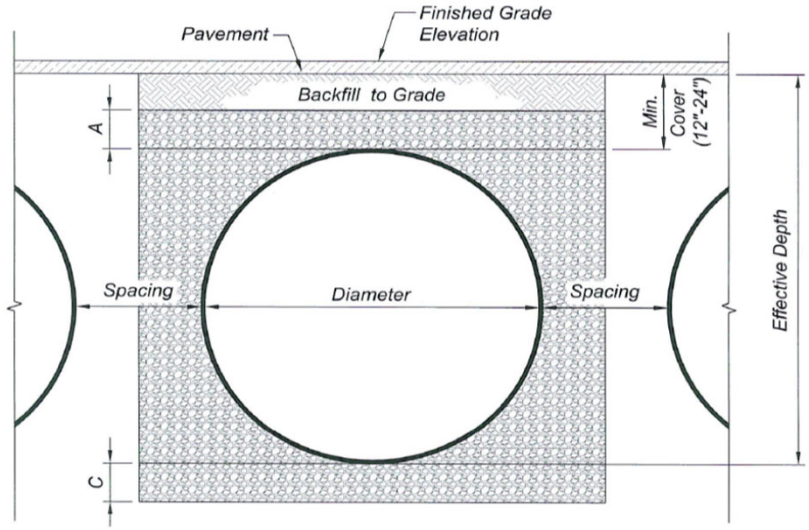
Date:	11/5/2024
Project Name:	Detention 1
City / County:	Franklin
State:	IN
Designed By:	Venus Thorne
Company:	Northpointe
Telephone:	317721-0032

Enter Information in Blue Cells

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	36,000
Limiting Width (ft):	140.00
Invert Depth Below Asphalt (ft):	3.82
Solid or Perforated Pipe:	Perforated
Shape Or Diameter (in):	30
Number Of Headers:	2
Spacing between Barrels (ft):	1.25
Stone Width Around Perimeter of System (ft):	1
Depth A: Porous Stone Above Pipe (in):	12
Depth C: Porous Stone Below Pipe (in):	0
Stone Porosity (0 to 40%):	40

4.91 ft^2 Pipe Area



System Sizing

Pipe Storage:	21,692	cf	
Porous Stone Storage:	14,564	cf	
Total Storage Provided:	36,256	cf	100.7% Of Required Storage
Number of Barrels:	37	barrels	
Length per Barrel:	112.0	ft	
Length Per Header:	137.5	ft	
Rectangular Footprint (W x L):	139.5 ft x 119. ft		

CONTECH Materials

Total CMP Footage:	4,419	ft
Approximate Total Pieces:	197	pcs
Approximate Coupling Bands:	232	bands
Approximate Truckloads:	11	trucks

Construction Quantities**

Total Excavation:	2349	cy
Porous Stone Backfill For Storage:	1349	cy stone
Backfill to Grade Excluding Stone:	197	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout

Barrel 12
Barrel 11
Barrel 10
Barrel 9
Barrel 8
Barrel 7
Barrel 6
Barrel 5
Barrel 4
Barrel 3
Barrel 2
Barrel 1

Number Of Barrels Exceed Graph Limitations

Detention Area 2 Summary

Commerce Point

Analytical Methodology:
Detention Area 2 serves the northeast side of the development. The drainage area to this detention contains 1.0 acres. The proposed runoff and underground detention were sized using Hydraflow Hydrographs. Per the design calculations the site requires 5,216 cubic feet (cuft) of storage. A Contech underground detention system is proposed for the site. The system provides 5,378 cuft of storage.

Runoff Coeffient

Detention Area 2

Project	Commerce Point	By	VT	Date	11/5/2024
Location	Franklin Johnson County	Checked	DJS	Date	11/5/2024

	Present	X	Developed

	Cover Description	CN	Area (ac)	Product
B | C	Impervious	98	0.72	70.56
Br - B	Good Condition Grass Cover	61	0.20	12.2
CrA - C	Good Condition Grass Cover	74	0.08	5.92
		Totals =	1.00	88.68

CN = 88.7

TR55 Tc Worksheet

Hyd. No. 1

Chipotle 1HR

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 80.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 2.64		0.00		0.00		
Land slope (%)	= 1.50		0.00		0.00		
Travel Time (min)	**= 10.12**	**+**	**0.00**	**+**	**0.00**	**=**	**10.12**
Shallow Concentrated Flow							
Flow length (ft)	= 40.00		0.00		0.00		
Watercourse slope (%)	= 1.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=2.03		0.00		0.00		
Travel Time (min)	**= 0.33**	**+**	**0.00**	**+**	**0.00**	**=**	**0.33**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 10.45 min

Hydrograph Summary Report

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

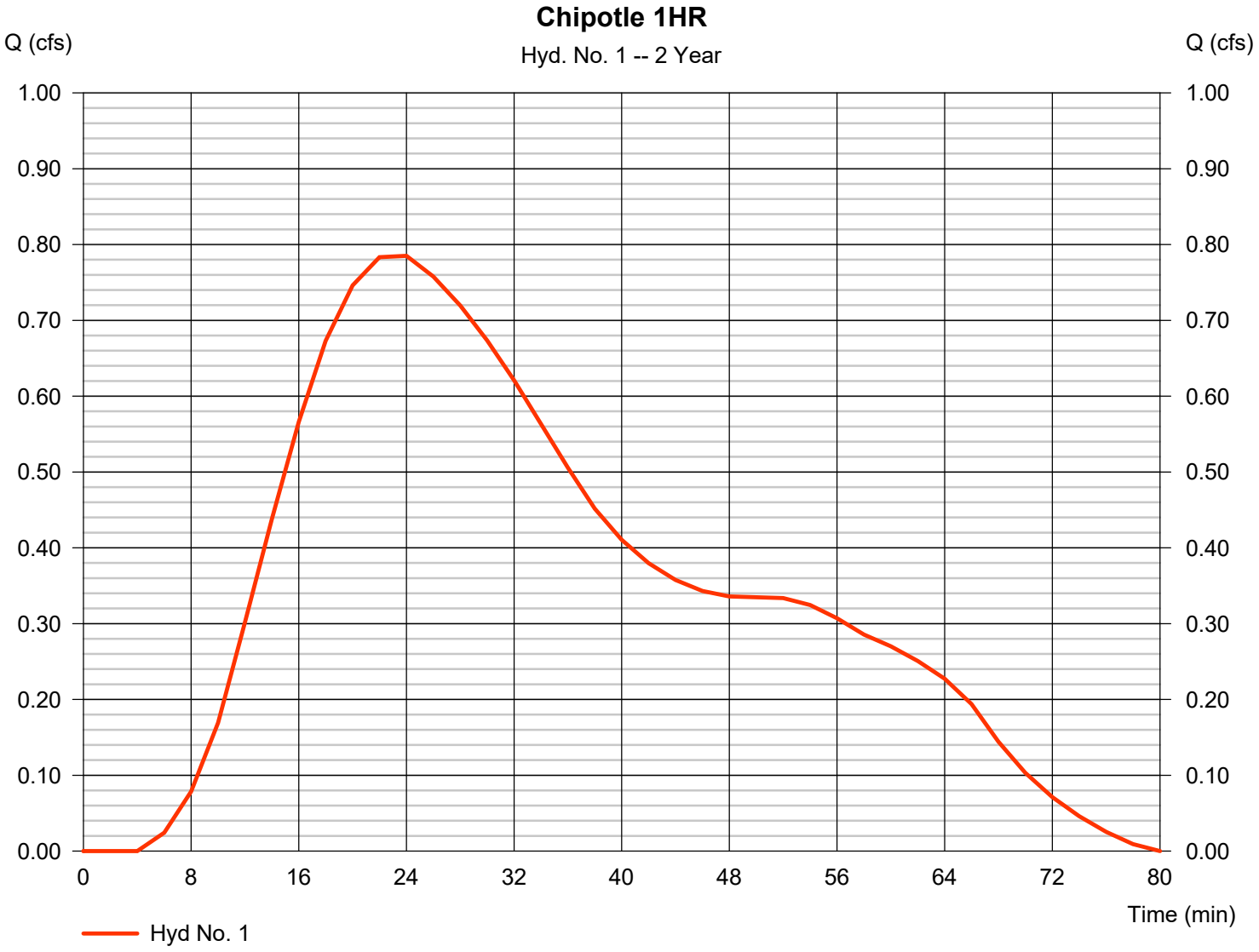
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.785	2	24	1,633	------	------	------	Chipotle 1HR
2	SCS Runoff	0.651	2	32	2,360	------	------	------	Chipotle 2 HR
3	SCS Runoff	0.534	2	46	2,816	------	------	------	Chipotle 3HR
4	SCS Runoff	0.375	2	42	3,715	------	------	------	Chipotle 6HR
5	SCS Runoff	0.333	2	324	5,038	------	------	------	Chipotle 12HR
6	SCS Runoff	0.237	2	936	5,820	------	------	------	Chipotle 24HR
7	Reservoir	0.088	2	70	1,567	1	759.45	1,449	1 HR
8	Reservoir	0.131	2	126	2,293	2	759.49	1,790	2 HR
9	Reservoir	0.140	2	160	2,750	3	759.49	1,856	3 HR
10	Reservoir	0.143	2	186	3,649	4	759.50	1,878	6 HR
11	Reservoir	0.178	2	406	4,972	5	759.52	2,115	12 HR
12	Reservoir	0.165	2	1012	5,754	6	759.51	2,030	24 Hr

Hydrograph Report

Hyd. No. 1

Chipotle 1HR

Hydrograph type	= SCS Runoff	Peak discharge	= 0.785 cfs
Storm frequency	= 2 yrs	Time to peak	= 24 min
Time interval	= 2 min	Hyd. volume	= 1,633 cuft
Drainage area	= 1.000 ac	Curve number	= 88.7
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.50 min
Total precip.	= 1.25 in	Distribution	= Huff-1st
Storm duration	= 1.00 hrs	Shape factor	= 484



