STORMWATER POLLUTION PREVENTION PLAN

TIN BARN BREWING INC.

19 Lake Station Road
Section 17, Block 1, Lot 20.2

Town of Chester
Orange County
New York

David A. Getz, PE
NYS License #61265
Date: 1/26/18

L&G #2052

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TIN BARN BREWING INC.

STORMWATER POLLUTION PREVENTION PLAN

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1. PROJECT DESCRIPTION

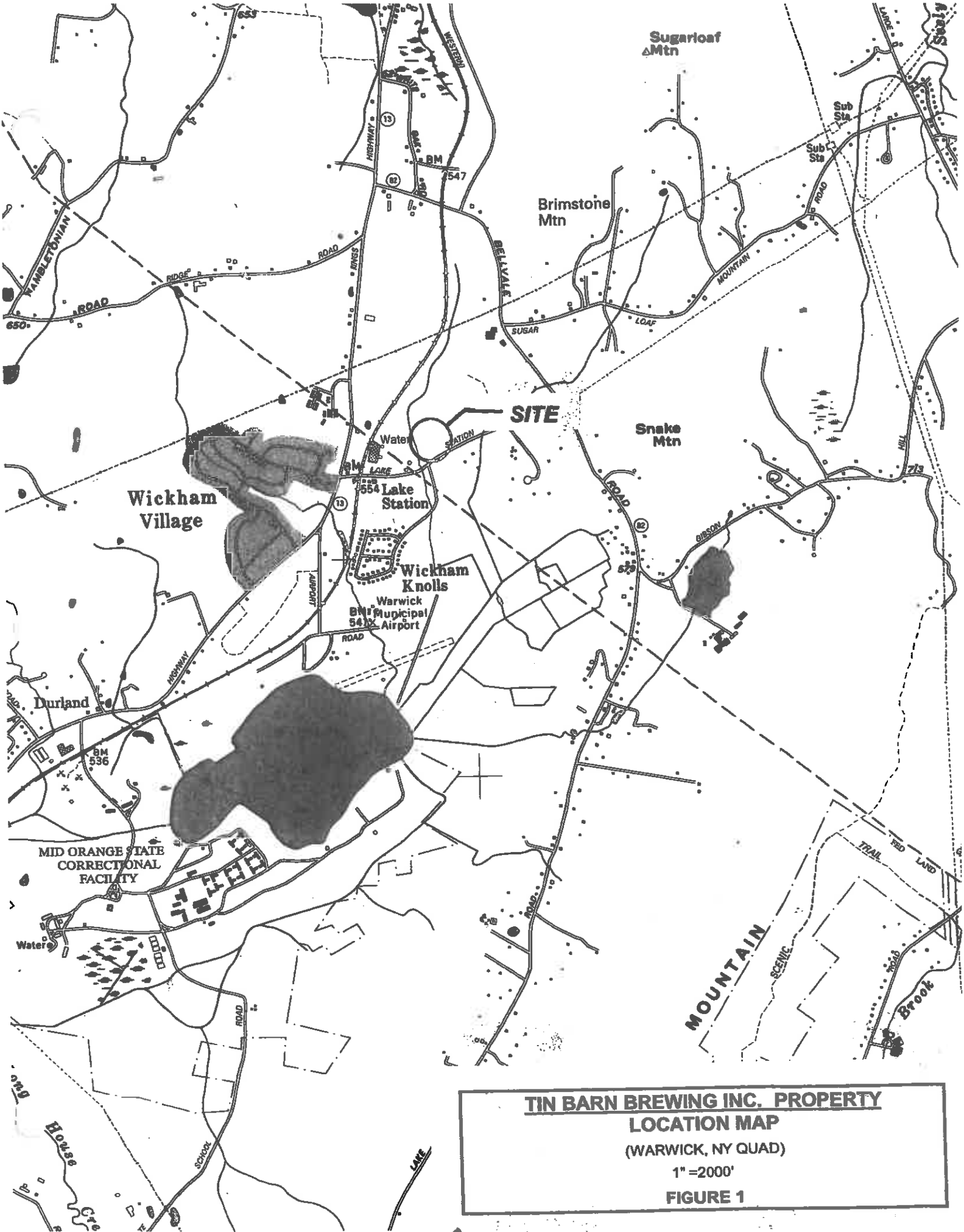
Tin Barn Brewing Inc. proposes to construct a brewery building on a vacant property located at 19 Lake Station Road in the Town of Chester. The site includes 13.3 acres, and is located on the northern side of Lake Station Road. The site's location is shown in Figure 1.

The site includes wooded areas and agricultural fields. A un-named stream flows in a southerly direction along the western edge of the property. New York State DEC-regulated wetlands are present in the northern and western portions of the property.

The proposed facility will include a new building that will house a brewery, tasting room and food service area. Access will be provided by a new driveway from Lake Station Road.

The brewery facility will be served by a well located in the north of the property. An on-site sewage disposal system is proposed.

This report addresses potential stormwater impacts from the proposed construction, and provides information on the proposed mitigation measures. The proposed stormwater practices have been designed in accordance with the 2015 NYSDEC *Stormwater Management Design Manual*. We have addressed the requirements for mitigating impacts on flooding, for runoff reduction, and for stormwater quality treatment.



TIN BARN BREWING INC. PROPERTY

LOCATION MAP

(WARWICK, NY QUAD)

1" =2000'

FIGURE 1

2. PEAK FLOW REDUCTION

The study area encompasses 3.6 acres and includes all proposed impervious surfaces, including the building, driveway, and parking areas. A detention basin is proposed near the intersection of the new driveway and Lake Station Road. The limit of the study area is shown for existing and proposed conditions on Figures 2 and 3, respectively.

Under proposed conditions, the study area is divided into five subbasins. Subbasins A, B, and C drain to the proposed bioretention basins. Subbasin D includes the area that drains directly to the detention basin. Subbasin E includes the small area that will be developed downhill of the stormwater basins.

The Hydraflow program was utilized to calculate runoff hydrographs within the study area for existing and proposed conditions. The SCS unit hydrograph method was used to develop the hydrographs. As shown in Figure 4, the NRCS has mapped the soils within the study area as Mardin gravelly silt loam (MdB and MdC) and Canandaigua silt loam (Ca). These soils are all classified as Hydrologic Soil Group D soils. SCS curve numbers were computed based on the various land covers.

Under proposed conditions, the attenuation effect of the bioretention basins is included in the Hydraflow analysis. The detention basin has been designed to provide sufficient storage and routing of peak flows for 1-year, 10-year, and 100-year design storms so that peak discharge rates from the study area will be lower under proposed conditions than they are under existing conditions:

Peak Discharge from Study Area

Design Storm	Existing Conditions	Proposed Conditions	Change
1 year	2.2 cfs	1.6 cfs	-0.6 cfs
10 year	6.5 cfs	6.3 cfs	- 0.2 cfs
100 year	14.8 cfs	13.8 cfs	- 1.0 cfs

A channel protection (Cpv) analysis was performed to address the requirements of Section 4.4 of the Design Manual. The one-year 24-hour precipitation depth was input, and the detention basin outlet structure was modified to simulate a theoretical 3-inch orifice. Due to the small drainage areas and flows involved, the resultant routing creates a very short lag between the peak of the inflow and outflow hydrographs, demonstrating that the Cpv requirement is not applicable:

846 minutes – 744 minutes = 102 minutes = 1.7 hours.

Supporting data is provided in Appendix A. Printouts of the Hydraflow results are included in Appendix B.

Soil Map—Orange County, New York

Map Scale: 1:2,530 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84

FIGURE 4

USDA **Natural Resources Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

3. WATER QUALITY TREATMENT

Three bioretention basins are proposed to treat runoff from new impervious surfaces including pavement, sidewalks, and the new building's roof. The basins will protect water quality by promoting sedimentation of particulates and by filtration through a specific soil media. The basins will be planted in accordance with the requirements of the DEC Design Manual.

The watershed area to each basin is shown in Figure 3.

In accordance with DEC requirements, the practices have been sized based on the size and imperviousness of the contributing drainage area. In each case, their size exceeds the requirements.

The sizes of the basins are summarized below:

Bioretention Basin	Required Filter Area	Proposed Filter Area
A	2,361 sf	2,650 sf
B	1,400 sf	1,620 sf
C	185 sf	650 sf

The basins have been oversized to provide treatment levels in excess of the minimum requirements. Their sizing compensates for the minor area of new pavement in Subbasin E that, due to site elevations and the location of the regulated wetland buffer, cannot be drain to a water quality measure.

Runoff will be directed to the basins by sheet flow. A gravel diaphram will be constructed immediately uphill of each basin to promote the removal of particulate matter

Design calculations are included in Appendix A. A checklist for inspection, operation, and maintenance of the bioretention basins is included in Appendix D.

4. RUNOFF REDUCTION VOLUME

In accordance with the Design Manual, runoff from newly constructed impervious areas will be directed to runoff reduction techniques, and the proposed stormwater measures will provide for infiltration of a portion of the runoff. The required runoff reduction volume (RRv) depends on the amount of impervious coverage and the hydrologic soil group of the soils.

Figure 4 indicates that the soils within the drainage areas and the bioretention basins are mapped by the NRCS as Mardin gravelly silt loam (MdB and MdC). These soils are classified as Hydrologic Soil Group D, with a reduction factor "S" of 0.20.

As per Section 4.3 of the Design Manual, the minimum RRv is:

P x Rv x Aic x S / 12, where

P = 1.4 inches
Rv = 0.95 (for 100% impervious cover)
Aic = new impervious cover = 38,380 sf
S = 0.20

Minimum RRv = 851 cf

During the design of the sewage disposal system, we performed soil percolation tests on various parts of the site. Because we found percolation rates greater than 0.5 inches per hour, we have not provided underdrains in the bioretention systems. As described in Section 3.6 of the Manual, the bioretention basins are credited with providing a runoff reduction volume equal to 100% of the water quality volume (refer to calculations in Appendix A):

RRv provided:	**Bioretention A:**	**2,754 cf**
	Bioretention B:	**1,633 cf**
	Bioretention C:	**216 cf**
	Total:	**4,603 cf**

The project meets the standards for runoff reduction volume.

APPENDIX A

TIM BARN BREWERY 1/26/18
TOWN OF CHESTER, NY

DESIGN CALCULATIONS - BIORETENTION BASIN A

WATER QUALITY VOLUME CALCULATION

90% Precipitation (P) (in.)	**1.4**
Drainage Area (sf)	**48,750**
Impervious Area (sf)	**23,520**
Imperviousness (%)	**48.2**
R_v	0.48
Water Quality Depth (in.)	0.68
WQv = Required Water Quality Volume (cf)	**2,754**

PRETREATMENT MEASURES

Gravel diaphragm	**yes**
Mulch layer	**yes**

BIORETENTION CALCULATIONS

Surface elevation (ft.)	**549.0**
Spillway elevation (ft.)	549.50
Available filter head (ft.)	0.50
Depth of filter media (ft.)	**3.00**
Depth of topsoil / mulch (ft.)	0.25
Filter fabric elevation (ft.)	545.8
Depth of stone (ft.)	**1.00**
Bottom of stone elevation (ft.)	544.8
Underdrain invert (ft.) *(underdrain 3" above bottom of stone)*	545.00
Filter Media "k"	**0.5**
Tf = Time to drain (days)	**2**
Af = Required filter area (sf)	**2,361**
Proposed filter area (sf)	**2,650**

TABLE CN-1

CURVE NUMBER CALCULATIONS

EXISTING CONDITIONS

	Hyd. Soil Group:	*D*	*D*	*D*	*D*	Total	Weighted
	Cover:	*Woods - good*	*Meadow - good*	*Open Space - good*	*Impervious*	Area	CN
	CN:	*77*	*78*	*80*	*98*		
Subbasin **Existing**	*Area in acres:*	0.49	2.99	0	0.12	3.60	**78.5**

PROPOSED CONDITIONS

	Hyd. Soil Group:	*D*	*D*	*D*	*D*	Total	Weighted
	Cover:	*Woods - good*	*Meadow - good*	*Open Space - good*	*Impervious*	Area	CN
	CN:	*77*	*78*	*80*	*98*		
Subbasin							
A	*Area in acres:*	0	0	0.58	0.54	1.12	**88.7**
B		0.09	0	0.61	0.30	1.00	**85.1**
C		0	0	0.09	0.04	0.13	**85.5**
D		0.38	0	0.68	0.14	1.20	**81.2**
E		0	0	0.04	0.11	0.15	**93.2**
	TOTALS:	*0.47*	*0.00*	*2.00*	*1.13*	*3.60*	

TIM BARN BREWERY

1/26/18

TOWN OF CHESTER, NY

DESIGN CALCULATIONS - BIORETENTION BASIN B

WATER QUALITY VOLUME CALCULATION

90% Precipitation (P) (in.)	**1.4**
Drainage Area (sf)	**43,850**
Impervious Area (sf)	**13,120**
Imperviousness (%)	**29.9**
R_v	0.32
Water Quality Depth (in.)	0.45
WQv = Required Water Quality Volume (cf)	**1,633**

PRETREATMENT MEASURES

Gravel diaphragm	**yes**
Mulch layer	**yes**

BIORETENTION CALCULATIONS

Surface elevation (ft.)	**549.0**
Spillway elevation (ft.)	549.50
Available filter head (ft.)	0.50
Depth of filter media (ft.)	**3.00**
Depth of topsoil / mulch (ft.)	0.25
Filter fabric elevation (ft.)	545.8
Depth of stone (ft.)	**1.00**
Bottom of stone elevation (ft.)	544.8
Underdrain invert (ft.) *(underdrain 3" above bottom of stone)*	545.00
Filter Media "k"	**0.5**
Tf = Time to drain (days)	**2**
Af = Required filter area (sf)	**1,400**
Proposed filter area (sf)	**1,620**

TIM BARN BREWERY 1/26/18
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DESIGN CALCULATIONS - BIORETENTION BASIN C

WATER QUALITY VOLUME CALCULATION

90% Precipitation (P) (in.)	**1.4**
Drainage Area (sf)	**5,660**
Impervious Area (sf)	**1,740**
Imperviousness (%)	**30.7**
R_v	0.33
Water Quality Depth (in.)	0.46
WQv = Required Water Quality Volume (cf)	**216**

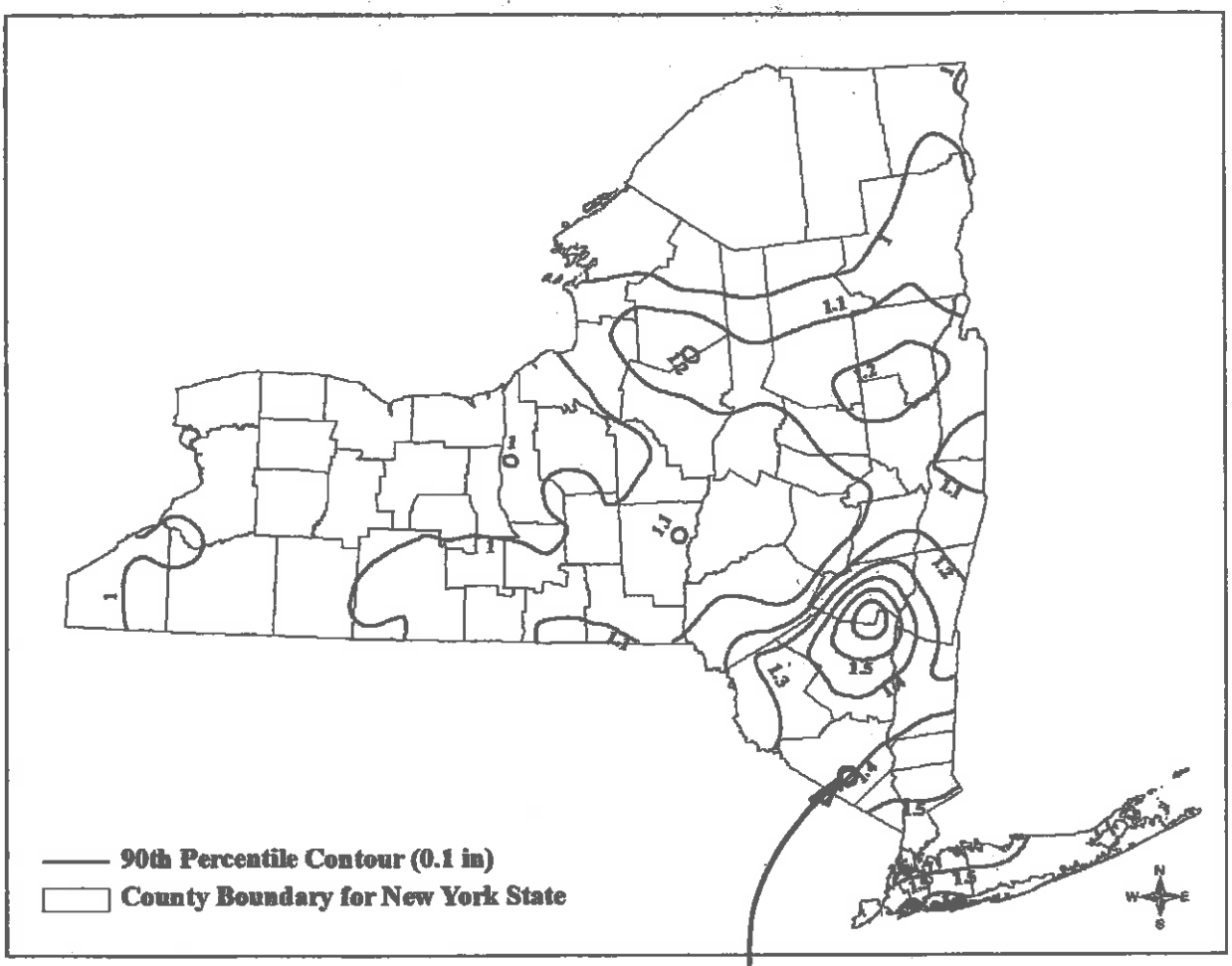
PRETREATMENT MEASURES

Gravel diaphragm	**yes**
Mulch layer	**yes**

BIORETENTION CALCULATIONS

Surface elevation (ft.)	**539.0**
Spillway elevation (ft.)	539.50
Available filter head (ft.)	0.50
Depth of filter media (ft.)	**3.00**
Depth of topsoil / mulch (ft.)	0.25
Filter fabric elevation (ft.)	535.8
Depth of stone (ft.)	**1.00**
Bottom of stone elevation (ft.)	534.8
Underdrain invert (ft.) *(underdrain 3" above bottom of stone)*	535.00
Filter Media "k"	**0.5**
Tf = Time to drain (days)	**2**
Af = Required filter area (sf)	**185**
Proposed filter area (sf)	**650**

Figure 4.1: 90th Percentile Rainfall in New York State (NYSDEC, 2013)



Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	Yes
State	New York
Location	
Longitude	74.284 degrees West
Latitude	41.297 degrees North
Elevation	0 feet
Date/Time	Wed, 20 Dec 2017 11:10:02 -0500

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.33	0.51	0.63	0.83	1.03	1.28	**1yr**	0.89	1.20	1.47	1.80	2.19	2.67	3.08	**1yr**	2.36	2.96	3.40	4.10	4.74	**1yr**
2yr	0.40	0.62	0.77	1.00	1.25	1.55	**2yr**	1.08	1.46	1.77	2.17	2.65	3.23	3.68	**2yr**	2.85	3.54	4.06	4.78	5.43	**2yr**
5yr	0.46	0.72	0.90	1.21	1.54	1.94	**5yr**	1.33	1.80	2.23	2.74	3.34	4.05	4.65	**5yr**	3.58	4.47	5.11	5.91	6.68	**5yr**
10yr	0.52	0.81	1.03	1.39	1.81	2.30	**10yr**	1.56	2.11	2.65	3.26	3.98	4.80	5.55	**10yr**	4.25	5.34	6.08	6.94	7.80	**10yr**
25yr	0.60	0.95	1.21	1.68	2.24	2.87	**25yr**	1.93	2.61	3.32	4.11	5.01	6.04	7.03	**25yr**	5.34	6.76	7.67	8.58	9.60	**25yr**
50yr	0.68	1.09	1.39	1.95	2.63	3.40	**50yr**	2.27	3.06	3.95	4.89	5.96	7.18	8.42	**50yr**	6.35	8.09	9.14	10.09	11.24	**50yr**
100yr	0.77	1.24	1.60	2.27	3.09	4.02	**100yr**	2.67	3.60	4.69	5.82	7.10	8.54	10.07	**100yr**	7.56	9.69	10.91	11.86	13.16	**100yr**
200yr	0.87	1.41	1.83	2.63	3.64	4.77	**200yr**	3.14	4.24	5.58	6.93	8.46	10.17	12.06	**200yr**	9.00	11.60	13.02	13.95	15.42	**200yr**
500yr	1.03	1.70	2.22	3.22	4.52	5.97	**500yr**	3.90	5.26	7.00	8.73	10.66	12.82	15.32	**500yr**	11.35	14.73	16.47	17.30	19.04	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.30	0.46	0.56	0.76	0.93	1.12	**1yr**	0.80	1.09	1.23	1.56	2.03	2.30	2.60	**1yr**	2.03	2.50	2.84	3.83	4.33	**1yr**
2yr	0.38	0.59	0.72	0.98	1.21	1.45	**2yr**	1.04	1.42	1.65	2.11	2.63	3.13	3.56	**2yr**	2.77	3.42	3.93	4.67	5.30	**2yr**
5yr	0.43	0.66	0.82	1.12	1.42	1.69	**5yr**	1.23	1.65	1.92	2.46	3.08	3.76	4.32	**5yr**	3.33	4.16	4.79	5.53	6.27	**5yr**
10yr	0.47	0.72	0.89	1.24	1.61	1.89	**10yr**	1.39	1.85	2.16	2.76	3.49	4.29	4.91	**10yr**	3.80	4.72	5.54	6.27	7.07	**10yr**
25yr	0.53	0.81	1.01	1.44	1.89	2.18	**25yr**	1.63	2.14	2.52	3.24	4.10	5.07	5.89	**25yr**	4.49	5.67	6.72	7.44	8.23	**25yr**
50yr	0.59	0.89	1.11	1.60	2.15	2.45	**50yr**	1.86	2.39	2.84	3.66	4.64	5.71	6.79	**50yr**	5.06	6.53	7.78	8.48	9.26	**50yr**
100yr	0.65	0.99	1.23	1.78	2.45	2.74	**100yr**	2.11	2.68	3.21	4.14	5.27	6.43	7.82	**100yr**	5.69	7.52	9.02	9.64	10.37	**100yr**
200yr	0.73	1.09	1.39	2.01	2.80	3.07	**200yr**	2.42	3.01	3.62	4.71	6.00	7.25	9.02	**200yr**	6.42	8.67	10.49	10.99	11.59	**200yr**
500yr	0.85	1.26	1.62	2.36	3.35	3.58	**500yr**	2.89	3.50	4.27	5.60	7.15	8.49	10.92	**500yr**	7.51	10.50	12.83	13.08	13.47	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.36	0.55	0.68	0.91	1.12	1.36	**1yr**	0.97	1.33	1.57	1.98	2.42	2.86	3.32	**1yr**	2.53	3.20	3.67	4.32	5.11	**1yr**
2yr	0.41	0.63	0.78	1.05	1.30	1.55	**2yr**	1.12	1.52	1.77	2.26	2.81	3.37	3.83	**2yr**	2.98	3.69	4.23	4.94	5.66	**2yr**
5yr	0.50	0.78	0.96	1.32	1.68	1.99	**5yr**	1.45	1.95	2.28	2.91	3.64	4.36	4.95	**5yr**	3.86	4.76	5.44	6.28	7.08	**5yr**
10yr	0.59	0.91	1.13	1.58	2.04	2.44	**10yr**	1.76	2.39	2.77	3.55	4.45	5.36	6.15	**10yr**	4.74	5.92	6.64	7.55	8.46	**10yr**
25yr	0.75	1.13	1.41	2.02	2.65	3.19	**25yr**	2.29	3.12	3.62	4.64	5.78	7.06	8.07	**25yr**	6.25	7.76	8.65	9.64	10.74	**25yr**
50yr	0.88	1.34	1.67	2.41	3.24	3.82	**50yr**	2.79	3.73	4.41	5.66	7.05	8.73	9.92	**50yr**	7.73	9.54	10.55	11.59	12.90	**50yr**
100yr	1.05	1.59	1.99	2.87	3.93	4.65	**100yr**	3.40	4.55	5.37	6.90	8.59	10.81	12.20	**100yr**	9.57	11.73	12.88	13.95	15.50	**100yr**
200yr	1.25	1.87	2.38	3.44	4.80	5.67	**200yr**	4.14	5.55	6.55	8.42	10.48	13.42	15.00	**200yr**	11.88	14.42	15.73	16.78	18.66	**200yr**
500yr	1.57	2.34	3.01	4.37	6.22	7.36	**500yr**	5.37	7.20	8.52	10.95	13.60	17.86	19.67	**500yr**	15.81	18.92	20.47	21.45	23.86	**500yr**

Powered by ACIS Northeast Regional Climate Center

TR55 Tc Worksheet

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No. 1

Existing

Description	A		B		C		Totals
Sheet Flow Elev. 581 → 578							
Manning's n-value	= 0.400		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.23		0.00		0.00		
Land slope (%)	= 3.00		0.00		0.00		
Travel Time (min)	**= 18.17**	**+**	**0.00**	**+**	**0.00**	**=**	**18.17**
Shallow Concentrated Flow	Elev. 578 → 557		Elev. 557 → 531				
Flow length (ft)	= 235.00		460.00		0.00		
Watercourse slope (%)	= 8.90		5.70		0.00		
Surface description	= Unpaved		Unpaved		Paved		
Average velocity (ft/s)	=4.81		3.85		0.00		
Travel Time (min)	**= 0.81**	**+**	**1.99**	**+**	**0.00**	**=**	**2.80**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.030		0.012		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 21.00 min

TR55 Tc Worksheet

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No. 12

Proposed D

Description	A		B		C		Totals
Sheet Flow Elev. 581 → 578							
Manning's n-value	= 0.400		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.23		0.00		0.00		
Land slope (%)	= 3.00		0.00		0.00		
Travel Time (min)	**= 18.17**	**+**	**0.00**	**+**	**0.00**	**=**	**18.17**
Shallow Concentrated Flow	Elev. 578 → 557		Elev. 557 → 528.5				
Flow length (ft)	= 235.00		410.00		0.00		
Watercourse slope (%)	= 8.90		7.00		0.00		
Surface description	= Unpaved		Unpaved		Paved		
Average velocity (ft/s)	=4.81		4.27		0.00		
Travel Time (min)	**= 0.81**	**+**	**1.60**	**+**	**0.00**	**=**	**2.41**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.012		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 20.60 min

All other subbasins : min. Tc = 6 minutes

Version 1.8
Last Updated: 11/09/2015

Total Water Quality Volume Calculation

WQv(acre-feet) = [(P)(Rv)(A)] /12

Is this project subject to Chapter 10 of the NYS Design Manual (i.e. WQv is equal to post-development 1 year runoff volume)?	NO

Design Point:		
P=	1.40	inch

Manually enter P, Total Area and Impervious Cover.

Breakdown of Subcatchments

Catchment Number	Total Area (Acres)	Impervious Area (Acres)	Percent Impervious %	Rv	WQv (ft^3)	Description
1	1.12	0.54	48%	0.48	2,754	Bioretention A
2	1.01	0.30	30%	0.32	1,633	Bioretention B
3	0.13	0.04	31%	0.33	216	Bioretention C
4						
5						
6						
7						
8						
9						
10						
Subtotal (1-30)	2.26	0.88	39%	0.40	4,603	Subtotal 1
Total	2.26	0.88	39%	0.40	4,603	Initial WQv 0.11 af

Identify Runoff Reduction Techniques By Area

Technique	Total Contributing Area (Acre)	Contributing Impervious Area (Acre)	Notes
Conservation of Natural Areas	0.00	0.00	*minimum 10,000 sf*
Riparian Buffers	0.00	0.00	*maximum contributing length 75 feet to 150 feet*
Filter Strips	0.00	0.00	
Tree Planting	0.00	0.00	*Up to 100 sf directly connected impervious area may be subtracted per tree*
Total	**0.00**	**0.00**	

Recalculate WQv after application of Area Reduction Techniques

	Total Area (Acres)	Impervious Area (Acres)	Percent Impervious %	Runoff Coefficient Rv	WQv (ft^3)		
"<<Initial WQv"	2.26	0.88	39%	0.40	4,603		
Subtract Area	0.00	0.00					
WQv adjusted after Area Reductions	**2.26**	**0.88**	39%	0.40	4,603		
Disconnection of Rooftops		0.00					
Adjusted WQv after Area Reduction and Rooftop Disconnect	2.26	**0.88**	39%	0.40	**4,603**	**0.11**	af
WQv reduced by Area Reduction techniques					0	**0.00**	af

Bioretention Worksheet

(For use on HSG C or D Soils with underdrains)

Af=WQv*(df)/[k*(hf+df)(tf)]

Af	Required Surface Area (ft2)
WQv	Water Quality Volume (ft3)
df	Depth of the Soil Medium (feet)
hf	Average height of water above the planter bed
tf	Volume Through the Filter Media (days)

k — The hydraulic conductivity [ft/day], can be varied depending on the properties of the soil media. Some reported conductivity values are: ***Sand*** - 3.5 ft/day (City of Austin 1988); ***Peat*** - 2.0 ft/day (Galli 1990); ***Leaf Compost*** - 8.7 ft/day (Claytor and Schueler, 1996); ***Bioretention Soil*** (0.5 ft/day (Claytor &

Design Point:

Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious %	Rv	WQv *(ft^3)*	Precipitation *(in)*	Description
1	1.12	0.54	0.48	0.48	2754.44	1.40	Bioretention A
Enter Impervious Area Reduced by Disconnection of Rooftops			48%	0.48	2,754	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.						*ft^3*	

Soil Information			
Soil Group	D		
Soil Infiltration Rate		*in/hour*	
Using Underdrains?	No	*Design as an infiltration bioretention practice*	

Calculate the Minimum Filter Area				
		Value	Units	Notes
WQv		2,754	*ft^3*	
Enter Depth of Soil Media	*df*	3	*ft*	*2.5-4 ft*
Enter Hydraulic Conductivity	*k*	0.5	*ft/day*	
Enter Average Height of Ponding	*hf*	0.5	*ft*	*6 inches max.*
Enter Filter Time	*tf*	2	*days*	
Required Filter Area	***Af***	**2361**	*ft^2*	

Determine Actual Bio-Retention Area			
Filter Width	20	*ft*	
Filter Length	132.5	*ft*	
Filter Area	2650	*ft^2*	
Actual Volume Provided	3092	*ft^3*	

Determine Runoff Reduction			
Is the Bioretention contributing flow to another practice?	No	Select Practice	
RRv	2,473		
RRv applied	**2,473**	*ft^3*	***This is 40% of the storage provided or WQv whichever is less.***
Volume Treated	281	*ft^3*	*This is the portion of the WQv that is not reduced in the practice.*
Volume Directed	0	*ft^3*	This volume is directed another practice

Bioretention Worksheet

Sizing √	OK		*Check to be sure Area provided ≥ Af*

(For use on HSG C or D Soils with underdrains)

Af=WQv*(df)/[k*(hf+df)(tf)]

Af	Required Surface Area (ft2)
WQv	Water Quality Volume (ft3)
df	Depth of the Soil Medium (feet)
hf	Average height of water above the planter bed
tf	Volume Through the Filter Media (days)

k — The hydraulic conductivity [ft/day], can be varied depending on the properties of the soil media. Some reported conductivity values are: ***Sand*** - 3.5 ft/day (City of Austin 1988); ***Peat*** - 2.0 ft/day (Galli 1990); ***Leaf Compost*** - 8.7 ft/day (Claytor and Schueler, 1996); ***Bioretention Soil*** (0.5 ft/day (Claytor & Schueler, 1996)

