# STORMWATER MANAGEMENT REPORT

# for

## PROPOSED GROCER AT THE PROMENADE SHOPS AT EVERGREEN WALK (UNIT 2)
## 801 Evergreen Way
## South Windsor, CT

***Prepared for:***

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## EXECUTIVE SUMMARY

Langan prepared this stormwater management report in support of the proposed grocery and retail stores located at 801 Evergreen Way within Unit 2 of the Promenade Shops at Evergreen Walk, located in the town of South Windsor, Connecticut. This site is identified as Map 27, Block 15, Unit 2 by the Town of South Windsor Assessor's Office and is approximately 7.3± acres of the Evergreen Walk Master Development Plan Area.

In the existing condition, two retail buildings with associated parking lots and drive aisles occupy the site. The majority of stormwater is collected by on-site drainage structures. It is conveyed through an existing pipe network in Hemlock Avenue in the westerly direction where it eventually discharges to Detention Basin 4 or a drainage swale that both ultimately discharge to the nearby wetlands.

The proposed redevelopment project includes the demolition of the two existing retail buildings and the construction of a ±40,000 square-foot grocer and adjacent inline ±10,000 square-foot retail space. Other associated site improvements including walkways, parking, drive aisles, driveways, site lighting, utility improvements, and drainage improvements. The overall impervious coverage has been reduced (approximately 0.5%), the overall peak flow rates have been reduced, and additional water quality measures have been introduced on site.

The proposed stormwater management system has been designed in general compliance with the Town of South Windsor Design Requirements, the 2002 State of Connecticut Guidelines for Soil Erosion and Sediment Control, and the 2004 Connecticut Stormwater Quality Manual. This report demonstrates that the proposed stormwater system will effectively manage the quality and quantity of stormwater runoff for the proposed development at 801 Evergreen Way, consistent with the approved master plans. A comparative analysis is provided of the calculated total pre- and post-development site runoff conditions, in which the overall peak runoff flow rates leaving the project limits in the 2, 10, 25, and 100-year storm events do not exceed those in the existing condition. In addition, stormwater quality improvements and the installation of erosion and sedimentation controls during demolition and construction periods is specified, as well as long-term stabilization and pollution prevention on the site.

Water quality Best Management Practices (BMP's) have also been incorporated to promote treatment and include sumped catch basins, rain gardens, permeable pavers, a reduction in pervious surfaces, and three water quality units.

It is the opinion of this office and the findings of this report that the proposed stormwater system, as designed, will effectively manage the stormwater runoff for quality and quantity for the proposed redevelopment. The design in this report is further supported by the "Proposed Grocer at The Promenade Shops at Evergreen Walk" plans prepared by Langan and dated April 6, 2021.

## INTRODUCTION

### 1.1 General

This stormwater management report has been prepared in support of the proposed grocery and retail spaces to be located at 801 Evergreen Way (Unit 2) in the town of South Windsor, Connecticut. The development will include the construction of a ±40,000 square-foot grocer and adjacent inline ±10,000 square-foot retail space along with associated parking, drive aisles, driveways, walkways, a loading dock, landscaped areas, site lighting, utility upgrades, and drainage improvements. This report addresses the engineering design of the stormwater conveyance and management systems for the site.

### 1.2 Site Location

This site is identified as Map 27, Block 15, Unit 2 by the Town of South Windsor Assessor's Office and is approximately 7.3± acres of the Evergreen Walk Master Development Plan Area. The project limits is bordered by a largely wooded area to the north, wetlands and retail space to the east, a private drive Hemlock Avenue to the south, and Evergreen Crossings Retirement Community to the west. A Costco and fueling station is proposed to be developed to the north of the site on the currently vacant land.

### 1.3 Existing Conditions

The proposed site is currently developed with two existing retail buildings, parking lot, and associated site features. The site generally slopes from east to west with an elevation ±139 at the eastern most part of the site, elevation ±107 in the southwest corner of the site, and existing building elevations of ±130 and ±128.

Currently ±2,460 square-feet of wetlands and ±29,765 square-feet of upland review area, inclusive of the wetland area, are present in the northeast corner of the site. The wetlands have been delineated by All Points Technologies Corporation in February 2021 and their findings are presented under a separate cover.

## 1.4 Project Description

The redevelopment project consists of the demolition of two existing retail spaces and construction of a ±40,000 square-foot grocer and adjacent inline ±10,000 square-foot retail space. Site improvements include parking, drive aisles, driveways, a loading dock, landscaping, walkways, site lighting, utility improvements, and drainage improvements.

Because of previous development, no wetland alterations are proposed for the redevelopment of the site, with the exception of intermittent stream and wetland buffer enhancements. Minor regrading and site improvements will take place within the upland review area. These improvements will occur in previously disturbed areas and will generally increase the separation from the wetlands.

Under the proposed conditions, small portion of the west, north, and northeast perimeters of the site will continue to sheet flow off site as they do in existing conditions. The stormwater runoff patterns from the interior of the site will generally be maintained. Runoff will continue to be collected by on-site drainage structures where it is conveyed through closed pipe networks before exiting the site through the existing Evergreen Walk stormwater system. New low impact design techniques such as rain gardens will be added to improve water quality treatment prior to discharging to the closed pipe network.

## 1.5 FEMA

According to the *Flood Insurance Study of Hartford County, Connecticut* conducted by the Federal Emergency Management Agency (FEMA) map number 09003C0383F with an effective date of September 26, 2008 (Figure 4), the site is located within the FEMA Flood Zone X, which is outside of the 100-year floodplain and is considered an area of minimal flood risk.

## 1.6 Soil Conditions

Soils are classified into hydrologic soil groups (HSG) to indicate the minimum rate of infiltration obtained for bare soil after prolonged wetting. The HSGs, which are classified as A, B, C, and D, are one element used to determine runoff curve numbers and analyzing stormwater characteristics on site.

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

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

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

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

According to the *USDA Natural Resources Conservation Service Web Soil Survey* (Figure 5), the site soil type is classified as Tisbury silt loam, 0 to 3 percent; Enfield silt loam, 0 to 3 percent slopes; and Enfield silt loam, 3 to 8 percent slopes. The Web Soil Survey has classified these soils as hydrologic soil groups B and C.

**Table 1: NRCS Soil Survey**

**Hydrologic Soil Group - Summary by Map Unit- State of Connecticut**

| Map Unit Symbol | Map Unit Name | Rating |
|---|---|---|
| 702 A | Tisbury silt loam, 0 to 3 percent | C |
| 704 A | Enfield silt loam, 0 to 3 percent slopes | B |
| 704 B | Enfield silt loam, 3 to 8 percent slopes | B |

All soils within the project site have been classified as hydrologic soil groups B and C. In general, the soils within project site have moderate to slow infiltration rates when thoroughly wet.

## 1.0 STORMWATER MANAGEMENT

### 2.1 Design Criteria

Proposed peak flow rates at all points of discharge from the site were analyzed to compare proposed discharge rates with the existing condition.

The storms analyzed include the following:

- A 2-year, 24-hour storm consisting of 3.11 inches of rainfall
- A 10-year, 24-hour storm consisting of 4.91 inches of rainfall
- A 25-year, 24-hour storm consisting of 6.03 inches of rainfall
- A 100-year, 24-hour storm consisting of 7.77 inches of rainfall

These events are based on NOAA Atlas 14, Volume 10, Version 2 South Windsor, CT.

### 2.2 Design Methodology

The peak runoff discharges for the existing and proposed conditions were analyzed using Soil Conservation Service (SCS) methodology, which outlines procedures for calculating peak rates of runoff resulting from precipitation events, and procedures for developing runoff hydrographs. Values for area, curve number, and time of concentration were calculated for the existing and proposed conditions.

The curve number "CN" is a land-sensitive coefficient that dictates the relationship between total rainfall depth and direct storm runoff. The soils within the watershed are divided into hydrologic soil groups (A, B, C, and D) as previously described.

The time of concentration, Tc, is defined as the time for runoff to travel from the hydraulically most distant point in the watershed to a point of interest. Values of time of concentration were determined for existing and proposed conditions based on land cover and slope of the flow path, using methods outlined in the SCS methodology.

For this study, a 24-hour SCS Type III standard rainfall distribution was used to determine the peak flow rate to all points of discharge from the site.

### 2.3 Existing Runoff Discharges (See Appendix A for Calculations)

The existing drainage conditions were delineated into four (4) watershed areas: EX-1 through EX-4 (See EX-WS).

Watershed EX-1, consisting of 0.35 acres, is comprised of the western edge of the site. It includes steep sloped landscaped and wooded areas and a portion of the western drive aisle, which is approximately 2,200 SF of pavement. Runoff from this watershed sheet flows off site to the west and is either collected in the Tamarack Avenue drainage network or discharged to the wetlands west of the site.

Watershed EX-2, consisting of 1.32± acres, is comprised of approximately 3,000± sf of building roof, 47,000± sf of parking lot, and 7,000± landscaped area in the western portion of the site. Runoff from this watershed is collected through drainage structures on site and conveyed through a closed pipe drainage network before exiting the site through an 18-inch RCP pipe that eventually discharges to a drainage swale and ultimately flows into the wetlands west of the site.

Watershed EX-3, consisting of 5.46± acres, makes up the majority of the site's runoff. It is comprised of the majority of the existing building roofs, the main parking area, and the site driveways. Runoff from this watershed is collected through various drainage structures on site and is conveyed through a closed pipe drainage network before exiting the site through a 24-inch RCP pipe that connects to the Evergreen Walk drainage network and eventually discharges to Detention Basin 4 west of the site.

Watershed EX-4, consisting 0.16± pervious acres, is comprised of the on-site wetlands in the northeastern corner of the site. Runoff from this watershed sheet flows northeast to the wetlands.

### 2.4 Proposed Runoff Discharges (See Appendix B for Calculations)

The proposed drainage conditions were delineated into four (4) watershed areas: PR-1 through PR-4 (See PR-WS).

Watershed PR-1, consisting of 0.39 acres, is comprised of the western edge of the site. It includes steep sloped landscaped and wooded areas and a portion of the western

drive aisle, which is approximately 1,800 SF of pavement. Runoff from this watershed sheet flows off site to the west and is either collected in the Tamarack Avenue drainage network or discharged to the wetlands west of the site, as it does in existing conditions.

Watershed PR-2, consisting of 1.32± acres, is comprised of the western portion of the parking lot. Runoff from this watershed is collected through various drainage structures on site and is conveyed through a closed pipe drainage network. The runoff passes through a proposed water quality unit before exiting the site through an existing 18-inch pipe that connects to a drainage manhole southwest of the site. Runoff eventually discharges to a drainage swale that ultimately flows into wetlands west of the site, as it does in existing conditions.

Watershed PR-3, consisting of 5.43± acres, makes up the majority of the site's runoff. It is comprised of the building roof, the front parking area, and the site driveways. Runoff from this watershed is collected through various drainage structures on site and conveyed through a closed pipe drainage network. The runoff passes through a proposed water quality unit before exiting the site through a 24-inch pipe that connects to the Evergreen Walk drainage network and eventually discharges to Detention Basin 4, as it does in existing conditions.

Watershed PR-4, consisting 0.16± pervious acres, is comprised of the on-site wetlands in the northeastern corner of the site. Runoff from this watershed sheet flows northeast to the wetlands as it does in existing conditions.

**Table 2: Peak Runoff Flow Comparison (CFS)**

| Design Point | 2-YEAR | | 10-YEAR | | 25-YEAR | | 100-YEAR | |
|---|---|---|---|---|---|---|---|---|
| | Existing | Proposed | Existing | Proposed | Existing | Proposed | Existing | Proposed |
| **Design Point 1 (Tamarack Ave.)** | 0.81 | 0.87 | 1.49 | 1.62 | 1.91 | 2.09 | 2.56 | 2.81 |
| **Design Point 2 (Hemlock Ave. 18" RCP)** | 4.05 | 3.97 | 6.51 | 6.45 | 8.03 | 7.98 | 10.38 | 10.34 |
| **Design Point 3 (Hemlock Ave. 24" RCP)** | 16.42 | 16.33 | 26.67 | 26.52 | 32.99 | 32.81 | 42.76 | 42.53 |
| **Design Point 4 (Wetlands)** | 0.34 | 0.34 | 0.65 | 0.65 | 0.84 | 0.84 | 1.14 | 1.14 |
| **Total Site Discharge** | 21.63 | 21.51 | 35.31 | 35.23 | 43.76 | 43.55 | 56.84 | 56.81 |

Note: Because of varying times of concentrations, the total site discharge is not cumulative of the contributing flows.

The redevelopment project has been designed to the maximum extent practicable to maintain existing drainage patterns. In addition, the proposed development results in a net decrease in the site's impervious areas by approximately ±1,330 square-feet. Ultimately, the majority of the stormwater on site flows into the wetlands west of the abutting development. By striving to maintain existing drainage patterns to the extent feasible and decreasing the total impervious area, the total site peak flow for all analyzed storms are decreased without any additional stormwater management features.

The small increase in the peak flows to Design Point 1, Tamarack Avenue, is expected to have an insignificant impact on the design point, as it is a minimal increase in flow and volume and ultimately connects to the aforementioned wetlands west of the abutting development. Additionally, there is a reduction in discharge rates overall.

## 2.0 STORMWATER QUALITY

### 3.1 Stormwater Quality Improvements

The stormwater management system has been designed in with the guidance of the Connecticut DEEP Stormwater Quality Manual and the Connecticut DEEP Soil Erosion and Sediment Control Manual. The primary source of water quality improvement comes from the reduction in the sites total impervious area, added landscaped areas, added rain gardens, added water quality units, and modernization of the drainage network.

### 3.2 Additional Stormwater Quality Features

In addition to decreasing the site's impervious area, the following additional water-quality control measures will be provided:

Catch basins with sumps: Catch basins at the site are to be constructed with sumps (minimum 2 feet) to prevent discharge of sediments.

Rain gardens: Rain gardens are to be constructed in landscaped islands to facilitate the filtering of collected stormwater.

Water Quality Units: Water quality units are to be installed prior to discharge into the existing storm sewer system within Hemlock Avenue.

Permeable pavers and pavement: Permeable pavers are to be installed in the pedestrian only seasonal marketing area, and permeable pavement is to be added at the parking spaces behind the building, which leads to a net decrease in impervious area for the site.

## 3.0 STORM DRAINAGE COLLECTION SYSTEM DESIGN (See Appendix C for Calculations)

### 4.1 Design Criteria

The proposed subsurface storm drainage collection system is designed to convey the 10-year design storm with event with one foot of freeboard per the Town of South Windsor requirements.

### 4.2 Design Methodology

The storm drainage system was analyzed using the Rational Method for estimating runoff for a 10-year design storm event. The site was divided into subareas, each contributing runoff to an individual catch basin inlet or roof drain. A value for area, time of concentration, and runoff coefficient was calculated for each contributing subarea.

Values of time of concentration were chosen based on land cover and flow path slope from the hydraulically most distant point in the subarea to the appropriate inlet. The average runoff coefficient, which is the ratio of peak runoff rate to the average rainfall rate for the period known as the time of concentration, was chosen using the following values:

| CONDITION | C |
|---|---|
| Grass/Landscaping | 0.30 |
| Paved/Impervious/Roof | 0.90 |

Rainfall intensities were taken from the NOAA Atlas 14, Volume 10, Version 2 South Windsor, CT rain gauge data. Storm drainage pipes were then sized based on calculated flows using Manning's Equation and were verified by solving for the hydraulic grade line. Starting hydraulic grade lines for the pipe networks were set to the calculated maximum water elevations for the 10-year-design storm event within the analyzed drainage network.

### 4.3 Storm Drainage Collection Summary

The runoff from the development will be collected using a conventional roof drains, catch basin, and manhole system. The collection system was designed to convey the 10-year storm to allow for one foot of free board within the proposed catch basins on-site.

## 4.0 CONCLUSION

The proposed stormwater management system has been designed in general accordance with the town of South Windsor requirements, the 2004 CT DEEP Stormwater Quality Manual, and the 2000 CT DOT Drainage Manual. The system incorporates stormwater quality measures and decreases the overall peak rate of runoff from the project development for all storm events analyzed as compared to the existing conditions.

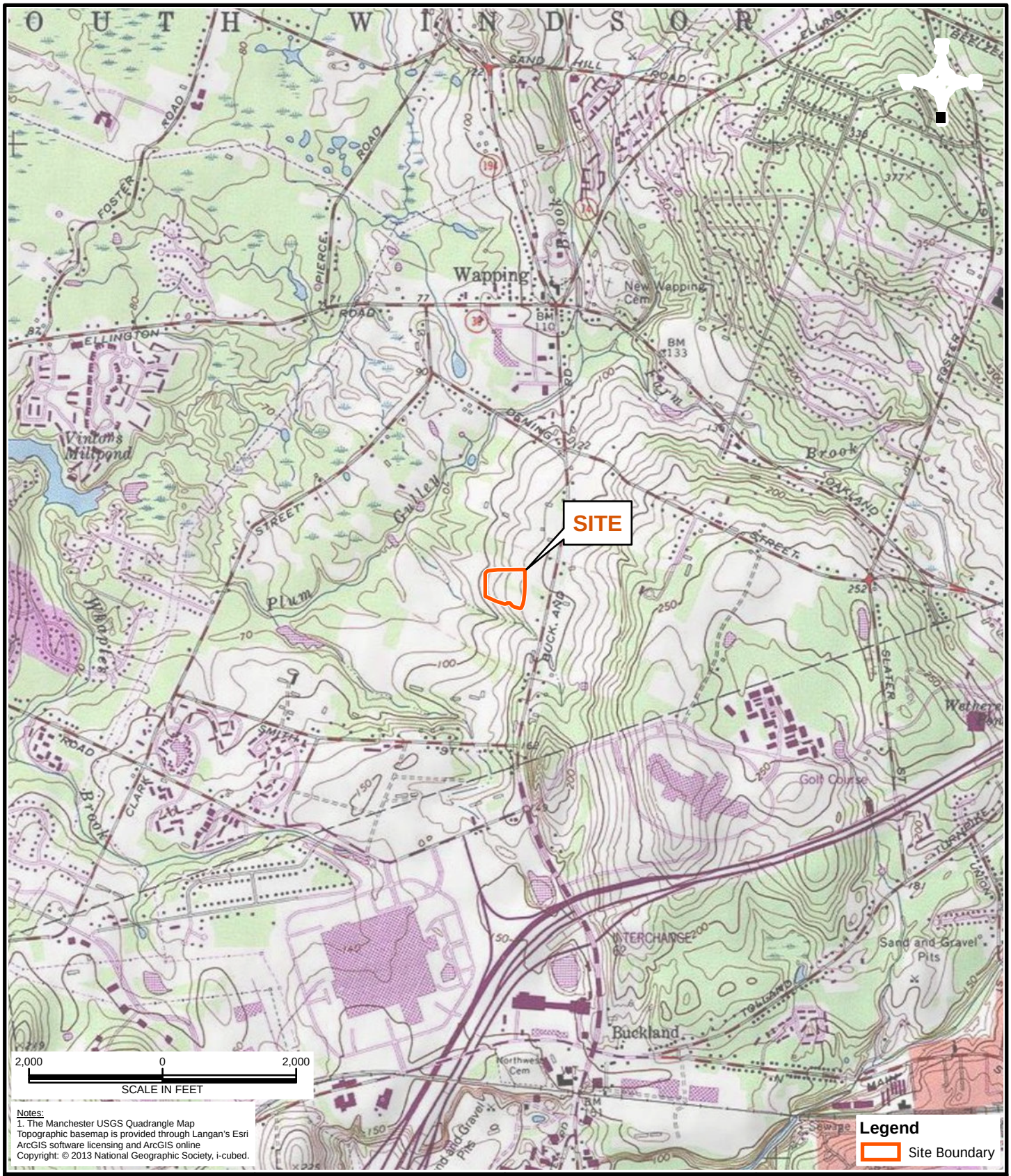
It is the opinion of this office and the findings of this report that the proposed stormwater system, as designed, will effectively manage quality and quantity of stormwater runoff for the proposed development.

## LIST OF FIGURES



## LIST OF DRAWINGS

**FIGURES**





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| | |
|---|---|
| Project | 801 EVERGREEN WAY<br>SOUTH WINDSOR<br>HARTFORD COUNTY CONNECTICUT |
| Drawing Title | SITE LOCATION MAP |
| Project No. | 140222801 |
| Date | 2/16/2021 |
| Scale | 1" = 2,000 feet |
| Drawn By | ELB |
| Figure | 1 |



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SOUTH WINDSOR
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Drawing Title
AERIAL MAP

| | |
|---|---|
| Project No. | 140222801 |
| Date | 2/16/2021 |
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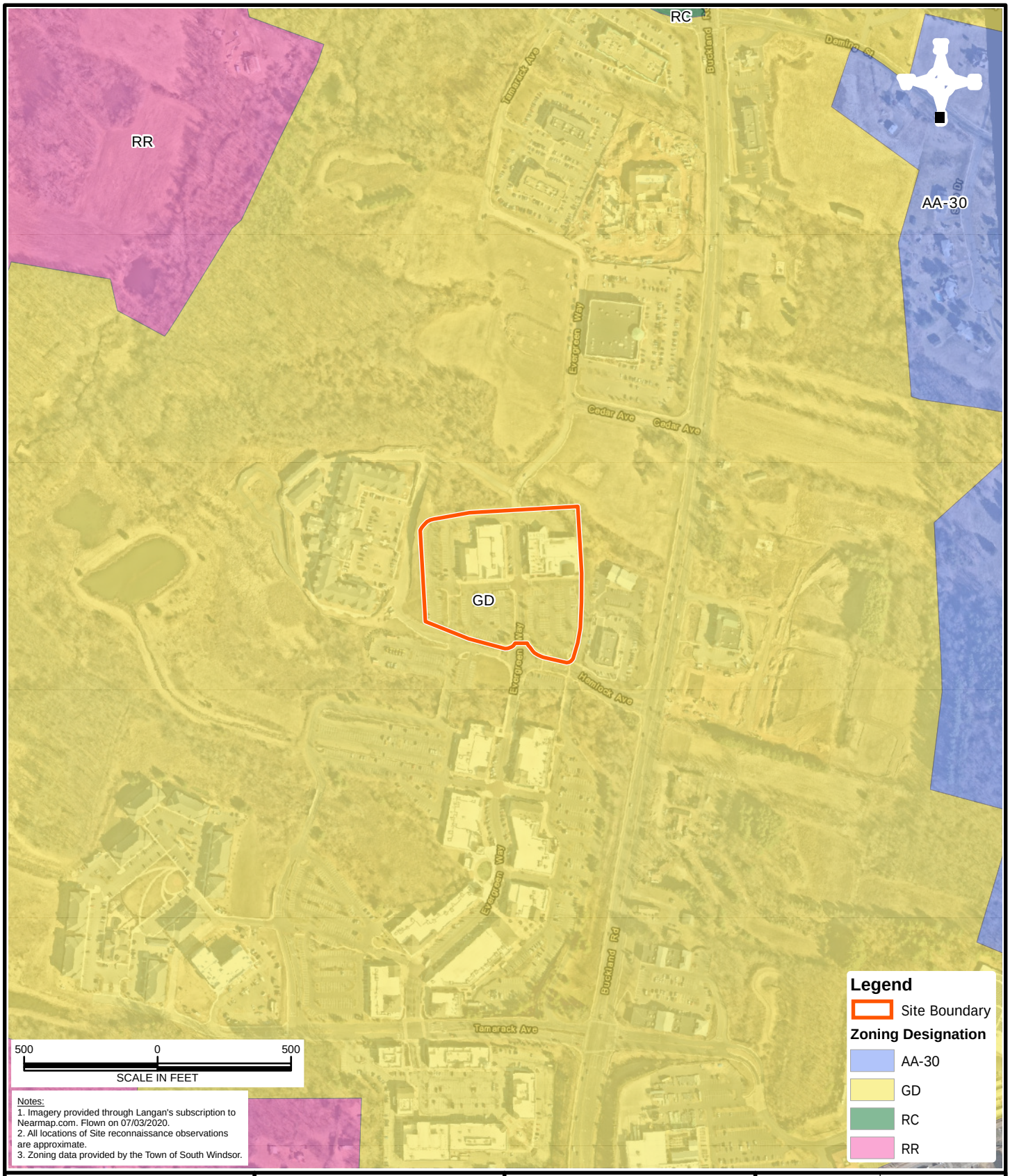


Notes:
1. Imagery provided through Langan's subscription to Nearmap.com. Flown on 07/03/2020.
2. All locations of Site reconnaissance observations are approximate.
3. Zoning data provided by the Town of South Windsor.

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Drawing Title
NEARBY PROPERTIES MAP

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| Project No. 140222801 | Figure 3 |
| Date 2/16/2021 | |
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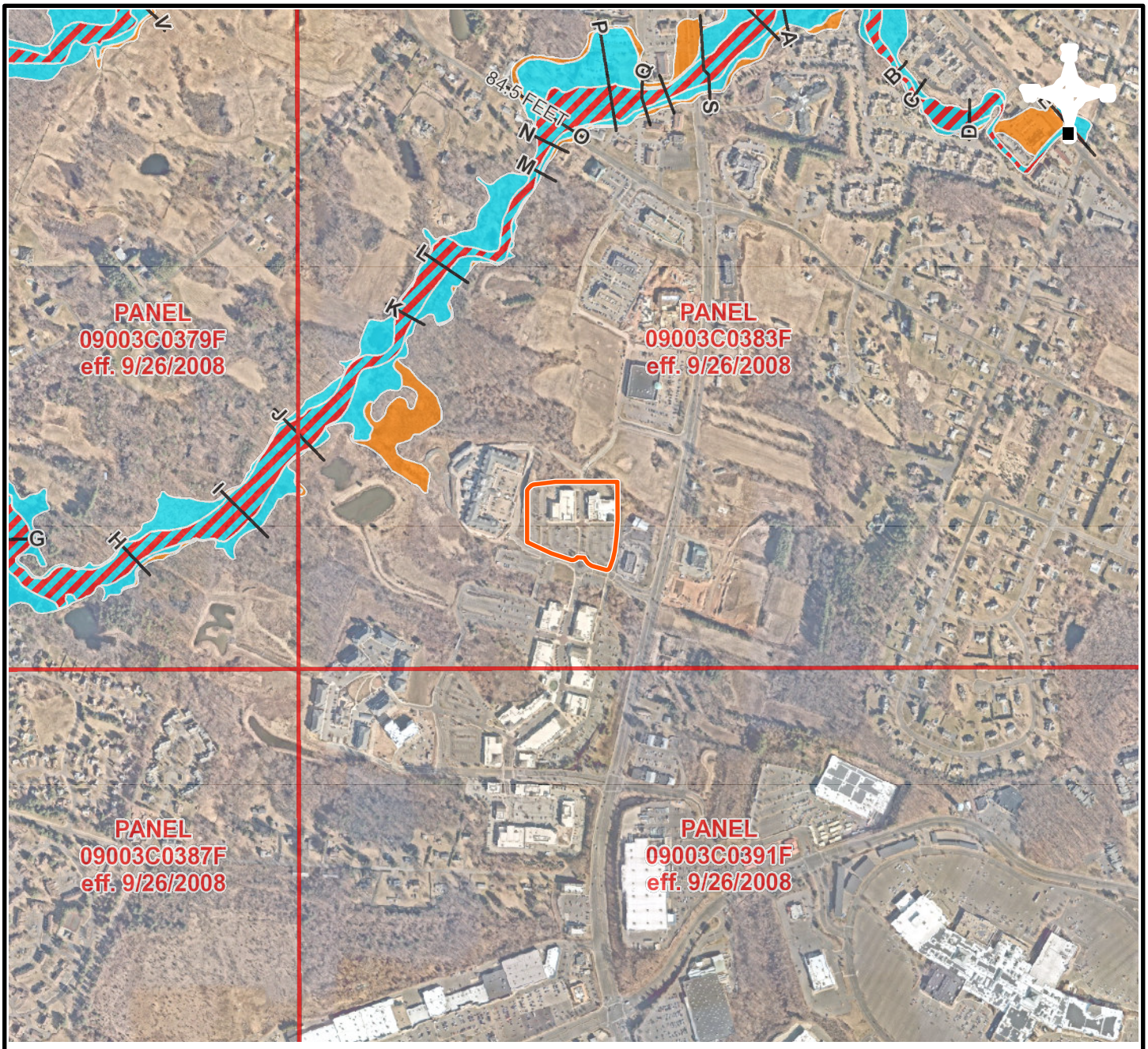


**Legend**

- Site Boundary
- FIRM Panels
- Cross-Sections
- Limit of Moderate Wave Action

Flood Hazard Boundaries

- Other Boundaries
- Limit Lines
- SFHA / Flood Zone Boundary

Flood Hazard Zones

- 1% Annual Chance Flood Hazard
- Regulatory Floodway
- Special Floodway
- Area of Undetermined Flood Hazard
- 0.2% Annual Chance Flood Hazard
- Future Conditions 1% Annual Chance Flood Hazard
- Area with Reduced Risk Due to Levee

Notes:
1. Imagery provided through Langan's subscription to Nearmap.com. Flown on 07/03/2020.
2. All locations of site reconnaissance observations are approximate.
3. Effective FEMA Firm data provided by the Federal Emergency Management Agency.

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Drawing Title
EFFECTIVE FEMA FIRM

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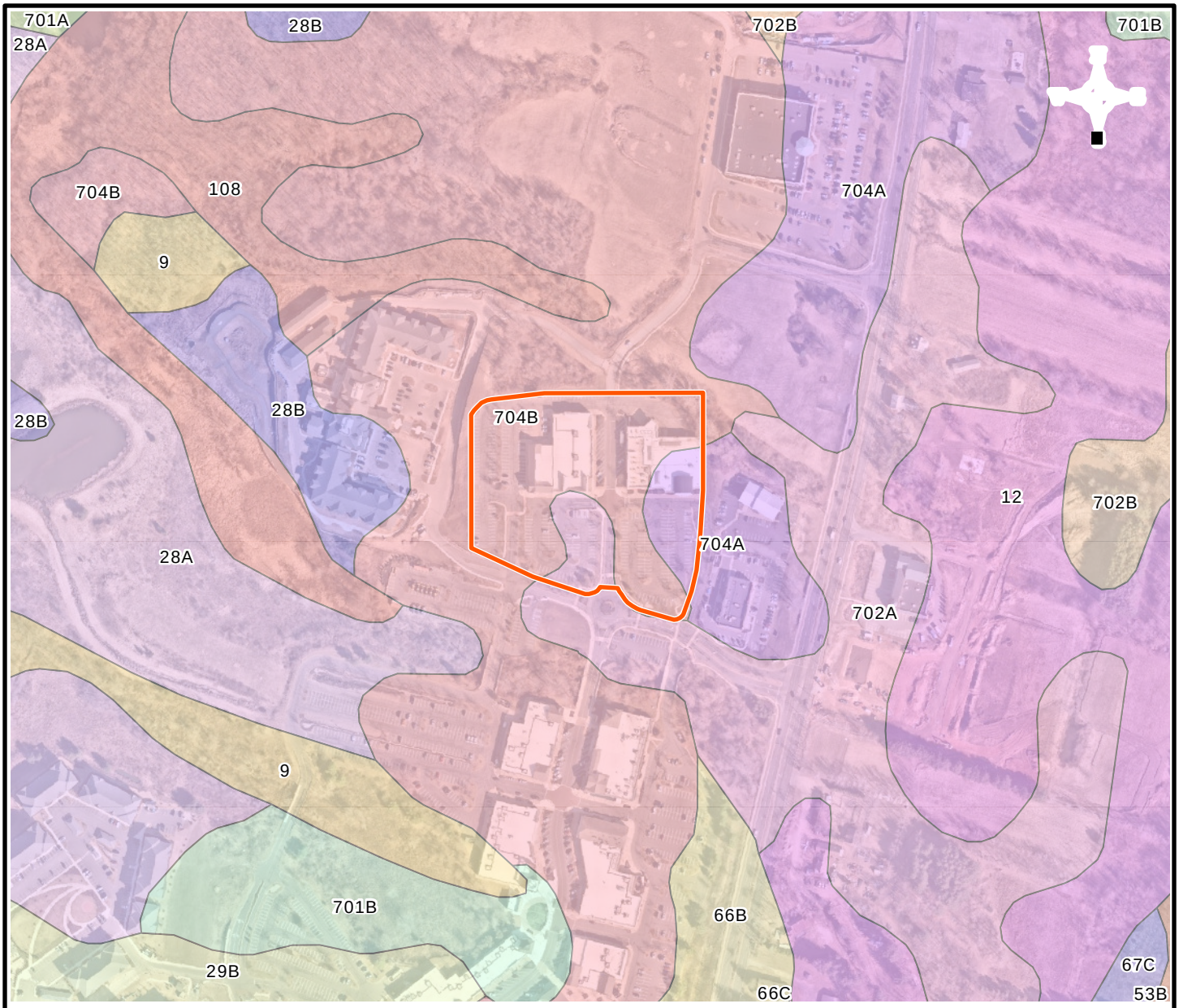


Notes:
1. Imagery provided through Langan's subscription to Nearmap.com. Flown on 03/07/2020.
2. All locations of Site reconnaissance observations are approximate.
3. Soils data provided by the Natural Resource Conservation Service.

## Legend

- Site Boundary

Mapunit Symbol,Mapunit Name

- 108,Saco silt loam
- 12,Raypol silt loam
- 28A,Elmridge fine sandy loam, 0 to 3 percent slopes
- 28B,Elmridge fine sandy loam, 3 to 8 percent slopes
- 29B,Agawam fine sandy loam, 3 to 8 percent slopes
- 53B,Wapping very fine sandy loam, 3 to 8 percent slopes
- 66B,Narragansett silt loam, 2 to 8 percent slopes
- 66C,Narragansett silt loam, 8 to 15 percent slopes
- 67C,Narragansett silt loam, 8 to 15 percent slopes, very stony
- 701A,Ninigret fine sandy loam, 0 to 3 percent slopes
- 701B,Ninigret fine sandy loam, 3 to 8 percent slopes
- 702A,Tisbury silt loam, 0 to 3 percent slopes
- 702B,Tisbury silt loam, 3 to 8 percent slopes
- 704A,Enfield silt loam, 0 to 3 percent slopes
- 704B,Enfield silt loam, 3 to 8 percent slopes
- 9,Scitico, Shaker, and Maybid soils

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Drawing Title
**NRCS SOILS**

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| Project No. | 140222801 |
| Date | 2/16/2021 |
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| Figure | 5 |



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## LAND USE TABLE

| | | | |
|---|---|---|---|
| LAND AREA WITHIN | | | |
| - THE 'BUCKLAND ROAD GATEWAY DEVELOPMENT ZONE' | | 229.9 AC. | |
| - THE 'RURAL RESIDENTIAL ZONE' | | 13.1 AC. | |
| OVERALL PROPERTY | | 243 AC. | |
| | EXIST./APPROVED | PROPOSED | |
| - BUILDINGS, RETAIL | | | |
| The Shops at Evergreen Walk | 284,750 SF | | |
| The Shops - Phase II (88,095 SF u/c) | 90,250 SF | | |
| Wright Property | | 50,000 SF | |
| Site '3' - Lifestyle Retail | | 95,000 SF | |
| Site '6' - Town Square | | 205,000 SF | |
| TOTAL | 375,000 SF | 350,000 SF | 725,000 SF |
| | EXISTING | PROPOSED | |
| - BUILDINGS, OFFICE | | | |
| The Shops at Evergreen Walk | 3,870 SF | | |
| ECHN Medical Center | 39,820 SF | | |
| Office - South I & II | | 58,800 SF | |
| Office - West, A, B, C, D, E, F, G | | 447,510 SF | |
| TOTAL | 43,690 SF | 506,310 SF | 550,000 SF |
| | EXISTING | PROPOSED | |
| - BUILDINGS, RECREATION | | | |
| L.A.Fitness at Evergreen Walk | 45,000 SF | | |
| L.A.Fitness Expansion & Site 3 | | 30,000 SF | |
| TOTAL | 45,000 SF | 30,000 SF | 75,000 SF |
| | EXISTING | PROPOSED | |
| - BUILDINGS, HOTEL | | | |
| Hotel - North & South | | 250 Rooms | |
| TOTAL | | 250 Rooms | 250 Rooms |
| | EXISTING | PROPOSED | |
| - BUILDINGS, RESIDENTIAL | | | |
| Town Square at Evergreen Walk | | 200 Units | |
| TOTAL | | 200 Units | |

PROJECT SITE

PLUM GULLY BROOK

ECHN II
(APPROVED APPLICATION)
Detention Basin 7

W10
(CONCEPTUAL DESIGN)
No Detention

ECHN
(CONSTRUCTED)
No Detention

UNIT 13
(CONCEPTUAL DESIGN)
Detention Basin 7

UNIT 12
(CONCEPTUAL DESIGN)
Detention Basin 7

WALKING / JOGGING TRAIL

UNIT 11
(CONCEPTUAL DESIGN)
Detention Basin 7

L.A. FITNESS
(CONSTRUCTED)
No detention

DETENTION BASIN #1

DETENTION BASIN #2

DETENTION BASIN #2a

DETENTION BASIN #4

DETENTION BASIN #5

DETENT 5/UNIT 5
(CONCEPTUAL DESIGN)
Detention Basin 5

Detention Basin 5
Underground Storage

LA FITNESS
(CONCEPTUAL DESIGN)
No detention

EW5
(CONSTRUCTED)
No detention

UNIT 4
(CONCEPTUAL DESIGN)
Detention Basin 4

EW4
(CONSTRUCTED)
Detention Basin 4

EW VILLAGE
(CONCEPTUAL DESIGN)
Detention Basin 2 & 2a

EW4
(CONSTRUCTED)
Detention Basin 4

EW3
(CONSTRUCTED)
Detention Basin 2 & 2a

EXPO
(UNDER CONSTRUCTION)
Detention Basin 1

EW VILLAGE
(CONCEPTUAL DESIGN)

EW 3
(CONCEPTUAL DESIGN)
Detention Basin 2 & 2a

File Path: \\blcompanies.com\dfs\prog\JOBS13\113\C13C4718\RECORDING\2015-12-03 master plan drainage area map\Prop Dra - Standard\STC Drainage\Prop Dra.dwg, Layout: PROP DRA Tue, Jun 12, 2018 - 11:42 AM User: sleclerc

CTB: LMAN: MS VIEW: UCS:WORLD

SCALE:
HORZ.: 1" = 400'
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DATUM:
HORZ.:
VERT.:
0 200 400
GRAPHIC SCALE

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EVERGREEN WALK, LLC

PROPOSED WATERSHED AREAS

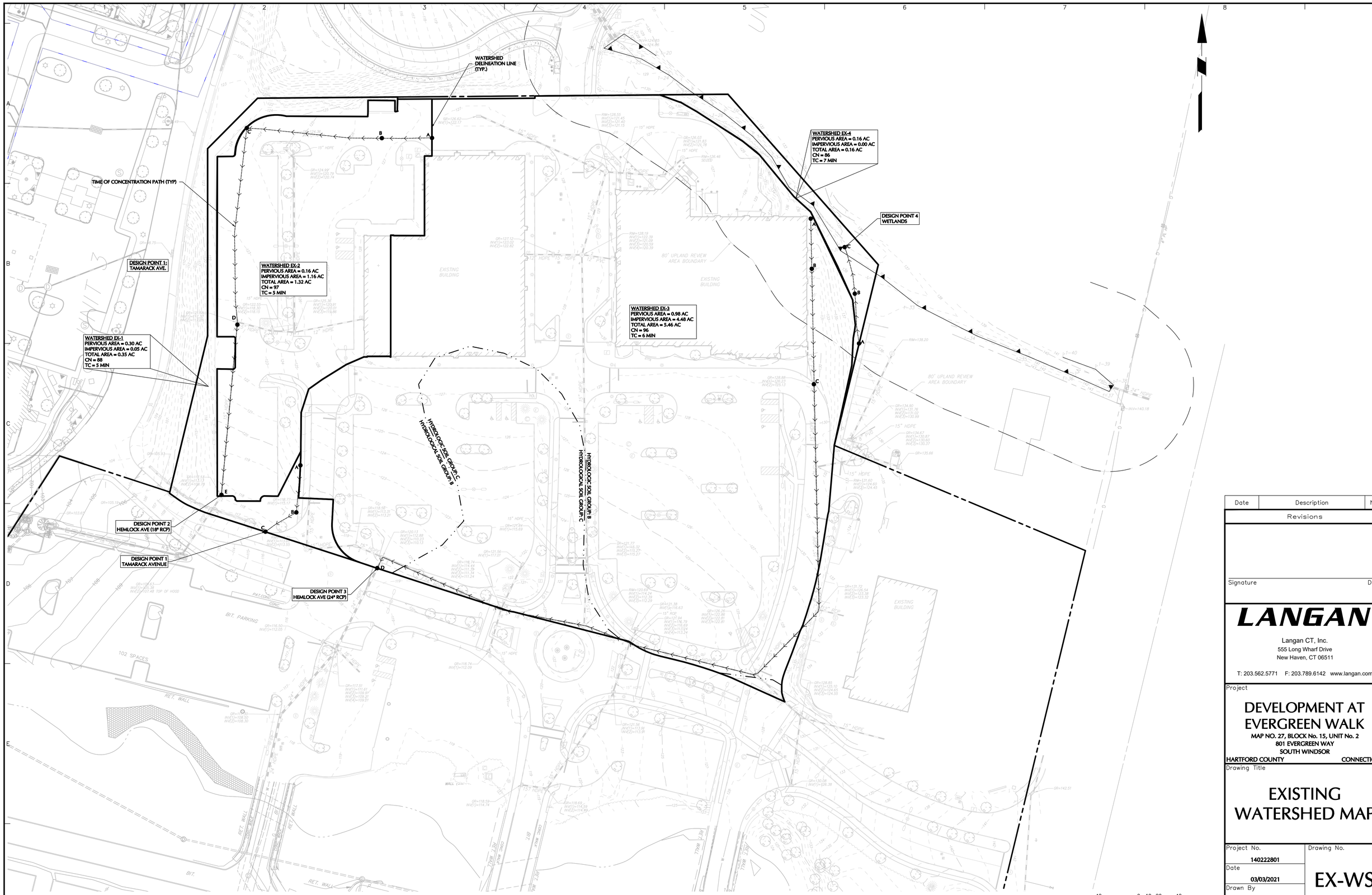
EVERGREEN WALK MASTER DEVELOPMENT PLAN

SOUTH WINDSOR CONNECTICUT

PROJ. No.: 2000 481 A30
DATE: 6/8/2007

DRA-1

**DRAWINGS**




NOTES:
1. LIMITS OF WETLANDS WERE DELINEATED BY ALL POINTS TECHNOLOGIES CORPORATION IN FEBRUARY 2021.

