CIVIL ENGINEERING
ENVIRONMENTAL
SURVEYING
LANDSCAPE ARCHITECTURE
GEOTECHNICAL

STORMWATER MANAGEMENT REPORT

Clinton Commons
Block 14 Lots 32
Town of Clinton, Hunterdon County, New Jersey

Prepared For:
Clinton Moebus 34, LLC
C/O David Meiskin
9 Kent Place,
Freehold, New Jersey 07728

January 30, 2021

Wayne J. Ingram
Professional Engineer
N.J.P.E. NO. 24GB04258200

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Expertise Innovation Solutions

E&LP
Headquarters
140 West Main Street | High Bridge, NJ 08829
T: 908.238.0544

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TABLE OF CONTENTS

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LIST OF APPENDICIES

1. INTRODUCTION

Engineering & Land Planning Associates, Inc. has prepared this Stormwater Management Report on behalf of Clinton Moebus 34, LLC, to document the design methodology and the associated calculations for the project's stormwater management system. The project is located on State Highway 31 on Block 14, Lots 32, 32.01 & 32.02 in theTown of Clinton, Hunterdon County, New Jersey. The subject property currently consists of open farm field.. The project proposes to build 3 Retail buildings consists of 30,559 s.f. and 56 townhome units with its associated improvements. The design incorporates stormwater management measures which meet the NJDEP Phase II Stormwater Regulations for stormwater quantity, quality, and groundwater recharge.

2. METHODOLOGY

2.1 Product Description

The existing property totals 28.06 acres and contains farm field. The property is bound to the north by New Jersey State Highway 31, to the west the South branch of Raritan River and wooded area and to the north and east by residential homes. The project consists of the construction of a 56 Townhouses and three pad sites for retail use. The project is considered a major project in accordance with the NJDEP Phase II Stormwater Regulations, as it will include more than 1.0 acre of disturbance and creates more than ¼ acre of new impervious surface. Stormwater management measures have been provided in accordance with NJDEP's Phase II Stormwater regulations.

The conversion of the land cover from farm field to a lawn and impervious surface results in a increase in storm water runoff as a result of the project. The project proposes one storm water infiltration basin that collect the runoff from the proposed roads, driveways and portions of the lawns. The site has Karst formation where infiltration is not advisable. Therefore, have infiltration is confined to the extents of the basin which is located at the most downstream location. The Infiltration Basin outflow discharge to the South branch of Raritan River. The Infiltration basin provides water quality by recharging the water quality storm to ground. The Infiltration basin also provides the required ground water recharge and reduction in the peak runoff from site. These stormwater management measures meet the NJDEP's Phase II regulations for water quantity, quality, and groundwater recharge.

We have also provided the soils map for the property in Appendix A of this report. The report also includes each soil type that is located on site and the respective Hydrologic Soil Group of each soil in description of the soil.

2.2 Stormwater Runoff Quantity

The stormwater quantity runoff analysis has been performed utilizing the Soil Conservation Service (SCS) Technical Release 55 (TR-55) "Urban Hydrology for Small Watersheds," revised June 1986. The site runoff has been calculated for the 2 year, 10 year, and 100 year storm frequencies in accordance with NJDEP's storm water regulations. (N.J.A.C. 7:8-5.4). This project will reduce the site runoff for the calculated storms below that of the existing condition as required during the 2, 10, and 100 year storm events, while maintaining the existing drainage patterns in accordance with N.J.A.C. 7:8-5.4 (3) iii. (see Appendices B, C, and D).

The analysis utilized the SCS Type III-24 hour rainfall distribution. The time of concentration (Tc) calculations were calculated based on the TR-55 methodology. Several potential Tc flow paths were analyzed in order to determine the most appropriate flow path. CN values were calculated for each drainage area utilizing the soil data from Morris County Soil Survey. The summary of results and supporting calculations for the existing and proposed stormwater quantity runoff analysis can be found in Appendices B-E of this report.

2.3 Stormwater Runoff Quality

The storm water runoff quality analysis has been performed in accordance with NJDEP's Storm Water Management Regulations (N.J.A.C. 7:8-5.5). This storm water management plan serves to reduce the post-construction load of Total Suspended Solids (TSS) generated from the water quality design storm by 80 percent, as an annual average. This reduction has been applied to all areas of new development on the site. The water quality design storm consists of 1.25 inches of rain falling in 2 hours with the NJDEP distribution as illustrated in of N.J.A.C. 7:8-5.5 "Table 1 - Water Quality Design Storm Distribution" (refer to Appendix F).

A infiltration basin has been employed to obtain the required 80% TSS removal.

2.4 Groundwater Recharge

A groundwater recharge analysis has been performed in accordance with NJDEP's Stormwater Management Rules (N.J.A.C. 7:8-5.4). The New Jersey Groundwater Recharge Spreadsheet (NJGRS) Version 2.0 (updated November 2003) was utilized to determine the groundwater recharge associated with the site. Computations of the pre-development and post-development annual groundwater recharge rate and the annual recharge deficit was prepared based on the New Jersey Geological Survey Report GSR-32 "A Method for Evaluating Ground-Water Recharge Areas in New Jersey", which is incorporated into the NJGSR spreadsheet (Refer to Appendix I of this report).

2.5 Non-Structural Stormwater Management Strategies

As per N.J.A.C. 7:8-5.3 requirements non-structural stormwater strategies have been incorporated into the design to the maximum extent practicable:

The project site is currently an open farm field that is susceptible to erosion and sediment loss due to steep slopes on the property. The proposed improvement will eliminate these susceptible areas since the project area will become maintained lawns, dwellings, driveways, a road is also proposed to break up the over lands flow and contain in underground storm water system. The water quality will benefit because all the impervious surfaces are being recharge using infiltration basin.
The impervious surfaces are minimized on the project site to meet current codes and the runoff over the impervious surfaces flows into a proposed stormwater system.

Natural drainage features and vegetation are maintained and maximized where possible.

The Time of Concentration and flow path is generally maintained from the existing to the proposed condition.

Land disturbance is being minimized and there is minimal clearing needed since the site is currently existing farm field. The land disturbance is generally limited to the existing developed area.

Soil compaction will be minimized and any areas of over compaction will be mediated.

Low maintenance trees and native grasses are proposed to encourage retention of all plantings.

The use of natural open channel swales is utilized to convey the stormwater runoff through portions of the site where it is feasible.

The stormwater control system was designed to prevent trash and debris from draining into the existing wetlands located to the south of the project site. This is accomplished through the use of trash racks, grates and stormwater filtration units. The stormwater system will be cleaned and trash/debris will be removed according the Stormwater Management Maintenance Plan.

2.6 Stormwater Conveyance

The storm sewer hydraulics is based upon the Manning Equation as defined in the "Handbook of Hydraulics," by Brater and King, Sixth Edition. Storm sewer capacity is based on full depth gravity flow. The project has designed to convey water via closed pipe systems to the detention basin. Refer to Appendix E for calculations. The storm system is designed for 25 years storm freq.

3. STORMWATER ANALYSIS

3.1 Stormwater Runoff Quantity

The Existing Drainage Area Plan (Appendix J) located in the site improvement plans illustrates the existing drainage area. The composite curve numbers (CN), time of concentrations (Tc) have been calculated utilizing the TR-55 method for each drainage area. A runoff hydrograph has been calculated for the 2, 10, and 100 year storms. The peak runoff (Q cfs) has been obtained from the runoff hydrograph for each drainage area.
The existing site contains one drainage area (DA#1) which leaves the site in a westerly direction. The DA#1 is consists of 33.69 ac. and contains 0.98 ac of impervious area. Runoff generally sheet flows across the site towards the wetlands and stream located on the westerly portion of the property. Refer to Appendices B and C for a summary of the composite curve numbers (CN), pre-development peak discharge rates for the 2, 10, and 100 year storms, and the associated runoff hydrographs.

The proposed site improvements will not result in significant modifications to the overall drainage area layout. The Proposed Drainage Area Plan, located on Appendix H of the site improvement plans illustrates the proposed drainage areas for the post-development condition.

The majority of the stormwater runoff from proposed drainage area PDA#1 will enter the stormwater system via inlets located along the road before ultimately discharging into the wetland areas after in the western area of the property after treating runoff. This Drainage are PDA#1 is consists of 19.80 ac which contains 9.11 ac on impervious area. The remaining areas PDA#2 will flow overland consistent with the existing condition. The PDA#2 is consist of 13.89 ac and contains no impervious area. The proposed storm water discharges to levels below that of the existing condition in DA#1 for the 2, 10, and 100 year storms in accordance with NJDEP requirements. This meets the NJDEP Phase II stormwater quantity standards.

3.2 Stormwater Runoff Quality

Runoff quality has achieved the required TSS removal, in accordance with NJDEP standards. The water quality storm hydrographs are contained in Appendix F. Quality treatment has been provided through using Infiltration basin (80% TSS removal rate). The proposed roads, sidewalks and driveways are directed through proposed Infiltration basin resulting in an 80% TSS removal rate in accordance with the NJDEP Phase II standards.

3.3 Groundwater Recharge

An annual recharge deficit of 465,612 CF is observed in the post-development condition. This is achieved through the permanent conversion of existing farm areas to a lawn surface and impervious surface. The proposed infiltration basin is designed to provide required recharge to mitigate the reduction in the ground water recharge due to proposed development. The analysis has been performed based upon the approved NJDEP Recharge spreadsheet and can be found in Appendix H.

3.4 Stormwater Management Maintenance Plan

A recommended Stormwater Management Maintenance Plan has been established for this site in order to maintain the performance and efficiency of the proposed stormwater management basin. The plan is contained in Appendix J of this report.

3.5 Soil Erosion and Sediment Control

Soil Erosion and Sediment Control measures have been designed for the stormwater management system to ensure that water quality is maintained and that the system can safely and adequately control runoff from the property. Design calculations for the conduit outlet protection can be found in Appendix I of this report.

4. CONCLUSIONS

In conclusion, the proposed design includes a proposed storm water management system for the property that meets all of the quantity, quality and recharge requirements outlined in the Storm water Management Rules of N.J.A.C. 7:8. The proposed storm management basin will provides the required 80% TSS removal requirements, it also provides the required recharge and reduce the peak runoff from the site in accordance with quantity requirement.
The summary table provided in this sections shows that the project will meet the peak rate reduction criteria of the storm water rules.

5.1 : Pre-development And Post-development Peak Runoff Results Summary

Pre-Development Peak Runoff

Storm Freq.	To Stream	Total Pre-Dev Flow	Total Pre-Dev Flow From Distrurbed	% Flow Reduction Required From Developed Area	Flow Reduction Required From Developed Area	Max Post- Dev Peak Flow Allowable From Site
(Col #1)	(Col #2)	(Col #3)	(Col #4)	(Col #5)	(Col #6)=#4*#5	(Col #7)=#3-#6
(years)	(c.f.s.)	(c.f.s.)	(c.f.s.)	**(%)**	(c.f.s.)	(c.f.s)
2	12.78	12.78	5.67	50%	2.84	9.95
10	43.73	43.73	19.41	25%	4.85	38.88
100	117.79	117.79	52.27	20%	10.45	107.34

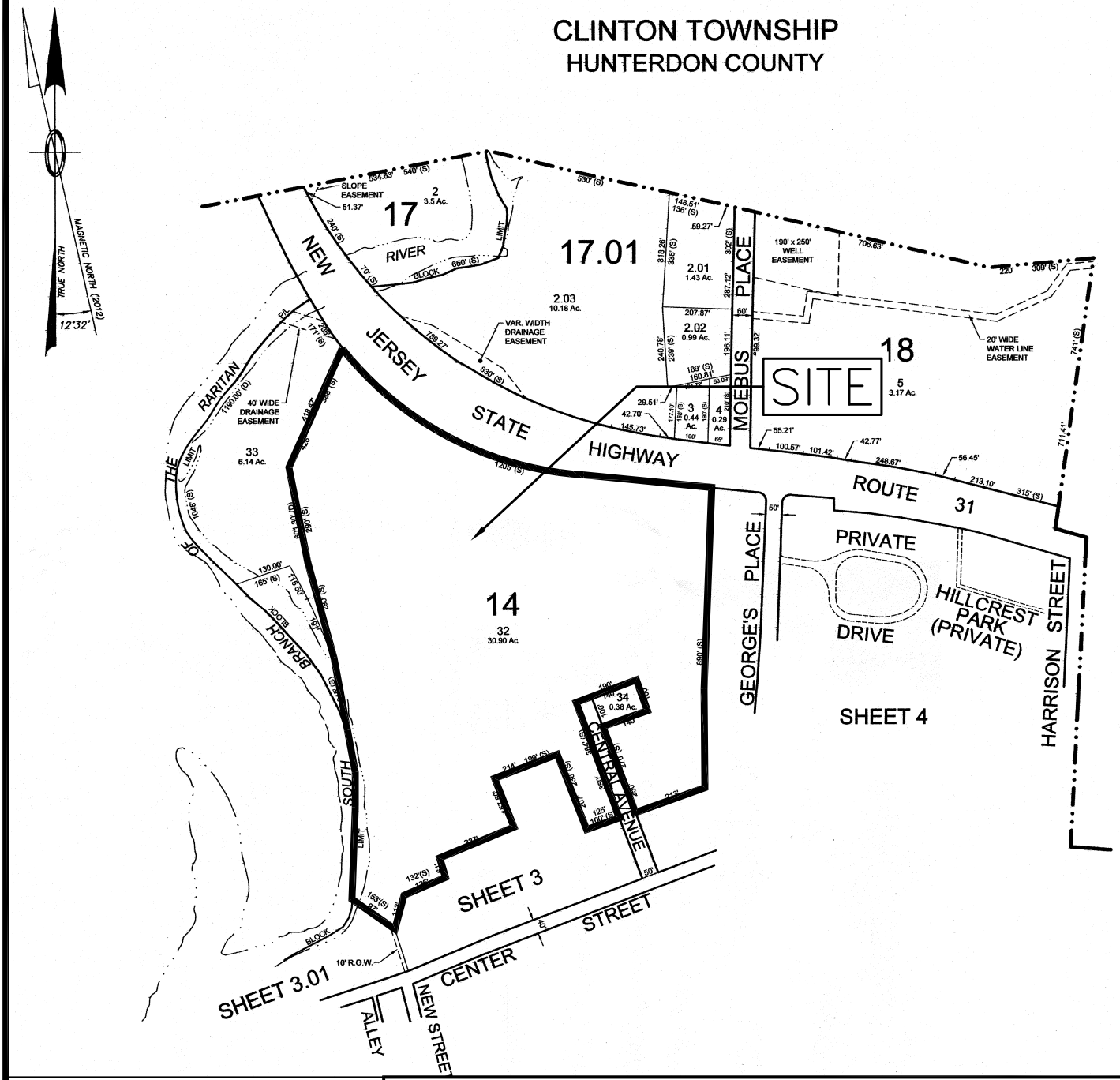
Post-Development Peak Runoff Summary

Storm Freq.	To Stream	Total Post-Dev Peak Runoff	Reduction in Peak Runoff
(Col #8)	(Col #9)	(Col #10)	(Col #11)=#3-#10
(years)	(c.f.s.)	(c.f.s.)	(c.f.s.)
2	9.22	9.22	3.57
10	30.65	30.65	13.08
100	93.21	93.21	24.58

APPENDIX – A:

EXHIBITS

CLINTON TOWNSHIP
HUNTERDON COUNTY



TITLE:

TAX MAP

E&LP

140 WEST MAIN STREET CLINTON TOWNSHIP, NJ 08829
(908) 238-0544 FAX: (908)238-9572
C.O.A. #: 24GA28021500
A PROFESSIONAL ASSOCIATION

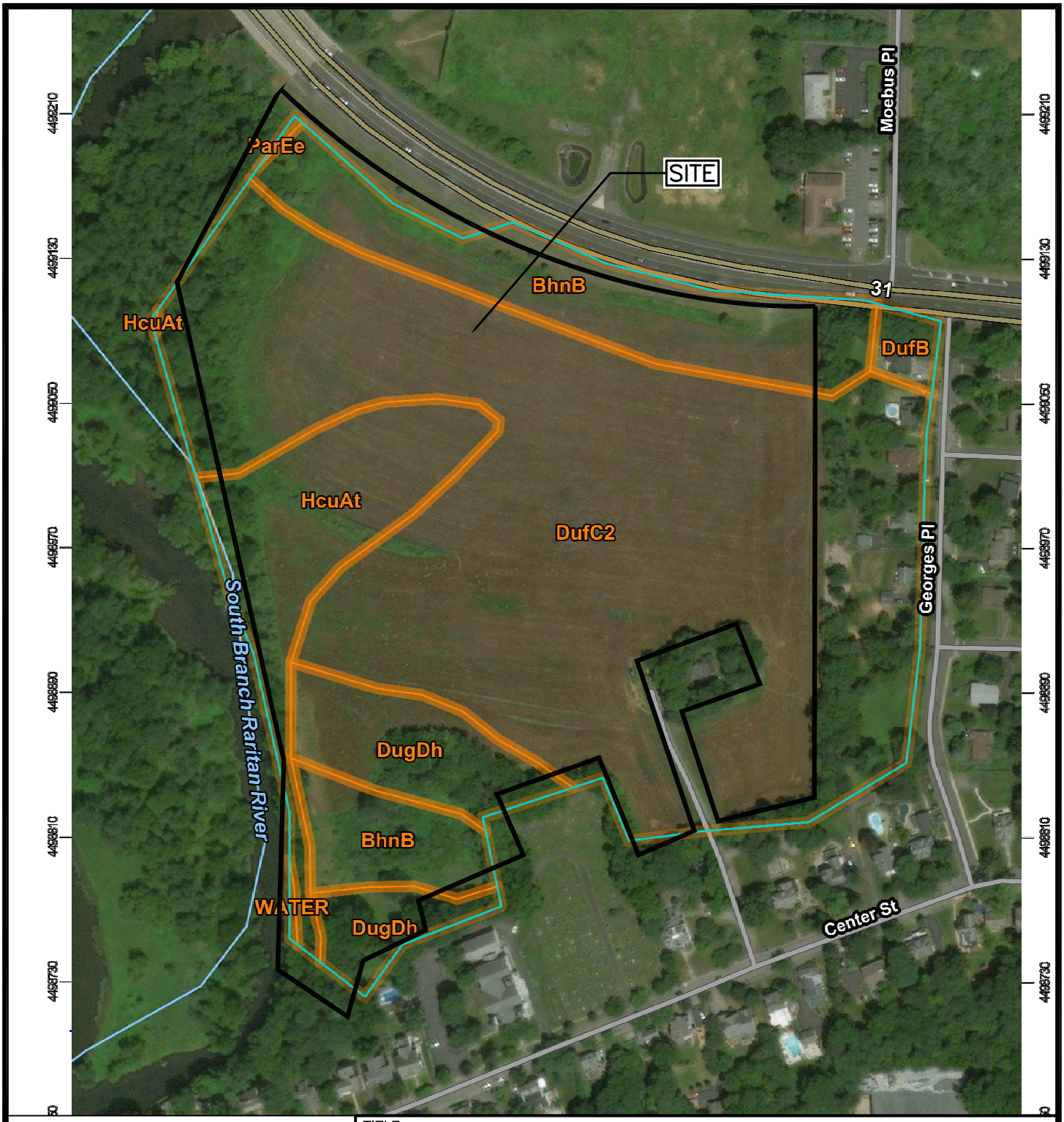
LOCATION:
BLOCK: 14
LOTS: 32
ROUTE #31
TOWN OF CLINTON
HUNTERDON COUNTY
NEW JERSEY

DATE: 11/18/2020

PROJECT NO.: 8144

FILENAME: 2020-11-18 EXHIBITS

FIGURE: 1



TITLE:

SOILS MAP

E&LP

140 WEST MAIN STREET CLINTON TOWNSHIP, NJ 08829
(908) 238-0544 FAX: (908)238-9572
C.O.A. #: 24GA28021500
A PROFESSIONAL ASSOCIATION

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FIGURE: 2

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: Hunterdon County, New Jersey
Survey Area Data: Version 15, Sep 16, 2019

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

Date(s) aerial images were photographed: Mar 31, 2014—Apr 2, 2017

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
BhnB	Birdsboro silt loam, 2 to 6 percent slopes	5.1	15.5%
DufB	Duffield silt loam, 2 to 6 percent slopes	0.3	1.1%
DufC2	Duffield silt loam, 6 to 12 percent slopes, eroded	21.3	65.1%
DugDh	Duffield silt loam, 12 to 18 percent slopes, very rocky	2.6	8.0%
HcuAt	Hatboro-Codorus complex, 0 to 3 percent slopes, frequently flooded	3.3	10.2%
ParEe	Parker cobbly loam, 18 to 40 percent slopes, extremely stony	0.0	0.1%
WATER	Water	0.0	0.1%
Totals for Area of Interest		**32.7**	**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.

Hunterdon County, New Jersey

BhnB—Birdsboro silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: ldv5
Elevation: 200 to 1,000 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Birdsboro and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Birdsboro

Setting

Landform: Stream terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Old alluvium derived from sandstone and siltstone and/or shale

Typical profile

Ap - 0 to 8 inches: silt loam
BA - 8 to 13 inches: silt loam
Bt - 13 to 29 inches: silt loam
BC - 29 to 40 inches: silt loam
C - 40 to 60 inches: stratified sand to silty clay loam
2C - 60 to 80 inches: stratified sand to fine sand

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 10.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Bucks

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Raritan, rarely flooded

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Duffield

Percent of map unit: 5 percent
Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

DufB—Duffield silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: ldvs
Elevation: 300 to 1,000 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Duffield and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Duffield

Setting

Landform: Hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear

Parent material: Fine-loamy residuum weathered from limestone

Typical profile

Ap - 0 to 9 inches: silt loam
BA - 9 to 14 inches: silt loam
Bt1 - 14 to 28 inches: silt loam
Bt2 - 28 to 42 inches: silt loam
C - 42 to 56 inches: loam
R - 56 to 80 inches: unweathered bedrock

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 48 to 60 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 11.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Turbotville

Percent of map unit: 5 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: No

Washington

Percent of map unit: 5 percent
Landform: Hills
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

DufC2—Duffield silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting

National map unit symbol: 1lmfh

Elevation: 300 to 1,000 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Duffield, eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Duffield, Eroded

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Fine-loamy residuum weathered from limestone

Typical profile

Ap - 0 to 9 inches: silt loam
BA - 9 to 14 inches: silt loam
Bt1 - 14 to 28 inches: silt loam
Bt2 - 28 to 42 inches: silt loam
C - 42 to 56 inches: loam
R - 56 to 80 inches: unweathered bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 48 to 60 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 11.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Washington

Percent of map unit: 5 percent
Landform: Hills
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Turbotville

Percent of map unit: 5 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: No

DugDh—Duffield silt loam, 12 to 18 percent slopes, very rocky

Map Unit Setting

National map unit symbol: 1lmfk
Elevation: 300 to 1,300 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: Not prime farmland

Map Unit Composition

Duffield, eroded, very rocky, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Duffield, Eroded, Very Rocky

Setting

Landform: Hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Fine-loamy residuum weathered from limestone

Typical profile

Ap - 0 to 9 inches: silt loam
BA - 9 to 14 inches: silt loam
Bt1 - 14 to 28 inches: silt loam
Bt2 - 28 to 42 inches: silt loam
C - 42 to 56 inches: loam
R - 56 to 80 inches: unweathered bedrock

Properties and qualities

Slope: 12 to 18 percent
Depth to restrictive feature: 48 to 60 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 11.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Klinesville

Percent of map unit: 5 percent
Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Turbotville

Percent of map unit: 5 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: No

Washington

Percent of map unit: 5 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

HcuAt—Hatboro-Codorus complex, 0 to 3 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2w06g
Elevation: 90 to 680 feet
Mean annual precipitation: 47 to 51 inches
Mean annual air temperature: 48 to 57 degrees F
Frost-free period: 180 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Hatboro, frequently, and similar soils: 60 percent
Codorus, occasional, and similar soils: 35 percent
Minor components: 5 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hatboro, Frequently

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Loamy alluvium derived from greenstone and/or phyllite and/or quartzite and/or schist

Typical profile

A - 0 to 11 inches: silt loam
Bg1 - 11 to 18 inches: silt loam
Bg2 - 18 to 29 inches: silt loam
BCg - 29 to 44 inches: silt loam
Cg1 - 44 to 55 inches: silty clay loam
Cg2 - 55 to 80 inches: sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Available water storage in profile: High (about 9.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Description of Codorus, Occasional

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Loamy alluvium derived from phyllite and/or mica schist and/or greenstone and/or old loamy alluvium derived from phyllite and/or mica schist and/or greenstone

Typical profile

Ap - 0 to 11 inches: silt loam
Bw1 - 11 to 18 inches: silt loam
Bw2 - 18 to 40 inches: gravelly silt loam
2C - 40 to 80 inches: very gravelly silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Low
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: Occasional
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Delanco

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

ParEe—Parker cobbly loam, 18 to 40 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 1ls04
Elevation: 250 to 1,200 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: Not prime farmland

Map Unit Composition

Parker, extremely stony, and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Parker, Extremely Stony

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder

Landform position (three-dimensional): Nose slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Residuum weathered from granite and gneiss

Typical profile

Ap - 0 to 9 inches: cobbly loam
Bw - 9 to 22 inches: cobbly sandy loam
C - 22 to 41 inches: very cobbly sandy loam
R - 41 to 80 inches: unweathered bedrock

Properties and qualities

Slope: 18 to 40 percent
Percent of area covered with surface fragments: 9.0 percent
Depth to restrictive feature: 39 to 60 inches to lithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Gladstone

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

WATER—Water

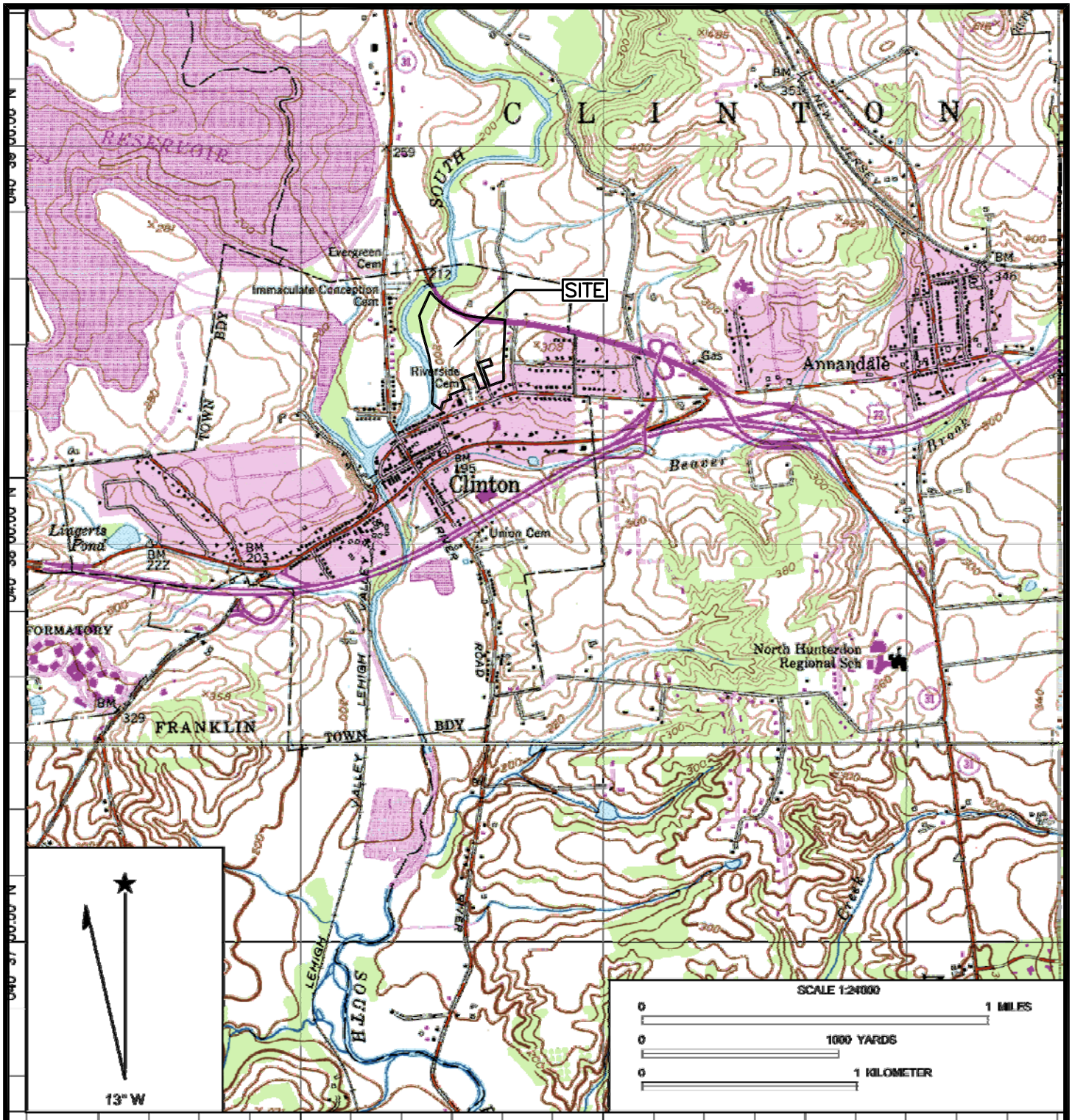
Map Unit Setting

National map unit symbol: ldyj
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.



TITLE:

U.S.G.S. MAP

E&LP

140 WEST MAIN STREET CLINTON TOWNSHIP, NJ 08829
(908) 238-0544 FAX: (908)238-9572
C.O.A. #: 24GA28021500
A PROFESSIONAL ASSOCIATION

LOCATION:
BLOCK: 14
LOTS: 32
ROUTE #31
TOWN OF CLINTON
HUNTERDON COUNTY
NEW JERSEY

DATE: 11/18/2020

PROJECT NO.: 8144

FILENAME: 2020-11-18 EXHIBITS

FIGURE:

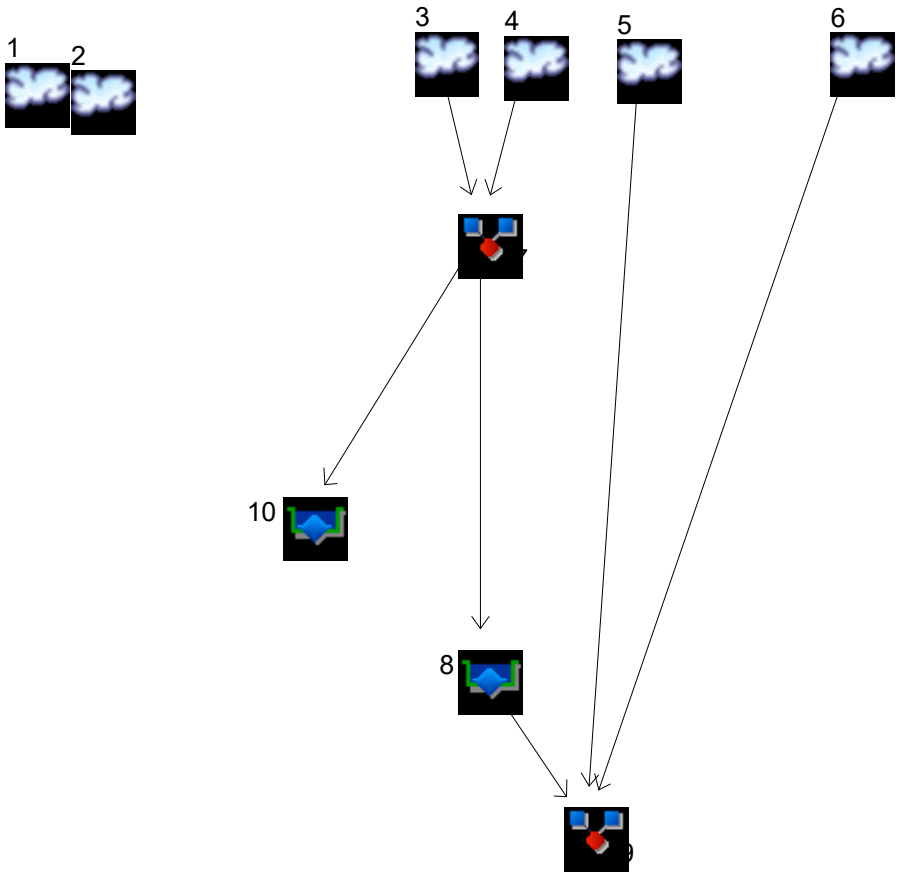
3

APPENDIX - B:

SUMMARY OF HYDROLOGIC ANALYSIS AND RUNOFF QUANTITY CALCULATIONS

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066



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	------	-------	12.78	-------	-------	43.73	68.63	-------	117.79	Pre-Dev To Stream
2	SCS Runoff	------	-------	5.670	-------	-------	19.41	30.45	-------	52.27	Pre-Dev Dist
3	SCS Runoff	------	-------	27.25	-------	-------	40.57	49.51	-------	65.39	Post-Dev Imp To Basin
4	SCS Runoff	------	-------	3.498	-------	-------	13.00	20.71	-------	36.04	Post-Dev Perv. To Basin
5	SCS Runoff	------	-------	5.268	-------	-------	18.03	28.29	-------	48.56	Post-Dev To Stream
6	SCS Runoff	------	-------	0.959	-------	-------	1.450	1.778	-------	2.359	Post-Dev To Trench Drain
7	Combine	3, 4,	-------	29.35	-------	-------	51.42	67.62	-------	98.12	Post-Dev Total To Basin
8	Reservoir	7	-------	4.543	-------	-------	16.24	27.12	-------	48.95	Basin Routing
9	Combine	5, 6, 8	-------	9.215	-------	-------	30.65	51.44	-------	93.21	Post-Dev Total to Stream
10	Reservoir	7	-------	0.000	-------	-------	3.055	15.92	-------	68.73	Spillway Routing

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

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	12.78	3	732	63,554	------	------	------	Pre-Dev To Stream
2	SCS Runoff	5.670	3	732	28,202	------	------	------	Pre-Dev Dist
3	SCS Runoff	27.25	3	726	94,348	------	------	------	Post-Dev Imp To Basin
4	SCS Runoff	3.498	3	732	18,616	------	------	------	Post-Dev Perv. To Basin
5	SCS Runoff	5.268	3	732	26,202	------	------	------	Post-Dev To Stream
6	SCS Runoff	0.959	3	726	3,187	------	------	------	Post-Dev To Trench Drain
7	Combine	29.35	3	729	112,963	3, 4,	------	------	Post-Dev Total To Basin
8	Reservoir	4.543	3	768	83,557	7	226.90	63,052	Basin Routing
9	Combine	9.215	3	735	112,946	5, 6, 8	------	------	Post-Dev Total to Stream
10	Reservoir	0.000	3	n/a	0	7	228.71	112,963	Spillway Routing

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

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	43.73	3	732	167,433	------	------	------	Pre-Dev To Stream
2	SCS Runoff	19.41	3	732	74,299	------	------	------	Pre-Dev Dist
3	SCS Runoff	40.57	3	726	142,807	------	------	------	Post-Dev Imp To Basin
4	SCS Runoff	13.00	3	732	50,393	------	------	------	Post-Dev Perv. To Basin
5	SCS Runoff	18.03	3	732	69,031	------	------	------	Post-Dev To Stream
6	SCS Runoff	1.450	3	726	4,936	------	------	------	Post-Dev To Trench Drain
7	Combine	51.42	3	729	193,200	3, 4,	------	------	Post-Dev Total To Basin
8	Reservoir	16.24	3	744	163,779	7	228.01	91,044	Basin Routing
9	Combine	30.65	3	735	237,746	5, 6, 8	------	------	Post-Dev Total to Stream
10	Reservoir	3.055	3	843	58,972	7	229.55	138,824	Spillway Routing

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

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	68.63	3	732	252,657	------	------	------	Pre-Dev To Stream
2	SCS Runoff	30.45	3	732	112,117	------	------	------	Pre-Dev Dist
3	SCS Runoff	49.51	3	726	175,445	------	------	------	Post-Dev Imp To Basin
4	SCS Runoff	20.71	3	732	76,715	------	------	------	Post-Dev Perv. To Basin
5	SCS Runoff	28.29	3	732	104,168	------	------	------	Post-Dev To Stream
6	SCS Runoff	1.778	3	726	6,117	------	------	------	Post-Dev To Trench Drain
7	Combine	67.62	3	729	252,160	3, 4,	------	------	Post-Dev Total To Basin
8	Reservoir	27.12	3	741	222,734	7	228.55	107,792	Basin Routing
9	Combine	51.44	3	735	333,018	5, 6, 8	------	------	Post-Dev Total to Stream
10	Reservoir	15.92	3	753	117,932	7	229.74	144,649	Spillway Routing

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

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	117.79	3	732	424,064	------	------	------	Pre-Dev To Stream
2	SCS Runoff	52.27	3	732	188,179	------	------	------	Pre-Dev Dist
3	SCS Runoff	65.39	3	726	233,561	------	------	------	Post-Dev Imp To Basin
4	SCS Runoff	36.04	3	732	129,979	------	------	------	Post-Dev Perv. To Basin
5	SCS Runoff	48.56	3	732	174,837	------	------	------	Post-Dev To Stream
6	SCS Runoff	2.359	3	726	8,223	------	------	------	Post-Dev To Trench Drain
7	Combine	98.12	3	729	363,541	3, 4,	------	------	Post-Dev Total To Basin
8	Reservoir	48.95	3	738	334,107	7	229.42	134,858	Basin Routing
9	Combine	93.21	3	732	517,166	5, 6, 8	------	------	Post-Dev Total to Stream
10	Reservoir	68.73	3	735	229,312	7	230.16	158,345	Spillway Routing

APPENDIX - C:

EXISTING HYDROLOGIC ANALYSIS AND RUNOFF QUANTITY CALCULATIONS

Worksheet 2: Runoff Curve Number and Runoff

Project:	Moebus	By:	bh	Date	1/31/2021
Location:	Clinton	Checked:	Enter	Date	Enter
Circle One:	Present	Developed		DA#1	

1. Runoff Curve Number (CN)

Soil Name and hydrologic group (Appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio	CN* Table 2-2	Table 2-3	Table 2-4	Area acres / sq. mi. / x %	Product of CN X area
B	Open Space	61			29.15	1778.15
B	Wood - Grass Combination	55			3.40	187.00
C	Water	74			0.16	11.84
Any	Impervious Area	98			0.98	96.04
				Totals =	33.69	2073.03

* Use only one CN per line.

