Springfield Industrial

SPR-20250917-8086-P
PRELIMINARY
DRAINAGE STUDY & PCSMP CALCULATIONS

12/8/25

Project Engineer

Bradley Huyck, P.E.

Prepared by Connor Cloyed

TD2 File No. 1570-104

DRAINAGE STUDY & PCSMP CALCULATIONS
Springfield Industrial
SPR-20250917-8086-P

TABLE OF CONTENTS

DRAINAGE STUDY & PCSMP CALCULATIONS
Springfield Industrial
SPR-20250917-8086-P

EXECUTIVE SUMMARY

This drainage study was prepared for the Post-Construction Stormwater Management Plan (SPR-20250917-8086-P) for Springfield Industrial located on Fairview Road between S 144th Street and S 156th Street, Springfield, Sarpy County, Nebraska.

The total site is approximately 78.49 acres. The total disturbed area is approximately 76.84 acres. The proposed development will construct 4 new warehouse buildings, pavement, retaining walls, the necessary infrastructure to support the building, and an extended dry detention basin.

The Rational Method was used for pipe sizing calculations and the SCS Method was used for analysis of stormwater runoff.

An extended dry detention basin will be used for stormwater detention and treatment and was designed using the *Omaha Regional Stormwater Design Manual*, *Chapter 8: Stormwater Best Management Practices* and *Bioretention Gardens* by Ted Hartsig and Steven N. Rodie.

The intent of this drainage study is to demonstrate the proposed storm sewers have been designed to adequately transport stormwater runoff from this site, Best Management Practices (BMPs) utilized on this site will adequately treat the first half inch of runoff, and BMPs will adequately detain stormwater to meet pre- and post-construction stormwater runoff requirements.

I. Existing Conditions

The existing site is agricultural use consisting of row crops. Impact Point 1 is located along the south property line where an existing drainageway crosses through the site. There is one existing drainage area that contributes to IP1 which consists of almost the entirety of the proposed development site, and approximately 213 acres of farmland located west of the site. This area, EX1, is shown on the existing drainage map DM-1, located in Section 2 of this report. This area consists of row crops and surface drains from an area southeast of the intersection of Fairview Road and S 156th Street to IP1 to the southeast. The time of concentration for area EX1 has been calculated to be 59 minutes with an average basin slope of 2.5 percent and a hydraulic length of 3,572 feet.

Information for the existing area and impact point is included in the table below.

ID	Description	Total Area (Ac.)	Total Area (SF)	Impervious (SF)	Pervious (SF)	Composite CN	Composite C	Impact Point	Impact Point Description
EX-1	Proposed Site and Western Area	275	12,022,316	11,322	12,010,994	78	0.37	1	Existing Drainageway
TOTAL EXISTING SITE		275	12,022,316	11,322	12,010,994	78	0.37		

II. Proposed Conditions

The proposed construction will consist of 4 warehouse buildings, pavement, retaining walls, utilities necessary for facility operations, and an extended dry detention basin (DB-1). The area of the site draining to impact point 1 is 3,419,024 square feet of which approximately 3,347,150 square feet will be disturbed during construction.

Proposed grading and storm sewer configurations result in 2 drainage areas. Area A1, which will consist of all the disturbed areas of the proposed site, and area B1, which will consist of the undisturbed areas to the west of the proposed site. Area A1 will be captured and treated by DB1 where it will then be discharged at IP1. The time of concentration for area A1 has been calculated to be 13.3 minutes, while the time of concentration for area B1 has been calculated to be 59 minutes.

Further information for each proposed area is shown in the table below.

ID	Description	Total Area (Ac.)	Total Area (SF)	Impervious (SF)	Perv. (SF)	Comp. CN	Composite C	Impact Point	Impact Point Description
A1	Buildings, Paving, & Bio-retention Basin 1	78	3,376,125	2,301,710	1,074,415	91	0.80	1	Existing Drainageway
B1	Existing area to the West	213	9,266,448	11,322	9,255,126	78	0.37	1	Existing Drainageway
TOTAL PROPOSED SITE		291	12,642,573	2,313,032	10,329,541	81	0.48		

IV. Runoff Summary

Hydraflow Hydrographs Extension for AutoCAD Civil 3D 2024 was used to calculate the pre- and post-construction stormwater runoff rates for the 2-, 10-, and 100-year storm events for Impact Point 1. The pre- and post-construction runoff rates for this development are shown in the table below. The proposed construction will decrease the flows for the 2-, 10-, and 100-year storm events.

	2-Year (cfs)	10-Year (cfs)	100-Year (cfs)
Impact Point 1			
Pre-Construction	166	365	651
Post-Construction	138	295	519

SECTION 1

COMPUTATION FORM
STORM DRAINAGE SYSTEM DESIGN
BY THE RATIONAL METHOD

THOMPSON DREESSEN & DORNER
Consulting Engineers & Land Surveyors
Omaha, NE 68154 (402)330-8860

Calculated By: CNC
Date: 10-06-25
Checked By: BPH

Preliminary x
Final Design

Drainage Area
Project No. 1570-104
Design Storm: 10 yr.

Imp Pt. No.	Location	Conveyance		Direct Runoff										Travel Time (System Design)								Total Runoff					
														Conv Sys		Slope											
		From	To	W.S. or No.	O.F.L. ft.	W.C. Type *	S %	V fps	Ti min	i in/hr	A Ac.	C	q cfs	No.	Size	min %	des %	V des. fps	Cap. (all.) cfs	Lgth ft.	t min	TOC min	i	Comp. C	Total A Ac.	Des. Q cfs	Remarks
	A1								5	8.8	0.10	0.65	0.5734		15	0.01	1.00	6.24	7.65189	25	0.07	5	8.8	0.65	0.10	0.573	
	A2								10	7	3.79	0.76	20.258		24	0.60	1.00	8.53	26.8013	124	0.24	10.1	7	0.76	3.89	20.71	
															24	0.58	1.00	8.53	26.8013	348	0.68	10.3	6.9	0.76	3.89	20.42	
															24	0.55	1.00	8.53	26.8013	135	0.26	11	6.7	0.76	3.89	19.83	
	A3								5	8.8	0.34	0.60	1.7823		15	0.05	1.00	6.24	7.65189	25	0.07	5	8.8	0.60	0.34	1.782	
	A4								10	8.8	7.14	0.89	55.854		36	0.63	1.00	11.2	79.03	287	0.43	11.3	6.6	0.84	11.37	62.76	
															36	0.63	1.00	11.2	79.03	210	0.31	11.7	6.6	0.84	11.37	62.76	
	A5								5	8.8	0.87	0.45	3.4263		15	0.20	1.00	6.24	7.65189	25	0.07	5	8.8	0.45	0.87	3.426	
	A6								10	7	6.36	0.84	37.23		42	0.71	1.00	12.4	119.217	355	0.48	12	6.6	0.82	18.59	100.4	
															42	0.69	1.00	12.4	119.217	100	0.13	12.5	6.5	0.82	18.59	98.91	
	A7								5	8.8	0.51	0.50	2.2717		15	0.09	1.00	6.24	7.65189	25	0.07	5	8.8	0.50	0.51	2.272	
	A8								10	8.8	7.72	0.85	57.473		48	0.71	1.00	13.5	170.217	463	0.57	12.6	6.5	0.82	26.83	143	
															48	0.69	1.00	13.5	170.217	128	0.16	13.2	6.4	0.82	26.83	140.8	
	A9								5	8.8	0.60	0.57	2.9835		15	0.15	1.00	6.24	7.65189	25	0.07	5	8.8	0.57	0.60	2.984	
	A10								10	8.8	3.15	0.72	19.896		48	0.86	3.00	23.5	294.825	140	0.1	13.3	6.4	0.80	30.58	157.5	
	A11								10	7	12.58	0.88	77.226		42	0.42	1.00	12.4	119.217	443	0.6	10	7	0.88	12.58	77.23	
															42	0.41	1.00	12.4	119.217	524	0.7	10.6	6.9	0.88	12.58	76.12	
	A12								10	7	14.20	0.95	94.462		48	0.91	1.00	13.5	170.217	470	0.58	11.3	6.6	0.92	26.78	161.9	
															48	0.91	1.00	13.5	170.217	118	0.15	11.9	6.6	0.92	26.78	161.9	
	A13								5	8.8	0.50	0.65	2.8542		15	0.14	1.00	6.24	7.65189	25	0.07	5	8.8	0.65	0.50	2.854	
	A14								10	7	4.98	0.85	29.705		54	0.68	1.00	14.7	233.038	245	0.28	12	6.6	0.90	32.27	192	
															54	0.66	1.00	14.7	233.038	225	0.26	12.3	6.5	0.90	32.27	189.1	

REMINDER: Check Storm Drain System for Major Storm Provisions.

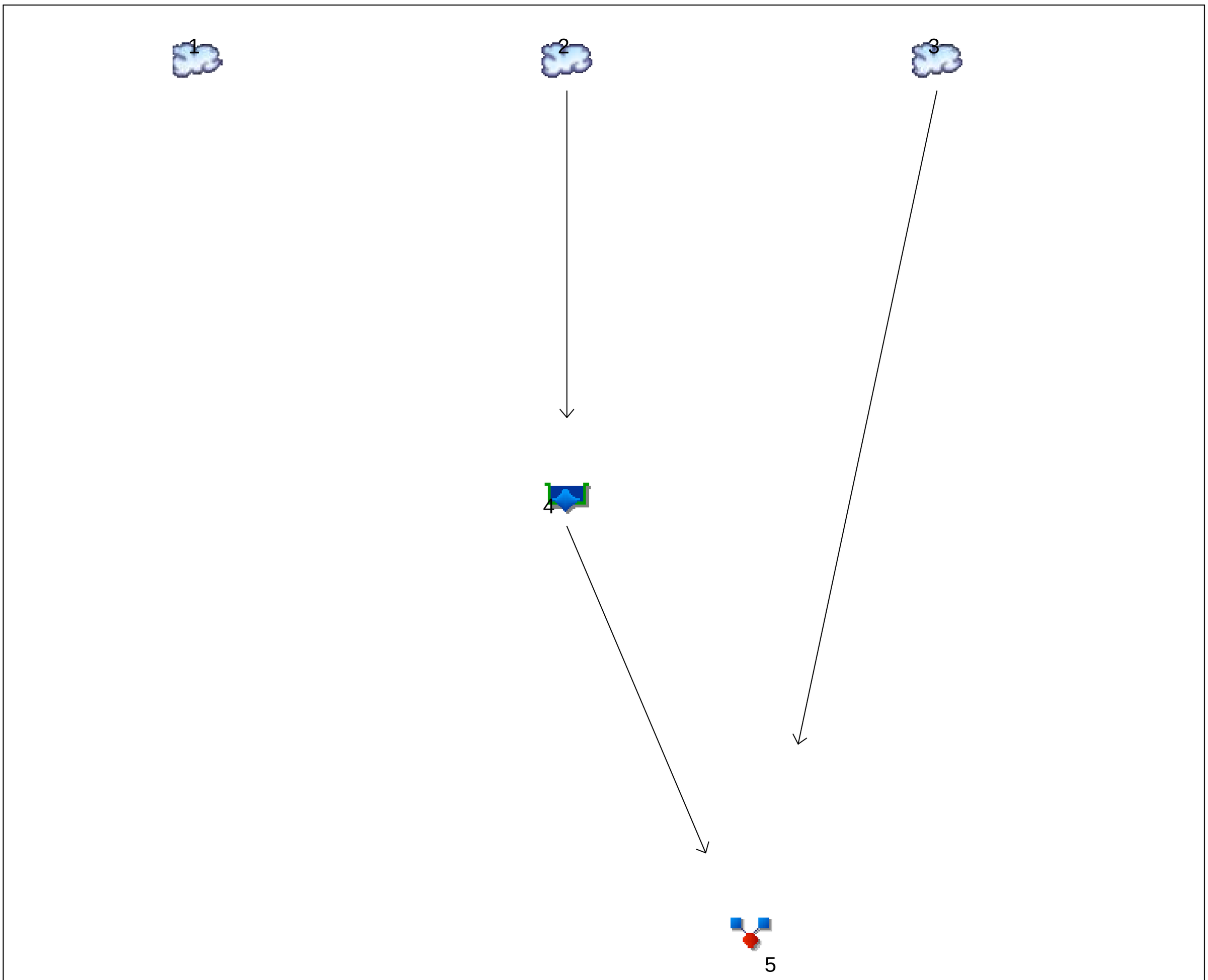
*Water Course Legend Figure 2-2
FO - Forest
FA - Fallow
GR - Grass/Lawn
BG - Bare Ground
GW - Grass Waterway
SG - Shallow Gut. Flow

NOTES:

Sheet 1 of 1

Watershed Model Schematic

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



Legend

Hyd.	Origin	Description
1	SCS Runoff	EX IP1
2	SCS Runoff	A1 Into SB1
3	SCS Runoff	B1 IP1
4	Reservoir	DB1
5	Combine	IP1 Proposed

Hydrograph Return Period Recap

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

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)							Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	166.00	-------	-------	365.31	-------	-------	651.02	EX IP1
2	SCS Runoff	------	-------	229.30	-------	-------	387.60	-------	-------	593.03	A1 Into SB1
3	SCS Runoff	------	-------	128.57	-------	-------	282.95	-------	-------	504.24	B1 IP1
4	Reservoir	2	-------	10.03	-------	-------	13.25	-------	-------	18.18	DB1
5	Combine	3, 4	-------	138.26	-------	-------	295.92	-------	-------	519.09	IP1 Proposed

