PLD
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Stormwater Management Report

And

Erosion Control Calculations

for

Weaver's Pointe Subdivision

Zebulon North Carolina

6/7/24

Prepared by:

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Weavers Point Subdivision
Zebulon, North Carolina

Project Narrative

The proposed residential project is located on a 43.10 acre vacant, mostly wooded lot. The proposed development includes construction of 87 single family residential properties. The site is located in Zebulon, NC approximately 2.80 miles northeast of US 64 at coordinates 35° 51' 44.5644" N 78° 20' 4.2756" W. The site is located in the Neuse River watershed basin . The proposed development provides two wet detention SCMs for water quantity and quality treatment.

Stormwater Runoff Analysis

CIVIL 3D 2019 software Hydrograph extensions were utilized to model the runoff, time of concentration and routing calculations. The calculations for the 1-year and 10-year storms for pre-developed and post-development drainage areas for each stormwater discharge location are provided in this report. (See Appendix B, C, and D for details.)

This site consists of soils predominantly hydrological soil group type “C”. Refer to the USDA Soil Map in Appendix A for reference.

The site is subject to the Wake County Stormwater rules for the Town of Zebulon.

Following are the stormwater requirements:

- Post-developed peak flows cannot exceed pre-developed flows for the 1 year storm.
- Control the first 1” runoff volume and drawn down per SCM requirements.
- Provide 85% TSS removal.
- Ensure the specified volume, as determined by the Stormwater Municipal Tool, is controlled and released in 2-5 days.

Stormwater Runoff Summary

See the Wake County Stormwater Municipal Tool spreadsheet provided in Appendix B for complete SCM design data. The results of pre and post-development peak flows for Discharge Point #1-#5 are shown in the tables below.

Discharge Point #1

Required Volume to be controlled = 11,344 cf. Volume Provided =12,203 cf

Stormwater Runoff Results

Storm Event	Pre-Development	Post-Development with Detention
1-Year	10.05 cfs	8.34 cfs
10-Year	33.66 cfs	30.41 cfs

Discharge Point #2

Required Volume to be controlled = 30,619 cf. Volume Provided =32,020 cf

Stormwater Runoff Results

Storm Event	Pre-Development	Post-Development with Detention
1-Year	9.56 cfs	4.48 cfs
10-Year	32.03 cfs	31.07 cfs

Discharge Point #3

Required Volume to be controlled = n/a

Stormwater Runoff Results

Storm Event	Pre-Development	Post-Development
1-Year	1.46 cfs	1.36 cfs
10-Year	4.88 cfs	3.31 cfs

Post-developed flow is less than pre-developed flow.

Discharge Point #4

Required Volume to be controlled = n/a

Stormwater Runoff Results

Storm Event	Pre-Development	Post-Development
1-Year	4.94 cfs	3.33 cfs
10-Year	16.55 cfs	8.76 cfs

Post-developed flow is less than pre-developed flow.

Discharge Point #5

Required Volume to be controlled = n/a

Stormwater Runoff Results

Storm Event	Pre-Development	Post-Development
1-Year	2.48 cfs	2.44 cfs
10-Year	8.32 cfs	6.30 cfs

Post-developed flow is less than pre-developed flow.

Required Surface Area for SCM's:

SCM #1

Table 1 ***Surface Area to Drainage Area Ratio for Permanent Pool Sizing***

Piedmont and Mountain

% Impervious	Permanent Pool Depth (feet)						
Cover	**3.0**	**4.0**	**5.0**	**6.0**	**7.0**	**8.0**	**9.0**
10	0.51	0.43					
20	0.84	0.69					
30	1.17	0.94					
40	1.51	1.24					
50	1.79	1.51					
60	2.09	1.77					
70	2.51	2.09					
80	2.92	2.41					
90	3.25	2.64					

Source: NCDEQ Stormwater Design Manual, pg. 7, 11-23-2020

STORMWATER SCM - WET DETENTION POND

Land Use	**Area (ac)**	**% IA**	**Imp. Area (ac)**
Impervious	2.1	100	2.10
Open Space	3.9	0	0.00
Totals	**6.00**		**2.10**

Total % Impervious Surface Area = **35.0** %

Surface Area of Permanent Pool:

Assumed depth = 3 feet

SA/DA ratio = **1.09** % *From Table 1.1*

Minimum pond surface area (SA) = (DA * SA/DA ratio)/100

SA = **0.065** **acres**

2849 sq. ft.

* Required Volume to be controlled as determined by the Wake County Spreadsheet

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SCM #2

Table 1 ***Surface Area to Drainage Area Ratio for Permanent Pool Sizing***

Piedmont and Mountain

% Impervious	Permanent Pool Depth (feet)						
Cover	**3.0**	**4.0**	**5.0**	**6.0**	**7.0**	**8.0**	**9.0**
10	0.51	0.43					
20	0.84	0.69					
30	1.17	0.94					
40	1.51	1.24					
50	1.79	1.51					
60	2.09	1.77					
70	2.51	2.09					
80	2.92	2.41					
90	3.25	2.64					

Source: NCDEQ Stormwater Design Manual, pg. 7, 11-23-2020

STORMWATER SCM - WET DETENTION POND

Land Use	**Area (ac)**	**% IA**	**Imp. Area (ac)**
Impervious	7.4	100	7.40
Open Space	14.9	0	0.00
Totals	**22.30**		**7.40**

Total % Impervious Surface Area = **33.2** %

Surface Area of Permanent Pool:

Assumed depth = 3 feet

SA/DA ratio = **1.04** % *From Table 1.1*

Minimum pond surface area (SA) = (DA * SA/DA ratio)/100

SA = **0.232** **acres**

10102 sq. ft.

* Required Volume to be controlled as determined by the Wake County Spreadsheet

SCM Drainage Area calculations:

Discharge Point #1

Pre-developed
Drainage Area = 16.0 acres

Post-developed
Drainage area = 12.1 acres

To SCM:
Drainage area = 6.0 acres
Open Space = 3.9 acres
Impervious: = 1.0 acres roads/sidewalk + amenity
1.1 acres (14 lots @ 3,500 sf / lot)
2.1 acres total impervious

Bypass:
Drainage area = 6.1 acres
Open Space = 5.4 acres
Impervious: = 0.7 acres total impervious (includes greenway and 9 lots)

Discharge Point #2

Pre-developed
Drainage Area = 13.5 acres

Post-developed
Drainage area = 26.5 acres

To SCM:
Drainage area = 22.3 acres
Open Space = 14.9 acres
Impervious: = 3.9 acres roads/sidewalk
3.5 acres (44 lots @ 3,500 sf / lot)
7.4 acres total impervious

Bypass:
Drainage area = 4.2 acres
Open Space = 3.7 acres
Impervious: = 0.5 acres total impervious (includes greenway and 6 lots)

Anti-Floatation Calculations

				SCM #1					
			Box	Box	Submerged				
			Width (ft)	Depth (ft)	Height (ft)				
Water Displacement		=	(5.0)	(5.0)	(4.3)	=	107.5	cf	
Bouyant Force		=	107.5	cf x 62.4 pcf		=	6,708	lbs	
						Weight of			
			Box	Box	Depth of	Concrete			
			Width (ft)	Depth (ft)	Concrete (	(pcf)			
Structure Weight		=	(5.0)	(5.0)	(2.0)	150	=	7,500	lbs
**Structure Weight = quantity of concrete provided at bottom of structure									

				SCM #2					
			Box	Box	Submerged				
			Width (ft)	Depth (ft)	Height (ft)				
Water Displacement		=	(5.0)	(5.0)	(4.0)	=	100.0	cf	
Bouyant Force		=	100.0	cf x 62.4 pcf		=	6,240	lbs	
						Weight of			
			Box	Box	Depth of	Concrete			
			Width (ft)	Depth (ft)	Concrete (	(pcf)			
Structure Weight		=	(5.0)	(5.0)	(2.0)	150	=	7,500	lbs
**Structure Weight = quantity of concrete provided at bottom of structure									

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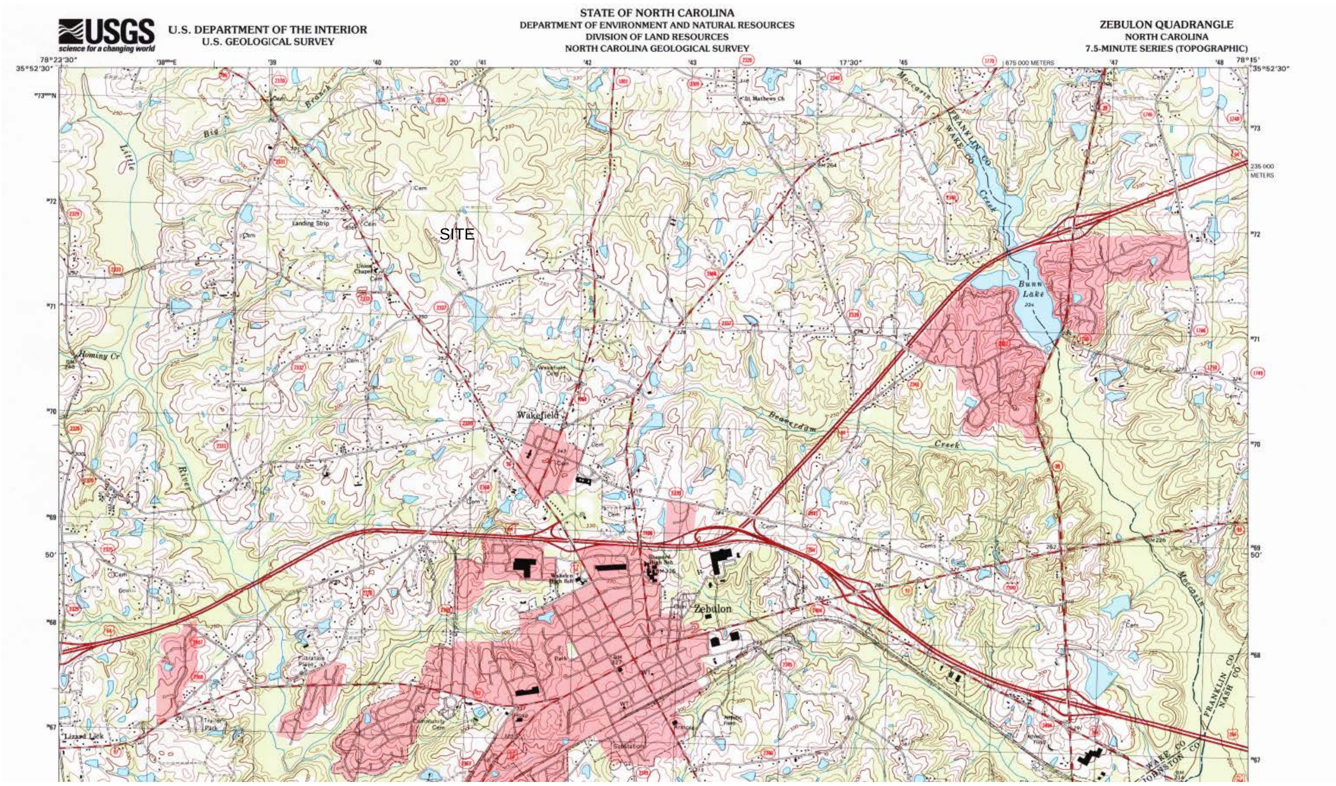
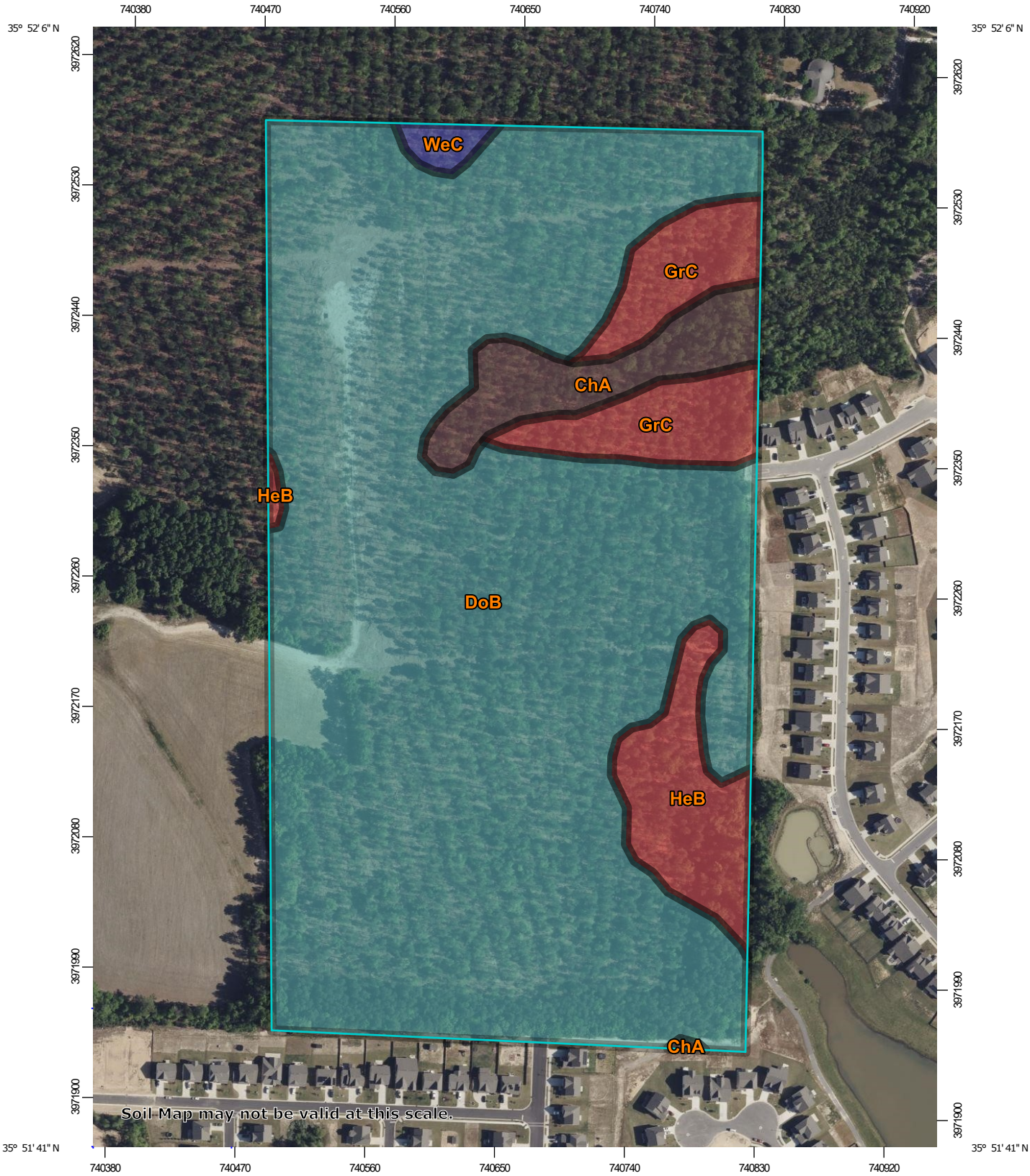
Appendix A
USDA Soils, USGS, and FEMA Map

PLD


USGS
science for a changing world
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF LAND RESOURCES
NORTH CAROLINA GEOLOGICAL SURVEY
ZEBULON QUADRANGLE
NORTH CAROLINA
7.5-MINUTE SERIES (TOPOGRAPHIC)
SITE
Wakefield
Zebulon
Bunn Lake
Beaverdam
Creek
Little
River
Hominy Cr
Landing Strip
FRANKLIN CO
WAKE CO



Map Scale: 1:3,770 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

Appendix B
Wake County Stormwater Municipal Tool

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SITE DATA

Project Information	
Project Name:	**Weavers Point Subdivision**
Applicant:	Piedmont Land Design, PLLC
Applicant Contact Name:	Mike Schneider
Applicant Contact Number:	919-845-7600
Contact Email:	mikes@piedmontlanddesign.com
Municipal Jurisdiction (Select from dropdown menu):	Zebulon
Last Updated:	
Site Data:	
Total Site Area (Ac):	43.10
Existing Lake/Pond Area (Ac):	0.00
Proposed Disturbed Area (Ac):	
Impervious Surface Area (acre):	11.94
Type of Development (Select from Dropdown menu):	Residential
Percent Built Upon Area (BUA):	28%
Project Density:	High
Is the proposed project a site expansion?	No
Number of Drainage Areas on Site:	5
NOAA — **1-Year, 24-Hour Storm (inches) (See NOAA Website):**	2.85
2-Year, 24-Hour Storm (inches) (See NOAA Website):	3.45
10-Year, 24-Hour Storm (inches) (See NOAA Website):	5.11
Lot Data (if applicable):	
Total Acreage in Lots:	0.25
Number of Lots:	87
Average Lot Size (SF):	10890.00
Total Impervious Surface Area on Lots (SF):	304500.00
Average Impervious Surface Area Per Lot (SF):	3500.00

Stormwater Narrative (limit to 1,200 characters - attach additional pages with submittal if necessary):

The proposed residential project is located on a 43.10AC vacant lot that consists of mainly wooded tract of land. The proposed development includes construction of 87 single family residential properties. The site is located in Zebulon, NC approximately 2.80 miles northeast of US 64 at coordinates 35° 51' 44.5644" N 78° 20' 4.2756" W. The site is located in the Neuse River watershed basin. The proposed development provides two wet detention SCMs for water quantity volume control, water quality treatment, and an outlet control structure to reduce post-development peak flow discharge to the pre-development conditions. There are areas of bypass that have been accounted for in the Hydraflow modeling system and confirmed that there is no negative downstream impacts as the result of the site improvements.

Project Name: Weavers Point Subdivision

DRAINAGE AREA 1
STORMWATER PRE-POST CALCULATIONS

LAND USE & SITE DATA	PRE-DEVELOPMENT				POST-DEVELOPMENT			
Drainage Area (Acres)=	16.00				12.10			
Site Acreage within Drainage=	16.00				12.10			
One-year, 24-hour rainfall (in)=	2.85							
Two-year, 24-hour rainfall (in)=	3.45							
Ten-year, 24-hour storm (in)=	5.11							
Total Lake/Pond Area (Acres)=								
Lake/Pond Area not in the Tc flow path (Acres)=								
Site Land Use (acres):	A	B	C	D	A	B	C	D
Pasture								
Woods, Poor Condition								
Woods, Fair Condition								
Woods, Good Condition			16.00					
Open Space, Poor Condition								
Open Space, Fair condition								
Open Space, Good Condition							9.30	
Reforestation (in dedicated OS)								
Connected Impervious							2.10	
Disconnected Impervious							0.70	
SITE FLOW	**PRE-DEVELOPMENT T_c**				**POST-DEVELOPMENT Tc**			
Sheet Flow								
Length (ft)=	25.00				25.00			
Slope (ft/ft)=	0.020				0.020			
Surface Cover:	Woods				Woods			
n-value=	0.400				0.400			
T_t (hrs)=	0.125				0.125			
Shallow Flow								
Length (ft)=	975.00				250.00			
Slope (ft/ft)=	0.020				0.020			
Surface Cover:	Unpaved				Unpaved			
Average Velocity (ft/sec)=	2.28				2.28			
T_t (hrs)=	0.12				0.03			
Channel Flow 1								
Length (ft)=					300.00			
Slope (ft/ft)=					0.005			
Cross Sectional Flow Area (ft^2)=					0.56			
Wetted Perimeter (ft)=					4.70			
Channel Lining:					Concrete, finished			
n-value=					0.012			
Hydraulic Radius (ft)=					0.12			
Average Velocity (ft/sec)=					2.13			
T_t (hrs)=					0.04			

Project Name: Weavers Point Subdivision

DRAINAGE AREA 1
STORMWATER PRE-POST CALCULATIONS

Channel Flow 2		
Length (ft)=		
Slope (ft/ft)=		
Cross Sectional Flow Area (ft^2)=		
Wetted Perimeter (ft)=		
Channel Lining:		
n-value=		
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=		
T_t (hrs)=		
Channel Flow 3		
Length (ft)=		
Slope (ft/ft)=		
Cross Sectional Flow Area (ft^2)=		
Wetted Perimeter (ft)=		
Channel Lining:		
n-value=		
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=		
T_t (hrs)=		
Tc (hrs)=	0.24	0.19
RESULTS	**PRE-DEVELOPMENT**	**POST-DEVELOPMENT**
Composite Curve Number=	70	80
Disconnected Impervious Adjustment		
Disconnected impervious area (acre) =	0.70	
$CN_{adjusted\ (1\text{-}year)}$=	**80**	
High Density Only		
Volume of runoff from 1" rainfall for DA HIGH DENSITY REQUIREMENT = (ft^3) =	11,344	
1-year, 24-hour storm (Peak Flow)		
Runoff (inches) = $Q^*_{1\text{-}year}$=	0.63	1.11
Volume of runoff (ft^3) =	36,738	48,844
Volume change (ft^3) =	12,106	
Peak Discharge (cfs)= $Q_{1\text{-}year}$=	10.050	16.991
2-year, 24-hour storm (LID)		
Runoff (inches) = $Q^*_{2\text{-}year}$=	0.98	1.57
Volume of runoff (ft^3) =	56,766	68,751
Peak Discharge (cfs)= $Q_{2\text{-}year}$=	15.529	23.916
10-year, 24-hour storm (DIA)		
Runoff (inches) = $Q^*_{10\text{-}year}$=	2.12	2.95
Volume of runoff (ft^3) =	123,028	171,178
Peak Discharge (cfs)= $Q_{10\text{-}year}$=	33.655	45.032

Project Name: Weavers Point Subdivision

DRAINAGE AREA 2
STORMWATER PRE-POST CALCULATIONS

LAND USE & SITE DATA	PRE-DEVELOPMENT				POST-DEVELOPMENT			
Drainage Area (Acres)=	13.50				26.50			
Site Acreage within Drainage=	13.50				26.50			
One-year, 24-hour rainfall (in)=	2.85							
Two-year, 24-hour rainfall (in)=	3.45							
Ten-year, 24-hour storm (in)=	5.11							
Total Lake/Pond Area (Acres)=								
Lake/Pond Area not in the Tc flow path (Acres)=								
Site Land Use (acres):	A	B	C	D	A	B	C	D
Pasture								
Woods, Poor Condition								
Woods, Fair Condition								
Woods, Good Condition			13.50					
Open Space, Poor Condition								
Open Space, Fair condition								
Open Space, Good Condition							18.60	
Reforestation (in dedicated OS)								
Connected Impervious							7.40	
Disconnected Impervious							0.50	
SITE FLOW	**PRE-DEVELOPMENT T_c**				**POST-DEVELOPMENT Tc**			
Sheet Flow								
Length (ft)=	25.00				25.00			
Slope (ft/ft)=	0.030				0.020			
Surface Cover:	Woods				Woods			
n-value=	0.400				0.400			
T_t (hrs)=	0.106				0.125			
Shallow Flow								
Length (ft)=	825.00							
Slope (ft/ft)=	0.030							
Surface Cover:	Unpaved							
Average Velocity (ft/sec)=	2.79							
T_t (hrs)=	0.08							
Channel Flow 1								
Length (ft)=					1700.00			
Slope (ft/ft)=					0.005			
Cross Sectional Flow Area (ft^2)=					1.77			
Wetted Perimeter (ft)=					4.70			
Channel Lining:					Concrete, finished			
n-value=					0.012			
Hydraulic Radius (ft)=					0.38			
Average Velocity (ft/sec)=					4.58			
T_t (hrs)=					0.10			

Project Name: Weavers Point Subdivision

DRAINAGE AREA 2
STORMWATER PRE-POST CALCULATIONS

Channel Flow 2		
Length (ft)=		
Slope (ft/ft)=		
Cross Sectional Flow Area (ft^2)=		
Wetted Perimeter (ft)=		
Channel Lining:		
n-value=		
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=		
T_t (hrs)=		
Channel Flow 3		
Length (ft)=		
Slope (ft/ft)=		
Cross Sectional Flow Area (ft^2)=		
Wetted Perimeter (ft)=		
Channel Lining:		
n-value=		
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=		
T_t (hrs)=		
Tc (hrs)=	0.19	0.23
RESULTS	**PRE-DEVELOPMENT**	**POST-DEVELOPMENT**
Composite Curve Number=	70	81
Disconnected Impervious Adjustment		
Disconnected impervious area (acre) =	0.50	
$CN_{adjusted\ (1\text{-}year)}$=	**81**	
High Density Only		
Volume of runoff from 1" rainfall for DA HIGH DENSITY REQUIREMENT = (ft^3) =	30,619	
1-year, 24-hour storm (Peak Flow)		
Runoff (inches) = $Q^*_{1\text{-}year}$=	0.63	1.21
Volume of runoff (ft^3) =	30,998	116,258
Volume change (ft^3) =	85,260	
Peak Discharge (cfs)= $Q_{1\text{-}year}$=	9.564	37.994
2-year, 24-hour storm (LID)		
Runoff (inches) = $Q^*_{2\text{-}year}$=	0.98	1.68
Volume of runoff (ft^3) =	47,896	161,514
Peak Discharge (cfs)= $Q_{2\text{-}year}$=	14.778	52.784
10-year, 24-hour storm (DIA)		
Runoff (inches) = $Q^*_{10\text{-}year}$=	2.12	3.10
Volume of runoff (ft^3) =	103,805	151,763
Peak Discharge (cfs)= $Q_{10\text{-}year}$=	32.028	97.357

Project Name: Weavers Point Subdivision

DRAINAGE AREA 3
STORMWATER PRE-POST CALCULATIONS

LAND USE & SITE DATA	PRE-DEVELOPMENT				POST-DEVELOPMENT			
Drainage Area (Acres)=	1.80				0.50			
Site Acreage within Drainage=	1.80				0.50			
One-year, 24-hour rainfall (in)=	2.85							
Two-year, 24-hour rainfall (in)=	3.45							
Ten-year, 24-hour storm (in)=	5.11							
Total Lake/Pond Area (Acres)=								
Lake/Pond Area not in the Tc flow path (Acres)=								
Site Land Use (acres):	A	B	C	D	A	B	C	D
Pasture								
Woods, Poor Condition								
Woods, Fair Condition								
Woods, Good Condition			1.80					
Open Space, Poor Condition								
Open Space, Fair condition								
Open Space, Good Condition							0.30	
Reforestation (in dedicated OS)								
Connected Impervious							0.20	
Disconnected Impervious								
SITE FLOW	**PRE-DEVELOPMENT T_c**				**POST-DEVELOPMENT Tc**			
Sheet Flow								
Length (ft)=	25.00				25.00			
Slope (ft/ft)=	0.030				0.600			
Surface Cover:	Woods				Grass			
n-value=	0.400				0.240			
T_t (hrs)=	0.106				0.021			
Shallow Flow								
Length (ft)=	325.00				100.00			
Slope (ft/ft)=	0.030				0.020			
Surface Cover:	Unpaved				Unpaved			
Average Velocity (ft/sec)=	2.79				2.28			
T_t (hrs)=	0.03				0.01			
Channel Flow 1								
Length (ft)=								
Slope (ft/ft)=								
Cross Sectional Flow Area (ft^2)=								
Wetted Perimeter (ft)=								
Channel Lining:								
n-value=								
Hydraulic Radius (ft)=								
Average Velocity (ft/sec)=								
T_t (hrs)=								

Project Name: Weavers Point Subdivision

DRAINAGE AREA 3
STORMWATER PRE-POST CALCULATIONS

Channel Flow 2		
Length (ft)=		
Slope (ft/ft)=		
Cross Sectional Flow Area (ft^2)=		
Wetted Perimeter (ft)=		
Channel Lining:		
n-value=		
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=		
T_t (hrs)=		
Channel Flow 3		
Length (ft)=		
Slope (ft/ft)=		
Cross Sectional Flow Area (ft^2)=		
Wetted Perimeter (ft)=		
Channel Lining:		
n-value=		
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=		
T_t (hrs)=		
Tc (hrs)=	0.14	0.03
RESULTS	**PRE-DEVELOPMENT**	**POST-DEVELOPMENT**
Composite Curve Number=	70	84
Disconnected Impervious Adjustment		
Disconnected impervious area (acre) =		
$CN_{adjusted\ (1\text{-}year)}$=	**84**	
High Density Only		
Volume of runoff from 1" rainfall for DA HIGH DENSITY REQUIREMENT = (ft^3) =	744	
1-year, 24-hour storm (Peak Flow)		
Runoff (inches) = $Q^*_{1\text{-}year}$=	0.63	1.37
Volume of runoff (ft^3) =	4,133	2,481
Volume change (ft^3) =		
Peak Discharge (cfs)= $Q_{1\text{-}year}$=	1.458	1.356
2-year, 24-hour storm (LID)		
Runoff (inches) = $Q^*_{2\text{-}year}$=	0.98	1.86
Volume of runoff (ft^3) =	6,386	3,381
Peak Discharge (cfs)= $Q_{2\text{-}year}$=	2.253	1.847
10-year, 24-hour storm (DIA)		
Runoff (inches) = $Q^*_{10\text{-}year}$=	2.12	3.33
Volume of runoff (ft^3) =	13,841	21,772
Peak Discharge (cfs)= $Q_{10\text{-}year}$=	4.884	3.305

Project Name: Weavers Point Subdivision

DRAINAGE AREA 4
STORMWATER PRE-POST CALCULATIONS

LAND USE & SITE DATA	PRE-DEVELOPMENT				POST-DEVELOPMENT			
Drainage Area (Acres)=	8.20				2.60			
Site Acreage within Drainage=	8.20				2.60			
One-year, 24-hour rainfall (in)=	2.85							
Two-year, 24-hour rainfall (in)=	3.45							
Ten-year, 24-hour storm (in)=	5.11							
Total Lake/Pond Area (Acres)=								
Lake/Pond Area not in the Tc flow path (Acres)=								
Site Land Use (acres):	A	B	C	D	A	B	C	D
Pasture								
Woods, Poor Condition								
Woods, Fair Condition								
Woods, Good Condition			8.20					
Open Space, Poor Condition								
Open Space, Fair condition								
Open Space, Good Condition							1.96	
Reforestation (in dedicated OS)								
Connected Impervious							0.64	
Disconnected Impervious								
SITE FLOW	**PRE-DEVELOPMENT T_c**				**POST-DEVELOPMENT Tc**			
Sheet Flow								
Length (ft)=	25.00				25.00			
Slope (ft/ft)=	0.010				0.010			
Surface Cover:	Woods				Woods			
n-value=	0.400				0.400			
T_t (hrs)=	0.165				0.165			
Shallow Flow								
Length (ft)=	825.00				650.00			
Slope (ft/ft)=	0.020				0.015			
Surface Cover:	Unpaved				Unpaved			
Average Velocity (ft/sec)=	2.28				1.98			
T_t (hrs)=	0.10				0.09			
Channel Flow 1								
Length (ft)=								
Slope (ft/ft)=								
Cross Sectional Flow Area (ft^2)=								
Wetted Perimeter (ft)=								
Channel Lining:								
n-value=								
Hydraulic Radius (ft)=								
Average Velocity (ft/sec)=								
T_t (hrs)=								

