AMERICAN Engineering

STORMWATER IMPACT ANALYSIS REPORT

THE PRESERVE AT MOODY FARM

ROLESVILLE, NC

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PRELIMINARY NOT FOR CONSTRUCTION

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REPORT

I. SITE HISTORY

The existing parcel use is agricultural. It is located at the intersection of Rolesville Road and Amazon Trail. The property is divided into two (2) tax parcels, totaling 51.78 acres, consisting of PIN: 1767-28-4304 and 1767-28-4925. The parcel is bordered by agricultural fields to the north, south, and west, with a new subdivision being built directly across the property to the east. An existing stream with surrounding wetlands spans the length of the property from east to west, with a portion of the wetlands also on the southern half of the property. All existing ponds but the one in the far northwest part of the project are to be breached in a separate operation. There is no FEMA flood plain on this site.

The soil on site predominately consists of Rawlings-Rion (RgB), Wedowee-Saw (Wfb), Chewacla and Wehadkee soils (ChA), and Altavista fine sandy loam (AaA) according to the US Department of Agriculture (USDA) NRCS soil report. More detailed soil information can be found in the project Geotechnical Report (see separate document uploaded with project submission).

The existing site is relatively hilly, with high points on the southern border and southeast portion of the site, directing the site drainage towards the wetlands in the middle of the site and discharging to the west. The contours on the site range from 335' to 385' above mean sea level.

II. PROJECT DESCRIPTION

The Preserve at Moody Farm project is predominately surrounded on the north, west and south side by another development in progress known as Kalas Falls. A few small tracts at the northeast side of this project are not part of this project. There is a parcel in the middle of the project which will be referred to as the Moody Homestead. The Moody Homestead is not part of this project, however, the parcel drains onto the Moody Farm project and will be considered in the drainage calculations. The eastern boundary of this project is Rolesville Road which is currently undergoing road improvements to accommodate development in the area.

The project drains to Harris Creek which is part of the Neuse River basin. It is approximately one mile northwest of the intersection of Mitchell Mill Road and Rolesville Road in Wake County, North Carolina. The area of the project is 48.28 acres which does not include the Moody Homestead but does include the existing cemetery between lot #3 and #4. The project at final build out will include 82 single-family homes.

III. STORMWATER CONVEYANCE

Pipe Network

The stormwater conveyance on site is split into seven (7) networks, five (5) of which are designated respective wet ponds, one (1) for bypasses, and one (1) for culvert crossings. Stormwater pipe material is proposed to be reinforced concrete pipe (RCP) within the rights-of-way. RCP pipes on site range from 15" to 54" in diameter. Proposed public easements to allow for future access and maintenance of each SCM and infrastructure can be seen in the

Construction Drawings (CD) Plan set.

Modeling was performed in *Autodesk Hydrograph Storm Sewers* for the 10 and 25-year storm events, see Appendix C. The 10-year modeling ensured hydraulic grade lines (HGL) were maintained within the pipe networks, see Appendix C: Attachment 12. The 25-year modeling ensured HGL's were maintained within the structures, see Appendix C: Attachment 13. To accomplish modeling, inlet areas were delineated for each structure that is to accept overland flow, see Appendix B: Attachment 3. A uniform rational C-value of 0.57 was determined by implementing the post-development impervious area being conveyed to SCM's and the post-development total area being conveyed to SCM's, see Appendix C: Attachment 1. A uniform time of concentration of 10 minutes was used during modeling.

Energy Dissipation

Riprap dissipater pads have been sized for pipe outlets following NCDOT charts and methodology to reduce sediment erosion in areas where water is discharging to the surface, see Appendix C: Attachment 2. Flared-end sections or headwalls are proposed at the outlets of each system entering/exiting SCM's or proposed ditches. Either class "B" or class "1" riprap is proposed at each of these outlets, determined by pipe size and exit velocity.

Inlet Spreads

Spreads were determined on site using a storm intensity of 4 in/hr, see Appendix C: Attachment 10. The method by Limited Area was used to calculate spread sizes and determine the max drainage area per structure based off several variables including road width, longitudinal slope, cross slope, and curb and gutter profile by implementing Manning's Equation. If the max drainage area exceeded the actual drainage area, then a double inlet was implemented in design. Max spreads for this project could not exceed 7.5-feet (5.5-foot half lane + 2-foot gutter).

Permanent Ditches

Permanent diversion ditches are implemented on site to channelize flow to SCM's and divert stormwater around SCM's in specific areas (bypass). Modeling was performed in the *Hydraflow Express Extension* of Autodesk to ensure velocities of less than 10 fps were achieved, see table below. Modeling also ensured that the ditches were adequately sized so that storm water would not over top the ditch during the 10-year storm event, see Appendix B: Attachment 4 and Appendix C: Attachment 9. The contractor should ensure these ditches are stabilized immediately following grading operations to minimize sediment loss on site. See permanent ditch schedule in the CD Plan set.

Ditch Label	V_{10} (fps)
Ditch #1	5.32
Ditch #2	5.55
Ditch #3	4.76
Ditch #4	1.16
Ditch #5	4.07
Ditch #6	4.42
Ditch #7	4.34
Ditch #8	4.63
Ditch #9	7.07

Table 1: *Calculated Velocities for Ditches*

Culvert Crossings

There are two (2) culvert crossings within the Moody project, see Appendix B: Attachment 5. One culvert is to be a 36” RCP pipe that will convey stormwater runoff underneath Mulberry Tree Drive. This 36” culvert conveys stormwater received from the northeast existing pond on site and the drainage area upstream. The second culvert crossing will consist of two (2) 54” RCP pipes that will convey water underneath Tansley Crest Loop. These 54” culverts convey stormwater received from Moody SCM’s #1, #2, #3, onsite bypass, Kalas Falls Phase 2 (POI #7), and the Mulberry culvert upstream. All culverts pipes are to be buried to a depth of 20% of the pipe diameter to meet environmental engineering requirements.

Autodesk Hydraflow Hydrograph Extension was used to determine the peaks flows for the 10-year, 25-year, and 100-year storm events for each culvert, see Table 2: *Culvert Peak Flows*. This modeling can be seen in Appendix C. *Autodesk Hydraflow Express Extension* was used to model each culvert, by implementing peaks flows obtained from *Hydrographs*, ensuring that the 10-year hydraulic grade line remained in the pipe and the 100-year storm event does not over top the roadway, see Appendix C: Attachments 4-6. Due to the *Hydraflow Express Extension* not being capable of factoring in the loss of hydraulic capacity with a portion of the culvert pipe being buried, additional hydraulic calculations were performed to ensure culverts are sized adequately, see Appendix C: *Attachment 7*.

Culvert Label	Q_{10} (cfs)	Q_{25} (cfs)	Q_{100} (cfs)
Mulberry Culvert: 36”	24.42	33.20	47.93
Tansley Culvert: Dbl 54”	135.24	194.15	312.87

Table 2: *Culvert Peak Flows*

IV. STORMWATER CONTROL MEASURE

Quantity Control

The primary SCM’s proposed on site to detain, treat, and attenuate storm-events are wet ponds. The wet ponds have been designed following the *North Carolina Department of Environmental Quality (NCDEQ) Stormwater Manual* (C-3), see Appendix D: Attachment 3. Each pond is to first be used as a sediment basin, later to be converted to a fully functioning wet pond (per design and sequencing) following installation of stormwater infrastructure and site stabilization.

Each wet pond was designed with a partially submerged vegetative shelf and their specific design elevations, control structures, and geometry can be seen in the Construction Drawing Plan Set, sheets C8.0 through C8.4. Each pond has a control structure that is designed to attenuate the 1-year 24-hour storm event less than or equal to the pre-development peak flow, see Appendix D: Attachment 5. Each emergency spillway has been designed to an elevation that will not be utilized (overtopped) during a 10-year storm event. Each wet pond is designed so that one- foot of freeboard is available during the 100-year storm event.

The SCS Method was implemented to determine curve numbers (CN) per point of discharge (POD). To do so, hydrologic soil group (HSG) data was uploaded from the USDA for determining CN calculations in each POD exhibit, see Appendix B: Attachment 1 & 2 and Appendix D: Attachment 3. During calculations, if a HSG had two values (E.g. A/D), the more conservative CN value was selected for that area (E.g. D group). Calculations were performed following the

NCDEQ design manual (Section B). In doing so, a composite CN value was determined for each POD area. These POD areas and composite CN values were entered into the *Autodesk Hydraflow Hydrograph Extension* to allow for each wet pond to be modeled for desired storm events, see Appendix D: Attachment 4-7.

For modeling purposes, the site had two notable points of discharges. In the post-development scenario, POD #2 was split into five (5) smaller points of discharge areas and the cumulative flow is represented in Table 4: *Post-Development Peak Flow* (see below).

The pre-development calculated peak flow from each POD area combined for a respective storm event can be seen below in Table 3: *Pre-Development Peak Flow.*

Q_1 (cfs)	Q_{10} (cfs)	Q_{100} (cfs)
56.68	163.83	310.97

Table 3: *Pre-Development POD flows*

The post-development calculated peak flow from each POD area combined for a respective storm event can be seen below in Table 4: *Post-Development Peak Flow.*

Q_1 (cfs)	Q_{10} (cfs)	Q_{100} (cfs)
38.14	163.19	367.29

Table 4: *Post-Development Peak Flow*

As seen in the tables above, the 1-year and 10-year storm event peak flows are lower in the post-development. Due to the 100-year storm hydraulic grade lines being within SCM emergency spillways, post-development peak flows surpass pre-development peak flows during the 100-year storm event.

<u>Quality Control</u>
Nutrient reduction was quantified on site by implementing the *North Carolina Department of Environmental Quality SNAP Tool*, see Appendix D: Attachment 1. Due to the site being within the Neuse River Basin, maintaining a total nitrogen (TN) load rate equal to or lower than 3.60 lb/ac/yr is required. If the TN load rate for the project is between 3.60 lb/ac/yr 6.00 lb/ac/yr buydown is required and an acceptable alternative to providing additional SCM treatment. The *SNAP Tool* calculated the project has a nitrogen export rate of 2.87 lb/ac/yr and no offset payment is required to a private nutrient bank.

V. METHODOLOGY

The stormwater design calculations are conducted using the following methods:

- Precipitation intensity and depths for the site were obtained from https://hdsc.nws.noaa.gov/pfds/pfds_map_cont.html?bkmrk=nc.
- Rational method was used to determined Q-values for inlet areas.
- The composite runoff coefficients (C-Value) were computed using the C-values from NCDEQ Stormwater Design Manual and are included in Appendix C: Attachments 1.
- SCS method was used to determine Q-values for drainage areas (POD's)
- The curve numbers (CN) were computed using the CN -values from NCDEQ Stormwater

Design Manual and are included in Appendix D: Attachment 3.

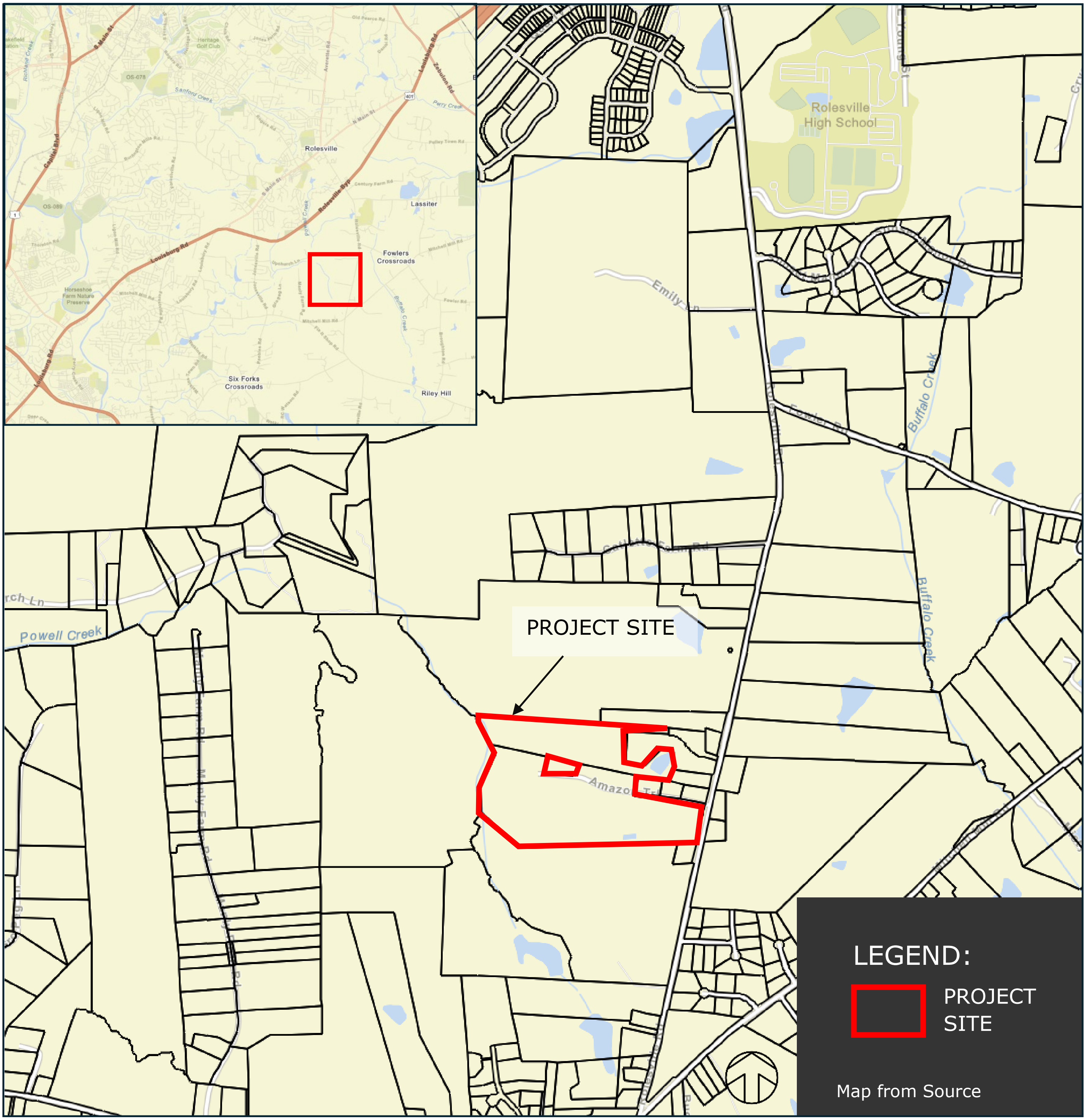
- Time of concentration (Tc) was calculated using the Kirpich method where applicable. A minimum Tc of 10-minutes was used for stormwater conveyance calculations.
- For culvert modeling, TR-55 method was used to determine time of concentraions (Tc).
- *Autodesk Hydraflow Hydrograph Extension* program was used to model wet ponds and determine peak flows at culverts.
- *Autodesk Hydrograph Storm Sewers Extension* program was used to model storm pipes.
- *Autodesk Hydraflow Express Extension* program was used to model ditches and culverts.
- Riprap sizing for erosion and sediment control was determined using NCDOT standard detail #876.02 “*Guide for Rip Rap at Pipe Outlets*”.
- Nutrient reduction was quantified by implementing the *NCDEQ SNAP Tool*.

VI. CONCLUSION

It is our professional opinion that the proposed stormwater design on site meets the requirements of the *NCDEQ Stormwater Manual* and the Wake County Stormwater Rules and Regulations.

APPENDIX A

PROJECT MAPS & DATA



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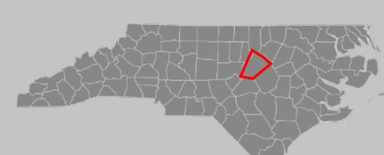
VICINITY MAP

THE PRESERVE AT MOODY FARM

WAKE COUNTY



United States Department of Agriculture

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Wake County, North Carolina

November 19, 2024

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:3,970 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 50, 100, 200, 300

Feet: 0, 150, 300, 600, 900

N

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 Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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: Wake County, North Carolina
Survey Area Data: Version 26, Sep 9, 2024

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

Date(s) aerial images were photographed: Apr 24, 2022—May 9, 2022

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AaA	Altavista fine sandy loam, 0 to 4 percent slopes, rarely flooded	4.5	8.5%
ChA	Chewacla and Wehadkee soils, 0 to 2 percent slopes, frequently flooded	4.5	8.6%
HeB	Helena sandy loam, 2 to 6 percent slopes	6.3	12.0%
RgB	Rawlings-Rion complex, 2 to 6 percent slopes	14.3	27.2%
RgC	Rawlings-Rion complex, 6 to 10 percent slopes	4.2	7.9%
RgD	Rawlings-Rion complex, 10 to 15 percent slopes	11.8	22.4%
W	Water	0.4	0.7%
WfB	Wedowee-Saw complex, 2 to 6 percent slopes	6.7	12.8%
Totals for Area of Interest		**52.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Wake County, North Carolina

AaA—Altavista fine sandy loam, 0 to 4 percent slopes, rarely flooded

Map Unit Setting

National map unit symbol: 2xh95
Elevation: 70 to 560 feet
Mean annual precipitation: 39 to 47 inches
Mean annual air temperature: 55 to 63 degrees F
Frost-free period: 200 to 250 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Altavista, rarely flooded, and similar soils: 95 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Altavista, Rarely Flooded

Setting

Landform: Stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Old loamy alluvium derived from igneous and metamorphic rock

Typical profile

Ap - 0 to 8 inches: fine sandy loam
E - 8 to 12 inches: fine sandy loam
BE - 12 to 15 inches: sandy clay loam
Bt - 15 to 35 inches: clay loam
BC - 35 to 42 inches: sandy loam
C - 42 to 80 inches: coarse sandy loam

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: Rare
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F136XY660NC - High terraces, very rare inundation
Hydric soil rating: No

Minor Components

Roanoke, occasionally flooded, undrained

Percent of map unit: 2 percent
Landform: Stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

ChA—Chewacla and Wehadkee soils, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2qwpj
Elevation: 70 to 560 feet
Mean annual precipitation: 39 to 47 inches
Mean annual air temperature: 55 to 63 degrees F
Frost-free period: 200 to 250 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Chewacla, frequently flooded, and similar soils: 50 percent
Wehadkee, frequently flooded, and similar soils: 45 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chewacla, Frequently Flooded

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy alluvium derived from igneous and metamorphic rock

Typical profile

A - 0 to 4 inches: loam
Bw1 - 4 to 26 inches: silty clay loam
Bw2 - 26 to 38 inches: loam
Bw3 - 38 to 60 inches: clay loam
C - 60 to 80 inches: loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.1 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Ecological site: F136XY610GA - Flood plain forest, wet
Hydric soil rating: No

Description of Wehadkee, Frequently Flooded

Setting
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy alluvium derived from igneous and metamorphic rock

Typical profile
A - 0 to 7 inches: silt loam
Bg - 7 to 49 inches: clay loam
Cg - 49 to 80 inches: clay loam

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.8 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: B/D
Ecological site: F136XY600NC - Flood plain forest, very wet
Hydric soil rating: Yes

HeB—Helena sandy loam, 2 to 6 percent slopes

Map Unit Setting
National map unit symbol: 2qqgq

Elevation: 70 to 560 feet
Mean annual precipitation: 39 to 47 inches
Mean annual air temperature: 55 to 63 degrees F
Frost-free period: 200 to 250 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Helena and similar soils: 92 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Helena

Setting
Landform: Interfluves
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from granite and gneiss

Typical profile
Ap - 0 to 12 inches: sandy loam
BE - 12 to 19 inches: sandy clay loam
Bt1 - 19 to 39 inches: clay
Bt2 - 39 to 43 inches: clay loam
BCg - 43 to 46 inches: clay loam
C - 46 to 80 inches: sandy loam

Properties and qualities
Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: D
Ecological site: F136XY810SC - Acidic upland forest, seasonally wet
Hydric soil rating: No

RgB—Rawlings-Rion complex, 2 to 6 percent slopes

Map Unit Setting
National map unit symbol: 2xhb9
Elevation: 70 to 560 feet
Mean annual precipitation: 39 to 47 inches

Mean annual air temperature: 55 to 63 degrees F
Frost-free period: 200 to 250 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Rawlings and similar soils: 55 percent
Rion and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rawlings

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from granite

Typical profile

Ap - 0 to 8 inches: sandy loam
Bt - 8 to 20 inches: sandy clay loam
C - 20 to 40 inches: gravelly sandy loam
R - 40 to 80 inches: bedrock

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F136XY830NC - Acidic upland forest, depth restriction, dry-moist
Hydric soil rating: No

Description of Rion

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Saprolite derived from granite and gneiss

Typical profile

Ap - 0 to 8 inches: sandy loam
Bt1 - 8 to 17 inches: sandy clay loam
Bt2 - 17 to 38 inches: sandy loam

C - 38 to 80 inches: sandy loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

RgC—Rawlings-Rion complex, 6 to 10 percent slopes

Map Unit Setting

National map unit symbol: 2xhbb
Elevation: 70 to 560 feet
Mean annual precipitation: 39 to 47 inches
Mean annual air temperature: 55 to 63 degrees F
Frost-free period: 200 to 250 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Rawlings and similar soils: 55 percent
Rion and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rawlings

Setting

Landform: Interfluves
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from granite

Typical profile

Ap - 0 to 8 inches: sandy loam
Bt - 8 to 20 inches: sandy clay loam
C - 20 to 40 inches: gravelly sandy loam
R - 40 to 80 inches: bedrock

Properties and qualities

Slope: 6 to 10 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F136XY830NC - Acidic upland forest, depth restriction, dry-moist
Hydric soil rating: No

Description of Rion

Setting

Landform: Interfluves
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Saprolite derived from granite and gneiss

Typical profile

Ap - 0 to 8 inches: sandy loam
Bt1 - 8 to 17 inches: sandy clay loam
Bt2 - 17 to 38 inches: sandy loam
C - 38 to 80 inches: sandy loam

Properties and qualities

Slope: 6 to 10 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

RgD—Rawlings-Rion complex, 10 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2xhb8
Elevation: 70 to 560 feet
Mean annual precipitation: 39 to 47 inches
Mean annual air temperature: 55 to 63 degrees F
Frost-free period: 200 to 250 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Rawlings and similar soils: 55 percent
Rion and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rawlings

Setting

Landform: Interfluves
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from granite

Typical profile

Ap - 0 to 8 inches: sandy loam
Bt - 8 to 20 inches: sandy clay loam
C - 20 to 40 inches: gravelly sandy loam
R - 40 to 80 inches: bedrock

Properties and qualities

Slope: 10 to 15 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F136XY830NC - Acidic upland forest, depth restriction, dry-moist
Hydric soil rating: No

Description of Rion

Setting

Landform: Interfluves
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Saprolite derived from granite and gneiss

Typical profile

Ap - 0 to 8 inches: sandy loam
Bt1 - 8 to 17 inches: sandy clay loam
Bt2 - 17 to 38 inches: sandy loam
C - 38 to 80 inches: sandy loam

Properties and qualities

Slope: 10 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

W—Water

Map Unit Setting

National map unit symbol: 2qqjv
Elevation: 70 to 450 feet
Mean annual precipitation: 39 to 51 inches
Mean annual air temperature: 55 to 63 degrees F
Frost-free period: 200 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

WfB—Wedowee-Saw complex, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2xn42
Elevation: 70 to 560 feet
Mean annual precipitation: 39 to 47 inches
Mean annual air temperature: 55 to 63 degrees F
Frost-free period: 200 to 250 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Wedowee and similar soils: 60 percent
Saw and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wedowee

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Saprolite residuum weathered from granite and gneiss and/or saprolite residuum weathered from schist

Typical profile

Ap - 0 to 4 inches: sandy loam
E - 4 to 7 inches: sandy loam
BC - 23 to 35 inches: clay loam
C - 35 to 80 inches: sandy clay loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

Description of Saw

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from granite and gneiss

Typical profile

Ap - 0 to 8 inches: sandy loam
Bt - 8 to 20 inches: clay
BC - 20 to 26 inches: sandy clay loam
C - 26 to 29 inches: sandy loam
R - 29 to 80 inches: bedrock

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to 0.01 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F136XY830NC - Acidic upland forest, depth restriction, dry-moist
Hydric soil rating: No

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U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map US Topo

ROLESVILLE QUADRANGLE
NORTH CAROLINA
7.5-MINUTE SERIES

Produced by the United States Geological Survey

North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid:Universal Transverse Mercator, Zone 17S

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery....NAIP, July 2020 - July 2020
Roads....U.S. Census Bureau, 2016
Names....GNIS, 1980 - 2022
Hydrography....National Hydrography Dataset, 2001 - 2021
Contours....National Elevation Dataset, 2008
Boundaries....Multiple sources; see metadata file 2019 - 2021

Wetlands....FWS National Wetlands Inventory Not Available

MN GN
9°23´ 167 MILS
1½° 27 MILS

UTM GRID AND 2019 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000 - m Square ID
QV
Grid Zone Designation 17S

SCALE 1:24 000

KILOMETERS
METERS
MILES
FEET

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard.

NORTH CAROLINA
QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 Grissom
2 Franklinton
3 Louisburg
4 Wake Forest
5 Bunn West
6 Raleigh East
7 Knightdale
8 Zebulon

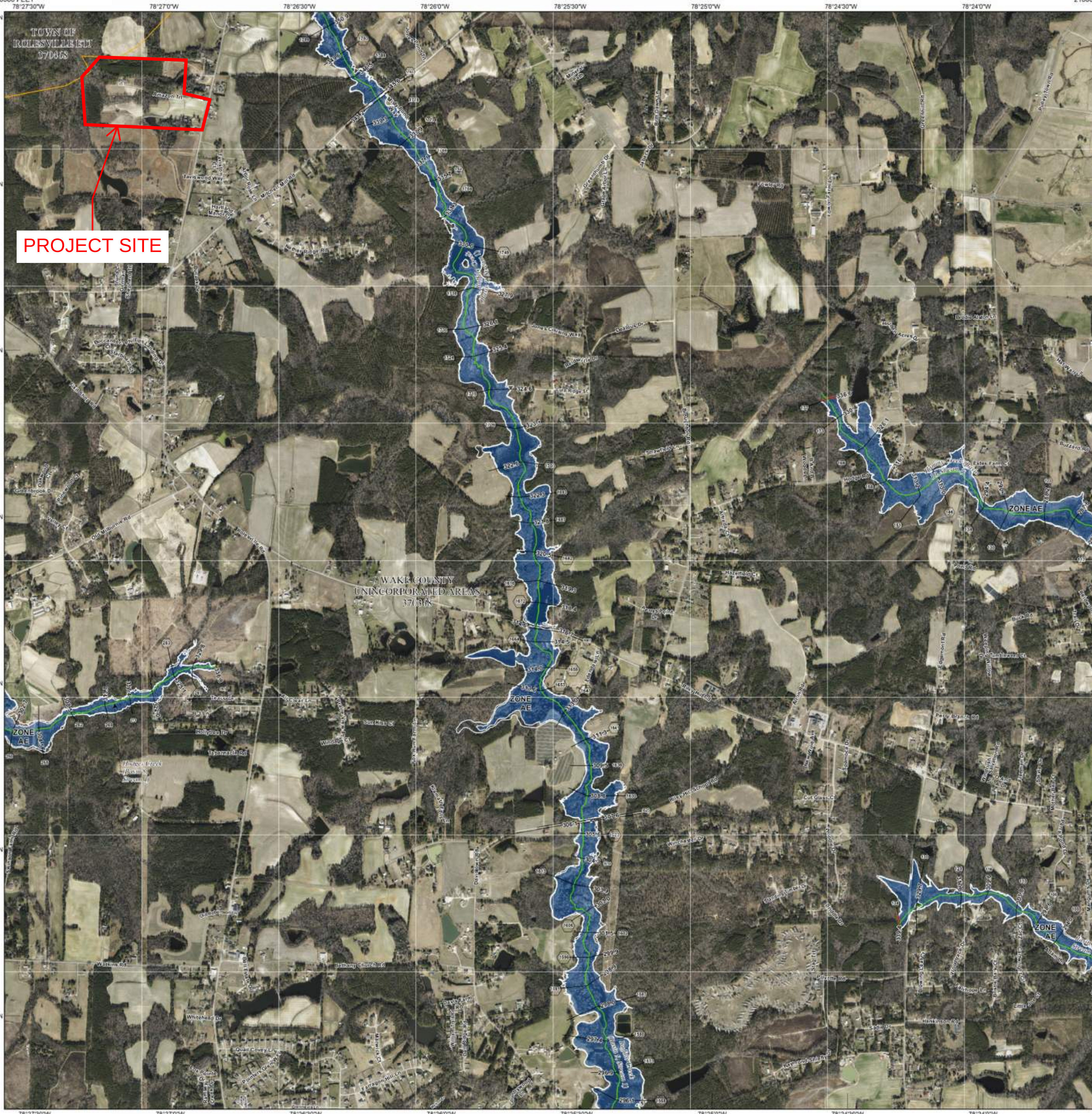
ADJOINING QUADRANGLES

ROAD CLASSIFICATION

Expressway — Local Connector
Secondary Hwy — Local Road
Ramp — 4WD
Interstate Route — US Route — State Route

ROLESVILLE, NC
2022

NSN. 7643016379170
NGA REF NO. USGSX24K38453



NORTH CAROLINA Cooperating Technical State
FEMA'S COOPERATING TECHNICAL PARTNER

This digital Flood Insurance Rate Map (FIRM) was produced through a unique cooperative partnership between the State of North Carolina and the Federal Emergency Management Agency (FEMA). The State of North Carolina has implemented a long term approach to floodplain management to decrease the costs associated with flooding. This is demonstrated by the State's commitment to map flood hazard areas at the local level. As a part of this effort, the State of North Carolina has joined in a Cooperating Technical State agreement with FEMA to produce and maintain this digital FIRM.

FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR ZONE DESCRIPTIONS AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT
HTTPS://FRIS.NC.GOV/FRIS
HTTPS://MSC.FEMA.GOV

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*
OTHER AREAS	Areas Determined to be Outside the 0.2% Annual Chance Floodplain *Zone X*
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall
	012 — 18.2 Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
	8 Coastal Transect
	Coastal Transect Baseline
	Profile Baseline
OTHER FEATURES	Hydrographic Feature
	Limit of Study
	Jurisdiction Boundary

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at https://msc.fema.gov. An accompanying Flood Insurance Study report, Letter of Map Revision (LOMR) or Letter of Map Amendment (LOMA) revising portions of this panel, and digital versions of this FIRM may be available. Visit the North Carolina Floodplain Mapping Program website at https://flood.nc.gov/ncflood, or contact the FEMA Map Service Center.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in the community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Flood Insurance Study (FIS) means an examination, evaluation, and determination of flood hazards, corresponding water surface elevations, flood hazard risk zones, and other flood data in a community issued by the North Carolina Floodplain Mapping Program (NCFMP). The Flood Insurance Study (FIS) is comprised of the following products used together: the Digital Flood Hazard Database, the Water Surface Elevation Rasters, the digitally derived, autogenerated Flood Insurance Rate Map and the Flood Insurance Survey Report. A Flood Insurance Survey is a compilation and presentation of flood risk data for specific watercourses, lakes, and coastal flood hazard areas within a community. This report contains detailed flood elevation data, data tables and FIRM indices. When a flood study is completed for the NFIP, the digital information, reports and maps are assembled into an FIS. Information shown on this FIRM is provided in digital format by the NCFMP. Base map information shown on this FIRM was provided in digital format by the NCFMP. The source of this information can be determined from the metadata available in the digital FLOOD database and in the Technical Support Data Notebook (TSDN).

ACCREDITED LEVEE NOTES TO USERS: If an accredited levee note appears on this panel check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at https://www.fema.gov/national-flood-insurance-program.

PROVISIONALLY ACCREDITED LEVEE NOTES TO USERS: If a Provisionally Accredited Levee (PAL) note appears on this panel, check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To maintain accreditation, the levee owner or community is required to submit the data and documentation necessary to comply with Section 65.10 of the NFIP regulations. If the community or owner does not provide the necessary data and documentation or if the data and documentation provided indicate the levee system does not comply with Section 65.10 requirements, FEMA will revise the flood hazard and risk information for this area to reflect de-accreditation of the levee system. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at https://www.fema.gov/national-flood-insurance-program.

LIMIT OF MODERATE WAVE ACTION NOTES TO USERS: For some coastal flooding zones the AE Zone category has been divided by a Limit of Moderate Wave Action (LiMWA). The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LiMWA (or between the shoreline and the LiMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Limit of Moderate Wave Action (LiMWA)

SCALE

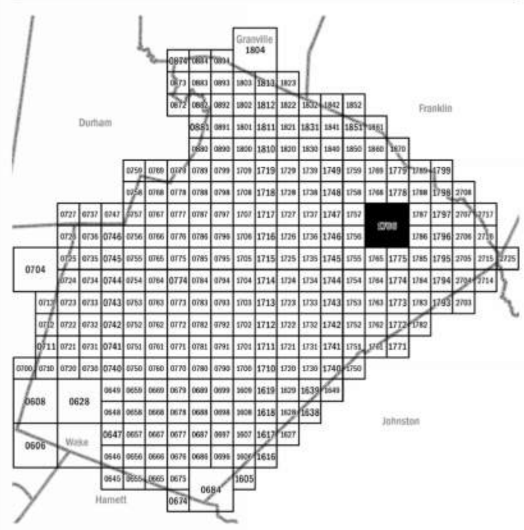
Map Projection:
North Carolina State Plane Projection Feet (Zone 3200)
Datum: NAD 1983 (Horizontal), NAVD 1988 (Vertical)

1 inch = 1,000 feet — 1:12,000

0 500 1,000 2,000 Feet

0 150 300 600 Meters

PANEL LOCATOR



National Flood Insurance Program
FEMA

NORTH CAROLINA FLOODPLAIN MAPPING PROGRAM
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

NORTH CAROLINA

PANEL **1766**

FEMA

Panel Contains:

COMMUNITY	CID	PANEL	SUFFIX
ROLESVILLE, TOWN OF	370468	1766	K
WAKE COUNTY	370368	1766	K

VERSION NUMBER
2.3.3.2

MAP NUMBER
3720176600K

MAP REVISED
July 19, 2022

NOAA Atlas 14, Volume 2, Version 3
Location name: Wake Forest, North Carolina, USA*
Latitude: 35.8876°, Longitude: -78.4479°
Elevation: 396 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	**4.85** (4.44-5.30)	**5.63** (5.16-6.14)	**6.41** (5.87-7.00)	**7.20** (6.59-7.86)	**7.99** (7.28-8.72)	**8.64** (7.82-9.41)	**9.20** (8.29-10.0)	**9.71** (8.70-10.6)	**10.3** (9.12-11.2)	**10.8** (9.49-11.8)
10-min	**3.87** (3.55-4.24)	**4.50** (4.12-4.91)	**5.13** (4.70-5.60)	**5.76** (5.27-6.28)	**6.37** (5.80-6.95)	**6.88** (6.23-7.49)	**7.31** (6.59-7.97)	**7.69** (6.89-8.39)	**8.12** (7.22-8.87)	**8.48** (7.48-9.29)
15-min	**3.22** (2.95-3.53)	**3.77** (3.46-4.12)	**4.33** (3.96-4.72)	**4.86** (4.44-5.30)	**5.38** (4.90-5.87)	**5.80** (5.26-6.33)	**6.16** (5.55-6.71)	**6.47** (5.80-7.06)	**6.81** (6.06-7.44)	**7.10** (6.26-7.77)
30-min	**2.21** (2.02-2.42)	**2.60** (2.39-2.85)	**3.07** (2.82-3.35)	**3.52** (3.22-3.84)	**3.99** (3.63-4.35)	**4.37** (3.96-4.76)	**4.72** (4.25-5.14)	**5.04** (4.51-5.50)	**5.42** (4.82-5.92)	**5.75** (5.07-6.29)
60-min	**1.38** (1.26-1.51)	**1.63** (1.50-1.78)	**1.97** (1.80-2.15)	**2.29** (2.10-2.50)	**2.66** (2.42-2.90)	**2.96** (2.68-3.23)	**3.25** (2.93-3.54)	**3.53** (3.16-3.86)	**3.89** (3.46-4.25)	**4.20** (3.70-4.59)
2-hr	**0.805** (0.732-0.889)	**0.958** (0.874-1.05)	**1.17** (1.06-1.28)	**1.38** (1.25-1.51)	**1.62** (1.46-1.77)	**1.83** (1.65-2.00)	**2.04** (1.82-2.23)	**2.25** (2.00-2.46)	**2.53** (2.22-2.77)	**2.78** (2.41-3.04)
3-hr	**0.568** (0.516-0.630)	**0.676** (0.617-0.746)	**0.828** (0.753-0.913)	**0.981** (0.890-1.08)	**1.17** (1.05-1.28)	**1.33** (1.19-1.46)	**1.50** (1.33-1.64)	**1.67** (1.47-1.83)	**1.90** (1.66-2.09)	**2.12** (1.82-2.32)
6-hr	**0.341** (0.311-0.377)	**0.407** (0.372-0.448)	**0.498** (0.454-0.548)	**0.591** (0.538-0.649)	**0.706** (0.638-0.773)	**0.810** (0.727-0.885)	**0.914** (0.814-0.998)	**1.02** (0.903-1.12)	**1.17** (1.02-1.28)	**1.31** (1.13-1.43)
12-hr	**0.200** (0.183-0.220)	**0.238** (0.219-0.261)	**0.293** (0.268-0.322)	**0.350** (0.319-0.383)	**0.420** (0.381-0.459)	**0.486** (0.436-0.529)	**0.552** (0.491-0.600)	**0.623** (0.548-0.677)	**0.721** (0.624-0.784)	**0.813** (0.693-0.884)
24-hr	**0.119** (0.110-0.128)	**0.144** (0.134-0.155)	**0.181** (0.168-0.195)	**0.211** (0.195-0.227)	**0.251** (0.232-0.271)	**0.284** (0.262-0.306)	**0.318** (0.292-0.343)	**0.353** (0.323-0.381)	**0.402** (0.365-0.434)	**0.441** (0.399-0.478)
2-day	**0.069** (0.064-0.074)	**0.083** (0.077-0.089)	**0.103** (0.096-0.111)	**0.120** (0.111-0.129)	**0.142** (0.132-0.153)	**0.160** (0.148-0.173)	**0.179** (0.164-0.193)	**0.198** (0.181-0.214)	**0.225** (0.204-0.243)	**0.246** (0.222-0.266)
3-day	**0.048** (0.045-0.052)	**0.058** (0.054-0.063)	**0.073** (0.068-0.078)	**0.084** (0.078-0.090)	**0.099** (0.092-0.107)	**0.112** (0.103-0.120)	**0.125** (0.115-0.134)	**0.138** (0.126-0.148)	**0.156** (0.142-0.168)	**0.171** (0.154-0.184)
4-day	**0.038** (0.036-0.041)	**0.046** (0.043-0.049)	**0.057** (0.053-0.061)	**0.066** (0.061-0.070)	**0.078** (0.072-0.083)	**0.087** (0.081-0.094)	**0.097** (0.090-0.104)	**0.108** (0.099-0.115)	**0.122** (0.111-0.131)	**0.133** (0.121-0.143)
7-day	**0.025** (0.024-0.027)	**0.030** (0.028-0.032)	**0.037** (0.035-0.040)	**0.042** (0.040-0.045)	**0.050** (0.046-0.053)	**0.056** (0.052-0.060)	**0.062** (0.057-0.066)	**0.068** (0.063-0.073)	**0.077** (0.070-0.083)	**0.084** (0.076-0.090)
10-day	**0.020** (0.019-0.021)	**0.024** (0.022-0.025)	**0.029** (0.027-0.031)	**0.033** (0.031-0.035)	**0.038** (0.036-0.041)	**0.042** (0.039-0.045)	**0.047** (0.043-0.050)	**0.051** (0.047-0.055)	**0.057** (0.052-0.061)	**0.062** (0.056-0.066)
20-day	**0.013** (0.012-0.014)	**0.016** (0.015-0.017)	**0.019** (0.018-0.020)	**0.021** (0.020-0.023)	**0.024** (0.023-0.026)	**0.027** (0.025-0.029)	**0.029** (0.027-0.031)	**0.032** (0.030-0.034)	**0.036** (0.033-0.038)	**0.038** (0.035-0.041)
30-day	**0.011** (0.010-0.012)	**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** (0.020-0.022)	**0.023** (0.021-0.024)	**0.024** (0.023-0.026)	**0.027** (0.025-0.029)	**0.029** (0.026-0.031)
45-day	**0.009** (0.009-0.010)	**0.011** (0.010-0.011)	**0.012** (0.012-0.013)	**0.014** (0.013-0.015)	**0.015** (0.015-0.016)	**0.017** (0.016-0.018)	**0.018** (0.017-0.019)	**0.019** (0.018-0.020)	**0.021** (0.019-0.022)	**0.022** (0.021-0.023)
60-day	**0.008** (0.008-0.009)	**0.010** (0.009-0.010)	**0.011** (0.010-0.012)	**0.012** (0.011-0.013)	**0.013** (0.013-0.014)	**0.014** (0.014-0.015)	**0.015** (0.015-0.016)	**0.016** (0.015-0.017)	**0.018** (0.017-0.019)	**0.019** (0.017-0.020)

[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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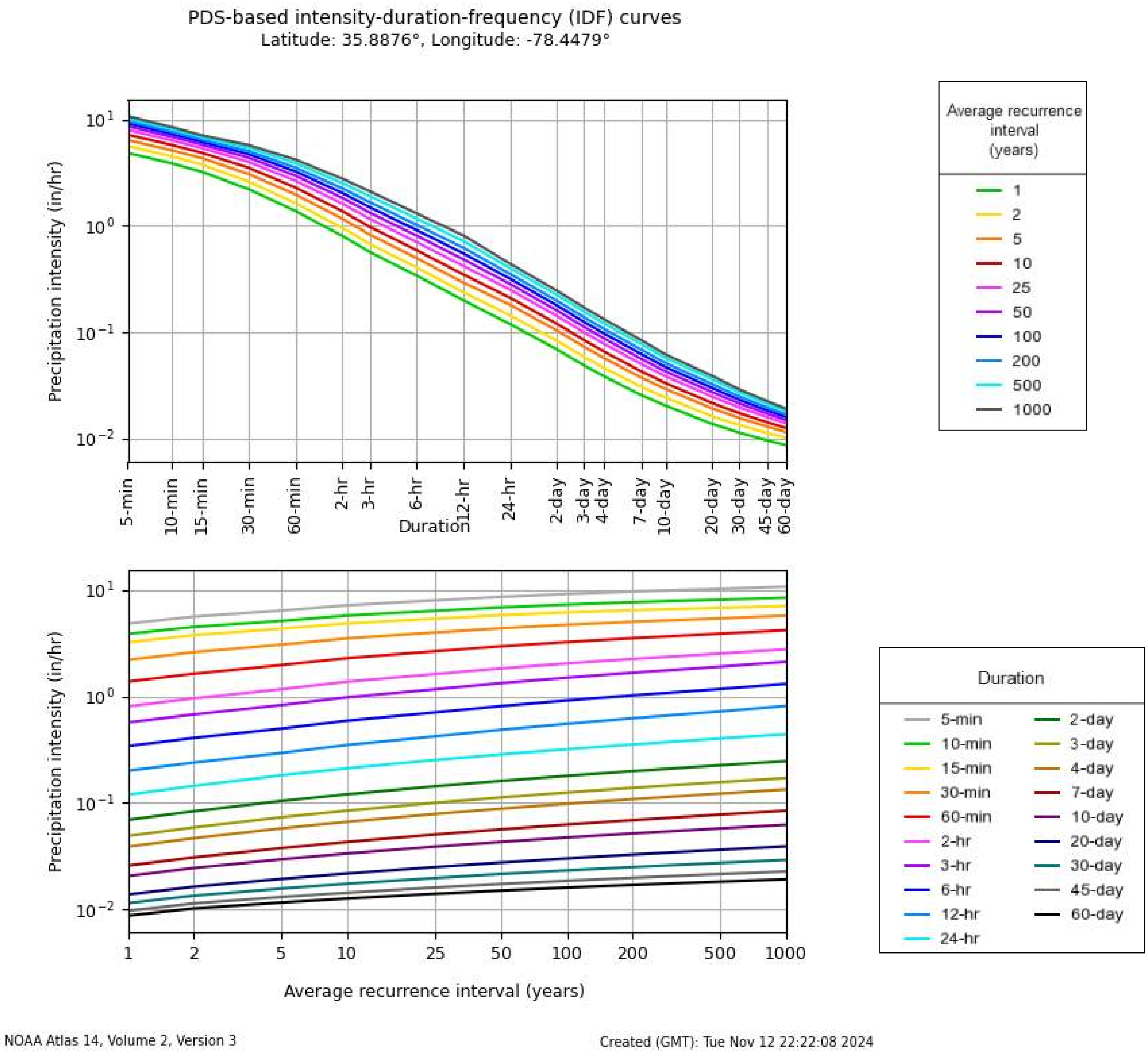
PF graphical



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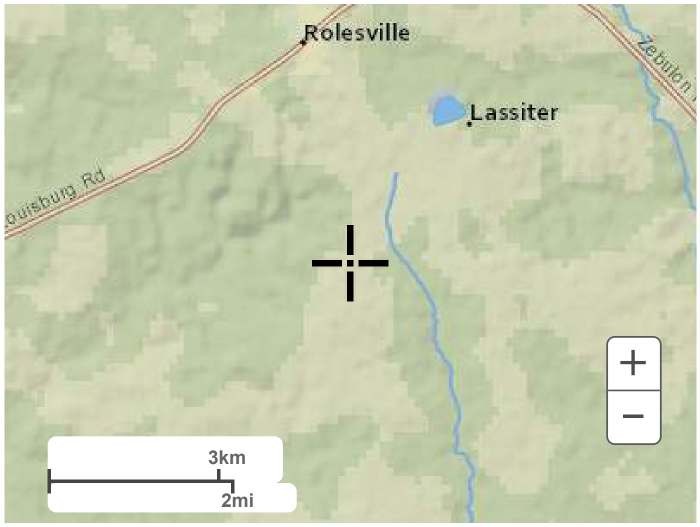
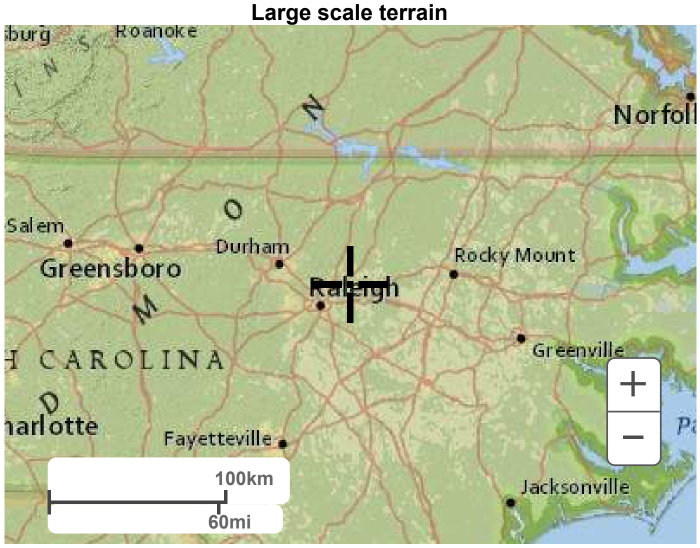
Maps & aerials

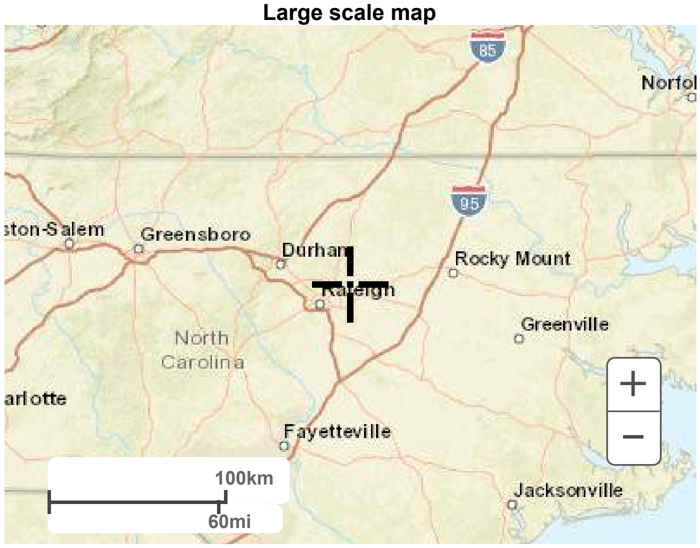
Small scale terrain



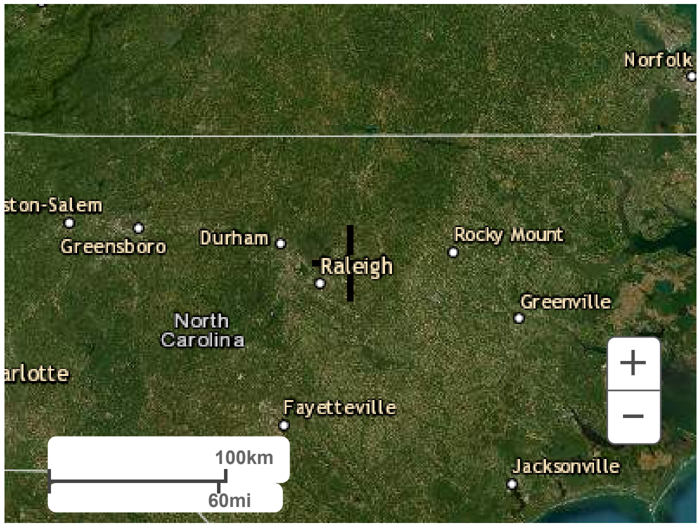
Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

NOAA Atlas 14, Volume 2, Version 3
Location name: Wake Forest, North Carolina, USA*
Latitude: 35.8876°, Longitude: -78.449°
Elevation: 385 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	**0.404** (0.370-0.442)	**0.469** (0.430-0.512)	**0.534** (0.489-0.583)	**0.600** (0.549-0.655)	**0.666** (0.607-0.726)	**0.719** (0.652-0.784)	**0.766** (0.691-0.835)	**0.808** (0.724-0.882)	**0.854** (0.759-0.933)	**0.896** (0.790-0.981)
10-min	**0.645** (0.591-0.706)	**0.750** (0.688-0.819)	**0.855** (0.784-0.934)	**0.960** (0.878-1.05)	**1.06** (0.967-1.16)	**1.14** (1.04-1.25)	**1.22** (1.10-1.33)	**1.28** (1.15-1.40)	**1.35** (1.20-1.48)	**1.41** (1.24-1.54)
15-min	**0.806** (0.738-0.882)	**0.942** (0.864-1.03)	**1.08** (0.991-1.18)	**1.21** (1.11-1.32)	**1.35** (1.22-1.47)	**1.45** (1.32-1.58)	**1.54** (1.39-1.68)	**1.62** (1.45-1.76)	**1.70** (1.51-1.86)	**1.77** (1.56-1.94)
30-min	**1.10** (1.01-1.21)	**1.30** (1.19-1.42)	**1.54** (1.41-1.68)	**1.76** (1.61-1.92)	**1.99** (1.82-2.17)	**2.18** (1.98-2.38)	**2.36** (2.12-2.57)	**2.52** (2.25-2.74)	**2.71** (2.40-2.96)	**2.87** (2.53-3.14)
60-min	**1.38** (1.26-1.51)	**1.63** (1.50-1.78)	**1.97** (1.81-2.15)	**2.29** (2.10-2.50)	**2.65** (2.42-2.89)	**2.96** (2.68-3.23)	**3.25** (2.93-3.54)	**3.53** (3.16-3.85)	**3.88** (3.45-4.24)	**4.19** (3.69-4.58)
2-hr	**1.61** (1.46-1.78)	**1.92** (1.75-2.10)	**2.34** (2.13-2.57)	**2.75** (2.49-3.02)	**3.24** (2.92-3.54)	**3.66** (3.29-4.01)	**4.07** (3.63-4.46)	**4.50** (3.98-4.92)	**5.05** (4.43-5.52)	**5.53** (4.81-6.07)
3-hr	**1.71** (1.55-1.89)	**2.03** (1.86-2.24)	**2.49** (2.26-2.74)	**2.95** (2.67-3.24)	**3.50** (3.16-3.84)	**4.00** (3.58-4.39)	**4.49** (3.99-4.93)	**5.01** (4.42-5.49)	**5.70** (4.97-6.25)	**6.33** (5.46-6.96)
6-hr	**2.05** (1.87-2.26)	**2.44** (2.23-2.68)	**2.99** (2.72-3.28)	**3.54** (3.22-3.89)	**4.23** (3.82-4.63)	**4.85** (4.35-5.30)	**5.47** (4.87-5.97)	**6.12** (5.40-6.68)	**7.02** (6.10-7.65)	**7.84** (6.73-8.56)
12-hr	**2.41** (2.21-2.66)	**2.88** (2.64-3.15)	**3.54** (3.24-3.88)	**4.22** (3.84-4.62)	**5.07** (4.59-5.54)	**5.85** (5.26-6.37)	**6.64** (5.91-7.22)	**7.50** (6.60-8.14)	**8.68** (7.51-9.42)	**9.77** (8.33-10.6)
24-hr	**2.86** (2.66-3.09)	**3.46** (3.22-3.73)	**4.36** (4.05-4.70)	**5.07** (4.70-5.46)	**6.04** (5.58-6.51)	**6.82** (6.28-7.35)	**7.63** (7.00-8.22)	**8.47** (7.74-9.13)	**9.63** (8.75-10.4)	**10.6** (9.55-11.4)
2-day	**3.32** (3.08-3.57)	**3.99** (3.72-4.30)	**4.99** (4.64-5.38)	**5.78** (5.36-6.22)	**6.85** (6.33-7.38)	**7.71** (7.10-8.30)	**8.59** (7.89-9.26)	**9.50** (8.70-10.3)	**10.8** (9.79-11.6)	**11.8** (10.6-12.8)
3-day	**3.52** (3.28-3.77)	**4.23** (3.94-4.54)	**5.26** (4.90-5.64)	**6.07** (5.64-6.51)	**7.18** (6.65-7.70)	**8.07** (7.46-8.66)	**8.98** (8.27-9.65)	**9.93** (9.10-10.7)	**11.2** (10.2-12.1)	**12.3** (11.1-13.3)
4-day	**3.72** (3.48-3.98)	**4.46** (4.17-4.77)	**5.52** (5.15-5.90)	**6.36** (5.92-6.80)	**7.51** (6.97-8.03)	**8.44** (7.81-9.02)	**9.38** (8.65-10.0)	**10.4** (9.51-11.1)	**11.7** (10.7-12.6)	**12.8** (11.6-13.8)
7-day	**4.32** (4.04-4.61)	**5.15** (4.82-5.50)	**6.30** (5.89-6.72)	**7.20** (6.73-7.69)	**8.45** (7.87-9.02)	**9.44** (8.77-10.1)	**10.5** (9.68-11.2)	**11.5** (10.6-12.3)	**13.0** (11.9-13.9)	**14.1** (12.9-15.2)
10-day	**4.92** (4.61-5.24)	**5.85** (5.49-6.24)	**7.05** (6.61-7.51)	**8.00** (7.48-8.52)	**9.28** (8.65-9.88)	**10.3** (9.57-11.0)	**11.3** (10.5-12.1)	**12.3** (11.4-13.2)	**13.8** (12.7-14.7)	**14.9** (13.7-16.0)
20-day	**6.59** (6.20-7.02)	**7.79** (7.33-8.30)	**9.24** (8.68-9.83)	**10.4** (9.74-11.0)	**11.9** (11.2-12.7)	**13.1** (12.3-14.0)	**14.4** (13.4-15.3)	**15.6** (14.5-16.7)	**17.3** (16.0-18.5)	**18.6** (17.1-20.0)
30-day	**8.19** (7.72-8.70)	**9.64** (9.09-10.2)	**11.2** (10.6-11.9)	**12.5** (11.7-13.3)	**14.1** (13.2-15.0)	**15.4** (14.4-16.4)	**16.6** (15.5-17.7)	**17.9** (16.7-19.1)	**19.6** (18.2-20.9)	**20.9** (19.3-22.3)
45-day	**10.4** (9.89-11.0)	**12.2** (11.6-12.9)	**14.0** (13.3-14.8)	**15.4** (14.6-16.3)	**17.2** (16.3-18.2)	**18.6** (17.6-19.6)	**20.0** (18.8-21.1)	**21.3** (20.0-22.5)	**23.0** (21.6-24.4)	**24.4** (22.7-25.9)
60-day	**12.5** (11.9-13.2)	**14.6** (13.9-15.4)	**16.6** (15.7-17.4)	**18.1** (17.2-19.0)	**20.0** (19.0-21.1)	**21.5** (20.3-22.7)	**22.9** (21.6-24.2)	**24.3** (22.9-25.7)	**26.1** (24.5-27.6)	**27.5** (25.7-29.1)

[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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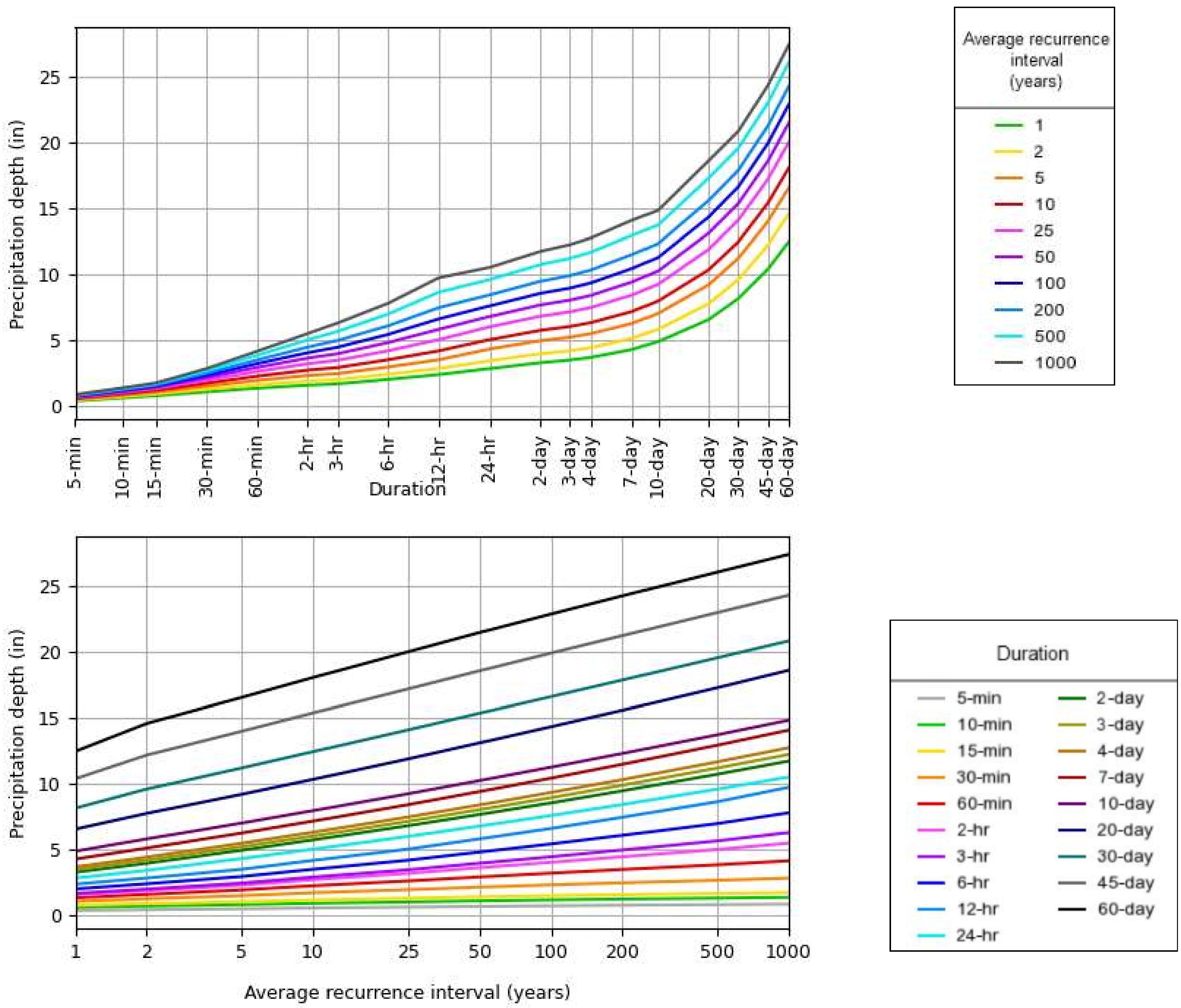
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 35.8876°, Longitude: -78.4490°



NOAA Atlas 14, Volume 2, Version 3 Created (GMT): Wed Jan 15 19:30:08 2025

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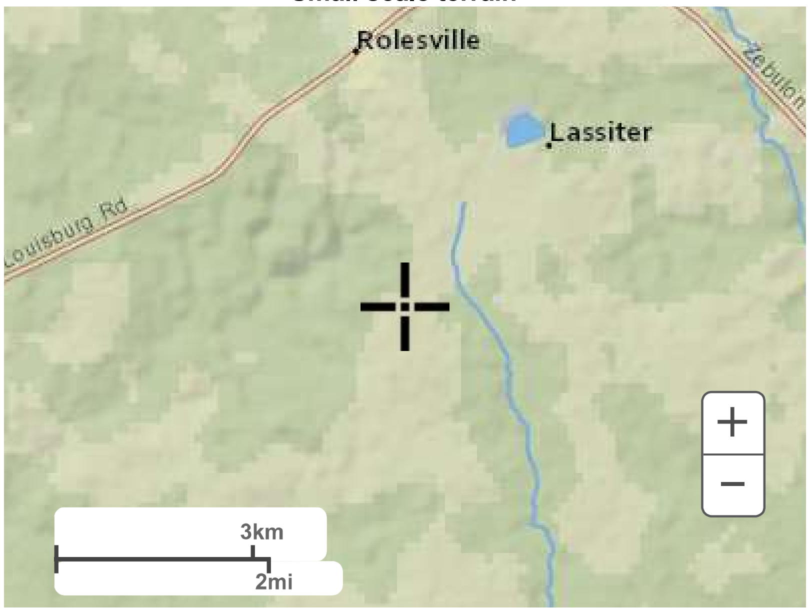
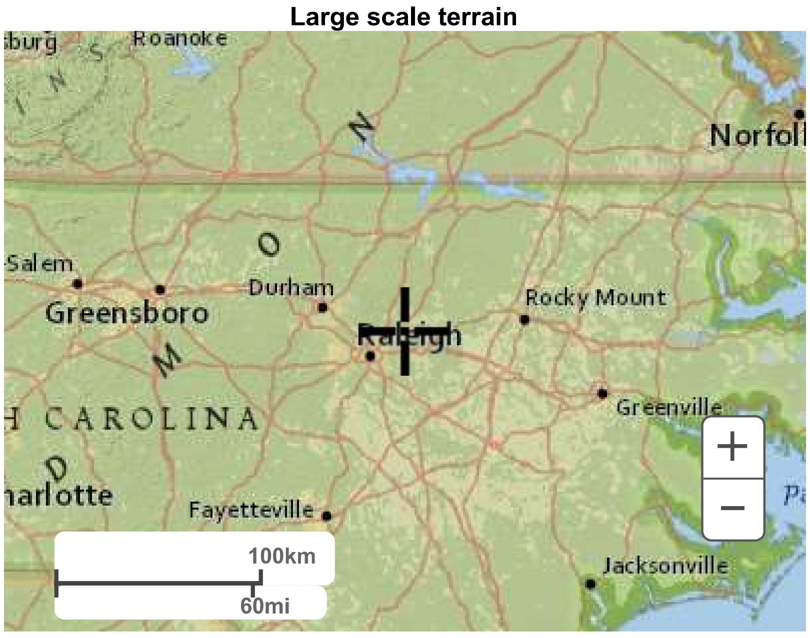
Maps & aerials

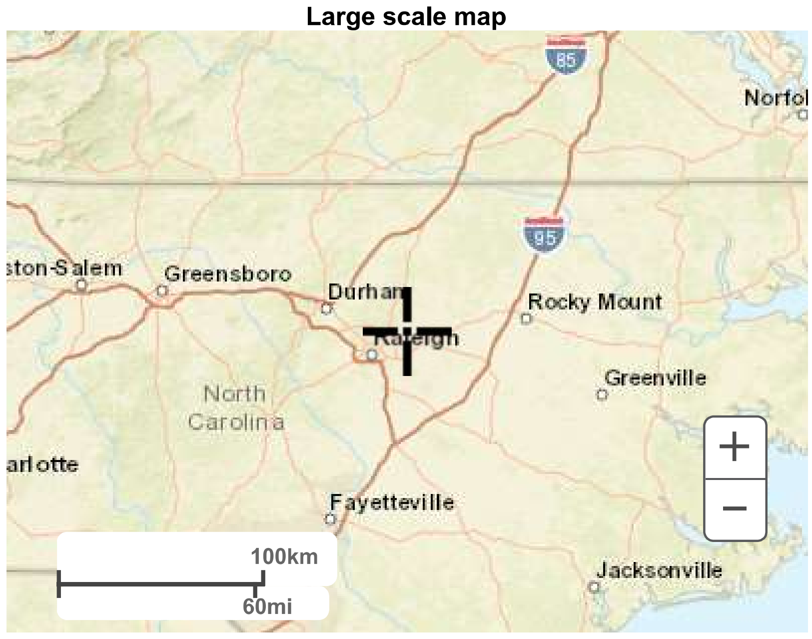
Small scale terrain



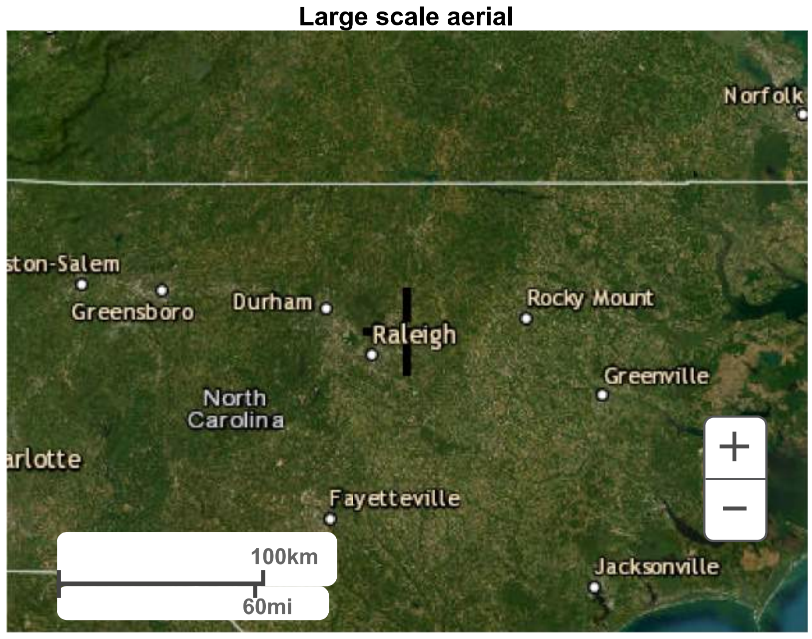
Large scale terrain



Large scale map



Large scale aerial



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[National Oceanic and Atmospheric Administration](#)
[National Weather Service](#)
[National Water Center](#)
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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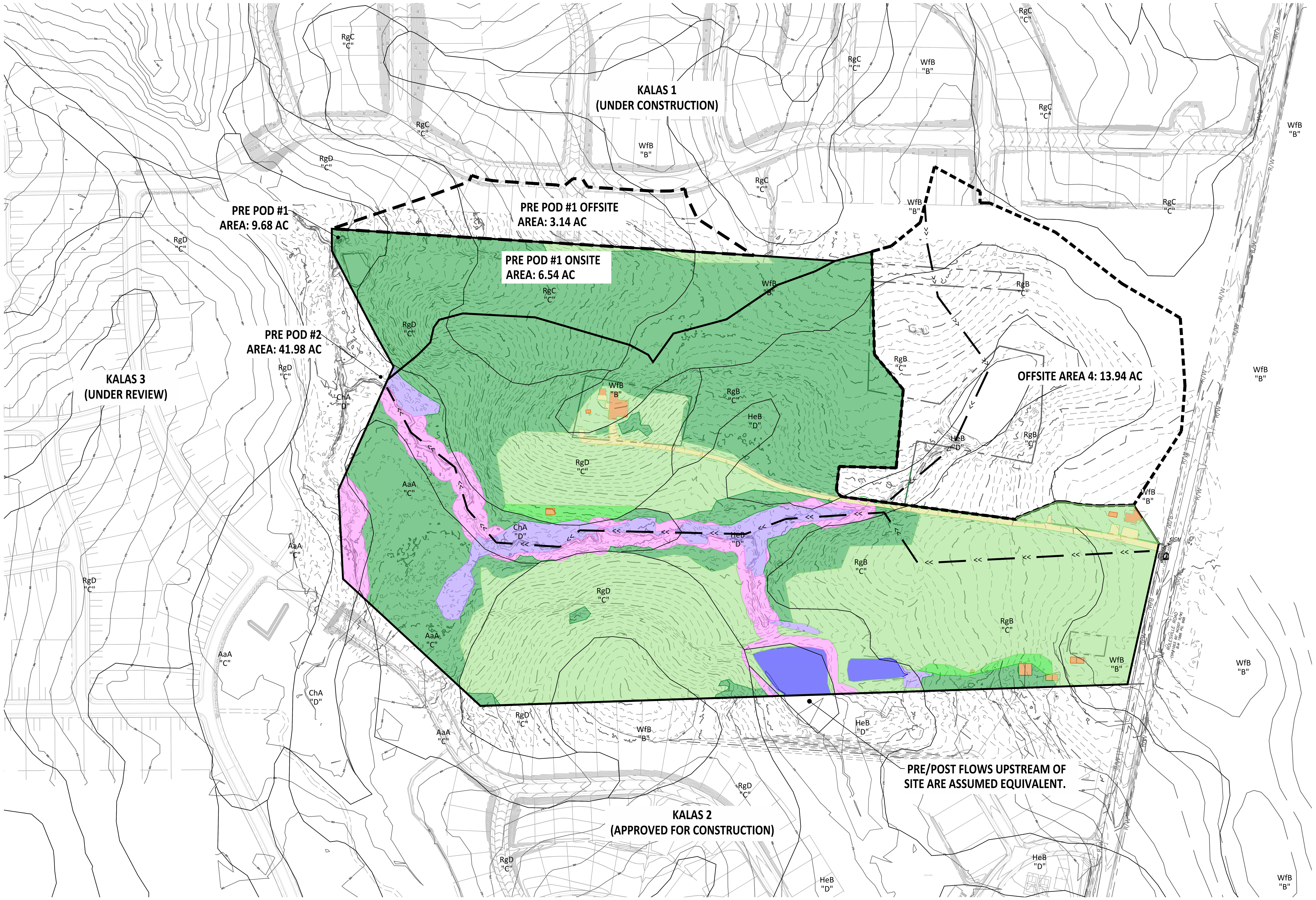
APPENDIX B

DRAINAGE AREA MAPS



LEGEND	
WOODS	
OPEN SPACE	
SIDEWALK	
ROADWAY	
GRASS IN R/W	
ROOF	
SCM/OPEN WATER	
WETLAND	
OFFSITE AREA	
POD AREA	
SOIL LINE	
TIME OF CONCENTRATION	

NOTE:

1. OFFSITE DRAINAGE AREAS ARE TO HAVE A Cn VALUE OF 74 APPLIED FOR MODELING PURPOSES.
2. THIS EXHIBIT IS TO BE USED ALONGSIDE HYDRAFLOW HYDROGRAPH MODELING FOR PEAK FLOW ATTENUATION.
4. OFFSITE DRAINAGE THAT IS UPSTREAM OF THE PROJECT AREA (SOUTH OF PROJECT) IS NOT INCLUDED IN POD 2 MODELING. THIS IS DUE TO NO CHANGE IN DRAINAGE PATTERNS FROM PRE TO POST DEVELOPMENT, ASSUMING ANY FLOWS FROM THIS AREA WOULD OFFSET.
5. IN WAKE COUNTY STORMWATER TOOL, THE SUMMATION OF DRAINAGE AREAS #2 & #3 ARE POD #2 IN THIS EXHIBIT.

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch =100

PRE-DEVELOPMENT POINT OF DISCHARGE AREAS

AMERICAN Engineering

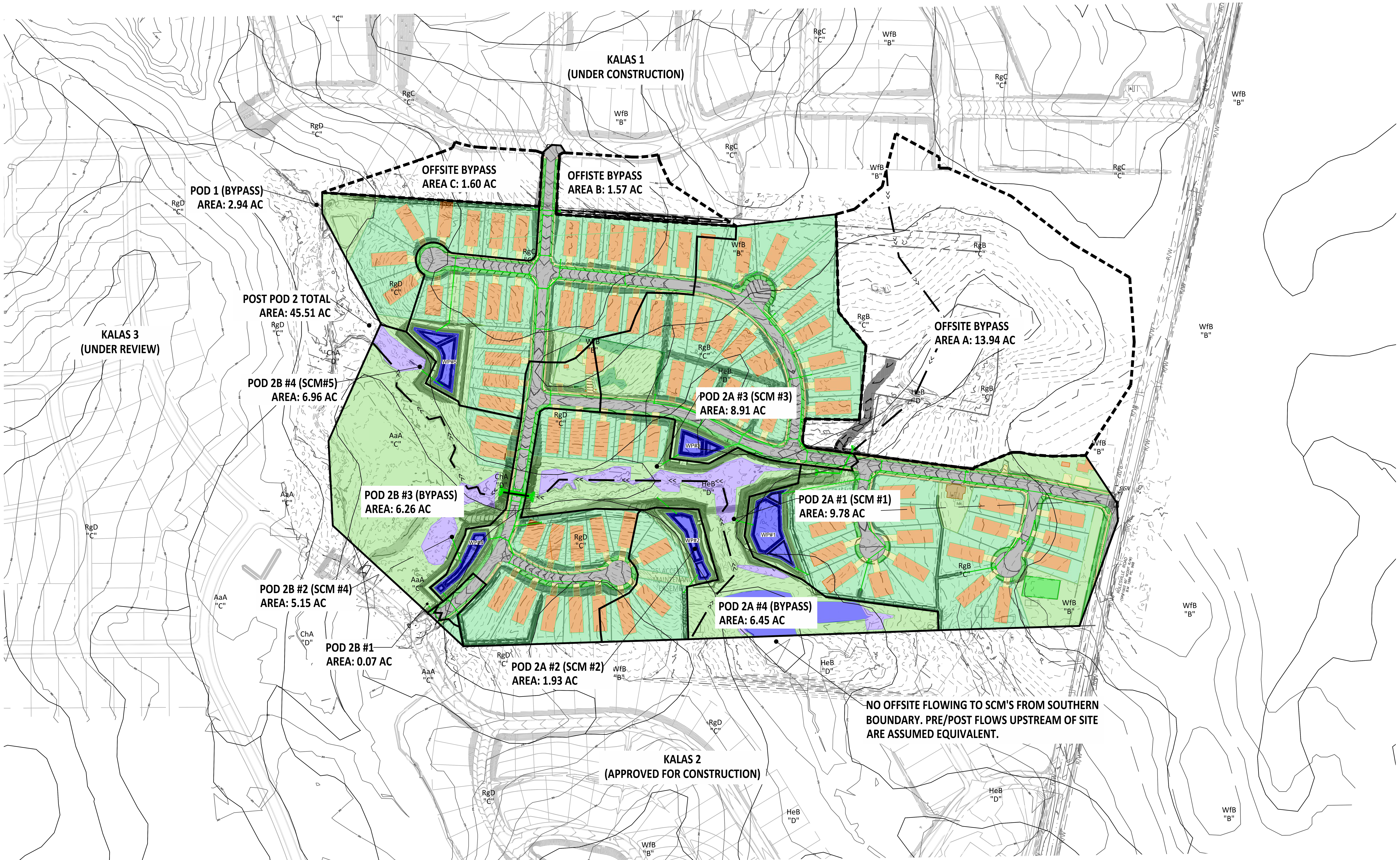
RALEIGH NC | CHARLOTTE NC | CHESAPEAKE VA

PROJECT # 220020

THE PRESERVE AT MOODY FARM

WAKE FOREST, NC | WAKE COUNTY

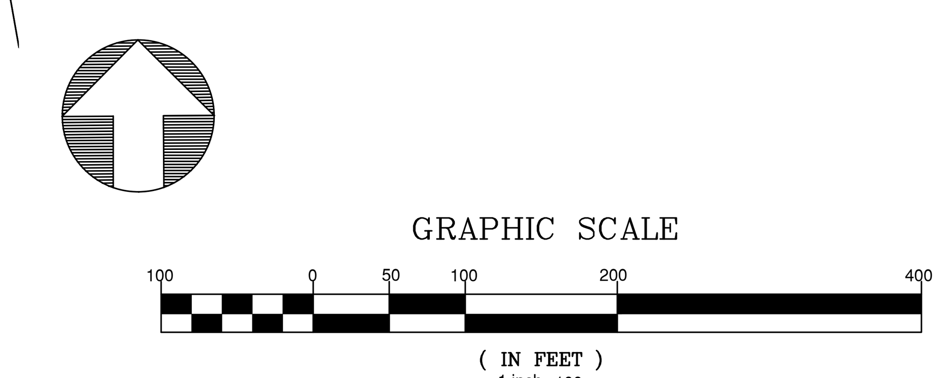
January 27, 2025



LEGEND	
WOODS	
OPEN SPACE	
SIDEWALK	
ROADWAY	
GRASS IN R/W	
ROOF	
SCM/OPEN WATER	
WETLAND	
OFFSITE AREA	
POD AREA	
SOIL LINE	
TIME OF CONCENTRATION	

NOTE:

1. OFFSITE DRAINAGE AREAS ARE TO HAVE A Cn VALUE OF 74 APPLIED FOR MODELING PURPOSES.
2. THIS EXHIBIT IS TO BE USED ALONGSIDE HYDRAFLOW HYDROGRAPH MODELING FOR PEAK FLOW ATTENUATION.
3. NO OFFSITE DRAINAGE BYPASS DELINEATED IS PROPOSED TO BE CONVEYED TO PROJECT SCM'S (DASH LINE).
4. OFFSITE DRAINAGE THAT IS UPSTREAM OF THE PROJECT AREA (SOUTH OF PROJECT) IS NOT INCLUDED IN POD 2 MODELING. THIS IS DUE TO NO CHANGE IN DRAINAGE PATTERNS FROM PRE TO POST DEVELOPMENT, ASSUMING ANY FLOWS FROM THIS AREA WOULD OFFSET.
5. IN THE WAKE COUNTY STORMWATER TOOL, THE SUMMATION OF DRAINAGE AREAS #2 & #3 ARE POD #2 IN THIS EXHIBIT.



POST-DEVELOPMENT POINT OF DISCHARGE AREAS

THE PRESERVE AT MOODY FARM

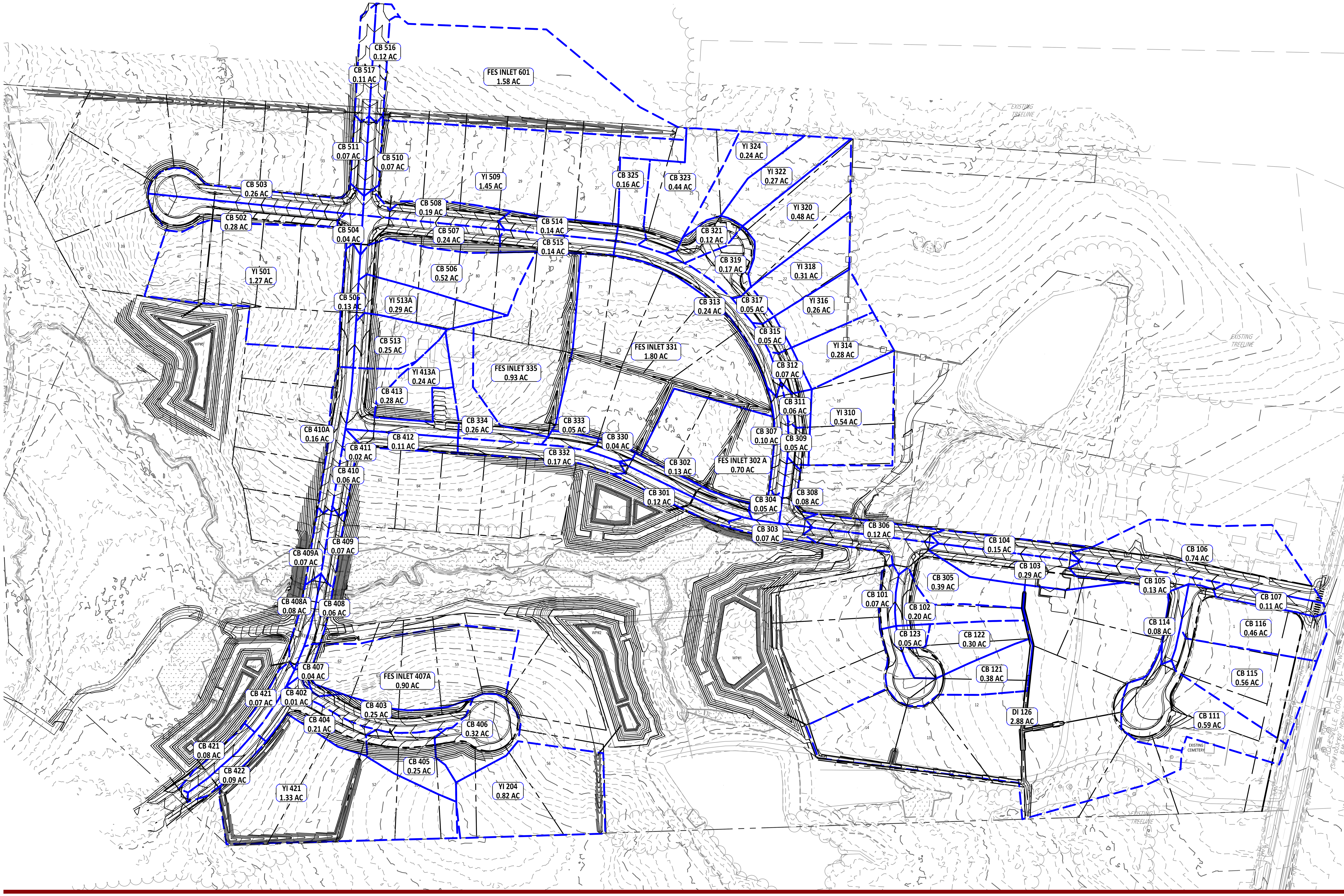
WAKE FOREST, NC | WAKE COUNTY

January 27, 2025

AMERICAN Engineering

RALEIGH NC | CHARLOTTE NC | CHESAPEAKE VA

PROJECT # 210002



NOTE: THIS EXHIBIT IS TO BE USED IN TANDEM WITH HYDRAFLOW STORM SEWERS MODELING FOR CONVEYANCE CALCULATIONS.

GRAPHIC SCALE

80 0 40 80 160 320

(IN FEET)
1 inch = 80 ft

POST-DEVELOPMENT INLET AREAS

AMERICAN Engineering

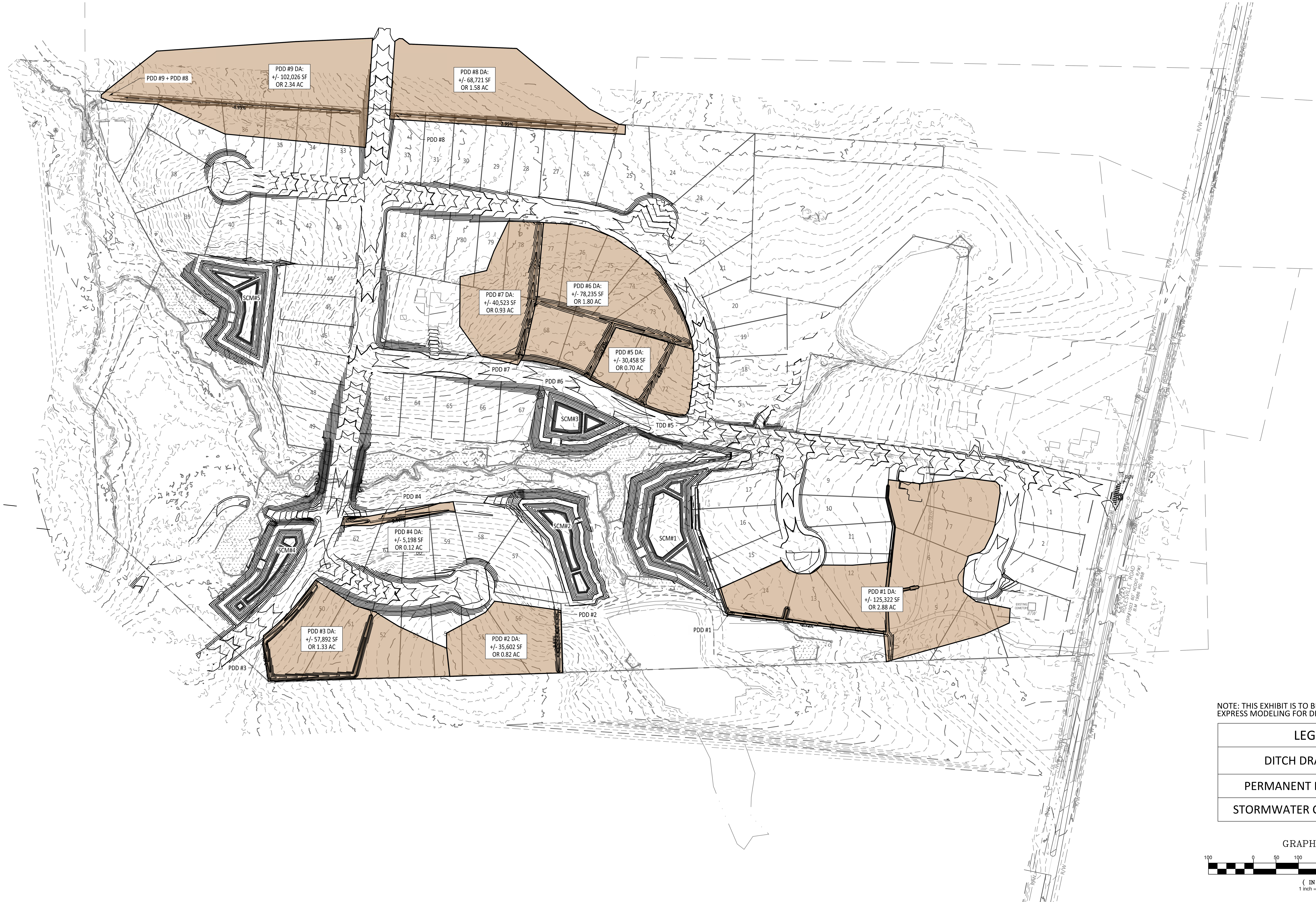
THE PRESERVE AT MOODY FARM

WAKE FOREST, NC | WAKE COUNTY

RALEIGH NC | CHARLOTTE NC | CHESAPEAKE VA

January 31, 2025

PROJECT # 220020



NOTE: THIS EXHIBIT IS TO BE USED IN TANDEM WITH HYDRAFLOW EXPRESS MODELING FOR DITCH VELOCITIES AND CAPACITY.

LEGEND & ABBREVIATIONS	
DITCH DRAINAGE AREA	
PERMANENT DIVERSION DITCH	PDD
STORMWATER CONTROL MEASURE	SCM

PERMANENT DIVERSION DITCH DRAINAGE AREAS

AMERICAN Engineering

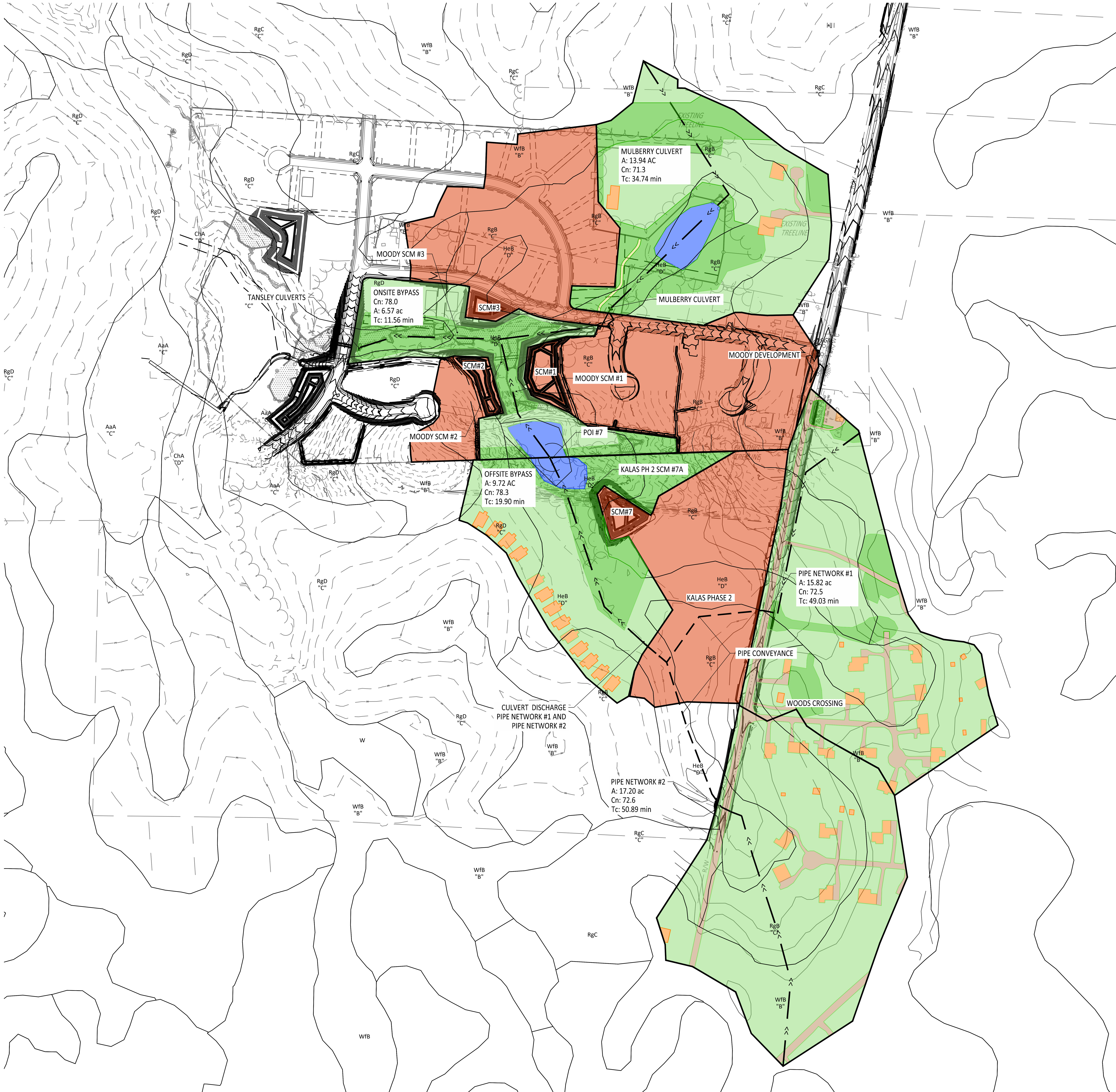
RALEIGH NC | CHARLOTTE NC | CHESAPEAKE VA

PROJECT # 220020

THE PRESERVE AT MOODY FARM

WAKE FOREST, NC

January 27, 2025



CULVERT DRAINAGE AREA SUPPORTING CALCULATIONS

PIPE NETWORK #1 AREA	**689195**	**S.F.**	**15.82**	**Ac**
Land Use	**Area, Ac.**	**"CN"**	**Wtd'd "CN"**	
Roadways + C&G (not Sidewalks)	1.94	98	12.02	
Roofs	0.62	98	3.82	
Driveways/Parking	0.00	98	0.00	
Sidewalks	0.00	98	0.00	
Openspace- A Soils Good Condition	0.00	39	0.00	
Openspace- B Soils Good Condition	5.99	61	23.11	
Openspace- C Soils Good Condition	3.07	74	14.35	
Openspace- D Soils Good Condition	2.40	80	12.11	
Woods-A Soils Good Condition	0.00	30	0.00	
Woods-B Soils Good Condition	1.24	55	4.30	
Woods-C Soils Good Condition	0.00	70	0.00	
Woods-D Soils Good Condition	0.57	77	2.78	
Lands Taken Up by BMP	0.00	98	0.00	
Open Water (Exist'g or Proposed Ponds)	0.00	98	0.00	
Total (Check):	**15.82**	Composite "CN"	**72.5**	
	Percent Impervious		16.2%	
PIPE NETWORK #2 AREA	**749114**	**S.F.**	**17.20**	**Ac**
Land Use	**Area, Ac.**	**"CN"**	**Wtd'd "CN"**	
Roadways + C&G (not Sidewalks)	1.61	98	9.20	
Roofs	0.67	98	3.80	
Driveways/Parking	0.00	98	0.00	
Sidewalks	0.00	98	0.00	
Openspace- A Soils Good Condition	0.00	39	0.00	
Openspace- B Soils Good Condition	6.74	61	23.89	
Openspace- C Soils Good Condition	6.75	74	29.03	
Openspace- D Soils Good Condition	1.43	80	6.67	
Woods-A Soils Good Condition	0.00	30	0.00	
Woods-B Soils Good Condition	0.00	55	0.00	
Woods-C Soils Good Condition	0.00	70	0.00	
Woods-D Soils Good Condition	0.00	77	0.00	
Lands Taken Up by BMP	0.00	98	0.00	
Open Water (Exist'g or Proposed Ponds)	0.00	98	0.00	
Total (Check):	**17.20**	Composite "CN"	**72.6**	
	Percent Impervious		13.3%	
OFFSITE BYPASS AREA	**423210**	**S.F.**	**9.72**	**Ac**
Land Use	**Area, Ac.**	**"CN"**	**Wtd'd "CN"**	
Roadways + C&G (not Sidewalks)	0.00	98	0.00	
Roofs	0.67	98	6.73	
Driveways/Parking	0.00	98	0.00	
Sidewalks	0.00	98	0.00	
Openspace- A Soils Good Condition	0.00	39	0.00	
Openspace- B Soils Good Condition	0.17	61	1.08	
Openspace- C Soils Good Condition	2.21	74	16.81	
Openspace- D Soils Good Condition	2.63	80	21.64	
Woods-A Soils Good Condition	0.00	30	0.00	
Woods-B Soils Good Condition	0.00	55	0.00	
Woods-C Soils Good Condition	1.20	70	8.68	
Woods-D Soils Good Condition	2.41	77	19.11	
Lands Taken Up by BMP	0.00	98	0.00	
Open Water (Exist'g or Proposed Ponds)	0.43	98	4.29	
Total (Check):	**9.72**	Composite "CN"	**78.3**	
	Percent Impervious		11.2%	
MULBERRY CULVERT AREA	**613925**	**S.F.**	**14.09**	**Ac**
Land Use	**Area, Ac.**	**"CN"**	**Wtd'd "CN"**	
Roadways + C&G (not Sidewalks)	0.19	98	1.30	
Roofs	0.26	98	1.78	
Driveways/Parking	0.00	98	0.00	
Sidewalks	0.07	98	0.51	
Openspace- A Soils Good Condition	0.00	39	0.00	
Openspace- B Soils Good Condition	2.39	61	10.34	
Openspace- C Soils Good Condition	4.55	74	23.87	
Openspace- D Soils Good Condition	0.25	80	1.41	
Woods-A Soils Good Condition	0.00	30	0.00	
Woods-B Soils Good Condition	1.62	55	6.32	
Woods-C Soils Good Condition	2.94	70	14.60	
Woods-D Soils Good Condition	1.04	77	5.70	
Lands Taken Up by BMP	0.00	98	0.00	
Open Water (Exist'g or Proposed Ponds)	0.79	98	5.48	
Total (Check):	**14.09**	Composite "CN"	**71.3**	
	Percent Impervious		9.3%	
ONSITE BYPASS AREA	**286108**	**S.F.**	**6.57**	**Ac**
Land Use	**Area, Ac.**	**"CN"**	**Wtd'd "CN"**	
Roadways + C&G (not Sidewalks)	0.00	98	0.00	
Roofs	0.00	98	0.00	
Driveways/Parking	0.00	98	0.00	
Sidewalks	0.00	98	0.00	
Openspace- B Soils Good Condition	0.00	61	0.00	
Openspace- C Soils Good Condition	1.51	74	16.97	
Openspace- D Soils Good Condition	1.66	80	20.25	
Woods-B Soils Good Condition	0.00	55	0.00	
Woods-C Soils Good Condition	0.68	70	7.23	
Woods-D Soils Good Condition	2.22	77	25.97	
Lands Taken Up by BMP	0.00	98	0.00	
Open Water (Exist'g or Proposed Ponds)	0.51	98	7.56	
Total (Check):	**6.57**	Composite "CN"	**78.0**	
	Percent Impervious		7.7%	

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 200 ft

LEGEND	
WOODS B/C/D	
OPEN SPACE B/C/D	
SIDEWALK	
ROADWAY	
SCM AREA	
ROOF	
SCM/OPEN WATER	
DRAINAGE AREA	
SOIL LINE	

NOTE:

1. EACH RESPECTIVE SCM FLOW (Q) HAS BEEN DETERMINED BY UTILIZING AUTODESK HYDROGRAPH SOFTWARE AND WILL BE ADDED TO THE TOTAL FLOW FOR ANALYZING THE CULVERT OF INTEREST.
2. FOR RECORD KEEPING PURPOSES, THE CALCULATED DRAINAGE AREA TO RESPECTIVE SCM IS HATCHED IN RED (AREA USED IN HYDROGRAPH TO DETERMINE Q).
3. PLEASE REFER TO PROJECT STORMWATER IMPACT ANALYSIS REPORT FOR COMPLETE CALCULATIONS.

CULVERT DRAINAGE AREA EXHIBIT (SUPPORTS HYDROGRAPH MODELING & ALLOWS FOR CULVERT SIZING)

THE PRESERVE AT MOODY FARM

WAKE FOREST, NC

January 27, 2025

AMERICAN Engineering

RALEIGH NC | CHARLOTTE NC | CHESAPEAKE VA

PROJECT # 220020

APPENDIX C

STORMWATER CONVEYANCE CALCULATIONS

AMERICAN Engineering

4020 Westchase Boulevard Suite 450 Raleigh, NC 27607
OFFICE: 919.469.1101 | AMERICAN-EA.COM

Project Name:	**Moody**
Project Number:	**R210002**
Date:	**12/5/2024**
Calculated By:	**RC**
Checked By:	**JK**
Input data in blue boxes	

Rational C-Value Calculations for Inlet Areas

Area ID	Drainage Area (ac)	SCM (ac)	Roof (ac)	Roadway (ac)	Driveway (ac)	Sidewalk (ac)	Open Space (ac)	Impervious C	Open Space C	Composite C Value
Catchments	32.29	1.86	7.45	3.90	1.89	0.88	16.31	0.95	0.2	**0.57**

AMERICAN Engineering

4020 Westchase Boulevard Suite 450 Raleigh, NC 27607
OFFICE: 919.469.1101 | AMERICAN-EA.COM

Project Name:	**Moody**
Project Number:	**R210002**
Date:	**1/27/2025**
Calculated By:	**RC**
Checked By:	**JK**

Rip Rap Dissipater Calculations 10-Year Storm

Outlet ID	Pipe Diameter (in)	Pipe Velocity (fps)	Stone Class	Stone Depth (in)	Stone Material (tons)	Geo-Textile (SY)	Start Width (ft)	End Width (ft)	Length (ft)
FES 100	18	6.40	B	12	2	7	3	9	6
FES 125	24	3.36	B	12	3	11	4	12	8
FES OS 100	24	2.99	B	12	3	11	4	12	8
FES 110	15	3.65	B	12	2	7	WOD	WOD	5
FES 120	15	2.45	B	12	2	7	WOD	WOD	5
EW 101	36	4.69	I	18	13	30	6	18	12
FES OS 200	18	1.12	B	12	2	7	3	9	6
FES 203	18	2.53	B	12	2	7	3	9	6
FES 300	36	3.54	I	18	10	23	6	18	12
FES OS 300	24	8.21	I	18	4	12	4	12	8
FES 400	24	3.26	B	12	3	11	4	12	8
FES OS 400	24	6.40	B	12	3	11	4	12	8
FES 410	18	3.71	B	12	2	7	3	9	6
FES 420	15	0.49	B	12	2	7	WOD	WOD	5
FES 500	30	5.26	B	12	5	16	5	15	10
FES OS 500	24	3.88	B	12	3	11	4	12	8
FES 602	18	4.12	B	12	3	10	WOD	WOD	6
EW 610	54 (DBL)	7.33	I	18	40	75	16	16	40

Calculations were determined from NCDOT Detail 876.02 *Guide for Rip Rap at Pipe Outlets*

Values shown in table above are minimum quantities and dimensions

WOD is abbreviation for width of ditch

DBL is double barell pipe

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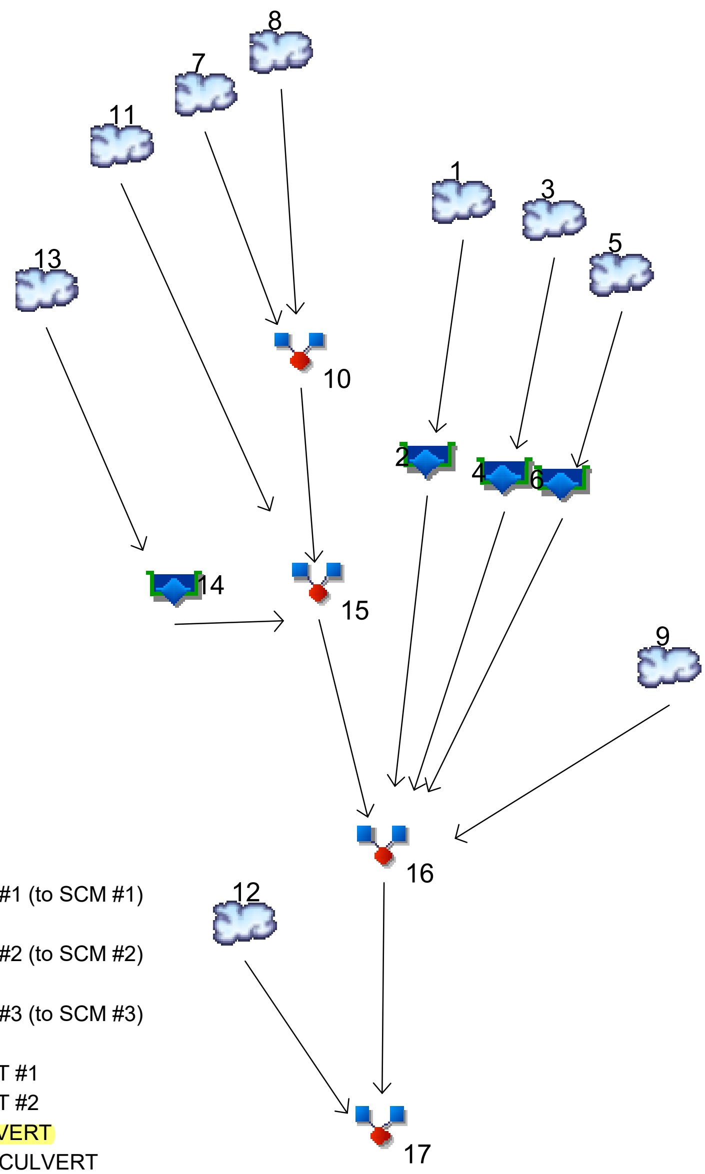
Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023



Legend

Hyd.	Origin	Description
1	SCS Runoff	MOODY POD 2A #1 (to SCM #1)
2	Reservoir	MOODY SCM #1
3	SCS Runoff	MOODY POD 2A #2 (to SCM #2)
4	Reservoir	MOODY SCM #2
5	SCS Runoff	MOODY POD 2A #3 (to SCM #3)
6	Reservoir	MOODY SCM #3
7	SCS Runoff	NCDOT CULVERT #1
8	SCS Runoff	NCDOT CULVERT #2
9	SCS Runoff	MULBERRY CULVERT
10	Combine	KALAS PHASE 2 CULVERT
11	SCS Runoff	OFFSITE BYPASS (FROM KALAS 2)
12	SCS Runoff	ONSITE BYPASS
13	SCS Runoff	KALAS 2 SCM7 POST DEV DA
14	Reservoir	KALAS 2 SCM #7A
15	Combine	POI 7
16	Combine	COMBINE AT ONSITE BYPASS
17	Combine	TANSLEY CULVERTS

Project: 20241205 Tansley Culvert Modeling Revised.gpw | Monday, 02 / 3 / 2025

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	------	21.66	27.42	-------	39.22	48.70	61.75	-------	82.71	MOODY POD 2A #1 (to SCM #1)
2	Reservoir	1	0.151	0.562	-------	2.821	7.835	25.24	-------	62.93	MOODY SCM #1
3	SCS Runoff	------	4.498	5.733	-------	8.245	10.26	13.07	-------	17.61	MOODY POD 2A #2 (to SCM #2)
4	Reservoir	3	0.025	0.028	-------	0.168	0.391	0.927	-------	5.790	MOODY SCM #2
5	SCS Runoff	------	19.16	24.35	-------	35.03	43.63	55.50	-------	74.57	MOODY POD 2A #3 (to SCM #3)
6	Reservoir	5	8.141	16.45	-------	30.37	32.96	46.77	-------	68.86	MOODY SCM #3
7	SCS Runoff	------	7.611	10.70	-------	17.34	22.96	31.01	-------	44.43	NCDOT CULVERT #1
8	SCS Runoff	------	7.949	11.16	-------	18.08	23.94	32.32	-------	46.30	NCDOT CULVERT #2
9	SCS Runoff	------	7.791	11.10	-------	18.31	24.42	33.20	-------	47.93	MULBERRY CULVERT
10	Combine	7, 8,	15.53	21.81	-------	35.33	46.78	63.17	-------	90.50	KALAS PHASE 2 CULVERT
11	SCS Runoff	------	12.63	16.51	-------	24.56	31.14	40.31	-------	55.22	OFFSITE BYPASS (FROM KALAS 2)
12	SCS Runoff	------	11.22	14.59	-------	21.62	27.36	35.35	-------	48.32	ONSITE BYPASS
13	SCS Runoff	------	16.09	20.70	-------	30.13	37.75	48.32	-------	65.36	KALAS 2 SCM7 POST DEV DA
14	Reservoir	13	0.248	0.319	-------	0.647	1.793	5.755	-------	24.08	KALAS 2 SCM #7A
15	Combine	10, 11, 14	21.01	29.09	-------	46.26	60.60	84.27	-------	138.29	POI 7
16	Combine	2, 4, 6, 9, 15	34.34	49.94	-------	82.09	116.84	166.08	-------	269.73	COMBINE AT ONSITE BYPASS
17	Combine	12, 16	42.01	62.16	-------	101.28	135.24	194.15	-------	312.87	TANSLEY CULVERTS

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

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	48.70	1	718	104,269	------	------	------	MOODY POD 2A #1 (to SCM #1)
2	Reservoir	7.835	1	730	74,620	1	366.27	96,189	MOODY SCM #1
3	SCS Runoff	10.26	1	718	21,027	------	------	------	MOODY POD 2A #2 (to SCM #2)
4	Reservoir	0.391	1	815	12,037	3	362.97	29,182	MOODY SCM #2
5	SCS Runoff	43.63	1	718	93,232	------	------	------	MOODY POD 2A #3 (to SCM #3)
6	Reservoir	32.96	1	722	85,555	5	363.89	39,351	MOODY SCM #3
7	SCS Runoff	22.96	1	743	128,914	------	------	------	NCDOT CULVERT #1
8	SCS Runoff	23.94	1	745	141,854	------	------	------	NCDOT CULVERT #2
9	SCS Runoff	24.42	1	735	110,272	------	------	------	MULBERRY CULVERT
10	Combine	46.78	1	744	270,767	7, 8,	------	------	KALAS PHASE 2 CULVERT
11	SCS Runoff	31.14	1	725	97,228	------	------	------	OFFSITE BYPASS (FROM KALAS 2)
12	SCS Runoff	27.36	1	720	66,239	------	------	------	ONSITE BYPASS
13	SCS Runoff	37.75	1	721	95,690	------	------	------	KALAS 2 SCM7 POST DEV DA
14	Reservoir	1.793	1	819	68,016	13	374.10	60,603	KALAS 2 SCM #7A
15	Combine	60.60	1	730	436,011	10, 11, 14	------	------	POI 7
16	Combine	116.84	1	726	718,494	2, 4, 6, 9, 15	------	------	COMBINE AT ONSITE BYPASS
17	Combine	135.24	1	725	784,733	12, 16	------	------	TANSLEY CULVERTS

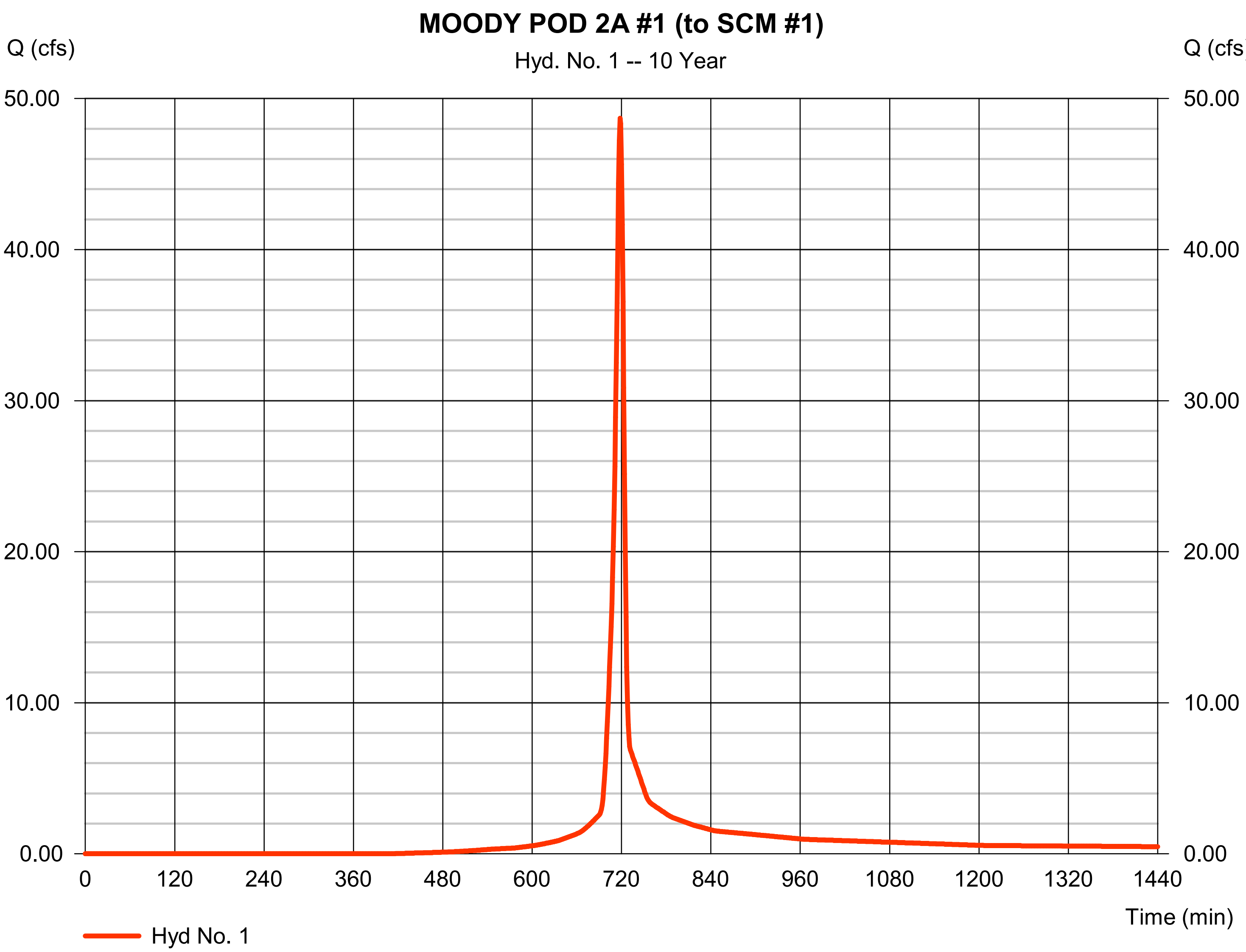
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 1

MOODY POD 2A #1 (to SCM #1)

Hydrograph type	= SCS Runoff	Peak discharge	= 48.70 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 104,269 cuft
Drainage area	= 9.780 ac	Curve number	= 81.1
Basin Slope	= 2.4 %	Hydraulic length	= 1000 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 6.69 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

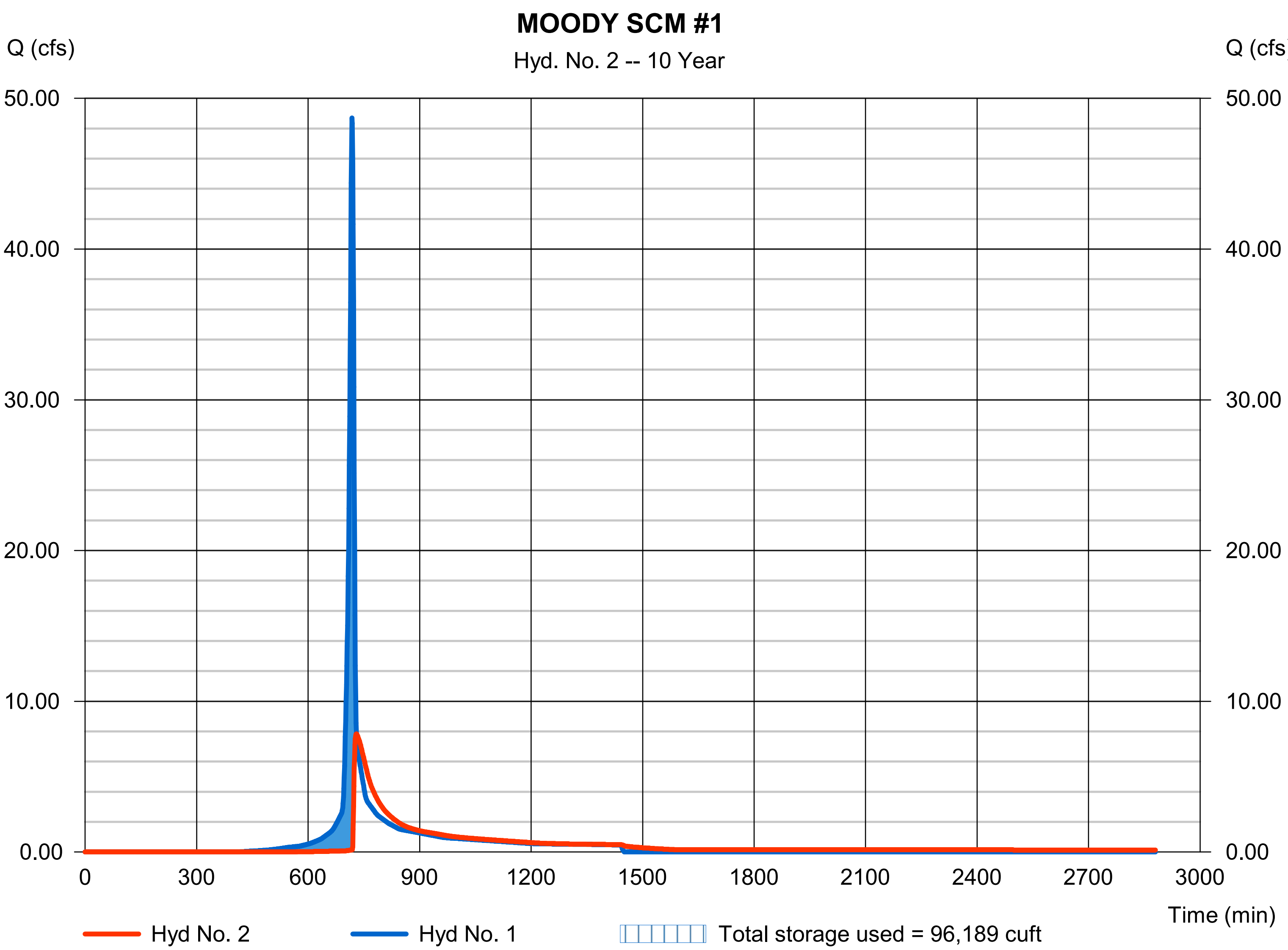
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 2

MOODY SCM #1

Hydrograph type	= Reservoir	Peak discharge	= 7.835 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 1 min	Hyd. volume	= 74,620 cuft
Inflow hyd. No.	= 1 - MOODY POD 2A #1 (to SCM #1)	Max. Elevation	= 366.27 ft
Reservoir name	= SCM #1	Max. Storage	= 96,189 cuft

Storage Indication method used. Wet pond routing start elevation = 363.50 ft.



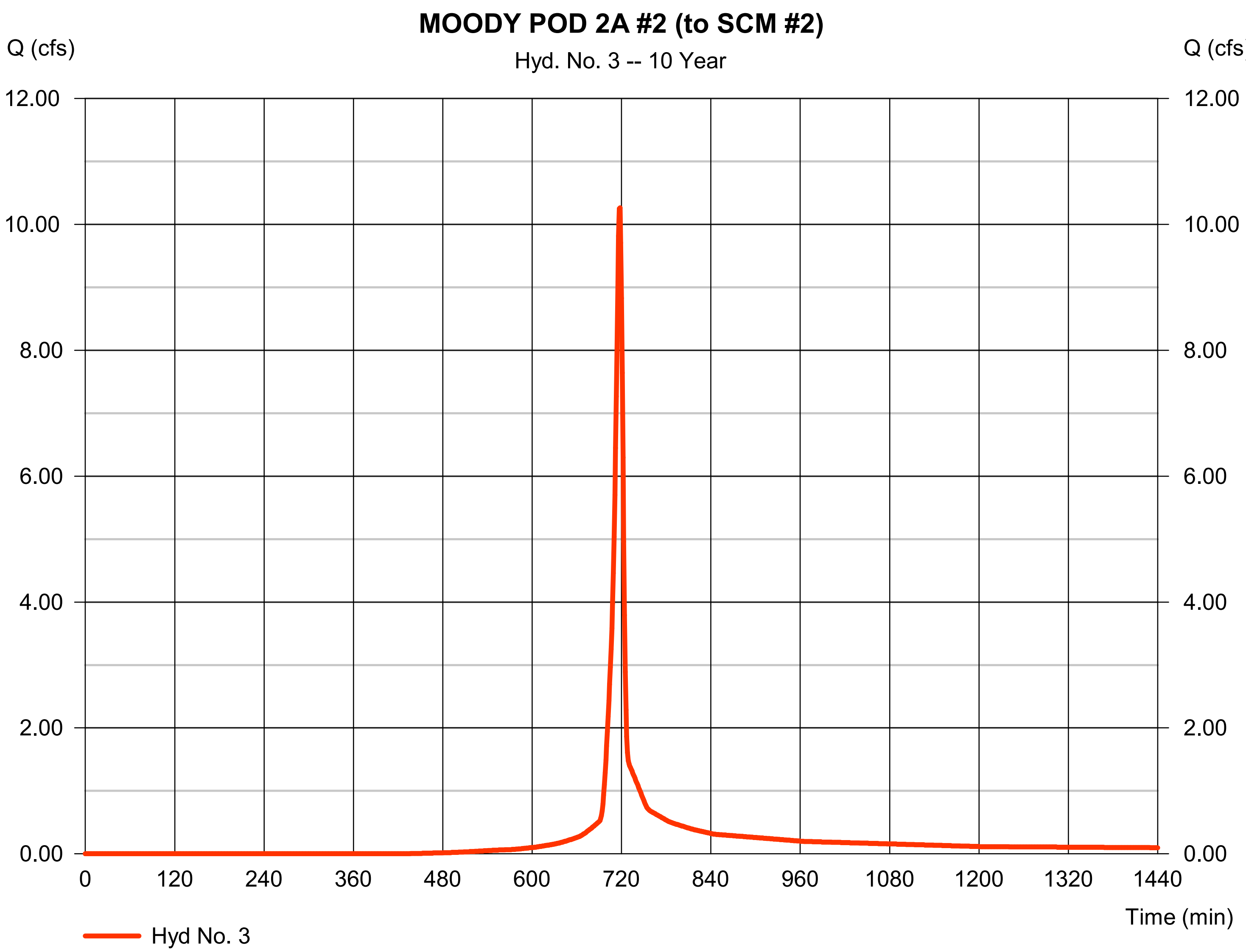
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 3

MOODY POD 2A #2 (to SCM #2)

Hydrograph type	= SCS Runoff	Peak discharge	= 10.26 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 21,027 cuft
Drainage area	= 1.930 ac	Curve number	= 80
Basin Slope	= 0.5 %	Hydraulic length	= 450 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



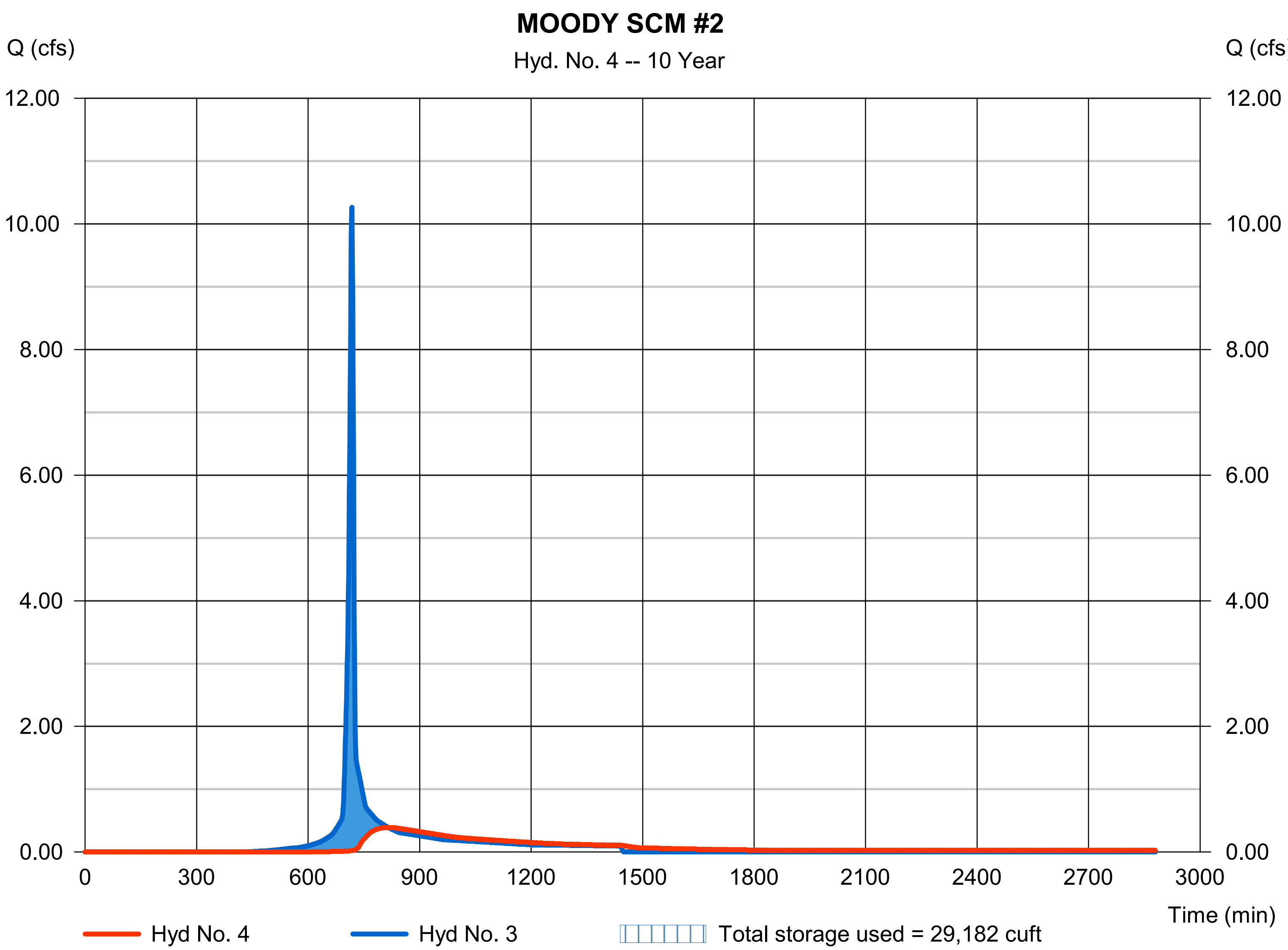
Hydrograph Report

Hyd. No. 4

MOODY SCM #2

Hydrograph type	= Reservoir	Peak discharge	= 0.391 cfs
Storm frequency	= 10 yrs	Time to peak	= 815 min
Time interval	= 1 min	Hyd. volume	= 12,037 cuft
Inflow hyd. No.	= 3 - MOODY POD 2A #2 (to SCM #2)	Max. Elevation	= 362.97 ft
Reservoir name	= SCM #2	Max. Storage	= 29,182 cuft

Storage Indication method used. Wet pond routing start elevation = 361.50 ft.

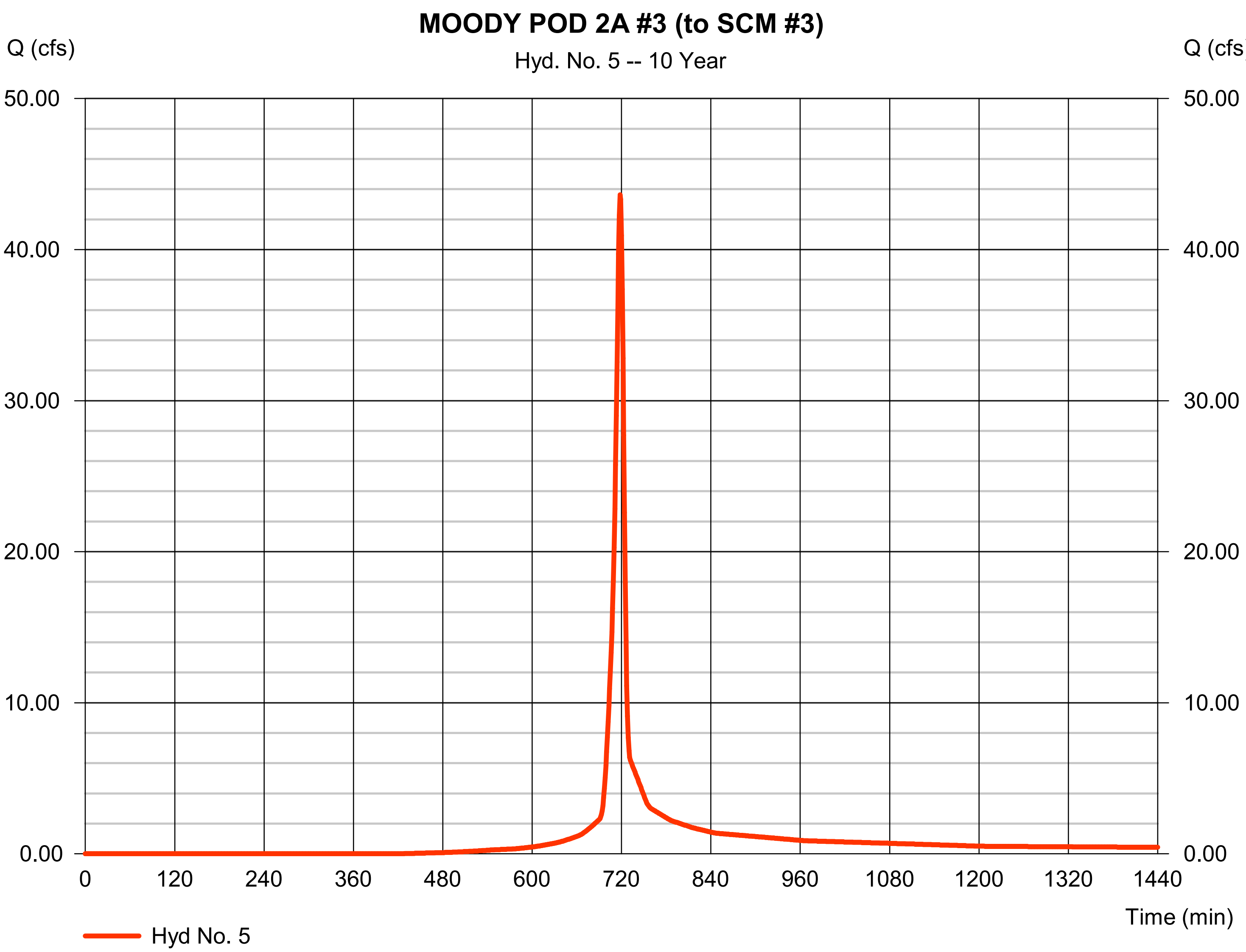


Hydrograph Report

Hyd. No. 5

MOODY POD 2A #3 (to SCM #3)

Hydrograph type	= SCS Runoff	Peak discharge	= 43.63 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 93,232 cuft
Drainage area	= 8.910 ac	Curve number	= 80.5
Basin Slope	= 2.6 %	Hydraulic length	= 1120 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 7.08 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

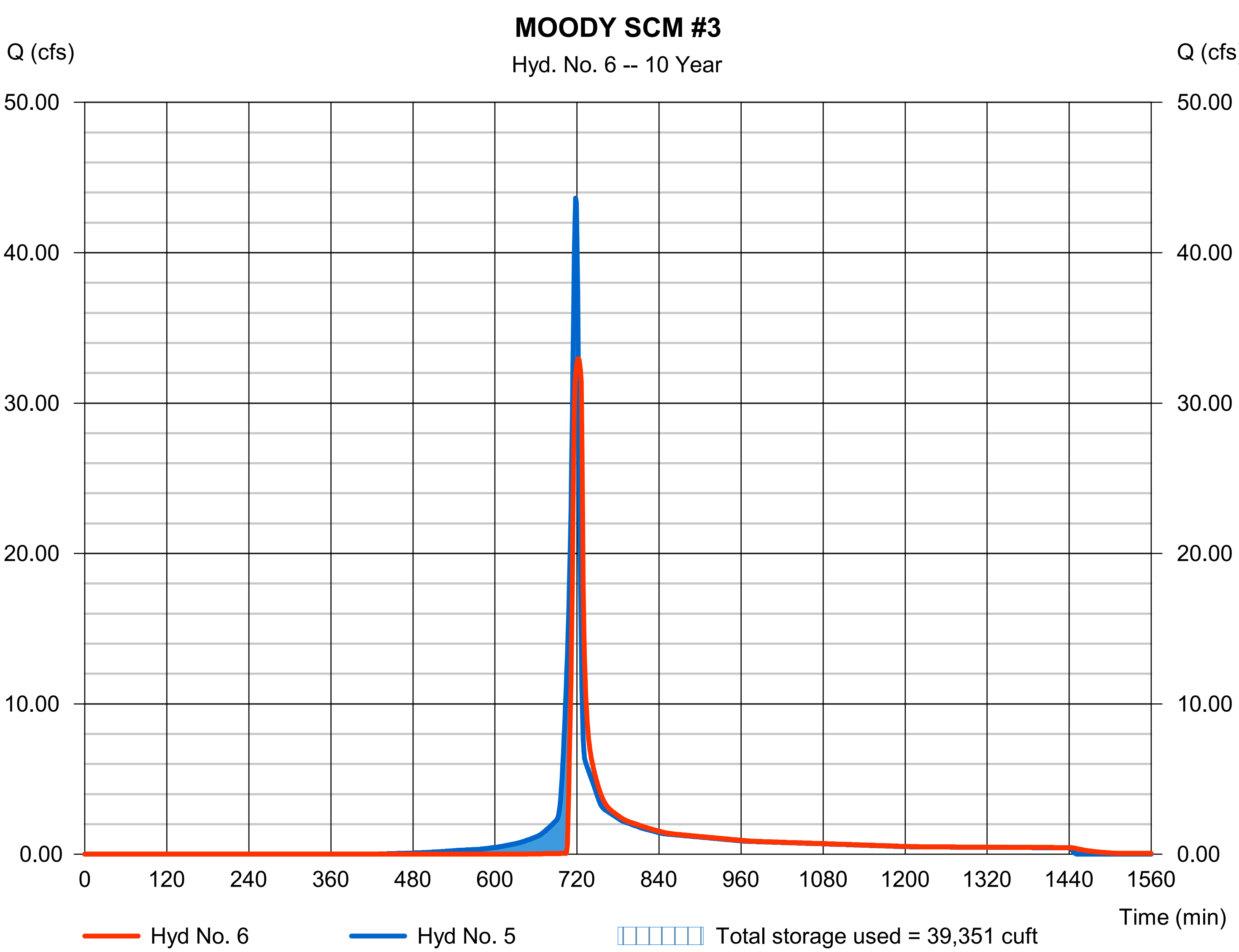
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 6

MOODY SCM #3

Hydrograph type	= Reservoir	Peak discharge	= 32.96 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 85,555 cuft
Inflow hyd. No.	= 5 - MOODY POD 2A #3 (to SCM #3)	Max. Elevation	= 363.89 ft
Reservoir name	= SCM #3	Max. Storage	= 39,351 cuft

Storage Indication method used. Wet pond routing start elevation = 361.00 ft.



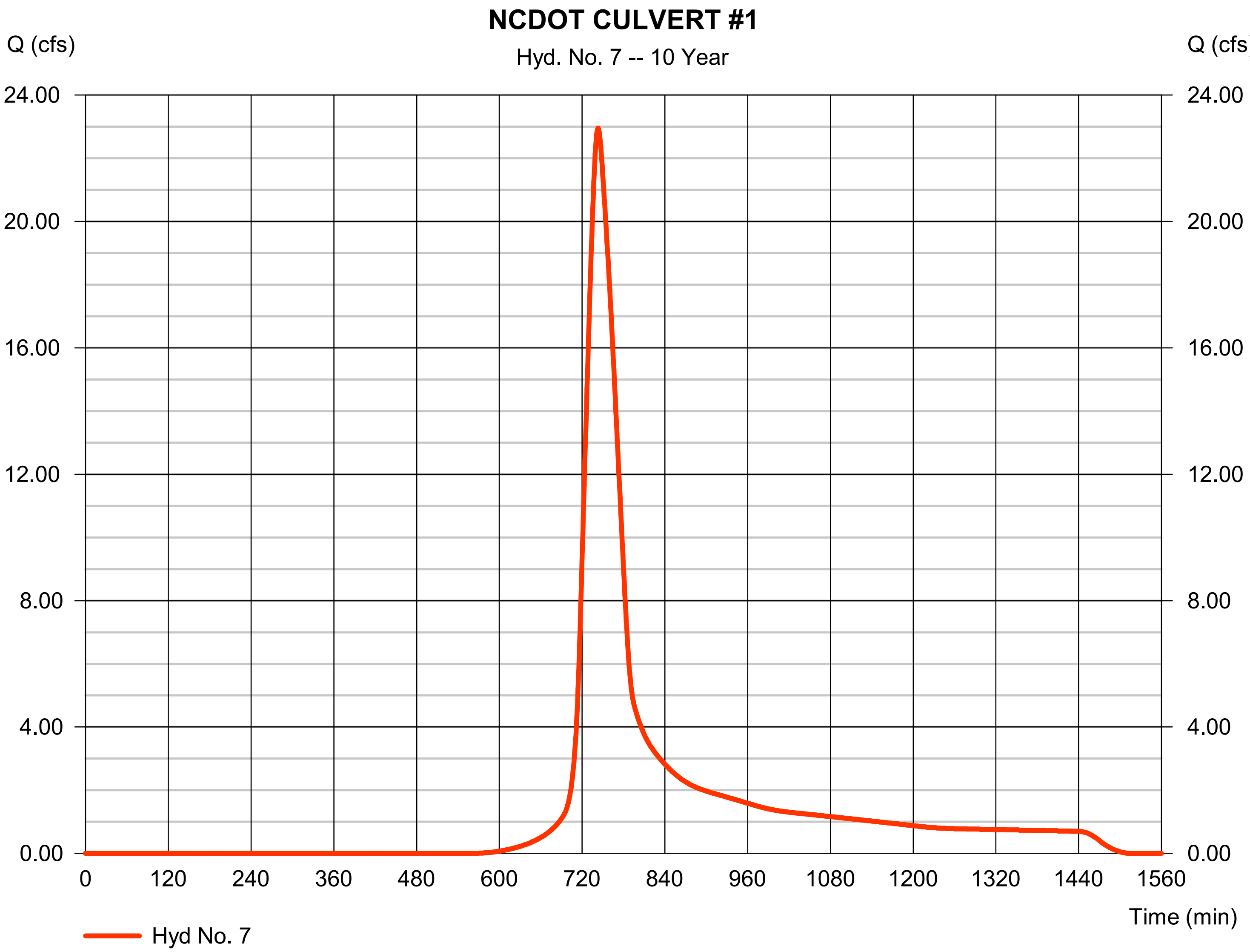
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 | Monday, 02 / 3 / 2025

Hyd. No. 7

NCDOT CULVERT #1

Hydrograph type	= SCS Runoff	Peak discharge	= 22.96 cfs
Storm frequency	= 10 yrs	Time to peak	= 743 min
Time interval	= 1 min	Hyd. volume	= 128,914 cuft
Drainage area	= 15.820 ac	Curve number	= 72.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 49.03 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

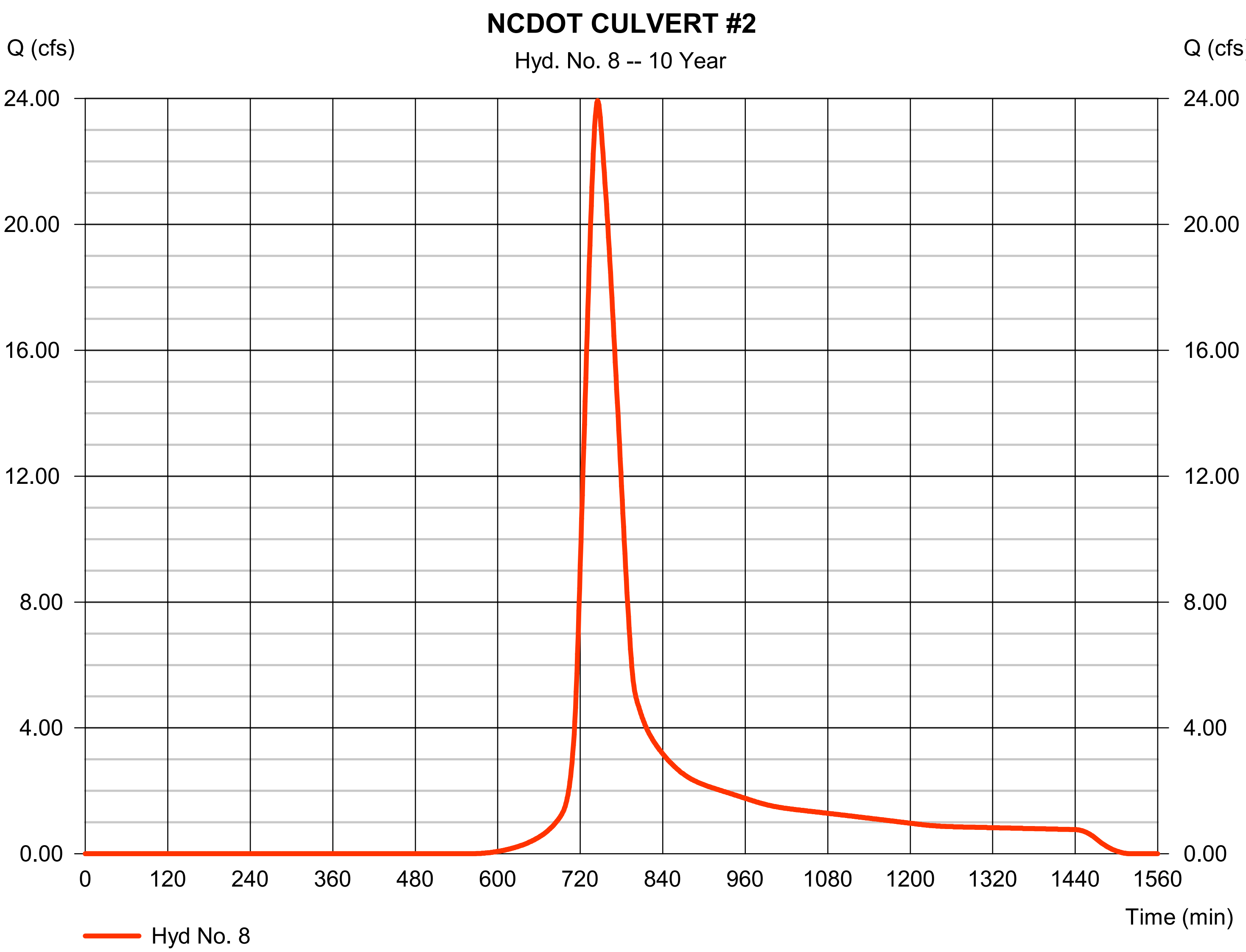


Hydrograph Report

Hyd. No. 8

NCDOT CULVERT #2

Hydrograph type	= SCS Runoff	Peak discharge	= 23.94 cfs
Storm frequency	= 10 yrs	Time to peak	= 745 min
Time interval	= 1 min	Hyd. volume	= 141,854 cuft
Drainage area	= 17.200 ac	Curve number	= 72.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 50.89 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

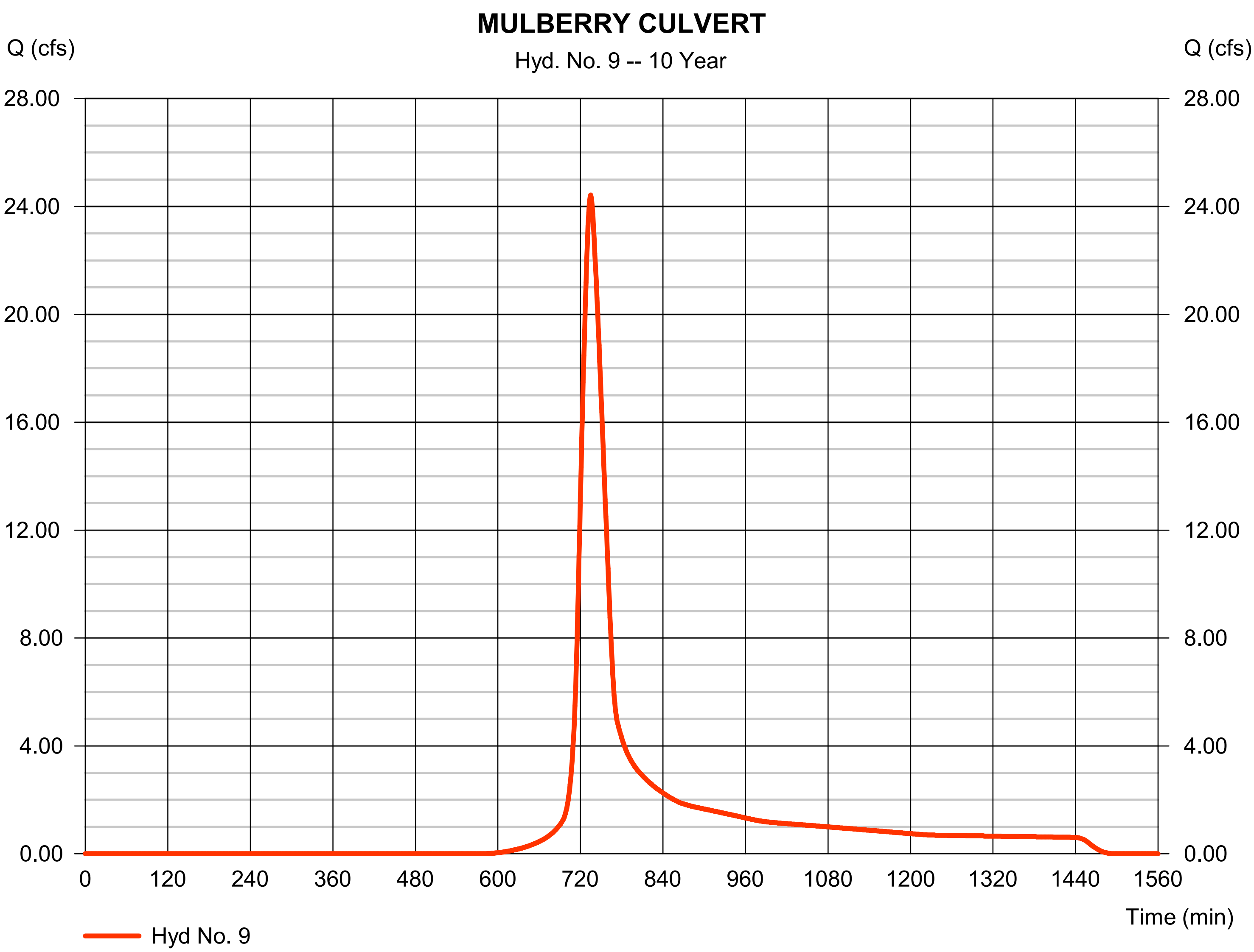


Hydrograph Report

Hyd. No. 9

MULBERRY CULVERT

Hydrograph type	= SCS Runoff	Peak discharge	= 24.42 cfs
Storm frequency	= 10 yrs	Time to peak	= 735 min
Time interval	= 1 min	Hyd. volume	= 110,272 cuft
Drainage area	= 14.090 ac	Curve number	= 71.3
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 34.74 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



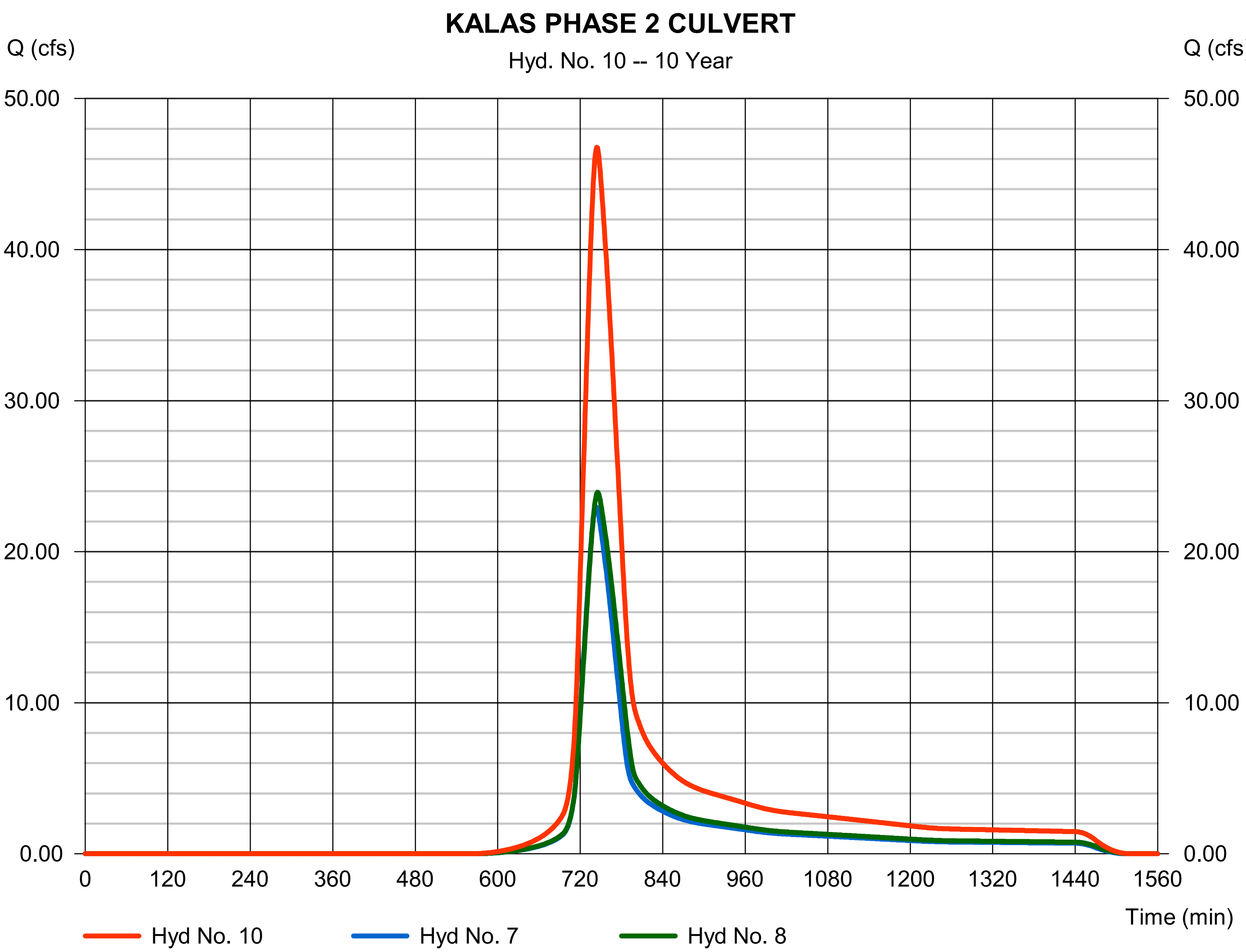
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 10

KALAS PHASE 2 CULVERT

Hydrograph type	= Combine	Peak discharge	= 46.78 cfs
Storm frequency	= 10 yrs	Time to peak	= 744 min
Time interval	= 1 min	Hyd. volume	= 270,767 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 33.020 ac

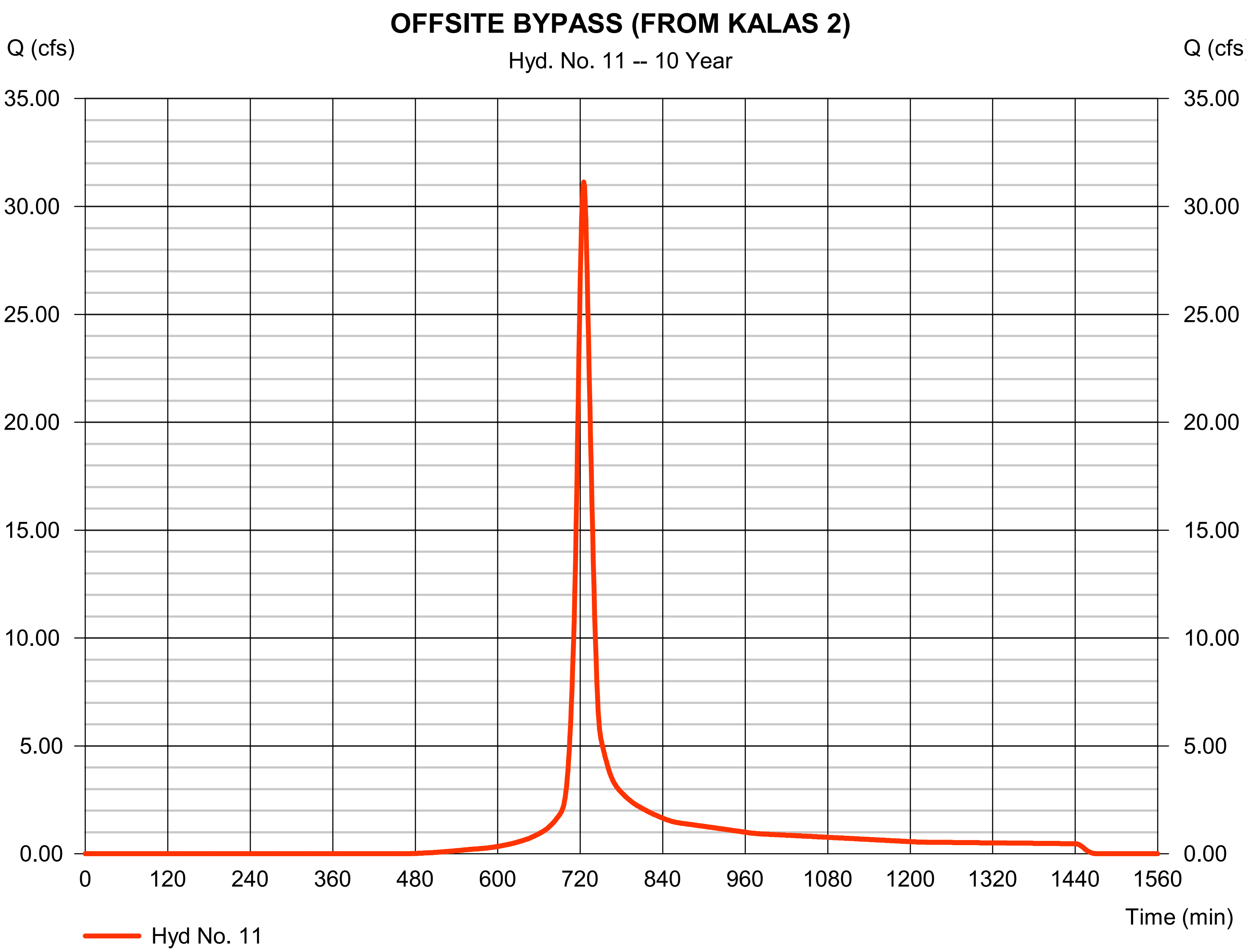


Hydrograph Report

Hyd. No. 11

OFFSITE BYPASS (FROM KALAS 2)

Hydrograph type	= SCS Runoff	Peak discharge	= 31.14 cfs
Storm frequency	= 10 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 97,228 cuft
Drainage area	= 9.720 ac	Curve number	= 78.3
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.90 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

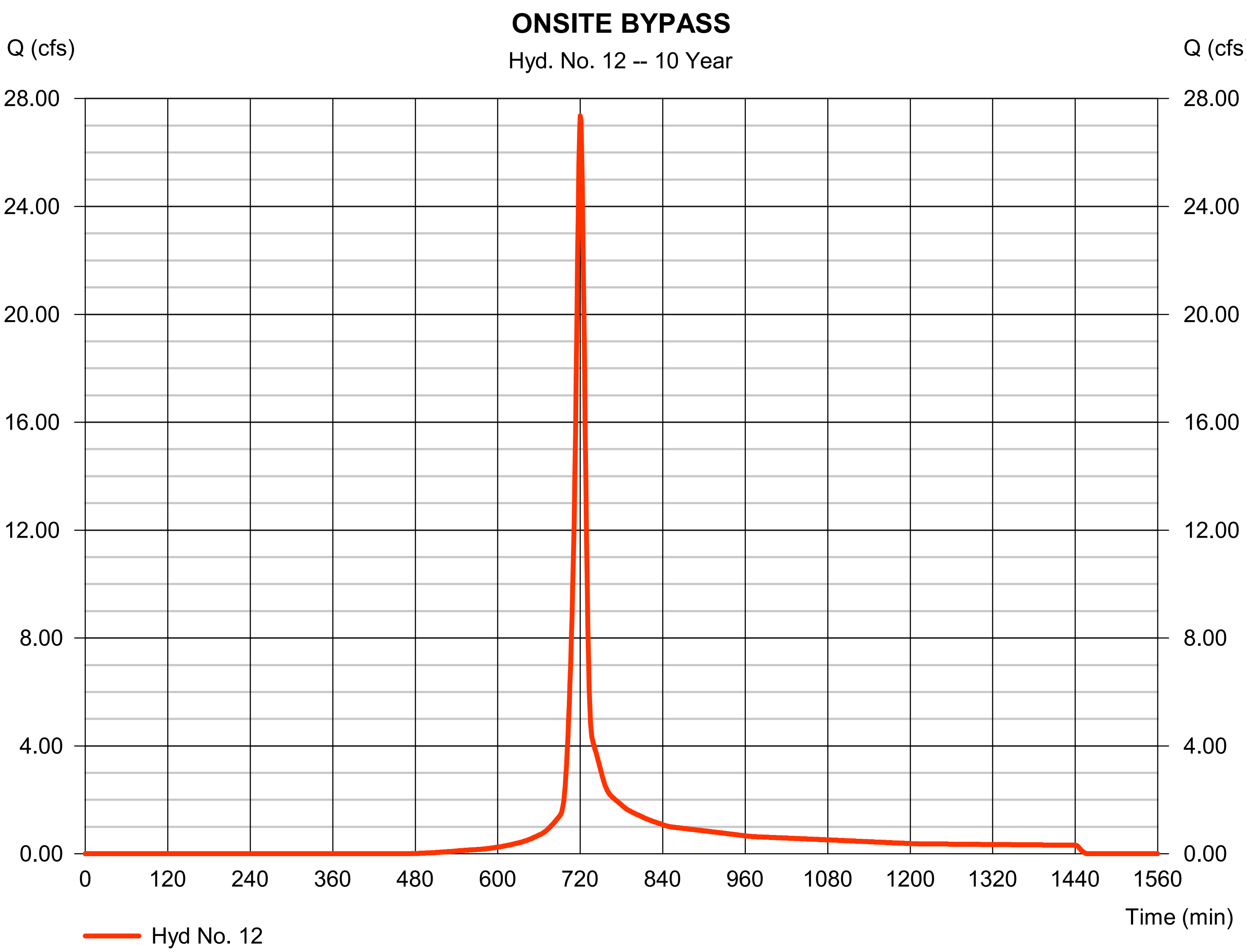


Hydrograph Report

Hyd. No. 12

ONSITE BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 27.36 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 66,239 cuft
Drainage area	= 6.570 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 11.56 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

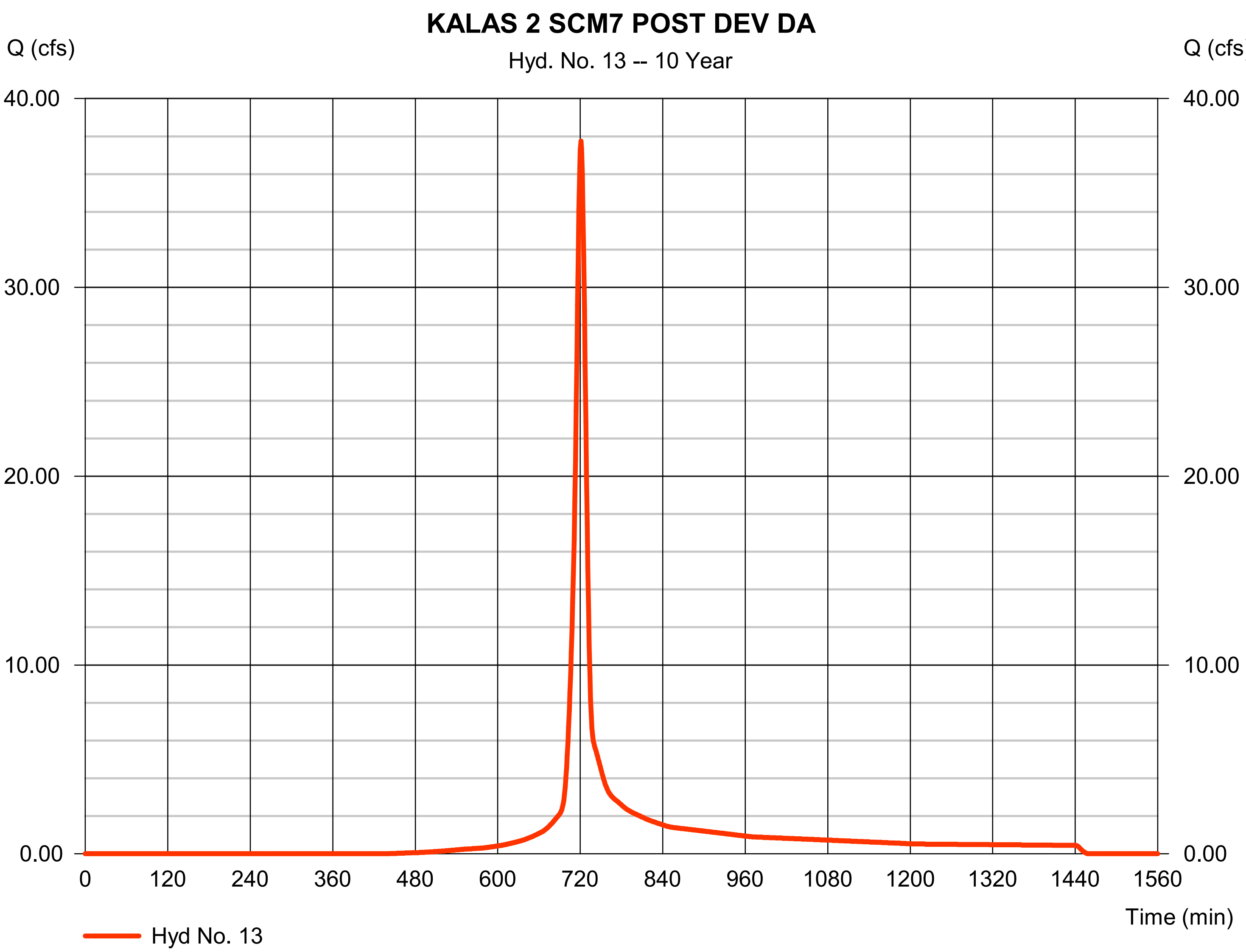


Hydrograph Report

Hyd. No. 13

KALAS 2 SCM7 POST DEV DA

Hydrograph type	= SCS Runoff	Peak discharge	= 37.75 cfs
Storm frequency	= 10 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 95,690 cuft
Drainage area	= 9.260 ac	Curve number	= 79.8
Basin Slope	= 1.1 %	Hydraulic length	= 1505 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 12.38 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

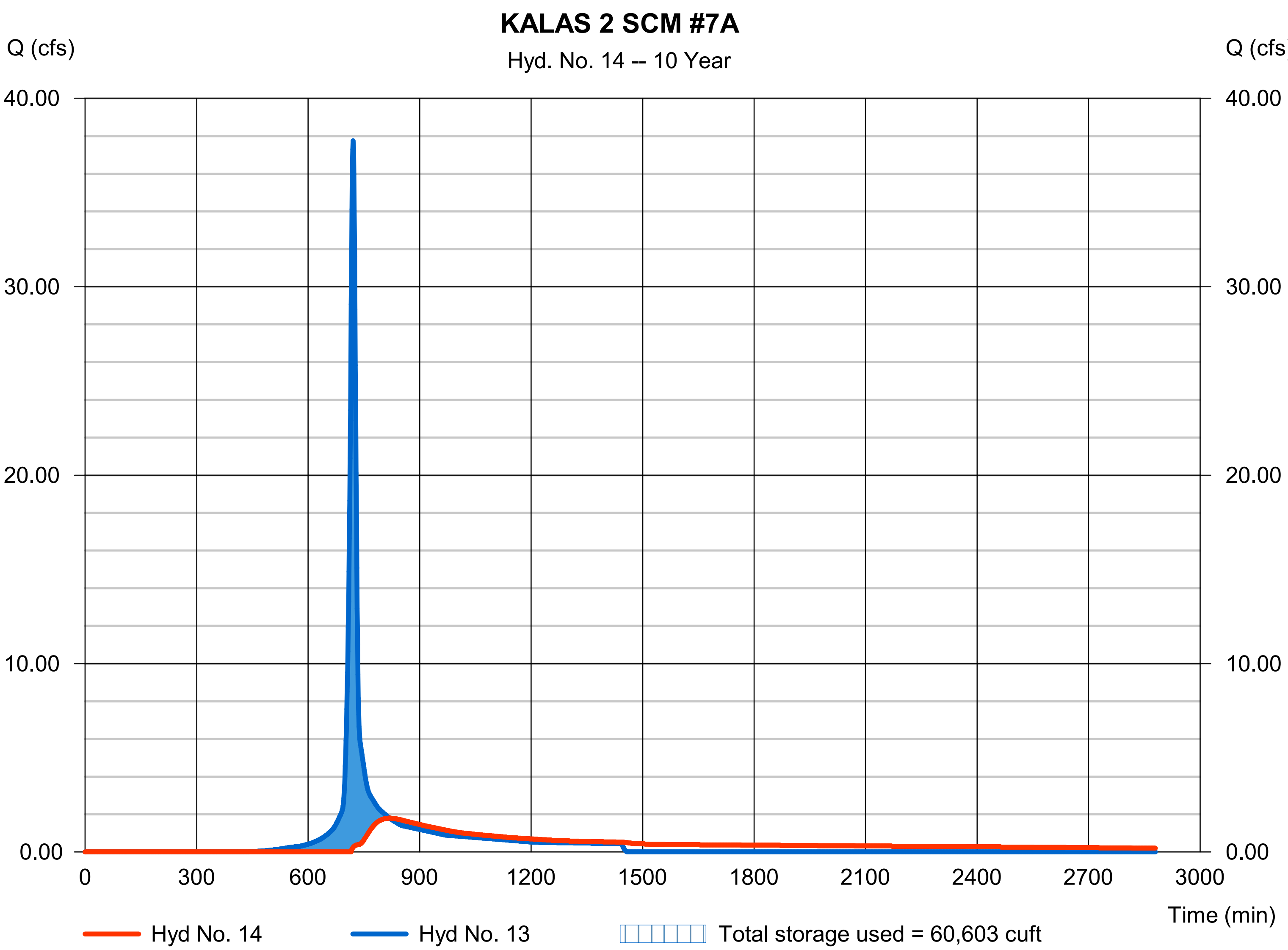
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 — Monday, 02 / 3 / 2025

Hyd. No. 14

KALAS 2 SCM #7A

Hydrograph type	= Reservoir	Peak discharge	= 1.793 cfs
Storm frequency	= 10 yrs	Time to peak	= 819 min
Time interval	= 1 min	Hyd. volume	= 68,016 cuft
Inflow hyd. No.	= 13 - KALAS 2 SCM7 POST DEV DA	Max. Elevation	= 374.10 ft
Reservoir name	= SCM #7A	Max. Storage	= 60,603 cuft

Storage Indication method used.



