

DRAINAGE REPORT FOR:

SARTA TRANSIT CENTER

**TOMMY HENDRICH DR NW
MASSILLON, OH 44647**

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RLB #13064.12

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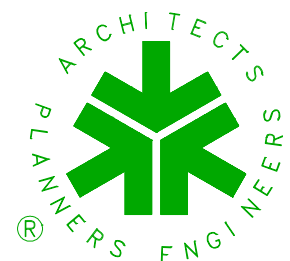


Table of Contents

1. Summary

- 1.1 Introduction
- 1.2 Stormwater Quantity Control
- 1.3 Stormwater Quality Control
- 1.4 Temporary Sediment Basin
- 1.5 Conclusion
- 1.6 Hydrologic Soil Group Map
- 1.7 NOAA Atlas 14, Volume 2, Version3 – Point Precipitation
- 1.8 TR-55 Urban Hydrology for Small Watersheds, Table 2-2a

2. Stormwater Management Analysis

- 2.1 TR-55 Tc Worksheet
- 2.2 Hydrograph Return Period Recap
- 2.3 Hydrograph Summary Reports (1 thru 100-Year)
- 2.4 Existing Hydrographs (1 thru 100-Year)
- 2.5 Developed Hydrographs (1 thru 100-Year)
- 2.6 Routed Hydrographs (1 thru 100-Year)
- 2.7 Pond Report (Stage / Storage / Discharge Table)

3. Exhibits

- 3.1 Drawing C1.1 – SWP3 Cover Sheet
- 3.2 Drawing C1.2 – SWP3 Phase 1-Construction Site Runoff Control Plan
- 3.3 Drawing C1.5 – SWP3 Phase 2-Post-Construction BMPs
- 3.4 Drawing C1.6 – SWP3 Phase 2-Post-Construction BMPs
- 3.5 Drawing C2.1 – Site Layout Plan
- 3.6 Drawing C4.1 – Site Utility Plan
- 3.7 Drawing C6.1 – Site Utility Details
- 3.8 Drawing C6.2 – Site Utility Details
- 3.9 Drawing D1.1 – Detention Pond Drainage Area Map
- 3.10 Drawing D1.2 – Storm Sewer Drainage Area Map
- 3.11 Drawing D1.3 – Storm Sewer Main Capacity Analysis
- 3.12 Storm Sewer Calculations (Plan View, Tabulation, & Profile)

SUMMARY

**STORMWATER MANAGEMENT
SARTA TRANSIT CENTER
MASSILLON, OHIO
RLB #13064.12**

1.1 Introduction

The new SARTA Transit Center will be located at on Tommy Hendrich Dr NW in Massillon, Stark County, Ohio. The site is partially located on parcels 10003717 and 10003719 which are being combined as part of this project. The site is bound by State Route 21 to the north and west, Tommy Hendrich Dr NW to the east, and a commercial retail outlet building to the south. The 1.512 acre site is vacant and partially covered by an abandoned asphalt parking lot. SARTA recently erected a temporary bus shelter on site which is being utilized while the permanent transit SARTA is being developed.

The existing topography of the site generally slopes from north to south with an approximate elevation difference of 2 feet. The existing site is tributary to the Tuscarawas River, which discharges into the Muskingham River, which discharges into the Ohio River.

The proposed improvements include a 5,565 SF single story bus transit center building, a bus drive loop around the building, a 10-space parking lot to the north, and associated drive aisles, aprons, and pedestrian hardscape. Approximately 0.55 Acres of impervious surface will be added due to the improvements. A stormwater management system consisting of site grading, curbs, pavement, extended dry detention pond, and drainage piping has been developed to safely capture, store, and convey runoff through the site.

Stormwater management is a device for controlling stormwater runoff for the purpose of reducing the negative effects of urbanization, including downstream erosion, flooding, and degradation of water resources. Stormwater discharge from the site will be controlled in accordance with current local requirements and the Ohio Environmental Protection Agency (OEPA) National Pollutant Discharge Elimination System (NPDES) General Permit No. OHC000005 for Construction activity.

1.2 Stormwater Quantity Control

According to the local criteria, "the post-development rate of runoff is not permitted to exceed the predevelopment rate of runoff". To meet these requirements, the project will incorporate a dry extended detention basin located on northwest portion of the site.

Description	Tributary Area (ac.)	Percent Impervious	Run-Off Curve Number	Time of Concentration (min.)
Pre-Developed	0.12	0	80	5
Post-Developed	1.00	64	92	19

Table 1 Tributary Area Characteristics

The stormwater management analysis is based on the tributary area characteristics shown in Table 1 shown above and on attached Drawing D1.1-Detention Pond Drainage Area Map.

Existing and proposed run-off curve numbers are based on factors such as hydrologic soil groups (HSG), and ground cover type and condition. The HSG was determined from the USDA NRCS Web Soil Survey (see attached map). Run-off curve numbers were estimated based on Table 2-2a from 'TR-55 NRCS USDA Urban Hydrology for Small Watersheds, 1986'. The percent impervious represents the percent of building, pavement and other impervious surfaces that restricted restrict

infiltration of rainfall into the ground. These estimates are shown on attached Drawing D1.2-Storm Sewer Drainage Area Map.

The Time of Concentration (Tc) is the time for run-off to travel from the hydraulically most remote point of the watershed to the outlet, and is affected by such factors as slope, conveyance type, and surface roughness. The path used to estimate the pre-developed Tc is shown on attached Drawing D1.1. The Hydraflow Hydrographs software program was used to calculate the pre-developed Tc and is shown in the attached 'TR55 Tc Worksheet', using the equations shown below. The post-developed Tc was obtained from the attached proposed Storm Sewer Calculations

Sheet Flow $T_t = (0.007 (nL)^{0.8}) / ((P_2)^{0.5} S^{0.4})$ T _t =travel time (hr) n=Manning's roughness coefficient (table 3-1) L=flow length (ft) P ₂ =2-year, 24-hr rainfall (in) s=slope of hydraulic grade line (land slope, ft/ft)	
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Table 2 Time of Concentration (Tc) Equations

The following is a summary of results of the storm water management analysis performed, based on the proposed extended dry detention pond and outlet control structure. As shown below, the post-development discharge rate is less than the pre-development runoff rate for each storm frequency.

Storm Frequency	Pre-Developed Peak Flow	Developed Peak Flow (cfs)	Routed Peak Flow	Storage Volume Required (cf)	Max. Water Elevation (ft)
	(cfs)		(cfs)		
1-Year	0.119	1.474	0.017	3,859	930.53
2-Year	0.173	1.886	0.019	5,069	930.91
5-Year	0.261	2.507	0.022	6,964	931.38
10-Year	0.341	3.045	0.024	8,654	931.78
25-Year	0.469	3.850	0.099	9,846	932.05
50-Year	0.582	4.537	0.257	10,259	932.12
100-Year	0.709	5.292	0.635	10,936	932.25

Table 3 Runoff Summary

1.3 Stormwater Quality Control

Storm water quality will be provided in the dry extended detention basin conforming to OEPA and local requirements. Discharge from the extended detention basin will be controlled by a water quality orifice, which will discharge the required water quality volume over the required minimum drain time. See attached Drawings C1.6, C4.1, & C6.1 for additional basin and outlet control structure information. See attached Hydraflow Hydrographs for additional water elevation and drain time information. The required Water Quality Volume (WQv) was calculated as follows:

OEPA Permit OHC000005 (4/23/18-4/22/23) – Water Quality Volume Calculation for Previously Developed Areas

$$WQv = P \cdot A \cdot [(Rv1 \cdot 0.2) + (Rv2 - Rv1)] / 12$$

$Rv = 0.05 + 0.9i$ (volumetric runoff coefficient)

P = precipitation depth (0.90 in)

A = area draining into the BMP (1.51 ac)

$Rv1 = 0.05 + 0.9(0.23) = 0.25$ (Pre-Development)

$Rv2 = 0.05 + 0.9(0.64) = 0.63$ (Post-Development)

$$WQv = 0.90 \cdot 1.51 \cdot [(0.25 \cdot 0.2) + (0.64 - 0.25)] / 12 = 0.05 \text{ Acre-FT} = 2,121 \text{ CF}$$

Note: WQv should be increased by 20% for capacity lost over time due to sediment accumulation.

See attached Drawing C1.6 for orifice sizing and drain times summary. As required for dry extended detention basins, a fore bay and micro pool will be provided, each sized at a minimum 10% of the WQv. Following is a summary of WQv:

	Required	Provided
Water Quality Volume (WQv)	2,121 cf	3,077 cf
Water Quality Volume + 20%	2,546 cf	3,077 cf
Sediment Storage (20%)	509 cf	509 cf
Forebay (10% WQv)	255 cf	608 cf
Micropool (10% WQv)	255 cf	302 cf
Drain Time	48 hours	51 hours

Table 4 Water Quality Volume (WQv) Data

1.4 Temporary Sediment Trap

The proposed stormwater management basin will be used as a temporary sediment trap during construction to capture and store sediment resulting from construction activity. See attached Drawing C1.1 for temporary sediment trap design data.

1.5 Conclusion


The proposed stormwater management system will control discharge from the areas being developed to satisfy local and OEPA requirements. The post-development peak discharge rates will be controlled to be less than pre-development peak discharge rates by a new outlet control structure. Stormwater quality control will be provided in the proposed dry extended detention basin utilizing a water quality orifice, as well as a fore bay and micro pool. The proposed extended dry detention pond will provide sufficient storage volume to safely store runoff being restricted by the outlet control structures. In the rare circumstance that the water level within the detention basins exceeds the top of bank elevation, an emergency path has been provided for the water to flow safely downstream.

Soil Map—Stark County, Ohio
(SARTA - Massillon Transit Center)



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Stark County, Ohio

Survey Area Data: Version 18, Sep 14, 2021

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

Date(s) aerial images were photographed: Jul 15, 2020—Aug 21, 2020

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Ur	Urban land	1.7	100.0%
Totals for Area of Interest		1.7	100.0%



POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M. Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerals](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.323 (0.295-0.354)	0.385 (0.352-0.422)	0.467 (0.425-0.511)	0.529 (0.481-0.579)	0.608 (0.550-0.664)	0.669 (0.603-0.730)	0.727 (0.653-0.792)	0.786 (0.704-0.857)	0.866 (0.770-0.942)	0.924 (0.817-1.00)
10-min	0.501 (0.458-0.550)	0.602 (0.549-0.659)	0.726 (0.660-0.795)	0.817 (0.742-0.893)	0.930 (0.842-1.02)	1.01 (0.914-1.11)	1.10 (0.983-1.19)	1.17 (1.05-1.28)	1.27 (1.13-1.38)	1.35 (1.19-1.46)
15-min	0.615 (0.561-0.675)	0.736 (0.671-0.806)	0.892 (0.811-0.976)	1.00 (0.913-1.10)	1.15 (1.04-1.25)	1.25 (1.13-1.37)	1.36 (1.22-1.48)	1.46 (1.31-1.59)	1.59 (1.41-1.73)	1.68 (1.49-1.83)
30-min	0.813 (0.743-0.893)	0.985 (0.898-1.08)	1.22 (1.11-1.34)	1.40 (1.27-1.53)	1.62 (1.47-1.77)	1.79 (1.62-1.96)	1.96 (1.76-2.14)	2.13 (1.91-2.32)	2.35 (2.09-2.56)	2.52 (2.23-2.74)
60-min	0.993 (0.907-1.09)	1.21 (1.10-1.32)	1.53 (1.39-1.68)	1.78 (1.61-1.94)	2.11 (1.90-2.30)	2.36 (2.13-2.58)	2.63 (2.36-2.86)	2.89 (2.59-3.15)	3.26 (2.90-3.54)	3.54 (3.13-3.85)
2-hr	1.14 (1.03-1.25)	1.38 (1.25-1.52)	1.78 (1.61-1.96)	2.10 (1.90-2.30)	2.57 (2.31-2.81)	2.96 (2.66-3.24)	3.38 (3.03-3.69)	3.84 (3.42-4.18)	4.50 (3.98-4.89)	5.06 (4.45-5.49)
3-hr	1.21 (1.09-1.33)	1.46 (1.33-1.62)	1.88 (1.70-2.07)	2.22 (2.01-2.45)	2.72 (2.45-2.99)	3.14 (2.81-3.44)	3.60 (3.21-3.94)	4.11 (3.64-4.48)	4.84 (4.26-5.26)	5.46 (4.77-5.92)
6-hr	1.46 (1.32-1.63)	1.76 (1.59-1.96)	2.24 (2.02-2.49)	2.64 (2.38-2.93)	3.24 (2.91-3.59)	3.75 (3.35-4.14)	4.32 (3.83-4.75)	4.94 (4.36-5.42)	5.86 (5.12-6.41)	6.65 (5.76-7.26)
12-hr	1.73 (1.57-1.93)	2.08 (1.89-2.32)	2.61 (2.37-2.91)	3.08 (2.78-3.42)	3.77 (3.39-4.18)	4.37 (3.91-4.83)	5.04 (4.48-5.55)	5.78 (5.10-6.34)	6.89 (6.02-7.53)	7.84 (6.80-8.56)
24-hr	2.04 (1.86-2.24)	2.44 (2.23-2.69)	3.04 (2.78-3.35)	3.56 (3.25-3.91)	4.34 (3.93-4.76)	5.01 (4.51-5.48)	5.75 (5.13-6.28)	6.57 (5.81-7.18)	7.80 (6.79-8.51)	8.85 (7.60-9.66)
2-day	2.35 (2.16-2.58)	2.81 (2.58-3.08)	3.46 (3.18-3.80)	4.02 (3.68-4.41)	4.85 (4.41-5.31)	5.56 (5.02-6.08)	6.33 (5.67-6.93)	7.17 (6.36-7.85)	8.41 (7.35-9.22)	9.46 (8.15-10.4)
3-day	2.51 (2.32-2.75)	3.00 (2.76-3.27)	3.68 (3.38-4.01)	4.25 (3.90-4.63)	5.08 (4.64-5.54)	5.79 (5.25-6.30)	6.55 (5.90-7.13)	7.37 (6.58-8.03)	8.58 (7.56-9.36)	9.62 (8.37-10.5)
4-day	2.68 (2.47-2.91)	3.19 (2.94-3.46)	3.89 (3.59-4.22)	4.47 (4.11-4.85)	5.32 (4.87-5.76)	6.01 (5.48-6.52)	6.76 (6.12-7.33)	7.56 (6.80-8.20)	8.75 (7.77-9.51)	9.77 (8.59-10.7)
7-day	3.20 (2.97-3.46)	3.81 (3.53-4.11)	4.60 (4.26-4.97)	5.26 (4.87-5.68)	6.21 (5.71-6.70)	6.99 (6.40-7.54)	7.82 (7.11-8.43)	8.69 (7.86-9.38)	9.93 (8.88-10.7)	10.9 (9.70-11.8)
10-day	3.69 (3.43-3.97)	4.37 (4.07-4.70)	5.23 (4.87-5.63)	5.93 (5.51-6.37)	6.90 (6.39-7.41)	7.69 (7.08-8.25)	8.49 (7.79-9.12)	9.33 (8.51-10.0)	10.5 (9.49-11.3)	11.4 (10.2-12.3)
20-day	5.15 (4.83-5.49)	6.08 (5.71-6.49)	7.17 (6.72-7.66)	8.02 (7.51-8.57)	9.15 (8.54-9.77)	10.0 (9.33-10.7)	10.9 (10.1-11.6)	11.7 (10.9-12.6)	12.9 (11.8-13.8)	13.7 (12.6-14.7)
30-day	6.46 (6.06-6.87)	7.61 (7.15-8.10)	8.87 (8.32-9.44)	9.83 (9.21-10.5)	11.1 (10.4-11.8)	12.1 (11.2-12.8)	13.0 (12.1-13.8)	13.9 (12.9-14.8)	15.0 (13.9-16.0)	15.9 (14.6-17.0)
45-day	8.26 (7.79-8.76)	9.69 (9.14-10.3)	11.1 (10.5-11.8)	12.2 (11.5-13.0)	13.6 (12.8-14.4)	14.6 (13.7-15.5)	15.6 (14.6-16.6)	16.5 (15.4-17.5)	17.7 (16.4-18.8)	18.5 (17.2-19.7)
60-day	9.99 (9.45-10.5)	11.7 (11.1-12.3)	13.3 (12.6-14.1)	14.5 (13.8-15.3)	16.0 (15.2-16.9)	17.1 (16.2-18.1)	18.2 (17.1-19.2)	19.1 (18.0-20.2)	20.2 (19.0-21.5)	21.0 (19.7-22.3)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

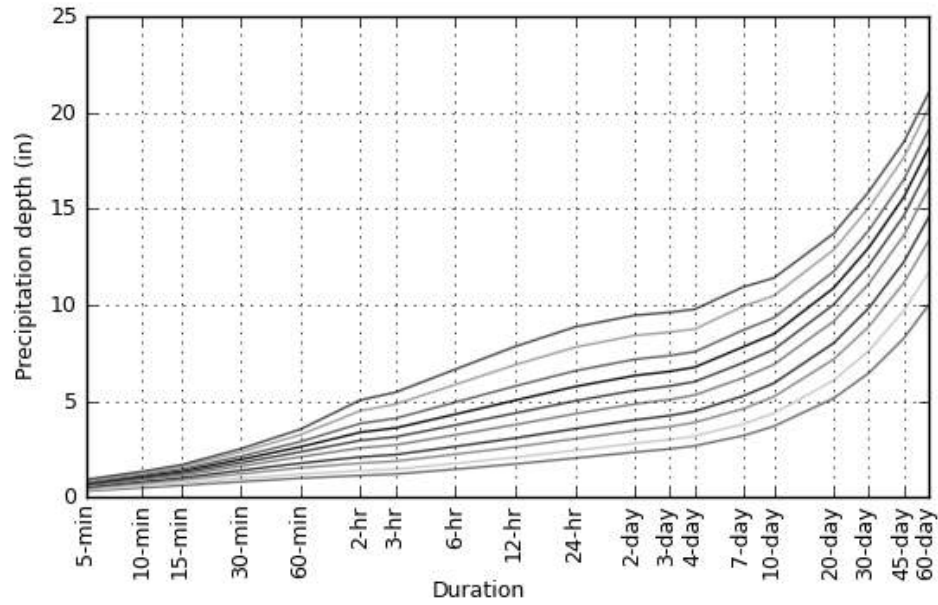
Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)

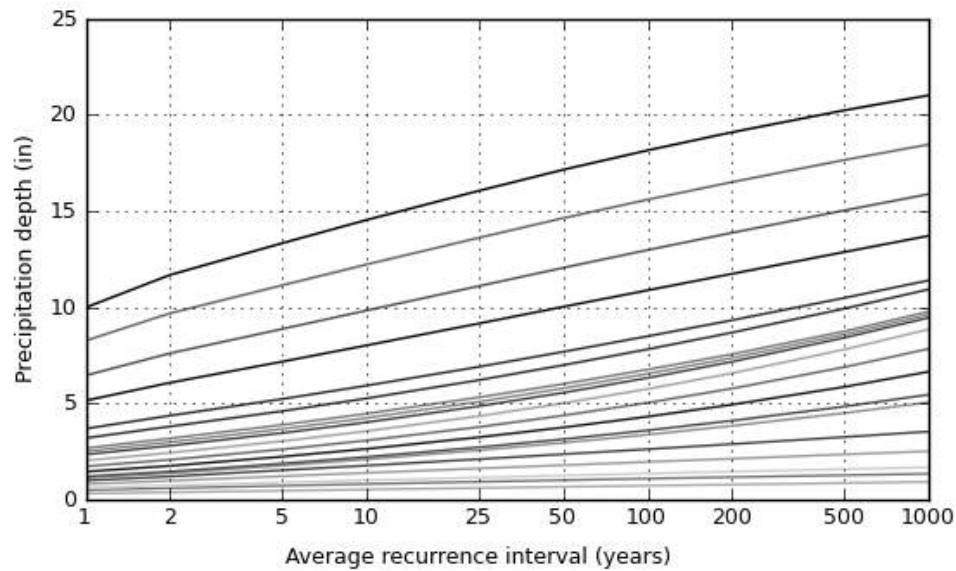
PF graphical

PDS-based depth-duration-frequency (DDF) curves

Latitude: 40.7965°, Longitude: -81.5277°



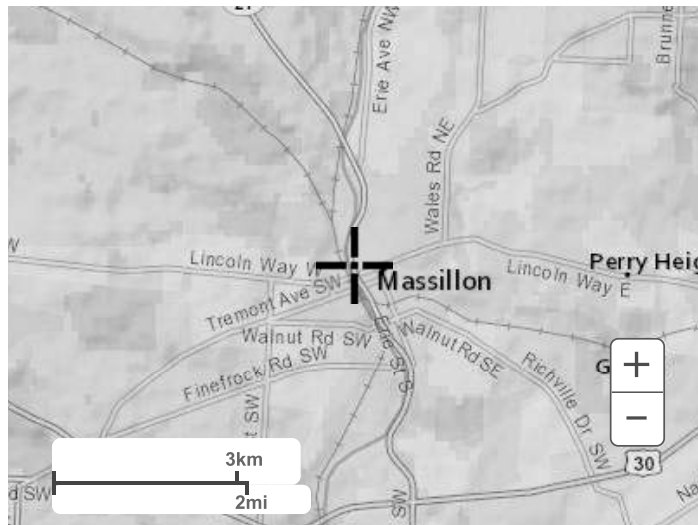
Average recurrence interval (years)
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5
10
25
50
100
200
500
1000



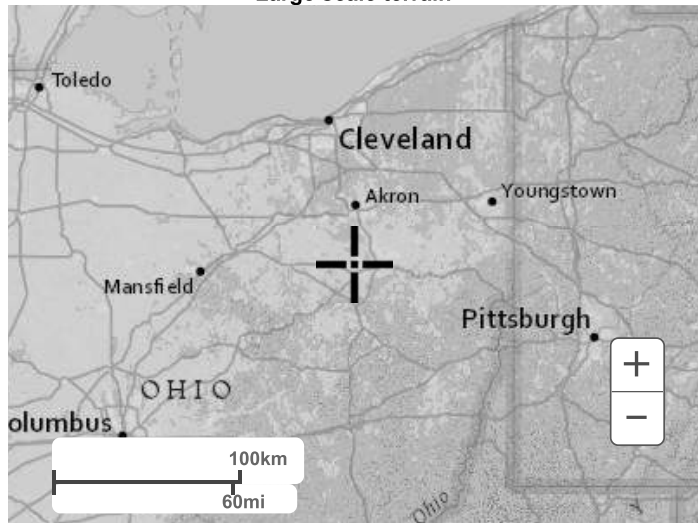
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15-min	4-day
30-min	7-day
60-min	10-day
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3-hr	30-day
6-hr	45-day
12-hr	60-day
24-hr	

Maps & aerials

Small scale terrain



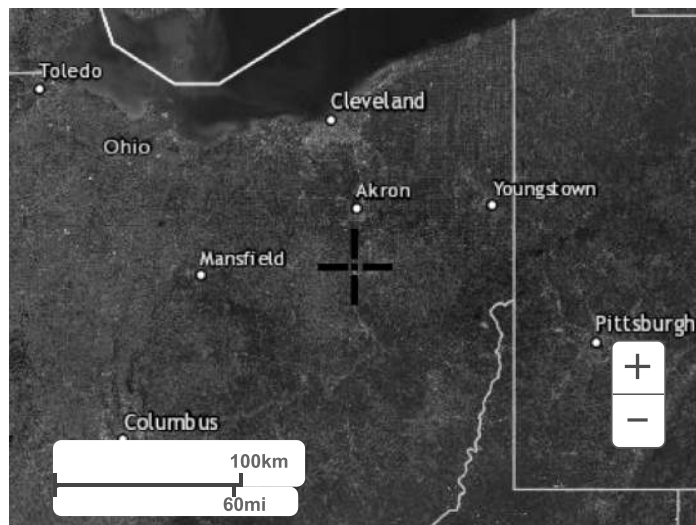
Large scale terrain



Large scale map



Large scale aerial



[Back to Top](#)

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1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

[Disclaimer](#)

Hydraflow Rainfall Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Tuesday, 12 / 6 / 2022

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	41.2648	9.8000	0.8779	-----
2	49.3678	10.1000	0.8726	-----
3	0.0000	0.0000	0.0000	-----
5	50.4399	9.4000	0.8244	-----
10	50.5524	8.8000	0.7909	-----
25	44.3016	7.1000	0.7238	-----
50	42.9511	6.3000	0.6918	-----
100	39.5863	5.3000	0.6488	-----

File name: Massillon Rain Intensity.IDF

$$\text{Intensity} = B / (T_c + D)^E$$

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	3.87	3.00	2.46	2.10	1.83	1.63	1.47	1.34	1.23	1.14	1.06	0.99
2	4.62	3.60	2.96	2.53	2.21	1.97	1.78	1.62	1.49	1.38	1.29	1.21
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	5.59	4.38	3.62	3.11	2.73	2.44	2.21	2.02	1.87	1.74	1.63	1.53
10	6.34	4.97	4.12	3.54	3.12	2.80	2.54	2.34	2.16	2.02	1.89	1.78
25	7.29	5.68	4.71	4.07	3.60	3.24	2.96	2.73	2.53	2.37	2.23	2.11
50	8.03	6.23	5.18	4.47	3.97	3.58	3.27	3.03	2.82	2.64	2.49	2.36
100	8.72	6.74	5.61	4.87	4.33	3.92	3.60	3.33	3.12	2.93	2.77	2.63

Tc = time in minutes. Values may exceed 60.