Hydrograph Summary Report

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

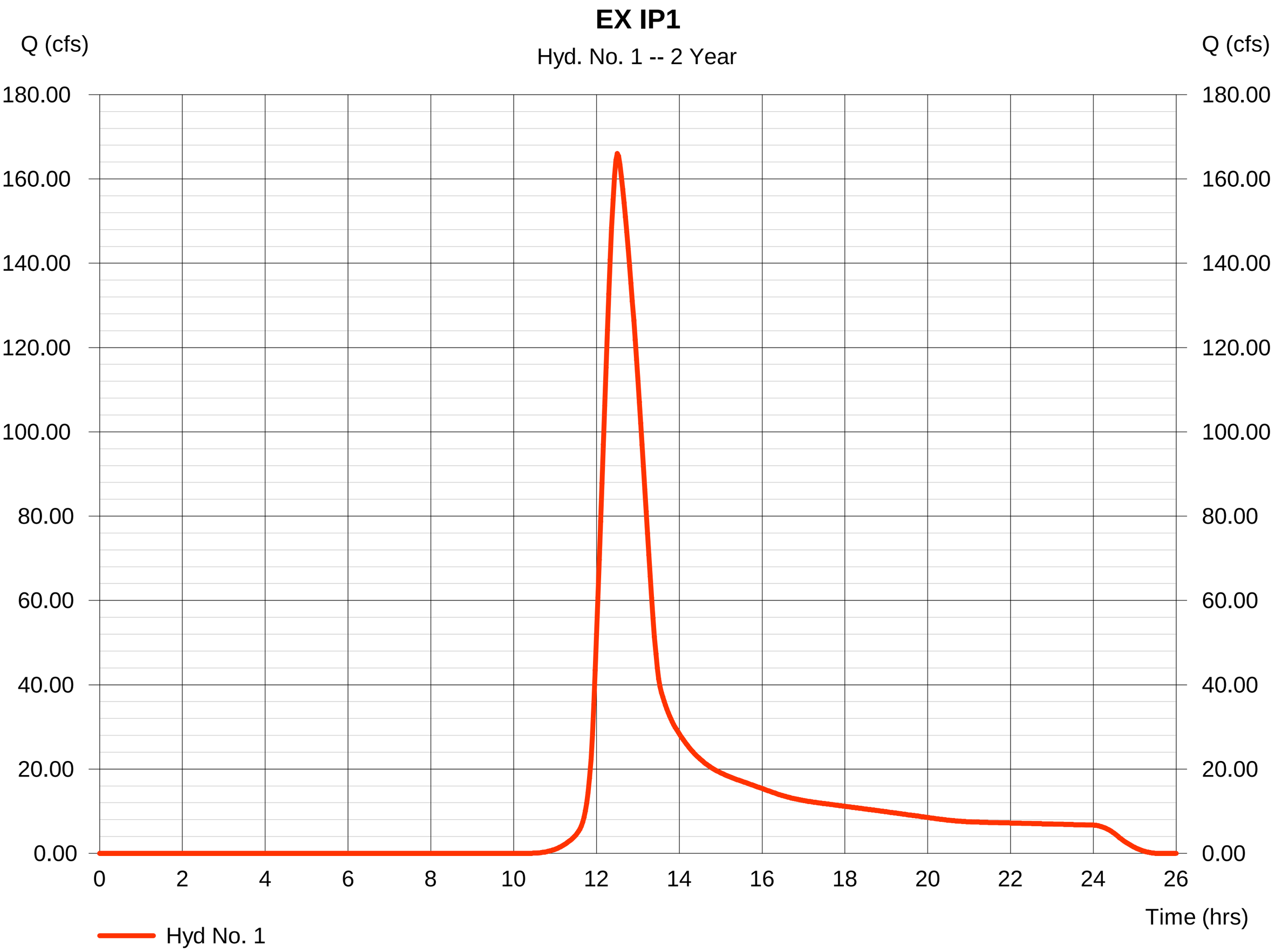
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	166.00	2	750	1,126,855	------	------	------	EX IP1
2	SCS Runoff	229.30	2	720	604,763	------	------	------	A1 Into SB1
3	SCS Runoff	128.57	2	750	872,801	------	------	------	B1 IP1
4	Reservoir	10.03	2	824	588,355	2	1102.66	376,095	DB1
5	Combine	138.26	2	750	1,461,153	3, 4	------	------	IP1 Proposed

Hydrograph Report

Hyd. No. 1

EX IP1

Hydrograph type	=	SCS Runoff	Peak discharge	=	166.00 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.50 hrs
Time interval	=	2 min	Hyd. volume	=	1,126,855 cuft
Drainage area	=	275.000 ac	Curve number	=	78
Basin Slope	=	2.5 %	Hydraulic length	=	3572 ft
Tc method	=	LAG	Time of conc. (Tc)	=	59.20 min
Total precip.	=	3.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

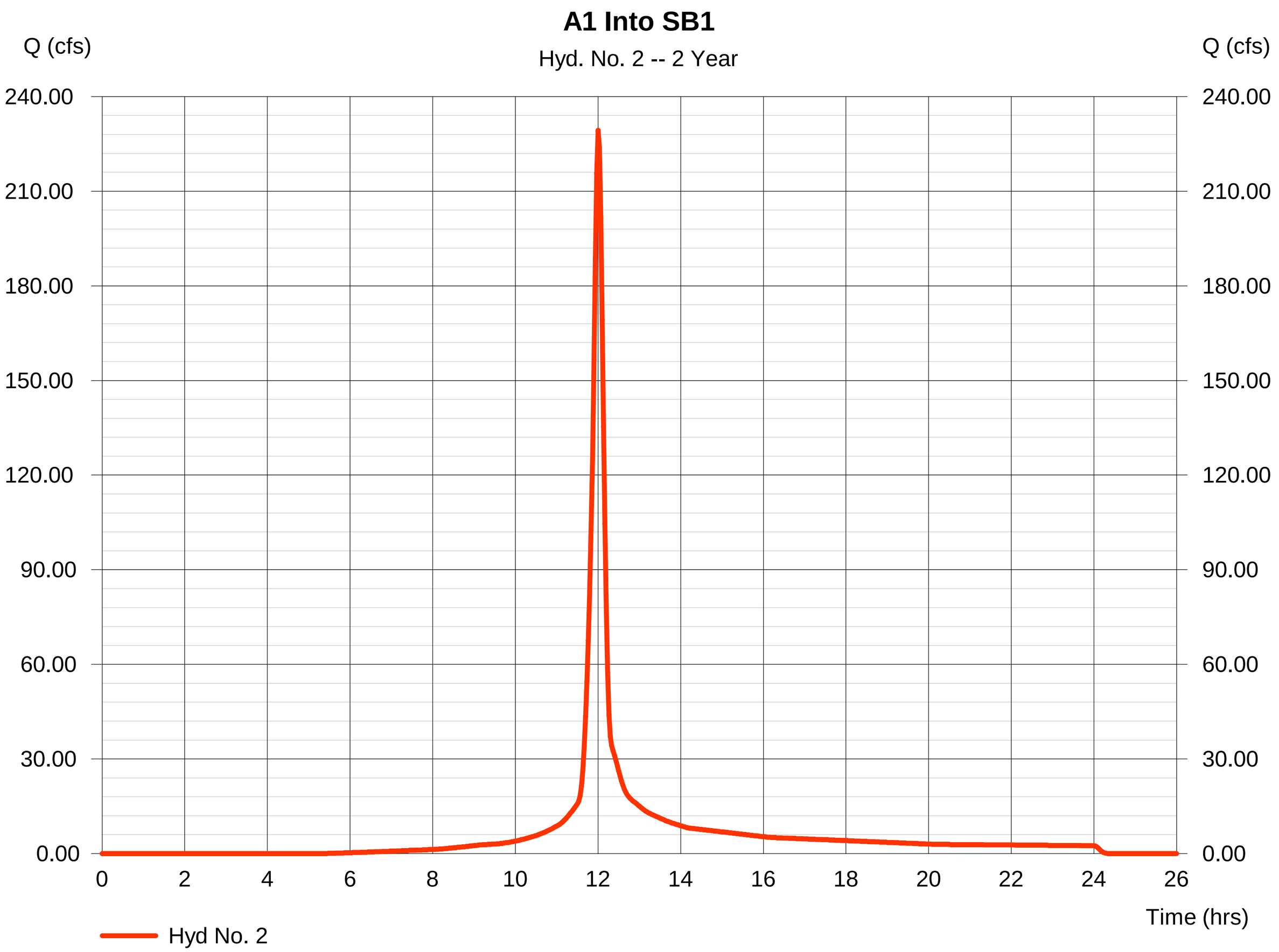


Hydrograph Report

Hyd. No. 2

A1 Into SB1

Hydrograph type	=	SCS Runoff	Peak discharge	=	229.30 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.00 hrs
Time interval	=	2 min	Hyd. volume	=	604,763 cuft
Drainage area	=	78.000 ac	Curve number	=	91
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	13.30 min
Total precip.	=	3.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

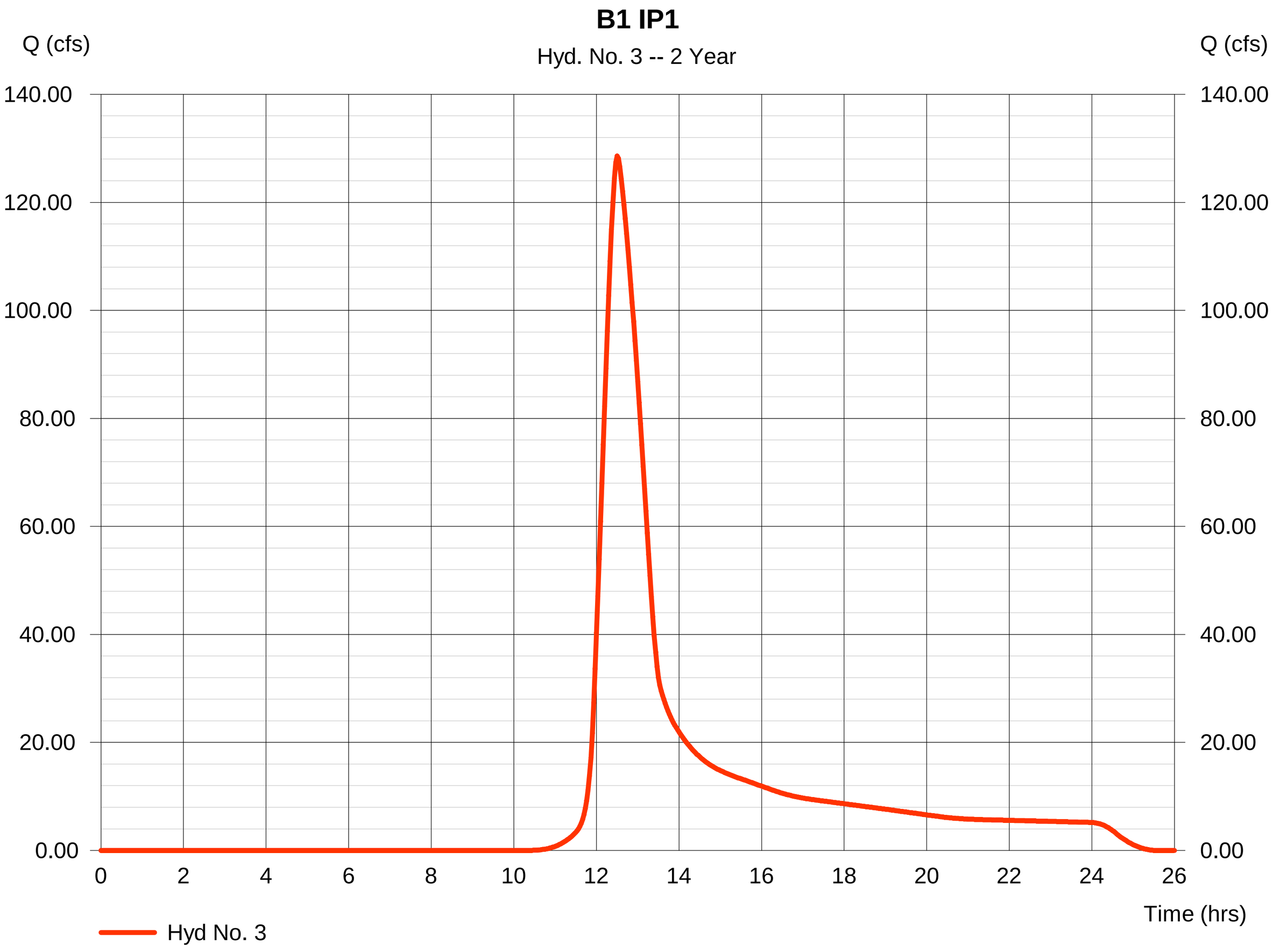


Hydrograph Report

Hyd. No. 3

B1 IP1

Hydrograph type	=	SCS Runoff	Peak discharge	=	128.57 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.50 hrs
Time interval	=	2 min	Hyd. volume	=	872,801 cuft
Drainage area	=	213.000 ac	Curve number	=	78
Basin Slope	=	2.5 %	Hydraulic length	=	3572 ft
Tc method	=	LAG	Time of conc. (Tc)	=	59.20 min
Total precip.	=	3.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



