LOT #12 HURRICANE INDUSTRIAL PARK

Commercial Development

City of Franklin, Indiana

NORTHPOINTE

ENGINEERING & SURVEYING, Inc.

WBE/DBE Certified

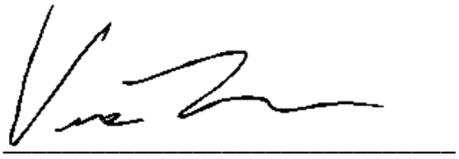
Table of Contents

Lot #12 Hurricane Industrial Park

Professional Certification

Lot #12 Hurricane Industrial Park

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



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Professional Engineer
Registration Number: 11200278

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Drainage Summary

Lot #12 Hurricane Industrial Park

The project is a proposed commercial development consisting of approximately 1.32 acres. The project is located along Amy Lane in Franklin and is part of the Hurricane Industrial Park development.

Site History | Existing Site Conditions:
The existing site is grass covered. The runoff for the site flows to the existing detention facility designed as part of the Hurricane Industrial Park Development. The existing detention pond is located to the south of the site and was designed to handle the development of this site.

Proposed Site Conditions:
The runoff for the site will be collected by a proposed storm system and outlet into the existing detention constructed as part of the Hurricane Industrial Park Development. The detention was designed to handle the runoff from this commercial site.

The impervious runoff for the site is being collected by the proposed storm system. The grass areas along the eastern and western border of the site will be collected by grass swales and directed to the existing detention pond. Calculations for the proposed storm are enclosed. The storm system was designed using Hydraflow Storm Sewers.

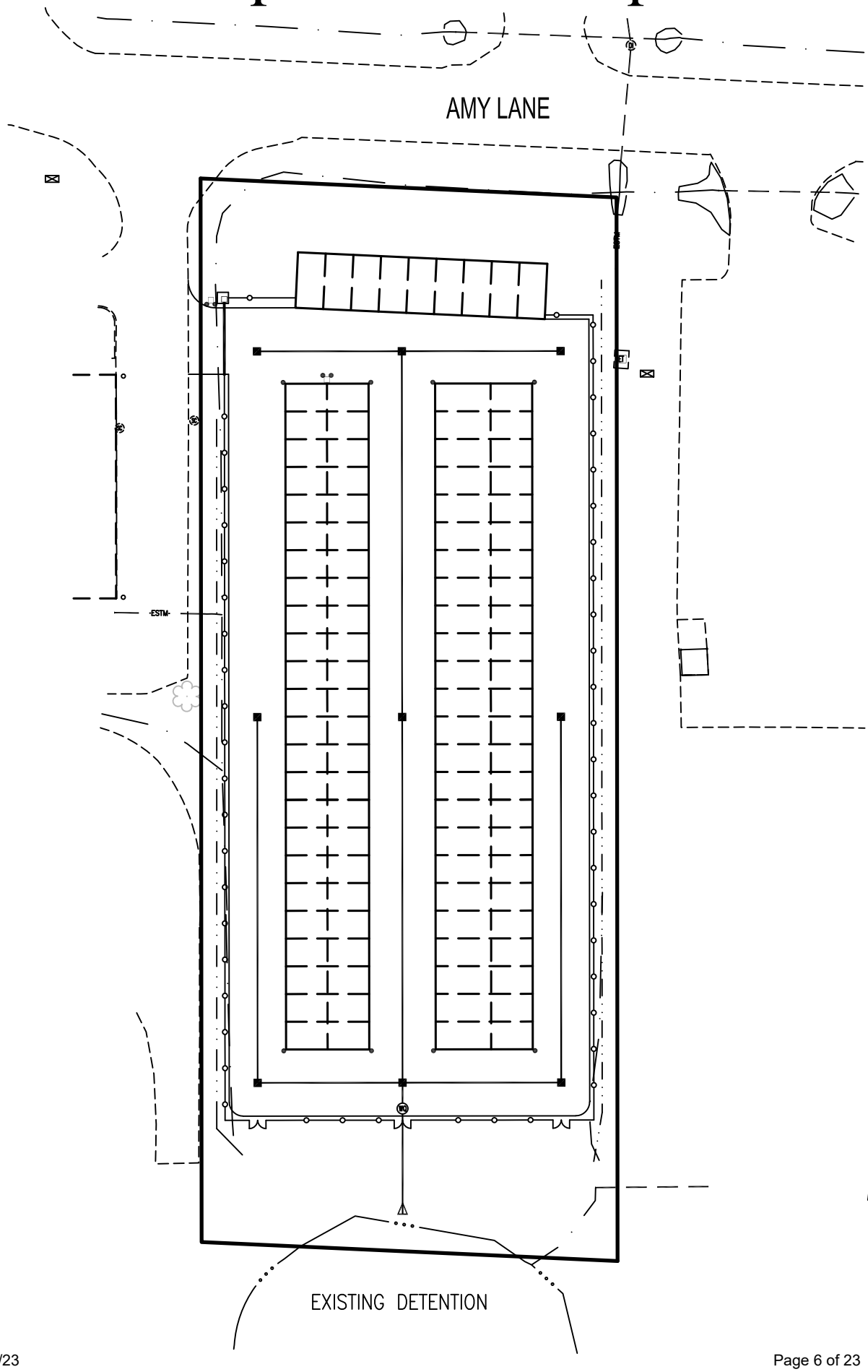
Water Quality
Water quality will be provided for the proposed pond via a manufactured structure. The proposed water quality unit is a CS-3 Cascade Separator. The structure is located south of the site. Calculations for the unit are included within this report.