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[illegible]

Table 2-2a Runoff curve numbers for urban areas ^{1/}

Cover description		Curve numbers for hydrologic soil group			
Cover type and hydrologic condition	Average percent impervious area ^{2/}	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) ^{3/} :					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) ^{4/}		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas					
(pervious areas only, no vegetation) ^{5/}		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

¹ Average runoff condition, and $I_a = 0.2S$.² The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.³ CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.⁴ Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.⁵ Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2b Runoff curve numbers for cultivated agricultural lands ^{1/}

Cover description			Curve numbers for hydrologic soil group			
Cover type	Treatment ^{2/}	Hydrologic condition ^{3/}	A	B	C	D
Fallow	Bare soil	—	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
Close-seeded or broadcast legumes or rotation meadow	C&T+ CR	Poor	60	71	78	81
		Good	58	69	77	80
	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

¹ Average runoff condition, and $I_a=0.2S$ ² Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.³ Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good $\geq 20\%$), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

Table 2-2c Runoff curve numbers for other agricultural lands ^{1/}

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. ^{2/}	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. ^{3/}	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 ^{4/}	48	65	73
Woods—grass combination (orchard or tree farm). ^{5/}	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. ^{6/}	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 ^{4/}	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

¹ Average runoff condition, and $I_a = 0.2S$.² **Poor:** <50% ground cover or heavily grazed with no mulch.**Fair:** 50 to 75% ground cover and not heavily grazed.**Good:** > 75% ground cover and lightly or only occasionally grazed.³ **Poor:** <50% ground cover.**Fair:** 50 to 75% ground cover.**Good:** >75% ground cover.⁴ Actual curve number is less than 30; use CN = 30 for runoff computations.⁵ CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.⁶ **Poor:** Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.**Fair:** Woods are grazed but not burned, and some forest litter covers the soil.**Good:** Woods are protected from grazing, and litter and brush adequately cover the soil.

Table 2-2d Runoff curve numbers for arid and semiarid rangelands ^{1/}

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition ^{2/}	A ^{3/}	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

¹ Average runoff condition, and $I_a = 0.2S$. For range in humid regions, use table 2-2c.² Poor: <30% ground cover (litter, grass, and brush overstory).

Fair: 30 to 70% ground cover.

Good: > 70% ground cover.

³ Curve numbers for group A have been developed only for desert shrub.

PART 2

STORMWATER MANAGEMENT ANALYSIS

TR55 Tc Worksheet

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Hyd. No. 1

Pre-Development

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>			
Sheet Flow							
Manning's n-value	= 0.150	0.011	0.011				
Flow length (ft)	= 38.0	0.0	0.0				
Two-year 24-hr precip. (in)	= 2.35	0.00	0.00				
Land slope (%)	= 2.30	0.00	0.00				
Travel Time (min)	= 4.99	+	0.00	+	0.00	=	4.99
Shallow Concentrated Flow							
Flow length (ft)	= 0.00	0.00	0.00				
Watercourse slope (%)	= 0.00	0.00	0.00				
Surface description	= Paved	Paved	Paved				
Average velocity (ft/s)	=0.00	0.00	0.00				
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00
Channel Flow							
X sectional flow area (sqft)	= 0.00	0.00	0.00				
Wetted perimeter (ft)	= 0.00	0.00	0.00				
Channel slope (%)	= 0.00	0.00	0.00				
Manning's n-value	= 0.015	0.015	0.015				
Velocity (ft/s)	=0.00	0.00	0.00				
Flow length (ft)	(0)0.0	0.0	0.0				
Travel Time (min)	= 0.00	+	0.00	+	0.00	=	0.00
Total Travel Time, Tc				5.00 min			

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

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Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.119	2	718	240	-----	-----	-----	Pre-Development
2	SCS Runoff	1.474	2	724	4,621	-----	-----	-----	Post-Development
3	Reservoir	0.017	2	1448	4,024	2	930.53	3,859	Routed
1306412SWM5.gpw					Return Period: 1 Year			Tuesday, 12 / 6 / 2022	

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.173	2	718	346	-----	-----	-----	Pre-Development
2	SCS Runoff	1.886	2	724	5,945	-----	-----	-----	Post-Development
3	Reservoir	0.019	2	1448	4,754	2	930.91	5,069	Routed
1306412SWM5.gpw					Return Period: 2 Year			Tuesday, 12 / 6 / 2022	

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.261	2	718	523	-----	-----	-----	Pre-Development
2	SCS Runoff	2.507	2	724	7,982	-----	-----	-----	Post-Development
3	Reservoir	0.022	2	1450	5,654	2	931.38	6,964	Routed
1306412SWM5.gpw					Return Period: 5 Year			Tuesday, 12 / 6 / 2022	

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.341	2	718	688	-----	-----	-----	Pre-Development
2	SCS Runoff	3.045	2	724	9,780	-----	-----	-----	Post-Development
3	Reservoir	0.024	2	1452	6,341	2	931.78	8,654	Routed
1306412SWM5.gpw					Return Period: 10 Year			Tuesday, 12 / 6 / 2022	

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.469	2	716	950	-----	-----	-----	Pre-Development
2	SCS Runoff	3.850	2	724	12,511	-----	-----	-----	Post-Development
3	Reservoir	0.099	2	970	8,377	2	932.05	9,846	Routed
1306412SWM5.gpw					Return Period: 25 Year			Tuesday, 12 / 6 / 2022	

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.582	2	716	1,185	-----	-----	-----	Pre-Development
2	SCS Runoff	4.537	2	724	14,880	-----	-----	-----	Post-Development
3	Reservoir	0.257	2	812	10,736	2	932.12	10,259	Routed
1306412SWM5.gpw					Return Period: 50 Year			Tuesday, 12 / 6 / 2022	

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.709	2	716	1,452	-----	-----	-----	Pre-Development
2	SCS Runoff	5.292	2	724	17,511	-----	-----	-----	Post-Development
3	Reservoir	0.635	2	758	13,359	2	932.25	10,936	Routed
1306412SWM5.gpw					Return Period: 100 Year			Tuesday, 12 / 6 / 2022	

Hydrograph Report

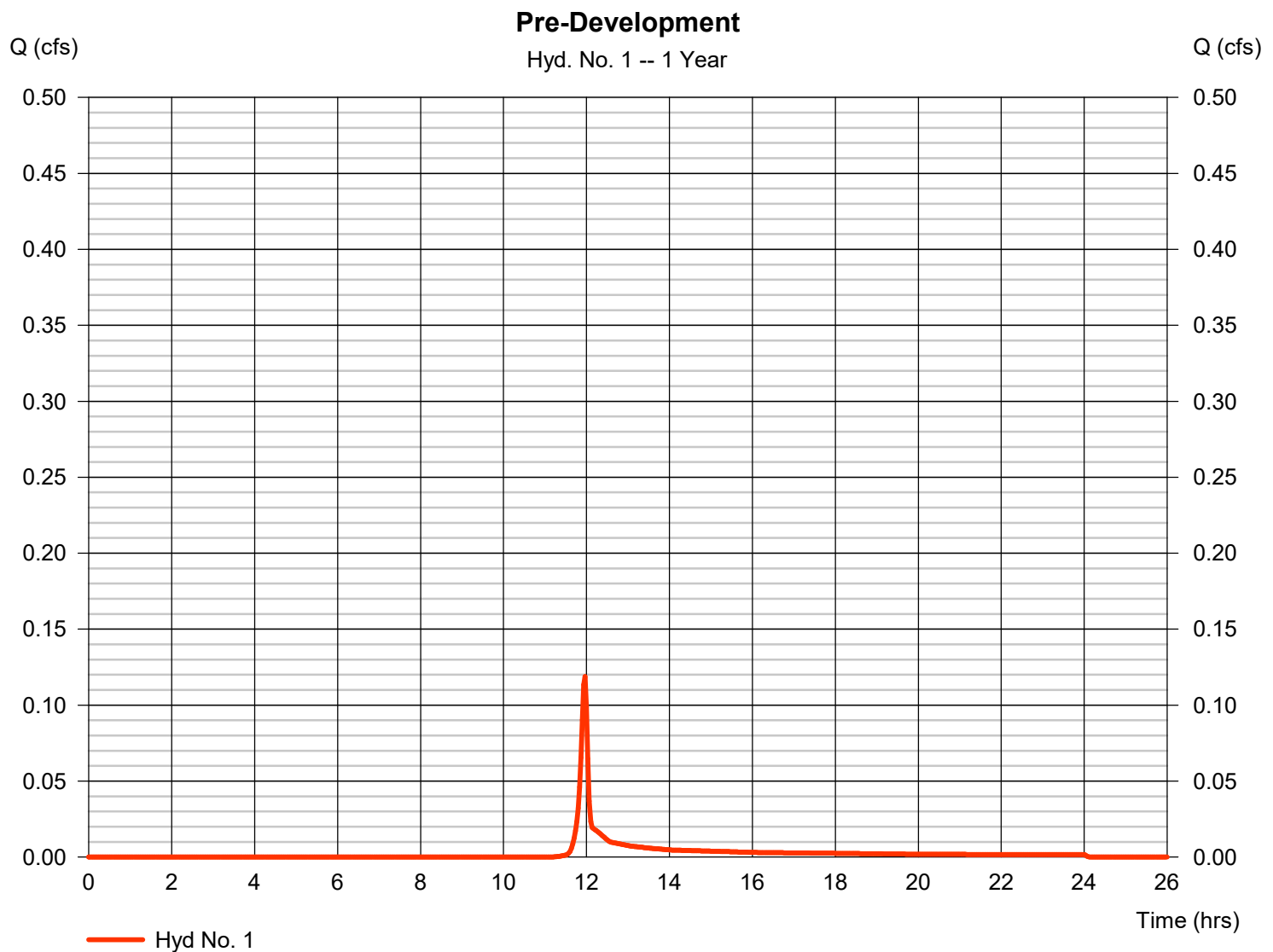
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Tuesday, 12 / 6 / 2022

Hyd. No. 1

Pre-Development

Hydrograph type	= SCS Runoff	Peak discharge	= 0.119 cfs
Storm frequency	= 1 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 240 cuft
Drainage area	= 0.120 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.04 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

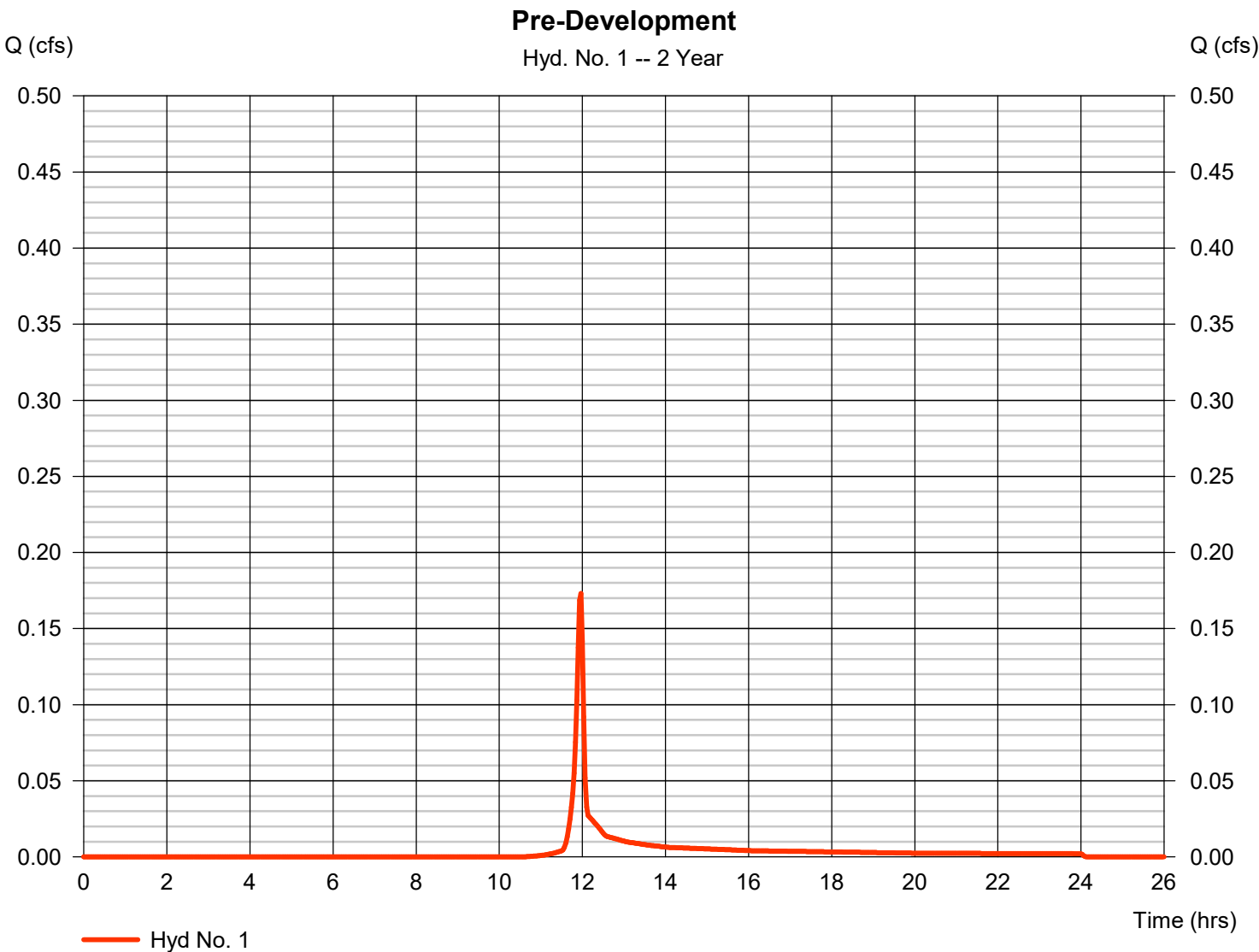


Hydrograph Report

Hyd. No. 1

Pre-Development

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.173 cfs
Storm frequency	=	2 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	346 cuft
Drainage area	=	0.120 ac	Curve number	=	80
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.44 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

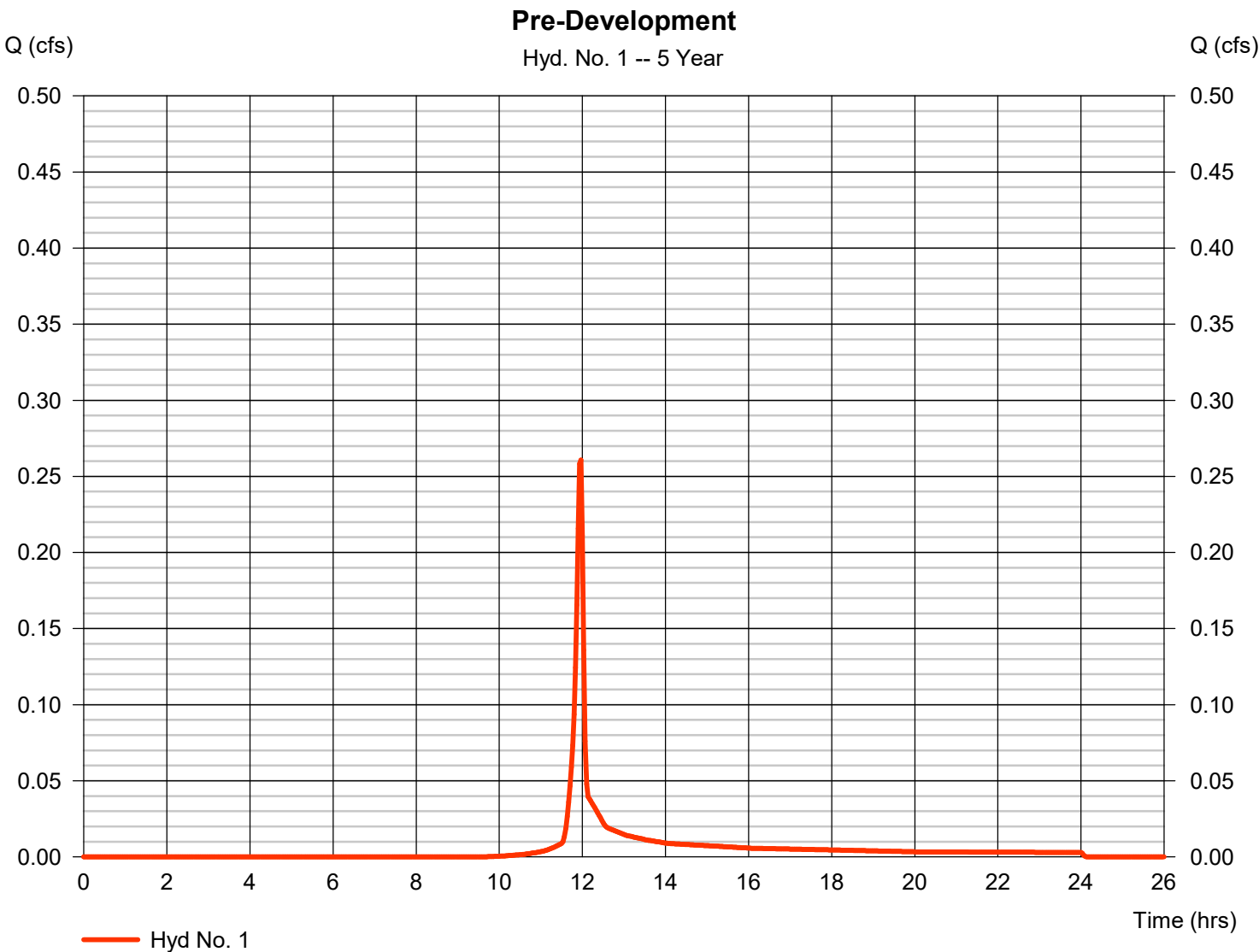


Hydrograph Report

Hyd. No. 1

Pre-Development

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.261 cfs
Storm frequency	=	5 yrs	Time to peak	=	11.97 hrs
Time interval	=	2 min	Hyd. volume	=	523 cuft
Drainage area	=	0.120 ac	Curve number	=	80
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.04 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