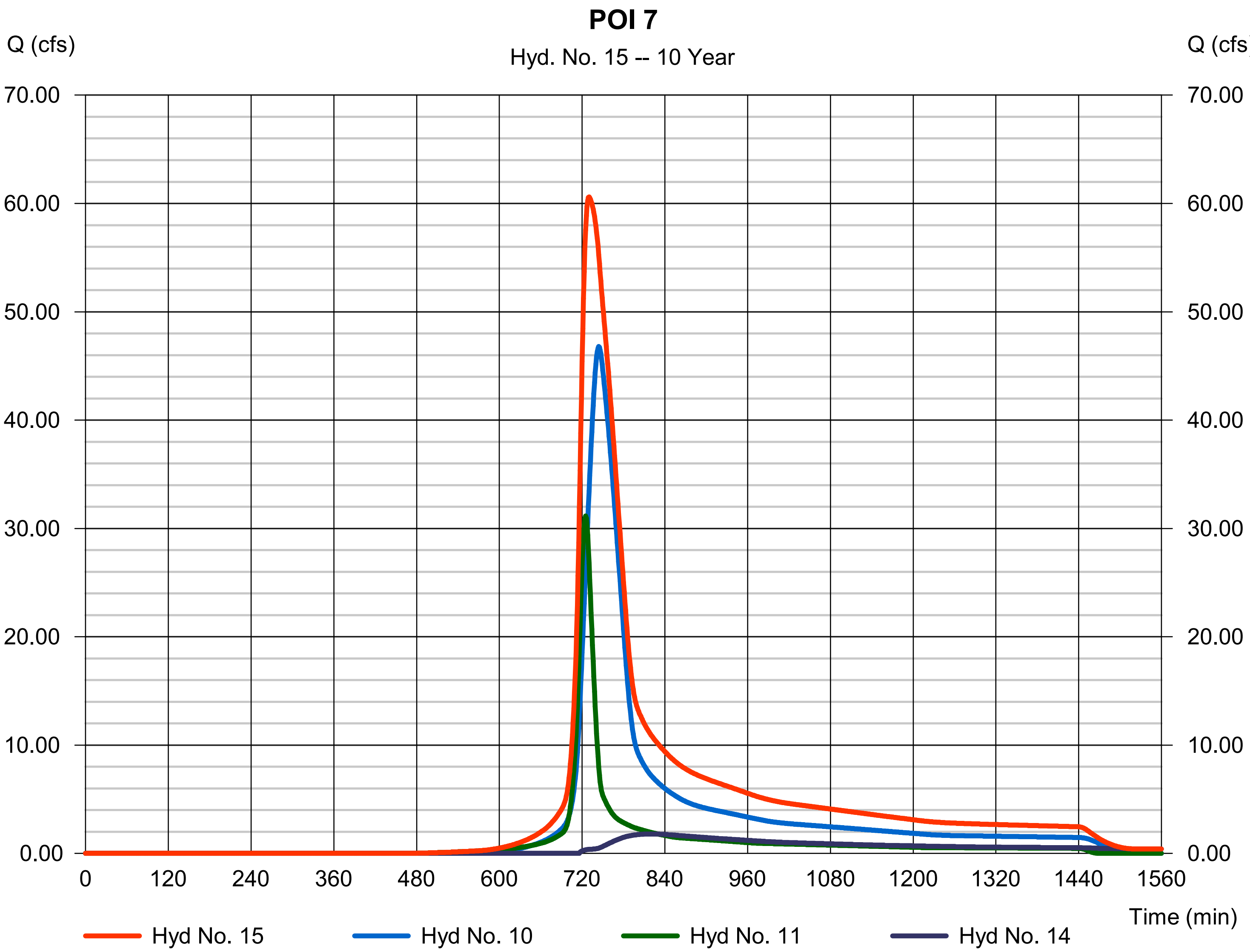
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 15

POI 7

Hydrograph type	= Combine	Peak discharge	= 60.60 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 1 min	Hyd. volume	= 436,011 cuft
Inflow hyds.	= 10, 11, 14	Contrib. drain. area	= 9.720 ac

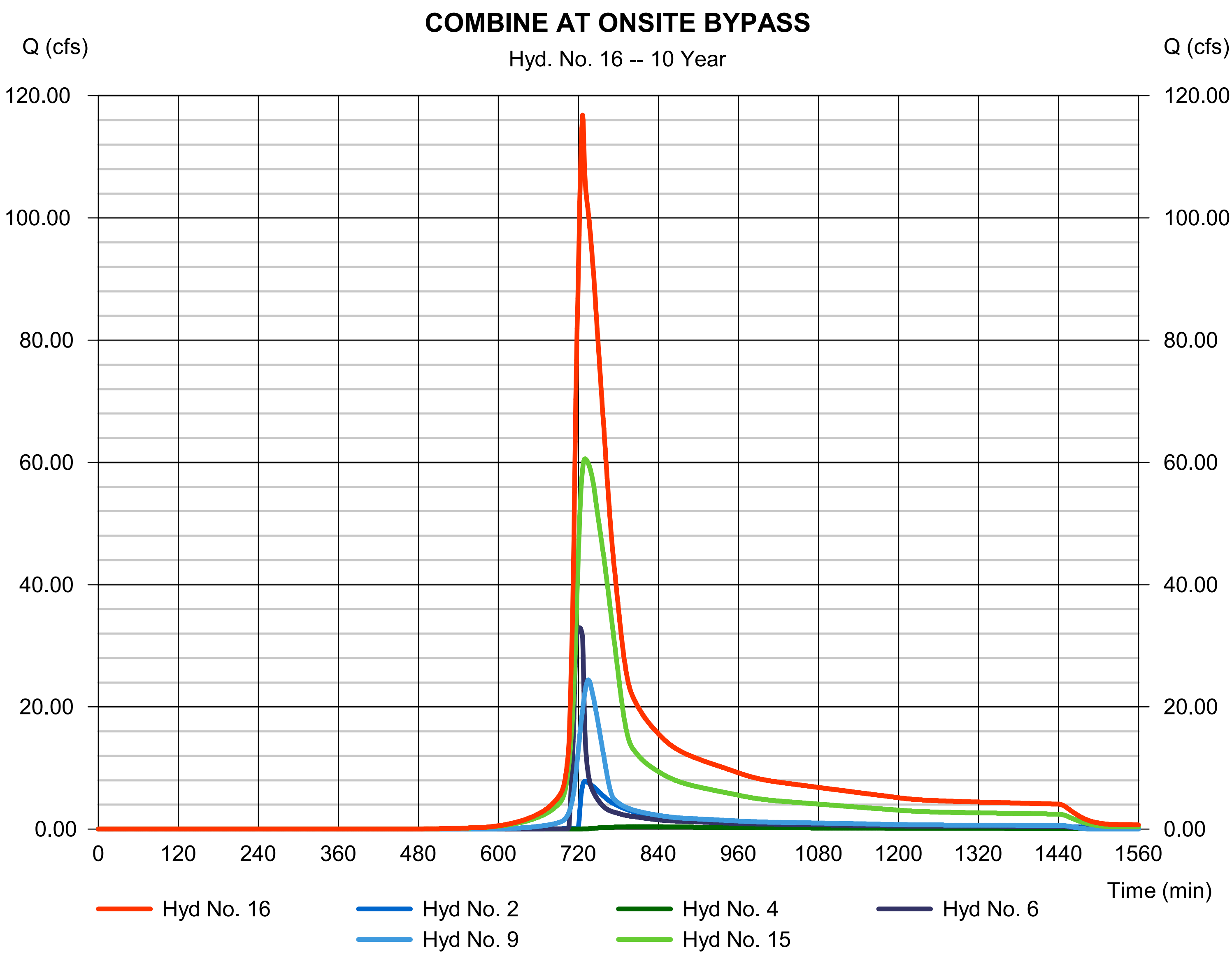


Hydrograph Report

Hyd. No. 16

COMBINE AT ONSITE BYPASS

Hydrograph type	= Combine	Peak discharge	= 116.84 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 718,494 cuft
Inflow hyds.	= 2, 4, 6, 9, 15	Contrib. drain. area	= 14.090 ac



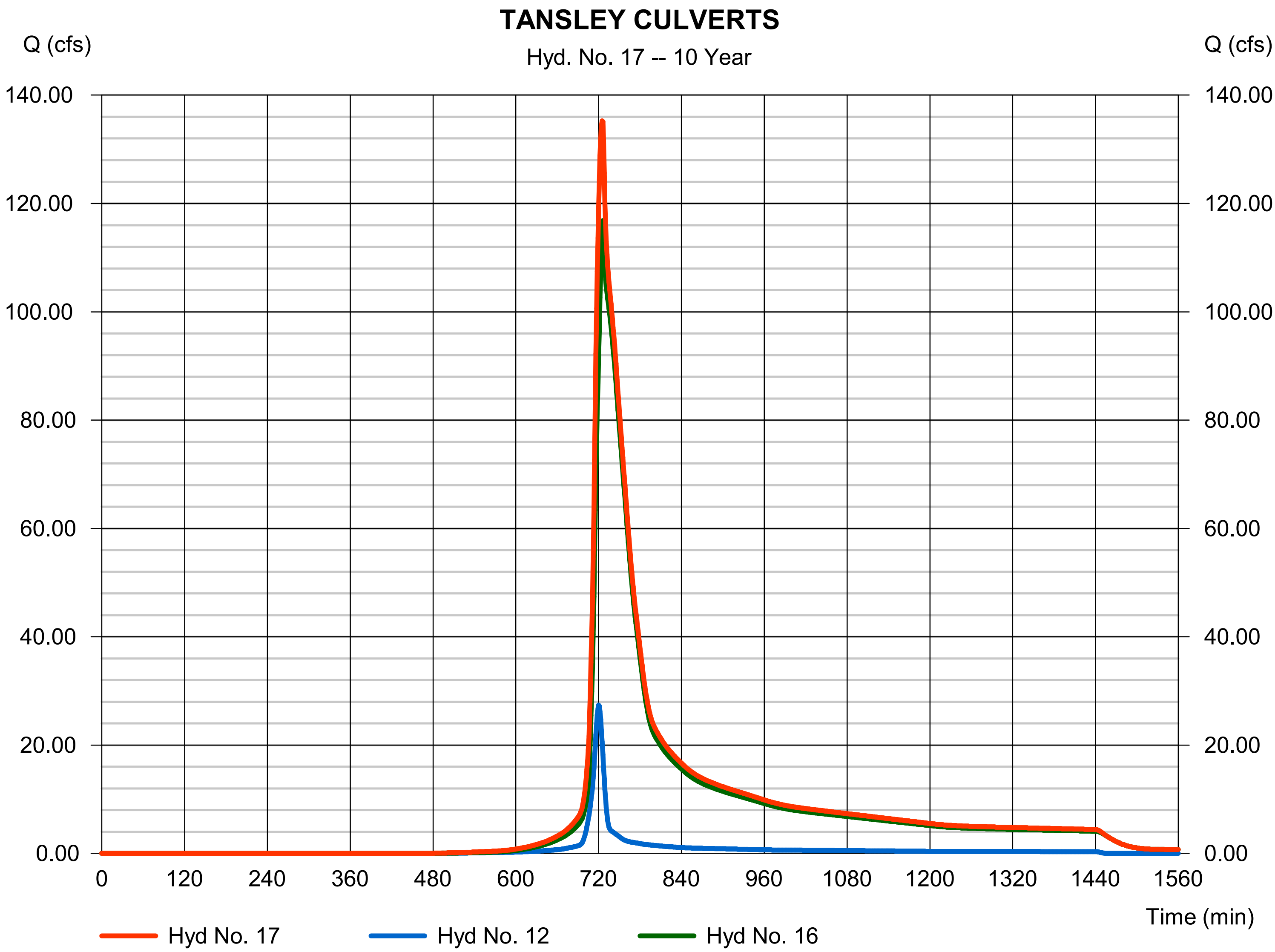
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 17

TANSLEY CULVERTS

Hydrograph type	= Combine	Peak discharge	= 135.24 cfs
Storm frequency	= 10 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 784,733 cuft
Inflow hyds.	= 12, 16	Contrib. drain. area	= 6.570 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

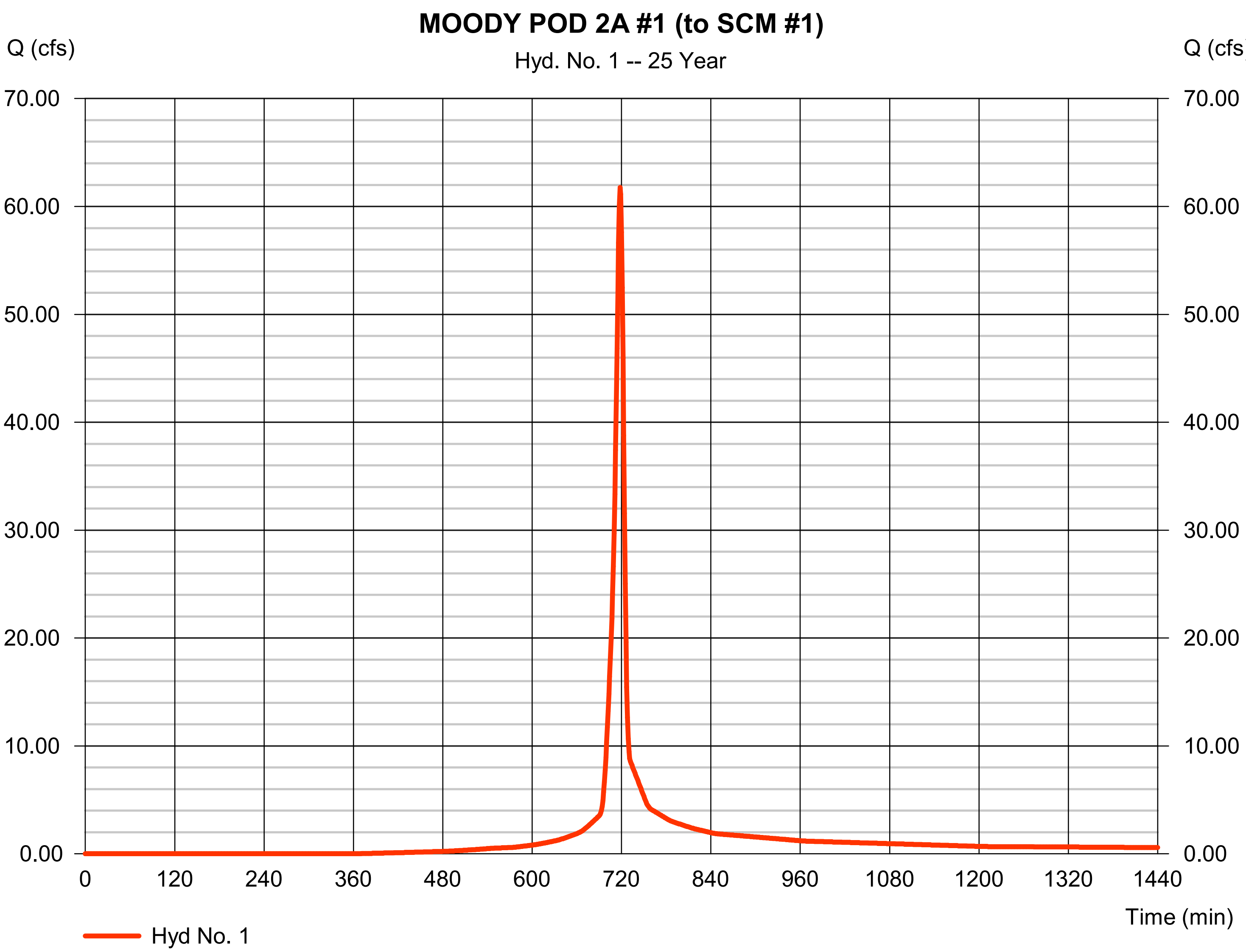
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	61.75	1	718	133,525	------	------	------	MOODY POD 2A #1 (to SCM #1)
2	Reservoir	25.24	1	725	103,820	1	366.68	105,506	MOODY SCM #1
3	SCS Runoff	13.07	1	717	27,058	------	------	------	MOODY POD 2A #2 (to SCM #2)
4	Reservoir	0.927	1	754	18,037	3	363.16	31,251	MOODY SCM #2
5	SCS Runoff	55.50	1	718	119,710	------	------	------	MOODY POD 2A #3 (to SCM #3)
6	Reservoir	46.77	1	721	112,023	5	364.19	42,427	MOODY SCM #3
7	SCS Runoff	31.01	1	743	171,988	------	------	------	NCDOT CULVERT #1
8	SCS Runoff	32.32	1	745	189,153	------	------	------	NCDOT CULVERT #2
9	SCS Runoff	33.20	1	735	148,052	------	------	------	MULBERRY CULVERT
10	Combine	63.17	1	744	361,141	7, 8,	------	------	KALAS PHASE 2 CULVERT
11	SCS Runoff	40.31	1	725	126,090	------	------	------	OFFSITE BYPASS (FROM KALAS 2)
12	SCS Runoff	35.35	1	720	86,021	------	------	------	ONSITE BYPASS
13	SCS Runoff	48.32	1	721	123,250	------	------	------	KALAS 2 SCM7 POST DEV DA
14	Reservoir	5.755	1	749	95,254	13	374.60	68,006	KALAS 2 SCM #7A
15	Combine	84.27	1	734	582,485	10, 11, 14	------	------	POI 7
16	Combine	166.08	1	728	964,417	2, 4, 6, 9, 15	------	------	COMBINE AT ONSITE BYPASS
17	Combine	194.15	1	723	1,050,437	12, 16	------	------	TANSLEY CULVERTS

Hydrograph Report

Hyd. No. 1

MOODY POD 2A #1 (to SCM #1)

Hydrograph type	= SCS Runoff	Peak discharge	= 61.75 cfs
Storm frequency	= 25 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 133,525 cuft
Drainage area	= 9.780 ac	Curve number	= 81.1
Basin Slope	= 2.4 %	Hydraulic length	= 1000 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 6.69 min
Total precip.	= 5.96 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

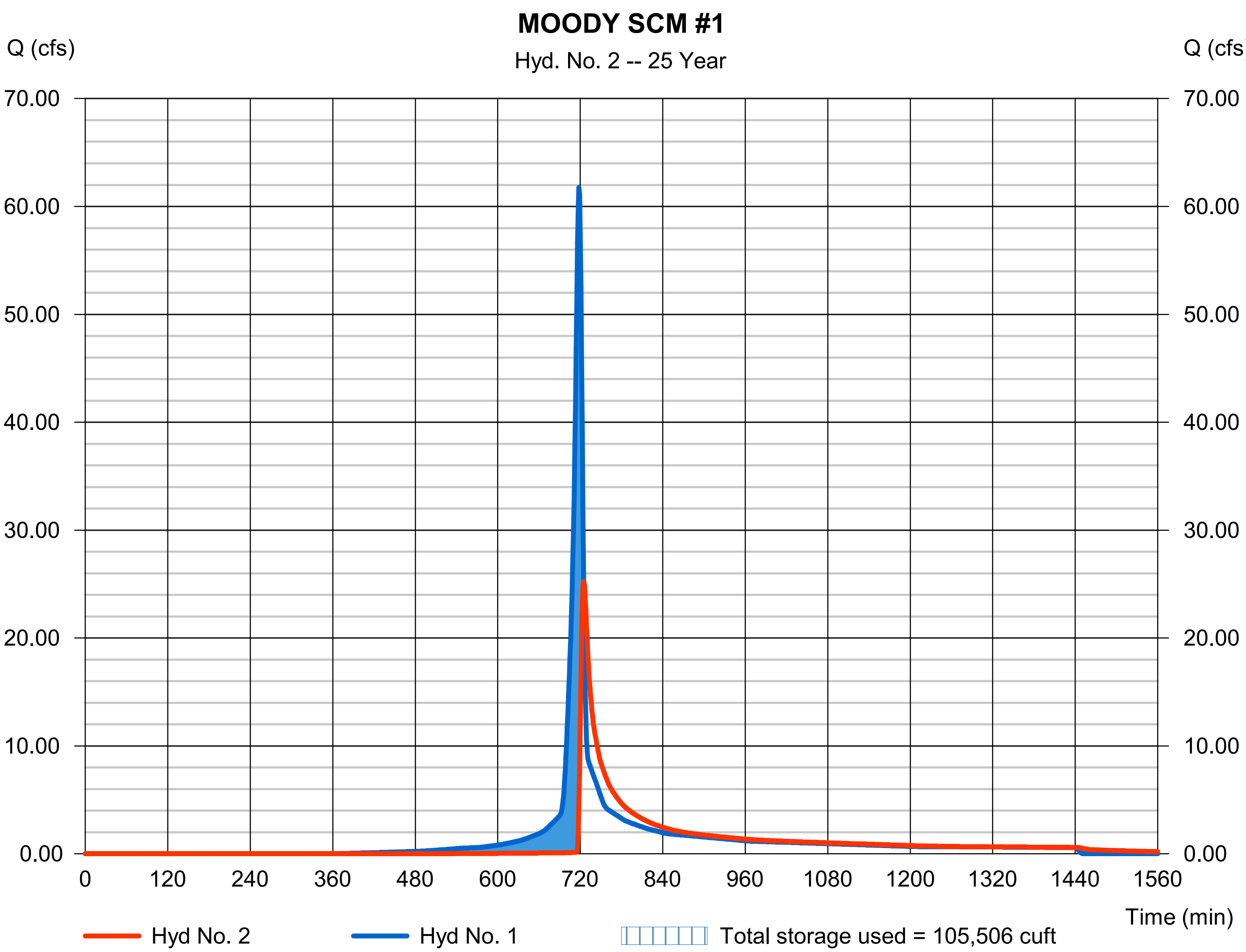
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 | Monday, 02 / 3 / 2025

Hyd. No. 2

MOODY SCM #1

Hydrograph type	= Reservoir	Peak discharge	= 25.24 cfs
Storm frequency	= 25 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 103,820 cuft
Inflow hyd. No.	= 1 - MOODY POD 2A #1 (to SCM #1)	Max. Elevation	= 366.68 ft
Reservoir name	= SCM #1	Max. Storage	= 105,506 cuft

Storage Indication method used. Wet pond routing start elevation = 363.50 ft.



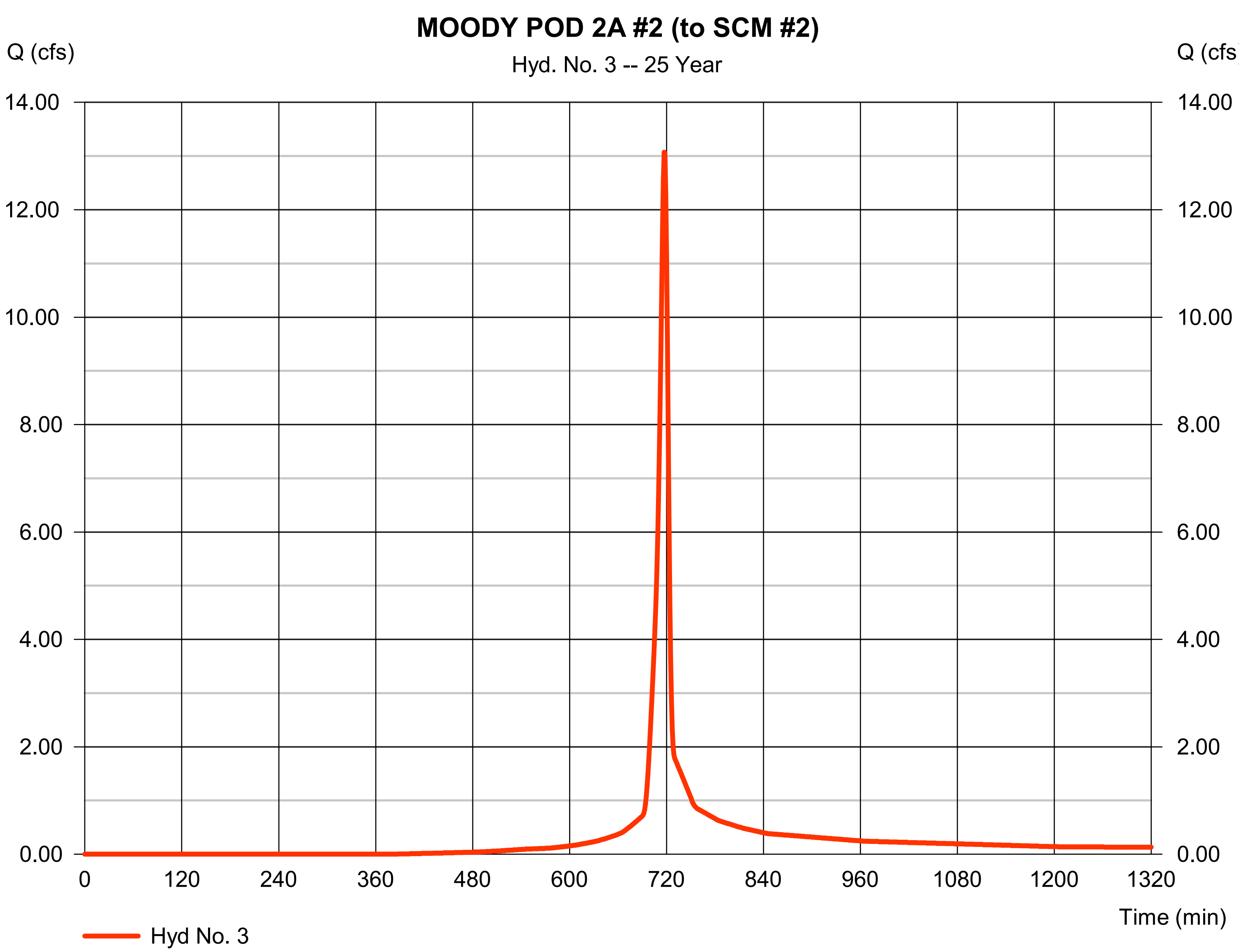
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 3

MOODY POD 2A #2 (to SCM #2)

Hydrograph type	= SCS Runoff	Peak discharge	= 13.07 cfs
Storm frequency	= 25 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 27,058 cuft
Drainage area	= 1.930 ac	Curve number	= 80
Basin Slope	= 0.5 %	Hydraulic length	= 450 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.96 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

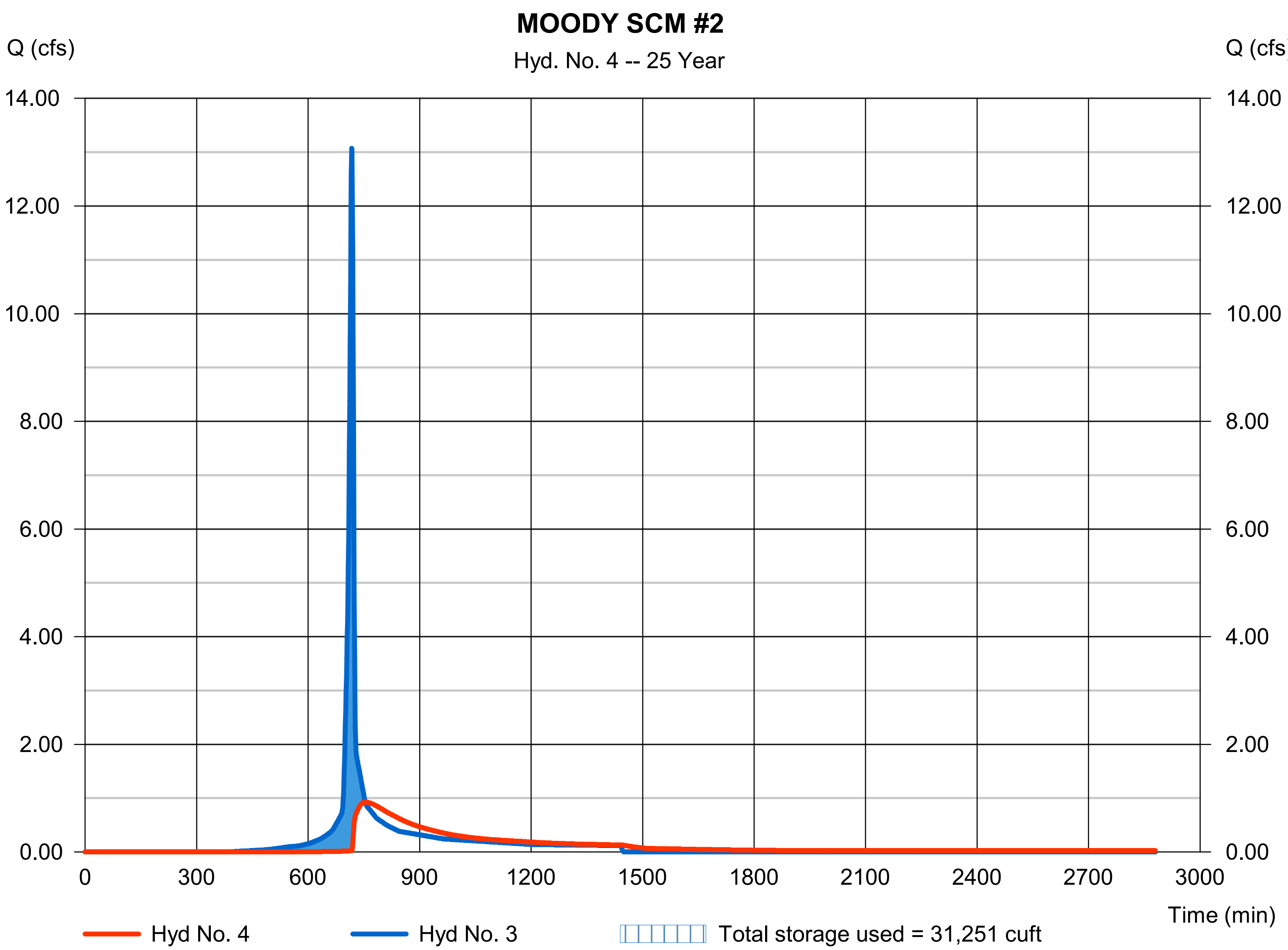
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 4

MOODY SCM #2

Hydrograph type	= Reservoir	Peak discharge	= 0.927 cfs
Storm frequency	= 25 yrs	Time to peak	= 754 min
Time interval	= 1 min	Hyd. volume	= 18,037 cuft
Inflow hyd. No.	= 3 - MOODY POD 2A #2 (to SCM #2)	Max. Elevation	= 363.16 ft
Reservoir name	= SCM #2	Max. Storage	= 31,251 cuft

Storage Indication method used. Wet pond routing start elevation = 361.50 ft.



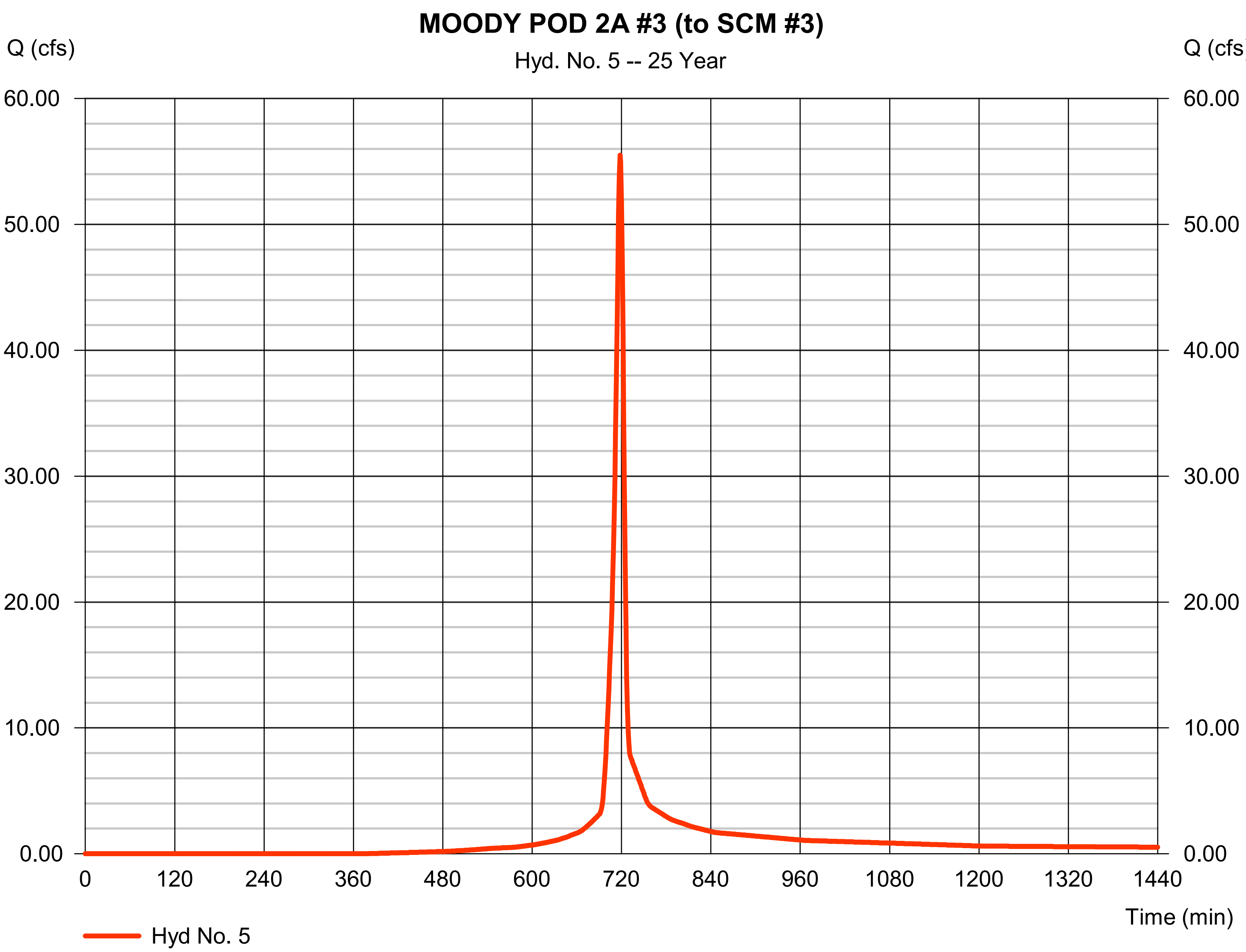
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 5

MOODY POD 2A #3 (to SCM #3)

Hydrograph type	= SCS Runoff	Peak discharge	= 55.50 cfs
Storm frequency	= 25 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 119,710 cuft
Drainage area	= 8.910 ac	Curve number	= 80.5
Basin Slope	= 2.6 %	Hydraulic length	= 1120 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 7.08 min
Total precip.	= 5.96 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



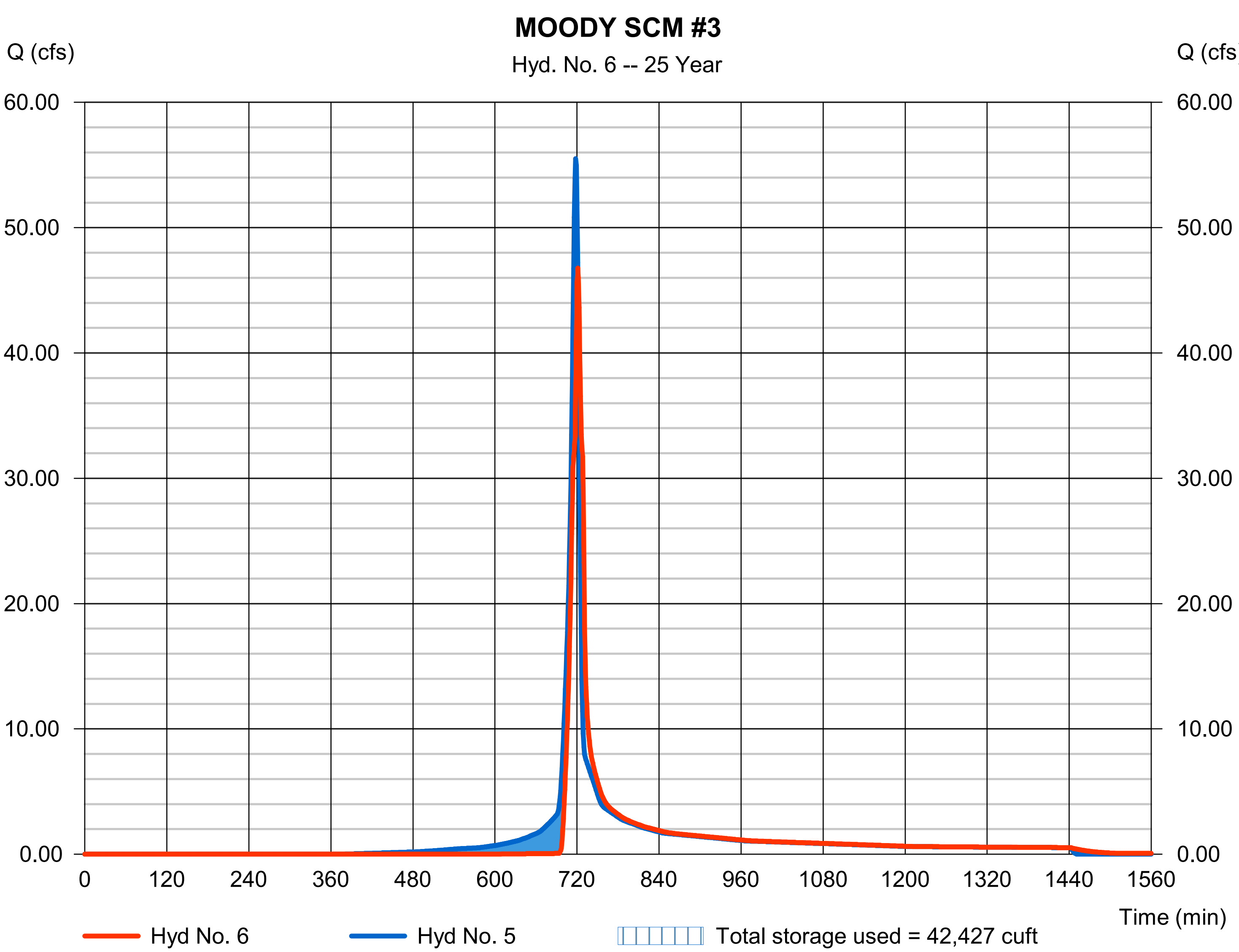
Hydrograph Report

Hyd. No. 6

MOODY SCM #3

Hydrograph type	= Reservoir	Peak discharge	= 46.77 cfs
Storm frequency	= 25 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 112,023 cuft
Inflow hyd. No.	= 5 - MOODY POD 2A #3 (to SCM #3)	Max. Elevation	= 364.19 ft
Reservoir name	= SCM #3	Max. Storage	= 42,427 cuft

Storage Indication method used. Wet pond routing start elevation = 361.00 ft.



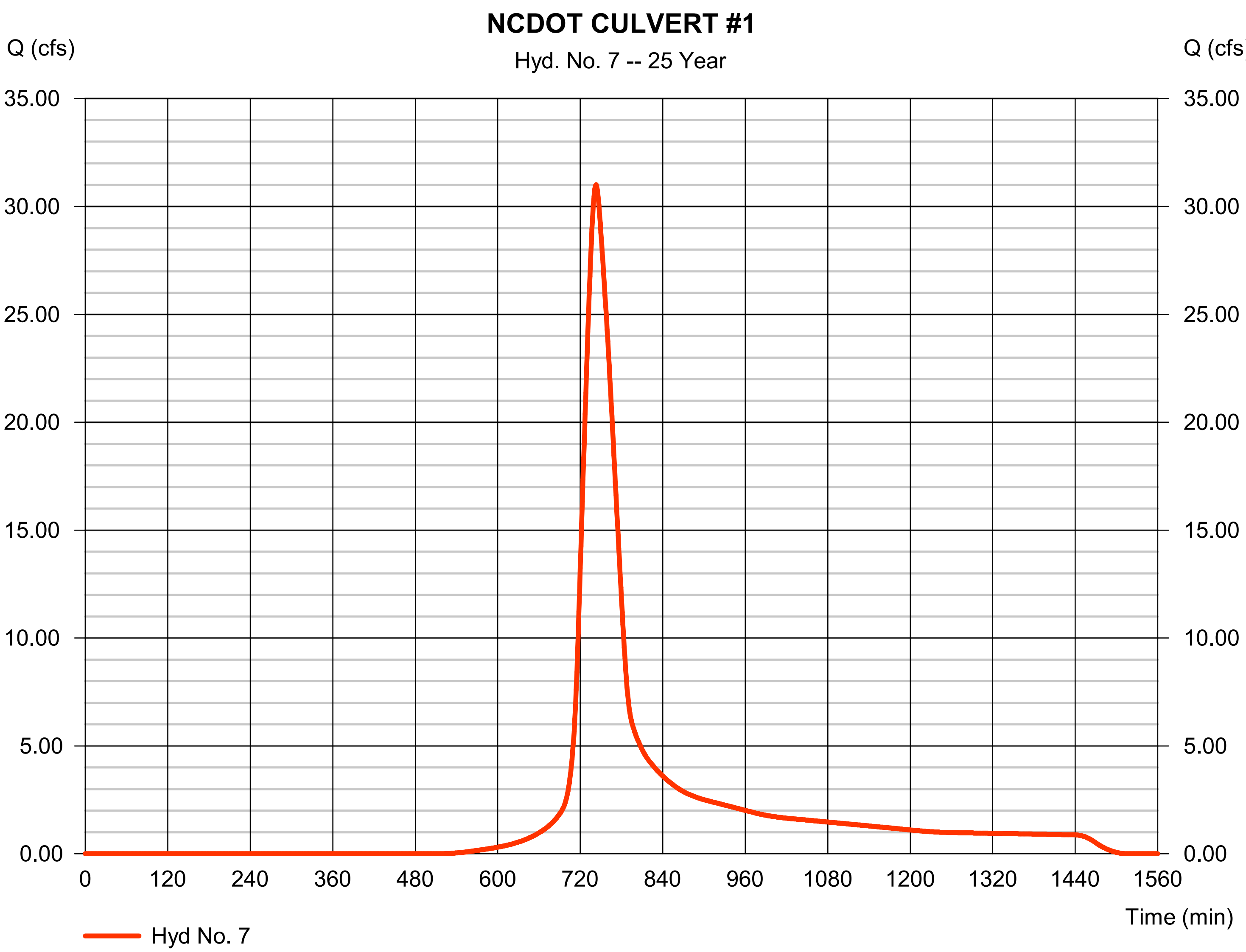
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 7

NCDOT CULVERT #1

Hydrograph type	= SCS Runoff	Peak discharge	= 31.01 cfs
Storm frequency	= 25 yrs	Time to peak	= 743 min
Time interval	= 1 min	Hyd. volume	= 171,988 cuft
Drainage area	= 15.820 ac	Curve number	= 72.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 49.03 min
Total precip.	= 5.96 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



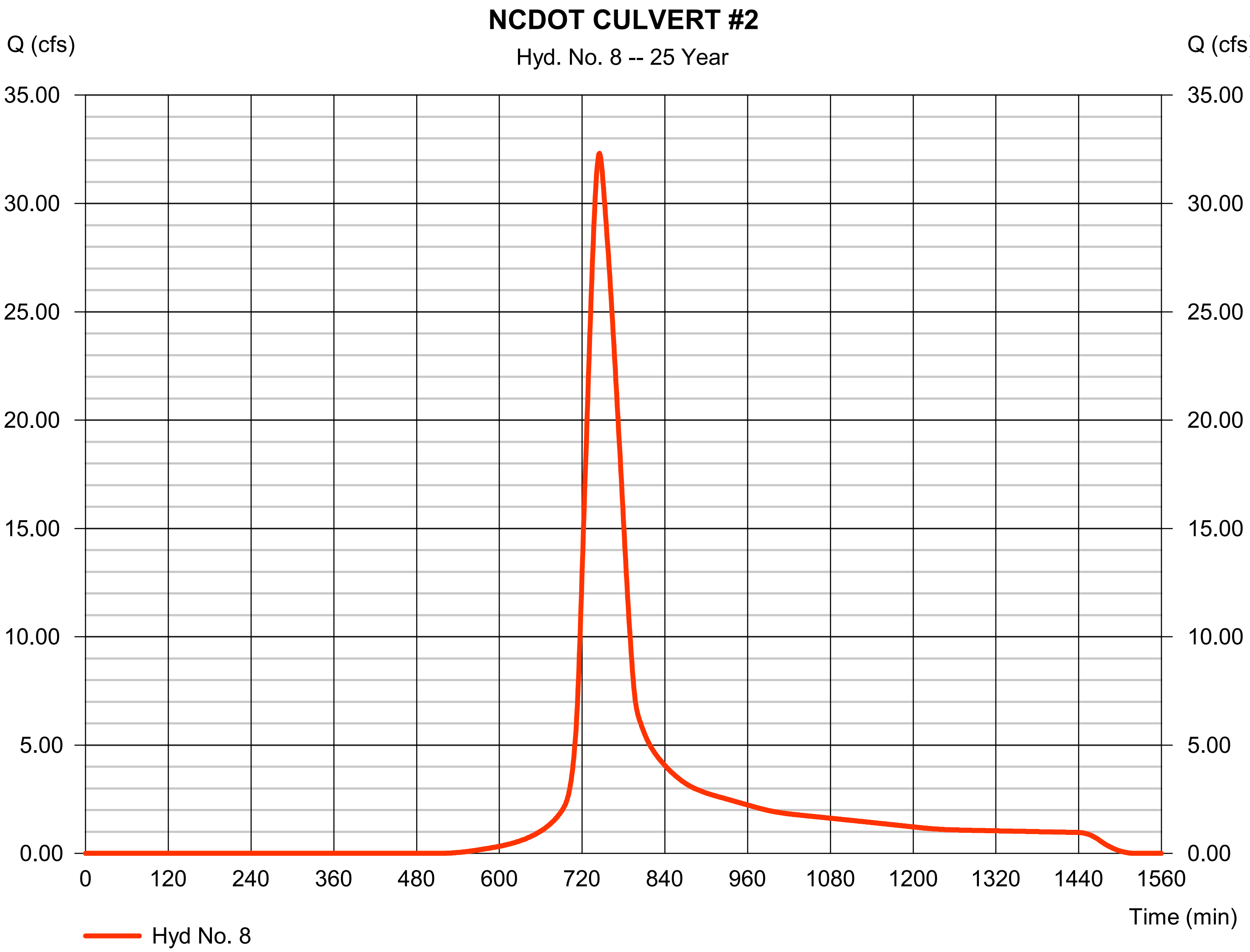
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 8

NCDOT CULVERT #2

Hydrograph type	= SCS Runoff	Peak discharge	= 32.32 cfs
Storm frequency	= 25 yrs	Time to peak	= 745 min
Time interval	= 1 min	Hyd. volume	= 189,153 cuft
Drainage area	= 17.200 ac	Curve number	= 72.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 50.89 min
Total precip.	= 5.96 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

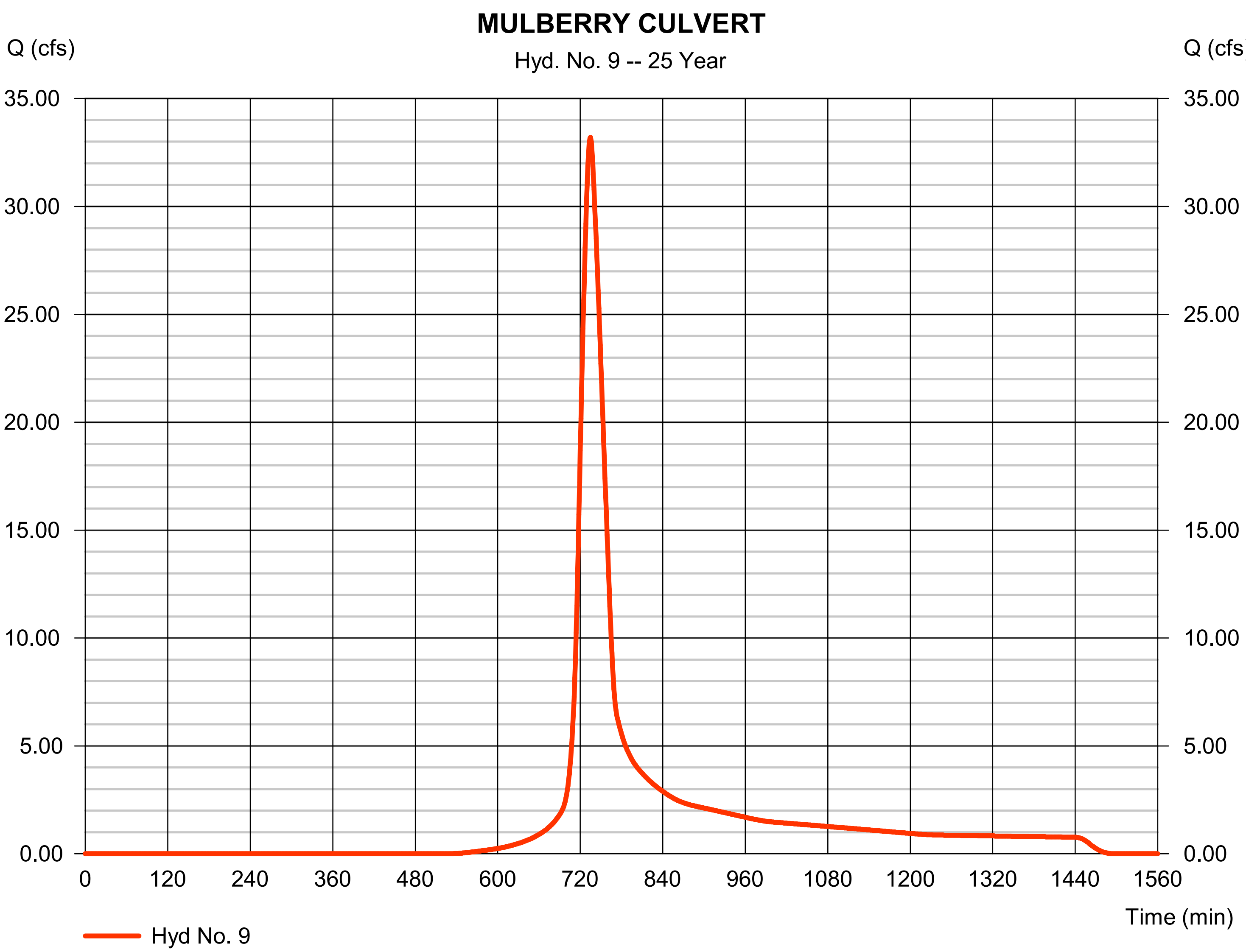


Hydrograph Report

Hyd. No. 9

MULBERRY CULVERT

Hydrograph type	= SCS Runoff	Peak discharge	= 33.20 cfs
Storm frequency	= 25 yrs	Time to peak	= 735 min
Time interval	= 1 min	Hyd. volume	= 148,052 cuft
Drainage area	= 14.090 ac	Curve number	= 71.3
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 34.74 min
Total precip.	= 5.96 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



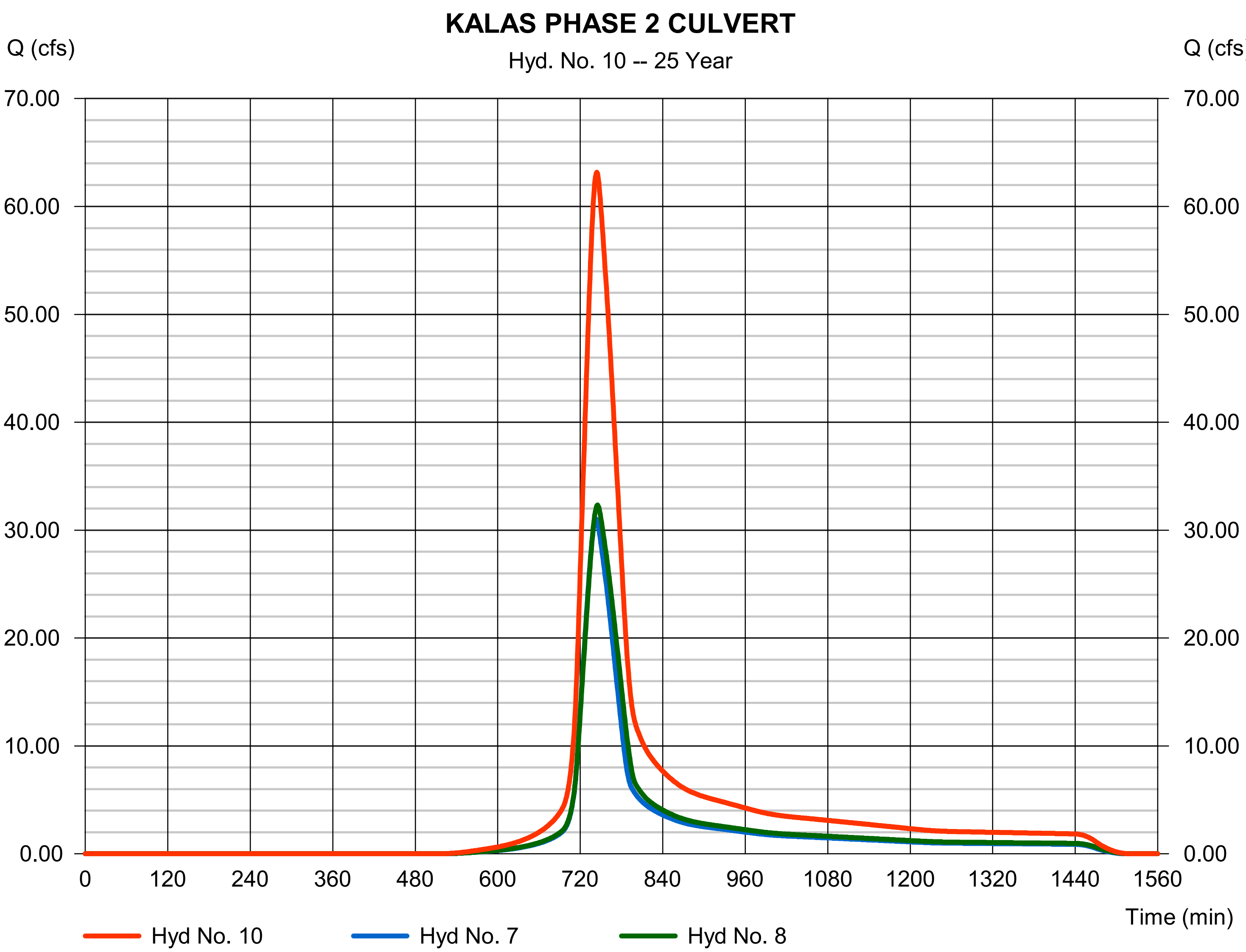
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 10

KALAS PHASE 2 CULVERT

Hydrograph type	= Combine	Peak discharge	= 63.17 cfs
Storm frequency	= 25 yrs	Time to peak	= 744 min
Time interval	= 1 min	Hyd. volume	= 361,141 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 33.020 ac

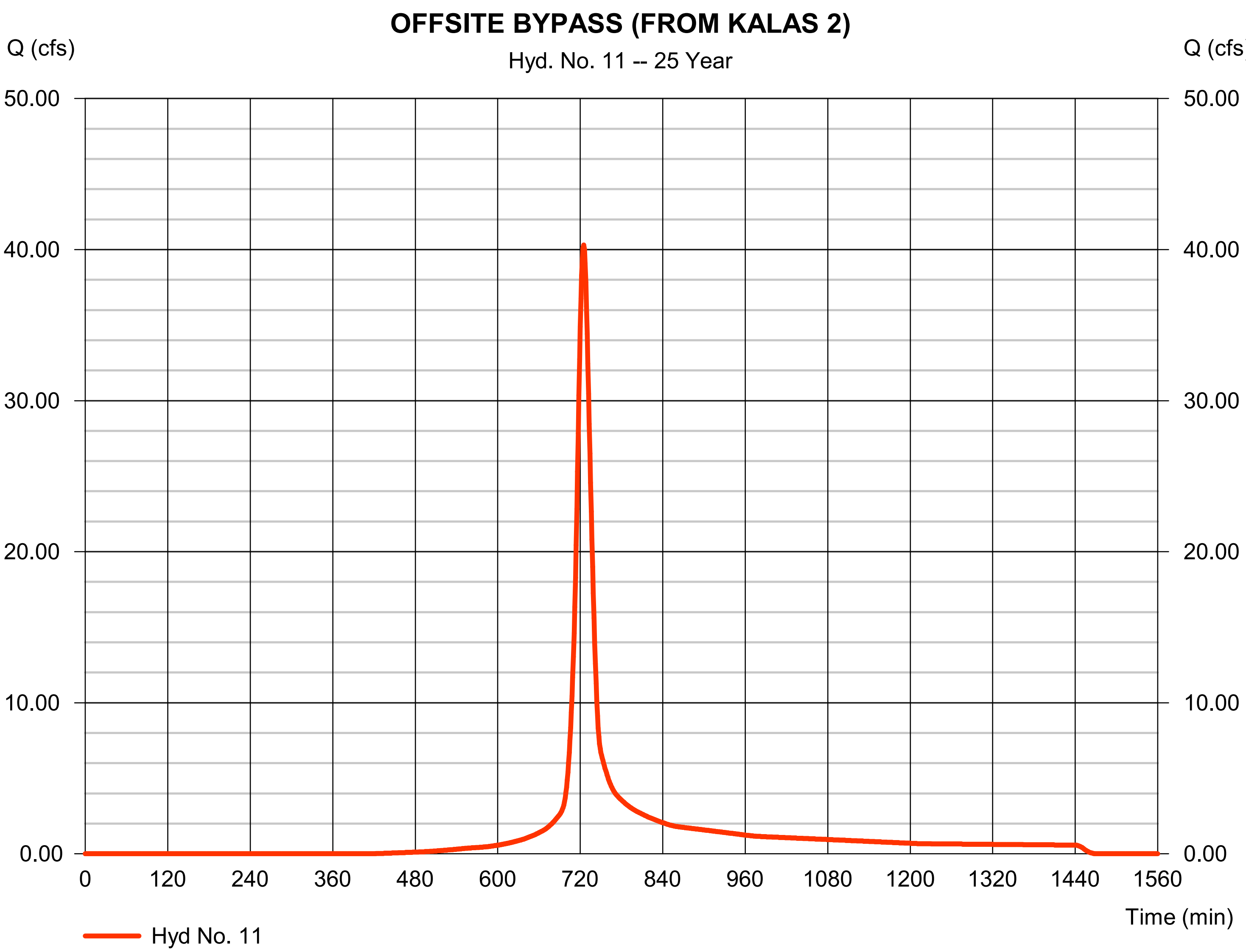


Hydrograph Report

Hyd. No. 11

OFFSITE BYPASS (FROM KALAS 2)

Hydrograph type	= SCS Runoff	Peak discharge	= 40.31 cfs
Storm frequency	= 25 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 126,090 cuft
Drainage area	= 9.720 ac	Curve number	= 78.3
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.90 min
Total precip.	= 5.96 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

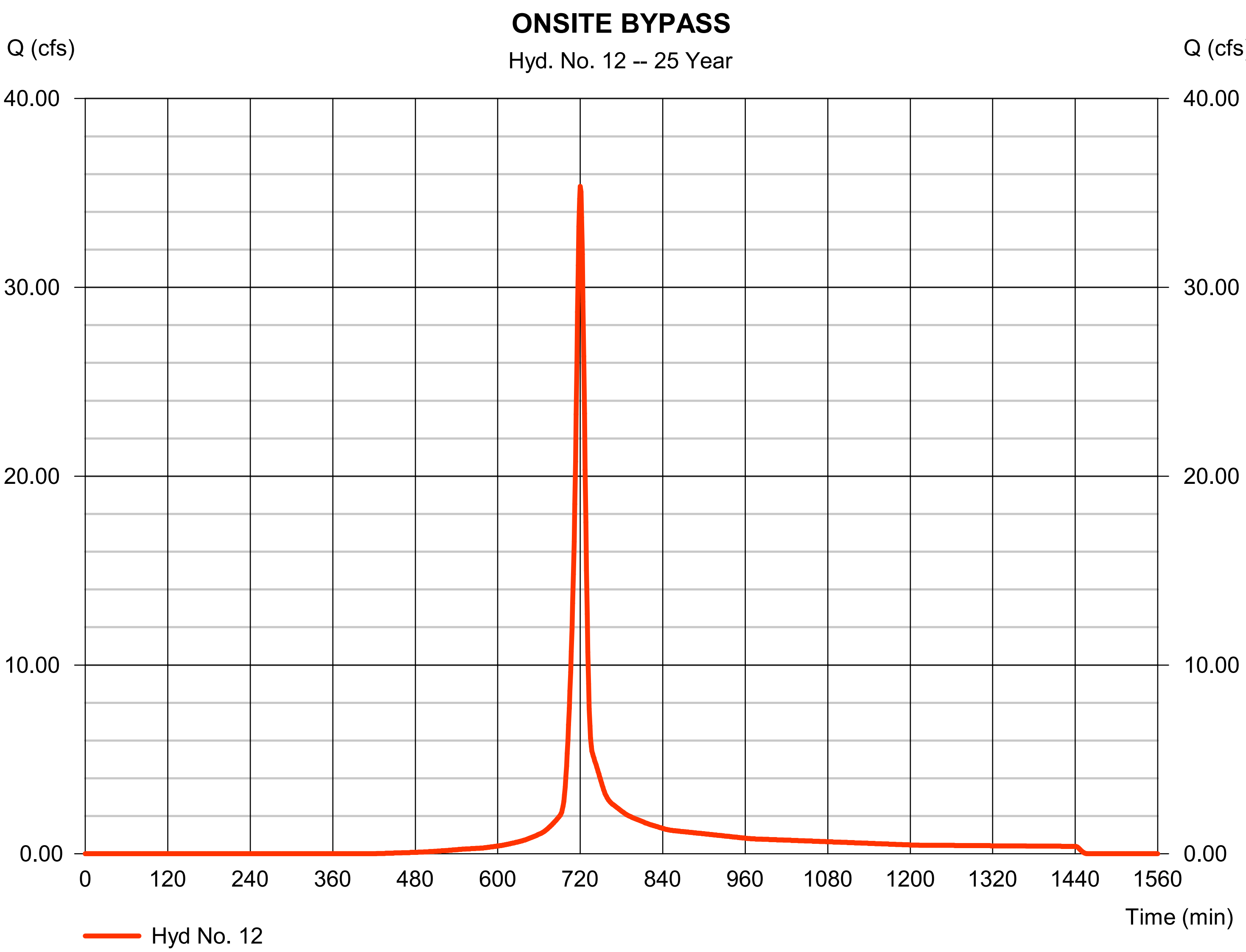


Hydrograph Report

Hyd. No. 12

ONSITE BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 35.35 cfs
Storm frequency	= 25 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 86,021 cuft
Drainage area	= 6.570 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 11.56 min
Total precip.	= 5.96 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

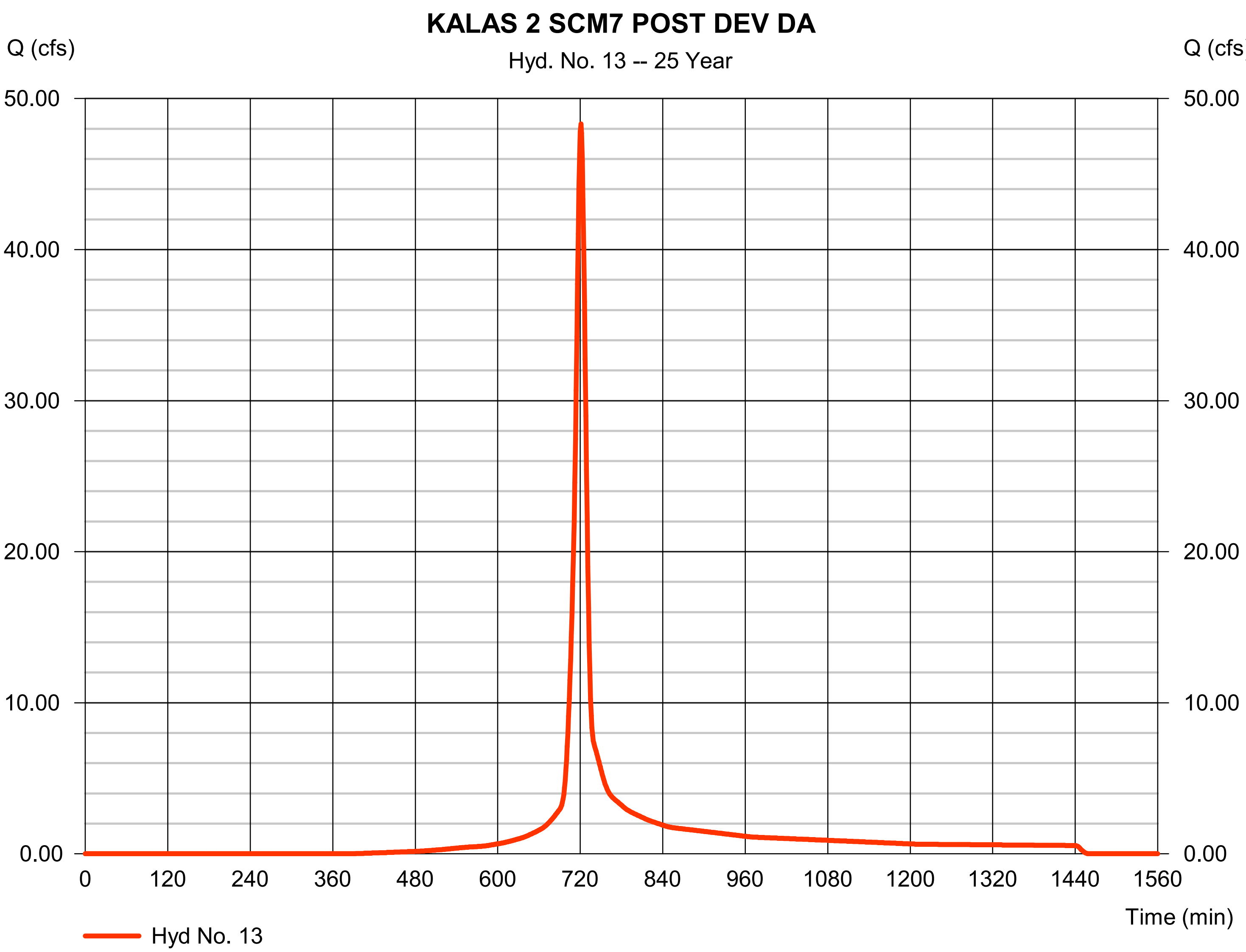


Hydrograph Report

Hyd. No. 13

KALAS 2 SCM7 POST DEV DA

Hydrograph type	= SCS Runoff	Peak discharge	= 48.32 cfs
Storm frequency	= 25 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 123,250 cuft
Drainage area	= 9.260 ac	Curve number	= 79.8
Basin Slope	= 1.1 %	Hydraulic length	= 1505 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 12.38 min
Total precip.	= 5.96 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

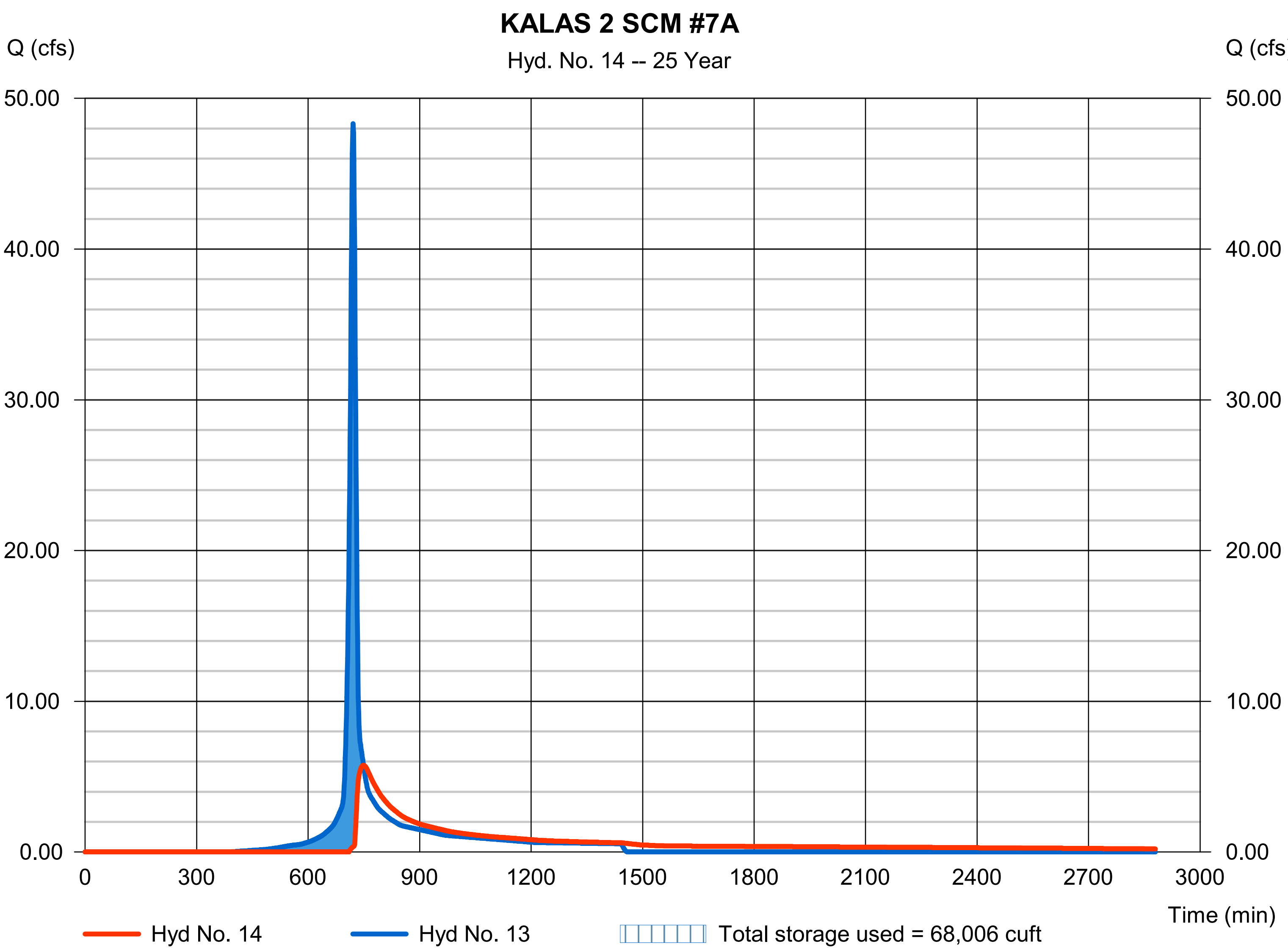
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 — Monday, 02 / 3 / 2025

Hyd. No. 14

KALAS 2 SCM #7A

Hydrograph type	= Reservoir	Peak discharge	= 5.755 cfs
Storm frequency	= 25 yrs	Time to peak	= 749 min
Time interval	= 1 min	Hyd. volume	= 95,254 cuft
Inflow hyd. No.	= 13 - KALAS 2 SCM7 POST DEV DA	Max. Elevation	= 374.60 ft
Reservoir name	= SCM #7A	Max. Storage	= 68,006 cuft

Storage Indication method used.

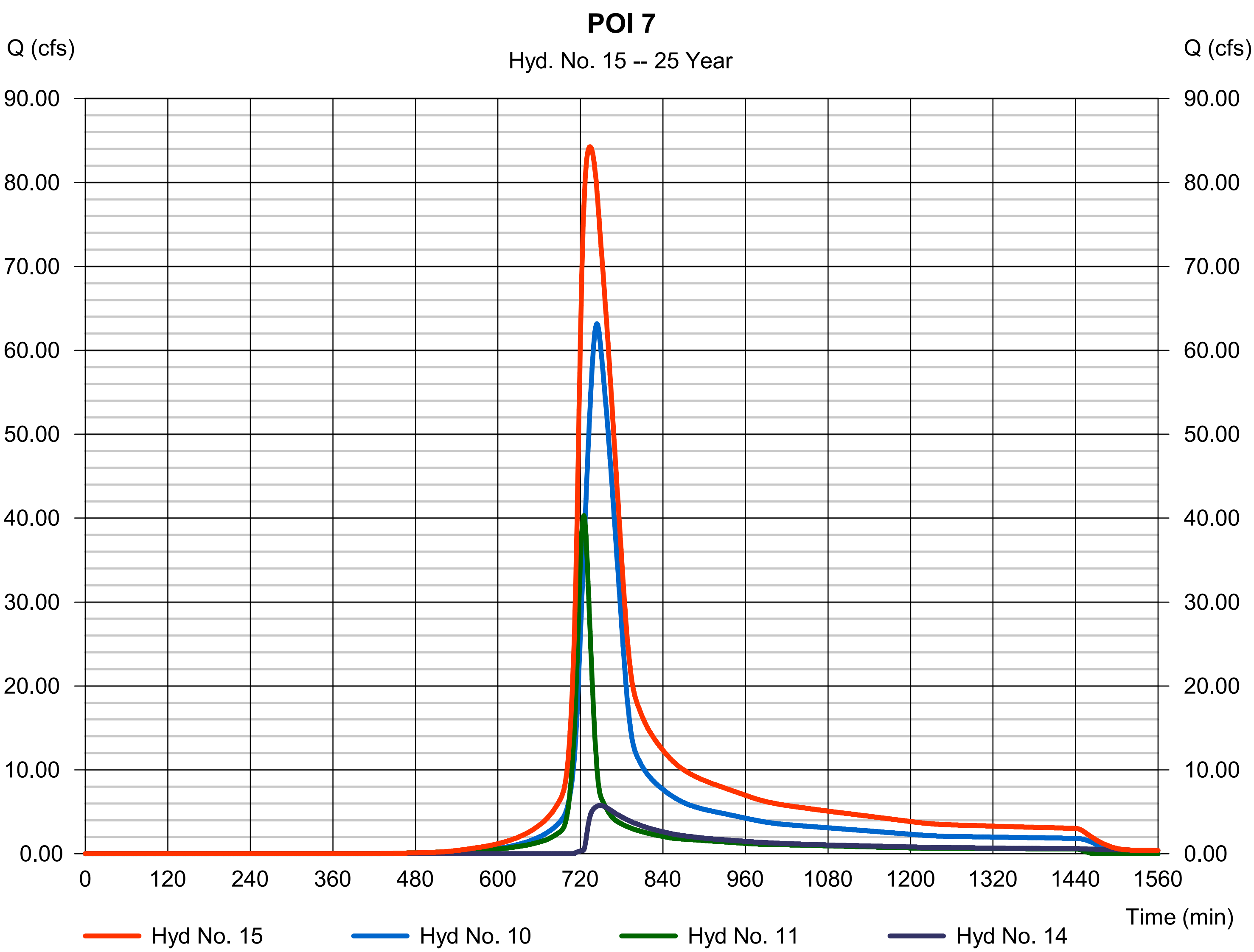


Hydrograph Report

Hyd. No. 15

POI 7

Hydrograph type	= Combine	Peak discharge	= 84.27 cfs
Storm frequency	= 25 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 582,485 cuft
Inflow hyds.	= 10, 11, 14	Contrib. drain. area	= 9.720 ac



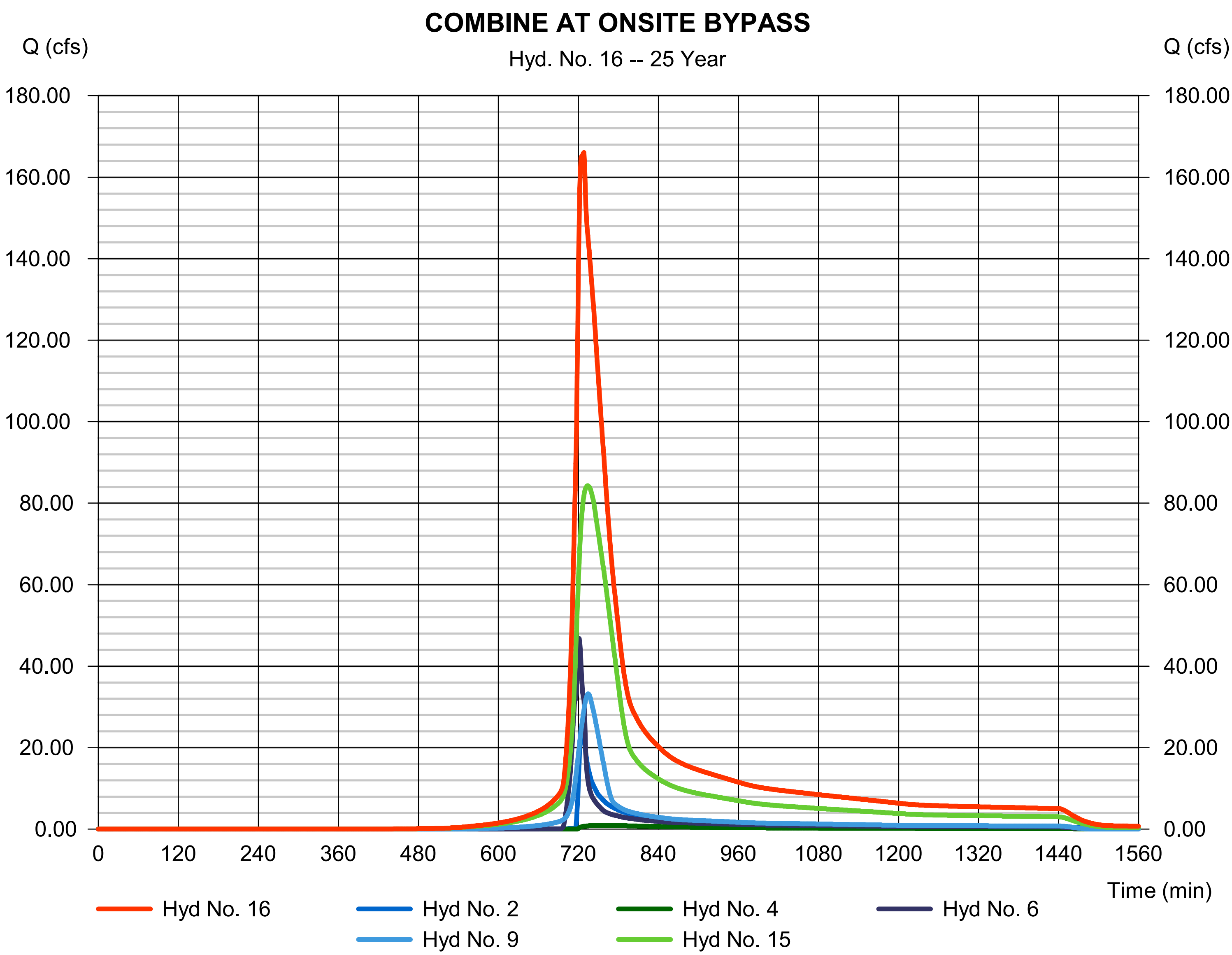
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 16

COMBINE AT ONSITE BYPASS

Hydrograph type	= Combine	Peak discharge	= 166.08 cfs
Storm frequency	= 25 yrs	Time to peak	= 728 min
Time interval	= 1 min	Hyd. volume	= 964,417 cuft
Inflow hyds.	= 2, 4, 6, 9, 15	Contrib. drain. area	= 14.090 ac



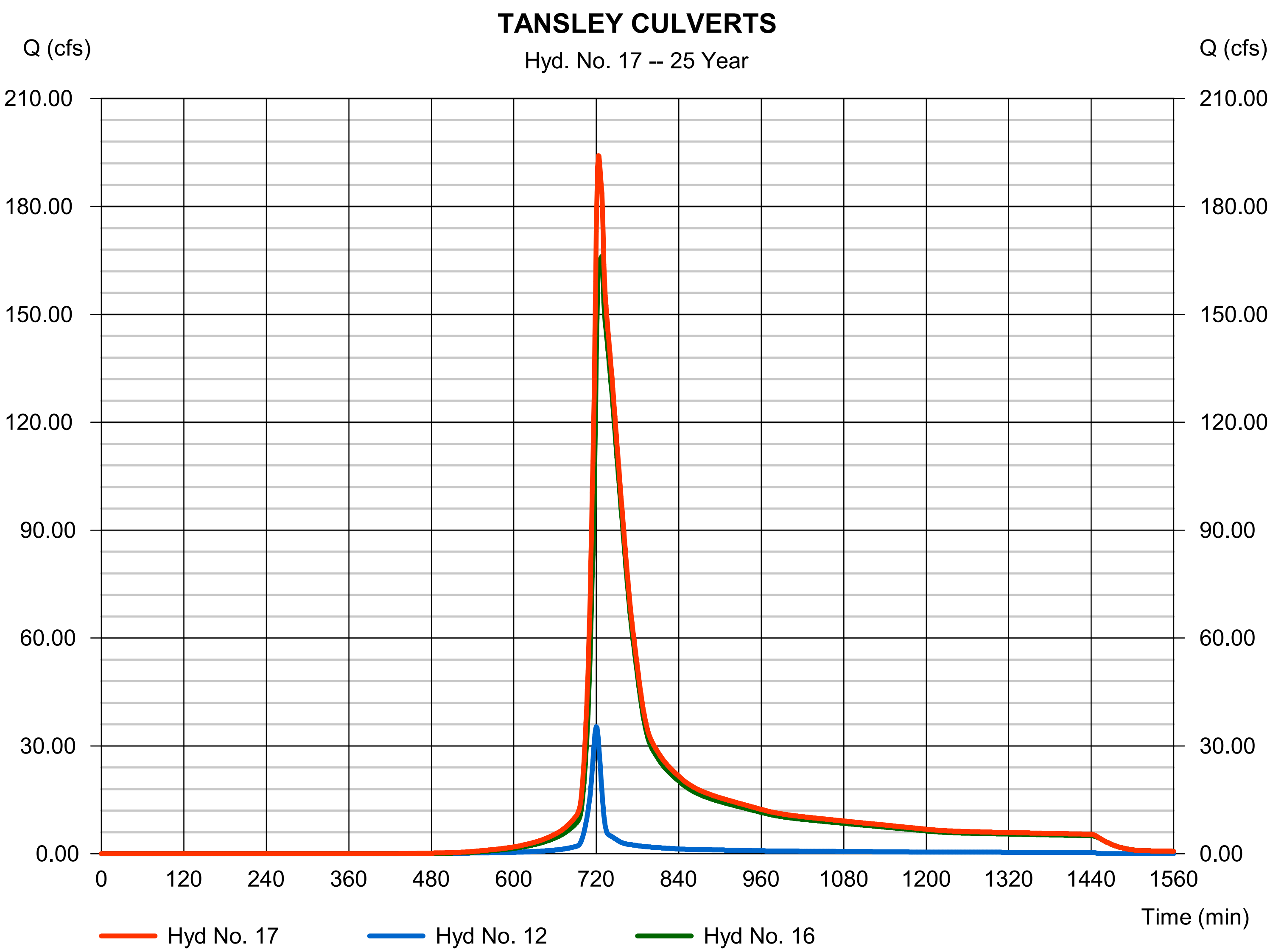
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 17

TANSLEY CULVERTS

Hydrograph type	= Combine	Peak discharge	= 194.15 cfs
Storm frequency	= 25 yrs	Time to peak	= 723 min
Time interval	= 1 min	Hyd. volume	= 1,050,437 cuft
Inflow hyds.	= 12, 16	Contrib. drain. area	= 6.570 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

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	82.71	1	718	181,581	------	------	------	MOODY POD 2A #1 (to SCM #1)
2	Reservoir	62.93	1	722	151,806	1	367.06	114,243	MOODY SCM #1
3	SCS Runoff	17.61	1	717	36,996	------	------	------	MOODY POD 2A #2 (to SCM #2)
4	Reservoir	5.790	1	724	27,936	3	363.45	34,500	MOODY SCM #2
5	SCS Runoff	74.57	1	718	163,272	------	------	------	MOODY POD 2A #3 (to SCM #3)
6	Reservoir	68.86	1	720	155,580	5	364.46	45,315	MOODY SCM #3
7	SCS Runoff	44.43	1	743	244,683	------	------	------	NCDOT CULVERT #1
8	SCS Runoff	46.30	1	745	268,950	------	------	------	NCDOT CULVERT #2
9	SCS Runoff	47.93	1	734	212,094	------	------	------	MULBERRY CULVERT
10	Combine	90.50	1	744	513,634	7, 8,	------	------	KALAS PHASE 2 CULVERT
11	SCS Runoff	55.22	1	725	173,878	------	------	------	OFFSITE BYPASS (FROM KALAS 2)
12	SCS Runoff	48.32	1	720	118,805	------	------	------	ONSITE BYPASS
13	SCS Runoff	65.36	1	721	168,684	------	------	------	KALAS 2 SCM7 POST DEV DA
14	Reservoir	24.08	1	731	140,354	13	375.56	82,868	KALAS 2 SCM #7A
15	Combine	138.29	1	731	827,866	10, 11, 14	------	------	POI 7
16	Combine	269.73	1	723	1,375,281	2, 4, 6, 9, 15	------	------	COMBINE AT ONSITE BYPASS
17	Combine	312.87	1	722	1,494,086	12, 16	------	------	TANSLEY CULVERTS

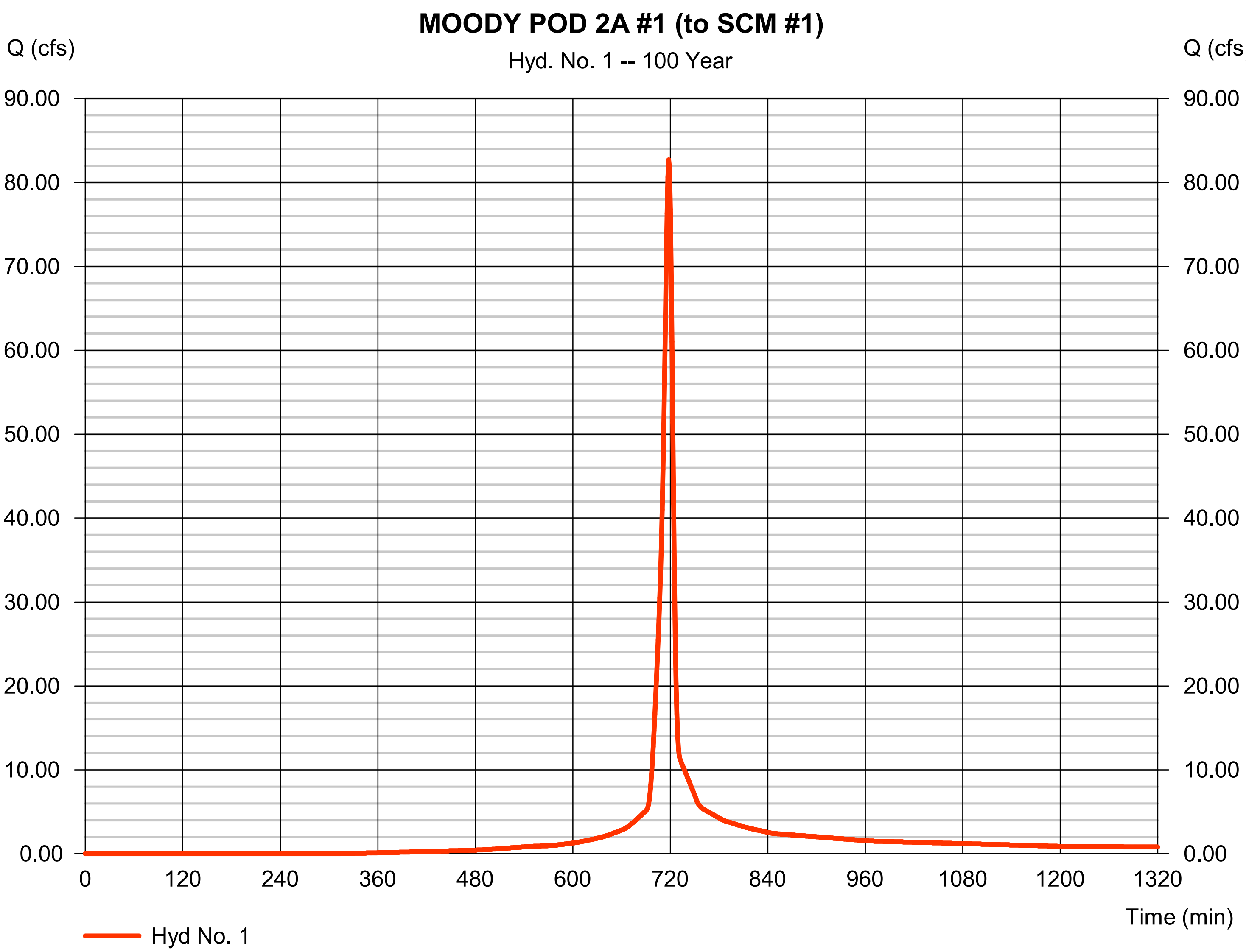
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 1

MOODY POD 2A #1 (to SCM #1)

Hydrograph type	= SCS Runoff	Peak discharge	= 82.71 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 181,581 cuft
Drainage area	= 9.780 ac	Curve number	= 81.1
Basin Slope	= 2.4 %	Hydraulic length	= 1000 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 6.69 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

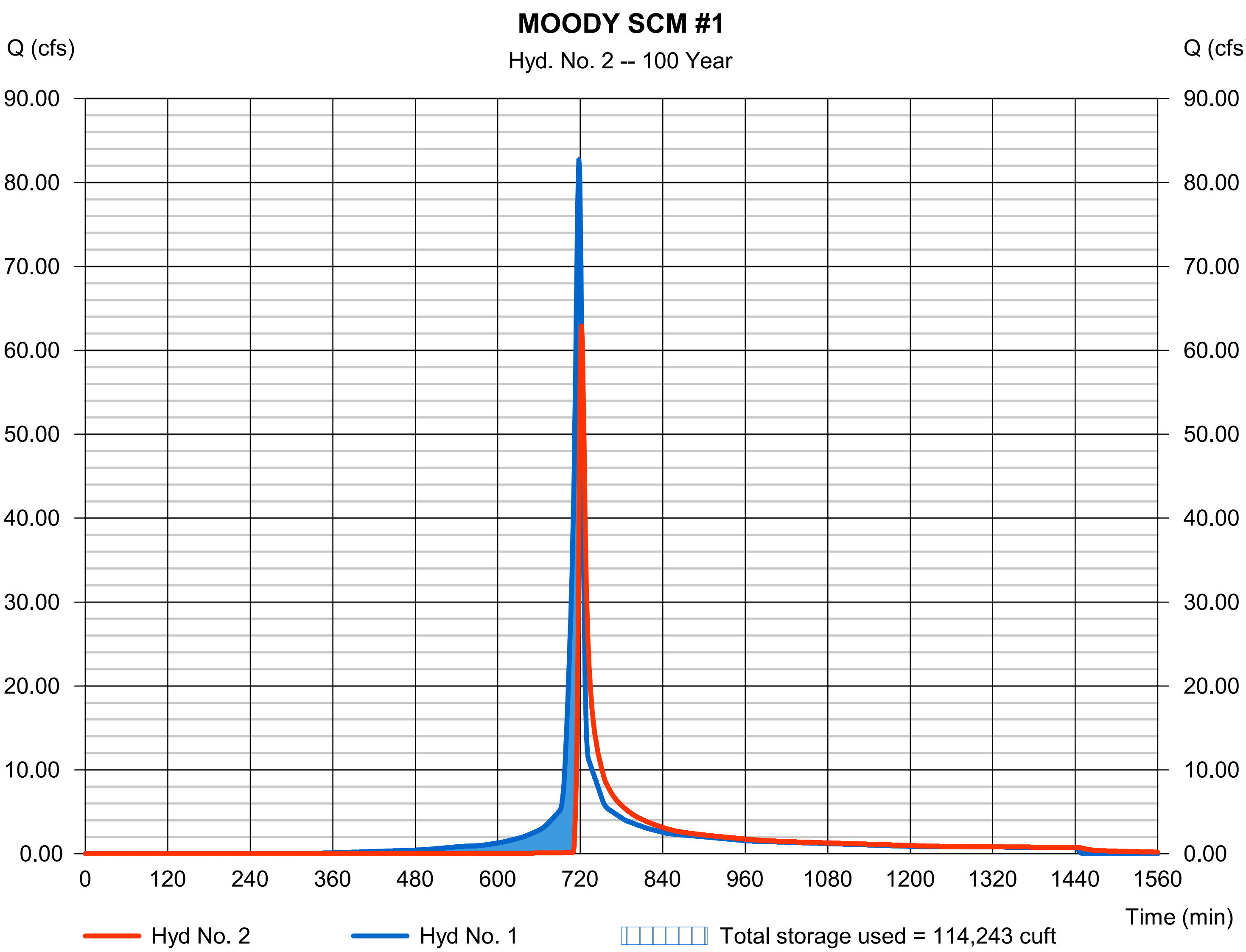
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 2

MOODY SCM #1

Hydrograph type	= Reservoir	Peak discharge	= 62.93 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 151,806 cuft
Inflow hyd. No.	= 1 - MOODY POD 2A #1 (to SCM #1)	Max. Elevation	= 367.06 ft
Reservoir name	= SCM #1	Max. Storage	= 114,243 cuft

Storage Indication method used. Wet pond routing start elevation = 363.50 ft.



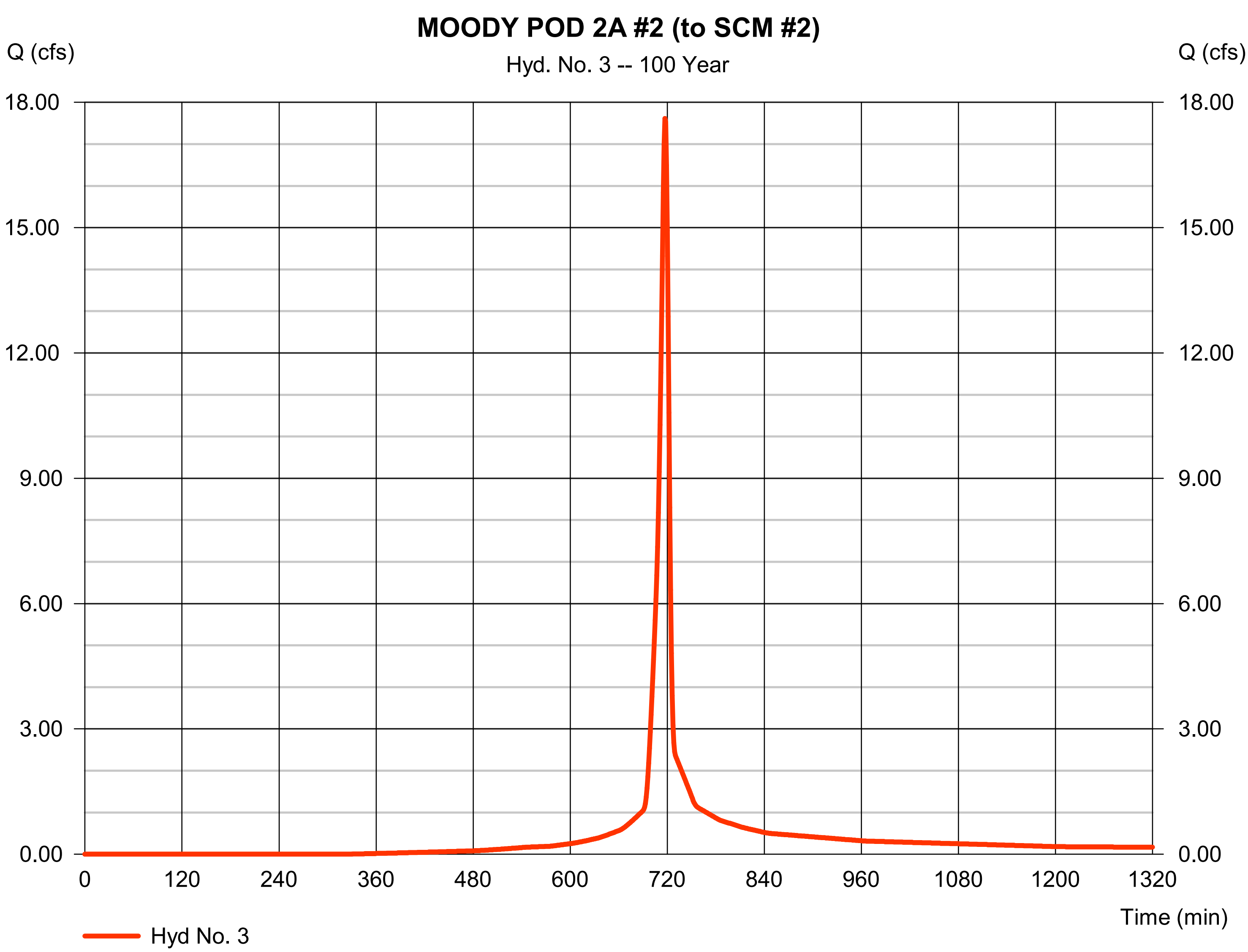
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 3

MOODY POD 2A #2 (to SCM #2)

Hydrograph type	= SCS Runoff	Peak discharge	= 17.61 cfs
Storm frequency	= 100 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 36,996 cuft
Drainage area	= 1.930 ac	Curve number	= 80
Basin Slope	= 0.5 %	Hydraulic length	= 450 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

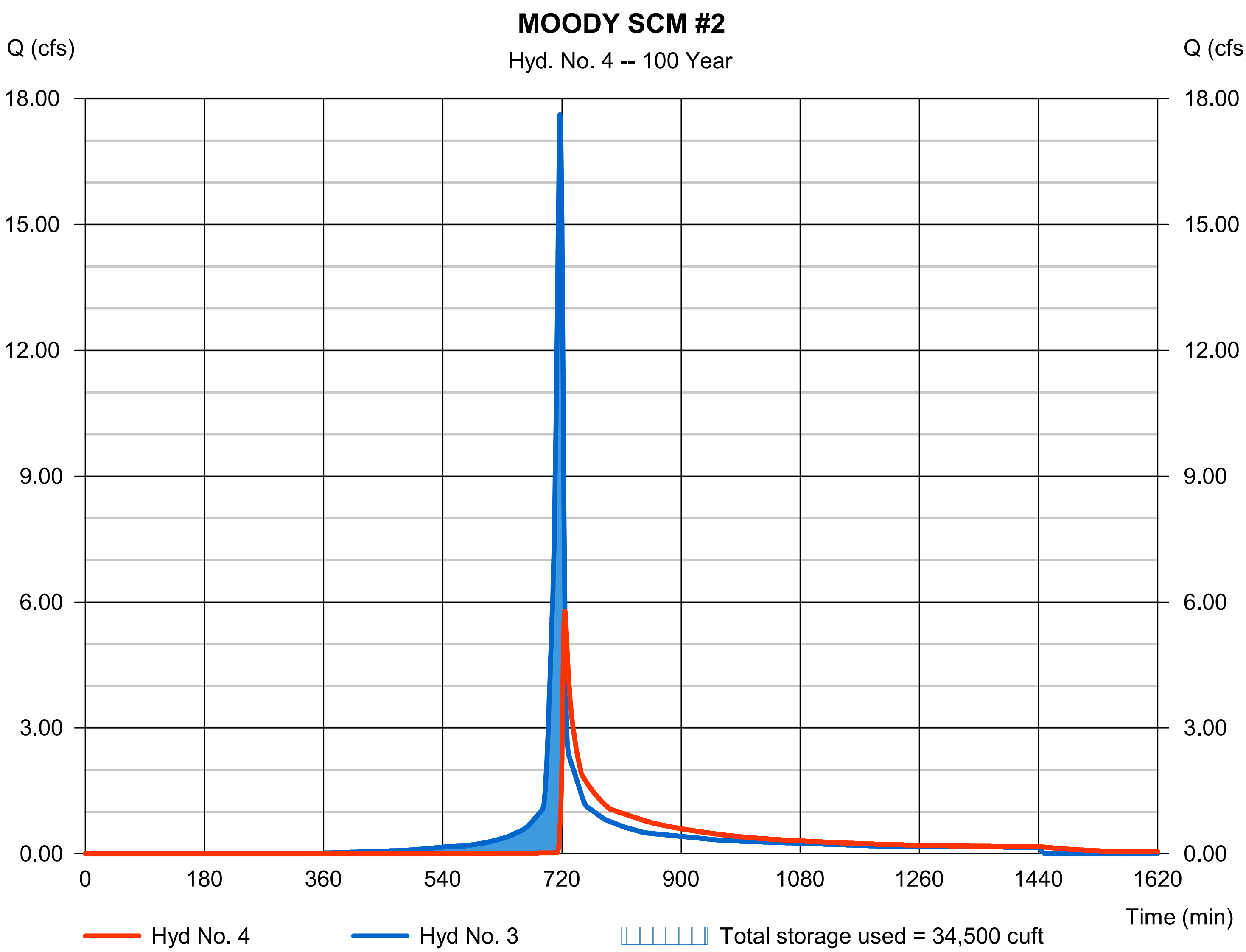
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 4

MOODY SCM #2

Hydrograph type	= Reservoir	Peak discharge	= 5.790 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 27,936 cuft
Inflow hyd. No.	= 3 - MOODY POD 2A #2 (to SCM #2)	Max. Elevation	= 363.45 ft
Reservoir name	= SCM #2	Max. Storage	= 34,500 cuft

Storage Indication method used. Wet pond routing start elevation = 361.50 ft.

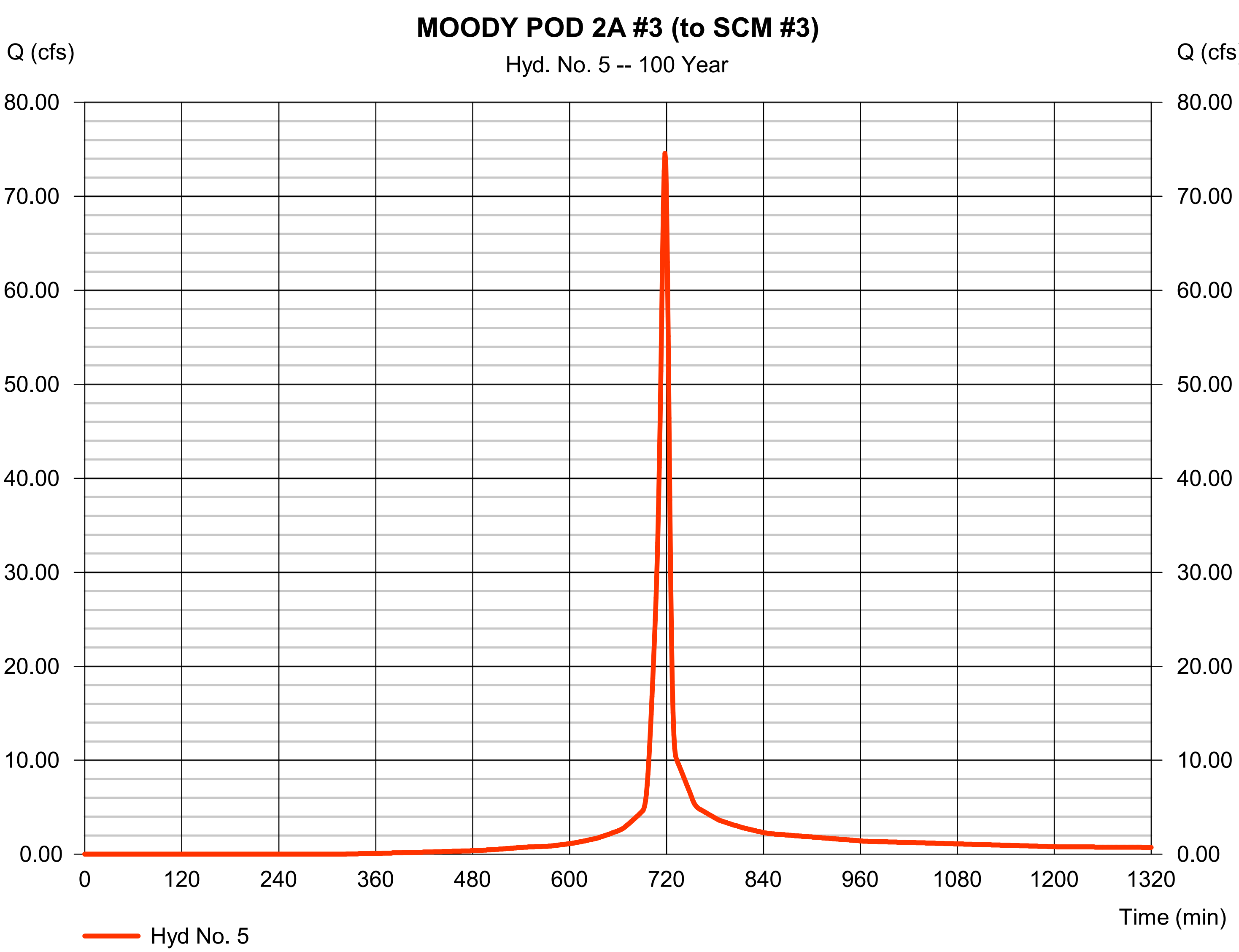


Hydrograph Report

Hyd. No. 5

MOODY POD 2A #3 (to SCM #3)

Hydrograph type	= SCS Runoff	Peak discharge	= 74.57 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 1 min	Hyd. volume	= 163,272 cuft
Drainage area	= 8.910 ac	Curve number	= 80.5
Basin Slope	= 2.6 %	Hydraulic length	= 1120 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 7.08 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

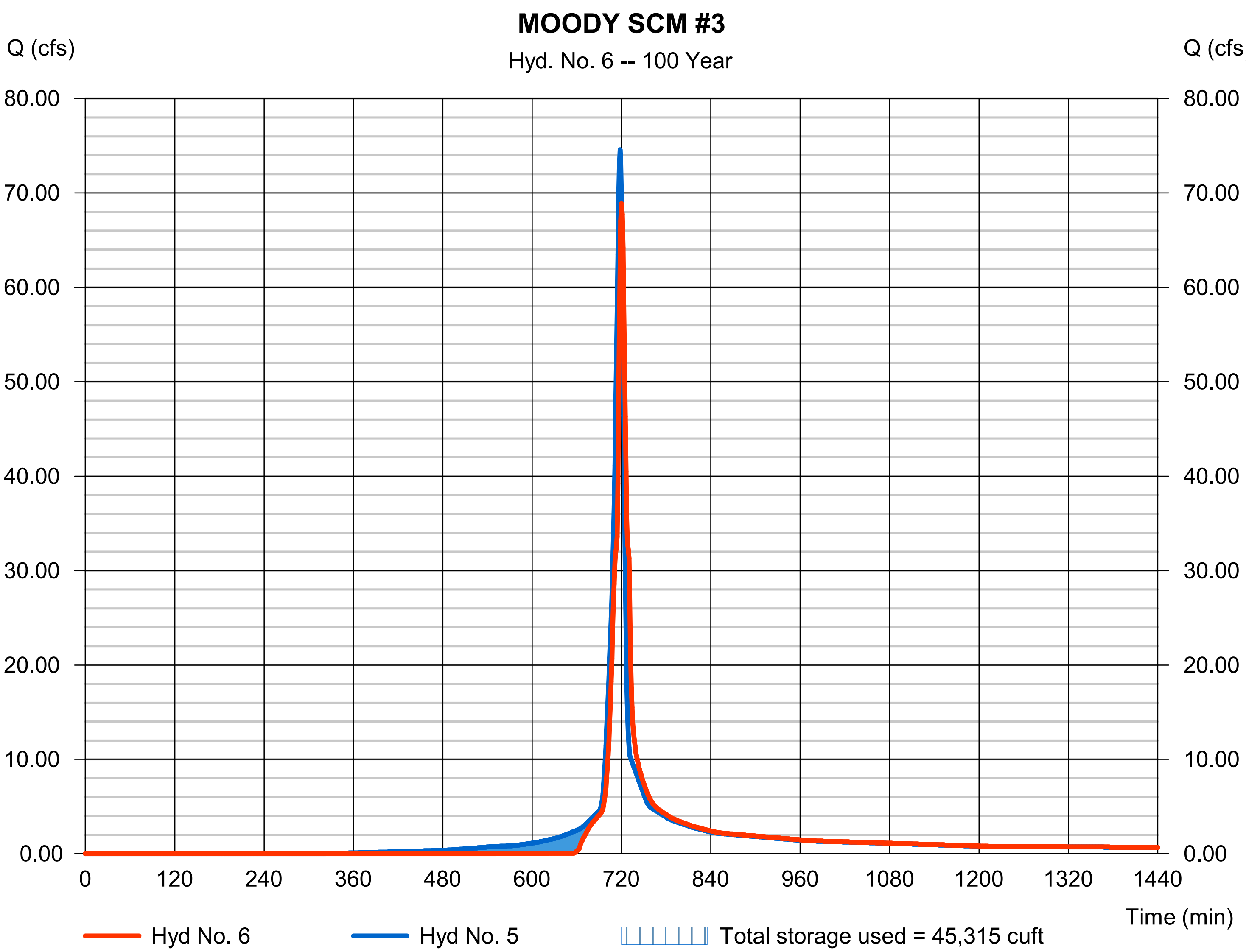
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 6

MOODY SCM #3

Hydrograph type	= Reservoir	Peak discharge	= 68.86 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 155,580 cuft
Inflow hyd. No.	= 5 - MOODY POD 2A #3 (to SCM #3)	Max. Elevation	= 364.46 ft
Reservoir name	= SCM #3	Max. Storage	= 45,315 cuft

Storage Indication method used. Wet pond routing start elevation = 361.00 ft.

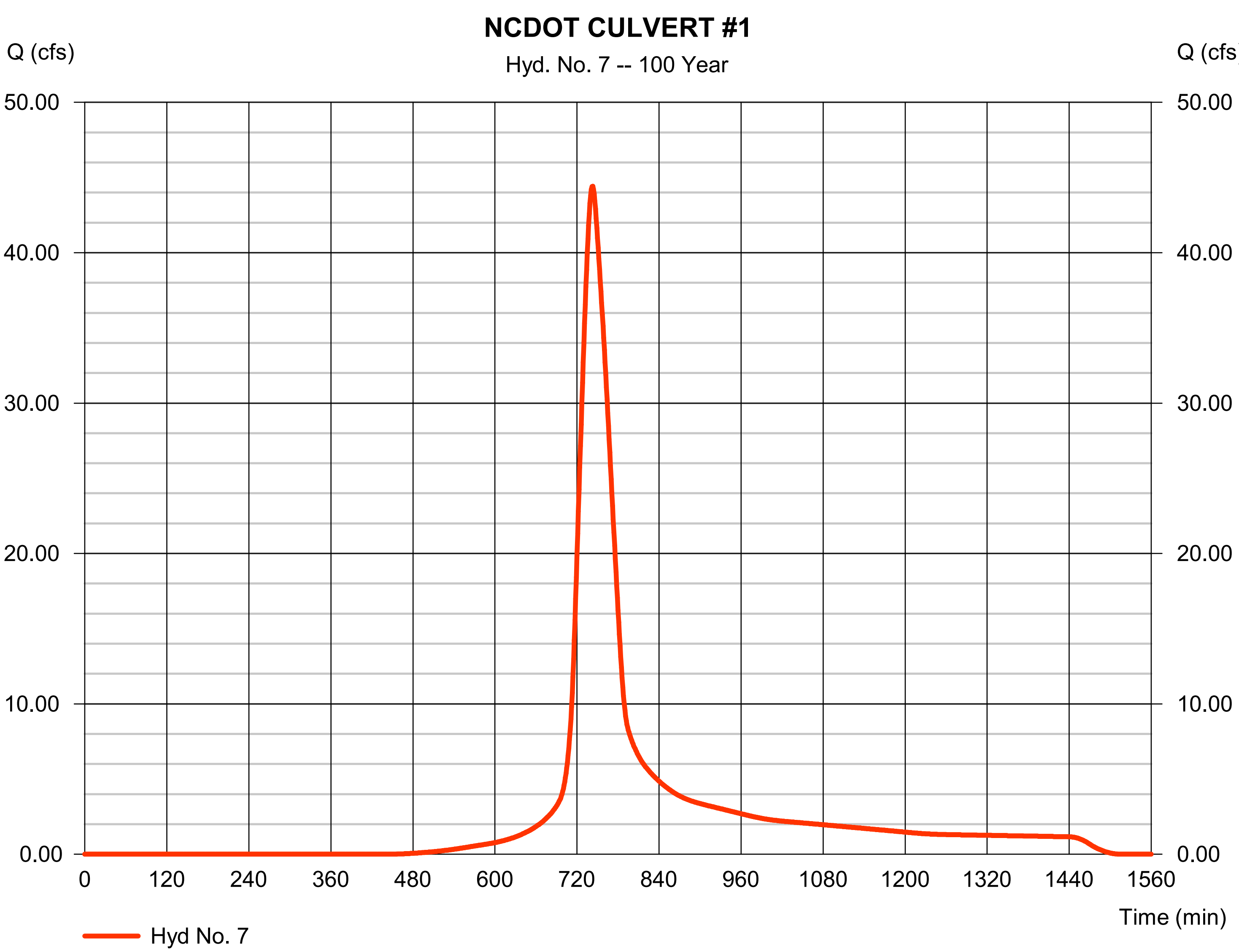


Hydrograph Report

Hyd. No. 7

NCDOT CULVERT #1

Hydrograph type	= SCS Runoff	Peak discharge	= 44.43 cfs
Storm frequency	= 100 yrs	Time to peak	= 743 min
Time interval	= 1 min	Hyd. volume	= 244,683 cuft
Drainage area	= 15.820 ac	Curve number	= 72.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 49.03 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



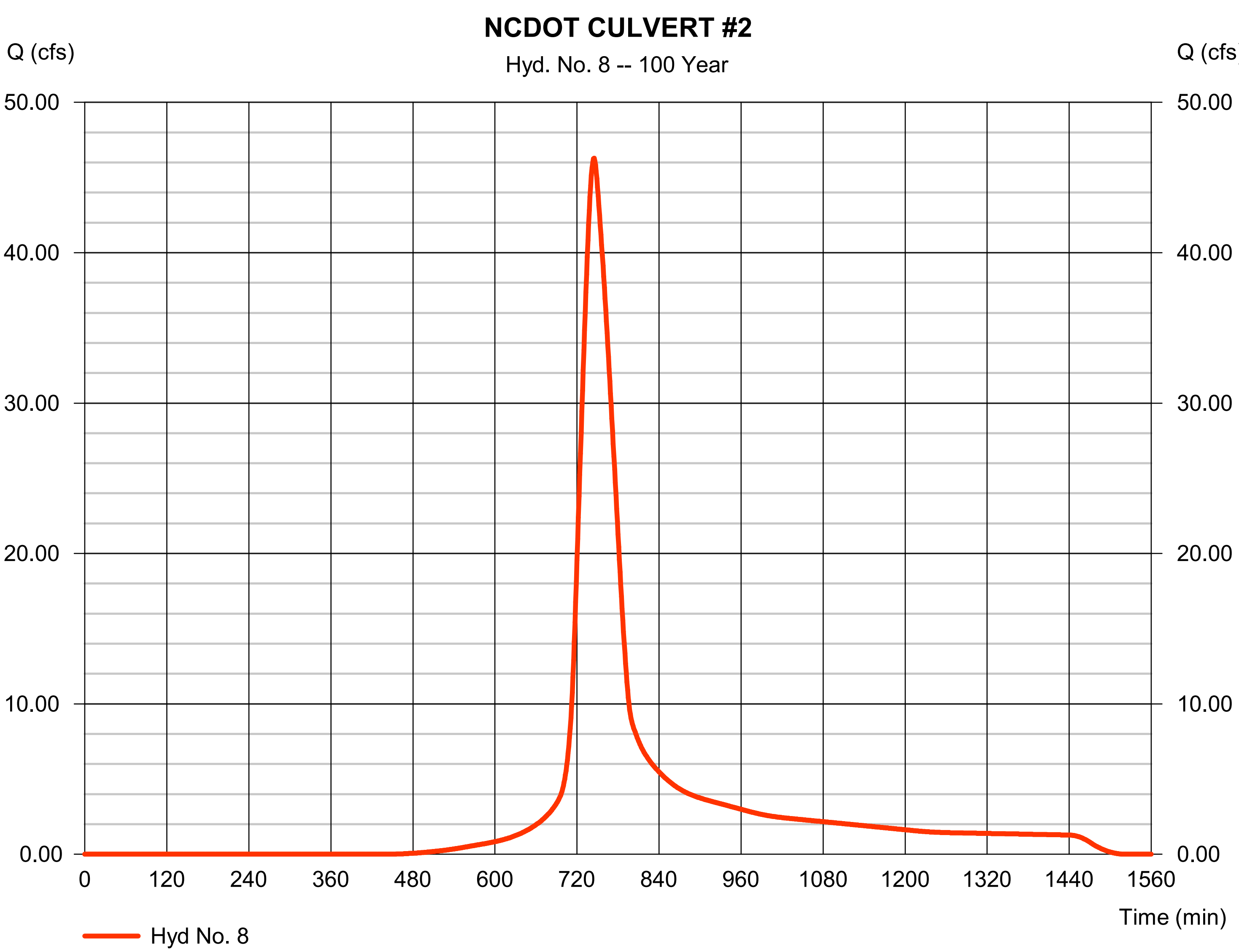
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 8

NCDOT CULVERT #2

Hydrograph type	= SCS Runoff	Peak discharge	= 46.30 cfs
Storm frequency	= 100 yrs	Time to peak	= 745 min
Time interval	= 1 min	Hyd. volume	= 268,950 cuft
Drainage area	= 17.200 ac	Curve number	= 72.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 50.89 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



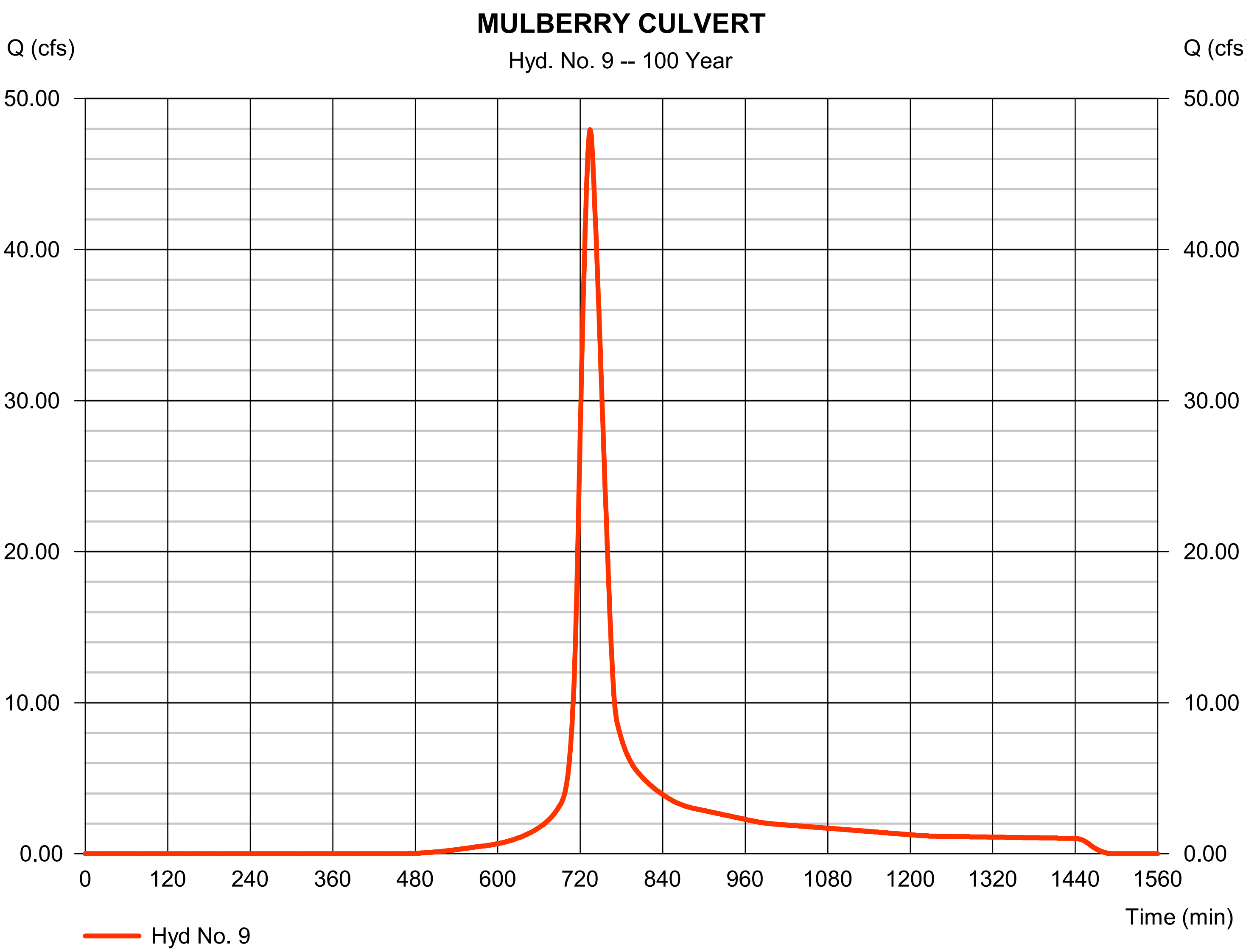
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 9

MULBERRY CULVERT

Hydrograph type	= SCS Runoff	Peak discharge	= 47.93 cfs
Storm frequency	= 100 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 212,094 cuft
Drainage area	= 14.090 ac	Curve number	= 71.3
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 34.74 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



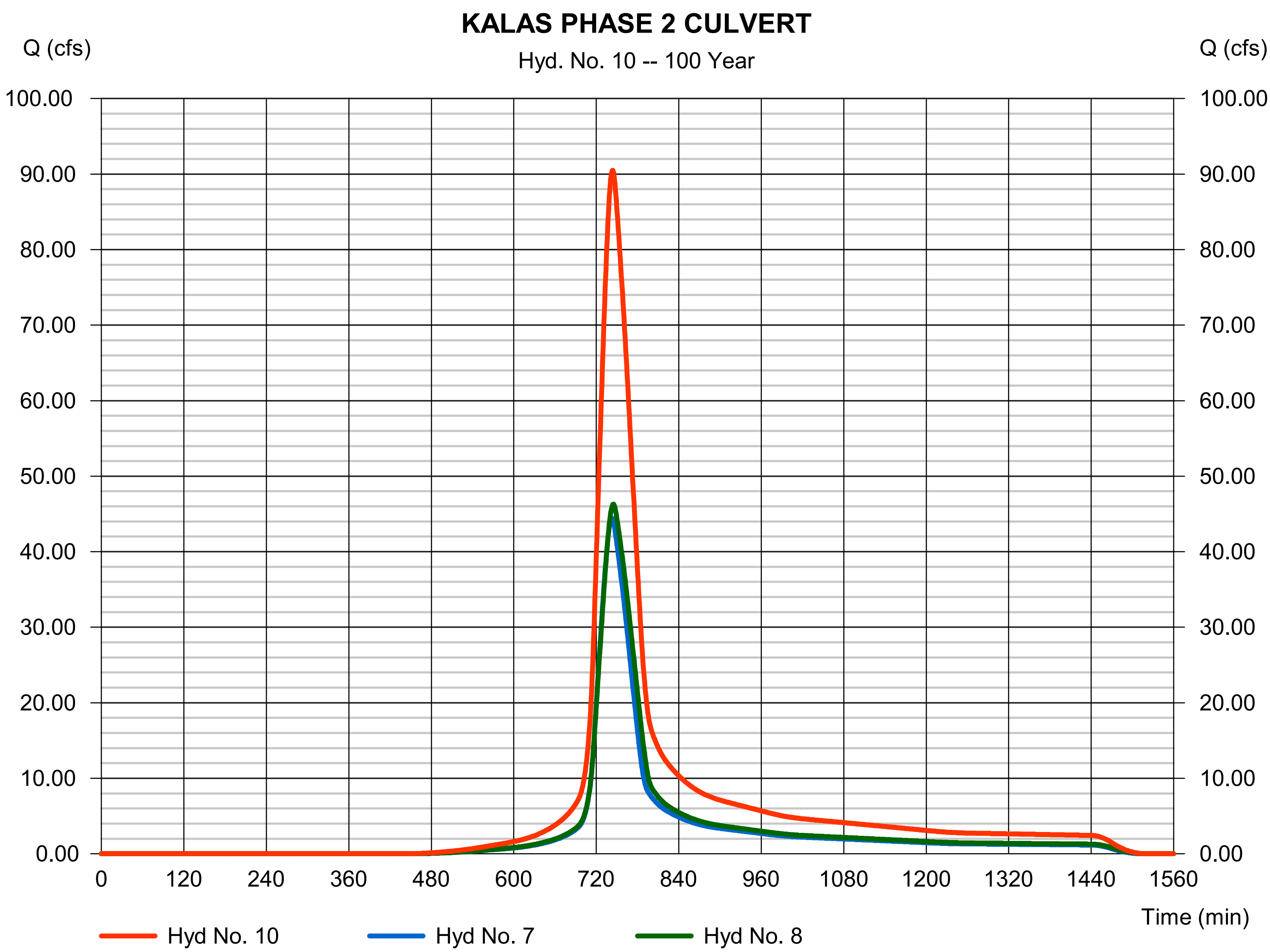
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 10

KALAS PHASE 2 CULVERT

Hydrograph type	= Combine	Peak discharge	= 90.50 cfs
Storm frequency	= 100 yrs	Time to peak	= 744 min
Time interval	= 1 min	Hyd. volume	= 513,634 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 33.020 ac



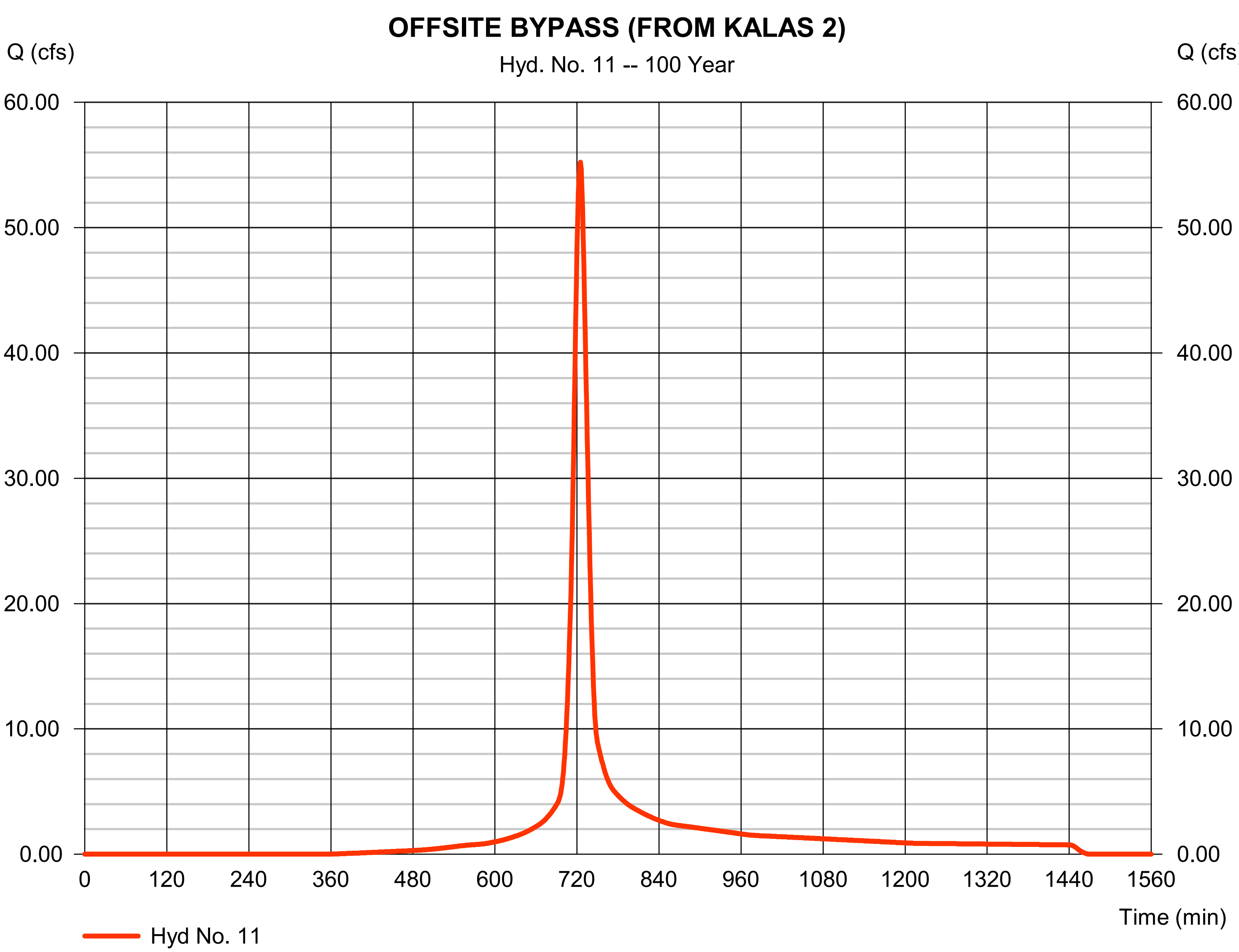
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 | Monday, 02 / 3 / 2025

Hyd. No. 11

OFFSITE BYPASS (FROM KALAS 2)

Hydrograph type	= SCS Runoff	Peak discharge	= 55.22 cfs
Storm frequency	= 100 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 173,878 cuft
Drainage area	= 9.720 ac	Curve number	= 78.3
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.90 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



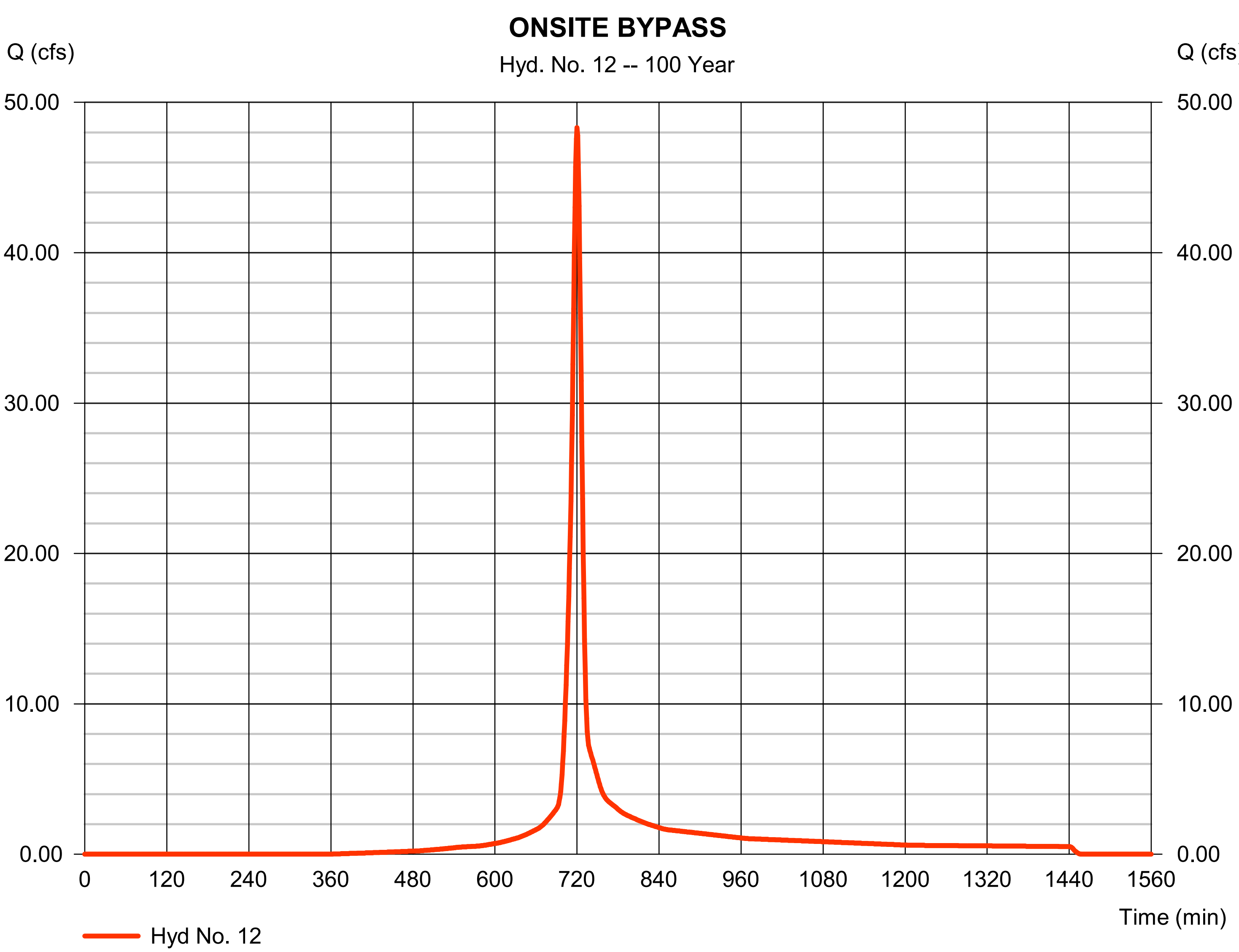
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 12

ONSITE BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 48.32 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 118,805 cuft
Drainage area	= 6.570 ac	Curve number	= 78
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 11.56 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



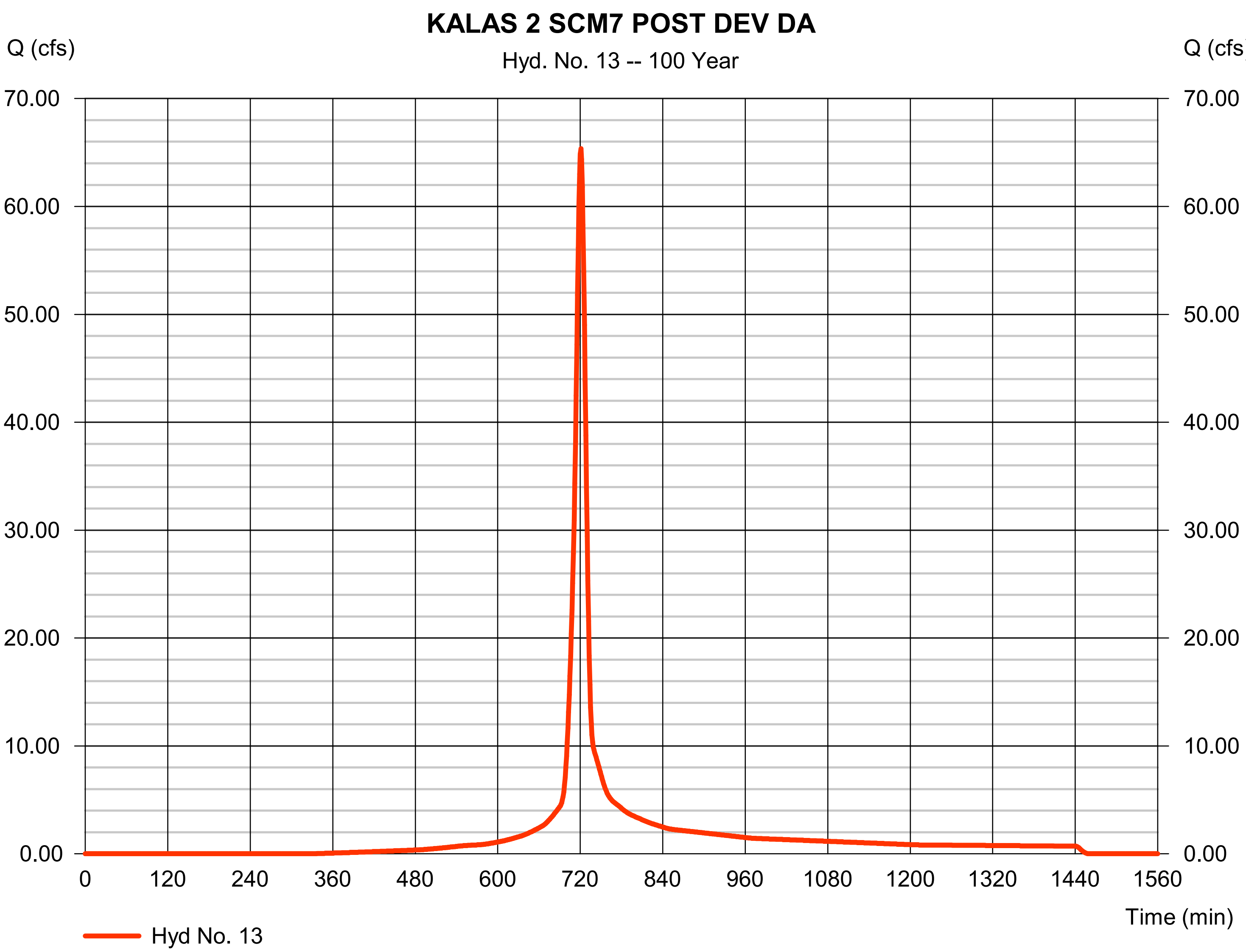
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 13

KALAS 2 SCM7 POST DEV DA

Hydrograph type	= SCS Runoff	Peak discharge	= 65.36 cfs
Storm frequency	= 100 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 168,684 cuft
Drainage area	= 9.260 ac	Curve number	= 79.8
Basin Slope	= 1.1 %	Hydraulic length	= 1505 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 12.38 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

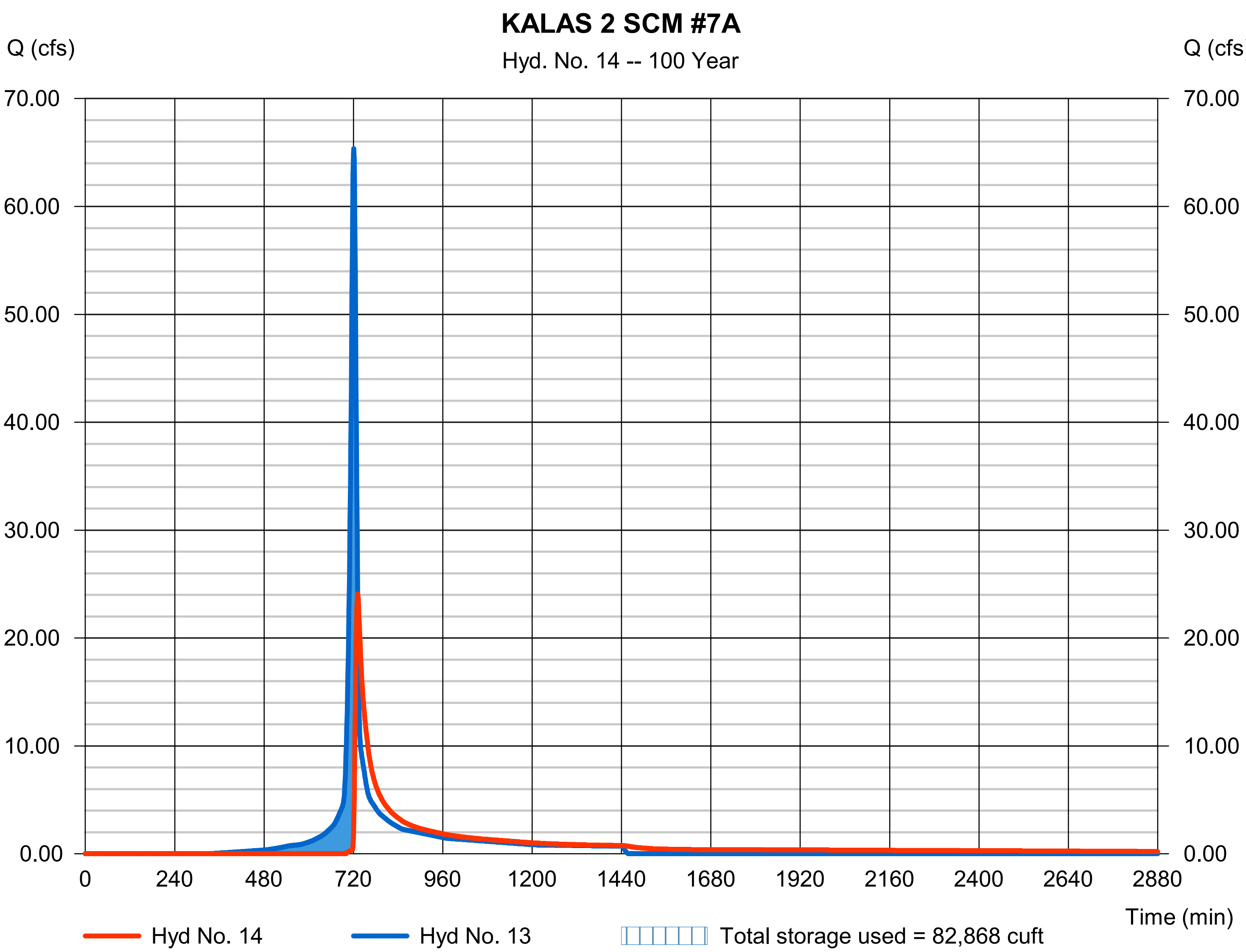
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 14

KALAS 2 SCM #7A

Hydrograph type	= Reservoir	Peak discharge	= 24.08 cfs
Storm frequency	= 100 yrs	Time to peak	= 731 min
Time interval	= 1 min	Hyd. volume	= 140,354 cuft
Inflow hyd. No.	= 13 - KALAS 2 SCM7 POST DEV DA	Max. Elevation	= 375.56 ft
Reservoir name	= SCM #7A	Max. Storage	= 82,868 cuft

Storage Indication method used.



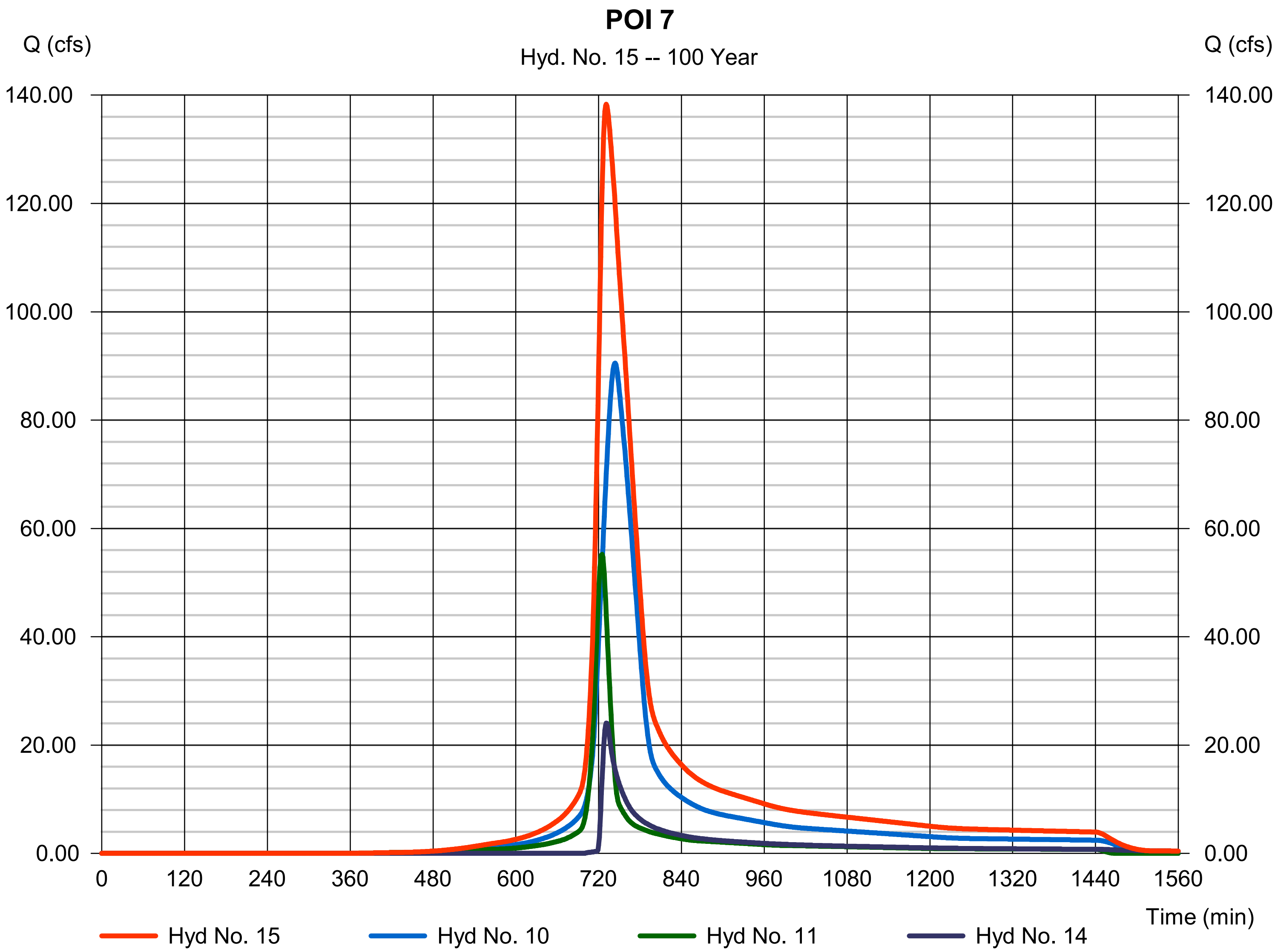
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 15

POI 7

Hydrograph type	= Combine	Peak discharge	= 138.29 cfs
Storm frequency	= 100 yrs	Time to peak	= 731 min
Time interval	= 1 min	Hyd. volume	= 827,866 cuft
Inflow hyds.	= 10, 11, 14	Contrib. drain. area	= 9.720 ac



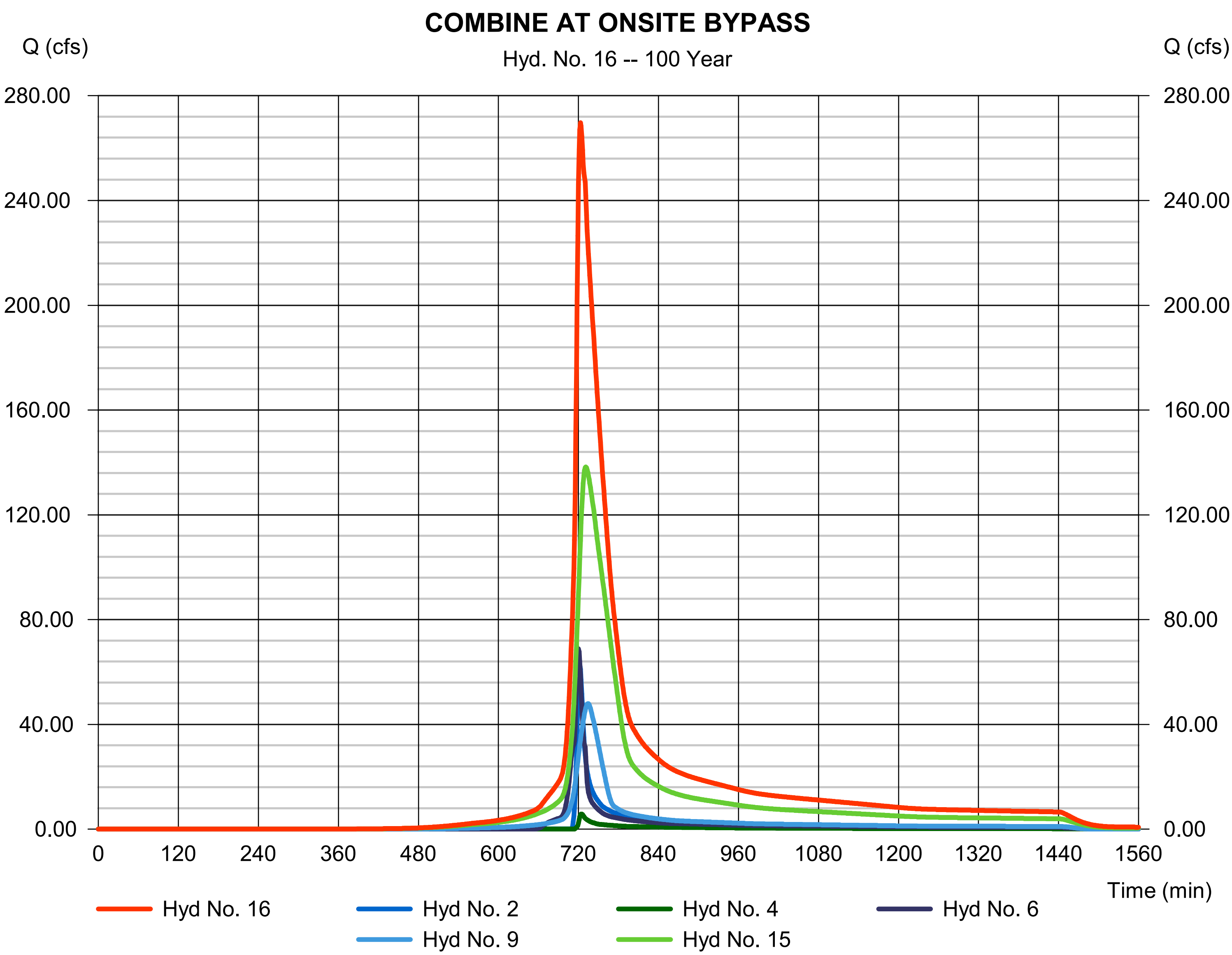
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 16

COMBINE AT ONSITE BYPASS

Hydrograph type	= Combine	Peak discharge	= 269.73 cfs
Storm frequency	= 100 yrs	Time to peak	= 723 min
Time interval	= 1 min	Hyd. volume	= 1,375,281 cuft
Inflow hyds.	= 2, 4, 6, 9, 15	Contrib. drain. area	= 14.090 ac



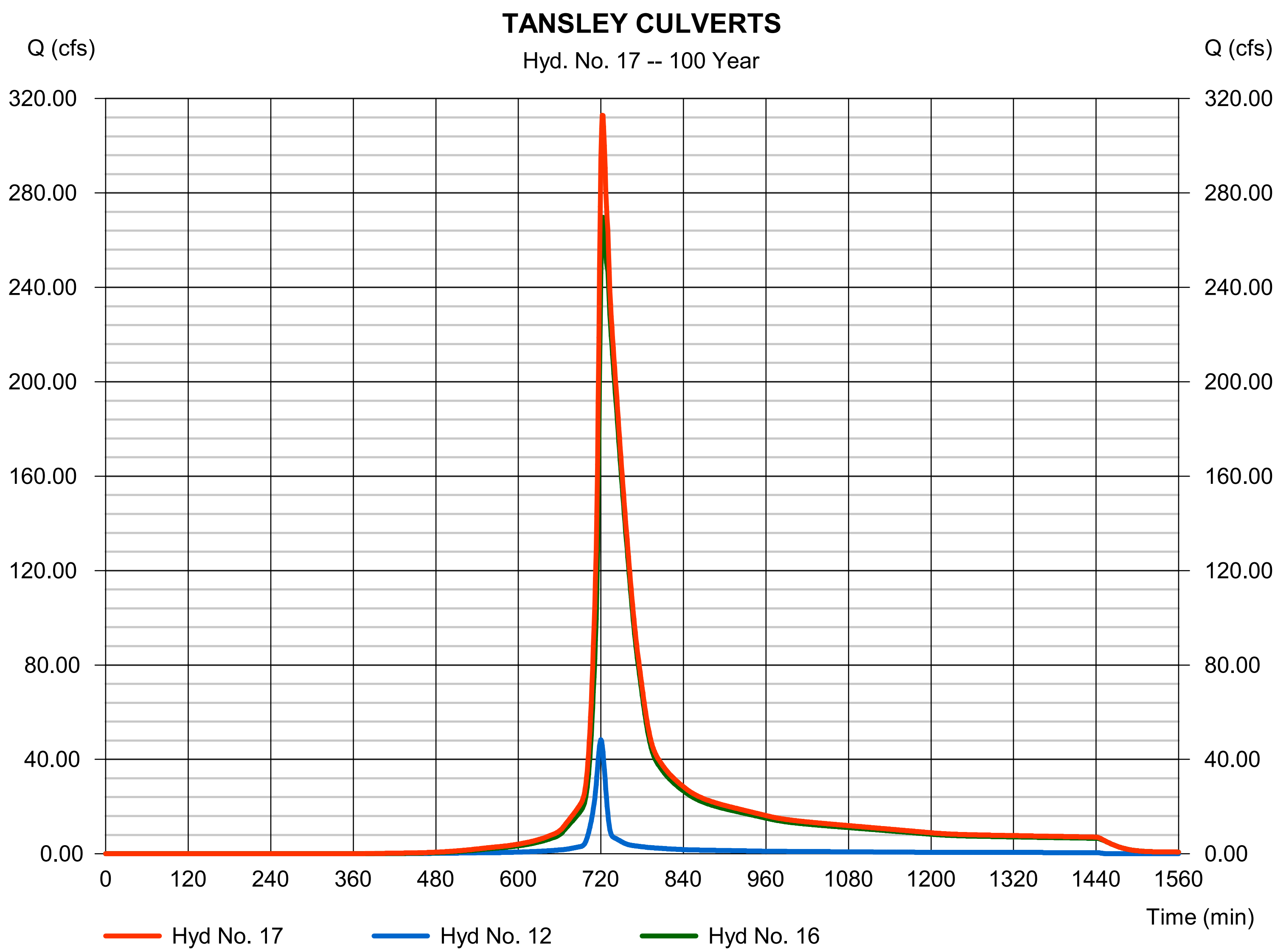
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Monday, 02 / 3 / 2025

Hyd. No. 17

TANSLEY CULVERTS

Hydrograph type	= Combine	Peak discharge	= 312.87 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 1,494,086 cuft
Inflow hyds.	= 12, 16	Contrib. drain. area	= 6.570 ac



Culvert Report

Tansley 10-Year Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Feb 3 2025

Culvert at Tansley Loop-Moody Property-Q10

Invert Elev Dn (ft)	= 347.00
Pipe Length (ft)	= 86.00
Slope (%)	= 1.16
Invert Elev Up (ft)	= 348.00
Rise (in)	= 54.0
Shape	= Circular
Span (in)	= 54.0
No. Barrels	= 2
n-Value	= 0.012
Culvert Type	= Circular Concrete
Culvert Entrance	= Square edge w/headwall (C)
Coeff. K,M,c,Y,k	= 0.0098, 2, 0.0398, 0.67, 0.5

Embankment

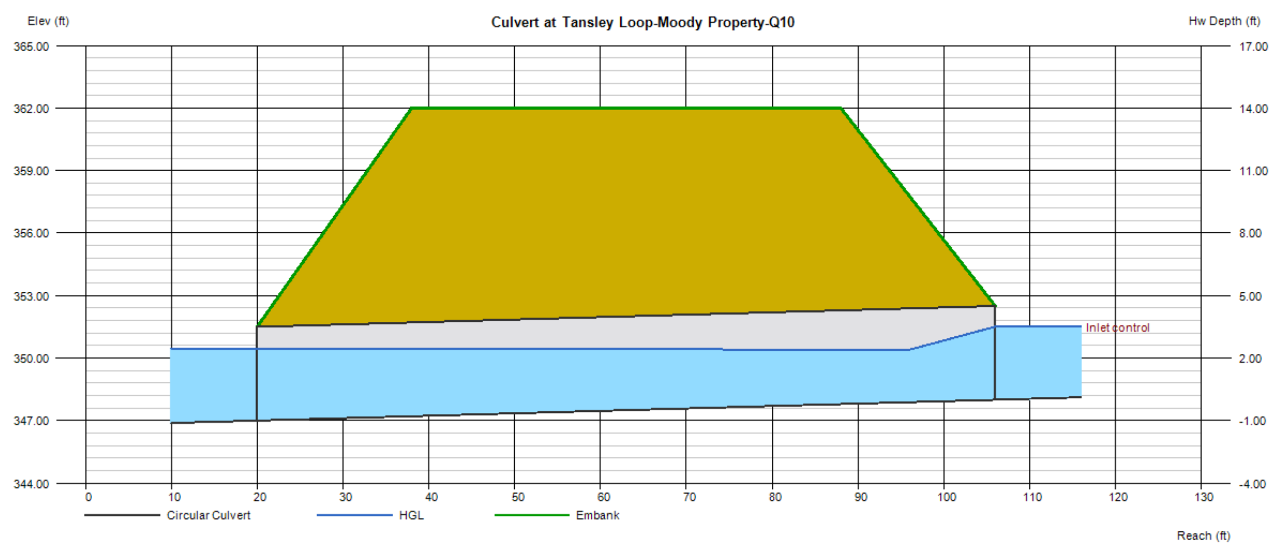
Top Elevation (ft)	= 362.00
Top Width (ft)	= 50.00
Crest Width (ft)	= 80.00

Calculations

Qmin (cfs)	= 135.24
Qmax (cfs)	= 135.24
Tailwater Elev (ft)	= (dc+D)/2

Highlighted

Qtotal (cfs)	= 135.24
Qpipe (cfs)	= 135.24
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 5.17
Veloc Up (ft/s)	= 7.86
HGL Dn (ft)	= 350.45
HGL Up (ft)	= 350.39
Hw Elev (ft)	= 351.51
Hw/D (ft)	= 0.78
Flow Regime	= Inlet Control



Culvert Report

Tansley 25-Year Culvert Report

Culvert at Tansley Loop-Moody Property-Q25

Invert Elev Dn (ft)	= 347.00
Pipe Length (ft)	= 86.00
Slope (%)	= 1.16
Invert Elev Up (ft)	= 348.00
Rise (in)	= 54.0
Shape	= Circular
Span (in)	= 54.0
No. Barrels	= 2
n-Value	= 0.012
Culvert Type	= Circular Concrete
Culvert Entrance	= Square edge w/headwall (C)
Coeff. K,M,c,Y,k	= 0.0098, 2, 0.0398, 0.67, 0.5

Embankment

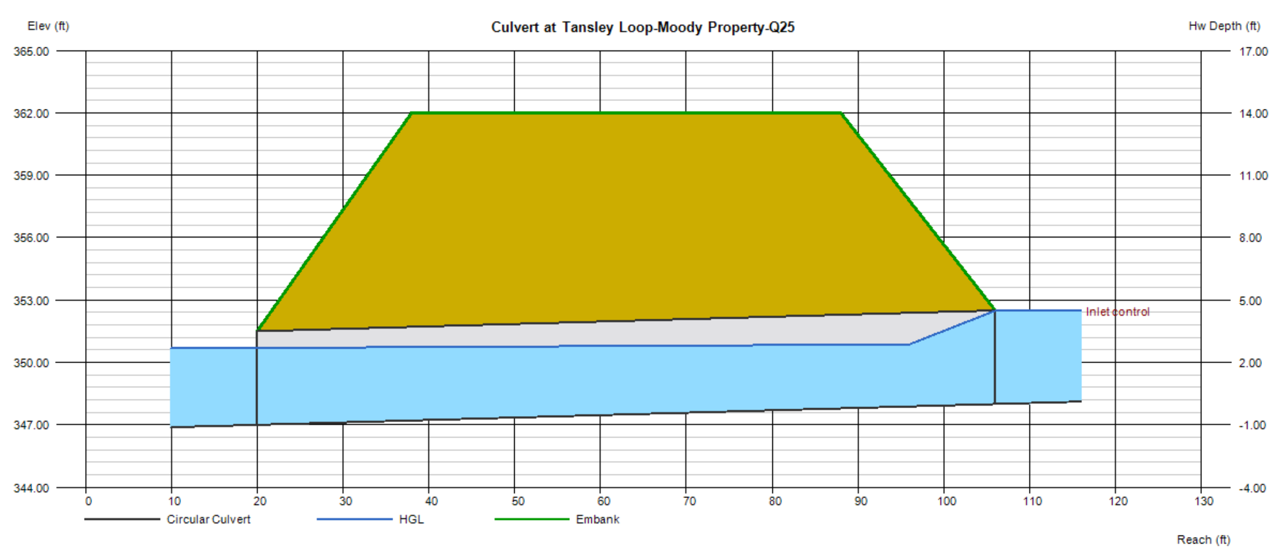
Top Elevation (ft)	= 362.00
Top Width (ft)	= 50.00
Crest Width (ft)	= 80.00

Calculations

Qmin (cfs)	= 194.15
Qmax (cfs)	= 194.15
Tailwater Elev (ft)	= (dc+D)/2

Highlighted

Qtotal (cfs)	= 194.15
Qpipe (cfs)	= 194.15
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 6.95
Veloc Up (ft/s)	= 8.99
HGL Dn (ft)	= 350.70
HGL Up (ft)	= 350.89
Hw Elev (ft)	= 352.49
Hw/D (ft)	= 1.00
Flow Regime	= Inlet Control



Culvert Report

Tansley 100-Year Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Feb 3 2025

Culvert at Tansley Loop-Moody Property-Q100

Invert Elev Dn (ft)	=	347.00
Pipe Length (ft)	=	86.00
Slope (%)	=	1.16
Invert Elev Up (ft)	=	348.00
Rise (in)	=	54.0
Shape	=	Circular
Span (in)	=	54.0
No. Barrels	=	2
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

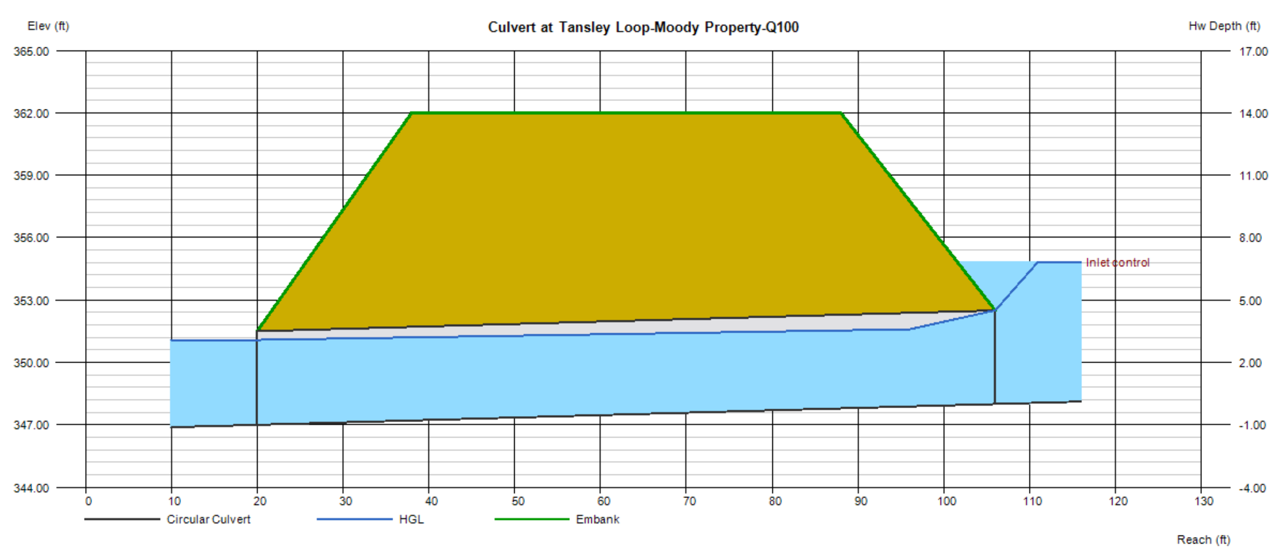
Top Elevation (ft)	=	362.00
Top Width (ft)	=	50.00
Crest Width (ft)	=	80.00

Calculations

Qmin (cfs)	=	312.87
Qmax (cfs)	=	312.87
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	312.87
Qpipe (cfs)	=	312.87
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	10.32
Veloc Up (ft/s)	=	11.29
HGL Dn (ft)	=	351.08
HGL Up (ft)	=	351.66
Hw Elev (ft)	=	354.84
Hw/D (ft)	=	1.52
Flow Regime	=	Inlet Control



Culvert Report

Mulberry 10-Year Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Feb 3 2025

Culvert Crossing on Mulberry +/- 18+00 (Q10)

Invert Elev Dn (ft)	= 365.60
Pipe Length (ft)	= 116.00
Slope (%)	= 0.50
Invert Elev Up (ft)	= 366.18
Rise (in)	= 36.0
Shape	= Circular
Span (in)	= 36.0
No. Barrels	= 1
n-Value	= 0.012
Culvert Type	= Circular Concrete
Culvert Entrance	= Square edge w/headwall (C)
Coeff. K,M,c,Y,k	= 0.0098, 2, 0.0398, 0.67, 0.5

Embankment

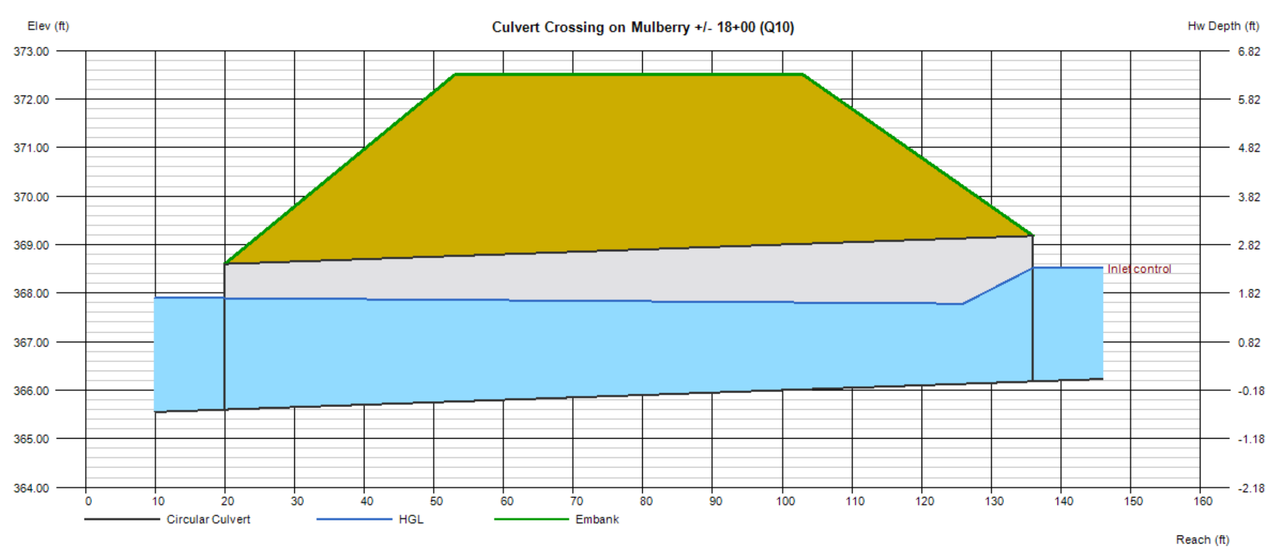
Top Elevation (ft)	= 372.50
Top Width (ft)	= 50.00
Crest Width (ft)	= 100.00

Calculations

Qmin (cfs)	= 24.42
Qmax (cfs)	= 24.42
Tailwater Elev (ft)	= (dc+D)/2

Highlighted

Qtotal (cfs)	= 24.42
Qpipe (cfs)	= 24.42
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 4.21
Veloc Up (ft/s)	= 6.41
HGL Dn (ft)	= 367.90
HGL Up (ft)	= 367.77
Hw Elev (ft)	= 368.52
Hw/D (ft)	= 0.78
Flow Regime	= Inlet Control



Culvert Report

Mulberry 25-Year Culvert Report

Culvert Crossing on Mulberry +/- 18+00 (Q25)

Invert Elev Dn (ft)	=	365.60
Pipe Length (ft)	=	116.00
Slope (%)	=	0.50
Invert Elev Up (ft)	=	366.18
Rise (in)	=	36.0
Shape	=	Circular
Span (in)	=	36.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

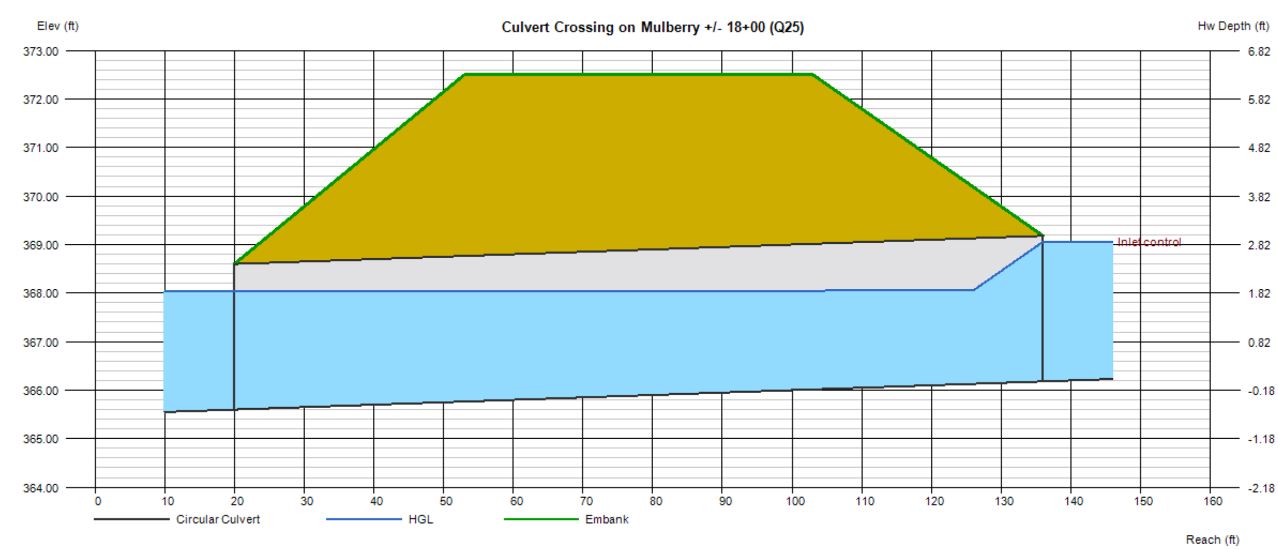
Top Elevation (ft)	=	372.50
Top Width (ft)	=	50.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	33.20
Qmax (cfs)	=	33.20
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	33.20
Qpipe (cfs)	=	33.20
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	5.40
Veloc Up (ft/s)	=	7.14
HGL Dn (ft)	=	368.03
HGL Up (ft)	=	368.06
Hw Elev (ft)	=	369.06
Hw/D (ft)	=	0.96
Flow Regime	=	Inlet Control



Culvert Report

Mulberry 100-Year Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. — Monday, Feb 3 2025

Culvert Crossing on Mulberry +/- 18+00 (Q100)

Invert Elev Dn (ft)	=	365.60
Pipe Length (ft)	=	116.00
Slope (%)	=	0.50
Invert Elev Up (ft)	=	366.18
Rise (in)	=	36.0
Shape	=	Circular
Span (in)	=	36.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

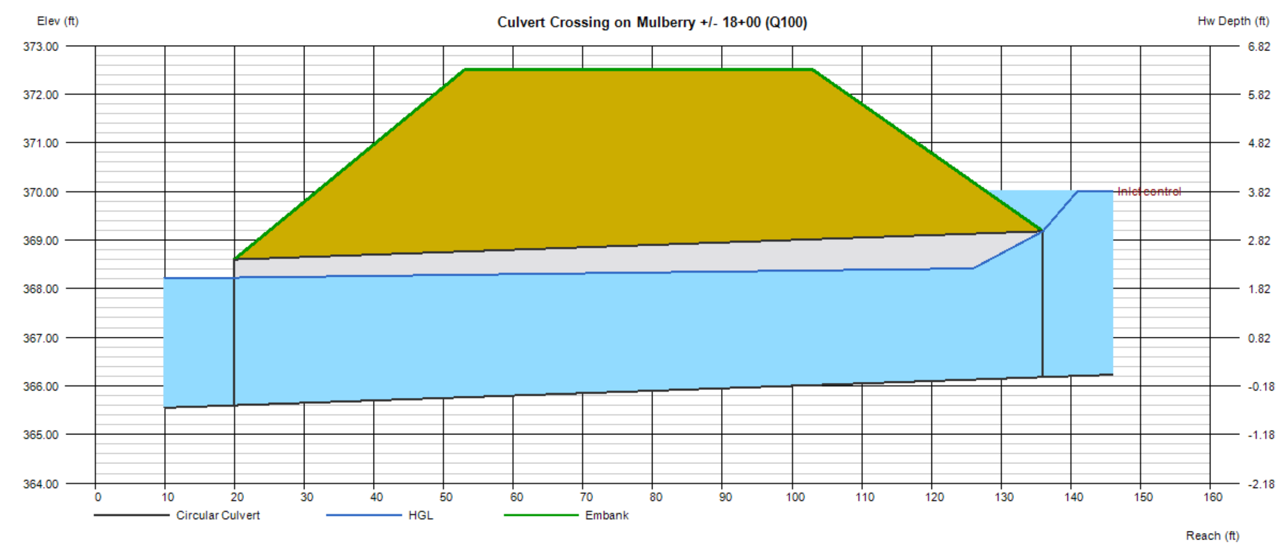
Top Elevation (ft)	=	372.50
Top Width (ft)	=	50.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	47.93
Qmax (cfs)	=	47.93
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	47.93
Qpipe (cfs)	=	47.93
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	7.30
Veloc Up (ft/s)	=	8.42
HGL Dn (ft)	=	368.23
HGL Up (ft)	=	368.43
Hw Elev (ft)	=	370.01
Hw/D (ft)	=	1.28
Flow Regime	=	Inlet Control



Project Name:	**Moody Development**
Project Number:	**R210002**
Date:	**2/3/2025**
Calculated By:	**RC**
Checked By:	**JK**

CULVERT SIZING WORKSHEET (INLET CONTROL)- Tansley Loop

Step 1: Determine Q (cfs) by using Rational Equation or inputting Known Q

Enter Known Q_{25} (cfs):	194

Q value can be determined by using Hydrograph, Express, or Storm Sewers, etc…

Step 2: Q_{25} culvert sizing with a minimum HW/D = 1.20 (Inlet Control)

Culvert Invert Up Elevation (ft):	348

Nomenclature	Embedded?	Diamater (ft)	C-S A (sf)	Centroid Value (ft)
Culvert #1	yes	4.5	13.64	1.97
Culvert #2	yes	4.5	13.64	1.97

HW (ft):	5.40

Head h_1 (ft):	2.87
Head h_2 (ft):	2.87

Culvert #1 Capacity Q_1 (cfs):	111.26	$Q_1 = KeA(2gh_1)^{1/2}$	
Culvert #2 Capacity Q_2 (cfs):	111.26	$Q_2 = KeA(2gh_2)^{1/2}$	
Total Capacity Q_T (cfs):	222.53	ADEQUATE	*QT=Q1+Q2*

Step 3: Q_{100} culvert sizing to not overtop roadway

Culvert invert (ft elev.):		348.00
Top elevation of grade above culvert (ft elev.):		362.00
Enter Known Q_{100} (cfs):		313
Ke coefficient	0.60	

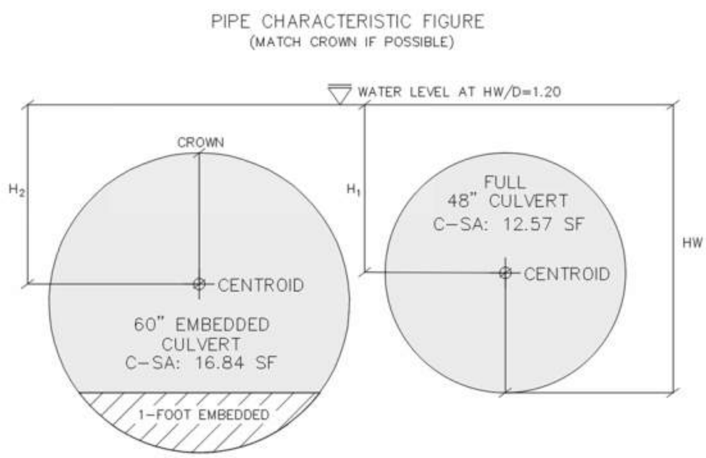
Note: The Ke coefficient of 0.60 is standard for a head wall-beveled inlet

Total C-S A (sf) available:	27.28	
Q_{100} Head, H (ft)	5.68	$H=[(Q/KeA)^2]/2g$
Headwater Depth, HW (ft):	7.93	*HW=H+D/2*
Headwater Elevation (ft)	355.93	
Q_{100} Overtopping Roadway?	NO	

Pipe Characteristics Table

Pipe Diameter	Full Pipe		Embedded Pipe	
(ft)	C-S A (sf)	Centroid of C-S A (ft)	C-S A (sf)	Centroid to Crown Distance (ft)
2	3.14	1.00	2.69	0.87
2.5	4.91	1.25	4.21	1.09
3	7.07	1.50	6.06	1.31
3.5	9.62	1.75	8.25	1.53
4	12.57	2.00	10.78	1.75
4.5	15.90	2.25	13.64	1.97
5	19.64	2.50	16.84	2.18
6	28.27	3.00	25.18	2.70

FIGURE BELOW IS FOR EXAMPLE PURPOSES ONLY (NOT PROJECT SPECIFIC)



AMERICAN Engineering

4020 Westchase Boulevard Suite 450 Raleigh, NC 27607
OFFICE: 919.469.1101 | AMERICAN-EA.COM

Project Name:	**Moody Development**
Project Number:	**R210002**
Date:	**2/3/2025**
Calculated By:	**RC**
Checked By:	**JK**

CULVERT SIZING WORKSHEET (INLET CONTROL)- Mulberry

Step 1: Determine Q (cfs) by using Rational Equation or inputting Known Q

Enter Known Q_{25} (cfs):	34

Q value can be determined by using Hydrograph, Express, or Storm Sewers, etc…

Step 2: Q_{25} culvert sizing with a minimum HW/D = 1.20 (Inlet Control)

Culvert Invert Up Elevation (ft):	348

Nomenclature	Embedded?	Diamater (ft)	C-S A (sf)	Centroid Value (ft)
Culvert #1	yes	3	6.06	1.31
Culvert #2	n/a	0	0	0

HW (ft):	3.60

Head h_1 (ft):	1.91
Head h_2 (ft):	~~0.60~~

Culvert #1 Capacity Q_1 (cfs):	40.33	$Q_1 = KeA(2gh_1)^{1/2}$	
Culvert #2 Capacity Q_2 (cfs):	0.00	$Q_2 = KeA(2gh_2)^{1/2}$	
Total Capacity Q_T (cfs):	40.33	ADEQUATE	$Q_T = Q_1 + Q_2$

Step 3: Q_{100} culvert sizing to not overtop roadway

Culvert invert (ft elev.):	366.50	
Top elevation of grade above culvert (ft elev.):	373.00	
Enter Known Q_{100} (cfs):	48	
Ke coefficient	0.60	

Note: The Ke coefficient of 0.60 is standard for a head wall-beveled inlet

Total C-S A (sf) available:	6.06	
Q_{100} Head, H (ft)	2.71	$H=[(Q/KeA)^2]/2g$
Headwater Depth, HW (ft):	4.21	$HW=H+D/2$
Headwater Elevation (ft)	370.71	
Q_{100} Overtopping Roadway?	NO	

Pipe Characteristics Table

Pipe Diameter	Full Pipe		Embedded Pipe	
(ft)	C-S A (sf)	Centroid of C-S A (ft)	C-S A (sf)	Centroid to Crown Distance (ft)
2	3.14	1.00	2.69	0.87
2.5	4.91	1.25	4.21	1.09
3	7.07	1.50	6.06	1.31
3.5	9.62	1.75	8.25	1.53
4	12.57	2.00	10.78	1.75
4.5	15.90	2.25	13.64	1.97
5	19.64	2.50	16.84	2.18
6	28.27	3.00	25.18	2.70

FIGURE BELOW IS FOR EXAMPLE PURPOSES ONLY (NOT PROJECT SPECIFIC)

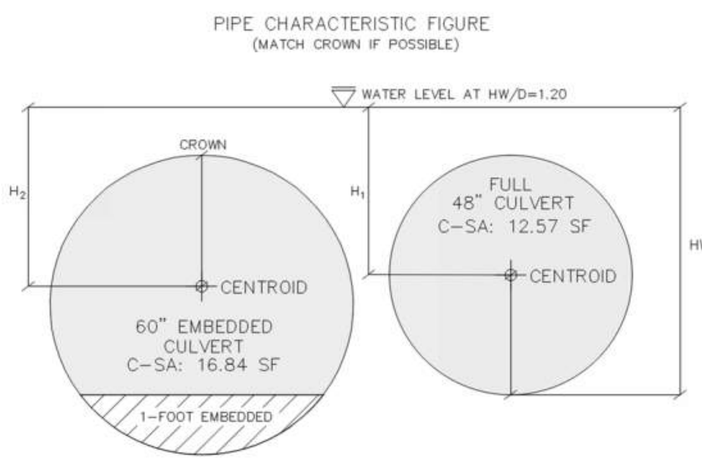
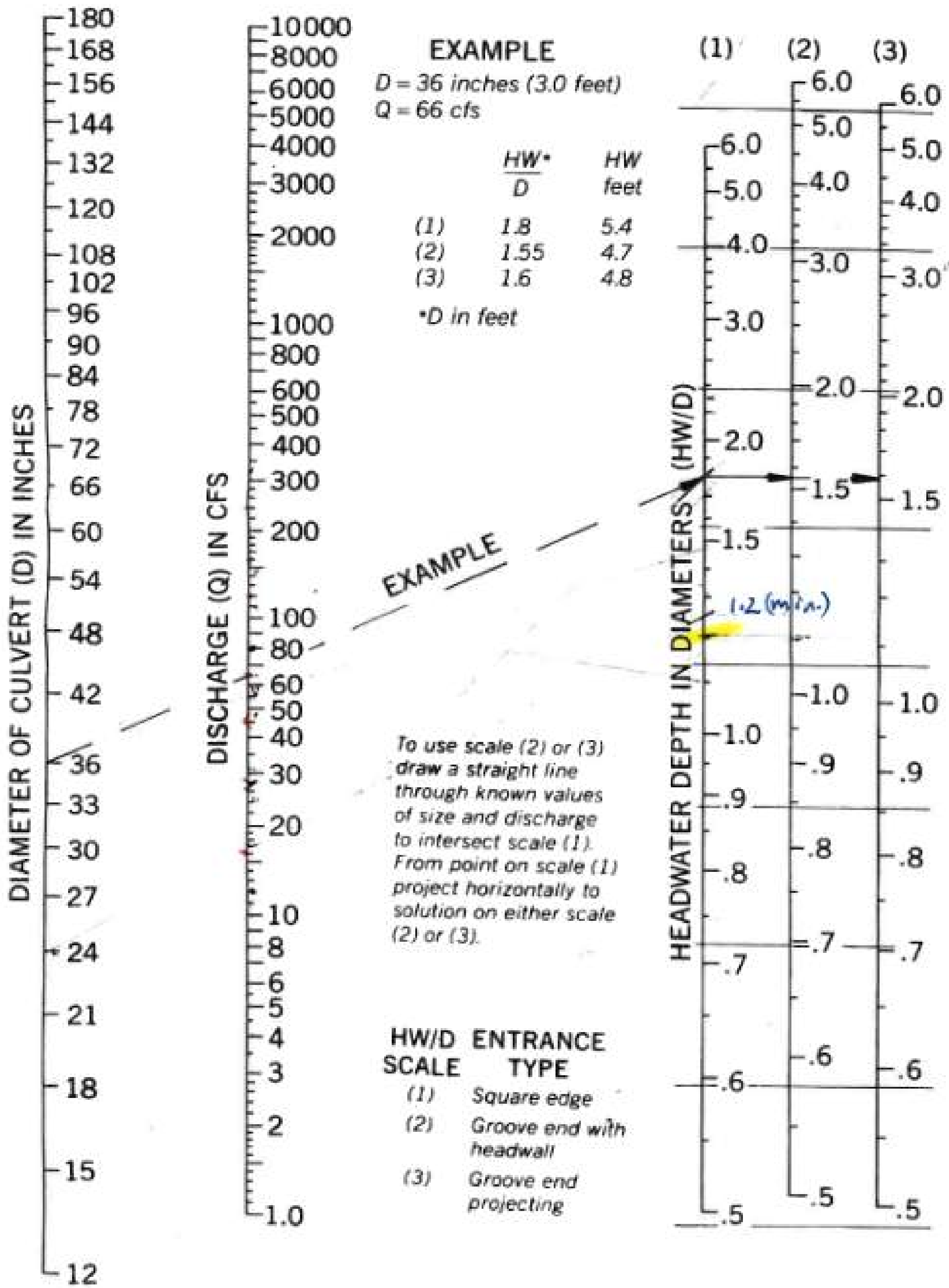


FIGURE 33

HEADWATER DEPTH FOR CIRCULAR CONCRETE PIPE CULVERTS WITH INLET CONTROL



TIME OF CONCENTRATION & TRAVEL TIME

AMERICAN Engineering

CALCULATIONS BY:	**RC**
CHECKED BY:	**JK**
DATE:	**1/27/2025**
PROJECT:	**Moody**
PROJECT #	**R210002**
AREA:	**NCDOT CULVERT #1**

Calculate the Travel Time and/or Time of Concentration with Overland (Sheet) Flow, Shallow Concentrated Flow, and Channel Flow. Based on Chapter 3 of the NRCS TR-55 Method.