| No. | Description | Date |
|---|---|---|
| | Revisions | |

Signature Date


LANGAN

Langan CT, Inc.
555 Long Wharf Drive
New Haven, CT 06511

T: 203.562.5771 F: 203.789.6142 www.langan.com


Project

# DEVELOPMENT AT EVERGREEN WALK

MAP NO. 27, BLOCK No. 15, UNIT No. 2
801 EVERGREEN WAY
SOUTH WINDSOR
HARTFORD COUNTY CONNECTICUT

Drawing Title

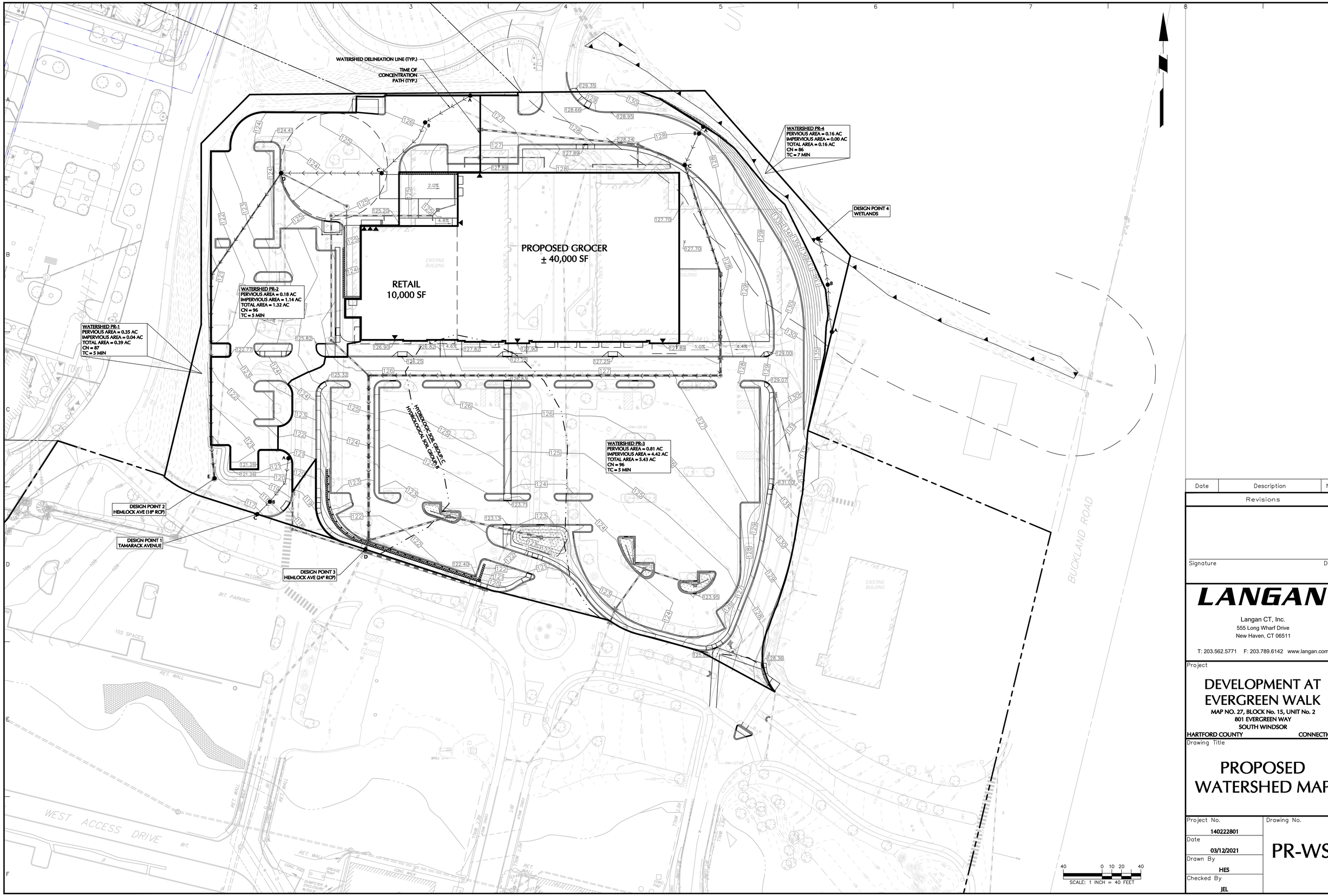
# EXISTING WATERSHED MAP

| Project No. | Drawing No. |
|---|---|
| 140222801 | EX-WS |
| Date: 03/03/2021 | |
| Drawn By: HES | |
| Checked By: JEL | |

LANGAN
Project No. 140222801



Date: 4/8/2021 Time: 16:39 User: ibrown Style Table: Langan.stb Layout: Layout1 Document Code: 140222801-0503-CG103-0101




| Date | Description | No. |
|---|---|---|

Revisions

Signature Date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Project

# DEVELOPMENT AT EVERGREEN WALK

MAP NO. 27, BLOCK No. 15, UNIT No. 2
801 EVERGREEN WAY
SOUTH WINDSOR
HARTFORD COUNTY CONNECTICUT

Drawing Title

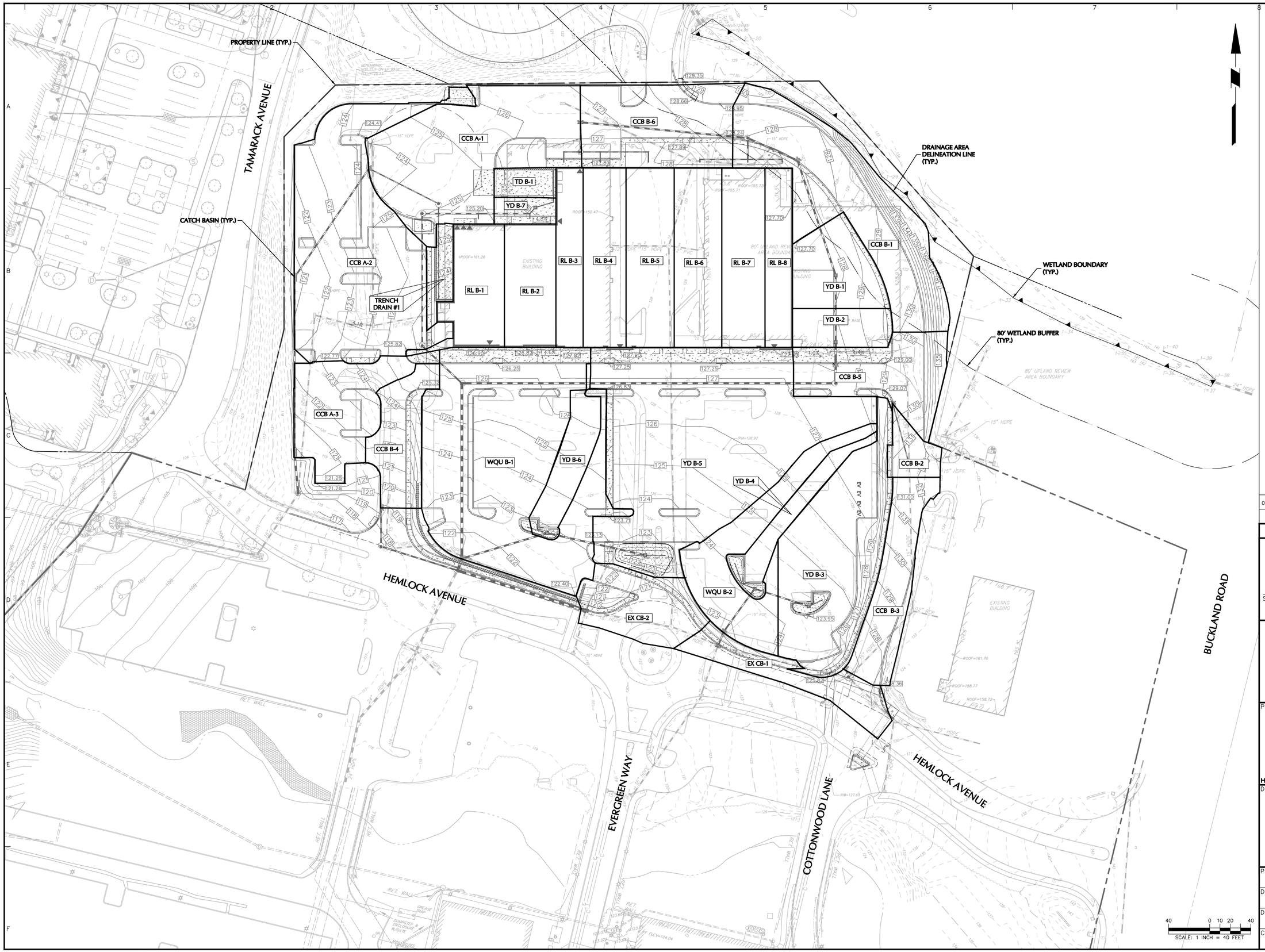
# PROPOSED WATERSHED MAP

| Project No. | Drawing No. |
|---|---|
| 140222801 | PR-WS |
| Date: 03/12/2021 | |
| Drawn By: HES | |
| Checked By: JEL | |

LANGAN Project No. 140222801



Date: 6/8/2021 Time: 20:42 User: ibrown Style Table: Langan.stb Layout: Layout1 Document Code: 140222801-0503-CG104-0101




LANGAN

Project No. 140222801

| Date | Description | No. |
|---|---|---|
| 06/10/2021 | PLANNING DEPARTMENT SUBMISSION | 1 |

Revisions

Signature Date


LANGAN

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Project

# DEVELOPMENT AT EVERGREEN WALK

**MAP NO. 27, BLOCK No. 15, UNIT No. 2**
**801 EVERGREEN WAY**
**SOUTH WINDSOR**
**HARTFORD COUNTY CONNECTICUT**

Drawing Title

# DRAINAGE AREA MAP

| Project No. | Drawing No. |
|---|---|
| 140222801 | DA-CB |
| Date: 03/12/2021 | |
| Drawn By: IJAB | |
| Checked By: JEL | |



Date: 6/8/2021 Time: 20:49 User: ibrown Style Table: Langan.stb Layout: Layout1 Document Code: 140222801-0504-CG104-0101

# APPENDIX A

## Existing Stormwater Discharge Calculations

Project **Evergreen Walk** By **HES** Date **3/12/2021**

Location **South Windsor, CT** Checked **JEL** Date **3/12/2021**

Circle One: (Present) Developed

Circle One: ($T_c$) $T_t$ through subarea **EX-1**

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 $T_c$ Only) | | Segment ID | AB | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1. Surface description (table 3-1) | | | Short Grass Prairie | | | | | |
| 2. Manning's roughness coeff., n (table 3-1) | | | 0.15 | | | | | |
| 3. Flow Length, L (total L ≤ 150 ft) | | ft | 50 | | | | | |
| 4. Two-yr 24-hr rainfall, $P_2$ | | in | 3.1 | | | | | |
| 5. Land slope, s | | ft/ft | 0.066 | | | | | |
| 6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ | Compute $T_t$ | hr | 0.059 | + | | + | = | 0.059 |

| **Shallow concentrated flow** | | Segment ID | BC | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7. Surface description (paved or unpaved) | | | Unpaved | | | | | |
| 8. Flow length, L | | ft | 34 | | | | | |
| 9. Watercourse slope, s | | ft/ft | 0.065 | | | | | |
| 10. Average velocity, V (figure 3-1) | | ft/s | 4.1 | | | | | |
| 11. $T_t = \frac{L}{3600\ V}$ | Compute $T_t$ | hr | 0.002 | + | | + | = | 0.002 |

| **Channel flow** | | Segment ID | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 12. Cross sectional flow area, a | | $ft^2$ | | | | | | |
| 13. Wetted perimeter, $p_w$ | | ft | | | | | | |
| 14. Hydraulic radius, r $r = \frac{a}{p_w}$ | Compute r | ft | | | | | | |
| 15. Channel slope, s | | ft/ft | | | | | | |
| 16. Manning's roughness coeff., n | | | | | | | | |
| 17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ | Compute V | ft/s | | | | | | |
| 18. Flow length, L | | ft | | | | | | |
| 19. $T_t = \frac{L}{3600\ V}$ | Compute $T_t$ | hr | | + | | | = | 0.000 |
| 20. Watershed or subarea $T_c$ or $T_t$ (add $T_t$ in steps 6, 11, 19) | | | | | | | | 0.061 hr |

**Use Tc= 5 min**

Project **Evergreen Walk** By **HES** Date **3/12/2021**

Location **South Windsor, CT** Checked **JEL** Date **3/12/2021**

Circle One: (Present) Developed

Circle One: ($T_c$) $T_t$ through subarea **EX-2**

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 $T_c$ Only) | | Segment ID | AB | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1. Surface description (table 3-1) | | | Asphalt | | | | | |
| 2. Manning's roughness coeff., n (table 3-1) | | | 0.01 | | | | | |
| 3. Flow Length, L (total L ≤ 150 ft) | | ft | 50 | | | | | |
| 4. Two-yr 24-hr rainfall, $P_2$ | | in | 3.1 | | | | | |
| 5. Land slope, s | | ft/ft | 0.012 | | | | | |
| 6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ | Compute $T_t$ | hr | 0.014 | + | | + | = | 0.014 |

| **Shallow concentrated flow** | | Segment ID | BC | CD | | | | |
|---|---|---|---|---|---|---|---|---|
| 7. Surface description (paved or unpaved) | | | Paved | Paved | | | | |
| 8. Flow length, L | | ft | 125 | 193 | | | | |
| 9. Watercourse slope, s | | ft/ft | 0.022 | 0.010 | | | | |
| 10. Average velocity, V (figure 3-1) | | ft/s | 3.0 | 2.0 | | | | |
| 11. $T_t = \frac{L}{3600\ V}$ | Compute $T_t$ | hr | 0.011 | + 0.026 | + | | = | 0.038 |

| **Channel flow** | | Segment ID | DE | | | | |
|---|---|---|---|---|---|---|---|
| 12. Cross sectional flow area, a | | $ft^2$ | | | | | |
| 13. Wetted perimeter, $p_w$ | | ft | | | | | |
| 14. Hydraulic radius, $r = \frac{a}{p_w}$ | Compute r | ft | | | | | |
| 15. Channel slope, s | | ft/ft | 0.023 | | | | |
| 16. Manning's roughness coeff., n | | | 0.011 | | | | |
| 17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ | Compute V | ft/s | 5.00 | | | | |
| 18. Flow length, L | | ft | 175 | | | | |
| 19. $T_t = \frac{L}{3600\ V}$ | Compute $T_t$ | hr | 0.010 | + | = | 0.010 | |
| 20. Watershed or subarea $T_c$ or $T_t$ (add $T_t$ in steps 6, 11, 19) | | | | | | 0.062 | hr |

**Use Tc= 5 min**

Project **Evergreen Walk** By **HES** Date **3/12/2021**

Location **South Windsor, CT** Checked **JEL** Date **3/12/2021**

Circle One: (Present) Developed

Circle One: ($T_c$) $T_t$ through subarea **EX-3**

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 $T_c$ Only) | | Segment ID | AB | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1. Surface description (table 3-1) | | | Short Grass Prairie | | | | | |
| 2. Manning's roughness coeff., n (table 3-1) | | | 0.15 | | | | | |
| 3. Flow Length, L (total L ≤ 150 ft) | | ft | 50 | | | | | |
| 4. Two-yr 24-hr rainfall, $P_2$ | | in | 3.1 | | | | | |
| 5. Land slope, s | | ft/ft | 0.072 | | | | | |
| 6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ | Compute $T_t$ | hr | 0.057 | + | | + | = | 0.057 |

| **Shallow concentrated flow** | | Segment ID | BC | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7. Surface description (paved or unpaved) | | | Unpaved | | | | | |
| 8. Flow length, L | | ft | 116 | | | | | |
| 9. Watercourse slope, s | | ft/ft | 0.032 | | | | | |
| 10. Average velocity, V (figure 3-1) | | ft/s | 2.9 | | | | | |
| 11. $T_t = \frac{L}{3600\ V}$ | Compute $T_t$ | hr | 0.011 | + | | + | = | 0.011 |

| **Channel flow** | | Segment ID | CD | | | | |
|---|---|---|---|---|---|---|---|
| 12. Cross sectional flow area, a | | $ft^2$ | | | | | |
| 13. Wetted perimeter, $p_w$ | | ft | | | | | |
| 14. Hydraulic radius, r $r = \frac{a}{p_w}$ | Compute r | ft | | | | | |
| 15. Channel slope, s | | ft/ft | 0.017 | | | | |
| 16. Manning's roughness coeff., n | | | 0.011 | | | | |
| 17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ | Compute V | ft/s | 5.00 | | | | |
| 18. Flow length, L | | ft | 721 | | | | |
| 19. $T_t = \frac{L}{3600\ V}$ | Compute $T_t$ | hr | 0.040 | + | | = | 0.040 |
| 20. Watershed or subarea $T_c$ or $T_t$ (add $T_t$ in steps 6, 11, 19) | | | | | | | 0.108 hr |

**Use Tc= 6 min**

Project **Evergreen Walk** By **HES** Date **3/12/2021**

Location **South Windsor, CT** Checked **JEL** Date **3/12/2021**

Circle One: (Present) Developed

Circle One: ($T_c$) $T_t$ through subarea **EX-4**

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 $T_c$ Only) | | Segment ID | AB | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1. Surface description (table 3-1) | | | Short Grass Prairie | | | | | |
| 2. Manning's roughness coeff., n (table 3-1) | | | 0.15 | | | | | |
| 3. Flow Length, L (total L ≤ 150 ft) | | ft | 50 | | | | | |
| 4. Two-yr 24-hr rainfall, $P_2$ | | in | 3.1 | | | | | |
| 5. Land slope, s | | ft/ft | 0.015 | | | | | |
| 6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ | Compute $T_t$ | hr | 0.107 | + | | + | = | 0.107 |

| **Shallow concentrated flow** | | Segment ID | BC | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7. Surface description (paved or unpaved) | | | Unpaved | | | | | |
| 8. Flow length, L | | ft | 48 | | | | | |
| 9. Watercourse slope, s | | ft/ft | 0.053 | | | | | |
| 10. Average velocity, V (figure 3-1) | | ft/s | 3.7 | | | | | |
| 11. $T_t = \frac{L}{3600\ V}$ | Compute $T_t$ | hr | 0.004 | + | | + | = | 0.004 |

| **Channel flow** | | Segment ID | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 12. Cross sectional flow area, a | | $ft^2$ | | | | | | |
| 13. Wetted perimeter, $p_w$ | | ft | | | | | | |
| 14. Hydraulic radius, r $r = \frac{a}{p_w}$ | Compute r | ft | | | | | | |
| 15. Channel slope, s | | ft/ft | | | | | | |
| 16. Manning's roughness coeff., n | | | | | | | | |
| 17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ | Compute V | ft/s | | | | | | |
| 18. Flow length, L | | ft | | | | | | |
| 19. $T_t = \frac{L}{3600\ V}$ | Compute $T_t$ | hr | | + | | = | 0.000 | |
| 20. Watershed or subarea $T_c$ or $T_t$ (add $T_t$ in steps 6, 11, 19) | | | | | | | 0.110 | hr |

**Use Tc= 7 min**

| Drainage Area ID | **EX-1** |
|---|---|

## Composite Curve Number Calculations

### TR-55 Reference Table

*Abbreviated TR-55 Table 2-2a Runoff Curve Numbers for Urban Areas*

| Cover Description | Curve Numbers for Hydrologic Soil Group (HSG) | | | |
|---|---|---|---|---|
| Fully Developed Urban Areas | A | B | C | D |
| Pervious Area | | | | |
| Open Space - Lawns, Parks, and Cemeteries | 68 | 79 | 86 | 89 |
| Woods and Forest | 30 | 55 | 70 | 77 |
| Slectively Cleared Woods and Forest | 43 | 65 | 76 | 82 |
| Impervious Area | | | | |
| Paved Areas and Roofs | 98 | 98 | 98 | 98 |
| Gravel Roads | 76 | 85 | 89 | 91 |
| Dirt Roads | 72 | 82 | 87 | 89 |
| Developing Urban Areas | | | | |
| Newly Graded Pervious Areas | 77 | 86 | 91 | 94 |

### Composite Runoff Curve Number Calculation

$$\text{Composite CN} = \frac{\sum_{i=1}^{n} CN_i \times A_i}{\sum_{i=1}^{n} A_i}$$

*n = Number of Distinct Cover Types in the Drainage Area*

| Cover Description | HSG | CN | Area ($ft^2$) | CN × A |
|---|---|---|---|---|
| Newly Graded Pervious Areas | B | 86 | 13,379 | 1,150,594 |
| Paved Areas and Roofs | B | 98 | 2,082 | 204,036 |
| | | | | 0 |
| | | | | 0 |
| | | | | 0 |
| | | Total | 15,461 | 1,354,630 |

| *Composite CN* = | 88 |
|---|---|

| | | | |
|---|---|---|---|
| EVERGREEN WALK | BY | HES | |
| | DATE | 3/12/2021 | LANGAN PROJ. NUMBER: 140222801 |
| SOUTH WINDSOR, CT | CKD | JEL | |
| | DATE | 3/12/2021 | |

| Drainage Area ID | **EX-2** |
|---|---|

## Composite Curve Number Calculations

### TR-55 Reference Table

*Abbreviated TR-55 Table 2-2a Runoff Curve Numbers for Urban Areas*

| Cover Description | Curve Numbers for Hydrologic Soil Group (HSG) | | | |
|---|---|---|---|---|
| Fully Developed Urban Areas | A | B | C | D |
| Pervious Area | | | | |
| Open Space - Lawns, Parks, and Cemeteries | 68 | 79 | 86 | 89 |
| Woods and Forest | 30 | 55 | 70 | 77 |
| Slectively Cleared Woods and Forest | 43 | 65 | 76 | 82 |
| Impervious Area | | | | |
| Paved Areas and Roofs | 98 | 98 | 98 | 98 |
| Gravel Roads | 76 | 85 | 89 | 91 |
| Dirt Roads | 72 | 82 | 87 | 89 |
| Developing Urban Areas | | | | |
| Newly Graded Pervious Areas | 77 | 86 | 91 | 94 |

### Composite Runoff Curve Number Calculation

$$\text{Composite } CN = \frac{\sum_{i=1}^{n} CN_i \times A_i}{\sum_{i=1}^{n} A_i}$$

*n = Number of Distinct Cover Types in the Drainage Area*

| Cover Description | HSG | CN | Area ($ft^2$) | CN × A |
|---|---|---|---|---|
| Newly Graded Pervious Areas | B | 86 | 7,171 | 616,727 |
| Paved Areas and Roofs | B | 98 | 50,664 | 4,965,081 |
| | | | | 0 |
| | | | | 0 |
| | | | | 0 |
| | | Total | 57,835 | 5,581,807 |

| *Composite CN* = | 97 |
|---|---|

EVERGREEN WALK

SOUTH WINDSOR, CT

BY HES
DATE 3/12/2021
CKD JEL
DATE 3/12/2021

LANGAN PROJ. NUMBER: 140222801

| Drainage Area ID | **EX-3** |
|---|---|

## Composite Curve Number Calculations

### TR-55 Reference Table

*Abbreviated TR-55 Table 2-2a Runoff Curve Numbers for Urban Areas*

| Cover Description | Curve Numbers for Hydrologic Soil Group (HSG) | | | |
|---|---|---|---|---|
| Fully Developed Urban Areas | A | B | C | D |
| Pervious Area | | | | |
| Open Space - Lawns, Parks, and Cemeteries | 68 | 79 | 86 | 89 |
| Woods and Forest | 30 | 55 | 70 | 77 |
| Slectively Cleared Woods and Forest | 43 | 65 | 76 | 82 |
| Impervious Area | | | | |
| Paved Areas and Roofs | 98 | 98 | 98 | 98 |
| Gravel Roads | 76 | 85 | 89 | 91 |
| Dirt Roads | 72 | 82 | 87 | 89 |
| Developing Urban Areas | | | | |
| Newly Graded Pervious Areas | 77 | 86 | 91 | 94 |

### Composite Runoff Curve Number Calculation

$$\text{Composite } CN = \frac{\sum_{i=1}^{n} CN_i \times A_i}{\sum_{i=1}^{n} A_i}$$

*n = Number of Distinct Cover Types in the Drainage Area*

| Cover Description | HSG | CN | Area ($ft^2$) | CN × A |
|---|---|---|---|---|
| Newly Graded Pervious Areas | B | 86 | 33,956 | 2,920,216 |
| Newly Graded Pervious Areas | C | 91 | 8,939 | 813,486 |
| Paved Areas and Roofs | B | 98 | 195,305 | 19,139,890 |
| | | | | 0 |
| | | | | 0 |
| | | Total | 238,200 | 22,873,592 |

| *Composite CN* = | 96 |
|---|---|

EVERGREEN WALK

SOUTH WINDSOR, CT

BY HES
DATE 3/12/2021
CKD JEL
DATE 3/12/2021

LANGAN PROJ. NUMBER: 140222801

| Drainage Area ID | **EX-4** |
|---|---|

## Composite Curve Number Calculations

### TR-55 Reference Table

*Abbreviated TR-55 Table 2-2a Runoff Curve Numbers for Urban Areas*

| Cover Description | Curve Numbers for Hydrologic Soil Group (HSG) | | | |
|---|---|---|---|---|
| Fully Developed Urban Areas | A | B | C | D |
| Pervious Area | | | | |
| Open Space - Lawns, Parks, and Cemeteries | 68 | 79 | 86 | 89 |
| Woods and Forest | 30 | 55 | 70 | 77 |
| Slectively Cleared Woods and Forest | 43 | 65 | 76 | 82 |
| Impervious Area | | | | |
| Paved Areas and Roofs | 98 | 98 | 98 | 98 |
| Gravel Roads | 76 | 85 | 89 | 91 |
| Dirt Roads | 72 | 82 | 87 | 89 |
| Developing Urban Areas | | | | |
| Newly Graded Pervious Areas | 77 | 86 | 91 | 94 |

### Composite Runoff Curve Number Calculation

$$\text{Composite CN} = \frac{\sum_{i=1}^{n} CN_i \times A_i}{\sum_{i=1}^{n} A_i}$$

*n = Number of Distinct Cover Types in the Drainage Area*

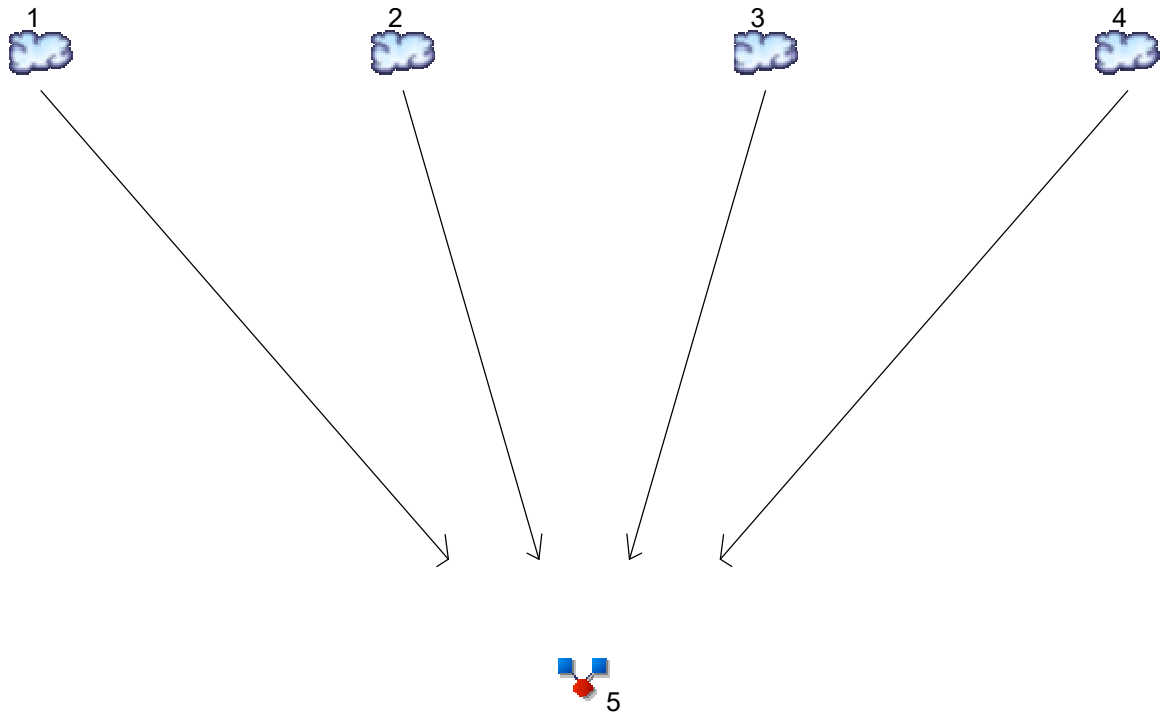
| Cover Description | HSG | CN | Area ($ft^2$) | CN × A |
|---|---|---|---|---|
| Newly Graded Pervious Areas | B | 86 | 6,954 | 598,044 |
| | | | | 0 |
| | | | | 0 |
| | | | | 0 |
| | | | | 0 |
| | | Total | 6,954 | 598,044 |

| *Composite CN* = | 86 |
|---|---|

| | | | |
|---|---|---|---|
| EVERGREEN WALK | BY | HES | |
| | DATE | 3/12/2021 | LANGAN PROJ. NUMBER: 140222801 |
| SOUTH WINDSOR, CT | CKD | JEL | |
| | DATE | 3/12/2021 | |

# Watershed Model Schematic






## Legend

| Hyd. | Origin | Description |
|---|---|---|
| 1 | SCS Runoff | EX-1 |
| 2 | SCS Runoff | EX-2 |
| 3 | SCS Runoff | EX-3 |
| 4 | SCS Runoff | EX-4 |
| 5 | Combine | Combined Existing Condition |

# 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 | ------ | ------- | 0.811 | ------- | ------- | 1.485 | 1.906 | ------- | 2.556 | EX-1 |
| 2 | SCS Runoff | ------ | ------- | 4.053 | ------- | ------- | 6.510 | 8.029 | ------- | 10.38 | EX-2 |
| 3 | SCS Runoff | ------ | ------- | 16.42 | ------- | ------- | 26.67 | 32.99 | ------- | 42.76 | EX-3 |
| 4 | SCS Runoff | ------ | ------- | 0.341 | ------- | ------- | 0.647 | 0.840 | ------- | 1.138 | EX-4 |
| 5 | Combine | 1, 2, 3, 4 | ------- | 21.63 | ------- | ------- | 35.31 | 43.76 | ------- | 56.84 | Combined Existing Condition |

# Hydrograph Summary Report

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

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SCS Runoff | 0.811 | 1 | 725 | 2,511 | ------ | ------ | ------ | EX-1 |
| 2 | SCS Runoff | 4.053 | 1 | 724 | 13,674 | ------ | ------ | ------ | EX-2 |
| 3 | SCS Runoff | 16.42 | 1 | 724 | 54,377 | ------ | ------ | ------ | EX-3 |
| 4 | SCS Runoff | 0.341 | 1 | 725 | 1,052 | ------ | ------ | ------ | EX-4 |
| 5 | Combine | 21.63 | 1 | 724 | 71,614 | 1, 2, 3, 4 | ------ | ------ | Combined Existing Condition |

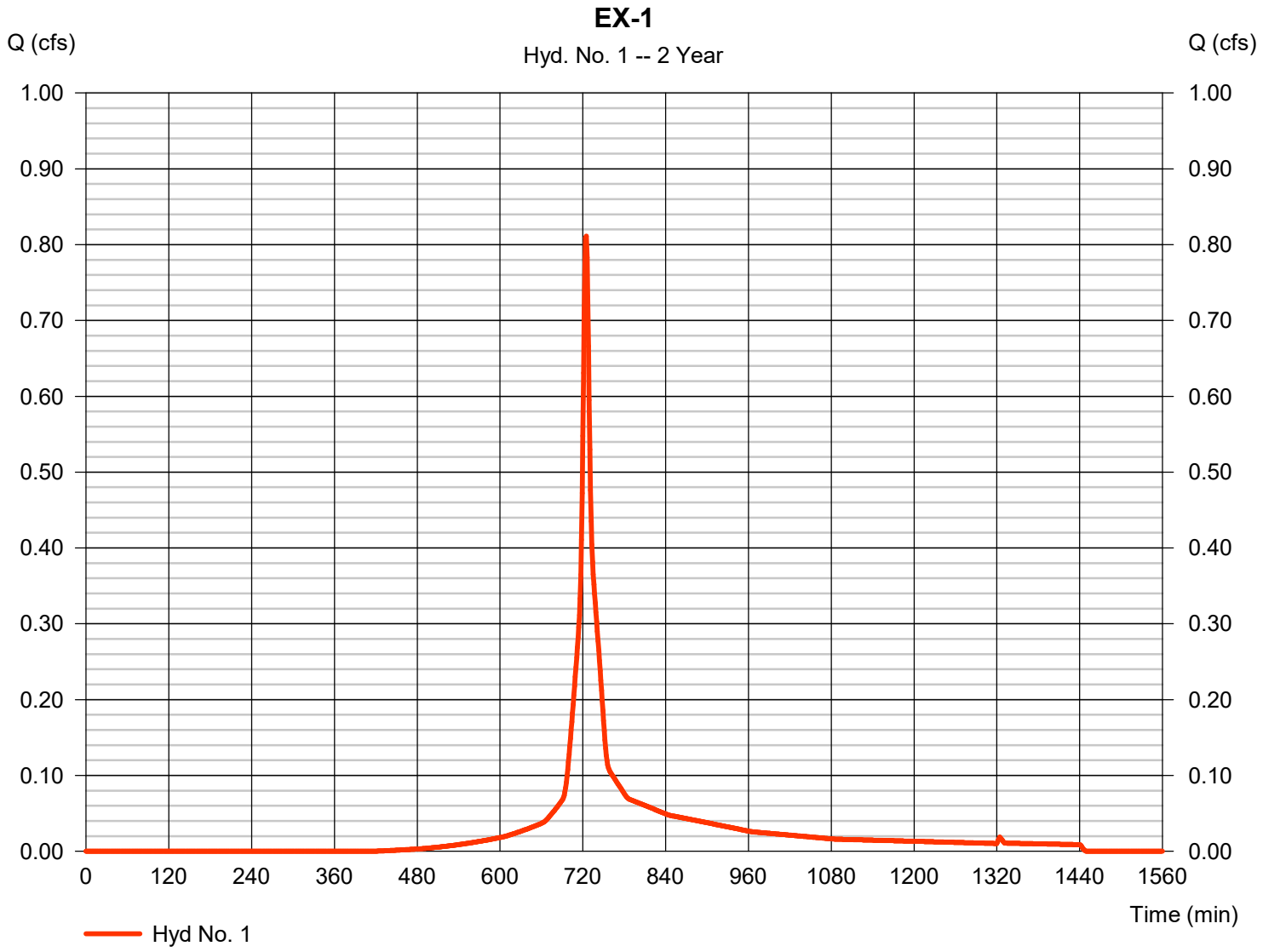
# Hydrograph Report



## Hyd. No. 1

EX-1

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 0.811 cfs |
| Storm frequency | = | 2 yrs | Time to peak | = | 725 min |
| Time interval | = | 1 min | Hyd. volume | = | 2,511 cuft |
| Drainage area | = | 0.350 ac | Curve number | = | 88 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 3.11 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



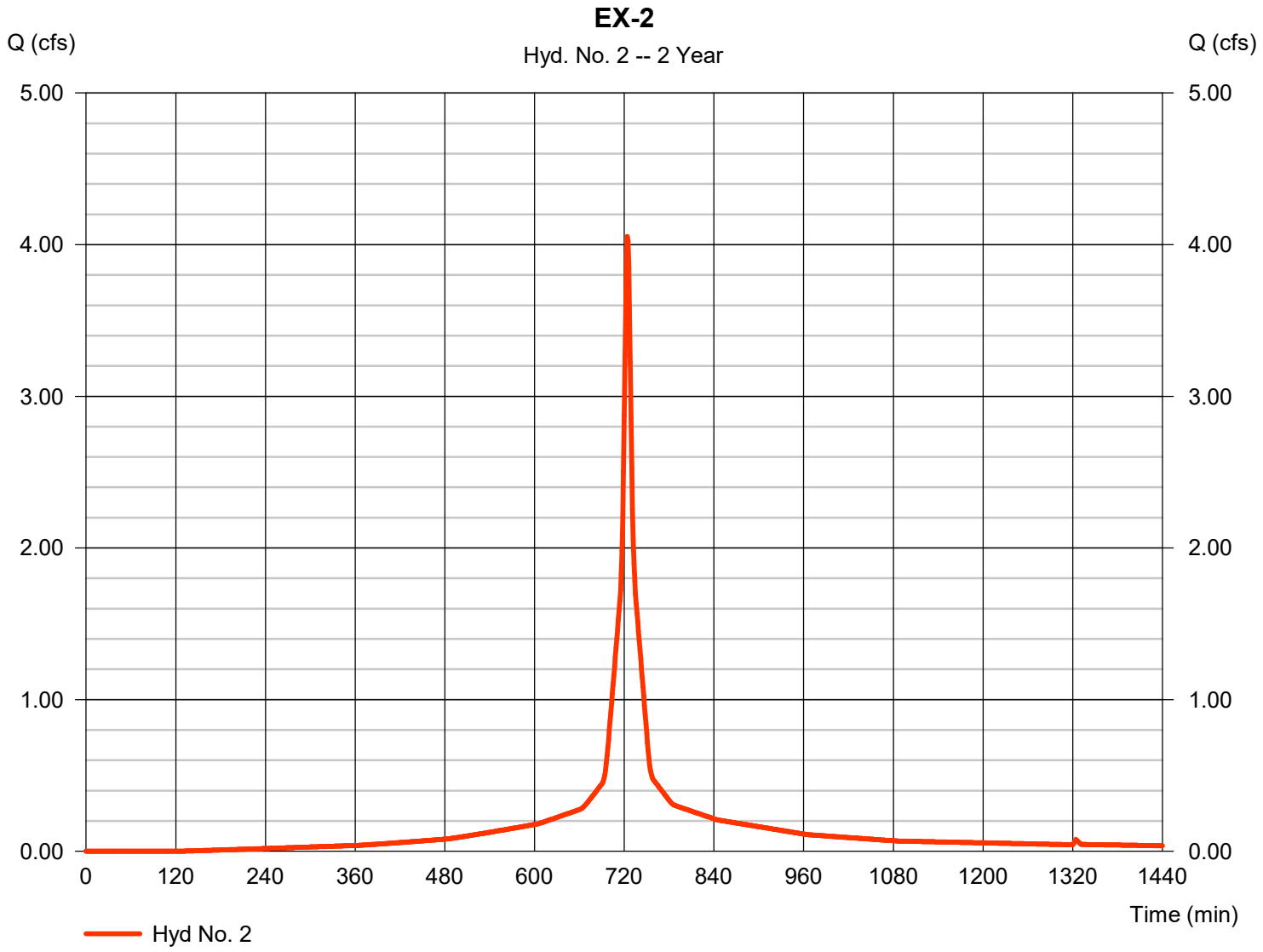
# Hydrograph Report



## Hyd. No. 2

EX-2

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 4.053 cfs |
| Storm frequency | = | 2 yrs | Time to peak | = | 724 min |
| Time interval | = | 1 min | Hyd. volume | = | 13,674 cuft |
| Drainage area | = | 1.320 ac | Curve number | = | 97 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 3.11 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



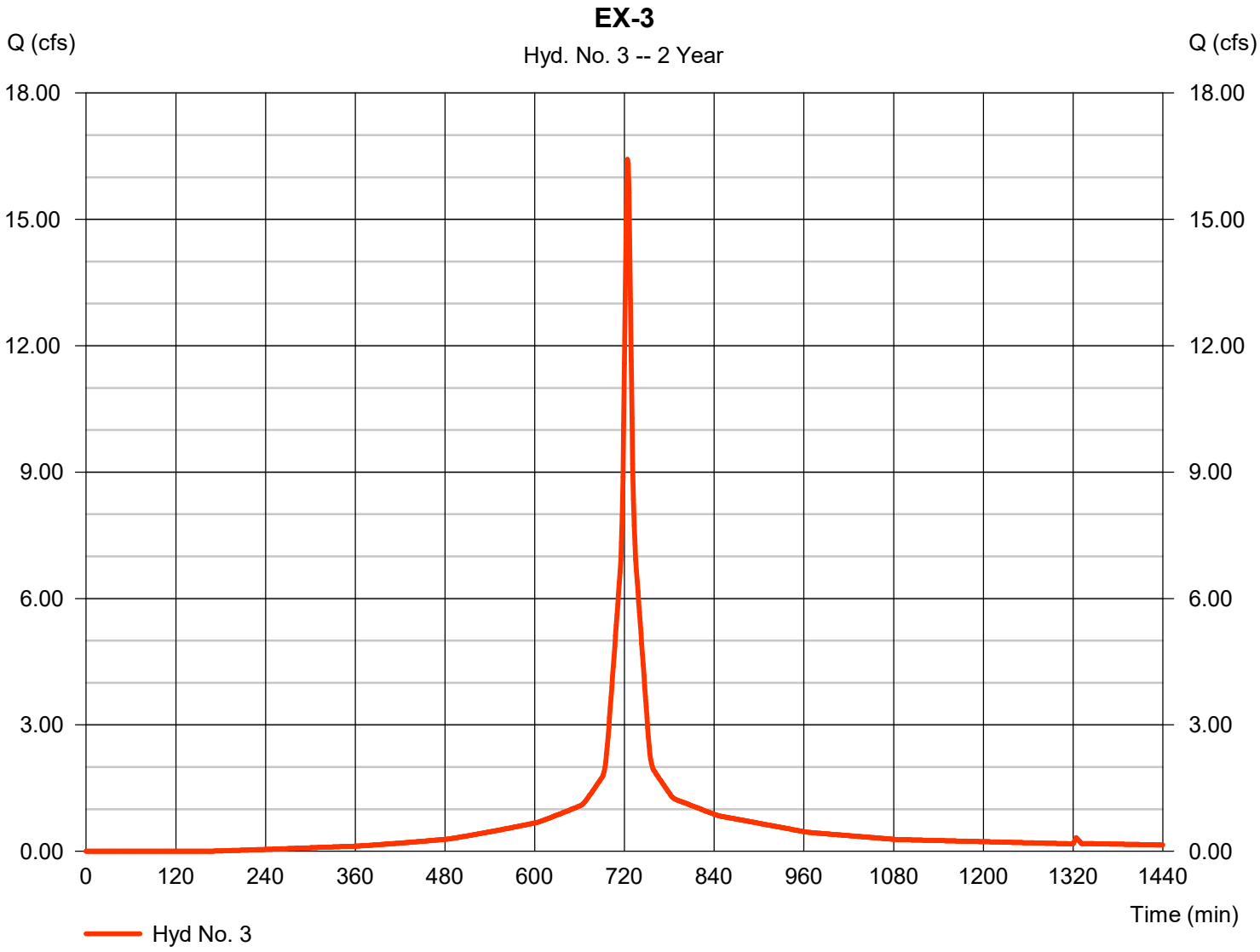
# Hydrograph Report



## Hyd. No. 3

EX-3

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 16.42 cfs |
| Storm frequency | = | 2 yrs | Time to peak | = | 724 min |
| Time interval | = | 1 min | Hyd. volume | = | 54,377 cuft |
| Drainage area | = | 5.460 ac | Curve number | = | 96 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 6.00 min |
| Total precip. | = | 3.11 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