Design Point:	

Enter Site Data For Drainage Area to be Treated by Practice

Catchment Number	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious %	Rv	WQv *(ft^3)*	Precipitation *(in)*	Description
2	1.01	0.30	0.30	0.32	1632.59	1.40	Bioretention B
Enter Impervious Area Reduced by Disconnection of Rooftops			30%	0.32	1,633	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.						*ft^3*	

Soil Information

Soil Group	D	
Soil Infiltration Rate		*in/hour*
Using Underdrains?	No	*Design as an infiltration bioretention practice*

Calculate the Minimum Filter Area

		Value	Units	Notes
WQv		1,633	*ft^3*	
Enter Depth of Soil Media	*df*	3	*ft*	*2.5-4 ft*
Enter Hydraulic Conductivity	*k*	0.5	*ft/day*	
Enter Average Height of Ponding	*hf*	0.5	*ft*	*6 inches max.*
Enter Filter Time	*tf*	2	*days*	
Required Filter Area	***Af***	**1399**	*ft^2*	

Determine Actual Bio-Retention Area

Filter Width	20	*ft*	
Filter Length	81	*ft*	
Filter Area	1620	*ft^2*	
Actual Volume Provided	1890	*ft^3*	

Determine Runoff Reduction

Is the Bioretention contributing flow to another practice?	No	Select Practice	
RRv	1,512		
RRv applied	**1,512**	*ft^3*	***This is 40% of the storage provided or WQv whichever is less.***
Volume Treated	121	*ft^3*	*This is the portion of the WQv that is not reduced in the practice.*

Bioretention Worksheet

Volume Directed	0	ft^3	This volume is directed another practice
Sizing √	OK		*Check to be sure Area provided ≥ Af*

(For use on HSG C or D Soils with underdrains)

Af=WQv*(df)/[k*(hf+df)(tf)]

Af	Required Surface Area (ft2)
WQv	Water Quality Volume (ft3)
df	Depth of the Soil Medium (feet)
hf	Average height of water above the planter bed
tf	Volume Through the Filter Media (days)

k — The hydraulic conductivity [ft/day], can be varied depending on the properties of the soil media. Some reported conductivity values are: ***Sand*** - 3.5 ft/day (City of Austin 1988); ***Peat*** - 2.0 ft/day (Galli 1990); ***Leaf Compost*** - 8.7 ft/day (Claytor and Schueler, 1996); ***Bioretention Soil*** (0.5 ft/day (Claytor &

Design Point:							
Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	**Total Area** *(Acres)*	**Impervious Area** *(Acres)*	**Percent Impervious** *%*	**Rv**	**WQv** *(ft^3)*	**Precipitation** *(in)*	**Description**
3	0.13	0.04	0.31	0.33	215.99	1.40	Bioretention C
Enter Impervious Area Reduced by Disconnection of Rooftops			31%	0.33	216	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.						ft^3	

Soil Information		
Soil Group	D	
Soil Infiltration Rate		*in/hour*
Using Underdrains?	No	*Design as an infiltration bioretention practice*

Calculate the Minimum Filter Area				
		Value	Units	Notes
WQv		216	ft^3	
Enter Depth of Soil Media	*df*	3	*ft*	*2.5-4 ft*
Enter Hydraulic Conductivity	*k*	0.5	*ft/day*	
Enter Average Height of Ponding	*hf*	0.5	*ft*	*6 inches max.*
Enter Filter Time	*tf*	2	*days*	
Required Filter Area	***Af***	**185**	ft^2	

Determine Actual Bio-Retention Area			
Filter Width	10	*ft*	
Filter Length	65	*ft*	
Filter Area	650	ft^2	
Actual Volume Provided	758	ft^3	

Determine Runoff Reduction				
Is the Bioretention contributing flow to another practice?			Select Practice	
RRv	607			
RRv applied	**216**	ft^3	***This is 40% of the storage provided or WQv whichever is less.***	

Minimum RRv

Soil Group	Acres	S
A		55%
B		40%
C		30%
D	**2.88**	20%
Total Area	2.88	

S =	**0.20**	
Impervious =	0.88	*acre*
Precipitation	1.4	*in*
Rv	0.95	
Minimum RRv	**851**	***ft3***
	0.02	af

NOI QUESTIONS

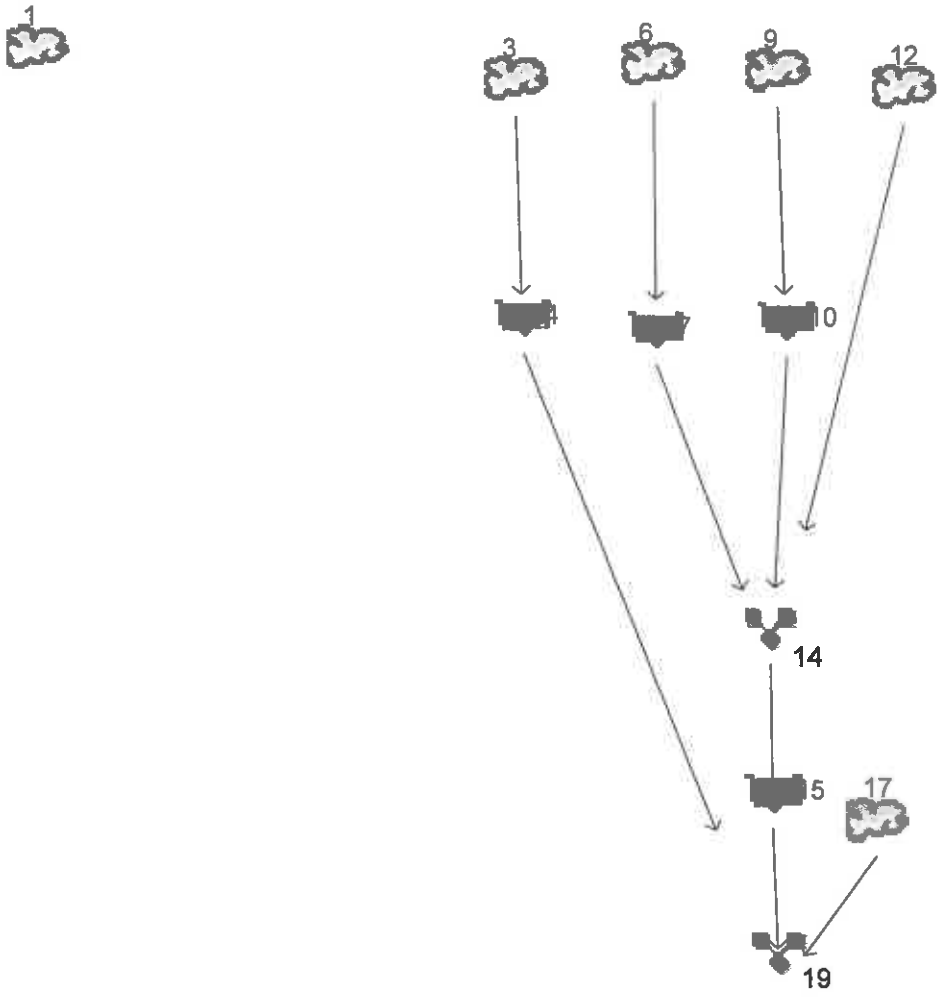
#	NOI Question	Reported Value	
		cf	af
28	Total Water Quality Volume (WQv) Required	4603	*0.106*
30	Total RRV Provided	4201	*0.096*
31	Is RRv Provided ≥WQv Required?	No	
32	Minimum RRv	851	*0.020*
32a	Is RRv Provided ≥ Minimum RRv Required?	Yes	
33a	Total WQv Treated	402	*0.009*
34	Sum of Volume Reduced & Treated	4603	*0.106*
34	Sum of Volume Reduced and Treated	4603	*0.106*
35	Is Sum RRv Provided and WQv Provided ≥WQv Required?	Yes	

Apply Peak Flow Attenuation			
36	Channel Protection	*Cpv*	
37	Overbank	*Qp*	
37	Extreme Flood Control	*Qf*	
	Are Quantity Control requirements met?		

APPENDIX B

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8



Legend

Hyd.	Origin	Description
1	SCS Runoff	Existing
3	SCS Runoff	Proposed A
4	Reservoir	Outflow Bio A
6	SCS Runoff	Proposed B
7	Reservoir	Outflow Bio B
9	SCS Runoff	Proposed C
10	Reservoir	Outflow Bio C
12	SCS Runoff	Proposed D
14	Combine	Inflow to Detention
15	Reservoir	Detention
17	SCS Runoff	Proposed E
19	Combine	Total Proposed

Hydraflow Table of Contents

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

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	-----	2.214	-----	-----	-----	6.505	-----	-----	14.82	Existing
3	SCS Runoff	-----	1.409	-----	-----	-----	3.077	-----	-----	5.983	Proposed A
4	Reservoir	3	0.448	-----	-----	-----	2.851	-----	-----	5.832	Outflow Bio A
6	SCS Runoff	-----	1.054	-----	-----	-----	2.516	-----	-----	5.132	Proposed B
7	Reservoir	6	0.454	-----	-----	-----	2.256	-----	-----	4.905	Outflow Bio B
9	SCS Runoff	-----	0.140	-----	-----	-----	0.331	-----	-----	0.670	Proposed C
10	Reservoir	9	0.012	-----	-----	-----	0.161	-----	-----	0.552	Outflow Bio C
12	SCS Runoff	-----	0.881	-----	-----	-----	2.372	-----	-----	5.166	Proposed D
14	Combine	7, 10, 12,	1.295	-----	-----	-----	4.775	-----	-----	10.42	Inflow to Detention
15	Reservoir	14	1.047	-----	-----	-----	3.647	-----	-----	8.255	Detention
17	SCS Runoff	-----	0.228	-----	-----	-----	0.450	-----	-----	0.831	Proposed E
19	Combine	4, 15, 17,	1.564	-----	-----	-----	6.338	-----	-----	13.79	Total Proposed

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

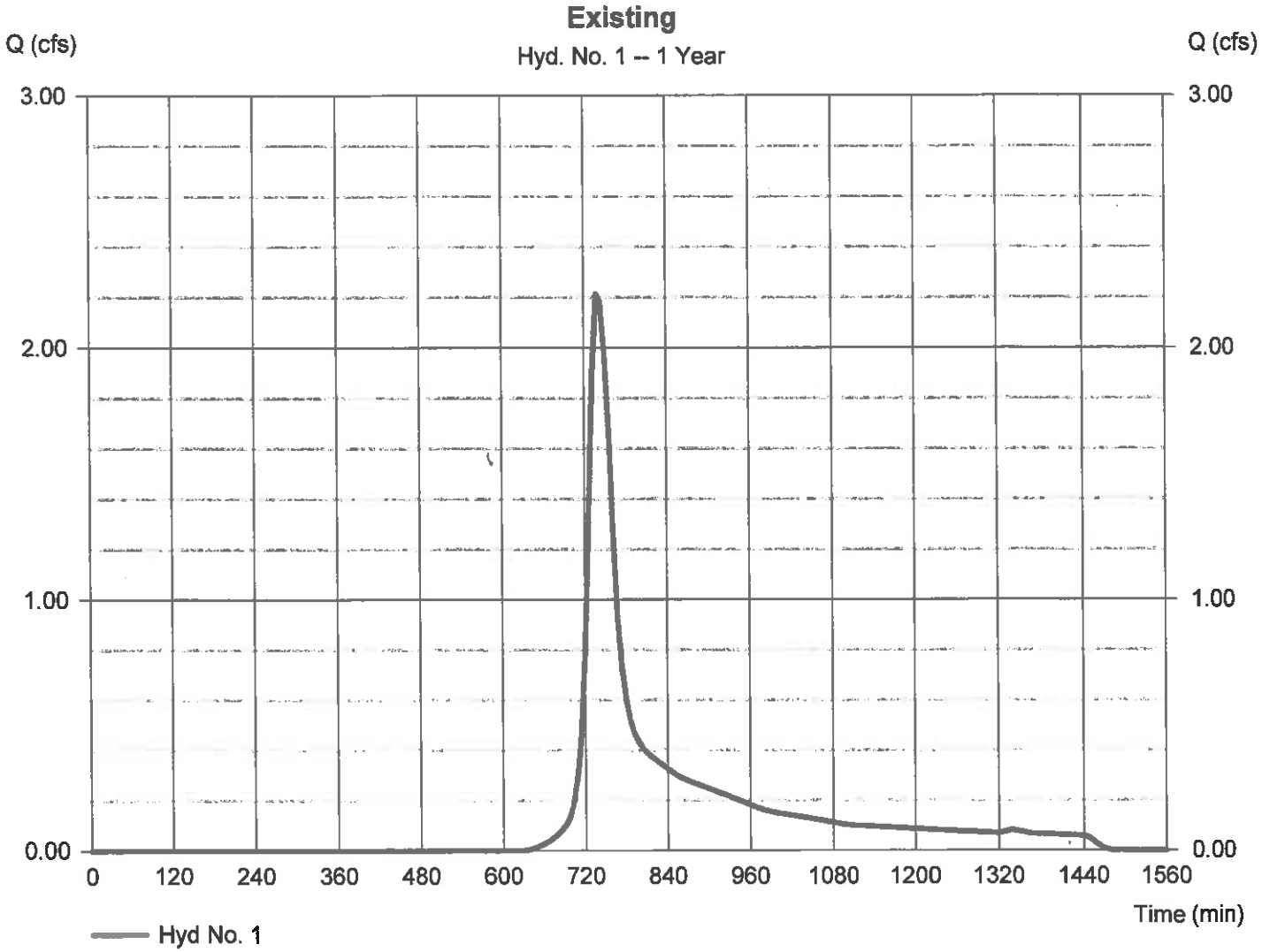
yd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	2.214	6	738	12,108	-----	-----	-----	Existing
3	SCS Runoff	1.409	6	732	6,027	-----	-----	-----	Proposed A
4	Reservoir	0.448	6	756	4,804	3	550.04	2,847	Outflow Bio A
6	SCS Runoff	1.054	6	732	4,499	-----	-----	-----	Proposed B
7	Reservoir	0.454	6	750	3,608	6	540.86	1,649	Outflow Bio B
9	SCS Runoff	0.140	6	732	597	-----	-----	-----	Proposed C
10	Reservoir	0.012	6	852	222	9	539.52	391	Outflow Bio C
12	SCS Runoff	0.881	6	738	4,692	-----	-----	-----	Proposed D
14	Combine	1.295	6	744	8,522	7, 10, 12,	-----	-----	Inflow to Detention
15	Reservoir	1.047	6	756	7,926	14	529.13	1,543	Detention
17	SCS Runoff	0.228	6	732	1,000	-----	-----	-----	Proposed E
19	Combine	1.564	6	756	13,730	4, 15, 17,	-----	-----	Total Proposed

Hydrograph Report

Hyd. No. 1

Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 2.214 cfs
Storm frequency	= 1 yrs	Time to peak	= 738 min
Time interval	= 6 min	Hyd. volume	= 12,108 cuft
Drainage area	= 3.600 ac	Curve number	= 78.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 21.00 min
Total precip.	= 2.67 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

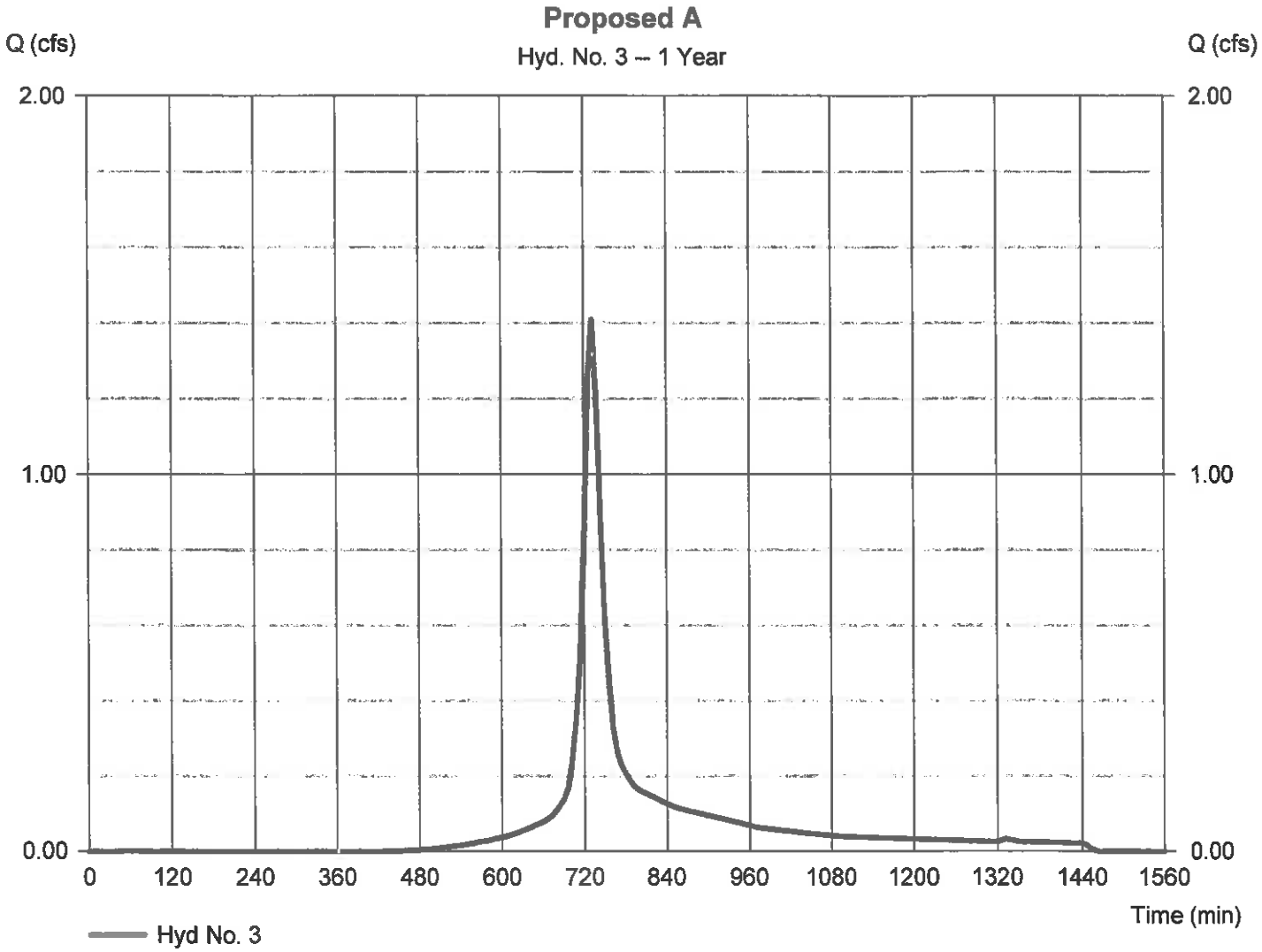


Hydrograph Report

Hyd. No. 3

Proposed A

Hydrograph type	= SCS Runoff	Peak discharge	= 1.409 cfs
Storm frequency	= 1 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 6,027 cuft
Drainage area	= 1.120 ac	Curve number	= 88.7
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 2.67 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

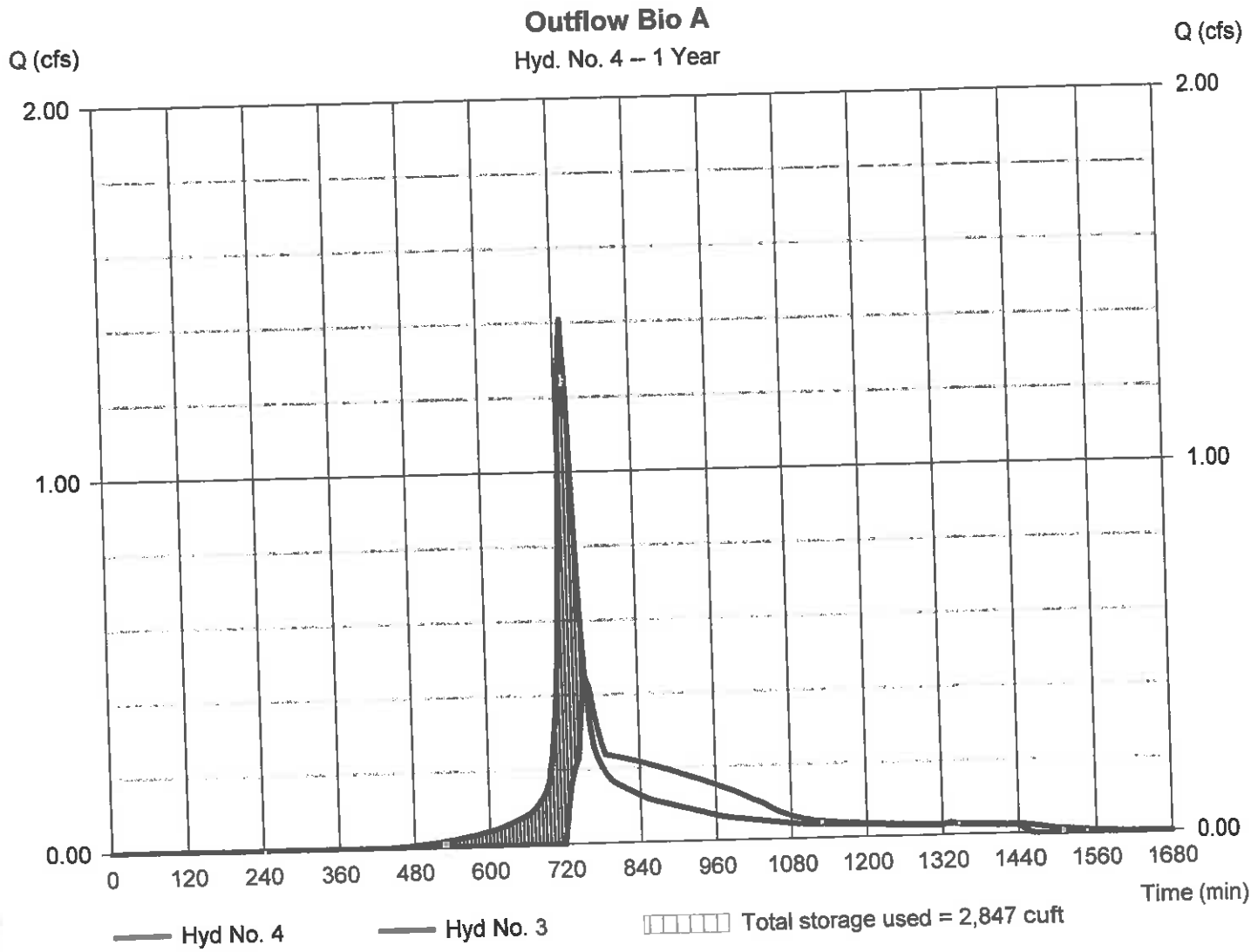
Thursday, Jan 25, 2018

Hyd. No. 4

Outflow Bio A

Hydrograph type	= Reservoir	Peak discharge	= 0.448 cfs
Storm frequency	= 1 yrs	Time to peak	= 756 min
Time interval	= 6 min	Hyd. volume	= 4,804 cuft
Inflow hyd. No.	= 3 - Proposed A	Max. Elevation	= 550.04 ft
Reservoir name	= Bioretention A	Max. Storage	= 2,847 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Bioretention A

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 549.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	549.00	2,230	0	0
0.50	549.50	2,650	1,218	1,218
1.00	550.00	3,350	1,496	2,715
1.50	550.50	3,900	1,811	4,525

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	0.00	0.00	0.00
Span (in)	= 15.00	0.00	0.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 545.00	0.00	0.00	0.00
Length (ft)	= 25.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .012	.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)	= 1.00	8.00	0.00	0.00
Crest El. (ft)	= 549.50	550.00	0.00	0.00
Weir Coeff.	= 3.10	3.10	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	Yes	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

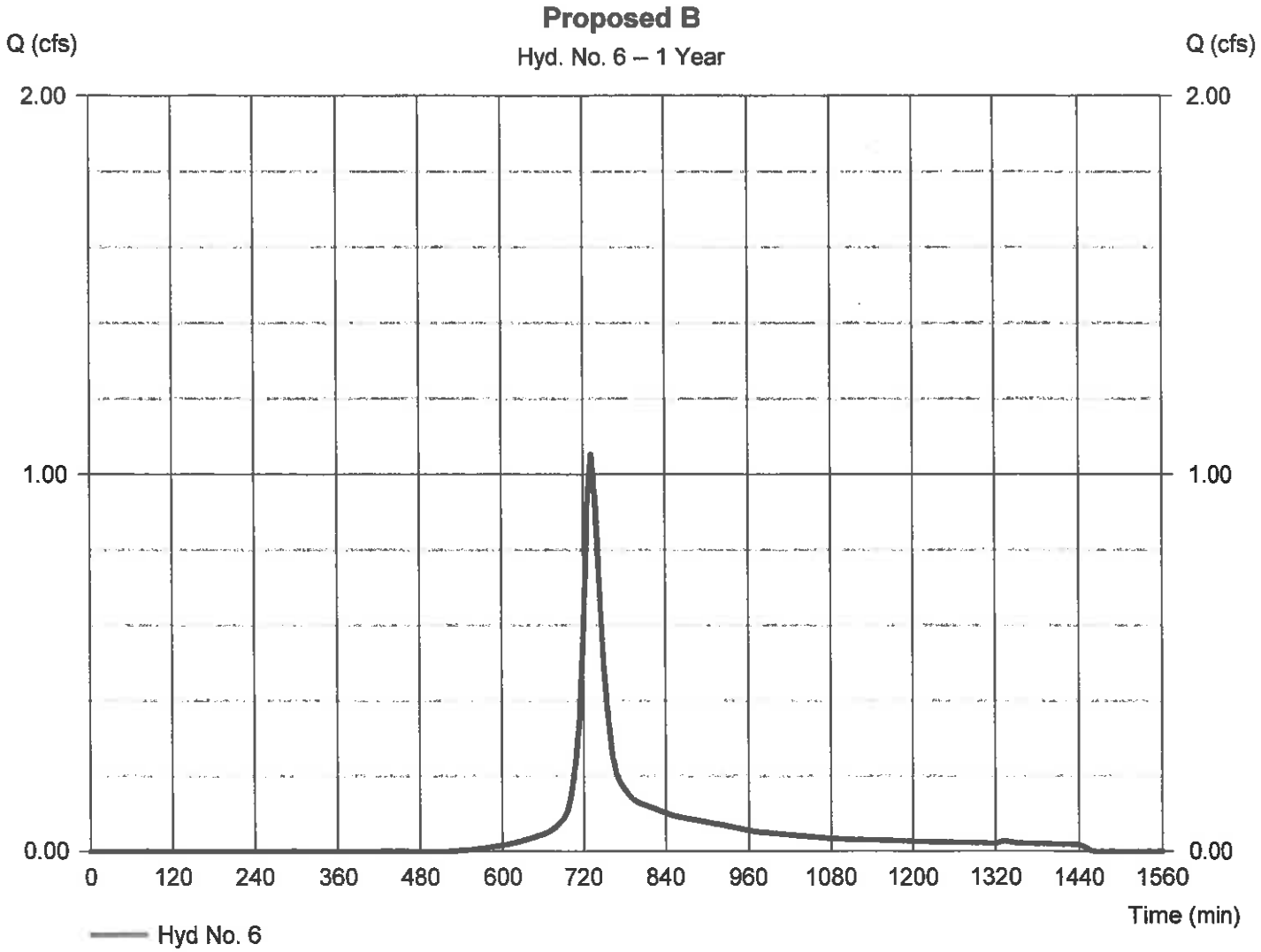
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	549.00	0.00	---	---	---	0.00	0.00	---	---	---	---	0.000
0.50	1,218	549.50	10.85 ic	---	---	---	0.00	0.00	---	---	---	---	0.000
1.00	2,715	550.00	10.85 ic	---	---	---	0.24 ic	0.00	---	---	---	---	0.238
1.50	4,525	550.50	10.85 ic	---	---	---	0.34 ic	8.77	---	---	---	---	9.104

Hydrograph Report

Hyd. No. 6

Proposed B

Hydrograph type	= SCS Runoff	Peak discharge	= 1.054 cfs
Storm frequency	= 1 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 4,499 cuft
Drainage area	= 1.000 ac	Curve number	= 85.1
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 2.67 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



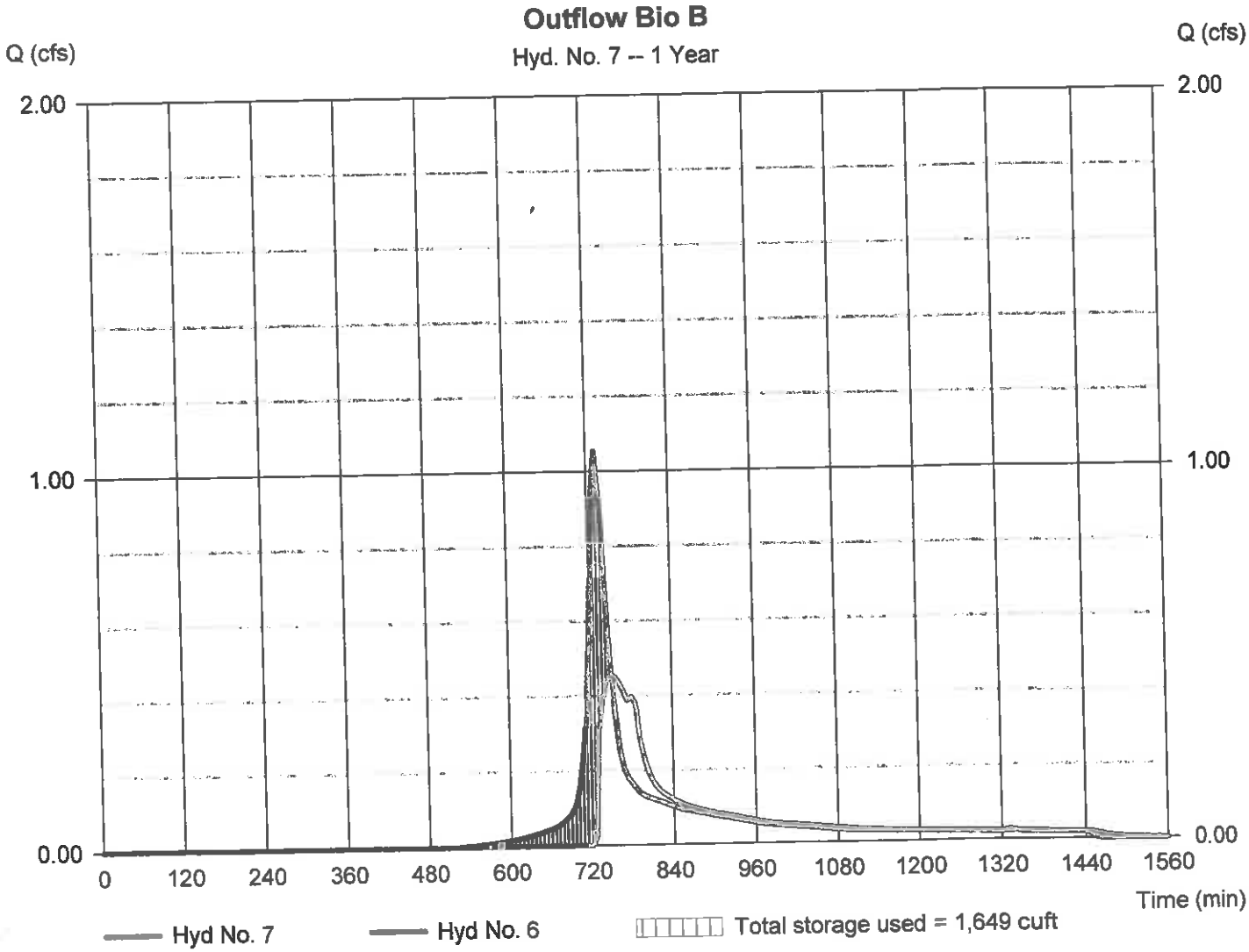
Hydrograph Report

Hyd. No. 7

Outflow Bio B

Hydrograph type	= Reservoir	Peak discharge	= 0.454 cfs
Storm frequency	= 1 yrs	Time to peak	= 750 min
Time interval	= 6 min	Hyd. volume	= 3,608 cuft
Inflow hyd. No.	= 6 - Proposed B	Max. Elevation	= 540.86 ft
Reservoir name	= Bioretention B	Max. Storage	= 1,649 cuft

Storage Indication method used.