Area Map

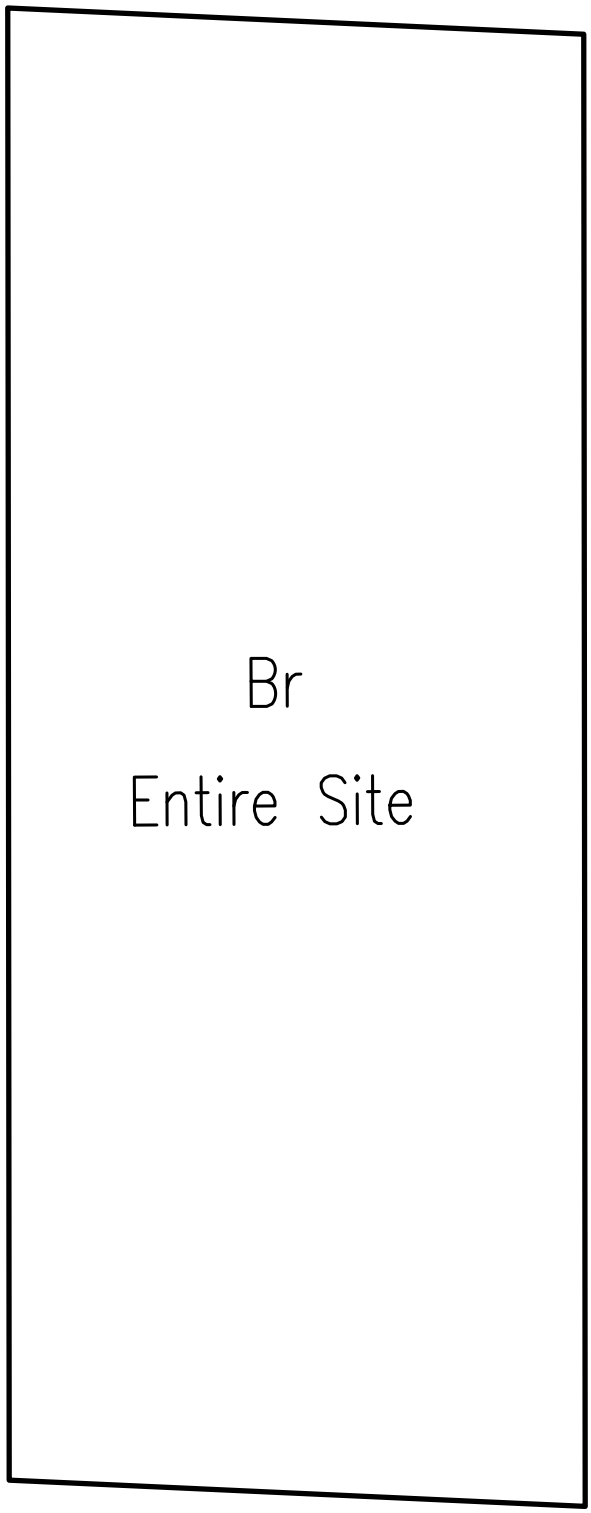
Scale: NTS

01/10/23

Proposed Site Map



Soils Map



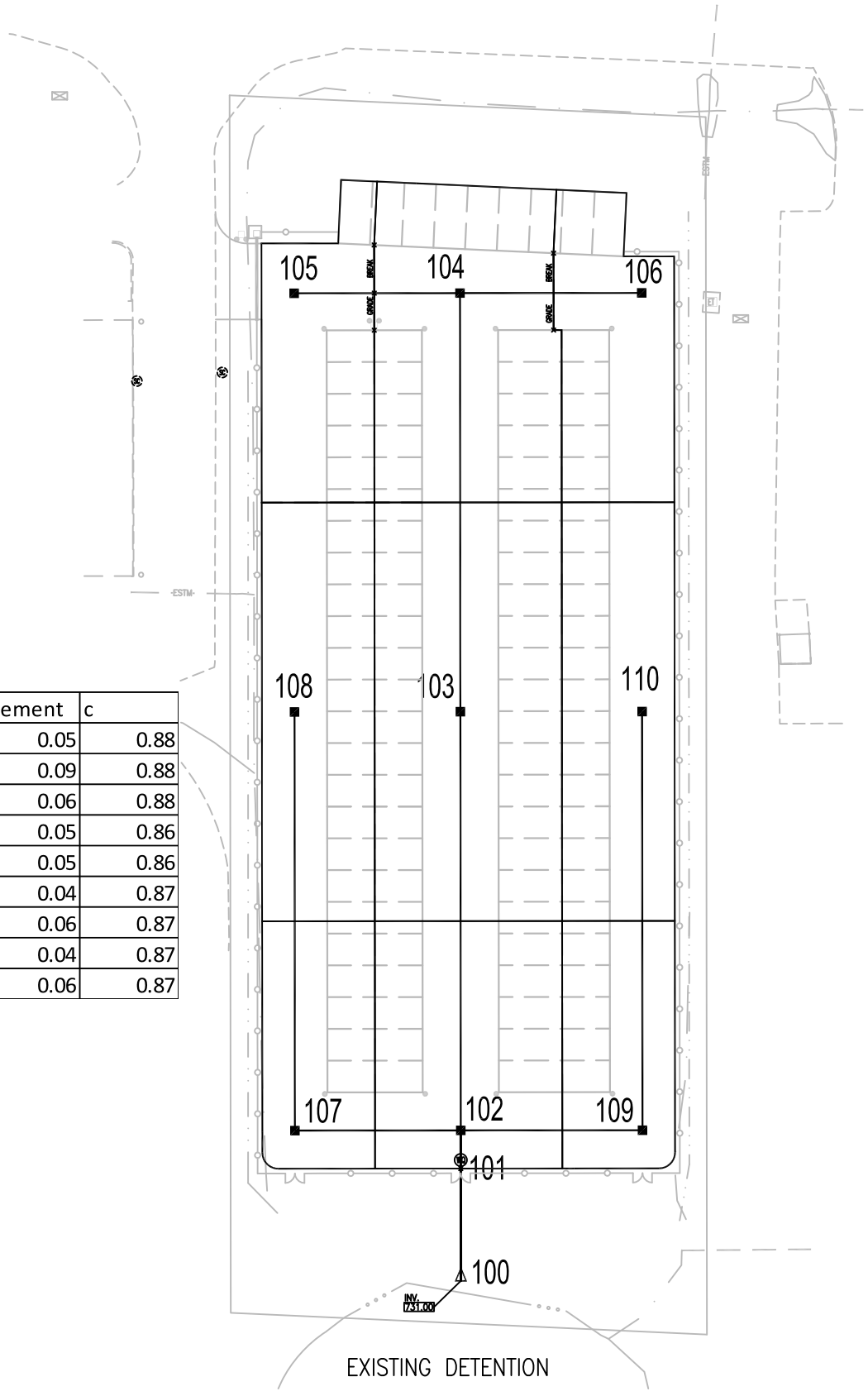
Br (1.32 AC)

BROOKSTON SILTY CLAY
LOAM–URBAN LAND COMPLEX,
0 TO 2 PERCENT SLOPES

NORTH

Scale: 1"=50'

Proposed Storm Sewers Map

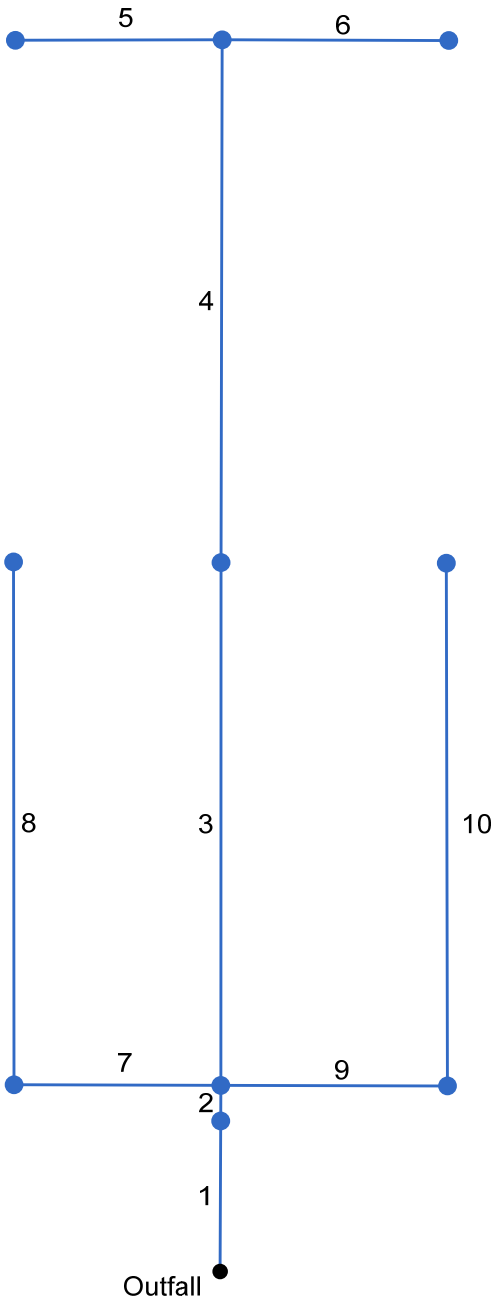


Structure	Area	Building	Pavement	c
102	0.11	0.06	0.05	0.88
103	0.18	0.09	0.09	0.88
104	0.13	0.07	0.06	0.88
105	0.07	0.02	0.05	0.86
106	0.07	0.02	0.05	0.86
107	0.06	0.02	0.04	0.87
108	0.11	0.05	0.06	0.87
109	0.06	0.02	0.04	0.87
110	0.11	0.05	0.06	0.87