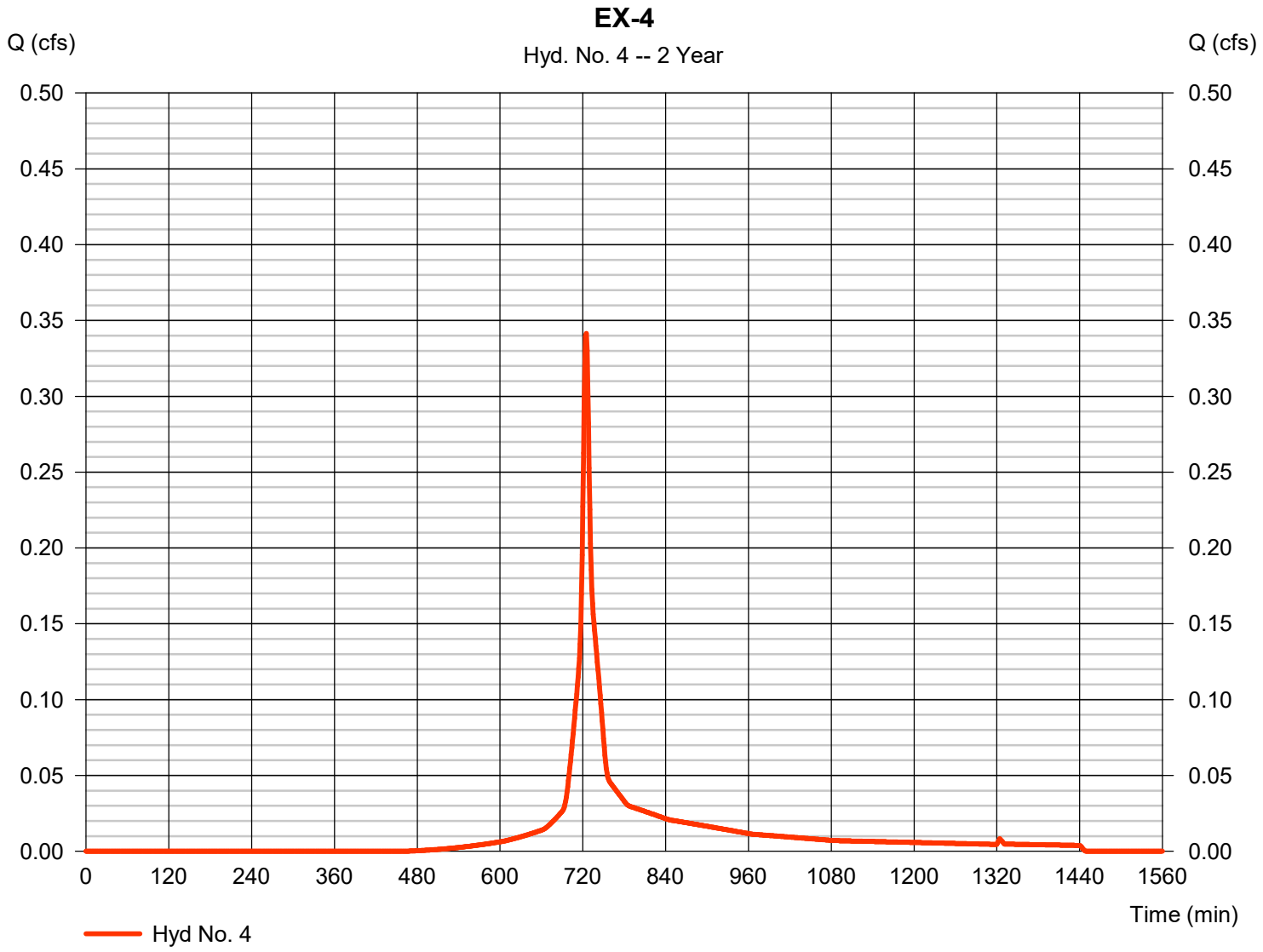
# Hydrograph Report



## Hyd. No. 4

EX-4

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 0.341 cfs |
| Storm frequency | = | 2 yrs | Time to peak | = | 725 min |
| Time interval | = | 1 min | Hyd. volume | = | 1,052 cuft |
| Drainage area | = | 0.160 ac | Curve number | = | 86 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 3.11 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



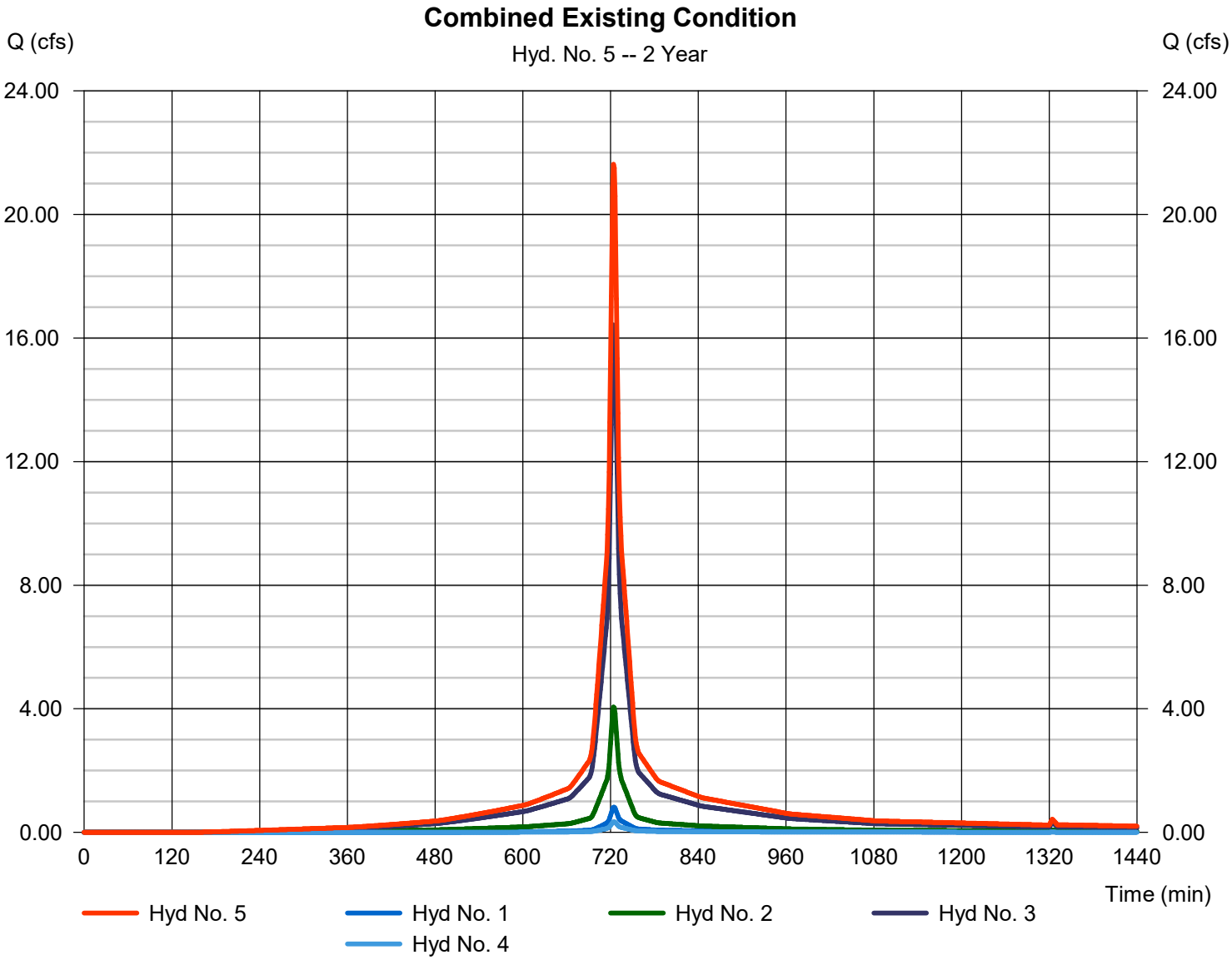
# Hydrograph Report



## Hyd. No. 5

Combined Existing Condition

| | | | |
|---|---|---|---|
| Hydrograph type | = Combine | Peak discharge | = 21.63 cfs |
| Storm frequency | = 2 yrs | Time to peak | = 724 min |
| Time interval | = 1 min | Hyd. volume | = 71,614 cuft |
| Inflow hyds. | = 1, 2, 3, 4 | Contrib. drain. area | = 7.290 ac |



# Hydrograph Summary Report

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

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SCS Runoff | 1.485 | 1 | 724 | 4,695 | ------ | ------ | ------ | EX-1 |
| 2 | SCS Runoff | 6.510 | 1 | 724 | 22,520 | ------ | ------ | ------ | EX-2 |
| 3 | SCS Runoff | 26.67 | 1 | 724 | 90,814 | ------ | ------ | ------ | EX-3 |
| 4 | SCS Runoff | 0.647 | 1 | 724 | 2,026 | ------ | ------ | ------ | EX-4 |
| 5 | Combine | 35.31 | 1 | 724 | 120,055 | 1, 2, 3, 4 | ------ | ------ | Combined Existing Condition |

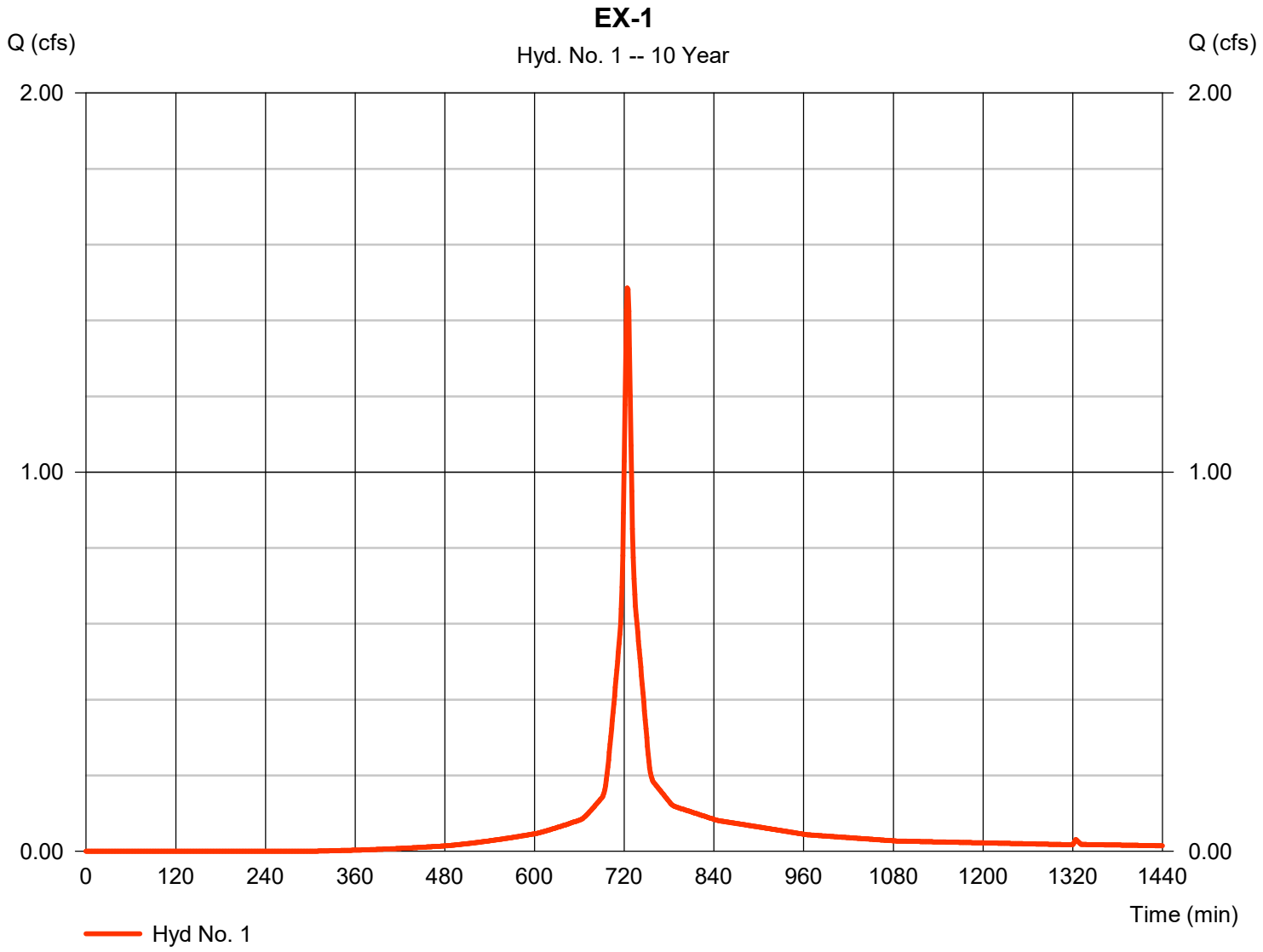
# Hydrograph Report



## Hyd. No. 1

EX-1

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 1.485 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 724 min |
| Time interval | = | 1 min | Hyd. volume | = | 4,695 cuft |
| Drainage area | = | 0.350 ac | Curve number | = | 88 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 4.91 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



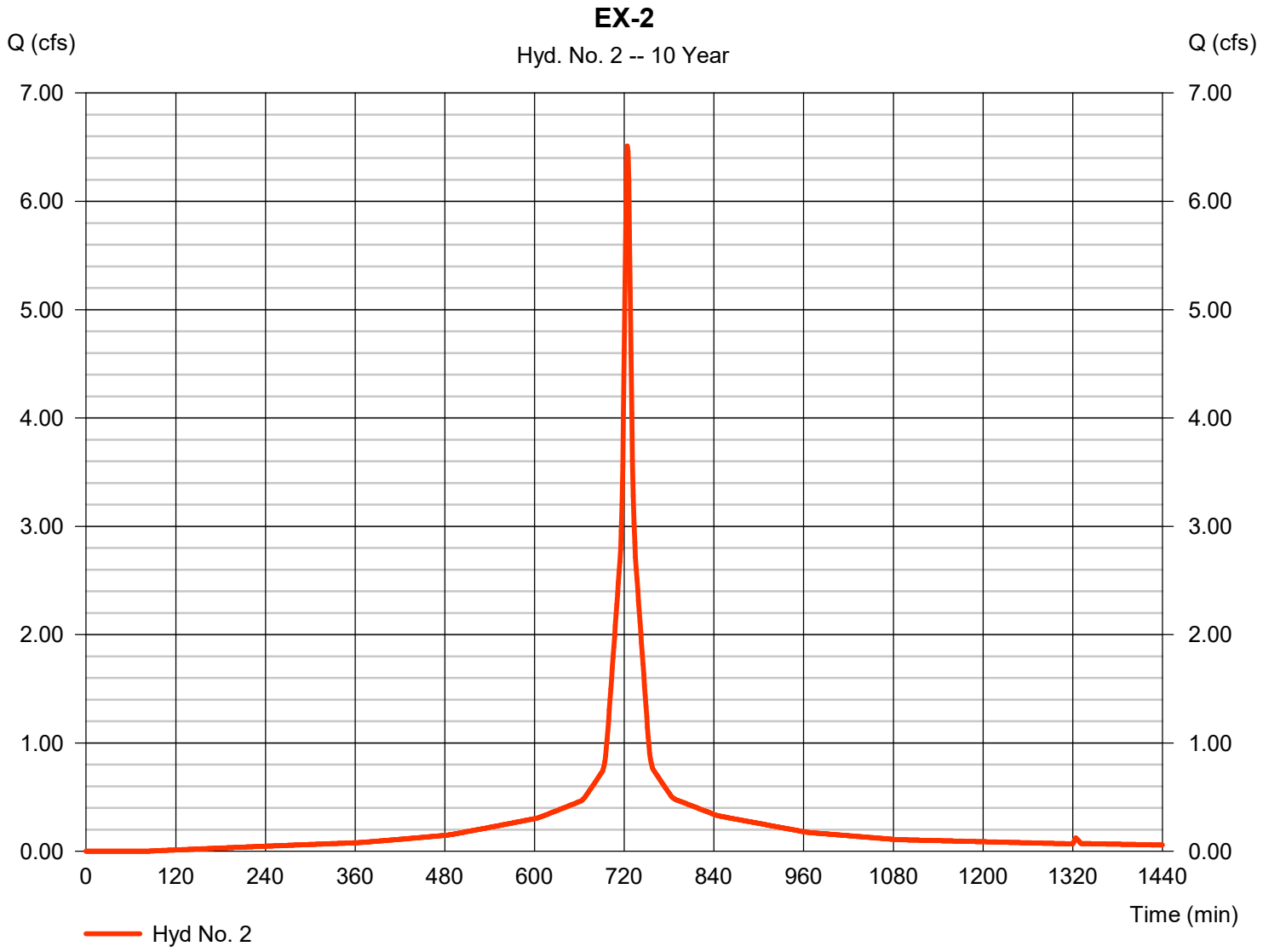
# Hydrograph Report



## Hyd. No. 2

EX-2

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 6.510 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 724 min |
| Time interval | = | 1 min | Hyd. volume | = | 22,520 cuft |
| Drainage area | = | 1.320 ac | Curve number | = | 97 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 4.91 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



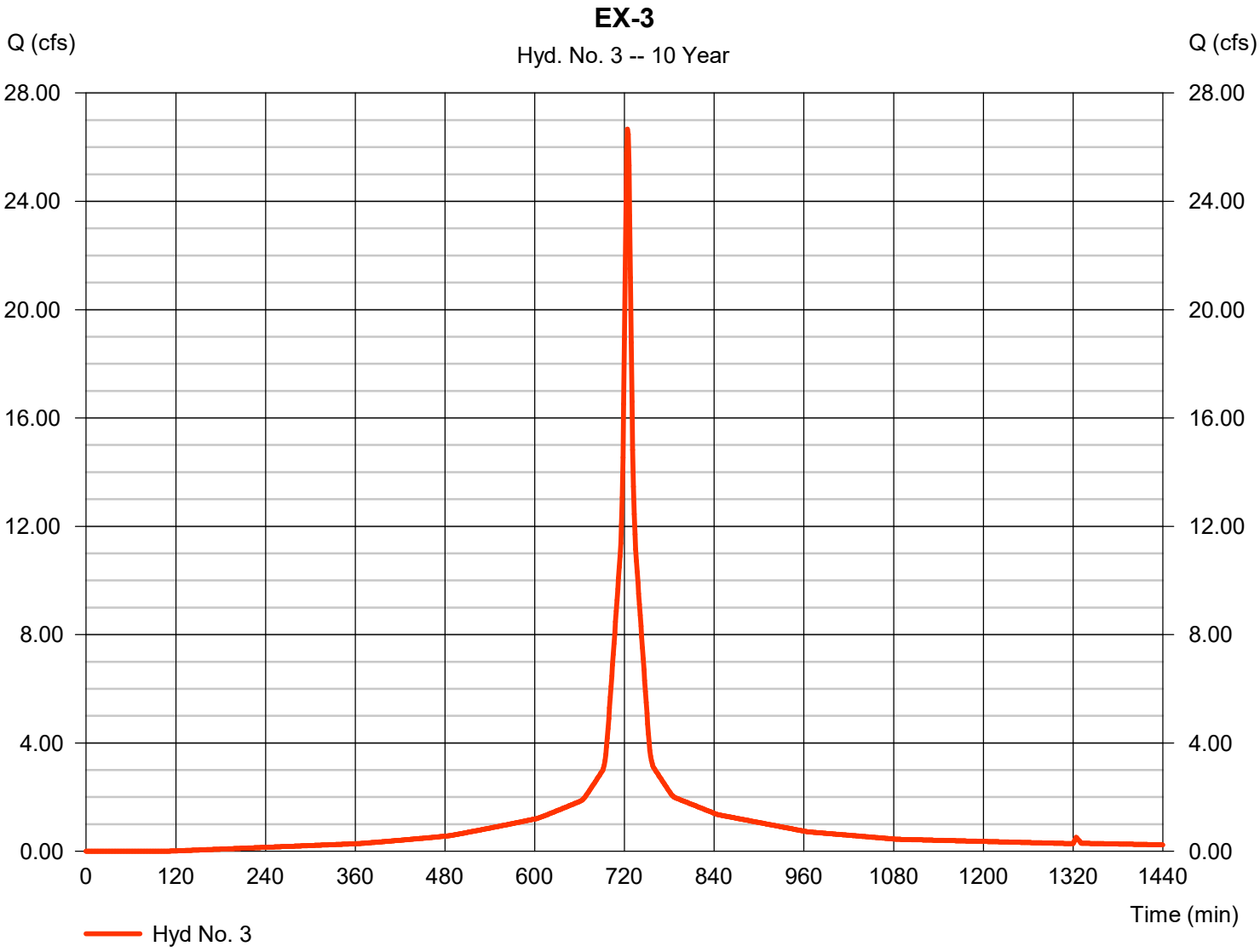
# Hydrograph Report



## Hyd. No. 3

EX-3

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 26.67 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 724 min |
| Time interval | = | 1 min | Hyd. volume | = | 90,814 cuft |
| Drainage area | = | 5.460 ac | Curve number | = | 96 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 6.00 min |
| Total precip. | = | 4.91 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



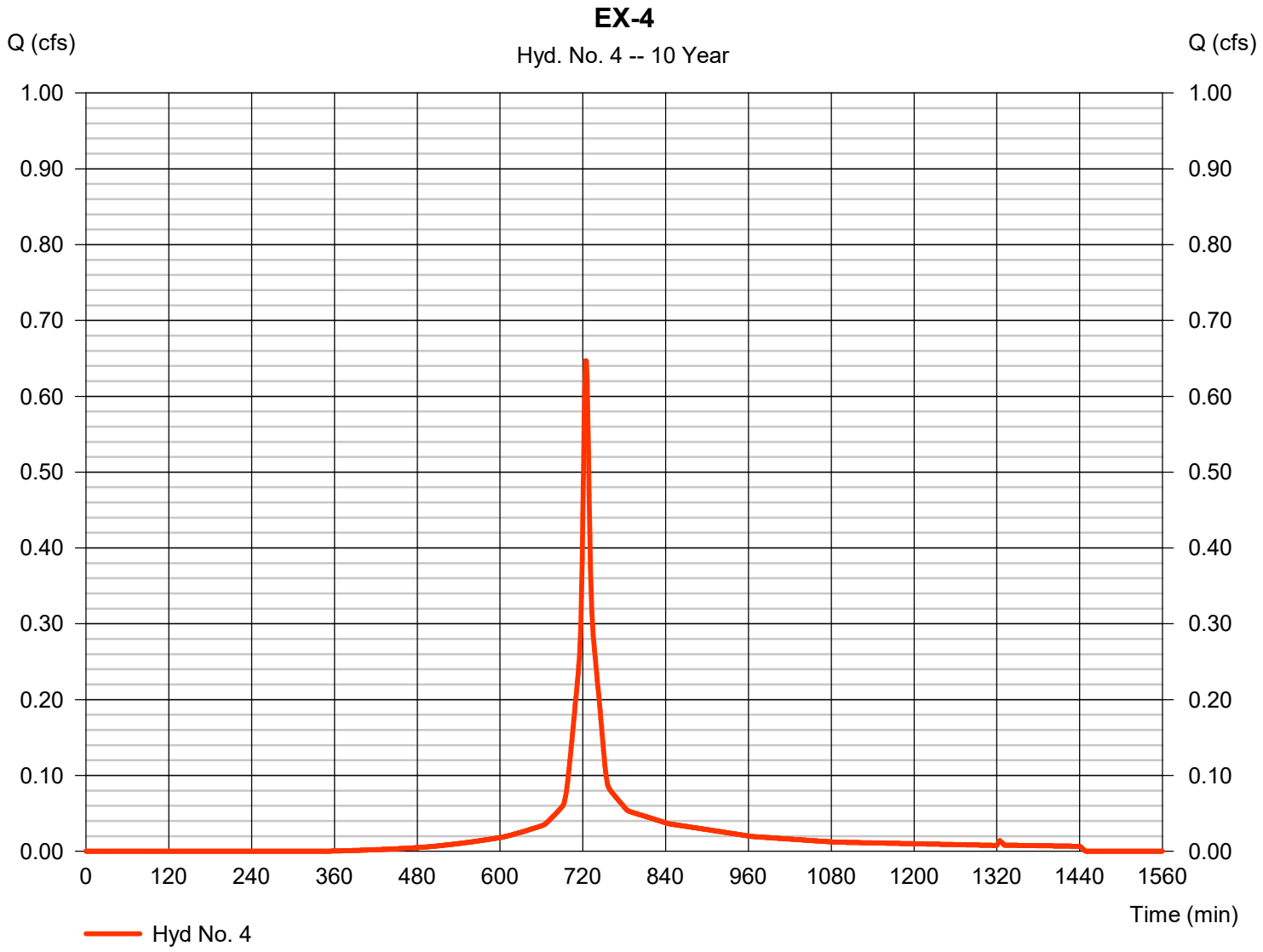
# Hydrograph Report



## Hyd. No. 4

EX-4

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 0.647 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 724 min |
| Time interval | = | 1 min | Hyd. volume | = | 2,026 cuft |
| Drainage area | = | 0.160 ac | Curve number | = | 86 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 4.91 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



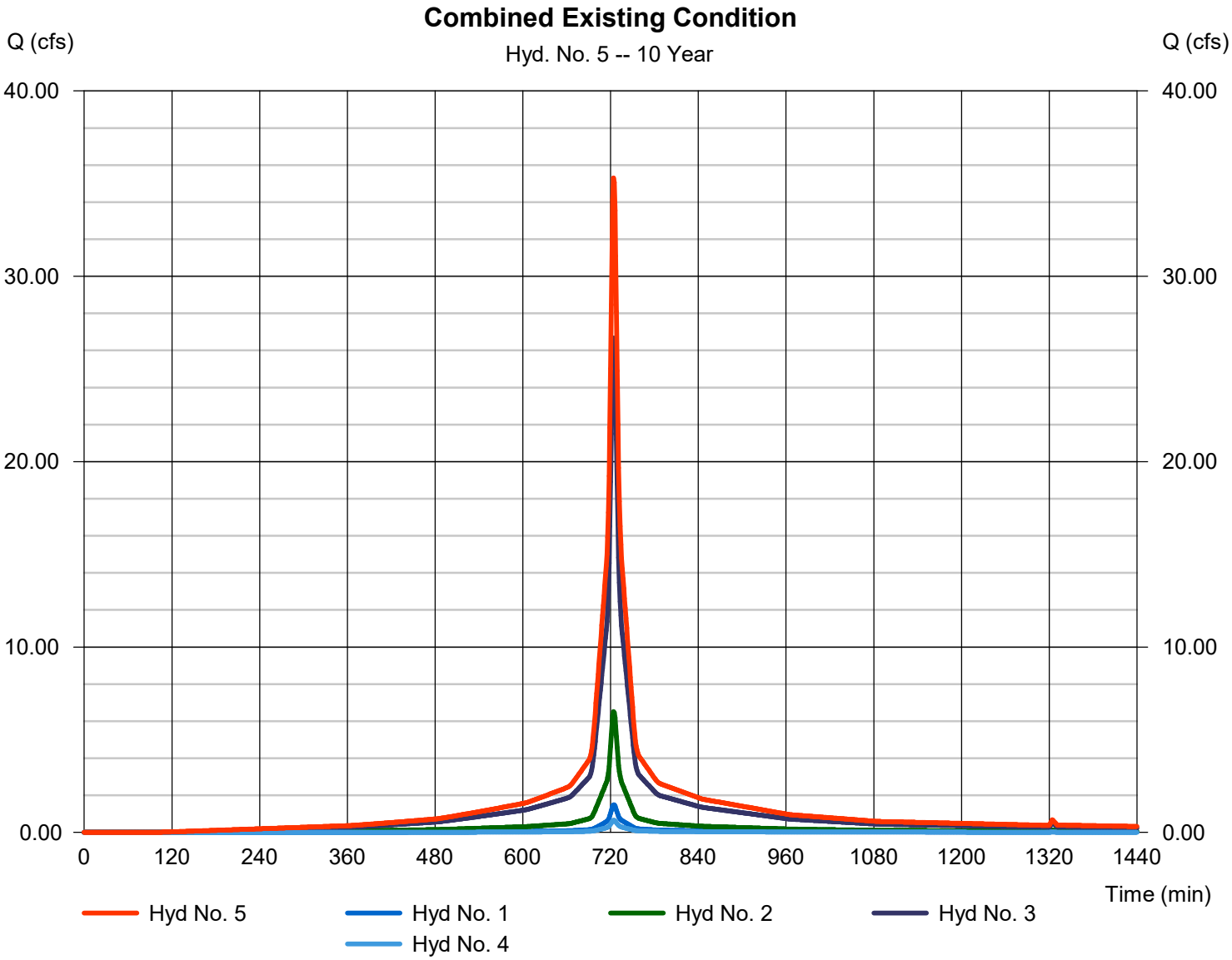
# Hydrograph Report



## Hyd. No. 5

Combined Existing Condition

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Combine | Peak discharge | = | 35.31 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 724 min |
| Time interval | = | 1 min | Hyd. volume | = | 120,055 cuft |
| Inflow hyds. | = | 1, 2, 3, 4 | Contrib. drain. area | = | 7.290 ac |



# Hydrograph Summary Report

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

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SCS Runoff | 1.906 | 1 | 724 | 6,099 | ------ | ------ | ------ | EX-1 |
| 2 | SCS Runoff | 8.029 | 1 | 724 | 28,038 | ------ | ------ | ------ | EX-2 |
| 3 | SCS Runoff | 32.99 | 1 | 724 | 113,586 | ------ | ------ | ------ | EX-3 |
| 4 | SCS Runoff | 0.840 | 1 | 724 | 2,658 | ------ | ------ | ------ | EX-4 |
| 5 | Combine | 43.76 | 1 | 724 | 150,381 | 1, 2, 3, 4 | ------ | ------ | Combined Existing Condition |

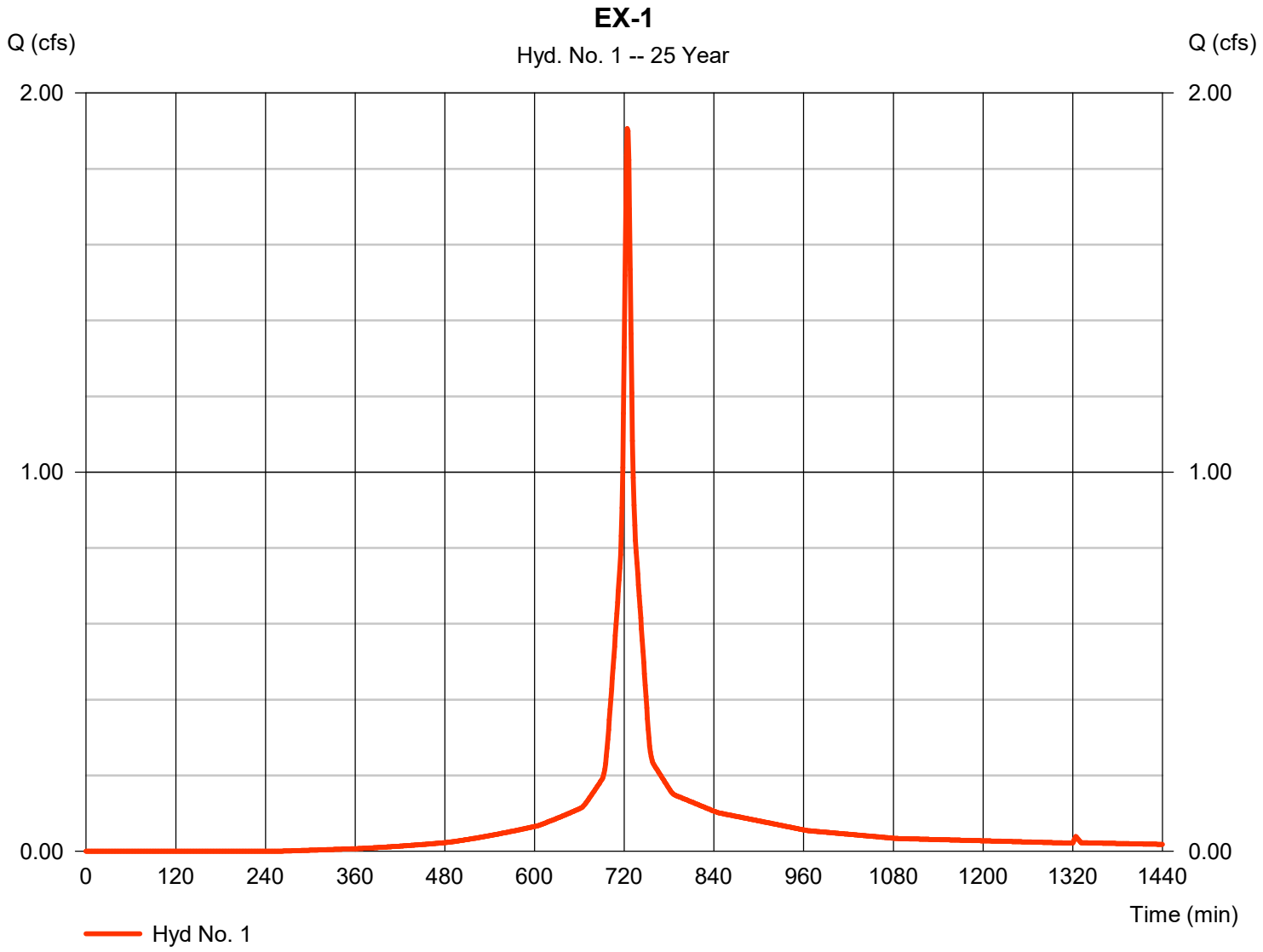
# Hydrograph Report



## Hyd. No. 1

EX-1

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 1.906 cfs |
| Storm frequency | = | 25 yrs | Time to peak | = | 724 min |
| Time interval | = | 1 min | Hyd. volume | = | 6,099 cuft |
| Drainage area | = | 0.350 ac | Curve number | = | 88 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 6.03 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



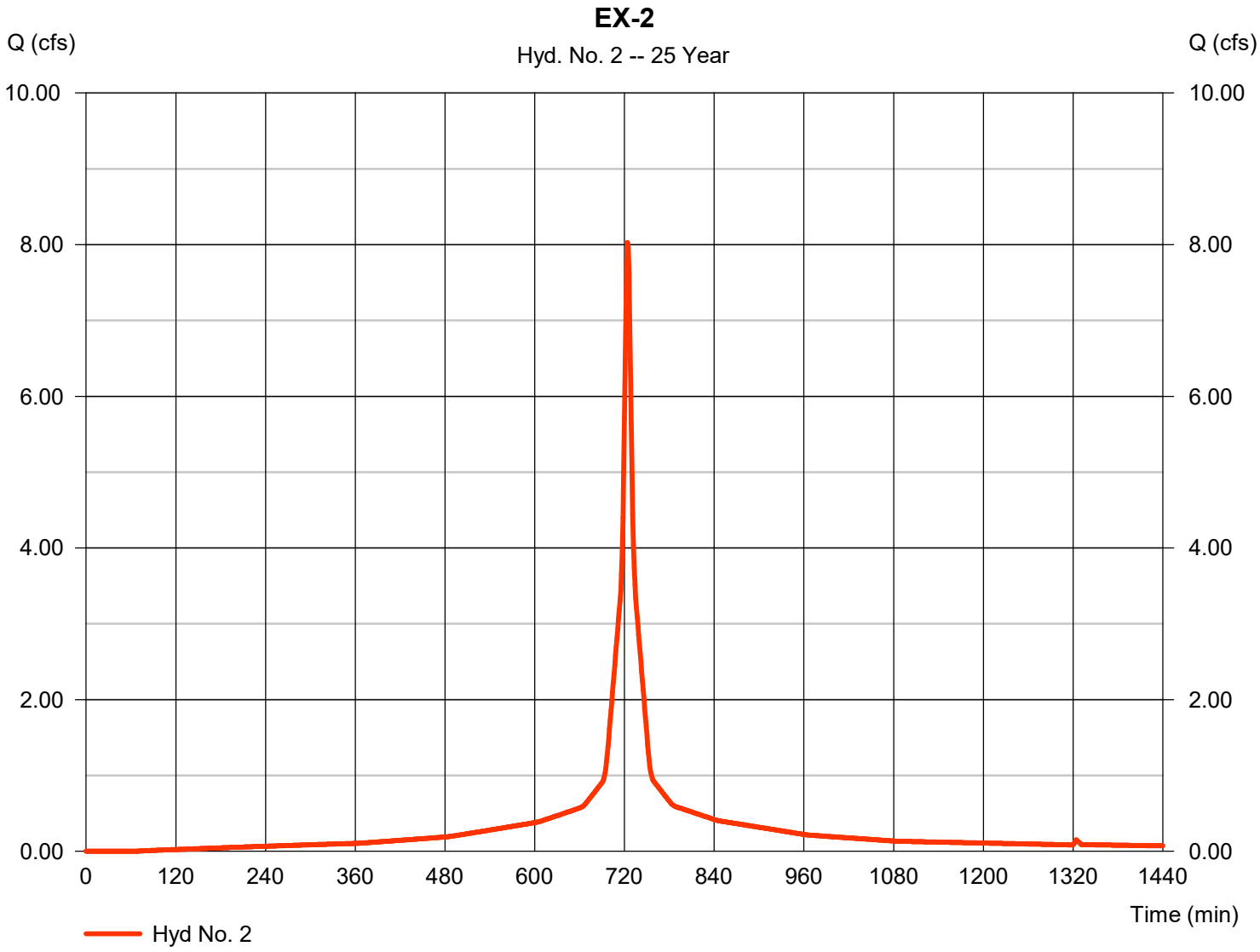
# Hydrograph Report



## Hyd. No. 2

EX-2

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 8.029 cfs |
| Storm frequency | = | 25 yrs | Time to peak | = | 724 min |
| Time interval | = | 1 min | Hyd. volume | = | 28,038 cuft |
| Drainage area | = | 1.320 ac | Curve number | = | 97 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 6.03 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



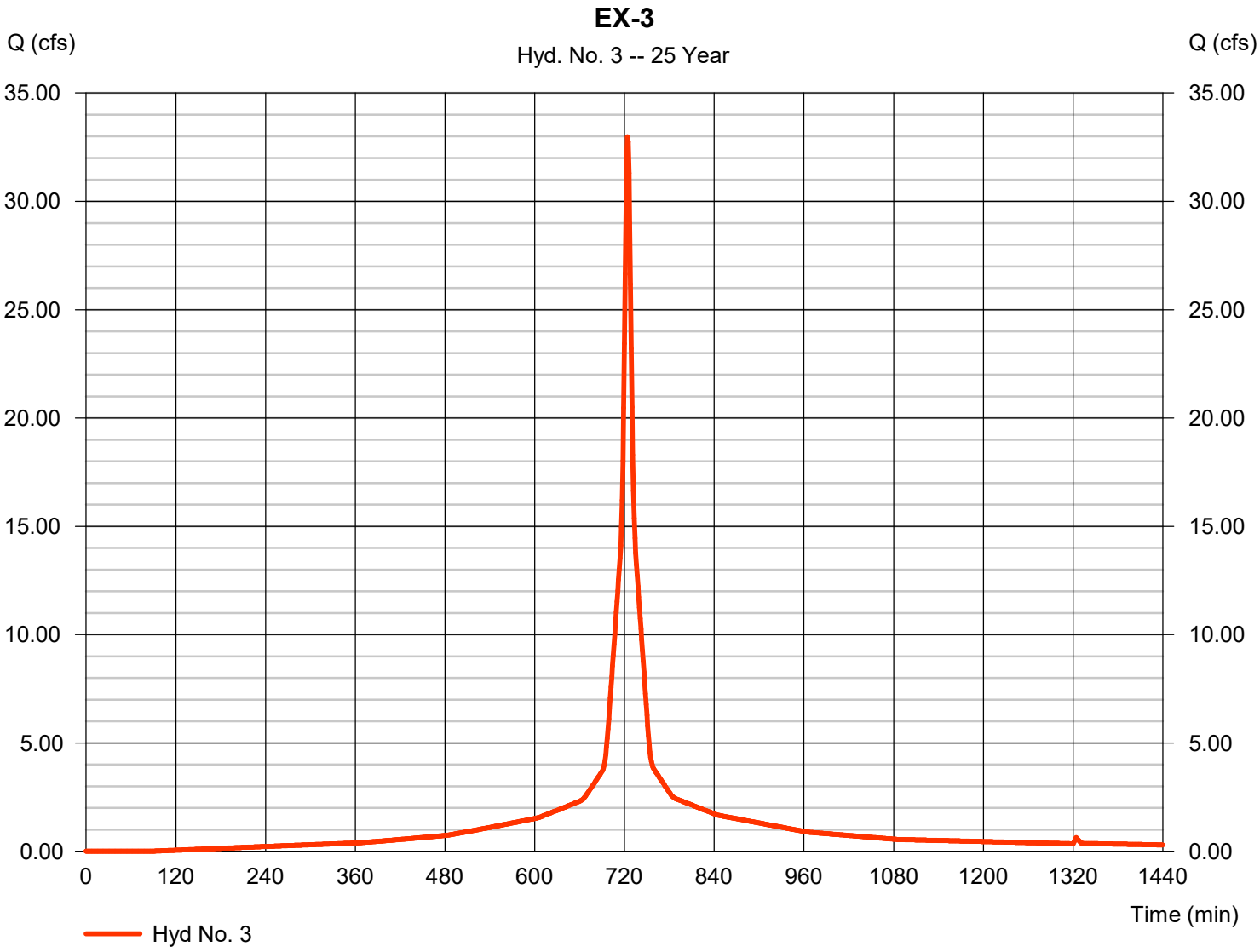
# Hydrograph Report



## Hyd. No. 3

EX-3

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 32.99 cfs |
| Storm frequency | = | 25 yrs | Time to peak | = | 724 min |
| Time interval | = | 1 min | Hyd. volume | = | 113,586 cuft |
| Drainage area | = | 5.460 ac | Curve number | = | 96 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 6.00 min |
| Total precip. | = | 6.03 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



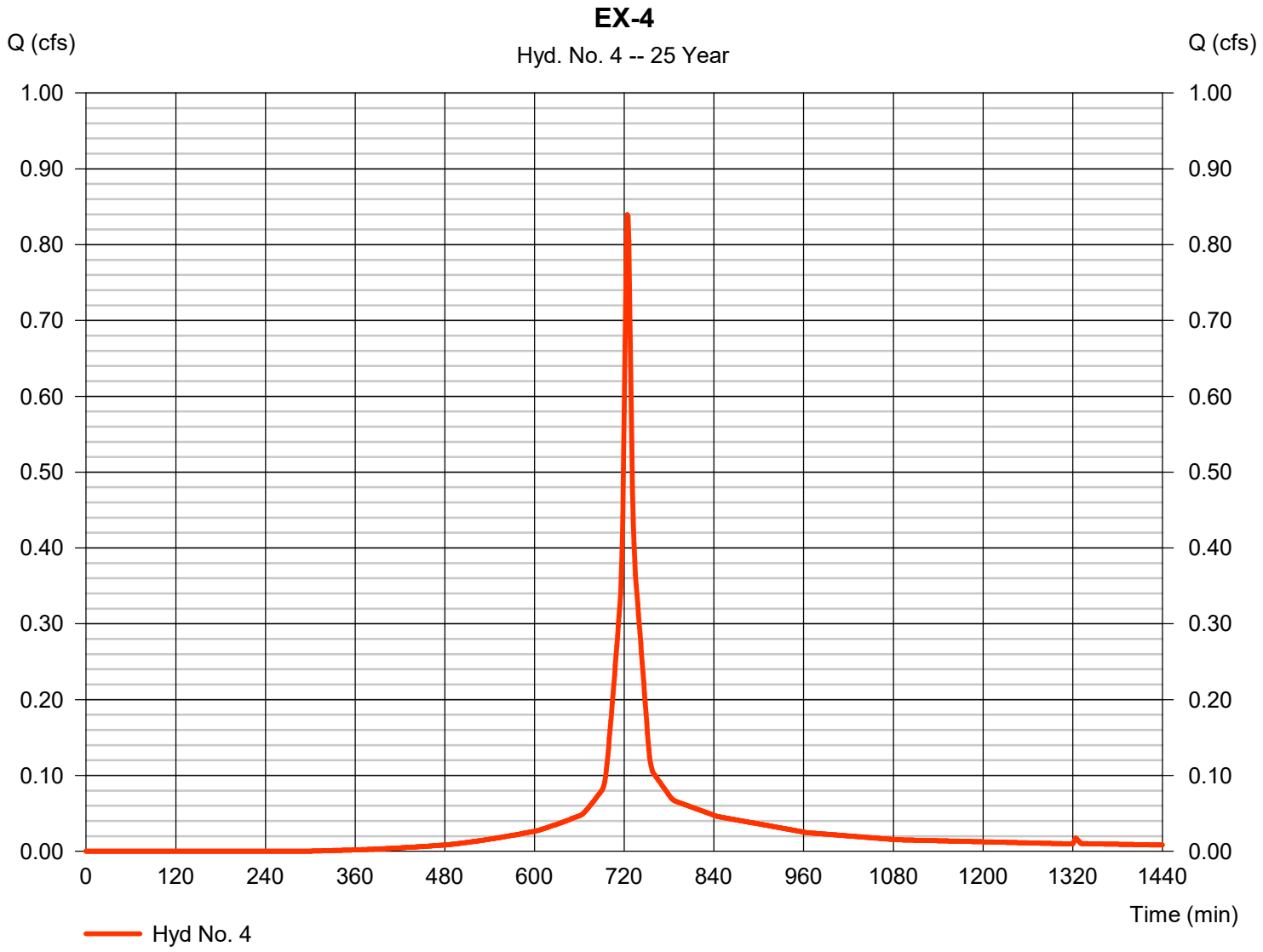
# Hydrograph Report



## Hyd. No. 4

EX-4

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 0.840 cfs |
| Storm frequency | = | 25 yrs | Time to peak | = | 724 min |
| Time interval | = | 1 min | Hyd. volume | = | 2,658 cuft |
| Drainage area | = | 0.160 ac | Curve number | = | 86 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 6.03 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



