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TRANSLAND TRUCKING
EAST TERRA LANE
O'FALLON, MO

DETENION BASIN REPORT

PREPARED FOR:
MW REAL ESTATE
1601 WEST OLD ROUTE
STAFFORD, MISSOURI 65757

PREPARED BY:
ST. CHARLES ENGINEERING & SURVEYING, INC.

November 2022

TABLE OF CONTENTS

SITE INFORMATION AND PROPOSED DETENTION ---------- Page 1 and 2

DETENTION SUMMARY ---------- Page 3

APPENDIX A - AUTOCAD HYDRAFLOW CALCULATIONS

GRADING PLAN

DRAINAGE AREA MAPS

PROFILES

SITE INFORMATION AND PROPOSED DETENTION

Transland Trucking is 4.47-acre site on East Terra Lane at Commerce Drive in the City of O'Fallon, Missouri. The site is located between State Highway 79 on the east side and East Terra Lane on the west side. The site was previously graded but has not been developed. This report provide the hydraulic analysis to provide the storm water detention for the Proposed Transland Trucking site.

The site is less than 10 acres, so this report was prepared using the Rational Method of storm water analysis for the storms that are a 20-minute duration. The travel time is mainly sheet flow over pavement then a short length of storm sewer travel time and 2-minute durations has been assigned for the maximum travel time to the detention basin.

As shown on the Existing Drainage Area Map 0.45 acres of the site drains off-site to the south to a ditch along the Highway 79 exit ramp to a 36-inch reinforced concrete pipe on the west side of the Highway 79 pavement. An additional .05 acres of off-site land on East Terra Lane drain onto the side and travels with the above mentioned 0.45 acres draining off-site to the south. The north 4.02 acres of the site drains to a low point along the east property line to a ditch along Highway 79 that drains to the above mentioned 36-inch reinforced concrete pipe on the west side of Highway 79. An additional 3.03 acres off-site land to the west, north and east drains onto the site draining to the low point on the east property line.

As shown on the Proposed Drainage Area Map all of the site proposed pavement and buildings area of 3.83 acres will drain to the proposed detention basin located in the southeast corner of the site plus 0.07 acres of East Terra Lane that drains into the site at the entrance. The total area draining to the detention basin is 3.9 acres and that area is 87 percent impervious. As shown at the south end of the site 0.26 acres will by-pass the detention basin draining to the ditch to the south. As shown at the north end of the site 0.38 acres will by-pass the detention basin and drain to a proposed on-site swale along the east property line to the site low point along Highway 79. The total site area by-passing the basin will be 0.64 acres. An additional 3.02 acres of off-site land to the west, north, and east will also drain in the proposed on-site swale along the east property line to the site low point along Highway 79.

The allowable release from the detention basin was determined using the differential runoff for the predeveloped 4.47 acres of the site less the post developed site area of 0.64 acres of pervious area by-passes the detention basin as indicated above and as shown on the drainage area map.

The detention report was prepared using Hydraflow Hydrographs Extension for Autodesk Civil 3D software. The combined discharge of the basin routing and the basin by-pass is shown as the actual release from the site which are all below the allowable release.

The low flow openings blocked analysis for the 100-year storm assumes the lower opening on the Outfall Structure to be blocked and then routing the storm water through be basin. The top of the detention basin dam provides at least 1.0 feet of freeboard to the top of the detention basin dam.

To filter the storm water runoff all of the curb inlets catch basins include a catch basin inlet filter per the detail shown on the plans (or equal product).

Catch Basin Inlet Filters shall be serviced on a recurring basin to remove pollutant loading and interference from debris (leaves, vegetation, or trash). Each insert filter installation shall be serviced a minimum of three times per year with a change of filter medium pouches once per year. Timing of insert filter maintenance shall be March 1st, July 1st, and November 1st being prior to and just after the winter snow season and during the summer.

Service Procedures:

1. Remove catch basin top or grate and set to one side. The catch basin shall be visually inspected for defects and possible illegal dumping. If illegal dumping has occurred, the proper authorities shall be notified as soon as practicable.
2. Using an individual vacuum, the collected materials shall be removed from the liner.
3. When all collect material have been removed, the filter medium pouches shall be removed per the manufacture's recommendations. The filter liner, gaskets, frame, and mounting brackets shall be inspected for continued serviceability. Minor damage or defects found shall be correct on-the-spot and a notation made on the Maintenance Records. More extensive deficiencies that affect the efficiency of the filter (torn liner, etc.) shall be correct and notation made in the Maintenance Record.
4. The filter medium pouches shall be inspected for defects and continued serviceability and replaced as necessary, at least once per year.
5. The top or grate shall be replaced.
6. Used pouches and removed debris shall be disposed of in accordance with local, state, and federal requirements.

DETENTION SUMMARY
Site Area = 4.47 Acres

Pre-Development PIs, 5% Impervious, 20-Minute Storm

Pre-Developed 2-Year PI =	1.15 cfs/acres
Pre-Developed 15-Year PI =	1.7 cfs/acre
Pre-Developed 25-Year PI =	1.81 cfs/acre
Pre-Developed 100-Year PI =	2.29 cfs/acre

Pre-Development 4.47 Acres Discharge, 5% Impervious, 20-Minute Storm

Pre-Developed 2-Year 4.47 x 1.15 =	5.14 cfs
Pre-Developed 15-Year 4.47 x 1.7 =	7.60 cfs
Pre-Developed 25-Year 4.47 x 1.81 =	9.09 cfs
Pre-Developed 100-Year 4.47 x 2.29 =	10.24 cfs

Less Basin By-Pass, 5% Impervious 0.64 Acres, 20-Minute Storm		**Difference**
Post-Developed 2-Year 0.64 x 1.15 =	0.74 cfs	4.4 cfs
Post-Developed 15-Year 0.64 x 1.7 =	1.09 cfs	6.51 cfs
Post-Developed 25-Year 0.64 x 1.81 =	1.16 cfs	7.93 cfs
Post-Developed 100-Year 0.64 x 2.29 =	1.47 cfs	8.77 cfs

Plus, Off-Site to Basin 0.07 Acres, 100% Impervious, 20 Min Storm		**Allowable Release**
Pre-Developed 2-Year 0.07 x 2.39 =	0.17 cfs	4.64 cfs
Pre-Developed 15-Year 0.07 x 3.54 =	0.25 cfs	6.76 cfs
Pre-Developed 25-Year 0.07 x 3.77 =	0.26 cfs	8.19 cfs
Pre-Developed 100-Year 0.07 x 4.77 =	0.33 cfs	9.1 cfs

Post-Development, 87% Impervious, 20- Minute Storm

Post-Developed 2-Year PI =	2.22 cfs/acre
Post-Developed 15-Year PI =	3.29 cfs/acre
Post-Developed 25-Year PI =	3.52 cfs/acre
Post-Developed 100-Year PI =	4.43 cfs/acre

Discharge with 3.9 Acres to Basin

Allowable 2-Year 3.9 x 2.22 =	8.66 cfs
Allowable 15-Year 3.9 x 3.29 =	12.83 cfs
Allowable 25-Year 3.9 x 3.52 =	13.73 cfs
Allowable 100-Year 3.9 x 4.43 =	17.28 cfs

Actual Detention Basin Release	**Actual All Below Allowable**
Actual 2-Year, 20-Minute Release =	**4.15 cfs**
Actual 15-Year, 20-Minute Release =	**5.35 cfs**
Actual 25-Year, 20-Minute Release =	**5.63 cfs**
Actual 100-Year, 20-Minute Release =	**8.53 cfs**

100-Year Low Flow Blocked

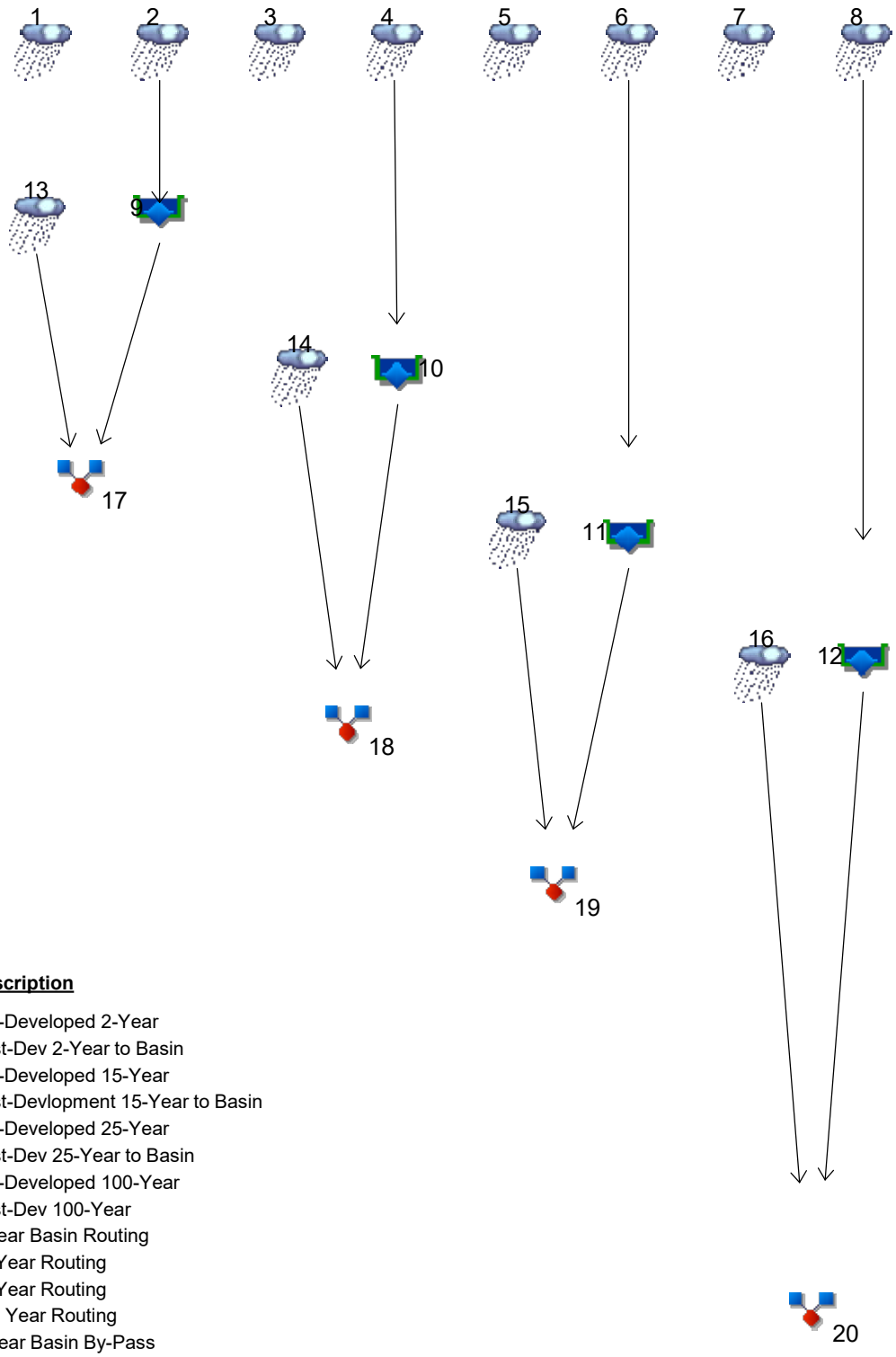
Post-Development 100-year low flows blocked

Peak Elevation = 489.40

Top of Dam = 491.00 **1.60 Feet of Freeboard**

Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020



Legend

Hyd.	Origin	Description
1	Manual	Pre-Developed 2-Year
2	Manual	Post-Dev 2-Year to Basin
3	Manual	Pre-Developed 15-Year
4	Manual	Post-Devlopment 15-Year to Basin
5	Manual	Pre-Developed 25-Year
6	Manual	Post-Dev 25-Year to Basin
7	Manual	Pre-Developed 100-Year
8	Manual	Post-Dev 100-Year
9	Reservoir	2 Year Basin Routing
10	Reservoir	15 Year Routing
11	Reservoir	25 Year Routing
12	Reservoir	100 Year Routing
13	Manual	2-Year Basin By-Pass
14	Manual	15-Year Basin By-Pass
15	Manual	25-Year Basin By-Pass
16	Manual	100-Year Basin By-Pass
17	Combine	2 Year Combined
18	Combine	15-Year Combined
19	Combine	25-Year Combined
20	Combine	100-Year Combined

Hydrograph Return Period Recap

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	Manual	------	-------	5.140	-------	-------	0.000	0.000	-------	0.000	Pre-Developed 2-Year
2	Manual	------	-------	8.660	-------	-------	0.000	0.000	-------	0.000	Post-Dev 2-Year to Basin
3	Manual	------	-------	0.000	-------	-------	7.600	0.000	-------	0.000	Pre-Developed 15-Year
4	Manual	------	-------	0.000	-------	-------	12.83	0.000	-------	0.000	Post-Devlopment 15-Year to Basin
5	Manual	------	-------	0.000	-------	-------	0.000	8.090	-------	0.000	Pre-Developed 25-Year
6	Manual	------	-------	0.000	-------	-------	0.000	13.73	-------	0.000	Post-Dev 25-Year to Basin
7	Manual	------	-------	0.000	-------	-------	0.000	0.000	-------	10.24	Pre-Developed 100-Year
8	Manual	------	-------	0.000	-------	-------	0.000	0.000	-------	17.28	Post-Dev 100-Year
9	Reservoir	2	-------	3.443	-------	-------	0.000	0.000	-------	0.000	2 Year Basin Routing
10	Reservoir	4	-------	0.000	-------	-------	4.338	0.000	-------	0.000	15 Year Routing
11	Reservoir	6	-------	0.000	-------	-------	0.000	4.544	-------	0.000	25 Year Routing
12	Reservoir	8	-------	0.000	-------	-------	0.000	0.000	-------	7.589	100 Year Routing
13	Manual	------	-------	0.740	-------	-------	0.000	0.000	-------	0.000	2-Year Basin By-Pass
14	Manual	------	-------	0.000	-------	-------	1.090	0.000	-------	0.000	15-Year Basin By-Pass
15	Manual	------	-------	0.000	-------	-------	0.000	1.160	-------	0.000	25-Year Basin By-Pass
16	Manual	------	-------	0.000	-------	-------	0.000	0.000	-------	1.470	100-Year Basin By-Pass
17	Combine	9, 13,	-------	4.154	-------	-------	0.000	0.000	-------	0.000	2 Year Combined
18	Combine	10, 14,	-------	0.000	-------	-------	5.353	0.000	-------	0.000	15-Year Combined
19	Combine	11, 15,	-------	0.000	-------	-------	0.000	5.629	-------	0.000	25-Year Combined
20	Combine	12, 16,	-------	0.000	-------	-------	0.000	0.000	-------	8.527	100-Year Combined

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Manual	5.140	1	2	6,168	------	------	------	Pre-Developed 2-Year
2	Manual	8.660	1	2	10,392	------	------	------	Post-Dev 2-Year to Basin
3	Manual	0.000	1	n/a	0	------	------	------	Pre-Developed 15-Year
4	Manual	0.000	1	n/a	0	------	------	------	Post-Devlopment 15-Year to Basin
5	Manual	0.000	6	n/a	0	------	------	------	Pre-Developed 25-Year
6	Manual	0.000	1	n/a	0	------	------	------	Post-Dev 25-Year to Basin
7	Manual	0.000	1	n/a	0	------	------	------	Pre-Developed 100-Year
8	Manual	0.000	1	n/a	0	------	------	------	Post-Dev 100-Year
9	Reservoir	3.443	1	21	10,388	2	488.29	7,226	2 Year Basin Routing
10	Reservoir	0.000	1	n/a	0	4	486.57	0.000	15 Year Routing
11	Reservoir	0.000	1	n/a	0	6	486.57	0.000	25 Year Routing
12	Reservoir	0.000	1	n/a	0	8	486.57	0.000	100 Year Routing
13	Manual	0.740	1	2	888	------	------	------	2-Year Basin By-Pass
14	Manual	0.000	1	n/a	0	------	------	------	15-Year Basin By-Pass
15	Manual	0.000	1	n/a	0	------	------	------	25-Year Basin By-Pass
16	Manual	0.000	1	n/a	0	------	------	------	100-Year Basin By-Pass
17	Combine	4.154	1	20	11,276	9, 13,	------	------	2 Year Combined
18	Combine	0.000	1	n/a	0	10, 14,	------	------	15-Year Combined
19	Combine	0.000	1	n/a	0	11, 15,	------	------	25-Year Combined
20	Combine	0.000	1	n/a	0	12, 16,	------	------	100-Year Combined

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 09 / 30 / 2022

Hyd. No. 1

Pre-Developed 2-Year

Hydrograph type	= Manual	Peak discharge	= 5.140 cfs
Storm frequency	= 2 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 6,168 cuft