NORTH

Scale: 1"=50'

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



Project File: 2023.01.09_100-110 Storm.stm	Number of lines: 10	Date: 1/10/2023

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	101	Manhole	741.15	Cir	4.00	4.00	12	Cir	732.14	12	Cir	732.14
2	102	DropGrate	741.00	Cir	4.00	4.00	12	Cir	732.41	12 12 12	Cir Cir Cir	734.34 735.00 735.00
3	103	DropGrate	741.00	Cir	4.00	4.00	12	Cir	735.66	12	Cir	735.66
4	104	DropGrate	741.00	Cir	4.00	4.00	12	Cir	736.98	12 12	Cir Cir	736.98 736.98
5	105	DropGrate	741.00	Cir	4.00	4.00	12	Cir	737.50			
6	106	DropGrate	741.00	Cir	4.00	4.00	12	Cir	737.55			
7	107	DropGrate	741.00	Cir	4.00	4.00	12	Cir	735.52	12	Cir	735.52
8	108	DropGrate	741.00	Cir	4.00	4.00	12	Cir	736.84			
9	109	DropGrate	741.00	Cir	4.00	4.00	12	Cir	735.57	12	Cir	735.57
10	110	DropGrate	741.00	Cir	4.00	4.00	12	Cir	736.89			

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	100-101	5.49	12	Cir	38.000	731.00	732.14	3.000	731.90	733.08	n/a	733.08	End	Manhole
2	101-102	5.49	12	Cir	9.000	732.14	732.41	3.000	733.08	733.35	n/a	733.35	1	DropGrate
3	102-103	2.75	12	Cir	132.000	734.34	735.66	1.000	734.96	736.37	n/a	736.37	2	DropGrate
4	103-104	1.64	12	Cir	132.000	735.66	736.98	1.000	736.37	737.52	n/a	737.52 j	3	DropGrate
5	104-105	0.42	12	Cir	52.000	736.98	737.50	1.000	737.52	737.77	n/a	737.77 j	4	DropGrate
6	104-106	0.42	12	Cir	57.000	736.98	737.55	1.000	737.52	737.82	n/a	737.82 j	4	DropGrate
7	102-107	1.03	12	Cir	52.000	735.00	735.52	1.000	735.35	735.95	0.24	735.95	2	DropGrate
8	107-108	0.67	12	Cir	132.000	735.52	736.84	1.000	735.95	737.18	n/a	737.18 j	7	DropGrate
9	102-109	1.03	12	Cir	57.000	735.00	735.57	1.000	735.35	736.00	0.24	736.00	2	DropGrate
10	109-110	0.67	12	Cir	132.000	735.57	736.89	1.000	736.00	737.23	n/a	737.23 j	9	DropGrate

Project File: 2023.01.09_100-110 Storm.stm | Number of lines: 10 | Run Date: 1/10/2023

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

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	38.000	0.00	0.90	0.00	0.00	0.79	0.0	8.5	5.9	5.49	6.68	7.27	12	3.00	731.00	732.14	731.90	733.08	0.00	741.15	100-101
2	1	9.000	0.11	0.90	0.88	0.10	0.79	5.0	8.5	5.9	5.49	6.68	7.17	12	3.00	732.14	732.41	733.08	733.35	741.15	741.00	101-102
3	2	132.000	0.18	0.45	0.88	0.16	0.39	5.0	7.8	6.0	2.75	3.86	4.97	12	1.00	734.34	735.66	734.96	736.37	741.00	741.00	102-103
4	3	132.000	0.13	0.27	0.88	0.11	0.23	5.0	6.8	6.4	1.64	3.86	3.25	12	1.00	735.66	736.98	736.37	737.52	741.00	741.00	103-104
5	4	52.000	0.07	0.07	0.86	0.06	0.06	5.0	5.0	7.0	0.42	3.86	1.72	12	1.00	736.98	737.50	737.52	737.77	741.00	741.00	104-105
6	4	57.000	0.07	0.07	0.86	0.06	0.06	5.0	5.0	7.0	0.42	3.86	1.72	12	1.00	736.98	737.55	737.52	737.82	741.00	741.00	104-106
7	2	52.000	0.06	0.17	0.87	0.05	0.15	5.0	7.6	6.1	1.03	3.86	3.69	12	1.00	735.00	735.52	735.35	735.95	741.00	741.00	102-107
8	7	132.000	0.11	0.11	0.87	0.10	0.10	5.0	5.0	7.0	0.67	3.86	2.46	12	1.00	735.52	736.84	735.95	737.18	741.00	741.00	107-108
9	2	57.000	0.06	0.17	0.87	0.05	0.15	5.0	7.6	6.1	1.03	3.86	3.69	12	1.00	735.00	735.57	735.35	736.00	741.00	741.00	102-109
10	9	132.000	0.11	0.11	0.87	0.10	0.10	5.0	5.0	7.0	0.67	3.86	2.46	12	1.00	735.57	736.89	736.00	737.23	741.00	741.00	109-110

Project File: 2023.01.09_100-110 Storm.stm | Number of lines: 10 | Run Date: 1/10/2023

NOTES:Intensity = 57.92 / (Inlet time + 9.10) ^ 0.80; Return period =Yrs. 10 ; Total flows limited to inlet captured flows ; c = cir e = ellip b = box

Water Quality Summary

Lot #12 Hurricane Industrial Park

Analytical Methodology:
The water quality structure has been designed using the peak discharge from the 0.3-inch storm using the appropriate Huff, 50% rainfall. A single hydrograph for each basin should be determined and all basin hydrographs added to determine the peak flow. Storm durations of 15-, 30- and 45 minutes as well as 1-, 2-, 3- 6- 12- and 24- hours have been checked to determine the peak SQU flow. Hydrograph hydrographs for these calculations are enclosed. The structure is designed to capture the impervious area for the site. The Structure was routed with 0.87 acres of impervious surface and a curve number of 98.

