STORM WATER MANAGEMENT REPORT

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Prepared For:

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SHEETZ STORE

3544 Erie Avenue SW
Massillon, Ohio 44646

Property Owner:
Sheetz

Civil Engineer:
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Project Manager:
Josh Lyons

Date:
February 2023

Revision Date:
-

GPD Project Number:
2020117.09

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Leonardo Sferra, P.E. — 01/31/23 Date

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Section 1

Executive Summary

The following report includes storm water management calculations for the Sheetz Store project as required by the Stark County Regional Planning Commission Subdivision Engineer. This report accompanies the site development plans.

The scope of this project is to develop a predominately vacant piece of land off Erie Avenue SW into a new Sheetz store. Construction would include a new store building, fueling canopy with dispensers, drive-thru lane with order boards, site parking, and asphalt/concrete circulation drives.

The project parcel will be owned by Sheetz (upon final closing on the property) and will consist of 6.26 acres of land located at 3544 Erie Avenue SW in Perry Township, Stark County, Ohio. The property sits north of Ortt Street SW (to be developed as part of these improvements), east of Erie Avenue SW, south of US-62, and west of Millennium Boulevard SE.
See Figure 1 below for location.

Figure 1: Location Map

Existing Site

The project area is currently broken into smaller properties owned by different parties. The properties will be purchased by Sheetz and consolidated into one parcel. The consolidated parcel is occupied by a small appliance store surrounded by vacant wooded land. Minor asphalt/concrete pavement surrounds the appliance store for customer parking and vehicle circulation. Two aprons connected to Erie Avenue SW allow access to the site. Ortt Street SW is currently an undeveloped right-of-way made up of a dirt and gravel mixture. An existing apron off Erie Avenue SW allows access to the undeveloped Ortt Street SW. In general, the topography of the site slopes from west to east. Site storm water generally sheet flows across the property and into the Elliot Avenue SW right-of-way before entering the adjacent property owned by Shelly Materials, Inc. (Allied Corporation). The site is ultimately tributary to an unnamed creek that runs along the north side Warmington Road SE and flows west before reaching the Tuscarawas River approximately 0.8 miles southwest of the project site.

A National Resources Conservation Service (NRCS) web soil survey was performed to determine the soil type(s) that underlie the project site. The soil types were determined to be Chili Silt Loam (CpA/CpB/CpC) of varying slopes and Conotton Gravelly Loam (CyD2). The underlying soils on the property have a hydrologic soil rating of 'A'. Calculations herein use this hydrologic soil rating to determine curve numbers

for storm water runoff calculations described in later sections of this report. The NRCS site soils map, including more detailed descriptions of the existing soil properties and qualities, can be found in Section 2 of this report.

Proposed Site

The proposed site construction will consist of a new Sheetz store, fueling canopy with dispensers, drive-thru lane with order boards, and site parking, and asphalt/concrete circulation drives. A new right-in-right-out drive apron will be installed along Erie Avenue SW in the general area of the existing drive apron locations to the appliance store. Improvements on Erie Avenue SW will consist of a right turn deceleration lane to enter the Sheetz property, and a concrete median between northbound and southbound traffic to deter left-hand turn in the Sheetz development. Ortt Street SW will be improved to an asphalt road with concrete curb edging. A new apron connected to Ortt Street SW will allow access to the Sheetz site from the south. In general, the topography of the site will match that of the existing such that the area will slope west to east. Storm water will be collected by a new storm sewer system and conveyed to a proposed infiltration basin to provide runoff control as described in later sections of this report.

Storm Water Quantity Analysis

The methods for storm water runoff control requirements have been set forth in the *Stark County Subdivision Regulations* dated August 8, 2018, which states that:

Section 620.2. Storm Water Runoff Control

A. The flow rate of storm water from a developed site must be controlled so that the following criteria are met:

1. *The peak flow of storm water from the developed site at an appropriately selected point of analysis on the earth's surface shall not exceed the peak flow of storm water from the pre-developed site at the same point of analysis for the same year frequency storm. This requirement applies for all storms with a frequency of one hundred (100) years and less.*
2. *The peak flow of storm water from the site during construction at an appropriately selected point of analysis on the earth's surface shall not exceed the peak flow of storm water from the pre-developed site at the same point of analysis for the same year frequency storm. This requirement applies for all storms with a frequency of ten (10) years and less. When determining the area of land disturbed during construction, and allowance shall be included for lots that are also under construction at the same time the streets are being constructed.*
3. *The flow of storm water from the developed site shall be drained to an adequate outlet. This outlet must be approved by the Subdivision Engineer and will consist of a ditch, stream, river, storm sewer, pond or lake having sufficient capacity to accommodate flow from the developed site.*
4. *The flow of storm water from the developed site must not cause flooding to proposed buildings within the development or to existing downstream homes, buildings, places of business or other structures.*
5. *Surface water draining from an existing watershed area cannot be diverted, channeled, piped or otherwise rerouted into another watershed area unless approved by the Subdivision Engineer.*

To provide storm water quantity for the project watershed, an infiltration basin is proposed in the southeast corner of the property. To determine the appropriateness and feasibility of constructing an infiltration basin, preliminary soil testing was conducted in the area of the proposed basin as outlined below.

To determine the approximate infiltration rate of the native soil, GPD Group collected two boring samples in the location of the basin's infiltration bed. The Ohio EPA's *Rainwater and Land Development Manual* provides guidance on estimating infiltration rates based on soil texture using the following abbreviated table found in Chapter 2:

Subgrade USDA Soil Texture	Clay Content %	Infiltration Rate (in/hr)
Sand	< 8	2.8
Loamy Sand	< 15	2.0
Sandy Loam	< 20	0.80

Table 1: Estimated Infiltration Rate by Texture (OEPA Provision 2018)

The native soil was determined to be a loamy sand and have an approximate infiltration rate of **2.0 in/hr**. The laboratory results supporting the findings of the soil borings can be found in Section 3 of this report.

The analysis boundary is based on the onsite and offsite areas that are tributary to the proposed infiltration basin. Vegetated areas disturbed due to development that are not tributary to the proposed infiltration basin are not included as part of the analysis boundary since these areas have similar ground cover in both the pre- and post-development conditions. The roadway improvements for both Erie Avenue SW and Ortt Street SW are not required to be included as part of this storm water analysis as directed by the Subdivision Engineer.

For the purposes of this report and design of the infiltration basin, the analysis boundary will include areas of future development on the property that would be tributary to the infiltration basin. These areas are assumed to be 80% impervious surface cover.

The analysis boundary under pre-development conditions is not considered due the high infiltrative properties of the native soil on the property and an adequate outfall not being available for the site. The allowable peak flow for all storm events up to the 100-year frequency is considered zero (0) ft^3/s, meaning that all storm frequencies up to the 100-year event will be required to infiltrate into the ground.

The analysis boundary area was analyzed by surface cover in the post-development condition to determine the development's peak flow. The post-development watershed area (2.73 acres), broken down by surface cover using a hydrologic soil group rating of 'A', is 67% impervious and 33% pervious. The storm water management map for post-development conditions can be found in Section 3 of this report.

Stark County requires the stacking of storm water quality volume and storm water quantity volume; therefore, the water quantity volume begins at the top of the water quality volume. See report section *Storm Water Quality Analysis* for more information on the projects water quality.

The Soil Conservation Service (SCS) Method was used to analyze the project watershed.

The proposed infiltration basin is designed to infiltrate all storm events up to the 100-year event to meet the allowable peak flow rate of zero (0) ft^3/s of all storm events. Per the *Stark County Subdivision Regulations*, an emergency spillway shall be provided for the proposed basin. A conventional earthen spillway is not feasible for the proposed basin due to future development on the property. To provide means of emergency overflow, an overflow structure will be installed southeast of the proposed basin and will act as a broad crested weir. A 12-inch reinforced concrete pipe will connect a headwall at the basin to the overflow structure and allow water to be conveyed between the two. The rim of the overflow structure is proposed to be at an elevation of 986.00, which is slightly above the 100-year high water elevation of the infiltration basin. An 8' wide earthen embankment (temporary until future phase work is completed) is proposed on the east side of the basin with an elevation of 987.50, providing 1.5' of freeboard between the 100-year high water elevation and the top of the embankment. The emergency spillway (weir) calculations can be found in Section 3 of this report.

It should be noted that the bottom of the forebay is not being considered for infiltration bed area in the calculations.

The hydrograph calculations can be found in the Appendix of this report. The following tables (see next page) summarize the results found in the hydrograph calculations.

Hydrograph Results Summary					
Storm Event	Allowable Release (ft^3/s)	Generated Post-Development Peak Flow (ft^3/s)	Infiltration Basin Release (ft^3/s)	High Water Elevation (Including WQv) (ft)	Maximum Volume Storage (Including WQv) (ft^3)
1-Year	0.00	2.67	0.00	982.78	9,163
2-Year	0.00	3.92	0.00	983.12	10,888
5-Year	0.00	5.89	0.00	983.63	13,805
10-Year	0.00	7.70	0.00	984.08	16,629
25-Year	0.00	10.56	0.00	984.74	21,245
50-Year	0.00	13.04	0.00	985.26	25,381
100-Year	0.00	15.84	0.00	985.82	30,191

Table 2: Hydrograph Calculated Release Table

Infiltration Basin Data					
Bottom of Basin & Bottom of Water Quality Elevation (ft)	Top of Water Quality & Bottom of Water Quantity Elevation (ft)	Top Water Quantity Elevation & 100-Year High Water Elevation (ft)	Emergency Spillway Structure Rim Elevation (ft)	Top of Embankment Elevation (ft)	Freeboard (ft)
980.00	982.15	985.82	986.00	987.50	1.50

Table 3: Infiltration Basin Data

The infiltration basin has been designed to meet the storm water control requirements set forth in the *Stark County Subdivision Regulations.*

See report section *Soil Erosion and Sediment Control* for temporary sediment basin sizing and calculations for peak flow control during construction.

Storm Water Quality Analysis

Per the requirements of the Stark County Regional Planning Commission Subdivision Engineer and the *Ohio Environmental Protection Agency (OEPA) General Storm Water Permit OHC000005*, sites disturbing over one acre of land are required to provide post construction Best Management Practices (BMP's) to treat storm water runoff before it discharges off the site. With a total land disturbance of over one-acre, post-construction BMP's will be required for this construction project.

According to *General Storm Water Permit OHC000005*:

Post-Construction practices shall be sized to treat 100% of the WQv associated with their contributing drainage area. Use the following equation:

$$WQ_v = Rv * P * A / 12 \qquad \text{(Equation 1)}$$

where:
WQ_v = water quality volume in acre-feet
Rv = the volumetric runoff coefficient calculated using equation 2
P = 0.90 inch precipitation depth
A = area draining into the BMP in acres

$$Rv = 0.05 + 0.9i \qquad \text{(Equation 2)}$$

where i = fraction of post-construction impervious surface

But also:

Where there is a combination of redeveloped areas and new development, a weighted approach shall be used with the following equation:

$$WQv = P * A * [(Rv_1*0.2) + (Rv_2 - Rv_1)] / 12 \qquad \text{(Equation 3)}$$

where

P = 0.90 inches
A = area draining into the BMP in acres
Rv_1 = volumetric runoff coefficient for existing conditions (current site impervious area)
Rv_2 = volumetric runoff coefficient for proposed conditions (post-construction site impervious area)

Using equation 1 and 2, the minimum water quality volume based on the tributary drainage area to the infiltration basin is 6,121 ft^3. Using Equation 3, the required water quality volume for this development is 4,233 ft^3. Equation 1 and 2 will govern for this project and therefore the required water quality volume for this development is **6,121 ft^3**. See Section 4 of this report for the Required Water Quality Map for Pre- and Post-Development Conditions, Project Required Water Quality Calculation (Equation 3), and BMP Drainage Area Calculation (Equation 1 & 2).

Stark County requires the stacking of storm water quality volume and storm water quantity volume. To meet this, the bottom 2.15' of the infiltration basin will be utilized for water quality only, providing **6,246 ft^3**. The general permit requires a maximum drawdown time of 24 hours to minimize the nuisance effects of standing water and to promote vigorous communities of appropriate vegetation. Based on an infiltration bed area of 1,540 ft^2 and an approximate infiltration rate of 2.0 in/hr, the provided water quality volume will have a drawdown time of 23.8 hrs. See below for the supporting calculations.

Step 3 - Bowl Storage and Overflow Height					Incremental	Cumulative
	Elevation	Area (ft^2)			Volume (ft^3)	Volume (ft^3)
Elevation of Infiltration Bed =	980.00	1,540				
	981.00	2,846			2,160	2,160
	982.00	4,108			3,458	5,618
	983.00	5,240			4,663	10,280
	984.00	6,496			5,857	16,137
	985.00	7,884			7,179	23,316
Elevation of Top of WQv =	982.13					
Elevation of Overflow =	982.15					OKAY
Surface Basin Overflow Height, $d_{overflow}$ =	25.8	in			>12 in	OKAY
Surface Storage Volume Provided, V_{bowl}	6,246	ft^3				
Volume Provided Relative to WQv, V_{bowl}/WQv	1.02		=		102.0%	OKAY

Step 4 - Drawdown Check				Bottom	Top
Depth of WQv, d_{WQv} =	2.1	ft			
Apparent WQv Depth, $d_{WQv\text{-}apparent}$ =	4.0	ft			
WQv Drawdown Time, t_{WQv} =	23.8	hr		OKAY	

To meet infiltration basin pretreatment requirements set forth in the Rainwater and Land Development Manual, a forebay is required to be designed with a minimum volume of 10% of the provided water quality volume, or 625 ft^3. A forebay with a design volume of 693 ft^3 is provided on the north side of the infiltration basin where the concentrated flows enter. See next page for supporting calculations.

Pond Name: Infiltration Basin Forebay

Row	Stage	Elevation	Contour Area	Incremental Storage	Total Storage
	(ft)	(ft)	(sqft)	(cuft)	(cuft)
0	0.00	979.50	141	0.000	0.000
1	0.50	980.00	271	101	101
2	1.50	981.00	607	428	529
3	1.75	981.25	706	164	693

Figure 2: Calculation for Provided Forebay Volume

Storm Sewer Design Calculations

The design criteria for storm pipes have been set forth in the *Stark County Subdivision Regulations,* which states that:

Storm sewers as well as their end treatments shall be designed and constructed in accordance with the design criteria and requirements given in the current edition of the Ohio Department of Transportation's Location and Design Manual Volume Two.

Section 1104.3 Storm Sewer Design Criteria in the *Location and Design Manual* states:

Section 1104.3.1 Design AEP Storm
Size all storm sewers using open channel, just full capacity design to flow just full for a 10% AEP storm.

Section 1104.3.2 Hydraulic Grade Line
Determine the elevation of the hydraulic grade line at the upper end of each sewer run using a 4% AEP storm.

The storm pipes to be installed as part of this project were designed using NOAA rainfall intensity data and Hydraflow storm sewers extension for Autodesk. All proposed pipes were designed to convey the 10-year storm event as required by County regulations. Additionally, all proposed pipes were checked to ensure the 100-year hydraulic grade line did not surcharge the proposed storm structure rims, exceeding the County requirement for hydraulic grade line check. This check was to ensure the 100-year runoff reached the proposed infiltration basin.

The pipe systems tributary to the infiltration basin were designed using a tailwater condition for high water elevation for the storm event under consideration. The 10-year high water elevation of 984.08 was considered for the 10-year storm pipe design, the 100-year high water elevation of 985.82 was considered for the 100-year storm pipe design.

The storm water drainage map for post-construction storm sewers, 10-year capacity calculations, 10-year profiles, 100-year hydraulic grade check calculations, 100-year profiles can be found in Section 5 of this report. Site specific NOAA rainfall intensity information can be found in the Appendix of this report.

Soil Erosion and Sediment Control

The proposed development shall provide erosion and sedimentation control measures as detailed on the site improvement plans. The improvement plans provide details as to the construction of a temporary sediment basin located within the footprint of the proposed infiltration basin. As per County requirements, the temporary sediment basin shall control peak flows of storm water from the site during construction. The construction peak flows shall not exceed the peak flows of storm water from the pre-developed site for the same year frequency storm. This requirement applies for all storms with a frequency of ten (10) years and less.

This analysis was performed using hydrographs to confirm the basin, with its temporary shape/size, was adequately sized to control all storm events up to and including the 10-year event. The assumption of allowable release will match that of the final permanent basin design such that the allowable release will be zero (0) ft^3/s. The hydrograph calculations can be found in the Appendix of this report. The following table

summarize the results found in the hydrograph calculations:

Hydrograph Results Summary for Sediment Basin					
Storm Event	Allowable Release (ft^3/s)	Generated Post-Development Peak Flow (ft^3/s)	Infiltration Basin Release (ft^3/s)	Maximum Volume Storage (ft^3)	High Water Elevation (ft)
1-Year	0.00	2.67	0.00	2,635	982.17
2-Year	0.00	3.92	0.00	4,313	982.54
5-Year	0.00	5.89	0.00	7,186	983.11
10-Year	0.00	7.70	0.00	9,925	983.60
Note: The bottom of the temporary sediment basin is at an elevation of 981.50. The generated post-development peak flows provided are the anticipated flows for full development buildout.					

Table 4: Hydrograph Summary Results for Sediment Basin

See the improvement plans for the sizing of the temporary sediment basin as it relates to the sediment storage zone volume and dewatering zone volume.

Section 2

Hydrologic Soil Group—Stark County, Ohio
(Sheetz Massillon)

Map Scale: 1:1,800 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 25 50 100 150

Feet
0 50 100 200 300

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Lines

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Points

A
A/D
B
B/D
C
C/D
D
Not rated or not available

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CpA	Chili silt loam, 0 to 2 percent slopes	A	3.4	24.6%
CpB	Chili silt loam, 2 to 6 percent slopes	A	5.8	42.2%
CpC	Chili silt loam, 6 to 12 percent slopes	A	3.1	22.8%
CyD2	Conotton gravelly loam, 12 to 18 percent slopes, moderately eroded	A	1.4	10.4%
Totals for Area of Interest			**13.7**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Section 3

GPD GROUP
Glaus, Pyle, Schomer, Burns & DeHaven, Inc.

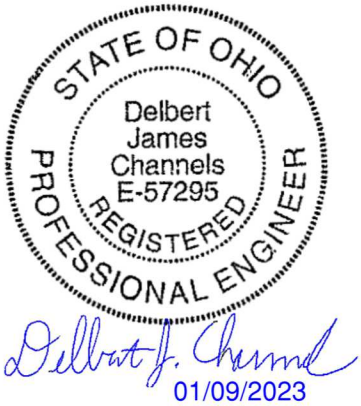
ADDITIONAL
FIELD EXPLORATION AND GEOTECHNICAL ENGINEERING REPORT

PROPOSED SHEETZ STORE & DIESEL REFUELING
S.E. CORNER – ERIE ST. & US HWY 62
MASSILLON, OHIO

Prepared For:

Sheetz Inc.

GPD Project No. 2020117.09
January 9, 2023



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Introduction

GPD is pleased to submit the results of a subsurface exploration performed for the aforementioned project. Due to an updated location for the gasoline UST area of the proposed Sheetz Store and the need for an estimated infiltration rate in the region of the proposed basin area, it was determined that additional subsurface information and sampling would be required. Our Geotechnical personnel revisited the site on the date of December 15th, 2022, to complete the additional subsurface investigations. This additional field exploration and Geotechnical engineering report is a supplement to our original subsurface report dated September 1, 2020.

Subsurface Exploration Program

The subsurface exploration conducted by GPD Geotechnical, performed on December 15, 2022, consisted of drilling and sampling at four (4) additional locations at the proposed Sheetz site.

Two (2) UST borings were drilled with a track-mounted 7822DT Geoprobe rotary drill rig using hollow-stem augers and an automatic hammer to advance the boreholes. Representative soil samples were obtained by split-barrel sampling procedure in general accordance with the appropriate ASTM standards. In the split-barrel sampling procedure, the number of blows required to advance a standard 2-inch O.D. split-barrel sampler the last 12 inches of the typical total 18-inch penetration by means of a 140-pound hammer with a free fall of 30 inches, is the standard penetration resistance value (N-Value). This value is used to estimate the in-situ relative density of cohesion-less soils and the consistency of cohesive soils. The sampling depths and penetration distance, plus the standard penetration resistance values, are shown on the UST boring logs. The samples were sealed and returned to the laboratory for testing and classification.

The drill crew prepared Field logs of each UST boring. These logs included visual classifications of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. Final boring logs included with this report represent an interpretation of the field logs and include modifications based on observations made by a Geotechnical Engineer and the results of laboratory testing.

Two (2) infiltration borings also took place with a track-mounted 7822DT Geoprobe drill rig. Auger advancement took place at each location to a depth of 8 feet below the existing site grades. Split-barrel sampling took place from 8 feet to 10 feet below grade. Penetration resistance values were not recorded. All recovered samples were sealed in jars and returned to our lab for USDA soil textural analysis testing.

Subsurface Conditions

Asphalt (UST Area) – The existing asphalt pavement encountered at soil boring B-17 & B-18 were measured to thicknesses of 6 inches.

Native Soil – The subgrade soils at the boring locations consisted of soft clay or loose to medium dense sand & silt with varying amounts of gravel. Soil moistures were generally found to be damp to moist. No groundwater was encountered.

Engineering Recommendations

The following engineering recommendations are a supplement our original subsurface investigation and information provided to GPD Group regarding the design of the proposed Sheetz, the field and laboratory testing performed on the soil encountered at this site, and other information discussed in this report. This report does not reflect variations that may occur across the site, or due to the modifying effects of weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, GPD should be immediately notified so that further evaluation and supplemental recommendations can be provided.

Geotechnical Considerations

Based on the information obtained during this study, the following geotechnical considerations should be taken into account during the planning, design and construction phases of the project. **These geotechnical considerations are provided as a summary of the soils of the specific test locations associated with this investigation and are an addition to the geotechnical considerations of our original subsurface report dated September 1, 2020.**

- The subgrades soils of soil boring B-17 & B-18 are similar or better to those of our original subsurface report. The considerations & foundation recommendations provided in that report are modified as follows: Excavations of the UST area may encounter a loose sand at the planned excavation depths as encountered elsewhere on site. The bottom of the excavation should be compacted by a smooth drum roller (or other vibratory type compactor) after grade is achieved. Due to the fine nature of some of the subgrades at planned UST depth a protective layer of crushed stone may be required to help prevent disturbance. Bedrock encounter is not anticipated for excavations of the UST area. Based on the referenced ODNR bedrock map and water well data, rock should not be encountered until a depth of approximately 100 feet below grade. Groundwater was not encountered in the borings for the UST's and is not anticipated to be an issue during proposed excavations. **Foundations for the UST's could be sized with a maximum allowable soil bearing pressure of 2,500 psf.**

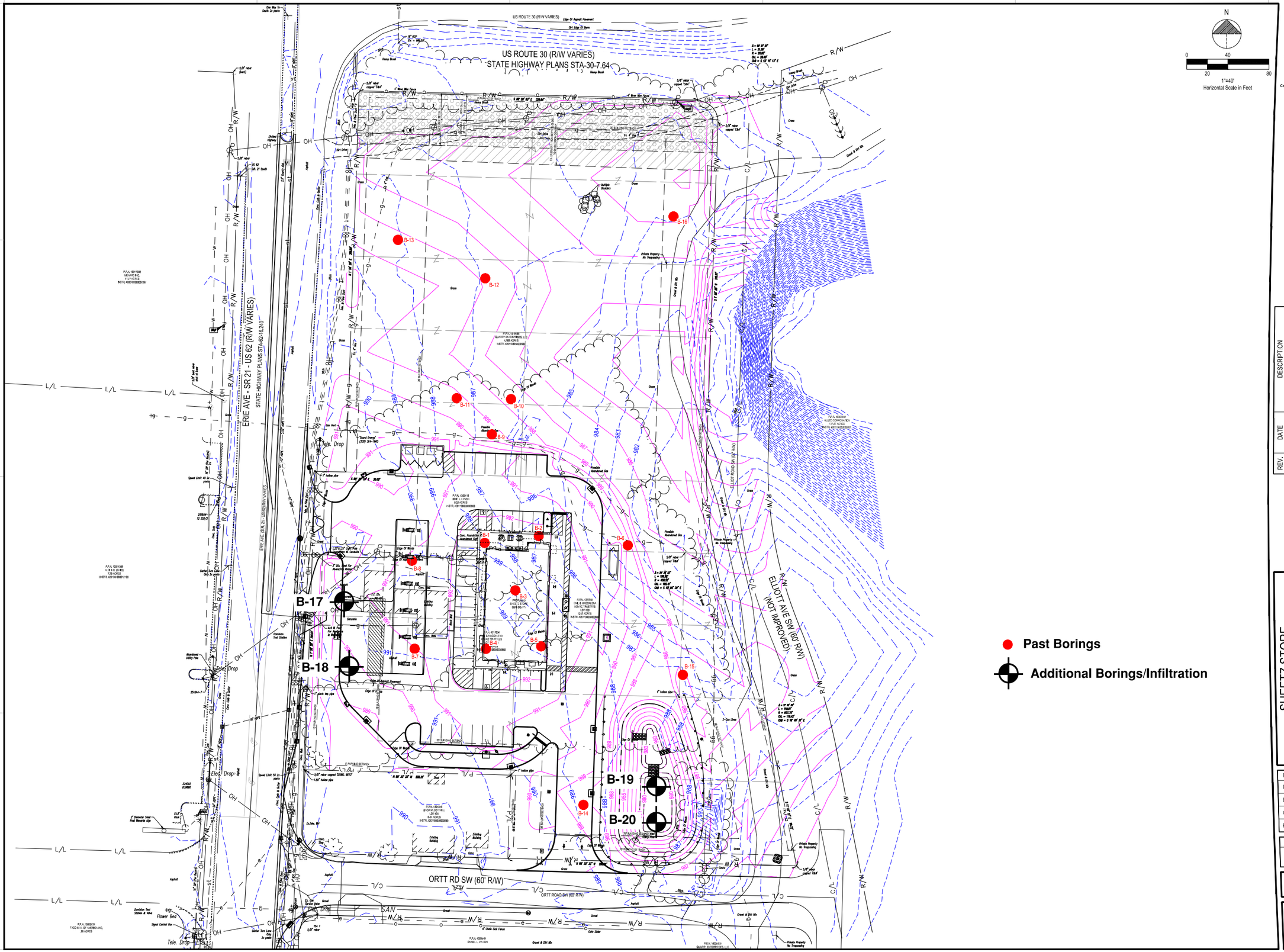
- Planned grade in the region of soil boring B-17 & B-18 will closely match to those of the existing grades. Medium dense silts or soft silts with clays were encountered to a depth of 3 feet below planned grade at the boring locations. Although these subgrades will be removed during excavation for the UST's, a potential exists where these soils could be encountered adjacent to the UST area. If encountered, these silt soils would likely become disturbed during construction activity and/or fail a proof-roll. These subgrades should be handled per section 3.2 "Site Preparation" of our original subsurface report.

- The soils of the infiltration basin in the region of soil boring B-19 & B-20 consisted of a damp to moist, fine to coarse sand with trace amounts of silts & clays. A laboratory test of these soils resulted in a classification as a loamy sand. **The infiltration rate at a proposed basin depth of 8 to 9 feet can be design based on an estimated rate of 2.0 inches/hour.**

Limitations

The analysis and recommendations presented in this report are based upon the data obtained from the borings & and lab tests performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, GPD should be immediately notified so that further evaluation and supplemental recommendations can be provided.

This report has been prepared for the exclusive use of **Sheetz Incorporated** for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless GPD Group reviews the changes and either verifies or modifies the conclusions of this report in writing.