Hydrograph Summary Report

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

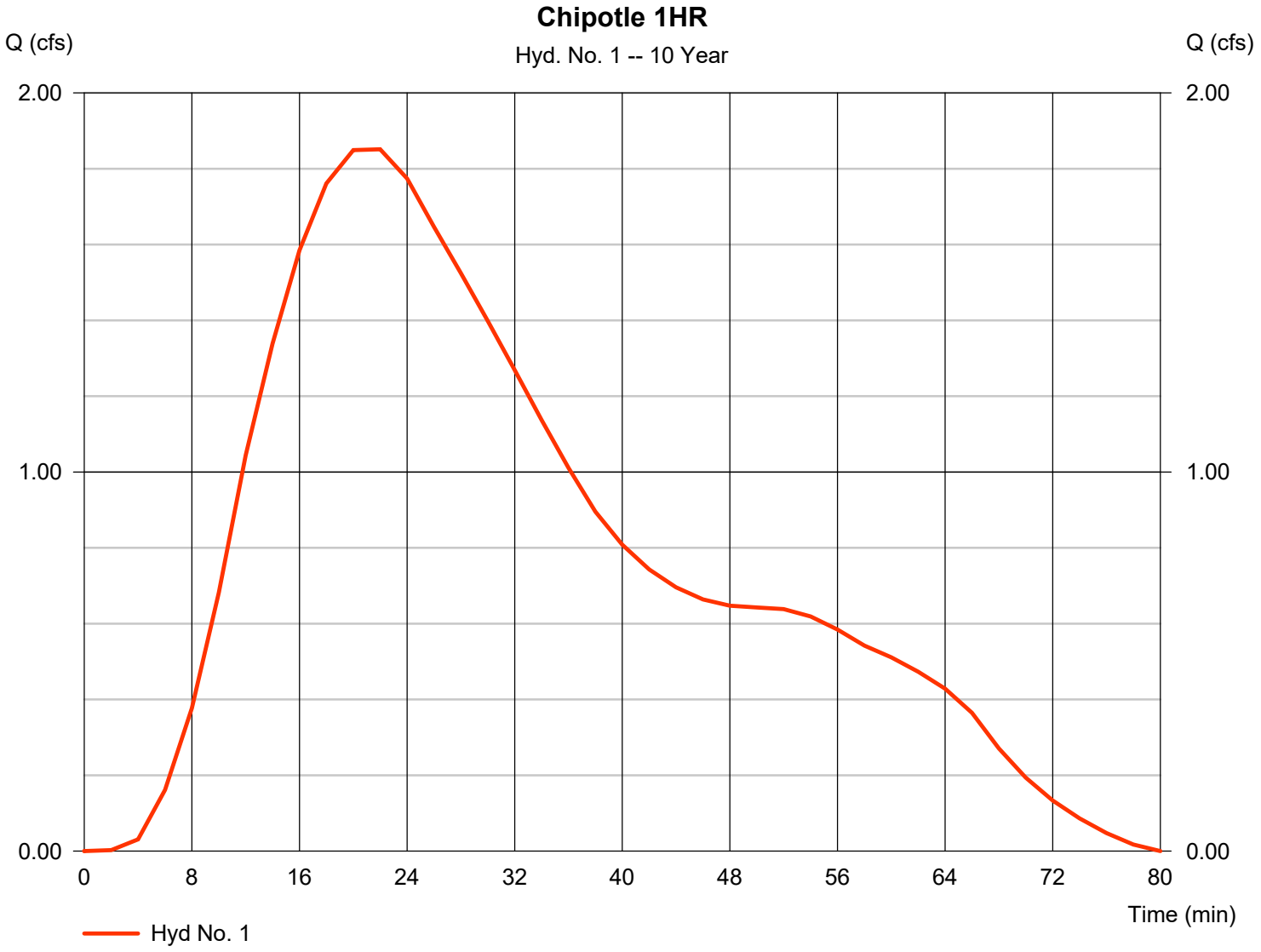
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.851	2	22	3,654	------	------	------	Chipotle 1HR
2	SCS Runoff	1.471	2	26	5,038	------	------	------	Chipotle 2 HR
3	SCS Runoff	1.187	2	28	5,818	------	------	------	Chipotle 3HR
4	SCS Runoff	0.934	2	40	7,423	------	------	------	Chipotle 6HR
5	SCS Runoff	0.588	2	290	9,069	------	------	------	Chipotle 12HR
6	SCS Runoff	0.408	2	936	10,742	------	------	------	Chipotle 24HR
7	Reservoir	0.317	2	68	3,588	1	759.61	2,925	1 HR
8	Reservoir	0.373	2	108	4,972	2	759.64	3,221	2 HR
9	Reservoir	0.375	2	100	5,752	3	759.64	3,230	3 HR
10	Reservoir	0.363	2	166	7,357	4	759.63	3,170	6 HR
11	Reservoir	0.381	2	368	9,003	5	759.64	3,262	12 HR
12	Reservoir	0.329	2	946	10,676	6	759.61	2,995	24 Hr

Hydrograph Report

Hyd. No. 1

Chipotle 1HR

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.851 cfs
Storm frequency	=	10 yrs	Time to peak	=	22 min
Time interval	=	2 min	Hyd. volume	=	3,654 cuft
Drainage area	=	1.000 ac	Curve number	=	88.7
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	10.50 min
Total precip.	=	1.96 in	Distribution	=	Huff-1st
Storm duration	=	1.00 hrs	Shape factor	=	484



Hydrograph Summary Report

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

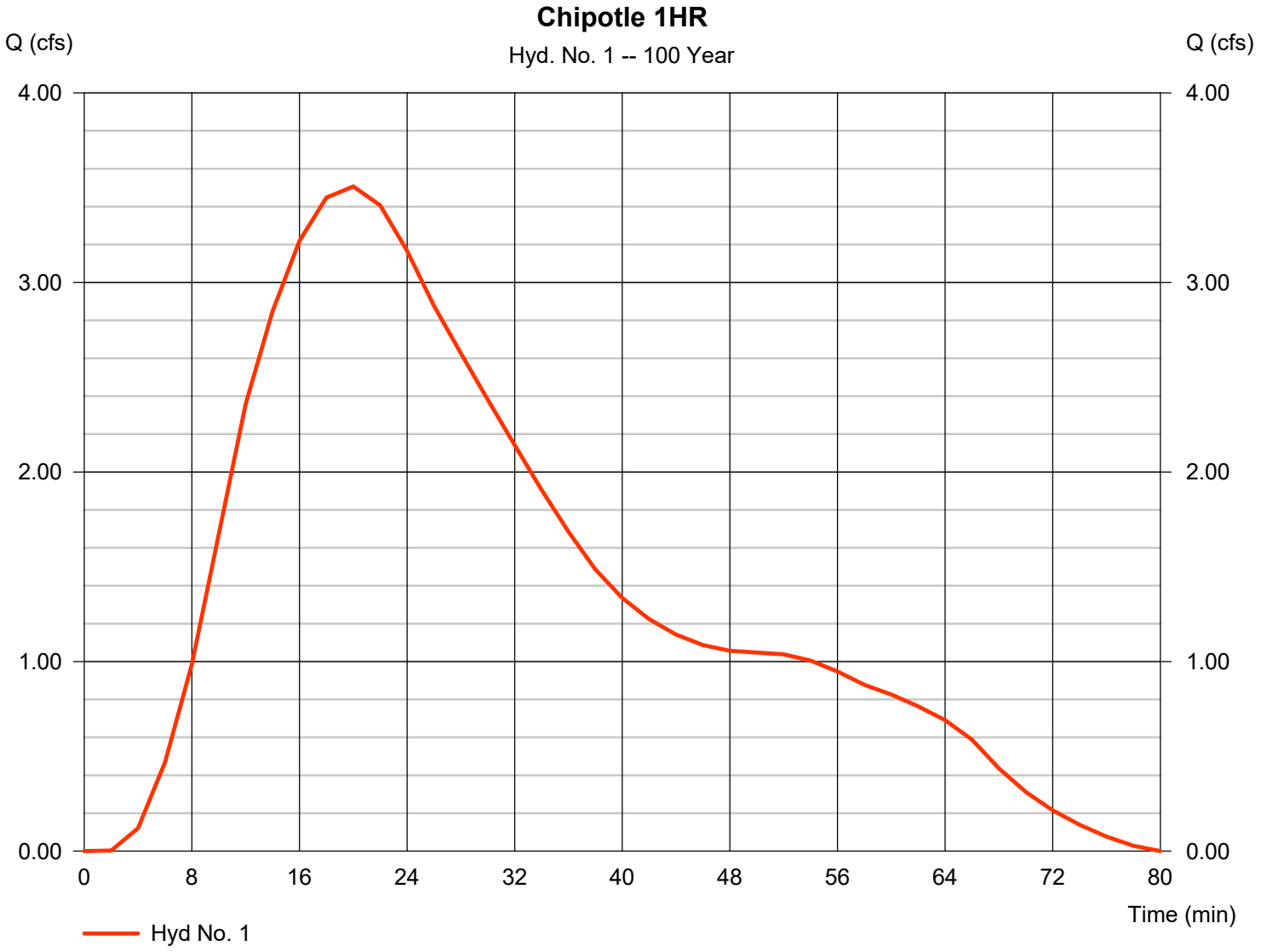
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.506	2	20	6,616	------	------	------	Chipotle 1HR
2	SCS Runoff	2.724	2	24	8,724	------	------	------	Chipotle 2 HR
3	SCS Runoff	2.302	2	24	10,006	------	------	------	Chipotle 3HR
4	SCS Runoff	1.709	2	38	12,223	------	------	------	Chipotle 6HR
5	SCS Runoff	0.930	2	288	14,577	------	------	------	Chipotle 12HR
6	SCS Runoff	0.634	2	936	17,603	------	------	------	Chipotle 24HR
7	Reservoir	0.665	2	64	6,550	1	759.78	4,908	1 HR
8	Reservoir	0.702	2	74	8,658	2	759.80	5,141	2 HR
9	Reservoir	0.714	2	96	9,940	3	759.81	5,216	3 HR
10	Reservoir	0.651	2	134	12,157	4	759.78	4,818	6 HR
11	Reservoir	0.633	2	364	14,510	5	759.77	4,709	12 HR
12	Reservoir	0.534	2	944	17,537	6	759.72	4,081	24 Hr

Hydrograph Report

Hyd. No. 1

Chipotle 1HR

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.506 cfs
Storm frequency	=	100 yrs	Time to peak	=	20 min
Time interval	=	2 min	Hyd. volume	=	6,616 cuft
Drainage area	=	1.000 ac	Curve number	=	88.7
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	10.50 min
Total precip.	=	2.88 in	Distribution	=	Huff-1st
Storm duration	=	1.00 hrs	Shape factor	=	484



Pond Report

Pond No. 1 - Detention 2

Pond Data

UG Chambers -Invert elev. = 759.30 ft, Rise x Span = 3.00 x 3.00 ft, Barrel Len = 125.00 ft, No. Barrels = 9, Slope = 0.00%, Headers = Yes
Encasement -Invert elev. = 759.30 ft, Width = 133.00 ft, Height = 4.00 ft, Voids = 1.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	759.30	n/a	0	0
0.40	759.70	n/a	3,827	3,827
0.80	760.10	n/a	5,192	9,019
1.20	760.50	n/a	5,797	14,816
1.60	760.90	n/a	6,038	20,854
2.00	761.30	n/a	5,953	26,807
2.40	761.70	n/a	5,549	32,356
2.80	762.10	n/a	4,673	37,028
3.20	762.50	n/a	2,577	39,605
3.60	762.90	n/a	1,872	41,477
4.00	763.30	n/a	1,872	43,349