Designed Structure
The calculations for the water quality structures is as follows:

	Peak Flow (cfs)
Str. 1	0.67

A Contech Cascade Separator CS-3 structures are proposed for the project. The loading requirements and other for the unit is specified on the detail. The structure is designed to meet AASHTO HS-20 load rating. The unit is designed with a sump chamber for the storage of captured sediments and other negatively buoyant pollutants in between maintenance cycles. The structure inverts are 8' above the ground water elevation in the area. Buoyancy is not expected to be a factor for the units. However, buoyancy calculations are attached should the site experience an unexpected high water table. The units have a buoyancy safety factor of 2.36, above the acceptable factor of 1.2.

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022

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	0.668	2	8	429	------	------	------	15 Min Impervious
2	SCS Runoff	0.453	2	10	429	------	------	------	30 Min Impervious
3	SCS Runoff	0.326	2	12	429	------	------	------	45 Min Impervious
4	SCS Runoff	0.242	2	14	429	------	------	------	1 HR Impervious
5	SCS Runoff	0.124	2	26	429	------	------	------	2 HR Impervious
6	SCS Runoff	0.086	2	20	429	------	------	------	3 HR Impervious
7	SCS Runoff	0.048	2	36	429	------	------	------	6 HR Impervious
8	SCS Runoff	0.386	2	288	6,429	------	------	------	12 HR Impervious
9	SCS Runoff	0.233	2	936	7,135	------	------	------	24 HR Impervious

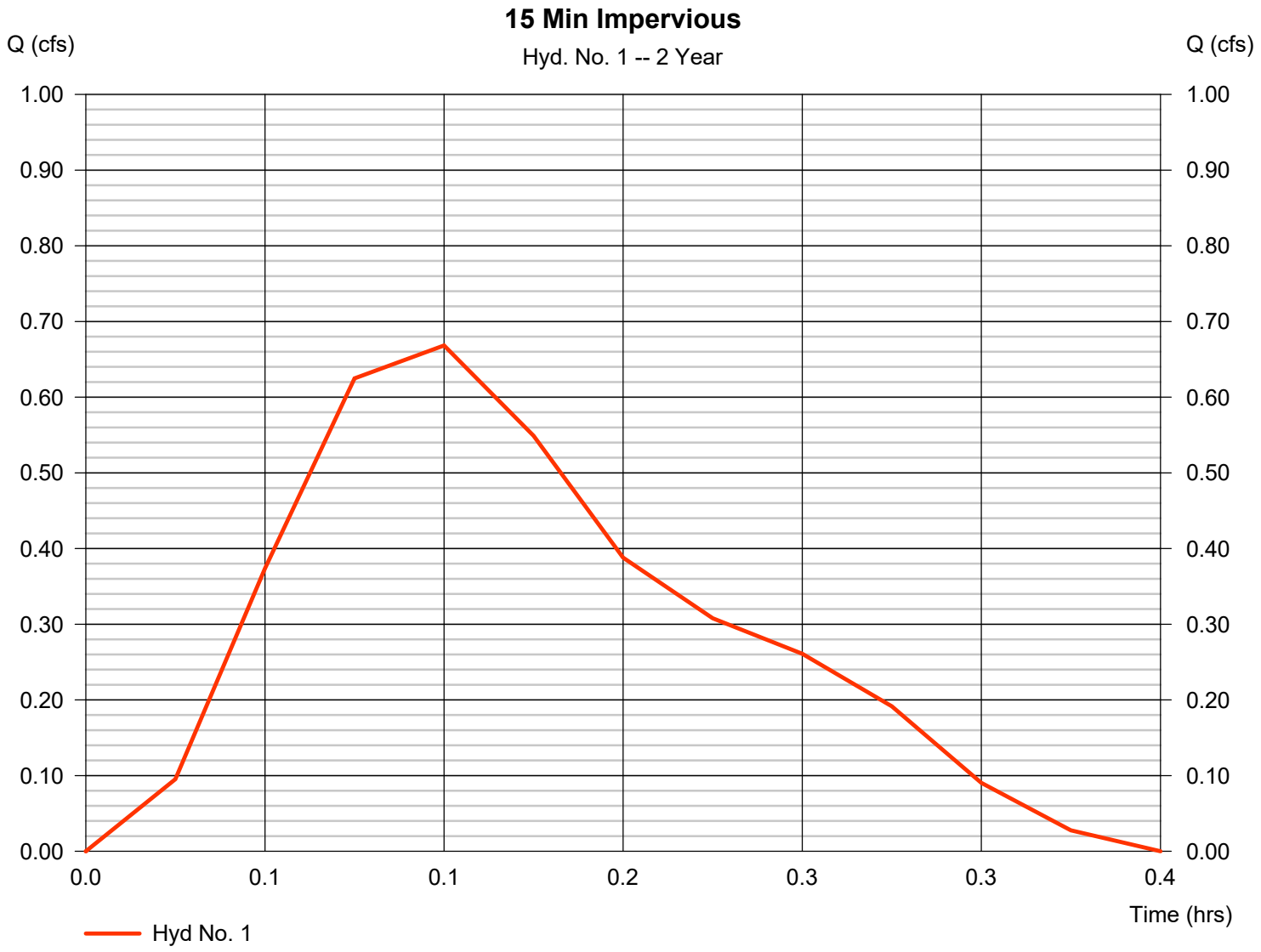
Hydrograph Report

Hyd. No. 1

15 Min Impervious

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.668 cfs
Storm frequency	=	2 yrs	Time to peak	=	0.13 hrs
Time interval	=	2 min	Hyd. volume	=	429 cuft
Drainage area	=	0.870 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	0.30 in	Distribution	=	Huff-1st
Storm duration	=	0.25 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.970 x 98) + (0.310 x 61)] / 0.870