Sheet flow (Applicable to Tc only) using Manning's Kinematic Solution

$$T_t = 0.007 * \frac{(nL)^{0.8}}{\left(P_2^{0.5} * s^{0.4}\right)}$$

Suface description (table 3-1)	Dense Grass		
Manning's roughness coefficient, n (table 3-1)	0.240		
Flow Length, L (Max. 300')*	300 ft		
Two-year 24-hour rainfall, P2	3.46 in		
Land slope, s	0.010 ft/ft		
Travel Time, Tt	**0.73 hr**	**43.61 min**	

*Once flow exceeds 300' it becomes shallow concentration flow (a maximum of 150' is typical)

Shallow concentrated flow using graphical method (see Figure 3-1)

$$T_t = \frac{L}{3600V}$$

Surface description (paved or unpaved)	Unpaved	
Flow Length, L	500 ft	
Watercourse slope, s	0.015 ft/ft	
Average velocity, V (Figure 3-1)	2 ft/s	
Travel Time, Tt	**0.07 hr**	**4.17 min**

Channel flow using Manning's Equation

$$T_t = \frac{L}{3600V} \qquad V = \frac{1.49 * r^{\frac{2}{3}} * s^{\frac{1}{2}}}{n} \qquad r = \frac{a}{p_w}$$

Cross sectional flow area, a	7.00 sf	
Wetted perimeter, pw	9.50 ft	
Hydraulic Radius, r	0.74 ft	
Channel slope, s	0.005 ft/ft	
Manning's roughness coefficient, n	0.011	
Flow Length, L	590 ft	
Velocity, V	7.81 ft/s	
Travel Time, Tt	**0.02 hr**	**1.26 min**
Total Travel Time/Time of Concentration	**0.82 hr**	**49.03 min**

TIME OF CONCENTRATION & TRAVEL TIME

CALCULATIONS BY:	RC
CHECKED BY:	JK
DATE:	1/27/2025
PROJECT:	Moody
PROJECT #	R210002
AREA:	NCDOT CULVERT #2

Calculate the Travel Time and/or Time of Concentration with Overland (Sheet) Flow, Shallow Concentrated Flow, and Channel Flow. Based on Chapter 3 of the NRCS TR-55 Method.

Sheet flow (Applicable to Tc only) using Manning's Kinematic Solution

$$T_t = 0.007 * \frac{(nL)^{0.8}}{\left(P_2^{0.5} * s^{0.4}\right)}$$

Suface description (table 3-1)	Dense Grass		
Manning's roughness coefficient, n (table 3-1)	0.240		
Flow Length, L (Max. 300')*	300	ft	
Two-year 24-hour rainfall, P2	3.46	in	
Land slope, s	0.010	ft/ft	
Travel Time, Tt	**0.73 hr**		**43.61 min**

*Once flow exceeds 300' it becomes shallow concentration flow (a maximum of 150' is typical)

Shallow concentrated flow using graphical method (see Figure 3-1)

$$T_t = \frac{L}{3600V}$$

Surface description (paved or unpaved)	Unpaved		
Flow Length, L	691	ft	
Watercourse slope, s	0.015	ft/ft	
Average velocity, V (Figure 3-1)	2	ft/s	
Travel Time, Tt	**0.10 hr**		**5.76 min**

Channel flow using Manning's Equation

$$T_t = \frac{L}{3600V} \qquad V = \frac{1.49 * r^{\frac{2}{3}} * s^{\frac{1}{2}}}{n} \qquad r = \frac{a}{p_w}$$

Cross sectional flow area, a	7.00	sf	
Wetted perimeter, pw	9.50	ft	
Hydraulic Radius, r	0.74	ft	
Channel slope, s	0.005	ft/ft	
Manning's roughness coefficient, n	0.011		
Flow Length, L	714	ft	
Velocity, V	7.81	ft/s	
Travel Time, Tt	**0.03 hr**		**1.52 min**
Total Travel Time/Time of Concentration	**0.85 hr**		**50.89 min**

TIME OF CONCENTRATION & TRAVEL TIME

CALCULATIONS BY:	RC
CHECKED BY:	JK
DATE:	1/27/2025
PROJECT:	Moody
PROJECT #	R210002
AREA:	OFFSITE BYPASS

Calculate the Travel Time and/or Time of Concentration with Overland (Sheet) Flow, Shallow Concentrated Flow, and Channel Flow. Based on Chapter 3 of the NRCS TR-55 Method.

Sheet flow (Applicable to Tc only) using Manning's Kinematic Solution

$$T_t = 0.007 * \frac{(nL)^{0.8}}{\left(P_2^{0.5} * s^{0.4}\right)}$$

Suface description (table 3-1)	DENSE GRASS		
Manning's roughness coefficient, n (table 3-1)	0.240		
Flow Length, L (Max. 300')*	50	ft	
Two-year 24-hour rainfall, P2	3.46	in	
Land slope, s	0.010	ft/ft	
Travel Time, Tt	**0.17**	**hr**	**10.40 min**

*Once flow exceeds 300' it becomes shallow concentration flow (a maximum of 150' is typical)

Shallow concentrated flow using graphical method (see Figure 3-1)

$$T_t = \frac{L}{3600V}$$

Surface description (paved or unpaved)	Unpaved		
Flow Length, L	684	ft	
Watercourse slope, s	0.005	ft/ft	
Average velocity, V (Figure 3-1)	1.2	ft/s	
Travel Time, Tt	**0.16**	**hr**	**9.50 min**

Channel flow using Manning's Equation

$$T_t = \frac{L}{3600V} \qquad V = \frac{1.49 * r^{\frac{2}{3}} * s^{\frac{1}{2}}}{n} \qquad r = \frac{a}{p_w}$$

Cross sectional flow area, a	7.00	sf	
Wetted perimeter, pw	9.50	ft	
Hydraulic Radius, r	0.74	ft	
Channel slope, s	0.005	ft/ft	
Manning's roughness coefficient, n	0.011		
Flow Length, L	0	ft	
Velocity, V	7.81	ft/s	
Travel Time, Tt	**0.00**	**hr**	**0.00 min**
Total Travel Time/Time of Concentration	**0.33**	**hr**	**19.90 min**

TIME OF CONCENTRATION & TRAVEL TIME

CALCULATIONS BY:	RC
CHECKED BY:	JK
DATE:	1/27/2025
PROJECT:	Moody
PROJECT #	R210002
AREA:	ONSITE BYPASS

Calculate the Travel Time and/or Time of Concentration with Overland (Sheet) Flow, Shallow Concentrated Flow, and Channel Flow. Based on Chapter 3 of the NRCS TR-55 Method.

Sheet flow (Applicable to Tc only) using Manning's Kinematic Solution

$$T_t = 0.007 * \frac{(nL)^{0.8}}{\left(P_2^{0.5} * s^{0.4}\right)}$$

Suface description (table 3-1)	N/A		
Manning's roughness coefficient, n (table 3-1)	0.400		
Flow Length, L (Max. 300')*	0	ft	
Two-year 24-hour rainfall, P2	3.46	in	
Land slope, s	0.010	ft/ft	
Travel Time, Tt	**0.00 hr**		**0.00 min**

*Once flow exceeds 300' it becomes shallow concentration flow (a maximum of 150' is typical)

Shallow concentrated flow using graphical method (see Figure 3-1)

$$T_t = \frac{L}{3600V}$$

Surface description (paved or unpaved)	Unpaved		
Flow Length, L	1110	ft	
Watercourse slope, s	0.013	ft/ft	
Average velocity, V (Figure 3-1)	1.6	ft/s	
Travel Time, Tt	**0.19 hr**		**11.56 min**

Channel flow using Manning's Equation

$$T_t = \frac{L}{3600V} \qquad V = \frac{1.49 * r^{\frac{2}{3}} * s^{\frac{1}{2}}}{n} \qquad r = \frac{a}{p_w}$$

Cross sectional flow area, a	7.00	sf	
Wetted perimeter, pw	9.50	ft	
Hydraulic Radius, r	0.74	ft	
Channel slope, s	0.005	ft/ft	
Manning's roughness coefficient, n	0.011		
Flow Length, L	0	ft	
Velocity, V	7.81	ft/s	
Travel Time, Tt	**0.00 hr**		**0.00 min**

Total Travel Time/Time of Concentration	**0.19 hr**	**11.56 min**

TIME OF CONCENTRATION & TRAVEL TIME

AMERICAN Engineering

CALCULATIONS BY:	RC
CHECKED BY:	JK
DATE:	1/27/2025
PROJECT:	Moody
PROJECT #	R210002
AREA:	MULBERRY CULVERT

Calculate the Travel Time and/or Time of Concentration with Overland (Sheet) Flow, Shallow Concentrated Flow, and Channel Flow. Based on Chapter 3 of the NRCS TR-55 Method.

Sheet flow (Applicable to Tc only) using Manning's Kinematic Solution

$$T_t = 0.007 * \frac{(nL)^{0.8}}{\left(P_2^{0.5} * s^{0.4}\right)}$$

Suface description (table 3-1)	Dense Grass	
Manning's roughness coefficient, n (table 3-1)	0.240	
Flow Length, L (Max. 300')*	175	ft
Two-year 24-hour rainfall, P2	3.46	in
Land slope, s	0.010	ft/ft

Travel Time, Tt — **0.47 hr** — **28.33 min**

*Once flow exceeds 300' it becomes shallow concentration flow (a maximum of 150' is typical)

Shallow concentrated flow using graphical method (see Figure 3-1)

$$T_t = \frac{L}{3600V}$$

Surface description (paved or unpaved)	Unpaved	
Flow Length, L	1000	ft
Watercourse slope, s	0.025	ft/ft
Average velocity, V (Figure 3-1)	2.6	ft/s

Travel Time, Tt — **0.11 hr** — **6.41 min**

Channel flow using Manning's Equation

$$T_t = \frac{L}{3600V} \qquad V = \frac{1.49 * r^{\frac{2}{3}} * s^{\frac{1}{2}}}{n} \qquad r = \frac{a}{p_w}$$

Cross sectional flow area, a	7.00	sf
Wetted perimeter, pw	9.50	ft
Hydraulic Radius, r	0.74	ft
Channel slope, s	0.005	ft/ft
Manning's roughness coefficient, n	0.011	
Flow Length, L	0	ft
Velocity, V	7.81	ft/s

Travel Time, Tt — **0.00 hr** — **0.00 min**

Total Travel Time/Time of Concentration	**0.58 hr**	**34.74 min**

Figure 3-1 Average velocities for estimating travel time for shallow concentrated flow

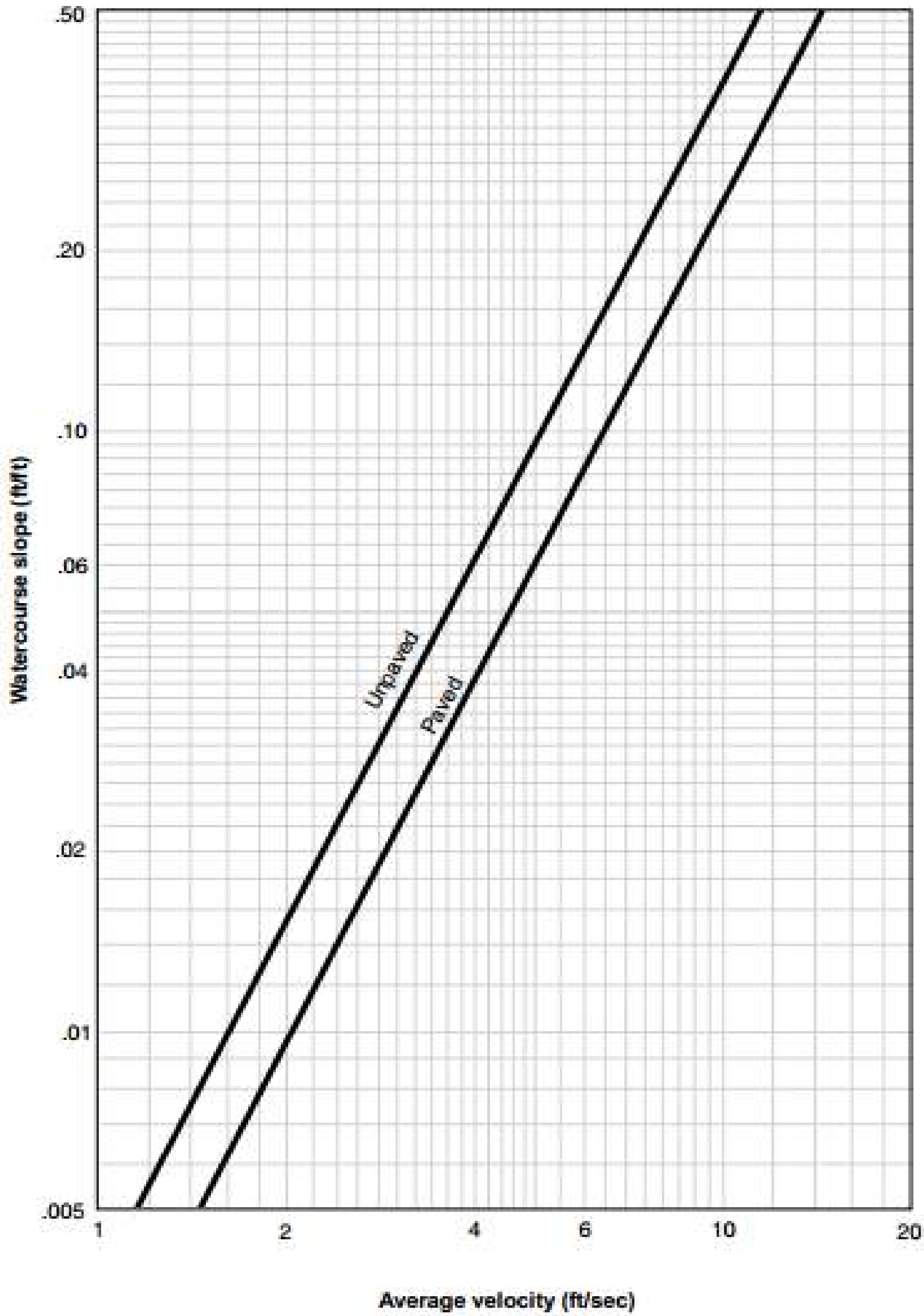


Table 3-1 Roughness coefficients (Manning's n) for sheet flow

Surface description	n [1]
Smooth surfaces (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.05
Cultivated soils:	
Residue cover ≤20%	0.06
Residue cover >20%	0.17
Grass:	
Short grass prairie	0.15
Dense grasses [2]	0.24
Bermudagrass	0.41
Range (natural)	0.13
Woods: [3]	
Light underbrush	0.40
Dense underbrush	0.80

1 The n values are a composite of information compiled by Engman (1986).

2 Includes species such as weeping lovegrass, bluegrass, buffalo grass, blue grama grass, and native grass mixtures.

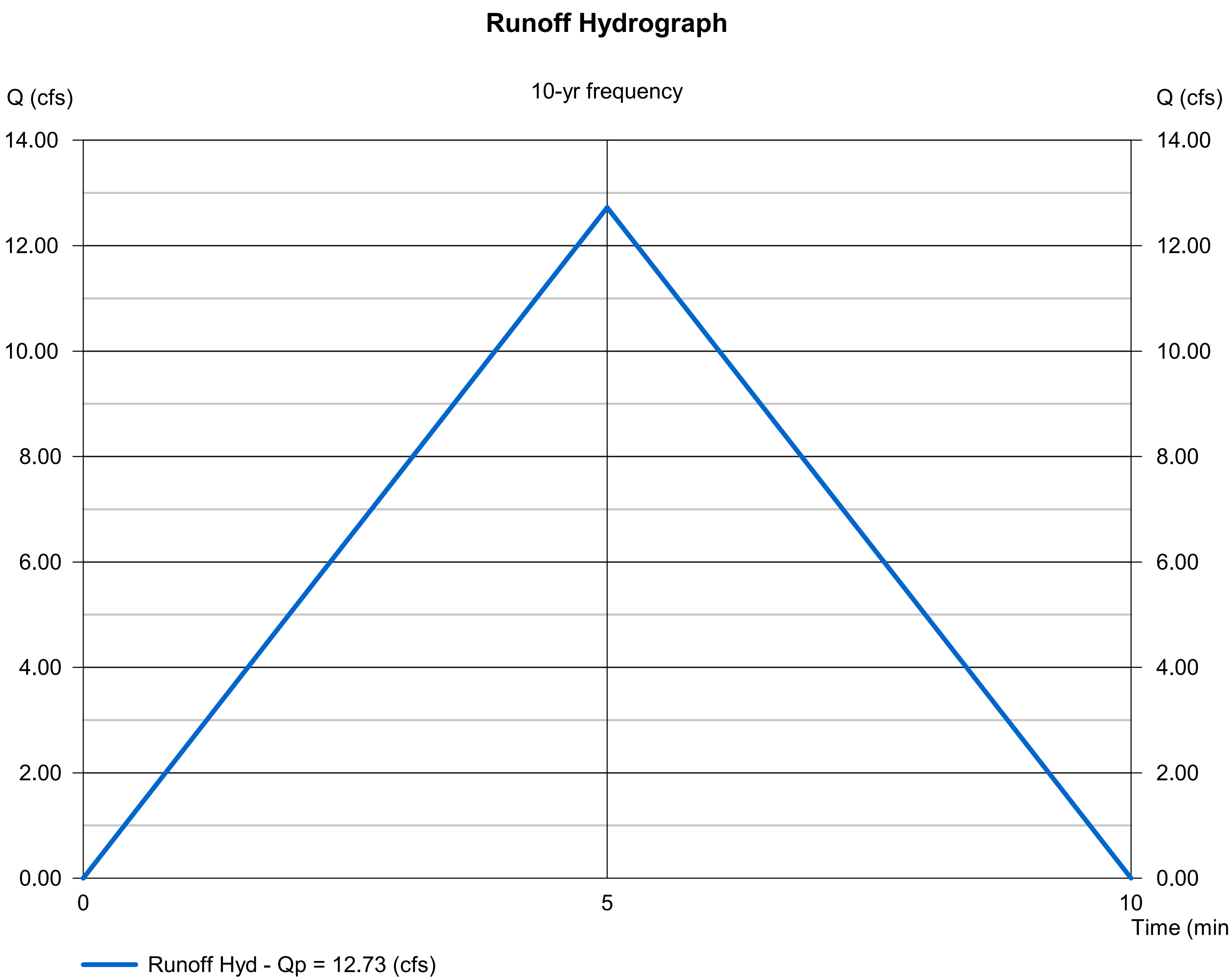
3 When selecting n , consider cover to a height of about 0.1 ft. This is the only part of the plant cover that will obstruct sheet flow.

Hydrology Report

PDD #1 - Moody

Hydrograph type	= Rational	Peak discharge (cfs)	= 12.73
Storm frequency (yrs)	= 10	Time interval (min)	= 1
Drainage area (ac)	= 2.880	Runoff coeff. (C)	= 0.6
Rainfall Inten (in/hr)	= 7.364	Tc by User (min)	= 5
IDF Curve	= 20241113 Moody IDF.IDF	Rec limb factor	= 1.00

Hydrograph Volume = 3,818 (cuft); 0.088 (acft)



Channel Report

PDD #1 - Moody

Trapezoidal

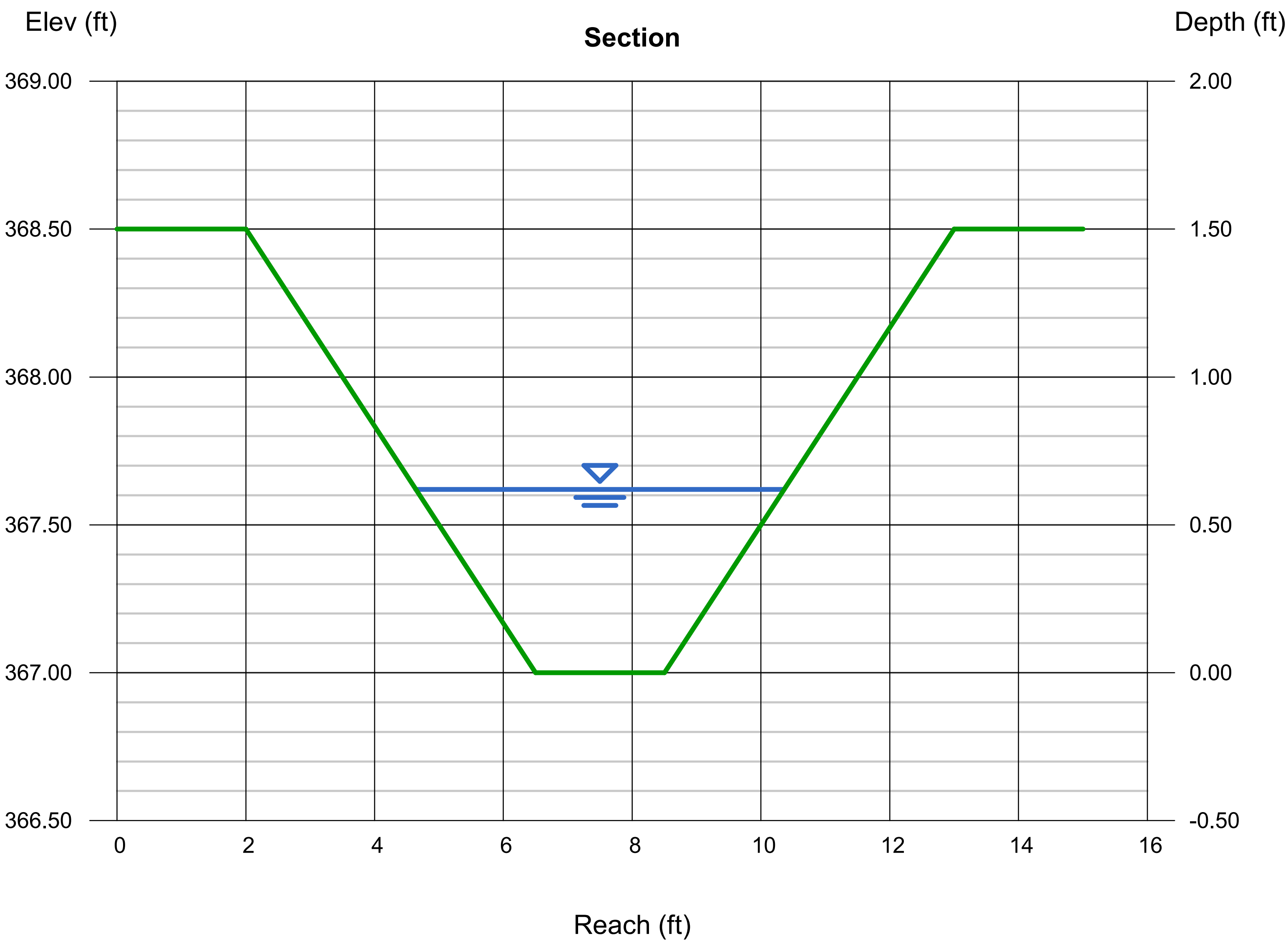
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.50
Invert Elev (ft)	= 367.00
Slope (%)	= 2.71
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cfs)	= 12.73

Highlighted

Depth (ft)	= 0.62
Q (cfs)	= 12.73
Area (sqft)	= 2.39
Velocity (ft/s)	= 5.32
Wetted Perim (ft)	= 5.92
Crit Depth, Yc (ft)	= 0.76
Top Width (ft)	= 5.72
EGL (ft)	= 1.06

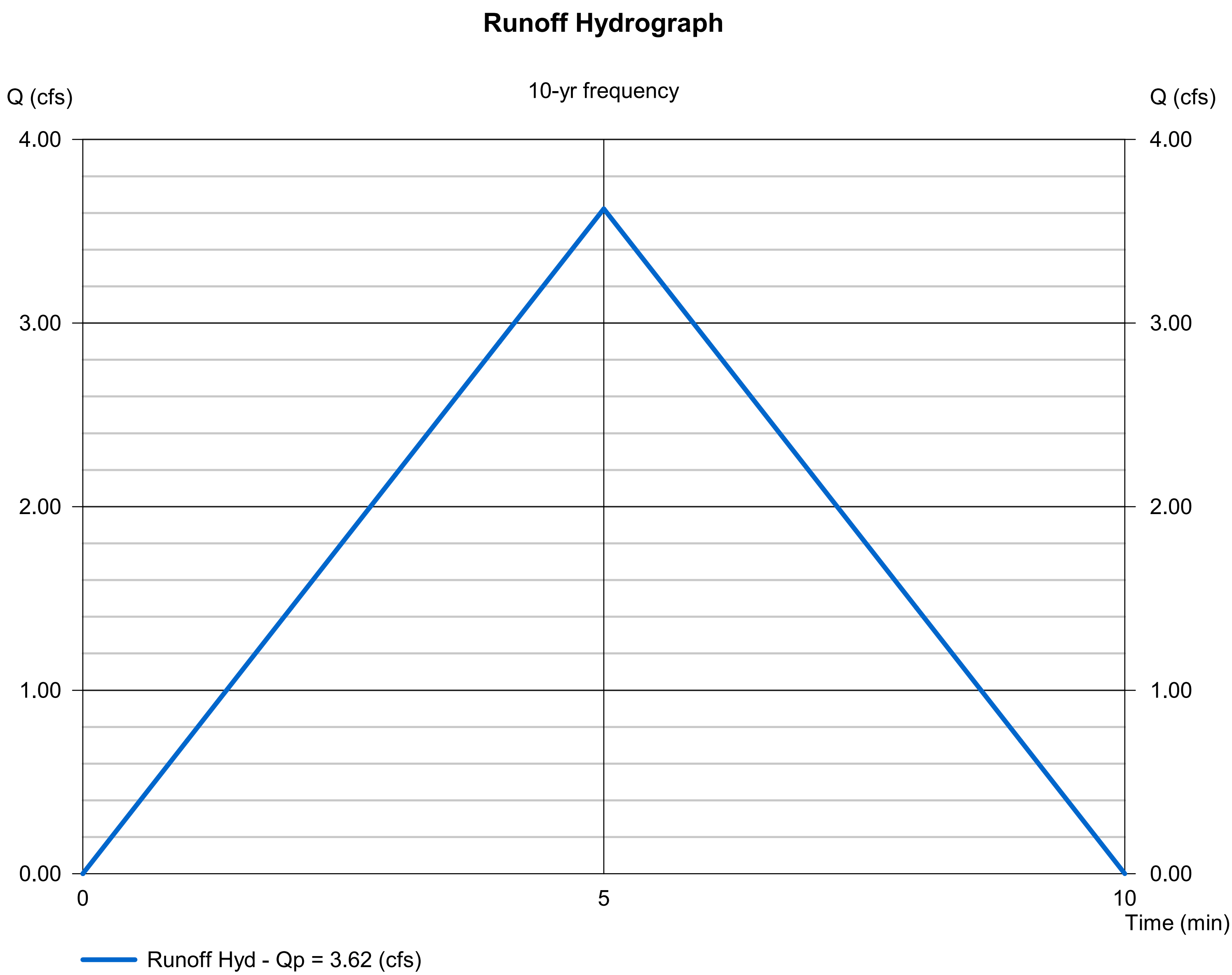


Hydrology Report

PDD #2 - Moody

Hydrograph type	= Rational	Peak discharge (cfs)	= 3.623
Storm frequency (yrs)	= 10	Time interval (min)	= 1
Drainage area (ac)	= 0.820	Runoff coeff. (C)	= 0.6
Rainfall Inten (in/hr)	= 7.364	Tc by User (min)	= 5
IDF Curve	= 20241113 Moody IDF.IDF	Rec limb factor	= 1.00

Hydrograph Volume = 1,087 (cuft); 0.025 (acft)



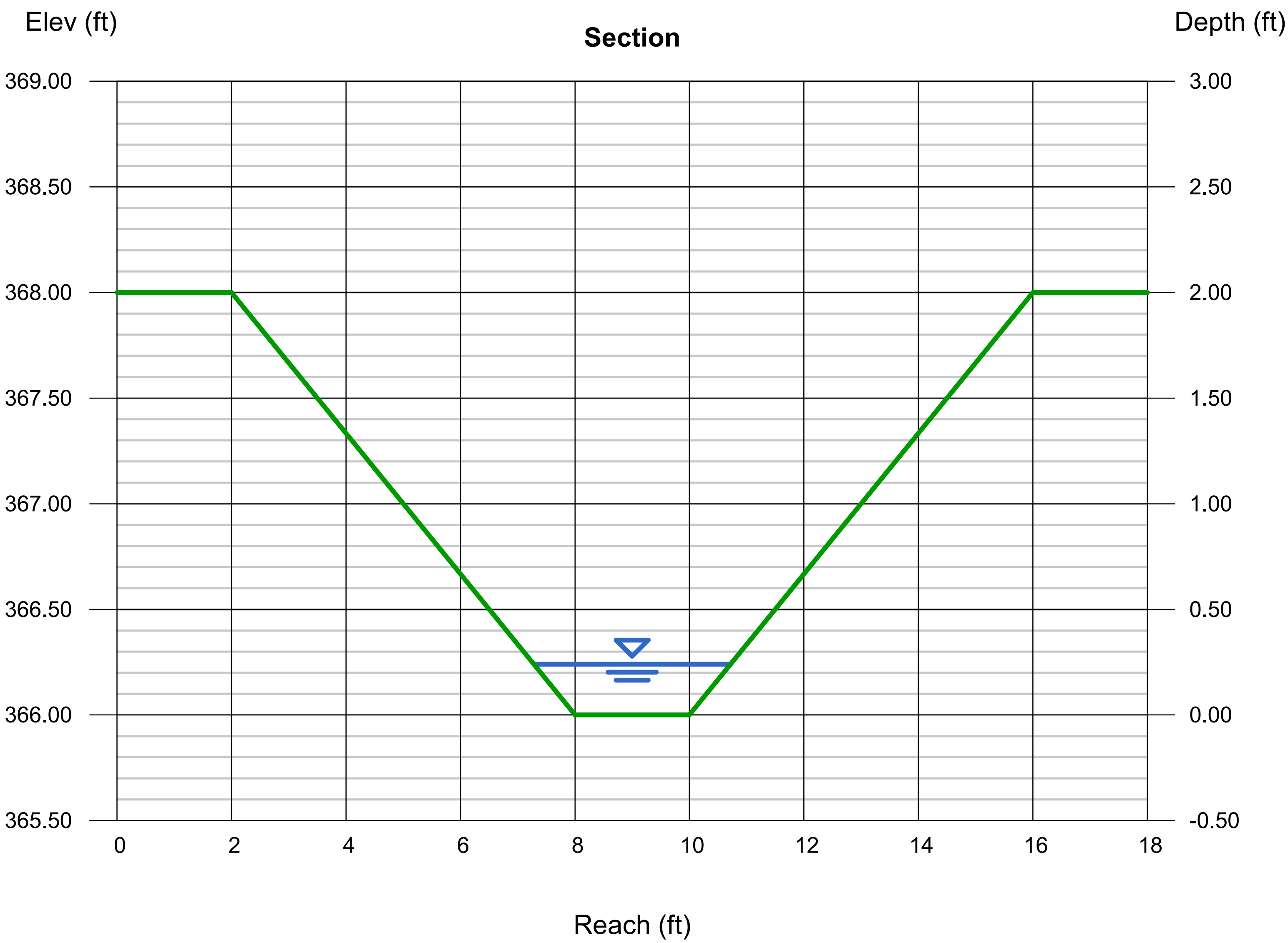
Channel Report

PDD #2 - Moody

Trapezoidal
Bottom Width (ft) = 2.00
Side Slopes (z:1) = 3.00, 3.00
Total Depth (ft) = 2.00
Invert Elev (ft) = 366.00
Slope (%) = 8.84
N-Value = 0.025

Calculations
Compute by: Known Q
Known Q (cfs) = 3.62

Highlighted
Depth (ft) = 0.24
Q (cfs) = 3.620
Area (sqft) = 0.65
Velocity (ft/s) = 5.55
Wetted Perim (ft) = 3.52
Crit Depth, Yc (ft) = 0.39
Top Width (ft) = 3.44
EGL (ft) = 0.72



Hydrology Report

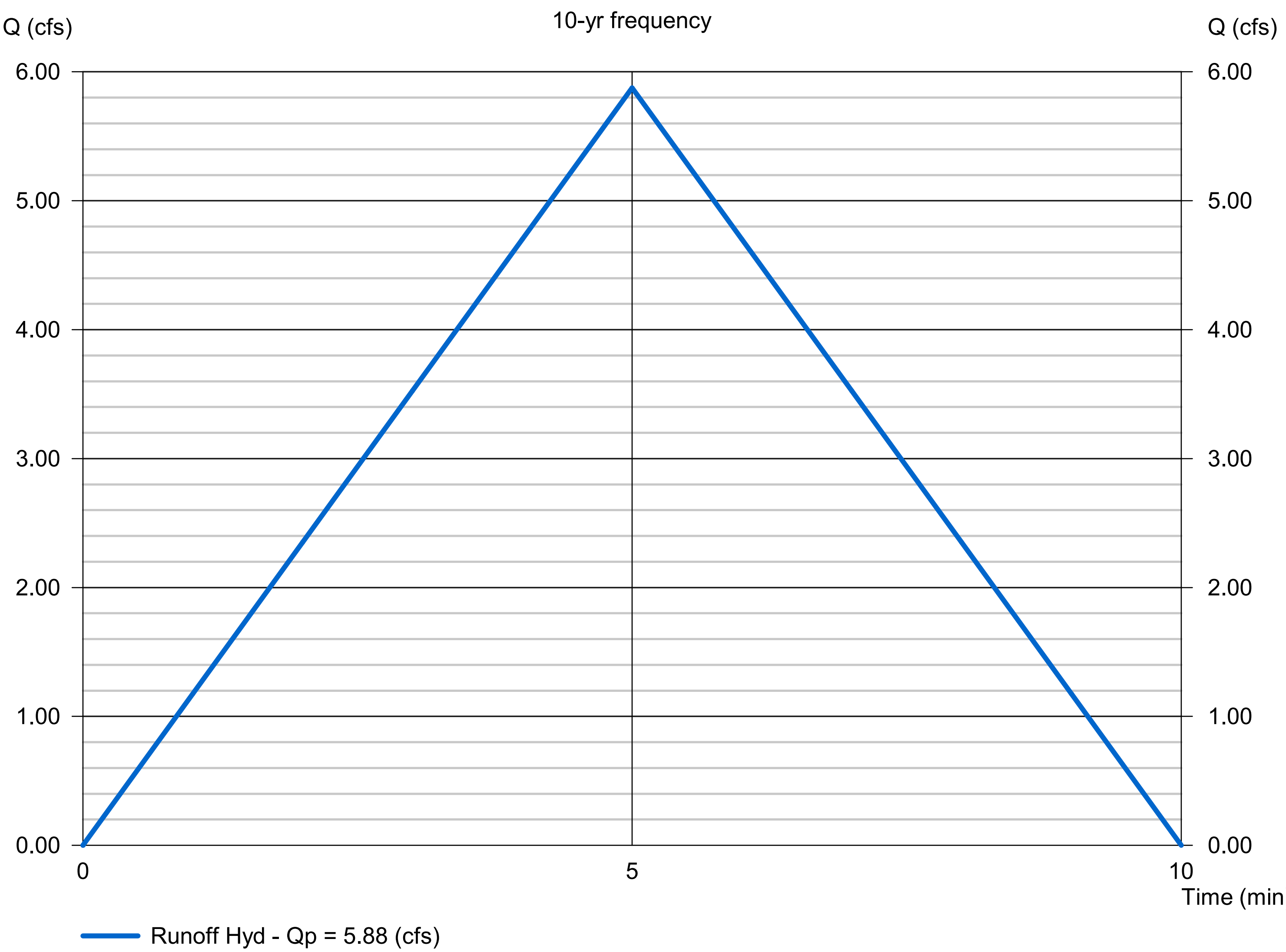
Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Feb 3 2025

PDD #3 - Moody

Hydrograph type	= Rational	Peak discharge (cfs)	= 5.877
Storm frequency (yrs)	= 10	Time interval (min)	= 1
Drainage area (ac)	= 1.330	Runoff coeff. (C)	= 0.6
Rainfall Inten (in/hr)	= 7.364	Tc by User (min)	= 5
IDF Curve	= 20241113 Moody IDF.IDF	Rec limb factor	= 1.00

Hydrograph Volume = 1,763 (cuft); 0.040 (acft)

Runoff Hydrograph



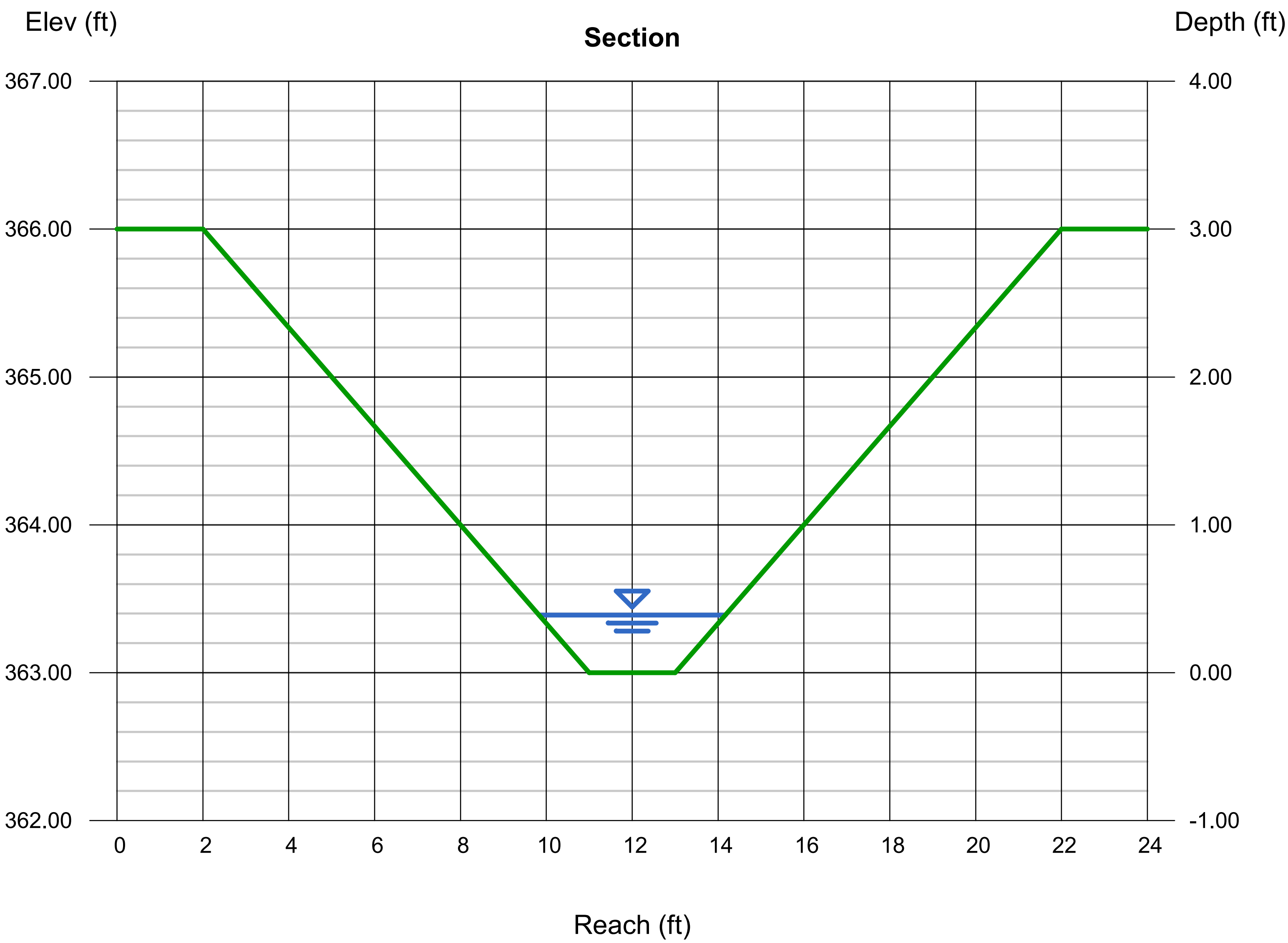
Channel Report

PDD #3 - Moody

Trapezoidal		**Highlighted**	
Bottom Width (ft)	= 2.00	Depth (ft)	= 0.39
Side Slopes (z:1)	= 3.00, 3.00	Q (cfs)	= 5.880
Total Depth (ft)	= 3.00	Area (sqft)	= 1.24
Invert Elev (ft)	= 363.00	Velocity (ft/s)	= 4.76
Slope (%)	= 3.67	Wetted Perim (ft)	= 4.47
N-Value	= 0.025	Crit Depth, Yc (ft)	= 0.51
		Top Width (ft)	= 4.34
		EGL (ft)	= 0.74

Calculations

Compute by:	Known Q
Known Q (cfs)	= 5.88

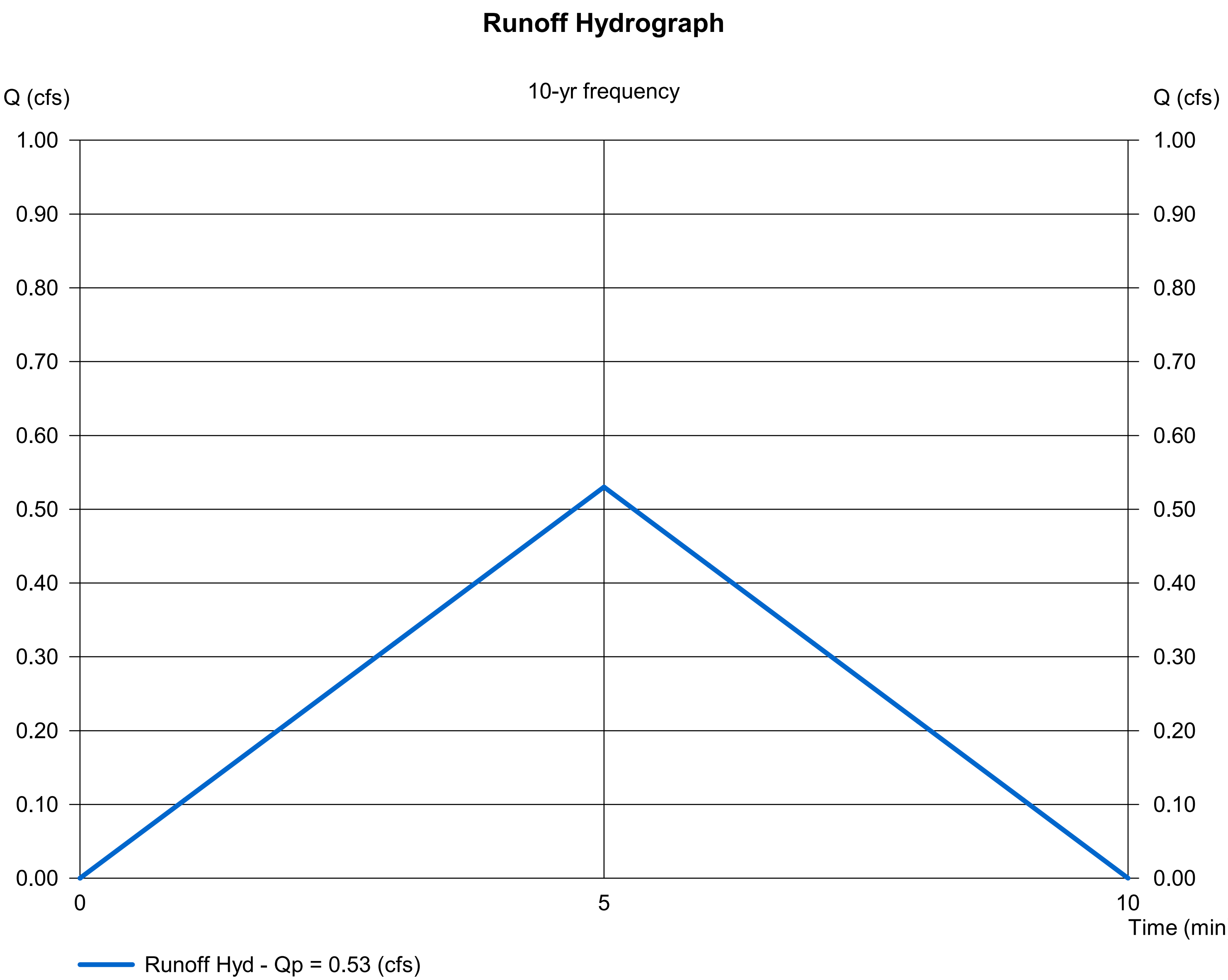


Hydrology Report

PDD #4 - Moody

Hydrograph type	= Rational	Peak discharge (cfs)	= 0.530
Storm frequency (yrs)	= 10	Time interval (min)	= 1
Drainage area (ac)	= 0.120	Runoff coeff. (C)	= 0.6
Rainfall Inten (in/hr)	= 7.364	Tc by User (min)	= 5
IDF Curve	= 20241113 Moody IDF.IDF	Rec limb factor	= 1.00

Hydrograph Volume = 159 (cuft); 0.004 (acft)



Channel Report

PDD #4 - Moody

Trapezoidal

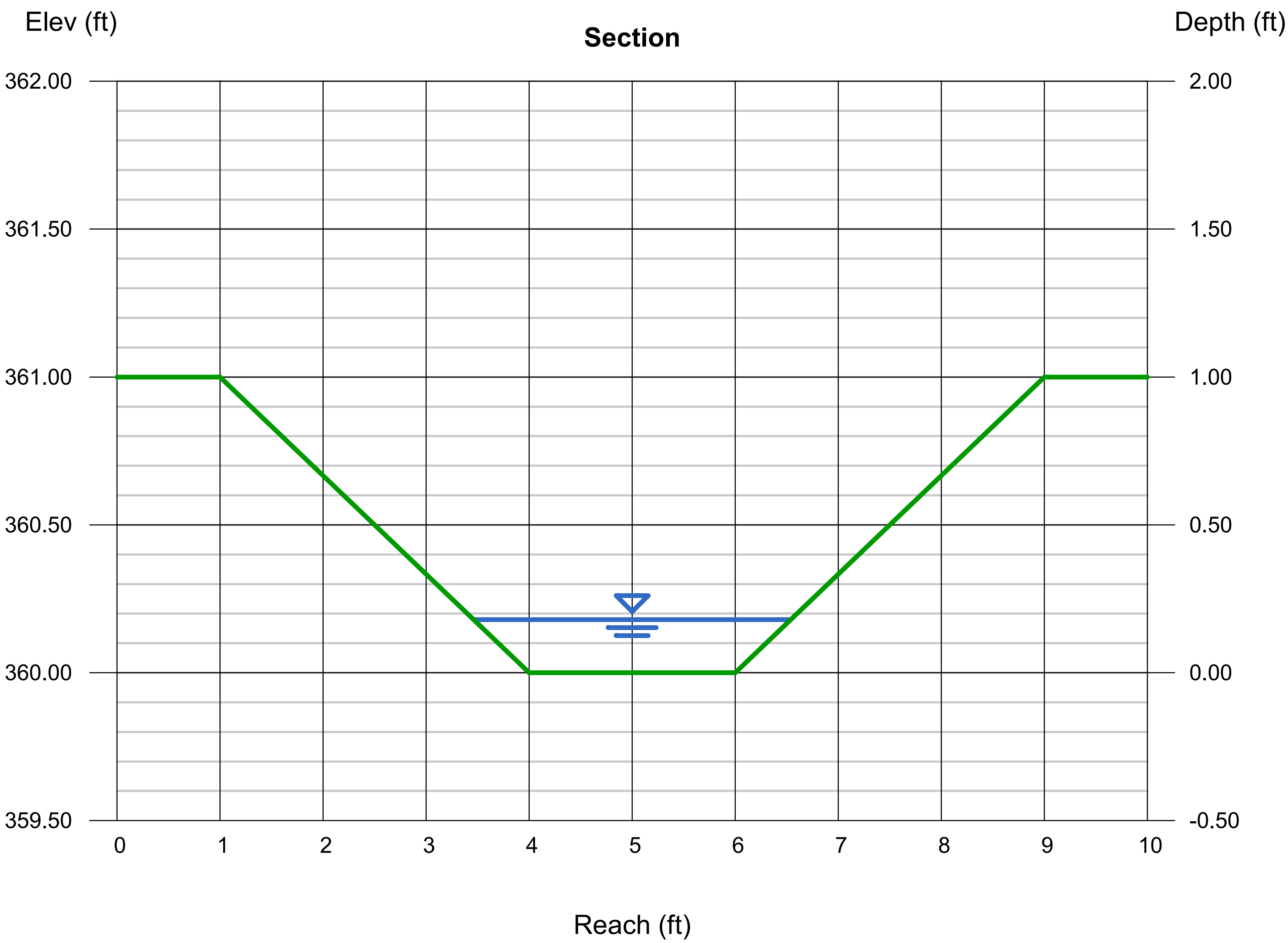
Bottom Width (ft)	=	2.00
Side Slopes (z:1)	=	3.00, 3.00
Total Depth (ft)	=	1.00
Invert Elev (ft)	=	360.00
Slope (%)	=	0.56
N-Value	=	0.025

Calculations

Compute by:		Known Q
Known Q (cfs)	=	0.53

Highlighted

Depth (ft)	=	0.18
Q (cfs)	=	0.530
Area (sqft)	=	0.46
Velocity (ft/s)	=	1.16
Wetted Perim (ft)	=	3.14
Crit Depth, Yc (ft)	=	0.13
Top Width (ft)	=	3.08
EGL (ft)	=	0.20



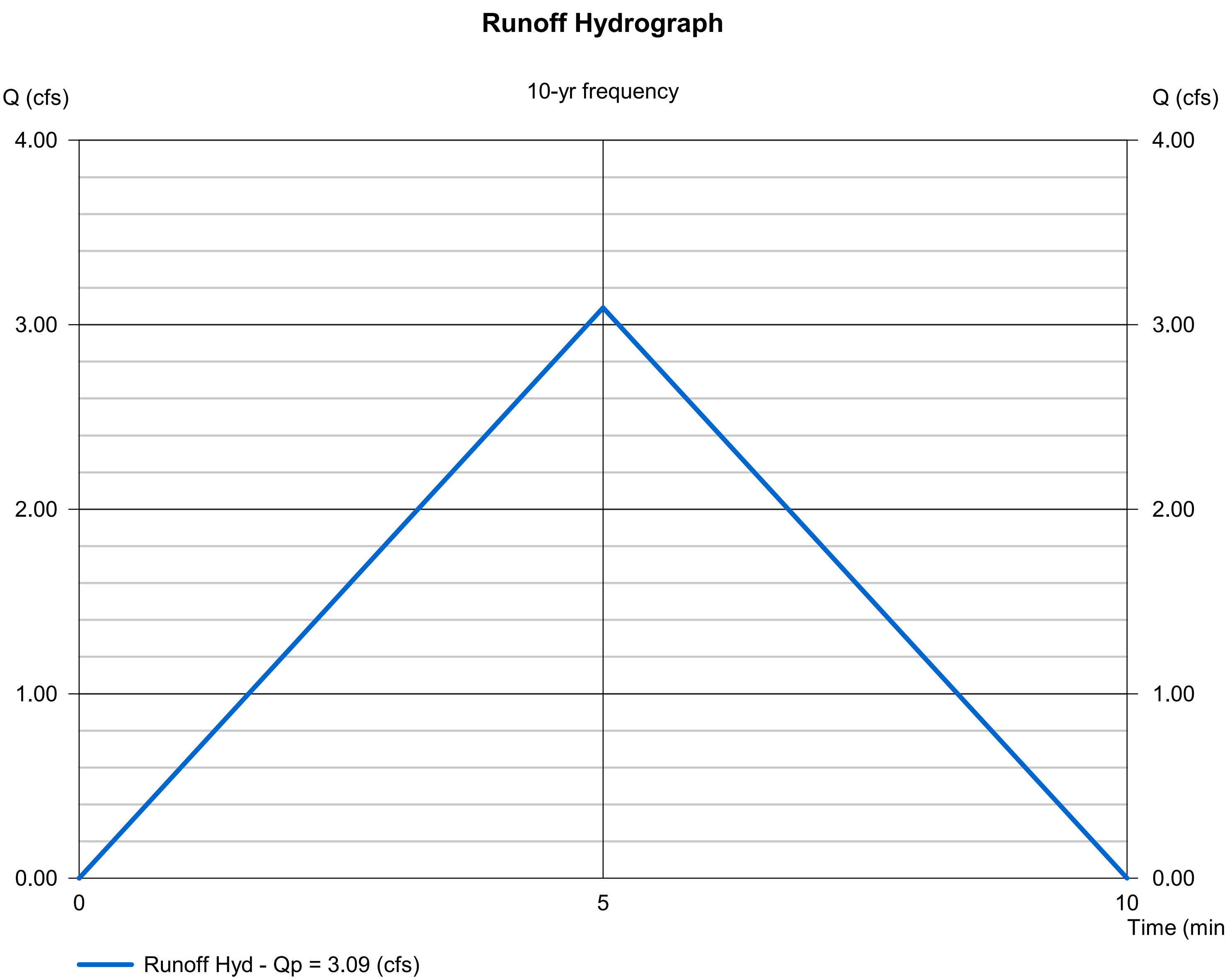
Hydrology Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Feb 3 2025

PDD #5 - Moody

Hydrograph type	= Rational	Peak discharge (cfs)	= 3.093
Storm frequency (yrs)	= 10	Time interval (min)	= 1
Drainage area (ac)	= 0.700	Runoff coeff. (C)	= 0.6
Rainfall Inten (in/hr)	= 7.364	Tc by User (min)	= 5
IDF Curve	= 20241113 Moody IDF.IDF	Rec limb factor	= 1.00

Hydrograph Volume = 928 (cuft); 0.021 (acft)

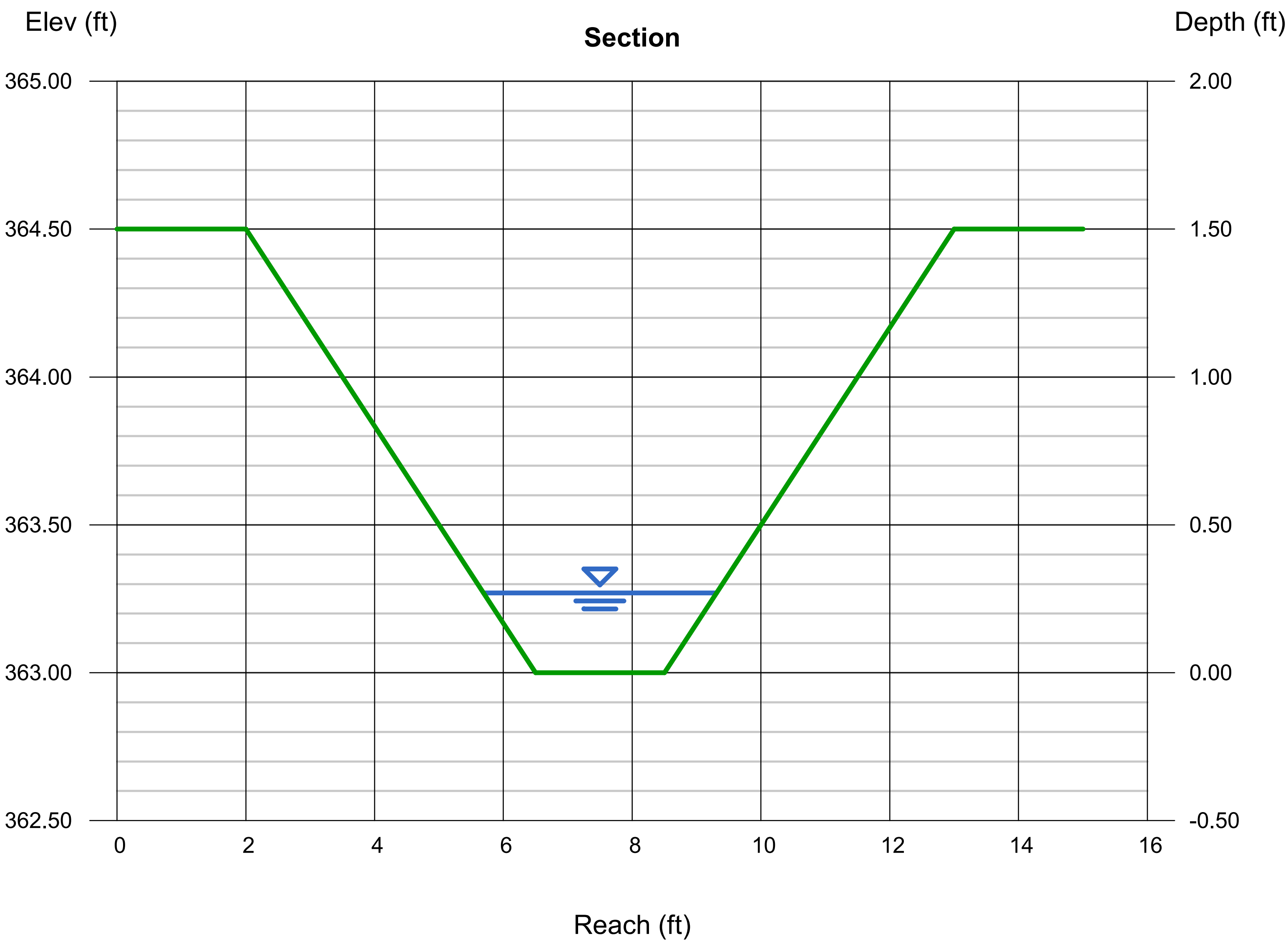


Channel Report

PDD #5 - Moody

Trapezoidal	
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.50
Invert Elev (ft)	= 363.00
Slope (%)	= 4.29
N-Value	= 0.025
Calculations	
Compute by:	Known Q
Known Q (cfs)	= 3.09

Highlighted	
Depth (ft)	= 0.27
Q (cfs)	= 3.090
Area (sqft)	= 0.76
Velocity (ft/s)	= 4.07
Wetted Perim (ft)	= 3.71
Crit Depth, Yc (ft)	= 0.36
Top Width (ft)	= 3.62
EGL (ft)	= 0.53



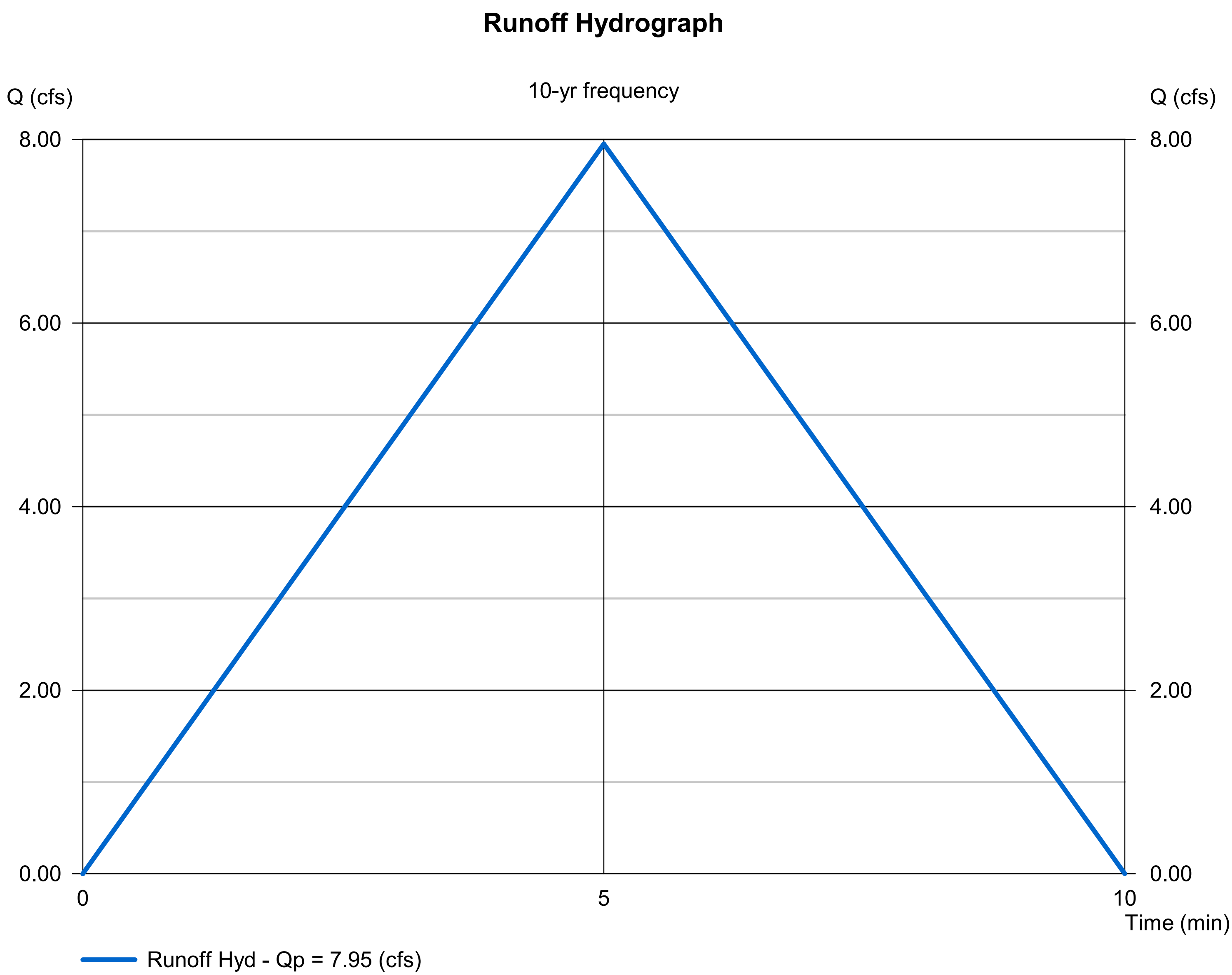
Hydrology Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Feb 3 2025

PDD #6 - Moody

Hydrograph type	= Rational	Peak discharge (cfs)	= 7.953
Storm frequency (yrs)	= 10	Time interval (min)	= 1
Drainage area (ac)	= 1.800	Runoff coeff. (C)	= 0.6
Rainfall Inten (in/hr)	= 7.364	Tc by User (min)	= 5
IDF Curve	= 20241113 Moody IDF.IDF	Rec limb factor	= 1.00

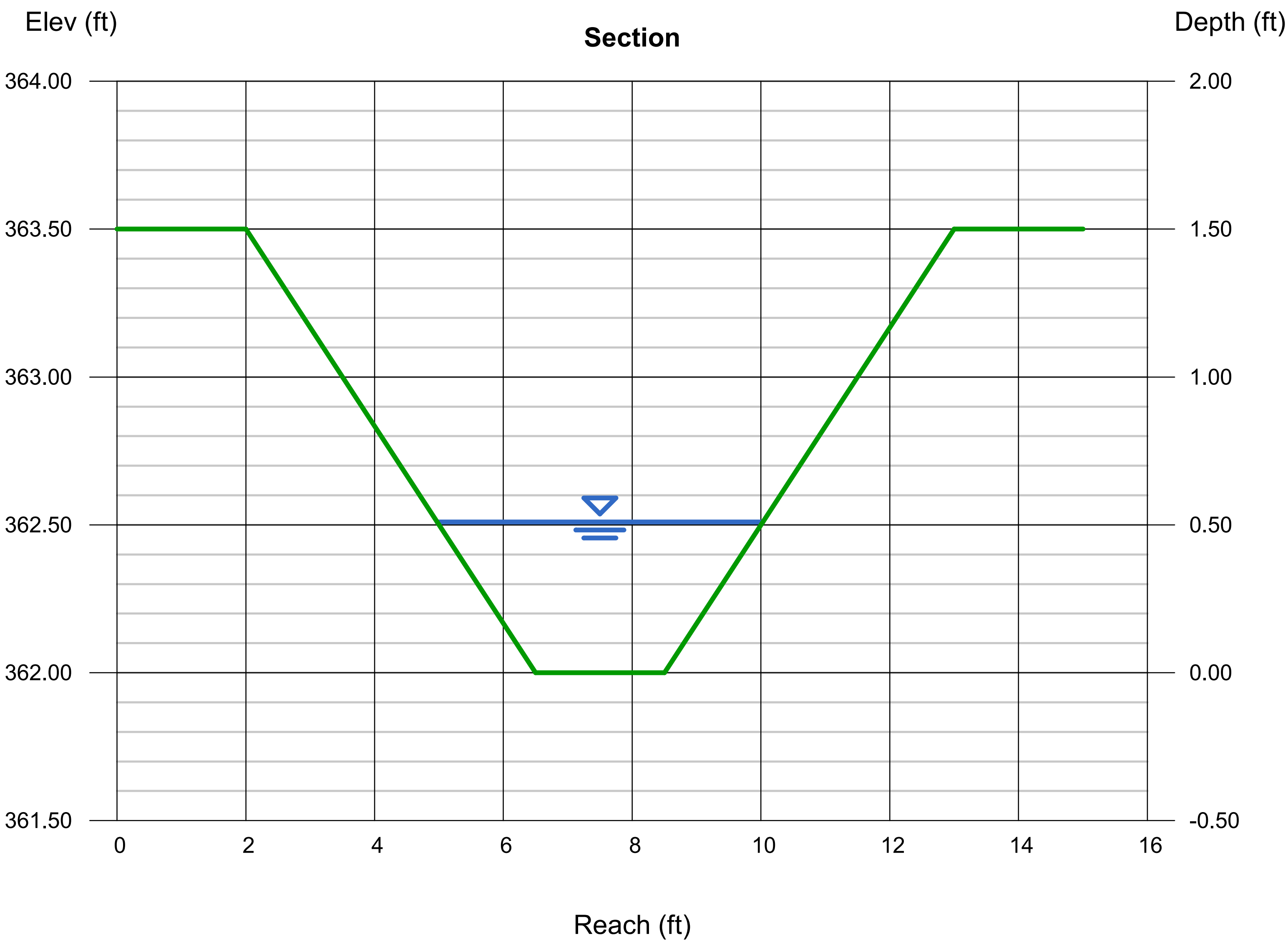
Hydrograph Volume = 2,386 (cuft); 0.055 (acft)



Channel Report

PDD #6 - Moody

Trapezoidal		**Highlighted**	
Bottom Width (ft)	= 2.00	Depth (ft)	= 0.51
Side Slopes (z:1)	= 3.00, 3.00	Q (cfs)	= 7.950
Total Depth (ft)	= 1.50	Area (sqft)	= 1.80
Invert Elev (ft)	= 362.00	Velocity (ft/s)	= 4.42
Slope (%)	= 2.42	Wetted Perim (ft)	= 5.23
N-Value	= 0.025	Crit Depth, Yc (ft)	= 0.59
		Top Width (ft)	= 5.06
Calculations		EGL (ft)	= 0.81
Compute by:	Known Q		
Known Q (cfs)	= 7.95		



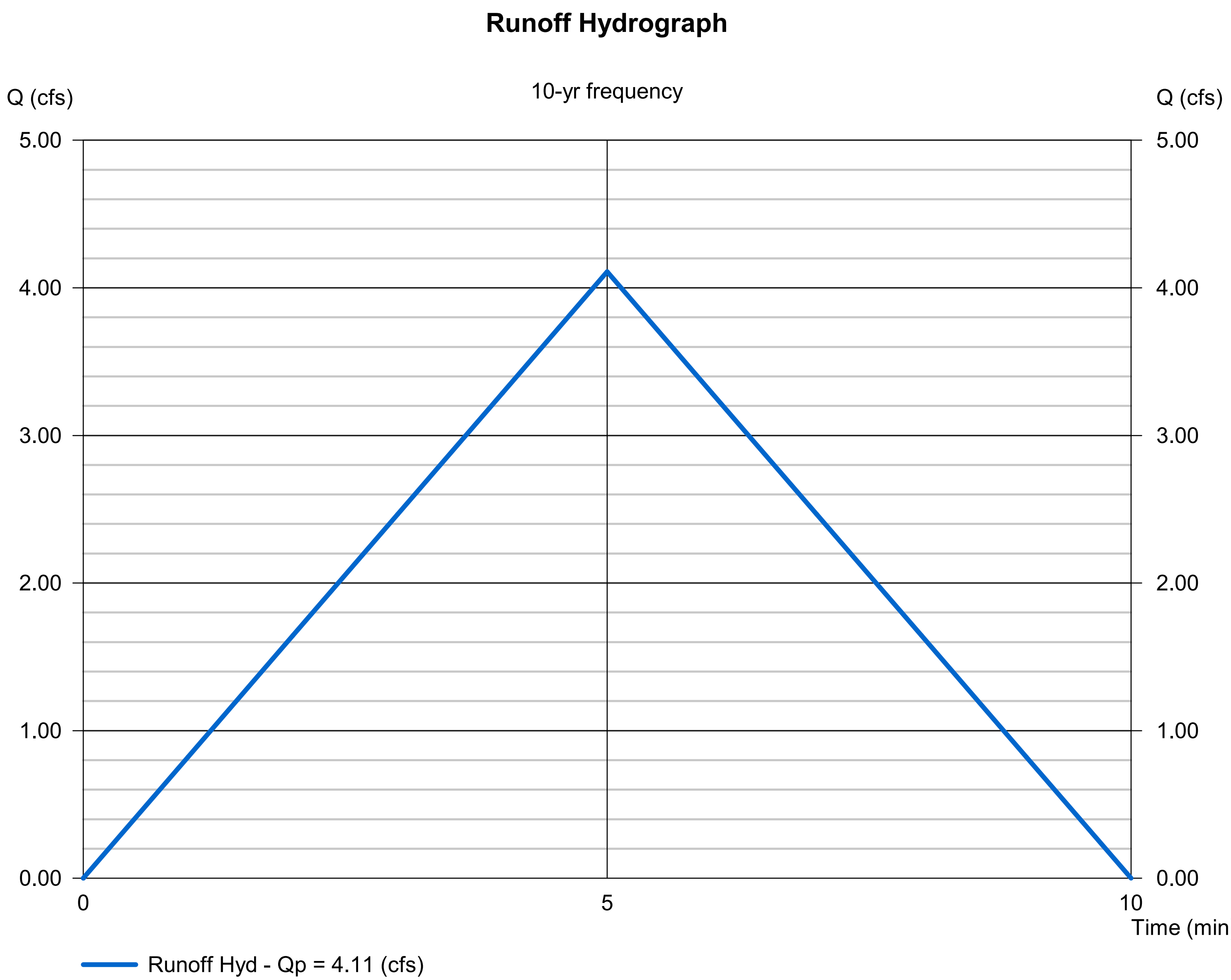
Hydrology Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. | Monday, Feb 3 2025

PDD #7 - Moody

Hydrograph type	= Rational	Peak discharge (cfs)	= 4.109
Storm frequency (yrs)	= 10	Time interval (min)	= 1
Drainage area (ac)	= 0.930	Runoff coeff. (C)	= 0.6
Rainfall Inten (in/hr)	= 7.364	Tc by User (min)	= 5
IDF Curve	= 20241113 Moody IDF.IDF	Rec limb factor	= 1.00

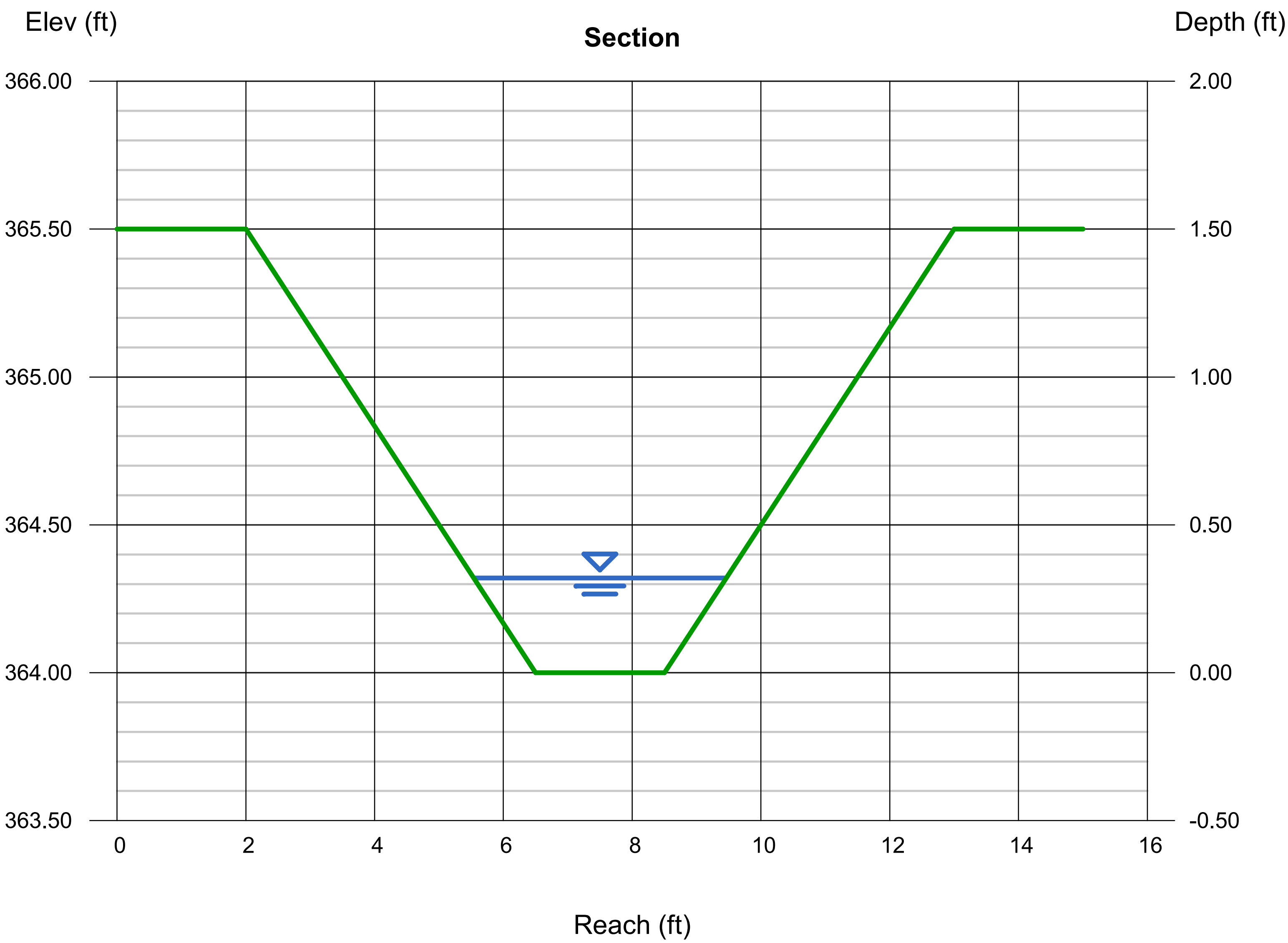
Hydrograph Volume = 1,233 (cuft); 0.028 (acft)



Channel Report

PDD #7 - Moody

Trapezoidal		**Highlighted**	
Bottom Width (ft)	= 2.00	Depth (ft)	= 0.32
Side Slopes (z:1)	= 3.00, 3.00	Q (cfs)	= 4.110
Total Depth (ft)	= 1.50	Area (sqft)	= 0.95
Invert Elev (ft)	= 364.00	Velocity (ft/s)	= 4.34
Slope (%)	= 3.99	Wetted Perim (ft)	= 4.02
N-Value	= 0.025	Crit Depth, Yc (ft)	= 0.42
		Top Width (ft)	= 3.92
Calculations		EGL (ft)	= 0.61
Compute by:	Known Q		
Known Q (cfs)	= 4.11		

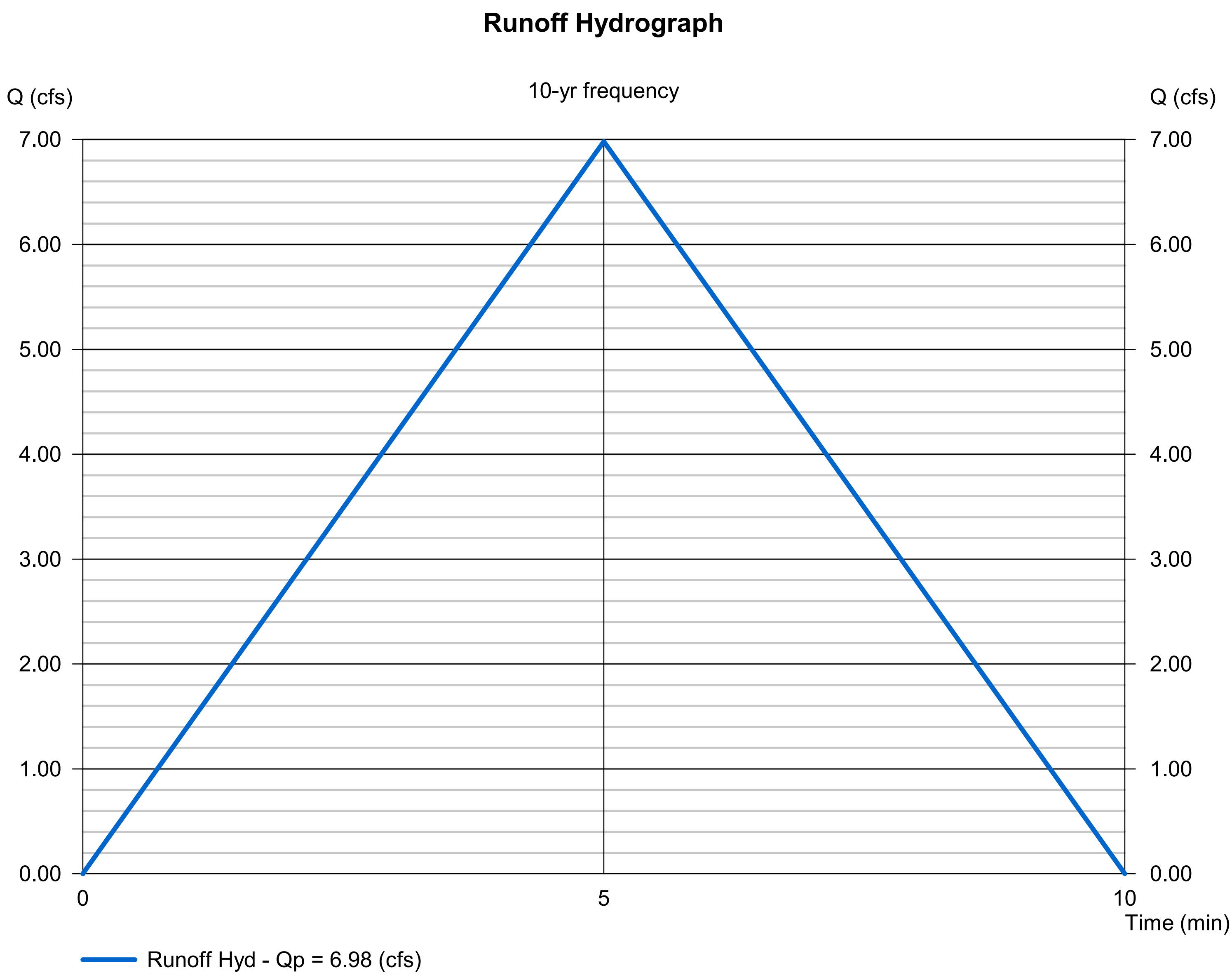


Hydrology Report

PDD #8 - Moody

Hydrograph type	= Rational	Peak discharge (cfs)	= 6.981
Storm frequency (yrs)	= 10	Time interval (min)	= 1
Drainage area (ac)	= 1.580	Runoff coeff. (C)	= 0.6
Rainfall Inten (in/hr)	= 7.364	Tc by User (min)	= 5
IDF Curve	= 20241113 Moody IDF.IDF	Rec limb factor	= 1.00

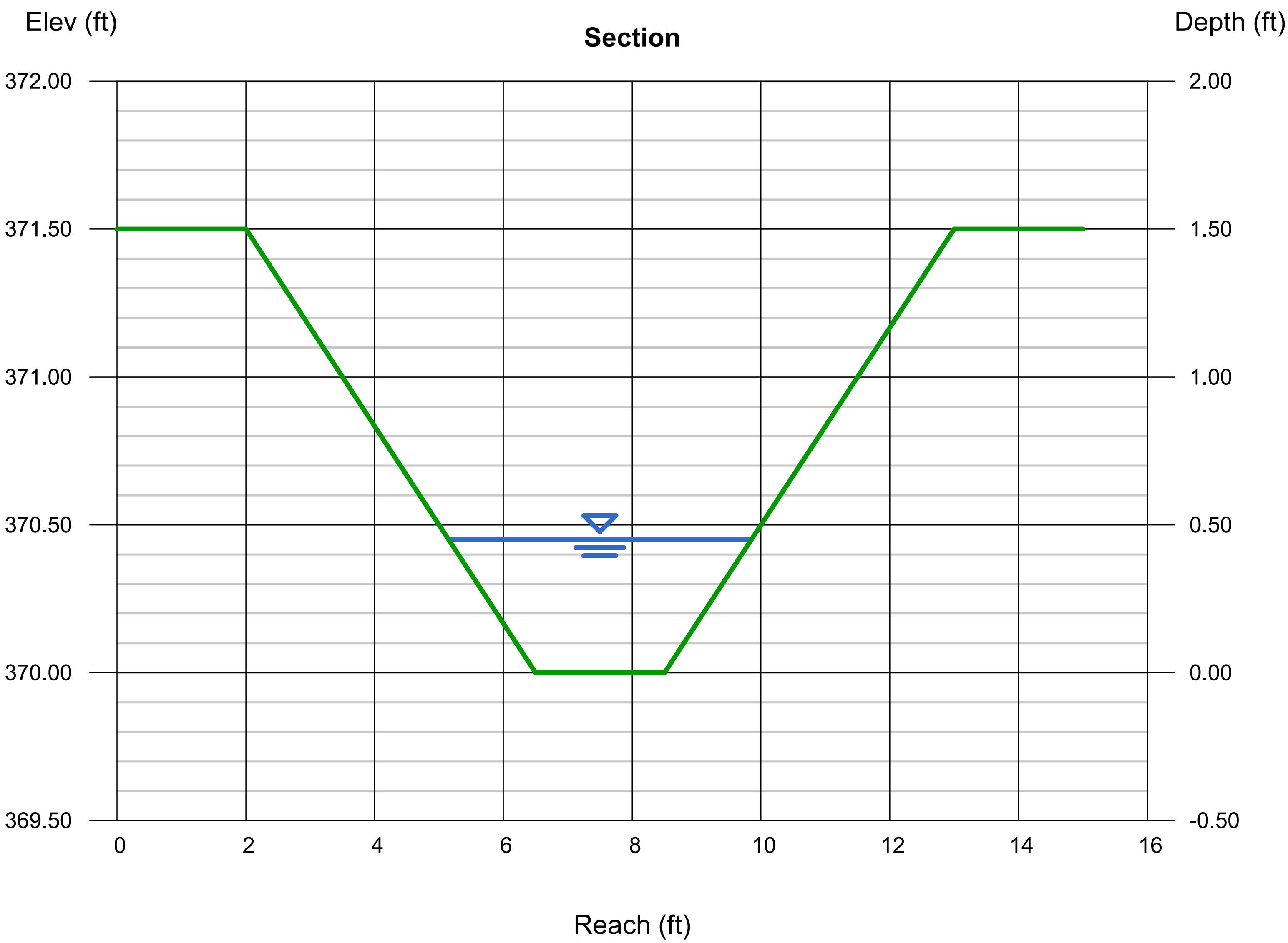
Hydrograph Volume = 2,094 (cuft); 0.048 (acft)



Channel Report

PDD #8 - Moody

Trapezoidal		**Highlighted**	
Bottom Width (ft)	= 2.00	Depth (ft)	= 0.45
Side Slopes (z:1)	= 3.00, 3.00	Q (cfs)	= 6.980
Total Depth (ft)	= 1.50	Area (sqft)	= 1.51
Invert Elev (ft)	= 370.00	Velocity (ft/s)	= 4.63
Slope (%)	= 2.95	Wetted Perim (ft)	= 4.85
N-Value	= 0.025	Crit Depth, Yc (ft)	= 0.55
		Top Width (ft)	= 4.70
Calculations		EGL (ft)	= 0.78
Compute by:	Known Q		
Known Q (cfs)	= 6.98		

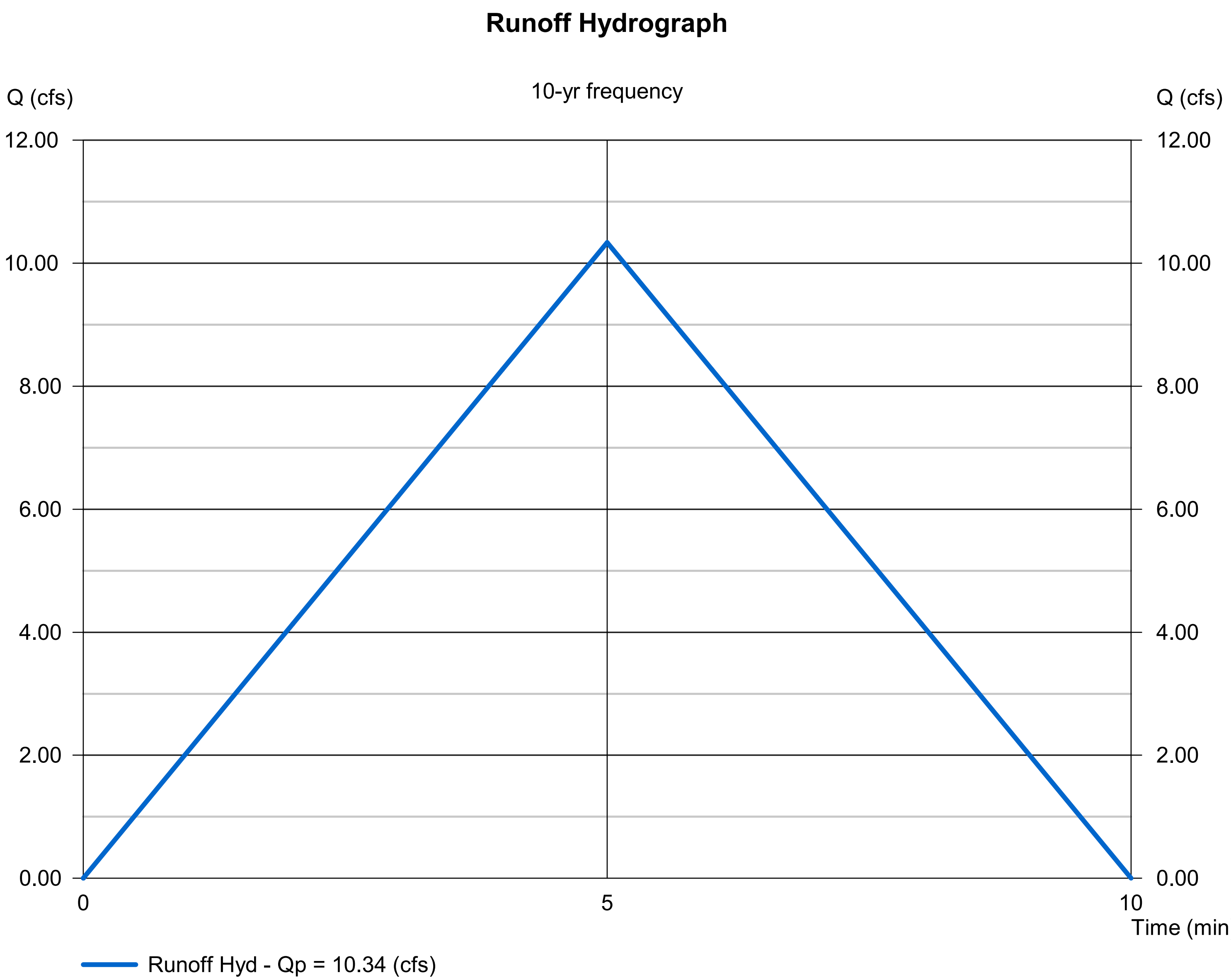


Hydrology Report

PDD #9 - Moody

Hydrograph type	= Rational	Peak discharge (cfs)	= 10.34
Storm frequency (yrs)	= 10	Time interval (min)	= 1
Drainage area (ac)	= 2.340	Runoff coeff. (C)	= 0.6
Rainfall Inten (in/hr)	= 7.364	Tc by User (min)	= 5
IDF Curve	= 20241113 Moody IDF.IDF	Rec limb factor	= 1.00

Hydrograph Volume = 3,102 (cuft); 0.071 (acft)



Channel Report

PDD #9 - Moody

Trapezoidal

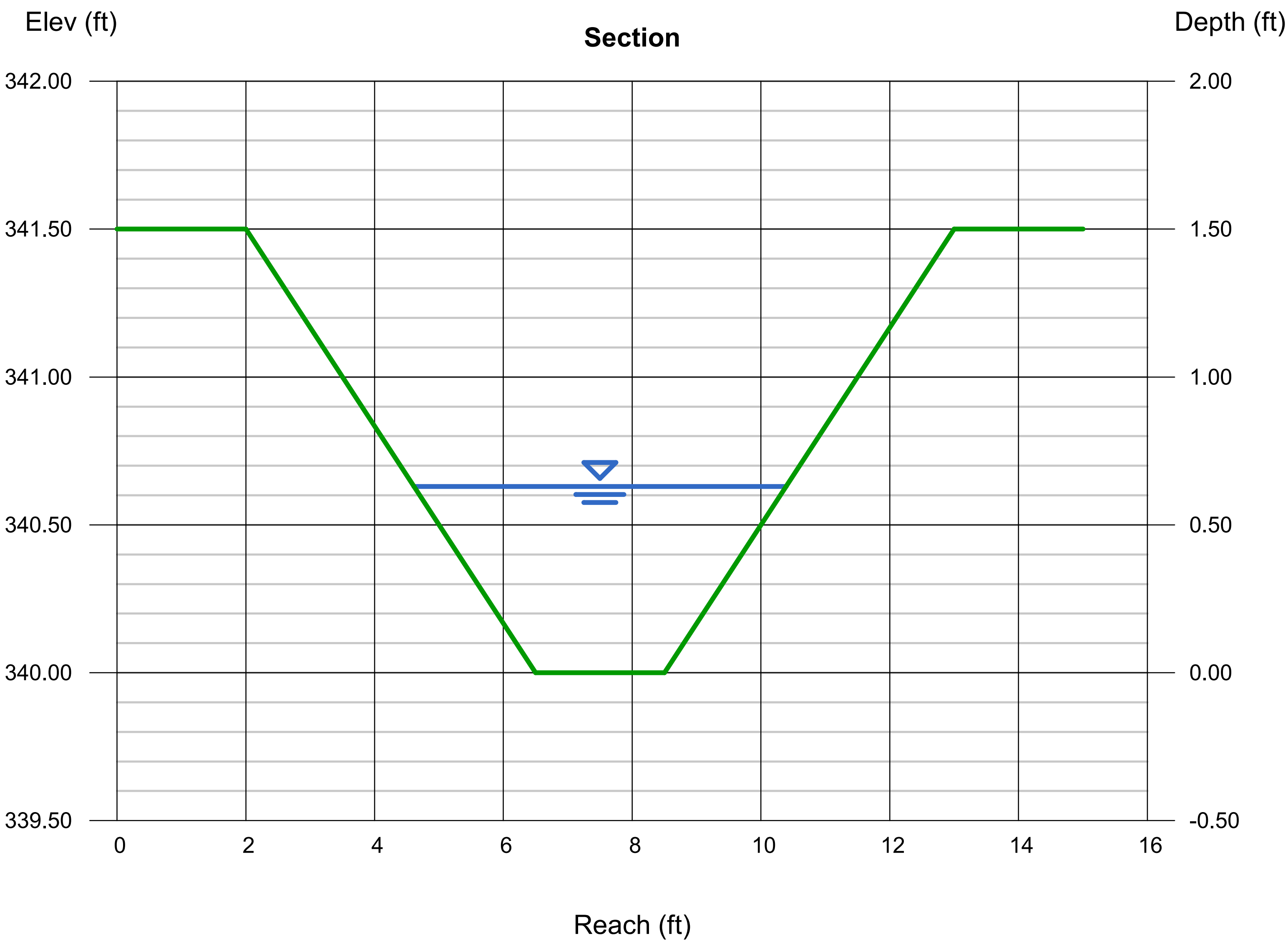
Bottom Width (ft)	= 2.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.50
Invert Elev (ft)	= 340.00
Slope (%)	= 4.83
N-Value	= 0.025

Calculations

Compute by:	Known Q
Known Q (cfs)	= 17.32 10.34 + 6.98 (PDD#8 + PDD #9) = 17.32

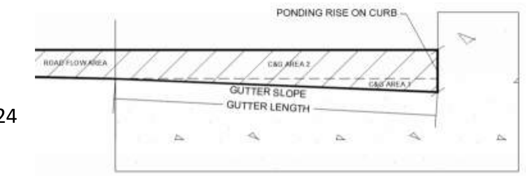
Highlighted

Depth (ft)	= 0.63
Q (cfs)	= 17.32
Area (sqft)	= 2.45
Velocity (ft/s)	= 7.07
Wetted Perim (ft)	= 5.98
Crit Depth, Yc (ft)	= 0.88
Top Width (ft)	= 5.78
EGL (ft)	= 1.41



Gutter Spread by Limited Area

Determine maximum area to on-grade inlet using input factors as shown below.



Project: **Moody** Road: **Mulberry Tree Drive (27' B-B)** Date: 12/5/24

Inlet No. **1** Allowable Spread=Pvm't + Gutter Width: 7.5 ft

Compute "C" Factor: One Half R/W Width: 25 One Half B/B Width: 13.5 S/W Width 5

Paved Area "C": 0.95 Grass Area 0.2

0.70 0.05

Standard Curb and Gutter Profile (see diagram above)

Gutter Length (ft) 2

Gutter Slope (ft/ft) 0.04

Ponding Rise on Curb (ft) 0.19

Gutter Width= 2.00 ft.

Total Allow. Spread = 7.50 ft. Manning's n = 0.015 Weir C = 3.33

Inlet Type 1 Inlet Types 1 NCDOT Std. 840.03

Composite Rational C = 0.76 I (2yr.) = 4.00 iph

Roadway X-slope = 0.02 Varies Manual Input

Max Flow for Limited Spread																		
C.B. NUMBER	**Long. Slope**	**ROAD X-SLOPE**	**E. O. P. Depth**	**Weir Depth**	**C&G Flow Area 1**	**C&G Flow Area 2**	**C&G WP**	**Road Flow Area**	**Road WP**	**Total Flow A**	**Total WP**	**MAX Q FOR SPREAD, CFS**	**On-Grade Spread**	**Max Drainage Area (S.F.)**	**tual Drainage Ar Area (S.F.)**	**al Drainage Area (ACRE)**	**Check**	
CB 107	0.030	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.91**	7.50	25436	4637	0.11	GOOD	
CB 105	0.030	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.91**	7.50	25436	5793	0.13	GOOD	
CB 106	0.030	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.91**	7.50	50872	32403	0.74	GOOD	*dbl
CB 104	0.030	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.91**	7.50	25436	6542	0.15	GOOD	
CB 103	0.030	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.91**	7.50	25436	12632	0.29	GOOD	
CB 305	0.030	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.91**	7.50	25436	16988	0.39	GOOD	
CB 306	0.030	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.91**	7.50	25436	5227	0.12	GOOD	
CB 304	0.015	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.35**	7.50	17986	2178	0.05	GOOD	
CB 303	0.015	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.35**	7.50	17986	3049	0.07	GOOD	
CB 302	0.005	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**0.78**	7.50	20769	5663	0.13	GOOD	
CB 301	0.005	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**0.78**	7.50	10384	5227	0.12	GOOD	
CB 330	0.010	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.10**	7.50	14686	1742	0.04	GOOD	
CB 332	0.010	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.10**	7.50	14686	7405	0.17	GOOD	
CB 333	0.010	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.10**	7.50	14686	2178	0.05	GOOD	
CB 334	0.010	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.10**	7.50	14686	11326	0.26	GOOD	
CB 412	0.010	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.10**	7.50	14686	4792	0.11	GOOD	
CB 413	0.010	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.10**	7.50	14686	9583	0.22	GOOD	

E. O. P. - Edge of Pavement
C&G - Curb and gutter
WP - Wetted Perimeter (ft.)

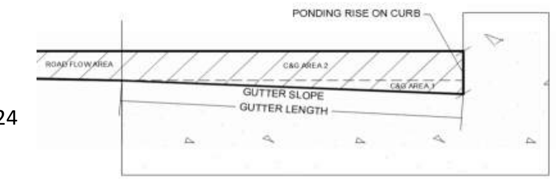
A - Area (s. f.)
V - Velocity (fps)

Note: Program uses Manning's formula for open channel flow.

Z:\Jobs\9900\Watkins Property\Documents\Schedules\Gutter Spread Calcs

Gutter Spread by Limited Area

Determine maximum area to on-grade inlet using input factors as shown below.



Project: **Moody** Road: **Tansley Crest Loop (27' B-B)** Date: 12/5/24

Inlet No. **1** Allowable Spread=Pvm't + Gutter Width: 7.5 ft

Compute "C" Factor: One Half R/W Width: 25 One Half B/B Width: 13.5 S/W Width 5

Paved Area "C": 0.95 Grass Area 0.2

0.70 0.05

Standard Curb and Gutter Profile (see diagram above)

Gutter Length (ft)	2
Gutter Slope (ft/ft)	0.04
Ponding Rise on Curb (ft)	0.19

Gutter Width= 2.00 ft.

Total Allow. Spread = 7.50 ft. Manning's n = 0.015 Weir C = 3.33

Inlet Type 1 Inlet Types 1 NCDOT Std. 840.03

Composite Rational C = 0.76 I (2yr.) = 4.00 iph

Roadway X-slope = 0.02 Varies Manual Input

Max Flow for Limited Spread

C.B. NUMBER	Long. Slope	ROAD X-SLOPE	E. O. P. Depth	Weir Depth	C&G Flow Area 1	C&G Flow Area 2	C&G WP	Road Flow Area	Road WP	Total Flow A	Total WP	MAX Q FOR SPREAD, CFS	On-Grade Spread	Max Drainage Area (S.F.)	ctual Drainage Ar Area (S.F.)	al Drainage Area (ACRE)	Check
CB 421	0.030	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.91**	7.50	25436	3485	0.08	GOOD
CB 422	0.030	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.91**	7.50	25436	3920	0.09	GOOD
CB 401	0.012	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.21**	7.50	16087	3049	0.07	GOOD
CB 402	0.012	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.21**	7.50	16087	436	0.01	GOOD
CB 407	0.012	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.21**	7.50	16087	1742	0.04	GOOD
CB 408	0.012	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.21**	7.50	16087	2614	0.06	GOOD
CB 408A/408B	0.012	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.21**	7.50	16087	3485	0.08	GOOD
CB 409	0.020	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.56**	7.50	20769	3049	0.07	GOOD
CB 409A	0.020	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.56**	7.50	20769	3049	0.07	GOOD
CB 410	0.036	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**2.09**	7.50	55728	2614	0.06	GOOD
CB 410A	0.036	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**2.09**	7.50	27864	6970	0.16	GOOD
CB 411	0.027	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.81**	7.50	24131	871	0.02	GOOD
CB 505	0.010	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.10**	7.50	14686	1264	0.03	GOOD
CB 506	0.010	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.10**	7.50	14686	4356	0.10	GOOD
CB 510	0.042	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**2.26**	7.50	30097	3049	0.07	GOOD
CB 511	0.042	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**2.26**	7.50	30097	3049	0.07	GOOD
CB 512	0.010	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.10**	7.50	14686	1879	0.04	GOOD
CB 513	0.010	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.10**	7.50	14686	2370	0.05	GOOD
CB 516	0.030	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.91**	7.50	25436	5227	0.12	GOOD
CB 517	0.030	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.91**	7.50	25436	4792	0.11	GOOD

E. O. P. - Edge of Pavement
C&G - Curb and gutter
WP - Wetted Perimeter (ft.)

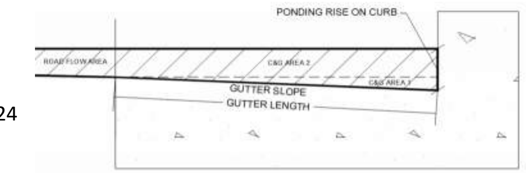
A - Area (s. f.)
V - Velocity (fps)

Note: Program uses Manning's formula for open channel flow.

Z:\Jobs\9900\Watkins Property\Documents\Schedules\Gutter Spread Calcs

Gutter Spread by Limited Area

Determine maximum area to on-grade inlet using input factors as shown below.



Project: **Moody** Road: **Vintage Vinery Court (27' B-B)** Date: 12/5/24

Inlet No. 1 Allowable Spread=Pvm't + Gutter Width: 7.5 ft
Compute "C" Factor: One Half R/W Width: 25 One Half B/B Width: 13.5 S/W Width 5
Paved Area "C": 0.95 Grass Area 0.2
0.70 0.05

Standard Curb and Gutter Profile (see diagram above)
Gutter Length (ft) 2
Gutter Slope (ft/ft) 0.04
Ponding Rise on Curb (ft) 0.19

Gutter Width= 2.00 ft.
Total Allow. Spread = 7.50 ft. Manning's n = 0.015 Weir C = 3.33

Inlet Type 1 Inlet Types 1 NCDOT Std. 840.03

Composite Rational C = 0.76 I (2yr.) = 4.00 iph

Roadway X-slope = 0.02 Varies Manual Input

Max Flow for Limited Spread

C.B. NUMBER	Long. Slope	ROAD X-SLOPE	E. O. P. Depth	Weir Depth	C&G Flow Area 1	C&G Flow Area 2	C&G WP	Road Flow Area	Road WP	Total Flow A	Total WP	MAX Q FOR SPREAD, CFS	On-Grade Spread	Max Drainage Area (S.F.)	tual Drainage Ar Area (S.F.)	al Drainage Area (ACRE)	Check	
CB 307	0.050	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**2.47**	7.50	32838	4356	0.10	GOOD	
CB 308	0.050	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**2.47**	7.50	32838	3485	0.08	GOOD	
CB 309	0.050	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**2.47**	7.50	32838	2178	0.05	GOOD	
CB 311	0.040	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**2.21**	7.50	29371	2614	0.06	GOOD	
CB 312	0.010	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.10**	7.50	14686	3049	0.07	GOOD	
CB 313	0.010	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.10**	7.50	14686	10454	0.24	GOOD	
CB 315	0.010	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.10**	7.50	14686	2178	0.05	GOOD	
CB 317	0.010	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.10**	7.50	14686	2178	0.05	GOOD	
CB 319	0.010	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.10**	7.50	14686	12981	0.30	GOOD	
CB 323	0.028	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.85**	7.50	24574	19166	0.44	GOOD	
CB 325	0.005	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**0.78**	7.50	20769	6970	0.16	GOOD	
CB 514	0.039	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**2.18**	7.50	29002	6098	0.14	GOOD	
CB 515	0.039	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**2.18**	7.50	29002	6098	0.14	GOOD	
CB 507	0.039	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**2.18**	7.50	58004	28750	0.66	GOOD	*dbl
CB 508	0.039	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**2.18**	7.50	29002	8276	0.19	GOOD	
CB 504	0.047	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**2.39**	7.50	31838	1742	0.04	GOOD	
CB 503	0.025	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.74**	7.50	23220	11326	0.26	GOOD	
CB 502	0.025	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.74**	7.50	23220	12197	0.28	GOOD	

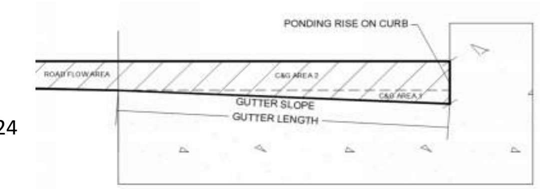
E. O. P. - Edge of Pavement
C&G - Curb and gutter
WP - Wetted Perimeter (ft.)
A - Area (s. f.)
V - Velocity (fps)

Note: Program uses Manning's formula for open channel flow.

Z:\Jobs\9900\Watkins Property\Documents\Schedules\Gutter Spread Calcs

Gutter Spread by Limited Area

Determine maximum area to on-grade inlet using input factors as shown below.



Project: **Moody** Road: **Cranapple Lane (27' B-B)** Date: 12/5/24

Inlet No. **1** Allowable Spread=Pvm't + Gutter Width: 7.5 ft

Compute "C" Factor: One Half R/W Width: 25 One Half B/B Width: 13.5 S/W Width 5

Paved Area "C": 0.95 Grass Area 0.2

0.70 0.05

Standard Curb and Gutter Profile (see diagram above)

Gutter Length (ft) 2

Gutter Slope (ft/ft) 0.04

Ponding Rise on Curb (ft) 0.19

Gutter Width= 2.00 ft.

Total Allow. Spread = 7.50 ft. Manning's n = 0.015 Weir C = 3.33

Inlet Type 1 Inlet Types 1 NCDOT Std. 840.03

Composite Rational C = 0.76 I (2yr.) = 4.00 iph

Roadway X-slope = 0.02 Varies Manual Input

Max Flow for Limited Spread																	
C.B. NUMBER	**Long. Slope**	**ROAD X-SLOPE**	**E. O. P. Depth**	**Weir Depth**	**C&G Flow Area 1**	**C&G Flow Area 2**	**C&G WP**	**Road Flow Area**	**Road WP**	**Total Flow A**	**Total WP**	**MAX Q FOR SPREAD, CFS**	**On-Grade Spread**	**Max Drainage Area (S.F.)**	**ctual Drainage Ar Area (S.F.)**	**al Drainage Area (ACRE)**	**Check**
CB 406	0.018	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.48**	7.50	19703	13939	0.32	GOOD
CB 405	0.035	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**2.06**	7.50	27474	10890	0.25	GOOD
CB 404	0.035	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**2.06**	7.50	27474	9148	0.21	GOOD
CB 403	0.035	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**2.06**	7.50	27474	10890	0.25	GOOD

E. O. P. - Edge of Pavement
C&G - Curb and gutter
WP - Wetted Perimeter (ft.)

A - Area (s. f.)
V - Velocity (fps)

Note: Program uses Manning's formula for open channel flow.

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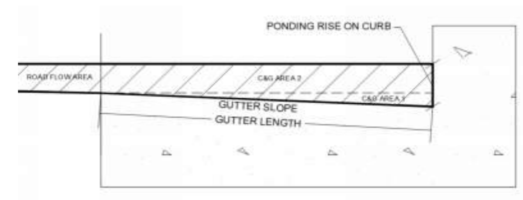
Gutter Spread by Limited Area



Determine maximum area to on-grade inlet using input factors as shown below.

Project: **Moody** Road: **Wineberry Bush Lane (27' B-B)** Date: 12/5/24

Inlet No. **1** Allowable Spread=Pvm't + Gutter Width: 7.5 ft

Compute "C" Factor: One Half R/W Width: 25 One Half B/B Width: 13.5 S/W Width 5

Paved Area "C": 0.95 Grass Area 0.2

0.70 0.05

Standard Curb and Gutter Profile (see diagram above)

Gutter Length (ft) 2

Gutter Slope (ft/ft) 0.04

Ponding Rise on Curb (ft) 0.19

Gutter Width= 2.00 ft.

Total Allow. Spread = 7.50 ft. Manning's n = 0.015 Weir C = 3.33

Inlet Type 1 Inlet Types 1 NCDOT Std. 840.03

Composite Rational C = 0.76 I (2yr.) = 4.00 iph

Roadway X-slope = 0.02 Varies Manual Input

Max Flow for Limited Spread

C.B. NUMBER	Long. Slope	ROAD X-SLOPE	E. O. P. Depth	Weir Depth	C&G Flow Area 1	C&G Flow Area 2	C&G WP	Road Flow Area	Road WP	Total Flow A	Total WP	MAX Q FOR SPREAD, CFS	On-Grade Spread	Max Drainage Area (S.F.)	ctual Drainage Ar Area (S.F.)	al Drainage Area (ACRE)	Check
CB 101	0.025	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.74**	7.50	23220	3049	0.07	GOOD
CB 102	0.025	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.74**	7.50	23220	8712	0.20	GOOD
CB 121	0.020	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.56**	7.50	20769	16553	0.38	GOOD
CB 122	0.020	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.56**	7.50	20769	13068	0.30	GOOD
CB 123	0.015	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.35**	7.50	17986	2178	0.05	GOOD

E. O. P. - Edge of Pavement
C&G - Curb and gutter
WP - Wetted Perimeter (ft.)

A - Area (s. f.)
V - Velocity (fps)

Note: Program uses Manning's formula for open channel flow.

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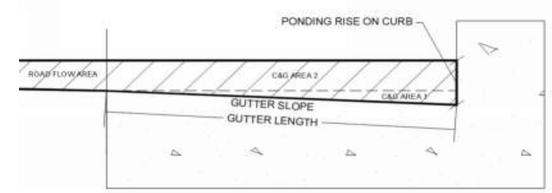
Gutter Spread by Limited Area



Determine maximum area to on-grade inlet using input factors as shown below.

Project: **Moody** Road: **Clover Cottage Lane (27' B-B)** Date: 12/5/24

Inlet No. **1** Allowable Spread=Pvm't + Gutter Width: 7.5 ft

Compute "C" Factor: One Half R/W Width: 25 One Half B/B Width: 13.5 S/W Width 5

Paved Area "C": 0.95 Grass Area 0.2

0.70 0.05

Standard Curb and Gutter Profile (see diagram above)

Gutter Length (ft)	2
Gutter Slope (ft/ft)	0.04
Ponding Rise on Curb (ft)	0.19

Gutter Width= 2.00 ft.

Total Allow. Spread = 7.50 ft. Manning's n = 0.015 Weir C = 3.33

Inlet Type 1 Inlet Types 1 NCDOT Std. 840.03

Composite Rational C = 0.76 I (2yr.) = 4.00 iph

Roadway X-slope = 0.02 Varies Manual Input

Max Flow for Limited Spread

C.B. NUMBER	Long. Slope	ROAD X-SLOPE	E. O. P. Depth	Weir Depth	C&G Flow Area 1	C&G Flow Area 2	C&G WP	Road Flow Area	Road WP	Total Flow A	Total WP	MAX Q FOR SPREAD, CFS	On-Grade Spread	Max Drainage Area (S.F.)	ctual Drainage Ar Area (S.F.)	al Drainage Area (ACRE)	Check	
CB 111	0.010	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.10**	7.50	29371	25700	0.59	GOOD	*dbl
CB 114	0.010	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.10**	7.50	14686	3485	0.08	GOOD	
CB 115	0.010	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.10**	7.50	29371	24394	0.56	GOOD	*dbl
CB 116	0.010	0.020	0.11	0.11	0.08	0.22	2.19	0.30	5.50	0.61	7.69	**1.10**	7.50	29371	20038	0.46	GOOD	*dbl

E. O. P. - Edge of Pavement
C&G - Curb and gutter
WP - Wetted Perimeter (ft.)

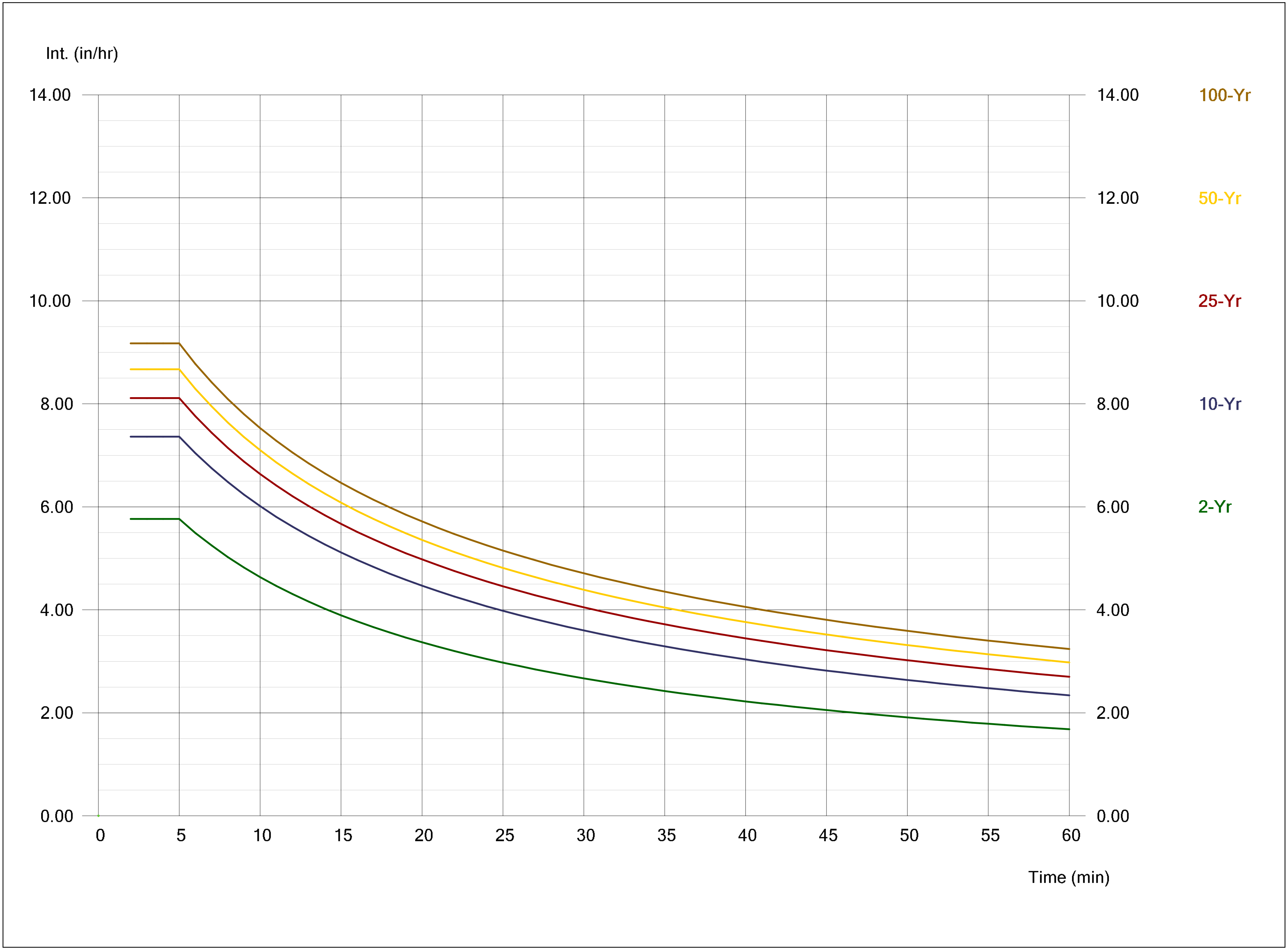
A - Area (s. f.)
V - Velocity (fps)

Note: Program uses Manning's formula for open channel flow.

Z:\Jobs\9900\Watkins Property\Documents\Schedules\Gutter Spread Calcs

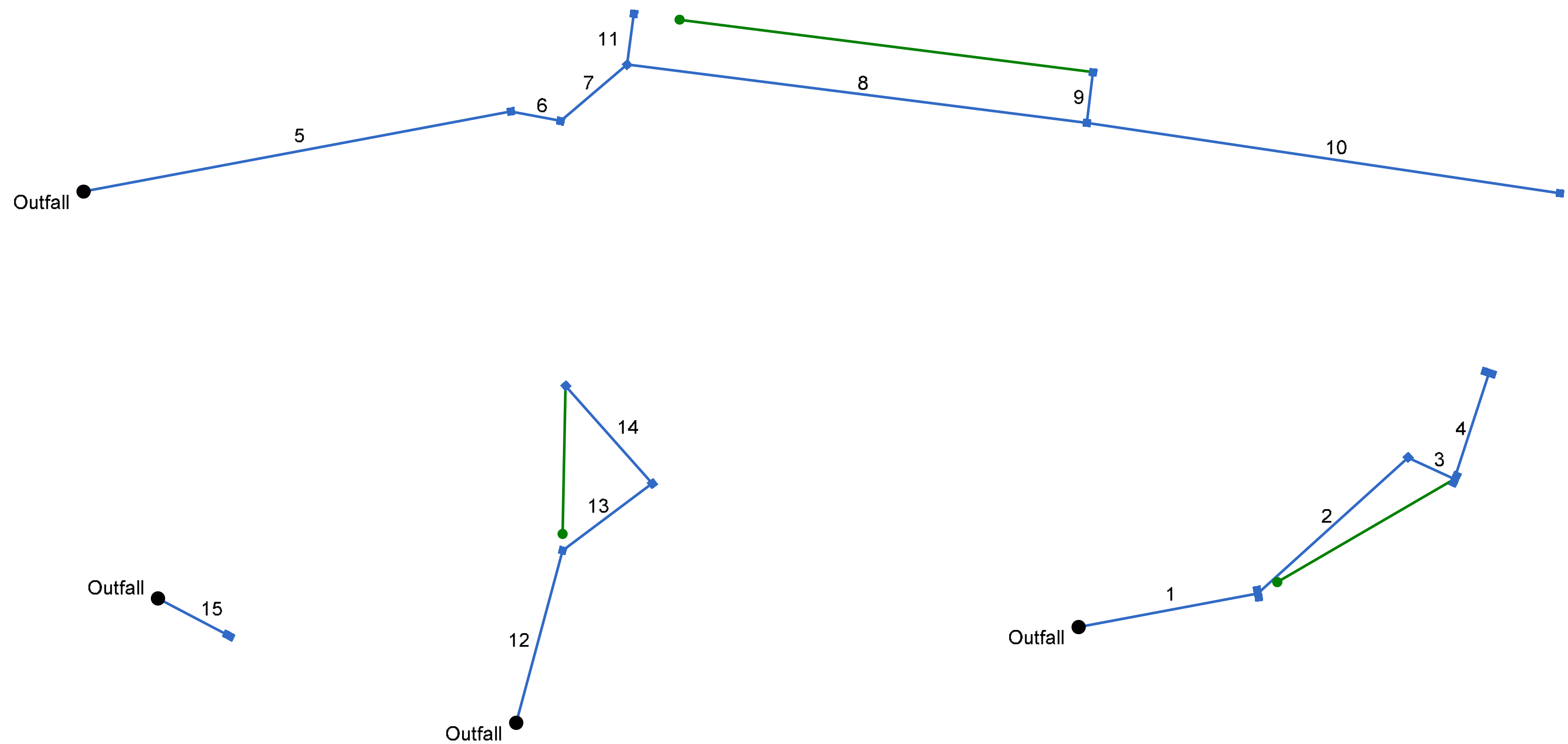
Storm Sewer IDF Curves

IDF file: 20241113 Moody IDF.IDF



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

10-Year SCM#1 Report



Project File: SCM#1.stm	Number of lines: 15	Date: 12/5/2024

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	96.027	-10.617	Comb	0.00	0.59	0.57	10.0	380.50	0.58	381.06	18	Cir	0.013	0.87	386.00	Pipe - (97)
2	1	107.000	-31.568	Comb	0.00	0.08	0.57	10.0	381.63	0.77	382.45	15	Cir	0.013	1.40	387.03	Pipe - (95)
3	2	26.999	67.120	Comb	0.00	0.56	0.57	10.0	382.55	0.67	382.73	15	Cir	0.013	1.50	387.04	Pipe - (94)
4	3	59.003	-96.968	Comb	0.00	0.46	0.57	10.0	382.83	0.75	383.27	15	Cir	0.013	1.00	387.89	Pipe - (93)
5	End	229.120	-10.656	Comb	0.00	0.07	0.57	10.0	363.00	2.20	368.04	18	Cir	0.013	0.63	373.98	Pipe - (86)
6	5	27.000	21.423	Comb	0.00	0.20	0.57	10.0	368.14	0.52	368.28	18	Cir	0.013	1.22	373.87	Pipe - (85)
7	6	45.912	-51.157	Comb	0.00	0.29	0.57	10.0	368.38	3.48	369.98	18	Cir	0.013	1.62	375.04	Pipe - (84)
8	7	244.371	47.632	Comb	0.00	0.13	0.57	10.0	370.08	2.96	377.31	15	Cir	0.013	1.50	382.57	Pipe - (83)
9	8	27.044	-90.017	Comb	0.00	0.74	0.57	10.0	378.23	0.63	378.40	15	Cir	0.013	1.00	382.57	Pipe - (88)
10	8	252.428	1.235	Comb	0.00	0.11	0.57	10.0	377.42	2.97	384.92	15	Cir	0.013	1.00	390.04	Pipe - (82)
11	7	27.000	-42.459	Comb	0.00	0.15	0.57	10.0	370.18	0.52	370.32	15	Cir	0.013	1.00	375.04	Pipe - (87)
12	End	94.321	-74.896	Comb	0.00	0.38	0.57	10.0	368.50	0.56	369.03	15	Cir	0.013	1.00	374.00	Pipe - (92)
13	12	59.044	38.083	Comb	0.00	0.30	0.57	10.0	369.13	1.00	369.72	15	Cir	0.013	1.50	374.04	Pipe - (91)
14	13	68.947	-94.675	Comb	0.00	0.05	0.57	10.0	369.82	1.00	370.51	15	Cir	0.013	1.00	375.01	Pipe - (90)
15	End	42.000	27.855	DrGrt	0.00	2.88	0.57	10.0	363.50	0.50	363.71	24	Cir	0.013	1.00	366.50	Pipe - (89)

Project File: SCM#1.stm | Number of lines: 15 | Date: 12/5/2024

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	CB 111	Combination	386.00	Rect	4.00	8.00	18	Cir	381.06	15	Cir	381.63
2	CB 114	Combination	387.03	Rect	4.00	4.00	15	Cir	382.45	15	Cir	382.55
3	CB 115	Combination	387.04	Rect	4.00	8.00	15	Cir	382.73	15	Cir	382.83
4	CB 116	Combination	387.89	Rect	4.00	8.00	15	Cir	383.27			
5	CB 101	Combination	373.98	Rect	4.00	4.00	18	Cir	368.04	18	Cir	368.14
6	CB 102	Combination	373.87	Rect	4.00	4.00	18	Cir	368.28	18	Cir	368.38
7	CB 103	Combination	375.04	Rect	4.00	4.00	18	Cir	369.98	15 15	Cir Cir	370.08 370.18
8	CB 105	Combination	382.57	Rect	4.00	4.00	15	Cir	377.31	15 15	Cir Cir	378.23 377.42
9	CB 106	Combination	382.57	Rect	4.00	4.00	15	Cir	378.40			
10	CB 107	Combination	390.04	Rect	4.00	4.00	15	Cir	384.92			
11	CB 104	Combination	375.04	Rect	4.00	4.00	15	Cir	370.32			
12	CB 121	Combination	374.00	Rect	4.00	4.00	15	Cir	369.03	15	Cir	369.13
13	CB 122	Combination	374.04	Rect	4.00	4.00	15	Cir	369.72	15	Cir	369.82
14	CB 123	Combination	375.01	Rect	4.00	4.00	15	Cir	370.51			
15	DI 126	DropGrate	366.50	Rect	6.00	4.00	24	Cir	363.71			

Project File: SCM#1.stm | Number of Structures: 15 | Run Date: 12/5/2024

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	Pipe - (97)	5.63	18	Cir	96.027	380.50	381.06	0.583	382.00	382.22	0.20	382.42	End	Combination
2	Pipe - (95)	3.71	15	Cir	107.000	381.63	382.45	0.766	382.42	383.23	n/a	383.23 j	1	Combination
3	Pipe - (94)	3.45	15	Cir	26.999	382.55	382.73	0.667	383.29	383.48	n/a	383.48	2	Combination
4	Pipe - (93)	1.58	15	Cir	59.003	382.83	383.27	0.746	383.48	383.77	n/a	383.77 j	3	Combination
5	Pipe - (86)	5.06	18	Cir	229.120	363.00	368.04	2.200	364.50	368.91	n/a	368.91 j	End	Combination
6	Pipe - (85)	4.87	18	Cir	27.000	368.14	368.28	0.518	369.02	369.15	0.39	369.55	5	Combination
7	Pipe - (84)	4.29	18	Cir	45.912	368.38	369.98	3.485	369.55	370.77	n/a	370.77 j	6	Combination
8	Pipe - (83)	3.05	15	Cir	244.371	370.08	377.31	2.959	370.77	378.01	0.43	378.01	7	Combination
9	Pipe - (88)	2.54	15	Cir	27.044	378.23	378.40	0.629	378.85	379.04	n/a	379.04	8	Combination
10	Pipe - (82)	0.38	15	Cir	252.428	377.42	384.92	2.971	378.01	385.16	n/a	385.16 j	8	Combination
11	Pipe - (87)	0.51	15	Cir	27.000	370.18	370.32	0.519	370.77	370.78	0.02	370.80	7	Combination
12	Pipe - (92)	2.39	15	Cir	94.321	368.50	369.03	0.562	369.75	369.86	0.12	369.98	End	Combination
13	Pipe - (91)	1.16	15	Cir	59.044	369.13	369.72	0.999	369.98	370.14	n/a	370.14 j	12	Combination
14	Pipe - (90)	0.17	15	Cir	68.947	369.82	370.51	1.001	370.14	370.67	n/a	370.67 j	13	Combination
15	Pipe - (89)	9.87	24	Cir	42.000	363.50	363.71	0.500	365.50	365.56	0.16	365.73	End	DropGrate

Project File: SCM#1.stm	Number of lines: 15	Run Date: 12/5/2024

NOTES: Return period = 10 Yrs. ; j - Line contains hyd. jump.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet Ht (in)	Curb Inlet L (ft)	Grate Inlet Area (sqft)	Grate Inlet L (ft)	Grate Inlet W (ft)	Gutter So (ft/ft)	Gutter W (ft)	Gutter Sw (ft/ft)	Gutter Sx (ft/ft)	Gutter n	Gutter Depth (ft)	Gutter Spread (ft)	Inlet Depth (ft)	Inlet Spread (ft)	Inlet Depr (in)	Byp Line No
1	CB 111	2.02	0.87	2.89	0.00	Comb	6.0	3.00	7.50	3.00	5.00	Sag	2.00	0.040	0.020	0.013	0.22	8.89	0.38	8.89	2.0	Off
2	CB 114	0.27	0.00	0.27	0.01	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.11	3.28	0.19	0.70	2.0	1
3	CB 115	1.92	0.46	1.51	0.86	Comb	6.0	1.50	0.00	3.00	5.00	0.010	2.00	0.040	0.020	0.013	0.22	8.87	0.32	5.79	2.0	1
4	CB 116	1.58	0.00	1.12	0.46	Comb	6.0	1.50	0.00	3.00	5.00	0.010	2.00	0.040	0.020	0.013	0.19	7.49	0.29	4.30	2.0	3
5	CB 101	0.24	0.00	0.24	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.025	2.00	0.040	0.020	0.013	0.09	2.27	0.17	0.00	2.0	Off
6	CB 102	0.69	0.15	0.84	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	0.10	2.87	0.26	2.87	2.0	Off
7	CB 103	0.99	0.01	0.86	0.15	Comb	6.0	1.50	0.00	3.00	2.50	0.030	2.00	0.040	0.020	0.013	0.14	4.83	0.24	1.73	2.0	6
8	CB 105	0.45	0.01	0.44	0.01	Comb	6.0	1.50	0.00	3.00	2.50	0.030	2.00	0.040	0.020	0.013	0.10	3.19	0.19	0.70	2.0	7
9	CB 106	2.54	0.00	1.71	0.82	Comb	6.0	1.50	0.00	3.00	2.50	0.030	2.00	0.040	0.020	0.013	0.19	7.26	0.29	4.38	2.0	11
10	CB 107	0.38	0.00	0.37	0.01	Comb	6.0	1.50	0.00	3.00	2.50	0.030	2.00	0.040	0.020	0.013	0.10	2.87	0.19	0.51	2.0	8
11	CB 104	0.51	0.82	1.07	0.27	Comb	6.0	1.50	0.00	3.00	2.50	0.030	2.00	0.040	0.020	0.013	0.15	5.50	0.25	2.31	2.0	Off
12	CB 121	1.30	0.22	1.52	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	0.12	3.79	0.28	3.79	2.0	Off
13	CB 122	1.03	0.00	0.81	0.22	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.16	6.24	0.26	2.90	2.0	12
14	CB 123	0.17	0.00	0.17	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.09	2.46	0.18	0.24	2.0	12
15	DI 126	9.87	0.00	9.87	0.00	DrGrt	0.0	0.00	9.00	3.00	5.00	Sag	6.00	0.020	0.020	0.013	0.35	40.82	0.35	40.82	0.0	Off

Project File: SCM#1.stm | Number of lines: 15 | Run Date: 12/5/2024

NOTES: Inlet N-Values = 0.016; Intensity = 74.09 / (Inlet time + 12.50) ^ 0.81; Return period = 10 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

Hydraulic Grade Line Computations

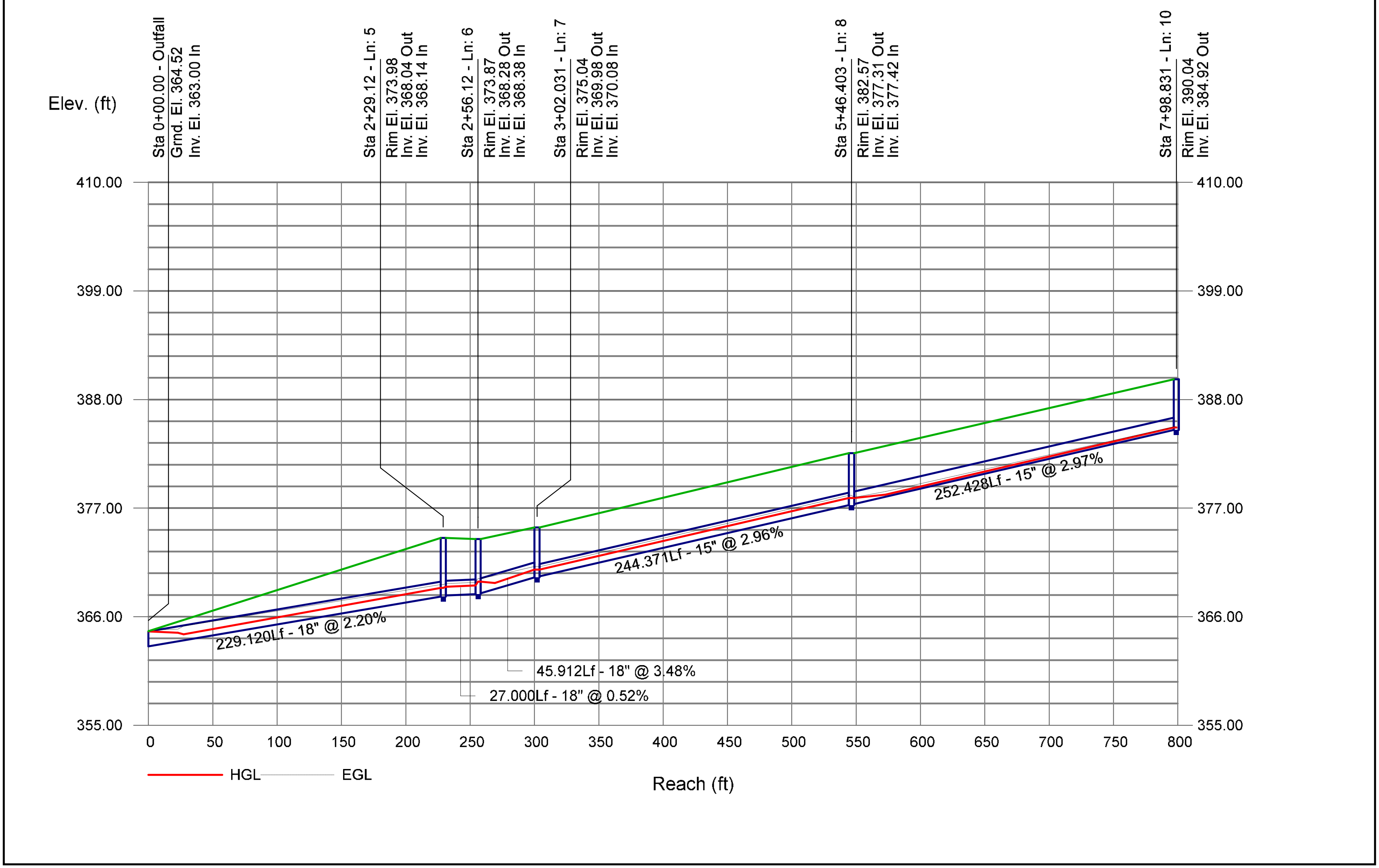
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
1	18	5.63	380.50	382.00	1.50	1.77	3.18	0.16	382.16	0.287	96.027	381.06	382.22	1.16	1.47	3.83	0.23	382.45	0.321	0.304	0.292	0.87	0.20
2	15	3.71	381.63	382.42	0.79	0.80	4.54	0.33	382.75	0.000	107.000	382.45	383.23 j	0.78**	0.80	4.62	0.33	383.56	0.000	0.000	n/a	1.40	0.47
3	15	3.45	382.55	383.29	0.74*	0.75	4.58	0.31	383.60	0.000	26.999	382.73	383.48	0.75**	0.77	4.50	0.31	383.79	0.000	0.000	n/a	1.50	n/a
4	15	1.58	382.83	383.48	0.65	0.46	2.45	0.19	383.67	0.000	59.003	383.27	383.77 j	0.50**	0.46	3.46	0.19	383.95	0.000	0.000	n/a	1.00	0.19
5	18	5.06	363.00	364.50	1.50*	1.06	2.87	0.13	364.63	0.233	229.120	368.04	368.91 j	0.87**	1.06	4.80	0.36	369.26	0.582	0.408	n/a	0.63	0.23
6	18	4.87	368.14	369.02	0.88*	1.07	4.54	0.32	369.34	0.518	27.000	368.28	369.15	0.87	1.07	4.56	0.32	369.48	0.522	0.520	0.140	1.22	0.39
7	18	4.29	368.38	369.55	1.17	0.95	2.91	0.32	369.87	0.000	45.912	369.98	370.77 j	0.79**	0.95	4.52	0.32	371.09	0.000	0.000	n/a	1.62	n/a
8	15	3.05	370.08	370.77	0.69	0.70	4.36	0.29	371.06	0.000	244.371	377.31	378.01	0.70**	0.71	4.30	0.29	378.30	0.000	0.000	n/a	1.50	0.43
9	15	2.54	378.23	378.85	0.62*	0.61	4.16	0.25	379.10	0.000	27.044	378.40	379.04	0.64**	0.63	4.03	0.25	379.29	0.000	0.000	n/a	1.00	n/a
10	15	0.38	377.42	378.01	0.59	0.16	0.66	0.08	378.10	0.000	252.428	384.92	385.16 j	0.24**	0.16	2.31	0.08	385.24	0.000	0.000	n/a	1.00	0.08
11	15	0.51	370.18	370.77	0.59	0.57	0.89	0.01	370.79	0.030	27.000	370.32	370.78	0.46	0.41	1.26	0.02	370.80	0.078	0.054	0.015	1.00	0.02
12	15	2.39	368.50	369.75	1.25*	1.23	1.95	0.06	369.81	0.137	94.321	369.03	369.86	0.83	0.87	2.75	0.12	369.98	0.223	0.180	0.170	1.00	0.12
13	15	1.16	369.13	369.98	0.85	0.37	1.31	0.16	370.14	0.000	59.044	369.72	370.14 j	0.42**	0.37	3.17	0.16	370.30	0.000	0.000	n/a	1.50	0.23
14	15	0.17	369.82	370.14	0.32	0.09	0.68	0.05	370.20	0.000	68.947	370.51	370.67 j	0.16**	0.09	1.88	0.05	370.72	0.000	0.000	n/a	1.00	0.05
15	24	9.87	363.50	365.50	2.00*	3.14	3.14	0.15	365.65	0.191	42.000	363.71	365.56	1.85	3.04	3.25	0.16	365.73	0.165	0.178	0.075	1.00	0.16

Project File: SCM#1.stm | Number of lines: 15 | Run Date: 12/5/2024

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

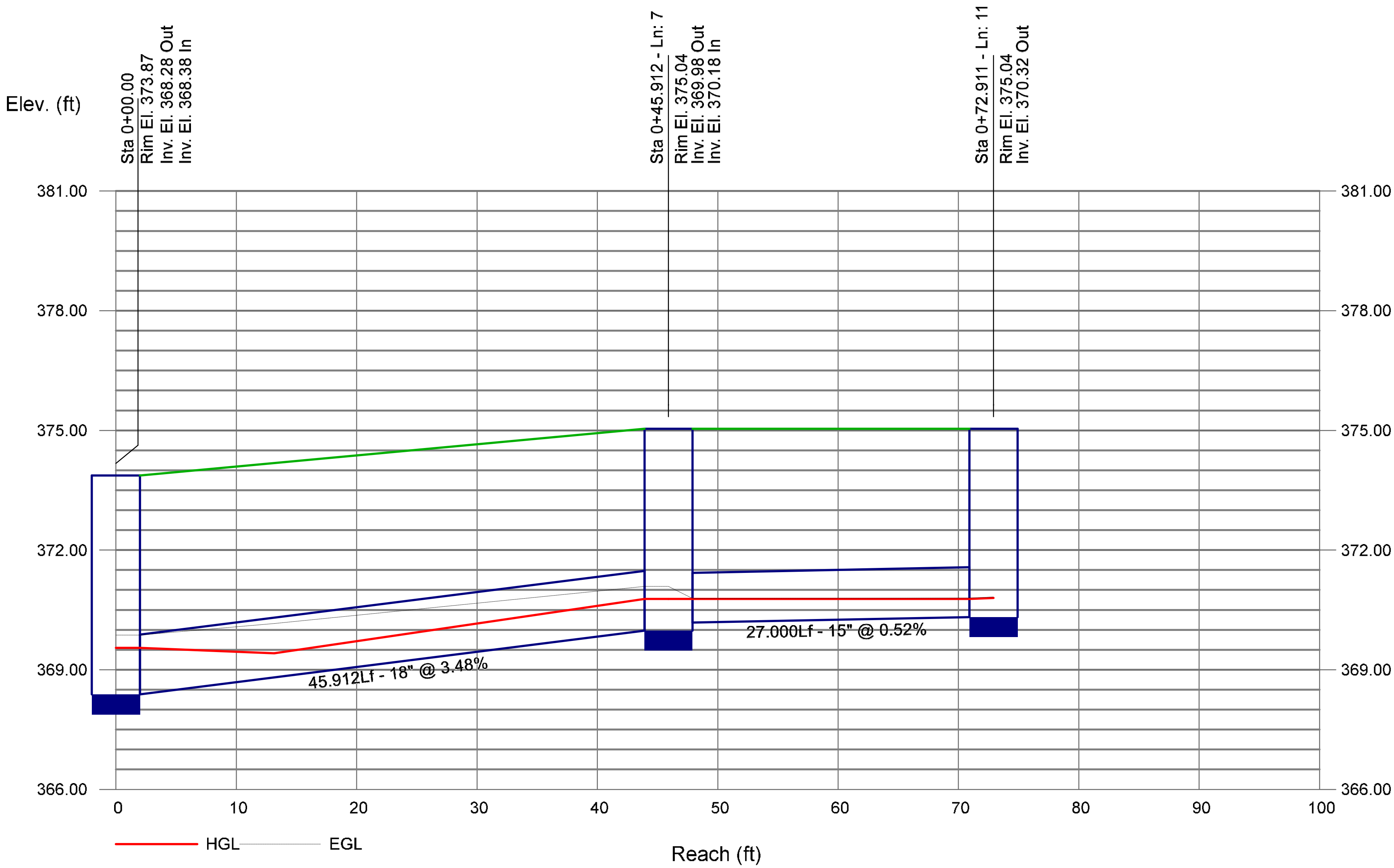
Storm Sewer Profile

10-Year SCM#1 Profile 5-10 Proj. file: SCM#1.stm



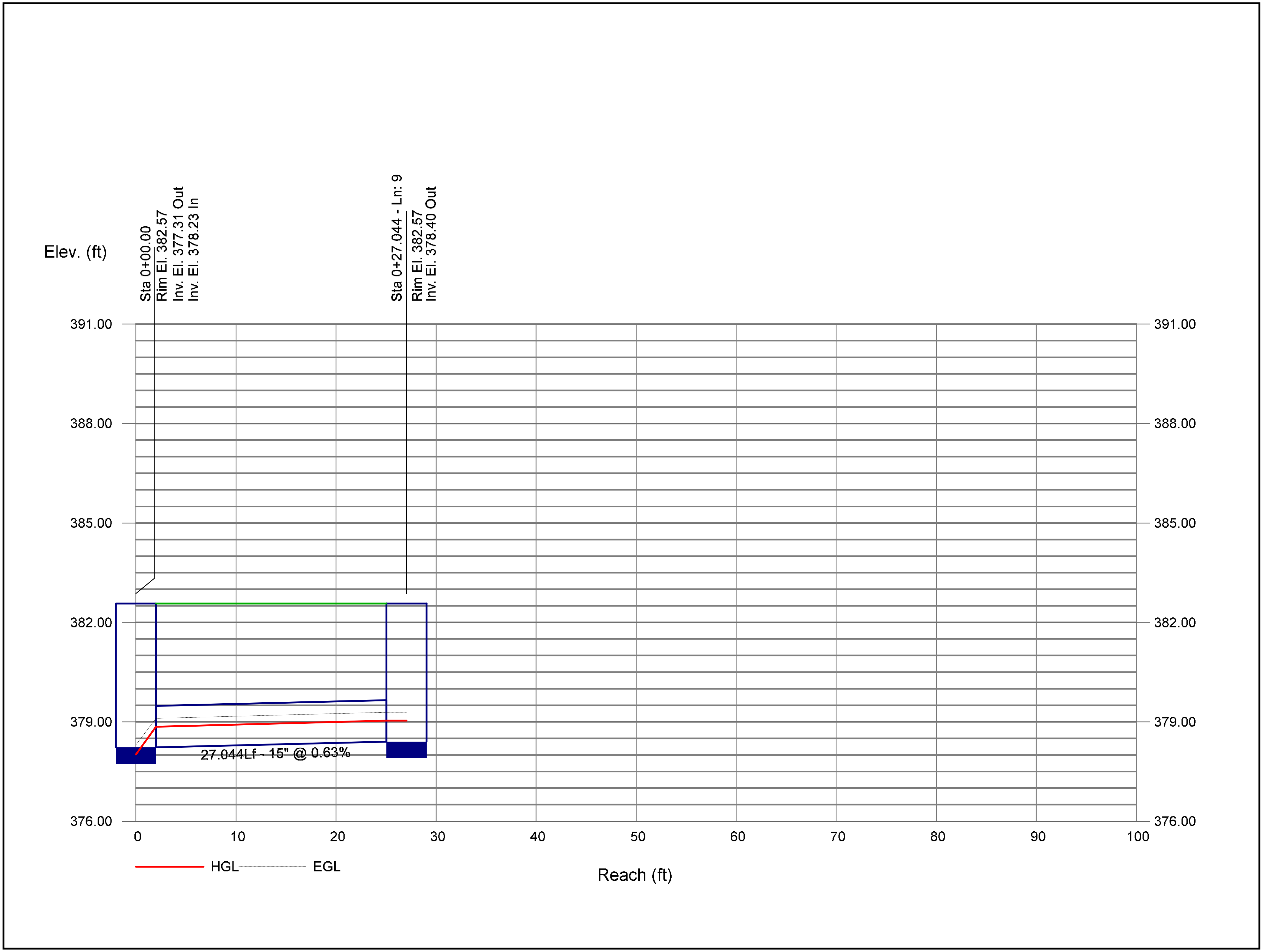
Storm Sewer Profile

10-Year SCM#1 Profile 7-11 Proj. file: SCM#1.stm



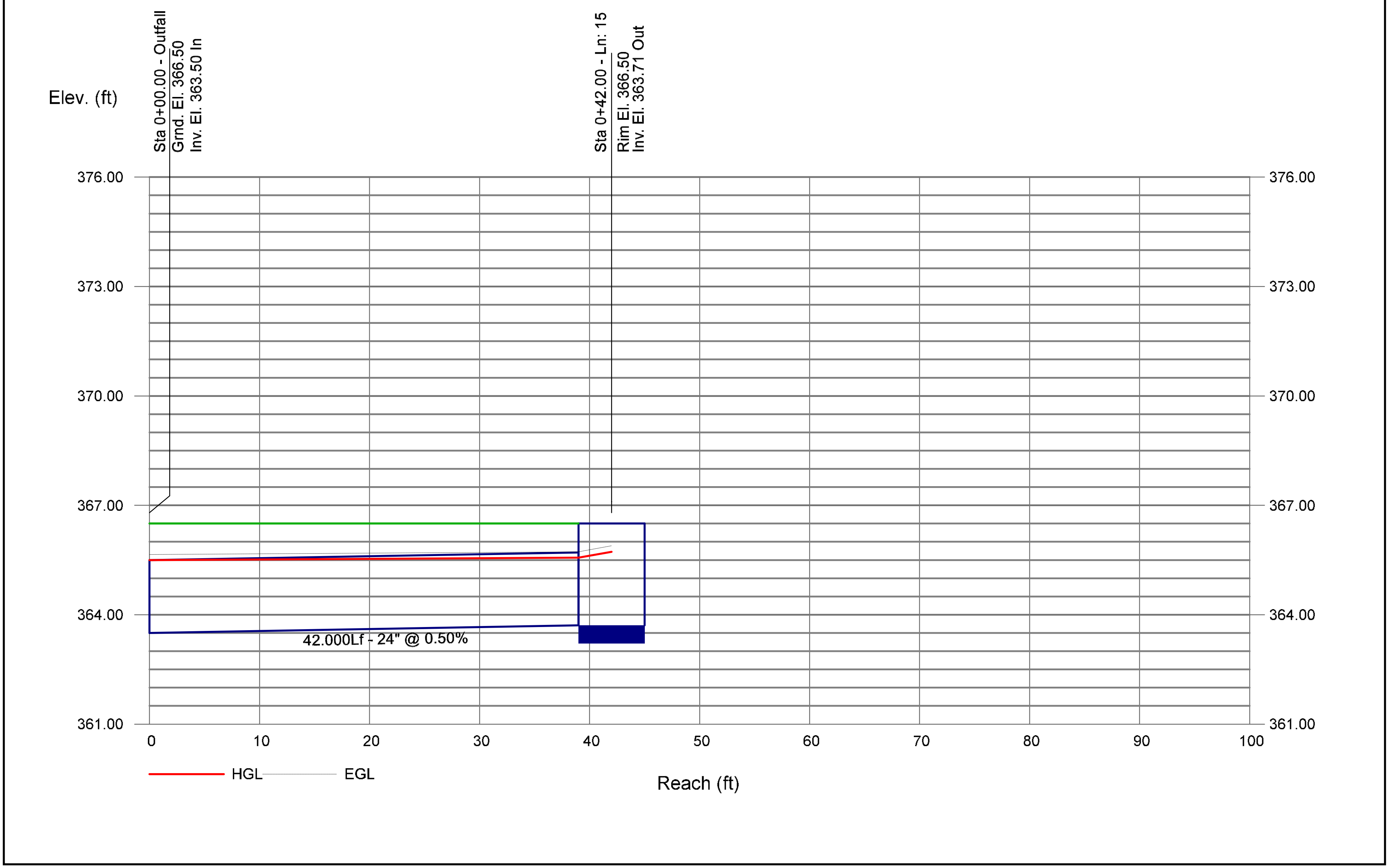
Storm Sewer Profile

10-Year SCM#1 Profile 9-9 Proj. file: SCM#1.stm



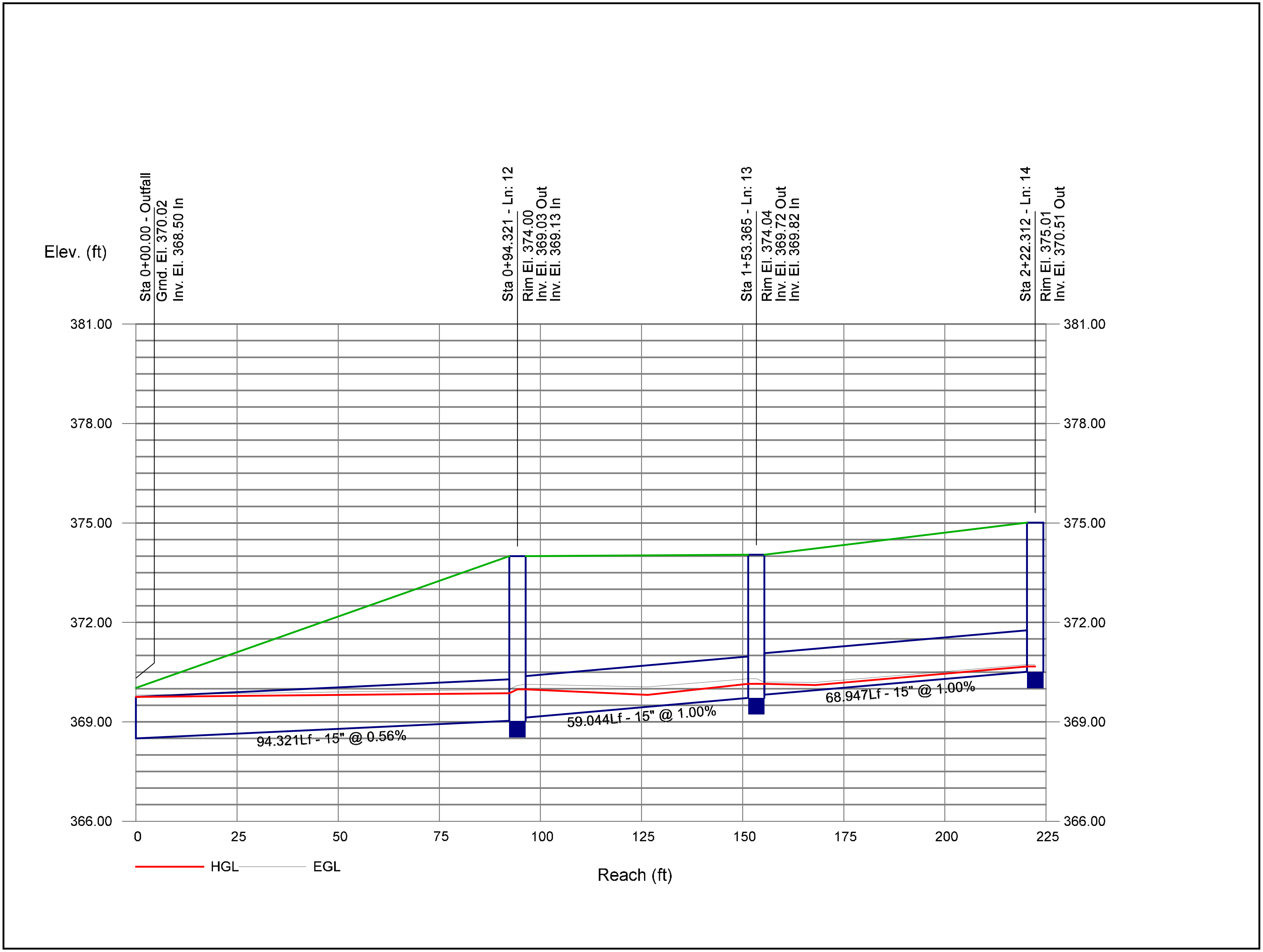
Storm Sewer Profile

10-Year SCM#1 Profile 15-15 Proj. file: SCM#1.stm



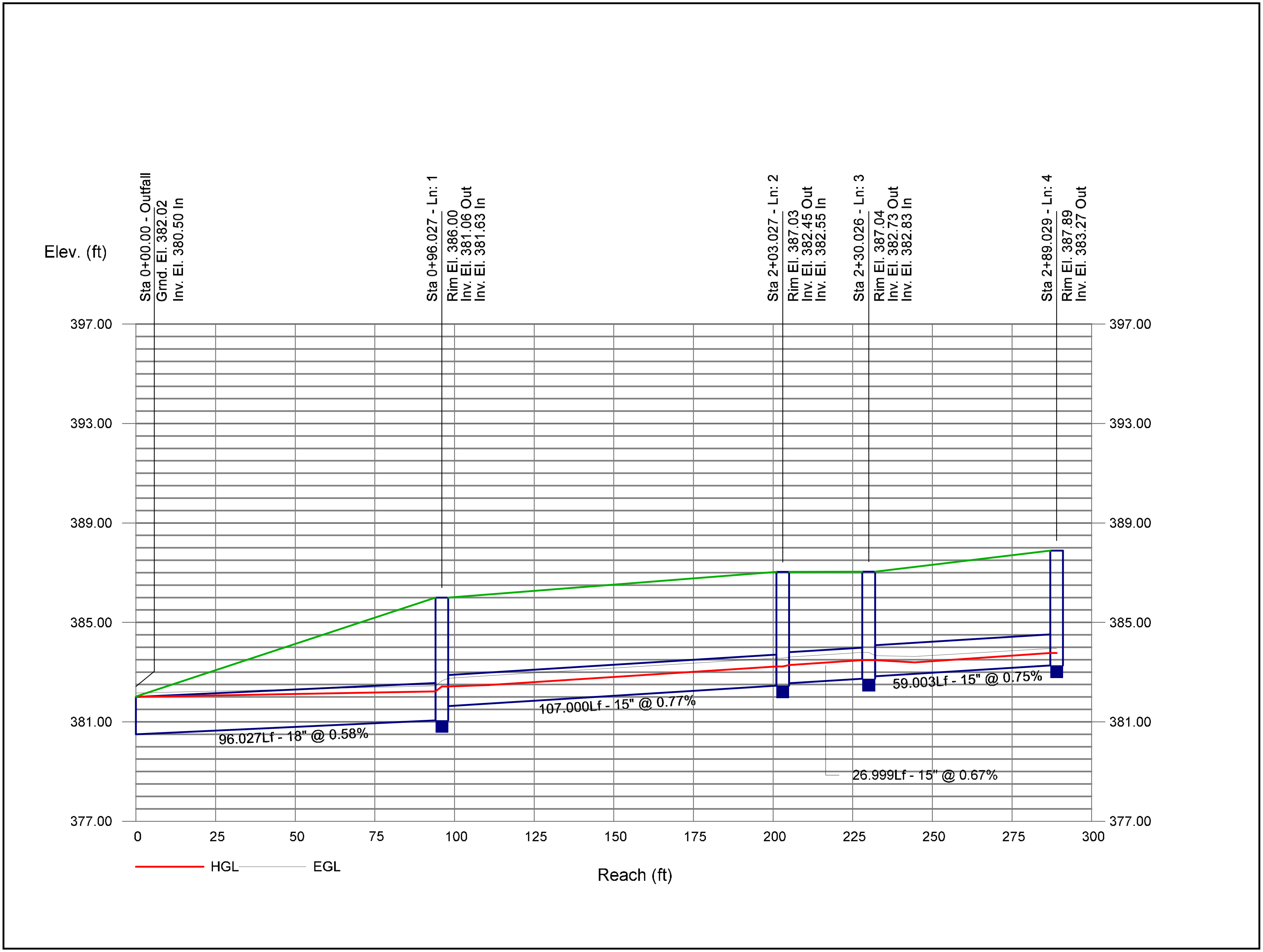
Storm Sewer Profile

10-Year SCM#1 Profile 12-14 Proj. file: SCM#1.stm



Storm Sewer Profile

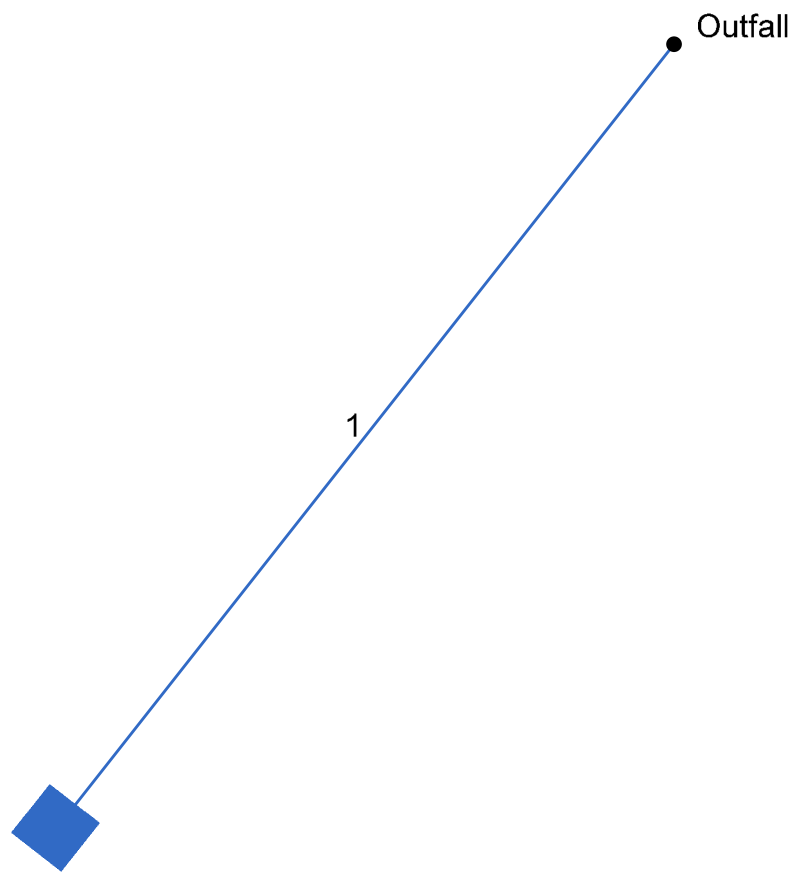
10-Year SCM#1 Profile 1-4 Proj. file: SCM#1.stm



Storm Sewers

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

10-Year SCM#2 Report



Project File: SCM#2.stm	Number of lines: 1	Date: 12/5/2024

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	64.790	128.444	DrGrt	0.00	0.82	0.57	10.0	361.50	1.16	362.25	18	Cir	0.013	1.00	366.00	Pipe - (164)

Project File: SCM#2.stm | Number of lines: 1 | Date: 12/5/2024

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	YI 204	DropGrate	366.00	Rect	4.00	4.00	18	Cir	362.25			

Project File: SCM#2.stm	Number of Structures: 1	Run Date: 12/5/2024

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	Pipe - (164)	2.81	18	Cir	64.790	361.50	362.25	1.158	363.00	363.00	0.16	363.16	End	DropGrate

Project File: SCM#2.stm	Number of lines: 1	Run Date: 12/5/2024
NOTES: Return period = 10 Yrs.		