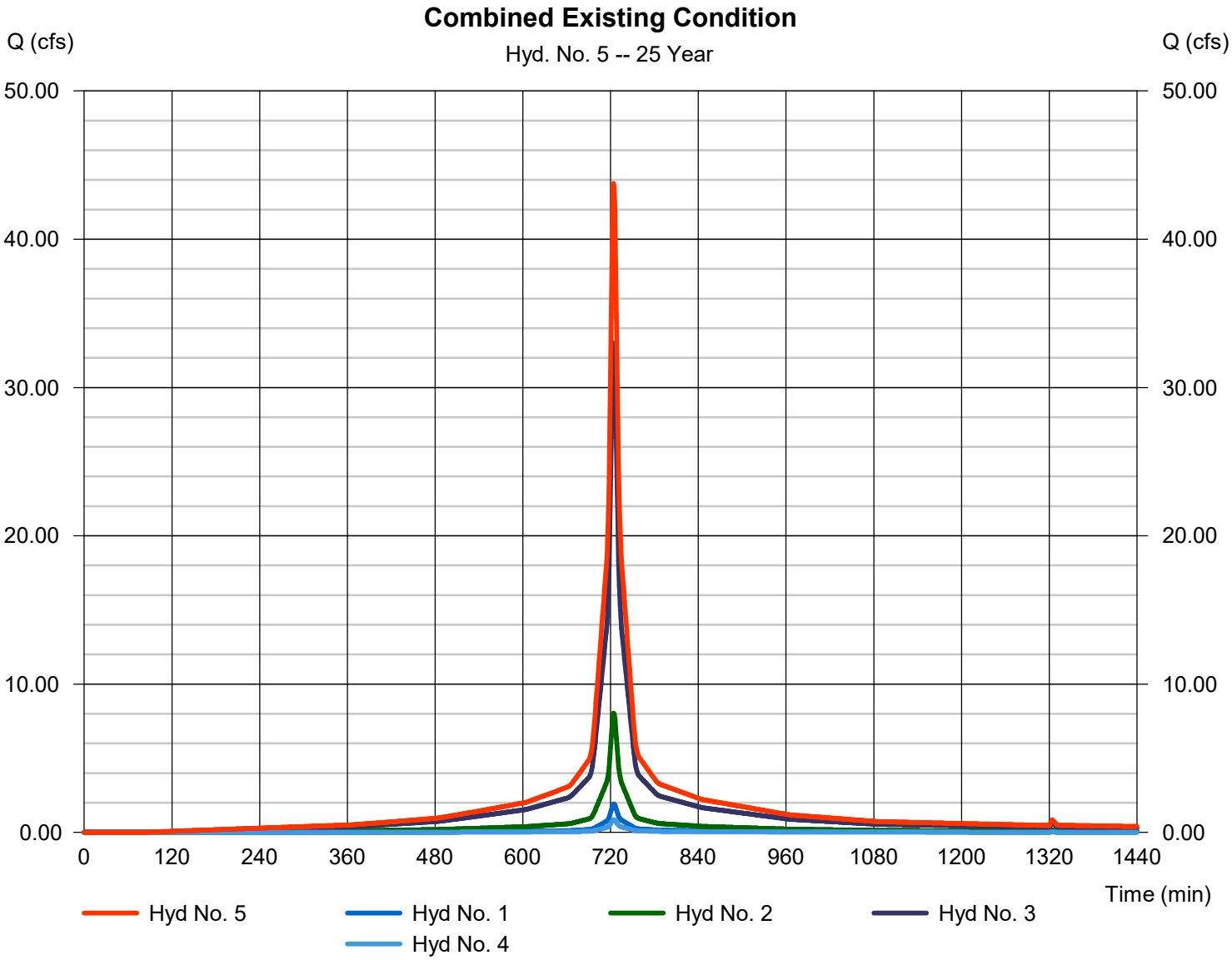
# Hydrograph Report



## Hyd. No. 5

Combined Existing Condition

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Combine | Peak discharge | = | 43.76 cfs |
| Storm frequency | = | 25 yrs | Time to peak | = | 724 min |
| Time interval | = | 1 min | Hyd. volume | = | 150,381 cuft |
| Inflow hyds. | = | 1, 2, 3, 4 | Contrib. drain. area | = | 7.290 ac |



# Hydrograph Summary Report

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

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SCS Runoff | 2.556 | 1 | 724 | 8,311 | ------ | ------ | ------ | EX-1 |
| 2 | SCS Runoff | 10.38 | 1 | 724 | 36,619 | ------ | ------ | ------ | EX-2 |
| 3 | SCS Runoff | 42.76 | 1 | 724 | 149,031 | ------ | ------ | ------ | EX-3 |
| 4 | SCS Runoff | 1.138 | 1 | 724 | 3,659 | ------ | ------ | ------ | EX-4 |
| 5 | Combine | 56.84 | 1 | 724 | 197,620 | 1, 2, 3, 4 | ------ | ------ | Combined Existing Condition |

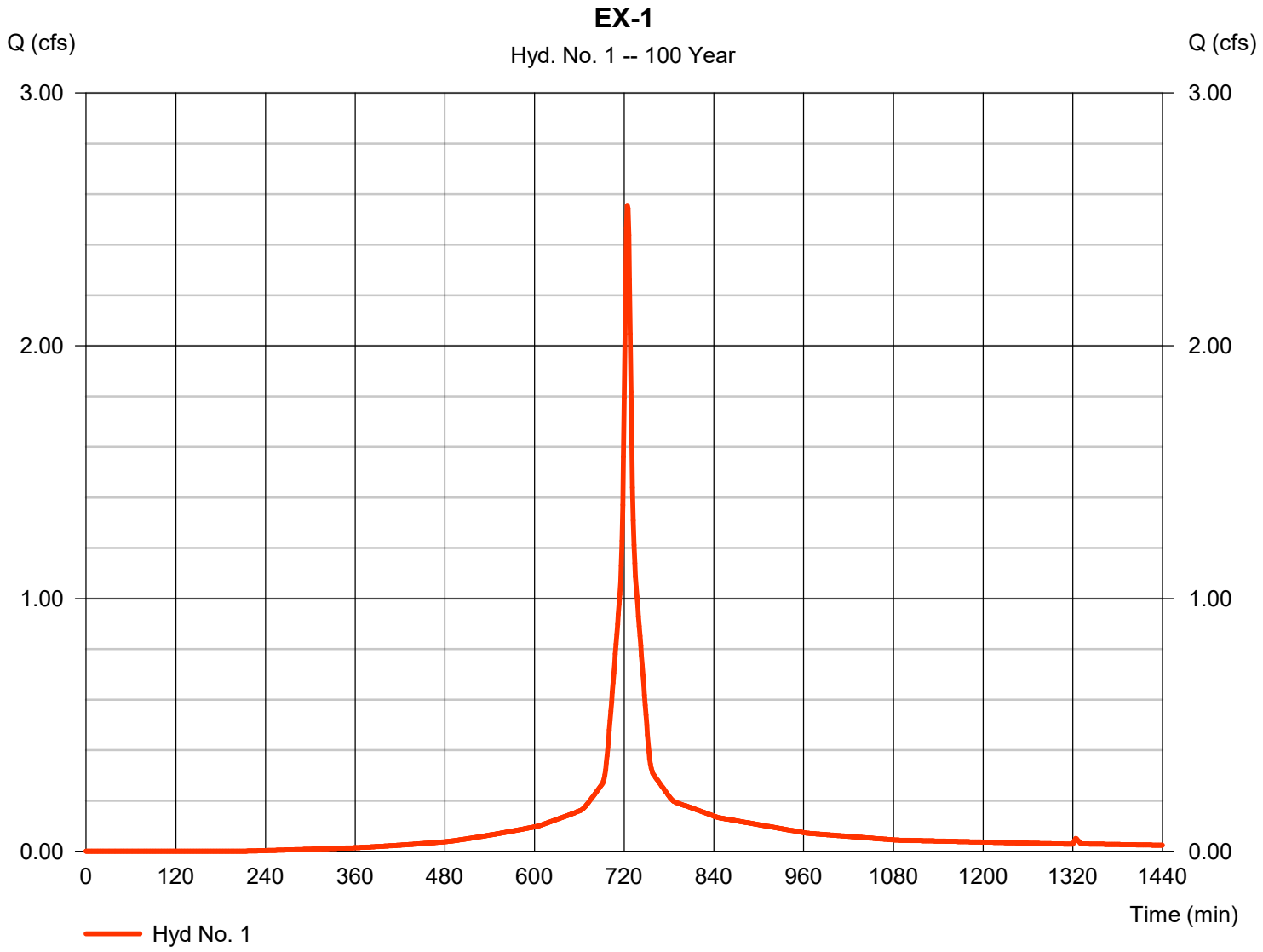
# Hydrograph Report



## Hyd. No. 1

EX-1

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 2.556 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 724 min |
| Time interval | = | 1 min | Hyd. volume | = | 8,311 cuft |
| Drainage area | = | 0.350 ac | Curve number | = | 88 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 7.77 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



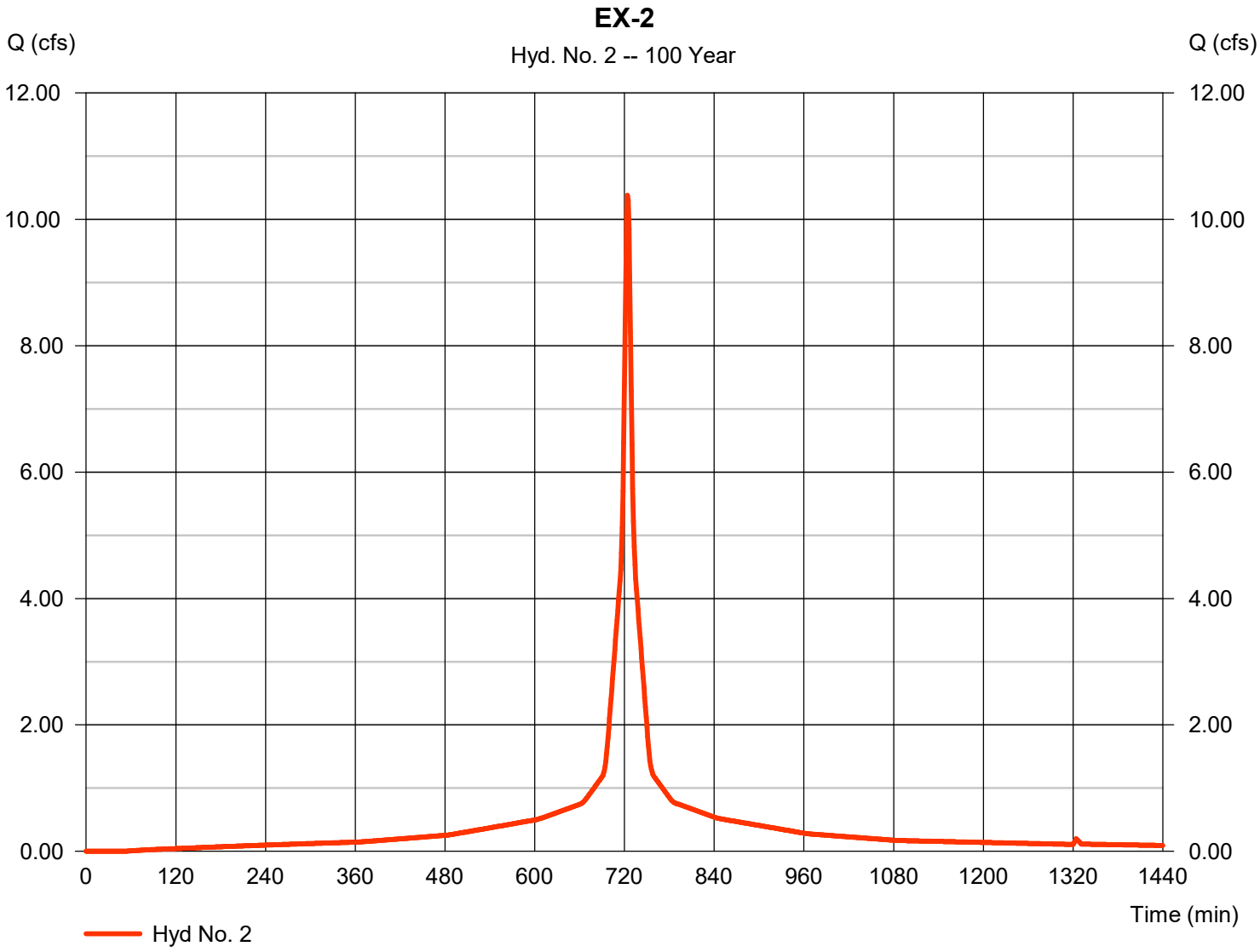
# Hydrograph Report



## Hyd. No. 2

EX-2

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 10.38 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 724 min |
| Time interval | = | 1 min | Hyd. volume | = | 36,619 cuft |
| Drainage area | = | 1.320 ac | Curve number | = | 97 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 7.77 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



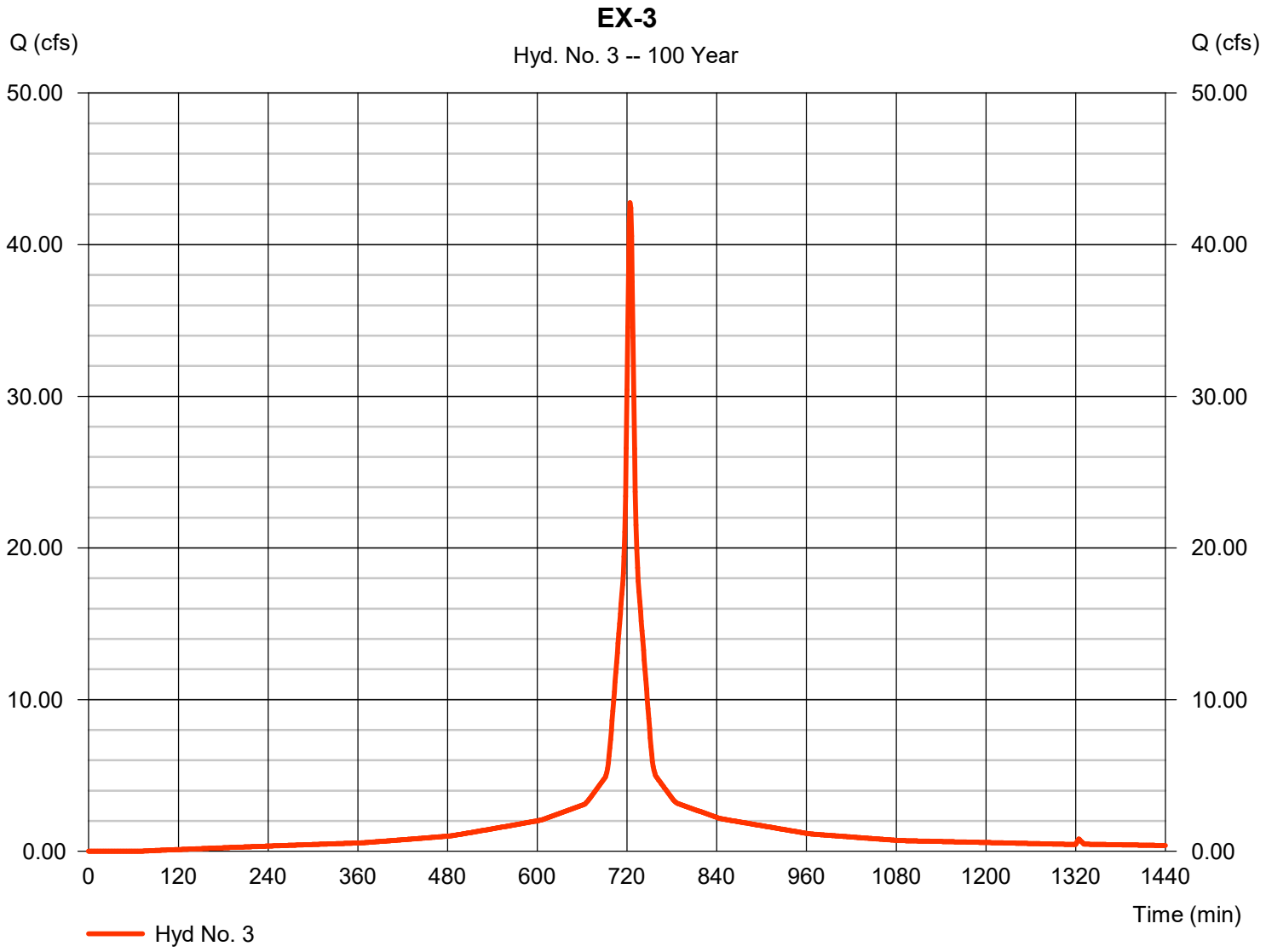
# Hydrograph Report



## Hyd. No. 3

EX-3

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 42.76 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 724 min |
| Time interval | = | 1 min | Hyd. volume | = | 149,031 cuft |
| Drainage area | = | 5.460 ac | Curve number | = | 96 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 6.00 min |
| Total precip. | = | 7.77 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



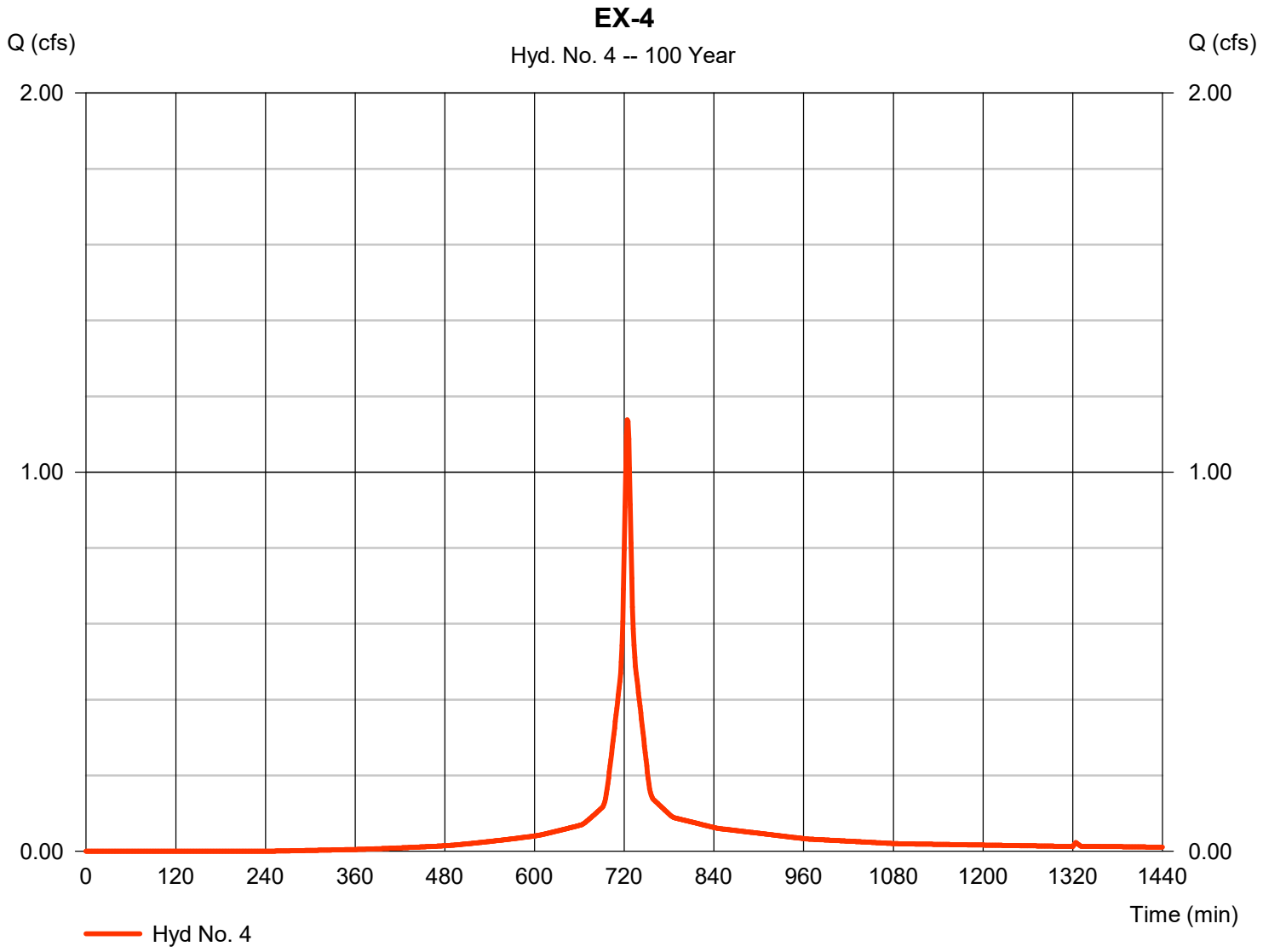
# Hydrograph Report



## Hyd. No. 4

EX-4

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 1.138 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 724 min |
| Time interval | = | 1 min | Hyd. volume | = | 3,659 cuft |
| Drainage area | = | 0.160 ac | Curve number | = | 86 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 7.77 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



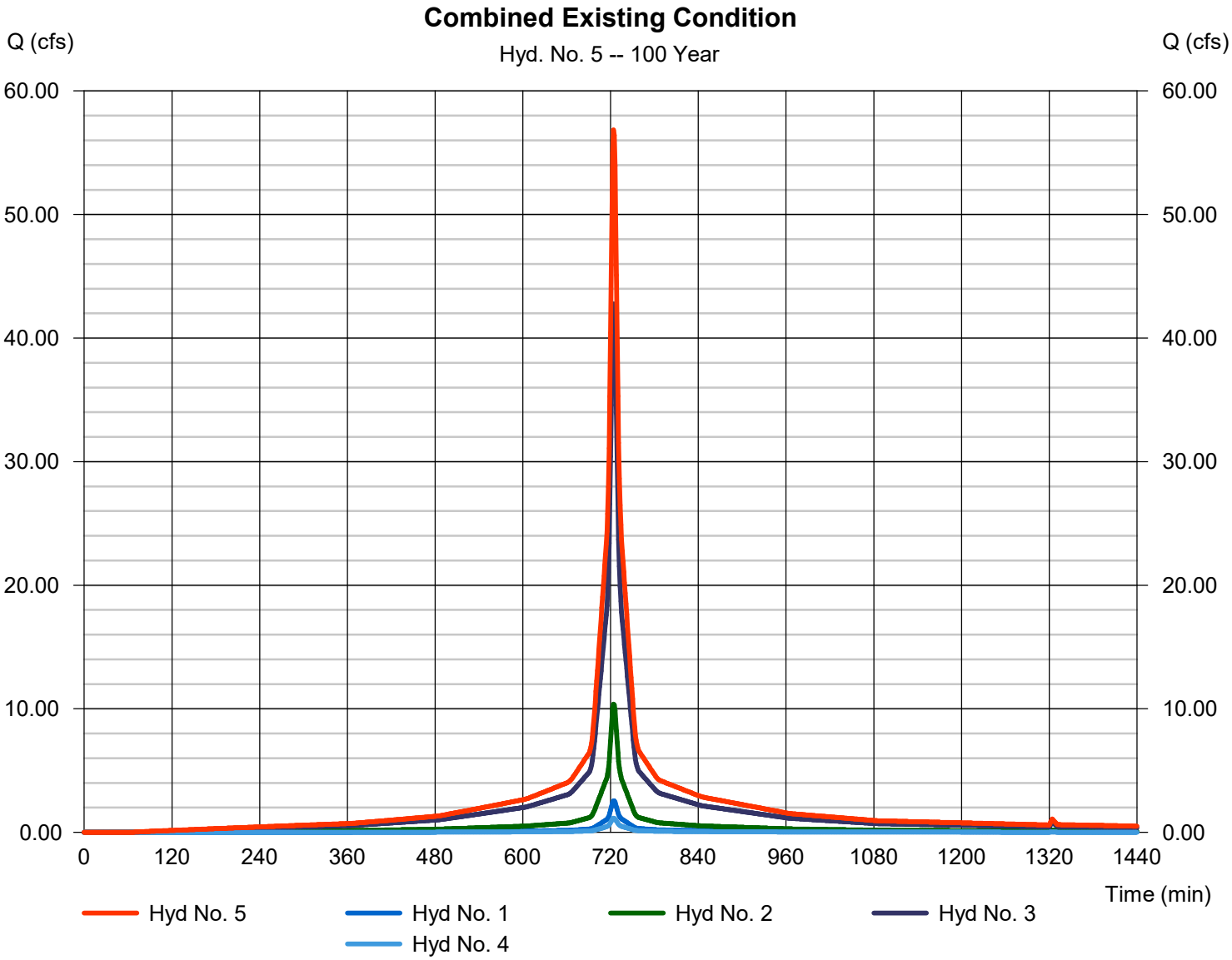
# Hydrograph Report



## Hyd. No. 5

Combined Existing Condition

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Combine | Peak discharge | = | 56.84 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 724 min |
| Time interval | = | 1 min | Hyd. volume | = | 197,620 cuft |
| Inflow hyds. | = | 1, 2, 3, 4 | Contrib. drain. area | = | 7.290 ac |



# APPENDIX B

## Proposed Stormwater Discharge Calculations

Project **Evergreen Walk** By **IJAB** Date **4/7/2021**

Location **South Windsor, CT** Checked **DTG** Date **4/7/2021**

Circle One: Present (Developed)

Circle One: ($T_c$) $T_t$ through subarea **PR-1**

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 $T_c$ Only) | | Segment ID | AB | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1. Surface description (table 3-1) | | | Short Grass Prairie | | | | | |
| 2. Manning's roughness coeff., n (table 3-1) | | | 0.15 | | | | | |
| 3. Flow Length, L (total L ≤ 150 ft) | | ft | 50 | | | | | |
| 4. Two-yr 24-hr rainfall, $P_2$ | | in | 3.1 | | | | | |
| 5. Land slope, s | | ft/ft | 0.069 | | | | | |
| 6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ | Compute $T_t$ | hr | 0.058 | + | | + | = | 0.058 |

| **Shallow concentrated flow** | | Segment ID | BC | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7. Surface description (paved or unpaved) | | | Unpaved | | | | | |
| 8. Flow length, L | | ft | 20 | | | | | |
| 9. Watercourse slope, s | | ft/ft | 0.065 | | | | | |
| 10. Average velocity, V (figure 3-1) | | ft/s | 4.1 | | | | | |
| 11. $T_t = \frac{L}{3600\ V}$ | Compute $T_t$ | hr | 0.001 | + | | + | = | 0.001 |

| **Channel flow** | | Segment ID | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 12. Cross sectional flow area, a | | $ft^2$ | | | | | | |
| 13. Wetted perimeter, $p_w$ | | ft | | | | | | |
| 14. Hydraulic radius, r $r = \frac{a}{p_w}$ | Compute r | ft | | | | | | |
| 15. Channel slope, s | | ft/ft | | | | | | |
| 16. Manning's roughness coeff., n | | | | | | | | |
| 17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ | Compute V | ft/s | | | | | | |
| 18. Flow length, L | | ft | | | | | | |
| 19. $T_t = \frac{L}{3600\ V}$ | Compute $T_t$ | hr | | + | | = | 0.000 | |
| 20. Watershed or subarea $T_c$ or $T_t$ (add $T_t$ in steps 6, 11, 19) | | | | | | | 0.059 | hr |

**Use Tc= 5 min**

Project **Evergreen Walk** By **IJAB** Date **4/7/2021**

Location **South Windsor, CT** Checked **DTG** Date **4/7/2021**

Circle One: Present (Developed)

Circle One: ($T_c$) $T_t$ through subarea **PR-2**

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 $T_c$ Only) | | Segment ID | AB | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1. Surface description (table 3-1) | | | Asphalt | | | | | |
| 2. Manning's roughness coeff., n (table 3-1) | | | 0.01 | | | | | |
| 3. Flow Length, L (total L ≤ 150 ft) | | ft | 50 | | | | | |
| 4. Two-yr 24-hr rainfall, $P_2$ | | in | 3.1 | | | | | |
| 5. Land slope, s | | ft/ft | 0.017 | | | | | |
| 6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ | Compute $T_t$ | hr | 0.013 | + | | + | = | 0.013 |

| **Shallow concentrated flow** | | Segment ID | BC | CD | | | | |
|---|---|---|---|---|---|---|---|---|
| 7. Surface description (paved or unpaved) | | | Paved | Paved | | | | |
| 8. Flow length, L | | ft | 74 | 103 | | | | |
| 9. Watercourse slope, s | | ft/ft | 0.017 | 0.016 | | | | |
| 10. Average velocity, V (figure 3-1) | | ft/s | 2.7 | 2.6 | | | | |
| 11. $T_t = \frac{L}{3600\ V}$ | Compute $T_t$ | hr | 0.008 | + | 0.011 | + | = | 0.019 |

| **Channel flow** | | Segment ID | DE | | | |
|---|---|---|---|---|---|---|
| 12. Cross sectional flow area, a | | $ft^2$ | | | | |
| 13. Wetted perimeter, $p_w$ | | ft | | | | |
| 14. Hydraulic radius, r $r = \frac{a}{p_w}$ | Compute r | ft | | | | |
| 15. Channel slope, s | | ft/ft | 0.010 | | | |
| 16. Manning's roughness coeff., n | | | 0.011 | | | |
| 17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ | Compute V | ft/s | 5.00 | | | |
| 18. Flow length, L | | ft | 494 | | | |
| 19. $T_t = \frac{L}{3600\ V}$ | Compute $T_t$ | hr | 0.027 | + | = | 0.027 |
| 20. Watershed or subarea $T_c$ or $T_t$ (add $T_t$ in steps 6, 11, 19) | | | | | | 0.059 hr |

**Use Tc= 5 min**

Project **Evergreen Walk** By **IJAB** Date **4/7/2021**

Location **South Windsor, CT** Checked **DTG** Date **4/7/2021**

Circle One: Present (Developed)

Circle One: ($T_c$) $T_t$ through subarea **PR-3**

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 $T_c$ Only) | | Segment ID | AB | BC | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1. Surface description (table 3-1) | | | Short Grass Prairie | Asphalt | | | | | |
| 2. Manning's roughness coeff., n (table 3-1) | | | 0.15 | 0.01 | | | | | |
| 3. Flow Length, L (total L ≤ 150 ft) | | ft | 8 | 36 | | | | | |
| 4. Two-yr 24-hr rainfall, $P_2$ | | in | 3.1 | 3.1 | | | | | |
| 5. Land slope, s | | ft/ft | 0.130 | 0.020 | | | | | |
| 6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ | Compute $T_t$ | hr | 0.010 | + 0.008 | + | = | 0.019 | | |

| **Shallow concentrated flow** | | Segment ID | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 7. Surface description (paved or unpaved) | | | Unpaved | | | | | | |
| 8. Flow length, L | | ft | | | | | | | |
| 9. Watercourse slope, s | | ft/ft | | | | | | | |
| 10. Average velocity, V (figure 3-1) | | ft/s | | | | | | | |
| 11. $T_t = \frac{L}{3600\ V}$ | Compute $T_t$ | hr | + | + | = | 0.000 | | | |

| **Channel flow** | | Segment ID | CD | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 12. Cross sectional flow area, a | | $ft^2$ | | | | | | | |
| 13. Wetted perimeter, $p_w$ | | ft | | | | | | | |
| 14. Hydraulic radius, r $r = \frac{a}{p_w}$ | Compute r | ft | | | | | | | |
| 15. Channel slope, s | | ft/ft | 0.010 | | | | | | |
| 16. Manning's roughness coeff., n | | | 0.011 | | | | | | |
| 17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ | Compute V | ft/s | 5.00 | | | | | | |
| 18. Flow length, L | | ft | 769 | | | | | | |
| 19. $T_t = \frac{L}{3600\ V}$ | Compute $T_t$ | hr | 0.043 | + | = | 0.043 | | | |
| 20. Watershed or subarea $T_c$ or $T_t$ (add $T_t$ in steps 6, 11, 19) | | | | | | 0.062 | hr | | |

**Use Tc= 5 min**

Project **Evergreen Walk** By **IJAB** Date **4/7/2021**

Location **South Windsor, CT** Checked **DTG** Date **4/7/2021**

Circle One: Present (Developed)

Circle One: ($T_c$) $T_t$ through subarea **PR-4**

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 $T_c$ Only) | | Segment ID | AB | | |
|---|---|---|---|---|---|
| 1. Surface description (table 3-1) | | | Short Grass Prairie | | |
| 2. Manning's roughness coeff., n (table 3-1) | | | 0.15 | | |
| 3. Flow Length, L (total L ≤ 150 ft) | | ft | 50 | | |
| 4. Two-yr 24-hr rainfall, $P_2$ | | in | 3.1 | | |
| 5. Land slope, s | | ft/ft | 0.015 | | |
| 6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ | Compute $T_t$ | hr | 0.107 | + | + = 0.107 |

| **Shallow concentrated flow** | | Segment ID | BC | | |
|---|---|---|---|---|---|
| 7. Surface description (paved or unpaved) | | | Unpaved | | |
| 8. Flow length, L | | ft | 48 | | |
| 9. Watercourse slope, s | | ft/ft | 0.053 | | |
| 10. Average velocity, V (figure 3-1) | | ft/s | 3.7 | | |
| 11. $T_t = \frac{L}{3600\ V}$ | Compute $T_t$ | hr | 0.004 | + | + = 0.004 |

| **Channel flow** | | Segment ID | | |
|---|---|---|---|---|
| 12. Cross sectional flow area, a | | $ft^2$ | | |
| 13. Wetted perimeter, $p_w$ | | ft | | |
| 14. Hydraulic radius, r $r = \frac{a}{p_w}$ | Compute r | ft | | |
| 15. Channel slope, s | | ft/ft | | |
| 16. Manning's roughness coeff., n | | | | |
| 17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ | Compute V | ft/s | | |
| 18. Flow length, L | | ft | | |
| 19. $T_t = \frac{L}{3600\ V}$ | Compute $T_t$ | hr | + | = 0.000 |
| 20. Watershed or subarea $T_c$ or $T_t$ (add $T_t$ in steps 6, 11, 19) | | | | 0.110 hr |

**Use Tc= 7 min**

| Drainage Area ID | **PR-1** |
|---|---|

## Composite Curve Number Calculations

### TR-55 Reference Table

*Abbreviated TR-55 Table 2-2a Runoff Curve Numbers for Urban Areas*

| Cover Description | Curve Numbers for Hydrologic Soil Group (HSG) | | | |
|---|---|---|---|---|
| Fully Developed Urban Areas | A | B | C | D |
| Pervious Area | | | | |
| Open Space - Lawns, Parks, and Cemeteries | 68 | 79 | 86 | 89 |
| Woods and Forest | 30 | 55 | 70 | 77 |
| Slectively Cleared Woods and Forest | 43 | 65 | 76 | 82 |
| Impervious Area | | | | |
| Paved Areas and Roofs | 98 | 98 | 98 | 98 |
| Gravel Roads | 76 | 85 | 89 | 91 |
| Dirt Roads | 72 | 82 | 87 | 89 |
| Developing Urban Areas | | | | |
| Newly Graded Pervious Areas | 77 | 86 | 91 | 94 |

### Composite Runoff Curve Number Calculation

$$\text{Composite } CN = \frac{\sum_{i=1}^{n} CN_i \times A_i}{\sum_{i=1}^{n} A_i}$$

*n = Number of Distinct Cover Types in the Drainage Area*

| Cover Description | HSG | CN | Area ($ft^2$) | CN × A |
|---|---|---|---|---|
| Newly Graded Pervious Areas | B | 86 | 15,324 | 1,317,864 |
| Paved Areas and Roofs | B | 98 | 1,793 | 175,714 |
| | | | | 0 |
| | | | | 0 |
| | | | | 0 |
| | | Total | 17,117 | 1,493,578 |

| *Composite CN* = | 87 |
|---|---|

EVERGREEN WALK

SOUTH WINDSOR, CT

BY HES

DATE 3/12/2021

CKD JEL

DATE 3/12/2021

LANGAN PROJ. NUMBER: 140222801

| Drainage Area ID | **PR-2** |
|---|---|

## Composite Curve Number Calculations

### TR-55 Reference Table

*Abbreviated TR-55 Table 2-2a Runoff Curve Numbers for Urban Areas*

| Cover Description | Curve Numbers for Hydrologic Soil Group (HSG) | | | |
|---|---|---|---|---|
| Fully Developed Urban Areas | A | B | C | D |
| Pervious Area | | | | |
| Open Space - Lawns, Parks, and Cemeteries | 68 | 79 | 86 | 89 |
| Woods and Forest | 30 | 55 | 70 | 77 |
| Slectively Cleared Woods and Forest | 43 | 65 | 76 | 82 |
| Impervious Area | | | | |
| Paved Areas and Roofs | 98 | 98 | 98 | 98 |
| Gravel Roads | 76 | 85 | 89 | 91 |
| Dirt Roads | 72 | 82 | 87 | 89 |
| Developing Urban Areas | | | | |
| Newly Graded Pervious Areas | 77 | 86 | 91 | 94 |

### Composite Runoff Curve Number Calculation

$$\text{Composite } CN = \frac{\sum_{i=1}^{n} CN_i \times A_i}{\sum_{i=1}^{n} A_i}$$

*n = Number of Distinct Cover Types in the Drainage Area*

| Cover Description | HSG | CN | Area ($ft^2$) | CN × A |
|---|---|---|---|---|
| Newly Graded Pervious Areas | B | 86 | 7,677 | 660,222 |
| Paved Areas and Roofs | B | 98 | 49,975 | 4,897,550 |
| | | | | 0 |
| | | | | 0 |
| | | | | 0 |
| | | Total | 57,652 | 5,557,772 |

| *Composite CN* = | 96 |
|---|---|

EVERGREEN WALK

SOUTH WINDSOR, CT

BY HES
DATE 3/12/2021
CKD JEL
DATE 3/12/2021

LANGAN PROJ. NUMBER: 140222801

| Drainage Area ID | **PR-3** |
|---|---|

## Composite Curve Number Calculations

### TR-55 Reference Table

*Abbreviated TR-55 Table 2-2a Runoff Curve Numbers for Urban Areas*

| Cover Description | Curve Numbers for Hydrologic Soil Group (HSG) | | | |
|---|---|---|---|---|
| Fully Developed Urban Areas | A | B | C | D |
| Pervious Area | | | | |
| Open Space - Lawns, Parks, and Cemeteries | 68 | 79 | 86 | 89 |
| Woods and Forest | 30 | 55 | 70 | 77 |
| Slectively Cleared Woods and Forest | 43 | 65 | 76 | 82 |
| Impervious Area | | | | |
| Paved Areas and Roofs | 98 | 98 | 98 | 98 |
| Gravel Roads | 76 | 85 | 89 | 91 |
| Dirt Roads | 72 | 82 | 87 | 89 |
| Developing Urban Areas | | | | |
| Newly Graded Pervious Areas | 77 | 86 | 91 | 94 |

### Composite Runoff Curve Number Calculation

$$\text{Composite } CN = \frac{\sum_{i=1}^{n} CN_i \times A_i}{\sum_{i=1}^{n} A_i}$$

*n = Number of Distinct Cover Types in the Drainage Area*

| Cover Description | HSG | CN | Area ($ft^2$) | CN × A |
|---|---|---|---|---|
| Newly Graded Pervious Areas | B | 86 | 32,959 | 2,834,474 |
| Newly Graded Pervious Areas | C | 91 | 4,937 | 449,267 |
| Paved Areas and Roofs | B | 98 | 195,896 | 19,197,808 |
| Gravel Roads | B | 85 | 3,000 | 255,000 |
| | | | | 0 |
| | | Total | 236,792 | 22,736,549 |

| *Composite CN* = | 96 |
|---|---|

EVERGREEN WALK

SOUTH WINDSOR, CT

BY HES
DATE 3/12/2021
CKD JEL
DATE 3/12/2021

LANGAN PROJ. NUMBER: 140222801

| Drainage Area ID | **PR-4** |
|---|---|

## Composite Curve Number Calculations

### TR-55 Reference Table

*Abbreviated TR-55 Table 2-2a Runoff Curve Numbers for Urban Areas*

| Cover Description | Curve Numbers for Hydrologic Soil Group (HSG) | | | |
|---|---|---|---|---|
| Fully Developed Urban Areas | A | B | C | D |
| Pervious Area | | | | |
| Open Space - Lawns, Parks, and Cemeteries | 68 | 79 | 86 | 89 |
| Woods and Forest | 30 | 55 | 70 | 77 |
| Slectively Cleared Woods and Forest | 43 | 65 | 76 | 82 |
| Impervious Area | | | | |
| Paved Areas and Roofs | 98 | 98 | 98 | 98 |
| Gravel Roads | 76 | 85 | 89 | 91 |
| Dirt Roads | 72 | 82 | 87 | 89 |
| Developing Urban Areas | | | | |
| Newly Graded Pervious Areas | 77 | 86 | 91 | 94 |

### Composite Runoff Curve Number Calculation

$$\text{Composite CN} = \frac{\sum_{i=1}^{n} CN_i \times A_i}{\sum_{i=1}^{n} A_i}$$