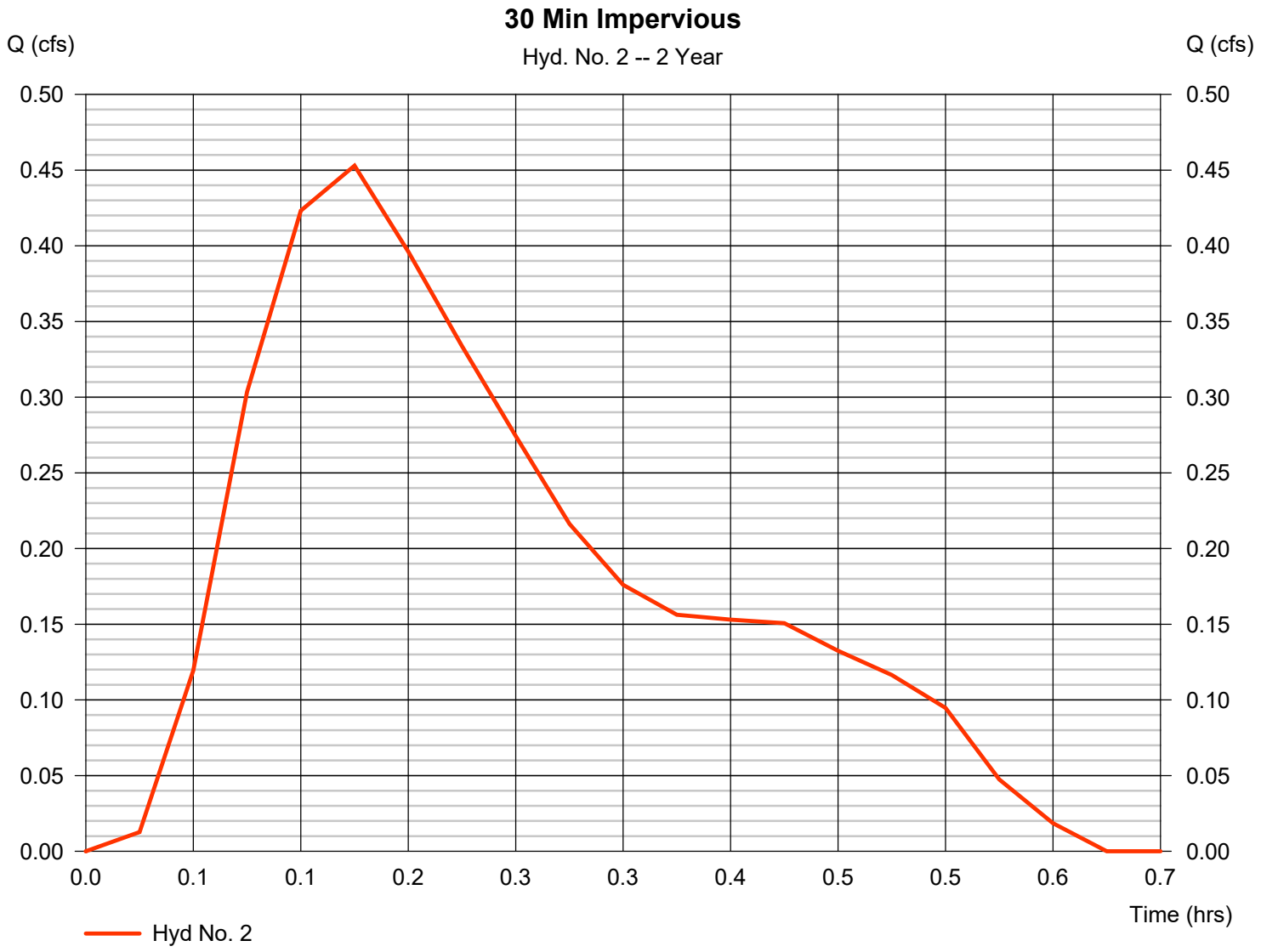
Hydrograph Report

Hyd. No. 2

30 Min Impervious

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.453 cfs
Storm frequency	=	2 yrs	Time to peak	=	0.17 hrs
Time interval	=	2 min	Hyd. volume	=	429 cuft
Drainage area	=	0.870 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	0.30 in	Distribution	=	Huff-1st
Storm duration	=	0.50 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.970 x 98) + (0.310 x 61)] / 0.870



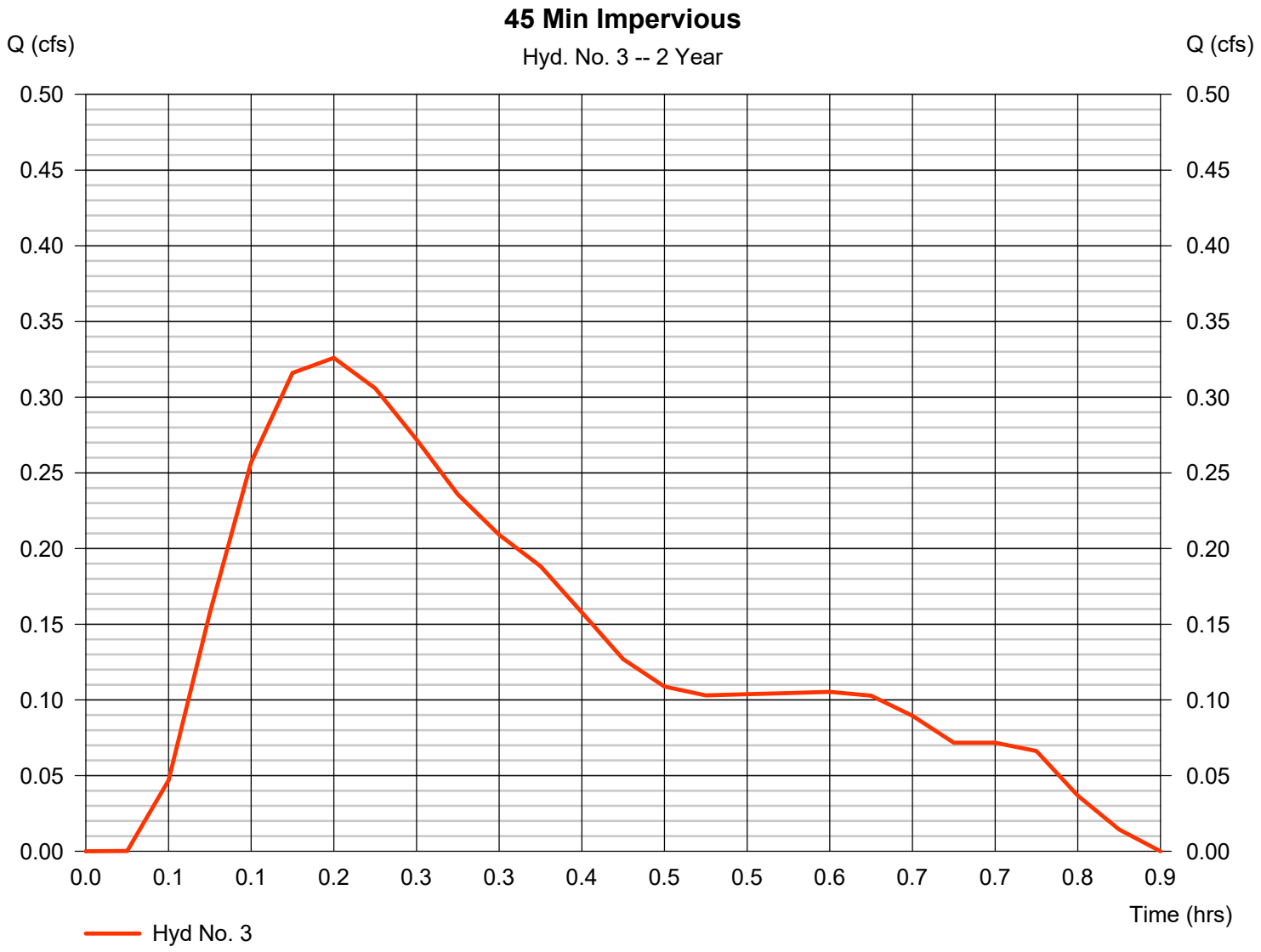
Hydrograph Report

Hyd. No. 3

45 Min Impervious

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.326 cfs
Storm frequency	=	2 yrs	Time to peak	=	0.20 hrs
Time interval	=	2 min	Hyd. volume	=	429 cuft
Drainage area	=	0.870 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	0.30 in	Distribution	=	Huff-1st
Storm duration	=	0.75 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.970 x 98) + (0.310 x 61)] / 0.870