CN (weighted) total product / total area = 2073 / 33.69 = 61.533 Use CN = 62

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency .....yr.			
Rainfall, P (24 hour).....in.			
Runoff, Q .....in. (Use P and CN with Table 2-1, fig. 2-1, or eqs. 2-3 and 2-4)			

D-2

Copied from: (210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentration (T_c) or Travel Time (T_t)

Project:	Moebus	By:	bh	Date	1/31/2021
Location:	Clinton	Checked:	Enter	Date	Enter

Circle One: Present / Developed — DA#1
Circle One: Tc / Tt through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet
Include a map, schematic, or description of flow segments

Sheet flow (applicable to Tc only)	Segment ID		Enter	
1. Surface description (table 3-1).....		Dense Grass		
2. Manning's roughness coeff., (table 3-1).....		0.24		
3. Flow length, L (total L<= 150 ft.).....ft.		100		
4. Two-yr. 24-hr rainfall, P2.....in		3.38		
5. Land Slope, s..... .....ft/ft		0.066		
6. $Tt = \frac{0.007(nL)^{0.8}}{P_2^{0.5}s^{0.4}}$ Compute T_t.....hr.		0.14	0.00	0.14

Shallow Concentrated flow	Segment ID			
7. Surface description (paved or unpaved).....		unpaved		
8. Flow length, L .....ft		1335		
9. Watercourse slope, s .....ft/ft		0.065169		
10. Average velocity, V (figure 3-1).....ft/s		4.1		
11. $T_c = \frac{L}{3600V}$ Compute T_t.....hr		0.09		0.09

Channel flow	Segment ID	Enter	Enter	
12. Cross sectional flow area, a.....ft2				
13. Wetted perimeter, p_w .....ft				
14. Hydraulic radius, $r = a/p_w$ Compute r.....ft				
15. Channel slope, s.....ft/ft				
16. Manning's roughness coeff., n				
17. $V = \frac{1.49r^{2/3}s^{1/2}}{n}$ Compute V.....ft/s				
18. Flow length, L.....ft				
19. $T_t = \frac{L}{3600V}$ Compute T_t.....ft.		0.00	0.00	0.00

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)..... 0.23

Min= 14.01

Copied from: (210-VI-TR-55, Second Ed., June 1986)

Worksheet 2: Runoff Curve Number and Runoff

Project:	Moebus	By:	bh	Date	2/3/2021
Location:	Clinton	Checked:	Enter	Date	Enter
Circle One:	Present	Developed		To Stream	

1. Runoff Curve Number (CN)

Soil Name and hydrologic group (Appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio	CN* Table 2-2	Table 2-3	Table 2-4	Area ( ) acres ( ) sq. mi. (x) %	Product of CN X area
B	Open Space	61			14.60	890.60
B	Wood - Grass Combination	55			0.20	11.00
C	Water	74			0.00	0.00
Any	Impervious Area	98			0.15	14.70
				Totals =	14.95	916.30

* Use only one CN per line.

CN (weighted) total product / total area = 916.3 / 14.95 = 61.291 Use CN = 61

2. Runoff

	Storm #1		Storm #2		Storm #3
Frequency .....yr.					
Rainfall, P (24 hour).....in.					
Runoff, Q .....in.					

(Use P and CN with Table 2-1, fig. 2-1, or eqs. 2-3 and 2-4)

D-2

Copied from: (210-VI-TR-55, Second Ed., June 1986)

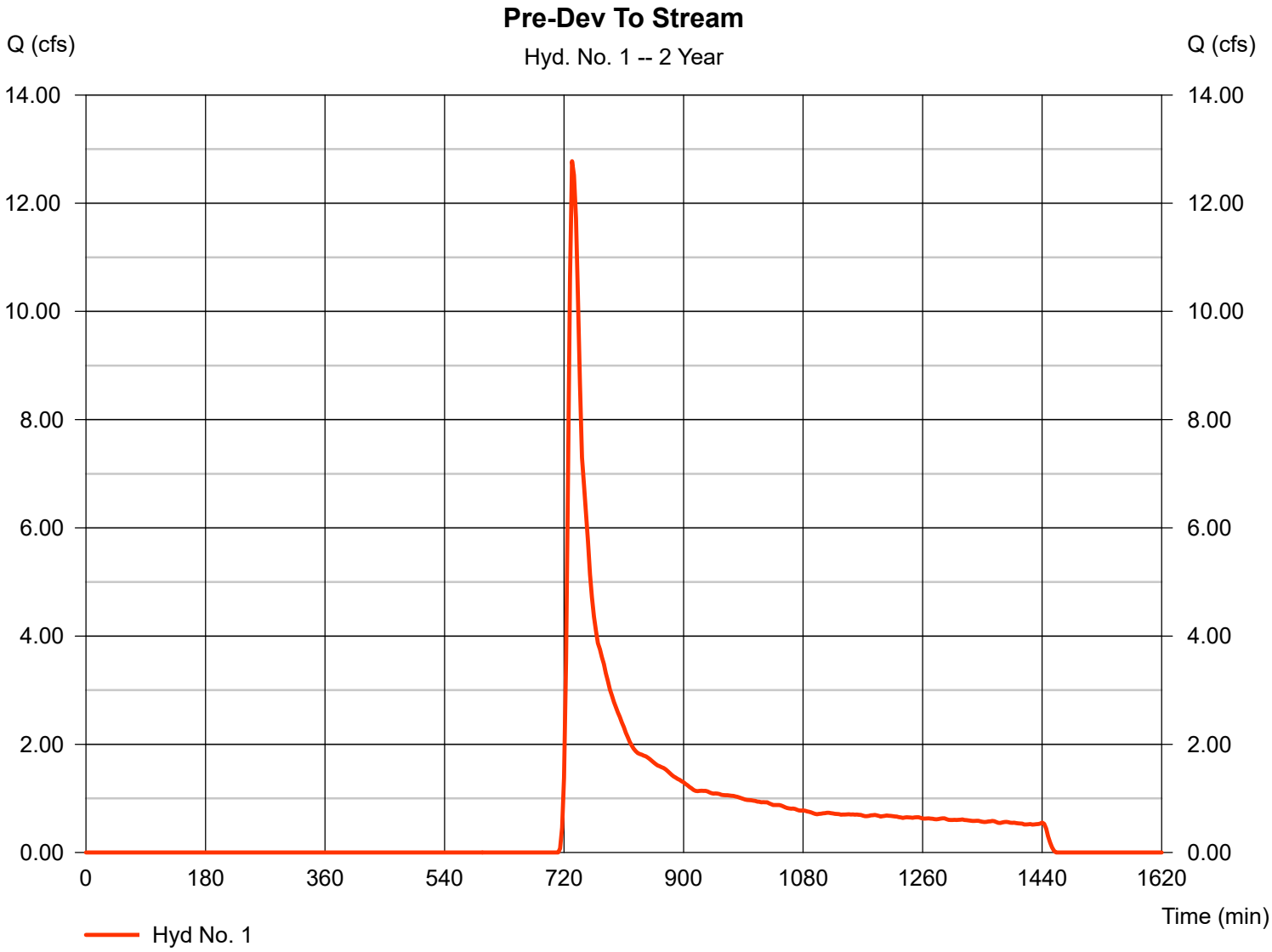
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Wednesday, Feb 3, 2021

Hyd. No. 1

Pre-Dev To Stream

Hydrograph type	=	SCS Runoff	Peak discharge	=	12.78 cfs
Storm frequency	=	2 yrs	Time to peak	=	732 min
Time interval	=	3 min	Hyd. volume	=	63,554 cuft
Drainage area	=	33.690 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	14.00 min
Total precip.	=	3.38 in	Distribution	=	Custom
Storm duration	=	NOAA_C_3 min.cds	Shape factor	=	484

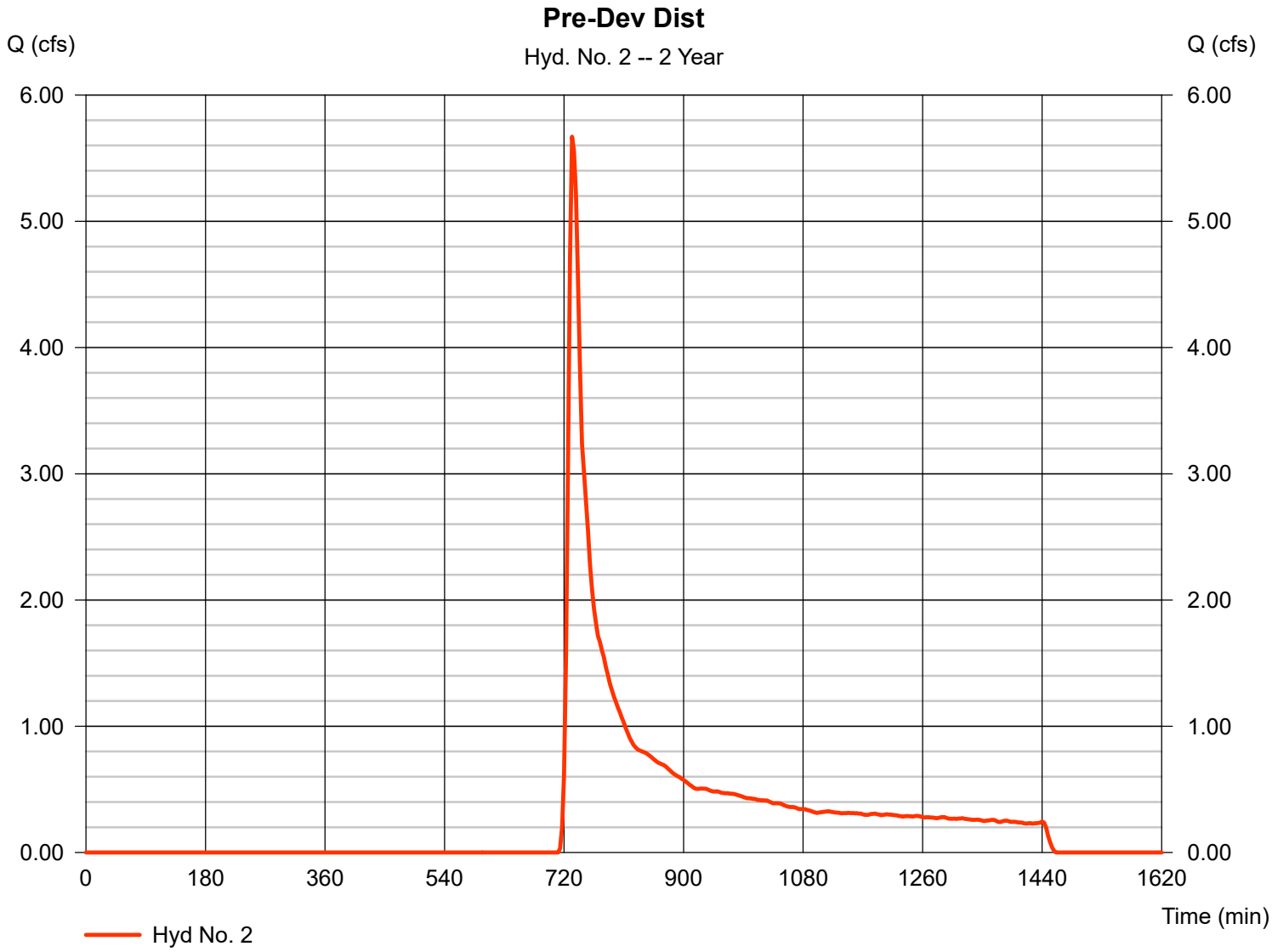


Hydrograph Report

Hyd. No. 2

Pre-Dev Dist

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.670 cfs
Storm frequency	=	2 yrs	Time to peak	=	732 min
Time interval	=	3 min	Hyd. volume	=	28,202 cuft
Drainage area	=	14.950 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	14.00 min
Total precip.	=	3.38 in	Distribution	=	Custom
Storm duration	=	NOAA_C_3 min.cds	Shape factor	=	484



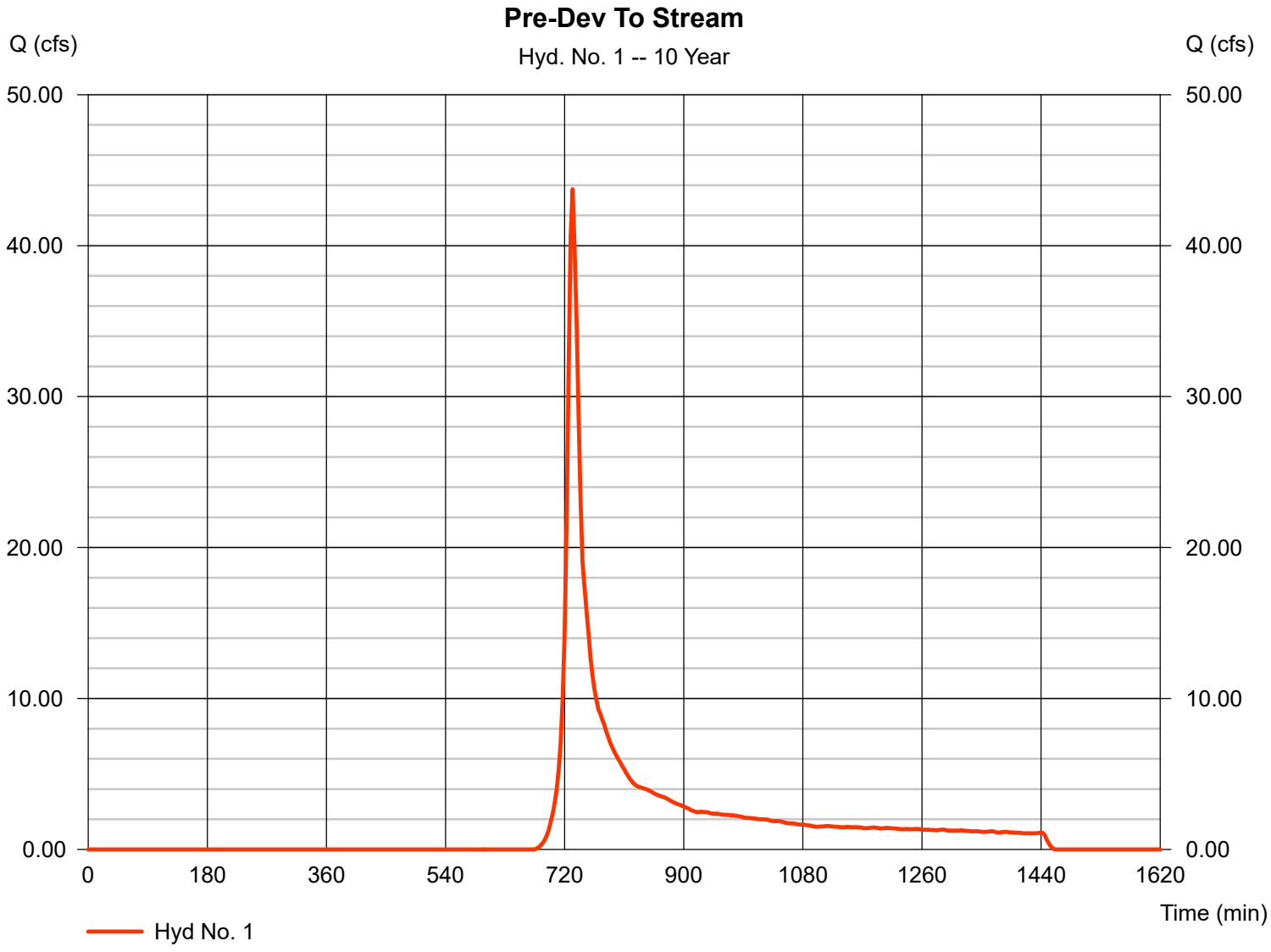
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Wednesday, Feb 3, 2021

Hyd. No. 1

Pre-Dev To Stream

Hydrograph type	=	SCS Runoff	Peak discharge	=	43.73 cfs
Storm frequency	=	10 yrs	Time to peak	=	732 min
Time interval	=	3 min	Hyd. volume	=	167,433 cuft
Drainage area	=	33.690 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	14.00 min
Total precip.	=	5.00 in	Distribution	=	Custom
Storm duration	=	NOAA_C_3 min.cds	Shape factor	=	484



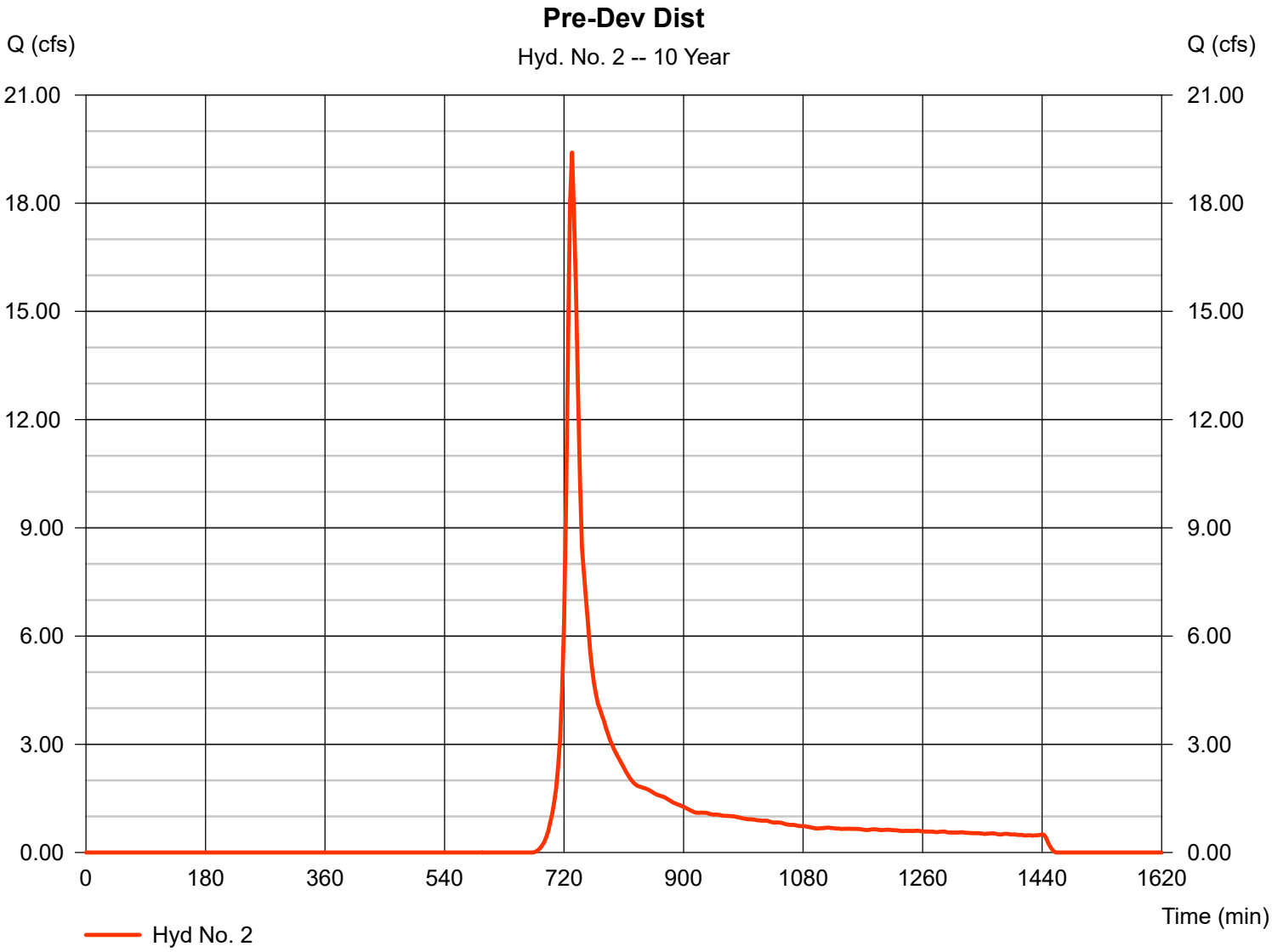
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Wednesday, Feb 3, 2021

Hyd. No. 2

Pre-Dev Dist

Hydrograph type	=	SCS Runoff	Peak discharge	=	19.41 cfs
Storm frequency	=	10 yrs	Time to peak	=	732 min
Time interval	=	3 min	Hyd. volume	=	74,299 cuft
Drainage area	=	14.950 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	14.00 min
Total precip.	=	5.00 in	Distribution	=	Custom
Storm duration	=	NOAA_C_3 min.cds	Shape factor	=	484

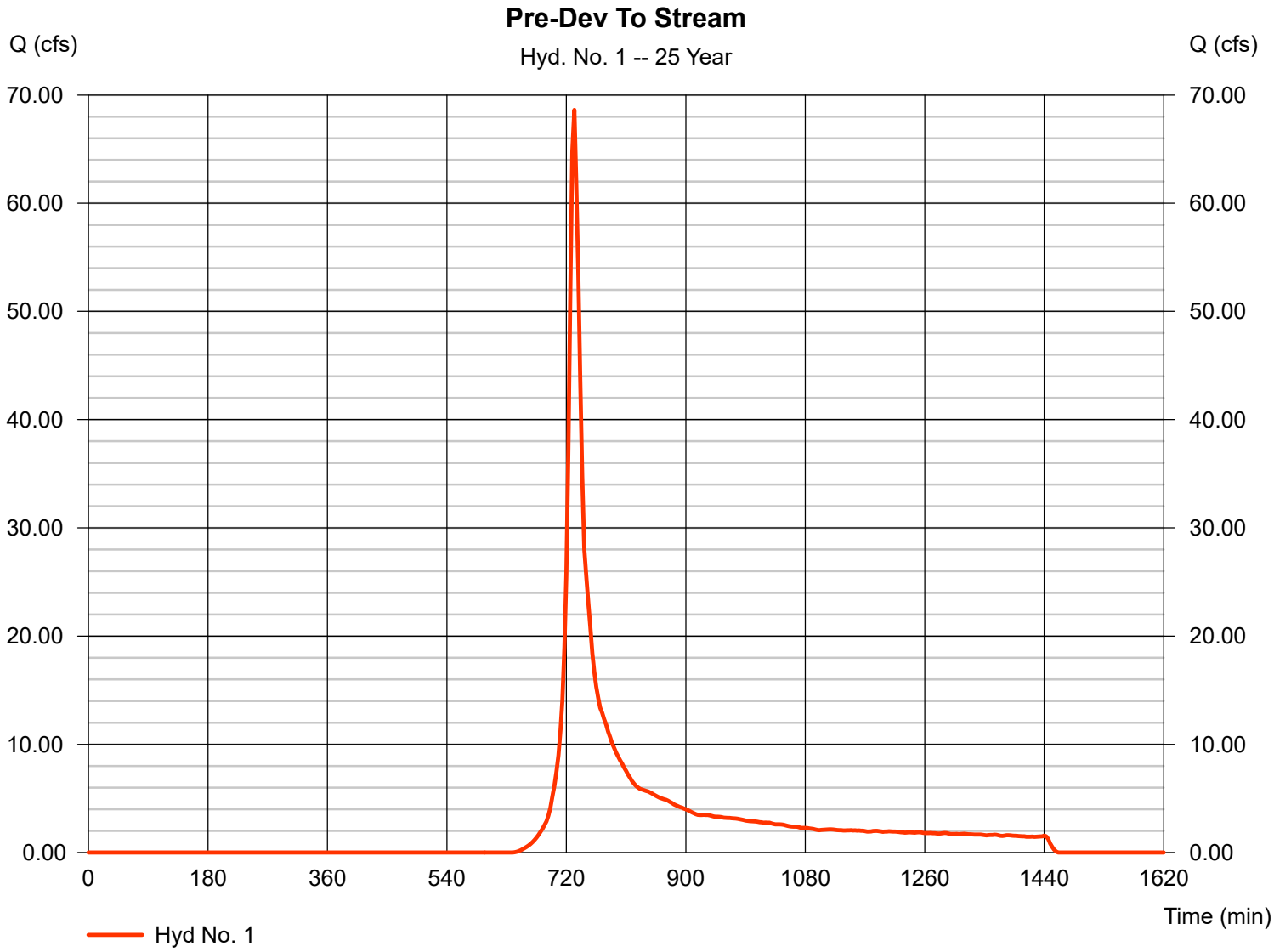


Hydrograph Report

Hyd. No. 1

Pre-Dev To Stream

Hydrograph type	=	SCS Runoff	Peak discharge	=	68.63 cfs
Storm frequency	=	25 yrs	Time to peak	=	732 min
Time interval	=	3 min	Hyd. volume	=	252,657 cuft
Drainage area	=	33.690 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	14.00 min
Total precip.	=	6.09 in	Distribution	=	Custom
Storm duration	=	NOAA_C_3 min.cds	Shape factor	=	484



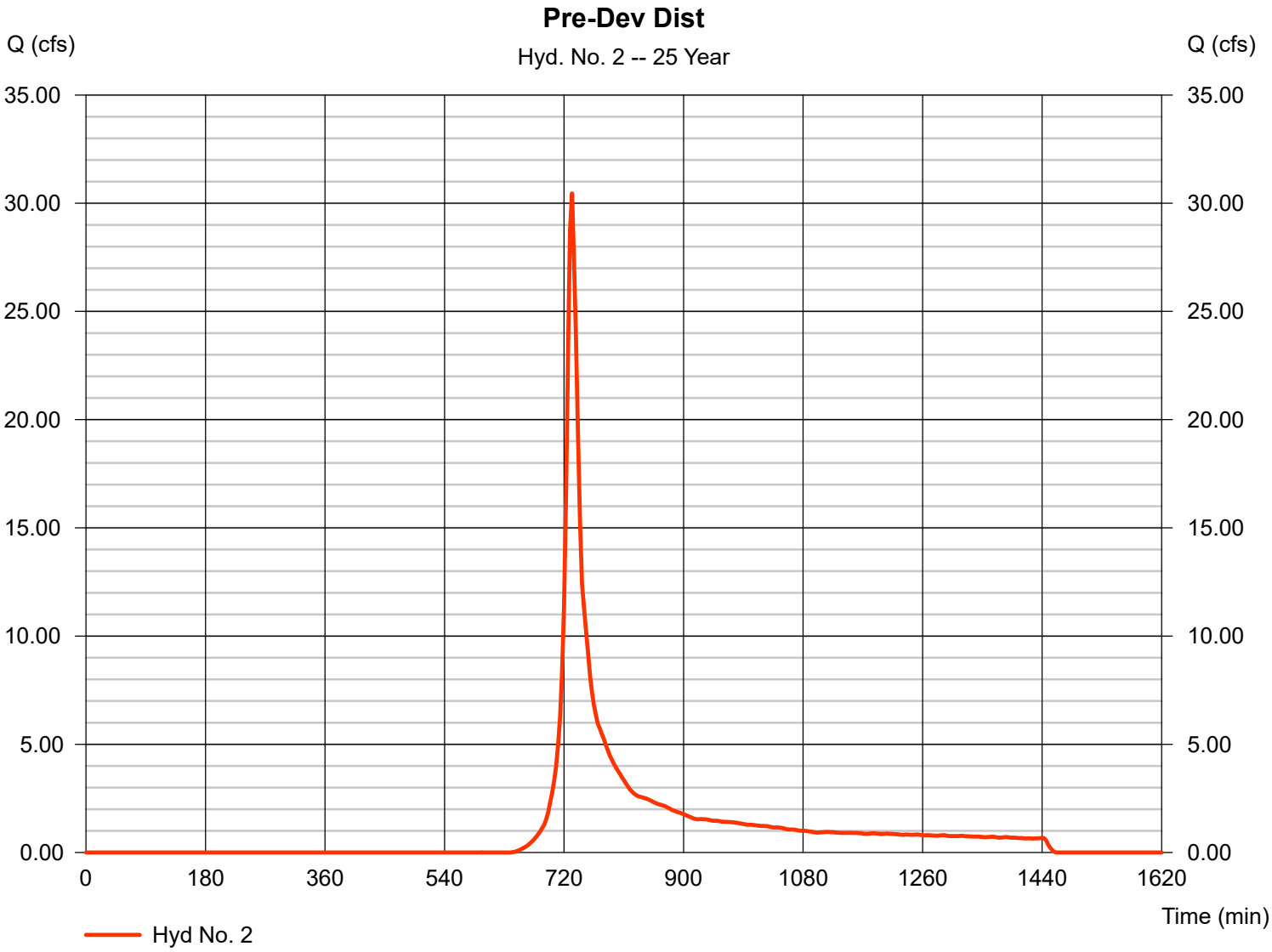
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Wednesday, Feb 3, 2021

Hyd. No. 2

Pre-Dev Dist

Hydrograph type	=	SCS Runoff	Peak discharge	=	30.45 cfs
Storm frequency	=	25 yrs	Time to peak	=	732 min
Time interval	=	3 min	Hyd. volume	=	112,117 cuft
Drainage area	=	14.950 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	14.00 min
Total precip.	=	6.09 in	Distribution	=	Custom
Storm duration	=	NOAA_C_3 min.cds	Shape factor	=	484