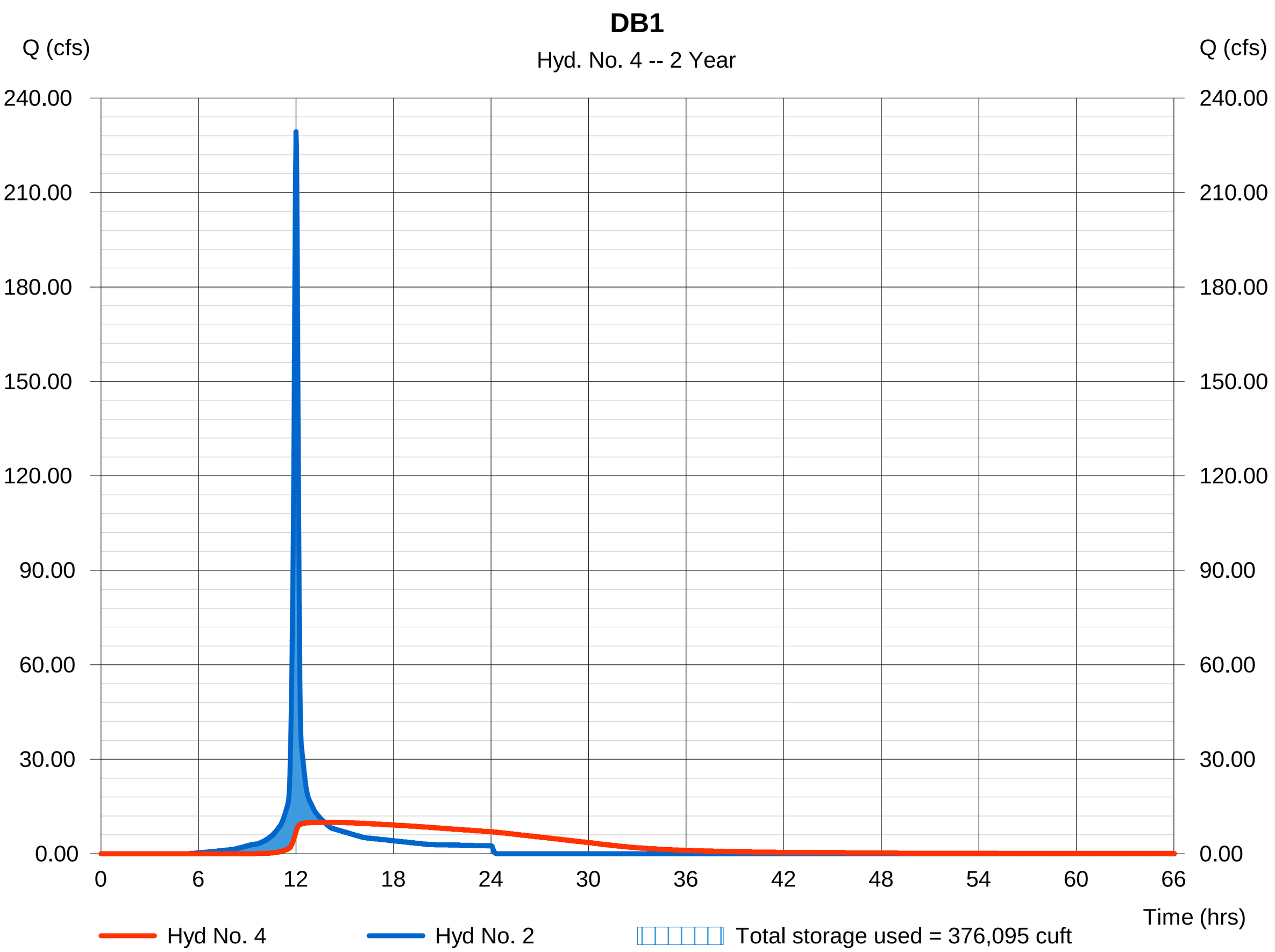
Hydrograph Report

Hyd. No. 4

DB1

Hydrograph type	=	Reservoir	Peak discharge	=	10.03 cfs
Storm frequency	=	2 yrs	Time to peak	=	13.73 hrs
Time interval	=	2 min	Hyd. volume	=	588,355 cuft
Inflow hyd. No.	=	2 - A1 Into SB1	Max. Elevation	=	1102.66 ft
Reservoir name	=	DB1	Max. Storage	=	376,095 cuft

Storage Indication method used.

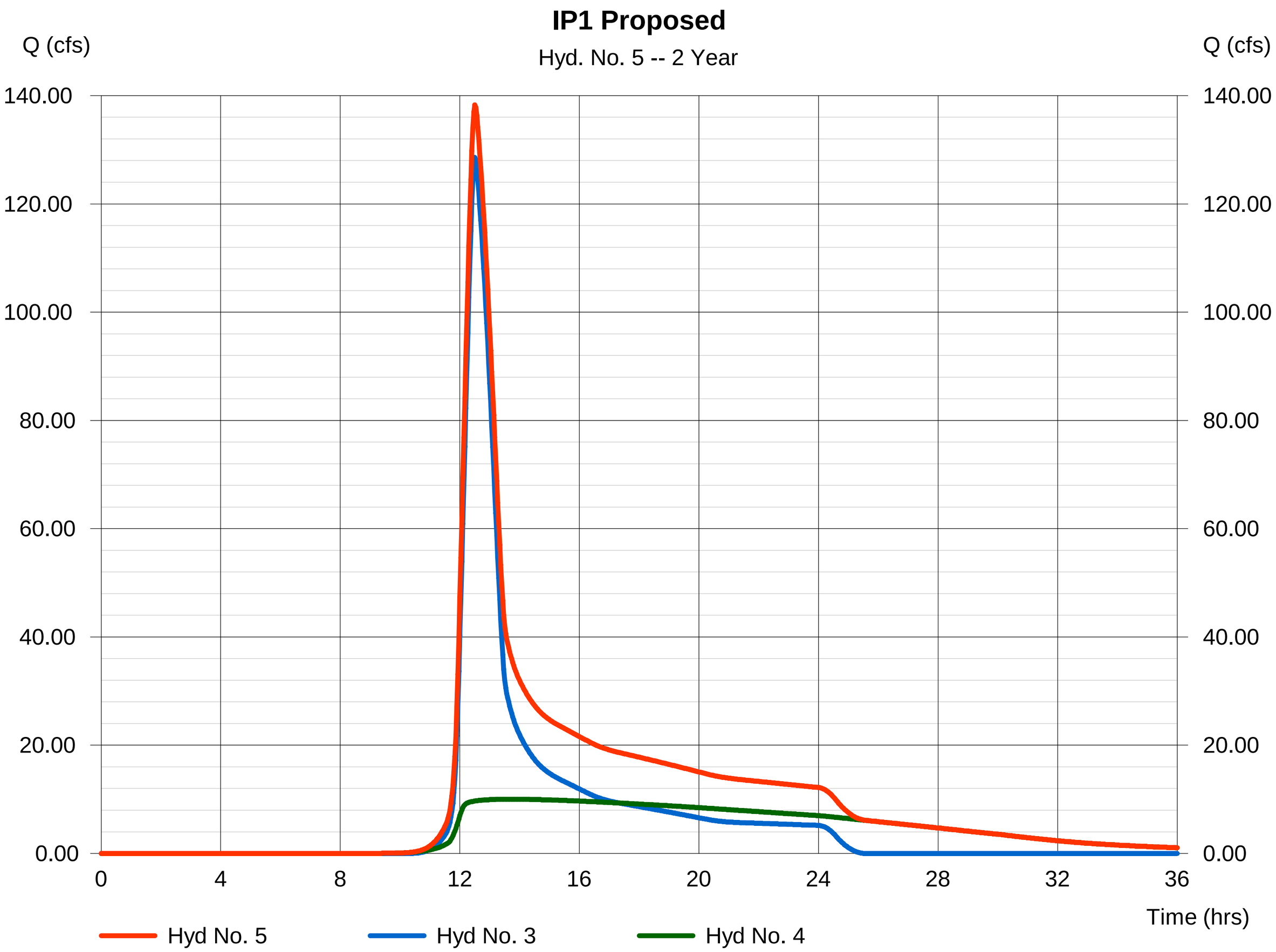


Hydrograph Report

Hyd. No. 5

IP1 Proposed

Hydrograph type	=	Combine	Peak discharge	=	138.26 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.50 hrs
Time interval	=	2 min	Hyd. volume	=	1,461,153 cuft
Inflow hyds.	=	3, 4	Contrib. drain. area	=	213.000 ac



Hydrograph Summary Report

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

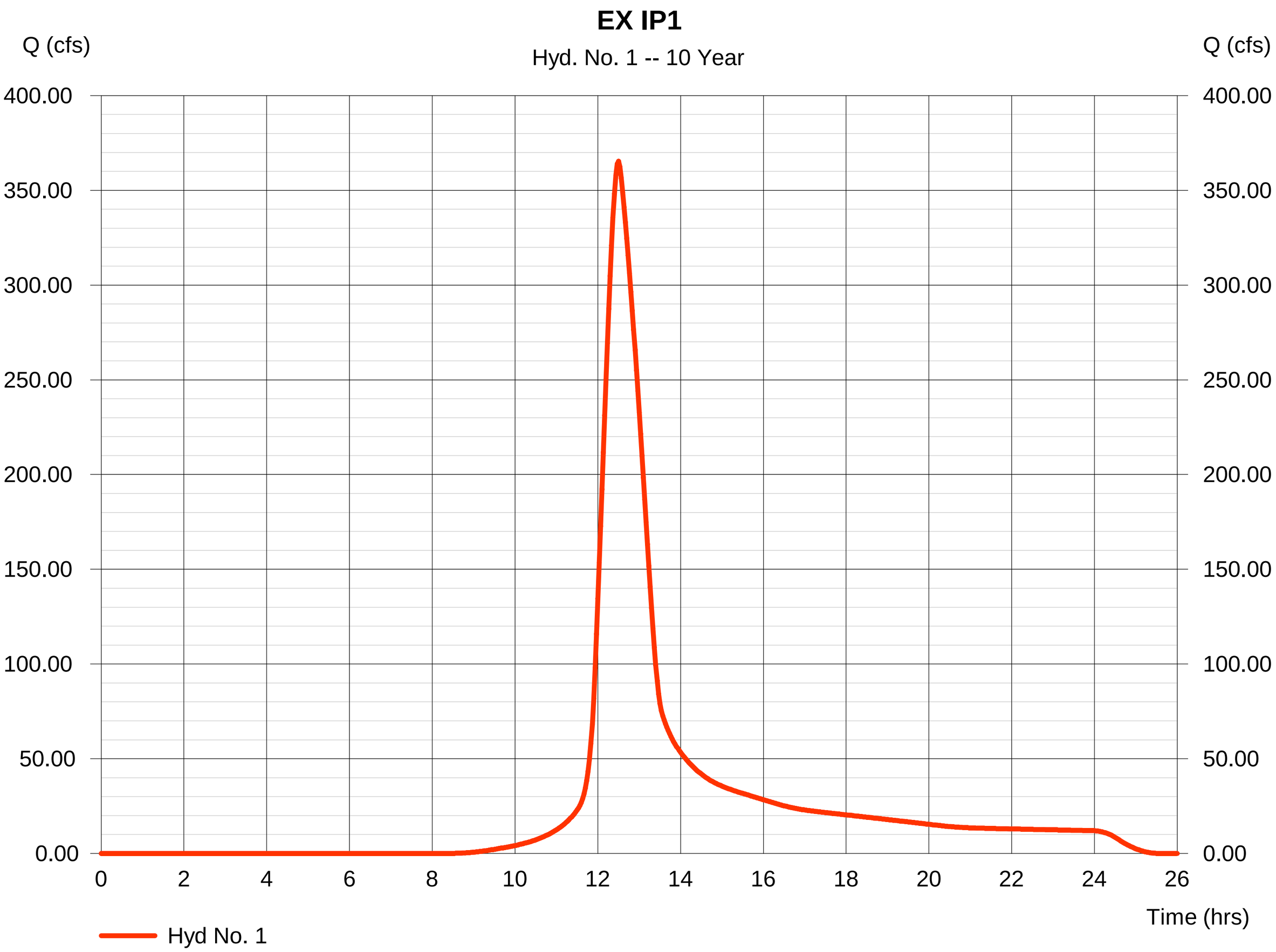
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	365.31	2	750	2,371,496	------	------	------	EX IP1
2	SCS Runoff	387.60	2	720	1,049,586	------	------	------	A1 Into SB1
3	SCS Runoff	282.95	2	750	1,836,830	------	------	------	B1 IP1
4	Reservoir	13.25	2	850	1,032,260	2	1104.67	683,454	DB1
5	Combine	295.92	2	750	2,869,092	3, 4	------	------	IP1 Proposed

Hydrograph Report

Hyd. No. 1

EX IP1

Hydrograph type	=	SCS Runoff	Peak discharge	=	365.31 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.50 hrs
Time interval	=	2 min	Hyd. volume	=	2,371,496 cuft
Drainage area	=	275.000 ac	Curve number	=	78
Basin Slope	=	2.5 %	Hydraulic length	=	3572 ft
Tc method	=	LAG	Time of conc. (Tc)	=	59.20 min
Total precip.	=	4.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