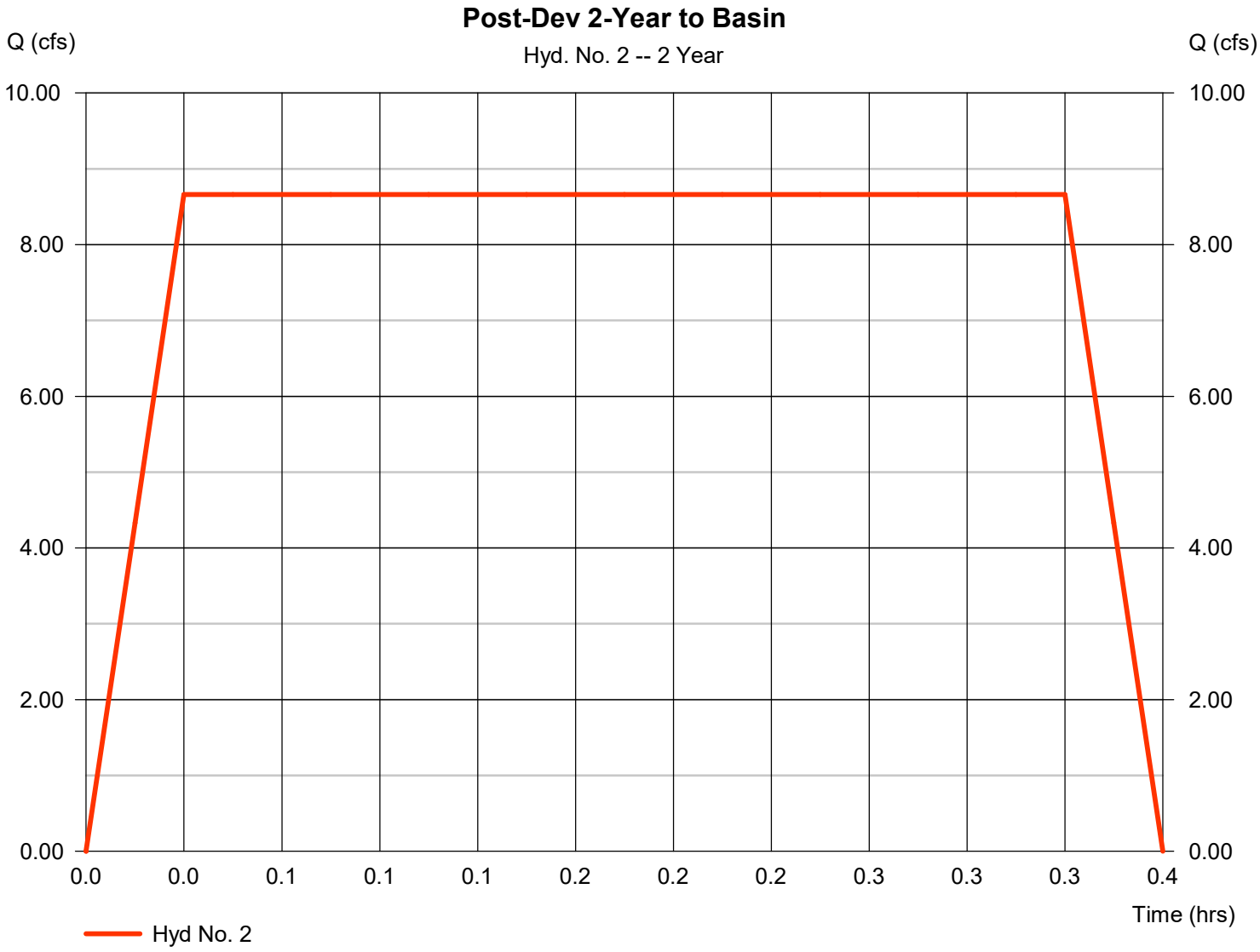
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 09 / 30 / 2022

Hyd. No. 2

Post-Dev 2-Year to Basin

Hydrograph type	= Manual	Peak discharge	= 8.660 cfs
Storm frequency	= 2 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 10,392 cuft



Hydrograph Report

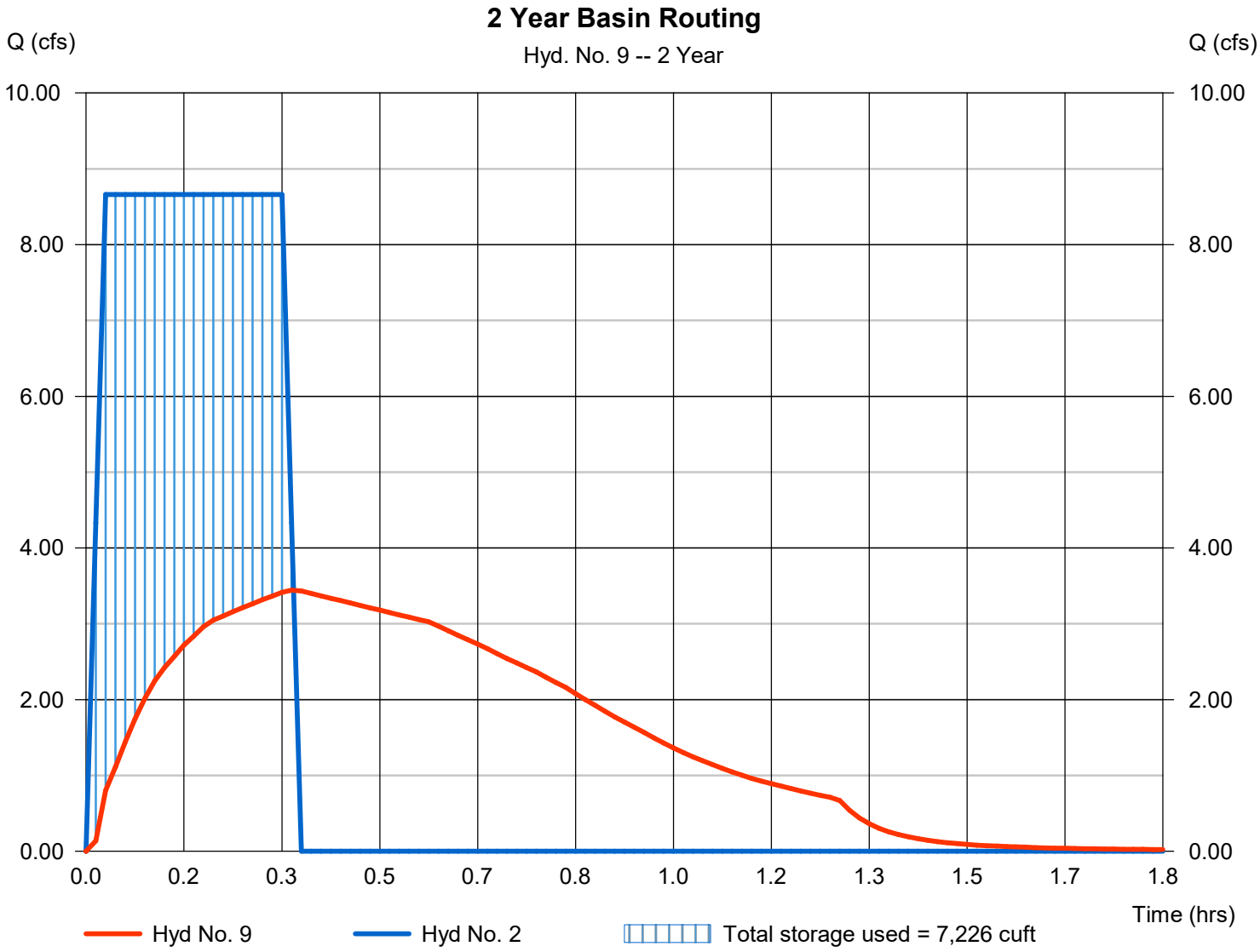
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 09 / 30 / 2022

Hyd. No. 9

2 Year Basin Routing

Hydrograph type	=	Reservoir	Peak discharge	=	3.443 cfs
Storm frequency	=	2 yrs	Time to peak	=	0.35 hrs
Time interval	=	1 min	Hyd. volume	=	10,388 cuft
Inflow hyd. No.	=	2 - Post-Dev 2-Year to Basin	Max. Elevation	=	488.29 ft
Reservoir name	=	Basin	Max. Storage	=	7,226 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 — Friday, 09 / 30 / 2022

Pond No. 1 - Basin

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 486.57 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	486.57	00	0	0
0.43	487.00	2,147	308	308
1.43	488.00	6,841	4,273	4,581
2.43	489.00	11,475	9,058	13,639
3.43	490.00	13,199	12,326	25,964
4.43	491.00	14,090	13,641	39,605

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	12.00	8.00	Inactive
Span (in)	= 18.00	12.00	6.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 486.45	486.57	488.33	0.00
Length (ft)	= 20.00	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

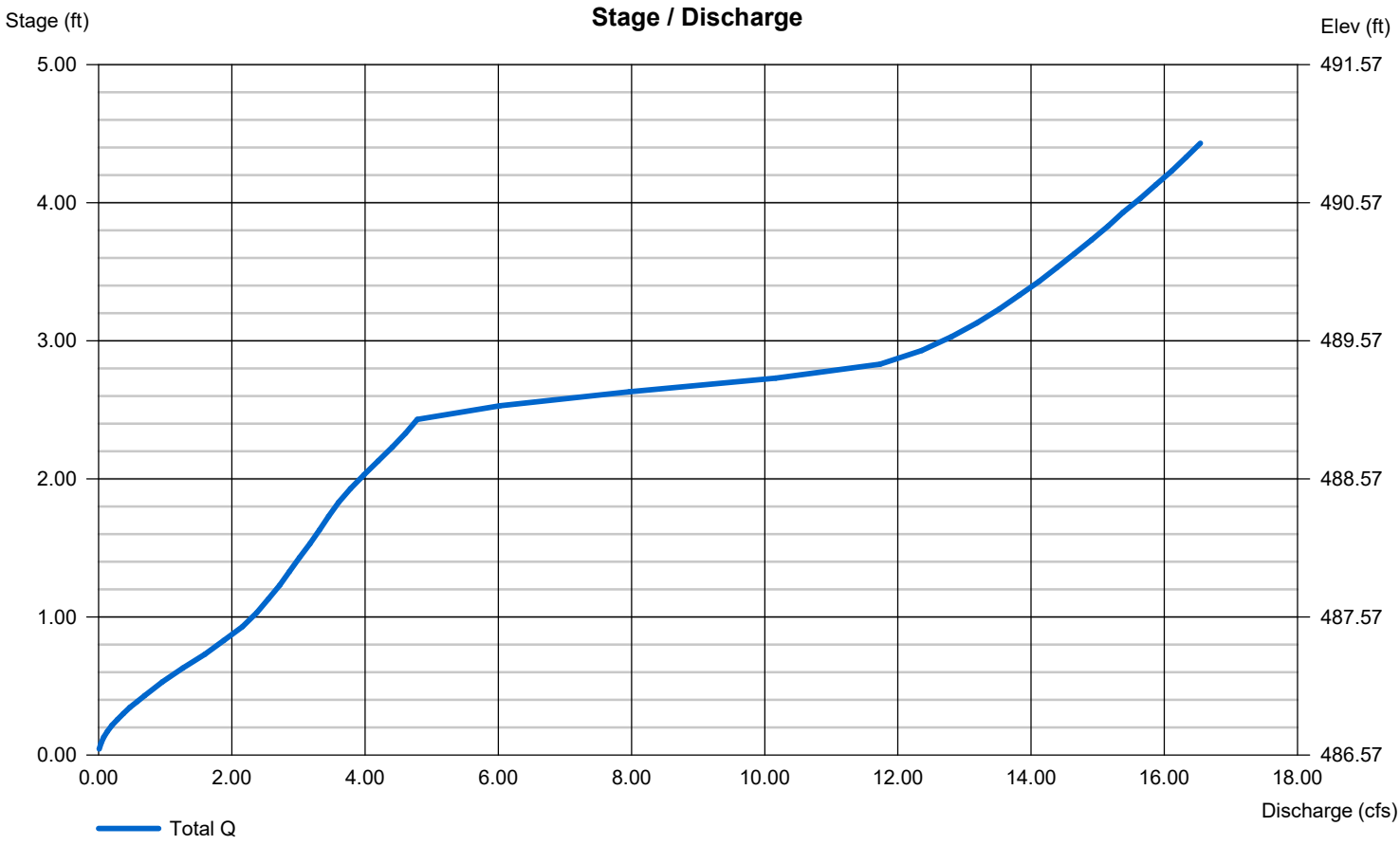
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 11.00	0.00	0.00	0.00
Crest El. (ft)	= 489.00	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).



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Multi-Stage	= n/a	Yes	Yes	No

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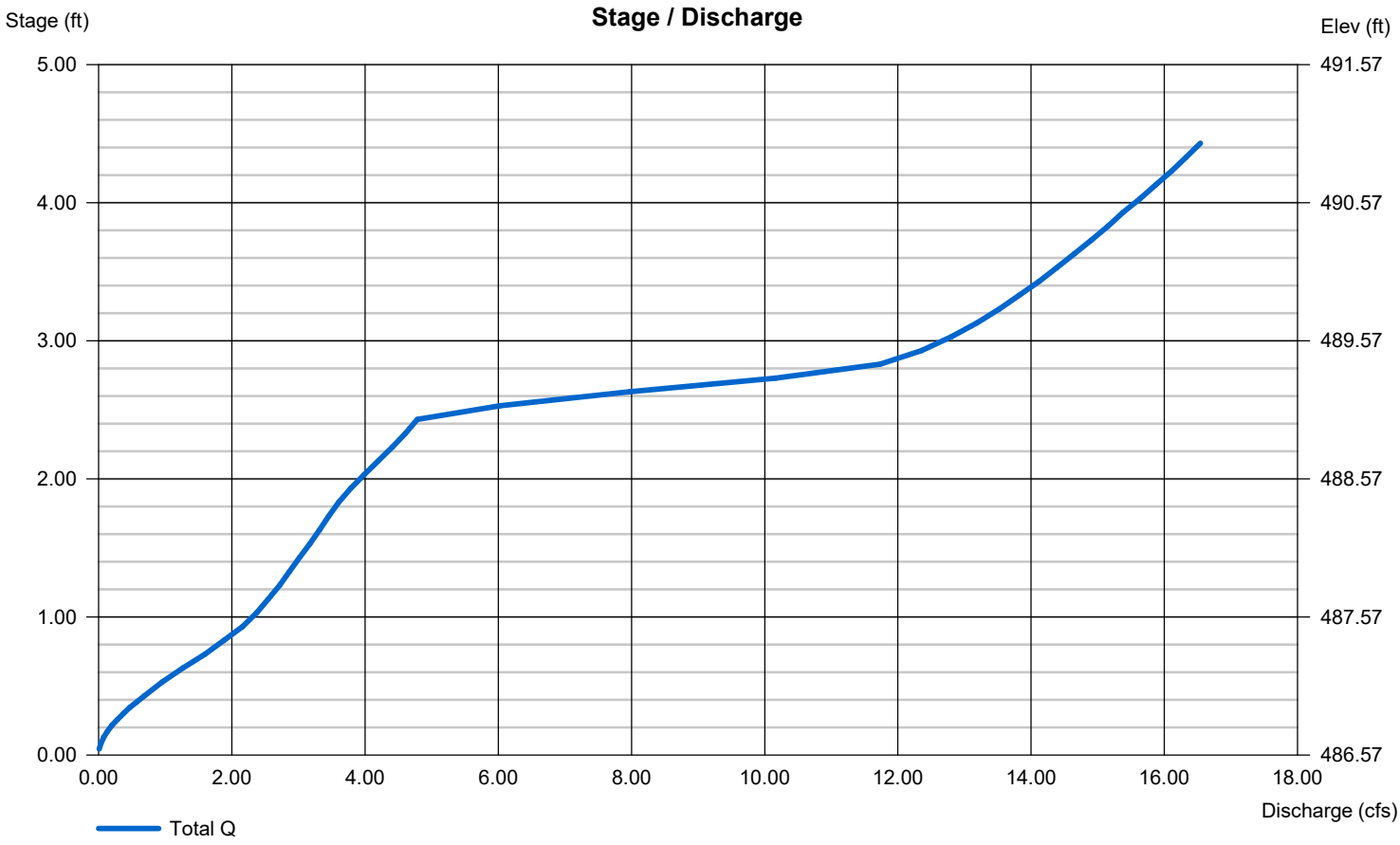

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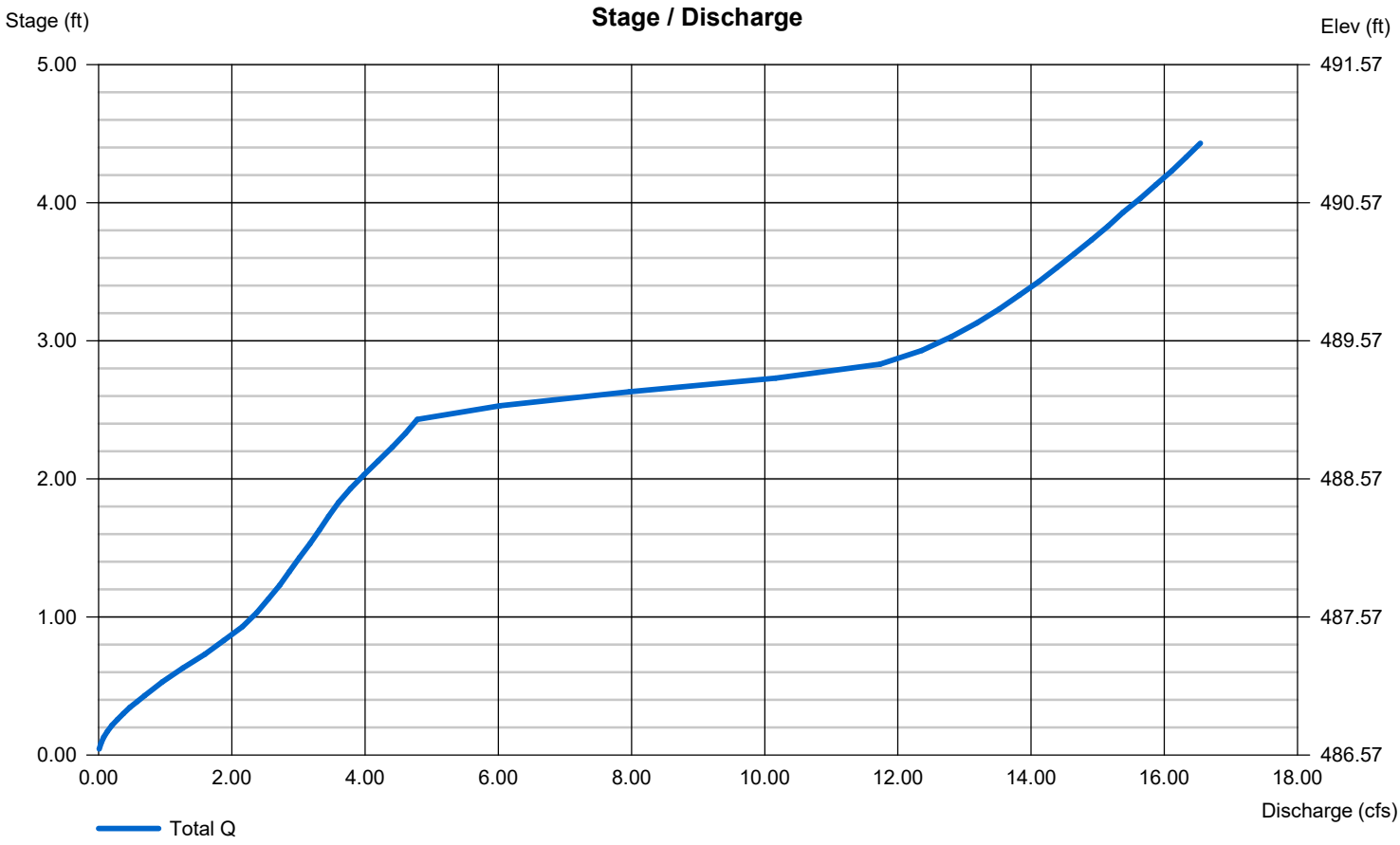