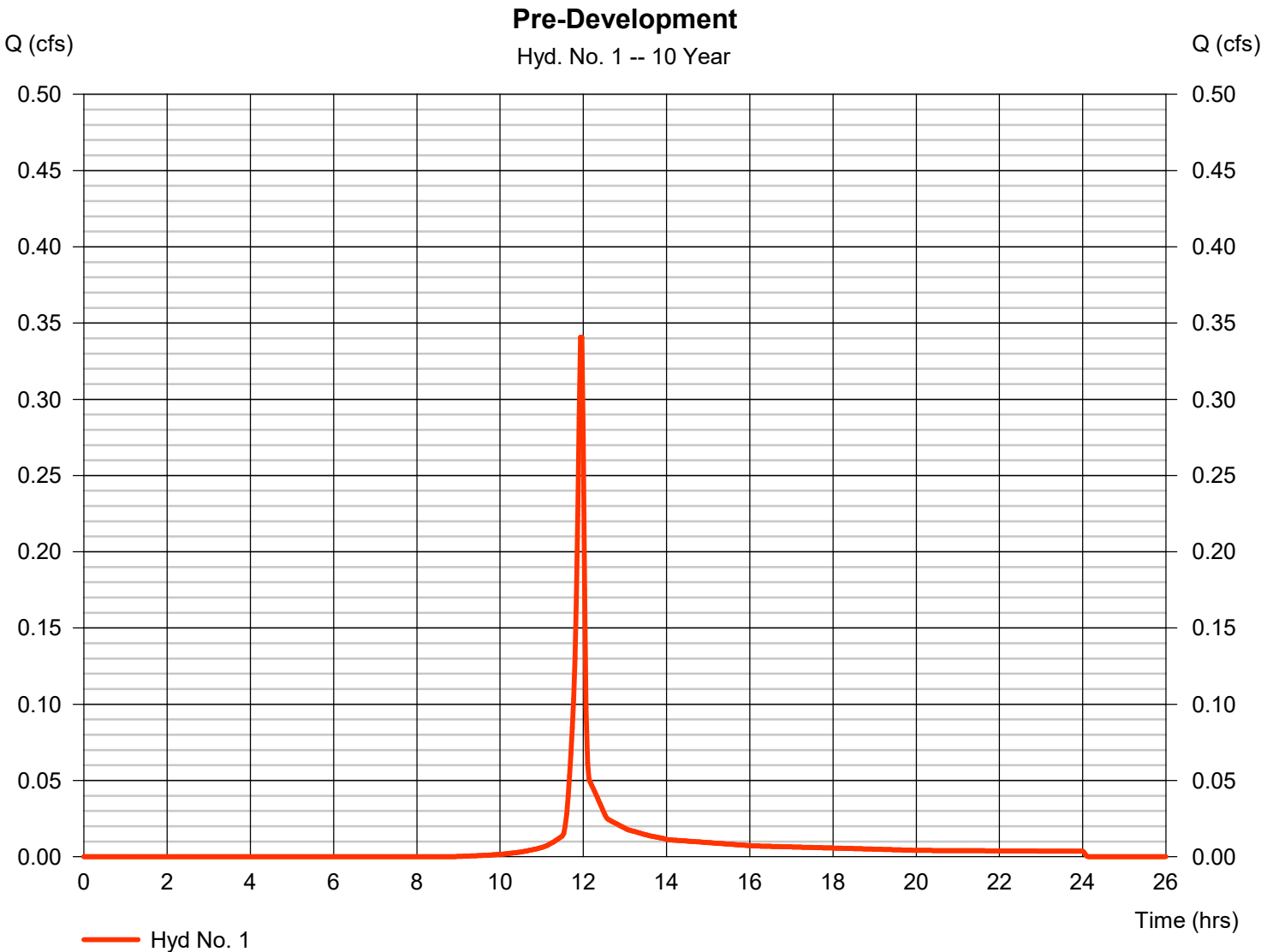


Hydrograph Report

Hyd. No. 1

Pre-Development

Hydrograph type	= SCS Runoff	Peak discharge	= 0.341 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.97 hrs
Time interval	= 2 min	Hyd. volume	= 688 cuft
Drainage area	= 0.120 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.56 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

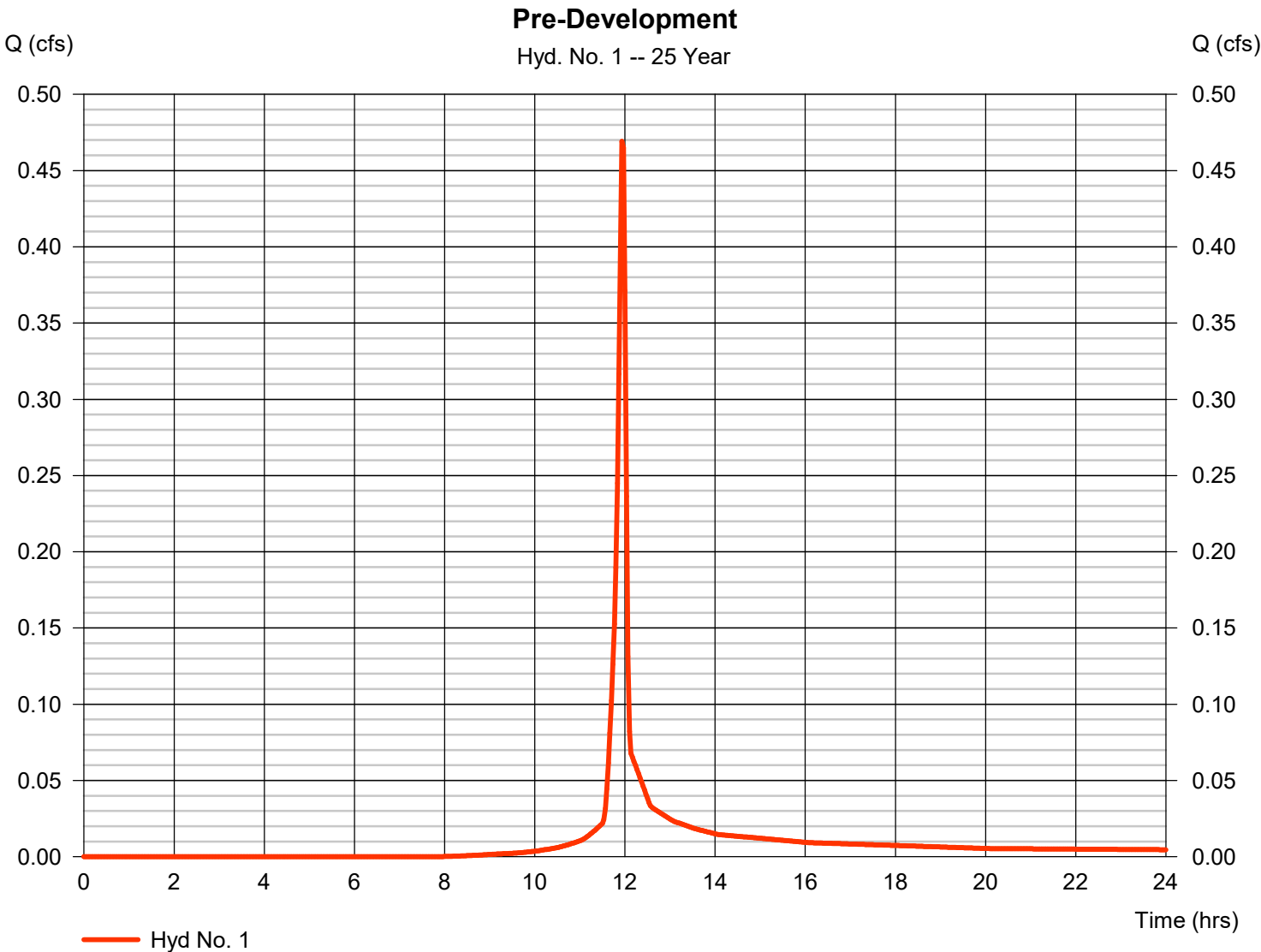


Hydrograph Report

Hyd. No. 1

Pre-Development

Hydrograph type	= SCS Runoff	Peak discharge	= 0.469 cfs
Storm frequency	= 25 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 950 cuft
Drainage area	= 0.120 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.34 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

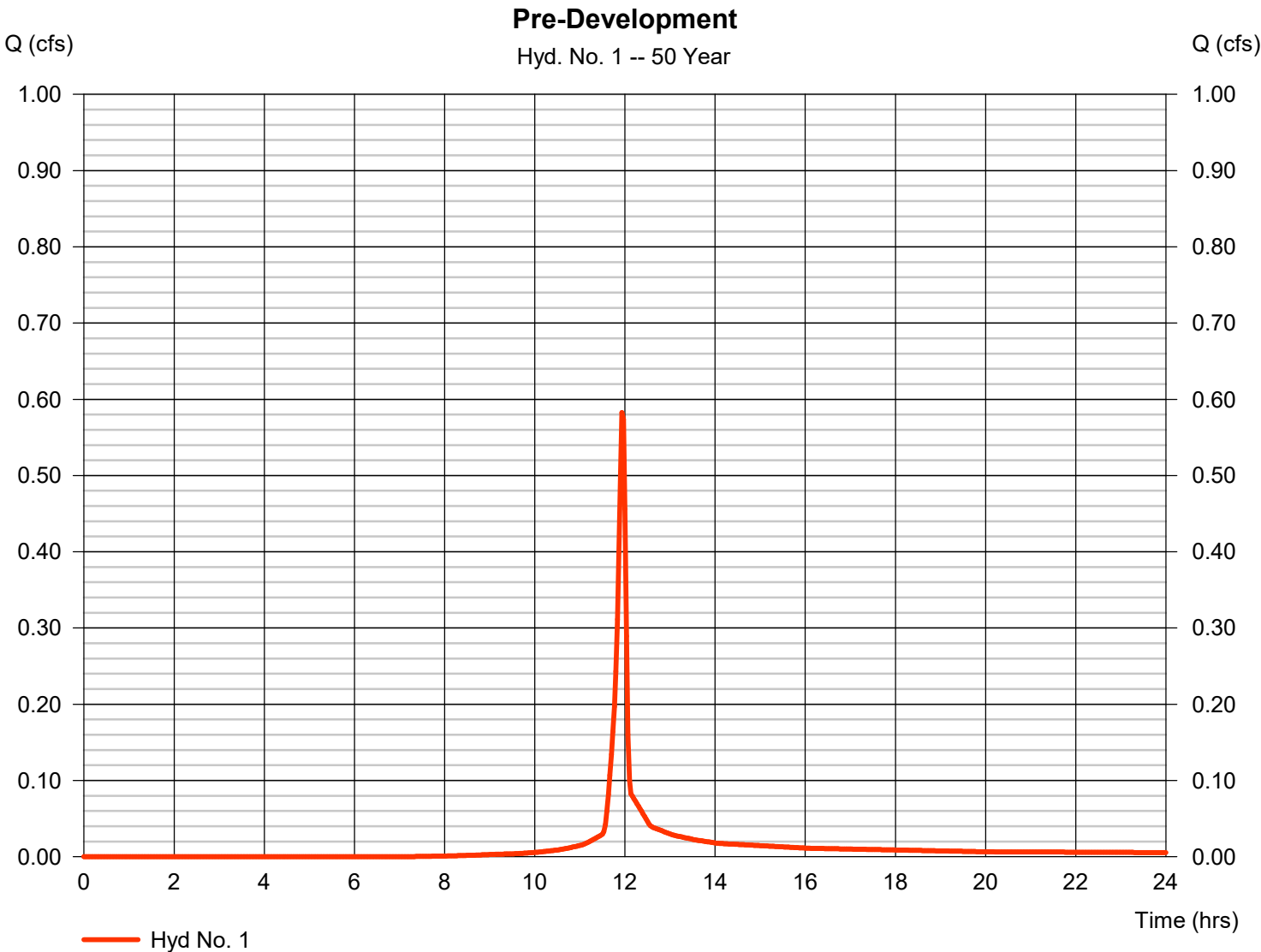


Hydrograph Report

Hyd. No. 1

Pre-Development

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.582 cfs
Storm frequency	=	50 yrs	Time to peak	=	11.93 hrs
Time interval	=	2 min	Hyd. volume	=	1,185 cuft
Drainage area	=	0.120 ac	Curve number	=	80
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.01 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

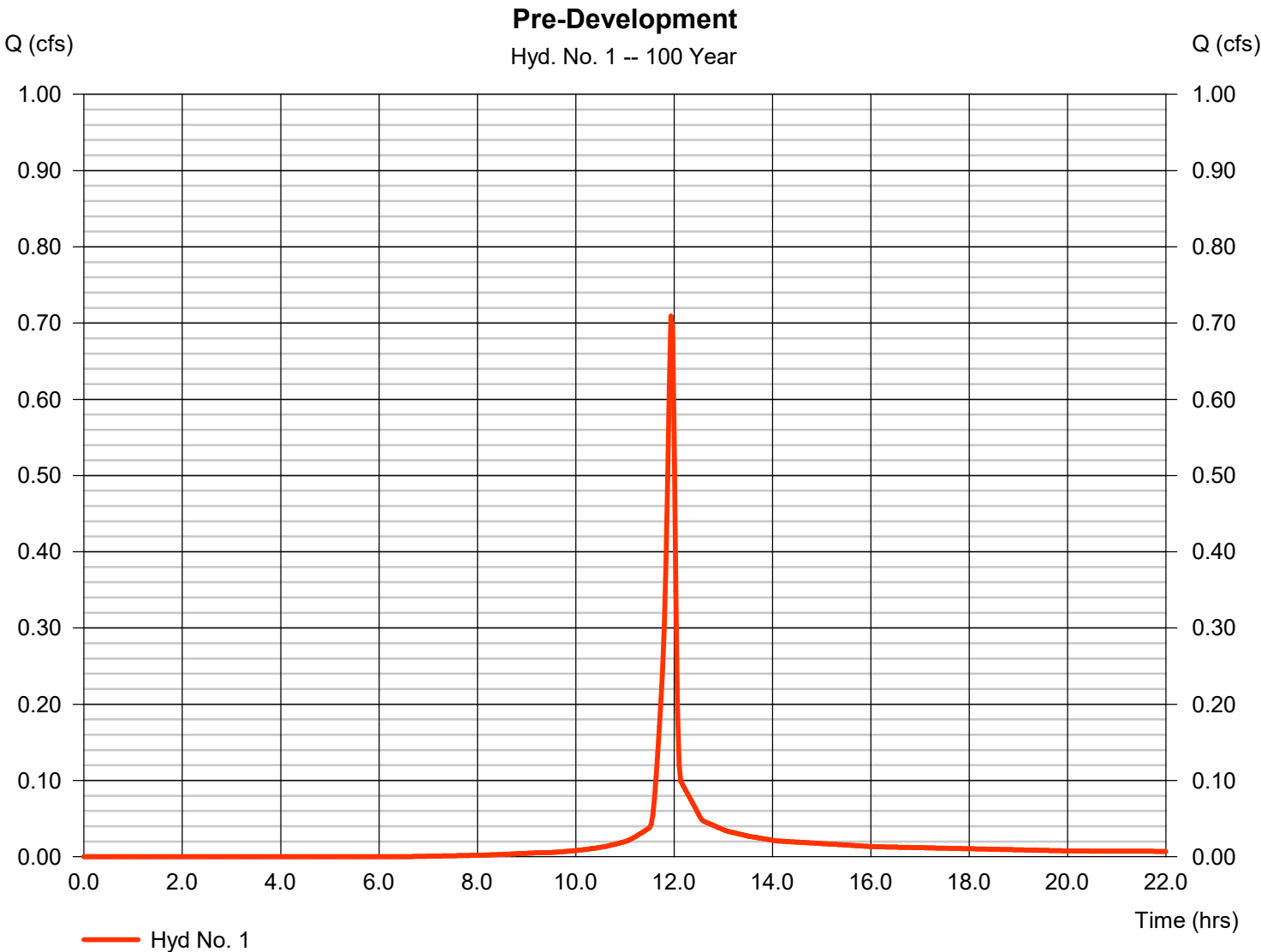


Hydrograph Report

Hyd. No. 1

Pre-Development

Hydrograph type	= SCS Runoff	Peak discharge	= 0.709 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.93 hrs
Time interval	= 2 min	Hyd. volume	= 1,452 cuft
Drainage area	= 0.120 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.75 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

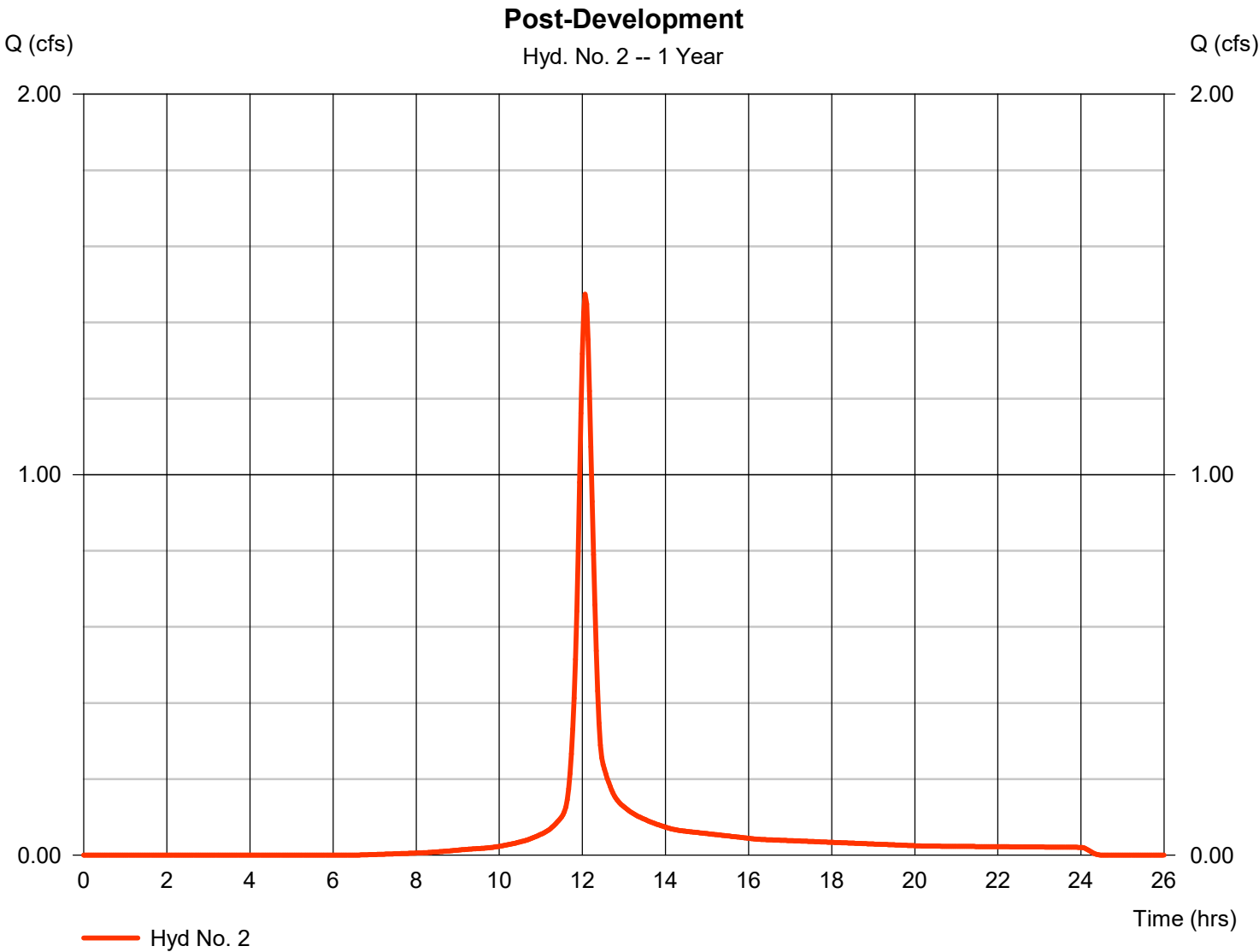


Hydrograph Report

Hyd. No. 2

Post-Development

Hydrograph type	= SCS Runoff	Peak discharge	= 1.474 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 4,621 cuft
Drainage area	= 1.000 ac	Curve number	= 92
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.90 min
Total precip.	= 2.04 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

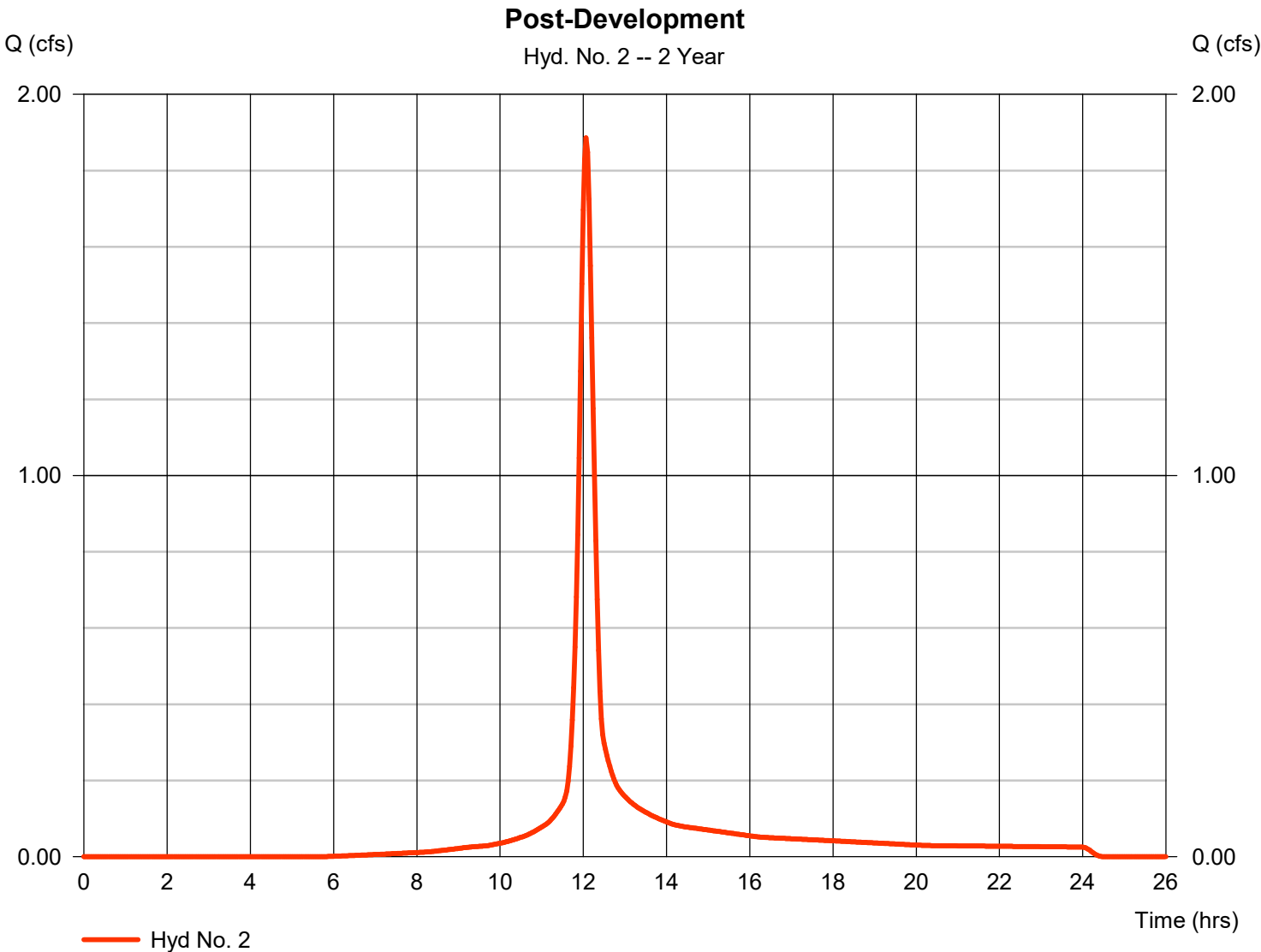


Hydrograph Report

Hyd. No. 2

Post-Development

Hydrograph type	= SCS Runoff	Peak discharge	= 1.886 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 5,945 cuft
Drainage area	= 1.000 ac	Curve number	= 92
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.90 min
Total precip.	= 2.44 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