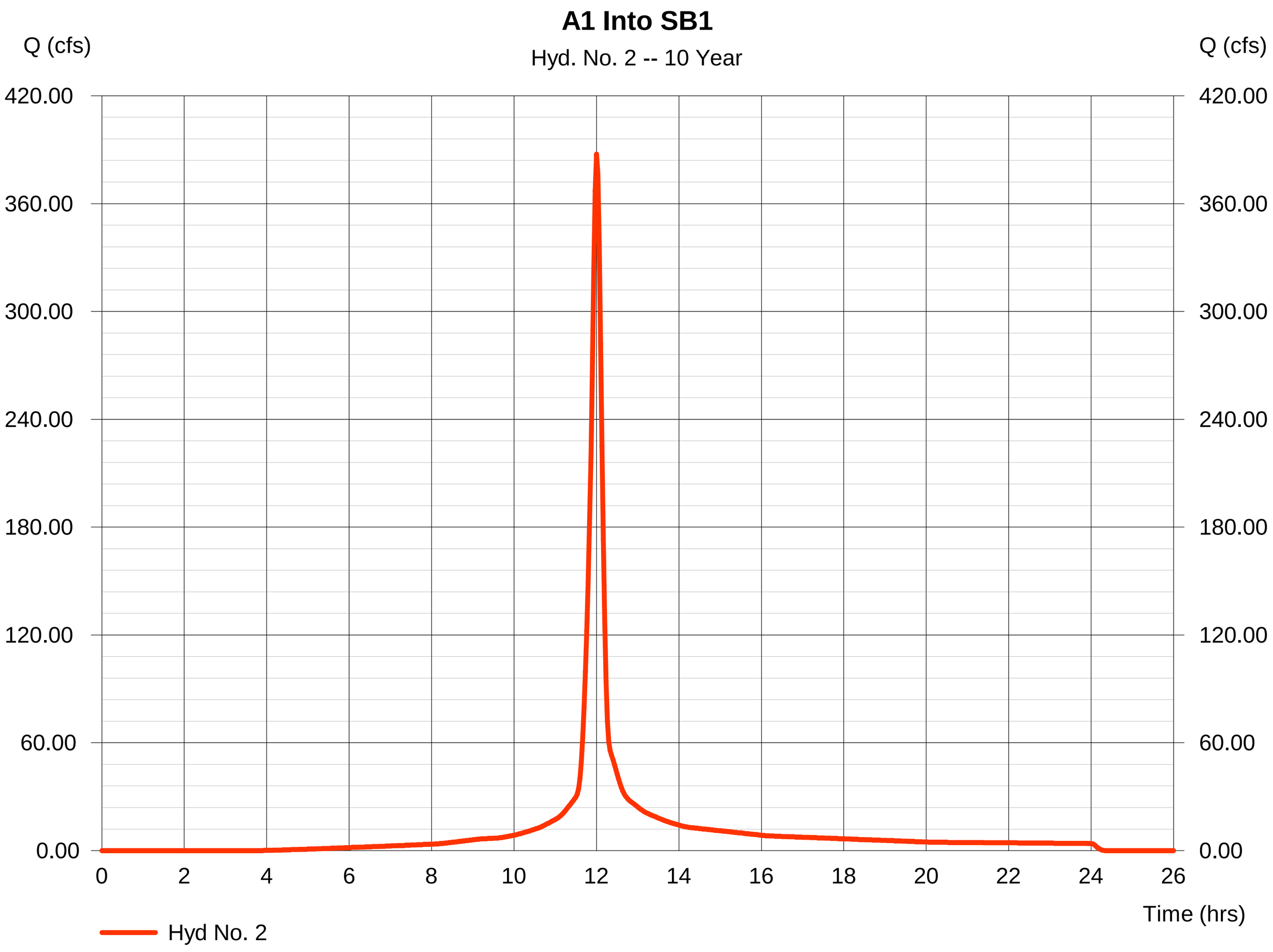


Hydrograph Report

Hyd. No. 2

A1 Into SB1

Hydrograph type	=	SCS Runoff	Peak discharge	=	387.60 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.00 hrs
Time interval	=	2 min	Hyd. volume	=	1,049,586 cuft
Drainage area	=	78.000 ac	Curve number	=	91
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	13.30 min
Total precip.	=	4.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

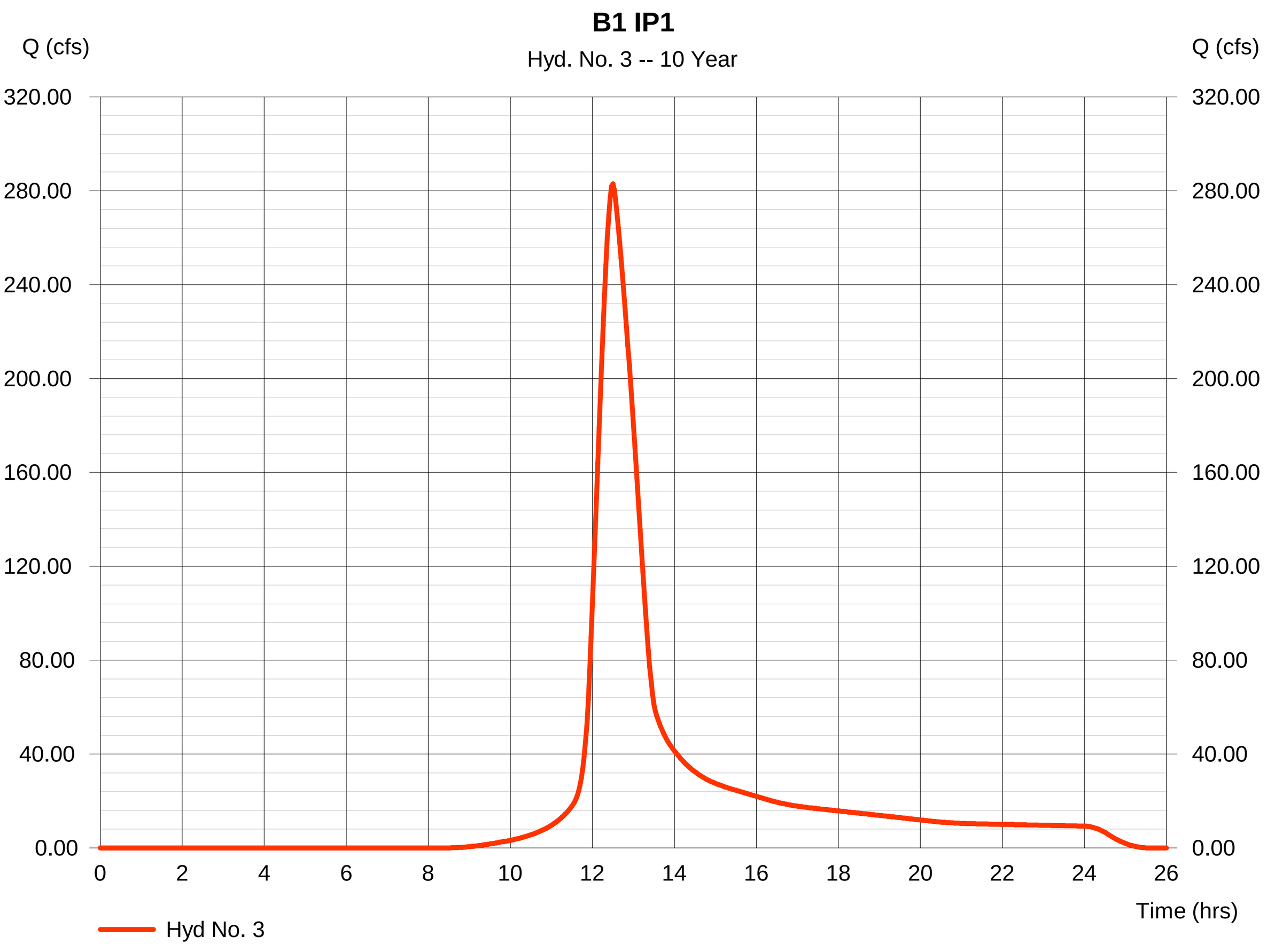


Hydrograph Report

Hyd. No. 3

B1 IP1

Hydrograph type	=	SCS Runoff	Peak discharge	=	282.95 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.50 hrs
Time interval	=	2 min	Hyd. volume	=	1,836,830 cuft
Drainage area	=	213.000 ac	Curve number	=	78
Basin Slope	=	2.5 %	Hydraulic length	=	3572 ft
Tc method	=	LAG	Time of conc. (Tc)	=	59.20 min
Total precip.	=	4.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



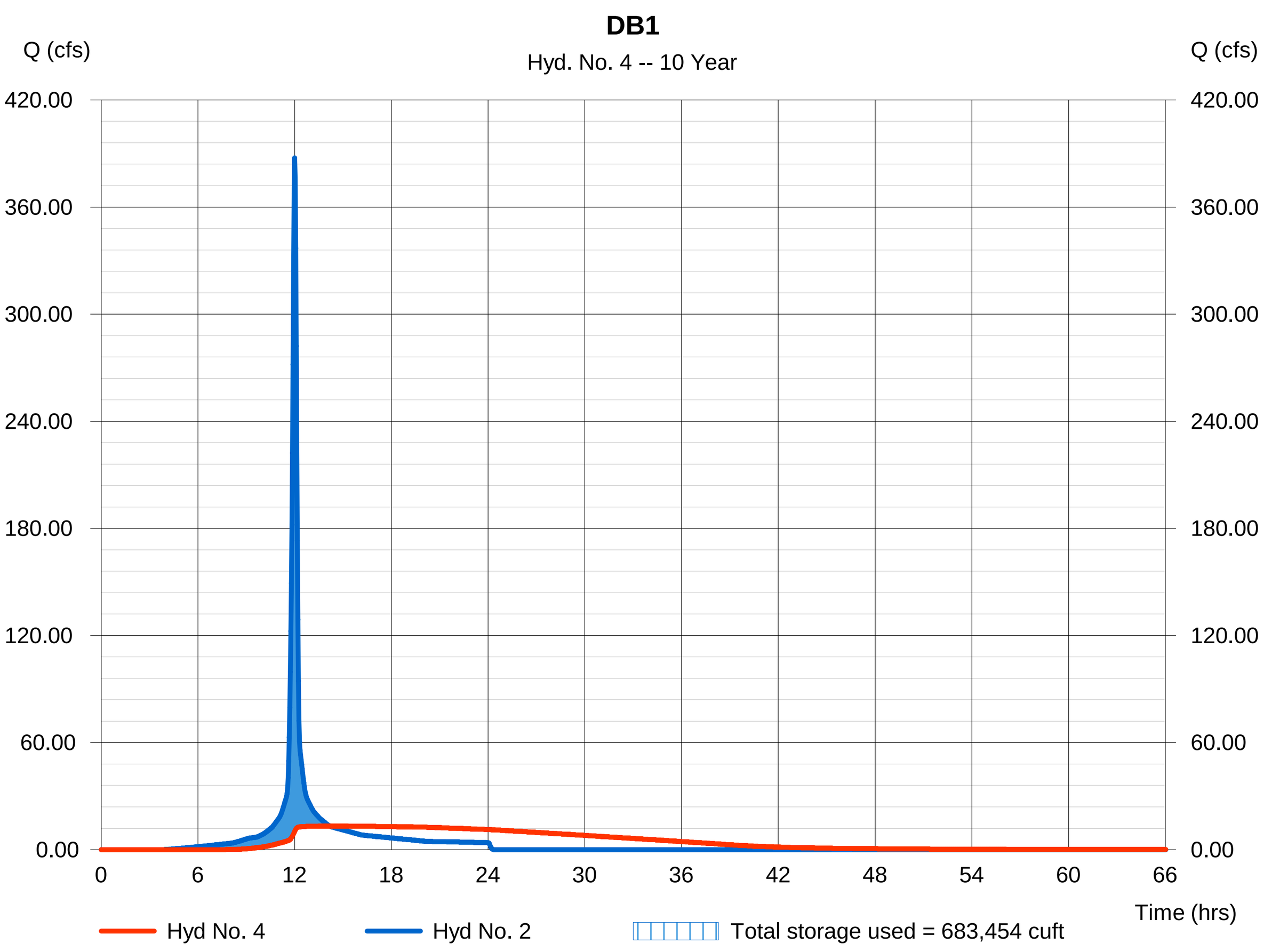
Hydrograph Report

Hyd. No. 4

DB1

Hydrograph type	=	Reservoir	Peak discharge	=	13.25 cfs
Storm frequency	=	10 yrs	Time to peak	=	14.17 hrs
Time interval	=	2 min	Hyd. volume	=	1,032,260 cuft
Inflow hyd. No.	=	2 - A1 Into SB1	Max. Elevation	=	1104.67 ft
Reservoir name	=	DB1	Max. Storage	=	683,454 cuft

Storage Indication method used.