Culvert / Orifice Structures

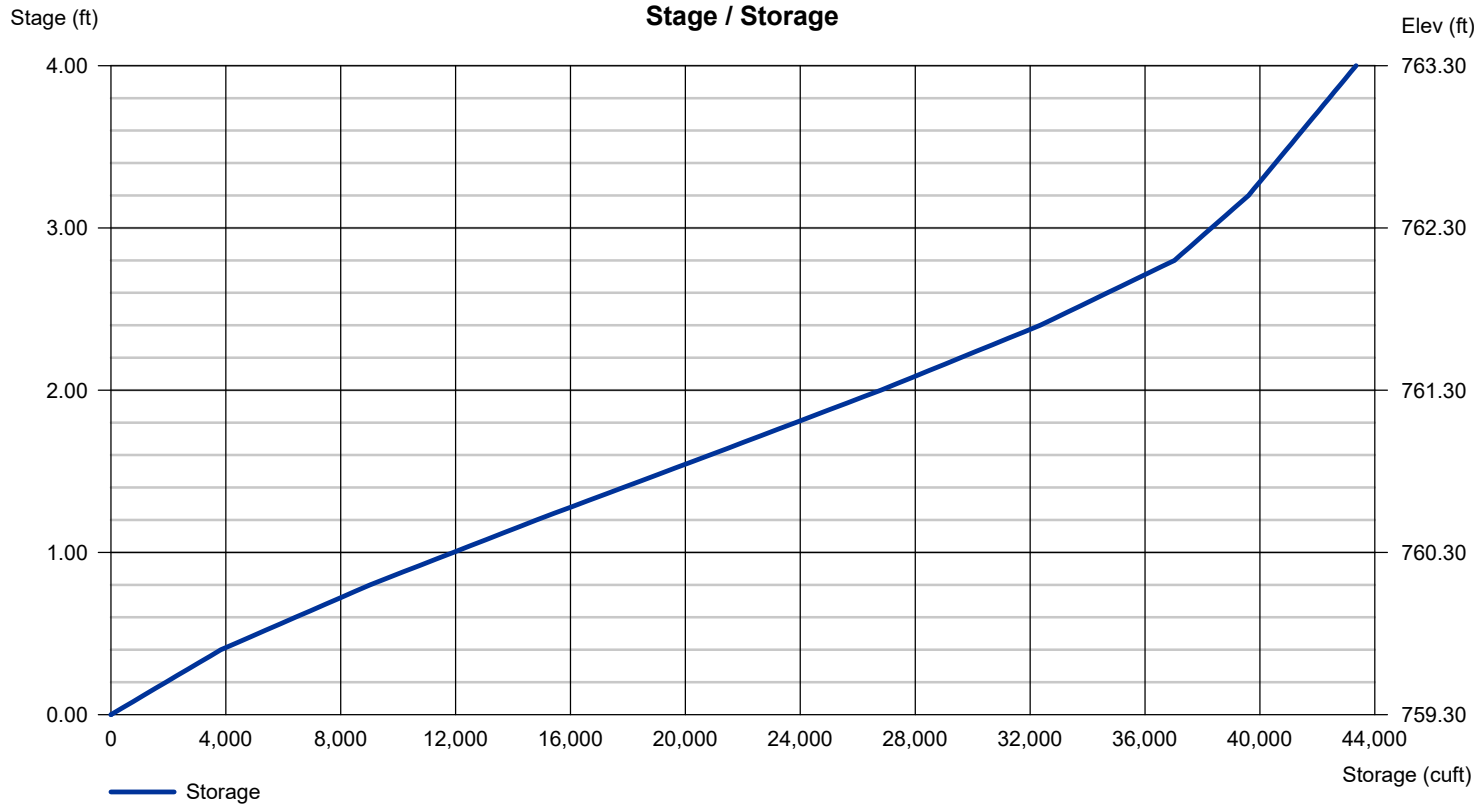
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 759.30	0.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 0.30	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	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 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 Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.785	2	24	1,633	------	------	------	Chipotle 1HR
2	SCS Runoff	0.651	2	32	2,360	------	------	------	Chipotle 2 HR
3	SCS Runoff	0.534	2	46	2,816	------	------	------	Chipotle 3HR
4	SCS Runoff	0.375	2	42	3,715	------	------	------	Chipotle 6HR
5	SCS Runoff	0.333	2	324	5,038	------	------	------	Chipotle 12HR
6	SCS Runoff	0.237	2	936	5,820	------	------	------	Chipotle 24HR
7	Reservoir	0.088	2	70	1,567	1	759.45	1,449	1 HR
8	Reservoir	0.131	2	126	2,293	2	759.49	1,790	2 HR
9	Reservoir	0.140	2	160	2,750	3	759.49	1,856	3 HR
10	Reservoir	0.143	2	186	3,649	4	759.50	1,878	6 HR
11	Reservoir	0.178	2	406	4,972	5	759.52	2,115	12 HR
12	Reservoir	0.165	2	1012	5,754	6	759.51	2,030	24 Hr

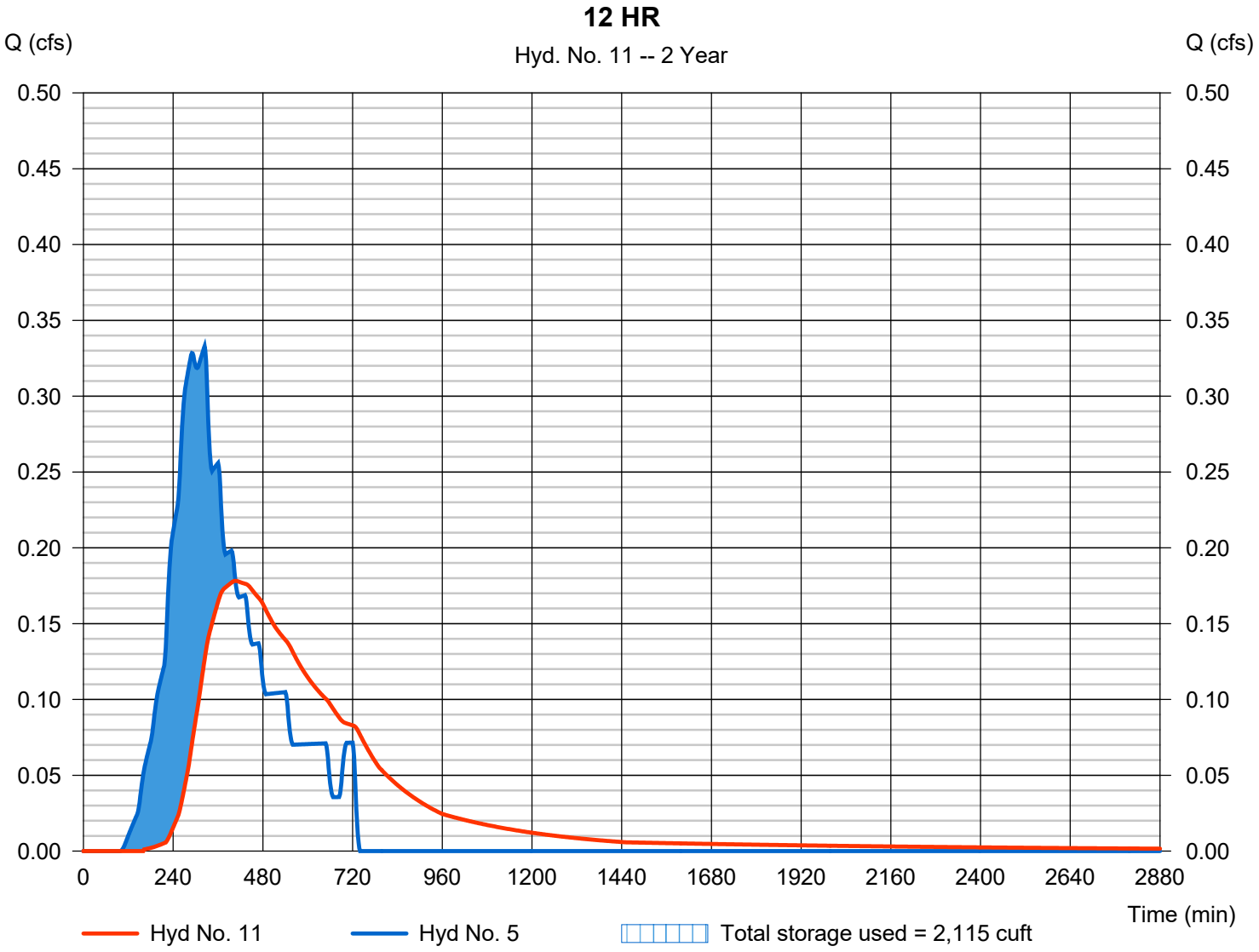
Hydrograph Report

Hyd. No. 11

12 HR

Hydrograph type	=	Reservoir	Peak discharge	=	0.178 cfs
Storm frequency	=	2 yrs	Time to peak	=	406 min
Time interval	=	2 min	Hyd. volume	=	4,972 cuft
Inflow hyd. No.	=	5 - Chipotle 12HR	Max. Elevation	=	759.52 ft
Reservoir name	=	Detention 2	Max. Storage	=	2,115 cuft

Storage Indication method used.



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.851	2	22	3,654	------	------	------	Chipotle 1HR
2	SCS Runoff	1.471	2	26	5,038	------	------	------	Chipotle 2 HR
3	SCS Runoff	1.187	2	28	5,818	------	------	------	Chipotle 3HR
4	SCS Runoff	0.934	2	40	7,423	------	------	------	Chipotle 6HR
5	SCS Runoff	0.588	2	290	9,069	------	------	------	Chipotle 12HR
6	SCS Runoff	0.408	2	936	10,742	------	------	------	Chipotle 24HR
7	Reservoir	0.317	2	68	3,588	1	759.61	2,925	1 HR
8	Reservoir	0.373	2	108	4,972	2	759.64	3,221	2 HR
9	Reservoir	0.375	2	100	5,752	3	759.64	3,230	3 HR
10	Reservoir	0.363	2	166	7,357	4	759.63	3,170	6 HR
11	Reservoir	0.381	2	368	9,003	5	759.64	3,262	12 HR
12	Reservoir	0.329	2	946	10,676	6	759.61	2,995	24 Hr