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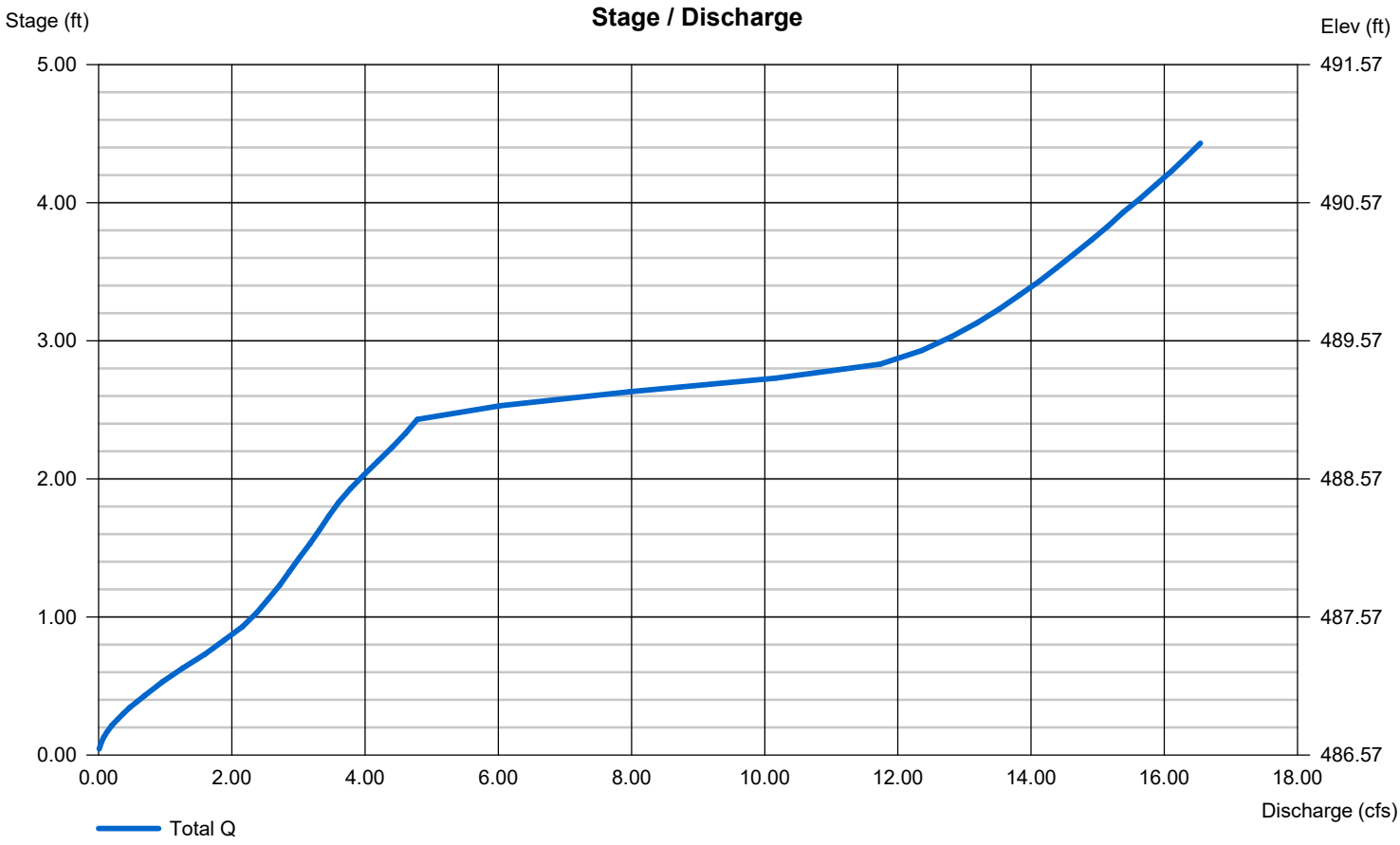
TW Elev. (ft) = 0.00

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



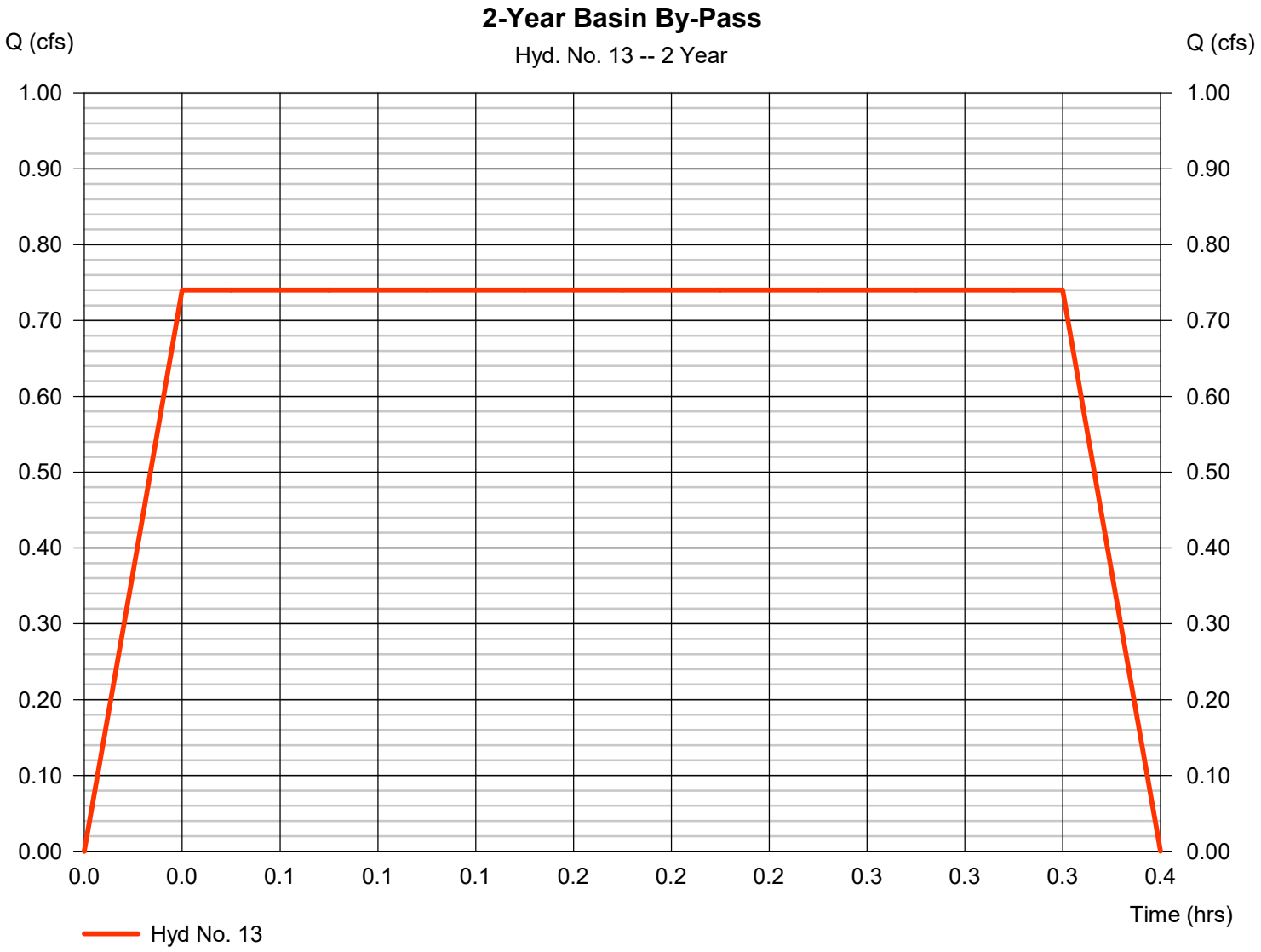
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 09 / 30 / 2022

Hyd. No. 13

2-Year Basin By-Pass

Hydrograph type	= Manual	Peak discharge	= 0.740 cfs
Storm frequency	= 2 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 888 cuft



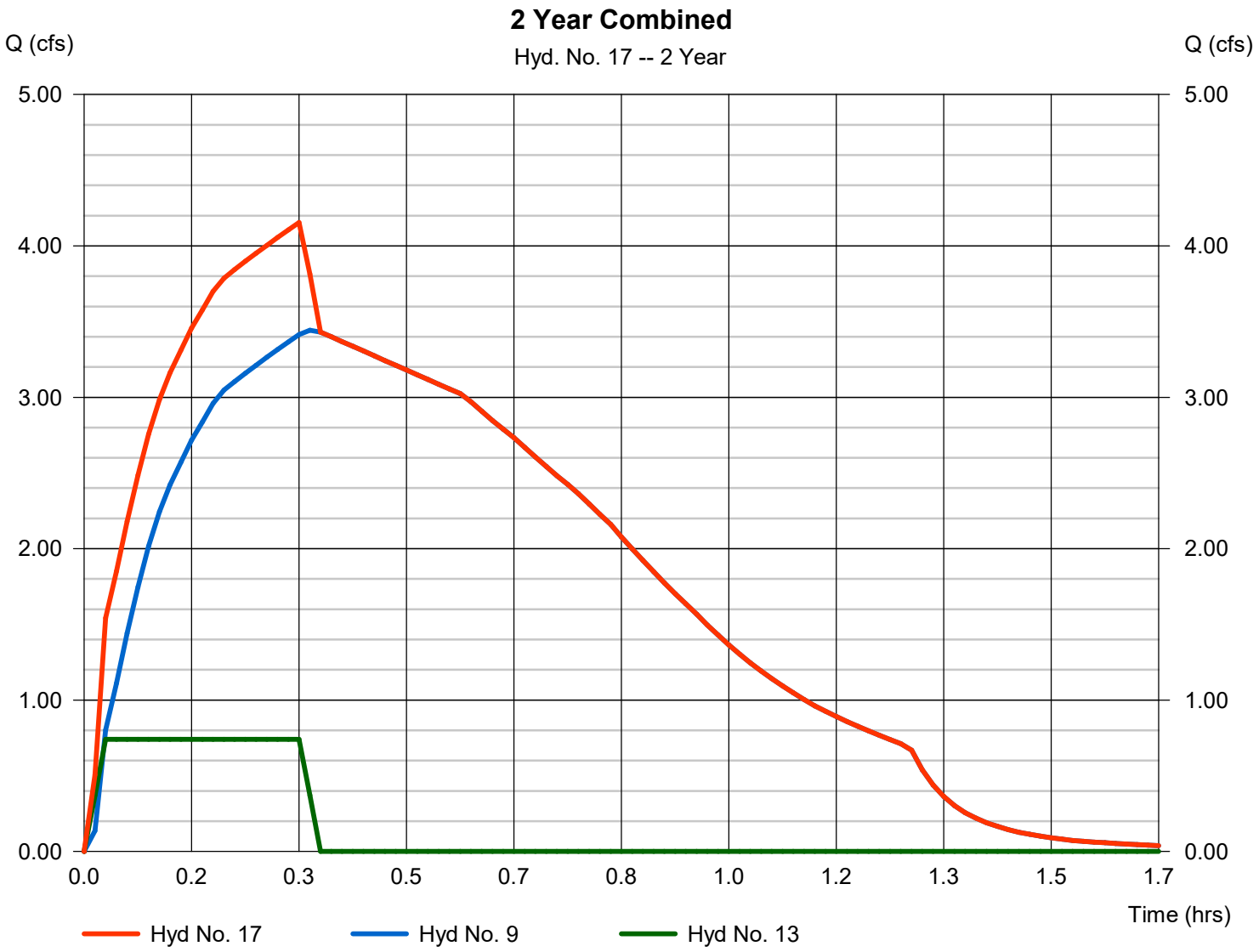
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 09 / 30 / 2022

Hyd. No. 17

2 Year Combined

Hydrograph type	= Combine	Peak discharge	= 4.154 cfs
Storm frequency	= 2 yrs	Time to peak	= 0.33 hrs
Time interval	= 1 min	Hyd. volume	= 11,276 cuft
Inflow hyds.	= 9, 13	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Manual	0.000	1	n/a	0	------	------	------	Pre-Developed 2-Year
2	Manual	0.000	1	n/a	0	------	------	------	Post-Dev 2-Year to Basin
3	Manual	7.600	1	2	9,120	------	------	------	Pre-Developed 15-Year
4	Manual	12.83	1	2	15,396	------	------	------	Post-Devlopment 15-Year to Basin
5	Manual	0.000	6	n/a	0	------	------	------	Pre-Developed 25-Year
6	Manual	0.000	1	n/a	0	------	------	------	Post-Dev 25-Year to Basin
7	Manual	0.000	1	n/a	0	------	------	------	Pre-Developed 100-Year
8	Manual	0.000	1	n/a	0	------	------	------	Post-Dev 100-Year
9	Reservoir	0.000	1	n/a	0	2	486.57	0.000	2 Year Basin Routing
10	Reservoir	4.338	1	21	15,392	4	488.77	11,526	15 Year Routing
11	Reservoir	0.000	1	n/a	0	6	486.57	0.000	25 Year Routing
12	Reservoir	0.000	1	n/a	0	8	486.57	0.000	100 Year Routing
13	Manual	0.000	1	n/a	0	------	------	------	2-Year Basin By-Pass
14	Manual	1.090	1	2	1,308	------	------	------	15-Year Basin By-Pass
15	Manual	0.000	1	n/a	0	------	------	------	25-Year Basin By-Pass
16	Manual	0.000	1	n/a	0	------	------	------	100-Year Basin By-Pass
17	Combine	0.000	1	n/a	0	9, 13,	------	------	2 Year Combined
18	Combine	5.353	1	20	16,700	10, 14,	------	------	15-Year Combined
19	Combine	0.000	1	n/a	0	11, 15,	------	------	25-Year Combined
20	Combine	0.000	1	n/a	0	12, 16,	------	------	100-Year Combined

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 09 / 30 / 2022

Hyd. No. 3

Pre-Developed 15-Year

Hydrograph type	= Manual	Peak discharge	= 7.600 cfs
Storm frequency	= 10 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 9,120 cuft

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 09 / 30 / 2022

Hyd. No. 4

Post-Devlopment 15-Year to Basin

Hydrograph type	= Manual	Peak discharge	= 12.83 cfs
Storm frequency	= 10 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 15,396 cuft

Hydrograph Report

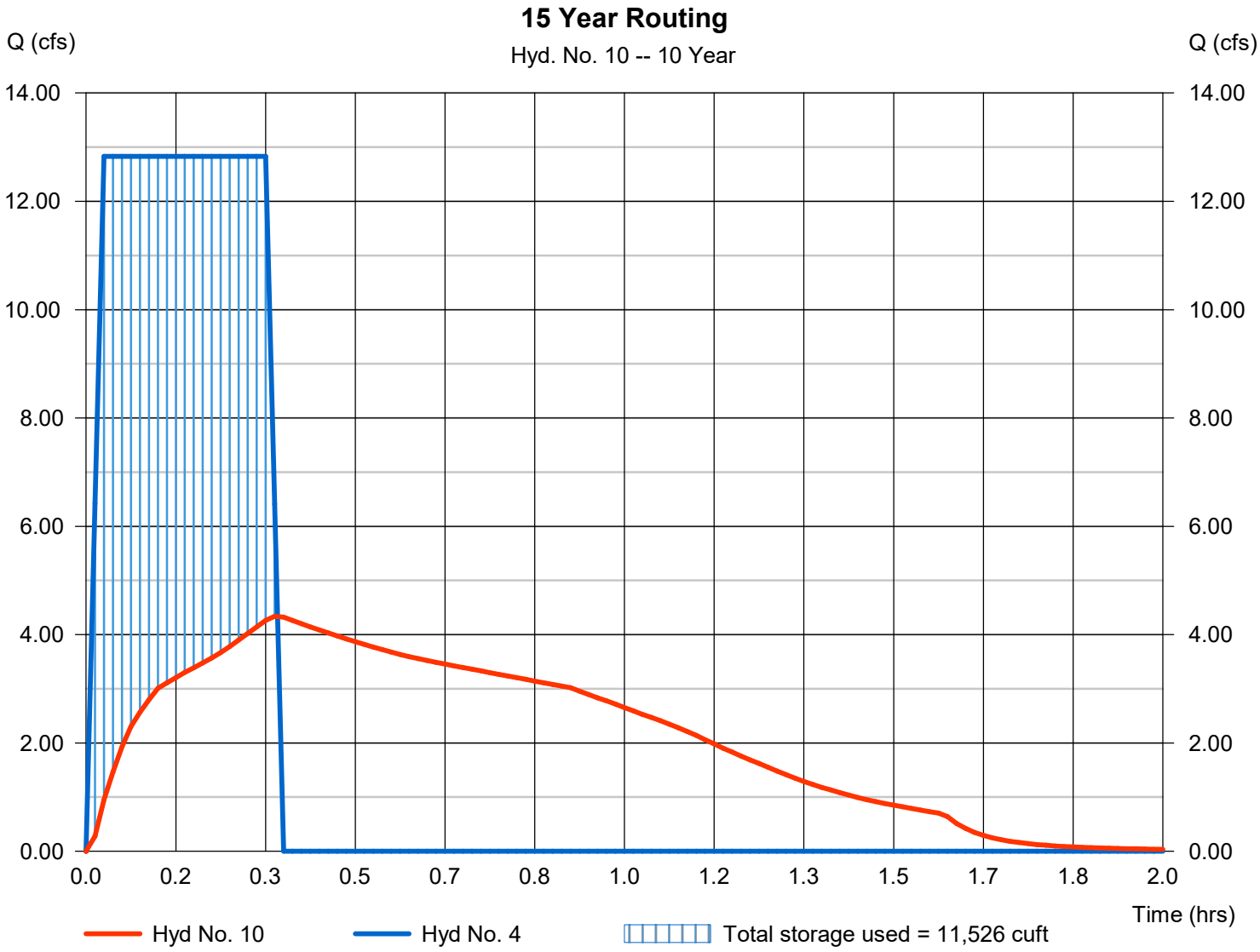
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 09 / 30 / 2022

Hyd. No. 10

15 Year Routing

Hydrograph type	=	Reservoir	Peak discharge	=	4.338 cfs
Storm frequency	=	10 yrs	Time to peak	=	0.35 hrs
Time interval	=	1 min	Hyd. volume	=	15,392 cuft
Inflow hyd. No.	=	4 - Post-Devlopment 15-Year to Basin	Max. Elevation	=	488.77 ft
Reservoir name	=	Basin	Max. Storage	=	11,526 cuft

Storage Indication method used.