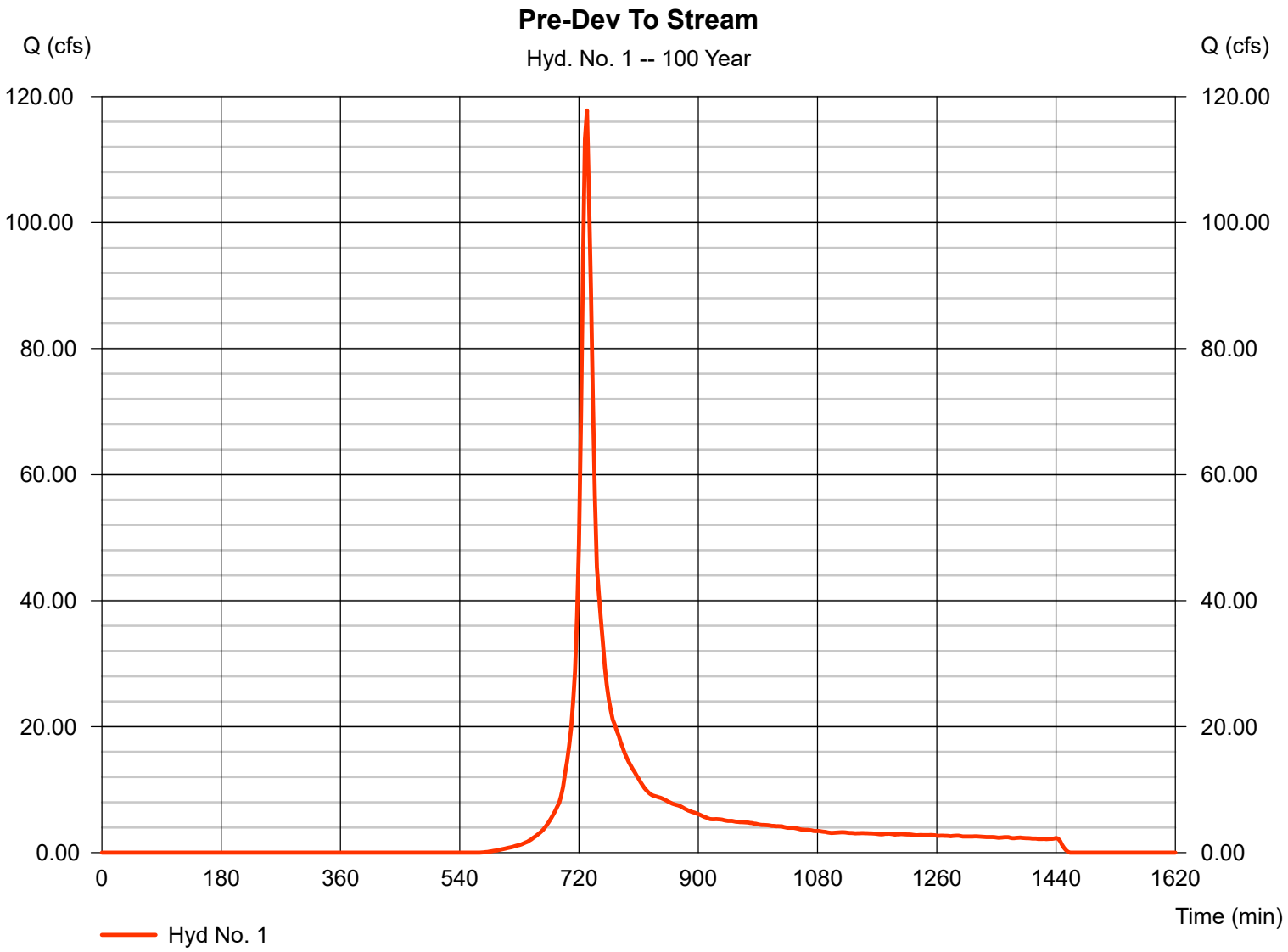
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Wednesday, Feb 3, 2021

Hyd. No. 1

Pre-Dev To Stream

Hydrograph type	=	SCS Runoff	Peak discharge	=	117.79 cfs
Storm frequency	=	100 yrs	Time to peak	=	732 min
Time interval	=	3 min	Hyd. volume	=	424,064 cuft
Drainage area	=	33.690 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	14.00 min
Total precip.	=	8.03 in	Distribution	=	Custom
Storm duration	=	NOAA_C_3 min.cds	Shape factor	=	484



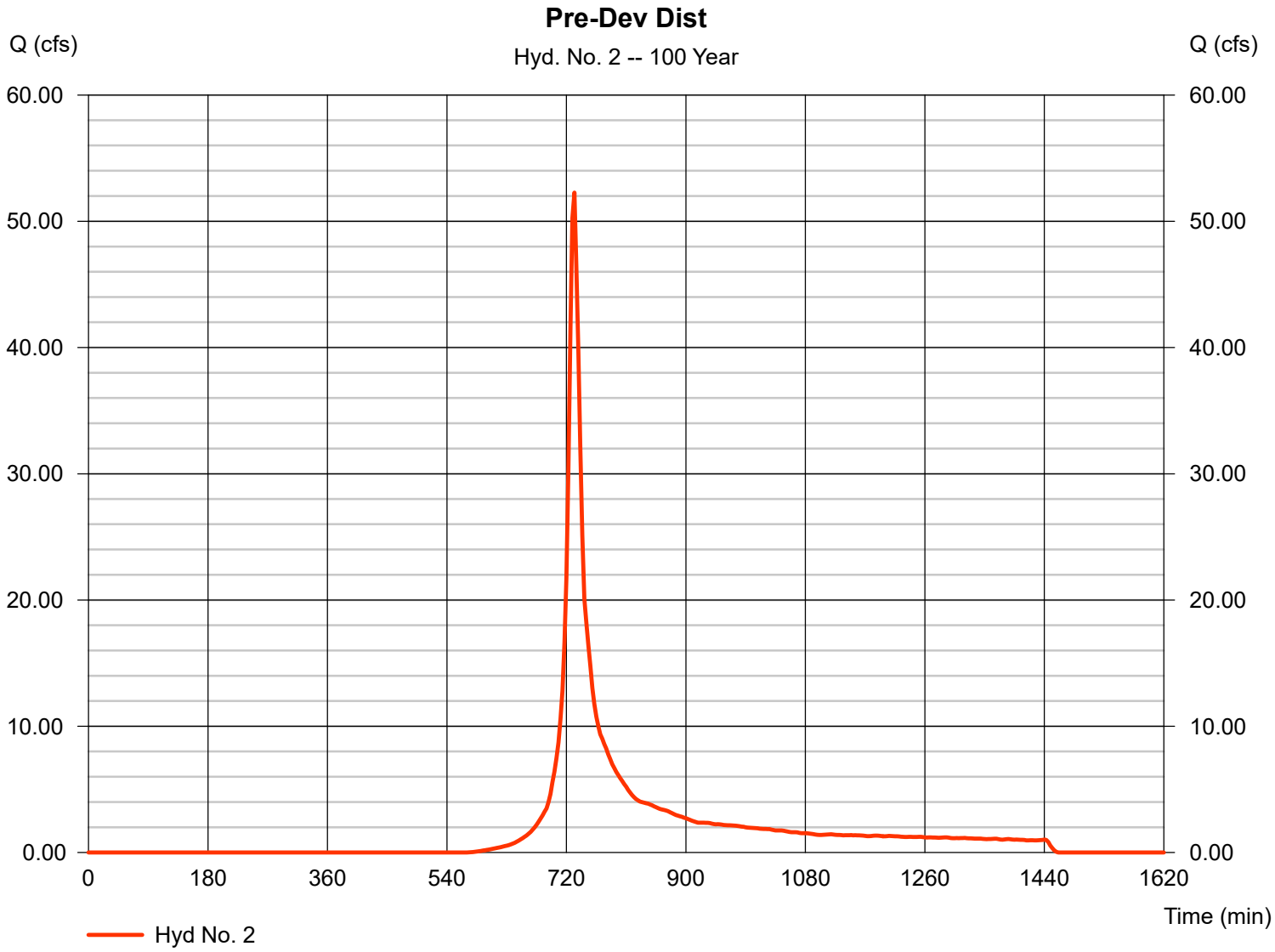
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Wednesday, Feb 3, 2021

Hyd. No. 2

Pre-Dev Dist

Hydrograph type	=	SCS Runoff	Peak discharge	=	52.27 cfs
Storm frequency	=	100 yrs	Time to peak	=	732 min
Time interval	=	3 min	Hyd. volume	=	188,179 cuft
Drainage area	=	14.950 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	14.00 min
Total precip.	=	8.03 in	Distribution	=	Custom
Storm duration	=	NOAA_C_3 min.cds	Shape factor	=	484



APPENDIX - D:

PROPOSED HYDROLOGIC ANALYSIS AND RUNOFF QUANTITY CALCULATIONS

Worksheet 2: Runoff Curve Number and Runoff

Project:	Moebus	By:	bh	Date	1/31/2021
Location:	Clinton	Checked:	Enter	Date	Enter
Circle One:	Present	Developed		PDA#2-To Stream	

1. Runoff Curve Number (CN)

Soil Name and hydrologic group (Appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio	CN* Table 2-2	Table 2-3	Table 2-4	Area [ ] acres [ ] sq. mi. [x] %	Product of CN X area
B	Open Space	61			12.72	775.92
B	Wood - Grass Combination	55			1.01	55.55
C	Water	74			0.16	11.84
Any	Impervious Area	98			0.00	0.00
				Totals =	13.89	843.31

* Use only one CN per line.

CN (weighted) total product / total area = 843.31 / 13.89 = 60.713 Use CN = 61

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency .....yr.			
Rainfall, P (24 hour).....in.			
Runoff, Q .....in. (Use P and CN with Table 2-1, fig. 2-1, or eqs. 2-3 and 2-4)			

D-2

Copied from: (210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentration (T_c) or Travel Time (T_t)

Project:	Moebus	By:	bh	Date	1/31/2021
Location:	Clinton	Checked:	Enter	Date	Enter

Circle One: Present / Developed — PDA#2-To Stream
Circle One: Tc / Tt through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet
Include a map, schematic, or description of flow segments

Sheet flow (applicable to Tc only)	Segment ID		Enter	
1. Surface description (table 3-1).....		Dense Grass		
2. Manning's roughness coeff., (table 3-1).....		0.24		
3. Flow length, L (total L<= 150 ft.).....ft.		100		
4. Two-yr. 24-hr rainfall, P2.....in		3.38		
5. Land Slope, s..... .....ft/ft		0.0533		
6. $Tt = \frac{0.007(nL)^{0.8}}{P_2^{0.5}s^{0.4}}$ Compute T_t.....hr.		0.16	0.00	0.16

Shallow Concentrated flow	Segment ID			
7. Surface description (paved or unpaved).....		unpaved		
8. Flow length, L .....ft		600		
9. Watercourse slope, s .....ft/ft		0.063		
10. Average velocity, V (figure 3-1).....ft/s		4.0		
11. $T_c = \frac{L}{3600V}$ Compute T_t.....hr		0.04		0.04

Channel flow	Segment ID	Enter	Enter	
12. Cross sectional flow area, a.....ft2				
13. Wetted perimeter, p_w .....ft				
14. Hydraulic radius, $r = a/p_w$ Compute r.....ft				
15. Channel slope, s.....ft/ft				
16. Manning's roughness coeff., n				
17. $V = \frac{1.49r^{2/3}s^{1/2}}{n}$ Compute V.....ft/s				
18. Flow length, L.....ft				
19. $T_t = \frac{L}{3600V}$ Compute T_t.....ft.		0.00	0.00	0.00

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)..... 0.20

Min= 11.85

Copied from: (210-VI-TR-55, Second Ed., June 1986)

Worksheet 2: Runoff Curve Number and Runoff

Project: Moebus By: bh Date 1/31/2021

Location: Clinton Checked: Enter Date Enter

Circle One: Present Developed PDA#1-To Basin

1. Runoff Curve Number (CN)

Soil Name and hydrologic group (Appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio	CN* Table 2-2	Table 2-3	Table 2-4	Area [ ] acres [ ] sq. mi. [x] %	Product of CN X area
B	Open Space	61			9.08	553.88
B	Wood - Grass Combination	55			1.59	87.45
C	Water	74			0.00	0.00
Any	Impervious Area	98			0.00	0.00
				Totals =	10.67	641.33

* Use only one CN per line.

CN (weighted) total product / total area = 641.33 / 10.67 = 60.106 Use CN = 60

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency .....yr.			
Rainfall, P (24 hour).....in.			
Runoff, Q .....in.			

(Use P and CN with Table 2-1, fig. 2-1, or eqs. 2-3 and 2-4)

D-2

Copied from: (210-VI-TR-55, Second Ed., June 1986)

Worksheet 3: Time of Concentration (T_c) or Travel Time (T_t)

Project:	Moebus	By:	bh	Date	1/31/2021
Location:	Clinton	Checked:	Enter	Date	Enter

Circle One: Present Developed PDA#1-To Basin
Circle One: Tc Tt through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet
Include a map, schematic, or description of flow segments

Sheet flow (applicable to Tc only)	Segment ID		Enter	
1. Surface description (table 3-1).....			Dense Grass	
2. Manning's roughness coeff., (table 3-1).....			0.24	
3. Flow length, L (total L<= 150 ft.).....ft.			100	
4. Two-yr. 24-hr rainfall, P2.....in			3.3	
5. Land Slope, s..... .....ft/ft			0.032	
6. $Tt = \frac{0.007(nL)^{0.8}}{P_2^{0.5}s^{0.4}}$ Compute T_t.....hr.			0.19	0.00	0.19

Shallow Concentrated flow	Segment ID			
7. Surface description (paved or unpaved).....			unpaved	
8. Flow length, L .....ft			200	
9. Watercourse slope, s .....ft/ft			0.03	
10. Average velocity, V (figure 3-1).....ft/s			2.8	
11. $T_c = \frac{L}{3600V}$ Compute T_t.....hr			0.02		0.02

Channel flow	Segment ID	Enter	Enter	
12. Cross sectional flow area, a.....ft2				
13. Wetted perimeter, p_w .....ft				
14. Hydraulic radius, $r = a/p_w$ Compute r.....ft				
15. Channel slope, s.....ft/ft				
16. Manning's roughness coeff., n				
17. $V = \frac{1.49r^{2/3}s^{1/2}}{n}$ Compute V.....ft/s				
18. Flow length, L.....ft				
19. $T_t = \frac{L}{3600V}$ Compute T_t.....ft.		0.00	0.00	0.00

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)..... 0.21

Min= 12.84

Copied from: (210-VI-TR-55, Second Ed., June 1986)

Worksheet 2: Runoff Curve Number and Runoff

Project:	Moebus	By:	bh	Date	1/31/2021
Location:	Clinton	Checked:	Enter	Date	Enter
Circle One:	Present	Developed		PDA#1-Imp To Basin	

1. Runoff Curve Number (CN)

Soil Name and hydrologic group (Appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio	CN* Table 2-2	Table 2-3	Table 2-4	Area		Product of CN X area
						acres	
						sq. mi.	
					x	%	
B	Open Space	61					
B	Wood - Grass Combination	55					
C	Water	74					
Any	Impervious Area	98			8.81		863.38
				Totals =	8.81		863.38

* Use only one CN per line.

CN (weighted) total product / total area = 863.38 / 8.81 = 98 Use CN = 98

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency .....yr.			
Rainfall, P (24 hour).....in.			
Runoff, Q .....in.			

(Use P and CN with Table 2-1, fig. 2-1, or eqs. 2-3 and 2-4)

D-2

Copied from: (210-VI-TR-55, Second Ed., June 1986)

Worksheet 2: Runoff Curve Number and Runoff

Project:	Moebus	By:	bh	Date	1/31/2021
Location:	Clinton	Checked:	Enter	Date	Enter

Circle One: Present <u>Developed</u> To Trench Drain

1. Runoff Curve Number (CN)

Soil Name and hydrologic group (Appendix A)	Cover Description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio	CN* Table 2-2	Table 2-3	Table 2-4	Area [ ] acres [ ] sq. mi. [x] %	Product of CN X area
B	Open Space	61			0.02	1.22
B	Wood - Grass Combination	55			0.00	0.00
C	Water	74			0.00	0.00
Any	Impervious Area	98			0.30	29.40
				Totals =	0.32	30.62

* Use only one CN per line.

CN (weighted) $\frac{\text{total product}}{\text{total area}} = \frac{30.62}{0.32} = 95.688$ Use CN = 96

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency .....yr.			
Rainfall, P (24 hour).....in.			
Runoff, Q .....in.			

(Use P and CN with Table 2-1, fig. 2-1, or eqs. 2-3 and 2-4)

D-2

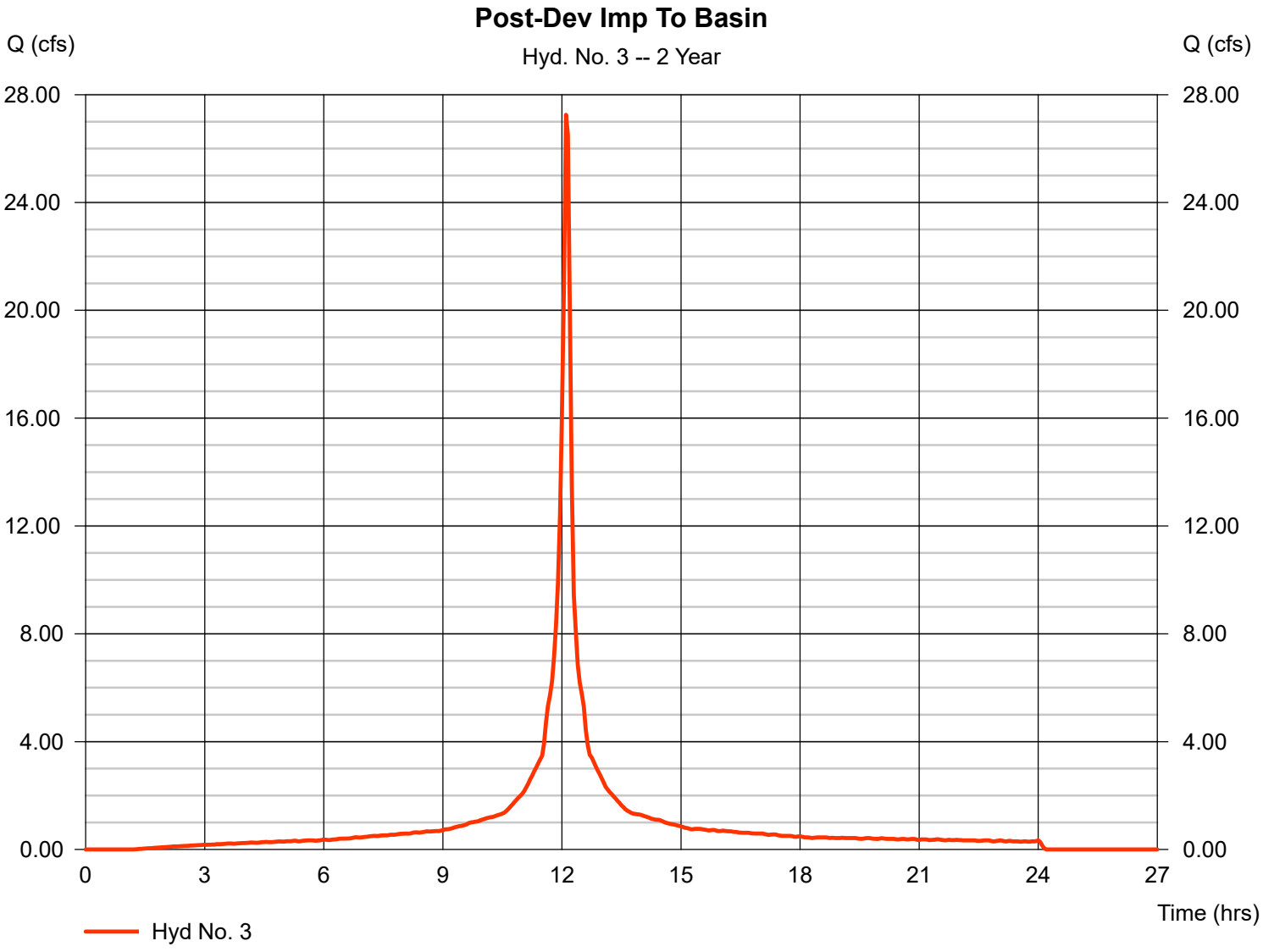
Copied from: (210-VI-TR-55, Second Ed., June 1986)

Hydrograph Report

Hyd. No. 3

Post-Dev Imp To Basin

Hydrograph type	=	SCS Runoff	Peak discharge	=	27.25 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.10 hrs
Time interval	=	3 min	Hyd. volume	=	94,348 cuft
Drainage area	=	8.810 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	3.38 in	Distribution	=	Custom
Storm duration	=	NOAA_C_3 min.cds	Shape factor	=	484



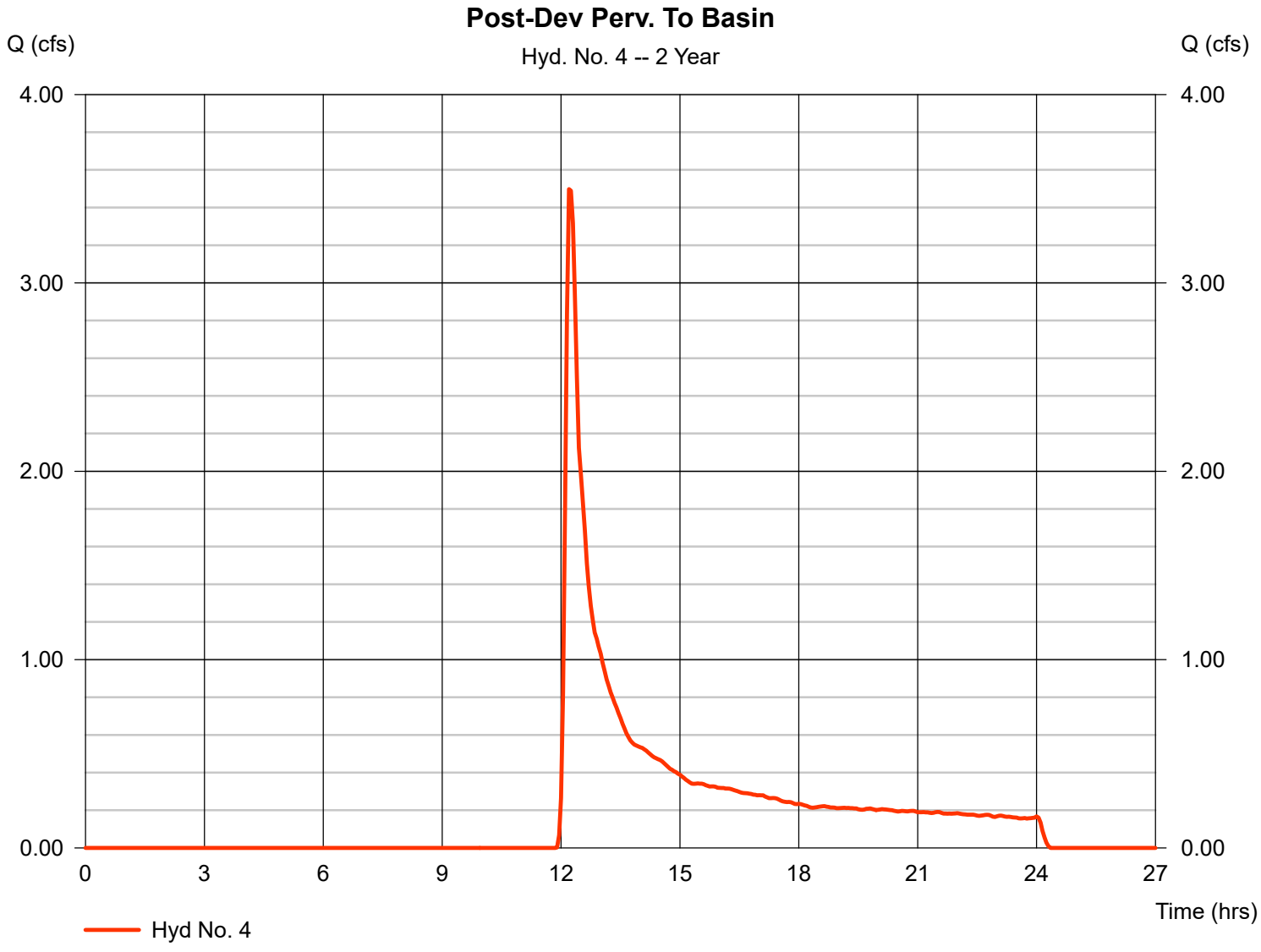
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 4

Post-Dev Perv. To Basin

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.498 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.20 hrs
Time interval	=	3 min	Hyd. volume	=	18,616 cuft
Drainage area	=	10.670 ac	Curve number	=	60
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	12.80 min
Total precip.	=	3.38 in	Distribution	=	Custom
Storm duration	=	NOAA_C_3 min.cds	Shape factor	=	484

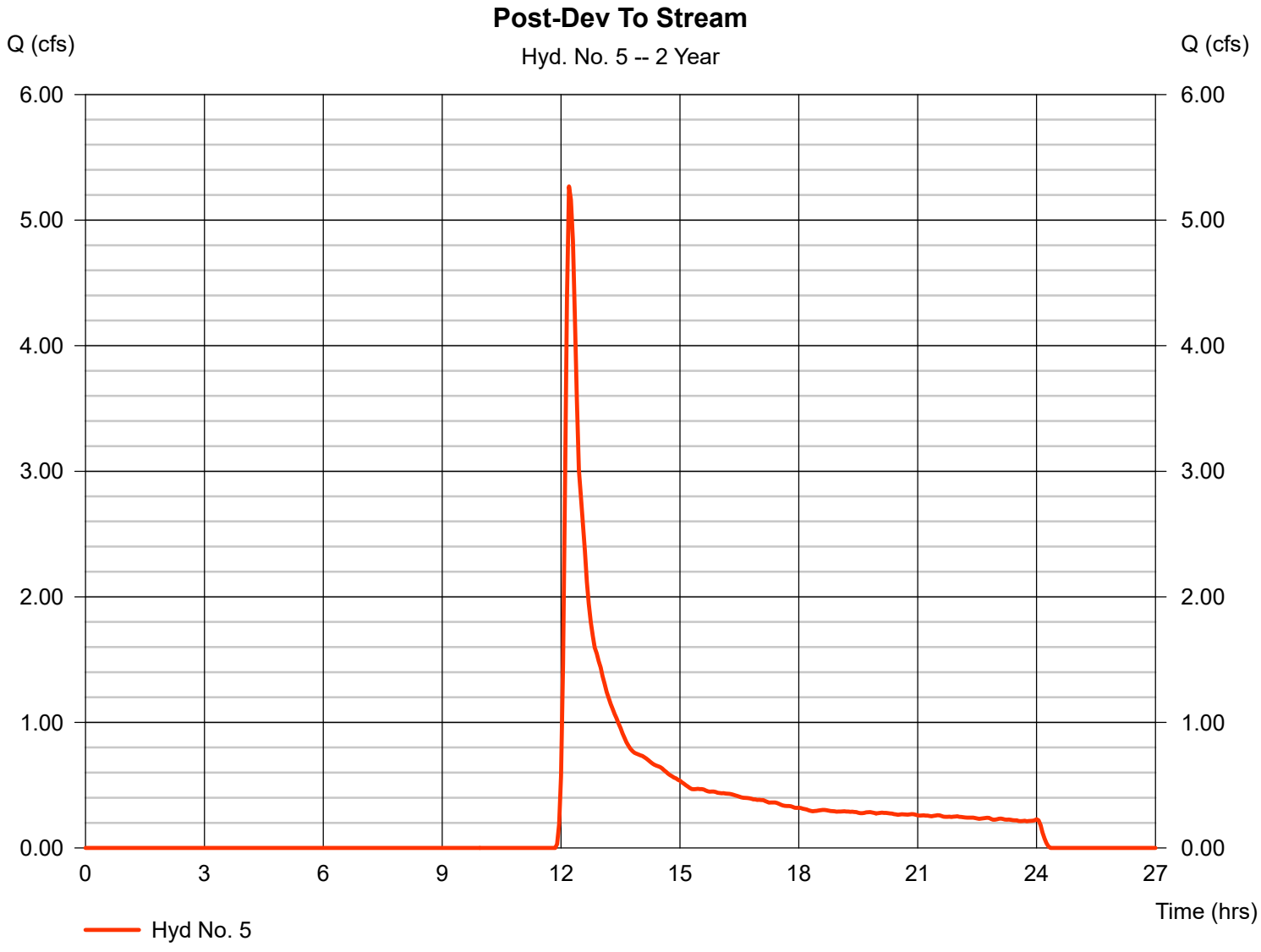


Hydrograph Report

Hyd. No. 5

Post-Dev To Stream

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.268 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.20 hrs
Time interval	=	3 min	Hyd. volume	=	26,202 cuft
Drainage area	=	13.890 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	11.90 min
Total precip.	=	3.38 in	Distribution	=	Custom
Storm duration	=	NOAA_C_3 min.cds	Shape factor	=	484



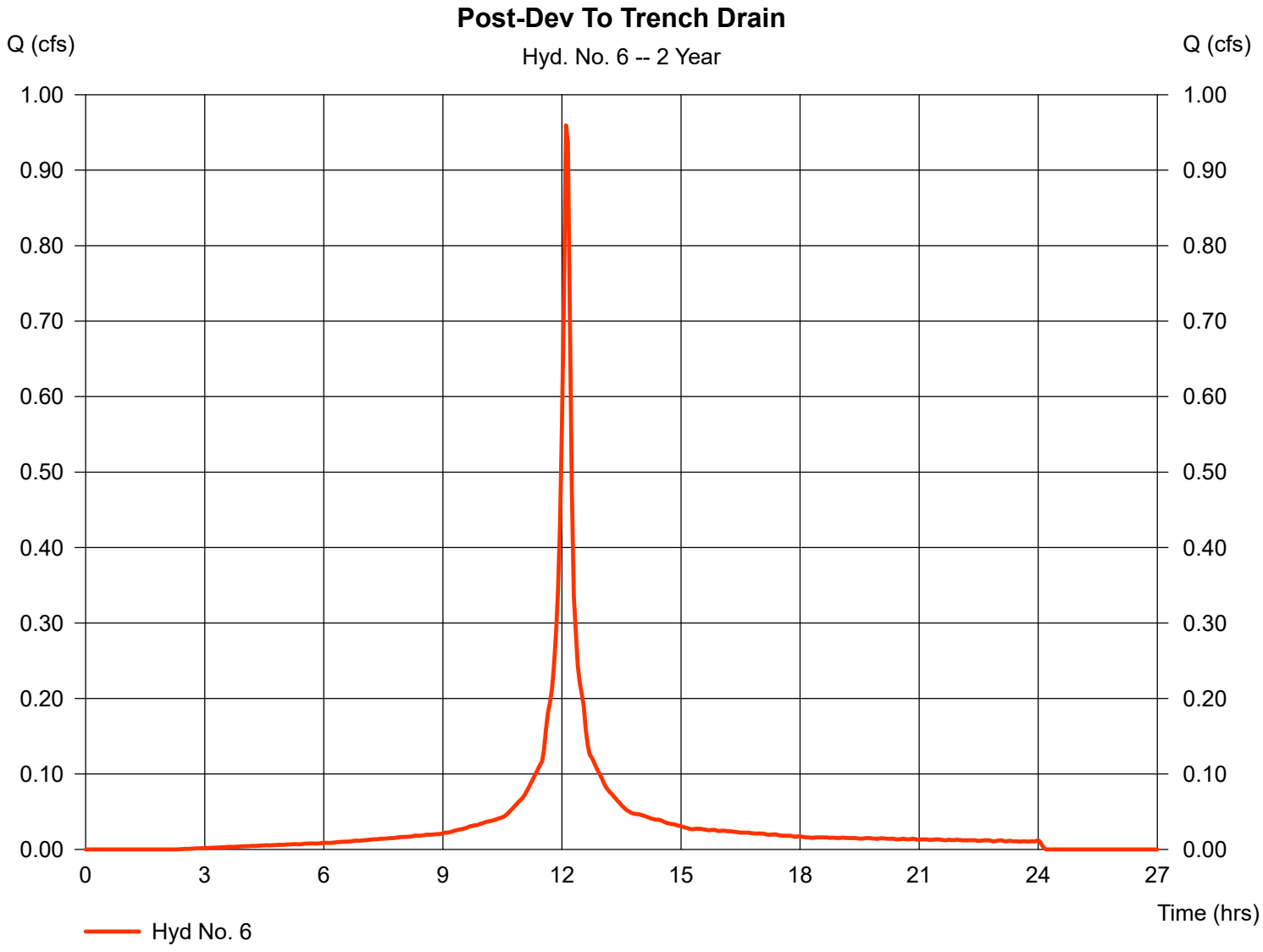
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 6

Post-Dev To Trench Drain

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.959 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.10 hrs
Time interval	=	3 min	Hyd. volume	=	3,187 cuft
Drainage area	=	0.320 ac	Curve number	=	96
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	3.38 in	Distribution	=	Custom
Storm duration	=	NOAA_C_3 min.cds	Shape factor	=	484



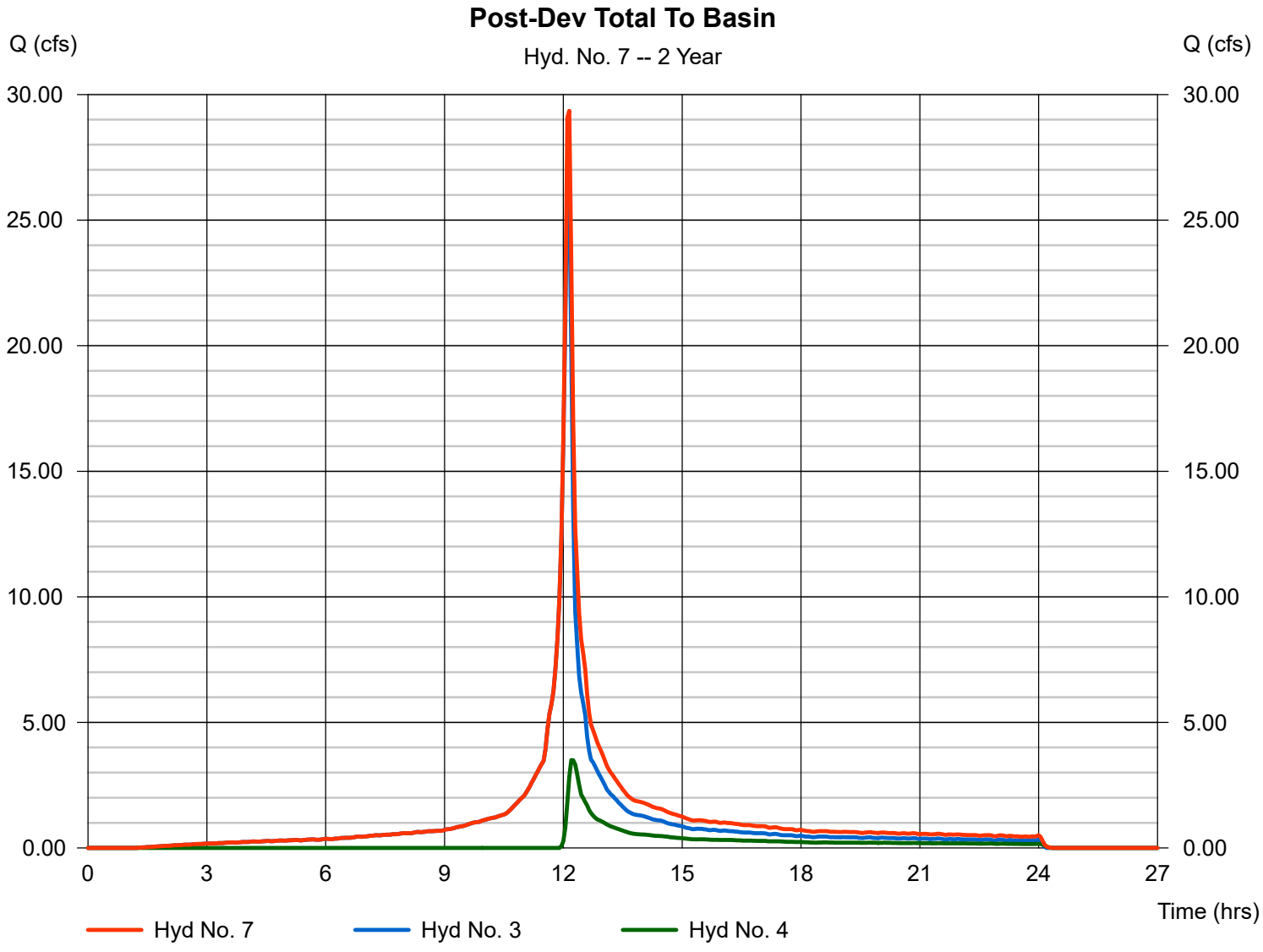
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 7