Project Name: Weavers Point Subdivision

DRAINAGE AREA 4
STORMWATER PRE-POST CALCULATIONS

Channel Flow 2		
Length (ft)=		
Slope (ft/ft)=		
Cross Sectional Flow Area (ft^2)=		
Wetted Perimeter (ft)=		
Channel Lining:		
n-value=		
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=		
T_t (hrs)=		
Channel Flow 3		
Length (ft)=		
Slope (ft/ft)=		
Cross Sectional Flow Area (ft^2)=		
Wetted Perimeter (ft)=		
Channel Lining:		
n-value=		
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=		
T_t (hrs)=		
Tc (hrs)=	0.27	0.26
RESULTS	**PRE-DEVELOPMENT**	**POST-DEVELOPMENT**
Composite Curve Number=	70	80
Disconnected Impervious Adjustment		
Disconnected impervious area (acre) =		
$CN_{adjusted\ (1\text{-}year)}$=	**80**	
High Density Only		
Volume of runoff from 1" rainfall for DA HIGH DENSITY REQUIREMENT = (ft^3) =	2,563	
1-year, 24-hour storm (Peak Flow)		
Runoff (inches) = $Q^*_{1\text{-}year}$=	0.63	1.13
Volume of runoff (ft^3) =	18,828	10,696
Volume change (ft^3) =		
Peak Discharge (cfs)= $Q_{1\text{-}year}$=	4.942	3.331
2-year, 24-hour storm (LID)		
Runoff (inches) = $Q^*_{2\text{-}year}$=	0.98	1.59
Volume of runoff (ft^3) =	29,092	15,011
Peak Discharge (cfs)= $Q_{2\text{-}year}$=	7.637	4.675
10-year, 24-hour storm (DIA)		
Runoff (inches) = $Q^*_{10\text{-}year}$=	2.12	2.98
Volume of runoff (ft^3) =	63,052	88,723
Peak Discharge (cfs)= $Q_{10\text{-}year}$=	16.551	8.762

Project Name: Weavers Point Subdivision

DRAINAGE AREA 5
STORMWATER PRE-POST CALCULATIONS

LAND USE & SITE DATA	PRE-DEVELOPMENT				POST-DEVELOPMENT			
Drainage Area (Acres)=	3.50				1.40			
Site Acreage within Drainage=	3.50				1.40			
One-year, 24-hour rainfall (in)=	2.85							
Two-year, 24-hour rainfall (in)=	3.45							
Ten-year, 24-hour storm (in)=	5.11							
Total Lake/Pond Area (Acres)=								
Lake/Pond Area not in the Tc flow path (Acres)=								
Site Land Use (acres):	A	B	C	D	A	B	C	D
Pasture								
Woods, Poor Condition								
Woods, Fair Condition								
Woods, Good Condition			3.30					
Open Space, Poor Condition								
Open Space, Fair condition								
Open Space, Good Condition							1.00	
Reforestation (in dedicated OS)								
Connected Impervious							0.40	
Disconnected Impervious								
SITE FLOW	**PRE-DEVELOPMENT T_c**				**POST-DEVELOPMENT Tc**			
Sheet Flow								
Length (ft)=	25.00				25.00			
Slope (ft/ft)=	0.020				0.015			
Surface Cover:	Woods				Grass			
n-value=	0.400				0.240			
T_t (hrs)=	0.125				0.093			
Shallow Flow								
Length (ft)=	575.00				200.00			
Slope (ft/ft)=	0.025				0.010			
Surface Cover:	Unpaved				Unpaved			
Average Velocity (ft/sec)=	2.55				1.61			
T_t (hrs)=	0.06				0.03			
Channel Flow 1								
Length (ft)=								
Slope (ft/ft)=								
Cross Sectional Flow Area (ft^2)=								
Wetted Perimeter (ft)=								
Channel Lining:								
n-value=								
Hydraulic Radius (ft)=								
Average Velocity (ft/sec)=								
T_t (hrs)=								

Project Name: Weavers Point Subdivision

DRAINAGE AREA 5
STORMWATER PRE-POST CALCULATIONS

Channel Flow 2		
Length (ft)=		
Slope (ft/ft)=		
Cross Sectional Flow Area (ft^2)=		
Wetted Perimeter (ft)=		
Channel Lining:		
n-value=		
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=		
T_t (hrs)=		
Channel Flow 3		
Length (ft)=		
Slope (ft/ft)=		
Cross Sectional Flow Area (ft^2)=		
Wetted Perimeter (ft)=		
Channel Lining:		
n-value=		
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=		
T_t (hrs)=		
Tc (hrs)=	0.19	0.13
RESULTS	**PRE-DEVELOPMENT**	**POST-DEVELOPMENT**
Composite Curve Number=	70	81
Disconnected Impervious Adjustment		
Disconnected impervious area (acre) =		
$CN_{adjusted\ (1\text{-}year)}$=	**81**	
High Density Only		
Volume of runoff from 1" rainfall for DA HIGH DENSITY REQUIREMENT = (ft^3) =	1,561	
1-year, 24-hour storm (Peak Flow)		
Runoff (inches) = $Q^*_{1\text{-}year}$=	0.63	1.19
Volume of runoff (ft^3) =	8,036	6,051
Volume change (ft^3) =		
Peak Discharge (cfs)= $Q_{1\text{-}year}$=	2.484	2.442
2-year, 24-hour storm (LID)		
Runoff (inches) = $Q^*_{2\text{-}year}$=	0.98	1.66
Volume of runoff (ft^3) =	12,417	8,426
Peak Discharge (cfs)= $Q_{2\text{-}year}$=	3.837	3.400
10-year, 24-hour storm (DIA)		
Runoff (inches) = $Q^*_{10\text{-}year}$=	2.12	3.07
Volume of runoff (ft^3) =	26,912	38,998
Peak Discharge (cfs)= $Q_{10\text{-}year}$=	8.317	6.295

Project Name: Weavers Point Subdivision

DA SITE SUMMARY
STORMWATER PRE-POST CALCULATIONS

SITE SUMMARY

DRAINAGE AREA SUMMARIES

DRAINAGE AREA:	DA1	DA2	DA3	DA4	DA5	DA6	DA7	DA8	DA9	DA10
Pre-Development (1-year, 24-hour storm)										
Runoff (in) = $Q_{pre,1\text{-}year}$ =	0.63	0.63	0.63	0.63	0.63					
Peak Flow (cfs)=$Q_{1\text{-}year}$ =	10.050	9.564	1.458	4.942	2.484					
Post-Development (1-year, 24-hour storm)										
Proposed Impervious Surface (acre) =	2.80	7.90	0.20	0.64	0.40					
Runoff (in)=$Q_{1\text{-}year}$ =	1.11	1.21	1.37	1.13	1.19					
Peak Flow (cfs)=$Q_{1\text{-}year}$ =	16.991	37.994	1.356	3.331	2.442					
Increase in volume per DA (ft^3)_1-yr storm=	12,106	85,260								
Minimum Volume to be Managed for DA HIGH DENSITY REQUIREMENT = (ft^3) =	11,344	30,619	744	2,563	1,561					

TARGET CURVE NUMBER (TCN)

Site Data

SITE \SOIL COMPOSITION

HYDROLOGIC SOIL GROUP	Site Area	%	Target CN
A	0.00	0%	N/A
B	0.00	0%	N/A
C	43.10	100%	N/A
D	0.00	0%	N/A

Total Site Area (acres) =	43.10
Percent BUA (Includes Existing Lakes/Pond Areas) =	28%
Project Density =	High
Target Curve Number (TCN) =	N/A
$CN_{adjusted\ (1\text{-}year)}$=	81
Minimum Volume to be Managed (Total Site) Per TCN Requirement= ft^3 =	N/A

Site Nitrogen Loading Data

HSG	TN export coefficient (lbs/ac/yr)	Site Acreage	N Export
Pasture	1.2	0.00	0.00
Woods, Poor Condition	1.6	0.00	0.00
Woods, Fair Condition	1.2	0.00	0.00
Woods, Good Condition	0.8	0.00	0.00
Open Space, Poor Condition	1.0	0.00	0.00
Open Space, Fair Condition	0.8	0.00	0.00
Open Space, Good Condition	0.6	31.16	18.70
Reforestation (in dedicated OS)	0.6	0.00	0.00
Impervious	21.2	11.94	253.13

SITE NITROGEN LOADING RATE (lbs/ac/yr)=	6.31
Nitrogen Load (lbs/yr)=	271.82
TOTAL SITE NITROGEN TO MITIGATE (lbs/yr)_Wendell Only=	116.66

Site Nitrogen Loading Data For Expansions Only

	Existing	New
Impervious(acres)=	NA	NA
"Expansion Area" (acres=)		
Nitrogen Load (lbs/yr)=	NA	NA
SITE NITROGEN LOADING RATE (lbs/ac/yr)=	NA	NA
Total Site loading rate (lbs/ac/yr)		
TOTAL SITE NITROGEN TO MITIGATE (lbs/yr)=	NA	

WAKE COUNTY
NORTH CAROLINA

Project Name: Weavers Point Subdivision

DRAINAGE AREA 1
BMP CALCULATIONS

DRAINAGE AREA 1 - BMP DEVICES AND ADJUSTMENTS				
DA1 Site Acreage=	12.10			
DA1 Off-Site Acreage=				
Total Required Storage Volume for Site TCN Requirement (ft^3)=	N/A			
Total Required Storage Volume for DA1 1" Rainfall for High Density (ft^3)=	11,344			
Will site use underground detention/cistern?	No	Enter % of the year water will be reused=	0%	Note: Supporting information/details should be submitted to demonstrate water usage.

ENTER ACREAGE FOR ALL SUB-DRAINAGE AREAS IN DA

HSG	Sub-DA1(a) (Ac)		Sub-DA1(b) (Ac)		Sub-DA1(c) (Ac)		Sub-DA1(d) (Ac)		Sub-DA1(e) (Ac)	
	Site	Off-site	Site	Off-site	Site	Off-site	Site	Off-site	Site	Off-site
Pasture										
Woods, Poor Condition										
Woods, Fair Condition										
Woods, Good Condition										
Open Space, Poor Condition										
Open Space, Fair Condition										
Open Space, Good Condition	3.90		5.40							
Reforestation (in dedicated OS)										
Impervious	2.10		0.70							

Sub-DA1(a) BMP(s)

Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft^3)	Provided Volume that will drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
SCM 1	Wet Detention Basin	4,491	12,203	25%	46.86	11.72	48
				0%	35.15	0.00	
				0%	35.15	0.00	
				0%	35.15	0.00	
				0%	35.15	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):		**35.15**					

Sub-DA1(b) BMP(s)

If Sub-DA1(b) is connected to upstream subbasin(s), enter the nitrogen leaving the most upstream subbasin(lbs):

Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft^3)	Provided Volume that will drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
		2,260		0%	18.08	0.00	
				0%	18.08	0.00	
				0%	18.08	0.00	
				0%	18.08	0.00	
				0%	18.08	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):		**18.08**					

Sub-DA1 (c) BMP(s)

If Sub-DA1(c) is connected to upstream subbasin(s), enter the nitrogen leaving the most upstream subbasin(lbs):

Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft^3)	Provided Volume that will drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):							

Project Name: Weavers Point Subdivision

DRAINAGE AREA 1
BMP CALCULATIONS

Sub-DA1(d) BMP(s)							
If Sub-DA1(d) is connected to upstream subbasin(s), enter the nitrogen leaving the most upstream subbasin(lbs):							
Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft^3)	Provided Volume that will drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):							
Sub-DA1(e) BMP(s)							
If Sub-DA1(e) is connected to upstream subbasin(s), enter the nitrogen leaving the most upstream subbasin(lbs):							
Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft^3)	Provided Volume that will drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):							

DA1 BMP SUMMARY	
Total Volume Treated (ft^3)=	12,203
Nitrogen Mitigated(lbs)=	11.72
1-year, 24-hour storm	
Post BMP Volume of Runoff (ft^3)$_{(1\text{-}year)}$=	36,641
Post BMP Runoff (inches) = $Q^*_{(1\text{-}year)}$=	0.83
Post BMP $CN_{(1\text{-}year)}$=	74
Post BMP Peak Discharge (cfs)= $Q_{1\text{-}year}$=	8.330
2-year, 24-hour storm (LID)	
Post BMP Volume of Runoff (ft3)$_{(2\text{-}year)}$=	56,548
Post BMP Runoff (inches) = $Q^*_{(2\text{-}year)}$=	1.29
Post BMP $CN_{(2\text{-}year)}$=	75
Post BMP Peak Discharge (cfs)= $Q_{(2\text{-}year)}$=	
10-year, 24-hour storm (DIA)	
Post BMP Volume of Runoff (ft^3)$_{(10\text{-}year)}$=	158,975
Post BMP Runoff (inches) = $Q^*_{(10\text{-}year)}$=	3.62
Post BMP $CN_{(10\text{-}year)}$=	98
Post BMP Peak Discharge (cfs)= $Q_{(10\text{-}year)}$=	31.870

Project Name: Weavers Point Subdivision

DRAINAGE AREA 2
BMP CALCULATIONS

DRAINAGE AREA 1 - BMP DEVICES AND ADJUSTMENTS				
DA2 Site Acreage=	26.50			
DA2 Off-Site Acreage=				
Total Required Storage Volume TCN Requirement (ft^3)=	N/A			
Total Required Storage Volume for DA2 1" Rainfall for High Density (ft3)=	30,619			
Will site use underground detention/cistern?	No	Enter % of the year water will be reused=	0%	Note: Supporting information/details should be submitted to demonstrate water usage.

ENTER ACREAGE FOR ALL SUB-DRAINAGE AREAS IN DA

HSG	Sub-DA2(a) (Ac)		Sub-DA2(b) (Ac)		Sub-DA2(c) (Ac)		Sub-DA2(d) (Ac)		Sub-DA2(e) (Ac)	
	Site	Off-site	Site	Off-site	Site	Off-site	Site	Off-site	Site	Off-site
Pasture										
Woods, Poor Condition										
Woods, Fair Condition										
Woods, Good Condition										
Open Space, Poor Condition										
Open Space, Fair Condition										
Open Space, Good Condition	14.90		3.70							
Reforestation (in dedicated OS)										
Impervious	7.40		0.50							

Sub-DA1(a) BMP(s)

Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft^3)	Provided Volume that will drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
SCM 2	Wet Detention Basin	24,392	32,020	25%	165.82	41.46	48
				0%	124.37	0.00	
				0%	124.37	0.00	
				0%	124.37	0.00	
				0%	124.37	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):		**124.37**					

Sub-DA1(b) BMP(s)

If Sub-DA1(b) is connected to upstream subbasin(s), enter the nitrogen leaving the most upstream subbasin(lbs):

Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft^3)	Provided Volume that will drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
		1,021		0%	12.82	0.00	
				0%	12.82	0.00	
				0%	12.82	0.00	
				0%	12.82	0.00	
				0%	12.82	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):		**12.82**					

Sub-DA1 (c) BMP(s)

If Sub-DA1(c) is connected to upstream subbasin(s), enter the nitrogen leaving the most upstream subbasin(lbs):

Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft^3)	Provided Volume that will drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):							

Project Name: Weavers Point Subdivision

DRAINAGE AREA 2
BMP CALCULATIONS

Sub-DA1(d) BMP(s)							
If Sub-DA1(d) is connected to upstream subbasin(s), enter the nitrogen leaving the most upstream subbasin(lbs):							
Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft^3)	Provided Volume that will drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):							
Sub-DA1(e) BMP(s)							
If Sub-DA1(e) is connected to upstream subbasin(s), enter the nitrogen leaving the most upstream subbasin(lbs):							
Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft^3)	Provided Volume that will drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
				0%	0.00	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):							

DA2 BMP SUMMARY	
Total Volume Treated (ft^3)=	32,020
Nitrogen Mitigated(lbs)=	41.46
1-year, 24-hour storm	
Post BMP Volume of Runoff (ft^3)$_{(1\text{-}year)}$=	84,238
Post BMP Runoff (inches) = $Q^*_{(1\text{-}year)}$=	0.88
Post BMP $CN_{(1\text{-}year)}$=	75
Post BMP Peak Discharge (cfs)= $Q_{1\text{-}year}$=	4.480
2-year, 24-hour storm (LID)	
Post BMP Volume of Runoff (ft3)$_{(2\text{-}year)}$=	129,494
Post BMP Runoff (inches) = $Q^*_{(2\text{-}year)}$=	1.35
Post BMP $CN_{(2\text{-}year)}$=	76
Post BMP Peak Discharge (cfs)= $Q_{(2\text{-}year)}$=	
10-year, 24-hour storm (DIA)	
Post BMP Volume of Runoff (ft^3)$_{(10\text{-}year)}$=	119,743
Post BMP Runoff (inches) = $Q^*_{(10\text{-}year)}$=	1.24
Post BMP $CN_{(10\text{-}year)}$=	74
Post BMP Peak Discharge (cfs)= $Q_{(10\text{-}year)}$=	31.070

Project Name: Weavers Point Subdivision

DA SITE SUMMARY
BMP CALCULATIONS

BMP SUMMARY										
DRAINAGE AREA SUMMARIES										
DRAINAGE AREA:	DA1	DA2	DA3	DA4	DA5	DA6	DA7	DA8	DA9	DA10
Pre-Development (1-year, 24-hour storm)										
Runoff (in)=$Q^*_{1\text{-year}}$ =	0.63	0.63	0.63	0.63	0.63					
Peak Flow (cfs)=$Q_{1\text{-year}}$ =	10.050	9.564	1.458	4.942	2.484					
Post-Development (1-year, 24-hour storm)										
Target Curve Number (TCN) =	NA									
Post BMP Runoff (inches) = $Q^*_{(1\text{-year})}$=	0.83	0.88	1.37	1.13	1.19					
Post BMP Peak Discharge (cfs)= $Q_{1\text{-year}}$=	8.330	4.480								
Post BMP $CN_{(1\text{-year})}$=	75									
Post-BMP Nitrogen Loading										
TOTAL SITE NITROGEN MITIGATED (lbs)=	53.17									
SITE NITROGEN LOADING RATE (lbs/ac/yr)=	5.07									
TOTAL SITE NITROGEN LEFT TO MITIGATE_Wendell Only (lbs)=	**63.49**									

SCM #1 Drawdown Calculation

Calculate Skimmer Size					
Basin Volume in Cubic Feet	12,203	Cu.Ft	**Skimmer Size**	**2.5**	Inch
Days to Drain*	2	Days	Orifice Radius	**1.2**	Inch[es]
			Orifice Diameter	**2.5**	Inch[es]
*In NC assume 3 days to drain					

SCM #2 Drawdown Calculation

Calculate Skimmer Size					
Basin Volume in Cubic Feet	32,020	Cu.Ft	**Skimmer Size**	**4.0**	Inch
Days to Drain*	2	Days	Orifice Radius	**1.8**	Inch[es]
			Orifice Diameter	**3.6**	Inch[es]
*In NC assume 3 days to drain					

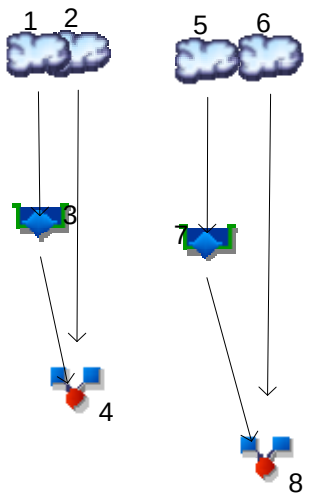
PLD

Appendix C
Stormwater Routing CALCS

PLD

Watershed Model Schematic

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



Legend

Hyd.	Origin	Description
1	SCS Runoff	DP #1 Post-Dev to SCM
2	SCS Runoff	DP #1 Post-Development Bypass
3	Reservoir	SCM 1
4	Combine	DP #1 - Total Post-Dev Flow
5	SCS Runoff	DP #2 Post-Dev to SCM
6	SCS Runoff	DP #2 Post-Dev Bypass
7	Reservoir	SCM #2
8	Combine	DP #2 Total Post-Dev Flow

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 — Friday, 04 / 12 / 2024

Pond No. 1 - SCM 1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 354.00 ft

Required Surface Area of 2,849 sf is exceeded

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	354.00	6,334	0	0
1.00	355.00	7,325	6,823	6,823
1.70	355.70	8,053	5,380	12,203
2.00	356.00	8,373	2,463	14,666
3.00	357.00	9,477	8,918	23,584
4.00	358.00	10,638	10,051	33,635
5.00	359.00	11,827	11,226	44,862

12,203 cf provided at 355.70 (11,344 cf required)

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	2.50	12.00	0.00
Span (in)	= 24.00	2.50	25.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 353.90	354.00	355.70	0.00
Length (ft)	= 53.00	0.00	0.00	0.00
Slope (%)	= 0.05	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

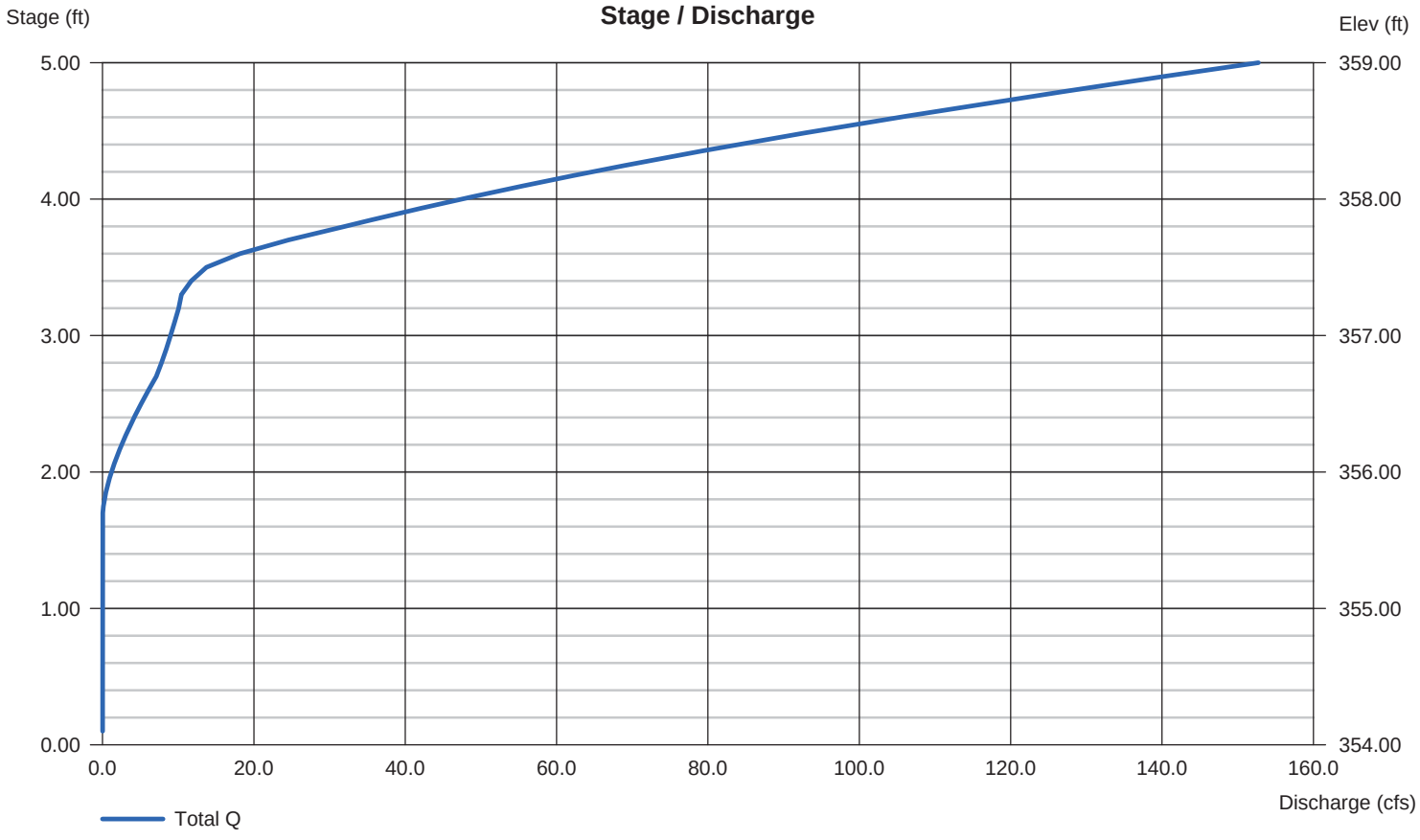
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	20.00	Inactive	Inactive
Crest El. (ft)	= 357.30	357.50	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

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

TW Elev. (ft) = 0.00

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



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 — Friday, 01 / 26 / 2024

Pond No. 2 - SCM 2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 354.00 ft

Required surface area of 10,102 sf is exceeded

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	354.00	23,389	0	0
1.00	355.00	25,309	24,340	24,340
1.30	355.30	25,896	7,680	32,020
2.00	356.00	27,285	18,609	50,629
3.00	357.00	29,318	28,293	78,922
4.00	358.00	31,408	30,354	109,276
5.00	359.00	33,554	32,472	141,748
6.00	360.00	35,757	34,646	176,394

32,020 cf provided at 355.30 (28,986 cf required)

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 30.00	3.60	12.00	0.00
Span (in)	= 30.00	3.60	25.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 354.00	354.00	355.30	0.00
Length (ft)	= 48.00	0.00	0.00	0.00
Slope (%)	= 0.05	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)	= 12.00	31.00	Inactive	Inactive
Crest El. (ft)	= 358.00	358.30	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

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

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

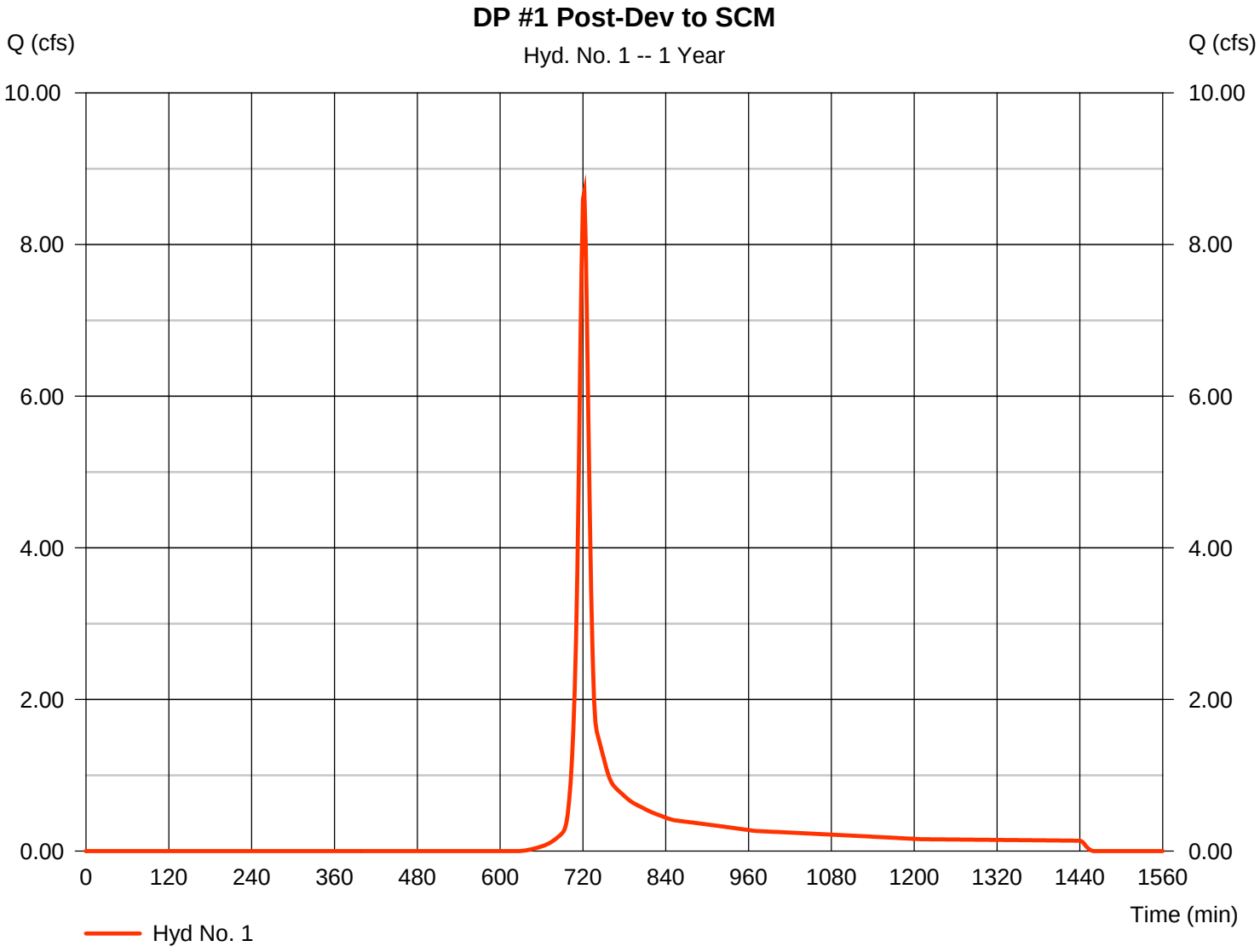
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	354.00	0.00	0.00	0.00	---	0.00	0.00	---	---	---	---	0.000
1.00	24,340	355.00	0.10 oc	0.09 ic	0.00	---	0.00	0.00	---	---	---	---	0.095
1.30	32,020	355.30	0.11 oc	0.11 ic	0.00	---	0.00	0.00	---	---	---	---	0.110
2.00	50,629	356.00	3.47 oc	0.05 ic	3.41 ic	---	0.00	0.00	---	---	---	---	3.459
3.00	78,922	357.00	6.92 oc	0.07 ic	6.85 ic	---	0.00	0.00	---	---	---	---	6.920
4.00	109,276	358.00	11.80 oc	0.12 ic	11.68 ic	---	0.00	0.00	---	---	---	---	11.80
5.00	141,748	359.00	40.93 oc	0.07 ic	7.09 ic	---	33.77 s	60.46	---	---	---	---	101.39
6.00	176,394	360.00	50.75 ic	0.04 ic	3.74 ic	---	46.97 s	228.81	---	---	---	---	279.55

Hydrograph Report

Hyd. No. 1

DP #1 Post-Dev to SCM

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.693 cfs
Storm frequency	=	1 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	22,984 cuft
Drainage area	=	6.000 ac	Curve number	=	78
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	11.00 min
Total precip.	=	2.85 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