Pond Report

Pond No. 6 - Bioretention B

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 540.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	540.00	1,620	0	0
0.50	540.50	1,940	889	889
1.00	541.00	2,270	1,051	1,940
1.50	541.50	2,700	1,241	3,181

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	0.00	0.00	0.00
Span (in)	= 15.00	0.00	0.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 536.00	0.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .012	.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)	= 1.50	4.00	0.00	0.00
Crest El. (ft)	= 540.50	541.00	0.00	0.00
Weir Coeff.	= 3.10	3.10	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	Yes	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

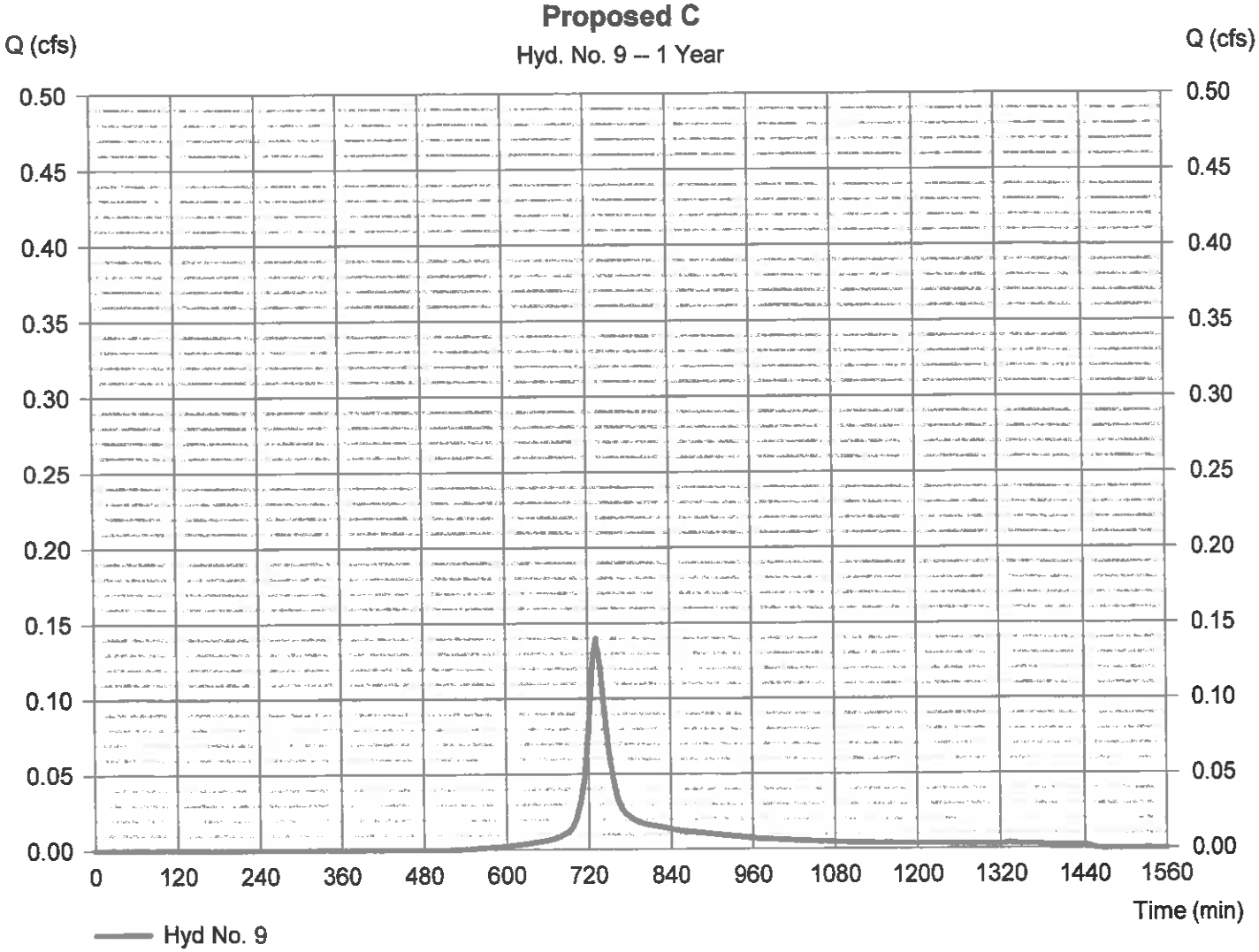
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	540.00	0.00	---	---	---	0.00	0.00	---	---	---	---	0.000
0.50	889	540.50	10.85 ic	---	---	---	0.00	0.00	---	---	---	---	0.000
1.00	1,940	541.00	10.85 ic	---	---	---	0.53 ic	0.00	---	---	---	---	0.535
1.50	3,181	541.50	10.85 ic	---	---	---	0.76 ic	4.38	---	---	---	---	5.140

Hydrograph Report

Hyd. No. 9

Proposed C

Hydrograph type	= SCS Runoff	Peak discharge	= 0.140 cfs
Storm frequency	= 1 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 597 cuft
Drainage area	= 0.130 ac	Curve number	= 85.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 2.67 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

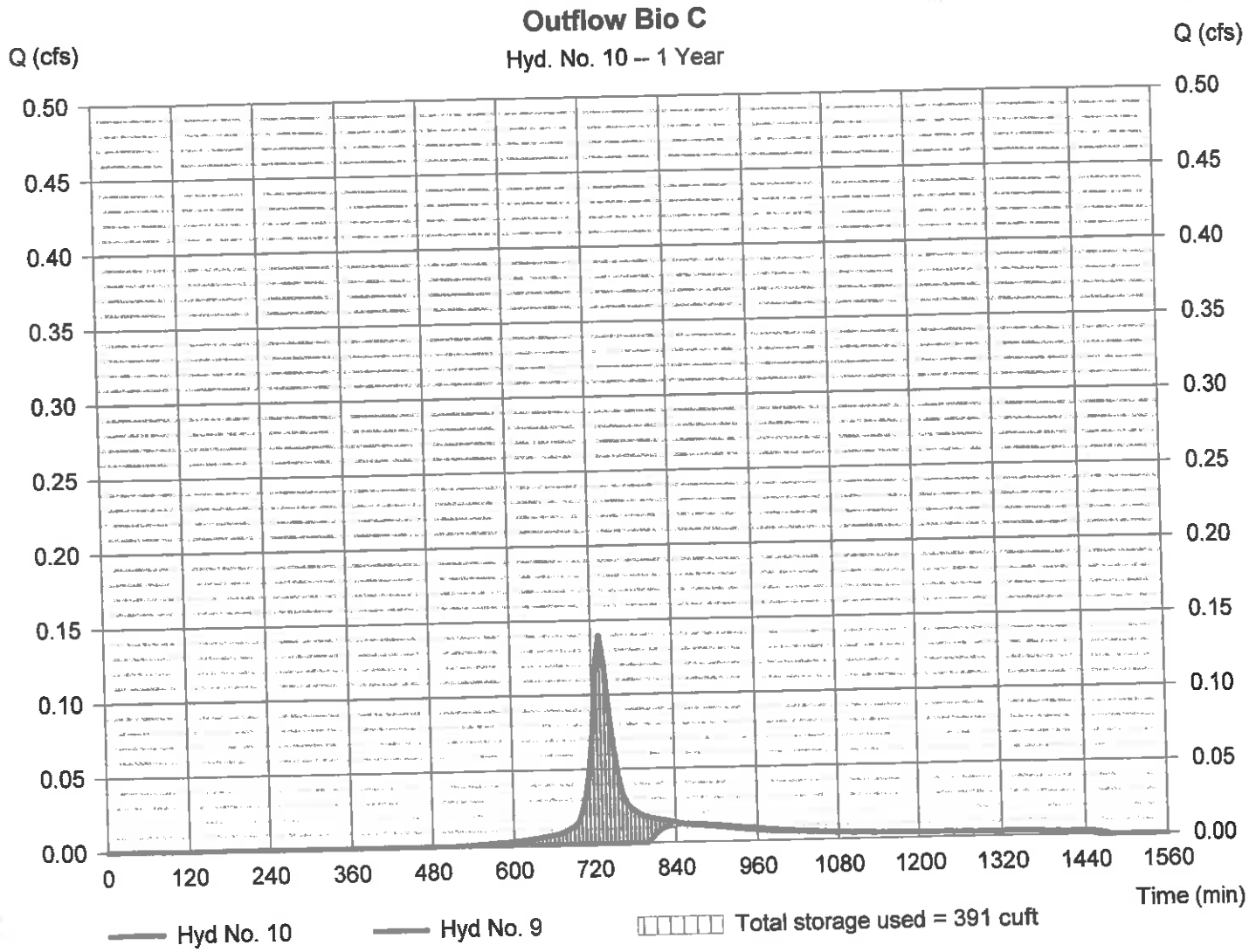
Thursday, Jan 25, 2018

Hyd. No. 10

Outflow Bio C

Hydrograph type	= Reservoir	Peak discharge	= 0.012 cfs
Storm frequency	= 1 yrs	Time to peak	= 852 min
Time interval	= 6 min	Hyd. volume	= 222 cuft
Inflow hyd. No.	= 9 - Proposed C	Max. Elevation	= 539.52 ft
Reservoir name	= Bioretention C	Max. Storage	= 391 cuft

Storage Indication method used.



Pond No. 3 - Bioretention C

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 539.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	539.00	650	0	0
0.50	539.50	850	374	374
1.00	540.00	1,070	479	853
1.50	540.50	1,070	535	1,388

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 535.00	0.00	0.00	0.00
Length (ft)	= 15.00	0.00	0.00	0.00
Slope (%)	= 5.00	0.00	0.00	n/a
N-Value	= .012	.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)	= 1.00	4.00	0.00	0.00
Crest El. (ft)	= 539.50	540.00	0.00	0.00
Weir Coeff.	= 3.10	3.10	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	Yes	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

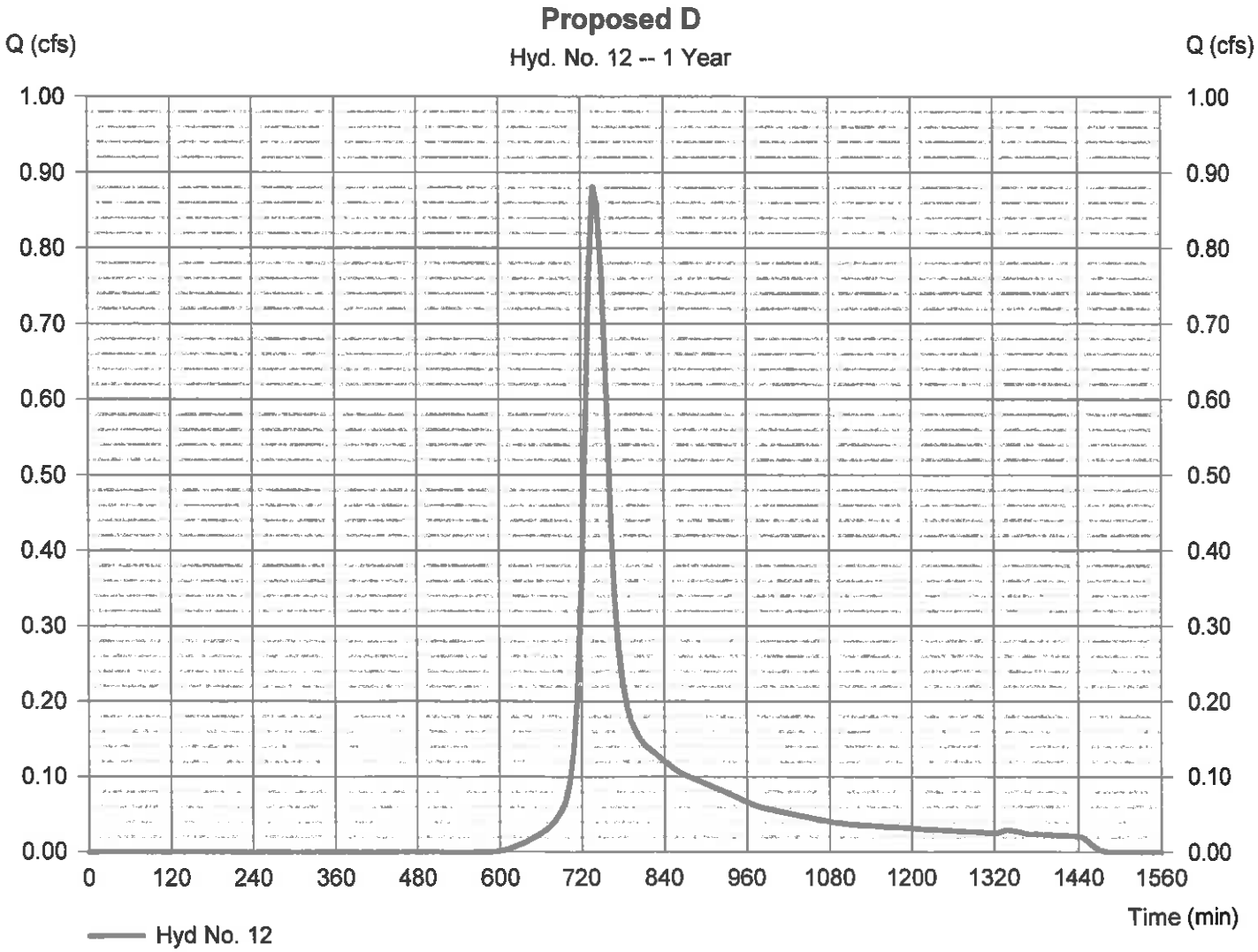
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	539.00	0.00	---	---	---	0.00	0.00	---	---	---	---	0.000
0.50	374	539.50	7.07 ic	---	---	---	0.00	0.00	---	---	---	---	0.000
1.00	853	540.00	7.07 ic	---	---	---	0.24 ic	0.00	---	---	---	---	0.238
1.50	1,388	540.50	7.07 ic	---	---	---	0.34 ic	4.38	---	---	---	---	4.720

Hydrograph Report

Hyd. No. 12

Proposed D

Hydrograph type	= SCS Runoff	Peak discharge	= 0.881 cfs
Storm frequency	= 1 yrs	Time to peak	= 738 min
Time interval	= 6 min	Hyd. volume	= 4,692 cuft
Drainage area	= 1.200 ac	Curve number	= 81.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 21.00 min
Total precip.	= 2.67 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

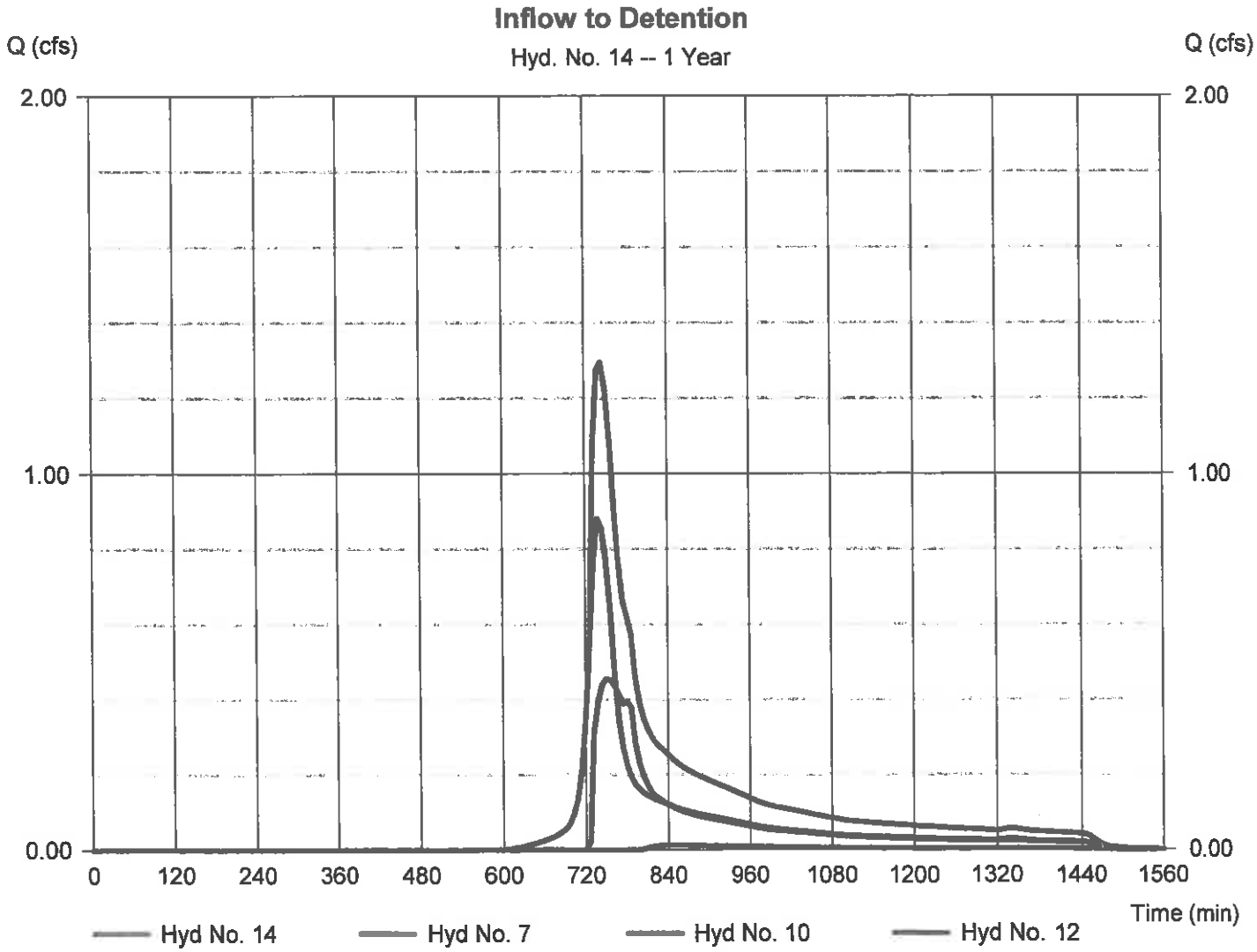


Hydrograph Report

Hyd. No. 14

Inflow to Detention

Hydrograph type	= Combine	Peak discharge	= 1.295 cfs
Storm frequency	= 1 yrs	Time to peak	= 744 min
Time interval	= 6 min	Hyd. volume	= 8,522 cuft
Inflow hyds.	= 7, 10, 12	Contrib. drain. area	= 1.200 ac



Hydrograph Report

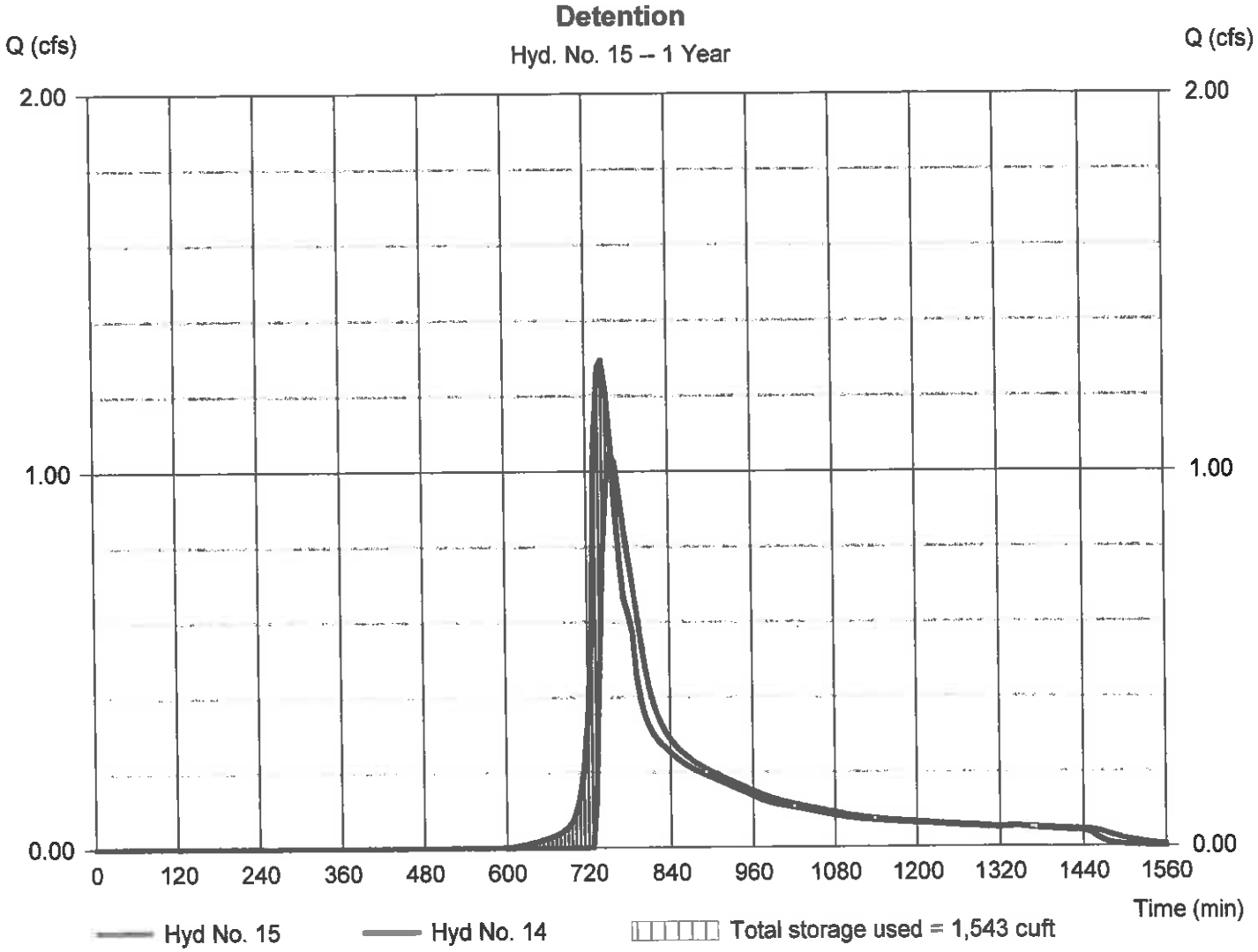
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Thursday, Jan 25, 2018

Hyd. No. 15

Detention

Hydrograph type	= Reservoir	Peak discharge	= 1.047 cfs
Storm frequency	= 1 yrs	Time to peak	= 756 min
Time interval	= 6 min	Hyd. volume	= 7,926 cuft
Inflow hyd. No.	= 14 - Inflow to Detention	Max. Elevation	= 529.13 ft
Reservoir name	= Detention	Max. Storage	= 1,543 cuft

Storage Indication method used.



Pond Report

Pond No. 4 - Detention

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 528.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	528.50	2,250	0	0
0.50	529.00	2,500	1,187	1,187
1.50	530.00	3,225	2,855	4,041
2.50	531.00	4,000	3,605	7,647
3.50	532.00	4,800	4,393	12,040

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	8.00	0.00	0.00
Span (in)	= 15.00	16.00	0.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 528.00	528.75	0.00	0.00
Length (ft)	= 65.00	0.00	0.00	0.00
Slope (%)	= 0.62	0.00	0.00	n/a
N-Value	= .012	.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)	= 5.50	0.00	0.00	0.00
Crest El. (ft)	= 530.25	0.00	0.00	0.00
Weir Coeff.	= 3.10	3.10	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	Yes	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	528.50	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.50	1,187	529.00	1.13 ic	0.57 ic	---	---	0.00	---	---	---	---	---	0.567
1.50	4,041	530.00	3.84 oc	3.84 ic	---	---	0.00	---	---	---	---	---	3.838
2.50	7,647	531.00	8.38 oc	1.63 ic	---	---	6.74 s	---	---	---	---	---	8.373
3.50	12,040	532.00	10.44 oc	0.75 ic	---	---	9.69 s	---	---	---	---	---	10.44

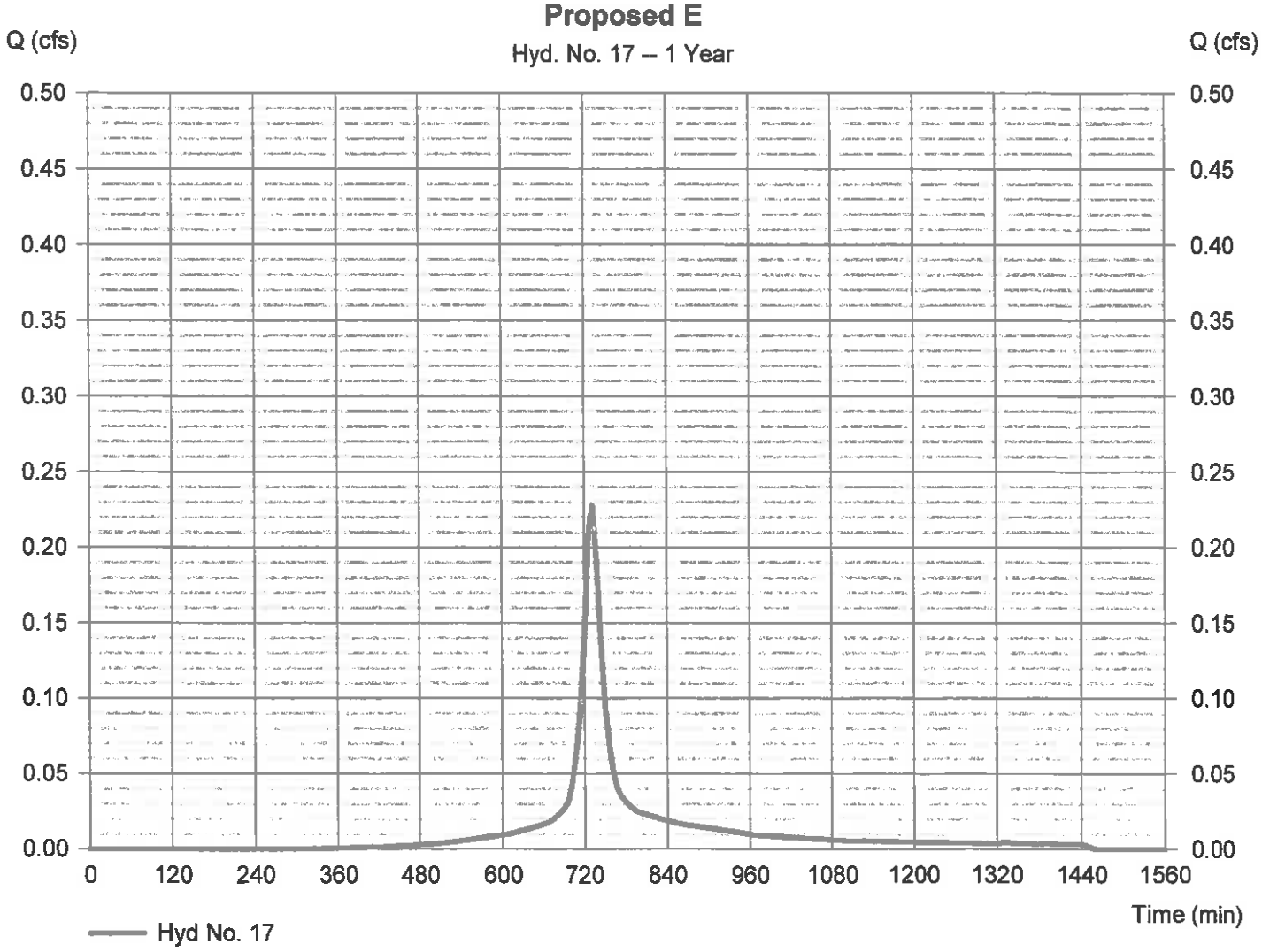
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Thursday, Jan 25, 2018

Hyd. No. 17

Proposed E

Hydrograph type	= SCS Runoff	Peak discharge	= 0.228 cfs
Storm frequency	= 1 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 1,000 cuft
Drainage area	= 0.150 ac	Curve number	= 93.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 2.67 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

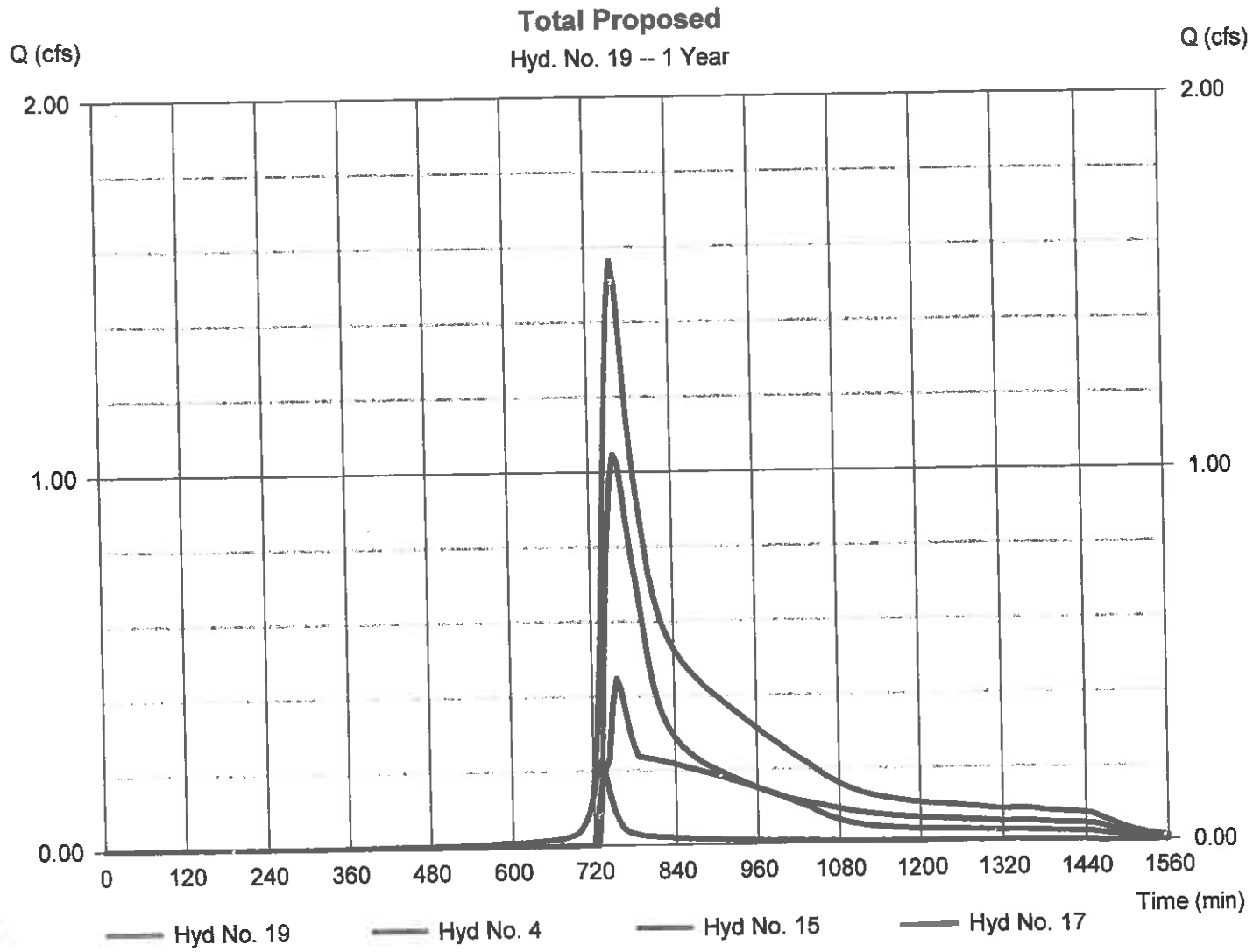


Hydrograph Report

Hyd. No. 19

Total Proposed

Hydrograph type	= Combine	Peak discharge	= 1.564 cfs
Storm frequency	= 1 yrs	Time to peak	= 756 min
Time interval	= 6 min	Hyd. volume	= 13,730 cuft
Inflow hyds.	= 4, 15, 17	Contrib. drain. area	= 0.150 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