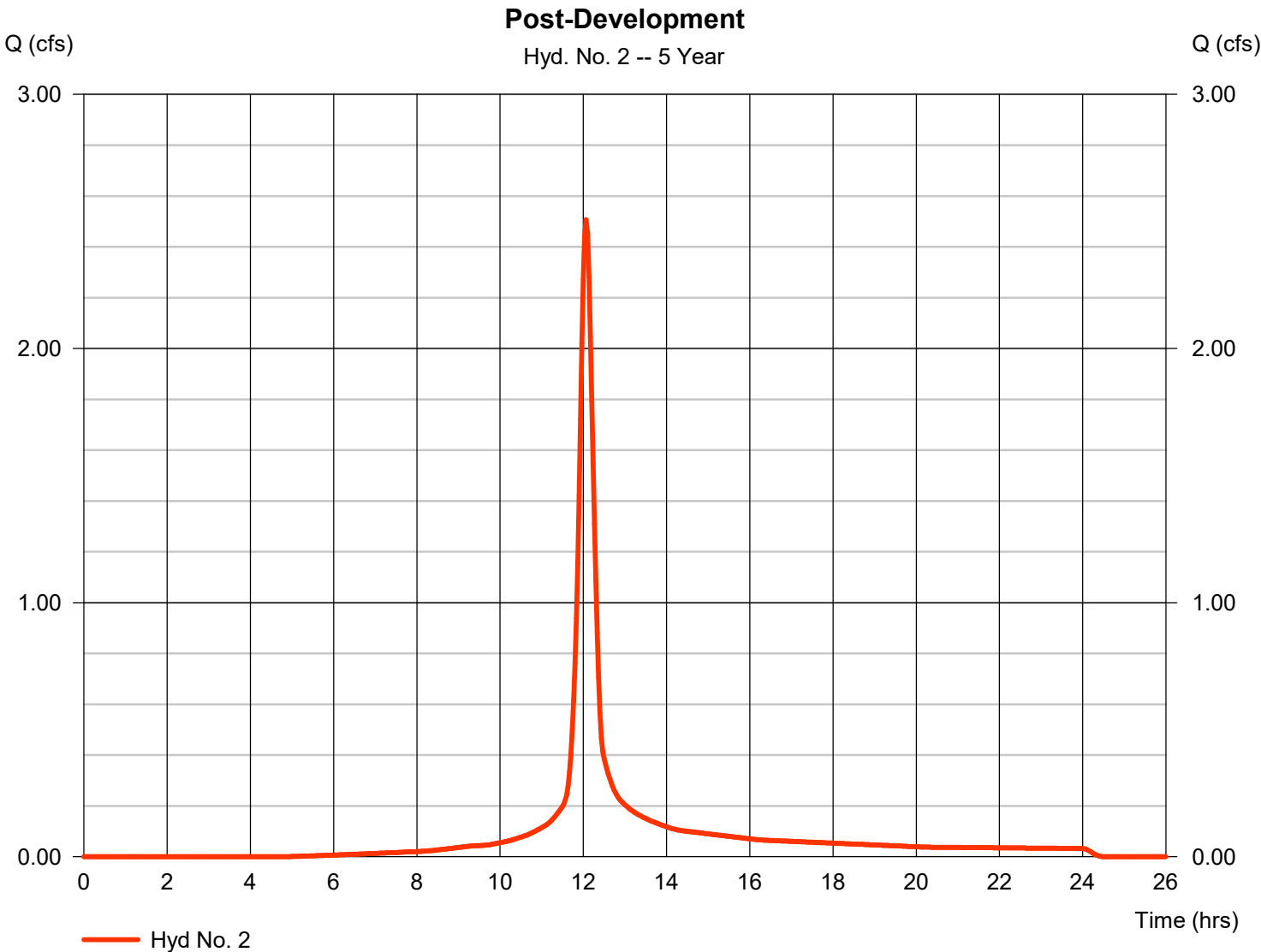


Hydrograph Report

Hyd. No. 2

Post-Development

Hydrograph type	= SCS Runoff	Peak discharge	= 2.507 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 7,982 cuft
Drainage area	= 1.000 ac	Curve number	= 92
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.90 min
Total precip.	= 3.04 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

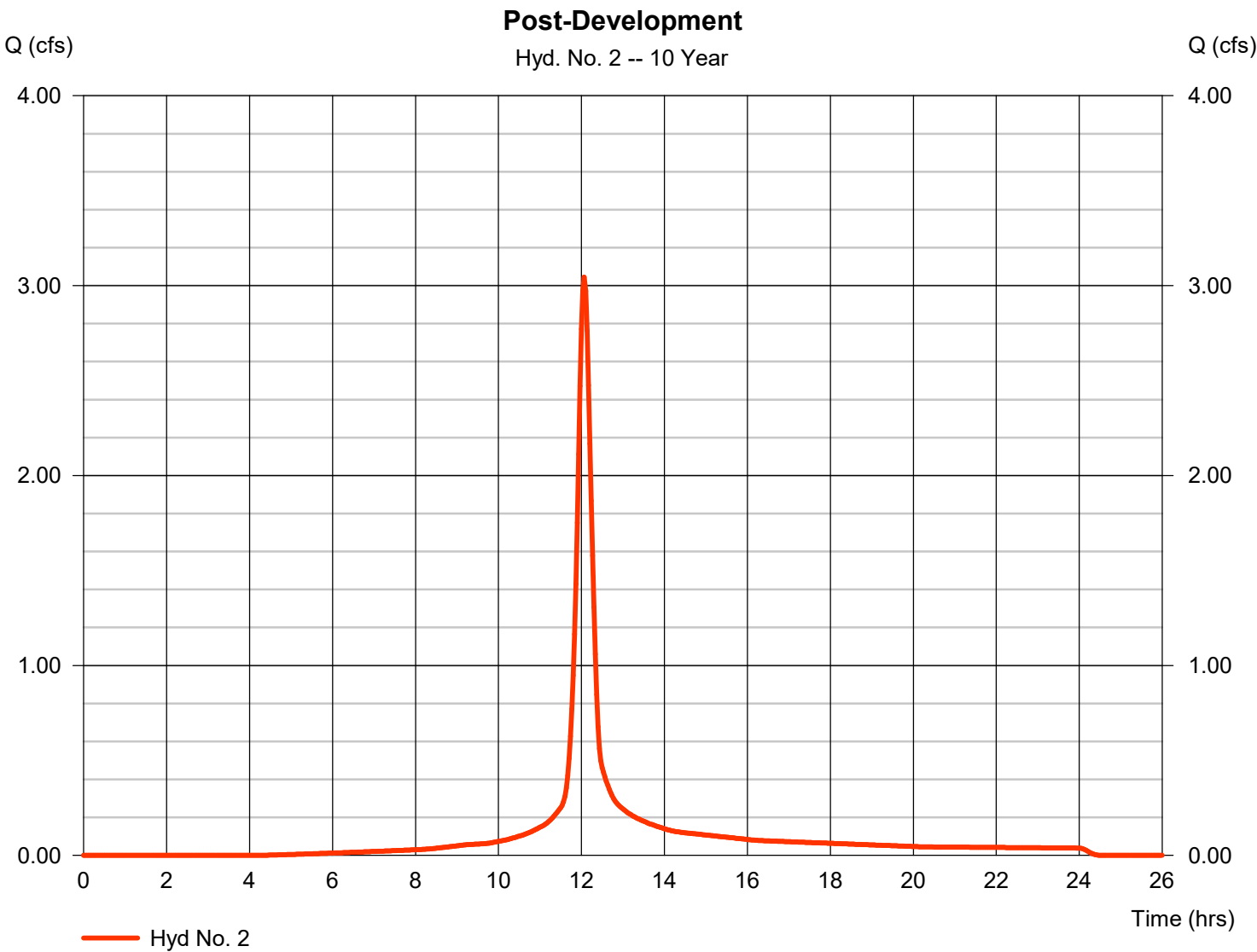


Hydrograph Report

Hyd. No. 2

Post-Development

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.045 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.07 hrs
Time interval	=	2 min	Hyd. volume	=	9,780 cuft
Drainage area	=	1.000 ac	Curve number	=	92
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	18.90 min
Total precip.	=	3.56 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

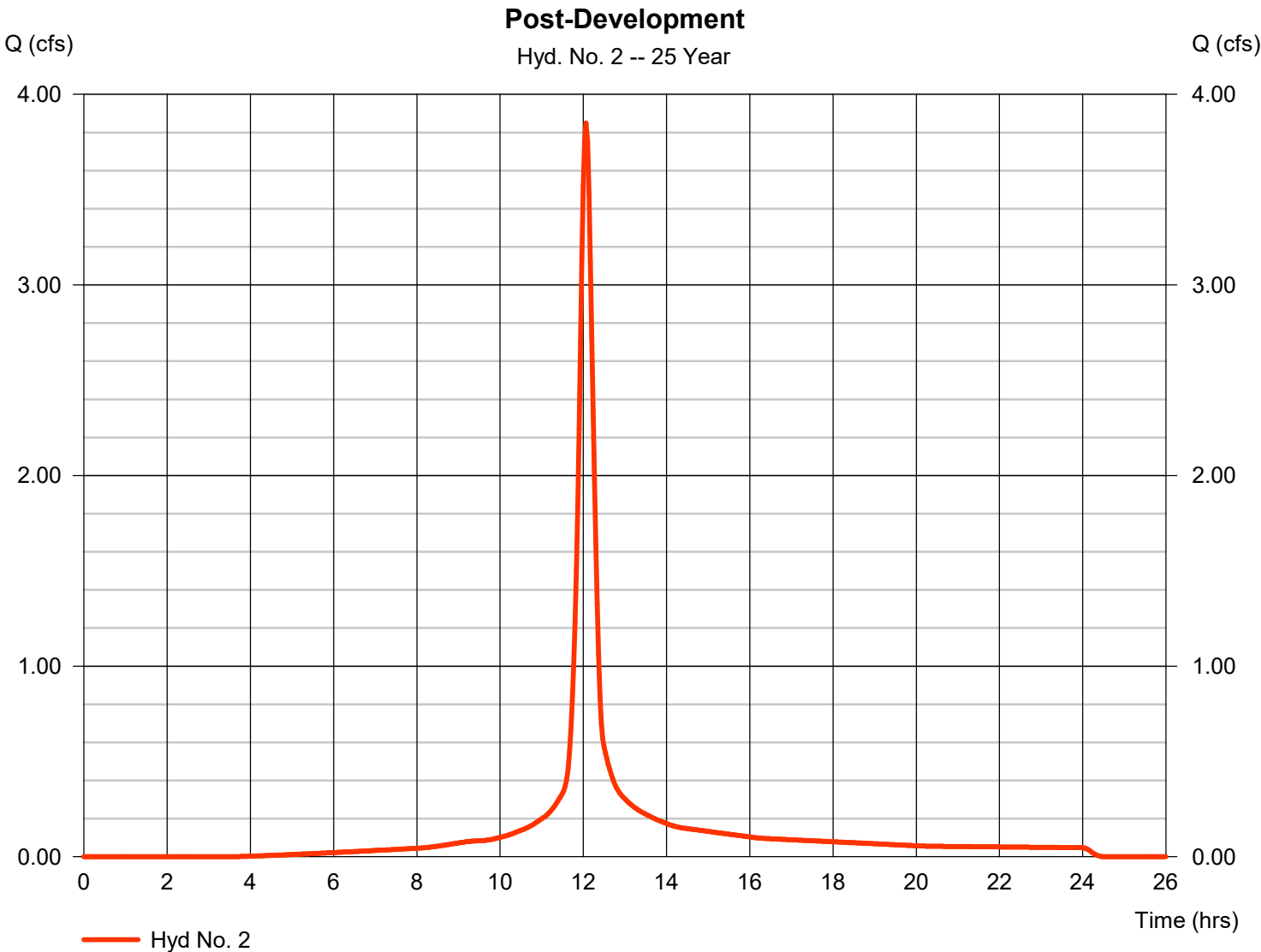


Hydrograph Report

Hyd. No. 2

Post-Development

Hydrograph type	= SCS Runoff	Peak discharge	= 3.850 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 12,511 cuft
Drainage area	= 1.000 ac	Curve number	= 92
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.90 min
Total precip.	= 4.34 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

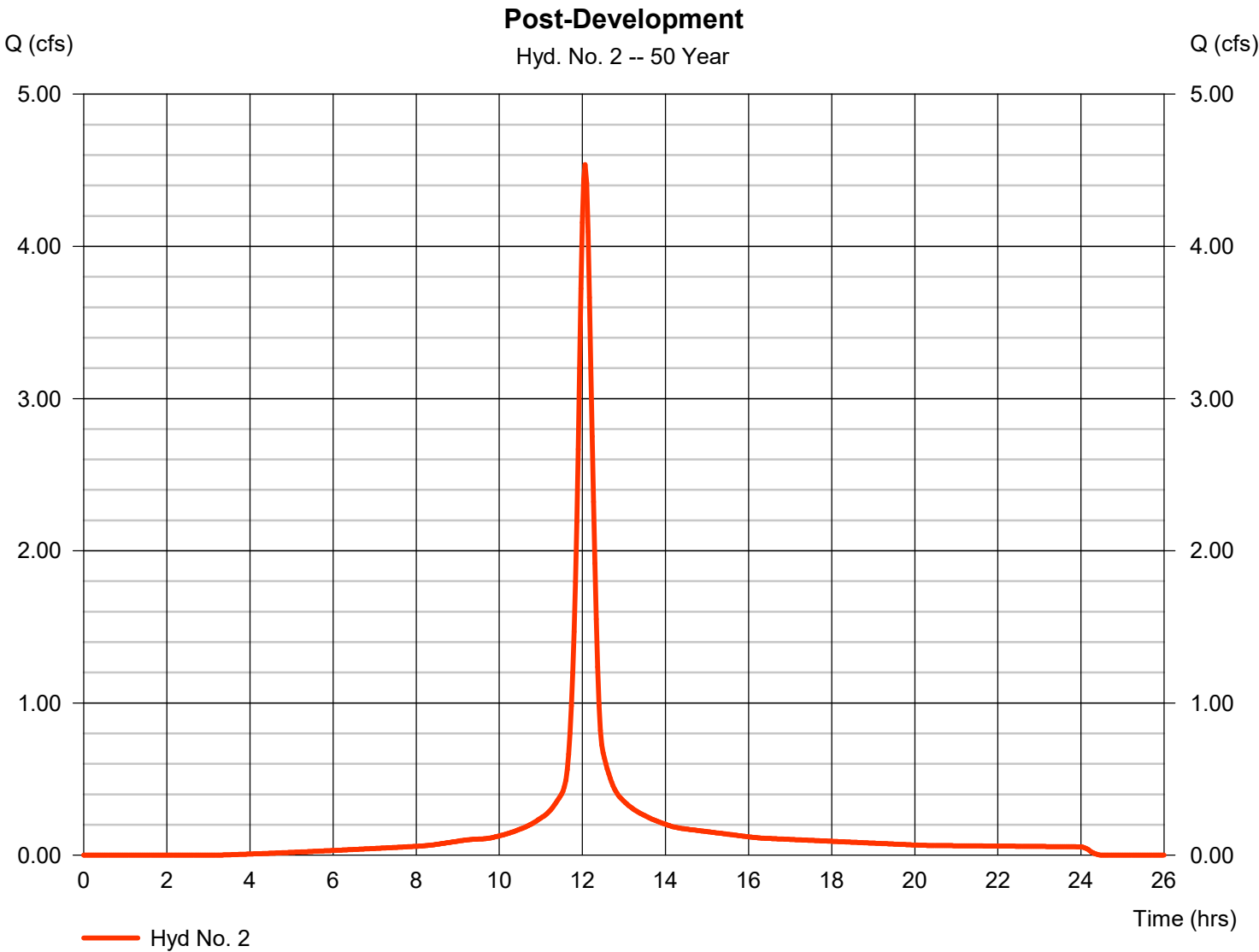


Hydrograph Report

Hyd. No. 2

Post-Development

Hydrograph type	= SCS Runoff	Peak discharge	= 4.537 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 14,880 cuft
Drainage area	= 1.000 ac	Curve number	= 92
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.90 min
Total precip.	= 5.01 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

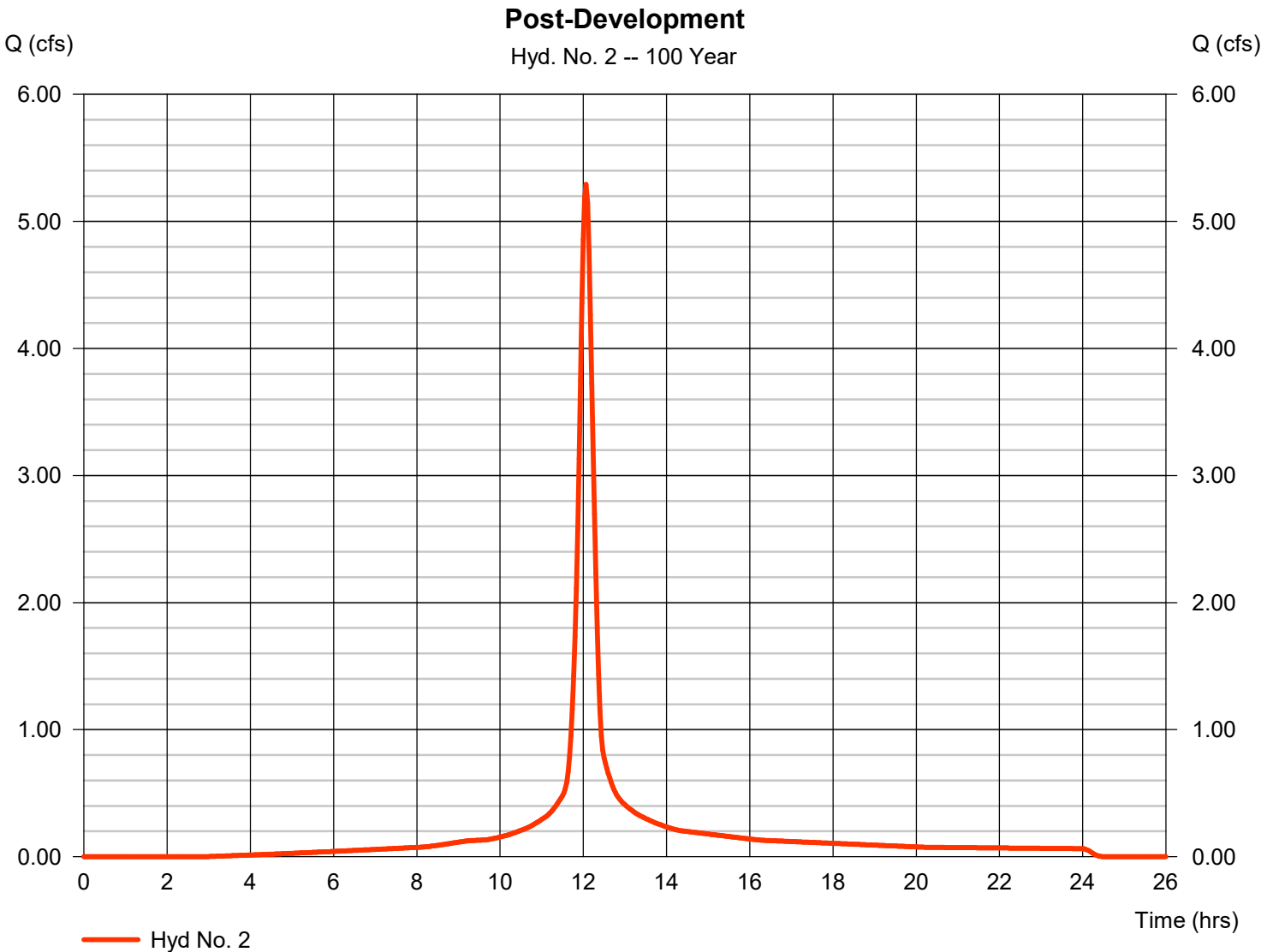


Hydrograph Report

Hyd. No. 2

Post-Development

Hydrograph type	= SCS Runoff	Peak discharge	= 5.292 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 17,511 cuft
Drainage area	= 1.000 ac	Curve number	= 92
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.90 min
Total precip.	= 5.75 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



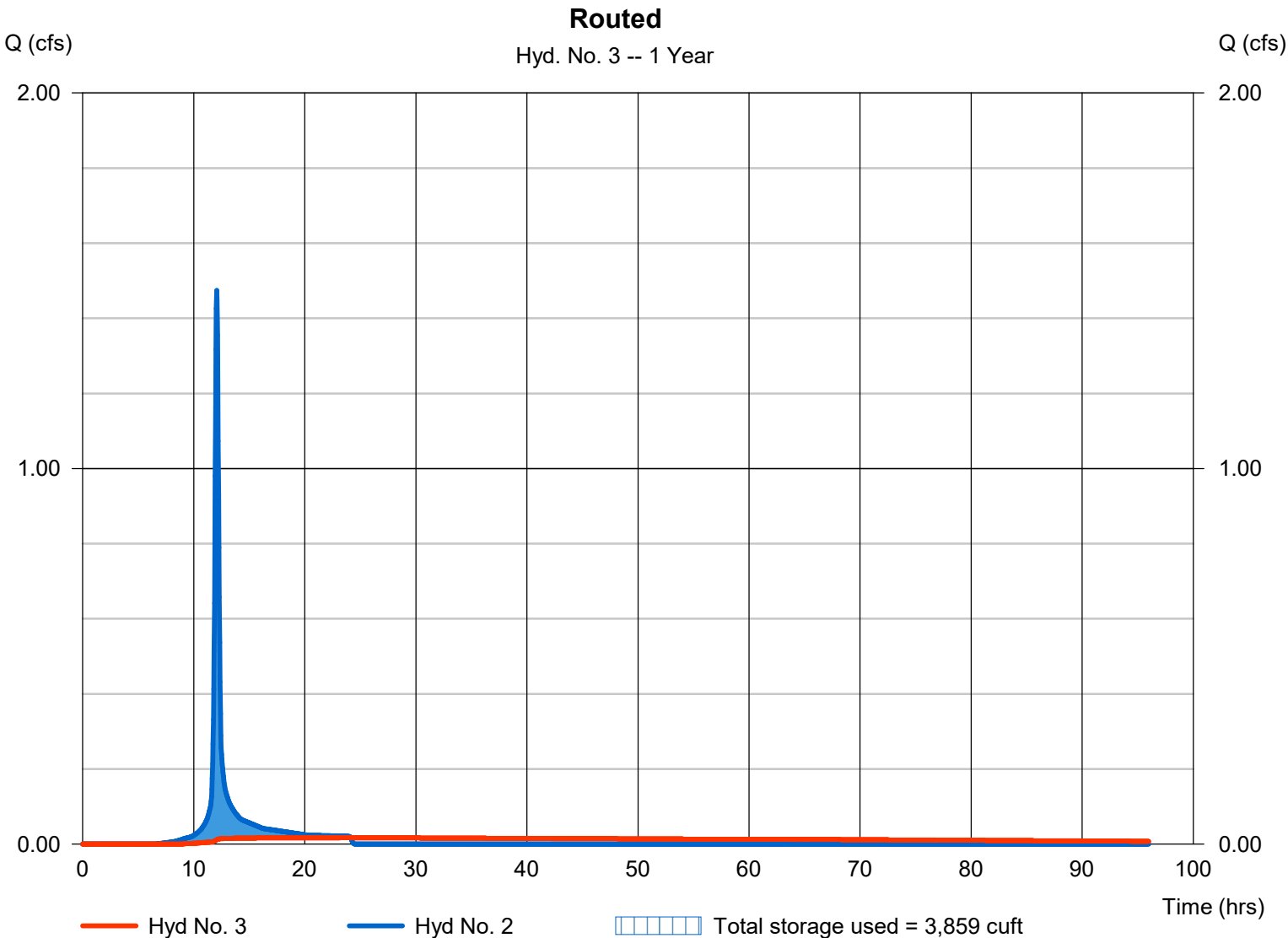
Hydrograph Report

Hyd. No. 3

Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.017 cfs
Storm frequency	= 1 yrs	Time to peak	= 24.13 hrs
Time interval	= 2 min	Hyd. volume	= 4,024 cuft
Inflow hyd. No.	= 2 - Post-Development	Max. Elevation	= 930.53 ft
Reservoir name	= Ext Dry Det Pond	Max. Storage	= 3,859 cuft

Storage Indication method used.