N

0 40 20 80

1"=40'

Horizontal Scale in Feet

GPD GROUP®
Glaus, Pyle, Schomer, Burns & DeHaven, Inc.
520 South Main Street, Suite 2531
Akron, OH 44311
330.572.2100 Fax 330.572.2101

REV.	DATE	DESCRIPTION

SHEETZ STORE
SE CORNER OF ERIE ST. AND US HWY 62
MASSILLON, OH 44646

ISSUED FOR:
PERMIT
BID
CONSTRUCTION
RECORD

PROJECT MANAGER	DESIGNER
JAL	TJW

JOB NO.
2020117.09

C-100

Drawing Name: O:\2020\2020117.09_Massillon\working Files\2022.11.21 Void - Files Contain Diesel Area\void Sheets\dgt Docs\2020117.09 Geotech Site Plan.dwg
November 21, 2022 - mcafarati

Boring Number: B-17

CLIENT Sheetz, Inc. **PROJECT NAME** Sheetz Store

PROJECT NUMBER 2021117.09 **PROJECT LOCATION** S.E. Corner of Erie St. & US HWY 62, Massillon, Ohio

DATE STARTED December 15, 2022 **COMPLETED** December 15, 2022 **GROUND ELEVATION** 990.50 ft **HOLE SIZE** 6 in

DRILLING CONTRACTOR GPD Geotechnical Services, Inc. **GROUND WATER LEVELS:**

DRILLING METHOD Hollow Stem Auger - 2 1/4" ID **AT TIME OF DRILLING** --- None

LOGGED BY Dave Campana **CHECKED BY** Thomas Kratz **AT END OF DRILLING** --- None

NOTES Drill Rig: Geoprobe 7822

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		6" ASPHALT										
		Moist, soft, brown, clayey SILT, some sand, little gravel.	SS 1	89	2-2-2 (4)							
		Moist, loose, brown, medium to coarse SAND & GRAVEL, little silt.	SS 2	56	2-2-3 (5)							
5												
		Damp, loose, brown, medium to coarse SAND & GRAVEL, trace of silt.	SS 3	28	2-4-2 (6)							
10												
		Damp, medium dense, tan, fine to coarse SAND, some gravel.	SS 4	89	4-12-12 (24)							
15												
		Damp, medium dense, tan, fine to medium SAND.	SS 5	78	7-7-7 (14)							
20												

Boring terminated at 20.0 feet

Boring Number: B-18

CLIENT Sheetz, Inc. **PROJECT NAME** Sheetz Store

PROJECT NUMBER 2021117.09 **PROJECT LOCATION** S.E. Corner of Erie St. & US HWY 62, Massillon, Ohio

DATE STARTED December 15, 2022 **COMPLETED** December 15, 2022 **GROUND ELEVATION** 990.50 ft **HOLE SIZE** 6 in

DRILLING CONTRACTOR GPD Geotechnical Services, Inc. **GROUND WATER LEVELS:**

DRILLING METHOD Hollow Stem Auger - 2 1/4" ID **AT TIME OF DRILLING** --- None

LOGGED BY Dave Campana **CHECKED BY** Thomas Kratz **AT END OF DRILLING** --- None

NOTES Drill Rig: Geoprobe 7822

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		6" ASPHALT										
		Moist, medium dense, brown SILT, some sand & clay.	SS 1	78	9-5-5 (10)							
		Damp to moist, loose, brown, fine to coarse SAND, some gravel & silt.	SS 2	44	3-4-3 (7)							
5												
		Damp, medium dense, brown & tan, fine to coarse SAND, little gravel & silt.	SS 3	72	4-4-7 (11)							
10												
		Damp, medium dense, tan, medium to coarse SAND, little gravel & silt.	SS 4	78	7-9-12 (21)							
15												
		Damp, medium dense, tan, fine to coarse SAND, trace of gravel.	SS 5	89	9-9-11 (20)							
20												

Boring terminated at 20.0 feet

GENERALIZED SUBSURFACE PROFILE - GINT STD US LAB.GDT - 1/5/23 11:44 - F:\GPD GILCHRIST\JOBS\2020\GPD\DRILLING\2020117.09 - SHEETZ - MASSILLON ADDITIONAL BORINGS\B-17 & B-18.GPJ

Boring Number: B-19

CLIENT Sheetz, Inc. **PROJECT NAME** Sheetz Store

PROJECT NUMBER 2021117.09 **PROJECT LOCATION** S.E. Corner of Erie St. & US HWY 62, Massillon, Ohio

DATE STARTED December 15, 2022 **COMPLETED** December 15, 2022 **GROUND ELEVATION** 988.00 ft **HOLE SIZE** 6 in

DRILLING CONTRACTOR GPD Geotechnical Services, Inc. **GROUND WATER LEVELS:**

DRILLING METHOD Hollow Stem Auger - 2 1/4" ID **AT TIME OF DRILLING** --- None

LOGGED BY Dave Campana **CHECKED BY** Thomas Kratz **AT END OF DRILLING** --- None

NOTES Drill Rig: Geoprobe 7822

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0				(Augering advanced to 8.0')
8.0				980.0
		SM		(SM) Damp to moist, fine to coarse SAND, trace of silt & clay. **USDA SOIL CLASSIFICATION: Loamy sand** Sand - 84.9% Silt - 9.1% Clay - 6.0% **ESTIMATED INFILTRATION RATE: 2.0 in/hr**
10.0				978.0

Boring terminated at 10.0 feet

Boring Number: B-20

CLIENT Sheetz, Inc. **PROJECT NAME** Sheetz Store

PROJECT NUMBER 2021117.09 **PROJECT LOCATION** S.E. Corner of Erie St. & US HWY 62, Massillon, Ohio

DATE STARTED December 15, 2022 **COMPLETED** December 15, 2022 **GROUND ELEVATION** 988.00 ft **HOLE SIZE** 6 in

DRILLING CONTRACTOR GPD Geotechnical Services, Inc. **GROUND WATER LEVELS:**

DRILLING METHOD Hollow Stem Auger - 2 1/4" ID **AT TIME OF DRILLING** --- None

LOGGED BY Dave Campana **CHECKED BY** Thomas Kratz **AT END OF DRILLING** --- None

NOTES Drill Rig: Geoprobe 7822

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0.0				(Augering advanced to 8.0')
8.0				980.0
		SM		(SM) Damp to moist, fine to coarse SAND, trace of silt & clay. **USDA SOIL CLASSIFICATION: Loamy sand** Sand - 82.6% Silt - 12.0% Clay - 5.4% **ESTIMATED INFILTRATION RATE: 2.0 in/hr**
10.0				978.0

Boring terminated at 10.0 feet

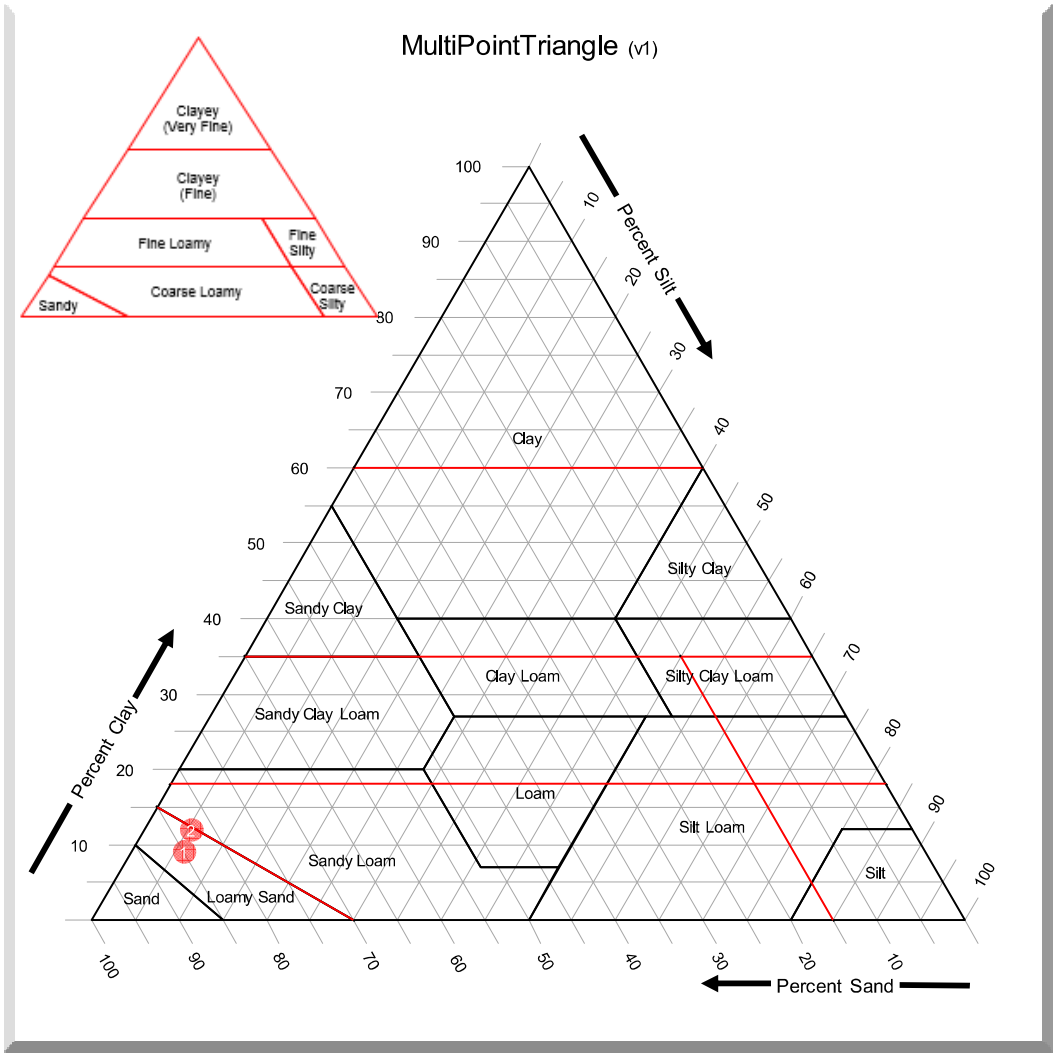
520 South Main Street, Suite 2531
Akron, Ohio 44311

Phone 330.572.2100
www.gpdgroup.com

USDA Soil Classification

Project:	Sheetz Massillon	**GPD Project #**	2020117.09
Date:	December 29, 2022	**Lab #**	22243
Location:	Massillon, Ohio		

Sample	Sand % (2 mm – 0.075 mm)	Silt % (0.075 mm – 0.005 mm)	Clay % (<0.005 mm)	USDA Classification
#1: B-19 (8.0'-10.0')	84.9	9.1	6.0	Loamy Sand
#2: B-20 (8.0'-10.0')	82.6	12.0	5.4	Loamy Sand



GENERAL NOTES

SAMPLE IDENTIFICATION

The Unified Soil Classification System (USCS), AASHTO 1988 and ASTM designations D2487 and D-2488 are used to identify the encountered materials unless otherwise noted. Coarse-grained soils are defined as having more than 50% of their dry weight retained on a #200 sieve (0.075mm); they are described as: boulders, cobbles, gravel or sand. Fine-grained soils have less than 50% of their dry weight retained on a #200 sieve; they are defined as silts or clay depending on their Atterberg Limit attributes. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size.

DRILLING AND SAMPLING SYMBOLS

SFA: Solid Flight Auger - typically 4" diameter flights, except where noted.
HSA: Hollow Stem Auger - typically 3¼" or 4¼ I.D. openings, except where noted.
M.R.: Mud Rotary - Uses a rotary head with Bentonite or Polymer Slurry
R.C.: Diamond Bit Core Sampler
H.A.: Hand Auger
P.A.: Power Auger - Handheld motorized auger

SS: Split-Spoon - 1 3/8" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
BS: Bulk Sample
PM: Pressuremeter
CPT-U: Cone Penetrometer Testing with Pore-Pressure Readings

SOIL PROPERTY SYMBOLS

N: Standard "N" penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2-inch O.D. Split-Spoon.
N_{60}: A "N" penetration value corrected to an equivalent 60% hammer energy transfer efficiency (ETR)
Q_u: Unconfined compressive strength, TSF
Q_p: Pocket penetrometer value, unconfined compressive strength, TSF
w%: Moisture/water content, %
LL: Liquid Limit, %
PL: Plastic Limit, %
PI: Plasticity Index = (LL-PL),%
DD: Dry unit weight, pcf
▼,▽,⧩ Apparent groundwater level at time noted

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Relative Density	N - Blows/foot
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	50 - 80
Extremely Dense	80+

ANGULARITY OF COARSE-GRAINED PARTICLES

Description	Criteria
Angular:	Particles have sharp edges and relatively plane sides with unpolished surfaces
Subangular:	Particles are similar to angular description, but have rounded edges
Subrounded:	Particles have nearly plane sides, but have well-rounded corners and edges
Rounded:	Particles have smoothly curved sides and no edges

GRAIN-SIZE TERMINOLOGY

Component	Size Range
Boulders:	Over 300 mm (>12 in.)
Cobbles:	75 mm to 300 mm (3 in. to 12 in.)
Coarse-Grained Gravel:	19 mm to 75 mm (¾ in. to 3 in.)
Fine-Grained Gravel:	4.75 mm to 19 mm (No.4 to ¾ in.)
Coarse-Grained Sand:	2 mm to 4.75 mm (No.10 to No.4)
Medium-Grained Sand:	0.42 mm to 2 mm (No.40 to No.10)
Fine-Grained Sand:	0.075 mm to 0.42 mm (No. 200 to No.40)
Silt:	0.005 mm to 0.075 mm
Clay:	<0.005 mm

PARTICLE SHAPE

Description	Criteria
Flat:	Particles with width/thickness ratio > 3
Elongated:	Particles with length/width ratio > 3
Flat & Elongated:	Particles meet criteria for both flat and elongated

RELATIVE PROPORTIONS OF FINES

Descriptive Term	% Dry Weight
Trace:	< 5%
With:	5% to 12%
Modifier:	>12%

GENERAL NOTES

(Continued)

CONSISTENCY OF FINE-GRAINED SOILS

Q_U - TSF	N - Blows/foot	Consistency
0 - 0.25	0 - 2	Very Soft
0.25 - 0.50	2 - 4	Soft
0.50 - 1.00	4 - 8	Firm (Medium Stiff)
1.00 - 2.00	8 - 15	Stiff
2.00 - 4.00	15 - 30	Very Stiff
4.00 - 8.00	30 - 50	Hard
8.00+	50+	Very Hard

MOISTURE CONDITION DESCRIPTION

Description	Criteria
Dry:	Absence of moisture, dusty, dry to the touch
Moist:	Damp but no visible water
Wet:	Visible free water, usually soil is below water table

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term	% Dry Weight
Trace:	< 15%
With:	15% to 30%
Modifier:	>30%

STRUCTURE DESCRIPTION

Description	Criteria
Stratified:	Alternating layers of varying material or color with layers at least ¼-inch (6 mm) thick
Laminated:	Alternating layers of varying material or color with layers less than ¼-inch (6 mm) thick
Fissured:	Breaks along definite planes of fracture with little resistance to fracturing
Slickensided:	Fracture planes appear polished or glossy, sometimes striated
Blocky:	Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Lensed:	Inclusion of small pockets of different soils
Layer:	Inclusion greater than 3 inches thick (75 mm)
Seam:	Inclusion 1/8-inch to 3 inches (3 to 75 mm) thick extending through the sample
Parting:	Inclusion less than 1/8-inch (3 mm) thick

SCALE OF RELATIVE ROCK HARDNESS

Q_U - TSF	Consistency
2.5 - 10	Extremely Soft
10 - 50	Very Soft
50 - 250	Soft
250 - 525	Medium Hard
525 - 1,050	Moderately Hard
1,050 - 2,600	Hard
>2,600	Very Hard

ROCK BEDDING THICKNESSES

Description	Criteria
Very Thick Bedded	Greater than 3-foot (>1.0 m)
Thick Bedded	1-foot to 3-foot (0.3 m to 1.0 m)
Medium Bedded	4-inch to 1-foot (0.1 m to 0.3 m)
Thin Bedded	1¼-inch to 4-inch (30 mm to 100 mm)
Very Thin Bedded	½-inch to 1¼-inch (10 mm to 30 mm)
Thickly Laminated	1/8-inch to ½-inch (3 mm to 10 mm)
Thinly Laminated	1/8-inch or less "paper thin" (<3 mm)

ROCK VOIDS

Voids	Void Diameter
Pit	<6 mm (<0.25 in)
Vug	6 mm to 50 mm (0.25 in to 2 in)
Cavity	50 mm to 600 mm (2 in to 24 in)
Cave	>600 mm (>24 in)

GRAIN-SIZED TERMINOLOGY

(Typically Sedimentary Rock)

Component	Size Range
Very Coarse Grained	>4.76 mm
Coarse Grained	2.0 mm - 4.76 mm
Medium Grained	0.42 mm - 2.0 mm
Fine Grained	0.075 mm - 0.42 mm
Very Fine Grained	<0.075 mm

ROCK QUALITY DESCRIPTION

Rock Mass Description	RQD Value
Excellent	90 -100
Good	75 - 90
Fair	50 - 75
Poor	25 -50
Very Poor	Less than 25

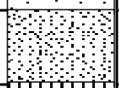
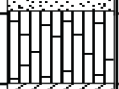
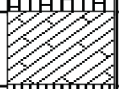
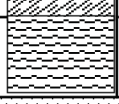
DEGREE OF WEATHERING

Slightly Weathered: Rock generally fresh, joints stained and discoloration extends into rock up to 25 mm (1 in), open joints may contain clay, core rings under hammer impact.

Weathered: Rock mass is decomposed 50% or less, significant portions of the rock show discoloration and weathering effects, cores cannot be broken by hand or scraped by knife.

Highly Weathered: Rock mass is more than 50% decomposed, complete discoloration of rock fabric, core may be extremely broken and gives clunk sound when struck by hammer, may be shaved with a knife.

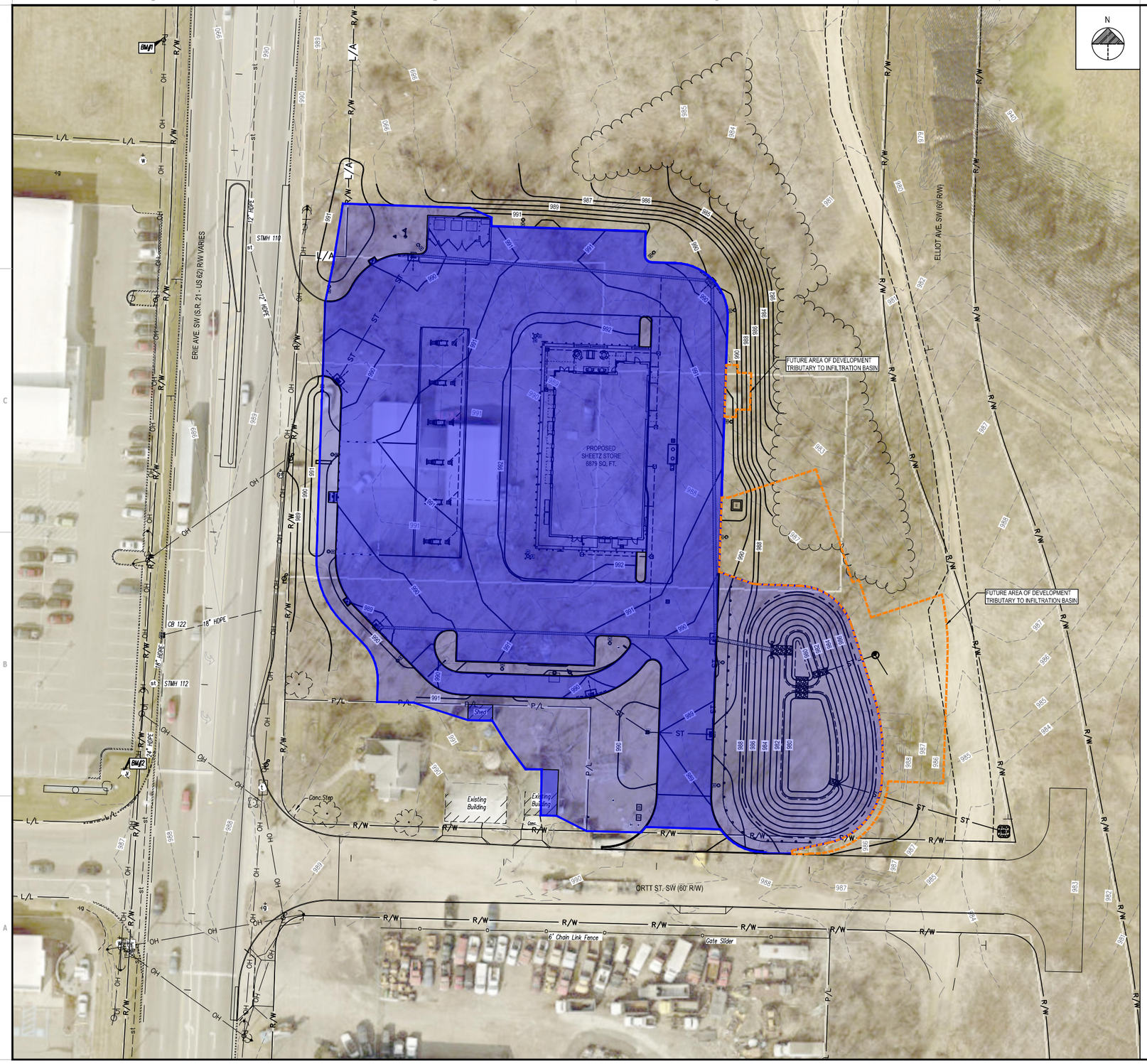
Unified Soil Classification System

Major Divisions			Letter	Symbol	Description
Coarse-grained Soils More than ½ retained on the No. 200 Sieve	**Gravels** More than ½ coarse fraction retained on the No. 4 sieve	Clean Gravels	GW		Well-graded gravels and gravel-sand mixtures, little or no fines.
			GP		Poorly-graded gravels and gravel-sand mixtures, little or no fines.
		Gravels With Fines	GM		Silty gravels, gravel-sand-silt mixtures.
			GC		Clayey gravels, gravel-sand-clay mixtures.
	Sands More than ½ passing through the No. 200 sieve	Clean Sands	SW		Well-graded sands and gravelly sands, little or no fines.
			SP		Poorly-graded sands and gravelly sands, little or no fines.
		Sands With Fines	SM		Silty sands, sand-silt mixtures
			SC		Clayey sands, sandy-clay mixtures.
Fine-grained Soils More than ½ passing through the No. 200 Sieve	**Silts and Clays** Liquid Limit less than 50%		ML		Inorganic silts, very fine sands, rock flour, silty or clayey fine sands.
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL		Organic clays of medium to high plasticity.
	Silts and Clays Liquid Limit greater than 50%		MH		Inorganic silts, micaceous or diatomaceous fines sands or silts, elastic silts.
			CH		Inorganic clays of high plasticity, fat clays.
			OH		Organic clays of medium to high plasticity.
Highly Organic Soils			PT		Peat, muck, and other highly organic soils.

Consistency Classification

Granular Soils			***Cohesive Soils***		
Description - Blows Per Foot (Corrected)			Description - Blows Per Foot (Corrected)		
	MCS	SPT		MCS	SPT
Very loose	<5	<4	Very soft	<3	<2
Loose	5 – 15	4 – 10	Soft	3 – 5	2 – 4
Medium dense	16 – 40	11 – 30	Firm	6 – 10	5 – 8
Dense	41 – 65	31 – 50	Stiff	11 – 20	9 – 15
Very dense	>65	>50	Very Stiff	21 – 40	16 – 30
			Hard	>40	>30

MCS = Modified California Sampler SPT = Standard Penetration Test Sampler



STORMWATER MANAGEMENT MAP
POST-DEVELOPMENT CONDITIONS

TOTAL AREA UNDER ANALYSIS = 2.73 ACRES
ASSUMED T.O.C. OF 10 MINUTES

INFILTRATION BASIN TRIBUTARY AREA - CURRENT PHASE
TRIBUTARY AREA = 2.46 ACRES

BOUNDARY OF ANALYSIS

HYDROLOGIC SOIL GROUP:	A
COVER TYPE:	IMPERVIOUS SURFACE COVER
CURVE NUMBER:	98
AREA (ACRES):	1.71

HYDROLOGIC SOIL GROUP:	A
COVER TYPE:	PERVIOUS SURFACE COVER
CURVE NUMBER:	39
AREA (ACRES):	0.75

INFILTRATION BASIN TRIBUTARY AREA - FUTURE PHASE
TRIBUTARY AREA = 0.27 ACRES
ASSUMPTION: 80% IMPERVIOUS SURFACE COVER

BOUNDARY OF ANALYSIS

HYDROLOGIC SOIL GROUP:	A
COVER TYPE:	IMPERVIOUS SURFACE COVER
CURVE NUMBER:	98
AREA (ACRES):	0.22

HYDROLOGIC SOIL GROUP:	A
COVER TYPE:	PERVIOUS SURFACE COVER
CURVE NUMBER:	39
AREA (ACRES):	0.05

GPD GROUP
Gibus, Pyle, Schomer, Burns & DeHaven, Inc.
520 South Main Street, Suite 2531
Akron, OH 44311
330.572.2100 Fax 330.572.2101

REV.	DATE	DESCRIPTION

SHEETZ STORE
3544 ERIE AVE SW
MASSILLON (PERRY TOWNSHIP), OH 44646

STORM WATER MANAGEMENT MAP
POST-DEVELOPMENT CONDITIONS

ISSUED FOR:	
PERMIT	01/31/2023
BID	
CONSTRUCTION	
RECORD	

PROJECT MANAGER	DESIGNER
JAL	MCC

JOB NO.
2020117.09

POST

Drawing Name: O:\2020\2020117.09_Massillon\working Files\Civil\mxp\sxs\Sheetz Massillon Stormwater Maps.dwg
January 31, 2023 - mcollantti

WEIR EQUATION FOR PRECAST STRUCTURE OVERFLOW

Project: Sheetz - Massillon, OH
Job No.: 2020117.09
Engineer: Michael Cefaratti, P.E.
Date: January 2023

Weir Equation

$Q_{max}=C_wLH^{1.5}$ Where:

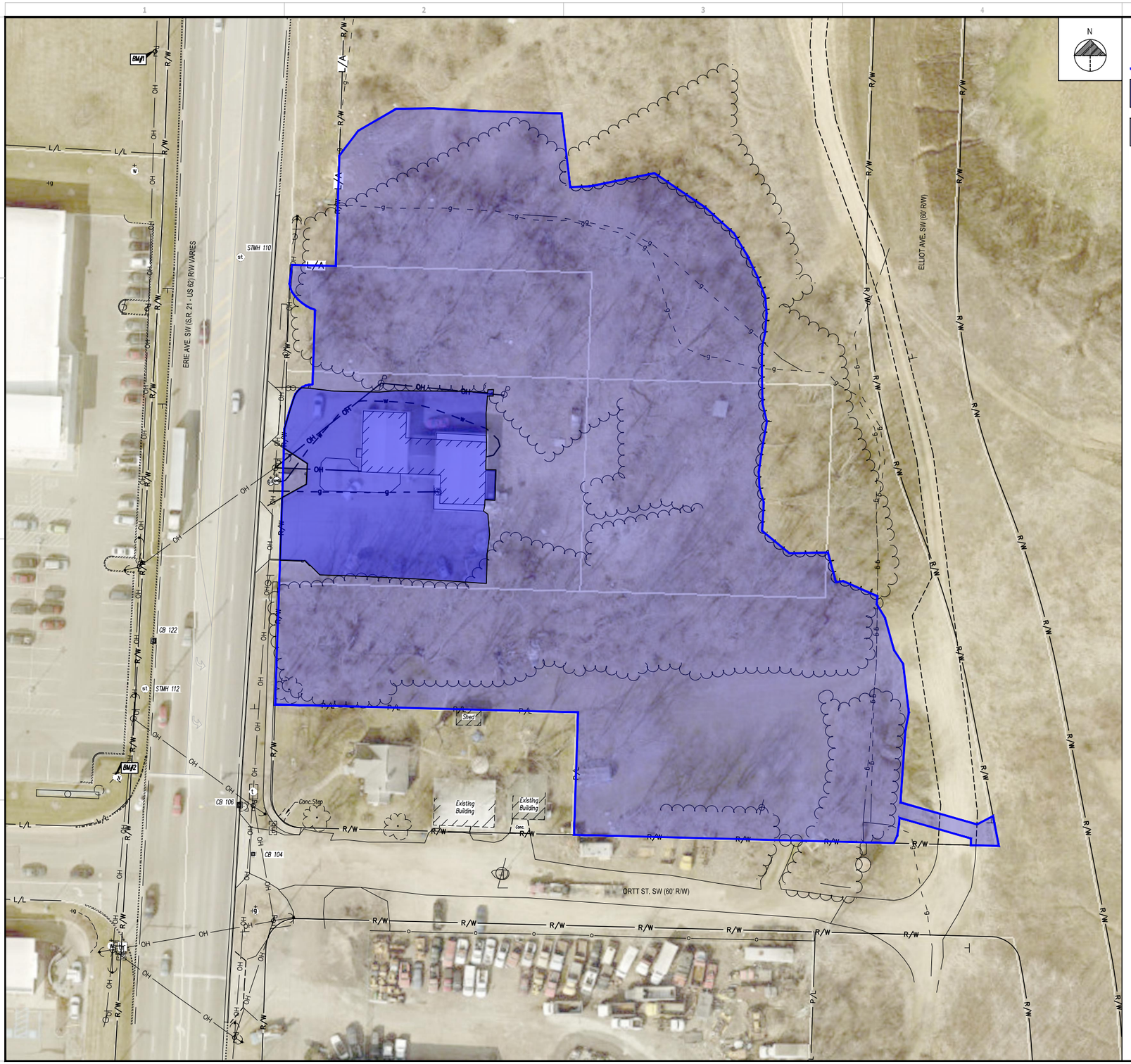
Q_{max}	Maximum Flow Over Weir
C_w	Weir Coefficient (3.0)
L	Weir Length
H	Maximum Head Over Weir*

* Measured from top of embankment elevation to weir elevation.