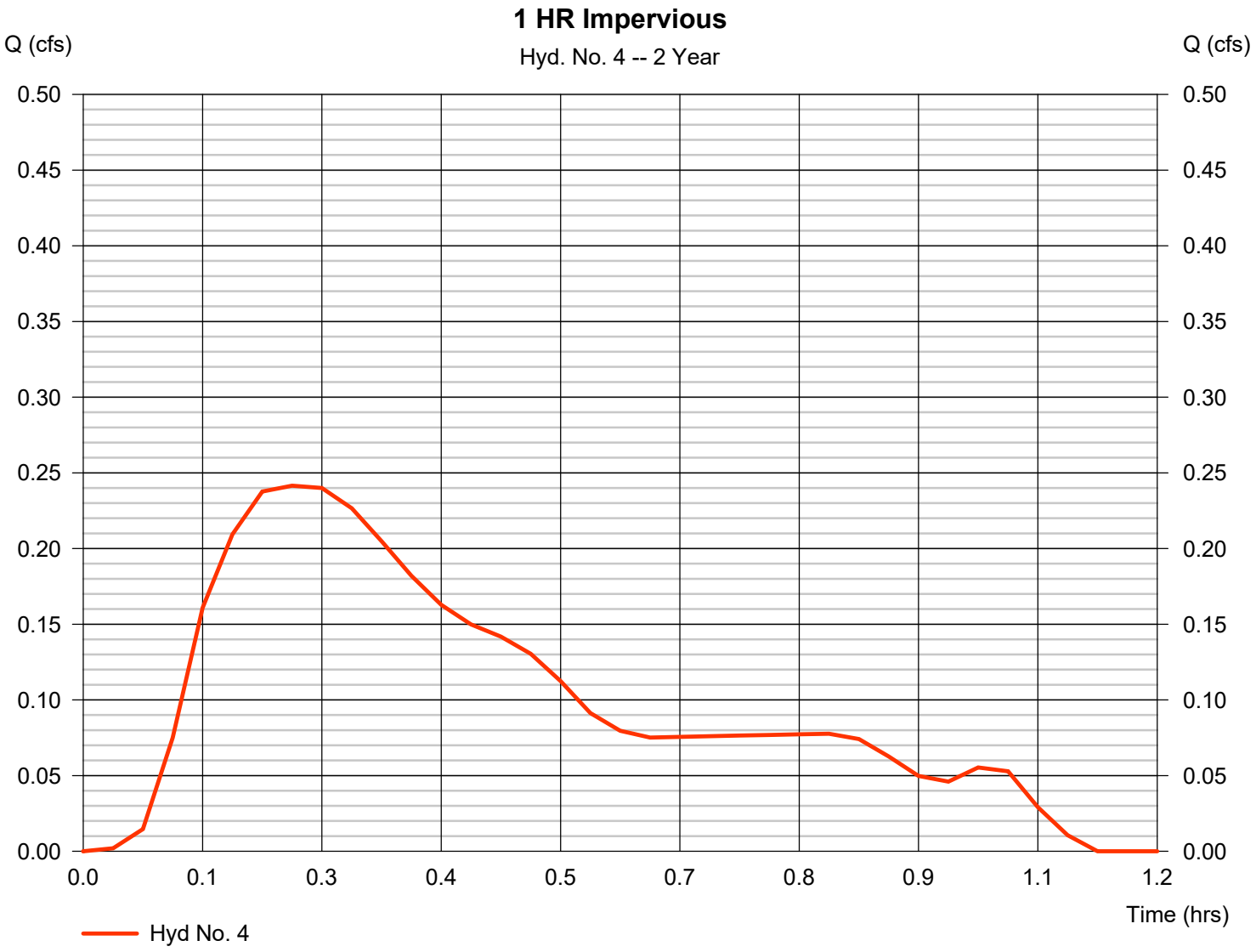
Hydrograph Report

Hyd. No. 4

1 HR Impervious

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.242 cfs
Storm frequency	=	2 yrs	Time to peak	=	0.23 hrs
Time interval	=	2 min	Hyd. volume	=	429 cuft
Drainage area	=	0.870 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	0.30 in	Distribution	=	Huff-1st
Storm duration	=	1.00 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.970 x 98) + (0.310 x 61)] / 0.870