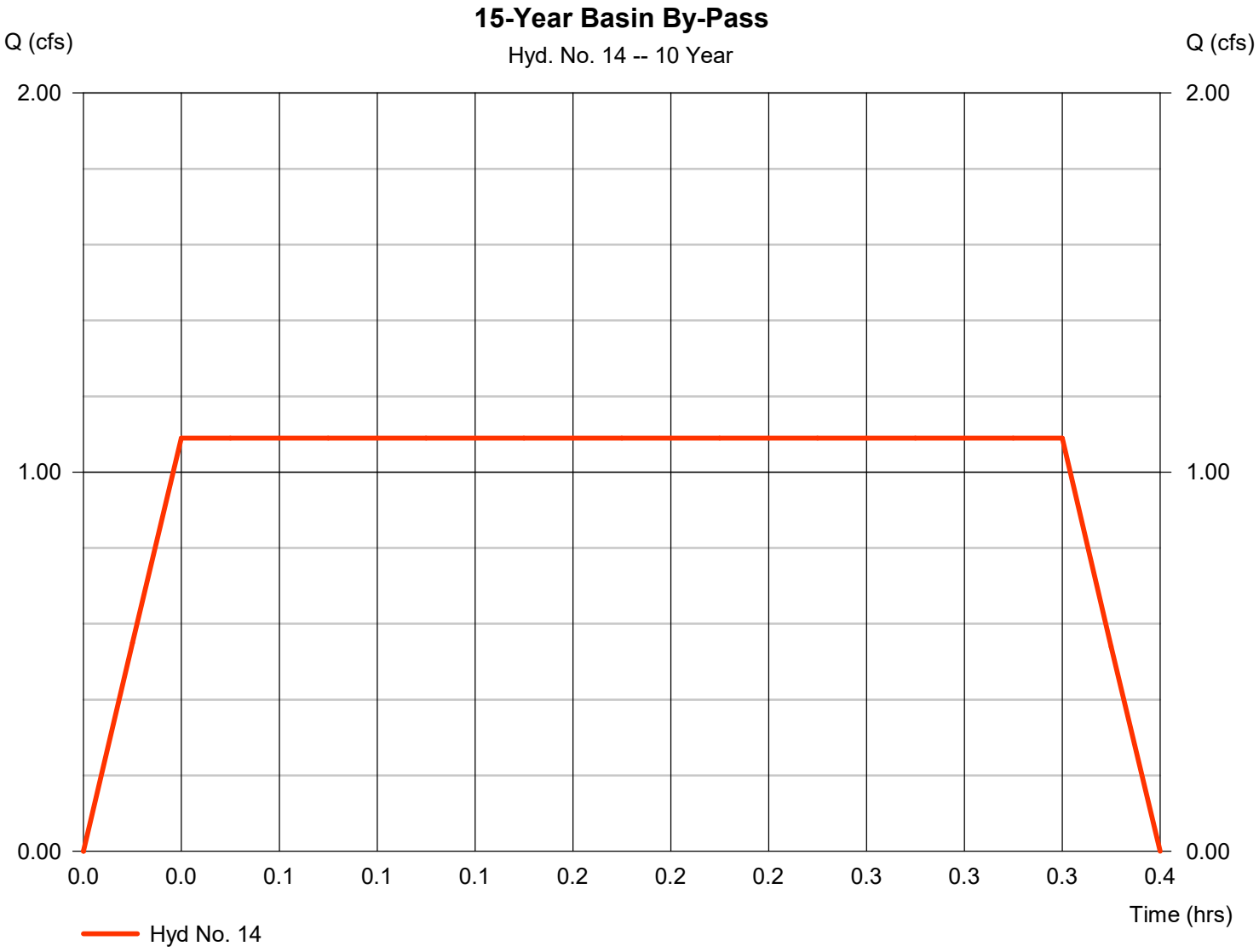
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 09 / 30 / 2022

Hyd. No. 14

15-Year Basin By-Pass

Hydrograph type	= Manual	Peak discharge	= 1.090 cfs
Storm frequency	= 10 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 1,308 cuft



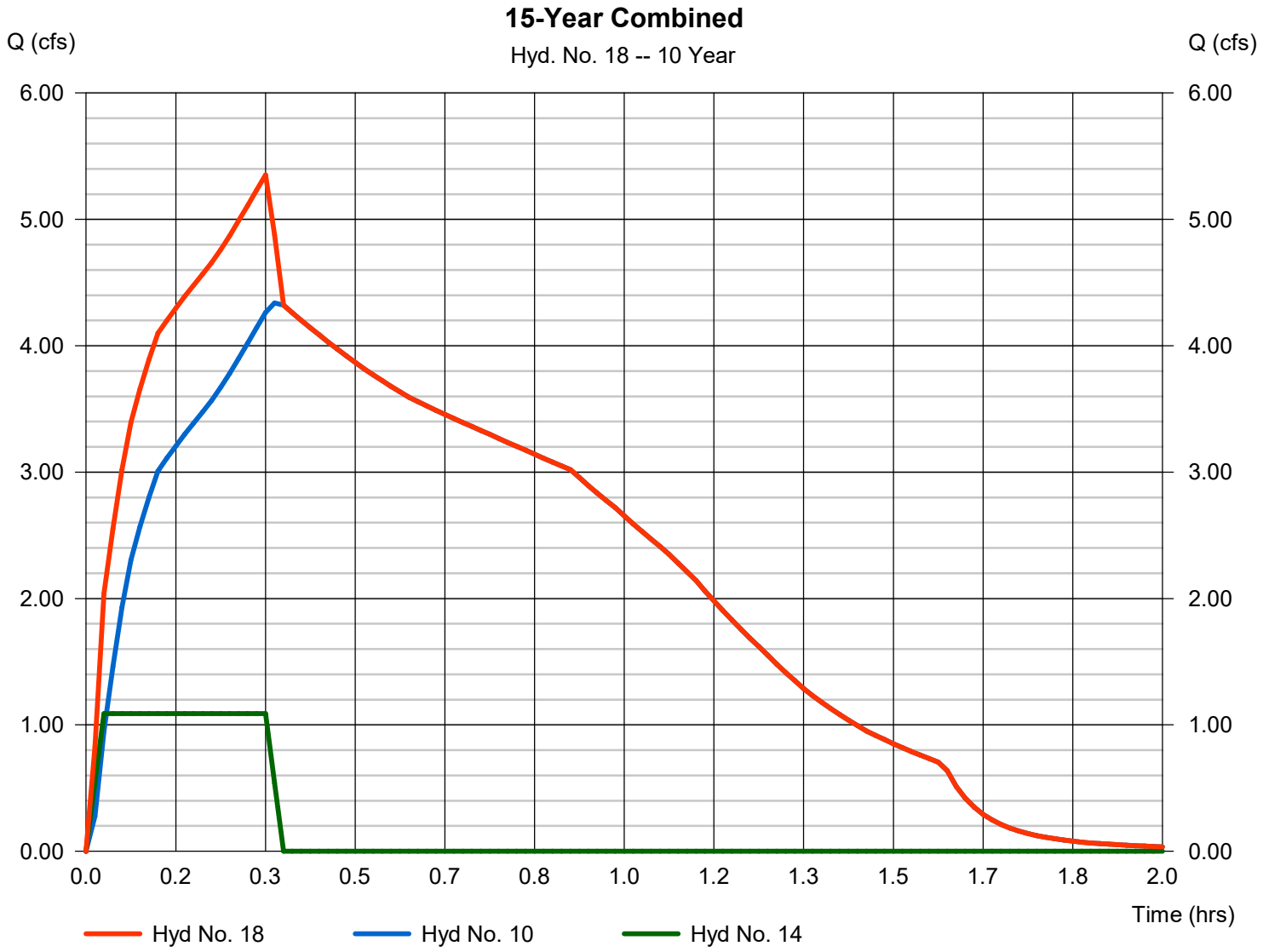
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 09 / 30 / 2022

Hyd. No. 18

15-Year Combined

Hydrograph type	=	Combine	Peak discharge	=	5.353 cfs
Storm frequency	=	10 yrs	Time to peak	=	0.33 hrs
Time interval	=	1 min	Hyd. volume	=	16,700 cuft
Inflow hyds.	=	10, 14	Contrib. drain. area	=	0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Manual	0.000	1	n/a	0	------	------	------	Pre-Developed 2-Year
2	Manual	0.000	1	n/a	0	------	------	------	Post-Dev 2-Year to Basin
3	Manual	0.000	1	n/a	0	------	------	------	Pre-Developed 15-Year
4	Manual	0.000	1	n/a	0	------	------	------	Post-Devlopment 15-Year to Basin
5	Manual	8.090	6	12	58,248	------	------	------	Pre-Developed 25-Year
6	Manual	13.73	1	2	16,476	------	------	------	Post-Dev 25-Year to Basin
7	Manual	0.000	1	n/a	0	------	------	------	Pre-Developed 100-Year
8	Manual	0.000	1	n/a	0	------	------	------	Post-Dev 100-Year
9	Reservoir	0.000	1	n/a	0	2	486.57	0.000	2 Year Basin Routing
10	Reservoir	0.000	1	n/a	0	4	486.57	0.000	15 Year Routing
11	Reservoir	4.544	1	21	16,472	6	488.88	12,455	25 Year Routing
12	Reservoir	0.000	1	n/a	0	8	486.57	0.000	100 Year Routing
13	Manual	0.000	1	n/a	0	------	------	------	2-Year Basin By-Pass
14	Manual	0.000	1	n/a	0	------	------	------	15-Year Basin By-Pass
15	Manual	1.160	1	2	1,392	------	------	------	25-Year Basin By-Pass
16	Manual	0.000	1	n/a	0	------	------	------	100-Year Basin By-Pass
17	Combine	0.000	1	n/a	0	9, 13,	------	------	2 Year Combined
18	Combine	0.000	1	n/a	0	10, 14,	------	------	15-Year Combined
19	Combine	5.629	1	20	17,864	11, 15,	------	------	25-Year Combined
20	Combine	0.000	1	n/a	0	12, 16,	------	------	100-Year Combined

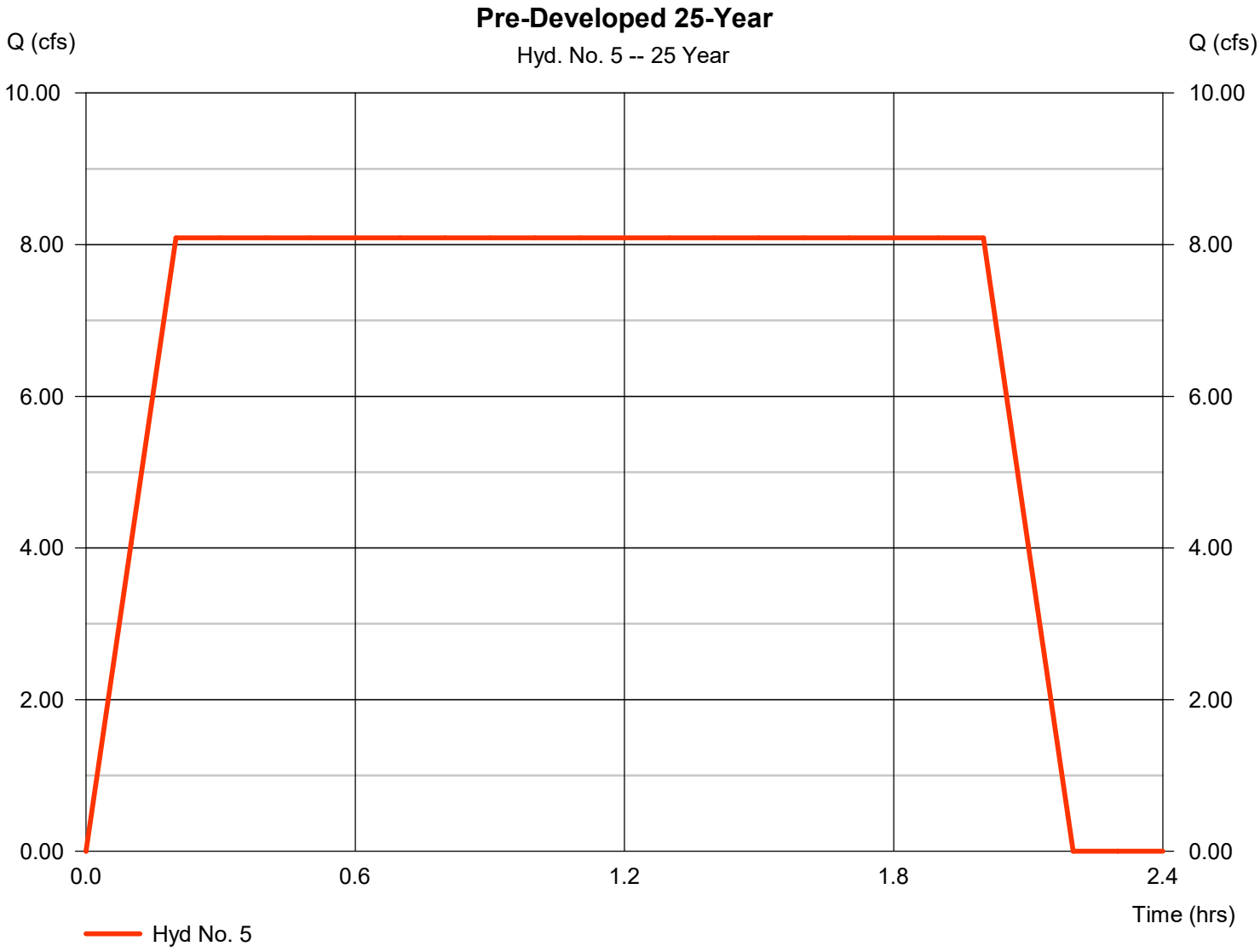
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 09 / 30 / 2022

Hyd. No. 5

Pre-Developed 25-Year

Hydrograph type	= Manual	Peak discharge	= 8.090 cfs
Storm frequency	= 25 yrs	Time to peak	= 0.20 hrs
Time interval	= 6 min	Hyd. volume	= 58,248 cuft



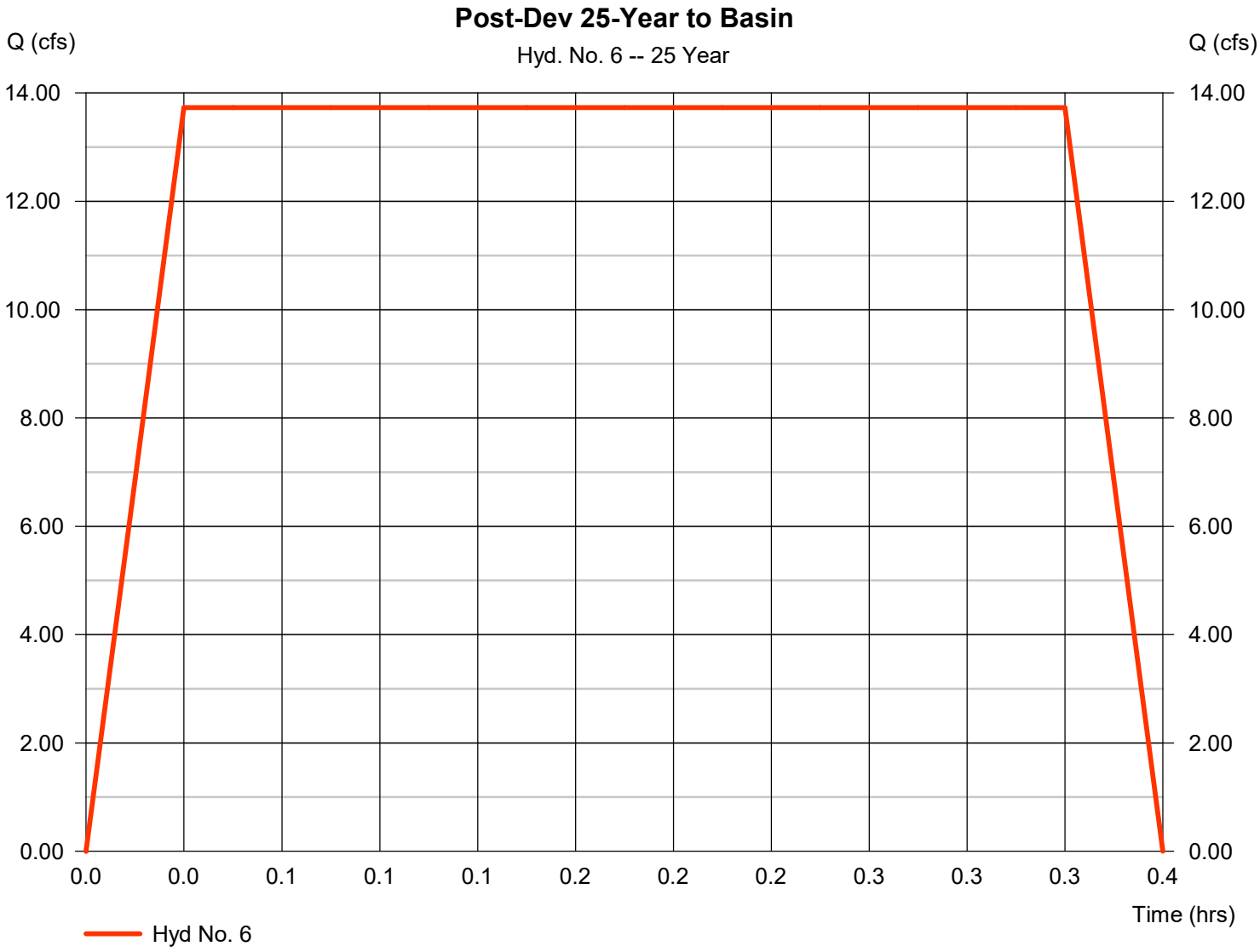
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 09 / 30 / 2022