Structure Size:	2'x2'	
Weir Elevation:	986.00	
Embankment Elevation:	987.50	
L	8.0	ft
H	1.5	ft

Q_{max}	44.09	ft^3/s	
Q_{100}	15.84	ft^3/s	OK

Section 4



REQUIRED WATER QUALITY MAP
PRE-DEVELOPMENT CONDITIONS

TOTAL AREA UNDER ANALYSIS = 3.21 ACRES

BOUNDARY OF ANALYSIS

COVER TYPE:	IMPERVIOUS SURFACE COVER	
AREA (ACRES):	0.37	
COVER TYPE:	PERVIOUS SURFACE COVER	
AREA (ACRES):	2.84	

GPD GROUP
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Akron, OH 44311
330.572.2100 Fax 330.572.2101

SHEETZ
FRESH FOOD MADE TO ORDER

REV.	DATE	DESCRIPTION

SHEETZ STORE
3544 ERIE AVE SW
MASSILLON (PERRY TOWNSHIP), OH 44646

REQUIRED WATER QUALITY MAP
PRE-DEVELOPMENT CONDITIONS

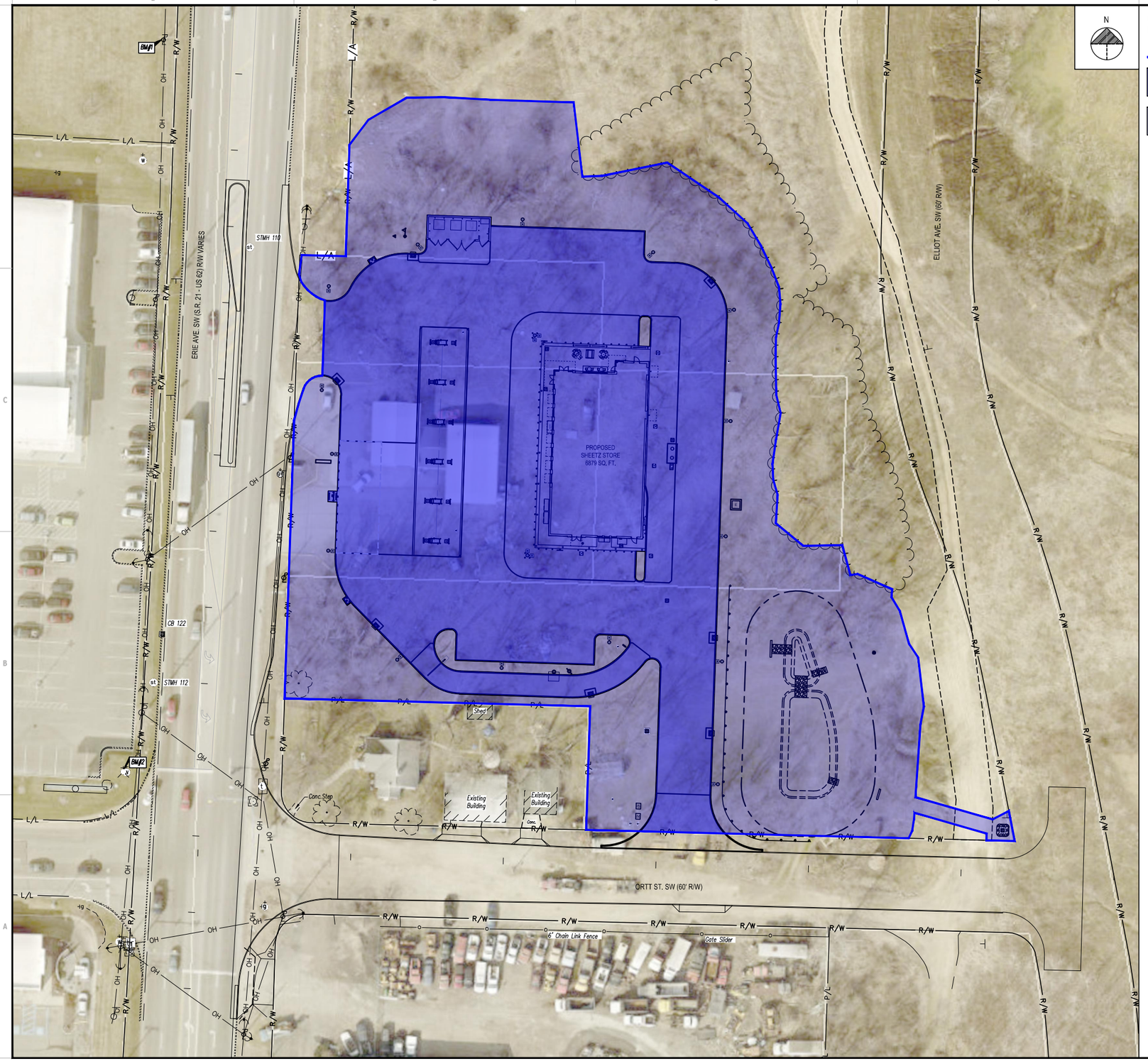
ISSUED FOR:	
PERMIT	01/31/2023
BID	
CONSTRUCTION	
RECORD	

PROJECT MANAGER	DESIGNER
JAL	MCC

JOB NO.
2020117.09

PRE

Drawing Name: O:\2020\2020117.09_Massillon\working Files\Civil\maps\Sheetz Massillon Stormwater Maps.dwg
January 31, 2023 - mcefaratti



REQUIRED WATER QUALITY MAP
POST-DEVELOPMENT CONDITIONS
TOTAL AREA UNDER ANALYSIS = 3.21 ACRES

BOUNDARY OF ANALYSIS

COVER TYPE:	IMPERVIOUS SURFACE COVER	
AREA (ACRES):	1.70	
COVER TYPE:	PERVIOUS SURFACE COVER	
AREA (ACRES):	1.51	

GPD GROUP
Gibus, Pyle, Schaner, Burns & DeHaven, Inc.
520 South Main Street, Suite 2531
Akron, OH 44311
330.572.2100 Fax 330.572.2101

REV.	DATE	DESCRIPTION

SHEETZ STORE
3544 ERIE AVE SW
MASSILLON (PERRY TOWNSHIP), OH 44646

REQUIRED WATER QUALITY MAP
POST-DEVELOPMENT CONDITIONS

ISSUED FOR:	
PERMIT	01/31/2023
BID	
CONSTRUCTION	
RECORD	

PROJECT MANAGER	DESIGNER
JAL	MCC

JOB NO.
2020117.09

POST

Drawing Name: O:\2020\2020117.09_Massillon\working Files\Civil\maps\Sheetz Massillon Stormwater Maps.dwg
January 31, 2023 - mcollarati

Post-Construction Water Quality Volume
As Required Under Ohio NPDES Construction General Permit No. OHC00005

version 1.1 2020-5-7

This spreadsheet calculates the Water Quality Volume required for both new development and redevelopment projects. Green boxes indicate user input for 1) the total area disturbed, 2) planned total impervious surface and, if redevelopment, 3) total existing impervious surface, each in acres. The user must select new or redevelopment from the dropdown menu to apply the proper equation. Use the separate BMP Compliance Spreadsheets to verify a designed practice or combination of practices meets the applicable requirements including the required Water Quality Volume calculated here. This spreadsheet does not account for factors that may affect the final practice design, including offsite run-on or sediment storage volume.

Project Details

Project Name:	**Sheetz - Massillon, OH**		
Project ID:	**2020117.09**		
Project Location:	**Erie Street and Ortt Road**		
Project Latitude:		**Longitude:**	
NPDES Permit Applicant:			
Submitted By:	**Michael Cefaratti, P.E.**		
Date:	**1/3/2023**		

Required Water Quality Volume Calculation

Total Disturbed Area, A = **3.210** **acres**

Type of Development: Redevelopment

Water Quality Volume Equation: WQv = 0.90 in. * A * [(Rv1*0.2)+(Rv2-Rv1)] / 12 [Equation 3]

where, Rv = 0.05 + 0.9(i)

PRE-CONSTRUCTION CONDITIONS		PROPOSED POST-CONSTRUCTION CONDITIONS	
Ex. Impervious Surface =	**0.370** **acres**	**Total Impervious Surface Area =**	**1.700** **acres**
Ex. Impervious Fraction, i =	**0.115**	**Impervious Fraction, i =**	**0.530**
Rv1 =	**0.154**	**Volumetric Runoff Coefficient, Rv2 =**	**0.527**
		ΔRv =	**243 %**

Water Quality Volume, WQv = **0.097 ac-ft** **=** **4,233 cu. ft.**

Message Center: *The minimum impervious area to treat with a practice is 1.364 acres*

Post-Construction Water Quality Volume
As Required Under Ohio NPDES Construction General Permit No. OHC00005

version 1.1 2020-5-7

This spreadsheet calculates the Water Quality Volume required for both new development and redevelopment projects. Green boxes indicate user input for 1) the total area disturbed, 2) planned total impervious surface and, if redevelopment, 3) total existing impervious surface, each in acres. The user must select new or redevelopment from the dropdown menu to apply the proper equation. Use the separate BMP Compliance Spreadsheets to verify a designed practice or combination of practices meets the applicable requirements including the required Water Quality Volume calculated here. This spreadsheet does not account for factors that may affect the final practice design, including offsite run-on or sediment storage volume.

Project Details

Project Name:	**Sheetz - Massillon, OH**		
Project ID:	**2020117.09**		
Project Location:	**Erie Street and Ortt Road**		
Project Latitude:		**Longitude:**	
NPDES Permit Applicant:			
Submitted By:	**Michael Cefaratti, P.E.**		
Date:	**1/3/2023**		

Required Water Quality Volume Calculation

Total Disturbed Area, A = **2.730** **acres**

Type of Development: New Development

Water Quality Volume Equation: WQv = Rv * 0.90 in. * A / 12 [Equation 1]

where, Rv = 0.05 + 0.9(i)

PROPOSED POST-CONSTRUCTION CONDITIONS

Total Impervious Surface Area = **1.930** **acres**

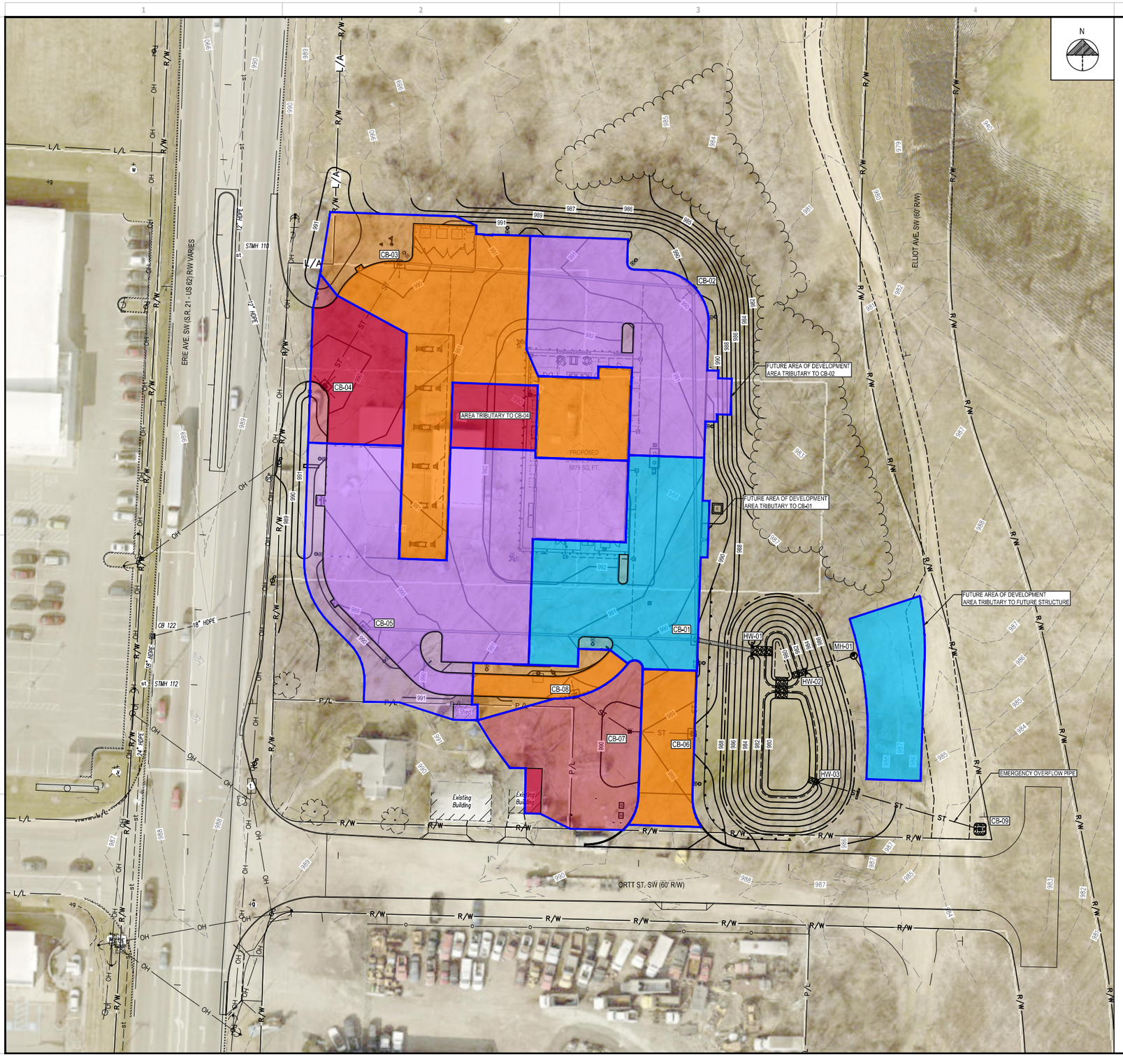
Impervious Fraction, i = **0.707**

Volumetric Runoff Coefficient, Rv = **0.686**

Water Quality Volume, WQv = **0.141 ac-ft** **=** **6,121 cu. ft.**

Message Center: *none*

Section 5



CB 01 = TOTAL AREA = 0.28 AC

- IMPERVIOUS AREA (RC = 0.95) = 0.27 ACRES
- PERVIOUS AREA (RC = 0.35) = 0.01 ACRES

CB 02 = TOTAL AREA = 0.30 AC

- IMPERVIOUS AREA (RC = 0.95) = 0.29 ACRES
- PERVIOUS AREA (RC = 0.35) = 0.01 ACRES

CB 03 = TOTAL AREA = 0.45 AC

- IMPERVIOUS AREA (RC = 0.95) = 0.39 ACRES
- PERVIOUS AREA (RC = 0.35) = 0.06 ACRES

CB 04 = TOTAL AREA = 0.19 AC

- IMPERVIOUS AREA (RC = 0.95) = 0.17 ACRES
- PERVIOUS AREA (RC = 0.35) = 0.02 ACRES

CB 05 = TOTAL AREA = 0.55 AC

- IMPERVIOUS AREA (RC = 0.95) = 0.47 ACRES
- PERVIOUS AREA (RC = 0.35) = 0.08 ACRES

CB 06 = TOTAL AREA = 0.09 AC

- IMPERVIOUS AREA (RC = 0.95) = 0.09 ACRES

CB 07 = TOTAL AREA = 0.18 AC

- IMPERVIOUS AREA (RC = 0.95) = 0.01 ACRES
- PERVIOUS AREA (RC = 0.35) = 0.17 ACRES

CB 08 = TOTAL AREA = 0.07 AC

- IMPERVIOUS AREA (RC = 0.95) = 0.04 ACRES
- PERVIOUS AREA (RC = 0.35) = 0.03 ACRES

FUTURE STRUCTURE = TOTAL AREA = 0.11 AC

- IMPERVIOUS AREA (RC = 0.95) = 0.11 ACRES

TIME OF CONCENTRATION NOTE:

THE TIME OF CONCENTRATIONS FOR ALL SUB-DRAINAGE AREAS WERE ASSUMED TO BE 10 MINUTES.

GPD GROUP
Gibus, Pyle, Schomer, Burns & DeHaven, Inc.
520 South Main Street, Suite 2531
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330.572.2100 Fax 330.572.2101

SHEETZ
FRESH FOOD MADE TO ORDER

REV.	DATE	DESCRIPTION

SHEETZ STORE
3544 ERIE AVE SW
MASSILLON (PERRY TOWNSHIP), OH 44646

STORMWATER DRAINAGE MAP
FOR POST-CONSTRUCTION STORM SEWERS

ISSUED FOR:	
PERMIT	01/31/2023
BID	
CONSTRUCTION	
RECORD	

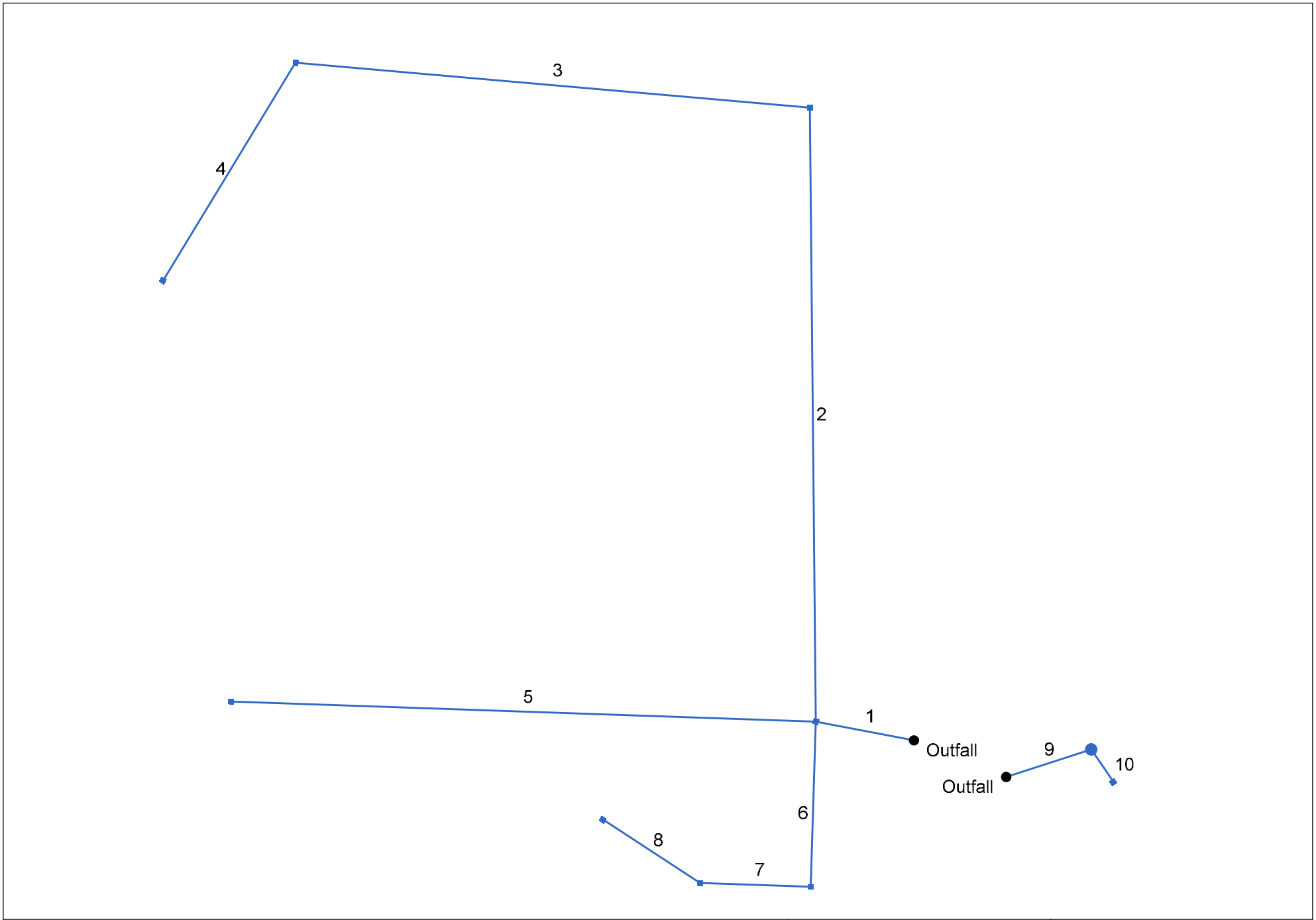
PROJECT MANAGER	DESIGNER
JAL	MCC

JOB NO.
2020117.09

PCSS

Drawing Name: O:\2020\2020117\09_Massillon\working Files\Civil\maps\Sheetz Massillon Stormwater Maps.dwg
January 31, 2023 - mcafarelli

2022.08.30 - Sheetz Massillon



Project File: 2023.01.04 - Sheetz Massillon Storm Sewers.stm	Number of lines: 10	Date: 1/5/2023

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)	
10	9	15.000	0.11	0.11	0.95	0.10	0.10	10.0	10.0	5.0	0.52	3.09	0.66	12	1.00	981.88	982.03	984.10	984.10	988.71	988.00	STM-10
9	End	34.000	0.00	0.11	0.00	0.00	0.10	10.0	10.4	4.9	0.51	3.04	0.65	12	0.97	981.55	981.88	984.08	984.09	983.55	988.71	STM-09
8	7	44.000	0.07	0.07	0.69	0.05	0.05	10.0	10.0	5.0	0.24	3.45	1.63	12	1.25	986.15	986.70	986.46	986.90	989.15	989.70	STM-08
7	6	42.000	0.18	0.25	0.38	0.07	0.12	10.0	10.4	4.9	0.57	5.41	2.28	12	3.07	984.86	986.15	985.27	986.46	988.80	989.15	STM-07
6	1	63.000	0.09	0.34	0.95	0.09	0.20	10.0	10.8	4.8	0.97	5.63	2.20	12	3.33	982.76	984.86	984.29	985.27	989.35	988.80	STM-06
5	1	222.000	0.55	0.55	0.86	0.47	0.47	10.0	10.0	5.0	2.34	6.39	2.92	15	1.30	982.51	985.40	984.29	986.01	989.35	988.65	STM-05
4	3	97.000	0.19	0.19	0.89	0.17	0.17	10.0	10.0	5.0	0.84	2.58	2.88	12	0.70	985.72	986.40	986.13	986.79	989.55	989.40	STM-04
3	2	196.000	0.45	0.64	0.87	0.39	0.56	10.0	10.6	4.8	2.71	4.64	3.41	15	0.69	984.12	985.47	985.07	986.13	989.40	989.55	STM-03
2	1	234.000	0.30	0.94	0.93	0.28	0.84	10.0	11.5	4.7	3.91	7.55	2.77	18	0.69	982.26	983.87	984.29	984.82	989.35	989.40	STM-02
1	End	38.000	0.28	2.11	0.93	0.26	1.78	10.0	12.9	4.4	7.84	16.21	2.50	24	0.68	981.50	981.76	984.08	984.14	984.00	989.35	STM-01

2022.08.30 - Sheetz Massillon

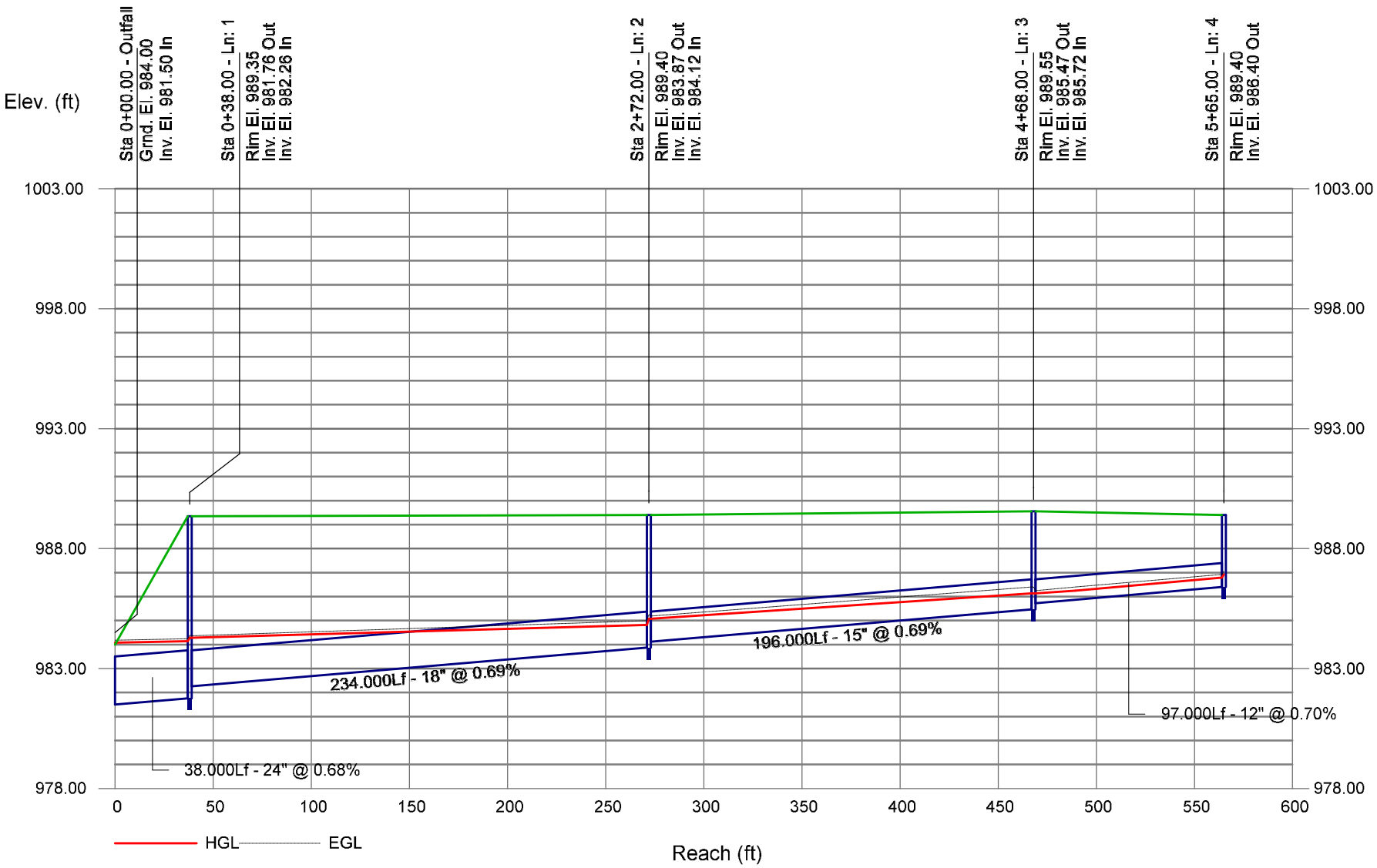
Number of lines: 10

Run Date: 1/5/2023

NOTES:Intensity = 47.03 / (Inlet time + 8.20) ^ 0.78; Return period =Yrs. 10 ; c = cir e = ellip b = box