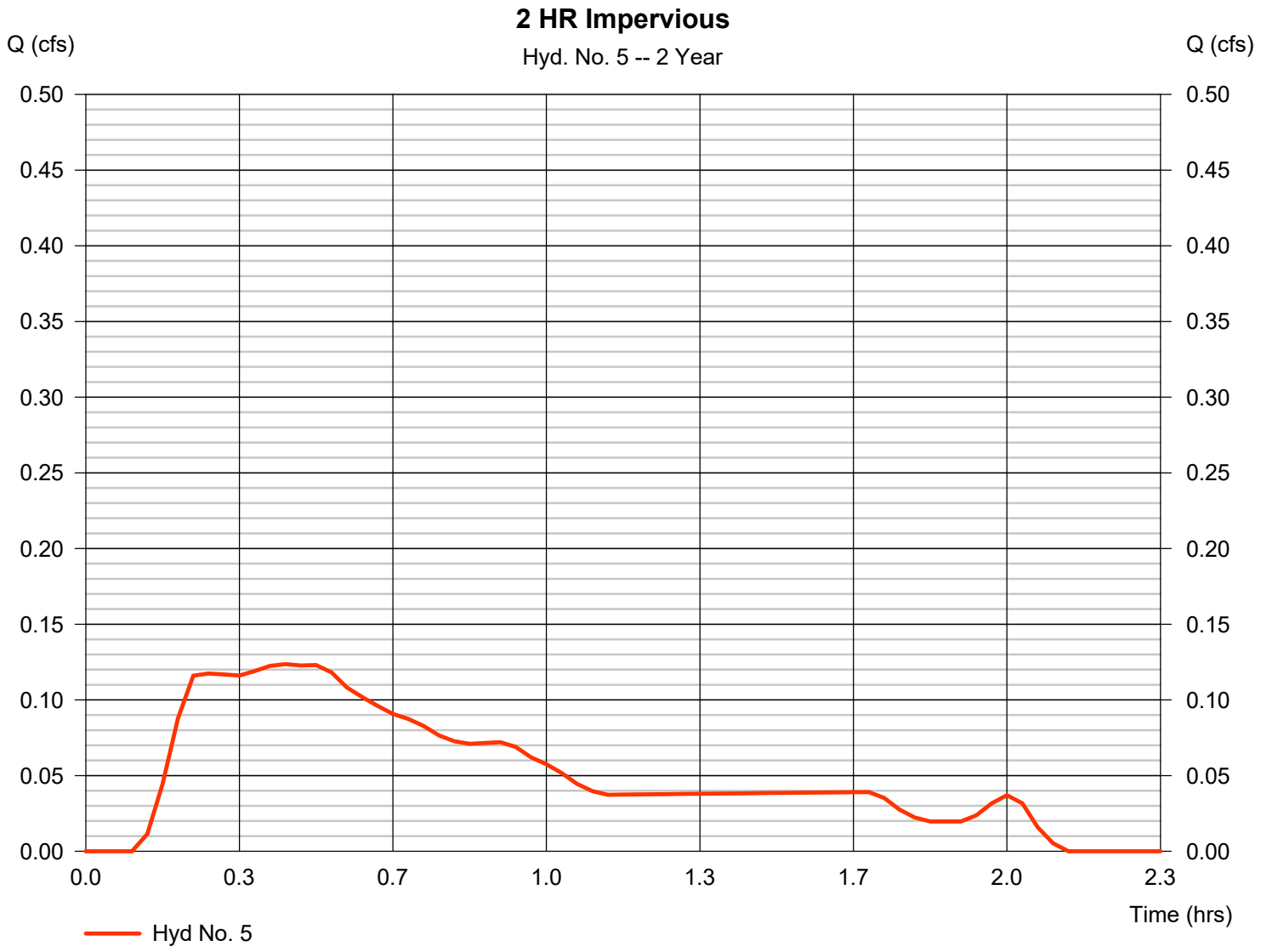
Hydrograph Report

Hyd. No. 5

2 HR Impervious

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.124 cfs
Storm frequency	=	2 yrs	Time to peak	=	0.43 hrs
Time interval	=	2 min	Hyd. volume	=	429 cuft
Drainage area	=	0.870 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	0.30 in	Distribution	=	Huff-1st
Storm duration	=	2.00 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.970 x 98) + (0.310 x 61)] / 0.870



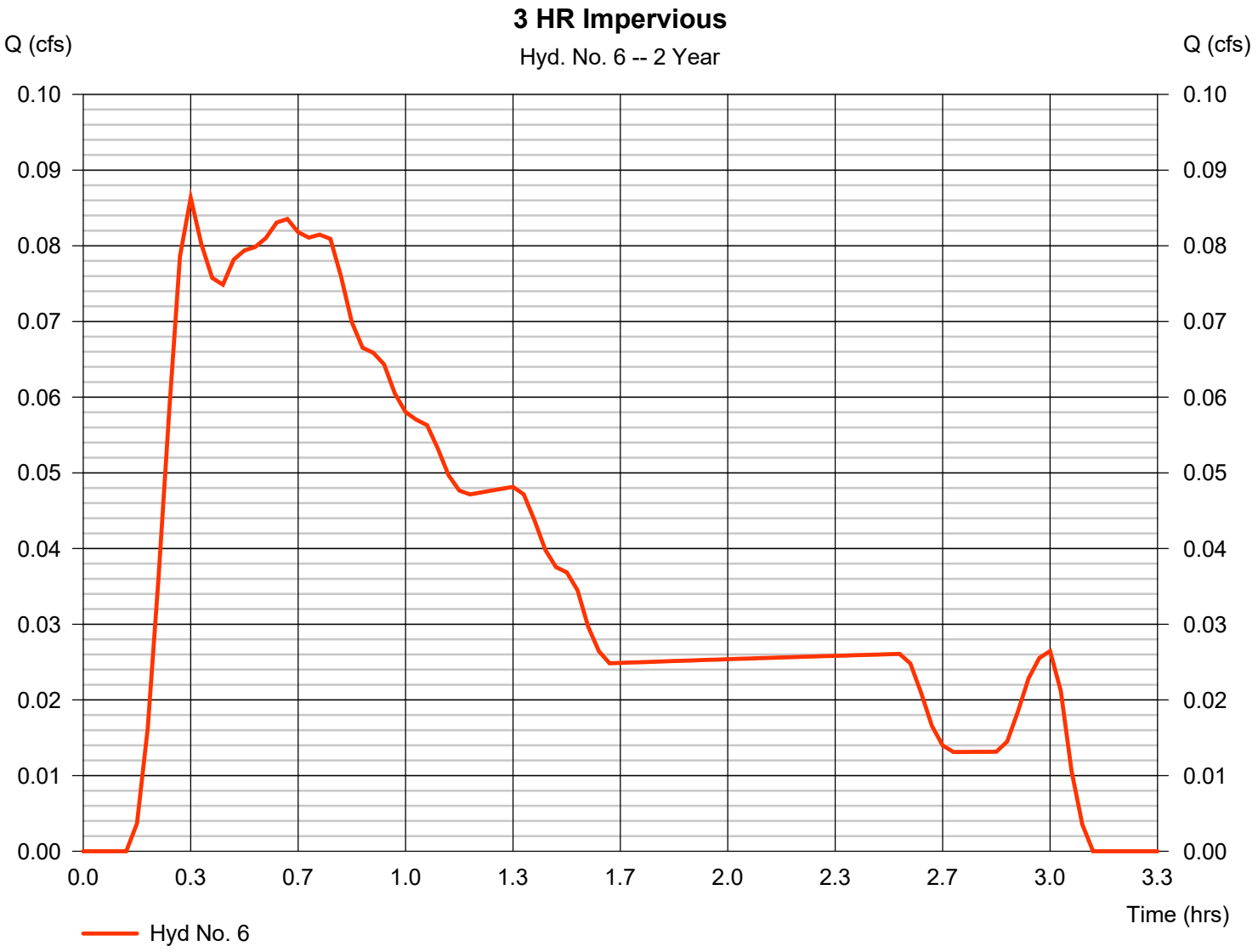
Hydrograph Report

Hyd. No. 6

3 HR Impervious

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.086 cfs
Storm frequency	=	2 yrs	Time to peak	=	0.33 hrs
Time interval	=	2 min	Hyd. volume	=	429 cuft
Drainage area	=	0.870 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	0.30 in	Distribution	=	Huff-1st
Storm duration	=	3.00 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.970 x 98) + (0.310 x 61)] / 0.870