Hyd. No. 6

Post-Dev 25-Year to Basin

Hydrograph type	= Manual	Peak discharge	= 13.73 cfs
Storm frequency	= 25 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 16,476 cuft



Hydrograph Report

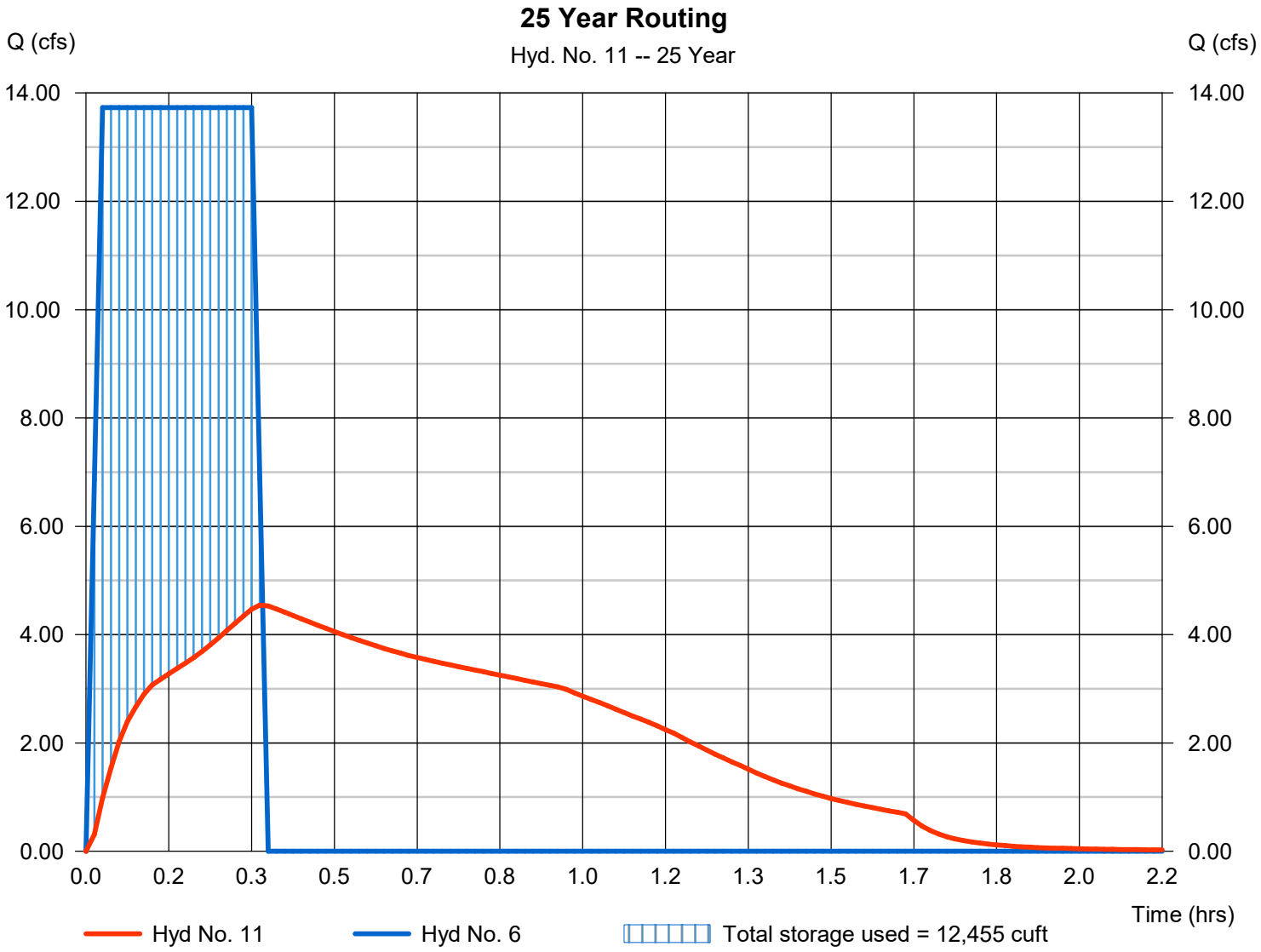
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 09 / 30 / 2022

Hyd. No. 11

25 Year Routing

Hydrograph type	=	Reservoir	Peak discharge	=	4.544 cfs
Storm frequency	=	25 yrs	Time to peak	=	0.35 hrs
Time interval	=	1 min	Hyd. volume	=	16,472 cuft
Inflow hyd. No.	=	6 - Post-Dev 25-Year to Basin	Max. Elevation	=	488.88 ft
Reservoir name	=	Basin	Max. Storage	=	12,455 cuft

Storage Indication method used.



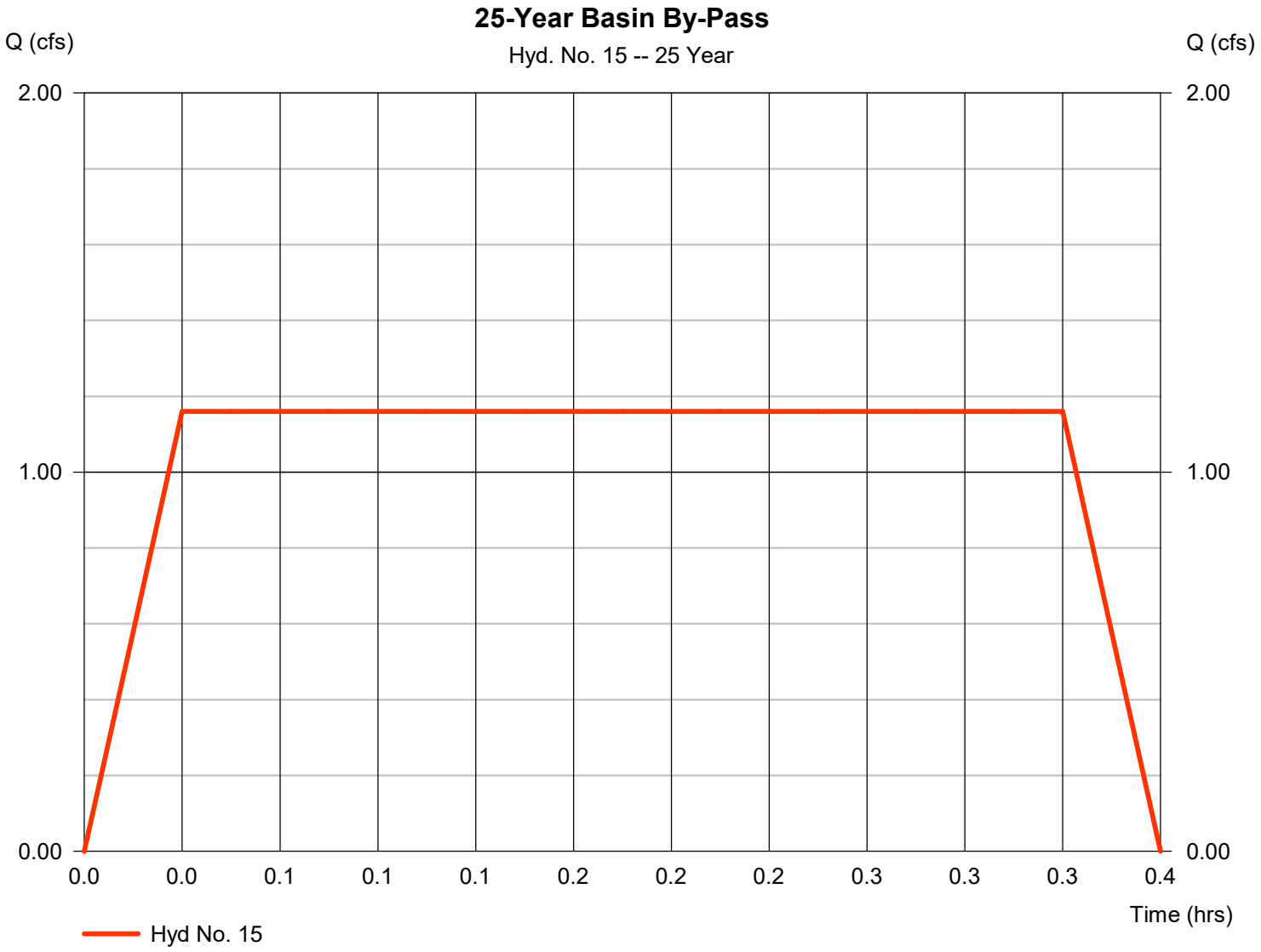
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 09 / 30 / 2022

Hyd. No. 15

25-Year Basin By-Pass

Hydrograph type	= Manual	Peak discharge	= 1.160 cfs
Storm frequency	= 25 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 1,392 cuft



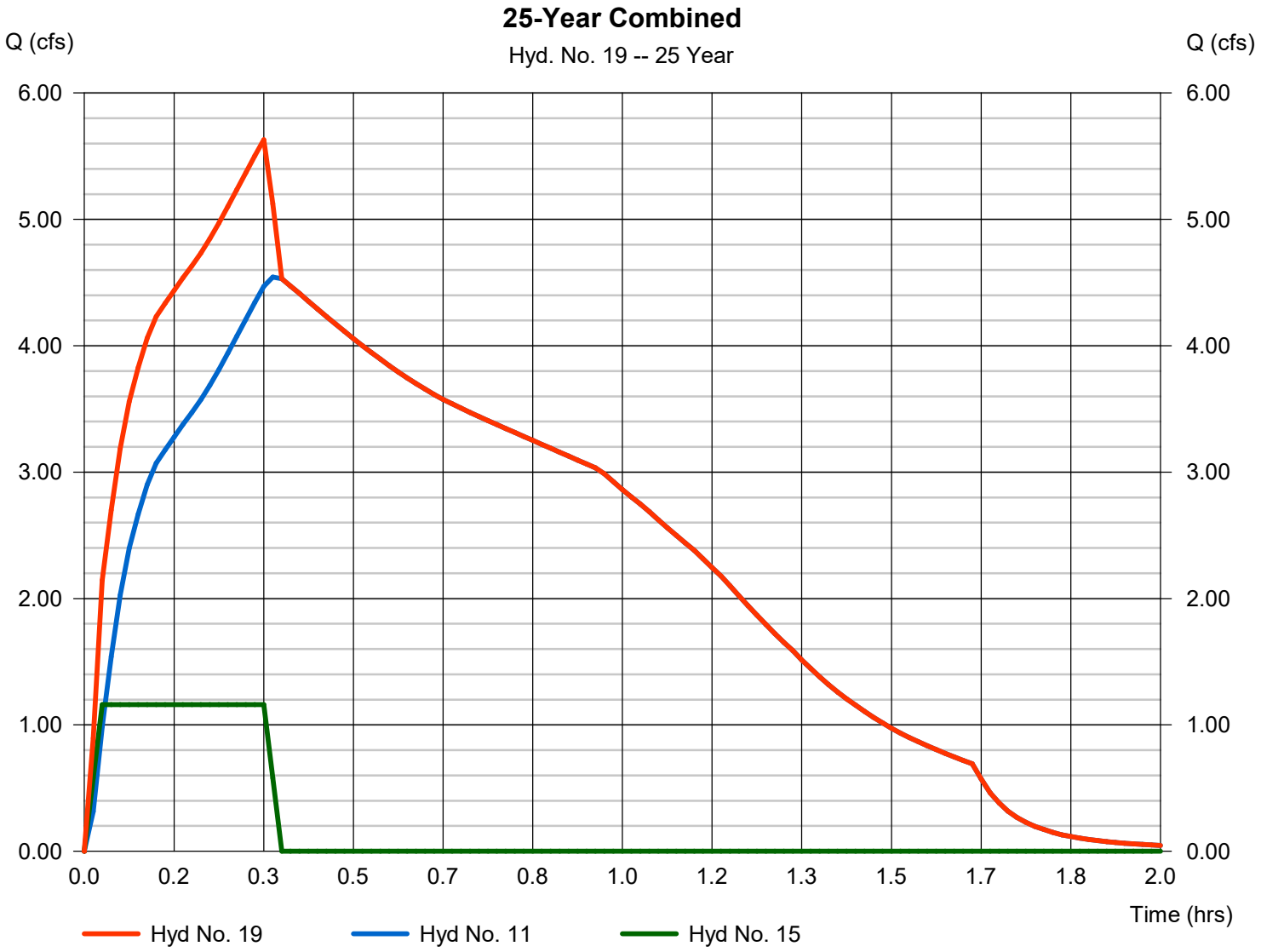
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 09 / 30 / 2022

Hyd. No. 19

25-Year Combined

Hydrograph type	=	Combine	Peak discharge	=	5.629 cfs
Storm frequency	=	25 yrs	Time to peak	=	0.33 hrs
Time interval	=	1 min	Hyd. volume	=	17,864 cuft
Inflow hyds.	=	11, 15	Contrib. drain. area	=	0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	Manual	0.000	1	n/a	0	------	------	------	Pre-Developed 2-Year
2	Manual	0.000	1	n/a	0	------	------	------	Post-Dev 2-Year to Basin
3	Manual	0.000	1	n/a	0	------	------	------	Pre-Developed 15-Year
4	Manual	0.000	1	n/a	0	------	------	------	Post-Devlopment 15-Year to Basin
5	Manual	0.000	6	n/a	0	------	------	------	Pre-Developed 25-Year
6	Manual	0.000	1	n/a	0	------	------	------	Post-Dev 25-Year to Basin
7	Manual	10.24	1	2	12,288	------	------	------	Pre-Developed 100-Year
8	Manual	17.28	1	2	20,736	------	------	------	Post-Dev 100-Year
9	Reservoir	0.000	1	n/a	0	2	486.57	0.000	2 Year Basin Routing
10	Reservoir	0.000	1	n/a	0	4	486.57	0.000	15 Year Routing
11	Reservoir	0.000	1	n/a	0	6	486.57	0.000	25 Year Routing
12	Reservoir	7.589	1	21	20,732	8	489.18	15,865	100 Year Routing
13	Manual	0.000	1	n/a	0	------	------	------	2-Year Basin By-Pass
14	Manual	0.000	1	n/a	0	------	------	------	15-Year Basin By-Pass
15	Manual	0.000	1	n/a	0	------	------	------	25-Year Basin By-Pass
16	Manual	1.470	1	2	1,764	------	------	------	100-Year Basin By-Pass
17	Combine	0.000	1	n/a	0	9, 13,	------	------	2 Year Combined
18	Combine	0.000	1	n/a	0	10, 14,	------	------	15-Year Combined
19	Combine	0.000	1	n/a	0	11, 15,	------	------	25-Year Combined
20	Combine	8.527	1	20	22,496	12, 16,	------	------	100-Year Combined

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 09 / 30 / 2022

Hyd. No. 7

Pre-Developed 100-Year

Hydrograph type	= Manual	Peak discharge	= 10.24 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 12,288 cuft

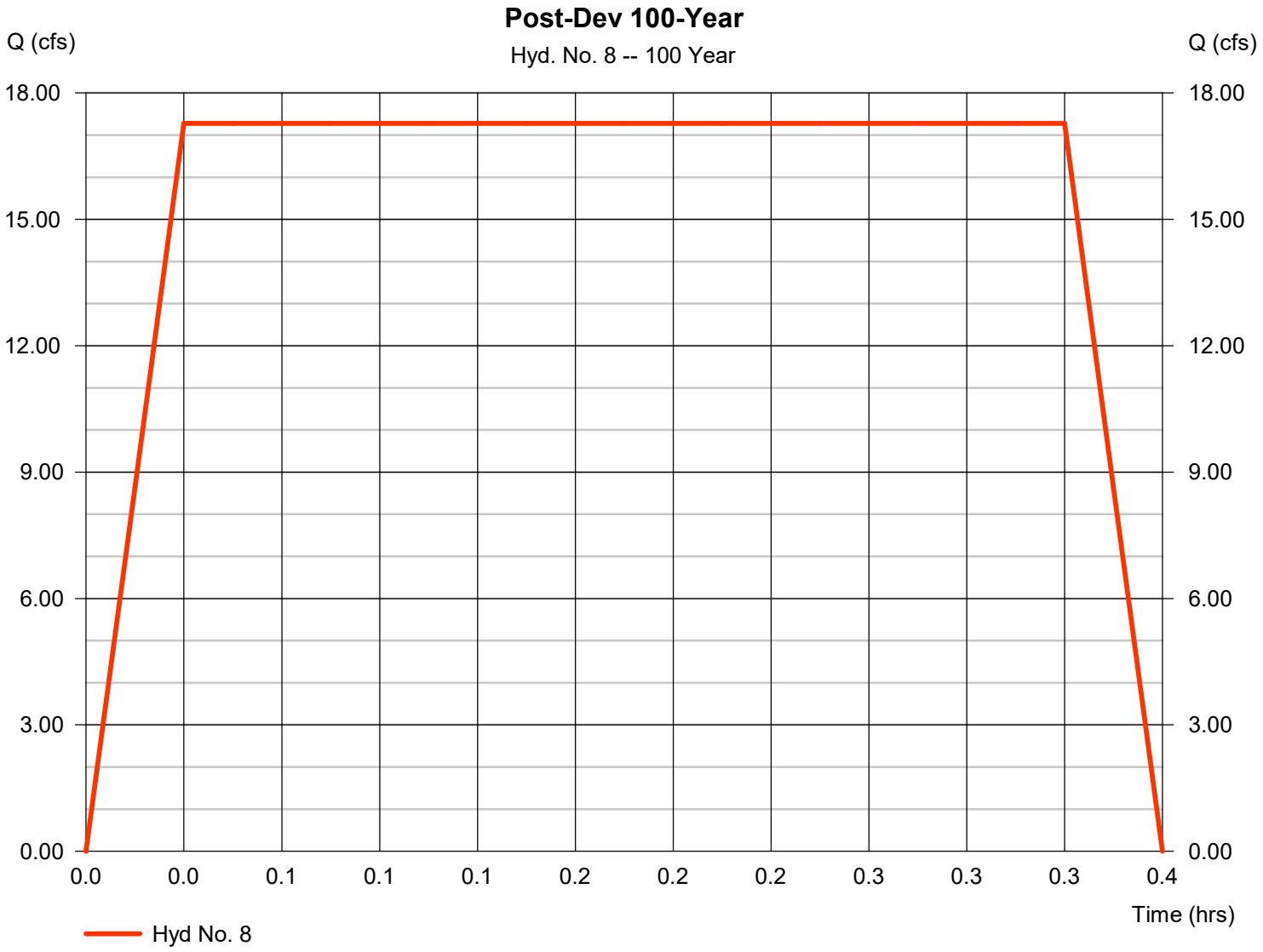
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 09 / 30 / 2022