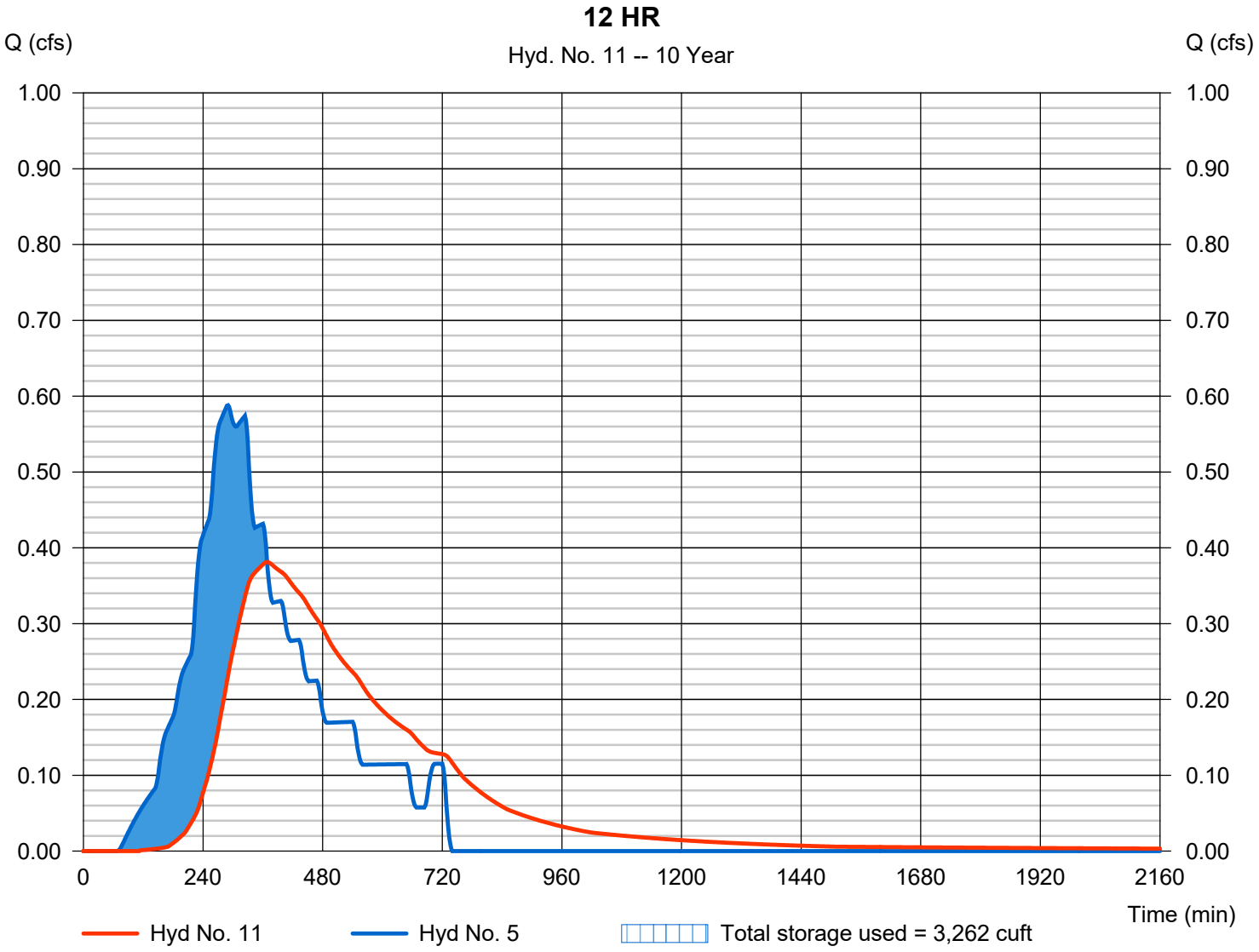
Hydrograph Report

Hyd. No. 11

12 HR

Hydrograph type	=	Reservoir	Peak discharge	=	0.381 cfs
Storm frequency	=	10 yrs	Time to peak	=	368 min
Time interval	=	2 min	Hyd. volume	=	9,003 cuft
Inflow hyd. No.	=	5 - Chipotle 12HR	Max. Elevation	=	759.64 ft
Reservoir name	=	Detention 2	Max. Storage	=	3,262 cuft

Storage Indication method used.



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.506	2	20	6,616	------	------	------	Chipotle 1HR
2	SCS Runoff	2.724	2	24	8,724	------	------	------	Chipotle 2 HR
3	SCS Runoff	2.302	2	24	10,006	------	------	------	Chipotle 3HR
4	SCS Runoff	1.709	2	38	12,223	------	------	------	Chipotle 6HR
5	SCS Runoff	0.930	2	288	14,577	------	------	------	Chipotle 12HR
6	SCS Runoff	0.634	2	936	17,603	------	------	------	Chipotle 24HR
7	Reservoir	0.665	2	64	6,550	1	759.78	4,908	1 HR
8	Reservoir	0.702	2	74	8,658	2	759.80	5,141	2 HR
9	Reservoir	0.714	2	96	9,940	3	759.81	5,216	3 HR
10	Reservoir	0.651	2	134	12,157	4	759.78	4,818	6 HR
11	Reservoir	0.633	2	364	14,510	5	759.77	4,709	12 HR
12	Reservoir	0.534	2	944	17,537	6	759.72	4,081	24 Hr

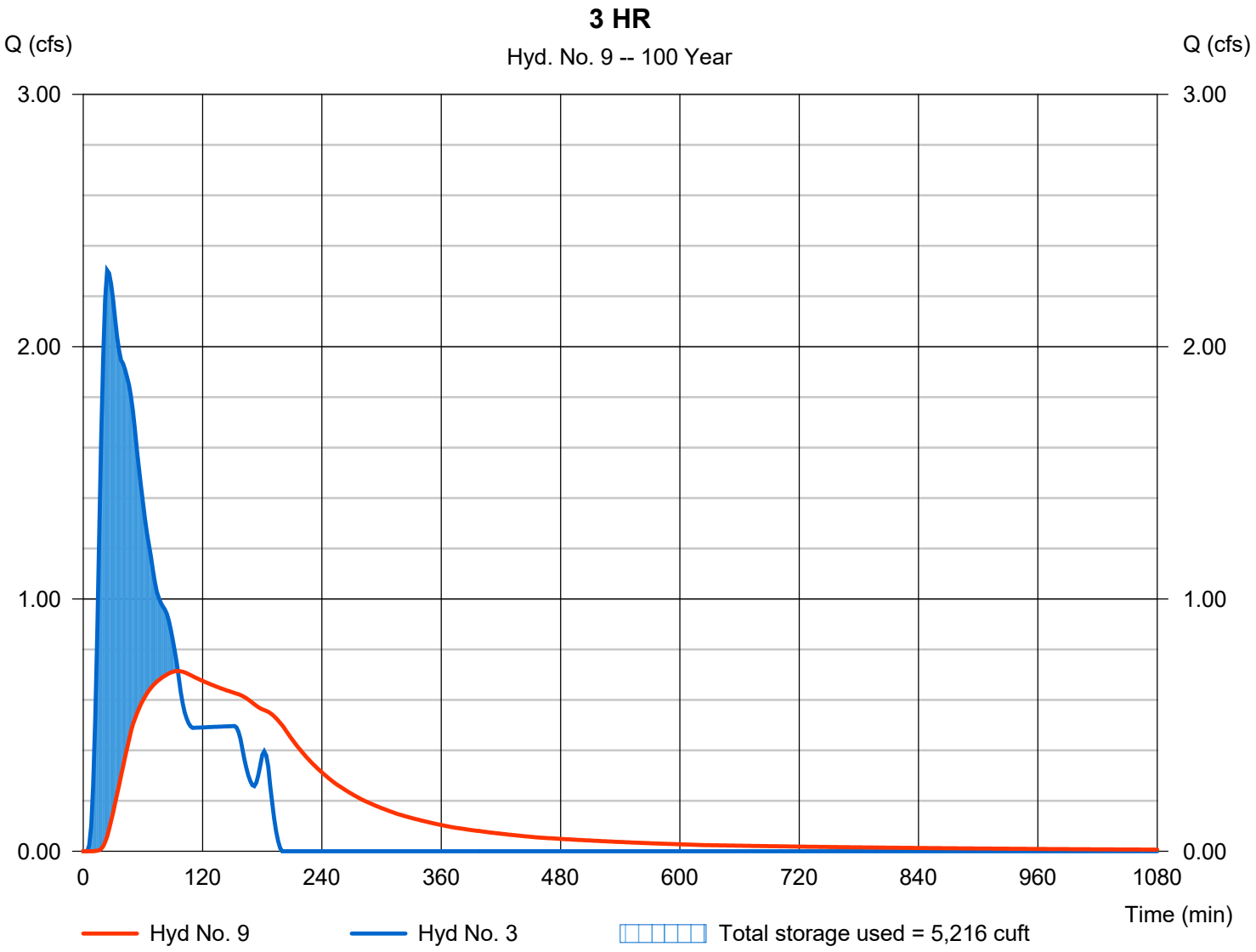
Hydrograph Report

Hyd. No. 9

3 HR

Hydrograph type	=	Reservoir	Peak discharge	=	0.714 cfs
Storm frequency	=	100 yrs	Time to peak	=	96 min
Time interval	=	2 min	Hyd. volume	=	9,940 cuft
Inflow hyd. No.	=	3 - Chipotle 3HR	Max. Elevation	=	759.81 ft
Reservoir name	=	Detention 2	Max. Storage	=	5,216 cuft

Storage Indication method used.



DYODS™
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CONTECH CMP DETENTION SYSTEMS

CONTECH STORMWATER SOLUTIONS INC.

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and pricing send completed worksheet to:
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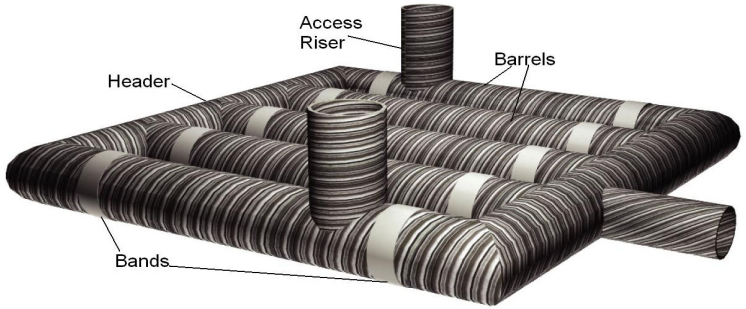


Project Summary

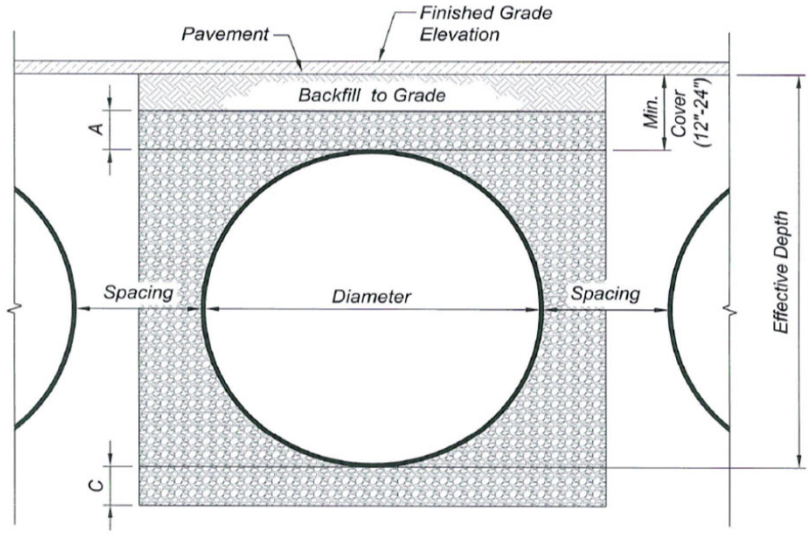
Date:	11/5/2024
Project Name:	Detention 2
City / County:	Franklin
State:	IN
Designed By:	Venus Thorne
Company:	Northpointe
Telephone:	317-721-0032