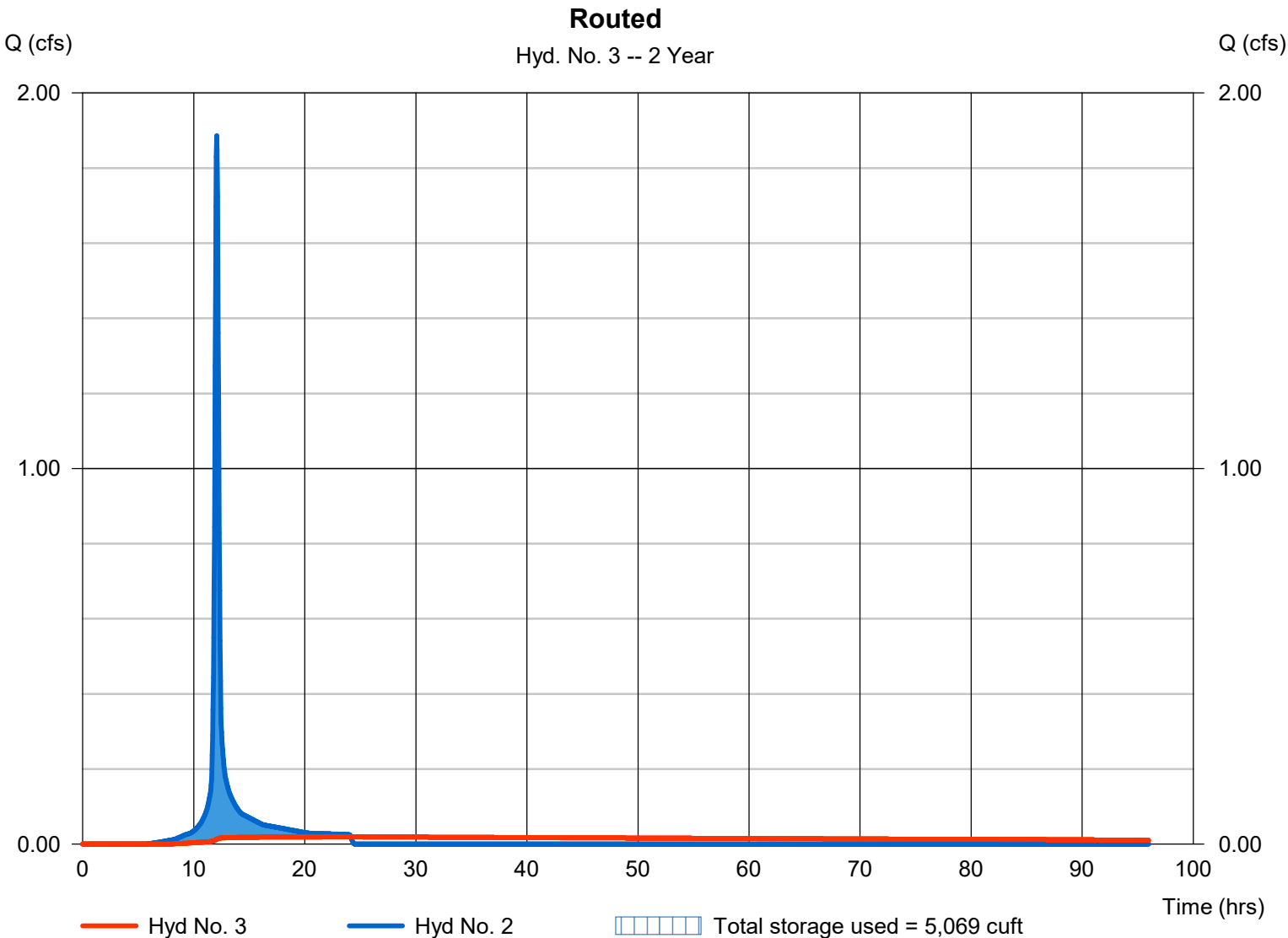
Hydrograph Report

Hyd. No. 3

Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.019 cfs
Storm frequency	= 2 yrs	Time to peak	= 24.13 hrs
Time interval	= 2 min	Hyd. volume	= 4,754 cuft
Inflow hyd. No.	= 2 - Post-Development	Max. Elevation	= 930.91 ft
Reservoir name	= Ext Dry Det Pond	Max. Storage	= 5,069 cuft

Storage Indication method used.



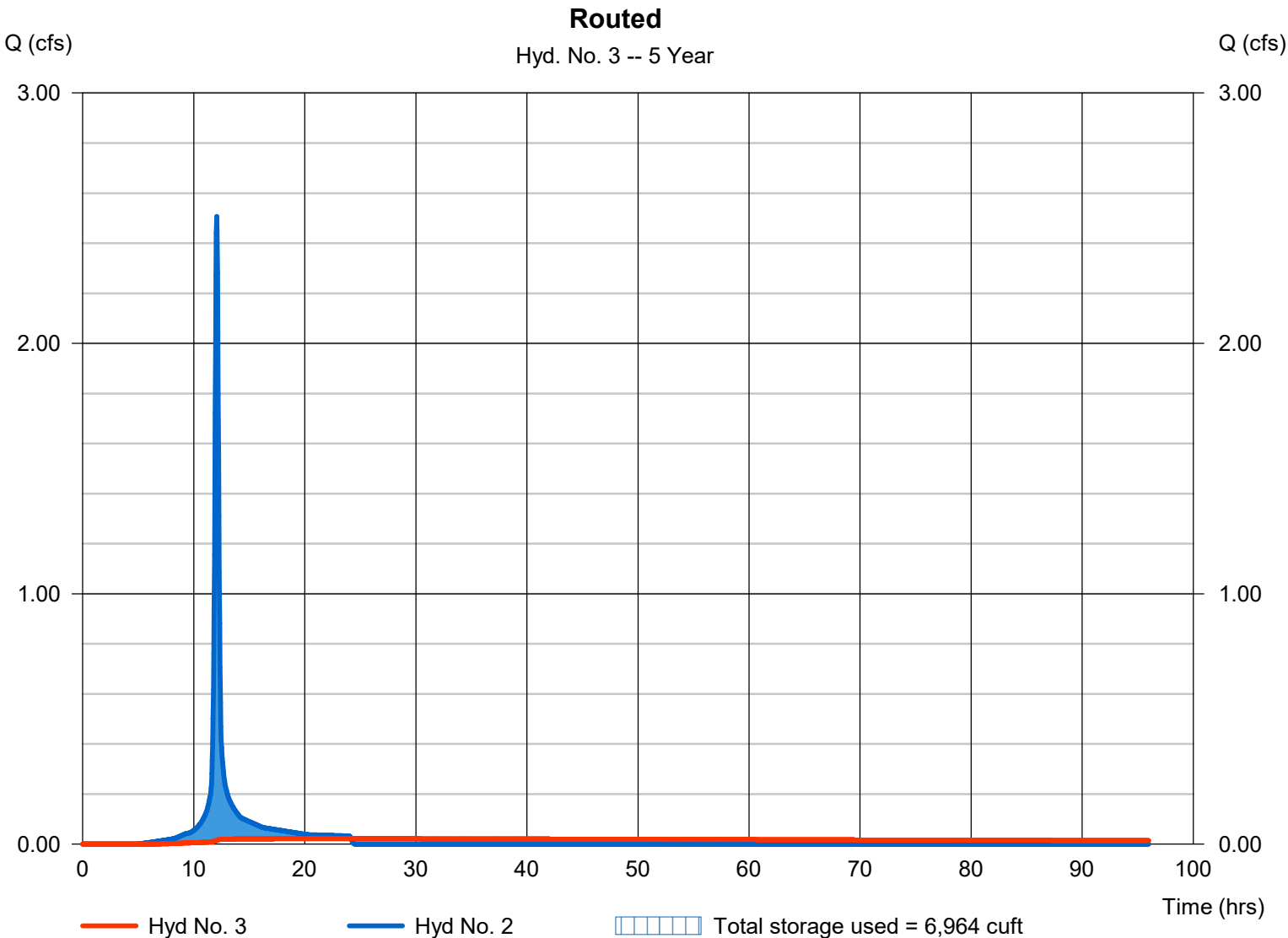
Hydrograph Report

Hyd. No. 3

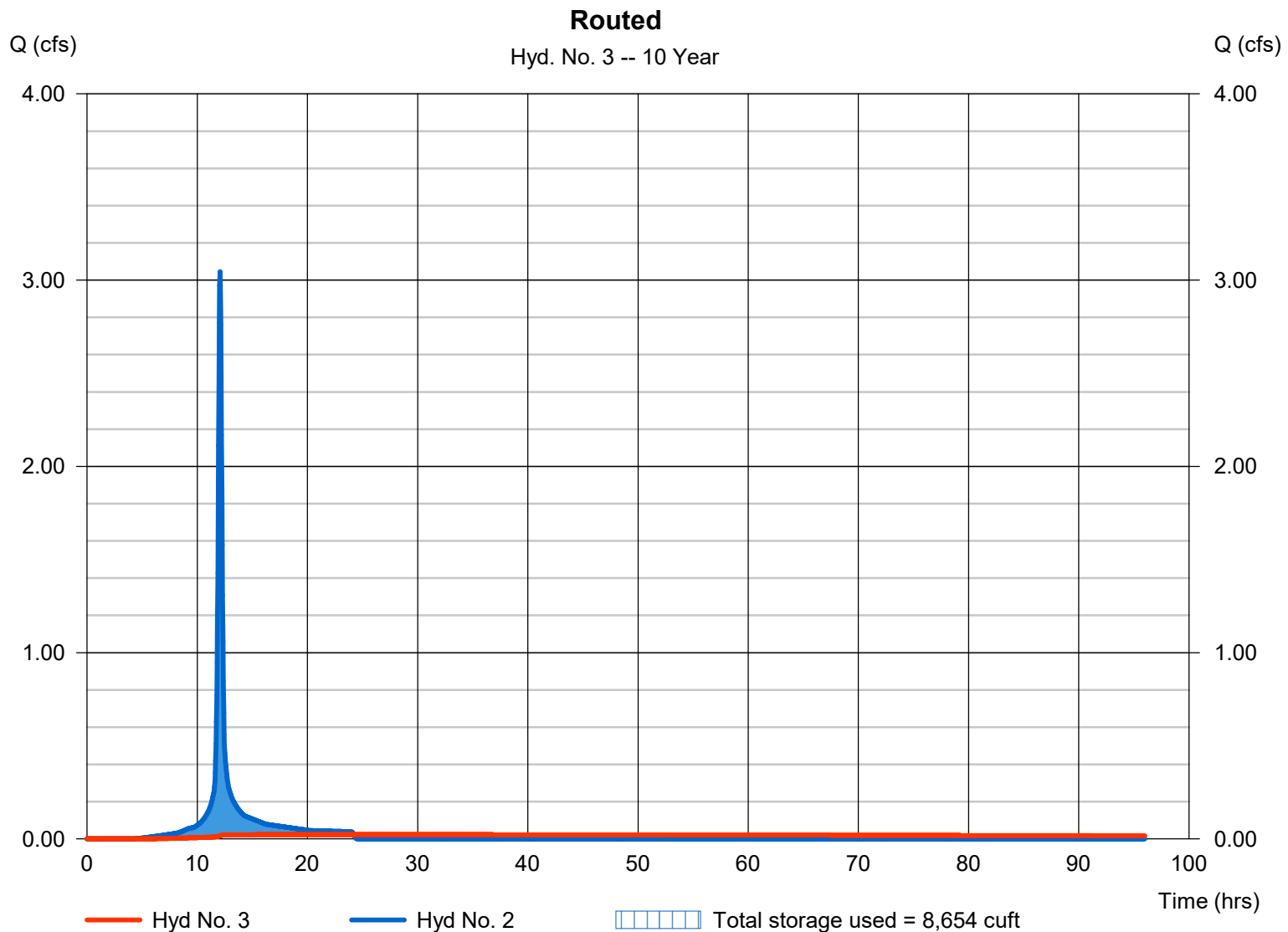
Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.022 cfs
Storm frequency	= 5 yrs	Time to peak	= 24.17 hrs
Time interval	= 2 min	Hyd. volume	= 5,654 cuft
Inflow hyd. No.	= 2 - Post-Development	Max. Elevation	= 931.38 ft
Reservoir name	= Ext Dry Det Pond	Max. Storage	= 6,964 cuft

Storage Indication method used.



Tuesday, 12 / 6 / 2022



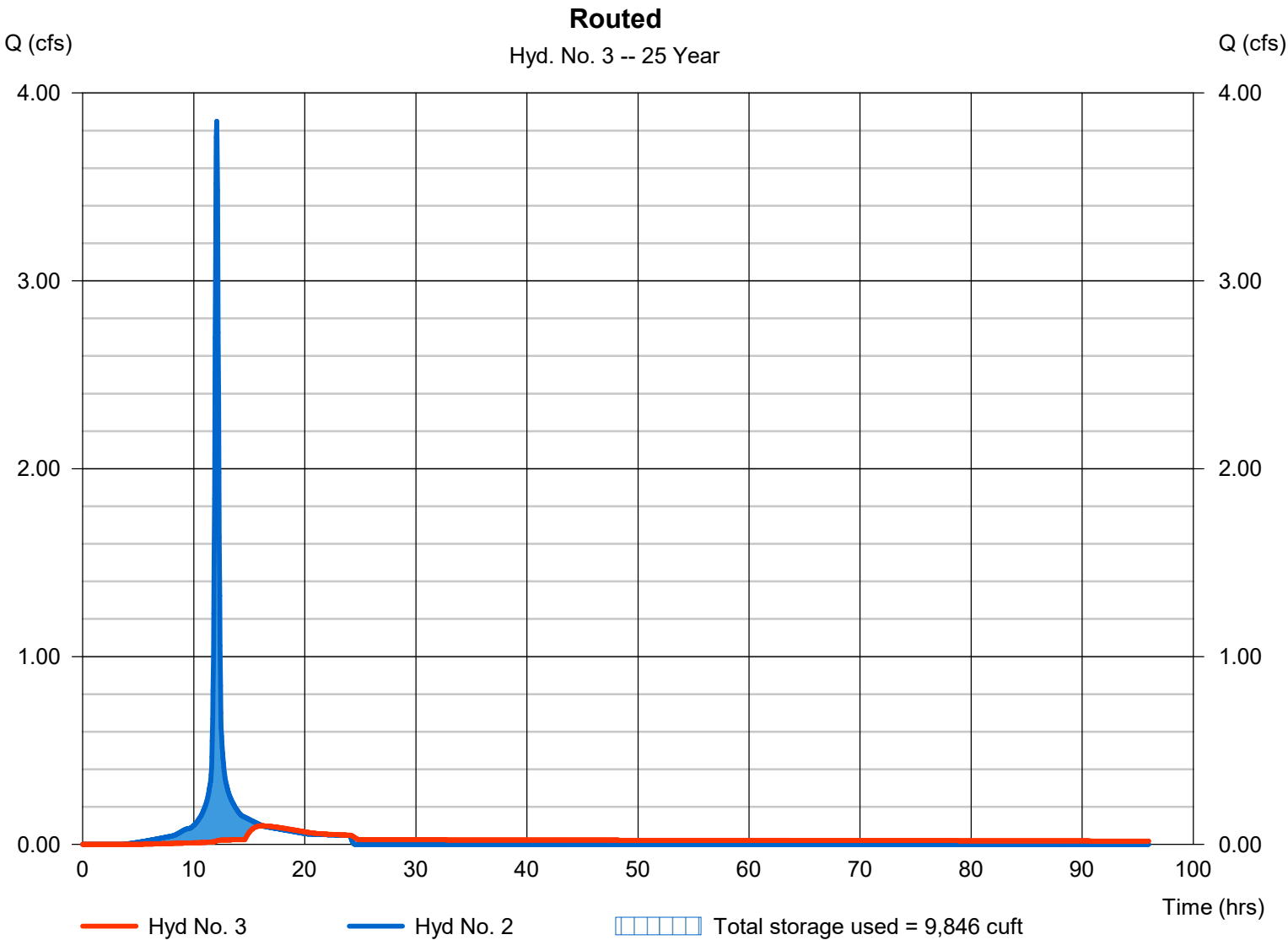
Hydrograph Report

Hyd. No. 3

Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.099 cfs
Storm frequency	= 25 yrs	Time to peak	= 16.17 hrs
Time interval	= 2 min	Hyd. volume	= 8,377 cuft
Inflow hyd. No.	= 2 - Post-Development	Max. Elevation	= 932.05 ft
Reservoir name	= Ext Dry Det Pond	Max. Storage	= 9,846 cuft

Storage Indication method used.



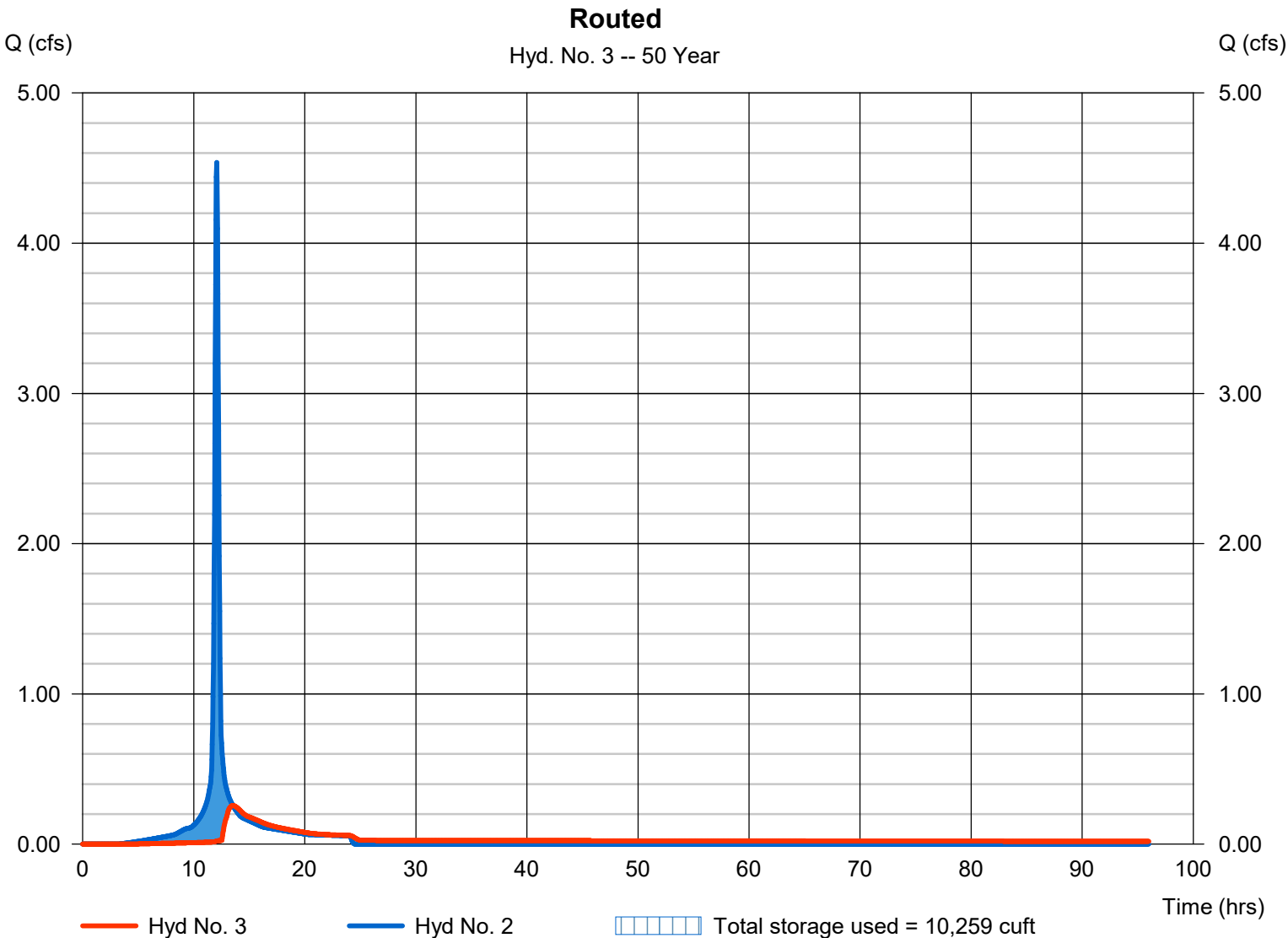
Hydrograph Report

Hyd. No. 3

Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.257 cfs
Storm frequency	= 50 yrs	Time to peak	= 13.53 hrs
Time interval	= 2 min	Hyd. volume	= 10,736 cuft
Inflow hyd. No.	= 2 - Post-Development	Max. Elevation	= 932.12 ft
Reservoir name	= Ext Dry Det Pond	Max. Storage	= 10,259 cuft

Storage Indication method used.