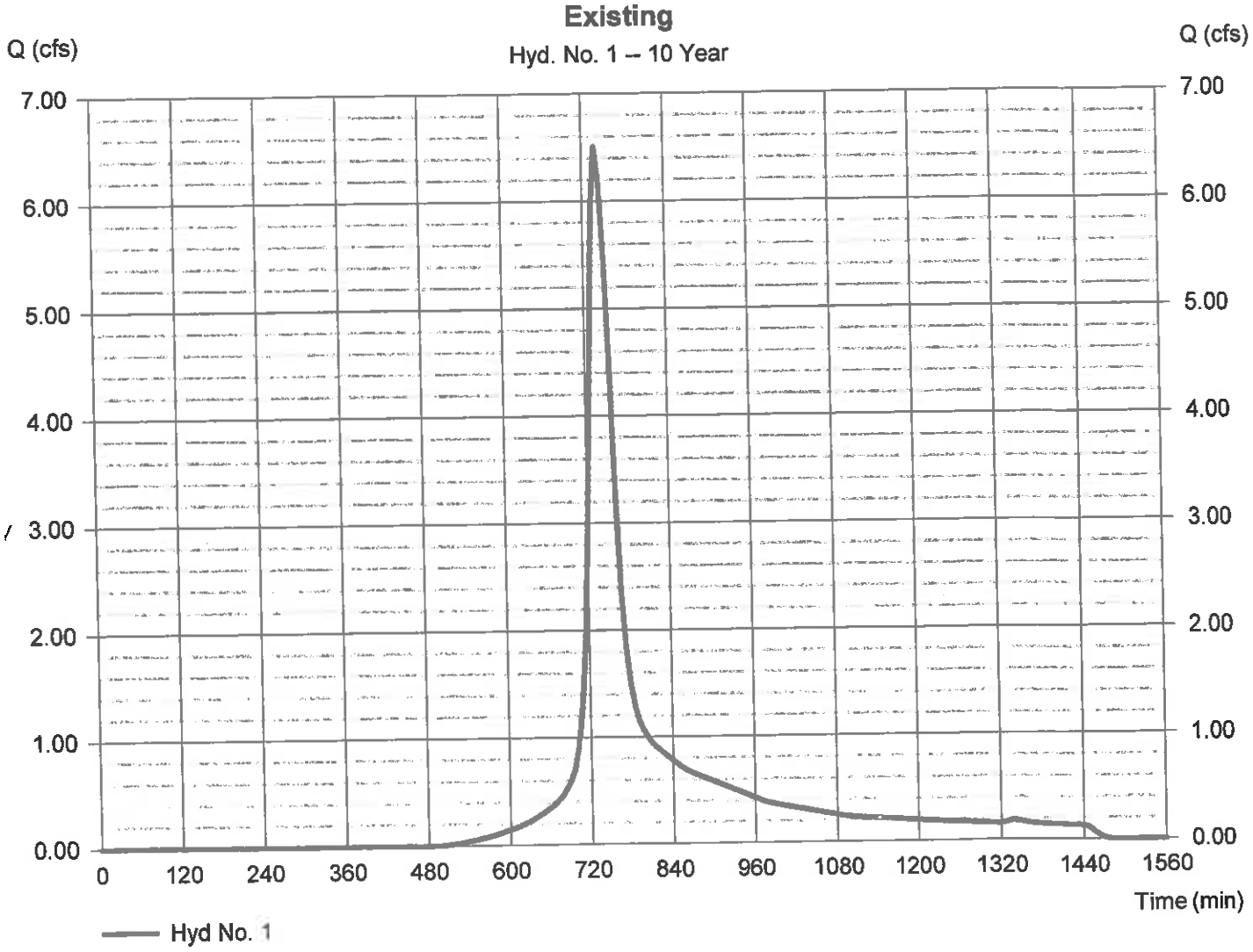
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	6.505	6	738	33,799	-----	-----	-----	Existing
3	SCS Runoff	3.077	6	732	13,531	-----	-----	-----	Proposed A
4	Reservoir	2.851	6	732	12,309	3	550.23	3,511	Outflow Bio A
6	SCS Runoff	2.516	6	732	10,867	-----	-----	-----	Proposed B
7	Reservoir	2.256	6	738	9,977	6	541.27	2,573	Outflow Bio B
9	SCS Runoff	0.331	6	732	1,430	-----	-----	-----	Proposed C
10	Reservoir	0.161	6	750	1,055	9	539.73	594	Outflow Bio C
12	SCS Runoff	2.372	6	738	12,317	-----	-----	-----	Proposed D
14	Combine	4.775	6	738	23,348	7, 10, 12,	-----	-----	Inflow to Detention
15	Reservoir	3.647	6	750	22,752	14	529.82	3,522	Detention
17	SCS Runoff	0.450	6	732	2,054	-----	-----	-----	Proposed E
19	Combine	6.338	6	738	37,115	4, 15, 17,	-----	-----	Total Proposed

Hydrograph Report

Hyd. No. 1

Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 6.505 cfs
Storm frequency	= 10 yrs	Time to peak	= 738 min
Time interval	= 6 min	Hyd. volume	= 33,799 cuft
Drainage area	= 3.600 ac	Curve number	= 78.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 21.00 min
Total precip.	= 4.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

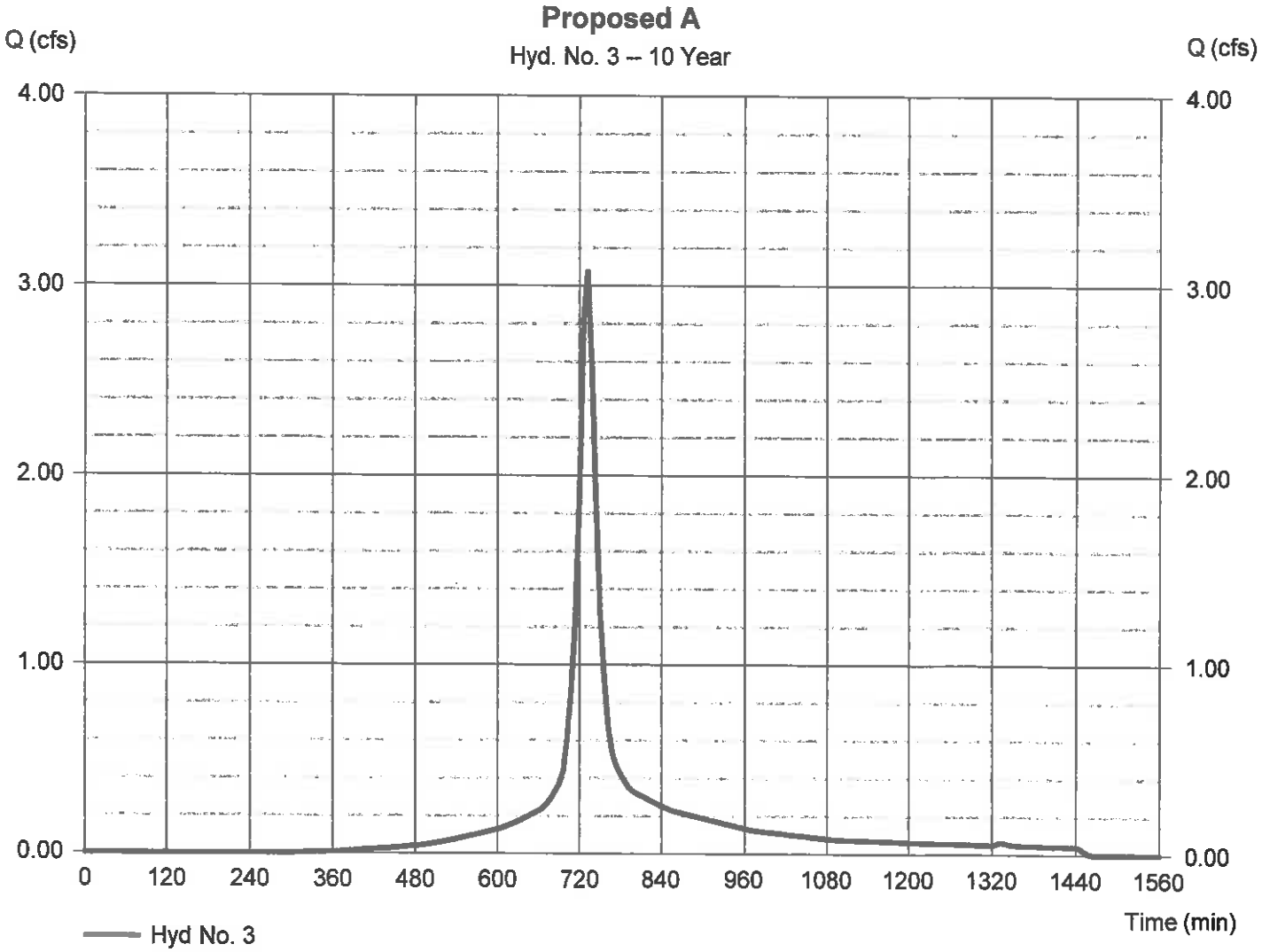


Hydrograph Report

Hyd. No. 3

Proposed A

Hydrograph type	= SCS Runoff	Peak discharge	= 3.077 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 13,531 cuft
Drainage area	= 1.120 ac	Curve number	= 88.7
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 4.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



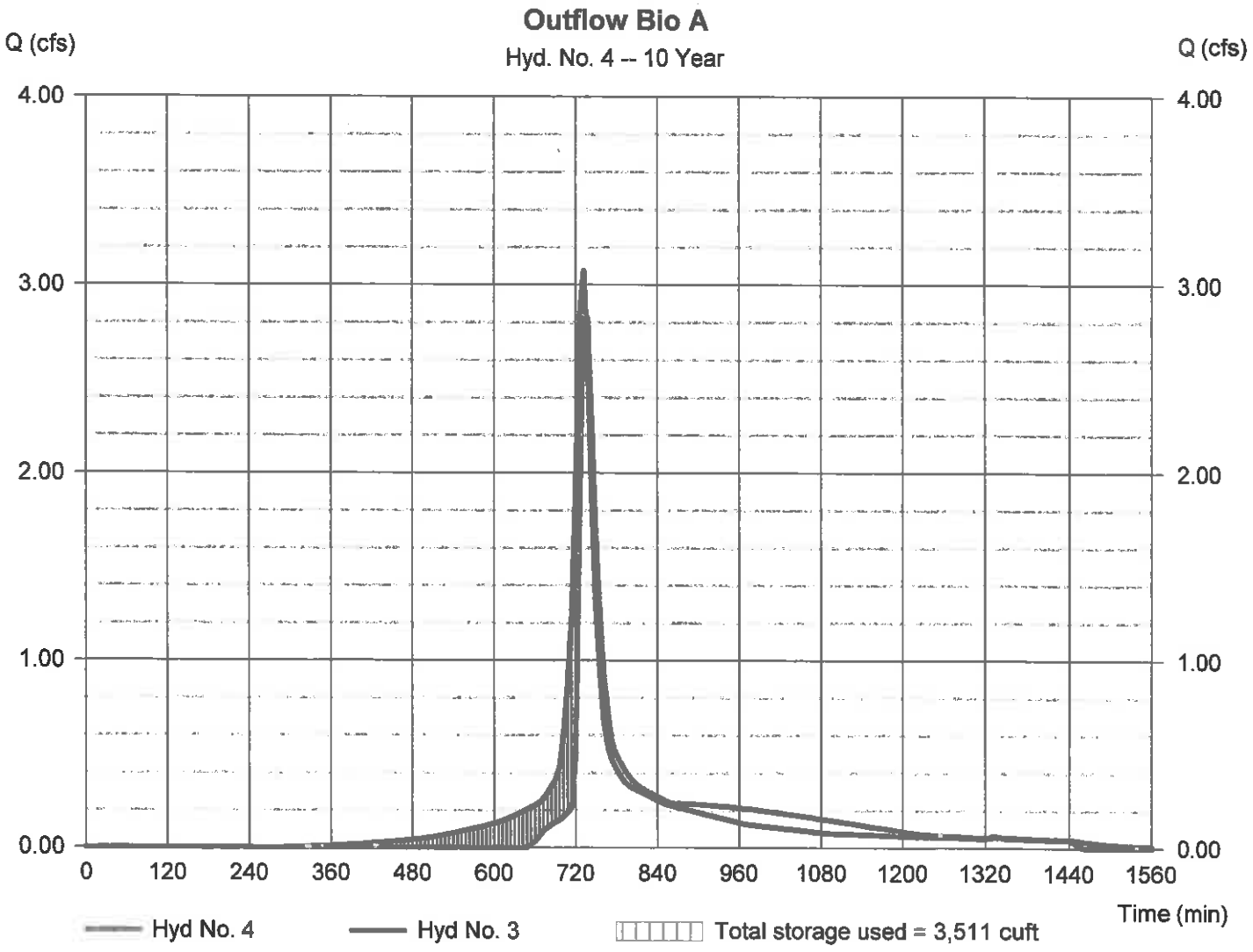
Hydrograph Report

Hyd. No. 4

Outflow Bio A

Hydrograph type	= Reservoir	Peak discharge	= 2.851 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 12,309 cuft
Inflow hyd. No.	= 3 - Proposed A	Max. Elevation	= 550.23 ft
Reservoir name	= Bioretention A	Max. Storage	= 3,511 cuft

Storage Indication method used.

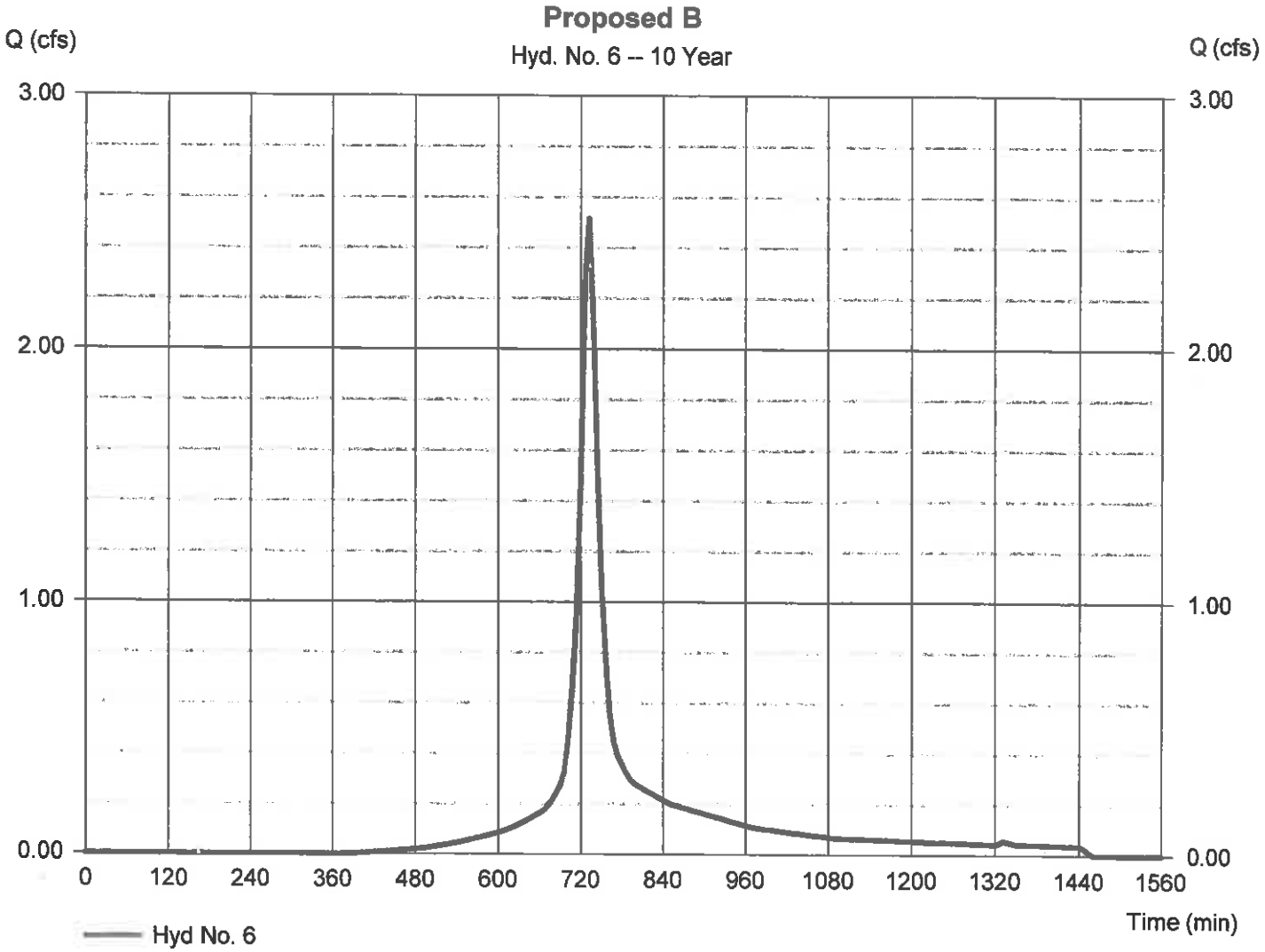


Hydrograph Report

Hyd. No. 6

Proposed B

Hydrograph type	= SCS Runoff	Peak discharge	= 2.516 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 10,867 cuft
Drainage area	= 1.000 ac	Curve number	= 85.1
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 4.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

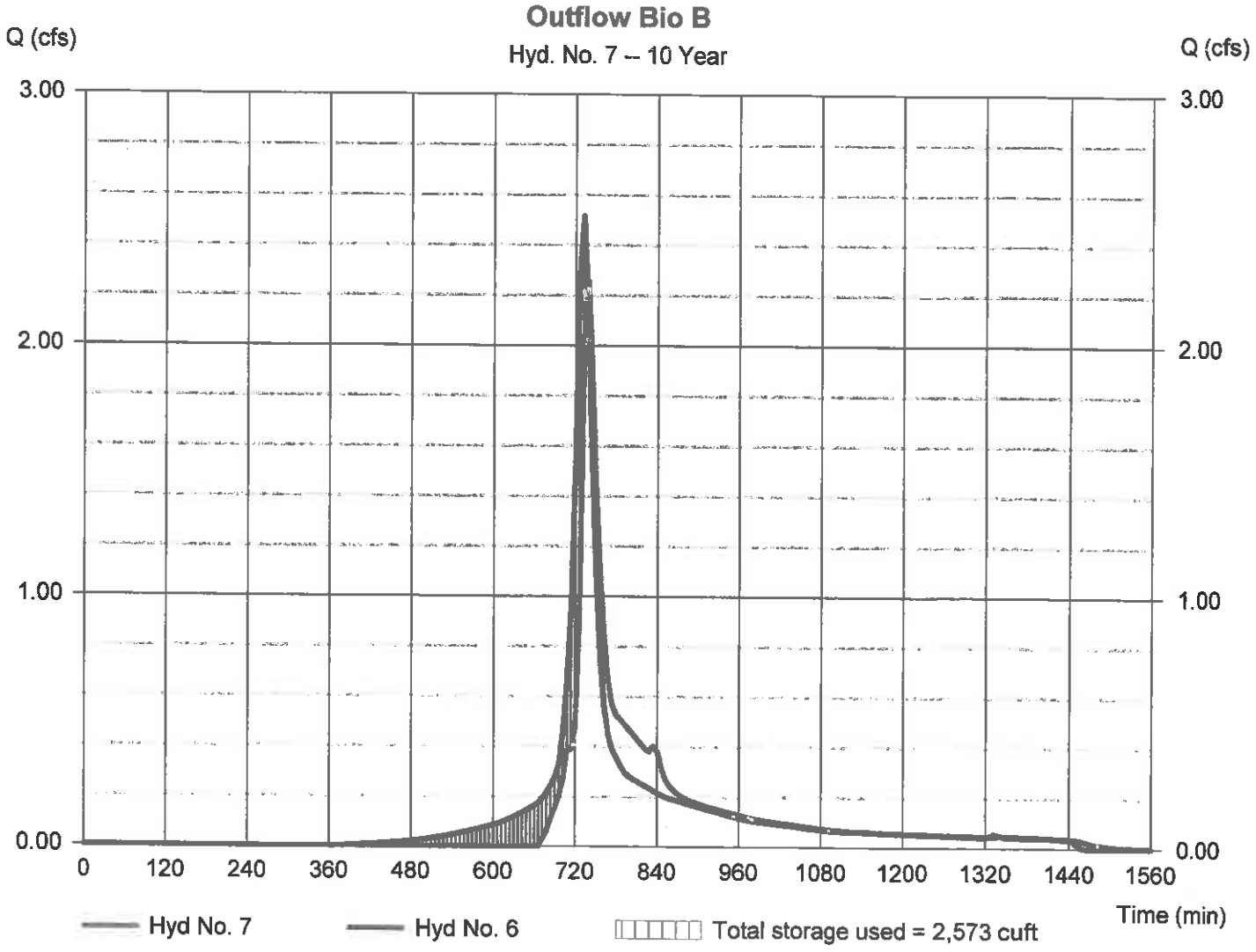
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Thursday, Jan 25, 2018

Hyd. No. 7

Outflow Bio B

Hydrograph type	= Reservoir	Peak discharge	= 2.256 cfs
Storm frequency	= 10 yrs	Time to peak	= 738 min
Time interval	= 6 min	Hyd. volume	= 9,977 cuft
Inflow hyd. No.	= 6 - Proposed B	Max. Elevation	= 541.27 ft
Reservoir name	= Bioretention B	Max. Storage	= 2,573 cuft

Storage Indication method used.

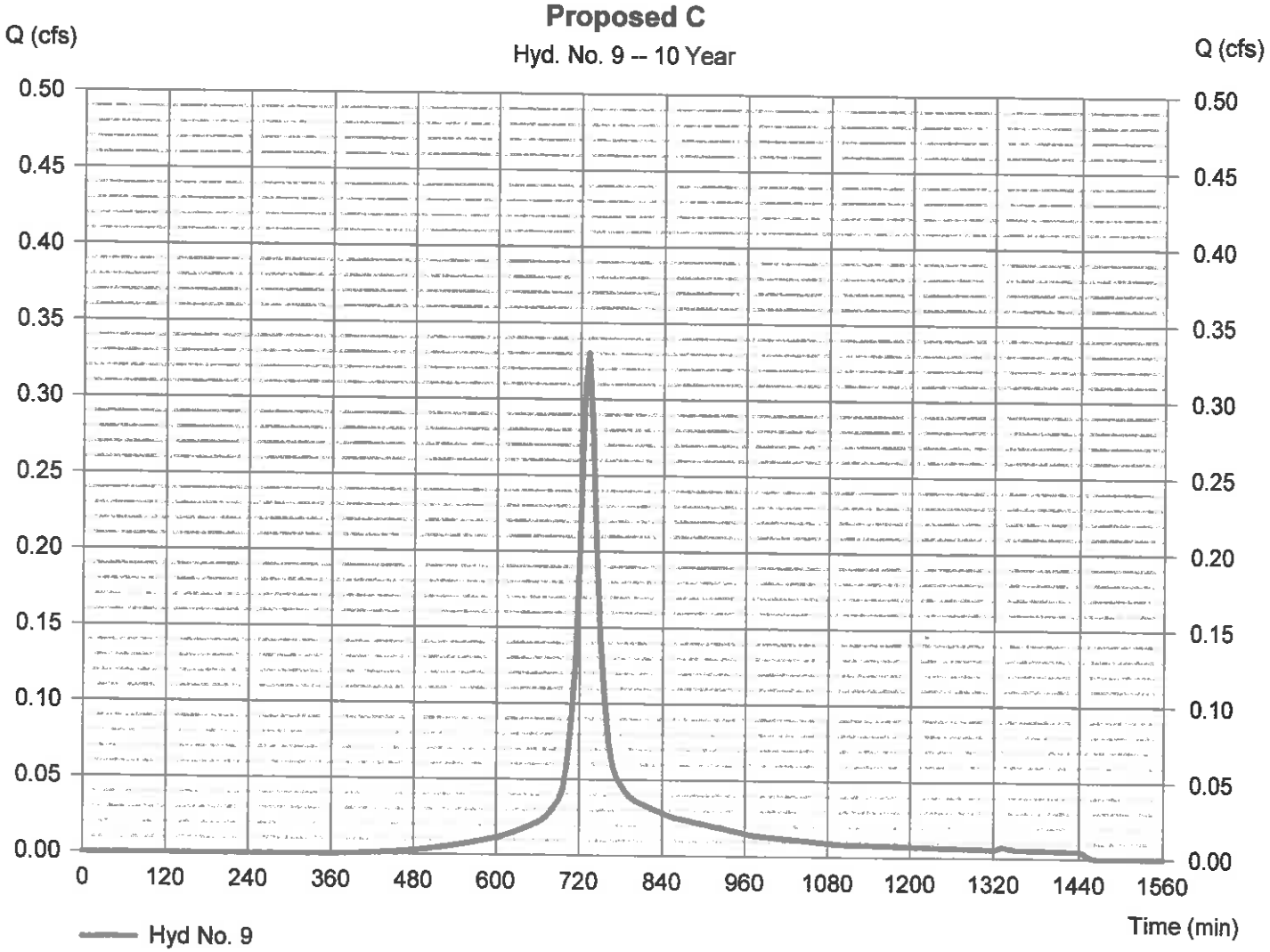


Hydrograph Report

Hyd. No. 9

Proposed C

Hydrograph type	= SCS Runoff	Peak discharge	= 0.331 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 1,430 cuft
Drainage area	= 0.130 ac	Curve number	= 85.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 4.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

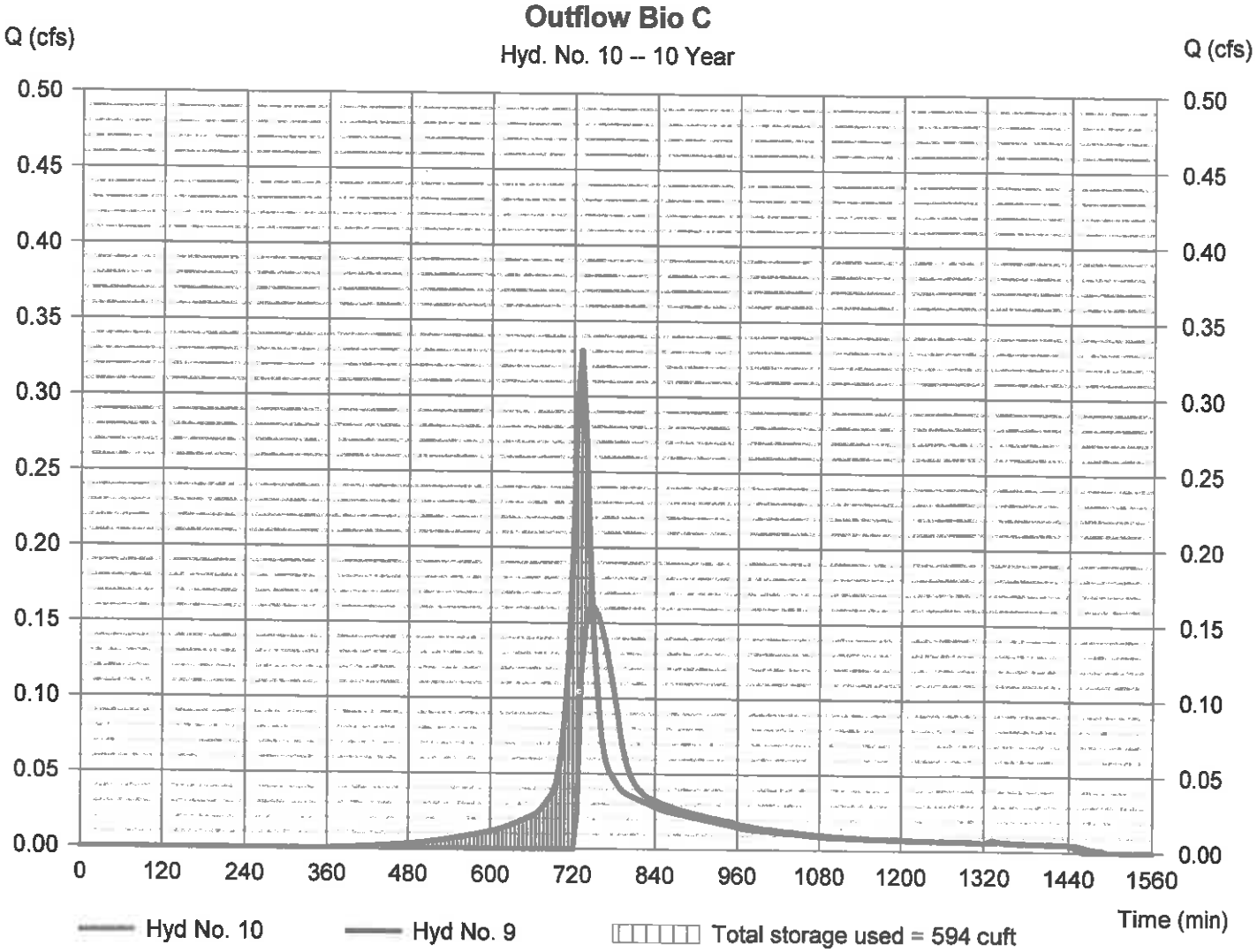
Thursday, Jan 25, 2018

Hyd. No. 10

Outflow Bio C

Hydrograph type	= Reservoir	Peak discharge	= 0.161 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 6 min	Hyd. volume	= 1,055 cuft
Inflow hyd. No.	= 9 - Proposed C	Max. Elevation	= 539.73 ft
Reservoir name	= Bioretention C	Max. Storage	= 594 cuft

Storage Indication method used.