*n = Number of Distinct Cover Types in the Drainage Area*

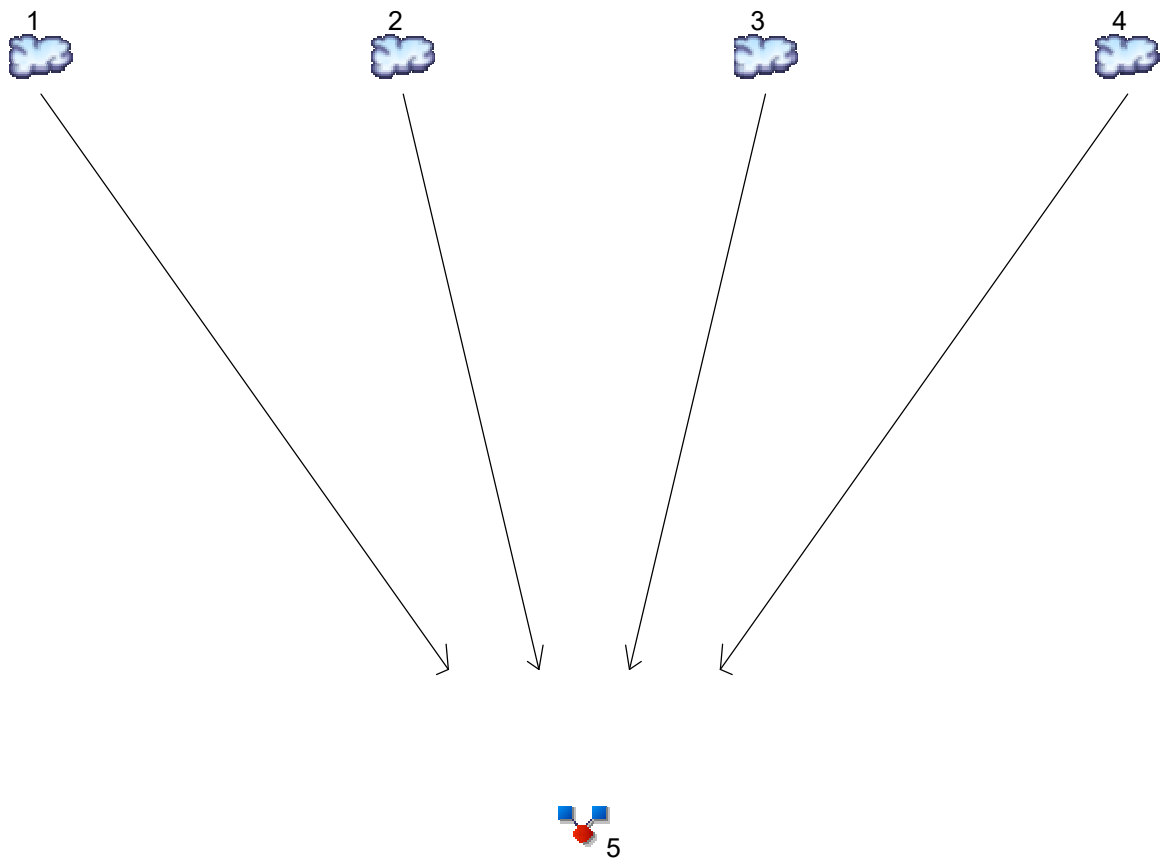
| Cover Description | HSG | CN | Area ($ft^2$) | CN × A |
|---|---|---|---|---|
| Newly Graded Pervious Areas | B | 86 | 6,954 | 598,044 |
| | | | | 0 |
| | | | | 0 |
| | | | | 0 |
| | | | | 0 |
| | | Total | 6,954 | 598,044 |

| *Composite CN* = | 86 |
|---|---|

| | | | |
|---|---|---|---|
| EVERGREEN WALK | BY | HES | |
| | DATE | 3/12/2021 | LANGAN PROJ. NUMBER: 140222801 |
| SOUTH WINDSOR, CT | CKD | JEL | |
| | DATE | 3/12/2021 | |

# Watershed Model Schematic






## Legend

| Hyd. | Origin | Description |
|---|---|---|
| 1 | SCS Runoff | PR-1 |
| 2 | SCS Runoff | PR-2 |
| 3 | SCS Runoff | PR-3 |
| 4 | SCS Runoff | PR-4 |
| 5 | Combine | Combined - Proposed Condition |

# 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 | ------ | ------- | 0.868 | ------- | ------- | 1.616 | 2.086 | ------- | 2.812 | PR-1 |
| 2 | SCS Runoff | ------ | ------- | 3.971 | ------- | ------- | 6.447 | 7.975 | ------- | 10.34 | PR-2 |
| 3 | SCS Runoff | ------ | ------- | 16.33 | ------- | ------- | 26.52 | 32.81 | ------- | 42.53 | PR-3 |
| 4 | SCS Runoff | ------ | ------- | 0.341 | ------- | ------- | 0.647 | 0.840 | ------- | 1.138 | PR-4 |
| 5 | Combine | 1, 2, 3, 4 | ------- | 21.51 | ------- | ------- | 35.23 | 43.71 | ------- | 56.81 | Combined - Proposed Condition |

# Hydrograph Summary Report

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

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SCS Runoff | 0.868 | 1 | 725 | 2,680 | ------ | ------ | ------ | PR-1 |
| 2 | SCS Runoff | 3.971 | 1 | 724 | 13,146 | ------ | ------ | ------ | PR-2 |
| 3 | SCS Runoff | 16.33 | 1 | 724 | 54,078 | ------ | ------ | ------ | PR-3 |
| 4 | SCS Runoff | 0.341 | 1 | 725 | 1,052 | ------ | ------ | ------ | PR-4 |
| 5 | Combine | 21.51 | 1 | 724 | 70,956 | 1, 2, 3, 4 | ------ | ------ | Combined - Proposed Condition |

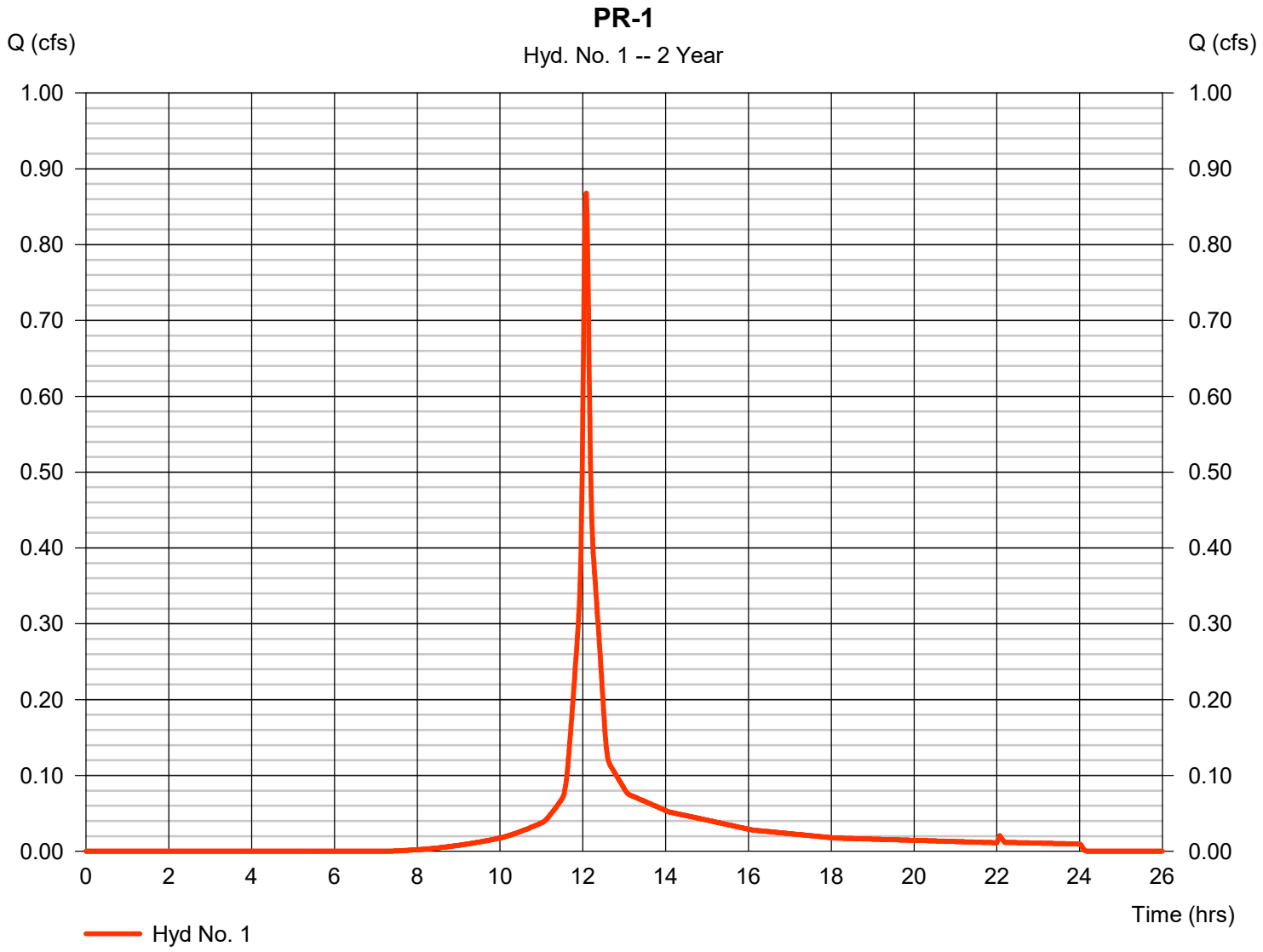
# Hydrograph Report



## Hyd. No. 1

PR-1

| | | | |
|---|---|---|---|
| Hydrograph type | = SCS Runoff | Peak discharge | = 0.868 cfs |
| Storm frequency | = 2 yrs | Time to peak | = 12.08 hrs |
| Time interval | = 1 min | Hyd. volume | = 2,680 cuft |
| Drainage area | = 0.390 ac | Curve number | = 87 |
| Basin Slope | = 0.0 % | Hydraulic length | = 0 ft |
| Tc method | = User | Time of conc. (Tc) | = 5.00 min |
| Total precip. | = 3.11 in | Distribution | = Type III |
| Storm duration | = 24 hrs | Shape factor | = 484 |



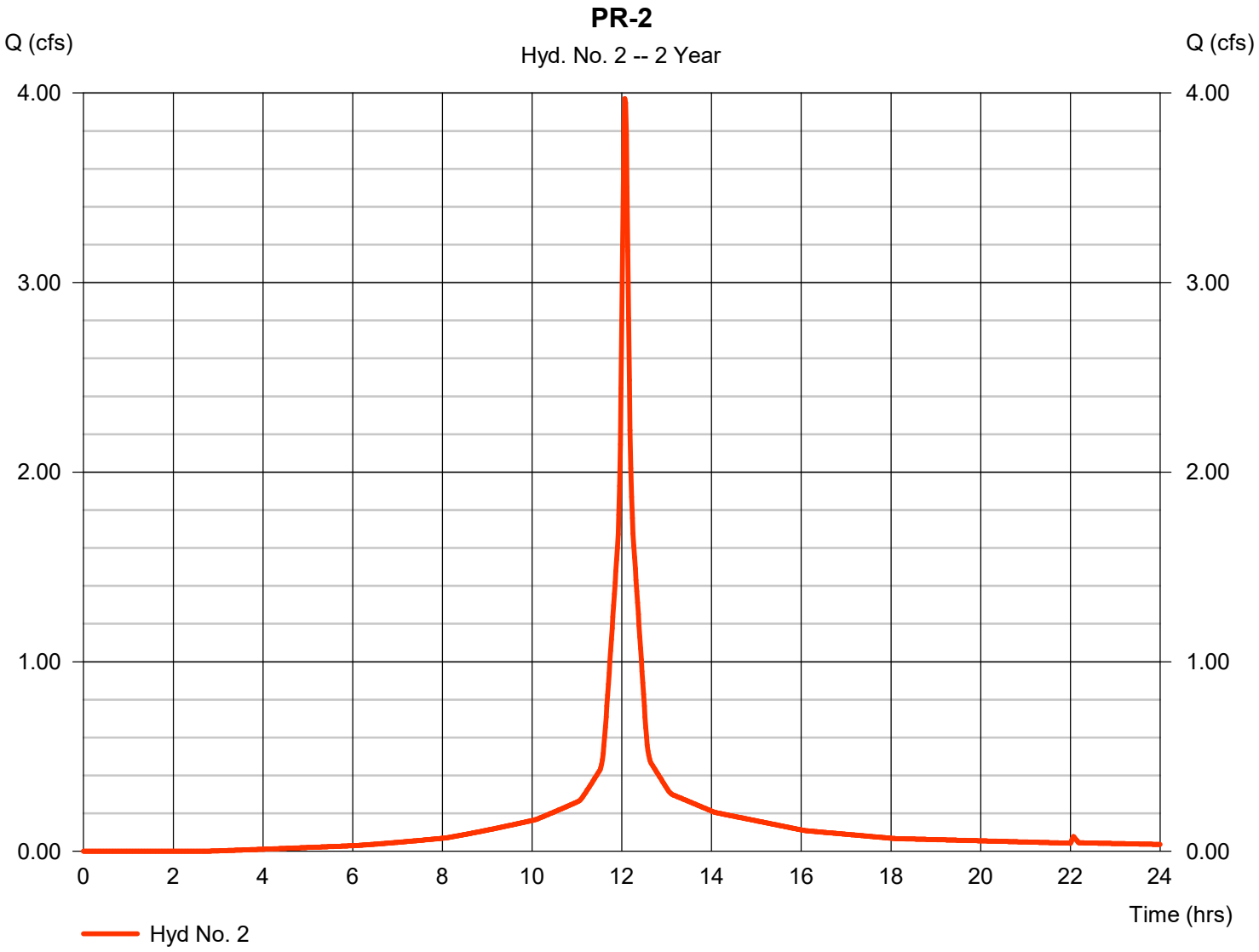
# Hydrograph Report



## Hyd. No. 2

PR-2

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 3.971 cfs |
| Storm frequency | = | 2 yrs | Time to peak | = | 12.07 hrs |
| Time interval | = | 1 min | Hyd. volume | = | 13,146 cuft |
| Drainage area | = | 1.320 ac | Curve number | = | 96 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 3.11 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



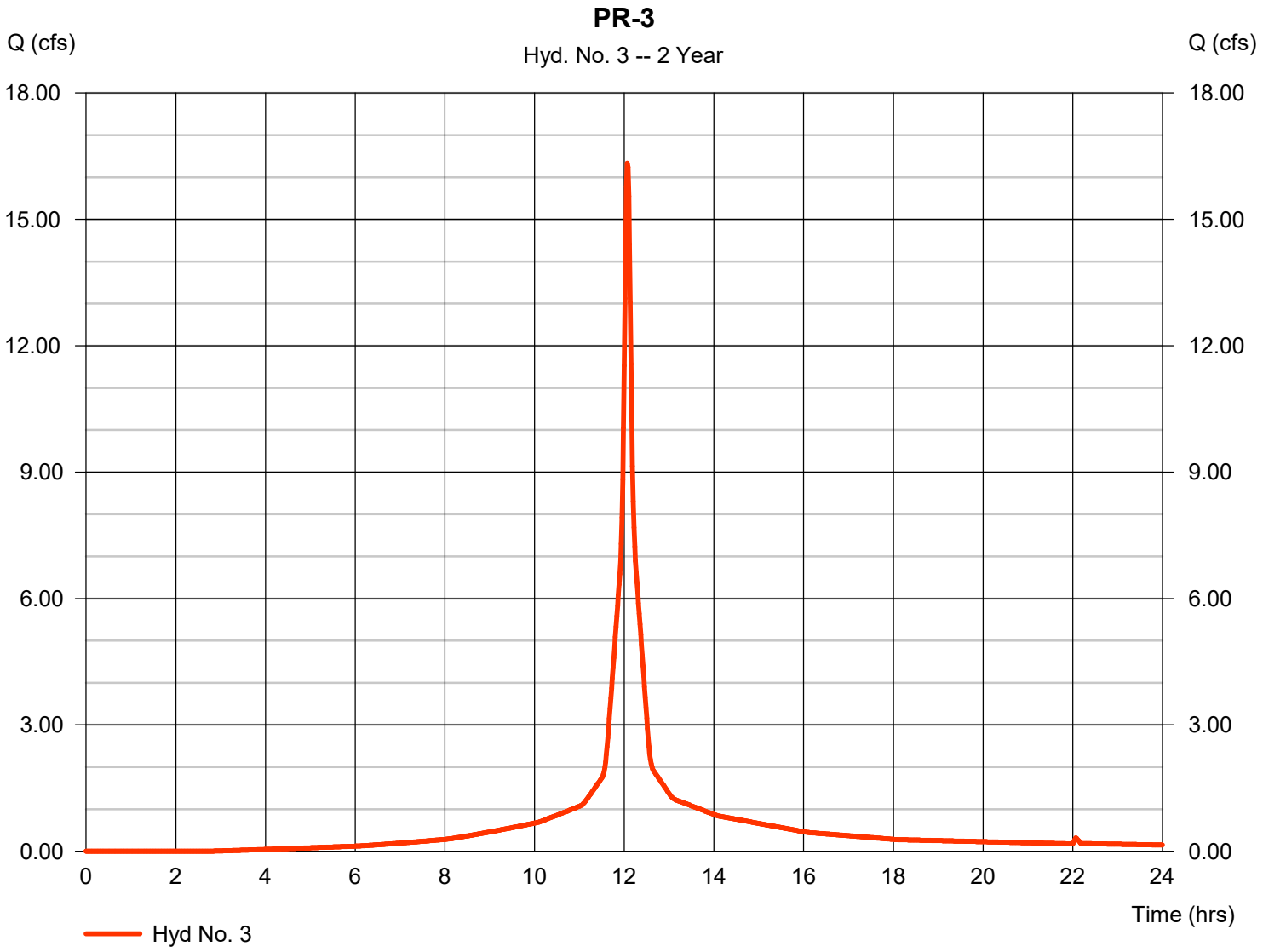
# Hydrograph Report



## Hyd. No. 3

PR-3

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 16.33 cfs |
| Storm frequency | = | 2 yrs | Time to peak | = | 12.07 hrs |
| Time interval | = | 1 min | Hyd. volume | = | 54,078 cuft |
| Drainage area | = | 5.430 ac | Curve number | = | 96 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 3.11 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



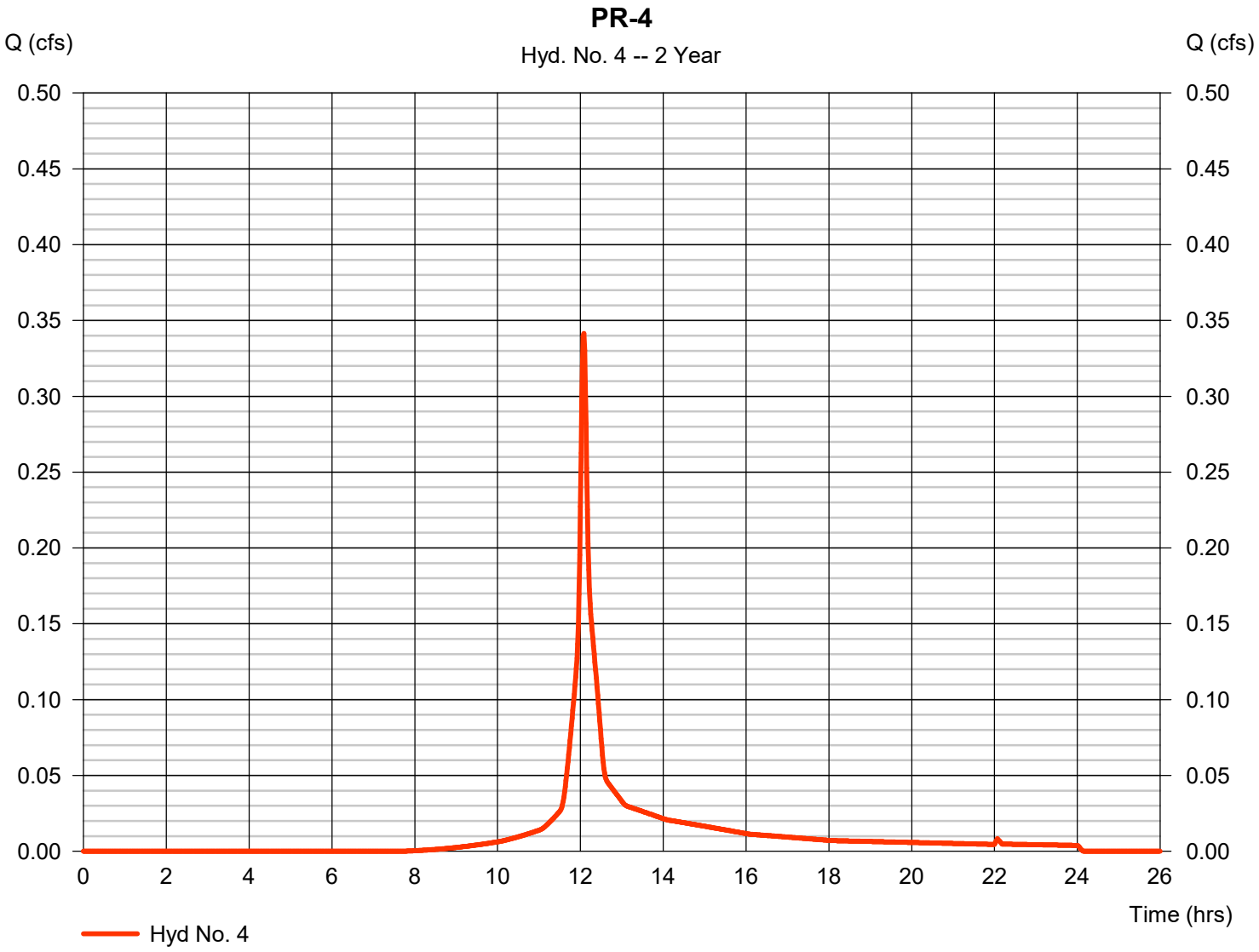
# Hydrograph Report



## Hyd. No. 4

PR-4

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 0.341 cfs |
| Storm frequency | = | 2 yrs | Time to peak | = | 12.08 hrs |
| Time interval | = | 1 min | Hyd. volume | = | 1,052 cuft |
| Drainage area | = | 0.160 ac | Curve number | = | 86 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 3.11 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



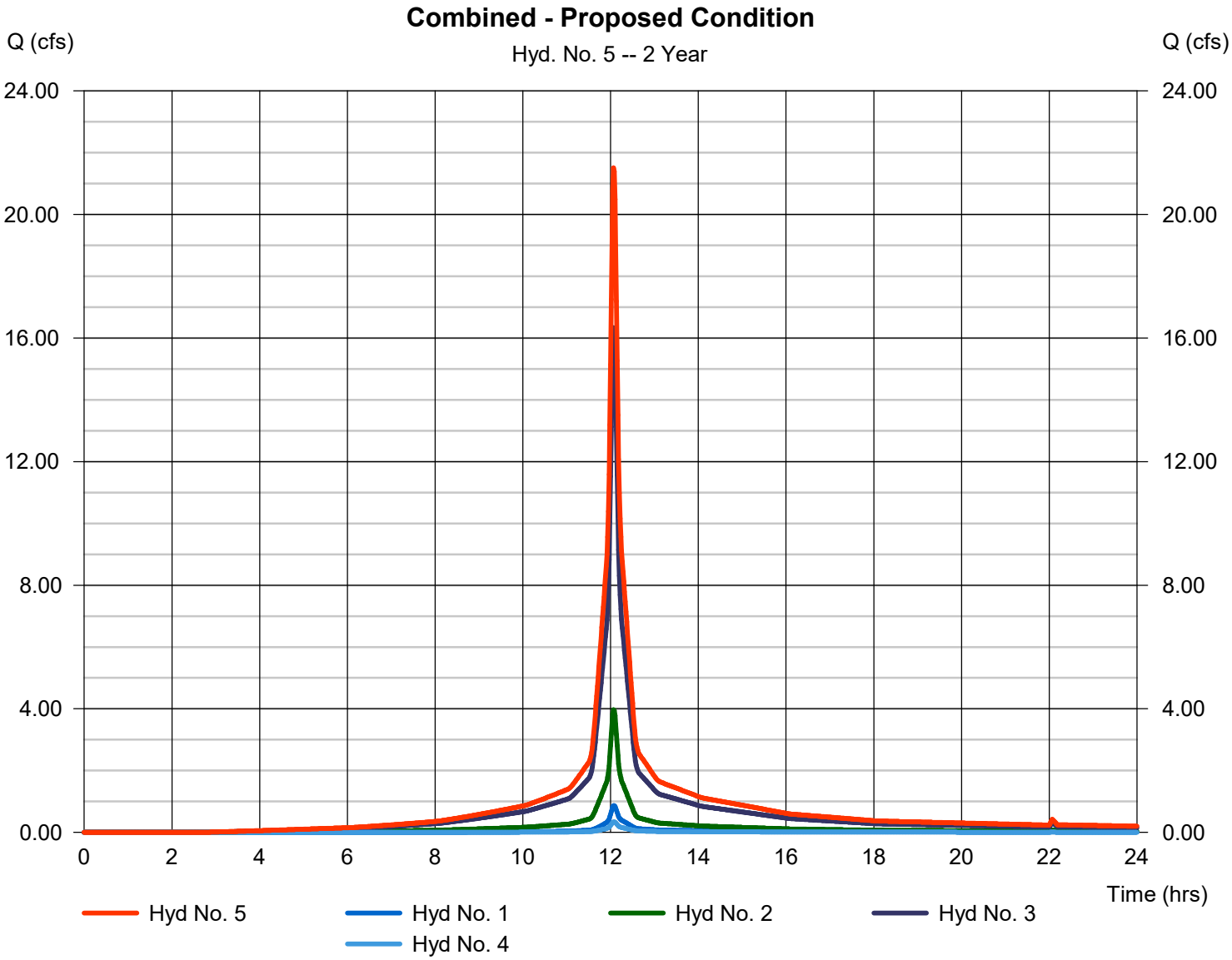
# Hydrograph Report



## Hyd. No. 5

Combined - Proposed Condition

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Combine | Peak discharge | = | 21.51 cfs |
| Storm frequency | = | 2 yrs | Time to peak | = | 12.07 hrs |
| Time interval | = | 1 min | Hyd. volume | = | 70,956 cuft |
| Inflow hyds. | = | 1, 2, 3, 4 | Contrib. drain. area | = | 7.300 ac |



# Hydrograph Summary Report

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

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SCS Runoff | 1.616 | 1 | 724 | 5,084 | ------ | ------ | ------ | PR-1 |
| 2 | SCS Runoff | 6.447 | 1 | 724 | 21,955 | ------ | ------ | ------ | PR-2 |
| 3 | SCS Runoff | 26.52 | 1 | 724 | 90,314 | ------ | ------ | ------ | PR-3 |
| 4 | SCS Runoff | 0.647 | 1 | 724 | 2,026 | ------ | ------ | ------ | PR-4 |
| 5 | Combine | 35.23 | 1 | 724 | 119,380 | 1, 2, 3, 4 | ------ | ------ | Combined - Proposed Condition |

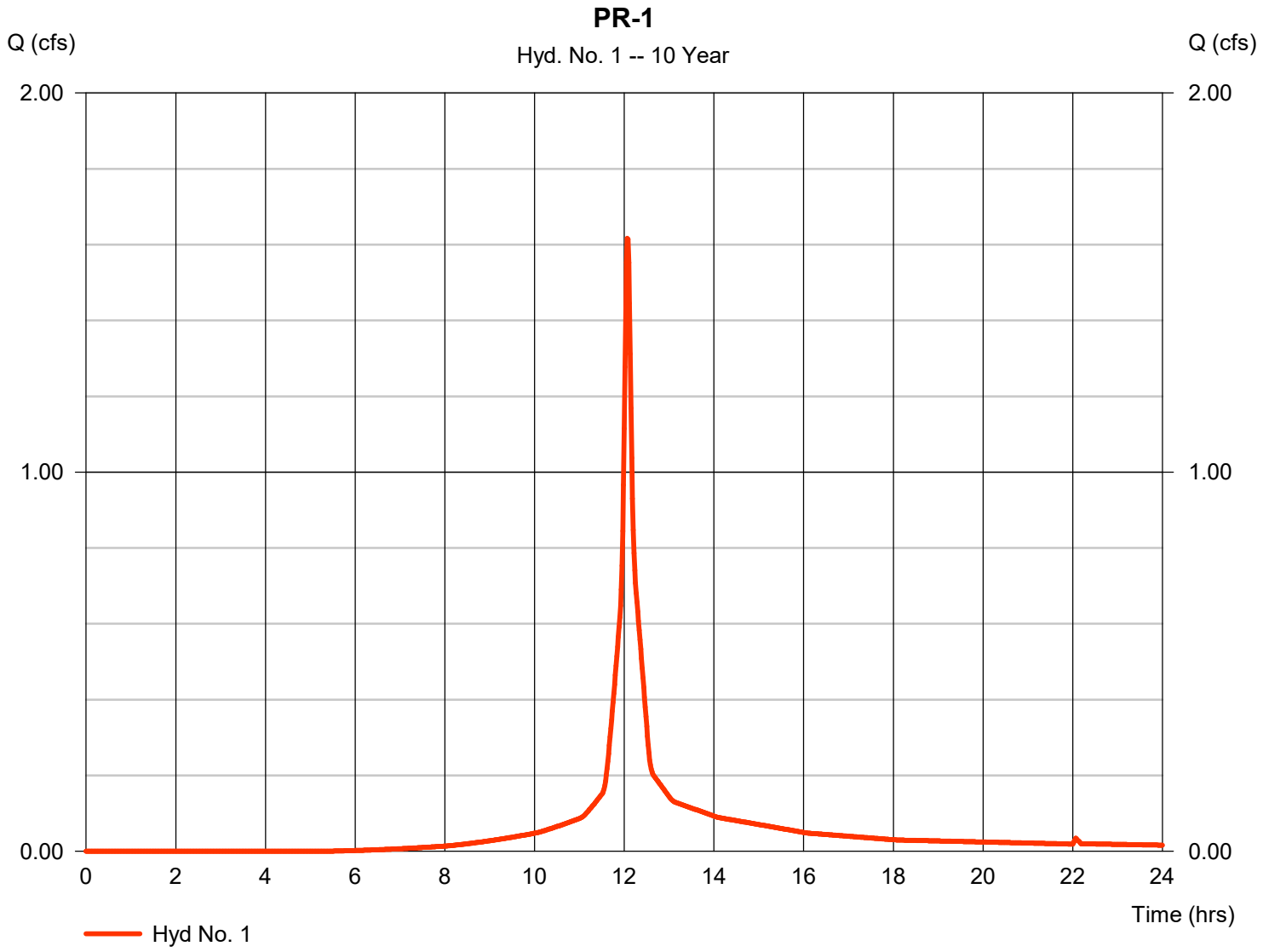
# Hydrograph Report



## Hyd. No. 1

PR-1

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 1.616 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 12.07 hrs |
| Time interval | = | 1 min | Hyd. volume | = | 5,084 cuft |
| Drainage area | = | 0.390 ac | Curve number | = | 87 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 4.91 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



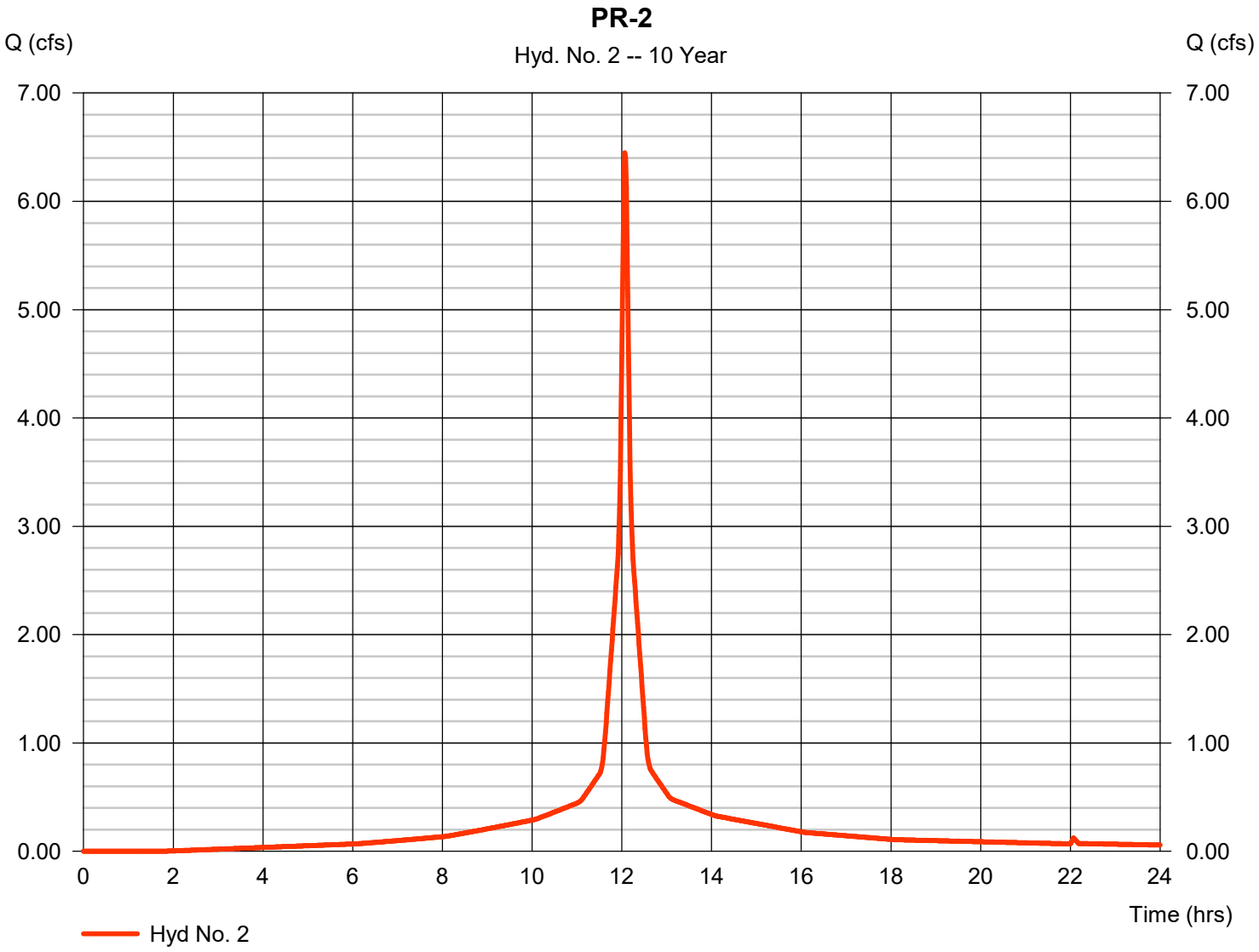
# Hydrograph Report



## Hyd. No. 2

PR-2

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 6.447 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 12.07 hrs |
| Time interval | = | 1 min | Hyd. volume | = | 21,955 cuft |
| Drainage area | = | 1.320 ac | Curve number | = | 96 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 4.91 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



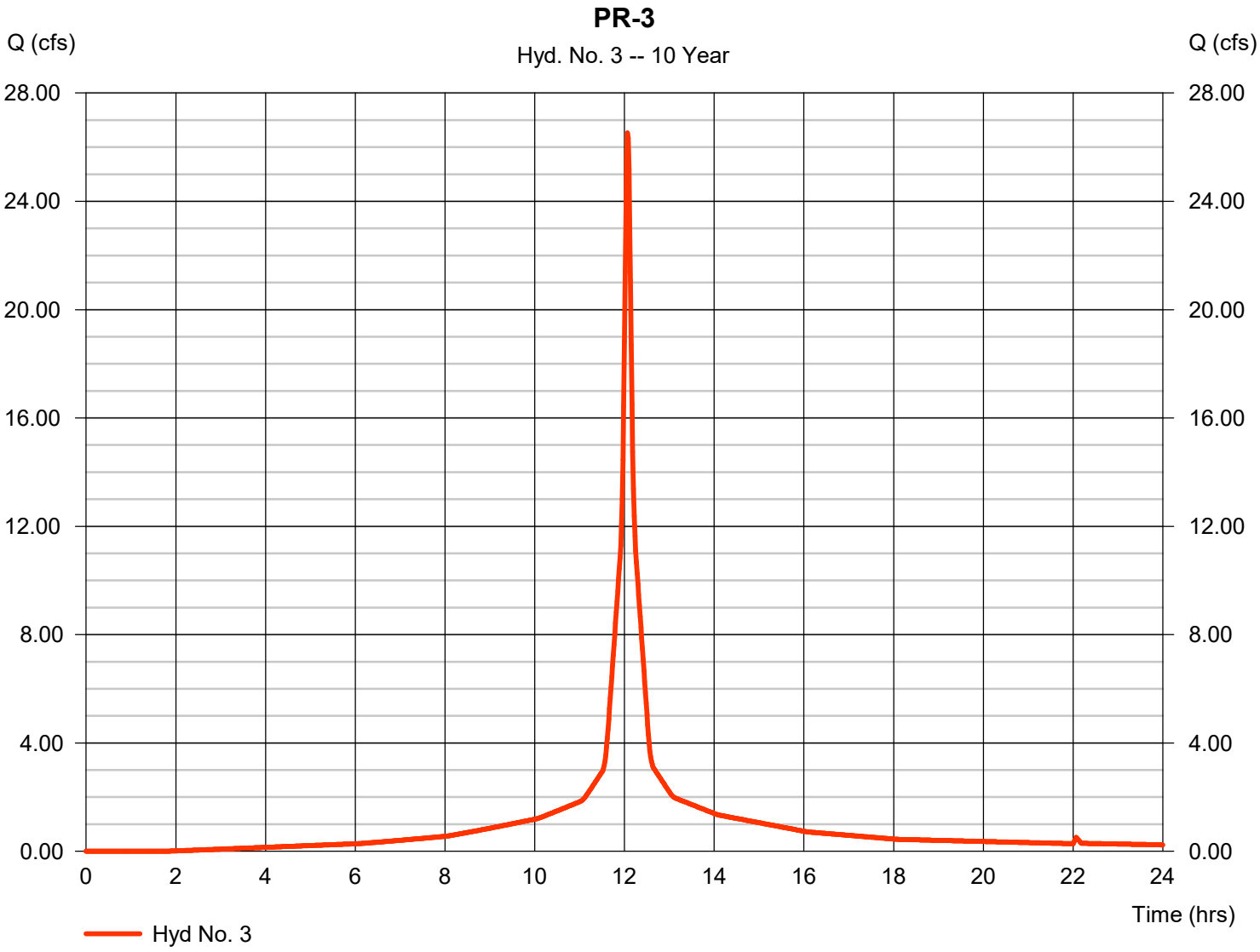
# Hydrograph Report



## Hyd. No. 3

PR-3

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 26.52 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 12.07 hrs |
| Time interval | = | 1 min | Hyd. volume | = | 90,314 cuft |
| Drainage area | = | 5.430 ac | Curve number | = | 96 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 4.91 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



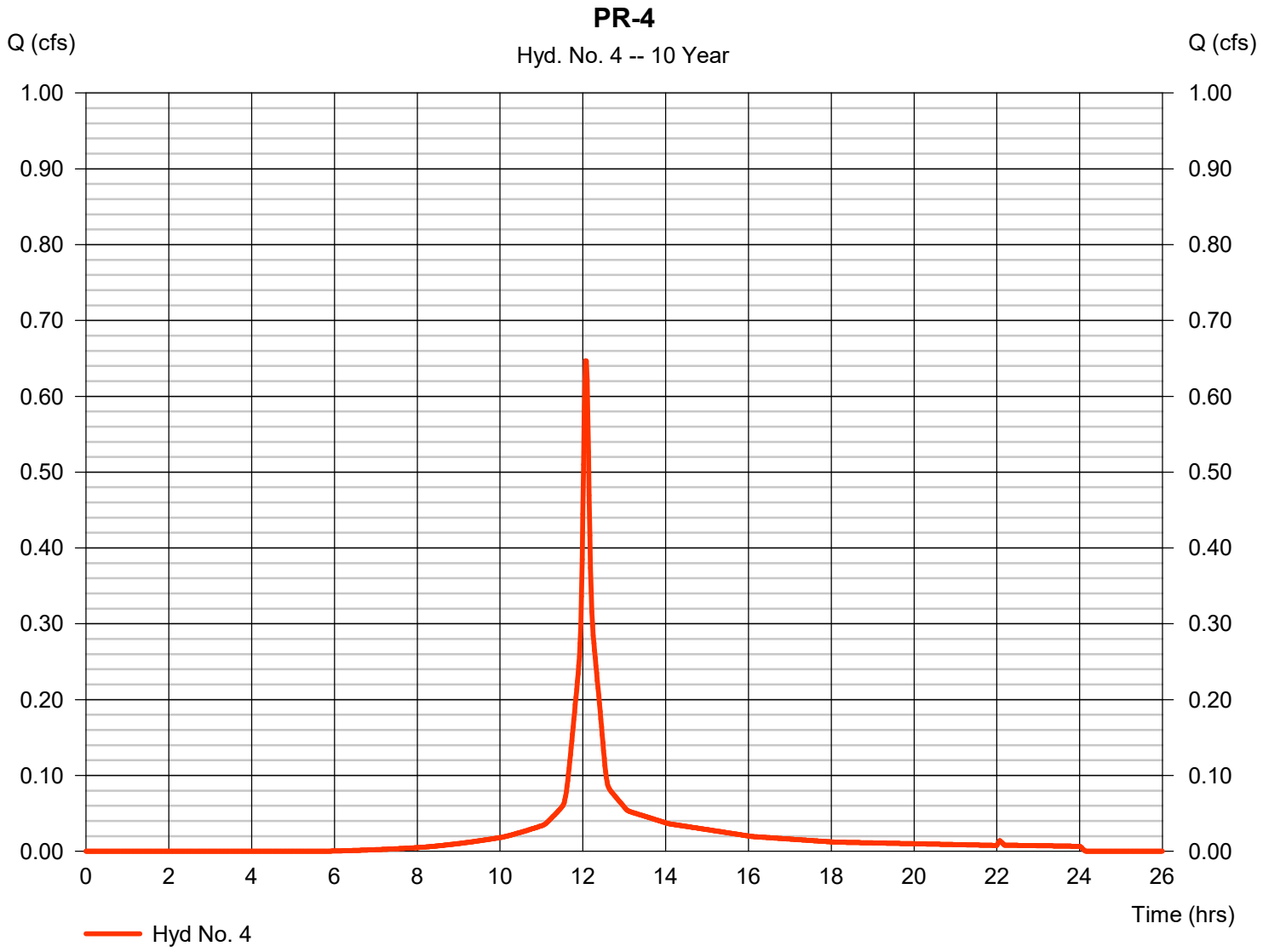
# Hydrograph Report



## Hyd. No. 4

PR-4

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 0.647 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 12.07 hrs |
| Time interval | = | 1 min | Hyd. volume | = | 2,026 cuft |
| Drainage area | = | 0.160 ac | Curve number | = | 86 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 4.91 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



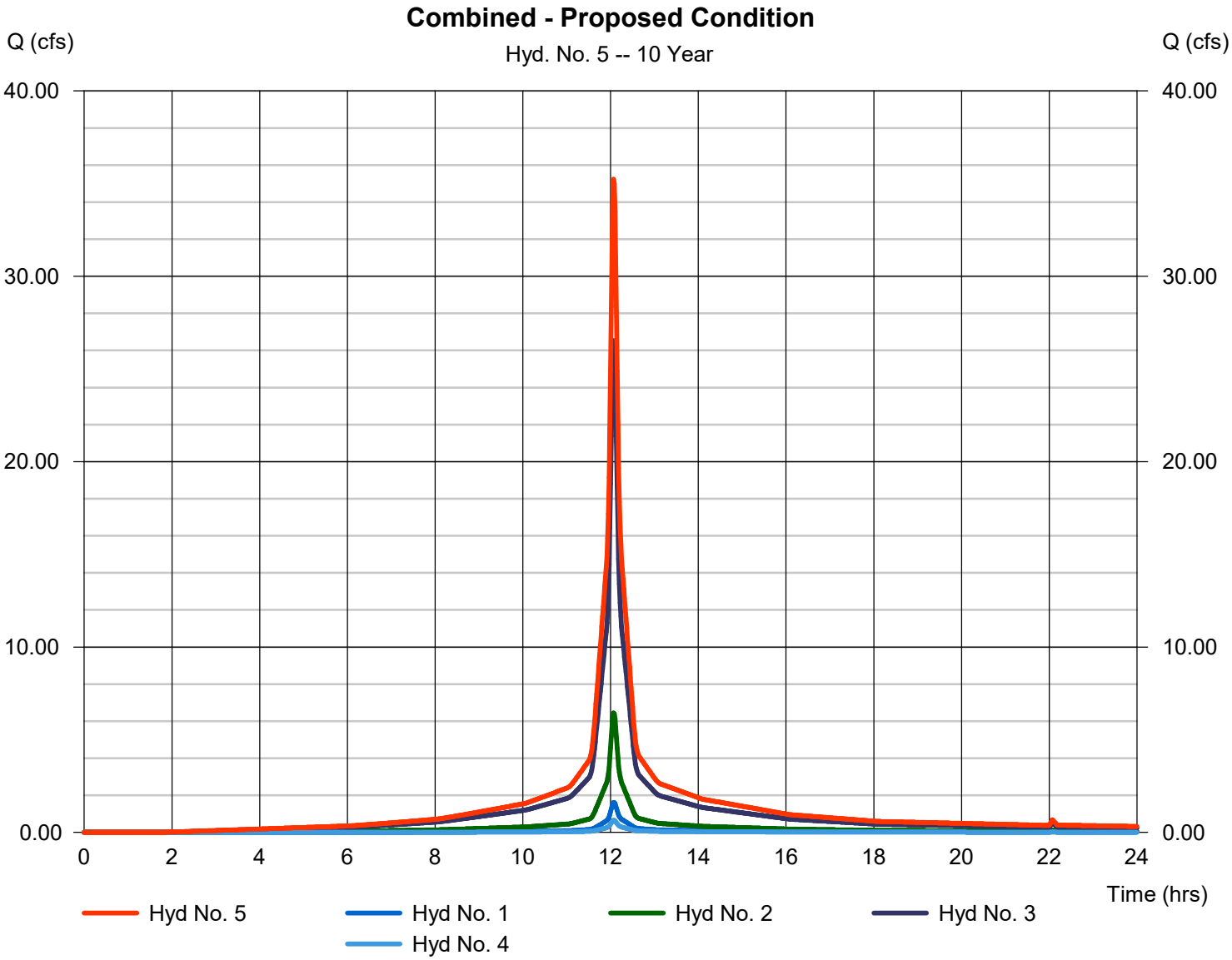
# Hydrograph Report



## Hyd. No. 5

Combined - Proposed Condition

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Combine | Peak discharge | = | 35.23 cfs |
| Storm frequency | = | 10 yrs | Time to peak | = | 12.07 hrs |
| Time interval | = | 1 min | Hyd. volume | = | 119,380 cuft |
| Inflow hyds. | = | 1, 2, 3, 4 | Contrib. drain. area | = | 7.300 ac |