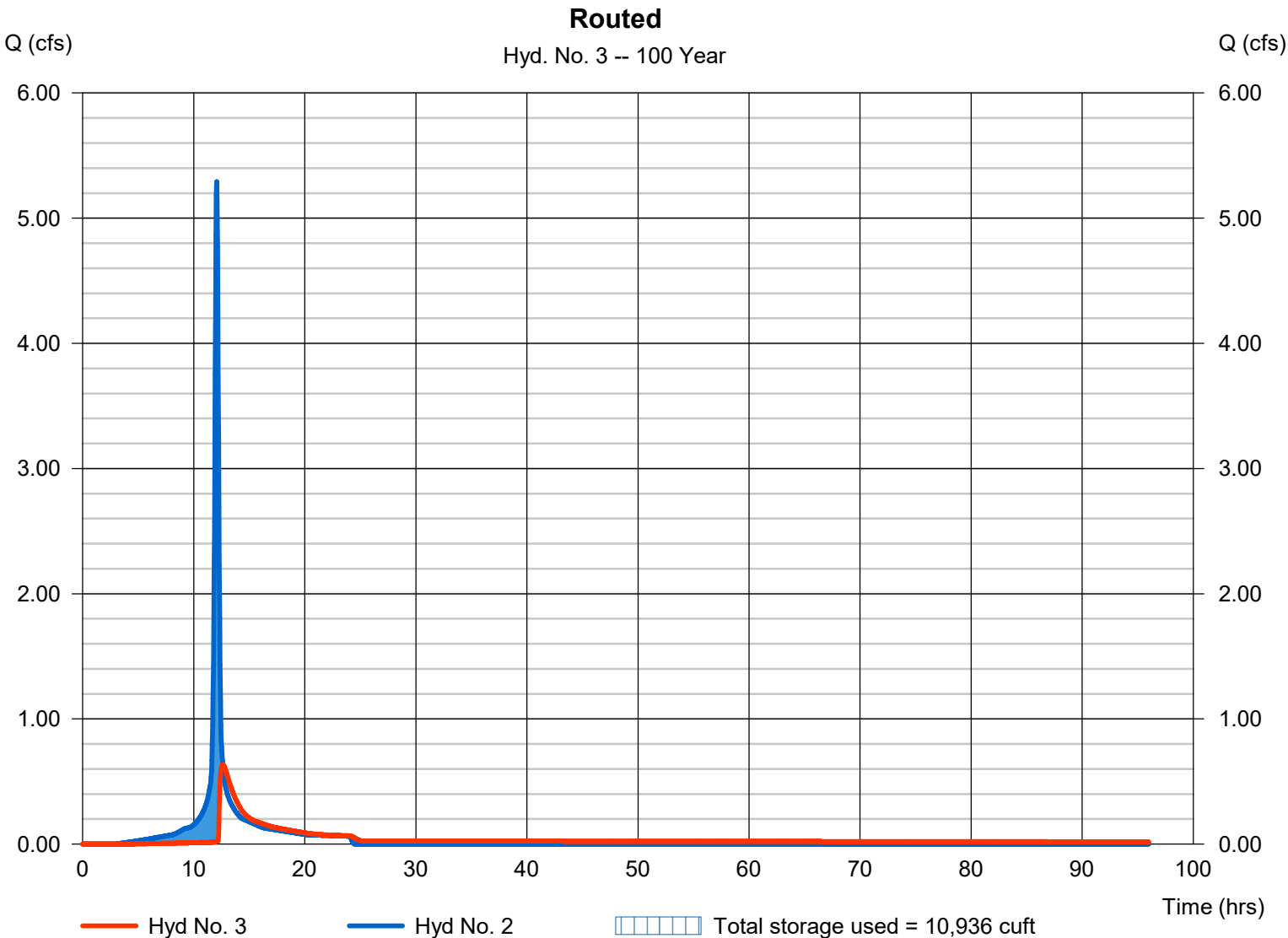
Hydrograph Report

Hyd. No. 3

Routed

Hydrograph type	= Reservoir	Peak discharge	= 0.635 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.63 hrs
Time interval	= 2 min	Hyd. volume	= 13,359 cuft
Inflow hyd. No.	= 2 - Post-Development	Max. Elevation	= 932.25 ft
Reservoir name	= Ext Dry Det Pond	Max. Storage	= 10,936 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Ext Dry Det Pond

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Beginning Elevation = 929.20 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	929.20	2,001	0	0
0.90	930.00	2,751	2,138	2,138
1.90	931.00	3,715	3,233	5,371
2.90	932.00	4,747	4,231	9,602
3.90	933.00	5,865	5,306	14,908
4.90	934.00	6,935	6,400	21,308

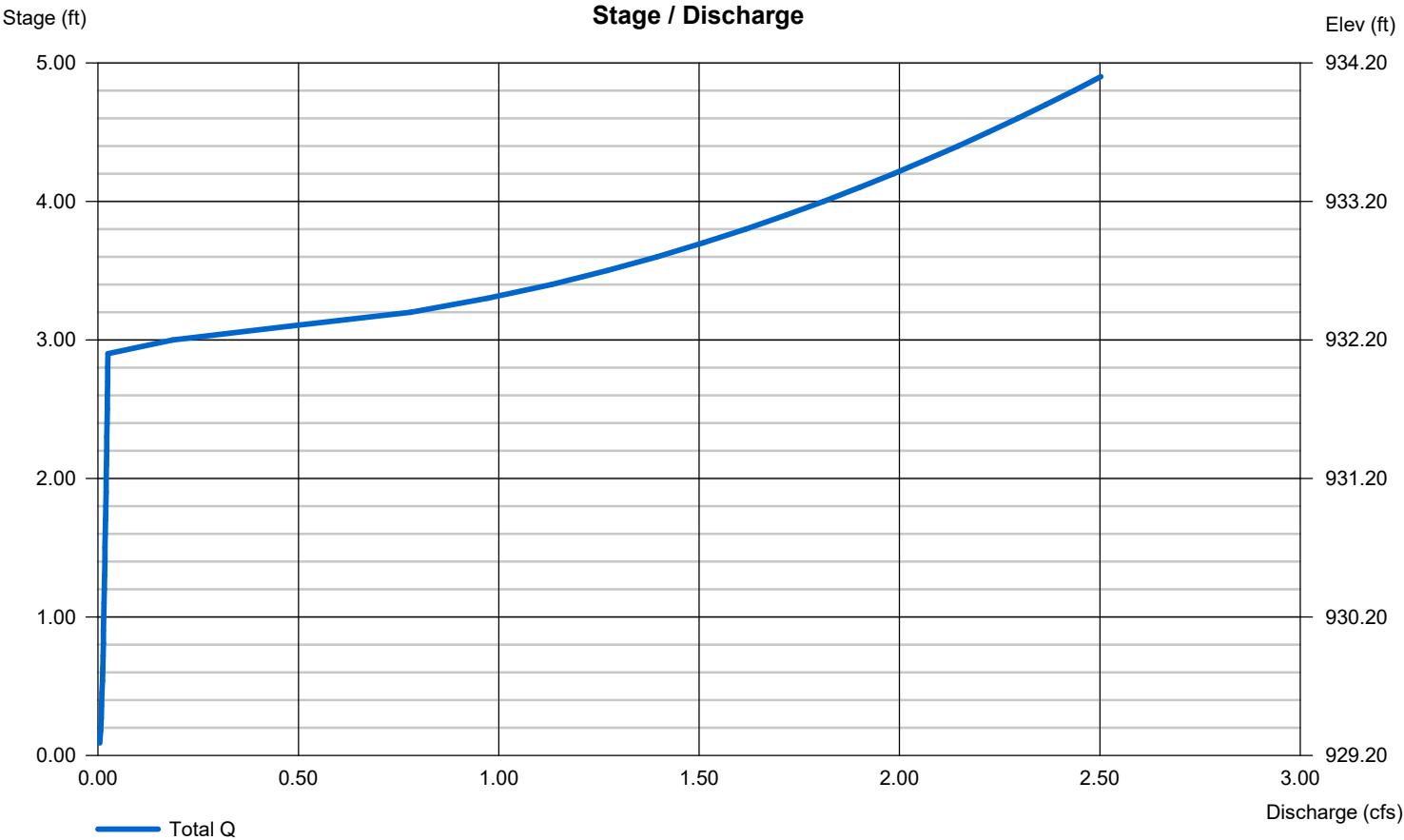
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	0.75	3.00	0.00
Span (in)	= 15.00	0.75	18.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 929.00	929.00	932.00	0.00
Length (ft)	= 113.00	0.00	0.00	0.00
Slope (%)	= 0.44	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 934.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Contour)			
TW Elev. (ft)	= 0.00			

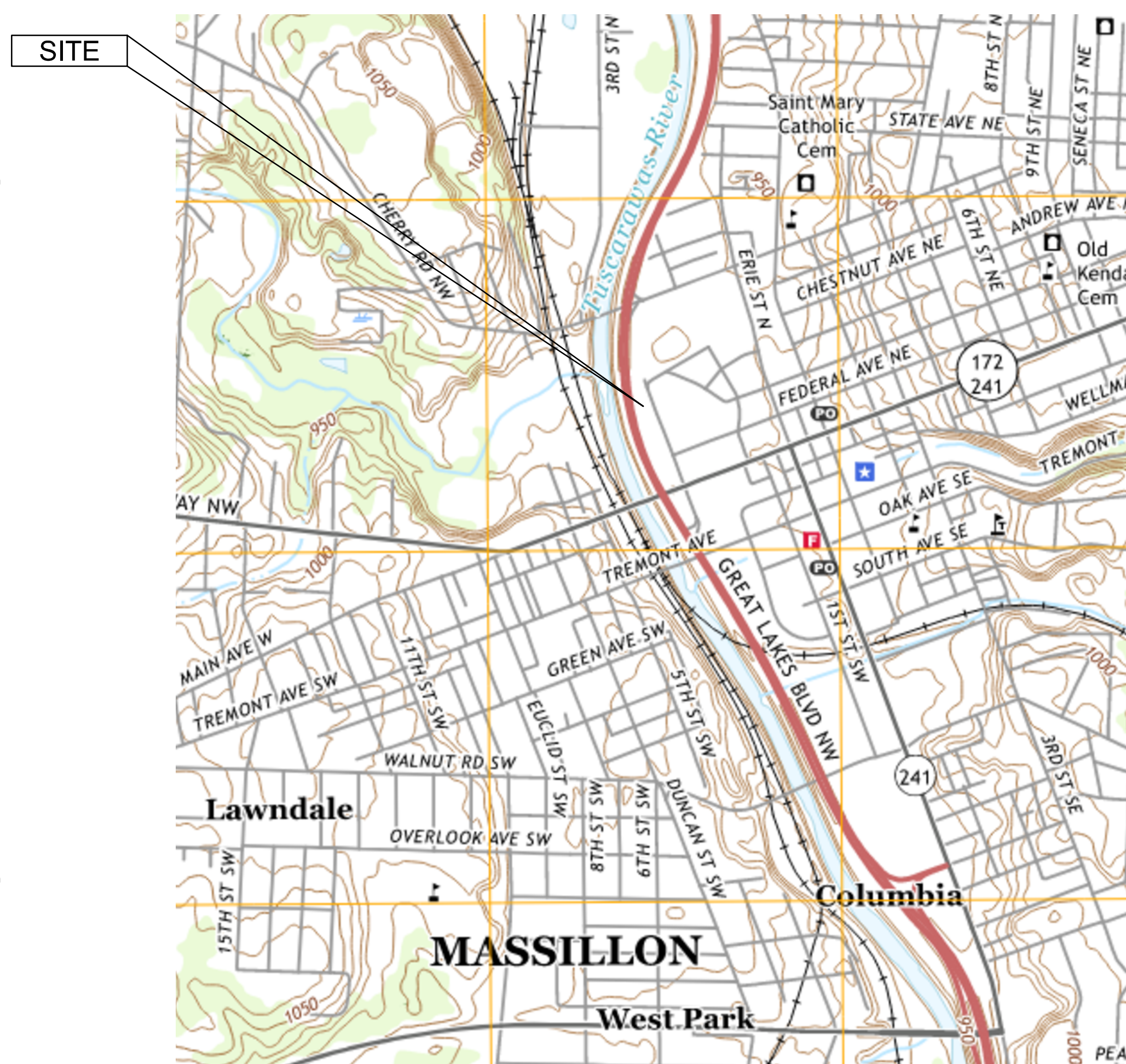
Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



PART 3

EXHIBITS

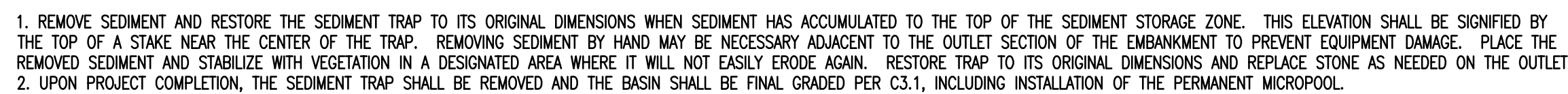
DATES AND REVISIONS	
No.	Date/Description
	08.26.22 BID/PERMIT
	12.06.22 CITY REVIEW



(C1.1) SCALE: N.T.S.

C1 1

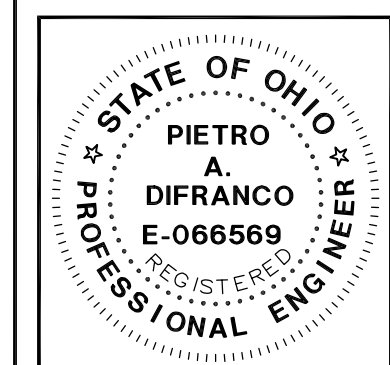
Dwg No.	Title
C.1	SWP3 COVER SHEET
C.2	SWP3 PHASE 1 – CONSTRUCTION SITE RUNOFF CONTROL PLAN
C.3	SWP3 PHASE 1 DETAILS
C.4	SWP3 PHASE 1 DETAILS
C.5	SWP3 PHASE 2 – POST-CONSTRUCTION BMPs
C.6	SWP3 PHASE 2 – POST-CONSTRUCTION BMP DETAILS



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10

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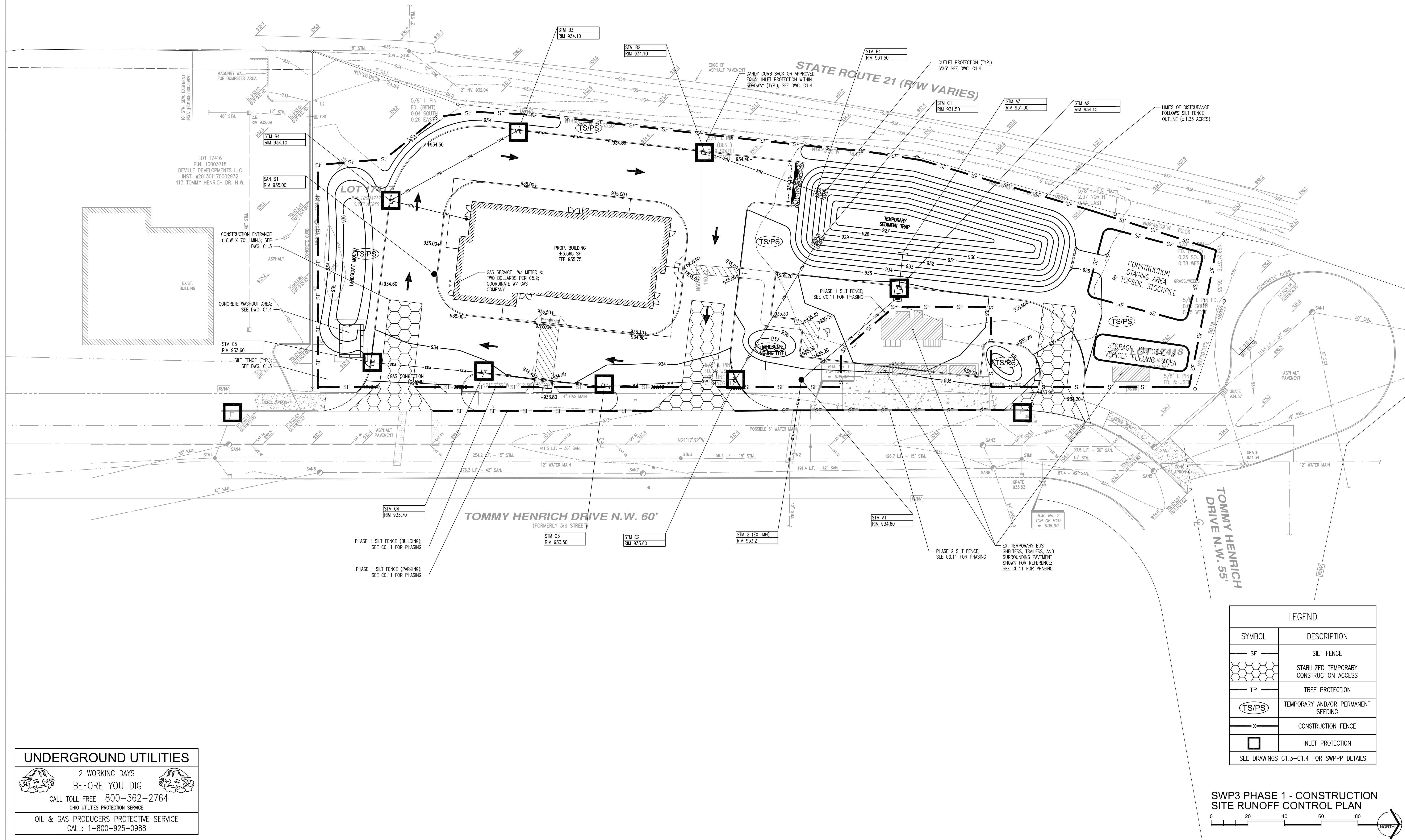


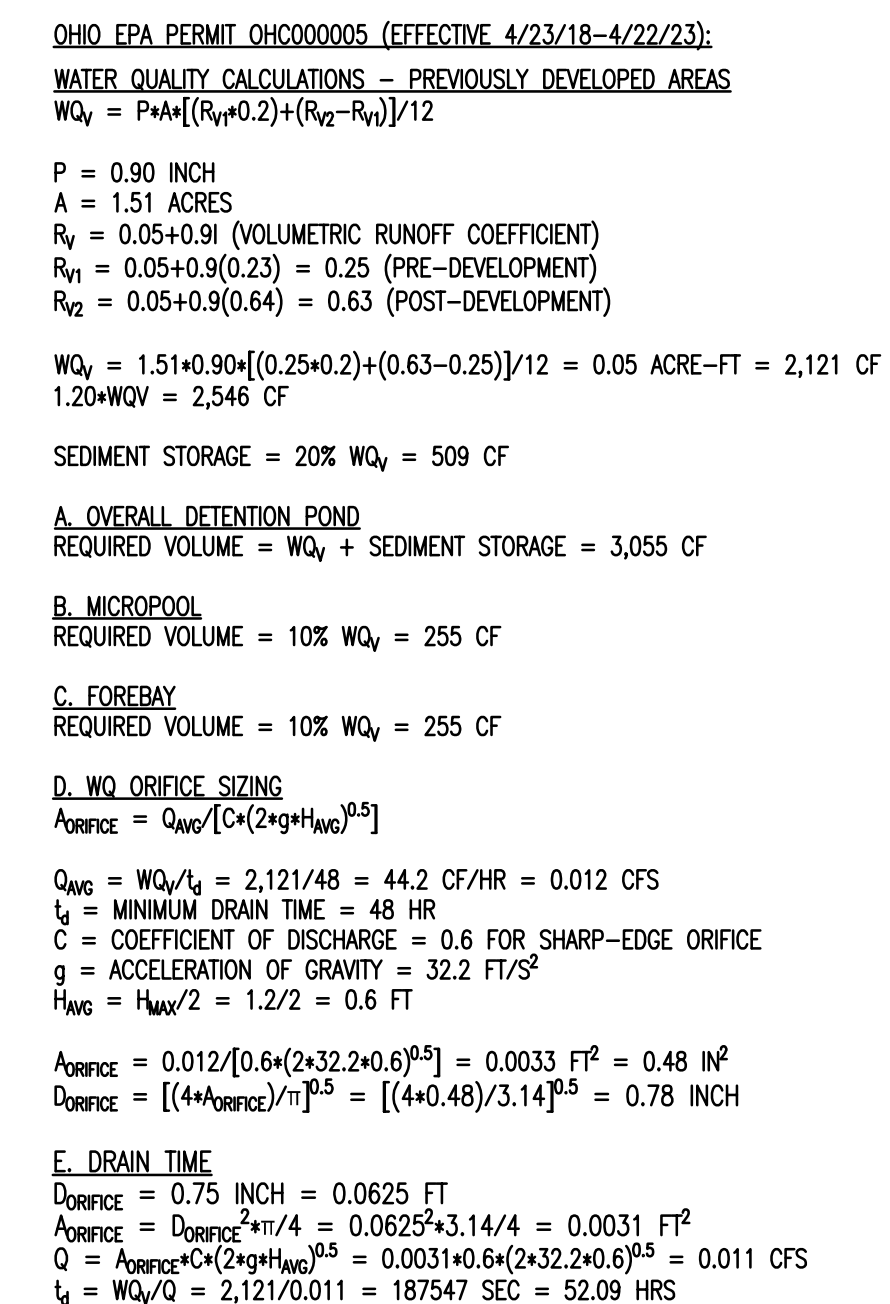
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MASSILLON, OHIO 44647

SWP3 PHASE 1 - CONSTRUCTION
SITE RUNOFF CONTROL PLAN

DRAWN BY:	KMT
CHECKED BY:	-
RLB NO.:	13064.12

DRAWING NO.
C1.2

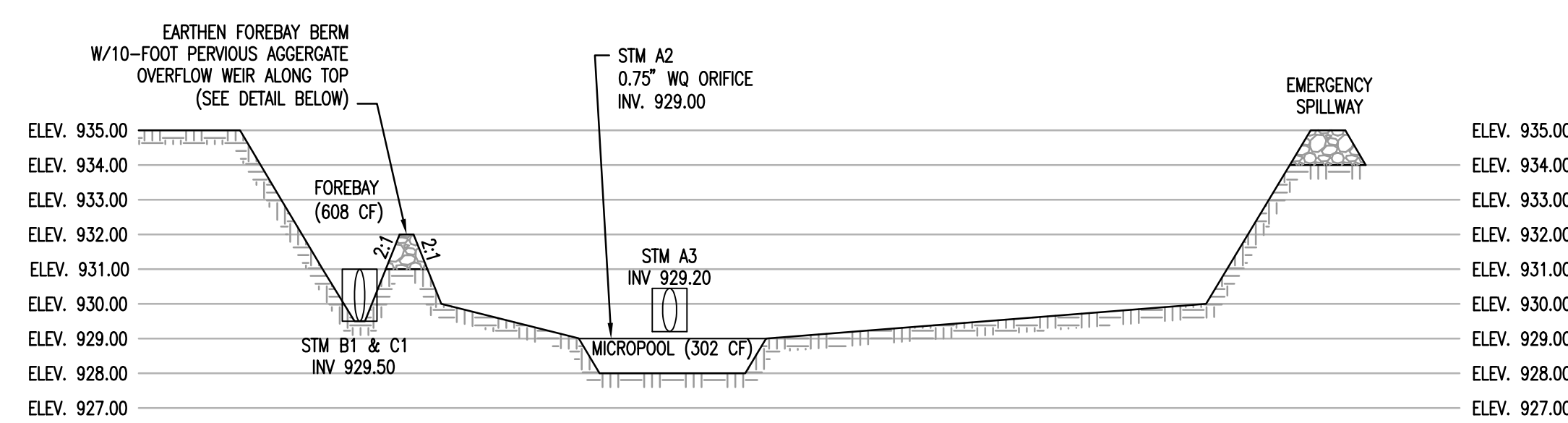




OVERALL POND CHARACTERISTICS			
ELEVATION (FT)	CONTOUR AREA (SQ)	INCREMENTAL VOLUME (CF)	CUMULATIVE VOLUME (CF)
934	6935	6400	21048
933	5865	5306	14648
932	4747	4231	9342
931	3715	3233	5111
930	2751	1576	1878
929	401	302	302
928	202	0	0