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	YI 204	2.81	0.00	2.81	0.00	DrGrt	0.0	0.00	3.00	3.00	3.00	Sag	6.00	0.020	0.020	0.013	0.18	24.25	0.18	24.25	0.0	Off

Project File: SCM#2.stm | Number of lines: 1 | Run Date: 12/5/2024

NOTES: Inlet N-Values = 0.016; Intensity = 74.09 / (Inlet time + 12.50) ^ 0.81; Return period = 10 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

Hydraulic Grade Line Computations

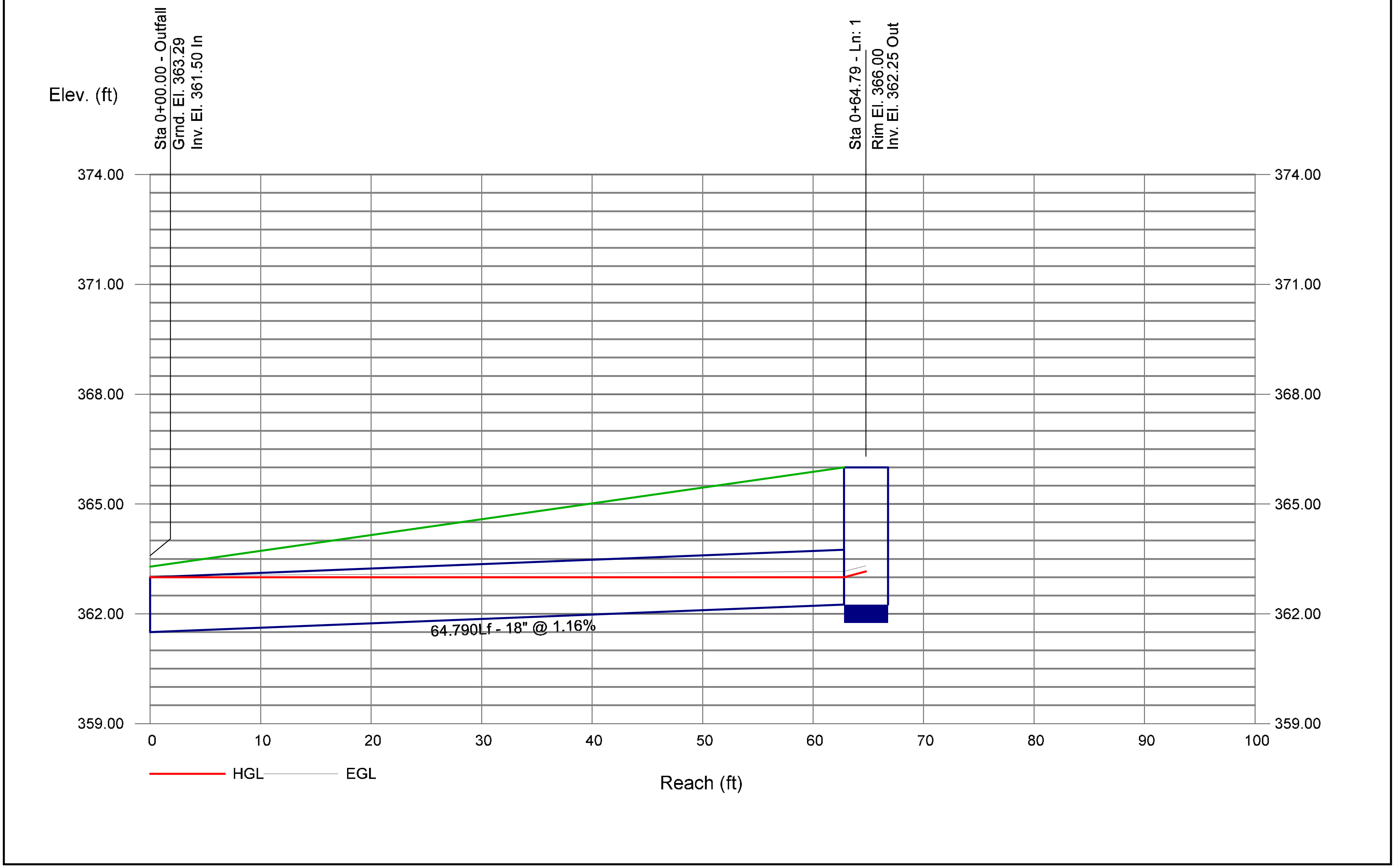
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
1	18	2.81	361.50	363.00	1.50	1.77	1.59	0.04	363.04	0.072	64.790	362.25	363.00	0.75	0.88	3.19	0.16	363.16	0.289	0.180	0.117	1.00	0.16

Project File: SCM#2.stm	Number of lines: 1	Run Date: 12/5/2024

; c = cir e = ellip b = box

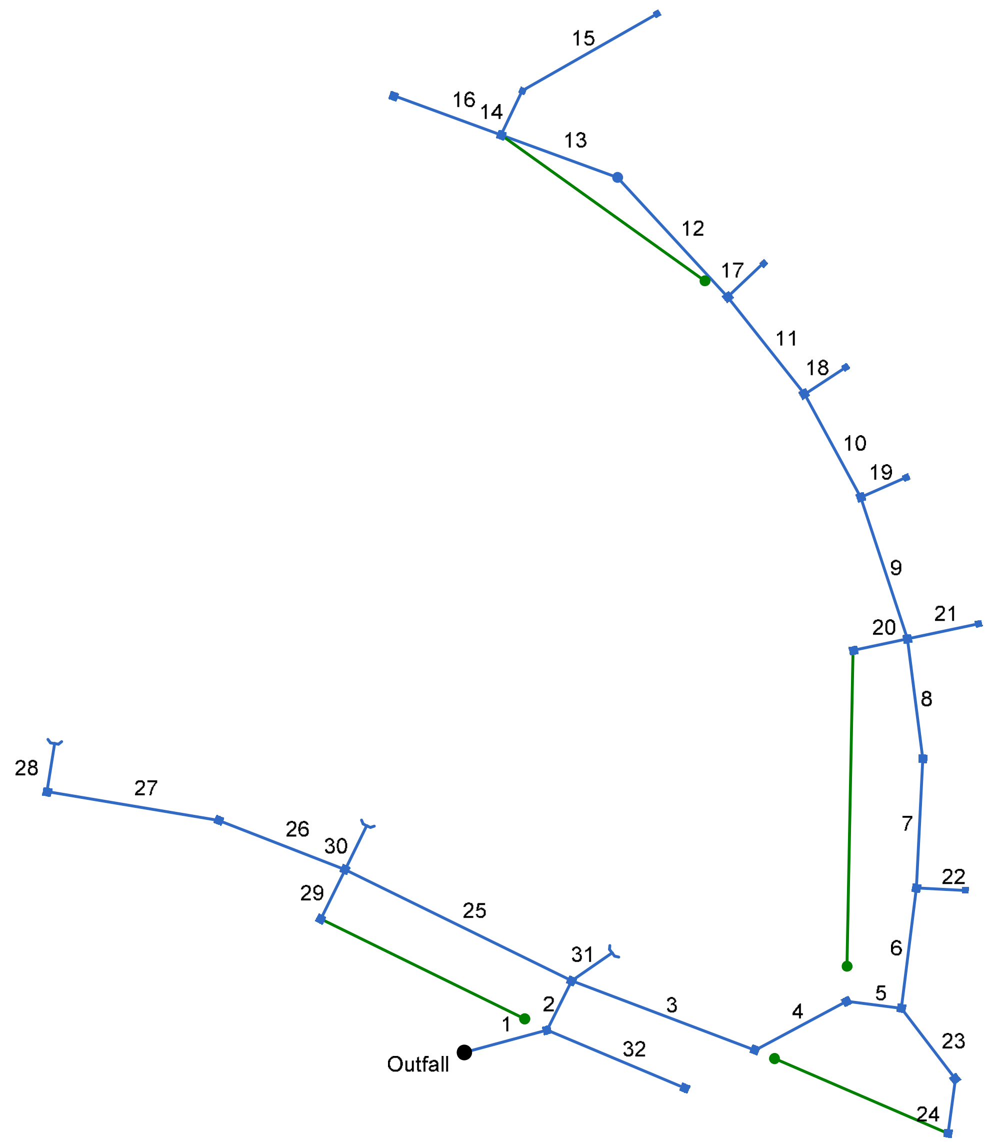
Storm Sewer Profile

10-Year SCM#2 Profile 1-1 Proj. file: SCM#2.stm



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

10-Year SCM#3 Report



Project File: SCM#3.stm	Number of lines: 32	Date: 12/5/2024

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	42.067	-15.170	Comb	0.00	0.12	0.57	10.0	361.00	0.50	361.21	36	Cir	0.013	1.18	365.97	Pipe - (51)
2	1	27.000	-48.608	Comb	0.00	0.13	0.57	10.0	361.31	0.48	361.44	36	Cir	0.013	1.50	366.04	Pipe - (50)
3	2	95.970	84.571	Comb	0.00	0.05	0.57	10.0	361.65	0.69	362.31	30	Cir	0.013	1.19	366.98	Pipe - (49) (1)
4	3	50.862	-48.939	Comb	0.00	0.10	0.57	10.0	362.56	0.49	362.81	24	Cir	0.013	0.95	367.04	Pipe - (68)
5	4	27.000	35.381	Comb	0.00	0.08	0.57	10.0	362.91	0.52	363.05	24	Cir	0.013	1.70	367.09	Pipe - (67)
6	5	59.521	-90.000	Comb	0.00	0.05	0.57	10.0	363.34	2.91	365.07	24	Cir	0.013	1.50	370.04	Pipe - (66)
7	6	63.410	-4.578	Comb	0.00	0.06	0.57	10.0	365.15	3.00	367.05	24	Cir	0.013	0.50	373.03	Pipe - (65)
8	7	59.348	-9.943	Comb	0.00	0.07	0.57	10.0	367.15	3.00	368.93	18	Cir	0.013	2.24	374.74	Pipe - (64)
9	8	73.131	-10.753	Comb	0.00	0.05	0.57	10.0	369.43	1.00	370.16	18	Cir	0.013	1.49	375.97	Pipe - (63)
10	9	57.694	-10.618	Comb	0.00	0.05	0.57	10.0	370.26	1.01	370.84	18	Cir	0.013	1.50	376.00	Pipe - (62)
11	10	60.773	-9.612	Comb	0.00	0.29	0.57	10.0	370.94	1.00	371.55	18	Cir	0.013	1.50	377.14	Pipe - (61)
12	11	79.646	-4.271	MH	0.00	0.00	0.57	10.0	373.45	0.50	373.85	15	Cir	0.013	0.52	378.03	Pipe - (60) (1)
13	12	60.480	-27.352	Comb	0.00	0.44	0.57	10.0	373.95	0.50	374.25	15	Cir	0.013	1.50	378.04	Pipe - (60)
14	13	24.001	94.878	DrGrt	0.00	0.24	0.57	10.0	374.75	5.67	376.11	15	Cir	0.013	0.94	382.30	Pipe - (75)
15	14	76.039	35.232	DrGrt	0.00	0.27	0.57	10.0	377.70	2.37	379.50	15	Cir	0.013	1.00	385.27	Pipe - (76)
16	13	55.875	-0.060	Comb	0.00	0.16	0.57	10.0	374.45	1.00	375.01	15	Cir	0.013	1.00	378.78	Pipe - (59)
17	11	24.000	85.069	DrGrt	0.00	0.48	0.57	10.0	373.26	1.00	373.50	15	Cir	0.013	1.00	378.58	Pipe - (78)
18	10	24.000	85.319	DrGrt	0.00	0.31	0.57	10.0	371.60	1.00	371.84	15	Cir	0.013	1.00	376.93	Pipe - (74)
19	9	24.000	84.063	DrGrt	0.00	0.26	0.57	10.0	371.20	5.00	372.40	15	Cir	0.013	1.00	377.58	Pipe - (73)
20	8	27.000	-94.816	Comb	0.00	0.24	0.57	10.0	369.94	0.67	370.12	15	Cir	0.013	1.00	374.73	Pipe - (71)
21	8	35.500	85.182	DrGrt	0.00	0.28	0.57	10.0	369.94	2.99	371.00	15	Cir	0.013	1.00	378.00	Pipe - (72)
22	6	24.000	85.596	DrGrt	0.00	0.54	0.57	10.0	365.80	1.00	366.04	15	Cir	0.013	1.00	372.06	Pipe - (70)
23	5	43.537	45.555	Comb	0.00	0.12	0.57	10.0	363.55	1.01	363.99	24	Cir	0.013	1.12	368.91	Pipe - (56) (1)

Project File: SCM#3.stm	Number of lines: 32	Date: 12/5/2024

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
24	23	27.000	44.445	Comb	0.00	0.39	0.57	10.0	364.58	1.15	364.89	15	Cir	0.013	1.00	368.93	Pipe - (56)
25	2	123.519	-90.000	Comb	0.00	0.04	0.57	10.0	361.54	0.50	362.16	24	Cir	0.013	2.25	367.00	Pipe - (49)
26	25	66.365	-4.879	Comb	0.00	0.05	0.57	10.0	362.67	0.50	363.00	24	Cir	0.013	0.50	367.90	Pipe - (48)
27	26	85.141	-11.831	Comb	0.00	0.26	0.57	10.0	363.20	0.51	363.63	18	Cir	0.013	1.50	368.63	Pipe - (47)
28	27	24.000	89.190	Hdwl	0.00	0.93	0.57	10.0	363.73	0.50	363.85	18	Cir	0.013	1.00	367.00	Pipe - (46)
29	25	27.000	-90.000	Comb	0.00	0.17	0.57	10.0	363.20	0.52	363.34	15	Cir	0.013	1.00	367.03	Pipe - (54)
30	25	24.000	90.193	Hdwl	0.00	1.80	0.57	10.0	362.42	0.50	362.54	24	Cir	0.013	1.00	363.96	Pipe - (53)
31	2	24.000	29.044	Hdwl	0.00	0.70	0.57	10.0	361.94	1.04	362.19	18	Cir	0.013	1.00	363.71	Pipe - (55)
32	1	73.029	38.107	Comb	0.00	0.07	0.57	10.0	362.30	0.48	362.65	24	Cir	0.013	1.00	366.75	Pipe - (58)

Project File: SCM#3.stm | Number of lines: 32 | Date: 12/5/2024

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure Shape	Structure Length (ft)	Structure Width (ft)	Line Out Size (in)	Line Out Shape	Line Out Invert (ft)	Line In Size (in)	Line In Shape	Line In Invert (ft)
1	CB 301	Combination	365.97	Rect	4.00	4.00	36	Cir	361.21	36 24	Cir Cir	361.31 362.30
2	CB 302	Combination	366.04	Rect	4.00	4.00	36	Cir	361.44	30 24 18	Cir Cir Cir	361.65 361.54 361.94
3	CB 304	Combination	366.98	Rect	4.00	4.00	30	Cir	362.31	24	Cir	362.56
4	CB 307	Combination	367.04	Rect	4.00	4.00	24	Cir	362.81	24	Cir	362.91
5	CB 308	Combination	367.09	Rect	4.00	4.00	24	Cir	363.05	24 24	Cir Cir	363.34 363.55
6	CB 309	Combination	370.04	Rect	4.00	4.00	24	Cir	365.07	24 15	Cir Cir	365.15 365.80
7	CB 311	Combination	373.03	Rect	4.00	4.00	24	Cir	367.05	18	Cir	367.15
8	CB 312	Combination	374.74	Rect	4.00	4.00	18	Cir	368.93	18 15 15	Cir Cir Cir	369.43 369.94 369.94
9	CB 315	Combination	375.97	Rect	4.00	4.00	18	Cir	370.16	18 15	Cir Cir	370.26 371.20
10	CB 317	Combination	376.00	Rect	4.00	4.00	18	Cir	370.84	18 15	Cir Cir	370.94 371.60
11	CB 319	Combination	377.14	Rect	4.00	4.00	18	Cir	371.55	15 15	Cir Cir	373.45 373.26
12	JB 176	Manhole	378.03	Cir	4.00	4.00	15	Cir	373.85	15	Cir	373.95
13	CB 323	Combination	378.04	Rect	4.00	4.00	15	Cir	374.25	15 15	Cir Cir	374.75 374.45
14	YI 324	DropGrate	382.30	Rect	3.00	3.00	15	Cir	376.11	15	Cir	377.70
15	YI 322	DropGrate	385.27	Rect	3.00	3.00	15	Cir	379.50			
16	CB 325	Combination	378.78	Rect	4.00	4.00	15	Cir	375.01			
17	YI 320	DropGrate	378.58	Rect	3.00	3.00	15	Cir	373.50			

Project File: SCM#3.stm | Number of Structures: 32 | Run Date: 12/5/2024

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure Shape	Structure Length (ft)	Structure Width (ft)	Line Out Size (in)	Line Out Shape	Line Out Invert (ft)	Line In Size (in)	Line In Shape	Line In Invert (ft)
18	YI 318	DropGrate	376.93	Rect	3.00	3.00	15	Cir	371.84			
19	YI 316	DropGrate	377.58	Rect	3.00	3.00	15	Cir	372.40			
20	CB 313	Combination	374.73	Rect	4.00	4.00	15	Cir	370.12			
21	YI 314	DropGrate	378.00	Rect	3.00	3.00	15	Cir	371.00			
22	YI 310	DropGrate	372.06	Rect	3.00	3.00	15	Cir	366.04			
23	CB 306	Combination	368.91	Rect	4.00	4.00	24	Cir	363.99	15	Cir	364.58
24	CB 305	Combination	368.93	Rect	4.00	4.00	15	Cir	364.89			
25	CB 330	Combination	367.00	Rect	4.00	4.00	24	Cir	362.16	24 15 24	Cir Cir Cir	362.67 363.20 362.42
26	CB 333	Combination	367.90	Rect	4.00	4.00	24	Cir	363.00	18	Cir	363.20
27	CB 334	Combination	368.63	Rect	4.00	4.00	18	Cir	363.63	18	Cir	363.73
28	FES INLET 335	OpenHeadwall	367.00	n/a	n/a	n/a	18	Cir	363.85			
29	CB 332	Combination	367.03	Rect	4.00	4.00	15	Cir	363.34			
30	FES INLET 331	OpenHeadwall	363.96	n/a	n/a	n/a	24	Cir	362.54			
31	FES INLET 302 A	OpenHeadwall	363.71	n/a	n/a	n/a	18	Cir	362.19			
32	CB 303	Combination	366.75	Rect	4.00	4.00	24	Cir	362.65			

Project File: SCM#3.stm | Number of Structures: 32 | Run Date: 12/5/2024

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	Pipe - (51)	20.31	36	Cir	42.067	361.00	361.21	0.499	364.00	364.03	0.16	364.19	End	Combination
2	Pipe - (50)	26.82	36	Cir	27.000	361.31	361.44	0.481	364.19	363.11	n/a	363.11	1	Combination
3	Pipe - (49) (1)	14.25	30	Cir	95.970	361.65	362.31	0.688	363.11	363.58	n/a	363.58 j	2	Combination
4	Pipe - (68)	14.16	24	Cir	50.862	362.56	362.81	0.492	364.03	364.28	0.48	364.76	3	Combination
5	Pipe - (67)	13.89	24	Cir	27.000	362.91	363.05	0.518	364.76	364.84	0.58	365.42	4	Combination
6	Pipe - (66)	12.10	24	Cir	59.521	363.34	365.07	2.907	365.42	366.32	n/a	366.32 j	5	Combination
7	Pipe - (65)	10.28	24	Cir	63.410	365.15	367.05	2.996	366.32	368.20	n/a	368.20 j	6	Combination
8	Pipe - (64)	10.14	18	Cir	59.348	367.15	368.93	2.999	368.20	370.16	n/a	370.16	7	Combination
9	Pipe - (63)	8.28	18	Cir	73.131	369.43	370.16	0.998	370.44	371.27	n/a	371.27	8	Combination
10	Pipe - (62)	7.32	18	Cir	57.694	370.26	370.84	1.005	371.27	371.89	0.72	371.89	9	Combination
11	Pipe - (61)	6.18	18	Cir	60.773	370.94	371.55	1.004	371.89	372.51	0.62	372.51	10	Combination
12	Pipe - (60) (1)	3.69	15	Cir	79.646	373.45	373.85	0.500	374.30	374.70	0.14	374.84	11	Manhole
13	Pipe - (60)	3.72	15	Cir	60.480	373.95	374.25	0.496	374.84	375.11	0.40	375.51	12	Combination
14	Pipe - (75)	1.73	15	Cir	24.001	374.75	376.11	5.666	375.51	376.63	n/a	376.63 j	13	DropGrate
15	Pipe - (76)	0.93	15	Cir	76.039	377.70	379.50	2.367	377.96	379.88	n/a	379.88	14	DropGrate
16	Pipe - (59)	0.55	15	Cir	55.875	374.45	375.01	1.002	375.51	375.30	n/a	375.30	13	Combination
17	Pipe - (78)	1.65	15	Cir	24.000	373.26	373.50	1.000	373.69	374.01	n/a	374.01	11	DropGrate
18	Pipe - (74)	1.06	15	Cir	24.000	371.60	371.84	1.000	371.94	372.25	0.15	372.25	10	DropGrate
19	Pipe - (73)	0.89	15	Cir	24.000	371.20	372.40	5.000	371.41	372.77	0.13	372.77	9	DropGrate
20	Pipe - (71)	0.82	15	Cir	27.000	369.94	370.12	0.667	370.27	370.47	n/a	370.47	8	Combination
21	Pipe - (72)	0.96	15	Cir	35.500	369.94	371.00	2.986	370.19	371.38	0.14	371.38	8	DropGrate
22	Pipe - (70)	1.85	15	Cir	24.000	365.80	366.04	1.000	366.32	366.58	n/a	366.58	6	DropGrate
23	Pipe - (56) (1)	1.74	24	Cir	43.537	363.55	363.99	1.011	365.42	364.45	n/a	364.45	5	Combination
24	Pipe - (56)	1.34	15	Cir	27.000	364.58	364.89	1.148	364.95	365.35	n/a	365.35	23	Combination

Project File: SCM#3.stm	Number of lines: 32	Run Date: 12/5/2024

NOTES: Return period = 10 Yrs. ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
25	Pipe - (49)	10.79	24	Cir	123.519	361.54	362.16	0.502	363.11	363.37	1.04	364.41	2	Combination
26	Pipe - (48)	4.18	24	Cir	66.365	362.67	363.00	0.497	364.41	363.72	0.13	363.72	25	Combination
27	Pipe - (47)	4.05	18	Cir	85.141	363.20	363.63	0.505	363.99	364.42	0.43	364.85	26	Combination
28	Pipe - (46)	3.19	18	Cir	24.000	363.73	363.85	0.500	364.85	364.86	0.10	364.96	27	OpenHeadwall
29	Pipe - (54)	0.58	15	Cir	27.000	363.20	363.34	0.518	364.41	364.41	0.00	364.41	25	Combination
30	Pipe - (53)	6.17	24	Cir	24.000	362.42	362.54	0.500	364.41	363.42	n/a	363.42	25	OpenHeadwall
31	Pipe - (55)	2.40	18	Cir	24.000	361.94	362.19	1.042	363.11	362.78	0.22	362.78	2	OpenHeadwall
32	Pipe - (58)	0.24	24	Cir	73.029	362.30	362.65	0.479	364.19	364.19	0.00	364.19	1	Combination

Project File: SCM#3.stm	Number of lines: 32	Run Date: 12/5/2024

NOTES: Return period = 10 Yrs. ; j - Line contains hyd. jump.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet Ht (in)	Curb Inlet L (ft)	Grate Inlet Area (sqft)	Grate Inlet L (ft)	Grate Inlet W (ft)	Gutter So (ft/ft)	Gutter W (ft)	Gutter Sw (ft/ft)	Gutter Sx (ft/ft)	Gutter n	Gutter Depth (ft)	Gutter Spread (ft)	Inlet Depth (ft)	Inlet Spread (ft)	Inlet Depr (in)	Byp Line No
1	CB 301	0.41	0.07	0.48	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	0.04	1.71	0.21	1.71	2.0	Off
2	CB 302	0.45	0.03	0.47	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	0.04	1.69	0.21	1.69	2.0	Off
3	CB 304	0.17	0.27	0.41	0.03	Comb	6.0	1.50	0.00	3.00	2.50	0.014	2.00	0.040	0.020	0.013	0.12	3.89	0.21	1.08	2.0	2
4	CB 307	0.34	0.15	0.49	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	0.05	1.72	0.21	1.72	2.0	Off
5	CB 308	0.27	0.01	0.28	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	-0.01	1.28	0.16	1.28	2.0	Off
6	CB 309	0.17	0.00	0.17	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.050	2.00	0.040	0.020	0.013	0.07	1.65	0.17	0.00	2.0	5
7	CB 311	0.21	0.00	0.21	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.040	2.00	0.040	0.020	0.013	0.07	1.86	0.17	0.00	2.0	6
8	CB 312	0.24	0.00	0.24	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.10	3.07	0.19	0.58	2.0	7
9	CB 315	0.17	0.06	0.23	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.10	2.99	0.19	0.53	2.0	8
10	CB 317	0.17	0.38	0.49	0.06	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.13	4.71	0.23	1.53	2.0	9
11	CB 319	0.99	0.41	1.03	0.38	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.18	7.14	0.28	3.92	2.0	10
12	JB 176	0.00	0.00	0.00	0.00	MH	0.0	2.00	0.00	2.00	0.00	0.000	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
13	CB 323	1.51	0.07	1.17	0.41	Comb	6.0	1.50	0.00	3.00	2.50	0.020	2.00	0.040	0.020	0.013	0.17	6.48	0.27	3.39	2.0	11
14	YI 324	0.82	0.00	0.82	0.00	DrGrt	0.0	0.00	4.00	2.00	2.00	Sag	3.00	0.020	0.020	0.013	0.11	13.54	0.11	13.54	0.0	Off
15	YI 322	0.93	0.00	0.93	0.00	DrGrt	0.0	0.00	4.00	2.00	2.00	Sag	3.00	0.020	0.020	0.013	0.11	14.40	0.11	14.40	0.0	Off
16	CB 325	0.55	0.00	0.47	0.07	Comb	6.0	1.50	0.00	3.00	2.50	0.005	2.00	0.040	0.020	0.013	0.15	5.51	0.24	1.85	2.0	13
17	YI 320	1.65	0.00	1.65	0.00	DrGrt	0.0	0.00	4.00	2.00	2.00	Sag	3.00	0.020	0.020	0.013	0.17	19.73	0.17	19.73	0.0	Off
18	YI 318	1.06	0.00	1.06	0.00	DrGrt	0.0	0.00	4.00	2.00	2.00	Sag	3.00	0.020	0.020	0.013	0.13	15.50	0.13	15.50	0.0	Off
19	YI 316	0.89	0.00	0.89	0.00	DrGrt	0.0	0.00	4.00	2.00	2.00	Sag	3.00	0.020	0.020	0.013	0.11	14.12	0.11	14.12	0.0	Off
20	CB 313	0.82	0.00	0.68	0.15	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.15	5.66	0.25	2.21	2.0	4
21	YI 314	0.96	0.00	0.96	0.00	DrGrt	0.0	0.00	4.00	2.00	2.00	Sag	3.00	0.020	0.020	0.013	0.12	14.68	0.12	14.68	0.0	Off
22	YI 310	1.85	0.00	1.85	0.00	DrGrt	0.0	0.00	4.00	2.00	2.00	Sag	3.00	0.020	0.020	0.013	0.18	21.10	0.18	21.10	0.0	Off
23	CB 306	0.41	0.00	0.40	0.01	Comb	6.0	1.50	0.00	3.00	2.50	0.029	2.00	0.040	0.020	0.013	0.10	3.05	0.19	0.62	2.0	5

Project File: SCM#3.stm	Number of lines: 32	Run Date: 12/5/2024

NOTES: Inlet N-Values = 0.016; Intensity = 74.09 / (Inlet time + 12.50) ^ 0.81; Return period = 10 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet Ht (in)	Curb Inlet L (ft)	Grate Inlet Area (sqft)	Grate Inlet L (ft)	Grate Inlet W (ft)	Gutter So (ft/ft)	Gutter W (ft)	Gutter Sw (ft/ft)	Gutter Sx (ft/ft)	Gutter n	Gutter Depth (ft)	Gutter Spread (ft)	Inlet Depth (ft)	Inlet Spread (ft)	Inlet Depr (in)	Byp Line No
24	CB 305	1.34	0.00	1.06	0.27	Comb	6.0	1.50	0.00	3.00	2.50	0.029	2.00	0.040	0.020	0.013	0.15	5.54	0.25	2.35	2.0	3
25	CB 330	0.14	0.02	0.15	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.09	2.29	0.17	0.00	2.0	2
26	CB 333	0.17	0.17	0.32	0.02	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.11	3.70	0.20	0.94	2.0	25
27	CB 334	0.89	0.00	0.72	0.17	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.16	5.86	0.26	2.45	2.0	26
28	FES INLET 335	3.19	0.00	3.19	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	3.00	0.020	0.020	0.013	0.00	0.00	0.00	0.00	0.0	Off
29	CB 332	0.58	0.00	0.51	0.07	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.14	4.83	0.23	1.60	2.0	1
30	FES INLET 331	6.17	0.00	6.17	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	Off
31	FES INLET 302 A	2.40	0.00	2.40	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	Off
32	CB 303	0.24	0.00	0.24	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.014	2.00	0.040	0.020	0.013	0.09	2.75	0.18	0.39	2.0	1

Project File: SCM#3.stm | Number of lines: 32 | Run Date: 12/5/2024

NOTES: Inlet N-Values = 0.016; Intensity = 74.09 / (Inlet time + 12.50) ^ 0.81; Return period = 10 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
(1)	(in) (2)	(cfs) (3)	Invert elev (ft) (4)	HGL elev (ft) (5)	Depth (ft) (6)	Area (sqft) (7)	Vel (ft/s) (8)	Vel head (ft) (9)	EGL elev (ft) (10)	Sf (%) (11)	(ft) (12)	Invert elev (ft) (13)	HGL elev (ft) (14)	Depth (ft) (15)	Area (sqft) (16)	Vel (ft/s) (17)	Vel head (ft) (18)	EGL elev (ft) (19)	Sf (%) (20)	Ave Sf (%) (21)	Enrgy loss (ft) (22)	(K) (23)	(ft) (24)
1	36	20.31	361.00	364.00	3.00	7.07	2.87	0.13	364.13	0.093	42.067	361.21	364.03	2.82	6.89	2.95	0.13	364.16	0.080	0.086	0.036	1.18	0.16
2	36	26.82	361.31	364.19	2.88	4.05	3.85	0.68	364.87	0.147	27.000	361.44	363.11	1.67**	4.05	6.62	0.68	363.79	0.129	0.138	n/a	1.50	n/a
3	30	14.25	361.65	363.11	1.46	2.50	4.78	0.50	363.62	0.111	95.970	362.31	363.58 j	1.27**	2.50	5.69	0.50	364.08	0.099	0.105	n/a	1.19	0.60
4	24	14.16	362.56	364.03	1.47*	2.48	5.71	0.51	364.54	0.492	50.862	362.81	364.28	1.47	2.48	5.71	0.51	364.79	0.493	0.492	0.250	0.95	0.48
5	24	13.89	362.91	364.76	1.85	3.04	4.57	0.32	365.09	0.326	27.000	363.05	364.84	1.79	2.96	4.69	0.34	365.18	0.334	0.330	0.089	1.70	0.58
6	24	12.10	363.34	365.42	2.00	2.06	3.85	0.23	365.65	0.286	59.521	365.07	366.32 j	1.25**	2.06	5.87	0.53	366.85	0.563	0.424	n/a	1.50	0.80
7	24	10.28	365.15	366.32	1.17	1.86	5.39	0.47	366.79	0.000	63.410	367.05	368.20 j	1.15**	1.86	5.52	0.47	368.67	0.000	0.000	n/a	0.50	n/a
8	18	10.14	367.15	368.20	1.05	1.32	7.69	0.67	368.87	0.000	59.348	368.93	370.16	1.23**	1.55	6.56	0.67	370.82	0.000	0.000	n/a	2.24	n/a
9	18	8.28	369.43	370.44	1.01*	1.26	6.58	0.54	370.97	0.000	73.131	370.16	371.27	1.11**	1.41	5.89	0.54	371.81	0.000	0.000	n/a	1.49	n/a
10	18	7.32	370.26	371.27	1.01	1.27	5.76	0.48	371.75	0.000	57.694	370.84	371.89	1.05**	1.32	5.56	0.48	372.37	0.000	0.000	n/a	1.50	0.72
11	18	6.18	370.94	371.89	0.95	1.18	5.26	0.42	372.30	0.000	60.773	371.55	372.51	0.96**	1.19	5.18	0.42	372.93	0.000	0.000	n/a	1.50	0.62
12	15	3.69	373.45	374.30	0.85*	0.89	4.14	0.27	374.57	0.500	79.646	373.85	374.70	0.85	0.89	4.14	0.27	374.97	0.499	0.499	0.398	0.52	0.14
13	15	3.72	373.95	374.84	0.89	0.93	3.99	0.25	375.09	0.455	60.480	374.25	375.11	0.86	0.90	4.16	0.27	375.37	0.502	0.478	0.289	1.50	0.40
14	15	1.73	374.75	375.51	0.76	0.48	2.22	0.20	375.71	0.000	24.001	376.11	376.63 j	0.52**	0.48	3.56	0.20	376.83	0.000	0.000	n/a	0.94	0.19
15	15	0.93	377.70	377.96	0.26*	0.18	5.07	0.14	378.09	0.000	76.039	379.50	379.88	0.38**	0.31	2.96	0.14	380.01	0.000	0.000	n/a	1.00	n/a
16	15	0.55	374.45	375.51	1.06	0.21	0.49	0.10	375.61	0.000	55.875	375.01	375.30	0.29**	0.21	2.56	0.10	375.40	0.000	0.000	n/a	1.00	n/a
17	15	1.65	373.26	373.69	0.43*	0.37	4.40	0.19	373.88	0.000	24.000	373.50	374.01	0.51**	0.47	3.51	0.19	374.20	0.000	0.000	n/a	1.00	n/a
18	15	1.06	371.60	371.94	0.34*	0.27	3.88	0.15	372.09	0.000	24.000	371.84	372.25	0.41**	0.34	3.08	0.15	372.39	0.000	0.000	n/a	1.00	0.15
19	15	0.89	371.20	371.41	0.21*	0.14	6.52	0.13	371.54	0.000	24.000	372.40	372.77	0.37**	0.30	2.93	0.13	372.90	0.000	0.000	n/a	1.00	0.13
20	15	0.82	369.94	370.27	0.33*	0.26	3.12	0.13	370.40	0.000	27.000	370.12	370.47	0.35**	0.29	2.87	0.13	370.60	0.000	0.000	n/a	1.00	n/a
21	15	0.96	369.94	370.19	0.25*	0.17	5.56	0.14	370.33	0.000	35.500	371.00	371.38	0.38**	0.32	3.00	0.14	371.52	0.000	0.000	n/a	1.00	0.14

Project File: SCM#3.stm	Number of lines: 32	Run Date: 12/5/2024

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

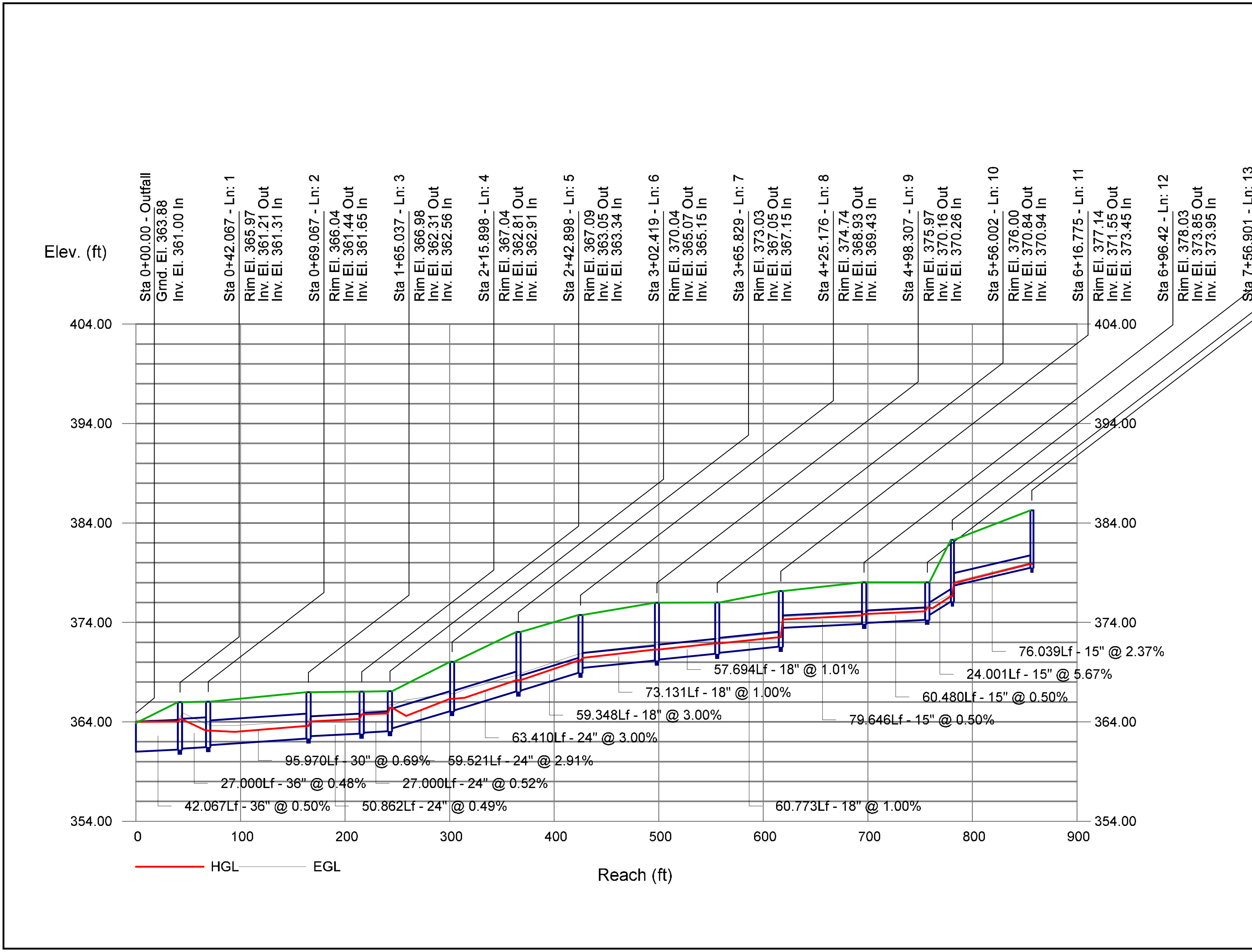
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
22	15	1.85	365.80	366.32	0.52	0.48	3.85	0.21	366.52	0.000	24.000	366.04	366.58	0.54**	0.51	3.64	0.21	366.79	0.000	0.000	n/a	1.00	n/a
23	24	1.74	363.55	365.42	1.87	0.54	0.57	0.16	365.58	0.006	43.537	363.99	364.45	0.46**	0.54	3.22	0.16	364.61	0.005	0.006	n/a	1.12	n/a
24	15	1.34	364.58	364.95	0.37*	0.31	4.36	0.17	365.12	0.043	27.000	364.89	365.35	0.46**	0.41	3.30	0.17	365.52	0.040	0.042	n/a	1.00	n/a
25	24	10.79	361.54	363.11	1.57	2.65	4.07	0.26	363.37	0.247	123.519	362.16	363.37	1.21	1.98	5.45	0.46	363.83	0.497	0.372	0.459	2.25	1.04
26	24	4.18	362.67	364.41	1.74	1.01	1.44	0.26	364.67	0.034	66.365	363.00	363.72	0.72**	1.01	4.13	0.26	363.98	0.034	0.034	n/a	0.50	0.13
27	18	4.05	363.20	363.99	0.79*	0.94	4.31	0.29	364.28	0.504	85.141	363.63	364.42	0.79	0.94	4.30	0.29	364.71	0.503	0.503	0.429	1.50	0.43
28	18	3.19	363.73	364.85	1.12	1.42	2.25	0.08	364.93	0.112	24.000	363.85	364.86	1.01	1.27	2.52	0.10	364.96	0.146	0.129	0.031	1.00	0.10
29	15	0.58	363.20	364.41	1.21	1.21	0.48	0.00	364.41	0.007	27.000	363.34	364.41	1.07	1.11	0.52	0.00	364.41	0.008	0.007	0.002	1.00	0.00
30	24	6.17	362.42	364.41	1.99	1.33	1.97	0.34	364.74	0.074	24.000	362.54	363.42	0.88**	1.33	4.65	0.34	363.75	0.074	0.074	n/a	1.00	n/a
31	18	2.40	361.94	363.11	1.17	0.64	1.62	0.22	363.33	0.052	24.000	362.19	362.78	0.59**	0.64	3.75	0.22	362.99	0.052	0.052	n/a	1.00	0.22
32	24	0.24	362.30	364.19	1.89	3.07	0.08	0.00	364.19	0.000	73.029	362.65	364.19	1.54	2.59	0.09	0.00	364.19	0.000	0.000	0.000	1.00	0.00

Project File: SCM#3.stm	Number of lines: 32	Run Date: 12/5/2024

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

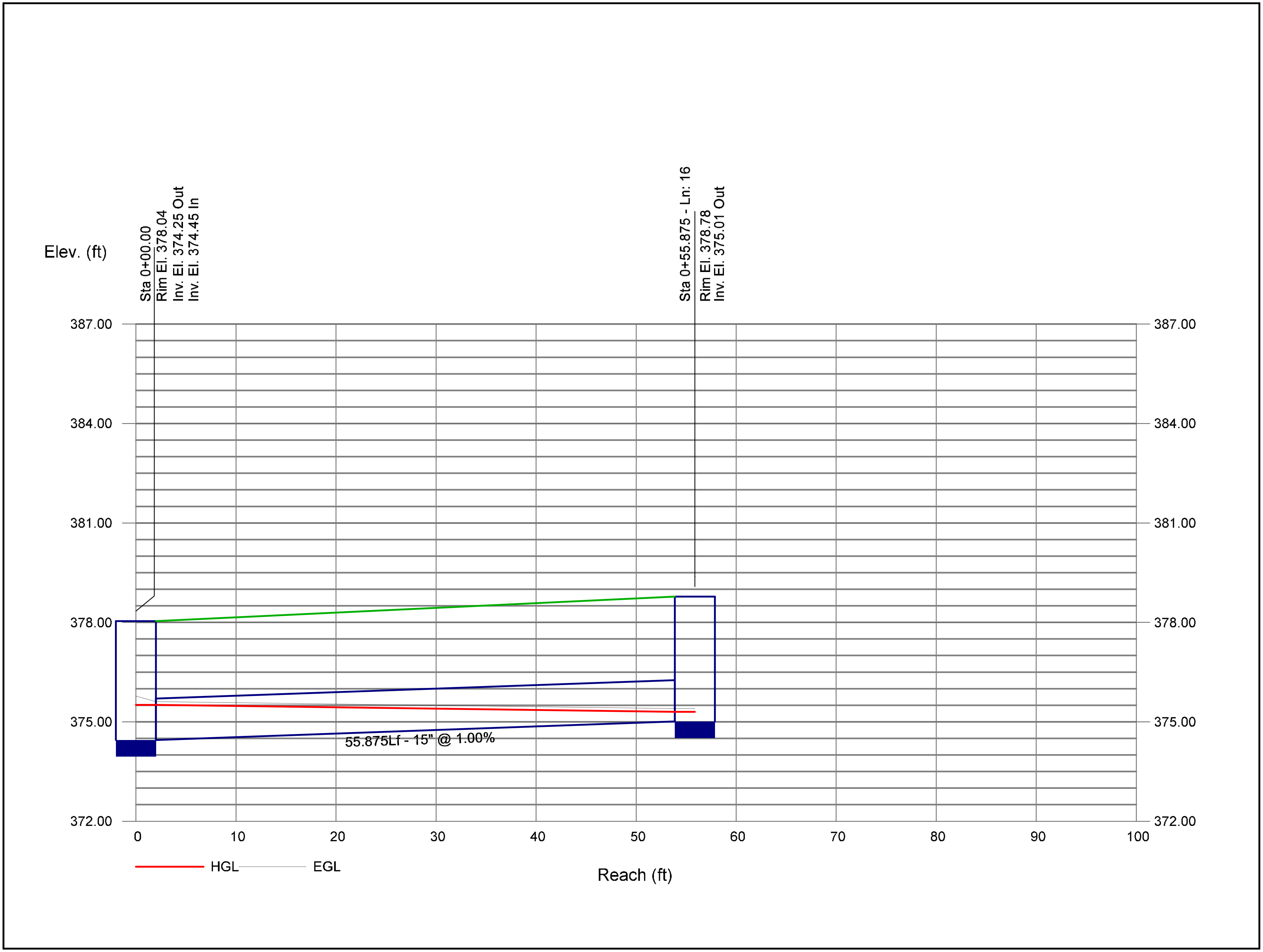
Storm Sewer Profile

10-Year SCM#3 Profile 1-14 Proj. file: SCM#3.stm



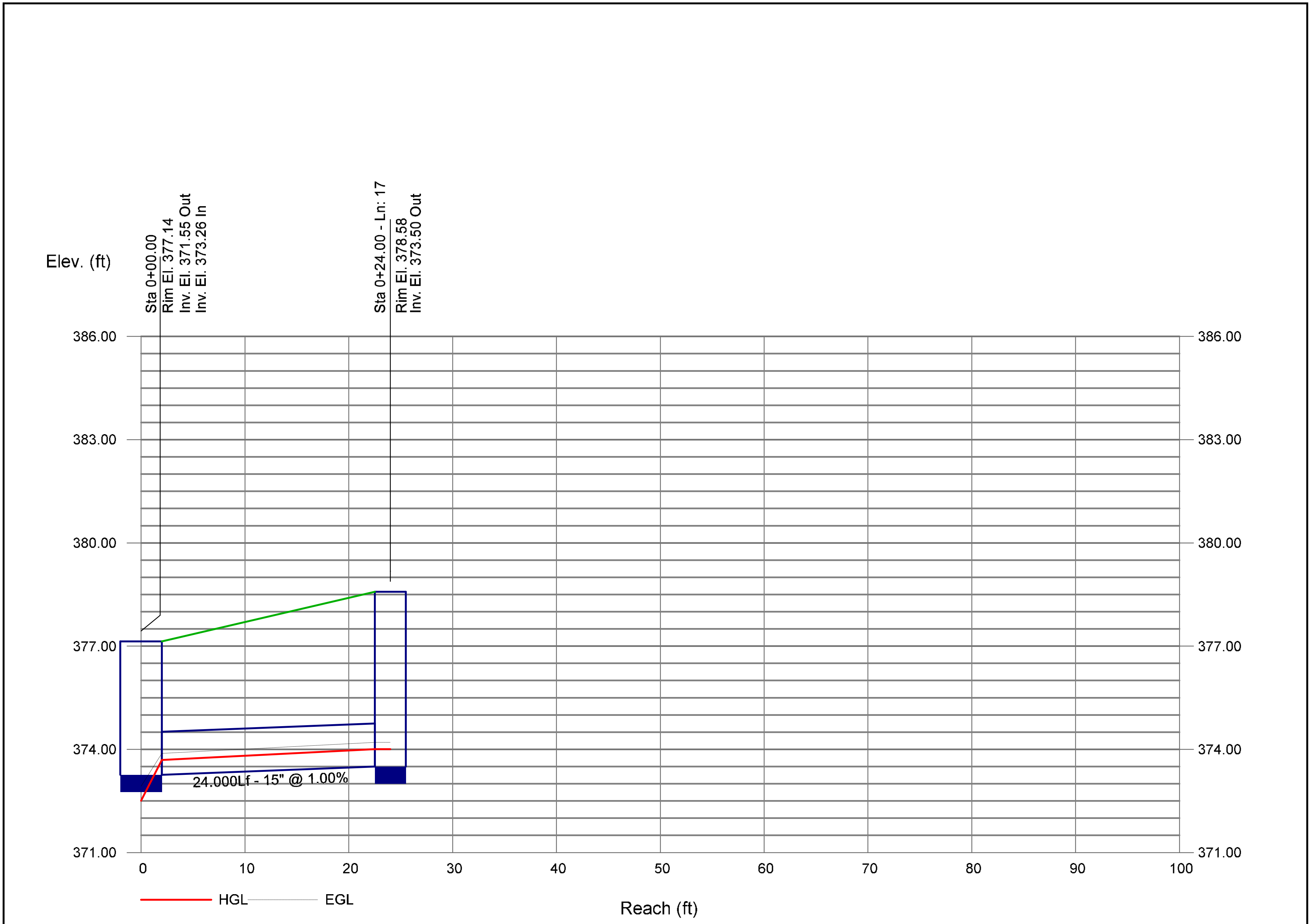
Storm Sewer Profile

10-Year SCM#3 Profile 16-16 Proj. file: SCM#3.stm



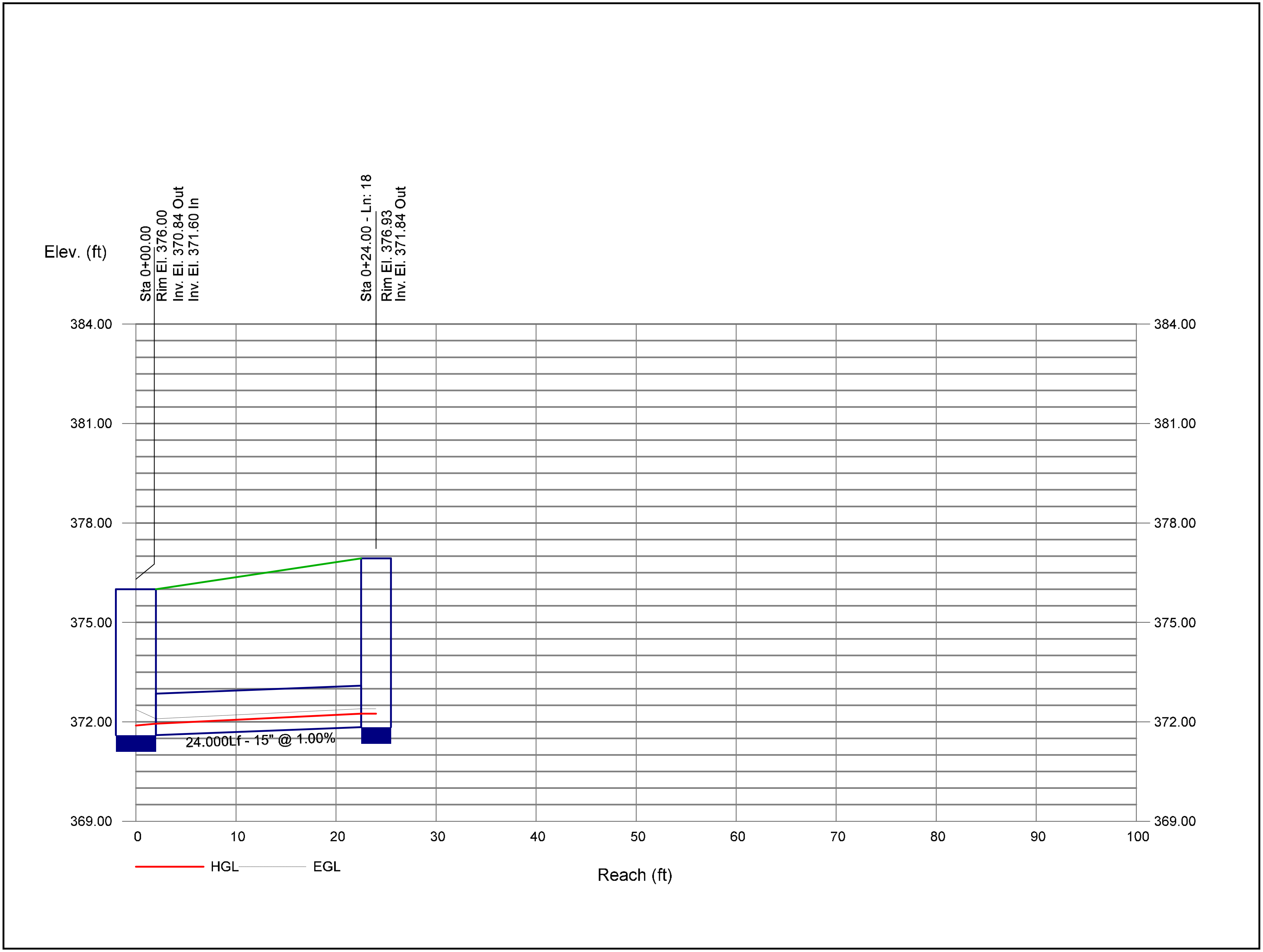
Storm Sewer Profile

10-Year SCM#3 Profile 17-17 Proj. file: SCM#3.stm



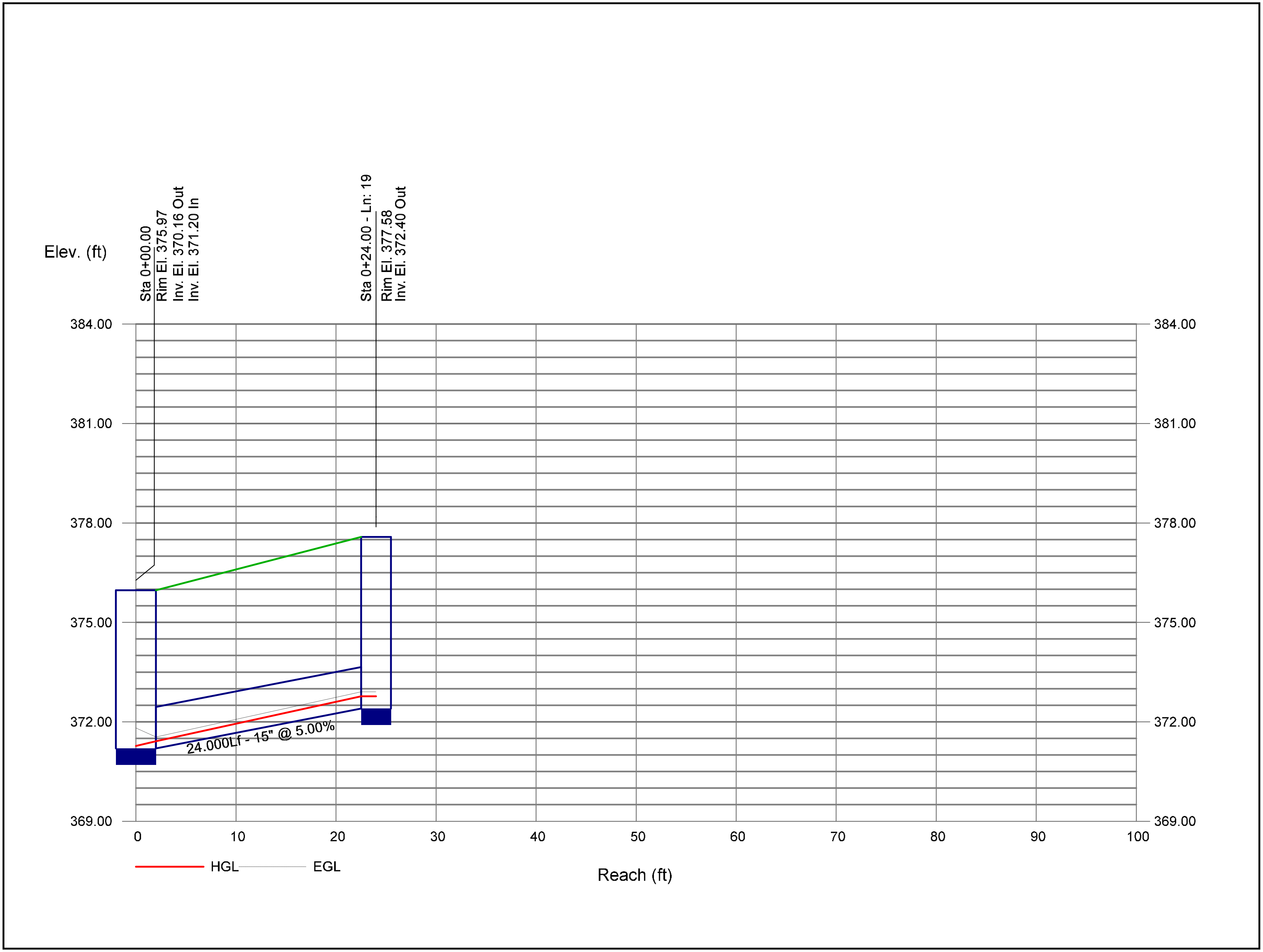
Storm Sewer Profile

10-Year SCM#3 Profile 18-18 Proj. file: SCM#3.stm



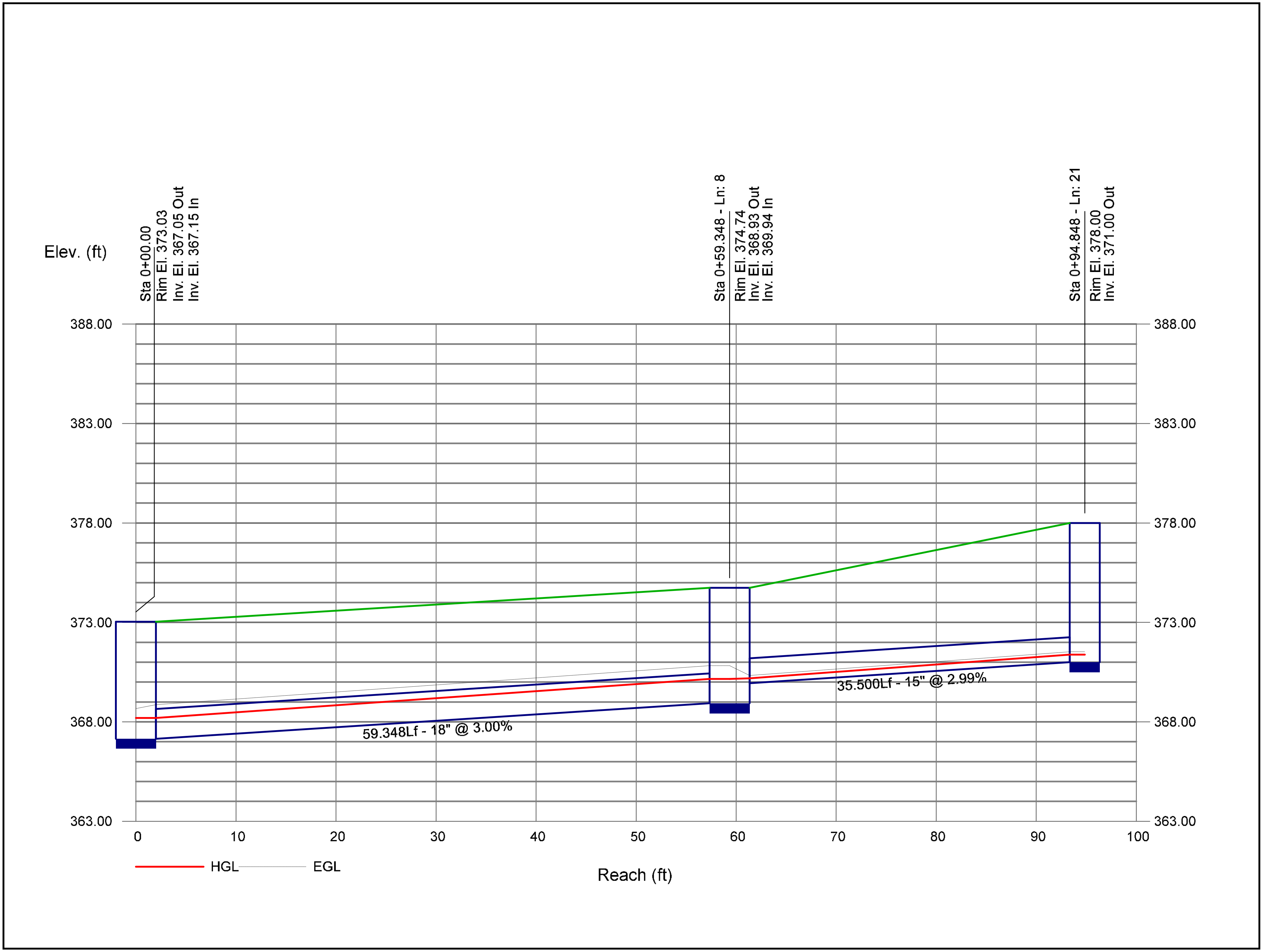
Storm Sewer Profile

10-Year SCM#3 Profile 19-19 Proj. file: SCM#3.stm



Storm Sewer Profile

10-Year SCM#3 Profile 8-21 Proj. file: SCM#3.stm



Storm Sewer Profile

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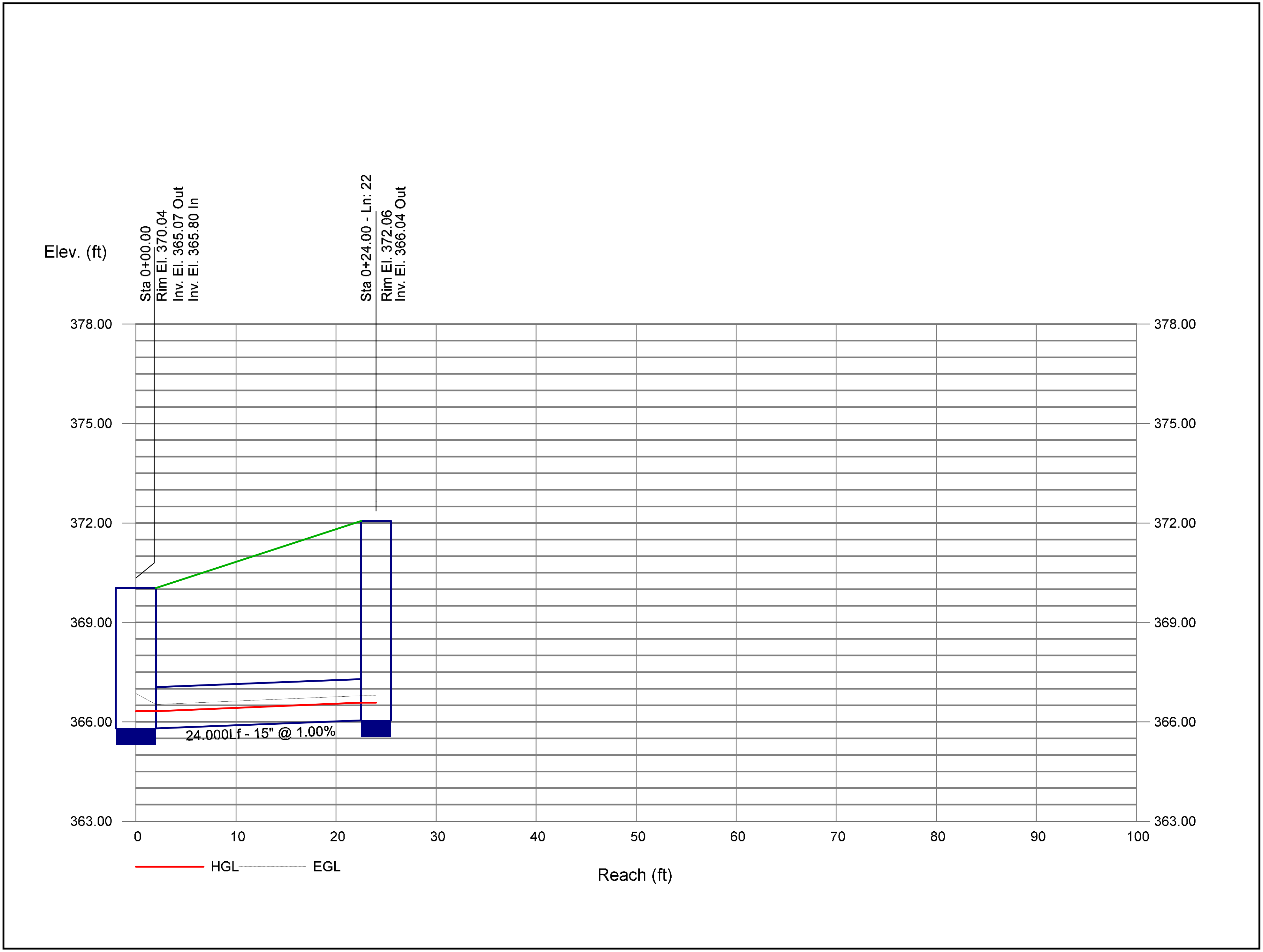

Storm Sewer Profile

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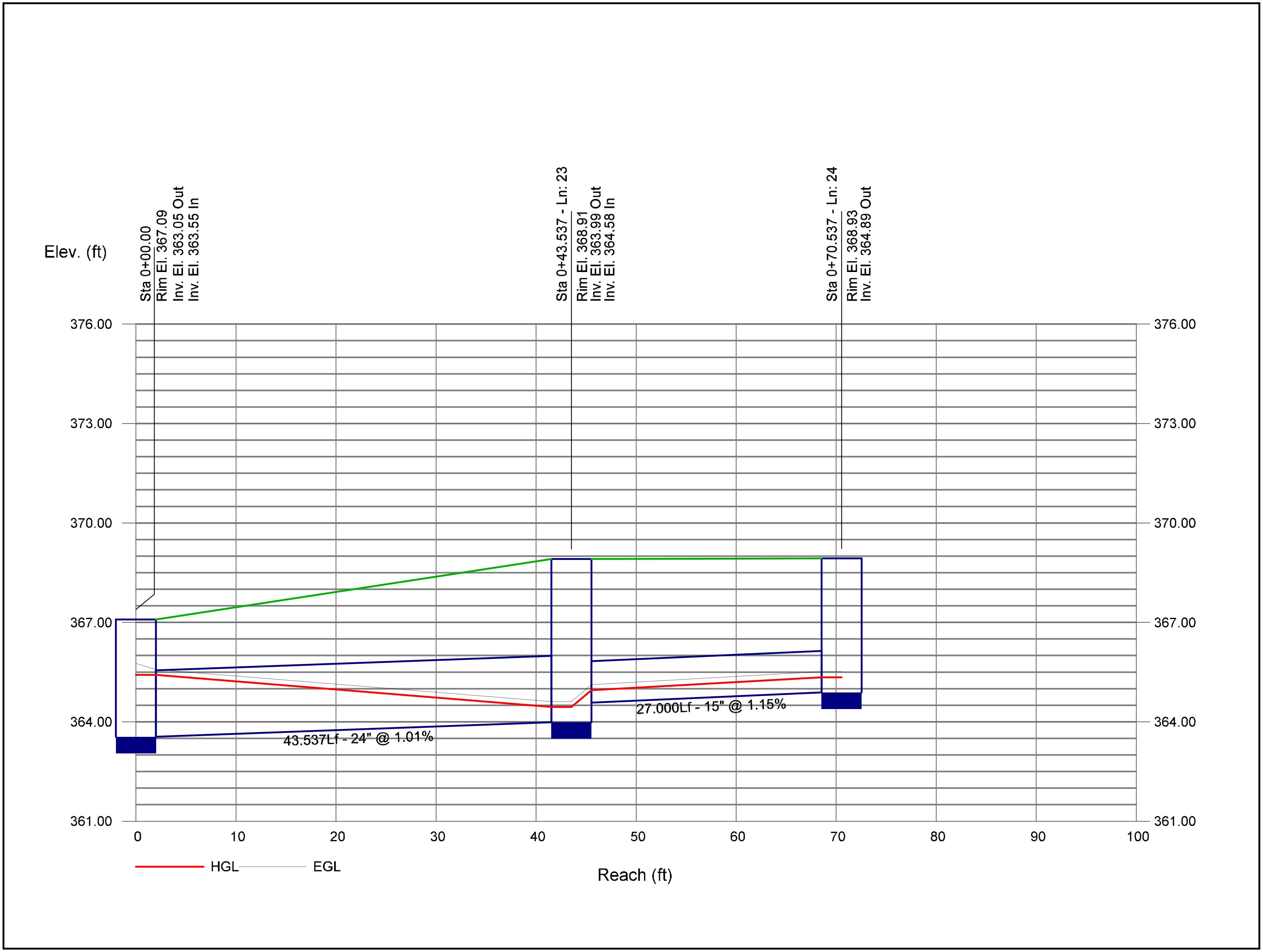
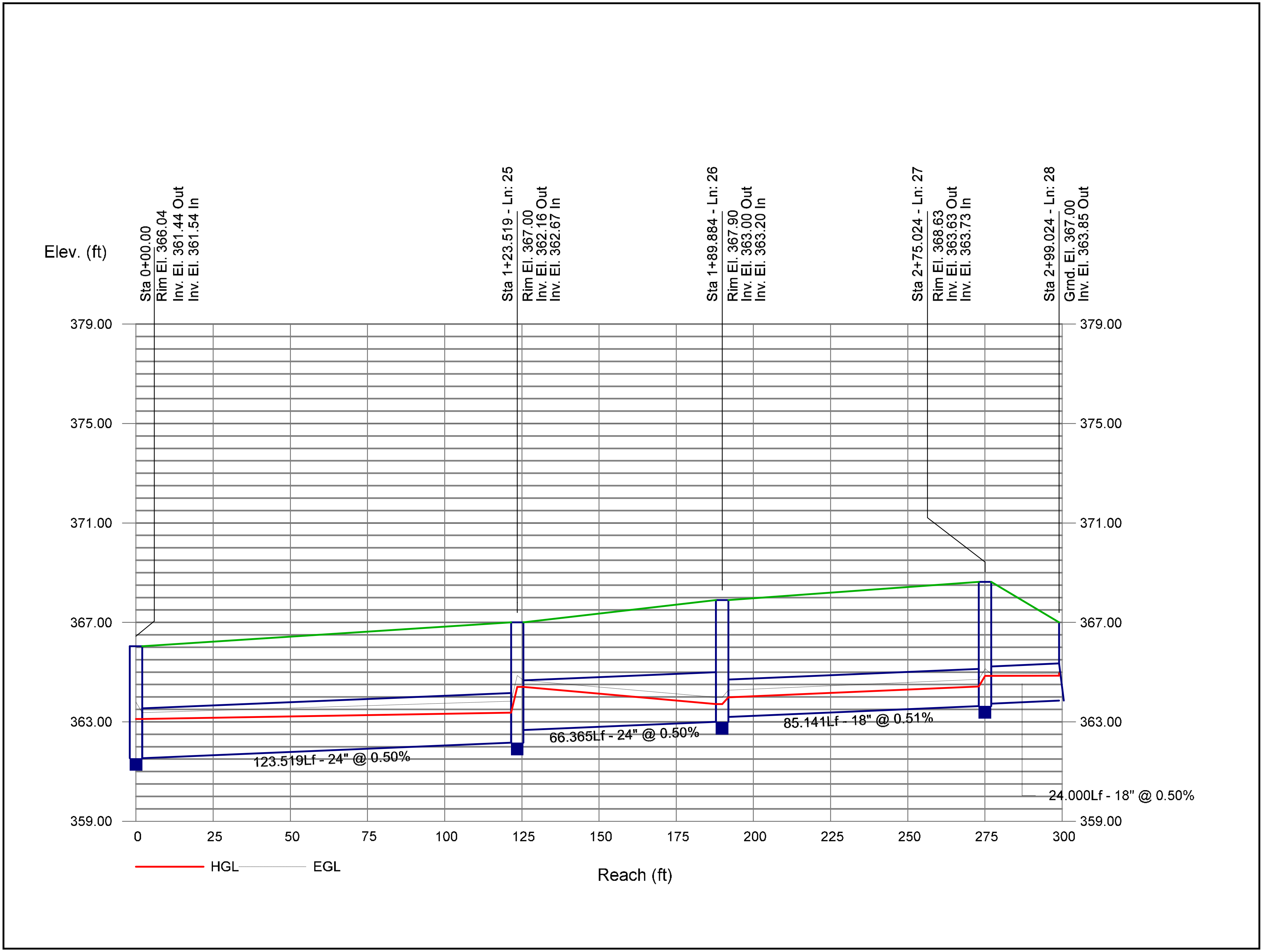


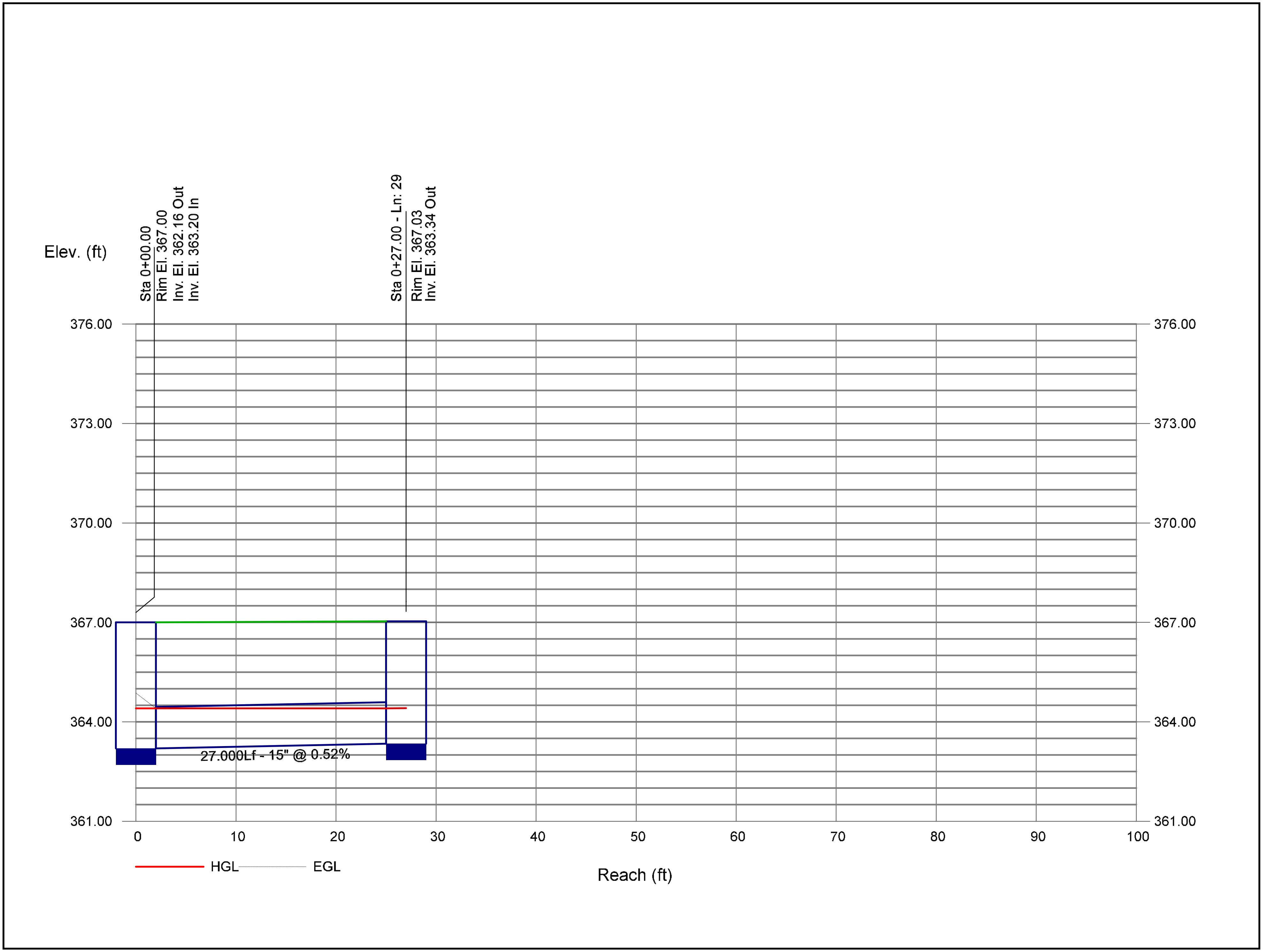
Storm Sewer Profile

10-Year SCM#3 Profile 25-28 Proj. file: SCM#3.stm



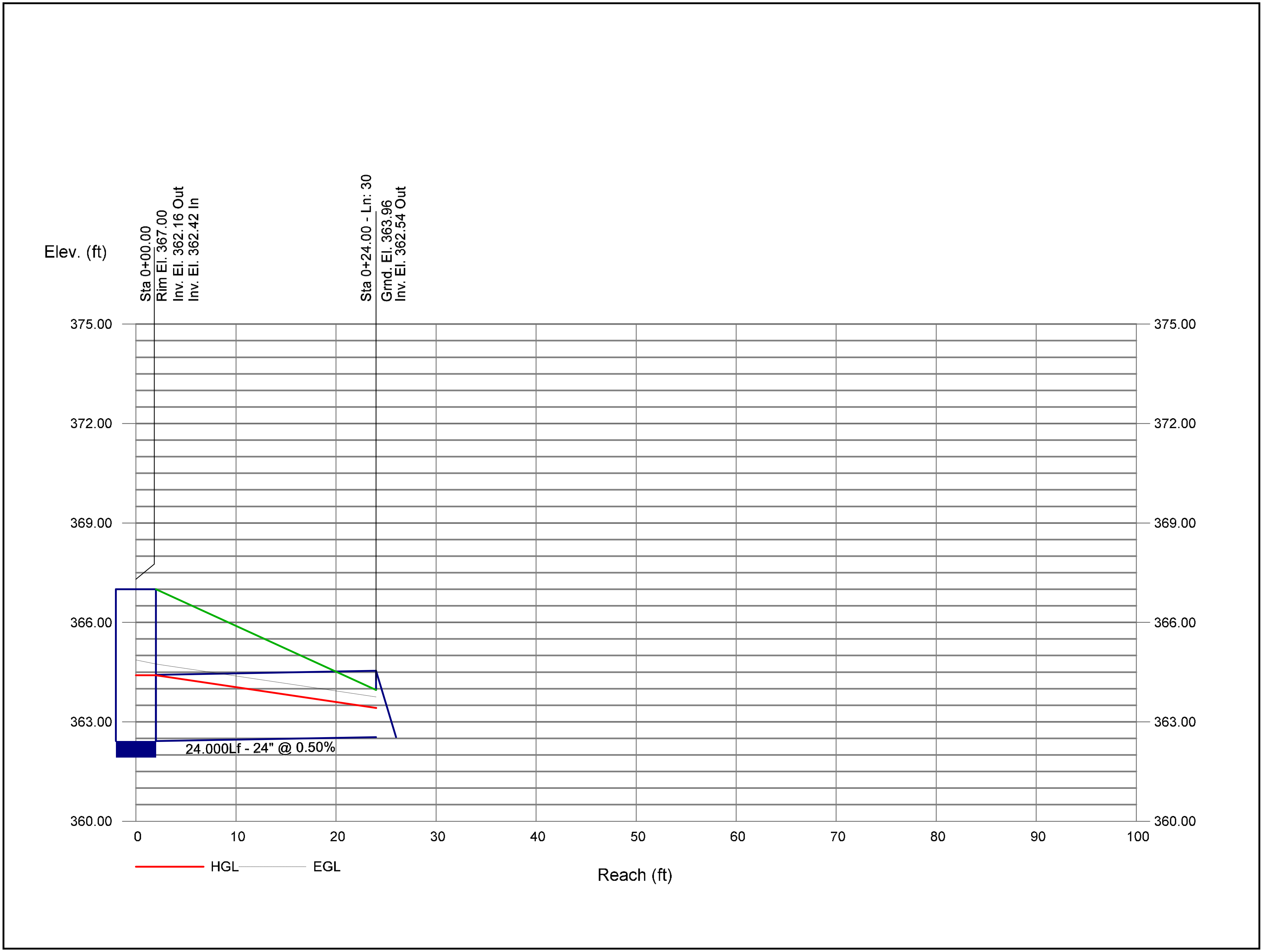
Storm Sewer Profile

10-Year SCM#3 Profile 29-29 Proj. file: SCM#3.stm



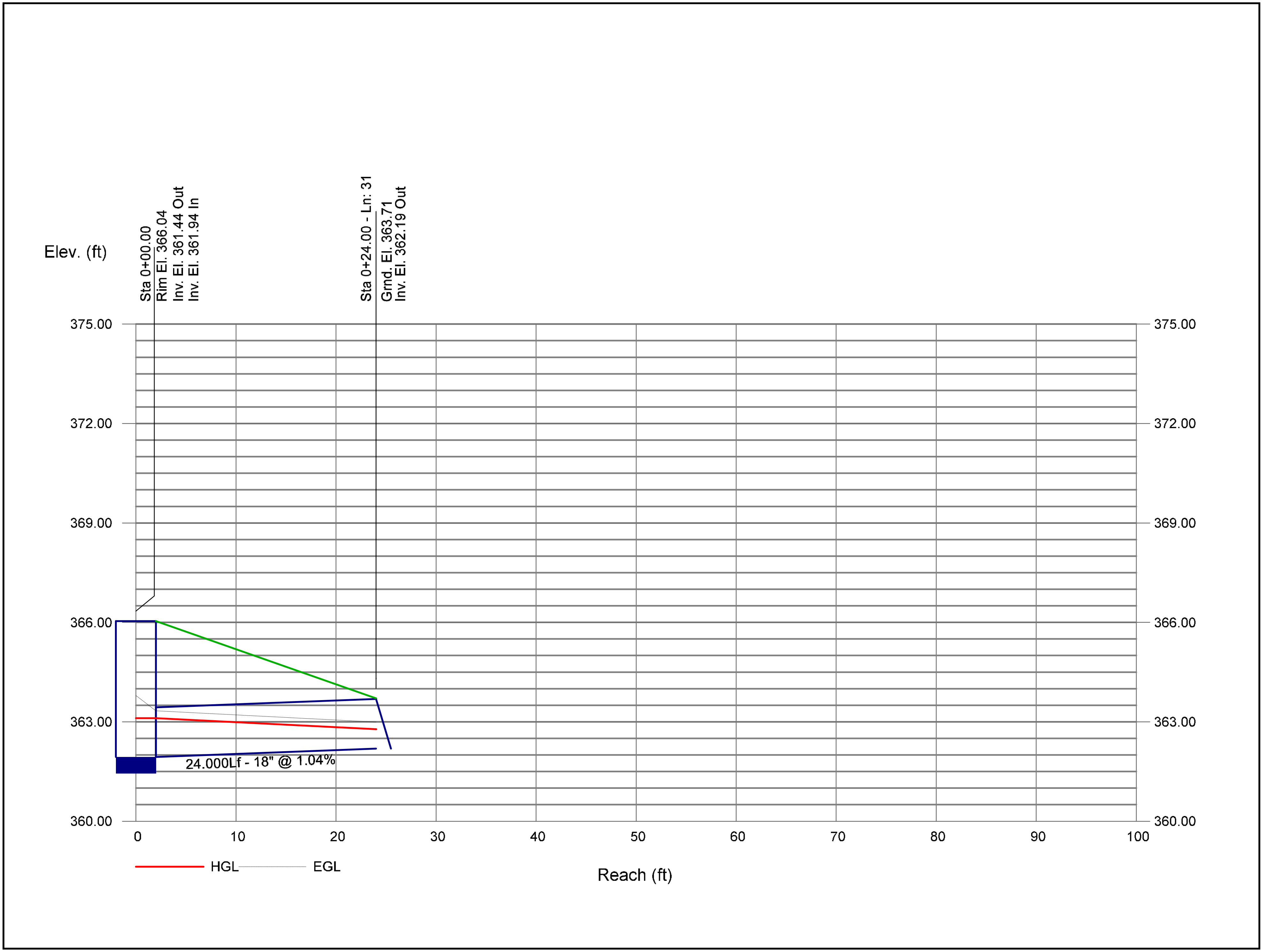
Storm Sewer Profile

10-Year SCM#3 Profile 30-30 Proj. file: SCM#3.stm



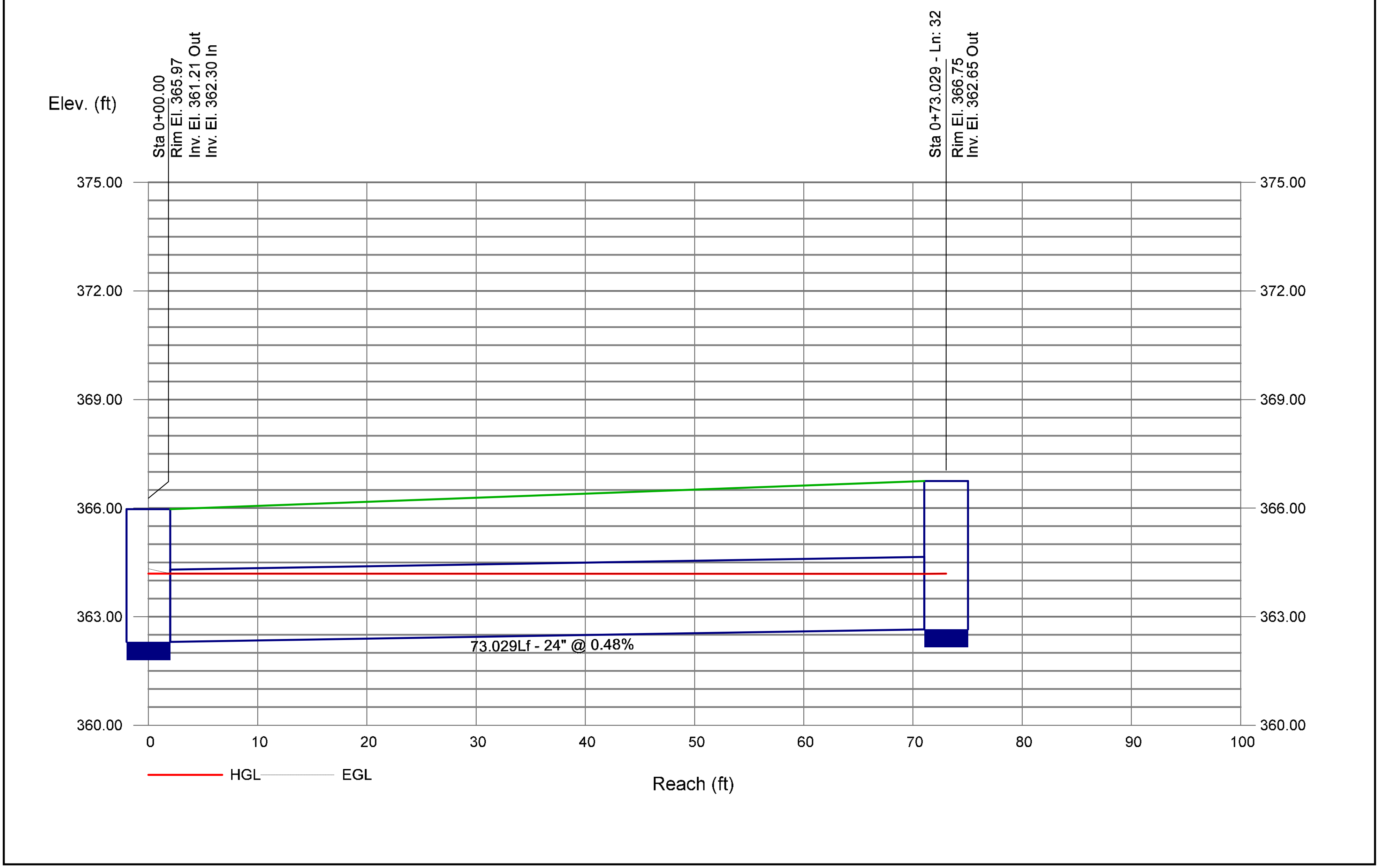
Storm Sewer Profile

10-Year SCM#3 Profile 31-31 Proj. file: SCM#3.stm



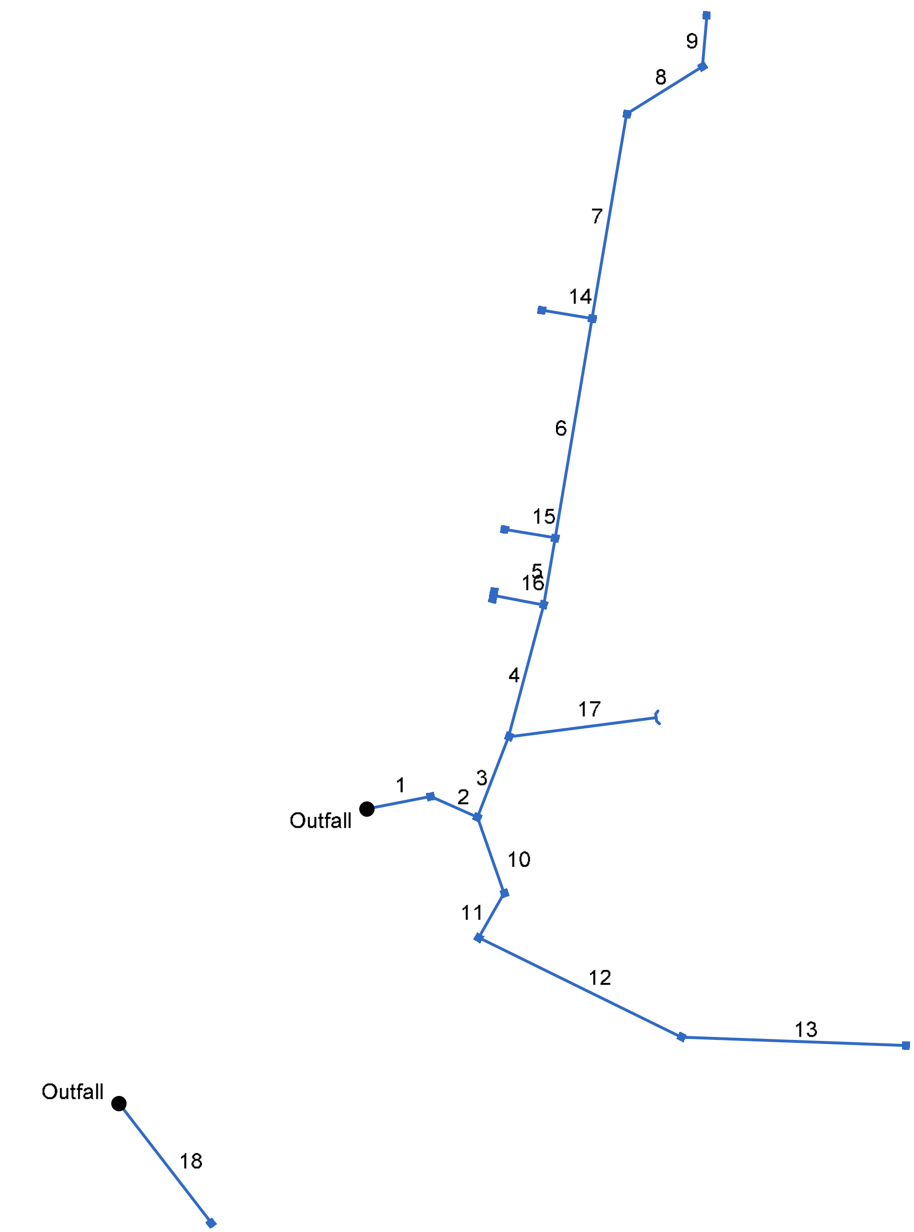
Storm Sewer Profile

10-Year SCM#3 Profile 32-32 Proj. file: SCM#3.stm



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

10-Year SCM#4 Report



Project File: SCM#4.stm	Number of lines: 18	Date: 12/6/2024

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	34.253	-11.231	Comb	0.00	0.07	0.57	10.0	357.00	0.50	357.17	24	Cir	0.013	0.95	363.04	Pipe - (14)
2	1	27.000	35.364	Comb	0.00	0.01	0.57	10.0	357.27	0.48	357.40	24	Cir	0.013	1.72	363.02	Pipe - (19)
3	2	45.598	-92.825	Comb	0.00	0.04	0.57	10.0	357.50	0.50	357.73	24	Cir	0.013	1.35	362.81	Pipe - (13) (1)
4	3	72.000	-6.548	Comb	0.00	0.06	0.57	10.0	357.95	0.64	358.41	24	Cir	0.013	1.50	362.04	Pipe - (13)
5	4	35.770	-5.010	Comb	0.00	0.07	0.57	10.0	358.54	0.50	358.72	18	Cir	0.013	1.50	362.04	Pipe - (12)
6	5	117.298	-0.174	Comb	0.00	0.06	0.57	10.0	358.86	1.19	360.25	15	Cir	0.013	1.50	364.99	Pipe - (11)
7	6	109.503	0.000	Comb	0.00	0.02	0.57	10.0	360.58	3.41	364.31	15	Cir	0.013	1.18	368.85	Pipe - (9)
8	7	47.144	48.466	Comb	0.00	0.11	0.57	10.0	364.41	0.51	364.65	15	Cir	0.013	1.25	369.03	Pipe - (8)
9	8	27.000	-53.413	Comb	0.00	0.52	0.57	10.0	364.75	0.52	364.89	15	Cir	0.013	1.00	369.03	Pipe - (7)
10	2	42.392	46.461	Comb	0.00	0.25	0.57	10.0	357.51	0.50	357.72	24	Cir	0.013	1.19	363.00	Pipe - (18)
11	10	27.000	48.827	Comb	0.00	0.21	0.57	10.0	358.32	0.52	358.46	18	Cir	0.013	1.50	363.00	Pipe - (17)
12	11	118.810	-93.248	Comb	0.00	0.25	0.57	10.0	359.07	2.35	361.86	15	Cir	0.013	0.69	368.09	Pipe - (16)
13	12	118.495	-24.060	Comb	0.00	0.32	0.57	10.0	363.06	1.31	364.61	15	Cir	0.013	1.00	372.03	Pipe - (15)
14	6	27.000	-90.000	Comb	0.00	0.16	0.57	10.0	360.64	0.96	360.90	15	Cir	0.013	1.00	364.99	Pipe - (10)
15	5	27.000	-90.174	Comb	0.00	0.07	0.57	10.0	358.68	1.41	359.06	15	Cir	0.013	1.00	362.16	Pipe - (20)
16	4	27.000	-94.006	Comb	0.00	0.08	0.57	10.0	358.68	0.74	358.88	15	Cir	0.013	1.00	362.03	Pipe - (21)
17	3	78.211	61.239	Hdwl	0.00	0.90	0.57	10.0	358.33	0.51	358.73	18	Cir	0.013	1.00	359.75	Pipe - (163)
18	End	79.656	52.362	DrGrt	0.00	1.33	0.57	10.0	356.95	1.00	357.75	18	Cir	0.013	1.00	363.00	Pipe - (24)(0)

Project File: SCM#4.stm	Number of lines: 18	Date: 12/6/2024

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure Shape	Structure Length (ft)	Structure Width (ft)	Line Out Size (in)	Line Out Shape	Line Out Invert (ft)	Line In Size (in)	Line In Shape	Line In Invert (ft)
1	CB 401	Combination	363.04	Rect	4.00	4.00	24	Cir	357.17	24	Cir	357.27
2	CB 402	Combination	363.02	Rect	4.00	4.00	24	Cir	357.40	24 24	Cir Cir	357.50 357.51
3	CB 407	Combination	362.81	Rect	4.00	4.00	24	Cir	357.73	24 18	Cir Cir	357.95 358.33
4	CB 408	Combination	362.04	Rect	4.00	4.00	24	Cir	358.41	18 15	Cir Cir	358.54 358.68
5	CB 409	Combination	362.04	Rect	4.00	4.00	18	Cir	358.72	15 15	Cir Cir	358.86 358.68
6	CB 410	Combination	364.99	Rect	4.00	4.00	15	Cir	360.25	15 15	Cir Cir	360.58 360.64
7	CB 411	Combination	368.85	Rect	4.00	4.00	15	Cir	364.31	15	Cir	364.41
8	CB 412	Combination	369.03	Rect	4.00	4.00	15	Cir	364.65	15	Cir	364.75
9	CB 413	Combination	369.03	Rect	4.00	4.00	15	Cir	364.89			
10	CB 403	Combination	363.00	Rect	4.00	4.00	24	Cir	357.72	18	Cir	358.32
11	CB 404	Combination	363.00	Rect	4.00	4.00	18	Cir	358.46	15	Cir	359.07
12	CB 405	Combination	368.09	Rect	4.00	4.00	15	Cir	361.86	15	Cir	363.06
13	CB 406	Combination	372.03	Rect	4.00	4.00	15	Cir	364.61			
14	CB 410A	Combination	364.99	Rect	4.00	4.00	15	Cir	360.90			
15	CB 409A	Combination	362.16	Rect	4.00	4.00	15	Cir	359.06			
16	CB 408A	Combination	362.03	Rect	4.00	8.00	15	Cir	358.88			
17	FES INLET 407A	OpenHeadwall	359.75	n/a	n/a	n/a	18	Cir	358.73			
18	YI 421	DropGrate	363.00	Rect	4.00	4.00	18	Cir	357.75			

Project File: SCM#4.stm | Number of Structures: 18 | Run Date: 12/6/2024

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	Pipe - (14)	10.12	24	Cir	34.253	357.00	357.17	0.496	359.00	359.06	0.16	359.22	End	Combination
2	Pipe - (19)	9.95	24	Cir	27.000	357.27	357.40	0.481	359.22	359.25	0.29	359.54	1	Combination
3	Pipe - (13) (1)	6.72	24	Cir	45.598	357.50	357.73	0.504	359.54	359.57	0.10	359.68	2	Combination
4	Pipe - (13)	3.75	24	Cir	72.000	357.95	358.41	0.639	359.68	359.09	n/a	359.09	3	Combination
5	Pipe - (12)	3.31	18	Cir	35.770	358.54	358.72	0.503	359.24	359.42	0.39	359.81	4	Combination
6	Pipe - (11)	2.91	15	Cir	117.298	358.86	360.25	1.185	359.81	360.93	n/a	360.93 j	5	Combination
7	Pipe - (9)	2.20	15	Cir	109.503	360.58	364.31	3.406	360.94	364.90	n/a	364.90	6	Combination
8	Pipe - (8)	2.15	15	Cir	47.144	364.41	364.65	0.509	365.01	365.25	0.26	365.51	7	Combination
9	Pipe - (7)	1.78	15	Cir	27.000	364.75	364.89	0.519	365.51	365.53	0.12	365.65	8	Combination
10	Pipe - (18)	3.40	24	Cir	42.392	357.51	357.72	0.495	359.54	359.55	0.02	359.57	2	Combination
11	Pipe - (17)	2.59	18	Cir	27.000	358.32	358.46	0.518	359.57	359.07	n/a	359.07	10	Combination
12	Pipe - (16)	1.92	15	Cir	118.810	359.07	361.86	2.348	359.44	362.41	n/a	362.41	11	Combination
13	Pipe - (15)	1.10	15	Cir	118.495	363.06	364.61	1.308	363.39	365.02	0.15	365.02	12	Combination
14	Pipe - (10)	0.55	15	Cir	27.000	360.64	360.90	0.963	360.93	361.19	n/a	361.19 j	6	Combination
15	Pipe - (20)	0.24	15	Cir	27.000	358.68	359.06	1.407	359.81	359.25	0.07	359.25	5	Combination
16	Pipe - (21)	0.27	15	Cir	27.000	358.68	358.88	0.741	359.09	359.08	n/a	359.08 j	4	Combination
17	Pipe - (163)	3.08	18	Cir	78.211	358.33	358.73	0.511	359.68	359.72	0.10	359.82	3	OpenHeadwall
18	Pipe - (24)(0)	4.56	18	Cir	79.656	356.95	357.75	1.004	358.45	358.57	n/a	358.57 j	End	DropGrate

Project File: SCM#4.stm | Number of lines: 18 | Run Date: 12/6/2024

NOTES: Return period = 10 Yrs. ; j - Line contains hyd. jump.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	CB 401	0.24	0.00	0.24	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.10	3.04	0.19	0.55	2.0	Off
2	CB 402	0.03	0.16	0.19	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.09	2.65	0.18	0.33	2.0	Off
3	CB 407	0.14	0.00	0.14	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.08	2.11	0.17	0.00	2.0	Off
4	CB 408	0.21	0.00	0.21	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.020	2.00	0.040	0.020	0.013	0.08	2.20	0.17	0.00	2.0	Off
5	CB 409	0.24	0.00	0.24	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	-0.02	1.16	0.14	1.16	2.0	Off
6	CB 410	0.21	0.00	0.20	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.10	2.77	0.18	0.39	2.0	Off
7	CB 411	0.07	0.00	0.07	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.030	2.00	0.040	0.020	0.013	0.05	1.29	0.17	0.00	2.0	6
8	CB 412	0.38	0.00	0.38	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	0.02	1.50	0.18	1.50	2.0	Off
9	CB 413	1.78	0.00	1.78	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	0.13	4.67	0.30	4.67	2.0	Off
10	CB 403	0.86	0.00	0.70	0.16	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.16	5.76	0.25	2.33	2.0	2
11	CB 404	0.72	0.00	0.65	0.07	Comb	6.0	1.50	0.00	3.00	2.50	0.030	2.00	0.040	0.020	0.013	0.12	4.10	0.22	1.27	2.0	Off
12	CB 405	0.86	0.21	0.91	0.15	Comb	6.0	1.50	0.00	3.00	2.50	0.038	2.00	0.040	0.020	0.013	0.13	4.69	0.23	1.66	2.0	Off
13	CB 406	1.10	0.00	0.89	0.21	Comb	6.0	1.50	7.50	3.00	2.50	0.020	2.00	0.040	0.020	0.013	0.15	5.51	0.25	2.24	2.0	12
14	CB 410A	0.55	0.00	0.49	0.06	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.13	4.69	0.23	1.52	2.0	Off
15	CB 409A	0.24	0.00	0.24	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	-0.02	1.16	0.14	1.16	2.0	Off
16	CB 408A	0.27	0.00	0.27	0.00	Comb	6.0	1.50	0.00	3.00	5.00	0.020	2.00	0.040	0.020	0.013	0.09	2.67	0.18	0.39	2.0	Off
17	FES INLET 407A	3.08	0.00	3.08	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	2.00	0.040	0.020	0.013	0.00	0.00	0.00	0.00	0.0	Off
18	YI 421	4.56	0.00	4.56	0.00	DrGrt	0.0	0.00	9.00	3.00	3.00	Sag	4.00	0.020	0.020	0.013	0.25	29.20	0.25	29.20	0.0	Off

Project File: SCM#4.stm | Number of lines: 18 | Run Date: 12/6/2024

NOTES: Inlet N-Values = 0.016; Intensity = 74.09 / (Inlet time + 12.50) ^ 0.81; Return period = 10 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

Hydraulic Grade Line Computations

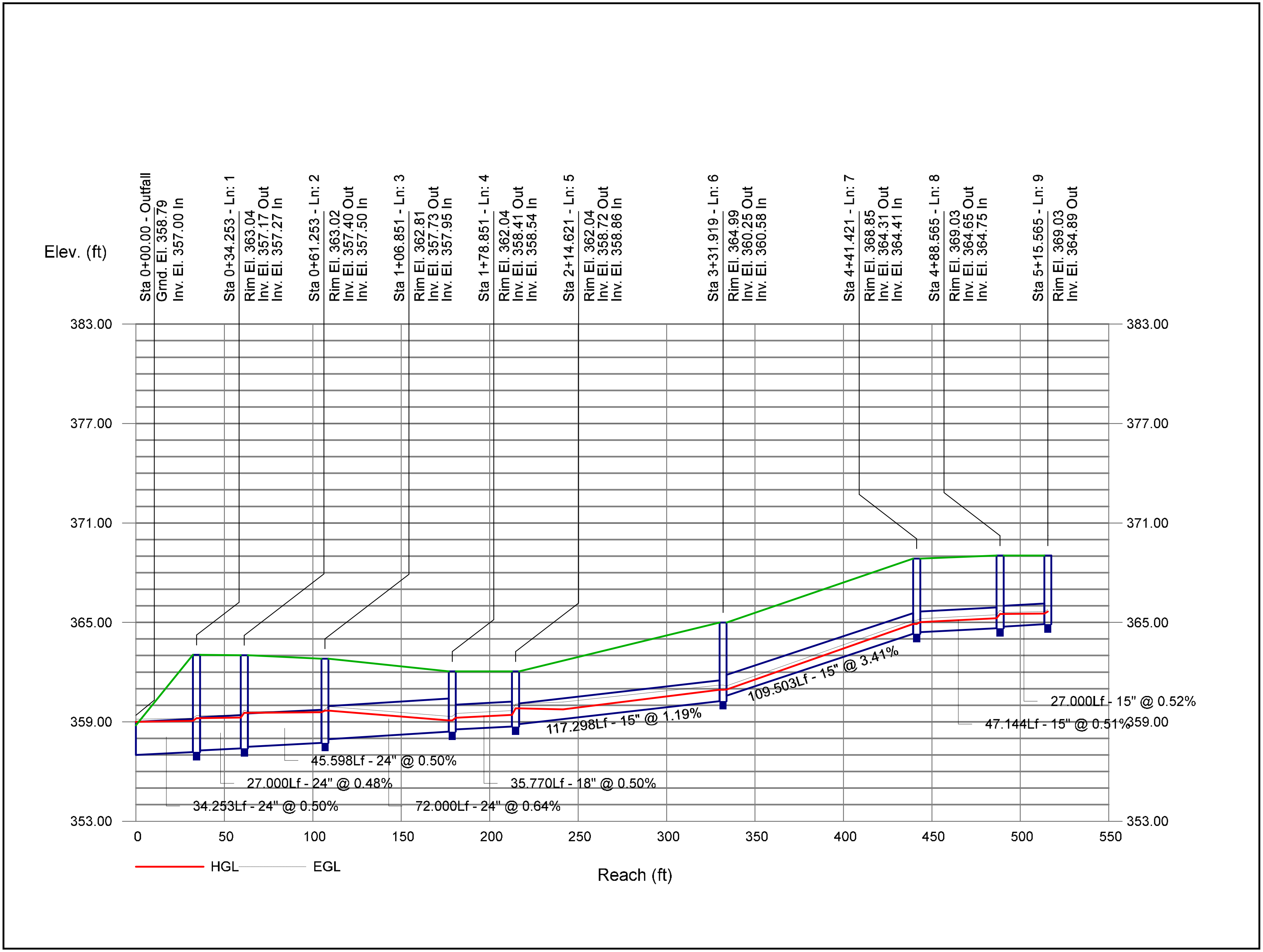
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	24	10.12	357.00	359.00	2.00	3.14	3.22	0.16	359.16	0.200	34.253	357.17	359.06	1.89	3.07	3.30	0.17	359.22	0.173	0.187	0.064	0.95	0.16
2	24	9.95	357.27	359.22	1.95	3.12	3.19	0.16	359.37	0.171	27.000	357.40	359.25	1.85	3.04	3.27	0.17	359.42	0.167	0.169	0.046	1.72	0.29
3	24	6.72	357.50	359.54	2.00	3.14	2.14	0.07	359.61	0.088	45.598	357.73	359.57	1.84	3.03	2.22	0.08	359.65	0.077	0.082	0.038	1.35	0.10
4	24	3.75	357.95	359.68	1.73	0.94	1.30	0.25	359.93	0.000	72.000	358.41	359.09	0.68**	0.94	4.00	0.25	359.34	0.000	0.000	n/a	1.50	n/a
5	18	3.31	358.54	359.24	0.70*	0.80	4.09	0.26	359.50	0.503	35.770	358.72	359.42	0.70**	0.81	4.09	0.26	359.68	0.504	0.504	0.180	1.50	0.39
6	15	2.91	358.86	359.81	0.95	0.69	2.90	0.28	360.09	0.000	117.298	360.25	360.93 j	0.68**	0.69	4.23	0.28	361.21	0.000	0.000	n/a	1.50	n/a
7	15	2.20	360.58	360.94	0.36*	0.30	7.40	0.23	361.17	0.000	109.503	364.31	364.90	0.59**	0.57	3.84	0.23	365.13	0.000	0.000	n/a	1.18	n/a
8	15	2.15	364.41	365.01	0.60*	0.58	3.69	0.21	365.22	0.508	47.144	364.65	365.25	0.60	0.58	3.69	0.21	365.46	0.509	0.509	0.240	1.25	0.26
9	15	1.78	364.75	365.51	0.76	0.79	2.27	0.08	365.59	0.160	27.000	364.89	365.53	0.64	0.63	2.82	0.12	365.65	0.282	0.221	0.060	1.00	0.12
10	24	3.40	357.51	359.54	2.00	3.14	1.08	0.02	359.56	0.023	42.392	357.72	359.55	1.83	3.01	1.13	0.02	359.57	0.020	0.021	0.009	1.19	0.02
11	18	2.59	358.32	359.57	1.25	0.67	1.64	0.23	359.80	0.000	27.000	358.46	359.07	0.61**	0.67	3.84	0.23	359.30	0.000	0.000	n/a	1.50	n/a
12	15	1.92	359.07	359.44	0.37*	0.31	6.23	0.21	359.65	0.000	118.810	361.86	362.41	0.55**	0.52	3.68	0.21	362.62	0.000	0.000	n/a	0.69	n/a
13	15	1.10	363.06	363.39	0.33*	0.25	4.31	0.15	363.54	0.000	118.495	364.61	365.02	0.41**	0.35	3.11	0.15	365.17	0.000	0.000	n/a	1.00	0.15
14	15	0.55	360.64	360.93	0.29	0.21	2.48	0.10	361.04	0.000	27.000	360.90	361.19 j	0.29**	0.21	2.56	0.10	361.29	0.000	0.000	n/a	1.00	n/a
15	15	0.24	358.68	359.81	1.13	0.12	0.21	0.07	359.88	0.000	27.000	359.06	359.25	0.19**	0.12	2.05	0.07	359.31	0.000	0.000	n/a	1.00	0.07
16	15	0.27	358.68	359.09	0.41	0.13	0.79	0.07	359.16	0.000	27.000	358.88	359.08 j	0.20**	0.13	2.12	0.07	359.15	0.000	0.000	n/a	1.00	n/a
17	18	3.08	358.33	359.68	1.35	1.67	1.84	0.05	359.73	0.076	78.211	358.73	359.72	0.99	1.24	2.50	0.10	359.82	0.145	0.110	0.086	1.00	0.10
18	18	4.56	356.95	358.45	1.50*	0.99	2.58	0.10	358.55	0.189	79.656	357.75	358.57 j	0.82**	0.99	4.62	0.33	358.90	0.562	0.375	n/a	1.00	n/a

Project File: SCM#4.stm	Number of lines: 18	Run Date: 12/6/2024

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Storm Sewer Profile

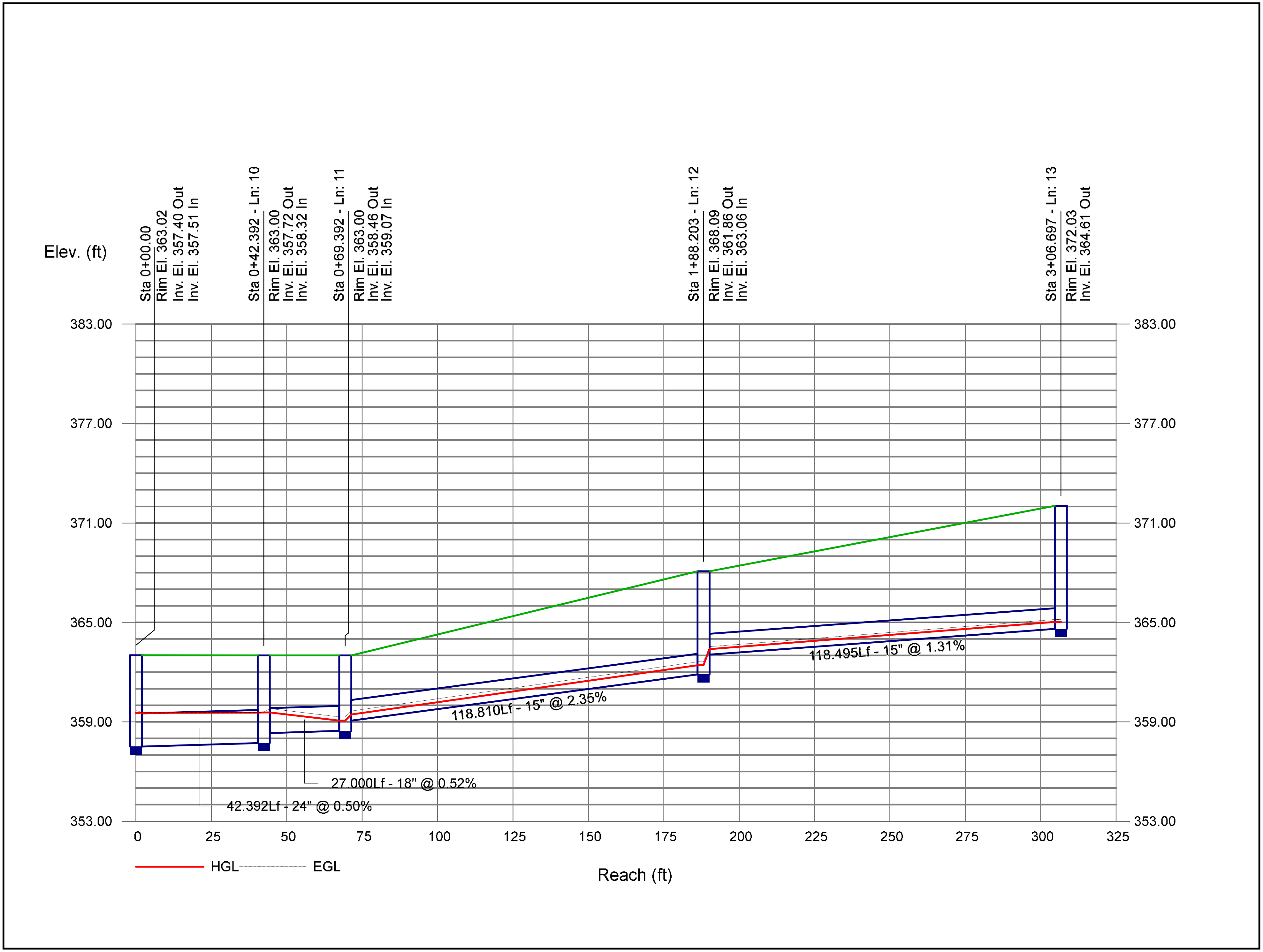
10-Year SCM#4 Profile 1-9 Proj. file: SCM#4.stm



Storm Sewers

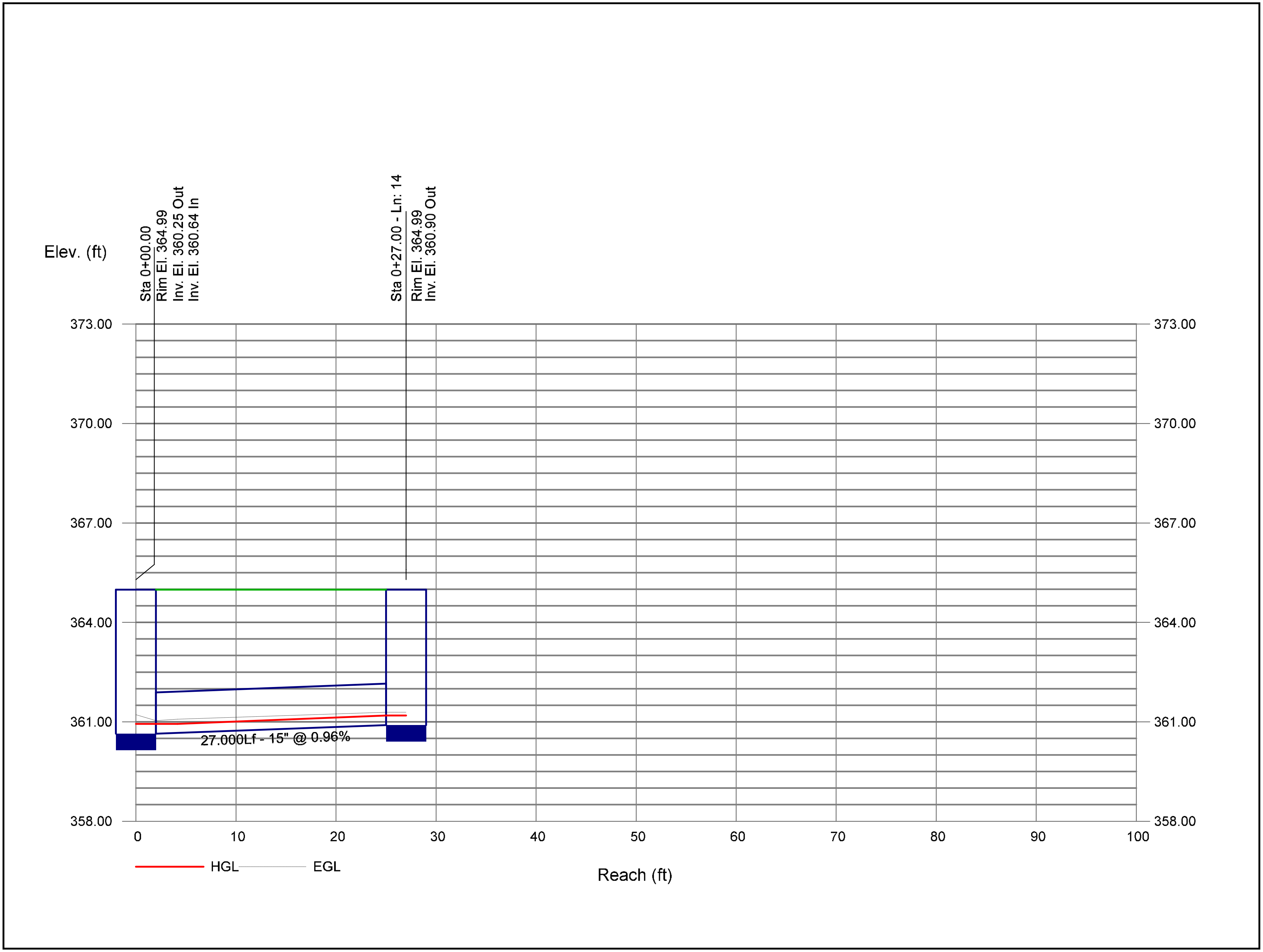
Storm Sewer Profile

10-Year SCM#4 Profile 10-13 Proj. file: SCM#4.stm



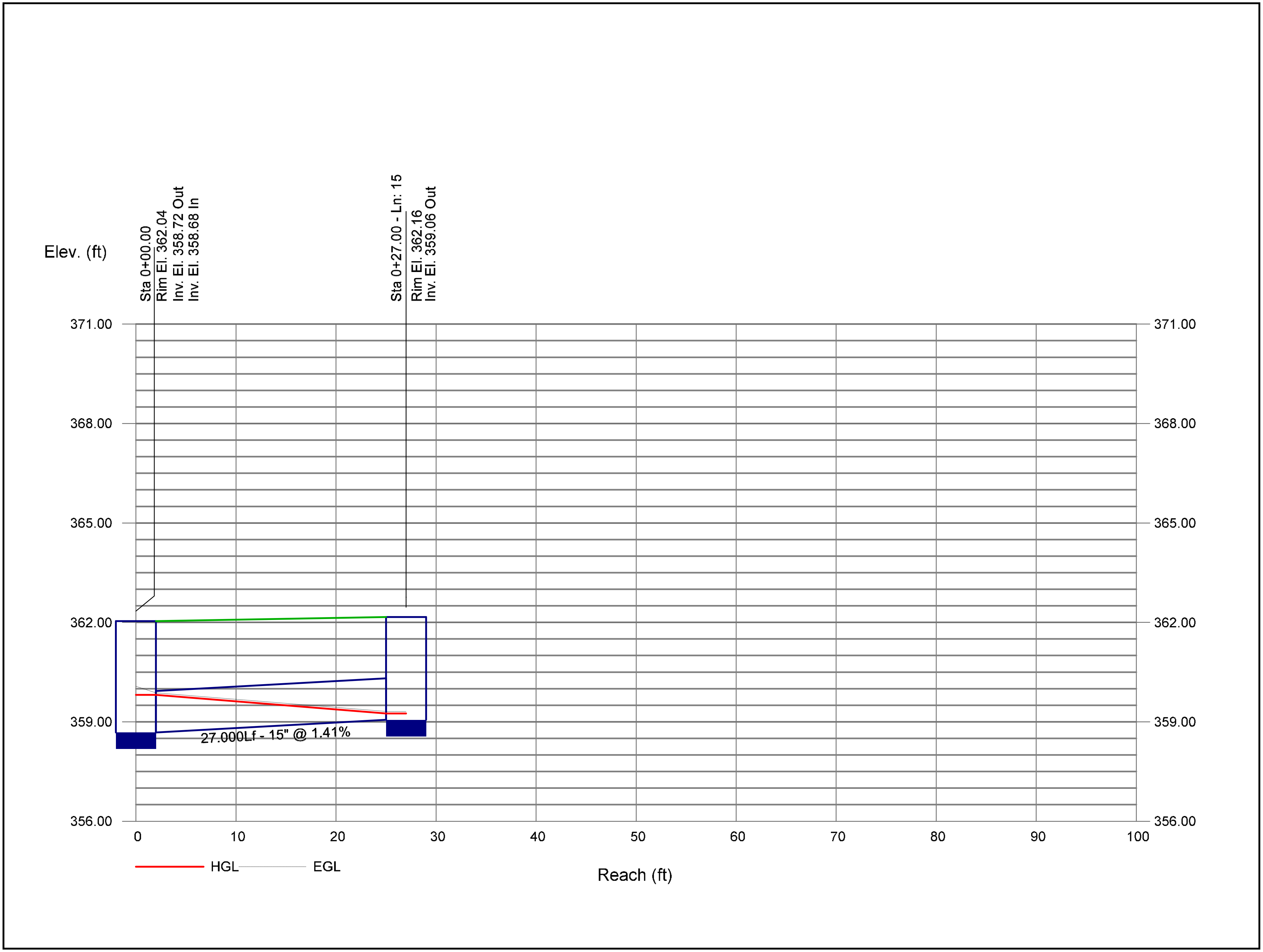
Storm Sewer Profile

10-Year SCM#4 Profile 14-14 Proj. file: SCM#4.stm



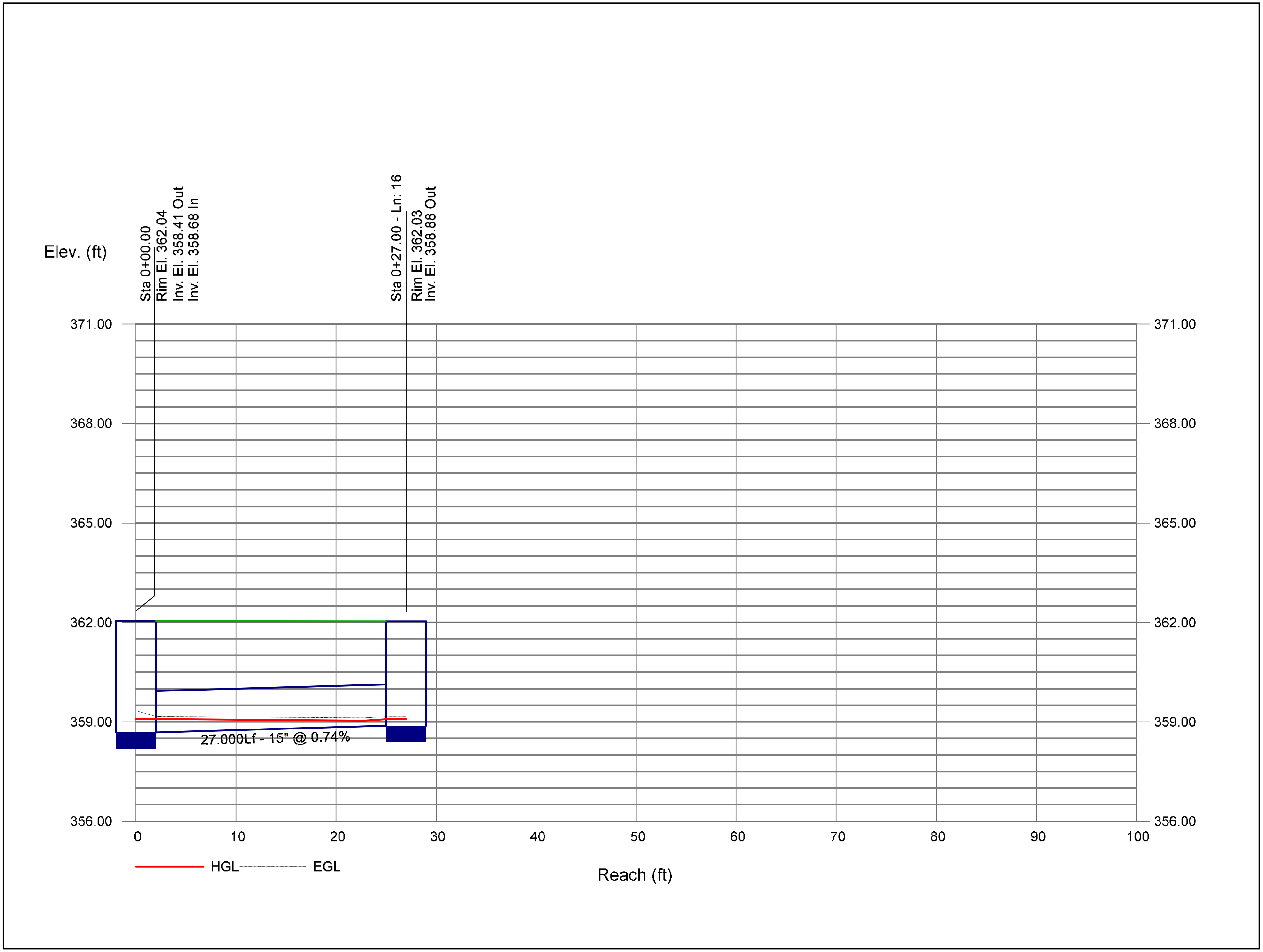
Storm Sewer Profile

10-Year SCM#4 Profile 15-15 Proj. file: SCM#4.stm



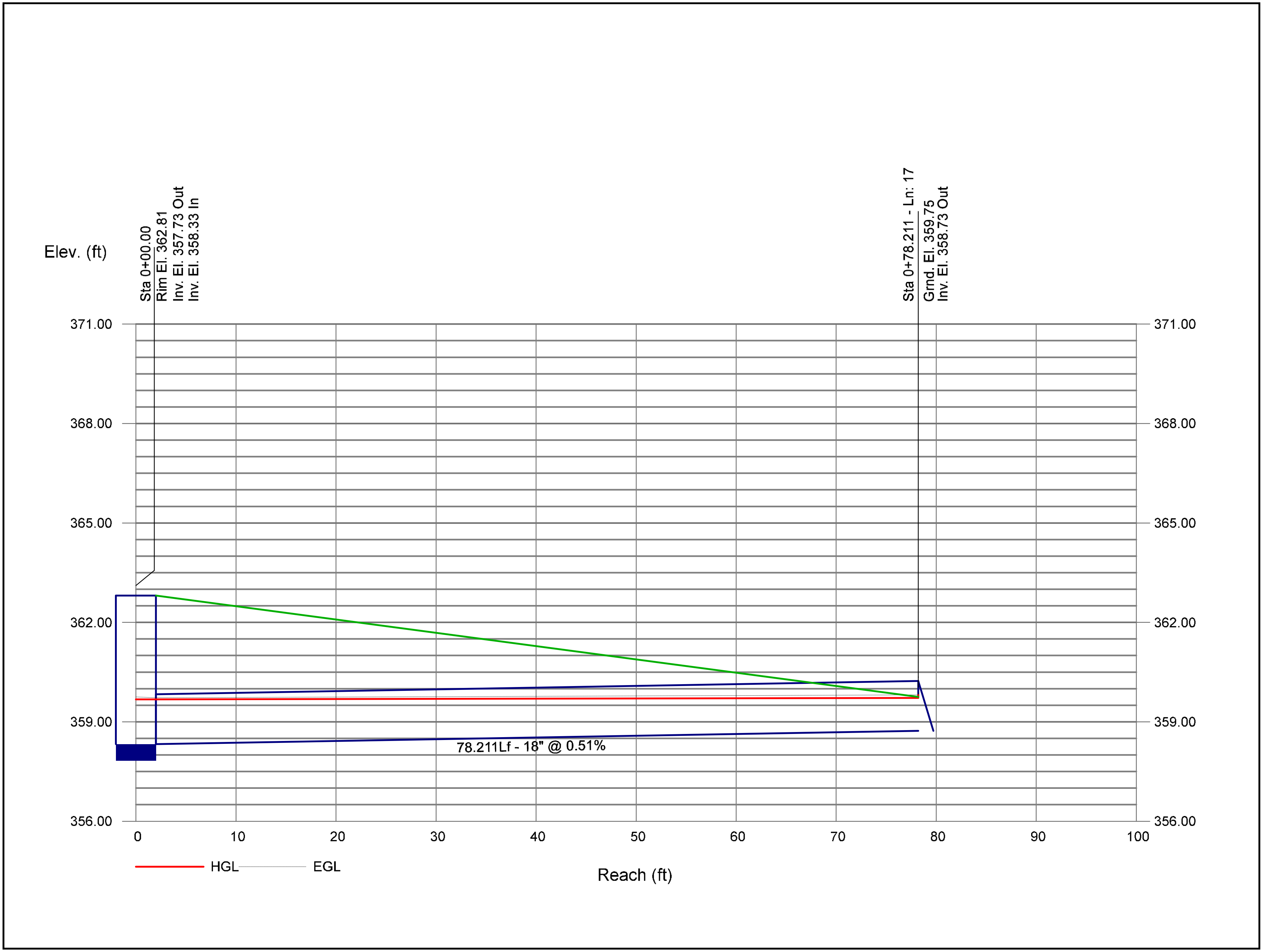
Storm Sewer Profile

10-Year SCM#4 Profile 16-16 Proj. file: SCM#4.stm



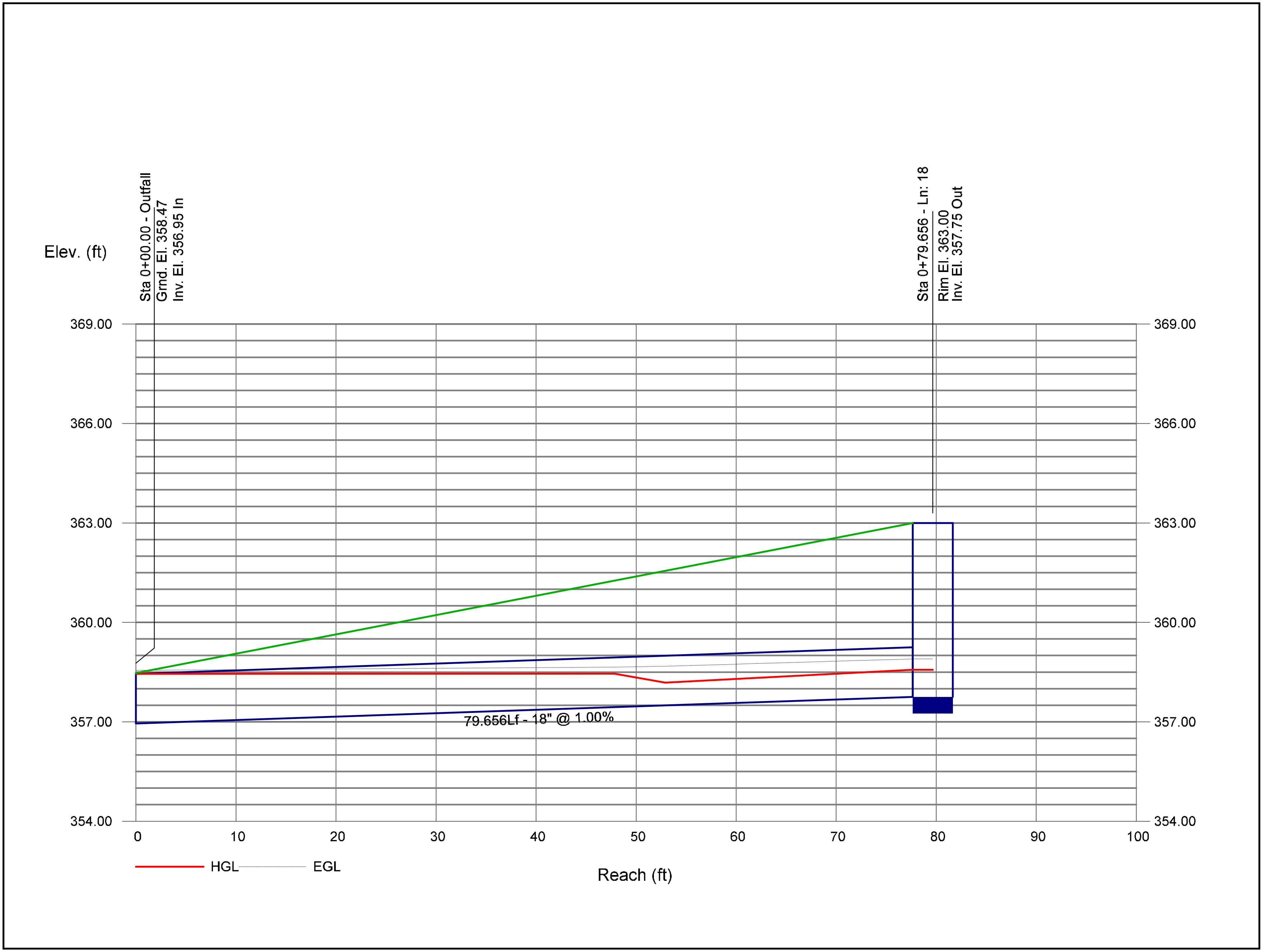
Storm Sewer Profile

10-Year SCM#4 Profile 17-17 Proj. file: SCM#4.stm



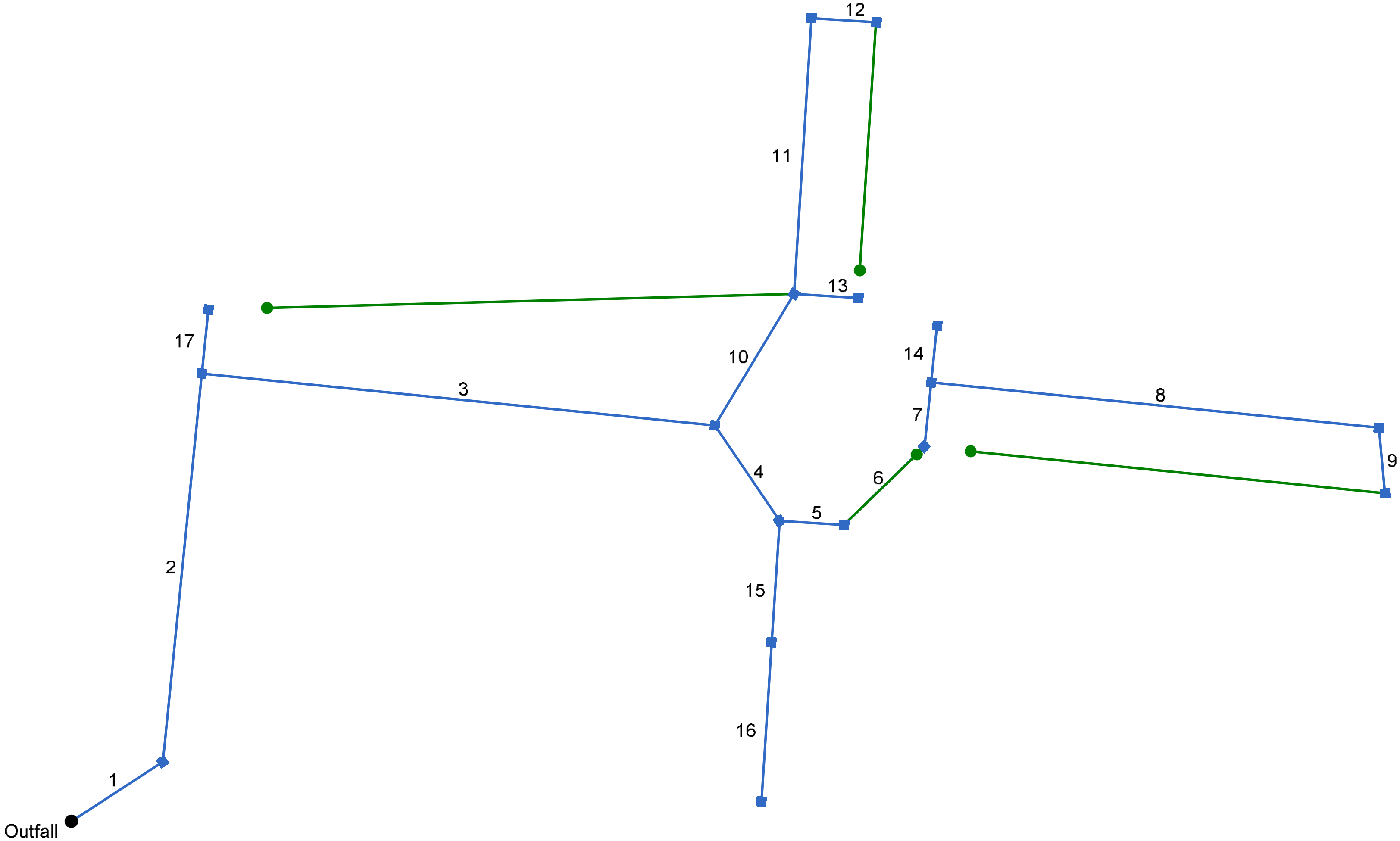
Storm Sewer Profile

10-Year SCM#4 Profile 18-18 Proj. file: SCM#4.stm



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

10-Year SCM#5 Report



Project File: SCM#5.stm	Number of lines: 17	Date: 12/6/2024

Storm Sewer Inventory Report

10-Year SCM#5 Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	45.553	-33.168	DrGrt	0.00	1.27	0.57	10.0	346.92	0.50	347.15	30	Cir	0.013	1.22	350.00	Pipe - (39)
2	1	163.558	-51.139	Comb	0.00	0.28	0.57	10.0	347.25	3.24	352.55	24	Cir	0.013	1.50	357.04	Pipe - (38)
3	2	215.399	90.101	Comb	0.00	0.04	0.57	10.0	352.65	4.00	361.27	24	Cir	0.013	1.38	366.04	Pipe - (37)
4	3	48.260	50.241	Comb	0.00	0.03	0.57	10.0	361.37	0.99	361.85	24	Cir	0.013	1.49	367.77	Pipe - (36)
5	4	27.000	-52.412	Comb	0.00	1.06	0.57	10.0	362.36	0.52	362.50	24	Cir	0.013	1.17	367.48	Pipe - (35)
6	5	47.057	-47.882	Comb	0.00	0.24	0.57	10.0	362.58	0.53	362.83	24	Cir	0.013	1.04	367.03	Pipe - (34)
7	6	27.000	-39.946	Comb	0.00	0.19	0.57	10.0	362.93	0.52	363.07	18	Cir	0.013	1.50	367.03	Pipe - (33)
8	7	187.898	90.000	Comb	0.00	0.14	0.57	10.0	363.26	3.69	370.19	15	Cir	0.013	1.48	374.04	Pipe - (31)
9	8	27.526	78.789	Comb	0.00	0.14	0.57	10.0	370.29	0.51	370.43	15	Cir	0.013	1.00	374.10	Pipe - (30)
10	3	64.208	-64.883	Comb	0.00	0.07	0.57	10.0	362.27	1.32	363.12	15	Cir	0.013	1.36	368.61	Pipe - (44)
11	10	115.871	-27.298	Comb	0.00	0.11	0.57	10.0	363.77	2.68	366.88	15	Cir	0.013	1.50	372.04	Pipe - (150)
12	11	27.018	90.079	Comb	0.00	0.12	0.57	10.0	367.17	1.07	367.46	15	Cir	0.013	1.00	372.04	Pipe - (28)
13	10	27.000	62.711	Comb	0.00	0.07	0.57	10.0	364.00	0.89	364.24	15	Cir	0.013	1.00	368.57	Pipe - (43)
14	7	24.000	0.003	DrGrt	0.00	1.45	0.57	10.0	363.18	0.88	363.39	18	Cir	0.013	1.00	367.00	Pipe - (45)
15	4	50.977	37.588	Comb	0.00	0.04	0.57	10.0	362.69	0.63	363.01	15	Cir	0.013	0.50	367.99	Pipe - (42)
16	15	66.788	0.000	Comb	0.00	0.06	0.57	10.0	363.11	1.62	364.19	15	Cir	0.013	1.00	369.04	Pipe - (41)
17	2	27.001	0.467	Comb	0.00	0.26	0.57	10.0	353.30	0.52	353.44	15	Cir	0.013	1.00	357.04	Pipe - (40)

Project File: SCM#5.stm | Number of lines: 17 | Date: 12/6/2024

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	YI 501	DropGrate	350.00	Rect	4.00	4.00	30	Cir	347.15	24	Cir	347.25
2	CB 502	Combination	357.04	Rect	4.00	4.00	24	Cir	352.55	24 15	Cir Cir	352.65 353.30
3	CB 504	Combination	366.04	Rect	4.00	4.00	24	Cir	361.27	24 15	Cir Cir	361.37 362.27
4	CB 505	Combination	367.77	Rect	4.00	4.00	24	Cir	361.85	24 15	Cir Cir	362.36 362.69
5	CB 506	Combination	367.48	Rect	4.00	4.00	24	Cir	362.50	24	Cir	362.58
6	CB 507	Combination	367.03	Rect	4.00	4.00	24	Cir	362.83	18	Cir	362.93
7	CB 508	Combination	367.03	Rect	4.00	4.00	18	Cir	363.07	15 18	Cir Cir	363.26 363.18
8	CB 514	Combination	374.04	Rect	4.00	4.00	15	Cir	370.19	15	Cir	370.29
9	CB 515	Combination	374.10	Rect	4.00	4.00	15	Cir	370.43			
10	CB 511	Combination	368.61	Rect	4.00	4.00	15	Cir	363.12	15 15	Cir Cir	363.77 364.00
11	CB 517	Combination	372.04	Rect	4.00	4.00	15	Cir	366.88	15	Cir	367.17
12	CB 516	Combination	372.04	Rect	4.00	4.00	15	Cir	367.46			
13	CB 510	Combination	368.57	Rect	4.00	4.00	15	Cir	364.24			
14	YI 509	DropGrate	367.00	Rect	4.00	4.00	18	Cir	363.39			
15	CB 512	Combination	367.99	Rect	4.00	4.00	15	Cir	363.01	15	Cir	363.11
16	CB 513	Combination	369.04	Rect	4.00	4.00	15	Cir	364.19			
17	CB 503	Combination	357.04	Rect	4.00	4.00	15	Cir	353.44			

Project File: SCM#5.stm	Number of Structures: 17	Run Date: 12/6/2024

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	Pipe - (39)	16.98	30	Cir	45.553	346.92	347.15	0.505	349.42	349.48	0.24	349.72	End	DropGrate
2	Pipe - (38)	13.32	24	Cir	163.558	347.25	352.55	3.240	349.72	353.86	n/a	353.86 j	1	Combination
3	Pipe - (37)	11.88	24	Cir	215.399	352.65	361.27	4.002	353.86	362.51	n/a	362.51	2	Combination
4	Pipe - (36)	10.63	24	Cir	48.260	361.37	361.85	0.995	362.51	363.02	0.72	363.02	3	Combination
5	Pipe - (35)	10.25	24	Cir	27.000	362.36	362.50	0.519	363.51	363.65	0.55	364.20	4	Combination
6	Pipe - (34)	6.92	24	Cir	47.057	362.58	362.83	0.531	364.20	363.76	0.38	363.76	5	Combination
7	Pipe - (33)	6.17	18	Cir	27.000	362.93	363.07	0.519	363.96	364.10	0.53	364.63	6	Combination
8	Pipe - (31)	0.95	15	Cir	187.898	363.26	370.19	3.688	364.63	370.57	n/a	370.57 j	7	Combination
9	Pipe - (30)	0.48	15	Cir	27.526	370.29	370.43	0.509	370.57	370.70	0.09	370.79	8	Combination
10	Pipe - (44)	1.24	15	Cir	64.208	362.27	363.12	1.324	362.62	363.56	n/a	363.56	3	Combination
11	Pipe - (150)	0.78	15	Cir	115.871	363.77	366.88	2.684	364.00	367.23	n/a	367.23	10	Combination
12	Pipe - (28)	0.41	15	Cir	27.018	367.17	367.46	1.073	367.38	367.71	0.09	367.71	11	Combination
13	Pipe - (43)	0.24	15	Cir	27.000	364.00	364.24	0.889	364.17	364.43	0.07	364.43	10	Combination
14	Pipe - (45)	4.97	18	Cir	24.000	363.18	363.39	0.875	364.63	364.25	n/a	364.25	7	DropGrate
15	Pipe - (42)	0.34	15	Cir	50.977	362.69	363.01	0.628	363.02	363.23	n/a	363.23 j	4	Combination
16	Pipe - (41)	0.21	15	Cir	66.788	363.11	364.19	1.617	363.25	364.37	0.06	364.37	15	Combination
17	Pipe - (40)	0.89	15	Cir	27.001	353.30	353.44	0.519	353.86	353.87	0.09	353.96	2	Combination

Project File: SCM#5.stm | Number of lines: 17 | Run Date: 12/6/2024

NOTES: Return period = 10 Yrs. ; j - Line contains hyd. jump.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	YI 501	4.35	0.00	4.35	0.00	DrGrt	0.0	0.00	4.00	2.00	2.00	Sag	4.00	0.020	0.020	0.013	0.32	36.02	0.32	36.02	0.0	Off
2	CB 502	0.96	0.00	0.96	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	0.11	3.39	0.27	3.39	2.0	Off
3	CB 504	0.14	0.00	0.14	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.047	2.00	0.040	0.020	0.013	0.06	1.54	0.17	0.00	2.0	2
4	CB 505	0.10	0.00	0.10	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.07	1.84	0.17	0.00	2.0	3
5	CB 506	3.63	0.00	2.05	1.58	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.25	10.51	0.36	7.50	2.0	6
6	CB 507	0.82	1.60	2.42	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	0.17	6.66	0.34	6.66	2.0	Off
7	CB 508	0.65	0.01	0.66	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	0.08	2.07	0.25	2.07	2.0	Off
8	CB 514	0.48	0.00	0.47	0.01	Comb	6.0	1.50	0.00	3.00	2.50	0.039	2.00	0.040	0.020	0.013	0.10	3.06	0.19	0.64	2.0	7
9	CB 515	0.48	0.00	0.47	0.01	Comb	6.0	1.50	0.00	3.00	2.50	0.039	2.00	0.040	0.020	0.013	0.10	3.06	0.19	0.64	2.0	6
10	CB 511	0.24	0.01	0.25	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.040	2.00	0.040	0.020	0.013	0.08	1.97	0.17	0.00	2.0	17
11	CB 517	0.38	0.00	0.37	0.01	Comb	6.0	1.50	0.00	3.00	2.50	0.030	2.00	0.040	0.020	0.013	0.10	2.87	0.19	0.51	2.0	10
12	CB 516	0.41	0.00	0.40	0.01	Comb	6.0	1.50	0.00	3.00	2.50	0.030	2.00	0.040	0.020	0.013	0.10	3.02	0.19	0.60	2.0	13
13	CB 510	0.24	0.01	0.25	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.040	2.00	0.040	0.020	0.013	0.08	1.98	0.17	0.00	2.0	10
14	YI 509	4.97	0.00	4.97	0.00	DrGrt	0.0	0.00	4.00	2.00	2.00	Sag	4.00	0.020	0.020	0.013	0.35	38.98	0.35	38.98	0.0	Off
15	CB 512	0.14	0.00	0.14	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.020	2.00	0.040	0.020	0.013	0.07	1.80	0.17	0.00	2.0	4
16	CB 513	0.21	0.00	0.21	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.020	2.00	0.040	0.020	0.013	0.08	2.20	0.17	0.00	2.0	15
17	CB 503	0.89	0.00	0.89	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	0.10	3.10	0.27	3.10	2.0	Off

Project File: SCM#5.stm | Number of lines: 17 | Run Date: 12/6/2024

NOTES: Inlet N-Values = 0.016; Intensity = 74.09 / (Inlet time + 12.50) ^ 0.81; Return period = 10 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	30	16.98	346.92	349.42	2.50	4.91	3.46	0.19	349.61	0.171	45.553	347.15	349.48	2.33	4.76	3.56	0.20	349.68	0.148	0.160	0.073	1.22	0.24
2	24	13.32	347.25	349.72	2.00	2.19	4.24	0.28	350.00	0.347	163.558	352.55	353.86 j	1.31**	2.19	6.09	0.58	354.44	0.590	0.468	n/a	1.50	n/a
3	24	11.88	352.65	353.86	1.21	1.99	5.96	0.53	354.39	0.000	215.399	361.27	362.51	1.24**	2.04	5.82	0.53	363.03	0.000	0.000	n/a	1.38	n/a
4	24	10.63	361.37	362.51	1.14	1.84	5.77	0.48	362.99	0.000	48.260	361.85	363.02	1.17**	1.90	5.58	0.48	363.50	0.000	0.000	n/a	1.49	0.72
5	24	10.25	362.36	363.51	1.15*	1.86	5.48	0.47	363.98	0.518	27.000	362.50	363.65	1.15**	1.87	5.48	0.47	364.12	0.519	0.519	0.140	1.17	0.55
6	24	6.92	362.58	364.20	1.62	1.44	2.54	0.36	364.56	0.000	47.057	362.83	363.76	0.93**	1.44	4.82	0.36	364.12	0.000	0.000	n/a	1.04	0.38
7	18	6.17	362.93	363.96	1.03*	1.29	4.77	0.35	364.31	0.518	27.000	363.07	364.10	1.03	1.29	4.77	0.35	364.45	0.519	0.518	0.140	1.50	0.53
8	15	0.95	363.26	364.63	1.25	0.32	0.78	0.01	364.64	0.022	187.898	370.19	370.57 j	0.38**	0.32	2.99	0.14	370.71	0.523	0.272	n/a	1.48	0.21
9	15	0.48	370.29	370.57	0.28	0.19	2.30	0.08	370.66	0.436	27.526	370.43	370.70	0.27**	0.20	2.44	0.09	370.79	0.513	0.474	0.131	1.00	0.09
10	15	1.24	362.27	362.62	0.35*	0.28	4.49	0.16	362.78	0.000	64.208	363.12	363.56	0.44**	0.38	3.23	0.16	363.72	0.000	0.000	n/a	1.36	n/a
11	15	0.78	363.77	364.00	0.23*	0.16	5.04	0.12	364.12	0.000	115.871	366.88	367.23	0.35**	0.28	2.83	0.12	367.35	0.000	0.000	n/a	1.50	n/a
12	15	0.41	367.17	367.38	0.21*	0.14	3.02	0.09	367.47	0.000	27.018	367.46	367.71	0.25**	0.17	2.37	0.09	367.80	0.000	0.000	n/a	1.00	0.09
13	15	0.24	364.00	364.17	0.17*	0.10	2.40	0.07	364.24	0.000	27.000	364.24	364.43	0.19**	0.12	2.05	0.07	364.49	0.000	0.000	n/a	1.00	0.07
14	18	4.97	363.18	364.63	1.45	1.04	2.84	0.35	364.98	0.000	24.000	363.39	364.25	0.86**	1.04	4.76	0.35	364.60	0.000	0.000	n/a	1.00	n/a
15	15	0.34	362.69	363.02	0.33	0.15	1.32	0.08	363.10	0.000	50.977	363.01	363.23 j	0.22**	0.15	2.25	0.08	363.31	0.000	0.000	n/a	0.50	n/a
16	15	0.21	363.11	363.25	0.14*	0.07	2.83	0.06	363.31	0.000	66.788	364.19	364.37	0.18**	0.10	1.97	0.06	364.43	0.000	0.000	n/a	1.00	0.06
17	15	0.89	353.30	353.86	0.56	0.54	1.66	0.04	353.91	0.110	27.001	353.44	353.87	0.43	0.38	2.37	0.09	353.96	0.291	0.200	0.054	1.00	0.09

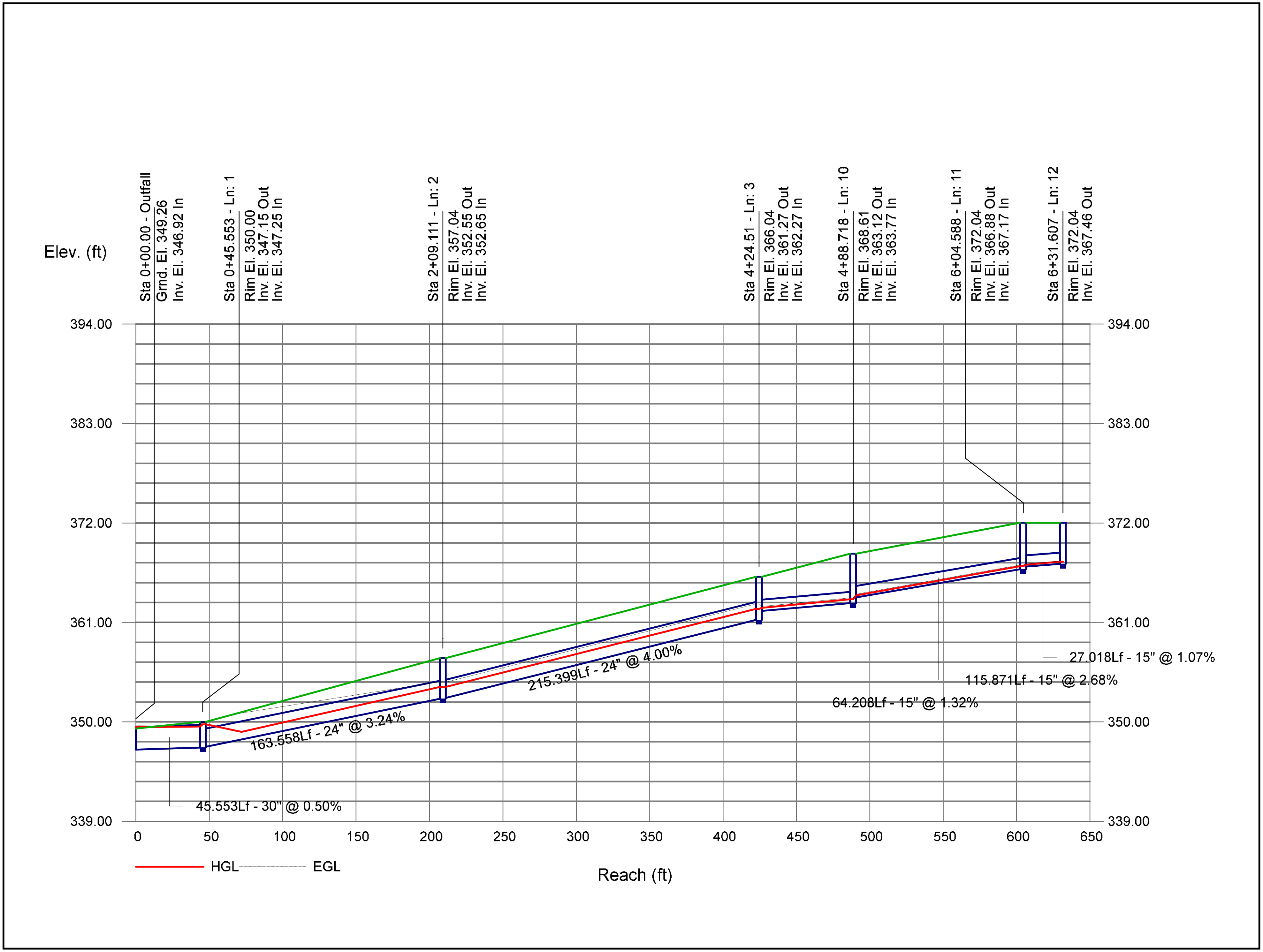
Project File: SCM#5.stm | Number of lines: 17 | Run Date: 12/6/2024

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Storm Sewer Profile

10-Year SCM#5 Profile 4-9

Proj. file: SCM#5.stm

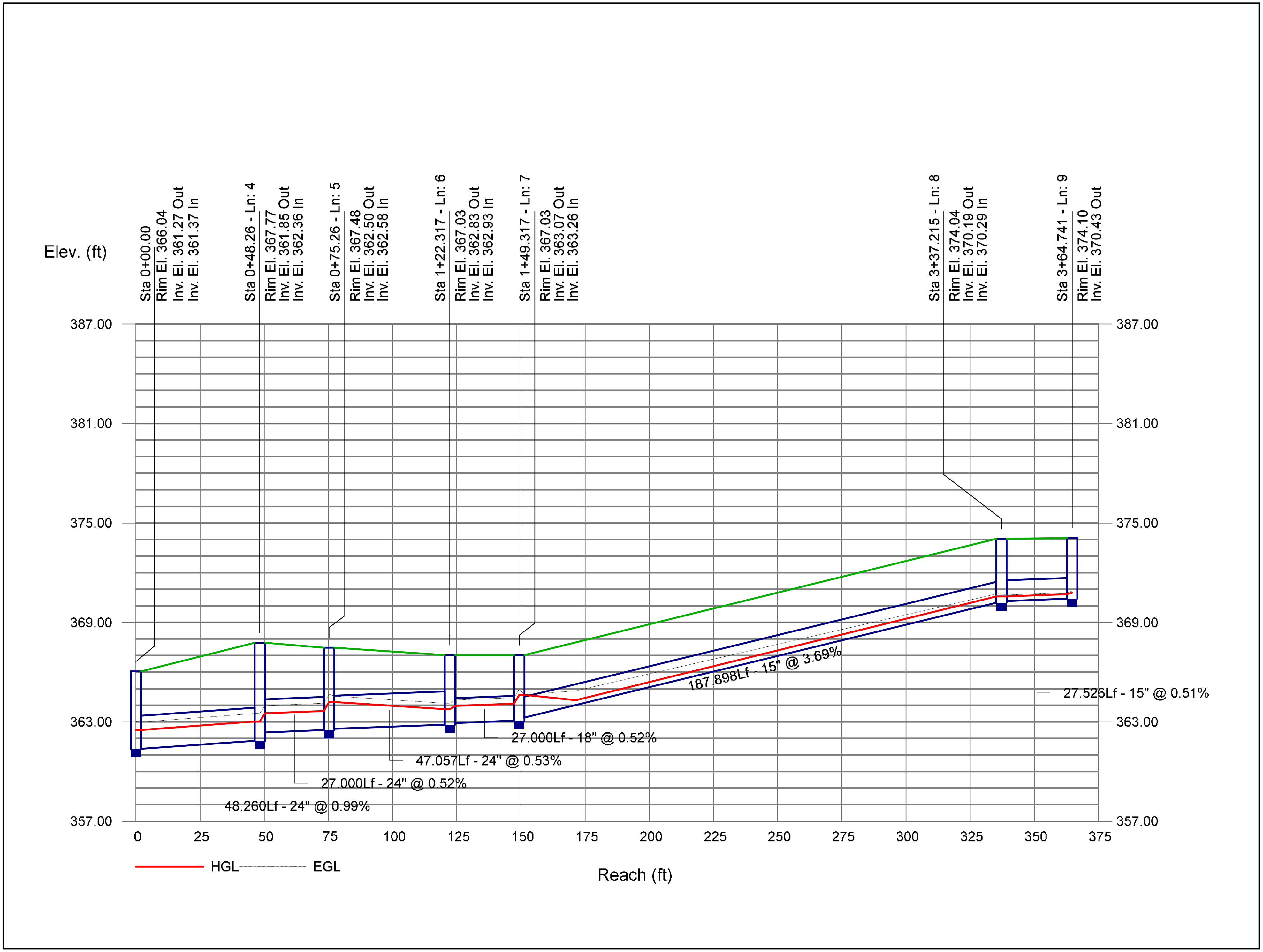


Storm Sewers

Storm Sewer Profile

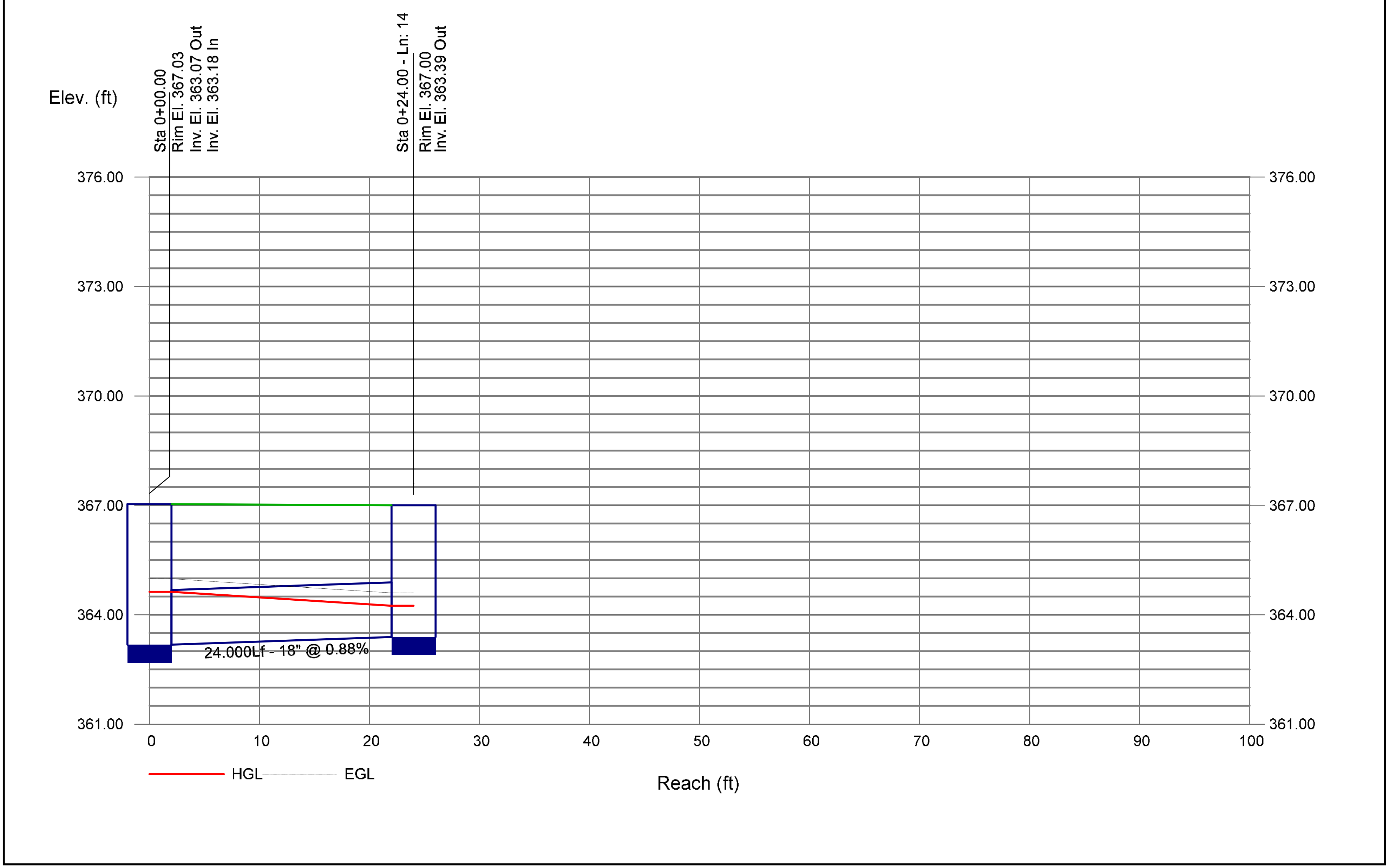
10-Year SCM#5 Profile 4-9

Proj. file: SCM#5.stm



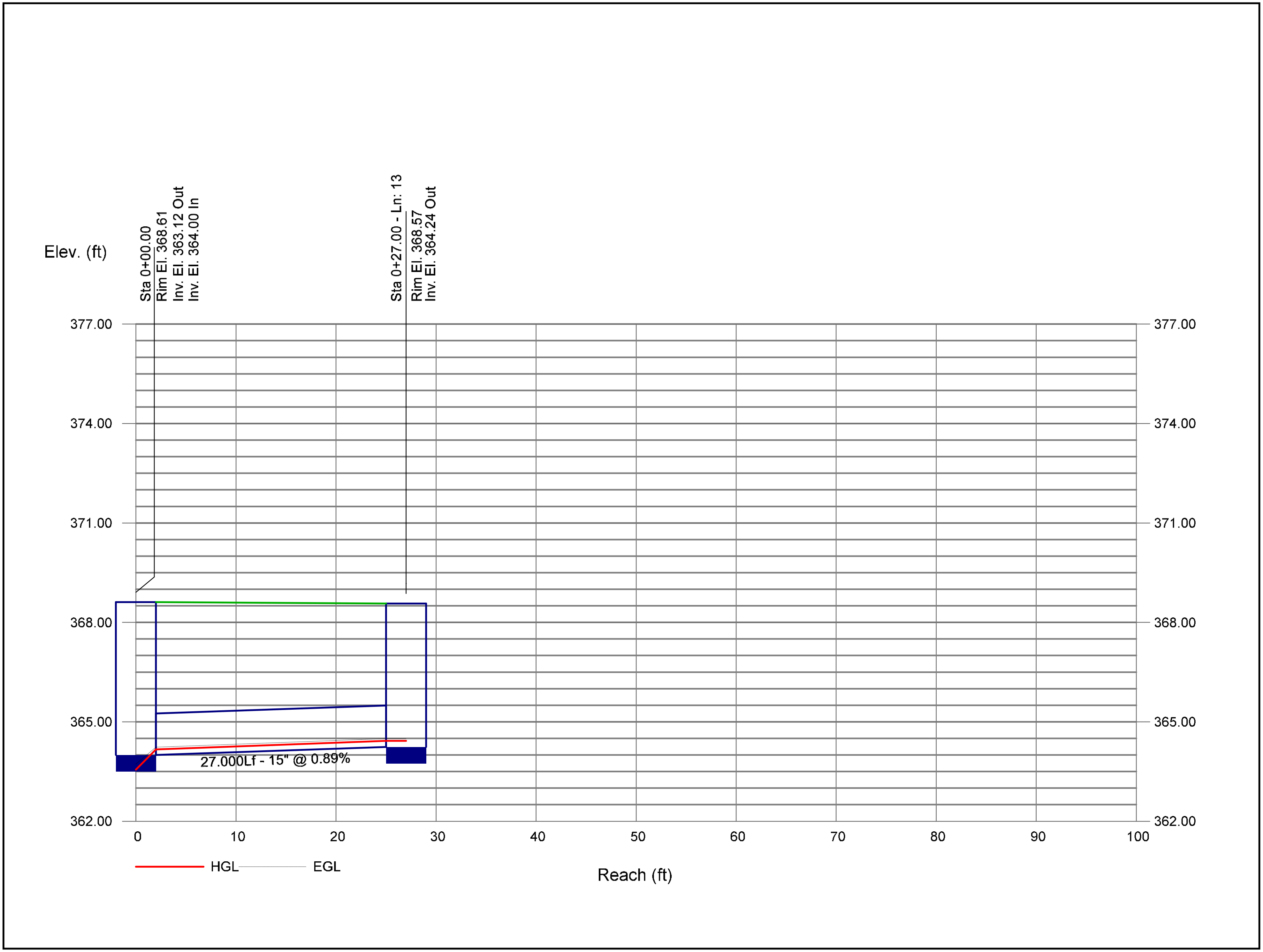
Storm Sewer Profile

10-Year SCM#5 Profile 14-14 Proj. file: SCM#5.stm



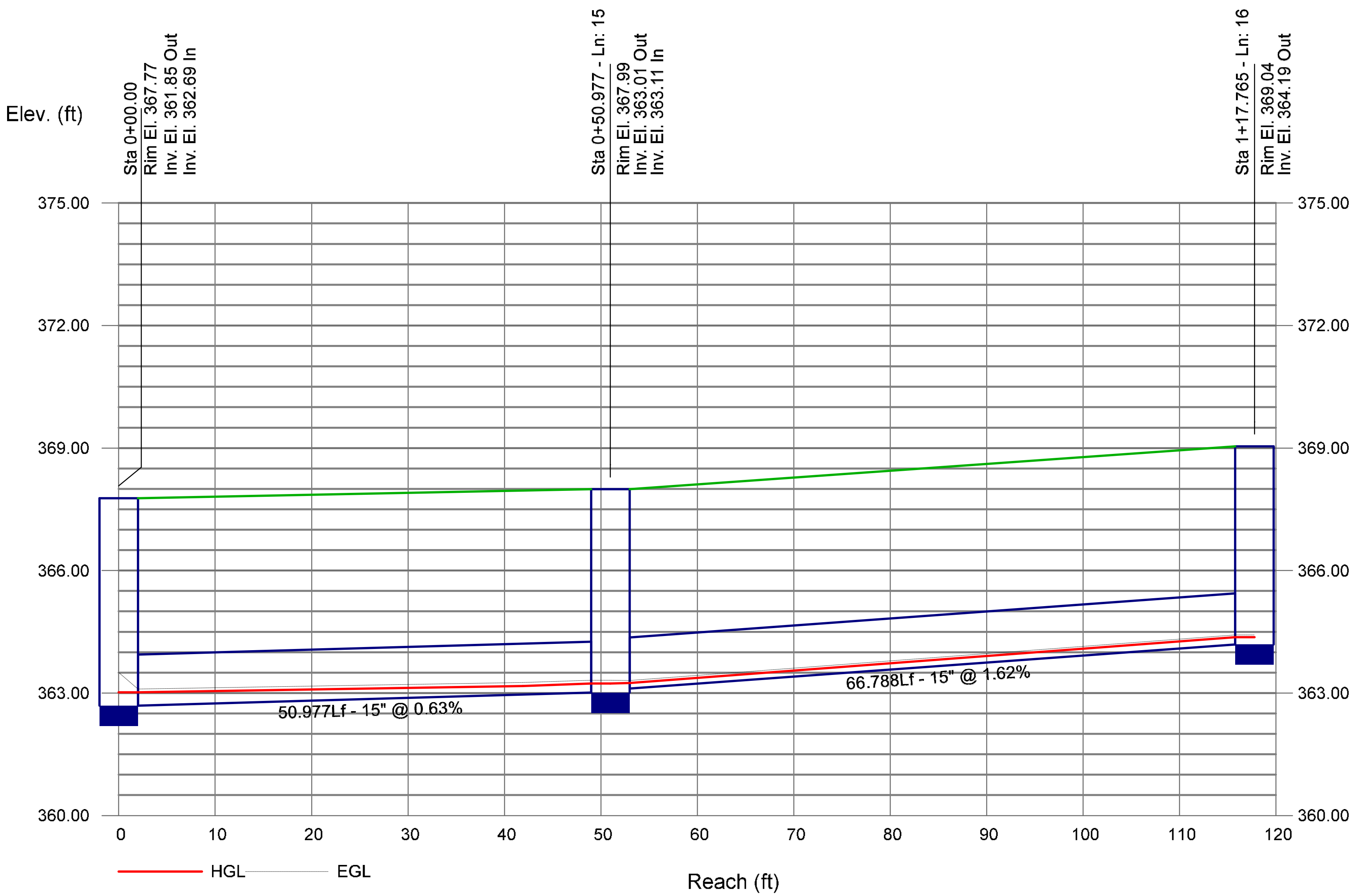
Storm Sewer Profile

10-Year SCM#5 Profile 13-13 Proj. file: SCM#5.stm



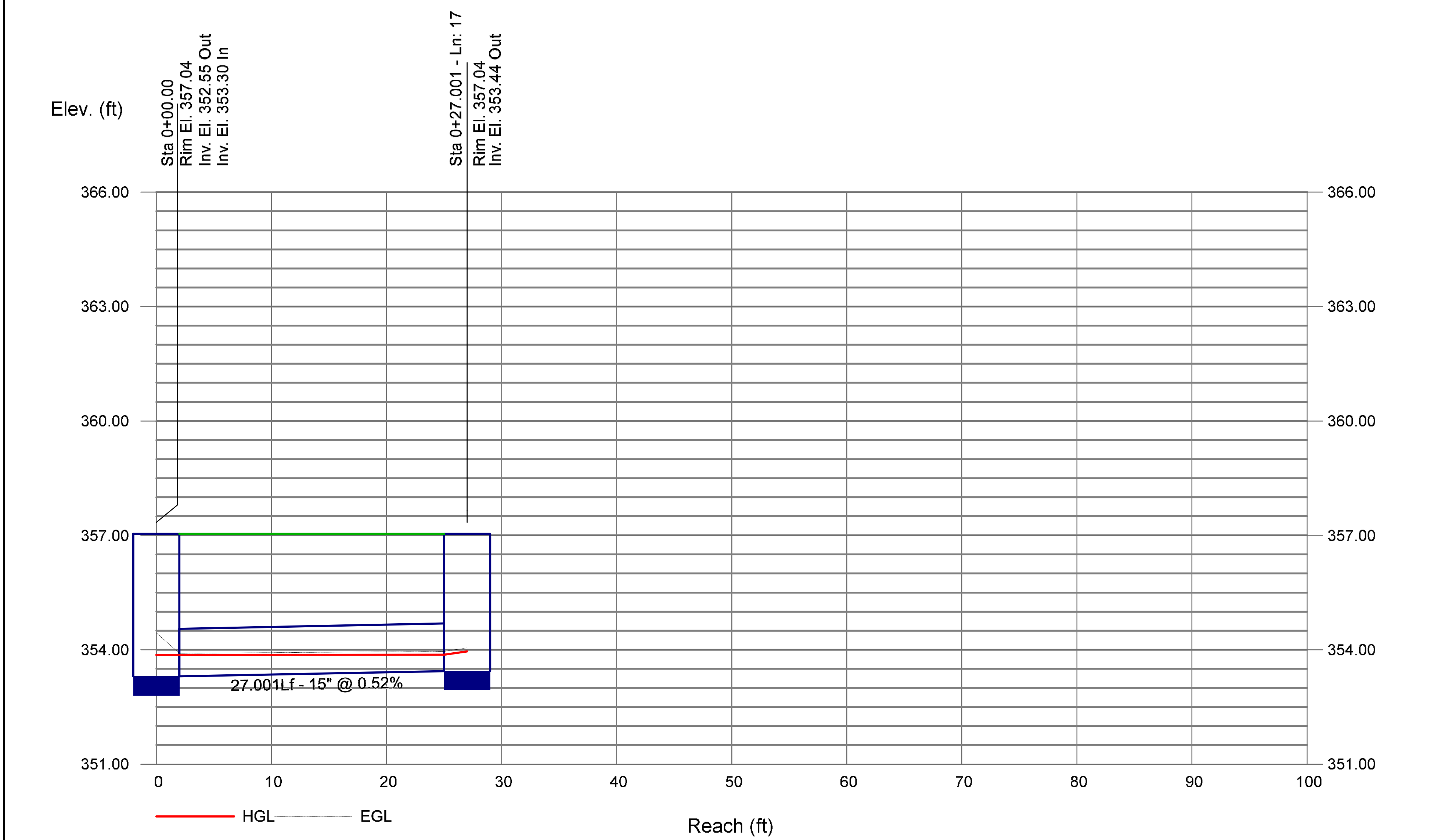
Storm Sewer Profile

10-Year SCM#5 Profile 15-16 Proj. file: SCM#5.stm



Storm Sewer Profile

10-Year SCM#5 Profile 17-17 Proj. file: SCM#5.stm



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

10-Year Bypass Report

Project File: Bypass.stm	Number of lines: 3	Date: 12/5/2024

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	79.189	3.627	Hdwl	0.00	1.58	0.57	10.0	366.06	4.36	369.51	18	Cir	0.013	1.00	371.30	Pipe - (27)
2	End	23.999	80.505	Comb	0.00	0.08	0.57	10.0	356.16	0.50	356.28	15	Cir	0.013	0.71	360.04	Pipe - (26)
3	2	27.005	-24.771	Comb	0.00	0.09	0.57	10.0	356.41	0.52	356.55	15	Cir	0.013	1.00	360.04	Pipe - (25)

Project File: Bypass.stm | Number of lines: 3 | Date: 12/5/2024

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	FES INLET 601	OpenHeadwall	371.30	n/a	n/a	n/a	18	Cir	369.51			
2	CB 421	Combination	360.04	Rect	4.00	4.00	15	Cir	356.28	15	Cir	356.41
3	CB 422	Combination	360.04	Rect	4.00	4.00	15	Cir	356.55			

Project File: Bypass.stm | Number of Structures: 3 | Run Date: 12/5/2024

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	Pipe - (27)	5.42	18	Cir	79.189	366.06	369.51	4.357	367.56	370.41	n/a	370.41 j	End	OpenHeadwall
2	Pipe - (26)	0.55	15	Cir	23.999	356.16	356.28	0.500	357.41	357.41	0.00	357.41	End	Combination
3	Pipe - (25)	0.31	15	Cir	27.005	356.41	356.55	0.518	357.41	357.42	0.00	357.42	2	Combination

Project File: Bypass.stm	Number of lines: 3	Run Date: 12/5/2024

NOTES: Return period = 10 Yrs. ; j - Line contains hyd. jump.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	FES INLET 601	5.42	0.00	5.42	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	2.00	0.040	0.020	0.013	0.00	0.00	0.00	0.00	0.0	Off
2	CB 421	0.27	0.00	0.27	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.029	2.00	0.040	0.020	0.013	0.09	2.36	0.17	0.16	2.0	Off
3	CB 422	0.31	0.00	0.31	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.029	2.00	0.040	0.020	0.013	0.09	2.56	0.18	0.28	2.0	Off

Project File: Bypass.stm	Number of lines: 3	Run Date: 12/5/2024

NOTES: Inlet N-Values = 0.016; Intensity = 74.09 / (Inlet time + 12.50) ^ 0.81; Return period = 10 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
(1)	(in) (2)	(cfs) (3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
1	18	5.42	366.06	367.56	1.50	1.10	3.06	0.15	367.71	0.266	79.189	369.51	370.41 j	0.90**	1.10	4.92	0.38	370.78	0.597	0.431	n/a	1.00	n/a
2	15	0.55	356.16	357.41	1.25*	1.23	0.45	0.00	357.41	0.007	23.999	356.28	357.41	1.13	1.17	0.47	0.00	357.41	0.006	0.007	0.002	0.71	0.00
3	15	0.31	356.41	357.41	1.00	1.06	0.29	0.00	357.42	0.002	27.005	356.55	357.42	0.87	0.91	0.34	0.00	357.42	0.003	0.003	0.001	1.00	0.00

Project File: Bypass.stm	Number of lines: 3	Run Date: 12/5/2024

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Hydraflow HGL Computation Procedure

General Procedure:

Hydraflow computes the HGL using the Bernoulli energy equation. Manning's equation is used to determine energy losses due to pipe friction. In a standard step, iterative procedure, Hydraflow assumes upstream HGLs until the energy equation balances. If the energy equation cannot balance, supercritical flow exists and critical depth is temporarily assumed at the upstream end. A supercritical flow Profile is then computed using the same procedure in a downstream direction using momentum principles.

Col. 1 The line number being computed. Calculations begin at Line 1 and proceed upstream.

Col. 2 The line size. In the case of non-circular pipes, the line rise is printed above the span.

Col. 3 Total flow rate in the line.

Col. 4 The elevation of the downstream invert.

Col. 5 Elevation of the hydraulic grade line at the downstream end. This is computed as the upstream HGL + Minor loss of this line's downstream line.

Col. 6 The downstream depth of flow inside the pipe (HGL - Invert elevation) but not greater than the line size.

Col. 7 Cross-sectional area of the flow at the downstream end.

Col. 8 The velocity of the flow at the downstream end, (Col. 3 / Col. 7).

Col. 9 Velocity head (Velocity squared / 2g).

Col. 10 The elevation of the energy grade line at the downstream end, HGL + Velocity head, (Col. 5 + Col. 9).

Col. 11 The friction slope at the downstream end (the S or Slope term in Manning's equation).

Col. 12 The line length.

Col. 13 The elevation of the upstream invert.

Col. 14 Elevation of the hydraulic grade line at the upstream end.

Col. 15 The upstream depth of flow inside the pipe (HGL - Invert elevation) but not greater than the line size.

Col. 16 Cross-sectional area of the flow at the upstream end.

Col. 17 The velocity of the flow at the upstream end, (Col. 3 / Col. 16).

Col. 18 Velocity head (Velocity squared / 2g).

Col. 19 The elevation of the energy grade line at the upstream end, HGL + Velocity head, (Col. 14 + Col. 18) .

Col. 20 The friction slope at the upstream end (the S or Slope term in Manning's equation).

Col. 21 The average of the downstream and upstream friction slopes.

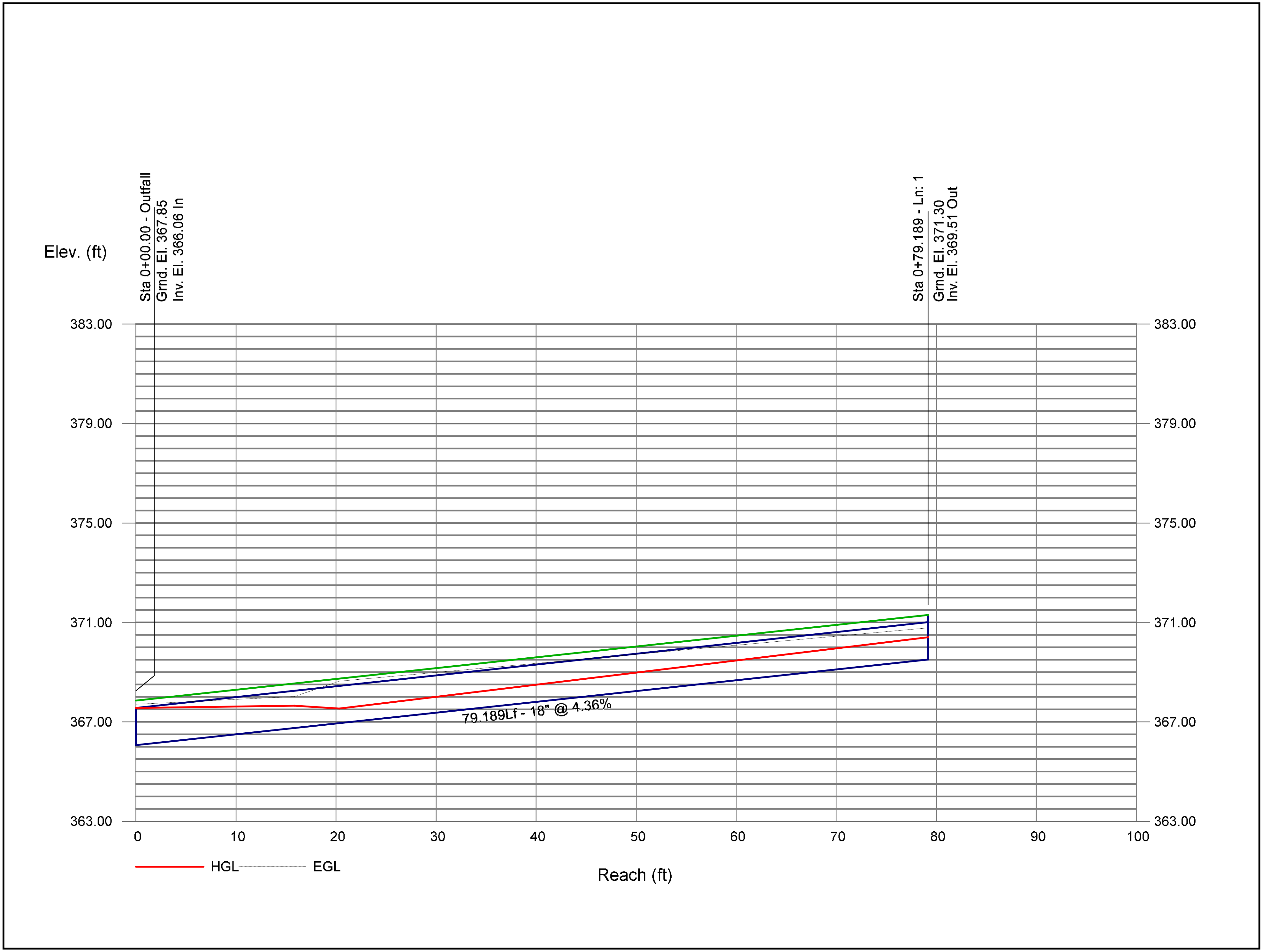
Col. 22 Energy loss. Average Sf/100 x Line Length (Col. 21/100 x Col. 12). Equals (EGL upstream - EGL downstream) +/- tolerance.

Col. 23 The junction loss coefficient (K).

Col. 24 Minor loss. (Col. 23 x Col. 18). Is added to upstream HGL and used as the starting HGL for the next upstream line(s).