Enter Information in Blue Cells

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	5,300
Limiting Width (ft):	40.00
Invert Depth Below Asphalt (ft):	4.00
Solid or Perforated Pipe:	Perforated
Shape Or Diameter (in):	36
Number Of Headers:	2
Spacing between Barrels (ft):	1.50
Stone Width Around Perimeter of System (ft):	1
Depth A: Porous Stone Above Pipe (in):	6
Depth C: Porous Stone Below Pipe (in):	0
Stone Porosity (0 to 40%):	40

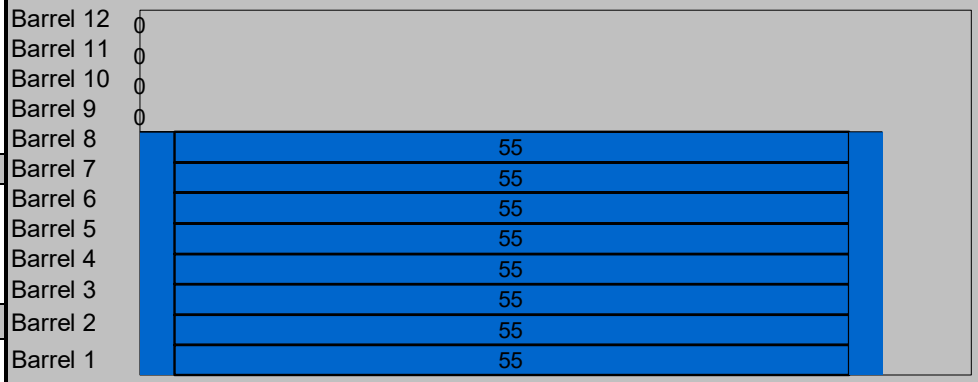
7.07 ft^2 Pipe Area



System Sizing

Pipe Storage:	3,598	cf	
Porous Stone Storage:	1,780	cf	
Total Storage Provided:	5,378	cf	101.5% Of Required Storage
Number of Barrels:	8	barrels	
Length per Barrel:	55.0	ft	
Length Per Header:	34.5	ft	
Rectangular Footprint (W x L):	36.5 ft x 63. ft		

System Layout



CONTECH Materials

Total CMP Footage:	509	ft
Approximate Total Pieces:	28	pcs
Approximate Coupling Bands:	34	bands
Approximate Truckloads:	3	trucks

Construction Quantities**

Total Excavation:	341	cy
Porous Stone Backfill For Storage:	165	cy stone
Backfill to Grade Excluding Stone:	43	cy fill

***Construction quantities are approximate and should be verified upon final design*

Detention Area 3 Summary

Commerce Point

Analytical Methodology:
Detention Area 3 serves the southeast side of the development. The drainage area to this detention contains 1.63 acres. The proposed runoff and underground detention were sized using Hydraflow Hydrographs. Per the design calculations the site requires 9,611 cubic feet (cuft) of storage. A Contech underground detention system is proposed for the site. The system provides 10,001 cuft of storage.

Runoff Coeffient

Detention Area 3

Project	Commerce Point	By	VT	Date	11/5/2024
Location	Franklin Johnson County	Checked	DJS	Date	11/5/2024

	Present	X	Developed

	Cover Description	CN	Area (ac)	Product
B | C	Impervious	98	1.29	126.42
Br - B	Good Condition Grass Cover	61	0.24	14.64
CrA - C	Good Condition Grass Cover	74	0.1	7.4
		Totals =	1.63	148.46

CN = 91.1

Hydrograph Summary Report

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

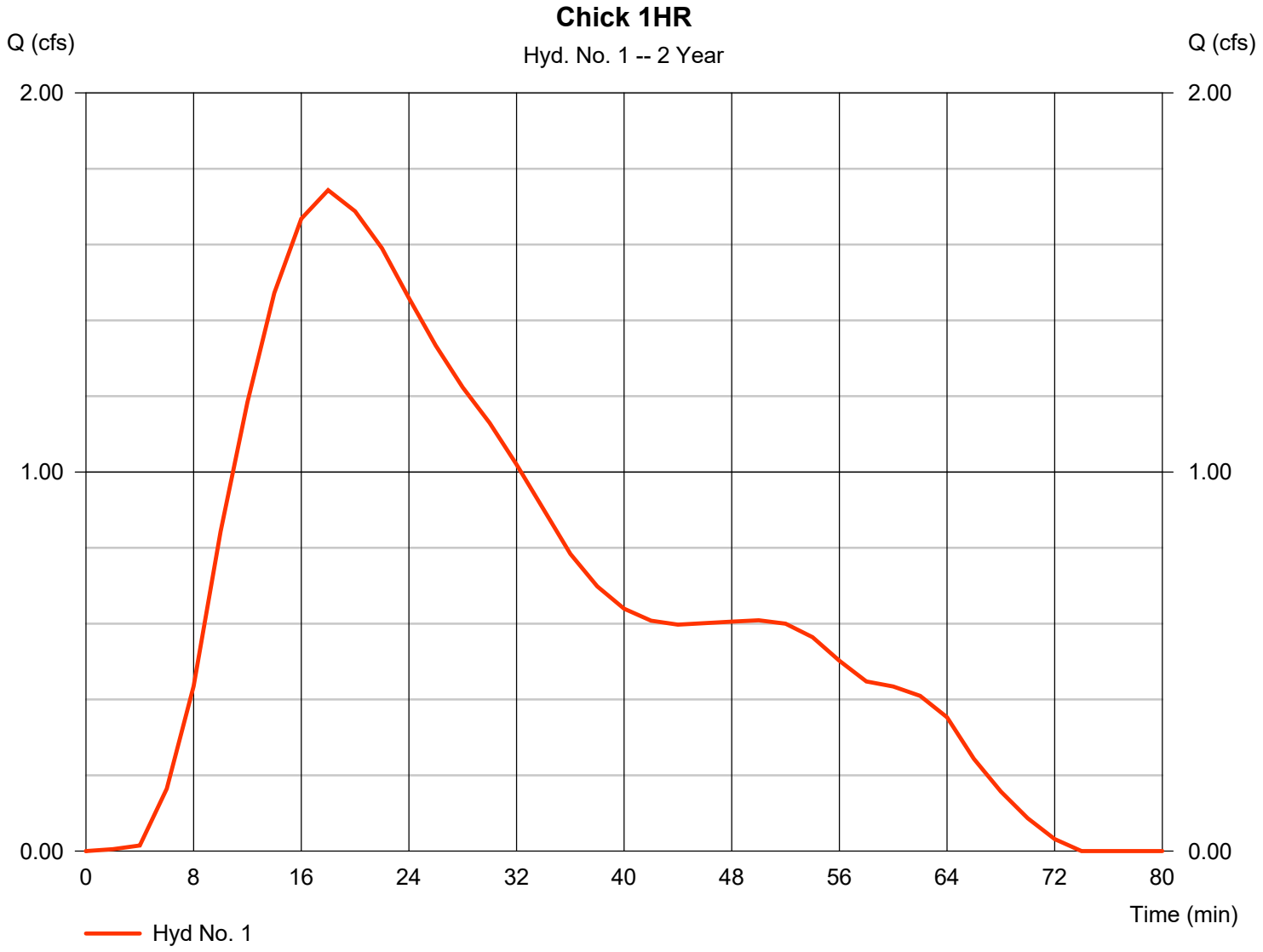
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.743	2	18	3,221	------	------	------	Chick 1HR
2	SCS Runoff	1.290	2	30	4,504	------	------	------	Chick 2HR
3	SCS Runoff	1.044	2	22	5,296	------	------	------	Chick 3 Hour
4	SCS Runoff	0.843	2	38	6,822	------	------	------	Chick 6 Hour
5	SCS Runoff	0.592	2	288	9,039	------	------	------	Chick 12HR
6	SCS Runoff	0.404	2	936	10,335	------	------	------	Chick 24HR
7	Reservoir	0.214	2	66	3,139	1	759.17	2,765	1 HR
8	Reservoir	0.278	2	110	4,421	2	759.21	3,206	2 HR
9	Reservoir	0.283	2	156	5,214	3	759.22	3,237	3 HR
10	Reservoir	0.289	2	172	6,740	4	759.22	3,278	6 HR
11	Reservoir	0.338	2	372	8,957	5	759.25	3,595	12 HR
12	Reservoir	0.298	2	946	10,252	6	759.22	3,334	24 Hr

Hydrograph Report

Hyd. No. 1

Chick 1HR

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.743 cfs
Storm frequency	=	2 yrs	Time to peak	=	18 min
Time interval	=	2 min	Hyd. volume	=	3,221 cuft
Drainage area	=	1.630 ac	Curve number	=	91.1
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	7.40 min
Total precip.	=	1.25 in	Distribution	=	Huff-1st
Storm duration	=	1.00 hrs	Shape factor	=	484