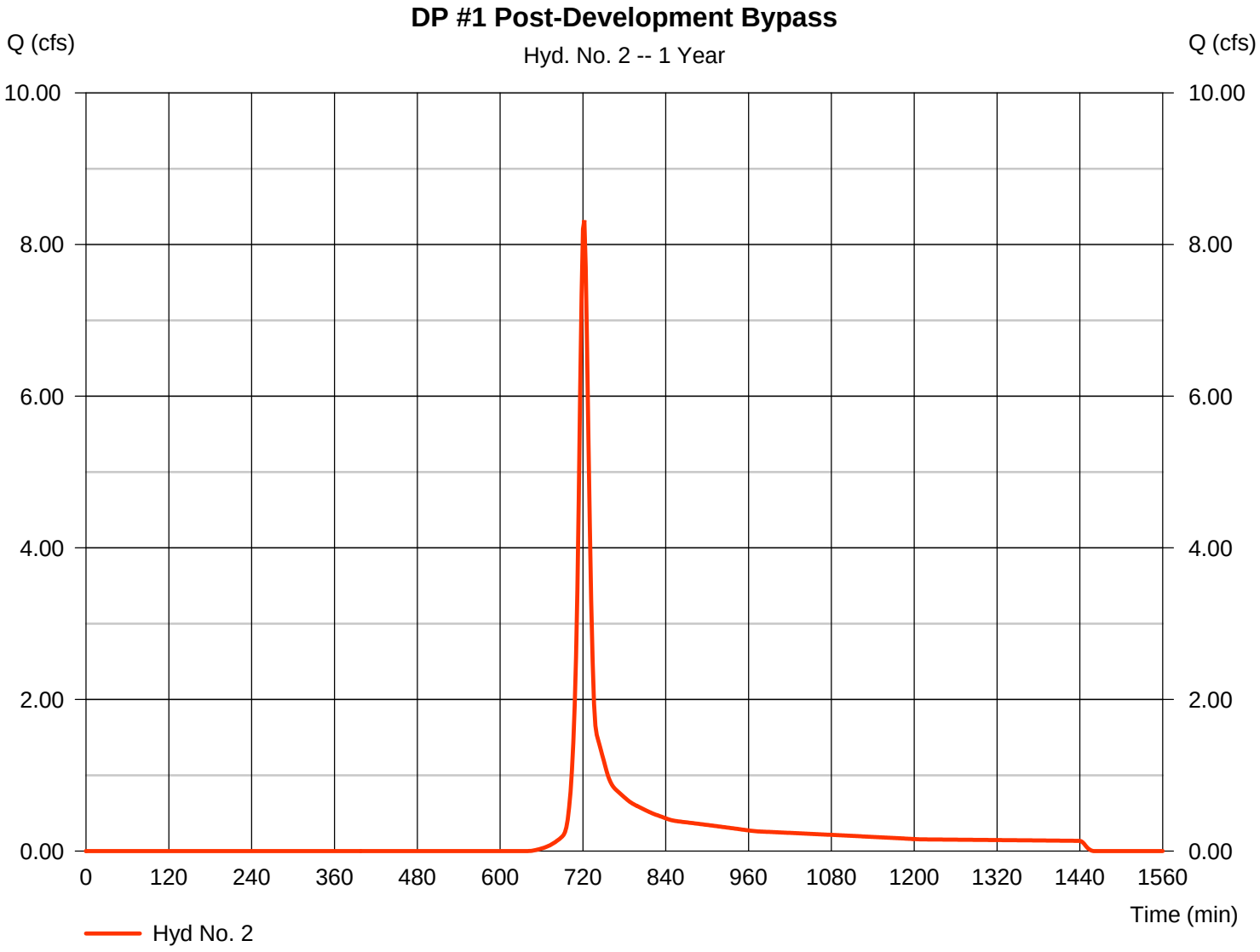
Hydrograph Report

Hyd. No. 2

DP #1 Post-Development Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.319 cfs
Storm frequency	=	1 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	22,114 cuft
Drainage area	=	6.100 ac	Curve number	=	77*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	10.80 min
Total precip.	=	2.85 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(5.400 x 74) + (0.700 x 98)] / 6.100



Hydrograph Report

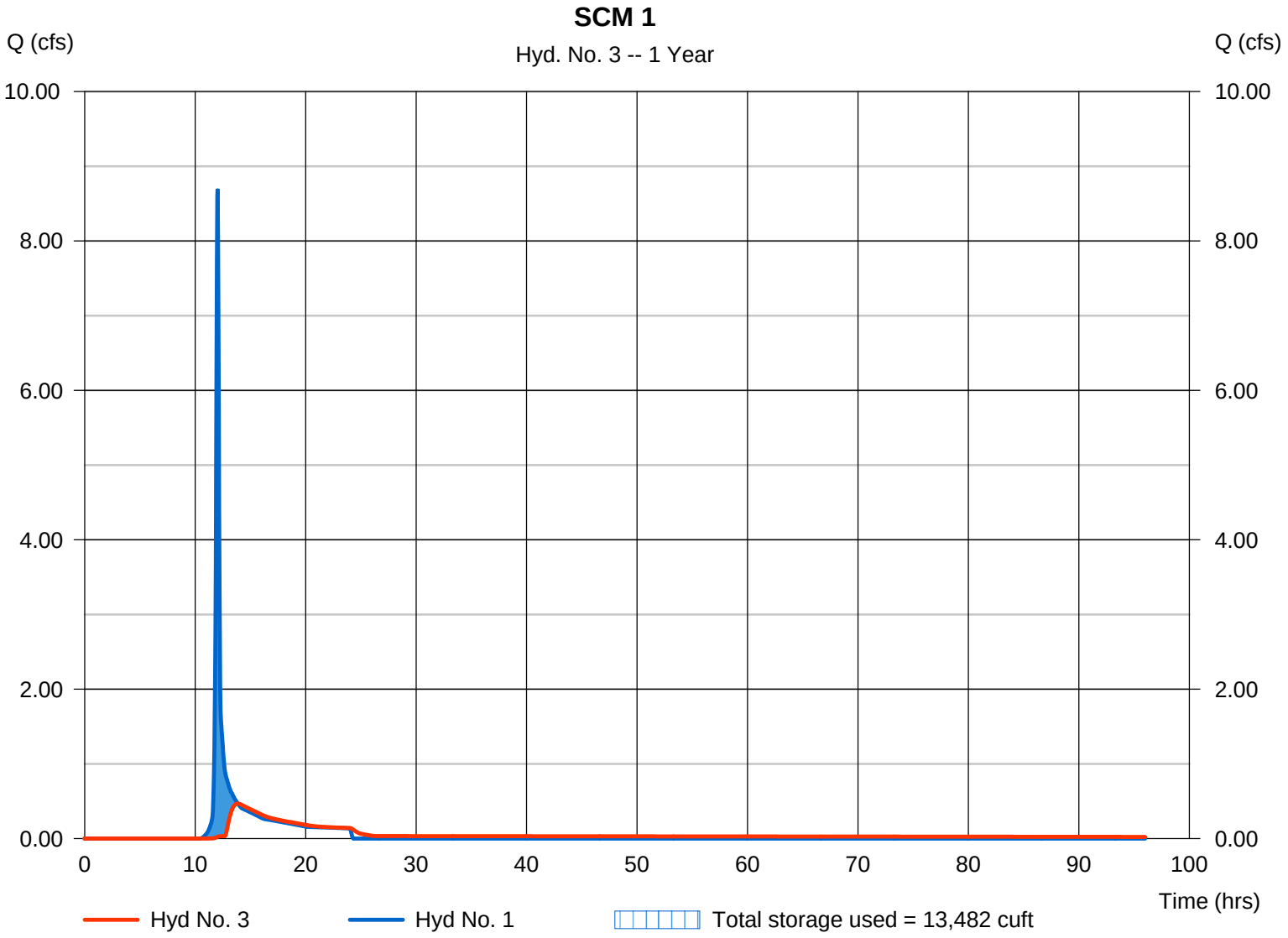
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 04 / 12 / 2024

Hyd. No. 3

SCM 1

Hydrograph type	=	Reservoir	Peak discharge	=	0.469 cfs
Storm frequency	=	1 yrs	Time to peak	=	13.87 hrs
Time interval	=	2 min	Hyd. volume	=	17,847 cuft
Inflow hyd. No.	=	1 - DP #1 Post-Dev to SCM	Max. Elevation	=	355.86 ft
Reservoir name	=	SCM 1	Max. Storage	=	13,482 cuft

Storage Indication method used.



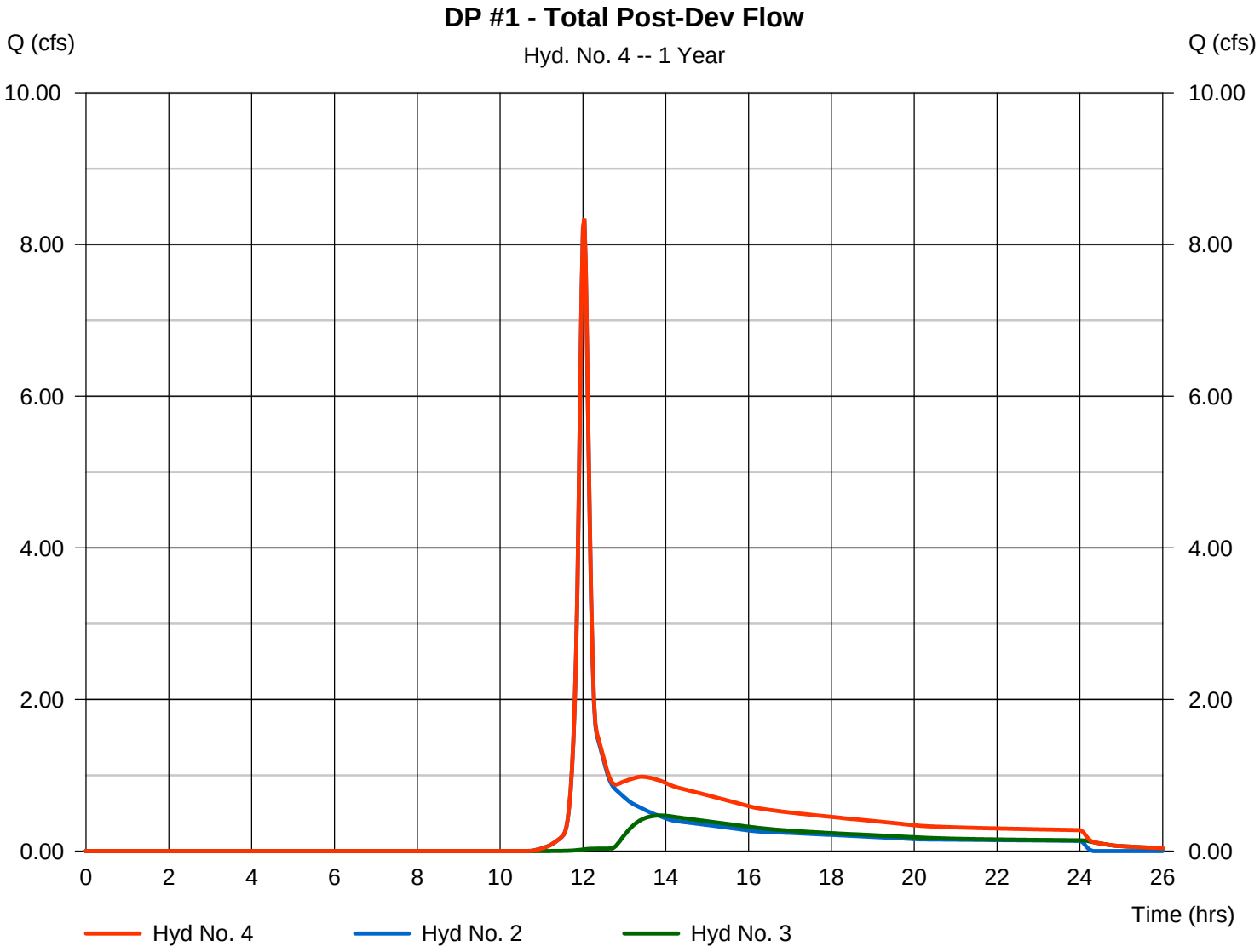
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 04 / 12 / 2024

Hyd. No. 4

DP #1 - Total Post-Dev Flow

Hydrograph type	= Combine	Peak discharge	= 8.343 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 39,961 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 6.100 ac

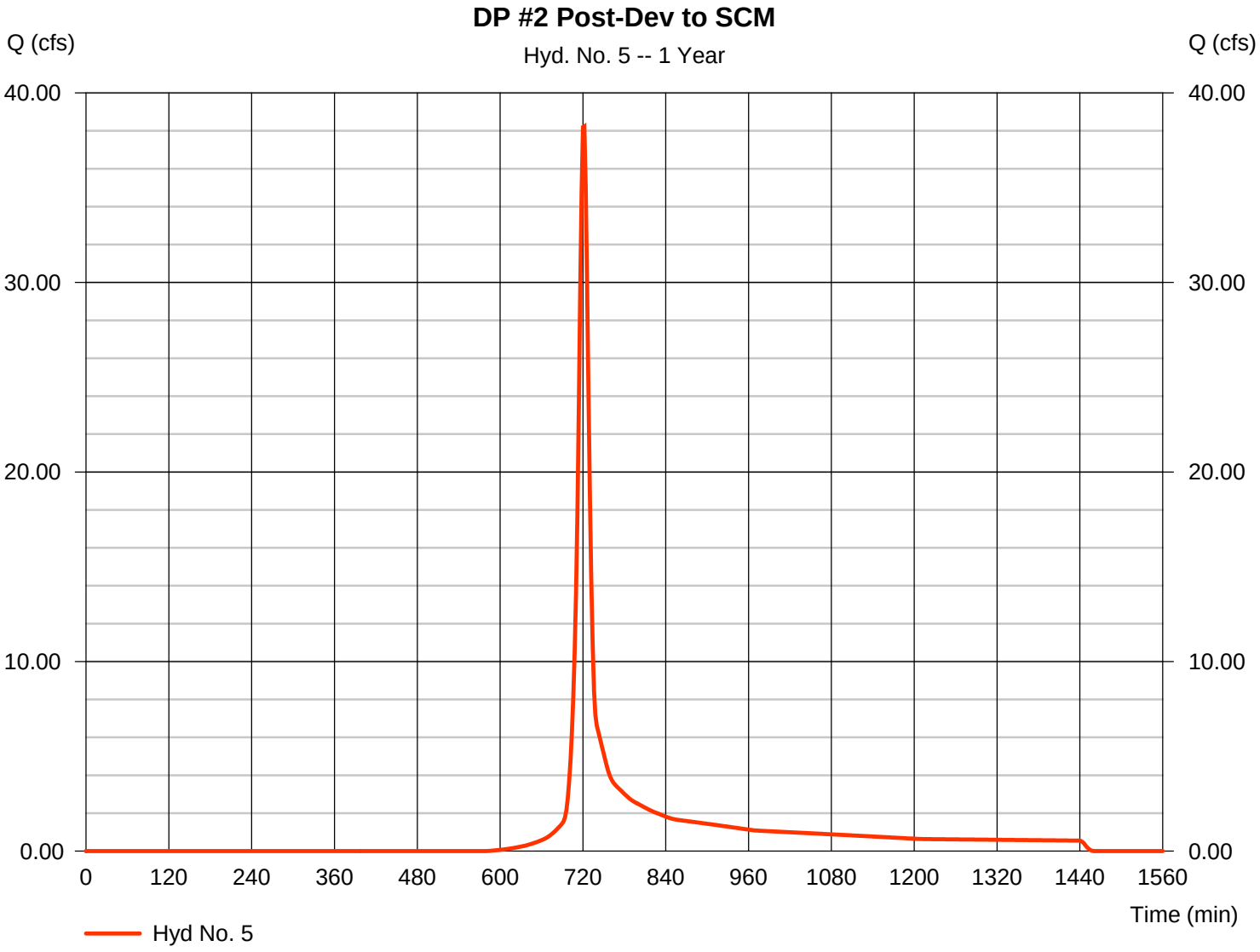


Hydrograph Report

Hyd. No. 5

DP #2 Post-Dev to SCM

Hydrograph type	= SCS Runoff	Peak discharge	= 38.24 cfs
Storm frequency	= 1 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 100,115 cuft
Drainage area	= 22.300 ac	Curve number	= 81
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 13.00 min
Total precip.	= 2.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



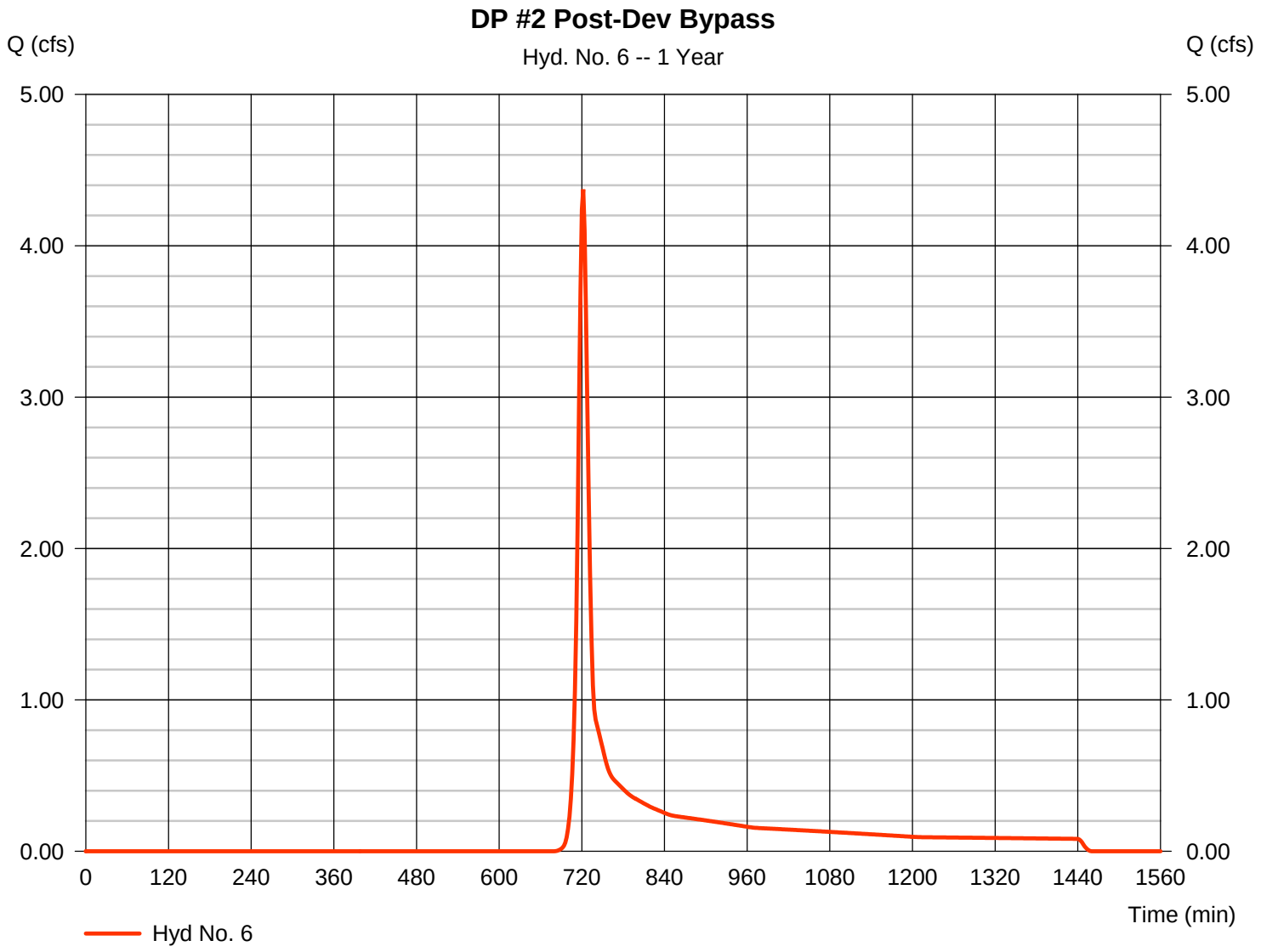
Hydrograph Report

Hyd. No. 6

DP #2 Post-Dev Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.373 cfs
Storm frequency	=	1 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	12,053 cuft
Drainage area	=	4.200 ac	Curve number	=	73*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.70 min
Total precip.	=	2.85 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(3.700 x 70) + (0.500 x 98)] / 4.200



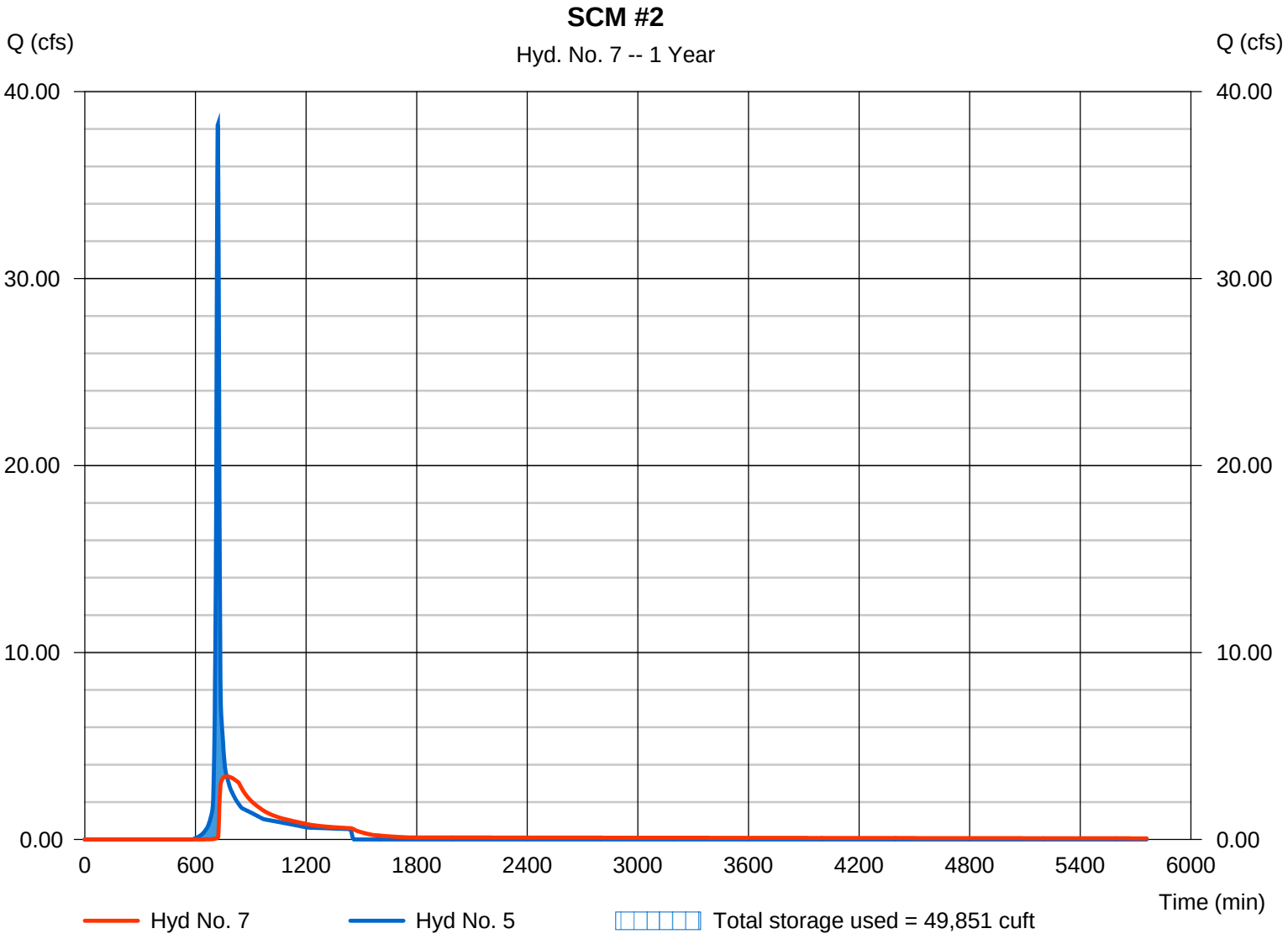
Hydrograph Report

Hyd. No. 7

SCM #2

Hydrograph type	=	Reservoir	Peak discharge	=	3.374 cfs
Storm frequency	=	1 yrs	Time to peak	=	770 min
Time interval	=	2 min	Hyd. volume	=	88,619 cuft
Inflow hyd. No.	=	5 - DP #2 Post-Dev to SCM	Max. Elevation	=	355.97 ft
Reservoir name	=	SCM 2	Max. Storage	=	49,851 cuft

Storage Indication method used.



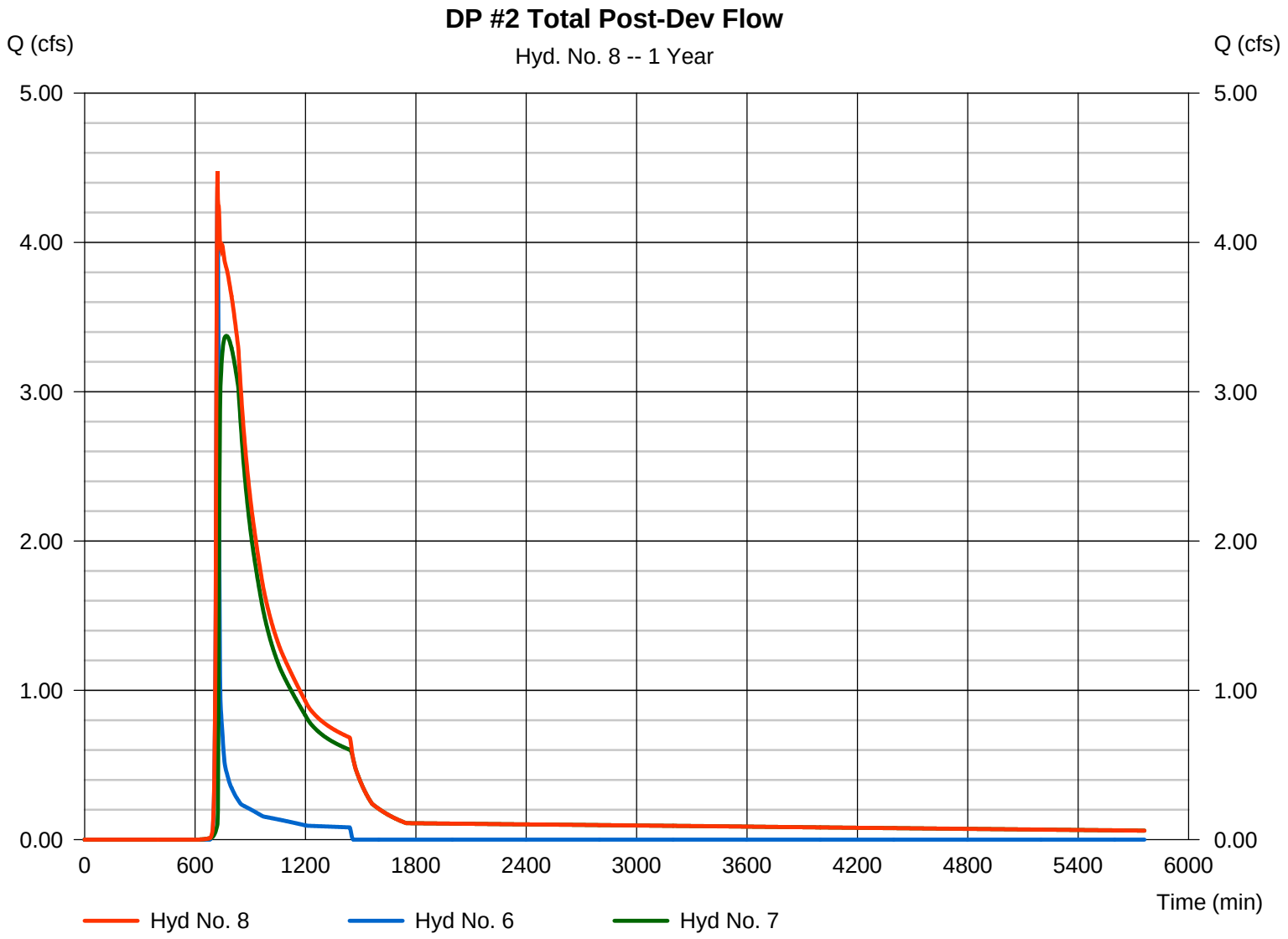
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 01 / 26 / 2024

Hyd. No. 8

DP #2 Total Post-Dev Flow

Hydrograph type	= Combine	Peak discharge	= 4.477 cfs
Storm frequency	= 1 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 100,672 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 4.200 ac

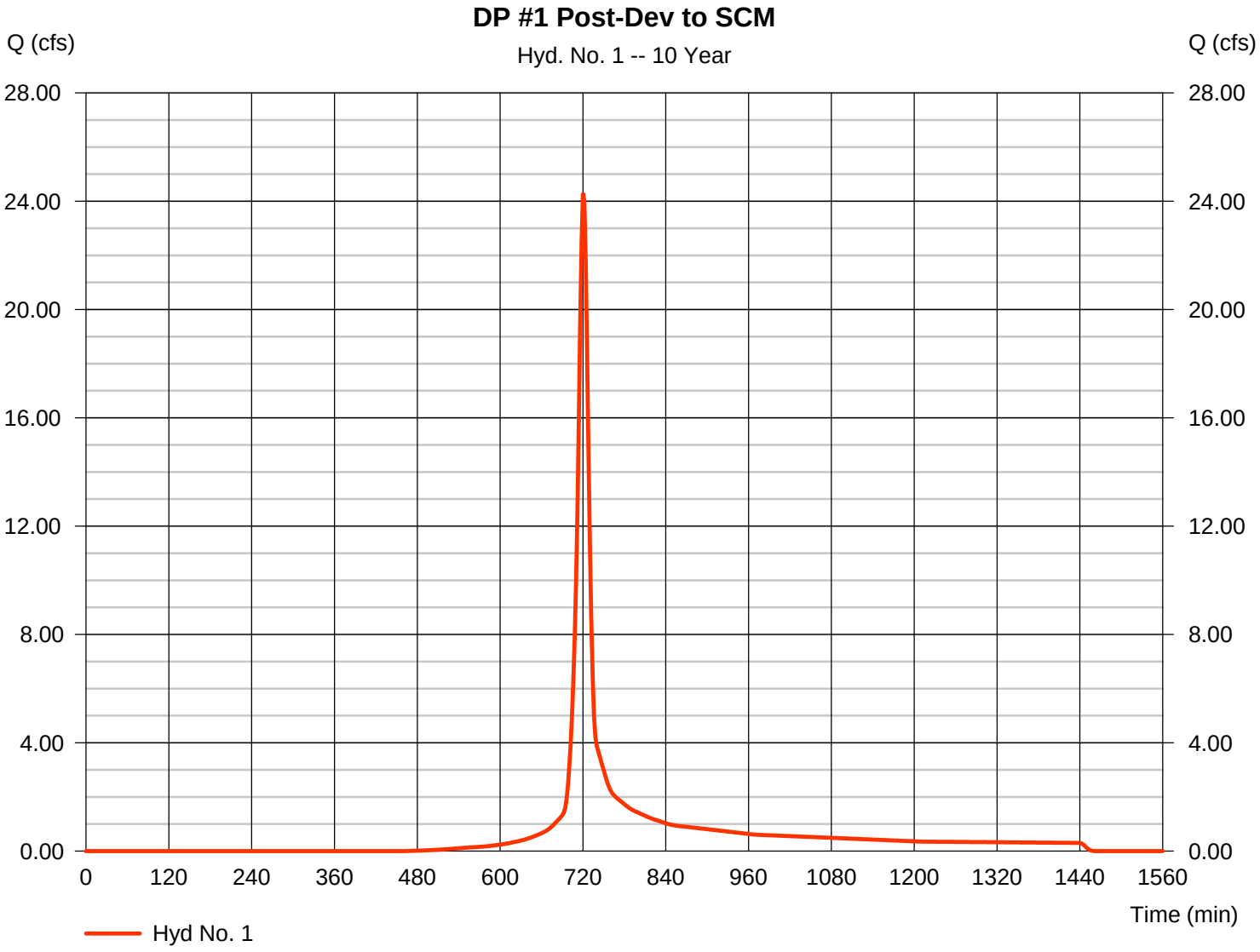


Hydrograph Report

Hyd. No. 1

DP #1 Post-Dev to SCM

Hydrograph type	= SCS Runoff	Peak discharge	= 24.30 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 63,009 cuft
Drainage area	= 6.000 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 11.00 min
Total precip.	= 5.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