Hyd. No. 8

Post-Dev 100-Year

Hydrograph type	= Manual	Peak discharge	= 17.28 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 20,736 cuft



Hydrograph Report

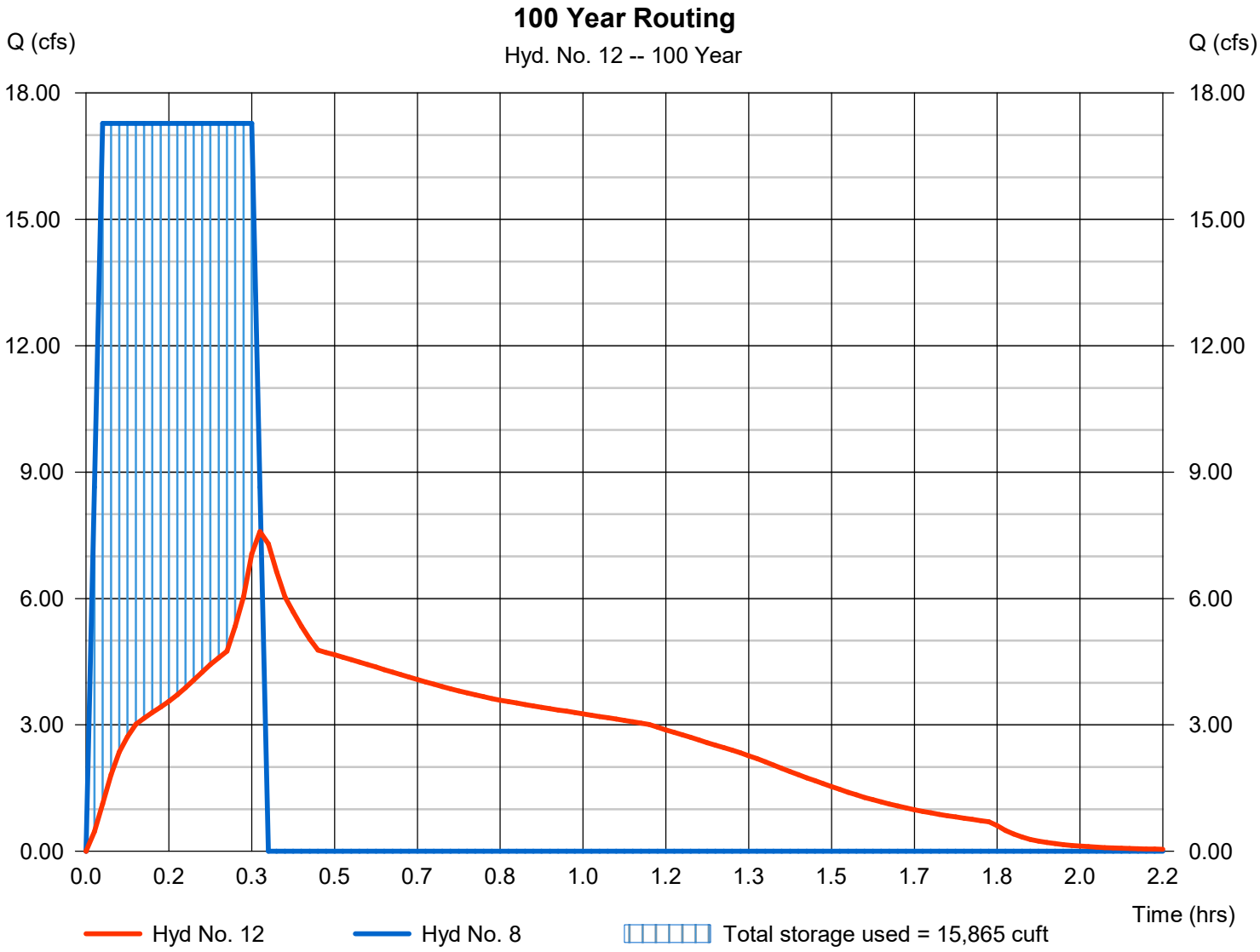
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 09 / 30 / 2022

Hyd. No. 12

100 Year Routing

Hydrograph type	=	Reservoir	Peak discharge	=	7.589 cfs
Storm frequency	=	100 yrs	Time to peak	=	0.35 hrs
Time interval	=	1 min	Hyd. volume	=	20,732 cuft
Inflow hyd. No.	=	8 - Post-Dev 100-Year	Max. Elevation	=	489.18 ft
Reservoir name	=	Basin	Max. Storage	=	15,865 cuft

Storage Indication method used.



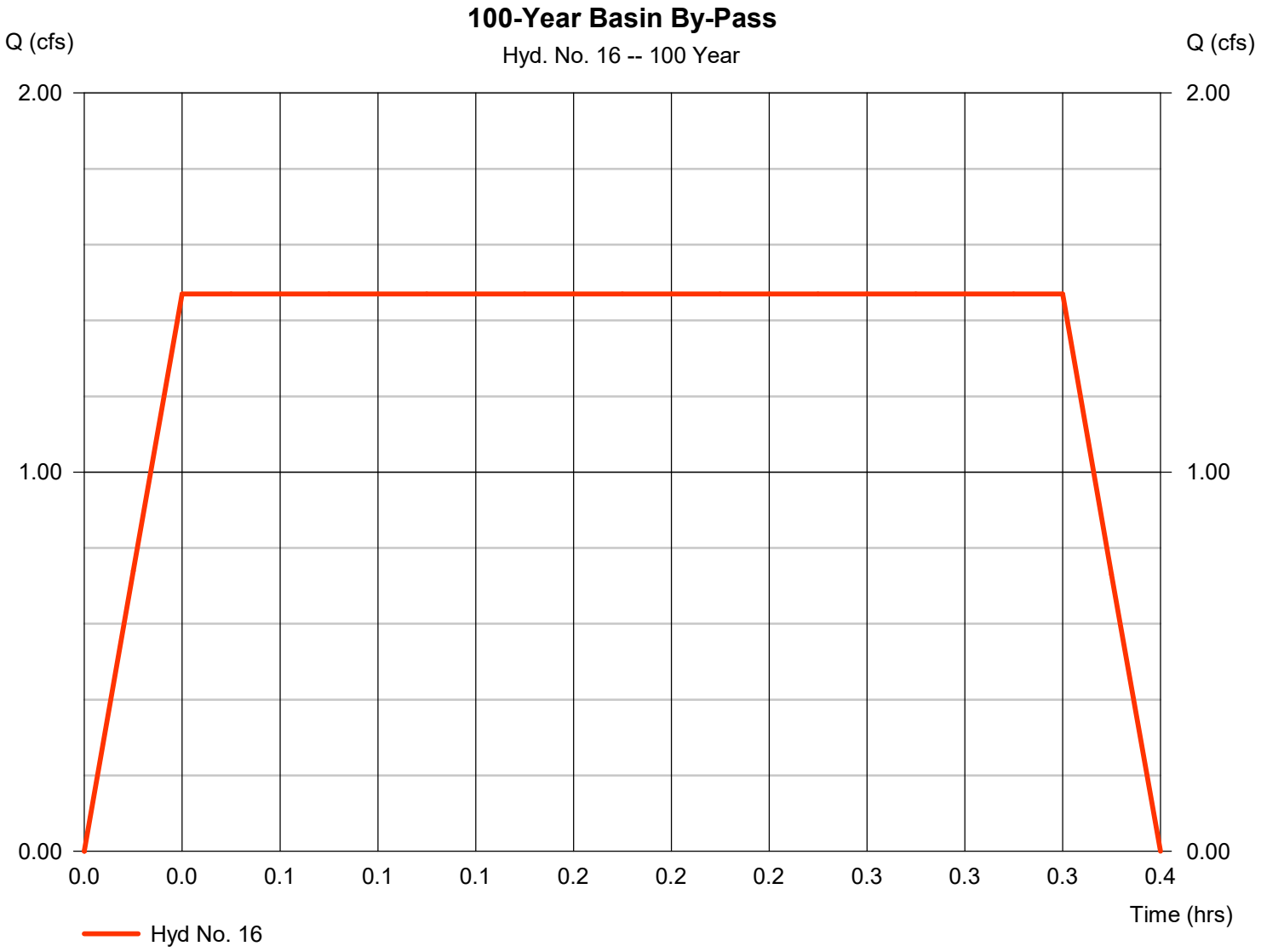
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 09 / 30 / 2022

Hyd. No. 16

100-Year Basin By-Pass

Hydrograph type	= Manual	Peak discharge	= 1.470 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.03 hrs
Time interval	= 1 min	Hyd. volume	= 1,764 cuft



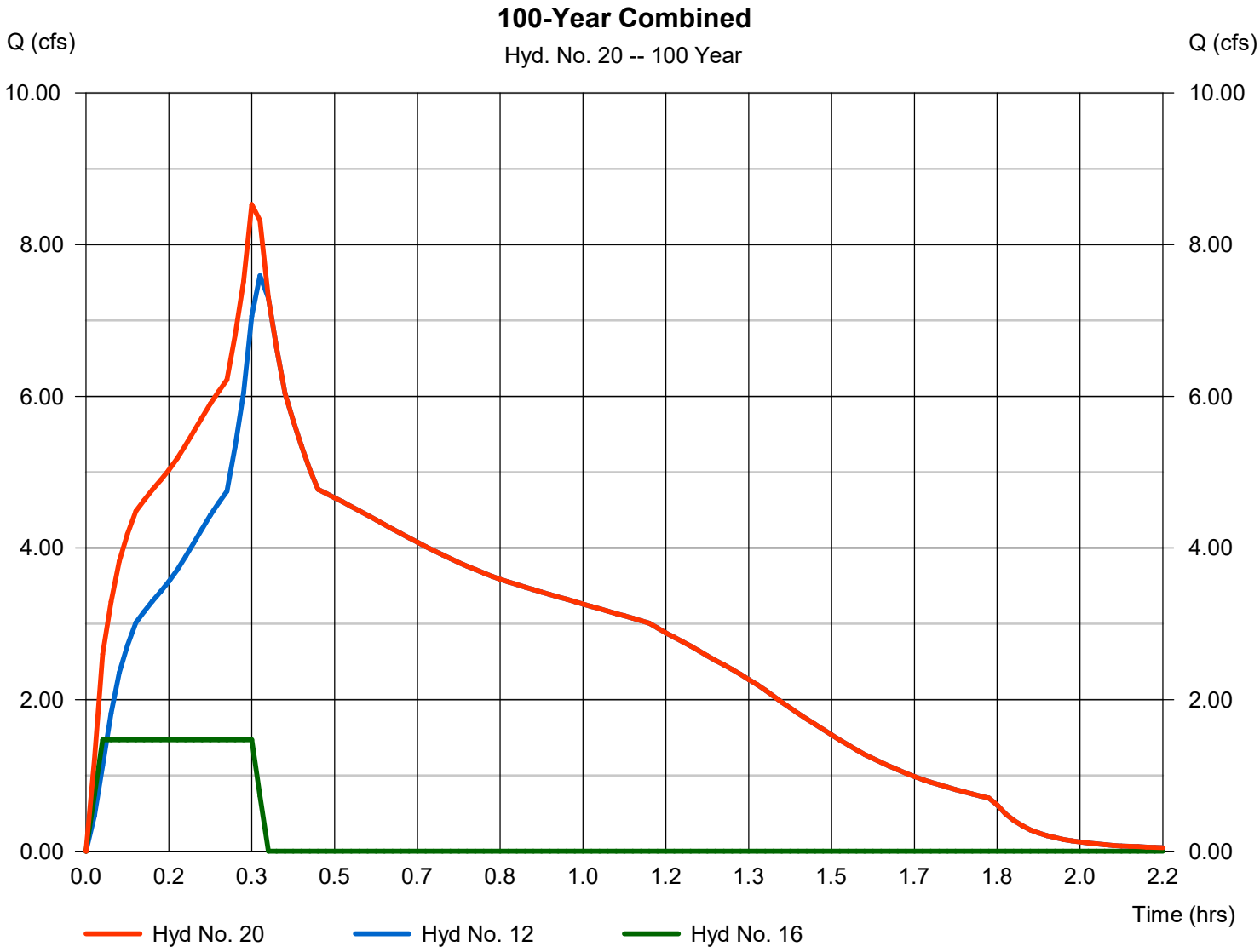
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 09 / 30 / 2022

Hyd. No. 20

100-Year Combined

Hydrograph type	= Combine	Peak discharge	= 8.527 cfs
Storm frequency	= 100 yrs	Time to peak	= 0.33 hrs
Time interval	= 1 min	Hyd. volume	= 22,496 cuft
Inflow hyds.	= 12, 16	Contrib. drain. area	= 0.000 ac



Hydrograph Report

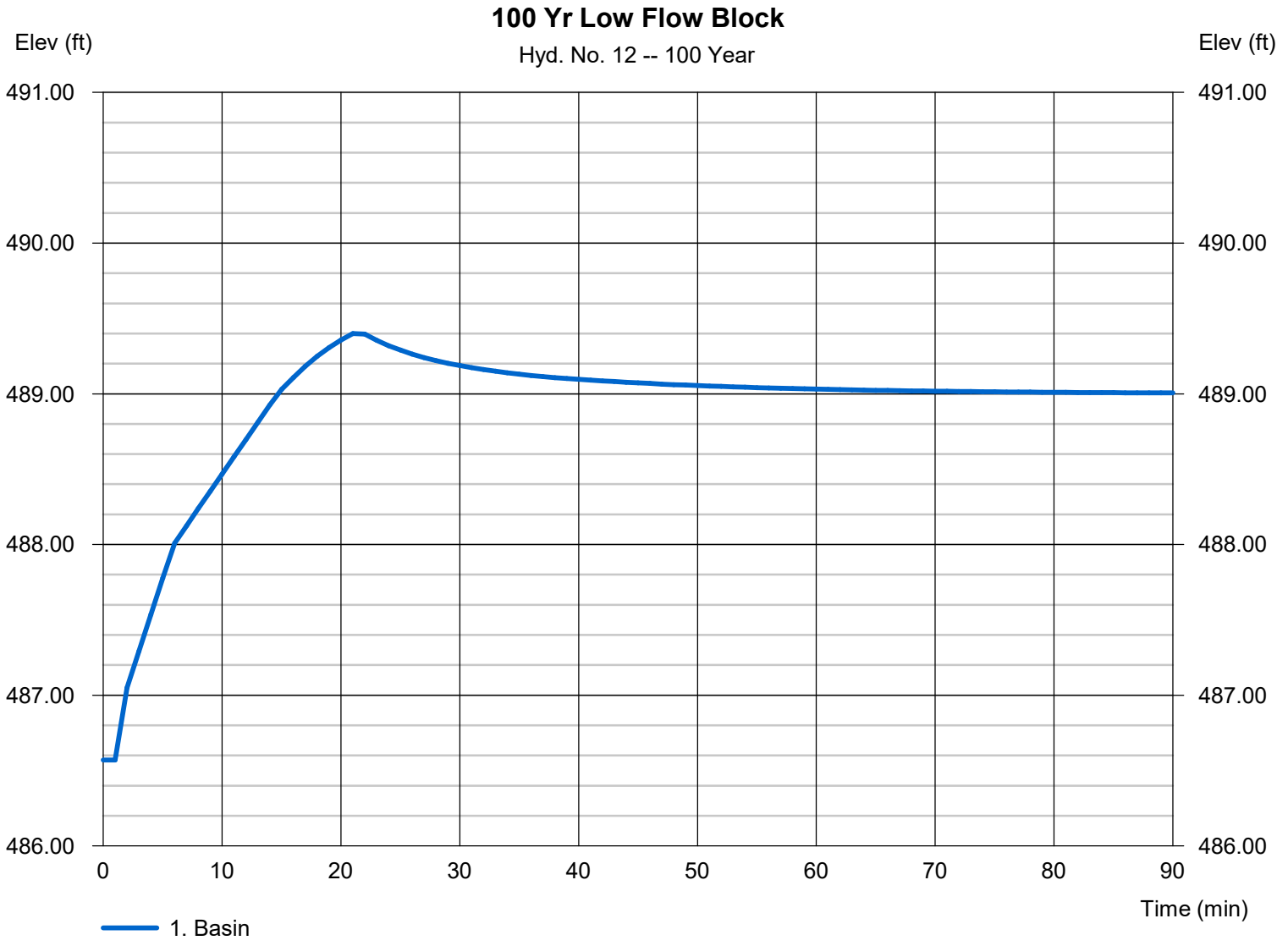
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 09 / 30 / 2022

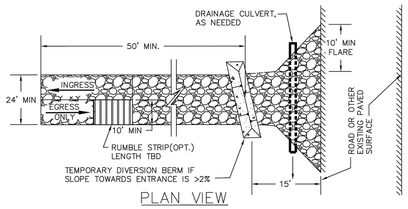
Hyd. No. 12

100 Yr Low Flow Block

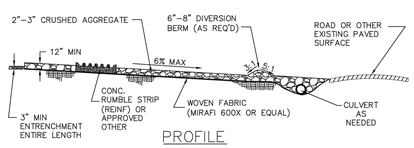
Hydrograph type	=	Reservoir	Peak discharge	=	9.194 cfs
Storm frequency	=	100 yrs	Time to peak	=	21 min
Time interval	=	1 min	Hyd. volume	=	7,096 cuft
Inflow hyd. No.	=	8 - Post-Dev 100-Year	Max. Elevation	=	489.40 ft
Reservoir name	=	Basin	Max. Storage	=	18,541 cuft

Storage Indication method used.