Hydrograph Summary Report

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

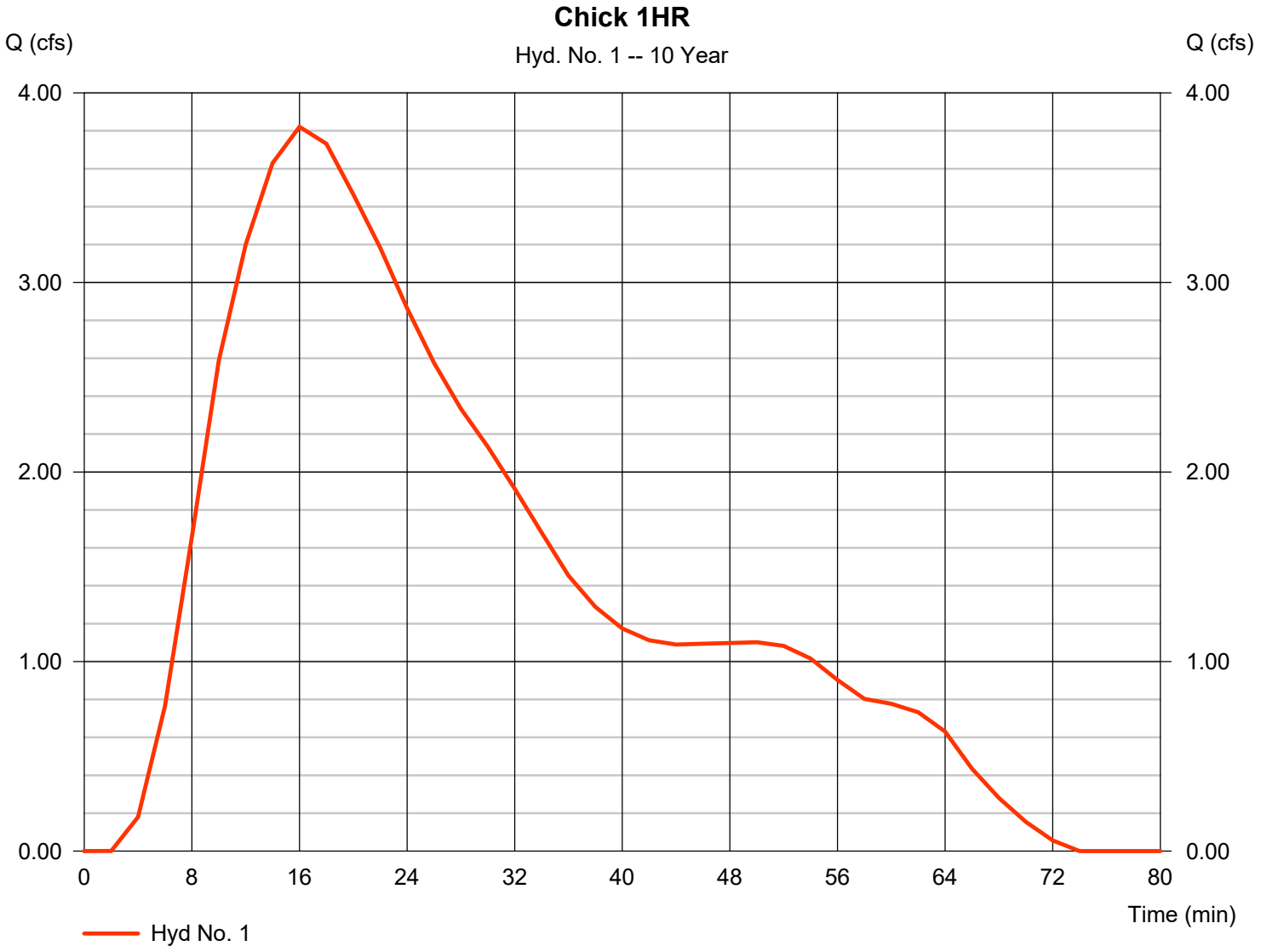
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.821	2	16	6,720	------	------	------	Chick 1HR
2	SCS Runoff	2.875	2	18	9,018	------	------	------	Chick 2HR
3	SCS Runoff	2.501	2	22	10,334	------	------	------	Chick 3 Hour
4	SCS Runoff	1.845	2	38	12,967	------	------	------	Chick 6 Hour
5	SCS Runoff	1.008	2	288	15,653	------	------	------	Chick 12HR
6	SCS Runoff	0.673	2	936	18,366	------	------	------	Chick 24HR
7	Reservoir	0.564	2	64	6,638	1	759.36	5,297	1 HR
8	Reservoir	0.618	2	106	8,936	2	759.39	5,791	2 HR
9	Reservoir	0.619	2	96	10,252	3	759.39	5,798	3 HR
10	Reservoir	0.599	2	164	12,885	4	759.38	5,616	6 HR
11	Reservoir	0.607	2	368	15,571	5	759.38	5,689	12 HR
12	Reservoir	0.521	2	944	18,284	6	759.34	4,901	24 Hr

Hydrograph Report

Hyd. No. 1

Chick 1HR

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.821 cfs
Storm frequency	=	10 yrs	Time to peak	=	16 min
Time interval	=	2 min	Hyd. volume	=	6,720 cuft
Drainage area	=	1.630 ac	Curve number	=	91.1
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	7.40 min
Total precip.	=	1.96 in	Distribution	=	Huff-1st
Storm duration	=	1.00 hrs	Shape factor	=	484



Hydrograph Summary Report

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

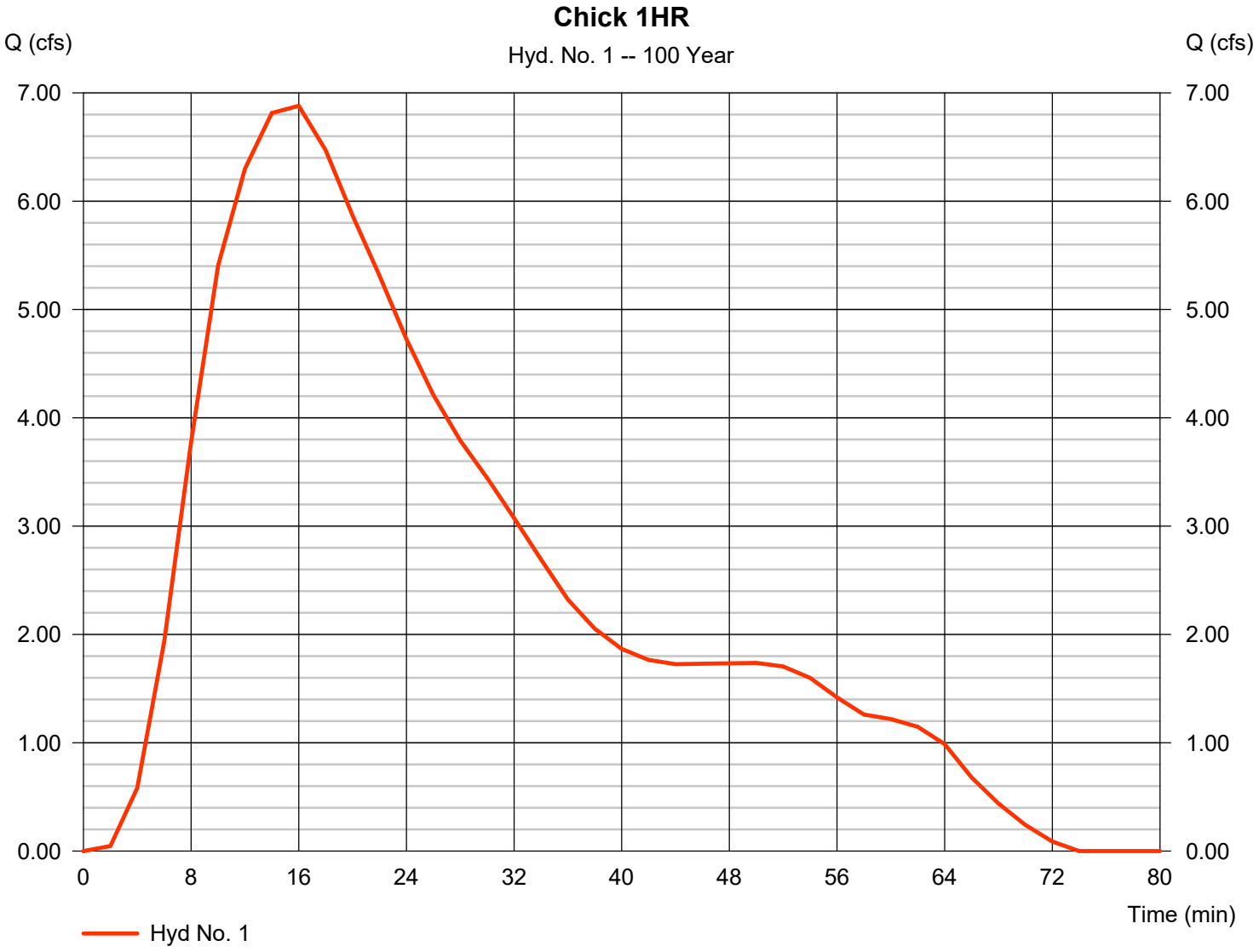
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	6.880	2	16	11,646	------	------	------	Chick 1HR
2	SCS Runoff	5.325	2	16	15,092	------	------	------	Chick 2HR
3	SCS Runoff	4.585	2	20	17,169	------	------	------	Chick 3 Hour
4	SCS Runoff	3.173	2	36	20,751	------	------	------	Chick 6 Hour
5	SCS Runoff	1.548	2	288	24,545	------	------	------	Chick 12HR
6	SCS Runoff	1.026	2	936	29,398	------	------	------	Chick 24HR
7	Reservoir	0.972	2	64	11,564	1	759.56	9,020	1 HR
8	Reservoir	1.024	2	104	15,009	2	759.59	9,516	2 HR
9	Reservoir	1.034	2	96	17,086	3	759.59	9,611	3 HR
10	Reservoir	0.961	2	136	20,668	4	759.56	8,925	6 HR
11	Reservoir	0.934	2	366	24,463	5	759.54	8,667	12 HR
12	Reservoir	0.774	2	946	29,315	6	759.47	7,200	24 Hr

Hydrograph Report

Hyd. No. 1

Chick 1HR

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.880 cfs
Storm frequency	=	100 yrs	Time to peak	=	16 min
Time interval	=	2 min	Hyd. volume	=	11,646 cuft
Drainage area	=	1.630 ac	Curve number	=	91.1
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	7.40 min
Total precip.	=	2.88 in	Distribution	=	Huff-1st
Storm duration	=	1.00 hrs	Shape factor	=	484



Pond Report

Pond No. 1 - Det 3

Pond Data

UG Chambers -Invert elev. = 758.93 ft, Rise x Span = 2.50 x 2.50 ft, Barrel Len = 54.00 ft, No. Barrels = 31, Slope = 0.00%, Headers = Yes
Encasement -Invert elev. = 758.93 ft, Width = 117.00 ft, Height = 3.82 ft, Voids = 0.02%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	758.93	n/a	0	0
0.38	759.31	n/a	4,318	4,318
0.76	759.69	n/a	7,186	11,504
1.15	760.08	n/a	8,340	19,844
1.53	760.46	n/a	8,547	28,391
1.91	760.84	n/a	7,938	36,329
2.29	761.22	n/a	6,229	42,557
2.67	761.60	n/a	1,820	44,377
3.06	761.99	n/a	80	44,457
3.44	762.37	n/a	80	44,536
3.82	762.75	n/a	80	44,616