Storm Sewer Profile

Proj. file: 2023.01.04 - Sheetz Massillon Storm Sewers.stm



Storm Sewer Profile

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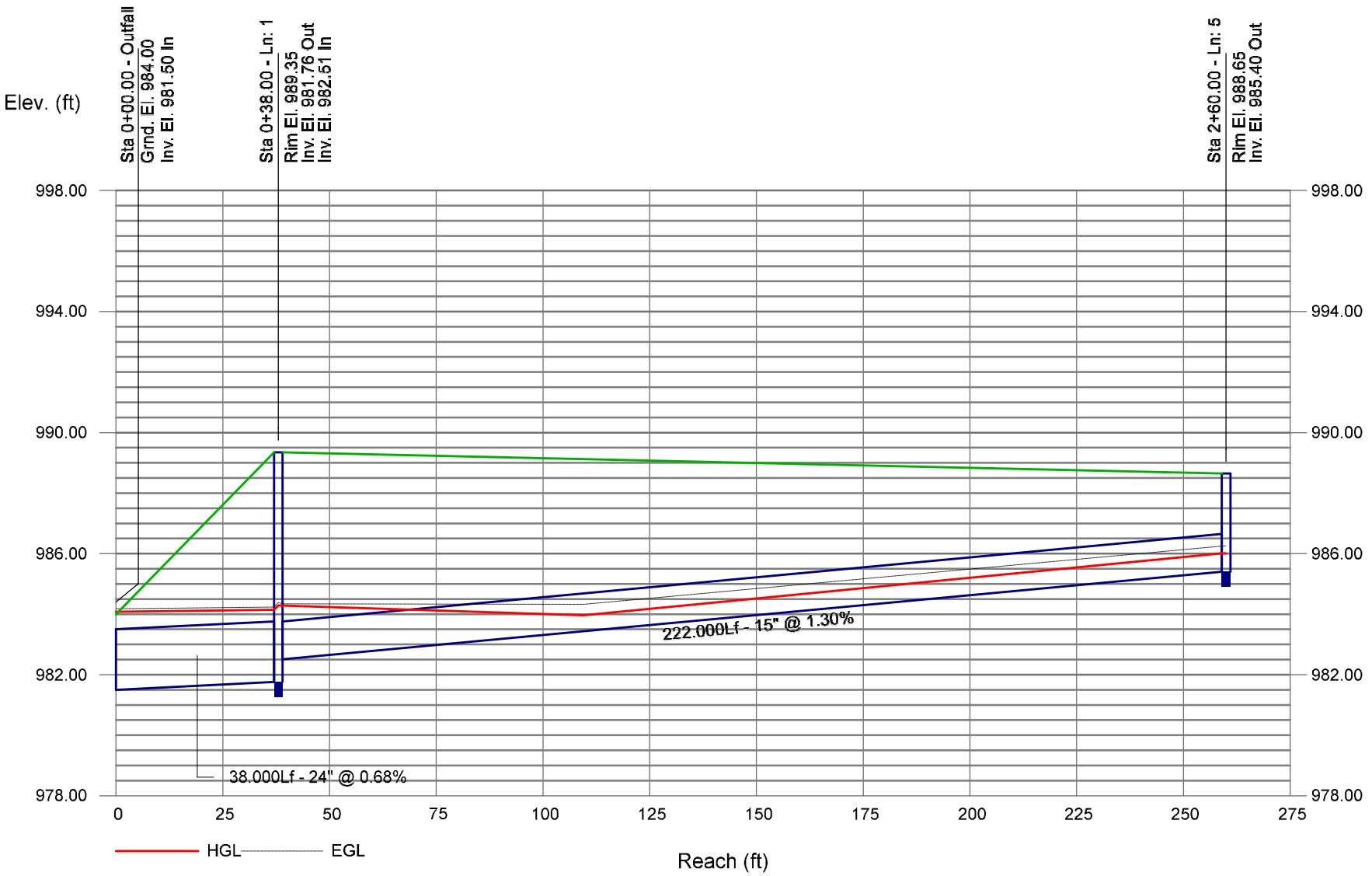
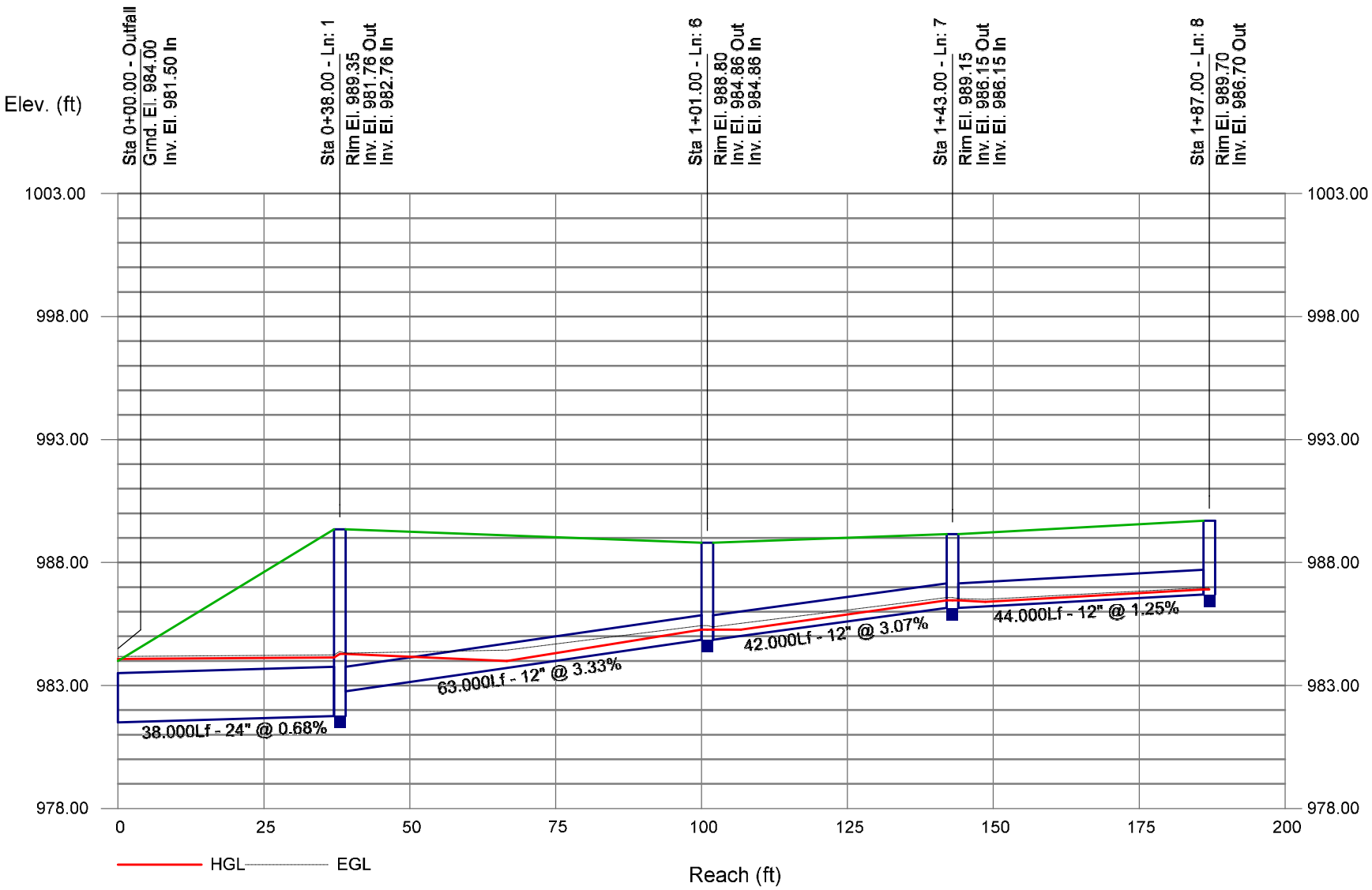


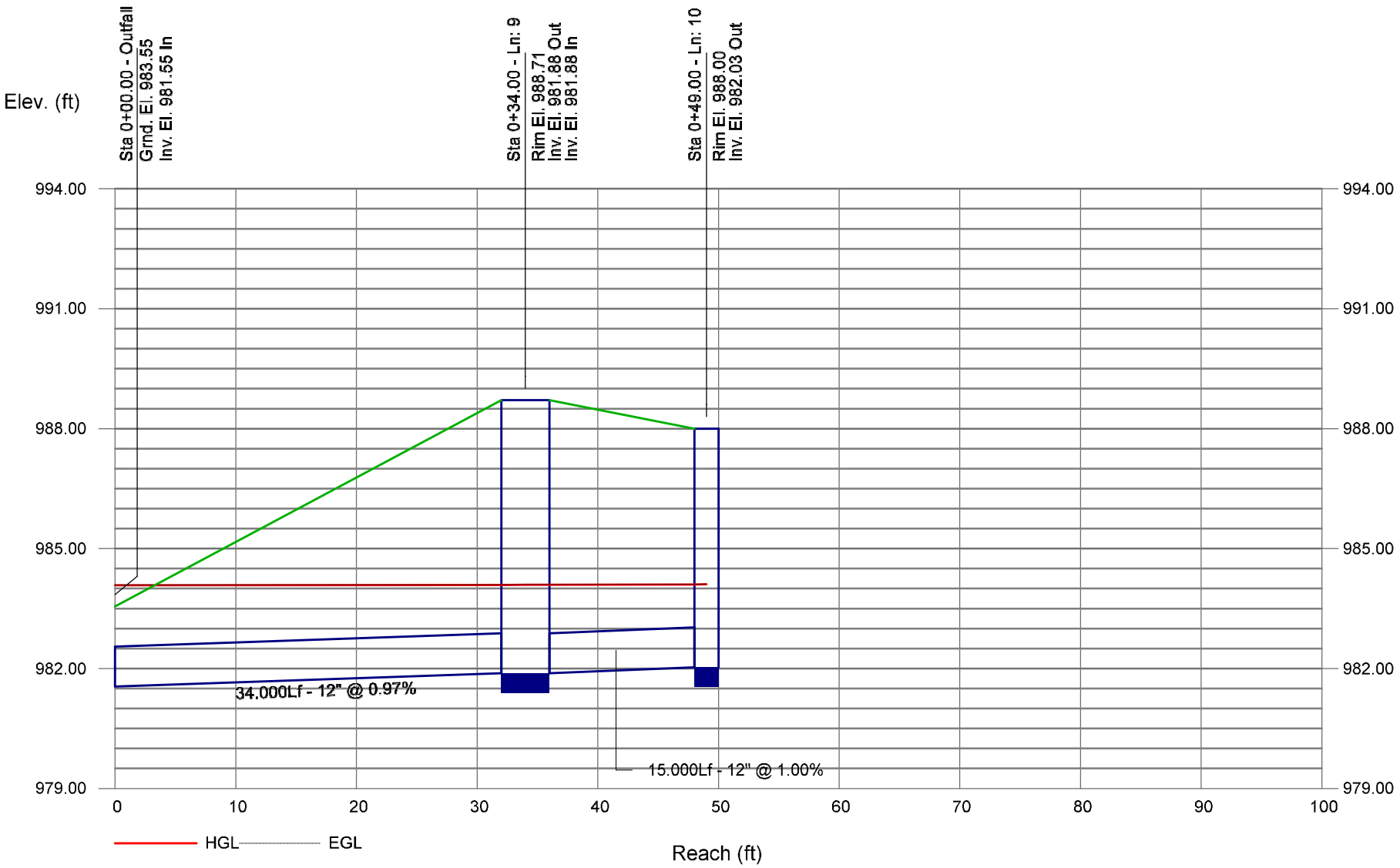
Storm Sewer Profile

Proj. file: 2023.01.04 - Sheetz Massillon Storm Sewers.stm



Storm Sewer Profile

Proj. file: 2023.01.04 - Sheetz Massillon Storm Sewers.stm



Storm Sewer Tabulation

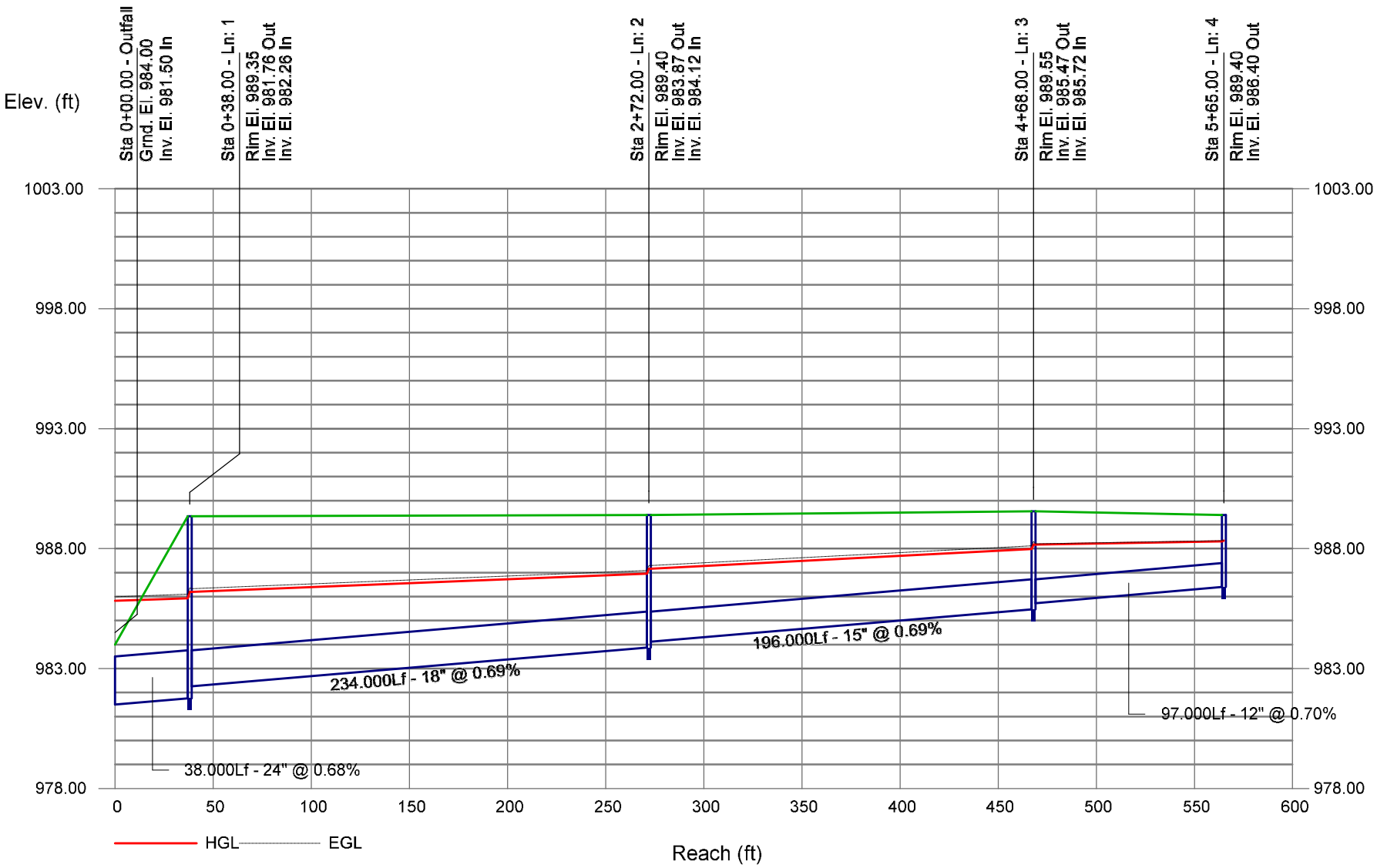
Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
10	9	15.000	0.11	0.11	0.95	0.10	0.10	10.0	10.0	6.8	0.71	3.09	0.90	12	1.00	981.88	982.03	985.85	985.86	988.71	988.00	STM-10
9	End	34.000	0.00	0.11	0.00	0.00	0.10	10.0	10.3	6.7	0.70	3.04	0.89	12	0.97	981.55	981.88	985.82	985.84	983.55	988.71	STM-09
8	7	44.000	0.07	0.07	0.69	0.05	0.05	10.0	10.0	6.8	0.33	3.45	1.78	12	1.25	986.15	986.70	986.52	986.94	989.15	989.70	STM-08
7	6	42.000	0.18	0.25	0.38	0.07	0.12	10.0	10.4	6.7	0.78	5.41	1.97	12	3.07	984.86	986.15	986.37	986.52	988.80	989.15	STM-07
6	1	63.000	0.09	0.34	0.95	0.09	0.20	10.0	10.8	6.6	1.33	5.63	1.69	12	3.33	982.76	984.86	986.19	986.31	989.35	988.80	STM-06
5	1	222.000	0.55	0.55	0.86	0.47	0.47	10.0	10.0	6.8	3.20	6.39	2.61	15	1.30	982.51	985.40	986.19	986.92	989.35	988.65	STM-05
4	3	97.000	0.19	0.19	0.89	0.17	0.17	10.0	10.0	6.8	1.14	2.58	1.46	12	0.70	985.72	986.40	988.16	988.30	989.55	989.40	STM-04
3	2	196.000	0.45	0.64	0.87	0.39	0.56	10.0	11.1	6.5	3.63	4.64	2.95	15	0.69	984.12	985.47	987.16	987.98	989.40	989.55	STM-03
2	1	234.000	0.30	0.94	0.93	0.28	0.84	10.0	12.2	6.2	5.21	7.55	2.95	18	0.69	982.26	983.87	986.19	986.96	989.35	989.40	STM-02
1	End	38.000	0.28	2.11	0.93	0.26	1.78	10.0	13.5	5.9	10.50	16.21	3.34	24	0.68	981.50	981.76	985.82	985.93	984.00	989.35	STM-01

2022.08.30 - Sheetz Massillon | Number of lines: 10 | Run Date: 1/5/2023

NOTES:Intensity = 40.83 / (Inlet time + 5.50) ^ 0.66; Return period =Yrs. 100 ; c = cir e = ellip b = box

Storm Sewer Profile

Proj. file: 2023.01.04 - Sheetz Massillon Storm Sewers.stm



Storm Sewer Profile

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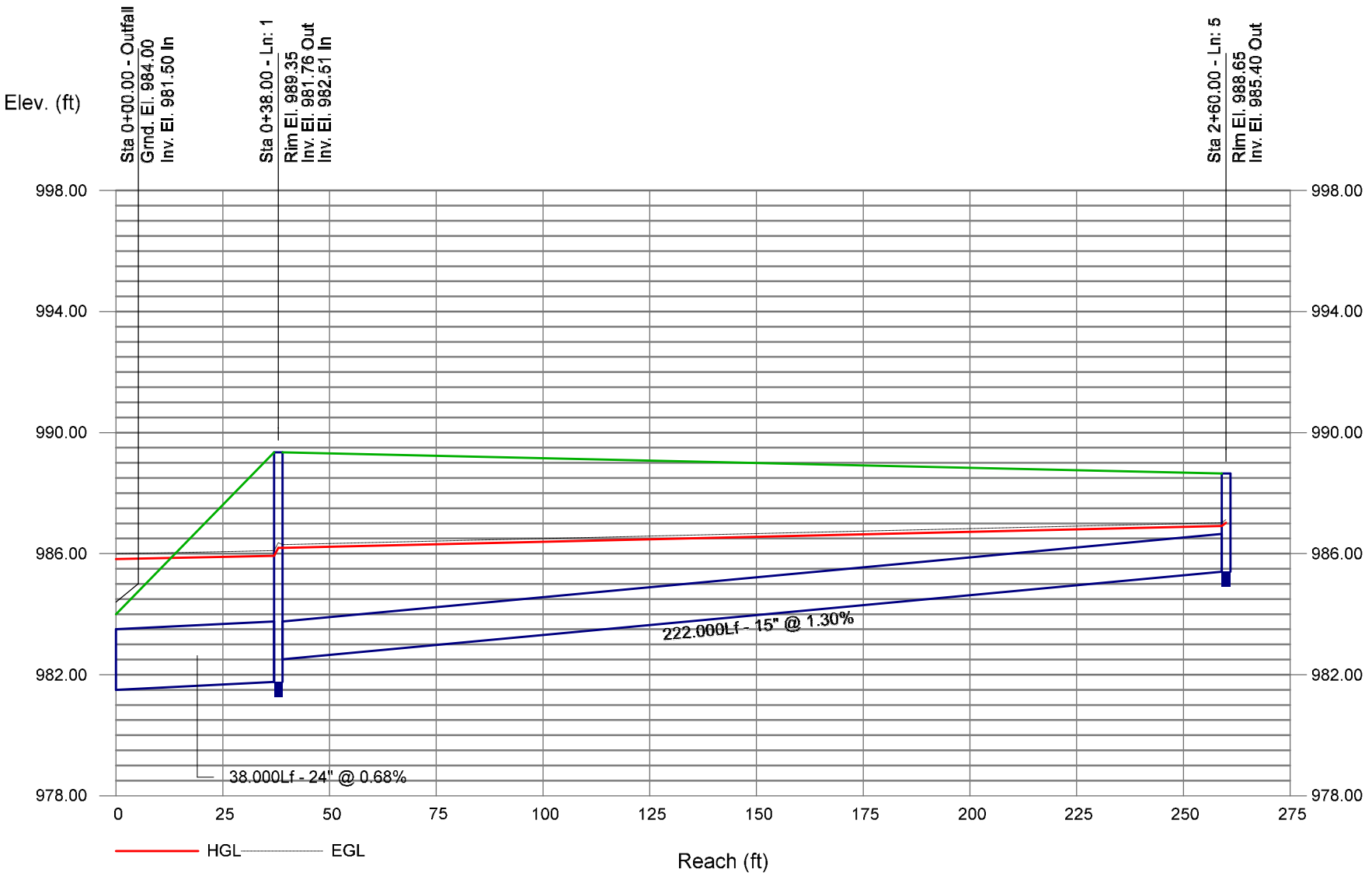

Storm Sewer Profile

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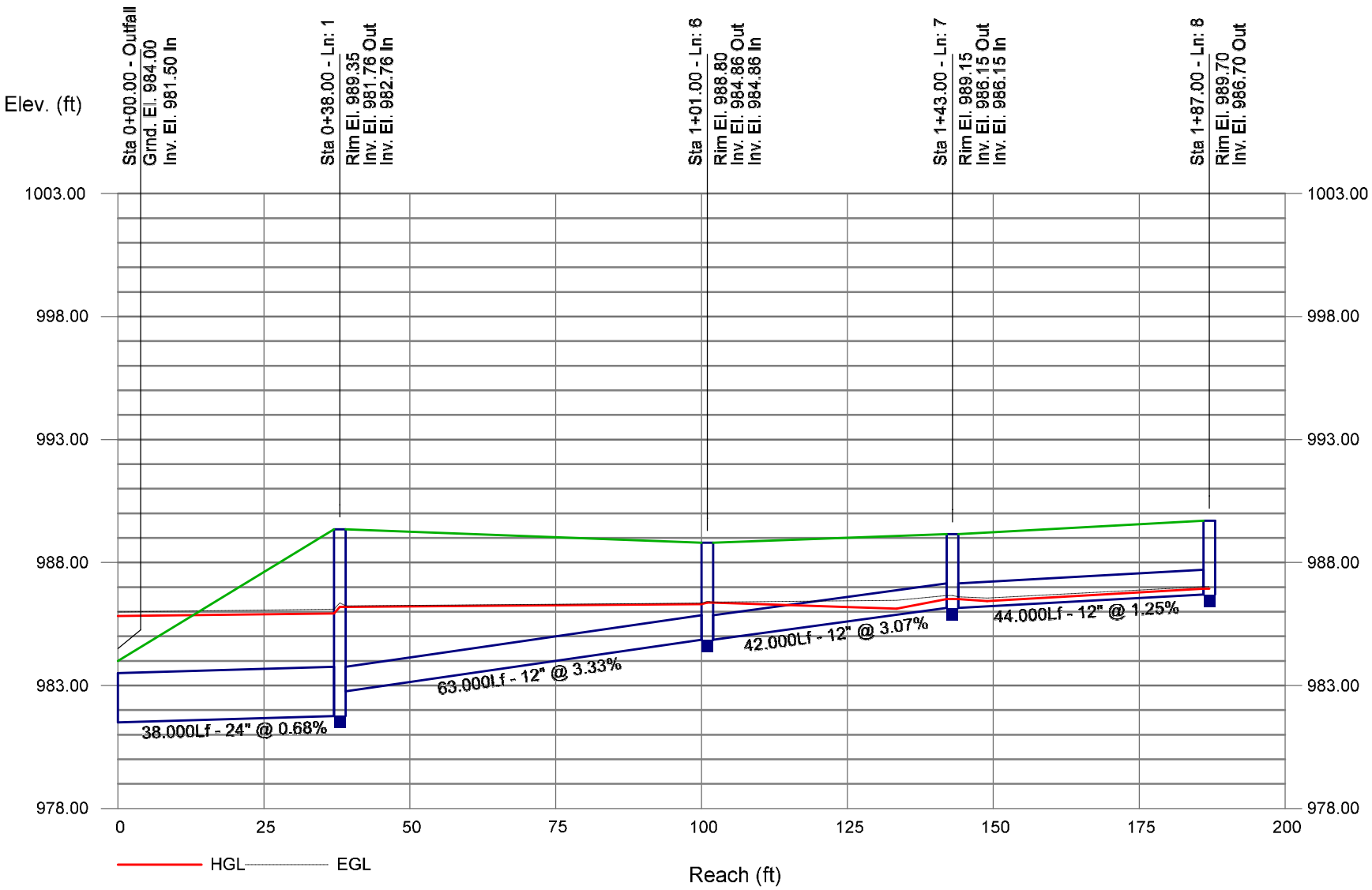

Storm Sewer Profile

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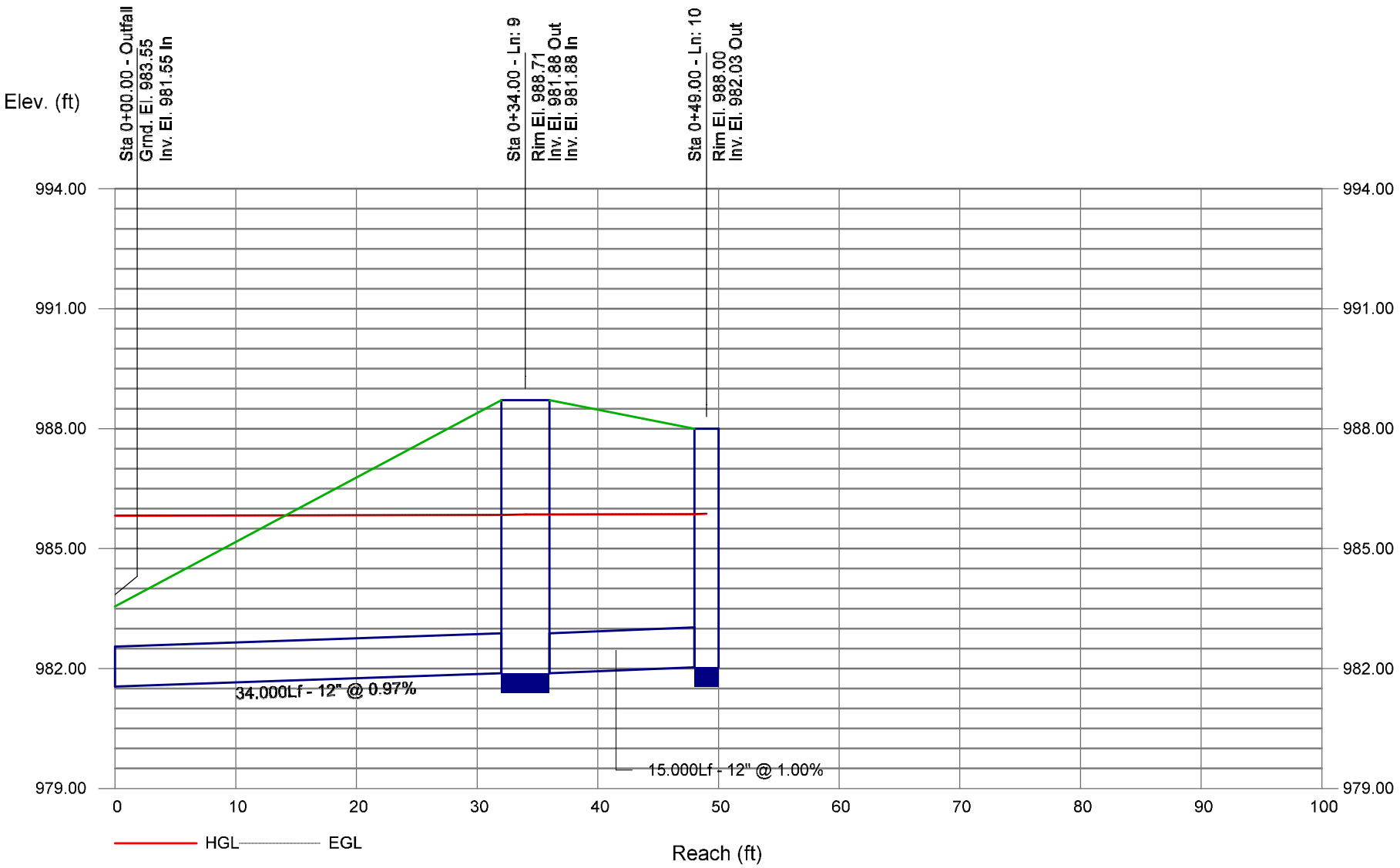

Appendix

National Flood Hazard Layer FIRMette

FEMA

81°31'14"W 40°45'41"N

81°30'36"W 40°45'14"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/5/2023 at 1:02 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

NOAA Atlas 14, Volume 2, Version 3
Location name: Massillon, Ohio, USA*
Latitude: 40.7578°, Longitude: -81.5154°
Elevation: 985.19 ft**
* source: ESRI Maps
** source: USGS