Storm Sewer Profile

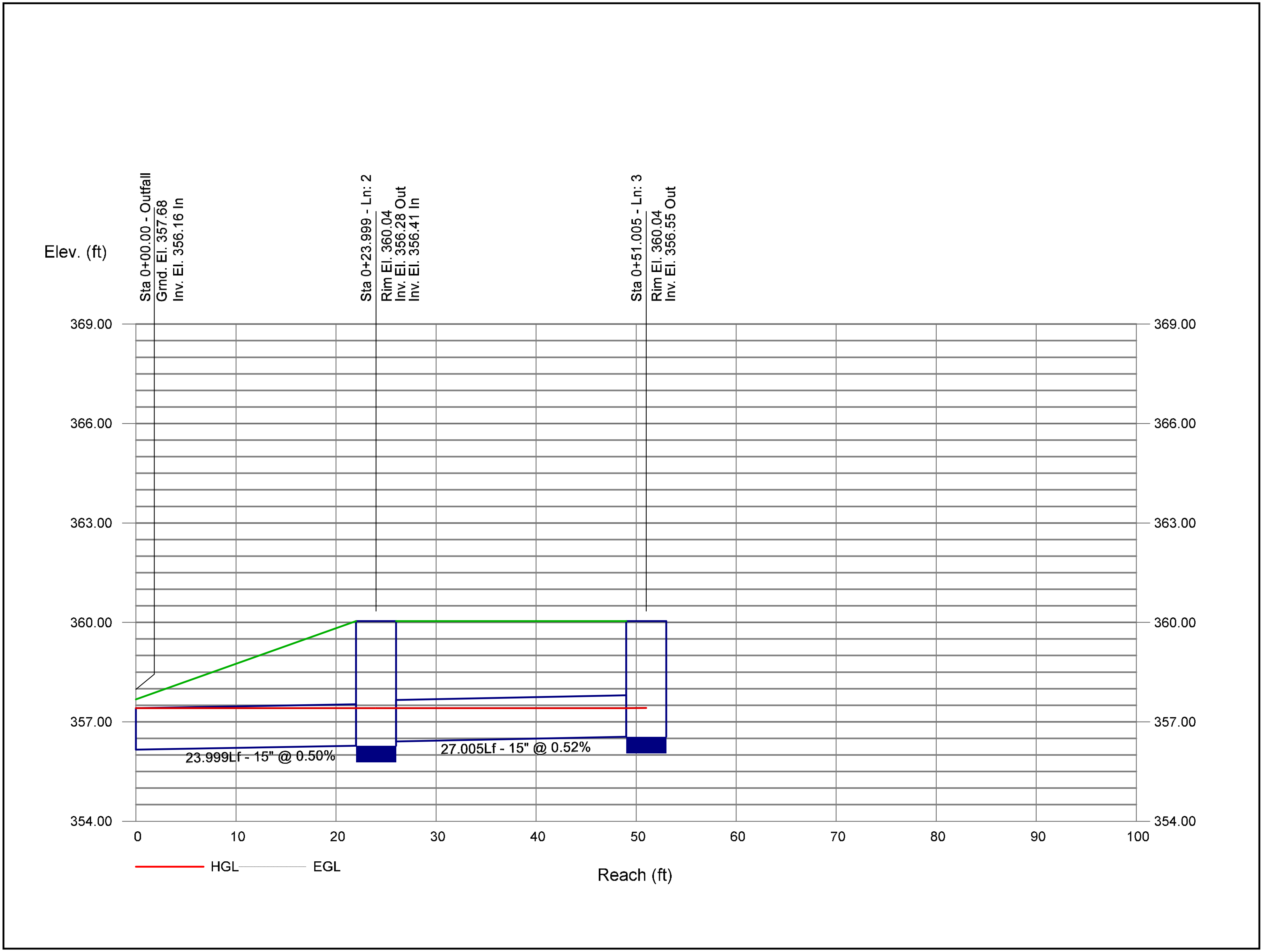
10-Year Bypass Profile 1-1 Proj. file: Bypass.stm



Storm Sewers

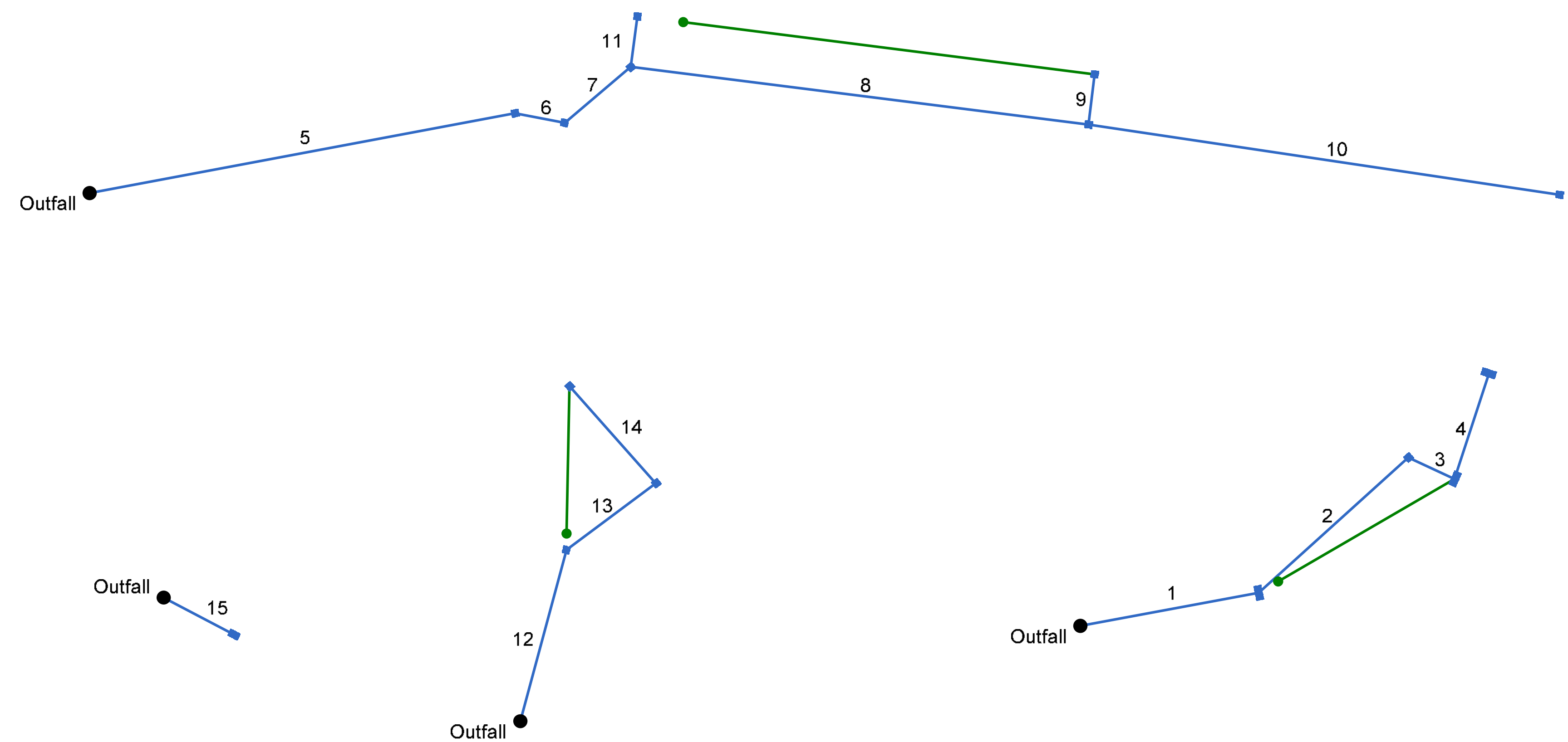
Storm Sewer Profile

10-Year Bypass Profile 2-3 Proj. file: Bypass.stm



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

25-Year SCM#1 Report



Project File: SCM#1.stm	Number of lines: 15	Date: 12/5/2024

Storm Sewer Inventory Report

25-Year SCM#1 Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	96.027	-10.617	Comb	0.00	0.59	0.57	10.0	380.50	0.58	381.06	18	Cir	0.013	0.87	386.00	Pipe - (97)
2	1	107.000	-31.568	Comb	0.00	0.08	0.57	10.0	381.63	0.77	382.45	15	Cir	0.013	1.40	387.03	Pipe - (95)
3	2	26.999	67.120	Comb	0.00	0.56	0.57	10.0	382.55	0.67	382.73	15	Cir	0.013	1.50	387.04	Pipe - (94)
4	3	59.003	-96.968	Comb	0.00	0.46	0.57	10.0	382.83	0.75	383.27	15	Cir	0.013	1.00	387.89	Pipe - (93)
5	End	229.120	-10.656	Comb	0.00	0.07	0.57	10.0	363.00	2.20	368.04	18	Cir	0.013	0.63	373.98	Pipe - (86)
6	5	27.000	21.423	Comb	0.00	0.20	0.57	10.0	368.14	0.52	368.28	18	Cir	0.013	1.22	373.87	Pipe - (85)
7	6	45.912	-51.157	Comb	0.00	0.29	0.57	10.0	368.38	3.48	369.98	18	Cir	0.013	1.62	375.04	Pipe - (84)
8	7	244.371	47.632	Comb	0.00	0.13	0.57	10.0	370.08	2.96	377.31	15	Cir	0.013	1.50	382.57	Pipe - (83)
9	8	27.044	-90.017	Comb	0.00	0.74	0.57	10.0	378.23	0.63	378.40	15	Cir	0.013	1.00	382.57	Pipe - (88)
10	8	252.428	1.235	Comb	0.00	0.11	0.57	10.0	377.42	2.97	384.92	15	Cir	0.013	1.00	390.04	Pipe - (82)
11	7	27.000	-42.459	Comb	0.00	0.15	0.57	10.0	370.18	0.52	370.32	15	Cir	0.013	1.00	375.04	Pipe - (87)
12	End	94.321	-74.896	Comb	0.00	0.38	0.57	10.0	368.50	0.56	369.03	15	Cir	0.013	1.00	374.00	Pipe - (92)
13	12	59.044	38.083	Comb	0.00	0.30	0.57	10.0	369.13	1.00	369.72	15	Cir	0.013	1.50	374.04	Pipe - (91)
14	13	68.947	-94.675	Comb	0.00	0.05	0.57	10.0	369.82	1.00	370.51	15	Cir	0.013	1.00	375.01	Pipe - (90)
15	End	42.000	27.855	DrGrt	0.00	2.88	0.57	10.0	363.50	0.50	363.71	24	Cir	0.013	1.00	366.50	Pipe - (89)

Project File: SCM#1.stm | Number of lines: 15 | Date: 12/5/2024

Storm Sewers v2023.00

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	CB 111	Combination	386.00	Rect	4.00	8.00	18	Cir	381.06	15	Cir	381.63
2	CB 114	Combination	387.03	Rect	4.00	4.00	15	Cir	382.45	15	Cir	382.55
3	CB 115	Combination	387.04	Rect	4.00	8.00	15	Cir	382.73	15	Cir	382.83
4	CB 116	Combination	387.89	Rect	4.00	8.00	15	Cir	383.27			
5	CB 101	Combination	373.98	Rect	4.00	4.00	18	Cir	368.04	18	Cir	368.14
6	CB 102	Combination	373.87	Rect	4.00	4.00	18	Cir	368.28	18	Cir	368.38
7	CB 103	Combination	375.04	Rect	4.00	4.00	18	Cir	369.98	15 15	Cir Cir	370.08 370.18
8	CB 105	Combination	382.57	Rect	4.00	4.00	15	Cir	377.31	15 15	Cir Cir	378.23 377.42
9	CB 106	Combination	382.57	Rect	4.00	4.00	15	Cir	378.40			
10	CB 107	Combination	390.04	Rect	4.00	4.00	15	Cir	384.92			
11	CB 104	Combination	375.04	Rect	4.00	4.00	15	Cir	370.32			
12	CB 121	Combination	374.00	Rect	4.00	4.00	15	Cir	369.03	15	Cir	369.13
13	CB 122	Combination	374.04	Rect	4.00	4.00	15	Cir	369.72	15	Cir	369.82
14	CB 123	Combination	375.01	Rect	4.00	4.00	15	Cir	370.51			
15	DI 126	DropGrate	366.50	Rect	6.00	4.00	24	Cir	363.71			

Project File: SCM#1.stm	Number of Structures: 15	Run Date: 12/5/2024

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	Pipe - (97)	6.22	18	Cir	96.027	380.50	381.06	0.583	382.00	382.28	0.22	382.50	End	Combination
2	Pipe - (95)	4.10	15	Cir	107.000	381.63	382.45	0.766	382.50	383.27	n/a	383.27 j	1	Combination
3	Pipe - (94)	3.82	15	Cir	26.999	382.55	382.73	0.667	383.34	383.52	0.51	383.52	2	Combination
4	Pipe - (93)	1.74	15	Cir	59.003	382.83	383.27	0.746	383.52	383.79	n/a	383.79 j	3	Combination
5	Pipe - (86)	5.63	18	Cir	229.120	363.00	368.04	2.200	364.50	368.95	n/a	368.95 j	End	Combination
6	Pipe - (85)	5.41	18	Cir	27.000	368.14	368.28	0.518	369.08	369.22	0.41	369.63	5	Combination
7	Pipe - (84)	4.77	18	Cir	45.912	368.38	369.98	3.485	369.63	370.82	n/a	370.82 j	6	Combination
8	Pipe - (83)	3.38	15	Cir	244.371	370.08	377.31	2.959	370.82	378.05	0.46	378.05	7	Combination
9	Pipe - (88)	2.80	15	Cir	27.044	378.23	378.40	0.629	378.89	379.07	0.27	379.07	8	Combination
10	Pipe - (82)	0.42	15	Cir	252.428	377.42	384.92	2.971	378.05	385.17	n/a	385.17 j	8	Combination
11	Pipe - (87)	0.57	15	Cir	27.000	370.18	370.32	0.519	370.82	370.82	0.02	370.85	7	Combination
12	Pipe - (92)	2.64	15	Cir	94.321	368.50	369.03	0.562	369.75	369.88	0.14	370.02	End	Combination
13	Pipe - (91)	1.28	15	Cir	59.044	369.13	369.72	0.999	370.02	370.17	n/a	370.17 j	12	Combination
14	Pipe - (90)	0.19	15	Cir	68.947	369.82	370.51	1.001	370.17	370.68	n/a	370.68 j	13	Combination
15	Pipe - (89)	10.90	24	Cir	42.000	363.50	363.71	0.500	365.50	365.58	0.20	365.78	End	DropGrate

Project File: SCM#1.stm | Number of lines: 15 | Run Date: 12/5/2024

NOTES: Return period = 25 Yrs. ; j - Line contains hyd. jump.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	CB 111	2.23	1.03	3.26	0.00	Comb	6.0	3.00	7.50	3.00	5.00	Sag	2.00	0.040	0.020	0.013	0.23	9.65	0.40	9.65	2.0	Off
2	CB 114	0.30	0.00	0.29	0.01	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.11	3.47	0.20	0.81	2.0	1
3	CB 115	2.12	0.54	1.64	1.02	Comb	6.0	1.50	0.00	3.00	5.00	0.010	2.00	0.040	0.020	0.013	0.23	9.28	0.33	6.21	2.0	1
4	CB 116	1.74	0.00	1.20	0.54	Comb	6.0	1.50	0.00	3.00	5.00	0.010	2.00	0.040	0.020	0.013	0.20	7.80	0.30	4.65	2.0	3
5	CB 101	0.26	0.00	0.26	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.025	2.00	0.040	0.020	0.013	0.09	2.43	0.17	0.19	2.0	Off
6	CB 102	0.76	0.19	0.94	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	0.11	3.33	0.27	3.33	2.0	Off
7	CB 103	1.10	0.02	0.93	0.19	Comb	6.0	1.50	0.00	3.00	2.50	0.030	2.00	0.040	0.020	0.013	0.14	5.07	0.24	1.88	2.0	6
8	CB 105	0.49	0.01	0.48	0.02	Comb	6.0	1.50	0.00	3.00	2.50	0.030	2.00	0.040	0.020	0.013	0.11	3.39	0.20	0.82	2.0	7
9	CB 106	2.80	0.00	1.84	0.96	Comb	6.0	1.50	0.00	3.00	2.50	0.030	2.00	0.040	0.020	0.013	0.19	7.57	0.30	4.73	2.0	11
10	CB 107	0.42	0.00	0.41	0.01	Comb	6.0	1.50	0.00	3.00	2.50	0.030	2.00	0.040	0.020	0.013	0.10	3.04	0.19	0.62	2.0	8
11	CB 104	0.57	0.96	1.18	0.35	Comb	6.0	1.50	0.00	3.00	2.50	0.030	2.00	0.040	0.020	0.013	0.16	5.84	0.26	2.73	2.0	Off
12	CB 121	1.44	0.26	1.70	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	0.13	4.40	0.29	4.40	2.0	Off
13	CB 122	1.14	0.00	0.87	0.26	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.17	6.52	0.27	3.21	2.0	12
14	CB 123	0.19	0.00	0.19	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.09	2.63	0.18	0.32	2.0	12
15	DI 126	10.90	0.00	10.90	0.00	DrGrt	0.0	0.00	9.00	3.00	5.00	Sag	6.00	0.020	0.020	0.013	0.37	43.19	0.37	43.19	0.0	Off

Project File: SCM#1.stm | Number of lines: 15 | Run Date: 12/5/2024

NOTES: Inlet N-Values = 0.016; Intensity = 62.86 / (Inlet time + 11.00) ^ 0.74; Return period = 25 Yrs. ; * Indicates Known Q added.All curb inlets are throat.

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
1	18	6.22	380.50	382.00	1.50	1.77	3.52	0.19	382.19	0.351	96.027	381.06	382.28	1.22	1.54	4.05	0.25	382.53	0.357	0.354	0.340	0.87	0.22
2	15	4.10	381.63	382.50	0.87	0.85	4.50	0.36	382.86	0.000	107.000	382.45	383.27 j	0.82**	0.85	4.81	0.36	383.63	0.000	0.000	n/a	1.40	0.50
3	15	3.82	382.55	383.34	0.79*	0.82	4.68	0.34	383.68	0.000	26.999	382.73	383.52	0.79**	0.82	4.67	0.34	383.86	0.000	0.000	n/a	1.50	0.51
4	15	1.74	382.83	383.52	0.69	0.49	2.51	0.20	383.72	0.000	59.003	383.27	383.79 j	0.52**	0.49	3.57	0.20	383.99	0.000	0.000	n/a	1.00	n/a
5	18	5.63	363.00	364.50	1.50*	1.13	3.18	0.16	364.66	0.287	229.120	368.04	368.95 j	0.91**	1.13	4.99	0.39	369.34	0.607	0.447	n/a	0.63	n/a
6	18	5.41	368.14	369.08	0.94*	1.16	4.65	0.34	369.41	0.518	27.000	368.28	369.22	0.94	1.16	4.65	0.34	369.55	0.517	0.518	0.140	1.22	0.41
7	18	4.77	368.38	369.63	1.25	1.02	3.03	0.34	369.97	0.000	45.912	369.98	370.82 j	0.84**	1.02	4.69	0.34	371.16	0.000	0.000	n/a	1.62	0.55
8	15	3.38	370.08	370.82	0.74	0.76	4.48	0.31	371.13	0.000	244.371	377.31	378.05	0.74**	0.76	4.46	0.31	378.36	0.000	0.000	n/a	1.50	0.46
9	15	2.80	378.23	378.89	0.66*	0.66	4.26	0.27	379.16	0.000	27.044	378.40	379.07	0.67**	0.67	4.17	0.27	379.34	0.000	0.000	n/a	1.00	0.27
10	15	0.42	377.42	378.05	0.63	0.18	0.67	0.09	378.14	0.000	252.428	384.92	385.17 j	0.25**	0.18	2.38	0.09	385.26	0.000	0.000	n/a	1.00	0.09
11	15	0.57	370.18	370.82	0.64	0.63	0.90	0.01	370.83	0.029	27.000	370.32	370.82	0.50	0.46	1.23	0.02	370.85	0.067	0.048	0.013	1.00	0.02
12	15	2.64	368.50	369.75	1.25*	1.23	2.15	0.07	369.82	0.167	94.321	369.03	369.88	0.85	0.89	2.95	0.14	370.02	0.254	0.211	0.199	1.00	0.14
13	15	1.28	369.13	370.02	0.89	0.39	1.37	0.17	370.19	0.000	59.044	369.72	370.17 j	0.45**	0.39	3.26	0.17	370.33	0.000	0.000	n/a	1.50	n/a
14	15	0.19	369.82	370.17	0.35	0.10	0.68	0.06	370.22	0.000	68.947	370.51	370.68 j	0.17**	0.10	1.93	0.06	370.74	0.000	0.000	n/a	1.00	n/a
15	24	10.90	363.50	365.50	2.00*	3.14	3.47	0.19	365.69	0.232	42.000	363.71	365.58	1.87	3.05	3.57	0.20	365.78	0.201	0.216	0.091	1.00	0.20

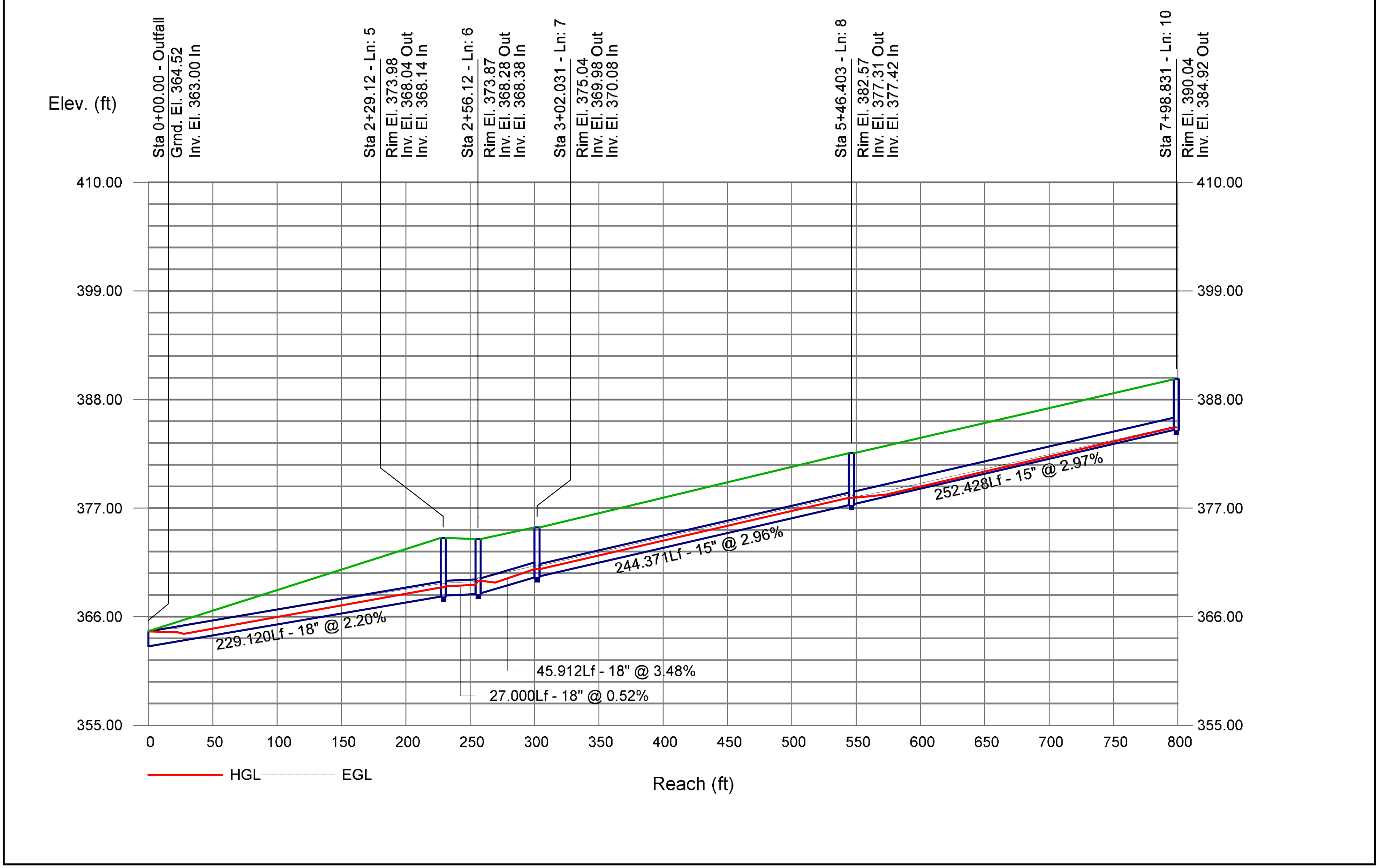
Project File: SCM#1.stm | Number of lines: 15 | Run Date: 12/5/2024

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Storm Sewer Profile

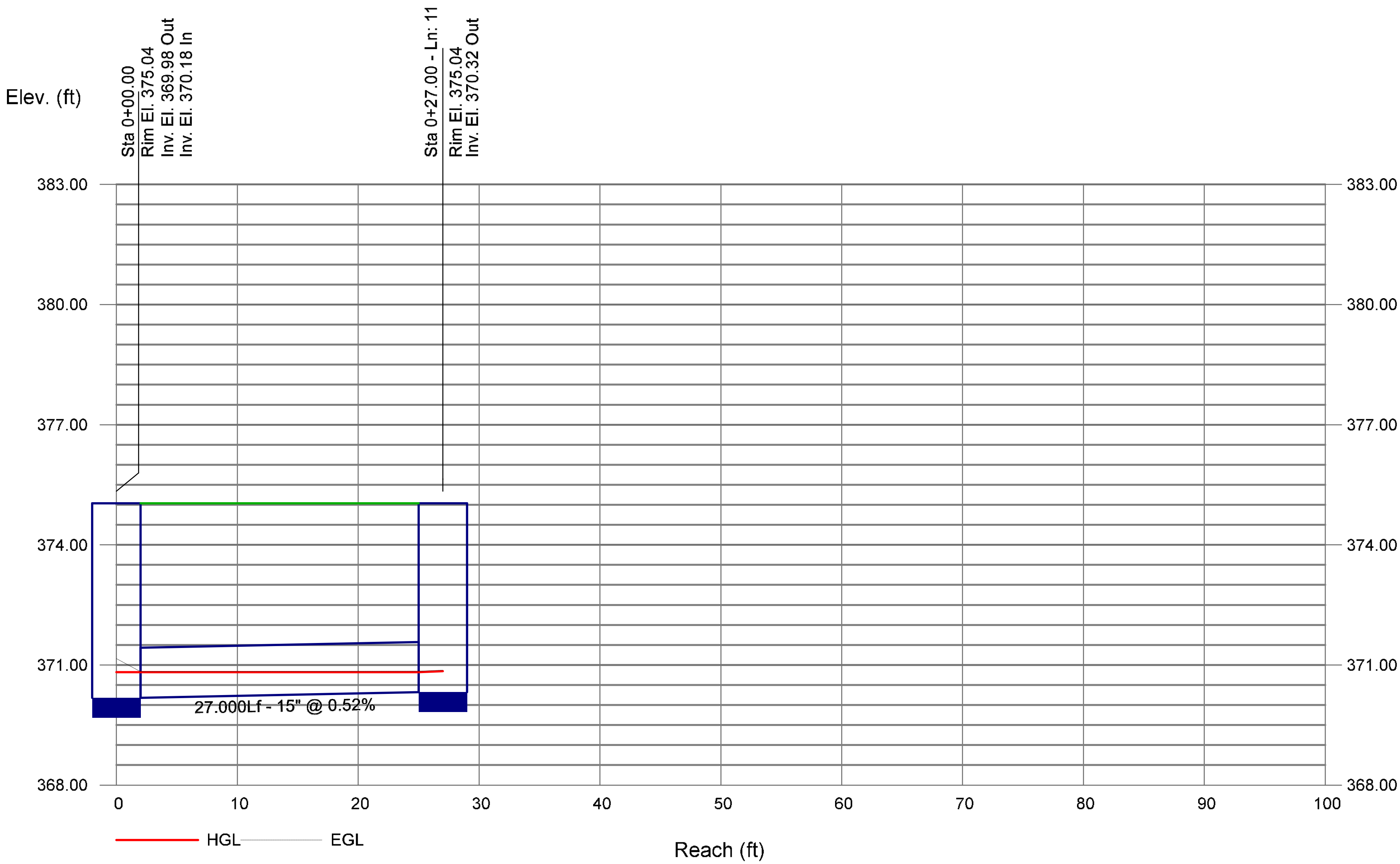
25-Year SCM#1 Profile 5-10

Proj. file: SCM#1.stm



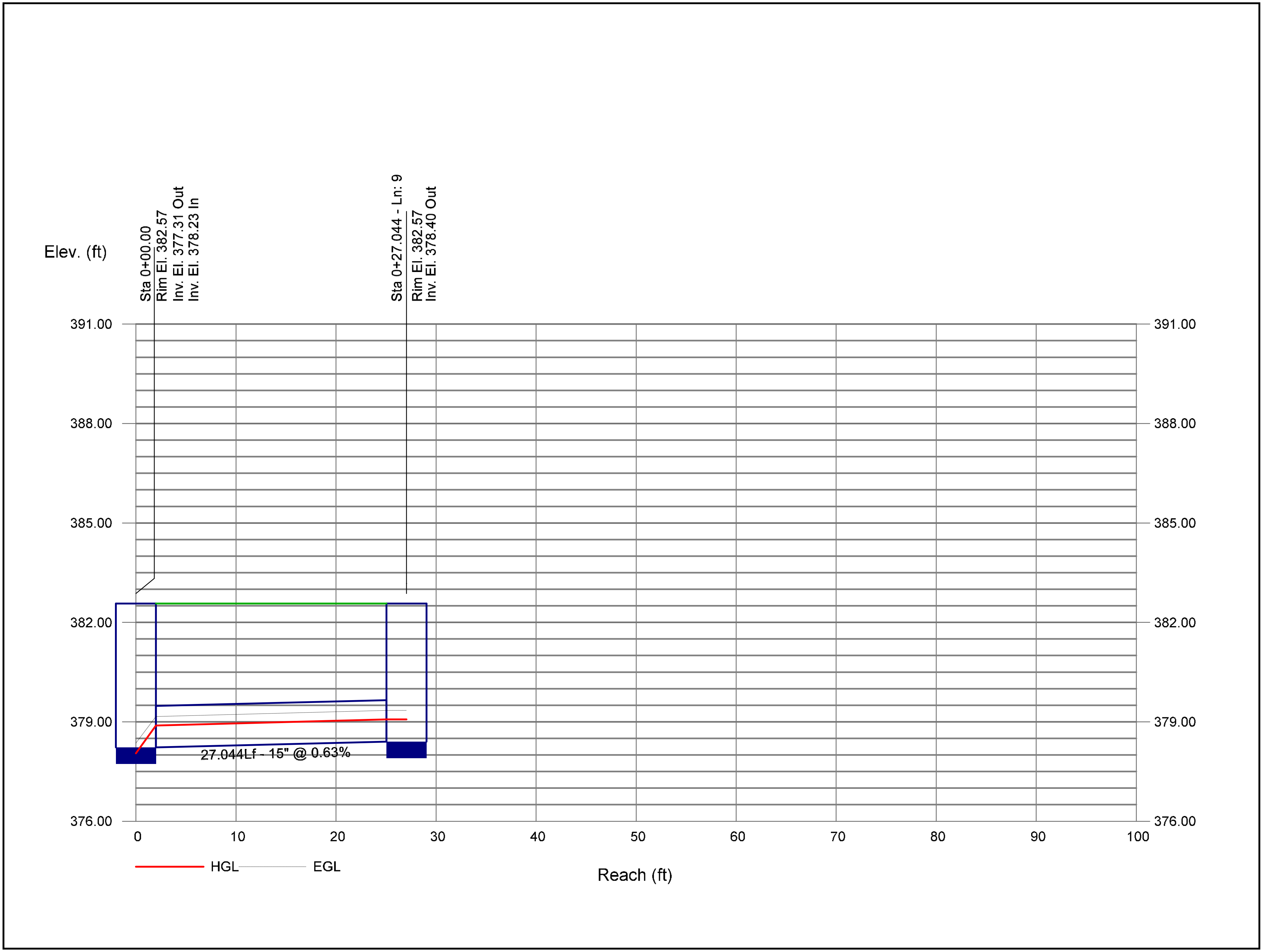
Storm Sewer Profile

25-Year SCM#1 Profile 11-11 Proj. file: SCM#1.stm



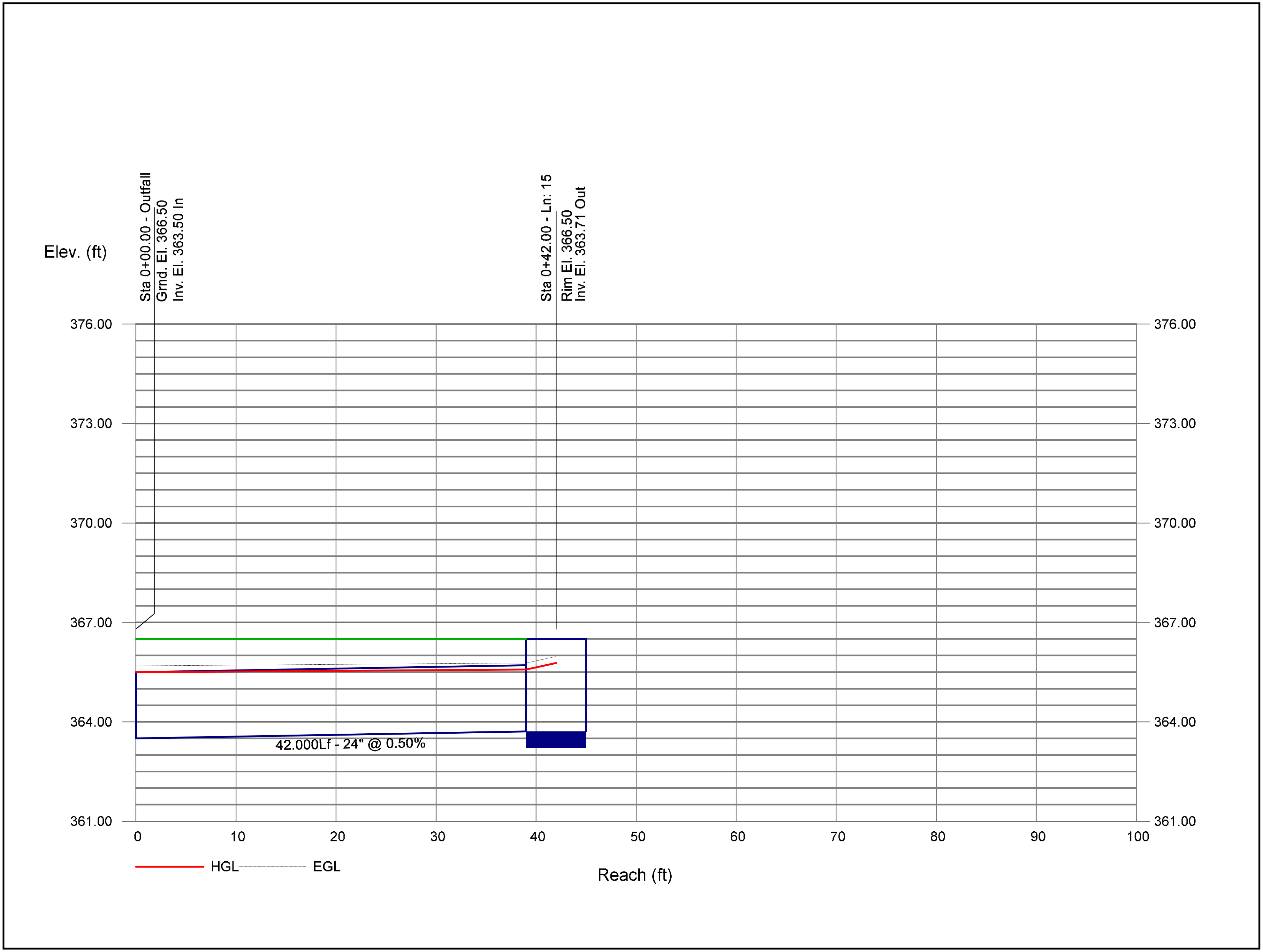
Storm Sewer Profile

25-Year SCM#1 Profile 9-9 Proj. file: SCM#1.stm



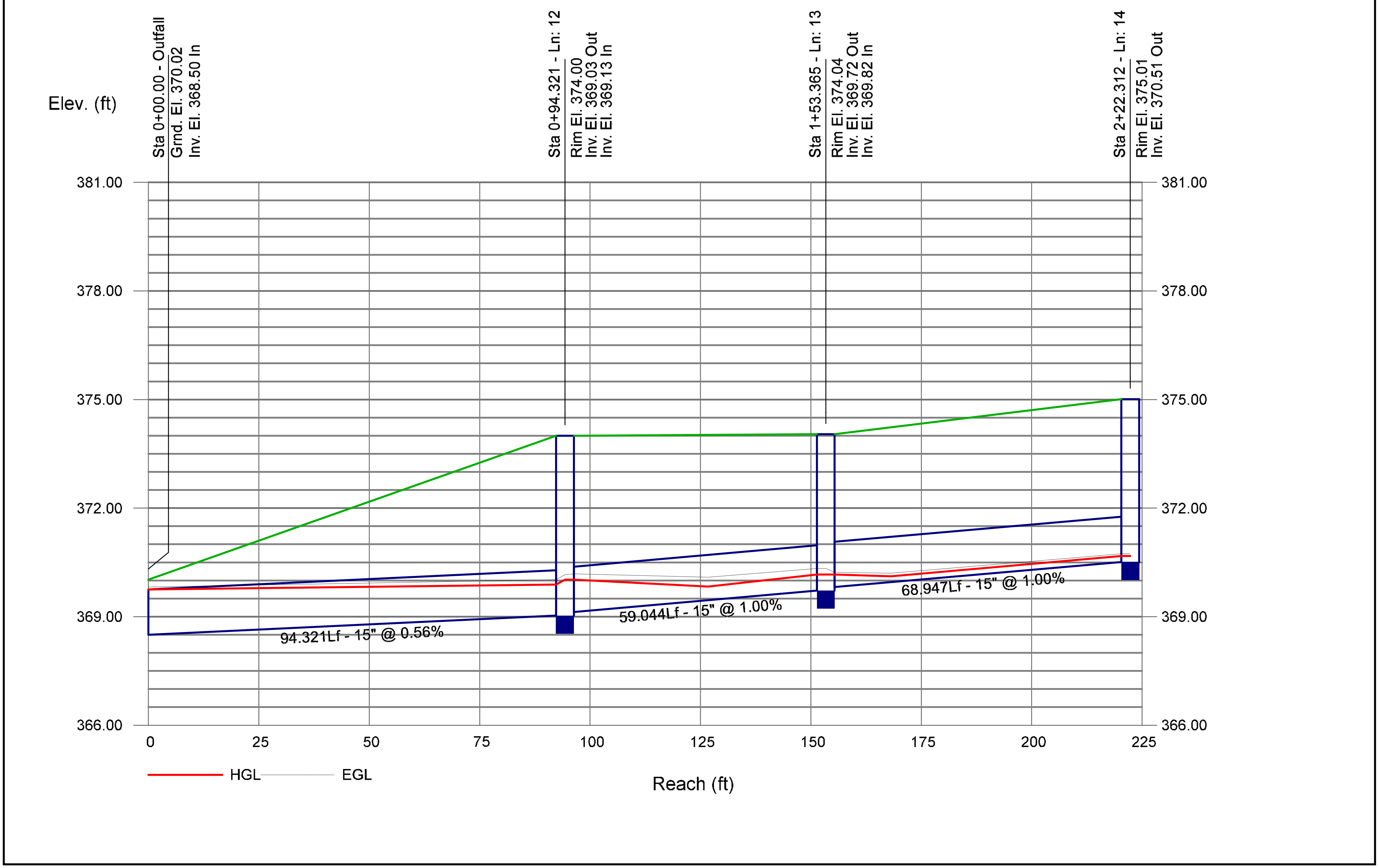
Storm Sewer Profile

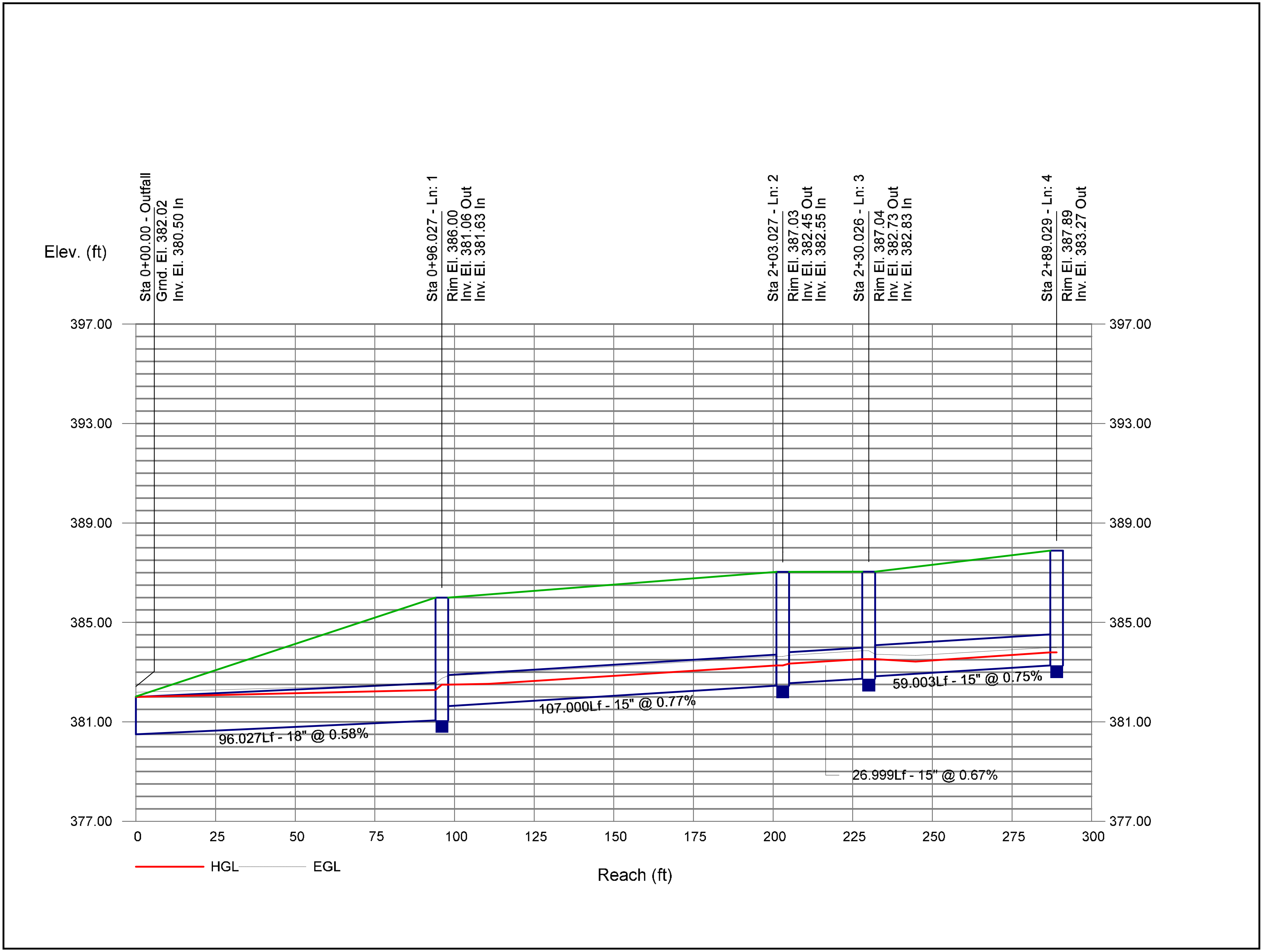
25-Year SCM#1 Profile 15-15 Proj. file: SCM#1.stm



Storm Sewer Profile

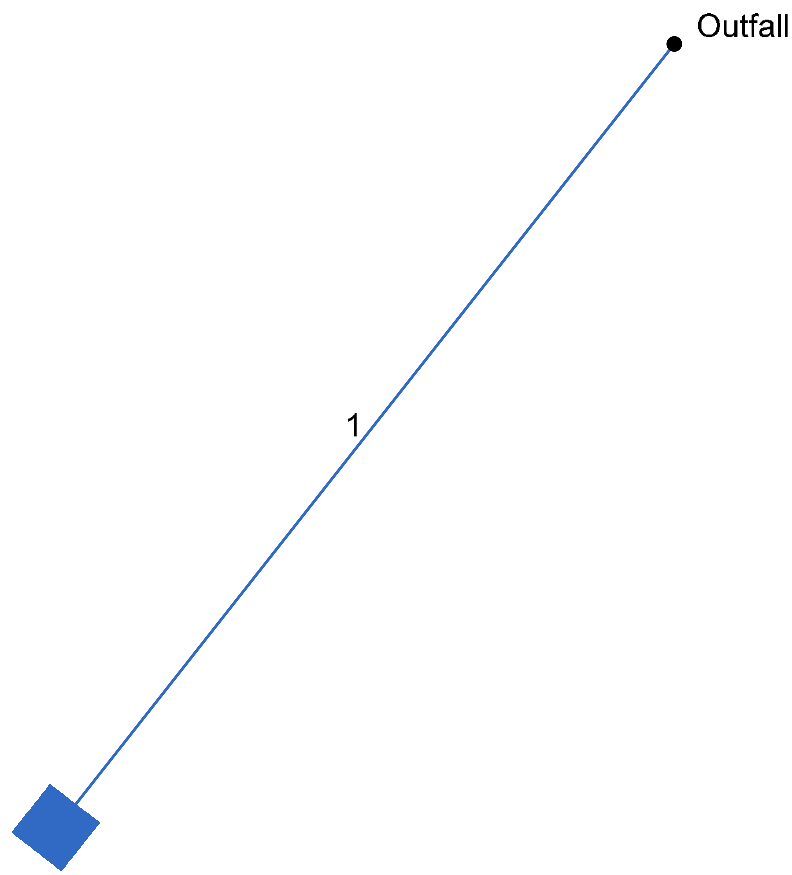
25-Year SCM#1 Profile 12-14 Proj. file: SCM#1.stm




Elev. (ft)
Sta 0+00.00 - Outfall
Grnd. El. 382.02
Inv. El. 380.50 In
Sta 0+96.027 - Ln: 1
Rim El. 386.00
Inv. El. 381.06 Out
Inv. El. 381.63 In
Sta 2+03.027 - Ln: 2
Rim El. 387.03
Inv. El. 382.45 Out
Inv. El. 382.55 In
Sta 2+30.026 - Ln: 3
Rim El. 387.04
Inv. El. 382.73 Out
Inv. El. 382.83 In
Sta 2+89.029 - Ln: 4
Rim El. 387.89
Inv. El. 383.27 Out
397.00
393.00
389.00
385.00
381.00
377.00
96.027Lf - 18" @ 0.58%
107.000Lf - 15" @ 0.77%
26.999Lf - 15" @ 0.67%
59.003Lf - 15" @ 0.75%
0
25
50
75
100
125
150
175
200
225
250
275
300
HGL
EGL
Reach (ft)

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

25-Year SCM#2 Report



Project File: SCM#2.stm	Number of lines: 1	Date: 12/5/2024

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	64.790	128.444	DrGrt	0.00	0.82	0.57	10.0	361.50	1.16	362.25	18	Cir	0.013	1.00	366.00	Pipe - (164)

Project File: SCM#2.stm | Number of lines: 1 | Date: 12/5/2024

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	YI 204	DropGrate	366.00	Rect	4.00	4.00	18	Cir	362.25			

Project File: SCM#2.stm	Number of Structures: 1	Run Date: 12/5/2024

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	Pipe - (164)	3.10	18	Cir	64.790	361.50	362.25	1.158	363.00	363.00	0.19	363.19	End	DropGrate

Project File: SCM#2.stm	Number of lines: 1	Run Date: 12/5/2024

NOTES: Return period = 25 Yrs.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	YI 204	3.10	0.00	3.10	0.00	DrGrt	0.0	0.00	3.00	3.00	3.00	Sag	6.00	0.020	0.020	0.013	0.19	25.49	0.19	25.49	0.0	Off

Project File: SCM#2.stm | Number of lines: 1 | Run Date: 12/5/2024

NOTES: Inlet N-Values = 0.016; Intensity = 62.86 / (Inlet time + 11.00) ^ 0.74; Return period = 25 Yrs. ; * Indicates Known Q added.All curb inlets are throat.

Hydraulic Grade Line Computations

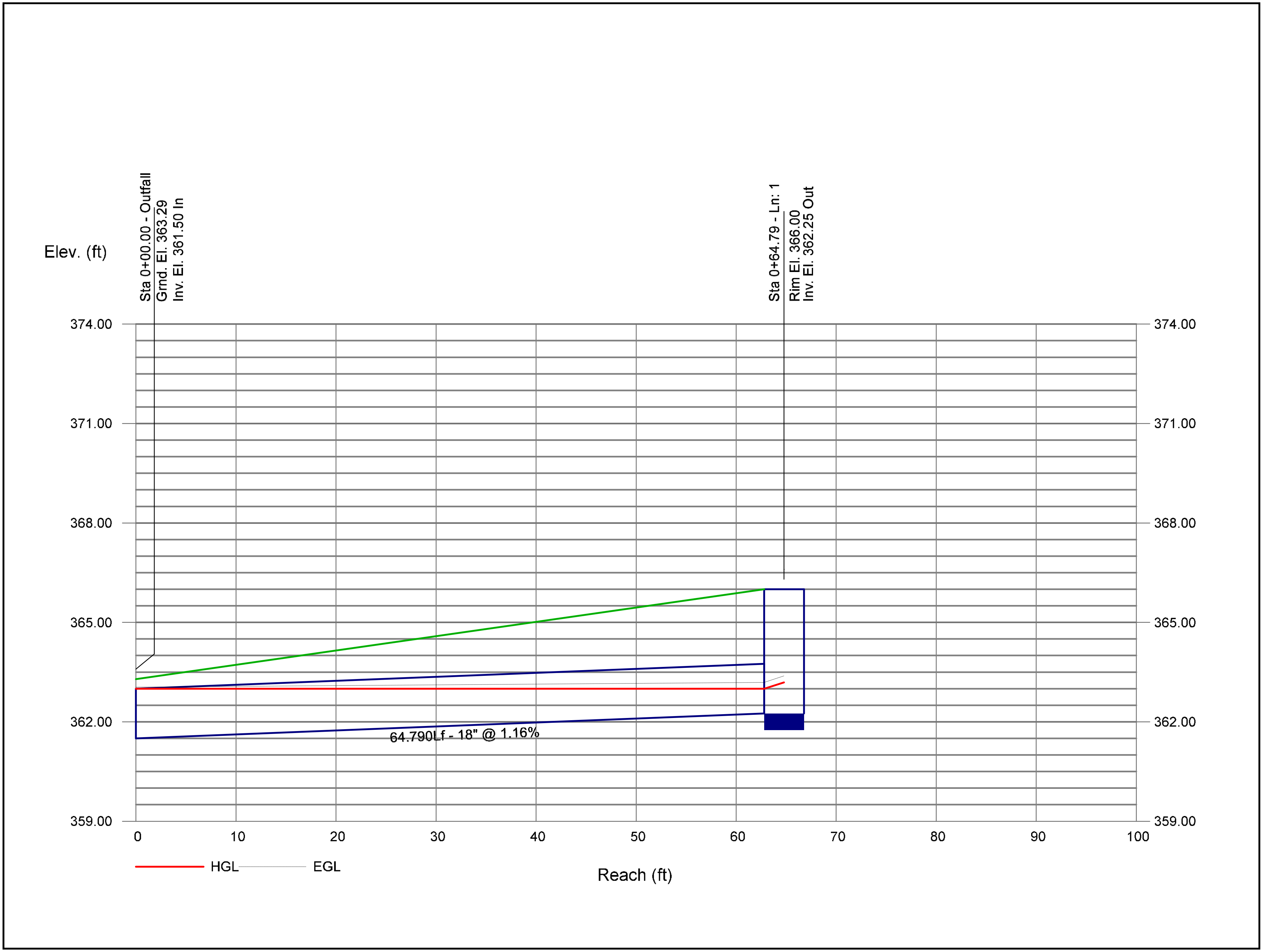
25-Year SCM#2 Report

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
1	18	3.10	361.50	363.00	1.50	1.77	1.76	0.05	363.05	0.087	64.790	362.25	363.00	0.75	0.88	3.52	0.19	363.19	0.352	0.220	0.142	1.00	0.19

Project File: SCM#2.stm	Number of lines: 1	Run Date: 12/5/2024

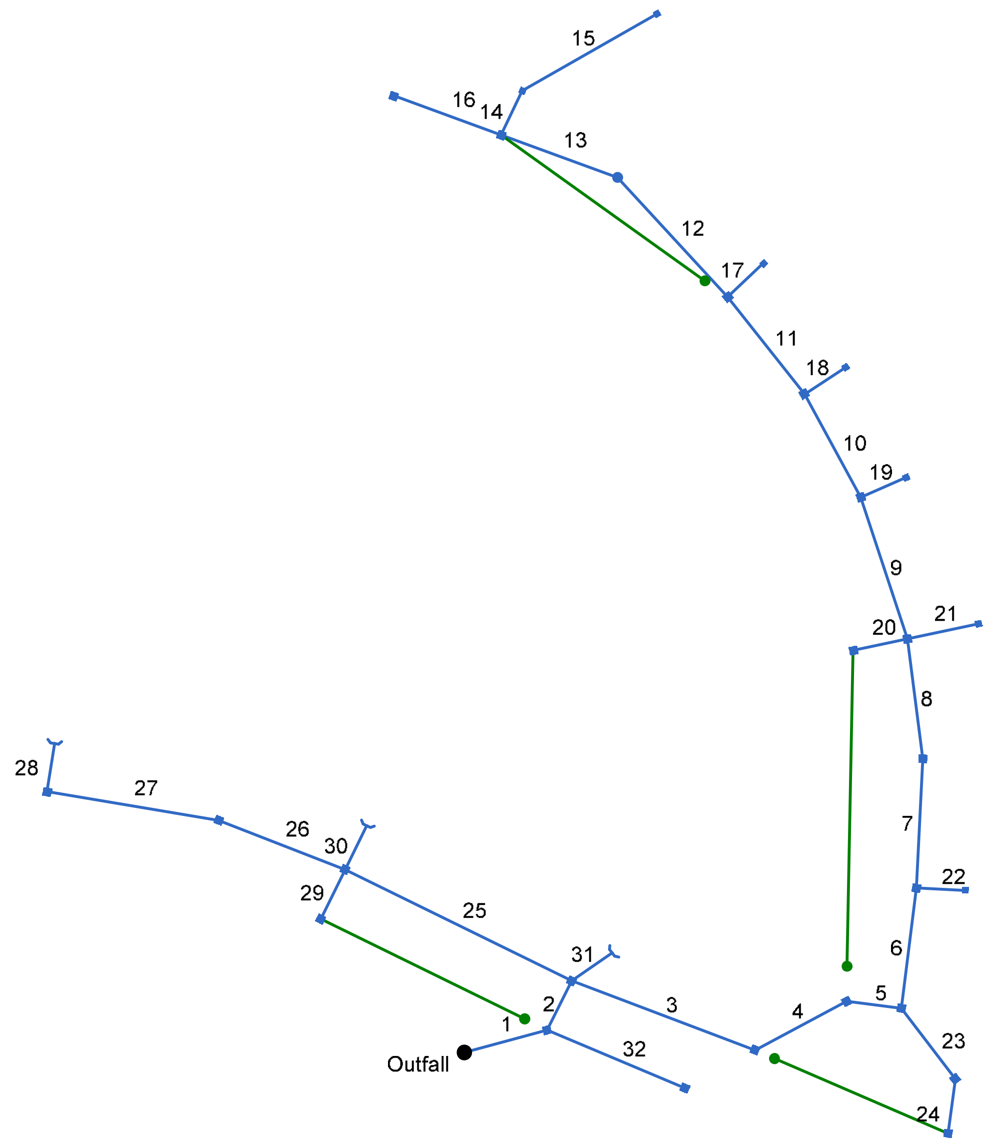
; c = cir e = ellip b = box

Storm Sewer Profile



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

25-Year SCM#3 Report



Project File: SCM#3.stm	Number of lines: 32	Date: 12/5/2024

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	42.067	-15.170	Comb	0.00	0.12	0.57	10.0	361.00	0.50	361.21	36	Cir	0.013	1.18	365.97	Pipe - (51)
2	1	27.000	-48.608	Comb	0.00	0.13	0.57	10.0	361.31	0.48	361.44	36	Cir	0.013	1.50	366.04	Pipe - (50)
3	2	95.970	84.571	Comb	0.00	0.05	0.57	10.0	361.65	0.69	362.31	30	Cir	0.013	1.19	366.98	Pipe - (49) (1)
4	3	50.862	-48.939	Comb	0.00	0.10	0.57	10.0	362.56	0.49	362.81	24	Cir	0.013	0.95	367.04	Pipe - (68)
5	4	27.000	35.381	Comb	0.00	0.08	0.57	10.0	362.91	0.52	363.05	24	Cir	0.013	1.70	367.09	Pipe - (67)
6	5	59.521	-90.000	Comb	0.00	0.05	0.57	10.0	363.34	2.91	365.07	24	Cir	0.013	1.50	370.04	Pipe - (66)
7	6	63.410	-4.578	Comb	0.00	0.06	0.57	10.0	365.15	3.00	367.05	24	Cir	0.013	0.50	373.03	Pipe - (65)
8	7	59.348	-9.943	Comb	0.00	0.07	0.57	10.0	367.15	3.00	368.93	18	Cir	0.013	2.24	374.74	Pipe - (64)
9	8	73.131	-10.753	Comb	0.00	0.05	0.57	10.0	369.43	1.00	370.16	18	Cir	0.013	1.49	375.97	Pipe - (63)
10	9	57.694	-10.618	Comb	0.00	0.05	0.57	10.0	370.26	1.01	370.84	18	Cir	0.013	1.50	376.00	Pipe - (62)
11	10	60.773	-9.612	Comb	0.00	0.29	0.57	10.0	370.94	1.00	371.55	18	Cir	0.013	1.50	377.14	Pipe - (61)
12	11	79.646	-4.271	MH	0.00	0.00	0.57	10.0	373.45	0.50	373.85	15	Cir	0.013	0.52	378.03	Pipe - (60) (1)
13	12	60.480	-27.352	Comb	0.00	0.44	0.57	10.0	373.95	0.50	374.25	15	Cir	0.013	1.50	378.04	Pipe - (60)
14	13	24.001	94.878	DrGrt	0.00	0.24	0.57	10.0	374.75	5.67	376.11	15	Cir	0.013	0.94	382.30	Pipe - (75)
15	14	76.039	35.232	DrGrt	0.00	0.27	0.57	10.0	377.70	2.37	379.50	15	Cir	0.013	1.00	385.27	Pipe - (76)
16	13	55.875	-0.060	Comb	0.00	0.16	0.57	10.0	374.45	1.00	375.01	15	Cir	0.013	1.00	378.78	Pipe - (59)
17	11	24.000	85.069	DrGrt	0.00	0.48	0.57	10.0	373.26	1.00	373.50	15	Cir	0.013	1.00	378.58	Pipe - (78)
18	10	24.000	85.319	DrGrt	0.00	0.31	0.57	10.0	371.60	1.00	371.84	15	Cir	0.013	1.00	376.93	Pipe - (74)
19	9	24.000	84.063	DrGrt	0.00	0.26	0.57	10.0	371.20	5.00	372.40	15	Cir	0.013	1.00	377.58	Pipe - (73)
20	8	27.000	-94.816	Comb	0.00	0.24	0.57	10.0	369.94	0.67	370.12	15	Cir	0.013	1.00	374.73	Pipe - (71)
21	8	35.500	85.182	DrGrt	0.00	0.28	0.57	10.0	369.94	2.99	371.00	15	Cir	0.013	1.00	378.00	Pipe - (72)
22	6	24.000	85.596	DrGrt	0.00	0.54	0.57	10.0	365.80	1.00	366.04	15	Cir	0.013	1.00	372.06	Pipe - (70)
23	5	43.537	45.555	Comb	0.00	0.12	0.57	10.0	363.55	1.01	363.99	24	Cir	0.013	1.12	368.91	Pipe - (56) (1)

Project File: SCM#3.stm	Number of lines: 32	Date: 12/5/2024

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
24	23	27.000	44.445	Comb	0.00	0.39	0.57	10.0	364.58	1.15	364.89	15	Cir	0.013	1.00	368.93	Pipe - (56)
25	2	123.519	-90.000	Comb	0.00	0.04	0.57	10.0	361.54	0.50	362.16	24	Cir	0.013	2.25	367.00	Pipe - (49)
26	25	66.365	-4.879	Comb	0.00	0.05	0.57	10.0	362.67	0.50	363.00	24	Cir	0.013	0.50	367.90	Pipe - (48)
27	26	85.141	-11.831	Comb	0.00	0.26	0.57	10.0	363.20	0.51	363.63	18	Cir	0.013	1.50	368.63	Pipe - (47)
28	27	24.000	89.190	Hdwl	0.00	0.93	0.57	10.0	363.73	0.50	363.85	18	Cir	0.013	1.00	367.00	Pipe - (46)
29	25	27.000	-90.000	Comb	0.00	0.17	0.57	10.0	363.20	0.52	363.34	15	Cir	0.013	1.00	367.03	Pipe - (54)
30	25	24.000	90.193	Hdwl	0.00	1.80	0.57	10.0	362.42	0.50	362.54	24	Cir	0.013	1.00	363.96	Pipe - (53)
31	2	24.000	29.044	Hdwl	0.00	0.70	0.57	10.0	361.94	1.04	362.19	18	Cir	0.013	1.00	363.71	Pipe - (55)
32	1	73.029	38.107	Comb	0.00	0.07	0.57	10.0	362.30	0.48	362.65	24	Cir	0.013	1.00	366.75	Pipe - (58)

Project File: SCM#3.stm	Number of lines: 32	Date: 12/5/2024

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure Shape	Structure Length (ft)	Structure Width (ft)	Line Out Size (in)	Line Out Shape	Line Out Invert (ft)	Line In Size (in)	Line In Shape	Line In Invert (ft)
1	CB 301	Combination	365.97	Rect	4.00	4.00	36	Cir	361.21	36 24	Cir Cir	361.31 362.30
2	CB 302	Combination	366.04	Rect	4.00	4.00	36	Cir	361.44	30 24 18	Cir Cir Cir	361.65 361.54 361.94
3	CB 304	Combination	366.98	Rect	4.00	4.00	30	Cir	362.31	24	Cir	362.56
4	CB 307	Combination	367.04	Rect	4.00	4.00	24	Cir	362.81	24	Cir	362.91
5	CB 308	Combination	367.09	Rect	4.00	4.00	24	Cir	363.05	24 24	Cir Cir	363.34 363.55
6	CB 309	Combination	370.04	Rect	4.00	4.00	24	Cir	365.07	24 15	Cir Cir	365.15 365.80
7	CB 311	Combination	373.03	Rect	4.00	4.00	24	Cir	367.05	18	Cir	367.15
8	CB 312	Combination	374.74	Rect	4.00	4.00	18	Cir	368.93	18 15 15	Cir Cir Cir	369.43 369.94 369.94
9	CB 315	Combination	375.97	Rect	4.00	4.00	18	Cir	370.16	18 15	Cir Cir	370.26 371.20
10	CB 317	Combination	376.00	Rect	4.00	4.00	18	Cir	370.84	18 15	Cir Cir	370.94 371.60
11	CB 319	Combination	377.14	Rect	4.00	4.00	18	Cir	371.55	15 15	Cir Cir	373.45 373.26
12	JB 176	Manhole	378.03	Cir	4.00	4.00	15	Cir	373.85	15	Cir	373.95
13	CB 323	Combination	378.04	Rect	4.00	4.00	15	Cir	374.25	15 15	Cir Cir	374.75 374.45
14	YI 324	DropGrate	382.30	Rect	3.00	3.00	15	Cir	376.11	15	Cir	377.70
15	YI 322	DropGrate	385.27	Rect	3.00	3.00	15	Cir	379.50			
16	CB 325	Combination	378.78	Rect	4.00	4.00	15	Cir	375.01			
17	YI 320	DropGrate	378.58	Rect	3.00	3.00	15	Cir	373.50			

Project File: SCM#3.stm	Number of Structures: 32	Run Date: 12/5/2024

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure Shape	Structure Length (ft)	Structure Width (ft)	Line Out Size (in)	Line Out Shape	Line Out Invert (ft)	Line In Size (in)	Line In Shape	Line In Invert (ft)
18	YI 318	DropGrate	376.93	Rect	3.00	3.00	15	Cir	371.84			
19	YI 316	DropGrate	377.58	Rect	3.00	3.00	15	Cir	372.40			
20	CB 313	Combination	374.73	Rect	4.00	4.00	15	Cir	370.12			
21	YI 314	DropGrate	378.00	Rect	3.00	3.00	15	Cir	371.00			
22	YI 310	DropGrate	372.06	Rect	3.00	3.00	15	Cir	366.04			
23	CB 306	Combination	368.91	Rect	4.00	4.00	24	Cir	363.99	15	Cir	364.58
24	CB 305	Combination	368.93	Rect	4.00	4.00	15	Cir	364.89			
25	CB 330	Combination	367.00	Rect	4.00	4.00	24	Cir	362.16	24 15 24	Cir Cir Cir	362.67 363.20 362.42
26	CB 333	Combination	367.90	Rect	4.00	4.00	24	Cir	363.00	18	Cir	363.20
27	CB 334	Combination	368.63	Rect	4.00	4.00	18	Cir	363.63	18	Cir	363.73
28	FES INLET 335	OpenHeadwall	367.00	n/a	n/a	n/a	18	Cir	363.85			
29	CB 332	Combination	367.03	Rect	4.00	4.00	15	Cir	363.34			
30	FES INLET 331	OpenHeadwall	363.96	n/a	n/a	n/a	24	Cir	362.54			
31	FES INLET 302 A	OpenHeadwall	363.71	n/a	n/a	n/a	18	Cir	362.19			
32	CB 303	Combination	366.75	Rect	4.00	4.00	24	Cir	362.65			

Project File: SCM#3.stm	Number of Structures: 32	Run Date: 12/5/2024

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	Pipe - (51)	23.21	36	Cir	42.067	361.00	361.21	0.499	364.00	364.04	0.21	364.25	End	Combination
2	Pipe - (50)	29.76	36	Cir	27.000	361.31	361.44	0.481	364.25	363.21	1.10	363.21	1	Combination
3	Pipe - (49) (1)	15.80	30	Cir	95.970	361.65	362.31	0.688	363.21	363.65	n/a	363.65 j	2	Combination
4	Pipe - (68)	15.70	24	Cir	50.862	362.56	362.81	0.492	364.18	364.43	0.49	364.92	3	Combination
5	Pipe - (67)	15.40	24	Cir	27.000	362.91	363.05	0.518	364.92	365.04	0.64	365.68	4	Combination
6	Pipe - (66)	13.40	24	Cir	59.521	363.34	365.07	2.907	365.68	366.39	n/a	366.39 j	5	Combination
7	Pipe - (65)	11.39	24	Cir	63.410	365.15	367.05	2.996	366.39	368.26	n/a	368.26 j	6	Combination
8	Pipe - (64)	11.22	18	Cir	59.348	367.15	368.93	2.999	368.26	370.21	n/a	370.21	7	Combination
9	Pipe - (63)	9.17	18	Cir	73.131	369.43	370.16	0.998	370.52	371.33	0.89	371.33	8	Combination
10	Pipe - (62)	8.10	18	Cir	57.694	370.26	370.84	1.005	371.33	371.94	n/a	371.94	9	Combination
11	Pipe - (61)	6.84	18	Cir	60.773	370.94	371.55	1.004	371.94	372.56	n/a	372.56	10	Combination
12	Pipe - (60) (1)	4.08	15	Cir	79.646	373.45	373.85	0.500	374.37	374.77	0.14	374.91	11	Manhole
13	Pipe - (60)	4.11	15	Cir	60.480	373.95	374.25	0.496	374.91	375.18	0.41	375.59	12	Combination
14	Pipe - (75)	1.91	15	Cir	24.001	374.75	376.11	5.666	375.59	376.66	n/a	376.66 j	13	DropGrate
15	Pipe - (76)	1.02	15	Cir	76.039	377.70	379.50	2.367	377.97	379.90	n/a	379.90	14	DropGrate
16	Pipe - (59)	0.61	15	Cir	55.875	374.45	375.01	1.002	375.59	375.31	0.11	375.31	13	Combination
17	Pipe - (78)	1.82	15	Cir	24.000	373.26	373.50	1.000	373.71	374.04	0.20	374.04	11	DropGrate
18	Pipe - (74)	1.17	15	Cir	24.000	371.60	371.84	1.000	371.96	372.27	0.16	372.27	10	DropGrate
19	Pipe - (73)	0.98	15	Cir	24.000	371.20	372.40	5.000	371.42	372.79	n/a	372.79	9	DropGrate
20	Pipe - (71)	0.91	15	Cir	27.000	369.94	370.12	0.667	370.29	370.49	n/a	370.49	8	Combination
21	Pipe - (72)	1.06	15	Cir	35.500	369.94	371.00	2.986	370.21	371.40	0.15	371.40	8	DropGrate
22	Pipe - (70)	2.04	15	Cir	24.000	365.80	366.04	1.000	366.39	366.61	n/a	366.61 j	6	DropGrate
23	Pipe - (56) (1)	1.92	24	Cir	43.537	363.55	363.99	1.011	365.68	365.68	0.01	365.69	5	Combination
24	Pipe - (56)	1.48	15	Cir	27.000	364.58	364.89	1.148	365.69	365.37	n/a	365.37	23	Combination

Project File: SCM#3.stm | Number of lines: 32 | Run Date: 12/5/2024

NOTES: Return period = 25 Yrs. ; j - Line contains hyd. jump.

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
25	Pipe - (49)	11.93	24	Cir	123.519	361.54	362.16	0.502	363.21	363.49	1.02	364.51	2	Combination
26	Pipe - (48)	4.61	24	Cir	66.365	362.67	363.00	0.497	364.51	363.75	0.14	363.75	25	Combination
27	Pipe - (47)	4.48	18	Cir	85.141	363.20	363.63	0.505	364.04	364.47	0.45	364.92	26	Combination
28	Pipe - (46)	3.52	18	Cir	24.000	363.73	363.85	0.500	364.92	364.94	0.10	365.04	27	OpenHeadwall
29	Pipe - (54)	0.64	15	Cir	27.000	363.20	363.34	0.518	364.51	364.51	0.00	364.51	25	Combination
30	Pipe - (53)	6.81	24	Cir	24.000	362.42	362.54	0.500	364.51	364.53	0.07	364.60	25	OpenHeadwall
31	Pipe - (55)	2.65	18	Cir	24.000	361.94	362.19	1.042	363.21	362.81	n/a	362.81	2	OpenHeadwall
32	Pipe - (58)	0.26	24	Cir	73.029	362.30	362.65	0.479	364.25	364.25	0.00	364.25	1	Combination

Project File: SCM#3.stm	Number of lines: 32	Run Date: 12/5/2024

NOTES: Return period = 25 Yrs. ; j - Line contains hyd. jump.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	CB 301	0.45	0.09	0.55	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	0.06	1.82	0.23	1.82	2.0	Off
2	CB 302	0.49	0.05	0.54	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	0.06	1.81	0.22	1.81	2.0	Off
3	CB 304	0.19	0.33	0.47	0.05	Comb	6.0	1.50	0.00	3.00	2.50	0.014	2.00	0.040	0.020	0.013	0.12	4.20	0.22	1.28	2.0	2
4	CB 307	0.38	0.18	0.55	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	0.06	1.84	0.23	1.84	2.0	Off
5	CB 308	0.30	0.01	0.32	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	0.00	1.36	0.17	1.36	2.0	Off
6	CB 309	0.19	0.00	0.19	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.050	2.00	0.040	0.020	0.013	0.07	1.72	0.17	0.00	2.0	5
7	CB 311	0.23	0.01	0.23	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.040	2.00	0.040	0.020	0.013	0.08	1.94	0.17	0.00	2.0	6
8	CB 312	0.26	0.01	0.27	0.01	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.11	3.28	0.19	0.69	2.0	7
9	CB 315	0.19	0.09	0.27	0.01	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.11	3.32	0.20	0.72	2.0	8
10	CB 317	0.19	0.46	0.56	0.09	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.14	5.10	0.24	1.76	2.0	9
11	CB 319	1.10	0.49	1.12	0.46	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.19	7.51	0.29	4.33	2.0	10
12	JB 176	0.00	0.00	0.00	0.00	MH	0.0	2.00	0.00	2.00	0.00	0.000	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
13	CB 323	1.66	0.09	1.26	0.49	Comb	6.0	1.50	0.00	3.00	2.50	0.020	2.00	0.040	0.020	0.013	0.18	6.77	0.28	3.73	2.0	11
14	YI 324	0.91	0.00	0.91	0.00	DrGrt	0.0	0.00	4.00	2.00	2.00	Sag	3.00	0.020	0.020	0.013	0.11	14.26	0.11	14.26	0.0	Off
15	YI 322	1.02	0.00	1.02	0.00	DrGrt	0.0	0.00	4.00	2.00	2.00	Sag	3.00	0.020	0.020	0.013	0.12	15.18	0.12	15.18	0.0	Off
16	CB 325	0.61	0.00	0.52	0.09	Comb	6.0	1.50	0.00	3.00	2.50	0.005	2.00	0.040	0.020	0.013	0.16	5.76	0.25	2.00	2.0	13
17	YI 320	1.82	0.00	1.82	0.00	DrGrt	0.0	0.00	4.00	2.00	2.00	Sag	3.00	0.020	0.020	0.013	0.18	20.87	0.18	20.87	0.0	Off
18	YI 318	1.17	0.00	1.17	0.00	DrGrt	0.0	0.00	4.00	2.00	2.00	Sag	3.00	0.020	0.020	0.013	0.13	16.35	0.13	16.35	0.0	Off
19	YI 316	0.98	0.00	0.98	0.00	DrGrt	0.0	0.00	4.00	2.00	2.00	Sag	3.00	0.020	0.020	0.013	0.12	14.88	0.12	14.88	0.0	Off
20	CB 313	0.91	0.00	0.73	0.18	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.16	5.91	0.26	2.51	2.0	4
21	YI 314	1.06	0.00	1.06	0.00	DrGrt	0.0	0.00	4.00	2.00	2.00	Sag	3.00	0.020	0.020	0.013	0.12	15.48	0.12	15.48	0.0	Off
22	YI 310	2.04	0.00	2.04	0.00	DrGrt	0.0	0.00	4.00	2.00	2.00	Sag	3.00	0.020	0.020	0.013	0.19	22.34	0.19	22.34	0.0	Off
23	CB 306	0.45	0.00	0.44	0.01	Comb	6.0	1.50	0.00	3.00	2.50	0.029	2.00	0.040	0.020	0.013	0.10	3.23	0.20	0.73	2.0	5

Project File: SCM#3.stm	Number of lines: 32	Run Date: 12/5/2024

NOTES: Inlet N-Values = 0.016; Intensity = 62.86 / (Inlet time + 11.00) ^ 0.74; Return period = 25 Yrs. ; * Indicates Known Q added.All curb inlets are throat.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
24	CB 305	1.48	0.00	1.15	0.33	Comb	6.0	1.50	0.00	3.00	2.50	0.029	2.00	0.040	0.020	0.013	0.16	5.79	0.26	2.66	2.0	3
25	CB 330	0.15	0.03	0.18	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.09	2.52	0.18	0.23	2.0	2
26	CB 333	0.19	0.20	0.37	0.03	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.12	3.99	0.21	1.10	2.0	25
27	CB 334	0.98	0.00	0.78	0.20	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.16	6.12	0.26	2.76	2.0	26
28	FES INLET 335	3.52	0.00	3.52	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	3.00	0.020	0.020	0.013	0.00	0.00	0.00	0.00	0.0	Off
29	CB 332	0.64	0.00	0.56	0.09	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.14	5.06	0.24	1.74	2.0	1
30	FES INLET 331	6.81	0.00	6.81	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	Off
31	FES INLET 302 A	2.65	0.00	2.65	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.013	0.00	0.00	0.00	0.00	0.0	Off
32	CB 303	0.26	0.00	0.26	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.014	2.00	0.040	0.020	0.013	0.10	2.92	0.19	0.51	2.0	1

Project File: SCM#3.stm | Number of lines: 32 | Run Date: 12/5/2024

NOTES: Inlet N-Values = 0.016; Intensity = 62.86 / (Inlet time + 11.00) ^ 0.74; Return period = 25 Yrs. ; * Indicates Known Q added.All curb inlets are throat.

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
1	36	23.21	361.00	364.00	3.00	7.07	3.28	0.17	364.17	0.121	42.067	361.21	364.04	2.83	6.91	3.36	0.18	364.21	0.105	0.113	0.048	1.18	0.21
2	36	29.76	361.31	364.25	2.94	4.33	4.23	0.74	364.98	0.180	27.000	361.44	363.21	1.77**	4.33	6.88	0.74	363.94	0.171	0.176	n/a	1.50	1.10
3	30	15.80	361.65	363.21	1.56	2.68	4.92	0.54	363.75	0.136	95.970	362.31	363.65 j	1.34**	2.68	5.89	0.54	364.19	0.136	0.136	n/a	1.19	n/a
4	24	15.70	362.56	364.18	1.62*	2.73	5.75	0.51	364.70	0.491	50.862	362.81	364.43	1.62	2.73	5.75	0.51	364.95	0.491	0.491	0.250	0.95	0.49
5	24	15.40	362.91	364.92	2.00	3.14	4.90	0.37	365.29	0.464	27.000	363.05	365.04	1.99	3.14	4.90	0.37	365.42	0.441	0.452	0.122	1.70	0.64
6	24	13.40	363.34	365.68	2.00	2.19	4.27	0.28	365.96	0.351	59.521	365.07	366.39 j	1.32**	2.19	6.11	0.58	366.97	0.592	0.472	n/a	1.50	0.87
7	24	11.39	365.15	366.39	1.24	1.99	5.58	0.51	366.90	0.239	63.410	367.05	368.26 j	1.21**	1.99	5.73	0.51	368.77	0.541	0.390	n/a	0.50	n/a
8	18	11.22	367.15	368.26	1.11	1.40	8.01	0.76	369.02	0.000	59.348	368.93	370.21	1.28**	1.61	6.99	0.76	370.97	0.000	0.000	n/a	2.24	n/a
9	18	9.17	369.43	370.52	1.09*	1.37	6.69	0.60	371.11	0.000	73.131	370.16	371.33	1.17**	1.48	6.20	0.60	371.93	0.000	0.000	n/a	1.49	0.89
10	18	8.10	370.26	371.33	1.07	1.35	6.00	0.53	371.86	0.000	57.694	370.84	371.94	1.10**	1.39	5.82	0.53	372.47	0.000	0.000	n/a	1.50	n/a
11	18	6.84	370.94	371.94	1.00	1.25	5.46	0.45	372.39	0.000	60.773	371.55	372.56	1.01**	1.27	5.40	0.45	373.01	0.000	0.000	n/a	1.50	n/a
12	15	4.08	373.45	374.37	0.92*	0.97	4.21	0.28	374.65	0.500	79.646	373.85	374.77	0.92	0.97	4.21	0.28	375.04	0.502	0.501	0.399	0.52	0.14
13	15	4.11	373.95	374.91	0.96	1.01	4.06	0.26	375.17	0.461	60.480	374.25	375.18	0.93	0.98	4.18	0.27	375.46	0.492	0.476	0.288	1.50	0.41
14	15	1.91	374.75	375.59	0.84	0.52	2.17	0.21	375.80	0.000	24.001	376.11	376.66 j	0.55**	0.52	3.68	0.21	376.87	0.000	0.000	n/a	0.94	0.20
15	15	1.02	377.70	377.97	0.27*	0.20	5.21	0.14	378.12	0.000	76.039	379.50	379.90	0.40**	0.34	3.05	0.14	380.04	0.000	0.000	n/a	1.00	n/a
16	15	0.61	374.45	375.59	1.14	0.23	0.51	0.11	375.70	0.000	55.875	375.01	375.31	0.30**	0.23	2.63	0.11	375.42	0.000	0.000	n/a	1.00	0.11
17	15	1.82	373.26	373.71	0.45*	0.40	4.52	0.20	373.92	0.000	24.000	373.50	374.04	0.54**	0.50	3.62	0.20	374.24	0.000	0.000	n/a	1.00	0.20
18	15	1.17	371.60	371.96	0.36*	0.29	4.00	0.16	372.12	0.000	24.000	371.84	372.27	0.43**	0.37	3.17	0.16	372.42	0.000	0.000	n/a	1.00	0.16
19	15	0.98	371.20	371.42	0.22*	0.15	6.72	0.14	371.56	0.000	24.000	372.40	372.79	0.39**	0.33	3.01	0.14	372.93	0.000	0.000	n/a	1.00	n/a
20	15	0.91	369.94	370.29	0.35*	0.28	3.21	0.14	370.43	0.000	27.000	370.12	370.49	0.37**	0.31	2.95	0.14	370.63	0.000	0.000	n/a	1.00	n/a
21	15	1.06	369.94	370.21	0.27	0.19	5.45	0.15	370.36	0.000	35.500	371.00	371.40	0.40**	0.34	3.08	0.15	371.55	0.000	0.000	n/a	1.00	0.15

Project File: SCM#3.stm | Number of lines: 32 | Run Date: 12/5/2024

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

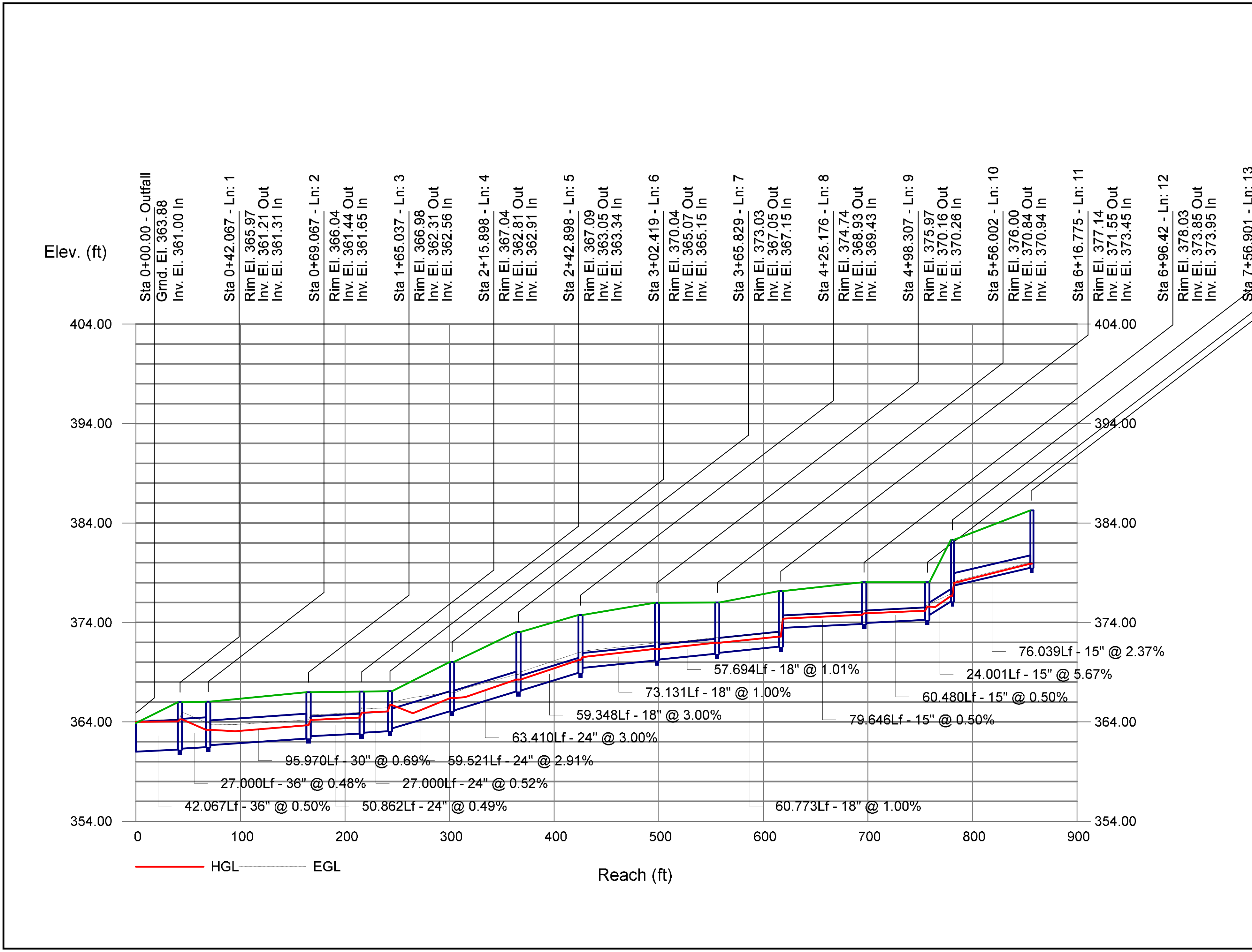
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
(1)	(in) (2)	(cfs) (3)	(ft) (4)	(ft) (5)	(ft) (6)	(sqft) (7)	(ft/s) (8)	(ft) (9)	(ft) (10)	(%) (11)	(ft) (12)	(ft) (13)	(ft) (14)	(ft) (15)	(sqft) (16)	(ft/s) (17)	(ft) (18)	(ft) (19)	(%) (20)	(%) (21)	(ft) (22)	(K) (23)	(ft) (24)
22	15	2.04	365.80	366.39	0.59	0.54	3.61	0.22	366.61	0.100	24.000	366.04	366.61 j	0.57**	0.54	3.76	0.22	366.83	0.087	0.093	n/a	1.00	n/a
23	24	1.92	363.55	365.68	2.00	3.14	0.61	0.01	365.68	0.007	43.537	363.99	365.68	1.69	2.83	0.68	0.01	365.69	0.007	0.007	0.003	1.12	0.01
24	15	1.48	364.58	365.69	1.11	0.43	1.28	0.18	365.87	0.052	27.000	364.89	365.37	0.48**	0.43	3.40	0.18	365.55	0.052	0.052	n/a	1.00	n/a
25	24	11.93	361.54	363.21	1.67	2.80	4.27	0.28	363.49	0.271	123.519	362.16	363.49	1.33	2.21	5.40	0.45	363.94	0.460	0.365	0.451	2.25	1.02
26	24	4.61	362.67	364.51	1.83	1.09	1.53	0.28	364.79	0.041	66.365	363.00	363.75	0.75**	1.09	4.25	0.28	364.04	0.041	0.041	n/a	0.50	0.14
27	18	4.48	363.20	364.04	0.84*	1.01	4.41	0.30	364.34	0.504	85.141	363.63	364.47	0.84	1.01	4.41	0.30	364.77	0.505	0.505	0.430	1.50	0.45
28	18	3.52	363.73	364.92	1.19	1.51	2.34	0.08	365.01	0.119	24.000	363.85	364.94	1.09	1.37	2.57	0.10	365.04	0.147	0.133	0.032	1.00	0.10
29	15	0.64	363.20	364.51	1.25	1.23	0.52	0.00	364.51	0.010	27.000	363.34	364.51	1.17	1.19	0.54	0.00	364.51	0.009	0.009	0.002	1.00	0.00
30	24	6.81	362.42	364.51	2.00	3.14	2.17	0.07	364.58	0.091	24.000	362.54	364.53	1.99	3.14	2.17	0.07	364.60	0.085	0.088	0.021	1.00	0.07
31	18	2.65	361.94	363.21	1.27	0.68	1.67	0.23	363.44	0.064	24.000	362.19	362.81	0.62**	0.68	3.87	0.23	363.04	0.064	0.064	n/a	1.00	n/a
32	24	0.26	362.30	364.25	1.95	3.12	0.08	0.00	364.25	0.000	73.029	362.65	364.25	1.60	2.69	0.10	0.00	364.25	0.000	0.000	0.000	1.00	0.00

Project File: SCM#3.stm | Number of lines: 32 | Run Date: 12/5/2024

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Storm Sewer Profile

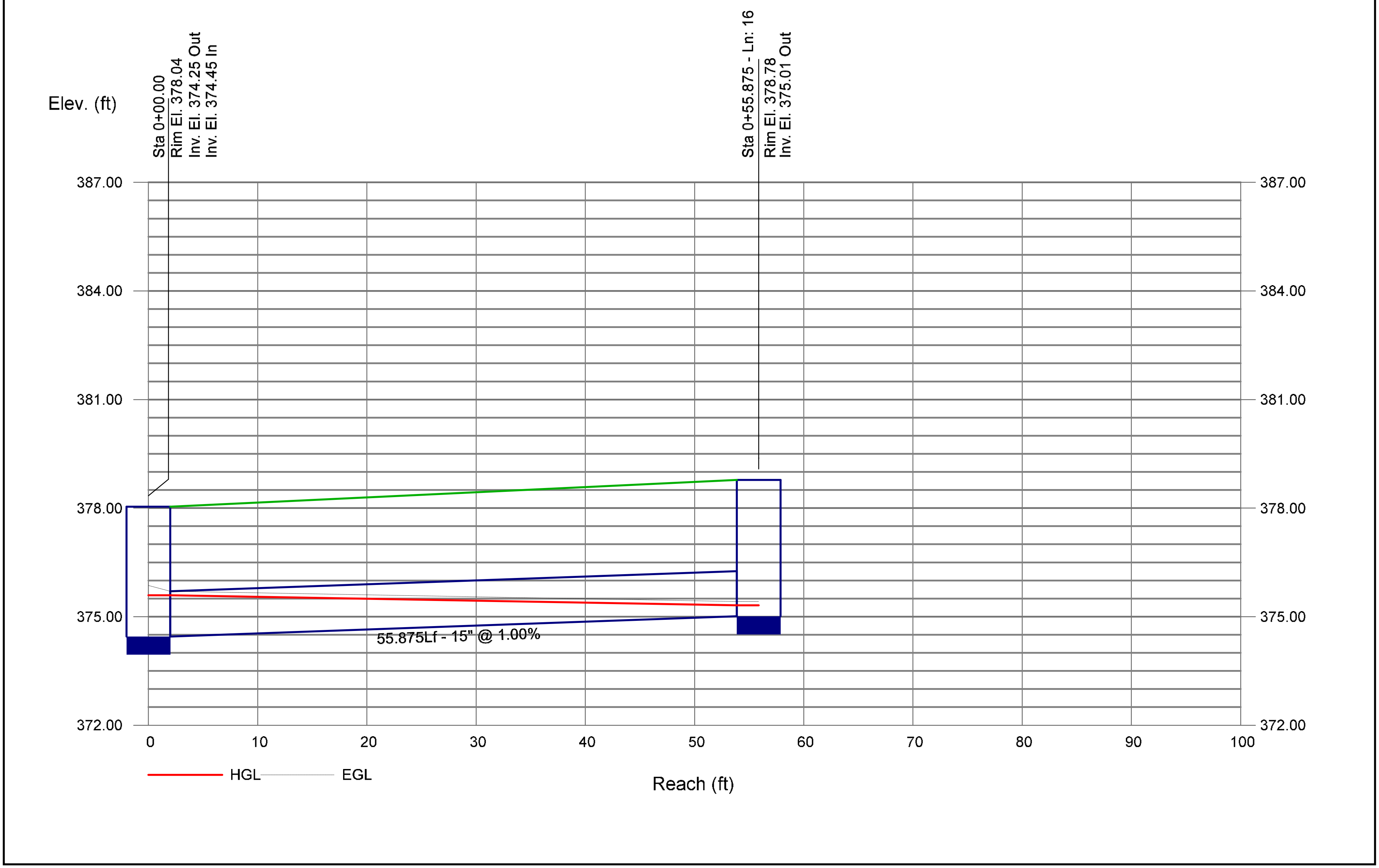
25-Year SCM#3 Profile 1-14 Proj. file: SCM#3.stm



Storm Sewers

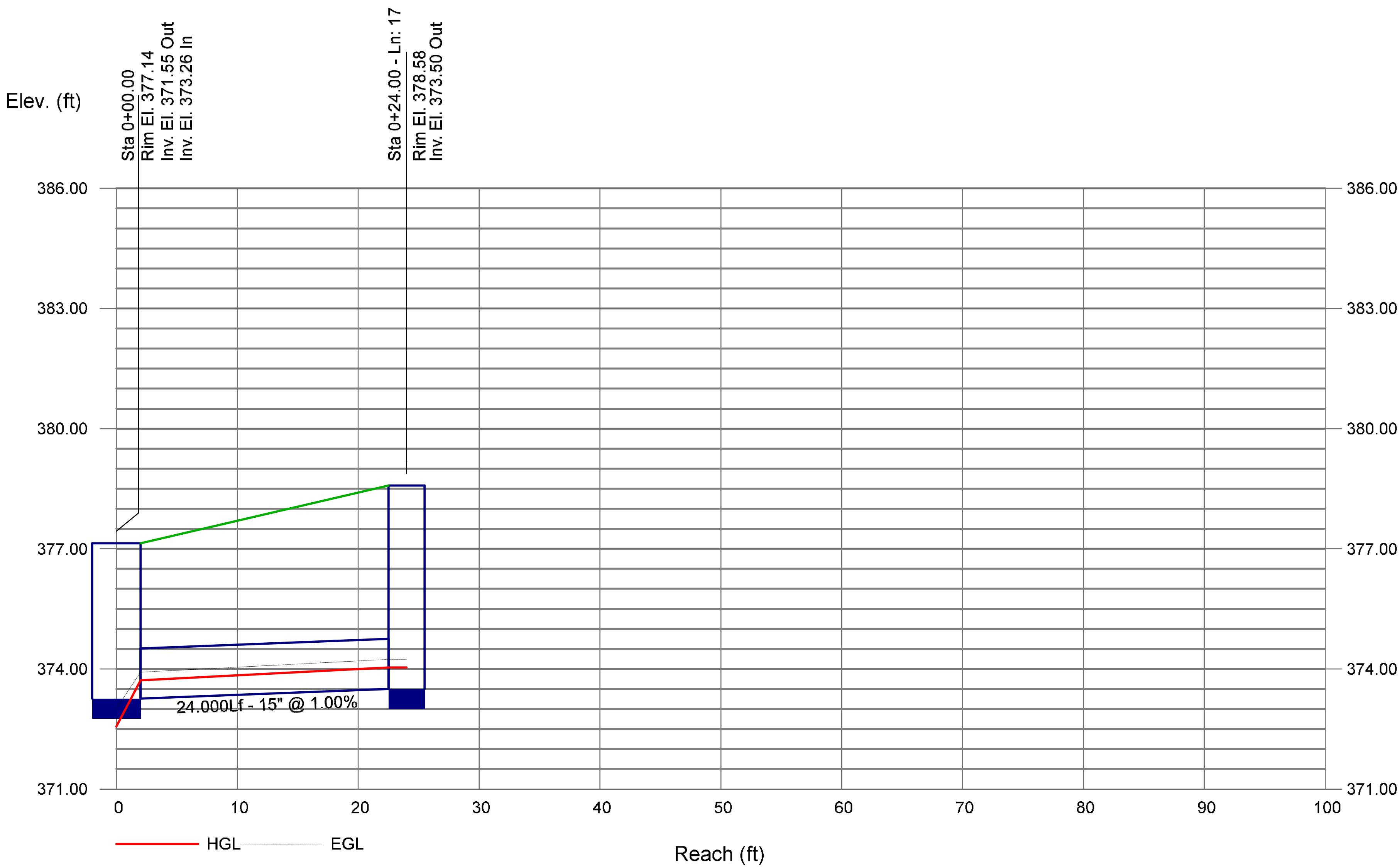
Storm Sewer Profile

25-Year SCM#3 Profile 16-16 Proj. file: SCM#3.stm



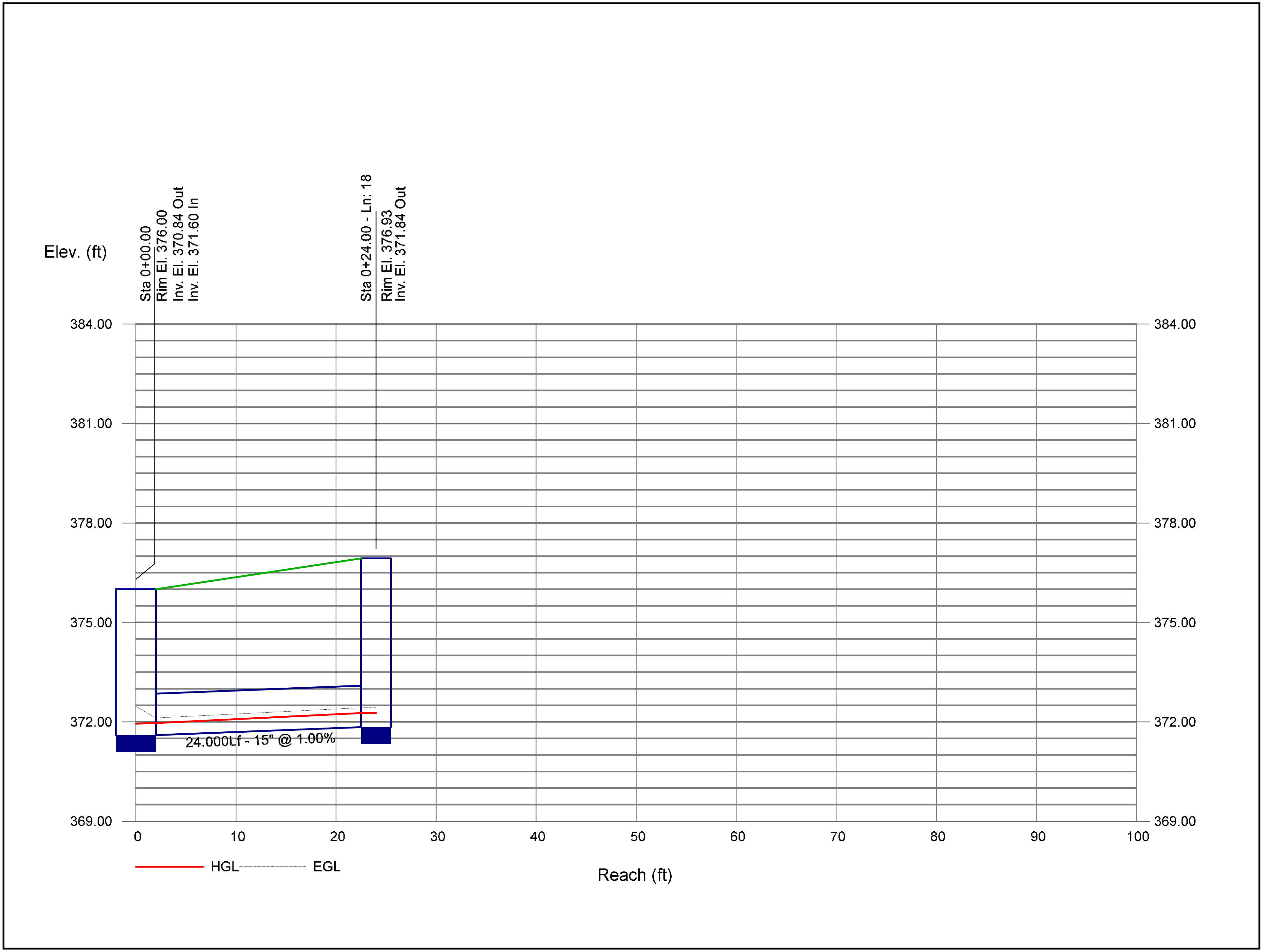
Storm Sewer Profile

25-Year SCM#3 Profile 17-17 Proj. file: SCM#3.stm



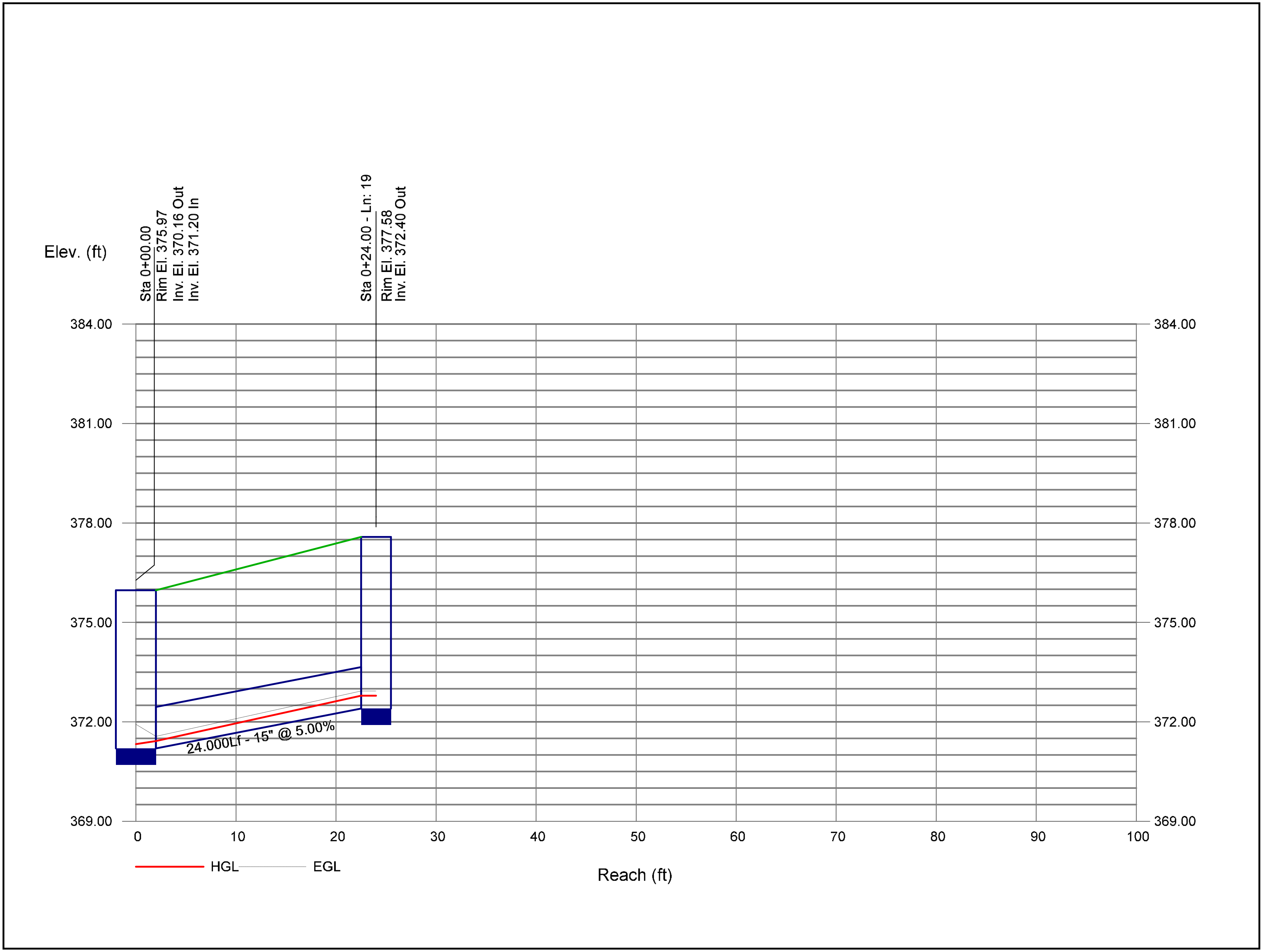
Storm Sewer Profile

25-Year SCM#3 Profile 18-18 Proj. file: SCM#3.stm



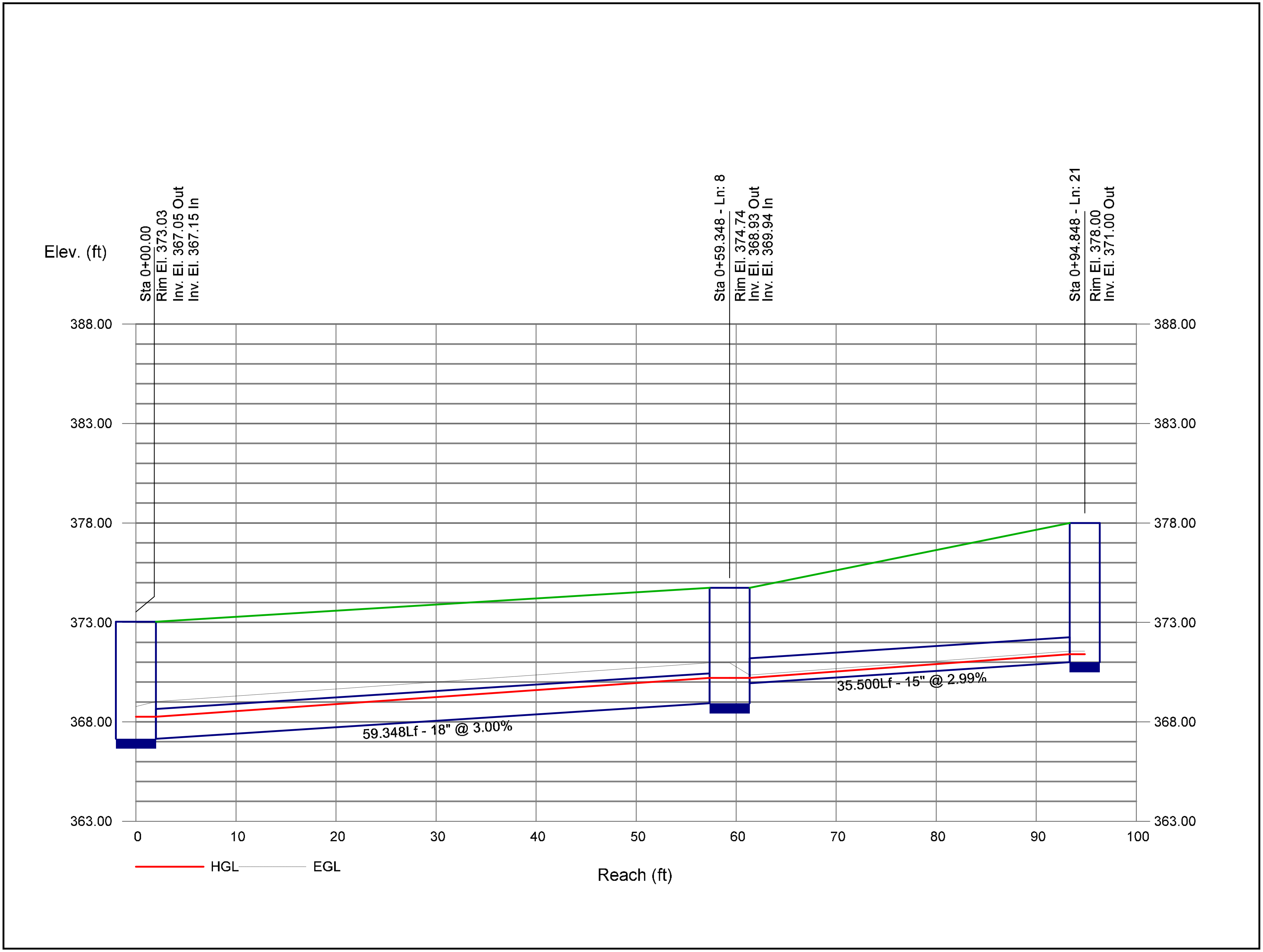
Storm Sewer Profile

25-Year SCM#3 Profile 19-19 Proj. file: SCM#3.stm



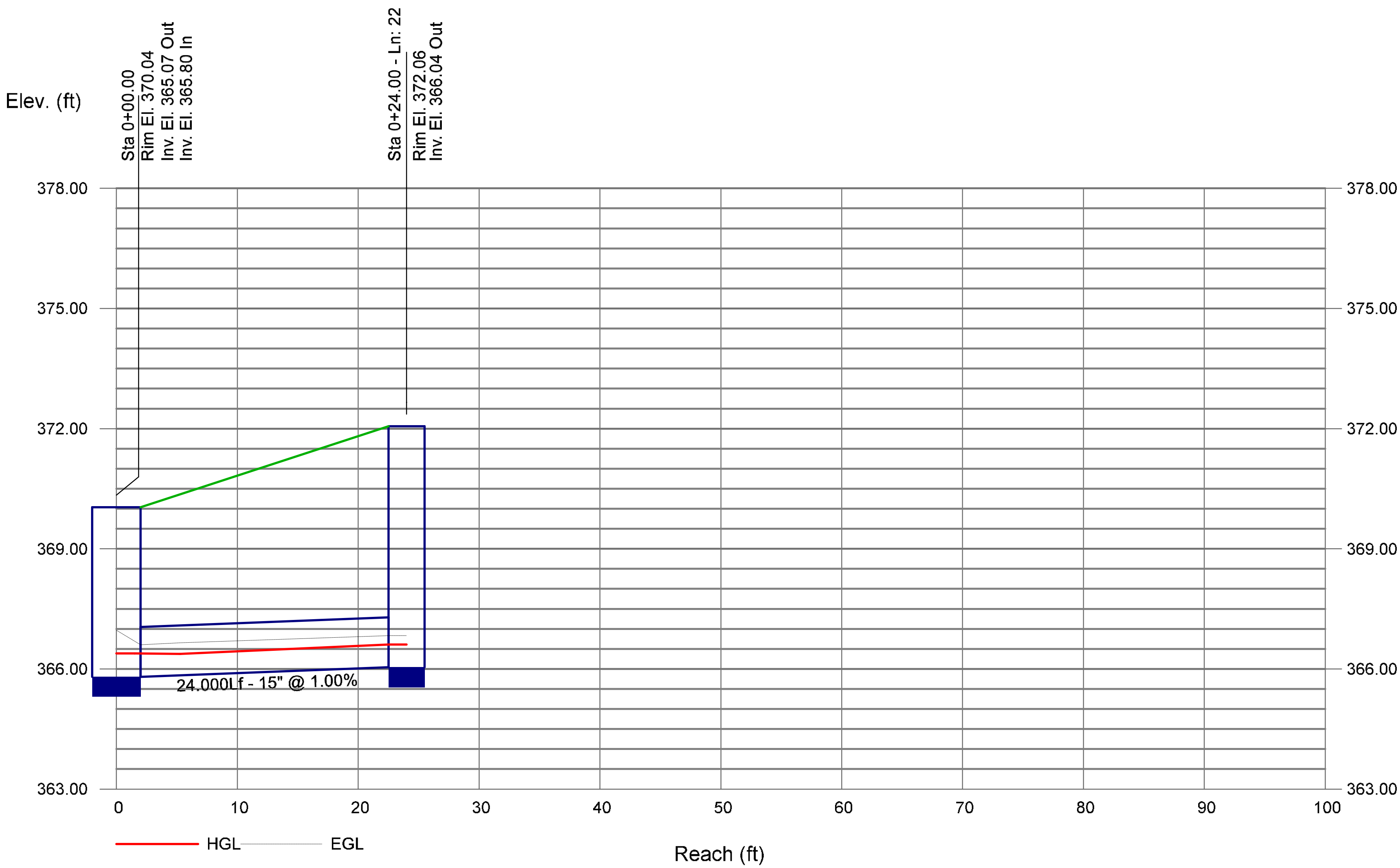
Storm Sewer Profile

25-Year SCM#3 Profile 8-21 Proj. file: SCM#3.stm



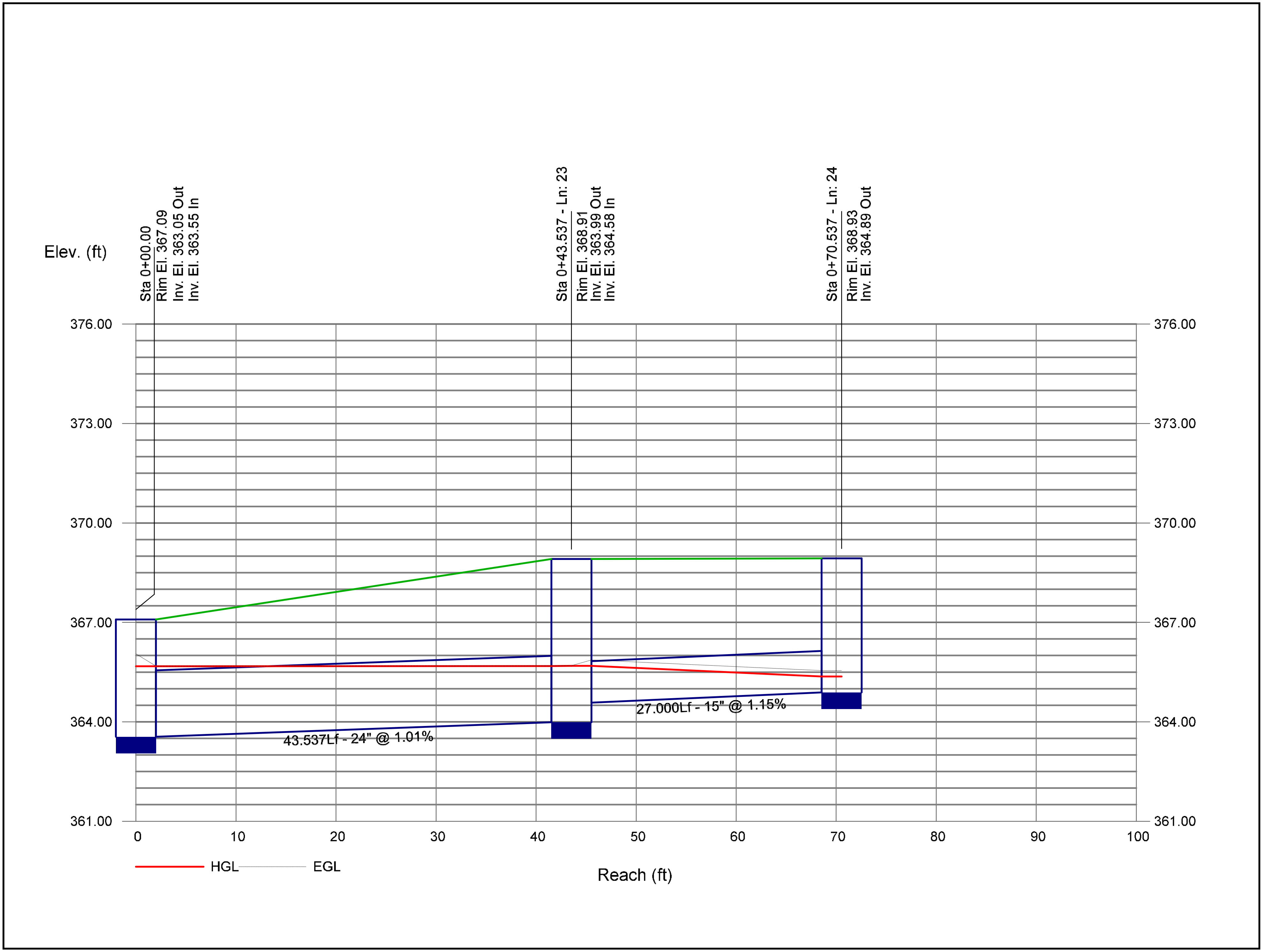
Storm Sewer Profile

25-Year SCM#3 Profile 22-22 Proj. file: SCM#3.stm



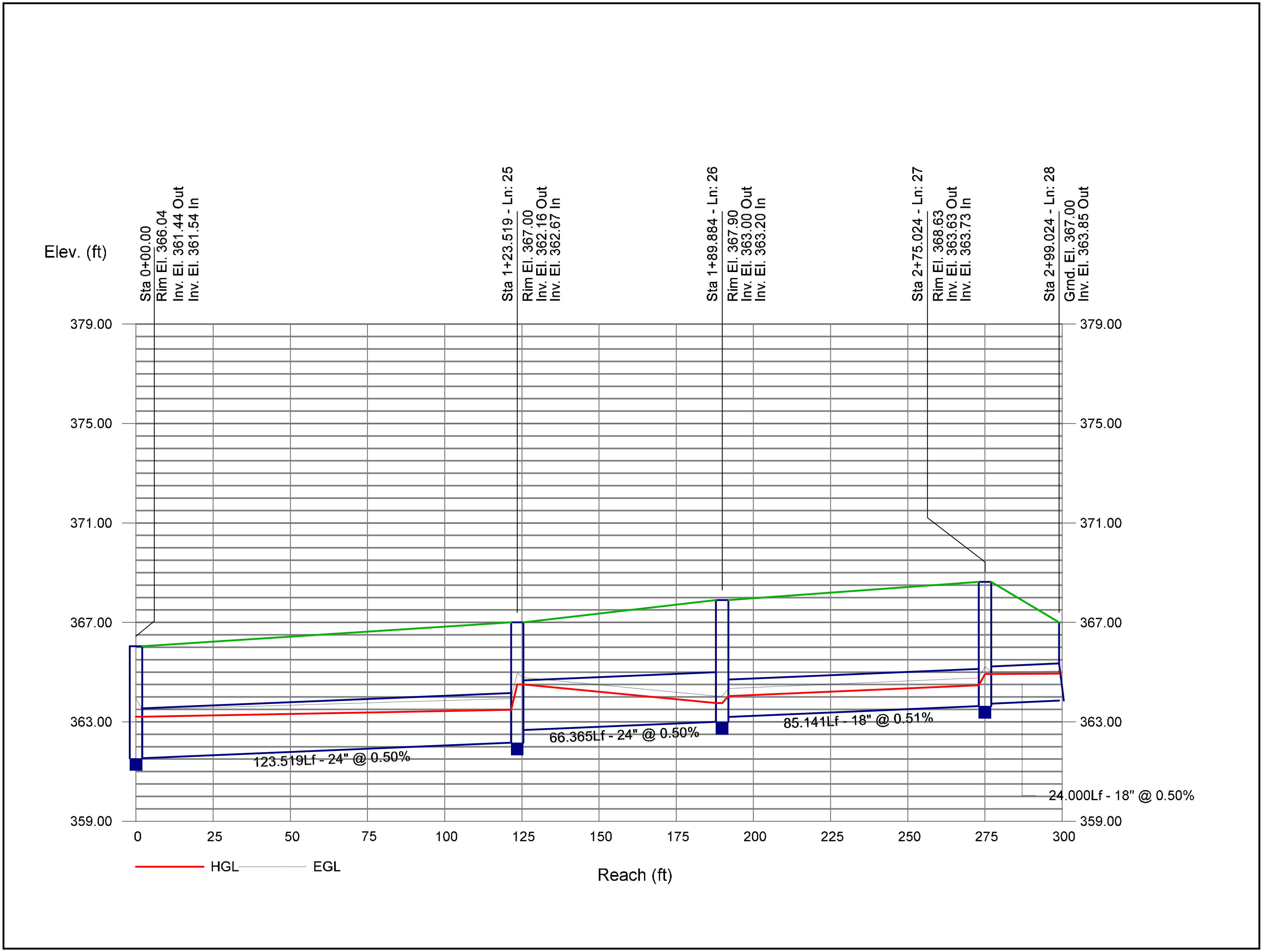
Storm Sewer Profile

25-Year SCM#3 Profile 23-24 Proj. file: SCM#3.stm



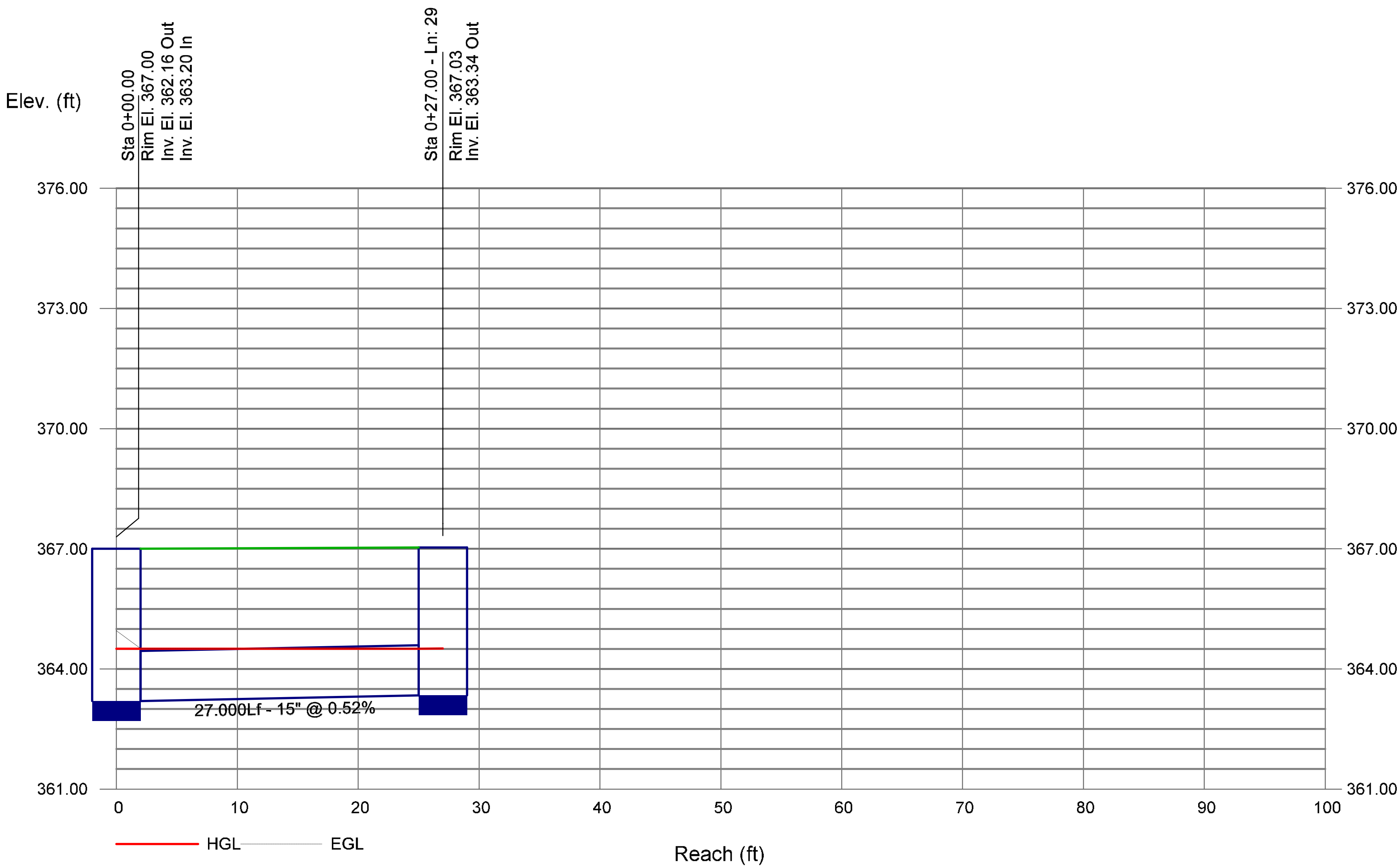
Storm Sewer Profile

25-Year SCM#3 Profile 25-28 Proj. file: SCM#3.stm



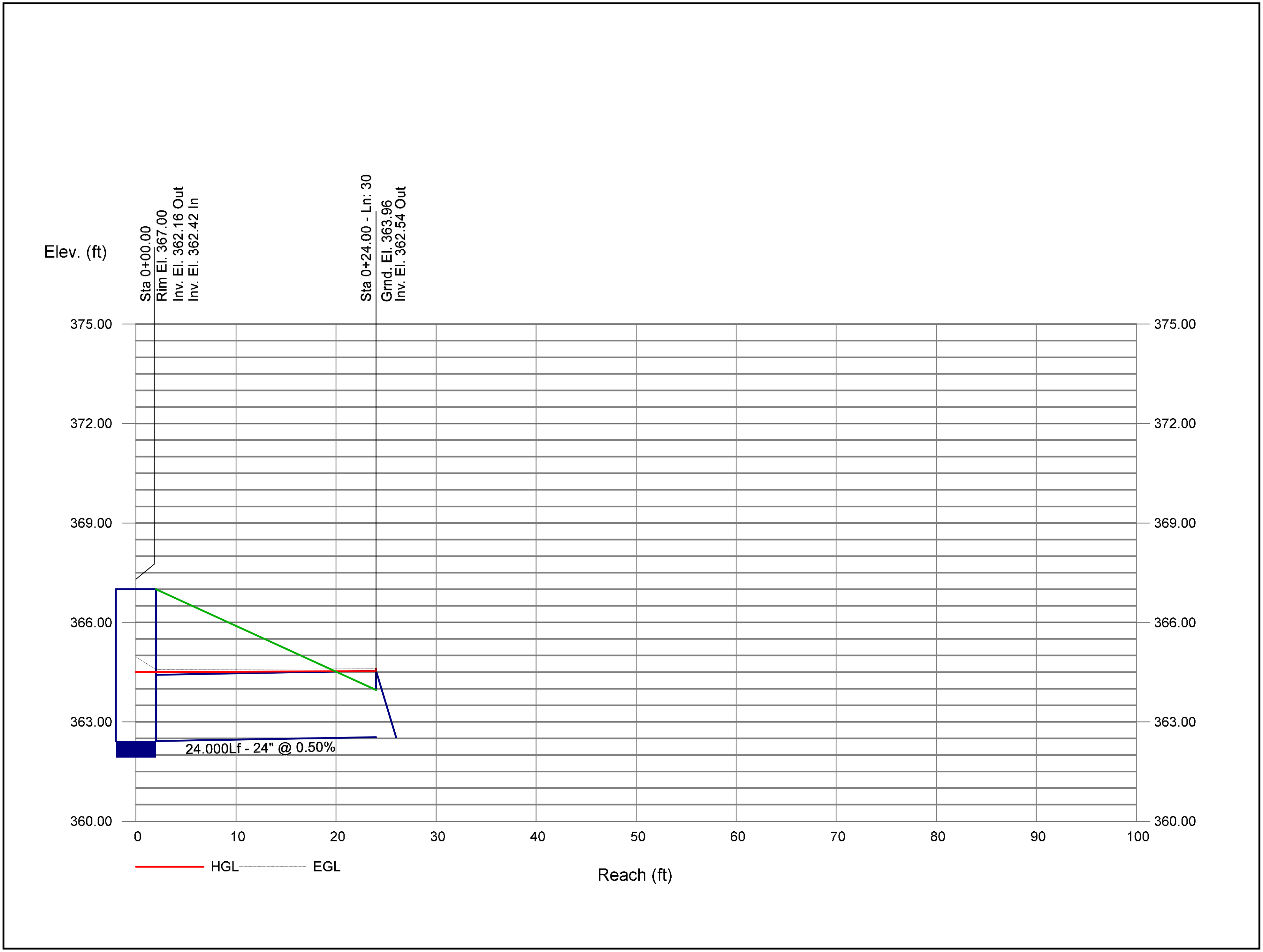
Storm Sewer Profile

25-Year SCM#3 Profile 29-29 Proj. file: SCM#3.stm



Storm Sewer Profile

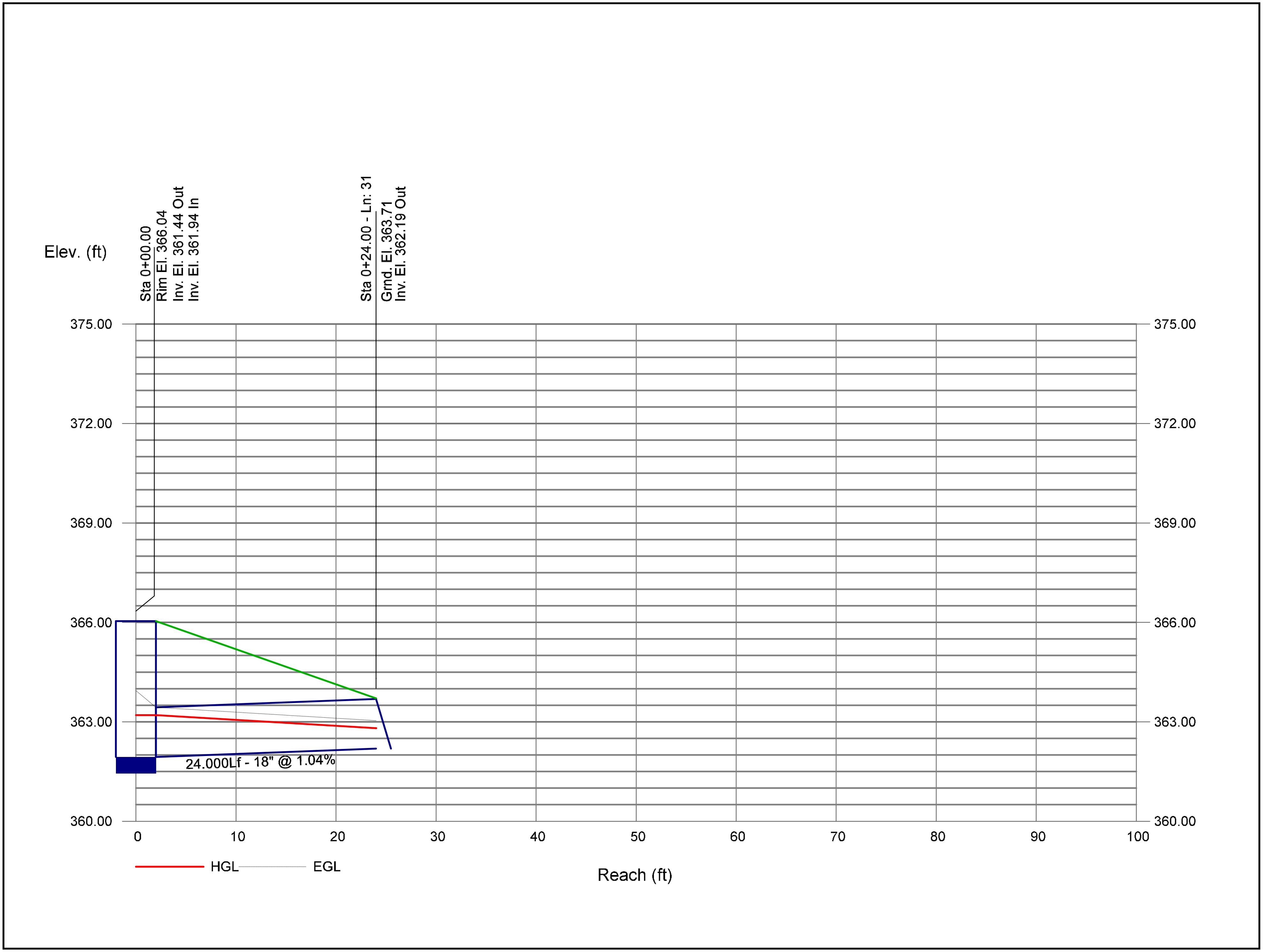
25-Year SCM#3 Profile 30-30 Proj. file: SCM#3.stm



Storm Sewers

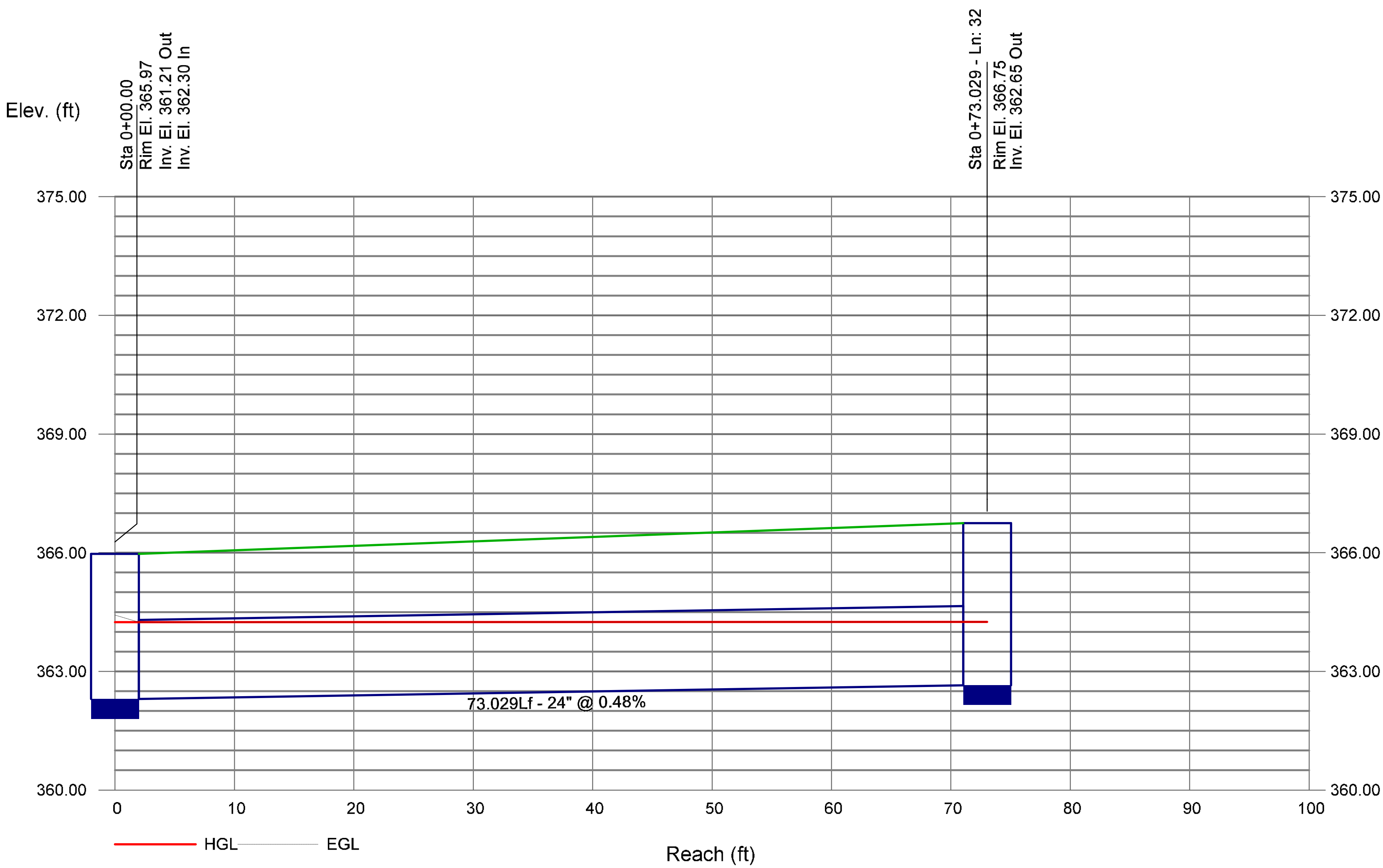
Storm Sewer Profile

25-Year SCM#3 Profile 31-31 Proj. file: SCM#3.stm



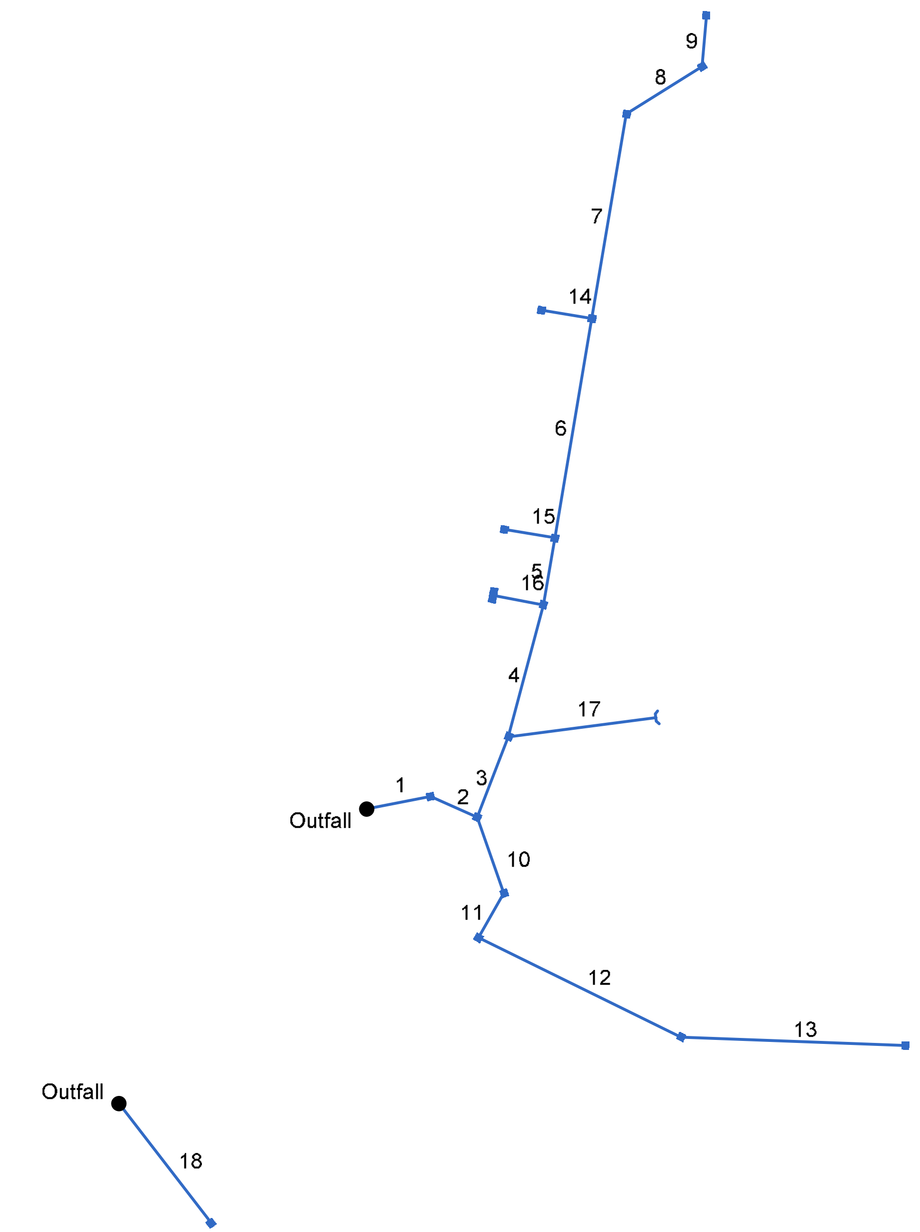
Storm Sewer Profile

25-Year SCM#3 Profile 32-32 Proj. file: SCM#3.stm



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

25-Year SCM#4 Report



Project File: SCM#4.stm	Number of lines: 18	Date: 12/6/2024

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	34.253	-11.231	Comb	0.00	0.07	0.57	10.0	357.00	0.50	357.17	24	Cir	0.013	0.95	363.04	Pipe - (14)
2	1	27.000	35.364	Comb	0.00	0.01	0.57	10.0	357.27	0.48	357.40	24	Cir	0.013	1.72	363.02	Pipe - (19)
3	2	45.598	-92.825	Comb	0.00	0.04	0.57	10.0	357.50	0.50	357.73	24	Cir	0.013	1.35	362.81	Pipe - (13) (1)
4	3	72.000	-6.548	Comb	0.00	0.06	0.57	10.0	357.95	0.64	358.41	24	Cir	0.013	1.50	362.04	Pipe - (13)
5	4	35.770	-5.010	Comb	0.00	0.07	0.57	10.0	358.54	0.50	358.72	18	Cir	0.013	1.50	362.04	Pipe - (12)
6	5	117.298	-0.174	Comb	0.00	0.06	0.57	10.0	358.86	1.19	360.25	15	Cir	0.013	1.50	364.99	Pipe - (11)
7	6	109.503	0.000	Comb	0.00	0.02	0.57	10.0	360.58	3.41	364.31	15	Cir	0.013	1.18	368.85	Pipe - (9)
8	7	47.144	48.466	Comb	0.00	0.11	0.57	10.0	364.41	0.51	364.65	15	Cir	0.013	1.25	369.03	Pipe - (8)
9	8	27.000	-53.413	Comb	0.00	0.52	0.57	10.0	364.75	0.52	364.89	15	Cir	0.013	1.00	369.03	Pipe - (7)
10	2	42.392	46.461	Comb	0.00	0.25	0.57	10.0	357.51	0.50	357.72	24	Cir	0.013	1.19	363.00	Pipe - (18)
11	10	27.000	48.827	Comb	0.00	0.21	0.57	10.0	358.32	0.52	358.46	18	Cir	0.013	1.50	363.00	Pipe - (17)
12	11	118.810	-93.248	Comb	0.00	0.25	0.57	10.0	359.07	2.35	361.86	15	Cir	0.013	0.69	368.09	Pipe - (16)
13	12	118.495	-24.060	Comb	0.00	0.32	0.57	10.0	363.06	1.31	364.61	15	Cir	0.013	1.00	372.03	Pipe - (15)
14	6	27.000	-90.000	Comb	0.00	0.16	0.57	10.0	360.64	0.96	360.90	15	Cir	0.013	1.00	364.99	Pipe - (10)
15	5	27.000	-90.174	Comb	0.00	0.07	0.57	10.0	358.68	1.41	359.06	15	Cir	0.013	1.00	362.16	Pipe - (20)
16	4	27.000	-94.006	Comb	0.00	0.08	0.57	10.0	358.68	0.74	358.88	15	Cir	0.013	1.00	362.03	Pipe - (21)
17	3	78.211	61.239	Hdwl	0.00	0.90	0.57	10.0	358.33	0.51	358.73	18	Cir	0.013	1.00	359.75	Pipe - (163)
18	End	79.656	52.362	DrGrt	0.00	1.33	0.57	10.0	356.95	1.00	357.75	18	Cir	0.013	1.00	363.00	Pipe - (24)(0)

Project File: SCM#4.stm | Number of lines: 18 | Date: 12/6/2024

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	CB 401	Combination	363.04	Rect	4.00	4.00	24	Cir	357.17	24	Cir	357.27
2	CB 402	Combination	363.02	Rect	4.00	4.00	24	Cir	357.40	24 24	Cir Cir	357.50 357.51
3	CB 407	Combination	362.81	Rect	4.00	4.00	24	Cir	357.73	24 18	Cir Cir	357.95 358.33
4	CB 408	Combination	362.04	Rect	4.00	4.00	24	Cir	358.41	18 15	Cir Cir	358.54 358.68
5	CB 409	Combination	362.04	Rect	4.00	4.00	18	Cir	358.72	15 15	Cir Cir	358.86 358.68
6	CB 410	Combination	364.99	Rect	4.00	4.00	15	Cir	360.25	15 15	Cir Cir	360.58 360.64
7	CB 411	Combination	368.85	Rect	4.00	4.00	15	Cir	364.31	15	Cir	364.41
8	CB 412	Combination	369.03	Rect	4.00	4.00	15	Cir	364.65	15	Cir	364.75
9	CB 413	Combination	369.03	Rect	4.00	4.00	15	Cir	364.89			
10	CB 403	Combination	363.00	Rect	4.00	4.00	24	Cir	357.72	18	Cir	358.32
11	CB 404	Combination	363.00	Rect	4.00	4.00	18	Cir	358.46	15	Cir	359.07
12	CB 405	Combination	368.09	Rect	4.00	4.00	15	Cir	361.86	15	Cir	363.06
13	CB 406	Combination	372.03	Rect	4.00	4.00	15	Cir	364.61			
14	CB 410A	Combination	364.99	Rect	4.00	4.00	15	Cir	360.90			
15	CB 409A	Combination	362.16	Rect	4.00	4.00	15	Cir	359.06			
16	CB 408A	Combination	362.03	Rect	4.00	8.00	15	Cir	358.88			
17	FES INLET 407A	OpenHeadwall	359.75	n/a	n/a	n/a	18	Cir	358.73			
18	YI 421	DropGrate	363.00	Rect	4.00	4.00	18	Cir	357.75			

Project File: SCM#4.stm	Number of Structures: 18	Run Date: 12/6/2024

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	Pipe - (14)	11.23	24	Cir	34.253	357.00	357.17	0.496	359.00	359.07	0.20	359.27	End	Combination
2	Pipe - (19)	11.03	24	Cir	27.000	357.27	357.40	0.481	359.27	359.32	0.34	359.66	1	Combination
3	Pipe - (13) (1)	7.44	24	Cir	45.598	357.50	357.73	0.504	359.66	359.71	0.12	359.82	2	Combination
4	Pipe - (13)	4.15	24	Cir	72.000	357.95	358.41	0.639	359.82	359.12	0.40	359.12	3	Combination
5	Pipe - (12)	3.66	18	Cir	35.770	358.54	358.72	0.503	359.28	359.46	0.41	359.87	4	Combination
6	Pipe - (11)	3.21	15	Cir	117.298	358.86	360.25	1.185	359.87	360.97	n/a	360.97 j	5	Combination
7	Pipe - (9)	2.43	15	Cir	109.503	360.58	364.31	3.406	360.97	364.93	n/a	364.93	6	Combination
8	Pipe - (8)	2.37	15	Cir	47.144	364.41	364.65	0.509	365.05	365.28	0.28	365.56	7	Combination
9	Pipe - (7)	1.97	15	Cir	27.000	364.75	364.89	0.519	365.56	365.58	0.12	365.71	8	Combination
10	Pipe - (18)	3.76	24	Cir	42.392	357.51	357.72	0.495	359.66	359.67	0.03	359.70	2	Combination
11	Pipe - (17)	2.86	18	Cir	27.000	358.32	358.46	0.518	359.70	359.10	0.37	359.10	10	Combination
12	Pipe - (16)	2.12	15	Cir	118.810	359.07	361.86	2.348	359.46	362.44	0.15	362.44	11	Combination
13	Pipe - (15)	1.21	15	Cir	118.495	363.06	364.61	1.308	363.40	365.04	n/a	365.04	12	Combination
14	Pipe - (10)	0.61	15	Cir	27.000	360.64	360.90	0.963	360.97	361.20	n/a	361.20 j	6	Combination
15	Pipe - (20)	0.26	15	Cir	27.000	358.68	359.06	1.407	359.87	359.26	0.07	359.26	5	Combination
16	Pipe - (21)	0.30	15	Cir	27.000	358.68	358.88	0.741	359.12	359.09	n/a	359.09	4	Combination
17	Pipe - (163)	3.41	18	Cir	78.211	358.33	358.73	0.511	359.82	359.88	0.08	359.97	3	OpenHeadwall
18	Pipe - (24)(0)	5.03	18	Cir	79.656	356.95	357.75	1.004	358.45	358.61	n/a	358.61 j	End	DropGrate

Project File: SCM#4.stm | Number of lines: 18 | Run Date: 12/6/2024

NOTES: Return period = 25 Yrs. ; j - Line contains hyd. jump.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet Ht (in)	Curb Inlet L (ft)	Grate Inlet Area (sqft)	Grate Inlet L (ft)	Grate Inlet W (ft)	Gutter So (ft/ft)	Gutter W (ft)	Gutter Sw (ft/ft)	Gutter Sx (ft/ft)	Gutter n	Gutter Depth (ft)	Gutter Spread (ft)	Inlet Depth (ft)	Inlet Spread (ft)	Inlet Depr (in)	Byp Line No
1	CB 401	0.26	0.00	0.26	0.01	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.10	3.22	0.19	0.67	2.0	Off
2	CB 402	0.04	0.19	0.23	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.10	2.95	0.19	0.51	2.0	Off
3	CB 407	0.15	0.00	0.15	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.09	2.26	0.17	0.09	2.0	Off
4	CB 408	0.23	0.00	0.23	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.020	2.00	0.040	0.020	0.013	0.09	2.36	0.17	0.15	2.0	Off
5	CB 409	0.26	0.00	0.26	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	-0.01	1.23	0.15	1.23	2.0	Off
6	CB 410	0.23	0.00	0.22	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.10	2.94	0.19	0.50	2.0	Off
7	CB 411	0.08	0.00	0.08	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.030	2.00	0.040	0.020	0.013	0.05	1.34	0.17	0.00	2.0	6
8	CB 412	0.42	0.00	0.42	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	0.03	1.58	0.19	1.58	2.0	Off
9	CB 413	1.97	0.00	1.97	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	0.15	5.27	0.31	5.27	2.0	Off
10	CB 403	0.95	0.00	0.76	0.19	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.16	6.02	0.26	2.64	2.0	2
11	CB 404	0.79	0.00	0.71	0.09	Comb	6.0	1.50	0.00	3.00	2.50	0.030	2.00	0.040	0.020	0.013	0.13	4.30	0.22	1.41	2.0	Off
12	CB 405	0.95	0.25	1.00	0.20	Comb	6.0	1.50	0.00	3.00	2.50	0.038	2.00	0.040	0.020	0.013	0.14	4.96	0.24	1.83	2.0	Off
13	CB 406	1.21	0.00	0.96	0.25	Comb	6.0	1.50	7.50	3.00	2.50	0.020	2.00	0.040	0.020	0.013	0.16	5.76	0.26	2.54	2.0	12
14	CB 410A	0.61	0.00	0.53	0.08	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.14	4.92	0.23	1.66	2.0	Off
15	CB 409A	0.26	0.00	0.26	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	-0.01	1.23	0.15	1.23	2.0	Off
16	CB 408A	0.30	0.00	0.30	0.00	Comb	6.0	1.50	0.00	3.00	5.00	0.020	2.00	0.040	0.020	0.013	0.10	2.84	0.19	0.48	2.0	Off
17	FES INLET 407A	3.41	0.00	3.41	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	2.00	0.040	0.020	0.013	0.00	0.00	0.00	0.00	0.0	Off
18	YI 421	5.03	0.00	5.03	0.00	DrGrt	0.0	0.00	9.00	3.00	3.00	Sag	4.00	0.020	0.020	0.013	0.27	30.92	0.27	30.92	0.0	Off

Project File: SCM#4.stm | Number of lines: 18 | Run Date: 12/6/2024

NOTES: Inlet N-Values = 0.016; Intensity = 62.86 / (Inlet time + 11.00) ^ 0.74; Return period = 25 Yrs. ; * Indicates Known Q added.All curb inlets are throat.

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	24	11.23	357.00	359.00	2.00	3.14	3.57	0.20	359.20	0.246	34.253	357.17	359.07	1.90	3.08	3.64	0.21	359.28	0.213	0.230	0.079	0.95	0.20
2	24	11.03	357.27	359.27	2.00	3.14	3.51	0.19	359.46	0.230	27.000	357.40	359.32	1.92	3.10	3.56	0.20	359.52	0.207	0.218	0.059	1.72	0.34
3	24	7.44	357.50	359.66	2.00	3.14	2.37	0.09	359.75	0.108	45.598	357.73	359.71	1.98	3.13	2.37	0.09	359.79	0.099	0.104	0.047	1.35	0.12
4	24	4.15	357.95	359.82	1.87	1.01	1.36	0.26	360.09	0.000	72.000	358.41	359.12	0.71**	1.01	4.12	0.26	359.39	0.000	0.000	n/a	1.50	0.40
5	18	3.66	358.54	359.28	0.74*	0.87	4.20	0.27	359.56	0.503	35.770	358.72	359.46	0.74	0.87	4.21	0.28	359.74	0.506	0.504	0.180	1.50	0.41
6	15	3.21	358.86	359.87	1.01	0.73	3.01	0.30	360.17	0.000	117.298	360.25	360.97 j	0.72**	0.73	4.38	0.30	361.27	0.000	0.000	n/a	1.50	n/a
7	15	2.43	360.58	360.97	0.39	0.33	7.39	0.25	361.22	0.000	109.503	364.31	364.93	0.62**	0.61	3.97	0.25	365.18	0.000	0.000	n/a	1.18	n/a
8	15	2.37	364.41	365.05	0.64*	0.63	3.78	0.22	365.27	0.508	47.144	364.65	365.28	0.63	0.62	3.79	0.22	365.51	0.513	0.511	0.241	1.25	0.28
9	15	1.97	364.75	365.56	0.81	0.85	2.33	0.08	365.65	0.162	27.000	364.89	365.58	0.69	0.70	2.82	0.12	365.71	0.265	0.213	0.058	1.00	0.12
10	24	3.76	357.51	359.66	2.00	3.14	1.20	0.02	359.68	0.028	42.392	357.72	359.67	1.95	3.12	1.20	0.02	359.69	0.024	0.026	0.011	1.19	0.03
11	18	2.86	358.32	359.70	1.38	0.72	1.68	0.24	359.94	0.000	27.000	358.46	359.10	0.64**	0.72	3.96	0.24	359.35	0.000	0.000	n/a	1.50	0.37
12	15	2.12	359.07	359.46	0.39*	0.33	6.41	0.22	359.69	0.000	118.810	361.86	362.44	0.58**	0.56	3.80	0.22	362.66	0.000	0.000	n/a	0.69	0.15
13	15	1.21	363.06	363.40	0.34*	0.27	4.44	0.16	363.56	0.000	118.495	364.61	365.04	0.43**	0.38	3.20	0.16	365.20	0.000	0.000	n/a	1.00	n/a
14	15	0.61	360.64	360.97	0.33	0.23	2.32	0.11	361.08	0.000	27.000	360.90	361.20 j	0.30**	0.23	2.63	0.11	361.31	0.000	0.000	n/a	1.00	0.11
15	15	0.26	358.68	359.87	1.19	0.13	0.22	0.07	359.94	0.000	27.000	359.06	359.26	0.20**	0.13	2.11	0.07	359.33	0.000	0.000	n/a	1.00	0.07
16	15	0.30	358.68	359.12	0.44	0.14	0.77	0.07	359.20	0.000	27.000	358.88	359.09	0.21**	0.14	2.18	0.07	359.17	0.000	0.000	n/a	1.00	n/a
17	18	3.41	358.33	359.82	1.49	1.77	1.93	0.06	359.88	0.100	78.211	358.73	359.88	1.15	1.46	2.34	0.08	359.97	0.120	0.110	0.086	1.00	0.08
18	18	5.03	356.95	358.45	1.50*	1.05	2.85	0.13	358.58	0.230	79.656	357.75	358.61 j	0.86**	1.05	4.78	0.36	358.97	0.580	0.405	n/a	1.00	0.36

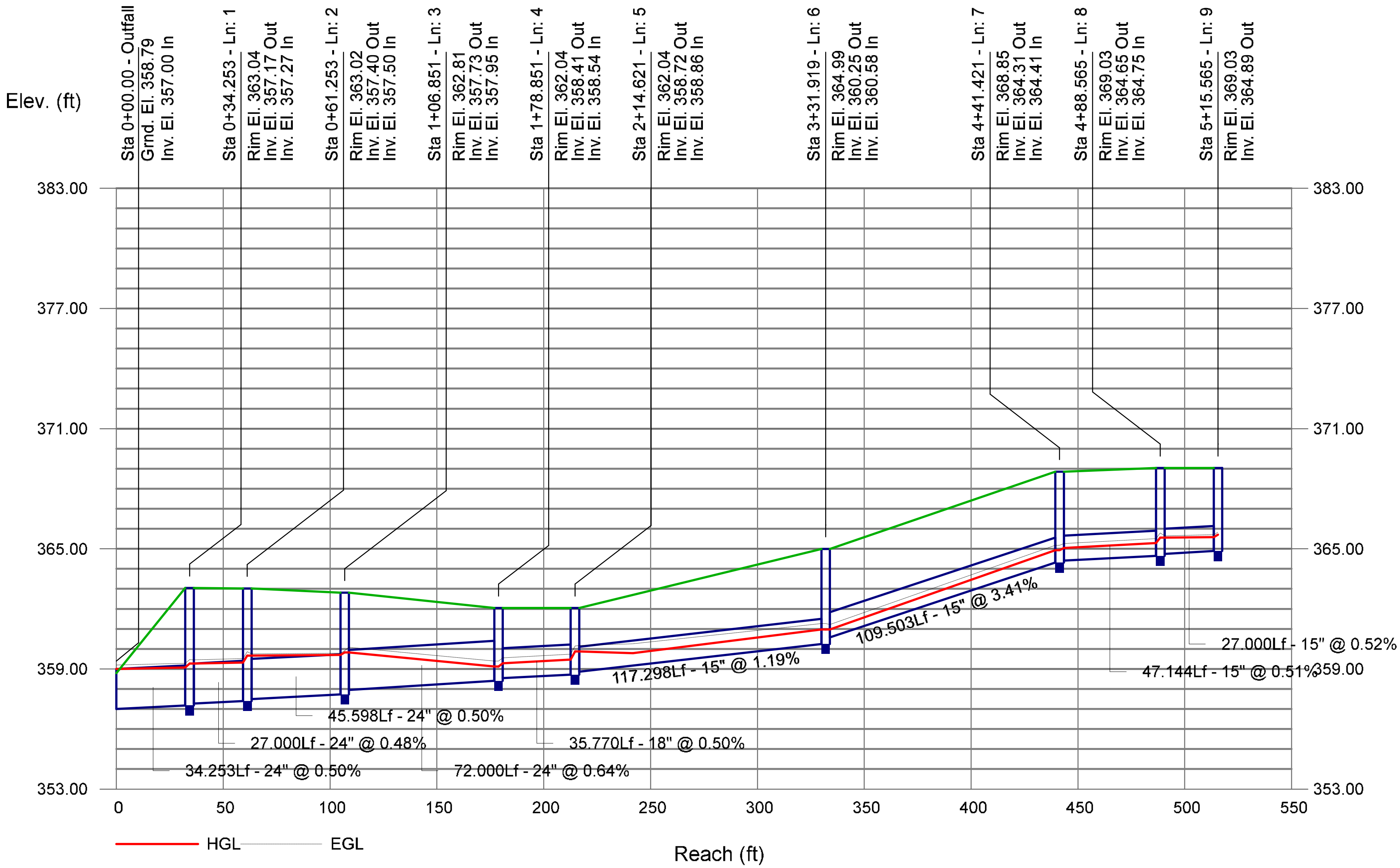
Project File: SCM#4.stm	Number of lines: 18	Run Date: 12/6/2024

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Storm Sewer Profile

25-Year SCM#4 Profile 1-9

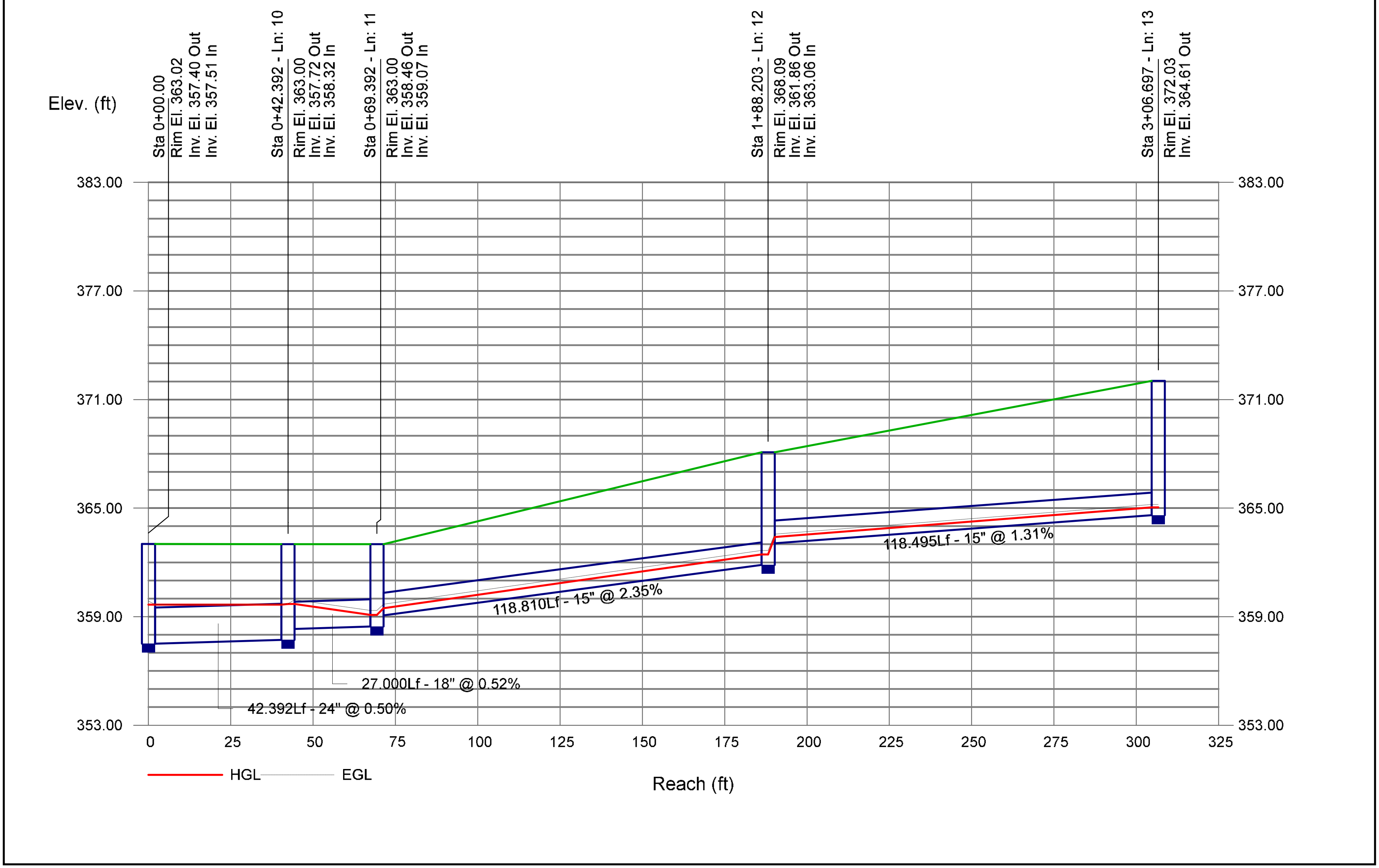
Proj. file: SCM#4.stm



Storm Sewers

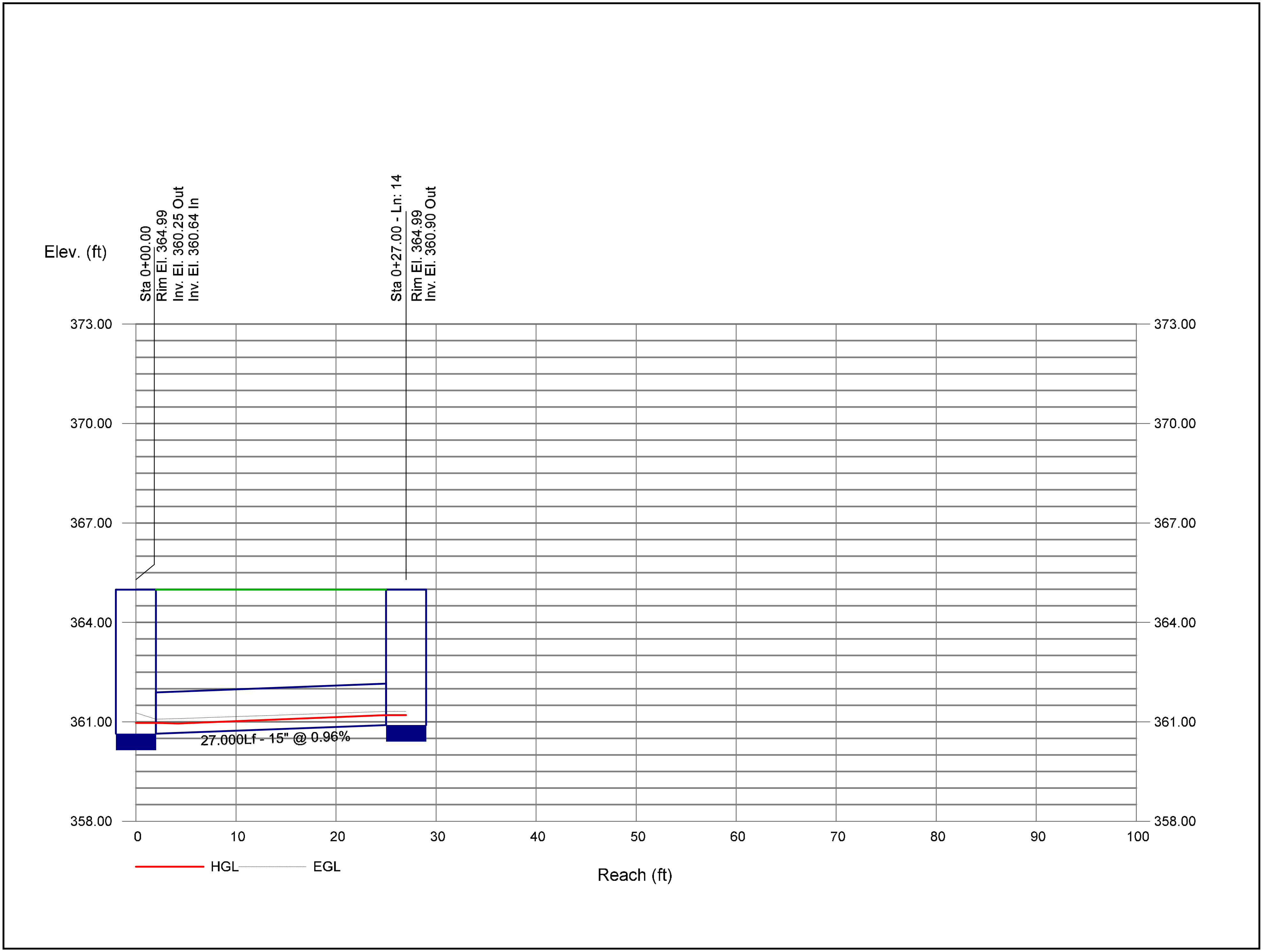
Storm Sewer Profile

25-Year SCM#4 Profile 10-13 Proj. file: SCM#4.stm



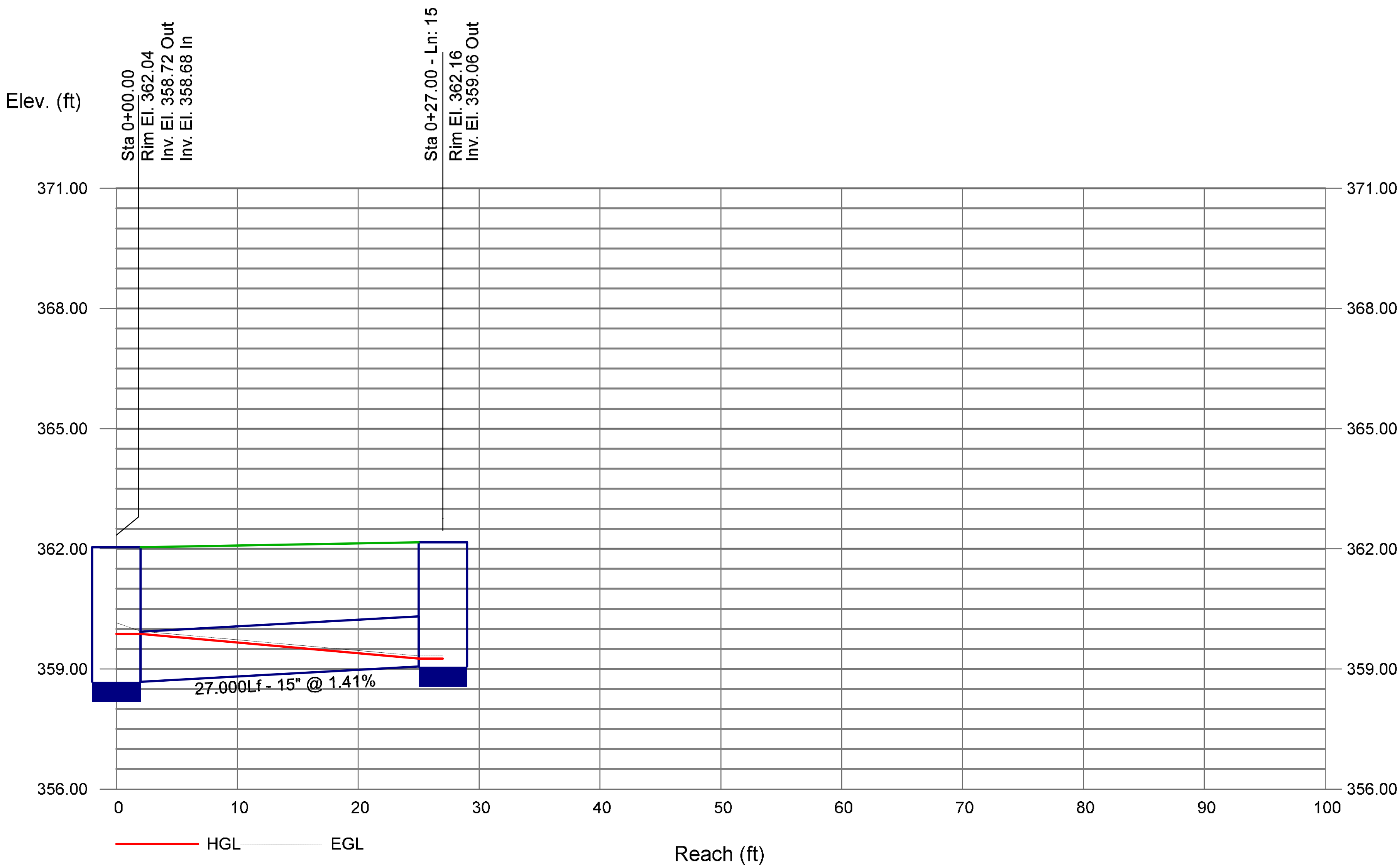
Storm Sewer Profile

25-Year SCM#4 Profile 14-14 Proj. file: SCM#4.stm



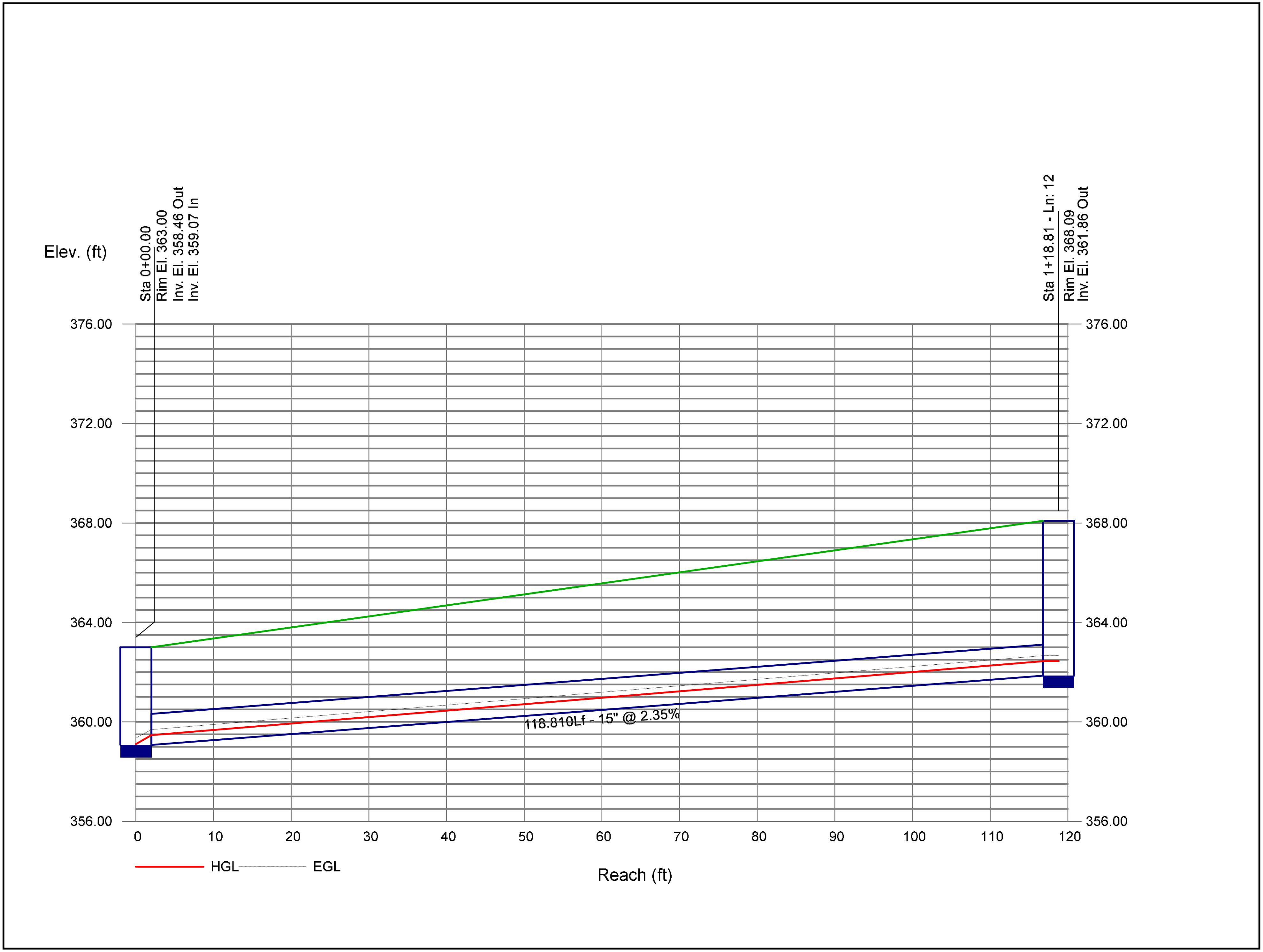
Storm Sewer Profile

25-Year SCM#4 Profile 15-15 Proj. file: SCM#4.stm



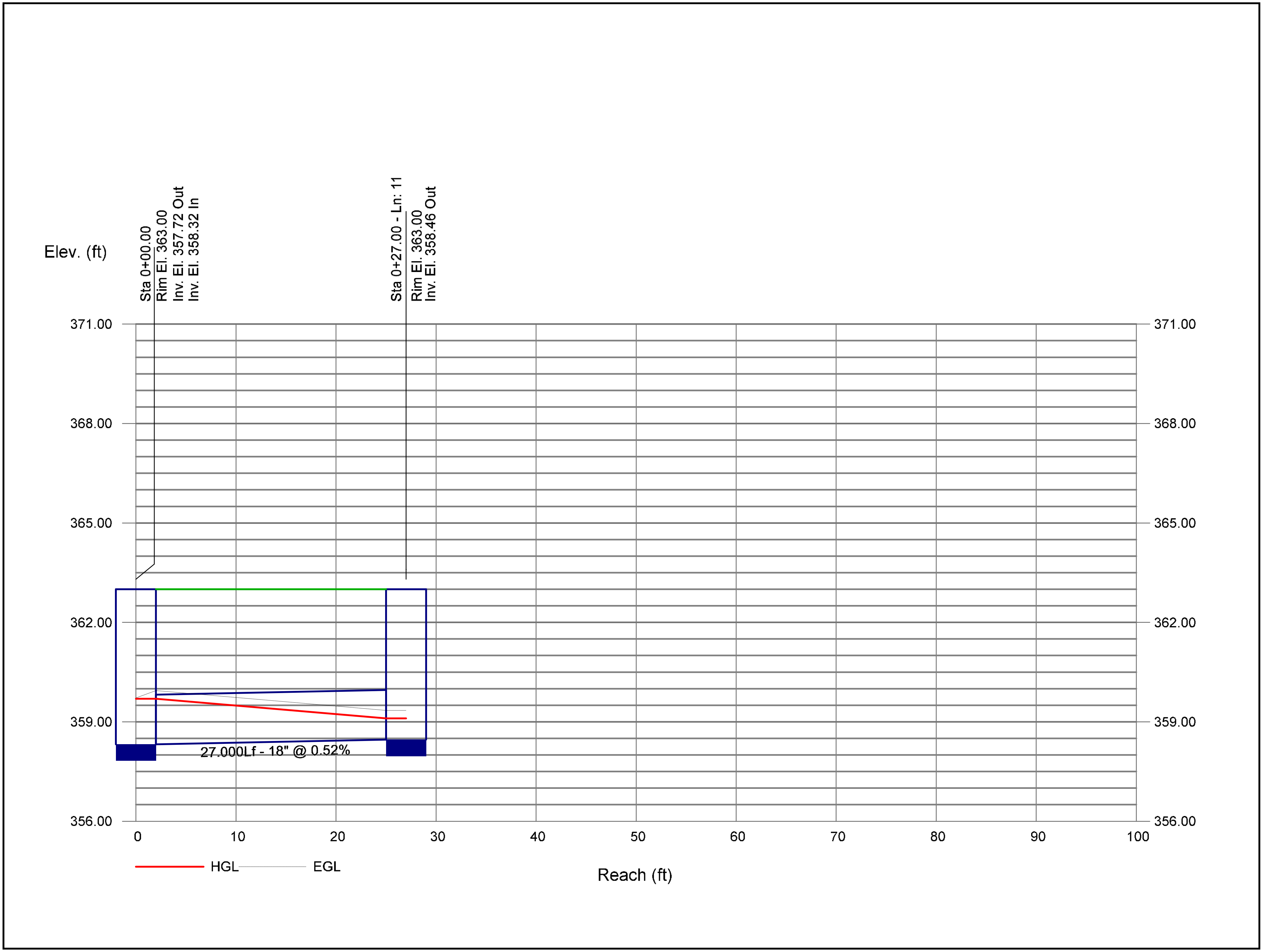
Storm Sewer Profile

25-Year SCM#4 Profile 12-12 Proj. file: SCM#4.stm



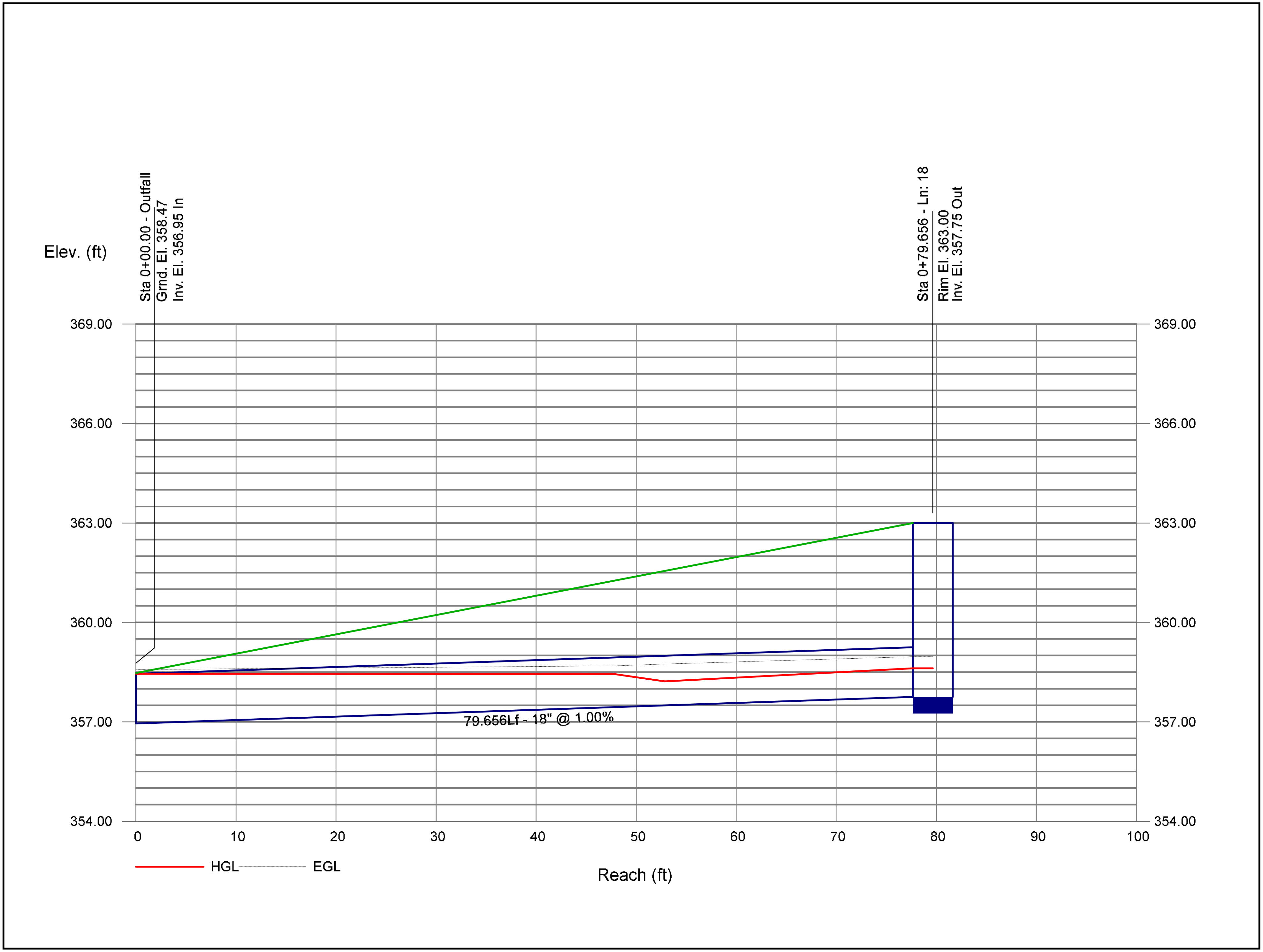
Storm Sewer Profile

25-Year SCM#4 Profile 11-11 Proj. file: SCM#4.stm



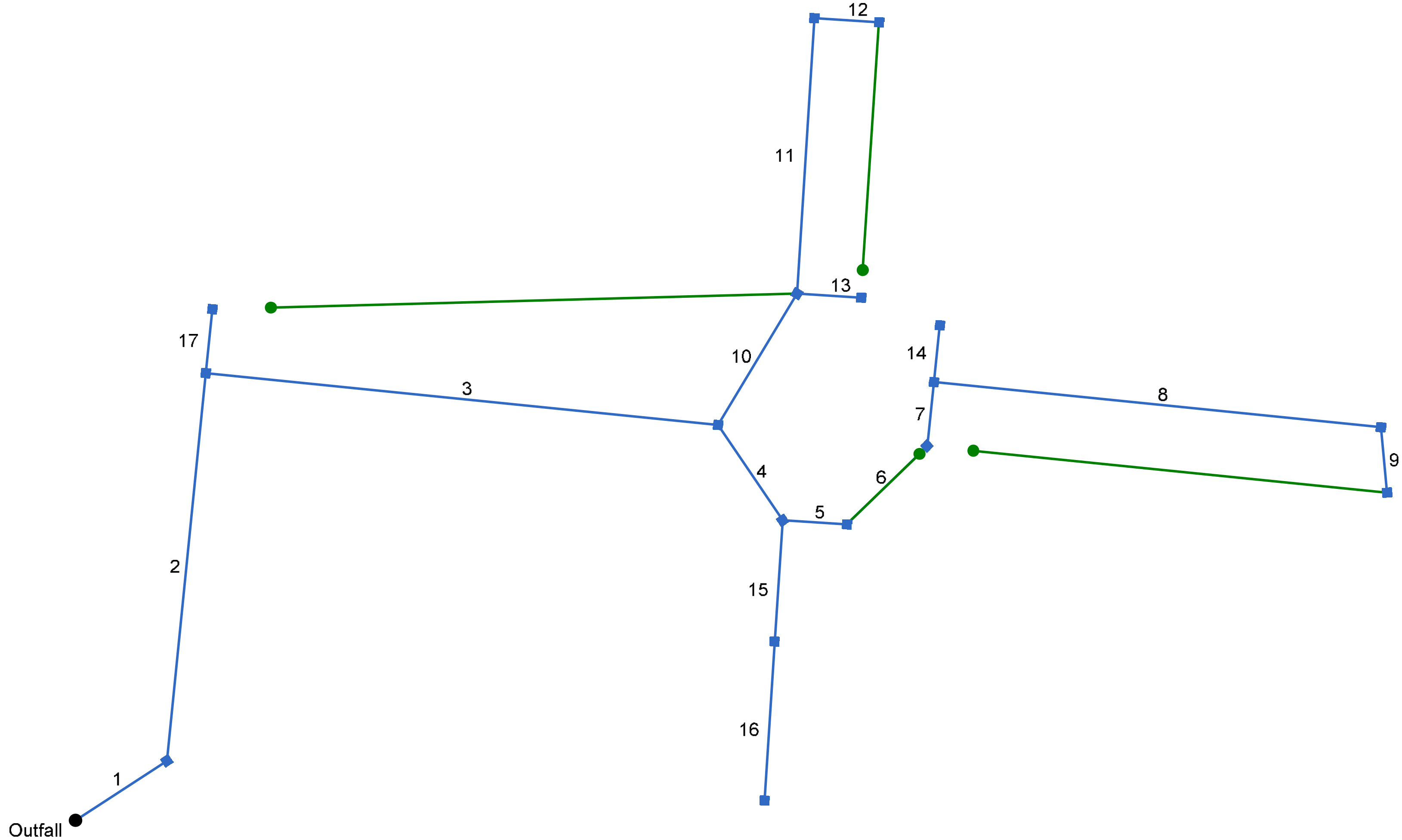
Storm Sewer Profile

25-Year SCM#4 Profile 18-18 Proj. file: SCM#4.stm



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

25-Year SCM#5 Report



Project File: SCM#5.stm	Number of lines: 17	Date: 12/6/2024

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	45.553	-33.168	DrGrt	0.00	1.27	0.57	10.0	346.92	0.50	347.15	30	Cir	0.013	1.22	350.00	Pipe - (39)
2	1	163.558	-51.139	Comb	0.00	0.28	0.57	10.0	347.25	3.24	352.55	24	Cir	0.013	1.50	357.04	Pipe - (38)
3	2	215.399	90.101	Comb	0.00	0.04	0.57	10.0	352.65	4.00	361.27	24	Cir	0.013	1.38	366.04	Pipe - (37)
4	3	48.260	50.241	Comb	0.00	0.03	0.57	10.0	361.37	0.99	361.85	24	Cir	0.013	1.49	367.77	Pipe - (36)
5	4	27.000	-52.412	Comb	0.00	1.06	0.57	10.0	362.36	0.52	362.50	24	Cir	0.013	1.17	367.48	Pipe - (35)
6	5	47.057	-47.882	Comb	0.00	0.24	0.57	10.0	362.58	0.53	362.83	24	Cir	0.013	1.04	367.03	Pipe - (34)
7	6	27.000	-39.946	Comb	0.00	0.19	0.57	10.0	362.93	0.52	363.07	18	Cir	0.013	1.50	367.03	Pipe - (33)
8	7	187.898	90.000	Comb	0.00	0.14	0.57	10.0	363.26	3.69	370.19	15	Cir	0.013	1.48	374.04	Pipe - (31)
9	8	27.526	78.789	Comb	0.00	0.14	0.57	10.0	370.29	0.51	370.43	15	Cir	0.013	1.00	374.10	Pipe - (30)
10	3	64.208	-64.883	Comb	0.00	0.07	0.57	10.0	362.27	1.32	363.12	15	Cir	0.013	1.36	368.61	Pipe - (44)
11	10	115.871	-27.298	Comb	0.00	0.11	0.57	10.0	363.77	2.68	366.88	15	Cir	0.013	1.50	372.04	Pipe - (150)
12	11	27.018	90.079	Comb	0.00	0.12	0.57	10.0	367.17	1.07	367.46	15	Cir	0.013	1.00	372.04	Pipe - (28)
13	10	27.000	62.711	Comb	0.00	0.07	0.57	10.0	364.00	0.89	364.24	15	Cir	0.013	1.00	368.57	Pipe - (43)
14	7	24.000	0.003	DrGrt	0.00	1.45	0.57	10.0	363.18	0.88	363.39	18	Cir	0.013	1.00	367.00	Pipe - (45)
15	4	50.977	37.588	Comb	0.00	0.04	0.57	10.0	362.69	0.63	363.01	15	Cir	0.013	0.50	367.99	Pipe - (42)
16	15	66.788	0.000	Comb	0.00	0.06	0.57	10.0	363.11	1.62	364.19	15	Cir	0.013	1.00	369.04	Pipe - (41)
17	2	27.001	0.467	Comb	0.00	0.26	0.57	10.0	353.30	0.52	353.44	15	Cir	0.013	1.00	357.04	Pipe - (40)

Project File: SCM#5.stm | Number of lines: 17 | Date: 12/6/2024

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	YI 501	DropGrate	350.00	Rect	4.00	4.00	30	Cir	347.15	24	Cir	347.25
2	CB 502	Combination	357.04	Rect	4.00	4.00	24	Cir	352.55	24 15	Cir Cir	352.65 353.30
3	CB 504	Combination	366.04	Rect	4.00	4.00	24	Cir	361.27	24 15	Cir Cir	361.37 362.27
4	CB 505	Combination	367.77	Rect	4.00	4.00	24	Cir	361.85	24 15	Cir Cir	362.36 362.69
5	CB 506	Combination	367.48	Rect	4.00	4.00	24	Cir	362.50	24	Cir	362.58
6	CB 507	Combination	367.03	Rect	4.00	4.00	24	Cir	362.83	18	Cir	362.93
7	CB 508	Combination	367.03	Rect	4.00	4.00	18	Cir	363.07	15 18	Cir Cir	363.26 363.18
8	CB 514	Combination	374.04	Rect	4.00	4.00	15	Cir	370.19	15	Cir	370.29
9	CB 515	Combination	374.10	Rect	4.00	4.00	15	Cir	370.43			
10	CB 511	Combination	368.61	Rect	4.00	4.00	15	Cir	363.12	15 15	Cir Cir	363.77 364.00
11	CB 517	Combination	372.04	Rect	4.00	4.00	15	Cir	366.88	15	Cir	367.17
12	CB 516	Combination	372.04	Rect	4.00	4.00	15	Cir	367.46			
13	CB 510	Combination	368.57	Rect	4.00	4.00	15	Cir	364.24			
14	YI 509	DropGrate	367.00	Rect	4.00	4.00	18	Cir	363.39			
15	CB 512	Combination	367.99	Rect	4.00	4.00	15	Cir	363.01	15	Cir	363.11
16	CB 513	Combination	369.04	Rect	4.00	4.00	15	Cir	364.19			
17	CB 503	Combination	357.04	Rect	4.00	4.00	15	Cir	353.44			

Project File: SCM#5.stm	Number of Structures: 17	Run Date: 12/6/2024

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	Pipe - (39)	18.88	30	Cir	45.553	346.92	347.15	0.505	349.42	349.50	0.29	349.79	End	DropGrate
2	Pipe - (38)	14.79	24	Cir	163.558	347.25	352.55	3.240	349.79	353.93	n/a	353.93 j	1	Combination
3	Pipe - (37)	13.18	24	Cir	215.399	352.65	361.27	4.002	353.93	362.58	n/a	362.58	2	Combination
4	Pipe - (36)	11.79	24	Cir	48.260	361.37	361.85	0.995	362.58	363.08	n/a	363.08	3	Combination
5	Pipe - (35)	11.36	24	Cir	27.000	362.36	362.50	0.519	363.59	363.73	0.57	364.30	4	Combination
6	Pipe - (34)	7.67	24	Cir	47.057	362.58	362.83	0.531	364.30	363.81	0.40	363.81	5	Combination
7	Pipe - (33)	6.84	18	Cir	27.000	362.93	363.07	0.519	364.05	364.19	0.55	364.73	6	Combination
8	Pipe - (31)	1.05	15	Cir	187.898	363.26	370.19	3.688	364.73	370.59	n/a	370.59 j	7	Combination
9	Pipe - (30)	0.53	15	Cir	27.526	370.29	370.43	0.509	370.59	370.72	0.10	370.81	8	Combination
10	Pipe - (44)	1.37	15	Cir	64.208	362.27	363.12	1.324	362.63	363.58	0.23	363.58	3	Combination
11	Pipe - (150)	0.87	15	Cir	115.871	363.77	366.88	2.684	364.01	367.24	n/a	367.24	10	Combination
12	Pipe - (28)	0.45	15	Cir	27.018	367.17	367.46	1.073	367.39	367.72	0.09	367.72	11	Combination
13	Pipe - (43)	0.26	15	Cir	27.000	364.00	364.24	0.889	364.18	364.44	0.07	364.44	10	Combination
14	Pipe - (45)	5.49	18	Cir	24.000	363.18	363.39	0.875	364.73	364.79	0.16	364.95	7	DropGrate
15	Pipe - (42)	0.37	15	Cir	50.977	362.69	363.01	0.628	363.08	363.25	n/a	363.25 j	4	Combination
16	Pipe - (41)	0.23	15	Cir	66.788	363.11	364.19	1.617	363.25	364.37	n/a	364.37	15	Combination
17	Pipe - (40)	0.98	15	Cir	27.001	353.30	353.44	0.519	353.93	353.94	0.07	354.01	2	Combination

Project File: SCM#5.stm	Number of lines: 17	Run Date: 12/6/2024

NOTES: Return period = 25 Yrs. ; j - Line contains hyd. jump.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	YI 501	4.80	0.00	4.80	0.00	DrGrt	0.0	0.00	4.00	2.00	2.00	Sag	4.00	0.020	0.020	0.013	0.34	38.20	0.34	38.20	0.0	Off
2	CB 502	1.06	0.00	1.06	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	0.11	3.54	0.28	3.54	2.0	Off
3	CB 504	0.15	0.00	0.15	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.047	2.00	0.040	0.020	0.013	0.06	1.60	0.17	0.00	2.0	2
4	CB 505	0.11	0.00	0.11	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.08	1.91	0.17	0.00	2.0	3
5	CB 506	4.01	0.00	2.20	1.81	Comb	6.0	1.50	0.00	3.00	2.50	0.010	2.00	0.040	0.020	0.013	0.26	10.93	0.37	7.94	2.0	6
6	CB 507	0.91	1.83	2.74	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	0.19	7.60	0.36	7.60	2.0	Off
7	CB 508	0.72	0.02	0.74	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	0.09	2.42	0.26	2.42	2.0	Off
8	CB 514	0.53	0.00	0.51	0.02	Comb	6.0	1.50	0.00	3.00	2.50	0.039	2.00	0.040	0.020	0.013	0.10	3.24	0.20	0.75	2.0	7
9	CB 515	0.53	0.00	0.51	0.02	Comb	6.0	1.50	0.00	3.00	2.50	0.039	2.00	0.040	0.020	0.013	0.10	3.24	0.20	0.75	2.0	6
10	CB 511	0.26	0.01	0.27	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.040	2.00	0.040	0.020	0.013	0.08	2.11	0.17	0.00	2.0	17
11	CB 517	0.42	0.00	0.41	0.01	Comb	6.0	1.50	0.00	3.00	2.50	0.030	2.00	0.040	0.020	0.013	0.10	3.04	0.19	0.62	2.0	10
12	CB 516	0.45	0.00	0.44	0.01	Comb	6.0	1.50	0.00	3.00	2.50	0.030	2.00	0.040	0.020	0.013	0.10	3.20	0.20	0.71	2.0	13
13	CB 510	0.26	0.01	0.28	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.040	2.00	0.040	0.020	0.013	0.08	2.13	0.17	0.07	2.0	10
14	YI 509	5.49	0.00	5.49	0.00	DrGrt	0.0	0.00	4.00	2.00	2.00	Sag	4.00	0.020	0.020	0.013	0.37	41.37	0.37	41.37	0.0	Off
15	CB 512	0.15	0.00	0.15	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.020	2.00	0.040	0.020	0.013	0.07	1.87	0.17	0.00	2.0	4
16	CB 513	0.23	0.00	0.23	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.020	2.00	0.040	0.020	0.013	0.09	2.36	0.17	0.15	2.0	15
17	CB 503	0.98	0.00	0.98	0.00	Comb	6.0	3.00	7.50	3.00	2.50	Sag	2.00	0.040	0.020	0.013	0.11	3.48	0.28	3.48	2.0	Off

Project File: SCM#5.stm	Number of lines: 17	Run Date: 12/6/2024

NOTES: Inlet N-Values = 0.016; Intensity = 62.86 / (Inlet time + 11.00) ^ 0.74; Return period = 25 Yrs. ; * Indicates Known Q added.All curb inlets are throat.