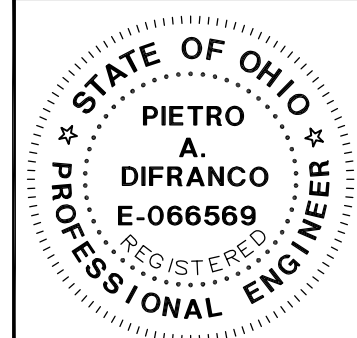
MICROPOOL CHARACTERISTICS			
ELEVATION (FT)	CONTOUR AREA (SF)	INCREMENTAL VOLUME (CF)	CUMULATIVE VOLUME (CF)
929	401	302	302
928	202	0	0

FOREBAY CHARACTERISTICS			
ELEVATION (FT)	CONTOUR AREA (SF)	INCREMENTAL VOLUME (CF)	CUMULATIVE VOLUME (CF)
932	522	407	608
931	292	201	201
930	110	0.00	0.00

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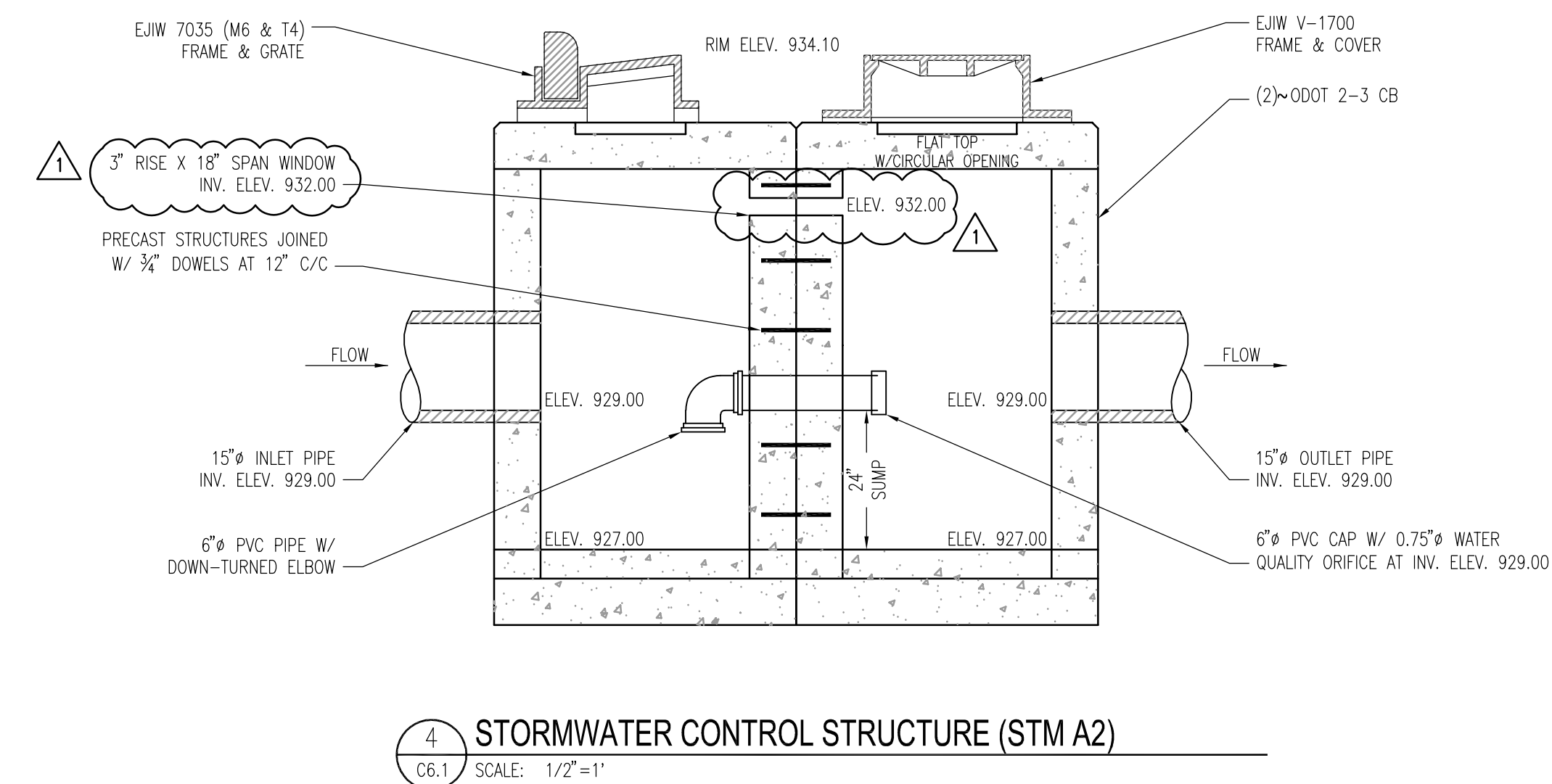
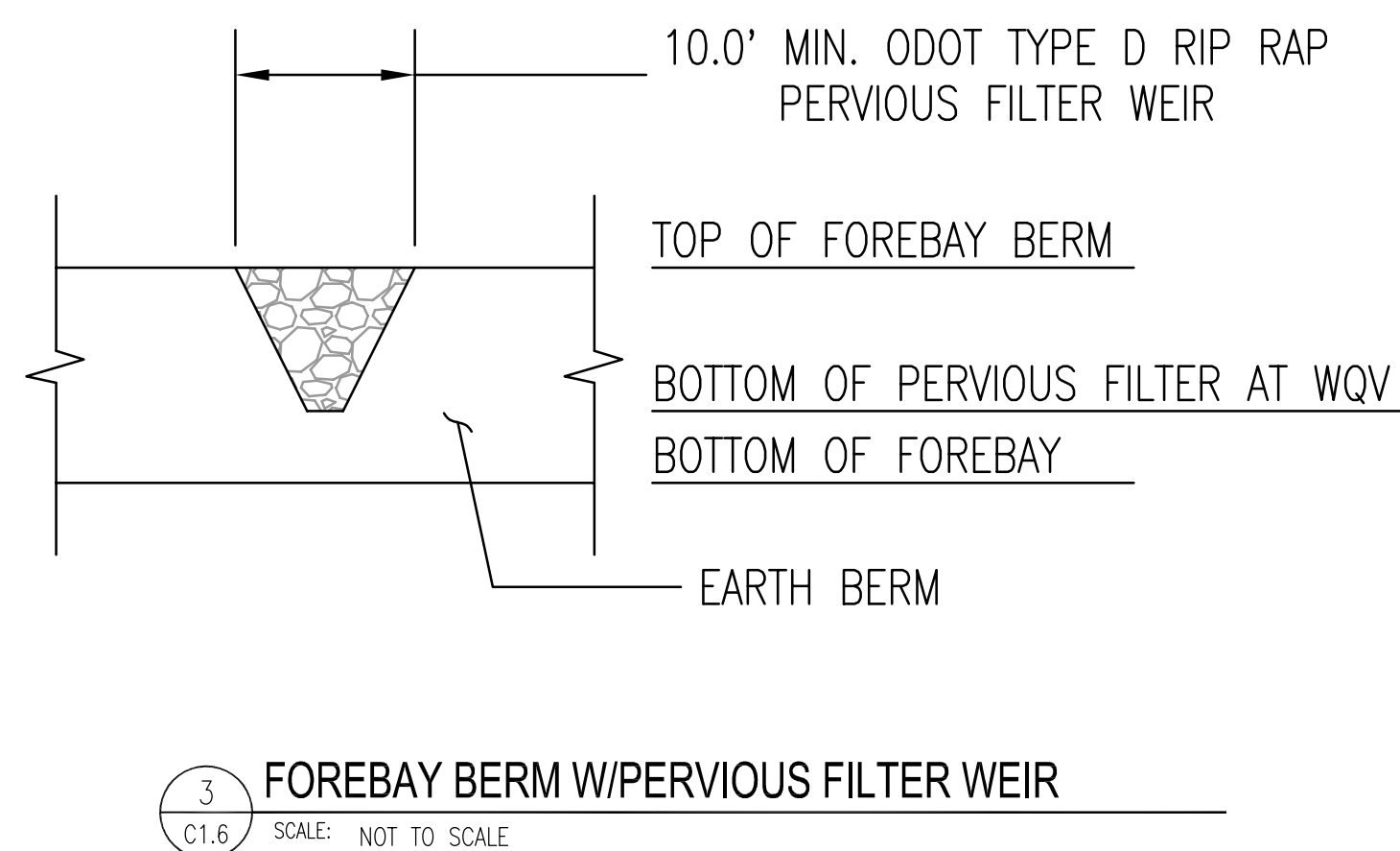


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SWP3 PHASE 2
POST-CONST BMPS

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C1.6



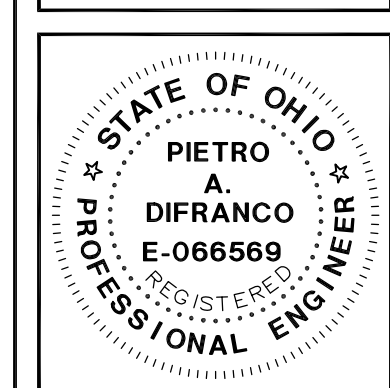
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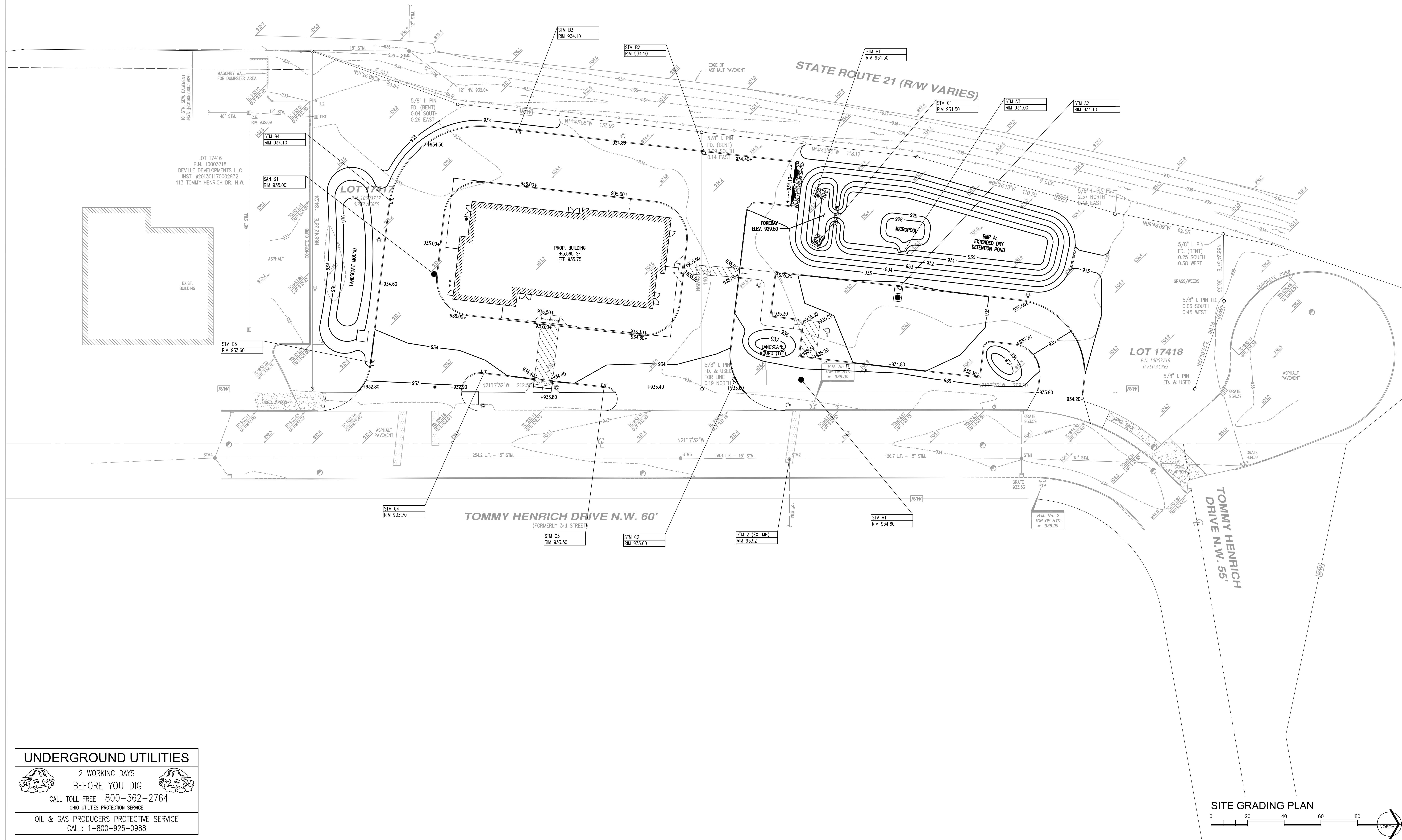


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SITE GRADING PLAN

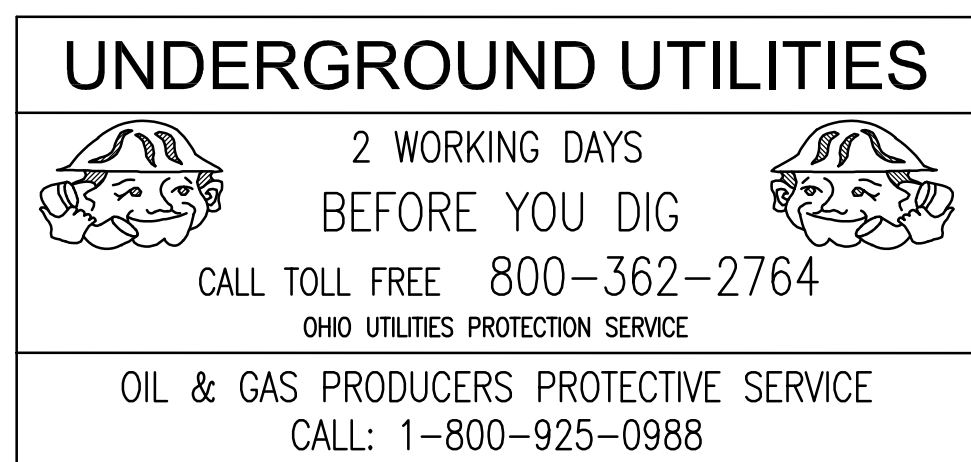
DRAWN BY:	KMT
CHECKED BY:	-
RLB NO.:	13064.12

DRAWING NO.
C3.1



SANITARY STRUCTURE TABLE	
STRUCTURE	
SAN1	SANITARY MANHOLE RIM 935.69
	30" INV. 920.99 SE (OUT)
SAN2	SANITARY MANHOLE RIM 934.53
	30" INV. 920.63 S (OUT) 30" INV. 920.73 NW (N)
SAN3	SANITARY MANHOLE RIM 934.26
	36" INV. 920.08 S (OUT) 24" INV. 921.08 NE (NW) 30" INV. 920.56 N (N)
SAN4	SANITARY MANHOLE RIM 932.60
	36" INV. 920.70 SE (OUT) 36" INV. 920.70 S (OUT)
SAN5	SANITARY MANHOLE RIM 934.00
	42" INV. 920.80 S (OUT) 42" INV. 920.80 NW (N)
SAN6	SANITARY MANHOLE RIM 934.00
	42" INV. 920.60 S (OUT)
	42" INV. 920.60 N (N)
	24" INV. 920.70 NE (N) 24" INV. 920.90 SW (N)
SAN7	SANITARY MANHOLE RIM 932.84
	42" INV. 920.34 S (OUT) 42" INV. 920.34 N (N)
SAN8	SANITARY MANHOLE RIM 930.22
	42" INV. 920.22 SE (OUT) 42" INV. 920.22 N (N)

ADDITIONAL NOTES:
A. GC SHALL BE RESPONSIBLE FOR ANY/ALL MODIFICATIONS TO THE TEMPORARY SITE FENCE IN ORDER TO FACILITY THE WORK INCLUDING UTILITY CONNECTIONS AT THE STREET. SEE C0.11 FOR LOCATION OF TEMPORARY SITE FENCE AND PHASING.
B. GC SHALL ENSURE PROPER LANE CLOSURES ARE IN PLACE FOR UTILITY WORK WITHIN TOMMY HENRICH DRIVE AND MEASURES ARE IN ACCORDANCE WITH CITY OF MASSILLON AND ODOT STANDARDS.

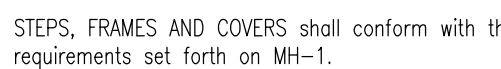


A profile view of a stepped surface. The horizontal axis is a scale from 0 to 80, with major tick marks at 0, 20, 40, 60, and 80. The profile consists of several horizontal segments at different elevations. A north arrow is located at the right end of the profile, pointing towards the upper right.

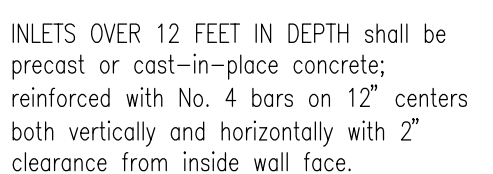


- ## SEWER TRENCH DETAIL

SCALE: NOT TO SCALE



STORM IN

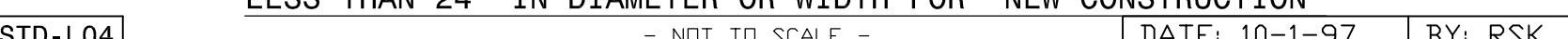


CATCH BASIN SIZE	OUTLET PIPE SIZE
2-3	12" to 33"
2-4	36" to 42"

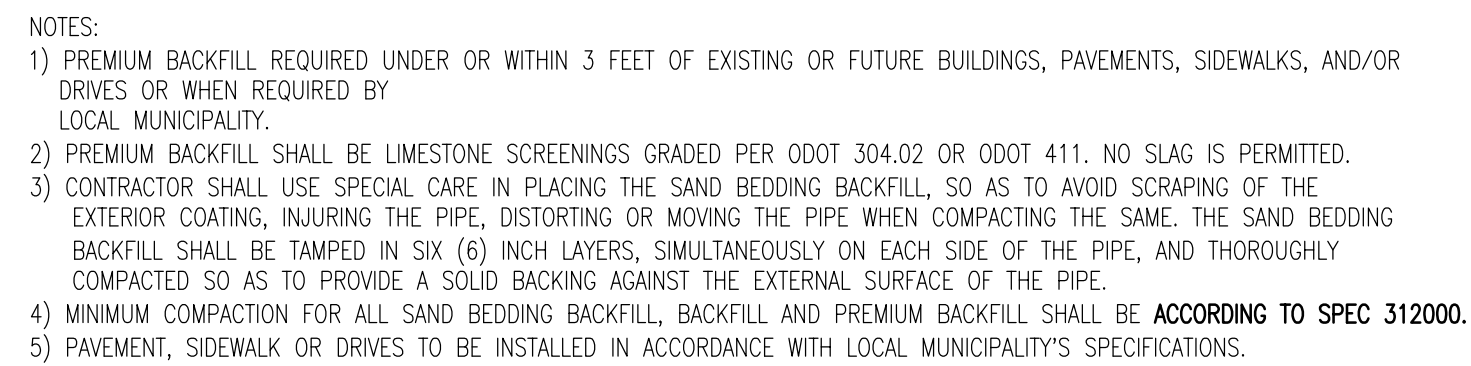
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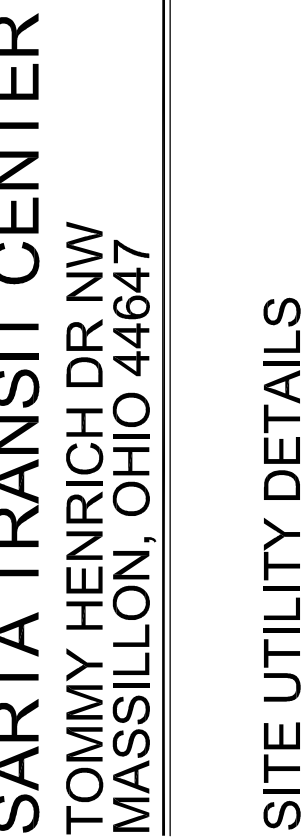
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WATER MAIN LOWERIN UNDER OBSTRUCTIONS LESS THAN 24" (NEW)



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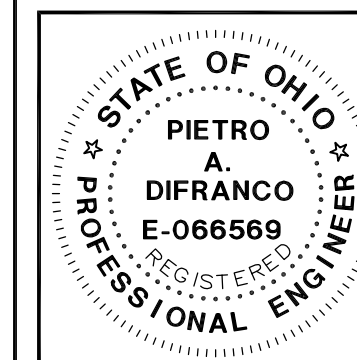
SANITARY STRUCTURE TABLE	
STRUCTURE	
SAN1	SANITARY MANHOLE RM 935.69
	30' INV. 920.99 SE (OU)
SAN2	SANITARY MANHOLE RM 934.63
	30' INV. 920.63 S (OUT) 30' INV. 920.73 NW (N)
SAN3	SANITARY MANHOLE RM 934.26
	36' INV. 920.06 S (OUT) 24' INV. 921.06 NE (N) 30' INV. 920.56 N (N)
SAN4	SANITARY MANHOLE RM 932.50
	36' INV. 920.70 SE (OU) 36' INV. 920.70 SE (N)
SAN5	SANITARY MANHOLE RM 934.00
	42' INV. 920.80 S (OUT) 42' INV. 920.80 NW (N)
SAN6	SANITARY MANHOLE RM 934.00
	42' INV. 920.60 S (OUT)
	42' INV. 920.60 NE (N)
	24' INV. 920.50 SW (N)
SAN7	SANITARY MANHOLE RM 932.84
	42' INV. 920.34 S (OUT) 42' INV. 920.34 N (N)
SAN8	SANITARY MANHOLE RM 932.22
	42' INV. 920.22 SE (OU)
	42' INV. 920.22 N (N)