NOTE:
A SPECIAL USE PERMIT IS REQ'D FOR THE ENTRANCE.



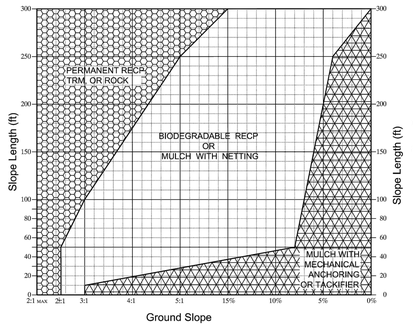
DESIGN NOTES

1. DIVERT ALL RUNOFF TO A SEDIMENTATION CONTROL DEVICE.
2. PROVIDE WATER SUPPLY FOR WASHDOWN.

St. Charles County
Erosion & Sediment Controls
Standard Drawings

CONSTRUCTION TRAFFIC WASH-OFF PAD

DATE: APRIL 2008 | DRAWING: ESC-4



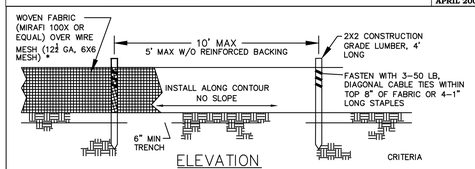
NOTES

1. REFER TO DESIGN MANUAL FOR APPLICATION RATES.
2. DUE TO THE DIFFERENT PRODUCTS ON THE MARKET, CONTRACTOR MUST SUBMIT MANUFACTURER SPECIFICATIONS ON APPLICATION RATE AND PROCEDURES.

St. Charles County
Erosion & Sediment Controls
Standard Drawings

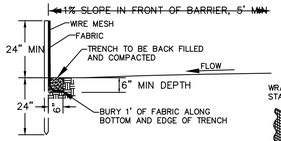
SURFACE STABILIZATION CHART FOR SHEET FLOW

DATE: MAY 2005 | DRAWING: ESC-3



CRITERIA

1. SILT FENCE SHALL BE 24 INCHES HIGH.
2. SILT FENCE SHALL NOT BE USED FOR CONCENTRATED FLOWS.
3. GEOSYNTHETIC REINFORCED SILT FENCE BACKING MAY BE USED IN LIEU OF WIRE MESH.
4. WIRE MESH WILL BE USED AT LOCATIONS SHOWN ON THE APPROVED SWPPP.

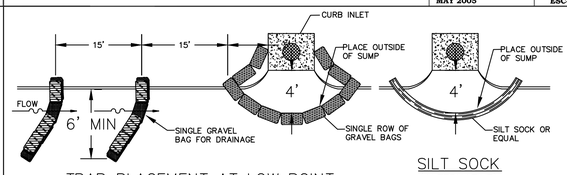


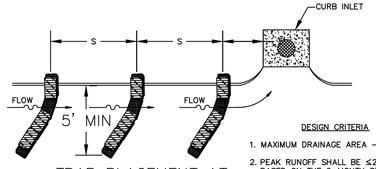
JOINING SECTIONS OF SILT FENCE

NOTE: IF FABRIC IS INSTALLED BY EQUIPMENT DESIGNED TO SLICE INTO THE GROUND, THE TRENCH IS NOT REQ'D.

CITY OF O'FALLON ENGINEERING DEPARTMENT O'FALLON, MISSOURI

SILT FENCE INSTALLATION SHEET FLOW (ONLY)





SPACING OF TRAPS

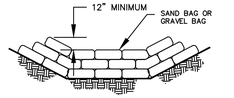
GUTTER SLOPE	S
LOW PT	15'
1%	20'
2%	15'
3% MAX.	10'

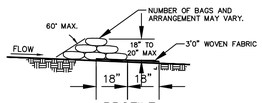
DESIGN CRITERIA

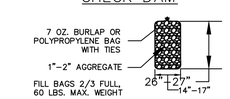
1. MAXIMUM DRAINAGE AREA – 1 ACRE.
2. PEAK RUNOFF SHALL BE ≤2 CFS BASED ON THE 6–MONTH STORM.
3. STACK GRAVEL BAGS DOUBLE HIGH. PROVIDE GAP FOR DRAINAGE.

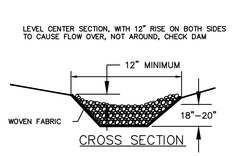
CITY OF O'FALLON ENGINEERING DEPARTMENT O'FALLON, MISSOURI

CURB INLET PROTECTION







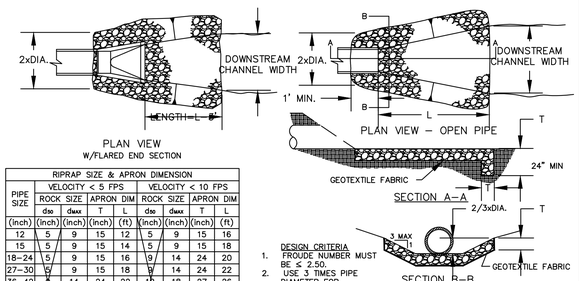


NOTE:
1. CHECK DAMS MAY BE CONSTRUCTED OF SEVERAL ESC CHECK DAM PRODUCTS.

2. SEE TABLE 60-12 AND ESC 1 FOR CHECK DAM SPACING.

CITY OF O'FALLON ENGINEERING DEPARTMENT O'FALLON, MISSOURI

CHECK DAMS



RIPRAP SIZE & APRON DIMENSION									
PIPE SIZE	VELOCITY < 5 FPS				VELOCITY < 10 FPS			
	ROCK SIZE		APRON DIM		ROCK SIZE		APRON DIM	
	d_{50}	d_{MAX}	T	L	d_{50}	d_{MAX}	T	L
(inch)	(inch)	(inch)	(inch)	(ft)	(inch)	(inch)	(inch)	(ft)
12	5	9	15	12	5	9	15	16
15	5	9	15	14	5	9	15	18
18–24	5	9	15	16	9	14	24	20
27–30	5	9	15	18	9	14	24	22
36–42	9	14	24	22	12	18	27	26
48–54	9	14	24	26	12	18	27	30
60–66	12	18	27	34	15	24	30	38
72–84	15	24	30	42	15	24	30	46
96	18	27	30	50	18	27	30	54

d_{50} – NOMINAL DIAMETER
d_{MAX} – MAXIMUM DIAMETER
T – THICKNESS
L – LENGTH

DESIGN CRITERIA

1. FROUDE NUMBER MUST BE ≤ 2.50.
2. USE 3 TIMES PIPE DIAMETER FOR DOWNSTREAM CHANNEL WIDTH IF THERE IS NO DEFINED CHANNEL.
3. BANK PROTECTION HEIGHT TO BE 2/3 TIMES PIPE DIAMETER.
4. ROCK SLOPES SHALL BE NO STEEPER THAN 3:1.

CITY OF O'FALLON ENGINEERING DEPARTMENT O'FALLON, MISSOURI

TEMPORARY OUTLET PIPE DISCHARGE PROTECTION

proposed prior to planting, as recommended by an agronomist, competent nursery company, or refer to NRCS MOFOTG Code 340 (Cover Crop) in Appendix D.

For channels, embankments, and slopes of 4:1 or steeper, seeding shall be a mixture of K31 fescue and rye at a rate of 400 pounds per acre.

Table 60-7 Temporary Fall Seeding

Plant Species	Rate [1] (lb/acre)	Seeding Times
Side-Oats	65	8/16 – 9/30
Winter Rye	50	8/01 – 10/15
Winter Wheat	60	8/01 – 10/15
Orchard Grass	120	8/01 – 10/15
Perennial Ryegrass	80	8/01 – 10/15
Tall fescue, Smooth Brome	80	8/01 – 10/15
K-31 Fescue	120	9/01 – 11/15
Ladino Clover	2 [2]	8/15 – 9/15
Crimson Clover	6 [2]	8/15 – 9/15
Orchard Grass and Oats or Rye	15 [2] 40 [2]	8/15 – 9/15

[1]If using aerial seeding or other broadcast method to apply seed without rolling or culti-packing, increase seeding rates by 50 percent.

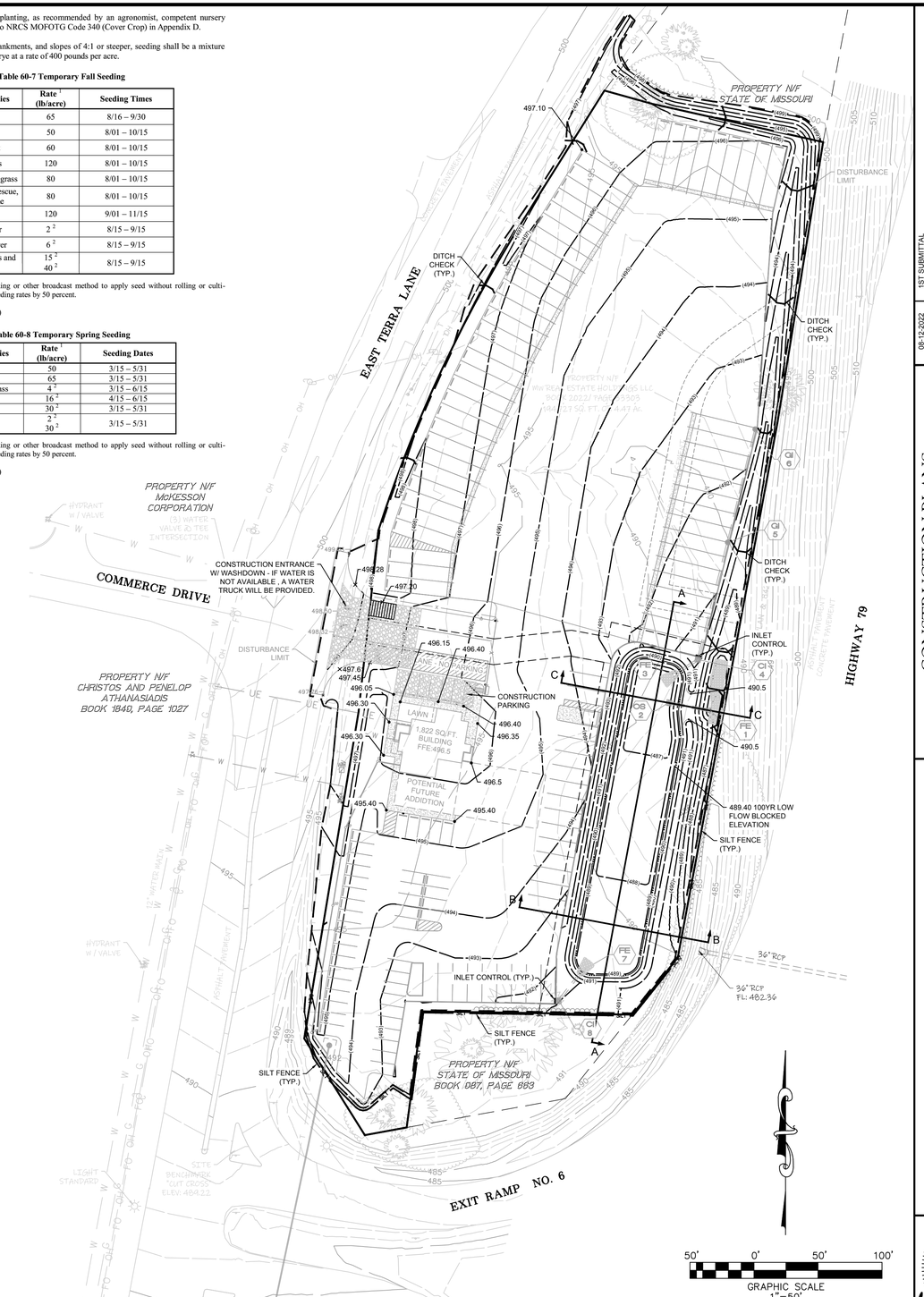
[2]Pure live seed (PLS)

Table 60-8 Temporary Spring Seeding

Plant Species	Rate [1] (lb/acre)	Seeding Dates
Winter Rye	50	3/15 – 5/31
Spring Oats	65	3/15 – 5/31
Annual Ryegrass	4 [2]	3/15 – 6/15
Sudangrass	16 [2]	4/15 – 6/15
K-31 Fescue	30 [2]	3/15 – 5/31
Red Clover & Oats	2 [2] 30 [2]	3/15 – 5/31

[1]If using aerial seeding or other broadcast method to apply seed without rolling or culti-packing, increase seeding rates by 50 percent.

[2]Pure live seed (PLS)



PLANNING & DEVELOPMENT DIVISION FILE NUMBER: 22-003084
SITE PLAN APPROVAL: MAY 5,2022
CONDITIONAL USE PERMIT APPROVAL: MAY 12, 2022

PROPERTY OWNER: MW REAL ESTATE HOLDINGS LLC
1601 W. OLD RTE 66
STAFFORD MO, 65757

08-12-2022	1ST SUBMITTAL
09-30-2022	GRADING PLAN SUBMITTAL
09-30-2022	2ND SUBMITTAL
10-18-2022	2ND GRADING PLAN SUBMITTAL
10-27-2022	MODOT SUBMITTAL
11-03-2022	3RD SUBMITTAL

CONSTRUCTION PLANS
TRANSLAND TRUCKING
3480 E. TARRA LANE
O'FALLON MO, 63366
GRADING PLAN & SWPPP

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801 S. FIFTH STREET, SUITE 202
ST. CHARLES, MO 63301
TEL: (636) 947-0607 FAX: (636) 947-2448
ST CHARLES ENGINEERING AND SURVEYING, INC.
PROFESSIONAL ENGINEERING AND LAND SURVEYING CORPORATION
MISSOURI STATE CERTIFICATES OF AUTHORITY – 001647 & 000379

STATE OF MISSOURI
MICHAEL NEWELL MEINERS
NUMBER E-22483
REGISTERED PROFESSIONAL ENGINEER
MICHAEL NEWELL MEINERS
CIVIL ENGINEER PE–22483
11/03/22

ORDER NO.
2022032

DATE
11/03/2022

4

Call BEFORE you DIG TOLL FREE 1–800–344–7483 MISSOURI ONE–CALL SYSTEM, INC.

UNDERGROUND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE INFORMATION AND THEREFORE THEIR LOCATIONS SHALL BE CONSIDERED APPROXIMATE ONLY. THE VERIFICATION OF THE LOCATION OF ALL UNDERGROUND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE PLANS, SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, AND SHALL BE LOCATED PRIOR TO ANY GRADING AND/OR CONSTRUCTION OF IMPROVEMENTS.