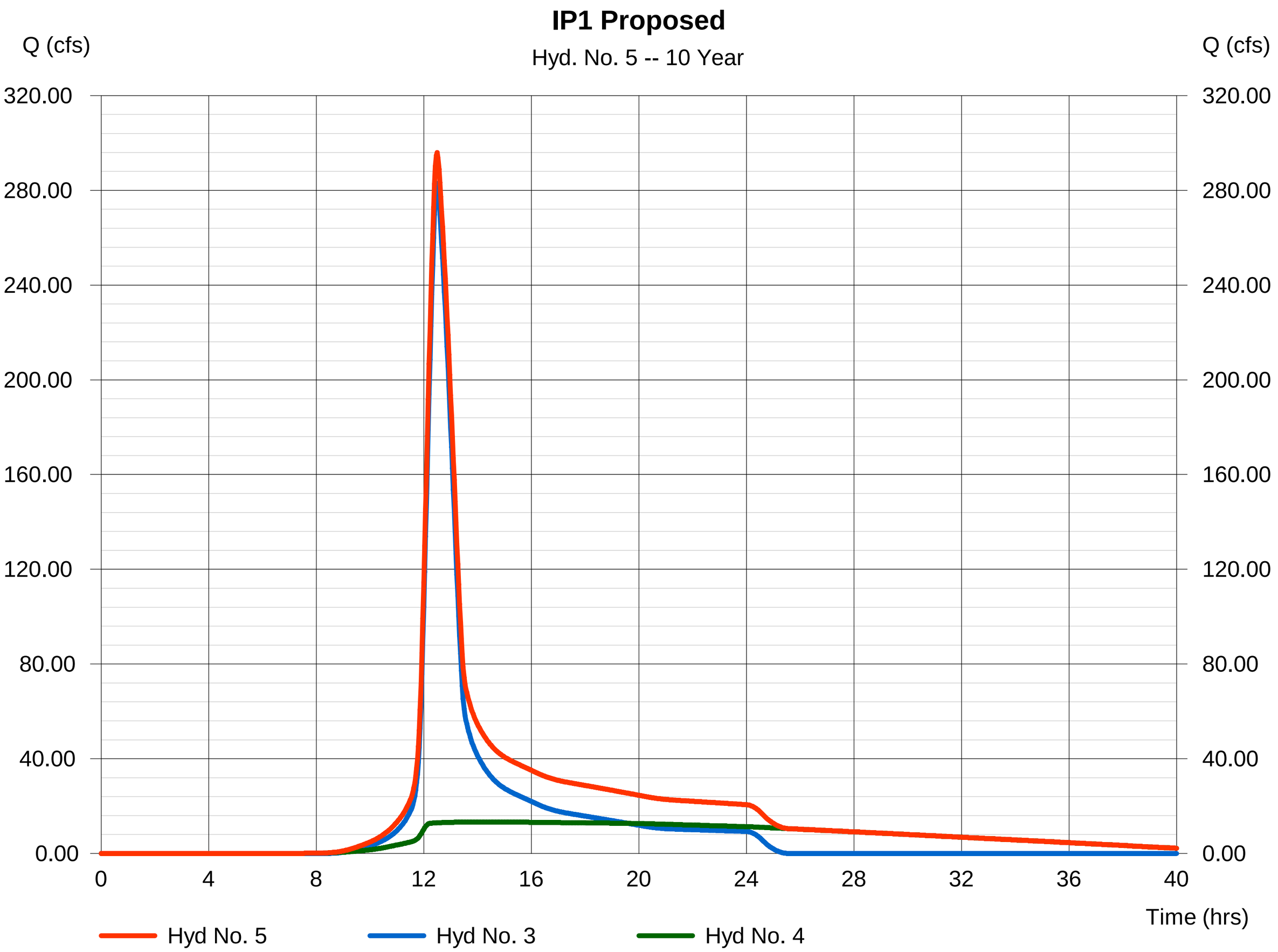


Hydrograph Report

Hyd. No. 5

IP1 Proposed

Hydrograph type	=	Combine	Peak discharge	=	295.92 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.50 hrs
Time interval	=	2 min	Hyd. volume	=	2,869,092 cuft
Inflow hyds.	=	3, 4	Contrib. drain. area	=	213.000 ac



Hydrograph Summary Report

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

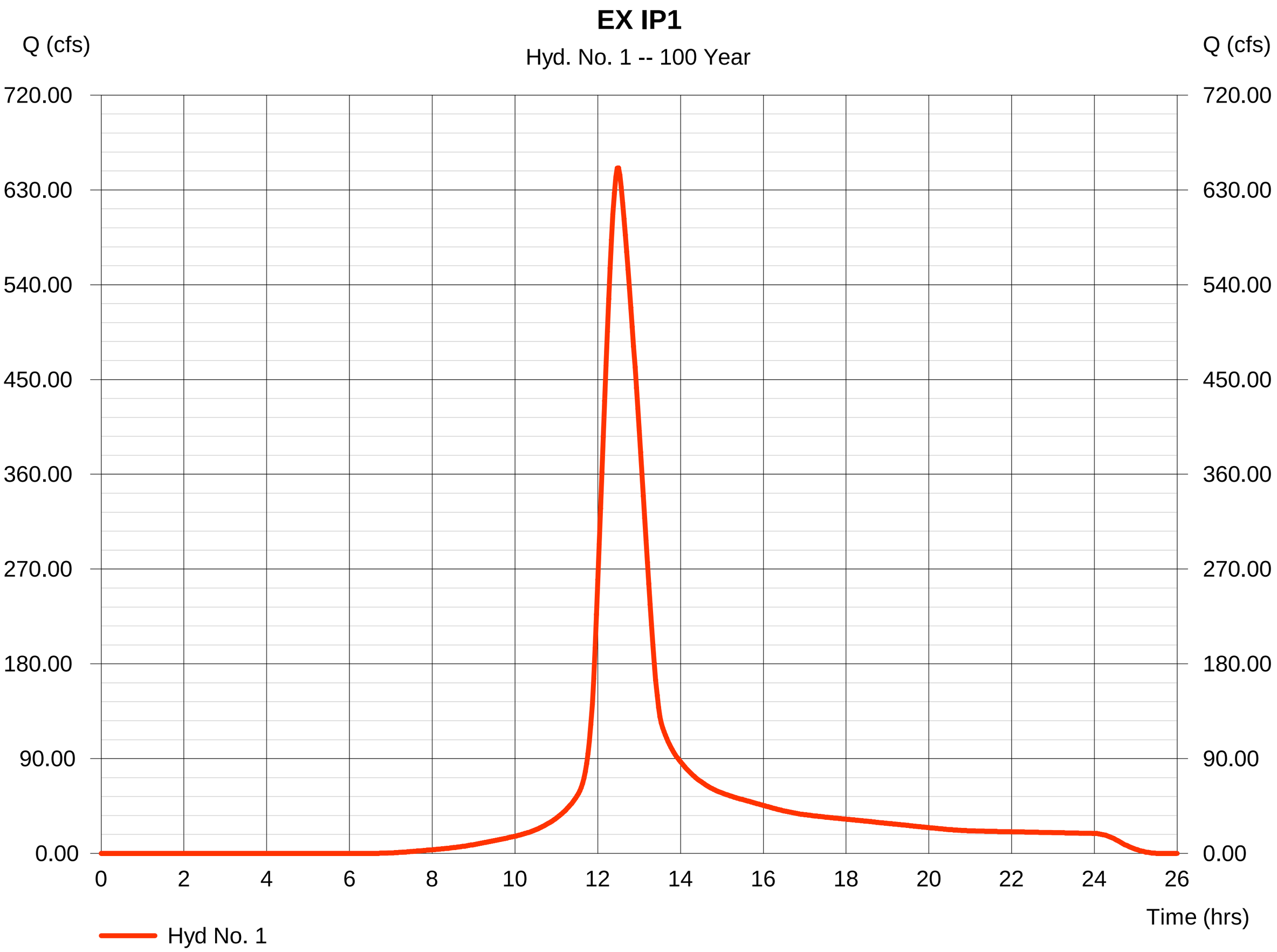
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	651.02	2	750	4,196,252	------	------	------	EX IP1
2	SCS Runoff	593.03	2	720	1,647,910	------	------	------	A1 Into SB1
3	SCS Runoff	504.24	2	750	3,250,188	------	------	------	B1 IP1
4	Reservoir	18.18	2	872	1,629,088	2	1107.26	1,108,596	DB1
5	Combine	519.09	2	750	4,879,272	3, 4	------	------	IP1 Proposed

Hydrograph Report

Hyd. No. 1

EX IP1

Hydrograph type	=	SCS Runoff	Peak discharge	=	651.02 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.50 hrs
Time interval	=	2 min	Hyd. volume	=	4,196,252 cuft
Drainage area	=	275.000 ac	Curve number	=	78
Basin Slope	=	2.5 %	Hydraulic length	=	3572 ft
Tc method	=	LAG	Time of conc. (Tc)	=	59.20 min
Total precip.	=	6.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

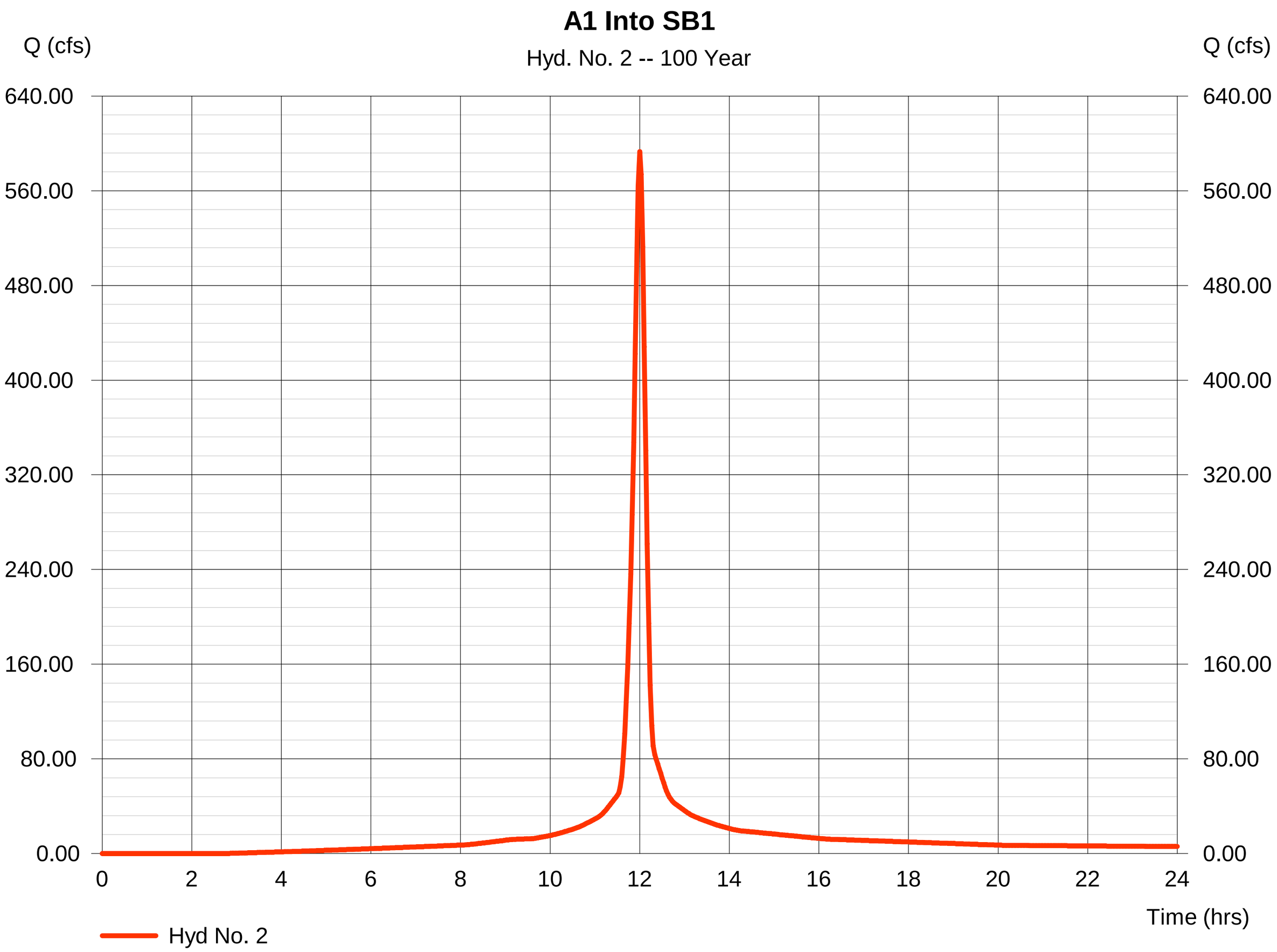


Hydrograph Report

Hyd. No. 2

A1 Into SB1

Hydrograph type	=	SCS Runoff	Peak discharge	=	593.03 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.00 hrs
Time interval	=	2 min	Hyd. volume	=	1,647,910 cuft
Drainage area	=	78.000 ac	Curve number	=	91
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	13.30 min
Total precip.	=	6.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

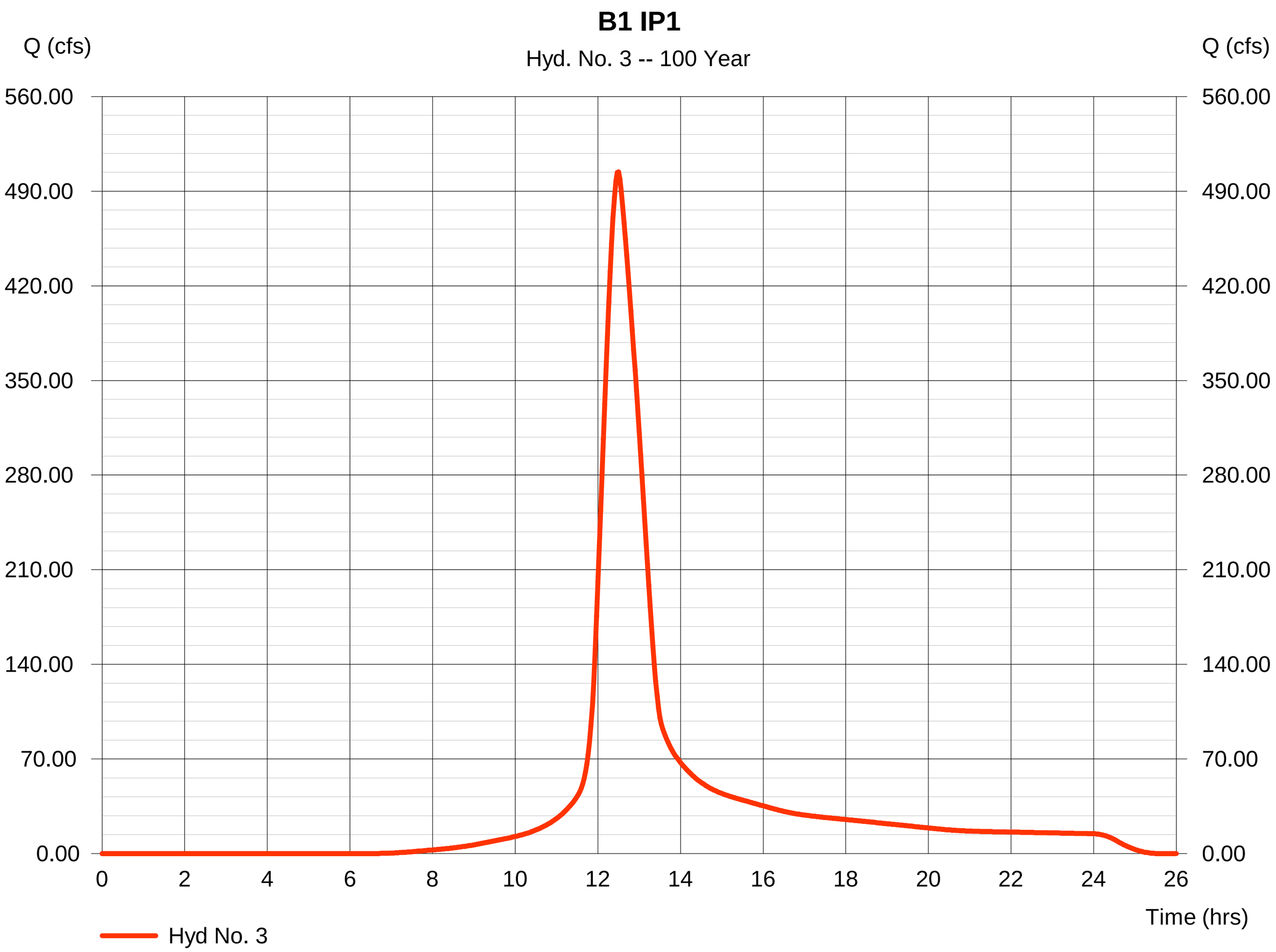


Hydrograph Report

Hyd. No. 3

B1 IP1

Hydrograph type	=	SCS Runoff	Peak discharge	=	504.24 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.50 hrs
Time interval	=	2 min	Hyd. volume	=	3,250,188 cuft
Drainage area	=	213.000 ac	Curve number	=	78
Basin Slope	=	2.5 %	Hydraulic length	=	3572 ft
Tc method	=	LAG	Time of conc. (Tc)	=	59.20 min
Total precip.	=	6.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