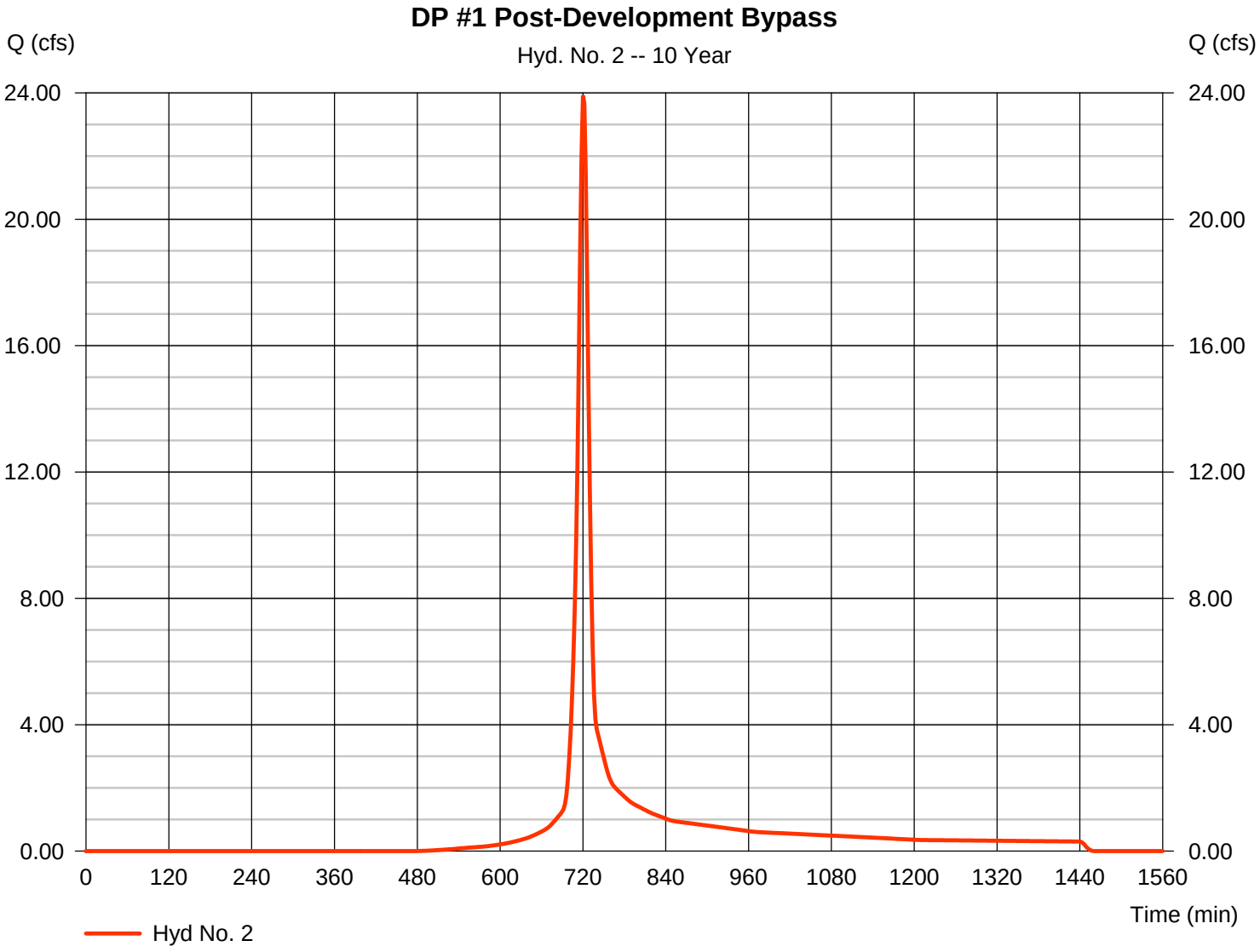
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 01 / 26 / 2024

Hyd. No. 2

DP #1 Post-Development Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	23.92 cfs
Storm frequency	=	10 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	62,003 cuft
Drainage area	=	6.100 ac	Curve number	=	77*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	10.80 min
Total precip.	=	5.11 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(5.400 x 74) + (0.700 x 98)] / 6.100



Hydrograph Report

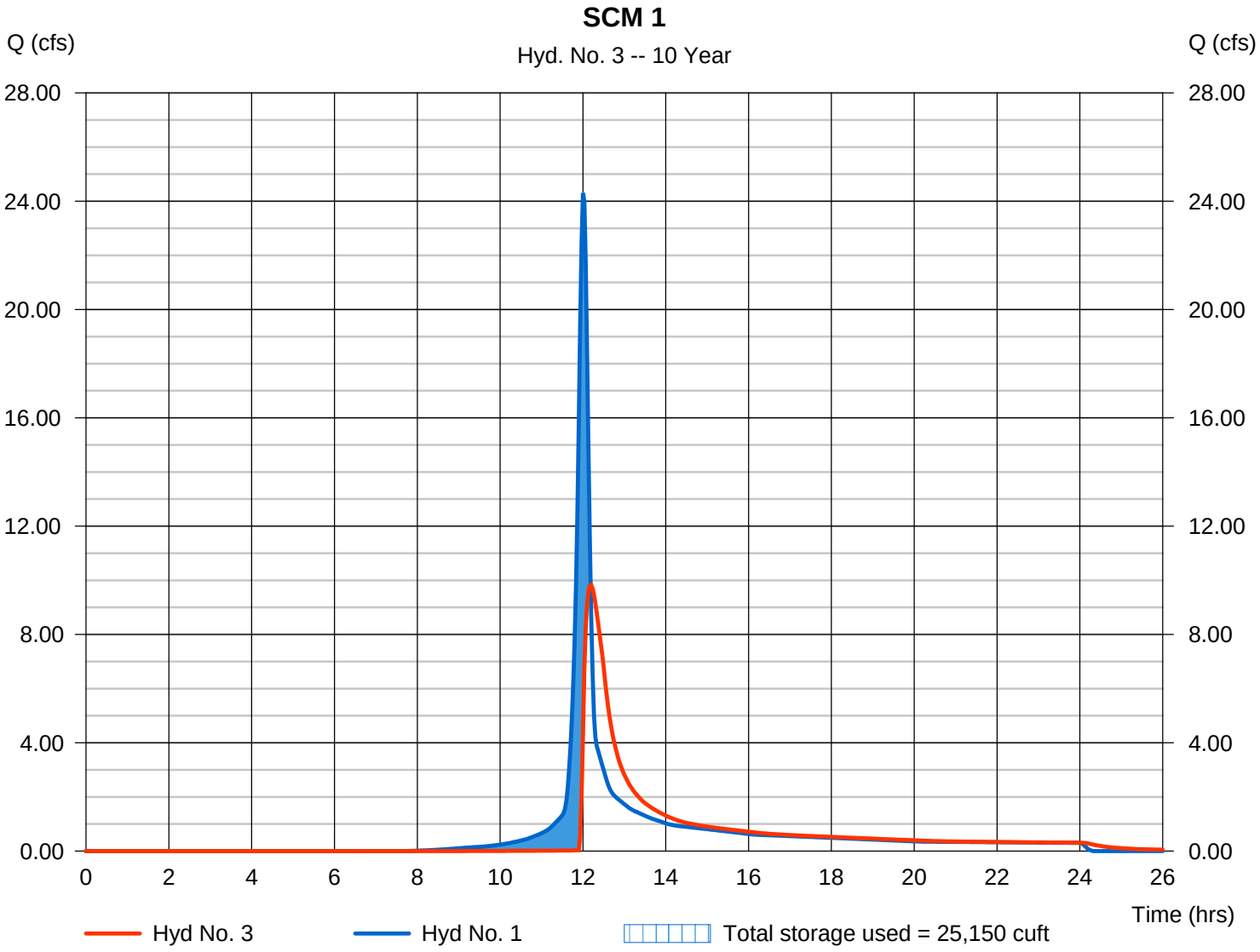
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 04 / 12 / 2024

Hyd. No. 3

SCM 1

Hydrograph type	=	Reservoir	Peak discharge	=	9.827 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.20 hrs
Time interval	=	2 min	Hyd. volume	=	57,826 cuft
Inflow hyd. No.	=	1 - DP #1 Post-Dev to SCM	Max. Elevation	=	357.16 ft
Reservoir name	=	SCM 1	Max. Storage	=	25,150 cuft

Storage Indication method used.



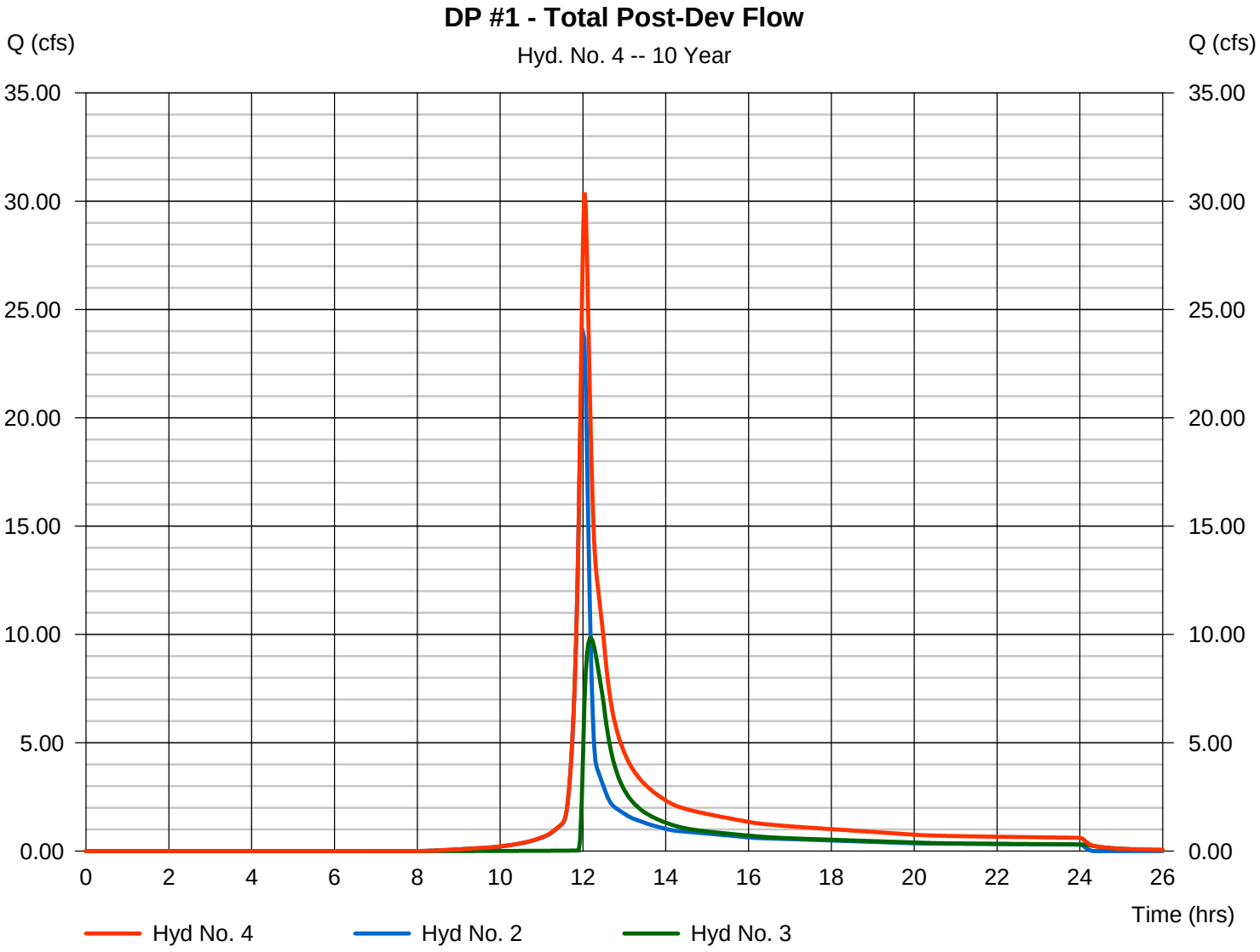
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 04 / 12 / 2024

Hyd. No. 4

DP #1 - Total Post-Dev Flow

Hydrograph type	=	Combine	Peak discharge	=	30.41 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	119,830 cuft
Inflow hyds.	=	2, 3	Contrib. drain. area	=	6.100 ac

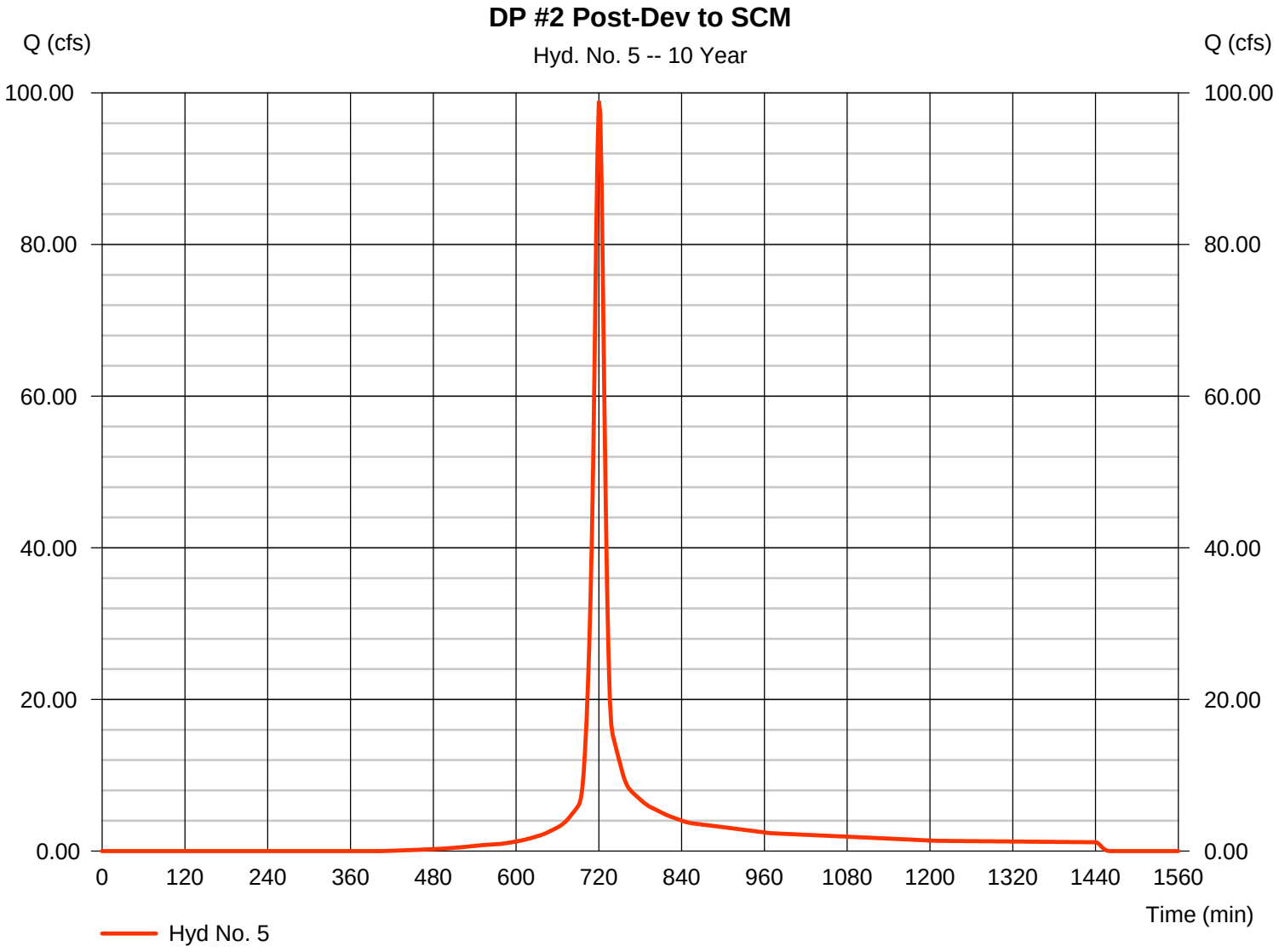


Hydrograph Report

Hyd. No. 5

DP #2 Post-Dev to SCM

Hydrograph type	= SCS Runoff	Peak discharge	= 98.92 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 257,342 cuft
Drainage area	= 22.300 ac	Curve number	= 81
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 13.00 min
Total precip.	= 5.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



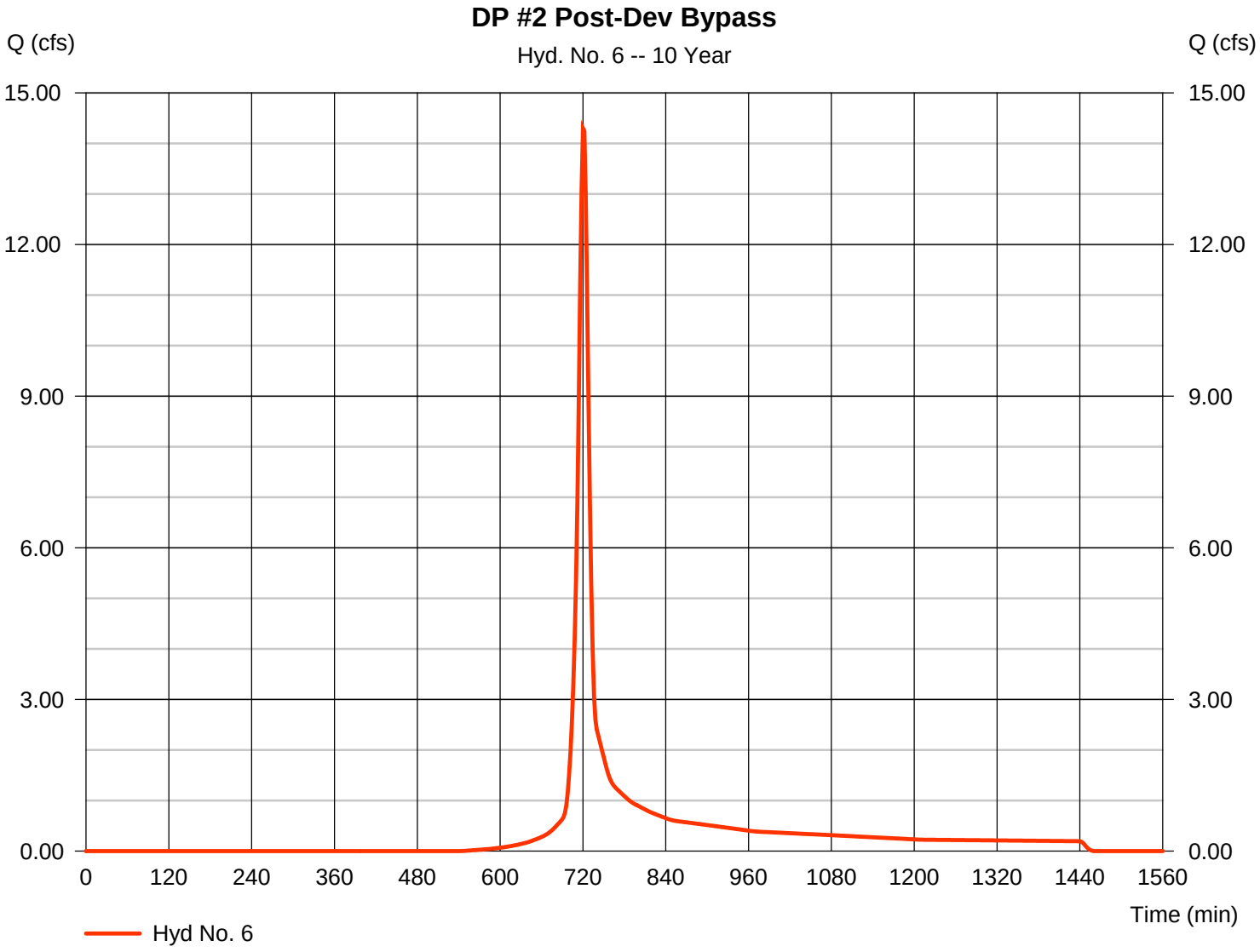
Hydrograph Report

Hyd. No. 6

DP #2 Post-Dev Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	14.30 cfs
Storm frequency	=	10 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	37,215 cuft
Drainage area	=	4.200 ac	Curve number	=	73*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.70 min
Total precip.	=	5.11 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(3.700 x 70) + (0.500 x 98)] / 4.200



Hydrograph Report

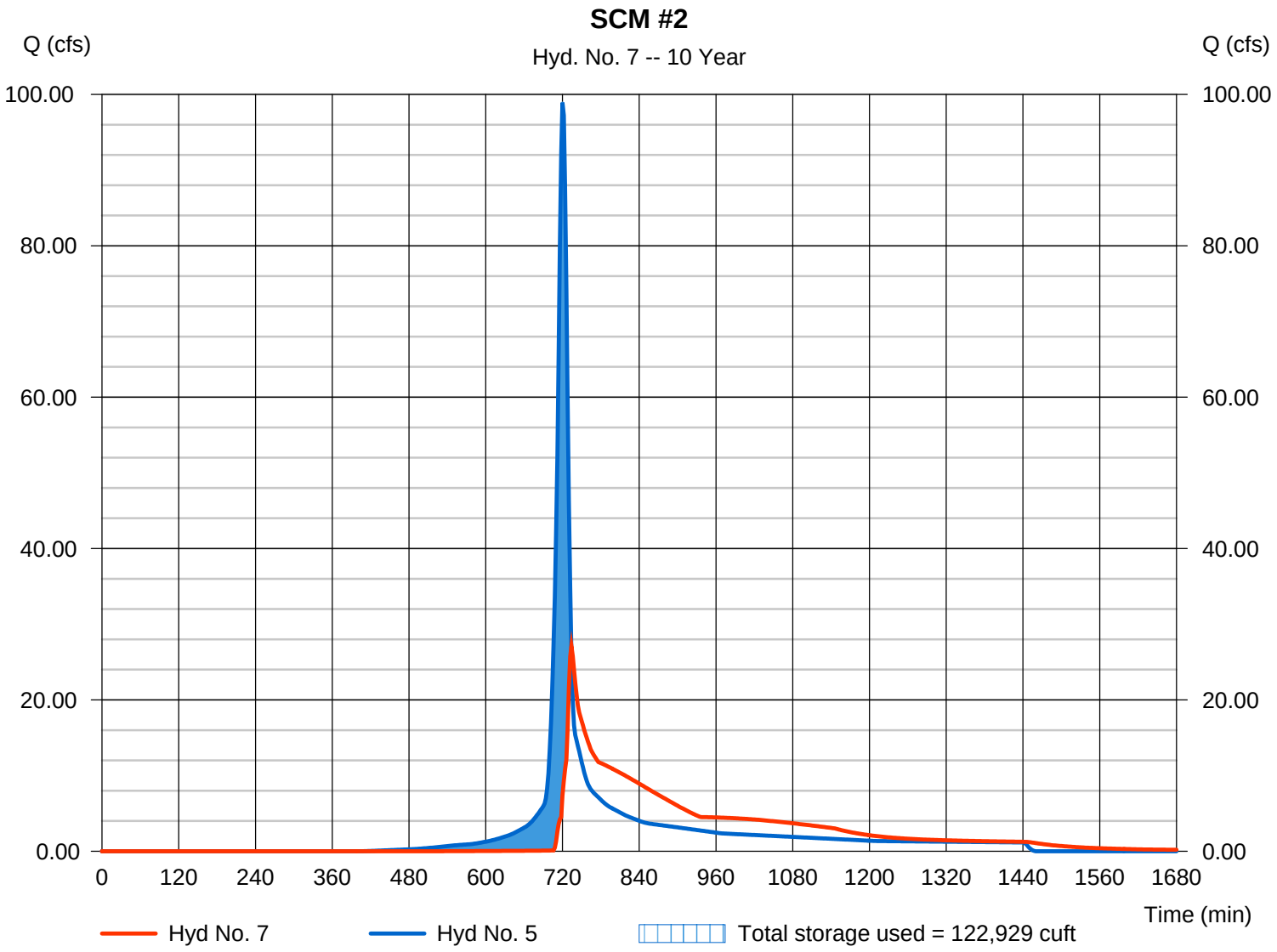
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 01 / 26 / 2024

Hyd. No. 7

SCM #2

Hydrograph type	=	Reservoir	Peak discharge	=	27.08 cfs
Storm frequency	=	10 yrs	Time to peak	=	734 min
Time interval	=	2 min	Hyd. volume	=	245,606 cuft
Inflow hyd. No.	=	5 - DP #2 Post-Dev to SCM	Max. Elevation	=	358.42 ft
Reservoir name	=	SCM 2	Max. Storage	=	122,929 cuft

Storage Indication method used.

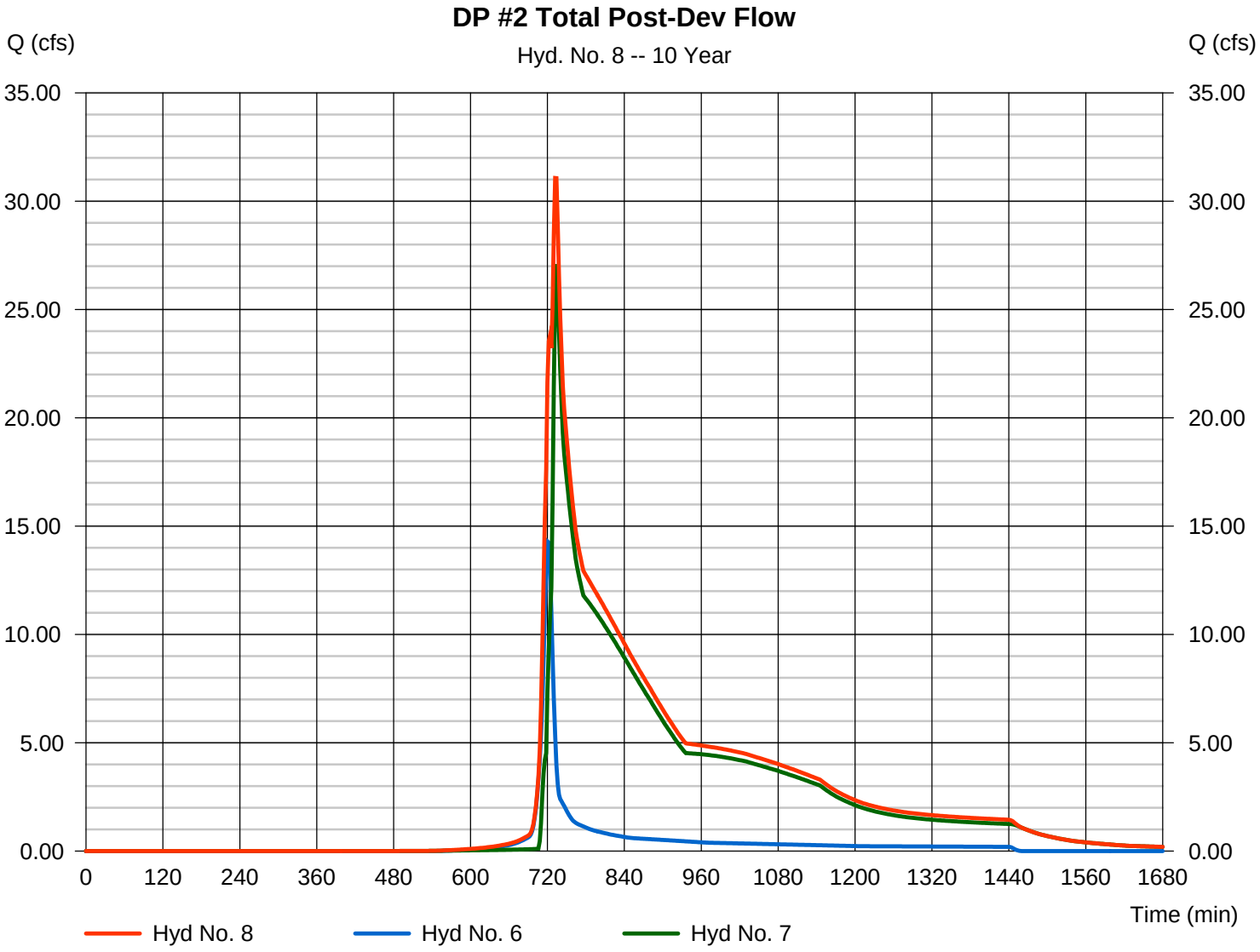


Hydrograph Report

Hyd. No. 8

DP #2 Total Post-Dev Flow

Hydrograph type	=	Combine	Peak discharge	=	31.07 cfs
Storm frequency	=	10 yrs	Time to peak	=	732 min
Time interval	=	2 min	Hyd. volume	=	282,821 cuft
Inflow hyds.	=	6, 7	Contrib. drain. area	=	4.200 ac

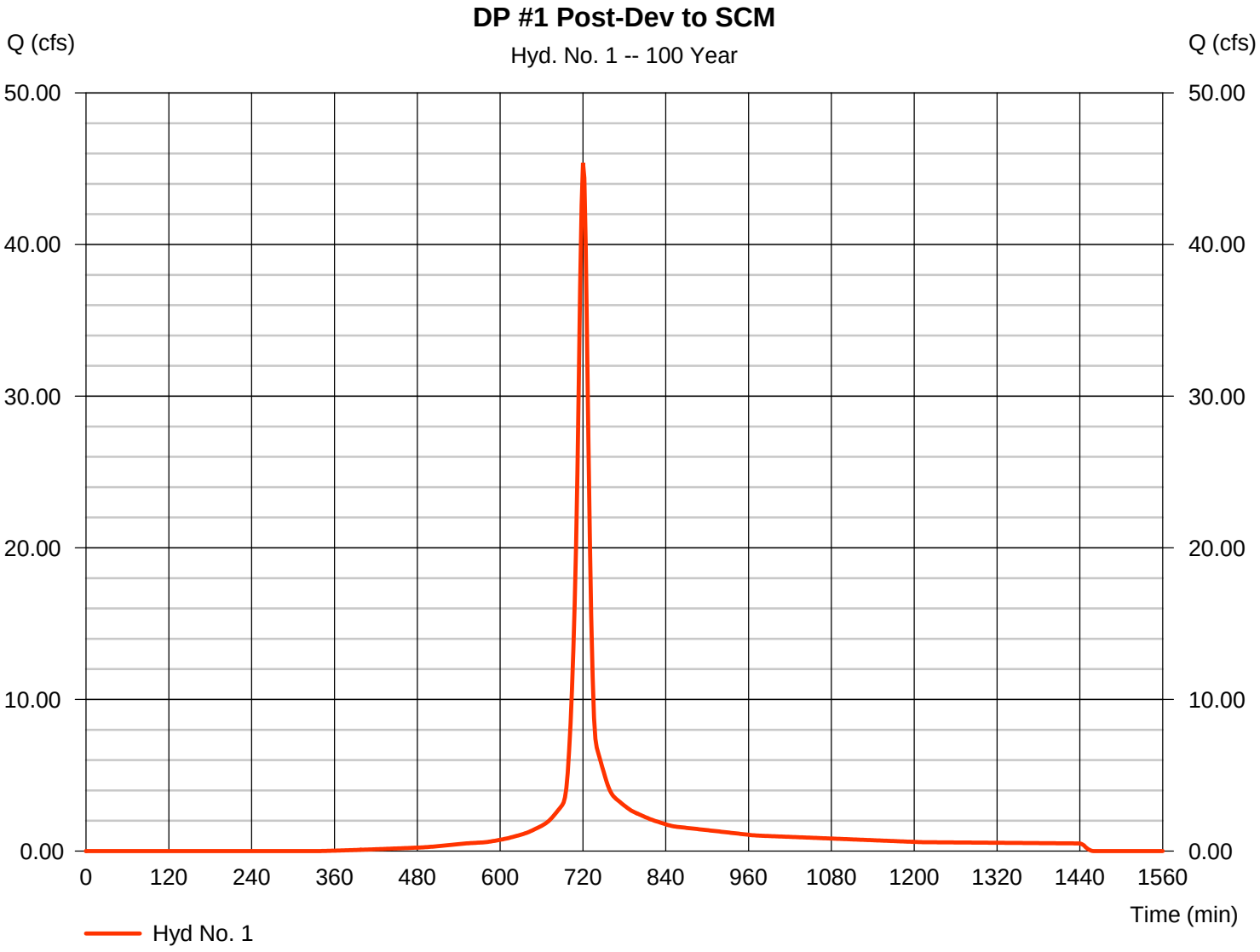


Hydrograph Report

Hyd. No. 1

DP #1 Post-Dev to SCM

Hydrograph type	=	SCS Runoff	Peak discharge	=	45.38 cfs
Storm frequency	=	100 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	119,219 cuft
Drainage area	=	6.000 ac	Curve number	=	78
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	11.00 min
Total precip.	=	7.91 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