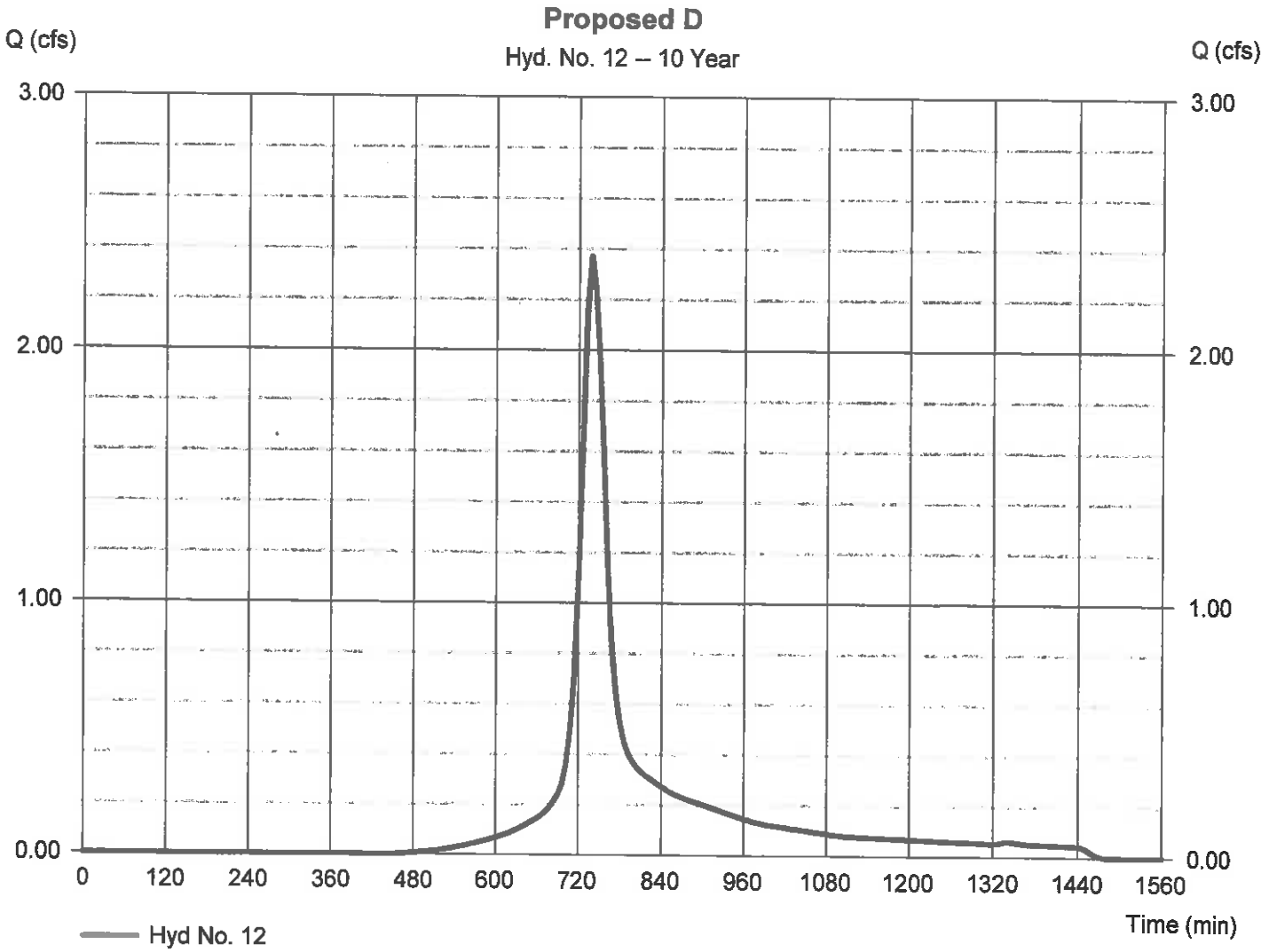
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Thursday, Jan 25, 2018

Hyd. No. 12

Proposed D

Hydrograph type	= SCS Runoff	Peak discharge	= 2.372 cfs
Storm frequency	= 10 yrs	Time to peak	= 738 min
Time interval	= 6 min	Hyd. volume	= 12,317 cuft
Drainage area	= 1.200 ac	Curve number	= 81.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 21.00 min
Total precip.	= 4.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

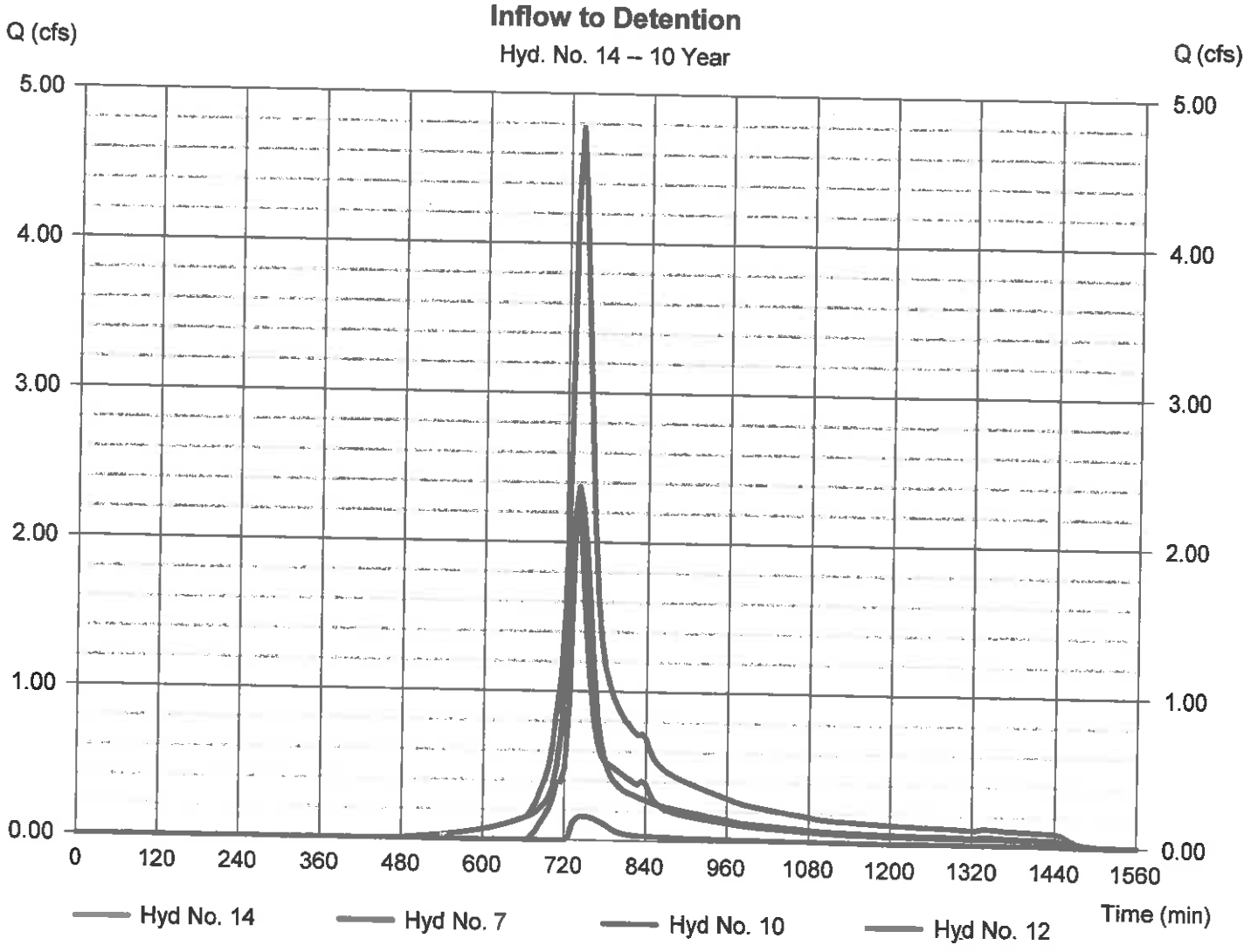
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Thursday, Jan 25, 2018

Hyd. No. 14

Inflow to Detention

Hydrograph type	= Combine	Peak discharge	= 4.775 cfs
Storm frequency	= 10 yrs	Time to peak	= 738 min
Time interval	= 6 min	Hyd. volume	= 23,348 cuft
Inflow hyds.	= 7, 10, 12	Contrib. drain. area	= 1.200 ac



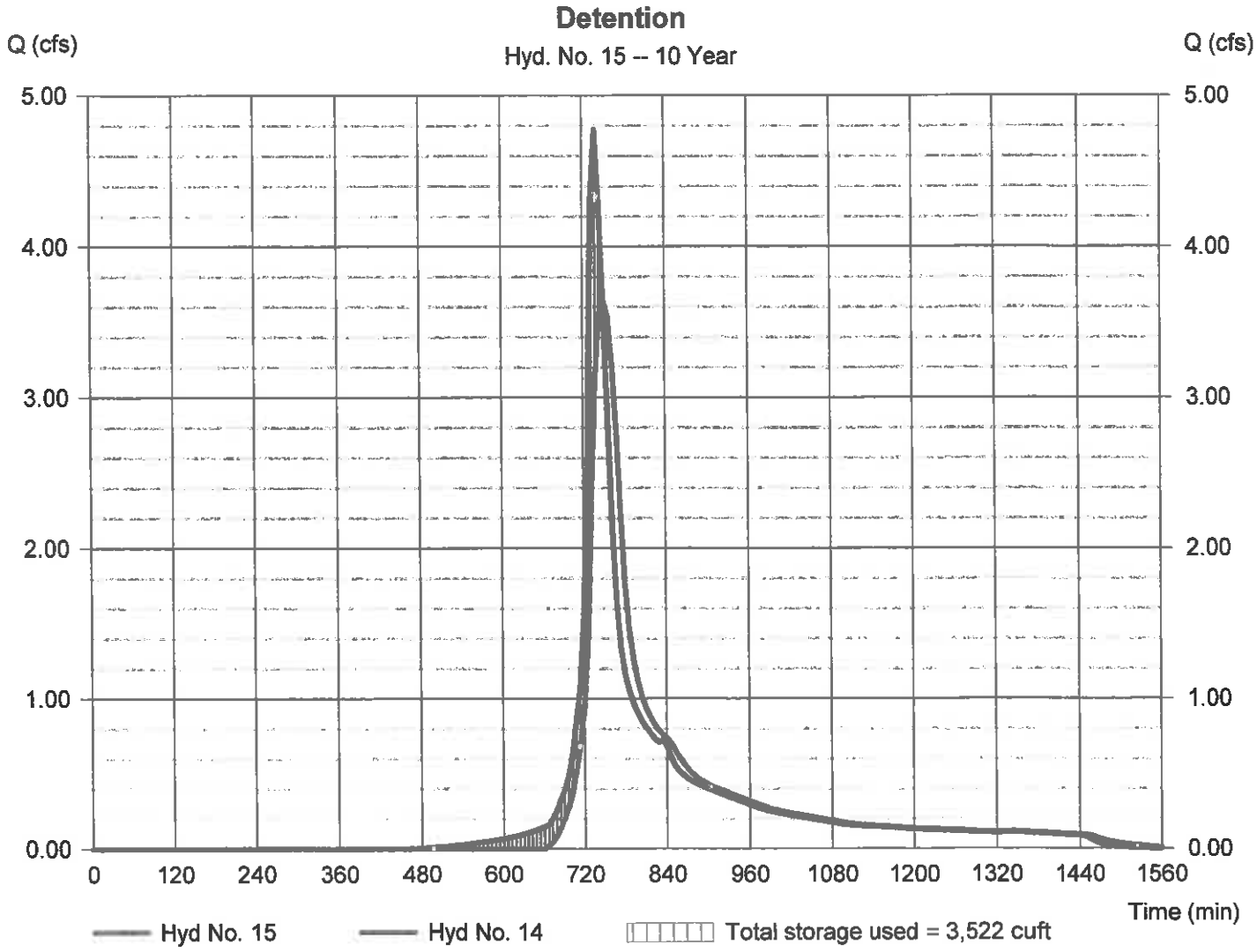
Hydrograph Report

Hyd. No. 15

Detention

Hydrograph type	= Reservoir	Peak discharge	= 3.647 cfs
Storm frequency	= 10 yrs	Time to peak	= 750 min
Time interval	= 6 min	Hyd. volume	= 22,752 cuft
Inflow hyd. No.	= 14 - Inflow to Detention	Max. Elevation	= 529.82 ft
Reservoir name	= Detention	Max. Storage	= 3,522 cuft

Storage Indication method used.

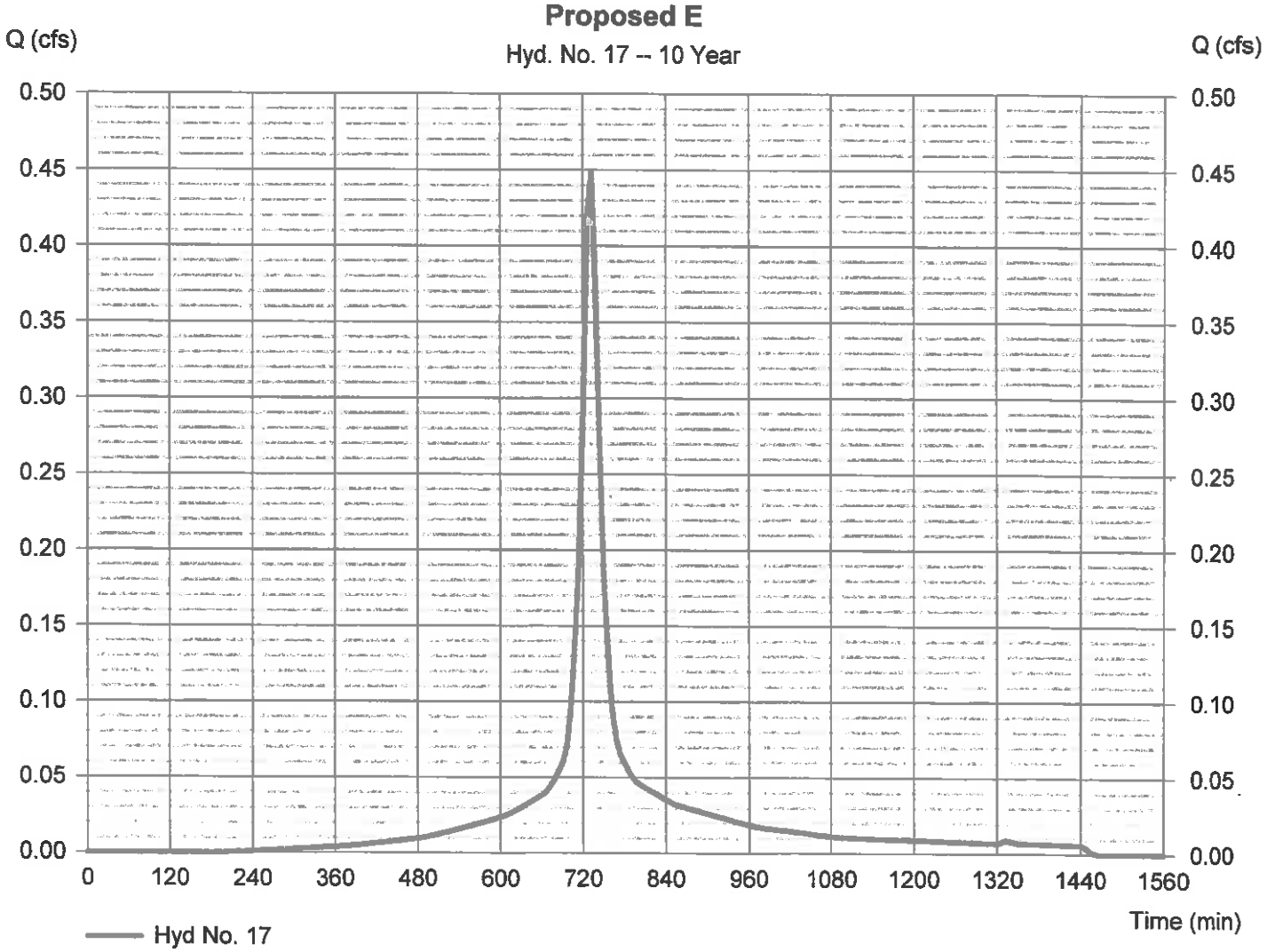


Hydrograph Report

Hyd. No. 17

Proposed E

Hydrograph type	= SCS Runoff	Peak discharge	= 0.450 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 2,054 cuft
Drainage area	= 0.150 ac	Curve number	= 93.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 4.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

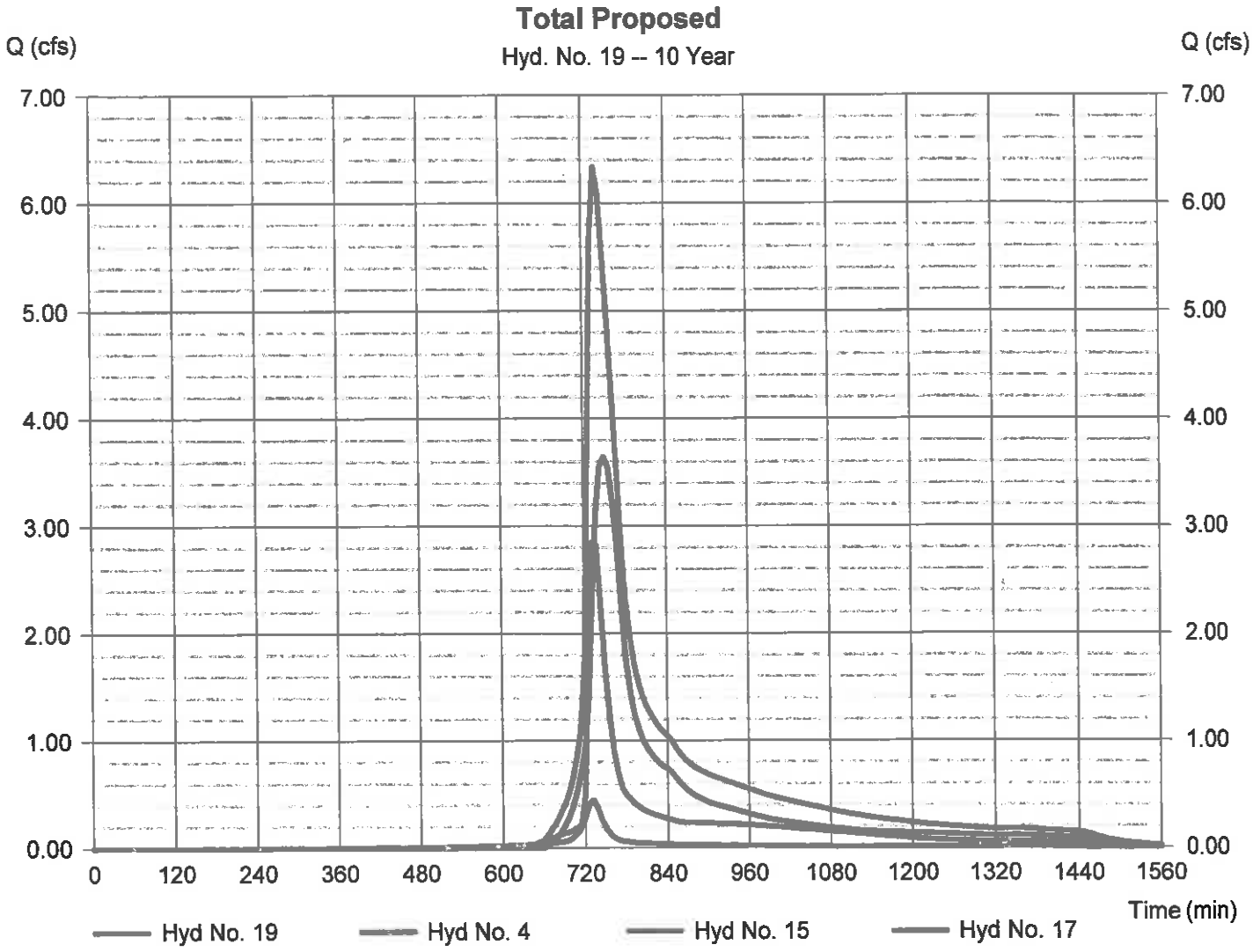


Hydrograph Report

Hyd. No. 19

Total Proposed

Hydrograph type	= Combine	Peak discharge	= 6.338 cfs
Storm frequency	= 10 yrs	Time to peak	= 738 min
Time interval	= 6 min	Hyd. volume	= 37,115 cuft
Inflow hyds.	= 4, 15, 17	Contrib. drain. area	= 0.150 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

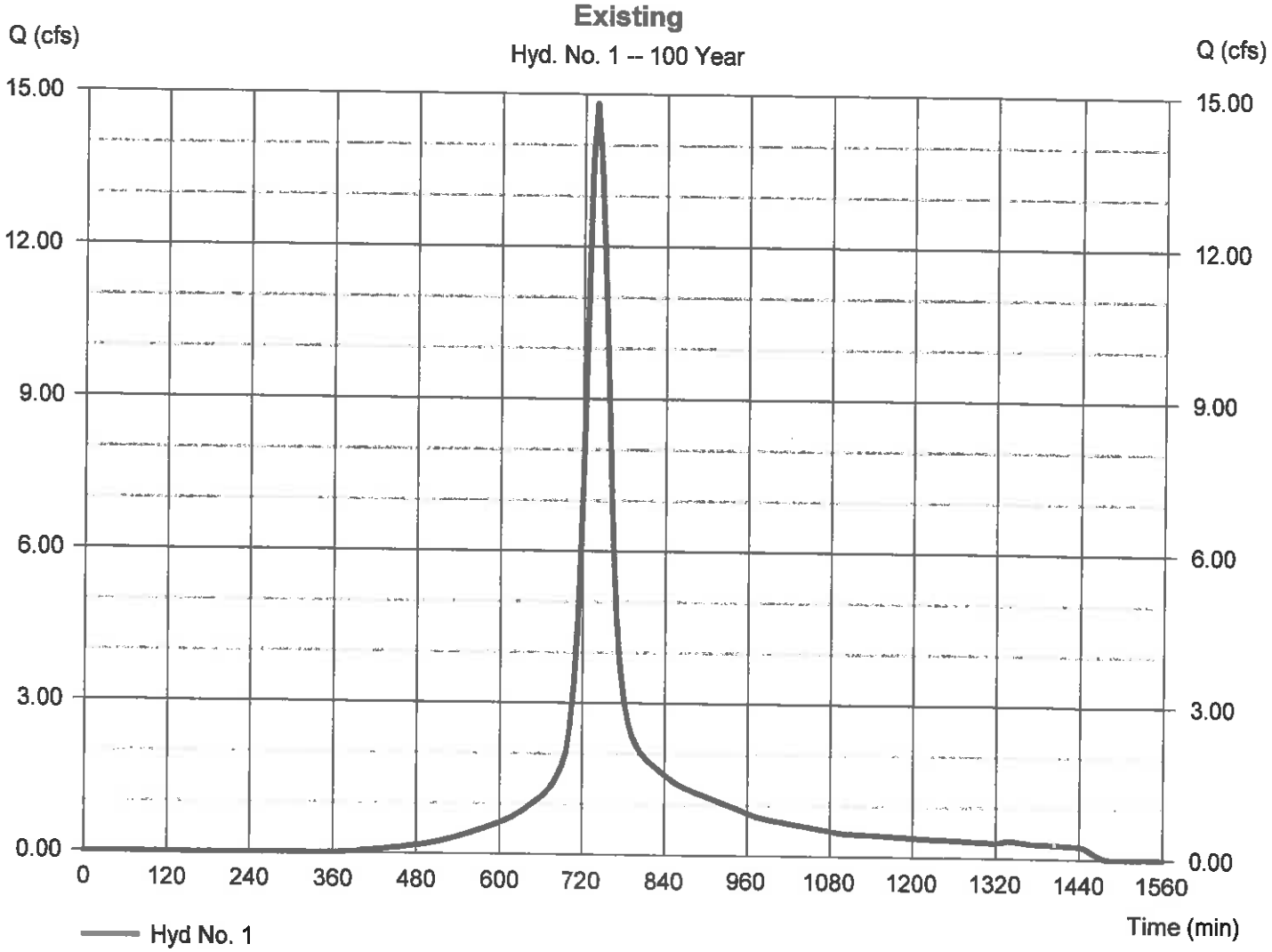
yd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	14.82	6	738	77,786	-----	-----	-----	Existing
3	SCS Runoff	5.983	6	732	27,370	-----	-----	-----	Proposed A
4	Reservoir	5.832	6	732	26,148	3	550.37	4,044	Outflow Bio A
6	SCS Runoff	5.132	6	732	22,962	-----	-----	-----	Proposed B
7	Reservoir	4.905	6	732	22,071	6	541.50	3,137	Outflow Bio B
9	SCS Runoff	0.670	6	732	3,006	-----	-----	-----	Proposed C
10	Reservoir	0.552	6	738	2,631	9	540.08	939	Outflow Bio C
12	SCS Runoff	5.166	6	738	27,345	-----	-----	-----	Proposed D
14	Combine	10.42	6	738	52,047	7, 10, 12,	-----	-----	Inflow to Detention
15	Reservoir	8.255	6	744	51,452	14	531.00	7,502	Detention
17	SCS Runoff	0.831	6	732	3,942	-----	-----	-----	Proposed E
19	Combine	13.79	6	738	81,542	4, 15, 17,	-----	-----	Total Proposed

Hydrograph Report

Hyd. No. 1

Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 14.82 cfs
Storm frequency	= 100 yrs	Time to peak	= 738 min
Time interval	= 6 min	Hyd. volume	= 77,786 cuft
Drainage area	= 3.600 ac	Curve number	= 78.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 21.00 min
Total precip.	= 8.54 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

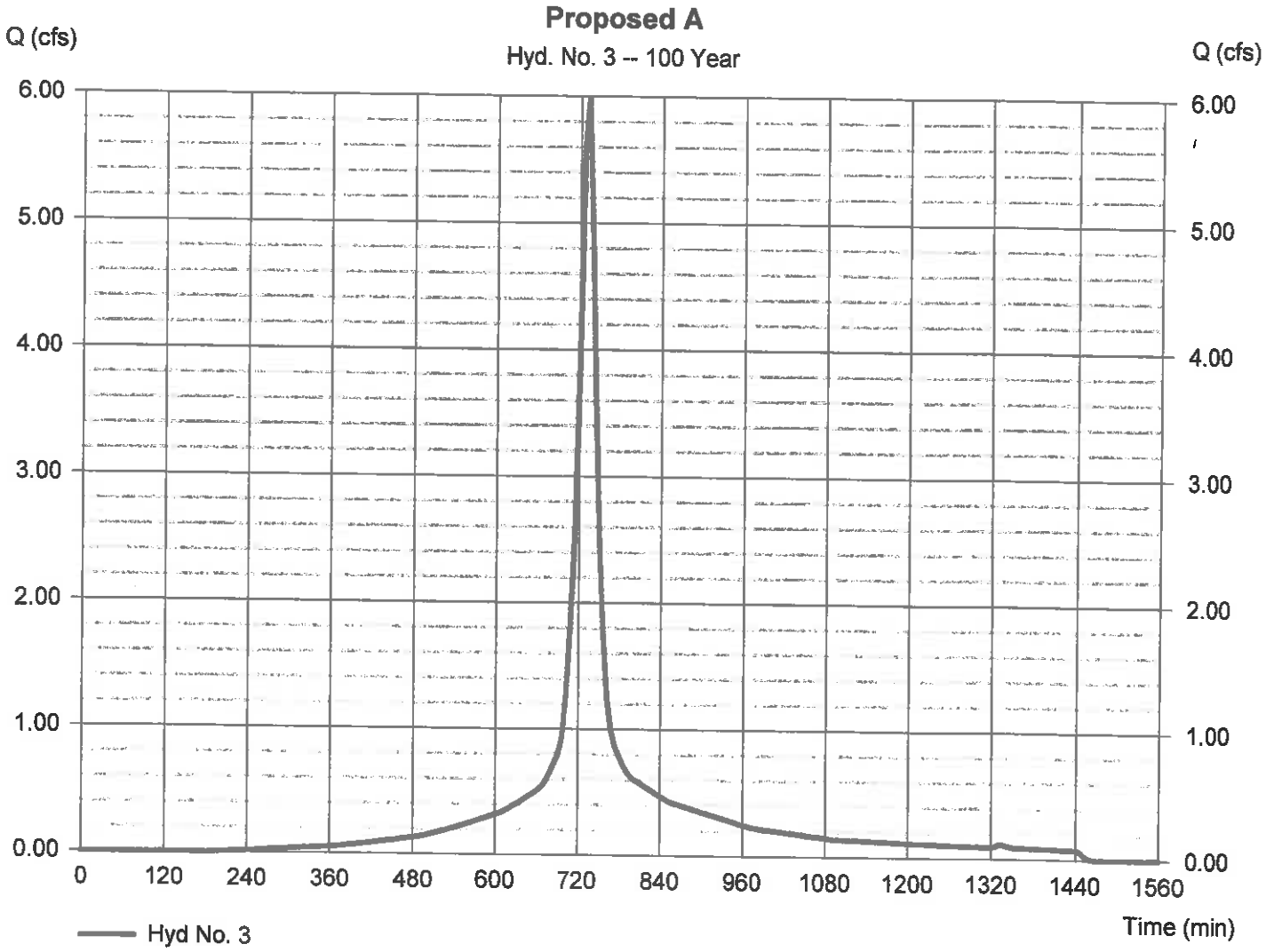


Hydrograph Report

Hyd. No. 3

Proposed A

Hydrograph type	= SCS Runoff	Peak discharge	= 5.983 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 27,370 cuft
Drainage area	= 1.120 ac	Curve number	= 88.7
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.54 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



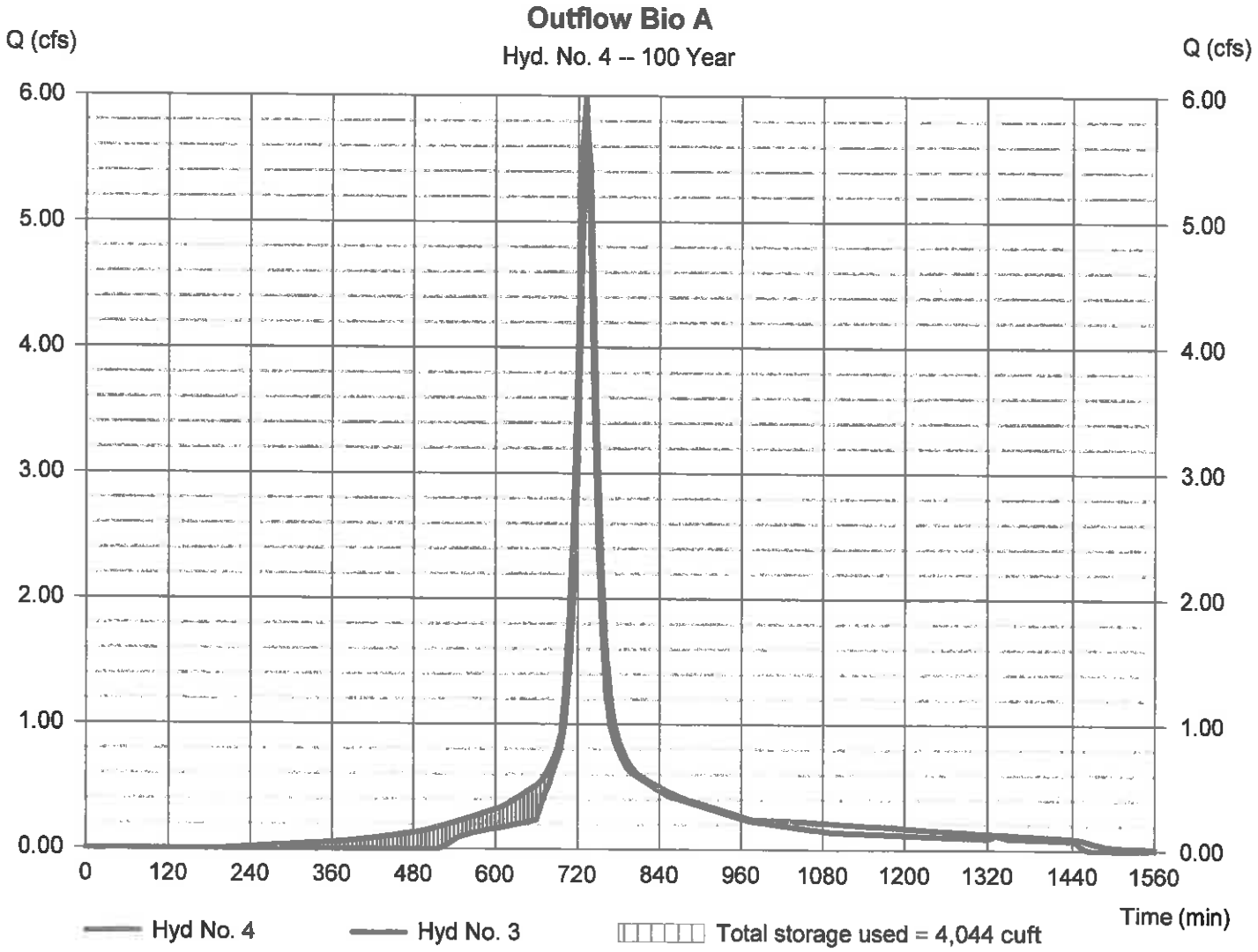
Hydrograph Report

Hyd. No. 4

Outflow Bio A

Hydrograph type	= Reservoir	Peak discharge	= 5.832 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 26,148 cuft
Inflow hyd. No.	= 3 - Proposed A	Max. Elevation	= 550.37 ft
Reservoir name	= Bioretention A	Max. Storage	= 4,044 cuft

Storage Indication method used.