Hydraulic Grade Line Computations

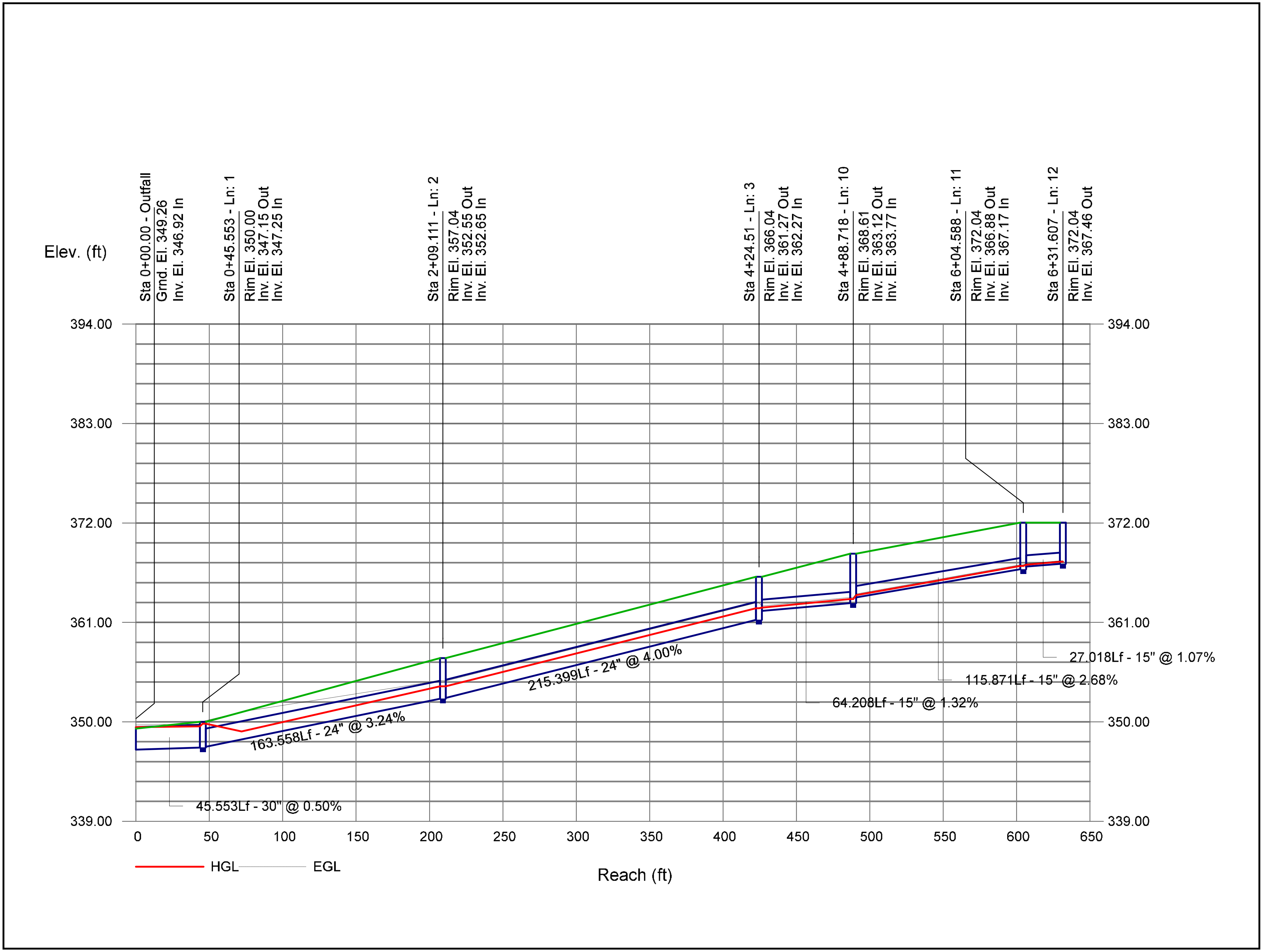
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	30	18.88	346.92	349.42	2.50	4.91	3.85	0.23	349.65	0.212	45.553	347.15	349.50	2.35	4.79	3.94	0.24	349.74	0.183	0.198	0.090	1.22	0.29
2	24	14.79	347.25	349.79	2.00	2.32	4.71	0.34	350.14	0.428	163.558	352.55	353.93 j	1.38**	2.32	6.37	0.63	354.57	0.628	0.528	n/a	1.50	0.95
3	24	13.18	352.65	353.93	1.28	2.13	6.18	0.57	354.51	0.000	215.399	361.27	362.58	1.31**	2.17	6.07	0.57	363.15	0.000	0.000	n/a	1.38	n/a
4	24	11.79	361.37	362.58	1.21	1.98	5.96	0.52	363.10	0.000	48.260	361.85	363.08	1.23**	2.03	5.81	0.52	363.61	0.000	0.000	n/a	1.49	n/a
5	24	11.36	362.36	363.59	1.23*	2.03	5.60	0.49	364.08	0.518	27.000	362.50	363.73	1.23	2.02	5.62	0.49	364.22	0.521	0.520	0.140	1.17	0.57
6	24	7.67	362.58	364.30	1.72	1.54	2.67	0.39	364.69	0.000	47.057	362.83	363.81	0.98**	1.54	4.98	0.39	364.20	0.000	0.000	n/a	1.04	0.40
7	18	6.84	362.93	364.05	1.12*	1.41	4.85	0.37	364.41	0.519	27.000	363.07	364.19	1.12	1.41	4.85	0.37	364.55	0.519	0.519	0.140	1.50	0.55
8	15	1.05	363.26	364.73	1.25	0.34	0.86	0.01	364.75	0.027	187.898	370.19	370.59 j	0.40**	0.34	3.07	0.15	370.74	0.524	0.275	n/a	1.48	0.22
9	15	0.53	370.29	370.59	0.30	0.21	2.30	0.08	370.68	0.404	27.526	370.43	370.72	0.29**	0.21	2.50	0.10	370.81	0.511	0.458	0.126	1.00	0.10
10	15	1.37	362.27	362.63	0.36*	0.30	4.61	0.17	362.81	0.000	64.208	363.12	363.58	0.46**	0.41	3.32	0.17	363.75	0.000	0.000	n/a	1.36	0.23
11	15	0.87	363.77	364.01	0.24*	0.17	5.19	0.13	364.14	0.000	115.871	366.88	367.24	0.36**	0.30	2.91	0.13	367.38	0.000	0.000	n/a	1.50	n/a
12	15	0.45	367.17	367.39	0.22*	0.15	3.11	0.09	367.48	0.000	27.018	367.46	367.72	0.26**	0.19	2.43	0.09	367.81	0.000	0.000	n/a	1.00	0.09
13	15	0.26	364.00	364.18	0.18*	0.11	2.48	0.07	364.25	0.000	27.000	364.24	364.44	0.20**	0.13	2.11	0.07	364.51	0.000	0.000	n/a	1.00	0.07
14	18	5.49	363.18	364.73	1.50	1.77	3.11	0.15	364.88	0.273	24.000	363.39	364.79	1.40	1.71	3.20	0.16	364.95	0.236	0.255	0.061	1.00	0.16
15	15	0.37	362.69	363.08	0.39	0.16	1.13	0.08	363.16	0.000	50.977	363.01	363.25 j	0.24**	0.16	2.30	0.08	363.33	0.000	0.000	n/a	0.50	0.04
16	15	0.23	363.11	363.25	0.14*	0.08	2.92	0.06	363.32	0.000	66.788	364.19	364.37	0.18**	0.11	2.02	0.06	364.44	0.000	0.000	n/a	1.00	n/a
17	15	0.98	353.30	353.93	0.63	0.63	1.57	0.04	353.97	0.088	27.001	353.44	353.94	0.50	0.46	2.15	0.07	354.01	0.204	0.146	0.039	1.00	0.07

Project File: SCM#5.stm	Number of lines: 17	Run Date: 12/6/2024

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Storm Sewer Profile

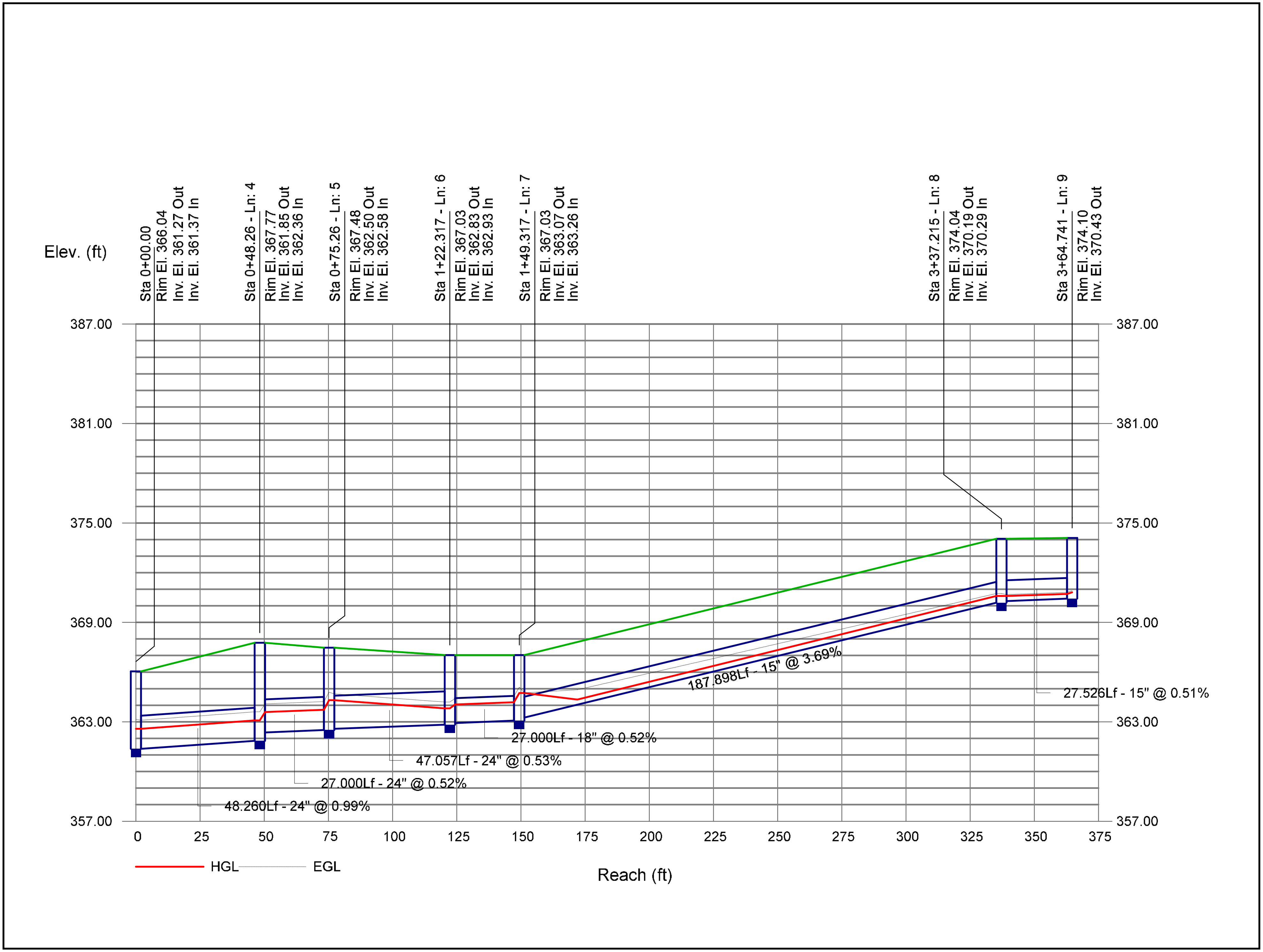
25-Year SCM#5 Profile 1-12 Proj. file: SCM#5.stm



Storm Sewers

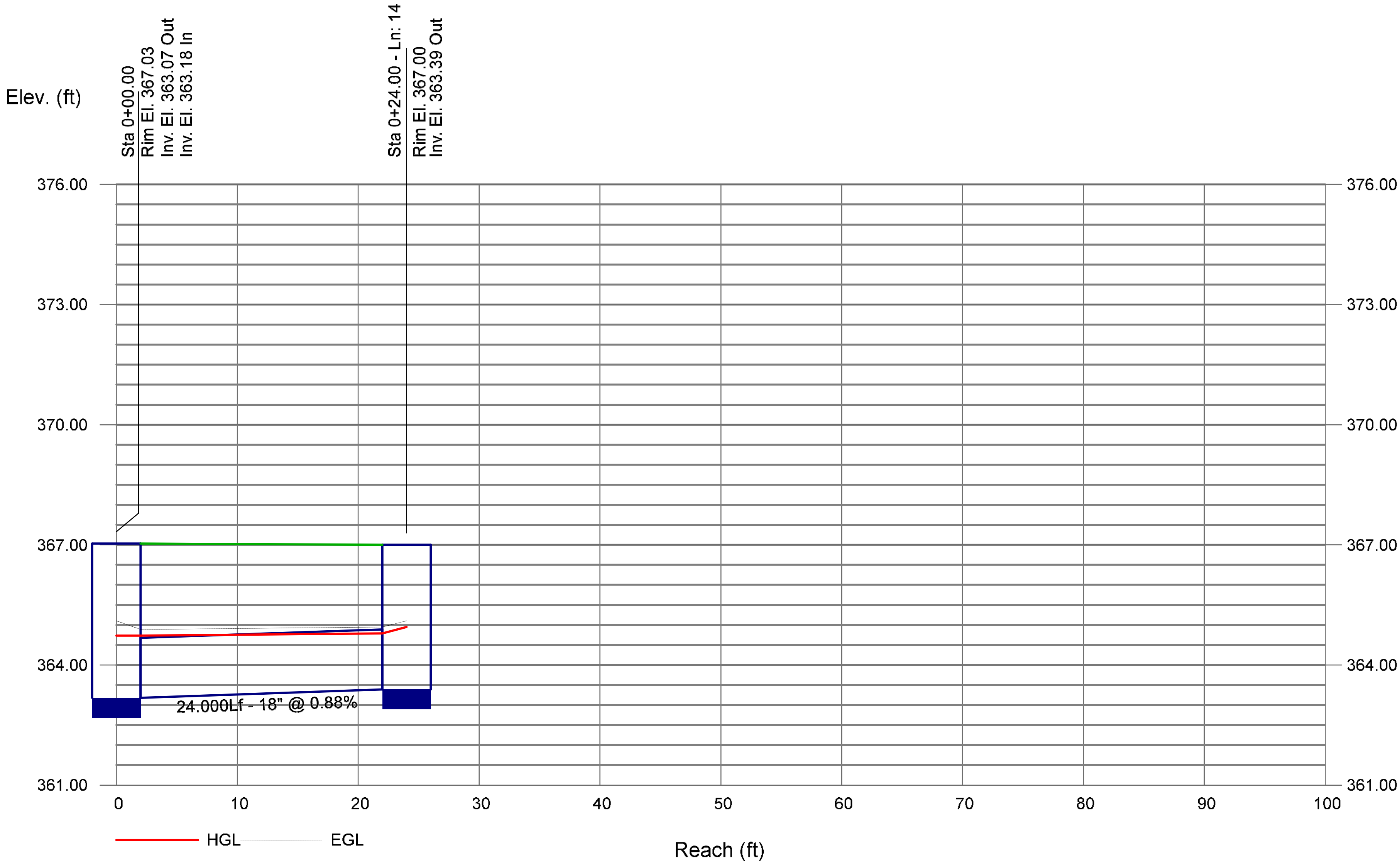
Storm Sewer Profile

25-Year SCM#5 Profile 4-9 Proj. file: SCM#5.stm



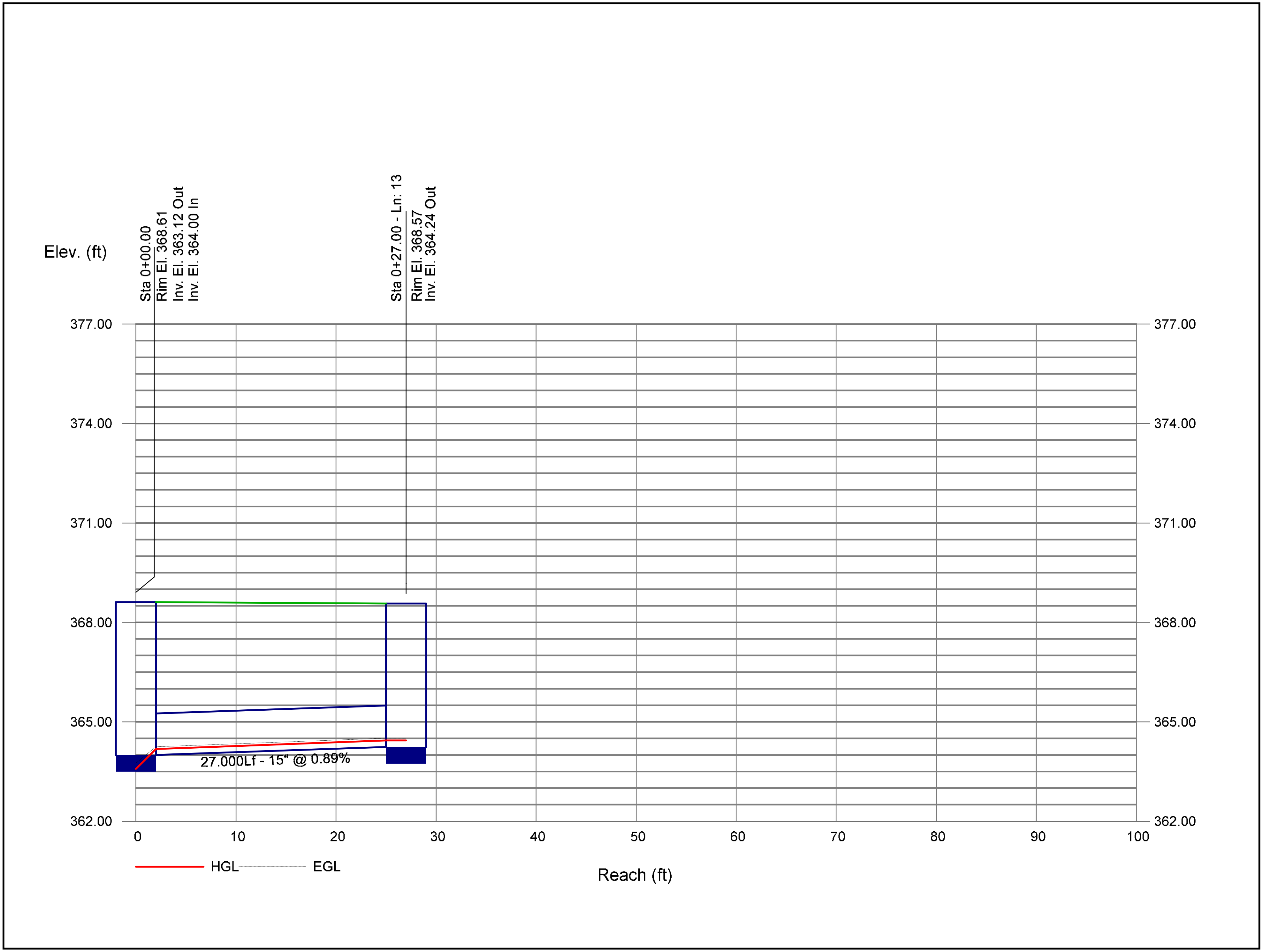
Storm Sewer Profile

25-Year SCM#5 Profile 14-14 Proj. file: SCM#5.stm



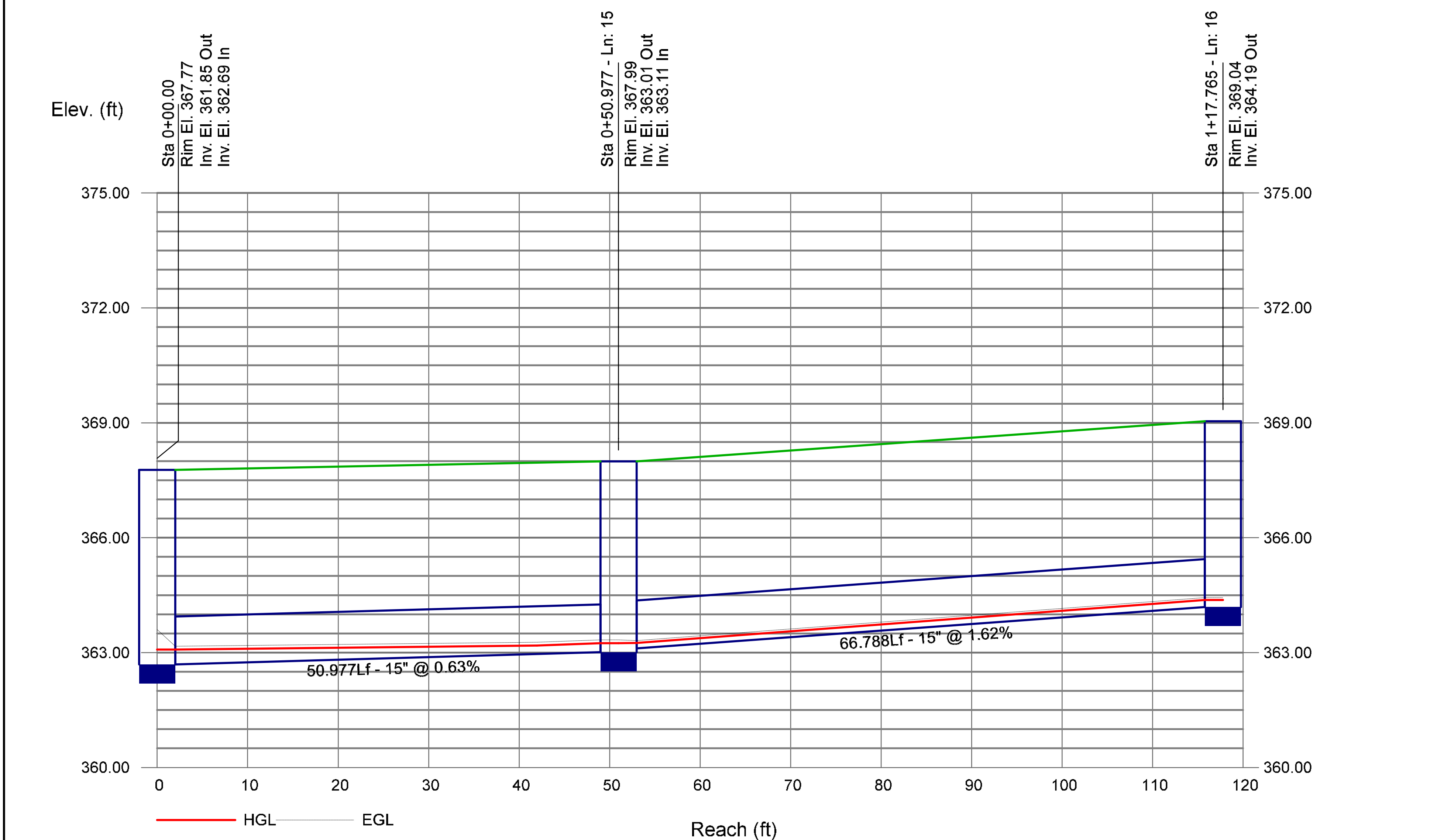
Storm Sewer Profile

25-Year SCM#5 Profile 13-13 Proj. file: SCM#5.stm



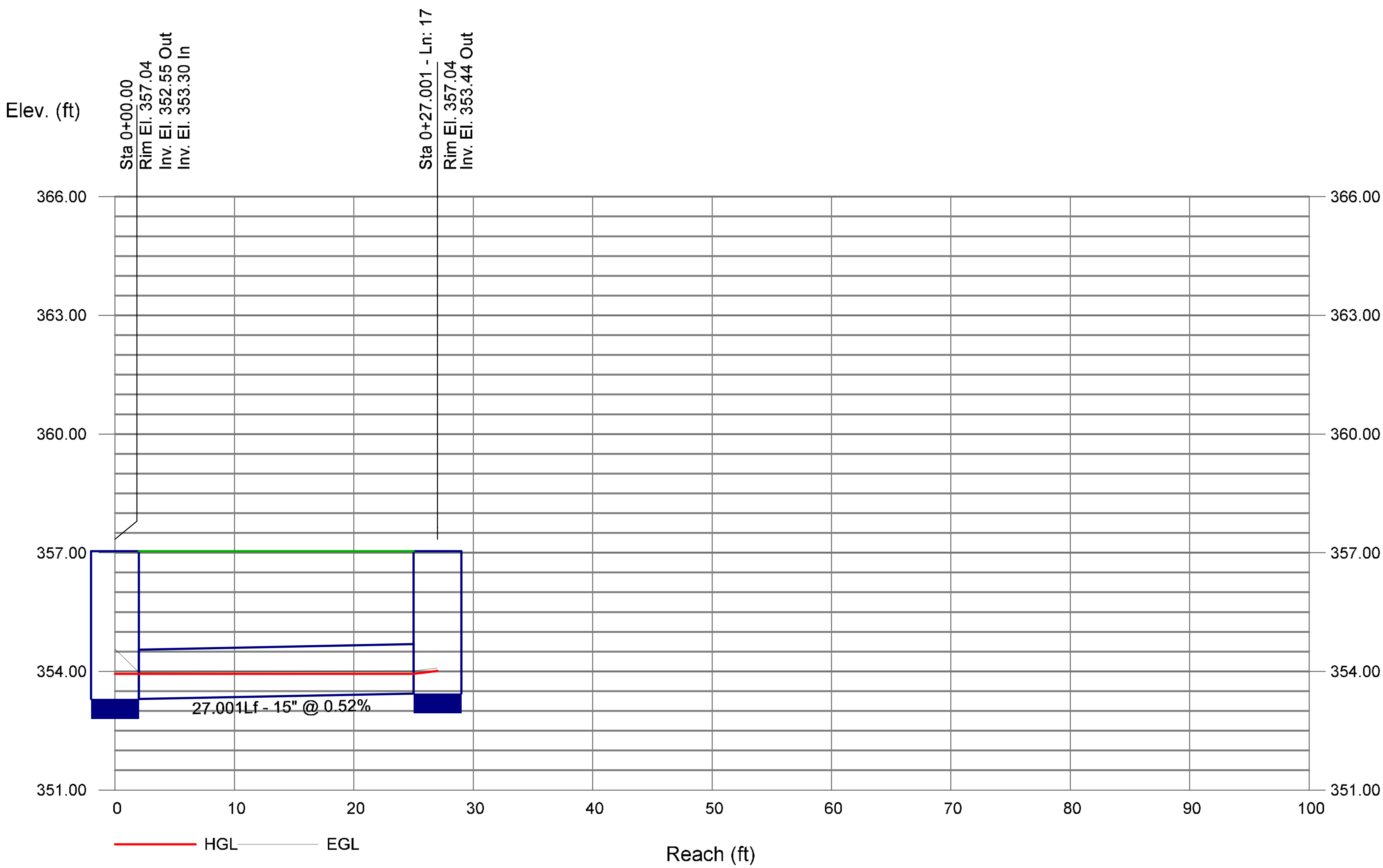
Storm Sewer Profile

25-Year SCM#5 Profile 15-16 Proj. file: SCM#5.stm



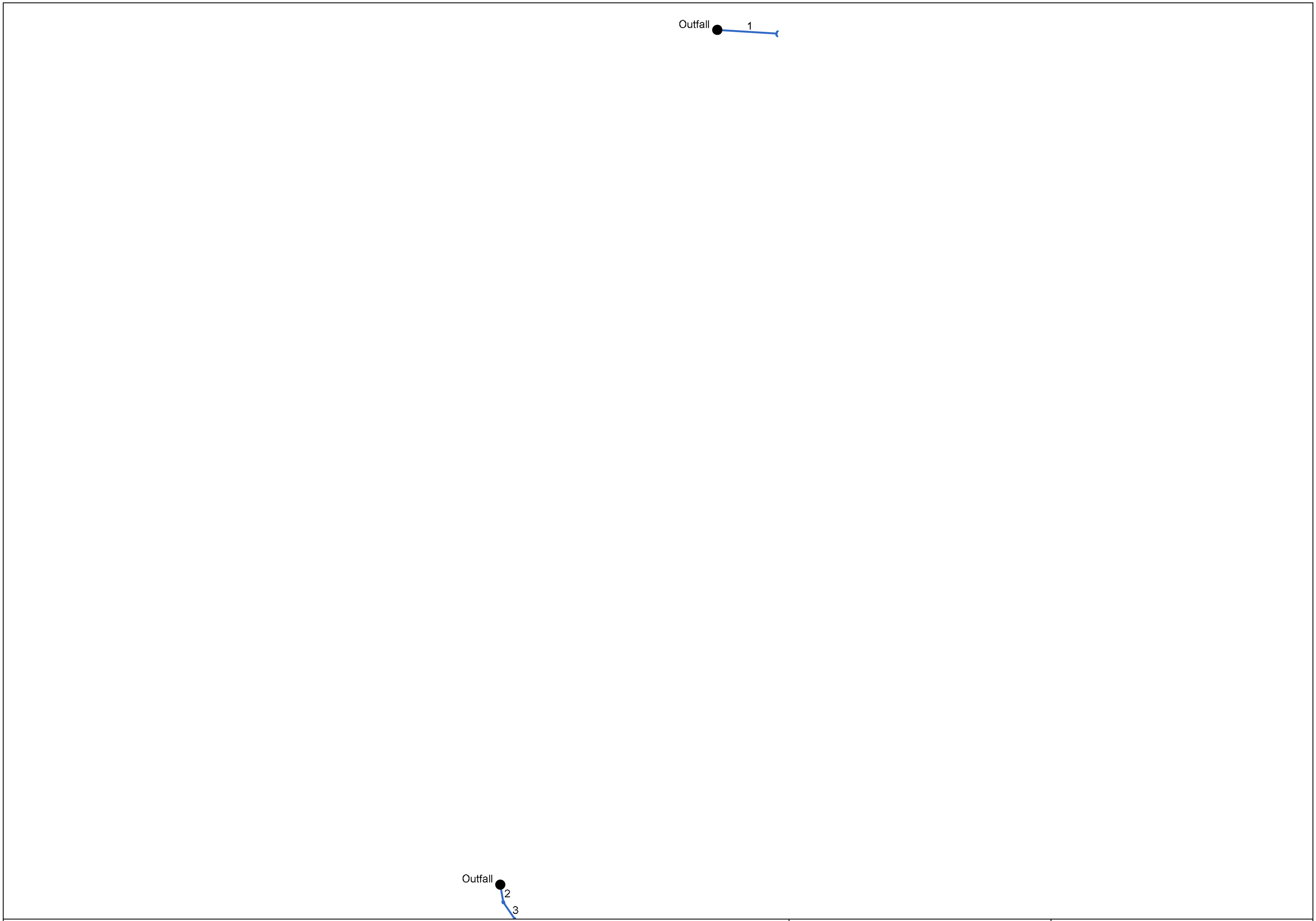
Storm Sewer Profile

25-Year SCM#5 Profile 17-17 Proj. file: SCM#5.stm



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

25-Year Bypass Report



Project File: Bypass.stm	Number of lines: 3	Date: 12/5/2024

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	79.189	3.627	Hdwl	0.00	1.58	0.57	10.0	366.06	4.36	369.51	18	Cir	0.013	1.00	371.30	Pipe - (27)
2	End	23.999	80.505	Comb	0.00	0.08	0.57	10.0	356.16	0.50	356.28	15	Cir	0.013	0.71	360.04	Pipe - (26)
3	2	27.005	-24.771	Comb	0.00	0.09	0.57	10.0	356.41	0.52	356.55	15	Cir	0.013	1.00	360.04	Pipe - (25)

Project File: Bypass.stm | Number of lines: 3 | Date: 12/5/2024

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	FES INLET 601	OpenHeadwall	371.30	n/a	n/a	n/a	18	Cir	369.51			
2	CB 421	Combination	360.04	Rect	4.00	4.00	15	Cir	356.28	15	Cir	356.41
3	CB 422	Combination	360.04	Rect	4.00	4.00	15	Cir	356.55			

Project File: Bypass.stm	Number of Structures: 3	Run Date: 12/5/2024

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line Size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line Slope (%)	HGL Down (ft)	HGL Up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns Line No.	Junction Type
1	Pipe - (27)	5.98	18	Cir	79.189	366.06	369.51	4.357	367.56	370.45	n/a	370.45 j	End	OpenHeadwall
2	Pipe - (26)	0.62	15	Cir	23.999	356.16	356.28	0.500	357.41	357.41	0.00	357.41	End	Combination
3	Pipe - (25)	0.34	15	Cir	27.005	356.41	356.55	0.518	357.41	357.41	0.00	357.42	2	Combination

Project File: Bypass.stm | Number of lines: 3 | Run Date: 12/5/2024

NOTES: Return period = 25 Yrs. ; j - Line contains hyd. jump.

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	FES INLET 601	5.98	0.00	5.98	0.00	Hdwl	0.0	0.00	0.00	0.00	0.00	Sag	2.00	0.040	0.020	0.013	0.00	0.00	0.00	0.00	0.0	Off
2	CB 421	0.30	0.00	0.30	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.029	2.00	0.040	0.020	0.013	0.09	2.52	0.18	0.30	2.0	Off
3	CB 422	0.34	0.00	0.34	0.00	Comb	6.0	1.50	0.00	3.00	2.50	0.029	2.00	0.040	0.020	0.013	0.09	2.72	0.18	0.41	2.0	Off

Project File: Bypass.stm | Number of lines: 3 | Run Date: 12/5/2024

NOTES: Inlet N-Values = 0.016; Intensity = 62.86 / (Inlet time + 11.00) ^ 0.74; Return period = 25 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
			Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf		Invert elev	HGL elev	Depth	Area	Vel	Vel head	EGL elev	Sf	Ave Sf	Enrgy loss		
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
1	18	5.98	366.06	367.56	1.50	1.17	3.38	0.18	367.74	0.324	79.189	369.51	370.45 j	0.94**	1.17	5.11	0.41	370.86	0.623	0.474	n/a	1.00	0.41
2	15	0.62	356.16	357.41	1.25*	1.23	0.50	0.00	357.41	0.009	23.999	356.28	357.41	1.13	1.17	0.53	0.00	357.42	0.008	0.009	0.002	0.71	0.00
3	15	0.34	356.41	357.41	1.00	1.06	0.32	0.00	357.42	0.003	27.005	356.55	357.41	0.86	0.91	0.38	0.00	357.42	0.004	0.003	0.001	1.00	0.00

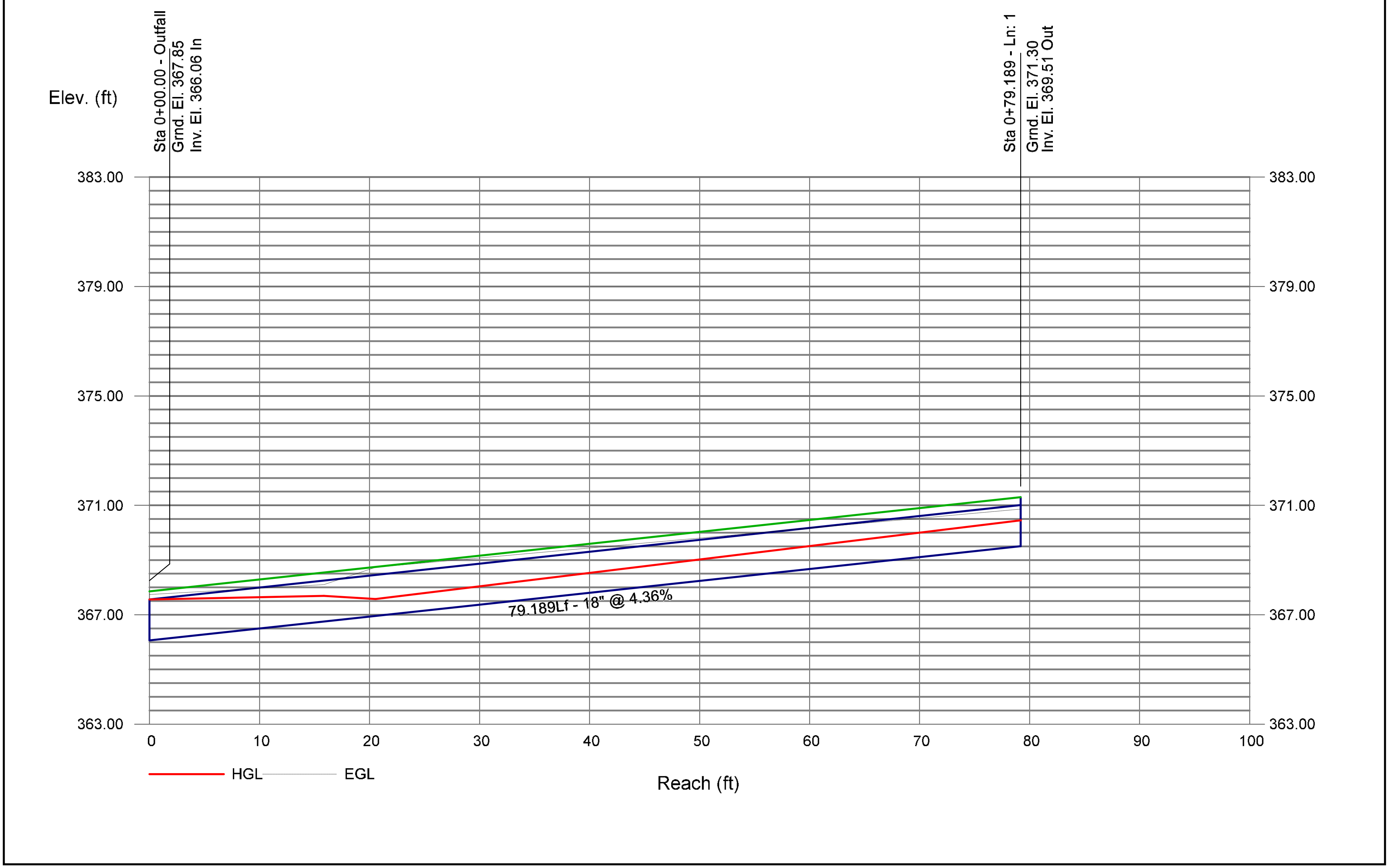
Project File: Bypass.stm	Number of lines: 3	Run Date: 12/5/2024

Notes: * depth assumed; ** Critical depth.; j-Line contains hyd. jump ; c = cir e = ellip b = box

Storm Sewer Profile

25-Year Bypass Profile 1-1

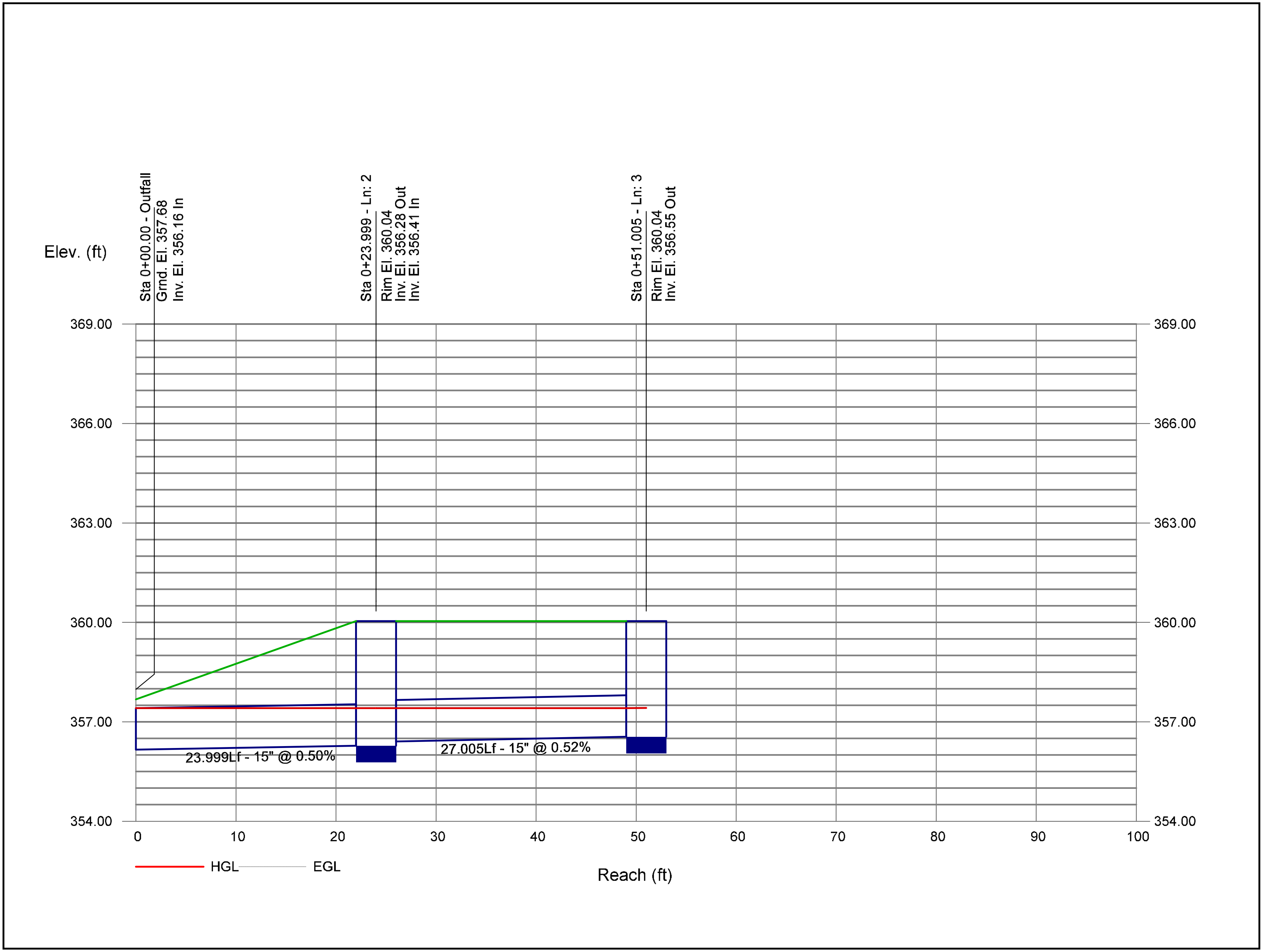
Proj. file: Bypass.stm



Storm Sewer Profile

25-Year Bypass Profile 2-3

Proj. file: Bypass.stm



Storm Sewers

APPENDIX D

STORMWATER CONTROL MEASURE CALCULATIONS

Project Information

Complete this sheet if required by your reviewing authority.
Contact them for any questions. Grey boxes/text are optional.

SNAP v4.2.0

LOCATION

Project Name (optional):	Moody Development		Parcel ID (optional):	1767284304 & 1767284925	
Submission Date (optional):	12/16/2024	date	Nutrient Management Watershed:	Neuse	menu
Local Jurisdiction / Reviewing Agency:	Wake County	menu	**Subwatershed:**	Neuse-Upper	menu
Project Latitude Coordinates (optional):		N	**Phosphorus Delivery Zone:**	Neuse - Upper 03020201	menu
Project Longitude Coordinates (optional):		W	**Nitrogen Delivery Zone:**	Neuse - Upper 03020201	menu

PROJECT DETAILS

Development Land Use Type:	Single Family Residential	menu	**Disturbed Area:**	827,640	ft^2
Part of Common Development Plan?	no	y/n	**Project Activity:**	New Development	menu
Designated Downtown Area?	no	y/n	**Project Drains to SA Waters?**	no	y/n
Public Linear Road/Sidewalk Project?	no	y/n	**Pre-Project Land Use:**	crops	menu
Project Owner Type:	Private	menu	Project Description (optional):		

STORMWATER DETAILS

(Falls ONLY) Onsite Reduction % Req.		%	**Project Uses LID/Runoff Volume Match?**	no	y/n
Existing BUA/Development Onsite?	yes	y/n	**Local Gov't nutrient req's same as State?**	yes	y/n
Local Gov't cutoff date for Existing BUA:		date	**Project Drains to Regional SCM?**	no	y/n
Nitrogen Export Rate Target:	3.60	lb/ac/yr	**Total Nitrogen Offset Credits Needed:**		lb/yr
Phosphorus Export Rate Target:		lb/ac/yr	**Total Phosphorus Offset Credits Needed:**		lb/yr

SNAP v4.2.0

Project Area and Offsite Land Cover Characteristics

Precipitation Station:	Raleigh

Copy & Paste VALUES ONLY for Best Results

Click here to scroll down to error messages on this sheet.

PROJECT AREA LAND COVERS		TN EMC (mg/L)	TP EMC (mg/L)	Pre-Project Area (ft^2)	Post-Project Area (ft^2)	*Change pre-to-post (ft^2)*
Roof		1.18	0.11		324,522	*324,522*
Roadway		1.64	0.34		169,884	*169,884*
Parking/Driveway/Sidewalk		1.42	0.18		120,661	*120,661*
Protected Forest		0.97	0.03	198,564	198,564	*0*
Managed Pervious/Landscaping		2.48	1.07	1,908,895	1,243,734	*-665,161*
Offsite or Existing Roof		1.18	0.11	6,411	6,411	*0*
Offsite or Existing Roadway		1.64	0.34			*0*
Offsite or Existing Parking/Driveway/Sidewa		1.42	0.18	24,233	24,233	*0*
Offsite Protected Forest		0.97	0.03			*0*
Offsite Managed Pervious		2.48	1.07			*0*
CUSTOM LAND COVER 1						*0*
CUSTOM LAND COVER 2						*0*
CUSTOM LAND COVER 3						*0*
LAND TAKEN UP BY SCM		1.18	0.11		50,094	*50,094*
		Total (Regulated & UnReg) Area		***2,138,103.00***	***2,138,103.00***	
		Project (Regulated) Area		***2,107,459.00***	***2,107,459.00***	

Stormwater Control Measure (SCM) Characteristics

SNAP v4.2.0

Copy & Paste VALUES ONLY for Best Results

[Click here to go to SCM101's Land Cover Data] [Click here to review Errors] [Click here to go to Summary Data] [Click here to go back to the top]

Catchment ID	1	1	1	2	2	2	3	3	3	4	4	4	5	5	5	6	6	6
	Drains to	Drains to		Drains to	Drains to		Drains to	Drains to		Drains to	Drains to		Drains to	Drains to		Drains to	Drains to	
SCM ID	101	102	103	201	202	203	301	302	303	401	402	403	501	502	503	601	602	603
Type of SCM	Wet Pond			Wet Pond			Wet Pond			Wet Pond			Wet Pond					
Hydrologic soil group at SCM location	B			C			C			C			C					
SCM Description	SCM #1			SCM #2			SCM #3			SCM #4			SCM #5					
Design Storm Size (inches/24hrs)	0.13			0.13			0.13			0.13			0.13					
Percent of Full Size	100%			100%			100%			100%			100%					
% Annual Effluent	68%	0%	0%	72%	0%	0%	72%	0%	0%	72%	0%	0%	72%	0%	0%	0%	0%	0%
% Annual Overflow	16%	0%	0%	16%	0%	0%	16%	0%	0%	16%	0%	0%	16%	0%	0%	0%	0%	0%
% Annual ET/Infiltrated	17%	0%	0%	13%	0%	0%	13%	0%	0%	13%	0%	0%	13%	0%	0%	0%	0%	0%
Custom % Annual Effluent																		
Custom % Annual Overflow																		
Custom % Annual ET/Infiltrated																		
SCM Effluent TP EMC (mg/L)	0.13	0.00	0.00	0.13	0.00	0.00	0.13	0.00	0.00	0.13	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00
SCM Effluent TN EMC (mg/L)	0.86	0.00	0.00	0.86	0.00	0.00	0.86	0.00	0.00	0.86	0.00	0.00	0.86	0.00	0.00	0.00	0.00	0.00
Custom Effluent TP EMC																		
Custom Effluent TN EMC																		
SCM Land Cover TP EMC (mg/L)	0.11	0.00	0.00	0.11	0.00	0.00	0.11	0.00	0.00	0.11	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00
SCM Land Cover TN EMC (mg/L)	1.18	0.00	0.00	1.18	0.00	0.00	1.18	0.00	0.00	1.18	0.00	0.00	1.18	0.00	0.00	0.00	0.00	0.00
This SCM Drains to Numbered SCM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Catchment Routing	Catchments Draining to SCM 101	Catchments Draining to SCM 102	Catchments Draining to SCM 103	Catchments Draining to SCM 201	Catchments Draining to SCM 202	Catchments Draining to SCM 203	Catchments Draining to SCM 301	Catchments Draining to SCM 302	Catchments Draining to SCM 303	Catchments Draining to SCM 401	Catchments Draining to SCM 402	Catchments Draining to SCM 403	Catchments Draining to SCM 501	Catchments Draining to SCM 502	Catchments Draining to SCM 503	Catchments Draining to SCM 601	Catchments Draining to SCM 602	Catchments Draining to SCM 603
Catchment 1																		
Catchment 2																		
Catchment 3																		
Catchment 4																		
Catchment 5																		
Catchment 6																		
Error Check - Missing SCM Area:																		
Error Check - Min/Max Size:																		
Error Check - Hydrology:																		
Error Check - Missing SCM Info:																		
Error Check - Drainage Data w/o SCM:																		
Error Checks - SCM Type:																		

SCM ID:	101	102	103	201	202	203	301	302	303	401	402	403	501	502	503	601	602	603			
SCM Drainage Area Land Covers	Area Draining Directly to SCM 101 (ft2)	Area Draining Directly to SCM 102 (ft2)	Area Draining Directly to SCM 103 (ft2)	Area Draining Directly to SCM 201 (ft2)	Area Draining Directly to SCM 202 (ft2)	Area Draining Directly to SCM 203 (ft2)	Area Draining Directly to SCM 301 (ft2)	Area Draining Directly to SCM 302 (ft2)	Area Draining Directly to SCM 303 (ft2)	Area Draining Directly to SCM 401 (ft2)	Area Draining Directly to SCM 402 (ft2)	Area Draining Directly to SCM 403 (ft2)	Area Draining Directly to SCM 501 (ft2)	Area Draining Directly to SCM 502 (ft2)	Area Draining Directly to SCM 503 (ft2)	Area Draining Directly to SCM 601 (ft2)	Area Draining Directly to SCM 602 (ft2)	Area Draining Directly to SCM 603 (ft2)	Total Land Use Area Treated By All SCMs (ft^2)	Allowable Total Land Use Area to be Treated Based on Post-Project Areas (ft^2)	Post-Project Untreated Land Area (ft^2)
Roof	72,745			13,939			86,249			42,689			74,488						290,110	324,522	34,412
Roadway	43,560						43,124			36,590			41,818						165,092	169,884	4,792
Parking/Driveway/Sidewalk	26,572			871			21,345			16,553			50,530						115,871	120,661	4,790
Protected Forest							6,970			871			2,178						10,019	198,564	188,545
Managed Pervious/Landscaping	265,280			60,113			216,493			116,305			124,146						782,337	1,243,734	461,397
Offsite or Existing Roof																			0	6,411	6,411
Offsite or Existing Roadway																			0	0	0
Offsite or Existing Parking/Driveway/Sidewalk																			0	24,233	24,233
Offsite Protected Forest																			0	0	0
Offsite Managed Pervious																			0	0	0
CUSTOM LAND COVER 1																			0	0	0
CUSTOM LAND COVER 2																			0	0	0
CUSTOM LAND COVER 3																			0	0	0
LAND TAKEN UP BY SCM	17,424			8,712			7,405			6,534			10,019						50,094	50,094	0
TOTAL AREA DRAINING TO SCM (ft^2):	**425,581**	**0**	**0**	**83,635**	**0**	**0**	**381,586**	**0**	**0**	**219,542**	**0**	**0**	**303,179**	**0**	**0**	**0**	**0**	**0**	**1,413,523**	**2,138,103**	**724,580**
CATCHMENT AREA (ft^2):	**425,581**			**83,635**			**381,586**			**219,542**			**303,179**			**0**					

Nutrient Export Summary

SNAP v4.2.0

Landcover & SCM Data Review

		Errors / Advisories
Avg Annual precip (in) =	46.22	
Total (Regulated + Unregulated) Area (ft^2) =	2,138,103	
Project (Regulated) Area (ft^2) =	2,107,459	
Net BUA (Project Area BUA only ft^2) =	615,067	Net BUA indicates new development or expansion.
Custom Landcovers are present:	no	
Total Nitrogen Export Target Scaled to Project Area (lb/yr):	174.17	

		Errors / Advisories
SCM Area (ft^2) =	50,094	
SCM Treated Area (ft^2) =	1,413,523	
Catchment Routing:	No errors	
Treating Runoff from Existing BUA or Offsite:	no	
Disturbed Area (ft^2) =	827,640	
Total Phosphorus Export Target Scaled to Project Area (lb/yr):	0.00	

Nutrient Export Summary	Total Area (Onsite + Offsite) Pre-Project	Project Area (Onsite Only) Pre-Project	Total Area Post-Project before Treatment	Project Area Post-Project before Treatment	Total Area Post-Project after Treatment	Project Area Post-Project after Treatment	Total Area Post-Project SCM-Treated Area Only	Project Area Post-Project SCM-Treated Area Only	Total Area Post-Project Untreated Areas	Project Area Post-Project Untreated Areas
Area (All Landcover Types) (acres)	49.0841	48.3806	49.0841	48.3806	49.0841	48.3806	32.4500	32.4500	16.6341	15.9306
Percent Built-Upon Area (BUA) (%)	1%	0%	30%	29%	30%	29%	40%	40%	10%	6%
Built-Upon Area (BUA) (sqft)	30,644	0	645,711	606,252	645,711	606,252	571,073	571,073	74,638	43,994
Annual Runoff Volume (ft^3/yr)	466,191	365,275	2,550,076	2,449,160	2,248,200	2,147,284	1,889,752	1,889,752	358,447	257,531
Annual Runoff % Change			447%	570%	382%	488%				
Total Runoff Change (cuft/yr)			2,083,885	2,083,885	1,782,008	1,782,008				
Total Nitrogen EMC (mg/L)	2.13	1.86	1.43	1.44	1.05	1.04	0.96	0.96	1.54	1.60
Total Nitrogen Load Leaving Site (lb/yr)	**61.95**	**53.32**	**228.16**	**219.53**	**147.43**	**138.80**	113.07	113.07	34.36	25.73
Total Nitrogen Loading Rate (lb/ac/yr)	*1.26*	*1.10*	*4.65*	*4.54*	*3.00*	*2.87*	*3.48*	*3.48*	*2.07*	*1.62*
Total Nitrogen % Change Pre-to-Post			268%	312%	138%	160%				
Total Nitrogen Change (lb/yr) Pre-to-Post			166.21	166.21	85.48	85.48				
Total Phosphorus EMC (mg/L)	0.80	0.77	0.25	0.26	0.18	0.18	0.15	0.15	0.35	0.42
Total Phosphorus Load Leaving Site (lb/yr)	**23.21**	**22.17**	**40.39**	**39.34**	**25.35**	**24.31**	17.61	17.61	7.74	6.70
Total Phosphorus Loading Rate (lb/ac/yr)	*0.47*	*0.46*	*0.82*	*0.81*	*0.52*	*0.50*	*0.54*	*0.54*	*0.47*	*0.42*
Total Phosphorus % Change Pre-to-Post			74%	77%	9%	10%				
Total Phosphorus Change (lb/yr)Pre-to-Post			17.17	17.17	2.14	2.14				

SCM/Catchment Summary

SCM ID and Type	Volume Reduction (%)	TN Reduction (%)	TP Reduction (%)	*TN Out (lbs/ac/yr)*	*TP Out (lbs/ac/yr)*
Catchment 1	16.88%	44.06%	50.02%	*2.96*	*0.47*
101: Wet Pond	16.88%	44.06%	50.02%	*2.96*	*0.47*
102: NA	0.00%	0.00%	0.00%	*0.00*	*0.00*
103: NA	0.00%	0.00%	0.00%	*0.00*	*0.00*
Catchment 2	12.66%	38.48%	42.93%	*2.40*	*0.37*
201: Wet Pond	12.66%	38.48%	42.93%	*2.40*	*0.37*
202: NA	0.00%	0.00%	0.00%	*0.00*	*0.00*
203: NA	0.00%	0.00%	0.00%	*0.00*	*0.00*
Catchment 3	12.66%	40.89%	45.85%	*3.34*	*0.52*
301: Wet Pond	12.66%	40.89%	45.85%	*3.34*	*0.52*
302: NA	0.00%	0.00%	0.00%	*0.00*	*0.00*
303: NA	0.00%	0.00%	0.00%	*0.00*	*0.00*
Catchment 4	12.66%	41.82%	47.51%	*3.73*	*0.59*
401: NA	12.66%	41.82%	47.51%	*3.73*	*0.59*
402: NA	0.00%	0.00%	0.00%	*0.00*	*0.00*
403: NA	0.00%	0.00%	0.00%	*0.00*	*0.00*
Catchment 5	12.66%	40.37%	41.27%	*4.53*	*0.69*
501: NA	12.66%	40.37%	41.27%	*4.53*	*0.69*
502: NA	0.00%	0.00%	0.00%	*0.00*	*0.00*
503: NA	0.00%	0.00%	0.00%	*0.00*	*0.00*
Catchment 6	0.00%	0.00%	0.00%	*0.00*	*0.00*
601: NA	0.00%	0.00%	0.00%	*0.00*	*0.00*
602: NA	0.00%	0.00%	0.00%	*0.00*	*0.00*
603: NA	0.00%	0.00%	0.00%	*0.00*	*0.00*

Falls Lake ONLY: Onsite Reduction Compliance Check

	Nitrogen	Phosphorus
Onsite % Reduction Requirement		
Export Target Scaled to Area (lb/yr)	**174.17**	
Export Load Post-Project Before Treatment	**219.53**	**39.34**
Total Reduction Need (lb/yr)		
Onsite Reduction Need (lb/yr)		
Onsite Export Target (lb/yr)		
Project Area Post-Project After Treatment	**138.80**	**24.31**

Nutrient Management Strategy Watershed - Nutrient Offset Credit Reporting Form

SNAP v4.2.0

Please complete and submit the following information to the local government permitting your development project to characterize it and assess the need to purchase nutrient offset credits. Contact and rule implementation information can be found online at:

http://deq.nc.gov/about/divisions/water-resources/planning/nonpoint-source-management/nutrient-offset-information

PROJECT INFORMATION

Applicant Name:	Caruso Homes		
Project Name:	Moody Development		
Project Address:	0 Rolesville RD & 0 Amazon Trail		
Date: *(mm/dd/yyyy)*	12/3/2024	**Development Land Use Type:**	Single Family Residential
County:	Wake	**Project Activity Type:**	New Development
Project Area (sqft):	2,107,459	**Project Latitude:**	0.000000
Post-Project Built-Upon Area %:	28.77%	**Project Longitude:**	0.000000

WATERSHED INFORMATION

Nutrient Management Watershed:	Neuse	**N Target Export Rate (lb/ac/yr):**	3.60
Subwatershed:	Neuse-Upper	**P Target Export Rate (lb/ac/yr):**	0.00
Nitrogen Delivery Zone:	Neuse - Upper 03020201	**Nitrogen Delivery Factor:**	100%
Phosphorus Delivery Zone:	Neuse - Upper 03020201	**Phosphorus Delivery Factor:**	100%

PERMANENT NUTRIENT OFFSET REQUEST

Post-Project Nitrogen Calculations - Projects with No Offsite or Built-Upon Area

(A)	(B)	(C)	(D)		(F)	(G)	*(Where Applicable)*	
TN Untreated Load (lb/yr)	TN Export Target Load (lb/yr)	TN Treated Load (lb/yr)	TN Remaining Reduction Need (lb/yr)		TN Delivery Factor (%)	TN Permanent Offsets Required (lb/yr)	Additional Local Gov't Offsets (lb/yr)	**Total TN Permanent Offsets to Buy (lb/yr)**
219.5	174.2	138.8	0.0		100.0%	0.0		**0.0**

Post-Project Phosphorus Calculations - Projects with No Offsite or Built-Upon Area

(A)	(B)	(C)	(D)		(F)	(G)	*(Where Applicable)*	
TP Untreated Load (lb/yr)	TP Export Target Load (lb/yr)	TP Treated Load (lb/yr)	TP Remaining Reduction Need (lb/yr)		TP Delivery Factor (%)	TP Permanent Offsets Required (lb/yr)	Additional Local Gov't Offsets (lb/yr)	**Total TP Permanent Offsets to Buy (lb/yr)**
								0.0

LOCAL GOVERNMENT AUTHORIZATION

Local Government Name:			
Staff Name:		**Phone:**	
Staff Email:		**Date:**	

Local Government Authorizing Signature:

SITE DATA

Project Information	
Project Name:	**The Preserve at Moody Farm**
Applicant:	American Engineeinrg
Applicant Contact Name:	Jakob Klein
Applicant Contact Number:	(919) 469-1101
Contact Email:	jklein@american-ea.com
Municipal Jurisdiction (Select from dropdown menu):	Rolesville
Last Updated:	Monday, January 27, 2025
Site Data:	
Total Site Area (Ac):	48.28
Existing Lake/Pond Area (Ac):	1.49
Proposed Disturbed Area (Ac):	19.00
Impervious Surface Area (acre):	15.03
Type of Development (Select from Dropdown menu):	Residential
Percent Built Upon Area (BUA):	31%
Project Density:	High
Is the proposed project a site expansion?	No
Number of Drainage Areas on Site:	2
NOAA — 1-Year, 24-Hour Storm (inches) (See NOAA Website):	2.86
NOAA — 2-Year, 24-Hour Storm (inches) (See NOAA Website):	3.46
NOAA — 10-Year, 24-Hour Storm (inches) (See NOAA Website):	5.06
Lot Data (if applicable):	
Total Acreage in Lots:	24.38
Number of Lots:	82
Average Lot Size (SF):	10000.00
Total Impervious Surface Area on Lots (SF):	402666.00
Average Impervious Surface Area Per Lot (SF):	4910.56

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

See project Stormwater Impact Analysis Report for detailed narrative and calculations. The Moody project will have five (5) SCM's which the cumalitive areas are post-development POD 2. Hydrograph modeling for the project shows peak flows being attenuated for the 1-year and 10-year storm events. Although the Wake County tool calculations show 5.56 lb/ac/yr as the nitrogen loading rate on site, the NCDEQ SNAP Tool was implemented as well for for nitrogen removal and shows no offets required as the site is currently below the traget Nitrogen export rate of 3.6 lb/ac/yr. Thank you.

WAKE COUNTY
NORTH CAROLINA

Project Name: The Preserve at Moody Farm

DRAINAGE AREA 1
STORMWATER PRE-POST CALCULATIONS
POD #1 BYPASS

LAND USE & SITE DATA	**PRE-DEVELOPMENT**				**POST-DEVELOPMENT**			
Drainage Area (Acres)=	9.68				6.07			
Site Acreage within Drainage=	6.54				2.90			
One-year, 24-hour rainfall (in)=	2.86							
Two-year, 24-hour rainfall (in)=	3.46							
Ten-year, 24-hour storm (in)=	5.06							
Total Lake/Pond Area (Acres)=	0.00				0.00			
Lake/Pond Area not in the Tc flow path (Acres)=	0.00				0.00			
Site Land Use (acres):	A	B	C	D	A	B	C	D
Pasture								
Woods, Poor Condition								
Woods, Fair Condition		1.23	4.84	0.01				
Woods, Good Condition								
Open Space, Poor Condition								
Open Space, Fair condition		0.12	0.16					
Open Space, Good Condition			3.14				4.93	0.40
Reforestation (in dedicated OS)								
Connected Impervious			0.18				0.74	
Disconnected Impervious								
SITE FLOW	**PRE-DEVELOPMENT T_c**				**POST-DEVELOPMENT Tc**			
Sheet Flow								
Length (ft)=	Kirpich Used, *See SCM Sizing & Calcs*				Kirpich Used, *See SCM Sizing & Calcs*			
Slope (ft/ft)=								
Surface Cover:								
n-value=								
T_t (hrs)=								
Shallow Flow								
Length (ft)=								
Slope (ft/ft)=								
Surface Cover:								
Average Velocity (ft/sec)=								
T_t (hrs)=								
Channel Flow 1								
Length (ft)=								
Slope (ft/ft)=								
Cross Sectional Flow Area (ft^2)=								
Wetted Perimeter (ft)=								
Channel Lining:								
n-value=								
Hydraulic Radius (ft)=								
Average Velocity (ft/sec)=								
T_t (hrs)=								
Channel Flow 2								
Length (ft)=								
Slope (ft/ft)=								
Cross Sectional Flow Area (ft^2)=								
Wetted Perimeter (ft)=								
Channel Lining:								
n-value=								
Hydraulic Radius (ft)=								
Average Velocity (ft/sec)=								
T_t (hrs)=								
Channel Flow 3								
Length (ft)=								
Slope (ft/ft)=								
Cross Sectional Flow Area (ft^2)=								
Wetted Perimeter (ft)=								
Channel Lining:								
n-value=								
Hydraulic Radius (ft)=								
Average Velocity (ft/sec)=								
T_t (hrs)=								
Tc (hrs)=	6.67				6.67			
RESULTS	**PRE-DEVELOPMENT**				**POST-DEVELOPMENT**			
Composite Curve Number=	72				77			
Disconnected Impervious Adjustment								
Disconnected impervious area (acre) =								
$CN_{adjusted\ (1-year)}$=	**77**							
High Density Only								
Volume of runoff from 1" rainfall for DA HIGH DENSITY REQUIREMENT = (ft^3) =	3,519							
1-year, 24-hour storm (Peak Flow)								
Runoff (inches) = Q^*_{1-year}=	0.73				0.99			
Volume of runoff (ft^3) =	17,445				10,438			
Volume change (ft^3) =								
Peak Discharge (cfs)= Q_{1-year}=	0.830				0.702			
2-year, 24-hour storm (LID)								
Runoff (inches) = Q^*_{2-year}=	1.11				1.42			
Volume of runoff (ft^3) =	26,250				14,952			
Peak Discharge (cfs)= Q_{2-year}=	1.249				1.006			
10-year, 24-hour storm (DIA)								
Runoff (inches) = $Q^*_{10-year}$=	2.26				2.70			
Volume of runoff (ft^3) =	53,651				64,140			
Peak Discharge (cfs)= $Q_{10-year}$=	2.552				1.912			

Project Name: The Preserve at Moody Farm

DRAINAGE AREA 2
STORMWATER PRE-POST CALCULATIONS

NOTE: DA #2 AND DA #3 ARE EQUAVALENT TO HYDROGRAPH MODELING POD #2

LAND USE & SITE DATA	PRE-DEVELOPMENT				POST-DEVELOPMENT			
Drainage Area (Acres)=	31.72				32.73			
Site Acreage within Drainage=	31.72				31.70			
One-year, 24-hour rainfall (in)=	2.86							
Two-year, 24-hour rainfall (in)=	3.46							
Ten-year, 24-hour storm (in)=	5.06							
Total Lake/Pond Area (Acres)=	0.68				0.68			
Lake/Pond Area not in the Tc flow path (Acres)=	0.68				0.68			
Site Land Use (acres):	A	B	C	D	A	B	C	D
Pasture			0.35		0.00	0.13	0.00	0.00
Woods, Poor Condition								
Woods, Fair Condition		1.72	10.03	2.82				
Woods, Good Condition						0.11	0.12	
Open Space, Poor Condition								
Open Space, Fair condition		2.07	10.09	4.07				
Open Space, Good Condition						4.43	14.50	1.03
Reforestation (in dedicated OS)								
Connected Impervious		0.14	0.39	0.05		2.51	9.26	0.64
Disconnected Impervious								
SITE FLOW	**PRE-DEVELOPMENT T_c**				**POST-DEVELOPMENT Tc**			
Sheet Flow								
Length (ft)=	100.00				100.00			
Slope (ft/ft)=	0.030				0.028			
Surface Cover:	Grass				Grass			
n-value=	0.240				0.240			
T_t (hrs)=	0.214				0.220			
Shallow Flow								
Length (ft)=	530.00				150.00			
Slope (ft/ft)=	0.030				0.030			
Surface Cover:	Unpaved				Unpaved			
Average Velocity (ft/sec)=	2.79				2.79			
T_t (hrs)=	0.05				0.01			
Channel Flow 1								
Length (ft)=	1600.00				550.00			
Slope (ft/ft)=	0.020				0.050			
Cross Sectional Flow Area (ft^2)=	2.50				1.77			
Wetted Perimeter (ft)=	5.00				2.90			
Channel Lining:	Weeds				Concrete, finished			
n-value=	0.040				0.012			
Hydraulic Radius (ft)=	0.50				0.61			
Average Velocity (ft/sec)=	3.32				19.98			
T_t (hrs)=	0.13				0.01			
Channel Flow 2								
Length (ft)=					20.00			
Slope (ft/ft)=					0.020			
Cross Sectional Flow Area (ft^2)=					2.00			
Wetted Perimeter (ft)=					6.13			
Channel Lining:					Gravel Bottom/riprap sides			
n-value=					0.033			
Hydraulic Radius (ft)=					0.33			
Average Velocity (ft/sec)=					3.03			
T_t (hrs)=					0.00			
Channel Flow 3								
Length (ft)=					1350.00			
Slope (ft/ft)=					0.025			
Cross Sectional Flow Area (ft^2)=					12.00			
Wetted Perimeter (ft)=					12.65			
Channel Lining:					Weeds			
n-value=					0.040			
Hydraulic Radius (ft)=					0.95			
Average Velocity (ft/sec)=					5.69			
T_t (hrs)=					0.07			
Tc (hrs)=	0.25				0.31			
RESULTS	**PRE-DEVELOPMENT**				**POST-DEVELOPMENT**			
Composite Curve Number=	76				81			
Disconnected Impervious Adjustment								
Disconnected impervious area (acre) =								
$CN_{adjusted\ (1\text{-}year)}$=	**81**							
High Density Only								
Volume of runoff from 1" rainfall for DA HIGH DENSITY REQUIREMENT = (ft^3) =	46,484							
1-year, 24-hour storm (Peak Flow)								
Runoff (inches) = $Q^*_{1\text{-}year}$=	0.94				1.23			
Volume of runoff (ft^3) =	108,264				141,737			
Volume change (ft^3) =	33,473							
Peak Discharge (cfs)= $Q_{1\text{-}year}$=	25.457				36.502			
2-year, 24-hour storm (LID)								
Runoff (inches) = $Q^*_{2\text{-}year}$=	1.36				1.71			
Volume of runoff (ft^3) =	156,432				196,238			
Peak Discharge (cfs)= $Q_{2\text{-}year}$=	36.783				50.538			
10-year, 24-hour storm (DIA)								
Runoff (inches) = $Q^*_{10\text{-}year}$=	2.62				3.08			
Volume of runoff (ft^3) =	301,152				354,138			
Peak Discharge (cfs)= $Q_{10\text{-}year}$=	70.812				91.157			

VALUE PRIOR TO SCM ATTENUATION

Post-development peak flow exceeds pre-development peak flow for this DA!

Project Name: The Preserve at Moody Farm

DRAINAGE AREA 3
STORMWATER PRE-POST CALCULATIONS

NOTE: DA #2 AND DA #3 ARE EQUAVALENT TO HYDROGRAPH MODELING POD #2

LAND USE & SITE DATA	PRE-DEVELOPMENT				POST-DEVELOPMENT			
Drainage Area (Acres)=	10.26				12.78			
Site Acreage within Drainage=	10.26				12.78			
One-year, 24-hour rainfall (in)=	2.86							
Two-year, 24-hour rainfall (in)=	3.46							
Ten-year, 24-hour storm (in)=	5.06							
Total Lake/Pond Area (Acres)=								
Lake/Pond Area not in the Tc flow path (Acres)=								
Site Land Use (acres):	A	B	C	D	A	B	C	D
Pasture			0.13					
Woods, Poor Condition								
Woods, Fair Condition		0.67	2.75	1.10				
Woods, Good Condition							0.31	1.21
Open Space, Poor Condition								
Open Space, Fair condition		0.80	3.03	1.58				
Open Space, Good Condition							4.99	4.57
Reforestation (in dedicated OS)								
Connected Impervious		0.05	0.12	0.02			1.45	0.25
Disconnected Impervious								

SITE FLOW	PRE-DEVELOPMENT T_c	POST-DEVELOPMENT Tc
Sheet Flow		
Length (ft)=	Minimum 5 min Tc used	Minimum 5 min Tc used
Slope (ft/ft)=		
Surface Cover:		
n-value=		
T_t (hrs)=		
Shallow Flow		
Length (ft)=		
Slope (ft/ft)=		
Surface Cover:		
Average Velocity (ft/sec)=		
T_t (hrs)=		
Channel Flow 1		
Length (ft)=		
Slope (ft/ft)=		
Cross Sectional Flow Area (ft^2)=		
Wetted Perimeter (ft)=		
Channel Lining:		
n-value=		
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=		
T_t (hrs)=		

Project Name: The Preserve at Moody Farm

DRAINAGE AREA 3
STORMWATER PRE-POST CALCULATIONS

NOTE: DA #2 AND DA #3 ARE EQUAVALENT TO HYDROGRAPH MODELING POD #2

Channel Flow 2		
Length (ft)=		
Slope (ft/ft)=		
Cross Sectional Flow Area (ft^2)=		
Wetted Perimeter (ft)=		
Channel Lining:		
n-value=		
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=		
T_t (hrs)=		
Channel Flow 3		
Length (ft)=		
Slope (ft/ft)=		
Cross Sectional Flow Area (ft^2)=		
Wetted Perimeter (ft)=		
Channel Lining:		
n-value=		
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=		
T_t (hrs)=		
Tc (hrs)=	5.00	5.00
RESULTS	**PRE-DEVELOPMENT**	**POST-DEVELOPMENT**
Composite Curve Number=	76	80
Disconnected Impervious Adjustment		
Disconnected impervious area (acre) =		
$CN_{adjusted\ (1\text{-}year)}$=	**80**	
High Density Only		
Volume of runoff from 1" rainfall for DA HIGH DENSITY REQUIREMENT = (ft^3) =	7,873	
1-year, 24-hour storm (Peak Flow)		
Runoff (inches) = $Q^*_{1\text{-}year}$=	0.94	1.12
Volume of runoff (ft^3) =	35,195	51,871
Volume change (ft^3) =	16,676	
Peak Discharge (cfs)= $Q_{1\text{-}year}$=	1.424	2.466
2-year, 24-hour storm (LID)		
Runoff (inches) = $Q^*_{2\text{-}year}$=	1.36	1.57
Volume of runoff (ft^3) =	50,816	72,913
Peak Discharge (cfs)= $Q_{2\text{-}year}$=	2.056	3.466
10-year, 24-hour storm (DIA)		
Runoff (inches) = $Q^*_{10\text{-}year}$=	2.62	2.90
Volume of runoff (ft^3) =	97,722	108,121
Peak Discharge (cfs)= $Q_{10\text{-}year}$=	3.955	6.400

ADDITIONAL CFS IN POST-DEV DUE TO SEVERAL BACK OF ROOF ADDED TO DA. THIS ADDITIONAL CFS IS OFFSET FROM DA #2 IMPROVED PEAK FLOW.

Post-development peak flow exceeds pre-development peak flow for this DA!

Project Name: The Preserve at Moody Farm

DRAINAGE AREA 4
STORMWATER PRE-POST CALCULATIONS

LAND USE & SITE DATA	PRE-DEVELOPMENT				POST-DEVELOPMENT			
Drainage Area (Acres)=	13.94				13.94			
Site Acreage within Drainage=	0.00				0.00			
One-year, 24-hour rainfall (in)=	2.86							
Two-year, 24-hour rainfall (in)=	3.46							
Ten-year, 24-hour storm (in)=	5.06							
Total Lake/Pond Area (Acres)=	0.79				0.79			
Lake/Pond Area not in the Tc flow path (Acres)=	0.79				0.79			
Site Land Use (acres):	A	B	C	D	A	B	C	D
Pasture								
Woods, Poor Condition								
Woods, Fair Condition								
Woods, Good Condition		1.61	2.90	0.97		1.61	2.90	0.97
Open Space, Poor Condition								
Open Space, Fair condition								
Open Space, Good Condition		2.35	4.54	0.26		2.35	4.54	0.26
Reforestation (in dedicated OS)								
Connected Impervious			0.52	0.79			0.52	0.79
Disconnected Impervious								

SITE FLOW	PRE-DEVELOPMENT T_c	POST-DEVELOPMENT Tc
Sheet Flow		
Length (ft)=	From Culvert Tc Calculations	From Culvert Tc Calculations
Slope (ft/ft)=		
Surface Cover:		
n-value=		
T_t (hrs)=		
Shallow Flow		
Length (ft)=		
Slope (ft/ft)=		
Surface Cover:		
Average Velocity (ft/sec)=		
T_t (hrs)=		
Channel Flow 1		
Length (ft)=		
Slope (ft/ft)=		
Cross Sectional Flow Area (ft^2)=		
Wetted Perimeter (ft)=		
Channel Lining:		
n-value=		
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=		
T_t (hrs)=		

Project Name: The Preserve at Moody Farm

DRAINAGE AREA 4
STORMWATER PRE-POST CALCULATIONS

Channel Flow 2		
Length (ft)=		
Slope (ft/ft)=		
Cross Sectional Flow Area (ft^2)=		
Wetted Perimeter (ft)=		
Channel Lining:		
n-value=		
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=		
T_t (hrs)=		
Channel Flow 3		
Length (ft)=		
Slope (ft/ft)=		
Cross Sectional Flow Area (ft^2)=		
Wetted Perimeter (ft)=		
Channel Lining:		
n-value=		
Hydraulic Radius (ft)=		
Average Velocity (ft/sec)=		
T_t (hrs)=		
Tc (hrs)=	34.70	34.70
RESULTS	**PRE-DEVELOPMENT**	**POST-DEVELOPMENT**
Composite Curve Number=	71	71
Disconnected Impervious Adjustment		
Disconnected impervious area (acre) =		
$CN_{adjusted\ (1\text{-}year)}$=	**71**	
High Density Only		
Volume of runoff from 1" rainfall for DA HIGH DENSITY REQUIREMENT = (ft^3) =	6,809	
1-year, 24-hour storm (Peak Flow)		
Runoff (inches) = $Q^*_{1\text{-}year}$=	0.70	0.70
Volume of runoff (ft^3) =		
Volume change (ft^3) =		
Peak Discharge (cfs)= $Q_{1\text{-}year}$=	0.185	0.185
2-year, 24-hour storm (LID)		
Runoff (inches) = $Q^*_{2\text{-}year}$=	1.06	1.06
Volume of runoff (ft^3) =	0	
Peak Discharge (cfs)= $Q_{2\text{-}year}$=	0.282	0.282
10-year, 24-hour storm (DIA)		
Runoff (inches) = $Q^*_{10\text{-}year}$=	2.19	2.19
Volume of runoff (ft^3) =	0	
Peak Discharge (cfs)= $Q_{10\text{-}year}$=	0.583	0.583

Project Name: The Preserve at Moody Farm

DA SITE SUMMARY
STORMWATER PRE-POST CALCULATIONS

SITE SUMMARY

DRAINAGE AREA SUMMARIES

DRAINAGE AREA:	DA1	DA2	DA3	DA4	DA5	DA6	DA7	DA8	DA9	DA10
Pre-Development (1-year, 24-hour storm)										
Runoff (in) = $Q_{pre,1\text{-}year}$ =	0.73	0.94	0.94	0.70						
Peak Flow (cfs)=$Q_{1\text{-}year}$ =	0.830	25.457	1.424	0.185						
Post-Development (1-year, 24-hour storm)										
Proposed Impervious Surface (acre) =	0.74	12.41	1.70							
Runoff (in)=$Q_{1\text{-}year}$ =	0.99	1.23	1.12	0.70						
Peak Flow (cfs)=$Q_{1\text{-}year}$ =	0.702	36.502	2.466	0.185						
Increase in volume per DA (ft^3)_1-yr storm=		33,473	16,676	0						
Minimum Volume to be Managed for DA HIGH DENSITY REQUIREMENT = (ft^3) =	3,519	46,484	7,873	6,809						

VALUE PRIOR TO SCM ATTENUATION

TARGET CURVE NUMBER (TCN)

Site Data

SITE \SOIL COMPOSITION

HYDROLOGIC SOIL GROUP	Site Area	%	Target CN
A	0.00	0%	N/A
B	8.05	17%	N/A
C	32.53	67%	N/A
D	7.71	16%	N/A

Total Site Area (acres) =	48.28
Percent BUA (Includes Existing Lakes/Pond Areas) =	30%
Project Density =	High
Target Curve Number (TCN) =	N/A
$CN_{adjusted\ (1\text{-}year)}$=	79
Minimum Volume to be Managed (Total Site) Per TCN Requirement= ft^3 =	N/A

Site Nitrogen Loading Data

HSG	TN export coefficient (lbs/ac/yr)	Site Acreage	N Export
Pasture	1.2	0.13	0.16
Woods, Poor Condition	1.6	0.00	0.00
Woods, Fair Condition	1.2	0.00	0.00
Woods, Good Condition	0.8	7.23	5.78
Open Space, Poor Condition	1.0	0.00	0.00
Open Space, Fair Condition	0.8	0.00	0.00
Open Space, Good Condition	0.6	42.00	25.20
Reforestation (in dedicated OS)	0.6	0.00	0.00
Impervious	21.2	16.16	342.59
SITE NITROGEN LOADING RATE (lbs/ac/yr)=	5.70		
Nitrogen Load (lbs/yr)=	373.73		

Site Nitrogen Loading Data For Expansions Only

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

Project Name: The Preserve at Moody Farm

DRAINAGE AREA 1
BMP CALCULATIONS

DRAINAGE AREA 1 - BMP DEVICES AND ADJUSTMENTS				
DA1 Site Acreage=	2.90			
DA1 Off-Site Acreage=	3.17			
Total Required Storage Volume for Site TCN Requirement (ft^3)=	N/A			
Total Required Storage Volume for DA1 1" Rainfall for High Density (ft^3)=	3,519			
Will site use underground detention/cistern?	No	Enter % of the year water will be reused=	0%	Note: Supporting information/details should be submitted to demonstrate water usage.

ENTER ACREAGE FOR ALL SUB-DRAINAGE AREAS IN DA

HSG	Sub-DA1(a) (Ac)		Sub-DA1(b) (Ac)		Sub-DA1(c) (Ac)		Sub-DA1(d) (Ac)		Sub-DA1(e) (Ac)	
	Site	Off-site	Site	Off-site	Site	Off-site	Site	Off-site	Site	Off-site
Pasture										
Woods, Poor Condition										
Woods, Fair Condition										
Woods, Good Condition										
Open Space, Poor Condition										
Open Space, Fair Condition										
Open Space, Good Condition	2.18	2.97								
Reforestation (in dedicated OS)										
Impervious	0.72	0.20								

Sub-DA1(a) BMP(s)

Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft^3)	Provided Volume that will drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
N/A		4,107		0%	22.59	0.00	
				0%	22.59	0.00	
				0%	22.59	0.00	
				0%	22.59	0.00	
				0%	22.59	0.00	
	Total Nitrogen remaining leaving the subbasin (lbs):	22.59					

Sub-DA1(b) BMP(s)

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

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

Sub-DA1 (c) BMP(s)

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

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

Sub-DA1(d) BMP(s)

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

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

Sub-DA1(e) BMP(s)

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

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

DA1 BMP SUMMARY

Total Volume Treated (ft^3)=	4,107
Nitrogen Mitigated(lbs)=	
1-year, 24-hour storm	
Post BMP Volume of Runoff (ft^3)$_{(1\text{-year})}$=	6,331
Post BMP Runoff (inches) = $Q^*_{(1\text{-year})}$=	0.60
Post BMP $CN_{(1\text{-year})}$=	69
Post BMP Peak Discharge (cfs)= $Q_{1\text{-year}}$=	0.84
2-year, 24-hour storm (LID)	
Post BMP Volume of Runoff (ft3)$_{(2\text{-year})}$=	10,845
Post BMP Runoff (inches) = $Q^*_{(2\text{-year})}$=	1.03
Post BMP $CN_{(2\text{-year})}$=	70
Post BMP Peak Discharge (cfs)= $Q_{(2\text{-year})}$=	
10-year, 24-hour storm (DIA)	
Post BMP Volume of Runoff (ft^3)$_{(10\text{-year})}$=	60,033
Post BMP Runoff (inches) = $Q^*_{(10\text{-year})}$=	5.71
Post BMP $CN_{(10\text{-year})}$=	98
Post BMP Peak Discharge (cfs)= $Q_{(10\text{-year})}$=	

Project Name: The Preserve at Moody Farm

DRAINAGE AREA 2
BMP CALCULATIONS

DRAINAGE AREA 1 - BMP DEVICES AND ADJUSTMENTS				
DA2 Site Acreage=	31.70			
DA2 Off-Site Acreage=	1.03			
Total Required Storage Volume TCN Requirement (ft^3)=	N/A			
Total Required Storage Volume for DA2 1" Rainfall for High Density (ft3)=	46,484			
Will site use underground detention/cistern?	No	Enter % of the year water will be reused=	0%	Note: Supporting information/details should be submitted to demonstrate water usage.

ENTER ACREAGE FOR ALL SUB-DRAINAGE AREAS IN DA

HSG	Sub-DA2(a) (Ac) Site	Sub-DA2(a) (Ac) Off-site	Sub-DA2(b) (Ac) Site	Sub-DA2(b) (Ac) Off-site	Sub-DA2(c) (Ac) Site	Sub-DA2(c) (Ac) Off-site	Sub-DA2(d) (Ac) Site	Sub-DA2(d) (Ac) Off-site	Sub-DA2(e) (Ac) Site	Sub-DA2(e) (Ac) Off-site
Pasture	0.13									
Woods, Poor Condition										
Woods, Fair Condition										
Woods, Good Condition					0.16		0.02		0.05	
Open Space, Poor Condition										
Open Space, Fair Condition										
Open Space, Good Condition	4.94	1.03	1.39		5.12		2.78		2.85	
Reforestation (in dedicated OS)										
Impervious	3.68		0.54		3.63		2.35		4.06	

Sub-DA1(a) BMP(s)

Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft^3)	Provided Volume that will drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
WP#1	Wet Detention Basin	5,368	5,368	25%	81.75	20.44	69
				0%	61.32	0.00	
				0%	61.32	0.00	
				0%	61.32	0.00	
				0%	61.32	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):		61.32					

Sub-DA1(b) BMP(s)

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

Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft^3)	Provided Volume that will drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
WP#2	Wet Detention Basin	454	454	25%	12.28	3.07	73
				0%	9.21	0.00	
				0%	9.21	0.00	
				0%	9.21	0.00	
				0%	9.21	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):		9.21					

Sub-DA1 (c) BMP(s)

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

Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft^3)	Provided Volume that will drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
WP#3	Wet Detention Basin	4,846	4,846	25%	80.16	20.04	85
				0%	60.12	0.00	
				0%	60.12	0.00	
				0%	60.12	0.00	
				0%	60.12	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):		60.12					

Sub-DA1(d) BMP(s)

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

Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft^3)	Provided Volume that will drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
WP#4	Wet Detention Basin	2,143	2,143	25%	51.50	12.88	65
				0%	38.63	0.00	
				0%	38.63	0.00	
				0%	38.63	0.00	
				0%	38.63	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):		38.63					

Sub-DA1(e) BMP(s)

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

Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft^3)	Provided Volume that will drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
WP#5	Wet Detention Basin	4,084	4,083	25%	87.82	21.96	54
				0%	65.87	0.00	
				0%	65.87	0.00	
				0%	65.87	0.00	
				0%	65.87	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):		65.87					

DA2 BMP SUMMARY

Total Volume Treated (ft^3)=	16,894
Nitrogen Mitigated(lbs)=	78.38
1-year, 24-hour storm	
Post BMP Volume of Runoff $(ft^3)_{(1\text{-year})}$=	124,843
Post BMP Runoff (inches) = $Q^*_{(1\text{-year})}$=	1.08
Post BMP $CN_{(1\text{-year})}$=	78
Post BMP Peak Discharge (cfs)= $Q_{1\text{-year}}$=	11.05
2-year, 24-hour storm (LID)	
Post BMP Volume of Runoff $(ft3)_{(2\text{-year})}$=	179,344
Post BMP Runoff (inches) = $Q^*_{(2\text{-year})}$=	1.56
Post BMP $CN_{(2\text{-year})}$=	79
Post BMP Peak Discharge (cfs)= $Q_{(2\text{-year})}$=	
10-year, 24-hour storm (DIA)	
Post BMP Volume of Runoff $(ft^3)_{(10\text{-year})}$=	337,244
Post BMP Runoff (inches) = $Q^*_{(10\text{-year})}$=	2.93
Post BMP $CN_{(10\text{-year})}$=	95
Post BMP Peak Discharge (cfs)= $Q_{(10\text{-year})}$=	

Project Name: The Preserve at Moody Farm

DRAINAGE AREA 3
BMP CALCULATIONS

DRAINAGE AREA 1 - BMP DEVICES AND ADJUSTMENTS				
DA3 Site Acreage=	12.78			
DA3 Off-Site Acreage=				
Total Required Storage Volume TCN Requirement (ft^3)=	N/A			
Total Required Storage Volume for DA3 1" Rainfall for High Density (ft3)=	7,873			
Will site use underground detention/cistern?	No	Enter % of the year water will be reused=	0%	Note: Supporting information/details should be submitted to demonstrate water usage.

ENTER ACREAGE FOR ALL SUB-DRAINAGE AREAS IN DA

HSG	Sub-DA3(a) (Ac) Site	Sub-DA3(a) (Ac) Off-site	Sub-DA3(b) (Ac) Site	Sub-DA3(b) (Ac) Off-site	Sub-DA3(c) (Ac) Site	Sub-DA3(c) (Ac) Off-site	Sub-DA3(d) (Ac) Site	Sub-DA3(d) (Ac) Off-site	Sub-DA3(e) (Ac) Site	Sub-DA3(e) (Ac) Off-site
Pasture										
Woods, Poor Condition										
Woods, Fair Condition										
Woods, Good Condition	0.89				0.61					
Open Space, Poor Condition										
Open Space, Fair Condition										
Open Space, Good Condition	4.33		0.06		5.19					
Reforestation (in dedicated OS)										
Impervious	1.23		0.01		0.46					

Sub-DA1(a) BMP(s)

Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft^3)	Provided Volume that will drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
N/A (BYPASS)		3,199	3,199	0%	29.39	0.00	
				0%	29.39	0.00	
				0%	29.39	0.00	
				0%	29.39	0.00	
				0%	29.39	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):		**29.39**					

Sub-DA1(b) BMP(s)

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

Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft^3)	Provided Volume that will drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
N/A (BYPASS)		13	13	0%	0.25	0.00	
				0%	0.25	0.00	
				0%	0.25	0.00	
				0%	0.25	0.00	
				0%	0.25	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):		**0.25**					

Sub-DA1 (c) BMP(s)

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

Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft^3)	Provided Volume that will drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
N/A (BYPASS)		1,872	1,872	0%	13.35	0.00	
				0%	13.35	0.00	
				0%	13.35	0.00	
				0%	13.35	0.00	
				0%	13.35	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):		**13.35**					

Project Name: The Preserve at Moody Farm

DRAINAGE AREA 3
BMP CALCULATIONS

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

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

DA3 BMP SUMMARY	
Total Volume Treated (ft^3)=	5,084
Nitrogen Mitigated(lbs)=	
1-year, 24-hour storm	
Post BMP Volume of Runoff (ft^3)$_{(1\text{-year})}$=	46,787
Post BMP Runoff (inches) = $Q^*_{(1\text{-year})}$=	1.01
Post BMP $CN_{(1\text{-year})}$=	77
Post BMP Peak Discharge (cfs)= $Q_{1\text{-year}}$=	2.47
2-year, 24-hour storm (LID)	
Post BMP Volume of Runoff (ft3)$_{(2\text{-year})}$=	67,829
Post BMP Runoff (inches) = $Q^*_{(2\text{-year})}$=	1.46
Post BMP $CN_{(2\text{-year})}$=	77
Post BMP Peak Discharge (cfs)= $Q_{(2\text{-year})}$=	
10-year, 24-hour storm (DIA)	
Post BMP Volume of Runoff (ft^3)$_{(10\text{-year})}$=	103,037
Post BMP Runoff (inches) = $Q^*_{(10\text{-year})}$=	2.22
Post BMP CN($_{10\text{-year}}$)=	87
Post BMP Peak Discharge (cfs)= $Q_{(10\text{-year})}$=	

Project Name: The Preserve at Moody Farm

DRAINAGE AREA 4
BMP CALCULATIONS

DRAINAGE AREA 1 - BMP DEVICES AND ADJUSTMENTS

DA4 Site Acreage=	
DA4 Off-Site Acreage=	13.94
Total Required Storage Volume TCN Requirement (ft^3)=	N/A
Total Required Storage Volume for DA4 1" Rainfall for High Density (ft3)=	6,809

Will site use underground detention/cistern?		Enter % of the year water will be reused=		Note: Supporting information/details should be submitted to demonstrate water usage.

ENTER ACREAGE FOR ALL SUB-DRAINAGE AREAS IN DA

HSG	Sub-DA4(a) (Ac)		Sub-DA4(b) (Ac)		Sub-DA4(c) (Ac)		Sub-DA4(d) (Ac)		Sub-DA4(e) (Ac)	
	Site	Off-site	Site	Off-site	Site	Off-site	Site	Off-site	Site	Off-site
Pasture										
Woods, Poor Condition										
Woods, Fair Condition										
Woods, Good Condition		5.48								
Open Space, Poor Condition										
Open Space, Fair Condition										
Open Space, Good Condition		7.15								
Reforestation (in dedicated OS)										
Impervious		1.31								

Sub-DA1(a) BMP(s)

Device Name (As Shown on Plan)	Device Type	Water Quality Volume for Sub-DA (ft^3)	Provided Volume that will drawdown 2-5 days (ft^3)	Nitrogen Removal Efficiency	Sub-DA Nitrogen (lbs)	Nitrogen Removed (lbs)	Drawdown Time (hours)
		6,809		0%	36.44	0.00	
				0%	36.44	0.00	
				0%	36.44	0.00	
				0%	36.44	0.00	
				0%	36.44	0.00	
Total Nitrogen remaining leaving the subbasin (lbs):		**36.44**					

Sub-DA1(b) BMP(s)

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

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

Sub-DA1 (c) BMP(s)

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

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

Project Name: The Preserve at Moody Farm

DRAINAGE AREA 4
BMP CALCULATIONS

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

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

DA4 BMP SUMMARY	
Total Volume Treated (ft^3)=	
Nitrogen Mitigated(lbs)=	
1-year, 24-hour storm	
Post BMP Volume of Runoff (ft^3)$_{(1\text{-year})}$=	
Post BMP Runoff (inches) = Q*$_{(1\text{-year})}$=	0.70
Post BMP CN$_{(1\text{-year})}$=	71
Post BMP Peak Discharge (cfs)= Q$_{1\text{-year}}$=	0.19
]	
Post BMP Volume of Runoff (ft3)$_{(2\text{-year})}$=	0
Post BMP Runoff (inches) = Q*$_{(2\text{-year})}$=	
Post BMP CN$_{(2\text{-year})}$=	
Post BMP Peak Discharge (cfs)= Q$_{(2\text{-year})}$=	
10-year, 24-hour storm (DIA)	
Post BMP Volume of Runoff (ft^3)$_{(10\text{-year})}$=	0
Post BMP Runoff (inches) = Q*$_{(10\text{-year})}$=	
Post BMP CN($_{10\text{-year}}$)=	
Post BMP Peak Discharge (cfs)= Q$_{(10\text{-year})}$=	

Project Name: The Preserve at Moody Farm

DA SITE SUMMARY
BMP CALCULATIONS

BMP SUMMARY

DRAINAGE AREA SUMMARIES

DRAINAGE AREA:	DA1	DA2	DA3	DA4	DA5	DA6	DA7	DA8	DA9	DA10
Pre-Development (1-year, 24-hour storm)										
Runoff (in)=$Q^*_{1\text{-year}}$ =	0.73	0.94	0.94	0.70						
Peak Flow (cfs)=$Q_{1\text{-year}}$ =	0.830	25.457	1.424	0.185						
Post-Development (1-year, 24-hour storm)										
Target Curve Number (TCN) =	NA									
Post BMP Runoff (inches) = $Q^*_{(1\text{-year})}$=	0.60	1.08	1.01	0.70						
Post BMP Peak Discharge (cfs)= $Q_{1\text{-year}}$=	0.842	11.053	2.470	0.185						
Post BMP $CN_{(1\text{-year})}$=	77									
Post-BMP Nitrogen Loading										
TOTAL SITE NITROGEN MITIGATED (lbs)=	78.38									
SITE NITROGEN LOADING RATE (lbs/ac/yr)=	4.51									
TOTAL SITE NITROGEN LEFT TO MITIGATE_Wendell Only (lbs)=	**59.50**									

OVERALL POST-DEV PEAK FLOW IMPROVED FROM PRE-DEV.

PRE: 27.90 cfs
POST: 14.55 cfs

Moody: Supplemental & Supporting Info for Hydrograph Generation
PreDev POD Calcs Roman Cook 12/4/2024

PreDev_POD #1:		285072	**S.F.**	**6.54**	**Ac**
	Land Use	Area	CN	Wtd. CN	
	Pasture (Fair) - B Soils	0.12	69	1.25	
	Pasture (Fair) - C Soils	0.16	79	1.96	
	Pasture (Fair) - D Soils	0.00	84	0.00	
	Woods/Wetlands (Fair) -B Soils	1.23	60	11.28	
	Woods/Wetlands (Fair) -C Soils	5.02	73	56.02	
	Woods/Wetlands (Fair) -D Soils	0.01	79	0.08	
	Roofs	0.00	98	0.00	
	Roadway	0.00	98	0.00	
	Open Water	0.00	98	0.00	
	Total (Check):	**6.54**	Composite "CN"	**70.6**	
	Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	**1299**	**46**	**6.67**	Minutes

PreDev_POD #2		1918625	**S.F.**	**44.05**	**Ac**
	Land Use	Area	CN	Wtd. CN	
	Pasture (Fair) - B Soils	2.87	69	4.50	
	Pasture (Fair) - C Soils	13.78	79	24.72	
	Pasture (Fair) - D Soils	1.85	84	3.53	
	Woods/Wetlands (Fair) -B Soils	2.39	60	3.25	
	Woods/Wetlands (Fair) -C Soils	12.44	73	20.62	
	Woods/Wetlands (Fair) -D Soils	6.46	79	11.59	
	Roof	0.15	98	0.33	
	Roadway	0.56	98	1.24	
	Open Water	1.49	98	3.32	
	Total (Check):	**41.98**	Composite "CN"	**73.1**	
	Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**	
	Tc, min.= 60*.000132*L^.77/S^.385	**2427**	**38**	**14.78**	Minutes

Moody: Supplemental & Supporting Info for Hydrograph Generation

PostDev POD 1 - bypass

Roman Cook 12/4/2024

PostDev POD 1 - Bypass	**128025**	**S.F.**	**2.94**	**Ac**
Land Use	**Area, Ac.**	**"CN"**	**Wtd'd "CN"**	
Roadways + C&G (not Sidewalks)	0.00	98	0.00	
Roofs	0.67	98	22.34	
Driveways	0.08	98	2.67	
Sidewalks	0.00	98	0.00	
Openspace- B Soils	0.58	61	12.05	
Openspace- C Soils	0.53	74	13.43	
Openspace- D Soils	1.07	80	29.26	
Woods/Wetlands-B Soils	0.00	55	0.00	
Woods/Wetlands-C Soils	0.00	70	0.00	
Woods/Wetlands-D Soils	0.00	77	0.00	
Lands Taken Up by BMP	0.00	98	0.00	
Open Water (Exist'g or Proposed Ponds)	0.00	98	0.00	
Total (Check):	**2.94**	Composite "CN"	**79.8**	
	Percent Impervious		26%	
Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**	
Tc, min.= 60*.000132*L^.77/S^.385	**605**	**30**	**3.25**	Minutes
Percent Impervious		26%		

Moody: Supplemental & Supporting Info for Hydrograph Generation

Post Dev - POD 2A #1 (SCM #1) Roman Cook 12/4/2024

Post Dev - POD 2A #1 (SCM #1)		**425831**	**S.F.**	**9.78**	**Ac**	
	Land Use	**Area, Ac.**	**"CN"**	**Wtd'd "CN"**		
	Roadways + C&G (not Sidewalks)	1.00	98	10.02		
	Roofs	1.67	98	16.74		
	Driveways/Parking	0.39	98	3.91		
	Sidewalks	0.22	98	2.21		
	Openspace- A Soils	0.00	39	0.00		
	Openspace- B Soils	1.64	61	10.23		
	Openspace- C Soils	4.14	74	31.34		
	Openspace- D Soils	0.32	80	2.62		
	Woods-A Soils	0.00	30	0.00		
	Woods-B Soils	0.00	55	0.00		
	Woods-C Soils	0.00	70	0.00		
	Woods-D Soils	0.00	77	0.00		
	Lands Taken Up by BMP	0.40	98	4.01		
	Open Water (Exist'g or Proposed Ponds)	0.00	98	0.00		
	Total (Check):	**9.78**	Composite "CN"	**81.1**		
		Percent Impervious		37.6%		
	Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**		
	Tc, min.= 60*.000132*L^.77/S^.385	**1083**	**27**	**6.64**	Minutes	
	Percent Impervious		37.6%			
		Pond Design Depth, ft.:	3.50			
SCM #1 Design Elements:	SA/DA Factor:		1.30	From NCDEQ SA/DA Char		D Avg, ft
Davg = VPP-Vshelf /A shelf bottom	Min.SCM Surface Area:		5536	S.F.		3.43
		VPP, c.f.	Perimeter, ft.	Vshelf, c.f.	Abottom, s.f.	**3.50**
Treatment Volume Requirement:		43,409	605	7,259.00	10,525	
	(From HydraFlow Attachment)			Design Pond Depth, ft.=		
Rv=0.05-.009*(%Impervious)						
Total Runoff for 1" Event= S in Ac	DA to SCM:	9.78	Ac.			
Treatment "S" in Cu. Ft. =	Composite % Impervious (Above) =	38%				
Treatment Volume to Be Stored:	Rv=0.05+.009*(%Impervious)	0.39	inch/inch			
Treatment Volume Provided, Cu.	Total Runoff for 1" Event= S in Ac-Ft:	0.32	S=1"*Rv*Drainage Area/12			
	Treatment "S" in Cu. Ft. =	13796.86				
	Treatment Volume to Be Stored:	13797	Cu. FT			
	Volume Achieved at Elev.	364.29	Orifice Dia	2.00	Inch Drawdown Pipe	
	Drawdown Pipe Elev.	363.5	Elev Diff, H., ft.	0.79		

Table 1: Piedmont and Mountain SA/DA Table (Adapted from Driscoll, 1986)

Percent Impervious Cover	Permanent Pool Average Depth (ft)					
	3.0	4.0	5.0	6.0	7.0	≥8.0
10%	0.51	0.43	0.37	0.30	0.27	0.25
20%	0.84	0.69	0.61	0.51	0.44	0.40
30%	1.17	0.94	0.84	0.72	0.61	0.56
40%	1.51	1.24	1.09	0.91	0.78	0.71
50%	1.79	1.51	1.31	1.13	0.95	0.87
60%	2.09	1.77	1.49	1.31	1.12	1.03
70%	2.51	2.09	1.80	1.56	1.34	1.17
80%	2.92	2.41	2.07	1.82	1.62	1.40
90%	3.25	2.64	2.31	2.04	1.84	1.59
100%	3.55	2.79	2.52	2.34	2.04	1.75

	3	4	
30%	1.17	0.94	
40%	1.51	1.24	
37.6% (interpolation)	1.43	1.17	1.30 SA/DA

Permanent Pool Surface Area (no forebay):	11540	sf
Forebay Volume (Total):	6440	cf
Permanent Pool Volume (Total):	36969	cf
Forebay Size (Volume):	17	%

Moody: Supplemental & Supporting Info for Hydrograph Generation

Post Dev - POD 2A #2 (SCM #2) Roman Cook 12/4/2024

Post Dev - POD 2A #2 (SCM #2)						
		84018	S.F.	1.93	Ac	
	Land Use	**Area, Ac.**	**"CN"**	**Wtd'd "CN"**		
	Roadways + C&G (not Sidewalks)	0.00	98	0.00		
	Roofs	0.32	98	16.26		
	Driveways/Parking	0.02	98	1.02		
	Sidewalks	0.00	98	0.00		
	Openspace- A Soils	0.00	39	0.00		
	Openspace- B Soils	0.23	61	7.40		
	Openspace- C Soils	0.96	74	36.83		
	Openspace- D Soils	0.20	80	8.30		
	Woods-A Soils	0.00	30	0.00		
	Woods-B Soils	0.00	55	0.00		
	Woods-C Soils	0.00	70	0.00		
	Woods-D Soils	0.00	77	0.00		
	Lands Taken Up by BMP	0.20	98	10.16		
	Open Water (Exist'g or Proposed Ponds)	0.00	98	0.00		
	Total (Check):	**1.93**	Composite "CN"	**80.0**		
		Percent Impervious		28.0%		
	Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**		
	Tc, min.= 60*.000132*L^.77/S^.385	**390**	**19**	**2.34**	Minutes	use 5 min. minimum
	Percent Impervious		28.0%			
		Pond Design Depth, ft.:	3.50			
SCM #1 Design Elements:	SA/DA Factor:		1.00	From NCDEQ SA/DA Char		D Avg, ft
Davg = VPP-Vshelf /A shelf bottom	Min.SCM Surface Area:		840	S.F.		4.40
		VPP, c.f.	Perimeter, ft.	Vshelf, c.f.	Abottom, s.f.	**3.50**
Treatment Volume Requirement:		15,908	517	3,197.00	2,888	
	(From HydraFlow Attachment)			Design Pond Depth, ft.=		**3.50**
Rv=0.05-.009*(%Impervious)						
Total Runoff for 1" Event= S in Ac	DA to SCM:	1.93	Ac.			
Treatment "S" in Cu. Ft. =	Composite % Impervious (Above) =	28%				
Treatment Volume to Be Stored:	Rv=0.05+.009*(%Impervious)	0.30	inch/inch			
Treatment Volume Provided, Cu.	Total Runoff for 1" Event= S in Ac-Ft:	0.05	S=1"*Rv*Drainage Area/12			
	Treatment "S" in Cu. Ft. =	2114.26				
	Treatment Volume to Be Stored:	2114	Cu. FT			
	Volume Achieved at Elev.	361.77	Orifice Dia	1.00	Inch Drawdown Pipe	
	Drawdown Pipe Elev.	361.5	Elev Diff, H., ft.	0.27		

Table 1: Piedmont and Mountain SA/DA Table (Adapted from Driscoll, 1986)

Percent Impervious Cover	Permanent Pool Average Depth (ft) 3.0	4.0	5.0	6.0	7.0	≥8.0
10%	0.51	0.43	0.37	0.30	0.27	0.25
20%	0.84	0.69	0.61	0.51	0.44	0.40
30%	1.17	0.94	0.84	0.72	0.61	0.56
40%	1.51	1.24	1.09	0.91	0.78	0.71
50%	1.79	1.51	1.31	1.13	0.95	0.87
60%	2.09	1.77	1.49	1.31	1.12	1.03
70%	2.51	2.09	1.80	1.56	1.34	1.17
80%	2.92	2.41	2.07	1.82	1.62	1.40
90%	3.25	2.64	2.31	2.04	1.84	1.59
100%	3.55	2.79	2.52	2.34	2.04	1.75

	3	4	
20%	0.84	0.69	
30%	1.17	0.94	
28.0% (interpolation)	1.10	0.89	1.00 SA/DA

Permanent Pool Surface Area (no forebay):	5547	sf
Forebay Volume (Total):	2567	cf
Permanent Pool Volume (Total):	13341	cf
Forebay Size (Volume):	19	%

Moody: Supplemental & Supporting Info for Hydrograph Generation

Post Dev - POD 2A #3 (SCM #3) Roman Cook 12/4/2024

Post Dev - POD 2A #3 (SCM #3)

Post Dev - POD 2A #3 (SCM #3)		388282	S.F.	8.91	Ac	
	Land Use	**Area, Ac.**	**"CN"**	**Wtd'd "CN"**		
	Roadways + C&G (not Sidewalks)	0.99	98	10.88		
	Roofs	1.98	98	21.77		
	Driveways/Parking	0.25	98	2.75		
	Sidewalks	0.24	98	2.64		
	Openspace- A Soils	0.00	39	0.00		
	Openspace- B Soils	1.47	61	10.06		
	Openspace- C Soils	3.05	74	25.32		
	Openspace- D Soils	0.45	80	4.04		
	Woods-A Soils	0.00	30	0.00		
	Woods-B Soils	0.06	55	0.37		
	Woods-C Soils	0.10	70	0.79		
	Woods-D Soils	0.00	77	0.00		
	Lands Taken Up by BMP	0.17	98	1.87		
	Open Water (Exist'g or Proposed Ponds)	0.00	98	0.00		
	Total (Check):	8.76	Composite "CN"	**80.5**		
		Percent Impervious		40.7%		
	Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**		
	Tc, min.= 60*.000132*L^.77/S^.385	**1140**	**25**	**7.25**	Minutes	
	Percent Impervious		40.7%			
		Pond Design Depth, ft.:	3.50			
SCM #1 Design Elements:	SA/DA Factor:		1.20	From NCDEQ SA/DA Char		D Avg, ft
Davg = VPP-Vshelf /A shelf bottom	Min.SCM Surface Area:		4659	S.F.		3.72
		VPP, c.f.	Perimeter, ft.	Vshelf, c.f.	Abottom, s.f.	**3.50**
Treatment Volume Requirement:		16,418	354	2,957.00	3,619	
	(From HydraFlow Attachment)			Design Pond Depth, ft.=		**3.50**
Rv=0.05-.009*(%Impervious)						
Total Runoff for 1" Event= S in Ac	DA to SCM:	8.914	Ac.			
Treatment "S" in Cu. Ft. =	Composite % Impervious (Above) =	41%				
Treatment Volume to Be Stored:	Rv=0.05+.009*(%Impervious)	0.42	inch/inch			
Treatment Volume Provided, Cu.	Total Runoff for 1" Event= S in Ac-Ft:	0.31	S=1"*Rv*Drainage Area/12			
	Treatment "S" in Cu. Ft. =	13477.05				
	Treatment Volume to Be Stored:	13477	Cu. FT			
	Volume Achieved at Elev.	363.1	Orifice Dia	1.50	Inch Drawdown Pipe	
	Drawdown Pipe Elev.	361.5	Elev Diff, H., ft.	1.6		

Permanent Pool Surface Area (no forebay):	4788	sf
Forebay Volume (Total):	3009	cf
Permanent Pool Volume (Total):	16422	cf
Forebay Size (Volume):	18	%

Table 1: Piedmont and Mountain SA/DA Table (Adapted from Driscoll, 1986)

Percent Impervious Cover	Permanent Pool Average Depth (ft) 3.0	4.0	5.0	6.0	7.0	≥8.0
10%	0.51	0.43	0.37	0.30	0.27	0.25
20%	0.84	0.69	0.61	0.51	0.44	0.40
30%	1.17	0.94	0.84	0.72	0.61	0.56
40%	1.51	1.24	1.09	0.91	0.78	0.71
50%	1.79	1.51	1.31	1.13	0.95	0.87
60%	2.09	1.77	1.49	1.31	1.12	1.03
70%	2.51	2.09	1.80	1.56	1.34	1.17
80%	2.92	2.41	2.07	1.82	1.62	1.40
90%	3.25	2.64	2.31	2.04	1.84	1.59
100%	3.55	2.79	2.52	2.34	2.04	1.75

	4	5	
40%	1.24	1.09	
50%	1.51	1.31	
41.5% (interpolation)	1.28	1.12	1.20 SA/DA

Hawthorne Trail: Supplemental & Supporting Info for Hydrograph Generation

Post Dev POD 2A #4 - Bypass

Roman Cook 12/4/2024

Post Dev POD 2A #4 - Bypass	281080	S.F.	6.45	Ac
Land Use	**Area, Ac.**	**"CN"**	**Wtd'd "CN"**	
Roadways + C&G (not Sidewalks)	0.00	98	0.00	
Roofs	0.48	98	7.22	
Driveways	0.05	98	0.77	
Sidewalks	0.00	98	0.00	
Openspace- B Soils	0.00	61	0.00	
Openspace- C Soils	1.50	74	17.15	
Openspace- D Soils	2.81	80	34.89	
Woods/Wetlands-B Soils	0.00	55	0.00	
Woods/Wetlands-C Soils	0.04	70	0.40	
Woods/Wetlands-D Soils	0.87	77	10.40	
Lands Taken Up by BMP	0.00	98	0.00	
Open Water (Exist'g or Proposed Ponds)	0.70	98	10.65	
Total (Check):	**6.45**	Composite "CN"	**81.5**	
	Percent Impervious		19%	
Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**	
Tc, min.= 60*.000132*L^.77/S^.385	**1032**	**29**	**6.11**	Minutes
Percent Impervious		19.0%		

Hawthorne Trail: Supplemental & Supporting Info for Hydrograph Generation

Post Dev POD 2B #1 - Bypass Roman Cook 12/4/2024

Post Dev POD 2B #1 - Bypass	3030	S.F.	0.07	Ac
Land Use	**Area, Ac.**	**"CN"**	**Wtd'd "CN"**	
Roadways + C&G (not Sidewalks)	0.01	98	17.14	
Roofs	0.00	98	0.00	
Driveways	0.00	98	0.00	
Sidewalks	0.00	98	3.69	
Openspace- B Soils	0.00	39	0.00	
Openspace- C Soils	0.06	74	58.86	
Openspace- D Soils	0.00	80	0.00	
Woods/Wetlands-B Soils	0.00	30	0.00	
Woods/Wetlands-C Soils	0.00	70	0.00	
Woods/Wetlands-D Soils	0.00	77	0.00	
Lands Taken Up by BMP	0.00	98	0.00	
Open Water (Exist'g or Proposed Ponds)	0.00	98	0.00	
Total (Check):	**0.07**	Composite "CN"	**79.7**	
	Percent Impervious		21%	
Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**	
Tc, min.= 60*.000132*L^.77/S^.385	**143**	**11**	**0.90**	Minutes
Percent Impervious		21.3%		

Moody: Supplemental & Supporting Info for Hydrograph Generation

Post Dev - POD 2B #2 (SCM #4)

Roman Cook 11/19/2024

Table 1: Piedmont and Mountain SA/DA Table (Adapted from Driscoll, 1986)

Percent Impervious Cover	Permanent Pool Average Depth (ft)					
	3.0	4.0	5.0	6.0	7.0	≥8.0
10%	0.51	0.43	0.37	0.30	0.27	0.25
20%	0.84	0.69	0.61	0.51	0.44	0.40
30%	1.17	0.94	0.84	0.72	0.61	0.56
40%	1.51	1.24	1.09	0.91	0.78	0.71
50%	1.79	1.51	1.31	1.13	0.95	0.87
60%	2.09	1.77	1.49	1.31	1.12	1.03
70%	2.51	2.09	1.80	1.56	1.34	1.17
80%	2.92	2.41	2.07	1.82	1.62	1.40
90%	3.25	2.64	2.31	2.04	1.84	1.59
100%	3.55	2.79	2.52	2.34	2.04	1.75

	3	4	
40%	1.51	1.24	
50%	1.79	1.51	
46.4% (interpolation)	1.69	1.41	1.55 SA/DA

Post Dev - POD 2B #2 (SCM #4)		224311	S.F.	5.15	Ac	
	Land Use	**Area, Ac.**	**"CN"**	**Wtd'd "CN"**		
	Roadways + C&G (not Sidewalks)	0.84	98	15.99		
	Roofs	0.98	98	18.65		
	Driveways/Parking	0.24	98	4.57		
	Sidewalks	0.14	98	2.66		
	Openspace- A Soils	0.00	39	0.00		
	Openspace- B Soils	0.62	61	7.34		
	Openspace- C Soils	2.02	74	29.03		
	Openspace- D Soils	0.05	80	0.78		
	Woods-A Soils	0.00	30	0.00		
	Woods-B Soils	0.00	55	0.00		
	Woods-C Soils	0.02	70	0.27		
	Woods-D Soils	0.00	77	0.00		
	Lands Taken Up by BMP	0.15	98	2.85		
	Open Water (Exist'g or Proposed Ponds)	0.00	98	0.00		
	Total (Check):	**5.06**	Composite "CN"	**82**		
		Percent Impervious		45.6%		
	Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**		
	Tc, min.= 60*.000132*L^.77/S^.385	**710**	**19**	**4.67**	Minutes	use 5 min. minimum
	Percent Impervious		45.6%			
		Pond Design Depth, ft.:	3.50			
SCM #1 Design Elements:	SA/DA Factor:		1.55	From NCDEQ SA/DA Char		D Avg, ft
Davg = VPP-Vshelf /A shelf bottom	Min.SCM Surface Area:		3477	S.F.		4.94
		VPP, c.f.	Perimeter, ft.	Vshelf, c.f.	Abottom, s.f.	**3.50**
Treatment Volume Requirement:		12,515	537	2,661.00	1,995	
	(From HydraFlow Attachment)			Design Pond Depth, ft.=		**3.50**
Rv=0.05-.009*(%Impervious)						
Total Runoff for 1" Event= S in Ac	DA to SCM:	5.149	Ac.			
Treatment "S" in Cu. Ft. =	Composite % Impervious (Above) =	46%				
Treatment Volume to Be Stored:	Rv=0.05+.009*(%Impervious)	0.46	inch/inch			
Treatment Volume Provided, Cu.	Total Runoff for 1" Event= S in Ac-Ft:	0.20	S=1"*Rv*Drainage Area/12			
	Treatment "S" in Cu. Ft. =	8612.08				
	Treatment Volume to Be Stored:	8612	Cu. FT			
	Volume Achieved at Elev.	358.61	Orifice Dia	1.50	Inch Drawdown Pipe	
	Drawdown Pipe Elev.	357.5	Elev Diff, H., ft.	1.11		

Permanent Pool Surface Area (no forebay):	4279	sf
Forebay Volume (Total):	2387	cf
Permanent Pool Volume (Total):	12515	cf
Forebay Size (Volume):	19	%

Hawthorne Trail: Supplemental & Supporting Info for Hydrograph Generation

Post Dev POD 2B #3 - Bypass

Roman Cook 11/19/2024

Post Dev POD 2B #3 - Bypass	276576	S.F.	6.35	Ac
Land Use	**Area, Ac.**	**"CN"**	**Wtd'd "CN"**	
Roadways + C&G (not Sidewalks)	0.00	98	0.00	
Roofs	0.18	98	2.76	
Driveways	0.02	98	0.36	
Sidewalks (+Pump Station)	0.00	98	0.00	
Openspace- A Soils	0.00	39	0.00	
Openspace- C Soils	3.76	74	43.88	
Openspace- D Soils	1.77	80	22.28	
Woods/Wetlands-A Soils	0.00	30	0.00	
Woods/Wetlands-C Soils	0.27	70	3.00	
Woods/Wetlands-D Soils	0.34	77	4.15	
Lands Taken Up by BMP	0.00	98	0.00	
Open Water (Exist'g or Proposed Ponds)	0.00	98	0.00	
Total (Check):	**6.35**	Composite "CN"	**76.42**	
	Percent Impervious		3%	
Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**	
Tc, min.= 60*.000132*L^.77/S^.385	**931**	**15**	**6.99**	Minutes
Percent Impervious		3%		

Moody: Supplemental & Supporting Info for Hydrograph Generation

Post Dev - POD 2B #4 (SCM #5) Roman Cook 11/19/2024

Post Dev - POD 2B #4 (SCM #5)			303275	S.F.	6.96	Ac			
	Land Use	**Area, Ac.**	**"CN"**	**Wtd'd "CN"**					
	Roadways + C&G (not Sidewalks)	0.96	98	13.51					
	Roofs	1.71	98	24.07					
	Driveways/Parking	0.90	98	12.67					
	Sidewalks	0.26	98	3.66					
	Openspace- A Soils	0.00	39	0.00					
	Openspace- B Soils	0.60	61	5.26					
	Openspace- C Soils	2.24	74	23.81					
	Openspace- D Soils	0.01	80	0.11					
	Woods-A Soils	0.00	30	0.00					
	Woods-B Soils	0.05	55	0.39					
	Woods-C Soils	0.00	70	0.00					
	Woods-D Soils	0.00	77	0.00					
	Lands Taken Up by BMP	0.23	98	3.24					
	Open Water (Exist'g or Proposed Ponds)	0.00	98	0.00					
	Total (Check):	**6.96**	Composite "CN"	**87**					
		Percent Impervious		58.3%					
	Tc (Kirpich):	**Length**	**Elev Delta**	**Tc=**					
	Tc, min.= 60*.000132*L^.77/S^.385	**1195**	**25**	**7.66**	Minutes				
	Percent Impervious		58.3%						
		Pond Design Depth, ft.:	3.50	(4.5' w/ 0.5' Sediment Storage)					
SCM #1 Design Elements:	SA/DA Factor:		1.87	From NCDEQ SA/DA Char		D Avg, ft			
Davg = VPP-Vshelf /A shelf bottom	Min.SCM Surface Area:		5671	S.F.		4.04	Permanent Pool Surface Area (no forebay):	5760	sf
		VPP, c.f.	Perimeter, ft.	Vshelf, c.f.	Abottom, s.f.	**3.50**	Forebay Volume (Total):	3881	cf
Treatment Volume Requirement:		19,680	537	3,760.00	3,945		Permanent Pool Volume (Total):	19680	cf
	(From HydraFlow Attachment)			Design Pond Depth, ft.=		**3.50**	Forebay Size (Volume):	20	%
Rv=0.05-.009*(%Impervious)									
Total Runoff for 1" Event= S in Ac	DA to SCM:	6.962	Ac.						
Treatment "S" in Cu. Ft. =	Composite % Impervious (Above) =	58%							
Treatment Volume to Be Stored:	Rv=0.05+.009*(%Impervious)	0.57	inch/inch						
Treatment Volume Provided, Cu.	Total Runoff for 1" Event= S in Ac-Ft:	0.33	S=1"*Rv*Drainage Area/12						
	Treatment "S" in Cu. Ft. =	14527.67							
	Treatment Volume to Be Stored:	14528	Cu. FT						
	Volume Achieved at Elev.	348.92	Orifice Dia	2.00	Inch Drawdown Pipe				
	Drawdown Pipe Elev.	347.5	Elev Diff, H., ft.	1.42					

Table 1: Piedmont and Mountain SA/DA Table (Adapted from Driscoll, 1986)

Percent Impervious Cover	Permanent Pool Average Depth (ft)					
	3.0	4.0	5.0	6.0	7.0	≥8.0
10%	0.51	0.43	0.37	0.30	0.27	0.25
20%	0.84	0.69	0.61	0.51	0.44	0.40
30%	1.17	0.94	0.84	0.72	0.61	0.56
40%	1.51	1.24	1.09	0.91	0.78	0.71
50%	1.79	1.51	1.31	1.13	0.95	0.87
60%	2.09	1.77	1.49	1.31	1.12	1.03
70%	2.51	2.09	1.80	1.56	1.34	1.17
80%	2.92	2.41	2.07	1.82	1.62	1.40
90%	3.25	2.64	2.31	2.04	1.84	1.59
100%	3.55	2.79	2.52	2.34	2.04	1.75

	3	4		
50%	1.79	1.51		
60%	2.09	1.77		
57.7% (interpolation)	2.02	1.71	1.87	SA/DA

Pond Report

Pond No. 1 - SCM #1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 360.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	360.00	10,525	0	0
1.00	361.00	11,518	11,017	11,017
2.00	362.00	12,558	12,033	23,050
3.00	363.00	13,653	13,100	36,150
3.50	363.50	15,404	7,259	43,409
4.00	364.00	17,281	8,166	51,575
5.00	365.00	19,287	18,273	69,848
6.00	366.00	21,423	20,344	90,192
7.00	367.00	23,693	22,546	112,738
8.00	368.00	26,063	24,866	137,604

Culvert / Orifice Structures

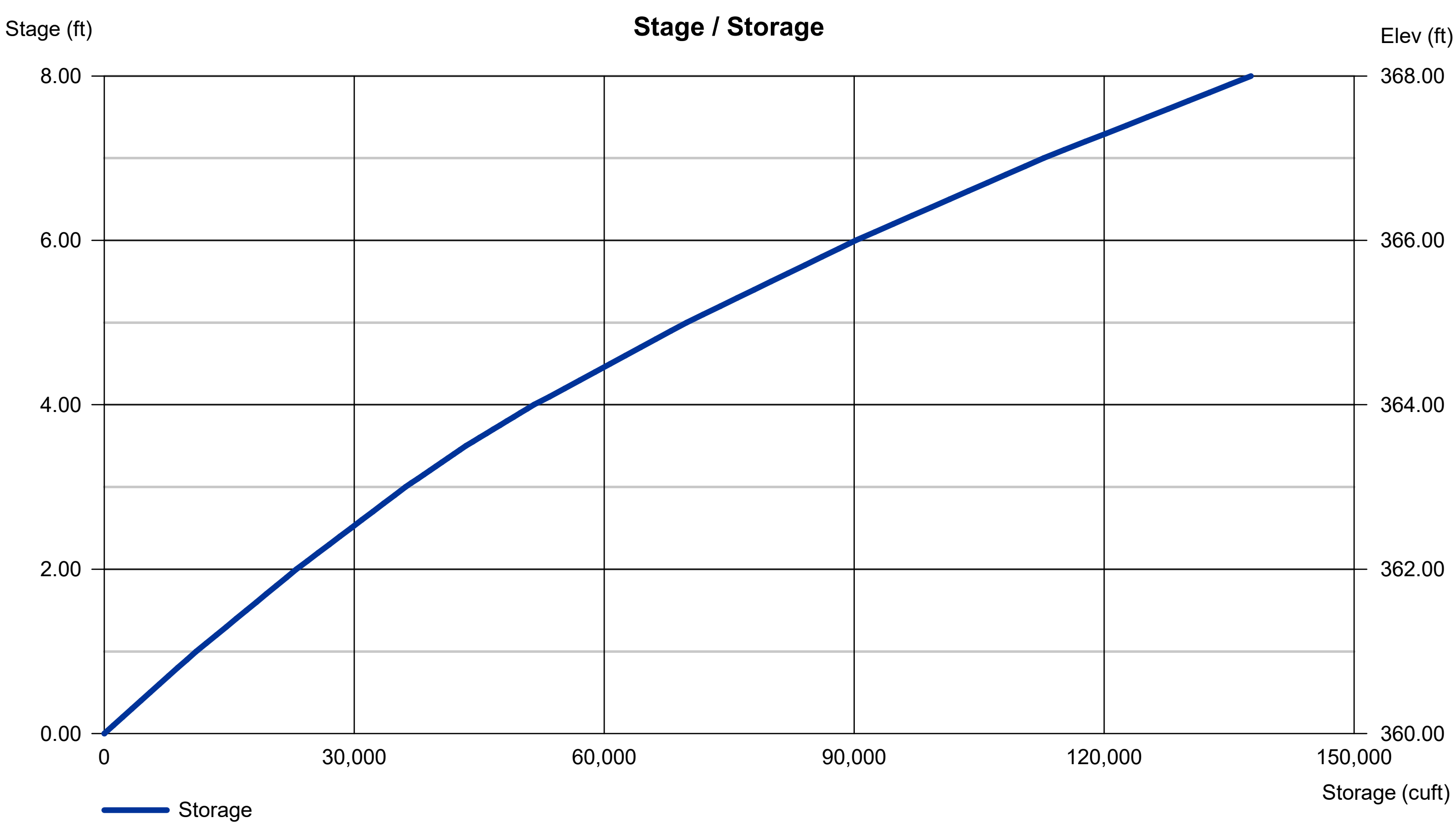
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	2.00	6.00	0.00
Span (in)	= 24.00	2.00	24.00	0.00
No. Barrels	= 1	1	3	0
Invert El. (ft)	= 360.00	363.50	365.75	0.00
Length (ft)	= 50.00	0.50	0.50	0.00
Slope (%)	= 1.50	0.50	0.50	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 14.00	24.00	0.00	0.00
Crest El. (ft)	= 366.25	366.75	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

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



Pond Report

Pond No. 2 - SCM #2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 358.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	358.00	2,888	0	0
1.00	359.00	3,772	3,320	3,320
2.00	360.00	4,695	4,225	7,545
3.00	361.00	5,655	5,167	12,712
3.50	361.50	7,163	3,197	15,908
4.00	362.00	8,755	3,972	19,881
5.00	363.00	10,430	9,579	29,460
6.00	364.00	12,189	11,297	40,757
7.00	365.00	14,033	13,099	53,856

Culvert / Orifice Structures

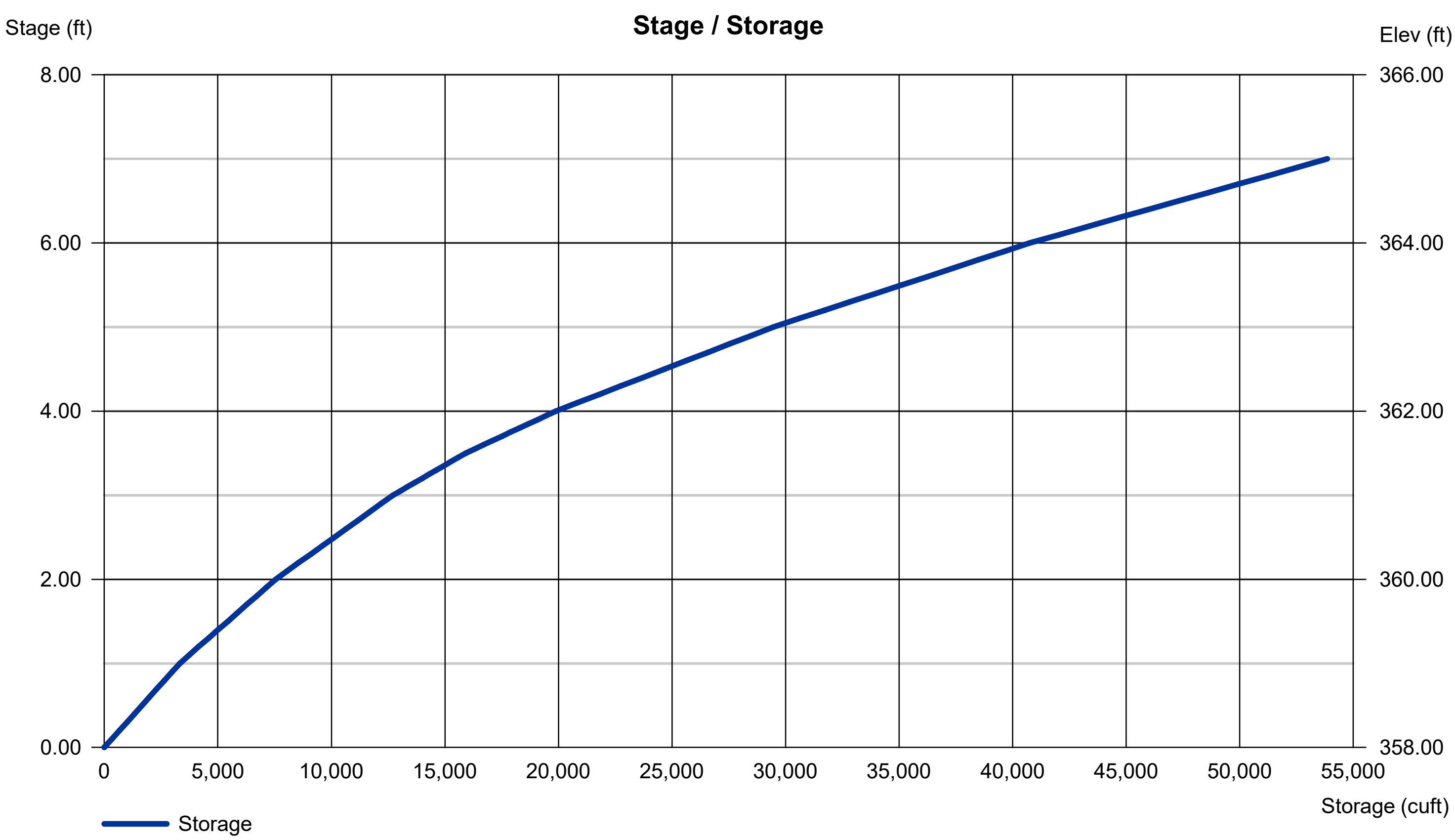
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	1.00	6.00	0.00
Span (in)	= 18.00	1.00	12.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 358.00	361.50	362.75	0.00
Length (ft)	= 72.00	0.50	0.50	0.00
Slope (%)	= 1.00	0.50	0.50	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 14.00	12.00	0.00	0.00
Crest El. (ft)	= 363.25	363.75	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

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



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Pond No. 3 - SCM #3

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 357.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	357.00	2,465	0	0
1.00	358.00	3,606	3,036	3,036
2.00	359.00	4,169	3,888	6,923
3.00	360.00	4,767	4,468	11,391
4.00	361.00	5,401	5,084	16,475
4.50	361.50	6,424	2,956	19,431
5.00	362.00	7,528	3,488	22,919
6.00	363.00	8,717	8,123	31,042
7.00	364.00	9,993	9,355	40,397
8.00	365.00	11,354	10,674	51,070

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	1.50	6.00	0.00
Span (in)	= 24.00	1.50	42.00	0.00
No. Barrels	= 1	1	3	0
Invert El. (ft)	= 358.00	361.50	362.75	0.00
Length (ft)	= 55.00	0.00	0.50	0.00
Slope (%)	= 1.40	0.00	0.50	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

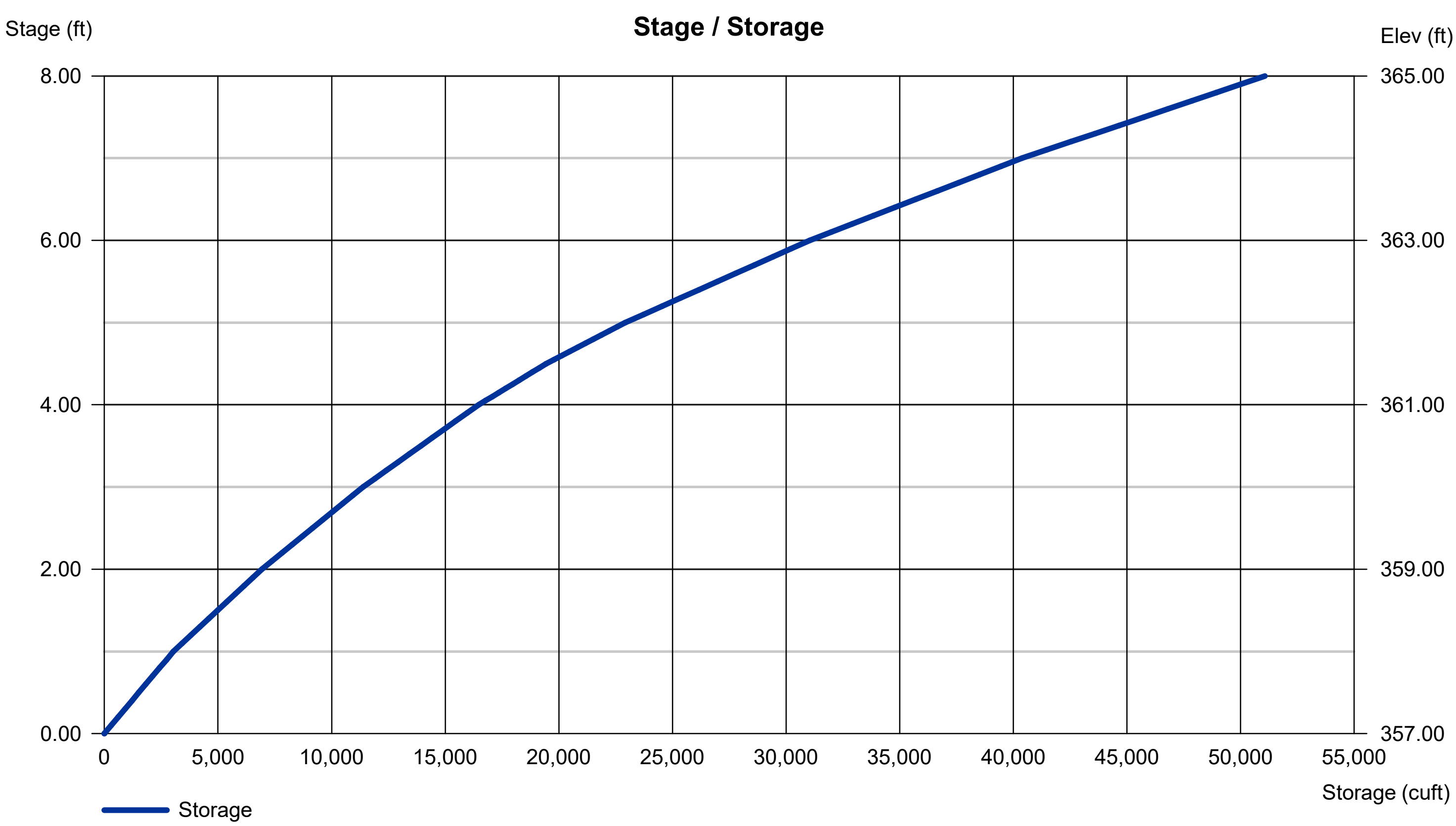
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 22.00	24.00	0.00	0.00
Crest El. (ft)	= 363.25	363.90	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

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

TW Elev. (ft) = 0.00

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



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Pond No. 5 - SCM #4

Pond Data

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

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	354.00	1,995	0	0
1.00	355.00	2,838	2,417	2,417
2.00	356.00	3,711	3,275	5,691
3.00	357.00	4,615	4,163	9,854
3.50	357.50	6,029	2,661	12,515
4.00	358.00	7,511	3,385	15,900
5.00	359.00	9,061	8,286	24,186
6.00	360.00	10,681	9,871	34,057
7.00	361.00	12,369	11,525	45,582

Culvert / Orifice Structures

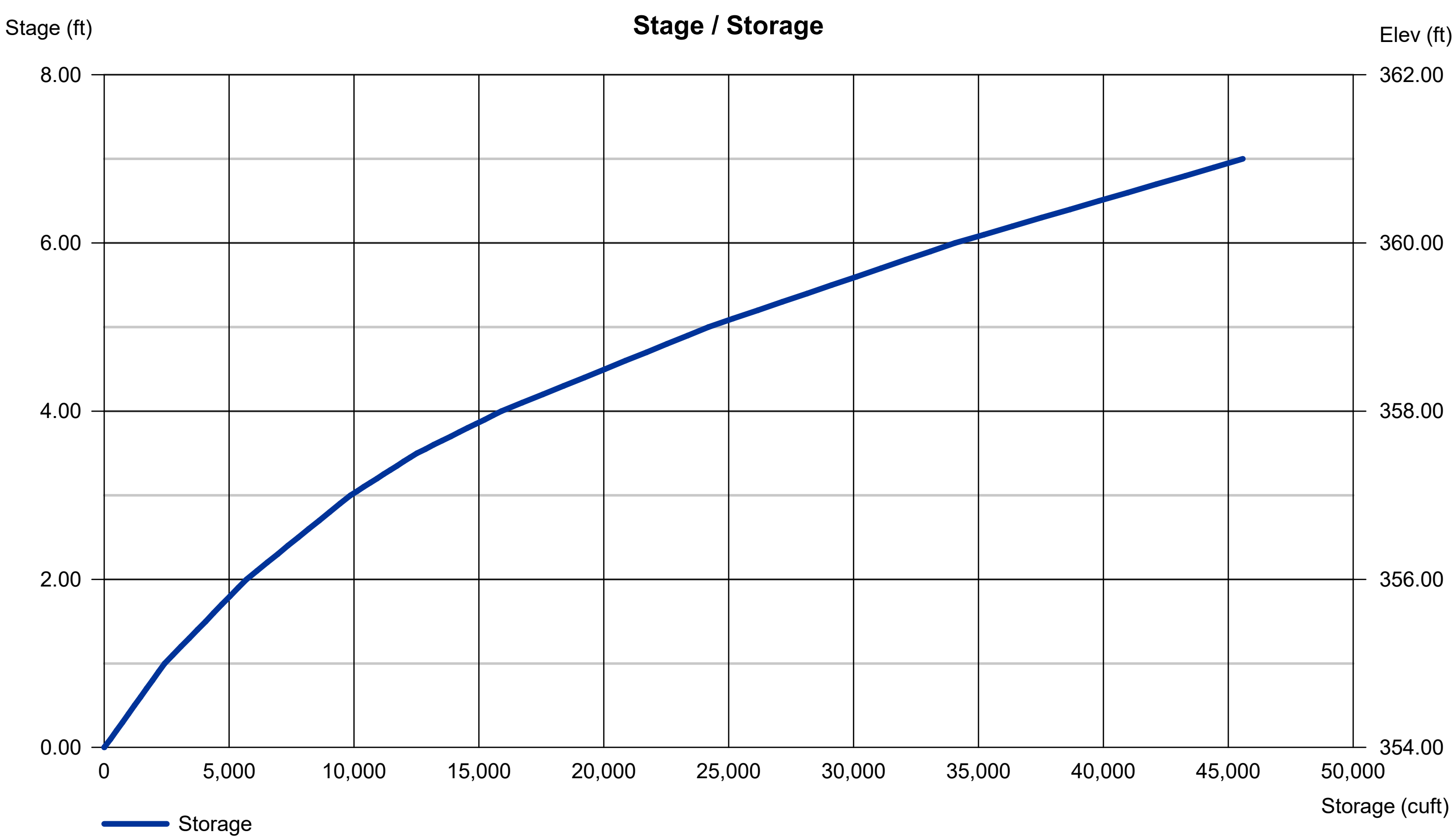
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	1.50	6.00	0.00
Span (in)	= 24.00	1.50	30.00	0.00
No. Barrels	= 1	1	3	0
Invert El. (ft)	= 354.00	357.50	358.75	0.00
Length (ft)	= 72.50	0.00	0.50	0.00
Slope (%)	= 0.50	0.00	0.50	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 22.00	24.00	0.00	0.00
Crest El. (ft)	= 359.25	360.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

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



Pond Report

Pond No. 4 - SCM #5

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 344.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	344.00	3,945	0	0
1.00	345.00	4,823	4,384	4,384
2.00	346.00	5,755	5,289	9,673
3.00	347.00	6,738	6,247	15,920
3.50	347.50	8,303	3,760	19,680
4.00	348.00	9,952	4,564	24,244
5.00	349.00	11,681	10,817	35,060
6.00	350.00	13,490	12,586	47,646
7.00	351.00	15,379	14,435	62,080
8.00	352.00	17,348	16,364	78,444

Culvert / Orifice Structures

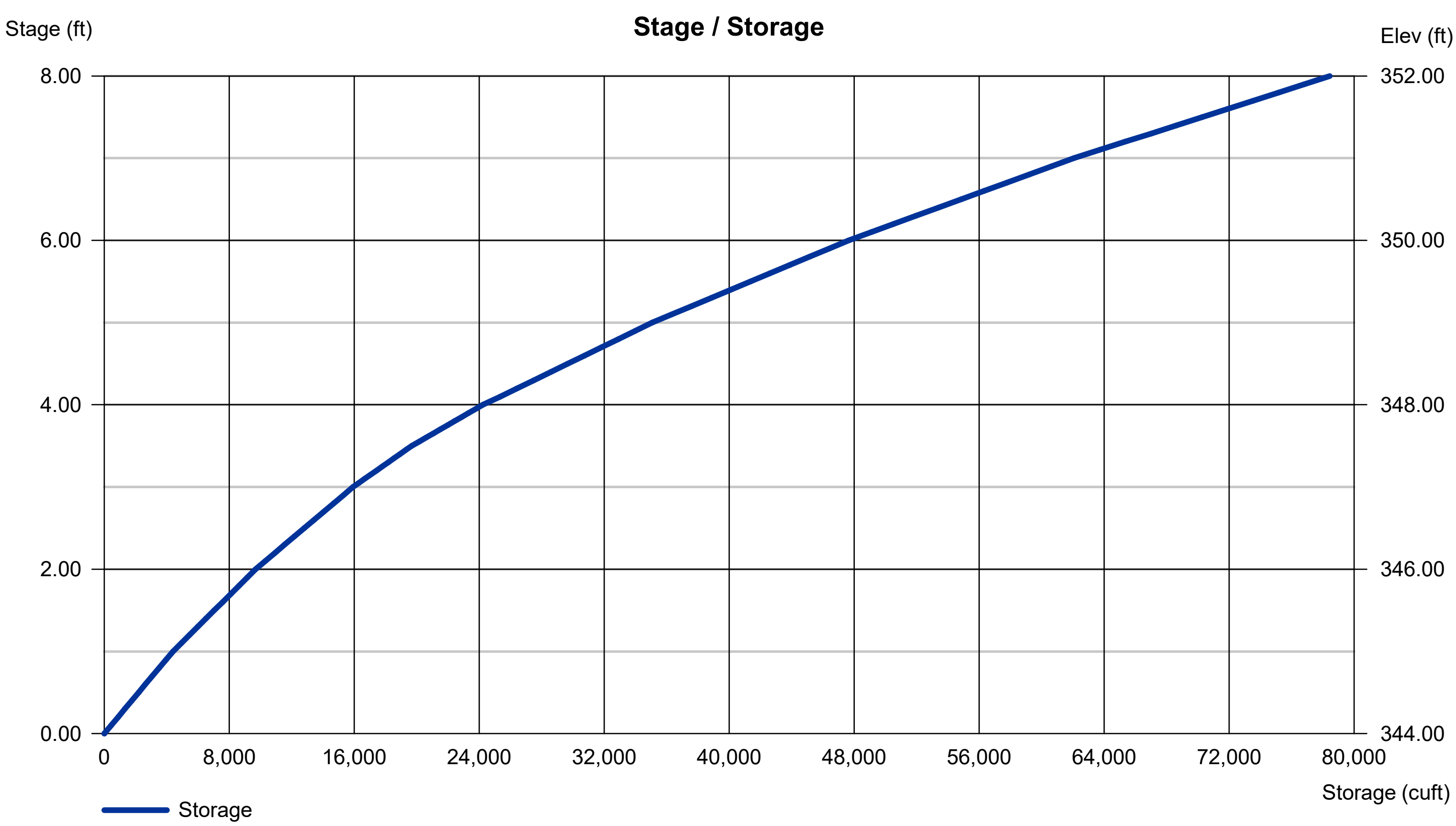
		[A]	[B]	[C]	[PrfRsr]
Rise (in)	=	24.00	2.00	6.00	0.00
Span (in)	=	24.00	2.00	24.00	0.00
No. Barrels	=	1	1	3	0
Invert El. (ft)	=	344.00	347.50	350.00	0.00
Length (ft)	=	72.50	0.50	0.50	0.00
Slope (%)	=	1.00	0.50	0.50	n/a
N-Value	=	.013	.013	.013	n/a
Orifice Coeff.	=	0.60	0.60	0.60	0.60
Multi-Stage	=	n/a	Yes	Yes	No

Weir Structures

		[A]	[B]	[C]	[D]
Crest Len (ft)	=	14.00	24.00	0.00	0.00
Crest El. (ft)	=	350.50	351.00	0.00	0.00
Weir Coeff.	=	3.33	3.33	3.33	3.33
Weir Type	=	1	Rect	---	---
Multi-Stage	=	Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

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



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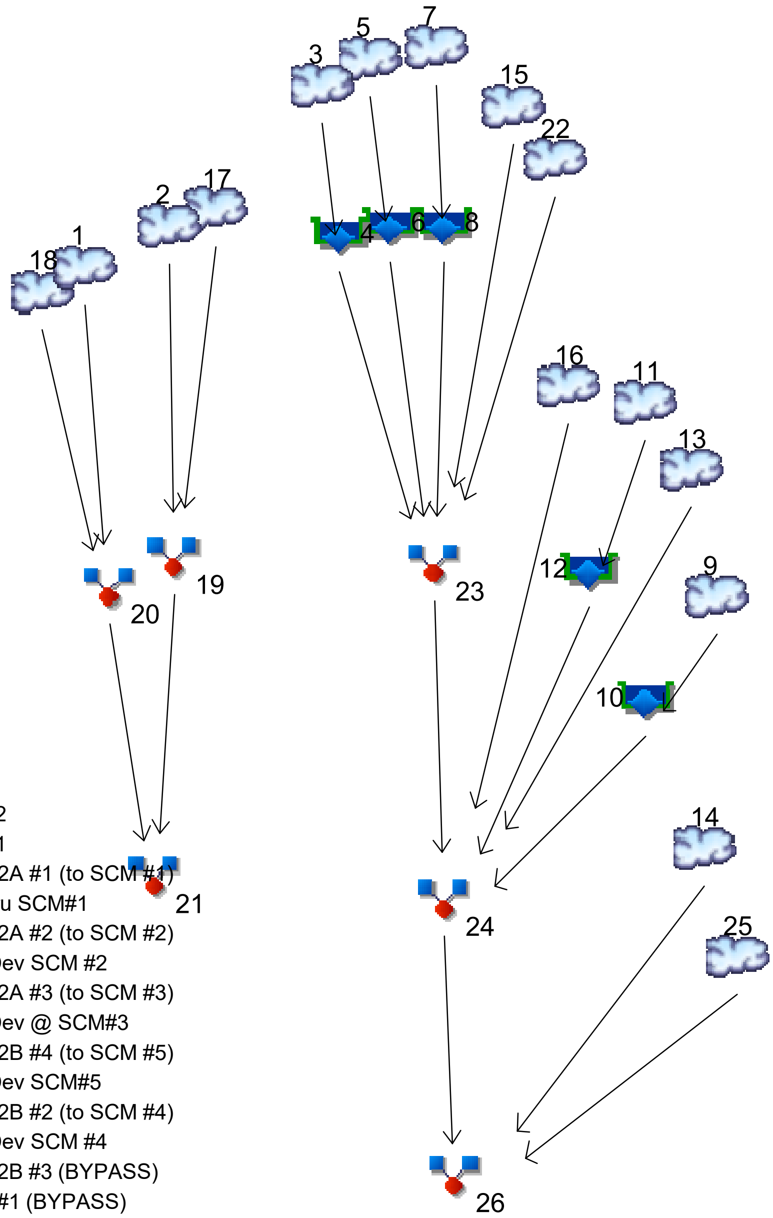
Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023



Legend

Hyd.	Origin	Description
1	SCS Runoff	PRE POD #2
2	SCS Runoff	PRE POD #1
3	SCS Runoff	POST POD 2A #1 (to SCM #1)
4	Reservoir	PostDev Thru SCM#1
5	SCS Runoff	POST POD 2A #2 (to SCM #2)
6	Reservoir	Route PostDev SCM #2
7	SCS Runoff	POST POD 2A #3 (to SCM #3)
8	Reservoir	Route PostDev @ SCM#3
9	SCS Runoff	POST POD 2B #4 (to SCM #5)
10	Reservoir	Route PostDev SCM#5
11	SCS Runoff	POST POD 2B #2 (to SCM #4)
12	Reservoir	Route PostDev SCM #4
13	SCS Runoff	POST POD 2B #3 (BYPASS)
14	SCS Runoff	POST POD #1 (BYPASS)
15	SCS Runoff	POST POD 2A #4 (BYPASS)
16	SCS Runoff	POST POD 2B #1 (BYPASS)
17	SCS Runoff	PRE POD #1 OFFSITE AREA
18	SCS Runoff	PRE OFFSITE AREA #4
19	Combine	PRE POD #1 TOTAL
20	Combine	PRE POD #2 TOTAL
21	Combine	PRE POD GRAND TOTAL
22	SCS Runoff	POST POD AREA A (OFFSITE BYPASS)
23	Combine	POST POD 2A TOTAL
24	Combine	POST POD 2B TOTAL
25	SCS Runoff	POST POD AREA C & B OFFSITE BYPASS
26	Combine	POST POD GRAND TOTAL

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

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	------	42.90	58.70	-------	92.74	121.51	162.39	-------	230.07	PRE POD #2
2	SCS Runoff	------	7.331	10.25	-------	16.51	21.78	29.34	-------	42.19	PRE POD #1
3	SCS Runoff	------	20.47	25.99	-------	37.34	46.46	59.05	-------	79.27	POST POD 2A #1 (to SCM #1)
4	Reservoir	3	0.152	0.644	-------	3.166	8.862	26.27	-------	62.03	PostDev Thru SCM#1
5	SCS Runoff	------	3.826	4.883	-------	7.093	8.879	11.35	-------	15.34	POST POD 2A #2 (to SCM #2)
6	Reservoir	5	0.024	0.027	-------	0.149	0.351	0.843	-------	4.791	Route PostDev SCM #2
7	SCS Runoff	------	18.11	23.06	-------	33.32	41.60	53.04	-------	71.45	POST POD 2A #3 (to SCM #3)
8	Reservoir	7	8.500	16.37	-------	29.68	32.74	45.49	-------	66.10	Route PostDev @ SCM#3
9	SCS Runoff	------	20.25	24.72	-------	33.54	40.48	49.91	-------	64.88	POST POD 2B #4 (to SCM #5)
10	Reservoir	9	0.518	1.442	-------	8.062	20.07	36.07	-------	53.87	Route PostDev SCM#5
11	SCS Runoff	------	12.00	15.11	-------	21.45	26.51	33.48	-------	44.64	POST POD 2B #2 (to SCM #4)
12	Reservoir	11	1.855	5.728	-------	15.41	22.73	29.17	-------	32.45	Route PostDev SCM #4
13	SCS Runoff	------	10.38	13.63	-------	20.39	26.07	34.02	-------	46.98	POST POD 2B #3 (BYPASS)
14	SCS Runoff	------	6.180	7.862	-------	11.38	14.23	18.18	-------	24.53	POST POD #1 (BYPASS)
15	SCS Runoff	------	12.46	15.86	-------	22.75	28.30	35.94	-------	48.23	POST POD 2A #4 (BYPASS)
16	SCS Runoff	------	0.146	0.186	-------	0.270	0.338	0.432	-------	0.583	POST POD 2B #1 (BYPASS)
17	SCS Runoff	------	4.826	6.440	-------	9.816	12.60	16.65	-------	23.29	PRE POD #1 OFFSITE AREA
18	SCS Runoff	------	9.181	12.61	-------	19.89	25.99	34.66	-------	49.11	PRE OFFSITE AREA #4
19	Combine	2, 17,	11.80	16.35	-------	26.08	34.24	45.84	-------	65.08	PRE POD #1 TOTAL
20	Combine	1, 18,	48.86	67.23	-------	106.30	138.98	185.37	-------	263.30	PRE POD #2 TOTAL
21	Combine	19, 20	56.68	78.45	-------	124.89	163.83	219.21	-------	310.97	PRE POD GRAND TOTAL
22	SCS Runoff	------	9.181	12.61	-------	19.89	25.99	34.66	-------	49.11	POST POD AREA A (OFFSITE BYP
23	Combine	4, 6, 8, 15, 22	25.06	39.39	-------	64.75	81.61	124.16	-------	209.01	POST POD 2A TOTAL
24	Combine	10, 12, 13, 16, 23	33.77	55.98	-------	104.31	141.81	210.54	-------	330.13	POST POD 2B TOTAL
25	SCS Runoff	------	4.872	6.501	-------	9.909	12.72	16.80	-------	23.52	POST POD AREA C & B OFFSITE B
26	Combine	14, 24, 25	38.14	63.50	-------	120.18	163.19	234.37	-------	367.29	POST POD GRAND TOTAL