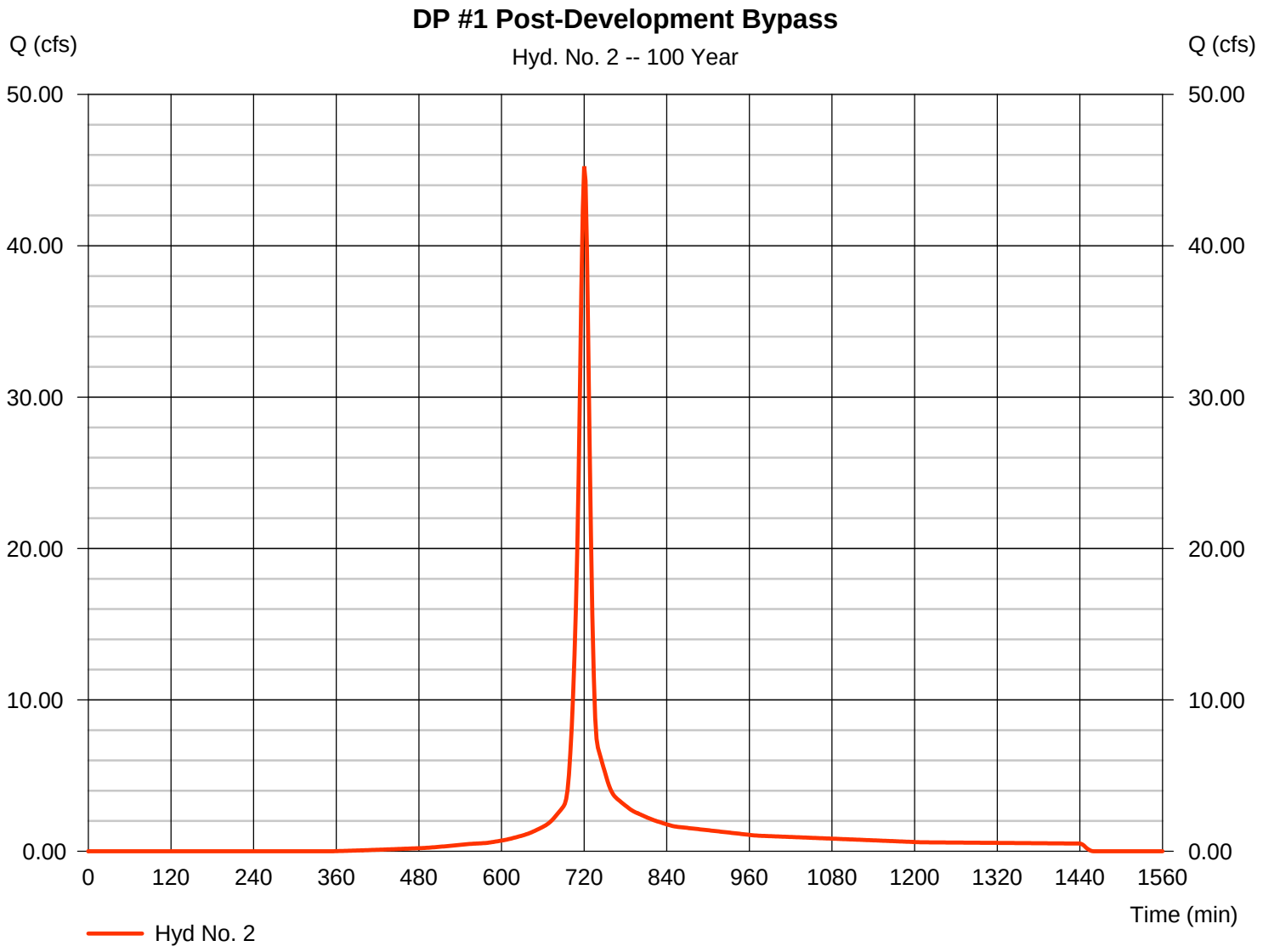
Hydrograph Report

Hyd. No. 2

DP #1 Post-Development Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	45.25 cfs
Storm frequency	=	100 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	118,556 cuft
Drainage area	=	6.100 ac	Curve number	=	77*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	10.80 min
Total precip.	=	7.91 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(5.400 x 74) + (0.700 x 98)] / 6.100



Hydrograph Report

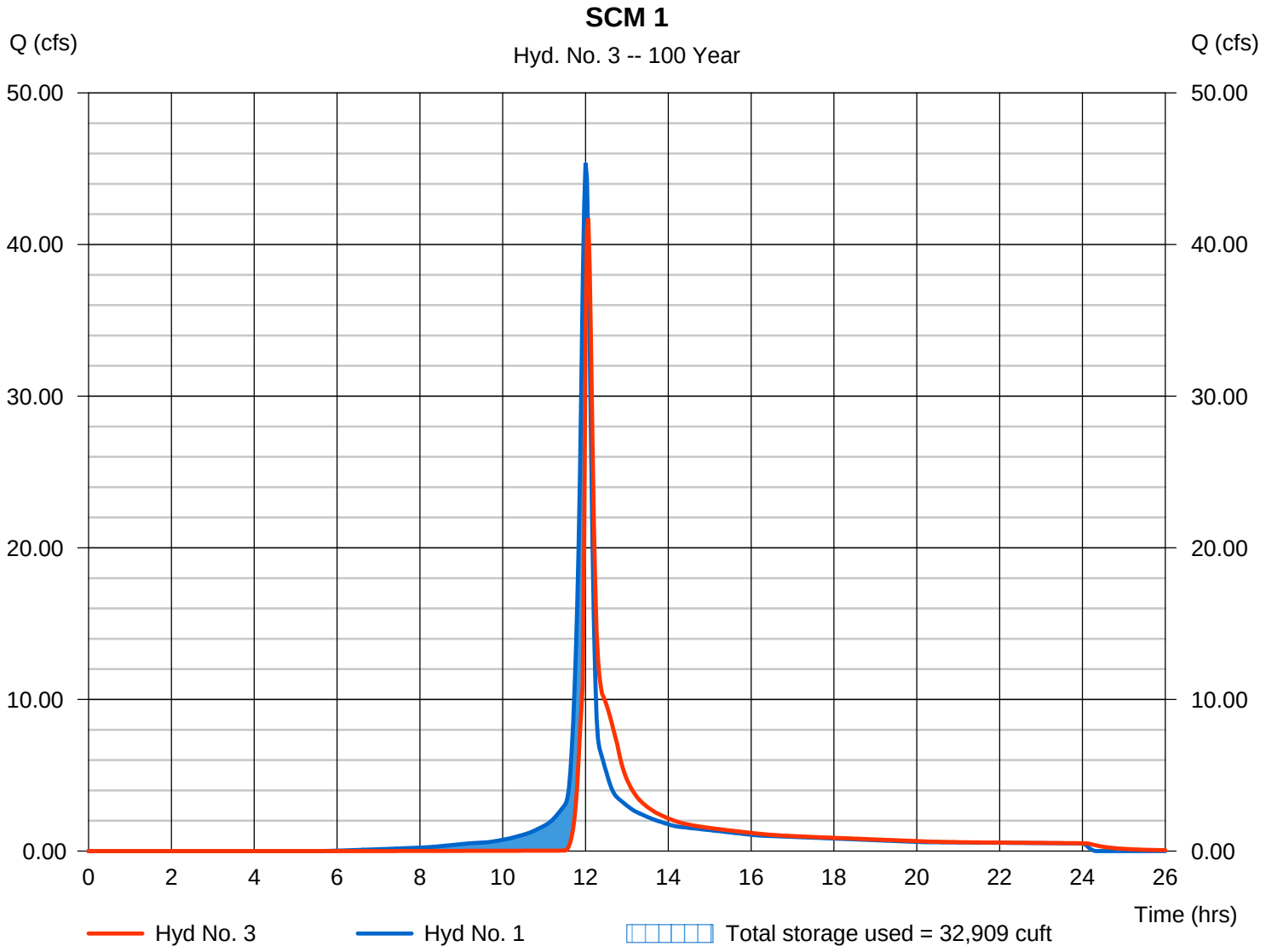
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 04 / 12 / 2024

Hyd. No. 3

SCM 1

Hydrograph type	=	Reservoir	Peak discharge	=	41.71 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.07 hrs
Time interval	=	2 min	Hyd. volume	=	114,012 cuft
Inflow hyd. No.	=	1 - DP #1 Post-Dev to SCM	Max. Elevation	=	357.94 ft
Reservoir name	=	SCM 1	Max. Storage	=	32,909 cuft

Storage Indication method used.

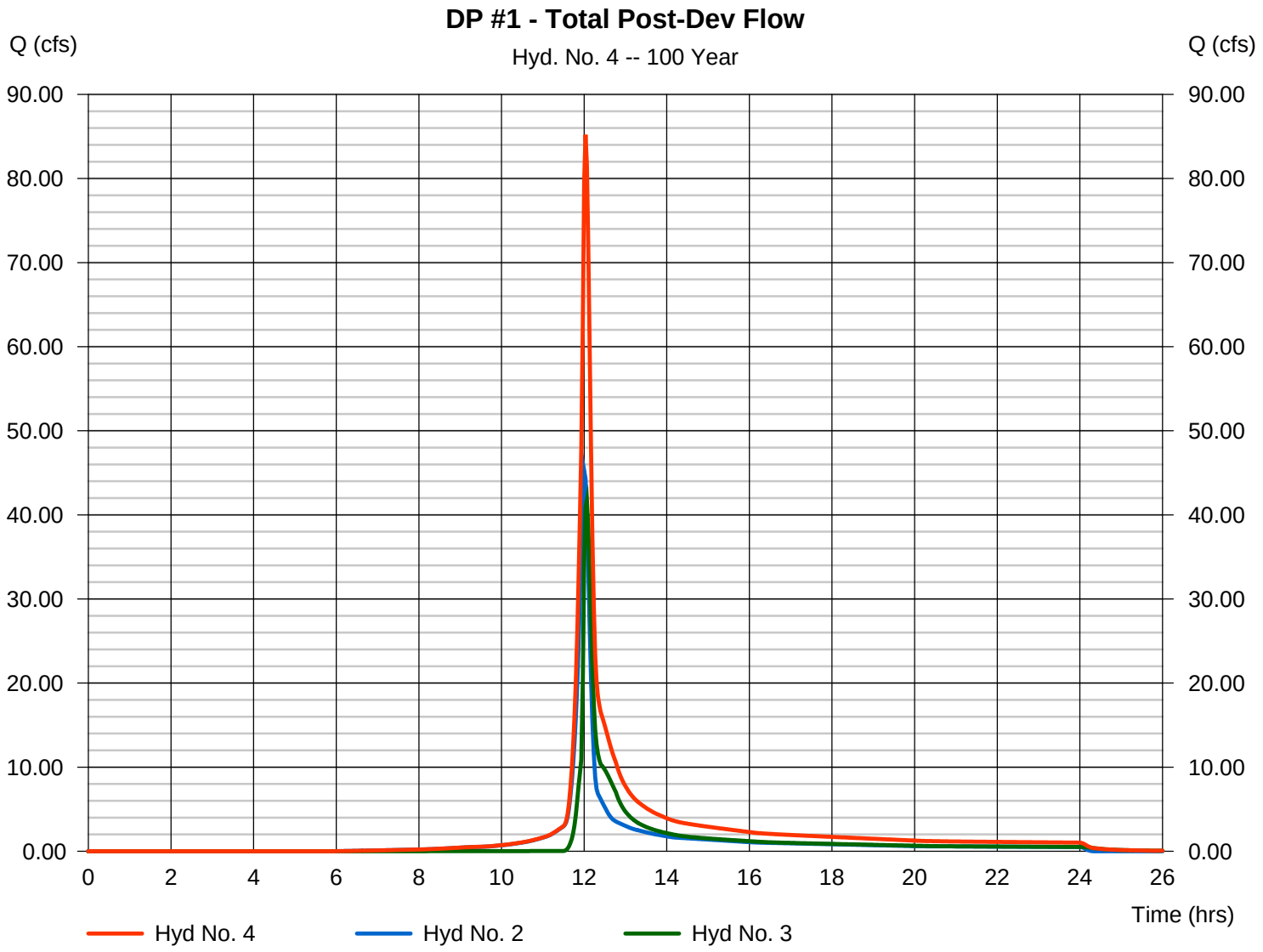


Hydrograph Report

Hyd. No. 4

DP #1 - Total Post-Dev Flow

Hydrograph type	=	Combine	Peak discharge	=	85.20 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	232,568 cuft
Inflow hyds.	=	2, 3	Contrib. drain. area	=	6.100 ac

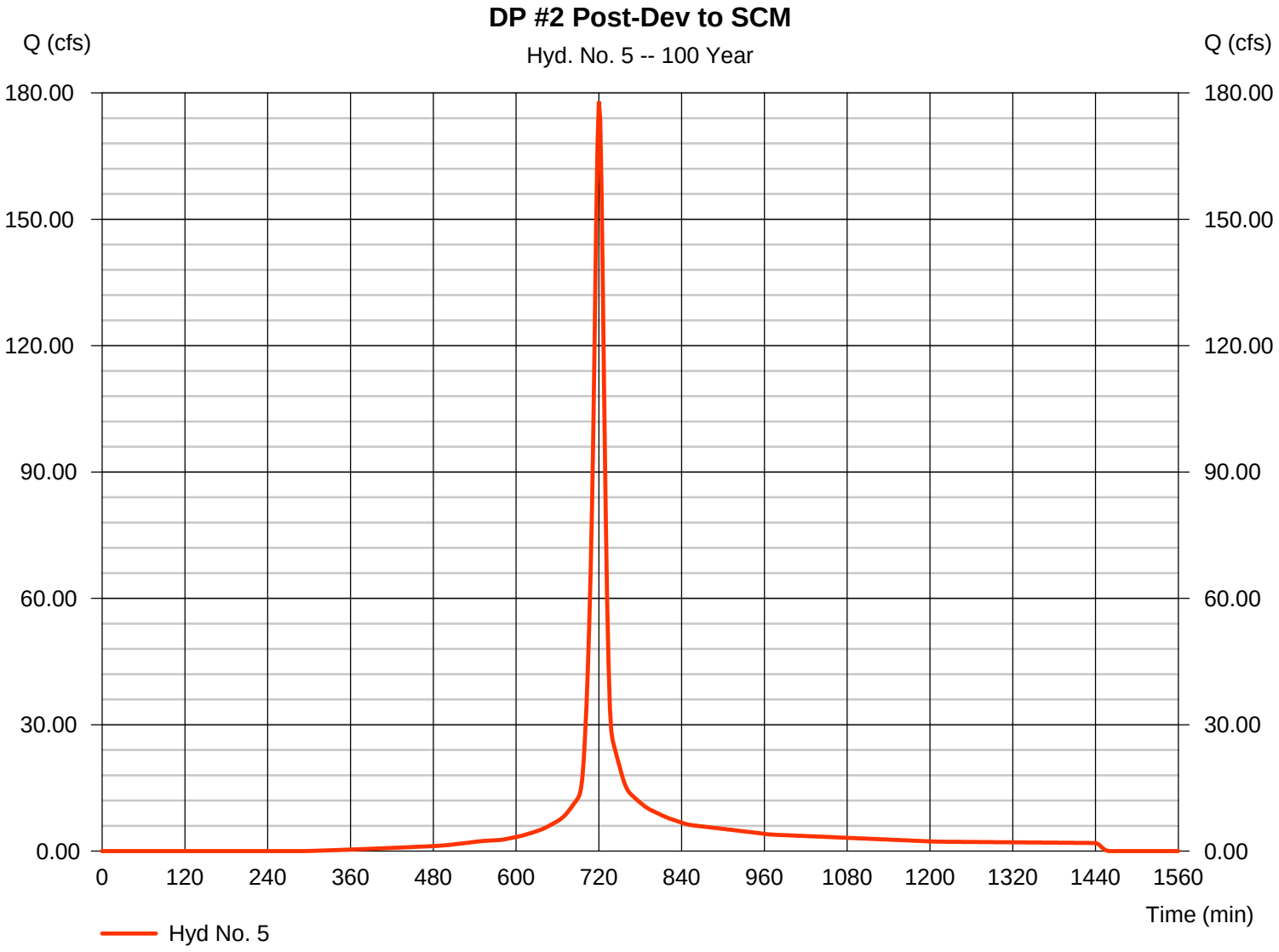


Hydrograph Report

Hyd. No. 5

DP #2 Post-Dev to SCM

Hydrograph type	=	SCS Runoff	Peak discharge	=	178.01 cfs
Storm frequency	=	100 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	472,273 cuft
Drainage area	=	22.300 ac	Curve number	=	81
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	13.00 min
Total precip.	=	7.91 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

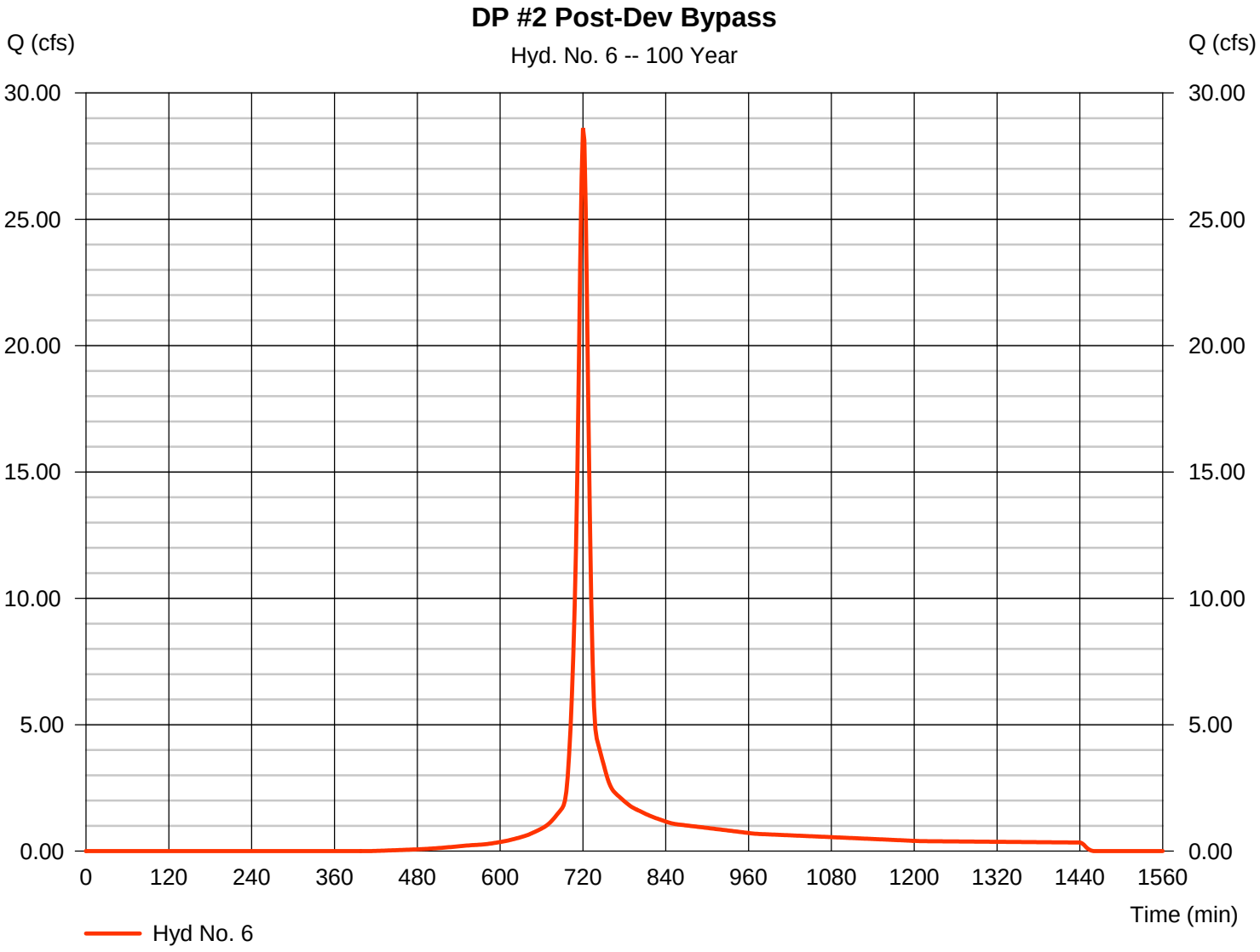
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 01 / 26 / 2024

Hyd. No. 6

DP #2 Post-Dev Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	28.60 cfs
Storm frequency	=	100 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	74,371 cuft
Drainage area	=	4.200 ac	Curve number	=	73*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.70 min
Total precip.	=	7.91 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(3.700 x 70) + (0.500 x 98)] / 4.200



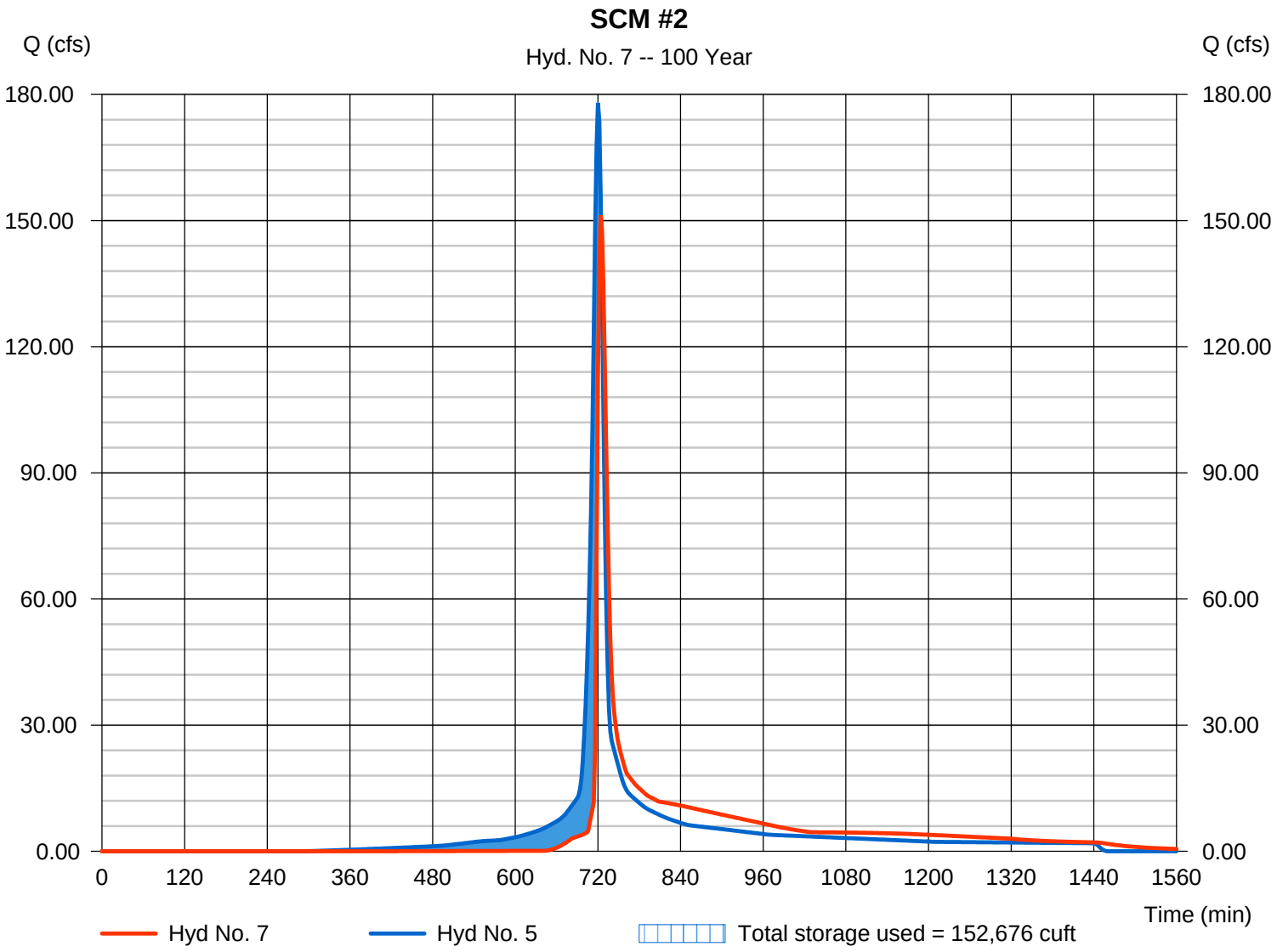
Hydrograph Report

Hyd. No. 7

SCM #2

Hydrograph type	=	Reservoir	Peak discharge	=	151.28 cfs
Storm frequency	=	100 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	460,400 cuft
Inflow hyd. No.	=	5 - DP #2 Post-Dev to SCM	Max. Elevation	=	359.32 ft
Reservoir name	=	SCM 2	Max. Storage	=	152,676 cuft

Storage Indication method used.

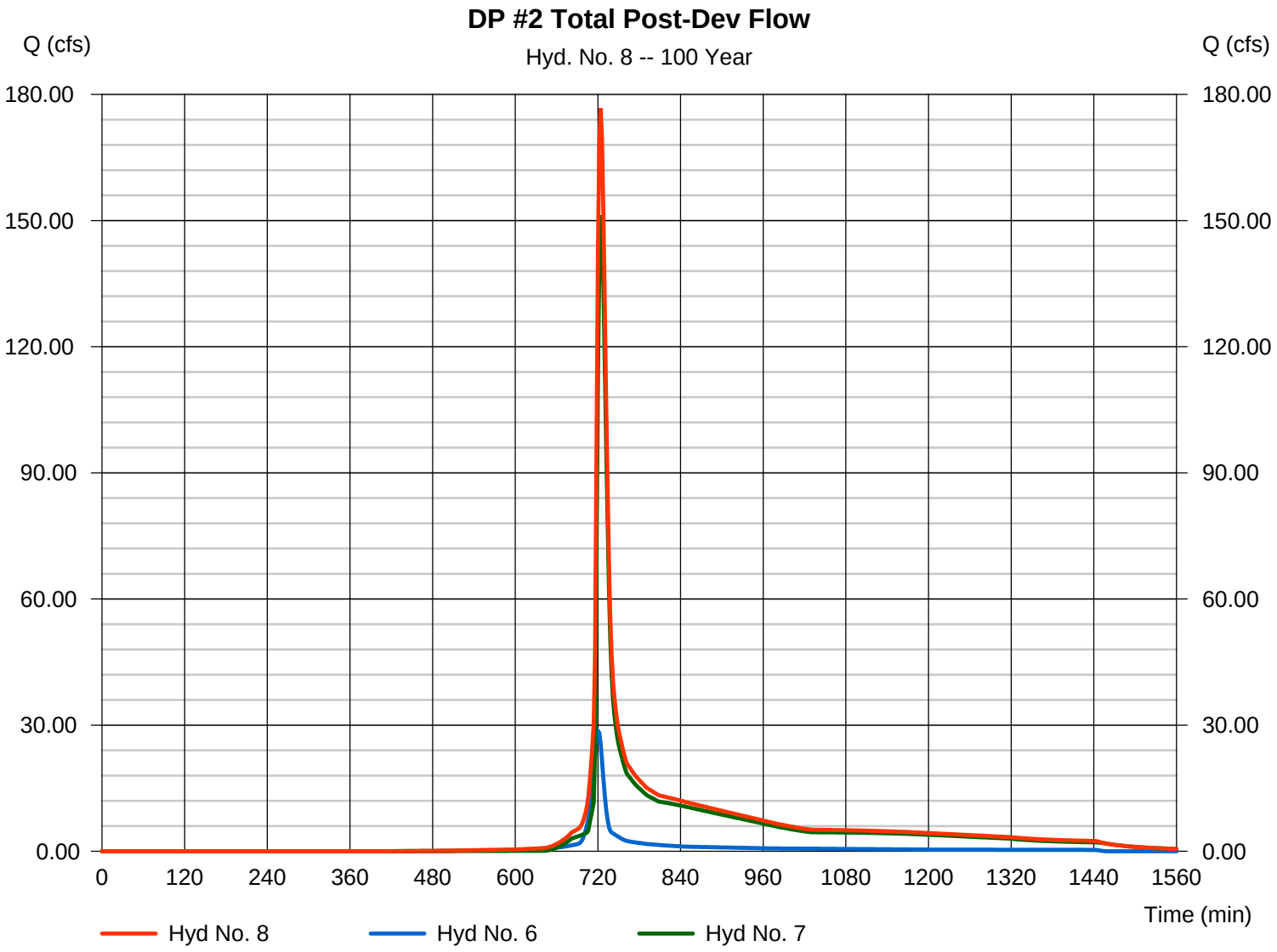


Hydrograph Report

Hyd. No. 8

DP #2 Total Post-Dev Flow

Hydrograph type	= Combine	Peak discharge	= 176.72 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 534,772 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 4.200 ac



Appendix D
SCM Drainage Area Map

PLD

GENERAL NOTES

1. ALL MATERIALS AND METHODS OF CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE TOWN OF ZEBULON AND THE STATE OF NORTH CAROLINA STANDARDS AND SPECIFICATIONS.
2. CONTRACTOR SHALL HAVE NORTH CAROLINA ONE CALL (1-800-632-4949) LOCATE ALL EXISTING UTILITIES PRIOR TO BEGINNING CONSTRUCTION.
3. CONTRACTOR SHALL VERIFY THE LOCATION AND DEPTH OF ALL EXISTING UTILITIES AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES OR CONFLICTS PRIOR TO BEGINNING CONSTRUCTION.
4. CONTRACTOR IS RESPONSIBLE FOR REMOVING OR RELOCATING ALL UTILITIES IN CONFLICT WITH NEW CONSTRUCTION. CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANIES PRIOR TO DISTURBANCE.