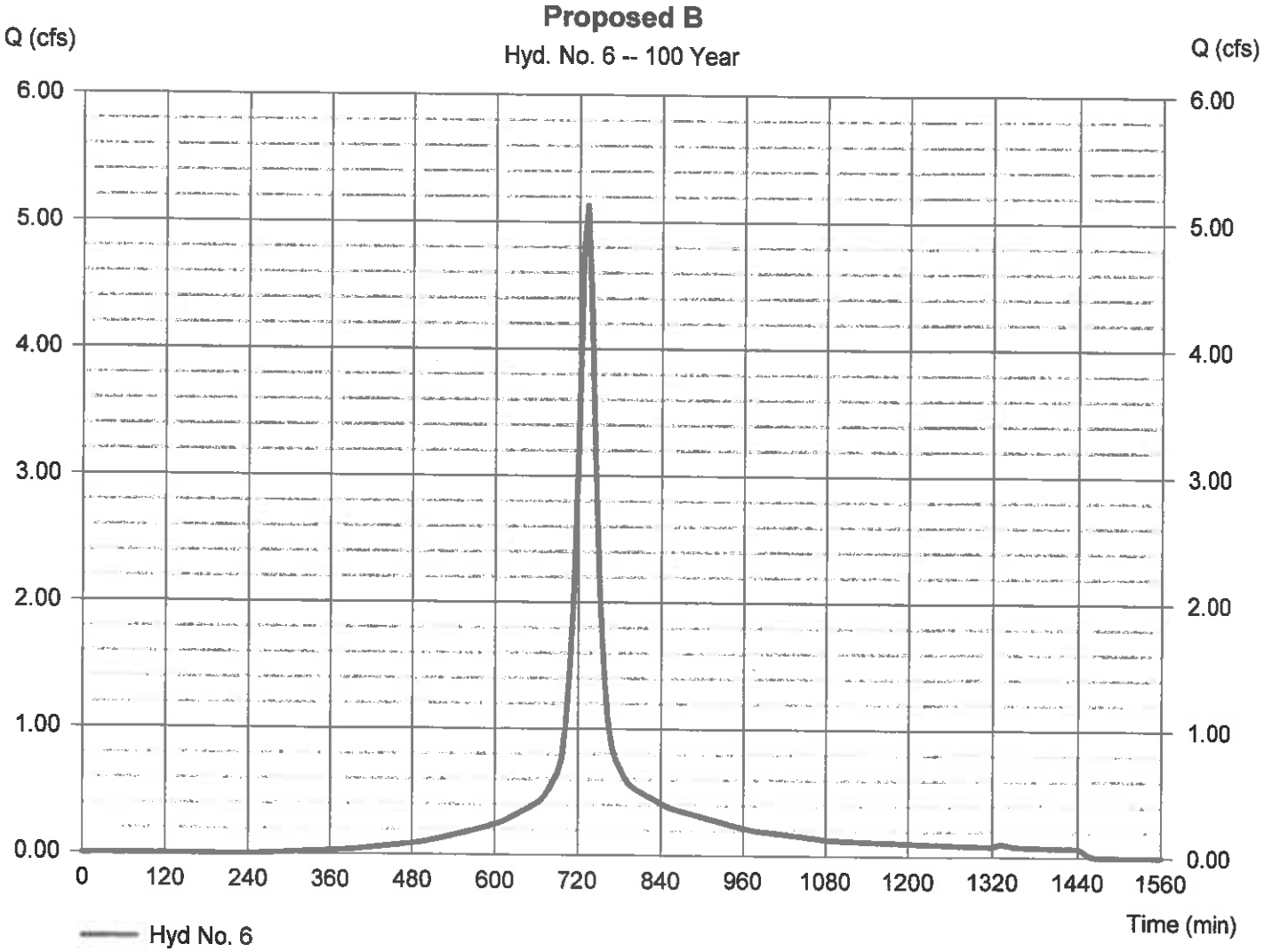


Hydrograph Report

Hyd. No. 6

Proposed B

Hydrograph type	= SCS Runoff	Peak discharge	= 5.132 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 22,962 cuft
Drainage area	= 1.000 ac	Curve number	= 85.1
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.54 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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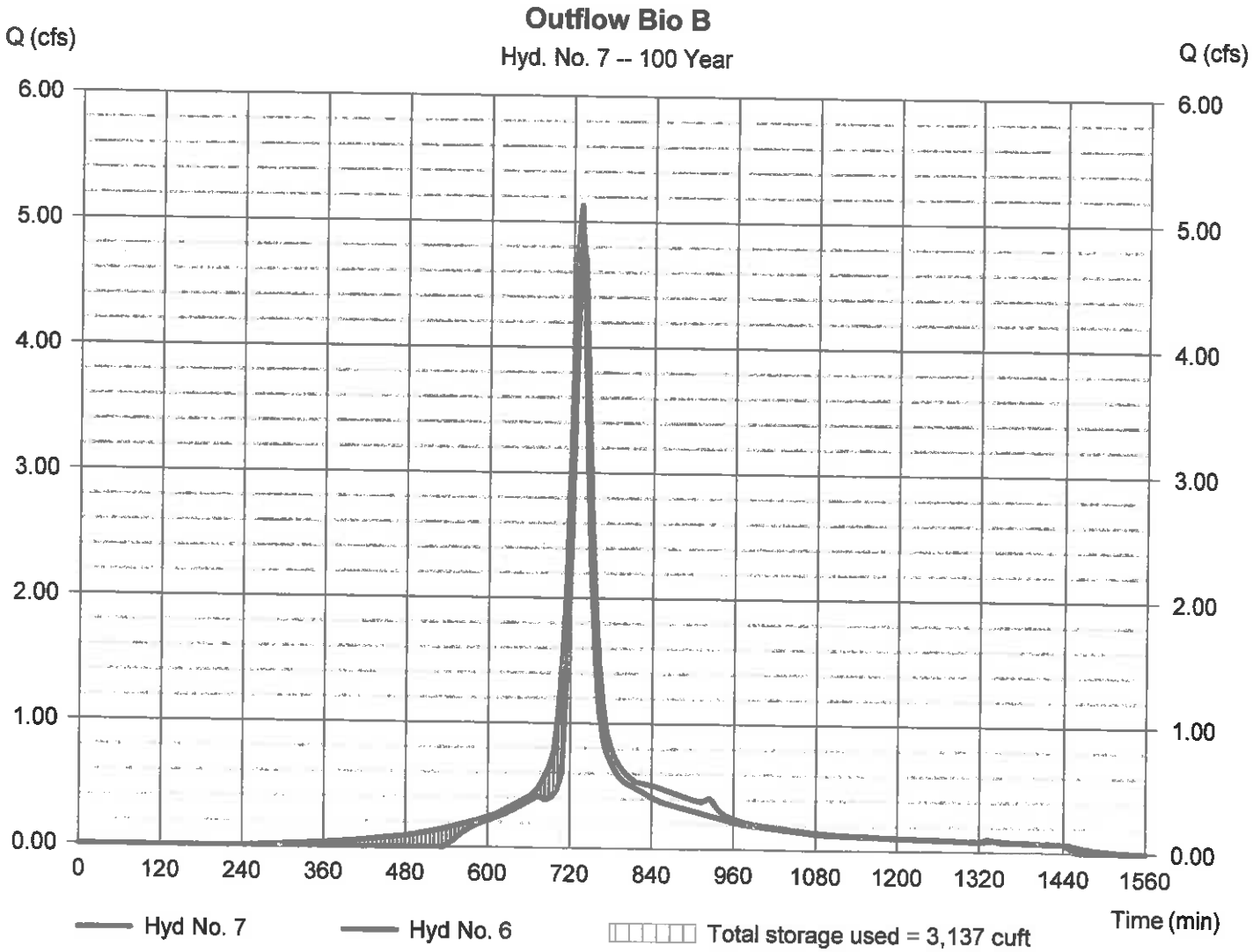
Thursday, Jan 25, 2018

Hyd. No. 7

Outflow Bio B

Hydrograph type	= Reservoir	Peak discharge	= 4.905 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 22,071 cuft
Inflow hyd. No.	= 6 - Proposed B	Max. Elevation	= 541.50 ft
Reservoir name	= Bioretention B	Max. Storage	= 3,137 cuft

Storage Indication method used.



Hydrograph Report

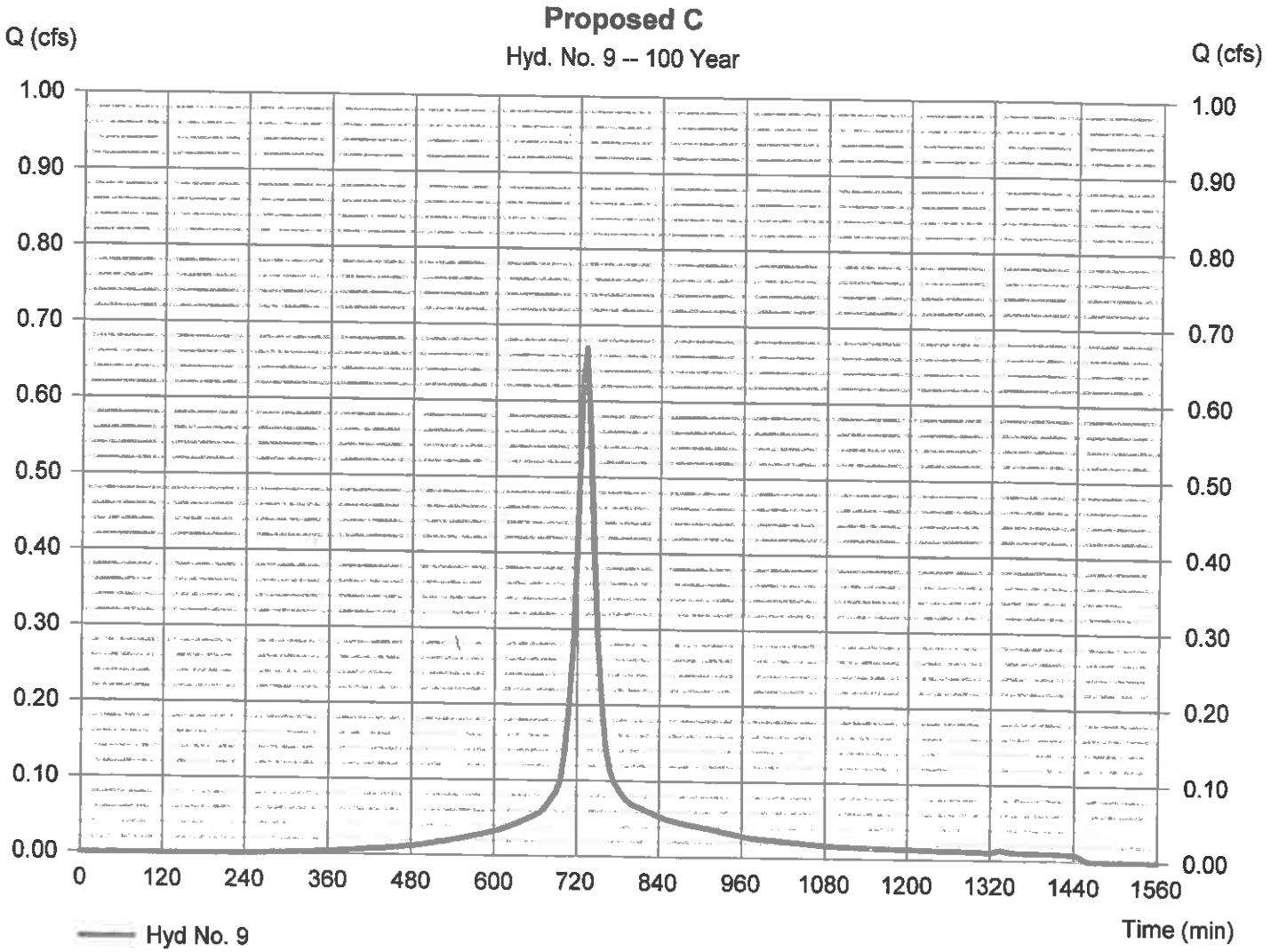
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Thursday, Jan 25, 2018

Hyd. No. 9

Proposed C

Hydrograph type	= SCS Runoff	Peak discharge	= 0.670 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 3,006 cuft
Drainage area	= 0.130 ac	Curve number	= 85.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.54 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

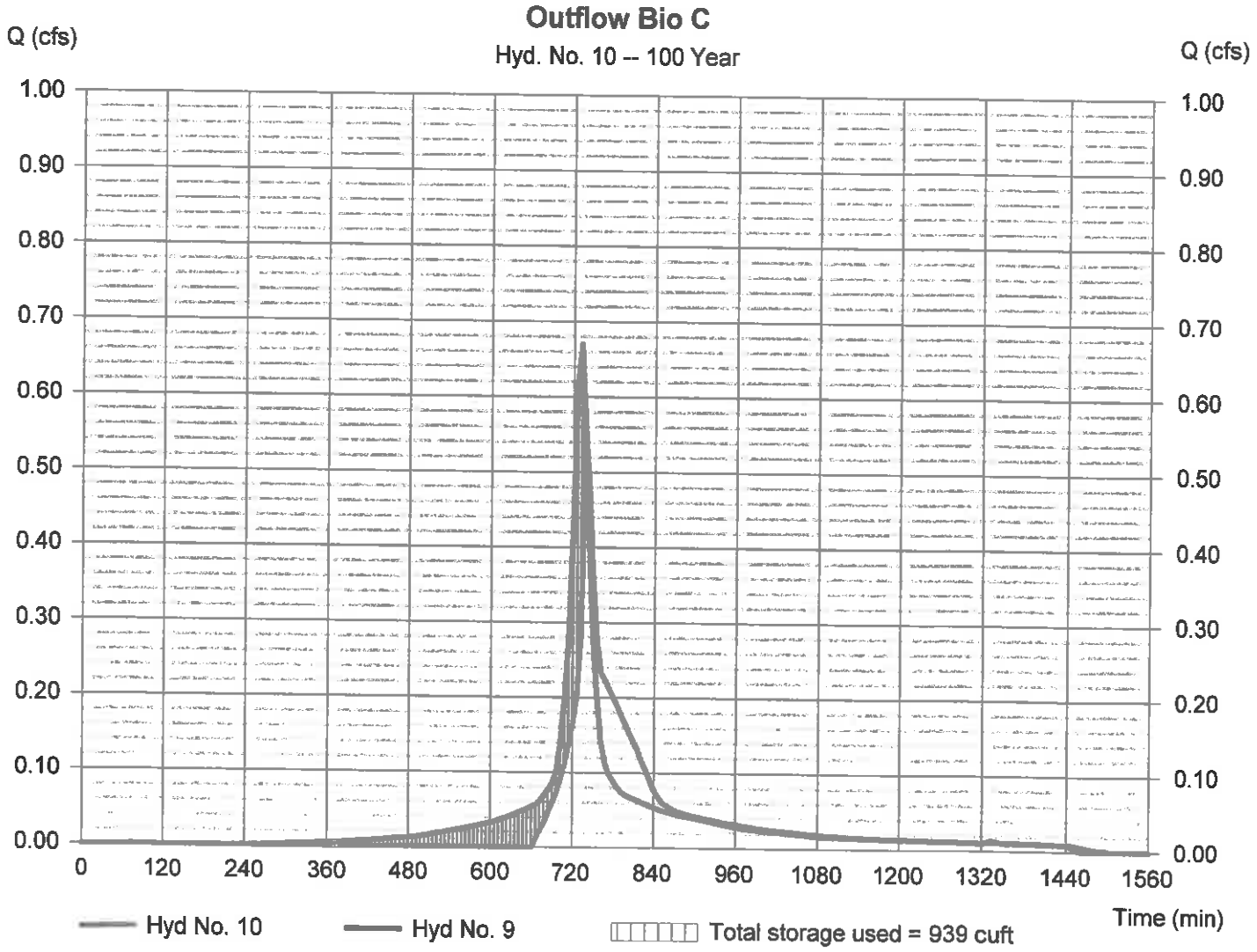
Thursday, Jan 25, 2018

Hyd. No. 10

Outflow Bio C

Hydrograph type	= Reservoir	Peak discharge	= 0.552 cfs
Storm frequency	= 100 yrs	Time to peak	= 738 min
Time interval	= 6 min	Hyd. volume	= 2,631 cuft
Inflow hyd. No.	= 9 - Proposed C	Max. Elevation	= 540.08 ft
Reservoir name	= Bioretention C	Max. Storage	= 939 cuft

Storage Indication method used.

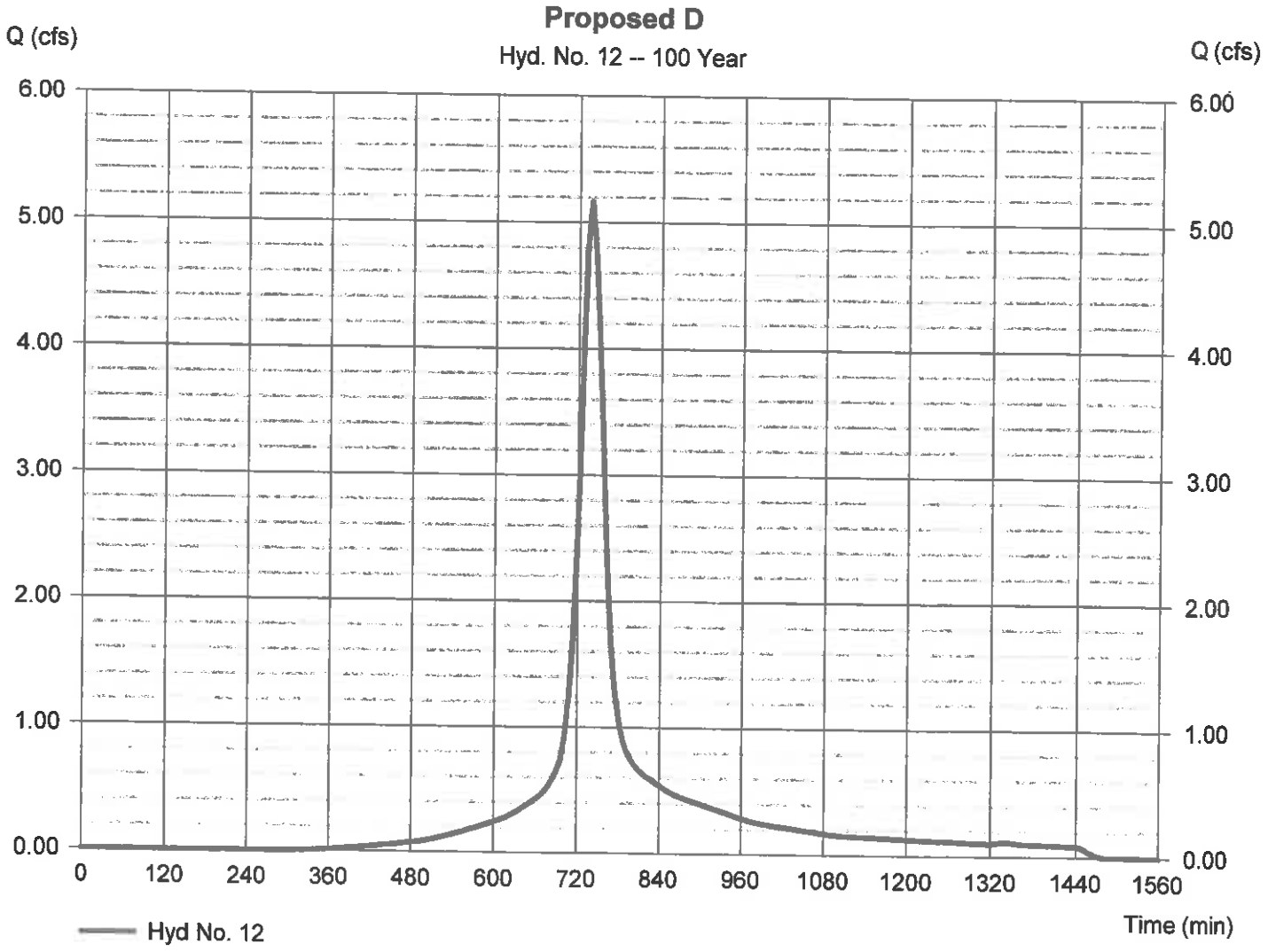


Hydrograph Report

Hyd. No. 12

Proposed D

Hydrograph type	= SCS Runoff	Peak discharge	= 5.166 cfs
Storm frequency	= 100 yrs	Time to peak	= 738 min
Time interval	= 6 min	Hyd. volume	= 27,345 cuft
Drainage area	= 1.200 ac	Curve number	= 81.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 21.00 min
Total precip.	= 8.54 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

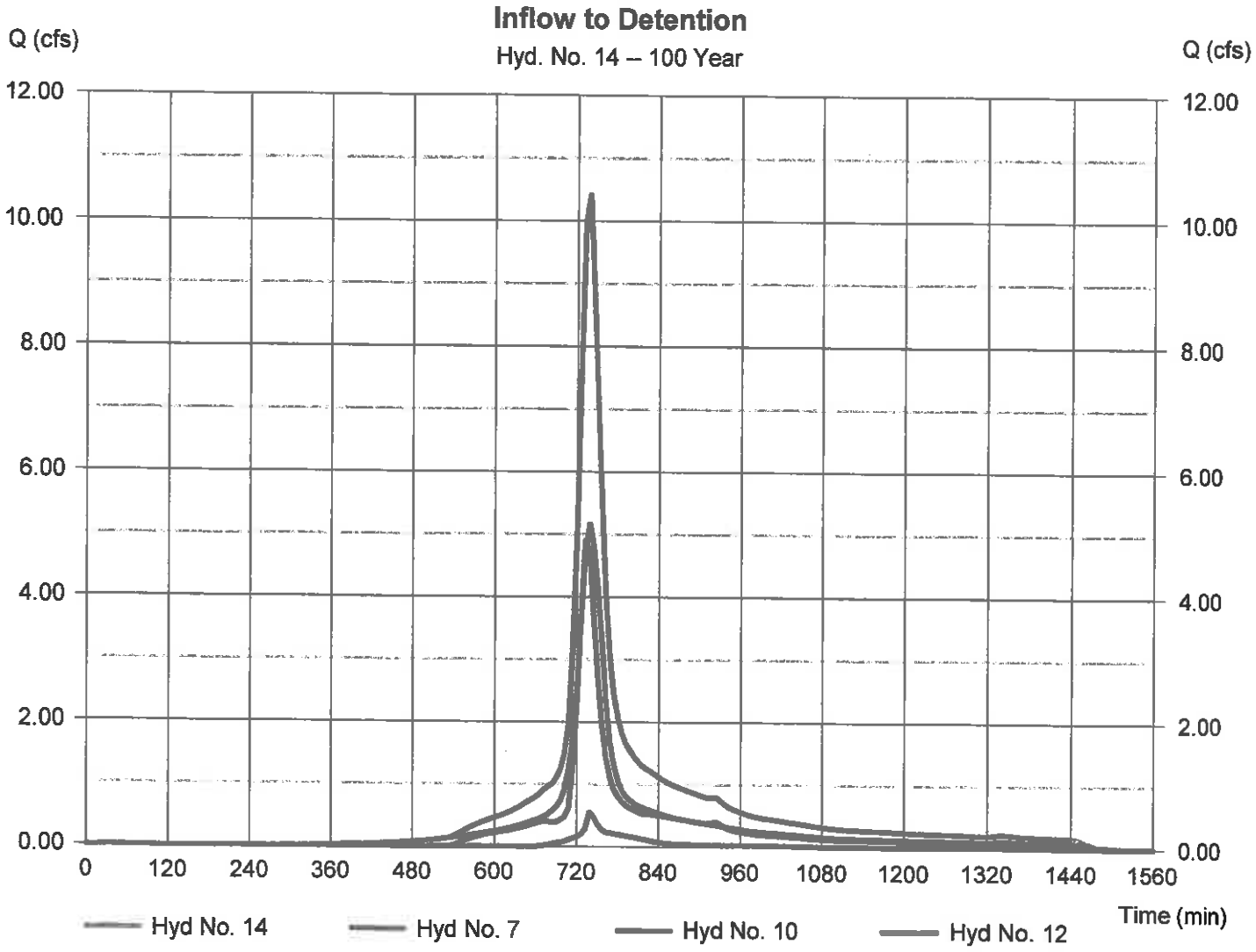


Hydrograph Report

Hyd. No. 14

Inflow to Detention

Hydrograph type	= Combine	Peak discharge	= 10.42 cfs
Storm frequency	= 100 yrs	Time to peak	= 738 min
Time interval	= 6 min	Hyd. volume	= 52,047 cuft
Inflow hyds.	= 7, 10, 12	Contrib. drain. area	= 1.200 ac



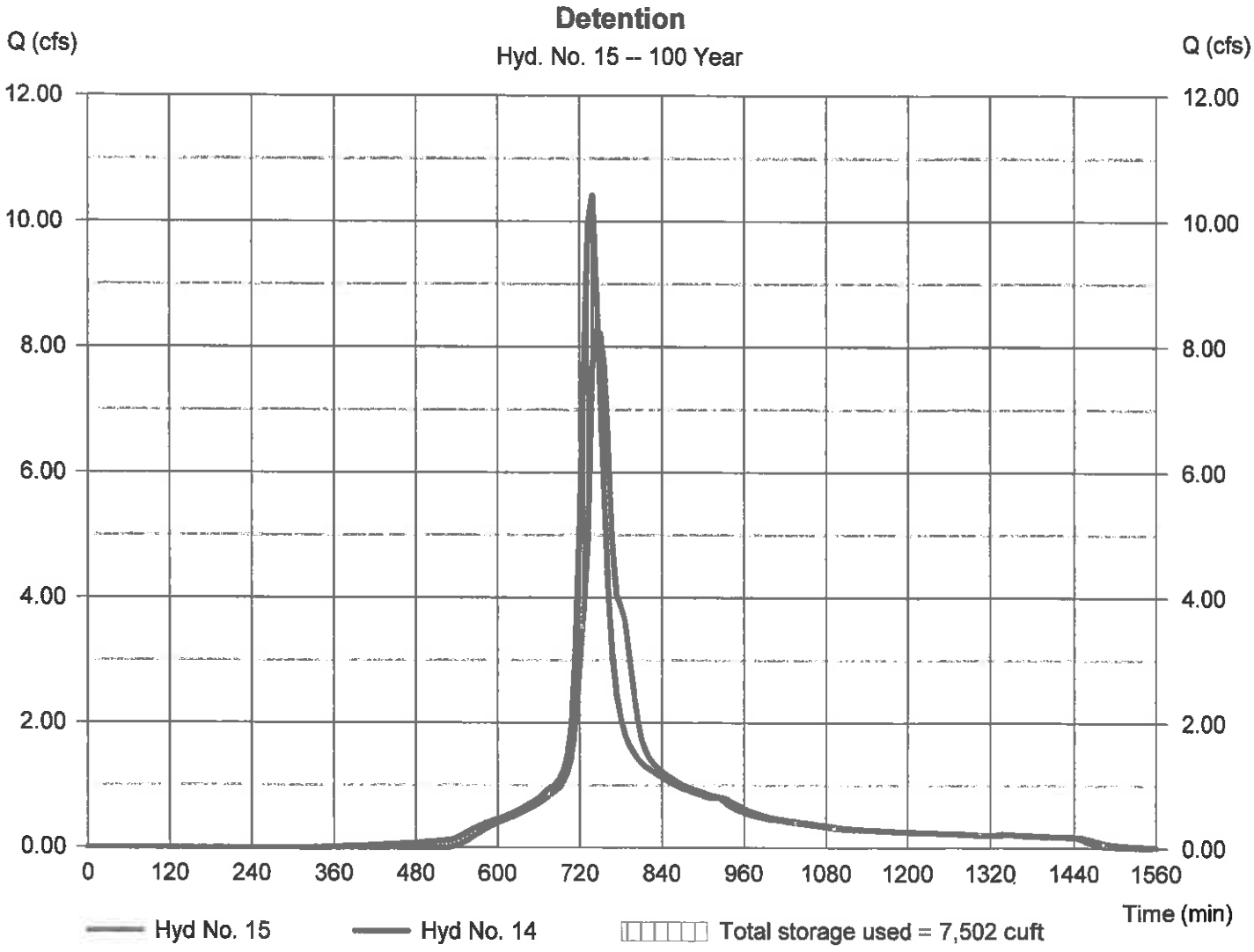
Hydrograph Report

Hyd. No. 15

Detention

Hydrograph type	= Reservoir	Peak discharge	= 8.255 cfs
Storm frequency	= 100 yrs	Time to peak	= 744 min
Time interval	= 6 min	Hyd. volume	= 51,452 cuft
Inflow hyd. No.	= 14 - Inflow to Detention	Max. Elevation	= 531.00 ft
Reservoir name	= Detention	Max. Storage	= 7,502 cuft

Storage Indication method used.