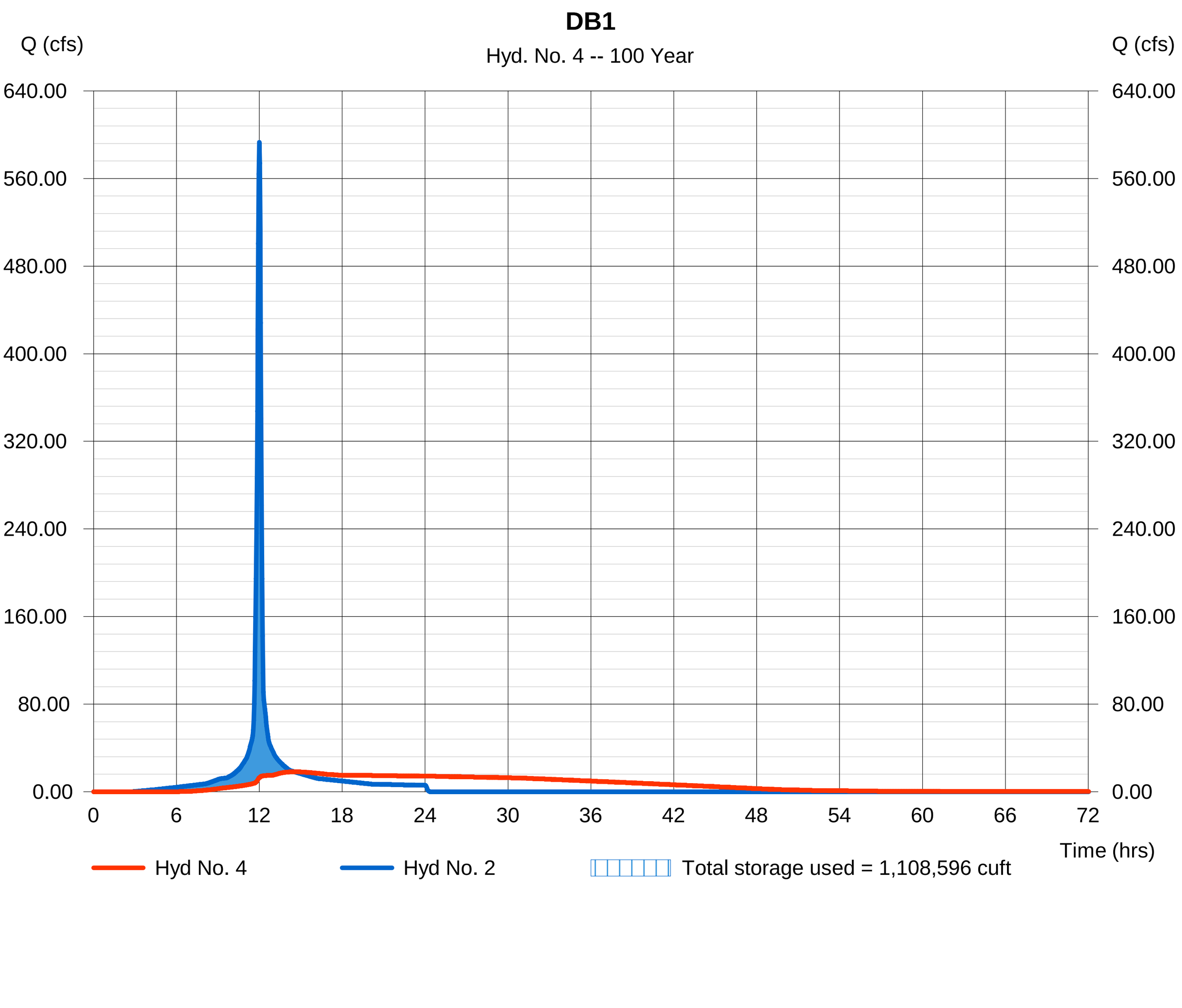
Hydrograph Report

Hyd. No. 4

DB1

Hydrograph type	=	Reservoir	Peak discharge	=	18.18 cfs
Storm frequency	=	100 yrs	Time to peak	=	14.53 hrs
Time interval	=	2 min	Hyd. volume	=	1,629,088 cuft
Inflow hyd. No.	=	2 - A1 Into SB1	Max. Elevation	=	1107.26 ft
Reservoir name	=	DB1	Max. Storage	=	1,108,596 cuft

Storage Indication method used.

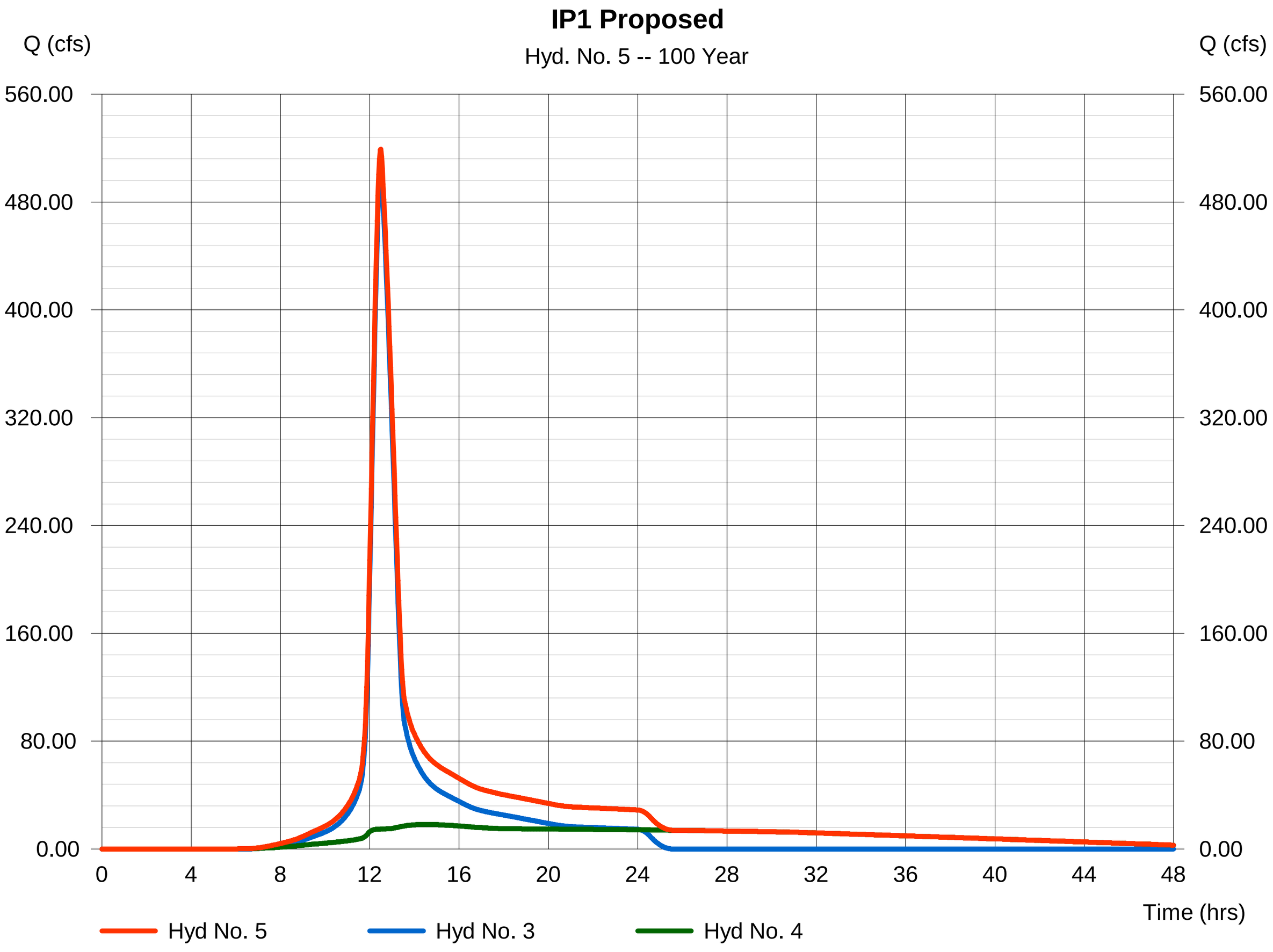


Hydrograph Report

Hyd. No. 5

IP1 Proposed

Hydrograph type	=	Combine	Peak discharge	=	519.09 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.50 hrs
Time interval	=	2 min	Hyd. volume	=	4,879,272 cuft
Inflow hyds.	=	3, 4	Contrib. drain. area	=	213.000 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	110.8217	18.3000	1.0108	--------
2	74.1125	11.8000	0.8974	--------
3	0.0000	0.0000	0.0000	--------
5	82.1212	10.1000	0.8627	--------
10	113.9855	12.1000	0.9024	--------
25	106.6791	11.3000	0.8449	--------
50	119.8696	11.8000	0.8406	--------
100	145.8254	12.7000	0.8636	--------

File name: Omaha.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	4.60	3.78	3.20	2.78	2.46	2.20	1.99	1.82	1.67	1.55	1.44	1.35
2	5.89	4.66	3.87	3.32	2.91	2.60	2.35	2.14	1.97	1.83	1.71	1.60
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	7.90	6.17	5.09	4.35	3.81	3.40	3.07	2.81	2.58	2.40	2.24	2.10
10	8.79	6.98	5.80	4.98	4.37	3.90	3.52	3.22	2.96	2.75	2.56	2.40
25	10.09	8.05	6.74	5.81	5.13	4.60	4.18	3.83	3.54	3.29	3.08	2.90
50	11.19	8.99	7.56	6.54	5.79	5.20	4.73	4.34	4.02	3.74	3.51	3.30
100	12.19	9.84	8.28	7.18	6.35	5.70	5.18	4.75	4.40	4.09	3.83	3.60

Tc = time in minutes. Values may exceed 60.

Precip. file name: H:\Hydroflow Data\Omaha 24-hr Precip SCS.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.00	0.00	3.90	4.60	5.30	6.00	6.70
SCS 6-Hr	0.00	1.80	0.00	0.00	2.60	0.00	0.00	4.00
Huff-1st	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	1.25	0.00	2.80	3.90	5.25	6.00	7.10

Pond Report

Pond No. 1 - DB1

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 1100.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1100.00	134,749	0	0
1.00	1101.00	139,554	137,152	137,152
2.00	1102.00	144,415	141,985	279,136
3.00	1103.00	149,332	146,874	426,010
4.00	1104.00	154,306	151,819	577,829
5.00	1105.00	159,337	156,822	734,650
6.00	1106.00	164,424	161,881	896,531
7.00	1107.00	169,568	166,997	1,063,527
8.00	1108.00	174,768	172,168	1,235,695
9.00	1109.00	180,025	177,396	1,413,091
10.00	1110.00	185,339	182,682	1,595,773
11.00	1111.00	190,708	188,024	1,783,797
12.00	1112.00	196,135	193,421	1,977,218

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	8.00	Inactive	0.00
Span (in)	= 18.00	8.00	12.00	0.00
No. Barrels	= 1	4	4	0
Invert El. (ft)	= 1097.00	1100.10	1105.00	0.00
Length (ft)	= 170.00	1.00	1.00	0.00
Slope (%)	= 1.00	1.00	1.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 14.85	0.00	0.00	0.00
Crest El. (ft)	= 1107.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