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_&_aerials

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** (0.295-0.355)	**0.386** (0.352-0.423)	**0.468** (0.425-0.512)	**0.530** (0.481-0.580)	**0.609** (0.551-0.666)	**0.670** (0.603-0.731)	**0.728** (0.653-0.793)	**0.787** (0.704-0.858)	**0.867** (0.771-0.944)	**0.926** (0.818-1.01)
10-min	**0.502** (0.459-0.551)	**0.603** (0.549-0.660)	**0.727** (0.661-0.796)	**0.817** (0.742-0.895)	**0.931** (0.842-1.02)	**1.01** (0.914-1.11)	**1.10** (0.983-1.19)	**1.18** (1.05-1.28)	**1.27** (1.13-1.39)	**1.35** (1.19-1.47)
15-min	**0.615** (0.562-0.676)	**0.737** (0.672-0.807)	**0.892** (0.811-0.978)	**1.01** (0.913-1.10)	**1.15** (1.04-1.26)	**1.26** (1.13-1.37)	**1.36** (1.22-1.48)	**1.46** (1.31-1.59)	**1.59** (1.42-1.73)	**1.68** (1.49-1.83)
30-min	**0.814** (0.744-0.894)	**0.986** (0.899-1.08)	**1.22** (1.11-1.34)	**1.40** (1.27-1.53)	**1.62** (1.47-1.78)	**1.80** (1.62-1.96)	**1.97** (1.76-2.14)	**2.13** (1.91-2.33)	**2.36** (2.10-2.56)	**2.53** (2.23-2.75)
60-min	**0.994** (0.908-1.09)	**1.21** (1.10-1.33)	**1.53** (1.39-1.68)	**1.78** (1.61-1.95)	**2.11** (1.91-2.30)	**2.37** (2.13-2.58)	**2.63** (2.36-2.86)	**2.90** (2.59-3.16)	**3.26** (2.90-3.55)	**3.55** (3.13-3.86)
2-hr	**1.14** (1.03-1.25)	**1.38** (1.25-1.52)	**1.78** (1.61-1.95)	**2.10** (1.90-2.30)	**2.57** (2.31-2.81)	**2.96** (2.66-3.24)	**3.38** (3.03-3.69)	**3.85** (3.43-4.19)	**4.51** (3.99-4.90)	**5.08** (4.46-5.51)
3-hr	**1.21** (1.09-1.33)	**1.46** (1.32-1.61)	**1.88** (1.70-2.07)	**2.22** (2.00-2.45)	**2.72** (2.45-2.99)	**3.15** (2.82-3.44)	**3.61** (3.22-3.94)	**4.12** (3.65-4.49)	**4.86** (4.27-5.28)	**5.48** (4.79-5.95)
6-hr	**1.46** (1.32-1.63)	**1.76** (1.59-1.96)	**2.24** (2.02-2.49)	**2.64** (2.38-2.94)	**3.24** (2.91-3.60)	**3.76** (3.35-4.16)	**4.33** (3.84-4.76)	**4.96** (4.37-5.45)	**5.88** (5.13-6.44)	**6.68** (5.78-7.31)
12-hr	**1.73** (1.57-1.93)	**2.08** (1.89-2.32)	**2.61** (2.37-2.92)	**3.08** (2.78-3.43)	**3.78** (3.39-4.19)	**4.38** (3.91-4.85)	**5.05** (4.49-5.57)	**5.80** (5.12-6.37)	**6.92** (6.04-7.57)	**7.88** (6.83-8.61)
24-hr	**2.03** (1.86-2.24)	**2.44** (2.23-2.69)	**3.04** (2.78-3.35)	**3.56** (3.24-3.92)	**4.35** (3.93-4.76)	**5.02** (4.51-5.49)	**5.77** (5.14-6.30)	**6.59** (5.82-7.20)	**7.83** (6.80-8.55)	**8.89** (7.62-9.71)
2-day	**2.35** (2.16-2.58)	**2.81** (2.58-3.09)	**3.46** (3.18-3.81)	**4.03** (3.68-4.42)	**4.86** (4.42-5.32)	**5.57** (5.03-6.09)	**6.35** (5.68-6.94)	**7.20** (6.38-7.88)	**8.45** (7.37-9.25)	**9.50** (8.18-10.4)
3-day	**2.51** (2.32-2.75)	**3.00** (2.76-3.28)	**3.68** (3.38-4.02)	**4.25** (3.90-4.64)	**5.09** (4.64-5.55)	**5.80** (5.25-6.31)	**6.56** (5.90-7.15)	**7.39** (6.59-8.05)	**8.61** (7.58-9.40)	**9.66** (8.40-10.6)
4-day	**2.68** (2.47-2.91)	**3.19** (2.94-3.47)	**3.89** (3.59-4.23)	**4.47** (4.11-4.86)	**5.32** (4.87-5.77)	**6.02** (5.48-6.53)	**6.77** (6.13-7.35)	**7.58** (6.80-8.22)	**8.78** (7.79-9.55)	**9.81** (8.61-10.7)
7-day	**3.21** (2.97-3.47)	**3.81** (3.53-4.12)	**4.61** (4.26-4.99)	**5.27** (4.87-5.70)	**6.22** (5.72-6.72)	**7.01** (6.41-7.56)	**7.83** (7.12-8.45)	**8.71** (7.87-9.40)	**9.95** (8.90-10.8)	**11.0** (9.72-11.9)
10-day	**3.70** (3.44-3.98)	**4.38** (4.07-4.71)	**5.24** (4.87-5.64)	**5.94** (5.51-6.39)	**6.92** (6.39-7.43)	**7.70** (7.09-8.28)	**8.51** (7.80-9.15)	**9.35** (8.52-10.1)	**10.5** (9.50-11.3)	**11.4** (10.3-12.4)
20-day	**5.16** (4.83-5.50)	**6.09** (5.71-6.51)	**7.18** (6.72-7.68)	**8.03** (7.51-8.59)	**9.16** (8.55-9.79)	**10.0** (9.34-10.7)	**10.9** (10.1-11.7)	**11.8** (10.9-12.6)	**12.9** (11.9-13.8)	**13.7** (12.6-14.8)
30-day	**6.46** (6.06-6.89)	**7.62** (7.14-8.12)	**8.88** (8.32-9.46)	**9.85** (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** (13.9-16.1)	**15.9** (14.6-17.0)
45-day	**8.27** (7.78-8.78)	**9.70** (9.13-10.3)	**11.1** (10.5-11.8)	**12.2** (11.5-13.0)	**13.6** (12.8-14.5)	**14.6** (13.7-15.6)	**15.6** (14.6-16.6)	**16.5** (15.4-17.6)	**17.7** (16.4-18.8)	**18.5** (17.1-19.7)
60-day	**9.99** (9.44-10.5)	**11.7** (11.1-12.4)	**13.3** (12.6-14.1)	**14.5** (13.7-15.4)	**16.1** (15.2-17.0)	**17.2** (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.

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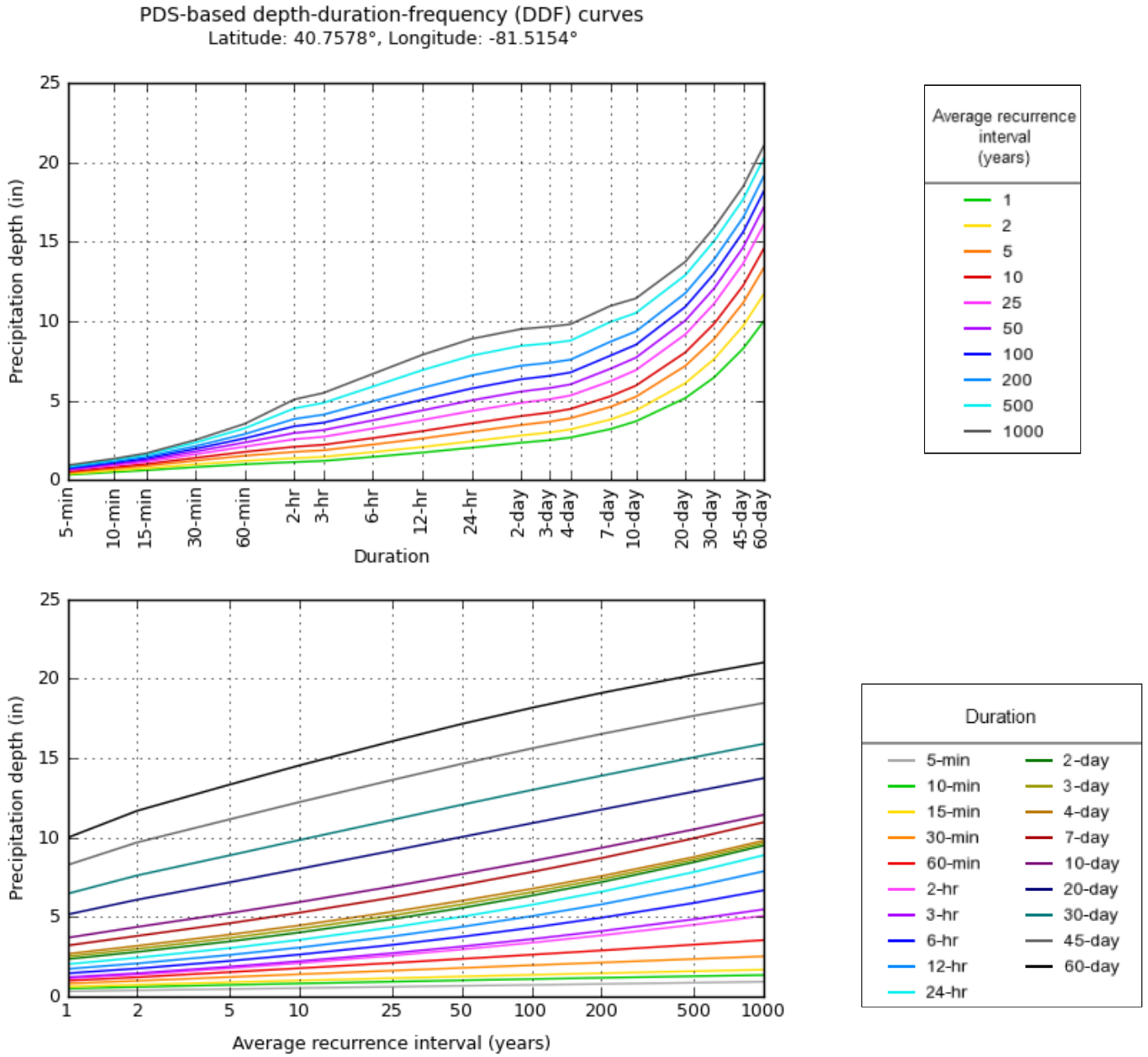
PF graphical



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Small scale terrain

NOAA Atlas 14, Volume 2, Version 3
Location name: Massillon, Ohio, USA*
Latitude: 40.7578°, Longitude: -81.5154°
Elevation: 985.19 ft**
* source: ESRI Maps
** source: USGS

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_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**3.88** (3.54-4.26)	**4.63** (4.22-5.08)	**5.62** (5.10-6.14)	**6.36** (5.77-6.96)	**7.31** (6.61-7.99)	**8.04** (7.24-8.77)	**8.74** (7.84-9.52)	**9.44** (8.45-10.3)	**10.4** (9.25-11.3)	**11.1** (9.82-12.1)
10-min	**3.01** (2.75-3.31)	**3.62** (3.29-3.96)	**4.36** (3.97-4.78)	**4.90** (4.45-5.37)	**5.59** (5.05-6.11)	**6.09** (5.48-6.65)	**6.58** (5.90-7.16)	**7.05** (6.31-7.69)	**7.65** (6.80-8.32)	**8.08** (7.15-8.79)
15-min	**2.46** (2.25-2.70)	**2.95** (2.69-3.23)	**3.57** (3.24-3.91)	**4.02** (3.65-4.40)	**4.60** (4.16-5.03)	**5.02** (4.53-5.49)	**5.44** (4.88-5.94)	**5.85** (5.23-6.38)	**6.36** (5.66-6.92)	**6.74** (5.96-7.33)
30-min	**1.63** (1.49-1.79)	**1.97** (1.80-2.16)	**2.44** (2.22-2.68)	**2.79** (2.54-3.06)	**3.25** (2.94-3.55)	**3.59** (3.23-3.92)	**3.93** (3.53-4.28)	**4.27** (3.81-4.65)	**4.72** (4.19-5.13)	**5.05** (4.46-5.49)
60-min	**0.994** (0.908-1.09)	**1.21** (1.10-1.33)	**1.53** (1.39-1.68)	**1.78** (1.61-1.95)	**2.11** (1.91-2.30)	**2.37** (2.13-2.58)	**2.63** (2.36-2.86)	**2.90** (2.59-3.16)	**3.26** (2.90-3.55)	**3.55** (3.13-3.86)
2-hr	**0.568** (0.515-0.625)	**0.689** (0.624-0.760)	**0.888** (0.804-0.977)	**1.05** (0.948-1.15)	**1.28** (1.16-1.41)	**1.48** (1.33-1.62)	**1.69** (1.51-1.85)	**1.92** (1.71-2.09)	**2.26** (2.00-2.45)	**2.54** (2.23-2.76)
3-hr	**0.401** (0.364-0.444)	**0.486** (0.441-0.537)	**0.624** (0.565-0.689)	**0.739** (0.667-0.815)	**0.906** (0.815-0.996)	**1.05** (0.937-1.15)	**1.20** (1.07-1.31)	**1.37** (1.22-1.50)	**1.62** (1.42-1.76)	**1.83** (1.60-1.98)
6-hr	**0.243** (0.220-0.272)	**0.293** (0.266-0.328)	**0.373** (0.337-0.416)	**0.441** (0.397-0.490)	**0.542** (0.486-0.601)	**0.628** (0.560-0.694)	**0.722** (0.641-0.796)	**0.827** (0.729-0.909)	**0.982** (0.857-1.08)	**1.12** (0.966-1.22)
12-hr	**0.144** (0.130-0.160)	**0.172** (0.157-0.192)	**0.217** (0.197-0.242)	**0.256** (0.231-0.284)	**0.314** (0.282-0.348)	**0.364** (0.325-0.402)	**0.419** (0.373-0.462)	**0.481** (0.425-0.529)	**0.574** (0.501-0.628)	**0.654** (0.567-0.715)
24-hr	**0.085** (0.078-0.093)	**0.102** (0.093-0.112)	**0.127** (0.116-0.140)	**0.149** (0.135-0.163)	**0.181** (0.164-0.199)	**0.209** (0.188-0.229)	**0.240** (0.214-0.262)	**0.275** (0.242-0.300)	**0.326** (0.283-0.356)	**0.370** (0.318-0.404)
2-day	**0.049** (0.045-0.054)	**0.058** (0.054-0.064)	**0.072** (0.066-0.079)	**0.084** (0.077-0.092)	**0.101** (0.092-0.111)	**0.116** (0.105-0.127)	**0.132** (0.118-0.145)	**0.150** (0.133-0.164)	**0.176** (0.154-0.193)	**0.198** (0.170-0.217)
3-day	**0.035** (0.032-0.038)	**0.042** (0.038-0.046)	**0.051** (0.047-0.056)	**0.059** (0.054-0.064)	**0.071** (0.064-0.077)	**0.080** (0.073-0.088)	**0.091** (0.082-0.099)	**0.103** (0.092-0.112)	**0.120** (0.105-0.131)	**0.134** (0.117-0.147)
4-day	**0.028** (0.026-0.030)	**0.033** (0.031-0.036)	**0.041** (0.037-0.044)	**0.047** (0.043-0.051)	**0.055** (0.051-0.060)	**0.063** (0.057-0.068)	**0.071** (0.064-0.077)	**0.079** (0.071-0.086)	**0.091** (0.081-0.099)	**0.102** (0.090-0.111)
7-day	**0.019** (0.018-0.021)	**0.023** (0.021-0.025)	**0.027** (0.025-0.030)	**0.031** (0.029-0.034)	**0.037** (0.034-0.040)	**0.042** (0.038-0.045)	**0.047** (0.042-0.050)	**0.052** (0.047-0.056)	**0.059** (0.053-0.064)	**0.065** (0.058-0.071)
10-day	**0.015** (0.014-0.017)	**0.018** (0.017-0.020)	**0.022** (0.020-0.024)	**0.025** (0.023-0.027)	**0.029** (0.027-0.031)	**0.032** (0.030-0.034)	**0.035** (0.032-0.038)	**0.039** (0.036-0.042)	**0.044** (0.040-0.047)	**0.048** (0.043-0.052)
20-day	**0.011** (0.010-0.011)	**0.013** (0.012-0.014)	**0.015** (0.014-0.016)	**0.017** (0.016-0.018)	**0.019** (0.018-0.020)	**0.021** (0.019-0.022)	**0.023** (0.021-0.024)	**0.024** (0.023-0.026)	**0.027** (0.025-0.029)	**0.029** (0.026-0.031)
30-day	**0.009** (0.008-0.010)	**0.011** (0.010-0.011)	**0.012** (0.012-0.013)	**0.014** (0.013-0.015)	**0.015** (0.014-0.016)	**0.017** (0.016-0.018)	**0.018** (0.017-0.019)	**0.019** (0.018-0.021)	**0.021** (0.019-0.022)	**0.022** (0.020-0.024)
45-day	**0.008** (0.007-0.008)	**0.009** (0.008-0.010)	**0.010** (0.010-0.011)	**0.011** (0.011-0.012)	**0.013** (0.012-0.013)	**0.014** (0.013-0.014)	**0.014** (0.014-0.015)	**0.015** (0.014-0.016)	**0.016** (0.015-0.017)	**0.017** (0.016-0.018)
60-day	**0.007** (0.007-0.007)	**0.008** (0.008-0.009)	**0.009** (0.009-0.010)	**0.010** (0.010-0.011)	**0.011** (0.011-0.012)	**0.012** (0.011-0.013)	**0.013** (0.012-0.013)	**0.013** (0.012-0.014)	**0.014** (0.013-0.015)	**0.015** (0.014-0.016)

[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.

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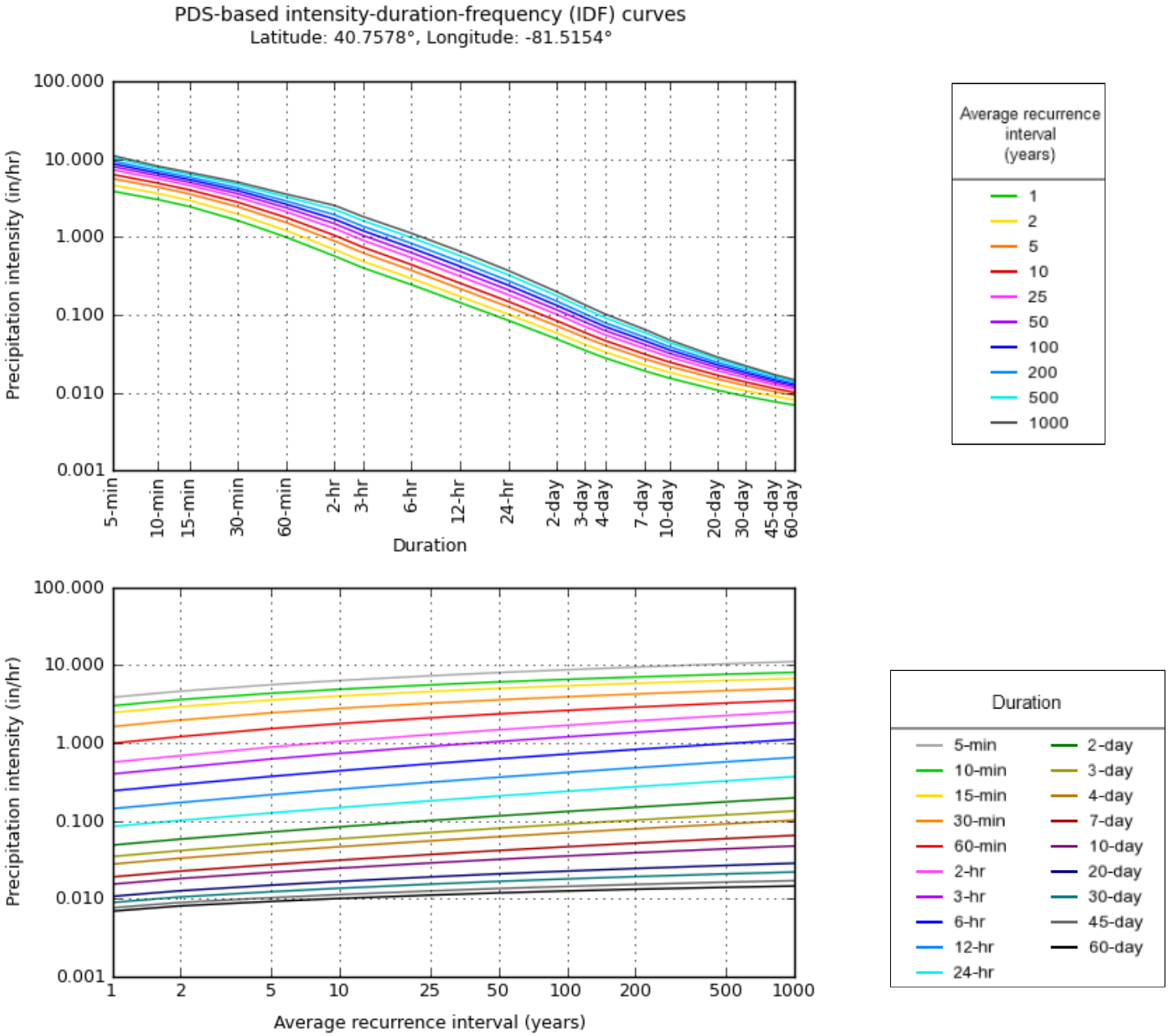
PF graphical



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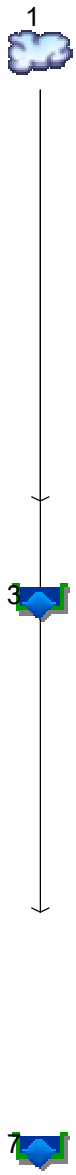
Watershed Model Schematic



Due to the stacking of water quality volume and quantity volume, the model only includes quantity volume.

The maximum elevation of the water in the basin shall be ignored since it does not include the water quality volume.

Refer to Table 2 in Section 1 of this report for accumulative high water elevations.

Legend

Hyd.	Origin	Description
1	SCS Runoff	Infiltration Basin Drainage
3	Reservoir	Basin Release
7	Reservoir	Construction Control

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	2.673	3.921	-------	5.889	7.699	10.56	13.04	15.84	Infiltration Basin Drainage
3	Reservoir	1	0.000	0.000	-------	0.000	0.000	0.000	0.000	0.000	Basin Release
7	Reservoir	1	0.000	0.000	-------	0.000	0.000	0.000	0.000	0.000	Construction Control

Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	2.673	1	720	6,180	------	------	------	Infiltration Basin Drainage
3	Reservoir	0.000	1	1288	0	1	981.22	2,917	Basin Release
7	Reservoir	0.000	1	1089	0	1	982.17	2,635	Construction Control

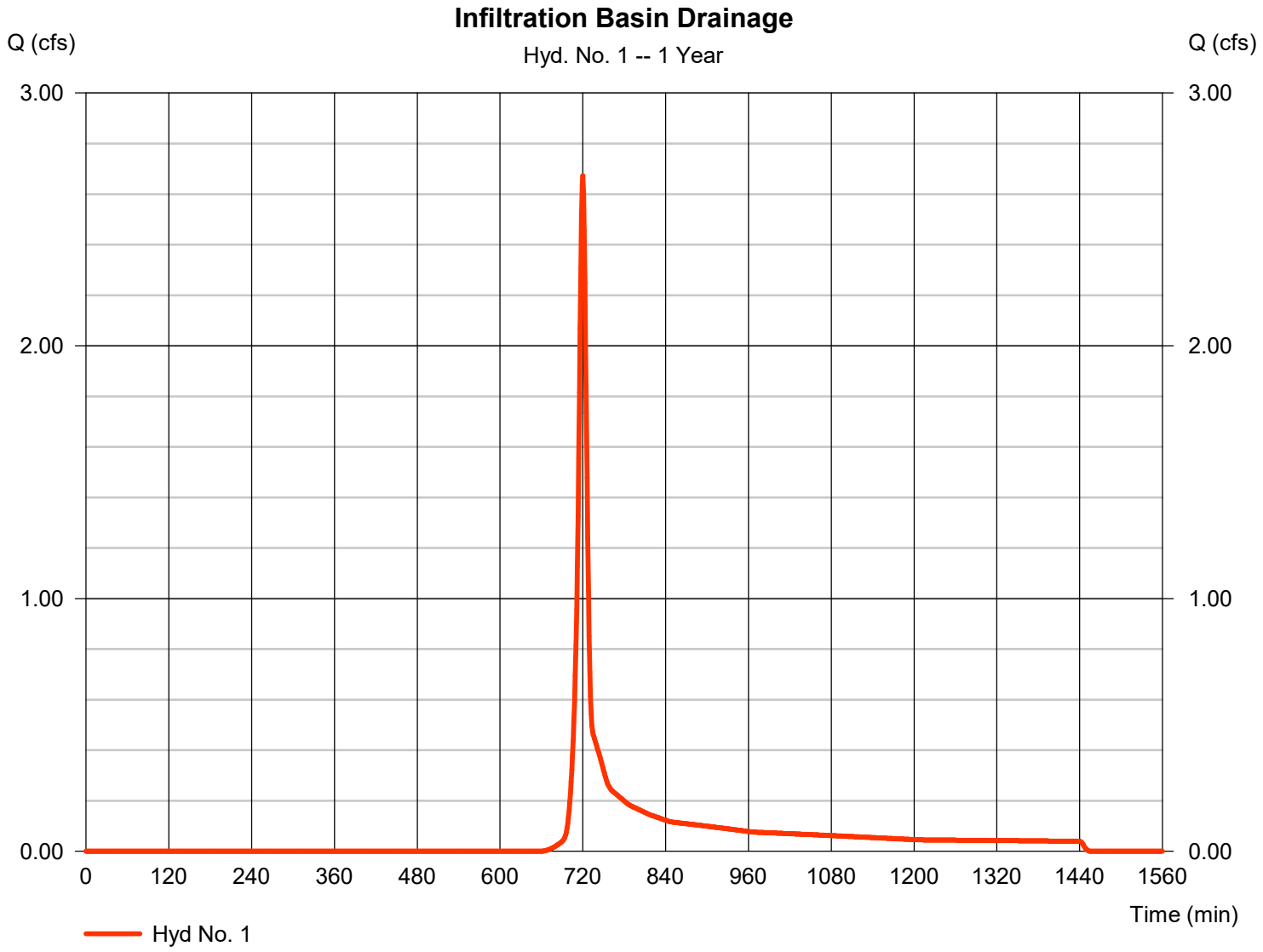
Hydrograph Report

Hyd. No. 1

Infiltration Basin Drainage

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.673 cfs
Storm frequency	=	1 yrs	Time to peak	=	720 min
Time interval	=	1 min	Hyd. volume	=	6,180 cuft
Drainage area	=	2.730 ac	Curve number	=	81*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	2.03 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.800 x 39) + (1.930 x 98)] / 2.730



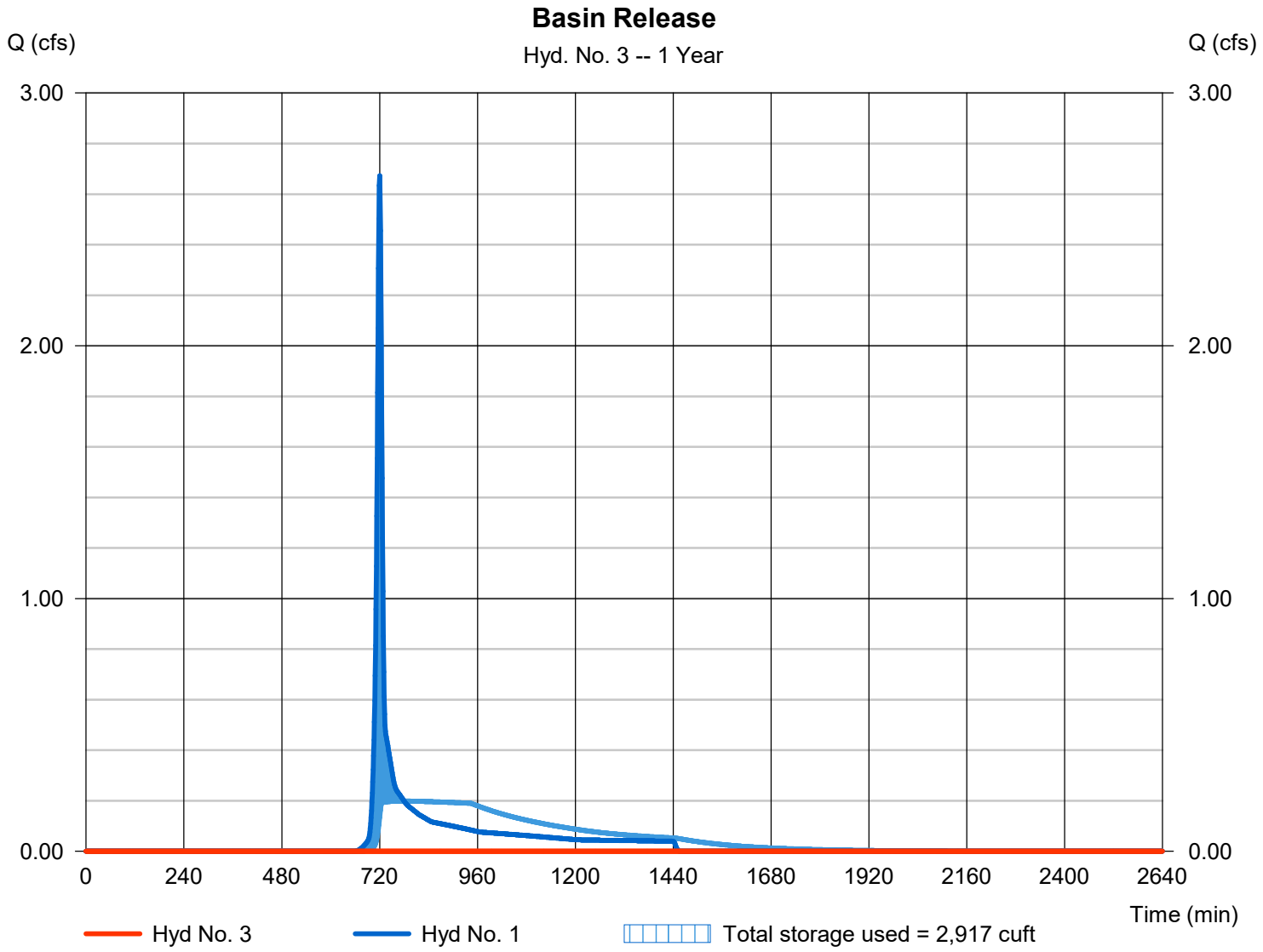
Hydrograph Report

Hyd. No. 3

Basin Release

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	1 yrs	Time to peak	=	1288 min
Time interval	=	1 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	1 - Infiltration Basin Drainage	Max. Elevation	=	981.22 ft
Reservoir name	=	Infiltration Basin	Max. Storage	=	2,917 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 1 - Infiltration Basin

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 980.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	980.00	1,540	0	0
1.00	981.00	2,848	2,161	2,161
2.00	982.00	4,100	3,455	5,615
3.00	983.00	5,208	4,643	10,258
4.00	984.00	6,496	5,840	16,097
5.00	985.00	7,884	7,178	23,275
6.00	986.00	9,356	8,609	31,884
7.00	987.00	10,930	10,132	42,016
7.50	987.50	11,754	5,669	47,685

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	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	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 2.000 (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).