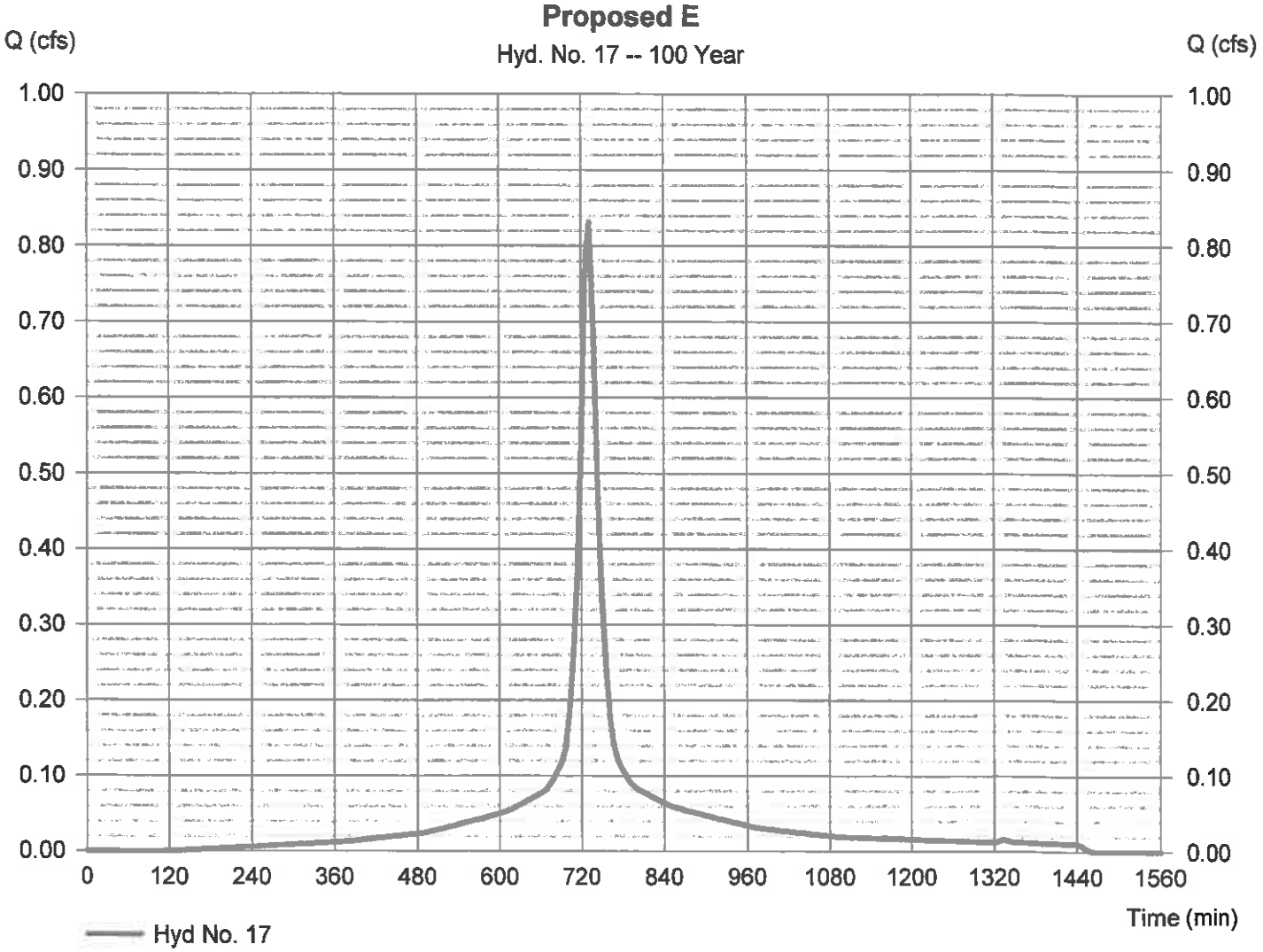


Hydrograph Report

Hyd. No. 17

Proposed E

Hydrograph type	= SCS Runoff	Peak discharge	= 0.831 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 3,942 cuft
Drainage area	= 0.150 ac	Curve number	= 93.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.54 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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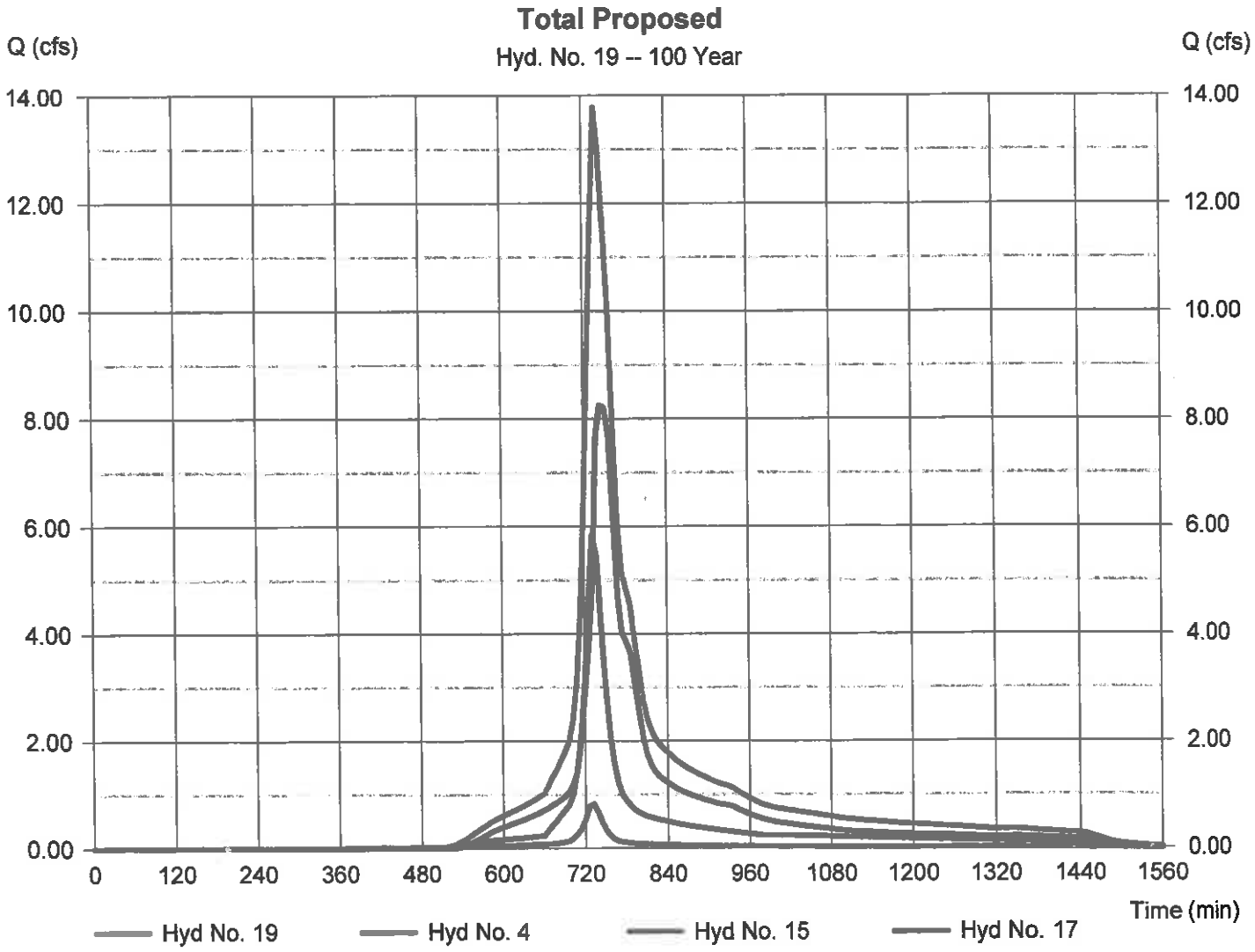
Hyd. No. 19

Total Proposed

Hydrograph type	= Combine	Peak discharge	= 13.79 cfs
Storm frequency	= 100 yrs	Time to peak	= 738 min
Time interval	= 6 min	Hyd. volume	= 81,542 cuft
Inflow hyds.	= 4, 15, 17	Contrib. drain. area	= 0.150 ac



CHANNEL PROTECTION 1 OF 4

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	2.214	6	738	12,108	-----	-----	-----	Existing
3	SCS Runoff	1.409	6	732	6,027	-----	-----	-----	Proposed A
4	Reservoir	0.448	6	756	4,804	3	550.04	2,847	Outflow Bio A
6	SCS Runoff	1.054	6	732	4,499	-----	-----	-----	Proposed B
7	Reservoir	0.454	6	750	3,608	6	540.86	1,649	Outflow Bio B
9	SCS Runoff	0.140	6	732	597	-----	-----	-----	Proposed C
10	Reservoir	0.012	6	852	222	9	539.52	391	Outflow Bio C
12	SCS Runoff	0.881	6	738	4,692	-----	-----	-----	Proposed D
14	Combine	1.295	6	744	8,522	7, 10, 12,	-----	-----	Inflow to Detention
15	Reservoir	0.239	6	846	7,906	14	529.90	3,744	Detention
17	SCS Runoff	0.228	6	732	1,000	-----	-----	-----	Proposed E
19	Combine	0.692	6	756	13,710	4, 15, 17,	-----	-----	Total Proposed

CHANNEL PROTECTION 2 OF 4

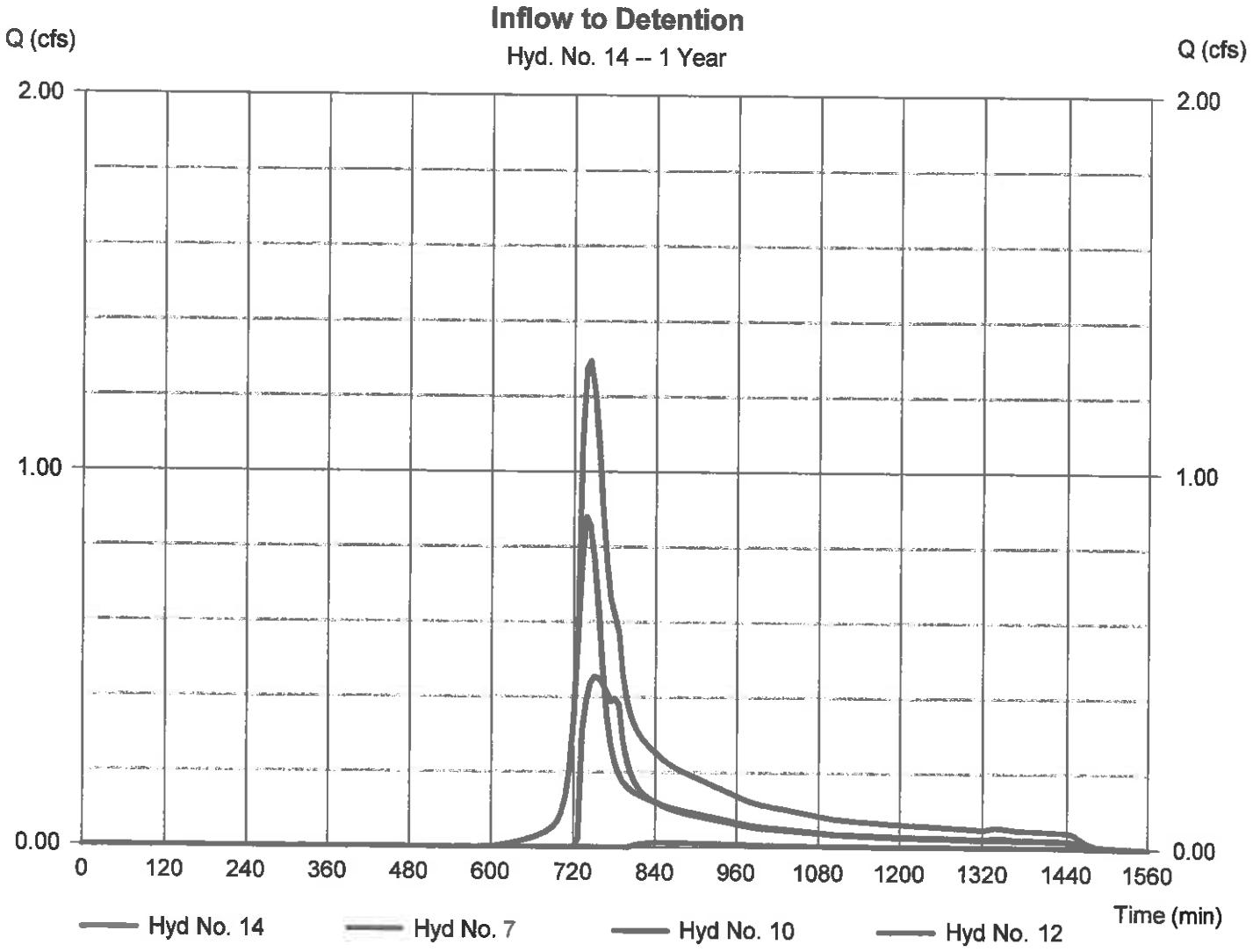
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 — Thursday, Jan 25, 2018

Hyd. No. 14

Inflow to Detention

Hydrograph type	= Combine	Peak discharge	= 1.295 cfs
Storm frequency	= 1 yrs	Time to peak	= 744 min
Time interval	= 6 min	Hyd. volume	= 8,522 cuft
Inflow hyds.	= 7, 10, 12	Contrib. drain. area	= 1.200 ac



Hydrograph Report

CHANNEL PROTECTION 3 of 4

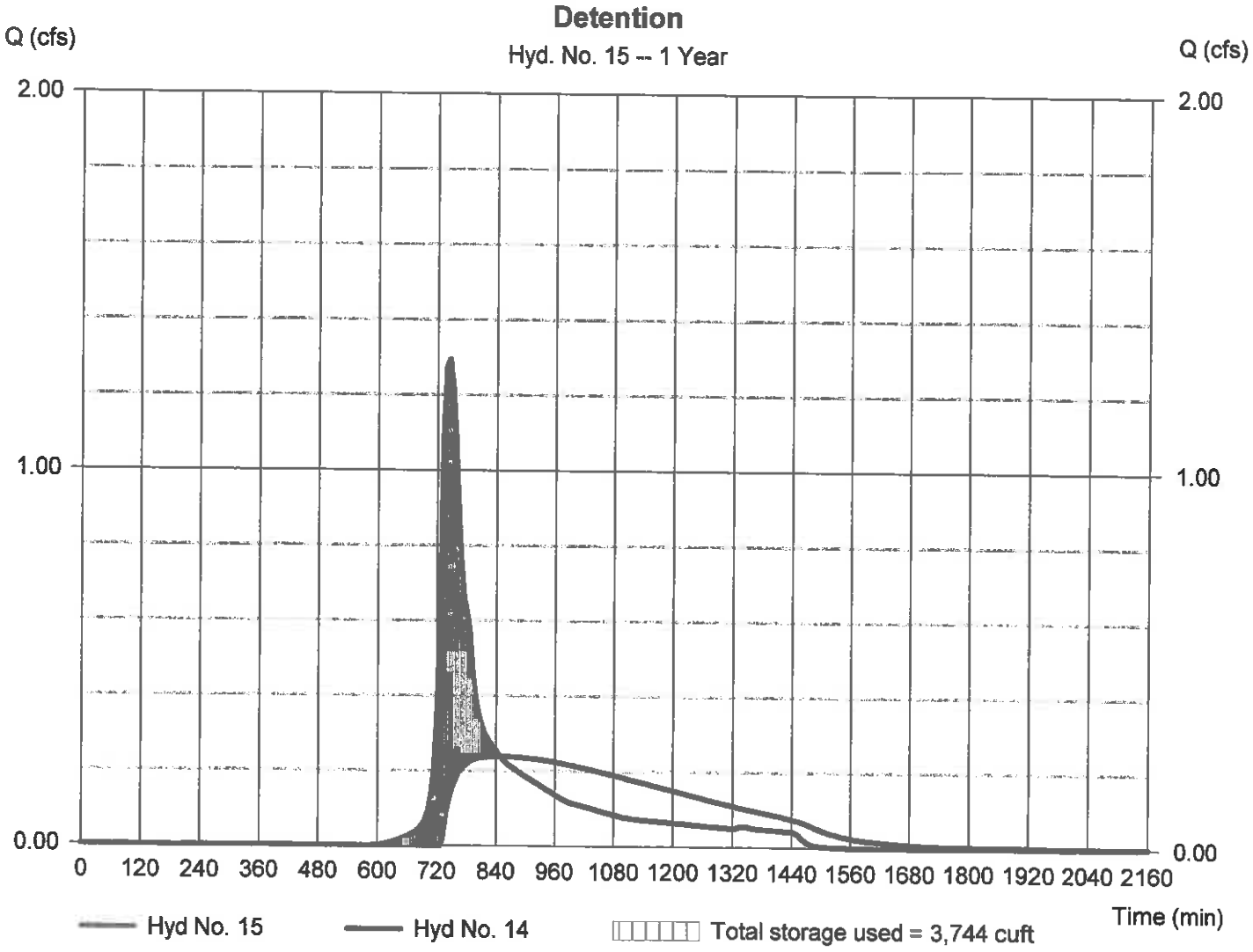
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Thursday, Jan 25, 2018

Hyd. No. 15

Detention

Hydrograph type	= Reservoir	Peak discharge	= 0.239 cfs
Storm frequency	= 1 yrs	Time to peak	= 846 min
Time interval	= 6 min	Hyd. volume	= 7,906 cuft
Inflow hyd. No.	= 14 - Inflow to Detention	Max. Elevation	= 529.90 ft
Reservoir name	= Detention	Max. Storage	= 3,744 cuft

Storage Indication method used.



Pond Report

CHANNEL PROTECTION 4 of 4

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8 Thursday, Jan 25, 2018

Pond No. 4 - Detention

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 528.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	528.50	2,250	0	0
0.50	529.00	2,500	1,187	1,187
1.50	530.00	3,225	2,855	4,041
2.50	531.00	4,000	3,605	7,647
3.50	532.00	4,800	4,393	12,040

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	3.00	0.00	0.00
Span (in)	= 15.00	3.00	0.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 528.00	528.75	0.00	0.00
Length (ft)	= 65.00	0.00	0.00	0.00
Slope (%)	= 0.62	0.00	0.00	n/a
N-Value	= .012	.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)	= 5.50	0.00	0.00	0.00
Crest El. (ft)	= 531.00	0.00	0.00	0.00
Weir Coeff.	= 3.10	3.10	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	Yes	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	528.50	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
0.50	1,187	529.00	1.13 ic	0.08 ic	---	---	0.00	---	---	---	---	---	0.084
1.50	4,041	530.00	1.13 ic	0.25 ic	---	---	0.00	---	---	---	---	---	0.251
2.50	7,647	531.00	1.13 ic	0.34 ic	---	---	0.00	---	---	---	---	---	0.345
3.50	12,040	532.00	10.19 oc	0.10 ic	---	---	10.09 s	---	---	---	---	---	10.19

APPENDIX C

STORMWATER POLLUTION PREVENTION PLAN NARRATIVE

SITE DESCRIPTION

Project Name & Location: Tin Barn Brewing Inc.
19 Lake Station Road
Town of Chester
Orange County, New York

The project site is located on the north side of Lake Station Road in the Town of Chester, immediately east of the municipal boundary of the Town of Warwick. The property is identified as Section 17, Block 1, Lot 20.2 on the Town tax map.

Owner: Lauren Van Pamelen
19 Lake Station Road
Warwick, NY 10990

Principal Site Features:

The site is currently undeveloped. It includes 13.3 acres, and is characterized by mildly sloping open fields and wooded areas. The property has frontage on Lake Station Road, a town road. An un-named tributary of the Wawayanda Creek flows in a southerly direction along the western edge of the property. New York State DEC-regulated wetlands are present in the northern and western portions of the property, and extend off the property.

Project Description:

The applicant proposes to construct a brewing facility and tasting room within a new building. Access will be provided by a new driveway from Lake Station Road. An existing well will serve the facility. A sand filter system is proposed to be constructed onsite to treat wastewater, with a proposed surface discharge to the onsite stream.

Approximately 3.8 acres will be disturbed during construction of the proposed facilities. Soil disturbing activities will include:

1. Clearing and grubbing
2. Construction of sediment and erosion controls
3. Rough grading
4. Grading of building areas, driveways, parking areas, etc.
5. Excavation for utilities, building foundation, berms, swales, etc.
6. Fine grading, preparation for final planting and seeding
7. Stabilization of disturbed areas

Receiving System:

Runoff from disturbed areas of the project site will be discharged, following water stormwater mitigation measures, to the existing on-site stream. The stream flows offsite toward the east, and is a tributary of the Wawayanda Creek.

Regulated wetlands are located on and near the project site. During construction, the contractor shall comply with all NYSDEC permit conditions with regard to the protection of wetlands and buffer areas.

Site Runoff:

Construction of the new building, driveway, and parking areas will produce an increase in runoff rates and volumes from the disturbed areas. Potential impacts will be mitigated by the construction of water quality measures and a stormwater detention basin. Calculations for existing and proposed conditions are included in the drainage report.

Sequence of Major Activities:

The general order of construction activities will be as follows.

1. Erect snow fencing around regulated wetland buffers, trees, structures, and other features to be protected.

2. Construct stabilized construction entrances.

3. Install silt fence barriers downslope of areas to be disturbed and as needed to protect nearby wetlands and streams.

4. Clear and grub vegetation in areas to be regraded.

5. Stockpile topsoil in approved locations.

6. Perform grading, excavation, construction of utilities, foundations, paving, etc.

7. Maintain silt fence barriers, construction entrances, and other measures in proper condition throughout the construction period. Removed sediment shall be deposited in a suitable area in a manner that prevents excessive erosion.

8. As construction proceeds, all disturbed areas shall be seeded, sodded, planted, or paved as specified on the plans, in a timely manner to prevent excessive erosion. Once disturbed areas have been properly stabilized, silt fence, temporary berms, and temporary swales shall be removed.

EROSION AND SEDIMENT CONTROLS

STABILIZATION PRACTICES

Temporary Stabilization:

Topsoil stockpiles and disturbed portions of the site where construction activity temporarily ceases for at least 30 days shall be stabilized with temporary seed and mulch no later than 14 days from the last construction activity in that area. The temporary seed shall be Rye (grain) applied at the rate of at least 2.5 pounds per 1000 square feet. After seeding each area shall be mulched with straw at a rate of at least 90 lbs. per 1000 square feet. The straw mulch is to be tacked into place by a disk with blades set nearly straight. Areas of the site that are to be paved shall be temporarily stabilized by applying stone sub-base until bituminous pavement can be applied.

Permanent Stabilization:

Disturbed portions of the site where construction activities permanently ceases shall be stabilized with permanent seed no later than 7 days after the last construction activity. Permanent stabilization shall be performed as follows:

- Seeding (5 lbs. per 1000 square feet):
  50% Kentucky Bluegrass
  25% Manhattan Rye Grass
  25% Pennlawn Creeping Red Fescue

- Fertilizer:
  20 lbs. 5-10-10 commercial fertilizer per 1000 square feet

- Mulch:
  90 lbs. salt hay or straw per 1000 square feet.

STRUCTURAL PRACTICES

Silt Fence Barriers:

During construction, temporary silt fence barriers will be provided to protect downstream areas from excessive sedimentation.

During Site Construction

The bioretention areas will generally be utilized as sediment traps during construction, once graded.

OTHER CONTROLS

Waste Materials:

All waste materials will be collected and stored in securely lidded metal dumpsters. The dumpsters will meet all Town of Chester, Orange County, and New York State solid waste management regulations. All trash and construction debris from the site will be deposited in the dumpster. The dumpster will be emptied a minimum of once per week or more often if necessary, and the trash will be hauled off-site to a transfer station. No construction waste materials will be buried onsite. All personnel will be instructed regarding the correct procedure for waste disposal. Notices stating these practices will be posted in the office trailer and the Site Superintendent, _____, the individual who manages the day-to-day site operations, will be responsible for seeing that these procedures are followed:

Hazardous Waste:

All hazardous waste materials will be disposed of in the manner specified by local or State regulation or by the manufacturer. Site personnel will be instructed in these practices and the Site Superintendent, the individual who manages day-to-day site operations, will be responsible for seeing that these practices are followed.

Sanitary Waste:

The contractor will provide portable toilet facilities for the use of his personnel during the construction phase of the project. All sanitary waste will be collected from the portable units a minimum of three times per week by a licensed sanitary waste management contractor.

Offsite Vehicle Tracking:

Stabilized construction entrances will be provided to reduce vehicle tracking of sediments. In addition, vehicle wheels shall be cleaned to remove sediment prior to entrance onto the public right-of-way. Any washing required shall be done on an area stabilized with stone, and which drains into an approved sediment-trapping device.

TIMING OF CONTROLS / MEASURES

As indicated in the Sequence of Major Activities, erosion and sediment control devices will be constructed prior to grading activities. Areas where construction activity temporarily ceases for more than 30 days will be stabilized with temporary seed and mulch within 14 days of the last disturbance. Slopes greater than 3:1 shall be immediately stabilized upon completion. Once construction activity ceases permanently in a lawn area, that area will be stabilized with sod or permanent seed and mulch.

CERTIFICATION OF COMPLIANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS

This Stormwater Pollution Prevention plan reflects New York State Department of Environmental Conservation requirements for stormwater management and erosion and sediment control, as established in Article 17, Titles 7, 8 and Article 70 of the Environmental Conservation Law. To ensure compliance, this plan was prepared in accordance with the SPDES General Permit for

Storm Water Discharges From Construction Activities That Are Classified as "Associated With Construction Activity", published by the NYSDEC.

MAINTENANCE / INSPECTION PROCEDURES
EROSION AND SEDIMENT CONTROL INSPECTION AND MAINTENANCE PRACTICES

The following inspection and maintenance practices will be implemented to maintain erosion and sediment controls:

1. All control measures will be inspected at least once each week.

2. All measures will be maintained in good working order. If a repair is necessary, it will be initiated within 24 hours of report.

3. Built up sediment will be removed from silt fence when it has reached one-third the height of the fence.

4. Silt fence will be inspected for depth of sediment, tears, to see if the fabric is securely attached to the fence posts, and to see that the fence posts are firmly in the ground.

5. Sediment traps will be inspected for depth of sediment and built up sediment will be removed when it reaches a depth equal to one half of the basin's design depth.

6. Temporary and permanent seeding and planting will be inspected for bare spots, washouts, and healthy growth.

7. A maintenance inspection report will be made after each inspection.

8. The Site Superintendent will select individuals who will be responsible for inspections, maintenance and repair activities, and filling out the inspection and maintenance report.

9. Personnel selected for inspection and maintenance responsibilities will receive training from the Site Superintendent. They will be trained in all the inspection and maintenance practices necessary for keeping the erosion and sediment controls used onsite in good working order.

NON-STORMWATER DISCHARGES

During construction: It is expected that the following non-storm water discharges will occur from the site during the construction period:

1. Pavement wash waters (where no spills or leaks of toxic or hazardous materials have occurred).

2. Uncontaminated groundwater from the dewatering of excavations.

All non-stormwater discharges will be directed to sediment control devices prior to discharge to waterways or wetlands.

During long-term operation:

1. Water from landscaping irrigation.

The facility will be operated in a manner that prevents the release of non-stormwater discharges to groundwater.

INVENTORY FOR POLLUTION PREVENTION PLAN

The materials or substances listed below are expected to be present onsite during construction:

Concrete	Fertilizers
Detergents	Petroleum Based Products
Paints (enamel and latex)	Cleaning Solvents
Metal Studs	Wood
Concrete	Masonry Block
Tar	Roofing Shingles

SPILL PREVENTION

MATERIAL MANAGEMENT PRACTICES

The following are the material management practices that will be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff:

Good Housekeeping:

The following good housekeeping practices will be followed onsite during the construction project:

1. An effort will be made to store only enough product required to do the job.
2. All materials stored onsite will be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure.
3. Products will be kept in their original containers with the original manufacturer's label.
4. Substances will not be mixed with one another unless recommended by the manufacturer.
5. Whenever possible, all of a product will be used up before disposing of the container.
6. Manufacturers' recommendations for proper use and disposal will be followed.
7. The Site Superintendent will inspect daily to ensure proper use and disposal of materials onsite.

Hazardous Products:

1. These practices are used to reduce the risks associated with hazardous materials.

2. Products will be kept in their original containers unless they are not resealable.

3. Original labels and material safety data sheets will be retained; they contain important product information.

4. If surplus product must be disposed of, manufacturers' or local and State recommended methods for proper disposal will be followed.

PRODUCT-SPECIFIC PRACTICES

The following product-specific practices will be followed on site:

Petroleum Products:

All onsite vehicles will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers that are clearly labeled. Any asphalt substances used onsite will be applied according to the manufacturers' recommendations.

Fertilizers:

Fertilizers used will be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer will be worked into the soil to limit exposure to storm water. Storage will be in a covered shed or trailer. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.

Paints:

All containers will be tightly sealed and stored when not required for use. Excess paint will not be discharged to the storm sewer system, but will be properly disposed of according to manufacturer's instructions or State and local regulations.

Concrete Trucks:

Concrete trucks will not be allowed to wash out or discharge surplus concrete or drum wash water on the site.

SPILL CONTROL PRACTICES

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and cleanup:

1. Manufacturer's recommended methods for spill cleanup will be clearly posted and site personnel will be made aware of the procedures and the location of the information and cleanup supplies.

2. Materials and equipment necessary for spill cleanup will be kept in the material storage area onsite. Equipment and materials will include but not be limited to, brooms, dust pans,

mops, rags, gloves, goggles, kitty litter, sand, activated charcoal, sawdust, and plastic and metal trash containers specifically provided for this purpose.

3. All spills will be cleaned up immediately after discovery.

4. The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.

5. Spills of toxic or hazardous material will be reported to the appropriate State or local government agency, regardless of the size.

6. The spill prevention plan will be adjusted to include measures to prevent this type of spill from re-occurring and how to clean up the spill if there is another one.

7. A description of the spill, what caused it, and the cleanup measures will also be included.

The Site Superintendent responsible for the day-to-day site operations will be the spill prevention and cleanup coordinator. He will designate at least three other site personnel who will receive spill prevention and cleanup training. These individuals will each become responsible for a particular phase of prevention and cleanup. The names of responsible spill personnel will be posted in the material storage area and in the office trailer onsite.

SUPPORTING DOCUMENTS

The following documents, prepared by Lehman & Getz, P.C., are included as part of the pollution prevention plan:

- *Site plans, as approved by the Town of Chester.*

POLLUTION PREVENTION PLAN CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed:

_____

Owner's Representative Date

CONTRACTOR'S CERTIFICATION

I certify under penalty of law that I understand the terms and conditions of the general National Pollutant Discharge Elimination System (NPDES) permit that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification.

Signed:

_____

Contractor's Signature Date

APPENDIX D

Bioretention Operation, Maintenance and Management Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
1. Debris Cleanout (Monthly)		
Bioretention and contributing areas clean of debris		
No dumping of yard wastes into practice		
Litter (branches, etc.) have been removed		
2. Vegetation (Monthly)		
Plant height not less than design water depth		
Fertilized per specifications		
Plant composition according to approved plans		
No placement of inappropriate plants		
Grass height not greater than 6 inches		
No evidence of erosion		
3. Check Dams/Energy Dissipaters/Sumps (Annual, After Major Storms)		
No evidence of sediment buildup		

MAINTENANCE ITEM	SATISFACTORY / UNSATISFACTORY	COMMENTS
Sumps should not be more than 50% full of sediment		
No evidence of erosion at downstream toe of drop structure		
4. Dewatering (Monthly)		
Dewaters between storms		
No evidence of standing water		
5. Sediment Deposition (Annual)		
Swale clean of sediments		
Sediments should not be > 20% of swale design depth		
6. Outlet/Overflow Spillway (Annual, After Major Storms)		
Good condition, no need for repair		
No evidence of erosion		
No evidence of any blockages		
7. Integrity of Filter Bed (Annual)		
Filter bed has not been blocked or filled inappropriately		

Comments:

Actions to be Taken:

APPENDIX E

0644089821

NOTICE OF INTENT

New York State Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505

NYR ☐☐☐☐☐☐ (for DEC use only)

Stormwater Discharges Associated with Construction Activity Under State Pollutant Discharge Elimination System (SPDES) General Permit # GP-0-15-002

All sections must be completed unless otherwise noted. Failure to complete all items may result in this form being returned to you, thereby delaying your coverage under this General Permit. Applicants must read and understand the conditions of the permit and prepare a Stormwater Pollution Prevention Plan prior to submitting this NOI. Applicants are responsible for identifying and obtaining other DEC permits that may be required.

-IMPORTANT-

RETURN THIS FORM TO THE ADDRESS ABOVE

OWNER/OPERATOR MUST SIGN FORM

Owner/Operator Information

Owner/Operator (Company Name/Private Owner Name/Municipality Name)
LAUREN VAN PAMELEN

Owner/Operator Contact Person Last Name (NOT CONSULTANT)
VAN PAMELEN

Owner/Operator Contact Person First Name
LAUREN

Owner/Operator Mailing Address
19 LAKE STATION RD

City
WARWICK

State NY Zip 10990-

Phone (Owner/Operator) 917-902-9035

Fax (Owner/Operator) 0-0-

Email (Owner/Operator)
LAUREN@TINBARN.COM

FED TAX ID
0-
(not required for individuals)

Project Site Information

Project/Site Name
TIN BARN BREWING INC

Street Address (NOT P.O. BOX)
19 LAKE STATION ROAD

Side of Street
● North ○ South ○ East ○ West

City/Town/Village (THAT ISSUES BUILDING PERMIT)
TOWN OF CHESTER

State: NY
Zip: 10918-
County: ORANGE
DEC Region: 3

Name of Nearest Cross Street
PARK DRIVE

Distance to Nearest Cross Street (Feet)
0

Project In Relation to Cross Street
● North ○ South ○ East ○ West

Tax Map Numbers
Section-Block-Parcel
17-1-20.2

Tax Map Numbers

1. Provide the Geographic Coordinates for the project site in NYTM Units. To do this you **must** go to the NYSDEC Stormwater Interactive Map on the DEC website at:

www.dec.ny.gov/imsmaps/stormwater/viewer.htm

Zoom into your Project Location such that you can accurately click on the centroid of your site. Once you have located your project site, go to the tool boxes on the top and choose "i"(identify). Then click on the center of your site and a new window containing the X, Y coordinates in UTM will pop up. Transcribe these coordinates into the boxes below. For problems with the interactive map use the help function.