Post-Dev Total To Basin

Hydrograph type	= Combine	Peak discharge	= 29.35 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.15 hrs
Time interval	= 3 min	Hyd. volume	= 112,963 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 19.480 ac



Hydrograph Report

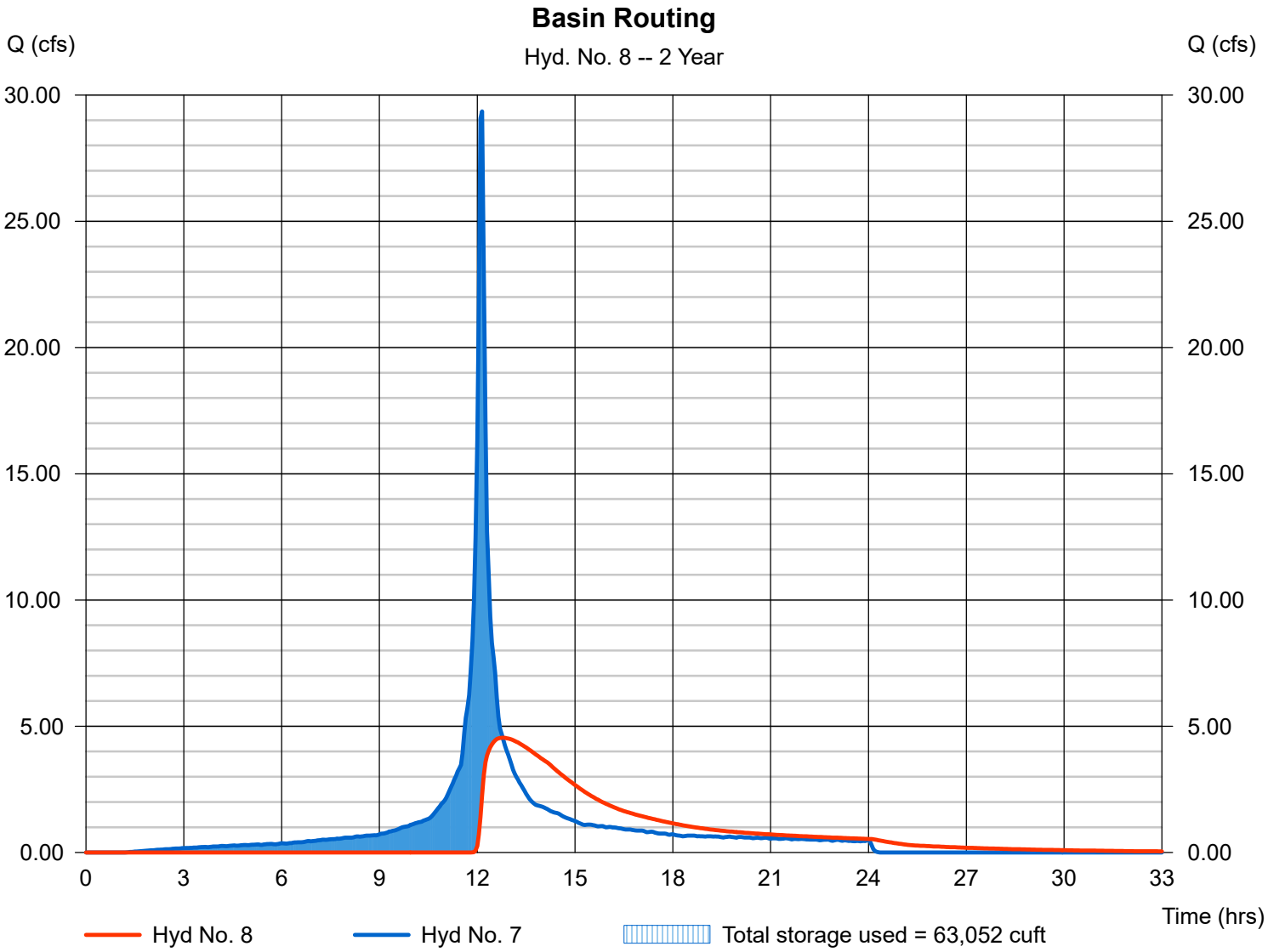
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 8

Basin Routing

Hydrograph type	=	Reservoir	Peak discharge	=	4.543 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.80 hrs
Time interval	=	3 min	Hyd. volume	=	83,557 cuft
Inflow hyd. No.	=	7 - Post-Dev Total To Basin	Max. Elevation	=	226.90 ft
Reservoir name	=	Infiltration Basin	Max. Storage	=	63,052 cuft

Storage Indication method used.

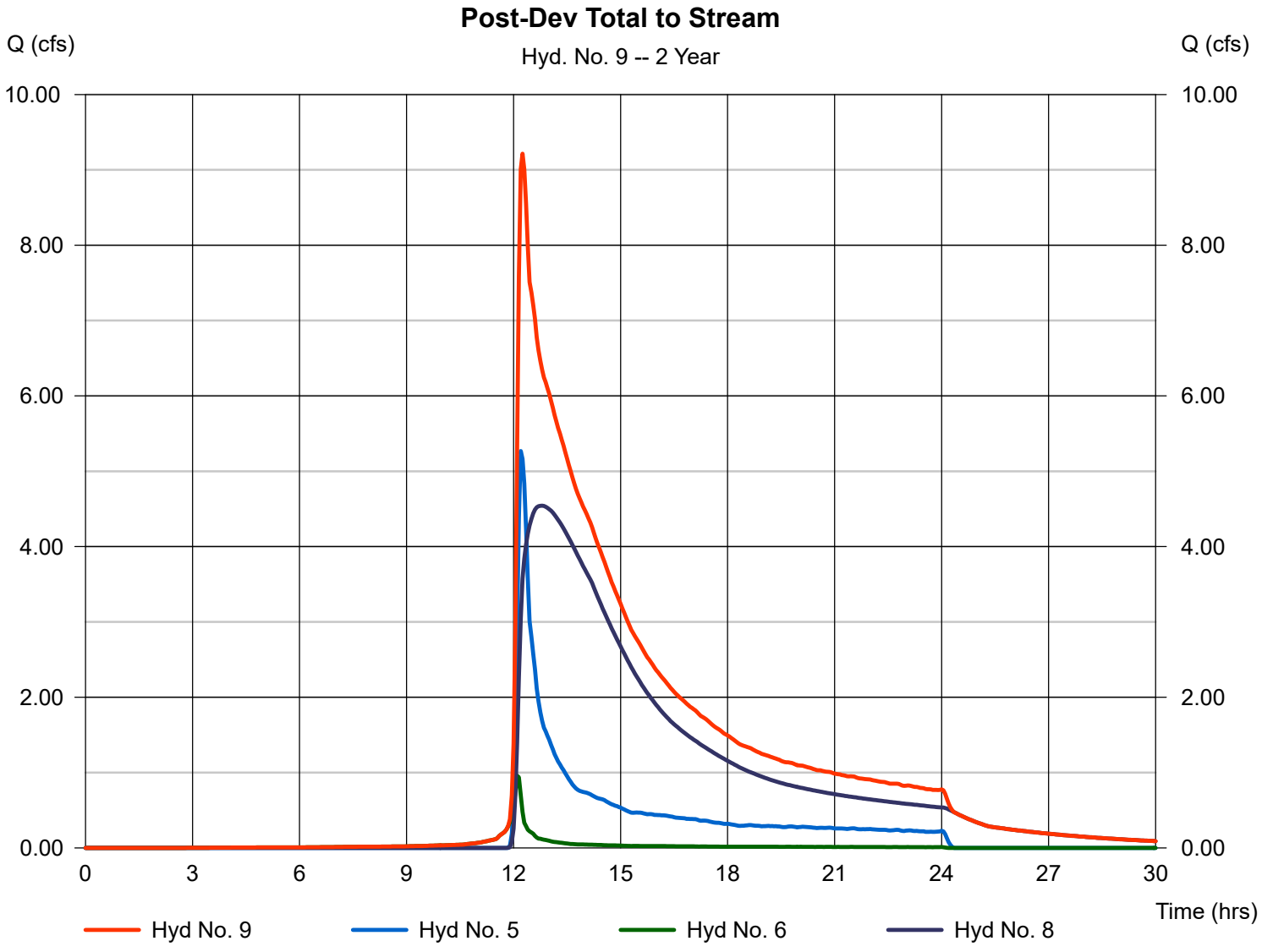


Hydrograph Report

Hyd. No. 9

Post-Dev Total to Stream

Hydrograph type	= Combine	Peak discharge	= 9.215 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.25 hrs
Time interval	= 3 min	Hyd. volume	= 112,946 cuft
Inflow hyds.	= 5, 6, 8	Contrib. drain. area	= 14.210 ac



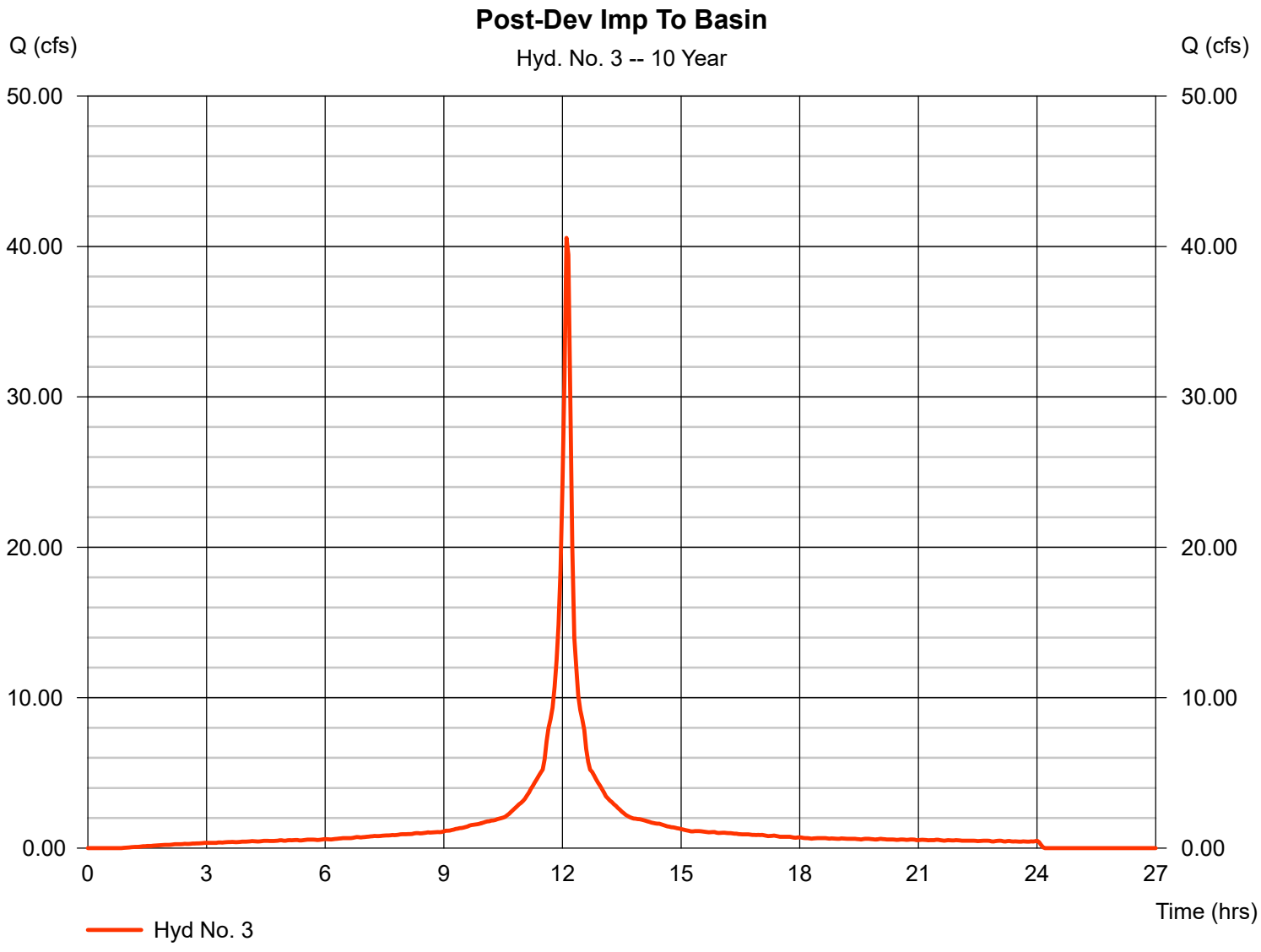
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 3

Post-Dev Imp To Basin

Hydrograph type	=	SCS Runoff	Peak discharge	=	40.57 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.10 hrs
Time interval	=	3 min	Hyd. volume	=	142,807 cuft
Drainage area	=	8.810 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	5.00 in	Distribution	=	Custom
Storm duration	=	NOAA_C_3 min.cds	Shape factor	=	484

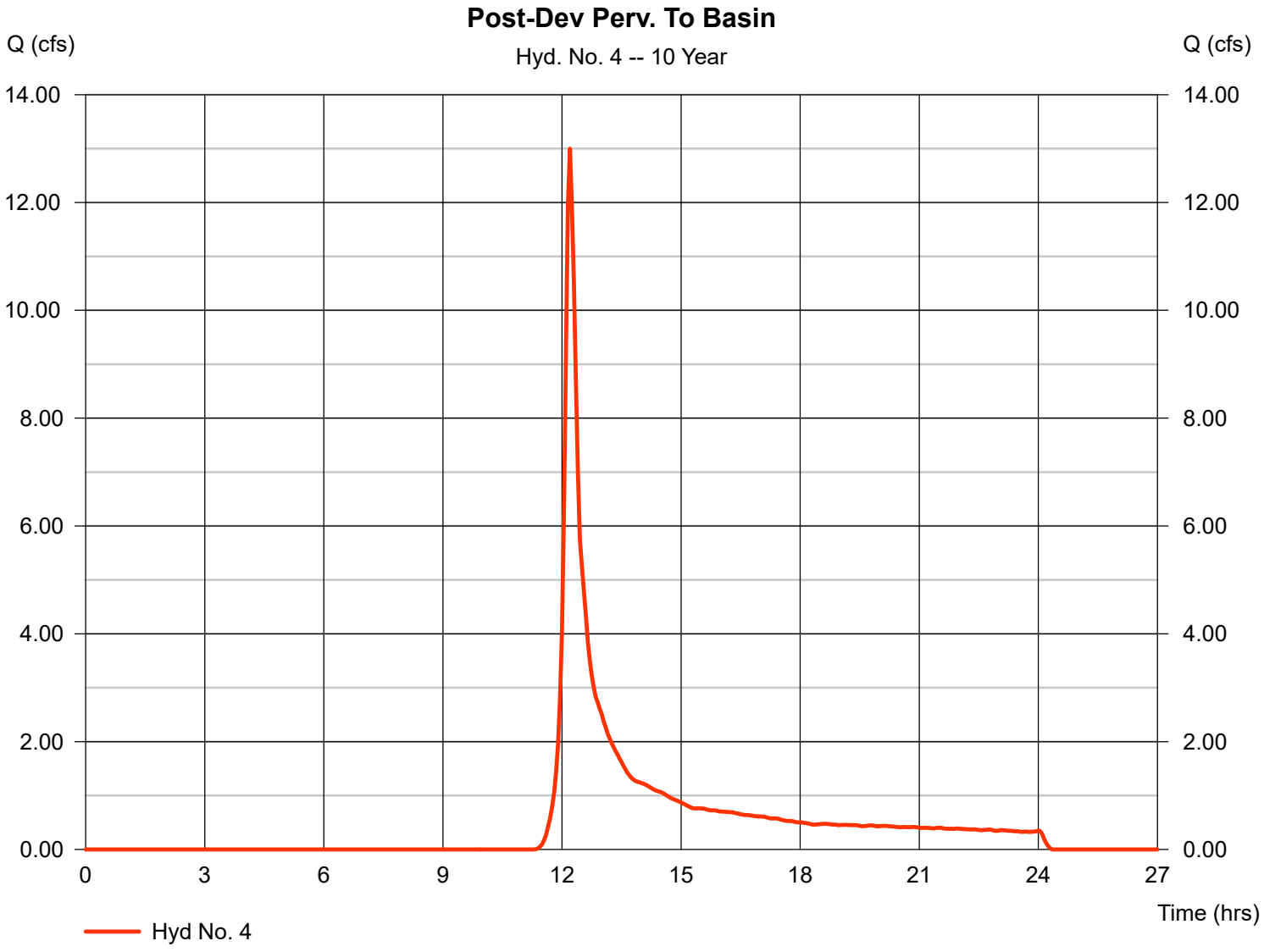


Hydrograph Report

Hyd. No. 4

Post-Dev Perv. To Basin

Hydrograph type	=	SCS Runoff	Peak discharge	=	13.00 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.20 hrs
Time interval	=	3 min	Hyd. volume	=	50,393 cuft
Drainage area	=	10.670 ac	Curve number	=	60
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	12.80 min
Total precip.	=	5.00 in	Distribution	=	Custom
Storm duration	=	NOAA_C_3 min.cds	Shape factor	=	484



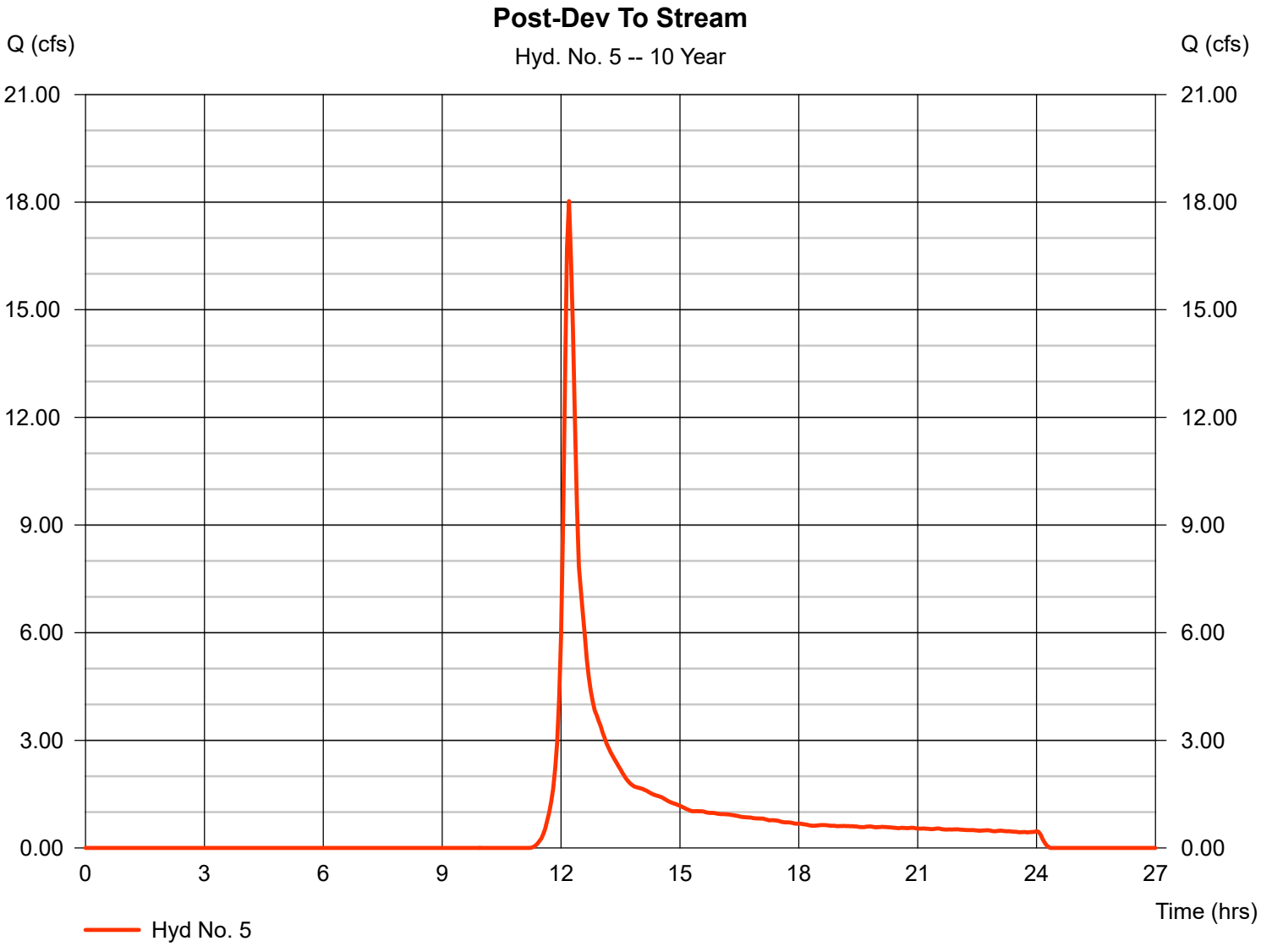
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 5

Post-Dev To Stream

Hydrograph type	=	SCS Runoff	Peak discharge	=	18.03 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.20 hrs
Time interval	=	3 min	Hyd. volume	=	69,031 cuft
Drainage area	=	13.890 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	11.90 min
Total precip.	=	5.00 in	Distribution	=	Custom
Storm duration	=	NOAA_C_3 min.cds	Shape factor	=	484



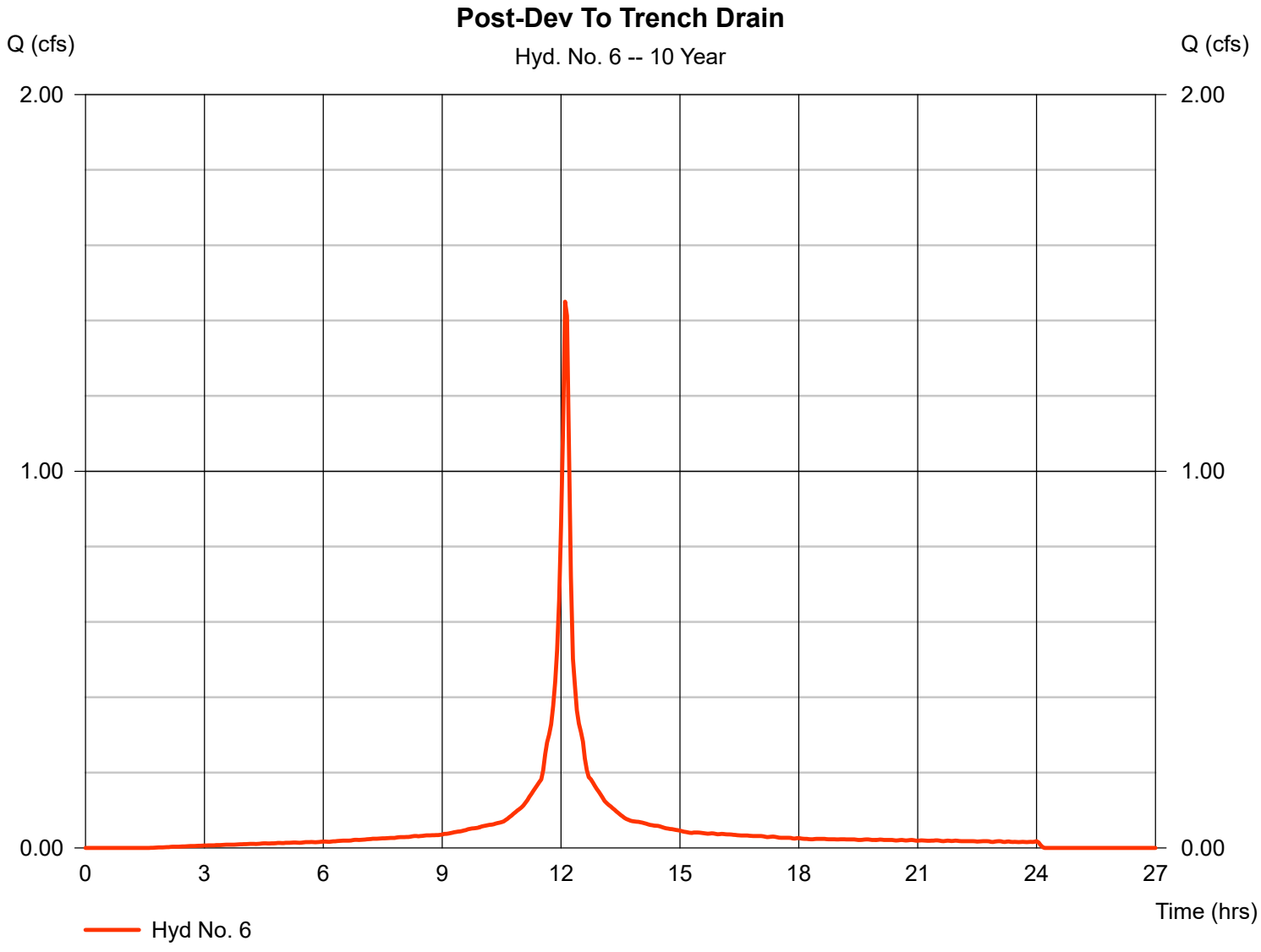
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 6

Post-Dev To Trench Drain

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.450 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.10 hrs
Time interval	=	3 min	Hyd. volume	=	4,936 cuft
Drainage area	=	0.320 ac	Curve number	=	96
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	5.00 in	Distribution	=	Custom
Storm duration	=	NOAA_C_3 min.cds	Shape factor	=	484



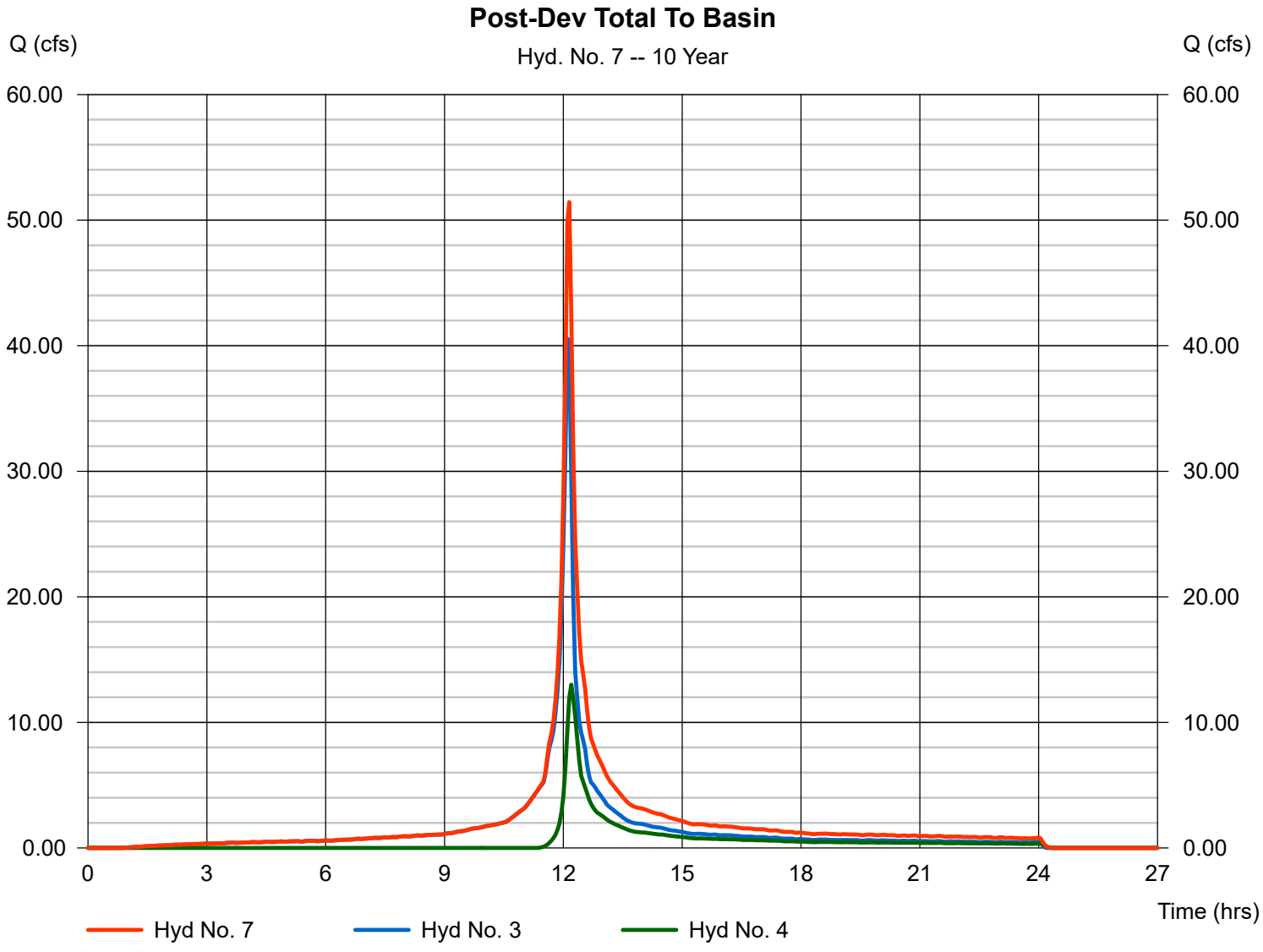
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 7

Post-Dev Total To Basin

Hydrograph type	= Combine	Peak discharge	= 51.42 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.15 hrs
Time interval	= 3 min	Hyd. volume	= 193,200 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 19.480 ac



Hydrograph Report

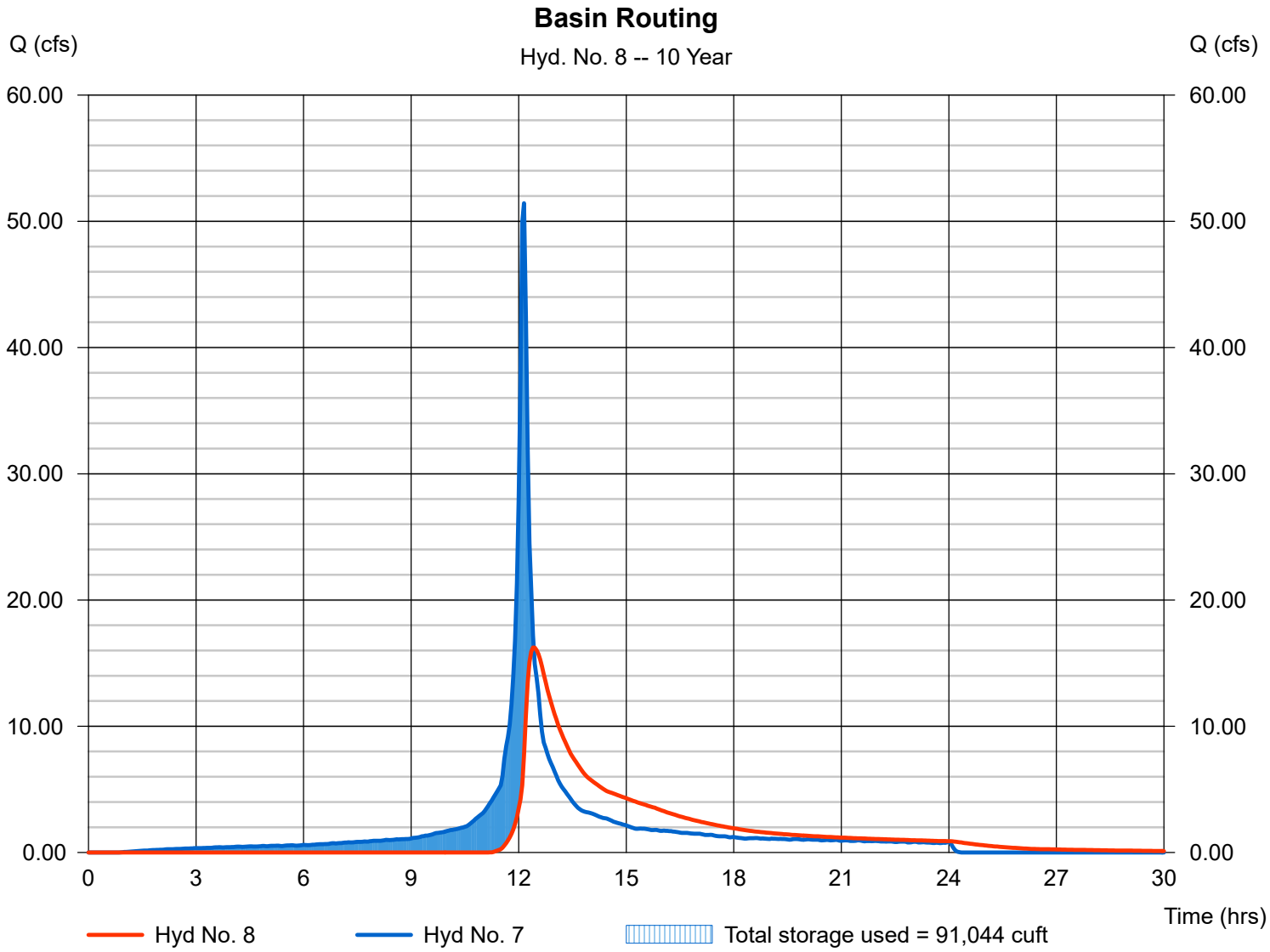
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 8

Basin Routing

Hydrograph type	=	Reservoir	Peak discharge	=	16.24 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.40 hrs
Time interval	=	3 min	Hyd. volume	=	163,780 cuft
Inflow hyd. No.	=	7 - Post-Dev Total To Basin	Max. Elevation	=	228.01 ft
Reservoir name	=	Infiltration Basin	Max. Storage	=	91,044 cuft

Storage Indication method used.