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	980.00	---	---	---	---	---	---	---	---	0.000	---	0.000
1.00	2,161	981.00	---	---	---	---	---	---	---	---	0.132	---	0.132
2.00	5,615	982.00	---	---	---	---	---	---	---	---	0.190	---	0.190
3.00	10,258	983.00	---	---	---	---	---	---	---	---	0.241	---	0.241
4.00	16,097	984.00	---	---	---	---	---	---	---	---	0.301	---	0.301
5.00	23,275	985.00	---	---	---	---	---	---	---	---	0.365	---	0.365
6.00	31,884	986.00	---	---	---	---	---	---	---	---	0.433	---	0.433
7.00	42,016	987.00	---	---	---	---	---	---	---	---	0.506	---	0.506
7.50	47,685	987.50	---	---	---	---	---	---	---	---	0.544	---	0.544

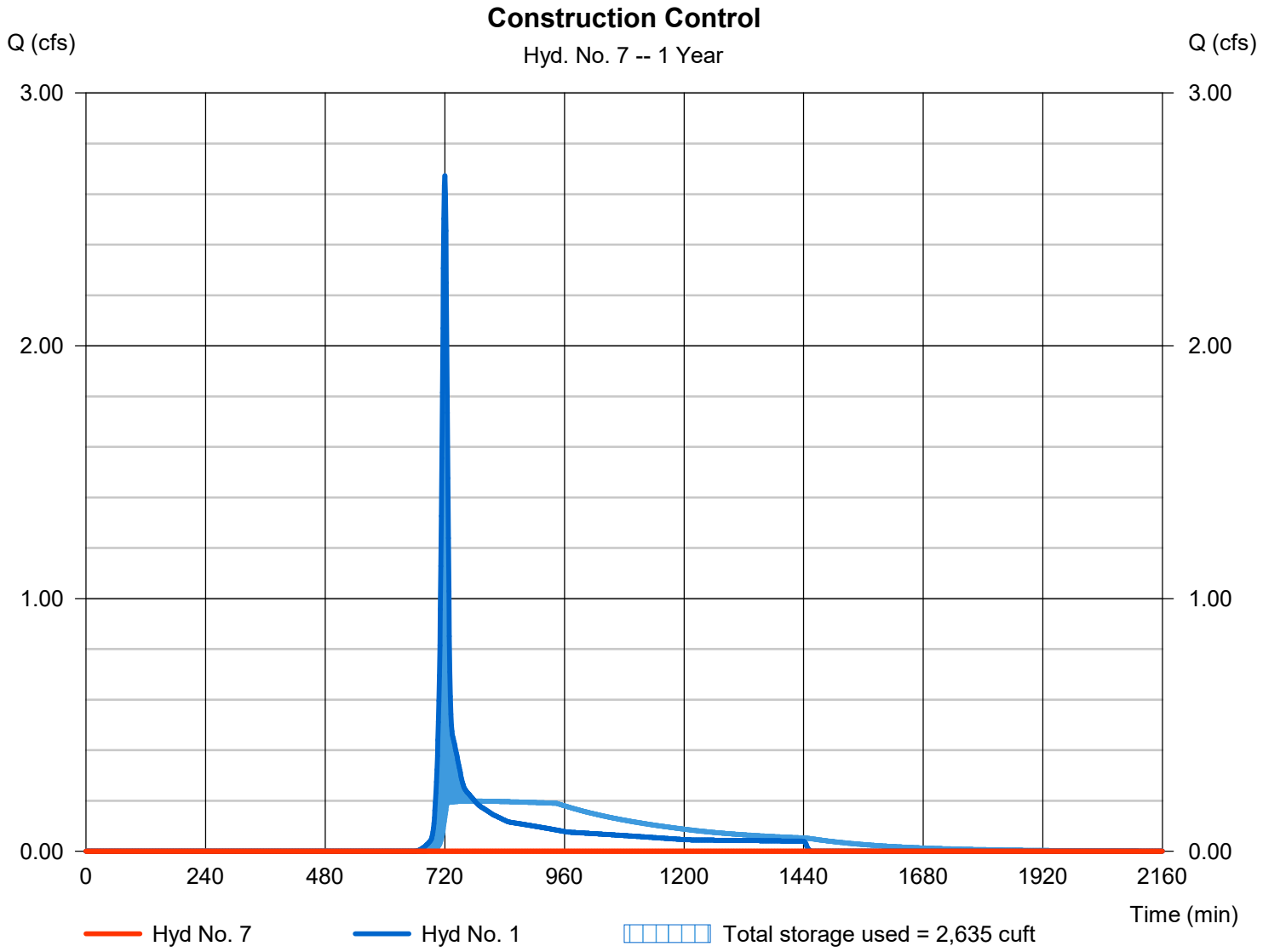
Hydrograph Report

Hyd. No. 7

Construction Control

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	1 yrs	Time to peak	=	1089 min
Time interval	=	1 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	1 - Infiltration Basin Drainage	Max. Elevation	=	982.17 ft
Reservoir name	=	Sediment Basin	Max. Storage	=	2,635 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 3 - Sediment Basin

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 981.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	981.50	3,560	0	0
0.50	982.00	4,100	1,913	1,913
1.00	982.50	4,647	2,185	4,098
1.50	983.00	5,208	2,462	6,560
2.00	983.50	5,863	2,766	9,326
2.50	984.00	6,496	3,088	12,414
3.50	985.00	7,884	7,178	19,593
4.50	986.00	9,356	8,609	28,201
5.50	987.00	10,930	10,132	38,333
6.00	987.50	11,754	5,669	44,002

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	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	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 2.000 (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).

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	981.50	---	---	---	---	---	---	---	---	0.000	---	0.000
0.50	1,913	982.00	---	---	---	---	---	---	---	---	0.190	---	0.190
1.00	4,098	982.50	---	---	---	---	---	---	---	---	0.215	---	0.215
1.50	6,560	983.00	---	---	---	---	---	---	---	---	0.241	---	0.241
2.00	9,326	983.50	---	---	---	---	---	---	---	---	0.271	---	0.271
2.50	12,414	984.00	---	---	---	---	---	---	---	---	0.301	---	0.301
3.50	19,593	985.00	---	---	---	---	---	---	---	---	0.365	---	0.365
4.50	28,201	986.00	---	---	---	---	---	---	---	---	0.433	---	0.433
5.50	38,333	987.00	---	---	---	---	---	---	---	---	0.506	---	0.506
6.00	44,002	987.50	---	---	---	---	---	---	---	---	0.544	---	0.544

Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.921	1	720	8,918	------	------	------	Infiltration Basin Drainage
3	Reservoir	0.000	1	715	0	1	981.72	4,642	Basin Release
7	Reservoir	0.000	1	1323	0	1	982.54	4,313	Construction Control

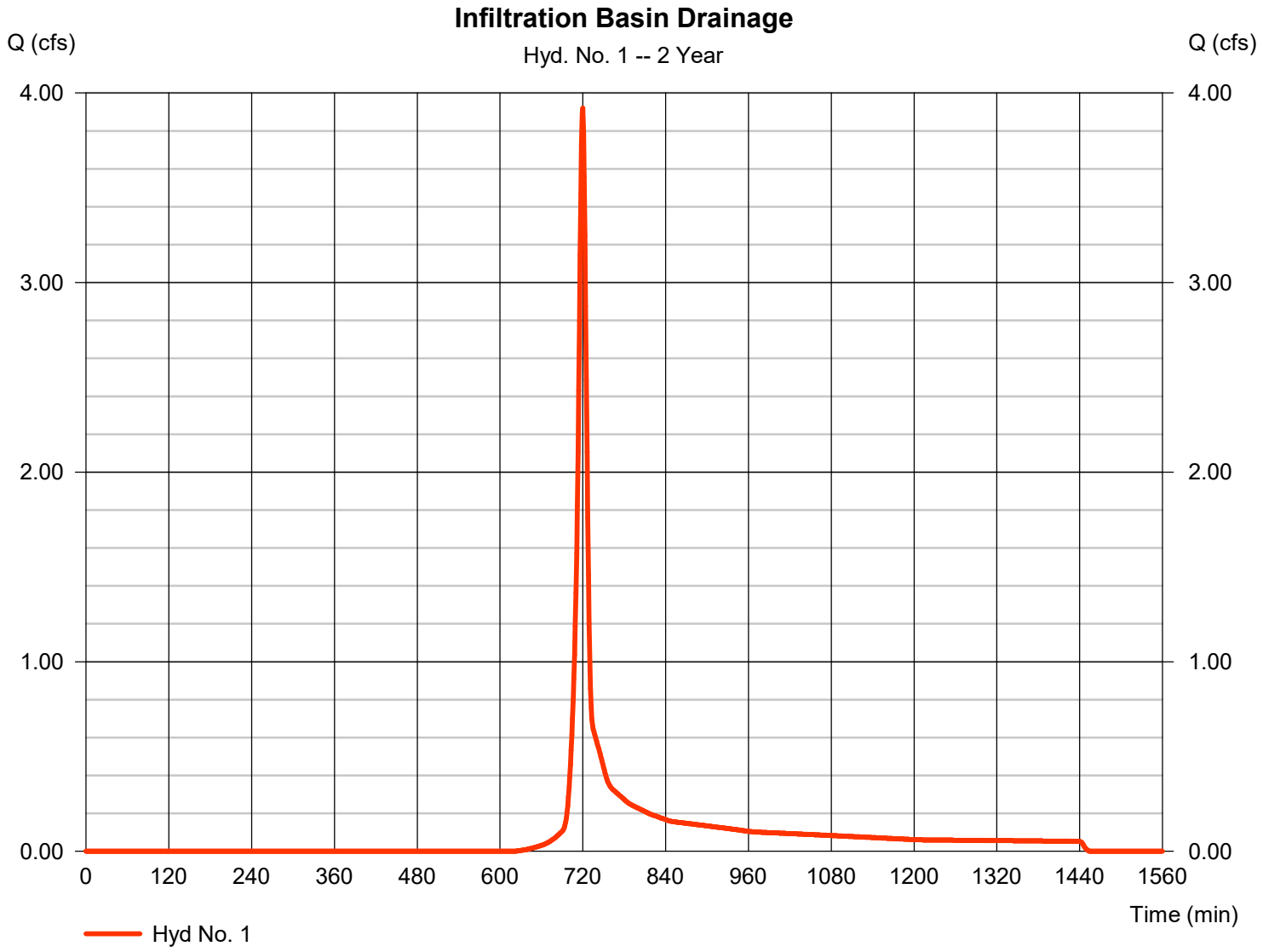
Hydrograph Report

Hyd. No. 1

Infiltration Basin Drainage

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.921 cfs
Storm frequency	=	2 yrs	Time to peak	=	720 min
Time interval	=	1 min	Hyd. volume	=	8,918 cuft
Drainage area	=	2.730 ac	Curve number	=	81*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	2.44 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.800 x 39) + (1.930 x 98)] / 2.730



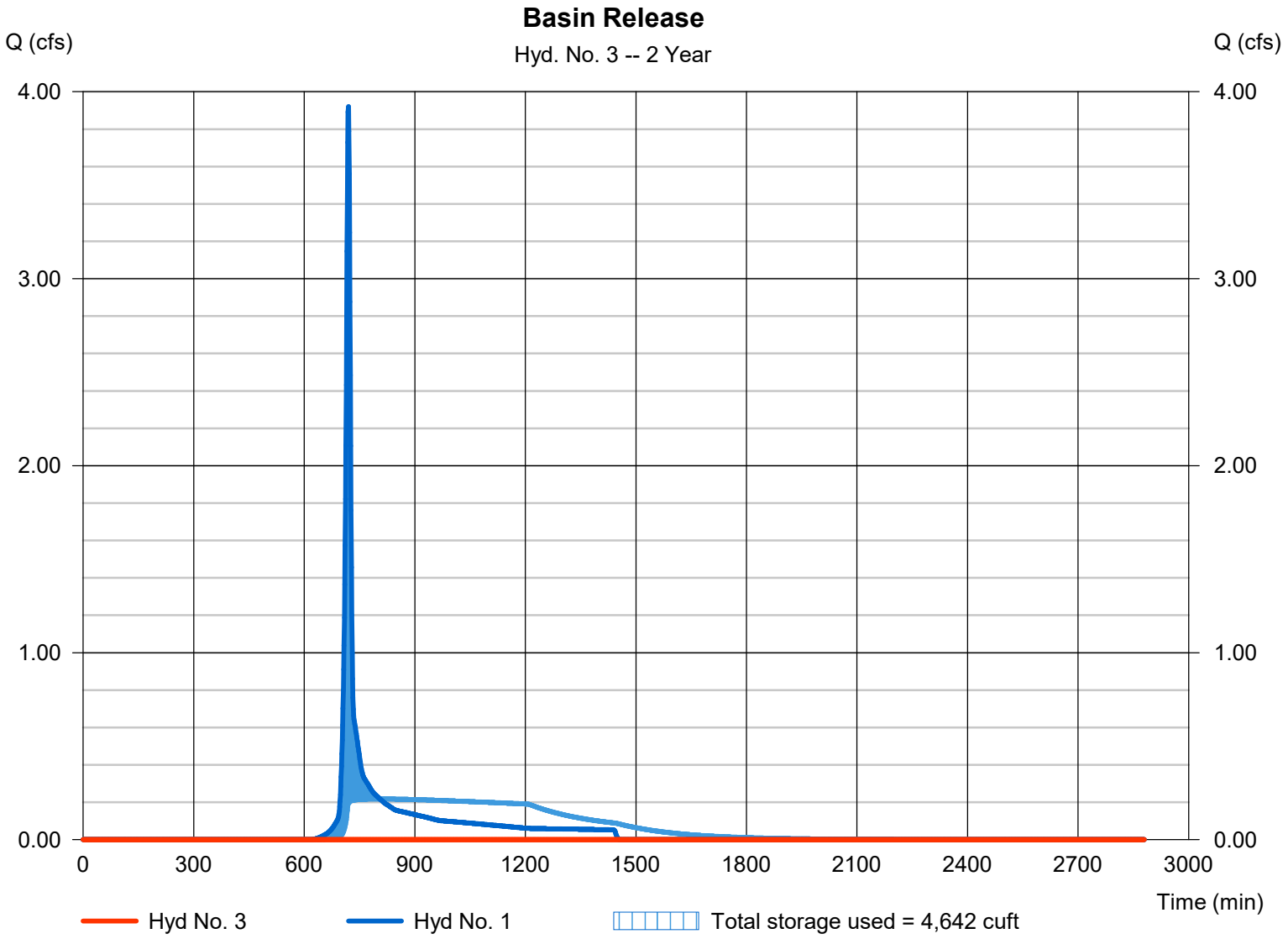
Hydrograph Report

Hyd. No. 3

Basin Release

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	2 yrs	Time to peak	=	715 min
Time interval	=	1 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	1 - Infiltration Basin Drainage	Max. Elevation	=	981.72 ft
Reservoir name	=	Infiltration Basin	Max. Storage	=	4,642 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



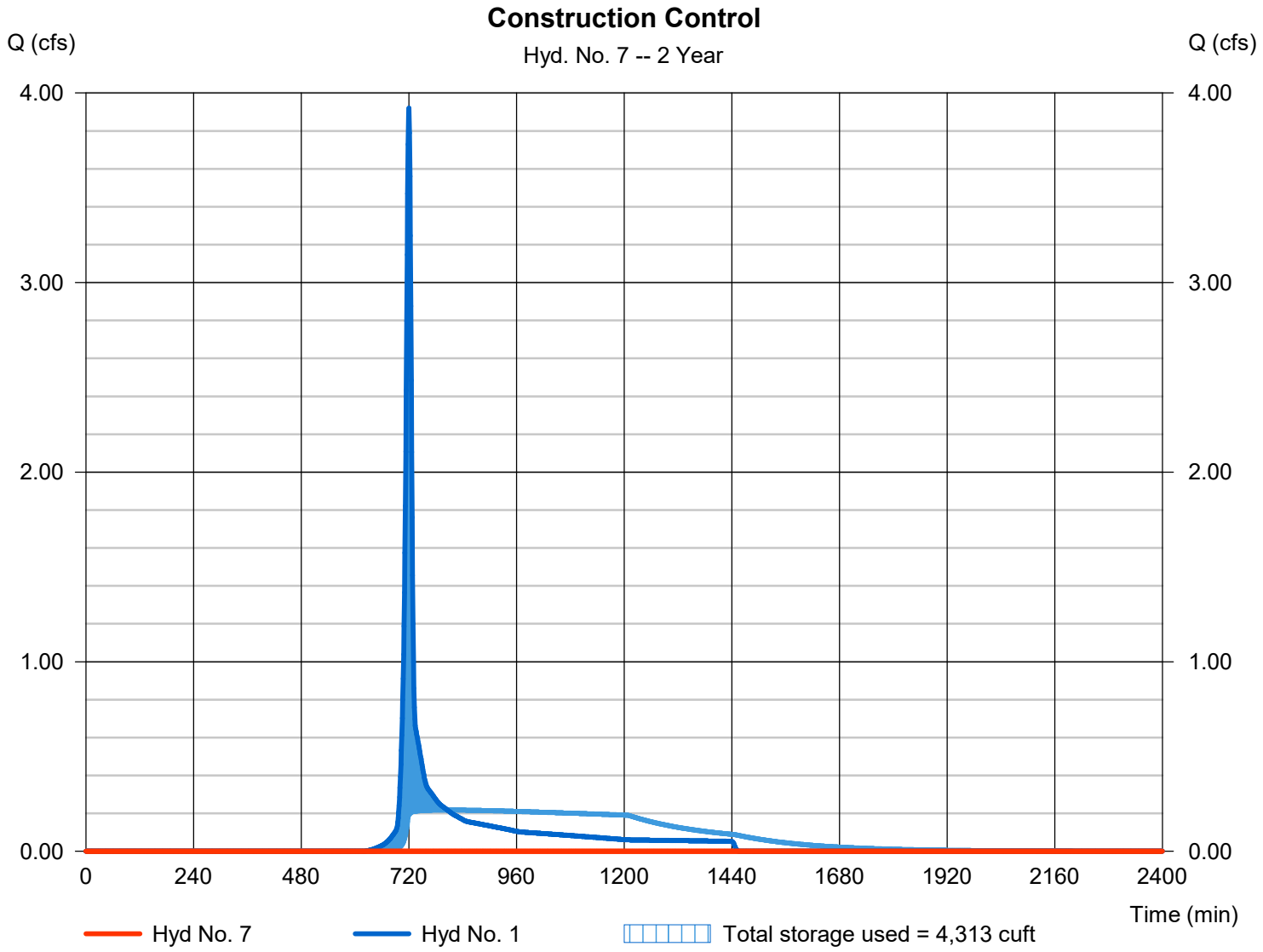
Hydrograph Report

Hyd. No. 7

Construction Control

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	2 yrs	Time to peak	=	1323 min
Time interval	=	1 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	1 - Infiltration Basin Drainage	Max. Elevation	=	982.54 ft
Reservoir name	=	Sediment Basin	Max. Storage	=	4,313 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	5.889	1	720	13,322	------	------	------	Infiltration Basin Drainage
3	Reservoir	0.000	1	1725	0	1	982.42	7,559	Basin Release
7	Reservoir	0.000	1	1612	0	1	983.11	7,186	Construction Control

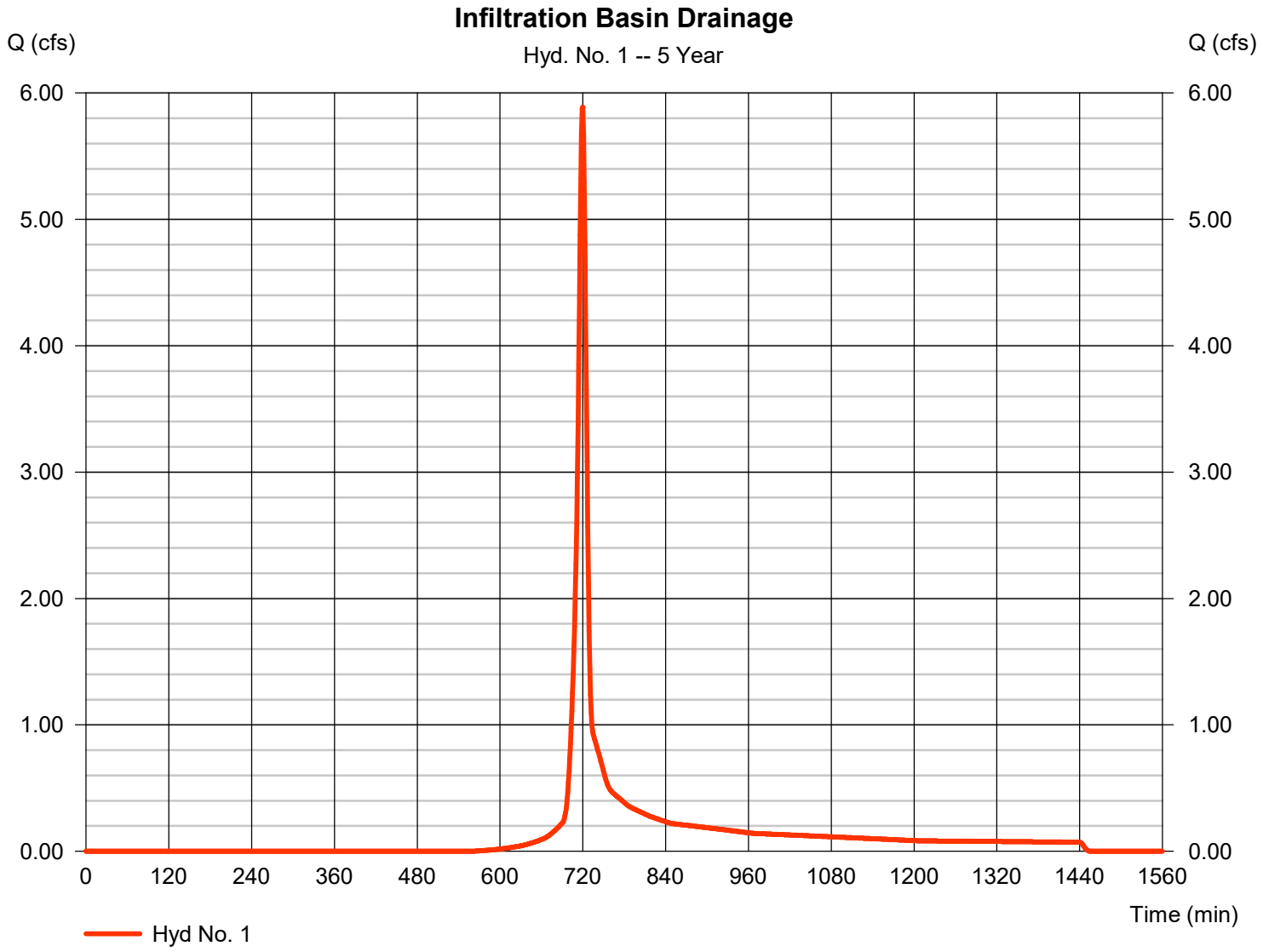
Hydrograph Report

Hyd. No. 1

Infiltration Basin Drainage

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.889 cfs
Storm frequency	=	5 yrs	Time to peak	=	720 min
Time interval	=	1 min	Hyd. volume	=	13,322 cuft
Drainage area	=	2.730 ac	Curve number	=	81*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	3.04 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.800 x 39) + (1.930 x 98)] / 2.730



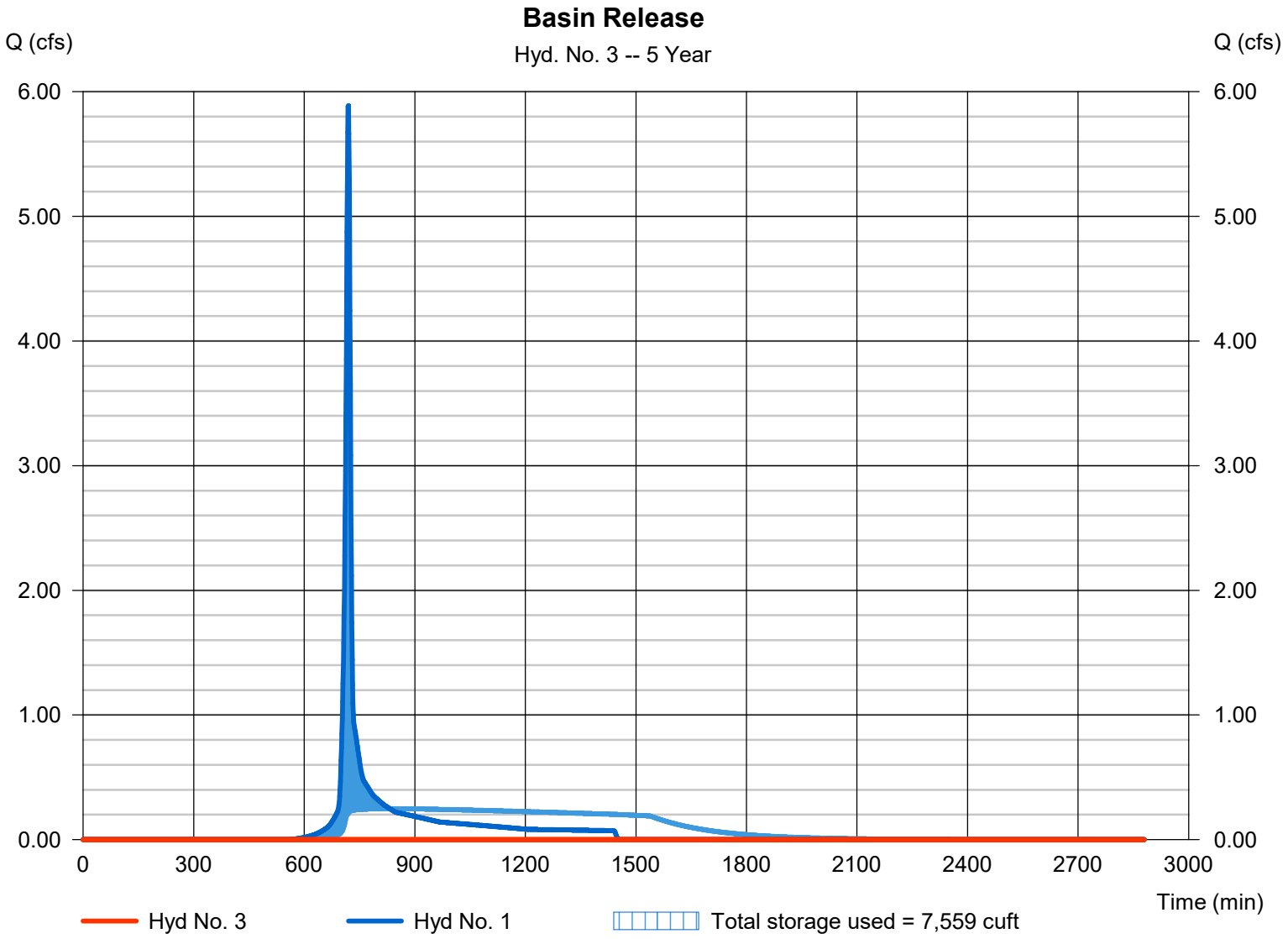
Hydrograph Report

Hyd. No. 3

Basin Release

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	5 yrs	Time to peak	=	1725 min
Time interval	=	1 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	1 - Infiltration Basin Drainage	Max. Elevation	=	982.42 ft
Reservoir name	=	Infiltration Basin	Max. Storage	=	7,559 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