# Hydrograph Summary Report

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

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SCS Runoff | 2.086 | 1 | 724 | 6,637 | ------ | ------ | ------ | PR-1 |
| 2 | SCS Runoff | 7.975 | 1 | 724 | 27,460 | ------ | ------ | ------ | PR-2 |
| 3 | SCS Runoff | 32.81 | 1 | 724 | 112,962 | ------ | ------ | ------ | PR-3 |
| 4 | SCS Runoff | 0.840 | 1 | 724 | 2,658 | ------ | ------ | ------ | PR-4 |
| 5 | Combine | 43.71 | 1 | 724 | 149,717 | 1, 2, 3, 4 | ------ | ------ | Combined - Proposed Condition |

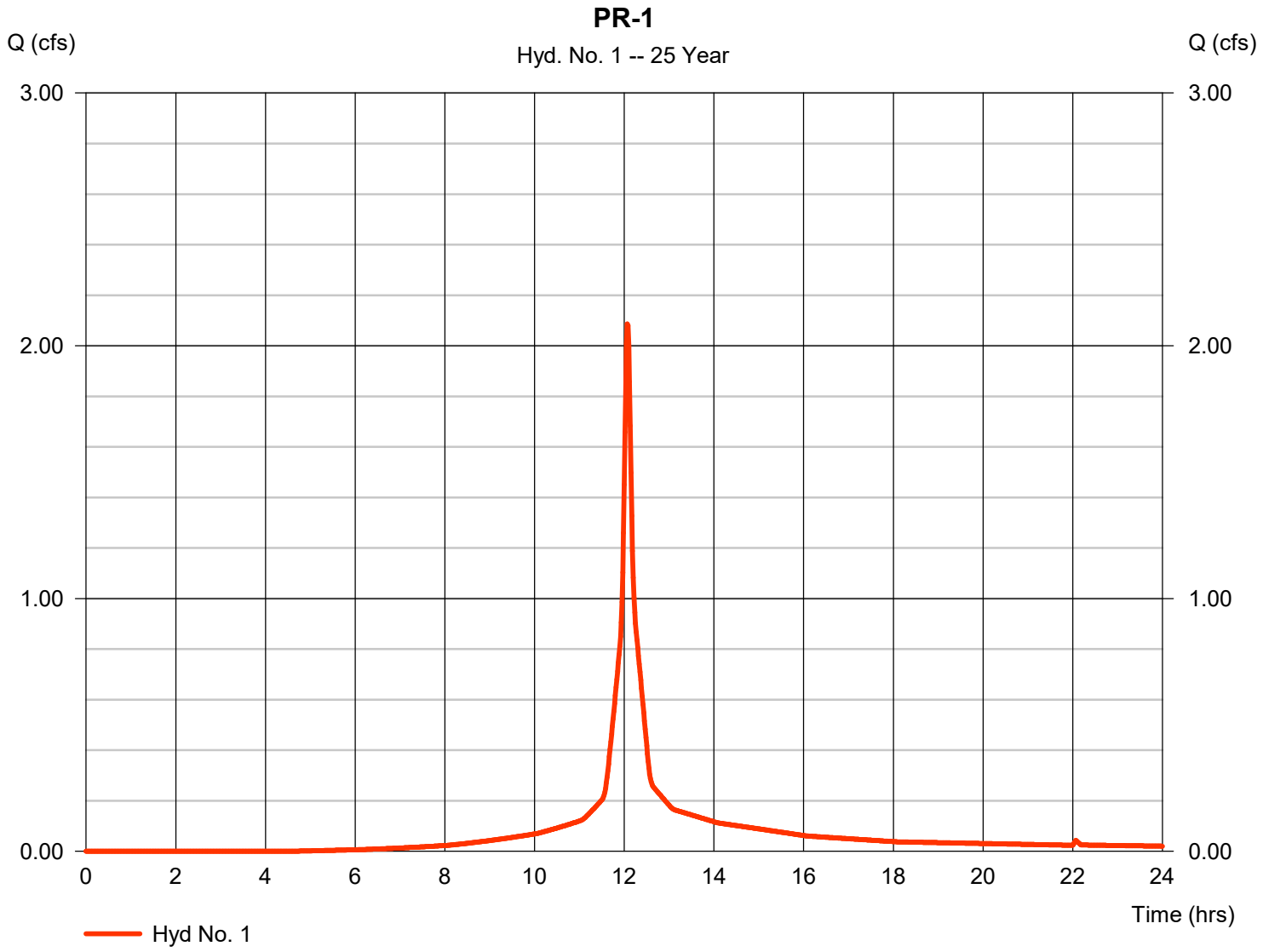
# Hydrograph Report



## Hyd. No. 1

PR-1

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 2.086 cfs |
| Storm frequency | = | 25 yrs | Time to peak | = | 12.07 hrs |
| Time interval | = | 1 min | Hyd. volume | = | 6,637 cuft |
| Drainage area | = | 0.390 ac | Curve number | = | 87 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 6.03 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



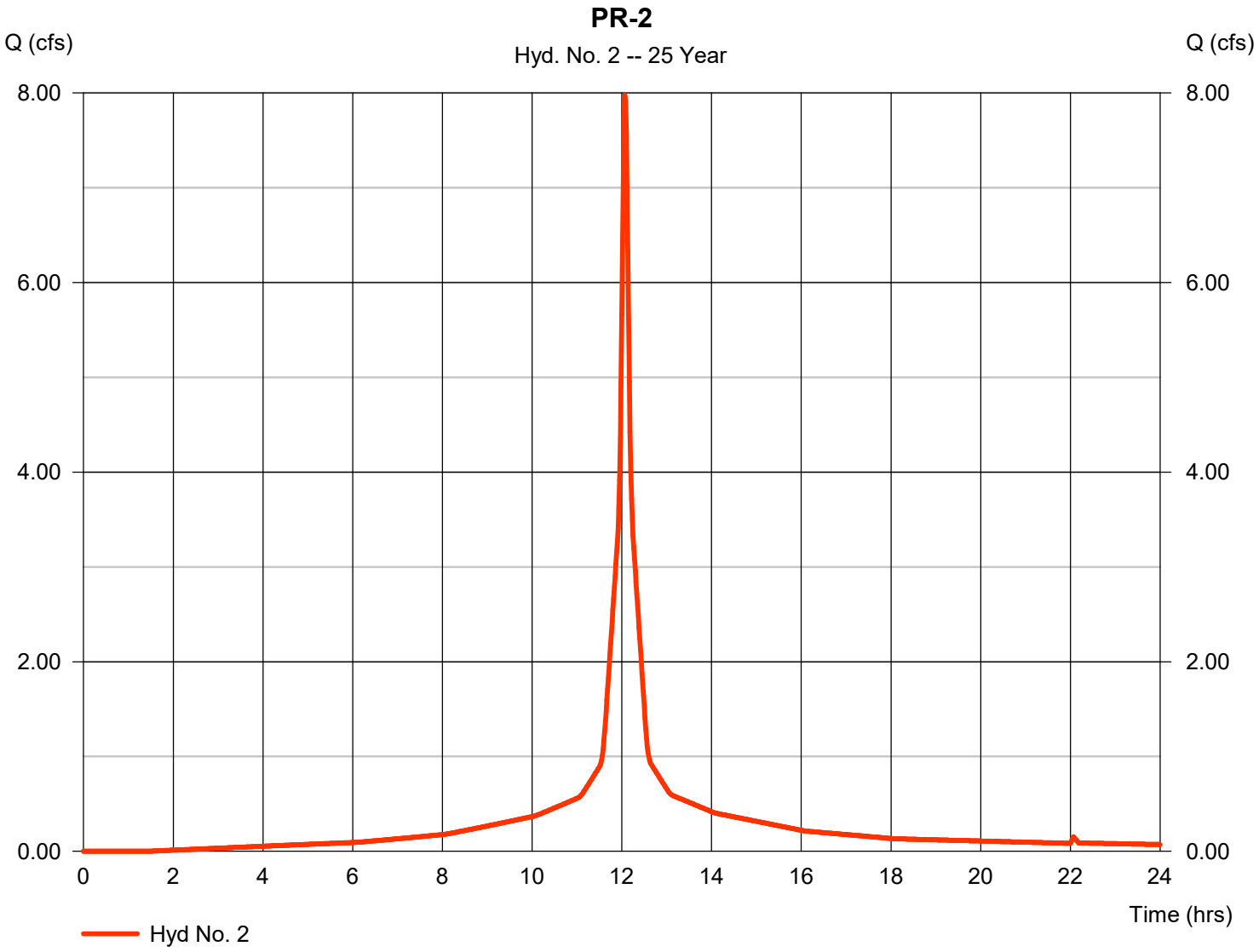
# Hydrograph Report



## Hyd. No. 2

PR-2

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 7.975 cfs |
| Storm frequency | = | 25 yrs | Time to peak | = | 12.07 hrs |
| Time interval | = | 1 min | Hyd. volume | = | 27,460 cuft |
| Drainage area | = | 1.320 ac | Curve number | = | 96 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 6.03 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



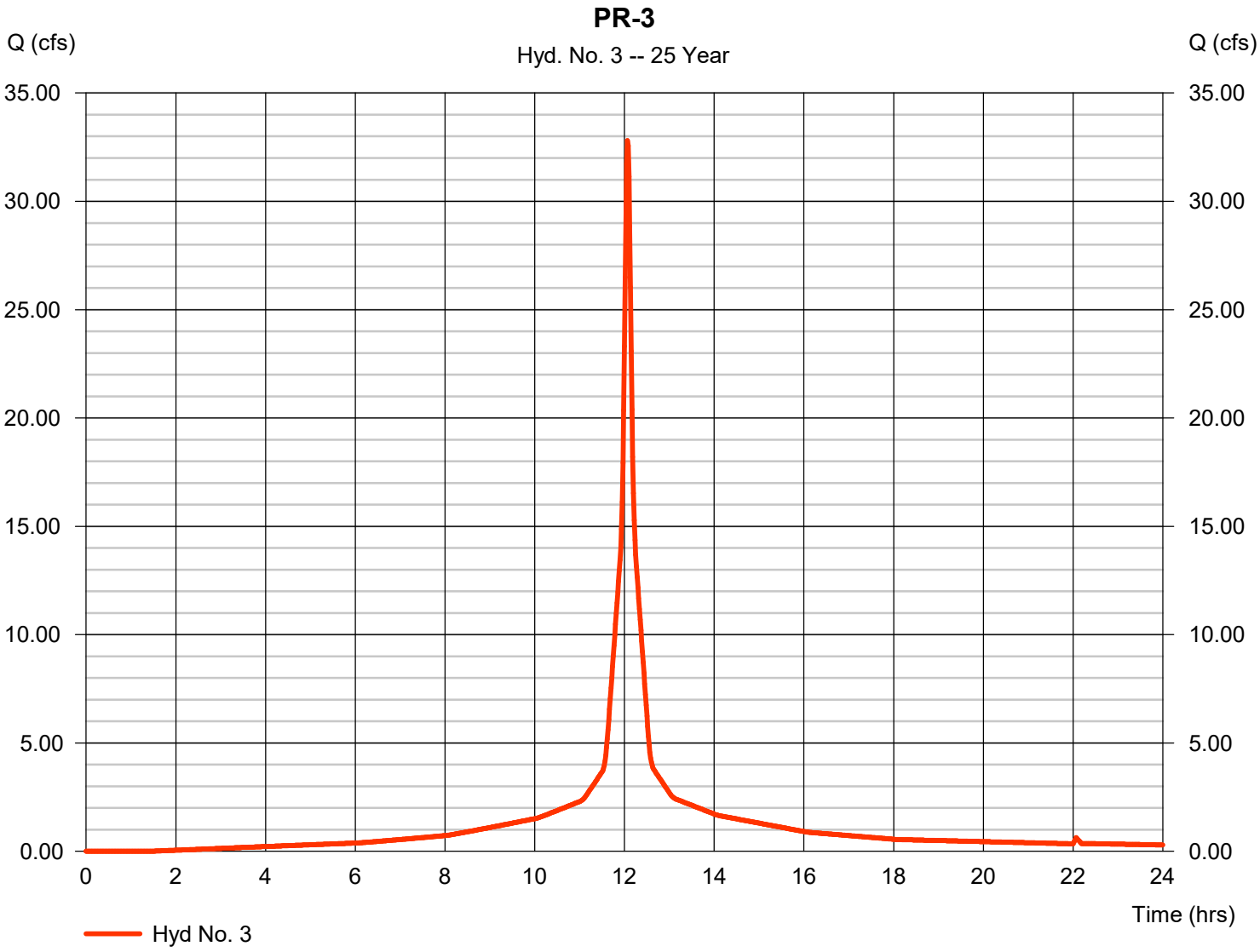
# Hydrograph Report



## Hyd. No. 3

PR-3

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 32.81 cfs |
| Storm frequency | = | 25 yrs | Time to peak | = | 12.07 hrs |
| Time interval | = | 1 min | Hyd. volume | = | 112,962 cuft |
| Drainage area | = | 5.430 ac | Curve number | = | 96 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 6.03 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



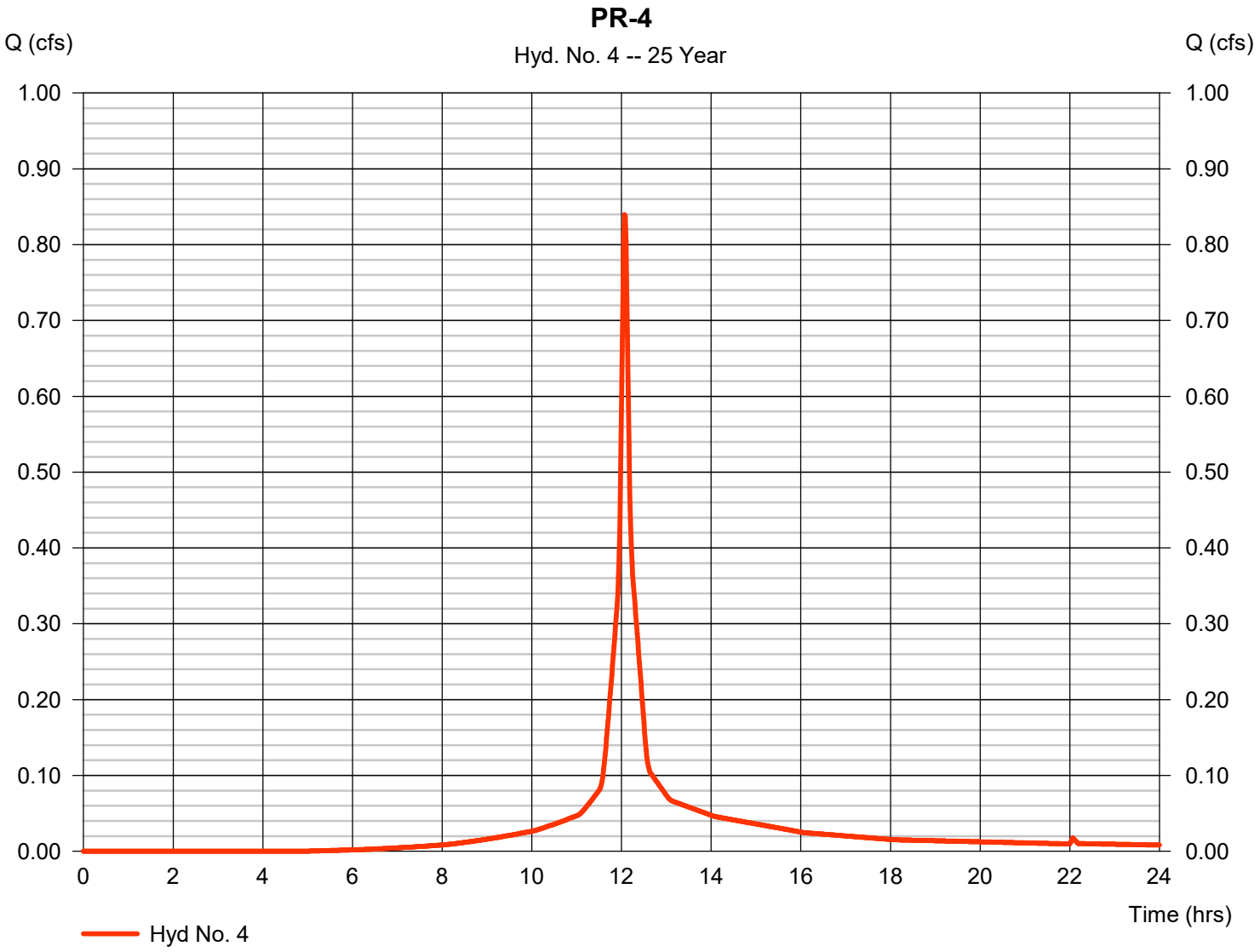
# Hydrograph Report



## Hyd. No. 4

PR-4

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 0.840 cfs |
| Storm frequency | = | 25 yrs | Time to peak | = | 12.07 hrs |
| Time interval | = | 1 min | Hyd. volume | = | 2,658 cuft |
| Drainage area | = | 0.160 ac | Curve number | = | 86 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 6.03 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



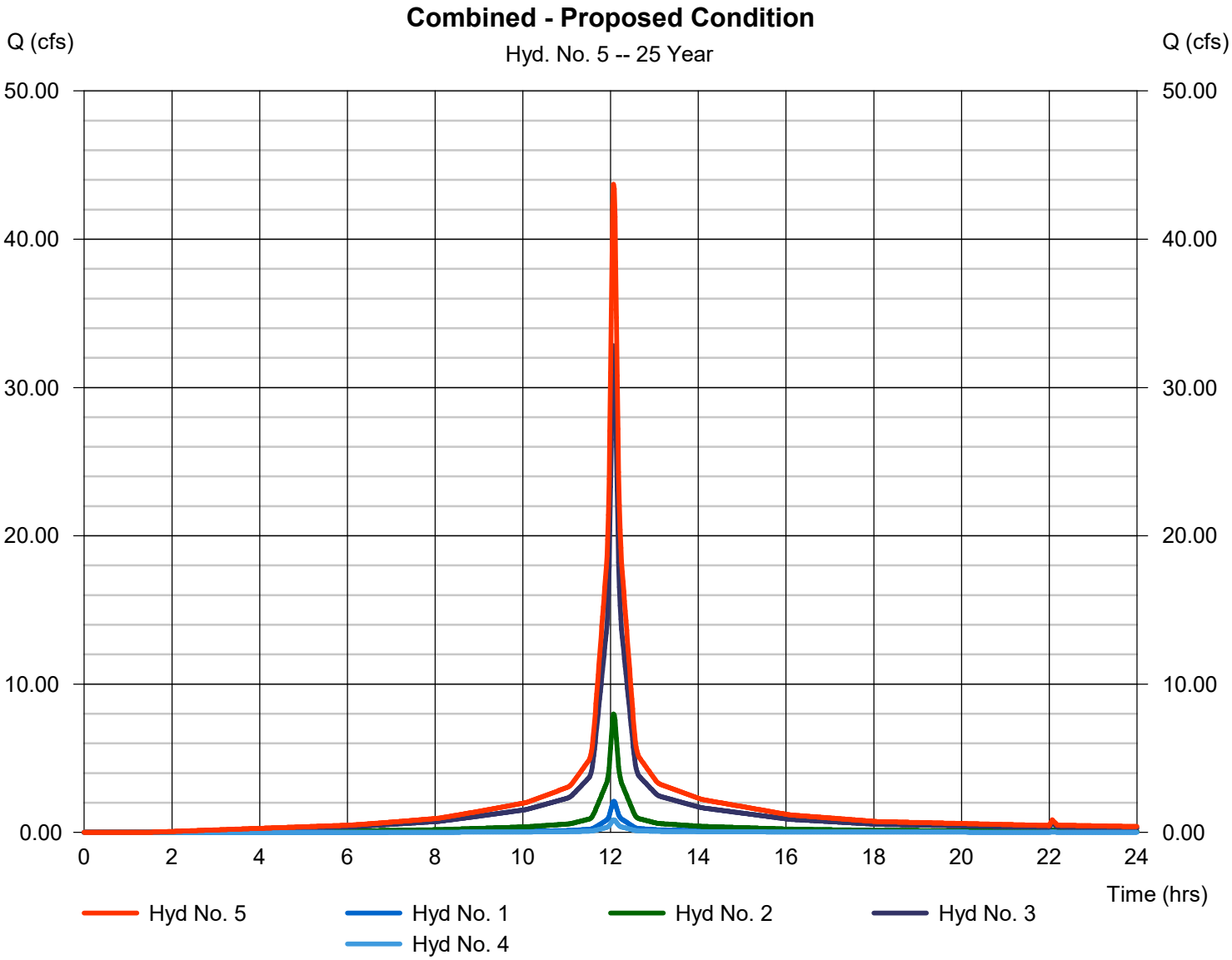
# Hydrograph Report



## Hyd. No. 5

Combined - Proposed Condition

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Combine | Peak discharge | = | 43.71 cfs |
| Storm frequency | = | 25 yrs | Time to peak | = | 12.07 hrs |
| Time interval | = | 1 min | Hyd. volume | = | 149,717 cuft |
| Inflow hyds. | = | 1, 2, 3, 4 | Contrib. drain. area | = | 7.300 ac |



# Hydrograph Summary Report

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

| Hyd. No. | Hydrograph type (origin) | Peak flow (cfs) | Time interval (min) | Time to Peak (min) | Hyd. volume (cuft) | Inflow hyd(s) | Maximum elevation (ft) | Total strge used (cuft) | Hydrograph Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | SCS Runoff | 2.812 | 1 | 724 | 9,090 | ------ | ------ | ------ | PR-1 |
| 2 | SCS Runoff | 10.34 | 1 | 724 | 36,029 | ------ | ------ | ------ | PR-2 |
| 3 | SCS Runoff | 42.53 | 1 | 724 | 148,212 | ------ | ------ | ------ | PR-3 |
| 4 | SCS Runoff | 1.138 | 1 | 724 | 3,659 | ------ | ------ | ------ | PR-4 |
| 5 | Combine | 56.81 | 1 | 724 | 196,989 | 1, 2, 3, 4 | ------ | ------ | Combined - Proposed Condition |

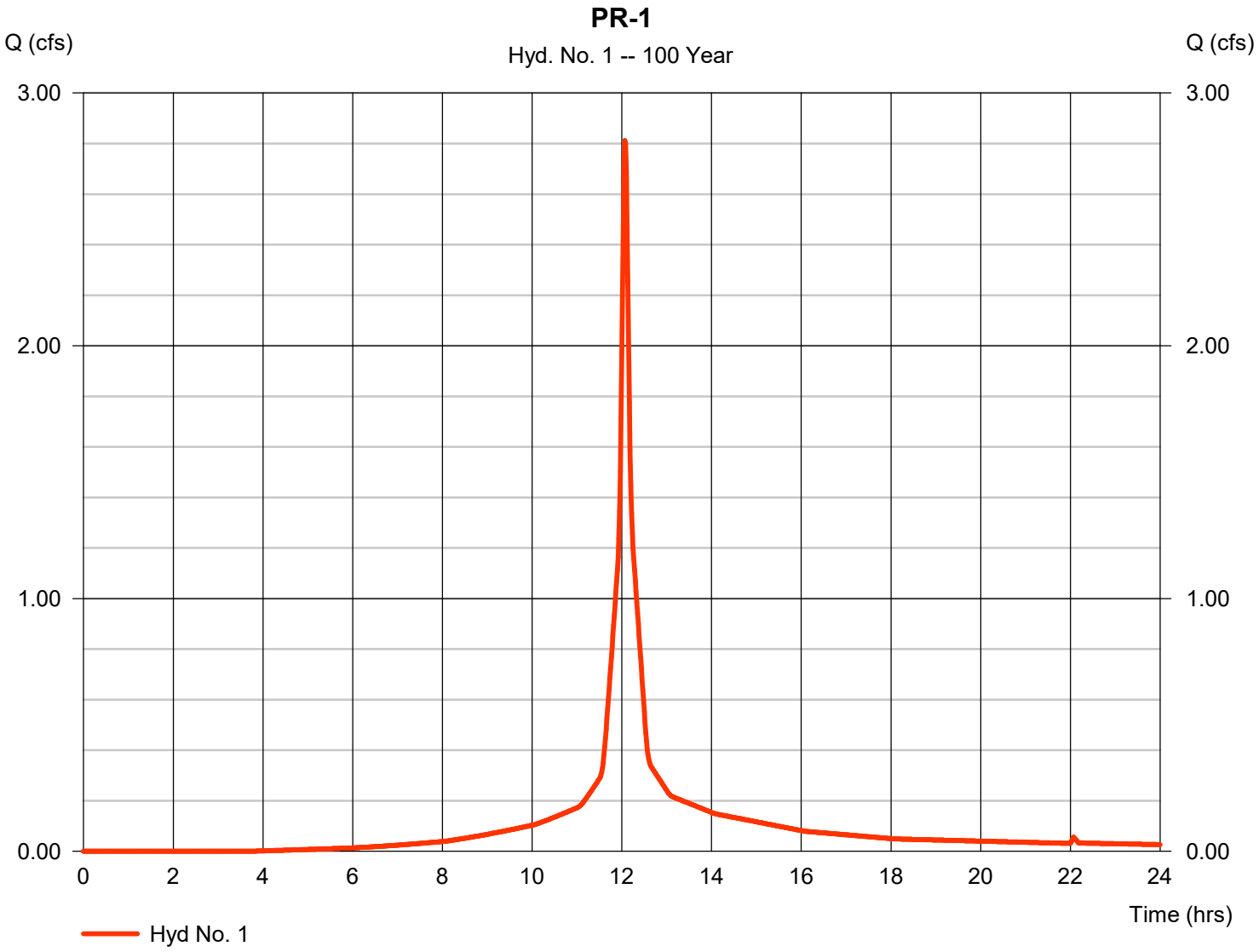
# Hydrograph Report



## Hyd. No. 1

PR-1

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 2.812 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 12.07 hrs |
| Time interval | = | 1 min | Hyd. volume | = | 9,090 cuft |
| Drainage area | = | 0.390 ac | Curve number | = | 87 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 7.77 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



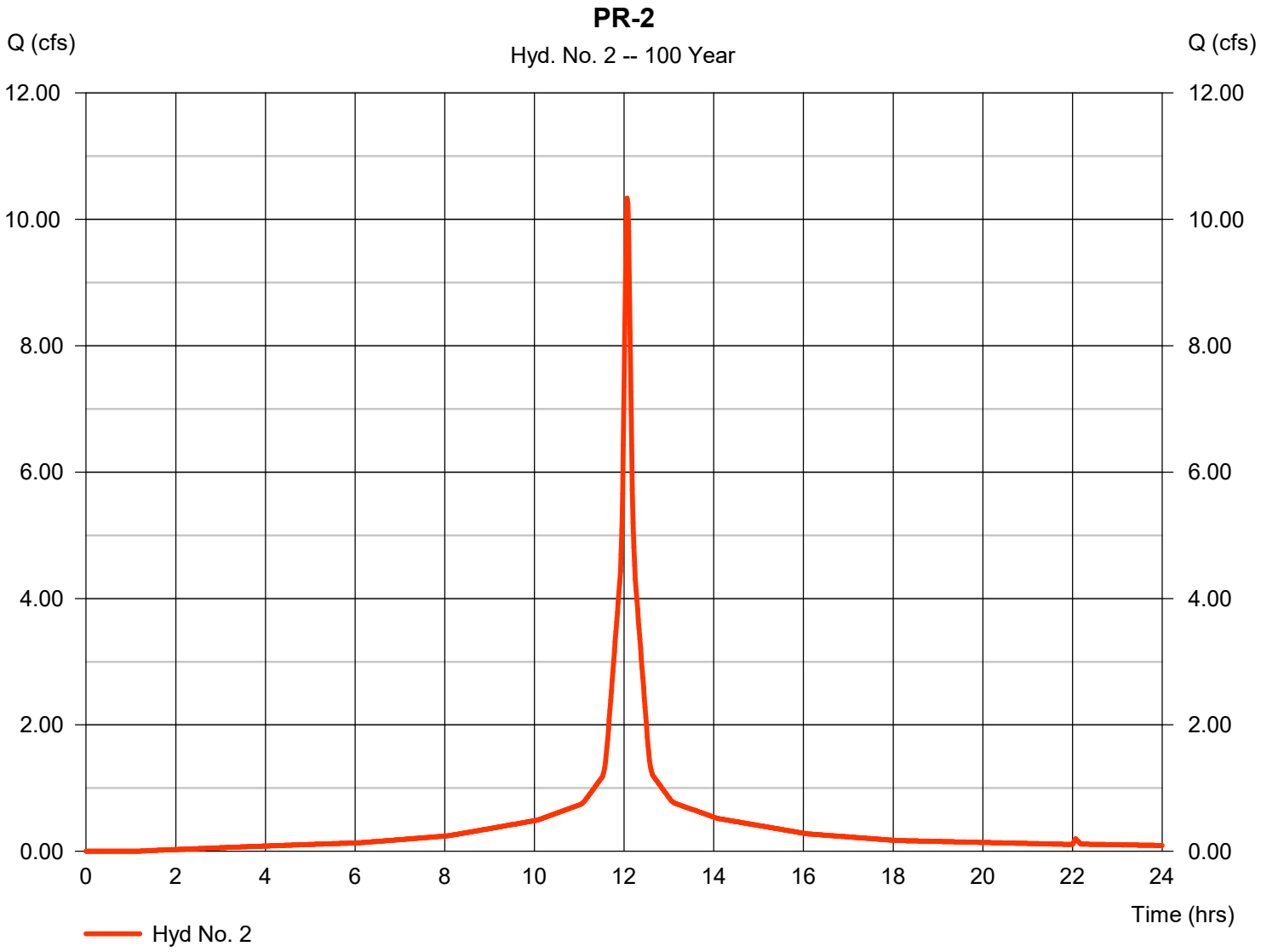
# Hydrograph Report



## Hyd. No. 2

PR-2

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 10.34 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 12.07 hrs |
| Time interval | = | 1 min | Hyd. volume | = | 36,029 cuft |
| Drainage area | = | 1.320 ac | Curve number | = | 96 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 7.77 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



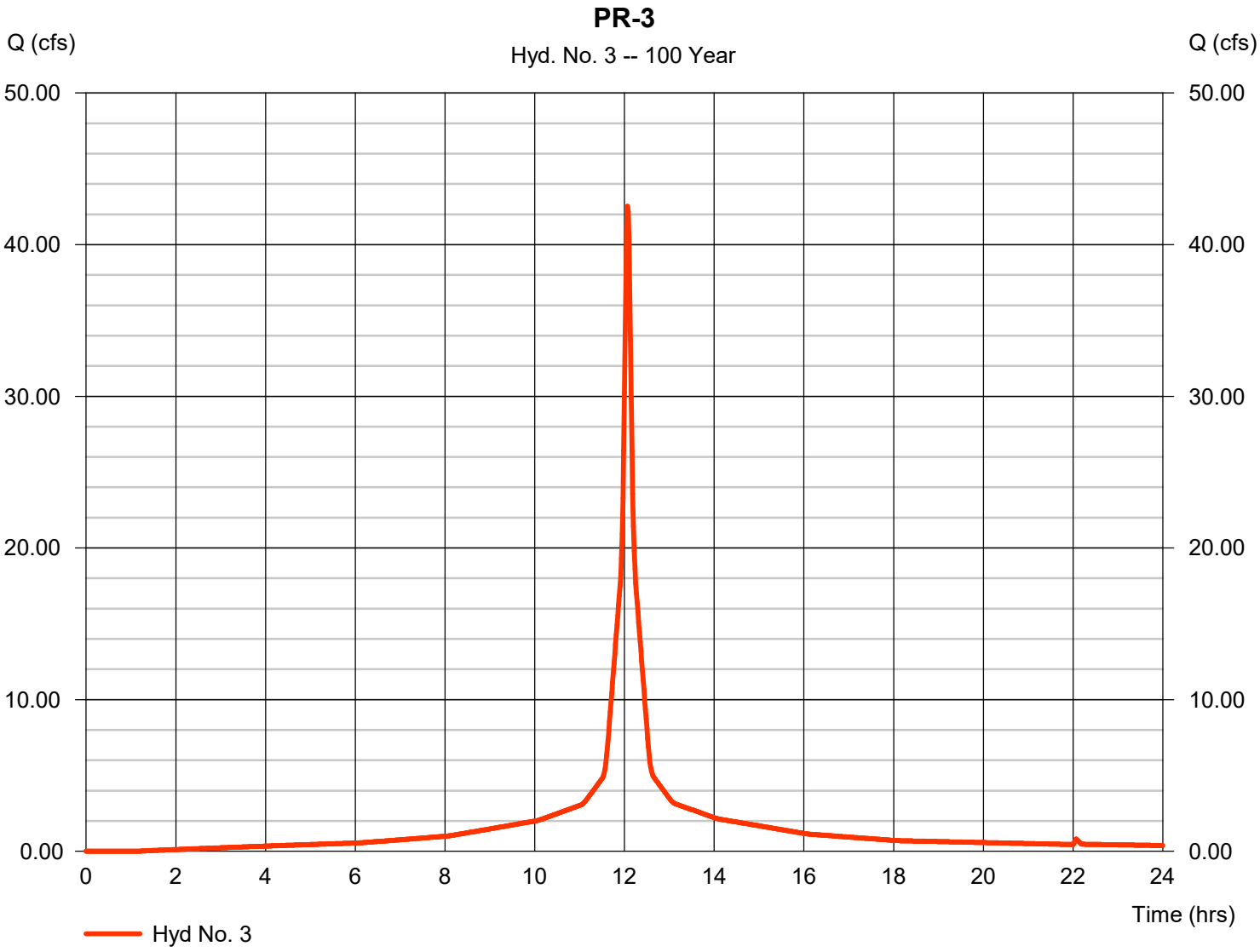
# Hydrograph Report



## Hyd. No. 3

PR-3

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 42.53 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 12.07 hrs |
| Time interval | = | 1 min | Hyd. volume | = | 148,212 cuft |
| Drainage area | = | 5.430 ac | Curve number | = | 96 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 7.77 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



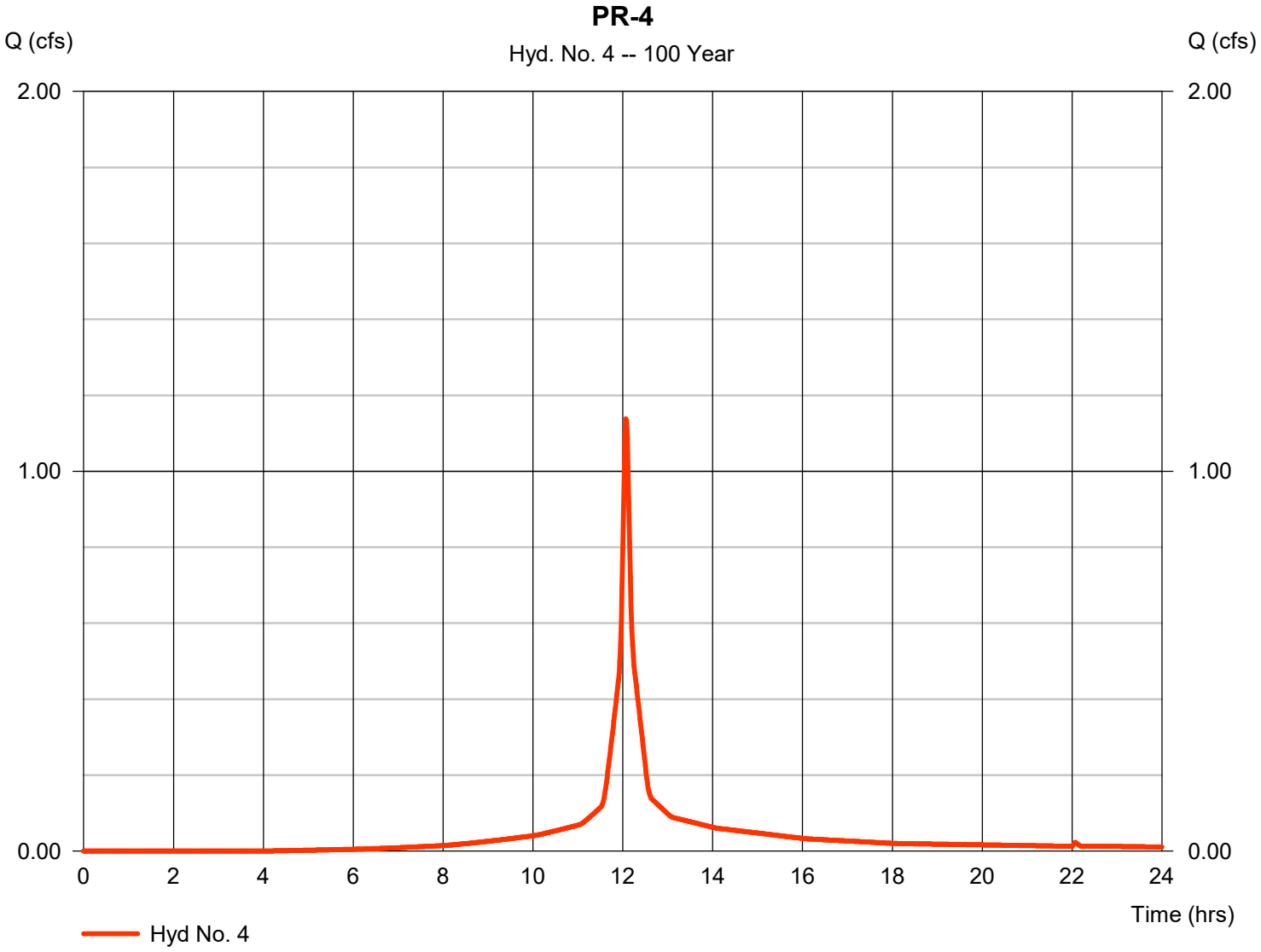
# Hydrograph Report



## Hyd. No. 4

PR-4

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | SCS Runoff | Peak discharge | = | 1.138 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 12.07 hrs |
| Time interval | = | 1 min | Hyd. volume | = | 3,659 cuft |
| Drainage area | = | 0.160 ac | Curve number | = | 86 |
| Basin Slope | = | 0.0 % | Hydraulic length | = | 0 ft |
| Tc method | = | User | Time of conc. (Tc) | = | 5.00 min |
| Total precip. | = | 7.77 in | Distribution | = | Type III |
| Storm duration | = | 24 hrs | Shape factor | = | 484 |



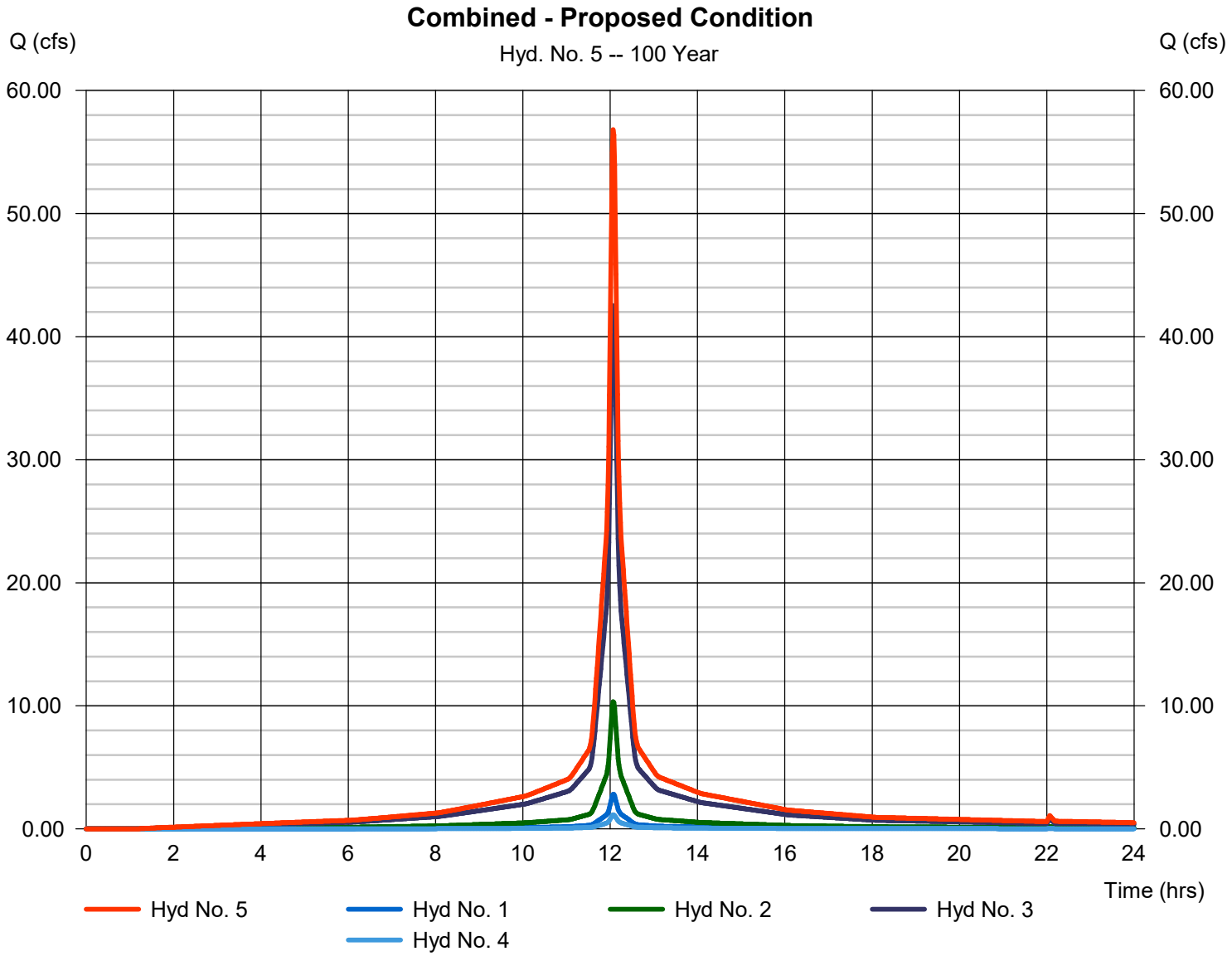
# Hydrograph Report



## Hyd. No. 5

Combined - Proposed Condition

| | | | | | |
|---|---|---|---|---|---|
| Hydrograph type | = | Combine | Peak discharge | = | 56.81 cfs |
| Storm frequency | = | 100 yrs | Time to peak | = | 12.07 hrs |
| Time interval | = | 1 min | Hyd. volume | = | 196,989 cuft |
| Inflow hyds. | = | 1, 2, 3, 4 | Contrib. drain. area | = | 7.300 ac |