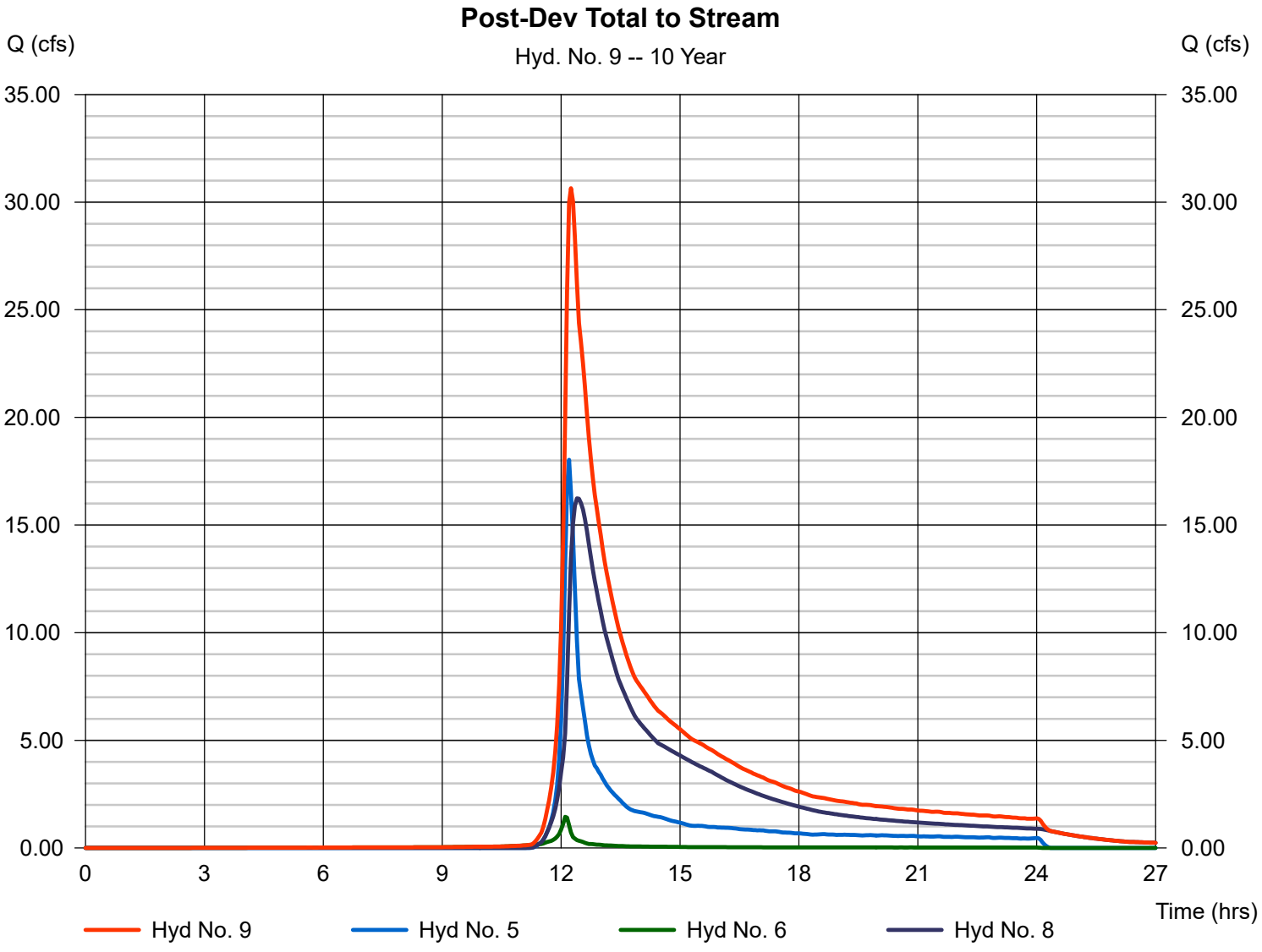
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 9

Post-Dev Total to Stream

Hydrograph type	= Combine	Peak discharge	= 30.65 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.25 hrs
Time interval	= 3 min	Hyd. volume	= 237,746 cuft
Inflow hyds.	= 5, 6, 8	Contrib. drain. area	= 14.210 ac



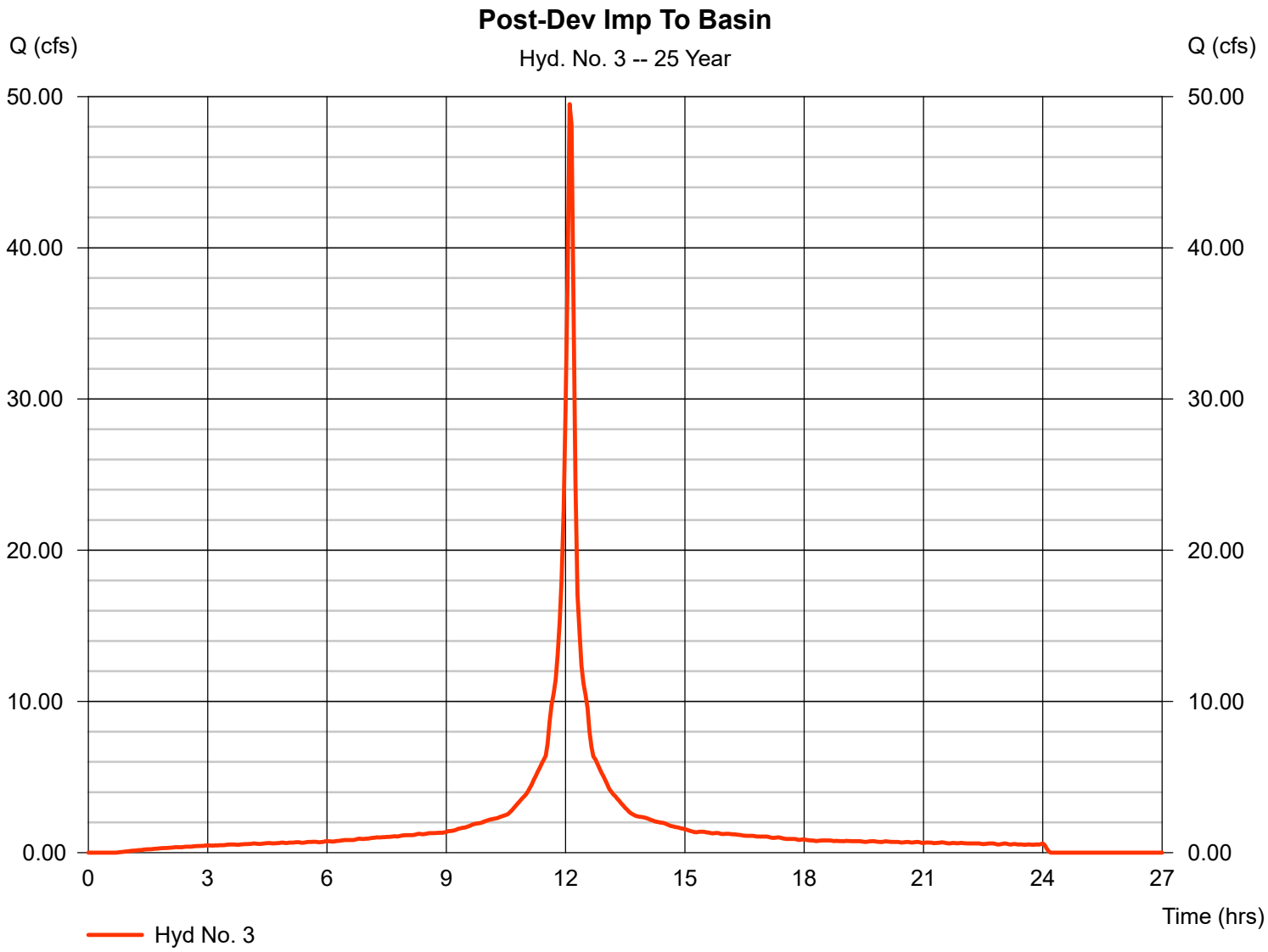
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 3

Post-Dev Imp To Basin

Hydrograph type	=	SCS Runoff	Peak discharge	=	49.51 cfs
Storm frequency	=	25 yrs	Time to peak	=	12.10 hrs
Time interval	=	3 min	Hyd. volume	=	175,445 cuft
Drainage area	=	8.810 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	6.09 in	Distribution	=	Custom
Storm duration	=	NOAA_C_3 min.cds	Shape factor	=	484



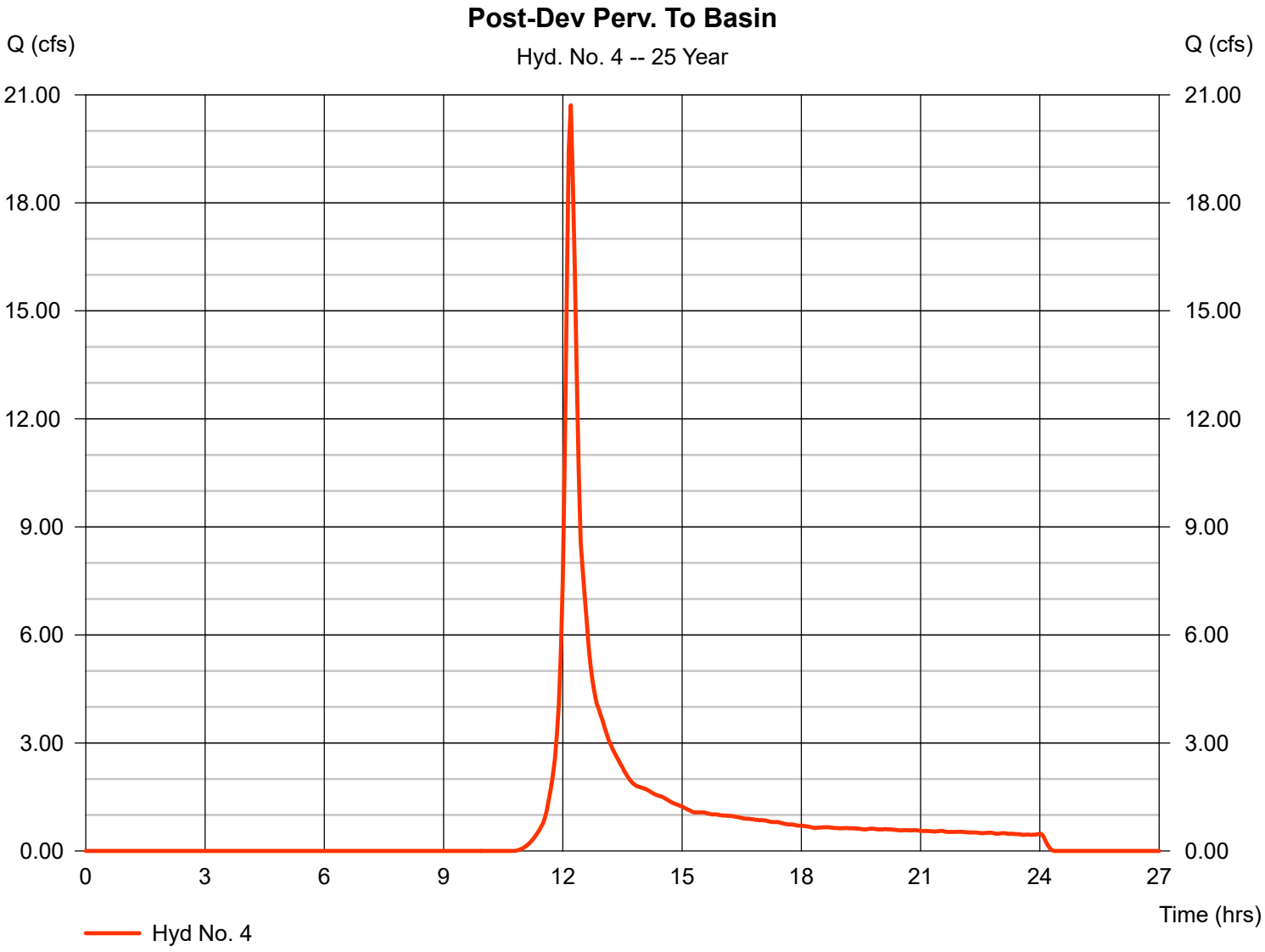
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 4

Post-Dev Perv. To Basin

Hydrograph type	=	SCS Runoff	Peak discharge	=	20.71 cfs
Storm frequency	=	25 yrs	Time to peak	=	12.20 hrs
Time interval	=	3 min	Hyd. volume	=	76,715 cuft
Drainage area	=	10.670 ac	Curve number	=	60
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	12.80 min
Total precip.	=	6.09 in	Distribution	=	Custom
Storm duration	=	NOAA_C_3 min.cds	Shape factor	=	484



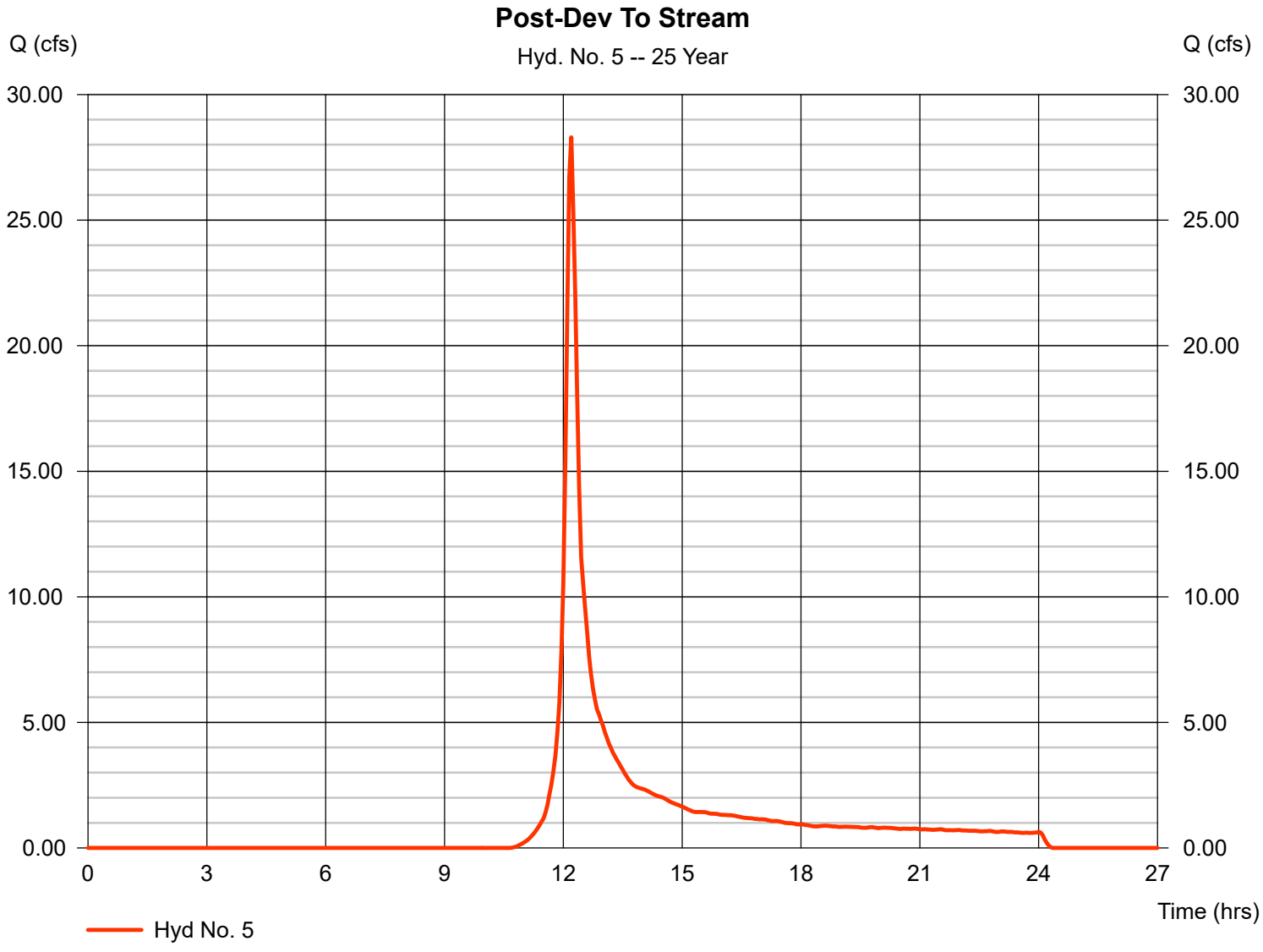
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 5

Post-Dev To Stream

Hydrograph type	=	SCS Runoff	Peak discharge	=	28.29 cfs
Storm frequency	=	25 yrs	Time to peak	=	12.20 hrs
Time interval	=	3 min	Hyd. volume	=	104,168 cuft
Drainage area	=	13.890 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	11.90 min
Total precip.	=	6.09 in	Distribution	=	Custom
Storm duration	=	NOAA_C_3 min.cds	Shape factor	=	484



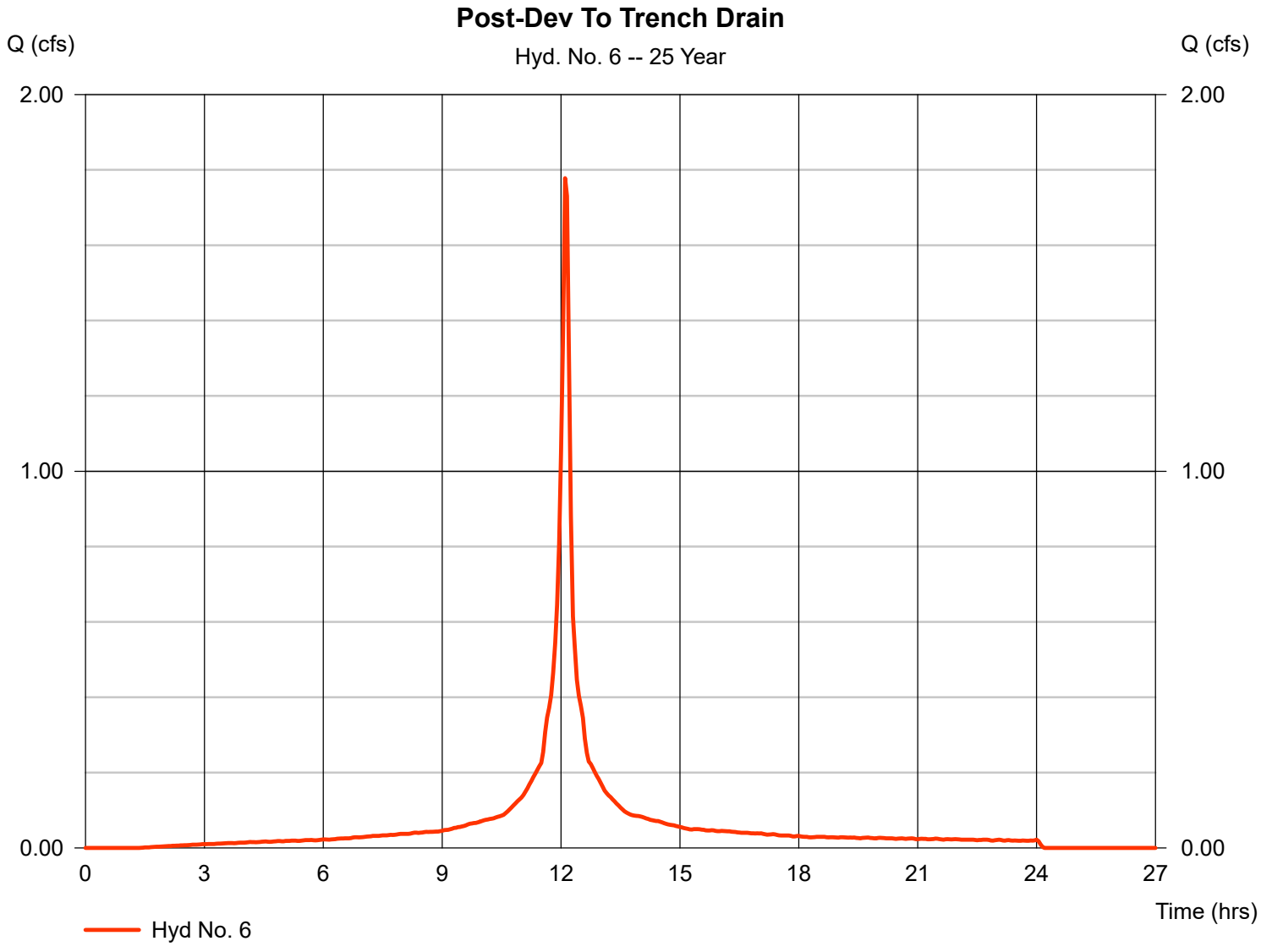
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 6

Post-Dev To Trench Drain

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.778 cfs
Storm frequency	=	25 yrs	Time to peak	=	12.10 hrs
Time interval	=	3 min	Hyd. volume	=	6,117 cuft
Drainage area	=	0.320 ac	Curve number	=	96
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	6.09 in	Distribution	=	Custom
Storm duration	=	NOAA_C_3 min.cds	Shape factor	=	484



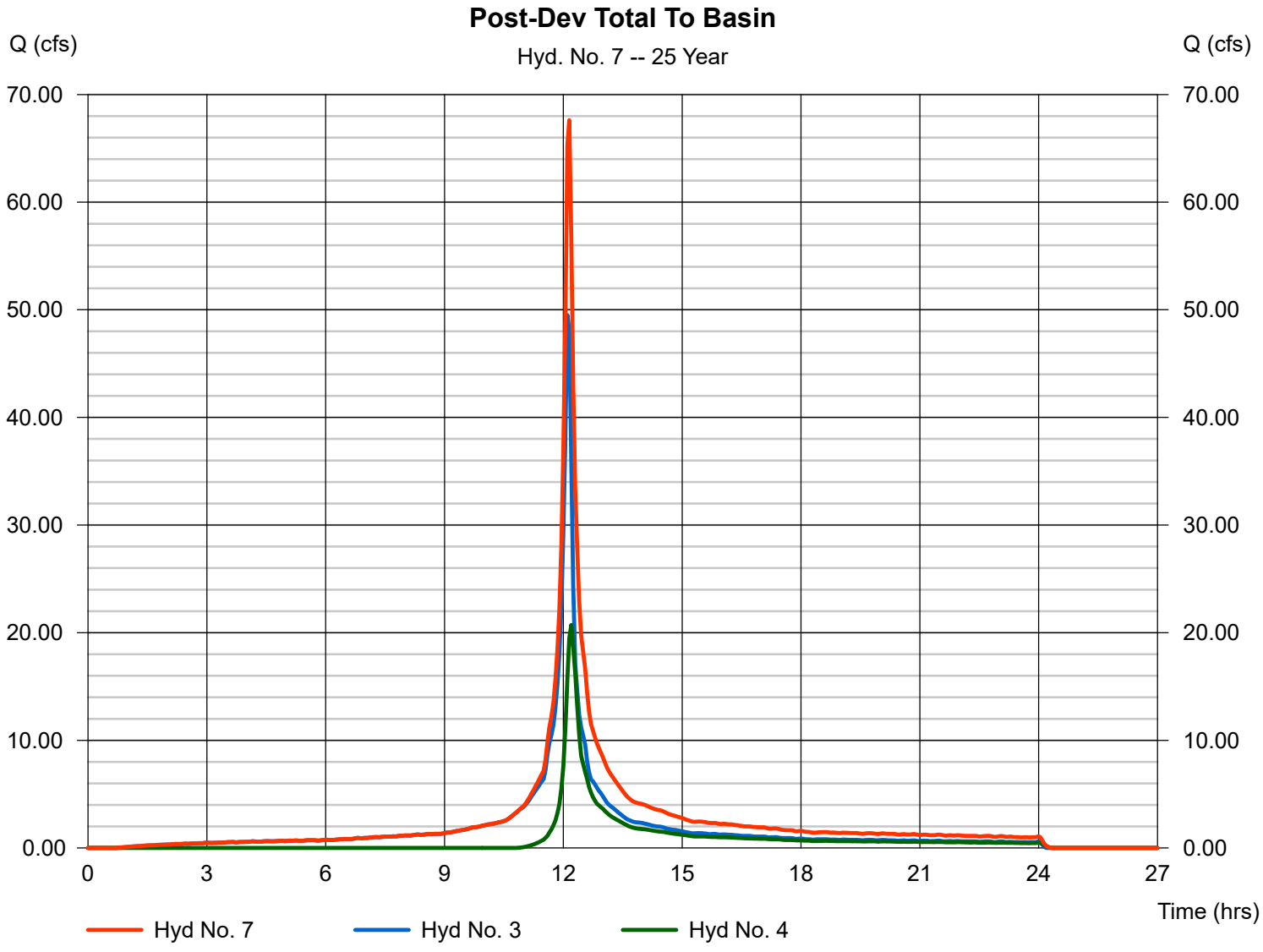
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 7

Post-Dev Total To Basin

Hydrograph type	= Combine	Peak discharge	= 67.62 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.15 hrs
Time interval	= 3 min	Hyd. volume	= 252,160 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 19.480 ac



Hydrograph Report

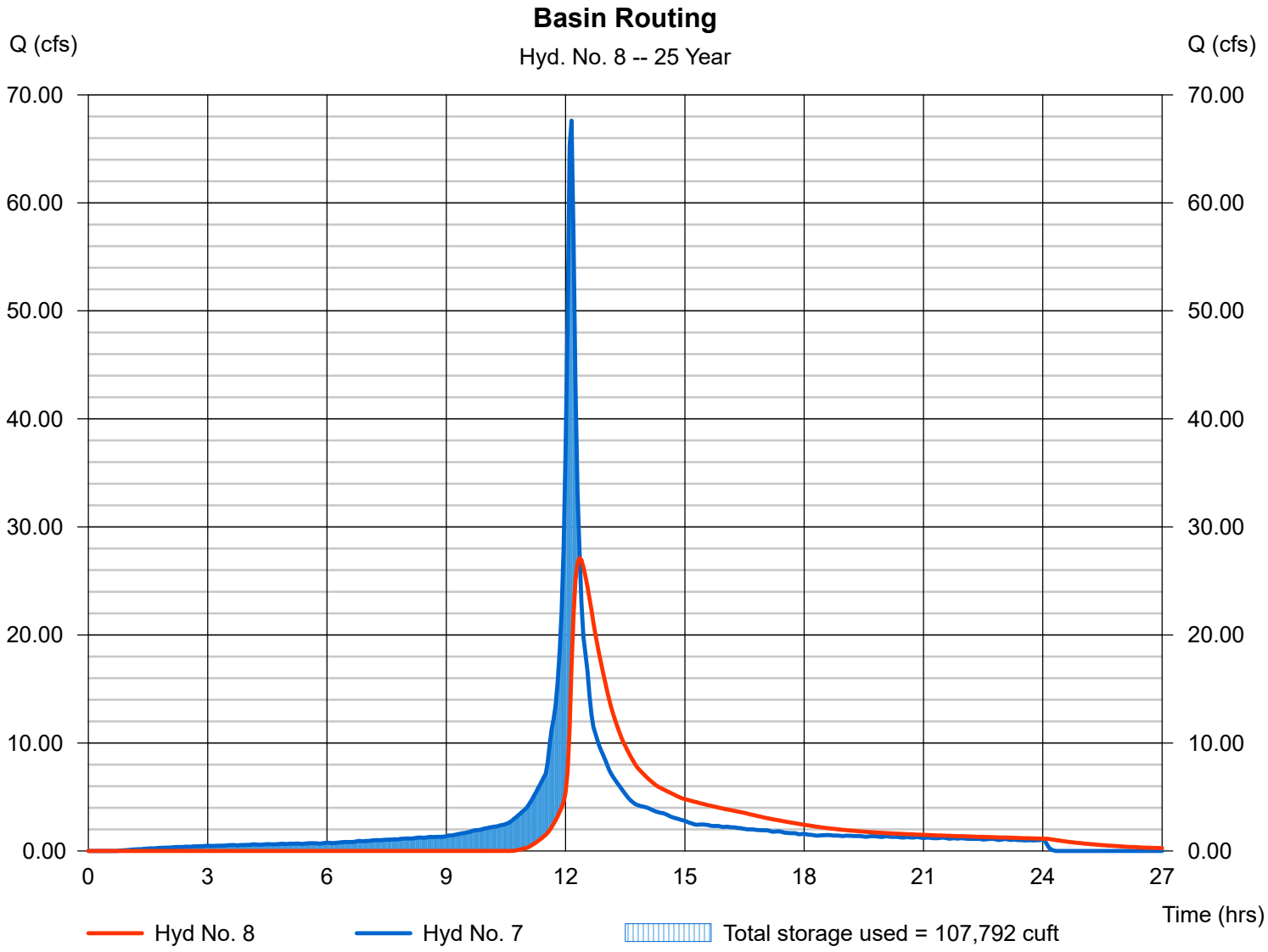
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 8

Basin Routing

Hydrograph type	=	Reservoir	Peak discharge	=	27.12 cfs
Storm frequency	=	25 yrs	Time to peak	=	12.35 hrs
Time interval	=	3 min	Hyd. volume	=	222,734 cuft
Inflow hyd. No.	=	7 - Post-Dev Total To Basin	Max. Elevation	=	228.55 ft
Reservoir name	=	Infiltration Basin	Max. Storage	=	107,792 cuft

Storage Indication method used.