Culvert / Orifice Structures

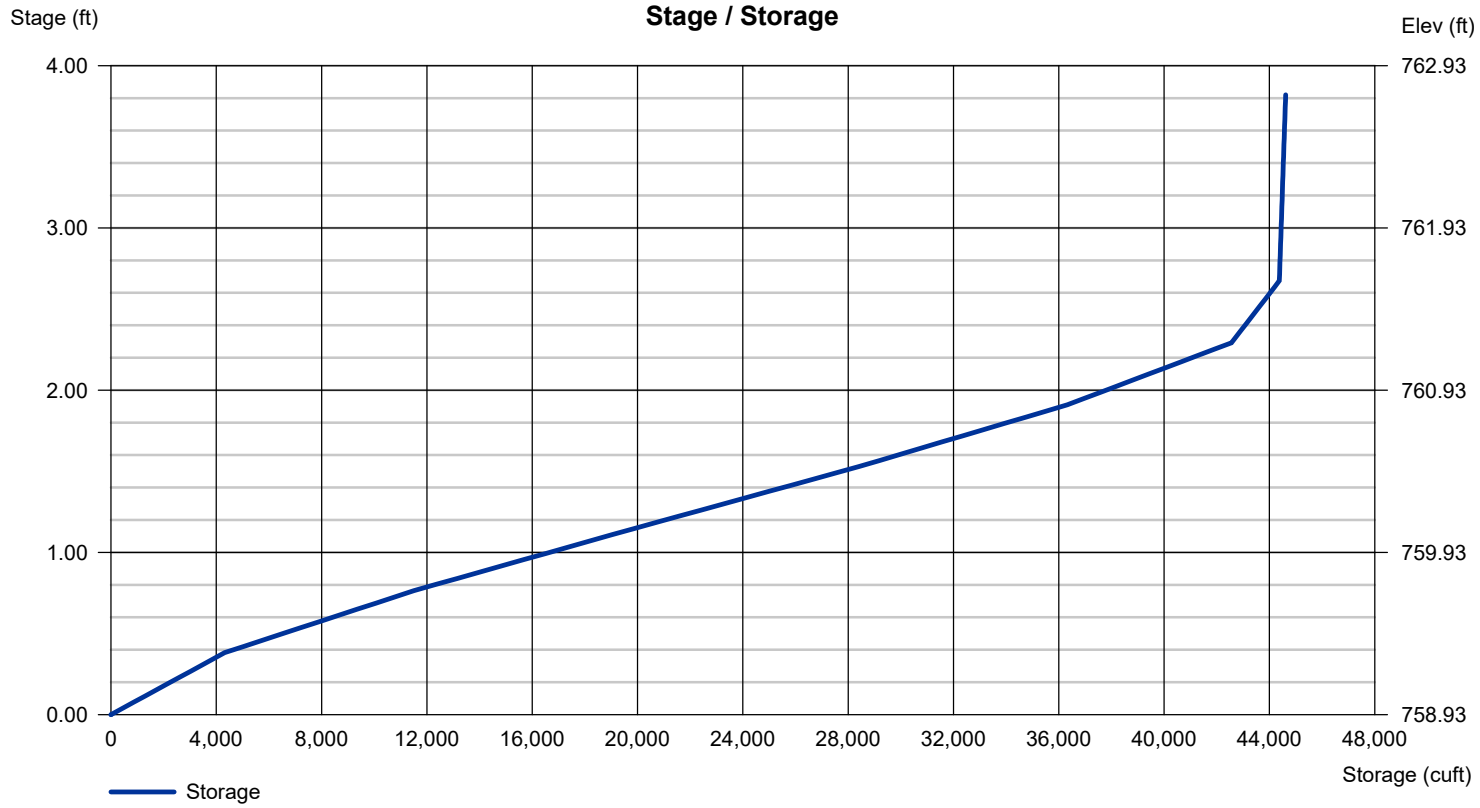
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 758.93	0.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 0.30	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	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 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 Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.743	2	18	3,221	------	------	------	Chick 1HR
2	SCS Runoff	1.290	2	30	4,504	------	------	------	Chick 2HR
3	SCS Runoff	1.044	2	22	5,296	------	------	------	Chick 3 Hour
4	SCS Runoff	0.843	2	38	6,822	------	------	------	Chick 6 Hour
5	SCS Runoff	0.592	2	288	9,039	------	------	------	Chick 12HR
6	SCS Runoff	0.404	2	936	10,335	------	------	------	Chick 24HR
7	Reservoir	0.214	2	66	3,139	1	759.17	2,765	1 HR
8	Reservoir	0.278	2	110	4,421	2	759.21	3,206	2 HR
9	Reservoir	0.283	2	156	5,214	3	759.22	3,237	3 HR
10	Reservoir	0.289	2	172	6,740	4	759.22	3,278	6 HR
11	Reservoir	0.338	2	372	8,957	5	759.25	3,595	12 HR
12	Reservoir	0.298	2	946	10,252	6	759.22	3,334	24 Hr

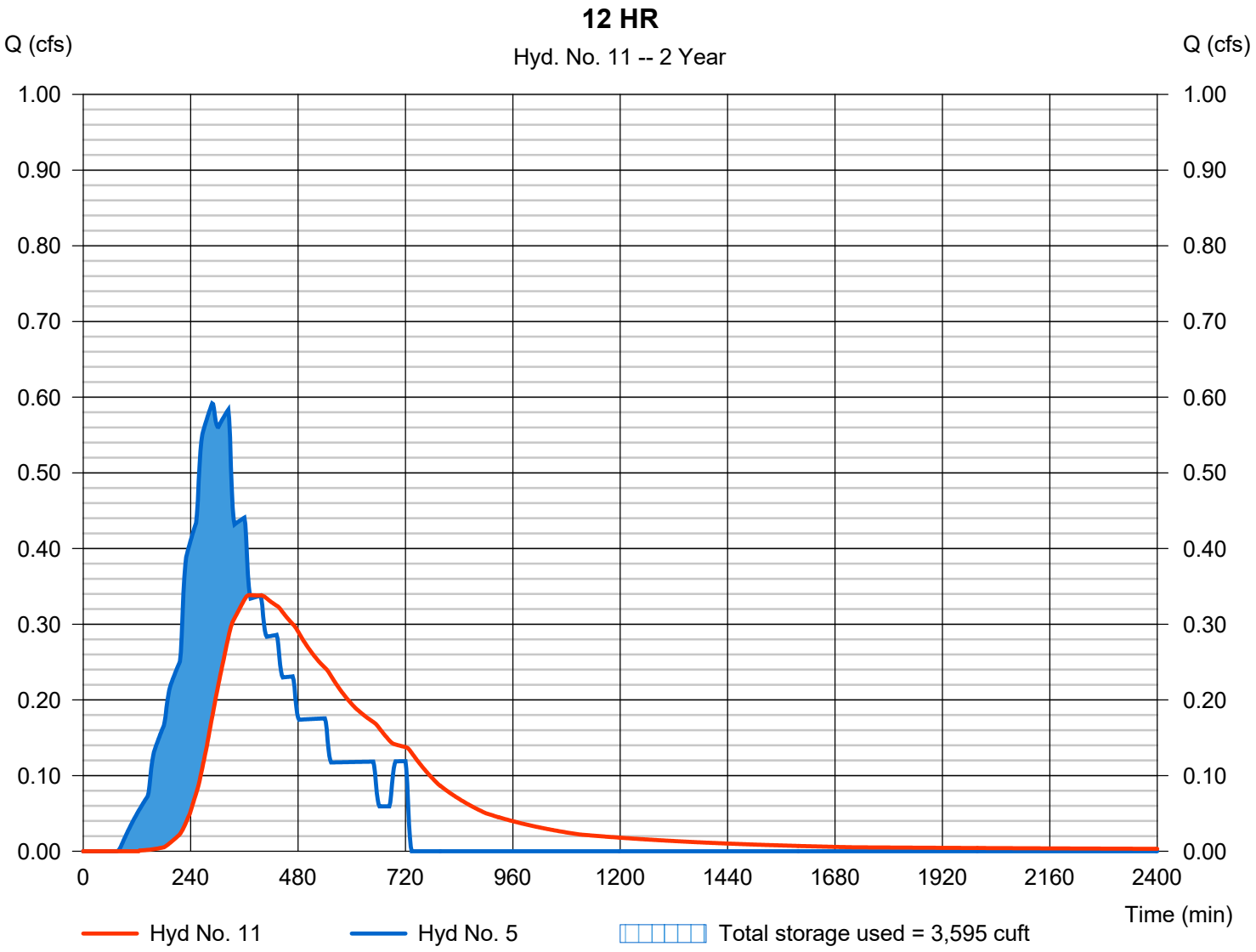
Hydrograph Report

Hyd. No. 11

12 HR

Hydrograph type	=	Reservoir	Peak discharge	=	0.338 cfs
Storm frequency	=	2 yrs	Time to peak	=	372 min
Time interval	=	2 min	Hyd. volume	=	8,957 cuft
Inflow hyd. No.	=	5 - Chick 12HR	Max. Elevation	=	759.25 ft
Reservoir name	=	Det 3	Max. Storage	=	3,595 cuft

Storage Indication method used.



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.821	2	16	6,720	------	------	------	Chick 1HR
2	SCS Runoff	2.875	2	18	9,018	------	------	------	Chick 2HR
3	SCS Runoff	2.501	2	22	10,334	------	------	------	Chick 3 Hour
4	SCS Runoff	1.845	2	38	12,967	------	------	------	Chick 6 Hour
5	SCS Runoff	1.008	2	288	15,653	------	------	------	Chick 12HR
6	SCS Runoff	0.673	2	936	18,366	------	------	------	Chick 24HR
7	Reservoir	0.564	2	64	6,638	1	759.36	5,297	1 HR
8	Reservoir	0.618	2	106	8,936	2	759.39	5,791	2 HR
9	Reservoir	0.619	2	96	10,252	3	759.39	5,798	3 HR
10	Reservoir	0.599	2	164	12,885	4	759.38	5,616	6 HR
11	Reservoir	0.607	2	368	15,571	5	759.38	5,689	12 HR
12	Reservoir	0.521	2	944	18,284	6	759.34	4,901	24 Hr

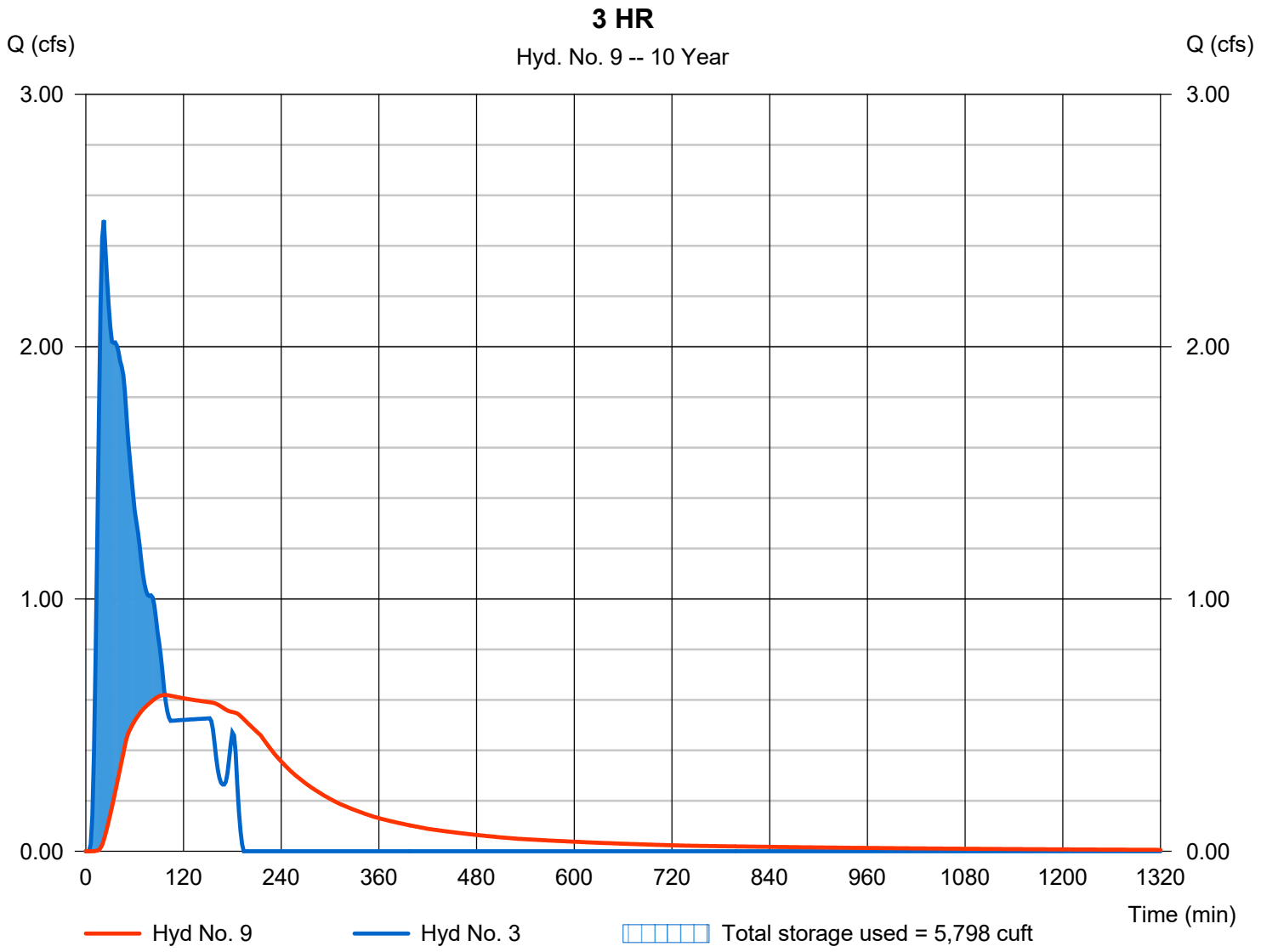
Hydrograph Report

Hyd. No. 9

3 HR

Hydrograph type	=	Reservoir	Peak discharge	=	0.619 cfs
Storm frequency	=	10 yrs	Time to peak	=	96 min
Time interval	=	2 min	Hyd. volume	=	10,252 cuft
Inflow hyd. No.	=	3 - Chick 3 Hour	Max. Elevation	=	759.39 ft
Reservoir name	=	Det 3	Max. Storage	=	5,798 cuft

Storage Indication method used.