# APPENDIX C

## Stormwater Collection System Calculations

Project **EVERGREEN WALK** By **IJAB** Date **3/10/2021**

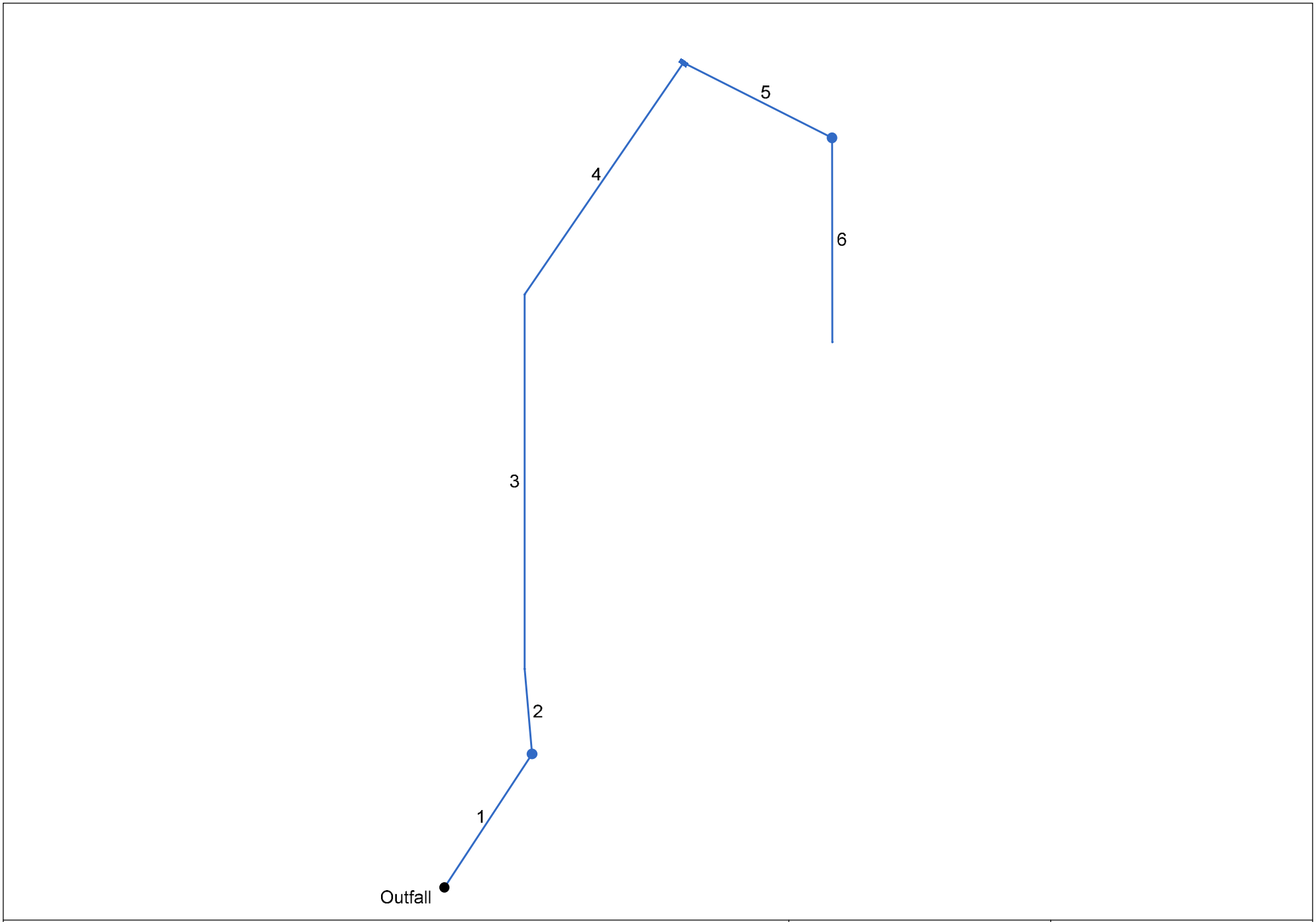
Location **South Windsor, CT** Checked **JEL** Date **3/10/2021**

Circle one: Present (Developed) Job No. **140222801**

1. Rational 'C' Runoff Coefficient & Area Calculations

| Catchment Area | Total Area | | Impervious (C=.9) | | Pervious (C=0.3) | | Percent Impervious | C |
|---|---|---|---|---|---|---|---|---|
| | SF | AC | SF | AC | SF | AC | | |
| CCB A-1 | 20,076 | 0.461 | 17,625 | 0.405 | 2,451 | 0.056 | 88% | 0.83 |
| CCB A-2 | 26,673 | 0.612 | 22,476 | 0.516 | 4,197 | 0.096 | 84% | 0.81 |
| CCB A-3 | 9,325 | 0.214 | 7,994 | 0.184 | 1,331 | 0.031 | 86% | 0.81 |
| TD A-1 | 1,970 | 0.045 | 1,579 | 0.036 | 391 | 0.009 | 80% | 0.78 |
| CCB B-1 | 19,099 | 0.438 | 10,055 | 0.231 | 9,044 | 0.208 | 53% | 0.62 |
| CCB B-2 | 2,306 | 0.053 | 2,306 | 0.053 | 0 | 0.000 | 100% | 0.90 |
| CCB B-3 | 7,452 | 0.171 | 6,432 | 0.148 | 1,020 | 0.023 | 86% | 0.82 |
| CCB B-4 | 6,012 | 0.138 | 4,771 | 0.110 | 1,241 | 0.028 | 79% | 0.78 |
| CCB B-5 | 9,134 | 0.210 | 6,796 | 0.156 | 2,338 | 0.054 | 74% | 0.75 |
| CCB B-6 | 12,046 | 0.277 | 8,124 | 0.187 | 3,922 | 0.090 | 67% | 0.70 |
| WQU B-1 | 32,575 | 0.748 | 29,847 | 0.685 | 2,728 | 0.063 | 92% | 0.85 |
| WQU B-2 | 9,855 | 0.226 | 9,789 | 0.225 | 66 | 0.002 | 99% | 0.90 |
| YD B-1 | 6,395 | 0.147 | 517 | 0.012 | 5,878 | 0.135 | 8% | 0.35 |
| YD B-2 | 3,615 | 0.083 | 152 | 0.003 | 3,463 | 0.079 | 4% | 0.33 |
| YD B-3 | 18,165 | 0.417 | 12,398 | 0.285 | 5,767 | 0.132 | 68% | 0.71 |
| YD B-4 | 3,759 | 0.086 | 3,017 | 0.069 | 742 | 0.017 | 80% | 0.78 |
| YD B-5 | 37,840 | 0.869 | 34,841 | 0.800 | 2,999 | 0.069 | 92% | 0.85 |
| YD B-6 | 4,526 | 0.104 | 4,167 | 0.096 | 359 | 0.008 | 92% | 0.85 |
| YD B-7 | 1,541 | 0.035 | 1,541 | 0.035 | 0 | 0.000 | 100% | 0.90 |
| TD B-1 | 1,724 | 0.040 | 1,724 | 0.040 | 0 | 0.000 | 100% | 0.90 |
| RL B-1 | 6,578 | 0.151 | 6,132 | 0.141 | 6,578 | 0.151 | 93% | 1.14 |
| RL B-2 | 6,000 | 0.138 | 6,000 | 0.138 | 0 | 0.000 | 100% | 0.90 |
| RL B-3 | 4,637 | 0.106 | 20,000 | 0.459 | 4,637 | 0.106 | 431% | 4.18 |
| RL B-4 | 7,300 | 0.168 | 7,300 | 0.168 | 0 | 0.000 | 100% | 0.90 |
| RL B-5 | 8,170 | 0.188 | 8,170 | 0.188 | 0 | 0.000 | 100% | 0.90 |
| RL B-6 | 8,082 | 0.186 | 8,082 | 0.186 | 1 | 0.000 | 100% | 0.90 |
| RL B-7 | 7,320 | 0.168 | 7,320 | 0.168 | 0 | 0.000 | 100% | 0.90 |
| RL B-8 | 4,647 | 0.107 | 4,647 | 0.107 | 0 | 0.000 | 100% | 0.90 |
| EX CB-1 | 5,567 | 0.128 | 4,850 | 0.111 | 717 | 0.016 | 87% | 0.82 |
| EX CB-2 | 7,200 | 0.165 | 5,391 | 0.124 | 1,809 | 0.042 | 75% | 0.75 |

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




| Project File: Network A.stm | Number of lines: 6 | Date: 6/8/2021 |
|---|---|---|

# Storm Sewer Summary Report



| Line No. | Line ID | Flow rate (cfs) | Line Size (in) | Line shape | Line length (ft) | Invert EL Dn (ft) | Invert EL Up (ft) | Line Slope (%) | HGL Down (ft) | HGL Up (ft) | Minor loss (ft) | HGL Junct (ft) | Dns Line No. | Junction Type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | PIPE-39 | 7.18 | 18 | Cir | 72.784 | 110.03 | 113.01 | 4.094 | 111.53 | 114.05 | n/a | 114.05 j | End | Manhole |
| 2 | PIPE-20 | 7.21 | 18 | Cir | 39.044 | 113.01 | 115.26 | 5.770 | 114.05 | 116.30 | n/a | 116.30 | 1 | Grate |
| 3 | PIPE-2 | 6.16 | 15 | Cir | 170.893 | 115.51 | 117.24 | 1.012 | 116.41 | 118.24 | 0.49 | 118.24 | 2 | Grate |
| 4 | PIPE-49 | 2.87 | 12 | Cir | 128.110 | 117.51 | 118.84 | 1.040 | 118.24 | 119.56 | n/a | 119.56 j | 3 | Grate |
| 5 | PIPE-47 | 0.25 | 8 | Cir | 75.802 | 118.84 | 119.60 | 1.000 | 119.56 | 119.83 | n/a | 119.83 j | 4 | Manhole |
| 6 | PIPE-46 | 0.26 | 6 | Cir | 93.261 | 119.60 | 120.53 | 1.000 | 119.83 | 120.78 | 0.10 | 120.78 | 5 | Grate |

Project File: Network A.stm | Number of lines: 6 | Run Date: 6/8/2021

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

# Storm Sewer Tabulation



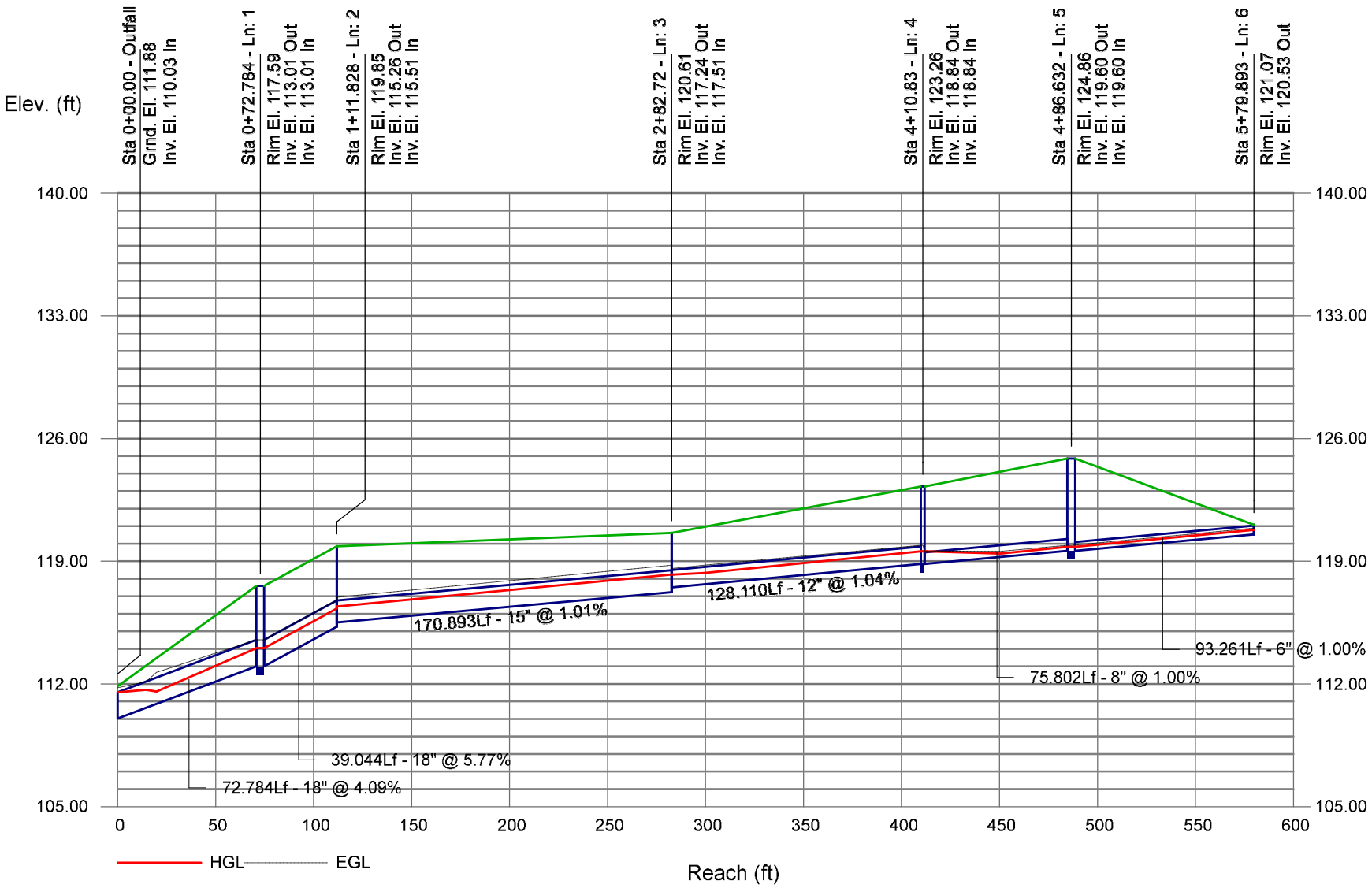
| Station | | Len | Drng Area | | Rnoff coeff | Area x C | | Tc | | Rain (I) | Total flow | Cap full | Vel | Pipe | | Invert Elev | | HGL Elev | | Grnd / Rim Elev | | Line ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Line | To Line | (ft) | Incr (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 | 72.784 | 0.00 | 1.33 | 0.00 | 0.00 | 1.09 | 0.0 | 7.4 | 6.6 | 7.18 | 18.41 | 4.79 | 18 | 4.09 | 110.03 | 113.01 | 111.53 | 114.05 | 111.88 | 117.59 | PIPE-39 |
| 2 | 1 | 39.044 | 0.21 | 1.33 | 0.81 | 0.17 | 1.09 | 5.0 | 7.3 | 6.6 | 7.21 | 27.33 | 5.53 | 18 | 5.77 | 113.01 | 115.26 | 114.05 | 116.30 | 117.59 | 119.85 | PIPE-20 |
| 3 | 2 | 170.893 | 0.61 | 1.12 | 0.81 | 0.50 | 0.91 | 5.0 | 6.8 | 6.7 | 6.16 | 7.04 | 6.15 | 15 | 1.01 | 115.51 | 117.24 | 116.41 | 118.24 | 119.85 | 120.61 | PIPE-2 |
| 4 | 3 | 128.110 | 0.46 | 0.51 | 0.83 | 0.38 | 0.42 | 5.0 | 6.4 | 6.9 | 2.87 | 3.93 | 4.68 | 12 | 1.04 | 117.51 | 118.84 | 118.24 | 119.56 | 120.61 | 123.26 | PIPE-49 |
| 5 | 4 | 75.802 | 0.00 | 0.05 | 0.00 | 0.00 | 0.04 | 0.0 | 5.6 | 7.1 | 0.25 | 1.31 | 1.52 | 8 | 1.00 | 118.84 | 119.60 | 119.56 | 119.83 | 123.26 | 124.86 | PIPE-47 |
| 6 | 5 | 93.261 | 0.05 | 0.05 | 0.78 | 0.04 | 0.04 | 5.0 | 5.0 | 7.2 | 0.26 | 0.61 | 2.72 | 6 | 1.00 | 119.60 | 120.53 | 119.83 | 120.78 | 124.86 | 121.07 | PIPE-46 |

Project File: Network A.stm | Number of lines: 6 | Run Date: 6/8/2021

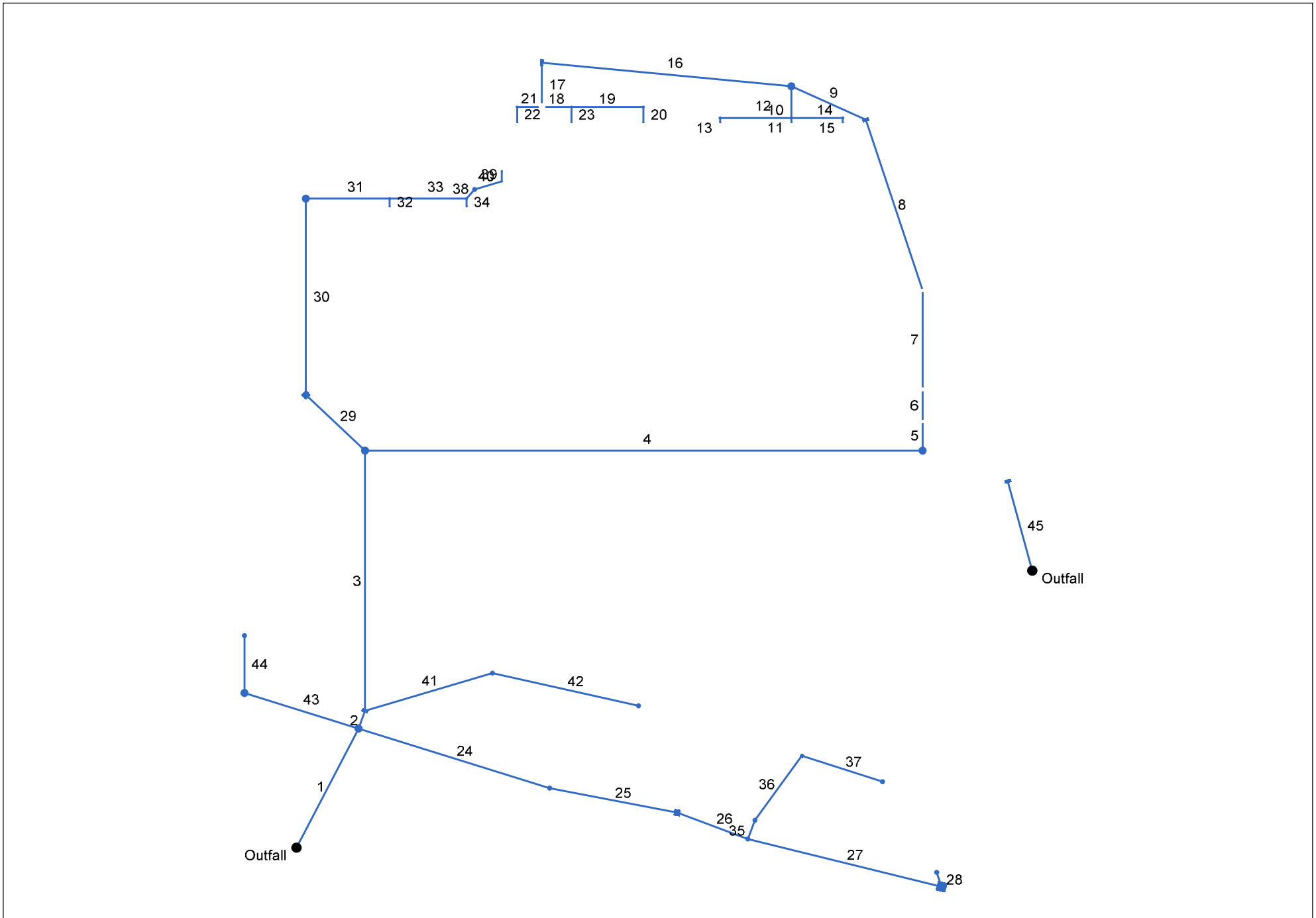
NOTES:Intensity = 88.24 / (Inlet time + 15.50) ^ 0.83; Return period =Yrs. 10 ; c = cir e = ellip b = box

# Storm Sewer Profile

Proj. file: Network A.stm



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




| Project File: Network B.stm | Number of lines: 45 | Date: 6/8/2021 |
|---|---|---|

# Storm Sewer Summary Report



| Line No. | Line ID | Flow rate (cfs) | Line Size (in) | Line shape | Line length (ft) | Invert EL Dn (ft) | Invert EL Up (ft) | Line Slope (%) | HGL Down (ft) | HGL Up (ft) | Minor loss (ft) | HGL Junct (ft) | Dns Line No. | Junction Type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | PIPE-40 | 25.99 | 24 | Cir | 87.891 | 109.21 | 110.13 | 1.047 | 111.21 | 112.10 | 1.07 | 113.17 | End | Manhole |
| 2 | PIPE-28 | 19.77 | 24 | Cir | 12.361 | 112.31 | 112.43 | 0.971 | 113.69 | 114.03 | 1.05 | 114.03 | 1 | Grate |
| 3 | PIPE-73 | 11.52 | 24 | Cir | 170.427 | 112.43 | 114.13 | 0.997 | 114.03 | 115.35 | n/a | 115.35 j | 2 | Manhole |
| 4 | PIPE-110 | 10.06 | 18 | Cir | 363.416 | 114.13 | 117.77 | 1.002 | 115.35 | 118.99 | 0.66 | 118.99 | 3 | Manhole |
| 5 | PIPE-94 | 10.09 | 18 | Cir | 19.000 | 118.27 | 118.46 | 1.000 | 119.37 | 119.68 | 0.33 | 119.68 | 4 | Grate |
| 6 | PIPE-72 | 9.10 | 18 | Cir | 21.000 | 118.46 | 118.67 | 1.000 | 119.68 | 119.84 | n/a | 119.84 j | 5 | Grate |
| 7 | PIPE-60 | 9.04 | 18 | Cir | 65.000 | 118.67 | 119.32 | 1.000 | 119.84 | 120.48 | n/a | 120.48 j | 6 | Grate |
| 8 | PIPE-59 | 8.86 | 15 | Cir | 117.605 | 119.32 | 120.49 | 0.995 | 120.57* | 122.46* | 0.94 | 123.40 | 7 | Grate |
| 9 | PIPE-96 | 7.12 | 15 | Cir | 53.141 | 120.49 | 121.02 | 0.997 | 123.40* | 123.95* | 0.52 | 124.47 | 8 | Manhole |
| 10 | PIPE-103 (1) | 3.10 | 12 | Cir | 20.700 | 124.65 | 124.86 | 1.014 | 125.33 | 125.61 | 0.37 | 125.61 | 9 | Manhole |
| 11 | PIPE-103 | 1.14 | 8 | Cir | 2.810 | 125.33 | 125.36 | 1.068 | 125.80 | 125.87 | 0.25 | 125.87 | 10 | Grate |
| 12 | PIPE-117 | 1.27 | 8 | Cir | 46.598 | 124.86 | 125.33 | 1.009 | 125.61 | 125.99 | 0.21 | 126.19 | 10 | Manhole |
| 13 | PIPE-116 | 1.28 | 8 | Cir | 2.810 | 125.33 | 125.36 | 1.068 | 126.19* | 126.22* | 0.21 | 126.43 | 12 | Grate |
| 14 | PIPE-104 | 0.74 | 8 | Cir | 33.407 | 124.94 | 125.27 | 0.988 | 125.61 | 125.68 | n/a | 125.85 j | 10 | Manhole |
| 15 | PIPE-102 | 0.74 | 8 | Cir | 2.810 | 125.27 | 125.30 | 1.068 | 125.85 | 125.71 | n/a | 125.71 | 14 | Grate |
| 16 | PIPE-95 | 4.48 | 15 | Cir | 163.365 | 121.02 | 122.66 | 1.004 | 124.47* | 125.14* | 0.31 | 125.45 | 9 | Grate |
| 17 | PIPE-100 | 3.08 | 12 | Cir | 28.913 | 123.16 | 123.45 | 1.003 | 125.45* | 125.64* | 0.24 | 125.88 | 16 | Manhole |
| 18 | PIPE-99 | 2.37 | 8 | Cir | 19.199 | 123.85 | 124.04 | 0.990 | 125.88* | 126.51* | 0.72 | 127.22 | 17 | Manhole |
| 19 | PIPE-115 | 1.27 | 8 | Cir | 46.844 | 124.04 | 125.12 | 2.306 | 127.22* | 127.66* | 0.21 | 127.87 | 18 | Manhole |
| 20 | PIPE-114 | 1.28 | 8 | Cir | 10.000 | 125.12 | 125.22 | 1.000 | 127.87* | 127.97* | 0.21 | 128.17 | 19 | Grate |
| 21 | PIPE-101 | 0.73 | 8 | Cir | 16.217 | 124.25 | 124.41 | 0.987 | 125.88* | 125.93* | 0.07 | 126.00 | 17 | Manhole |
| 22 | PIPE-97 | 0.74 | 8 | Cir | 10.000 | 124.41 | 124.70 | 2.900 | 126.00* | 126.03* | 0.07 | 126.10 | 21 | Grate |
| 23 | PIPE-98 | 1.14 | 8 | Cir | 10.000 | 124.40 | 124.70 | 3.000 | 127.22* | 127.30* | 0.17 | 127.46 | 18 | Grate |
| 24 | PIPE-35 | 6.54 | 24 | Cir | 130.589 | 110.13 | 111.24 | 0.850 | 113.17 | 113.24 | 0.03 | 113.27 | 1 | Grate |

Project File: Network B.stm | Number of lines: 45 | Run Date: 6/8/2021

NOTES: Return period = 10 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

# Storm Sewer Summary Report



| Line No. | Line ID | Flow rate (cfs) | Line Size (in) | Line shape | Line length (ft) | Invert EL Dn (ft) | Invert EL Up (ft) | Line Slope (%) | HGL Down (ft) | HGL Up (ft) | Minor loss (ft) | HGL Junct (ft) | Dns Line No. | Junction Type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 | PIPE-81 | 5.83 | 18 | Cir | 84.594 | 111.34 | 112.29 | 1.123 | 113.27 | 113.43 | 0.05 | 113.48 | 24 | Manhole |
| 26 | PIPE-80 | 5.90 | 15 | Cir | 49.272 | 112.39 | 113.24 | 1.725 | 113.48 | 114.22 | n/a | 114.22 j | 25 | Grate |
| 27 | PIPE-79 | 1.04 | 15 | Cir | 130.054 | 116.69 | 122.81 | 4.706 | 116.91 | 123.21 | 0.15 | 123.21 | 26 | Manhole |
| 28 | PIPE-78 | 1.04 | 12 | Cir | 9.990 | 123.13 | 123.23 | 1.001 | 123.48 | 123.66 | 0.16 | 123.66 | 27 | Grate |
| 29 | PIPE-108 | 2.25 | 12 | Cir | 53.094 | 118.32 | 118.85 | 0.998 | 118.87 | 119.49 | n/a | 119.49 | 3 | Manhole |
| 30 | PIPE-107 | 2.33 | 12 | Cir | 128.501 | 118.85 | 120.13 | 0.996 | 119.49 | 120.78 | 0.29 | 120.78 | 29 | Manhole |
| 31 | PIPE-106 (1) | 2.37 | 12 | Cir | 54.606 | 120.13 | 120.68 | 1.007 | 120.78 | 121.34 | 0.29 | 121.34 | 30 | Manhole |
| 32 | PIPE-109 | 1.01 | 8 | Cir | 5.000 | 122.47 | 122.57 | 2.000 | 122.82 | 123.05 | n/a | 123.05 | 31 | Grate |
| 33 | PIPE-106 | 1.44 | 12 | Cir | 50.058 | 120.68 | 121.18 | 0.999 | 121.34 | 121.69 | n/a | 121.69 j | 31 | Manhole |
| 34 | PIPE-105 | 0.94 | 8 | Cir | 5.000 | 121.97 | 122.57 | 12.000 | 122.18 | 123.03 | 0.21 | 123.03 | 33 | Grate |
| 35 | PIPE-58 | 4.14 | 12 | Cir | 13.138 | 119.51 | 119.64 | 0.989 | 120.51 | 120.64 | 0.22 | 120.86 | 26 | Grate |
| 36 | PIPE-57 | 2.70 | 12 | Cir | 52.099 | 119.64 | 120.73 | 2.092 | 120.86 | 121.43 | n/a | 121.43 j | 35 | Grate |
| 37 | PIPE-55 | 2.23 | 12 | Cir | 55.287 | 120.73 | 121.91 | 2.134 | 121.43 | 122.55 | n/a | 122.55 j | 36 | Grate |
| 38 | PIPE-113 | 0.53 | 6 | Cir | 7.972 | 121.18 | 121.26 | 1.003 | 121.69 | 121.74 | 0.10 | 121.84 | 33 | Grate |
| 39 | PIPE-112 | 0.27 | 6 | Cir | 18.461 | 121.26 | 121.44 | 0.975 | 121.84 | 121.87 | 0.03 | 121.90 | 38 | Manhole |
| 40 | PIPE-111 | 0.27 | 6 | Cir | 6.596 | 121.44 | 121.51 | 1.061 | 121.90 | 121.77 | 0.10 | 121.77 | 39 | Manhole |
| 41 | PIPE-74 | 6.01 | 15 | Cir | 86.598 | 117.59 | 118.54 | 1.097 | 118.45 | 119.53 | n/a | 119.53 | 2 | Grate |
| 42 | PIPE-24 | 5.52 | 15 | Cir | 97.671 | 118.54 | 120.14 | 1.638 | 119.53 | 121.09 | n/a | 121.09 j | 41 | Grate |
| 43 | PIPE-76 | 0.81 | 12 | Cir | 77.894 | 110.13 | 110.91 | 1.001 | 113.17* | 113.21* | 0.02 | 113.22 | 1 | Manhole |
| 44 | PIPE-75 | 0.81 | 12 | Cir | 37.609 | 113.81 | 115.69 | 4.999 | 114.02 | 116.07 | n/a | 116.07 | 43 | Grate |
| 45 | PIPE-56 | 0.34 | 8 | Cir | 60.801 | 125.22 | 126.50 | 2.105 | 125.89 | 126.77 | n/a | 126.77 j | End | Grate |

Project File: Network B.stm | Number of lines: 45 | Run Date: 6/8/2021

NOTES: Return period = 10 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

# 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 | 87.891 | 0.00 | 5.54 | 0.00 | 0.00 | 4.40 | 0.0 | 8.4 | 5.9 | 25.99 | 25.07 | 8.28 | 24 | 1.05 | 109.21 | 110.13 | 111.21 | 112.10 | 111.49 | 118.55 | PIPE-40 |
| 2 | 1 | 12.361 | 0.75 | 4.19 | 0.85 | 0.64 | 3.34 | 5.0 | 8.4 | 5.9 | 19.77 | 24.14 | 7.96 | 24 | 0.97 | 112.31 | 112.43 | 113.69 | 114.03 | 118.55 | 121.24 | PIPE-28 |
| 3 | 2 | 170.427 | 0.00 | 2.47 | 0.00 | 0.00 | 1.88 | 0.0 | 7.8 | 6.1 | 11.52 | 24.47 | 5.02 | 24 | 1.00 | 112.43 | 114.13 | 114.03 | 115.35 | 121.24 | 125.91 | PIPE-73 |
| 4 | 3 | 363.416 | 0.00 | 2.10 | 0.00 | 0.00 | 1.55 | 0.0 | 6.9 | 6.5 | 10.06 | 11.39 | 6.54 | 18 | 1.00 | 114.13 | 117.77 | 115.35 | 118.99 | 125.91 | 127.34 | PIPE-110 |
| 5 | 4 | 19.000 | 0.21 | 2.10 | 0.75 | 0.16 | 1.55 | 5.0 | 6.8 | 6.5 | 10.09 | 11.38 | 6.91 | 18 | 1.00 | 118.27 | 118.46 | 119.37 | 119.68 | 127.34 | 126.93 | PIPE-94 |
| 6 | 5 | 21.000 | 0.08 | 1.89 | 0.33 | 0.03 | 1.39 | 5.0 | 6.8 | 6.5 | 9.10 | 11.38 | 6.04 | 18 | 1.00 | 118.46 | 118.67 | 119.68 | 119.84 | 126.93 | 127.65 | PIPE-72 |
| 7 | 6 | 65.000 | 0.15 | 1.81 | 0.35 | 0.05 | 1.37 | 5.0 | 6.6 | 6.6 | 9.04 | 11.38 | 6.14 | 18 | 1.00 | 118.67 | 119.32 | 119.84 | 120.48 | 127.65 | 127.56 | PIPE-60 |
| 8 | 7 | 117.605 | 0.44 | 1.66 | 0.61 | 0.27 | 1.31 | 5.0 | 6.3 | 6.7 | 8.86 | 6.98 | 7.22 | 15 | 0.99 | 119.32 | 120.49 | 120.57 | 122.46 | 127.56 | 127.26 | PIPE-59 |
| 9 | 8 | 53.141 | 0.00 | 1.22 | 0.00 | 0.00 | 1.04 | 0.0 | 6.2 | 6.8 | 7.12 | 6.99 | 5.81 | 15 | 1.00 | 120.49 | 121.02 | 123.40 | 123.95 | 127.26 | 127.96 | PIPE-96 |
| 10 | 9 | 20.700 | 0.00 | 0.47 | 0.00 | 0.00 | 0.42 | 0.0 | 5.2 | 7.3 | 3.10 | 3.89 | 5.19 | 12 | 1.01 | 124.65 | 124.86 | 125.33 | 125.61 | 127.96 | 128.15 | PIPE-103 (1) |
| 11 | 10 | 2.810 | 0.17 | 0.17 | 0.90 | 0.15 | 0.15 | 5.0 | 5.0 | 7.5 | 1.14 | 1.35 | 4.18 | 8 | 1.07 | 125.33 | 125.36 | 125.80 | 125.87 | 128.15 | 128.07 | PIPE-103 |
| 12 | 10 | 46.598 | 0.00 | 0.19 | 0.00 | 0.00 | 0.17 | 0.0 | 5.0 | 7.5 | 1.27 | 1.31 | 3.66 | 8 | 1.01 | 124.86 | 125.33 | 125.61 | 125.99 | 128.15 | 128.15 | PIPE-117 |
| 13 | 12 | 2.810 | 0.19 | 0.19 | 0.90 | 0.17 | 0.17 | 5.0 | 5.0 | 7.5 | 1.28 | 1.35 | 3.66 | 8 | 1.07 | 125.33 | 125.36 | 126.19 | 126.22 | 128.15 | 128.07 | PIPE-116 |
| 14 | 10 | 33.407 | 0.00 | 0.11 | 0.00 | 0.00 | 0.10 | 0.0 | 5.0 | 7.5 | 0.74 | 1.30 | 2.70 | 8 | 0.99 | 124.94 | 125.27 | 125.61 | 125.68 | 128.15 | 128.00 | PIPE-104 |
| 15 | 14 | 2.810 | 0.11 | 0.11 | 0.90 | 0.10 | 0.10 | 5.0 | 5.0 | 7.5 | 0.74 | 1.35 | 2.81 | 8 | 1.07 | 125.27 | 125.30 | 125.85 | 125.71 | 128.00 | 128.01 | PIPE-102 |
| 16 | 9 | 163.365 | 0.28 | 0.75 | 0.71 | 0.20 | 0.62 | 5.0 | 5.4 | 7.2 | 4.48 | 7.01 | 3.65 | 15 | 1.00 | 121.02 | 122.66 | 124.47 | 125.14 | 127.96 | 126.55 | PIPE-95 |
| 17 | 16 | 28.913 | 0.00 | 0.47 | 0.00 | 0.00 | 0.42 | 0.0 | 5.3 | 7.3 | 3.08 | 3.86 | 3.92 | 12 | 1.00 | 123.16 | 123.45 | 125.45 | 125.64 | 126.55 | 127.20 | PIPE-100 |
| 18 | 17 | 19.199 | 0.00 | 0.36 | 0.00 | 0.00 | 0.32 | 0.0 | 5.3 | 7.3 | 2.37 | 1.30 | 6.78 | 8 | 0.99 | 123.85 | 124.04 | 125.88 | 126.51 | 127.20 | 127.20 | PIPE-99 |
| 19 | 18 | 46.844 | 0.00 | 0.19 | 0.00 | 0.00 | 0.17 | 0.0 | 5.0 | 7.4 | 1.27 | 1.99 | 3.64 | 8 | 2.31 | 124.04 | 125.12 | 127.22 | 127.66 | 127.20 | 127.84 | PIPE-115 |
| 20 | 19 | 10.000 | 0.19 | 0.19 | 0.90 | 0.17 | 0.17 | 5.0 | 5.0 | 7.5 | 1.28 | 1.31 | 3.66 | 8 | 1.00 | 125.12 | 125.22 | 127.87 | 127.97 | 127.84 | 127.93 | PIPE-114 |
| 21 | 17 | 16.217 | 0.00 | 0.11 | 0.00 | 0.00 | 0.10 | 0.0 | 5.1 | 7.4 | 0.73 | 1.30 | 2.10 | 8 | 0.99 | 124.25 | 124.41 | 125.88 | 125.93 | 127.20 | 127.20 | PIPE-101 |
| 22 | 21 | 10.000 | 0.11 | 0.11 | 0.90 | 0.10 | 0.10 | 5.0 | 5.0 | 7.5 | 0.74 | 2.23 | 2.12 | 8 | 2.90 | 124.41 | 124.70 | 126.00 | 126.03 | 127.20 | 127.84 | PIPE-97 |

Project File: Network B.stm | Number of lines: 45 | Run Date: 6/8/2021

NOTES:Intensity = 35.55 / (Inlet time + 3.80) ^ 0.72; Return period =Yrs. 10 ; c = cir e = ellip b = box

# Storm Sewer Tabulation

| Station | | Len | Drng Area | | Rnoff coeff | Area x C | | Tc | | Rain (I) | Total flow | Cap full | Vel | Pipe | | Invert Elev | | HGL Elev | | Grnd / Rim Elev | | Line ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Line | To Line | (ft) | Incr (ac) | Total (ac) | (C) | Incr | Total | Inlet (min) | Syst (min) | (in/hr) | (cfs) | (cfs) | (ft/s) | Size (in) | Slope (%) | Dn (ft) | Up (ft) | Dn (ft) | Up (ft) | Dn (ft) | Up (ft) | |
| 23 | 18 | 10.000 | 0.17 | 0.17 | 0.90 | 0.15 | 0.15 | 5.0 | 5.0 | 7.5 | 1.14 | 2.27 | 3.27 | 8 | 3.00 | 124.40 | 124.70 | 127.22 | 127.30 | 127.20 | 127.84 | PIPE-98 |
| 24 | 1 | 130.589 | 0.17 | 1.21 | 0.75 | 0.13 | 0.95 | 5.0 | 6.0 | 6.9 | 6.54 | 22.59 | 2.08 | 24 | 0.85 | 110.13 | 111.24 | 113.17 | 113.24 | 118.55 | 113.01 | PIPE-35 |
| 25 | 24 | 84.594 | 0.00 | 1.04 | 0.00 | 0.00 | 0.82 | 0.0 | 5.6 | 7.1 | 5.83 | 12.06 | 3.67 | 18 | 1.12 | 111.34 | 112.29 | 113.27 | 113.43 | 113.01 | 121.05 | PIPE-81 |
| 26 | 25 | 49.272 | 0.13 | 1.04 | 0.82 | 0.11 | 0.82 | 5.0 | 5.5 | 7.2 | 5.90 | 9.19 | 5.45 | 15 | 1.73 | 112.39 | 113.24 | 113.48 | 114.22 | 121.05 | 122.06 | PIPE-80 |
| 27 | 26 | 130.054 | 0.00 | 0.17 | 0.00 | 0.00 | 0.14 | 0.0 | 5.0 | 7.4 | 1.04 | 15.18 | 5.06 | 15 | 4.71 | 116.69 | 122.81 | 116.91 | 123.21 | 122.06 | 126.77 | PIPE-79 |
| 28 | 27 | 9.990 | 0.17 | 0.17 | 0.82 | 0.14 | 0.14 | 5.0 | 5.0 | 7.5 | 1.04 | 3.86 | 3.70 | 12 | 1.00 | 123.13 | 123.23 | 123.48 | 123.66 | 126.77 | 126.48 | PIPE-78 |
| 29 | 3 | 53.094 | 0.00 | 0.37 | 0.00 | 0.00 | 0.33 | 0.0 | 6.3 | 6.8 | 2.25 | 3.85 | 4.66 | 12 | 1.00 | 118.32 | 118.85 | 118.87 | 119.49 | 125.91 | 126.10 | PIPE-108 |
| 30 | 29 | 128.501 | 0.00 | 0.37 | 0.00 | 0.00 | 0.33 | 0.0 | 5.8 | 7.0 | 2.33 | 3.85 | 4.34 | 12 | 1.00 | 118.85 | 120.13 | 119.49 | 120.78 | 126.10 | 124.91 | PIPE-107 |
| 31 | 30 | 54.606 | 0.00 | 0.37 | 0.00 | 0.00 | 0.33 | 0.0 | 5.6 | 7.1 | 2.37 | 3.87 | 4.34 | 12 | 1.01 | 120.13 | 120.68 | 120.78 | 121.34 | 124.91 | 125.18 | PIPE-106 (1) |
| 32 | 31 | 5.000 | 0.15 | 0.15 | 0.90 | 0.14 | 0.14 | 5.0 | 5.0 | 7.5 | 1.01 | 1.85 | 4.60 | 8 | 2.00 | 122.47 | 122.57 | 122.82 | 123.05 | 125.18 | 125.28 | PIPE-109 |
| 33 | 31 | 50.058 | 0.00 | 0.22 | 0.00 | 0.00 | 0.20 | 0.0 | 5.3 | 7.3 | 1.44 | 3.86 | 3.11 | 12 | 1.00 | 120.68 | 121.18 | 121.34 | 121.69 | 125.18 | 125.18 | PIPE-106 |
| 34 | 33 | 5.000 | 0.14 | 0.14 | 0.90 | 0.13 | 0.13 | 5.0 | 5.0 | 7.5 | 0.94 | 4.53 | 6.95 | 8 | 12.00 | 121.97 | 122.57 | 122.18 | 123.03 | 125.18 | 126.86 | PIPE-105 |
| 35 | 26 | 13.138 | 0.23 | 0.74 | 0.90 | 0.21 | 0.58 | 5.0 | 5.4 | 7.2 | 4.14 | 3.84 | 5.28 | 12 | 0.99 | 119.51 | 119.64 | 120.51 | 120.64 | 122.06 | 122.63 | PIPE-58 |
| 36 | 35 | 52.099 | 0.09 | 0.51 | 0.78 | 0.07 | 0.37 | 5.0 | 5.2 | 7.3 | 2.70 | 5.58 | 4.00 | 12 | 2.09 | 119.64 | 120.73 | 120.86 | 121.43 | 122.63 | 123.69 | PIPE-57 |
| 37 | 36 | 55.287 | 0.42 | 0.42 | 0.71 | 0.30 | 0.30 | 5.0 | 5.0 | 7.5 | 2.23 | 5.64 | 3.99 | 12 | 2.13 | 120.73 | 121.91 | 121.43 | 122.55 | 123.69 | 123.59 | PIPE-55 |
| 38 | 33 | 7.972 | 0.04 | 0.08 | 0.90 | 0.04 | 0.07 | 5.0 | 5.3 | 7.3 | 0.53 | 0.61 | 2.69 | 6 | 1.00 | 121.18 | 121.26 | 121.69 | 121.74 | 125.18 | 124.56 | PIPE-113 |
| 39 | 38 | 18.461 | 0.00 | 0.04 | 0.00 | 0.00 | 0.04 | 0.0 | 5.1 | 7.4 | 0.27 | 0.60 | 1.43 | 6 | 0.98 | 121.26 | 121.44 | 121.84 | 121.87 | 124.56 | 124.39 | PIPE-112 |
| 40 | 39 | 6.596 | 0.04 | 0.04 | 0.90 | 0.04 | 0.04 | 5.0 | 5.0 | 7.5 | 0.27 | 0.63 | 2.00 | 6 | 1.06 | 121.44 | 121.51 | 121.90 | 121.77 | 124.39 | 122.05 | PIPE-111 |
| 41 | 2 | 86.598 | 0.10 | 0.97 | 0.85 | 0.09 | 0.82 | 5.0 | 5.3 | 7.3 | 6.01 | 7.33 | 6.21 | 15 | 1.10 | 117.59 | 118.54 | 118.45 | 119.53 | 121.24 | 122.81 | PIPE-74 |
| 42 | 41 | 97.671 | 0.87 | 0.87 | 0.85 | 0.74 | 0.74 | 5.0 | 5.0 | 7.5 | 5.52 | 8.95 | 5.40 | 15 | 1.64 | 118.54 | 120.14 | 119.53 | 121.09 | 122.81 | 121.00 | PIPE-24 |
| 43 | 1 | 77.894 | 0.00 | 0.14 | 0.00 | 0.00 | 0.11 | 0.0 | 5.1 | 7.4 | 0.81 | 3.86 | 1.03 | 12 | 1.00 | 110.13 | 110.91 | 113.17 | 113.21 | 118.55 | 117.68 | PIPE-76 |
| 44 | 43 | 37.609 | 0.14 | 0.14 | 0.78 | 0.11 | 0.11 | 5.0 | 5.0 | 7.5 | 0.81 | 8.63 | 4.95 | 12 | 5.00 | 113.81 | 115.69 | 114.02 | 116.07 | 117.68 | 118.80 | PIPE-75 |