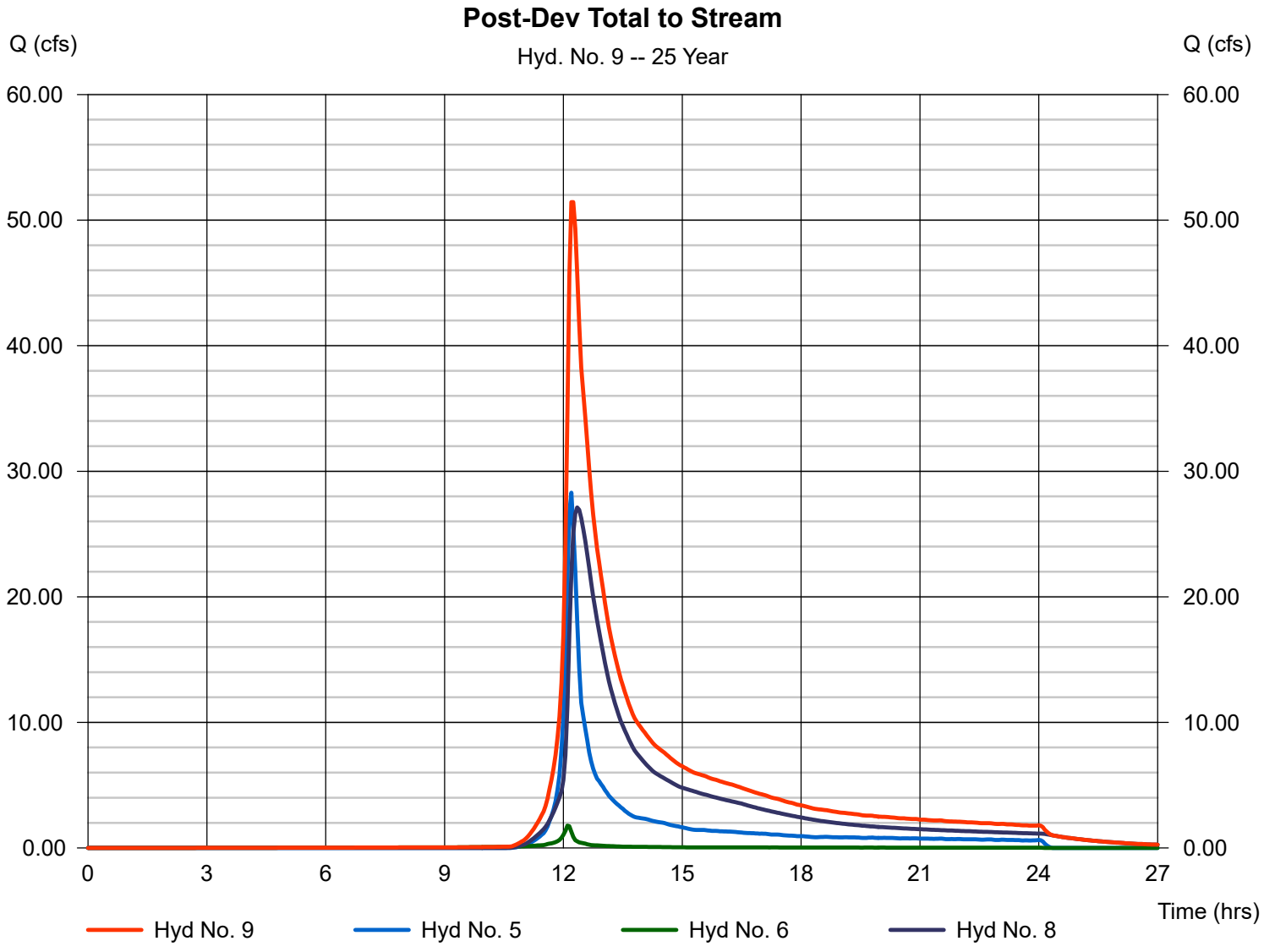
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 9

Post-Dev Total to Stream

Hydrograph type	= Combine	Peak discharge	= 51.44 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.25 hrs
Time interval	= 3 min	Hyd. volume	= 333,018 cuft
Inflow hyds.	= 5, 6, 8	Contrib. drain. area	= 14.210 ac



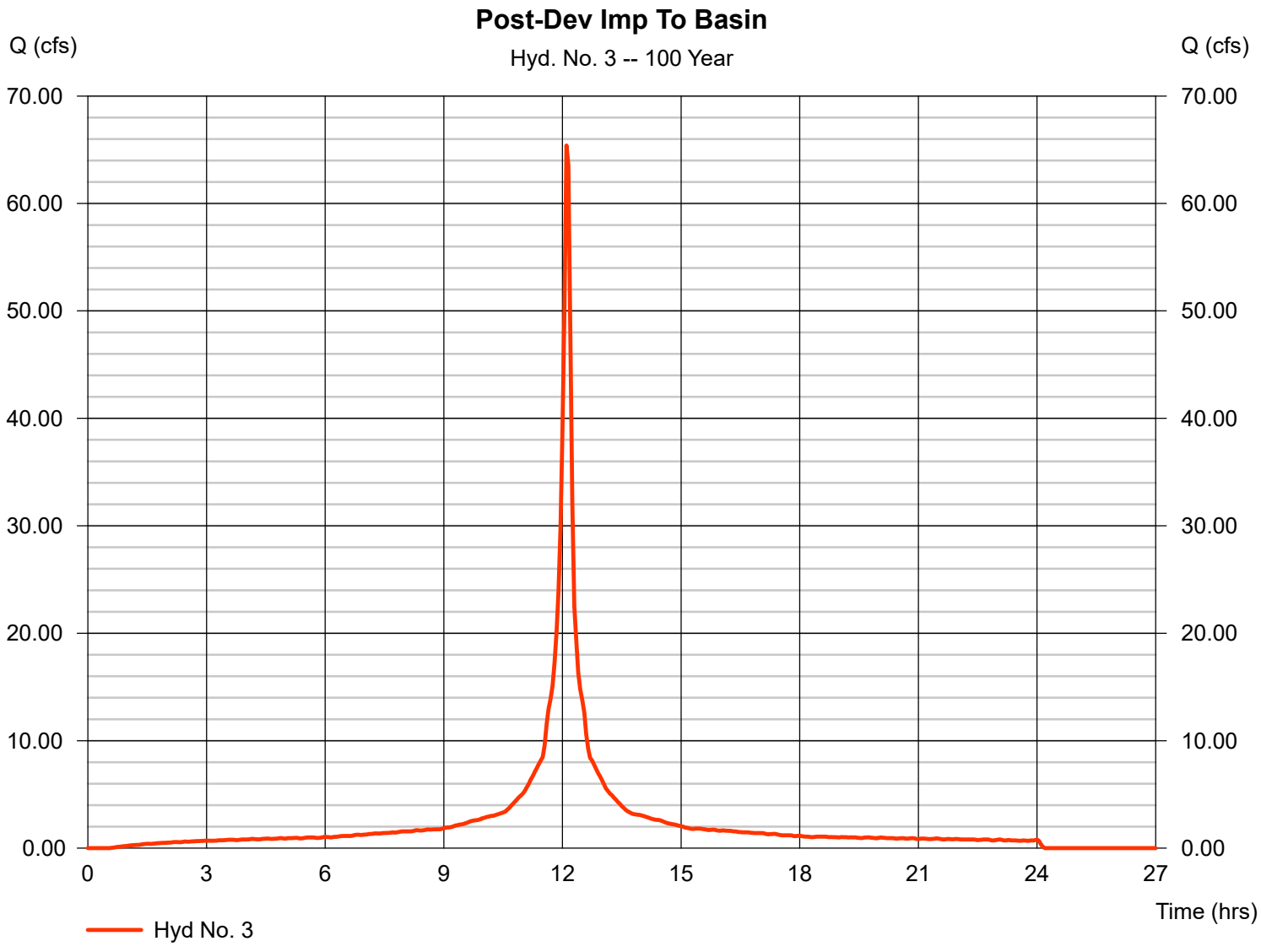
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 3

Post-Dev Imp To Basin

Hydrograph type	=	SCS Runoff	Peak discharge	=	65.39 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.10 hrs
Time interval	=	3 min	Hyd. volume	=	233,561 cuft
Drainage area	=	8.810 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	8.03 in	Distribution	=	Custom
Storm duration	=	NOAA_C_3 min.cds	Shape factor	=	484



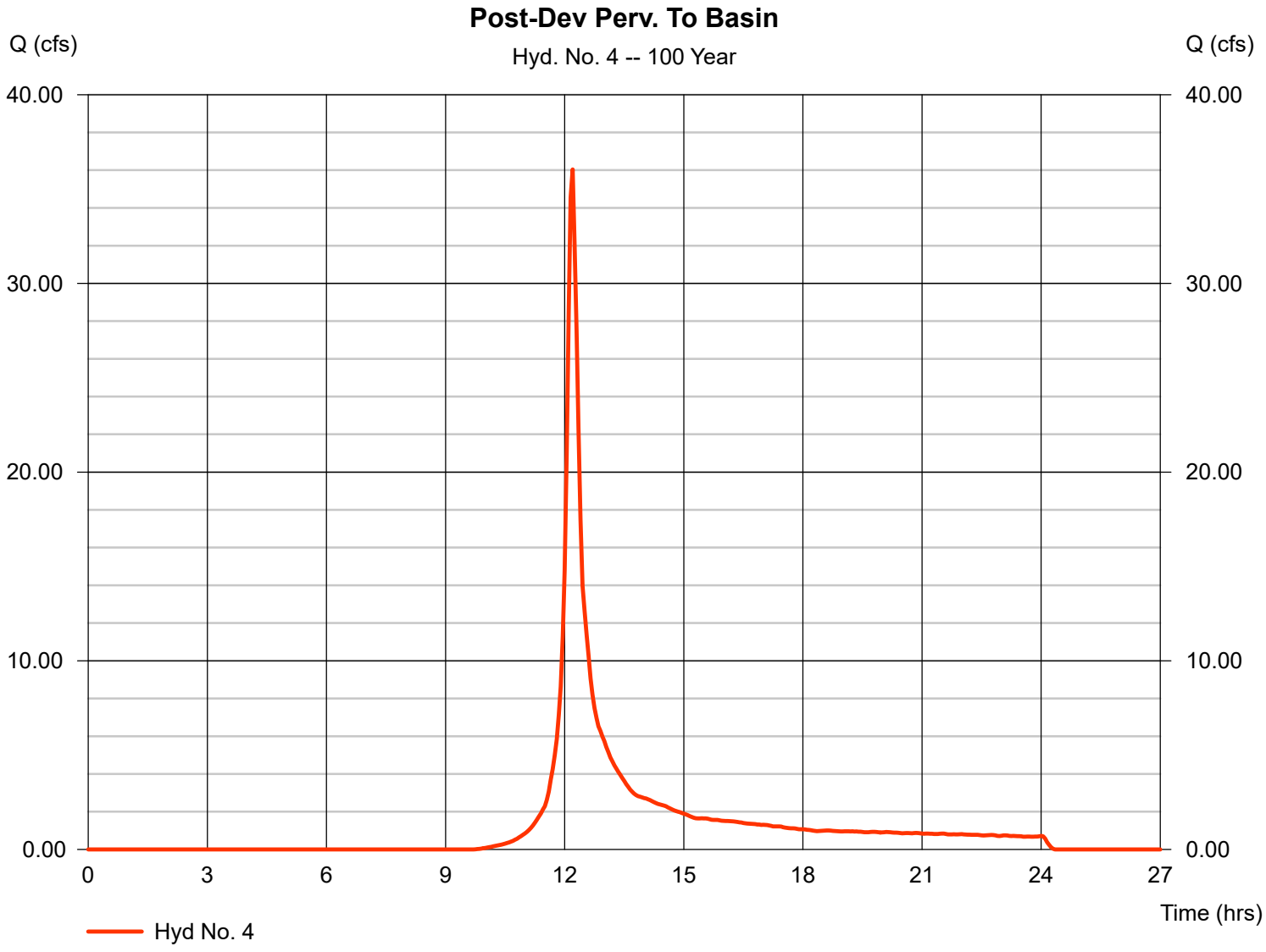
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 4

Post-Dev Perv. To Basin

Hydrograph type	=	SCS Runoff	Peak discharge	=	36.04 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.20 hrs
Time interval	=	3 min	Hyd. volume	=	129,979 cuft
Drainage area	=	10.670 ac	Curve number	=	60
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	12.80 min
Total precip.	=	8.03 in	Distribution	=	Custom
Storm duration	=	NOAA_C_3 min.cds	Shape factor	=	484



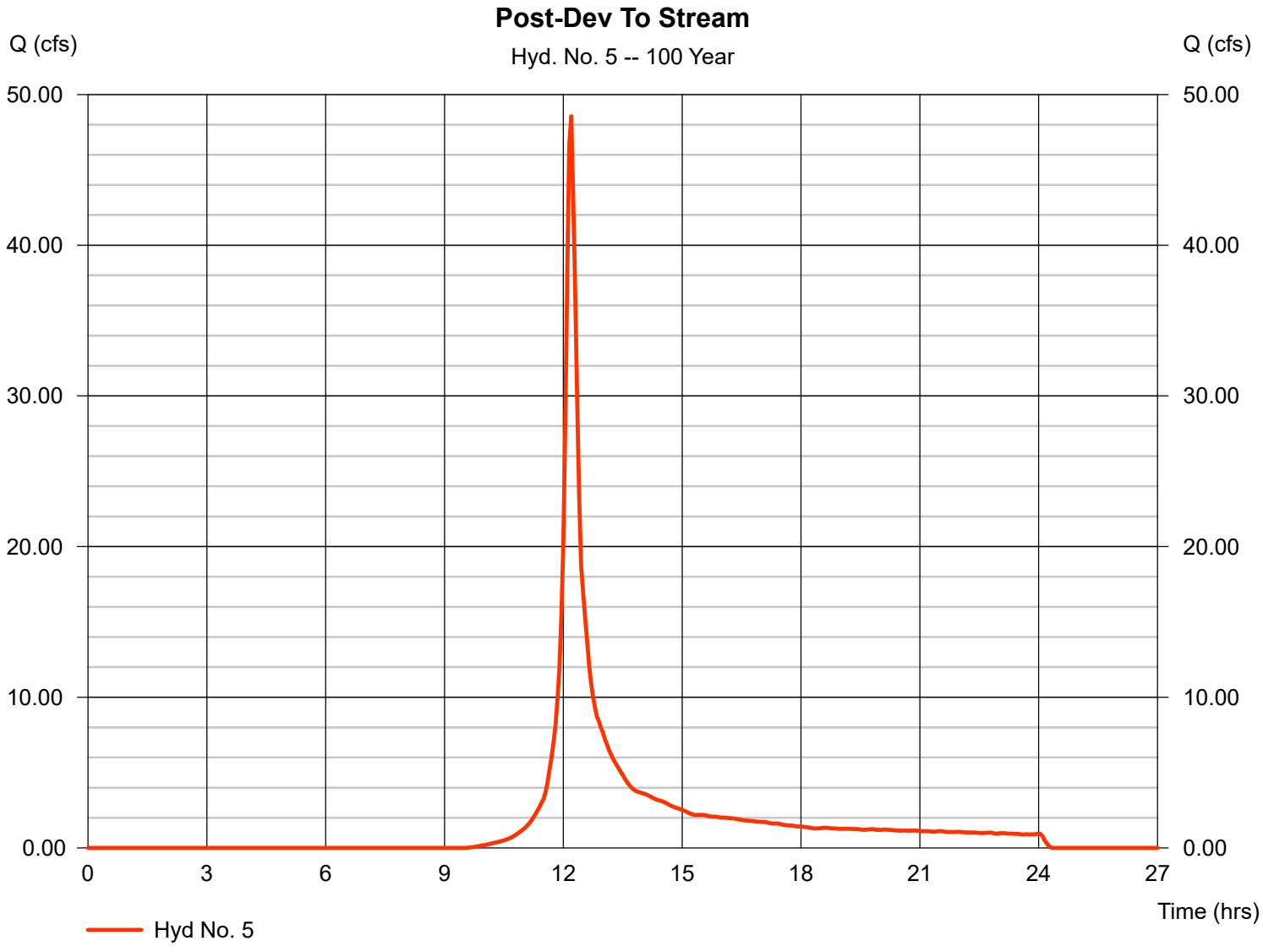
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 5

Post-Dev To Stream

Hydrograph type	=	SCS Runoff	Peak discharge	=	48.56 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.20 hrs
Time interval	=	3 min	Hyd. volume	=	174,837 cuft
Drainage area	=	13.890 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	11.90 min
Total precip.	=	8.03 in	Distribution	=	Custom
Storm duration	=	NOAA_C_3 min.cds	Shape factor	=	484



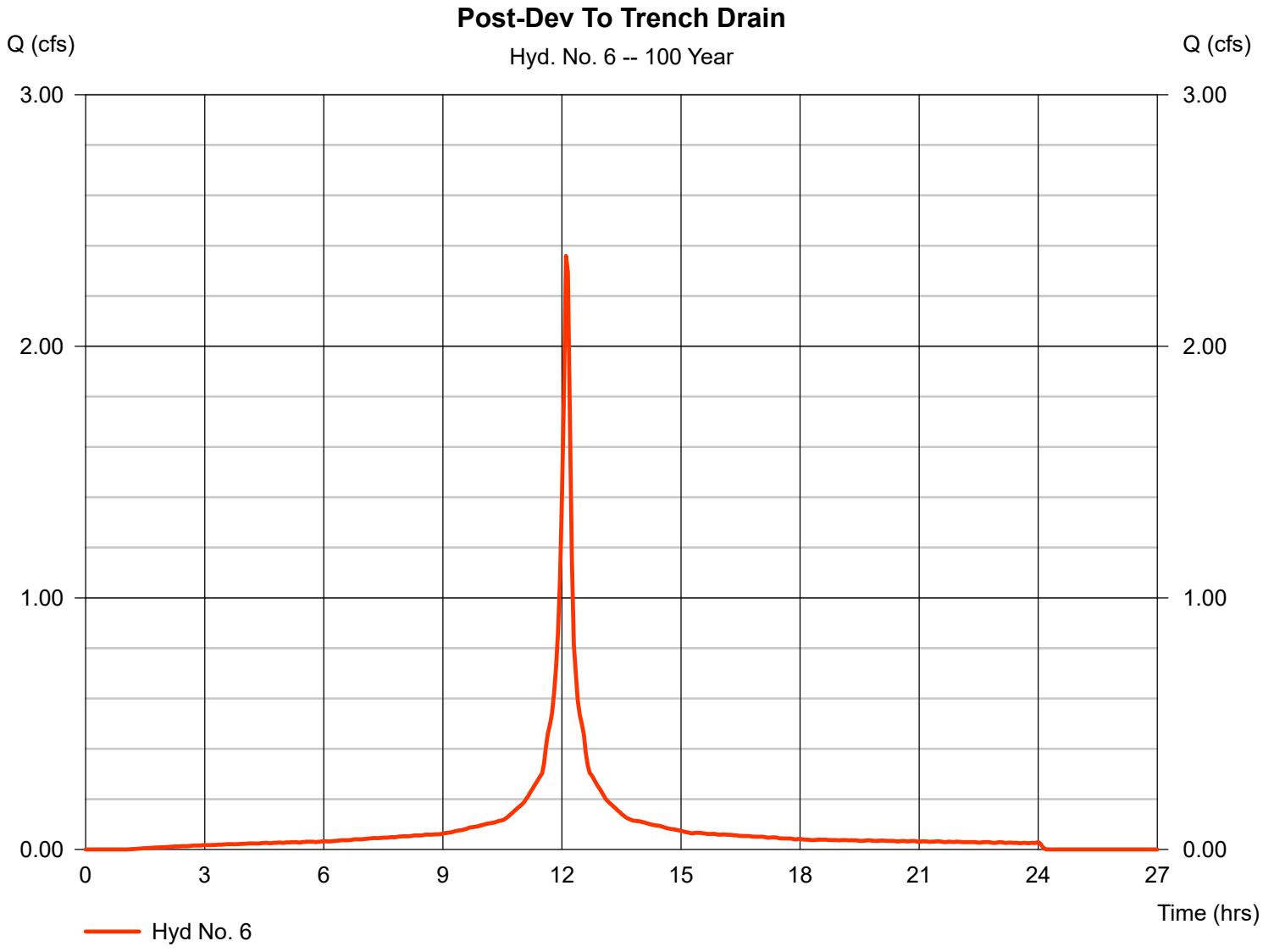
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 6

Post-Dev To Trench Drain

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.359 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.10 hrs
Time interval	=	3 min	Hyd. volume	=	8,223 cuft
Drainage area	=	0.320 ac	Curve number	=	96
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	8.03 in	Distribution	=	Custom
Storm duration	=	NOAA_C_3 min.cds	Shape factor	=	484



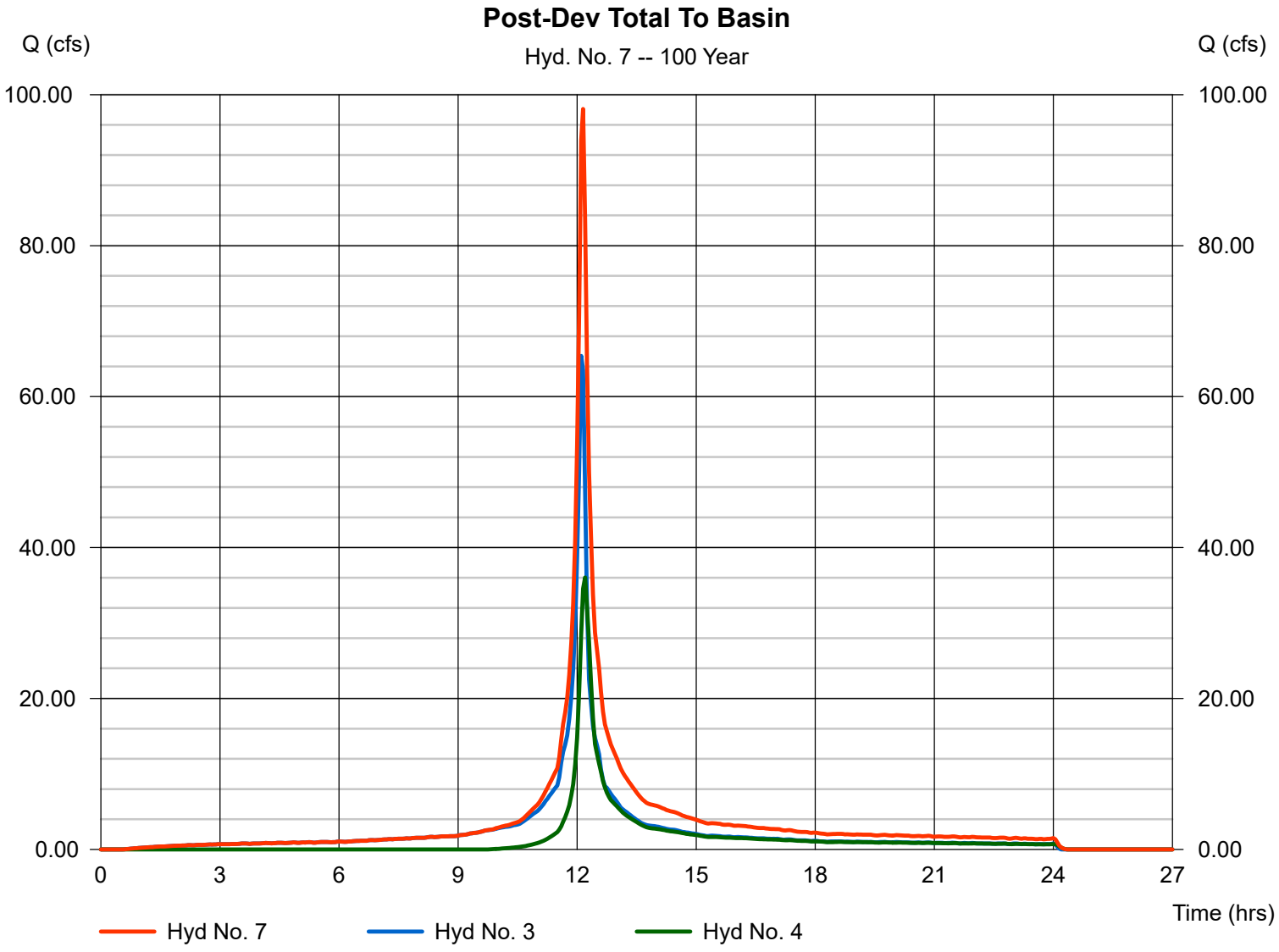
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 7

Post-Dev Total To Basin

Hydrograph type	= Combine	Peak discharge	= 98.12 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.15 hrs
Time interval	= 3 min	Hyd. volume	= 363,541 cuft
Inflow hyds.	= 3, 4	Contrib. drain. area	= 19.480 ac



Hydrograph Report

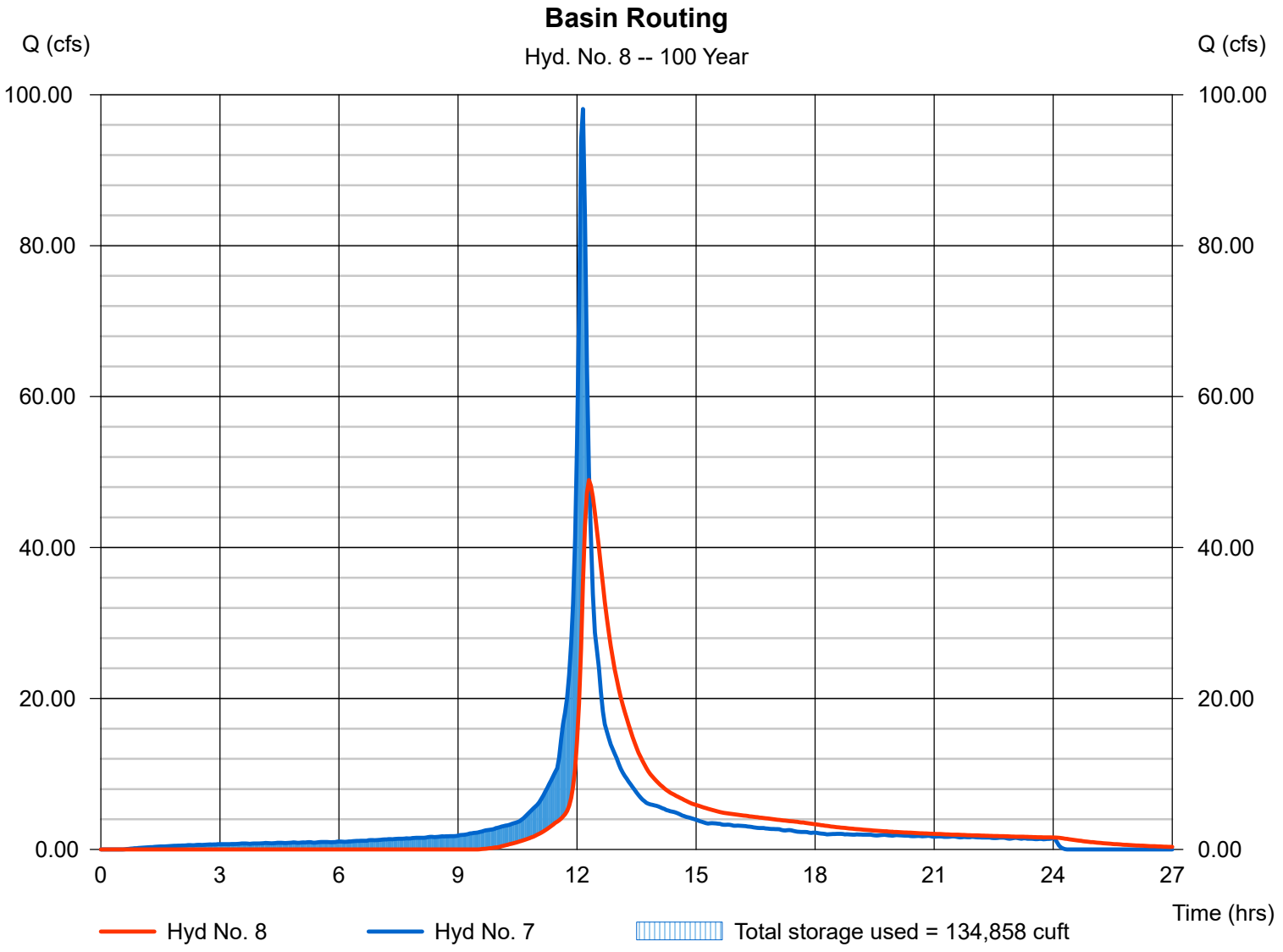
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 8

Basin Routing

Hydrograph type	=	Reservoir	Peak discharge	=	48.95 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.30 hrs
Time interval	=	3 min	Hyd. volume	=	334,107 cuft
Inflow hyd. No.	=	7 - Post-Dev Total To Basin	Max. Elevation	=	229.42 ft
Reservoir name	=	Infiltration Basin	Max. Storage	=	134,858 cuft

Storage Indication method used.

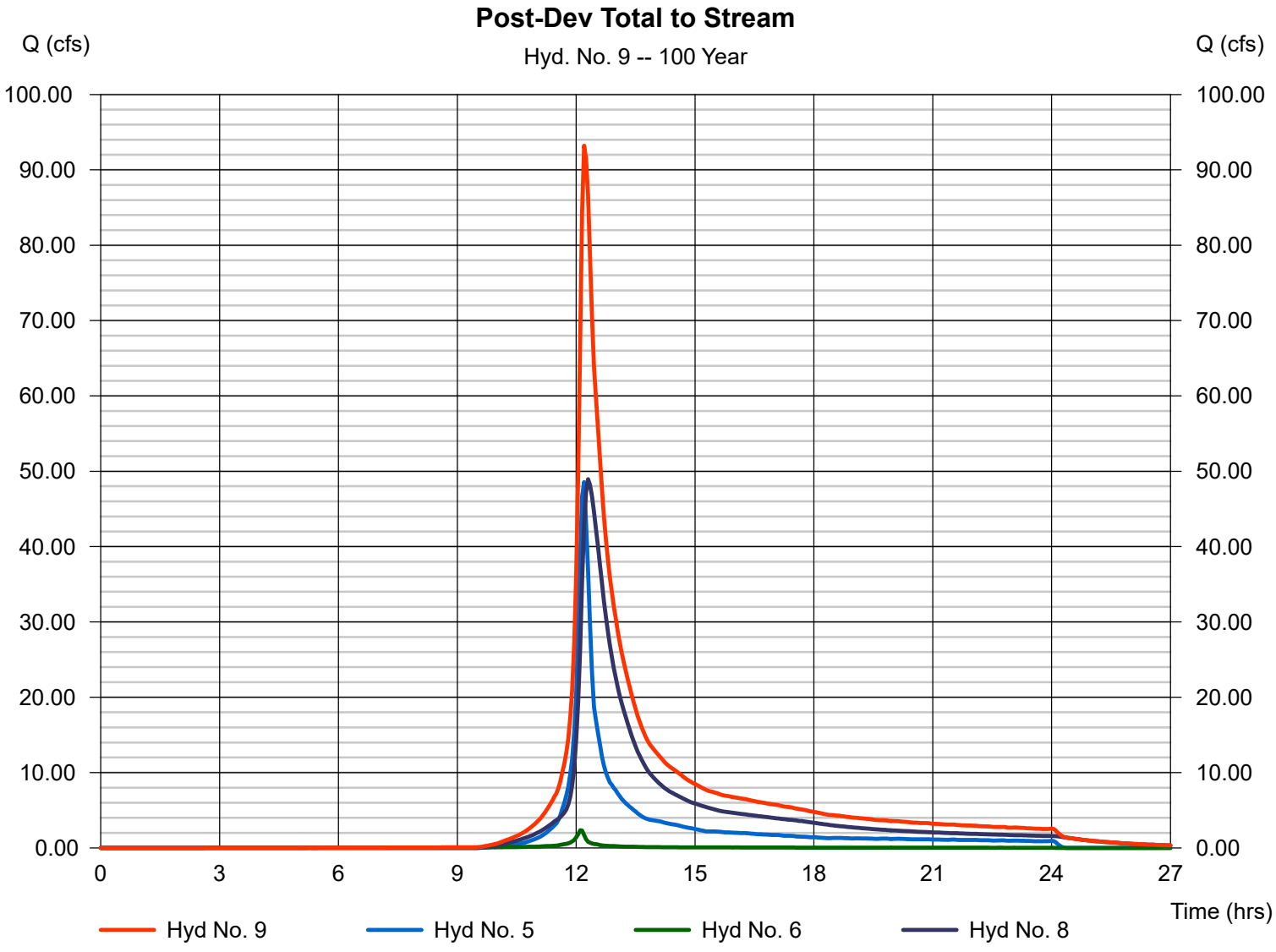


Hydrograph Report

Hyd. No. 9

Post-Dev Total to Stream

Hydrograph type	= Combine	Peak discharge	= 93.21 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 3 min	Hyd. volume	= 517,166 cuft
Inflow hyds.	= 5, 6, 8	Contrib. drain. area	= 14.210 ac



Pond Report

Pond No. 1 - Infiltration Basin

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 224.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	224.00	17,618	0	0
2.00	226.00	22,690	40,197	40,197
4.00	228.00	28,130	50,718	90,915
6.00	230.00	33,838	61,874	152,789
8.00	232.00	39,884	73,632	226,421

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 14.00	41.00	0.00	0.00
Span (in)	= 14.00	41.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 225.55	226.90	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 50.00	0.00	0.00	0.00
Crest El. (ft)	= 229.50	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

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

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	224.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.00	40,197	226.00	0.87 ic	0.00	---	---	0.00	---	---	---	---	---	0.870
4.00	90,915	228.00	7.03 ic	9.13 ic	---	---	0.00	---	---	---	---	---	16.16
6.00	152,789	230.00	10.12 ic	52.42 ic	---	---	45.96	---	---	---	---	---	108.50
8.00	226,421	232.00	12.47 ic	81.29 ic	---	---	513.87	---	---	---	---	---	607.63

APPENDIX - E:

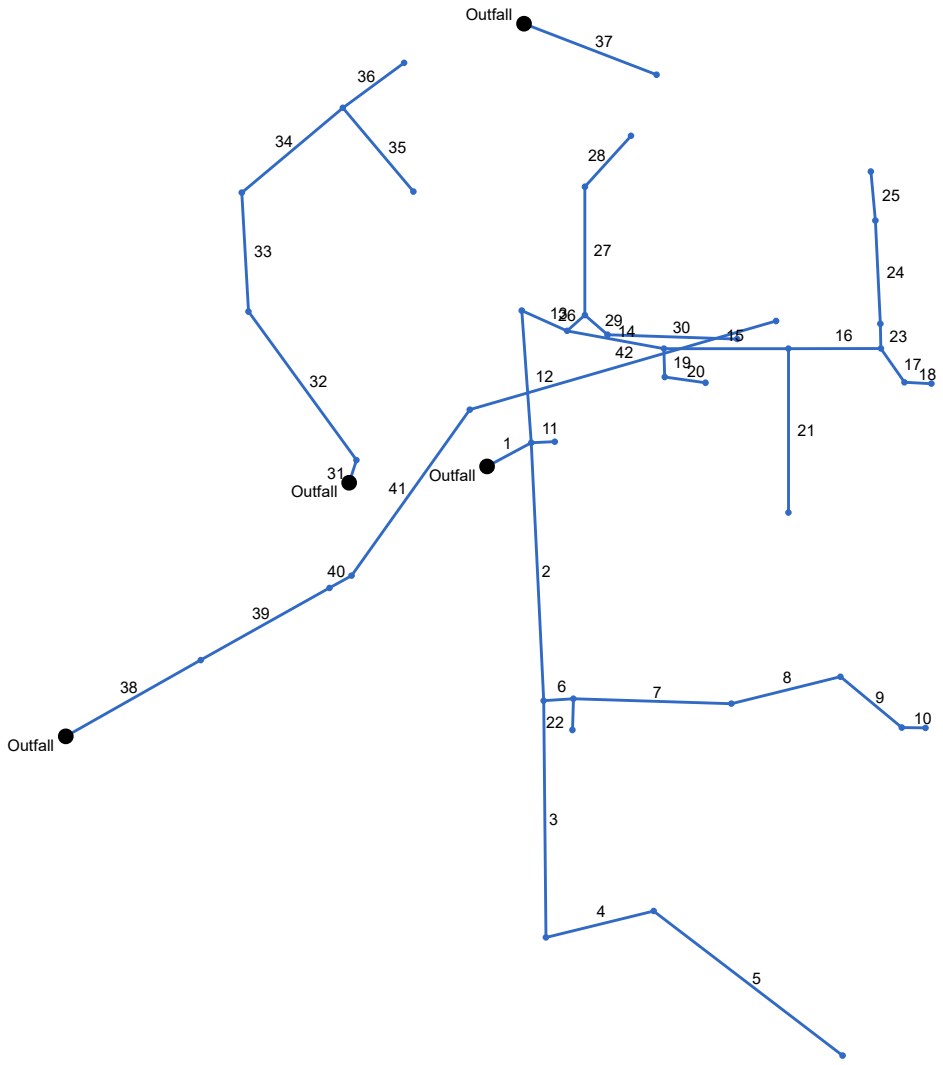
STORM SEWER SIZING CALCULATIONS

Weighted "C" (2)