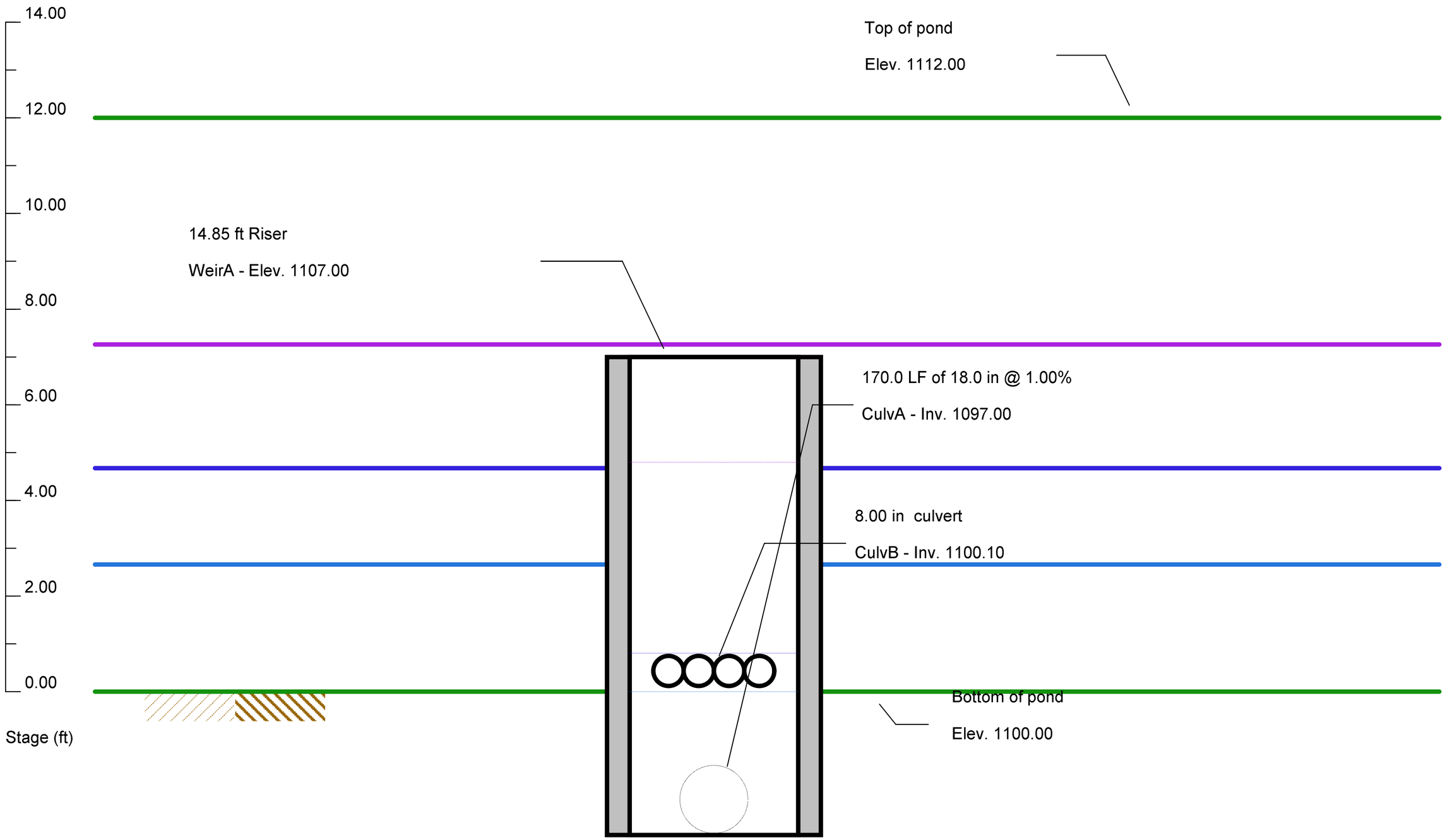
TW Elev. (ft) = 0.00

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	1100.00	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
1.00	137,152	1101.00	11.86 oc	5.06 ic	0.00	---	0.00	---	---	---	---	---	5.060
2.00	279,136	1102.00	11.86 oc	8.41 ic	0.00	---	0.00	---	---	---	---	---	8.414
3.00	426,010	1103.00	11.86 oc	10.77 ic	0.00	---	0.00	---	---	---	---	---	10.77
4.00	577,829	1104.00	12.67 oc	12.67 ic	0.00	---	0.00	---	---	---	---	---	12.67
5.00	734,650	1105.00	13.52 oc	13.52 ic	0.00	---	0.00	---	---	---	---	---	13.52
6.00	896,531	1106.00	14.32 oc	14.32 ic	0.00	---	0.00	---	---	---	---	---	14.32
7.00	1,063,527	1107.00	15.08 oc	15.08 ic	0.00	---	0.00	---	---	---	---	---	15.08
8.00	1,235,695	1108.00	22.13 oc	1.75 ic	0.00	---	20.37 s	---	---	---	---	---	22.12
9.00	1,413,091	1109.00	23.15 oc	0.72 ic	0.00	---	22.41 s	---	---	---	---	---	23.13
10.00	1,595,773	1110.00	24.09 oc	0.43 ic	0.00	---	23.52 s	---	---	---	---	---	23.94
11.00	1,783,797	1111.00	24.99 oc	0.29 ic	0.00	---	24.33 s	---	---	---	---	---	24.63
12.00	1,977,218	1112.00	25.85 oc	0.22 ic	0.00	---	25.03 s	---	---	---	---	---	25.25

Pond No. 1 - DB1



Front View

NTS - Looking Downstream

Inflow hydrograph = 2. SCS Runoff - A1 Into SB1

Hydrograph Report

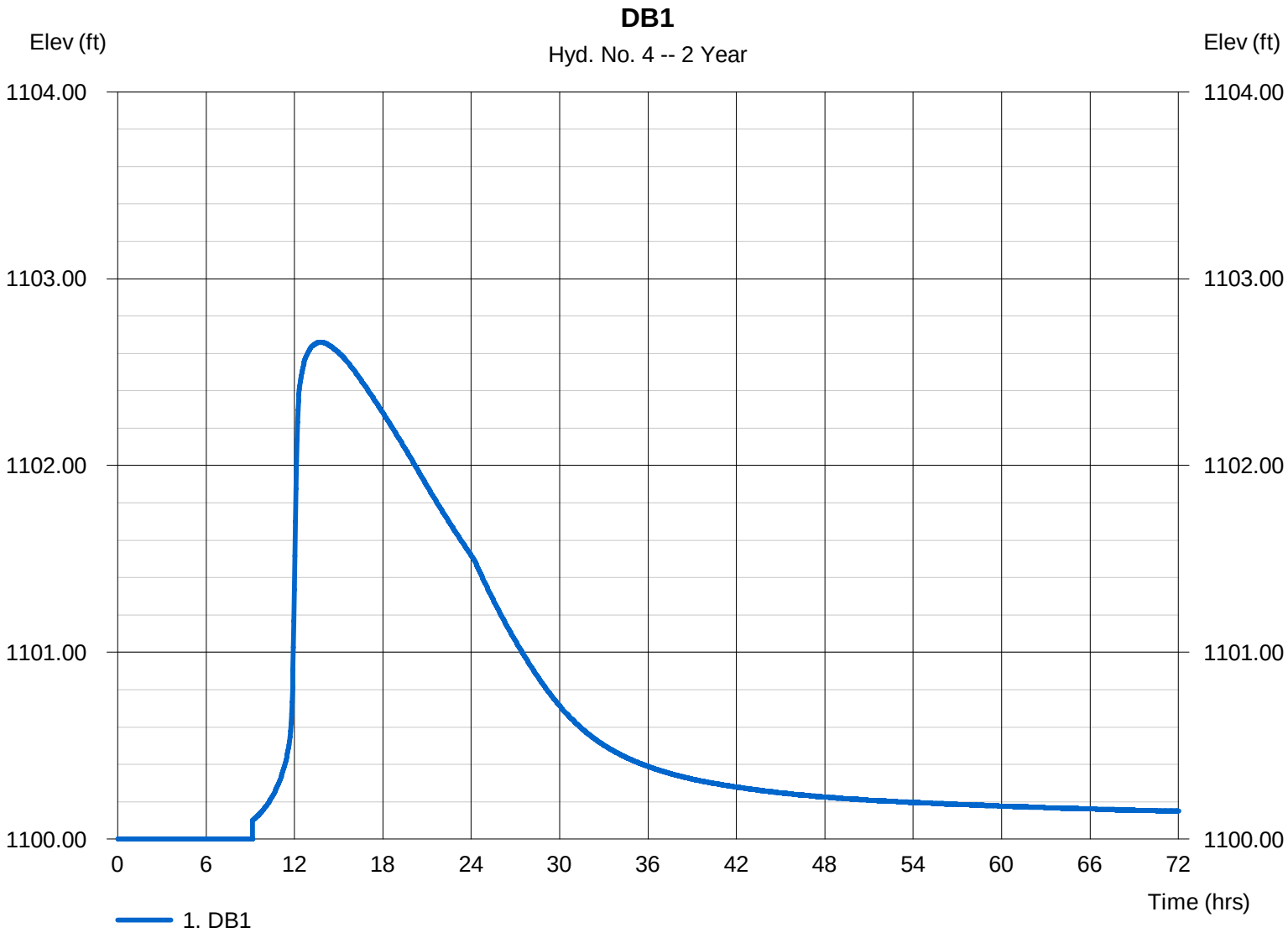
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024 Monday, 09 / 29 / 2025

Hyd. No. 4

DB1

Hydrograph type	= Reservoir	Peak discharge	= 10.03 cfs
Storm frequency	= 2 yrs	Time to peak	= 13.73 hrs
Time interval	= 2 min	Hyd. volume	= 588,355 cuft
Inflow hyd. No.	= 2 - A1 Into SB1	Max. Elevation	= 1102.66 ft
Reservoir name	= DB1	Max. Storage	= 376,095 cuft

Storage Indication method used.



United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for Sarpy County, Nebraska

September 29, 2025

Preface

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

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

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

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

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

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

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

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

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

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

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

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

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

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

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

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

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

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

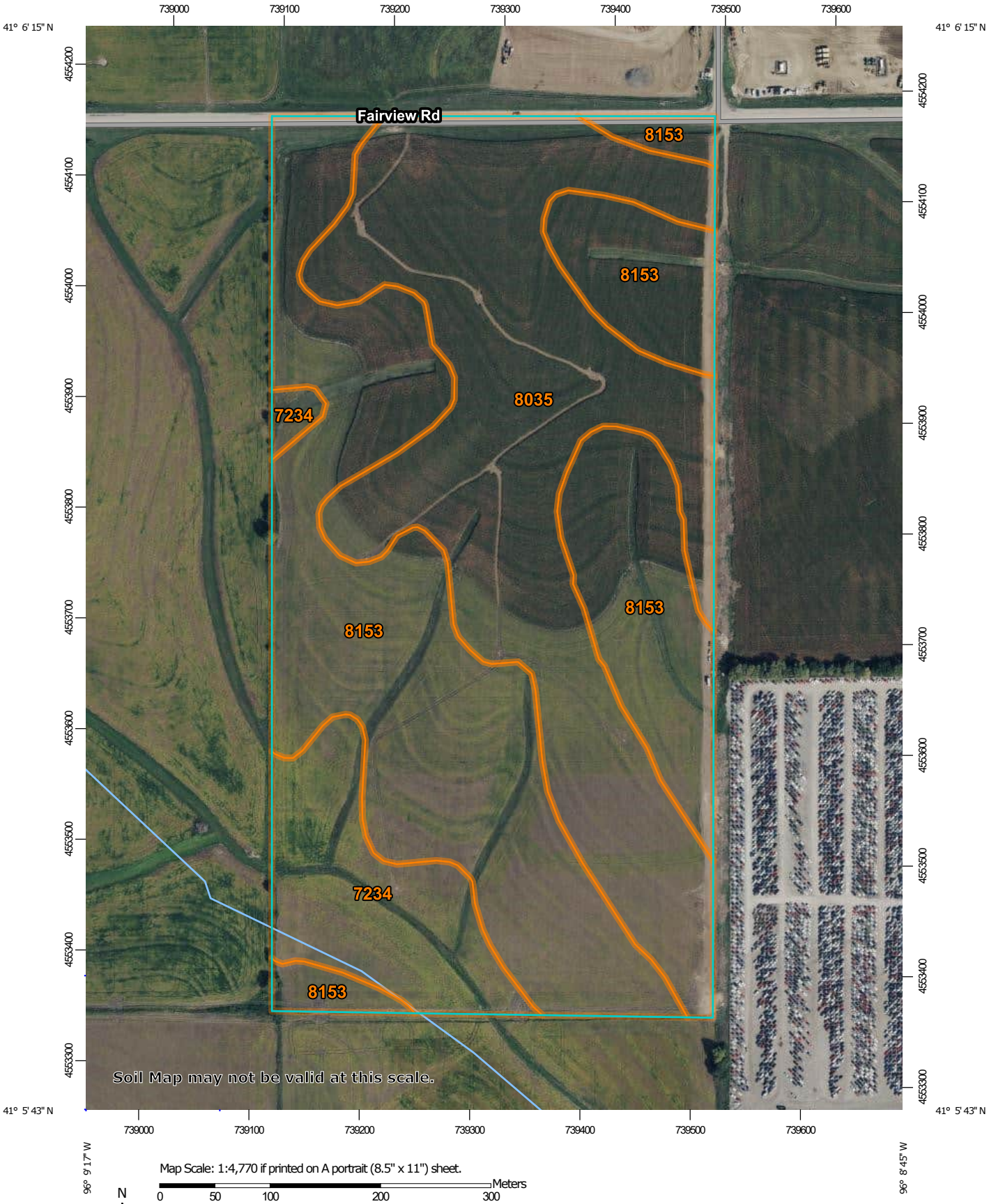
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

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

Custom Soil Resource Report
Soil Map



Map Scale: 1:4,770 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Sarpy County, Nebraska
Survey Area Data: Version 18, Aug 28, 2024

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

Date(s) aerial images were photographed: Data not available.