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2022032 SITE PLAN.dwg

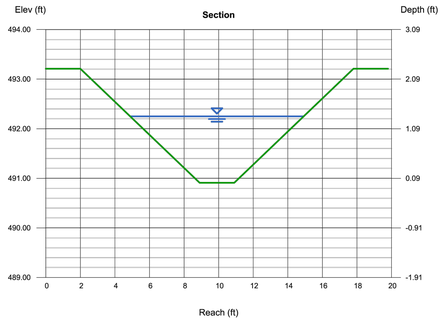
Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. — Thursday, Nov 3 2022

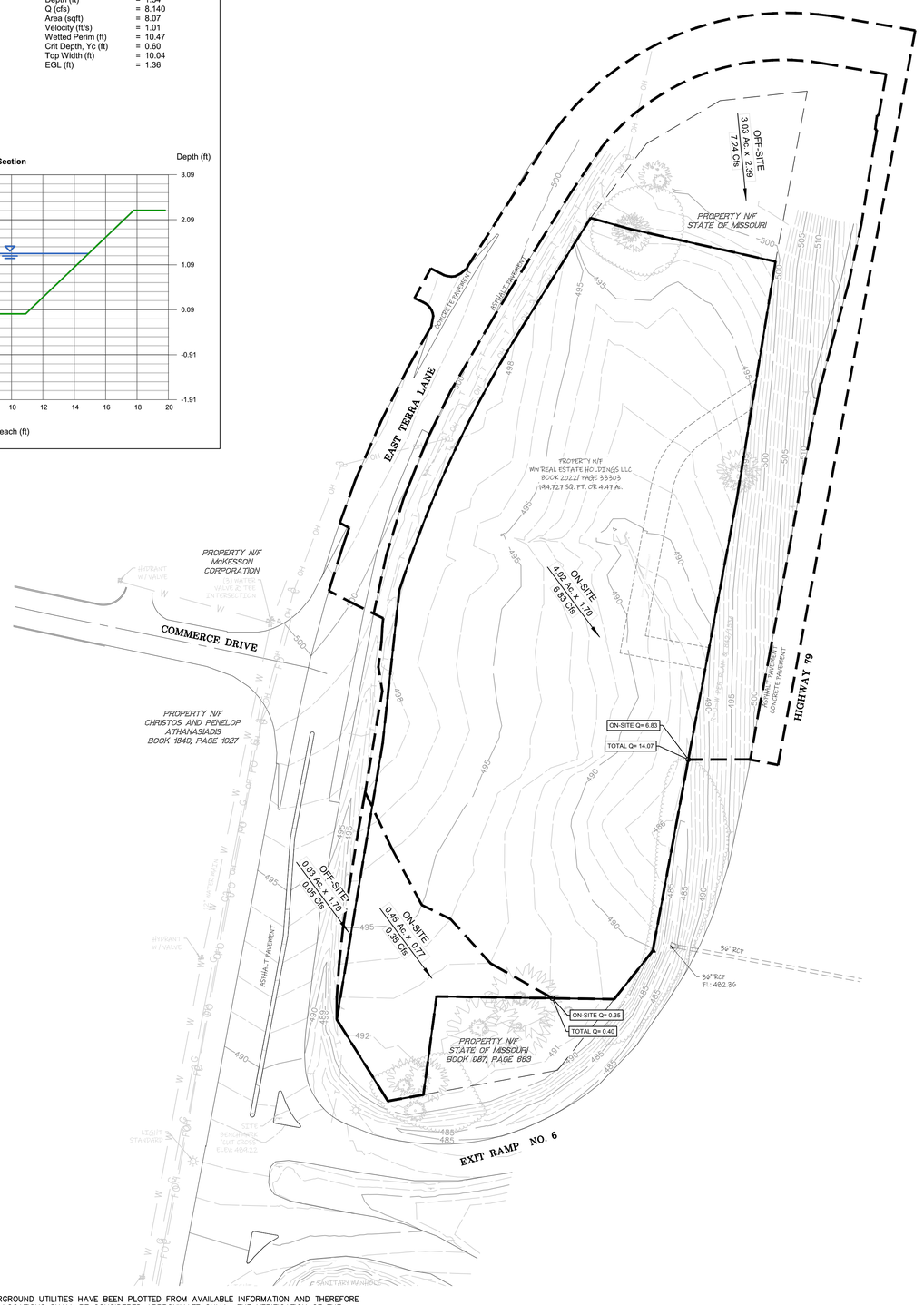
SECTION D-D

Trapezoidal		Highlighted	
Bottom Width (ft)	= 2.00	Depth (ft)	= 1.34
Side Slopes (z:1)	= 3.00, 3.00	Q (cfs)	= 8.140
Total Depth (ft)	= 2.30	Area (sqft)	= 8.07
Invert Elev (ft)	= 490.91	Velocity (ft/s)	= 1.01
Slope (%)	= 1.50	Wetted Perim (ft)	= 10.47
N-Value	= 0.150	Crit Depth, Yc (ft)	= 0.60
		Top Width (ft)	= 10.04
		EGL (ft)	= 1.36

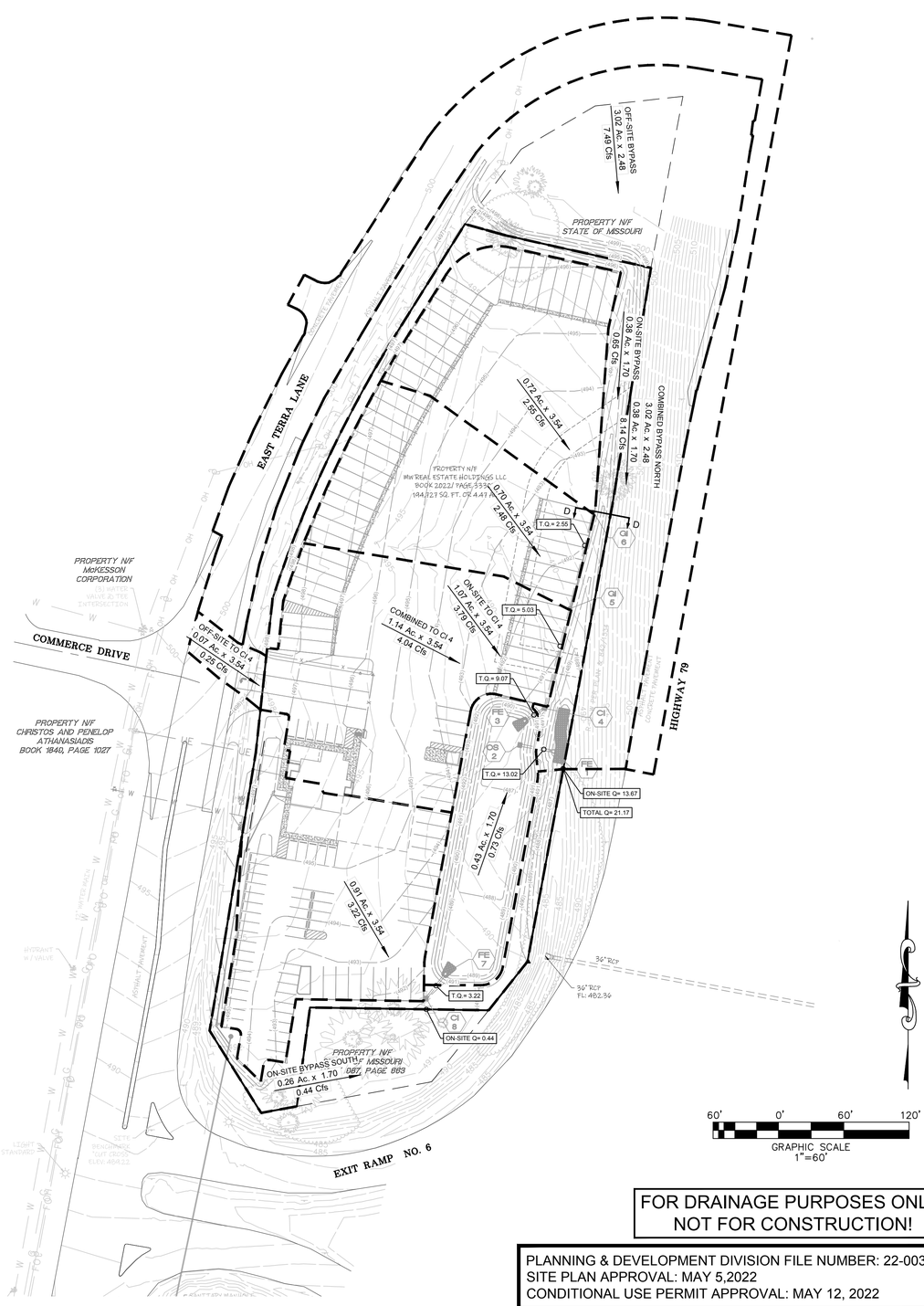
Calculations
Compute by: Known Q
Known Q (cfs) = 8.14



EXISTING DRAINAGE AREAS



PROPOSED DRAINAGE AREAS



FOR DRAINAGE PURPOSES ONLY.
NOT FOR CONSTRUCTION!

PLANNING & DEVELOPMENT DIVISION FILE NUMBER: 22-003084
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CONDITIONAL USE PERMIT APPROVAL: MAY 12, 2022

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1601 W. OLD RTE 66
STAFFORD MO, 65757

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08-12-2022	1ST SUBMITTAL
09-30-2022	GRADING PLAN SUBMITTAL
09-30-2022	2ND SUBMITTAL
10-18-2022	2ND GRADING PLAN SUBMITTAL
10-27-2022	MODOT SUBMITTAL
11-03-2022	3RD SUBMITTAL

CONSTRUCTION PLANS
TRANSLAND TRUCKING
3480 E. TARRA LANE
O'FALLON MO, 63366
DRAINAGE AREA MAPS

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ST. CHARLES, MO 63301
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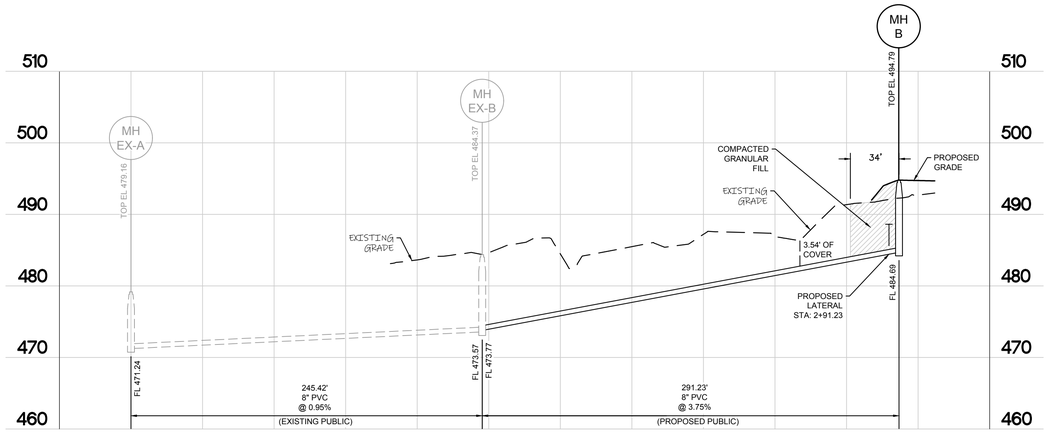
MISSOURI STATE CERTIFICATES OF AUTHORITY – 001647 & 000379

STATE OF MISSOURI
MICHAEL NEWELL MEINERS
NUMBER E-22483
REGISTERED PROFESSIONAL ENGINEER
MICHAEL NEWELL MEINERS
CIVIL ENGINEER PE-22483
11/03/22

ORDER NO. 2022032
DATE 11/03/2022
6

SHEET PLAN

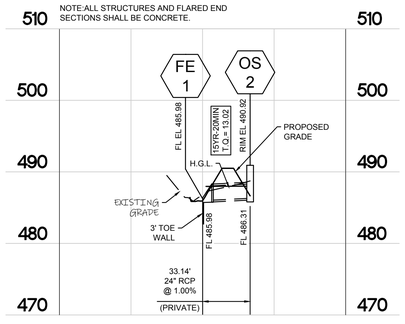


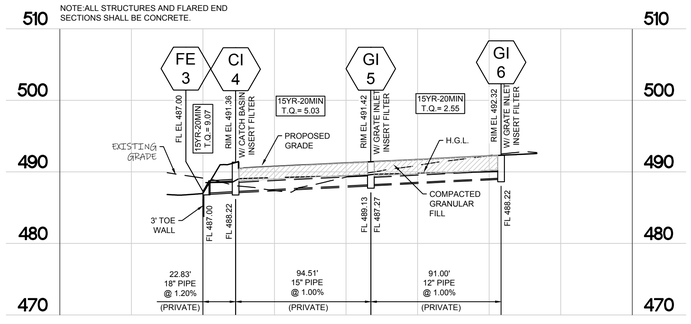
SANITARY SEWER PROFILE

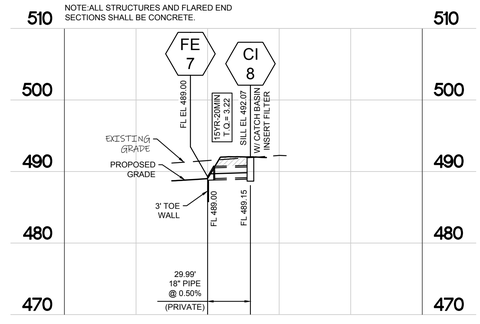
SCALE: HORIZ.: 1" = 50'
VERT.: 1" = 10'

15YR.-20MIN. HYDRAULICS

Line No.	Line ID	DnStm Ln No	Invert Dn (ft)	Gnd/Rim El Dn (ft)	Invert Up (ft)	Gnd/Rim El Up (ft)	Line Length (ft)	Line Slope (%)	Line Size (in)	n-val Pipe	Known Q (cfs)	Capac Full (cfs)	Flow Rate (cfs)	Vel Ave (ft/s)	Energy Loss (ft)	Minor Loss (ft)	HGL Dn (ft)	HGL Up (ft)	Rim-Hw (ft)
1	1-2	Outfall	485.98	488.95	486.31	490.92	33.136	1.00	24	0.012	13.02	24.45	13.02	4.35	0.091	0.32	487.98	488.01	2.58
2	3-4	Outfall	487.00	489.21	487.27	491.36	22.825	1.18	18	0.012	4.04	12.37	9.07	5.37	0.140	0.53	488.50	488.56	2.27
3	4-5	2	487.27	491.36	488.22	491.80	94.506	1.01	15	0.012	2.48	7.01	5.03	4.10	0.489	0.13	489.09	489.58	2.09
4	5-6	3	488.22	491.80	489.13	492.70	91.000	1.00	12	0.012	2.55	3.86	2.55	3.28	0.371	0.17	489.71	490.08	2.45
5	7-8	Outfall	489.00	491.21	489.15	492.07	29.991	0.50	18	0.012	3.22	8.05	3.22	4.12	0.000	0.26	489.68	489.83	2.24

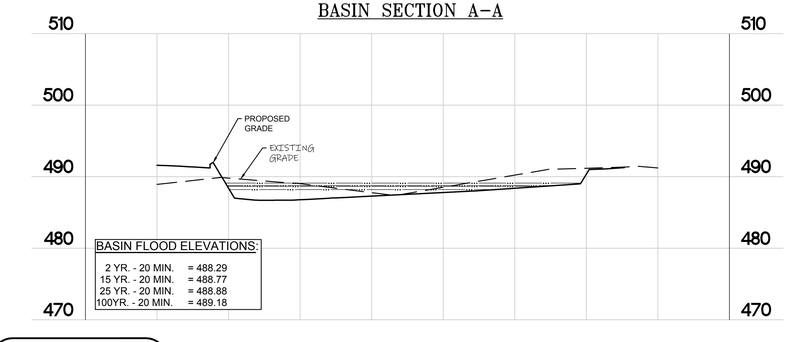


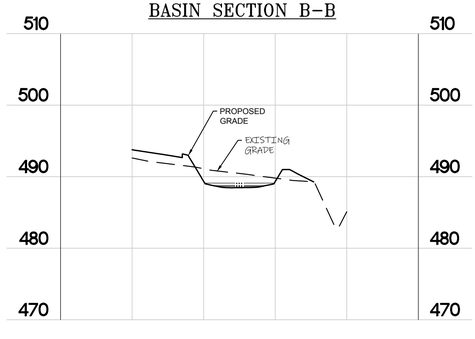


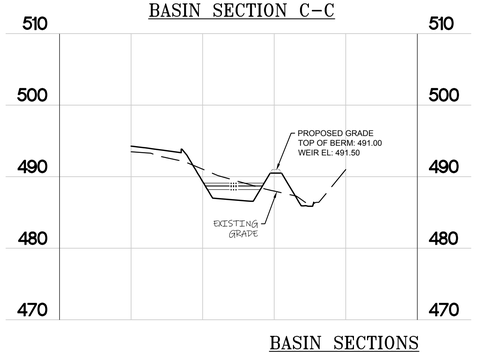


STORM SEWER PROFILES

SCALE: HORIZ.: 1" = 50'
VERT.: 1" = 10'

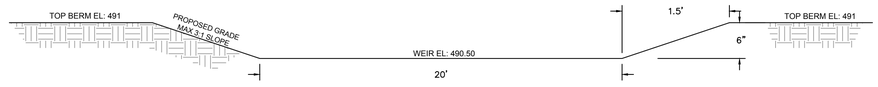






BASIN SECTIONS

SCALE: HORIZ.: 1" = 50'
VERT.: 1" = 10'



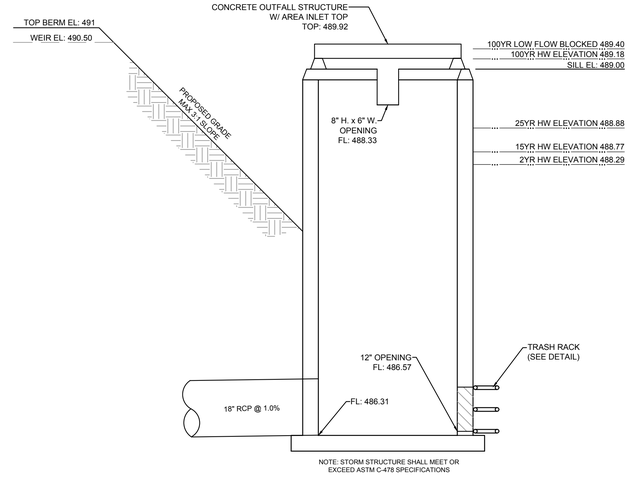
WEIR DETAIL

N.T.S.

STORM SEWER PIPES

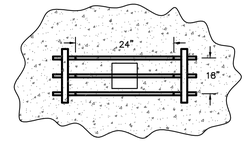
A. Reinforced Class III Concrete Culvert Pipe.

B. Dual wall and triple wall polypropylene pipe and fittings 12-inch through 60-inch diameter shall conform to ASTM F2764, except as otherwise specified herein. Dual wall polypropylene pipe (12-30") shall have a smooth interior and annular exterior corrugations. Triple wall polypropylene pipe (30" – 60") shall have a smooth interior and exterior with annular inner corrugations. Pipe shall have a minimum pipe stiffness of 46 psi when tested in accordance with ASTM D2412. Pipe shall be joined with an integral bell and spigot joint on all sizes. The joints shall be watertight in accordance with ASTM D3212. The spigot shall have two gaskets meeting the requirements of ASTM F477. The gaskets shall be installed by the pipe manufacturer and shall be covered with a removable, protective wrap to ensure the gaskets are free from debris. A joint lubricant shall be used on the gasket and pipe bell during assembly. Pipe shall have a reinforced bell with a polymer composite band installed by the manufacturer.



OUTFALL STRUCTURE DIMENSIONAL DETAIL

N.T.S.



HORIZONTAL VIEW

TOP VIEW

TRASH RACK DETAIL

N.T.S.

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PLANNING & DEVELOPMENT DIVISION FILE NUMBER: 22-003084
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CONDITIONAL USE PERMIT APPROVAL: MAY 12, 2022

PROPERTY OWNER: MW REAL ESTATE HOLDINGS LLC
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STAFFORD MO, 65757

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CONSTRUCTION PLANS
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STATE OF MISSOURI
MICHAEL NEWELL MEINERS
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11/03/22
MICHAEL NEWELL MEINERS
CIVIL ENGINEER PE-22483

ORDER NO.
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11/03/2022

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