Structure Number	Weighted "C"	Drainage Area (ac.)	Tc	Impervious Area (ac.)	Pervious Area (ac.)
Inlet#1	0.91	0.35	10.00	0.31	0.04
Inlet#2	0.91	0.29	6.00	0.26	0.03
Inlet#3	0.42	1.15	22.00	0.26	0.89
Inlet#4	0.66	0.36	12.00	0.20	0.16
Inlet#5	0.71	0.08	10.00	0.05	0.03
Inlet#6	0.70	1.09	15.00	0.67	0.42
Inlet#7	0.93	0.38	6.00	0.35	0.03
Inlet#8	0.84	0.15	6.00	0.12	0.03
Inlet#9	0.63	0.51	6.00	0.26	0.25
Inlet#10	0.95	0.18	6.00	0.17	0.01
Inlet#11	0.89	0.23	9.00	0.20	0.03
Inlet#12	0.50	0.03	6.00	0.01	0.02
Inlet#13	0.87	0.06	6.00	0.05	0.01
Inlet#14	0.88	0.07	6.00	0.06	0.01
Inlet#15	0.61	0.49	10.00	0.24	0.25
Inlet#16	0.86	0.17	10.00	0.14	0.03
Inlet#17	0.28	4.15	22.00	0.16	3.99
Inlet#18	0.35	0.60	14.00	0.08	0.52
Inlet#19	0.94	0.47	10.00	0.44	0.03
Inlet#20	0.95	0.18	6.00	0.17	0.01
Inlet#21	0.62	0.74	12.00	0.37	0.37
Inlet#22	0.91	0.28	6.00	0.25	0.03
Inlet#23	0.52	1.03	14.00	0.37	0.66
Inlet#24	0.99	0.04	6.00	0.04	0.00
Inlet#25	0.56	0.94	15.00	0.39	0.55
Inlet#26	0.79	0.59	11.00	0.43	0.16
Inlet#27	0.99	0.11	6.00	0.11	0.00
Inlet#28	0.81	0.21	6.00	0.16	0.05
Inlet#29	0.99	0.15	6.00	0.15	0.00
Inlet#30	0.99	0.08	6.00	0.08	0.00
Inlet#31	0.80	0.43	8.00	0.32	0.11
Inlet#32	0.48	0.48	13.00	0.15	0.33
Inlet#33	0.99	0.01	9.00	0.01	0.00
Inlet#34	0.76	0.35	6.00	0.24	0.11
Inlet#35	0.94	0.82	6.00	0.77	0.05
Inlet#36	0.85	0.71	8.00	0.58	0.13
Basin	0.34	1.52	16.00	0.19	1.33
Total=		**19.48**		**8.81**	**10.67**
Inlet #37	0.83	0.14	6.00	0.11	0.03
Trench Dra	0.94	0.32	6.00	0.30	0.02

Runoff Co-efficient for impervious area=	0.99
Runoff Co-efficient for pervious area=	0.25
Adjustment Factor For Runoff Coefficient=	1

32606



Project File: 32606.stm	Number of lines: 42	Date: 02-03-2021

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	52.790	0.28	15.16	0.91	0.25	8.77	6.0	29.4	3.7	32.69	65.58	7.44	30	2.56	224.00	225.35	226.40	227.26	0.00	238.89	22-HW1
2	1	272.307	0.18	6.45	0.95	0.17	2.77	6.0	27.1	3.9	10.77	12.06	7.27	18	1.32	232.06	235.65	233.17	236.90	238.89	248.72	20-22
3	2	249.361	0.47	5.22	0.94	0.44	1.81	10.0	25.1	4.1	7.37	8.67	5.16	18	0.68	235.65	237.35	236.90	238.39	248.72	246.92	19-20
4	3	116.908	0.60	4.75	0.35	0.21	1.37	14.0	24.1	4.1	5.69	7.52	4.61	18	0.51	237.35	237.95	238.39	238.90	246.92	249.00	18-19
5	4	250.753	4.15	4.15	0.28	1.16	1.16	22.0	22.0	4.3	5.05	6.63	3.50	18	0.40	237.95	238.95	239.34	239.95	249.00	242.90	17-18
6	2	31.422	0.17	1.05	0.88	0.15	0.78	10.0	10.3	6.3	4.91	11.52	6.60	15	3.18	245.35	246.35	245.92	247.49	248.72	249.73	16-20
7	6	166.659	0.07	0.39	0.88	0.06	0.33	6.0	7.9	7.0	2.34	14.15	2.91	15	4.80	246.35	254.35	247.90	254.96	249.73	259.28	14-16
8	7	118.432	0.06	0.32	0.87	0.05	0.27	6.0	6.9	7.4	2.01	15.22	6.16	15	5.56	255.85	262.43	256.16	263.00	259.28	266.04	13-14
9	8	83.964	0.03	0.26	0.50	0.02	0.22	6.0	6.2	7.7	1.70	12.08	5.20	15	3.50	262.68	265.62	263.00	266.14	266.04	269.14	12-13
10	9	25.000	0.23	0.23	0.89	0.20	0.20	6.0	6.0	7.8	1.60	4.66	3.36	15	0.52	265.62	265.75	266.14	266.26	269.14	269.14	11-12
11	1	24.996	0.74	0.74	0.62	0.46	0.46	12.0	12.0	5.9	2.69	9.13	5.13	15	2.00	235.25	235.75	235.71	236.45	238.89	238.89	21-22
12	1	139.650	0.18	7.69	0.95	0.17	5.28	6.0	25.2	4.0	21.40	35.16	8.20	27	1.29	234.60	236.40	235.87	237.99	238.89	241.89	10-22
13	12	52.410	0.51	7.51	0.84	0.43	5.11	6.0	24.8	4.1	20.90	28.80	8.51	24	1.62	236.65	237.50	237.99	239.12	241.89	241.12	9-10
14	13	103.736	0.15	5.86	0.90	0.14	3.71	6.0	23.9	4.2	15.46	24.18	9.04	18	5.30	237.75	243.25	239.12	244.67	241.12	247.88	8-9
15	14	131.355	0.08	4.24	0.71	0.06	2.46	10.0	22.8	4.3	10.50	16.26	8.26	18	2.40	244.80	247.95	245.68	249.19	247.88	255.58	5-8
16	15	97.459	1.15	3.80	0.42	0.48	2.17	22.0	22.0	4.3	9.42	17.15	8.15	18	2.67	252.25	254.85	253.04	256.02	255.58	261.23	3-5
17	16	43.468	0.29	0.64	0.91	0.26	0.58	6.0	10.2	6.3	3.66	12.19	6.67	15	3.57	258.20	259.75	258.67	260.52	261.23	263.66	2-3
18	17	28.449	0.35	0.35	0.91	0.32	0.32	10.0	10.0	6.4	2.02	13.26	3.14	15	4.22	259.75	260.95	260.52	261.52	263.66	264.58	1-2
19	14	30.018	0.38	1.47	0.93	0.35	1.12	6.0	15.4	5.2	5.81	9.13	6.49	15	2.00	244.75	245.35	245.47	246.44	247.88	248.43	7-8
20	19	43.426	1.09	1.09	0.70	0.76	0.76	15.0	15.0	5.3	4.02	12.59	4.05	15	3.80	245.35	247.00	247.04	247.80	248.43	250.00	6-7
21	15	172.966	0.36	0.36	0.66	0.24	0.24	12.0	12.0	5.9	1.39	4.53	3.25	15	0.49	249.30	250.15	249.78	250.63	255.58	253.00	4-5
22	6	32.906	0.49	0.49	0.61	0.30	0.30	10.0	10.0	6.4	1.90	9.08	1.77	15	1.98	246.35	247.00	247.90	247.91	249.73	250.42	15-16
23	16	26.000	0.94	2.01	0.56	0.53	1.10	15.0	15.3	5.2	5.74	10.75	6.79	15	2.77	255.99	256.71	256.64	257.96	261.23	261.45	25-3

32606 | Number of lines: 42 | Run Date: 02-03-2021

NOTES: Intensity = 31.22 / (Inlet time + 3.80) ^ 0.61; Return period = 25 Yrs. ; c = cir e = ellip b = box

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
24	23	109.000	0.04	1.07	0.99	0.04	0.58	6.0	14.4	5.4	3.09	6.63	3.43	15	1.06	256.71	257.86	258.13	258.56	261.45	263.70	24-25
25	24	52.000	1.03	1.03	0.52	0.54	0.54	14.0	14.0	5.4	2.92	8.82	4.17	15	1.87	257.86	258.83	258.56	259.51	263.70	262.20	23-24
26	13	24.962	0.08	1.14	0.99	0.08	0.97	6.0	12.7	5.7	5.54	13.86	5.83	15	4.61	238.25	239.40	239.12	240.34	241.12	252.00	30-9
27	26	135.366	0.11	0.70	0.99	0.11	0.58	6.0	11.6	5.9	3.42	8.18	5.44	15	1.60	245.55	247.72	246.11	248.46	252.00	250.97	27-30
28	27	72.378	0.59	0.59	0.79	0.47	0.47	11.0	11.0	6.1	2.84	9.39	3.98	15	2.11	247.72	249.25	248.46	249.92	250.97	252.50	26-27
29	26	31.634	0.15	0.36	0.99	0.15	0.32	6.0	7.1	7.3	2.33	7.26	4.57	15	1.26	246.45	246.85	246.94	247.46	252.00	251.78	29-30
30	29	136.626	0.21	0.21	0.81	0.17	0.17	6.0	6.0	7.8	1.33	8.36	2.36	15	1.68	246.85	249.14	247.70	249.60	251.78	252.39	28-29
31	End	25.016	0.71	2.80	0.85	0.60	2.22	8.0	17.5	4.9	10.87	13.23	8.91	15	4.20	224.00	225.05	225.26	226.25	228.00	233.00	36-HW2
32	31	193.654	0.82	2.09	0.94	0.77	1.62	6.0	15.9	5.1	8.31	9.30	6.98	15	2.08	225.05	229.07	226.25	230.20	233.00	232.62	35-36
33	32	125.512	0.35	1.27	0.76	0.27	0.85	9.0	14.8	5.3	4.50	7.65	4.46	15	1.40	229.07	230.83	230.20	231.68	232.62	235.28	34-35
34	33	139.128	0.01	0.92	0.99	0.01	0.58	6.0	13.7	5.5	3.22	6.64	4.02	15	1.06	230.83	232.30	231.68	233.02	235.28	238.85	33-34
35	34	115.412	0.43	0.43	0.80	0.34	0.34	8.0	8.0	7.0	2.40	5.34	3.62	15	0.68	232.30	233.09	233.02	233.71	238.85	236.34	31-33
36	34	80.037	0.48	0.48	0.48	0.23	0.23	13.0	13.0	5.6	1.30	14.16	5.20	15	4.81	235.60	239.45	235.86	239.91	238.85	242.70	32-33
37	End	149.826	0.14	0.14	0.83	0.12	0.12	6.0	6.0	7.8	0.91	12.90	2.87	15	3.99	244.33	250.31	244.71	250.69	249.33	254.31	37-ex
38	End	163.360	0.00	0.32	0.00	0.00	0.30	0.0	12.1	5.8	55.75	91.72	11.48	30	5.00	191.02	199.19	196.30	201.55	249.33	213.09	38-hw3
39	38	155.788	0.00	0.32	0.00	0.00	0.30	0.0	10.8	6.1	55.85	91.71	15.48	30	5.00	208.59	216.38	210.00	219.29	213.09	232.00	fil2-38
40	39	26.452	0.00	0.32	0.00	0.00	0.30	0.0	10.6	6.2	55.86	91.62	11.51	30	4.99	216.38	217.70	219.59	220.06	232.00	232.00	out-fil2
41	40	214.910	0.00	0.32	0.00	0.00	0.30	0.0	8.8	6.7	2.02	12.15	5.52	15	3.54	220.45	228.06	220.79	228.63	232.00	236.68	39-out
42	41	336.115	0.32	0.32	0.94	0.30	0.30	6.0	6.0	7.8	2.35	14.44	4.13	15	5.00	228.06	244.87	228.63	245.48	236.68	255.40	fil1-39

32606 | Number of lines: 42 | Run Date: 02-03-2021

NOTES: Intensity = 31.22 / (Inlet time + 3.80) ^ 0.61; Return period = 25 Yrs. ; c = cir e = ellip b = box

APPENDIX - F:

QUALITY STORM HYDROLOGIC ANALYSIS AND RUNOFF QUANTITY CALCULATIONS

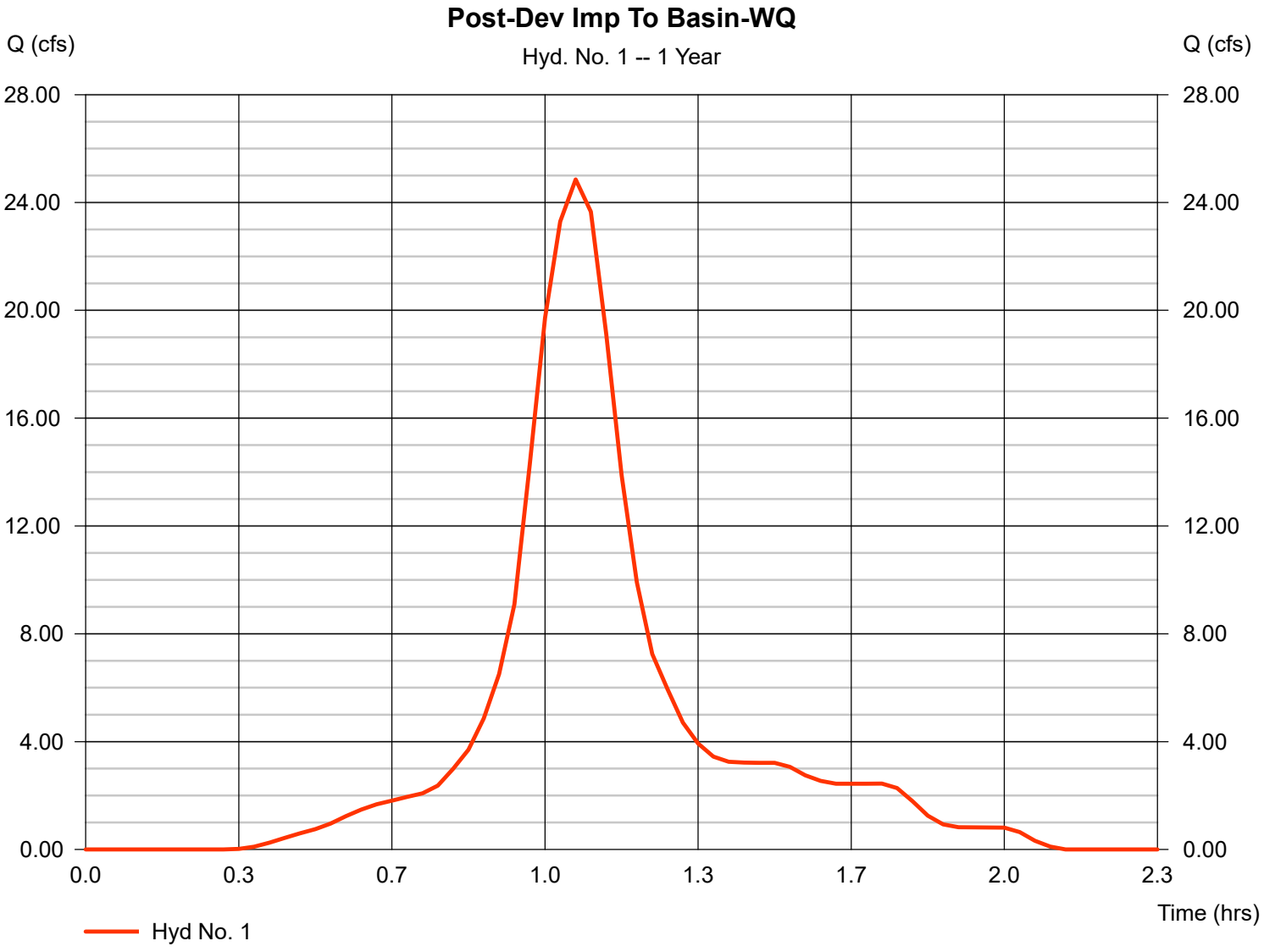
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 1

Post-Dev Imp To Basin-WQ

Hydrograph type	=	SCS Runoff	Peak discharge	=	24.85 cfs
Storm frequency	=	1 yrs	Time to peak	=	1.07 hrs
Time interval	=	2 min	Hyd. volume	=	31,018 cuft
Drainage area	=	8.810 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	6.00 min
Total precip.	=	1.25 in	Distribution	=	Custom
Storm duration	=	NJ-WQ.cds	Shape factor	=	484



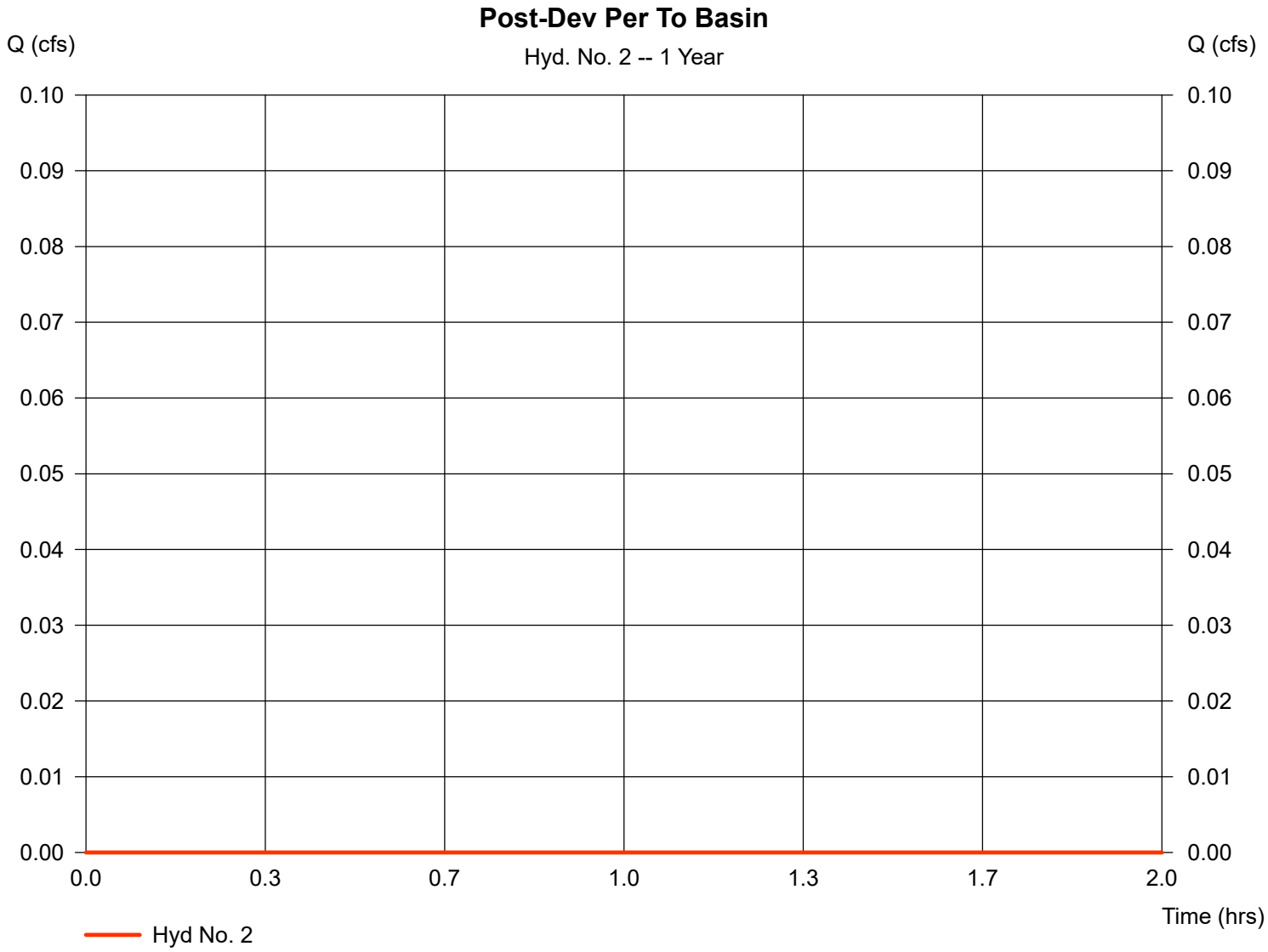
Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 2

Post-Dev Per To Basin

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.000 cfs
Storm frequency	=	1 yrs	Time to peak	=	n/a
Time interval	=	2 min	Hyd. volume	=	0 cuft
Drainage area	=	10.670 ac	Curve number	=	60
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	USER	Time of conc. (Tc)	=	12.80 min
Total precip.	=	1.25 in	Distribution	=	Custom
Storm duration	=	NJ-WQ.cds	Shape factor	=	484

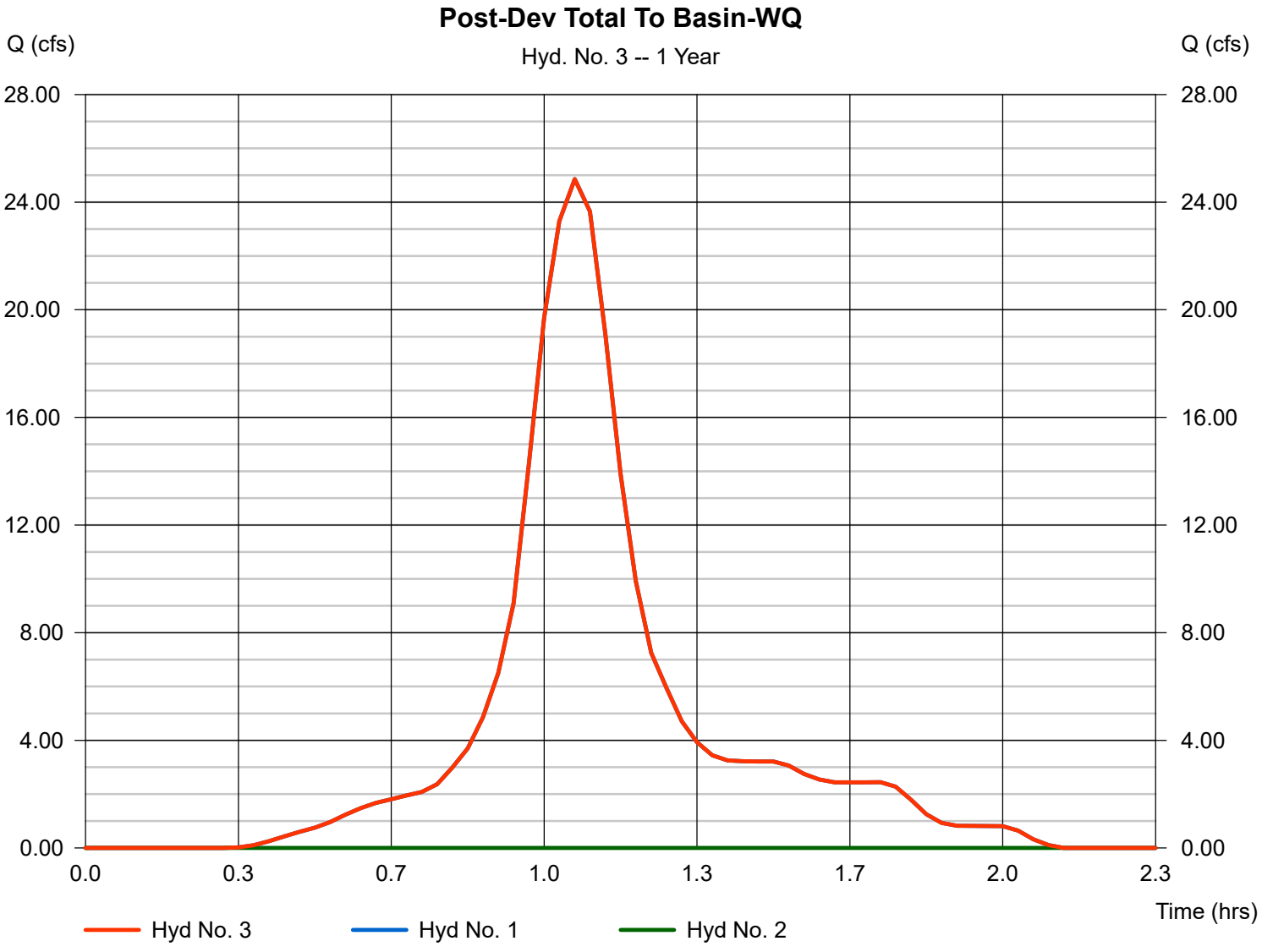


Hydrograph Report

Hyd. No. 3

Post-Dev Total To Basin-WQ

Hydrograph type	= Combine	Peak discharge	= 24.85 cfs
Storm frequency	= 1 yrs	Time to peak	= 1.07 hrs
Time interval	= 2 min	Hyd. volume	= 31,018 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 19.480 ac



Hydrograph Report

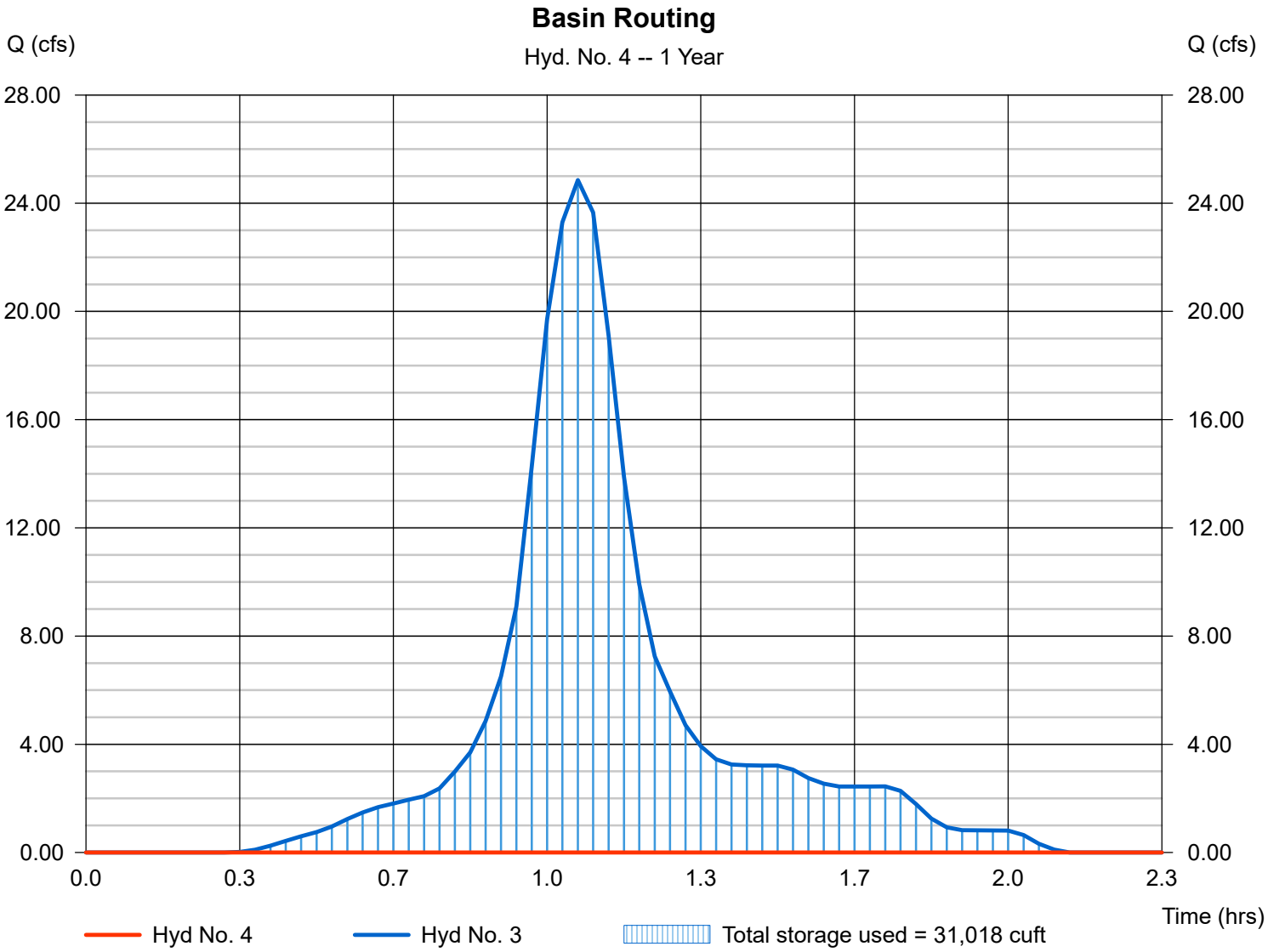
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066 Sunday, Jan 31, 2021

Hyd. No. 4

Basin Routing

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	1 yrs	Time to peak	=	n/a
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	3 - Post-Dev Total To Basin-WQ	Max. Elevation	=	225.54 ft
Reservoir name	=	Infiltration Basin	Max. Storage	=	31,018 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Infiltration Basin

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 224.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	224.00	17,618	0	0
2.00	226.00	22,690	40,197	40,197
4.00	228.00	28,130	50,718	90,915
6.00	230.00	33,838	61,874	152,789
8.00	232.00	39,884	73,632	226,421

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 14.00	41.00	0.00	0.00
Span (in)	= 14.00	41.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 225.80	226.90	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 50.00	0.00	0.00	0.00
Crest El. (ft)	= 229.50	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	224.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
2.00	40,197	226.00	0.19 ic	0.00	---	---	0.00	---	---	---	---	---	0.186
4.00	90,915	228.00	6.54 ic	9.13 ic	---	---	0.00	---	---	---	---	---	15.67
6.00	152,789	230.00	9.79 ic	52.42 ic	---	---	45.96	---	---	---	---	---	108.17
8.00	226,421	232.00	12.20 ic	81.29 ic	---	---	513.87	---	---	---	---	---	607.36

WATER QUALITY ANALYSIS

DRAIN TIME CALCULATIONS :

POST DEVELOPMENT FLOW FOR WATER QUALITY STORM

	VOLUME (CU. FT.)
Flow TO BASIN	31,018

TOTAL VOLUME REQUIRING 80% TSS REMOVAL 31,018 (CU. FT.)

(THE TSS REMOVAL CRITERIER IS SATISFIED BY PROVIDING A INFILTRATION BASIN)

PROP RECHARGE VOLUME (RETENTION VOLUME BELOW OUTLET) 31,153 (CU. FT.)

RECHARGE ANALYSIS

PERMEABILITY (K) RATE OF SOIL	2.7	(IN/HR)

FACTOR OF SAFETY (FS) FOR PERMEABILITY IS 2

PERMEABILITY (K) WITH FACTOR OF SAFETY	1.35	(IN/HR)
DEPTH OF RECHARGE VOLUME	19.0	(INCHES)**
PROPOSED RECHARGE RATE	1.35	(IN/HR)
PROPOSED TIME TO RECHARGE REQUIRED VOLUME	14.07	(HR) < 72 HRS REQUIRED

APPENDIX - G:

GROUNDWATER RECHARGE ANALYSIS

New Jersey Groundwater Recharge Spreadsheet
Version 2.0
November 2003

Annual Groundwater Recharge Analysis (based on GSR-32)

Select Township ↓	Average Annual P (in)	Climatic Factor
HUNTERDON CO., CLINTON TOWN	46.8	1.54

Project Name: Moebus

Description:

Analysis Date: 11/05/19

Pre-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	23.24	Open space	Duffield	15.3	1,288,533
2	2.46	Woods-grass combination	Duffield	15.7	140,005
3	3	Open space	Birdsboro	15.3	166,197
4	0.2	Woods-grass combination	Birdsboro	15.8	11,455
5	2.94	Open space	Haledon	12.9	137,471
6	0.44	Woods-grass combination	Haledon	13.9	22,225
7	0.16	Open space	Udorthents	0.0	-
8	0.64	Impervious areas	Duffield	0.0	-
9					
10					
11					
12					
13					
14	0				
15	0				
Total =	33.1			Total Annual Recharge (in)	Total Annual Recharge (cu-ft)
				14.7	1,765,885

Post-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	16.55	Open space	Duffield	15.3	917,608
2	2.14	Woods-grass combination	Duffield	15.7	121,793
3	2.05	Open space	Birdsboro	15.3	113,568
4	0.2	Woods-grass combination	Birdsboro	15.8	11,455
5	2.43	Open space	Haledon	12.9	113,624
6	0.44	Woods-grass combination	Haledon	13.9	22,225
7	0.16	Open space	Udorthents	0.0	-
8	9.11	Impervious areas	Duffield	0.0	-
9					
10					
11					
12					
13					
14	0				
15	0				
Total =	33.1			Total Annual Recharge (in)	Total Annual Recharge (cu.ft)
				10.8	1,300,273

Annual Recharge Requirements Calculation ↓

% of Pre-Developed Annual Recharge to Preserve =	100%	Total Impervious Area (sq.ft) 396,832
Post-Development Annual Recharge Deficit=	*465,612*	(cubic feet)

Recharge Efficiency Parameters Calculations (area averages)

RWC=	5.35	(in)	DRWC=	5.35	(in)
ERWC =	1.23	(in)	EDRWC=	1.23	(in)

Procedure to fill the Pre-Development and Post-Development Conditions Tables

For each land segment, first enter the area, then select TR-55 Land Cover, then select Soil. Start from the top of the table and proceed downward. Don't leave blank rows (with A=0) in between your segment entries. Rows with A=0 will not be displayed or used in calculations. For impervious areas outside of standard lots select "Impervious Areas" as the Land Cover. Soil type for impervious areas are only required if an infiltration facility will be built within these areas.

Project Name	Description	Analysis Date	BMP or LID Type
Moebus	0	11/05/19	

Recharge BMP Input Parameters

Parameter	Symbol	Value	Unit
BMP Area	ABMP	5507.0	sq.ft
BMP Effective Depth, this is the design variable	dBMP	18.0	in
Upper level of the BMP surface (negative if above ground)	dBMPu	-18.0	in
Depth of lower surface of BMP, must be>=dBMPu	dEXC	0.0	in
Post-development Land Segment Location of BMP , Input Zero if Location is distributed or undetermined	SegBMP	1	unitless

Root Zone Water capacity Calculated Parameters

Parameter	Symbol	Value	Unit
Empty Portion of RWC under Post-D Natural Recharge	ERWC	1.42	in
ERWC Modified to consider dEXC	EDRWC	1.42	in
Empty Portion of RWC under Infilt. BMP	RERWC	1.11	in

Recharge Design Parameters

Parameter	Symbol	Value	Unit
Inches of Runoff to capture	Qdesign	0.26	in
Inches of Rainfall to capture	Pdesign	0.35	in
Recharge Provided Avg. over Imp. Area		14.6	in
Runoff Captured Avg. over imp. Area		15.8	in

BMP Calculated Size Parameters

ABMP/Aimp	Aratio	0.01	unitless
BMP Volume	VBMP	8,260	cu.ft

Parameters from Annual Recharge Worksheet

Post-D Deficit Recharge (or desired recharge volume)	Vdef	465,612	cu.ft
Post-D Impervious Area (or target Impervious Area)	Aimp	383,763	sq.ft
Root Zone Water Capacity	RWC	6.18	in
RWC Modified to consider dEXC	DRWC	6.18	in
Climatic Factor	C-factor	1.54	no units
Average Annual P	Pavg	46.8	in
Recharge Requirement over Imp. Area	dr	14.1	in

System Performance Calculated Parameters

Annual BMP Recharge Volume		465,612	cu.ft
Avg BMP Recharge Efficiency		92.0%	Represents % Infiltration Recharged
%Rainfall became Runoff		78.1%	%
%Runoff Infiltrated		43.3%	%
%Runoff Recharged		38.5%	%
%Rainfall Recharged		30.1%	%

CALCULATION CHECK MESSAGES

Volume Balance-> OK
dBMP Check---> OK
dEXC Check---> OK
BMP Location---> OK

OTHER NOTES

Pdesign is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensetive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.