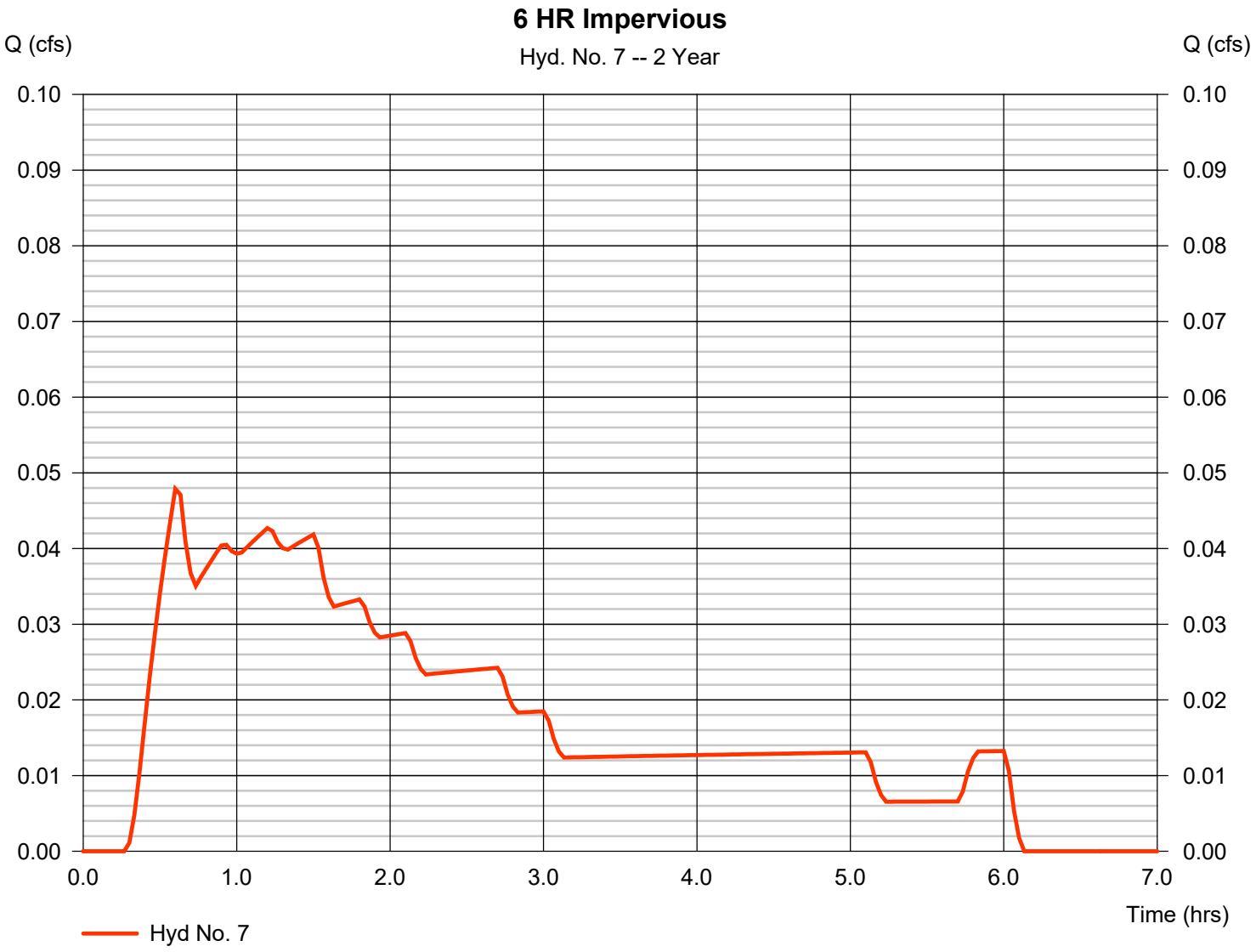
Hydrograph Report

Hyd. No. 7

6 HR Impervious

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.048 cfs
Storm frequency	=	2 yrs	Time to peak	=	0.60 hrs
Time interval	=	2 min	Hyd. volume	=	429 cuft
Drainage area	=	0.870 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	0.30 in	Distribution	=	Huff-1st
Storm duration	=	6.00 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.970 x 98) + (0.310 x 61)] / 0.870



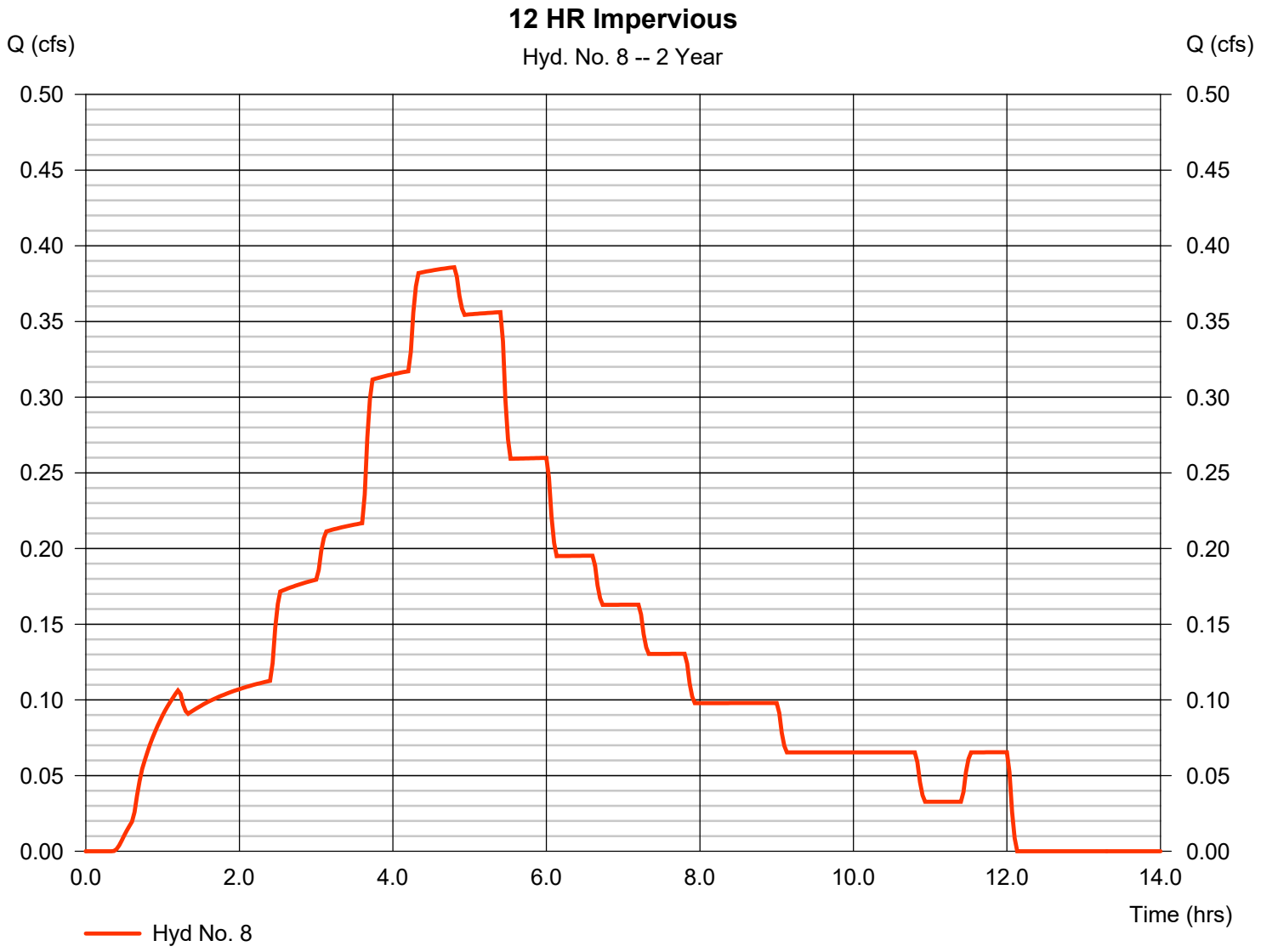
Hydrograph Report

Hyd. No. 8

12 HR Impervious

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.386 cfs
Storm frequency	=	2 yrs	Time to peak	=	4.80 hrs
Time interval	=	2 min	Hyd. volume	=	6,429 cuft
Drainage area	=	0.870 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.40 in	Distribution	=	Huff-2nd
Storm duration	=	12.00 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.970 x 98) + (0.310 x 61)] / 0.870



Hydrograph Report

Hyd. No. 9

24 HR Impervious

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.233 cfs
Storm frequency	=	2 yrs	Time to peak	=	15.60 hrs
Time interval	=	2 min	Hyd. volume	=	7,135 cuft
Drainage area	=	0.870 ac	Curve number	=	98*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.64 in	Distribution	=	Huff-3rd
Storm duration	=	24.00 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.970 x 98) + (0.310 x 61)] / 0.870