X Coordinates (Easting): 559711

Y Coordinates (Northing): 4571943

2. What is the nature of this construction project?

● **New Construction**

○ **Redevelopment with increase in impervious area**

○ **Redevelopment with no increase in impervious area**

3. Select the predominant land use for both pre and post development conditions.
SELECT ONLY ONE CHOICE FOR EACH

Pre-Development Existing Land Use

- ○ FOREST
- ● PASTURE/OPEN LAND
- ○ CULTIVATED LAND
- ○ SINGLE FAMILY HOME
- ○ SINGLE FAMILY SUBDIVISION
- ○ TOWN HOME RESIDENTIAL
- ○ MULTIFAMILY RESIDENTIAL
- ○ INSTITUTIONAL/SCHOOL
- ○ INDUSTRIAL
- ○ COMMERCIAL
- ○ ROAD/HIGHWAY
- ○ RECREATIONAL/SPORTS FIELD
- ○ BIKE PATH/TRAIL
- ○ LINEAR UTILITY
- ○ PARKING LOT
- ○ OTHER

Post-Development Future Land Use

- ○ SINGLE FAMILY HOME — Number of Lots
- ○ SINGLE FAMILY SUBDIVISION
- ○ TOWN HOME RESIDENTIAL
- ○ MULTIFAMILY RESIDENTIAL
- ○ INSTITUTIONAL/SCHOOL
- ○ INDUSTRIAL
- ● COMMERCIAL
- ○ MUNICIPAL
- ○ ROAD/HIGHWAY
- ○ RECREATIONAL/SPORTS FIELD
- ○ BIKE PATH/TRAIL
- ○ LINEAR UTILITY (water, sewer, gas, etc.)
- ○ PARKING LOT
- ○ CLEARING/GRADING ONLY
- ○ DEMOLITION, NO REDEVELOPMENT
- ○ WELL DRILLING ACTIVITY *(Oil, Gas, etc.)
- ○ OTHER

***Note**: for gas well drilling, non-high volume hydraulic fractured wells only

4. In accordance with the larger common plan of development or sale, enter the total project site area; the total area to be disturbed; existing impervious area to be disturbed (for redevelopment activities); and the future impervious area constructed within the disturbed area. (Round to the nearest tenth of an acre.)

Total Site Area	Total Area To Be Disturbed	Existing Impervious Area To Be Disturbed	Future Impervious Area Within Disturbed Area
013.3	03.8	00.0	01.0

5. Do you plan to disturb more than 5 acres of soil at any one time? ○ **Yes** ● **No**

6. Indicate the percentage of each Hydrologic Soil Group(HSG) at the site.

A	B	C	D
%	%	%	100 %

7. Is this a phased project? ○ **Yes** ● **No**

8. Enter the planned start and end dates of the disturbance activities.

Start Date	End Date
09/01/2018	03/01/2019

9. Identify the nearest surface waterbody(ies) to which construction site runoff will discharge.

Name: UNNAMED TRIBUTARY OF THE WAWAYANDA CREEK

9a. Type of waterbody identified in Question 9?

- ● Wetland / State Jurisdiction On Site (Answer 9b)
- ○ Wetland / State Jurisdiction Off Site
- ○ Wetland / Federal Jurisdiction On Site (Answer 9b)
- ○ Wetland / Federal Jurisdiction Off Site
- ● Stream / Creek On Site
- ○ Stream / Creek Off Site
- ○ River On Site
- ○ River Off Site
- ○ Lake On Site
- ○ Lake Off Site
- ○ Other Type On Site
- ○ Other Type Off Site

9b. How was the wetland identified?

- ○ Regulatory Map
- ● Delineated by Consultant
- ○ Delineated by Army Corps of Engineers
- ○ Other (identify)

10. Has the surface waterbody(ies) in question 9 been identified as a 303(d) segment in Appendix E of GP-0-15-002? ○ Yes ● No

11. Is this project located in one of the Watersheds identified in Appendix C of GP-0-15-002? ○ Yes ● No

12. Is the project located in one of the watershed areas associated with AA and AA-S classified waters? ○ Yes ● No
If no, skip question 13.

13. Does this construction activity disturb land with no existing impervious cover and where the Soil Slope Phase is identified as an E or F on the USDA Soil Survey? ○ Yes ● No
If Yes, what is the acreage to be disturbed?
0.

14. Will the project disturb soils within a State regulated wetland or the protected 100 foot adjacent area? ● Yes ○ No

15. Does the site runoff enter a separate storm sewer system (including roadside drains, swales, ditches, culverts, etc)? ● Yes ○ No ○ Unknown

16. What is the name of the municipality/entity that owns the separate storm sewer system?

TOWN OF CHESTER

17. Does any runoff from the site enter a sewer classified as a Combined Sewer? ○ Yes ● No ○ Unknown

18. Will future use of this site be an agricultural property as defined by the NYS Agriculture and Markets Law? ● Yes ○ No

19. Is this property owned by a state authority, state agency, federal government or local government? ○ Yes ● No

20. Is this a remediation project being done under a Department approved work plan? (i.e. CERCLA, RCRA, Voluntary Cleanup Agreement, etc.) ○ Yes ● No

21. Has the required Erosion and Sediment Control component of the SWPPP been developed in conformance with the current NYS Standards and Specifications for Erosion and Sediment Control (aka Blue Book)? ● Yes ○ No

22. Does this construction activity require the development of a SWPPP that includes the post-construction stormwater management practice component (i.e. Runoff Reduction, Water Quality and Quantity Control practices/techniques)? ● Yes ○ No
If No, skip questions 23 and 27-39.

23. Has the post-construction stormwater management practice component of the SWPPP been developed in conformance with the current NYS Stormwater Management Design Manual? ● Yes ○ No

0251089825

24. The Stormwater Pollution Prevention Plan (SWPPP) was prepared by:

- (●) **Professional Engineer (P.E.)**
- ( ) **Soil and Water Conservation District (SWCD)**
- ( ) **Registered Landscape Architect (R.L.A)**
- ( ) **Certified Professional in Erosion and Sediment Control (CPESC)**
- ( ) **Owner/Operator**
- ( ) **Other**

SWPPP Preparer
LEHMAN & GETZ ENGINEERING

Contact Name (Last, Space, First)
GETZ DAVID

Mailing Address
17 RIVER STREET

City
WARWICK

State NY Zip 10990 -

Phone 845 - 986 - 7737

Fax 845 - 986 - 0245

Email
GETZ@LEHMANGETZ.COM

SWPPP Preparer Certification

I hereby certify that the Stormwater Pollution Prevention Plan (SWPPP) for this project has been prepared in accordance with the terms and conditions of the GP-0-15-002. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of this permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

First Name DAVID **MI**

Last Name GETZ

Signature David A Getz

Date 01 / 26 / 2018

25. Has a construction sequence schedule for the planned management practices been prepared? ● Yes ○ No

26. Select **all** of the erosion and sediment control practices that will be employed on the project site:

Temporary Structural

- ○ Check Dams
- ○ Construction Road Stabilization
- ● Dust Control
- ○ Earth Dike
- ○ Level Spreader
- ○ Perimeter Dike/Swale
- ○ Pipe Slope Drain
- ○ Portable Sediment Tank
- ○ Rock Dam
- ○ Sediment Basin
- ○ Sediment Traps
- ● Silt Fence
- ● Stabilized Construction Entrance
- ○ Storm Drain Inlet Protection
- ○ Straw/Hay Bale Dike
- ○ Temporary Access Waterway Crossing
- ○ Temporary Stormdrain Diversion
- ● Temporary Swale
- ○ Turbidity Curtain
- ○ Water bars

Biotechnical

- ○ Brush Matting
- ○ Wattling

Vegetative Measures

- ○ Brush Matting
- ○ Dune Stabilization
- ○ Grassed Waterway
- ● Mulching
- ○ Protecting Vegetation
- ○ Recreation Area Improvement
- ● Seeding
- ○ Sodding
- ○ Straw/Hay Bale Dike
- ○ Streambank Protection
- ○ Temporary Swale
- ● Topsoiling
- ○ Vegetating Waterways

Permanent Structural

- ○ Debris Basin
- ○ Diversion
- ○ Grade Stabilization Structure
- ○ Land Grading
- ○ Lined Waterway (Rock)
- ○ Paved Channel (Concrete)
- ○ Paved Flume
- ○ Retaining Wall
- ○ Riprap Slope Protection
- ○ Rock Outlet Protection
- ○ Streambank Protection

Other

Post-construction Stormwater Management Practice (SMP) Requirements

Important: Completion of Questions 27-39 is not required if response to Question 22 is No.

27. Identify all site planning practices that were used to prepare the final site plan/layout for the project.

- ● **Preservation of Undisturbed Areas**
- ○ **Preservation of Buffers**
- ○ **Reduction of Clearing and Grading**
- ● **Locating Development in Less Sensitive Areas**
- ○ **Roadway Reduction**
- ○ **Sidewalk Reduction**
- ○ **Driveway Reduction**
- ○ **Cul-de-sac Reduction**
- ○ **Building Footprint Reduction**
- ○ **Parking Reduction**

27a. Indicate which of the following soil restoration criteria was used to address the requirements in Section 5.1.6("Soil Restoration") of the Design Manual (2010 version).

- ● All disturbed areas will be restored in accordance with the Soil Restoration requirements in Table 5.3 of the Design Manual (see page 5-22).
- ○ Compacted areas were considered as impervious cover when calculating the **WQv Required**, and the compacted areas were assigned a post-construction Hydrologic Soil Group (HSG) designation that is one level less permeable than existing conditions for the hydrology analysis.

28. Provide the total Water Quality Volume (WQv) required for this project (based on final site plan/layout).

Total WQv Required

0.106 **acre-feet**

29. Identify the RR techniques (Area Reduction), RR techniques(Volume Reduction) and Standard SMPs with RRv Capacity in Table 1 (See Page 9) that were used to reduce the Total WQv Required(#28).

Also, provide in Table 1 the total impervious area that contributes runoff to each technique/practice selected. For the Area Reduction Techniques, provide the total contributing area (includes pervious area) and, if applicable, the total impervious area that contributes runoff to the technique/practice.

Note: Redevelopment projects shall use Tables 1 and 2 to identify the SMPs used to treat and/or reduce the WQv required. If runoff reduction techniques will not be used to reduce the required WQv, skip to question 33a after identifying the SMPs.

Table 1 - Runoff Reduction (RR) Techniques and Standard Stormwater Management Practices (SMPs)

	Total Contributing Area (acres)		Total Contributing Impervious Area (acres)
RR Techniques (Area Reduction)			
○ Conservation of Natural Areas (RR-1)	0.000	and/or	0.000
○ Sheetflow to Riparian Buffers/Filters Strips (RR-2)	0.000	and/or	0.000
○ Tree Planting/Tree Pit (RR-3)	0.000	and/or	0.000
○ Disconnection of Rooftop Runoff (RR-4)	0.000	and/or	0.000
RR Techniques (Volume Reduction)			
○ Vegetated Swale (RR-5)			0.000
○ Rain Garden (RR-6)			0.000
○ Stormwater Planter (RR-7)			0.000
○ Rain Barrel/Cistern (RR-8)			0.000
○ Porous Pavement (RR-9)			0.000
○ Green Roof (RR-10)			0.000
Standard SMPs with RRv Capacity			
○ Infiltration Trench (I-1)			0.000
○ Infiltration Basin (I-2)			0.000
○ Dry Well (I-3)			0.000
○ Underground Infiltration System (I-4)			0.000
● Bioretention (F-5)			0.080
○ Dry Swale (O-1)			0.000
Standard SMPs			
○ Micropool Extended Detention (P-1)			0.000
○ Wet Pond (P-2)			0.000
○ Wet Extended Detention (P-3)			0.000
○ Multiple Pond System (P-4)			0.000
○ Pocket Pond (P-5)			0.000
○ Surface Sand Filter (F-1)			0.000
○ Underground Sand Filter (F-2)			0.000
○ Perimeter Sand Filter (F-3)			0.000
○ Organic Filter (F-4)			0.000
○ Shallow Wetland (W-1)			0.000
○ Extended Detention Wetland (W-2)			0.000
○ Pond/Wetland System (W-3)			0.000
○ Pocket Wetland (W-4)			0.000
○ Wet Swale (O-2)			0.000

Table 2 - Alternative SMPs
(DO NOT INCLUDE PRACTICES BEING USED FOR PRETREATMENT ONLY)

Alternative SMP	Total Contributing Impervious Area (acres)
○ Hydrodynamic	0.000
○ Wet Vault	0.000
○ Media Filter	0.000
○ Other [ ]	0.000

Provide the name and manufacturer of the Alternative SMPs (i.e. proprietary practice(s)) being used for WQv treatment.

Name [ ]

Manufacturer [ ]

Note: Redevelopment projects which do not use RR techniques, shall use questions 28, 29, 33 and 33a to provide SMPs used, total WQv required and total WQv provided for the project.

30. Indicate the Total RRv provided by the RR techniques (Area/Volume Reduction) and Standard SMPs with RRv capacity identified in question 29.

Total RRv provided

0.096 **acre-feet**

31. Is the Total RRv provided (#30) greater than or equal to the total WQv required (#28).

○ **Yes** ● **No**

If Yes, go to question 36.
If No, go to question 32.

32. Provide the Minimum RRv required based on HSG.
[Minimum RRv Required = (P)(0.95)(Ai)/12, Ai=(S)(Aic)]

Minimum RRv Required

0.020 **acre-feet**

32a. Is the Total RRv provided (#30) greater than or equal to the Minimum RRv Required (#32)?

● **Yes** ○ **No**

If Yes, go to question 33.
Note: Use the space provided in question #39 to summarize the specific site limitations and justification for not reducing 100% of WQv required (#28). A detailed evaluation of the specific site limitations and justification for not reducing 100% of the WQv required (#28) must also be included in the SWPPP.
If No, sizing criteria has not been met, so NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

33. Identify the Standard SMPs in Table 1 and, if applicable, the Alternative SMPs in Table 2 that were used to treat the remaining total WQv(=Total WQv Required in 28 - Total RRv Provided in 30).

Also, provide in Table 1 and 2 the total impervious area that contributes runoff to each practice selected.

Note: Use Tables 1 and 2 to identify the SMPs used on Redevelopment projects.

33a. Indicate the Total WQv provided (i.e. WQv treated) by the SMPs identified in question #33 and Standard SMPs with RRv Capacity identified in question 29.

WQv Provided

0 . 0 0 9 **acre-feet**

Note: For the standard SMPs with RRv capacity, the WQv provided by each practice = the WQv calculated using the contributing drainage area to the practice - RRv provided by the practice. (See Table 3.5 in Design Manual)

34. Provide the sum of the Total RRv provided (#30) and the WQv provided (#33a). 0 . 1 0 6

35. Is the sum of the RRv provided (#30) and the WQv provided (#33a) greater than or equal to the total WQv required (#28)? ● **Yes** ○ **No**

If Yes, go to question 36.
If No, sizing criteria has not been met, so NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

36. Provide the total Channel Protection Storage Volume (CPv) required and provided or select waiver (36a), if applicable.

CPv Required

0 . **acre-feet**

CPv Provided

0 . **acre-feet**

36a. The need to provide channel protection has been waived because:

○ Site discharges directly to tidal waters or a fifth order or larger stream.

● Reduction of the total CPv is achieved on site through runoff reduction techniques or infiltration systems.

37. Provide the Overbank Flood (Qp) and Extreme Flood (Qf) control criteria or select waiver (37a), if applicable.

Total Overbank Flood Control Criteria (Qp)

Pre-Development

0 6 . 5 0 5 **CFS**

Post-development

0 6 . 3 3 8 **CFS**

Total Extreme Flood Control Criteria (Qf)

Pre-Development

0 1 4 . 8 2 **CFS**

Post-development

0 1 3 . 7 9 **CFS**

37a. The need to meet the Qp and Qf criteria has been waived because:

- ○ Site discharges directly to tidal waters or a fifth order or larger stream.
- ○ Downstream analysis reveals that the Qp and Qf controls are not required

38. Has a long term Operation and Maintenance Plan for the post-construction stormwater management practice(s) been developed? ● Yes ○ No

If Yes, Identify the entity responsible for the long term Operation and Maintenance

TIN BARN BREWING INC (OWNER)

39. Use this space to summarize the specific site limitations and justification for not reducing 100% of WQv required(#28). (See question 32a) This space can also be used for other pertinent project information.

Due to the locations and elevations of regulated wetlands and buffers.

40. Identify other DEC permits, existing and new, that are required for this project/facility.

- ○ Air Pollution Control
- ○ Coastal Erosion
- ○ Hazardous Waste
- ○ Long Island Wells
- ○ Mined Land Reclamation
- ○ Solid Waste
- ○ Navigable Waters Protection / Article 15
- ○ Water Quality Certificate
- ○ Dam Safety
- ○ Water Supply
- ● Freshwater Wetlands/Article 24
- ○ Tidal Wetlands
- ○ Wild, Scenic and Recreational Rivers
- ○ Stream Bed or Bank Protection / Article 15
- ○ Endangered or Threatened Species(Incidental Take Permit)
- ● Individual SPDES
- ○ SPDES Multi-Sector GP [N][Y][R][ ][ ][ ][ ][ ][ ]
- ○ Other [ ]
- ○ None

41. Does this project require a US Army Corps of Engineers Wetland Permit? ○ **Yes** ● **No**
If Yes, Indicate Size of Impact. [0][ ][ ][ ][ ].[ ]

42. Is this project subject to the requirements of a regulated, traditional land use control MS4? ● **Yes** ○ **No**
(If No, skip question 43)

43. Has the "MS4 SWPPP Acceptance" form been signed by the principal executive officer or ranking elected official and submitted along with this NOI? ○ **Yes** ○ **No**

44. If this NOI is being submitted for the purpose of continuing or transferring coverage under a general permit for stormwater runoff from construction activities, please indicate the former SPDES number assigned. [N][Y][R][ ][ ][ ][ ][ ][ ]

3547089826

Owner/Operator Certification

I have read or been advised of the permit conditions and believe that I understand them. I also understand that, under the terms of the permit, there may be reporting requirements. I hereby certify that this document and the corresponding documents were prepared under my direction or supervision. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I further understand that coverage under the general permit will be identified in the acknowledgment that I will receive as a result of submitting this NOI and can be as long as sixty (60) business days as provided for in the general permit. I also understand that, by submitting this NOI, I am acknowledging that the SWPPP has been developed and will be implemented as the first element of construction, and agreeing to comply with all the terms and conditions of the general permit for which this NOI is being submitted.

Print First Name

MI

Print Last Name

Owner/Operator Signature

Date

0 / 0 /

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

NYS Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505

MS4 Stormwater Pollution Prevention Plan (SWPPP) Acceptance Form

for

Construction Activities Seeking Authorization Under SPDES General Permit
*(NOTE: Attach Completed Form to Notice Of Intent and Submit to Address Above)

I. Project Owner/Operator Information	
1. Owner/Operator Name:	Lauren Van Pamelen
2. Contact Person:	Lauren Van Pamelen
3. Street Address:	19 Lake Station Road
4. City/State/Zip:	Warwick, NY 10990
II. Project Site Information	
5. Project/Site Name:	Tin Barn Brewing Inc.
6. Street Address:	19 Lake Station Road
7. City/State/Zip:	Chester, NY 10918
III. Stormwater Pollution Prevention Plan (SWPPP) Review and Acceptance Information	
8. SWPPP Reviewed by:	
9. Title/Position:	
10. Date Final SWPPP Reviewed and Accepted:	
IV. Regulated MS4 Information	
11. Name of MS4:	
12. MS4 SPDES Permit Identification Number: NYR20A	
13. Contact Person:	
14. Street Address:	
15. City/State/Zip:	
16. Telephone Number:	

MS4 SWPPP Acceptance Form - continued

V. Certification Statement - MS4 Official (principal executive officer or ranking elected official) or Duly Authorized Representative

I hereby certify that the final Stormwater Pollution Prevention Plan (SWPPP) for the construction project identified in question 5 has been reviewed and meets the substantive requirements in the SPDES General Permit For Stormwater Discharges from Municipal Separate Storm Sewer Systems (MS4s). Note: The MS4, through the acceptance of the SWPPP, assumes no responsibility for the accuracy and adequacy of the design included in the SWPPP. In addition, review and acceptance of the SWPPP by the MS4 does not relieve the owner/operator or their SWPPP preparer of responsibility or liability for errors or omissions in the plan.

Printed Name:

Title/Position:

Signature:

Date:

VI. Additional Information

(NYS DEC - MS4 SWPPP Acceptance Form - January 2015)

APPENDIX F

New York State Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505
(NOTE: Submit completed form to address above)

NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity

Please indicate your permit identification number: NYR ____ ____ ____ ____ ____ ____

I. Owner or Operator Information

1. Owner/Operator Name:

2. Street Address:

3. City/State/Zip:

4. Contact Person: | 4a.Telephone:

4b. Contact Person E-Mail:

II. Project Site Information

5. Project/Site Name:

6. Street Address:

7. City/Zip:

8. County:

III. Reason for Termination

9a. □ All disturbed areas have achieved final stabilization in accordance with the general permit and SWPPP. ***Date final stabilization completed** (month/year): _____

9b. □ Permit coverage has been transferred to new owner/operator. Indicate new owner/operator's permit identification number: NYR ____ ____ ____ ____ ____ ____
(Note: Permit coverage can not be terminated by owner identified in I.1. above until new owner/operator obtains coverage under the general permit)

9c. □ Other (Explain on Page 2)

IV. Final Site Information:

10a. Did this construction activity require the development of a SWPPP that includes post-construction stormwater management practices? □ yes □ no (If no, go to question 10f.)

10b. Have all post-construction stormwater management practices included in the final SWPPP been constructed? □ yes □ no (If no, explain on Page 2)

10c. Identify the entity responsible for long-term operation and maintenance of practice(s)?

_____

NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity - continued

10d. Has the entity responsible for long-term operation and maintenance been given a copy of the operation and maintenance plan required by the general permit? □ yes □ no

10e. Indicate the method used to ensure long-term operation and maintenance of the post-construction stormwater management practice(s):

□ Post-construction stormwater management practice(s) and any right-of-way(s) needed to maintain practice(s) have been deeded to the municipality.

□ Executed maintenance agreement is in place with the municipality that will maintain the post-construction stormwater management practice(s).

□ For post-construction stormwater management practices that are privately owned, a mechanism is in place that requires operation and maintenance of the practice(s) in accordance with the operation and maintenance plan, such as a deed covenant in the owner or operator's deed of record.

□ For post-construction stormwater management practices that are owned by a public or private institution (e.g. school, university or hospital), government agency or authority, or public utility; policy and procedures are in place that ensures operation and maintenance of the practice(s) in accordance with the operation and maintenance plan.

10f. Provide the total area of impervious surface (i.e. roof, pavement, concrete, gravel, etc.) constructed within the disturbance area? _____ (acres)

11. Is this project subject to the requirements of a regulated, traditional land use control MS4? □ yes □ no

(If Yes, complete section VI - "MS4 Acceptance" statement

V. Additional Information/Explanation:

(Use this section to answer questions 9c. and 10b., if applicable)

VI. MS4 Acceptance - MS4 Official (principal executive officer or ranking elected official) or Duly Authorized Representative (Note: Not required when 9b. is checked -transfer of coverage)

I have determined that it is acceptable for the owner or operator of the construction project identified in question 5 to submit the Notice of Termination at this time.

Printed Name:

Title/Position:

Signature: | Date:

NOTICE OF TERMINATION for Storm Water Discharges Authorized under the SPDES General Permit for Construction Activity - continued

VII. Qualified Inspector Certification - Final Stabilization:

I hereby certify that all disturbed areas have achieved final stabilization as defined in the current version of the general permit, and that all temporary, structural erosion and sediment control measures have been removed. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

Printed Name:

Title/Position:

Signature: | Date:

VIII. Qualified Inspector Certification - Post-construction Stormwater Management Practice(s):

I hereby certify that all post-construction stormwater management practices have been constructed in conformance with the SWPPP. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

Printed Name:

Title/Position:

Signature: | Date:

IX. Owner or Operator Certification

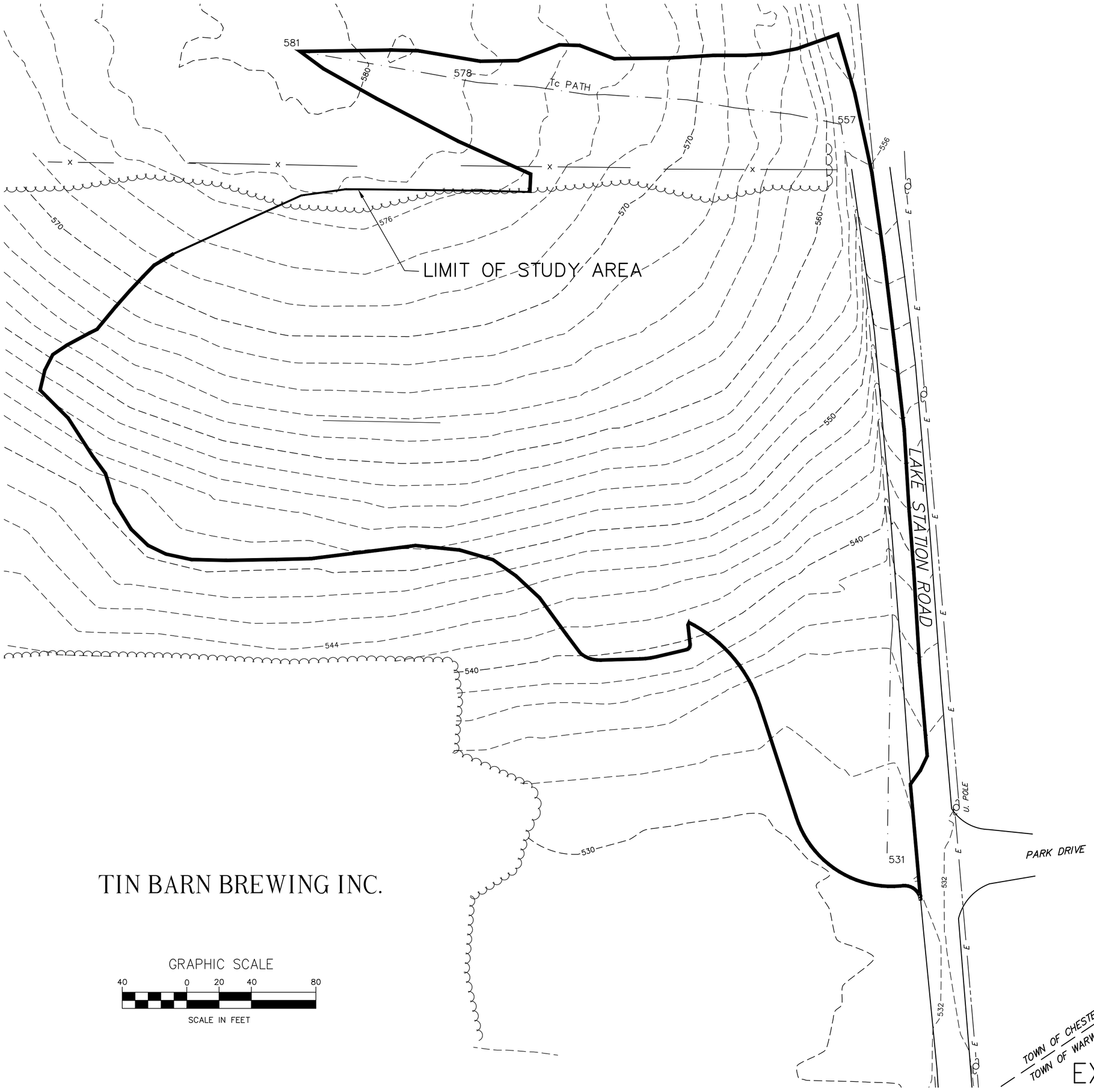
I hereby certify that this document was prepared by me or under my direction or supervision. My determination, based upon my inquiry of the person(s) who managed the construction activity, or those persons directly responsible for gathering the information, is that the information provided in this document is true, accurate and complete. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

Printed Name:

Title/Position:

Signature: | Date:

(NYS DEC Notice of Termination - January 2015)



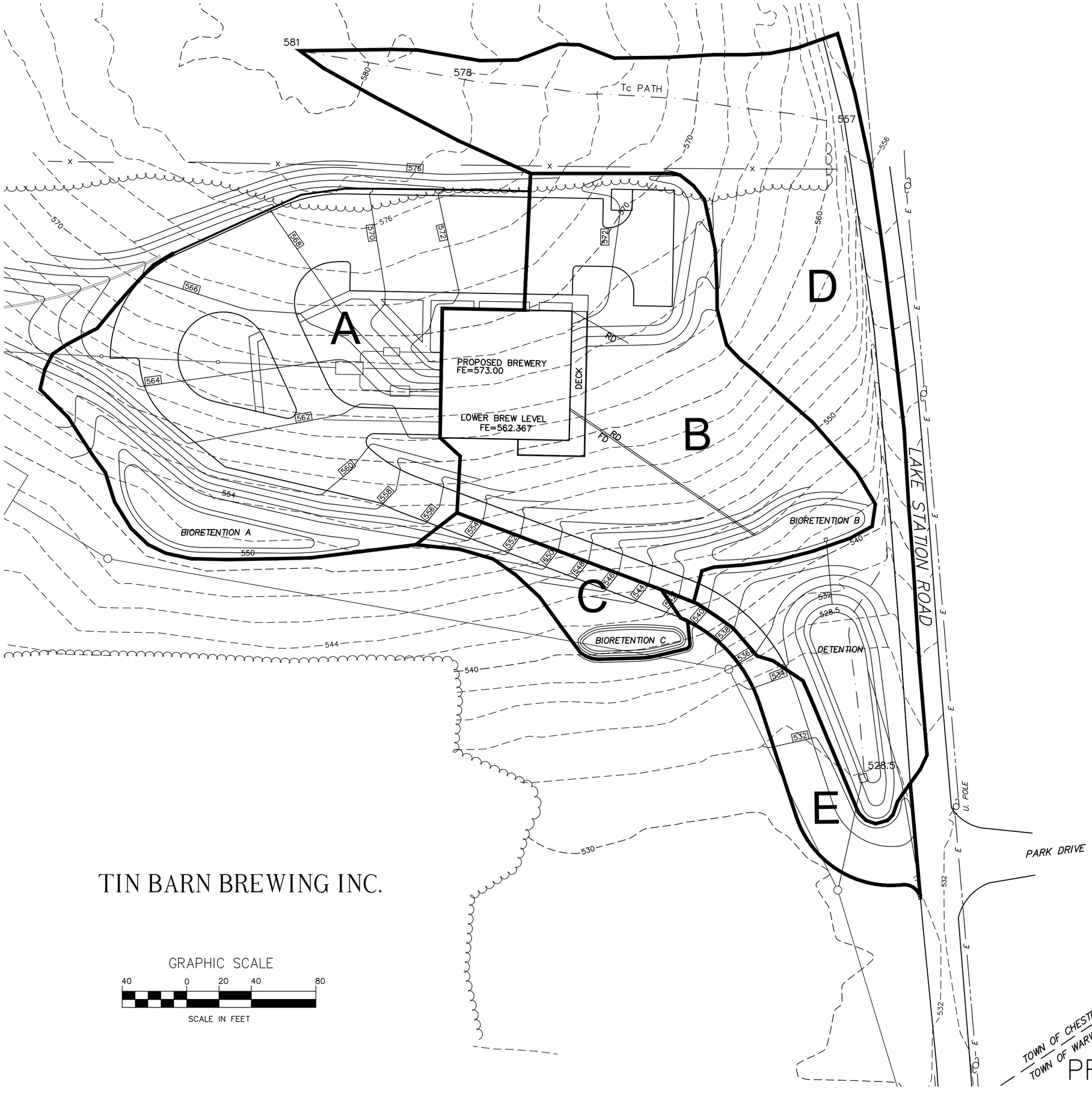
TIN BARN BREWING INC.

GRAPHIC SCALE

40 0 20 40 80

SCALE IN FEET

FIGURE 2
EXISTING CONDITIONS



TIN BARN BREWING INC.

GRAPHIC SCALE

40 0 20 40 80

SCALE IN FEET

FIGURE 3
PROPOSED CONDITIONS