NORTH

0 100 200 300

SCALE IN FEET

PLD
PIEDMONT LAND DESIGN, PLLC
8522-204 SIX FORKS ROAD
RALEIGH, NORTH CAROLINA 27615
919.845.7600 PHONE
919.845.7703 FAX
ENGR. FIRM LICENSE NO. F-0843

PRELIMINARY
NOT FOR CONSTRUCTION

PURDY FAMILY, LLC PROPERTY
2620 ZEBULON RD
ZEBULON, NC

ISSUED: **PROGRESS**

REVISIONS:

DRAWN BY: **JET**
CHECKED BY: **MLS**

PROJECT: **FDCWP9**

PRE-DEVELOPED DRAINAGE AREA MAP

DWG. NO. **DA.1**

NORTH

0 100 200 300

SCALE IN FEET

GENERAL NOTES

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PLD
PIEDMONT LAND DESIGN, PLLC
8522-204 SIX FORKS ROAD
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PRELIMINARY
NOT FOR CONSTRUCTION

PURDY FAMILY, LLC PROPERTY
2620 ZEBULON RD
ZEBULON, NC

ISSUED: **PROGRESS**

REVISIONS:

DRAWN BY: **JET**
CHECKED BY: **MLS**

PROJECT: **FDCWP9**

POST-DEVELOPED DRAINAGE AREA MAP

DWG. NO. **DA.2**

Appendix E
Storm Sewer System Calculations

PLD

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	100.180	0.32	9.84	0.60	0.19	4.97	5.0	12.1	5.6	28.01	28.97	6.82	30	0.50	354.00	354.50	355.92	356.48	359.00	361.22	Pipe - (177)
2	1	29.700	0.17	8.79	0.60	0.10	4.34	5.0	12.0	5.7	24.53	29.15	5.01	30	0.51	354.60	354.75	357.10	357.20	361.22	360.94	Pipe - (215)
3	2	151.727	0.17	8.62	0.60	0.10	4.23	5.0	11.5	5.7	24.32	29.78	5.11	30	0.53	354.85	355.65	357.42	357.88	360.94	363.12	Pipe - (215) (1)
4	3	137.524	0.20	8.45	0.60	0.12	4.13	5.0	11.1	5.8	24.03	29.26	5.67	30	0.51	355.75	356.45	357.98	358.31	363.12	364.84	Pipe - (216)
5	4	101.546	0.18	8.25	0.60	0.11	4.01	5.0	10.8	5.9	23.54	30.18	6.16	30	0.54	356.55	357.10	358.55	358.77	364.84	366.19	Pipe - (217)
6	5	114.696	0.18	5.90	0.60	0.11	3.00	5.0	10.5	5.9	17.80	29.66	4.97	30	0.52	357.20	357.80	359.48	359.23	366.19	365.88	Pipe - (217) (1)
7	6	35.000	0.04	4.94	0.60	0.02	2.42	5.0	10.4	6.0	14.43	17.10	6.10	24	0.57	357.90	358.10	359.31	359.51	365.88	365.88	Pipe - (201)
8	7	41.772	0.01	4.90	0.60	0.01	2.40	5.0	10.2	6.0	14.34	17.50	5.10	24	0.60	358.20	358.45	359.96	360.06	365.88	364.04	Pipe - (202)
9	8	60.592	0.54	4.89	0.60	0.32	2.39	5.0	10.0	6.0	14.41	15.92	4.86	24	0.50	358.55	358.85	360.40	360.58	364.04	363.69	Pipe - (203)
10	9	314.000	0.01	3.80	0.60	0.01	1.74	5.0	8.8	6.3	10.89	16.15	4.37	24	0.51	358.95	360.55	360.97	361.80	363.69	366.18	Pipe - (204)
11	10	54.835	0.17	3.53	0.60	0.10	1.58	5.0	8.6	6.3	9.96	16.73	4.59	24	0.55	360.65	360.95	362.23	362.08	366.18	365.47	Pipe - (205)
12	11	119.189	0.16	2.57	0.60	0.10	1.13	5.0	8.2	6.4	7.26	7.45	4.81	18	0.50	361.05	361.65	362.25	362.85	365.47	366.44	Pipe - (206)
13	12	115.936	0.52	2.41	0.60	0.31	1.04	5.0	7.8	6.5	6.75	7.55	4.58	18	0.52	361.75	362.35	362.99	363.45	366.44	367.68	Pipe - (207)
14	13	35.000	0.53	1.89	0.60	0.32	0.73	5.0	7.6	6.5	4.74	4.88	3.87	15	0.57	362.45	362.65	363.82	364.01	367.68	367.68	Pipe - (210)
15	14	131.967	0.39	1.36	0.30	0.12	0.41	5.0	6.8	6.7	2.75	4.70	2.71	15	0.53	362.75	363.45	364.04	364.28	367.68	365.80	Pipe - (233)
16	15	140.000	0.38	0.76	0.30	0.11	0.23	5.0	5.9	7.0	1.59	4.57	2.57	15	0.50	363.55	364.25	364.44	364.75	365.80	367.00	Pipe - (234)
17	16	140.088	0.38	0.38	0.30	0.11	0.11	5.0	5.0	7.2	0.82	4.56	2.53	15	0.50	364.35	365.05	364.78	365.41	367.00	368.50	Pipe - (235)
18	15	85.387	0.21	0.21	0.30	0.06	0.06	5.0	5.0	7.2	0.45	4.69	0.82	15	0.53	363.55	364.00	364.44	364.45	365.80	365.94	Pipe - (236)
19	11	35.000	0.04	0.79	0.60	0.02	0.34	5.0	6.0	6.9	2.37	4.88	3.07	15	0.57	361.05	361.25	362.08	361.87	365.47	365.47	Pipe - (211)
20	19	22.439	0.31	0.75	0.60	0.19	0.32	5.0	5.9	7.0	2.22	5.28	3.98	15	0.67	361.35	361.50	361.92	362.09	365.47	365.53	Pipe - (229)
21	20	136.590	0.44	0.44	0.30	0.13	0.13	5.0	5.0	7.2	0.95	6.54	2.55	15	1.02	361.60	363.00	362.09	363.38	365.53	0.81	Pipe - (230)
22	10	35.000	0.01	0.26	0.30	0.00	0.15	5.0	5.9	7.0	1.07	4.88	0.87	15	0.57	360.65	360.85	362.23	362.24	366.18	366.18	Pipe - (212)

Project File: Weavers Point Storm System.stm

Number of lines: 68

Run Date: 1/30/2024

NOTES:Intensity = 105.70 / (Inlet time + 16.80) ^ 0.87; Return period =Yrs. 10 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
23	22	47.432	0.25	0.25	0.60	0.15	0.15	5.0	5.0	7.2	1.08	4.69	0.90	15	0.53	360.85	361.10	362.25	362.26	366.18	365.55	Pipe - (213)
24	5	93.087	0.39	2.17	0.30	0.12	0.91	5.0	6.2	6.9	6.25	8.07	3.54	18	0.59	357.20	357.75	359.48	359.81	366.19	362.00	Pipe - (244)
25	24	120.003	0.93	1.78	0.30	0.28	0.79	5.0	5.5	7.1	5.58	7.73	3.16	18	0.54	357.85	358.50	359.84	360.18	362.00	362.77	Pipe - (245)
26	25	94.039	0.85	0.85	0.60	0.51	0.51	5.0	5.0	7.2	3.68	4.71	3.00	15	0.53	358.60	359.10	360.33	360.64	362.77	363.27	Pipe - (246)
27	9	35.000	0.55	0.55	0.60	0.33	0.33	5.0	5.0	7.2	2.38	5.46	1.94	15	0.71	358.95	359.20	360.97	361.02	363.69	363.69	Pipe - (214)
28	6	46.293	0.01	0.78	0.60	0.01	0.47	5.0	5.6	7.0	3.29	5.20	2.76	15	0.65	357.90	358.20	359.23	359.33	365.88	363.97	Pipe - (197)
29	28	96.719	0.32	0.77	0.60	0.19	0.46	5.0	5.1	7.2	3.31	4.64	3.30	15	0.52	358.30	358.80	359.43	359.64	363.97	362.89	Pipe - (198)
30	29	26.000	0.45	0.45	0.60	0.27	0.27	5.0	5.0	7.2	1.95	5.66	2.93	15	0.77	359.00	359.20	359.86	359.76	362.89	362.89	Pipe - (199)
31	1	35.000	0.73	0.73	0.60	0.44	0.44	5.0	5.0	7.2	3.16	4.88	2.58	15	0.57	354.70	354.90	357.10	357.19	361.22	361.22	Pipe - (178)
32	End	87.008	0.18	9.34	0.60	0.11	3.76	5.0	9.0	6.2	23.39	31.09	6.77	30	0.57	354.00	354.50	355.67	356.15	356.00	361.70	Pipe - (179)
33	32	136.179	0.18	5.46	0.60	0.11	2.54	5.0	8.7	6.3	16.02	16.22	5.88	24	0.51	354.60	355.30	356.22	356.92	361.70	363.78	Pipe - (180)
34	33	181.813	0.20	5.28	0.60	0.12	2.43	5.0	8.1	6.4	15.63	15.91	5.69	24	0.50	355.40	356.30	357.06	357.90	363.78	365.49	Pipe - (181)
35	34	109.927	0.18	3.98	0.60	0.11	1.98	5.0	7.7	6.5	12.92	18.05	4.46	24	0.64	356.40	357.10	358.42	358.70	365.49	364.05	Pipe - (182)
36	35	43.841	0.01	3.62	0.30	0.00	1.77	5.0	7.6	6.6	11.58	18.71	4.79	24	0.68	357.20	357.50	359.06	358.72	364.05	363.43	Pipe - (183)
37	36	84.994	0.42	3.61	0.60	0.25	1.76	5.0	7.3	6.6	11.66	17.35	5.85	24	0.59	357.60	358.10	358.80	359.32	363.43	363.01	Pipe - (184)
38	37	213.262	0.06	2.78	0.60	0.04	1.27	5.0	6.6	6.8	8.59	16.24	4.95	24	0.52	358.20	359.30	359.32	360.34	363.01	364.93	Pipe - (184) (1)
39	38	41.773	0.06	2.46	0.60	0.04	1.07	5.0	6.5	6.8	7.32	8.90	5.59	18	0.72	359.40	359.70	360.44	360.75	364.93	365.53	Pipe - (185)
40	39	35.000	0.09	2.40	0.60	0.05	1.04	5.0	6.4	6.8	7.11	7.94	5.08	18	0.57	359.80	360.00	360.91	361.11	365.53	365.53	Pipe - (186)
41	40	43.841	0.05	0.79	0.60	0.03	0.42	5.0	6.1	6.9	2.89	5.34	2.38	15	0.68	360.10	360.40	361.51	361.59	365.53	365.70	Pipe - (187)
42	41	124.078	0.23	0.74	0.60	0.14	0.39	5.0	5.4	7.1	2.75	4.67	2.98	15	0.52	360.50	361.15	361.65	361.89	365.70	365.32	Pipe - (188)
43	42	30.107	0.19	0.19	0.30	0.06	0.06	5.0	5.0	7.2	0.41	6.45	1.40	15	1.00	361.20	361.50	362.10	361.75	365.32	364.00	Pipe - (224)
44	42	35.000	0.32	0.32	0.60	0.19	0.19	5.0	5.0	7.2	1.39	4.88	2.45	15	0.57	361.25	361.45	362.10	361.92	365.32	365.32	Pipe - (189)

Project File: Weavers Point Storm System.stm

Number of lines: 68

Run Date: 1/30/2024

NOTES:Intensity = 105.70 / (Inlet time + 16.80) ^ 0.87; Return period =Yrs. 10 ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
45	40	111.945	0.37	1.52	0.60	0.22	0.57	5.0	5.2	7.2	4.05	4.73	3.31	15	0.54	360.10	360.70	361.51	361.93	365.53	367.32	Pipe - (226)
46	45	28.495	1.15	1.15	0.30	0.35	0.35	5.0	5.0	7.2	2.49	5.41	2.08	15	0.70	360.80	361.00	362.09	362.13	367.32	365.00	Pipe - (227)
47	38	34.999	0.08	0.26	0.60	0.05	0.16	5.0	5.5	7.1	1.10	4.88	2.11	15	0.57	359.40	359.60	360.34	360.01	364.93	364.93	Pipe - (194)
48	47	41.774	0.09	0.18	0.60	0.05	0.11	5.0	5.3	7.1	0.77	5.47	2.98	15	0.72	359.70	360.00	360.02	360.34	364.93	365.34	Pipe - (195)
49	48	35.000	0.09	0.09	0.60	0.05	0.05	5.0	5.0	7.2	0.39	4.88	2.32	15	0.57	360.10	360.30	360.34	360.54	365.34	365.34	Pipe - (196)
50	32	163.483	1.41	3.70	0.30	0.42	1.11	5.0	7.0	6.7	7.41	7.79	4.27	18	0.55	354.60	355.50	356.15	356.89	361.70	359.60	Pipe - (190)
51	50	86.915	0.54	2.29	0.30	0.16	0.69	5.0	6.7	6.8	4.65	4.90	3.79	15	0.58	355.60	356.10	357.18	357.63	359.60	360.00	Pipe - (237)
52	51	85.211	0.51	1.75	0.30	0.15	0.53	5.0	6.2	6.9	3.62	4.95	2.96	15	0.59	356.20	356.70	357.66	357.91	360.00	361.00	Pipe - (238)
53	52	85.201	0.68	1.24	0.30	0.20	0.37	5.0	5.7	7.0	2.61	7.34	3.15	15	1.29	356.80	357.90	357.93	358.55	361.00	362.00	Pipe - (239)
54	53	120.577	0.56	0.56	0.30	0.17	0.17	5.0	5.0	7.2	1.21	5.88	2.78	15	0.83	358.00	359.00	358.55	359.43	362.00	363.00	Pipe - (240)
55	37	35.000	0.41	0.41	0.60	0.25	0.25	5.0	5.0	7.2	1.78	4.88	2.56	15	0.57	358.20	358.40	359.32	358.93	363.01	363.01	Pipe - (231)
56	35	35.000	0.18	0.18	0.60	0.11	0.11	5.0	5.0	7.2	0.78	4.88	0.64	15	0.57	357.20	357.40	359.06	359.06	364.05	364.05	Pipe - (193)
57	34	34.034	0.36	1.10	0.30	0.11	0.33	5.0	6.6	6.8	2.24	4.95	1.83	15	0.59	356.40	356.60	358.42	358.47	365.49	361.00	Pipe - (191)
58	57	124.744	0.74	0.74	0.30	0.22	0.22	5.0	5.0	7.2	1.60	4.84	1.33	15	0.56	356.70	357.40	358.47	358.54	361.00	360.00	Pipe - (228)
59	End	48.461	0.26	0.26	0.60	0.16	0.16	5.0	5.0	7.2	1.13	5.08	2.98	15	0.62	360.00	360.30	360.45	360.72	361.29	365.00	Pipe - (176)
60	End	112.189	0.01	3.68	0.30	0.00	1.42	5.0	7.2	6.6	9.40	16.54	5.04	24	0.53	354.00	354.60	355.21	355.69	360.44	359.00	Pipe - (172)
61	60	144.977	0.52	3.67	0.60	0.31	1.41	5.0	6.7	6.7	9.53	16.80	5.44	24	0.55	354.70	355.50	355.78	356.60	359.00	365.78	Pipe - (173)
62	61	35.000	0.52	3.15	0.60	0.31	1.10	5.0	6.6	6.8	7.46	7.94	5.11	18	0.57	355.60	355.80	356.76	356.96	365.78	365.78	Pipe - (174)
63	62	154.835	0.71	2.63	0.30	0.21	0.79	5.0	6.0	6.9	5.47	7.55	4.39	18	0.52	355.90	356.70	357.02	357.60	365.78	360.05	Pipe - (222)
64	63	148.949	1.25	1.25	0.30	0.38	0.38	5.0	5.0	7.2	2.71	4.73	3.03	15	0.54	356.80	357.60	357.98	358.30	360.05	361.00	Pipe - (223)
65	63	144.000	0.67	0.67	0.30	0.20	0.20	5.0	5.0	7.2	1.45	4.81	2.29	15	0.56	356.80	357.60	357.98	358.08	360.05	363.00	Pipe - (232)
66	End	81.000	0.88	0.88	0.30	0.26	0.26	5.0	5.0	7.2	1.91	7.17	3.86	15	1.23	354.00	355.00	354.51	355.55	355.94	356.94	Pipe - (243)

Project File: Weavers Point Storm System.stm | Number of lines: 68 | Run Date: 1/30/2024

NOTES:Intensity = 105.70 / (Inlet time + 16.80) ^ 0.87; Return period =Yrs. 10 ; c = cir e = ellip b = box

Storm Sewer Tabulation

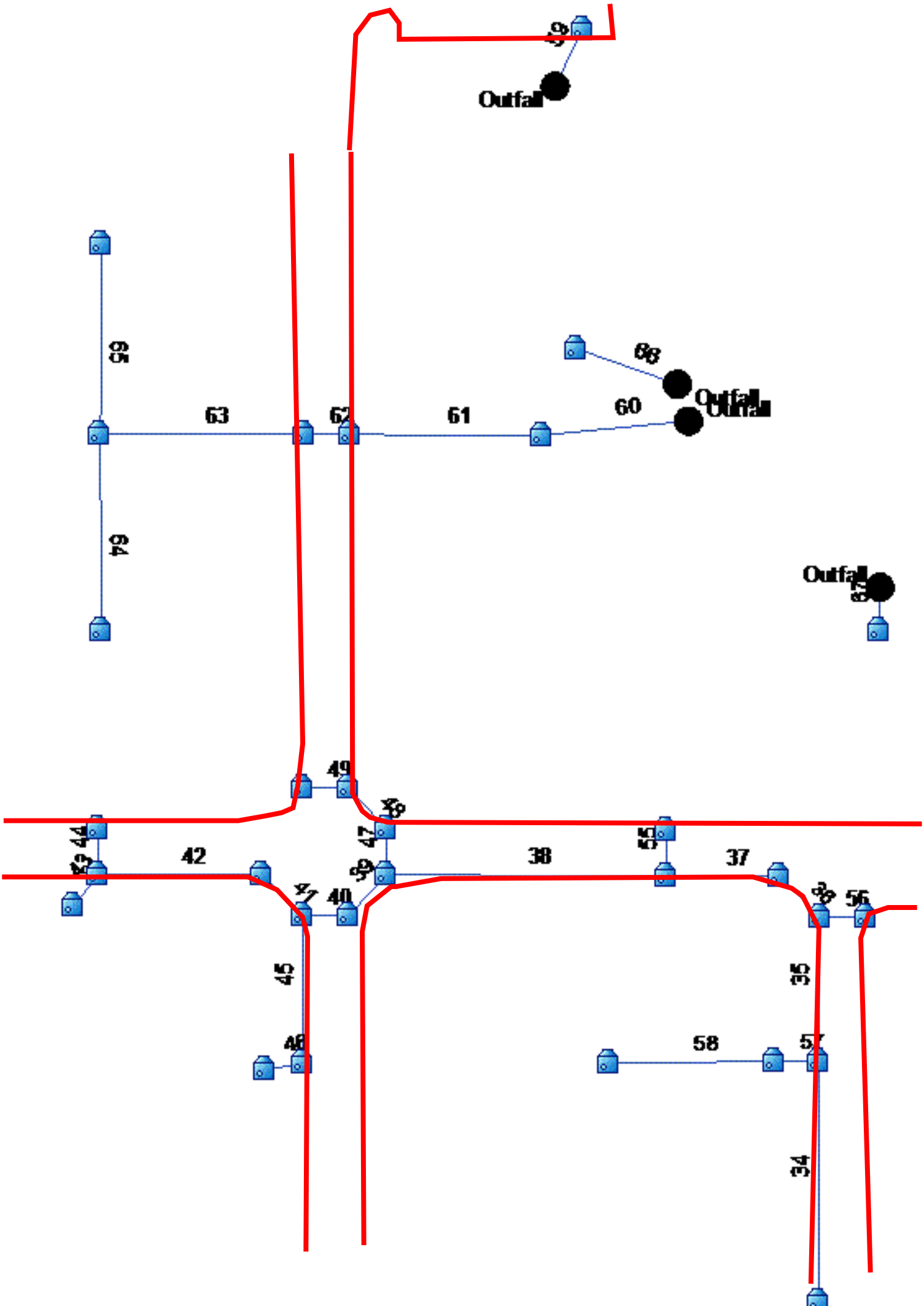
Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	ft/s	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
67	End	32.607	0.40	0.40	0.30	0.12	0.12	5.0	5.0	7.2	0.87	5.06	2.65	15	0.61	353.80	354.00	354.22	354.36	356.00	356.00	Pipe - (225)
68	End	30.060	1.16	1.16	0.30	0.35	0.35	5.0	5.0	7.2	2.51	6.50	4.23	12	3.33	352.00	353.00	352.74	353.68	350.00	350.00	Pipe - (241)

Project File: Weavers Point Storm System.stm

Number of lines: 68

Run Date: 1/30/2024

NOTES:Intensity = 105.70 / (Inlet time + 16.80) ^ 0.87; Return period =Yrs. 10 ; c = cir e = ellip b = box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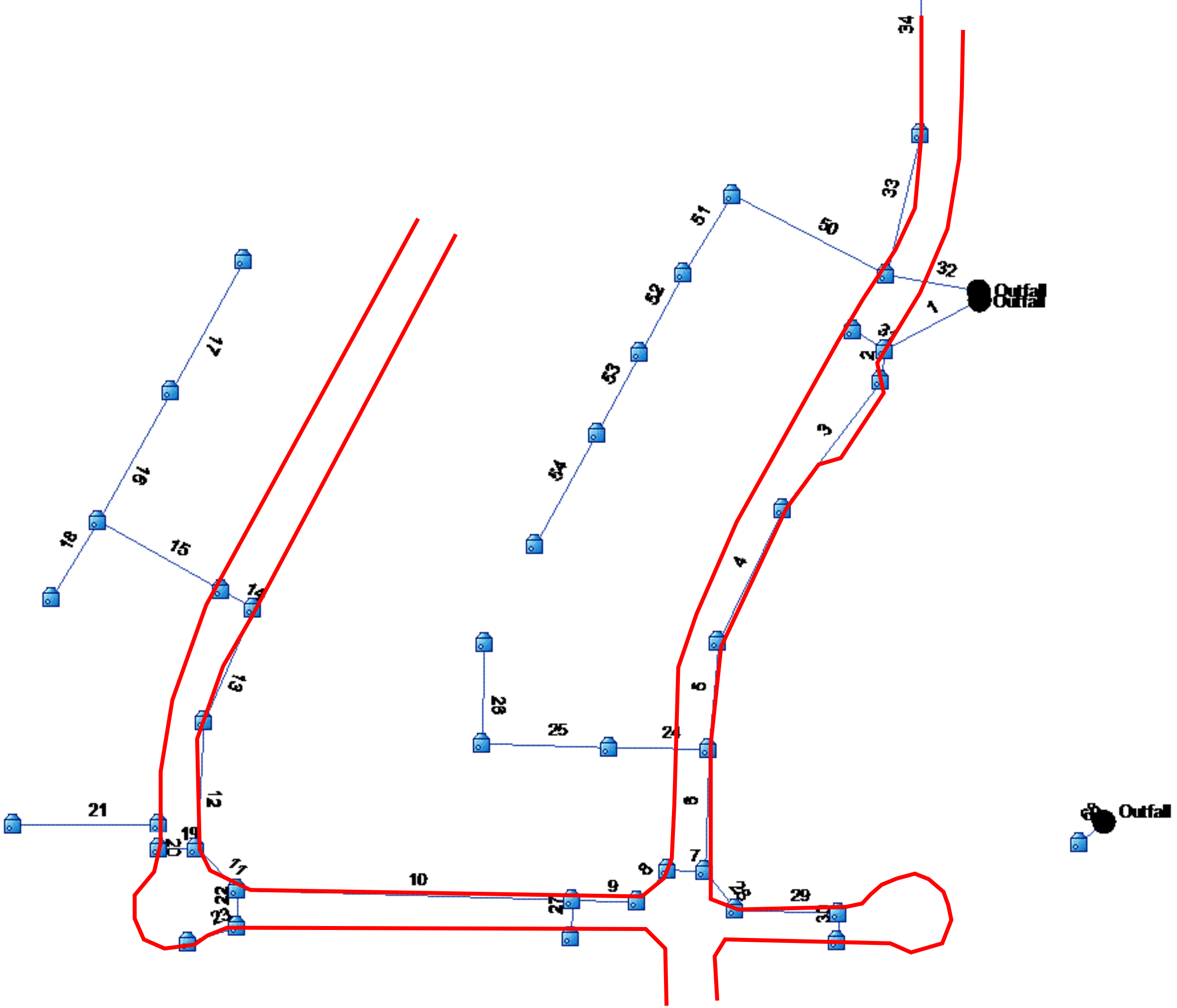
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33
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50
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52
Outfall
Outfall
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53
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54
3
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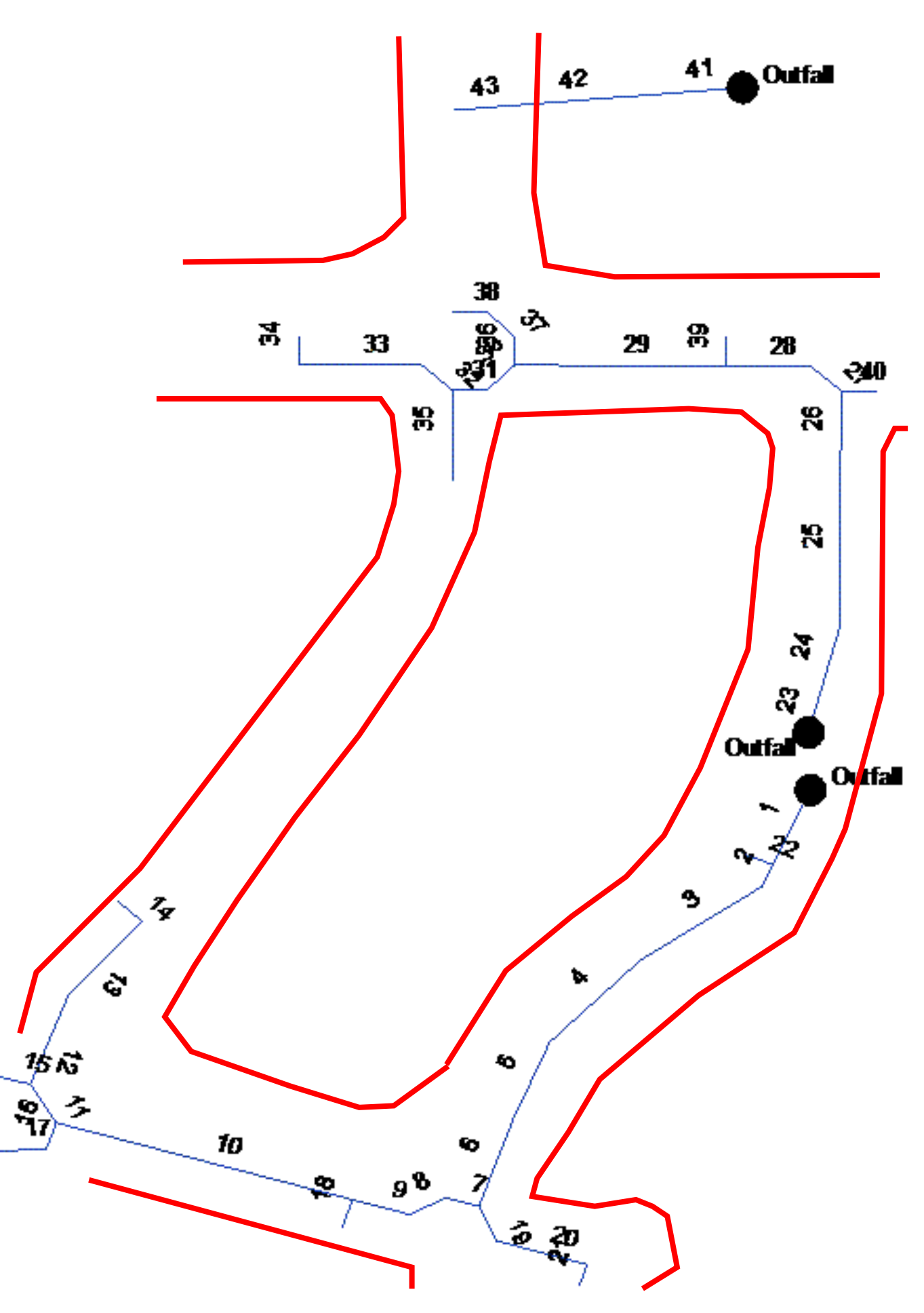
31
Outfall