Project File: Network B.stm | Number of lines: 45 | Run Date: 6/8/2021

NOTES:Intensity = 35.55 / (Inlet time + 3.80) ^ 0.72; Return period =Yrs. 10 ; c = cir e = ellip b = box

# Storm Sewer Tabulation

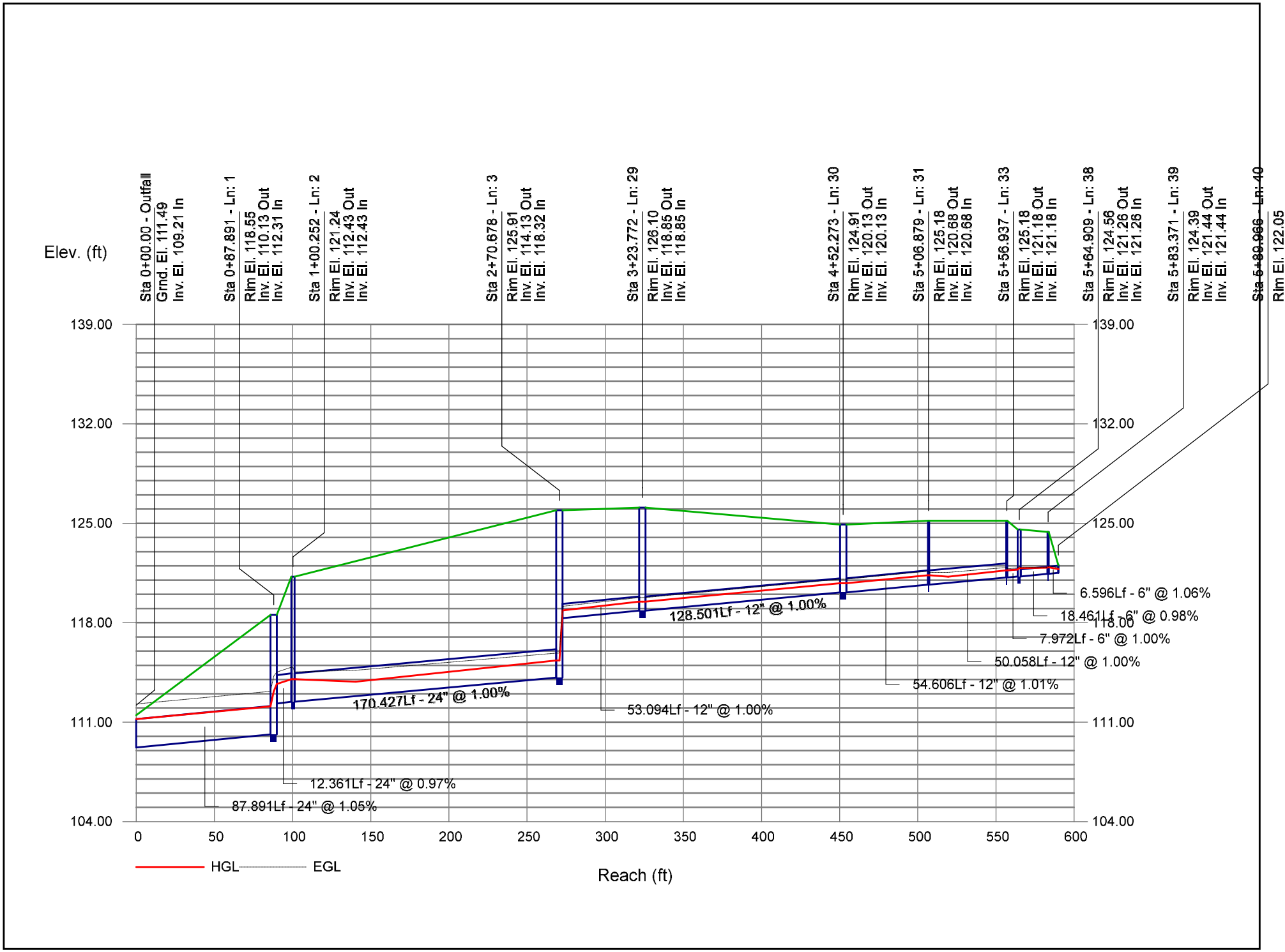
| Station | | Len | Drng Area | | Rnoff coeff | Area x C | | Tc | | Rain (I) | Total flow | Cap full | Vel | Pipe | | Invert Elev | | HGL Elev | | Grnd / Rim Elev | | Line ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Line | To Line | (ft) | Incr (ac) | Total (ac) | (C) | Incr | Total | Inlet (min) | Syst (min) | (in/hr) | (cfs) | (cfs) | (ft/s) | Size (in) | Slope (%) | Dn (ft) | Up (ft) | Dn (ft) | Up (ft) | Dn (ft) | Up (ft) | |
| 45 | End | 60.801 | 0.05 | 0.05 | 0.90 | 0.05 | 0.05 | 5.0 | 5.0 | 7.5 | 0.34 | 1.90 | 1.76 | 8 | 2.11 | 125.22 | 126.50 | 125.89 | 126.77 | 125.97 | 129.45 | PIPE-56 |

Project File: Network B.stm | Number of lines: 45 | Run Date: 6/8/2021

NOTES:Intensity = 35.55 / (Inlet time + 3.80) ^ 0.72; Return period =Yrs. 10 ; c = cir e = ellip b = box

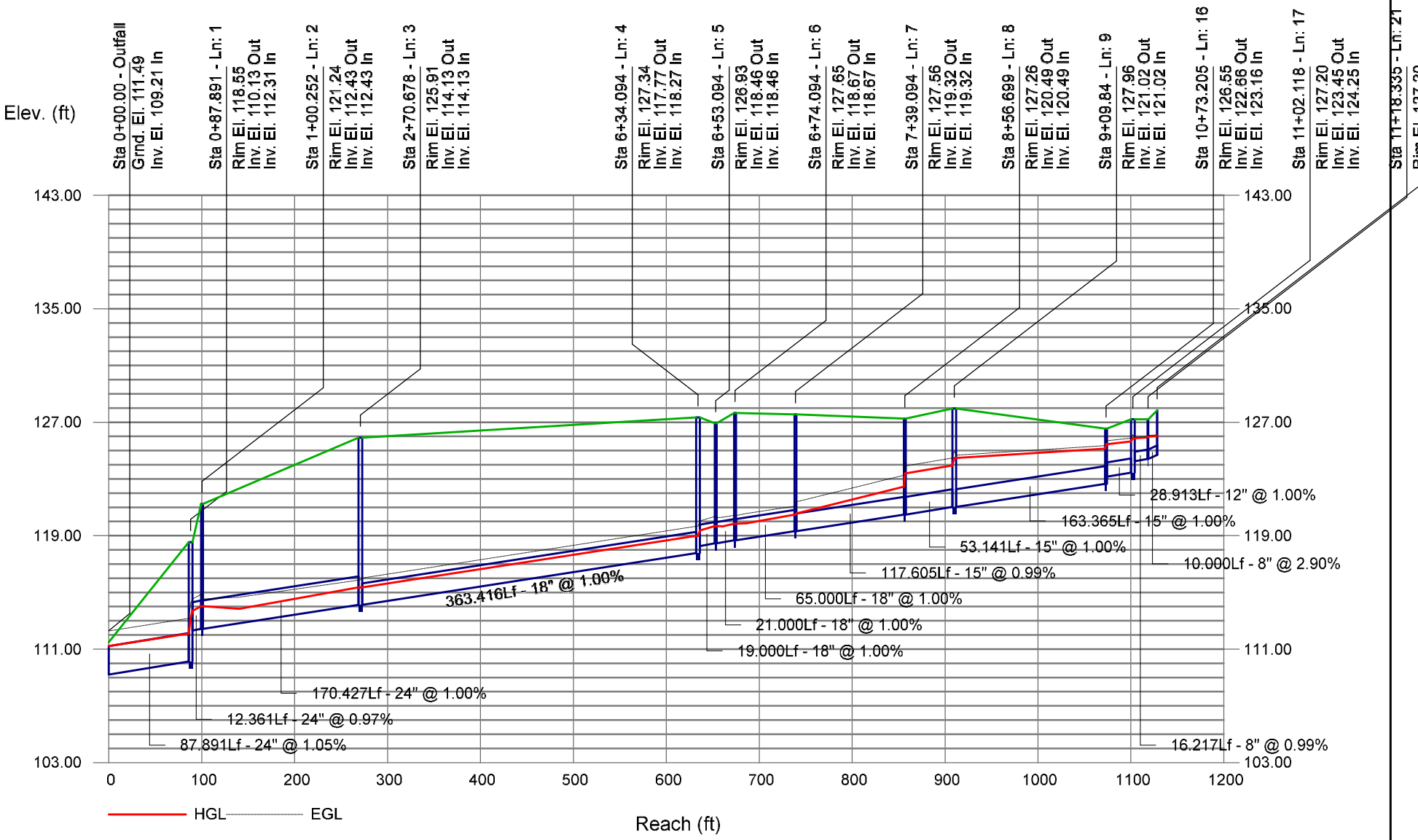
# Storm Sewer Profile

Proj. file: Network B.stm



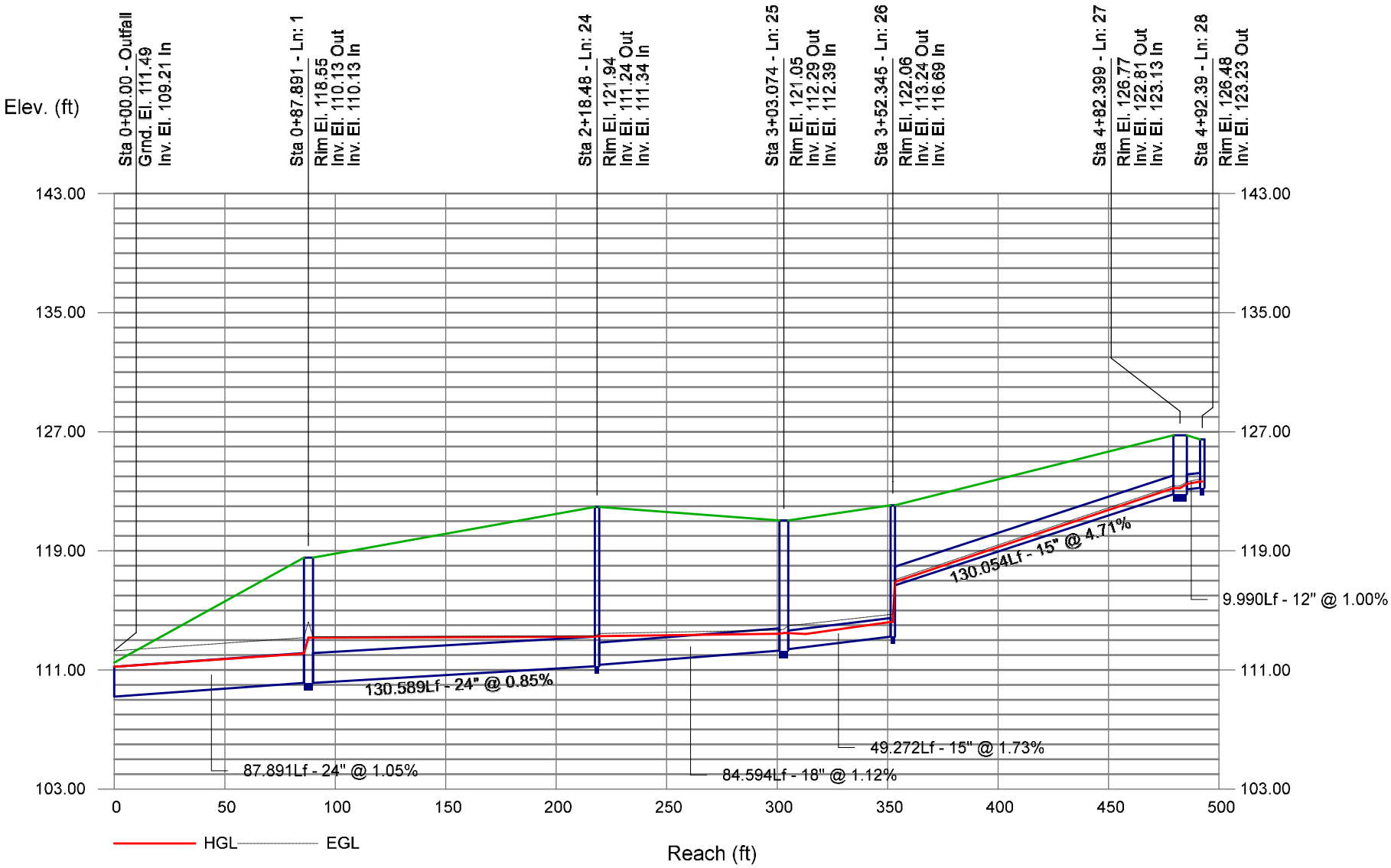
# Storm Sewer Profile

Proj. file: Network B.stm



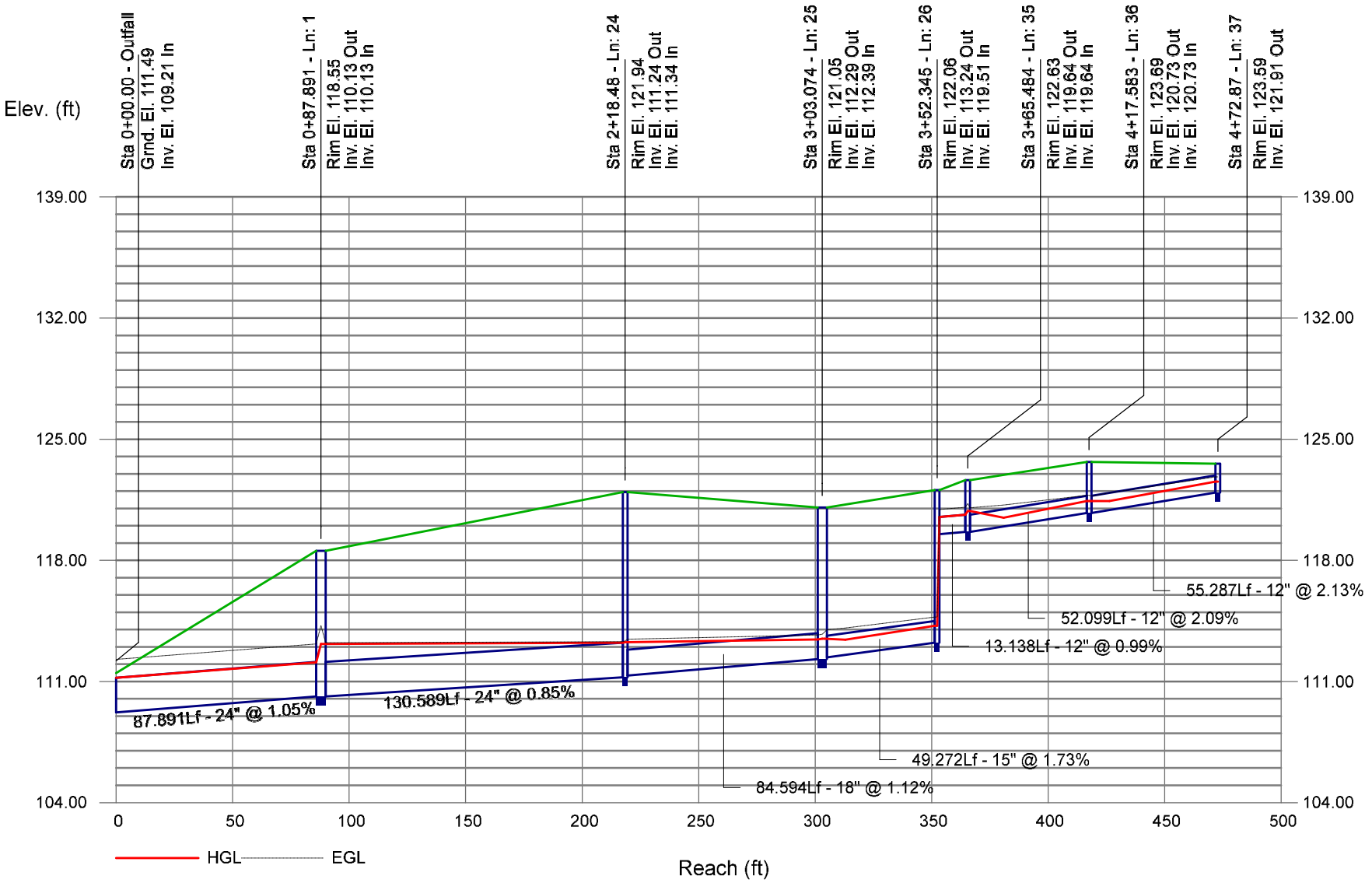
# Storm Sewer Profile

Proj. file: Network B.stm



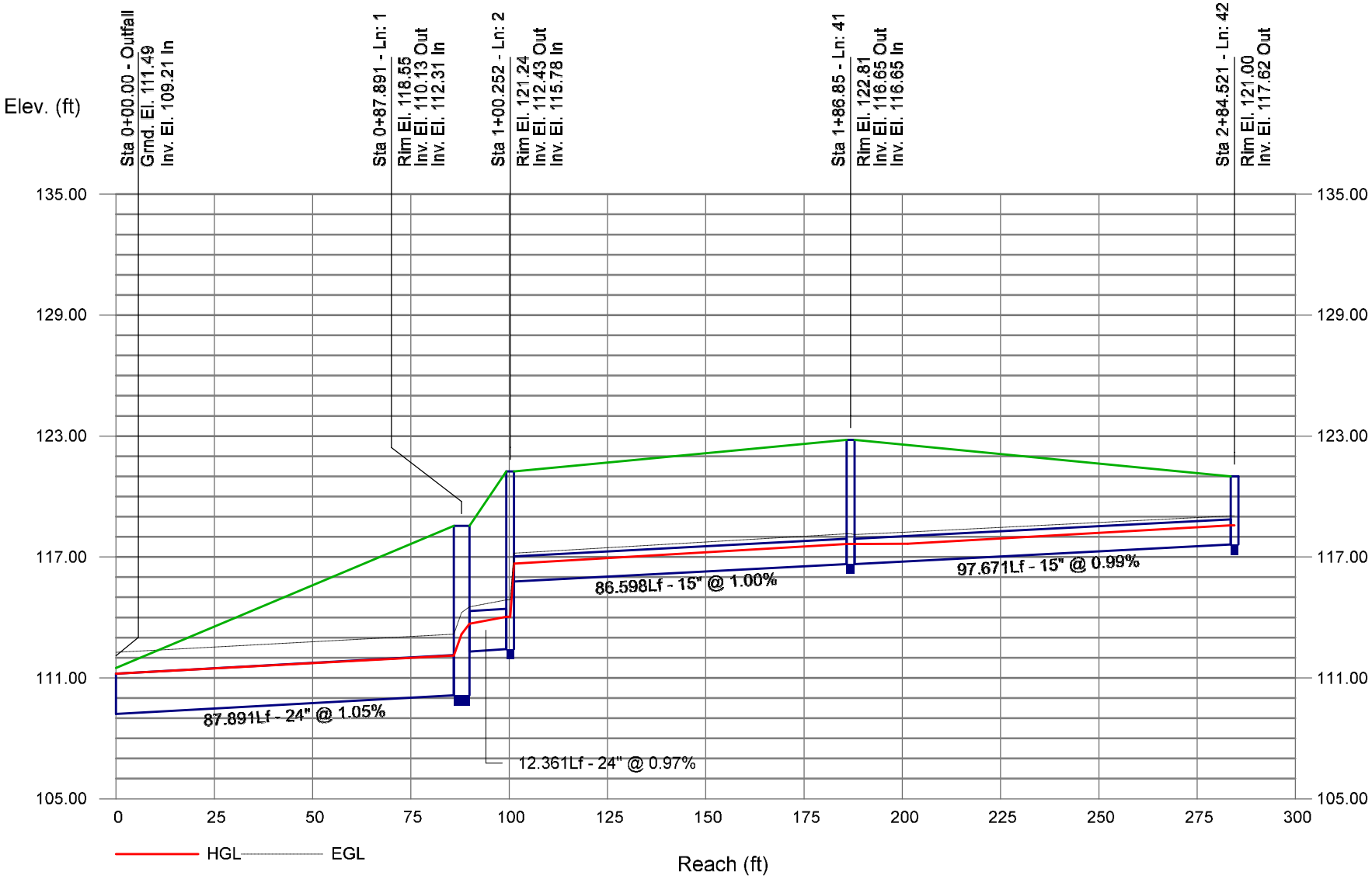
# Storm Sewer Profile

Proj. file: Network B.stm



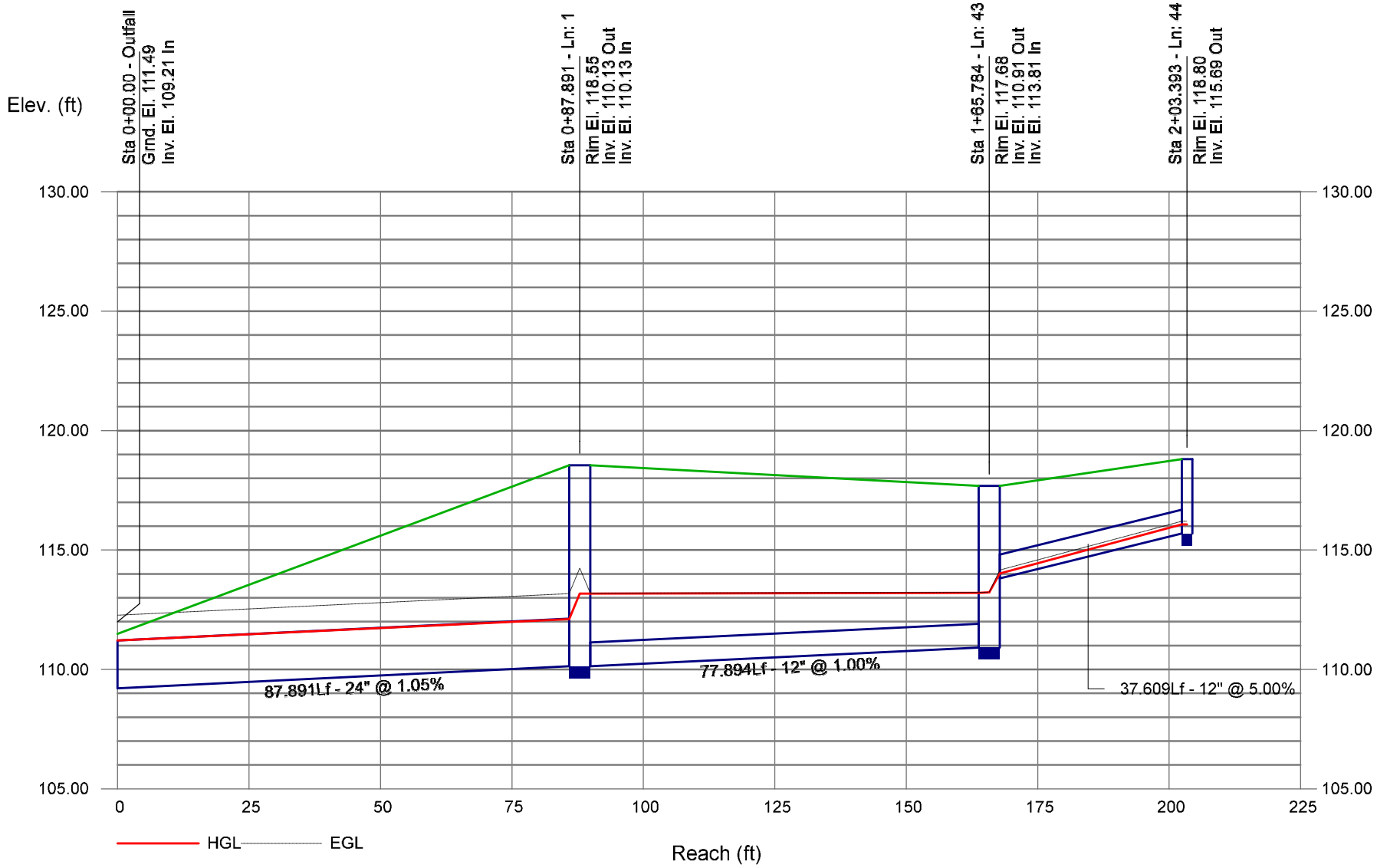
# Storm Sewer Profile

Proj. file: Network B.stm



# Storm Sewer Profile

Proj. file: Network B.stm



# APPENDIX D

## Stormwater Quality Calculations

## STORMWATER QUALITY CALCULATIONS

**Methodology:** Water Quality Volume and Flow

**Reference:** 2004 Stormwater Quality Manual

$$WQV = \frac{(1")(R)(A)}{12}$$

WQV = water quality volume (acre-feet)
R = volumetric runoff coefficient
I = percent impervious cover
A = site area (acres)

$$WQF = (q_u)(A)(Q)$$

WQF = water quality flow (cfs)
$q_u$ = unit peak discharge (cfs/mi$^2$/inch)
A = drainage area (mi$^2$)
Q = runoff depth (watershed inches)
= [WQV (acre-feet)]x[12 (inches/foot)] / Drainage area (acres)

**Site Characteristics**

| | | | | |
|---|---|---|---|---|
| *Description* | **WQU A-1** | Drainage Area to feature | | |
| *Area* | 1.33 | acres | 0.002078 mi^2 | |
| *Impervious Area* | 1.17 | acres | | 7761 |
| *Tc* | 0.08 | hr | | |
| *I* | 88.0 | % | | |
| *R = 0.05+ 0.009(I) =* | 0.842 | | | |
| **WQV =** | **0.09** | **acre-ft** | 4,064 cf | |

Q = WQV x 12/A = 0.84 inches
determine qu using NRCS Runoff Curve Number

P = 1.0 inch

$$CN = \frac{1000}{[10 + 5P + 10Q - 10(Q^2 + 1.25QP)^{1/2}]}$$

CN = 90

Determine $I_a$, table 4-1 Chapter 4 TR-55

$I_a$ = 0.222

Determine $q_u$, Exhibit 4-III Chapter 4 TR-55

$q_u$ = 640 csm/in

**WQF = 1.1** cfs

| | | | | | | |
|---|---|---|---|---|---|---|
| Evergreen Walk<br>South Windsor, CT | BY | IJAB | DATE | 3/12/2021 | PROJ NO. | 140222801 |
| | CKD | JEL | DATE | 3/12/2021 | SHEET | 1 of 1 |

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## STORMWATER QUALITY CALCULATIONS

**Methodology:** Water Quality Volume and Flow

**Reference:** 2004 Stormwater Quality Manual

$$WQV = \frac{(1")(R)(A)}{12}$$

WQV = water quality volume (acre-feet)
R = volumetric runoff coefficient
I = percent impervious cover
A = site area (acres)

$$WQF = (q_u)(A)(Q)$$

WQF = water quality flow (cfs)
$q_u$ = unit peak discharge (cfs/mi$^2$/inch)
A = drainage area (mi$^2$)
Q = runoff depth (watershed inches)
= [WQV (acre-feet)]x[12 (inches/foot)] / Drainage area (acres)

**Site Characteristics**

| | | | | |
|---|---|---|---|---|
| *Description* | **WQU B-1** | Drainage Area to feature | | |
| *Area* | 3.86 | acres | 0.006031 mi^2 | |
| *Impervious Area* | 3.21 | acres | | 7761 |
| *Tc* | 0.08 | hr | | |
| *I* | 83.2 | % | | |
| *R = 0.05+ 0.009(I) =* | 0.798 | | | |
| **WQV =** | **0.26** | **acre-ft** | 11,188 cf | |
| Q = WQV x 12/A = | 0.80 | inches | | |

determine qu using NRCS Runoff Curve Number

P = 1.0 inch

$$CN = \frac{1000}{[10 + 5P + 10Q - 10(Q^2 + 1.25QP)^{1/2}]}$$

CN = 90

Determine $I_a$, table 4-1 Chapter 4 TR-55

$I_a$ = 0.222

Determine $q_u$, Exhibit 4-III Chapter 4 TR-55

$q_u$ = 640 csm/in

**WQF = 3.1** cfs

| | | | | | | |
|---|---|---|---|---|---|---|
| Evergreen Walk<br>South Windsor, CT | BY | IJAB | DATE | 3/12/2021 | PROJ NO. | 140222801 |
| | CKD | JEL | DATE | 3/12/2021 | SHEET | 1 of 1 |

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## STORMWATER QUALITY CALCULATIONS

**Methodology:** Water Quality Volume and Flow

**Reference:** 2004 Stormwater Quality Manual

$$WQV = \frac{(1")(R)(A)}{12}$$

WQV = water quality volume (acre-feet)
R = volumetric runoff coefficient
I = percent impervious cover
A = site area (acres)

$$WQF = (q_u)(A)(Q)$$

WQF = water quality flow (cfs)
$q_u$ = unit peak discharge (cfs/mi$^2$/inch)
A = drainage area (mi$^2$)
Q = runoff depth (watershed inches)
= [WQV (acre-feet)]x[12 (inches/foot)] / Drainage area (acres)

**Site Characteristics**

| | | | | |
|---|---|---|---|---|
| *Description* | **WQU B-2** | Drainage Area to feature | | |
| *Area* | 0.73 | acres | 0.001141 mi^2 | |
| *Impervious Area* | 0.58 | acres | | 7761 |
| *Tc* | 0.08 | hr | | |
| *I* | 79.5 | % | | |
| *R = 0.05+ 0.009(I) =* | 0.765 | | | |
| **WQV =** | **0.05** | **acre-ft** | 2,027 cf | |

Q = WQV x 12/A = 0.77 inches
determine qu using NRCS Runoff Curve Number

P = 1.0 inch

$$CN = \frac{1000}{[10 + 5P + 10Q - 10(Q^2 + 1.25QP)^{1/2}]}$$

CN = 90

Determine $I_a$, table 4-1 Chapter 4 TR-55

$I_a$ = 0.222

Determine $q_u$, Exhibit 4-III Chapter 4 TR-55

$q_u$ = 640 csm/in

**WQF = 0.6** cfs

| | | | | | | |
|---|---|---|---|---|---|---|
| Evergreen Walk<br>South Windsor, CT | BY | IJAB | DATE | 3/12/2021 | PROJ NO. | 140222801 |
| | CKD | JEL | DATE | 3/12/2021 | SHEET | 1 of 1 |

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# APPENDIX E

## NOAA Atlas 14 Rainfall Depths and Intensities

**NOAA Atlas 14, Volume 10, Version 2**
**Location name: South Windsor, Connecticut, USA***
**Latitude: 41.8163°, Longitude: -72.5538°**
**Elevation: 148.62 ft****
* source: ESRI Maps
** source: USGS

**POINT PRECIPITATION FREQUENCY ESTIMATES**

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

## PF tabular

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

| Duration | Average recurrence interval (years) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 5 | 10 | 25 | 50 | 100 | 200 | 500 | 1000 |
| 5-min | **0.334** (0.259-0.431) | **0.406** (0.314-0.524) | **0.523** (0.403-0.677) | **0.620** (0.476-0.807) | **0.754** (0.560-1.03) | **0.857** (0.625-1.19) | **0.960** (0.681-1.39) | **1.09** (0.732-1.61) | **1.26** (0.816-1.93) | **1.39** (0.880-2.17) |
| 10-min | **0.473** (0.367-0.610) | **0.575** (0.445-0.742) | **0.741** (0.571-0.959) | **0.878** (0.674-1.14) | **1.07** (0.794-1.46) | **1.21** (0.885-1.69) | **1.36** (0.964-1.97) | **1.54** (1.04-2.28) | **1.79** (1.16-2.74) | **1.97** (1.25-3.08) |
| 15-min | **0.557** (0.431-0.718) | **0.676** (0.523-0.873) | **0.871** (0.672-1.13) | **1.03** (0.793-1.35) | **1.26** (0.934-1.71) | **1.43** (1.04-1.99) | **1.60** (1.13-2.31) | **1.82** (1.22-2.69) | **2.10** (1.36-3.22) | **2.32** (1.47-3.62) |
| 30-min | **0.748** (0.580-0.964) | **0.910** (0.705-1.18) | **1.18** (0.907-1.52) | **1.40** (1.07-1.82) | **1.70** (1.26-2.31) | **1.93** (1.41-2.69) | **2.16** (1.53-3.13) | **2.46** (1.65-3.63) | **2.84** (1.84-4.36) | **3.14** (1.98-4.90) |
| 60-min | **0.939** (0.728-1.21) | **1.14** (0.886-1.48) | **1.48** (1.14-1.92) | **1.76** (1.35-2.29) | **2.14** (1.59-2.91) | **2.43** (1.77-3.39) | **2.73** (1.93-3.95) | **3.10** (2.08-4.58) | **3.59** (2.32-5.49) | **3.95** (2.50-6.18) |
| 2-hr | **1.21** (0.946-1.56) | **1.47** (1.14-1.89) | **1.89** (1.47-2.43) | **2.24** (1.72-2.90) | **2.71** (2.03-3.69) | **3.08** (2.27-4.29) | **3.45** (2.47-5.00) | **3.96** (2.67-5.83) | **4.64** (3.01-7.07) | **5.15** (3.27-8.00) |
| 3-hr | **1.40** (1.09-1.79) | **1.69** (1.32-2.17) | **2.17** (1.69-2.79) | **2.57** (1.99-3.32) | **3.11** (2.34-4.22) | **3.54** (2.61-4.91) | **3.96** (2.85-5.73) | **4.57** (3.09-6.70) | **5.38** (3.50-8.17) | **5.99** (3.81-9.28) |
| 6-hr | **1.75** (1.38-2.23) | **2.13** (1.67-2.71) | **2.74** (2.14-3.50) | **3.24** (2.52-4.17) | **3.94** (2.98-5.32) | **4.48** (3.33-6.20) | **5.01** (3.64-7.25) | **5.83** (3.95-8.49) | **6.90** (4.50-10.4) | **7.72** (4.92-11.9) |
| 12-hr | **2.14** (1.69-2.71) | **2.62** (2.07-3.32) | **3.41** (2.68-4.33) | **4.06** (3.17-5.18) | **4.95** (3.76-6.65) | **5.64** (4.21-7.76) | **6.33** (4.62-9.10) | **7.38** (5.02-10.7) | **8.77** (5.74-13.2) | **9.83** (6.29-15.0) |
| 24-hr | **2.51** (1.99-3.15) | **3.11** (2.47-3.91) | **4.09** (3.24-5.17) | **4.91** (3.86-6.24) | **6.03** (4.61-8.08) | **6.90** (5.19-9.47) | **7.77** (5.71-11.2) | **9.15** (6.24-13.2) | **11.0** (7.20-16.3) | **12.4** (7.93-18.8) |
| 2-day | **2.83** (2.26-3.54) | **3.56** (2.84-4.45) | **4.75** (3.78-5.97) | **5.74** (4.54-7.25) | **7.11** (5.47-9.49) | **8.16** (6.18-11.2) | **9.21** (6.84-13.3) | **11.0** (7.53-15.8) | **13.4** (8.81-19.8) | **15.2** (9.78-22.9) |
| 3-day | **3.08** (2.47-3.84) | **3.88** (3.10-4.84) | **5.19** (4.14-6.50) | **6.28** (4.97-7.90) | **7.77** (6.00-10.4) | **8.93** (6.78-12.2) | **10.1** (7.52-14.5) | **12.1** (8.29-17.3) | **14.8** (9.72-21.8) | **16.8** (10.8-25.2) |
| 4-day | **3.30** (2.65-4.11) | **4.15** (3.33-5.17) | **5.55** (4.43-6.93) | **6.70** (5.33-8.42) | **8.30** (6.42-11.0) | **9.52** (7.25-13.0) | **10.8** (8.03-15.4) | **12.9** (8.85-18.3) | **15.7** (10.4-23.1) | **17.9** (11.5-26.7) |
| 7-day | **3.91** (3.15-4.84) | **4.87** (3.92-6.03) | **6.43** (5.16-8.00) | **7.73** (6.16-9.66) | **9.51** (7.39-12.6) | **10.9** (8.31-14.8) | **12.3** (9.17-17.4) | **14.6** (10.1-20.7) | **17.7** (11.7-25.9) | **20.0** (13.0-29.8) |
| 10-day | **4.53** (3.66-5.59) | **5.54** (4.47-6.85) | **7.19** (5.79-8.92) | **8.56** (6.85-10.7) | **10.5** (8.13-13.7) | **11.9** (9.09-16.0) | **13.4** (9.97-18.8) | **15.7** (10.9-22.2) | **18.9** (12.5-27.5) | **21.2** (13.8-31.5) |
| 20-day | **6.51** (5.30-7.99) | **7.59** (6.16-9.32) | **9.34** (7.56-11.5) | **10.8** (8.68-13.4) | **12.8** (9.97-16.6) | **14.3** (10.9-19.0) | **15.9** (11.8-21.9) | **18.1** (12.5-25.2) | **20.9** (14.0-30.2) | **23.1** (15.0-34.0) |
| 30-day | **8.21** (6.70-10.1) | **9.31** (7.59-11.4) | **11.1** (9.02-13.7) | **12.6** (10.2-15.6) | **14.7** (11.4-18.8) | **16.2** (12.4-21.3) | **17.8** (13.1-24.2) | **19.8** (13.8-27.5) | **22.3** (14.9-32.1) | **24.3** (15.8-35.6) |
| 45-day | **10.4** (8.47-12.6) | **11.5** (9.39-14.0) | **13.3** (10.9-16.3) | **14.9** (12.0-18.3) | **17.0** (13.3-21.6) | **18.6** (14.2-24.2) | **20.3** (14.8-27.1) | **21.9** (15.3-30.3) | **24.1** (16.2-34.5) | **25.8** (16.8-37.7) |
| 60-day | **12.2** (9.97-14.8) | **13.3** (10.9-16.2) | **15.2** (12.4-18.6) | **16.8** (13.6-20.7) | **19.0** (14.8-24.1) | **20.7** (15.7-26.7) | **22.4** (16.4-29.6) | **23.8** (16.7-32.8) | **25.8** (17.3-36.7) | **27.2** (17.8-39.7) |

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

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

Please refer to NOAA Atlas 14 document for more information.

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## PF graphical

# APPENDIX F

## Operation and Maintenance Plan

**Operation and Maintenance Manual**
**801 Evergreen Way**
**South Windsor, Connecticut**

Regular inspection and maintenance of the stormwater management system and uphill areas is necessary to ensure proper operation. These costs will be the responsibility of the developer. Inspections of the stormwater management system should be conducted monthly based on the following table:

## Site Areas:

General inspections shall be conducted monthly and after a storm event resulting in more than 2.5" of rain over a 24-hour period (1 year storm).

**Inspection and Maintenance**

| ***Check for:*** | ***Corrective Measure:*** |
|---|---|
| Erosion | Install erosion control measures and provide stabilization measures. |
| Spillage | Contain spill as close to source as possible with a dike of absorbent materials installed to protect drainage inlets, stormwater areas, or downstream wetlands and streams. All hazardous waste material, including absorbent materials must be disposed of by a licensed hazardous waste transporter and disposed of in an environmentally acceptable manner |
| Sediment Accumulation | Stabilize any disturbed areas uphill of where the sedimentation is occurring. Use temporary erosion control measures (i.e. silt fence, straw bales) to filter stormwater runoff. |
| Trash | Pick up and dispose of trash and litter in an environmentally acceptable manner. |

**Routine Maintenance**

| ***Maintenance Measure:*** | ***Frequency:*** |
|---|---|
| Surface Sweeping | Parking area and truck court paved areas shall be swept annually between April 1st and July 1st. |

## Catch Basins and Pipe:

All catch basins shall be inspected annually between May 1st and September 15th.

**Inspection and Maintenance**

| ***Check for:*** | ***Corrective Measure:*** |
|---|---|
| Trash, Sediment, Snow, Ice and Debris at Grate | Remove trash, sediment, snow/ice and debris and dispose of in an environmentally acceptable manner. |
| Sediment & Trash Accumulation in Sump | Remove sediment from sumps if depth of deposits is greater than one-half the depth from the bottom of the catch basin to the invert of the lowest pipe in the basin. |
| Pipe blockages | Flush pipes to remove blockages. TV inspect as required. |

At a minimum, the following maintenance measures shall be provided at the frequency listed in the following table:

**Routine Maintenance**

| ***Maintenance Measure:*** | ***Frequency:*** |
|---|---|
| Sediment Removal | Minimum once per year, between May 1st and September 15th: Remove sediment and trash from catch basin sumps and grates and pipe inverts. Dispose of sediment and trash in an environmentally acceptable manner. Catch basins shall be cleaned when accumulated material exceeds 1 foot. |

## Rain Gardens

Rain Gardens shall be inspected monthly. Inspect after every major storm during first 3 months of operation and monthly thereafter. Rain gardens shall be inspected for invasive vegetation every 6 months.

**Inspection and Maintenance**

| ***Check for:*** | ***Corrective Measure:*** |
|---|---|
| Trash and Debris | Remove trash and debris and dispose of in an environmentally acceptable manner. |
| Invasive and dead vegetation | Remove vegetation from rain garden. Revegetate as needed. |

At a minimum, the following maintenance measures shall be provided at the frequency listed in the following table:

**Routine Maintenance**

| ***Maintenance Measure:*** | ***Frequency:*** |
|---|---|
| Mowing | Twice a year: mow the buffer area. Remove trash and debris, grass clippings and accumulated organic matter. |
| Mulch, fertilize, prune | Annually |

## Water Quality Units

Water quality units shall be inspected and cleaned in strict accordance with the manufacturer's recommendations and requirements. Clean the units using the method specified by the manufacturer.