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
7234	Judson silty clay loam, 2 to 6 percent slopes	8.7	10.7%
8035	Marshall-Contrary silty clay loams, 2 to 7 percent slopes	32.2	39.9%
8153	Contrary-Marshall silty clay loams, 6 to 11 percent slopes	39.8	49.3%
Totals for Area of Interest		**80.6**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Sarpy County, Nebraska

7234—Judson silty clay loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2sy70
Elevation: 960 to 1,350 feet
Mean annual precipitation: 30 to 32 inches
Mean annual air temperature: 50 to 51 degrees F
Frost-free period: 160 to 170 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Judson and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Judson

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Silty colluvium

Typical profile

Ap - 0 to 9 inches: silty clay loam
A - 9 to 22 inches: silty clay loam
AB - 22 to 28 inches: silty clay loam
Bt - 28 to 35 inches: silty clay loam
BC - 35 to 52 inches: silty clay loam
C - 52 to 79 inches: silty clay loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R107XB008MO - Loamy Footslope Savanna
Hydric soil rating: No

Minor Components

Kennebec, occasionally flooded
Percent of map unit: 14 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R107XB025IA - Loamy Floodplain Prairie
Hydric soil rating: No

Ackmore, occasionally flooded
Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R107XB019MO - Wet Floodplain Prairie
Hydric soil rating: No

Kezan, occasionally flooded
Percent of map unit: 2 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R107XB019MO - Wet Floodplain Prairie
Hydric soil rating: Yes

8035—Marshall-Contrary silty clay loams, 2 to 7 percent slopes

Map Unit Setting
National map unit symbol: 1vfg4
Elevation: 800 to 1,300 feet
Mean annual precipitation: 24 to 36 inches
Mean annual air temperature: 39 to 61 degrees F
Frost-free period: 155 to 175 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Marshall and similar soils: 59 percent
Contrary and similar soils: 41 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Marshall

Setting
Landform: Loess hills

Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex, linear
Parent material: Fine-silty noncalcareous loess

Typical profile

Ap - 0 to 7 inches: silty clay loam
A - 7 to 18 inches: silty clay loam
Bw - 18 to 47 inches: silty clay loam
C - 47 to 80 inches: silty clay loam

Properties and qualities

Slope: 2 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.9 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R107XB007MO - Loess Upland Prairie
Hydric soil rating: No

Description of Contrary

Setting

Landform: Loess hills
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex, linear
Parent material: Fine-silty loess

Typical profile

Ap - 0 to 7 inches: silty clay loam
Bw - 7 to 55 inches: silty clay loam
C - 55 to 80 inches: silty clay loam

Properties and qualities

Slope: 2 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent

Available water supply, 0 to 60 inches: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R107XB002MO - Deep Loess Upland Prairie
Hydric soil rating: No

8153—Contrary-Marshall silty clay loams, 6 to 11 percent slopes

Map Unit Setting

National map unit symbol: 1vfgk
Elevation: 800 to 1,300 feet
Mean annual precipitation: 24 to 36 inches
Mean annual air temperature: 39 to 61 degrees F
Frost-free period: 155 to 175 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Contrary and similar soils: 55 percent
Marshall and similar soils: 39 percent
Minor components: 6 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Contrary

Setting

Landform: Loess hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, head slope, nose slope, side slope
Down-slope shape: Convex
Across-slope shape: Convex, linear
Parent material: Fine-silty loess

Typical profile

Ap - 0 to 7 inches: silty clay loam
Bw - 7 to 55 inches: silty clay loam
C - 55 to 80 inches: silty clay loam

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R107XB002MO - Deep Loess Upland Prairie
Hydric soil rating: No

Description of Marshall

Setting

Landform: Loess hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, head slope, nose slope, side slope
Down-slope shape: Convex
Across-slope shape: Convex, linear
Parent material: Fine-silty noncalcareous loess

Typical profile

Ap - 0 to 7 inches: silty clay loam
A - 7 to 18 inches: silty clay loam
Bw - 18 to 47 inches: silty clay loam
C - 47 to 80 inches: silty clay loam

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.9 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R107XB007MO - Loess Upland Prairie
Hydric soil rating: No

Minor Components

Ida

Percent of map unit: 6 percent
Landform: Loess hills
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Head slope, nose slope, side slope
Down-slope shape: Convex
Across-slope shape: Convex, linear
Ecological site: R107XB012MO - Calcareous Loess Upland Prairie
Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

SECTION 2

TD2 engineering & surveying

thompson, dreessen & dorner, inc.
10836 Old Mill Rd
Omaha, NE 68154
p.402.330.8860 www.td2co.com

dba: TD2 Engineering and Surveying
NE CA-0199

Project Name

Springfield Industrial

Project Location

Fairview Road Between S 144th Street and S 156th Street

Springfield, NE 68114

Client Name

Tribedo LLC

Professional Seal

Revision Dates

No.	Description	MM-DD-YY
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--

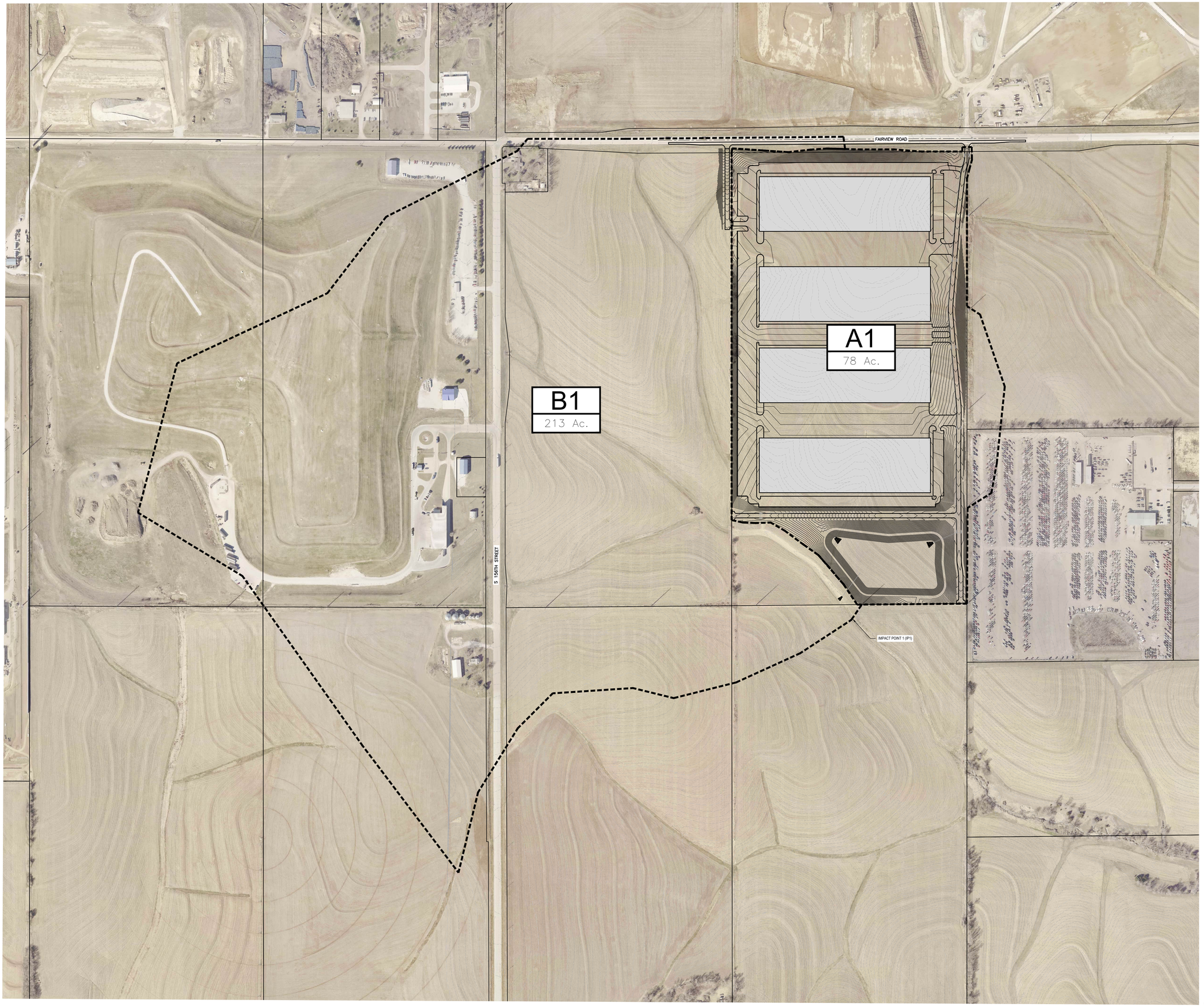
Drawn By: CNC Reviewed By: BPH
Job No.: 1570-104 Date: 10-06-25

Sheet Title

Existing Drainage Map

Sheet Number

DM-1



TD2 engineering & surveying
thompson, dreessen & dorner, inc.
10836 Old Mill Rd
Omaha, NE 68154
p.402.330.8860 www.td2co.com
dba: TD2 Engineering and Surveying
NE CA-0199

Project Name
Springfield Industrial

Project Location
Fairview Road Between S 144th Street and S 156th Street

Springfield, NE 68114

Client Name
Tribedo LLC

Professional Seal

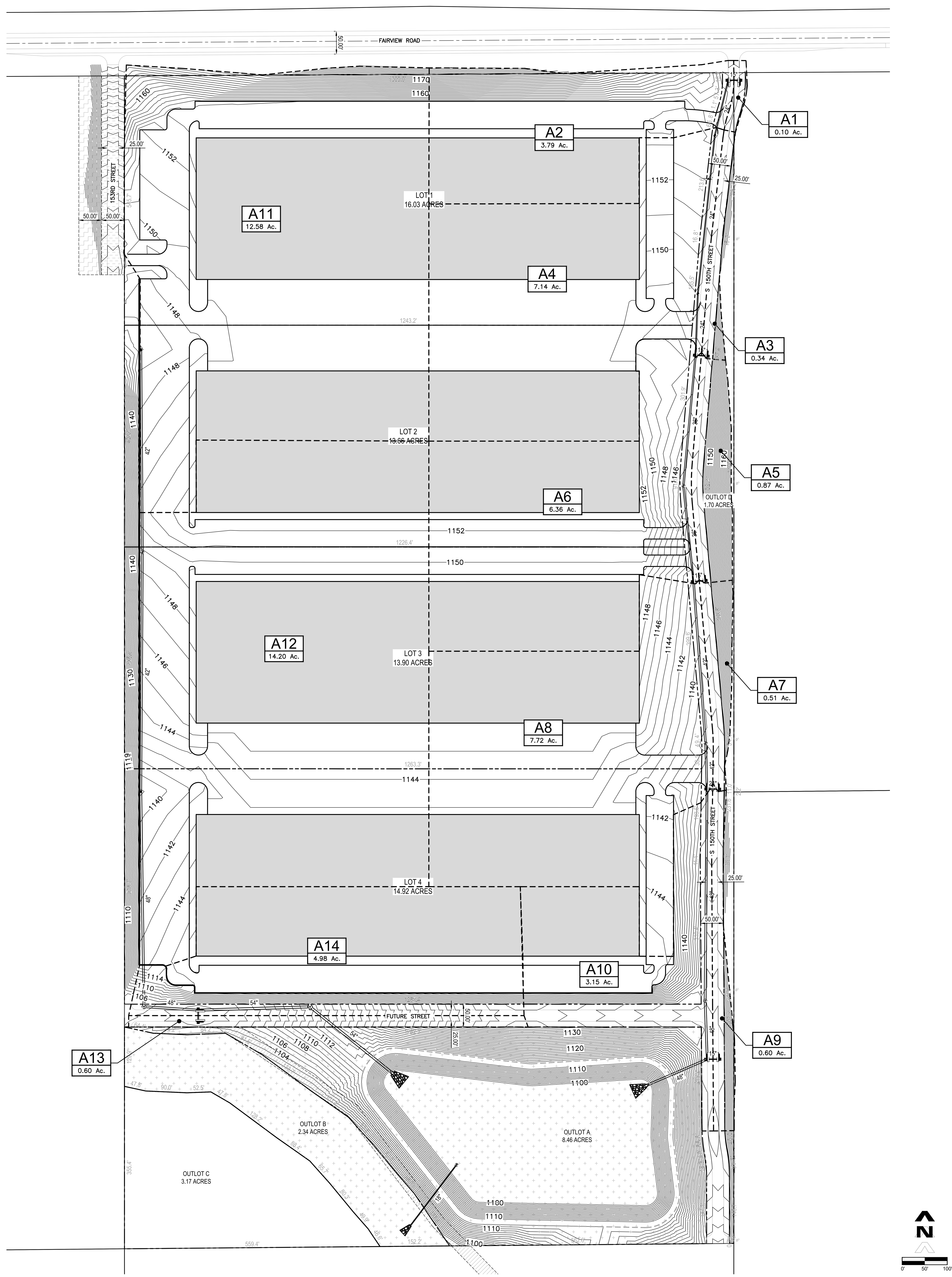
Revision Dates

No.	Description	MM-DD-YY
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--
--	--	--

Drawn By: CNC
Job No.: 1570-104
Reviewed By: BPH
Date: 10-06-25

Sheet Title
Proposed Drainage Map

Sheet Number
DM-2



TD2 engineering & surveying

thompson, dreessen & dorner, inc.
10836 Old Mill Rd
Omaha, NE 68154
p.402.330.8860 www.td2co.com
dba: TD2 Engineering and Surveying
NE CA-0199

Project Name

Springfield Industrial

Project Location

Fairview Road Between S 144th Street and S 156th Street

Springfield, NE 68114

Client Name

Tribedo LLC

Professional Seal

Revision Dates

No.	Description	MM-DD-YY
--	--	--

Drawn By: CNC Reviewed By: BPH
Job No.: 1570-104 Date: 10-06-25

Sheet Title

Proposed Drainage Areas

Sheet Number

DM-3