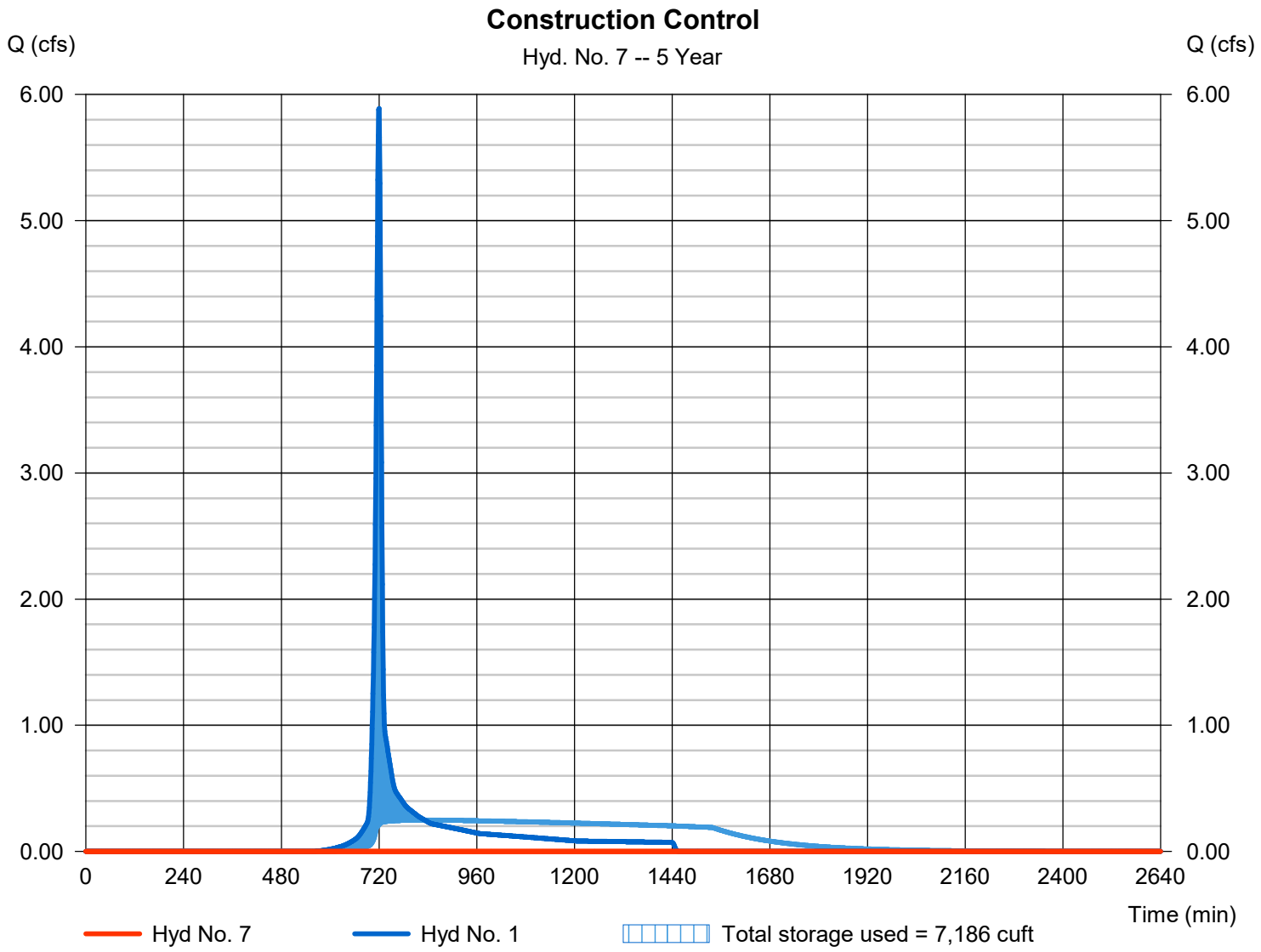
Hydrograph Report

Hyd. No. 7

Construction Control

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	5 yrs	Time to peak	=	1612 min
Time interval	=	1 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	1 - Infiltration Basin Drainage	Max. Elevation	=	983.11 ft
Reservoir name	=	Sediment Basin	Max. Storage	=	7,186 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	7.699	1	719	17,414	------	------	------	Infiltration Basin Drainage
3	Reservoir	0.000	1	706	0	1	983.02	10,383	Basin Release
7	Reservoir	0.000	1	1818	0	1	983.60	9,925	Construction Control

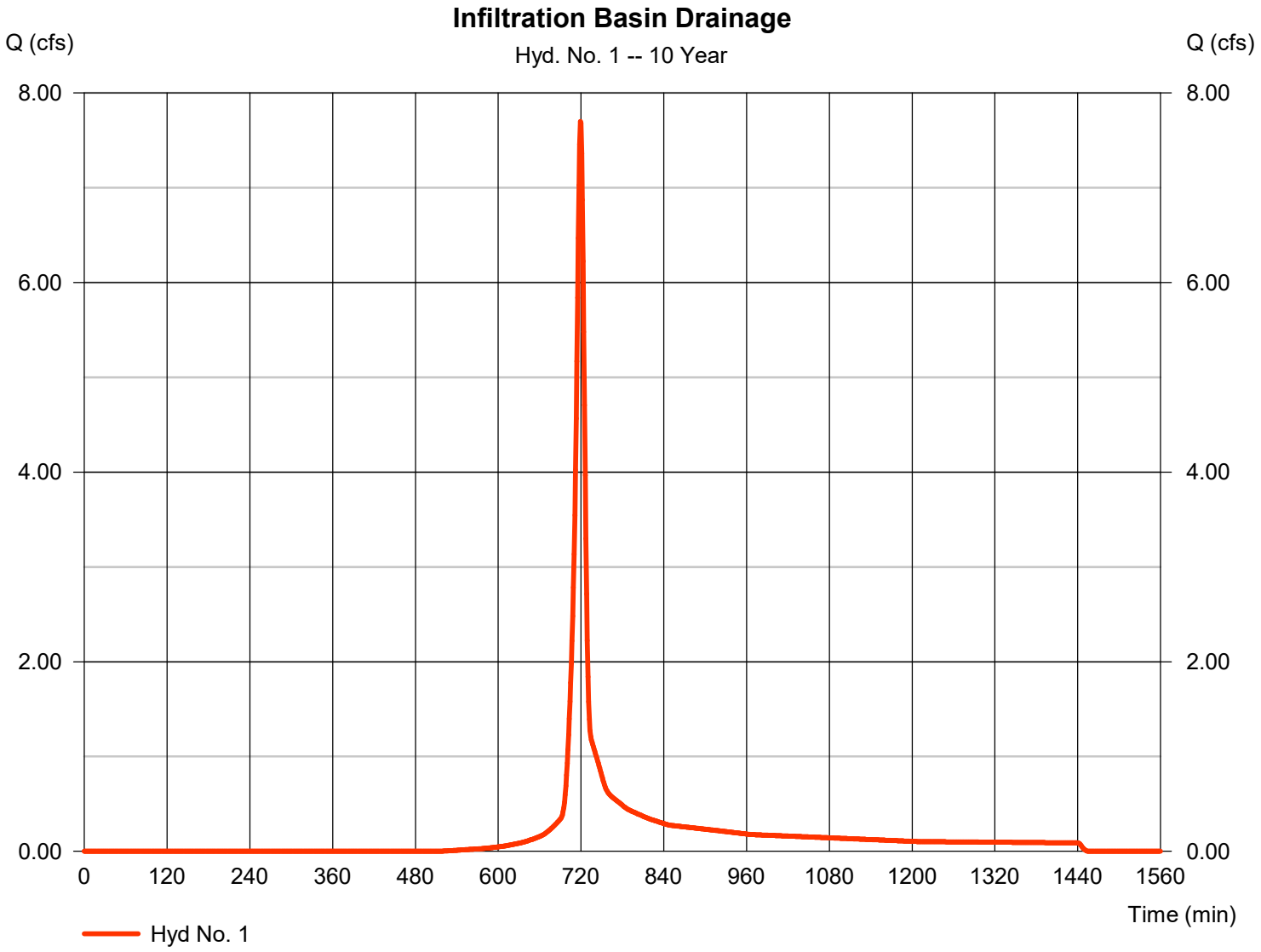
Hydrograph Report

Hyd. No. 1

Infiltration Basin Drainage

Hydrograph type	=	SCS Runoff	Peak discharge	=	7.699 cfs
Storm frequency	=	10 yrs	Time to peak	=	719 min
Time interval	=	1 min	Hyd. volume	=	17,414 cuft
Drainage area	=	2.730 ac	Curve number	=	81*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	3.56 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.800 x 39) + (1.930 x 98)] / 2.730



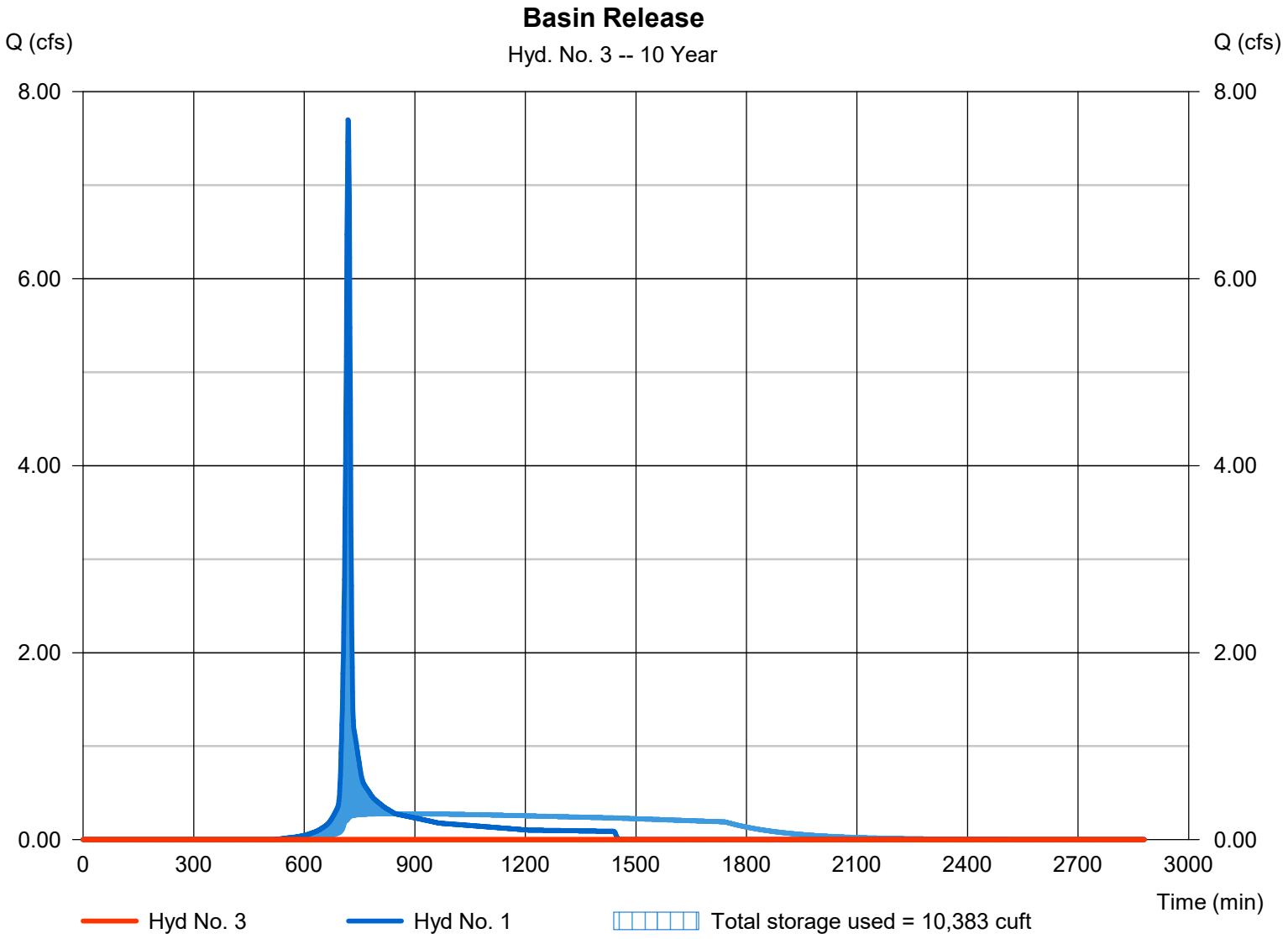
Hydrograph Report

Hyd. No. 3

Basin Release

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	10 yrs	Time to peak	=	706 min
Time interval	=	1 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	1 - Infiltration Basin Drainage	Max. Elevation	=	983.02 ft
Reservoir name	=	Infiltration Basin	Max. Storage	=	10,383 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



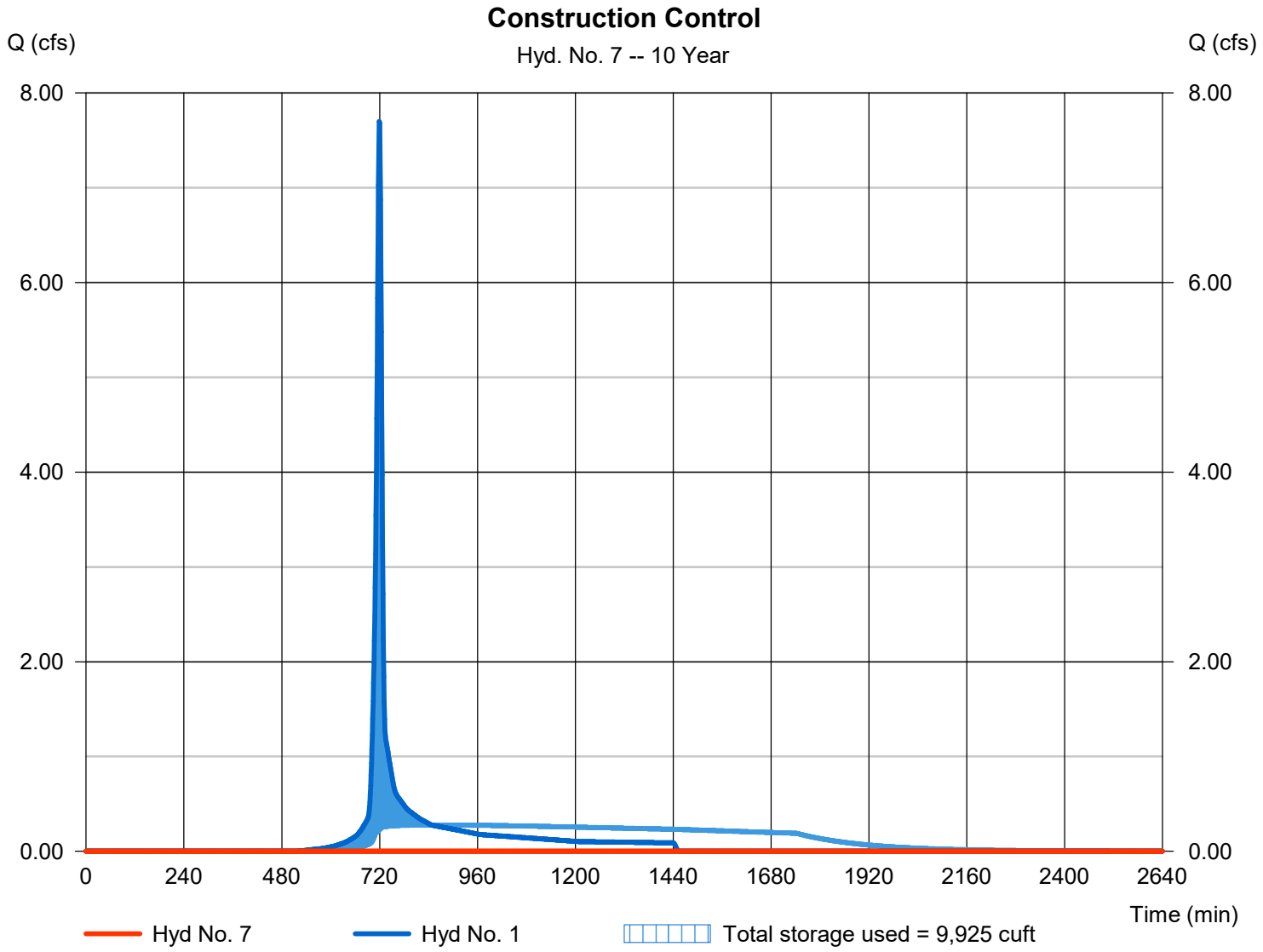
Hydrograph Report

Hyd. No. 7

Construction Control

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	10 yrs	Time to peak	=	1818 min
Time interval	=	1 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	1 - Infiltration Basin Drainage	Max. Elevation	=	983.60 ft
Reservoir name	=	Sediment Basin	Max. Storage	=	9,925 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	10.56	1	719	23,971	------	------	------	Infiltration Basin Drainage
3	Reservoir	0.000	1	679	0	1	983.81	14,999	Basin Release
7	Reservoir	0.000	1	684	0	1	984.28	14,441	Construction Control

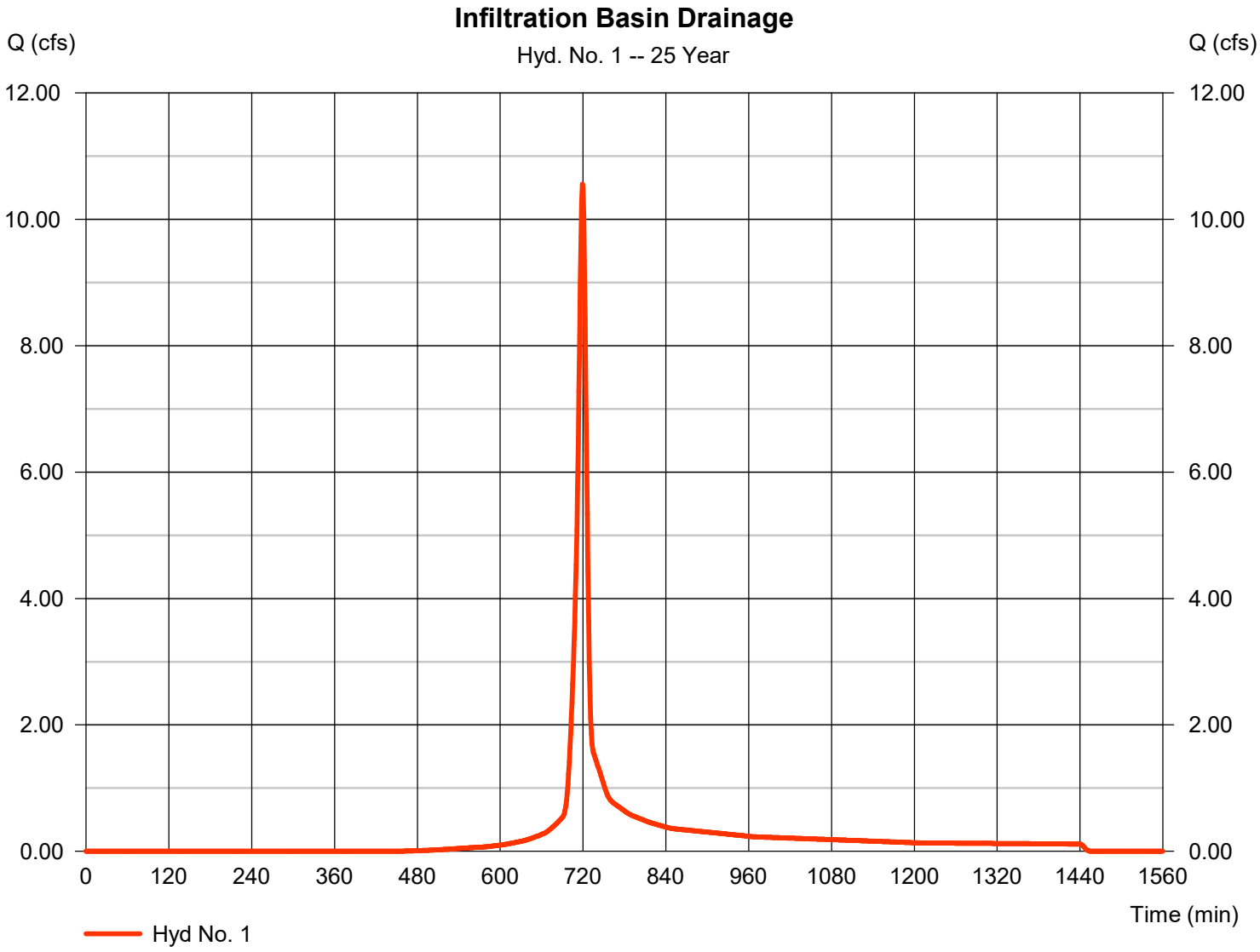
Hydrograph Report

Hyd. No. 1

Infiltration Basin Drainage

Hydrograph type	=	SCS Runoff	Peak discharge	=	10.56 cfs
Storm frequency	=	25 yrs	Time to peak	=	719 min
Time interval	=	1 min	Hyd. volume	=	23,971 cuft
Drainage area	=	2.730 ac	Curve number	=	81*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	4.35 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.800 x 39) + (1.930 x 98)] / 2.730



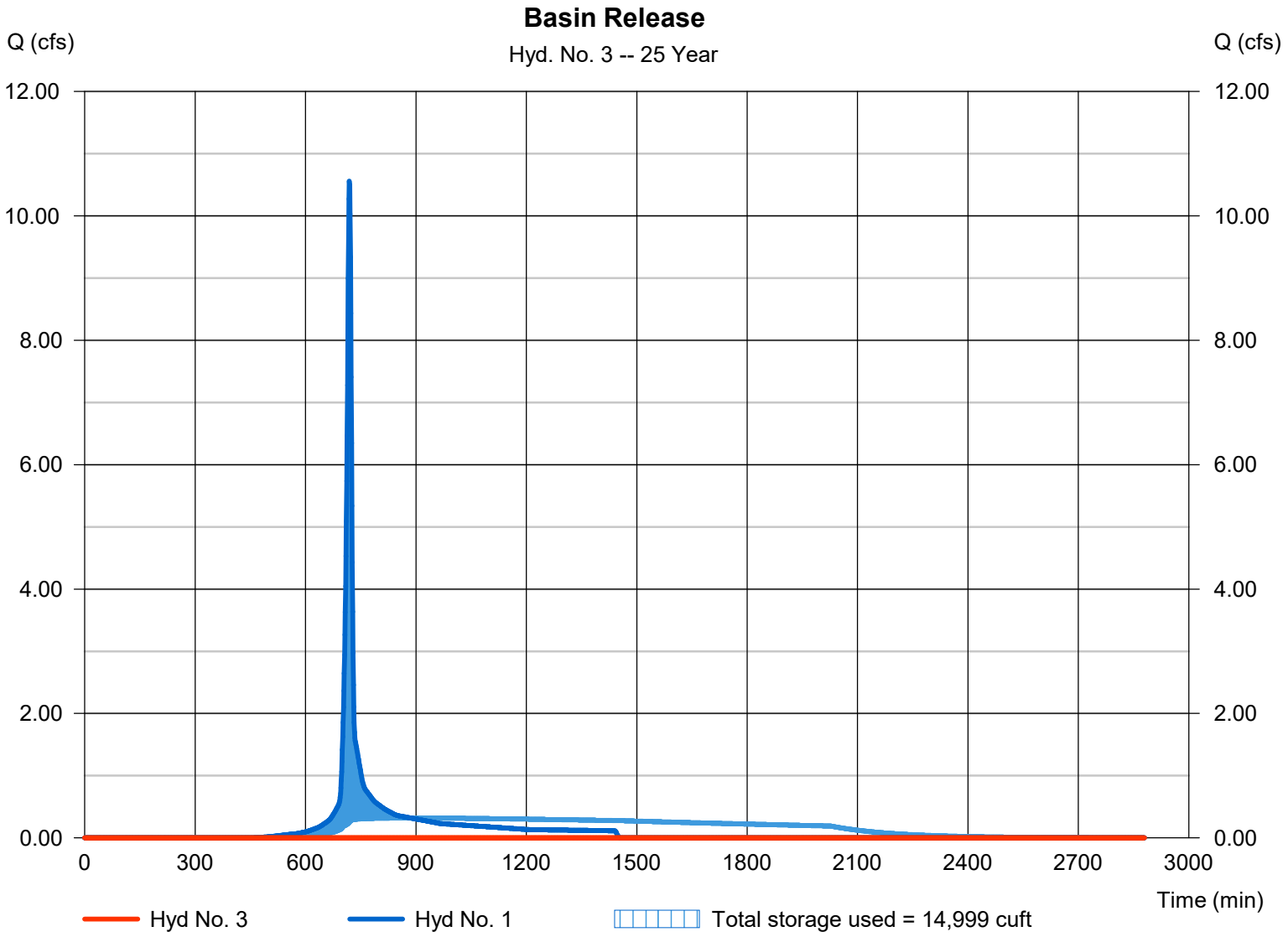
Hydrograph Report

Hyd. No. 3

Basin Release

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	25 yrs	Time to peak	=	679 min
Time interval	=	1 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	1 - Infiltration Basin Drainage	Max. Elevation	=	983.81 ft
Reservoir name	=	Infiltration Basin	Max. Storage	=	14,999 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



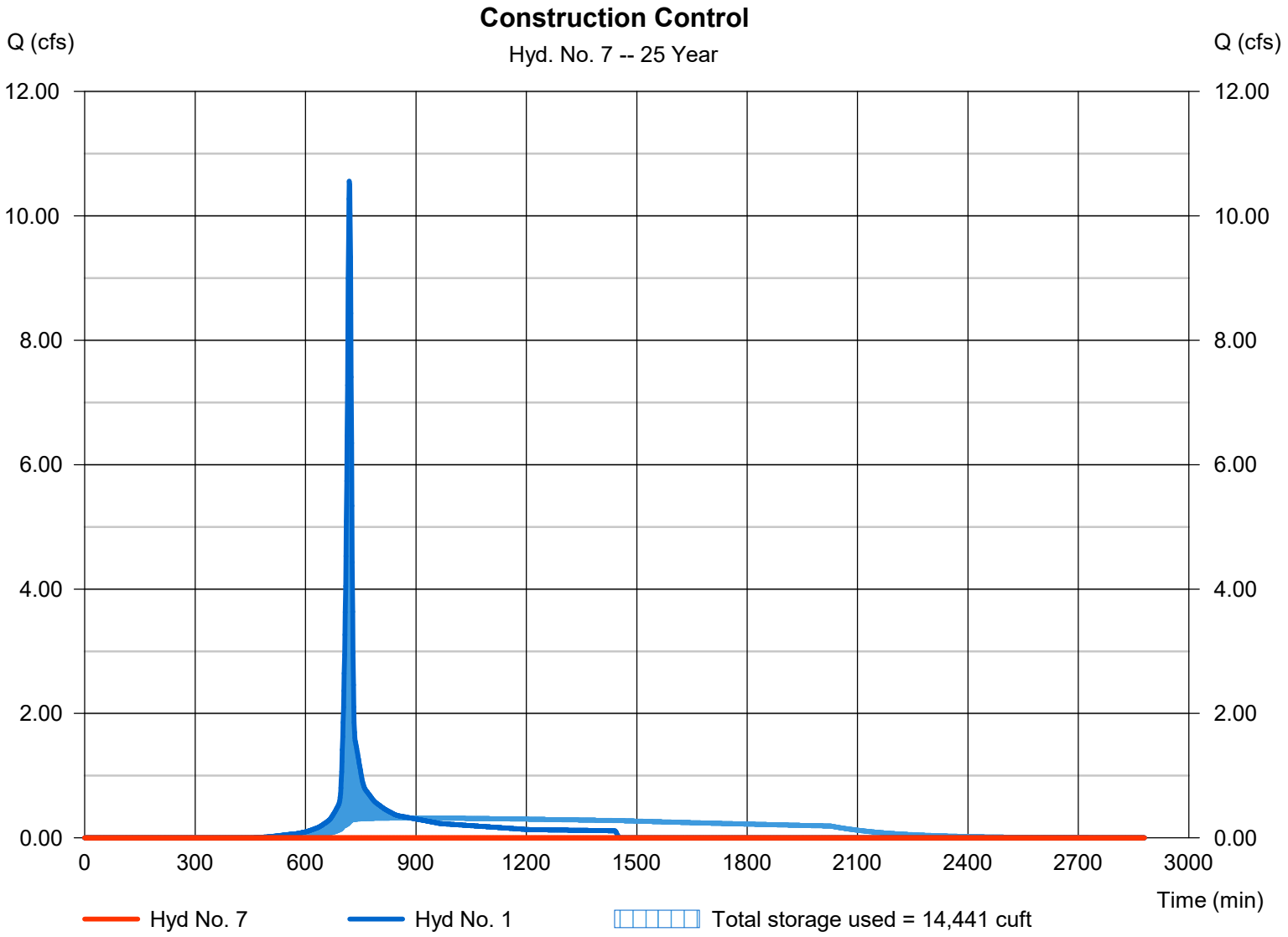
Hydrograph Report

Hyd. No. 7

Construction Control

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	25 yrs	Time to peak	=	684 min
Time interval	=	1 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	1 - Infiltration Basin Drainage	Max. Elevation	=	984.28 ft
Reservoir name	=	Sediment Basin	Max. Storage	=	14,441 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	13.04	1	719	29,759	------	------	------	Infiltration Basin Drainage
3	Reservoir	0.000	1	794	0	1	984.42	19,135	Basin Release
7	Reservoir	0.000	1	664	0	1	984.85	18,497	Construction Control