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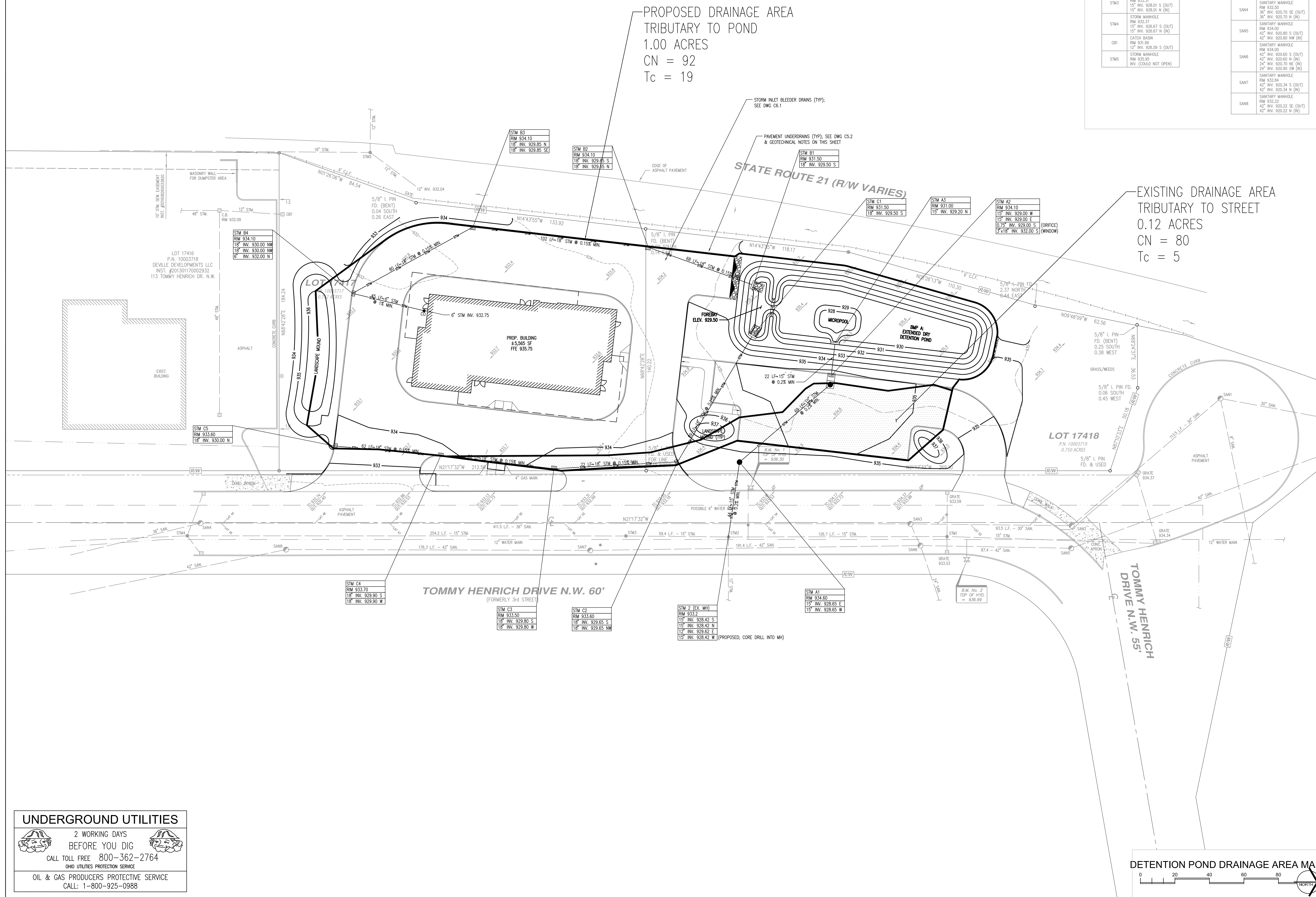


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DETENTION POND
DRAINAGE AREA MAP

DRAWN BY:	KM
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D1.1



UNDERGROUND UTILITIES

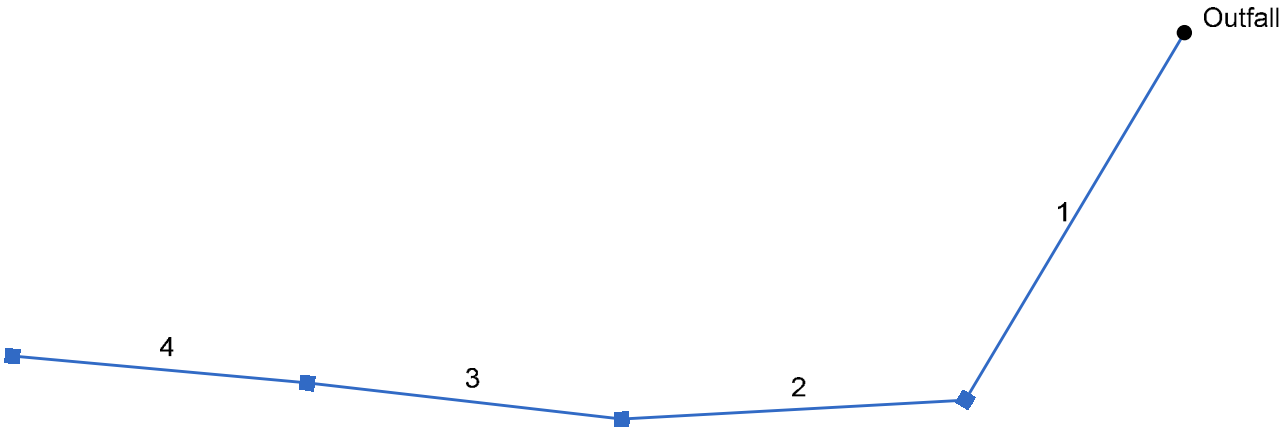
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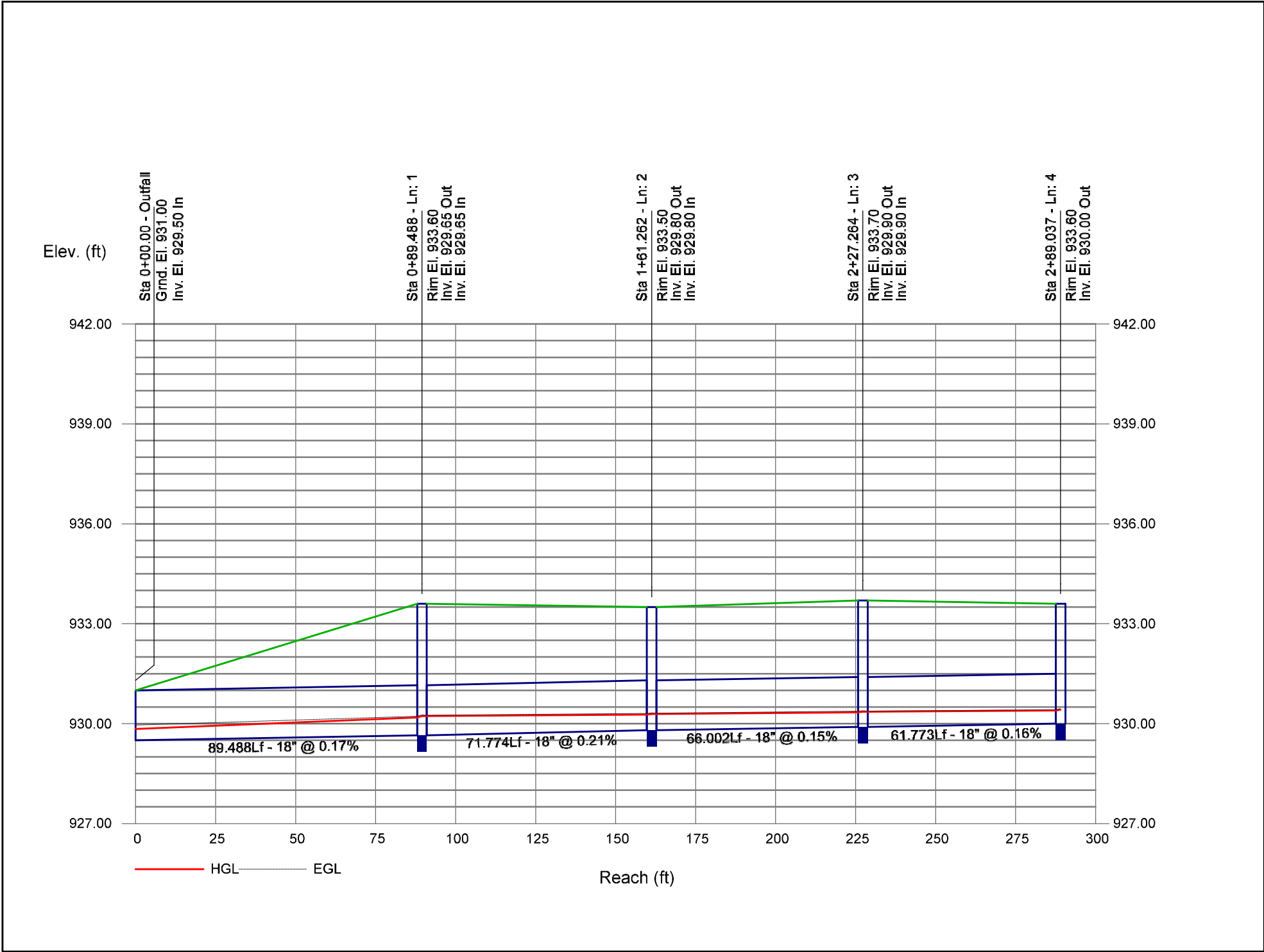
1306412STM EAST2



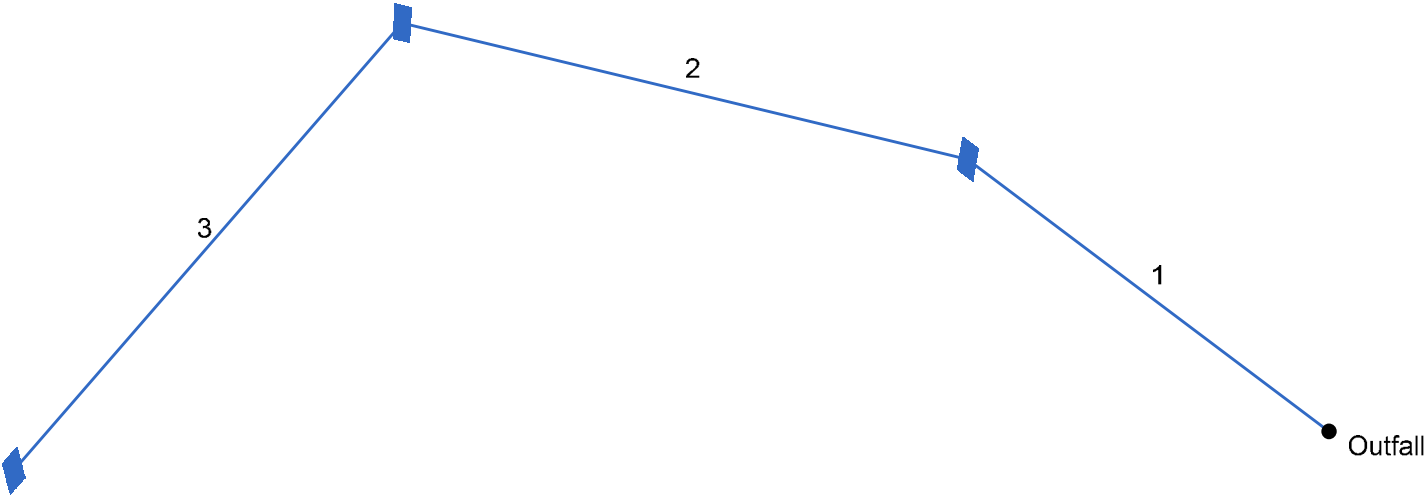
Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (l)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	89.488	0.09	0.21	0.90	0.08	0.19	10.0	24.4	4.2	0.80	4.30	2.08	18	0.17	929.50	929.65	929.84	930.16	931.50	933.60	C2-C1
2	1	71.774	0.04	0.12	0.95	0.04	0.11	10.0	21.1	4.5	0.50	4.80	1.00	18	0.21	929.65	929.80	930.21	930.23	933.60	933.50	C3-C2
3	2	66.002	0.03	0.08	0.95	0.03	0.07	10.0	16.7	5.0	0.37	4.09	0.95	18	0.15	929.80	929.90	930.24	930.27	933.50	933.70	C4-C3
4	3	61.773	0.05	0.05	0.90	0.05	0.05	10.0	10.0	6.0	0.27	4.22	0.90	18	0.16	929.90	930.00	930.28	930.31	933.70	933.60	C5-C4
1306412STM EAST2																Number of lines: 4				Run Date: 10/11/2022		
NOTES:Intensity = 88.24 / (Inlet time + 15.50) ^ 0.83; Return period =Yrs. 10 ; c = cir e = ellip b = box																						

Storm Sewer Profile



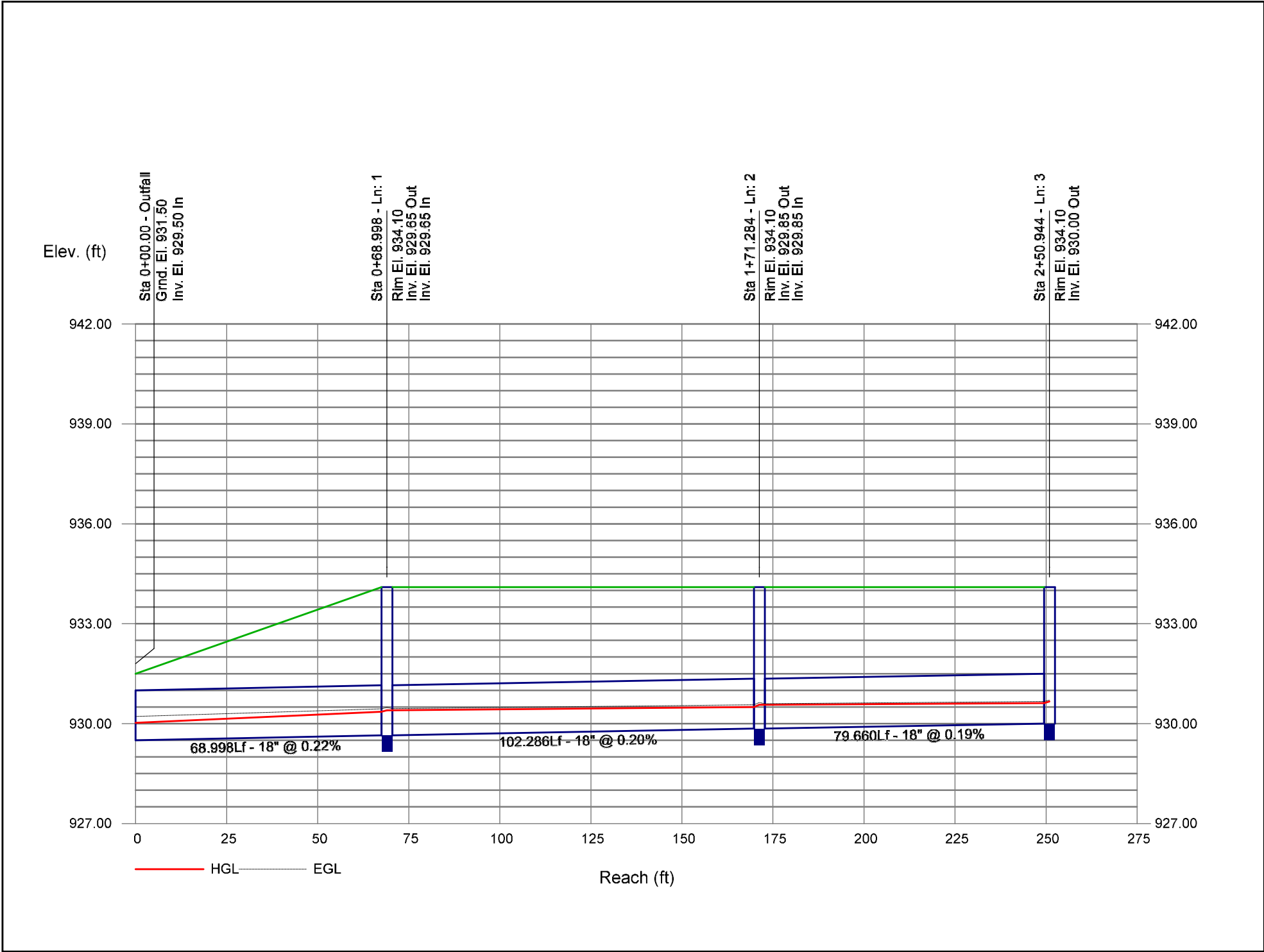
1306412STM WEST



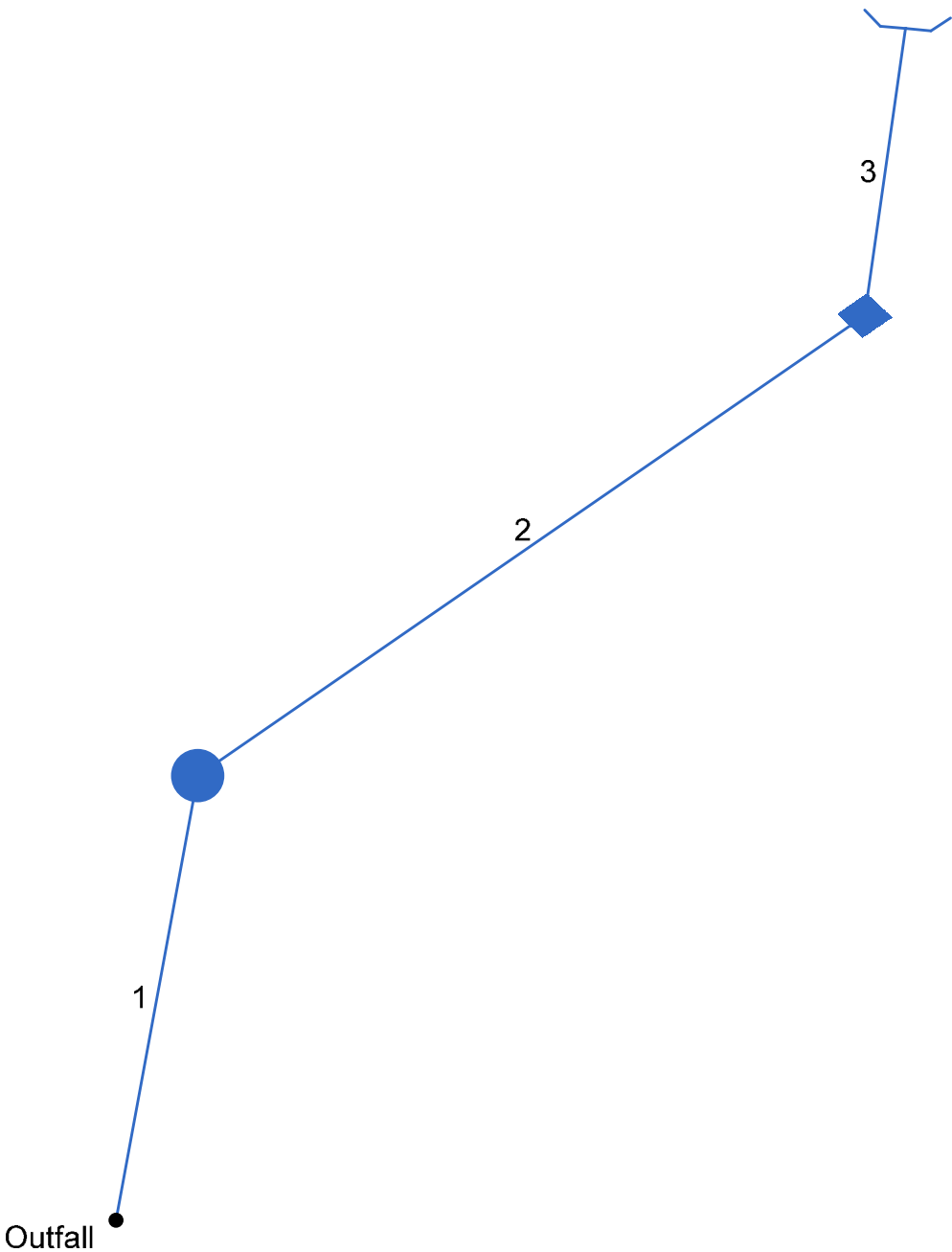
Storm Sewer Tabulation

Station		Len (ft)	Drng Area		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr (ac)	Total (ac)		Incr (min)	Total (min)	Inlet (min)	Syst (min)					Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	68.998	0.09	0.38	0.95	0.09	0.36	10.0	13.8	5.4	1.93	4.90	2.94	18	0.22	929.50	929.65	930.02	930.36	931.50	934.10	B2-B1
2	1	102.286	0.08	0.29	0.95	0.08	0.27	10.0	12.0	5.7	1.55	4.64	1.94	18	0.20	929.65	929.85	930.40	930.50	934.10	934.10	B3-B2
3	2	79.660	0.21	0.21	0.95	0.20	0.20	10.0	10.0	6.0	1.19	4.56	1.59	18	0.19	929.85	930.00	930.57	930.62	934.10	934.10	B4-B3
1306412STM WEST																Number of lines: 3				Run Date: 5/26/2022		
NOTES:Intensity = 88.24 / (Inlet time + 15.50) ^ 0.83; Return period =Yrs. 10 ; c = cir e = ellip b = box																						

Storm Sewer Profile



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



Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (l)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	43.866	0.00	0.37	0.95	0.00	0.30	10.0	11.3	5.8	1.76	4.68	3.54	15	0.52	928.42	928.65	928.95	929.18	933.20	934.60	A1-EX
2	1	69.166	0.13	0.37	0.95	0.12	0.30	10.0	10.5	5.9	1.80	4.59	3.14	15	0.51	928.65	929.00	929.32	929.54	934.60	934.10	A2-A1
3	2	28.200	0.24	0.24	0.75	0.18	0.18	10.0	10.0	6.0	1.09	5.44	2.25	15	0.71	929.00	929.20	929.75	929.61	934.10	931.00	A3-A2
Project File: 1306412STM STREET.stm																Number of lines: 3				Run Date: 5/26/2022		
NOTES:Intensity = 88.24 / (Inlet time + 15.50) ^ 0.83; Return period =Yrs. 10 ; c = cir e = ellip b = box																						

Storm Sewer Profile