Appendix F
Gutter Spread Calculations

PLD

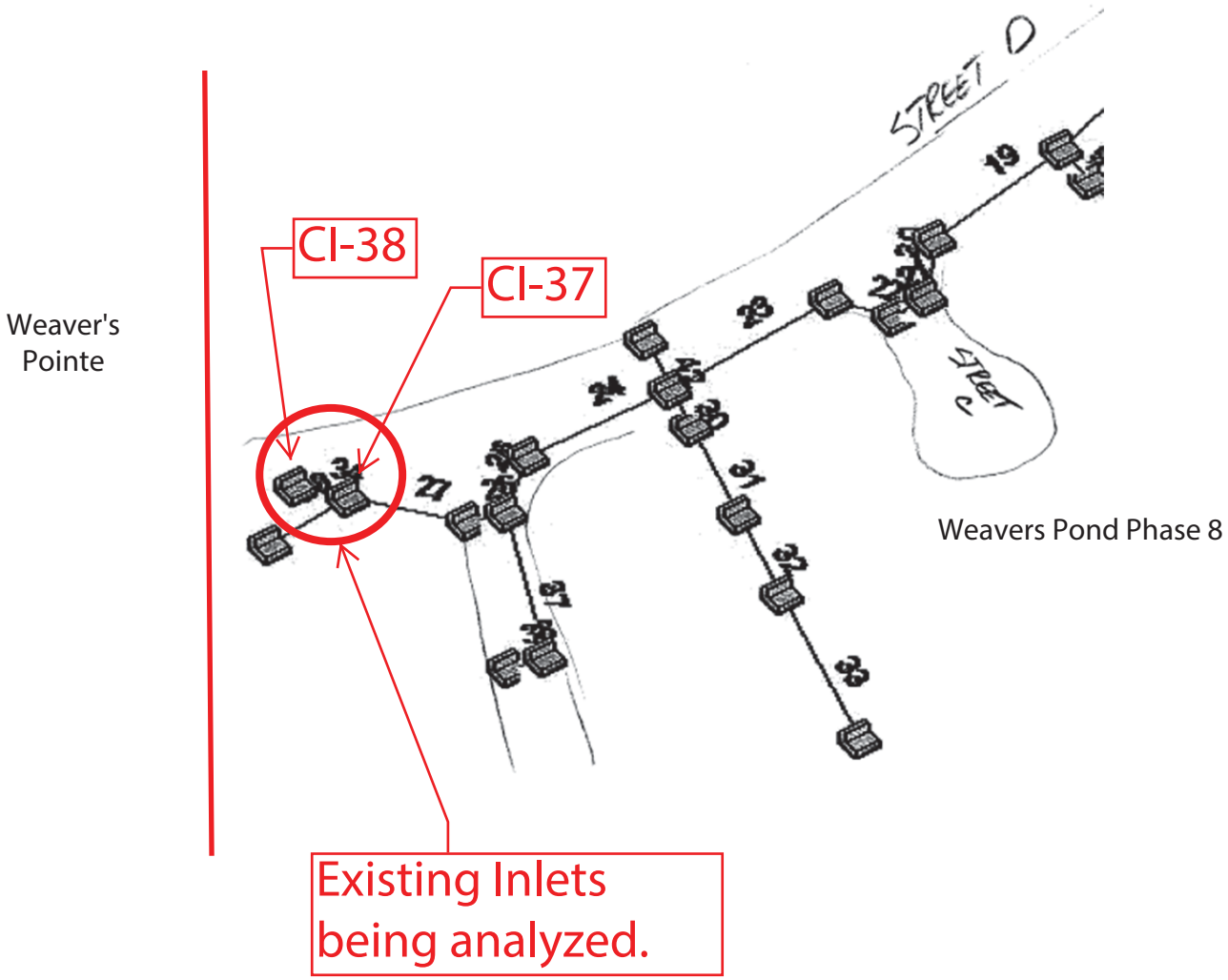
Line No.	Area	Inlet Time	Int.	Runoff Coeff.	Q = CIA	Q Carry-over	Q Captured	Q Bypassed	Junct Type	Curb Height	Curb Length	Grate Area	Grate Length	Grate Width	Gutter Slope	Gutter Width	Cross Slope, Sw	Cross Slope, Sx	Local Depr.	Inlet Depth	Bypass Depth	Bypass Spread	Gutter Depth	Gutter Spread	Bypass Line No.
	(ac)	(min)	(in/hr)	(C)	(cfs)	(cfs)	(cfs)	(cfs)		(in)	(ft)	(sqft)	(ft)	(ft)	(ft/ft)	(ft)	(ft/ft)	(ft/ft)	(in)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	0.32	5.0	4.00	0.70	0.90	0.04	0.93	0.00	Comb.	6.0	3.00	6.00	3.00	2.00	Sag	2.00	0.050	0.020	0.0	0.18	n/a	n/a	0.18	5.78	Sag
2	0.17	5.0	4.00	0.60	0.41	0.02	0.43	0.00	Comb.	6.0	3.00	6.00	3.00	2.00	Sag	2.00	0.050	0.020	0.0	0.12	n/a	n/a	0.12	3.24	Sag
3	0.17	5.0	4.00	0.60	0.41	0.03	0.42	0.02	Comb.	6.0	3.00	....	3.00	2.00	0.010	2.00	0.050	0.020	0.0	0.14	0.04	0.89	0.14	3.80	2
4	0.20	5.0	4.00	0.60	0.48	0.02	0.46	0.03	Comb.	6.0	3.00	....	3.00	2.00	0.010	2.00	0.050	0.020	0.0	0.14	0.05	1.03	0.14	4.09	3
5	0.18	5.0	4.00	0.60	0.43	0.00	0.42	0.02	Comb.	6.0	3.00	....	3.00	2.00	0.012	2.00	0.050	0.020	0.0	0.13	0.04	0.78	0.13	3.56	4
6	0.18	5.0	4.00	0.60	0.43	0.00	0.42	0.02	Comb.	6.0	3.00	....	3.00	2.00	0.012	2.00	0.050	0.020	0.0	0.13	0.04	0.78	0.13	3.56	19
7	0.04	5.0	4.00	0.60	0.10	0.00	0.10	0.00	Comb.	6.0	3.00	....	3.00	2.00	0.010	2.00	0.050	0.020	0.0	0.08	0.00	0.00	0.08	1.56	8
8	0.01	5.0	4.00	0.60	0.02	0.00	0.02	0.00	Comb.	6.0	3.00	....	3.00	2.00	0.010	2.00	0.050	0.020	0.0	0.05	0.00	0.00	0.05	0.93	9
9	0.50	5.0	4.00	0.60	1.20	0.00	1.20	0.00	Comb.	6.0	3.00	6.00	3.00	2.00	Sag	2.00	0.050	0.020	0.0	0.20	n/a	n/a	0.20	6.92	Sag
10	0.01	5.0	4.00	0.60	0.02	0.02	0.04	0.00	Comb.	6.0	3.00	....	3.00	2.00	0.010	2.00	0.050	0.020	0.0	0.06	0.00	0.00	0.06	1.12	18
11	0.17	5.0	4.00	0.60	0.41	0.00	0.39	0.02	Comb.	6.0	3.00	....	3.00	2.00	0.010	2.00	0.050	0.020	0.0	0.13	0.04	0.80	0.13	3.64	10
12	0.16	5.0	4.00	0.60	0.38	0.27	0.59	0.07	Comb.	6.0	3.00	....	3.00	2.00	0.010	2.00	0.050	0.020	0.0	0.16	0.07	1.38	0.16	4.76	15
13	0.52	5.0	4.00	0.60	1.25	0.00	0.98	0.27	Comb.	6.0	3.00	....	3.00	2.00	0.010	2.00	0.050	0.020	0.0	0.19	0.12	2.76	0.19	6.53	12
14	0.53	5.0	4.00	0.60	1.27	0.00	0.99	0.28	Comb.	6.0	3.00	....	3.00	2.00	0.010	2.00	0.050	0.020	0.0	0.19	0.12	2.83	0.19	6.59	15
15	0.04	5.0	4.00	0.60	0.10	0.35	0.45	0.00	Comb.	6.0	3.00	6.00	3.00	2.00	Sag	2.00	0.050	0.020	0.0	0.13	n/a	n/a	0.13	3.34	Sag
16	0.01	5.0	4.00	0.30	0.01	0.00	0.01	0.00	Comb.	6.0	3.00	....	3.00	2.00	0.010	2.00	0.050	0.020	0.0	0.04	0.00	0.00	0.04	0.72	Offsite
17	0.25	5.0	4.00	0.60	0.60	0.00	0.60	0.00	Comb.	6.0	3.00	6.00	3.00	2.00	Sag	2.00	0.050	0.020	0.0	0.14	n/a	n/a	0.14	4.18	Sag
18	0.50	5.0	4.00	0.60	1.20	0.00	1.20	0.00	Comb.	6.0	3.00	6.00	3.00	2.00	Sag	2.00	0.050	0.020	0.0	0.20	n/a	n/a	0.20	6.92	Sag
19	0.01	5.0	4.00	0.60	0.02	0.02	0.04	0.00	Comb.	6.0	3.00	....	3.00	2.00	0.010	2.00	0.050	0.020	0.0	0.06	0.00	0.00	0.06	1.13	20
20	0.32	5.0	4.00	0.60	0.77	0.00	0.67	0.10	Comb.	6.0	3.00	....	3.00	2.00	0.010	2.00	0.050	0.020	0.0	0.16	0.08	1.59	0.16	5.17	21
21	0.45	5.0	4.00	0.60	1.08	0.10	1.18	0.00	Comb.	6.0	3.00	6.00	3.00	2.00	Sag	2.00	0.050	0.020	0.0	0.20	n/a	n/a	0.20	6.84	Sag
22	0.70	5.0	4.00	0.60	1.68	0.00	1.68	0.00	Comb.	6.0	6.00	12.00	6.00	2.00	Sag	2.00	0.050	0.020	0.0	0.20	n/a	n/a	0.20	6.82	Sag
23	0.18	5.0	4.00	0.70	0.50	0.02	0.49	0.04	Comb.	6.0	3.00	....	3.00	2.00	0.010	2.00	0.050	0.020	0.0	0.14	0.06	1.11	0.14	4.23	1
24	0.18	5.0	4.00	0.60	0.43	0.02	0.43	0.02	Comb.	6.0	3.00	....	3.00	2.00	0.010	2.00	0.050	0.020	0.0	0.14	0.05	0.93	0.14	3.88	23
25	0.20	5.0	4.00	0.60	0.48	0.02	0.48	0.02	Comb.	6.0	3.00	....	3.00	2.00	0.014	2.00	0.050	0.020	0.0	0.13	0.04	0.86	0.13	3.72	24
26	0.18	5.0	4.00	0.60	0.43	0.00	0.41	0.02	Comb.	6.0	3.00	....	3.00	2.00	0.010	2.00	0.050	0.020	0.0	0.14	0.04	0.87	0.14	3.76	25
27	0.01	5.0	4.00	0.30	0.01	0.00	0.01	0.00	Comb.	6.0	3.00	....	3.00	2.00	0.010	2.00	0.050	0.020	0.0	0.04	0.00	0.00	0.04	0.72	28
28	0.42	5.0	4.00	0.60	1.01	0.00	1.01	0.00	Comb.	6.0	3.00	6.00	3.00	2.00	Sag	2.00	0.050	0.020	0.0	0.18	n/a	n/a	0.18	6.11	Sag
29	0.06	5.0	4.00	0.60	0.14	0.00	0.14	0.00	Comb.	6.0	3.00	....	3.00	2.00	0.010	2.00	0.050	0.020	0.0	0.09	0.00	0.00	0.09	1.82	39
30	0.06	5.0	4.00	0.60	0.14	0.00	0.14	0.00	Comb.	6.0	3.00	....	3.00	2.00	0.010	2.00	0.050	0.020	0.0	0.09	0.00	0.00	0.09	1.82	29
31	0.09	5.0	4.00	0.60	0.22	0.11	0.33	0.00	Comb.	6.0	3.00	6.00	3.00	2.00	Sag	2.00	0.050	0.020	0.0	0.11	n/a	n/a	0.11	2.63	Sag
32	0.05	5.0	4.00	0.60	0.12	0.00	0.12	0.00	Comb.	6.0	3.00	....	3.00	2.00	0.010	2.00	0.050	0.020	0.0	0.09	0.00	0.00	0.09	1.70	33
33	0.23	5.0	4.00	0.60	0.55	0.00	0.51	0.04	Comb.	6.0	3.00	....	3.00	2.00	0.010	2.00	0.050	0.020	0.0	0.15	0.06	1.16	0.15	4.34	34
34	0.32	5.0	4.00	0.60	0.77	0.04	0.81	0.00	Comb.	6.0	3.00	6.00	3.00	2.00	Sag	2.00	0.050	0.020	0.0	0.16	n/a	n/a	0.16	5.22	Sag
35	0.37	5.0	4.00	0.60	0.89	0.00	0.78	0.11	Comb.	6.0	3.00	....	3.00	2.00	0.016	2.00	0.050	0.020	0.0	0.16	0.08	1.52	0.16	4.94	31
36	0.08	5.0	4.00	0.60	0.19	0.00	0.19	0.00	Comb.	6.0	3.00	....	3.00	2.00	0.010	2.00	0.050	0.020	0.0	0.10	0.00	0.00	0.10	2.07	39
37	0.09	5.0	4.00	0.60	0.22	0.00	0.22	0.00	Comb.	6.0	3.00	....	3.00	2.00	0.010	2.00	0.050	0.020	0.0	0.11	0.00	0.00	0.11	2.30	38
38	0.09	5.0	4.00	0.60	0.22	0.00	0.22	0.00	Comb.	6.0	3.00	6.00	3.00	2.00	Sag	2.00	0.050	0.020	0.0	0.10	n/a	n/a	0.10	2.00	Sag
39	0.41	5.0	4.00	0.60	0.98	0.00	0.98	0.00	Comb.	6.0	3.00	6.00	3.00	2.00	Sag	2.00	0.050	0.020	0.0	0.18	n/a	n/a	0.18	6.00	Sag
40	0.18	5.0	4.00	0.60	0.43	0.00	0.41	0.02	Comb.	6.0	3.00	....	3.00	2.00	0.010	2.00	0.050	0.020	0.0	0.14	0.04	0.87	0.14	3.76	Offsite
41	0.01	5.0	4.00	0.30	0.01	....	....	....	MH	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
42	0.48	5.0	4.00	0.60	1.15	0.00	1.15	0.00	Comb.	6.0	3.00	6.00	3.00	2.00	Sag	2.00	0.050	0.020	0.0	0.19	n/a	n/a	0.19	6.72	Sag
43	0.48	5.0	4.00	0.60	1.15	0.00	1.15	0.00	Comb.	6.0	3.00	6.00	3.00	2.00	Sag	2.00	0.050	0.020	0.0	0.19	n/a	n/a	0.19	6.72	Sag


Outfall
Outfall
Outfall

Analysis of existing catch basins on Street A

Existing DA to existing CI-37 = 0.18 ac
Existing gutter spread at existing CI-37 = 2.00’
Additional area to CI-37=0.39 ac
New DA to existing CI-37=0.57 ac
New gutter spread = 5.74’

Existing DA existing CI-38 = 0.35 ac
Existing gutter spread at existing CI-38 = 2.87’
Additional area to CI-38=0.32 ac
New DA to existing CI-38=0.67 ac
New gutter spread = 6.91’



PLD

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
27	37	1.97	0.00	1.97	0.00	Comb	6.0	3.00	3.00	3.00	2.00	Sag	2.50	0.080	0.020	0.012	0.26	5.74	0.35	5.74	1.0	Off
28	39	1.93	0.00	1.93	0.00	Comb	6.0	3.00	3.00	3.00	2.00	Sag	2.50	0.080	0.020	0.012	0.26	5.62	0.35	5.62	1.0	Off
29	12	1.48	0.05	1.53	0.00	Comb	6.0	3.00	3.00	3.00	2.00	Sag	2.50	0.080	0.020	0.012	0.23	4.14	0.32	4.14	1.0	Off
30	30	0.46	0.00	0.46	0.00	Comb	6.0	3.00	3.00	3.00	2.00	Sag	2.50	0.080	0.020	0.012	0.12	1.78	0.20	1.78	1.0	Off
31	New	0.69	0.00	0.69	0.00	Comb	4.0	3.00	3.00	3.00	2.00	Sag	2.50	0.050	0.020	0.012	0.12	2.46	0.21	2.46	1.0	Off
32	New	0.87	0.00	0.87	0.00	Comb	4.0	3.00	3.00	3.00	2.00	Sag	2.50	0.050	0.020	0.012	0.14	3.30	0.22	3.30	1.0	Off
33	31	3.68	0.00	3.68	0.00	Comb	6.0	3.00	3.00	3.00	2.00	Sag	2.50	0.080	0.020	0.012	0.37	11.09	0.46	11.09	1.0	Off
34	38	2.31	0.00	2.31	0.00	Comb	6.0	3.00	3.00	3.00	2.00	Sag	2.50	0.080	0.020	0.012	0.29	6.91	0.37	6.91	1.0	Off

Project File: FDCWP7-8 Storm.stm | Number of lines: 8 | Run Date: 4/16/2024

NOTES: Inlet N-Values = 0.016; Intensity = 74.06 / (Inlet time + 13.30) ^ 0.88; Return period = 2 Yrs. ; * Indicates Known Q added. All curb inlets are Horiz throat.

Appendix G
Storm Sewer System Drainage Area Map

PLD

NORTH

0 100 200 300

SCALE IN FEET

PLD

PIEDMONT LAND DESIGN, PLLC
8522-204 SIX FORKS ROAD
RALEIGH, NORTH CAROLINA 27615
919.845.7600 PHONE
919.845.7703 FAX
ENGR. FIRM LICENSE NO. F-0843

PRELIMINARY
NOT FOR CONSTRUCTION

PURDY FAMILY, LLC PROPERTY
2620 ZEBULON RD
ZEBULON, NC

ISSUED: **PROGRESS**

REVISIONS:

DRAWN BY: **JET**
CHECKED BY: **MLS**

PROJECT: **FDCWP9**

STORM SEWER DRAINAGE AREA MAP

DWG. NO. **DA.4**

Appendix H
Sediment Basin Drainage Area Map

PLD

GENERAL NOTES

1. ALL MATERIALS AND METHODS OF CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE TOWN OF ZEBULON AND THE STATE OF NORTH CAROLINA STANDARDS AND SPECIFICATIONS.
2. CONTRACTOR SHALL HAVE NORTH CAROLINA ONE CALL (1-800-632-4949) LOCATE ALL EXISTING UTILITIES PRIOR TO BEGINNING CONSTRUCTION.
3. CONTRACTOR SHALL VERIFY THE LOCATION AND DEPTH OF ALL EXISTING UTILITIES AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES OR CONFLICTS PRIOR TO BEGINNING CONSTRUCTION.
4. CONTRACTOR IS RESPONSIBLE FOR REMOVING OR RELOCATING ALL UTILITIES IN CONFLICT WITH NEW CONSTRUCTION. CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANIES PRIOR TO DISTURBANCE.

NORTH

0 100 200 300

SCALE IN FEET

PLD
PIEDMONT LAND DESIGN, PLLC
8522-204 SIX FORKS ROAD
RALEIGH, NORTH CAROLINA 27615
919.845.7600 PHONE
919.845.7703 FAX
ENGR. FIRM LICENSE NO. F-0843

PRELIMINARY
NOT FOR CONSTRUCTION

PURDY FAMILY, LLC PROPERTY
2620 ZEBULON RD
ZEBULON, NC

ISSUED: **PROGRESS**

REVISIONS:

DRAWN BY: **JET**
CHECKED BY: **MLS**

PROJECT: **FDCWP9**

SEDIMENT BASIN/ TEMP DIVERSIONS DRAINAGE AREA MAP

DWG. NO. **DA.3**

Appendix I
Sediment Basin Skimmer Sizing Calculations

PLD

Skimmer Basin #1

Okay

12.6	Drainage Area (Acres)	
45.5	Peak Flow from 10-year Storm (cfs)	
22680	Required Volume (ft^3)	
19793	Required Surface Area (ft^2)	
99.5	Suggested Width (ft)	
199.0	Suggested Length (ft)	
200	Trial Top Width at Spillway Invert (ft)	
100	Trial Top Length at Spillway Invert (ft)	
2	Trial Side Slope Ratio Z:1	
2	Trial Depth (ft) (2 to 3.5 feet above grade)	
192	Bottom Width (ft)	
92	Bottom Length (ft)	
17664	Bottom Area (ft^2)	
37643	Actual Volume (ft^3)	**Okay**
20000	Actual Surface Area (ft^2)	**Okay**
45	Trial Weir Length (ft)	
0.5	Suggested Trial Depth of Flow (ft)	
47.7	Spillway Capacity (cfs)	**Okay**
6	Skimmer Size (inches)	
0.417	Head on Skimmer (feet)	
2	Orifice Size (1/4 inch increments)	
3.80	Dewatering Time (days)	
	Required 3 to 5 days for Wake County	

Skimmer Size (Inches)
1.5
2
2.5
3
4
5
6
8

Skimmer Basin #2

Okay

8.8	Drainage Area (Acres)
31.8	Peak Flow from 10-year Storm (cfs)
15840	Required Volume (ft^3)
13833	Required Surface Area (ft^2)
83.2	Suggested Width (ft)
166.3	Suggested Length (ft)
115	Trial Top Width at Spillway Invert (ft)
225	Trial Top Length at Spillway Invert (ft)
2	Trial Side Slope Ratio Z:1
2	Trial Depth (ft) (2 to 3.5 feet above grade)
107	Bottom Width (ft)
217	Bottom Length (ft)
23219	Bottom Area (ft^2)
49073	Actual Volume (ft^3) **Okay**
25875	Actual Surface Area (ft^2) **Okay**
30	Trial Weir Length (ft)
0.5	Suggested Trial Depth of Flow (ft)
31.8	Spillway Capacity (cfs) **Okay**
6	Skimmer Size (inches)
0.417	Head on Skimmer (feet)
1.5	Orifice Size (1/4 inch increments)
4.72	Dewatering Time (days)

Required 3 to 5 days for Wake County

Skimmer Size (Inches)
1.5
2
2.5
3
4
5
6
8

Skimmer Basin #3

Okay

6.7	Drainage Area (Acres)	
24.2	Peak Flow from 10-year Storm (cfs)	
12060	Required Volume (ft^3)	
10527	Required Surface Area (ft^2)	
72.5	Suggested Width (ft)	
145.1	Suggested Length (ft)	
150	Trial Top Width at Spillway Invert (ft)	
75	Trial Top Length at Spillway Invert (ft)	
2	Trial Side Slope Ratio Z:1	
2	Trial Depth (ft) (2 to 3.5 feet above grade)	
142	Bottom Width (ft)	
67	Bottom Length (ft)	
9514	Bottom Area (ft^2)	
20743	Actual Volume (ft^3)	**Okay**
11250	Actual Surface Area (ft^2)	**Okay**
23	Trial Weir Length (ft)	
0.5	Suggested Trial Depth of Flow (ft)	
24.4	Spillway Capacity (cfs)	**Okay**
4	Skimmer Size (inches)	
0.333	Head on Skimmer (feet)	
1.5	Orifice Size (1/4 inch increments)	
4.02	Dewatering Time (days)	

Required 3 to 5 days for Wake County

Skimmer Size (Inches)
1.5
2
2.5
3
4
5
6
8

Skimmer Basin #4

Okay

4.2	Drainage Area (Acres)	
15.2	Peak Flow from 10-year Storm (cfs)	
7560	Required Volume (ft^3)	
6612	Required Surface Area (ft^2)	
57.5	Suggested Width (ft)	
115.0	Suggested Length (ft)	
120	Trial Top Width at Spillway Invert (ft)	
60	Trial Top Length at Spillway Invert (ft)	
2	Trial Side Slope Ratio Z:1	
2	Trial Depth (ft) (2 to 3.5 feet above grade)	
112	Bottom Width (ft)	
52	Bottom Length (ft)	
5824	Bottom Area (ft^2)	
13003	Actual Volume (ft^3)	**Okay**
7200	Actual Surface Area (ft^2)	**Okay**
15	Trial Weir Length (ft)	
0.5	Suggested Trial Depth of Flow (ft)	
15.9	Spillway Capacity (cfs)	**Okay**
4	Skimmer Size (inches)	
0.333	Head on Skimmer (feet)	
1.25	Orifice Size (1/4 inch increments)	
3.63	Dewatering Time (days)	

Required 3 to 5 days for Wake County

Skimmer Size (Inches)
1.5
2
2.5
3
4
5
6
8

Appendix J
Temporary Diversion Ditch/Slope Drain Calculations

PLD

Diversion Ditch Design

Diversion	Total DA (CFS)	C	Q(10) (CFS)	SLOPE (FT/FT)	DEPTH (FT)	SHEAR STRESS (PSF)	ALLOWABLE SHEAR STRESS (PSF)	LINER
1A	2.00	0.5	7.22	0.005	0.89	0.28	2.00	JUTE MAT
1B	5.00	0.5	18.05	0.005	1.38	0.43	2.00	JUTE MAT
1C	4.30	0.5	15.52	0.005	1.29	0.40	2.00	JUTE MAT
2A	0.10	0.5	0.36	0.04	0.18	0.45	2.00	JUTE MAT
2B	5.00	0.5	18.05	0.005	1.38	0.43	2.00	JUTE MAT
3A	1.40	0.5	5.05	0.02	0.74	0.92	2.00	JUTE MAT
3B	0.40	0.5	1.44	0.005	0.38	0.12	2.00	JUTE MAT
4A	1.90	0.5	6.86	0.005	0.87	0.27	2.00	JUTE MAT
4B	0.70	0.5	2.53	0.005	0.52	0.16	2.00	JUTE MAT

Slope Drains

Basin Slope Drain	DA (AC)	Q(10) (CFS)	REQUIRED AREA (SF)	MINIMUM DIA (FT)	MINIMUM DIA (INCHES)	USE (INCHES)
BASIN 1 - From ditch 1A	2	7.22	1.22	1.25	14.98	15
BASIN 1 - From ditch 1B/1C	9.3	33.573	5.69	2.69	32.31	2@24
BASN 2 - From ditch 2A	0.1	0.361	0.06	0.28	3.35	12
BASN 2 - From ditch 2B	5	18.05	3.06	1.97	23.69	2@18
BASN 3 - From ditch 3A	1.4	5.054	0.86	1.04	12.54	15
BASN 3 - From ditch 3B	0.4	1.444	0.24	0.56	6.70	12
BASN 4 - From ditch 4A	0.7	2.527	0.43	0.74	8.86	12
BASN 4 - From ditch 4B	1.9	6.859	1.16	1.22	14.60	15

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Jan 29 2024

DIVERSION #1A

Trapezoidal

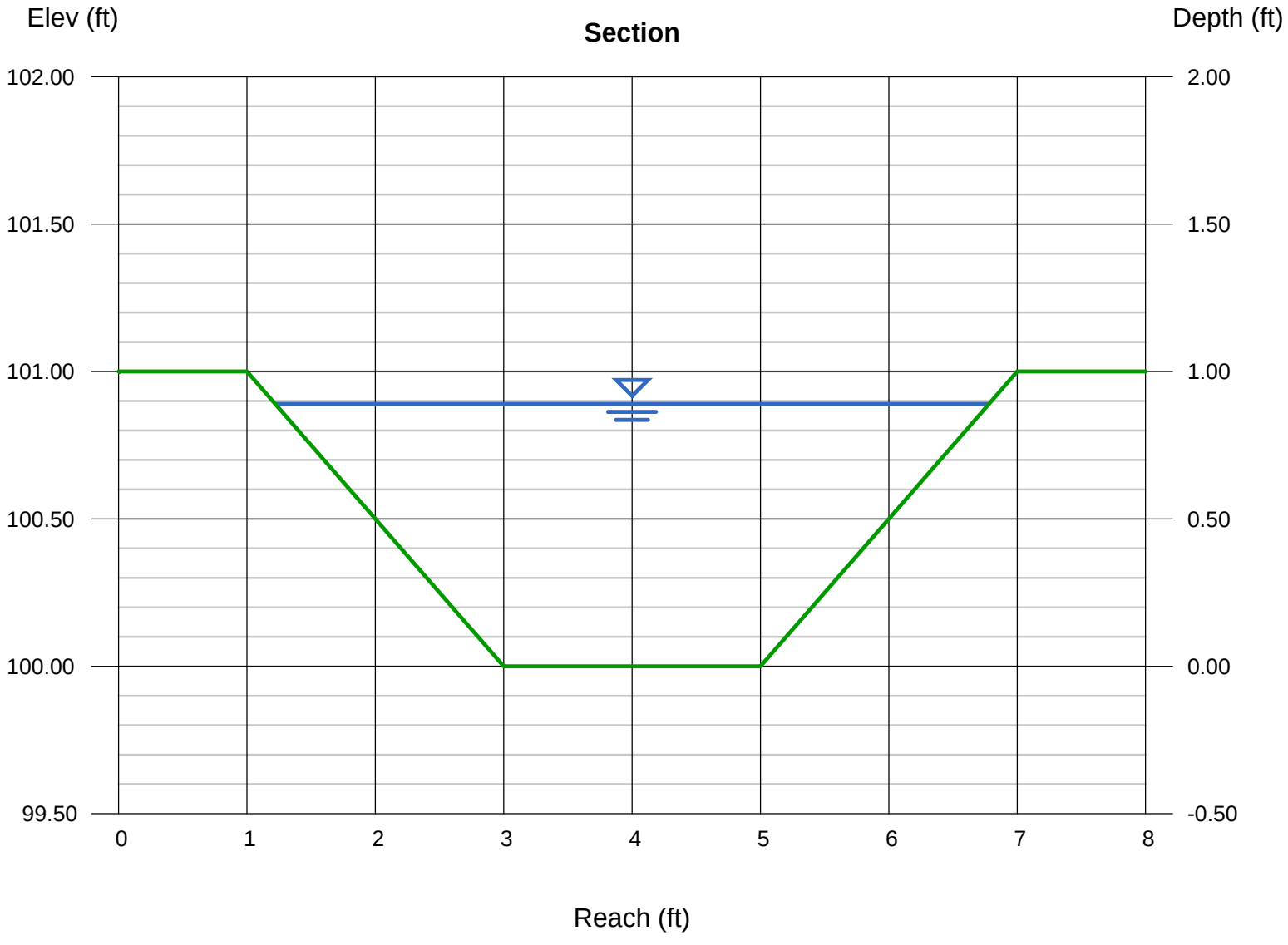
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.50
N-Value	= 0.033

Calculations

Compute by:	Known Q
Known Q (cfs)	= 7.22

Highlighted

Depth (ft)	= 0.89
Q (cfs)	= 7.220
Area (sqft)	= 3.36
Velocity (ft/s)	= 2.15
Wetted Perim (ft)	= 5.98
Crit Depth, Yc (ft)	= 0.61
Top Width (ft)	= 5.56
EGL (ft)	= 0.96



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Mar 25 2024

DIVERSION #1B

Trapezoidal

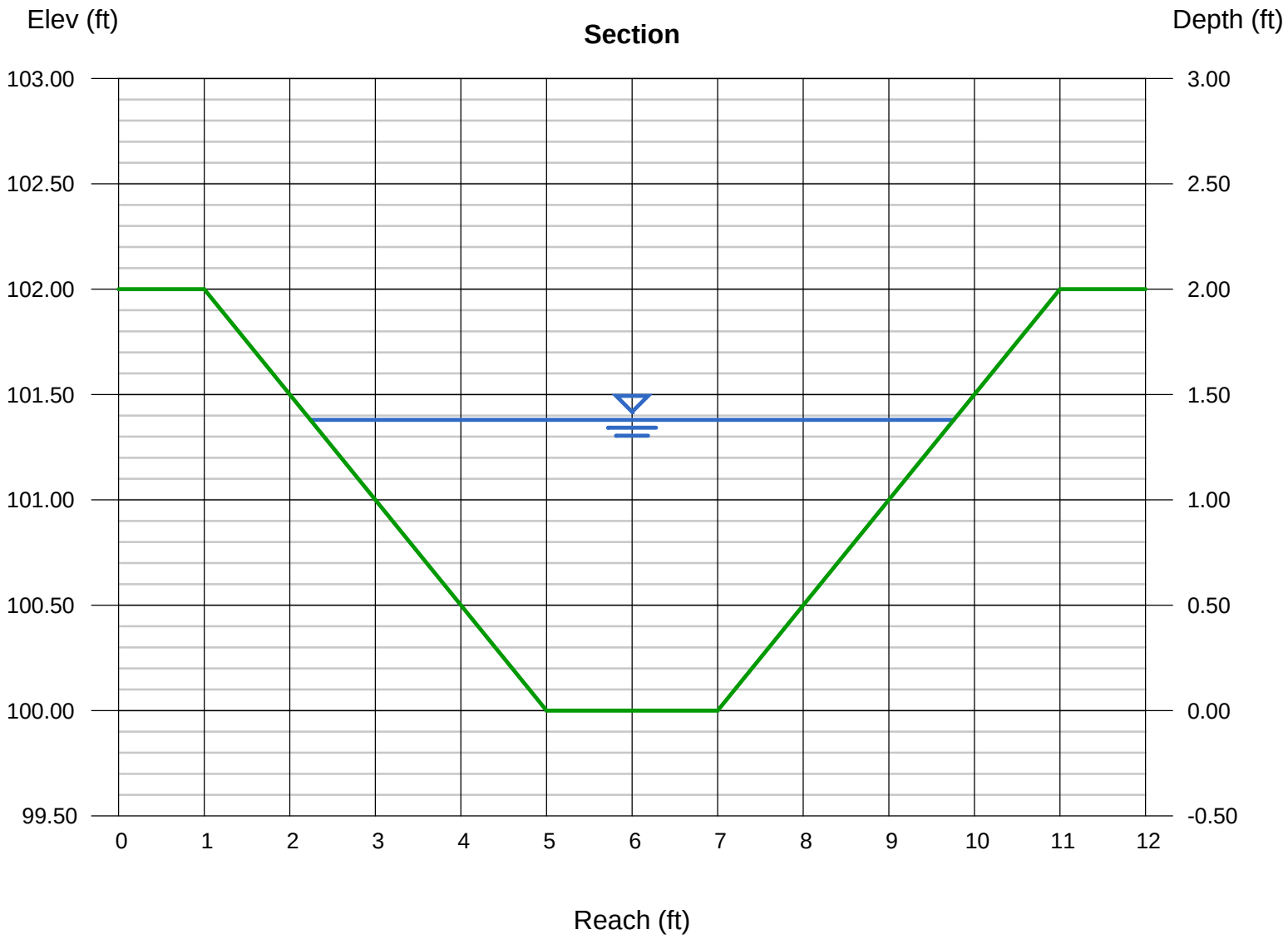
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.50
N-Value	= 0.033

Calculations

Compute by:	Known Q
Known Q (cfs)	= 18.05

Highlighted

Depth (ft)	= 1.38
Q (cfs)	= 18.05
Area (sqft)	= 6.57
Velocity (ft/s)	= 2.75
Wetted Perim (ft)	= 8.17
Crit Depth, Yc (ft)	= 0.99
Top Width (ft)	= 7.52
EGL (ft)	= 1.50