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	6.880	2	16	11,646	------	------	------	Chick 1HR
2	SCS Runoff	5.325	2	16	15,092	------	------	------	Chick 2HR
3	SCS Runoff	4.585	2	20	17,169	------	------	------	Chick 3 Hour
4	SCS Runoff	3.173	2	36	20,751	------	------	------	Chick 6 Hour
5	SCS Runoff	1.548	2	288	24,545	------	------	------	Chick 12HR
6	SCS Runoff	1.026	2	936	29,398	------	------	------	Chick 24HR
7	Reservoir	0.972	2	64	11,564	1	759.56	9,020	1 HR
8	Reservoir	1.024	2	104	15,009	2	759.59	9,516	2 HR
9	Reservoir	1.034	2	96	17,086	3	759.59	9,611	3 HR
10	Reservoir	0.961	2	136	20,668	4	759.56	8,925	6 HR
11	Reservoir	0.934	2	366	24,463	5	759.54	8,667	12 HR
12	Reservoir	0.774	2	946	29,315	6	759.47	7,200	24 Hr

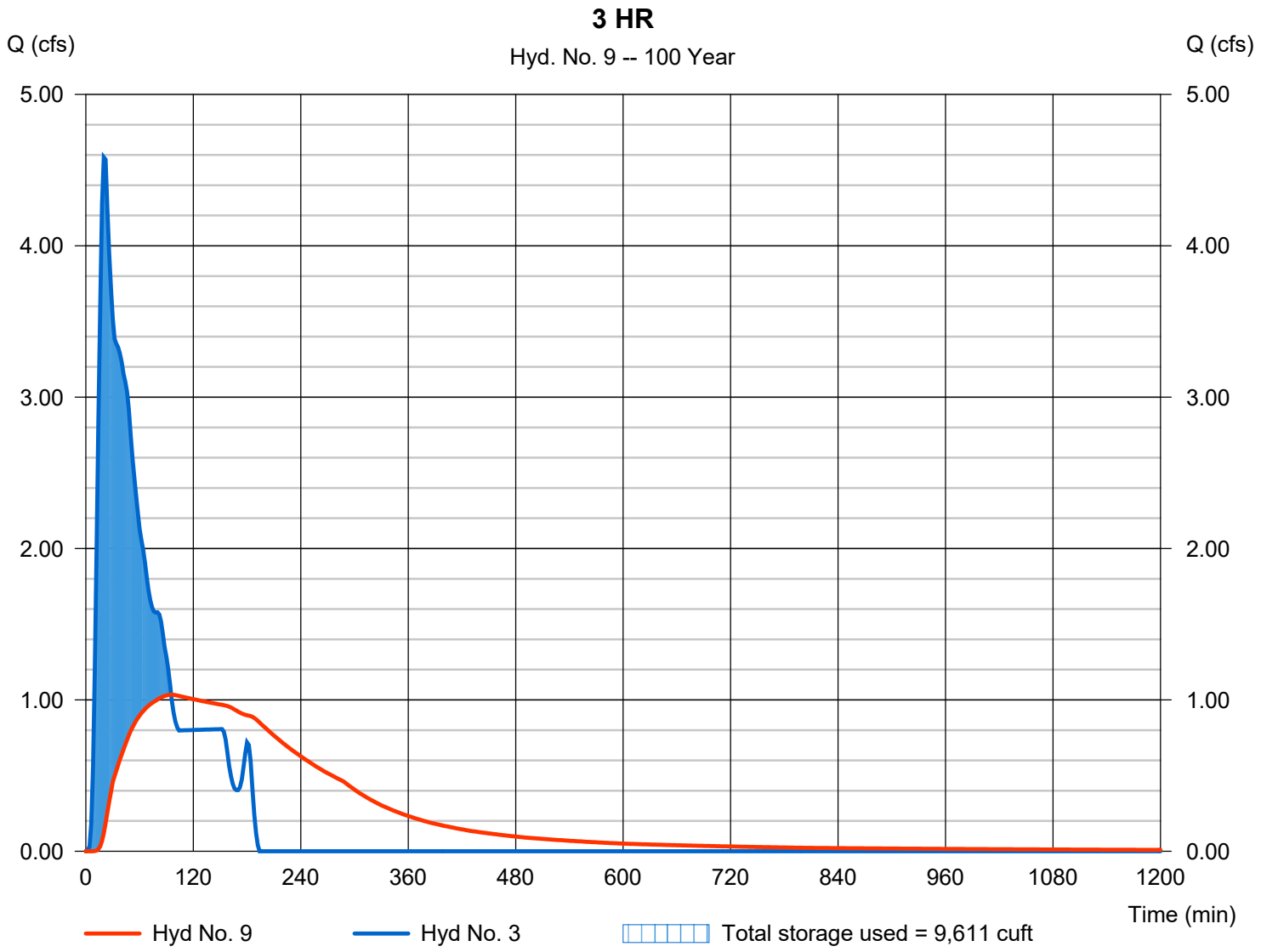
Hydrograph Report

Hyd. No. 9

3 HR

Hydrograph type	=	Reservoir	Peak discharge	=	1.034 cfs
Storm frequency	=	100 yrs	Time to peak	=	96 min
Time interval	=	2 min	Hyd. volume	=	17,086 cuft
Inflow hyd. No.	=	3 - Chick 3 Hour	Max. Elevation	=	759.59 ft
Reservoir name	=	Det 3	Max. Storage	=	9,611 cuft

Storage Indication method used.



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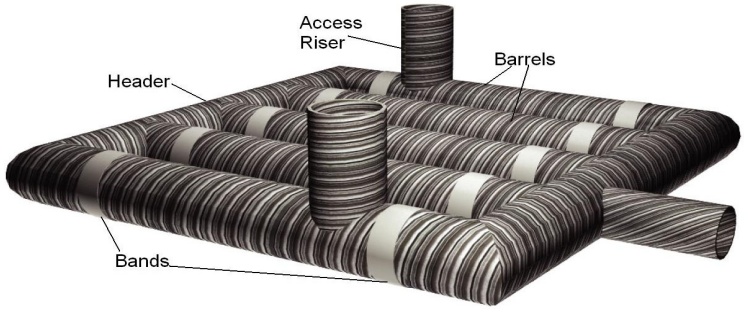


Project Summary

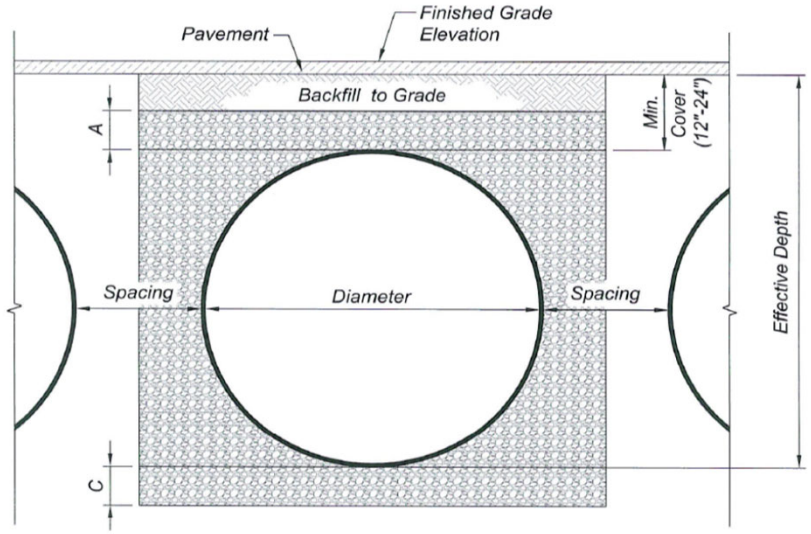
Date:	11/5/2024
Project Name:	Detention 3
City / County:	Franklin
State:	IN
Designed By:	Venus Thorne
Company:	Northpointe
Telephone:	317-721-0032

Enter Information in Blue Cells

Corrugated Metal Pipe Calculator

Storage Volume Required (cf):	9,700
Limiting Width (ft):	120.00
Invert Depth Below Asphalt (ft):	4.00
Solid or Perforated Pipe:	Perforated
Shape Or Diameter (in):	30
Number Of Headers:	2
Spacing between Barrels (ft):	1.25
Stone Width Around Perimeter of System (ft):	1
Depth A: Porous Stone Above Pipe (in):	6
Depth C: Porous Stone Below Pipe (in):	0
Stone Porosity (0 to 40%):	40

4.91 ft^2 Pipe Area



System Sizing

Pipe Storage:	6,607	cf	
Porous Stone Storage:	3,394	cf	
Total Storage Provided:	10,001	cf	103.1% Of Required Storage
Number of Barrels:	31	barrels	
Length per Barrel:	36.0	ft	
Length Per Header:	115.0	ft	
Rectangular Footprint (W x L):	117. ft x 43. ft		

CONTECH Materials

Total CMP Footage:	1,346	ft
Approximate Total Pieces:	72	pcs
Approximate Coupling Bands:	101	bands
Approximate Truckloads:	4	trucks

Construction Quantities**

Total Excavation:	746	cy
Porous Stone Backfill For Storage:	314	cy stone
Backfill to Grade Excluding Stone:	187	cy fill

***Construction quantities are approximate and should be verified upon final design*

System Layout

Barrel 12
Barrel 11
Barrel 10
Barrel 9
Barrel 8
Barrel 7
Barrel 6
Barrel 5
Barrel 4
Barrel 3
Barrel 2
Barrel 1

Number Of Barrels Exceed Graph Limitations