Proj. file: 20250124 SCM Modeling.gpw	Tuesday, 01 / 28 / 2025

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

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	42.90	2	724	128,128	------	------	------	PRE POD #2
2	SCS Runoff	7.331	2	720	17,610	------	------	------	PRE POD #1
3	SCS Runoff	20.47	2	720	46,860	------	------	------	POST POD 2A #1 (to SCM #1)
4	Reservoir	0.152	2	1446	36,358	3	365.69	83,906	PostDev Thru SCM#1
5	SCS Runoff	3.826	2	720	8,757	------	------	------	POST POD 2A #2 (to SCM #2)
6	Reservoir	0.024	2	1446	6,047	5	362.39	23,665	Route PostDev SCM #2
7	SCS Runoff	18.11	2	720	41,448	------	------	------	POST POD 2A #3 (to SCM #3)
8	Reservoir	8.500	2	726	38,063	7	363.13	32,260	Route PostDev @ SCM#3
9	SCS Runoff	20.25	2	716	41,192	------	------	------	POST POD 2B #4 (to SCM #5)
10	Reservoir	0.518	2	894	39,576	9	350.05	48,434	Route PostDev SCM#5
11	SCS Runoff	12.00	2	718	24,168	------	------	------	POST POD 2B #2 (to SCM #4)
12	Reservoir	1.855	2	728	23,766	11	358.92	23,504	Route PostDev SCM #4
13	SCS Runoff	10.38	2	720	23,909	------	------	------	POST POD 2B #3 (BYPASS)
14	SCS Runoff	6.180	2	718	12,382	------	------	------	POST POD #1 (BYPASS)
15	SCS Runoff	12.46	2	720	32,499	------	------	------	POST POD 2A #4 (BYPASS)
16	SCS Runoff	0.146	2	718	293	------	------	------	POST POD 2B #1 (BYPASS)
17	SCS Runoff	4.826	2	718	9,705	------	------	------	PRE POD #1 OFFSITE AREA
18	SCS Runoff	9.181	2	736	45,436	------	------	------	PRE OFFSITE AREA #4
19	Combine	11.80	2	718	27,315	2, 17,	------	------	PRE POD #1 TOTAL
20	Combine	48.86	2	724	173,564	1, 18,	------	------	PRE POD #2 TOTAL
21	Combine	56.68	2	722	200,879	19, 20	------	------	PRE POD GRAND TOTAL
22	SCS Runoff	9.181	2	736	45,436	------	------	------	POST POD AREA A (OFFSITE BYP
23	Combine	25.06	2	726	158,403	4, 6, 8, 15, 22	------	------	POST POD 2A TOTAL
24	Combine	33.77	2	724	245,947	10, 12, 13, 16, 23	------	------	POST POD 2B TOTAL
25	SCS Runoff	4.872	2	718	9,798	------	------	------	POST POD AREA C & B OFFSITE B
26	Combine	38.14	2	722	268,127	14, 24, 25	------	------	POST POD GRAND TOTAL

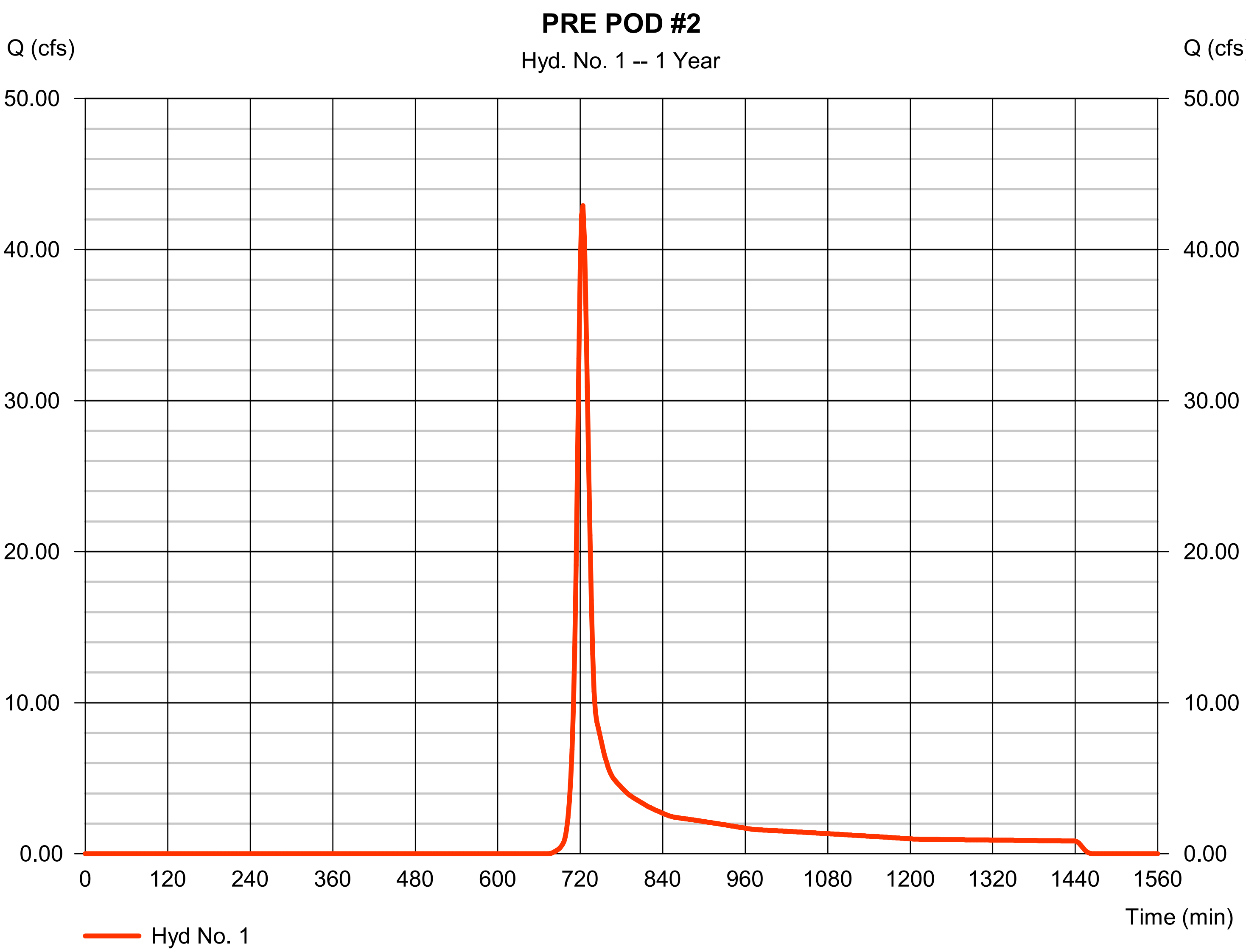
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 1

PRE POD #2

Hydrograph type	= SCS Runoff	Peak discharge	= 42.90 cfs
Storm frequency	= 1 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 128,128 cuft
Drainage area	= 41.980 ac	Curve number	= 73.1
Basin Slope	= 1.4 %	Hydraulic length	= 4320 ft
Tc method	= User	Time of conc. (Tc)	= 14.00 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



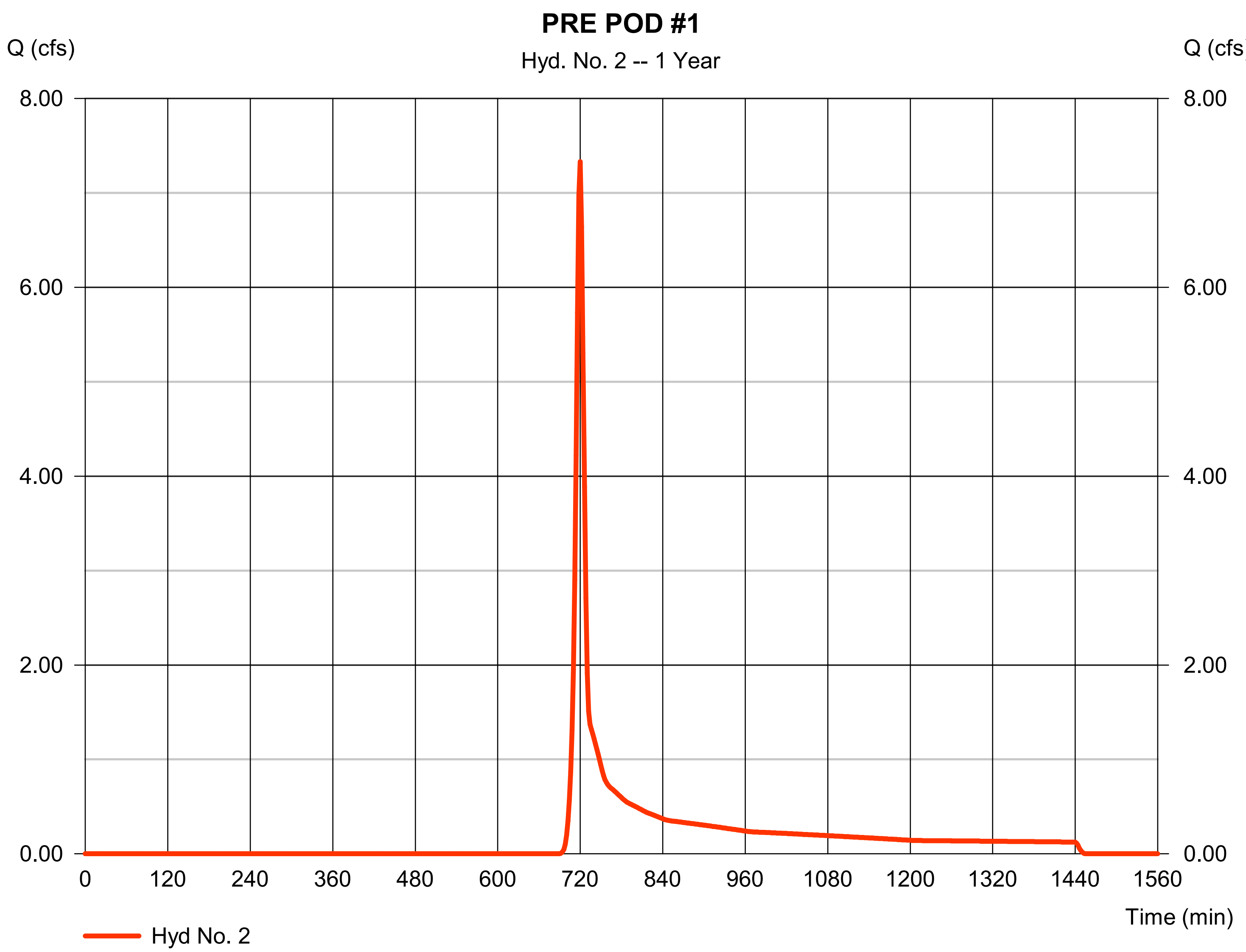
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 2

PRE POD #1

Hydrograph type	= SCS Runoff	Peak discharge	= 7.331 cfs
Storm frequency	= 1 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 17,610 cuft
Drainage area	= 6.540 ac	Curve number	= 70.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.70 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

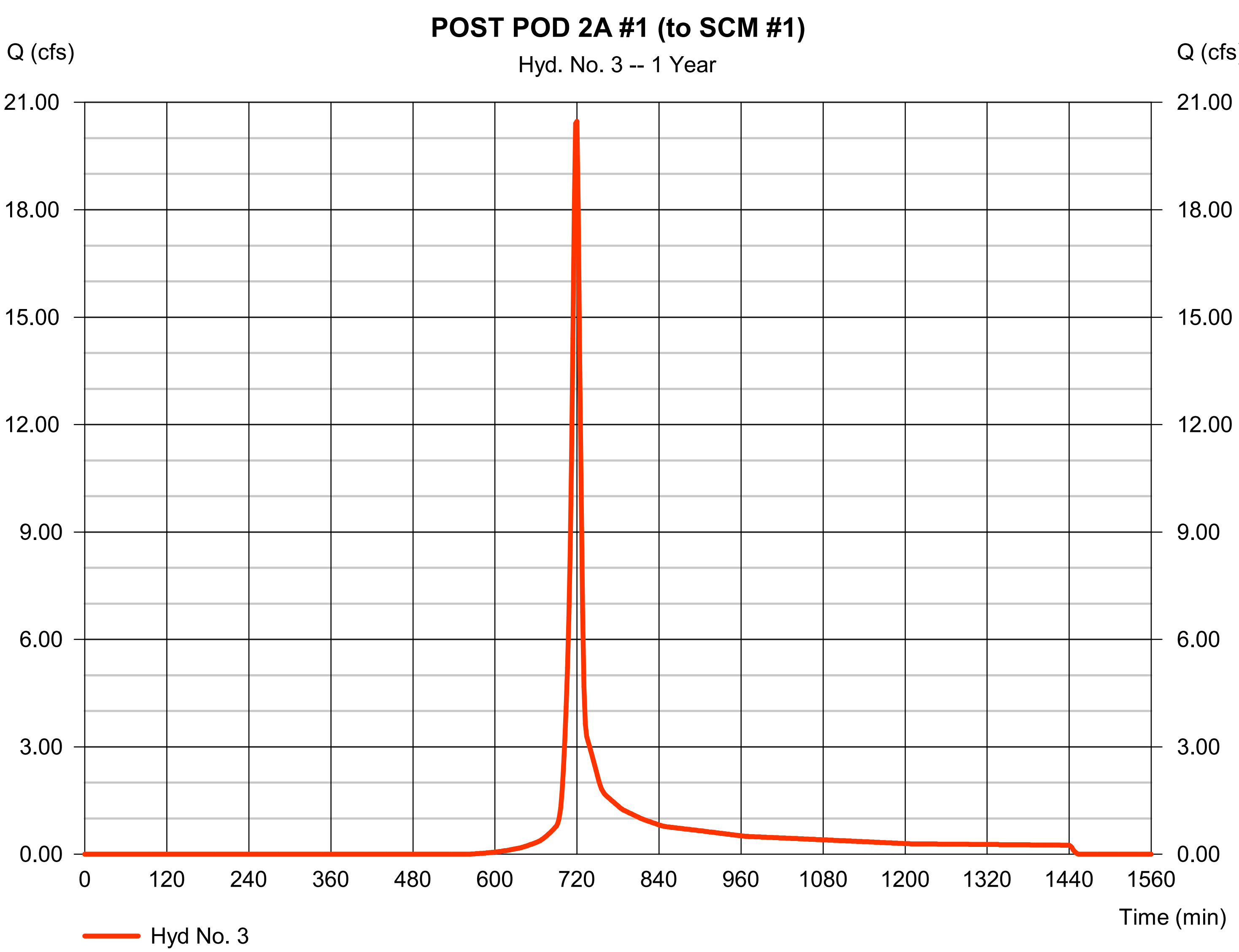


Hydrograph Report

Hyd. No. 3

POST POD 2A #1 (to SCM #1)

Hydrograph type	= SCS Runoff	Peak discharge	= 20.47 cfs
Storm frequency	= 1 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 46,860 cuft
Drainage area	= 9.780 ac	Curve number	= 81.1
Basin Slope	= 2.4 %	Hydraulic length	= 1000 ft
Tc method	= User	Time of conc. (Tc)	= 6.60 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

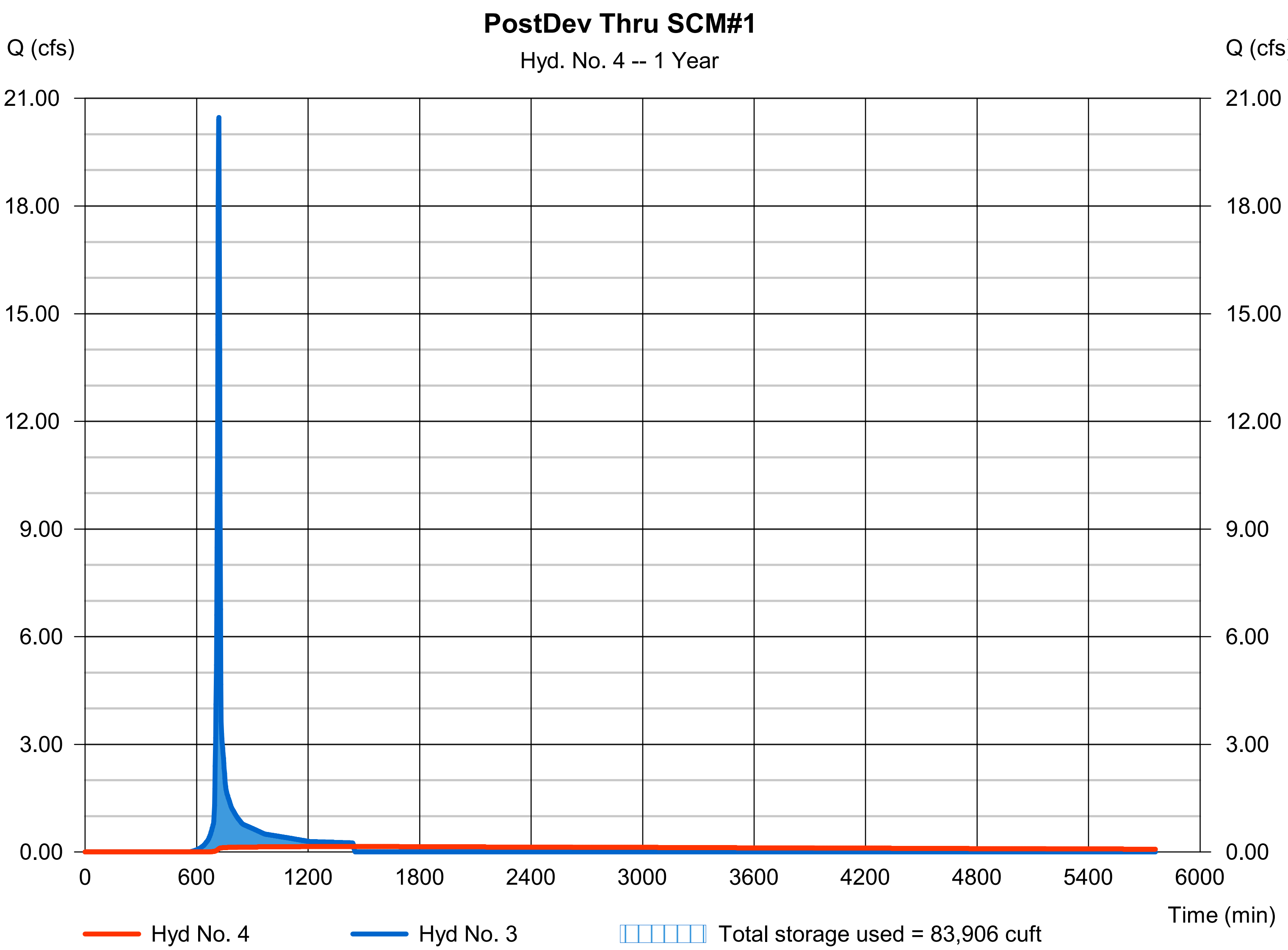
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 4

PostDev Thru SCM#1

Hydrograph type	= Reservoir	Peak discharge	= 0.152 cfs
Storm frequency	= 1 yrs	Time to peak	= 1446 min
Time interval	= 2 min	Hyd. volume	= 36,358 cuft
Inflow hyd. No.	= 3 - POST POD 2A #1 (to SCM #1)	Max. Elevation	= 365.69 ft
Reservoir name	= SCM #1	Max. Storage	= 83,906 cuft

Storage Indication method used. Wet pond routing start elevation = 363.50 ft.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Pond No. 1 - SCM #1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 360.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	360.00	10,525	0	0
1.00	361.00	11,518	11,017	11,017
2.00	362.00	12,558	12,033	23,050
3.00	363.00	13,653	13,100	36,150
3.50	363.50	15,404	7,259	43,409
4.00	364.00	17,281	8,166	51,575
5.00	365.00	19,287	18,273	69,848
6.00	366.00	21,423	20,344	90,192
7.00	367.00	23,693	22,546	112,738
8.00	368.00	26,063	24,866	137,604

Culvert / Orifice Structures

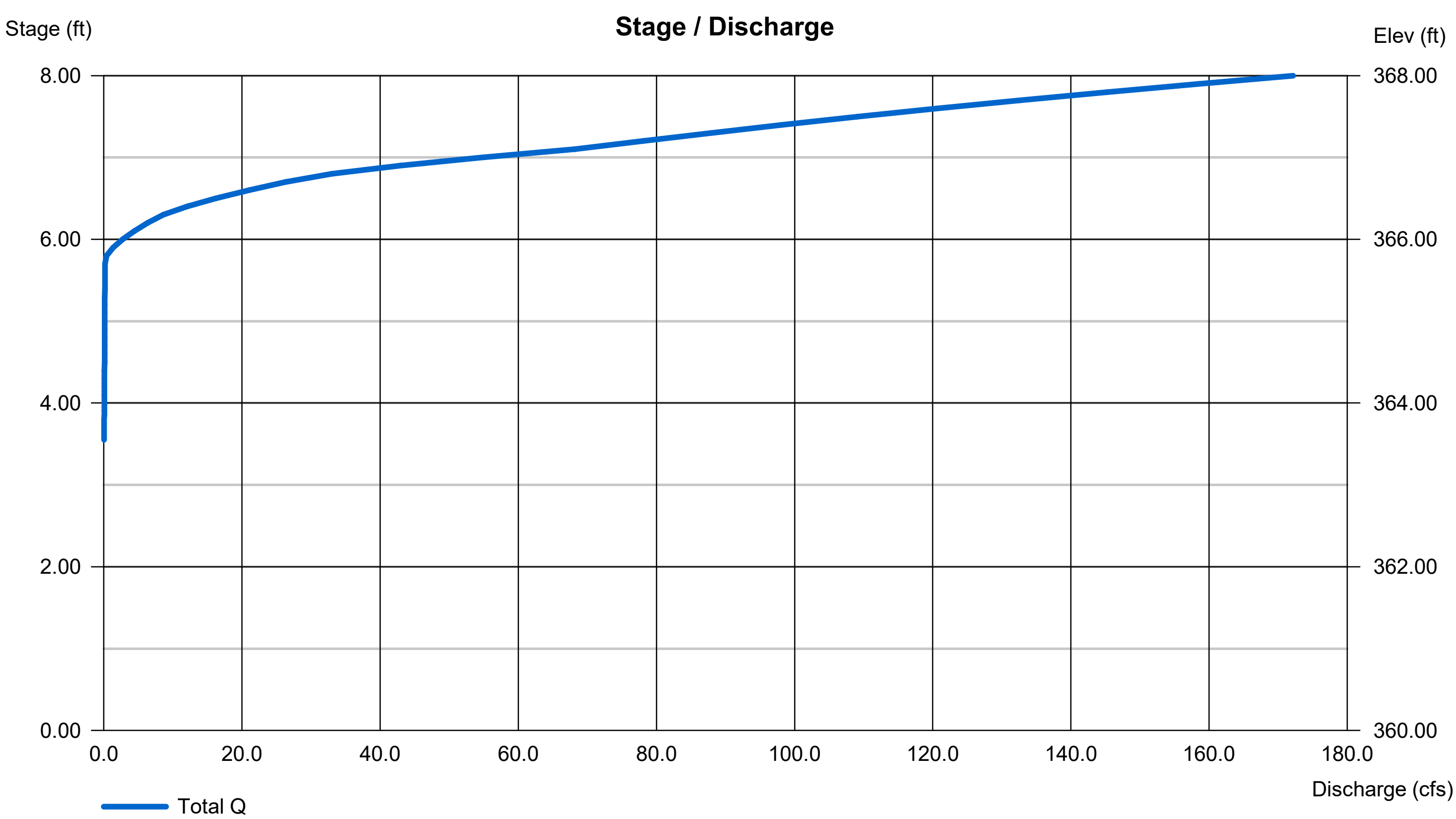
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	2.00	6.00	0.00
Span (in)	= 24.00	2.00	24.00	0.00
No. Barrels	= 1	1	3	0
Invert El. (ft)	= 360.00	363.50	365.75	0.00
Length (ft)	= 50.00	0.50	0.50	0.00
Slope (%)	= 0.50	0.50	0.50	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 14.00	24.00	0.00	0.00
Crest El. (ft)	= 366.25	366.75	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

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



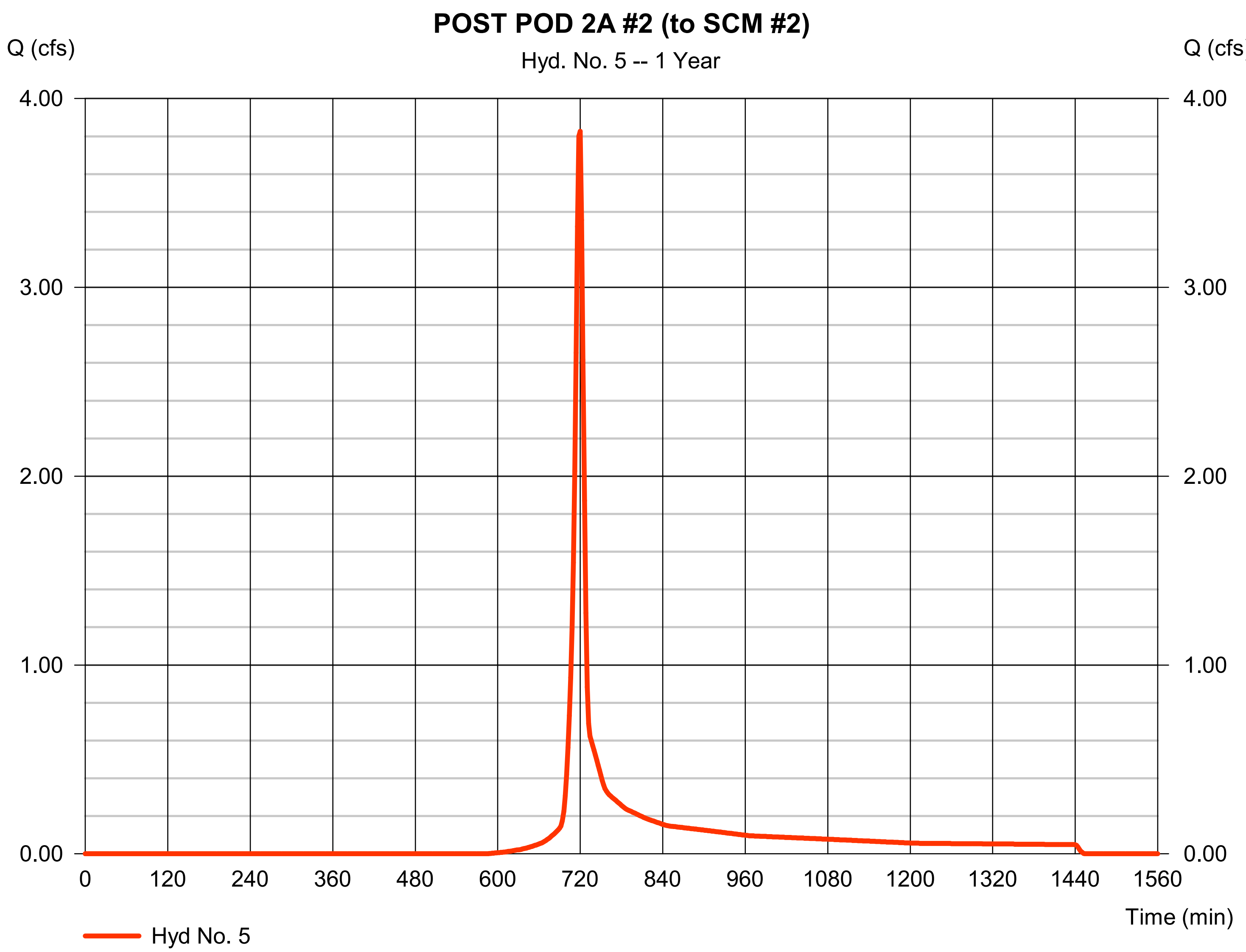
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 5

POST POD 2A #2 (to SCM #2)

Hydrograph type	= SCS Runoff	Peak discharge	= 3.826 cfs
Storm frequency	= 1 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 8,757 cuft
Drainage area	= 1.930 ac	Curve number	= 80
Basin Slope	= 0.5 %	Hydraulic length	= 450 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 6.62 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

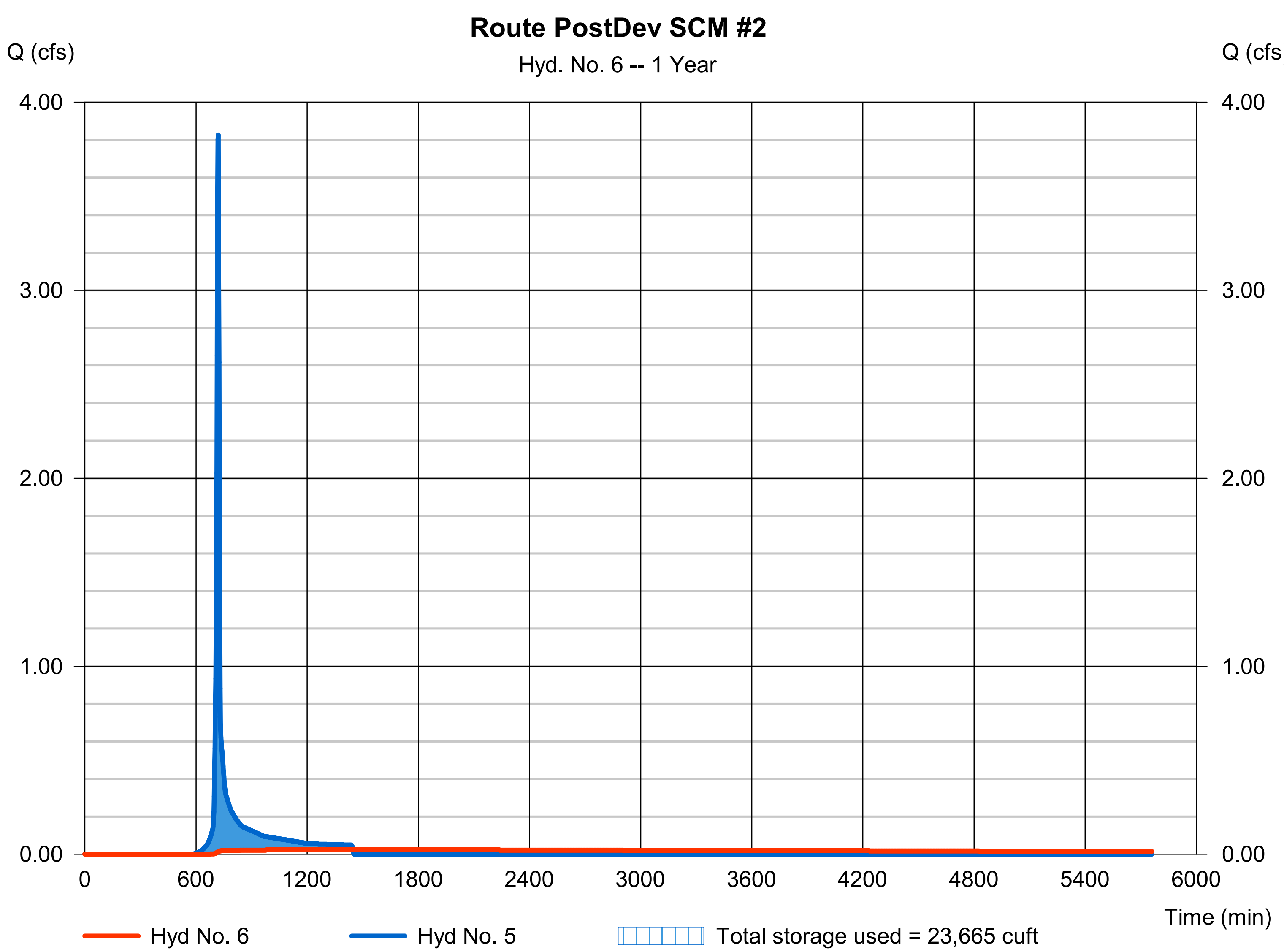
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 6

Route PostDev SCM #2

Hydrograph type	= Reservoir	Peak discharge	= 0.024 cfs
Storm frequency	= 1 yrs	Time to peak	= 1446 min
Time interval	= 2 min	Hyd. volume	= 6,047 cuft
Inflow hyd. No.	= 5 - POST POD 2A #2 (to SCM #2)	Max. Elevation	= 362.39 ft
Reservoir name	= SCM #2	Max. Storage	= 23,665 cuft

Storage Indication method used. Wet pond routing start elevation = 361.50 ft.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Pond No. 2 - SCM #2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 358.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	358.00	2,888	0	0
1.00	359.00	3,772	3,320	3,320
2.00	360.00	4,695	4,225	7,545
3.00	361.00	5,655	5,167	12,712
3.50	361.50	7,163	3,197	15,908
4.00	362.00	8,755	3,972	19,881
5.00	363.00	10,430	9,579	29,460
6.00	364.00	12,189	11,297	40,757
7.00	365.00	14,033	13,099	53,856

Culvert / Orifice Structures

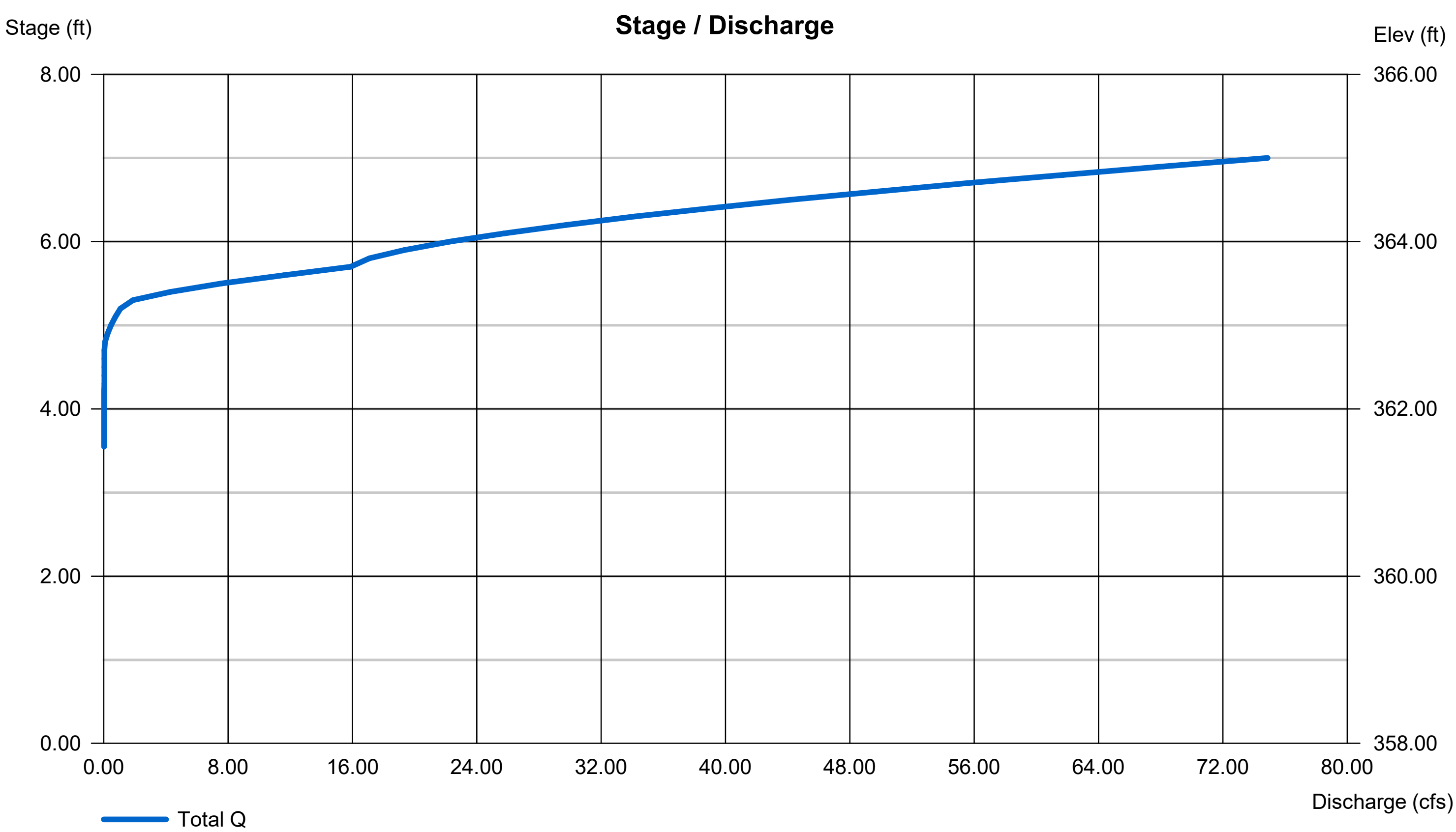
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	1.00	6.00	0.00
Span (in)	= 18.00	1.00	12.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 358.00	361.50	362.75	0.00
Length (ft)	= 100.00	0.50	0.50	0.00
Slope (%)	= 0.50	0.50	0.50	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 14.00	12.00	0.00	0.00
Crest El. (ft)	= 363.25	363.75	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

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



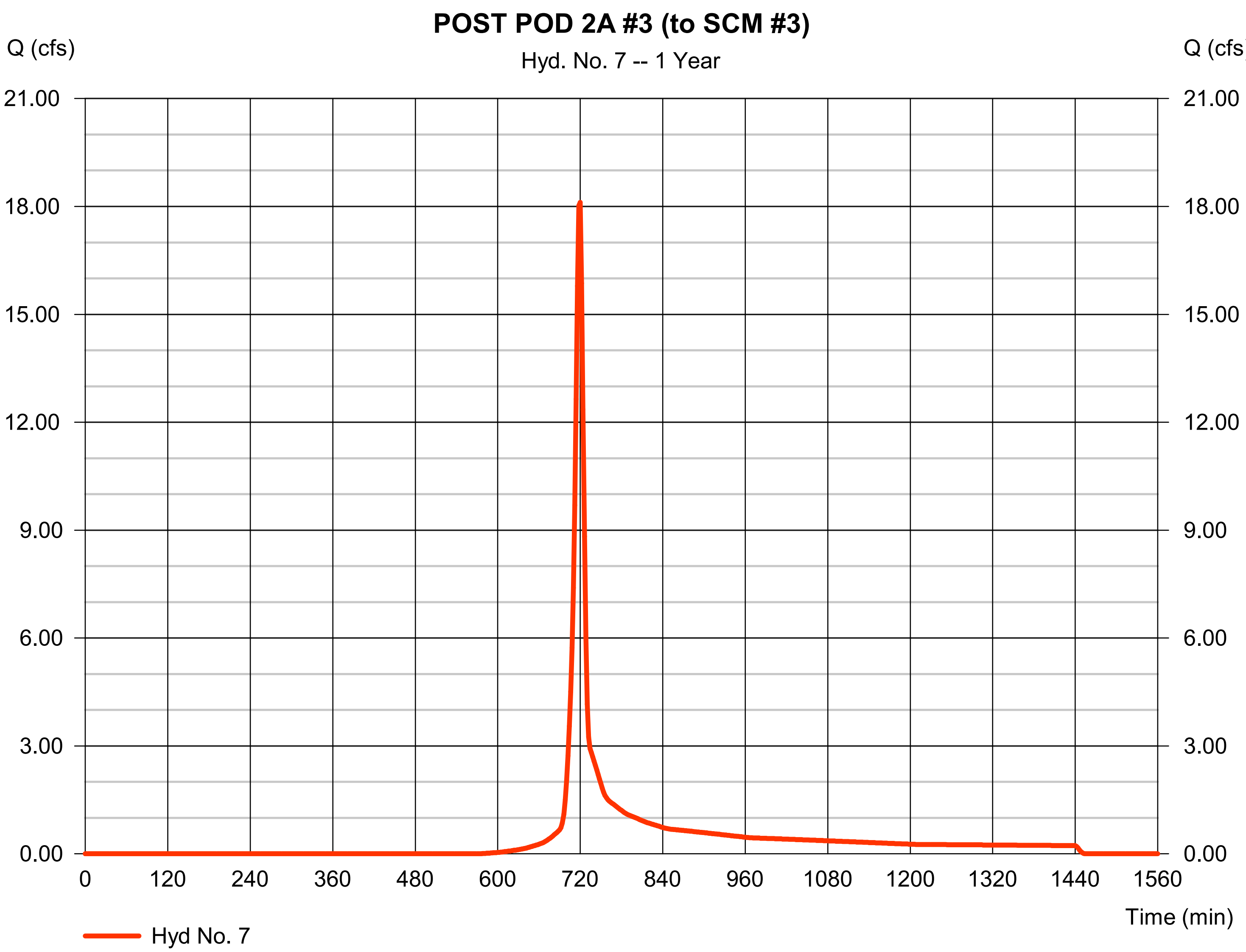
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 7

POST POD 2A #3 (to SCM #3)

Hydrograph type	= SCS Runoff	Peak discharge	= 18.11 cfs
Storm frequency	= 1 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 41,448 cuft
Drainage area	= 8.910 ac	Curve number	= 80.5
Basin Slope	= 2.6 %	Hydraulic length	= 1120 ft
Tc method	= User	Time of conc. (Tc)	= 7.30 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

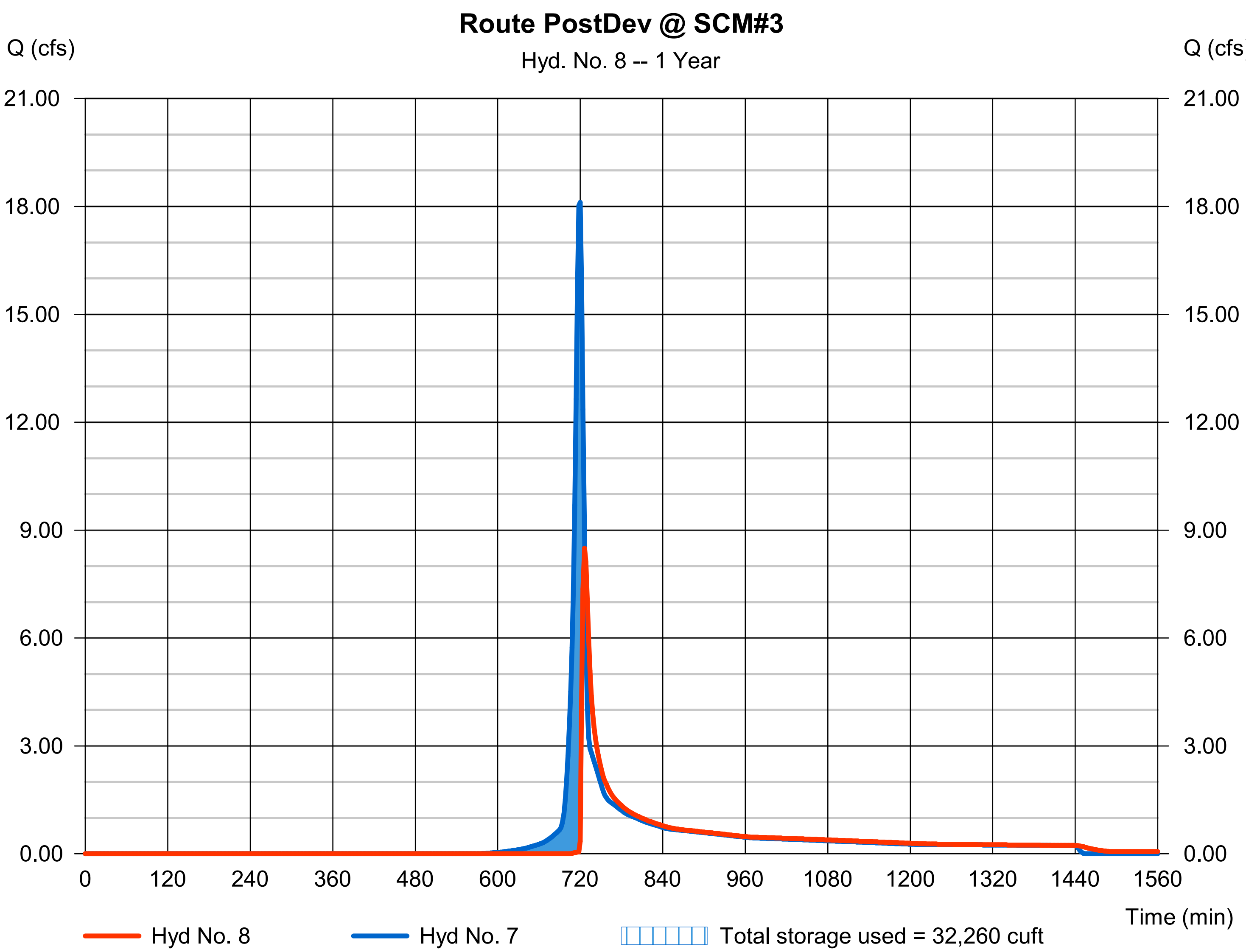
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 8

Route PostDev @ SCM#3

Hydrograph type	= Reservoir	Peak discharge	= 8.500 cfs
Storm frequency	= 1 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 38,063 cuft
Inflow hyd. No.	= 7 - POST POD 2A #3 (to SCM #3)	Max. Elevation	= 363.13 ft
Reservoir name	= SCM #3	Max. Storage	= 32,260 cuft

Storage Indication method used. Wet pond routing start elevation = 361.00 ft.



Pond Report

1-Year

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Pond No. 3 - SCM #3

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 357.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	357.00	2,465	0	0
1.00	358.00	3,606	3,036	3,036
2.00	359.00	4,169	3,888	6,923
3.00	360.00	4,767	4,468	11,391
4.00	361.00	5,401	5,084	16,475
4.50	361.50	6,424	2,956	19,431
5.00	362.00	7,528	3,488	22,919
6.00	363.00	8,717	8,123	31,042
7.00	364.00	9,993	9,355	40,397
8.00	365.00	11,354	10,674	51,070

Culvert / Orifice Structures

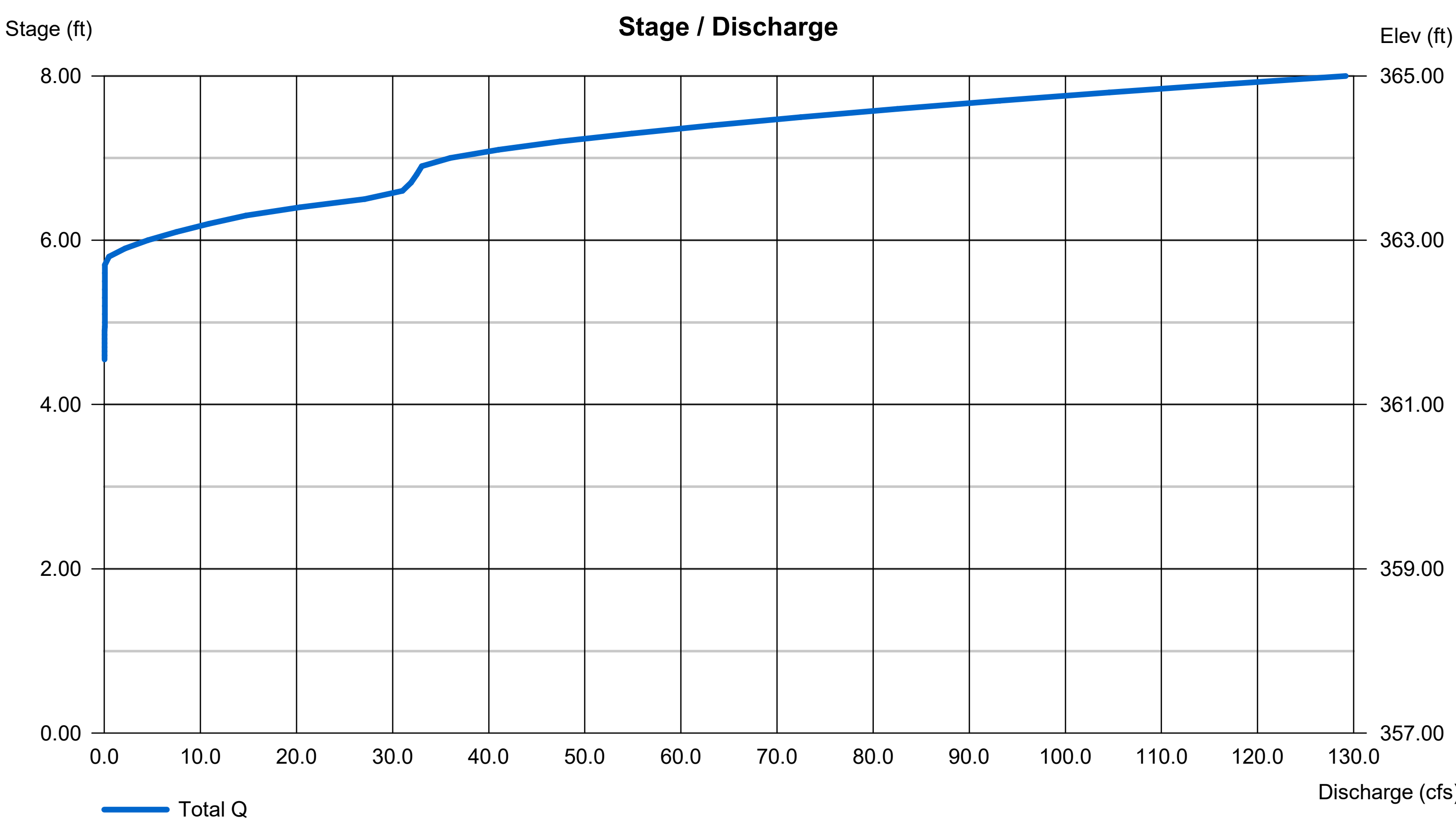
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	1.50	6.00	0.00
Span (in)	= 24.00	1.50	42.00	0.00
No. Barrels	= 1	1	3	0
Invert El. (ft)	= 358.00	361.50	362.75	0.00
Length (ft)	= 0.00	0.00	0.50	0.00
Slope (%)	= 0.00	0.00	0.50	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 22.00	24.00	0.00	0.00
Crest El. (ft)	= 363.25	363.90	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

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



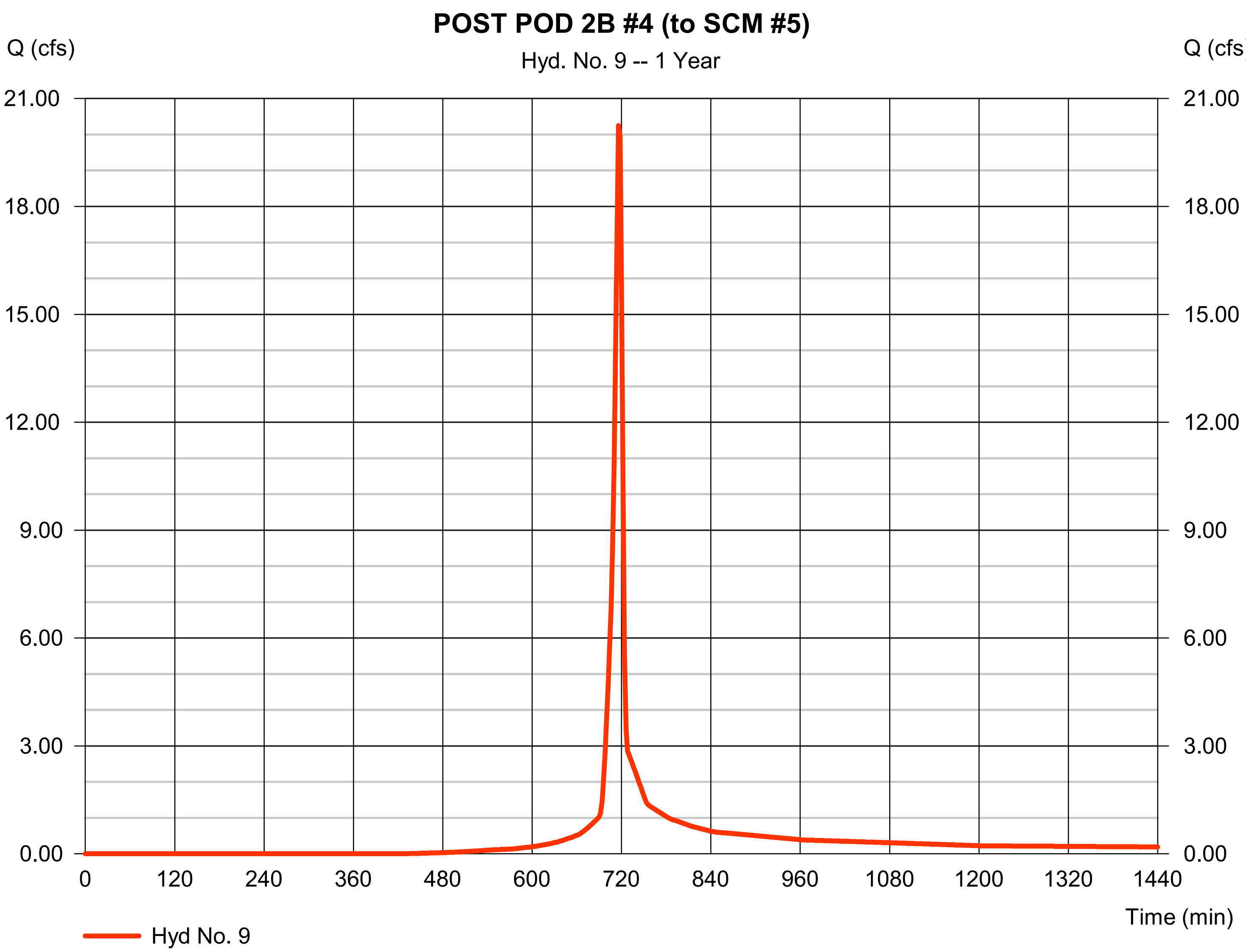
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 — Tuesday, 01 / 28 / 2025

Hyd. No. 9

POST POD 2B #4 (to SCM #5)

Hydrograph type	= SCS Runoff	Peak discharge	= 20.25 cfs
Storm frequency	= 1 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 41,192 cuft
Drainage area	= 6.960 ac	Curve number	= 87
Basin Slope	= 3.2 %	Hydraulic length	= 1270 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

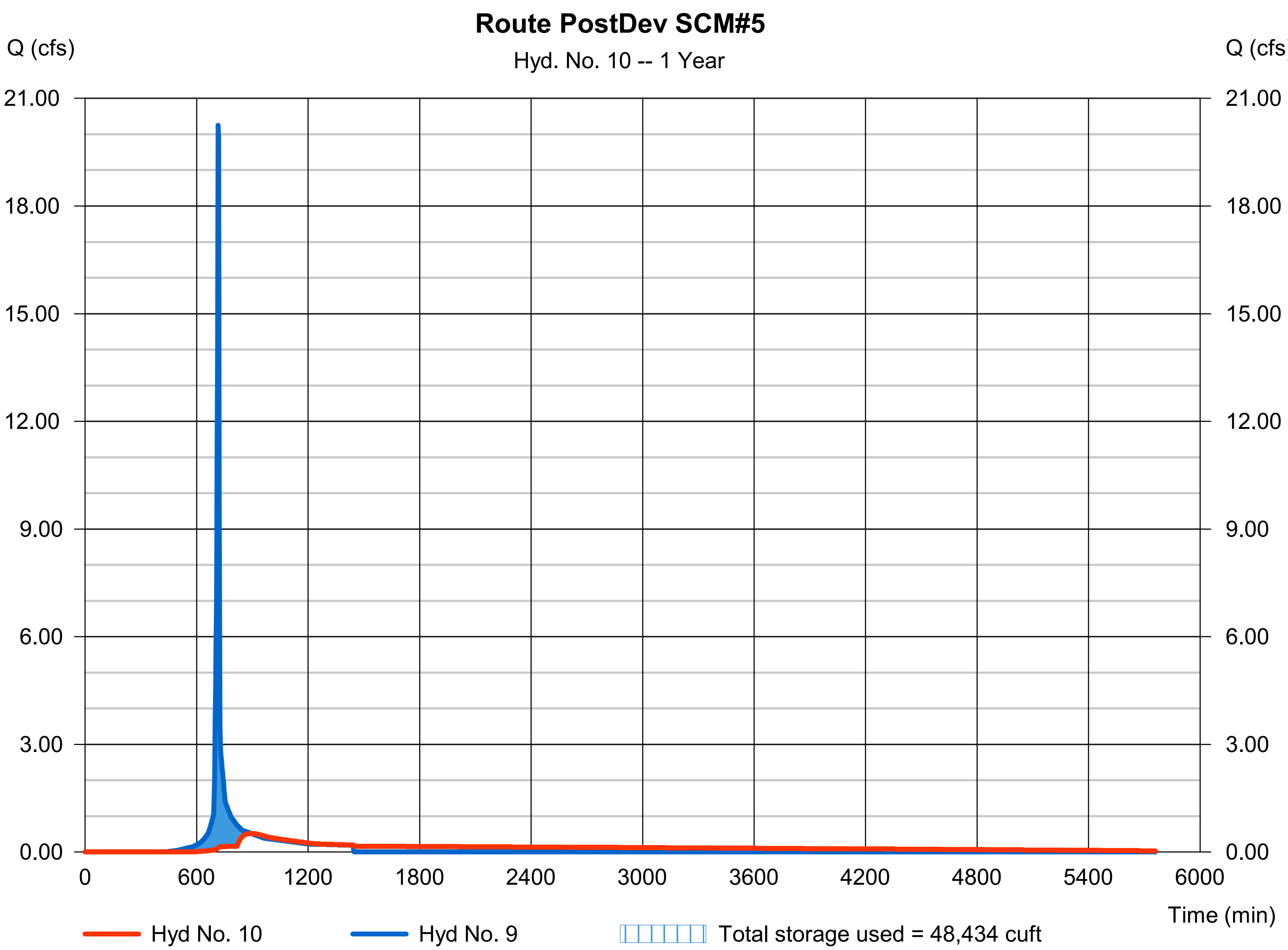
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 10

Route PostDev SCM#5

Hydrograph type	= Reservoir	Peak discharge	= 0.518 cfs
Storm frequency	= 1 yrs	Time to peak	= 894 min
Time interval	= 2 min	Hyd. volume	= 39,576 cuft
Inflow hyd. No.	= 9 - POST POD 2B #4 (to SCM #5)	Max. Elevation	= 350.05 ft
Reservoir name	= SCM #5	Max. Storage	= 48,434 cuft

Storage Indication method used. Wet pond routing start elevation = 347.50 ft.



Pond No. 4 - SCM #5

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 344.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	344.00	3,945	0	0
1.00	345.00	4,823	4,384	4,384
2.00	346.00	5,755	5,289	9,673
3.00	347.00	6,738	6,247	15,920
3.50	347.50	8,303	3,760	19,680
4.00	348.00	9,952	4,564	24,244
5.00	349.00	11,681	10,817	35,060
6.00	350.00	13,490	12,586	47,646
7.00	351.00	15,379	14,435	62,080
8.00	352.00	17,348	16,364	78,444

Culvert / Orifice Structures

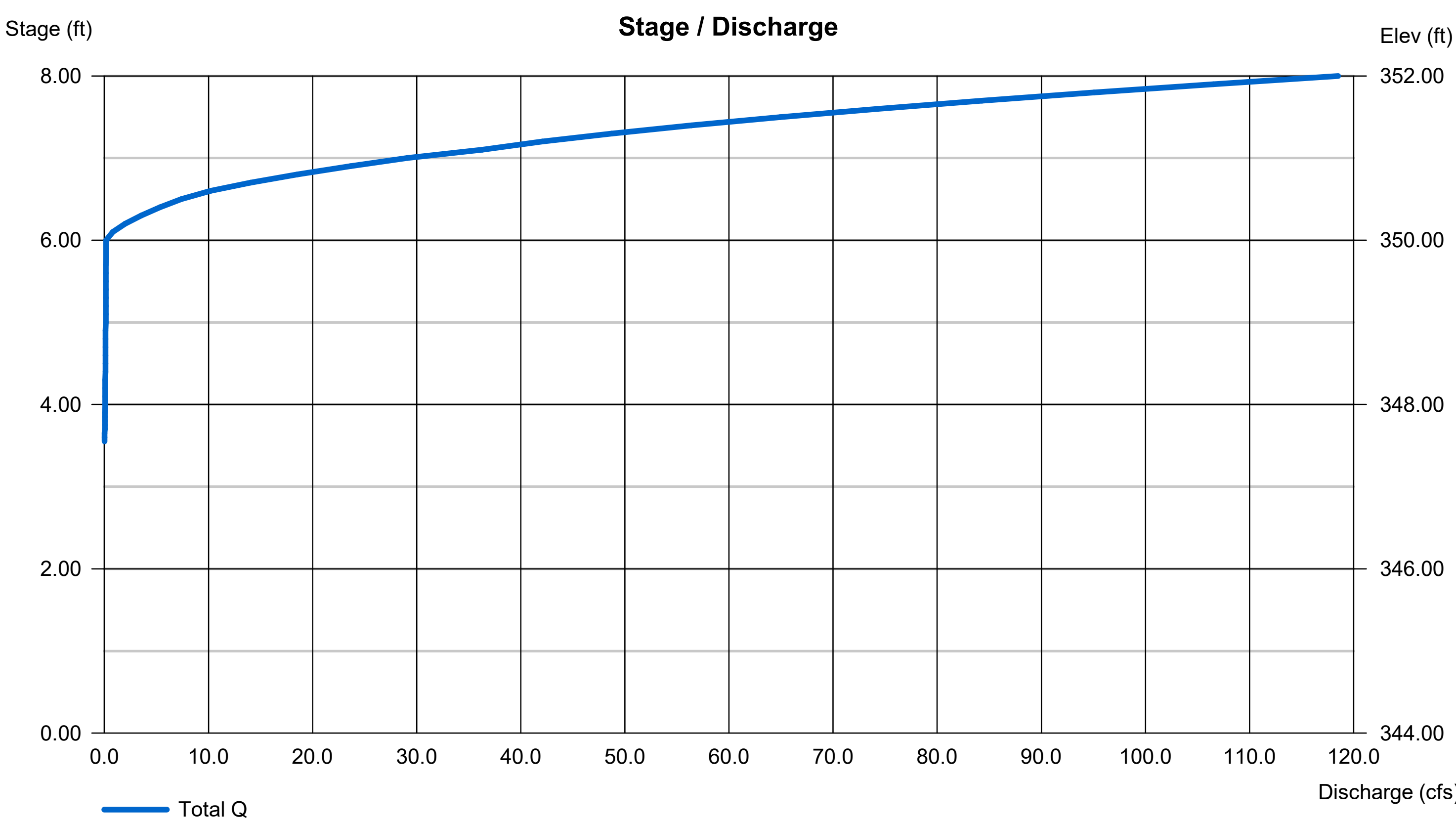
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	2.00	6.00	0.00
Span (in)	= 24.00	2.00	24.00	0.00
No. Barrels	= 1	1	3	0
Invert El. (ft)	= 344.00	347.50	350.00	0.00
Length (ft)	= 100.00	0.50	0.50	0.00
Slope (%)	= 0.50	0.50	0.50	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 14.00	24.00	0.00	0.00
Crest El. (ft)	= 350.50	351.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

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



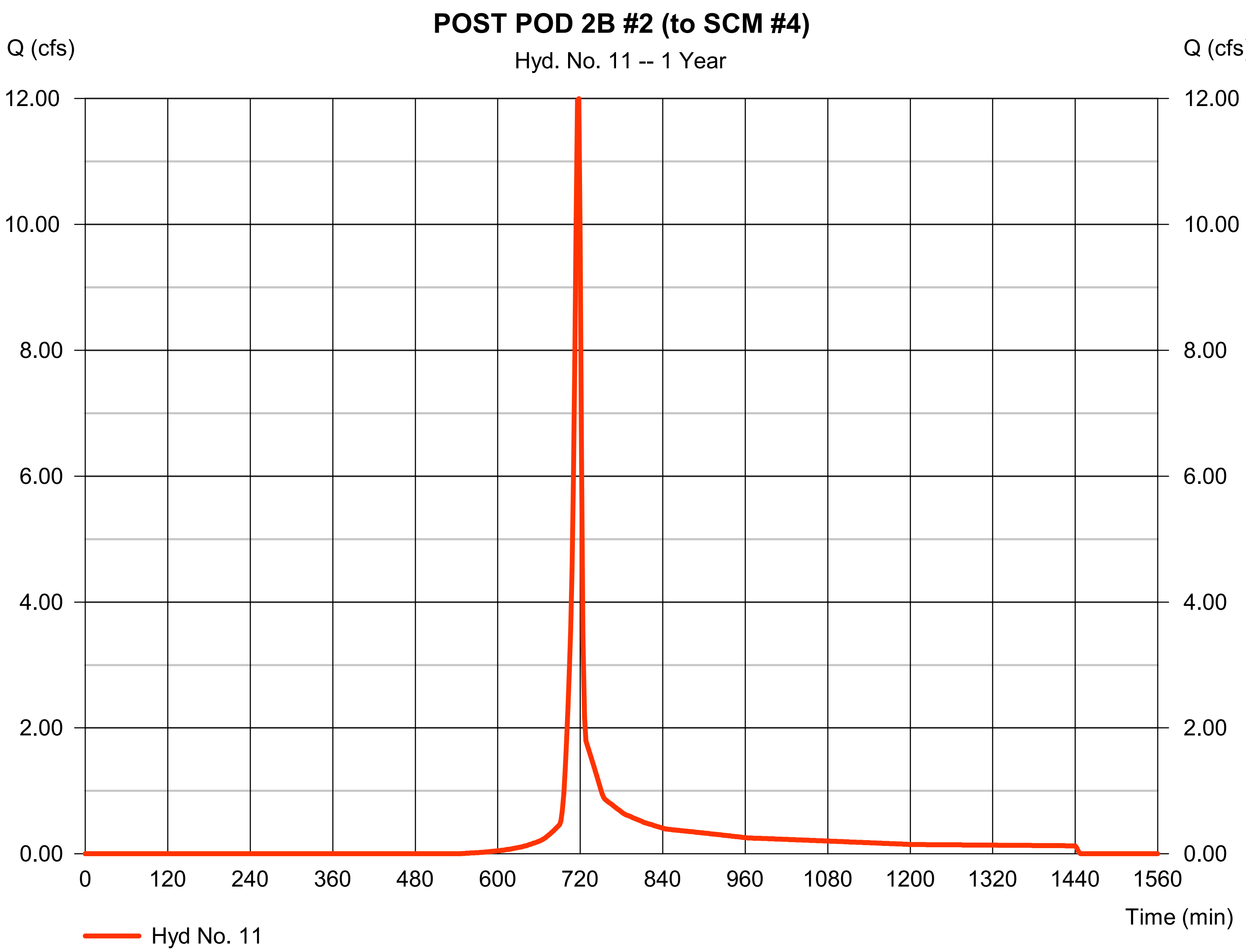
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 11

POST POD 2B #2 (to SCM #4)

Hydrograph type	= SCS Runoff	Peak discharge	= 12.00 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 24,168 cuft
Drainage area	= 5.150 ac	Curve number	= 82
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

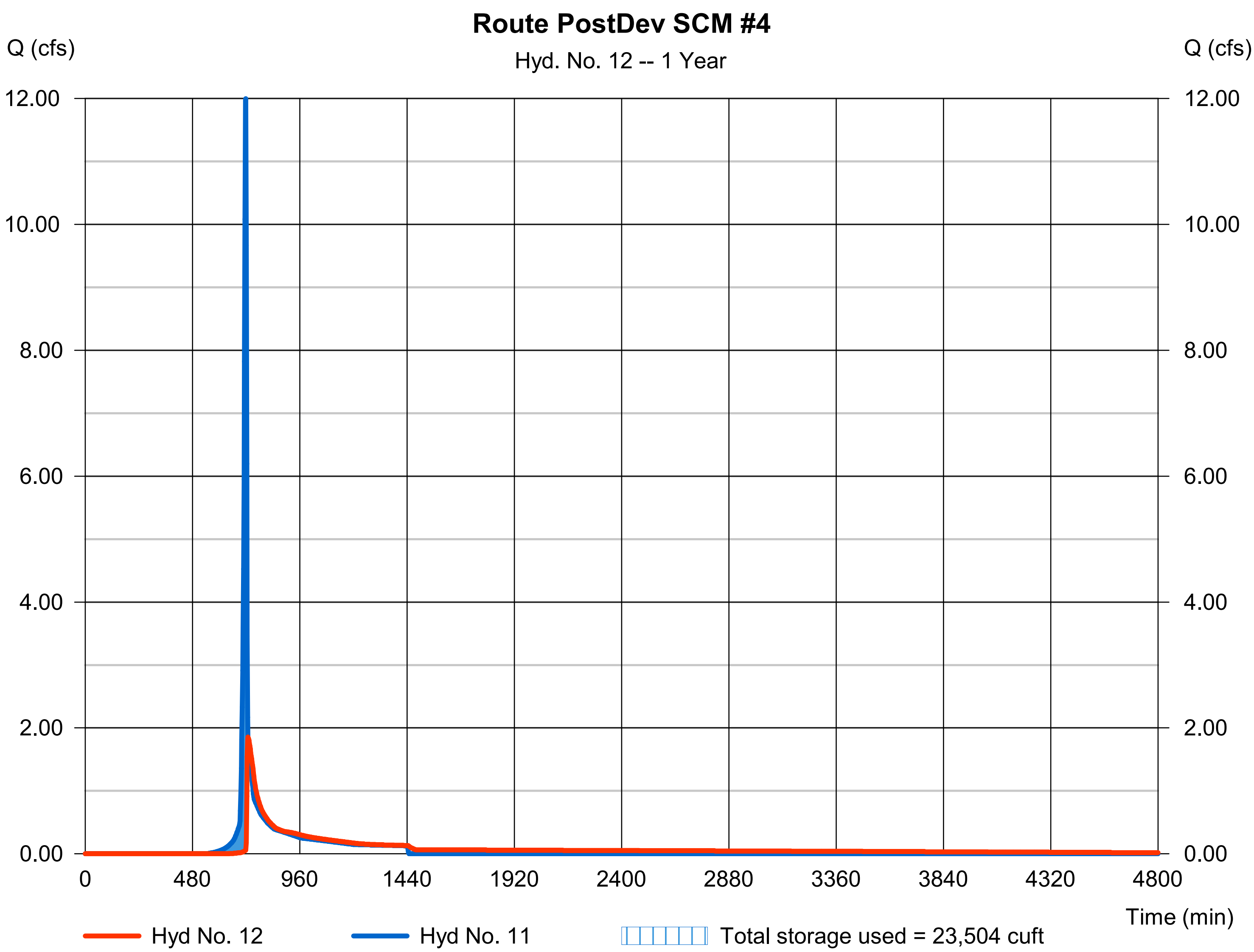
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 12

Route PostDev SCM #4

Hydrograph type	= Reservoir	Peak discharge	= 1.855 cfs
Storm frequency	= 1 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 23,766 cuft
Inflow hyd. No.	= 11 - POST POD 2B #2 (to SCM #4)	Max. Elevation	= 358.92 ft
Reservoir name	= SCM #4	Max. Storage	= 23,504 cuft

Storage Indication method used. Wet pond routing start elevation = 357.50 ft.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Pond No. 5 - SCM #4

Pond Data

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

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	354.00	1,995	0	0
1.00	355.00	2,838	2,417	2,417
2.00	356.00	3,711	3,275	5,691
3.00	357.00	4,615	4,163	9,854
3.50	357.50	6,029	2,661	12,515
4.00	358.00	7,511	3,385	15,900
5.00	359.00	9,061	8,286	24,186
6.00	360.00	10,681	9,871	34,057
7.00	361.00	12,369	11,525	45,582

Culvert / Orifice Structures

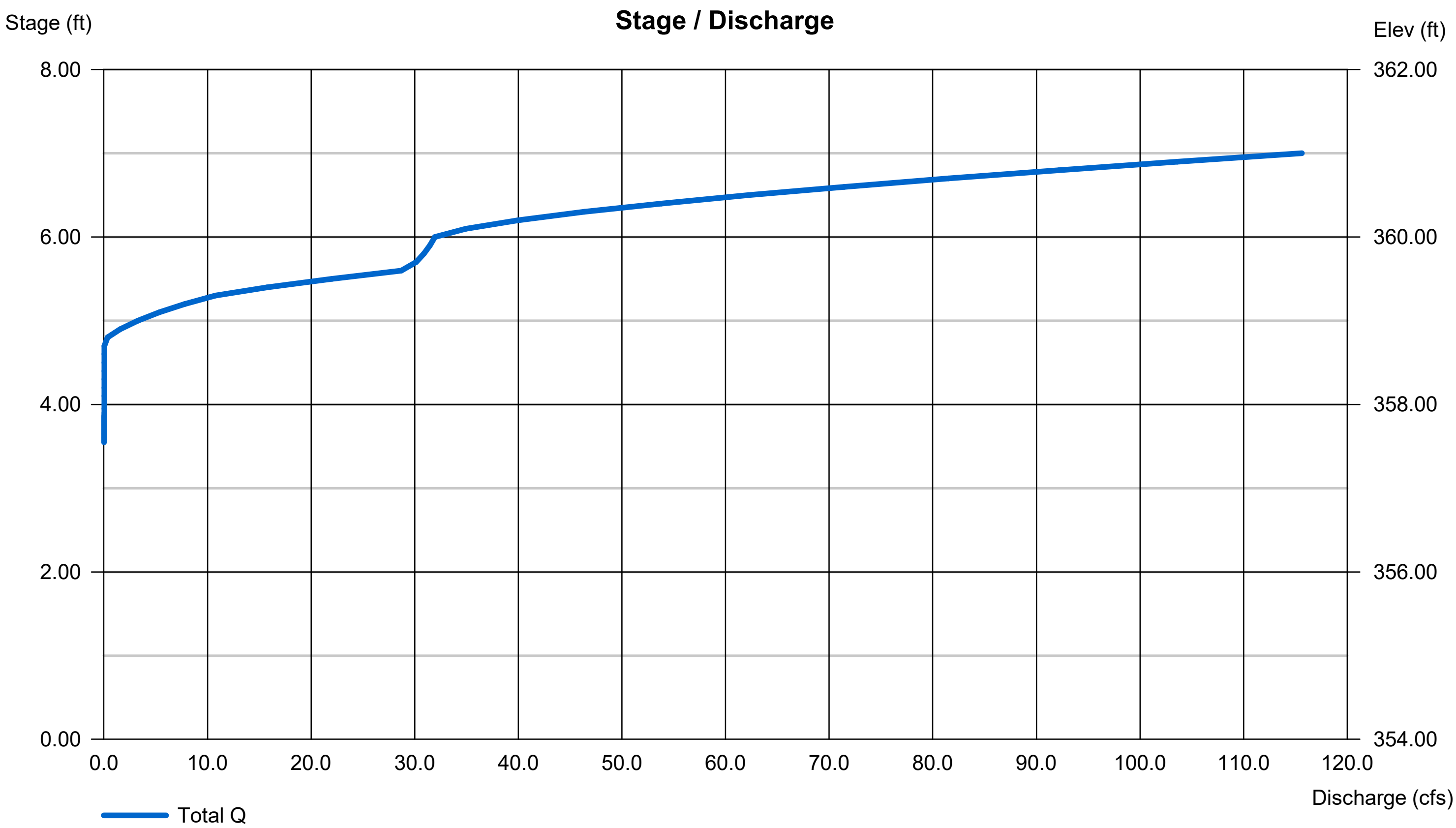
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	1.50	6.00	0.00
Span (in)	= 24.00	1.50	30.00	0.00
No. Barrels	= 1	1	3	0
Invert El. (ft)	= 354.00	357.50	358.75	0.00
Length (ft)	= 100.00	0.00	0.50	0.00
Slope (%)	= 0.50	0.00	0.50	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 22.00	24.00	0.00	0.00
Crest El. (ft)	= 359.25	360.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	Rect	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

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

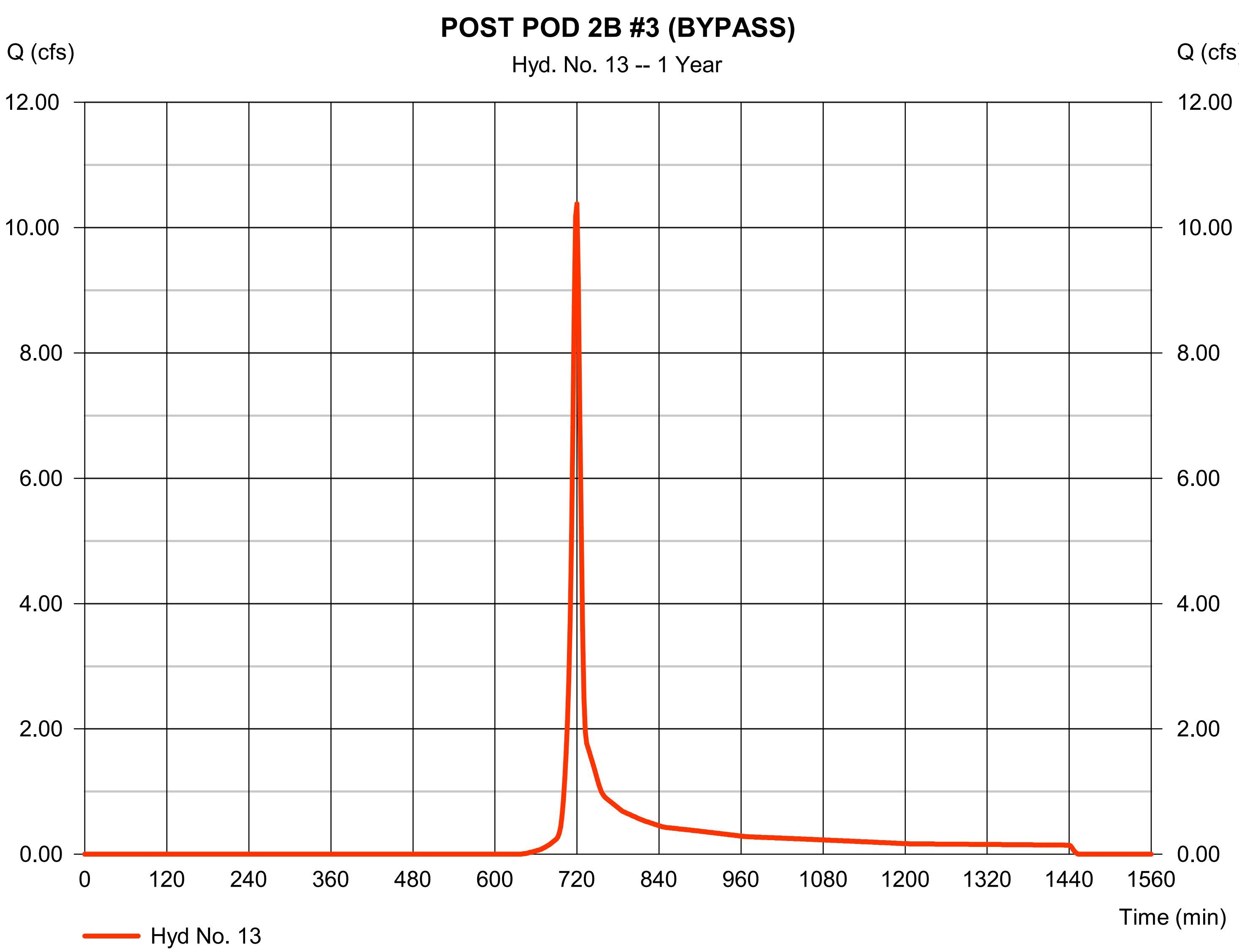


Hydrograph Report

Hyd. No. 13

POST POD 2B #3 (BYPASS)

Hydrograph type	= SCS Runoff	Peak discharge	= 10.38 cfs
Storm frequency	= 1 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 23,909 cuft
Drainage area	= 6.350 ac	Curve number	= 76.4
Basin Slope	= 1.3 %	Hydraulic length	= 4170 ft
Tc method	= User	Time of conc. (Tc)	= 7.00 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

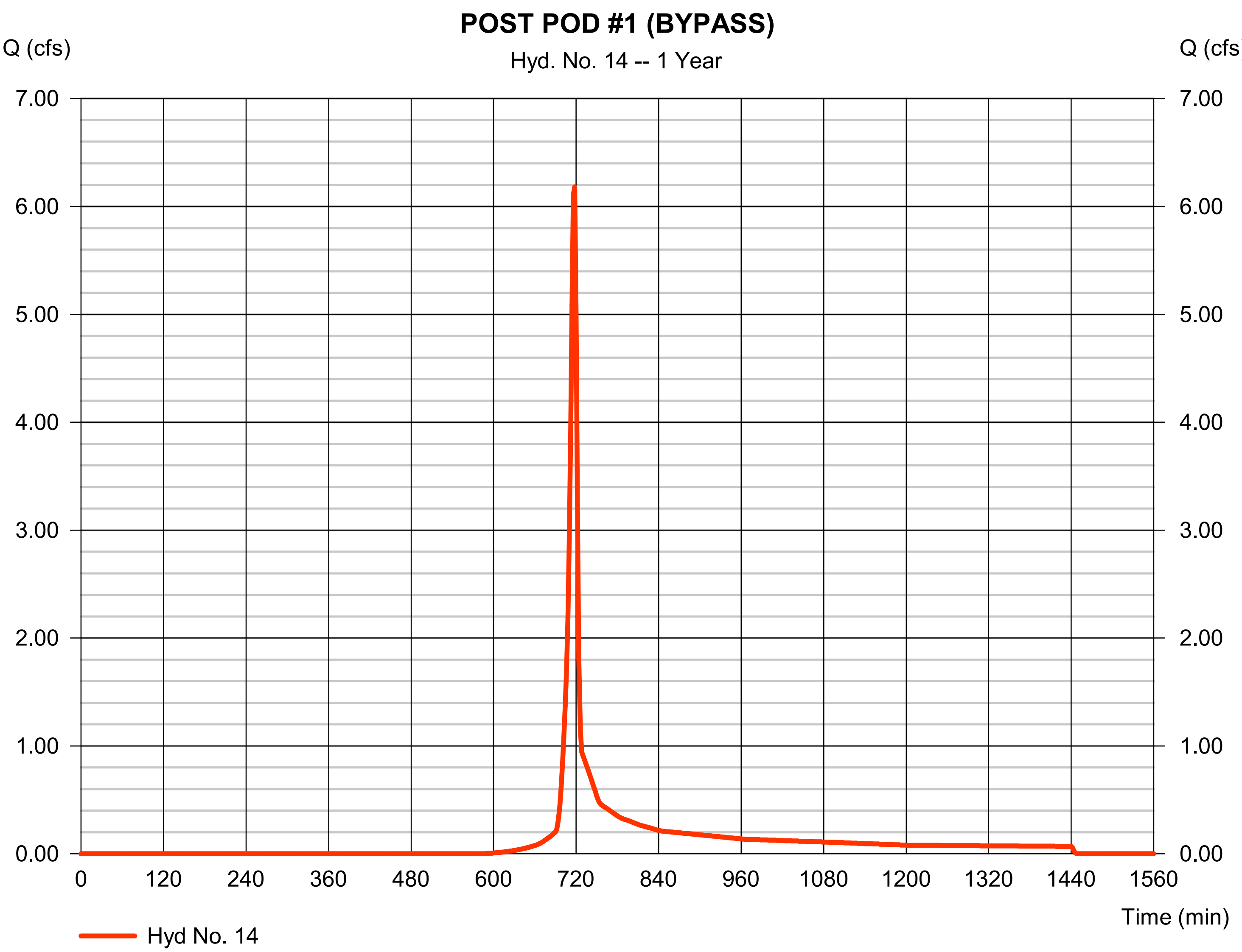


Hydrograph Report

Hyd. No. 14

POST POD #1 (BYPASS)

Hydrograph type	= SCS Runoff	Peak discharge	= 6.180 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 12,382 cuft
Drainage area	= 2.940 ac	Curve number	= 79.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

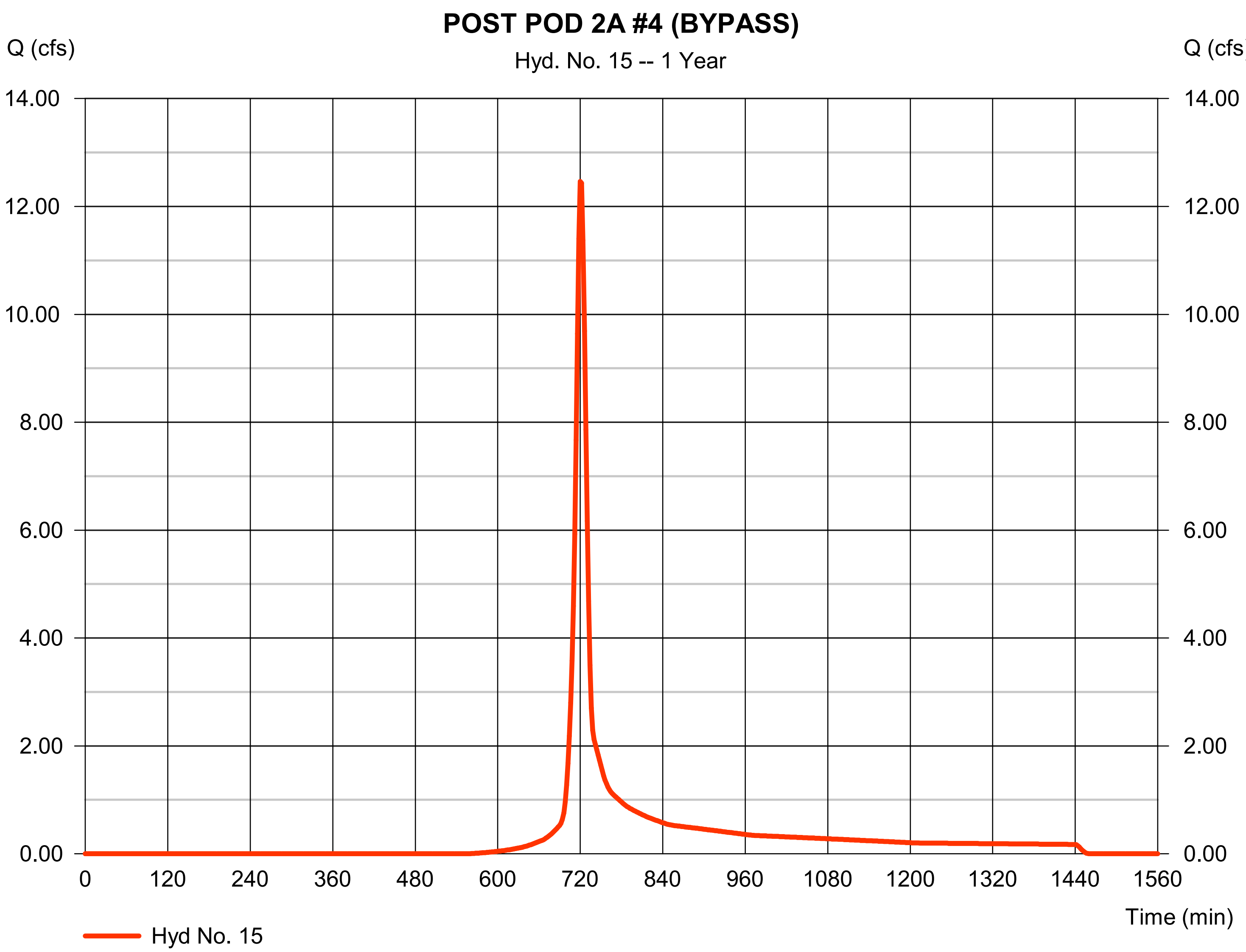


Hydrograph Report

Hyd. No. 15

POST POD 2A #4 (BYPASS)

Hydrograph type	= SCS Runoff	Peak discharge	= 12.46 cfs
Storm frequency	= 1 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 32,499 cuft
Drainage area	= 6.450 ac	Curve number	= 81.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.50 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



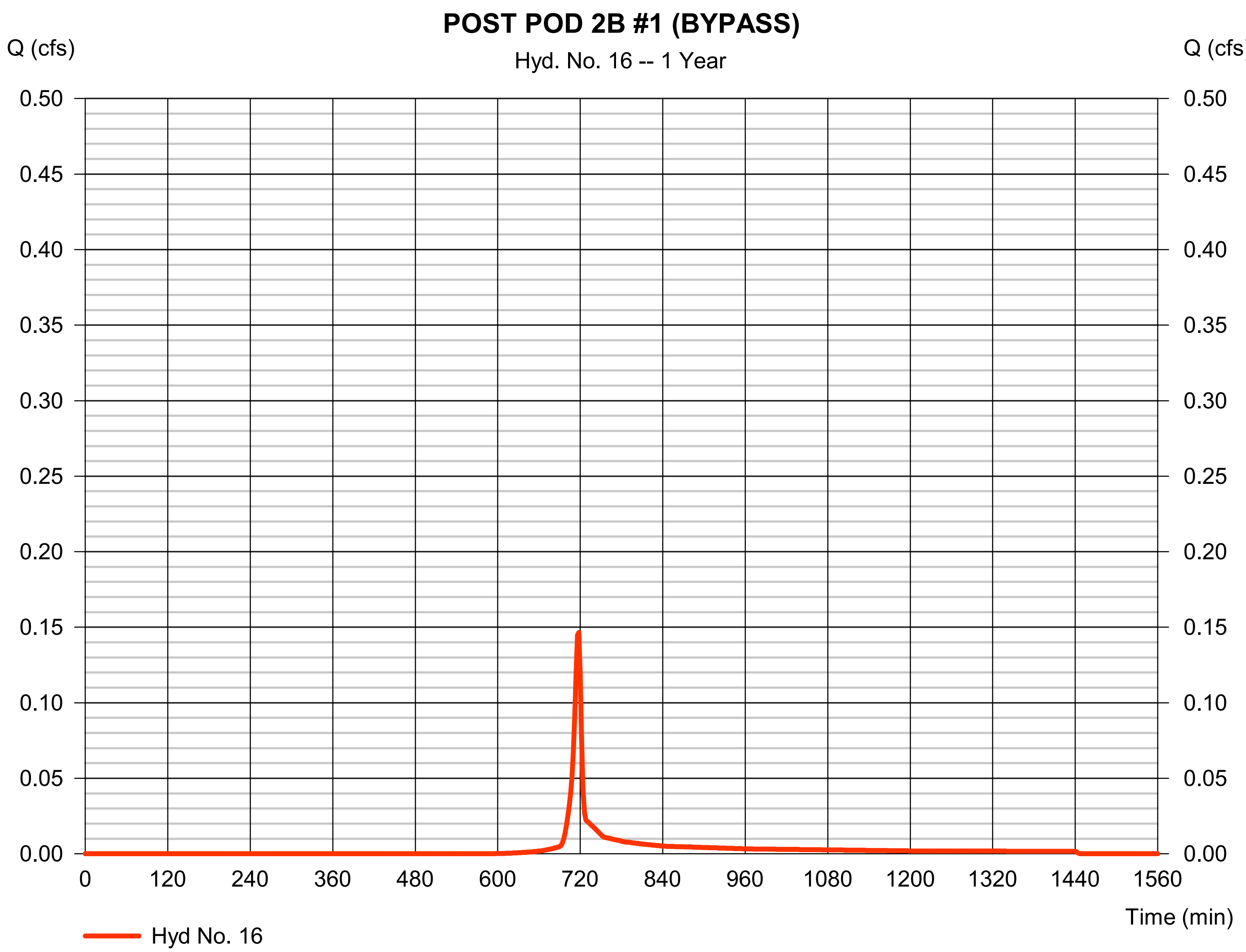
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 16

POST POD 2B #1 (BYPASS)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.146 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 293 cuft
Drainage area	= 0.070 ac	Curve number	= 79.7
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



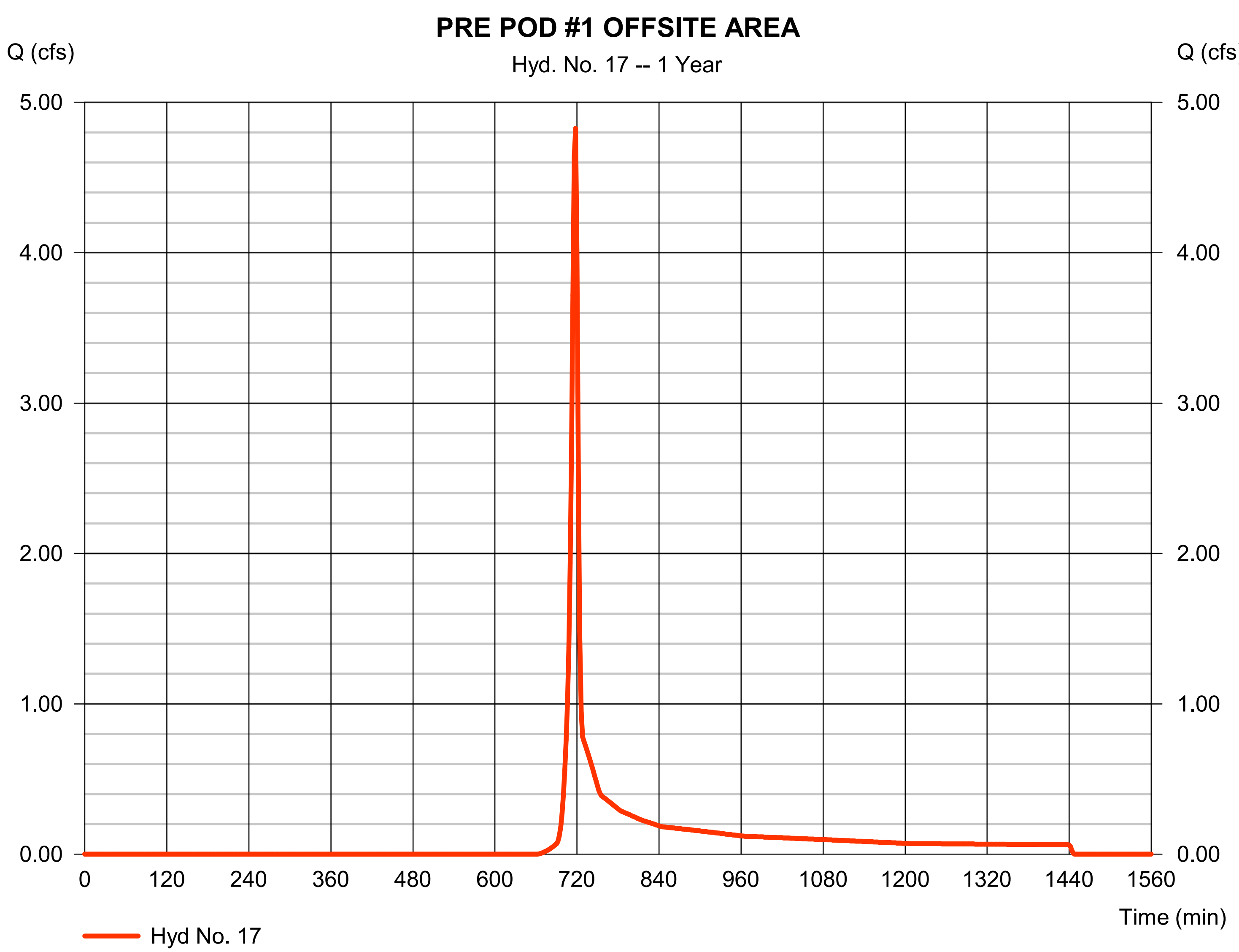
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 17

PRE POD #1 OFFSITE AREA

Hydrograph type	= SCS Runoff	Peak discharge	= 4.826 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 9,705 cuft
Drainage area	= 3.140 ac	Curve number	= 74
Basin Slope	= 4.5 %	Hydraulic length	= 1030 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 5.38 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



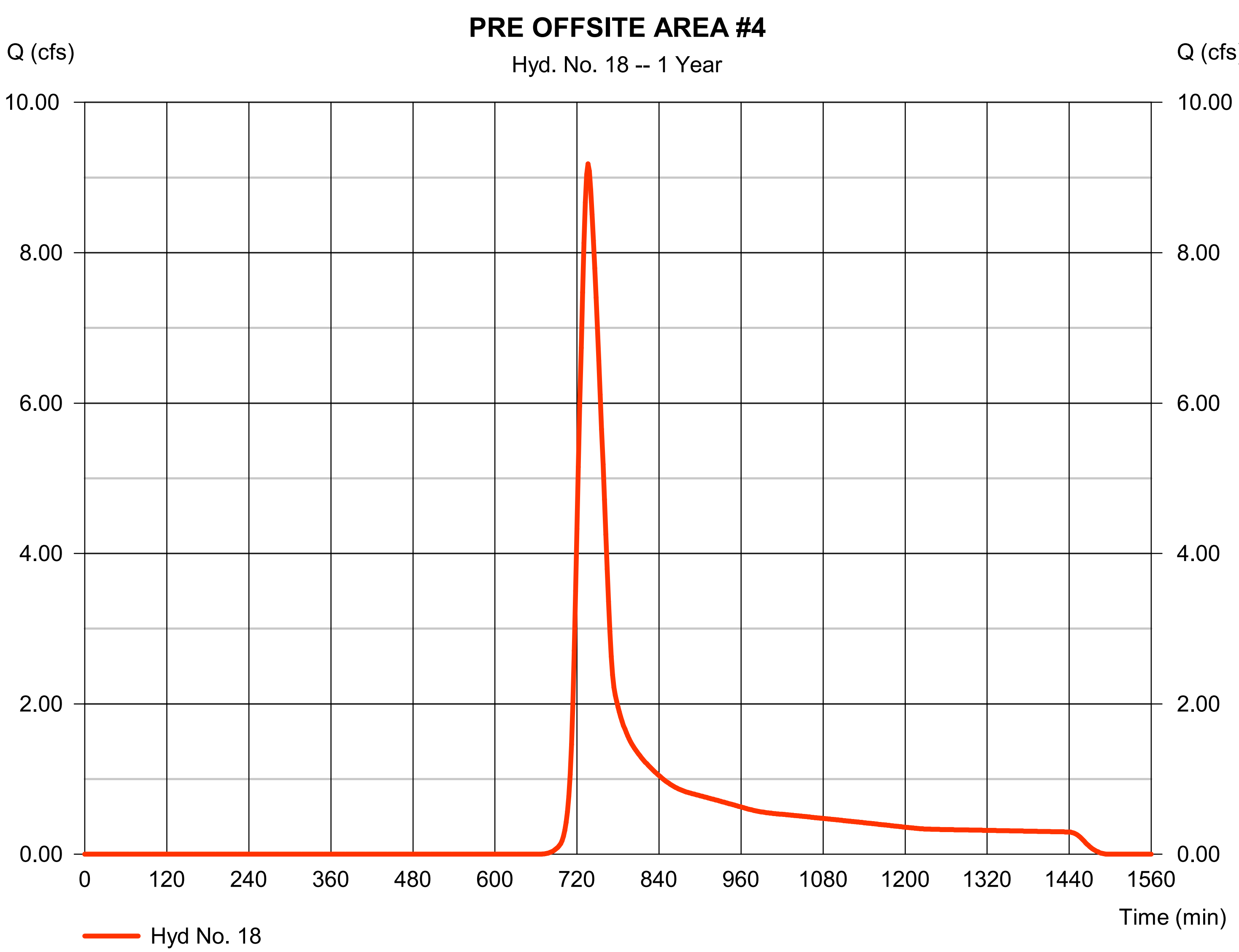
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 — Tuesday, 01 / 28 / 2025

Hyd. No. 18

PRE OFFSITE AREA #4

Hydrograph type	= SCS Runoff	Peak discharge	= 9.181 cfs
Storm frequency	= 1 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 45,436 cuft
Drainage area	= 13.940 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 34.70 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

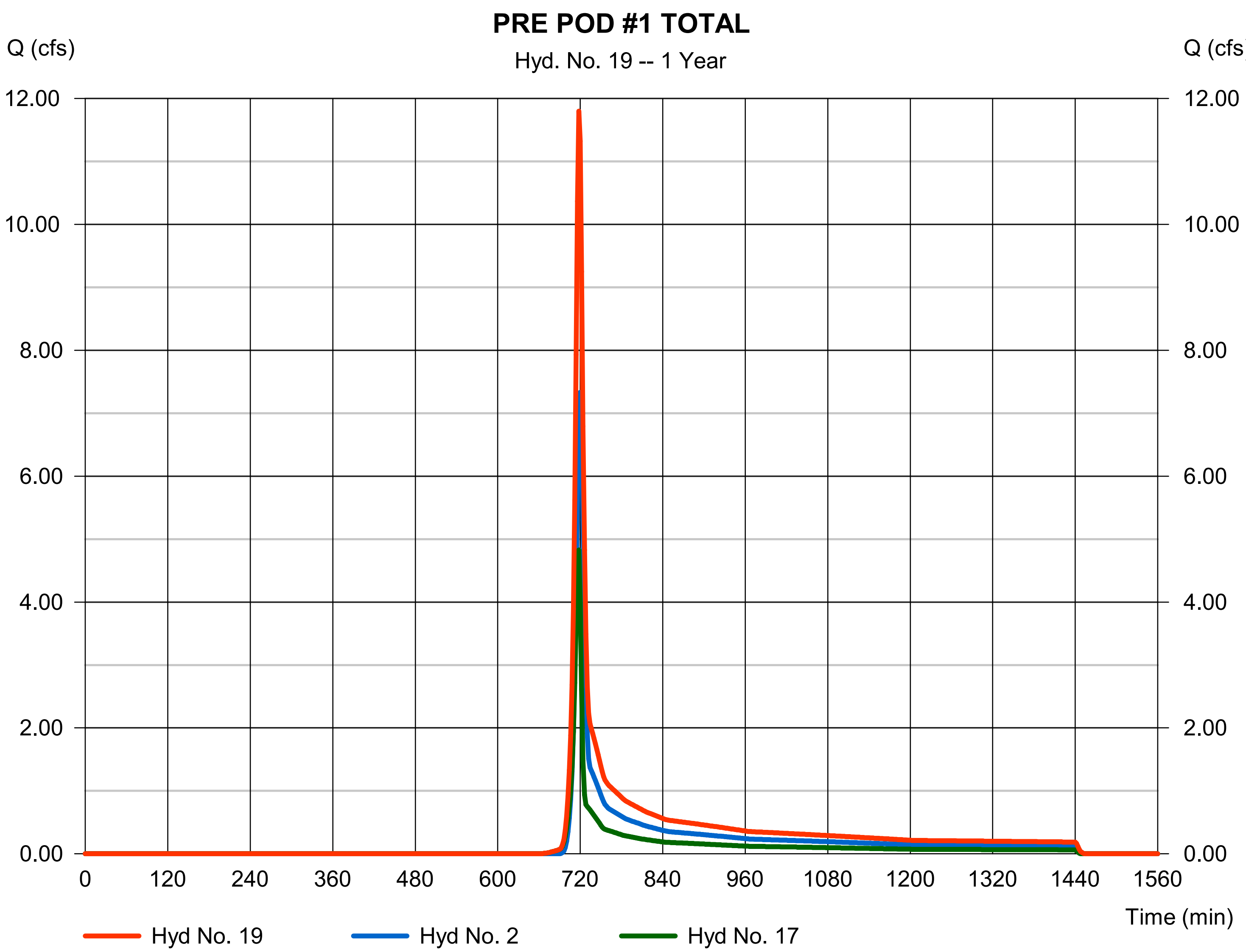


Hydrograph Report

Hyd. No. 19

PRE POD #1 TOTAL

Hydrograph type	= Combine	Peak discharge	= 11.80 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 27,315 cuft
Inflow hyds.	= 2, 17	Contrib. drain. area	= 9.680 ac



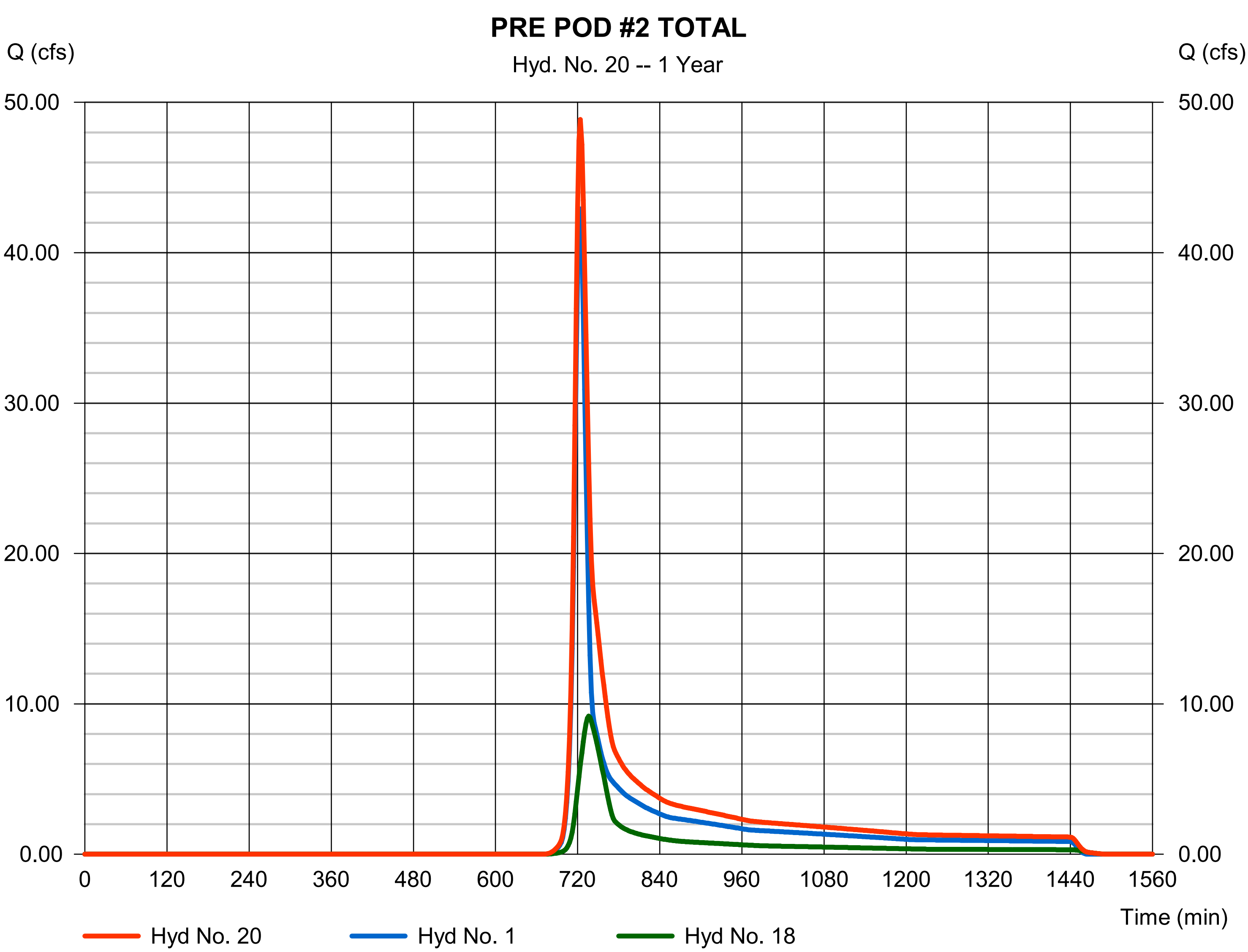
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 20

PRE POD #2 TOTAL

Hydrograph type	= Combine	Peak discharge	= 48.86 cfs
Storm frequency	= 1 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 173,564 cuft
Inflow hyds.	= 1, 18	Contrib. drain. area	= 55.920 ac

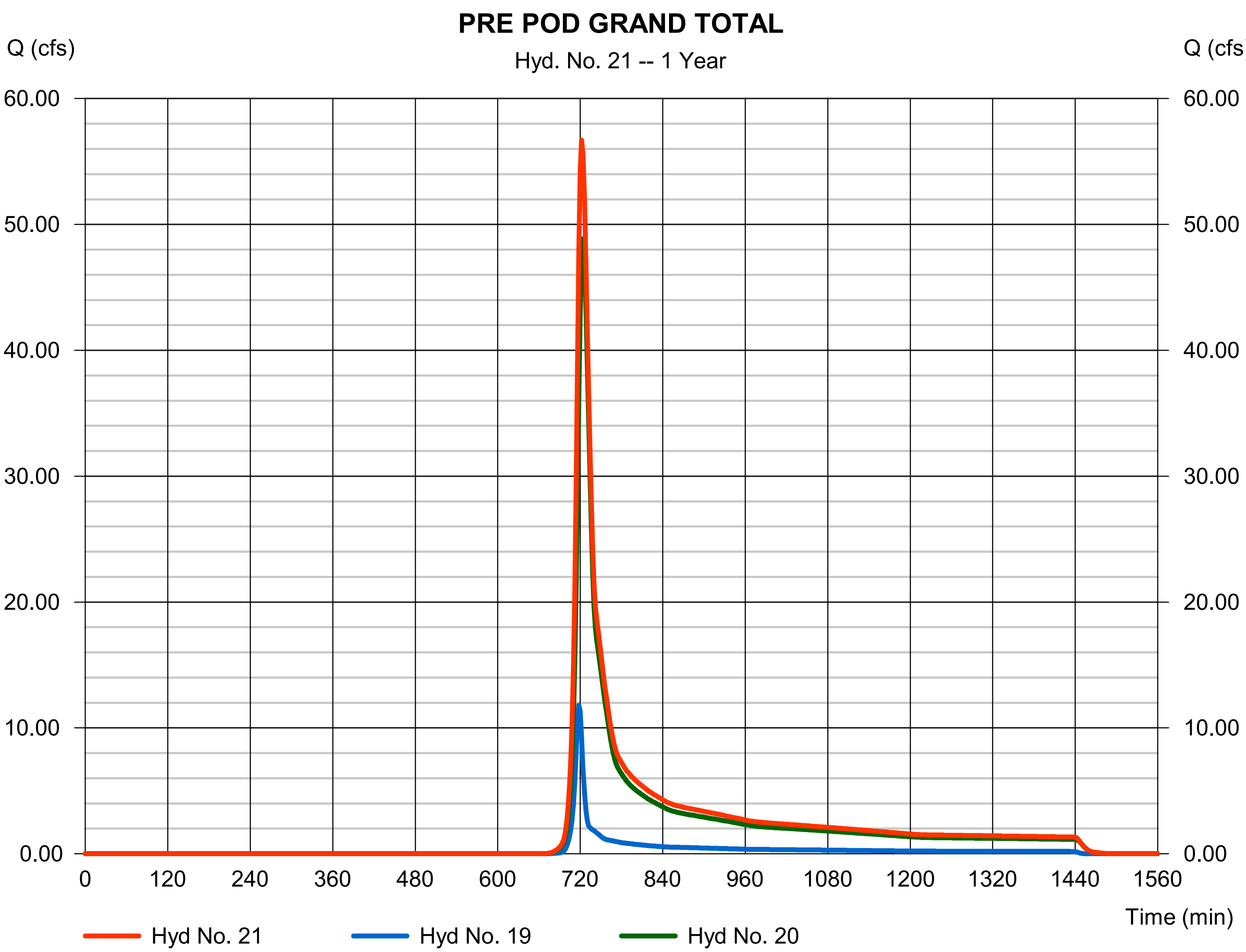


Hydrograph Report

Hyd. No. 21

PRE POD GRAND TOTAL

Hydrograph type	= Combine	Peak discharge	= 56.68 cfs
Storm frequency	= 1 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 200,879 cuft
Inflow hyds.	= 19, 20	Contrib. drain. area	= 0.000 ac



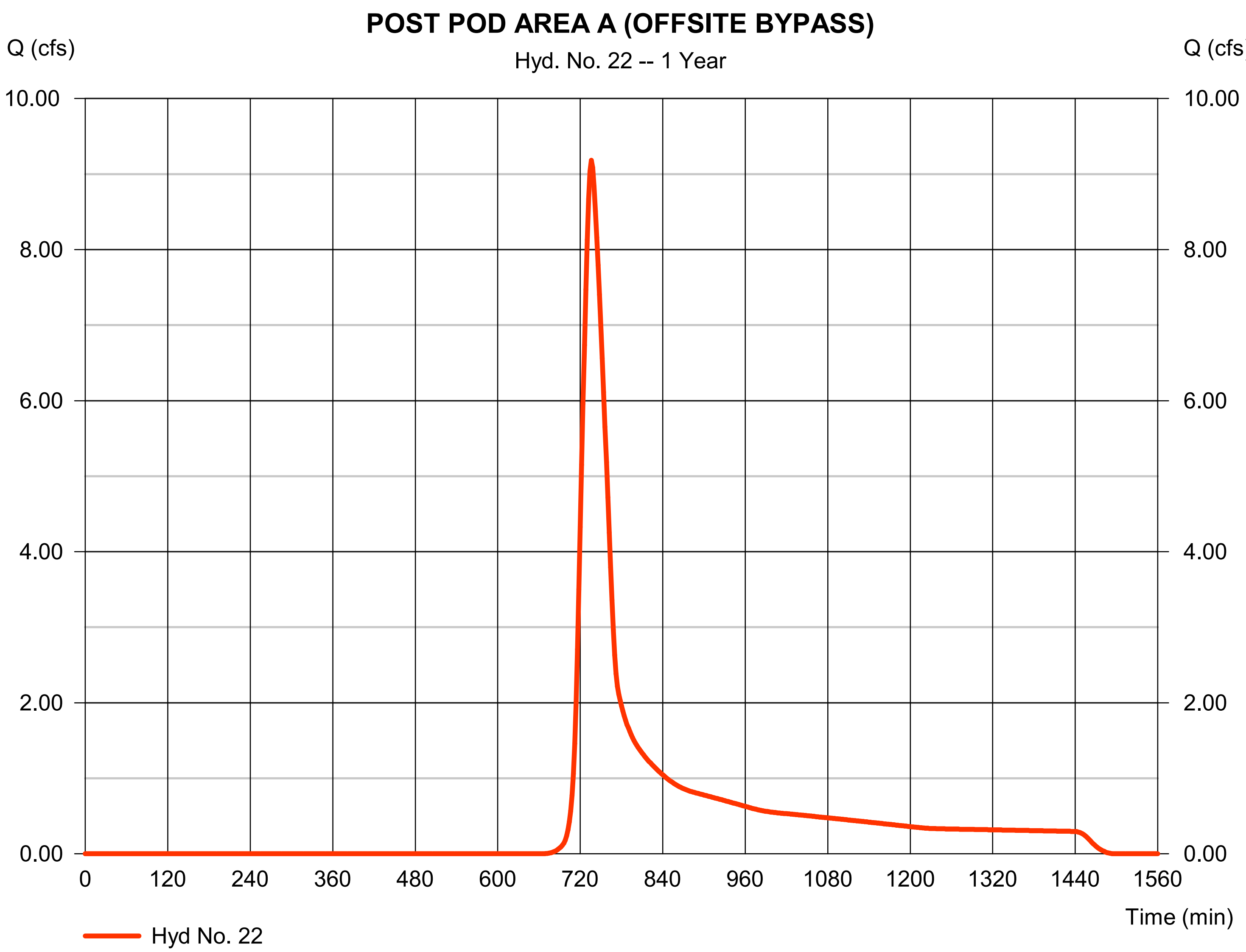
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 22

POST POD AREA A (OFFSITE BYPASS)

Hydrograph type	= SCS Runoff	Peak discharge	= 9.181 cfs
Storm frequency	= 1 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 45,436 cuft
Drainage area	= 13.940 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 34.70 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



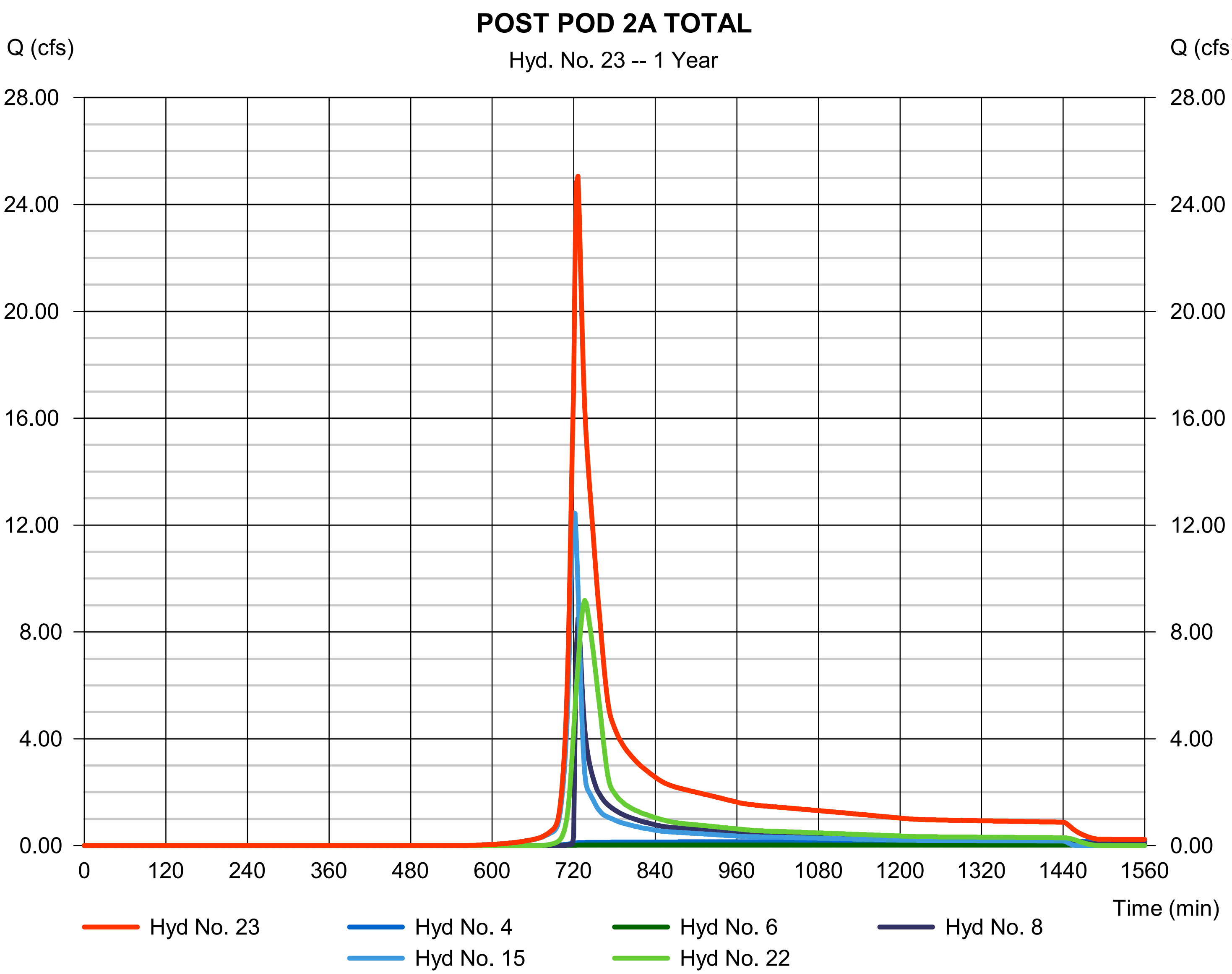
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 23

POST POD 2A TOTAL

Hydrograph type	= Combine	Peak discharge	= 25.06 cfs
Storm frequency	= 1 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 158,403 cuft
Inflow hyds.	= 4, 6, 8, 15, 22	Contrib. drain. area	= 20.390 ac



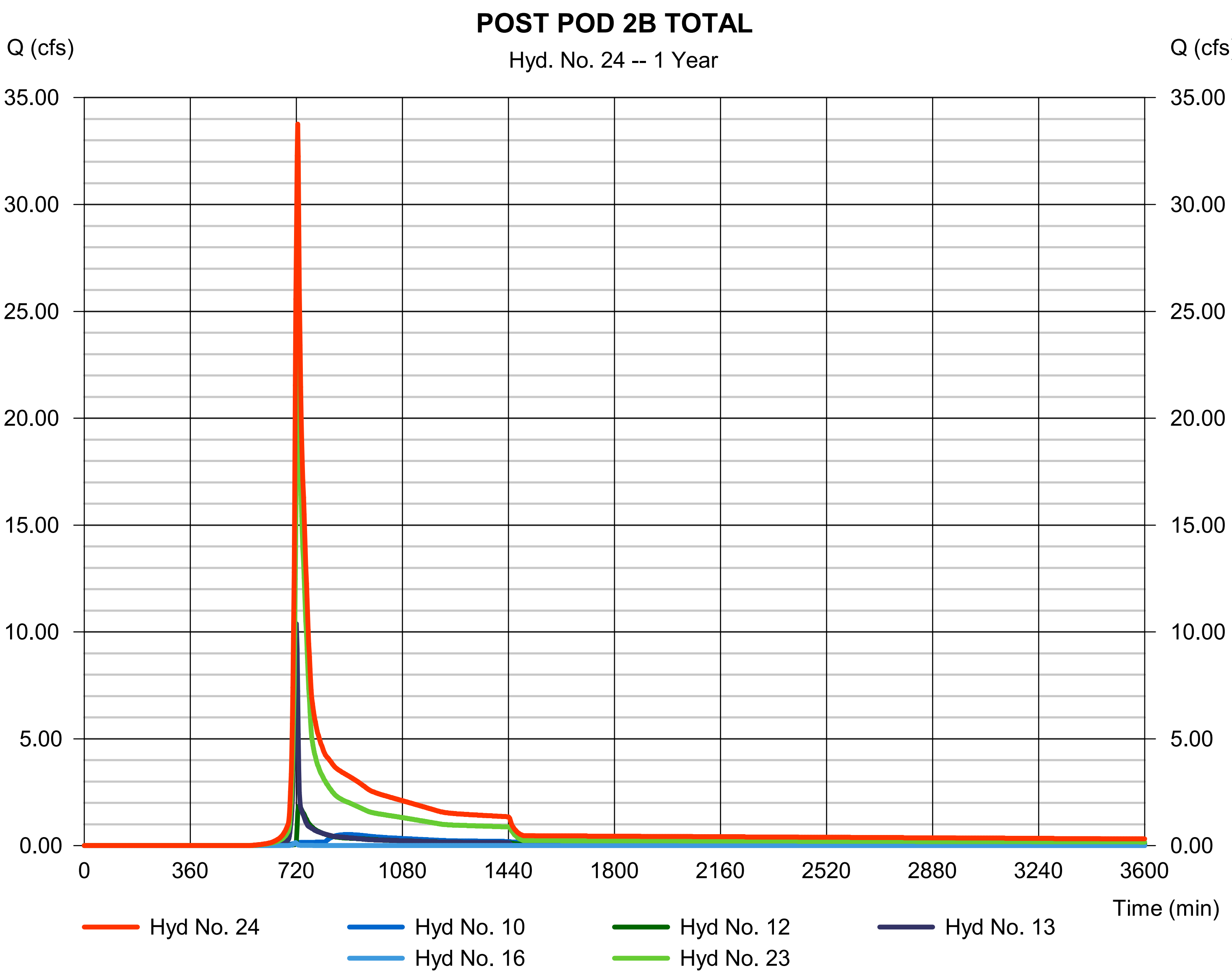
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 24

POST POD 2B TOTAL

Hydrograph type	= Combine	Peak discharge	= 33.77 cfs
Storm frequency	= 1 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 245,947 cuft
Inflow hyds.	= 10, 12, 13, 16, 23	Contrib. drain. area	= 6.420 ac

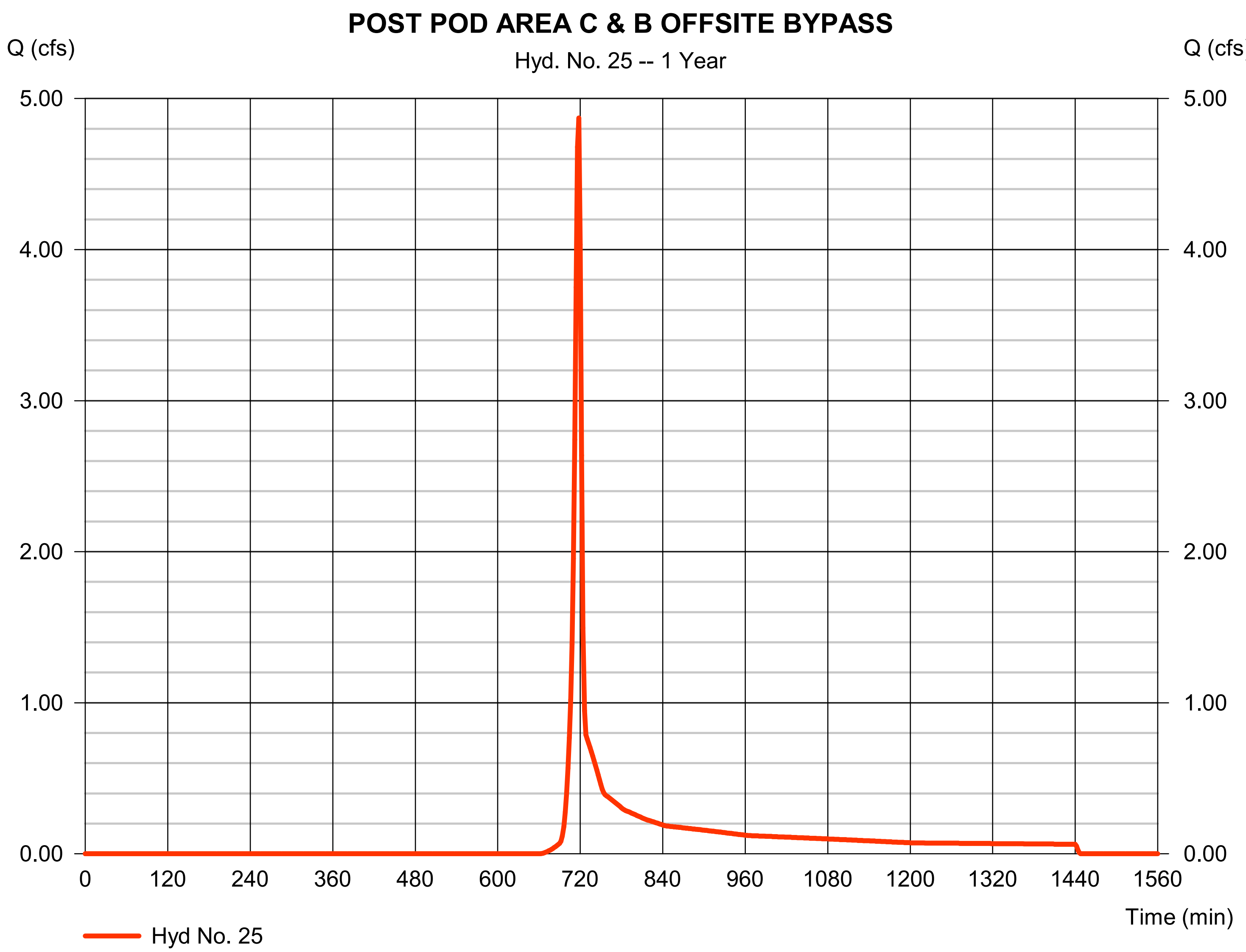


Hydrograph Report

Hyd. No. 25

POST POD AREA C & B OFFSITE BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 4.872 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 9,798 cuft
Drainage area	= 3.170 ac	Curve number	= 74
Basin Slope	= 4.5 %	Hydraulic length	= 1030 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 5.38 min
Total precip.	= 3.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



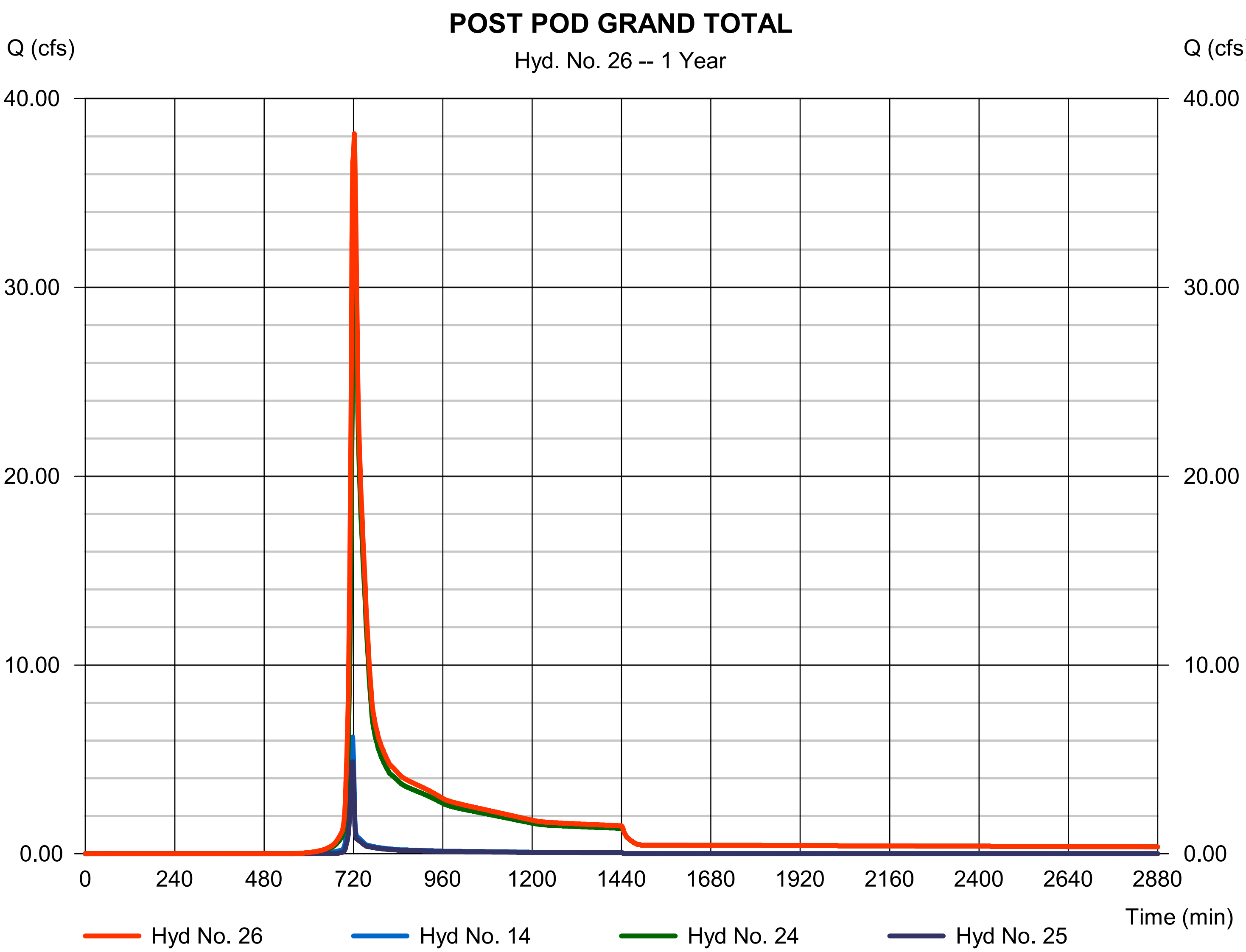
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 26

POST POD GRAND TOTAL

Hydrograph type	= Combine	Peak discharge	= 38.14 cfs
Storm frequency	= 1 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 268,127 cuft
Inflow hyds.	= 14, 24, 25	Contrib. drain. area	= 6.110 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

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	121.51	2	722	342,397	------	------	------	PRE POD #2
2	SCS Runoff	21.78	2	720	49,838	------	------	------	PRE POD #1
3	SCS Runoff	46.46	2	718	106,942	------	------	------	POST POD 2A #1 (to SCM #1)
4	Reservoir	8.862	2	730	95,674	3	366.31	97,125	PostDev Thru SCM#1
5	SCS Runoff	8.879	2	718	20,389	------	------	------	POST POD 2A #2 (to SCM #2)
6	Reservoir	0.351	2	828	15,360	5	362.95	29,016	Route PostDev SCM #2
7	SCS Runoff	41.60	2	718	95,623	------	------	------	POST POD 2A #3 (to SCM #3)
8	Reservoir	32.74	2	722	92,231	7	363.84	38,946	Route PostDev @ SCM#3
9	SCS Runoff	40.48	2	716	84,940	------	------	------	POST POD 2B #4 (to SCM #5)
10	Reservoir	20.07	2	722	83,282	9	350.83	59,623	Route PostDev SCM#5
11	SCS Runoff	26.51	2	716	54,278	------	------	------	POST POD 2B #2 (to SCM #4)
12	Reservoir	22.73	2	720	53,866	11	359.51	29,228	Route PostDev SCM #4
13	SCS Runoff	26.07	2	718	59,630	------	------	------	POST POD 2B #3 (BYPASS)
14	SCS Runoff	14.23	2	716	28,934	------	------	------	POST POD #1 (BYPASS)
15	SCS Runoff	28.30	2	720	73,639	------	------	------	POST POD 2A #4 (BYPASS)
16	SCS Runoff	0.338	2	716	687	------	------	------	POST POD 2B #1 (BYPASS)
17	SCS Runoff	12.60	2	718	25,435	------	------	------	PRE POD #1 OFFSITE AREA
18	SCS Runoff	25.99	2	736	119,076	------	------	------	PRE OFFSITE AREA #4
19	Combine	34.24	2	718	75,272	2, 17,	------	------	PRE POD #1 TOTAL
20	Combine	138.98	2	724	461,473	1, 18,	------	------	PRE POD #2 TOTAL
21	Combine	163.83	2	722	536,745	19, 20	------	------	PRE POD GRAND TOTAL
22	SCS Runoff	25.99	2	736	119,076	------	------	------	POST POD AREA A (OFFSITE BYP
23	Combine	81.61	2	724	395,979	4, 6, 8, 15, 22	------	------	POST POD 2A TOTAL
24	Combine	141.81	2	720	593,444	10, 12, 13, 16, 23	------	------	POST POD 2B TOTAL
25	SCS Runoff	12.72	2	718	25,678	------	------	------	POST POD AREA C & B OFFSITE B
26	Combine	163.19	2	720	648,056	14, 24, 25	------	------	POST POD GRAND TOTAL

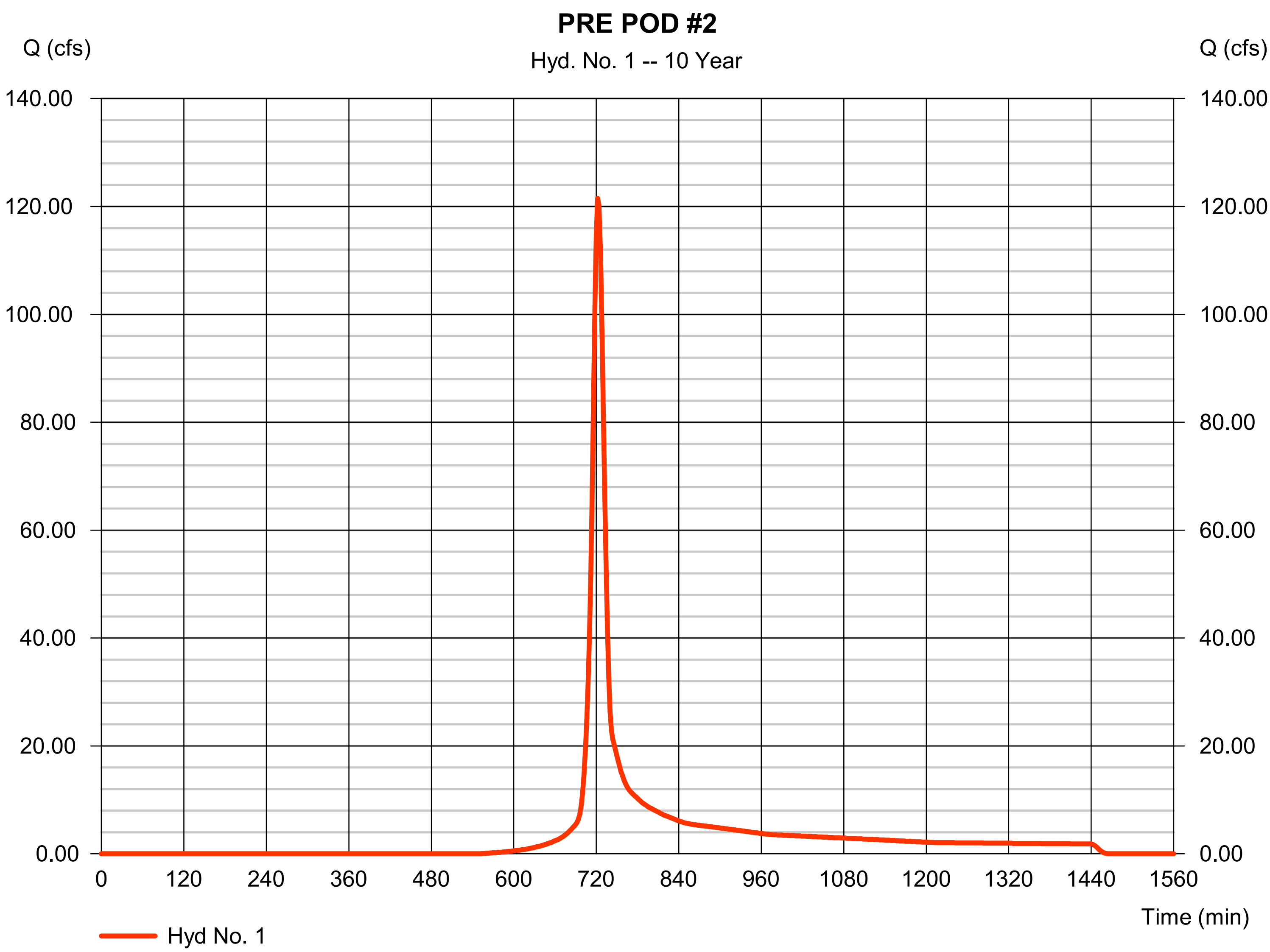
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 — Tuesday, 01 / 28 / 2025

Hyd. No. 1

PRE POD #2

Hydrograph type	= SCS Runoff	Peak discharge	= 121.51 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 342,397 cuft
Drainage area	= 41.980 ac	Curve number	= 73.1
Basin Slope	= 1.4 %	Hydraulic length	= 4320 ft
Tc method	= User	Time of conc. (Tc)	= 14.00 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



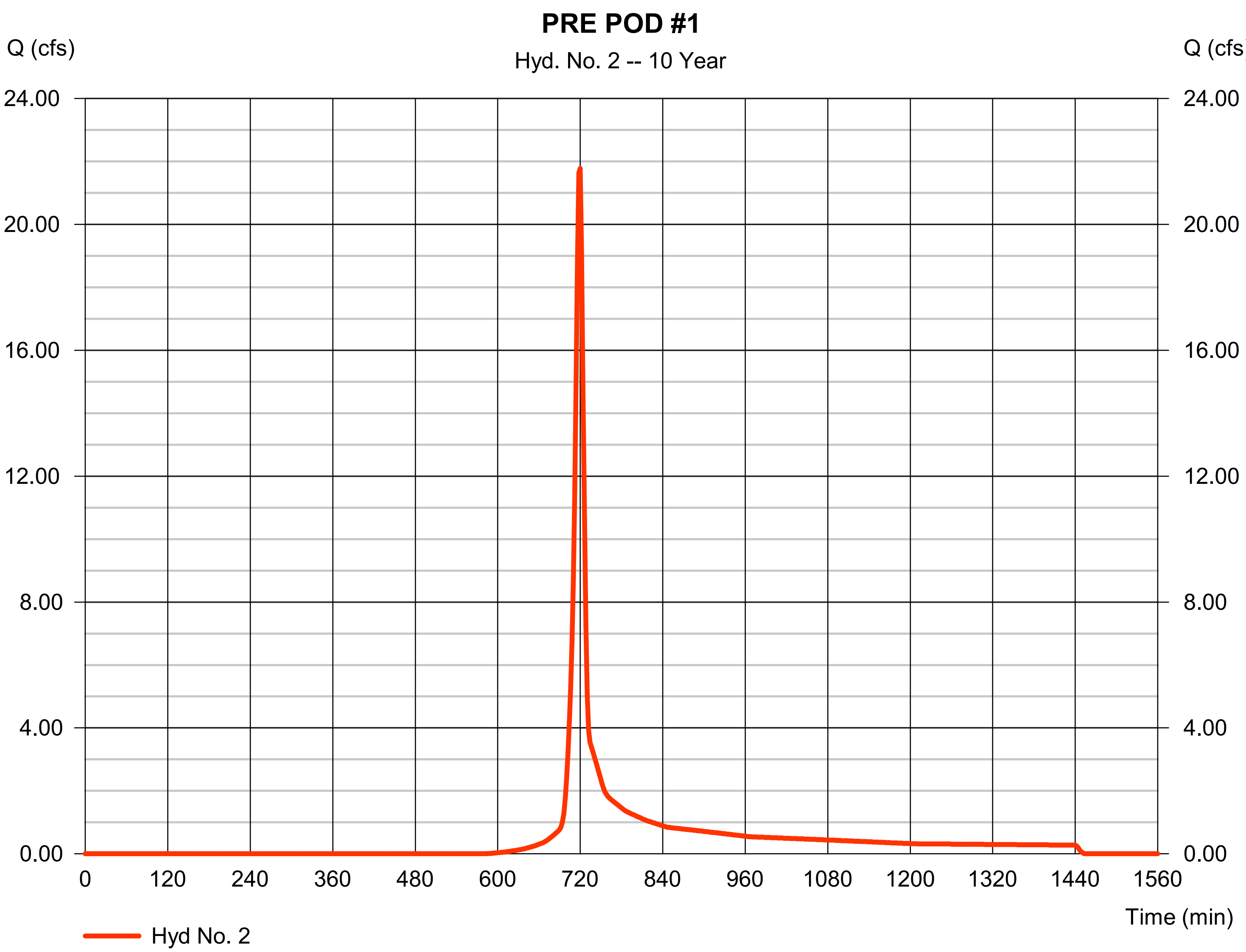
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 2

PRE POD #1

Hydrograph type	= SCS Runoff	Peak discharge	= 21.78 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 49,838 cuft
Drainage area	= 6.540 ac	Curve number	= 70.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.70 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

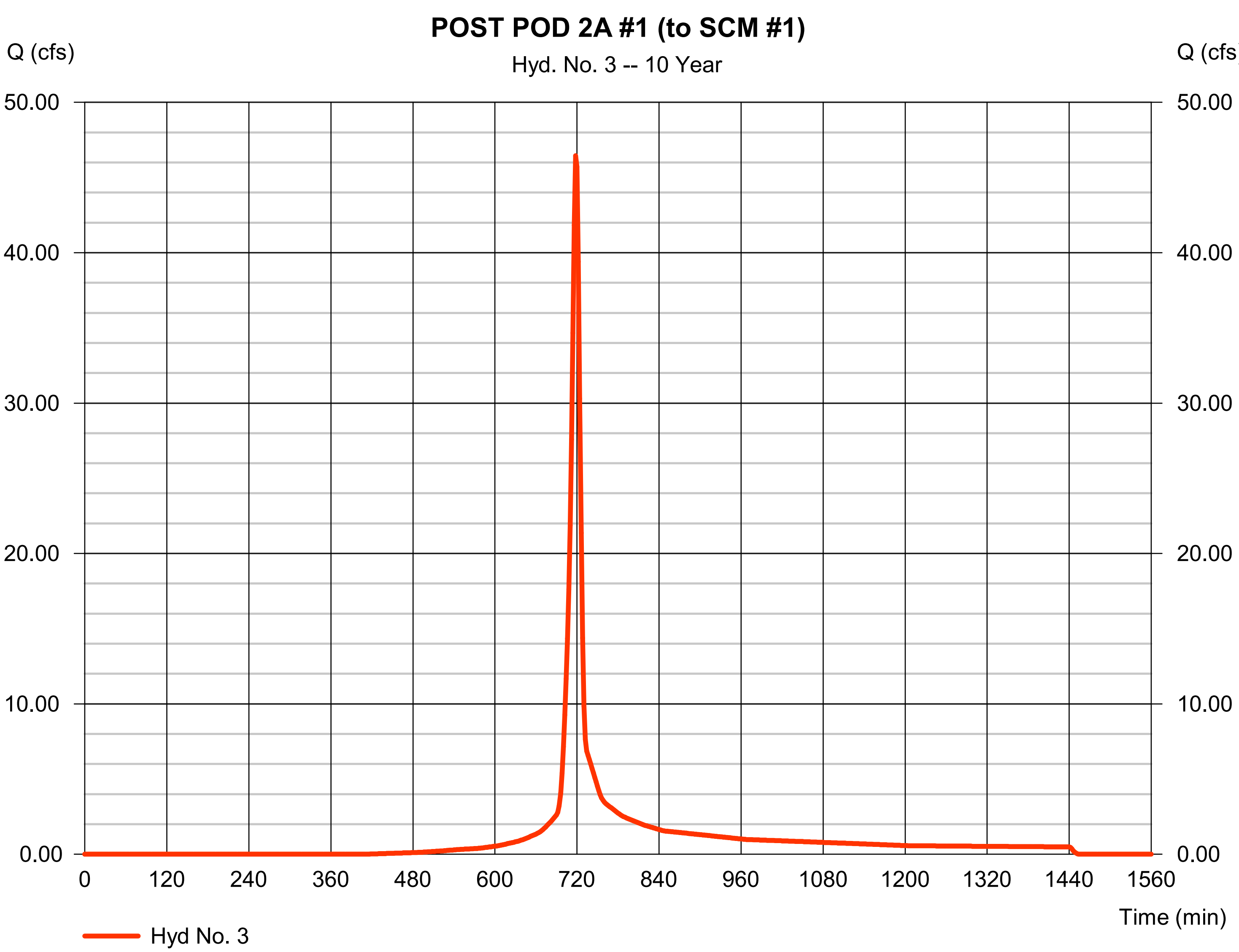


Hydrograph Report

Hyd. No. 3

POST POD 2A #1 (to SCM #1)

Hydrograph type	= SCS Runoff	Peak discharge	= 46.46 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 106,942 cuft
Drainage area	= 9.780 ac	Curve number	= 81.1
Basin Slope	= 2.4 %	Hydraulic length	= 1000 ft
Tc method	= User	Time of conc. (Tc)	= 6.60 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

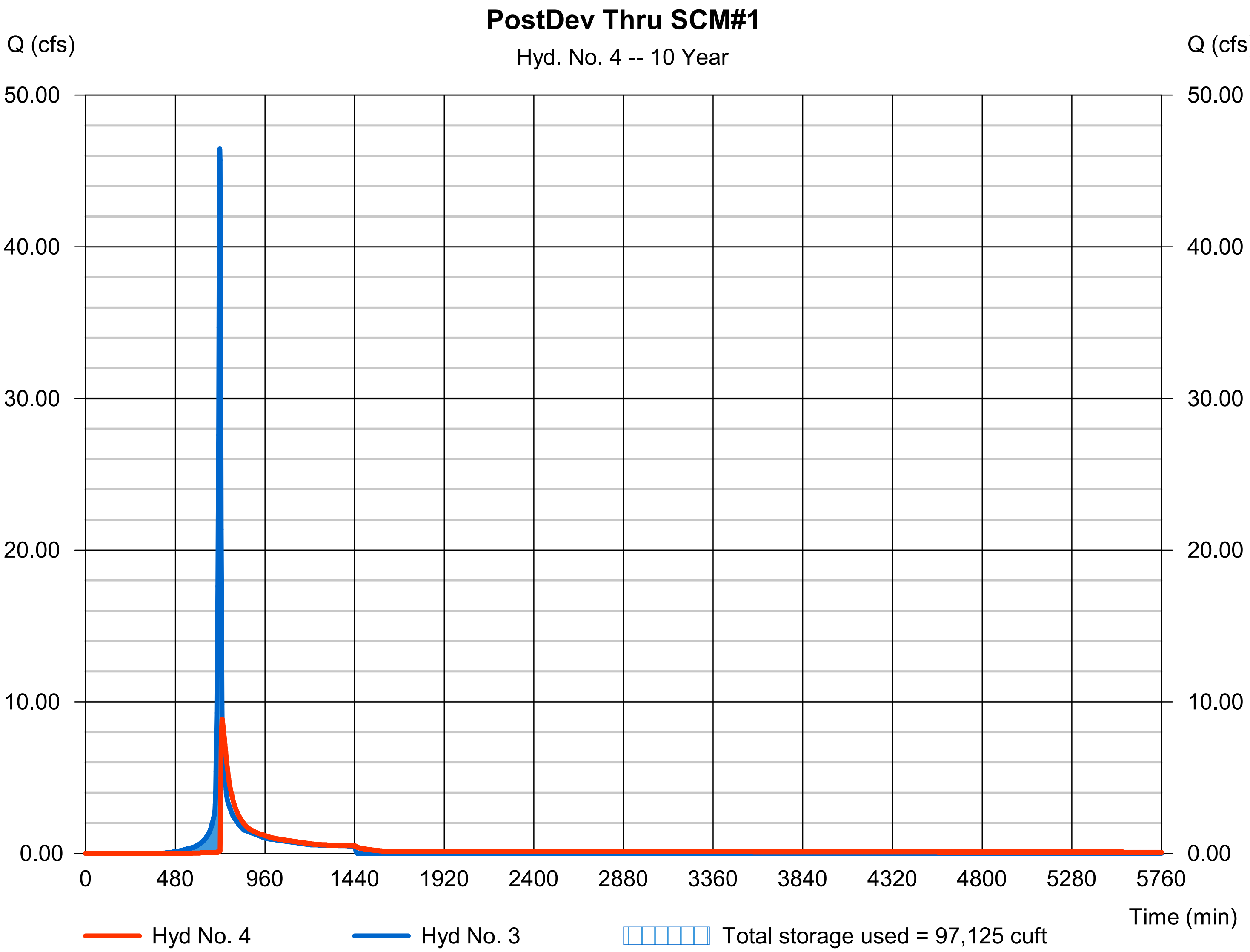
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 4

PostDev Thru SCM#1

Hydrograph type	= Reservoir	Peak discharge	= 8.862 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 95,674 cuft
Inflow hyd. No.	= 3 - POST POD 2A #1 (to SCM #1)	Max. Elevation	= 366.31 ft
Reservoir name	= SCM #1	Max. Storage	= 97,125 cuft

Storage Indication method used. Wet pond routing start elevation = 363.50 ft.

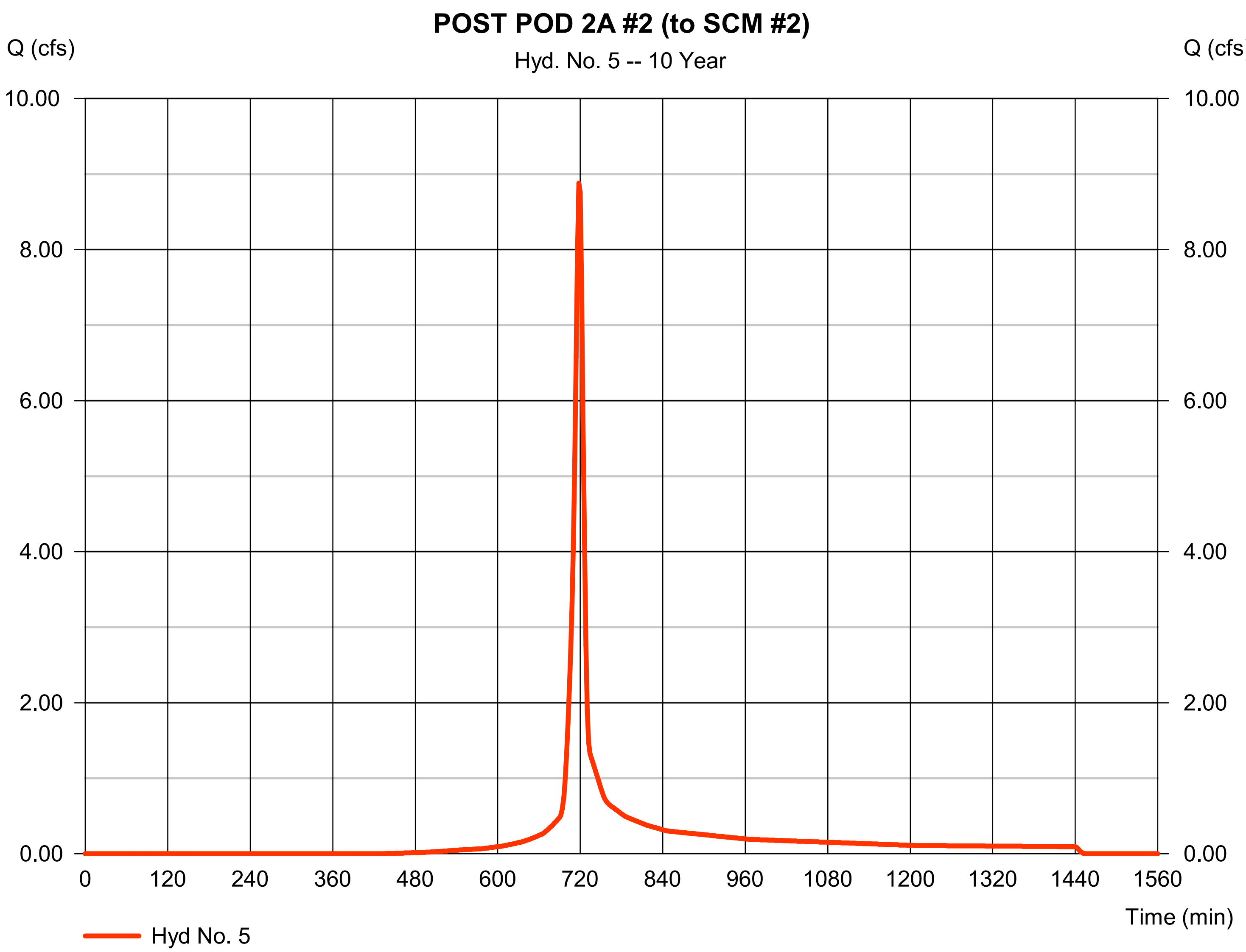


Hydrograph Report

Hyd. No. 5

POST POD 2A #2 (to SCM #2)

Hydrograph type	= SCS Runoff	Peak discharge	= 8.879 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 20,389 cuft
Drainage area	= 1.930 ac	Curve number	= 80
Basin Slope	= 0.5 %	Hydraulic length	= 450 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 6.62 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



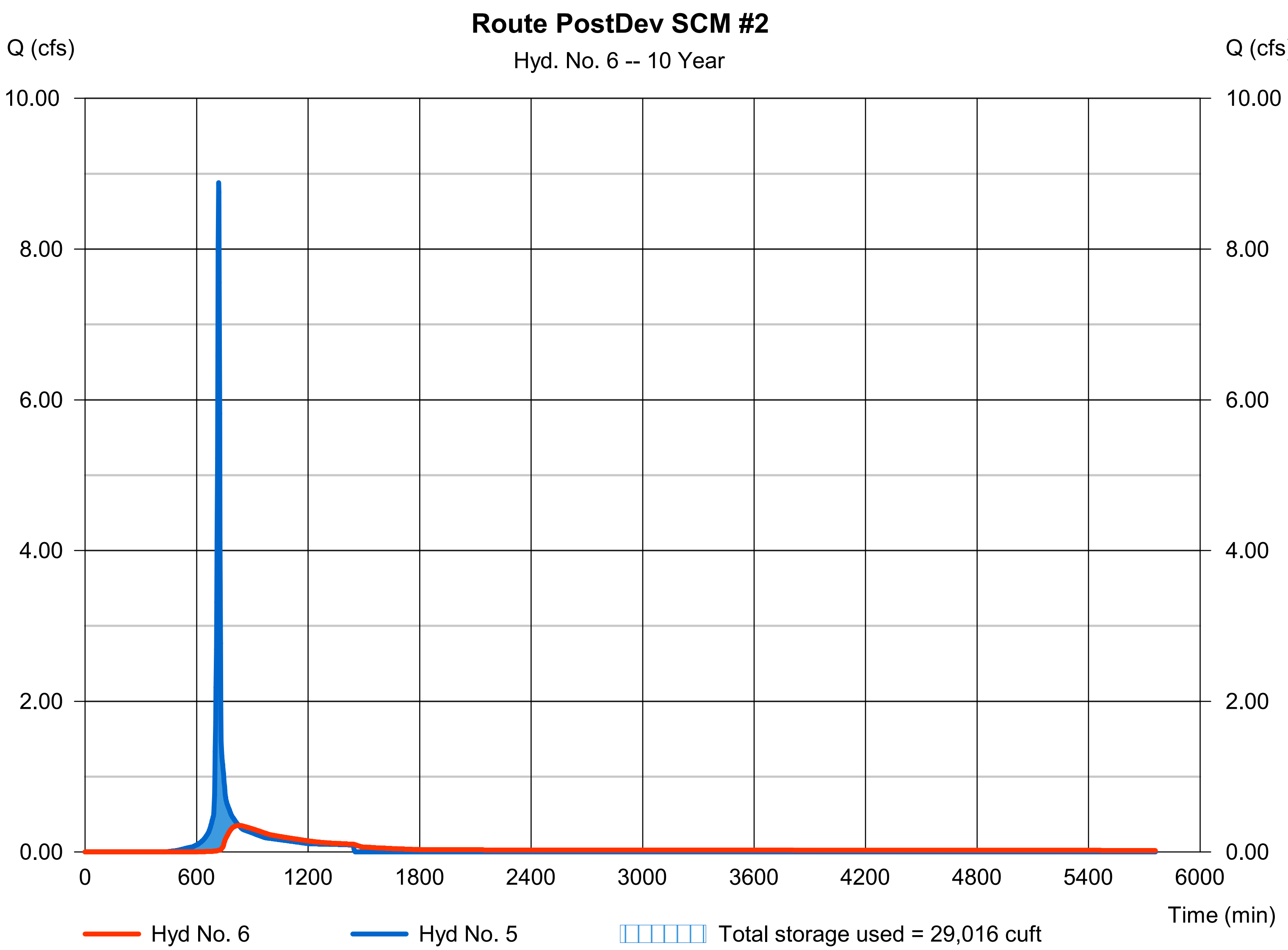
Hydrograph Report

Hyd. No. 6

Route PostDev SCM #2

Hydrograph type	= Reservoir	Peak discharge	= 0.351 cfs
Storm frequency	= 10 yrs	Time to peak	= 828 min
Time interval	= 2 min	Hyd. volume	= 15,360 cuft
Inflow hyd. No.	= 5 - POST POD 2A #2 (to SCM #2)	Max. Elevation	= 362.95 ft
Reservoir name	= SCM #2	Max. Storage	= 29,016 cuft

Storage Indication method used. Wet pond routing start elevation = 361.50 ft.

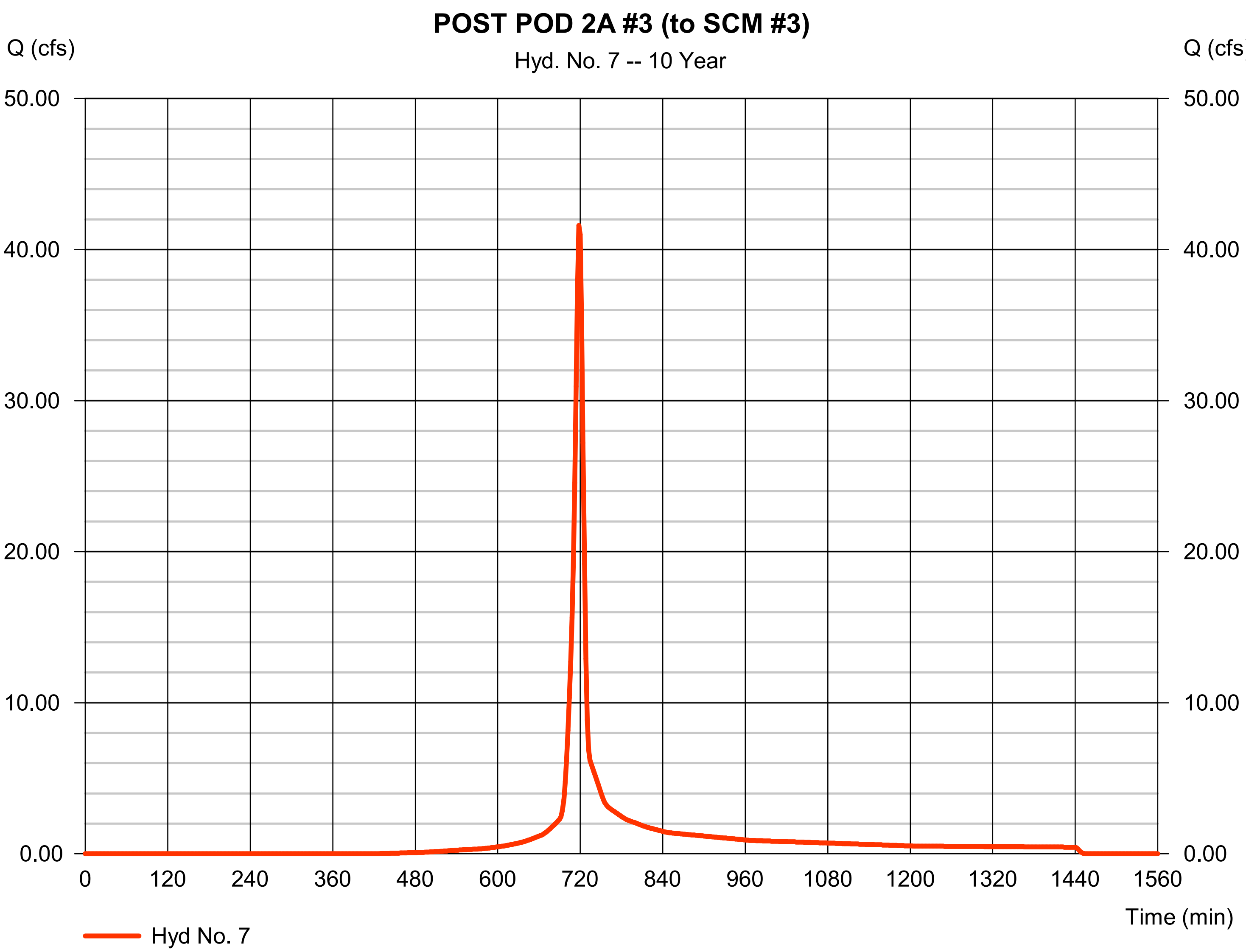


Hydrograph Report

Hyd. No. 7

POST POD 2A #3 (to SCM #3)

Hydrograph type	= SCS Runoff	Peak discharge	= 41.60 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 95,623 cuft
Drainage area	= 8.910 ac	Curve number	= 80.5
Basin Slope	= 2.6 %	Hydraulic length	= 1120 ft
Tc method	= User	Time of conc. (Tc)	= 7.30 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

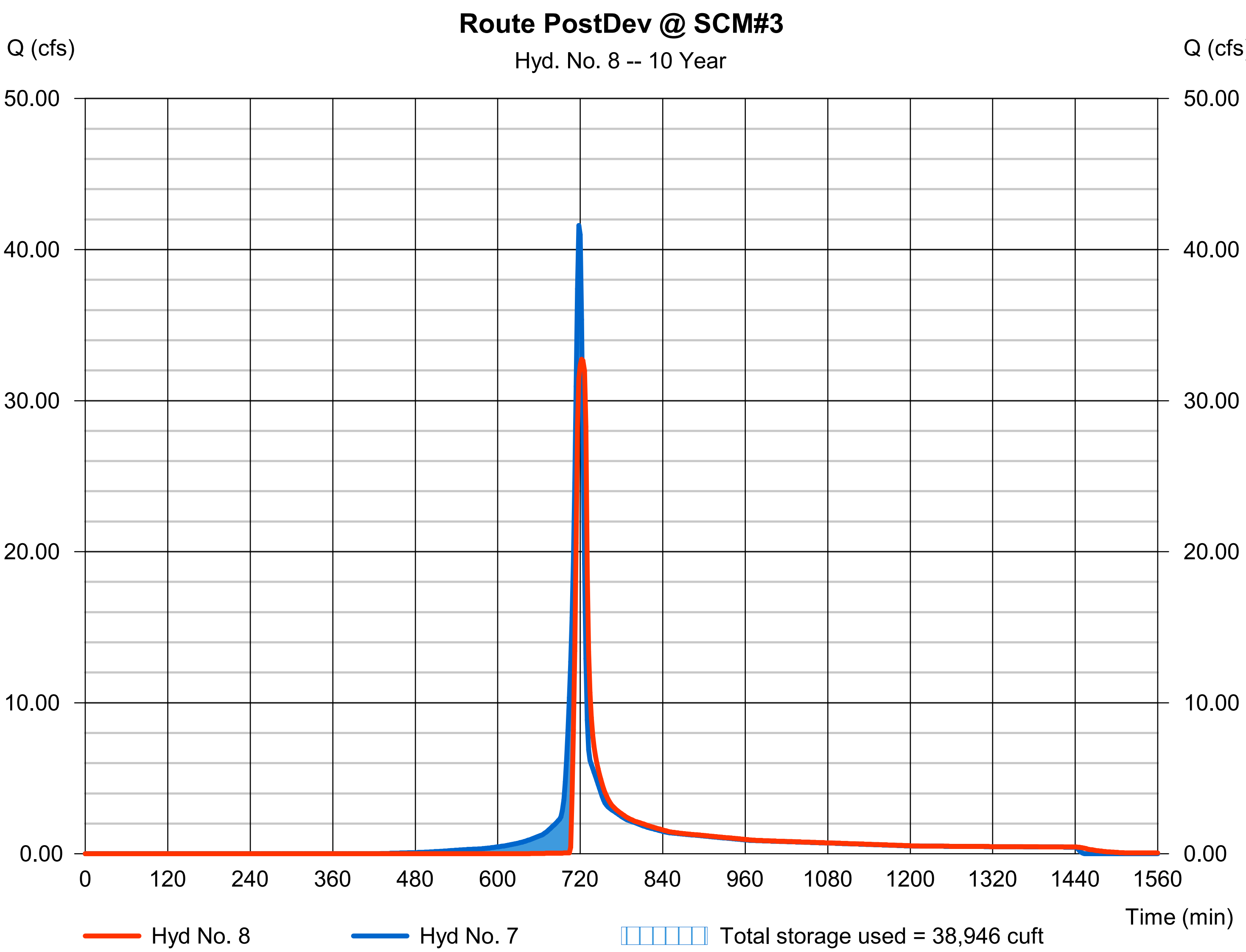
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 8

Route PostDev @ SCM#3

Hydrograph type	= Reservoir	Peak discharge	= 32.74 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 92,231 cuft
Inflow hyd. No.	= 7 - POST POD 2A #3 (to SCM #3)	Max. Elevation	= 363.84 ft
Reservoir name	= SCM #3	Max. Storage	= 38,946 cuft

Storage Indication method used. Wet pond routing start elevation = 361.00 ft.

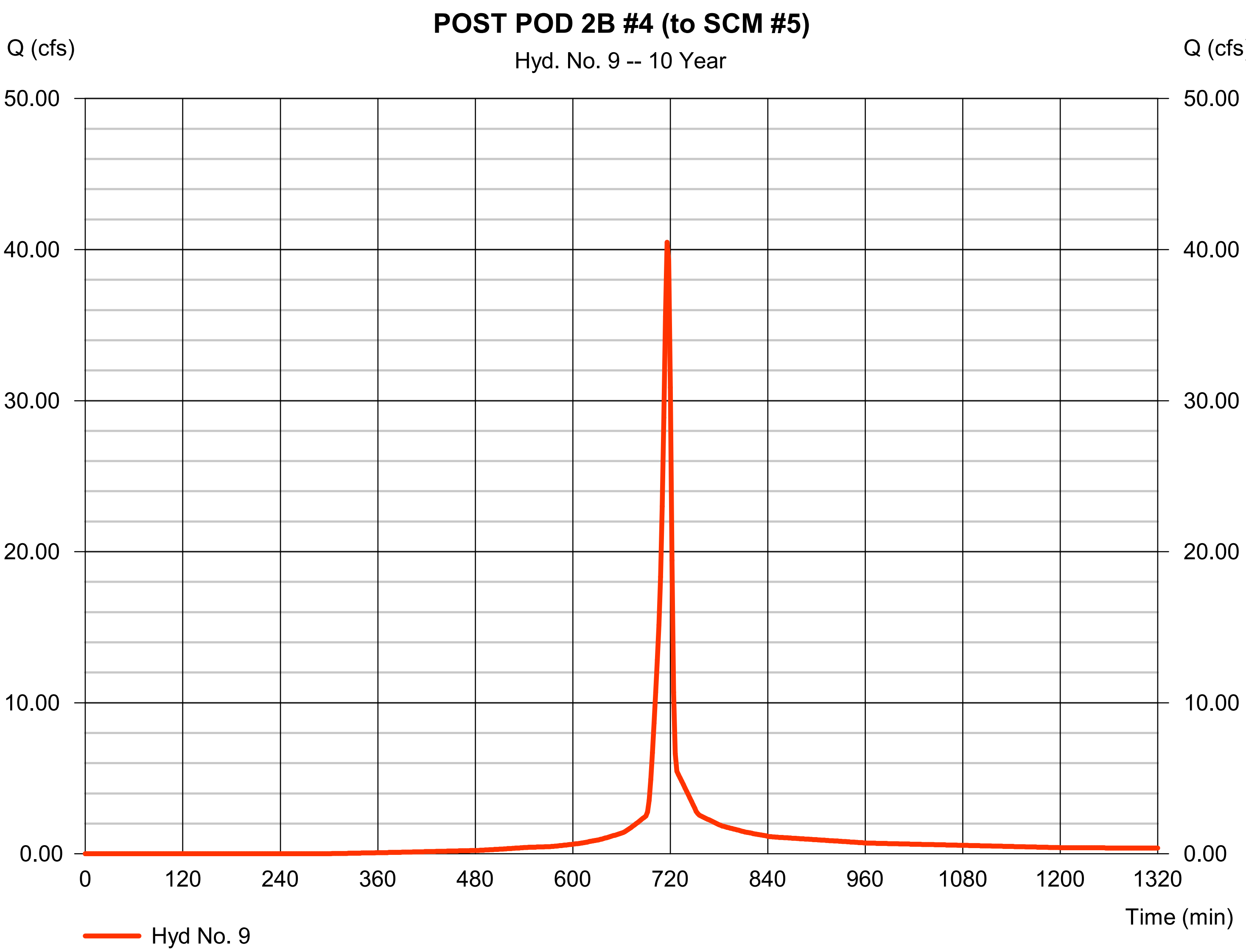


Hydrograph Report

Hyd. No. 9

POST POD 2B #4 (to SCM #5)

Hydrograph type	= SCS Runoff	Peak discharge	= 40.48 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 84,940 cuft
Drainage area	= 6.960 ac	Curve number	= 87
Basin Slope	= 3.2 %	Hydraulic length	= 1270 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

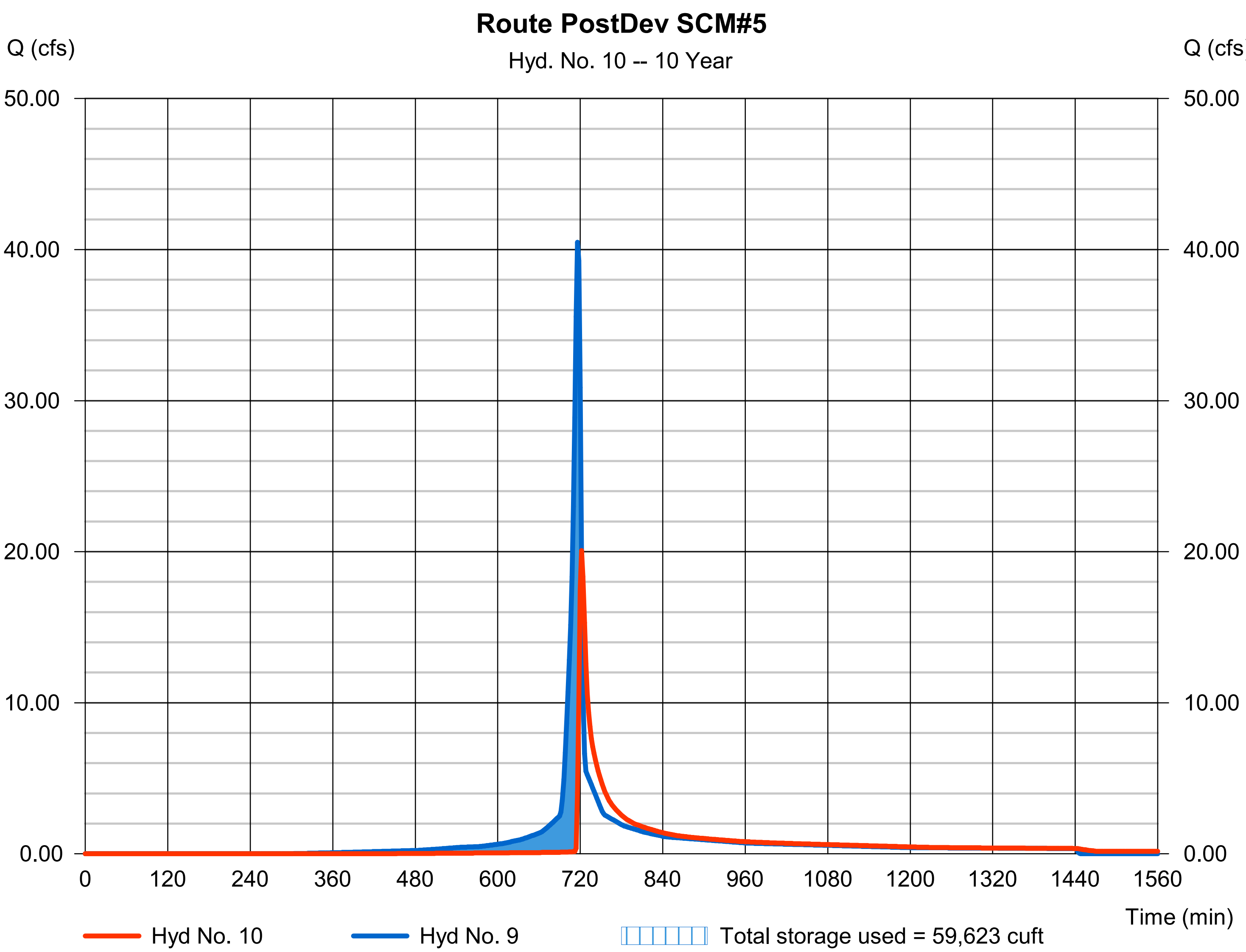
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 10

Route PostDev SCM#5

Hydrograph type	= Reservoir	Peak discharge	= 20.07 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 83,282 cuft
Inflow hyd. No.	= 9 - POST POD 2B #4 (to SCM #5)	Max. Elevation	= 350.83 ft
Reservoir name	= SCM #5	Max. Storage	= 59,623 cuft

Storage Indication method used. Wet pond routing start elevation = 347.50 ft.