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Mar 25 2024

DIVERSION #1C

Trapezoidal

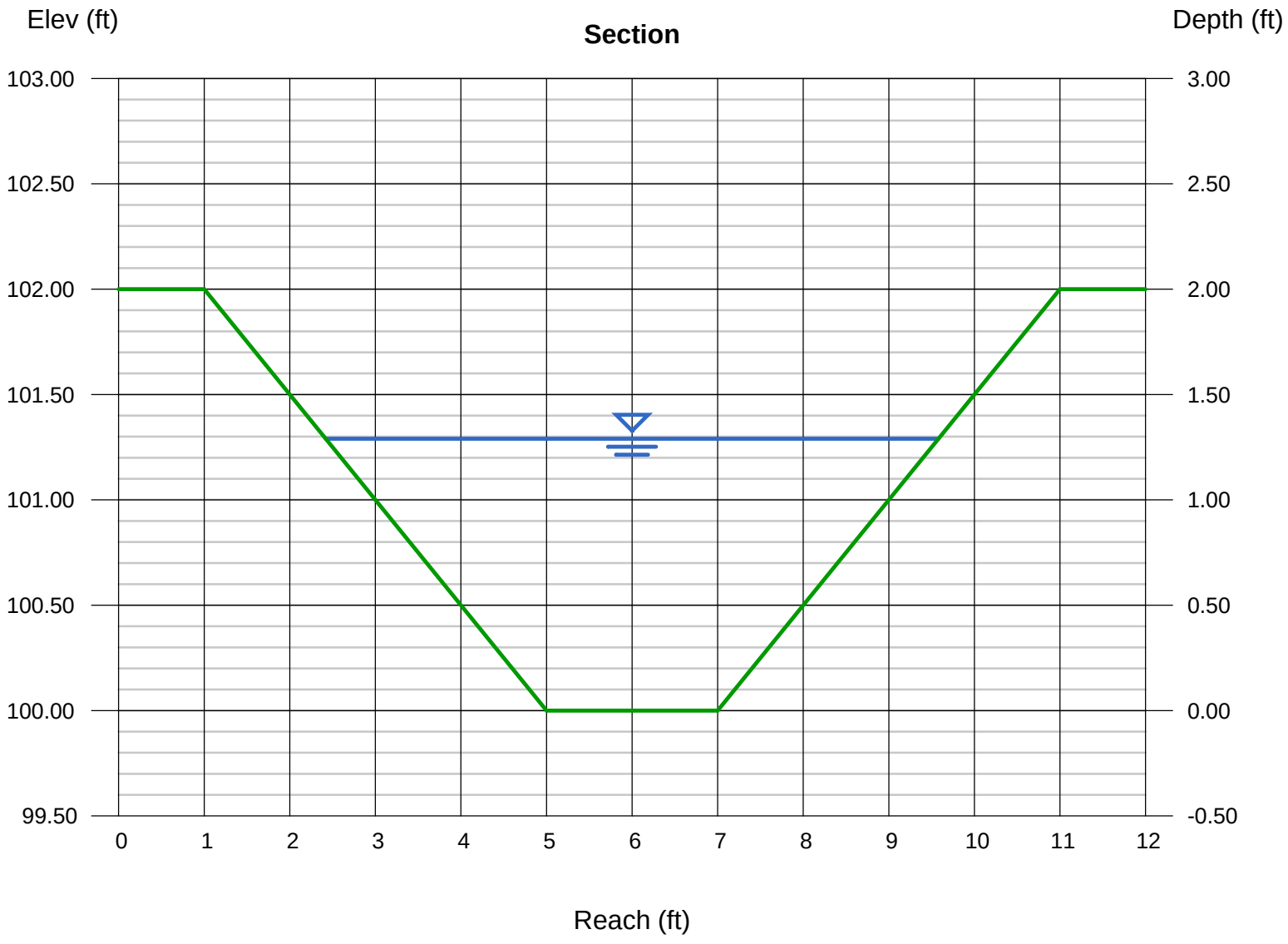
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.50
N-Value	= 0.033

Calculations

Compute by:	Known Q
Known Q (cfs)	= 15.52

Highlighted

Depth (ft)	= 1.29
Q (cfs)	= 15.52
Area (sqft)	= 5.91
Velocity (ft/s)	= 2.63
Wetted Perim (ft)	= 7.77
Crit Depth, Yc (ft)	= 0.92
Top Width (ft)	= 7.16
EGL (ft)	= 1.40



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Jan 29 2024

DIVERSION #2A

Trapezoidal

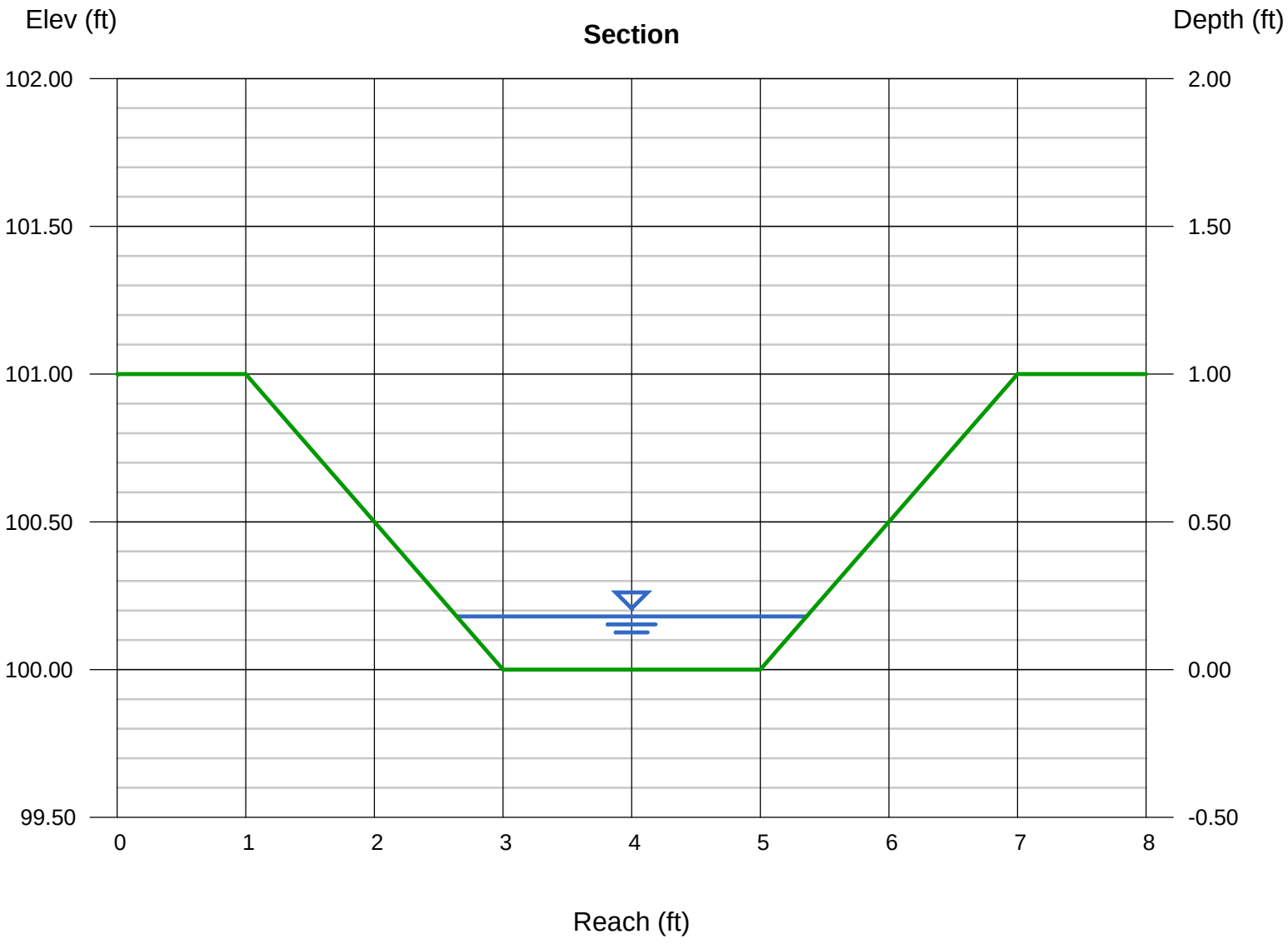
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.50
N-Value	= 0.033

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.36

Highlighted

Depth (ft)	= 0.18
Q (cfs)	= 0.360
Area (sqft)	= 0.42
Velocity (ft/s)	= 0.85
Wetted Perim (ft)	= 2.80
Crit Depth, Yc (ft)	= 0.10
Top Width (ft)	= 2.72
EGL (ft)	= 0.19



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Mar 25 2024

DIVERSION # 2B

Trapezoidal

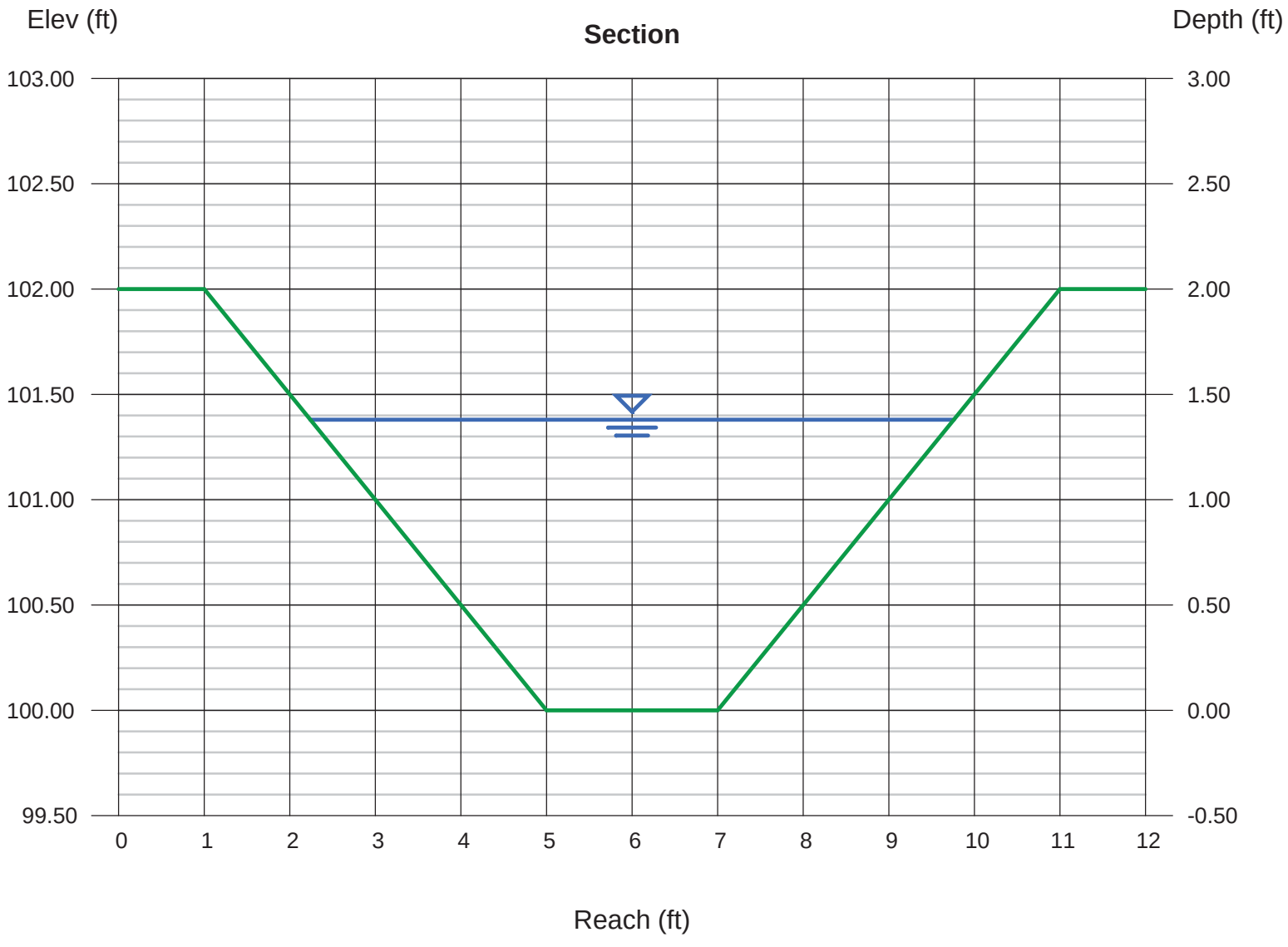
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 2.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.50
N-Value	= 0.033

Calculations

Compute by:	Known Q
Known Q (cfs)	= 18.05

Highlighted

Depth (ft)	= 1.38
Q (cfs)	= 18.05
Area (sqft)	= 6.57
Velocity (ft/s)	= 2.75
Wetted Perim (ft)	= 8.17
Crit Depth, Yc (ft)	= 0.99
Top Width (ft)	= 7.52
EGL (ft)	= 1.50



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Jan 29 2024

DIVERSION #3A

Trapezoidal

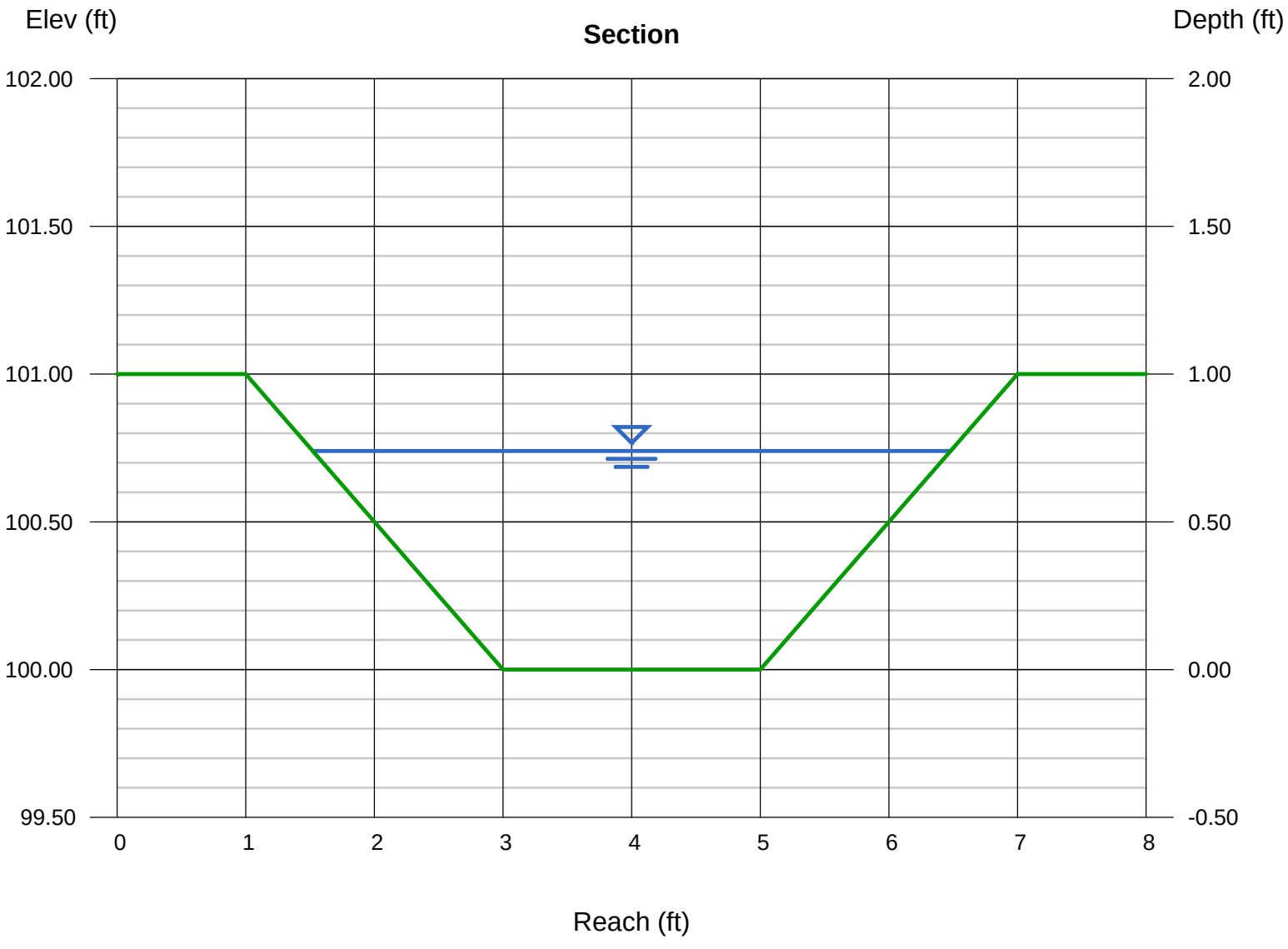
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.50
N-Value	= 0.033

Calculations

Compute by:	Known Q
Known Q (cfs)	= 5.05

Highlighted

Depth (ft)	= 0.74
Q (cfs)	= 5.050
Area (sqft)	= 2.58
Velocity (ft/s)	= 1.96
Wetted Perim (ft)	= 5.31
Crit Depth, Yc (ft)	= 0.50
Top Width (ft)	= 4.96
EGL (ft)	= 0.80



Channel Report

DIVERSION #3B

Trapezoidal

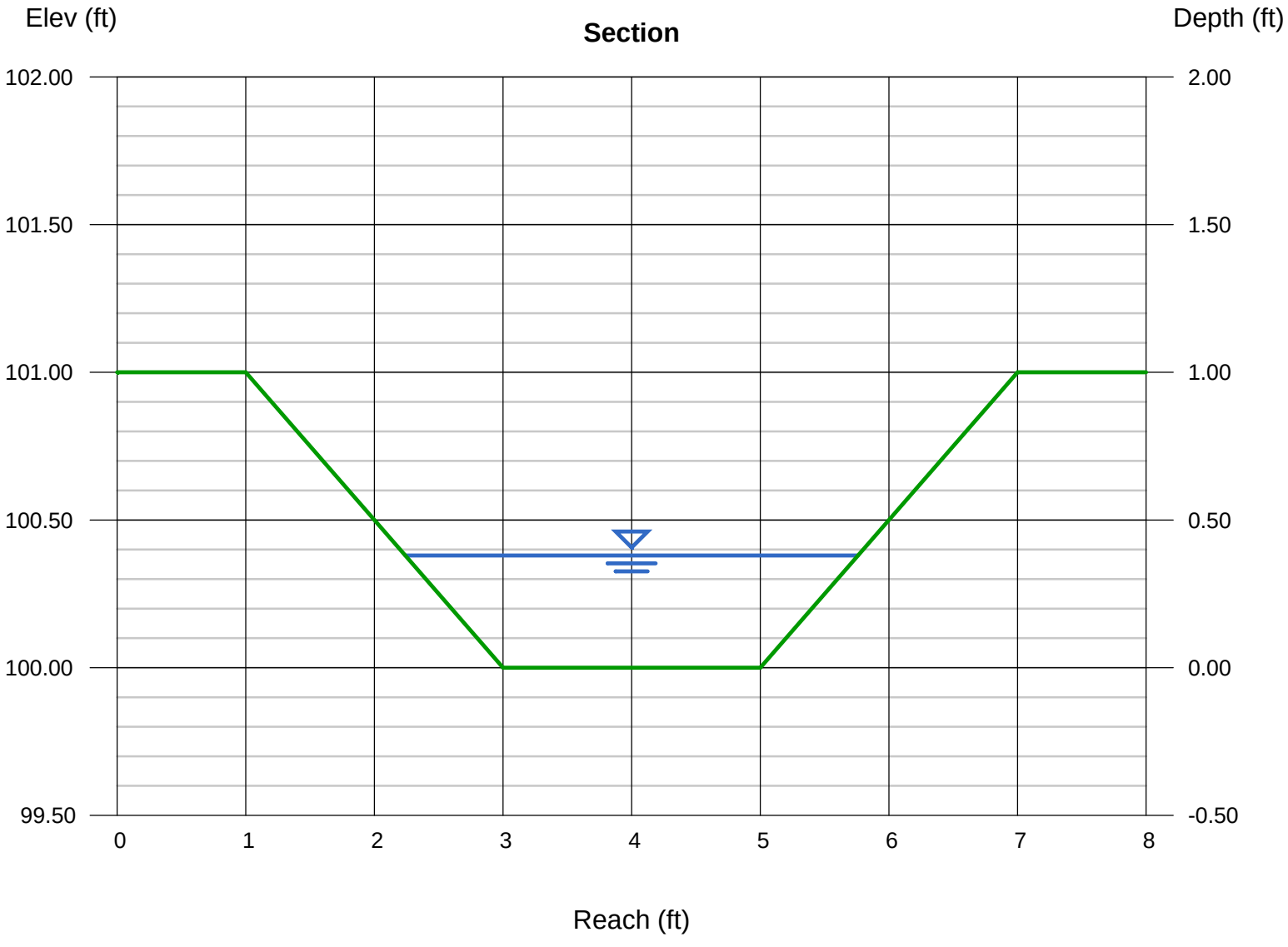
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.50
N-Value	= 0.033

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.44

Highlighted

Depth (ft)	= 0.38
Q (cfs)	= 1.440
Area (sqft)	= 1.05
Velocity (ft/s)	= 1.37
Wetted Perim (ft)	= 3.70
Crit Depth, Yc (ft)	= 0.24
Top Width (ft)	= 3.52
EGL (ft)	= 0.41



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Jan 29 2024

DIVERSION #4A

Trapezoidal

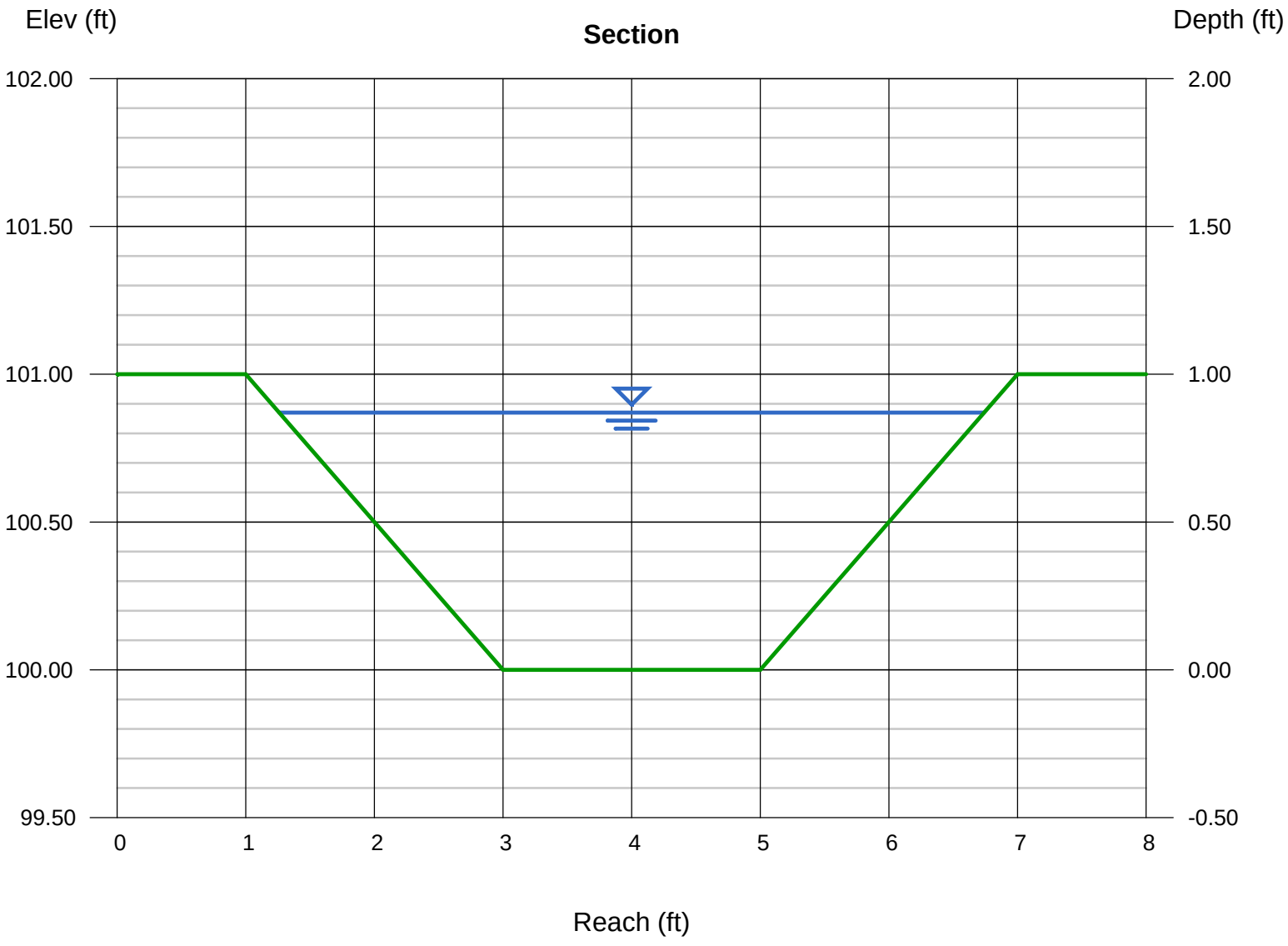
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.50
N-Value	= 0.033

Calculations

Compute by:	Known Q
Known Q (cfs)	= 6.86

Highlighted

Depth (ft)	= 0.87
Q (cfs)	= 6.860
Area (sqft)	= 3.25
Velocity (ft/s)	= 2.11
Wetted Perim (ft)	= 5.89
Crit Depth, Yc (ft)	= 0.59
Top Width (ft)	= 5.48
EGL (ft)	= 0.94



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Jan 29 2024

DIVERSION #4B

Trapezoidal

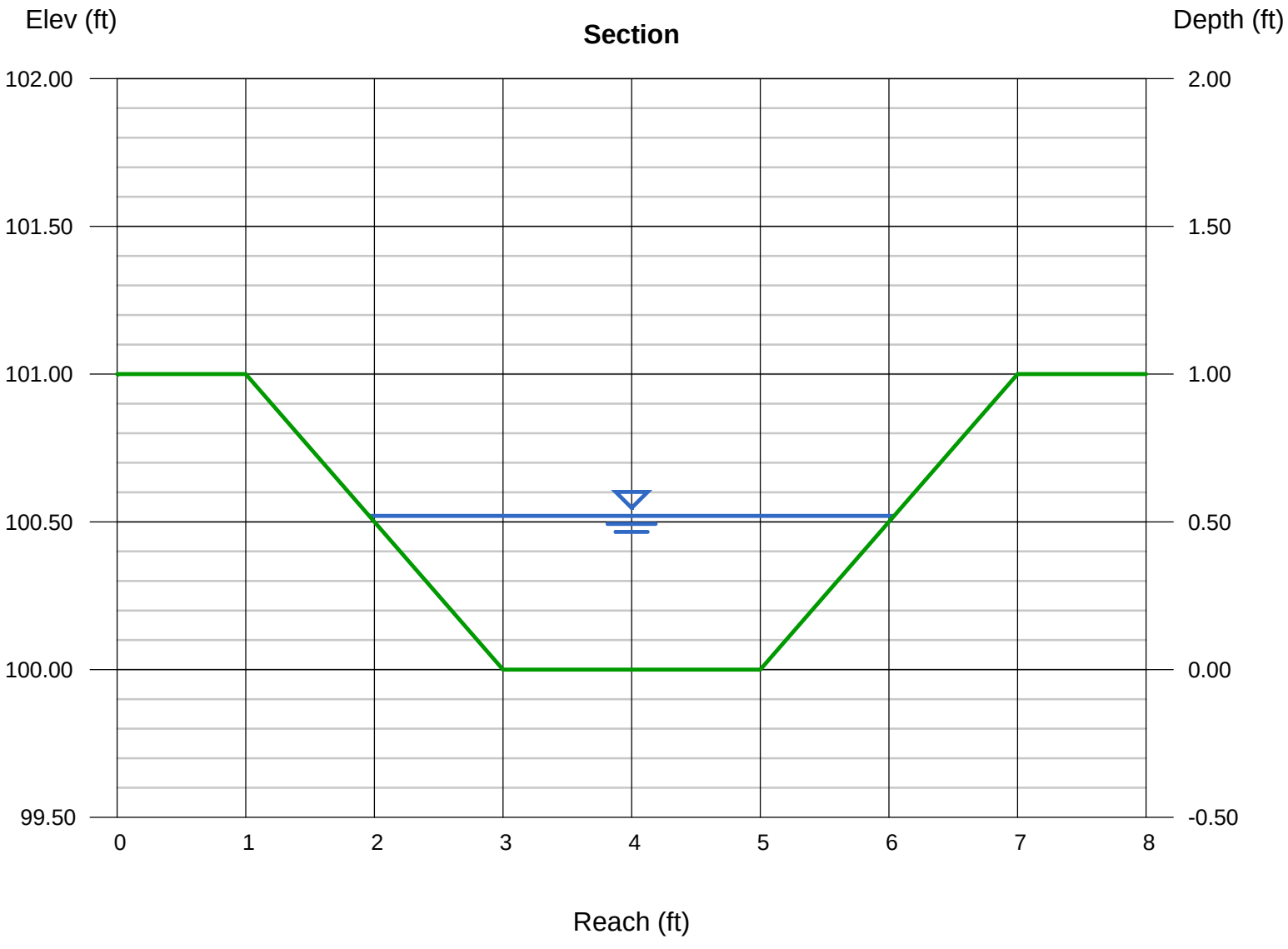
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.50
N-Value	= 0.033

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.53

Highlighted

Depth (ft)	= 0.52
Q (cfs)	= 2.530
Area (sqft)	= 1.58
Velocity (ft/s)	= 1.60
Wetted Perim (ft)	= 4.33
Crit Depth, Yc (ft)	= 0.33
Top Width (ft)	= 4.08
EGL (ft)	= 0.56



Appendix K
Energy Dissipater Calculations

PLD

Energy Dissipaters

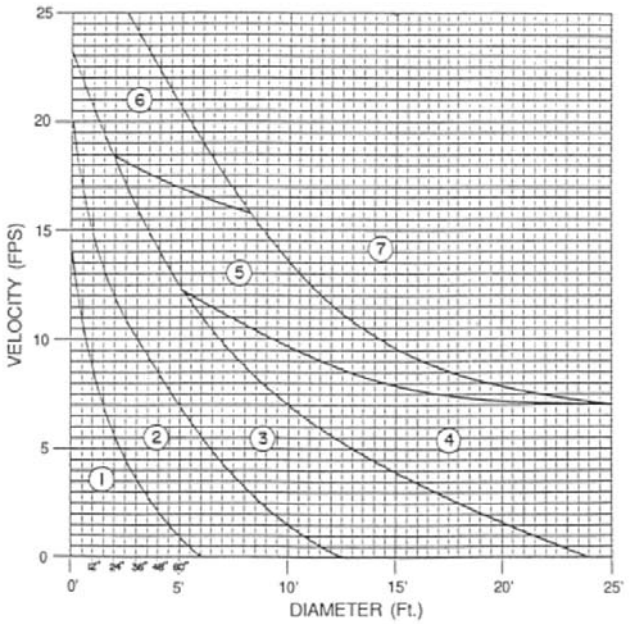


Figure 8.06c

ZONE	APRON MATERIAL	LENGTH OF APRON	
		TO PROTECT CULVERT L1	TO PREVENT SCOUR HOLE USE L2 ALWAYS L2
1	STONE FILLING (FINE) CL. A	3 X D_0	4 x D_0
2	STONE FILLING (LIGHT) CL. B	3 X D_0	6 x D_0
3	STONE FILLING (MEDIUM) CL. 1	4 X D_0	8 x D_0
4	STONE FILLING (HEAVY) CL. 1	4 X D_0	8 x D_0
5	STONE FILLING (HEAVY) CL. 2	5 X D_0	10 x D_0
6	STONE FILLING (HEAVY) CL. 2	6 X D_0	10 x D_0
7	SPECIAL STUDY REQUIRED (ENERGY DISSIPATORS, STILLING BASIN OR LARGER SIZE STONE).		

Figure 8.06d

Width = 3 times pipe dia. (min.)

	Diameter (inches)	Manning's "n"	Min. thickness of lining	(inches)
Fine	3	0.031	9	12
Light	6	0.035	12	18
Medium	13	0.040	18	24
Heavy	23	0.044	30	36
			(Channels)	(Dissapators)

Required Energy Dissipater type/Dimensions

	Diameter	Velocity			APRON DIMENSIONS		
Outlet	(inches)	(fps)	Zone	Rip-Rap	Lengh (ft)	Width (ft)	Thickness (in)
1	24	5.38	2	Class B	12	6	18
8	15	5.7	2	Class B	8	4	18
10	15	4.15	2	Class B	8	4	18
12	15	4.13	2	Class B	8	4	18
14	24	6.13	2	Class B	12	6	18
15	30	6.8	2	Class B	15	8	18
44	30	5.92	2	Class B	15	8	18
78	15	9.63	2	Class B	8	4	18
80	30	6.31	2	Class B	15	8	18