How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement assuming the runoff from entire impervious area is available to the BMP.
To solve for a smaller BMP or a LID-IMP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration clik the "Default Vdef & Aimp" button.

APPENDIX - H:

SOIL EROSION MEASURES

Concept Engineering Consultants, P.A.

227 Route #33 East, Bldg #2, Unit #7
Manalapan, NJ 07726

Date: 9/25/2020
Project: Clinton
Project No: 032606

Calculated By: BH
Checked By:

Conduit Outlet Protection Calculations

Scour Hole # 1

Design Parameters:

Design Storm Flow for 25 Year, Q	35.00	cfs
Vertical Dimension of Outlet Pipe, D_o	30	in
Horizontal Dimension of Outlet Pipe, W_o	30	in
Tailwater Depth, TW [1]	2.00	ft
Scour Hole Depth, y (1/2 D_o or D_o)	15	in

Apron Dimension Calculations:

Minimum Bottom Width, $W_1 = 2W_o$	W_1 = 5.00 ft
Minimum Bottom Length, $L_1 = 3D_o$	L_1 = 7.50 ft
Minimum Top Width *(max side slope of 3:1)*, W_2	W_2 = 12.50 ft
Minimum Top Length *(max side slope of 3:1)*, L_2	L_2 = 15.00 ft

Rip Rap Stone Size Calculations:

Unit Dicharge, $q = Q/D_o$ = 14.00 cfs per foot

- **Case I: $y = 1/2\ D_o$**

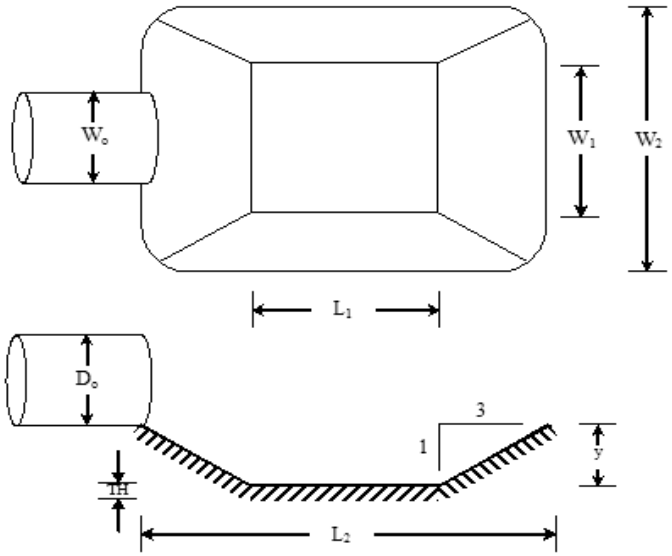
  Median Stone, $d_{50} = \frac{0.0125\ q^{1.33}}{TW}$ = 2.51 in Therefore, use ***d50* = 6 in**

  Apron Thickness, $TH = 2 \times d_{50}$ with filter fabric . . . . . ***TH* = 12 in**

- **Case II: $y = D_o$**

  Median Stone, $d_{50} = \frac{0.0082\ q^{1.33}}{TW}$ =

  Apron Thickness, $TH = 2 \times d_{50}$ with filter fabric . . . . . .



Notes:

1. The side slopes shall be 3:1 or flatter.
2. The bottom grade shall be 0.0% (level).
3. There shall be no overfall at the end of the apron or at the end of the culvert.
4. Fifty (50) percent by weight of the rip-rap mixture shall be smaller than the median size stone designated as d_{50}. The largest stone size in the mixture shall be 1.5 times the d_{50} size. The rip-rap shall be reasonably well graded.
5. The thickness of the rip-rap apron may be two (2) times the median stone diameter provided that the apron is constructed on a bedding of four (4) inches of 3/4 inch clean stone on approved filter fabric material.
6. Rip-rap and filter fabric shall meet the standards of the governing Soil Conservation District as well as the requirements of the local municipality.
7. Where the scour hole is to be placed within an existing or proposed waterway:
   a. The scour hole sidewalls should be eliminated to maintain a smooth hydraulic line along the waterway bottom to avoid inviting turbulent flow from a sudden depression in the waterway.
   b. If the flow in the waterway is greater than the flow from the proposed outlet, the rip-rap used to construct the scour hole should be sized based on the greater flow value according to the standard rip-rap.

Footnote:

1. Tailwater depth shall be the 2 year storm if discharging into a detention basin. For areas where tailwater cannot be computed, use $TW = 0.2D_o$.

Concept Engineering Consultants, P.A.

227 Route #33 East, Bldg #2, Unit #7
Manalapan, NJ 07726

Date: 9/25/2020
Project: Clinton
Project No: 032606

Calculated By: BH
Checked By:

Conduit Outlet Protection Calculations

Scour Hole # 2

Design Parameters:

Design Storm Flow for 25 Year, Q	11.00	cfs
Vertical Dimension of Outlet Pipe, D_o	15	in
Horizontal Dimension of Outlet Pipe, W_o	15	in
Tailwater Depth, TW [1]	2.00	ft
Scour Hole Depth, y (1/2 D_o or D_o)	8	in

Apron Dimension Calculations:

Minimum Bottom Width, $W_1 = 2W_o$	**W_1 = 2.50 ft**
Minimum Bottom Length, $L_1 = 3D_o$	**L_1 = 3.75 ft**
Minimum Top Width *(max side slope of 3:1)*, W_2	**W_2 = 6.25 ft**
Minimum Top Length *(max side slope of 3:1)*, L_2	**L_2 = 7.50 ft**

Rip Rap Stone Size Calculations:

Unit Dicharge, $q = Q/D_o$ = 8.80 cfs per foot

- **Case I: $y = 1/2\ D_o$**

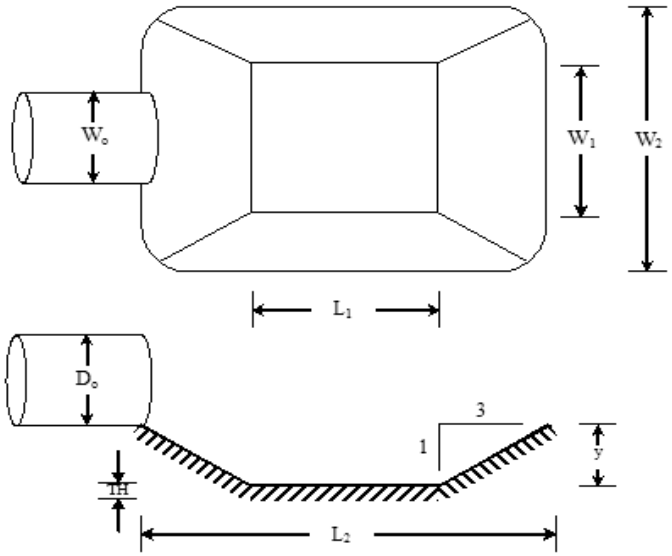
  Median Stone, $d_{50} = \frac{0.0125\ q^{1.33}}{TW}$ = 1.35 in Therefore, use **$d50$ = 6 in**

  Apron Thickness, $TH = 2 \times d_{50}$ with filter fabric . . . . . **TH = 12 in**

- **Case II: $y = D_o$**

  Median Stone, $d_{50} = \frac{0.0082\ q^{1.33}}{TW}$ =

  Apron Thickness, $TH = 2 \times d_{50}$ with filter fabric . . . . . .



Notes:

1. The side slopes shall be 3:1 or flatter.
2. The bottom grade shall be 0.0% (level).
3. There shall be no overfall at the end of the apron or at the end of the culvert.
4. Fifty (50) percent by weight of the rip-rap mixture shall be smaller than the median size stone designated as d_{50}. The largest stone size in the mixture shall be 1.5 times the d_{50} size. The rip-rap shall be reasonably well graded.
5. The thickness of the rip-rap apron may be two (2) times the median stone diameter provided that the apron is constructed on a bedding of four (4) inches of 3/4 inch clean stone on approved filter fabric material.
6. Rip-rap and filter fabric shall meet the standards of the governing Soil Conservation District as well as the requirements of the local municipality.
7. Where the scour hole is to be placed within an existing or proposed waterway:
   a. The scour hole sidewalls should be eliminated to maintain a smooth hydraulic line along the waterway bottom to avoid inviting turbulent flow from a sudden depression in the waterway.
   b. If the flow in the waterway is greater than the flow from the proposed outlet, the rip-rap used to construct the scour hole should be sized based on the greater flow value according to the standard rip-rap.

Footnote:

1. Tailwater depth shall be the 2 year storm if discharging into a detention basin. For areas where tailwater cannot be computed, use $TW = 0.2D_o$.

Concept Engineering Consultants, P.A.

227 Route #33 East, Bldg #2, Unit #7
Manalapan, NJ 07726

Date: 8/10/2020
Project: Clinton,nj
Project No: 032606

Calculated By: BH
Checked By:

Conduit Outlet Protection Calculations

Scour Hole # 3

Design Parameters:

Design Storm Flow for 25 Year, Q	28.50	cfs
Vertical Dimension of Outlet Pipe, D_o	30	in
Horizontal Dimension of Outlet Pipe, W_o	30	in
Tailwater Depth, TW [1]	1.00	ft
Scour Hole Depth, y (1/2 D_o or D_o)	15	in

Apron Dimension Calculations:

Minimum Bottom Width, $W_1 = 2W_o$	W_1 = 5.00 ft
Minimum Bottom Length, $L_1 = 3D_o$	L_1 = 7.50 ft
Minimum Top Width *(max side slope of 3:1)*, W_2	W_2 = 12.50 ft
Minimum Top Length *(max side slope of 3:1)*, L_2	L_2 = 15.00 ft

Rip Rap Stone Size Calculations:

Unit Dicharge, $q = Q/D_o$ = 11.40 cfs per foot

- **Case I: $y = 1/2\ D_o$**

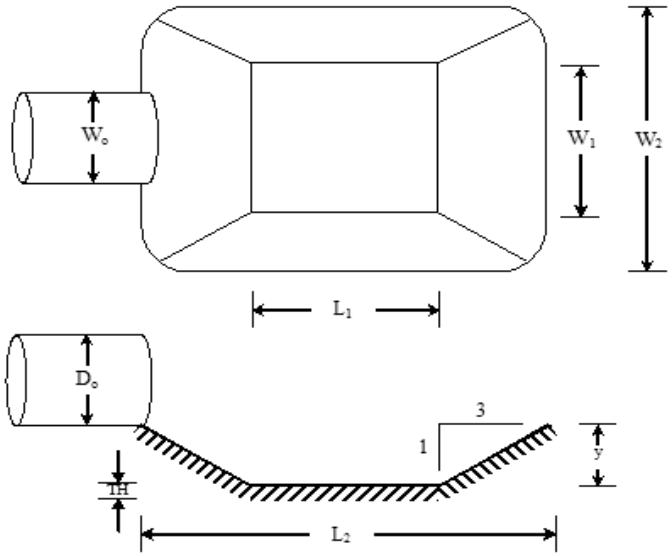
  Median Stone, $d_{50} = \frac{0.0125\ q^{1.33}}{TW}$ = 3.82 in Therefore, use ***d50* = 6 in**

  Apron Thickness, $TH = 2 \times d_{50}$ with filter fabric . . . . . ***TH* = 12 in**

- **Case II: $y = D_o$**

  Median Stone, $d_{50} = \frac{0.0082\ q^{1.33}}{TW}$ =

  Apron Thickness, $TH = 2 \times d_{50}$ with filter fabric . . . . . .



Notes:

1. The side slopes shall be 3:1 or flatter.
2. The bottom grade shall be 0.0% (level).
3. There shall be no overfall at the end of the apron or at the end of the culvert.
4. Fifty (50) percent by weight of the rip-rap mixture shall be smaller than the median size stone designated as d_{50}. The largest stone size in the mixture shall be 1.5 times the d_{50} size. The rip-rap shall be reasonably well graded.
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   b. If the flow in the waterway is greater than the flow from the proposed outlet, the rip-rap used to construct the scour hole should be sized based on the greater flow value according to the standard rip-rap.

Footnote:

1. Tailwater depth shall be the 2 year storm if discharging into a detention basin. For areas where tailwater cannot be computed, use $TW = 0.2D_o$.

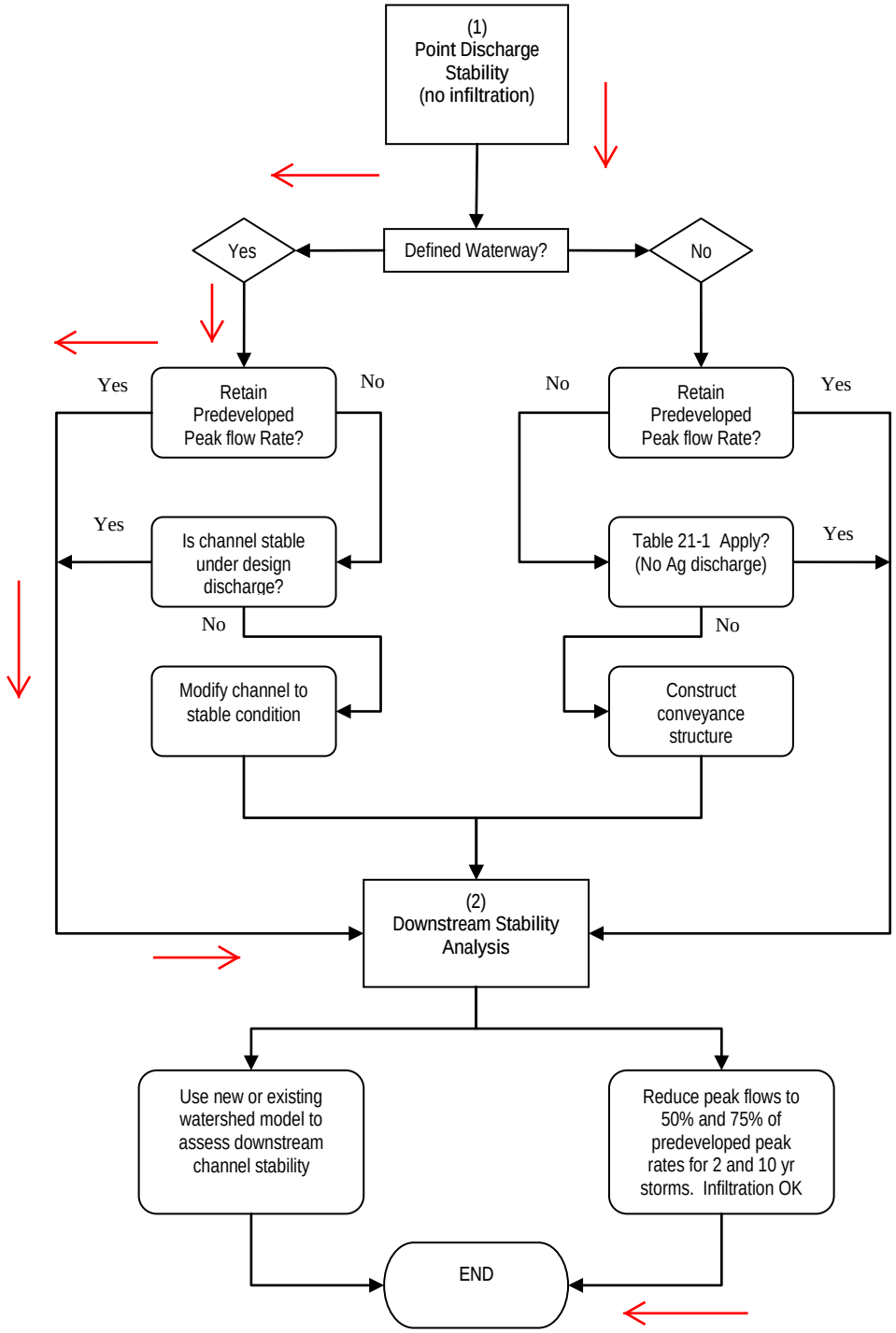
Offsite Stability Compliance.

The flow chart Figure 21-1 is provided in this appendix. The Project discharges the runoff to Well Defined waterway.

The project is designed to reduce the peak rate of flow from site for 2, 10 and 100 year storm as required by NJDEP storm water standards.

Based on above, the project meets the offsite stability standards.

Figure 21–1
Point Discharge and Downstream Stability Analysis Procedure



Return to TOC

APPENDIX - I:

STORMWATER MANAGEMENT MAINTENANCE PLAN (ATTACHED SEPARATELY)

APPENDIX - J:

SOIL LOG

SOIL LOG

Project Name:	Clinton Moebus 34, LLC	Boring #:	SL-2
Client Project #:		E&LP Project #:	8144
Location:	Town of Clinton, Hunterdon County	Total Depth:	
Date Drilled:	2/17/2020	Static Groundwater Level:	
Drilling Contractor:		Ground Surface Elevation:	Not Surveyed
Drilling Method:		Sampling Equipment:	--
Drilling Equipment:		Casing Equipment:	--
Drilling Angle:		Logged by:	MP

Depth Below Surface (Feet)	Blow Count 6"-6"-6"-6"	Recovery (in)	Sample Interval	Sample ID#	Lithologic Description	Comments	Depth Below Surface (Feet)
0.0 – 1.0					12" Topsoil;	No mottling or evidence of groundwater	0.0 – 1.0
1.5 – 6.0					Silty Clay; 10 YR 4/6; Subang Blocky; Dry; Friable Sample A @ 4'-5'	No mottling or evidence of groundwater	1.5 – 6.0
6.5 – 8.0					Silty Clay; 10 YR 6/6; 10% Gravel, 10% Cobble Subang Blocky; Moist; Friable Sample B @ 7'-7.5'	No mottling or evidence of groundwater	6.5 – 8.0
8.5 – 10.0					Silty Clay;10 YR 5/3; 10% Gravel, 10% Cobble Subang Blocky; Moist; Friable Sample C @ 9'-9.5'	Many signs of mottling (20%<) Distinct, Coarse (>15mm) Depth to 95"	8.5 – 10.0
10.5 – 11.5							10.5 – 11.5
12.0 – 25.0							12.0 – 25.0

SOIL LOG

Project Name:	Clinton Moebus 34, LLC	Boring #:	SL-3
Client Project #:		E&LP Project #:	8144
Location:	Town of Clinton, Hunterdon County	Total Depth:	
Date Drilled:	2/17/2020	Static Groundwater Level:	
Drilling Contractor:		Ground Surface Elevation:	Not Surveyed
Drilling Method:		Sampling Equipment:	--
Drilling Equipment:		Casing Equipment:	--
Drilling Angle:		Logged by:	MP

Depth Below Surface (Feet)	Blow Count 6"-6"-6"-6"	Recovery (in)	Sample Interval	Sample ID#	Lithologic Description	Comments	Depth Below Surface (Feet)
0.0 – 1.5					15" Topsoil;	No mottling or evidence of groundwater	0.0 – 1.5
2.0 – 6.0					Silty Clay; 10 YR 4/6; Subang Blocky; Moist; Friable Sample A @ 4'-5.5'	No mottling or evidence of groundwater	2.0 – 6.0
6.5 – 8.0					Silty Clay; 10 YR 6/6; Subang Blocky; Moist; Friable Sample B @ 7'-7.5'	No mottling. Evidence of seepage @ 127"	6.5 – 8.0
8.5 – 10.0							8.5 – 10.0
10.5 – 11.5							10.5 – 11.5
12.0 – 25.0							12.0 – 25.0

Engineering & Land Planning Associates

Project:	Moebus	Date:	2/26/2020
Location:	Clinton Township	Sample:	IN PLACE
Test By:	Annika Asplund		SL-2 @ C (9'-9.5')

				Disturbed	
L=	6.000	T1=	635	Tube Weight	700
H1=	7.500	T2=	1339	Gross Weight	1,558
H2=	6.000	T3=	1389	Net Weight	858
r=	1.125	T4=	1722		
R=	1.125	T5=	1761	Sample Vol. (in^3)	23.844375
		T(sec.)=	1761	(cm^3)	390.8093063
		T(min.)=	29.35		
				Bulk Density	2.195444137
					min. 1.2 gr/cm^3
Soil Permeability:			2.74		
Soil Class:			K3		

APPENDIX K:

GROUNDWATER MOUNDING ANALYSIS

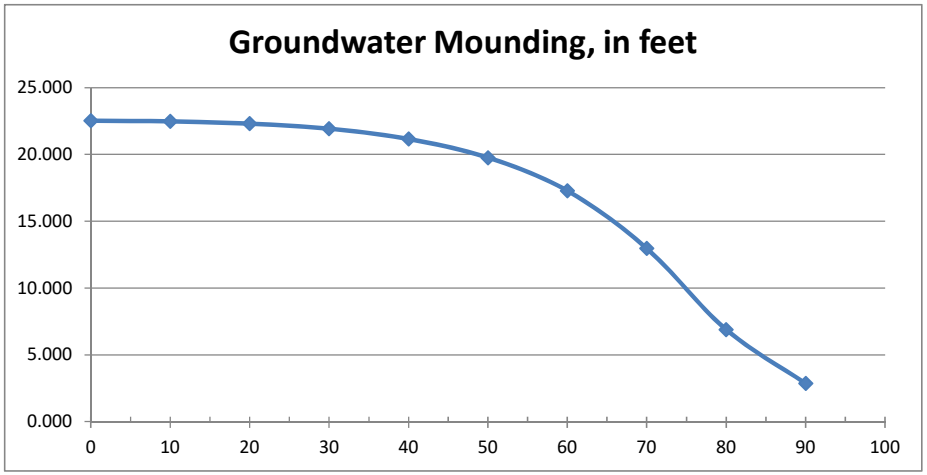
Input Values

2.74	R	Recharge rate (permeability rate) (in/hr)
0.150	Sy	Specific yield, Sy (dimensionless) default value is 0.15; max value is 0.2 provided that a lab test data is submitted
2.74	Kh	Horizontal hydraulic conductivity (in/hr) Kh = 5xRecharge Rate (R) in the costal plan; Kh=R outside the coastal plan
72.500	x	1/2 length of basin (x direction, in feet)
61.000	y	1/2 width of basin (y direction, in feet)
15.06	t	Duration of infiltration period (hours)
10.00	hi(0)	Initial thickness of saturated zone (feet)

32.527	h(max)	Maximum thickness of saturated zone (beneath center of basin at end of infiltration period)
22.527	Δh(max)	Maximum groundwater mounding (beneath center of basin at end of infiltration period)

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
22.527	0
22.479	10
22.309	20
21.926	30
21.164	40
19.757	50
17.284	60
12.960	70
6.883	80
2.855	90

Re-Calculate Now

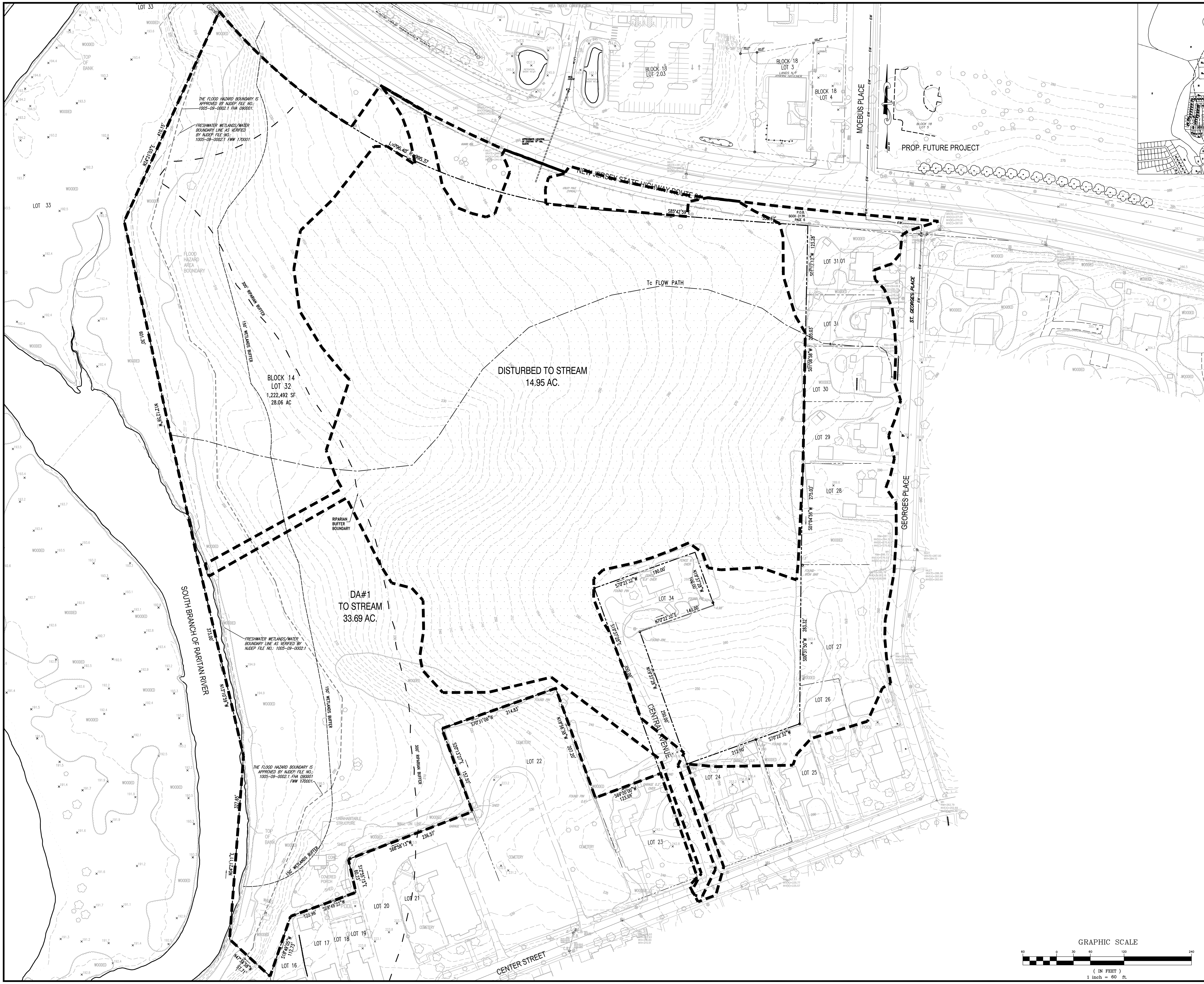


Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

APPENDIX - L:

PRE-DEVELOPMENT AND POST-DEVELOPMENT DRAINAGE AREA PLANS.


SOUTH BRANCH OF RARITAN RIVER
LOT 33
BLOCK 14
LOT 32
1,222,492 SF
28.06 AC
DISTURBED TO STREAM
14.95 AC.
DA#1
TO STREAM
33.69 AC.
Tc FLOW PATH
RIPARIAN BUFFER BOUNDARY
FLOOD HAZARD AREA BOUNDARY
THE FLOOD HAZARD BOUNDARY IS APPROVED BY NJDEP FILE NO.: 1005-09-0002.1 FHA 090001.
FRESHWATER WETLANDS/WATER BOUNDARY LINE AS VERIFIED BY NJDEP FILE NO.: 1005-09-0002.1 FWW 170001
THE FLOOD HAZARD BOUNDARY IS APPROVED BY NJDEP FILE NO.: 1005-09-0002.1 FHA 090001 FWW 170001
150' WETLANDS BUFFER
300' RIPARIAN BUFFER
NEW JERSEY STATE HIGHWAY ROUTE 31
BLOCK 18
LOT 2.03
BLOCK 18
LOT 3
BLOCK 18
LOT 4
MOEBUS PLACE
PROP. FUTURE PROJECT
ST. GEORGES PLACE
GEORGES PLACE
CENTRAL AVENUE
CENTER STREET
LOT 16
LOT 17
LOT 18
LOT 19
LOT 20
LOT 21
LOT 22
LOT 23
LOT 24
LOT 25
LOT 26
LOT 27
LOT 28
LOT 29
LOT 30
LOT 31
LOT 31.01
LOT 34
KEY MAP
SCALE: 1"=1000'
GRAPHIC SCALE
(IN FEET)
1 inch = 60 ft.

E&LP
140 WEST MAIN STREET HIGH BRIDGE, NJ 08829
PH. 908-238-0544 FAX. 908-238-9572
A PROFESSIONAL ASSOCIATION
CERTIFICATE OF AUTHORIZATION NO.: 24GA28021500 EXP. 8/31/2022

NO.	REVISION	BY	DATE

12/3/2020
DATE

WAYNE J. INGRAM
PROFESSIONAL ENGINEER & LAND SURVEYOR
N.J. P.E. NO. 24GB04258200

PROJECT:

CLINTON COMMONS
MINOR SUBDIVISION AND SITE PLAN
65 1/2 CENTER STREET
BLOCK 14 LOT 32
TOWN OF CLINTON

HUNTERDON COUNTY NEW JERSEY

TITLE:

PRE-DEVELOPMENT DRAINAGE AREA PLAN

JOB NO.:	8144/32606	DRAWING NO.:
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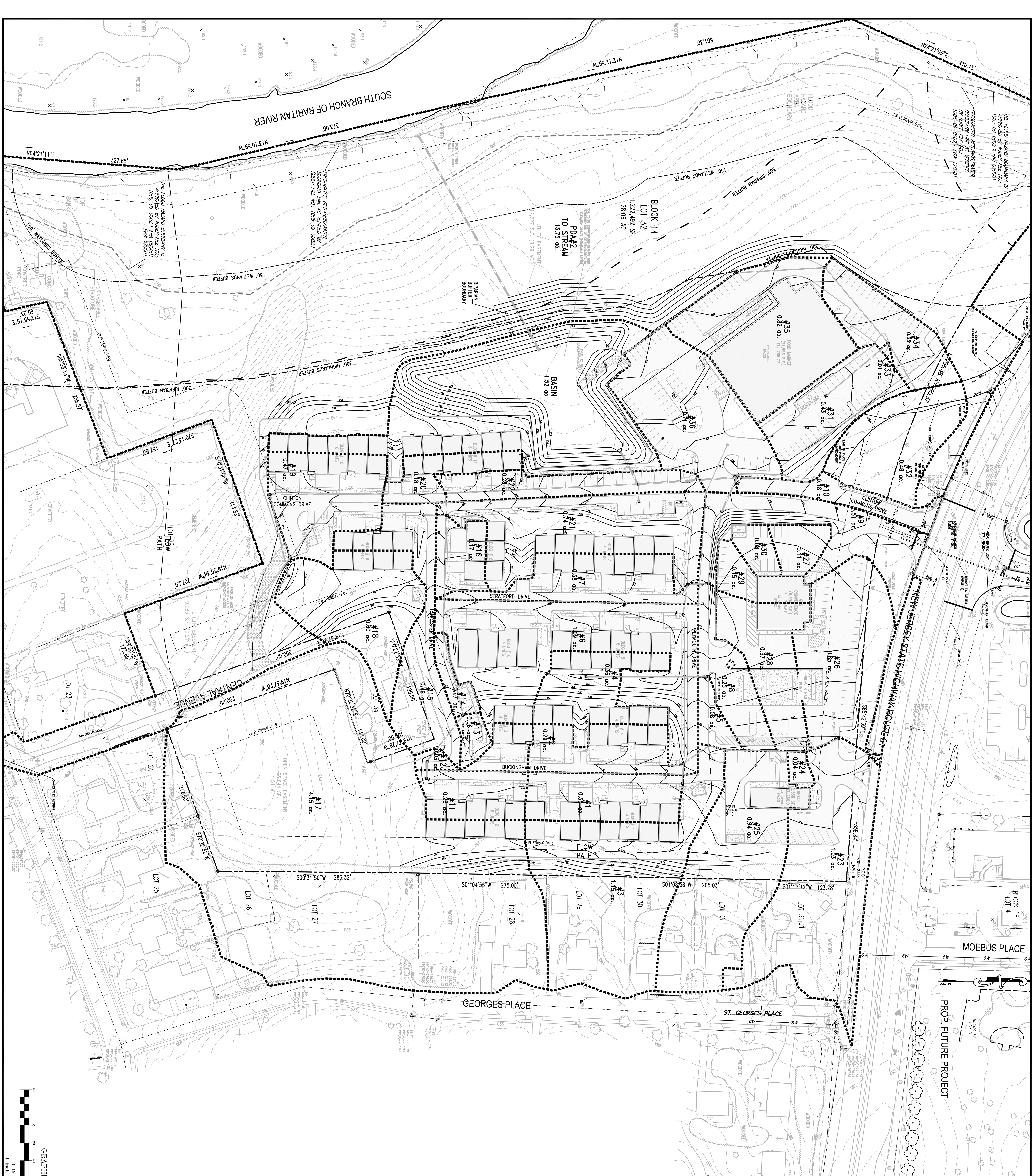
DESIGNED:	BH	
CHECKED:	CRN	
FILENAME:	32606.DWG	2
DATE:	12/03/2020	



GRAPHIC SCALE

(IN FEET)
1 inch = 40 ft.

E&LP
140 WEST MAIN STREET HIGH BRIDGE, NJ 08829
PH. 908-238-0544 FAX. 908-238-9572
A PROFESSIONAL ASSOCIATION
CERTIFICATE OF AUTHORIZATION NO.: 24GA28021500 EXP. 8/31/2022

NO.	REVISION	BY	DATE

12/3/2020
DATE

WAYNE J. INGRAM
PROFESSIONAL ENGINEER & LAND SURVEYOR
N.J. P.E. NO. 24GB04258200

PROJECT:

CLINTON COMMONS
MINOR SUBDIVISION AND SITE PLAN
65 1/2 CENTER STREET
BLOCK 14 LOT 32
TOWN OF CLINTON
HUNTERDON COUNTY NEW JERSEY

TITLE:

POST-DEVELOPMENT DRAINAGE AREA PLAN

JOB NO.:	8144/32606
SCALE:	1"=40'
DESIGNED:	BH
CHECKED:	CRN
FILENAME:	32606.DWG
DATE:	12/03/2020

DRAWING NO.: 2

2