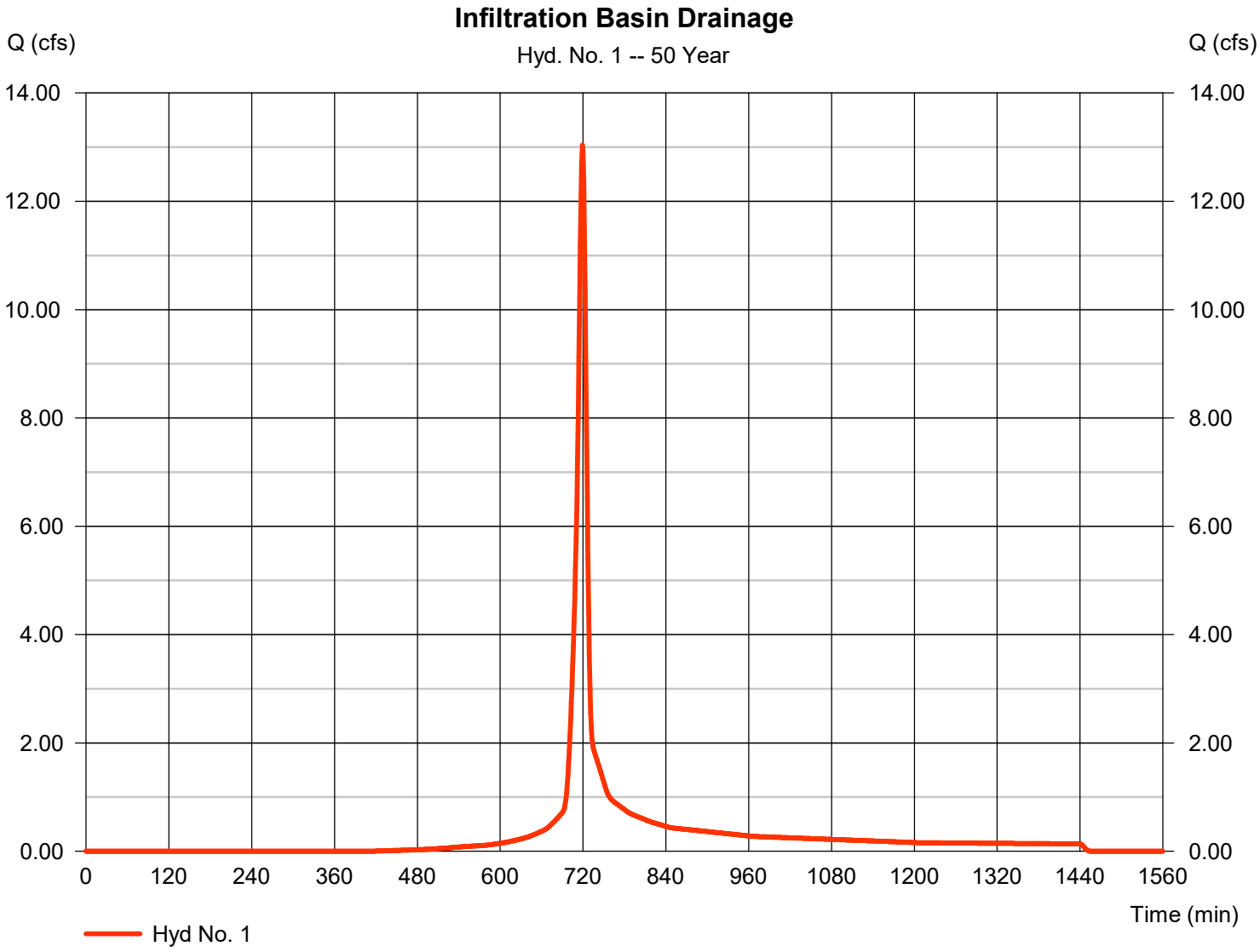
Hydrograph Report

Hyd. No. 1

Infiltration Basin Drainage

Hydrograph type	=	SCS Runoff	Peak discharge	=	13.04 cfs
Storm frequency	=	50 yrs	Time to peak	=	719 min
Time interval	=	1 min	Hyd. volume	=	29,759 cuft
Drainage area	=	2.730 ac	Curve number	=	81*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	5.02 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.800 x 39) + (1.930 x 98)] / 2.730



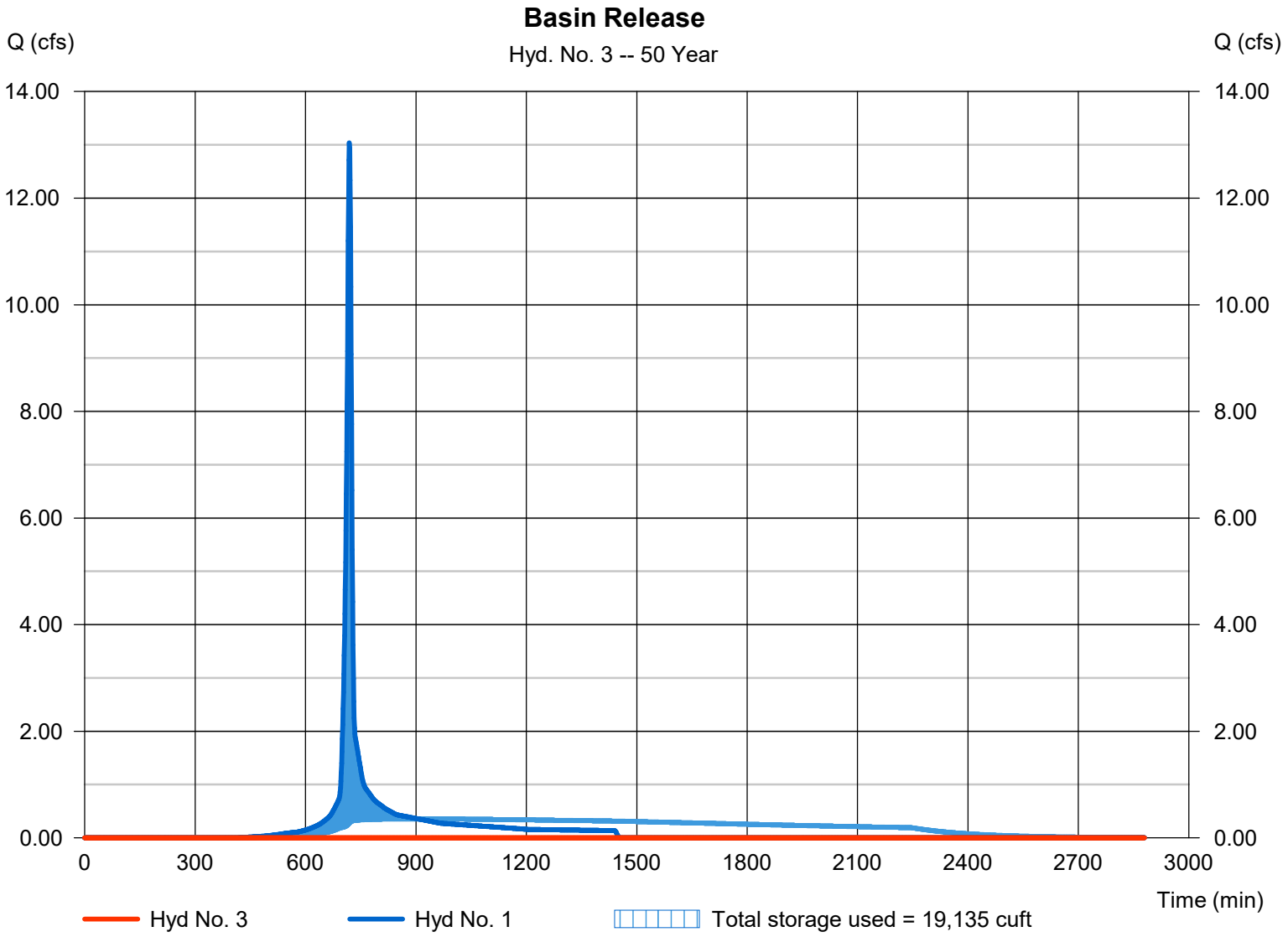
Hydrograph Report

Hyd. No. 3

Basin Release

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	50 yrs	Time to peak	=	794 min
Time interval	=	1 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	1 - Infiltration Basin Drainage	Max. Elevation	=	984.42 ft
Reservoir name	=	Infiltration Basin	Max. Storage	=	19,135 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



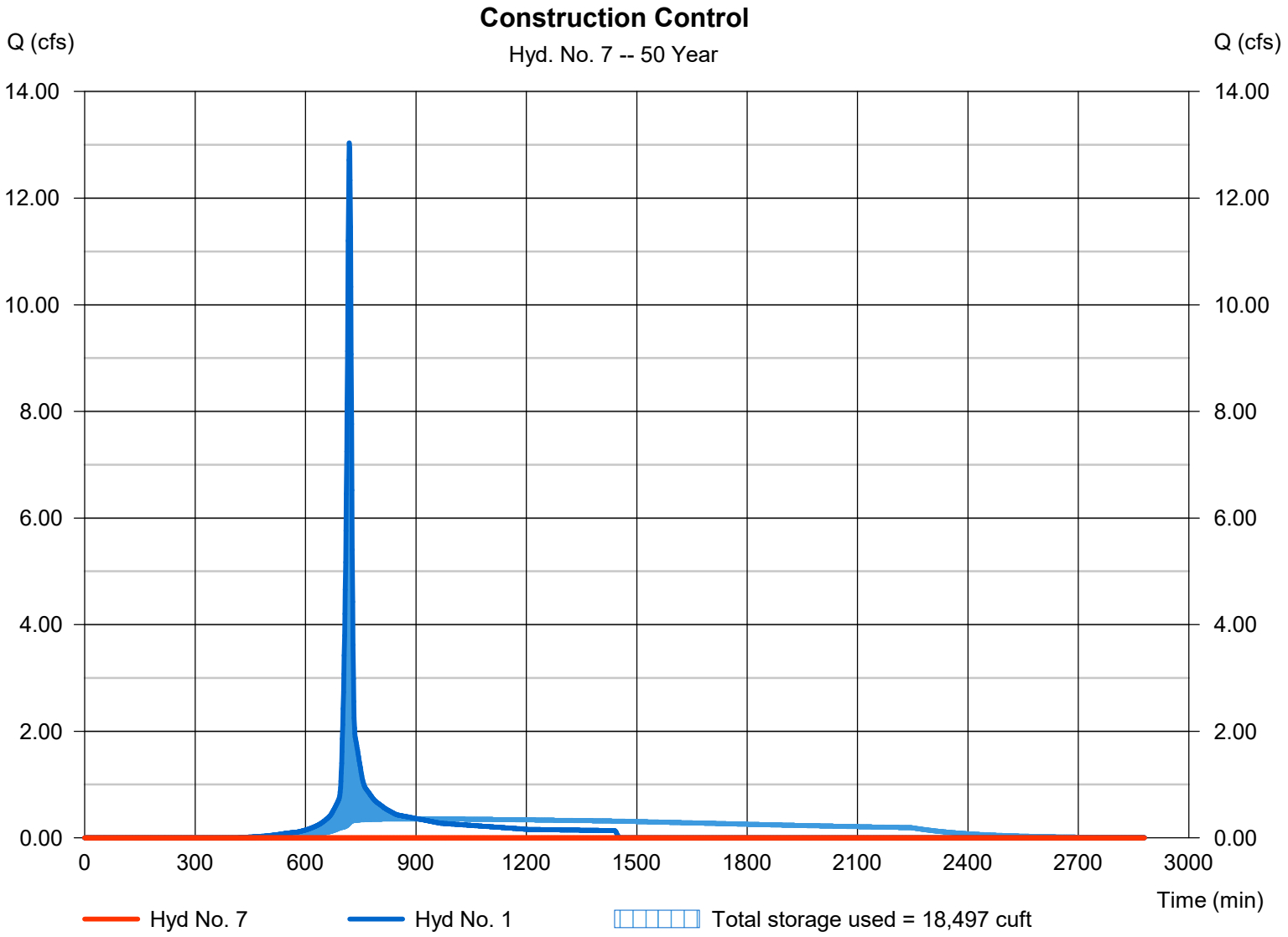
Hydrograph Report

Hyd. No. 7

Construction Control

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	50 yrs	Time to peak	=	664 min
Time interval	=	1 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	1 - Infiltration Basin Drainage	Max. Elevation	=	984.85 ft
Reservoir name	=	Sediment Basin	Max. Storage	=	18,497 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	15.84	1	719	36,416	------	------	------	Infiltration Basin Drainage
3	Reservoir	0.000	1	833	0	1	985.08	23,945	Basin Release
7	Reservoir	0.000	1	629	0	1	985.42	23,236	Construction Control

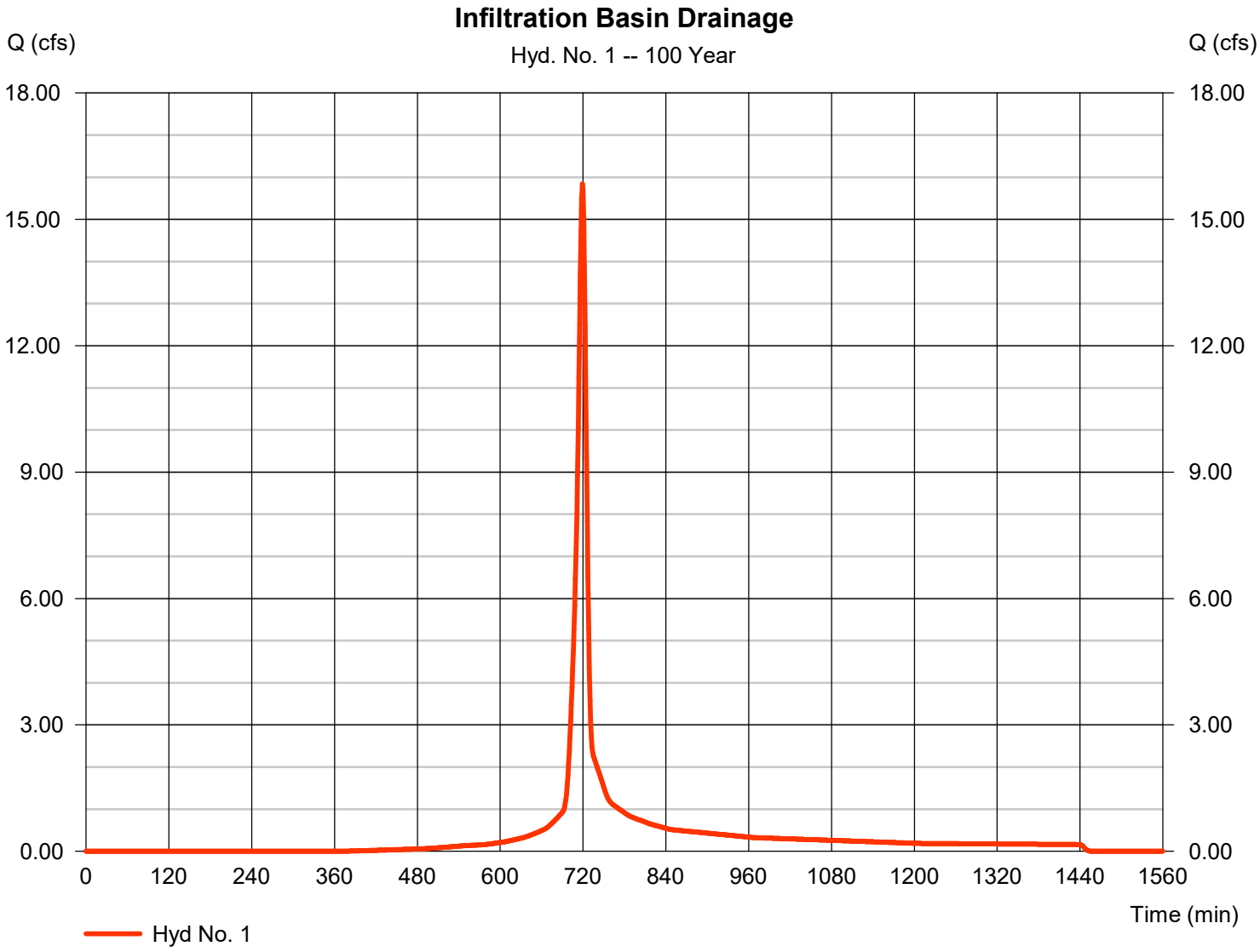
Hydrograph Report

Hyd. No. 1

Infiltration Basin Drainage

Hydrograph type	=	SCS Runoff	Peak discharge	=	15.84 cfs
Storm frequency	=	100 yrs	Time to peak	=	719 min
Time interval	=	1 min	Hyd. volume	=	36,416 cuft
Drainage area	=	2.730 ac	Curve number	=	81*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	5.77 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.800 x 39) + (1.930 x 98)] / 2.730



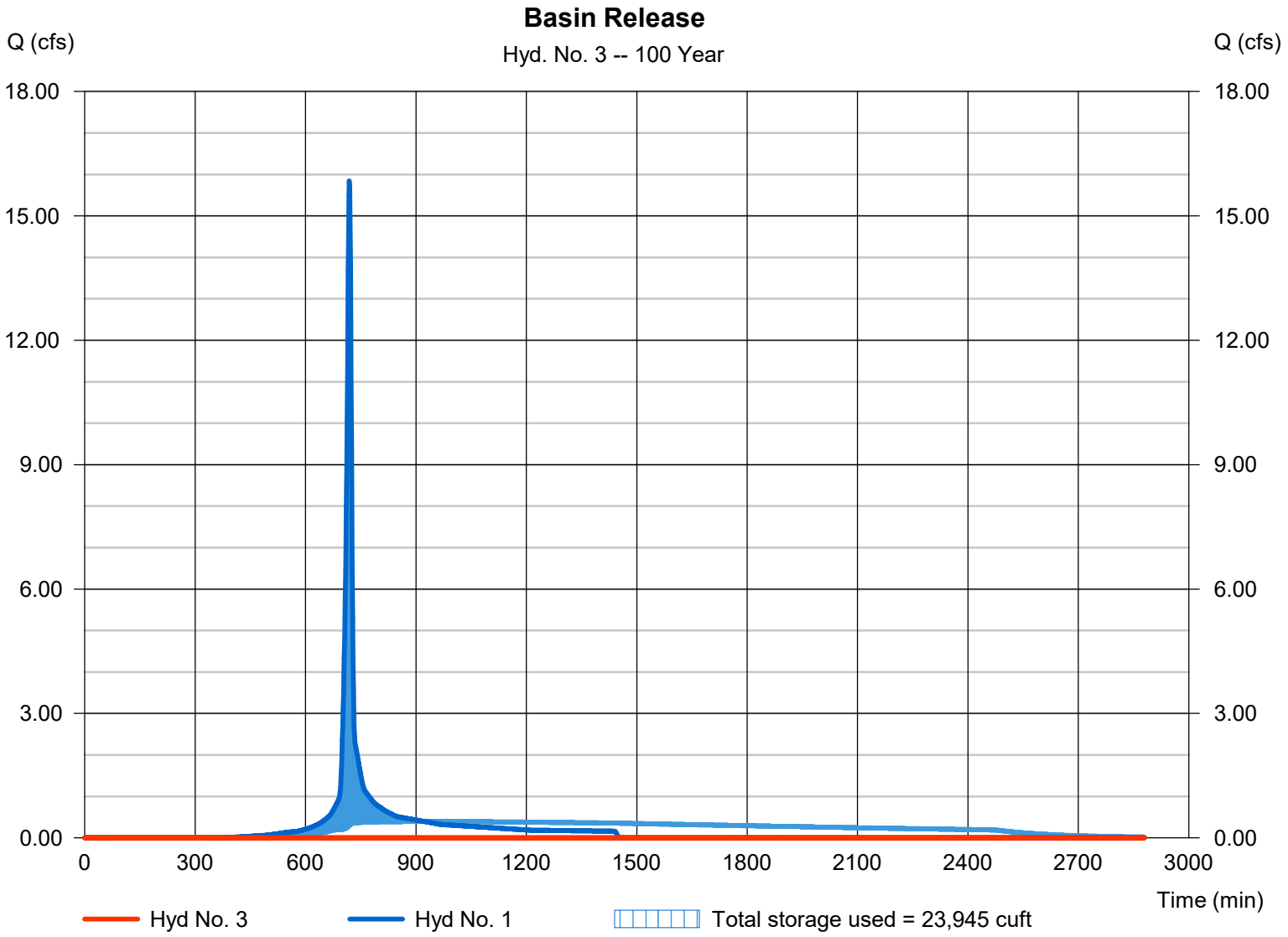
Hydrograph Report

Hyd. No. 3

Basin Release

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	100 yrs	Time to peak	=	833 min
Time interval	=	1 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	1 - Infiltration Basin Drainage	Max. Elevation	=	985.08 ft
Reservoir name	=	Infiltration Basin	Max. Storage	=	23,945 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



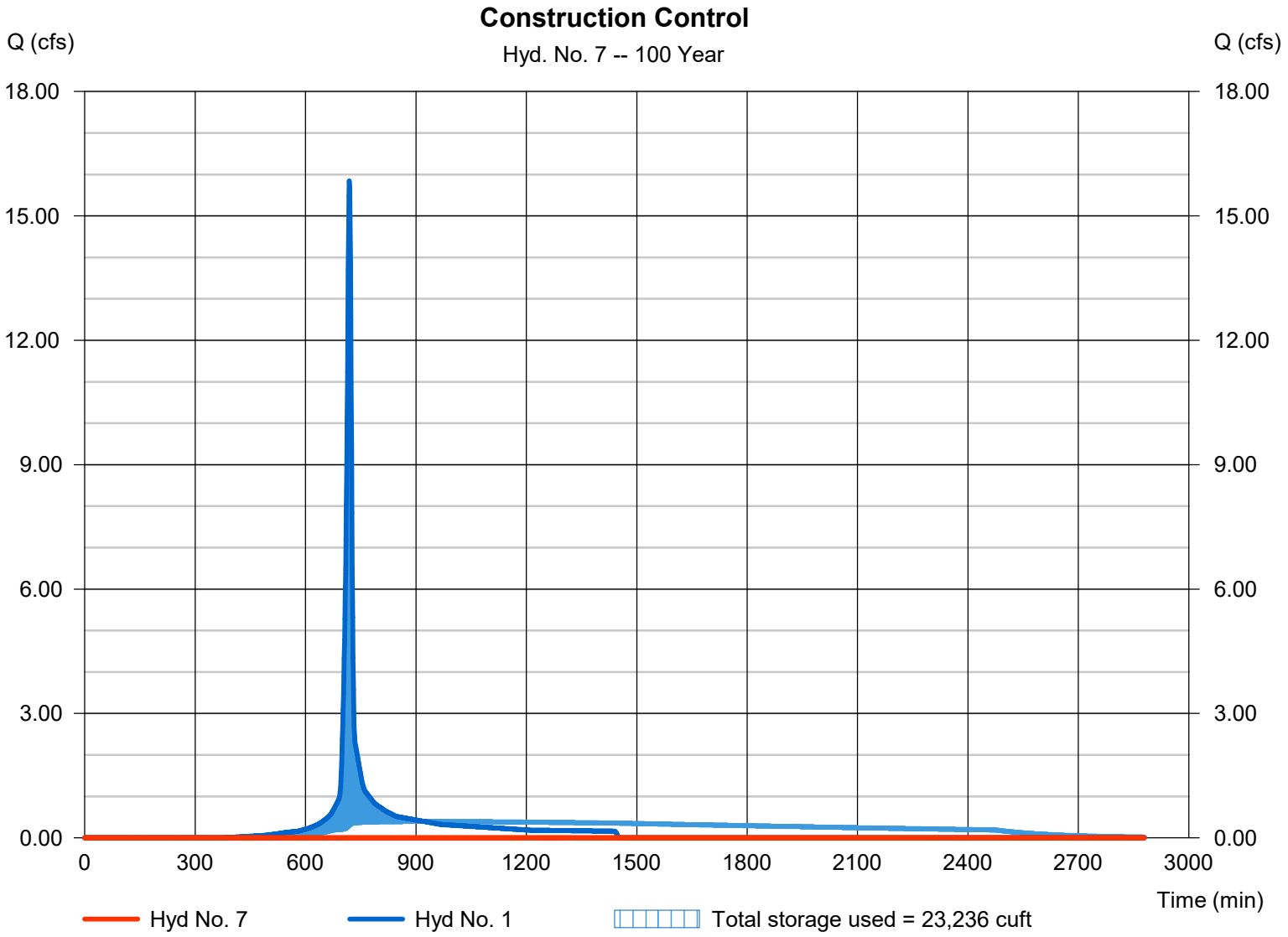
Hydrograph Report

Hyd. No. 7

Construction Control

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	100 yrs	Time to peak	=	629 min
Time interval	=	1 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	1 - Infiltration Basin Drainage	Max. Elevation	=	985.42 ft
Reservoir name	=	Sediment Basin	Max. Storage	=	23,236 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	42.4733	10.0000	0.8838	--------
2	48.9583	10.0000	0.8710	--------
3	0.0000	0.0000	0.0000	--------
5	49.6431	9.2000	0.8212	--------
10	47.0256	8.2000	0.7754	--------
25	46.2874	7.4000	0.7334	--------
50	42.7031	6.3000	0.6894	--------
100	40.8270	5.5000	0.6557	--------

File name: Sheetz Massillon Intensity.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	3.88	3.01	2.47	2.10	1.83	1.63	1.47	1.34	1.23	1.14	1.06	0.99
2	4.63	3.60	2.97	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	5.62	4.38	3.63	3.11	2.73	2.44	2.21	2.02	1.87	1.74	1.63	1.53
10	6.36	4.96	4.11	3.53	3.11	2.79	2.54	2.33	2.16	2.01	1.89	1.78
25	7.30	5.70	4.73	4.08	3.61	3.25	2.96	2.73	2.54	2.37	2.23	2.11
50	8.03	6.23	5.18	4.48	3.98	3.59	3.28	3.04	2.83	2.65	2.50	2.37
100	8.74	6.77	5.63	4.88	4.34	3.93	3.60	3.34	3.12	2.93	2.77	2.63

Tc = time in minutes. Values may exceed 60.

Precip. file name: O:\2020\2020117\09_Massillon\working files\C\swm\Sheetz Massillon Depth.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	2.03	2.44	0.00	3.04	3.56	4.35	5.02	5.77
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

INSPECTION REPORT
SHEETZ MASSILLON

Date of Inspection: _____

Inspector

Name: _____

Title: _____

Qualifications: _____

Weather

Temperature (°F) _____

Description (check all that apply):

Sunny	Yes	No
Overcast	Yes	No
Rainy	Yes	No
Windy	Yes	No
Snowy	Yes	No
Other		

Discharges

Any discharges occuring at the time of inspection? (circle one) Yes No

List location of discharges of sediment or other pollutants from the site.

Location(s)

_____

_____

_____

_____

_____

Best Management Practices (BMPs) on Site - Infiltration Basin (located at southeast corner of property)

Which BMPs are required to be maintained (excessive debris, clogged outlet, etc.).

_____ Infiltration Basin (located at southeast corner of property)

Which BMPs location(s) fail to operate as designed or proved inadequate.

_____ Infiltration Basin (located at southeast corner of property)

Location(s) where additional BMPs are needed that did not exist at the time of inspection.

_____

_____

List of corrective action required including any changes to the SWP3 necessary and implementation dates

Action	Date
(1)	
(2)	
(3)	
(4)	

_____

Signature of Inspector

Note: All inspection reports shall remain on site and filed for records.