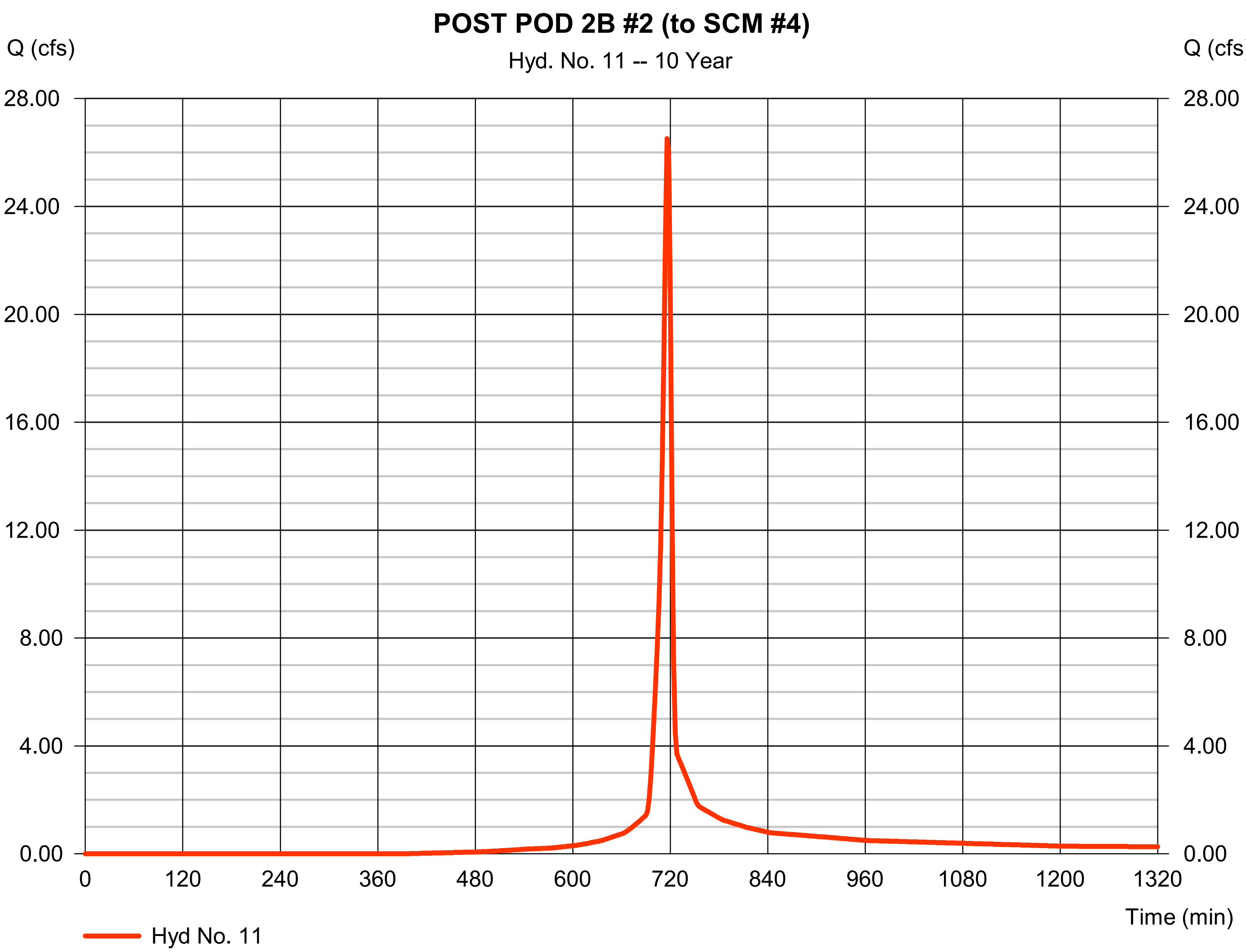
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 11

POST POD 2B #2 (to SCM #4)

Hydrograph type	= SCS Runoff	Peak discharge	= 26.51 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 54,278 cuft
Drainage area	= 5.150 ac	Curve number	= 82
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

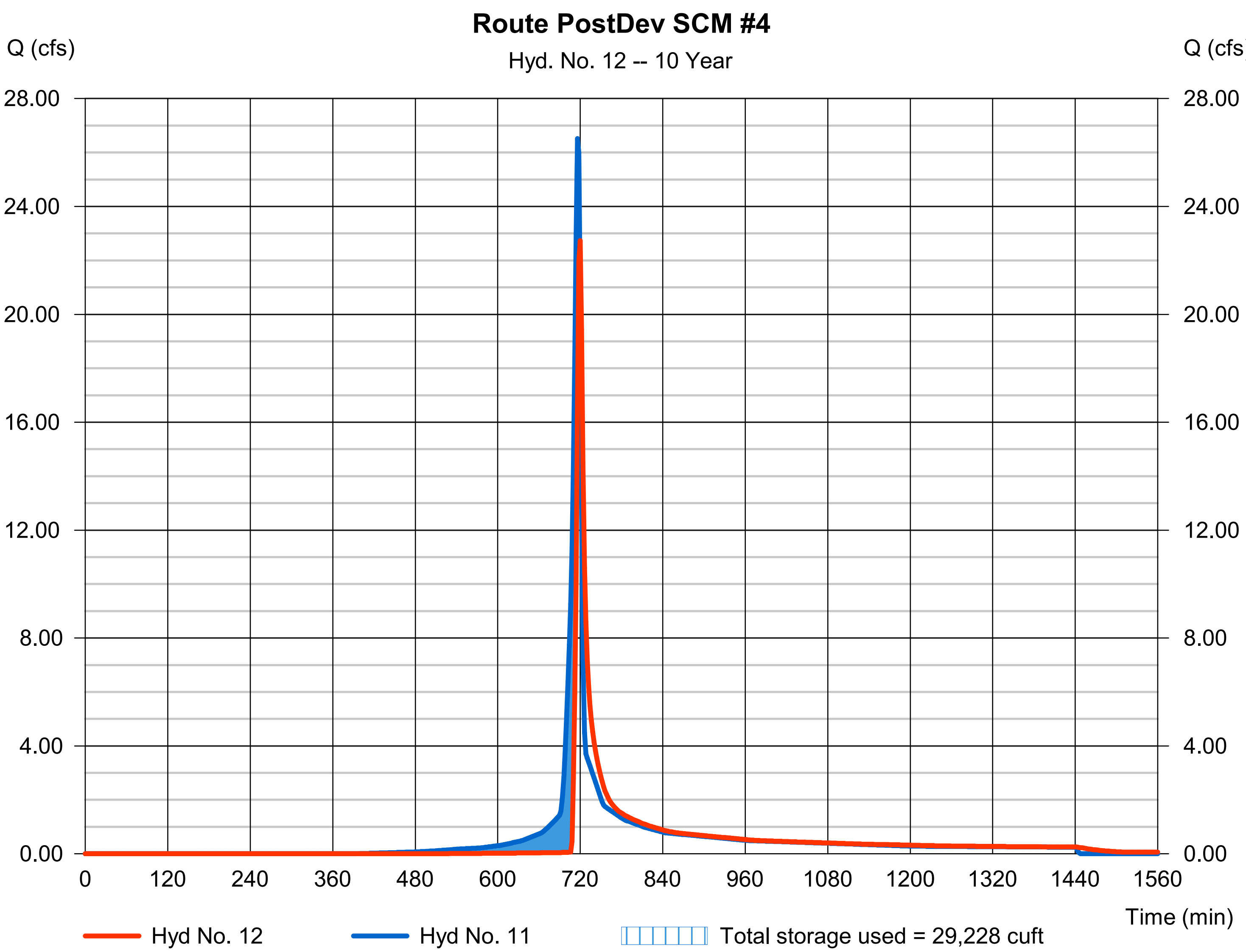
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 12

Route PostDev SCM #4

Hydrograph type	= Reservoir	Peak discharge	= 22.73 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 53,866 cuft
Inflow hyd. No.	= 11 - POST POD 2B #2 (to SCM #4)	Max. Elevation	= 359.51 ft
Reservoir name	= SCM #4	Max. Storage	= 29,228 cuft

Storage Indication method used. Wet pond routing start elevation = 357.50 ft.



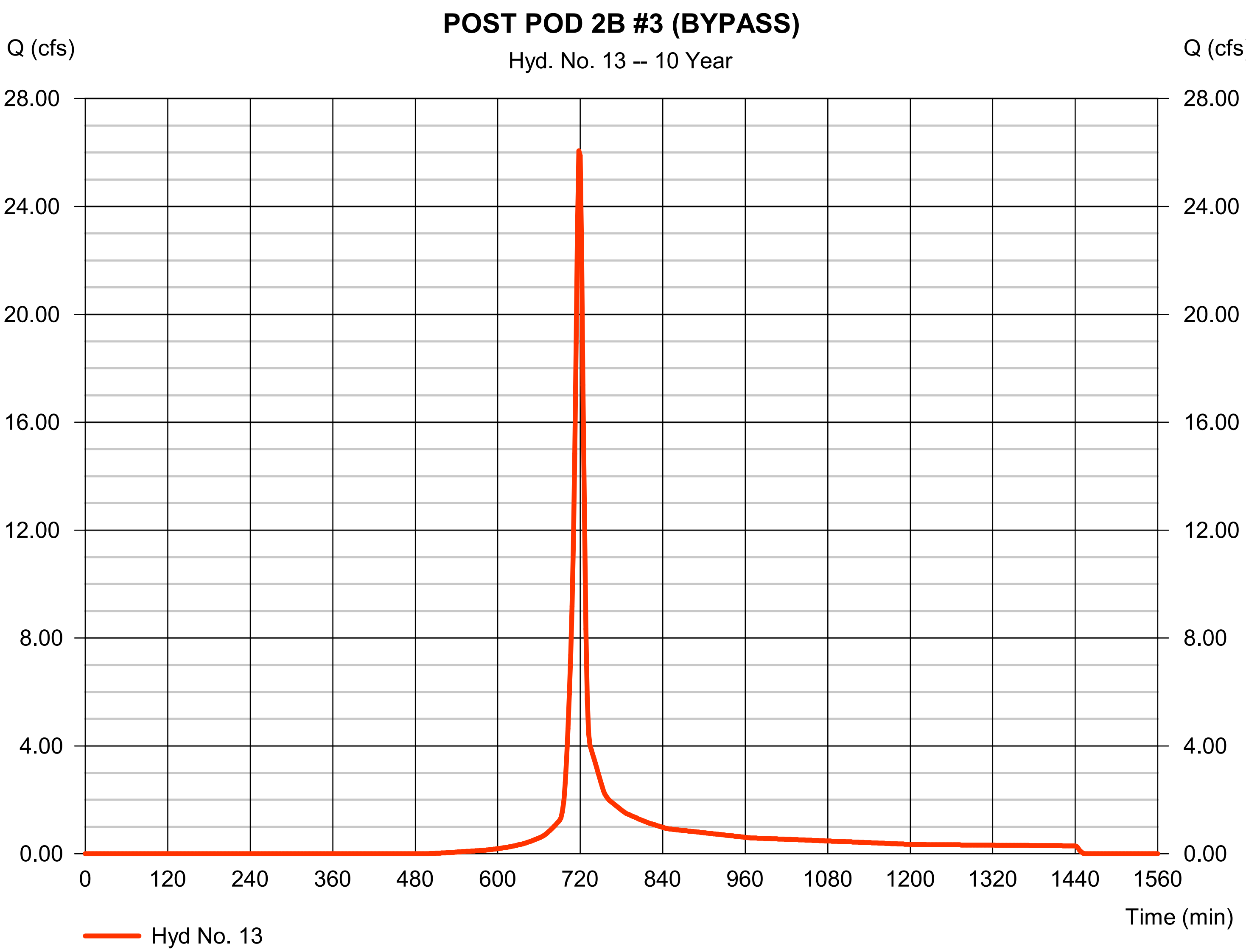
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 13

POST POD 2B #3 (BYPASS)

Hydrograph type	= SCS Runoff	Peak discharge	= 26.07 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 59,630 cuft
Drainage area	= 6.350 ac	Curve number	= 76.4
Basin Slope	= 1.3 %	Hydraulic length	= 4170 ft
Tc method	= User	Time of conc. (Tc)	= 7.00 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



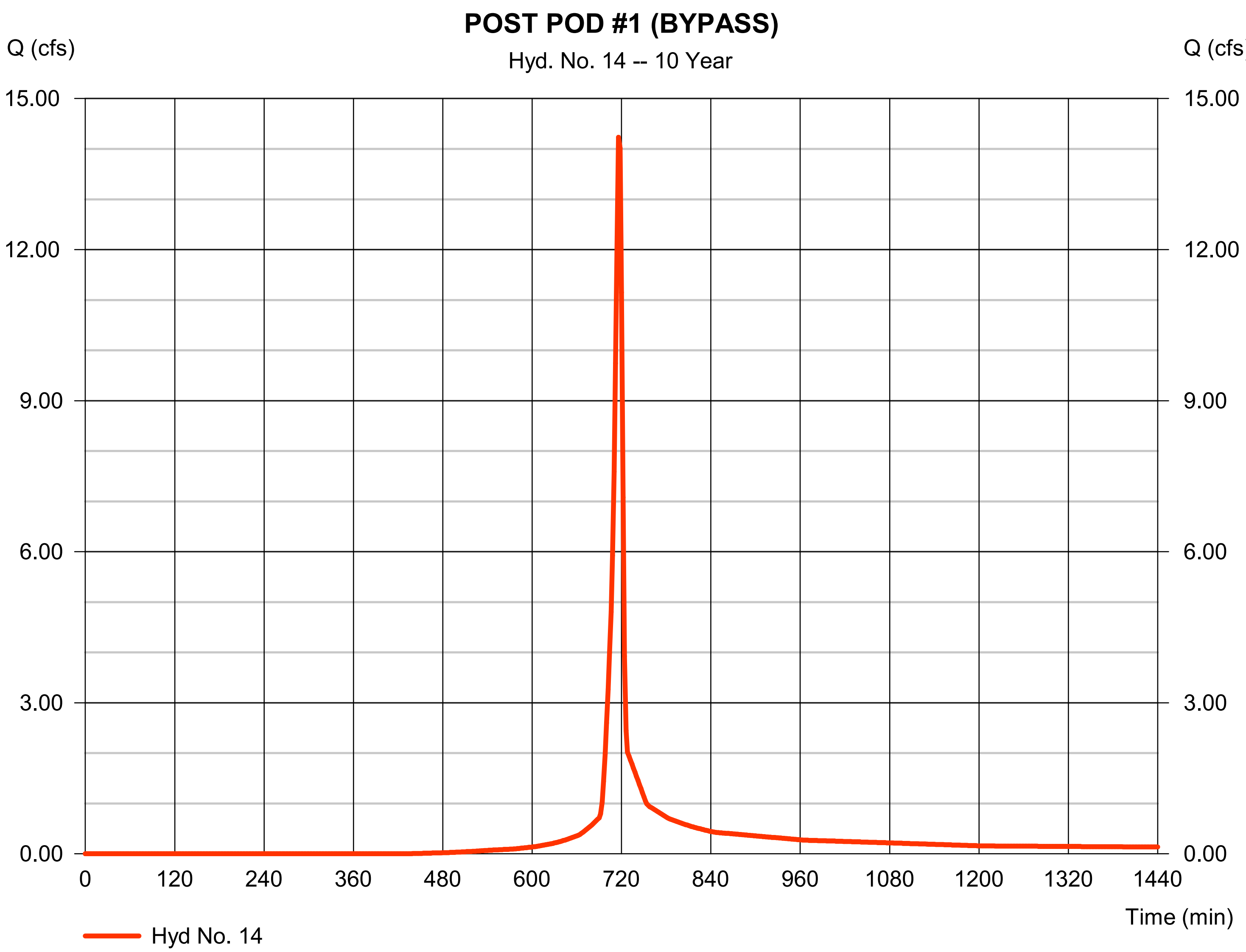
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 14

POST POD #1 (BYPASS)

Hydrograph type	= SCS Runoff	Peak discharge	= 14.23 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 28,934 cuft
Drainage area	= 2.940 ac	Curve number	= 79.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



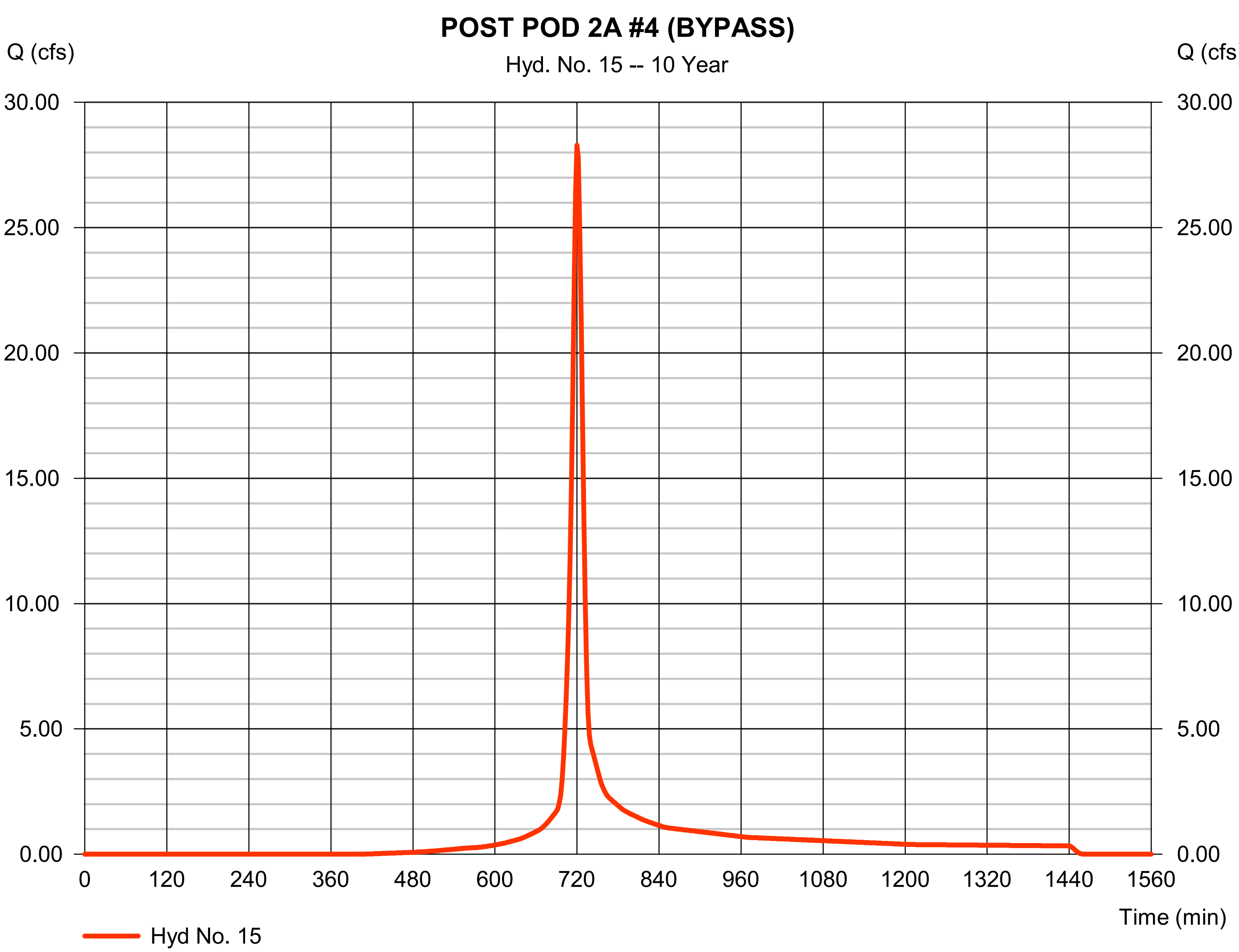
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 — Tuesday, 01 / 28 / 2025

Hyd. No. 15

POST POD 2A #4 (BYPASS)

Hydrograph type	= SCS Runoff	Peak discharge	= 28.30 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 73,639 cuft
Drainage area	= 6.450 ac	Curve number	= 81.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.50 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

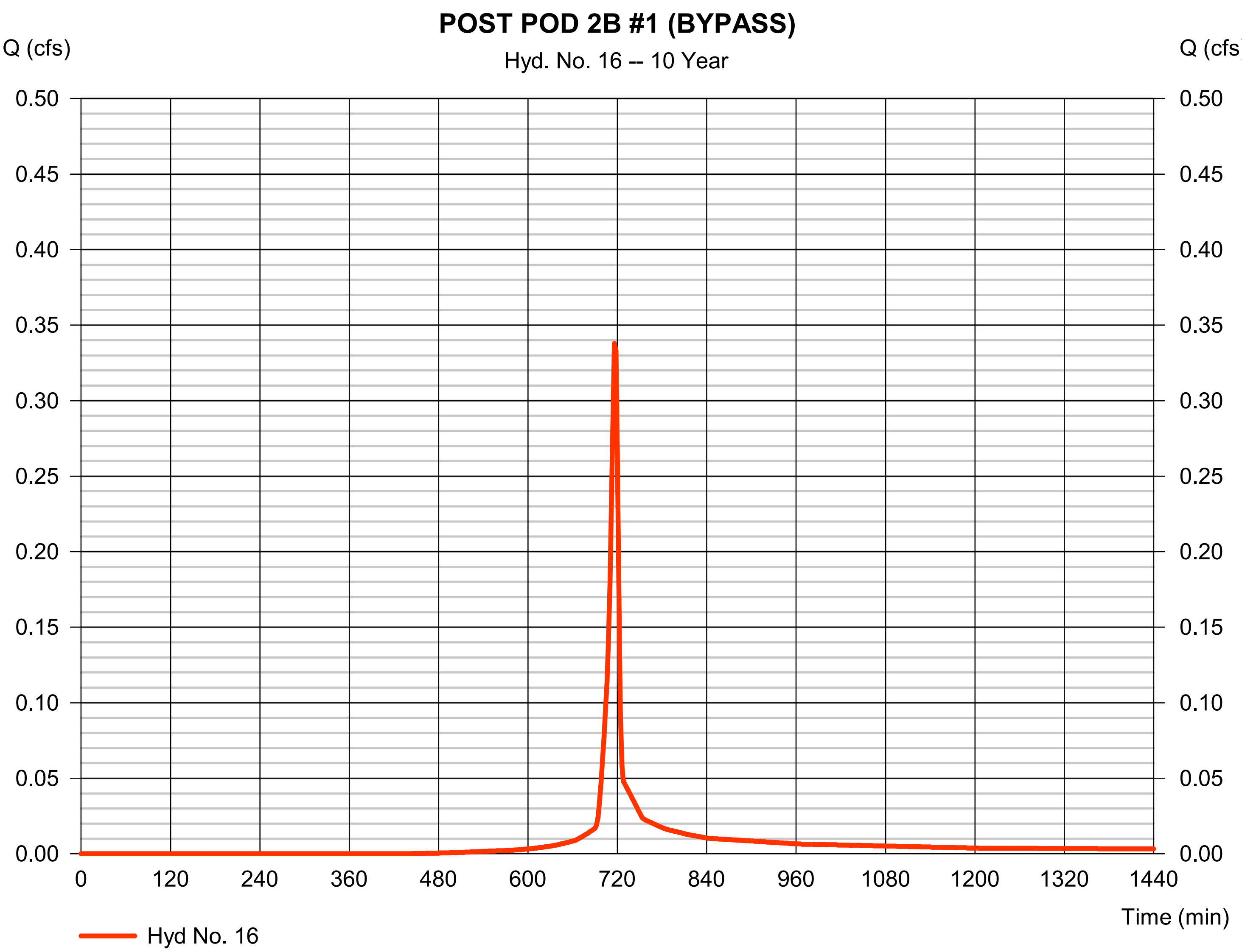


Hydrograph Report

Hyd. No. 16

POST POD 2B #1 (BYPASS)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.338 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 687 cuft
Drainage area	= 0.070 ac	Curve number	= 79.7
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



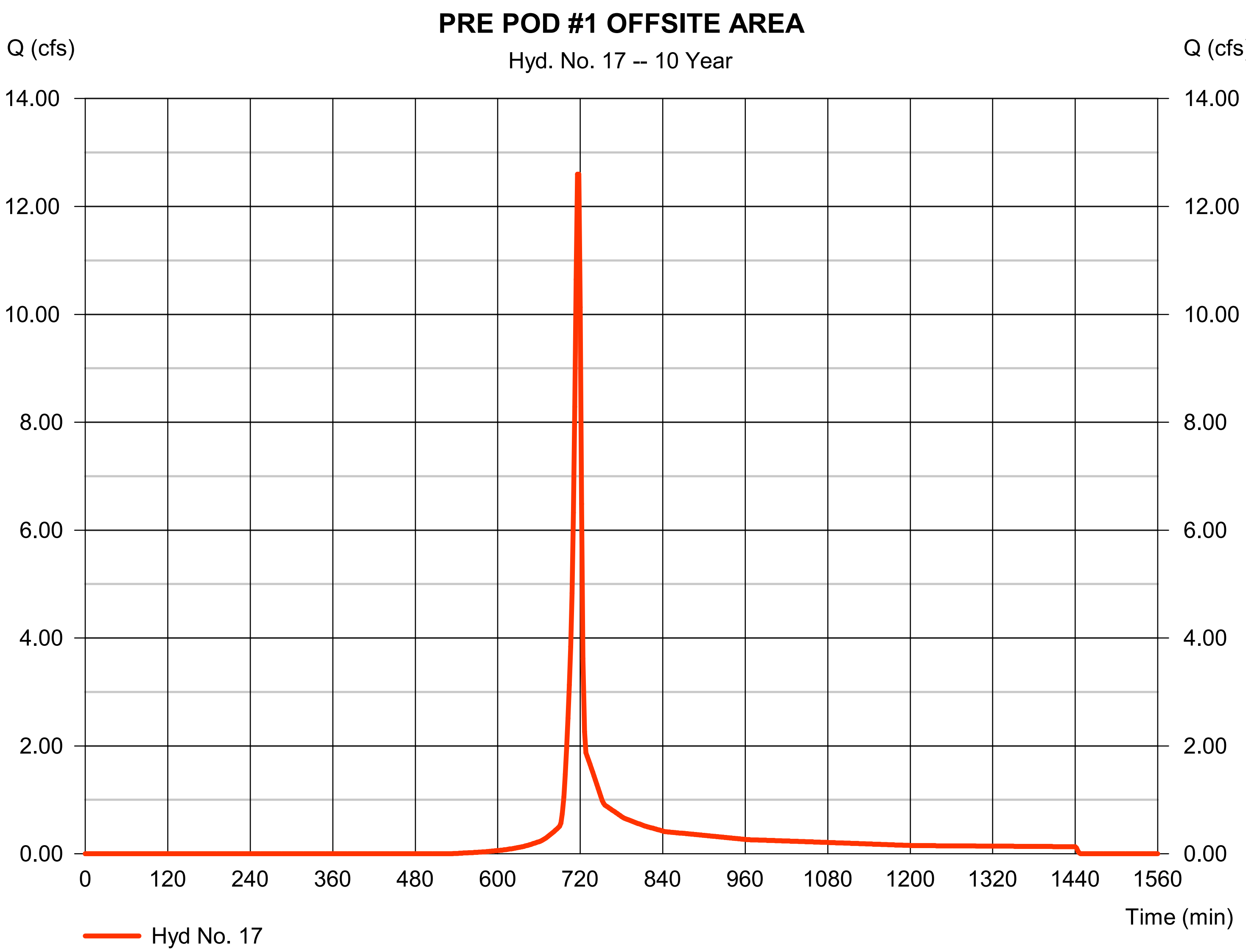
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 17

PRE POD #1 OFFSITE AREA

Hydrograph type	= SCS Runoff	Peak discharge	= 12.60 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 25,435 cuft
Drainage area	= 3.140 ac	Curve number	= 74
Basin Slope	= 4.5 %	Hydraulic length	= 1030 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 5.38 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



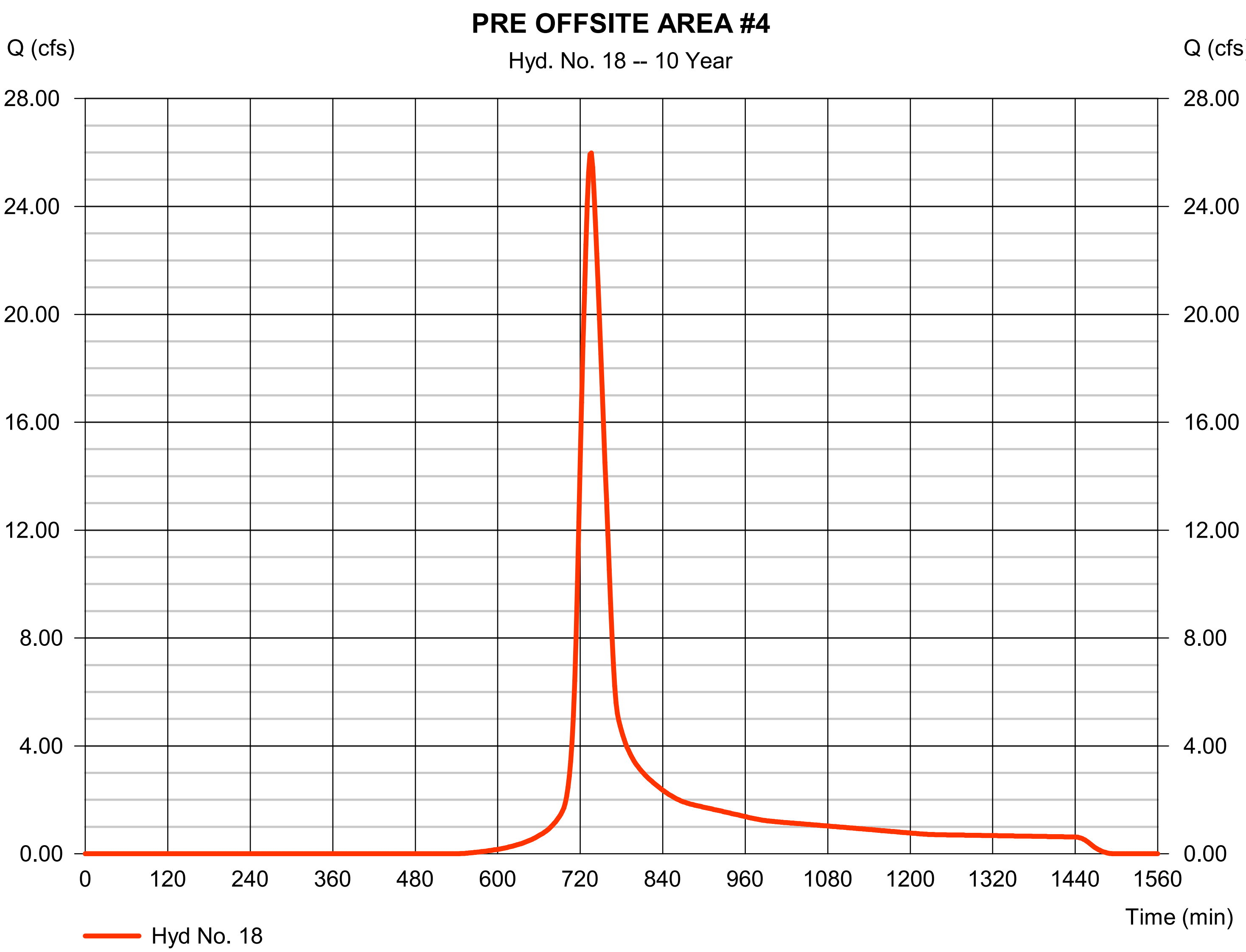
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 18

PRE OFFSITE AREA #4

Hydrograph type	= SCS Runoff	Peak discharge	= 25.99 cfs
Storm frequency	= 10 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 119,076 cuft
Drainage area	= 13.940 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 34.70 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



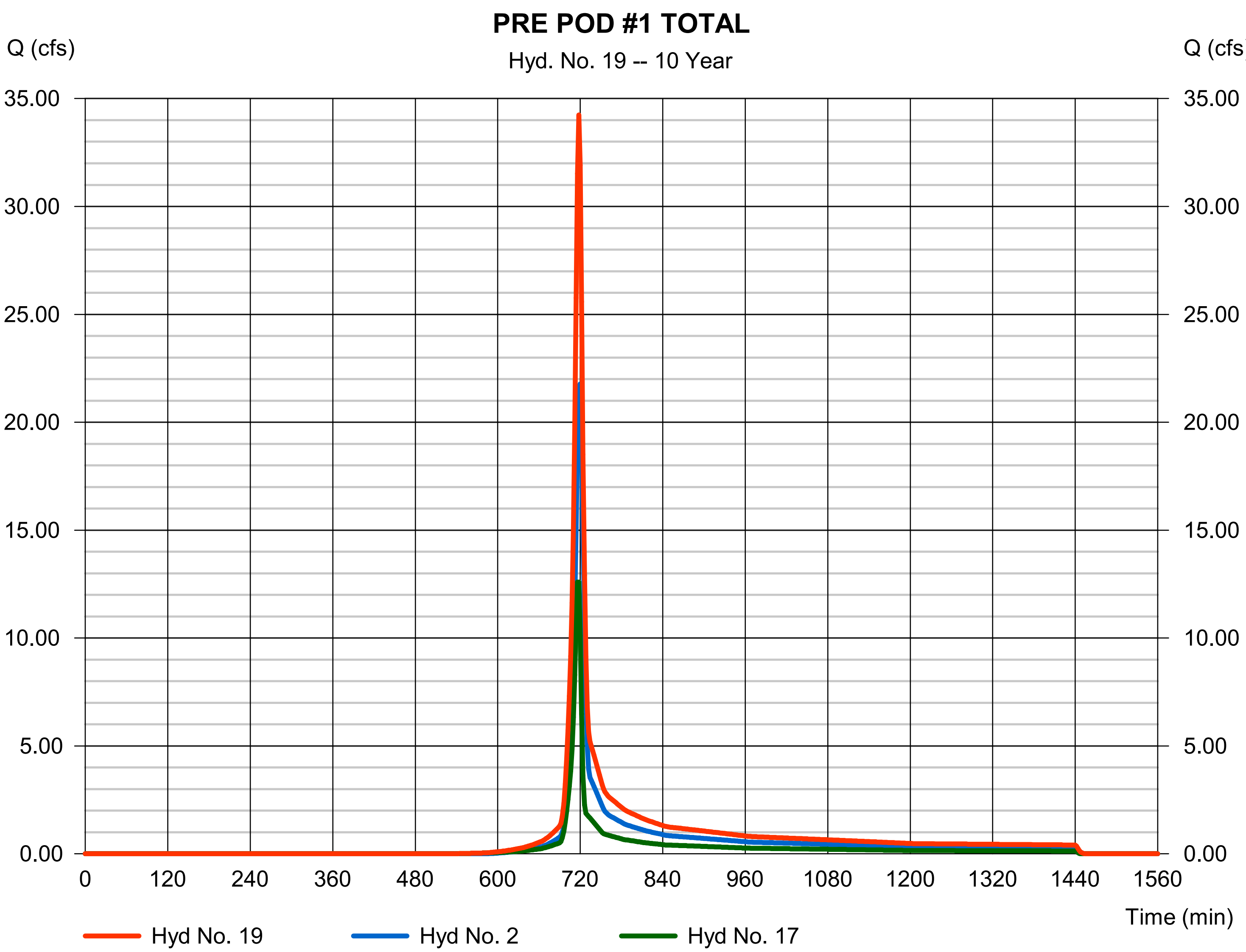
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 19

PRE POD #1 TOTAL

Hydrograph type	= Combine	Peak discharge	= 34.24 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 75,272 cuft
Inflow hyds.	= 2, 17	Contrib. drain. area	= 9.680 ac



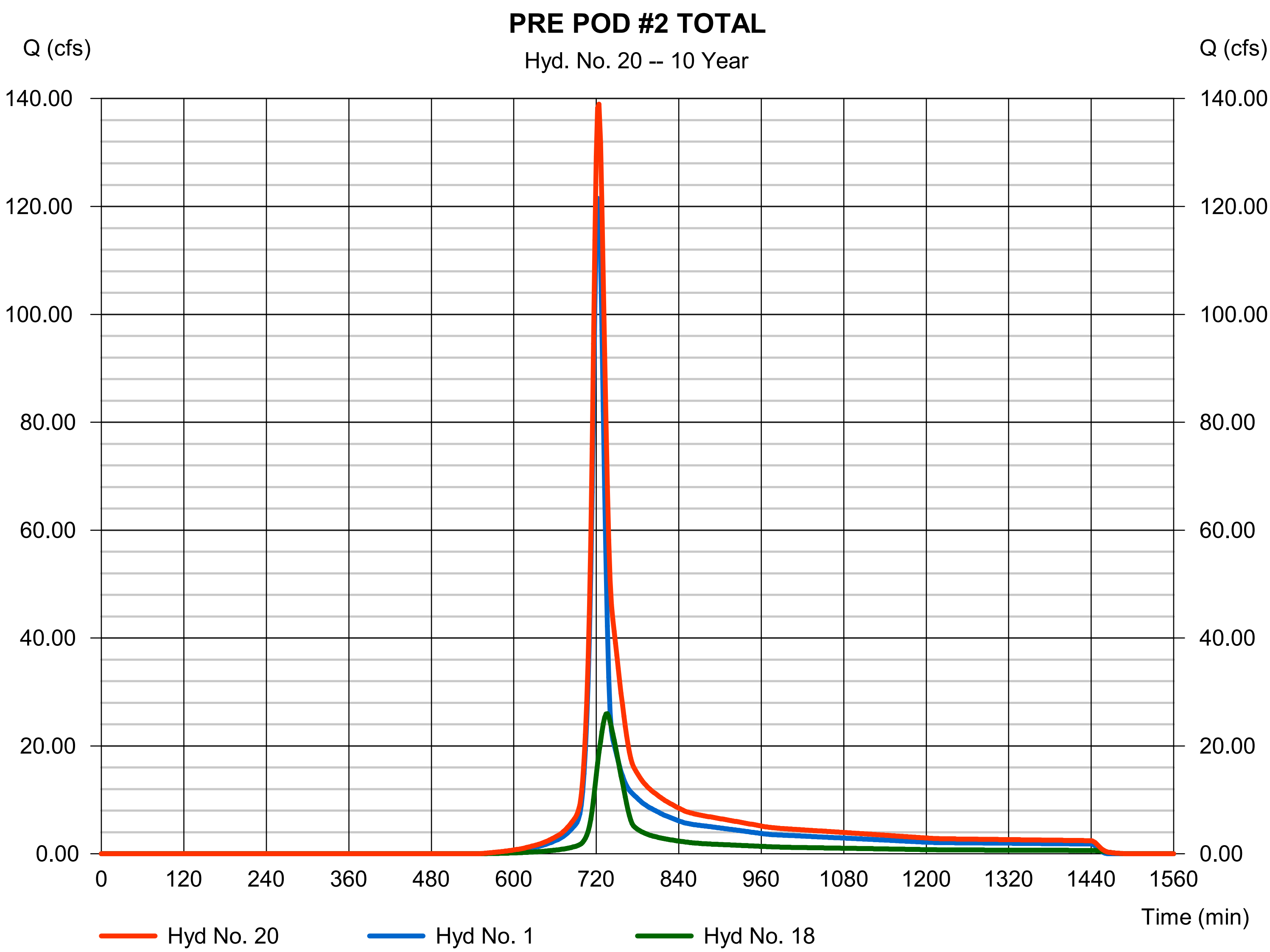
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 20

PRE POD #2 TOTAL

Hydrograph type	= Combine	Peak discharge	= 138.98 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 461,473 cuft
Inflow hyds.	= 1, 18	Contrib. drain. area	= 55.920 ac



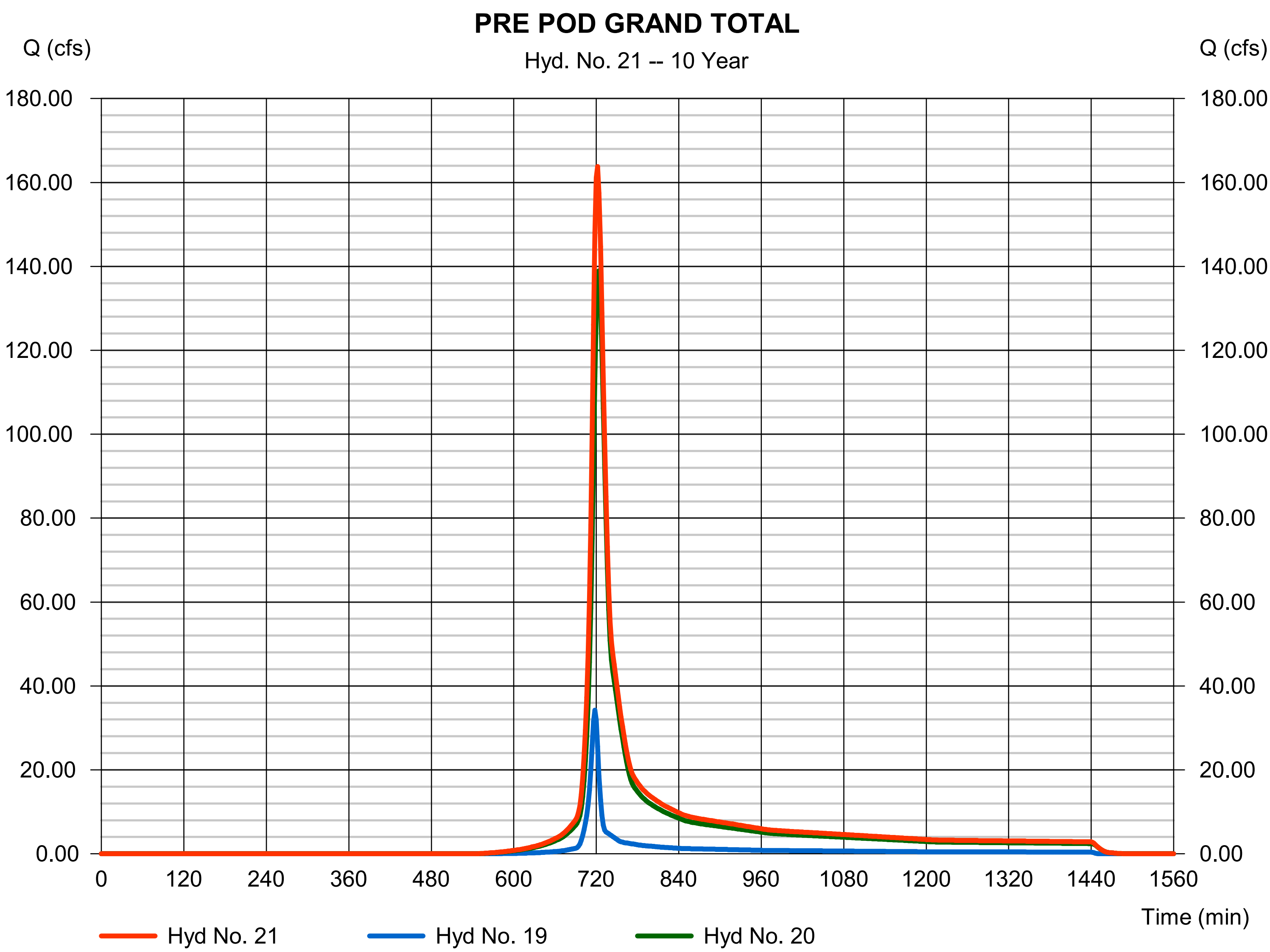
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 | Tuesday, 01 / 28 / 2025

Hyd. No. 21

PRE POD GRAND TOTAL

Hydrograph type	= Combine	Peak discharge	= 163.83 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 536,745 cuft
Inflow hyds.	= 19, 20	Contrib. drain. area	= 0.000 ac



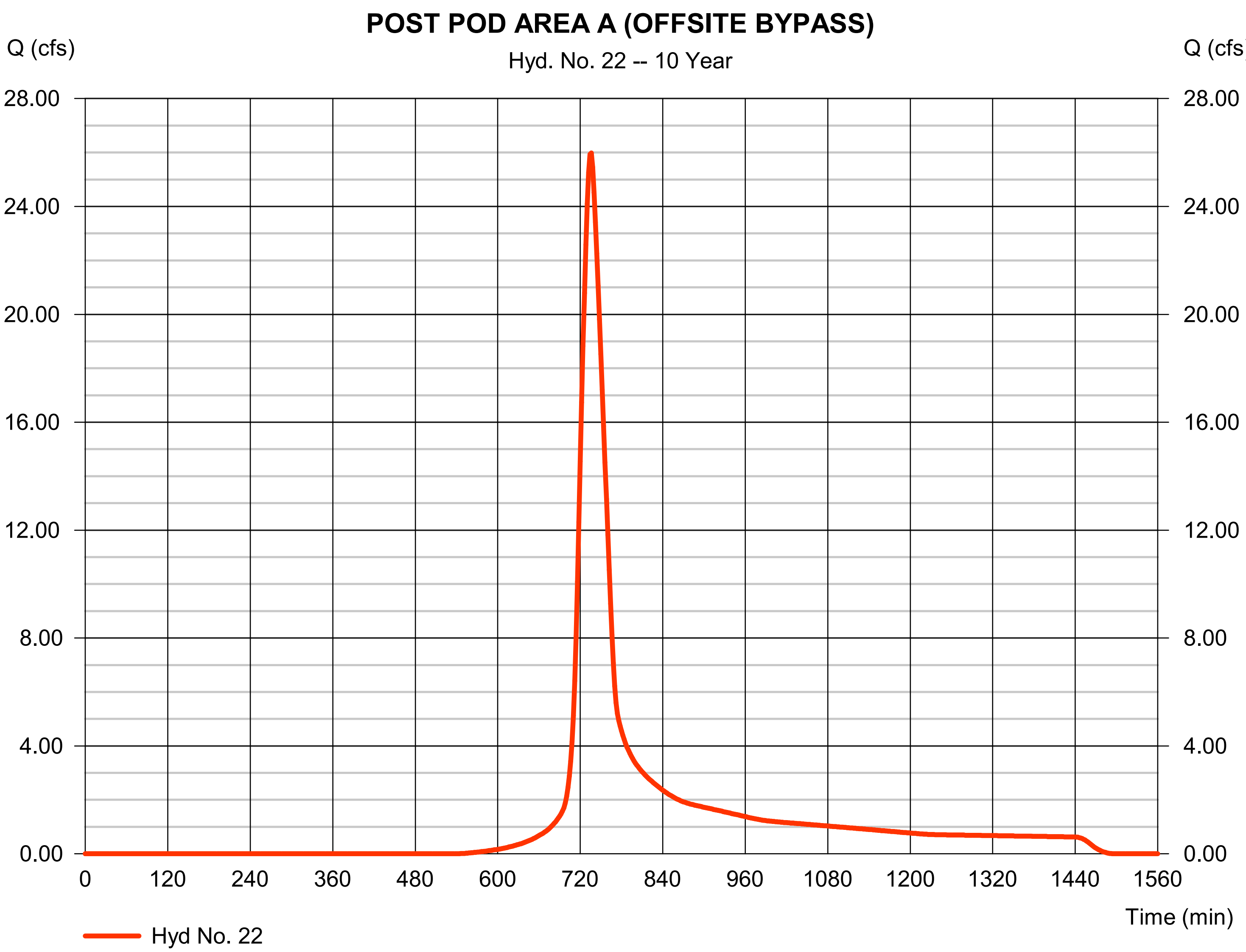
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 22

POST POD AREA A (OFFSITE BYPASS)

Hydrograph type	= SCS Runoff	Peak discharge	= 25.99 cfs
Storm frequency	= 10 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 119,076 cuft
Drainage area	= 13.940 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 34.70 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



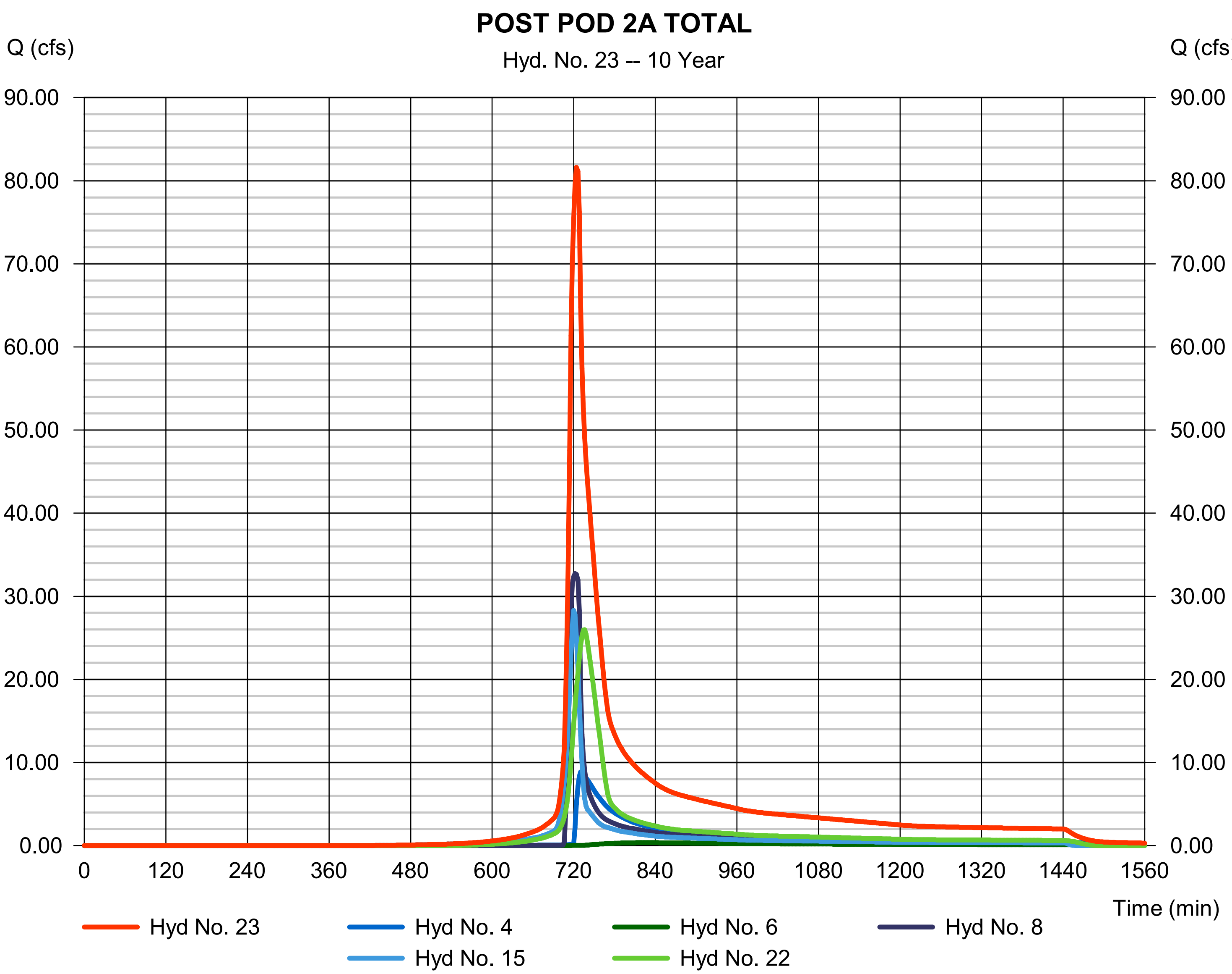
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 23

POST POD 2A TOTAL

Hydrograph type	= Combine	Peak discharge	= 81.61 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 395,979 cuft
Inflow hyds.	= 4, 6, 8, 15, 22	Contrib. drain. area	= 20.390 ac



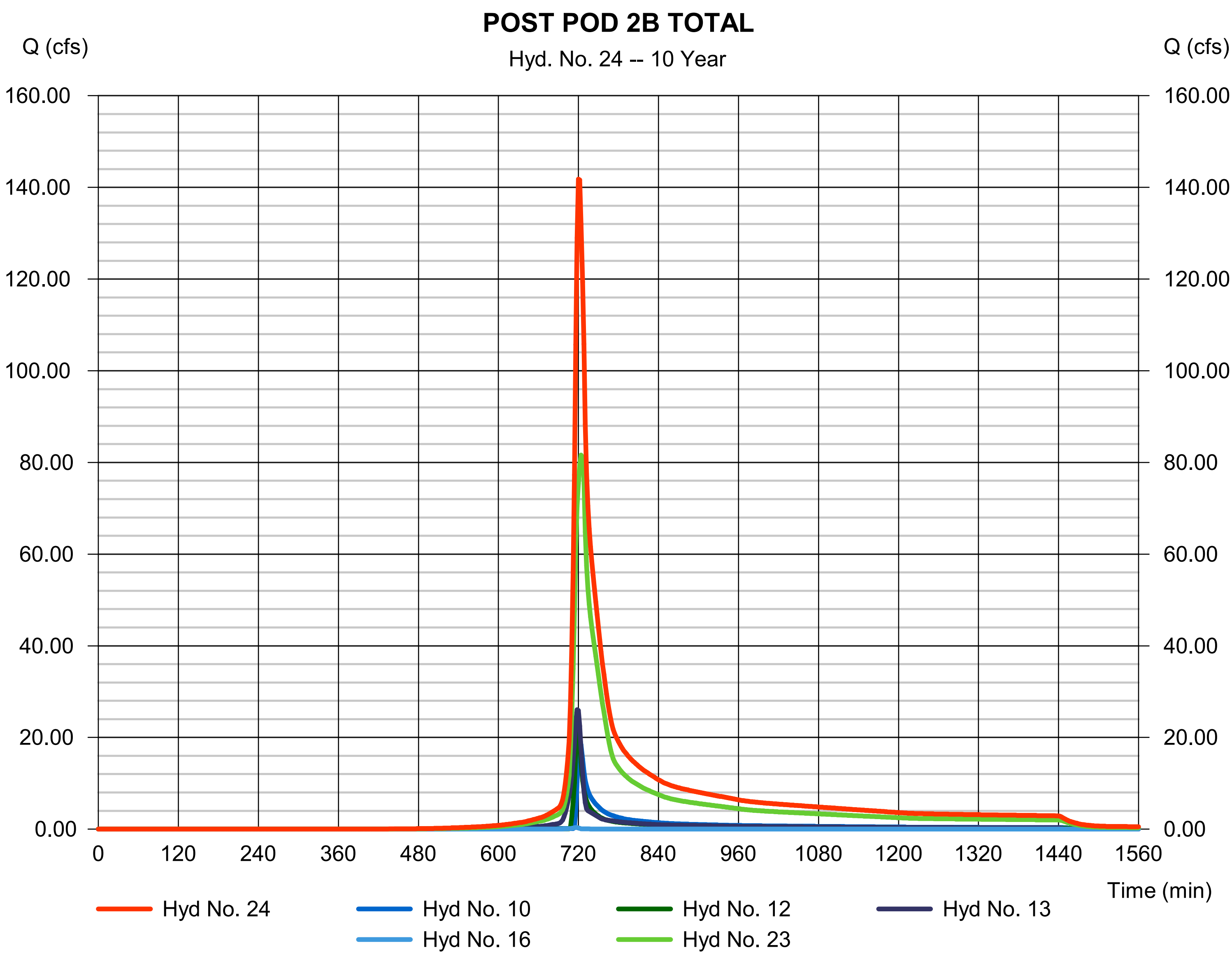
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 24

POST POD 2B TOTAL

Hydrograph type	= Combine	Peak discharge	= 141.81 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 593,444 cuft
Inflow hyds.	= 10, 12, 13, 16, 23	Contrib. drain. area	= 6.420 ac



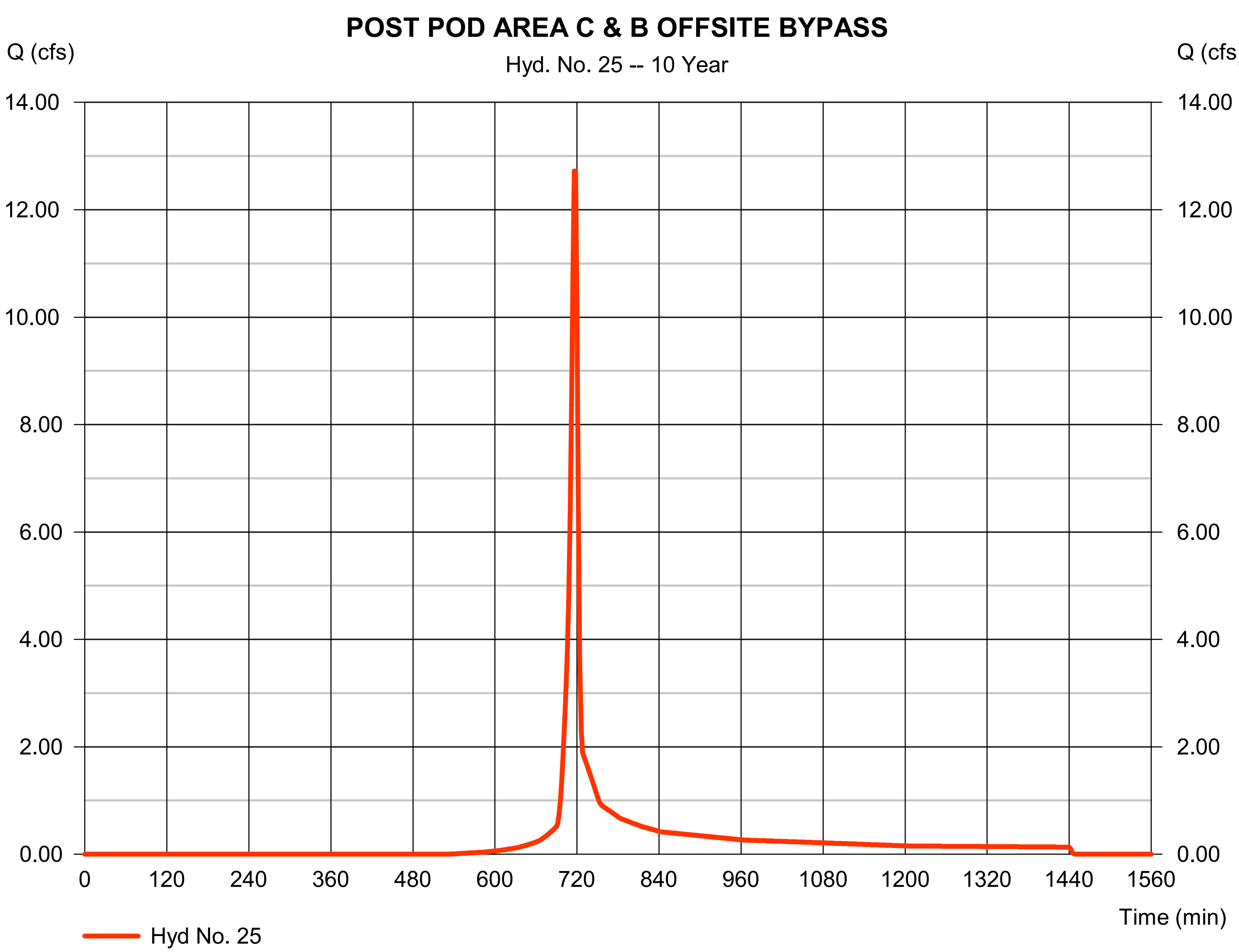
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 25

POST POD AREA C & B OFFSITE BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 12.72 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 25,678 cuft
Drainage area	= 3.170 ac	Curve number	= 74
Basin Slope	= 4.5 %	Hydraulic length	= 1030 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 5.38 min
Total precip.	= 5.02 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

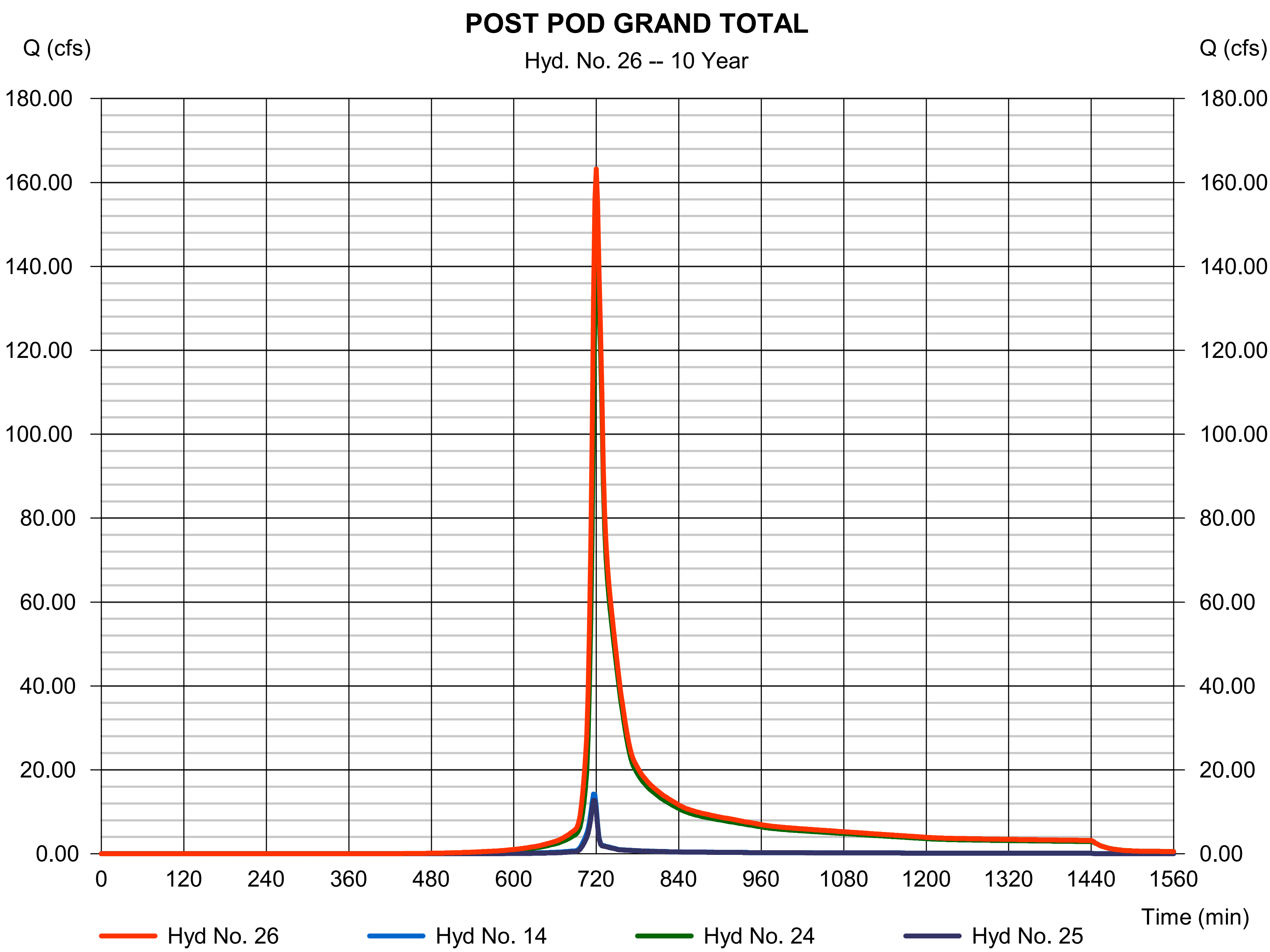


Hydrograph Report

Hyd. No. 26

POST POD GRAND TOTAL

Hydrograph type	= Combine	Peak discharge	= 163.19 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 648,056 cuft
Inflow hyds.	= 14, 24, 25	Contrib. drain. area	= 6.110 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

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	230.07	2	722	645,677	------	------	------	PRE POD #2
2	SCS Runoff	42.19	2	718	96,618	------	------	------	PRE POD #1
3	SCS Runoff	79.27	2	718	186,237	------	------	------	POST POD 2A #1 (to SCM #1)
4	Reservoir	62.03	2	722	174,892	3	367.05	114,076	PostDev Thru SCM#1
5	SCS Runoff	15.34	2	718	35,875	------	------	------	POST POD 2A #2 (to SCM #2)
6	Reservoir	4.791	2	728	30,791	5	363.42	34,158	Route PostDev SCM #2
7	SCS Runoff	71.45	2	718	167,459	------	------	------	POST POD 2A #3 (to SCM #3)
8	Reservoir	66.10	2	720	164,065	7	364.43	44,996	Route PostDev @ SCM#3
9	SCS Runoff	64.88	2	716	140,335	------	------	------	POST POD 2B #4 (to SCM #5)
10	Reservoir	53.87	2	720	138,645	9	351.37	68,087	Route PostDev SCM#5
11	SCS Runoff	44.64	2	716	93,742	------	------	------	POST POD 2B #2 (to SCM #4)
12	Reservoir	32.45	2	720	93,325	11	360.02	34,250	Route PostDev SCM #4
13	SCS Runoff	46.98	2	718	108,660	------	------	------	POST POD 2B #3 (BYPASS)
14	SCS Runoff	24.53	2	716	51,006	------	------	------	POST POD #1 (BYPASS)
15	SCS Runoff	48.23	2	720	127,766	------	------	------	POST POD 2A #4 (BYPASS)
16	SCS Runoff	0.583	2	716	1,212	------	------	------	POST POD 2B #1 (BYPASS)
17	SCS Runoff	23.29	2	716	47,506	------	------	------	PRE POD #1 OFFSITE AREA
18	SCS Runoff	49.11	2	734	222,406	------	------	------	PRE OFFSITE AREA #4
19	Combine	65.08	2	718	144,124	2, 17,	------	------	PRE POD #1 TOTAL
20	Combine	263.30	2	722	868,083	1, 18,	------	------	PRE POD #2 TOTAL
21	Combine	310.97	2	722	1,012,207	19, 20	------	------	PRE POD GRAND TOTAL
22	SCS Runoff	49.11	2	734	222,406	------	------	------	POST POD AREA A (OFFSITE BYP
23	Combine	209.01	2	722	719,920	4, 6, 8, 15, 22	------	------	POST POD 2A TOTAL
24	Combine	330.13	2	720	1,061,761	10, 12, 13, 16, 23	------	------	POST POD 2B TOTAL
25	SCS Runoff	23.52	2	716	47,960	------	------	------	POST POD AREA C & B OFFSITE B
26	Combine	367.29	2	720	1,160,727	14, 24, 25	------	------	POST POD GRAND TOTAL

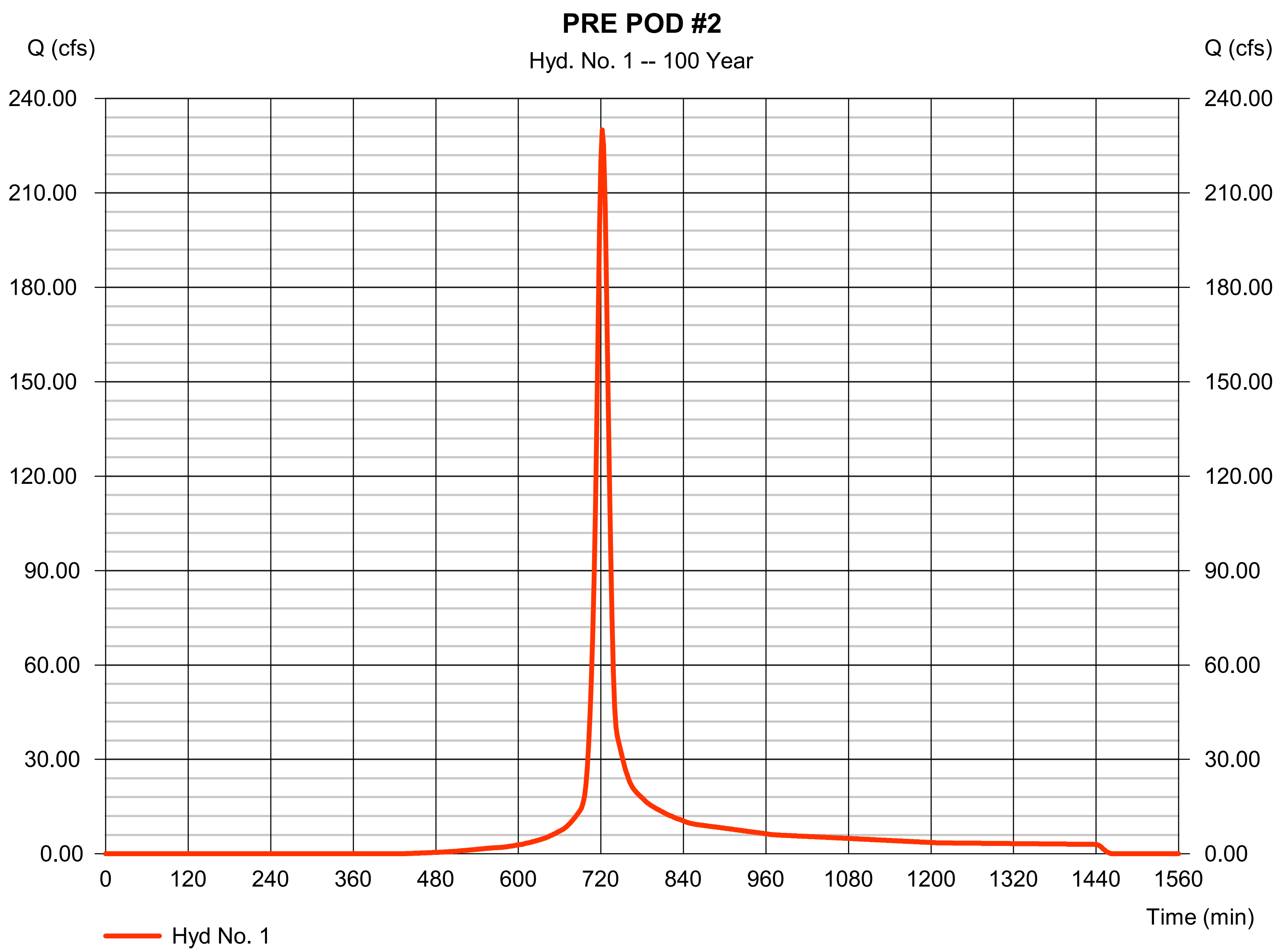
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 1

PRE POD #2

Hydrograph type	= SCS Runoff	Peak discharge	= 230.07 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 645,677 cuft
Drainage area	= 41.980 ac	Curve number	= 73.1
Basin Slope	= 1.4 %	Hydraulic length	= 4320 ft
Tc method	= User	Time of conc. (Tc)	= 14.00 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



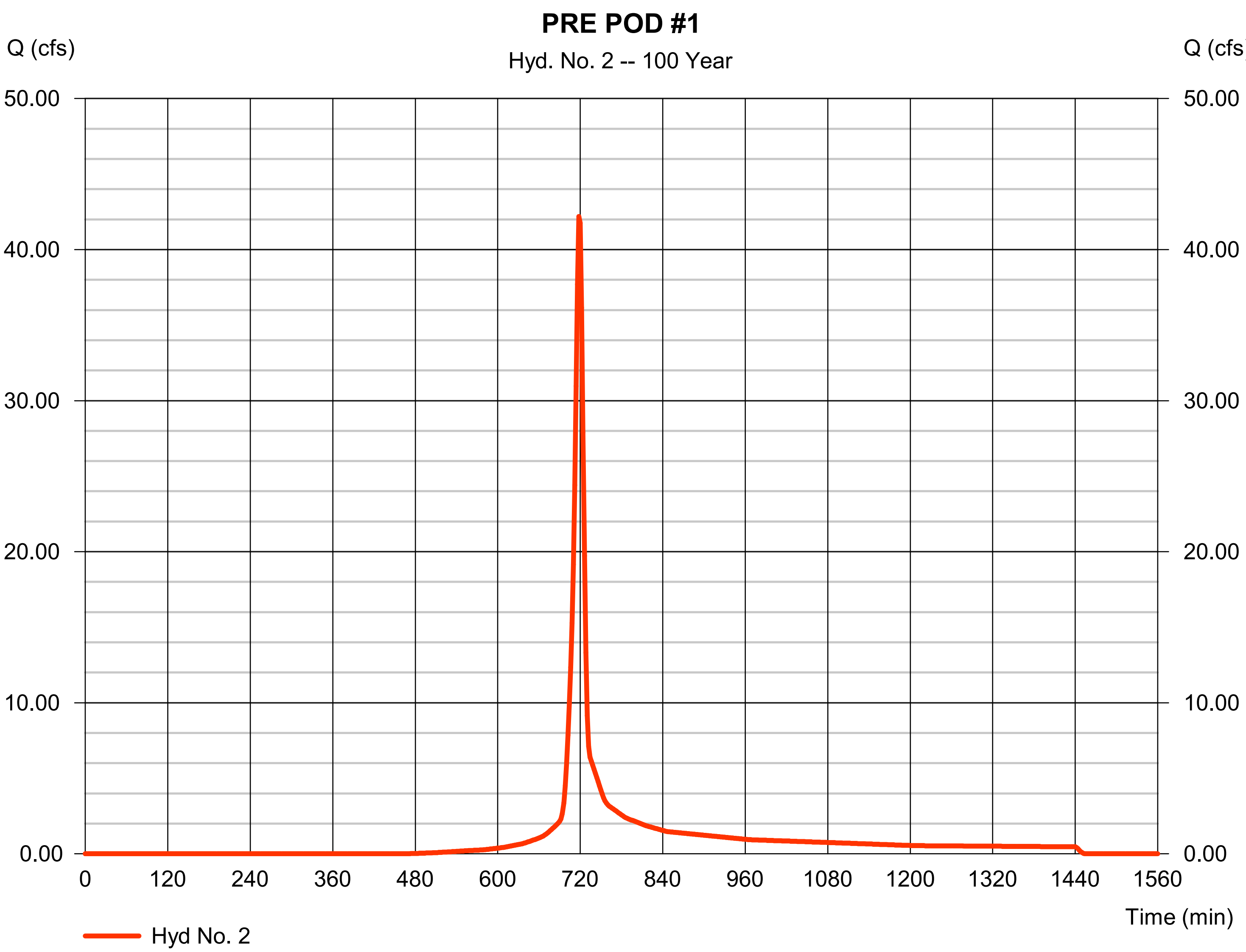
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 2

PRE POD #1

Hydrograph type	= SCS Runoff	Peak discharge	= 42.19 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 96,618 cuft
Drainage area	= 6.540 ac	Curve number	= 70.6
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.70 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



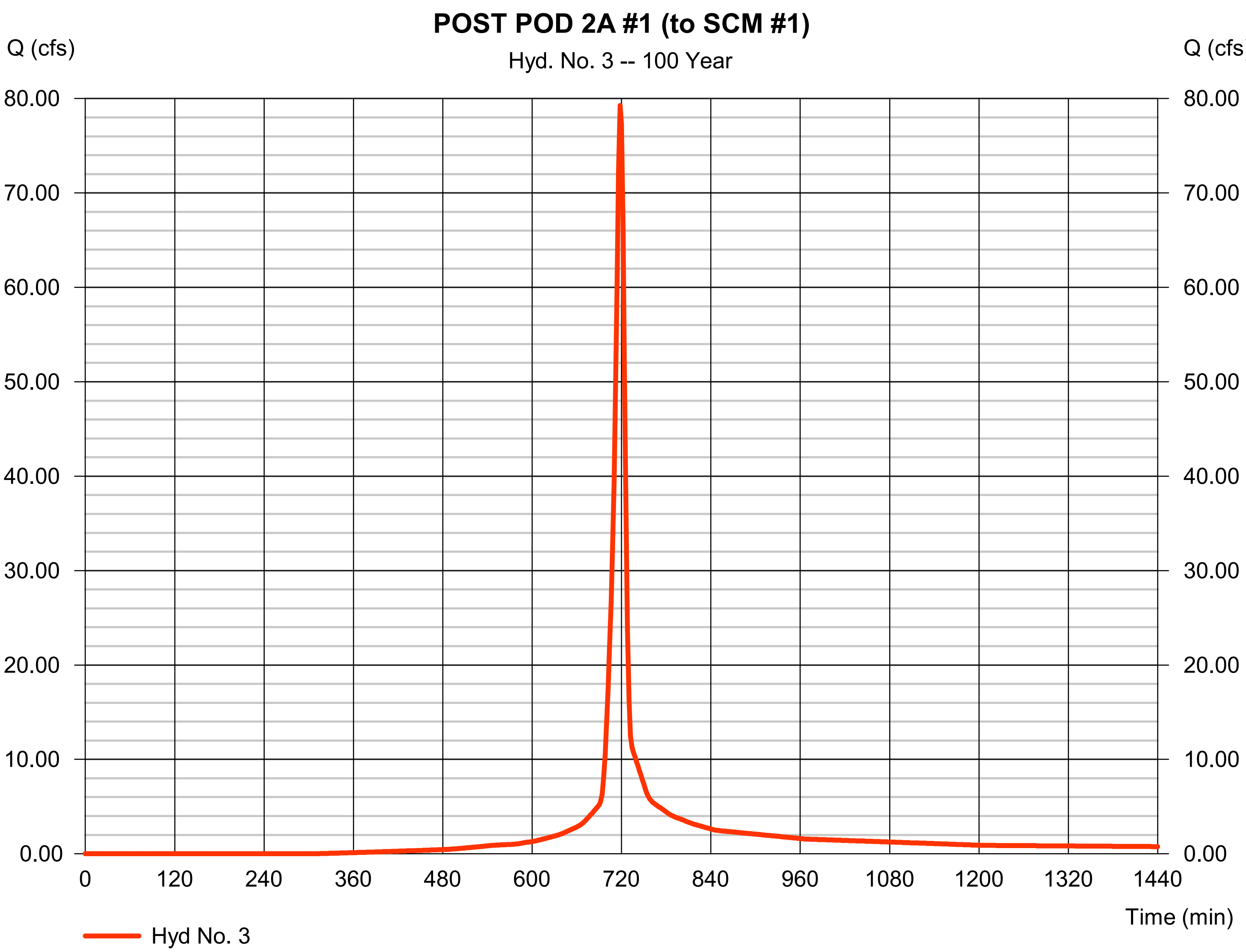
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 3

POST POD 2A #1 (to SCM #1)

Hydrograph type	= SCS Runoff	Peak discharge	= 79.27 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 186,237 cuft
Drainage area	= 9.780 ac	Curve number	= 81.1
Basin Slope	= 2.4 %	Hydraulic length	= 1000 ft
Tc method	= User	Time of conc. (Tc)	= 6.60 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

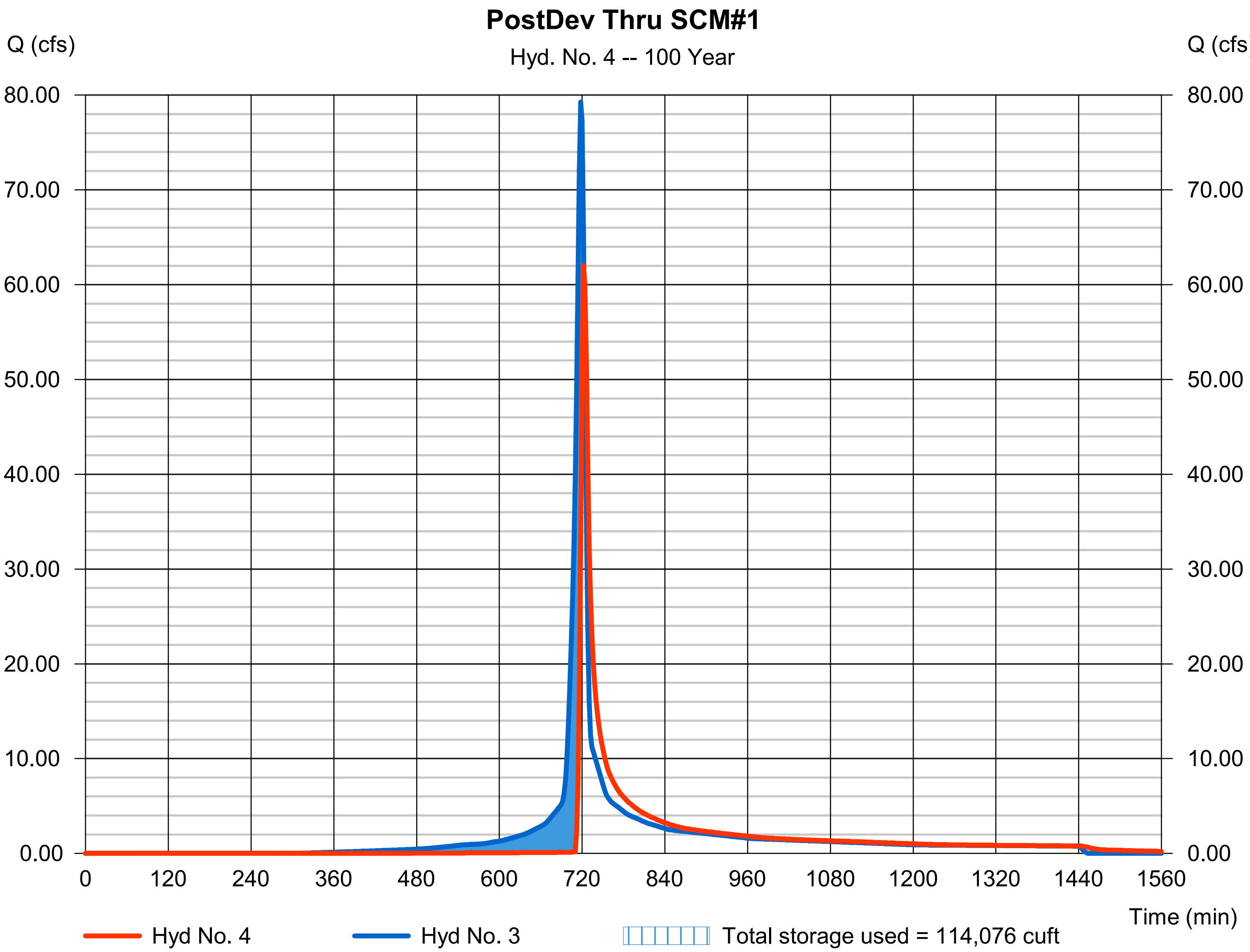
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 4

PostDev Thru SCM#1

Hydrograph type	= Reservoir	Peak discharge	= 62.03 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 174,892 cuft
Inflow hyd. No.	= 3 - POST POD 2A #1 (to SCM #1)	Max. Elevation	= 367.05 ft
Reservoir name	= SCM #1	Max. Storage	= 114,076 cuft

Storage Indication method used. Wet pond routing start elevation = 363.50 ft.



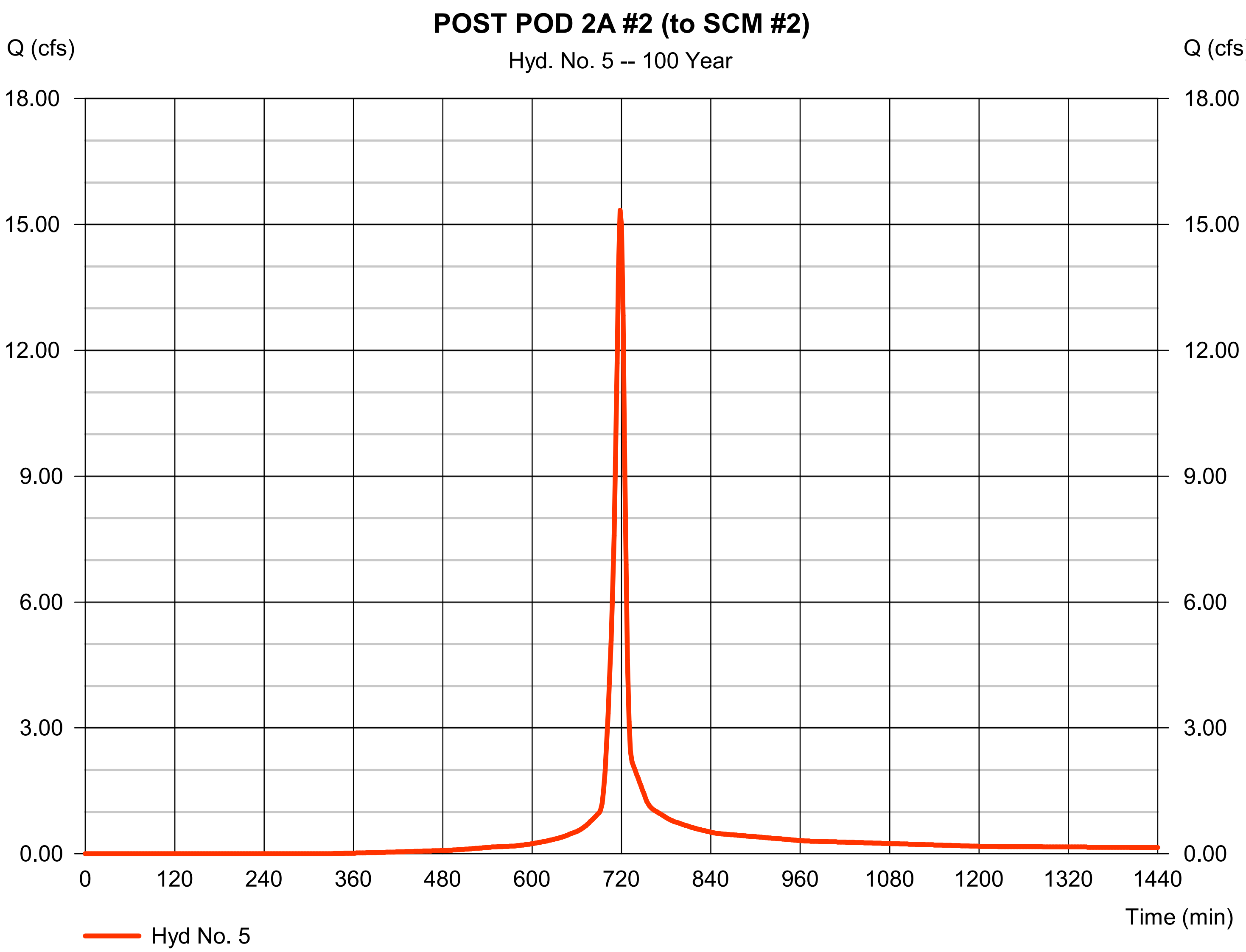
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 5

POST POD 2A #2 (to SCM #2)

Hydrograph type	= SCS Runoff	Peak discharge	= 15.34 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 35,875 cuft
Drainage area	= 1.930 ac	Curve number	= 80
Basin Slope	= 0.5 %	Hydraulic length	= 450 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 6.62 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

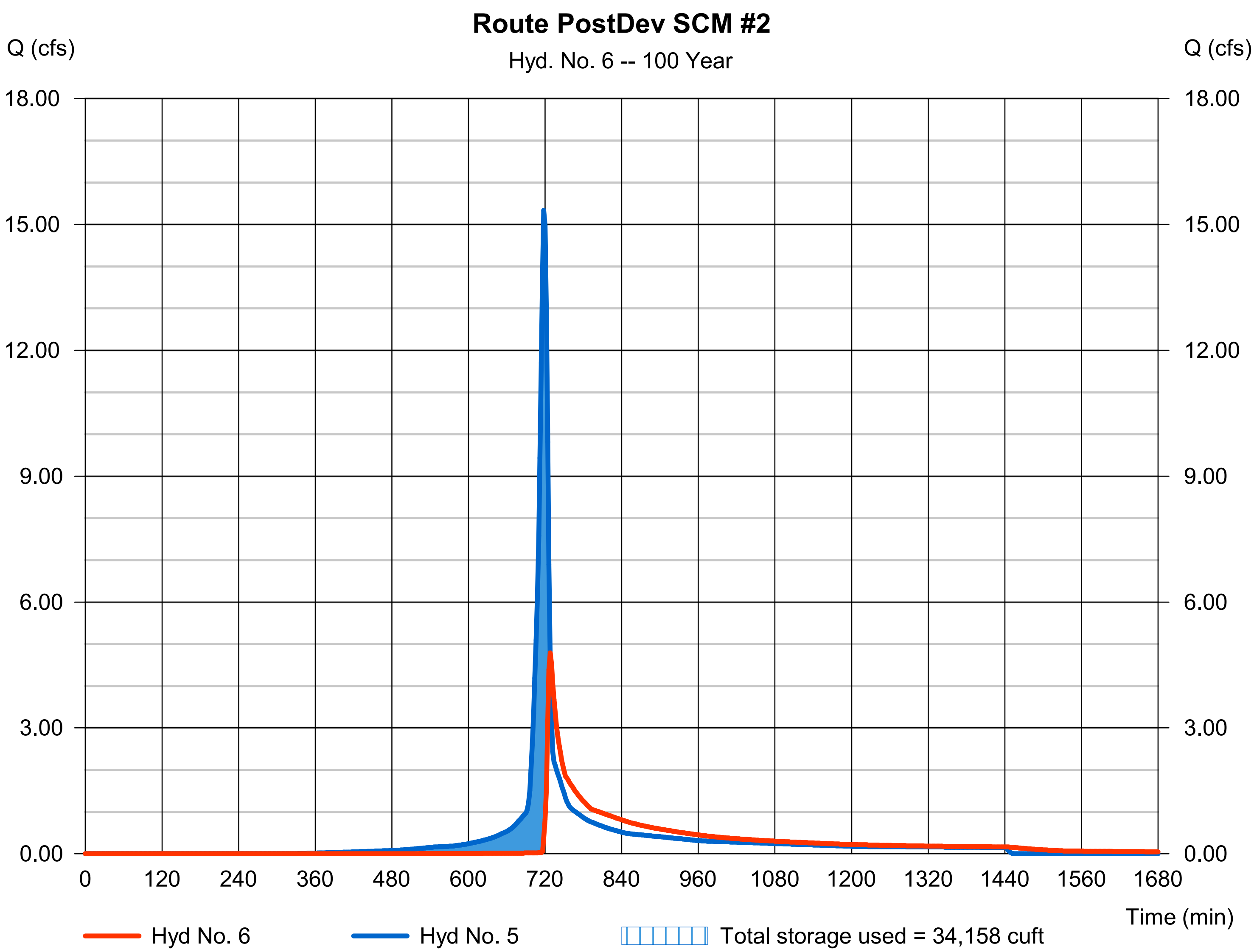
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 6

Route PostDev SCM #2

Hydrograph type	= Reservoir	Peak discharge	= 4.791 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 30,791 cuft
Inflow hyd. No.	= 5 - POST POD 2A #2 (to SCM #2)	Max. Elevation	= 363.42 ft
Reservoir name	= SCM #2	Max. Storage	= 34,158 cuft

Storage Indication method used. Wet pond routing start elevation = 361.50 ft.



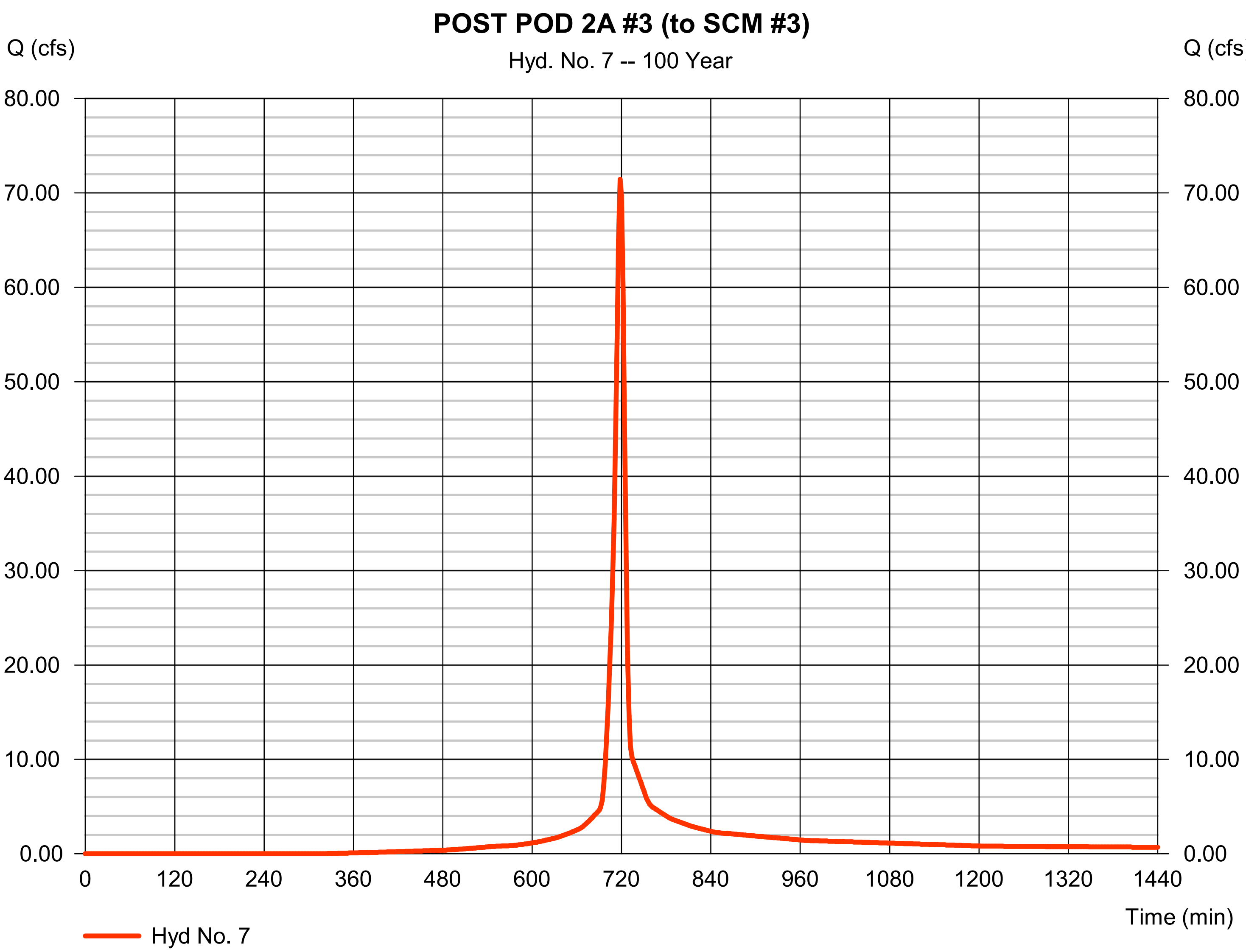
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 7

POST POD 2A #3 (to SCM #3)

Hydrograph type	= SCS Runoff	Peak discharge	= 71.45 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 167,459 cuft
Drainage area	= 8.910 ac	Curve number	= 80.5
Basin Slope	= 2.6 %	Hydraulic length	= 1120 ft
Tc method	= User	Time of conc. (Tc)	= 7.30 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

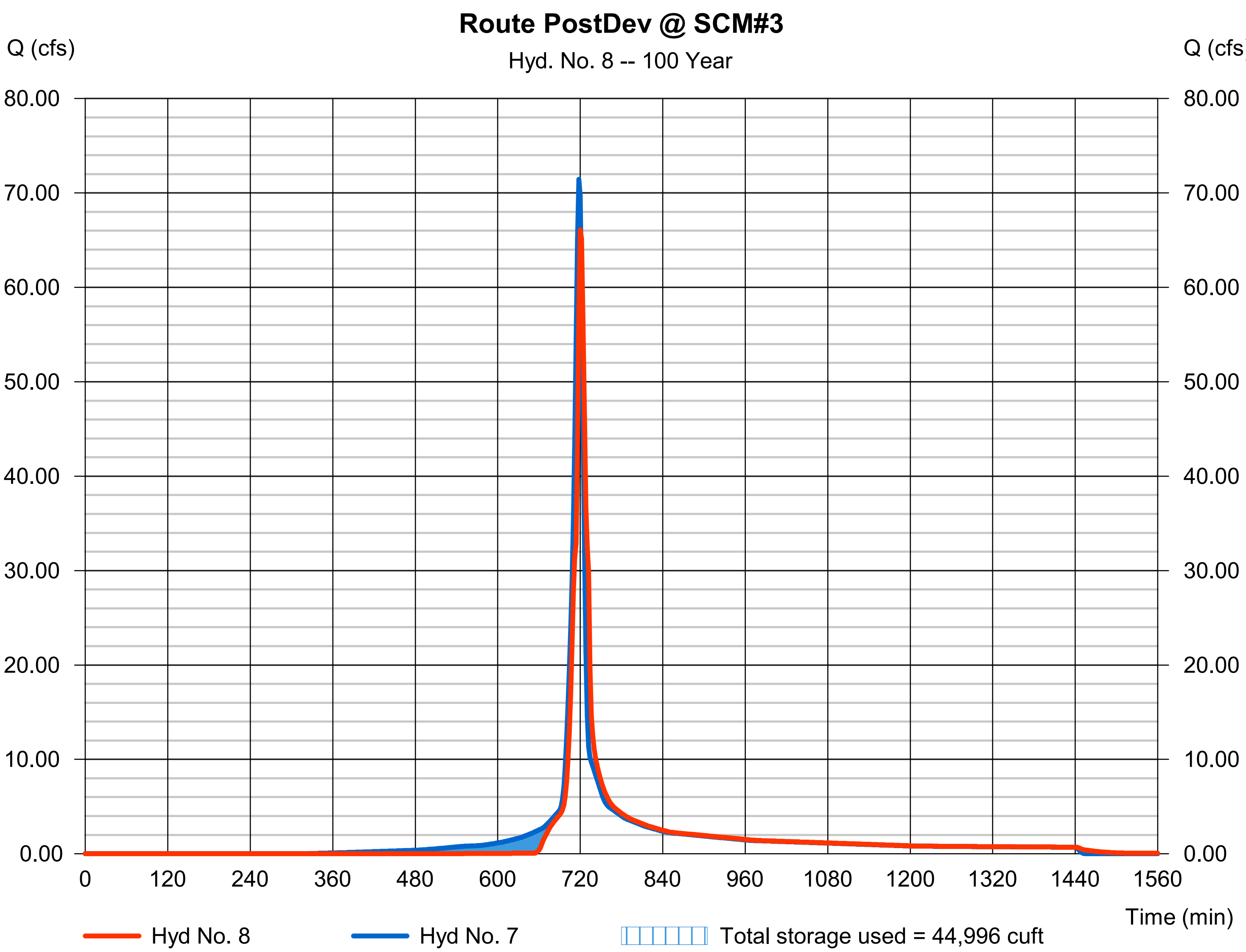
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 8

Route PostDev @ SCM#3

Hydrograph type	= Reservoir	Peak discharge	= 66.10 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 164,065 cuft
Inflow hyd. No.	= 7 - POST POD 2A #3 (to SCM #3)	Max. Elevation	= 364.43 ft
Reservoir name	= SCM #3	Max. Storage	= 44,996 cuft

Storage Indication method used. Wet pond routing start elevation = 361.00 ft.

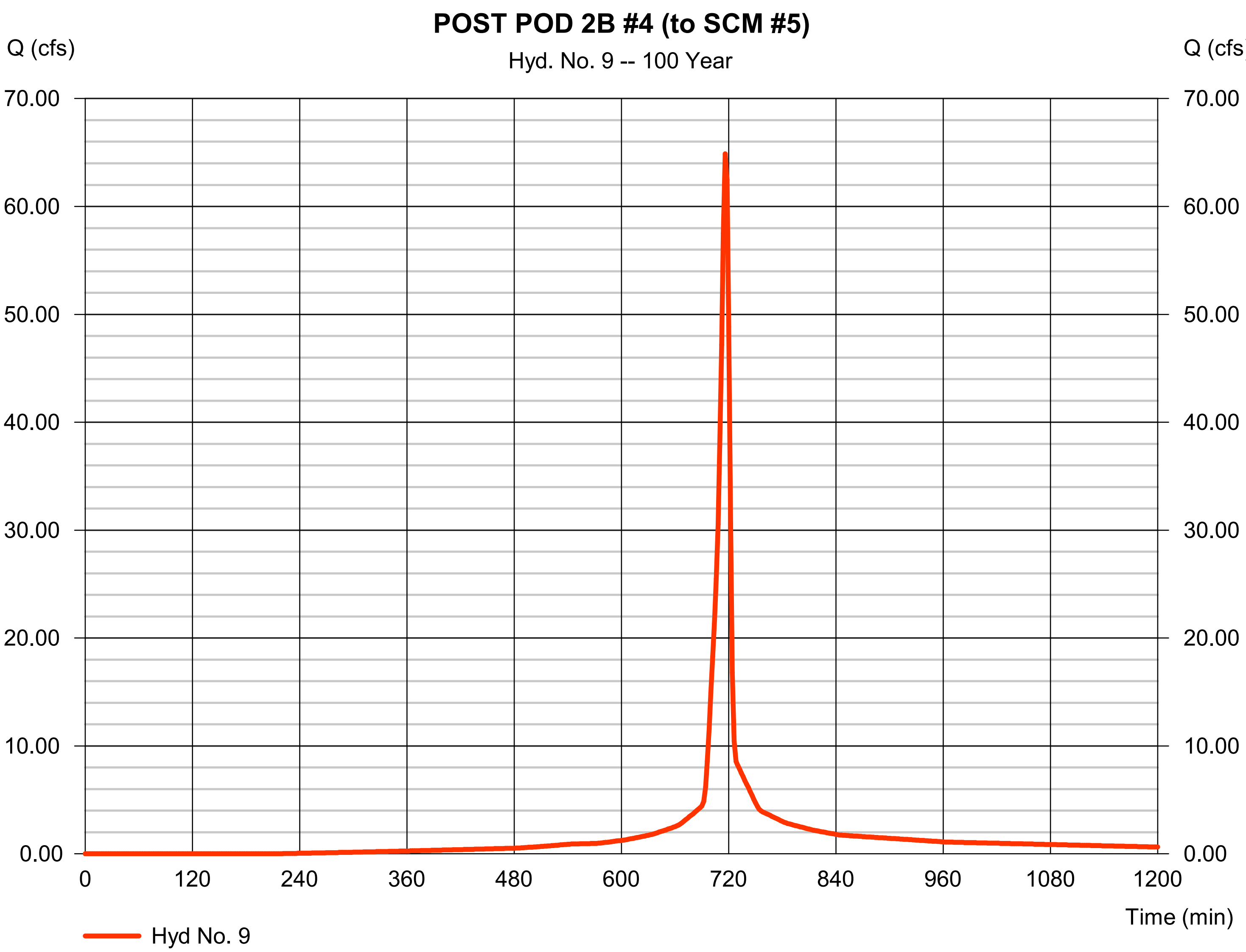


Hydrograph Report

Hyd. No. 9

POST POD 2B #4 (to SCM #5)

Hydrograph type	= SCS Runoff	Peak discharge	= 64.88 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 140,335 cuft
Drainage area	= 6.960 ac	Curve number	= 87
Basin Slope	= 3.2 %	Hydraulic length	= 1270 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

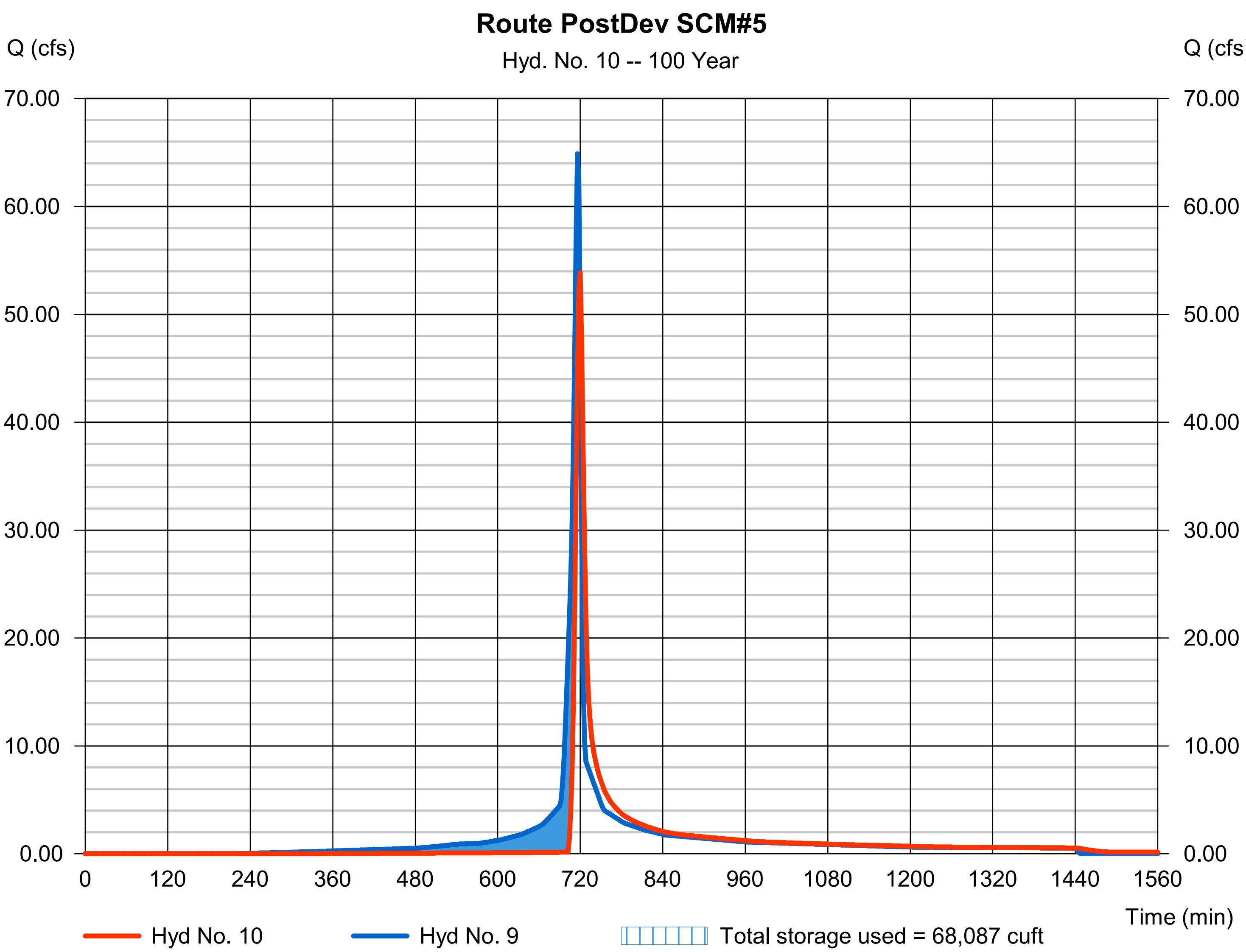
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 10

Route PostDev SCM#5

Hydrograph type	= Reservoir	Peak discharge	= 53.87 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 138,645 cuft
Inflow hyd. No.	= 9 - POST POD 2B #4 (to SCM #5)	Max. Elevation	= 351.37 ft
Reservoir name	= SCM #5	Max. Storage	= 68,087 cuft

Storage Indication method used. Wet pond routing start elevation = 347.50 ft.



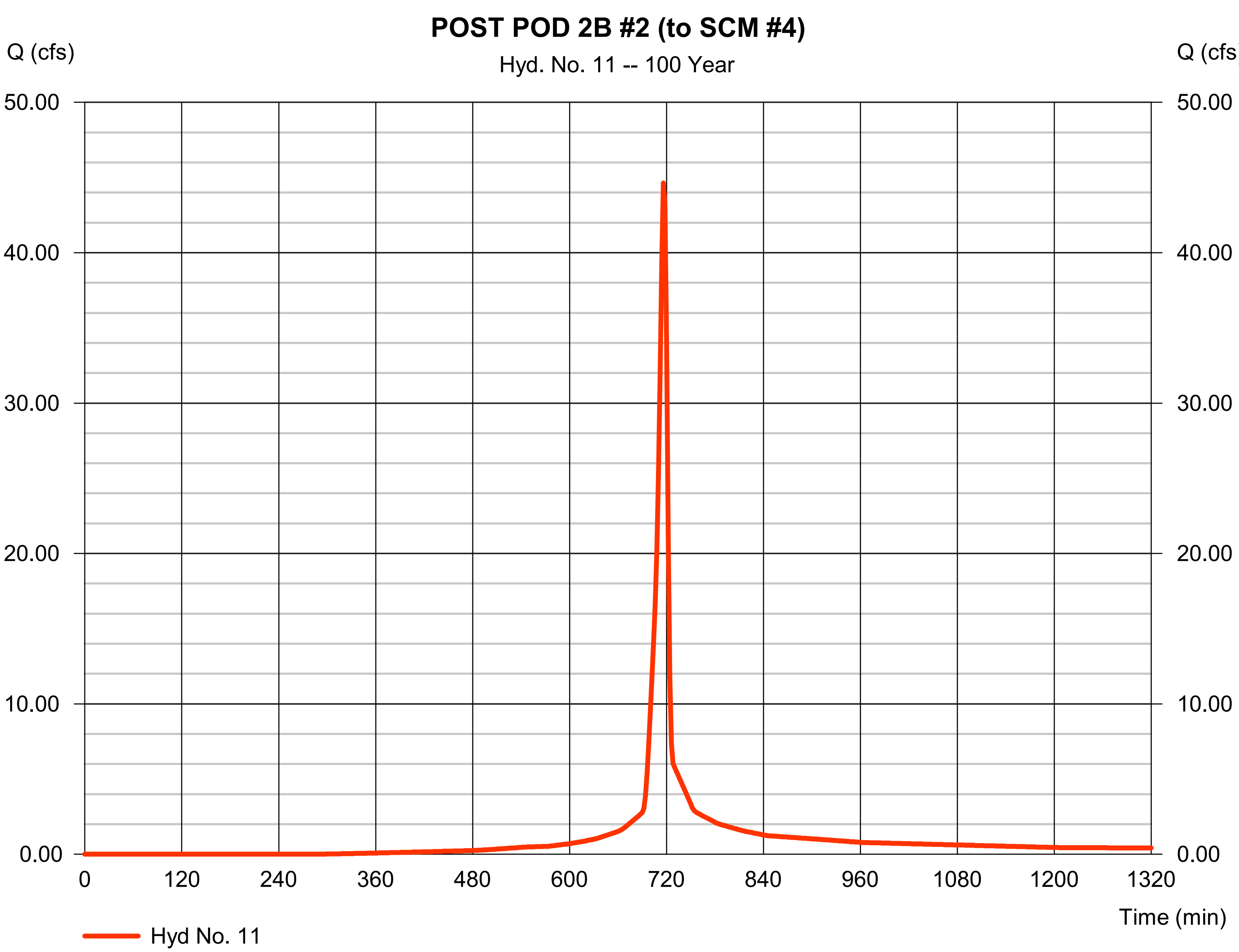
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 11

POST POD 2B #2 (to SCM #4)

Hydrograph type	= SCS Runoff	Peak discharge	= 44.64 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 93,742 cuft
Drainage area	= 5.150 ac	Curve number	= 82
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

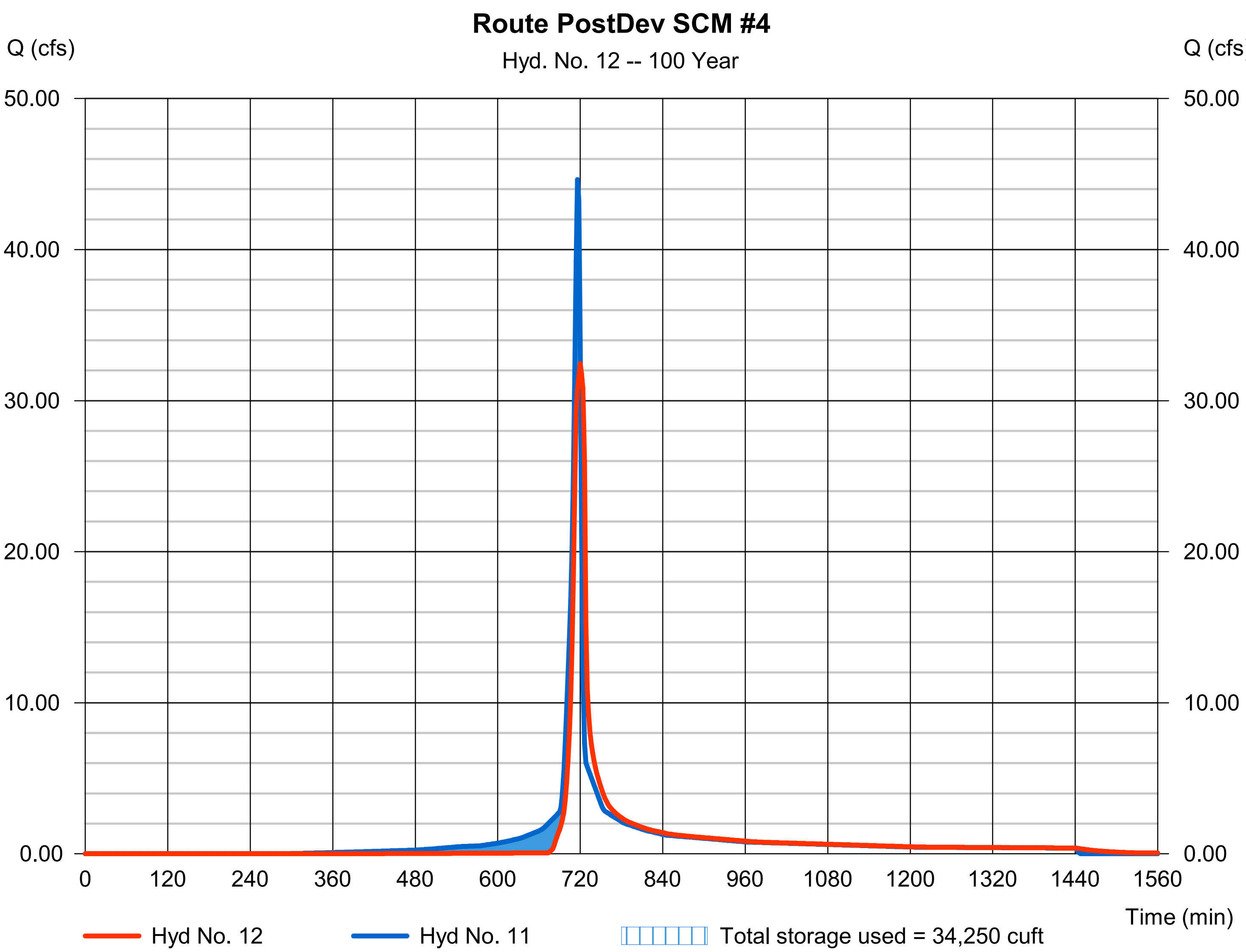
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 12

Route PostDev SCM #4

Hydrograph type	= Reservoir	Peak discharge	= 32.45 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 93,325 cuft
Inflow hyd. No.	= 11 - POST POD 2B #2 (to SCM #4)	Max. Elevation	= 360.02 ft
Reservoir name	= SCM #4	Max. Storage	= 34,250 cuft

Storage Indication method used. Wet pond routing start elevation = 357.50 ft.

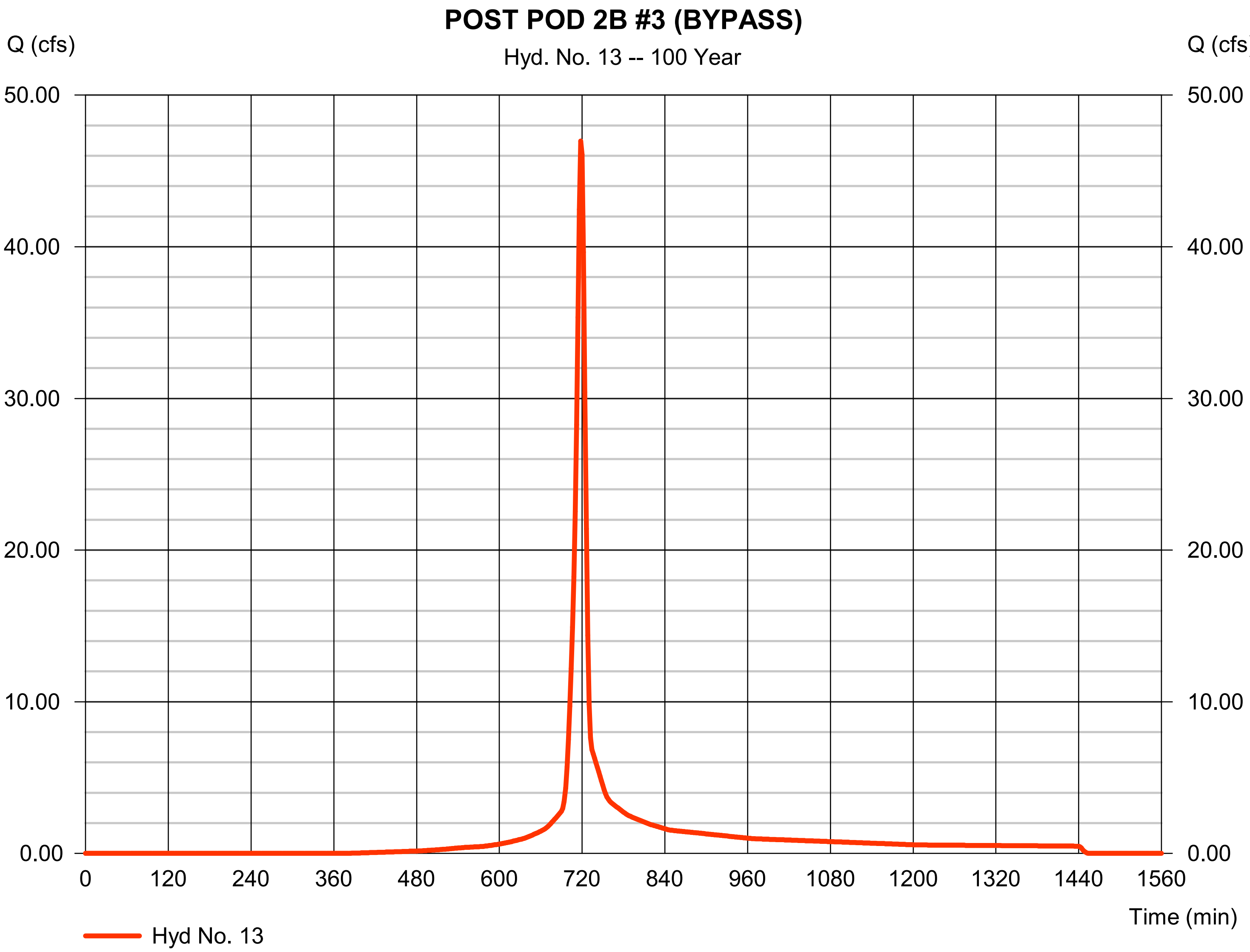


Hydrograph Report

Hyd. No. 13

POST POD 2B #3 (BYPASS)

Hydrograph type	= SCS Runoff	Peak discharge	= 46.98 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 108,660 cuft
Drainage area	= 6.350 ac	Curve number	= 76.4
Basin Slope	= 1.3 %	Hydraulic length	= 4170 ft
Tc method	= User	Time of conc. (Tc)	= 7.00 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

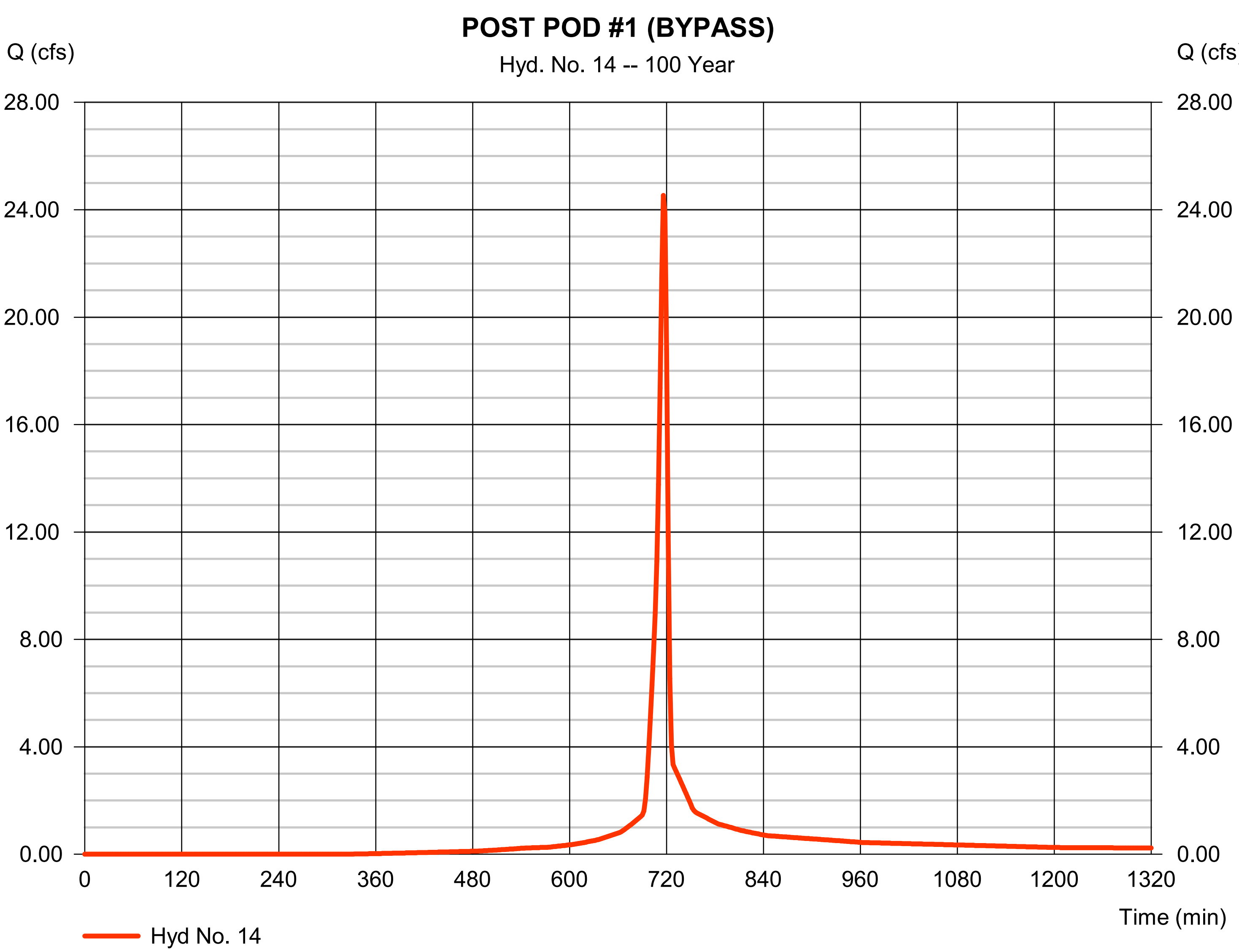


Hydrograph Report

Hyd. No. 14

POST POD #1 (BYPASS)

Hydrograph type	= SCS Runoff	Peak discharge	= 24.53 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 51,006 cuft
Drainage area	= 2.940 ac	Curve number	= 79.8
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

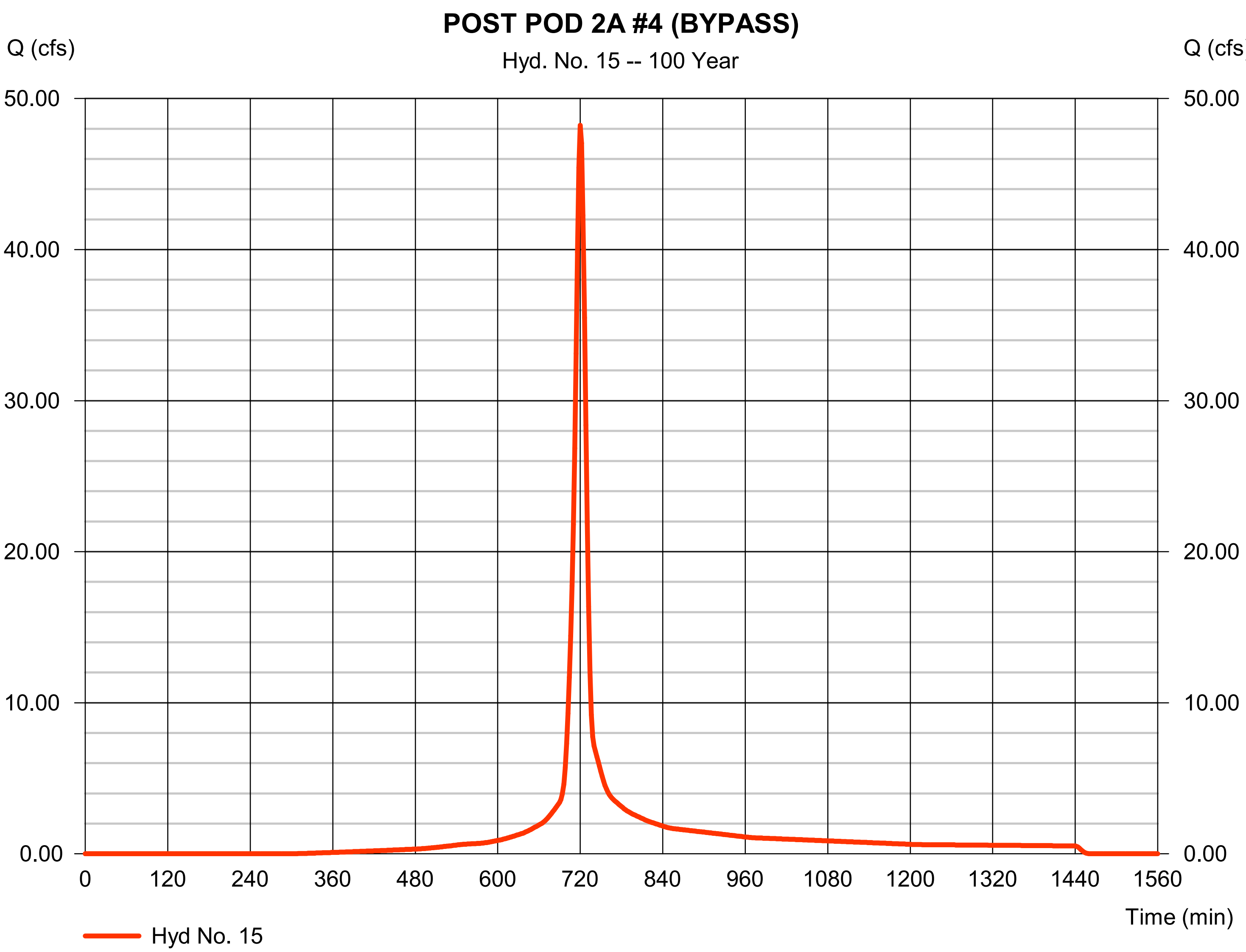


Hydrograph Report

Hyd. No. 15

POST POD 2A #4 (BYPASS)

Hydrograph type	= SCS Runoff	Peak discharge	= 48.23 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 127,766 cuft
Drainage area	= 6.450 ac	Curve number	= 81.5
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.50 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

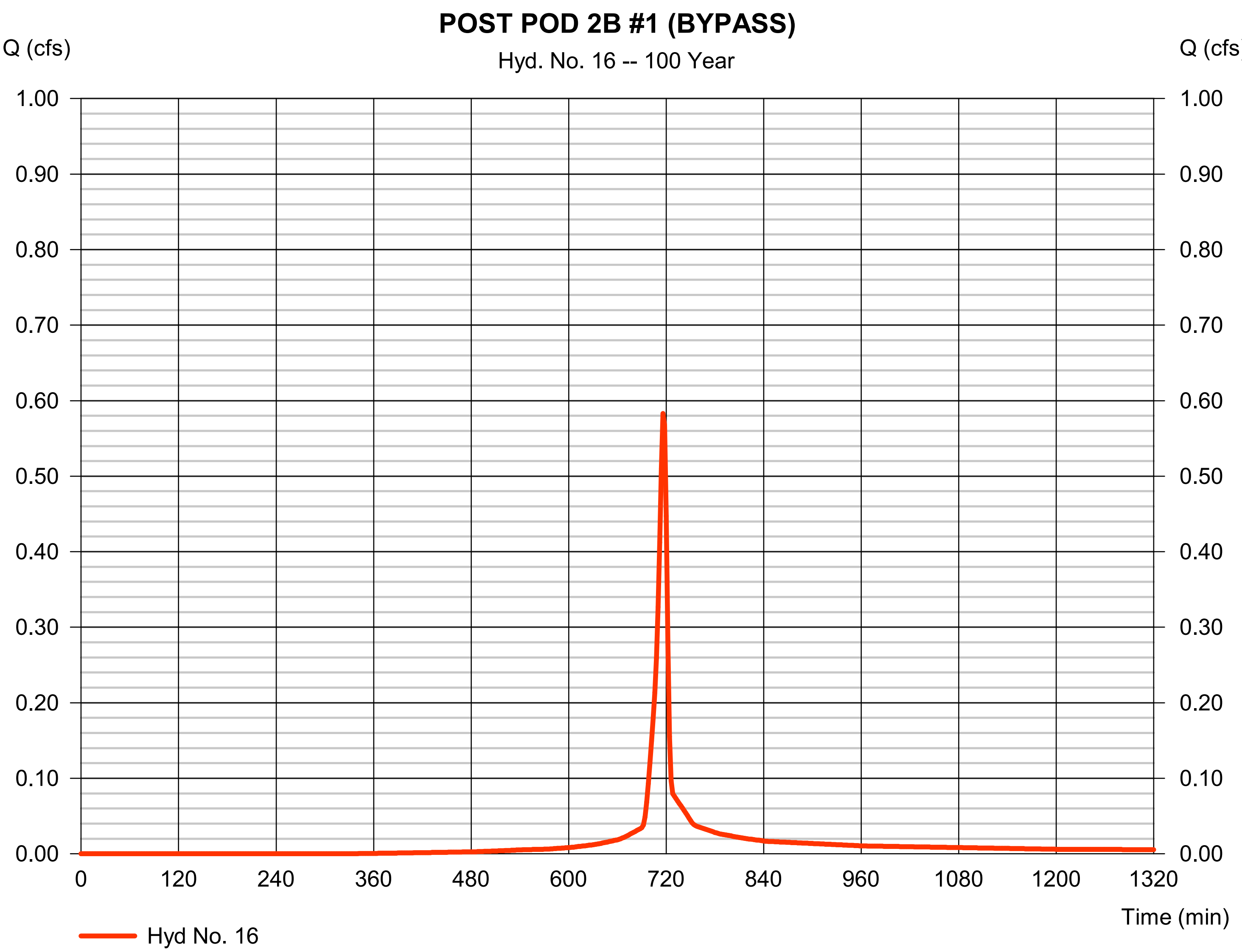


Hydrograph Report

Hyd. No. 16

POST POD 2B #1 (BYPASS)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.583 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 1,212 cuft
Drainage area	= 0.070 ac	Curve number	= 79.7
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



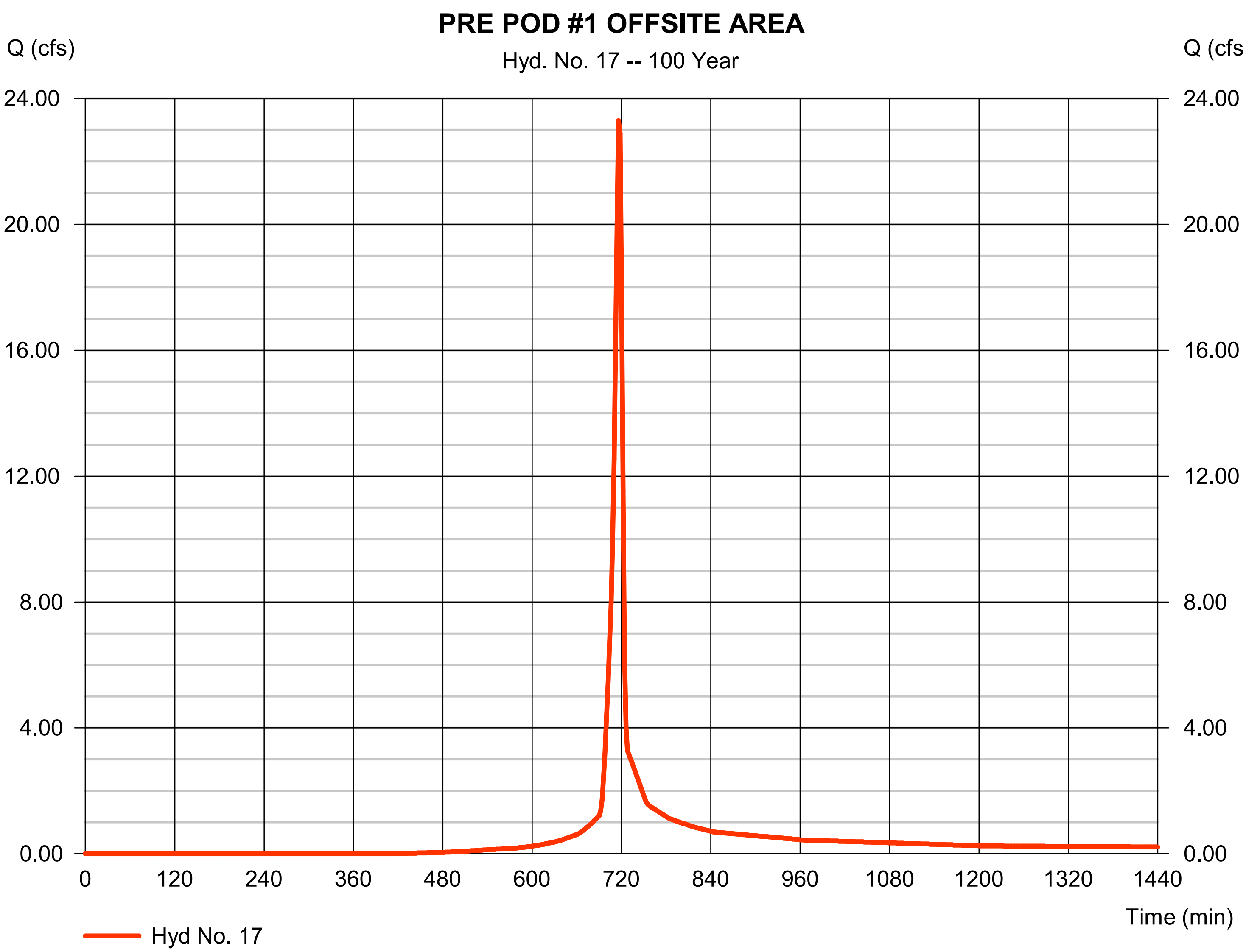
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 17

PRE POD #1 OFFSITE AREA

Hydrograph type	= SCS Runoff	Peak discharge	= 23.29 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 47,506 cuft
Drainage area	= 3.140 ac	Curve number	= 74
Basin Slope	= 4.5 %	Hydraulic length	= 1030 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 5.38 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



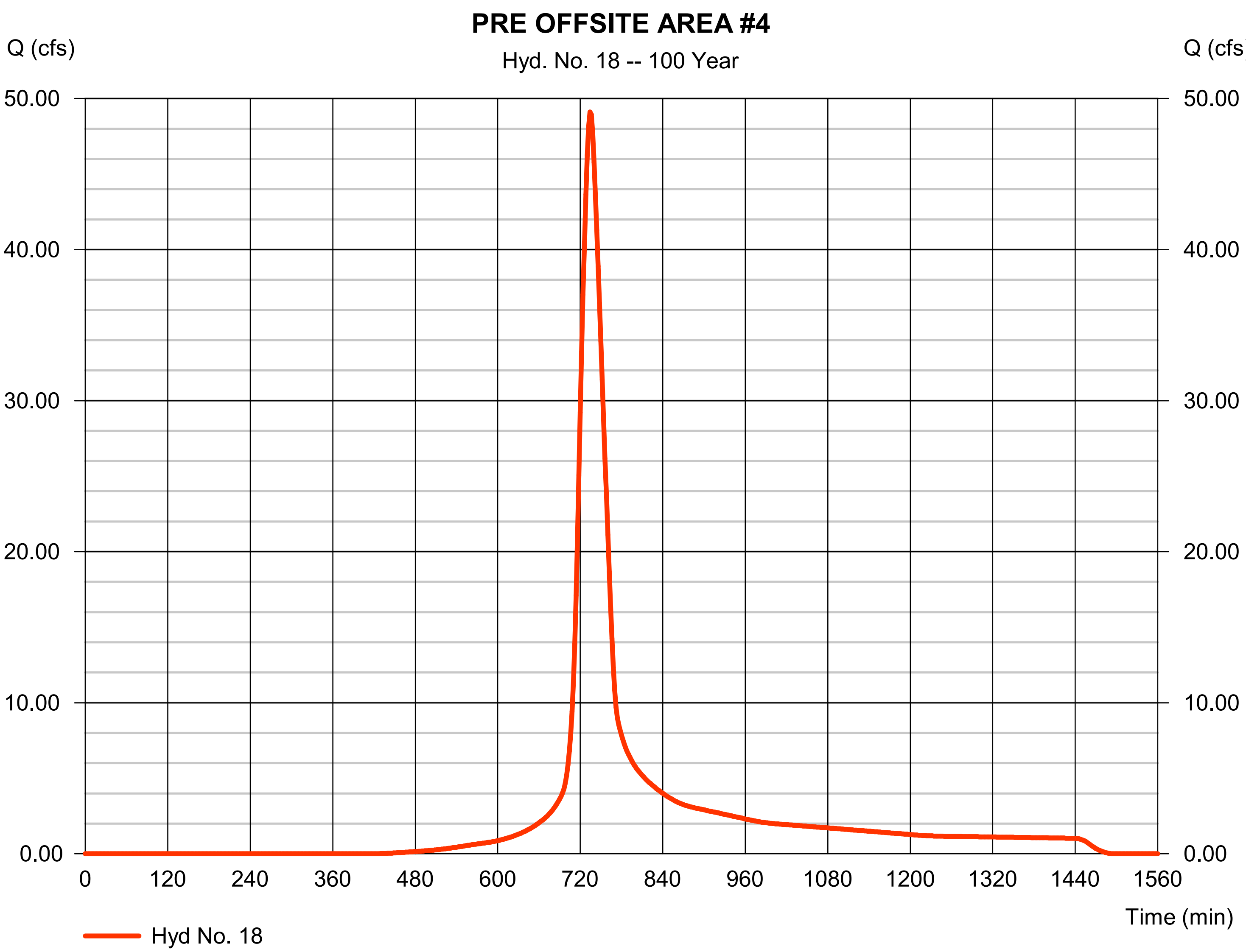
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 18

PRE OFFSITE AREA #4

Hydrograph type	= SCS Runoff	Peak discharge	= 49.11 cfs
Storm frequency	= 100 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 222,406 cuft
Drainage area	= 13.940 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 34.70 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

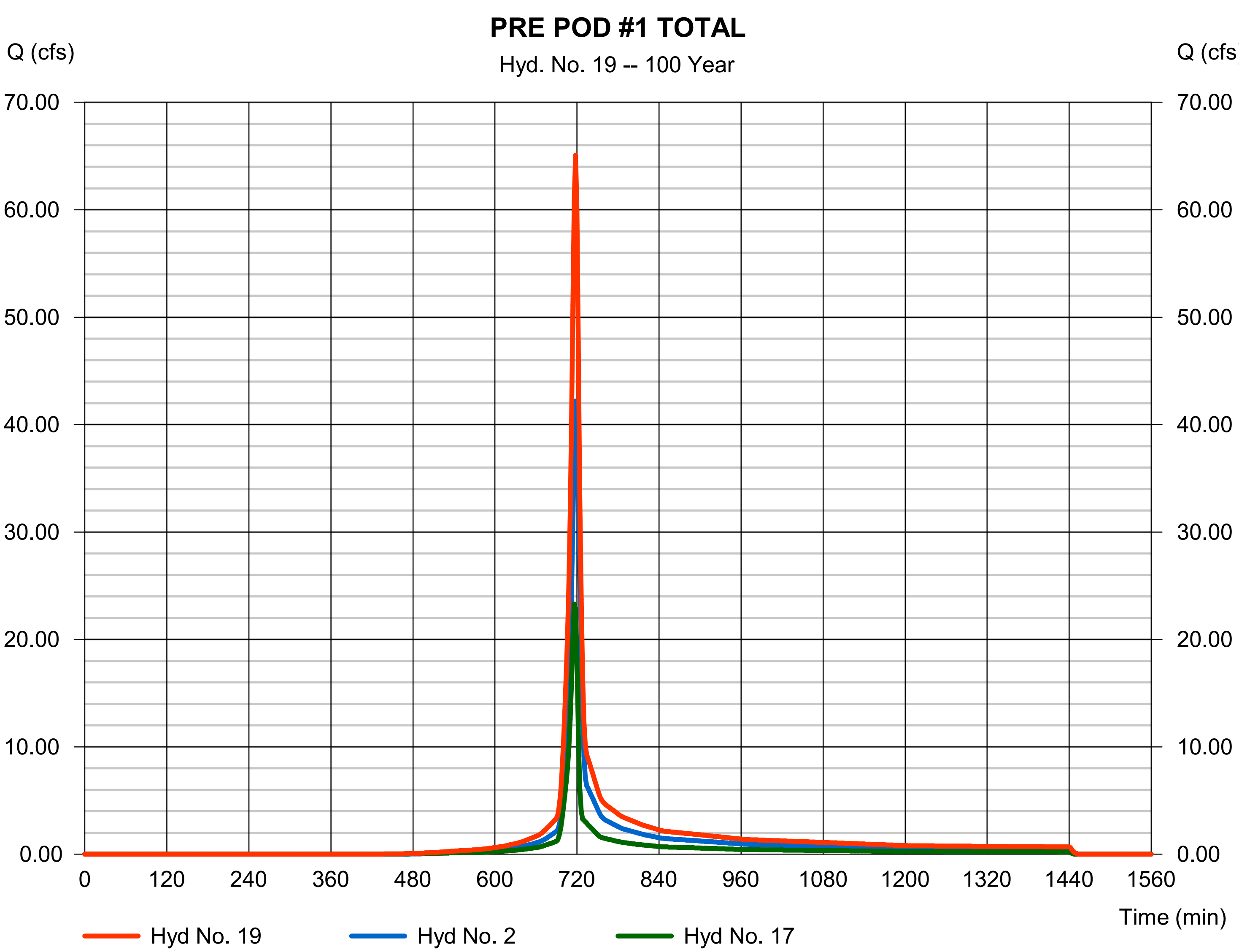


Hydrograph Report

Hyd. No. 19

PRE POD #1 TOTAL

Hydrograph type	= Combine	Peak discharge	= 65.08 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 144,124 cuft
Inflow hyds.	= 2, 17	Contrib. drain. area	= 9.680 ac



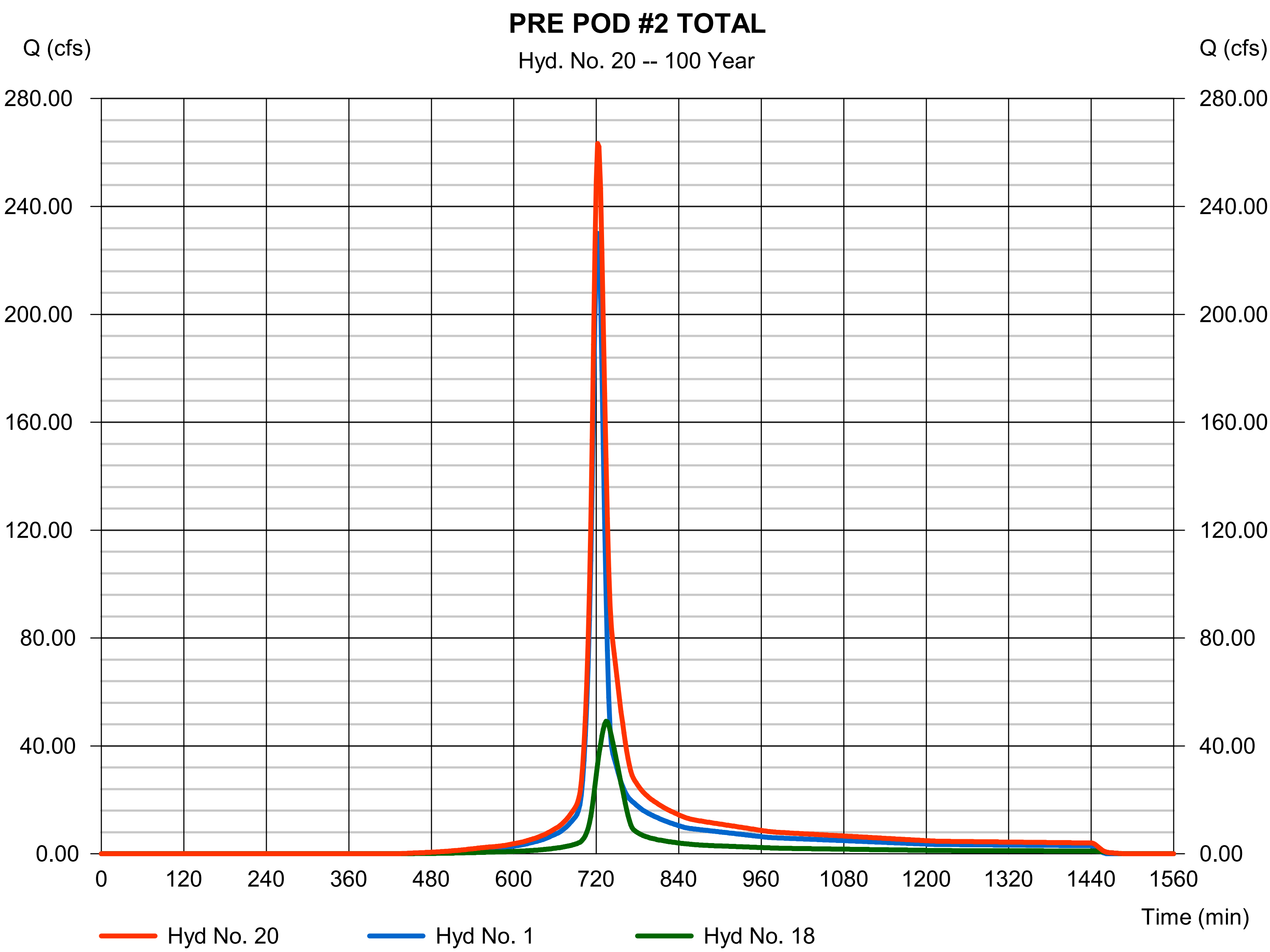
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 20

PRE POD #2 TOTAL

Hydrograph type	= Combine	Peak discharge	= 263.30 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 868,083 cuft
Inflow hyds.	= 1, 18	Contrib. drain. area	= 55.920 ac



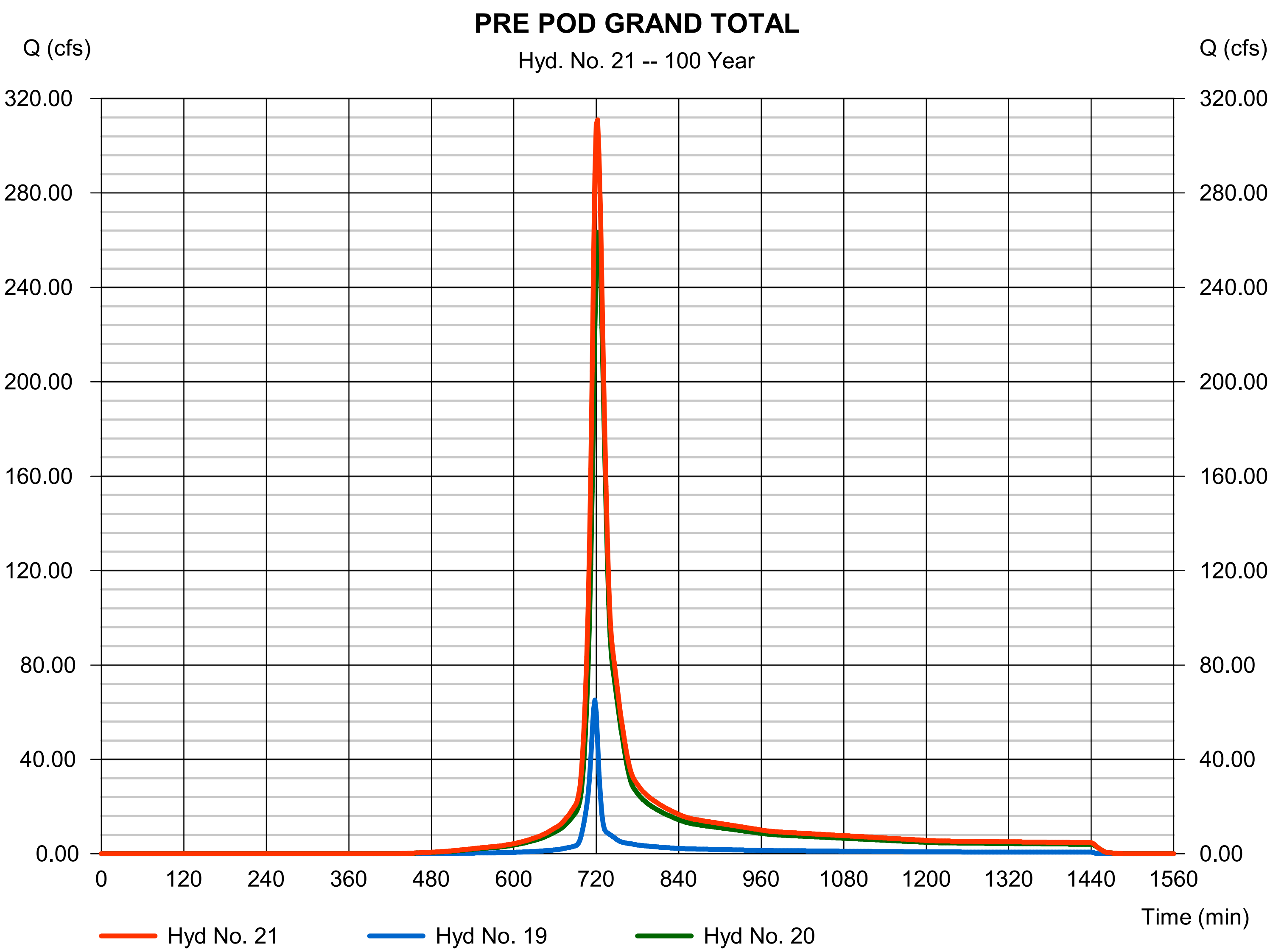
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 21

PRE POD GRAND TOTAL

Hydrograph type	= Combine	Peak discharge	= 310.97 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 1,012,207 cuft
Inflow hyds.	= 19, 20	Contrib. drain. area	= 0.000 ac



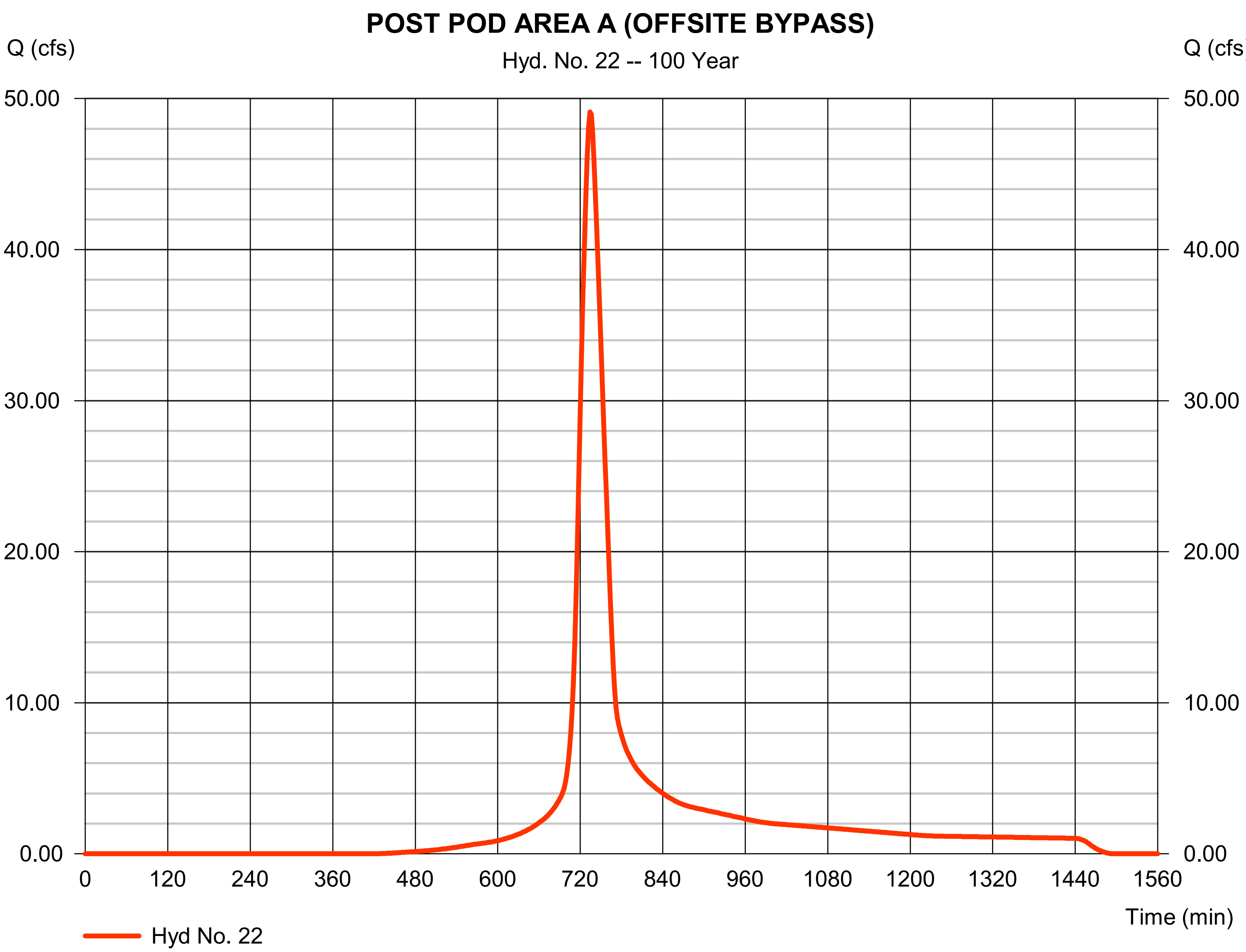
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 22

POST POD AREA A (OFFSITE BYPASS)

Hydrograph type	= SCS Runoff	Peak discharge	= 49.11 cfs
Storm frequency	= 100 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 222,406 cuft
Drainage area	= 13.940 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 34.70 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



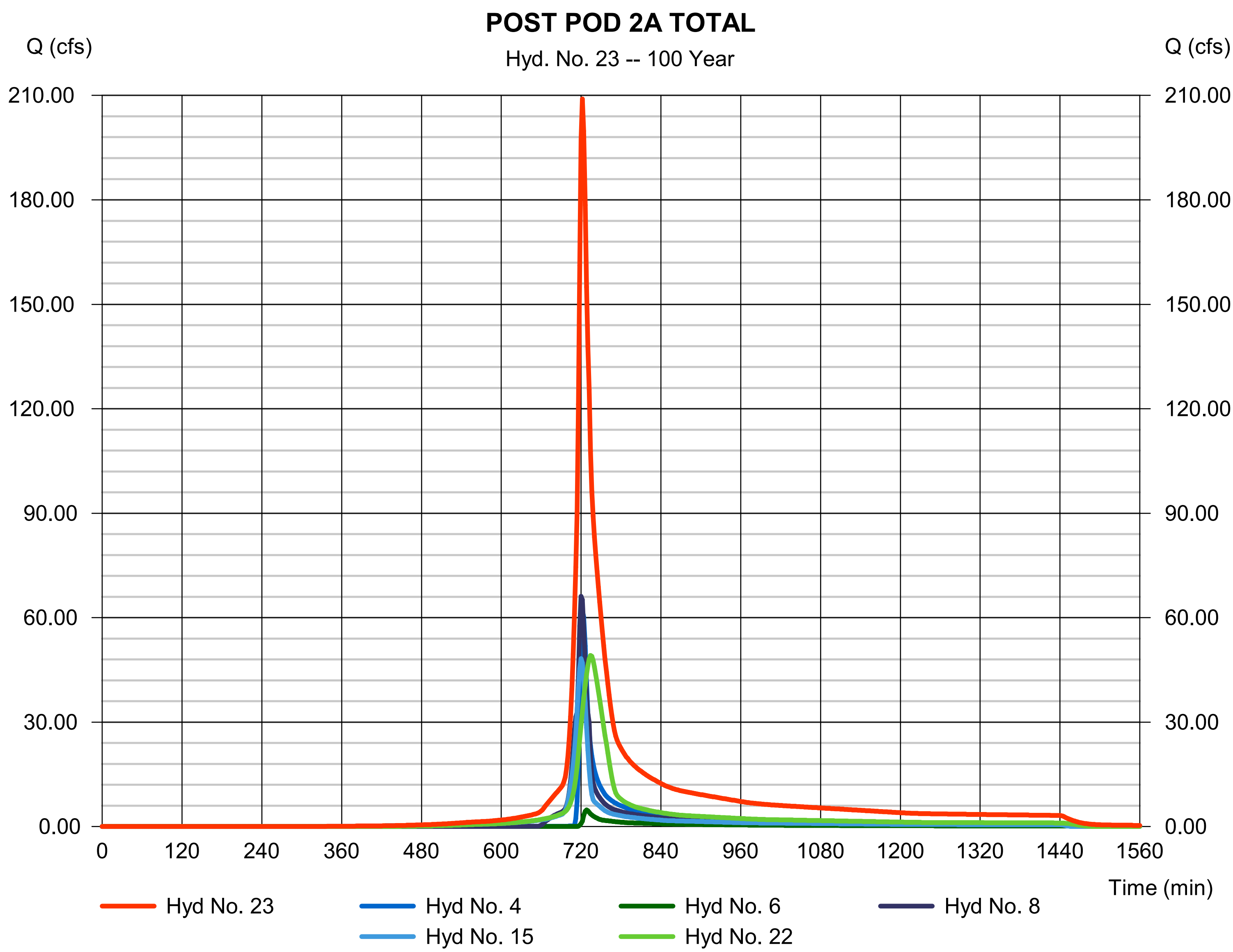
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 — Tuesday, 01 / 28 / 2025

Hyd. No. 23

POST POD 2A TOTAL

Hydrograph type	= Combine	Peak discharge	= 209.01 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 719,920 cuft
Inflow hyds.	= 4, 6, 8, 15, 22	Contrib. drain. area	= 20.390 ac



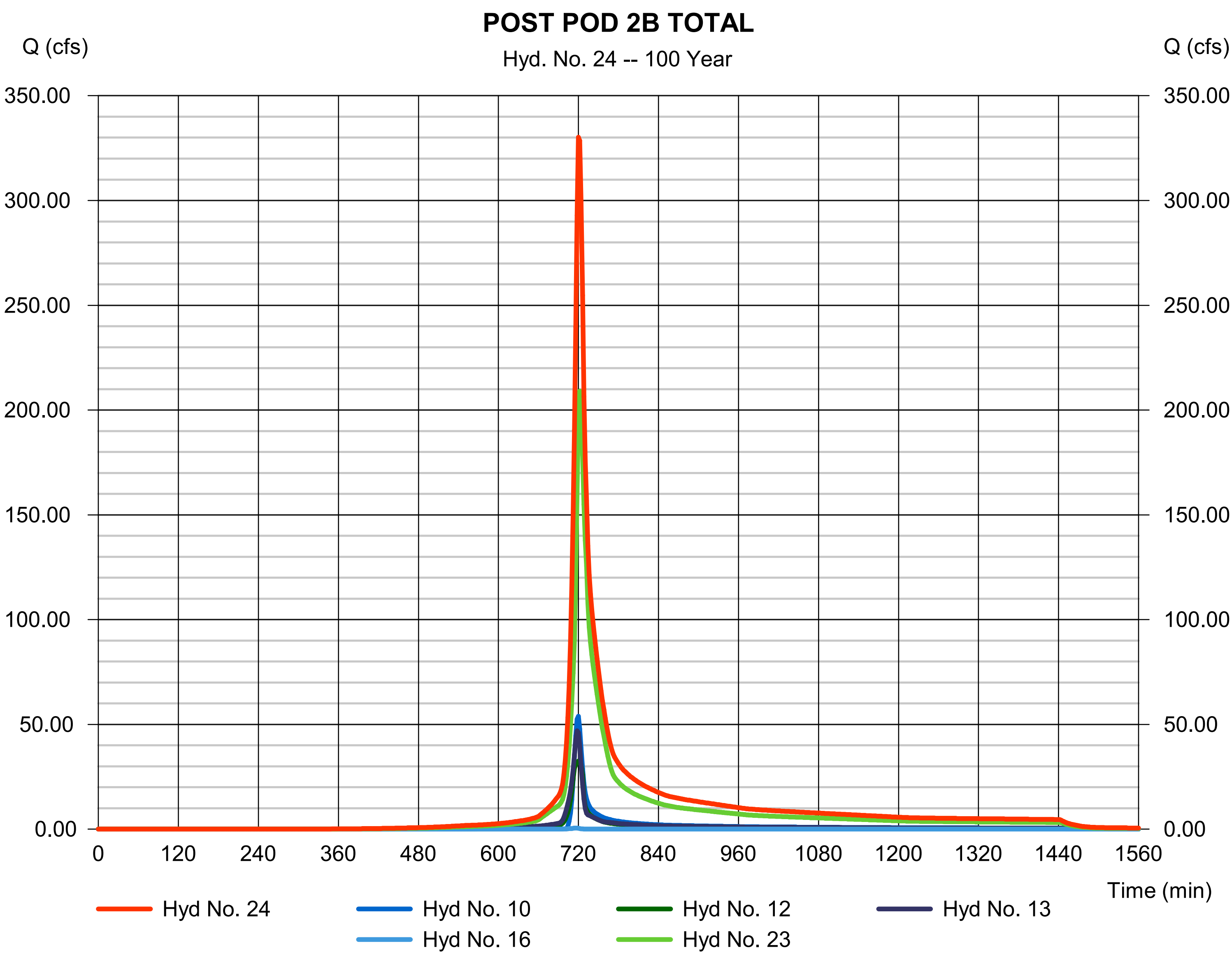
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 24

POST POD 2B TOTAL

Hydrograph type	= Combine	Peak discharge	= 330.13 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 1,061,761 cuft
Inflow hyds.	= 10, 12, 13, 16, 23	Contrib. drain. area	= 6.420 ac

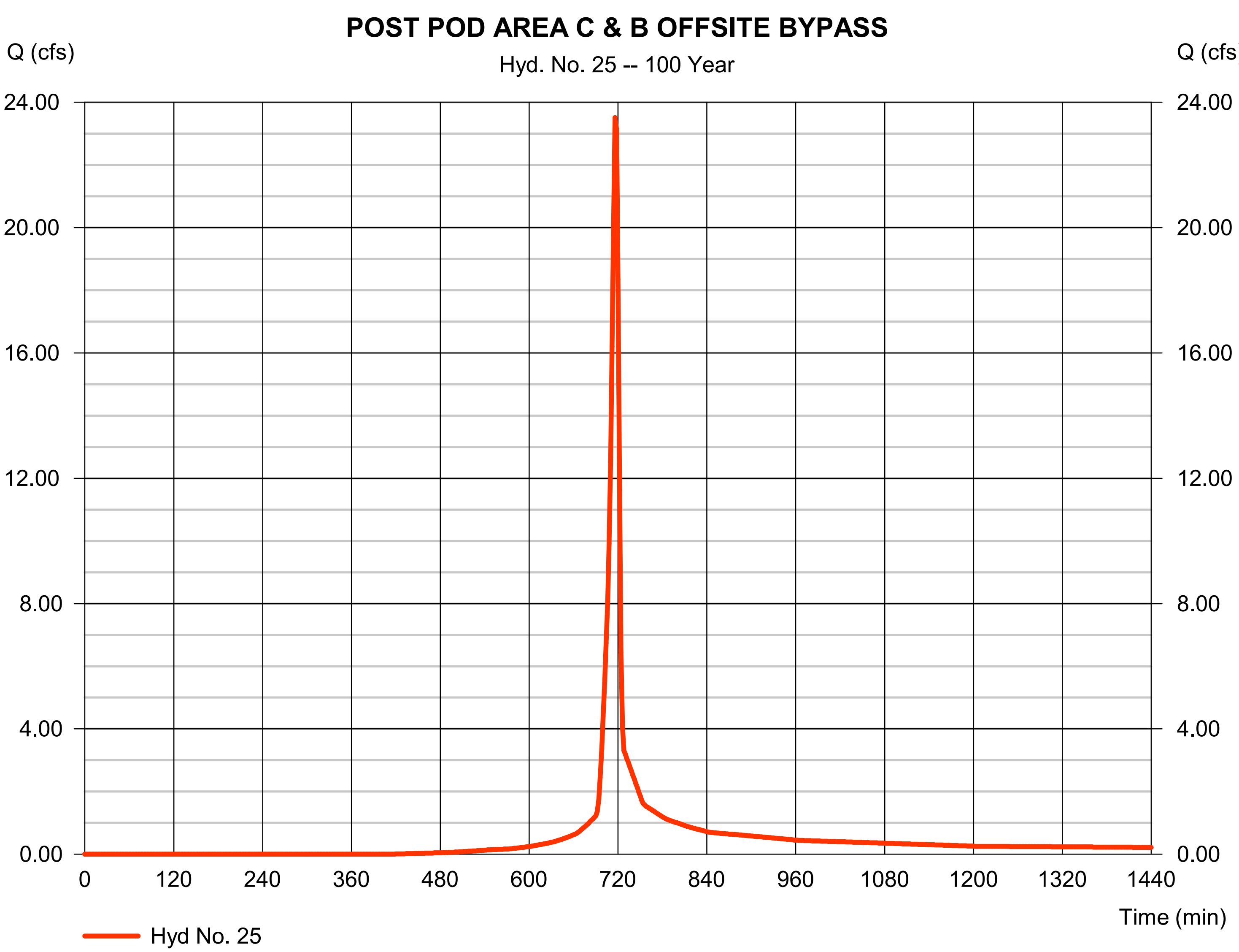


Hydrograph Report

Hyd. No. 25

POST POD AREA C & B OFFSITE BYPASS

Hydrograph type	= SCS Runoff	Peak discharge	= 23.52 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 47,960 cuft
Drainage area	= 3.170 ac	Curve number	= 74
Basin Slope	= 4.5 %	Hydraulic length	= 1030 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 5.38 min
Total precip.	= 7.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



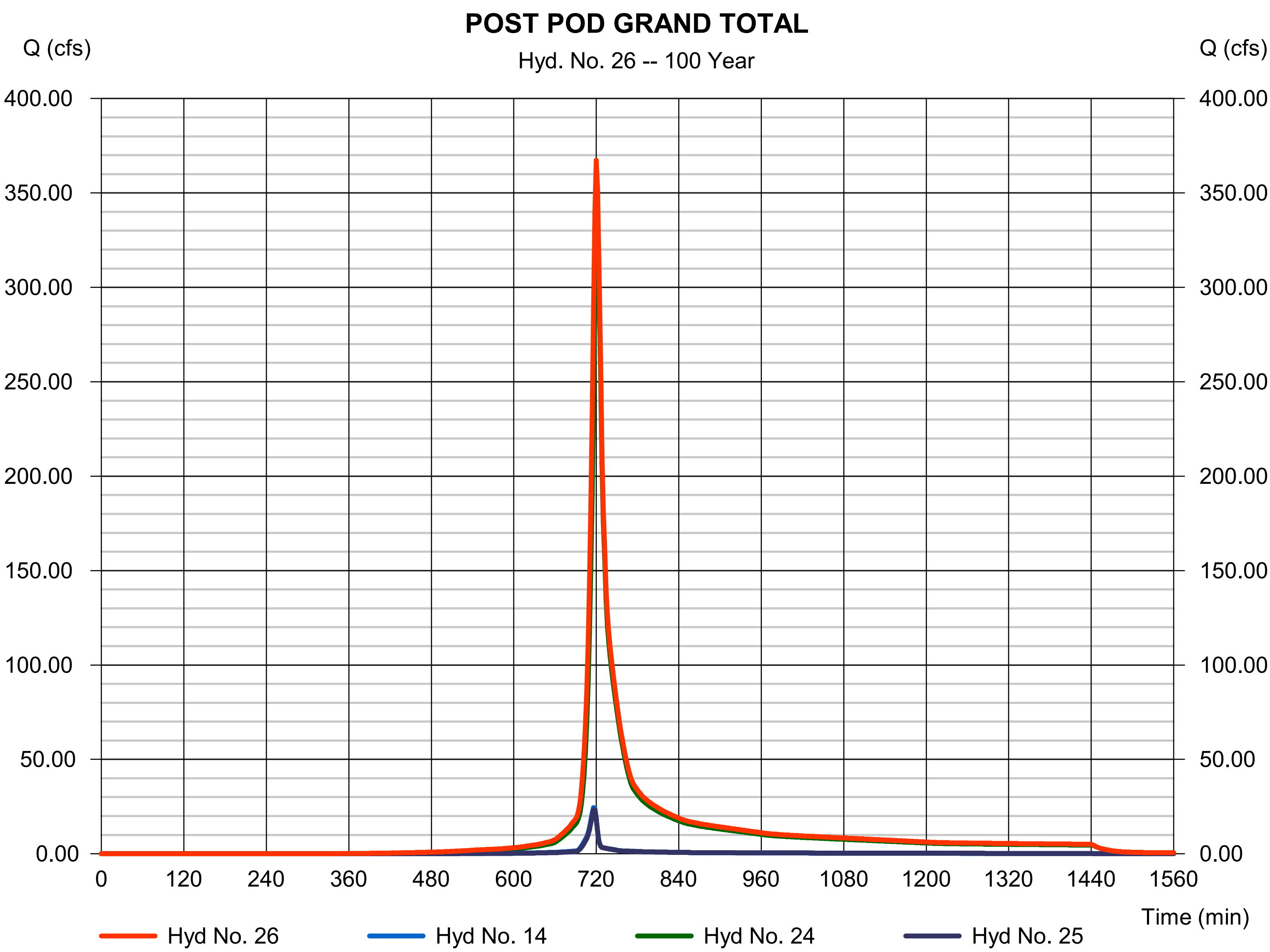
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Hyd. No. 26

POST POD GRAND TOTAL

Hydrograph type	= Combine	Peak discharge	= 367.29 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 1,160,727 cuft
Inflow hyds.	= 14, 24, 25	Contrib. drain. area	= 6.110 ac



Hydraflow Rainfall Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 01 / 28 / 2025

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	69.0305	12.5000	0.8674	--------
3	0.0000	0.0000	0.0000	--------
5	0.0000	0.0000	0.0000	--------
10	74.0861	12.5000	0.8066	--------
25	62.8559	11.0000	0.7384	--------
50	56.0596	9.9000	0.6909	--------
100	53.0414	9.3000	0.6596	--------

File name: 20241113 Moody IDF.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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.76	4.64	3.89	3.37	2.98	2.67	2.42	2.22	2.05	1.91	1.79	1.68
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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	7.36	6.01	5.11	4.47	3.98	3.60	3.29	3.04	2.82	2.64	2.48	2.34
25	8.11	6.64	5.67	4.98	4.46	4.05	3.72	3.45	3.22	3.02	2.85	2.70
50	8.67	7.10	6.08	5.36	4.82	4.39	4.05	3.76	3.52	3.32	3.14	2.98
100	9.17	7.53	6.47	5.72	5.15	4.71	4.35	4.06	3.81	3.59	3.40	3.24

Tc = time in minutes. Values may exceed 60.

Precip. file name: F:\Kalas Assemblage\Raleigh-Wake County 24Hr Rain.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	3.00	3.45	0.00	4.33	5.02	5.96	6.80	7.46
SCS 6-Hr	2.05	2.46	0.00	3.04	3.55	0.00	0.00	5.32
Huff-1st	0.00	0.00	0.00	2.75	0.00	5.38	6.50	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	2.80	0.00	5.25	6.00	0.00